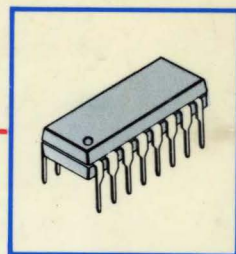


SAMSUNG

Data Book

Semiconductor **PRODUCT GUIDE**

1990



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Circuit diagrams utilizing SAMSUNG products are included as a means of illustrating typical semiconductor applications; consequently, complete information sufficient for construction purposes is not necessarily given. The information has been carefully checked and is believed to be entirely reliable. However, no responsibility is assumed for inaccuracies. Furthermore, such information does not convey to the purchaser of the semiconductor devices described herein any license under the patent rights of SAMSUNG or others. SAMSUNG reserve the right to change device specifications.

PRODUCT GUIDE

Transistors

Power MOSFETs

Linear ICs

Digital ICs

High Speed CMOS Logic ICs

Microprocessor Peripheral ICs

Application Specific Standard Products

Semicustom ICs

One Chip Microcomputer

Voice Synthesizer ICs

MOS Memory ICs

SAMSUNG DATA BOOK LIST

- I. Semiconductor Product Guide
- II. Transistor Data Book
 - Vol. 1: Small Signal TR
 - Vol. 2: Bipolar Power TR
 - Vol. 3: TR Pellet
- III. Linear IC Data Book
 - Vol. 1: Audio/CDP/Toy
 - Vol. 2: Video
 - Vol. 3: Telecom
 - Vol. 4: Industrial
 - Vol. 5: Data Converter IC
- IV. CMOS Consumer IC Data Book
- V. High Speed CMOS Logic Data Book
- VI. MOS Memory Data Book
- VII. SFET Data Book
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1. SMALL SIGNAL TRANSISTORS

1.1 General Purpose Transistors

1.1.1 SOT-23 Type Transistors

Device and Polarity (Marking)		V _{CEO} (V)	I _c (A)	Condition			h _{FE}		Condition		V _{CE} (sat), V _{BE} (sat) (V)		Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _c (mA)	I _b (mA)	MIN	MAX	I _c (mA)	I _b (mA)	MAX	MAX	V _{CE} (V)	I _c (mA)	MIN	TYP
MMBTA06(1G)	MMBTA56(2G)	80	0.5	1	100	50		100	10	0.25		2	10	100		
MMBTA05(1H)	MMBTA55(2H)	60	0.5	1	100	50		100	10	0.25		2	10	100		
KSC1623(C1X)	MMBT2907A(2F)	60	0.6	10	150	100	300	500	50	1.6	2.6	20	50	200		
	KSA812(D1X)	50	0.1	6	1	90	600	100	10	0.3	1	6	10		250	
	BCW69(H1)	45	0.1	5	2	120	260	10	0.5	0.3						
	BCW70(H2)	45	0.1	5	2	215	500	10	0.5	0.3						
BCW71(K1)		45	0.1	5	2	110	220	50	2.5			5	10		300	
BCW72(K2)		45	0.1	5	2	200	450	50	2.5			5	10		300	
BCX70G(AG)		45	0.1	5	2	120	220	50	1.25	0.55	1.05	5	10	125		
BCX70H(AH)		45	0.1	5	2	180	310	50	1.25	0.55	1.05	5	10	125		
BCX70J(AJ)		45	0.1	5	2	250	460	50	1.25	0.55	1.05	5	10	125		
BCX70K(AK)	BCX71G(BG) BCX71H(BH) BCX71J(BJ) BCX71K(BK)	45	0.1	5	2	380	630	50	1.25	0.55	1.05	5	10	125		
		45	0.1	5	2	120	220	50	1.25	0.55	1.05					
		45	0.1	5	2	180	310	50	1.25	0.55	1.05					
		45	0.1	5	2	250	460	50	1.25	0.55	1.05					
MMBC1623L3(L3)	MMBA811C5(C5)	45	0.05	3	0.5	135	270	20	2	0.3		6	1	75		
	MMBA811C6(C6)	45	0.05	3	0.5	200	400	20	2	0.3		6	1	75		
	MMBA811C7(C7)	45	0.05	3	0.5	300	600	20	2	0.3		6	1	75		
	MMBA811C8(C8)	45	0.05	3	0.5	450	900	20	2	0.3		6	1	75		
	MMBA812M3(M3)	40	0.1	6	1	60	120	30	3	0.5						
MMBC1623L4(L4)	MMBA812M4(M4)	40	0.1	6	1	90	180	30	3	0.5						
MMBC1623L5(L5)	MMBA812M5(M5)	40	0.1	6	1	135	270	30	3	0.5						
MMBC1623L6(L6)	MMBA812M6(M6)	40	0.1	6	1	200	400	30	3	0.5						
MMBC1623L7(L7)	MMBA812M7(M7)	40	0.1	6	1	300	600	30	3	0.5						
MMBT222A(1P)		40	0.6	10	150	100	300	500	50	1.6	2.6	20	20	300		
MMBT3903(1Y)	MMBT2907(2B)	40	0.6	10	150	100	300	500	50	1.6	2.6	20	50	200		
MMBT3904(1A)	MMBT3906(2A)	40	0.2	1	10	50	150	50	5	0.3	0.95	20	10	250		
MMBT4401(2X)	MMBT4403(2T)	40	0.2	1	10	100	300	50	5	0.3	0.95	20	10	300		
MMBT4001(2X)	MMBT4003(2T)	40	0.6	1	150	100	300	500	50	0.75	1.2	10	10	250		
MMBTA20(1C)	MMBTA70(2C)	40	0.1	10	5	40	400	10	1	0.25		10	5	125		
MMBC1622D6(D6)	BCW61A(BA) BCW61B(BB)	35	0.1	3	0.5	200	400	100	10	0.3		6	1	100		
MMBC1622D7(D7)		35	0.1	3	0.5	300	600	100	10	0.3		6	1	100		
MMBC1622D8(D8)		35	0.1	3	0.5	450	900	100	10	0.3		6	1	100		
BCW60A(AA)		32	0.1	5	2	120	220	50	1.25	0.55	1.05	5	10	125		
BCW60B(AB)	32	0.1	5	2	180	310	50	1.25	0.55	1.05	5	10	125			
BCW60C(AC)	BCW61C(BC)	32	0.1	5	2	250	460	50	1.25	0.55	1.05	5	10	125		
BCW60D(AD)	BCW61D(BD)	32	0.1	5	2	380	630	50	1.25	0.55	1.05	5	10	125		
MMBT2222(1B)		30	0.6	10	150	100	300	500	50	1.6	2.6	20	20	200		
KSC2859(E1X)	KSA1182(F1X)	30	0.5	1	100	70	240	100	10	0.25		6	20		200	
MMBT4123(5B)	MMBT4125(ZD)	30	0.2	1	2	50	150	50	5	0.3	0.95	20	10	250		
KSC3265(K1X)	KSA1298(J1X)	25	0.8	1	100	100	320	500	20	0.4		5	10		120	
MMBC1009F1(F1)		25	0.05	3	0.5	30	60	10	1	0.3		6	1	150		

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SOT-23 Type Transistors (Continued)

Device and Polarity (Marking)		V _{CEO} (V)	I _c (A)	Condition		h _{FE}		Condition		V _{CE (sat)} , V _{BE (sat)} (V)		Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _B (mA)	MAX	MAX	V _{CE} (V)	I _c (mA)	MIN	TYP
MMBC1009F2(F2)		25	0.05	3	0.5	40	80	10	1	0.3		6	1	150	
MMBC1009F3(F3)		25	0.05	3	0.5	60	120	10	1	0.3		6	1	150	
MMBC1009F4(F4)		25	0.05	3	0.5	90	180	10	1	0.3		6	1	150	
MMBC1009F5(F5)		25	0.05	3	0.5	135	270	10	1	0.3		6	1	150	
MMBT4124(ZC)	MMBT4126(C3)	25	0.2	1	2	120	360	50	5	0.3	0.95	20	10	300	
	BCW29(C1)	20	0.1	5	2	120	260	10	0.5	0.3					
	BCW30(C2)	20	0.1	5	2	215	500	10	0.5	0.3					
BCW31(D1)		20	0.1	5	2	110	220	10	0.5	0.3					
BCW32(D2)		20	0.1	5	2	200	450	10	0.5	0.3					
BCW33(D3)		20	0.1	5	2	420	800	10	0.5	0.3					

1.1.2 TO-92S Type Transistors

Device and Polarity		V _{CEO} (V)	I _c (A)	Condition		h _{FE}		Condition		V _{CE (sat)} , V _{BE (sat)} (V)			Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _B (mA)	TYP	MAX	TYP	MAX	V _{CE} (V)	I _c (mA)	MIN
	KSA1150	20	0.5	1	100	40	400	500	50	0.3	0.4	1	1.3	6	10	
	KSA1378	25	0.3	1	50	70	400	300	30	0.35	0.6					
	KSB810	25	0.7	1	100	70	400	700	70	0.25	0.4	0.95	1.2	6	10	50
	KSB811	25	1	0	100	70	400	1000	100	0.5		1.2	6	10		110
KSC2710		20	0.5	1	100	40	400	500	50	0.18	0.4					
KSC3488		25	0.3	1	50	70	400	300	30	0.14	0.4					
KSD1020		25	0.7	1	100	70	400	700	70	0.2	0.4	0.95	1.2	6	10	50
KSD1021		30	1	1	100	70	400	1000	100	0.5		1.2	6	10		130

1.1.3 TO-92 Type Transistors

Device and Polarity		V _{CEO} (V)	I _c (A)	Condition		h _{FE}		Condition		V _{CE (sat)} , V _{BE (sat)} (V)			Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _B (mA)	MAX	MAX	TYP	MAX	V _{CE} (V)	I _c (mA)	MIN
MPSA06	MPSA56	80	0.5	1	100	50		100	10	0.25			2	10	100	
MPS8099	MPS8599	80	0.5	5	1	100	300	100	10	0.3			5	10	150	
KSC2003	KSA954	80	0.3	1	50	90	400	300	30	0.6	1.2		6	10	50	
KSD1616A	KSB1116A	60	1	2	100	135	400	1000	50	0.3	1.2		2	100	70	
KSC1008	KSA708	60	0.7	2	50	40	240	500	50	0.7	1.1		10	50	50	
	MPS2907A	60	0.6	10	150	100	300	500	50	1.6	2.6		20	50	200	
MPS8098	MPS8598	60	0.5	5	1	100	300	100	10	0.3			5	10	150	
MPSA05	MPSA55	60	0.5	1	100	50		100	10	0.25			2	10	100	
KSC2002	KSA953	60	0.3	1	50	90	400	300	30	0.6	1.2		6	10	50	
KSC853	KSA545	60	0.2	1	50	40	400	150	15	0.5	1.2					
KSD1616	KSB1116	50	1	2	100	135	600	1000	50	0.3	1.2		2	100	70	
KSC1072	KSA707	45	0.7	2	50	40	240	500	50	0.7	1.1					
KSC815	KSA539	45	0.2	1	0.05	40	240	150	15	0.5	1.2					
SS9014	SS9015	45	0.1	5	1	60	1000	100	5	0.3	1		5	10	150	

TO-92 Type Transistors (continued)

Device and Polarity		V _{CEO} (V)	I _c (A)	Condition		h _{FE}		Condition		V _{CE(sat)} , V _{BE(sat)} (V)		Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _B (mA)	MAX	MAX	V _{CE} (V)	I _c (mA)	MIN	TYP
MPS6602		40	1	1	500	50									
2N4401	2N4403	40	0.6	1	150	100	300	500	50	0.75	1.2	10	20	200	
MPS2222A	MPS2907	40	0.6	10	150	100	300	500	50	1.6	2.6	20	20	300	
2N4400	2N4402	40	0.6	1	150	50	150	500	50	0.75	1.2	10	20	200	
2N3903	2N3905	40	0.2	1	10	50	150	50	5	0.3	0.95	20	10	250	
2N3904	2N3906	40	0.2	1	10	100	300	50	5	0.3	0.95	20	10	300	
MPS6513	MPS6517	40	0.1	10	2	90	180	50	5	0.5					
MPSA10		40	0.1	10	5	40	400					10	5	125	
MPSA20	MPSA70	40	0.1	10	5	40	400					10	5	125	
KSC1330		40	0.1	6	1	70	400	30	3	0.5		6	10		300
KSD471A		30	1	1	100	70	400	1000	100	0.5	1.2	6	10		130
MPS3705	MPS3703	30	0.6	5	50	30	150	50	5	0.25		5	50	100	
MPS3704		30	0.6	2	50	100	300	100	5			2	50	100	
MPS2222		30	0.6	10	150	100	300	500	50	1.6	2.6	20	20	250	
KSC921		30	0.1	10	2	40	240	10	1	0.6		10	1	100	250
KSC839		30	0.1	12	2	40	400	10	1	0.4		10	1	80	200
SS9011		30	0.03	5	1	28	198	10	1	0.3					
SS8050	SS8550	25	1.5		100	85	300	800	80	0.5	1.2	10	50	100	190
	KSB564A	25	1		100	70	400	1000	100	0.5	1.2	10	10		110
MPS6601	MPS6651	25	1		500	50		1000	100	0.6		10	50	100	
	MPS3702	25	0.6		50	60	300	50	50	0.25			50	100	
MPS6560	MPS6562	25	0.5	500	50	200	500	50	0.5		5	10	60		
KSD227	KSA642	25	0.3		50	70	400	300	30	0.6					
MPS5172		25	0.1		10	100	500	10	1	0.25			2		120
KSC184	KSA542	25	0.05		1	40	400	20	2	0.3		6	1		100
MPS3706		20	0.6		50	30	600	100	5	1		2	50	100	
KSD261	KSA643	20	0.5		100	40	400	500	50	0.4	1.3	1			
SS9013	SS9012	20	0.5		50	64	202	500	50	0.6	1.2				
KSD5019	10	2	1	500	140	600	2000	50	0.5		1	500		150	
*KSD5041		20	5	2	500	180	600								150

*: Under Development

1.1.4 TO-92L Type Transistors

Device and Polarity		V _{CEO} (V)	I _c (A)	Condition		h _{FE}		Condition		V _{CE(sat)} , V _{BE(sat)} (V)		Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _B (mA)	MAX	MAX	V _{CE} (V)	I _c (mA)	MIN	TYP
KSC2328A	KSA928A	30	2	2	500	100	320	1500	30	2		2	500		120
KSC2331	KSA931	60	0.7	2	50	40	240	500	50	0.7	1.2	10	50		100
KSC2500		10	2	1	500	140	600	2000	50	0.5		1	500		150

1.2 Low Noise Transistors

1.2.1 SOT-23 Type Transistors

Device and Polarity (Marketing)		NF (dB)		V _{CEO} (V)	I _c (A)	Condition		h _{FE}		Condition		V _{CE(sat)} (V)
NPN	PNP	MAX	Condition Frequency			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _B (mA)	
MMBT6428(1K)	MMBT5086(2P)	4	Audio	50	0.2	5	0.1	250	650	100	5	0.6
MMBT6429(1L)		4	Audio	45	-0.2	5	0.1	500	1250	100	5	0.6
MMBT2484(1U)		3	Audio	60	0.05	5	1	250		1	0.1	0.35
MMBT5088(1Q)		3	Audio	50	0.05	5	0.1	150	500	10	1	0.3
MMBT5087(2Q)		3	Audio	30	0.05	5	0.1	300	900	10	1	0.5
MMBT5089(1R)		2	Audio	50	0.05	5	0.1	250	800	10	1	0.3
		2	Audio	25	0.05	5	0.1	400	1200	10	1	0.5

1.2.2 TO-92S Type Transistors

Device and Polarity(Marking)		NF (dB)	V _{CEO}	I _c	Condition		h _{FE}		V _{CE(sat)}		Condition		f _r (MHz)			
NPN	PNP				TYP	Condition Frequency	V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _B (mA)	MAX	V _{CE} (V)	I _c (mA)	MIN
KSC2785	KSA1175	6	Audio	50	0.15	6	1	40	700	100	10	0.3	6	10		180
		4	Audio	50	0.15	6	1	40	700	100	10	0.3	6	10		300

1.2.3 TO-92 Type Transistors

Device and Polarity		NF (dB)		V _{CEO} (V)	I _c (A)	Condition		h _{FE}		Condition		V _{CE(sat)}
NPN	PNP	TYP	Condition Frequency			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _B (mA)	
2N6428	2N4125	6	Audio	50	0.2	5	0.1	250	650	100	5	0.6
2N4123		6	Audio	30	0.2	1	2	50	150	50	5	0.3
2N4124		5	Audio	30	0.2	1	2	50	150	50	5	0.4
KSC945		5	Audio	25	0.2	1	2	120	360	50	5	0.3
2N5088	KSA733	4	Audio	50	0.15	6	1	40	700	100	10	0.3
	2N4126	4	Audio	25	0.2	1	2	120	360	50	5	0.4
	MPS4249	3	Audio	60		5	0.1	100	300	10	0.5	0.25
	2N5086	3	Audio	50	0.05	5	0.1	150	500	10	1	0.3
	MPS6522	3	Audio	30	0.05	5	0.1	300	900	10	1	0.5
MPS6520	MPS6523	3	Audio	25	0.1	10	2	200	400	50	5	0.5
		3	Audio	25	0.1	10	2	300	600	50	5	0.5
		3	Audio	25	0.1	10	2	300	600	50	5	0.5
		2	Audio	60		5	0.1	250	700	10	0.5	0.25
		2	Audio	50	0.05	5	0.1	250	800	10	1	0.3
2N5089	MPS4250A	2	Audio	40		5	0.1	250	700	10	0.5	0.25
		2	Audio	25	0.05	5	0.1	400	1200	10	1	0.5
		*4	Audio	50	0.2	5	0.1	250	650	100	5	0.6
		*2	Audio	50	0.05	5	0.1	200	600	10	1	0.7
		*2	Audio	50	0.05	5	0.1	100	300	10	1	0.7
MPS8097	KSA640	*2	Audio	40	0.2	5	0.1	250	700			
		**40	Audio	45	0.05	3	0.5	120	1000	20	2	0.3
		**30	Audio	25	0.05	3	0.5	120	1000	20	2	0.2

Audio = 10Hz to 15.7KHz

* = MAX, ** = Noise Level

1-3. RF/VHF/UHF Amplifier Transistors

1-3-1. SOT-23 Type Transistors

Device	Condition		f _T (MHz)		C _{ob} (pF)	V _{CEO} (V)	G _{pe} (dB)	Condition		h _{FE}		NF(dB)		I _{AGC} (mA)	Condition Gain Reduction (dB)
	V _{CE} (V)	I _c (mA)	MIN	TYP				V _{CE} (V)	I _c (mA)	MIN	MAX	MAX	Condition f (MHz)		
KSC2734(H8Z)	10	10	1400	3500	1.5	12		10	5	20	200				
KSC3120(H9Z)	10	2	1500	2400	#0.9	15	\$12	10	5	40	200	*8	800		
KSC2759(H6X)	10	5	1250	2000	1.3	14	&10	10	5	40	180				
MMBR5179	6	5	900	2000	@1	12	15	1	3	25	250	4.5	200		
KSC2757(H3X)	10	5	800	1100	1.5	15		10	5	60	240				
KSC2758(H4Z)	10	3	750	1000	0.8	25	14	10	3	60	240	4.5	900	11	30
MMBTH10(3E)	10	4	650		@0.7	25		10	4	60					
KSC2756(H2X)	10	5	500	850	#0.5	20	\$15	10	5	60	240	*6.5	200		
MMBTH24(3A)	10	8	400	620	@0.36	30	\$19	10	8	30					
KSC2755(H1X)	10	3	400	600	#0.5	30	20	10	3	60	240	3	200	12	30
KSC2223(H5X)	6	1	400	600	*1	20		6	1	40	180	*3	100		
KSC3125(A1Z)	10	10	250	600	1.6	25		10	10	20	200				
KSC2715(B1X)	10	1	100		3.2	30	27	12	2	40	240				

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1.3.2 TO-92S Type Transistors

Device	Condition		f _T (MHz)		C _{OB} (pF)	V _{CEO} (V)	G _{PE} (dB)	Condition		h _{FE}		N _F (dB)	Condition
	V _{CE} (V)	I _c (mA)	MIN	TYP				V _{CE} (V)	I _c (mA)	MIN	TYP		
KSC2669	10	1	100	250	3.2	30		12	2	40	240		
KSC2786	6	1	400	600	*1.2	20	18	6	1	40	240	5	100
KSC2787	6	1	150	300	2.5	30		6	1	40	240		

1-3-2 TO-92 Type Transistors

Device	Condition		f _T (MHz)		C _{ob} (pF)	V _{CEO} (V)	G _{pe} (dB)	Condition		h _{FE}		NF(dB)		I _{AGC} (mA)	Condition Gain Reduction (dB)
	V _{CE} (V)	I _c (mA)	MIN	TYP				V _{CE} (V)	I _c (mA)	MIN	MAX	MAX	Condition f (MHz)		
MPS5179	6	5	900	2000	@1	12	15	1	3	25	250	4.5	200		
KSC1730	10	5	800	1100	1.5	15		10	5	40	240				
MPSH17	10	5	800		@0.9	15	*24	10	5	25	250	6	200		
KSC1070***	10	3	750	1000	0.8	25	14	10	3	40	200	4	900	11	30
SS9018	5	5	700	1100	1.7	15		5	1	28	198				
MPSH11	10	4	650		@0.7	25		10	4	60					
MPSH10	10	4	650		@0.7	25		10	4	60					
KSC1395	10	5	600	1100	1.5	15		10	5	40	240				
MPSH24	10	8	400	620	@0.36	30	\$19	10	8	30					
KSC1393	10	3	400	700	#0.5	30	20	10	2	40	240	3	200	12	30
KSC1394	10	3	400	700	#0.5	30	20	10	2	40	240	3.5	200		
MPSH20	10	4	400	620	@0.65	30	\$18	10	4	25					
SS9016	5	1	400	620	1.6	20		5	1	28	198	5	100		
KSC1187	10	3	400	700	#0.6	20	20	10	2	40	240				
KSC1188	10	3	400	700	1	20	20	10	2	40	240				
KSC1674	6	1	400	600	*1.5	20	18	6	1	40	240	5	100		
KSC388	12.5	12.5	300		2	25	28	12	12.5	20	200				
KSC1675	6	1	150	300	2.5	20		6	1	40	240				
KSC838	10	1	100	250	3.2	30		12	2	40	240				

* = TYP, # = Cre, @ = Ccb, \$ = Gce, & = Gcb, *** = DISK TYPE TRANSISTOR

1-4. High Voltage Transistors

1-4-1. SOT-23 Type Transistors

Device and Polarity		V _{CEO} (V)	I _C (A)	Condition		h _{FE}		Condition		V _{CE(sat)} , V _{BE(sat)} (V)		Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _C (mA)	MIN	MAX	I _C (mA)	I _B (mA)	MAX	MAX	V _{CE} (V)	I _C (mA)	MIN	TYP
MMBTA42(1D)	MMBTA92(2D)	300	0.5	10	30	40		20	2	0.5	0.9	20	10	50	
MMBTA43(1E)	MMBTA93(2E)	200	0.5	10	30	40		20	2	0.5	0.9	20	10	50	
	MMBT5401(2L)	150	0.5	5	10	60	240	50	5	0.5	1	10	10	100	
MMBT5550(1F)		140	0.6	5	10	60	250	50	5	0.25	1.2	10	10	100	

1-4.2. TO-92S Type Transistors

Device and polarity(Marking)		V _{CEO} (V)	I _C (A)	Condition		h _{FE}		Condition		V _{CE(sat)} , V _{BE(sat)} (V)			Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _C (mA)	MIN	MAX	I _C (mA)	I _B (mA)	TYP	MAX	TYP	MAX	V _{CE} (V)	I _C (mA)	MIN
	KSA1174	120	0.05	6	1	200	800	10	1	0.09	0.3		6	1	50	100
KSC2784		120	0.05	6	1	200	1200	10	1	0.07	0.3		6	1	50	110

1-4.3. TO-92 Type Transistors

Device and Polarity		V _{CEO} (V)	I _C (A)	Condition		h _{FE}		Condition		V _{CE(sat)} , V _{BE(sat)} (V)		Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _C (mA)	MIN	MAX	I _C (mA)	I _B (mA)	MAX	MAX	V _{CE} (V)	I _C (mA)	MIN	TYP
MPSA44		400	0.3	10	10	50	200	10	1	0.5	0.75				
2N6517	2N6520	350	0.5	10	30	30	200	30	3	0.5	0.9	20	10	40	
MPSA45		350	0.3	10	10	50	200	10	1	0.5	0.75				
MPSA42	MPSA92	300	0.5	10	30	40		20	2	0.5	0.9	20	10	50	
2N6516	2N6519	300	0.5	10	30	45	270	30	3	0.5	0.9	20	10	40	
KSC1506		300	0.1	10	10	40	240	50	5	2		30	10	40	80
2N6515	2N6518	250	0.5	10	30	50	300	30	3	0.5	0.9	20	10	40	
MPSA43	MPSA93	200	0.5	10	30	40		20	2	0.5	0.9	20	10	50	
2N5551		160	0.6	5	10	80	250	50	6	0.2	1	10	10	100	
	KSA709	150	0.7	2	50	40	240	200	20	0.4	1	10	50		50
	2N5401	150	0.6	5	10	60	240	50	5	0.5	1	10	10	100	
KSC1009		140	0.7	2	50	40	240	200	20	0.2	0.86	10	50	30	50
2N5550		140	0.6	5	10	60	250	50	5	0.25	1.2	10	10	100	
	2N5400	120	0.6	5	10	40	180	50	5	0.5	1	10	10	100	
MPSL01		120	0.15	5	10	50	300	50	5	0.3	1.4	10	10	60	
KSC1845	KSA992	120	0.05	6	1	200	800	10	1	0.3		6	1	50	100
	MPSL51	100	0.6	5	50	40	250	50	5	0.3	1.2	10	10	60	

1-4.4. TO-92L Type Transistors

Device and Polarity		V _{CEO} (V)	I _C (A)	Condition		h _{FE}		Condition		V _{CE(sat)} , V _{BE(sat)} (V)		Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _C (mA)	MIN	MAX	I _C (mA)	I _B (mA)	MAX	MAX	V _{CE} (V)	I _C (mA)	MIN	TYP
KSC2340		350	0.1	10	20	30	150	10	1	0.5	10	20	50		
KSC2330		300	0.1	10	20	40	240	10	1	0.5		30	10	50	
KSC2383	KSA1013	160	1	5	200	60	320	500	50	1.5		5	200	15	50
KSC2310	KSA910	150	0.05	5	10	40	240	10	1	0.8		30	10	100	
KSC2316	KSA916	120	0.8	5	100	80	240	500	50	1		5	100	120	

1-5. Darlington Transistors

1-5-1. SOT-23 Type Transistors

Device and Polarity		V _{CE0} (V)	I _c (A)	Condition		h _{FE}		Condition		V _{CE(sat)} , V _{BE(sat)} (V)		Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _B (mA)	MAX	MAX	V _{CE} (V)	I _c (mA)	MIN	TYP
MMBT6427(1V)	MMBTA63(2U) MMBTA64(2V)	*40	0.5	5	100	20K	200K	500	0.5	1.5	2				
MMBTA13(1M)		30	0.3	5	100	10K		100	0.1	1.5		5	10	125	
MMBTA14(1N)		30	0.3	5	100	10K		100	0.1	1.5		5	10	125	
		30	0.5	5	100	10K		100	0.1	1.5	5	10	125		
		30	0.5	5	100	10K		100	0.1	1.5	5	10	125		

*: V_{CE0}

1-5-2. TO-92 Type Transistors

Device and Polarity		V _{CE0} (V)	I _c (A)	Condition		h _{FE}		Condition		V _{CE(sat)} , V _{BE(sat)} (V)		Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _B (mA)	MAX	MAX	V _{CE} (V)	I _c (mA)	MIN	TYP
MPSA27	MPSA77	60	0.5	5	100	10K		100	0.1	1.5					
		60	0.5	5	100	10K		100	0.1	1.5					
MPSA26	MPSA76	50	0.5	5	100	10K		100	0.1	1.5					
		50	0.5	5	100	10K		100	0.1	1.5					
2N6427		*40	0.5	5	100	10K	200K	500	0.5	1.5	2				
	MPSA75	40	0.5	5	100	10K		100	0.1	1.5					
MPSA25		40	0.5	5	100	10K		100	0.1	1.5					
MPSA14	MPSA64	30	0.5	5	100	10K		100	0.1	1.5		.5	10	125	
MPSA13	MPSA63	30	0.5	5	100	20K		100	0.1	1.5		5	10	125	
MPSA12	MPSA62	20	0.5	5	100	20K		10	0.01	1					

*: V_{CE0}

1-6. Digital Transistors

1-6-1. SOT-23 Type Transistors

Device and Polarity		R1	R2	V _{CE0} (V)	I _c (mA)	Condition		h _{FE}		Condition		V _{CE(sat)} (V)		Condition		f _T (MHz)
NPN	PNP	KΩ	KΩ			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _B (mA)	TYP	MAX	V _{CE} (V)	I _c (mA)	
KSR1101	KSR2101	4.7	4.7	50	100	5	10	20		10	0.5	0.1	0.3	10	5	250/200
KSR1102	KSR2102	10	10	50	100	5	4	30		10	0.5	0.1	0.3	10	5	250/200
KSR1103	KSR2103	22	22	50	100	5	5	56		10	0.5	0.1	0.3	10	5	250/200
KSR1104	KSR2104	47	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200
KSR1105	KSR2105	4.7	10	50	100	5	5	30		10	0.5	0.1	0.3	10	5	250/200
KSR1106	KSR2106	10	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200
KSR1107	KSR2107	22	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200
KSR1108	KSR2108	47	22	50	100	5	5	56		10	0.5	0.1	0.3	10	5	250/200
KSR1109	KSR2109	4.7		40	100	5	5	100	600	10	1	0.1	0.3	10	5	250/200
KSR1110	KSR2110	10		40	100	5	1	100	600	10	1	0.1	0.3	10	5	250/200
KSR1111	KSR2111	22		40	100	5	1	100	600	10	1	0.1	0.3	10	5	250/200
KSR1112	KSR2112	47		40	100	5	1	100	600	10	1	0.1	0.3	10	5	250/200
KSR1113	KSR2113	2.2	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200
KSR1114	KSR2114	4.7	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200

1-6.2. TO-92S Type Transistors

Device and Polarity		R1	R2	V _{CEO}	I _c	Condition		h _{FE}		Condition		V _{CE(sat)} (V)		Condition		f _T (MHz)
NPN	PNP	KΩ	KΩ	(V)	(mA)	V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _B (mA)	TYP	MAX	V _{CE} (V)	I _c (mA)	TYP
KSR1201	KSR2201	4.7	4.7	50	100	5	10	20		10	0.5	0.1	0.3	10	5	250/200
KSR1202	KSR2202	10	10	50	100	5	4	30		10	0.5	0.1	0.3	10	5	250/200
KSR1203	KSR2203	22	22	50	100	5	5	56		10	0.5	0.1	0.3	10	5	250/200
KSR1204	KSR2204	47	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200
KSR1205	KSR2205	4.7	10	50	100	5	5	30		10	0.5	0.1	0.3	10	5	250/200
KSR1206	KSR2206	10	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200
KSR1207	KSR2207	22	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200
KSR1208	KSR2208	47	22	50	100	5	5	56		10	0.5	0.1	0.3	10	5	250/200
KSR1209	KSR2209	4.7		40	100	5	5	100	600	10	1	0.1	0.3	10	5	250/200
KSR1210	KSR2210	10		40	100	5	1	100	600	10	1	0.1	0.3	10	5	250/200
KSR1211	KSR2211	22		40	100	5	1	100	600	10	1	0.1	0.3	10	5	250/200
KSR1212	KSR2212	47		40	100	5	1	100	600	10	1	0.1	0.3	10	5	250/200
KSR1213	KSR2213	2.2	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200
KSR1214	KSR2214	4.7	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200

1-6.3. TO-92 Type Transistors

Device and Polarity		R1	R2	V _{CEO}	I _c	Condition		h _{FE}		Condition		V _{CE(sat)} (V)		Condition		f _T (MHz)
NPN	PNP	KΩ	KΩ	(V)	(mA)	V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _B (mA)	TYP	MAX	V _{CE} (V)	I _c (mA)	TYP
KSR1001	KSR2001	4.7	4.7	50	100	5	10	20		10	0.5	0.1	0.3	10	5	250/200
KSR1002	KSR2002	10	10	50	100	5	5	30		10	0.5	0.1	0.3	10	5	250/200
KSR1003	KSR2003	22	22	50	100	5	5	56		10	0.5	0.1	0.3	10	5	250/200
KSR1004	KSR2004	47	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200
KSR1005	KSR2005	4.7	10	50	100	5	5	30		10	0.5	0.1	0.3	10	5	250/200
KSR1006	KSR2006	10	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200
KSR1007	KSR2007	22	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200
KSR1008	KSR2008	47	22	50	100	5	5	56		10	0.5	0.1	0.3	10	5	250/200
KSR1009	KSR2009	4.7		40	100	5	1	100	600	10	1	0.1	0.3	10	5	250/200
KSR1010	KSR2010	10		40	100	5	1	100	600	10	1	0.1	0.3	10	5	250/200
KSR1011	KSR2011	22		40	100	5	1	100	600	10	1	0.1	0.3	10	5	250/200
KSR1012	KSR2012	47		40	100	5	1	100	600	10	1	0.1	0.3	10	5	250/200
KSR1013	KSR2013	2.2	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200
KSR1014	KSR2014	4.7	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200

1.7 JUNCTION FETS

1.7.1 SOT-23 Type J-FET.

DEVICE	V _{GDO} (V)	I _G (mA)	P _D (mW)	I _{DSS} (mA)			g _m (mS)			Condition			V _{GS} (OFF)	
				MIN	MAX	V _{DS} (V)	MIN	TYP	V _{DS} (V)	V _{DS} (V)	I _D (μA)	MIN	MAX	
KSK123	20	2	200	0.13	0.47	4.5	0.9	1.6	4.5					
KSK211	18	10	200	1	10	10		9	10	10	1	0.4	4	

1.7.2 TO-92S Type J-FET

DEVICE	V _{GDO} (V)	I _G (mA)	P _D (mW)	I _{DSS} (mA)			g _m (mS)			Condition			V _{GS} (OFF)	
				MIN	MAX	V _{DS} (V)	MIN	TYP	V _{DS} (V)	V _{DS} (V)	I _D (μA)	MIN	MAX	
KSK65	12	2	20	0.04	0.8	4.5	0.3	0.5	4.5					
KSK161	18	10	200	1	10	10		9	10	10	1	0.4	4	

1.7.3 TO-92 Type J-FET

DEVICE	V _{GDO} (V)	I _G (mA)	P _D (mW)	I _{DSS} (mA)			g _m (mS)			Condition			V _{GS} (OFF)	
				MIN	MAX	V _{DS} (V)	MIN	TYP	V _{DS} (V)	V _{DS} (V)	I _D (μA)	MIN	MAX	
KSK30	50	10	100	0.3	6.5	10	1.2		10	10	0.1	0.4	5	
KSK117	50	10	300	0.6	14	10	4	15	10	10	0.1	0.2	1.5	

1.7.4 SOT-143 Type MOS FET (Dual Gate)

DEVICE	V _{DS} (V)	I _D (mA)	P _D (mW)	I _{DSS} (mA)			g _m (mS)		C _{is} (pF)		C _{rs} (pF)		NF(dB)(200MHz)	
				MIN	MAX	V _{DS} (V)	MIN	TYP	TYP	MAX	TYP	MAX	TYP	MAX
*KSK5043	15	30	150	0	6	6	13	20	4.25	5.5	0.03	0.05	1.4	2.8
*KSD5044	15	30	150	0	6	6		17	2			0.03	3.2	

*: Under Development

2. POWER TRANSISTORS

2.1. General Purpose Transistors

2.1.1 TO-126 Type Transistors

I _C (A)	V _{CE0} (V)	Device Type		h _{FE}				V _{CE(SAT)} (V)				f _T (MHz)				P _C (W)
		NPN	PNP	V _{CE} (V)	I _C (A)	MIN	MAX	I _C (A)	I _B (A)	TYP	MAX	V _{CE} (V)	I _C (A)	MIN	TYP	
0.1	180	KSC2682	KSA1142	5	0.01	100	320	0.05	0.005	0.16	0.5	10	0.02		180	8
	200	C3502		10	0.01	40	320	0.02	0.002		0.6	30	0.01		150	5
	300		A1381	10	0.01	40	320	0.02	0.002		0.6	30	0.01		150	7
0.15	200	C5036		10	0.01	40	320	0.05	0.005		0.6	30	0.05		400	7
0.2	300	KSC2688		10	0.01	40	250	0.05	0.005		1.5	30	0.01	50	80	10
0.3	120	C5035		10	0.05	40	320	0.07	0.007		0.6	10	0.05		500	8
0.5	60	C5034		10	0.05	40	320	0.1	0.01		0.6	10	0.01		800	10
	250	BD157		10	0.05	30	240	0.25	0.025		2.5				20	
	300	BD158		10	0.05	30	240	0.25	0.025		2.5				20	
	300	MJE340	MJE350	10	0.05	30	240								20	
	350	BD159		10	0.05	30	240	0.25	0.025		2.5				20	
1.2	120	KSC2690	KSA1220	5	0.3	60	320	1	0.2	0.4	0.7	5	0.2		175	20
	160	KSC2690A	KSA1220A	5	0.3	60	320	1	0.2	0.4	0.7	5	0.2		11	20
1.5	45	BD135	BD136	2	0.15	40	250	0.5	0.05		0.5				13	
	60	BD137	BD138	2	0.15	40	160	0.5	0.05		0.5				13	
	80	BD139	BD140	2	0.15	40	160	0.5	0.05		0.5				13	
2	45	BD375	BD376	2	0.15	40	375	1	0.1		1.0				25	
	45	BD233	BD234	2	1	25		1	0.1		0.6	10	0.25	3	25	
	60	BD377	BD378	2	0.15	40	375	1	0.1		1.0				25	
	60	BD235	BD236	2	1	25		1	0.1		0.6	10	0.25	3	25	
	80	BD379	BD380	2	0.15	40	375	~1	0.1		1.0				25	
	80	BD237	BD238	2	1	25		1	0.1		0.6	10	0.25	3	25	
3	30	KSD882	KSB772	2	1	60	400	2	0.2	0.3	0.5	5	0.1		80	10
	40	MJE180	MJE170	1	0.1	50	250	3	0.6		1.7	10	0.1	50	12.5	
	45	KSD794	KSB744	5	0.5	60	320	1.5	0.15	0.5	2	5	0.1		45	10
	45	BD175	BD176	2	0.15	40		1	0.1		0.8	10	0.25	3	30	
	60	KSD794A	KSB744A	5	0.5	60		1.5		0.5	2	5	0.1		45	10
		MJE181	MJE171	1	0.1	50	250	3	0.6		1.7	10	0.1	50	12.5	
	60	BD177	BD178	2	0.15	40		1	0.1		0.8	10	0.25	3	30	
	80	MJE182	MJE172	1	0.1	50	250	3	0.6		1.7	10	0.1	50	12.5	
80	BD179	BD180	2	0.15	40		1	0.1		0.8	10	0.25	3	30		
4	22	BD433	BD434	1	0.5	85		2	0.2		0.5	1	0.25	3	36	
	32	BD435	BD436	1	0.5	85		2	0.2		0.5	1	0.2	3	36	
	45	BD437	BD438	1	0.5	85		2	0.2		0.6	1	0.25	3	36	
	60	BD439	BD440	1	0.5	40		2	0.2		0.8	1	0.25	3	36	
	80	BD441	BD442	1	0.5	40		2	0.2		0.8	1	0.25	3	36	
5	25	MJE200	MJE210	1	2	45	180	2	0.2		0.75	10	0.1	65	15	
	60	KSD1691	KSB1151	1	2	100	400	2	0.2	0.1	0.3				20	

2.1.2 D-PACK Transistors

I _c (A)	V _{CEO} (V)	Device Type		Condition		h _{FE}		Condition		V _{CE(sat)} (V)		Condition		f _T (MHz)	P _C (W)	
		NPN	PNP	V _{CE} (V)	I _C (A)	MIN	MAX	I _C (A)	I _B (A)	TYP	MAX	V _{CE} (V)	I _C (A)			MIN
1	40	MJD29	MJD30	4	1	15	75	1	0.125		0.7	10	0.2		3	15
	100	MJD29C	MJD30C	4	1	15	75	1	0.125		0.7	10	0.2		3	15
	250	MJD47		10	0.3	30	150	1	0.2		1	10	0.2		10	15
	400	MJD50		10	0.3	30	150	1	0.2		1	10	0.2		10	15
2	400	C3233		5	0.1	20		1	0.2		1	—	—	—		20
3	40	MJD31	MJD32	4	3	10	50	3	0.375		1.2	10	0.5		3	15
	60	D1221	B906	5	0.5	60	300	3	0.3	0.4	1	5	0.5		3	20
	100	MJD31C	MJD32C	4	3	10	50	3	0.375		1.2	10	0.5		3	15
6	100	MJD41C	MJD42C	4	3	15	75	6	0.6		1.5	10	0.5		3	20
8	80	MJD44H11	MJD45H11	1	2	60		8	0.4		1	10	0.5		50	20
10	60	MJD3055	MJD2955	4	4	20	100	4	0.4		1.1	10	0.5	2		20

2.1.3 TO-220 Type Transistors

I _c (A)	V _{CEO} (V)	Device Type		Condition		h _{FE}		Condition		V _{CE(sat)} (V)		Condition		f _T (MHz)	P _C (W)	
		NPN	PNP	V _{CE} (V)	I _C (A)	MIN	MAX	I _C (A)	I _B (A)	TYP	MAX	V _{CE} (V)	I _C (A)			MIN
0.2	300	KSC1507		1	0.01	40	240	0.05	0.005		2	30	0.01	40	80	15
1	40	TIP29	TIP30	4	1	15	75	1	0.125		0.7	10	0.2	3		30
	60	TIP29A	TIP30A	4	1	15	75	1	0.125		0.7	10	0.2	3		30
	80	TIP29B	TIP30B	4	1	15	75	1	0.125		0.7	10	0.2	3		30
	100	TIP29C	TIP30C	4	1	15	75	1	0.125		0.7	10	0.2	3		30
	250	TIP47		10	0.3	30	150	1	0.2		0.1	10	0.2	10		40
	300	TIP48		10	0.3	30	150	1	0.2		0.1	10	0.2	10		40
	350	TIP49		10	0.3	30	150	1	0.2		0.1	10	0.2	10		40
	400	TIP50		10	0.3	30	150	1	0.2		0.1	10	0.2	10		40
1.5	150	KSC2073	KSA940	10	0.5	40	140	0.5	0.05		1.5	10	0.5	4		25
2	45	BD239	BD240	4	1	15		1	0.1		0.7	10	0.2	3		30
	60	BD239A	BD240A	4	1	15		1	0.1		0.7	10	0.2	3		30
	80	BD239B	BD240B	4	1	15		1	0.1		0.7	10	0.2	3		30
	100	BD239C	BD240C	4	1	15		1	0.1		0.7	10	0.2	3		30
	150	KSD401	KSB546	10	0.4	40	240					10	0.4		5	25
3	30	KSC1173	KSA473	2	0.5	70	240	2	0.2	0.3	0.8	2	0.5		100	10
	40	TIP31	TIP32	4	3	10	50	3	0.375		1.2	10	0.5	3		40
	45	BD241	BD242	4	3	10		3	0.6		1.2	10	0.5	3		40
	55	KSD288	KSA614	5	0.5	40	240	1	0.1	0.15	0.5					25

2.1.3 TO-220 Type Transistors (Continued)

I _c (A)	V _{CE0} (V)	Device Type		Condition		h _{FE}		Condition		V _{CE(sat)} (V)		Condition		f _r (MHz)		P _c (W)
		NPN	PNP	V _{CE} (V)	I _c (A)	MIN	MAX	I _c (A)	I _B (A)	TYP	MAX	V _{CE} (V)	I _c (A)	MIN	TYP	
3	60	TIP31A	TIP32A	4	3	10	50	3	0.375		1.2	10	0.5	3	40	
		KSD880	KSB834	5	0.5	60	200	3	0.3	0.5		5	0.5	9	30	
		*KSC1983		4	0.5	500		2	0.05		1	12	0.2	15	30	
	60	BD241A	BD242A	4	3	10		3	0.6		1.2	10	0.5	3	40	
	80	TIP31B	TIP32B	4	3	10	50	3	0.375		1.2	10	0.5	3	40	
	80	BD241B	BD242B	4	3	10		3	0.6		1.2	10	0.5	3	40	
	100	TIP31C	TIP32C	4	3	10	50	3	0.375		1.2	10	0.5	3	40	
100	BD241C	BD242C	4	3	10		3	0.6		1.2	10	0.5	3	40		
4	60	KSC2233		5	1	30	150	4	0.4		1	5	0.5	10	40	
	80	KSD526	KSB595	5	0.5	40	240	3	0.3	1.0	1.7	5	0.5	3	30	
5	60	KSD73		10	1	70	240	5	0.5		2	10	0.3	20	30	
	70	KSD362		5	5	20	140	5	0.5		1	5	0.5	10	40	
	100	KSC2517		5	2	40	200	3	0.3		0.6				30	
6	40	TIP41	TIP42	4	3	15	75	6	0.6		1.5	10	0.5	3	65	
	45	BD243	BD244	4	3	15		6	1		1.5	10	0.5	3	65	
	60	BD243A	BD244A	4	3	15		6	1		1.5	10	0.5	3	65	
	60	TIP41A	TIP42A	4	3	15	75	6	0.6		1.5	10	0.5	3	65	
	80	BD243B	BD244B	4	3	15		6	1		1.5	10	0.5	3	65	
	80	TIP41B	TIP42B	4	3	15	75	6	0.6		1.5	10	0.5	3	65	
	100	BD243C	BD244C	4	3	15		6	1		1.5	10	0.5	3	65	
	100	TIP41C	TIP42C	4	3	15	75	6	0.6		1.5	10	0.5	3	65	
	120	KSD363		5	1	40	240	1	0.1		1	5	0.5	10	40	
7	60	KSD568	KSB707	1	3	40	200	5	0.5		0.5				40	
	80	KSD569	KSB708	1	3	40	200	5	0.5		0.5				40	
	100	KSC2334	KSA1010	5	3	40	200	5	0.5		0.6				40	
	150	BU407							5	0.5		1	10	0.5	10	60
		BU407H							5	0.8		1	10	0.5	10	
	200	BU406							5	0.5		1	10	5	10	60
		BU406H							5	0.8		1	10	5	10	
BU408								6	1.2		1	10	5	10		
8	45	BD533	BD534	2	2	30	100	2	0.2		0.8	5	0.5	3	50	
	60	BD535	BD536	2	2	30	100	2	0.2		0.8	5	0.5	3	50	
	80	BD537	BD538	2	2	30	100	2	0.2		0.8	5	0.5	3	50	
10	60	MJE3055T	MJE2955T	4	4	20	100	4	0.4		1.1	10	0.5	2	75	
	80	D44H	D45H	1	4	20		8	0.4		1	10	0.5	40	50	

*: high B

2-2. Darlington Transistors

2.2.1 TO-126 & D-Pack Type Transistors

Ic (A)	V _{CEO} (V)	Device Type		Condition		h _{FE}		Condition		V _{CE(sat)} (V)		Condition		f _T (MHz)		P _C (W)
		NPN	PNP	V _{CE} (V)	I _C (A)	MIN	MAX	I _C (A)	I _B (A)	TYP	MAX	V _{CE} (V)	I _C (A)	MIN	TYP	
1.5	60	KSD985	KSB794	2	1	2K	3K	1A	0.001		1.5					10
	80	KSD986	KSB795	2	1	2K	3K	1A	0.001		1.5					10
2	100	*MJD112	*MJD117	3	2	1K	12K	2	0.008	—	2	10	0.75	25		20
3	40	*KSD1222	*KSB907	2	1	2K	—	2	0.004	—	1.5	—	—	—	—	15
	60	KSD1693	KSB1150	2	1.5	2K	20K	1.5	0.0015	0.9	1.2					15
	100	KSD1692	KSB1149	2	1.5	2K	20K	1.5	0.0015	0.9	1.2					15
4	60	MJE800	MJE700	3	1.5	0.75K		1.5	0.03		2.5					40
		MJE801	MJE701	3	2	0.75K		2	0.04		2.8					
	80	MJE802	MJE702	3	1.5	0.75K		1.5	0.03		2.5					40
		MJE803	MJE703	3	2	0.75K		2	0.04		2.8					
8	100	*MJD122	*MJD127	4	4	1K	12K	4	0.016		2					20

*: D-pack type

2.2.2 TO-220 Type Transistors

Ic (A)	V _{CEO} (V)	Device Type		Condition		h _{FE}		Condition		V _{CE(sat)} (V)		Condition		f _T (MHz)		P _C (W)
		NPN	PNP	V _{CE} (V)	I _C (A)	MIN	MAX	I _C (A)	I _B (A)	TYP	MAX	V _{CE} (V)	I _C (A)	MIN	TYP	
2	60	TIP110	TIP115	4	2	0.5K		2	0.008		2.5					50
	80	TIP111	TIP116	4	2	0.5K		2	0.008		2.5					50
	100	TIP112	TIP117	4	2	0.5K		2	0.008		2.5					50
4	275	D5018		5	3			2	0.005		1.5					50
5	60	TIP120	TIP125	3	3	1K		3	0.012		2					65
	80	TIP121	TIP126	3	3	1K		3	0.012		2					65
	100	TIP122	TIP127	3	3	1K		3	0.012		2					65
		KSD560	KSB601	2	3	2K	15K	3	0.003		1.5					30
6	45	BDW23	BDW24	3	2	0.75K	20K	2	0.008		2					50
	60	BDW23C	BDW24C	3	2	0.75K	20K	2	0.008		2					50
	80	BDW23B	BDW24B	3	2	0.75K	20K	2	0.008		2					50
	100	BDW23C	BDW24C	3	2	0.75K	20K	2	0.008		2					50
8	45	BDX53	BDX54	3	3	0.75K		3	0.012		2.5					60
	60	BDX53A	BDX54A	3	3	0.75K		3	0.012		2.5					60
	60	TIP100	TIP105	4	3	1K	20K	3	0.006		2					80
	80	BDX53B	BDX54B	3	3	0.75K		3	0.012		2.5					60
	80	TIP101	TIP106	4	3	1K	20K	3	0.006		2					80

2.2.2 TO-220 Type Transistors (Continued)

I _c (A)	V _{CEO} (V)	Device Type		Condition		h _{FE}		Condition		V _{CE(sat)} (V)		Condition		f _T (MHz)		P _c (W)
		NPN	PNP	V _{CE} (V)	I _c (A)	MIN	MAX	I _c (A)	I _B (A)	TYP	MAX	V _{CE} (V)	I _c (A)	MIN	TYP	
8	100	BDX53C	BDX54C	3	3	0.75K		3	0.012		2.5					60
	100	TIP102	TIP107	4	3	1K	20K	3	0.006		2					80
	150	BU807						5	0.05		1.5					60
	200	BU806						5	0.05		1.5					60
10	45	BDX33	BDX34	3	4	0.75K		4	0.008		2.5					70
	60	BDX33A	BDX34A	3	4	0.75K		4	0.008		2.5					70
	60	TIP140T	TIP145T	4	5	1K		5	0.01		2					80
	80	BDX33B	BDX34B	3	3	0.75K		3	0.006		2.5					70
	80	TIP141T	TIP146T	4	5	1K		5	0.01		2					80
	100	BDX33C	BDX34C	3	3	0.75K		3	0.006		2.5					70
	100	TIP142T	TIP147T	4	5	1K		5	0.01		2					80
12	45	BDW93	BDW94	3	5	0.754	20K	5	0.02		2					80
	60	BDW93A	BDW94A	3	5	0.75K	20K	5	0.02		2					80
	80	BDW93B	BDW94B	3	5	0.75K	20K	5	0.02		2					80
	100	BDW93C	BDW94C	3	5	0.75K	20K	5	0.02		2					80

2.2.3 TO-3P & TO-3P(F) Type Transistors

I _c (A)	V _{CEO} (V)	Device Type		h _{FE}				V _{CE(sat)} (V)				f _T (MHz)				P _c (W)	PKG
		NPN	PNP	V _{CE} (V)	I _c (A)	MIN	MAX	I _c (A)	I _B (A)	TYP	MAX	V _{CE} (V)	I _c (A)	MIN	TYP		
10	60	TIP140F	TIP145F	4	5	1K		5	0.01		2					60	TO-247F
		TIP140	TIP145	4	5	1K		5	0.01		2					125	TO-3P
	80	TIP141F	TIP142F	4	5	1K		5	0.01		2					60	TO-247F
		TIP141	TIP142	4	5	1K		5	0.01		2					125	TO-3P
	100	TIP142F	TIP142F	4	5	1K		5	0.01		2					60	TO-247F
		TIP142	TIP147	4	5	1K		5	0.01		2					125	TO-3P
12	60	BDV65	BDV64	4	5	1K		5	0.02		2				125	TO-3P	
	80	BDV65A	BDV64A	4	5	1K		5	0.02		2				125	TO-3P	
	100	BDV65B	BDV64B	4	5	1K		5	0.02		2				125	TO-3P	
15	50	*C5047		5	5	80		5	0.12		0.5				100	TO-3P	

*: high β

2-3. Switching Transistors

V _{CEO} (V)	I _C (A)	Device (NPN)	h _{FE}				V _{CE(SAT)} (V)				Switching Time			P _C (W)	Package
			V _{CE} (V)	I _C (A)	MIN	MAX	I _C (A)	I _B (A)	TYP	MAX	t _{on} MAX (μS)	t _{sig} MAX (μS)	t _f MAX (μS)		
375	6	*BU426	5	0.6		60	2.5	0.5		1.5	0.5	3.5	0.5	113	TO-3P
	0.5	KSA1156	5	0.01	30	200	0.1	0.01		1	1	4	1	10	TO-126(PNP)
300	4	MJE13004	5	2	8	40	2	0.5		0.6	0.8	3	0.7	75	TO-220
	8	MJE13006	5	5	5	30	5	1		2	0.8	3	0.7	80	TO-220
	12	MJE13008	5	8	6	30	8	1.6		1.5	0.8	3	0.7	100	TO-220
400	0.5	KSC2752	5	0.05	20	80	0.3	0.06		1	1	2.5	1	10	TO-126
	2	KSC2333	5	0.1	20	80	0.5	0.1		1	1	2.5	1	15	TO-220
	4	MJE13005	5	1	10	60	1	0.2		0.5	0.8	3	0.7	75	TO-220
	5	KSC2518	5	0.5	20	80	2	0.4		1	1	2.5	0.7	40	TO-220
	5	*BUT11	5	2	5		3	0.6		1.5	1	4	0.8	100	TO-220
	5	*BUV46	5	2	5		3.5	0.7		5	1	3	0.8	85	TO-220
	5	*BUW11	5	2	5		3	0.6		1.5	1	4	0.8	113	TO-3P
	6	*BU426A	5	0.6		60	2.5	0.5		1.5	0.5	3.5	0.5	113	TO-3P
	7	KSC2335	5	1	20	80	3	0.6		1	1	2.5	1	40	TO-220
	8	*BUW12	5	3	5		6	1.2		1.5	1	4	0.8	125	TO-3P
		MJE13007	5	2	8	60	2	0.4		1	0.8	3	0.7	80	TO-220
	9	*BUV47	5	5	5		9	3		3	0.8	2.5	0.8	120	TO-3P
	10	KSC2749	5	1	15	80	6	1.2		1	1	2.5	0.7	100	TO-3P
	12	MJE13009	5	5	8	40	5	1		1	0.8	3	0.7	100	TO-220
	15	KSC2751	5	2	15	80	10	2	0.3	1	1	2.5	0.7	120	TO-3P
15	*BUV48	5	10	5		12	2.4		5	1	3	0.8	150	TO-3P	
450	5	**BUT11A	5	2	5		2.5	0.5		1.5	1	4	0.8	100	TO-220
	5	**BUW11A	5	2	5		2.5	0.5		1.5	1	4	0.8	113	TO-3P
	8	**BUW12A	5	3	5		6	1.2		1.5	1	4	0.8	125	TO-3P
	9	**BUV47A	5	5	5		8	2.5		3	0.7	3	0.8	120	TO-3P
	15	**BUV48A	5	10	5		15	3		5	1	3	0.8	150	TO-3P
500	3	KSC5020	5	0.3	15	50	1.5	0.3		1	0.5	3	0.3	40	TO-220
	4	KSC5022	5	0.3	15	50	1.5	0.3		1	0.5	3	0.3	60	TO-3P
	5	KSC5021	5	0.6	15	50	3	0.6		1	0.5	3	0.3	50	TO-220
	7	KSC5023	5	0.6	15	50	3	0.6		1	0.5	3	0.3	80	TO-3P
	10	KSC5024	5	0.8	15	50	4	0.8		1	0.5	3	0.3	90	TO-3P
	15	KSC5025	5	1.2	15	50	6	1.2		1	0.5	3	0.3	100	TO-3P
600	15	***BUV48B	5	10	5		10	4		3	1	3	0.7	150	TO-3P
700	15	***BUV48C	5	10	5		10	4		3	1	3	0.7	150	TO-3P
800	1.5	KSC5026	5	0.1	10	40	0.75	0.15		2	0.5	3	0.3	40	TO-220
	3	KSC5027	5	0.2	10	40	1.5	0.3		2	0.5	3	0.3	50	TO-220
		KSC5028	5	0.2	10	40	1.5	0.3		2	0.5	3	0.3	80	TO-3P
	4.5	KSC5029	5	0.3	10	40	2	0.4		2	0.5	3	0.3	90	TO-3P
	6	KSC5030	5	0.4	10	40	3	0.6		2	0.5	3	0.3	100	TO-3P
	8	KSC5031	5	0.6	10	40	4	0.8		2	0.5	3	0.3	140	TO-3P
	12	KSC3552	5	0.8	10	40	6	1.2		2	0.5	3	0.3	150	TO-3P

*: BV_{CE(S)} 850V **: BU_{CE(S)} 1000V ***: BU_{CE(S)} 1200V

2-4. Horizontal Deflection Output Transistors

2.4.1 TO-3P Type Transistors

V _{CEO}	V _{CE0}	I _c	Device	h _{FE}				V _{CE(sat)} (V)				Switching Time			P _c	Comment
				V _{CE}	I _c	MIN	MAX	I _c	I _B	TYP	MAX	t _{on}	t _{stg}	t _r		
(V)	(V)	(A)	(NPN)	(V)	(A)			(A)	(A)			MAX	MAX	MAX	(W)	
1500	800	2.5	KSD5000	5	0.5	8		2	0.6		8			0.4	80	Built in Damper Diode
		3.5	KSD5001	5	0.5	8		2.5	0.8		8			0.4	80	Built in Damper Diode
		5	KSD5002	5	1	8		4	0.8		5			0.4	120	Built in Damper Diode
		6	KSD5003	5	1	8		5	1		5			0.4	120	Built in Damper Diode
		2.5	KSD5004	5	0.5	8		2	0.6		8			0.4	80	
		3.5	KSD5005	5	0.5	8		2.5	0.8		8			0.4	80	
		5	KSD5006	5	1	8		4	0.8		5			0.4	120	
		6	KSD5007	5	1	8		5	1		5			0.4	120	

2.4.2 TO-247F Type Transistors

V _{CEO}	V _{CE0}	I _c	Device	h _{FE}				V _{CE(sat)} (V)				Switching Time			P _c	Comment
				V _{CE}	I _c	MIN	MAX	I _c	I _B	TYP	MAX	t _{on}	t _{stg}	t _r		
(V)	(V)	(A)	(NPN)	(V)	(A)			(A)	(A)			MAX	MAX	MAX	(W)	
1500	800	2.5	KSD5010	5	0.5	8		2	0.6		8			0.4	50	Built in Damper Diode
		3.5	KSD5011	5	0.5	8		2.5	0.8		8			0.4	50	Built in Damper Diode
		5	KSD5012	5	1	8		4	0.8		5			0.4	60	Built in Damper Diode
		6	KSD5013	5	1	8		5	1		5			0.4	60	Built in Damper Diode
		2.5	KSD5014	5	0.5	8		2	0.6		8			0.4	50	
		3.5	KSD5015	5	0.5	8		2.5	0.8		8			0.4	50	
		5	KSD5016	5	1	8		4	0.8		5			0.4	60	
		6	KSD5017	5	1	8		5	1		5			0.4	60	
		5	KSD5056	5	1	8		4	0.8		1.5			0.3	60	Built in Damper Diode
		6	KSD5057	5	1	8		5	1		1.5			0.3	60	Built in Damper Diode
		5	KSD5058	5	1	8		4	0.8		1.5			0.3	60	
		6	KSD5059	5	1	8		5	1		1.5			0.3	60	

3. QUICK REFERENCE TABLE (APPLICATION)

3.1 Audio Equipment

Package		SOT-23	TO-92	TO-92L	TO-126	TO-220
Application						
FM	RM AMP	KSC2223	KSC1674			
	Mix. Conv	KSC2223	KSC1674			
	Local Osc	KSC2223	KSC1674.KSC1675			
	IF	KSC2715	KSC838.KSC1675			
AM	RF	KSC1623	KSC945.KSC815			
	Conv Osc	KSC2715	KSC1675.KSC945 KSC838			
IF		KSC2715	KSC1675.KSC945 KSC838			
Diff Amp	10W	KSA812.KSC1623	KSA733.KSC945			
	20W	KSA812.KSC1623	KSA733.KSC945			
	25W	KSA812.KSC1623	KSA733.KSC945			
	30W	KSA812.KSC1623	KSA733.KSC945			
	35W	KSA812.KSC1623	KSA733.KSC945			
	40W		KSA992.KSC1845			
	50W		KSA992.KSC1845			
	60W		KSA991.KSC1845			
	80W		KSA992.KSC1845			
	100W		KSA992.KSC1845			
150W		KSA992.KSC1845				
Pre Driver	20W		KSA954.KSC2003			
	25W		KSA954.KSC2003			
	30W			KSA910.KSC2310		
	35W			KSA910.KSC2310		
	40W			KSA910.KSC2310		
	50W			KSA910.KSC2310		
	60W			KSA910.KSC2310		
	80W			KSA910.KSC2310		
	100W			KSA910.KSC2310		
	150W				KSA1142.KSC2682	
20W				KSA1142.KSC2682	KSA1142.KSC2682	
Driver	3W		KSA642.KSD227			
	5W		KSA642.KSD227			
	10W		KSA954.KSC2003			
	20W		KSA954.KSC2003			
	25W		KSA954.KSC2003			
	30W		KSA954.KSC2003			
	40W			KSA916.KSC2316		
	50W			KSA916.KSC2316		
	60W				KSA1220.KSC2690	
	80W				KSA1220.KSC2690	KSA1220A.KSC2690A
Output	3W			KSA928A.KSC2328A		
	5W				KSB772.KSD882	
	10W				KSB744.KSD794	
	20W					
	25W					KSB834.KSD880
	30W					KSA614.KSD288
	35W					KSB596.KSD526 TIP41C.TIP42C TIP41C.TIP42C

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3.2 Video Equipment

Application		Package	Color TV	B/W TV	
Tuner	VHF	RF	SOT-23	KSC2755	KSC2755
			TO-92		KSC1393
		MIX	SOT-23	KSC2756	KSC2756
			TO-92	KSC1393, MP5H24	KSC1394, MP5H24
		UHF	SOT-23	KSC2757, KSC2759, KSC3120, MMBR5179	KSC2757, KSC2759, KSC3120, MMBR5179
			TO-92	KSC1730, MP5S179, MP5H10	KSC1730, MP5S179, MP5H10
	UHF	RF	SOT-23	KSC2758	KSC2758
		MIX	SOT-23	KSC2758	KSC2758
		UHF	SOT-23	KSC2757, KSC2759, KSC3120, MMBR5179	KSC2757, KSC2759, KSC3120, MMBR5179
			TO-92	KSC1730, MP5S179, MP5H10	KSC1730, MP5S179, MP5H10
Video Chroma	Output	TO-92	KSA643, KSA733	KSA733, KSC945	
		TO-92L	KSC2330, KSC2340	KSC2330, KSC2340	
		TO-202	KSC1520A	KSC1520A	
		TO-126	KSC2688, *KSA5037, *KSC5038, *KSA5034, *KSA5033, *KSC5036	*KSA5033, *KSA5034, *KSA5037, *KSC5036, *KSC5038	
		TO-220	KSC1257	KSC1507	
Vertical Deflection	OSC	TO-92		KSA733, KSC945	
		Driver	TO-92		KSA642, KSA643, KSD227, KSD261
			TO-92L	KSC2310, KSA910	
	Output	TO-92L		KSC2328A, KSA928A	
		TO-202		KSC1096, KSA643	
		TO-126	KSA1220A, KSC2690A	KSA1220A, KSC2690A, KSB772, KSD882	
		TO-220	KSB546, KSD401, KSA940, KSC2073	KSD880, KSD288, KSA614, KSB834	
Sound	Output	TO-92		KSD261, KSB564, KSB1116, KSA643, KSD471, KSD1616	
		TO-92L	KSC2383, KSA1013	KSC2328A, KSA928A	
		TO-126	KSA1220A, KSC2690A		
		TO-220	KSB546, KSD401, KSA940, KSC2073		
AGC		TO-92	KSC945, KSA733	KSC945, KSA733	
Sync Separator		TO-92	KSC945, KSA733	KSC945, KSA733	
Horizontal Deflection	OSC	TO-92	KSC945, KSA733	KSC945, KSA733	
	Driver	TO-92L	KSC2330, KSC2316, KSA91E		
		Output	TO-220		KSD362, KSD73
			TO-3P	KSD5000, KSD5001, KSD5002, KSD5003, KSD5004, KSD5006, KSD5007	
			TO-3PF	KSD5010, KSD5011, KSD5012, KSD5013, KSD5014, KSD5015, KSD5016, *KSD5056, *KSD5057, *KSD5058, *KSD5059, BU508D, BU508	
Series Regulator	Error Amp	TO-92		KSA733, KSC945	
		TO-92L	KSC2310, KSA910		
	Driver	TO-92		KSA733, KSC945	
		TO-92L	KSC2310, KSA910		
		TO-202		KSC1096, KSA634	
	Output	TO-126		KSB772, KSD882	
		TO-220	KSD560	KSD288, KSD880, KSB834, KSA614	
Switching	Driver	TO-92	KSD471A, KSB564A, KSD261, KSA643	KSD471A, KSB564A, KSD261, KSA643	
Regulator	Output	TO-3P	KSD5006, KSD5007	KSD5006, KSD5007	
		TO-3PF	*KSD5058, *KSD5059	*KSD5058, *KSD5059	

*: Under Development

SOT-23 TYPE

V _{CEO}	I _c										
	20mA	30mA	50mA	0.1A	0.2A	0.3A	0.5A	0.6A	0.8A	10mA	
12V			MMBR5179								
14V			KSC2734 KSC2759								
15V			KSC3120 KSC2757								
20V	KSC2223	KSC2756		BCW29-33							(2mA) KSK123
25V	KSC2758		KSC3125 MMBT5089 MMBC1009F1-5	MMBTH10	MMBTA4124 MMBTA4126					KSA1298 KSC3265	
30V	KSC2755		KSC2715 MMBT5088	MMBTH24	MMBTA4123 MMBTA4125	MMBTA13 MMBTA14	KSA1182 KSC2859 MMBTA63 MMBTA64	MMBT2222			
32A				BCW60A-D BCW61A-D							
35V				MMBC1622D6-8							
40V				MMBA812M3-7 MMBC1623L3-7 MMBTA20 MMBTA70 KSR1109-12 KSR2109-12	MMBT3903 MMBT3904 MMBT3906		MMBT6427	MMBT2222A MMBT2907 MMBT4401 MMBT4403			
45V			MMBA811C5-8	BCW69-72 BCW70G-K BCW71G-K	MMBT6429						
50V			MMBT5086 MMBT5087	KSA812 KSC1623 KSR1101-8 KSR2101-8 KSR1113/4 KSR2113/4	MMBT6428						
60V			MMBT2484				MMBTA05 MMBTA55	MMBT2907A			
80V							MMBTA06 MMBTA56				
140V								MMBT5550			
150V							MMBT5401				
200V							MMBTA43 MMBTA93				
300V							MMBTA42 MMBTA92				

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TRANSISTORS

FUNCTION GUIDE

TO-92S, TO-92 & TO-92L TYPE (V_{CE0} : 12V ~ 60V)

V_{CE0} I_c	12V	15V	20V	25V	30V	35V	40V	45V	50V	60V
20mA	KSK65 (2mA)	KSC1395	KSK161(10mA) KSK211(10mA) KSC1674 KSC2786	KSC1070	KSC1393 KSC1394				KSK117 (10mA) KSK30 (10mA)	
25mA			SS9016							
30mA			KSC1187 KSC1188		SS9011 KSC838 KSC2669					
50mA	MPS5179	KSC1730 SS9018		KSA542 KSC184 KSC2787 KSC388 KSC900 2N5089	2N5088 KSC1675			KSA640 KSC1222	2N5086 2N5087 2N5209 2N5210	
0.1A		MPSH17		MPS5172 MPS6520 MPS6521 MPS6522 MPS6523 MPSH10 MPSH11	KSC839 KSC921 MPSH20 MPSH24		KSC1330 MPS6513 MPS6517 MPSA10 MPSA20 MPSA70 KSR1009-12 KSR2009-12 KSR1209-12 KSR2209-12	SS9014 SS9015	KSR1201-8 KSR1213/4 KSR2201-8 KSR2213/4 KSR1001-8 KSR2001-8 KSR1013/4 KSR2013/4	
0.15A							MPS4250		KSA1175 KSC2785 KSA733 KSC945	MPS4250A MPS4249
0.2A				2N4124 2N4126	2N4123 2N4125		2N3903 2N3904 2N3905 2N3906 MPS8097	KSA539 KSC815	2N6428 2N6428A	KSA545 KSC853
0.3A				KSC3488 KSA1378 KSA642 KSD227						KSA953 KSC2002
0.5A			MPSA12 MPSA62 KSA643 KSD261 SS9012 SS9013 KSA1150 KSC2710	MPS6560 MPS6562	MPSA13 MPSA14 MPSA63 MPSA64		2N6427 MPSA25 MPSA75		MPSA26 MPSA76	MPS8098 MPS8598 MPSA05 MPSA55 MPSA27 MPSA77
0.6A			MPS3706	MPS3702	MPS2222 MPS3703 MPS3704 MPS3705		2N4400 2N4401 2N4402 2N4403 MPS2222A MPS2907			MPS2907A
0.7A				KSB810 KSB811				KSA707 KSC1072		KSA708 KSC1008 KSA931 KSC2331

TO-92S, TO-92 & T-92L TYPE (Continued)

V _{ceo} I _c	12V	15V	20V	25V	30V	35V	40V	45V	50V	60V
0.8A										
1A				KSB564A KSB811 MPS6601 MPS6651	KSD1021 KSD471A		MPS6602		KSB1116 KSD1616	KSB116A KSD1616A
1.5A				SS8050 SS8550						
2A	(10V) KSC2500 KSD5019				KSA928A KSC2328A					
5A			KSD5041							

TO-92S, TO-92 & TO-92L Type (V_{CEO}: 80V ~ 400V)

V _{ceo} I _c	80V	100V	120V	140V	150V	160V	200V	250V	300V	350V	400V
20mA											
25mA											
30mA											
50mA			KSA992 KSC1845 KSA1174 KSC2874		KSA910 KSC2310						
0.1mA									KSC1506 KSC2330	KSC2340	
0.15A			MPSL01								
0.2A											
0.3A	KSA954 KSC2003									MPSA45	MPSA44
0.5A	MPS8099 MPS8599 MPSA06 MPSA56						MPSA43 MPSA93	2N6515 2N6518	2N6519 MPSA92 2N6516 MPSA42	2N6517 2N6520	
0.6A		MPSL51	2N5400	2N5550	2N5401	2N5551					
0.7A				KSC1009	KSA709						
0.8A			KSA916 KSC2316								
1A						KSA1013 KSC2383					
1.5A											
2A											

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D-PACK & TO-126 Type (V_{CE0} : 25V~400V)

V_{CE0} Ic	25V	30V	40V	45V	60V	80V	100V	120V	150V/160V	180V	200V	250V	300V	400V
0.1A										KSC2682 KSA1142	KSC3502		KSA1381	
0.15A											KSC5036			
0.2A													KSC2688	
0.3A								KSC5035						
0.5A					KSC5034							BD157	MJE340 MJE350 BD158 BD159	KSC2752 KSA1156
1A			MJD29 MJD30				MJD29C MJD30C							
1.2A								KSC2690 KSA1220	KSC2690A KSA1220A					
1.5A				BD135 BD136	BD138 KSB794 BD137	KSD986 KSB795 BD139 BD140								
2A				BD233 BD378 BD375 BD376	BD377 BD237 BD235 BD236	BD379 BD237 BD238 BD380	MJD112 MJD117		KSD1033 KSB768					KSC3233
3A		KSD882 KSB772	MJE170 MJE180 MJD31 MJD32	KSD794 KSB744 BD175 BD176	KSD794A KSB744A MJE171 MJE181 BD177 BD178 KSD1693 KSB1150 KSD1221 KSB906	MJE172 MJE182 BD179 BD180	KSD1692 KSB1149 MJD31C MJD32C							
4A	BD433 BD434	BD435 BD436		BD437 BD438 BD675 BD675A BD676 BD676A	MJE700 MJE701 BD677 BD677A BD678 BD678A MJE800 MJE801 BD439 BD440	MJE702 MJE703 BD679 BD679A BD680 BD680A MJE802 MJE803 BD441 BD442 KSD1222 KSB907	BD681 BD682	BD683 BD684						
5A	MJE200 MJE210				KSD1691 KSB1151		MJD122 MJD127							
6A							MJD41C MJD42C							
10A					MJD2955 MJD3055									

TO-220 TYPE

V _{CEO} I _c	30V	40V	45V	55V	60V	70V	80V	100V	120V	150V	200V	250V	300V	350V	400V	450V	500V	800V
0.2													KSC1507					
1		TIP29 TIP30			TIP29A TIP30A		TIP29B TIP30B	TIP29C TIP30C				TIP47	TIP48	TIP49	TIP50			
1.5										KSC2073 KSA940								KSC5026
2A			BD239 BD240		TIP110 TIP115 BD239A BD240A		TIP111 TIP116 BD239B BD240B	TIP112 TIP117 BD239C BD240C		KSD401 KSB546					KSC2333 BUX84			
3A	KSC1173 KSA473	TIP31 TIP32	BD241 BD242	KSD288 KSA614	TIP31A TIP32A KSD880 KSB834 KSC1983 BD241A BD242A		TIP31B TIP32B BD241B BD242B	TIP31C TIP32C BD241C BD242C									KSC5020	KSC5027
4A					KSC2233		KSD526 KSB596						KSD5018 MJE 13004		MJE 13005			
5A					KSD73 TIP120 TIP125	KSD362	TIP121 TIP126	KSC2517 TIP122 TIP127 KSB601 KSD560							KSC2518 BUT11 BUX46	BUT11A	KSC5021	
6		TIP41 TIP42	BDW23 BDW24 BD243 BD244		TIP41A TIP42A BDW23A BDW24A BD243A BD244A		TIP41B TIP42B BUW23B BUW24B BD243B BD244B	TIP41C TIP42C BD243C BDW23C BDW24C	KSD363						KSC2335			
7					KSD568 KSB707		KSD569 KSB708	KSC2334 KSA1010		BU407 BU407H	BU406 BU406H BU408							
8			BDX53 BDX54 BD533 BD534		TIP100 TIP105 BDX53A BDX54A BD535 BD536		TIP101 TIP106 BDX53B BDX54B BD537 BD538	TIP102 TIP107 BDX53C BDX54C		BU807	BU806		MJE 5740 MJE 13006	MJE 5741	MJE 5742 MJE 13007			
10			BDX33A BDX34A		MJE3055T MJE2955T TIP140T TIP145T BDX33A BDX34A		TIP141T TIP146T BDX33B BDX34B D44H D45H	TIP142T TIP147T BDX33C BDX34C										
12			BDW93 BDW94		BDW93A BDW94A		BDW93B BDW94B	BDW93C BDW94C					MJE 13008		MJE 13009			

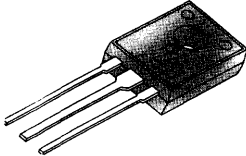
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TO-3P & TO-247F TYPE

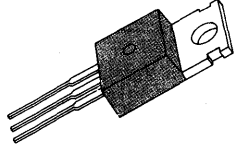
I_c V_{CE0}	2.5A	3A	3.5A	4A	4.5A	5A	6A	7A	8A	9A	10A	12A	15A
50													KSC5047
375							BU426						
400						BUW11	BU426A		BUW12	BUV47	KSC2749		KSC2751 BUV48
450						BUT11A BUW11A			BUW12A	BUV47A			BUV48A
500				KSC5022				KSC5023			KSC5024		KSC5025
600													BUV48B
700						BU508 BU508D BU508F BU508DF							BUW48C
800	KSD5000 KSD5004 KSD5010 KSD5014	KSC5028	KSD5000 KSD5005 KSD5011 KSD5012		KSC5029	KSD5002 KSD5006 KSD5012 KSD5016	KSC5030 KSD5003 KSD5007 KSD5013 KSD5017		KSC5031				KSC3552

1. SELECTION GUIDE

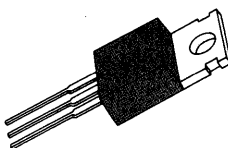
TO-126

BV _{dss} (V)	ID(on)(A)	RDS(on)(Ω)	Part Number	Remark	Package
60.00	0.40	3.20	IRFA1Z3		
100.00	0.50	2.40	IRFA1Z0		

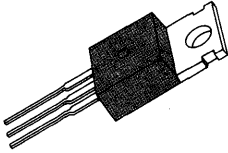
TO-220 N-CHANNEL

BV _{dss} (V)	ID(on)(A)	RDS(on)(Ω)	Part Number	Remark	Package
50.00	5.90	0.30	IRFZ12		
	10.00	0.28	SSP10N05		
	7.20	0.20	IRFZ10		
	12.00	0.20	SSP12N05		
	14.00	0.12	IRFZ22		
	15.00	0.10	IRFZ20		
	25.00	0.07	IRFZ32		
	30.00	0.05	IRFZ30		
	35.00	0.035	IRFZ42		
	35.00	0.028	IRFZ40		
60.00	8.30	0.30	IRFZ15		
	10.00	0.28	SSP10N06		
	10.00	0.20	IRFZ14		
	12.00	0.20	SSP12N06		
	25.00	0.07	IRFZ35		
	30.00	0.05	IRFZ34		
	35.00	0.035	IRFZ45		
	35.00	0.028	IRFZ44		
80.00	4.90	0.74	IRF513		
	5.60	0.54	IRF511		
	8.00	0.36	IRF523		
	9.20	0.27	IRF521		
	10.00	0.33	SSP10N08		
	12.00	0.18	SSP12N08		
	12.00	0.23	IRF533		
	14.00	0.16	IRF531		
	25.00	0.10	IRF543		
	28.00	0.077	IRF541		
100.00	4.90	0.74	IRF512		
	5.60	0.54	IRF510		
	8.00	0.36	IRF522		
	9.20	0.27	IRF520		
	10.00	0.33	SSP10N10		
	12.00	0.18	SSP12N10		
	12.00	0.23	IRF532		
	14.00	0.16	IRF530		
	25.00	0.10	IRF542		
	28.00	0.077	IRF540		
120.00	7.00	0.70	SSP7N12		
	8.00	0.50	SSP8N12		

TO-220 N-CHANNEL (Continued)

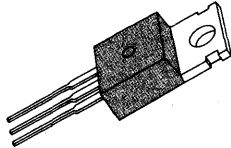
BVdss(V)	ID(on)(A)	RDS(on)(Ω)	Part Number	Remark	Package
150.00	2.60	2.40	IRF613		
	3.30	1.50	IRF611		
	4.00	1.20	IRF623		
	5.00	0.80	IRF621		
	7.00	0.70	SSP7N15		
	8.00	0.60	IRF633		
	8.00	0.50	SSP8N15		
	9.00	0.40	IRF631		
	16.00	0.22	IRF643		
	18.00	0.18	IRF641		
180.00	7.00	0.70	SSP7N18		
	8.00	0.50	SSP8N18		
200.00	2.60	2.40	IRF612		
	3.30	1.50	IRF610		
	4.00	1.20	IRF622		
	5.00	0.80	IRF620		
	7.00	0.70	SSP7N20		
	8.00	0.60	IRF632		
	8.00	0.50	SSP8N20		
	9.00	0.40	IRF630		
	16.00	0.22	IRF642		
	18.00	0.18	IRF640		
250.00	1.60	3.00	IRF615		
	2.00	2.00	IRF614		
	3.30	1.50	IRF625		
	3.80	1.10	IRF624		
	6.50	0.68	IRF635		
	8.10	0.45	IRF634		
	13.00	0.34	IRF645		
	14.00	0.28	IRF644		
350.00	1.70	5.00	IRF713		
	2.00	3.60	IRF711		
	2.50	2.50	IRF723		
	3.00	1.80	IRF721		
	5.00	1.50	IRF733		
	5.00	1.00	SSP5N35		
	5.50	1.00	IRF731		
	8.00	0.80	IRF743		
10.00	0.55	IRF741			
400.00	1.70	5.00	IRF712		
	2.00	3.60	IRF710		
	2.50	2.50	IRF722		
	3.00	1.80	IRF720		
	5.00	1.50	IRF732		
	5.00	1.00	SSP5N40		
	5.50	1.00	IRF730		
	8.00	0.80	IRF742		
10.00	0.55	IRF740			

TO-220 N-CHANNEL (Continued)

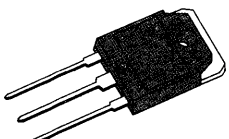
BVdss(V)	ID(on)(A)	RDS(on)(Ω)	Part Number	Remark	Package
450.00	2.20	4.00	IRF823		
	2.50	3.00	IRF821		
	4.00	2.00	IRF833		
	4.00	1.50	SSP4N45		
	4.50	1.50	IRF831		
	7.00	1.10	IRF843		
	8.00	0.85	IRF841		
500.00	2.20	4.00	IRF822		
	2.50	3.00	IRF820		
	4.00	2.00	IRF832		
500.00	4.00	1.50	SSP4N50		
	4.50	1.50	IRF830		
	7.00	1.10	IRF842		
	8.00	0.85	IRF840		
550.00	4.00	3.00	SSP4N55		
	6.00	1.80	SSP6N55		
600.00	4.00	3.00	SSP4N60		
	6.00	1.80	SSP6N60		
700.00	3.00	6.00	SSP3N70		
	3.00	5.00	SSP3N70A		
	4.00	3.50	SSP4N70		
	4.00	2.50	SSP4N70A		

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TO-220 P-CHANNEL

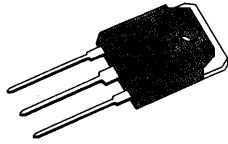
BV _{dss} (V)	ID(on)(A)	RDS(on)(Ω)	Part Number	Remark	Package
- 50.00	- 4.00	0.70	IRF9Z12		
	- 4.70	0.50	IRF9Z10		
	- 8.90	0.33	IRF9Z22		
	- 9.80	0.28	IRF9Z20		
	- 15.00	0.21	IRF9Z32		
	- 18.00	0.14	IRF9Z30		
- 60.00	- 2.50	1.60	IRF9513		
	- 3.00	1.20	IRF9511		
	- 5.00	0.80	IRF9523		
	- 6.00	0.60	IRF9521		
	- 10.00	0.40	IRF9533		
	- 12.00	0.30	IRF9531		
	- 15.00	0.30	IRF9543		
- 19.00	0.20	IRF9541			
- 100.00	- 2.50	1.60	IRF9512		
	- 3.00	1.20	IRF9510		
	- 5.00	0.80	IRF9522		
	- 6.00	0.60	IRF9520		
	- 10.00	0.40	IRF9532		
	- 12.00	0.30	IRF9530		
	- 15.00	0.30	IRF9542		
- 19.00	0.20	IRF9540			
- 150.00	- 1.50	4.50	IRF9613		
	- 1.75	3.00	IRF9611		
	- 3.00	2.40	IRF9623		
	- 3.50	1.50	IRF9621		
	- 5.50	1.20	IRF9633		
	- 6.50	0.80	IRF9631		
	- 9.00	0.70	IRF9643		
- 11.00	0.50	IRF9641			
- 200.00	- 1.50	4.50	IRF9612		
	- 1.75	3.00	IRF9610		
	- 3.00	2.40	IRF9622		
	- 3.50	1.50	IRF9620		
	- 5.50	1.20	IRF9632		
	- 6.50	0.80	IRF9630		
	- 9.00	0.70	IRF9642		
- 11.00	0.50	IRF9640			

TO-3P N-CHANNEL

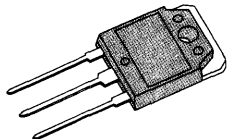
BV _{dss} (V)	ID(on)(A)	RDS(on)(Ω)	Part Number	Remark	Package
50.00	10.00	0.28	SSH10N05		
	12.00	0.20	SSH12N05		
60.00	10.00	0.28	SSH10N06		
	12.00	0.20	SSH12N06		
	60.00	0.03	SSH60N06		
	60.00	0.025	SSH60N06A		
80.00	8.00	0.36	IRFP123		
	9.20	0.27	IRFP121		
	10.00	0.33	SSH10N08		
	12.00	0.18	SSH12N08		
	12.00	0.23	IRFP133		
	14.00	0.16	IRFP131		
	25.00	0.10	IRFP143		
	28.00	0.077	IRFP141		
	34.00	0.080	IRFP153		
	40.00	0.055	IRFP151		
100.00	8.00	0.36	IRFP122		
	9.20	0.27	IRFP120		
	10.00	0.33	SSH10N10		
	12.00	0.18	SSH12N10		
	12.00	0.23	IRFP132		
	14.00	0.16	IRFP130		
	25.00	0.10	IRFP142		
	28.00	0.077	IRFP140		
	34.00	0.080	IRFP152		
	40.00	0.055	IRFP150		
	60.00	0.03	SSH60N10		
	60.00	0.025	SSH60N10A		
120.00	7.00	0.70	SSH7N12		
	8.00	0.50	SSH8N12		
150.00	4.00	1.20	IRFP233		
	5.00	1.80	IRFP221		
	7.00	0.70	SSH7N15		
	8.00	0.60	IRFP233		
	8.00	0.50	SSH8N15		
	9.00	0.40	IRFP231		
	16.00	0.22	IRFP243		
	18.00	0.18	IRFP241		
	25.00	0.12	IRFP253		
	30.00	0.085	IRFP251		
	40.00	0.065	SSH40N15A		
	40.00	0.080	SSH40N15		
180.00	7.00	0.70	SSH7N18		
	8.00	0.50	SSH8N18		
200.00	4.00	1.20	IRFP222		
	5.00	1.80	IRFP220		
	7.00	0.70	SSH7N20		
	8.00	0.60	IRFP232		
	8.00	0.50	SSH8N20		
	9.00	0.40	IRFP230		

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TO-3P N-CHANNEL (Continued)

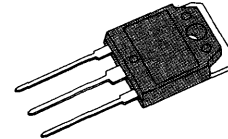
BVdss(V)	ID(on)(A)	RDS(on)(Ω)	Part Number	Remark	Package
200.00	16.00	0.22	IRFP242		
	18.00	0.18	IRFP240		
	25.00	0.12	IRFP252		
	30.00	0.085	IRFP250		
	40.00	0.065	SSH40N20A		
	40.00	0.080	SSH40N20		
250.00	13.00	0.34	IRFP245		
	14.00	0.28	IRFP244		
	21.00	0.17	IRFP255		
	23.00	0.14	IRFP254		
350.00	2.50	2.50	IRFP323		
	3.00	1.80	IRFP321		
	5.00	1.50	IRFP333		
	5.00	1.00	SSH5N35		
	5.50	1.00	IRFP331		
	8.00	0.80	IRFP343		
	10.00	0.55	IRFP341		
	13.00	0.40	IRFP353		
	15.00	0.30	IRFP351		
	25.00	0.20	SSH25N35A		
25.00	0.25	SSH25N35			
400.00	2.50	2.50	IRFP322		
	3.00	1.80	IRFP320		
	5.00	1.50	IRFP332		
	5.00	1.00	SSH5N40		
	5.50	1.00	IRFP330		
	8.00	0.80	IRFP342		
	10.00	0.55	IRFP340		
	13.00	0.40	IRFP352		
	15.00	0.30	IRFP350		
	25.00	0.20	SSH25N40A		
25.00	0.25	SSH25N40			
450.00	2.20	4.00	IRFP423		
	2.50	3.00	IRFP421		
	4.00	2.00	IRFP433		
	4.00	1.50	SSH4N45		
	4.50	1.50	IRFP431		
	7.00	1.10	IRFP443		
	8.00	0.85	IRFP441		
	12.00	0.50	IRFP453		
	13.00	0.40	IRFP451		
	20.00	0.25	SSH20N45A		
20.00	0.30	SSH20N45			
500.00	2.20	4.00	IRFP422		
	2.50	3.00	IRFP420		
	4.00	2.00	IRFP432		
	4.00	1.50	SSH4N50		
	4.50	1.50	IRFP430		
	7.00	1.10	IRFP442		
	8.00	0.85	IRFP440		
12.00	0.50	IRFP452			

TO-3P N-CHANNEL (Continued)

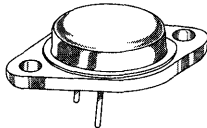
BV _{dss} (V)	ID(on)(A)	RDS(on)(Ω)	Part Number	Remark	Package
500.00	13.00	0.40	IRFP450		
	20.00	0.25	SSH20N50A		
	20.00	0.30	SSH20N50		
550.00	4.00	3.00	SSH4N55		
	6.00	1.80	SSH6N55		
	8.00	1.00	SSH8N55		
	15.00	0.45	SSH15N55A		
	15.00	0.50	SSH15N55		
600.00	6.00	1.80	SSH6N60		
	8.00	1.00	SSH8N60		
	15.00	0.45	SSH15N60A		
	15.00	0.50	SSH15N60		
700.00	3.00	6.00	SSH3N70		
	3.00	5.00	SSH3N70A		
	4.00	3.50	SSH4N70		
	4.00	2.50	SSH4N70A		
	6.00	1.90	SSH6N70		
	6.00	1.40	SSH6N70A		
	10.00	1.20	SSH10N70		
	10.00	0.90	SSH10N70A		

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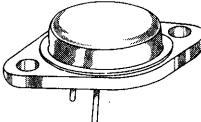
TO-3P P-CHANNEL

BV _{dss} (V)	ID(on)(A)	RDS(on)(Ω)	Part Number	Remark	Package
- 60.00	- 5.00	0.80	IRFP9123		
	- 6.00	0.60	IRFP9121		
	- 10.00	0.40	IRFP9133		
	- 12.00	0.30	IRFP9131		
	- 15.00	0.30	IRFP9143		
	- 19.00	0.20	IRFP9141		
- 100.00	- 5.00	0.80	IRFP9122		
	- 6.00	0.60	IRFP9120		
	- 10.00	0.40	IRFP9132		
	- 12.00	0.30	IRFP9130		
	- 15.00	0.30	IRFP9142		
	- 19.00	0.20	IRFP9140		
- 150.00	- 3.00	2.40	IRFP9223		
	- 3.50	1.50	IRFP9221		
	- 5.50	1.20	IRFP9233		
	- 6.50	0.80	IRFP9231		
	- 9.00	0.70	IRFP9243		
	- 11.00	0.50	IRFP9241		
- 200.00	- 3.00	2.40	IRFP9222		
	- 3.50	1.50	IRFP9220		
	- 5.50	1.20	IRFP9232		
	- 6.50	0.80	IRFP9230		
	- 9.00	0.70	IRFP9242		
	- 11.00	0.50	IRFP9240		

TO-3 N-CHANNEL (Continued)

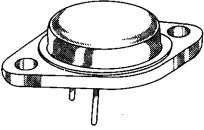
BVdss(V)	ID(on)(A)	RDS(on)(Ω)	Part Number	Remark	Package
200.00	8.00	0.50	SSM8N20		
	9.00	0.40	IRF230		
	16.00	0.22	IRF242		
	18.00	0.18	IRF240		
	25.00	0.12	IRF252		
	30.00	0.085	IRF250		
	40.00	0.065	SSM40N20A		
	40.00	0.080	SSM40N20		
250.00	21.00	0.17	IRF255		
	23.00	0.14	IRF254		
350.00	2.50	2.50	IRF323		
	3.00	1.80	IRF321		
	5.00	1.50	IRF333		
	5.00	1.00	SSM5N35		
	5.50	1.00	IRF331		
	8.00	0.80	IRF343		
	10.00	0.55	IRF341		
	13.00	0.40	IRF353		
	15.00	0.30	IRF351		
	25.00	0.20	SSM25N35A		
25.00	0.25	SSM25N35			
400.00	2.50	2.50	IRF322		
	3.00	1.80	IRF320		
	5.00	1.50	IRF332		
	5.00	1.00	SSM5N40		
	5.50	1.00	IRF330		
	8.00	0.80	IRF342		
	10.00	0.55	IRF340		
	13.00	0.40	IRF352		
	15.00	0.30	IRF350		
	25.00	0.20	SSM25N40A		
25.00	0.25	SSM25N40			
450.00	2.20	4.00	IRF423		
	2.50	3.00	IRF421		
	4.00	2.00	IRF433		
	4.00	1.50	SSM4N45		
	4.50	1.50	IRF431		
	7.00	1.10	IRF443		
	8.00	0.85	IRF441		
	12.00	0.50	IRF453		
	13.00	0.40	IRF451		
	20.00	0.25	SSM20N45A		
20.00	0.30	SSM20N45			
500.00	2.20	4.00	IRF422		
	2.50	3.00	IRF420		
	4.00	2.00	IRF432		
	4.00	1.50	SSM4N50		
	4.50	1.50	IRF430		
	7.00	1.10	IRF442		
	8.00	0.85	IRF440		

TO-3 N-CHANNEL

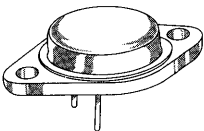
BVdss(V)	ID(on)(A)	RDS(on)(Ω)	Part Number	Remark	Package
50.00	10.00	0.28	SSH10N05		
	12.00	0.20	SSM12N05		
60.00	10.00	0.28	SSM10N06		
	12.00	0.20	SSM12N06		
	60.00	0.03	SSM60N06		
	60.00	0.025	SSM60N06A		
80.00	8.00	0.36	IRF123		
	9.20	0.27	IRF121		
	10.00	0.33	SSM10N08		
	12.00	0.18	SSM12N08		
	12.00	0.23	IRF133		
	14.00	0.16	IRF131		
	25.00	0.10	IRF143		
	28.00	0.077	IRF141		
	34.00	0.080	IRF153		
	40.00	0.055	IRF151		
100.00	8.00	0.36	IRF122		
	9.20	0.27	IRF120		
	10.00	0.33	SSM10N10		
	12.00	0.18	SSM12N10		
	12.00	0.23	IRF132		
	14.00	0.16	IRF130		
	25.00	0.10	IRF142		
	28.00	0.077	IRF140		
	34.00	0.080	IRF152		
	40.00	0.055	IRF150		
	60.00	0.03	SSM60N10		
	60.00	0.025	SSM60N10A		
120.00	7.00	0.70	SSM7N12		
	8.00	0.50	SSM8N12		
150.00	4.00	1.20	IRF233		
	5.00	1.80	IRF221		
	7.00	0.70	SSM7N15		
	8.00	0.60	IRF233		
	8.00	0.50	SSM8N15		
	9.00	0.40	IRF231		
	16.00	0.22	IRF243		
	18.00	0.18	IRF241		
	25.00	0.12	IRF253		
	30.00	0.085	IRF251		
	40.00	0.065	SSM40N15A		
40.00	0.080	SSM40N15			
180.00	7.00	0.70	SSM7N18		
	8.00	0.50	SSM8N18		
200.00	4.00	1.20	IRF222		
	5.00	1.80	IRF220		
	7.00	0.70	SSM7N20		
	8.00	0.60	IRF232		

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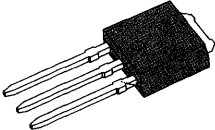
TO-3 N-CHANNEL (Continued)

BV _{dss} (V)	ID(on)(A)	RDS(on)(Ω)	Part Number	Remark	Package
500.00	12.00	0.50	IRF452		
	13.00	0.40	IRF450		
	20.00	0.25	SSM20N50A		
	20.00	0.30	SSM20N50		
550.00	4.00	3.00	SSM4N55		
	6.00	1.80	SSM6N55		
	8.00	1.00	SSM8N55		
	15.00	0.45	SSM15N55A		
	15.00	0.50	SSM15N55		
600.00	4.00	3.00	SSM4N60		
	6.00	1.80	SSM6N60		
	8.00	1.00	SSM8N60		
	15.00	0.45	SSM15N60A		
	15.00	0.50	SSM15N60		
700.00	3.00	6.00	SSM3N70		
	3.00	5.00	SSM3N70A		
	4.00	3.50	SSM4N70		
	4.00	2.50	SSM4N70A		
	6.00	1.90	SSM6N70		
	6.00	1.40	SSM6N70A		
	10.00	1.20	SSM10N70		
	10.00	0.90	SSM10N70A		

TO-3 P-CHANNEL

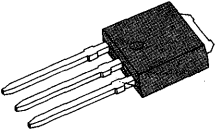
BV _{dss} (V)	ID(on)(A)	RDS(on)(Ω)	Part Number	Remark	Package
- 60.00	- 5.00	0.80	IRF9123		
	- 6.00	0.60	IRF9121		
	- 10.00	0.40	IRF9133		
	- 12.00	0.30	IRF9131		
	- 15.00	0.30	IRF9143		
	- 19.00	0.20	IRF9141		
- 100.00	- 5.00	0.80	IRF9122		
	- 6.00	0.60	IRF9120		
	- 10.00	0.40	IRF9132		
	- 12.00	0.30	IRF9130		
	- 15.00	0.30	IRF9142		
	- 19.00	0.20	IRF9140		
- 150.00	- 3.00	2.40	IRF9223		
	- 3.50	1.50	IRF9221		
	- 5.50	1.20	IRF9233		
	- 6.50	0.80	IRF9231		
	- 9.00	0.70	IRF9243		
	- 11.00	0.50	IRF9241		
- 200.00	- 3.00	2.40	IRF9222		
	- 3.50	1.50	IRF9220		
	- 5.50	1.20	IRF9232		
	- 6.50	0.80	IRF9230		
	- 9.00	0.70	IRF9242		
	- 11.00	0.50	IRF9240		

I-PAK N-CHANNEL

BVdss(V)	ID(on)(A)	RDS(on)(Ω)	Part Number	Remark	Package
50.00	6.70	0.300	†IRFU012		
	8.20	0.200	†IRFU010		
	14.00	0.120	†IRFU022		
	15.00	0.100	†IRFU020		
80.00	4.70	0.540	IRFU111		
	8.40	0.270	IRFU121		
100.00	4.70	0.540	IRFU110		
	8.40	0.270	IRFU120		
200.00	2.10	2.400	IRFU212		
	2.70	1.500	IRFU210		
	3.80	1.200	IRFU222		
	4.60	0.800	IRFU220		
400.00	2.00	3.600	IRFU310		
	3.00	1.800	IRFU320		
450.00	0.50	10.000	IRFU411		
500.00	2.50	3.000	IRFU420		

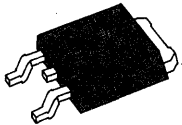
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I-PAK P-CHANNEL

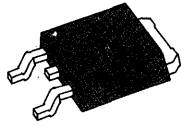
BVdss(V)	ID(on)(A)	RDS(on)(Ω)	Part Number	Remark	Package
- 50.00	- 4.50	0.700	†IRFU9012		
	- 5.30	0.500	†IRFU9010		
	- 9.00	0.330	†IRFU9022		
	- 9.90	0.280	†IRFU9020		
- 80.00	- 3.20	1.200	IRFU9111		
	- 5.90	0.600	IRFU9121		
- 100.00	- 3.20	1.200	IRFU9110		
	- 5.90	0.600	IRFU9120		
- 200.00	- 1.60	4.500	IRFU9212		
	- 2.00	3.000	IRFU9210		
	- 2.80	2.400	IRFU9222		
	- 3.60	1.500	IRFU9220		

† Under Development

D-PAK N-CHANNEL

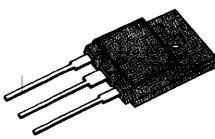
BVdss(V)	ID(on)(A)	RDS(on)(Ω)	Part Number	Remark	Package
50.00	6.70	0.300	†IRFR012		
	8.20	0.200	†IRFR010		
	14.00	0.120	†IRFR022		
	15.00	0.100	†IRFR020		
80.00	4.70	0.540	IRFR111		
	8.40	0.270	IRFR121		
100.00	4.70	0.540	IRFR110		
	8.40	0.270	IRFR120		
200.00	2.10	2.400	IRFR212		
	2.70	1.500	IRFR210		
	3.80	1.200	IRFR222		
	4.60	0.800	IRFR220		
400.00	2.00	3.600	IRFR310		
	3.00	1.800	IRFR320		
450.00	0.50	10.000	IRFR411		
500.00	2.50	3.000	IRFR420		

D-PAK P-CHANNEL

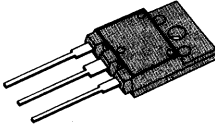
BVdss(V)	ID(on)(A)	RDS(on)(Ω)	Part Number	Remark	Package
- 50.00	- 4.50	0.700	†IRFR9012		
	- 5.30	0.500	†IRFR9010		
	- 9.00	0.330	†IRFR9022		
	- 9.90	0.280	†IRFR9020		
- 80.00	- 3.20	1.200	IRFR9111		
	- 5.90	0.600	IRFR9121		
- 100.00	- 3.20	1.200	IRFR9110		
	- 5.90	0.600	IRFR9120		
- 200.00	- 1.60	4.500	IRFR9212		
	- 2.00	3.000	IRFR9210		
	- 2.80	2.400	IRFR9222		
	- 3.60	1.500	IRFR9220		

† Under Development

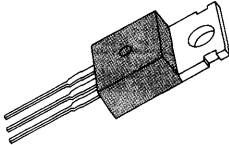
TO-247 FULL PACKAGE N-CANNEL

BVdss(V)	ID(on)(A)	RDS(on)(Ω)	Part Number	Remark	Package
80.00	8.30	0.230	IRFS133		
	9.70	0.160	IRFS131		
	17.30	0.100	IRFS143		
	19.40	0.077	IRFS141		
	23.50	0.080	IRFS153		
	27.50	0.055	IRFS151		
100.00	8.30	0.230	IRFS132		
	9.70	0.160	IRFS130		
	17.30	0.100	IRFS142		
	19.40	0.077	IRFS140		
	23.50	0.080	IRFS152		
	27.70	0.055	IRFS150		
150.00	5.50	0.600	IRFS233		
	6.20	0.400	IRFS231		
	11.00	0.220	IRFS243		
	12.50	0.180	IRFS241		
	17.30	0.120	IRFS253		
	20.70	0.085	IRFS251		
200.00	5.50	0.600	IRFS232		
	6.20	0.400	IRFS230		
	11.00	0.220	IRFS242		
	12.50	0.180	IRFS240		
	17.30	0.120	IRFS252		
	20.70	0.085	IRFS250		
350.00	3.50	1.500	IRFS333		
	3.80	1.000	IRFS331		
	5.50	0.800	IRFS343		
	6.90	0.550	IRFS341		
	9.00	0.400	IRFS353		
	10.40	0.300	IRFS351		
400.00	3.50	1.500	IRFS332		
	3.80	1.000	IRFS330		
	5.50	0.800	IRFS342		
	6.90	0.550	IRFS340		
	9.00	0.400	IRFS352		
	10.40	0.300	IRFS350		
450.00	2.80	2.000	IRFS433		
	3.10	1.500	IRFS431		
	4.80	1.100	IRFS443		
	5.50	0.850	IRFS441		
	8.30	0.500	IRFS453		
	9.00	0.400	IRFS451		
500.00	2.80	2.000	IRFS432		
	3.10	1.500	IRFS430		
	4.80	1.100	IRFS442		
	5.50	0.850	IRFS440		
	8.30	0.500	IRFS452		
	9.00	0.400	IRFS450		

TO-247 FULL PACKAGE P-CHANNEL

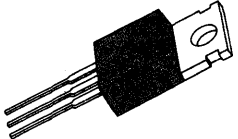
BVdss(V)	ID(on)(A)	RDS(on)(Ω)	Part Number	Remark	Package
- 60.00	- 6.90	0.40	IRFS9133		
	- 8.30	0.30	IRFS9131		
	- 10.40	0.30	IRFS9143		
	- 13.20	0.20	IRFS9141		
- 100.00	- 6.90	0.40	IRFS9132		
	- 8.30	0.30	IRFS9130		
	- 10.40	0.30	IRFS9142		
	- 13.20	0.20	IRFS9140		
- 150.00	- 3.80	1.20	IRFS9233		
	- 4.50	0.80	IRFS9231		
	- 6.20	0.70	IRFS9243		
	- 7.60	0.50	IRFS9241		
- 200.00	- 3.80	1.20	IRFS9232		
	- 4.50	0.80	IRFS9230		
	- 6.20	0.70	IRFS9242		
	- 7.60	0.50	IRFS9240		

TO-220 FULL PACKAGE N-CHANNEL

BV _{dss} (V)	ID(on)(A)	RDS(on)(Ω)	Part Number	Remark	Package
80.00	8.3	0.230	†IRFS533		
	9.5	0.160	†IRFS531		
	12.3	0.100	†IRFS543		
	14.0	0.077	†IRFS541		
100.00	8.3	0.230	†IRFS532		
	9.5	0.160	†IRFS530		
	12.3	0.100	†IRFS542		
	14.0	0.077	†IRFS540		
150.00	5.2	0.600	†IRFS633		
	6.0	0.400	†IRFS631		
	8.5	0.220	†IRFS643		
	9.7	0.180	†IRFS641		
200.00	5.2	0.600	†IRFS632		
	6.0	0.400	†IRFS630		
	8.5	0.220	†IRFS642		
	9.7	0.180	†IRFS640		
250.00	5.0	0.680	†IRFS635		
	5.7	0.450	†IRFS634		
	6.8	0.340	†IRFS645		
	7.8	0.280	†IRFS644		
350.00	3.3	1.500	†IRFS733		
	3.8	1.000	†IRFS731		
	4.8	0.800	†IRFS743		
	5.5	0.550	†IRFS741		
400.00	3.3	1.500	†IRFS732		
	3.8	1.000	†IRFS730		
	4.8	0.800	†IRFS742		
	5.5	0.550	†IRFS740		
450.00	2.7	2.000	†IRFS833		
	3.1	1.500	†IRFS831		
	3.8	1.100	†IRFS843		
	4.4	0.850	†IRFS841		
500.00	2.7	2.000	†IRFS832		
	3.1	1.500	†IRFS830		
	3.8	1.100	†IRFS842		
	4.4	0.850	†IRFS840		
550.00	1.9	2.000	†SSS4N55		
	4.0	1.500	†SSS6N55		
600.00	1.9	1.100	†SSS4N60		
	4.0	0.850	†SSS6N60		

† Under Development

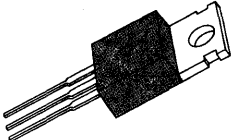
TO-220 FULL PACKAGE P-CHANNEL

BV _{dss} (V)	ID(on)(A)	RDS(on)(Ω)	Part Number	Remark	Package
- 60.00	- 6.8	0.400	†IRFS9533		
	- 8.1	0.300	†IRFS9531		
	- 10.2	0.300	†IRFS9543		
	- 12.9	0.200	†IRFS9541		
100.00	- 6.8	0.400	†IRFS9532		
	- 8.1	0.300	†IRFS9530		
	- 10.2	0.300	†IRFS9542		
	- 12.9	0.200	†IRFS9540		
150.00	- 3.7	1.200	†IRFS9633f		
	- 4.4	0.800	†IRFS9631		
	- 6.1	0.700	†IRFS9643		
	- 7.4	0.500	†IRFS9641		
200.00	- 3.7	1.200	†IRFS9632		
	- 4.4	0.800	†IRFS9630		
	- 6.1	0.700	†IRFS9642		
	- 7.4	0.500	†IRFS9640		

† Under Development

LOGIC LEVEL SFET

TO-220 N-CHANNEL

BV _{dss} (V)	ID(on)(A)	RDS(on)(Ω)	Part Number	Remark	Package
50.00	7.80	0.30	IRLZ10		
	13.00	0.15	IRLZ20		
	23.10	0.07	IRLZ30		
	39.80	0.04	IRLZ40		
60.00	7.80	0.30	IRLZ14		
	13.00	0.15	IRLZ24		
	23.00	0.07	IRLZ34		
	39.80	0.04	IRLZ44		
80.00	4.80	0.75	IRL511		
	7.90	0.40	IRL521		
	12.80	0.22	IRL531		
	23.70	0.11	IRL541		
100.00	4.80	0.75	IRL510		
	7.90	0.40	IRL520		
	12.80	0.22	IRL530		
	23.70	0.11	IRL540		
150.00	2.60	2.40	IRL611		
	4.00	1.20	IRL621		
	8.00	0.50	IRL631		
	16.00	0.22	IRL641		
200.00	2.60	2.40	IRL610		
	4.00	1.20	IRL620		
	8.00	0.50	IRL630		
	16.00	0.22	IRL640		

N-CHANNEL MOSFET TO-220

V_{DD} I_D	50	60	80	100	120	150	180	200	250	350	400	450	500	550	600	700	800	850	900	950	1000
1.3									IRF 713	IRF 712											
1.5								IRF 711	IRF 710	IRF											
2					IRF 613		IRF 612	IRF 614			IRF 823	IRF 822					SSP 2N85	SSP 2N90	SSP 2N95		SSP 2N100
2.5					IRF 611		IRF 610		IRF 723	IRF 722	IRF 821	IRF 820									
3									IRF 625	IRF 721	IRF 720						SSP 3N70	SSP 3N80			
3.5									IRF 624												
4						IRF 623		IRF 622				IRF 833	IRF 832	SSP 4N55	SSP 4N60	SSP 4N70	SSP 4N80	SSP 4N85	SSP 4N90	SSP 4N95	SSP 4N100
4.5											IRF 831	IRF 830									
5						IRF 621		IRF 620		IRF 733	IRF 732										
5.5									IRF 731	IRF 730											
6	IRF Z12								IRF 635						SSP 6N55	SSP 6N60	SSP 6N70	SSP 6N80			
7	IRF Z10				SSP 7N12	SSP 7N15	SSP 7N18	SSP 7N20				IRF 843	IRF 842								
8			IRF 523	IRF 522		IRF 633		IRF 632	IRF 634	IRF 743	IRF 742	IRF 841	IRF 840								
9			IRF 521	IRF 520		IRF 631		IRF 630													
10	SSP 10N05	SSP 10N06	SSP 10N08	SSP 10N10						IRF 741	IRF 740										
12		SSP 12N05	IRF 533	IRF 532						IRF 645											
14	IRF Z22		IRF 531	IRF 530						IRF 644											
16	IRF Z20					IRF 643		IRF 642													
18						IRF 641		IRF 640													
24	IRF Z34	IRF 543	IRF 543	IRF 542																	
27-30	IRF Z30	IRF 541	IRF 541	IRF 540																	
35																					

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N-CHANNEL TO-126

V_{DS} I_D	60	100
0.4	IRFA1Z3	
0.5		IRFA1Z0

N-CHANNEL MOSFET TO-3P

V_{DS} I_D	50	60	80	100	120	150	180	200	250	350	400	450	500	550	600	700	800	850	900	950	1000	
2												IRFP 423	IRFP 422					SSH 2N85	SSH 2N90	SSH 2N95	SSH 2N100	
2.5										IRFP 323	IRFP 322	IRFP 421	IRFP 420									
3										IRFP 321	IRFP 320					SSM 3N70	SSH 3N80					
4						IRFP 223		IRFP 222				IRFP 433	IRFP 432	SSH 4N55	SSH 4N60	SSH 4N70	SSH 4N80	SSH 4N85	SSH 4N90	SSH 4N95	SSH 4N100	
4.5												IRFP 431	IRFP 430									
5						IRFP 221		IRFP 220		IRFP 333	IRFP 332							SSH 5N85	SSH 5N90	SSH 5N95	SSH 5N100	
5.5										IRFP 331	IRFP 330											
6														SSH 6N55	SSH 6N60	SSH 6N70	SSH 6N80					
7					SSH 7N12	SSH 7N15	SSH 7N18	SSH 7N20				IRFP 443	IRFP 442									
8				IRFP 122		IRFP 233		IRFP 232		IRFP 343	IRFP 342	IRFP 441	IRFP 440	SSH 8N55	SSH 8N60			SSH 8N85	SSH 8N90	SSH 8N95	SSH 8N100	
9				IRFP 120		IRFP 231		IRFP 230														
10	SSH 10N05	SSH 10N06	SSH 10N08	SSH 10N10						IRFP 341	IRFP 340					SSH 10N70	SSH 10N80					
12			IRFP 133	IRFP 132					IRFP 245			IRFP 453	IRFP 452									
13										IRFP 353	IRFP 352	IRFP 451	IRFP 450									
14			IRFP 131	IRFP 130					IRFP 244													
15										IRFP 351	IRFP 350			SSH 15N55	SSH 15N60							
16						IRFP 243		IRFP 242														
18						IRFP 241		IRFP 240														
20									IRFP 255			SSH 20N45	SSH 20N50									
24			IRFP 143	IRFP 142					IRFP 244													
25						IRFP 253		IRFP 252		SSH 25N35	SSH 25N40											
27			IRFP 141	IRFP 140																		
30						IRFP 251		IRFP 250														
33			IRFP 153	IRFP 152																		
40			IRFP 151	IRFP 150		SSH 40N15		SSH 40N20														
60		SSH 60N06		SSH 60N10																		

N-CHANNEL MOSFET TO-3

V_{ds} I_d	50	60	80	100	120	150	180	200	250	350	400	450	500	550	600	700	800	850	900	950	1000
2												IRF 423	IRF 422					SSM 2N85	SSM 2N90	SSM 2N95	SSM 2N100
2.5										IRF 323	IRF 322	IRF 421	IRF 420								
3										IRF 321	IRF 320					SSM 3N70	SSM 3N80				
4						IRF 223		IRF 222				IRF 433	IRF 432	SSM 4N55	SSM 4N60	SSM 4N70	SSM 4N80	SSM 4N85	SSM 4N90	SSM 4N95	SSM 4N100
4.5												IRF 432	IRF 430								
5						IRF 221		IRF 220		IRF 333	IRF 332							SSM 5N85	SSM 5N90	SSM 5N95	SSM 5N100
5.5										IRF 331	IRF 330										
6														SSM 6N55	SSM 6N60	SSM 6N70	SSM 6N80				
7				IRF 122	SSM 7N12	SSM 7N15	SSM 7N18	SSM 7N20				IRF 443	IRF 442								
8			IRF 123	IRF 120		IRF 233		IRF 232		IRF 343	IRF 342	IRF 441	IRF 440	SSM 8N55	SSM 8N60			SSM 8N85	SSM 8N90	SSM 8N95	SSM 8N100
9			IRF 121			IRF 231		IRF 230													
10	SSM 10N05	SSM 10N06	SSM 10N08	SSM 10N10						IRF 341	IRF 340					SSM 10N70	SSM 10N80				
12			IRF 133	IRF 132								IRF 453	IRF 452								
13										IRF 353	IRF 352	IRF 451	IRF 450								
14			IRF 131	IRF 130																	
15										IRF 351	IRF 350			SSM 15N55	SSM 15N60						
16						IRF 243		IRF 242													
18						IRF 241		IRF 240													
20									IRF 255			SSM 20N45	SSM 20N50								
24			IRF 143	IRF 142					IRF 254												
25						IRF 253		IRF 252		SSM 25N35	SSM 25N40										
27			IRF 141	IRF 140																	
30						IRF 251		IRF 250													
33			IRF 153	IRF 152																	
40			IRF 151	IRF 150		SSM 40N15		SSM 40N20													
60		SSM 60N06		SSM 60N10																	

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P-CHANNEL TO-220

$I_b \backslash V_{DS}$	- 60	- 100	- 150	- 200
- 1.5			IRF8613	IRF9612
- 1.75			IRF9611	IRF9610
- 2.5	IRF9513	IRF9512		
- 3	IRF9511	IRF9510	IRF9623	IRF9622
- 3.5			IRF9621	IRF9620
- 5	IRF9523	IRF9522		
- 5.5			IRF9633	IRF9632
- 6	IRF9521	IRF9520		
- 6.5			IRF9631	IRF9630
- 9			IRF9643	IRF9642
- 10	IRF9533	IRF9532		
- 11			IRF9641	IRF9640
- 12	IRF9531	IRF9530		
- 15	IRF9543	IRF9542		
- 19	IRF9541	IRF9540		

P-CHANNEL TO-3

$I_b \backslash V_{DS}$	- 60	- 100	- 150	- 200
- 5.5			IRF9233	IRF9232
- 6.5			IRF9231	IRF9230
- 9			IRF9243	IRF9242
- 10	IRF9133	IRF9132		
- 11			IRF9241	IRF9240
- 12	IRF9131	IRF9130		
- 15	IRF9143	IRF9142		
- 19	IRF9141	IRF9140		

P-CHANNEL TO-3P

$I_b \backslash V_{DS}$	- 60	- 100	- 150	- 200
- 5.5			IRFP9233	IRFP9232
- 6.5			IRFP9231	IRFP9230
- 9			IRFP9243	IRFP9242
- 10	IRFP9133	IRFP9132		
- 11			IRFP9241	IRFP9240
- 12	IRFP9131	IRFP9130		
- 15	IRFP9143	IRFP9142		
- 19	IRFP9141	IRFP9140		

N-CHANNEL D-PAK

$I_b \backslash V_{DS}$	50	80	100	200
2.1				IRFR212
2.7				IRFR210
3.8				IRFR222
4.6				IRFR220
4.7		IRFR111	IRFR110	
6.7	IRFR012			
8.2	IRFR010			
8.4		IRFR121	IRFR120	
14	IRFR022			
15	IRFR020			

P-CHANNEL D-PAK

$I_b \backslash V_{DS}$	- 50	- 80	- 100	- 200
- 1.6				IRFR9212
- 2.0				IRFR9210
- 2.8				IRFR9222
- 3.2		IRFR9111	IRFR9110	
- 3.6				IRFR9220
- 4.5	IRFR9012			
- 5.3	IRFR9010			
- 5.9		IRFR9121	IRFR9120	
- 9	IRFR9022			
- 9.9	IRFR9020			

N-CHANNEL MOSFET TO-247 F/P

P-CHANNEL TO-247 F/P

I_D \ V_{DS}	80	100	150	200	350	400	450	500
4							IRFS 433	IRFS 432
4.5							IRFS 431	IRFS 430
5					IRFS 333	IRFS 332		
5.5					IRFS 331	IRFS 330		
7							IRFS 443	IRFS 442
8			IRFS 233	IRFS 232	IRFS 343	IRFS 342	IRFS 441	IRFS 440
9			IRFS 231	IRFS 230				
10					IRFS 341	IRFS 340		
12	IRFS 133	IRFS 132					IRFS 453	IRFS 452
13					IRFS 353	IRFS 352	IRFS 451	IRFS 450
14	IRFS 131	IRFS 130						
15					IRFS 351	IRFS 350		
16			IRFS 243	IRFS 242				
18			IRFS 241	IRFS 240				
24	IRFS 143	IRFS 142						
25			IRFS 253	IRFS 252				
27	IRFS 141	IRFS 140						
30			IRFS 251	IRFS 250				
33	IRFS 153	IRFS 152						
40	IRFS 151	IRFS 150						

I_D \ V_{DS}	-60	-100	-150	-200
-5.5			IRFS 9233	IRFS 9232
-6.5			IRFS 9231	IRFS 9230
-9			IRFS 9243	IRFS 9242
-10	IRFS 9133	IRFS 9132		
-11			IRFS 9241	IRFS 9240
-12	IRFS 9131	IRFS 9230		
-15	IRFS 9143	IRFS 9242		
-19	IRFS 9141	IRFS 9140		

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1. AUDIO APPLICATION

A. FM Front End

Type	Package	Function			Use			Remark
		RF	OSC	MIXER	R/C	Car	Hi-Fi	
KA2249/D	7 SIP/8 SOP	*	*	*	*			$V_{CC} = 2 \sim 7V$
KA22495	9 SIP	*	*	*	*		*	$V_{CC} = 1.6 \sim 6V$
KA22496	9 SIP	*	*	*	*		*	$V_{CC} = 1.6 \sim 6V$

B. FM/AM RF, IF and Detector System, AM Tuner System

Type	Package	Function						Use			Remark
		AM RF CONV	AM IF AMP	AM DET	FM IF AMP	FM DET	S/M	R/C	Car	Hi-Fi	
KA22461	19 ZSIP	*	*	*					*		$V_{CC} = 8 \sim 15V$
KA2243	16 DIP		*	*	*	*	*	*		*	$V_{CC} = 3 \sim 14V$
KA2244	9 SIP				*	*	*		*		$V_{CC} = 8 \sim 16V$
KA22441	16 ZSIP				*	*	*		*		$V_{CC} = 6 \sim 14V$
KA2245	7 SIP				*	*			*		$V_{CC} = 8 \sim 15V$
KA2247	16 DIP	*	*	*	*	*	*	*			$V_{CC} = 3 \sim 8V$
KA22471	16 DIP	*	*	*	*	*	*	*			$V_{CC} = 3 \sim 8V$
KA2248A/D	16 DIP/16 SOP	*	*	*	*	*	*	*			$V_{CC} = 1.8 \sim 6V$

C. FM Stereo Multiplex Decoder

Type	Package	PLL	Lamp Driver	VCO Stop	Sep. Cont.	Use			Remark
						R/C	Car	Hi-Fi	
KA2261	16 DIP	*	*	*	*	*	*		Sep = 45dB
KA2262	16 ZSIP	*	*	*	*		*		SNC/HCC
KA2263	9 SIP	*	*	*		*	*		Sep = 45dB
KA2264/D	9 SIP/16 SOP	*	*	*		*			$V_{CC} = 1.8 \sim 5V$
KA2265	16 DIP	*	*	*	*			*	VCO Non-Adjusting MPX
KA2266	16 ZSIP	*	*	*	*		*		Pilot Canceller SNC/HCC

† New Product

†† Under Development

D. Audio Power Amplifier

Type	Package	V _{CC} (V)	Output Power		Use			Remark
			R _L = 4 ohm	R _L = 8 ohm	R/C	Car	Hi-Fi	
KA2201/N/B	8 DIP	6		0.5W	*			V _{CC} = 3 ~ 14V
		9		1.2W				
KA2206	12 DIP/F	9	2.3W × 2		*			V _{CC} = 4.5 ~ 11V
KA22062S	12 SIP H/S	12	4.5W × 2		*			V _{CC} = 6 ~ 15V
KA22063S	12 SIP H/S	12	4.5W × 2		*			V _{CC} = 6 ~ 15V
††KA22065	12 SIP H/S	12	4.6W × 2		*			V _{CC} = 6 ~ 15V
KA2214	14 DIP H/S	9		1.2W × 2	*			V _{CC} = 3 ~ 16V
KA2209	8 DIP	3	110mW × 2		*			V _{CC} = 1.8 ~ 9V
KA2210	12 SIP H/S	13.2	5.5W × 2			*		V _{CC} = 10 ~ 16V
KA22101	12 ZSIP H/S	13.2	23W			*		V _{CC} = 9 ~ 18V
†KA22102	17 ZSIP H/S	13.2	15W × 2			*		V _{CC} = 9 ~ 18V
†KA22103	17 ZSIP H/S	13.2	19W × 2			*		V _{CC} = 9 ~ 18V
KA2211	12 SIP H/S	13.2	5.8W × 2			*		V _{CC} = 10 ~ 18V
KA2212	9 SIP	6		0.5W	*			V _{CC} = 3.5 ~ 12V
LM386/S/D	8 DIP/9 SIP/8 SOP	6		0.325W	*			V _{CC} = 4 ~ 12V
KA2213	14 DIP H/S	6	1W		*			Included Pre-Amp with ALC
†KA22130	16 DIP	6	1W		*			Included Pre-Amp with ALC
KA22131	24 SOP	3	69mW × 2 (R _L = 16Ω)		*			V _{CC} = 1.8 ~ 3.6V Included Auto Reverse Pre-AMP
†KA22134	16 DIP	3	27mW × 2 (R _L = 32Ω)		*			V _{CC} = 1.8 ~ 6V Dual PRE + POWER AMP with Volume Control
KA22135	22 DIP-S	3	28mW × 2 (R _L = 32Ω)		*			V _{CC} = 2 ~ 7.5V Dual PRE-POWER AMP and DC Motor Speed Controller
††KA22136	28 SOP	3	28mW × 2 (R _L = 32Ω)		*			V _{CC} = 2 ~ 5V Dual PRE-POWER AMP with Volume Control and DC Motor Speed Controller
KA8602	8 DIP/8 SOP	6	300mW (R _L = 32Ω)		*			V _{CC} = 2 ~ 16V R _L = 8Ω ~ 100Ω

† New Product

†† Under Development

E. Pre-Amplifier

Type	Package	Function	Use			Remark
			R/C	Car	Hi-Fi	
KA1222	8 SIP	Dual Pre-amplifier	*			V _{CC} = 2.5~6V
KA2220	9 SIP	Pre-amplifier with ALC	*		*	V _{CC} = 3.5~14V
KA2221	8 SIP	Dual Pre-amplifier	*	*	*	Included Voltage Regulator
KA22211	8 SIP	Dual Pre-amplifier	*	*	*	V _{CC} = 5~14V
KA2223	16 DIP	5 Band Mono Graphic EQ AMP	*	*	*	V _{CC} = 5~13V
KA22231	28 SOP	5 Band Dual Graphic EA AMP	*			V _{CC} = 1.6~6V
KA22232	20 SOP	3 Band Dual Graphic EQ AMP	*			V _{CC} = 1.6~6V
KA22233	22 DIP	3 Band Dual Graphic EQ AMP	*	*	*	V _{CC} = 5~15V
KA22234	24 ZSIP-S	5 Band Dual Graphic EQ AMP	*	*	*	V _{CC} = 3.5~14V
KA22235	18 ZSIP	5 Band Mono Graphic EQ AMP	*	*	*	V _{CC} = 3.5~16V
KA2224	14 DIP	Dual Pre-amplifier with ALC	*		*	V _{CC} = 4~13V
KA22241	9 SIP	Dual Pre-amplifier with ALC	*			V _{CC} = 4.5~14V
KA22242	10 SIP	Dual Pre-amplifier with ALC	*			V _{CC} = 4~12V
KA2225/D	16 DIP/16 SOP	Dual Pre-amplifier with Mute	*			V _{CC} = 1.6~5V
KA22261	16 DIP	Dual Pre-amplifier with ALC	*		*	Included REC AMP
KA2228	21 ZSIP-S	Dual Pre-amplifier system	*		*	V _{CC} = 3.5~7V
††KA22291	24 DIP-S	Quad Pre-amplifier system	*		*	V _{CC} = 5~14V
KA7226	14 DIP	Dual Pre-amplifier with ALC	*		*	V _{CC} = 3~16V

F. LED Level Meter Driver

Type	Package	Function	Remark
KA2281	16 DIP	5 Dot dual red/yellow/green LED driver	VU scale, input amplifier Reference voltage included
KA2283	16 DIP	5 Dot dual red/yellow/green LED driver	VU scale, input amplifier Reference voltage included
KA2284	9 SIP	5 Dot mono green LED driver	VU scale Reference voltage included
KA2285	9 SIP	5 Dot mono red LED driver	VU scale Reference voltage included
KA2286	9 SIP	5 Dot mono red LED driver	Linear scale Reference voltage included
KA2287	9 SIP	5 Dot mono green LED driver	Linear scale Reference voltage included
KA2288	16 DIP	7 Dot mono LED driver	VU scale Reference voltage included

† New Product

†† Under Development

G. Music Selector

Type	Package	Function	Remark
KA2230	22 DIP	9-Program Random Selector	$V_{CC} = 5 \sim 14V$
KA2231	9 SIP	Audio Level Sensor	$V_{CC} = 3.5 \sim 14V$

H. 1 Chip Radio

Type	Package	Function	Remark
KA22421/D	16 DIP/16 SOP	AM 1 Chip Radio	$V_{CC} = 2 \sim 5V$
†KA22426	28 SOP	AM/FM 1 Chip Radio	$V_{CC} = 1.6 \sim 6V$
KA22427	16 DIP	AM/FM 1 Chip Radio	$V_{CC} = 3 \sim 12V$
†KA22429	16 SOP	FM 1 Chip Radio	$V_{CC} = 1.8 \sim 6V$
††KA2291	24 SOP	FM F/E + AM/FM IF	$V_{CC} = 2 \sim 9V$
††KA2292	24 DIP-S	AM/FM TUNER + MPX	$V_{CC} = 1.8 \sim 7V$
††KA2293	24 DIP-S	AM/FM TUNER + MPX	$V_{CC} = 1.8 \sim 7V$

I. Noise Reduction

Type	Package	Function	Remark
KA2270	16 DIP	dBX Type	$V_{CC} = 4.7 \sim 16V$
KA2271	16 DIP	Dolby B Type	$V_{CC} = 8 \sim 16V$
†KA22711	16 DIP	Dolby B Type	$V_{CC} = 5 \sim 16V$
†KA22712	16 DIP	Dolby B Type	$V_{CC} = 6.5 \sim 16V$
KA2272/D	16 ZSIP/16 SOP	FM Noise Canceller	$V_{CC} = 8 \sim 15V$
KA2273	14 DIP	DNR for Car Stereo	$V_{CC} = 4.4 \sim 18V$

J. CD Player

Type	Package	Function	Remark
KA9256	10 SIP H/S	Dual Amp for CDP Motor Driver	$V_{CC} = 15V$, $V_{EE} = -15V$
KA9257	12 SIP H/S	Dual Amp for CDP Motor Driver	$V_{CC} = 5V$
†KA9255	22 SOP	PWM Motor Driver for CDP	$V_{CC} = 3.5 \sim 12V$
†KS5990	80 FQP	16K SRAM + Digital Signal Processor	$V_{CC} = 5V$
†KS5991	80 FQP	Processor	$V_{CC} = 3.4V$
††KA9210	80 FQP	16K SRAM + DSP + Digital Out 1	$V_{CC} = 5V$
†KA8309	48 QFP	Servo Signal Processor	$V_{CC} = 5V$
†KA9201	30 SOP	RF AMP for CDP	$V_{CC} = 5V$
††KDA0313	20 SOP	13 Bit D/A Converter	$V_{CC} = 5V$
†KDA0316	20 DIP/20 SOP	16 Bit D/A Converter	$V_{CC} = 5V$

K. DAT

Type	Package	Function	Remark
††KA9301	44 FQP	Pre Signal Processor	V _{CC} = 5V
††KA9302	28 FQP	Data Strobe	V _{CC} = 5V
††KA9310	100 FQP	Digital Signal Processor	V _{CC} = 5V
††KA9320	80 FQP	Servo Control	V _{CC} = 5V

L. DC Motor Speed Control

Type	Package	Function	Remark
KA2401	8 DIP	DC Motor Speed Controller	V _{CC} = 4 ~ 12V
KA2402	8 DIP	DC Motor Speed Controller	V _{CC} = 1.6 ~ 8V
KA2404	TO-92L	DC Motor Speed Controller	V _{CC} = 4 ~ 12V
KA2407	TO-126	DC Motor Speed Controller	V _{CC} = 3.5 ~ 14.4V

M. μ-COM

Type	Package	Function	Remark
††KS55C232	64 FQP	Digital Tuning System (DTS) for Car Stereo	V _{CC} = 5V, V _{EE} = -5V
††KS56C820	80 FQP	System Control for CDP	V _{CC} = 5V, V _{EE} = -5V
††KS56C460	64 DIP-S	System Control for CDP	V _{CC} = 5V, V _{EE} = -5V

† New Product
 †† Under Development

2. VIDEO APPLICATION

A. TV Use

Application	Type	Package	Circuit Function
SIF System	KA2101	14 DIP	IF amp, IF limiter, IF detector
SIF Subsystem for MPX	KA2105	9 SIP	IF amp, IF limiter, IF detector
Sound System	KA2102A	14 DIP H/S	KA2101 + 2.4W audio power amp
Sound MPX (Two Carrier System in Korea)	KA2268N	28 DIP	SIF amp, IF limiter, IF detector, LED driver, Mode SW, Matrix, VCO
	KA22682		
Sound MPX (Japan)	††KA22683	30 DIP-S	Detector, Limiter, Band pass filter, Trap, Stereo matrix presense, Volume, Tone, Balance control, TV/AUX select
Sound Muting	KA2103L	9 SIP	Hori sync detector, Integrator, Comparater, Voltage controller
Auto Power Off + Sound Muting	KA2104	9 SIP	KA2103 + auto power off control
VIF System	KA2911	16 DIP	VIF amp, Limiter, Video detector, Video amp, Noise invert, AGC detector, IF AGC, AFT, Reverse RF AGC
	KA2916	16 DIP	Forward RF AGC version of KA2911
	KA2912	14 DIP H/S	VIF amp, Limiter, Video detector, Video amp, IF AGC, Forward RF AGC, Noise canceller
VIF + SIF System	KA2913A	16 DIP	VIF amp, Limiter, Video detector, IF AGC, Forward RF AGC, SIF limiter, Sound, detector
	KA2917	16 DIP	Reverse RF AGC version of KA2913A
	KA2914A	24 DIP	VIF amp, Limiter, Video detector, Video AFT, IF AGC, Reverse RF AGC, SIF amp, SIF limiter, Sound detector
	KA2918	24 DIP	Forward RF AGC version of KA2914A
	KA2919	30 DIP-S	VIF amp, Video detector, AFT, IF AGC, Reverse RF AGC, Noise canceller, Video amp, SIF detector, Limiter amp, Mute, Attenuator, AF amp
	KA2922	20 DIP	VIF amp, Video Det, AFT, Noise Canceller, IF AGC, Forward RF AGC, Limiter amp, FM Det, Mute
	KA2923	20 DIP	VIF amp, Video Det, AFT, Noise canceller, IF AGC, Reverse RF AGC, Limit amp, FM Det, Mute
Quasi-IF	††KA2924	20 DIP-S	VIF amp, Quasi-IF amp, Video detector, SIF detector, AGC, AFT, B/W noise canceller
VIF + SIF + Deflection	KA2915	28 DIP	VIF amp, Limiter, Video detector, Video AFT, IF AGC, Forward RF AGC, SIF amp, SIF limiter, SIF detector, Sync separator, Hori OSC/driver/AFC, OSC/pre-driver
NTSC Chroma + Deflection + Video System	KA2153	42 DIP	ACC amp./detector, Killer detector, Phase detector, CW OSC, Demodulator, Sawtooth gen, APC, X-ray protection, Hori OSC/drive, Vert OSC/amp, Reverse amp
	KA2155	30 DIP-S	Video tone/contrast, Pedestal amp, Bright control, Color demodulator, APC, Tint control, VCO, ACC, Color killer, Hori OSC/AFC, Predriver, Sync separator, Burst gate, Vert blank/driver, Ramp generator, X-ray protection
	KA2156		

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TV Use (Continued)

Application	Type	Package	Circuit Function
PAL Chroma + Deflection + Video System	KA2154	42 DIP	ACC amp./detector, Killer detector, Phase detector, CW OSC, Demodulator, Sawtooth-Gen, APC, X-ray protection, Hori OSC/drive, Vert OSC/amp, Reverse amp
NTSC C/TV 1 Chip	††KA2159	42 DIP-SH	VIF, SIF, Video, Chroma Deflection Circuit
Vertical System	KA2130A	10 DIP H/S	Vert OSC/driver/output, Sawtooth generator
	KA2136	12 DIP/F	Synchronization circuit, OSC, Ramp generator, High power gain amplifier, Flyback Generator, Voltage regulator
Vertical Output	KA2131	10 SIP H/S	Driver, Output, Flyback generator, Pulse shaper
Horizontal System	KA2135	12 SIP	Polarity SW, AFC, Hori OSC/preamp, Pulse width adj, X-ray protector
	KA2137	16 DIP	Noise gated sync separator, Vert sync separator, Hori OSC with frequency limiter, Protection circuit phase comparator, Sync and OSC pulse, flyback and OSC pulse, Loop gain and time constant switching, Composite blanking, Key pulse generator, Output stage with high current capability
Deflection System	KA2133	16 DIP H/S	Vert OSC/driver/output, Sawtooth generator, Hori OSC/pre-driver, AFC
	KA2134	18 DIP	Sync separator, Noise detector, Hori/OSC/buffer, AFC, Vert OSC/driver/amp, Ramp generator, X-ray protector
	††KA2138	20 DIP	Vert OSC, Ramp generator, Sampling type, DC voltage control, Horiz OSC, AFC X-ray protector, Horiz phase shifter, Horiz pulse duty setting
Remocon Transmitter	KS5803A	16 DIP	Key In/output, Driver, Output control, OSC, Data register, Controller
	KS5803B	20 SOP	
	†KS5410	20 SOP	Oscillator, Key input, Data code generator, Timing generator, Strobe signal generator, REM-out
Infrared Preamp	KA2181	8 SIP	ALC, Input separation stage, Output gain control
	KA2182	8 SIP	ALC, Input separation stage, Output gain control, Low voltage use amp
	KA2183		
	†KA2184	8 SIP	ALC, Limite amp, BPF, Detector, Husteresis Comparator
DC Volume & Tone Control	KA2107	12 SIP	Tone control, Balance control, Volume control, Output amp
Sync Separator	KA2605	9 SIP	Phase Inverter, Hori sync separator, Vert sync separator, Composite sync separator, Vertical filter, Horizontal filter
	KA2606	9 SIP	Phase Inverter, Hori sync separator, Hori sync compensation, Composite sync separator, Vertical filter, Horizontal filter
R.G.B. Interface	KA6101	18 DIP	R.G.B. clamp, R.G.B. amp, Contrast control, Brightness control, Clamp pulse generator, R/Y, G/Y, B/Y switch, Switching pulse generator
	KA6102	18 DIP	R.G.B. clamp R.G.B. amp, Contrast control, Brightness control, Clamp pulse generator, R/Y, G/Y, B/Y switch, Switching pulse generator
Audio & Video Switch	KA2186	8 DIP	Switching Circuit Reference (Low Impedance)
Prescaler	††KA2185	20 DIP	Pre-amplifier, 1/8, 1/32, 1/33 Prescaler counter, OSC, PLL, Shift register

† New Product

†† Under Development

B. VTR & Camcorder

Application		Device	Package	Circuit Function
REC/PB Pre-amp		KA2944	28 DIP	Sync tip clamp, Dynamic emphasis, Main pre-emphasis, White/dark clip, Frequency modulator, REC buffer amp, FM AGC, DOC, Pre-amp, SW amp
		†KA8102	22 DIP SH	EQ amp, Current amp, Pre-amp, Chrominance amp, Peaking amp, AGC amp
		†KA8115	22 DIP SH	EQ amp, Current amp, Pre-amp, Chrominance amp, Peaking amp
		††KA8112	42 DIP SH	4 CH. REC/PB amp
S-VHS Sub Emphasis		†KA8106	18 DIP	NL processor, VHS & S-VHS SW SP/EP Mode & PB/REC SW
Video Signal Processor	Luminance Processor	KA2945	28 DIP	Video AGC, EE monitor squelch, FM limiter, FM demodulation, Dynamic de-emphasis, Noise cancel, Y/C mix, Squelch, Sync separation, Video output amp
		†KA8103	48 DIP SH	Comb filter, Detail enhancer, White clip, Picture control, Line noise canceller, Sync LPF, Main de-emphasis, LPF, Clamp, Edit control, DOC
		††KA8113	30 DIP SH	AGC, SYNC sep, Detail enhancer, Non-linear emphasis, Main emphasis, 75Ω driver, FMAGC, DOC, Line noise canceller, Noise canceller, Picture control
		††KA8108	54 DIP SH	Y/C comb filter, QV/QH character level 12dB amp, Outline compensation
	Chrominance Processor	KA2988	28 DIP	Auto color, Burst pre-emphasis, Converter, AFC, APC, VCO (160fH), Sub-converter, 4-Phase 40fH Signal generator, ID input, VCO (3.579545MHz)
		†KA8104	30 DIP SH	320fH(NTSC)/321fH(PAL) VCO, REC LPF, Edit control, PB input signal level compensator, fsc Multiplier (2fsc), Field start inhibit, High speed APC circuit, APC reference control
		††KA8109	24 DIP	Built-in filter (Rec 629KHz LPF, 4.21MHz BPF, 3.58MHz BPF), 320fH VCO, No adjust carrier balance/VCO
Luminance/Chrominance 1-Chip	††KA8111	36 DIP SH	YNR, CNR, Edit control, Double noise canceller, D.C.C.	
PAL/SECAM/SVHS Detector		††KA8107	16 ZIP	
Audio Processor		KA2983	18 DIP	REC/PB Pre-amplifier, Line amp, ALC, Analog SW, REC/PB/Multing control, REC amplifier
		KA8401	24 ZIP SH	EP/SP SW, REC/PB SW, PB/EE SW, REC/EE SW, Line muting SW, ALC, Line amp, REC amp, PB EQ amp
		††KA8404	42 DIP	Hi-Fi Audio processor
		††KA8405	30 DIP	Hi-Fi In/Out MPX
Digital Servo Controller		†KA8303	42 DIP SH	Speed/Phase servo for VTR drum and capstan. Many built-in functions including special playback and extended recording.
		†KA8308	30 DIP SH	Speed/Phase servo for VCR DRUM and capstan serial mode input, Viss, STILL, SLOW, etc.
		†KA8313/4	30 DIP SH	Speed/Phase servo for VCR DRUM and capstan motor, still, slow
		††KA8316	56 DIP SH	Speed/Phase servo for VCR DRUM and capstan motor, 70-search speed, fine slow, Quasi V-pulse position VISS code write/read
		††KA8318	80 QFP	Camcorder 1 chip
Servo Control Amplifier		KA8302	12 SDIP	CTL amp, FG amp, Doubler, Schmitt trigger
		KA8312	12 SDIP	CTL AMP, FG AMP, Doubler, Schmitt trigger, 1/2 block

† New Product
 †† Under Development

VTR & Camcorder (Continued)

Application	Device	Package	Circuit Function	
A/V Switch	KA8402	7 SIP	2-Input switch	
	KA8403	9 SIP	3-Input switch	
VHF RF Modulator	KA2981	16 DIP	Video clamp, White clip AM modulator, Sound FM modulator, Carrier OSC with SAW channel select SW, 6.2V	
Motor Driver	KA8301	10 SIP H/S	Pre amp, Driver, Logic circuit	
	KA8304	12 SIP H/S 12 ZIP H/S	Control amp, CW/CCW, Hall amp, 2-phase DRUM motor driver	
	KA8306	10 SIP H/S	Control circuit, Protect circuit, Dual motor driver	
	KA8310	20 ZIP	2 phase DC brushless hall motor driver IC DRUM motor, CTL amp, Hall amp, CW/CCW, Driver, TSD	
	††KA8311	30 DIP H/S	3 phase capstan DD motor driver	
Demodulator	KA2914A	24 DIP	VIF amp, Limiter, Video detector, Video AFT, IF AGC, Reverse RF AGC, SIF amp, SIF limiter, Sound detector	
	KA2917	16 DIP	VIF amp, Limiter, Video detector, IF AGC, Reverse RF AGC, SIF limiter, Sound detector	
	KA2919	30 SDIP	VIF amp, Video detector, AFT, IF AGC, Reverse RF AGC, Noise canceller, Video amp, SIF detector, Limiter amp, Mute, Attenuator, AF amp	
	KA2923	20 DIP	VIF amp, Video Det, AFT, Noise canceller, IF AGC, Reverse RF AGC, Limit amp, FM Det, Mute	
Character Generator	††KS5512	32 SOP	Sync separator & OSC, Character memory & ROM, Data/Address SW, Video output, NTSC/PAL = 8 colors each	
	††KS5513	42 DIP SH	Character generator + sync detector	
CCD Delay Line	††KS7100	8 DIP	Clamp, CCD, Bias, S&H, Buffer, Clock driver, 1H delay (NTSC)	
	††KS7104	8 DIP	Clamp, CCD, Bias, S&H, Buffer, Clock driver, 1H delay (NTSC)	
	††KS7105	8 DIP	Clamp, CCD, Bias, S&H, Buffer, Clock driver, 1H delay (PAL)	
	††KS7106	8 DIP	Clamp, CCD, Bias, S&H, Buffer, Clock driver, 0.5H delay (PAL)	
	††KS7107	8 DIP	Clamp, CCD, Bias, S&H, Buffer, Clock driver, 1H delay (NTSC)	
CCD Time Generator	††KS7210	80 QFP	H/V register driving pulse generator	
CCD Clock Driver	††KS7226	20 SOP	V Driver for CCD area sensor	
Sound MPX	KA22682	28 DIP	SIF amp, IF limiter, IF detector, LED driver, Mode SW, Matrix, VCO (Two Carrier System in Korea)	
	†KA2269	42 SDIP	Decoder (Sound MPX in USA)	
	††KA2270	16 DIP/SOP	dbx NR (Sound MPX in USA)	
Remocon	Tx	KS5803A	16 DIP	Key In/output, Driver, Output control, OSC, Data register, Controller
		KS5803B	20 SOP	
		†KS5410	20 SOP	
	Pre Amp	KA2181	8 SIP	ALC, Input separation stage, Output gain control
		†KA2184	8 SIP	ALC, Limite amp, BPF, Detector, Hysteresis comparator

† New Product †† Under Development

3. TOY APPLICATION

A. RC Toy Car

Device	Function					Package	V _{cc} (V)	A _v (dB)	Operating Mode	Application
	FW	B/W	Stop	L/R Turn	Turbo					
KA2303	○	○	○			9 SIP	2.5-10	65	RF	3 Function RC TOY CAR (RX)
KA2304	○	○				9 SIP	2.5-10	65	RF	2 Function RC TOY CAR (RX)
KA2305A	○	○	○			12 SIP	3-18	58	RF + PWM	3 Function RC TOY CAR (RX)
KA2306A	○	○	○		○	14 DIP	3-18	58	RF + FM	3 Function+ Turbo (RX)
KA2309	○	○	○	○	○	16 DIP	3-18	58	RF + FM + PWM	7 Function RC TOY CAR (RX)
KA2310	○	○	○	○	○	9 SIP	6-12		RF + FM + PWM	KA2309 Transmitter
KA2311	○	○	○	○	○	16 DIP	3-18	65	RF + FM + PWM	Full Function RC TOY CAR (RX) (L/R Turn on stop state)
KA2312	○	○	○	○	○	9 SIP	6-12		RF + FM + PWM	KA2311 Transmitter
††KA2321	7 step	7 step	○	7 step		28 DIP-S	3-12		RF + PCM	Digital Function RC TOY CAR(RX)
††KA2322	7 step	7 step	○	7 step		20 DIP	3-12		RF + PCM	KA2321 Transmitter (TX)

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4. FDD APPLICATION

Device	Package	Function	Features	Application
KA6201	18 DIP	FDD Read Amp	Gain selector, Peak detector Wave shape	FDD (5.25", 3")
KA6202	16 DIP	2-phase stepping motor driver	330mA output current capability, Dual bridge included, Single input direction control, Low supply current	FDD HDD

5. TELECOMMUNICATION APPLICATION

Application	Type	Package	Circuit Function
Tone Ringer	KA2410	8 DIP	Adjustable warbling and 2 frequency tone External triggering or ringer disable (KA2410) Adjustable supply initiating current (KA2411) Built-in hysteresis
Tone Ringer with Bridge Rectifier	KA2418	8 DIP	Protect against over voltage Low current consumption Allow the parallel operation of 4 devices Built-in hysteresis External component's are minimized High output voltage
DTMF Dialer	KS5808	16 DIP	Direct telephone line operation Standard 2 of 8 key board use Tone output: Bipolar output Mute output: N-CH open drain
	††KS5809	16 DIP	Low power dissipation Single contact key board use Tone output: Bipolar output Mute output: N-CH open drain
	††KS5810	16 DIP	Low power dissipation Single contact key board use 31 digit redial (Column 4 keys) Tone output: Bipolar output Mute output: N-CH open drain
	††KS5811	16 DIP	Low power dissipation Standard 2 of 8 key board use 31 digit redial (# key) Tone output: Bipolar output Mute output: N-CH open drain
	KA2413	16 DIP	Wide operating line voltage and current range Short start up time External components are minimized Internal protection of all inputs
Pulse Dialer with Redial	KS5805A/B	18 DIP	KS5805A: Pin 2; V_{ref} KS5805B: Pin 2; Tone output RC oscillator used as frequency reference DP out, 17 digit redial
	†KS58C/D05 †KS5851/52	18 DIP	KS58C05/KS5851: Pin 2; V_{ref} KS58D05/KD5852: Pin 2; Tone output RC oscillator used as frequency reference DP output, 32 digit redial
	KS58E05 †KS5853	16 DIP	DP output RC oscillator used as frequency reference 32 digit redial
DTMF/Pulse Switchable Dialer	KS58A/B/C/D19/N/E/P †KS58000/1/2/3 KS58A/B/C/D20/N/D †KS58004/5/6/7	22 DIP 18 DIP	Tone/pulse switchable dialing, touch key or slide switch 32 digit redialing & PABX auto-pause time Make/break ratio pin selectable

TELECOMMUNICATION APPLICATION (Continued)

Application	Type	Package	Circuit Function
DTMF/Pulse Switchable with 10 No Memory	KS5822 †KS58500	22 DIP	10 No × 16 digit memory including a redial memory Including PABX auto pause time 10 pps/20 pps pin selectable Make/Break pin selectable On/Off hook memory
	KS58A/B/C/D23N †KS58501/2/3/4	18 DIP	10 No × 16 digit memory including a redial memory Including PABX auto pause time Make/Break pin selectable
DTMF/Pulse Switchable with 20 No. Memory	KS58528/29/30/31/32/ 33/34/35/36/37/38/39	28 DIP 28 SOP	32 digit redial memory with buffer 20 No. × 16 digit repertory memory Make/break ratio (1/2, 2/3) pin selectable Repertory dialing is accessed by direct key or indirect key Flash function can be stored in memory
Speech Network	KA2412A	14 DIP	Transmit/Receiver amplifier Side tone control On chip regulator
Low Voltage Speech Network with Dialer Interface	KA2425A/B	18 DIP	Low Voltage Operation (1.5V) Tx, Rx & side tone gain set by external resistor Loop length equalization for Tx, Rx & sidetone Provides regulated voltage for CMOS dialer DTMF level adjustable with a single resistor A: Mute active low B: Mute active high
	KA8500A/B KA8501A/B KA8502A/B	16 DIP	Adjusts sending and receiving attenuation length Regulated voltage for dialer Linear interface for DTMF Suitable for ceramic transducers Mute function
Speaker Phone with Speech Network	KA8601	48 Shink DIP	*Speaker Phone Low operating voltage (3.0~0.5V) Improved sensitivity (Four-point signal sensing) High attenuator gain range (52dB) *Speech Network Low operating voltage (1.5V: speech) Regulated voltage for dialer Transmit, receive, side tone gains set by external components
Low Power Audio Amplifier	KA8602	8 DIP 8 SOP 9 SIP	Wide supply voltage (2~16V) Low quiescent supply current ($I_{CC} = 2.7mA$: Typ) Easy gain control Minimum external parts Load impedance range (8~100Ω) Mute function ($I_{CC} = 65\mu A$: Typ)
DTMF Receiver	KT3170	18 DIP	Full DTMF Receiver Provides DTMF high and low group filtering Dial tone suppression Adjustable acquisition and release times Integrated bandsplit filter and digital decoder functions High quality and performance Single +5 Volt power supply

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TELECOMMUNICATION APPLICATION (Continued)

Application	Type	Package	Circuit Function
Tone Decoder	LM567C/L	8 DIP 8 SOP	Touch tone decoding Sequential tone decoding Communication paging High stable center frequency LM567L: Micropower (4mW at 5V) dissipation
FM IF Amplifier	MC3361	16 DIP 16 SOP	Small current dissipation (Typ. 3.5mA: V _{CC} = 4.0V) Excellent input sensitivity Communication paging Used to cordless telephone parts required Work from 1.8V to 7.0V
Codec	KT5116 KT8520 ††KT8521	16 CERDIP 24 CERDIP 22 CERDIP	μ-Law: KT5116 μ-Law: KT8520 A-Law: KT8521 ± 5V operation Low power consumption Synchronous or asynchronous operation
Codec Filter	KT3040/A	16 CERDIP	Exceeds all D3/D4 and CCITT spec. ± 5V operation Low power consumption 20dB gain adjust range Sin X/X correction in receive filter TTL and CMOS compatible logic
Combo Codec	KT8554 KT8557 KT8564 KT8567	16 CERDIP 16 CERDIP 20 CERDIP 20 CERDIP	Exceeds all D3/D4 and CCITT spec. Complete CODEC and filtering system including ± 5V operation Low power consumption TTL and CMOS compatible logic Receive push-pull power amp (KT8564/7)
TSAC	KT8555	20 CERDIP	Controls up to 8 COMBO CODEC/Filters Low power consumption Single 5V operation Up to 32 time slots per frame
Line Driver	MC1488 ††KS5788	14 DIP †14 SOP	Conformance EIA standard No. RS-232C & V28 (CCITT) Quad line driver Interface between data terminal equipment (DTE) and data communication equipment (DCE) Current limited output: ± 10mA typ. Power-off source impedance 300 ohms min. Compatible with DTL and TTL, HCTLS families Flexible operating supply range KS5788: Low power CMOS version
Line Receiver	MC1489/A ††KS5789A	14 DIP †14 SOP	Conformance EIA standard No. RS-232C & V28 (CCITT) Quad line receiver Interface between data terminal equipment (DTE) and data communication equipment (DCE) input signal range: ± 30 volts Input threshold hysteresis built in Response control a) Logic threshold shifting b) Input noise filtering KS5789A: Low Power CMOS version

TELECOMMUNICATION APPLICATION (Continued)

Application	Type	Package	Circuit Function
Line Transceiver	KA2654	8 DIP	Conformance EIA Standard No. RS-232C & V28 (CCITT) One Driver & One Receiver on chip Wide supply voltage ($\pm 4.5V - \pm 15V$) Including reference regulator Response control provides TTL compatible
Peripheral Driver Array	KA2655/6/7/8/9	16 DIP 16 SOP	Including 7 NPN darlington-connected transistors These arrays are well suited for driving lamps, relays, or printer hammers in a variety of industrial and consumer applications. High breakdown voltage and internal suppression diodes insure freedom from problems associated with inductive loads
Fluorescent Display Driver	KA2651	18 DIP	Consisting of 8 NPN darlington output stages and associated common-emitter input stages Digit or segment drivers Low input current, internal output pull-down resistor High output breakdown voltage Single or split supply operation
8-Channel Source Driver	KA2580A	18 DIP	TTL, CMOS, PMOS, NMOS compatible High output current ratings Internal transient suppression Efficient input/output pin structure Drive telephone relays, incandescent lamps, and LEDS
	KA2588A	20 DIP	KA2588A: Separated logic and driver supply line
Universal Asynchronous Receiver and Transmitter (UART)	KS5824 KS5812	24 DIP 40 DIP	The data formatting and control to interface serial asynchronous data communications between main system and subsystems. Low power, high speed CMOS process Serial/parallel conversion of data 8 and 9 bit transmission Programmable control register Optional +1, +16, and +64 clock modes Peripheral/modem control functions Double buffered Included 4 UART in one chip (KS5812)
Phase Locked Loop	†KS8800	18 DIP	Dual PLL frequency synthesizer intended for use in 46/49MHz cordless phone 15 Channel selector
Crosspoint Switch	†KT8592	16 DIP	4 × 4 Array of Crosspoints Include 4 to 16 line decoder and latch circuits The switch can be selected by 4 line address
	*†KT8593	40 DIP	12 × 8 Array of crosspoints Include 7 to 96 line decoder and latch circuits The switch can be selected by 7 line address

† New Product
†† Under Development

6. VOLTAGE REGULATOR

A. 3-Terminal Fixed Positive Voltage Regulator

Function	Type	Package	Features	Application
Very High Output Current (3A)	KA78T05	TO-220	Output current in excess of 3A Internal thermal overload protection	5V output voltage
	LM323	TO-3P	Internal short circuit current limiting	5V output voltage
High Output Current ($I_o = 1A$)	MC78XX series	TO-220	Maximum output current 1A External components are minimized Internal protection circuit for output short Positive voltage regulator Variable application control	5V, 5.2V, 6V, 8V, 8.5V, 9V, 10V, 11V, 12V, 15V, 18V and 24V fixed output voltage
	KA340XX series	TO-220	Output current in excess of 1A Very low line regulation: 0.01% Very low load regulation: 0.3%	5V, 6V, 8V, 9V, 10V, 11V, 12V, 15V, 18V and 24V fixed output voltage
Medium Output Current ($I_o = 500mA$)	MC78MXX series	TO-220	Maximum output current 500mA External components are minimized Internal protection circuit for output short Positive fixed output voltage regulator Variable application circuit	5V, 6V, 8V, 10V, 12V, 15V, 18V, 20V and 24V fixed output voltage
Low Output Current ($I_o = 100mA$)	MC78LXXAC series	TO-92	Output current in excess of 100mA External components minimized Internal protection circuit for output short Positive voltage regulator Variable application circuit	2.6V, 5V, 6.2V, 8V, 8.2V, 9V, 12V, 15V, 18V and 24V fixed output voltage

B. 3-Terminal Fixed Negative Voltage Regulator

Function	Type	Package	Features	Application
High Output Current ($I_o = 1A$)	MC79XX series	TO-220	Output current in excess of 1A Internal thermal overload protection Internal short circuit current limiting	-2V, -5V, -6V, -8V, -9V, -10V, -12V, -15V, -18V and -24V fixed output
Medium Output Current ($I_o = 500mA$)	MC79MXX series	TO-220	Output current in excess of 500mA Internal thermal over load protection Internal short circuit current limiting	-5V, -6V, -8V, -10V, -12V, -15V, -18V and -24V fixed output voltage
Low Output Current ($I_o = 100mA$)	MC79L05AC	TO-92	Output current in excess of 100mA Internal short circuit current limiting External components minimized	-5V output voltage

† New Product

†† Under Development

C. Adjustable Voltage Regulator

Function	Type	Package	Features	Application
Precision Voltage Regulator	LM723	14 DIP 14 SOP	Positive or negative supply operation Series, shunt, switching or floating operation 0.01% line and load regulation Output current up to 150mA without external pass transistor	Output voltage adjustable from 2 to 37V
Adjustable Regulator	LM317	TO-220	Output current in excess of 1.5A Positive output adjustable from 1.2V to 37V Internal short circuit current limiting	Floating operation for high voltage operation Eliminates stocking many fixed voltages
	KA337	TO-220	Output current in excess of 1.5A Negative output adjustable from -1.2V to -37V Internal short circuit current limiting	Floating operation for high voltage operation Eliminates stocking many fixed voltages
	KA350	TO-3P	Output current in excess of 3A Positive output adjustable from 1.2V to 33V Internal short circuit current limiting	Floating operation for high voltage operation Eliminates stocking many fixed voltages
	†KA317L	TO-92	Output current in excess of 100mA Positive output adjustable from 1.2V to 37V Internal short circuit current limiting	Floating operation for high voltage operation Eliminates stocking many fixed voltages
	†KA317M	TO-220	Output current in excess of 500mA Positive output adjustable from 1.2V to 37V Internal short circuit current limiting	Floating operation for high voltage operation Eliminates stocking many fixed voltages
	†KA337L	TO-92	Output current in excess of 100mA Negative output adjustable from -1.2V to -37V Internal short circuit current limiting	Floating operation for high voltage operation Eliminates stocking many fixed voltages

† New Product

†† Under Development

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D. Switching Voltage Regulator

Function	Type	Package	Features	Application
Voltage Mode PWM Control IC	KA3524	16 DIP	Complete PWM power control circuitry Internal short circuit current limiting Complementary output Output current up to 100mA	Flyback converter Voltage inverter Voltage step-down Voltage step-up
	KA7500	16 DIP	Complete PWM power control circuitry Dead-time control Complementary output Output current up to 200mA	Voltage inverter Voltage step-down Voltage step-up
	††KA3525A	16 DIP	Adjustable dead-time control Internal soft-start Separate oscillator sync terminal Pulse-by-pulse shutdown Input undervoltage lockout with hysteresis	Flyback converter Voltage inverter Voltage step-down Voltage step-up
	††KA3526A	18 DIP	Programmable dead time Under voltage lockout Programmable soft-start Digital current limiting	Push-pull converter Voltage inverter Voltage step-down Voltage step-up
	††KA51977P	16 DIP	Over voltage protection Pulse by pulse current limiting Over current limiting Output drive current of ±2A	Flyback converter Voltage inverter Voltage step-down Voltage step-up
Current Mode PWM Control IC	†KA3842	8 DIP	Automatic feed forward compensation Pulse-by-pulse current limiting Undervoltage lockout with hysteresis Double pulse suppression High current totem pole output	Flyback converter Voltage inverter Voltage step-down Voltage step-up
	††KA3846	16 DIP	Programmable pulse-by-pulse Current limiting Double pulse suppression Under voltage lockout Soft-start capability Automatic feed forward compensation	Push-pull converter Voltage inverter Voltage step-down Voltage step-up
DC to DC Converter	††KA34063	8 DIP	Low standby current Current Limiting Output switch current of 1.5A Output voltage adjustable from 1.25 to 40V	Voltage inverter Voltage step-down Voltage step-up

7. VOLTAGE REFERENCE

Function	Type	Package	Features	Application
Adjustable Reference	KA431	TO-92 8 DIP 8 SOP	Programmable output voltage from V_{ref} to 36V Voltage reference tolerance: ± 1.0% Low output noise voltage	Switching regulator Constant current source Constant current sink
Reference	KA336	TO-92	Adjustable 4V to 6V Low temperature coefficient 0.6Ω dynamic impedance Fast turn-on	Adjustable shunt regulator Precision power regulator
33V Reference	KA33V	TO-92	Low temperature coefficient Low dynamic resistance	Electronic tuning system

8. OPERATIONAL AMPLIFIER

Function	Type	Package	Features	Application
OP AMP	LM741C/IE	8 DIP 8 SOP	Internal frequency compensation Short circuit protection	Comparator, DC amp, Multivibrator, Summing amp, Integrator or differentiator, Narrow band or BPF
	LM301A	8 DIP 8 SOP	Short circuit protection External frequency compensation	Variable capacitance Multiplier Sine wave oscillator
	KF351	8 DIP 8 SOP	Internally trimmed offset Voltage: 10mV Low input bias current High input impedance: $10^{12}\Omega$ High slew rate: $13V/\mu s$ Wide gain bandwidth: 4MHz	Hi-Zin inverting amp Ultra low duty cycle Pulse generator Sample and Hold
Dual OP AMP	MC4558C/I	8 DIP 8 SOP 9 SIP	Internal frequency compensation Low noise operation	Phone pre-amplifier Tape playback amplifier
	MC1458C/I	8 DIP 8 SOP 9 SIP	Internal frequency compensation Short circuit protection	Filter Schmitt trigger Comparator Multivibrator
	LM358/A LM258/A LM2904	8 DIP 8 SOP 9 SIP	Internal frequency compensation for unit gain Large DC voltage gain Wide power supply range Single supply operation	DC summing amplifier Power amplification RC active bandpass filter Compatible with all forms of logic.
	KA5532	8 DIP	Low input noise voltage High gain bandwidth: 10MHz High slew rate: $9V/\mu s$ Large supply voltage range: $\sim \pm 3$ to $\pm 20V$	DC Amp Telephone channel amplifiers Audio equipment
	KA9256	10 SIP H/S	Internal current limiting: $I_{SC} = 350mA$ Internal frequency compensation Minimal cross over distortion	High power amplifier CD motor driver
	KF442	8 DIP 8 SOP 9 SIP	Low supply current: $500\mu A$ (max) Low input bias current High input impedance High gain bandwidth: 1MHz High slew rate: $1V/\mu s$	Active filter DC summing amplifier Oscillator
	KS272	8 DIP	Wide range of supply voltage : 3V ~ 16V Common mode input voltage including the negative rail	Battery-powered application Active filter Signal buffer
	†KF353	8 DIP	Low bias current Wide band width High input impedance: 45MHz High slew rate: $13V/\mu s$	Sample and hold D/A converter integrator

†† Under Development

† New Product

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OPERATIONAL AMPLIFIER (Continued)

Function	Type	Package	Features	Application
Quad OP AMP	LM324/A LM224/A LM2902	14 DIP 14 SOP	Internal frequency compensation Wide supply voltage range Single supply: DC 3V ~ 32V Dual supply: DC $\pm 1.5V \sim \pm 16V$	Audio power booster DC amp, Multivibrator Switch, Comparator Schmitt trigger
	LM348 LM248	14 DIP 14 SOP	Each amplifier is functionally equivalent to the LM741C Pin compatible with LM324 Short circuit protection	Comparator with hysteresis Voltage reference
	MC3403 MC3303	14 DIP 14 SOP	Class AB output stage for minimal crossover distortion Single or split supply operation Internal frequency compensation	Comparator with hysteresis BI-Quad filter
	KF347	14 DIP 14 SOP	Low bias current Wide gain bandwidth: 4MHz High slew rate: 13V/ μ s High input impedance	D/A converter Sample and hold Integrator
	KS274	14 DIP	Wide range of supply voltage : 3V ~ 16V Single supply operation Very low input bias current, Typ 1pA	Battery-powered application Energy-conserving application

†New Product
 †† Under Development

9. VOLTAGE COMPARATOR

Function	Type	Package	Features	Application
Single Comparator	LM311	8 DIP 8 SOP	Operates from single 5V supply Maximum input current: 250mA Maximum offset current: 50nA Differential input voltage range: $\pm 30V$	Multivibrator output is compatible with DTL and as well as MOS circuits voltage controlled oscillator
	KA710C/I	14 DIP	Low offset and thermal drift Compatible with practically all types of integrated logic	Line receiver A/D converter Memory sense amplifier
Dual Comparator	LM393/A LM2903 LM293/A	8 DIP 8 SOP 9 SIP	High precision comparators Reduced V_{OS} drift over temperature Eliminates need for dual supply Allows sensing near ground Compatible with all form of logic Power drain suitable for battery operation Low input biasing current: 25nA Low output saturation voltage 250mA	Output voltage compatible with TTL, DTL, ECL and CMOS logic system Basic comparator Pulse comparator MOS clock driver
	LM319 LM219	14 DIP	Two independent comparators Operates from a single 5V High common mode slew rate	Relay driver Window detector
	KA711C/I	14 DIP 14 SOP	Separate differential input and single output Strobing each side	Sense amplifier for core memory Dual comparator with ORed output Double-ended limit detector
Quad Comparator	LM339/A LM2901 LM239/A LM3302	14 DIP 14 SOP	Wide single supply voltage range or dual supplies Very low supply current drain (0.8mA)-independent of supply voltage (2mW/Comparator at +5V DC) Low input biasing current: 25nA Input common-mode voltage range included GND Low output saturation voltage 250mV at 4mA	Compatible with all forms of logic Bi-stable multivibrator One-shot multivibrator Time delay generatory Square wave oscillator Pulse generator Limit comparator Crystal controlled oscillator

†† Under Development

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10. TIMER

Function	Type	Package	Features	Application
Single Timer	NE555	8 DIP 8 SOP	Maximum operating frequency: 500KHz Adjustable duty cycle	Precision timing Pulse generator
	KS555 KS555H	8 DIP 8 SOP	Low power consumption by using CMOS process High speed operation Wide operation supply voltage: 2 to 18 volts Pin compatible with NE555	Precision timing Pulse generator
Dual Timer	NE556	14 DIP 14 SOP	TTL Compatible Dual NE555	Time delay generation
	KS556	14 DIP 14 SOP	Low power consumption by using CMOS process Pin compatible with NE556	Time delay generation
Quad Timer	NE558	16 DIP	Wide supply voltage range: 4.5 to 16V 100mA output current per section Time period equal RC	Quad monostable Sequential timing Precision timing

11. MISCELLANEOUS

Function	Type	Package	Features	Application
Voltage to Frequency Converter	†KA331	8 DIP	V-F Conversion F-V Conversion Wide range of full scale frequency: 1Hz to 100KHz	Light intensity to frequency converter Temperature to frequency converter
Earth Leakage Detector	KA2803	8 DIP	Low power consumption Built-in voltage regulator 1mA output current pulse to trigger SCR's	Earth leakage detector
Zero Voltage Switch	KA2804	8 DIP	Very few external components Reference voltage output Supply voltage control	On-Off temperature control Time proportional temperature control
Earth Leakage	KA2807	8 DIP	Full advantage of the UL943 Direct interface to SCR Trim time in normal	Earth leakage detector
Video Amplifier	KA733C	14 DIP	120MHz bandwidth Selectable gains of 10000 and 400 No frequency compensation required	Video recorder systems Video amplifier Pulse amplifier in communications Magnetic memories

12. DATA CONVERTER

Function	Device	Package	Feature	Application
A/D + D/A Converter	KSV3110	40 DIP	High speed 8 bit A/D + 10 bit D/A	Image processing video graphics
A/D Converter	KSV3208	28 DIP	High speed 8 bit A/D converter	
	*KAD0206	30 DIP-SH 32 SOIC	High speed 6 bit A/D converter	
	*KAD0804	20 DIP	8 bit μ P-interface A/D converter	General purpose
	KAD0808/9	28 DIP	8 bit μ P-interface A/D with 8 channel	
	KAD0817/16	40 DIP	8 bit μ P-interface A/D with 16 channel	
	KAD0820	20 DIP	8 bit μ P-interface A/D converter	
DMM A/D	KS7126	40 DIP/60 FQP	3 1/2 digit A/D converter	DMM
D/A Converter	KDA3310	28 Cerdip/DIP	High speed 10 bit D/A	Image processing video graphics
	*KDA0406	28 SOIC 28 DIP-S	High speed tripple 6 bit D/A converter	
	**KDA0313	20 SOP	13 bit D/A converter for CDP	CDP
	*KDA0316	20 DIP/SOP	16 bit D/A converter for CDP	
	*KDA0476	28 DIP/32 PLCC/ 44 PLCC	6 bit RAMDAC	VGA
	*KDA0471	44 PLCC	6 bit RAMDAC with overlay register	
	*KDA0478	44 PLCC	8 bit RAMDAC wich overlay register	
		KDA0800/08	16 DIP	8 bit D/A converter
S.A.R.	KS25C02/03	16 DIP	8 bit CMOS S.A.R.	SAR of A/D converter
	KS25C04	24 SIP-S	12 bit CMOS S.A.R.	

* New Product
** Under Development

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1. CMOS LCD Watch

Device	Display					Function				Additional Features			Electrical Characteristic			Remark	
	Digit	Day Flags	Marks	Duplexed LCD	Triplexed LCD	Basic 5 Function	Day Type	Year	Alarm	Snooze	Chronograph	Chime	Remark	V _{DD} (V)	I _{DD} (μ A)		
															Typ.		Max.
KS5120	3.5	—	—	*	—	*	—	—	—	—	—	—		1.5	0.8	1.5	Internal Capacitor
KS5195	4	—	4	*	—	*	—	—	*	—	—	*		1.5	1.0	2.0	
KS5190	6	7	4	*	—	*	Flag	—	*	*	*	—	Chrono (1/100 sec, 24HR)	1.5	1.0	2.0	
KS5191	6	7	4	*	—	*	Flag	—	*	*	*	—	Chrono (1/100 sec, 24HR)	1.5	1.0	2.0	Internal Capacitor
KS5199A	3.5	—	—	*	—	*	—	—	—	—	—	—		1.5	0.8	1.5	
KS5112	6	—	1	—	*	*	—	—	—	—	—	—		1.5	0.8	1.5	Internal Capacitor
†KS5121	3.5	—	—	*	—	*	—	—	—	—	—	—		1.5	0.8	1.5	1.5V LCD use. colon flash option

2. CMOS Analog LCD Watch

Device	Display			Function	Electrical Characteristic			Remark
	Hand	Segment	LCD duty		V _{DD} (V)	I _{DD} (μ A)		
						Typ	Max	
KS5113	3	120	1/6	3	1.5	1.5	2.5	Internal Capacitor

3. Analog Watch

Device	PAD	Time keeping	Time stability(ppm)	V _{DD} (V)	I _{DD} (nA)		Remark
					Typ	Max	
†KS5243	10	Trimmer cap(OI)	Typ; 0.1	1.5	170	300	Motor output : Mask option
††KS5250	8	Internal E ² PROM	Typ; 0.1	1.5	170	250	Motor output modification with E ² PROM

4. CMOS Analog Clock

Device	Feature	V _{DD} (V)	I _{DD} (μ A)		Osc. (Hz)	Package	Remark
			Typ	Max			
KS5206	A: 0.5Hz Square Wave	1.5	2.0	2.5	32,768	8 DIP	2048Hz Alarm
KS5207	Pulse Output	1.5	2.0	2.5	32,768	8 DIP	1 Hour Function
KS5210	E: 0.5Hz, 46.9ms Duration Pulse Output	1.5	0.7	2.0	32,768	8 DIP	2048Hz Alarm
KS5211	F: 0.5Hz, 31.2ms Duration Pulse Output	1.5	0.7	2.0	32,768	8 DIP	Internal Capacitor
KS5221	Pulse Output	1.5	0.7	2.0	32,768	8 DIP	Internal Capacitor
†KS5212	A,M: 1000ms, EQ: 46.9ms F,R: 31.2ms, H,S: 15.6ms	1.5	0.7	2.0	32,768	8 DIP	Multi Capacitor Type Alarm Option

5. Melody

Device	Standard Type	Song List	Time Base (KHz)	Electrical Characteristic			Package	Remark
				V _{DD} (V)	I _{DD} (μ A)			
					Stand-by	Operating		
KS5310	KS5310A	Oh! Susanna	32.768	1.5	0.1	20	Chip	For Watch IC
KS5313	KS5313N KS5313P KS5313Q KS5313R KS5313S KS5313T	Minute (Bach) Cuckoo's waltz Home sweet home Oh! Susanna Big ben For elise	33	1.5	0.1	20	Chip 8 DIP 16 DIP	Speaker or piezo drive
KS537/ ††KS5327	KS537A KS537B KS537C KS537D KS537E KS537F KS537G KS537H KS537I KS537J KS537K KS537L KS537M KS537N KS537O	Jingle bells For elise Happy birthday to you Home sweet home Cuckoo's waltz Westminster Mary had a little lamb Choral symphony Oh, susanna Music box dancer Love me tender, love me true Arirang Green sleeves Twinkle twinkle little star Hand in hand	65	1.5 (3)	0.1	15	Chip 8 DIP (KS5327)	Speaker or piezo drive TO-92 (KS537)
††KS5318	KS5318A	For elise A maiden's prayer	32.768	1.5	0.3 (max)	50	Chip, 16 DIP	-KS5318: for clock R.C. -dual tone drive LED drive END/BUSY signal output -Dual tone
	KS5318B	Romance de Amor Petrouchka						
	††KS5328	For elise A maidens's prayer Romance de Amor Petrouchka	65	1.5	0.5 (max)	50	Chip 16 DIP	
†KS5319	KS5319A	Green sleeves	65	1.5	0.3 (max)	50	Chip, 8 DIP	-Speaker drive -Dual tone
	KS5319B	Symphony #40 (Mozart)						
KS5381	KS5381A	Home sweet home Oh, susanna Wrispering hope Dreaming of home and mother Oh, my darling elementire Beautiful Dreamer Red river vally	32.768	1.5 (3)	0.1	200 (min)	Chip 16 DIP 20 DIP	For watch IC 16 DIP: serial selection 20 DIP: binary selection
	††KS5318B	Jingle Bells Silent night Joy to the world Rudolph the red nosed- reindeer. White christmas Santa claus is coming to town The first noel O tanne baum						
KS5401	Electronic sound effect		125	3	0.5	100	Chip, 14 DIP	Speaker
KS5814	Sky-lark's and circket's sound		210	1.5	0.1	250	Chip, 18 DIP	Speaker

* New Product †† Under Development

6. CALCULATOR

Device	Function	A.P.O*	V _{DD} (V)	I _{DD} (μ A)		Package	Remark
				Typ	Max		
†KS6325	8 Digit Basic.	Option	1.5	4.2	6	Chip 48 FQP	
†KS6326	8 Digit Basic	Enable		4.2	6		Internal voltage limiter
†KS6125	8 Digit Basic	Option		4.2	6		Clear key; ON/AC, ON/CCE, CCE
†KS6126	8 Digit Basic	Enable		4.2	6		Clear key; ON/AC, ON/CCE, CCE Internal voltage limiter
†KS6129	10 Digit Basic	Option		1.5	3		Clear key; ON/AC, ON/CCE, CE Low current type
KS6028	8 Digit Basic	Option		1.3	3		Low current type
KS6029	10 Digit Basic	Option		1.5	3		Internal voltage limiter (application option)
KS6027A	10/12 Digit Desk Top	Disable	1.5	4.4	6.5	Chip	64 FQP available (KS6077)
KS6041	10 Digit Scientific	Enable	3	20	35	Chip 48 FQP	56 kinds function
†KS6033	20 Item Memory Data Bank	Option	3	20	35	Chip 60 FQP	Clock, telephone, calculator mode

7. MISCELLANEOUS

Device	Function	V _{DD} (V)	I _{DD} (μ A)		Package	Remark
			Typ	Max		
KS5815	Clinical thermometer	1.5	—	100	Bare chip	°C/°F option
KS5116	6 Digit up/down counter	1.5	9	16	Bare chip	Internal RC oscillator

† New Product
 †† Under Development

1. Alphanumeric Index

1) KS54/74AHCT Family

Device	Function
KS54/74AHCT00	Quad 2-Input NAND Gates
KS54/74AHCT01	Quad 2-Input NAND Gates with Open-Drain Outputs
KS54/74AHCT02	Quad 2-Input NOR Gates
KS54/74AHCT03	Quad 2-Input NAND Gates with Open-Drain Outputs
KS54/74AHCT04	Hex Inverters
KS54/74AHCT05	Hex Inverters with Open-Drain Outputs
KS54/74AHCT08	Quad 2-Input AND Gates
KS54/74AHCT09	Quad 2-Input AND Gates with Open-Drain Outputs
KS54/74AHCT10	Triple 3-Input NAND Gates
KS54/74AHCT11	Triple 3-Input AND Gates
KS54/74AHCT12	Triple 3-Input NAND Gates with Open-Drain Outputs
KS54/74AHCT14	Hex Schmitt-Trigger Inverters
KS54/74AHCT20	Dual 4-Input NAND Gates
KS54/74AHCT21	Dual 4-Input AND Gates
KS54/74AHCT22	Dual 4-Input NAND Gates with Open-Drain Outputs
KS54/74AHCT27	Triple 3-Input NOR Gates
KS54/74AHCT30	8-Input NAND Gate
KS54/74AHCT32	Quad 2-Input OR Gates
KS54/74AHCT42	BCD-to-Decimal Decoder
KS54/74AHCT51	Dual AND-OR-Invert Gates
KS54/74AHCT58	Dual AND-OR Gates
KS54/74AHCT73	Dual J-K Negative-Edge-Triggered Flip-Flops with Clear
KS54/74AHCT74	Dual D-Type Positive-Edge-Triggered Flip-Flops with Preset and Clear
KS54/74AHCT75	Quad Bistable Transparent Latches
KS54/74AHCT76	Dual J-K Negative-Edge-Triggered Flip-Flops with Preset and Clear
KS54/74AHCT77	Quad D-Type Latches
KS54/74AHCT78	Dual J-K Negative-Edge-Triggered Flip-Flops with Preset, Common Clear and Common Clock
KS54/74AHCT86	Quad 2-Input Exclusive-OR Gates
KS54/74AHCT90	Decade Counters
KS54/74AHCT92	Divide-by-Twelve Counter
KS54/74AHCT93	4 Bit Binary Counter Divide by Two and Divide by Eight
KS54/74AHCT107	Dual J-K Negative-Edge-Triggered Flip-Flops with Clear
KS54/74AHCT109	Dual J-K Positive-Edge-Triggered Flip-Flops with Preset and Clear
KS54/74AHCT112	Dual J-K Negative-Edge-Triggered Flip-Flops with Preset and Clear
KS54/74AHCT123	Dual Retriggerable Monostable Multivibrators
KS54/74AHCT125	Quad Buffers with 3-State Outputs
KS54/74AHCT126	Quad Buffers with 3-State Outputs
KS54/74AHCT132	Quad 2-Input NAND Gates with Schmitt-Trigger Inputs
KS54/74AHCT133	13-Input NAND Gate
KS54/74AHCT138	3-Line to 8-Line Decoders/Demultiplexers
KS54/74AHCT139	Dual 1 of 4 Decoders/Demultiplexers
KS54/74AHCT148	8-Line to 3-Line Priority Encoders
KS54/74AHCT151	1 of 8 Data Selectors/Multiplexers
KS54/74AHCT153	Dual 1 of 4 Data Selectors/Multiplexers
KS54/74AHCT154	4-Line to 16-Line Decoders/Demultiplexers
KS54/74AHCT155	Dual 2 to 4 Line Decoders/Demultiplexers
KS54/74AHCT157	Quad 2-Line to 1-Line Data Selectors/Multiplexers
KS54/74AHCT158	Quad 2-Line to 1-Line Data Selectors/Multiplexers
KS54/74AHCT160	Synchronous 4-Bit Decade Counters
KS54/74AHCT161	Synchronous 4-Bit Binary Counters
KS54/74AHCT162	Synchronous 4-Bit Decade Counters
KS54/74AHCT163	Synchronous 4-Bit Binary Counters
KS54/74AHCT164	8-Bit Serial-In/Parallel-Out Shift Registers
KS54/74AHCT165	8-Bit Parallel-In/Serial-Out Shift Registers
KS54/74AHCT166	8-Bit Parallel-In/Serial-Out Shift Registers with Clear

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KS54/74AHCT Family (continued)

Device	Function
KS54/74AHCT168	Synchronous 4-Bit Up/Down Decade Counters
KS54/74AHCT169	Synchronous 4-Bit Up/Down Binary Counters
KS54/74AHCT173	4-Bit D-Type Registers with 3-State Outputs
KS54/74AHCT174	Hex D-Type Flip-Flops with Clear
KS54/74AHCT175	Quad D-Type Flip-Flops with Clear
KS54/74AHCT181	4-Bit Arithmetic Logic Unit
KS54/74AHCT182	Look-Ahead Carry Generator
KS54/74AHCT183	Dual High Speed Adder
KS54/74AHCT190	Presettable Synchronous BCD Decade Up/Down Counter
KS54/74AHCT191	Synchronous 4-Bit Up/Down Binary Counters
KS54/74AHCT192	Presettable Synchronous BCD Decade Up/Down Counter
KS54/74AHCT193	Synchronous 4-Bit Up/Down Binary Counters with Dual Clock
KS54/74AHCT194	4-Bit Bidirectional Universal Shift Registers
KS54/74AHCT195	4-Bit Bidirectional Universal Shift Registers
KS54/74AHCT210	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74AHCT238	3-Line to 8-Line Decoders/Demultiplexers
KS54/74AHCT239	Dual 1-of-4 Decoders/Demultiplexers
KS54/74AHCT240	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74AHCT241	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74AHCT242	Quad Bus Transceivers with 3-State Outputs
KS54/74AHCT243	Quad Bus Transceivers with 3-State Outputs
KS54/74AHCT244	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74AHCT245	Octal Bus Transceivers with 3-State Outputs
KS54/74AHCT251	1 of 8 Data Selectors/Multiplexers with 3-State Outputs
KS54/74AHCT253	Dual 1 of 4 Data Selectors/Multiplexers with 3-State Outputs
KS54/74AHCT257	Quad 2-Line to 1-Line Data Selectors/Multiplexers with 3-State Outputs
KS54/74AHCT258	Quad 2-Line to 1-Line Data Selectors/Multiplexers with 3-State Outputs
KS54/74AHCT259	8-Bit Addressable Latches
KS54/74AHCT266	Quad Exclusive-NOR Gates with Open-Drain Outputs
KS54/74AHCT273	Octal D-Type Flip-Flops
KS54/74AHCT280	9-Bit Parity Generators/Checkers with Clear
KS54/74AHCT299	8-Bit Universal Shift/Storage Registers with 3-State Outputs
KS54/74AHCT322	8-Bit Shift Registers with Sign Extend
KS54/74AHCT352	Dual 4-Line to 1-Line Data Selectors/Multiplexers
KS54/74AHCT353	Dual 1 of 4 Data Selectors/Multiplexers with 3-State Outputs
KS54/74AHCT365	Hex Bus-Drivers with 3-State Outputs
KS54/74AHCT366	Hex Bus-Drivers with 3-State Outputs
KS54/74AHCT367	Hex Bus-Drivers with 3-State Outputs
KS54/74AHCT368	Hex Bus-Drivers with 3-State Outputs
KS54/74AHCT373	Octal D-Type Transparent Latches with 3-State Outputs
KS54/74AHCT374	Octal D-Type Flip-Flops with 3-State Outputs
KS54/74AHCT377	Octal D-Type Flip-Flops with Clock Enable
KS54/74AHCT390	Dual 4-Bit Decade Counters
KS54/74AHCT393	Dual 4-Bit Binary Counters
KS54/74AHCT399	Quad 2-Port Registers
KS54/74AHCT423	Dual Retriggerable Monostable Multivibrators
KS54/74AHCT465	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74AHCT466	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74AHCT467	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74AHCT468	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74AHCT518	8-Bit Identity Comparators
KS54/74AHCT519	8-Bit Identity Comparators
KS54/74AHCT520	8-Bit Identity Comparators
KS54/74AHCT521	8-Bit Identity Comparators
KS54/74AHCT522	8-Bit Identity Comparators
KS54/74AHCT533	Octal D-Type Transparent Latches with 3-State Outputs
KS54/74AHCT534	Octal D-Type Flip-Flops with 3-State Outputs
KS54/74AHCT540	Octal Buffers and Line Drivers with 3-State Outputs

KS54/74AHCT Family (continued)

Device	Function
KS54/74AHCT541	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74AHCT563	Octal D-Type Transparent Latches with 3-State Outputs
KS54/74AHCT564	Octal D-Type Flip-Flops with 3-State Outputs
KS54/74AHCT573	Octal D-Type Transparent Latches with 3-State Outputs
KS54/74AHCT574	Octal D-Type Flip-Flops with 3-State Outputs
KS54/74AHCT590	8-Bit Binary Counters with 3-State Output Register
KS54/74AHCT591	8-Bit Binary Counters with 3-State Output Register
KS54/74AHCT592	8-Bit Binary Counters with Input Register
KS54/74AHCT593	8-Bit Binary Counters with Bidirectional Input Register Counter Output
KS54/74AHCT595	8-Bit Shift Registers with Output Latches
KS54/74AHCT596	8-Bit Shift Registers with Output Latches
KS54/74AHCT597	8-Bit Shift Registers with Input Latches
KS54/74AHCT640	Octal Bus Transceivers with 3-State Outputs
KS54/74AHCT643	Octal Bus Transceivers with 3-State Outputs
KS54/74AHCT645	Octal Bus Transceivers with 3-State Outputs
KS54/74AHCT646	Octal 3-State Bus Transceivers with Registers
KS54/74AHCT648	Octal 3-State Bus Transceivers with Registers
KS54/74AHCT651	Octal 3-State Bus Transceivers with Registers
KS54/74AHCT652	Octal 3-State Bus Transceivers with Registers
KS54/74AHCT658	Octal Bus Transceivers with Parity
KS54/74AHCT659	Octal Bus Transceivers with Parity
KS54/74AHCT664	Octal Bus Transceivers with Parity
KS54/74AHCT665	Octal Bus Transceivers with Parity
KS54/74AHCT670	4-By-4 Register Files with 3-State Outputs
KS54/74AHCT679	12-Bit Address Comparators
KS54/74AHCT680	12-Bit Address Comparators
KS54/74AHCT682	8-Bit Magnitude Comparators
KS54/74AHCT684	8-Bit Magnitude Comparators
KS54/74AHCT686	8-Bit Magnitude Comparators
KS54/74AHCT688	8-Bit Identity Comparators
KS54/74AHCT689	8-Bit Identity Comparators with Open-Drain Outputs
KS54/74AHCT793	Octal Latches with Readback
KS54/74AHCT794	Octal Registers with Readback
KS54/74AHCT821	10-Bit Bus Interface Registers with 3-State Outputs
KS54/74AHCT822	10-Bit Bus Interface Registers with 3-State Outputs
KS54/74AHCT823	9-Bit Bus Interface Registers with 3-State Outputs
KS54/74AHCT824	9-Bit Bus Interface Registers with 3-State Outputs
KS54/74AHCT825	8-Bit Bus Interface Registers with 3-State Outputs
KS54/74AHCT826	8-Bit Bus Interface Registers with 3-State Outputs
KS54/74AHCT841	10-Bit Bus Interface D-Type Latches with 3-State Outputs
KS54/74AHCT842	10-Bit Bus Interface D-Type Latches with 3-State Outputs
KS54/74AHCT843	9-Bit Bus Interface D-Type Latches with 3-State Outputs
KS54/74AHCT844	9-Bit Bus Interface D-Type Latches with 3-State Outputs
KS54/74AHCT845	8-Bit Bus Interface D-Type Latches with 3-State Outputs
KS54/74AHCT846	8-Bit Bus Interface D-Type Latches with 3-State Outputs
KS54/74AHCT4049	Hex Inverting Logic Level Down Converters
KS54/74AHCT4050	Hex Logic Level Down Converters

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2) KS54/74HCTLS Family (continued)

Device	Function
KS54/74HCTLS00	Quad 2-Input NAND Gates
KS54/74HCTLS01	Quad 2-Input NAND Gates with Open-Drain Outputs
KS54/74HCTLS02	Quad 2-Input NOR Gates
KS54/74HCTLS03	Quad 2-Input NAND Gates with Open-Drain Outputs
KS54/74HCTLS04	Hex Inverters
KS54/74HCTLS05	Hex Inverters with Open-Drain Outputs
KS54/74HCTLS08	Quad 2-Input AND Gates
KS54/74HCTLS09	Quad 2-Input AND Gates with Open-Drain Outputs
KS54/74HCTLS10	Triple 3-Input NAND Gates
KS54/74HCTLS11	Triple 3-Input AND Gates
KS54/74HCTLS12	Triple 3-Input NAND Gates with Open-Drain Outputs
KS54/74HCTLS14	Hex Schmitt-Trigger Inverters
KS54/74HCTLS20	Dual 4-Input NAND Gates
KS54/74HCTLS21	Dual 4-Input AND Gates
KS54/74HCTLS22	Dual 4-Input NAND Gates with Open-Drain Outputs
KS54/74HCTLS27	Triple 3-Input NOR Gates
KS54/74HCTLS30	8-Input NAND Gate
KS54/74HCTLS32	Quad 2-Input OR Gates
KS54/74HCTLS42	BCD-to-Decimal Decoder
KS54/74HCTLS51	Dual AND-OR-Invert Gates
KS54/74HCTLS58	Dual AND-OR Gates
KS54/74HCTLS73A	Dual J-K Negative-Edge-Triggered Flip-Flops with Clear
KS54/74HCTLS74A	Dual D-Type Positive-Edge-Triggered Flip-Flops with Preset and Clear
KS54/74HCTLS75	Quad Bistable Transparent Latches
KS54/74HCTLS76A	Dual J-K Negative-Edge-Triggered Flip Flops with Preset and Clear
KS54/74HCTLS77	Quad D-Type Latches
KS54/74HCTLS78A	Dual J-K Negative-Edge-Triggered Flip-Flops with Preset, Common Clear and Common Clock
KS54/74HCTLS86	Quad 2-Input Exclusive-OR Gates
KS54/74HCTLS90	Decade Counters
KS54/74HCTLS92	Divide-by-Twelve Counter
KS54/74HCTLS93	4 Bit Binary Counter Divide by Two and Divide by Eight
KS54/74HCTLS107A	Dual J-K Negative-Edge-Triggered Flip-Flops with Clear
KS54/74HCTLS109A	Dual J-K Positive-Edge-Triggered Flip-Flops with Preset and Clear
KS54/74HCTLS112A	Dual J-K Negative-Edge-Triggered Flip-Flops with Preset and Clear
KS54/74HCTLS123	Dual Retriggerable Monostable Multivibrators
KS54/74HCTLS125	Quad Buffers with 3-State Outputs
KS54/74HCTLS126	Quad Buffers with 3-State Outputs
KS54/74HCTLS132	Quad 2-Input NAND Gates with Schmitt-Trigger Inputs
KS54/74HCTLS133	13-Input NAND Gate
KS54/74HCTLS138	3-Line to 8-Line Decoders/Demultiplexers
KS54/74HCTLS139	Dual 1 of 4 Decoders/Demultiplexers
KS54/74HCTLS148	8-Line to 3-Line Priority Encoders
KS54/74HCTLS151	1 of 8 Data Selectors/Multiplexers
KS54/74HCTLS153	Dual 1 of 4 Data Selectors/Multiplexers
KS54/74HCTLS154	4-Line to 16-Line Decoders/Demultiplexers
KS54/74HCTLS155	Dual 2 to 4 Line Decoders/Demultiplexers
KS54/74HCTLS157	Quad 2-Line to 1-Line Data Selectors/Multiplexers
KS54/74HCTLS158	Quad 2-Line to 1-Line Data Selectors/Multiplexers
KS54/74HCTLS160A	Synchronous 4-Bit Decade Counters
KS54/74HCTLS161A	Synchronous 4-Bit Binary Counters
KS54/74HCTLS162A	Synchronous 4-Bit Decade Counters
KS54/74HCTLS163A	Synchronous 4-Bit Binary Counters
KS54/74HCTLS164	8-Bit Serial-In/Parallel-Out Shift Registers
KS54/74HCTLS165	8-Bit Parallel-In/Serial-Out Shift Registers
KS54/74HCTLS166	8-Bit Parallel-In/Serial-Out Shift Registers with Clear
KS54/74HCTLS168	Synchronous 4-Bit Up/Down Decade Counters

KS54/74HCTLS Family (continued)

Device	Function
KS54/74HCTLS169	Synchronous 4-Bit Up/Down Binary Counters
KS54/74HCTLS173	4-Bit D-Type Registers with 3-State Outputs
KS54/74HCTLS174	Hex D-Type Filp-Flops with Clear
KS54/74HCTLS175	Quad D-Type Filp-Flops with Clear
KS54/74HCTLS181	4-Bit Arithmetic Logic Unit
KS54/74HCTLS182	Look-Ahead Carry Generator
KS54/74HCTLS183	Dual High Speed Adder
KS54/74HCTLS190	Presetttable Synchronous BCD Decade Up/Down Counter
KS54/74HCTLS191	Synchronous 4-Bit Up/Down Binary Counters
KS54/74HCTLS192	Presetttable Synchronous BCD Decade Up/Down Counter
KS54/74HCTLS193	Synchronous 4-Bit Up/Down Binary Counters with Dual Clock
KS54/74HCTLS194	4-Bit Bidirectional Universal Shift Registers
KS54/74HCTLS195	4-Bit Bidirectional Universal Shift Registers
KS54/74HCTLS210	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74HCTLS238	3-Line to 8-Line Decoders/Demultiplexers
KS54/74HCTLS239	Dual 1-of-4 Decoders/Demultiplexers
KS54/74HCTLS240	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74HCTLS241	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74HCTLS242	Quad Bus Transceivers with 3-State Outputs
KS54/74HCTLS243	Quad Bus Transceivers with 3-State Outputs
KS54/74HCTLS244	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74HCTLS245	Octal Bus Transceivers with 3-State Outputs
KS54/74HCTLS251	1 of 8 Data Selectors/Multiplexers with 3-State Outputs
KS54/74HCTLS253	Dual 1 of 4 Data Selectors/Multiplexers with 3-State Outputs
KS54/74HCTLS257	Quad 2-Line to 1-Line Data Selectors/Multiplexers with 3-State Outputs
KS54/74HCTLS258	Quad 2-Line to 1-Line Data Selectors/Multiplexers with 3-State Outputs
KS54/74HCTLS259	8-Bit Addressable Latches
KS54/74HCTLS266	Quad Exclusive-NOR Gatges with Open-Drain Outputs
KS54/74HCTLS273	Octal D-Type Filp-Flops
KS54/74HCTLS280	9-Bit Parity Generators/Checkers with Clear
KS54/74HCTLS299 A	8-Bit Universal Shift/Storage Registers with 3-State Outputs
KS54/74HCTLS322	8-Bit Shift Registers with Sign Extend
KS54/74HCTLS352	Dual 4-Line to 1-Line Data Selectors/Multiplexers
KS54/74HCTLS353	Dual 1 of 4 Data Selectors/Multiplexers with 3-State Outputs
KS54/74HCTLS365A	Hex Bus-Drivers with 3-State Outputs
KS54/74HCTLS366A	Hex Bus-Drivers with 3-State Outputs
KS54/74HCTLS367A	Hex Bus-Drivers with 3-State Outputs
KS54/74HCTLS368A	Hex Bus-Drivers with 3-State Outputs
KS54/74HCTLS373	Octal D-Type Transparent Latches with 3-State Outputs
KS54/74HCTLS374	Octal D-Type Flip-Flops with 3-State Outputs
KS54/74HCTLS377	Octal D-Type Flip-Flops with Clock Enable
KS54/74HCTLS390	Dual 4-Bit Decade Counters
KS54/74HCTLS393	Dual 4-Bit Binary Counters
KS54/74HCTLS399	Quad 2-Port Registers
KS54/74HCTLS423	Dual Retriggerable Monostable Multivibrators
KS54/74HCTLS465	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74HCTLS466	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74HCTLS467	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74HCTLS468	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74HCTLS518	8-Bit Identity Comparators
KS54/74HCTLS519	8-Bit Identity Comparators
KS54/74HCTLS520	8-Bit Identity Comparators
KS54/74HCTLS521	8-Bit Identity Comparators
KS54/74HCTLS522	8-Bit Identity Comparators
KS54/74HCTLS533	Octal D-Type Transparent Latches with 3-State Outputs
KS54/74HCTLS534	Octal D-Type Flip-Flops with 3-State Outputs
KS54/74HCTLS540	Octal Buffers and Line Drivers with 3-State Outputs
KS54/74HCTLS541	Octal Buffers and Line Drivers with 3-State Outputs

KS54/74HCTLS Family (continued)

Device	Function
KS54/74HCTLS563	Octal D-Type Transparent Latches with 3-State Outputs
KS54/74HCTLS564	Octal D-Type Flip-Flops with 3-State Outputs
KS54/74HCTLS573	Octal D-Type Transparent Latches with 3-State Outputs
KS54/74HCTLS574	Octal D-Type Flip-Flops with 3-State Outputs
KS54/74HCTLS590	8-Bit Binary Counters with 3-State Output Register
KS54/74HCTLS591	8-Bit Binary Counters with 3-State Output Register
KS54/74HCTLS592	8-Bit Binary Counters with Input Register
KS54/74HCTLS593	8-Bit Binary Counters with Bidirectional Input Register Counter Output
KS54/74HCTLS595	8-Bit Shift Registers with Output Latches
KS54/74HCTLS596	8-Bit Shift Registers with Output Latches
KS54/74HCTLS597	8-Bit Shift Registers with Input Latches
KS54/74HCTLS640	Octal Bus Transceivers with 3-State Outputs
KS54/74HCTLS643	Octal Bus Transceivers with 3-State Outputs
KS54/74HCTLS645	Octal Bus Transceivers with 3-State Outputs
KS54/74HCTLS646	Octal 3-State Bus Transceivers with Registers
KS54/74HCTLS648	Octal 3-State Bus Transceivers with Registers
KS54/74HCTLS651	Octal 3-State Bus Transceivers with Registers
KS54/74HCTLS652	Octal 3-State Bus Transceivers with Registers
KS54/74HCTLS658	Octal Bus Transceivers with Parity
KS54/74HCTLS659	Octal Bus Transceivers with Parity
KS54/74HCTLS664	Octal Bus Transceivers with Parity
KS54/74HCTLS665	Octal Bus Transceivers with Parity
KS54/74HCTLS670	4-By-4 Register Files with 3-State Outputs
KS54/74HCTLS679	12-Bit Address Comparators
KS54/74HCTLS680	12-Bit Address Comparators
KS54/74HCTLS682	8-Bit Magnitude Comparators
KS54/74HCTLS684	8-Bit Magnitude Comparators
KS54/74HCTLS686	8-Bit Magnitude Comparators
KS54/74HCTLS688	8-Bit Identity Comparators
KS54/74HCTLS689	8-Bit Identity Comparators with Open-Drain Outputs
KS54/74HCTLS793	Octal Latches with Readback
KS54/74HCTLS794	Octal Registers with Readback
KS54/74HCTLS821	10-Bit Bus Interface Registers with 3-State Outputs
KS54/74HCTLS822	10-Bit Bus Interface Registers with 3-State Outputs
KS54/74HCTLS823	9-Bit Bus Interface Registers with 3-State Outputs
KS54/74HCTLS824	9-Bit Bus Interface Registers with 3-State Outputs
KS54/74HCTLS825	8-Bit Bus Interface Registers with 3-State Outputs
KS54/74HCTLS826	8-Bit Bus Interface Registers with 3-State Outputs
KS54/74HCTLS841	10-Bit Bus Interface D-Type Latches with 3-State Outputs
KS54/74HCTLS842	10-Bit Bus Interface D-Type Latches with 3-State Outputs
KS54/74HCTLS843	9-Bit Bus Interface D-Type Latches with 3-State Outputs
KS54/74HCTLS844	9-Bit Bus Interface D-Type Latches with 3-State Outputs
KS54/74HCTLS845	8-Bit Bus Interface D-Type Latches with 3-State Outputs
KS54/74HCTLS846	8-Bit Bus Interface D-Type Latches with 3-State Outputs
KS54/74HCTLS4049	Hex Inverting Logic Level Down Converters
KS54/74HCTLS4050	Hex Logic Level Down Converters

2. Functional Selection Guide

Function	Part Number KS54/74AHCT KS54/74HCTLs	Description	Package
Gates and Inverters	00	Quad 2-Input NAND Gates	14 DIP/SOP
	01	Quad 2-Input NAND Gates with Open-Drain Outputs	14 DIP/SOP
	02	Quad 2-Input NOR Gates	14 DIP/SOP
	03	Quad 2-Input NAND Gates with Open-Drain Outputs	14 DIP/SOP
	04	Hex Inverters	14 DIP/SOP
	05	Hex Inverters with Open-Drain Outputs	14 DIP/SOP
	08	Quad 2-Input AND Gates	14 DIP/SOP
	09	Quad 2-Input AND Gates with Open-Drain Outputs	14 DIP/SOP
	10	Triple 3-Input NAND Gates	14 DIP/SOP
	11	Triple 3-Input AND Gates	14 DIP/SOP
	12	Triple 3-Input NAND Gates with Open-Drain Outputs	14 DIP/SOP
	14	Hex Schmitt-Trigger Inverters	14 DIP/SOP
	20	Dual 4-Input NAND Gates	14 DIP/SOP
	21	Dual 4-Input AND Gates	14 DIP/SOP
	22	Dual 4-Input NAND Gates with Open-Drain Outputs	14 DIP/SOP
	27	Triple 3-Input NOR Gates	14 DIP/SOP
	30	8-Input NAND Gate	14 DIP/SOP
	32	Quad 2-Input OR Gates	14 DIP/SOP
	51	Dual AND-OR-Invert Gates	14 DIP/SOP
	58	Dual AND-OR Gates	14 DIP/SOP
86	Quad 2-Input Exclusive-OR Gates	14 DIP/SOP	
132	Quad 2-Input NAND Gates with Schmitt-Trigger Inputs	14 DIP/SOP	
133	13-Input NAND Gate	16 DIP/SOP	
266	Quad Exclusive-NOR Gates with Open-Drain Outputs	16 DIP/SOP	
Buffers and Line Drivers	125	Quad Buffers with 3-State Outputs	14 DIP/SOP
	126	Quad Buffers with 3-State Outputs	14 DIP/SOP
	210	Octal Buffers and Line Drivers with 3-State Outputs	20 DIP/SOP
	240	Octal Buffers and Line Drivers with 3-State Outputs	20 DIP/SOP
	241	Octal Buffers and Line Drivers with 3-State Outputs	20 DIP/SOP
	244	Octal Buffers and Line Drivers with 3-State Outputs	20 DIP/SOP
	365	Hex Bus-Drivers with 3-State Outputs	16 DIP/SOP
	366	Hex Bus-Drivers with 3-State Outputs	16 DIP/SOP
	367	Hex Bus-Drivers with 3-State Outputs	16 DIP/SOP
	368	Hex Bus-Drivers with 3-State Outputs	16 DIP/SOP
	465	Octal Buffers and Line Drivers with 3-State Outputs	20 DIP/SOP
	466	Octal Buffers and Line Drivers with 3-State Outputs	20 DIP/SOP
	467	Octal Buffers and Line Drivers with 3-State Outputs	20 DIP/SOP
	468	Octal Buffers and Line Drivers with 3-State Outputs	20 DIP/SOP
	540	Octal Buffers and Line Drivers with 3-State Outputs	20 DIP/SOP
541	Octal Buffers and Line Drivers with 3-State Outputs	20 DIP/SOP	
Level Shifters	4049	Hex Inverting Logic Level Down Converters	16 DIP/SOP
	4050	Hex Logic Level Down Converters	16 DIP/SOP
Flip-Flops	73	Dual J-K Negative-Edge-Triggered Flip-Flops with Clear	14 DIP/SOP
	74	Dual D-Type Positive-Edge-Triggered Flip-Flops with Preset and Clear	14 DIP/SOP
	76	Dual J-K Negative-Edge-Triggered Flip-Flops with Preset and Clear	16 DIP/SOP
	78	Dual J-K Negative-Edge-Triggered Flip-Flops with Preset, Common Clear and Common Clock	14 DIP/SOP
	107	Dual J-K Negative-Edge-Triggered Flip-Flops with Clear	14 DIP/SOP
	109	Dual J-K Positive-Edge-Triggered Flip-Flops with Preset and Clear	16 DIP/SOP
	112	Dual J-K Negative-Edge-Triggered Flip-Flops with Preset and Clear	16 DIP/SOP
	173	4-Bit D-Type Registers with 3-State Outputs	16 DIP/SOP
	174	Hex D-Type Flip-Flops with Clear	16 DIP/SOP
	175	Quad D-Type Flip-Flops with Clear	16 DIP/SOP
	273	Octal D-Type Flip-Flops	20 DIP/SOP
	374	Octal D-Type Flip-Flops with 3-State Outputs	20 DIP/SOP

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Functional Selection Guide (continued)

Function	Part Number KS54/74AHCT KS54/74HCTLs	Description	Package
	377	Octal D-Type Flip-Flops with Clock Enable	20 DIP/SOP
	399	Quad 2-Port Registers	16 DIP/SOP
	534	Octal D-Type Flip-Flops with 3-State Outputs	20 DIP/SOP
	564	Octal D-Type Flip-Flops with 3-State Outputs	20 DIP/SOP
	574	Octal D-Type Flip-Flops with 3-State Outputs	20 DIP/SOP
	670	4-By-4 Register Files with 3-State Outputs	16 DIP/SOP
	794	Octal Registers with Readback	20 DIP/SOP
	821	10-Bit Bus Interface Registers with 3-State Outputs	24 DIP/SOP
	822	10-Bit Bus Interface Registers with 3-State Outputs	24 DIP/SOP
	823	9-Bit Bus Interface Registers with 3-State Outputs	24 DIP/SOP
	824	9-Bit Bus Interface Registers with 3-State Outputs	24 DIP/SOP
	825	8-Bit Bus Interface Registers with 3-State Outputs	24 DIP/SOP
	826	8-Bit Bus Interface Registers with 3-State Outputs	24 DIP/SOP
Latches	75	Quad Bistable Transparent Latches	16 DIP/SOP
	77	Quad D-Type Latches	16 DIP/SOP
	259	8-Bit Addressable Latches	14 DIP/SOP
	373	Octal D-Type Transparent Latches with 3-State Outputs	20 DIP/SOP
	533	Octal D-Type Transparent Latches with 3-State Outputs	20 DIP/SOP
	563	Octal D-Type Transparent Latches with 3-State Outputs	20 DIP/SOP
	573	Octal D-Type Transparent Latches with 3-State Outputs	20 DIP/SOP
	793	Octal Latches with Readback	20 DIP/SOP
	841	10-Bit Bus Interface D-Type Latches with 3-State Outputs	24 DIP/SOP
	842	10-Bit Bus Interface D-Type Latches with 3-State Outputs	24 DIP/SOP
	843	9-Bit Bus Interface D-Type Latches with 3-State Outputs	24 DIP/SOP
	844	9-Bit Bus Interface D-Type Latches with 3-State Outputs	24 DIP/SOP
	845	8-Bit Bus Interface D-Type Latches with 3-State Outputs	24 DIP/SOP
	846	8-Bit Bus Interface D-Type Latches with 3-State Outputs	24 DIP/SOP
Multiplexers	151	1 of 8 Data Selectors/Multiplexers	16 DIP/SOP
	153	Dual 1 of 4 Data Selectors/Multiplexers	16 DIP/SOP
	157	Quad 2-Line to 1-Line Data Selectors/Multiplexers	16 DIP/SOP
	158	Quad 2-Line to 1-Line Data Selectors/Multiplexers	16 DIP/SOP
	251	1 of 8 Data Selectors/Multiplexers with 3-State Outputs	16 DIP/SOP
	253	Dual 1 of 4 Data Selectors/Multiplexers with 3-State Outputs	16 DIP/SOP
	257	Quad 2-Line to 1-Line Data Selectors/Multiplexers with 3-State Outputs	16 DIP/SOP
	258	Quad 2-Line to 1-Line Data Selectors/Multiplexers with 3-State Outputs	16 DIP/SOP
	352	Dual 4-Line to 1-Line Data Selectors/Multiplexers	16 DIP/SOP
	353	Dual 1 of 4 Data Selectors/Multiplexers with 3-State Outputs	16 DIP/SOP
Shift Registers	164	8-Bit Serial-In/Parallel-Out Shift Registers	14 DIP/SOP
	165	8-Bit Parallel-In/Serial-Out Shift Registers	16 DIP/SOP
	166	8-Bit Parallel-In/Serial-Out Shift Registers with Clear	16 DIP/SOP
	194	4-Bit Bidirectional Universal Shift Registers	16 DIP/SOP
	195	4-Bit Bidirectional Universal Shift Registers	16 DIP/SOP
	299	8-Bit Universal Shift/Storage Registers with 3-State Outputs	20 DIP/SOP
	322	8-Bit Shift Registers with Sign Extend	20 DIP/SOP
	595	8-Bit Shift Registers with Output Latches	16 DIP/SOP
	596	8-Bit Shift Registers with Output Latches	16 DIP/SOP
	597	8-Bit Shift Registers with Input Latches	16 DIP/SOP
Transceivers	242	Quad Bus Transceivers with 3-State Outputs	14 DIP/SOP
	243	Quad Bus Transceivers with 3-State Outputs	14 DIP/SOP
	245	Octal Bus Transceivers with 3-State Outputs	20 DIP/SOP
	640	Octal Bus Transceivers with 3-State Outputs	20 DIP/SOP
	643	Octal Bus Transceivers with 3-State Outputs	20 DIP/SOP
	645	Octal Bus Transceivers with 3-State Outputs	20 DIP/SOP
	646	Octal 3-State Bus Transceivers with Registers	24 DIP/SOP
	648	Octal 3-State Bus Transceivers with Registers	24 DIP/SOP

Functional Selection Guide (continued)

Function	Part Number KS54/74AHCT KS54/74HCTLS	Description	Package
	651	Octal 3-State Bus Transceivers with Registers	24 DIP/SOP
	652	Octal 3-State Bus Transceivers with Registers	24 DIP/SOP
	658	Octal Bus Transceivers with Parity	24 DIP/SOP
	659	Octal Bus Transceivers with Parity	24 DIP/SOP
	664	Octal Bus Transceivers with Parity	24 DIP/SOP
	665	Octal Bus Transceivers with Parity	24 DIP/SOP
Counters	90	Decade Counters	14 DIP/SOP
	92	Divide-by-Twelve Counter	14 DIP/SOP
	93	4 Bit Binary Counter Divide by Two and Divide by Eight	14 DIP/SOP
	160	Synchronous 4-Bit Decade Counters	16 DIP/SOP
	161	Synchronous 4-Bit Binary Counters	16 DIP/SOP
	162	Synchronous 4-Bit Decade Counters	16 DIP/SOP
	163	Synchronous 4-Bit Binary Counters	16 DIP/SOP
	168	Synchronous 4-Bit Up/Down Decade Counters	16 DIP/SOP
	169	Synchronous 4-Bit Up/Down Binary Counters	16 DIP/SOP
	190	Presetable Synchronous BCD Decade Up/Down Counter	16 DIP/SOP
	191	Synchronous 4-Bit Up/Down Binary Counters	16 DIP/SOP
	192	Presetable Synchronous BCD Decade Up/Down Counter	16 DIP/SOP
	193	Synchronous 4-Bit Up/Down Binary Counters with Dual Clock	16 DIP/SOP
	390	Dual 4-Bit Decade Counters	16 DIP/SOP
	393	Dual 4-Bit Binary Counters	16 DIP/SOP
	590	8-Bit Binary Counters with 3-State Output Register	16 DIP/SOP
	591	8-Bit Binary Counters with 3-State Output Register	16 DIP/SOP
	592	8-Bit Binary Counters with Input Register	16 DIP/SOP
	593	8-Bit Binary Counters with Bidirectional Input Register Counter Output	20 DIP/SOP
Decoders Encoders	42	BCD-to-Decimal Decoder	16 DIP/SOP
	138	3-Line to 8-Line Decoders/Demultiplexers	16 DIP/SOP
	139	Dual 1 of 4 Decoders/Demultiplexers	16 DIP/SOP
	148	8-Line to 3-Line Priority Encoders	16 DIP/SOP
	154	4-Line to 16-Line Decoders/Demultiplexers	24 DIP/SOP
	155	Dual 2 to 4 Line Decoders/Demultiplexers	16 DIP/SOP
	238	3-Line to 8-Line Decoders/Demultiplexers	16 DIP/SOP
	239	Dual 1-of-4 Decoders/Demultiplexers	16 DIP/SOP
Multivibrators	123	Dual Retriggerable Monostable Multivibrators	16 DIP/SOP
	423	Dual Retriggerable Monostable Multivibrators	16 DIP/SOP
Arithmetic Circuits	181	4-Bit Arithmetic Logic Unit	24 DIP/SOP
	182	Look-Ahead Carry Generator	16 DIP/SOP
	183	Dual High Speed Adder	14 DIP/SOP
	280	9-Bit Parity Generators/Checkers with Clear	14 DIP/SOP
	518	8-Bit Identity Comparators	20 DIP/SOP
	519	8-Bit Identity Comparators	20 DIP/SOP
	520	8-Bit Identity Comparators	20 DIP/SOP
	521	8-Bit Identity Comparators	20 DIP/SOP
	522	8-Bit Identity Comparators	20 DIP/SOP
	679	12-Bit Address Comparators	20 DIP/SOP
	680	12-Bit Address Comparators	20 DIP/SOP
	682	8-Bit Magnitude Comparators	20 DIP/SOP
	684	8-Bit Magnitude Comparators	20 DIP/SOP
	686	8-Bit Magnitude Comparators	20 DIP/SOP
	688	8-Bit Identity Comparators	20 DIP/SOP
	689	8-Bit Identity Comparators with Open-Drain Outputs	20 DIP/SOP

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1. INTRODUCTION

Features	KS5901/KS5901A	KS5902XX	KS5911/ *KS5917	KS5912XX	*KS5915
Synthesis Method	LPC	LPC	ADM	ADM	ADM
Operating Voltage	5V	5V	5V	5V	5V
Oscillation Frequency	640KHz (X-Tal OSC)	2.56MHz (X-Tal OSC)	640KHz (RC OSC)	640KHz (RC OSC)	640KHz (X-Tal OSC)
Sampling Frequency	8KHz	8KHz	8-32KHz	8-32KHz	16-32KHz
Bit Rate	2.4-9.5Kbps	2.4-9.6Kbps	8-32Kbps	8-32Kbps	16-32Kbps
Control Mode	CPU/Manual	CPU/Manual/ Auto	Talk-Back/ Manal	Manual	CPU/Manual
Data Memory	External ROM 512KBytes/64KBytes	Internal ROM 48Kbits	External RAM 64K/256K × 4	Internal ROM 64KBits	External RAM 256K/1M × 4
Speech Time	Max. 10 Min./4 Min.	Max. 20 Sec.	Max. 2 Min.	Max. 8 Sec.	Max. 8 Min.
D/A Converter	9 bits	9 bits	10 bits	10 bits	10 bits
PKG	64 SDIP/60 FQP	24 DIP	48 FQP	16 DIP	60 FQP
Applications	HA A/M	Toy, Simple Sound Information	Message Phone, A/M	Toy	Message Phone, A/M

* New Product

** Under Development

* KS5917—Internal EOS

1. LCD Products

Function	Type	Package	Features	Application
40CH SEG/ COM Driver	KS0061	60 FQP, bare chip	<ul style="list-style-type: none"> —Interface with KS0062/KS0066 (Controller LSI) —Selectable function to use common/segment drivers simultaneously 	<ul style="list-style-type: none"> —Electronic measurement system —FAX, OA system, etc.
LCD Controller & Driver	KS0062/ KS0066	80 FQP, bare chip	<ul style="list-style-type: none"> —Interface with 4 bit or 8 bit MPU —Internal LCD driver <ul style="list-style-type: none"> •16 common controller •40 segment signal drivers —DD RAM for 80 CH. —Internal CG ROM. 	<ul style="list-style-type: none"> —Electronic measurement system —FAX, OA system, etc.
80CH Segment Driver	KS0063	100 FQP, bare chip	<ul style="list-style-type: none"> —Interface with K0062/KS0066 (Controller LSI) —Only segment driver 	<ul style="list-style-type: none"> —Electronic measurement system —FAX, OA system, etc.
80CH SEG/COM Driver	KS0081	100 FQP, bare chip	<ul style="list-style-type: none"> —Supply voltage: + 4.5~ + 5.5V —LCD driving voltage: + 24V (typ.) —Interface with KS0082 —COM/SEG drivers 	<ul style="list-style-type: none"> —Electronic measurement system —FAX, OA system, etc. —LAP top computer —OA system etc.
Video-LCD Interface	KS0082	80 FQP, bare chip	<ul style="list-style-type: none"> —LCD interface <ul style="list-style-type: none"> •Duty ratio: 1/100, 1/200, 1/400 •X driver interface •4 bit bus, enable chain type 	<ul style="list-style-type: none"> —LAP Top computer, —Word Processor
68CH. COMMON Driver	KS0101	80 FQP, bare chip	<ul style="list-style-type: none"> —Power supply voltage : + 4.5~ + 5.5V —Display voltage: 8-26V —Applicable LCD duty: 1/68-1/272 —Interface with KS0082 	<ul style="list-style-type: none"> —LAP Top computer, —Word Processor
80CH. SEGMENT Driver	KS0102	100 FQP, bare chip	<ul style="list-style-type: none"> —Power supply voltage: + 5V ± 10% —Display voltage: 8-26V —Applicable LCD duty: 1/64-1/256 —Interface with KS0082 	<ul style="list-style-type: none"> —LAP Top computer, —Word Processor

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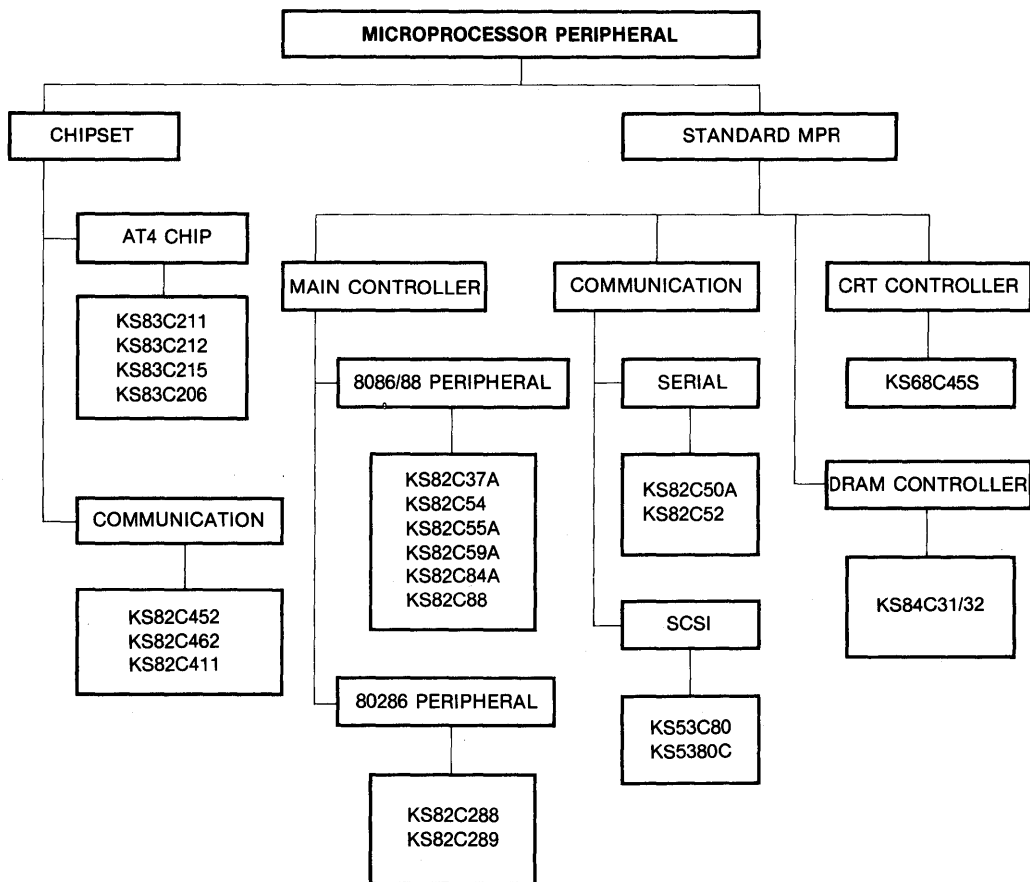
2. PC Products

Function	Type	Package	Features	Application
Parallel Controller	KS88C22	40 DIP	<ul style="list-style-type: none"> —Printer driver —Data readable —CMOS process 	PC/XT or PS/2 parallel port (Available '89, 4Q)
Serial & Parallel Controller	KS88C20	68 PLCC	<ul style="list-style-type: none"> —2 Serial and 1 parallel port —RS-232C asynchronous type —High speed operation —CMOS process 	PC/XT or PS/2 serial, parallel port (Available '89, 4Q)

3. Teletext & FAX. Products

Functions	Type	Package	Features	Application
Digital Teletext Processor	TXT4000	48 DIP	<ul style="list-style-type: none"> —Prefix processor —DMA interface —Composite processor —Video synchronization —Interrupt control 	Teletext system (NABTS)
64 Bit Thermal Head Driver	KS5064	Die form	<ul style="list-style-type: none"> —Built in output control circuit & 64 bit driver —High supply voltage: 28V (max.) —High output current: 30mA (max.) —High speed operation: 2MHz 	FAXIMILE
64 Bit LED Printer Driver	KS5164	Die form	<ul style="list-style-type: none"> —Output control function & 64 bit driver —Output current: 50mA (max.) 5mA (typ.) —High speed operation: 8MHz (max.) 4MHz (typ.) 	FAXIMILE
TPH Controller	KT3000	28 DIP	<ul style="list-style-type: none"> —Single operating voltage: 5V —Low power consumption —I/O compatible with CMOS & TTL —I/O protected from ESD & latch up 	FAXIMILE

1. INTRODUCTION



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2. PRODUCT GUIDE

1) Standard MPR

Device	Function	Speed (MHz)	Package	Application
KS82C37A	DMA Controller	5, 8, 10	40DIP/44PLCC	PC/XT, AT, general purpose
KS82C54	Interval Timer	8, 10	24DIP/28PLCC	PC/XT, general purpose
KS82C55A	Peripheral Interface	5, 8, 10	40DIP/44PLCC	PC/XT, Facsimile, Printer
KS82C59A	Interrupt Controller	8, 10	28DIP/28PLCC	PC/XT, AT, general purpose
KS82C84A	Clock Generator	5, 8, 10	18DIP/20PLCC	PC/XT
KS82C88A	Bus Controller	5, 8, 10	20DIP/20PLCC	PC/XT
KS82C288	Bus Controller for 80286	10, 12.5	20DIP/20PLCC	PC/AT, 386
KS82C289	Bus Arbiter for 80286	10, 12.5	20DIP/20PLCC	PC/AT
KS53C80	SCSI Controller	1.5MB/Sec	48DIP/44PLCC	PC/AT Hard Disk Controller SCSI protocol
KS5380C		3.0MB/Sec	40DIP/44PLCC	
KS68C45S	CRT Controller	4.6	40DIP/44PLCC	MONO, CGA Graphic Board
KS82C50A	Asynchronous Communication Element		40DIP/44PLCC	PC Serial Port
KS82C52	Serial Controller Interface		28DIP/28PLCC	COMM, Equipment
KS84C31	Enhanced 1MDRAM Controller	33	68PLCC	PC/386
KS84C32	Enhanced 1MDRAM Controller	33	84PLCC	PC/386

2) CHIPSET

Device	Function	Speed (MHz)	Package	Application
KS83C211	Bus Controller	12, 16	84 PLCC	PC AT
KS83C212	Memory Controller	12, 16	84 PLCC	PC AT
KS83C215	Address/Data Buffer	12, 16	84 PLCC	PC AT
KS83C206	Integrated Peripheral Controller		84 PLCC	PC AT
KS82C411	Parallel I/O Interface		40DIP	PC/XT, AT
KS82C452	Parallel, Dual Serial Controller		68PLCC	PC/AT
KS82C462	Parallel, Dual Serial Controller		64 SDIP	PC/AT

1. CMOS GATE ARRAY

1) KG30000 SERIES

- 2.0 μ m Si-gate P-Well process
- Double layer metal
- Typical propagation delay time: 1.0ns (F.O = 2)
- Maximum toggle frequency: 70MHz
- Maximum operating frequency: 30MHz
- Operating supply voltage: 3.0V to 6.0V
- TTL and CMOS compatible I/Os
- Support on DAISY, MENTOR

2) KG40000 SERIES

- 1.2 μ m Si-gate Twin-Well process
- Double layer metal
- Channelless gate array
- Typical propagation delay time: 0.5ns (F.O = 2)
- Maximum toggle frequency: 150MHz
- Maximum operating frequency: 70MHz
- Operating supply voltage: 3.0V to 6.0V
- TTL and CMOS compatible I/Os
- Customer definable memory cells: RAM, ROM
- Support on DAISY, MENTOR and valid, system-hilo

2. CMOS STANDARD CELL

1) STD20 STANDARD CELL

- 2.0 μ m Si-gate Twin-Well process
- Double layer metal
- Typical propagation delay time: 1.1ns (F.O = 2)
- Maximum toggle frequency: 80MHz
- Maximum operating frequency: 50MHz
- Operating supply voltage: 3.0V to 6.0V
- TTL and CMOS compatible I/Os
- Customer definable memory cells: RAM, ROM, PLA
- Mixed analog and digital function capability
- LSI function cells support
- Support on DAISY, MENTOR

2) STD15 STANDARD CELL

- 1.5 μ m Si-gate Twin-Well process
- Double layer metal
- Typical propagation delay time: 0.7ns (F.O = 2)
- Maximum toggle frequency: 135MHz
- Maximum operating frequency: 80MHz
- Operating supply voltage: 3.0V to 6.0V
- TTL and CMOS compatible I/Os
- Customer definable memory cells: RAM, ROM, PLA
- Mixed analog and digital function capability
- LSI function cells support
- Support on DAISY, MENTOR

3. GATE ARRAY FAMILIES

1) KG30000 SERIES

Description	KG30400	KG30600	KG30800	KG31200	KG32000	KG33200	KG34000	KG36000	KG38000	
Gate Count	400	600	800	1200	2000	3200	4000	6000	8000	
Pad	I/O	28	38	42	50	76	96	110	138	168
	Power	4	3	4	4	6	8	8	8	8
	Total	32	41	46	54	82	104	118	146	176

2) KG40000 SERIES

Description	KG4042	KG4142	KG4182	KG4352	KG4542	KG4782	KG4133	KG4163	KG4193	KG4333	KG4403	KG4493	KG4703
Total Gates	450	1456	1818	3550	5456	7844	12549	16059	19266	32984	40152	49569	70394
Usable Gates	405	1164	1454	2662	3819	5098	7530	9635	10596	16492	20076	22306	31668
Pad	I/O	24	48	52	68	84	100	128	144	160	208	230	304
	Power	4	4	4	4	4	4	4	4	4	4	4	4
	Total	28	52	56	72	88	104	132	148	164	212	234	308

4. STANDARD CELL LIBRARIES

1) STD20

Cell Description	Function Description
Primitive Cells (157)	Simple Logic : 66 Register & Counter : 7 Latch & Flip-Flop : 24 I/O Cell : 32 Decoder & MUX : 6 Special Function : 22
MSI Logic Cell	74xx Series : 66
Analog Cells (20)	OP AMP: Register, Cap, High Speed Comparator General Purpose Comparator: ECL Input Interface Bandgap Voltage Reference: Analog Switch 8 bit D/A Converter: 10/12 bit A/D Converter
Memory Cells	Dual Port RAM SRAM ROM PLA
Super Cell	82Cxx Series (8237A, 8250A, 8254, 8259A) 2901, 2910 6845, 146818 65C02

2) STD15

Cell Description	Function Description
Primitive Cells (178)	Simple Logic : 68 Register & Counter : 7 Latch & Flip-Flop : 31 I/O Cell : 39 Decoder & MUX : 6 Special Function : 27
MSI Logic Cell	74xx Series : 66
Analog Cells (10)	Analog Switch Bandgap Voltage Reference General Purpose Comparator ECL Input Interface General Purpose OP Amp Resistors Cap
Memory Cell	Dual Port RAM SRAM ROM PLA
Super Cell	82xx Series (8237A, 8254A, 8259A) 2910, 2901 6845, 146818, 16C450

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1. SMCS-51 SERIES

GENERAL DESCRIPTION

The SMCS-51 is a series of Si-gate C-MOS 4-bit microcontrollers with a range of ROM, RAM and I/O. These are complete "systems on a chip" with ALU, program ROM, data RAM, program control and I/O. They use the latest low-power data technology and feature power down modes to further conserve power. All have 3 level subroutine capability. The SMCS-51 Series is designed for use in small system control, such as remote control transmitters. These have been optimized for electric appliance, audio system, multi-purpose timer and other consumer control application.

FEATURES

- Complete 4-bit one chip microcontroller
- C-MOS technology
- 3 level subroutines
- Direct LED drive capability
- User programmable P3-output PLA
- Internal RC or crystal oscillator
- Single power supply (5V) – 3V operation on KS51600 & KS51700
- Various package configurations
- 2 μ s instruction cycle time at 3MHz clock
- On chip carrier frequency (38KHz); KS51600 & KS51700

CHARACTERISTICS

Devices		KS51400	KS51500	KS51600	KS51700
Features					
ROM Size (bytes)		2038	2038	1024	512
RAM Size (x 4 bits)		128	128	64	32
Instruction Set		40	40	39	39
Instruction Time (at 3 MHz)		2 μ S	2 μ S	2 μ S	2 μ S
Number Output Pins	P3	8	8	8	4
	P2	16	11	8	5
Number Input Pins	P0	4	4	4	4
	P1	4		4	
Package		40SD	30SD	30SD	20DIP/SOP
Supply Voltage		5V	5V	5V/3V	5V/3V

2. SMCS-55 SERIES

GENERAL DESCRIPTION

The SMCS-55 is a series of Si-gate C-MOS 4-bit microcontrollers with a same CPU core. These are complete "systems on a chip" with ALU, program ROM, data RAM, program control, Timer/Counter and I/O. They use the latest low-power data technology and feature power down modes to further conserve power. The SMCS-55 Series has been optimized for MWO, C-TV DTS, Car stereo DTS and boiler system.

FEATURE

Features	Devices	KS55C370	*KS55C230	*KS55C232
Technology		C-MOS	C-MOS	C-MOS
Data Bits		4 Bits	4 Bits	4 Bits
ROM Size (× 16 bit)		3042	1536	2048
RAM Size (× 4 bit)		256	128	256
Instruction Set		59	65	68
Inst. Cycle Time		7.5μS (2MHz)	3.3μS (4.5MHz)	33.3μS (4.5MHz)
Subroutine Level		7	12-21	12-21
Timer/Counter		8 bit 1 ch	8 bit 2 ch	16 bit 2 ch
Serial Interface		8 bit 1 ch	—	8 bit 1 ch
Interrupt		External: 1 Internal: 3	External: 1 Internal: 3	External: 1 Internal: 3
Package		40 DIP	42 SDIP	64 FQP
Supply Voltage		5V	5V	5V
Remarks		<ul style="list-style-type: none"> •Table Look Up •8 bit A/D Converter •VFT Direct Drive •I/O-Mapped I/O 	<ul style="list-style-type: none"> •PWM -14 bit 1 ch -6 bit 3 ch •3 bit A/D Converter 	<ul style="list-style-type: none"> • LCD Seg 28, COM2 • 6 bit A/D • PLL • Prescaler

* Under Development

3. KS56C400/KS56C460/KS56C1660

GENERAL DESCRIPTION

The KS56C400/460/1660 are a series of Si-gate C-MOS 4-bit microcontroller with a range of ROM, RAM and I/O. These are complete "systems on a chip" with ALU, program ROM, data RAM, program control, Timer/Counter and I/O. They use the latest low-power data technology and feature power down mode to further conserve power. All have unlimited subroutine capacity. The KS56C400/460/1660 are designed for use in system control. These have been optimized for electrical appliance, VTR, audio system, telephone, printer and other consumer application.

FEATURES

- Complete 4-bit one chip microcontroller
- C-MOS technology
- Direct LED drive capability
- Single power supply (5V)
- 1 μ s instruction cycle time at 4MHz clock

CHARACTERISTICS

Features	KS56C400	KS56C460	KS56C1660
Technology	C-MOS	C-MOS	C-MOS
Data Bits	4 bits	4 bits	4 bits
ROM Size (byte)	4096	4096	16256
RAM Size (\times 4 bit)	256	320	512
Instruction Set	43	43	43
Inst. Cycle Time	1 μ S (4MHz)	1 μ S (4MHz)	1 μ S (4MHz)
Subroutine Level	No Limit	No Limit	No Limit
Timer/Counter	8 bit 2 ch	8 bit 2 ch	8 bit 2 ch
Serial Interface	8 bit 1 ch	8 bit 1 ch	8 bit 1 ch
Input	8	12	12
I/O	28	44	44
Interrupt	External: 3 Internal: 4	External: 3 Internal: 4	External: 3 Internal: 4
Package	42 SDIP	64 SDIP/QFP	64 SDIP/QFP
Supply Voltage	5V	5V	5V

4. KS56C220/KS56C820/KS56C1610

GENERAL DESCRIPTION

The KS56C220/820/1610 are Si-gate C-MOS 4-bit microcontrollers with a SMCS-56 core. These are complete "systems on a chip" with ALU, program ROM, data RAM, program control, Timer/Counter and I/O. They use the latest low-power data technology and feature power down mode to further conserve power. All have unlimited subroutine capacity. The KS56C220/820/1610 are designed for use in system control. These have been optimized for use in system control. These have been optimized for electrical appliance, VTR, audio system, cash registration, LCD/VFD display system and other consumer application.

FEATURE of KS56C220/820/1610

Features	Devices	*KS56C220	*KS56C820	*KS56C1610
Technology		C-MOS	C-MOS	C-MOS
Data Bits		4 bits	4 bits	4 bits
ROM Size (byte)		2048	8192	16256
RAM Size (x 4 bit)		288	512	512
Instruction Set		43	43	43
Inst. Cycle Time		1 μ S (4MHz)	1 μ S (4MHz)	1 μ S (4MHz)
Subroutine Level		No limit	No limit	No limit
Timer/Counter		8 bit 1 ch	8 bit 1 ch	8 bit 2 ch
Serial Interface			8 bit 1 ch	8 bit 1 ch
Input		4	8	8
Output		Max. 8	Max. 8	4
I/O		12	16	20
Interrupt		External: 1 Internal: 2	External: 3 Internal: 3	External: 3 Internal: 5
Package		64 QFP	80 QFP	64 SDIP/QFP
Supply Voltage		3V/5V	3V/5V	5V
Remarks		LCD Drive •Seg Output 10 Pin (Max.) •Common 4 Pin	LCD Drive •Seg Output 10 Pin (Max.) •Common 4 Pin	VFD Drive •Seg Output Max. 10 Pin •Common 16 Pin

* Under development

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5. PRODUCT GUIDE

A. KS51400

Device	Process	Main Function	Supply Voltage	Package
KS51400-01	CMOS	LED Timer Counter	5V	40SD
KS51400-03	CMOS	Humidity Controller	5V	40SD
KS51400-05	CMOS	LED Timer Rice Cooker	5V	40SD
KS51400-06	CMOS	FAN Controller	5V	40SD

B. KS51500

Device	Process	Main Function	Supply Voltage	Package
KS51500-01	CMOS	MWO	5V	30SD
KS51500-02	CMOS	FAN Controller	5V	30SD
KS51500-03	CMOS	Dish Dryer	5V	30SD
KS51500-04	CMOS	Audio Remocon Tx	5V	30SD
KS51500-06	CMOS	FAN Controller	5V	30SD

C. KS51600

Device	Process	Main Function	Supply Voltage	Package
KS51600-01	CMOS	VTR + CTV Remocon Tx	3V	30SD
KS51600-02	CMOS	Remocon Tx Controller	3V	30SD
KS51600-03	CMOS	C-TV Remocon Tx	3V	30SD
KS51600-04	CMOS	FAN Controller	5V	30SD

D. KS51700

Device	Process	Main Function	Supply Voltage	Package
KS51700-01	CMOS	Remocon Tx Controller	3V	20SOP
KS51700-04	CMOS	FAN Controller	5V	20DIP

E. KS55C370

Device	Process	Main Function	Supply Voltage	Package
KS55C370-05	CMOS	MWO	5V	40DIP

F. KS56C400

Device	Process	Main Function	Supply Voltage	Package
KS56C400-03	CMOS	LCD Dot Display Bank	5V	64SDIP

G. KS56C460

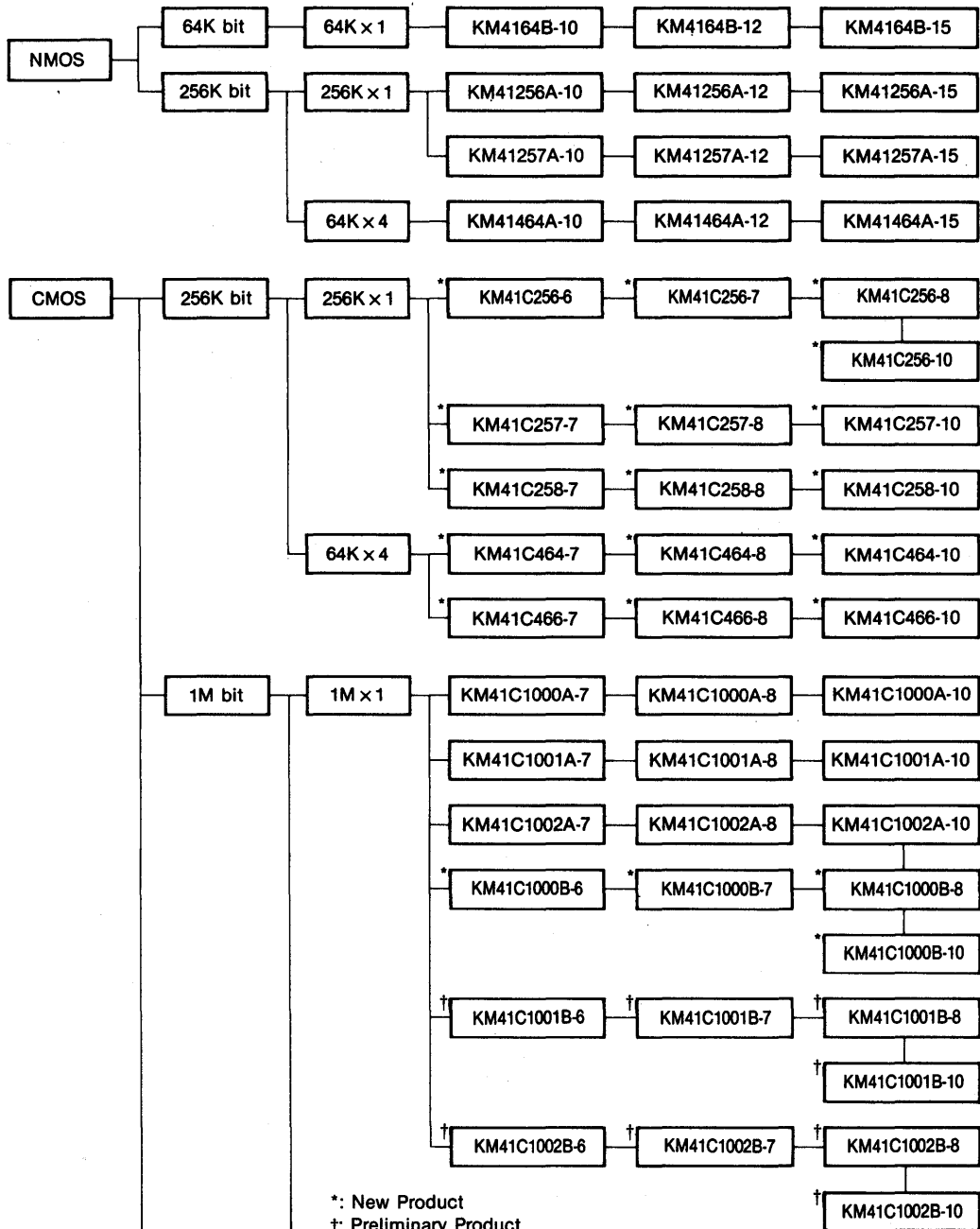
Device	Process	Main Function	Supply Voltage	Package
KS56C460-09	CMOS	VTR Syscon	5V	64SDIP

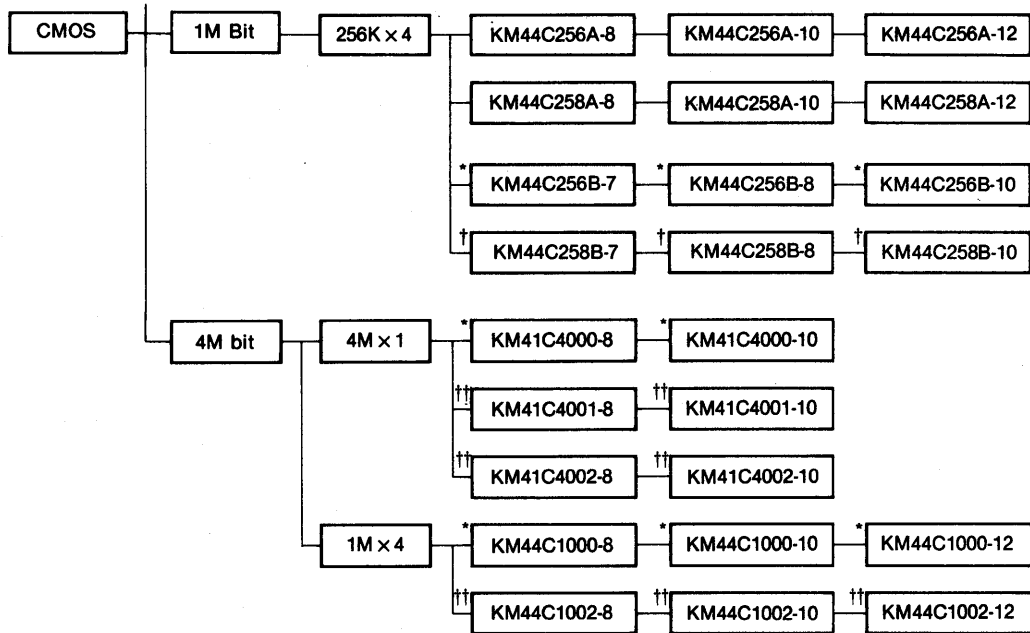
H. KS56C1660

Device	Process	Main Function	Supply Voltage	Package
KS56C1660-03	CMOS	VTR Syscon + Timer	5V	64SDIP

1. INTRODUCTION

1.1 Dynamic RAM

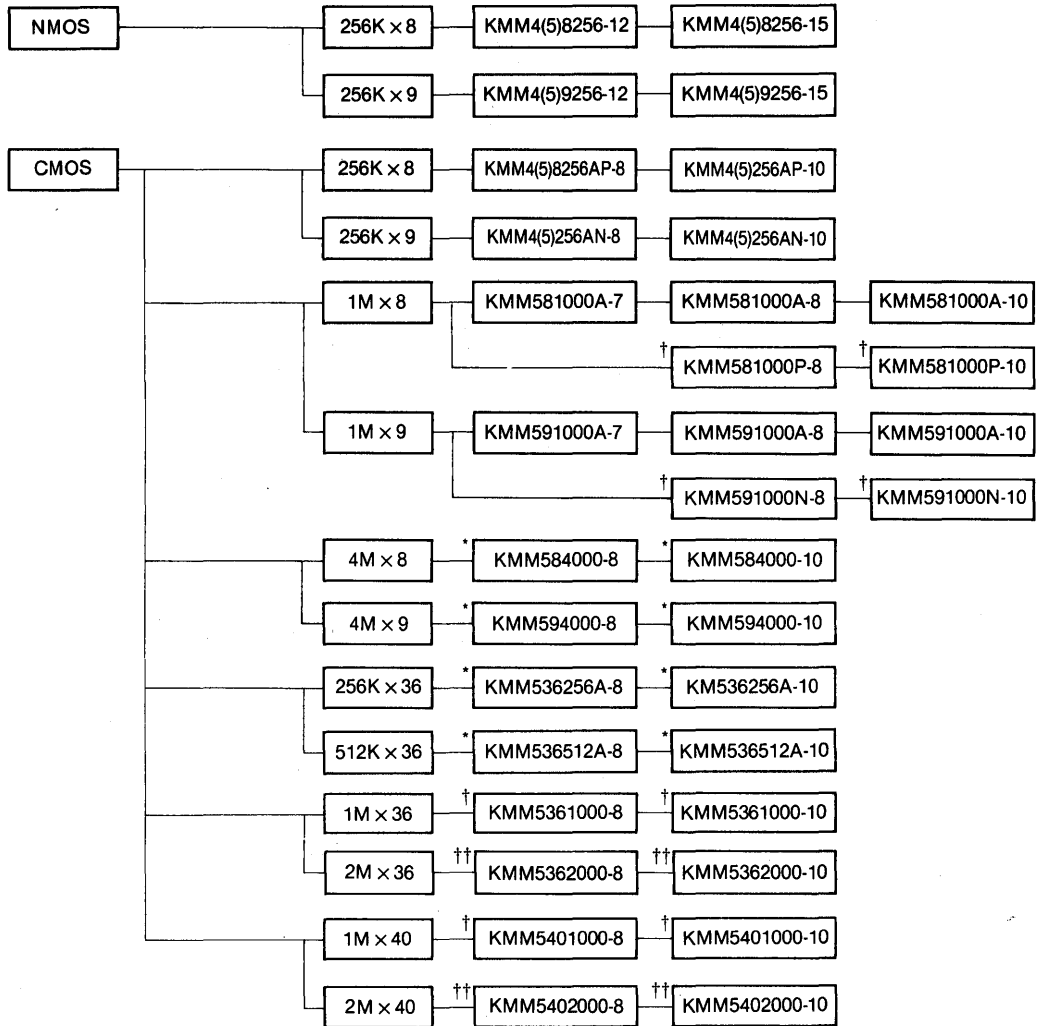




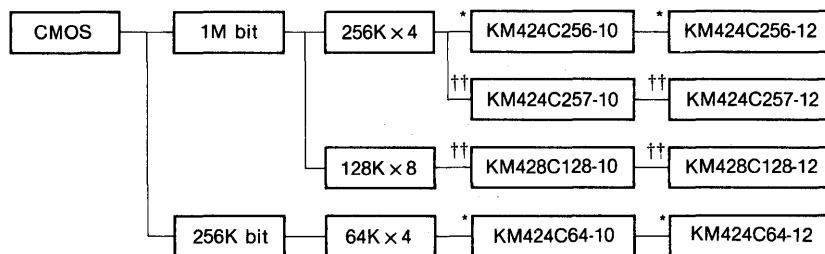
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*: New Product
 †: Preliminary Product
 ††: Under Development

1.2 Dynamic RAM Module



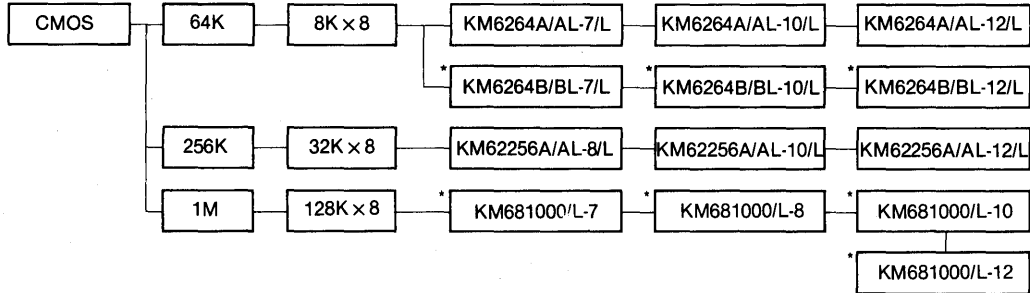
1.3 Video RAM



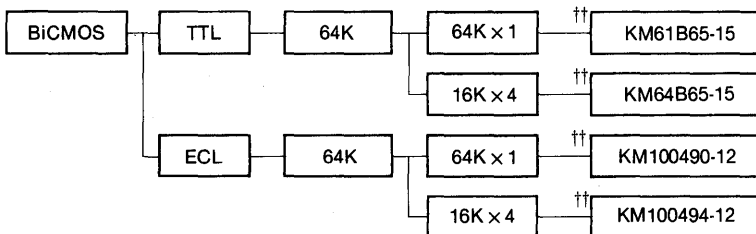
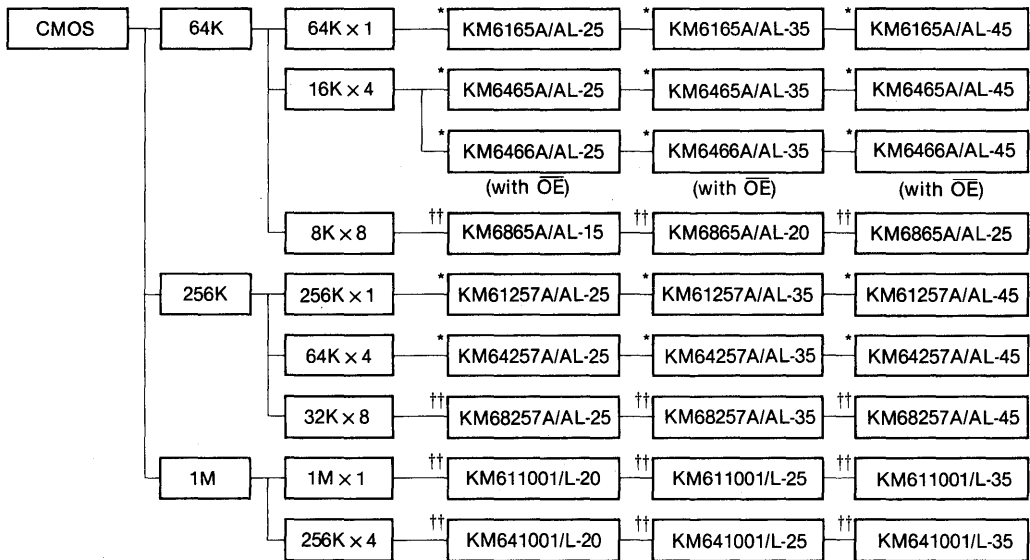
* New Product † Preliminary Product †† Under Development

1.4 Static SRAM

Low Power SRAM

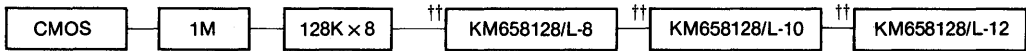


High Speed SRAM

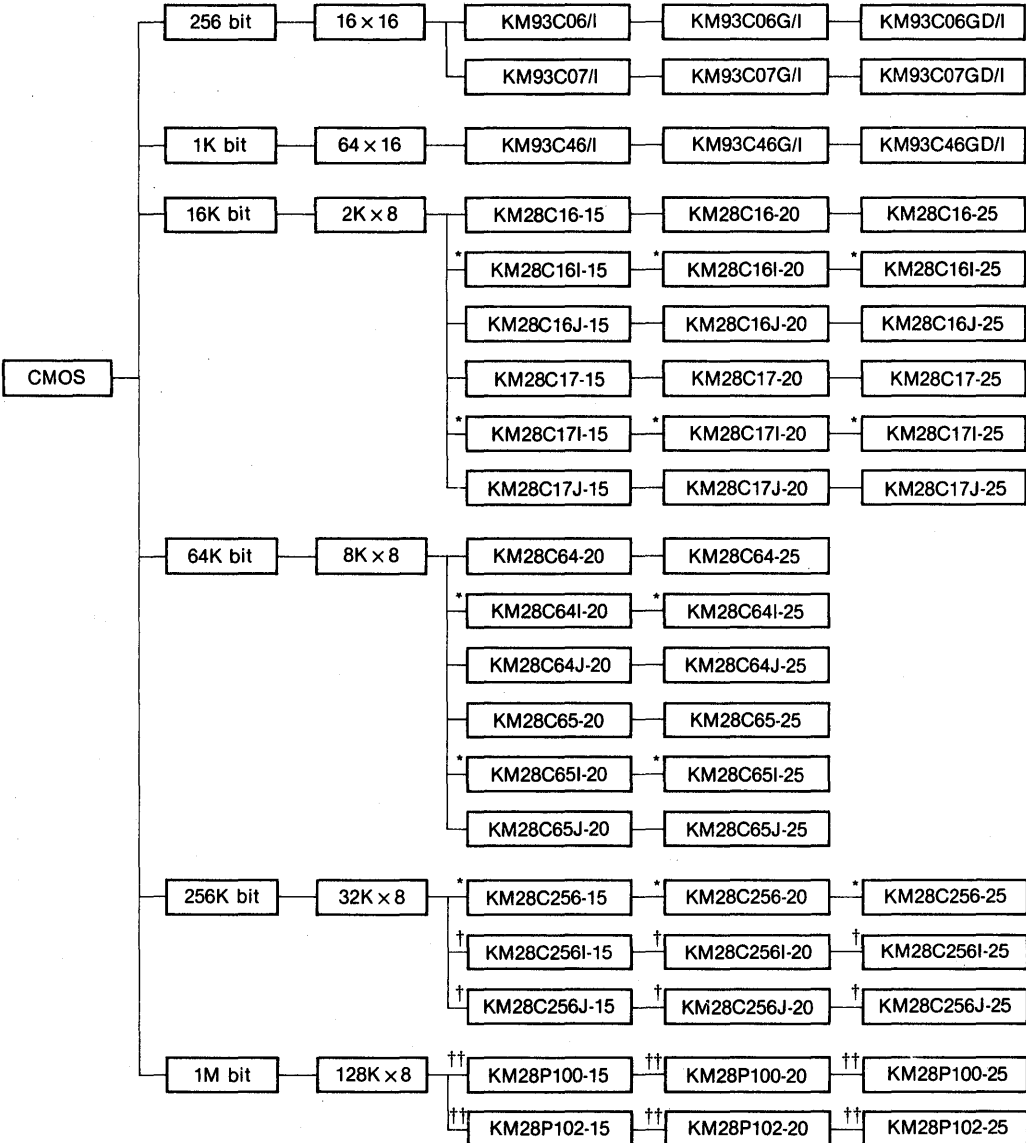


* New Product † Preliminary †† Under Development

1.5 Pseudo Static RAM

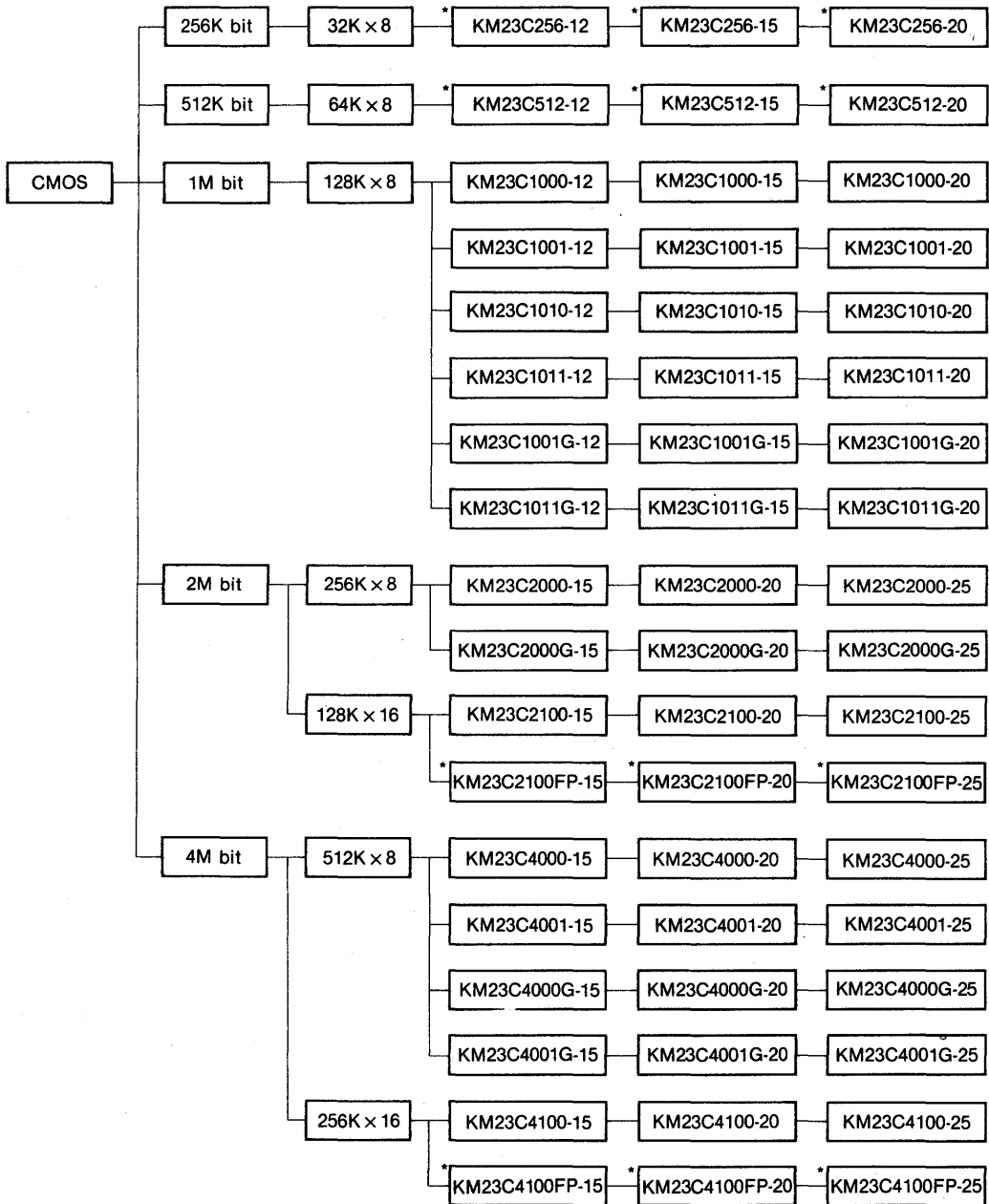


1.6 EEPROM



* New Product
 † Preliminary Product
 †† Under Development

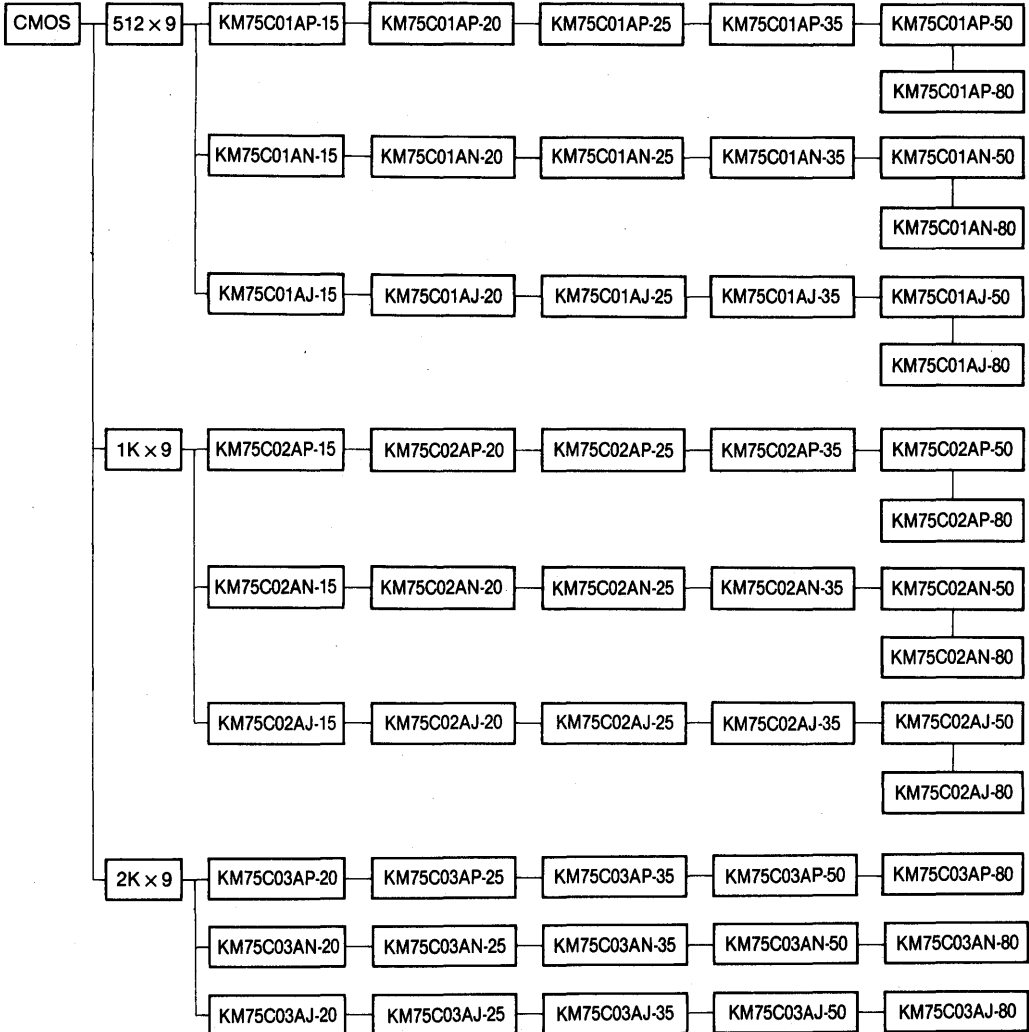
1.7 Mask ROM



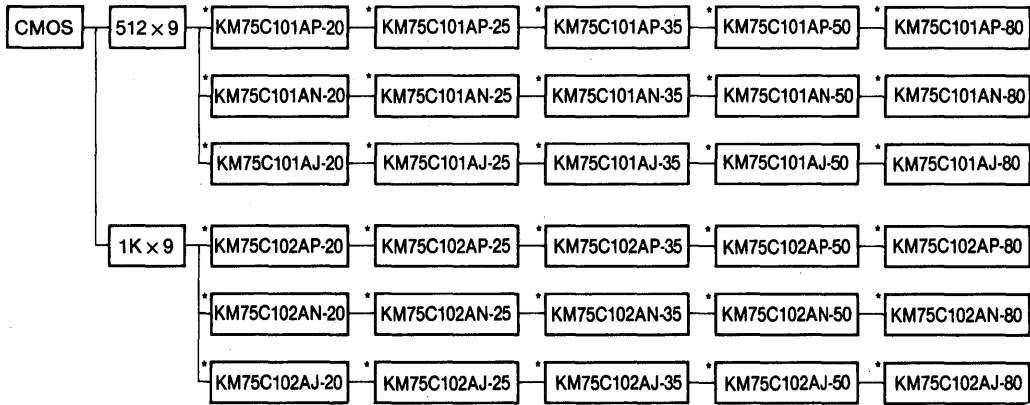
* New Product

1.8 Application Specific Memory

STANDARD FIFO



PROGRAMMABLE FLAG FIFO



- * AP: PDIP (0.6")
- AN: PDIP (0.3")
- AJ: PLCC
- * : New Product
- †: Preliminary Product
- ††: Under Development

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2. PRODUCT GUIDE

2.1 Dynamic RAM

Capacity	Part Number	Organization	Speed (ns)	Technology	Features	Packages	Remark
64K bit	KM4164BP	64K × 1	100/120/150	NMOS	Page Mode	16 Pin DIP	Now
256K bit	KM41256AP	256K × 1	100/120/150	NMOS	Page Mode	16 Pin DIP	Now
	KM41256AJ	256K × 1	100/120/150	NMOS	Page Mode	18 Pin PLCC	Now
	KM41256AZ	256K × 1	100/120/150	NMOS	Page Mode	16 Pin ZIP	Now
	KM41257AP	256K × 1	100/120/150	NMOS	Nibble Mode	16 Pin DIP	Now
	KM41257AJ	256K × 1	100/120/150	NMOS	Nibble Mode	18 Pin PLCC	Now
	KM41257AZ	256K × 1	100/120/150	NMOS	Nibble Mode	16 Pin ZIP	Now
	KM41464AP	64K × 4	100/120/150	NMOS	Page Mode	18 Pin DIP	Now
	KM41464AJ	64K × 4	100/120/150	NMOS	Page Mode	18 Pin PLCC	Now
	KM41464AZ	64K × 4	100/120/150	NMOS	Page Mode	20 Pin ZIP	Now
	*KM41C256P	256K × 1	60/70/80/100	CMOS	Fast Page	16 Pin DIP	Now
	*KM41C256J	256K × 1	60/70/80/100	CMOS	Fast Page	18 Pin PLCC	Now
	*KM41C256Z	256K × 1	60/70/80/100	CMOS	Fast Page	16 Pin ZIP	Now
	*KM41C257P	256K × 1	70/80/100	CMOS	Nibble Mode	16 Pin DIP	Now
	*KM41C257I	256K × 1	70/80/100	CMOS	Nibble Mode	18 Pin PLCC	Now
	*KM41C257Z	256K × 1	70/80/100	CMOS	Nibble Mode	16 Pin ZIP	Now
	*KM41C258P	256K × 1	70/80/100	CMOS	Static Column	16 Pin DIP	Now
	*KM41C258J	256K × 1	70/80/100	CMOS	Static Column	18 Pin PLCC	Now
	*KM41C258Z	256K × 1	70/80/100	CMOS	Static Column	16 Pin ZIP	Now
	*KM41C464P	64K × 4	70/80/100	CMOS	Fast Page	18 Pin DIP	Now
	*KM41C464J	64K × 4	70/80/100	CMOS	Fast Page	18 Pin PLCC	Now
*KM41C464Z	64K × 4	70/80/100	CMOS	Fast Page	20 Pin ZIP	Now	
*KM41C466P	64K × 4	70/80/100	CMOS	Static Column	18 Pin DIP	Now	
*KM41C466J	64K × 4	70/80/100	CMOS	Static Column	18 Pin PLCC	Now	
*KM41C466Z	64K × 4	70/80/100	CMOS	Static Column	20 Pin ZIP	Now	
1M bit	KM41C1000AP	1M × 1	70/80/100	CMOS	Fast Page	18 Pin DIP	Now
	KM41C1000AJ	1M × 1	70/80/100	CMOS	Fast Page	20 Pin SOJ	Now
	KM41C1000AZ	1M × 1	70/80/100	CMOS	Fast Page	20 Pin ZIP	Now
	KM41C1001AP	1M × 1	70/80/100	CMOS	Nibble Mode	18 Pin DIP	Now
	KM41C1001AJ	1M × 1	70/80/100	CMOS	Nibble Mode	20 Pin SOJ	Now
	KM41C1001AZ	1M × 1	70/80/100	CMOS	Nibble Mode	20 Pin ZIP	Now
	KM41C1002AP	1M × 1	70/80/100	CMOS	Static Column	18 Pin DIP	Now
	KM41C1002AJ	1M × 1	70/80/100	CMOS	Static Column	20 Pin SOJ	Now
	KM41C1002AZ	1M × 1	70/80/100	CMOS	Static Column	20 Pin ZIP	Now
	*KM41C1000BP	1M × 1	60/70/80/100	CMOS	Fast Page	18 Pin DIP	Now
	*KM41C1000BJ	1M × 1	60/70/80/100	CMOS	Fast Page	20 Pin SOJ	Now
	*KM41C1000BZ	1M × 1	60/70/80/100	CMOS	Fast Page	20 Pin ZIP	Now
	†KM41C1001BP	1M × 1	60/70/80/100	CMOS	Nibble Mode	18 Pin DIP	2Q, '90
	†KM41C1001BJ	1M × 1	60/70/80/100	CMOS	Nibble Mode	20 Pin SOJ	2Q, '90
	†KM41C1001BZ	1M × 1	60/70/80/100	CMOS	Nibble Mode	20 Pin ZIP	2Q, '90
	†KM41C1002BP	1M × 1	60/70/80/100	CMOS	Static Column	18 Pin DIP	2Q, '90
	†KM41C1002BJ	1M × 1	60/70/80/100	CMOS	Static Column	20 Pin SOJ	2Q, '90
	†KM41C1002BZ	1M × 1	60/70/80/100	CMOS	Static Column	20 Pin ZIP	2Q, '90

Dynamic RAM (Continued)

Capacity	Part Number	Organization	Speed (ns)	Technology	Features	Packages	Remark
1M bit	KM44C256AP	256K × 4	80/100/120	CMOS	Fast Page	20 Pin DIP	Now
	KM44C256AJ	256K × 4	80/100/120	CMOS	Fast Page	20 Pin SOJ	Now
	KM44C256AZ	256K × 4	80/100/120	CMOS	Fast Page	20 Pin ZIP	Now
	KM44C258AP	256K × 4	80/100/120	CMOS	Static Column	20 Pin DIP	Now
	KM44C258AJ	256K × 4	80/100/120	CMOS	Static Column	20 Pin SOJ	Now
	KM44C258AZ	256K × 4	80/100/120	CMOS	Static Column	20 Pin ZIP	Now
	*KM44C256BP	256K × 4	70/80/100	CMOS	Fast Page	20 Pin DIP	2Q, '90
	*KM44C256BJ	256K × 4	70/80/100	CMOS	Fast Page	20 Pin SOJ	2Q, '90
	*KM44C256BZ	256K × 4	70/80/100	CMOS	Fast Page	20 Pin ZIP	2Q, '90
	*KM44C258BP	256K × 4	70/80/100	CMOS	Static Column	20 Pin DIP	2Q, '90
	*KM44C258BJ	256K × 4	70/80/100	CMOS	Static Column	20 Pin SOJ	2Q, '90
	*KM44C258BZ	256K × 4	70/80/100	CMOS	Static Column	20 Pin ZIP	2Q, '90
	4M bit	*KM41C4000J	4M × 1	80/100	CMOS	Fast Page	20 Pin SOJ
*KM41C4000Z		4M × 1	80/100	CMOS	Fast Page	20 Pin ZIP	Now
††KM41C4001J		4M × 1	80/100	CMOS	Nibble	20 Pin SOJ	TBA
††KM41C4001Z		4M × 1	80/100	CMOS	Nibble	20 Pin ZIP	TBA
††KM41C4002J		4M × 1	80/100	CMOS	Static Column	20 Pin SOJ	TBA
††KM41C4002Z		4M × 1	80/100	CMOS	Static Column	20 Pin ZIP	TBA
*KM44C1000J		1M × 4	80/100/120	CMOS	Fast Page	20 Pin SOJ	Now
††KM44C1000Z		1M × 4	80/100/120	CMOS	Fast Page	20 Pin ZIP	TBA
††KM44C1002J		1M × 4	80/100/120	CMOS	Static Column	20 Pin SOJ	TBA
††KM44C1002Z		1M × 4	80/100/120	CMOS	Static Column	20 Pin ZIP	TBA

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2.2 Dynamic RAM Module

Part Number	Organization	Speed (ns)	Technology	Feature	Package	Remark
KMM48256 KMM58256	256K × 8 256K × 8	120/150 120/150	NMOS NMOS	Page Mode Page Mode	30 Pin SIP 30 Pin SIMM (Edge Connector)	Call Factory Now
KMM49256 KMM59256	256K × 9 256K × 9	120/150 120/150	NMOS NMOS	Page Mode Page Mode	30 Pin SIP 30 Pin SIMM (Edge Connector)	Call Factory Now
KMM58256AP KMM59256AN	256K × 8 256K × 9	80/100 80/100	CMOS CMOS	Fast Page Mode Fast Page Mode	30 Pin SIMM (2 Chips) 30 Pin SIMM (3 Chips)	Now Now
KMM581000A †KMM581000P	1M × 8 1M × 8	70/80/100 80/100	CMOS CMOS	Fast Page Mode Fast Page Mode	30 Pin SIMM (Edge Connector) 30 Pin SIMM (2 Chips)	Now 3Q, '90
KMM591000A †KMM591000N	1M × 9 1M × 9	70/80/100 80/100	CMOS CMOS	Fast Page Mode Fast Page Mode	30 Pin SIMM (Edge Connector) 30 Pin SIMM (3 Chips)	Now 3Q, '90
*KMM584000 *KMM594000	4M × 8 4M × 9	80/100 80/100	CMOS CMOS	Fast Page Mode Fast Page Mode	30 Pin SIMM (Edge Connector) 30 Pin SIMM (Edge Connector)	Now Now
*KMM536256A *KMM536512A	256K × 36 512K × 36	80/100 80/100	CMOS CMOS	Fast Page Mode Fast Page Mode	72 Pin SIMM (Edge Connector) 72 Pin SIMM (Edge Connector)	Now Now
†KMM5361000	1M × 36	80/100	CMOS	Fast Page Mode	72 Pin SIMM (Edge Connector)	2Q, '90
††KMM5362000	2M × 36	80/100	CMOS	Fast Page Mode	72 Pin SIMM (Edge Connector)	3Q, '90
†KMM5401000	1M × 40	80/100	CMOS	Fast Page Mode	72 Pin SIMM (Edge Connector)	2Q, '90
††KMM5402000	2M × 40	80/100	CMOS	Fast Page Mode	72 Pin SIMM (Edge Connector)	3Q, '90

2.3 Video RAM

Capacity	Part Number	Organization	Speed (ns)	Technology	Features	Packages	Remark
1M bit	*KM424C256J	256K × 4	RAM: 100/120 SAM: 25/35	CMOS	Minimum Feature	28 Pin SOJ	2Q, '90
	*KM424C256Z	256K × 4	RAM: 100/120 SAM: 25/35	CMOS	Minimum Feature	28 Pin ZIP	2Q, '90
	††KM424C257J	256K × 4	RAM: 100/120 SAM: 25/35	CMOS	Extended Feature	28 Pin SOJ	1Q, '90
	††KM424C257Z	256K × 4	RAM: 100/120 SAM: 25/35	CMOS	Extended Feature	28 Pin ZIP	1Q, '90
	††KM428C128Z	128K × 8	RAM: 100/120 SAM: 25/35	CMOS	Extended Feature	40 Pin ZIP	3Q, '90
	††KM428C128J	128K × 8	RAM: 100/120 SAM: 25/35	CMOS	Extended Feature	40 Pin SOJ	3Q, '90
256K bit	*KM424C64P	64K × 4	RAM: 100/120 SAM: 25/35	CMOS	Minimum Feature	24 Pin DIP	2Q, '90
	*KM424C64Z	64K × 4	RAM: 100/120 SAM: 25/35	CMOS	Minimum Feature	24 Pin ZIP	2Q, '90

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2.4 Static RAM

— Low Power SRAM —

Capacity	Part Name	Organization	Speed (ns)	Technology	Current		Package	Remark
					Active, mA (Typ) max	Standby, μ A (Typ) max		
64K	KM6264A	8K × 8	70/100/120	CMOS	70	1mA	DIP/SOP	Now
	KM6264AL	8K × 8	70/100/120	CMOS	70	(2)100	DIP/SOP	Now
	KM6264AL-L	8K × 8	70/100/120	CMOS	70	(1)30	DIP/SOP	Now
	*KM6264B	8K × 8	70/100/120	CMOS	45	1mA	DIP/SDIP/SOP	Now
	*KM6264BL	8K × 8	70/100/120	CMOS	45	(2)100	DIP/SDIP/SOP	Now
	*KM6264BL-L	8K × 8	70/100/120	CMOS	45	(1)30	DIP/SDIP/SOP	Now
256K	KM62256A	32K × 8	80/100/120	CMOS	70	1mA	DIP/SOP	Now
	KM62256AL	32K × 8	80/100/120	CMOS	70	(2)100	DIP/SOP	Now
	KM62256AL-L	32K × 8	80/100/120	CMOS	70	(2)50	DIP/SOP	Now
1M	*KM681000	128K × 8	70/85/100/120	CMOS	70	1mA	DIP/SOP	Now
	*KM681000L	128K × 8	70/85/100/120	CMOS	70	100	DIP/SOP	Now

— High Speed SRAM —

Capacity	Part Name	Organization	Speed (ns)	Technology	Current		Package	Remark
					Active, mA max	Standby, mA max		
64K	*KM6165A	64K × 1	25/35/45	CMOS	100	2	SDIP/SOJ	Now
	*KM6165AL	64K × 1	25/35/45	CMOS	100	0.1	SDIP/SOJ	Now
	*KM6465A	16K × 4	25/35/45	CMOS	100	2	SDIP/SOJ	Now
	*KM6465AL	16K × 4	25/35/45	CMOS	100	0.1	SDIP/SOJ	Now
	*KM6466A	16K × 4	25/35/45	CMOS	100	2	SDIP/SOJ	Now
	*KM6466AL	16K × 4	25/35/45	CMOS	100	0.1	SDIP/SOJ	Now
	††KM6865A	8K × 8	15/20/25	CMOS	120	2	SDIP/SOJ	2Q, '91
	††KM6865AL	8K × 8	15/20/25	CMOS	120	0.1	SDIP/SOJ	2Q, '91
256K	*KM61257A	256K × 1	25/35/45	CMOS	100	2	SDIP/SOJ	Now
	*KM61257AL	256K × 1	25/35/45	CMOS	100	0.1	SDIP/SOJ	Now
	*KM64257A	64K × 4	25/35/45	CMOS	100	2	SDIP/SOJ	Now
	*KM64257AL	64K × 4	25/35/45	CMOS	100	0.1	SDIP/SOJ	Now
	††KM68257A	32K × 8	25/35/45	CMOS	120	2	SDIP/SOJ	1Q, '91
	††KM68257AL	32K × 8	25/35/45	CMOS	120	0.1	SDIP/SOJ	1Q, '91
1M	††KM611001	1M × 1	20/25/35	CMOS	100	2	DIP/SOJ	1Q, '91
	††KM611001L	1M × 1	20/25/35	CMOS	100	0.1	DIP/SOJ	1Q, '91
	††KM641001	256K × 4	20/25/35	CMOS	100	2	DIP/SOJ	1Q, '91
	††KM641001L	256K × 4	20/25/35	CMOS	100	0.1	DIP/SOJ	1Q, '91

— BICMOS SRAM —

Capacity	Part Name	Organization	Speed (ns)	Technology	Current		Package	Remark
					Active, mA max	Standby, mA max		
64K	††KM61B65	64K × 1	15	BICMOS	100	30	DIP/SOJ	4Q, '90
	††KM64B65	16K × 4	15	BICMOS	100	30	DIP/SOJ	4Q, '90
	††KM100490 (ECL 100K)	64K × 1	12	BICMOS	120	—	DIP	4Q, '90
	††KM100494 (ECL 100K)	16K × 4	12	BICMOS	120	—	DIP	4Q, '90

2.5 Pseudo Static RAM

Capacity	Part Name	Organization	Speed (ns)	Technology	Current		Package	Remark
					Active, mA max	Standby, mA max		
1M	††KM658128	128K × 8	80/100/120	CMOS	75	1	SDIP/SOP/DIP	4Q, '90
	††KM658128L	128K × 8	80/100/120	CMOS	75	0.2	SDIP/SOP/DIP	4Q, '90

2.6 EEPROM

Capacity	Part Number	Organization	Speed (ns)	Technology	Features	Packages	Remarks
256 bit	KM93C06/G/GD/I	16 × 16	250KHz	CMOS	Ext.-timed	8 DIP/8 SOP	Now
	KM93C07/G/GD/I	16 × 16	250KHz	CMOS	Self-timed	8 DIP/8 SOP	Now
1K bit	KM93C46/G/GD	64 × 16	250KHz	CMOS	Self-timed	8 DIP/8 SOP	Now
	KM93C46I	64 × 16	250KHz	CMOS	Industrial	8 DIP/8 SOP	Now
16K bit	KM28C16/J	2K × 8	150/200/250	CMOS	\bar{D} -P, 32 Page Mode	24 DIP/32 PLCC	Now
	*KM28C16I	2K × 8	150/200/250	CMOS	Industrial	24 DIP	Now
	KM28C17/J	2K × 8	150/200/250	CMOS	\bar{D} -P, R/ \bar{B}	28 DIP/32 PLCC	Now
	*KM28C17I	2K × 8	150/200/250	CMOS	Industrial	28 DIP	Now
64K bit	KM28C64/J	8K × 8	200/250	CMOS	\bar{D} -P, 32 Page Mode	28 DIP/32 PLCC	Now
	*KM28C64I	8K × 8	200/250	CMOS	Industrial	28 DIP	Now
	KM28C65/J	8K × 8	200/250	CMOS	\bar{D} -P, R/ \bar{B}	28 DIP/32 PLCC	Now
	*KM28C65I	8K × 8	200/250	CMOS	Industrial	28 DIP	Now
256K bit	*KM28C256/J	32K × 8	150/200/250	CMOS	\bar{D} -P, T-B, 64 Page Mode	28 DIP/32 PLCC	Now
	†KM28C256I	32K × 8	150/200/250	CMOS	Industrial	28 DIP	'90
1M bit	††KM28P100/J	128K × 8	150/200/250	CMOS	—	32 DIP/42 PLCC	4Q, '90
	††KM28P102	64K × 16	150/200/250	CMOS	—	40 DIP	4Q, '90

*: \bar{D} -P: Data-Polling, R/ \bar{B} : Ready/Busy, T-B: Toggle Bit

2.7 Mask ROM

Capacity	Part Number	Organization	Speed (ns)	Technology	Features	Packages	Remark
1M bit	KM23C1000	128K × 8	120/150/200	CMOS	Programmable CE	28 DIP	Now
	KM23C1010	128K × 8	120/150/200	CMOS	Programmable CE & OE	32 DIP	Now
	KM23C1010G	128K × 8	120/150/200	CMOS	Programmable CE & OE	32 SOP	Now
	KM23C1001	128K × 8	120/150/200	CMOS	Programmable OE	28 DIP	Now
	*KM23C1011	128K × 8	120/150/200	CMOS	Programmable OE	32 DIP	Now
	KM23C1011G	128K × 8	120/150/200	CMOS	Programmable OE	32 SOP	Now
	2M bit	KM23C2000	256K × 8	150/200/250	CMOS	Programmable CE & OE	32 DIP
KM23C2000G		256K × 8	150/200/250	CMOS	Programmable CE & OE	32 SOP	Now
KM23C2100		128K × 16/ 256K × 8	150/200/250	CMOS	Programmable CE & OE Word/Byte Mode	40 DIP	Now
*KM23C2100FP		128K × 16/ 256K × 8	150/200/250	CMOS	Programmable CE & OE Word/Byte Mode	44 QFP	2Q, '90
4M bit	KM23C4000	512K × 8	150/200/250	CMOS	Programmable CE & OE	32 DIP	Now
	KM23C4000G	512K × 8	150/200/250	CMOS	Programmable CE & OE	32 SOP	Now
	KM23C4001	512K × 8	150/200/250	CMOS	Programmable OE	32 DIP	Now
	KM23C4001G	512K × 8	150/200/250	CMOS	Programmable OE	32 SOP	Now
	KM23C4100	256K × 16/ 512K × 8	150/200/250	CMOS	Programmable CE & OE Word/Byte Mode	40 DIP	Now
	*KM23C4100FP	256K × 16/ 512K × 8	150/200/250	CMOS	Programmable CE & OE Word/Byte Mode	44 QFP	2Q, '90

*: New Product †: Preliminary Product ††: Under Development

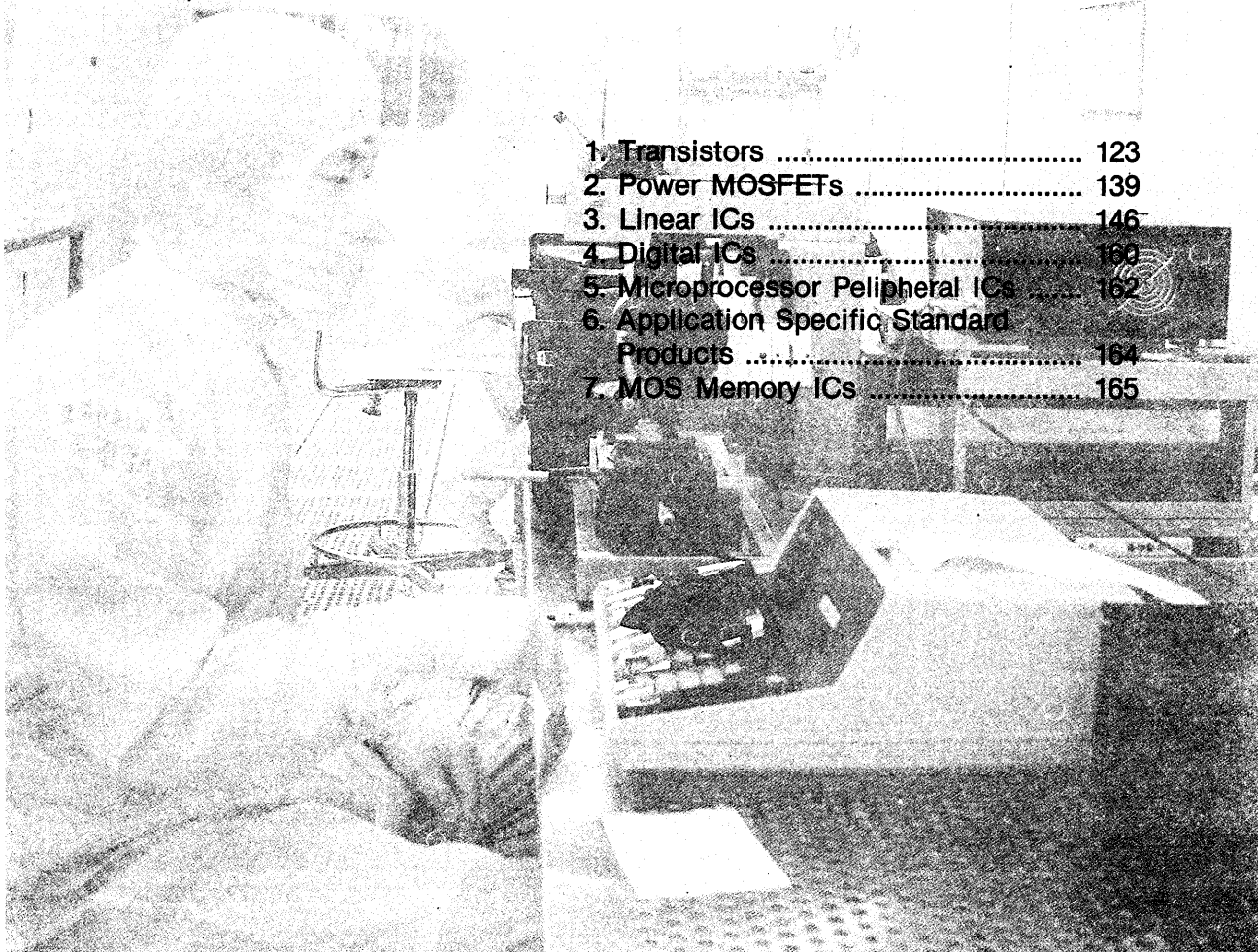
2.8 Application Specific Memory

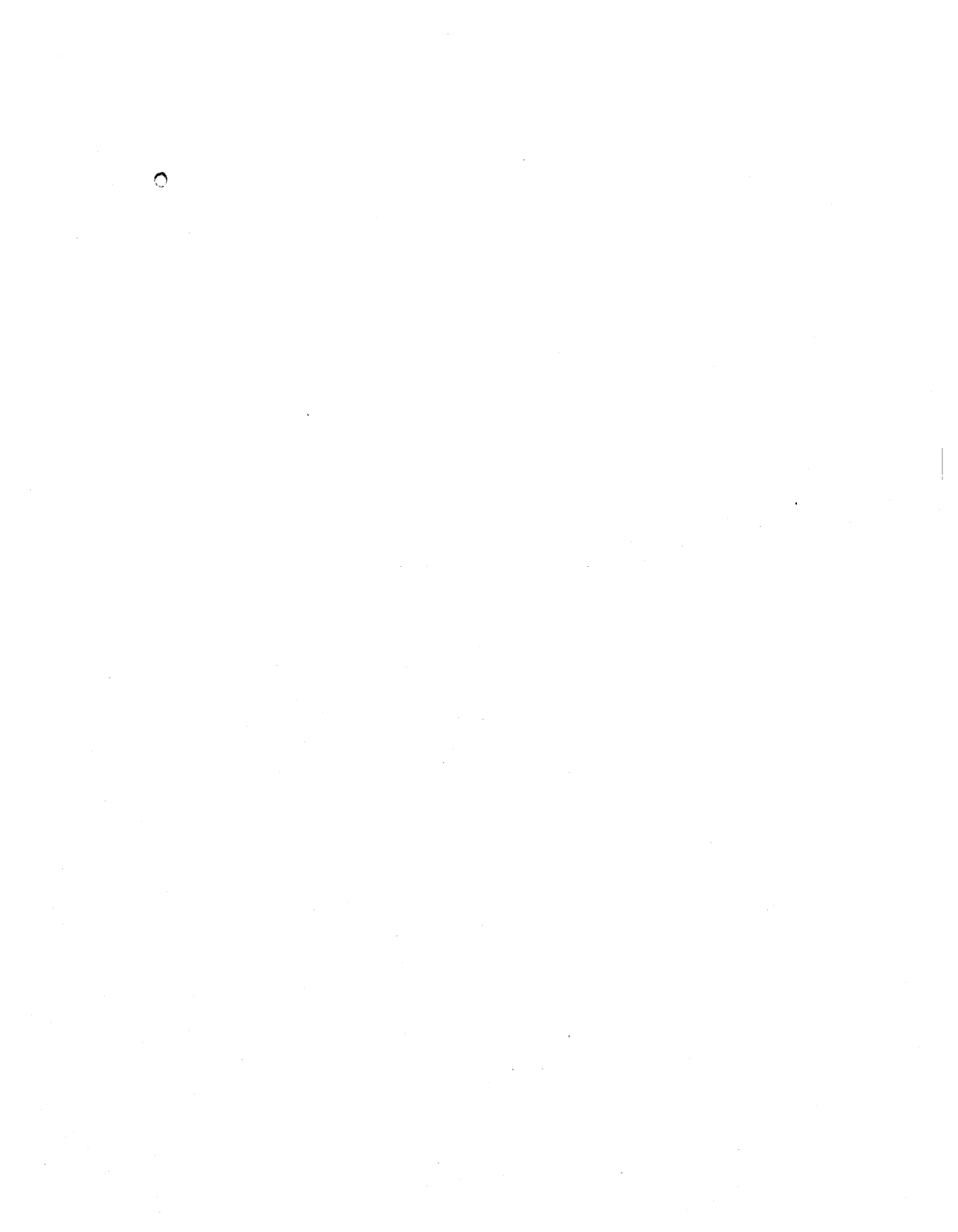
Capacity	Part Number	Organization	Speed	Technology	Features	Package	Remark
Standard FIFO	KM75C01AP	512 × 9	15/20/25/ 35/50/80	CMOS	Parallel FIFO	28 PDIP (0.6")	Now
	KM75C01AN	512 × 9	15/20/25/ 35/50/80	CMOS	Parallel FIFO	28 PDIP (0.3")	Now
	KM75C01AJ	512 × 9	15/20/25/ 35/50/80	CMOS	Parallel FIFO	32 PLCC	Now
	KM75C02AP	1K × 9	15/20/25/ 35/50/80	CMOS	Parallel FIFO	28 PDIP (0.6")	Now
	KM75C02AN	1K × 9	15/20/25/ 35/50/80	CMOS	Parallel FIFO	28 PDIP (0.3")	Now
	KM75C02AJ	1K × 9	15/20/25/ 35/50/80	CMOS	Parallel FIFO	32 PLCC	Now
	KM75C03AP	2K × 9	20/25/35/ 50/80	CMOS	Parallel FIFO	28 PDIP (0.6")	Now
	KM75C03AN	2K × 9	20/25/35/ 50/80	CMOS	Parallel FIFO	28 PDIP (0.3")	Now
	KM75C03AJ	2K × 9	20/25/35/ 50/80	CMOS	Parallel FIFO	32 PLCC	Now
Programmable Flag-FIFO	*KM75C101AP	512 × 9	20/25/35/ 50/80	CMOS	Programmable Flag with Parallel	28 PDIP (0.6")	2Q, '90
	*KM75C101AN	512 × 9	20/25/35/ 50/80	CMOS	Programmable Flag with Parallel	28 PDIP (0.3")	2Q, '90
	*KM75C101AJ	512 × 9	20/25/35/ 50/80	CMOS	Programmable Flag with Parallel	32 PLCC	2Q, '90
	*KM75C102AP	1K × 9	20/25/35/ 50/80	CMOS	Programmable Flag with Parallel	28 PDIP (0.6")	2Q, '90
	*KM75C102AN	1K × 9	20/25/35/ 50/80	CMOS	Programmable Flag with Parallel	28 PDIP (0.3")	2Q, '90
	*KM75C102AJ	1K × 9	20/25/35/ 50/80	CMOS	Programmable Flag with Parallel	32 PLCC	2Q, '90

*: New Product

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TRANSISTORS

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TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG
2N3903	MOTOROLA	2N3903	2SA1052	HITACHI	KSA812	2SA1298	TOSHIBA	KSA1298
2N3904	MOTOROLA	2N3904	2SA1072A	FUJITSU	KSA1050	2SA1299	mitsubishi	KSA1174
2N3905	MOTOROLA	2N3905	2SA1084	HITACHI	KSA992	2SA1309	MATSUSHITA	KSA1175
2N3906	MOTOROLA	2N3906	2SA1085	HITACHI	KSA992	2SA1310	MATSUSHITA	KSA1174
2N4123	MOTOROLA	2N4123	2SA1092	MATSUSHITA	KSA733	2SA1311	TOSHIBA	KSA811
2N4124	MOTOROLA	2N4124	2SA1096	MATSUSHITA	KSB744	2SA1312	TOSHIBA	KSA811
2N4125	MOTOROLA	2N4125	2SA1096A	MATSUSHITA	KSB744A	2SA1316	TOSHIBA	KSA992
2N4126	MOTOROLA	2N4126	2SA1110	MATSUSHITA	KSA1220A	2SA1317	SANYO	KSA1175
2N4400	MOTOROLA	2N4400	2SA1121	HITACHI	KSA1182	2SA1318	SANYO	KSA733
2N4401	MOTOROLA	2N4401	2SA1136	ROHM	KSA992	2SA1323	MATSUSHITA	KSA1175
2N4402	MOTOROLA	2N4402	2SA1137	ROHM	KSA992	2SA1324	TOSHIBA	KSA812
2N4403	MOTOROLA	2N4403	2SA1144	TOSHIBA	KSA1142	2SA1325	TOSHIBA	KSA811
2N5086	MOTOROLA	2N5086	2SA1150	TOSHIBA	KSA1150	2SA1334	TOSHIBA	KSA952
2N5087	MOTOROLA	2N5087	2SA1151	N.E.C	KSA733	2SA1335	TOSHIBA	KSA1174
2N5088	MOTOROLA	2N5088	2SA1156	N.E.C	KSA1156	2SA1337	HITACHI	KSA1175
2N5089	MOTOROLA	2N5089	2SA1158	TOSHIBA	KSA954	2SA1340	HITACHI	KSA953
2N5209	MOTOROLA	2N5209	2SA1162	TOSHIBA	KSA812	2SA1341	SANYO	KSR2104
2N5210	MOTOROLA	2N5210	2SA1174	N.E.C	KSA1174	2SA1342	SANYO	KSR2103
2N5400	MOTOROLA	2N5400	2SA1175	N.E.C	KSA1175	2SA1343	SANYO	KSR2108
2N5401	MOTOROLA	2N5401	2SA1178	MATSUSHITA	KSA1220A	2SA1344	SANYO	KSR2102
2N5550	MOTOROLA	2N5550	2SA1179	SANYO	KSA812	2SA1345	SANYO	KSR2204
2N5551	MOTOROLA	2N5551	2SA1182	TOSHIBA	KSA1182	2SA1346	SANYO	KSR2203
2N6427	MOTOROLA	2N6427	2SA1184	TOSHIBA	KSA1220A	2SA1347	SANYO	KSR2208
2N6428	MOTOROLA	2N6428	2SA1190	HITACHI	KSA992	2SA1348	SANYO	KSR2202
2N6428A	MOTOROLA	2N6428A	2SA1191	HITACHI	KSA992	2SA1350	HITACHI	KSA1175
2N6515	MOTOROLA	2N6515	2SA1198	ROHM	KSA954	2SA1351	HITACHI	KSA953
2N6516	MOTOROLA	2N6516	2SA1199	ROHM	KSA954	2SA1352	SANYO	KSA1142
2N6517	MOTOROLA	2N6517	2SA1201	TOSHIBA	KSA1201	2SA1358	TOSHIBA	KSA1220A
2N6518	MOTOROLA	2N6518	2SA1202	TOSHIBA	KSA1202	2SA1359	TOSHIBA	KSB744
2N6519	MOTOROLA	2N6519	2SA1203	TOSHIBA	KSA1203	2SA1360	TOSHIBA	KSA1142
2N6520	MOTOROLA	2N6520	2SA1209	SANYO	KSA1142	2SA1365	MITSUBISHI	KSA1298
2SA1004	HITACHI	KSA733	2SA1210	SANYO	KSA1142	2SA1367	MITSUBISHI	KSA1175
2SA1010	N.E.C	KSA1010	2SA1214	TOSHIBA	KSA1013	2SA1368	MITSUBISHI	KSA1202
2SA1013	TOSHIBA	KSA1013	2SA1220	N.E.C	KSA1220	2SA1369	MITSUBISHI	KSA1203
2SA1015	TOSHIBA	KSA733	2SA1220A	N.E.C	KSA1220A	2SA1373	HITACHI	KSA953
2SA1016	SANYO	KSA992	2SA1221	N.E.C	KSA1013	2SA1374	HITACHI	KSA1175
2SA1017	SANYO	KSA910	2SA1222	N.E.C	KSA1013	2SA1377	TOSHIBA	KSA733
2SA1019	SANYO	KSA910	2SA1235	MITSUBISHI	KSA812	2SA1378	TOSHIBA	KSB810
2SA1020	TOSHIBA	KSA1220A	2SA1246	SANYO	KSA953	2SA1380	SANYO	KSA1142
2SA1025	HITACHI	KSA733	2SA1252	SANYO	KSA812	2SA1390	HITACHI	KSA1150
2SA1026	MITSUBISHI	KSA733	2SA1253	SANYO	KSA1175	2SA1411	N.E.C	KSA5040
2SA1027	MITSUBISHI	KSA733	2SA1266	K.E.C	KSA733	2SA1416	SANYO	KSA1201
2SA1029	HITACHI	KSA733	2SA1267	K.E.C	KSA1175	2SA1418	SANYO	KSA1201
2SA1030	HITACHI	KSA733	2SA1268	K.E.C	KSA992	2SA1420	SANYO	KSR2004
2SA1031	HITACHI	KSA812	2SA1269	K.E.C	KSA1174	2SA1421	SANYO	KSR2003
2SA1032	HITACHI	KSA812	2SA1270	K.E.C	KSA539	2SA1422	SANYO	KSR2008
2SA1033	HITACHI	KSA733	2SA1271	K.E.C	KSA643	2SA1423	SANYO	KSR2002
2SA1034	MITSUSHITA	KSA812	2SA1272	K.E.C	KSA1150	2SA1453	TOSHIBA	KSA1175
2SA1035	MATSUSHITA	KSA812	2SA1275	K.E.C	KSA1013	2SA1463	N.E.C	KSA1203
2SA1037	ROHM	KSA812	2SA1276	K.E.C	KSA473	2SA1466	N.E.C	KSA1150
2SA1047	SANYO	KSA1142	2SA1288	SANYO	KSB834	2SA1467	N.E.C	KSA1298
2SA1048	TOSHIBA	KSA1175	2SA1290	SANYO	KSB708	2SA1478	SANYO	KSA1142

TRANSISTORS

CROSS REFERENCE GUIDE

TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG
2SA1496	SANYO	KSR2110	2SA615	TOSHIBA	KSB596	2SA774	MATSUSHITA	KSA733
2SA1497	SANYO	KSR2210	2SA616	TOSHIBA	KSB596	2SA774A	MATSUSHITA	KSA733
2SA1504	K.E.C	KSA812	2SA620	J.R.C	KSA733	2SA777	TOSHIBA	KSA733
2SA1505	K.E.C	KSA1182	2SA623	MITSUBISHI	KSA473	2SA778	HITACHI	KSA910
2SA1507	SANYO	KSA1220A	2SA624	MITSUBISHI	KSB744	2SA779	HITACHI	KSA473
2SA1508	SANYO	KSR2112	2SA628	MITSUBISHI	KSA733	2SA780	HITACHI	KSB744
2SA1509	SANYO	KSR2212	2SA628A	MITSUBISHI	KSA733	2SA781	HITACHI	KSA733
2SA1510	SANYO	KSR2109	2SA633	N.E.C	KSA473	2SA782	ROHM	KSA733
2SA1511	SANYO	KSR2209	2SA634	N.E.C	KSA634	2SA783	ROHM	KSA733
2SA1512	MATSUSHITA	KSB810	2SA636A	N.E.C	KSB834	2SA784	ROHM	KSA733
2SA1530	MITSUBISHI	KSA812	2SA642	N.E.C	KSA539	2SA785	ROHM	KSA733
2SA1542	ROHM	KSA733	2SA643	N.E.C	KSA643	2SA786	ROHM	KSA733
2SA1543	ROHM	KSA733	2SA659	SANYO	KSA953	2SA789	ROHM	KSA733
2SA1547	ROHM	KSA1175	2SA661	TOSHIBA	KSA954	2SA803	ROHM	KSA910
2SA1561	ROHM	KSA1175	2SA666	MATSUSHITA	KSA733	2SA811	N.E.C	KSA811
2SA1563	SANYO	KSR2105	2SA670	HITACHI	KSB596	2SA812	N.E.C	KSA812
2SA1564	SANYO	KSR2205	2SA671	HITACHI	KSB596	2SA813	N.E.C	KSA733
2SA1589	SANYO	KSR2111	2SA672	HITACHI	KSA733	2SA824	ROHM	KSA733
2SA1590	SANYO	KSR2211	2SA673	HITACHI	KSA643	2SA826	ROHM	KSA733
2SA1591	SANYO	KSR2214	2SA678	SONY	KSA953	2SA827	ROHM	KSA733
2SA1597	SANYO	KSR2114	2SA683	MATSUSHITA	KSA643	2SA828	ROHM	KSA733
2SA2420	SANYO	KSR2004	2SA695	MATSUSHITA	KSA643	2SA829	ROHM	KSA733
2SA473	TOSHIBA	KSA473	2SA696	MATSUSHITA	KSA953	2SA838	MATSUSHITA	KSA733
2SA480	SONY	KSA733	2SA697	MATSUSHITA	KSA953	2SA839	TOSHIBA	KSB546
2SA489	TOSHIBA	KSB596	2SA699	MATSUSHITA	KSA473	2SA843	MATSUSHITA	KSB546
2SA494	TOSHIBA	KSA733	2SA701	SANYO	KSA733	2SA844	HITACHI	KSA733
2SA495	TOSHIBA	KSA733	2SA702	SANYO	KSA733	2SA854	ROHM	KSA953
2SA509	TOSHIBA	KSA643	2SA703	MITSUBISHI	KSA473	2SA866	J.R.C	KSA733
2SA539	N.E.C	KSA733	2SA705	SONY	KSA953	2SA867	J.R.C	KSA733
2SA542	N.E.C	KSA733	2SA707	N.E.C	KSA643	2SA869	J.R.C	KSA953
2SA543	N.E.C	KSA733	2SA711	N.E.C	KSA733	2SA870	J.R.C	KSA953
2SA550A	MATSUSHITA	KSA733	2SA715	HITACHI	KSA473	2SA871	J.R.C	KSA733
2SA555	FUJITSU	KSA733	2SA718	N.E.C	KSA733	2SA872	HITACHI	KSA992
2SA556	FUJITSU	KSA733	2SA719	MATSUSHITA	KSA643	2SA873	FUJITSU	KSA733
2SA557	FUJITSU	KSA733	2SA720	MATSUSHITA	KSA953	2SA874	ROHM	KSA708
2SA561	TOSHIBA	KSA733	2SA723	N.E.C	KSA539	2SA880	MATSUSHITA	KSA733
2SA562	TOSHIBA	KSA539	2SA725	MITSUBISHI	KSA733	2SA885	MATSUSHITA	KSB744
2SA564	MATSUSHITA	KSA733	2SA726	MITSUBISHI	KSA733	2SA886	MATSUSHITA	KSB744
2SA564A	MATSUSHITA	KSA733	2SA728	MITSUBISHI	KSA1175	2SA888	MATSUSHITA	KSA733
2SA567	HITACHI	KSA733	2SA731	MATSUSHITA	KSA953	2SA889	MATSUSHITA	KSA733
2SA568	MITSUBISHI	KSA539	2SA732	FUJITSU	KSA643	2SA890	MATSUSHITA	KSA643
2SA569	MITSUBISHI	KSA733	2SA733	N.E.C	KSA733	2SA891	MATSUSHITA	KSA953
2SA570	MITSUBISHI	KSA733	2SA738	HITACHI	KSA473	2SA896	SONY	KSA910
2SA573	J.R.C	KSA733	2SA740	TOSHIBA	KSA940	2SA897	SONY	KSB744
2SA574	J.R.C	KSA733	2SA743	HITACHI	KSB744	2SA898	FUJITSU	KSA1142
2SA575	J.R.C	KSA733	2SA760	N.E.C	KSA733	2SA899	FUJITSU	KSA1142
2SA576	J.R.C	KSA953	2SA763	J.R.C	KSA733	2SA901	MITSUBISHI	KSA733
2SA577	J.R.C	KSA953	2SA767	TOSHIBA	KSA733	2SA905	MITSUBISHI	KSA910
2SA608	SANYO	KSA733	2SA768	SANKEN	KSB596	2SA914	MATSUSHITA	KSA1142
2SA609	SANYO	KSA733	2SA769	SANKEN	KSB596	2SA915	HITACHI	KSA643
2SA610	J.R.C	KSA733	2SA770	SANKEN	KSB707	2SA916	HITACHI	KSA643
2SA611	J.R.C	KSA733	2SA771	SANKEN	KSB708	2SA917	HITACHI	KSA643

TRANSISTORS

CROSS REFERENCE GUIDE

TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG
2SA918	FUJITSU	KSA953	2SB1127	SANYO	KSB1151	2SB605	N.E.C	KSA708
2SA923	HITACHI	KSA643	2SB1128	TOSHIBA	KSB794	2SB605	N.E.C	KSC1845
2SA924	HITACHI	KSA733	2SB1140	SANYO	KSB1151	2SB620	MATSUSHITA	KSA733
2SA927	FUJITSU	KSA953	2SB1142	SANYO	KSB772	2SB621	MATSUSHITA	KSA643
2SA933	ROHM	KSA733	2SB1143	SANYO	KSB1151	2SB628	N.E.C	KSA940
2SA937	ROHM	KSA733	2SB1144	SANYO	KSA1220A	2SB631	SANYO	KSA1220
2SA938	SONY	KSA953	2SB1149	N.E.C	KSB1149	2SB641	MATSUSHITA	KSA733
2SA940	TOSHIBA	KSA940	2SB1151	N.E.C	KSB1151	2SB642	MATSUSHITA	KSA733
2SA941	TOSHIBA	KSA992	2SB1165	SANYO	KSB1151	2SB643	MATSUSHITA	KSA642
2SA942	TOSHIBA	KSA992	2SB1188	ROHM	KSA1203	2SB646A	HITACHI	KSA910
2SA950	TOSHIBA	KSA643	2SB1189	ROHM	KSA1201	2SB647A	HITACHI	KSA916
2SA952	N.E.C	KSA643	2SB1206	MATSUSHITA	KSA1175	2SB676	TOSHIBA	KSB601
2SA953	N.E.C	KSA953	2SB1207	MATSUSHITA	KSB810	2SB677	TOSHIBA	KSB601
2SA954	N.E.C	KSA954	2SB1212	ROHM	KSA1013	2SB686	TOSHIBA	KSB601
2SA957	SANKEN	KSB546	2SB1266	SANYO	KSB834	2SB687	TOSHIBA	KSB601
2SA958	SANKEN	KSB546	2SB1271	SANYO	KSB708	2SB698	SANYO	KSA643
2SA963	MATSUSHITA	KSB744	2SB1273	SANYO	KSB834	2SB707	N.E.C	KSB707
2SA965	TOSHIBA	KSA965	2SB1276	ROHM	KSA953	2SB708	N.E.C	KSB708
2SA970	TOSHIBA	KSA992	2SB1279	ROHM	KSC945	2SB709	MATSUSHITA	KSA812
2SA972	MATSUSHITA	KSA733	2SB1296	SANYO	KSA1150	2SB715	HITACHI	KSA910
2SA973	MATSUSHITA	KSA733	2SB434	TOSHIBA	KSB596	2SB716	HITACHI	KSA910
2SA977	MATSUSHITA	KSA1142	2SB435	TOSHIBA	KSB596	2SB719	HITACHI	KSB546
2SA977A	MATSUSHITA	KSA1142	2SB507	SANYO	KSB596	2SB720	HITACHI	KSB546
2SA979	MITSUBISHI	KSA992	2SB508	SANYO	KSB596	2SB721	HITACHI	KSA643
2SA984	SANYO	KSA708	2SB509	SANYO	KSB596	2SB725	MATSUSHITA	KSA733
2SA985	N.E.C	KSA940	2SB511	SANYO	KSA473	2SB738	HITACHI	KSA928A
2SA989	N.E.C	KSA733	2SB512	MATSUSHITA	KSB596	2SB739	HITACHI	KSA928A
2SA990	N.E.C	KSA733	2SB512A	MATSUSHITA	KSB596	2SB744	N.E.C	KSB744
2SA992	N.E.C	KSA992	2SB513	MITSUBISHI	KSB596	2SB746	HITACHI	KSA643
2SA993	HITACHI	KSA953	2SB521	SONY	KSB596	2SB761	MATSUSHITA	KSB834
2SA994	MITSUBISHI	KSA733	2SB522	SONY	KSB596	2SB762	MATSUSHITA	KSB596
2SA999	MITSUBISHI	KSA733	2SB523	MITSUBISHI	KSB596	2SB766	MATSUSHITA	KSA1203
2SB1000	HITACHI	KSA1203	2SB524	MITSUBISHI	KSB596	2SB767	MATSUSHITA	KSA1202
2SB1004	TOSHIBA	KSB601	2SB528	MITSUBISHI	KSB546	2SB772	N.E.C	KSB772
2SB1012K	HITACHI	KSB795	2SB529	MITSUBISHI	KSB772	2SB775	SANYO	KSA1010
2SB1025	HITACHI	KSA1201	2SB542	MITSUBISHI	KSA539	2SB782	HITACHI	KSB596
2SB1026	HITACHI	KSA1201	2SB546	N.E.C	KSB546	2SB783	HITACHI	KSB596
2SB1030	MATSUSHITA	KSB810	2SB559	SANYO	KSB772	2SB786	ROHM	KSB794
2SB1034	TOSHIBA	KSB795	2SB560	SANYO	KSA916	2SB789	MATSUSHITA	KSA1201
2SB1049	MATSUSHITA	KSA733	2SB561	HITACHI	KSA643	2SB794	N.E.C	KSB794
2SB1053	MATSUSHITA	KSA812	2SB562	HITACHI	KSA928A	2SB795	N.E.C	KSB795
2SB1059	HITACHI	KSB1116	2SB563	N.E.C	KSB596	2SB798	N.E.C	KSA1203
2SB1066	ROHM	KSB744	2SB565	HITACHI	KSB596	2SB800	N.E.C	KSA1202
2SB1067	TOSHIBA	KSB795	2SB566	HITACHI	KSB596	2SB803	N.E.C	KSA1201
2SB1069	MATSUSHITA	KSB744	2SB568	HITACHI	KSA940	2SB805	N.E.C	KSA1201
2SB1075	MATSUSHITA	KSB744	2SB572	MOTOROLA	KSB596	2SB808	SANYO	KSB810
2SB1089	N.E.C	KSB834	2SB573	MOTOROLA	KSB596	2SB810	N.E.C	KSB810
2SB1115	N.E.C	KSA1201	2SB574	MOTOROLA	KSB596	2SB811	N.E.C	KSA1150
2SB1116	N.E.C	KSB1116	2SB596	TOSHIBA	KSB596	2SB815	SANYO	KSA1298
2SB1116A	N.E.C	KSB1116A	2SB598	SANYO	KSA643	2SB822	ROHM	KSB1116
2SB1121	SANYO	KSA1203	2SB601	N.E.C	KSB601	2SB831	HITACHI	KSA1298
2SB1122	SANYO	KSA1201	2SB604	MATSUSHITA	KSB596	2SB834	TOSHIBA	KSB834

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TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG
2SB850	FUJI	KSB707	2SC1114	SANKEN	KSD5006	2SC1316	SONY	KSD5004
2SB850A	FUJI	KSB708	2SC1117	HITACHI	KSC1070	2SC1317	MATSUSHITA	KSC2001
2SB857	HITACHI	KSB596	2SC1123	SONY	KSC1674	2SC1318	MATSUSHITA	KSC2002
2SB858	HITACHI	KSB596	2SC1126	SONY	KSC1674	2SC1319	N.E.C	KSC1187
2SB862	FUJI	KSB601	2SC1128	SONY	KSC1674	2SC1320	N.E.C	KSC1187
2SB864	HITACHI	KSA733	2SC1129	SONY	KSC1674	2SC1325A	N.E.C	KSD5005
2SB870	MATSUSHITA	KSA1010	2SC1153	MITSUBISHI	KSD5004	2SC1342	HITACHI	KSC1674
2SB876	HITACHI	KSA1220A	2SC1154	MITSUBISHI	KSD5005	2SC1346	MATSUSHITA	KSC2001
2SB877	HITACHI	KSA1220A	2SC1162	HITACHI	KSC1173	2SC1358	N.E.C	KSD5005
2SB880	SANYO	KSB601	2SC1166	TOSHIBA	KSC2003	2SC1359	MATSUSHITA	KSC1675
2SB885	SANYO	KSB601	2SC1170	TOSHIBA	KSD5005	2SC1361	SONY	KSC945
2SB890	ROHM	KSA539	2SC1170B	TOSHIBA	KSD5005	2SC1362	SONY	KSC945
2SB891	ROHM	KSB744	2SC1171	TOSHIBA	KSD5004	2SC1363	SONY	KSC945
2SB894	MATSUSHITA	KSA733	2SC1172	TOSHIBA	KSD5006	2SC1364	SONY	KSC945
2SB895	MATSUSHITA	KSB794	2SC1172A	TOSHIBA	KSD5007	2SC1367	HITACHI	KSD5004
2SB898	HITACHI	KSB834	2SC1173	TOSHIBA	KSD288/C1173	2SC1368	HITACHI	KSC1173
2SB899	HITACHI	KSB834	2SC1174	HITACHI	KSD5005	2SC1372	FUJITSU	KSC945
2SB900	HITACHI	KSB596	2SC1175	SANYO	KSC945	2SC1381	TOSHIBA	KSC2690
2SB901	HITACHI	KSB596	2SC1187	N.E.C	KSC1187	2SC1390	HITACHI	KSC1675
2SB902	MATSUSHITA	KSA812	2SC120	N.E.C	KSC945	2SC1393	N.E.C	KSC1393
2SB919	SANYO	KSB707	2SC1204	HITACHI	KSC945	2SC1394	N.E.C	KSC1394
2SB921	SANYO	KSA1010	2SC1205	HITACHI	KSC1675	2SC1395	N.E.C	KSC1395
2SB970	MATSUSHITA	KSA1298	2SC1206	MITSUBISHI	KSD526	2SC1398	MATSUSHITA	KSD288
2SB984	N.E.C	KSA1013	2SC1207	MITSUBISHI	KSD526	2SC1413	HITACHI	KSD5007
2SB988	K.E.C	KSB834	2SC1209	MITSUBISHI	KSC2001	2SC1413A	HITACHI	KSD5007
2SB989	K.E.C	KSB596	2SC121	N.E.C	KSC945	2SC1417	HITACHI	KSC1674
2SB992	TOSHIBA	KSA1010	2SC1210	MITSUBISHI	KSC2002	2SC1419	HITACHI	KSD288
2SB993	TOSHIBA	KSB708	2SC1211	MITSUBISHI	KSC2003	2SC1428	N.E.C	KSC838
2SC1004	TOSHIBA	KSD5004	2SC1212A	HITACHI	KSD794	2SC1429	SONY	KSC2500
2SC1004A	TOSHIBA	KSD5004	2SC1213	HITACHI	KSC2001	2SC1438	FUJITSU	KSC2310
2SC1005	TOSHIBA	KSD5006	2SC1213A	HITACHI	KSC2001	2SC1439	FUJITSU	KSC2310
2SC1006	N.E.C	KSC945	2SC1214	HITACHI	KSC2002	2SC145	OKI	KSC815
2SC1007	N.E.C	KSC945	2SC1215	MATSUSHITA	KSC1395	2SC146	OKI	JSC845
2SC1013	MITSUBISHI	KSC1173	2SC1219	FUJITSU	KSC2001	2SC146A	OKI	KSC945
2SC1023	FUJITSU	KSC1675	2SC122	N.E.C	KSC945	2SC1473	MATSUSHITA	MPSA43
2SC1024	SANYO	KSD526	2SC1220	FUJITSU	KSC2002	2SC1474	SONY	KSC2500
2SC1026	FUJITSU	KSC1675	2SC1226	MATSUSHITA	KSC1173/D882	2SC1507	N.E.C	KSC1507
2SC1032	FUJITSU	KSC1675	2SC1226A	MATSUSHITA	KSC1173	2SC1515K	HITACHI	KSC2310
2SC1034	SONY	KSD5004	2SC123	N.E.C	KSC945	2SC1518	MATSUSHITA	KSC1173
2SC1035	SANYO	KSC1070	2SC124	N.E.C	KSC945	2SC1520	N.E.C	KSC1520
2SC1036	SANYO	KSC1070	2SC1240	MITSUBISHI	KSC1674	2SC1537	ROHM	KSC838
2SC1046	SANYO	KSD5004	2SC1243	MITSUBISHI	KSD882	2SC1539	ROHM	KSC945
2SC1047	MATSUSHITA	KSC1674	2SC1246	FUJITSU	KSC2001	2SC1540	ROHM	KSC945
2SC1060	HITACHI	KSD526	2SC1247	FUJITSU	KSC2002	2SC1541	ROHM	KSC945
2SC1061	HITACHI	KSD526	2SC125	SONY	KSC2310	2SC1542	ROHM	KSC945
2SC1070	N.E.C	KSC1070	2SC126	SONY	KSC2310	2SC1544	ROHM	KSC945
2SC1096	N.E.C	KSC1096	2SC1285	SANYO	KSC945	2SC155	FUJITSU	KSC1675
2SC1098A	N.E.C	KSD880	2SC1293	SANYO	KSC1674	2SC156	FUJITSU	KSC1675
2SC1107	SANKEN	KSD526	2SC1308	SANYO	KSD5006	2SC1568	MATSUSHITA	KSD882
2SC1108	SANKEN	KSD526	2SC1309	MITSUBISHI	KSD5005	2SC157	HITACHI	KSC945
2SC1109	SANKEN	KSD526	2SC1310	MITSUBISHI	KSC945	2SC1570	SANYO	KSC945
2SC1110	SANKEN	KSD526	2SC1311	MITSUBISHI	KSC945	2SC158	HITACHI	KSC945

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TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG
2SC1599	TOSHIBA	KSC945	2SC182	N.E.C	KSC945	2SC1951	SONY	KSC2310
2SC160	HITACHI	KSC945	2SC1826	SANKEN	KSD526	2SC1954	FUJITSU	KSC1730
2SC1602	J.R.C	KSC945	2SC183	N.E.C	KSC945	2SC196	SONY	KSC945
2SC1621	N.E.C	KSC1623	2SC183A	N.E.C	KSC945	2SC1961	SONY	KSC1674
2SC1622	N.E.C	KSC1623	2SC184	N.E.C	KSC945	2SC197	SONY	KSC945
2SC1623	N.E.C	KSC1623	2SC1842	N.E.C	KSC945	2SC1980	MATSUSHITA	KSC1845
2SC1627	TOSHIBA	KSC2003	2SC1843	N.E.C	KSC945	2SC1982	SONY	KSC2310
2SC1631	SONY	KSC945	2SC1845	N.E.C	KSC1845	2SC1983	SANKEN	KSC1983
2SC1632	SONY	KSC945	2SC1847	MATSUSHITA	KSD794	2SC1989	MATSUSHITA	KSC1675
2SC1633	SONY	KSC945	2SC1849	MATSUSHITA	KSC945	2SC1990	MATSUSHITA	KSC1674
2SC1634	SONY	KSC945	2SC1850	MATSUSHITA	KSC945	2SC1992	N.E.C	KSC945
2SC1639	ROHM	KSC945	2SC1851	MATSUSHITA	KSC2001	2SC1993	N.E.C	KSC945
2SC1640	ROHM	KSC945	2SC1852	MATSUSHITA	KSC2002	2SC1998	N.E.C	KSC2310
2SC1641	ROHM	KSC945	2SC1853	MATSUSHITA	KSC1675	2SC1999	N.E.C	KSC2310
2SC1642	ROHM	KSC945	2SC1854	MATSUSHITA	KSC1675	2SC2000	N.E.C	KSC945
2SC1643	ROHM	KSC945	2SC1855	HITACHI	KSC1393	2SC2001	N.E.C	KSC2001
2SC1644	ROHM	KSC945	2SC1856	HITACHI	KSC1393	2SC2002	N.E.C	KSC2002
2SC1647	ROHM	KSC945	2SC1859	SONY	KSC2328A	2SC2003	N.E.C	KSC2003
2SC1648	ROHM	KSC945	2SC186	FUJITSU	KSC945	2SC2009	SONY	KSC1674
2SC1652	ROHM	KSC1008	2SC187	FUJITSU	KSC945	2SC2010	SONY	KSC1674
2SC1653	N.E.C	KSC1653	2SC1875	N.E.C	KSD5005	2SC2011	SONY	KSC1393
2SC1654	N.E.C	KSC1653	2SC1881	HITACHI	KSD560	2SC2013	SONY	KSC1393
2SC1670	SONY	KSC2316	2SC1883	HITACHI	KSD560	2SC2022	SANKEN	KSC2333
2SC1674	N.E.C	KSC1674	2SC1885	MATSUSHITA	KSC2310	2SC2023	SANKEN	KSC2333
2SC1675	N.E.C	KSC1675	2SC1886	HITACHI	KSC1730	2SC2027	HITACHI	KSD5006
2SC1683	MATSUSHITA	KSD401	2SC1887	HITACHI	KSC1730	2SC2057	SANYO	KSC1393
2SC1684	MATSUSHITA	KSC945	2SC1890	HITACHI	KSC1845	2SC2059	ROHM	KSC2223
2SC1685	MATSUSHITA	KSC945	2SC1892	TOSHIBA	KSD5004	2SC206	FUJITSU	KSC945
2SC1686	MATSUSHITA	KSC1675	2SC1893	TOSHIBA	KSD5005	2SC207	FUJITSU	KSC945
2SC1687	MATSUSHITA	KSC1674	2SC1894	TOSHIBA	KSD5006	2SC2072	SONY	KSC945
2SC1688	MATSUSHITA	KSC1674	2SC1895	TOSHIBA	KSD5007	2SC2073	TOSHIBA	KSD401
2SC170	FUJITSU	KSC945	2SC1898	J.R.C	KSC1393	2SC2076	MATSUSHITA	KSC838
2SC1708	MITSUBISHI	KSC1845	2SC1899	J.R.C	KSC1393	2SC2078	SANYO	KSD880
2SC171	FUJITSU	KSC945	2SC1903	FUJITSU	KSC2682	2SC2088	TOSHIBA	KSC1845
2SC172	FUJITSU	KSC945	2SC1904	FUJITSU	KSC2682	2SC2089	TOSHIBA	KSC1845
2SC1727	SONY	KSC1393	2SC1906	HITACHI	KSC1730	2SC2120	TOSHIBA	KSC2001
2SC1730	N.E.C	KSC1730	2SC1907	HITACHI	KSC1730	2SC2130	MITSUBISHI	KSC945
2SC1739	ROHM	KSC1675	2SC1908	SONY	KSC838	2SC2141	SONY	KSC2073
2SC174	FUJITSU	KSC945	2SC191	SONY	KSC945	2SC2153	MATSUSHITA	KSC2786
2SC1766	HITACHI	KSC945	2SC1913	MATSUSHITA	KSD401	2SC2166	MITSUBISHI	KSD526
2SC1771	J.R.C	KSC945	2SC1915	MITSUBISHI	KSC2310	2SC2167	SANKEN	KSD401
2SC1775	HITACHI	KSC1845	2SC192	SONY	KSC945	2SC2168	SANKEN	KSD401
2SC1776	FUJITSU	KSC2002	2SC1921	HITACHI	KSC2310	2SC2193	OKI	KSC2073
2SC1778	MATSUSHITA	KSC1674	2SC1922	HITACHI	KSD5004	2SC22	N.E.C	KSD526
2SC1779	MATSUSHITA	KSC1674	2SC1923	TOSHIBA	KSC1674	2SC2206	MATSUSHITA	KSC838
2SC1787	MATSUSHITA	KSC2784	2SC1928	SONY	KSC945	2SC2209	MATSUSHITA	KSD794
2SC1788	MATSUSHITA	KSC2001	2SC193	SONY	KSC945	2SC2212	SONY	KSC1674
2SC1788A	MATSUSHITA	KSC2001	2SC194	SONY	KSC945	2SC2215	TOSHIBA	KSC1674
2SC1799	SANYO	KSC2073	2SC1940	N.E.C	KSC2310	2SC2216	TOSHIBA	KSC1674
2SC1811	SONY	KSC2310	2SC1941	N.E.C	KSC2310	2SC2223	N.E.C	KSC2223
2SC1812	SONY	KSC1070	2SC1942	HITACHI	KSD5005	2SC2228	SANYO	KSC2310
2SC1815	TOSHIBA	KSC945	2SC195	SONY	KSC945	2SC2229	TOSHIBA	KSC2310

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TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG
2SC2235	TOSHIBA	KSC2316	2SC2518	N.E.C	KSC2518	2SC2755	N.E.C	KSC2755
2SC2239	TOSHIBA	KSD401	2SC2534	TOSHIBA	KSC2333	2SC2756	N.E.C	KSC2756
2SC2240	TOSHIBA	KSC1845	2SC2535	TOSHIBA	KSC2335	2SC2757	N.E.C	KSC2757
2SC2257	MATSUSHITA	KSC2310	2SC2542	FUJI	KSC2335	2SC2758	N.E.C	KSC2758
2SC2257A	MATSUSHITA	KSC2682	2SC2543	HITACHI	KSC1845	2SC2759	N.E.C	KSC2759
2SC2259	N.E.C	KSC1845	2SC2544	HITACHI	KSC1845	2SC2784	N.E.C	KSC2784
2SC2263	MATSUSHITA	KSC945	2SC2552	TOSHIBA	KSC2333	2SC2785	N.E.C	KSC2785
2SC2274	SANYO	KSC2002	2SC2553	TOSHIBA	KSC2335	2SC2786	N.E.C	KSC2786
2SC2274	SANYO	SS8050	2SC2555	TOSHIBA	KSC2749	2SC2787	N.E.C	KSC2787
2SC2275	N.E.C	KSC2073	2SC2556	MATSUSHITA	KSC2690	2SC2794	TOSHIBA	KSD794A
2SC2277	HITACHI	KSC2002	2SC2561	MATSUSHITA	KSC1675	2SC28	FUJITSU	KSC945
2SC2294	MATSUSHITA	KSC1675	2SC2582	MATSUSHITA	KSD794	2SC2803	MATSUSHITA	KSC2690A
2SC2296	MITSUBISHI	KSC1675	2SC2590	MATSUSHITA	KSC2690	2SC281	GUTACGU	JSC945
2SC2298	HITACHI	KSD985	2SC2612	HITACHI	KSC5020	2SC2810	SANKEN	KSC2335
2SC2299	FUJITSU	KSD471	2SC2612	HITACHI	KSC2335	2SC2812	SANYO	KSC1623
2SC23	N.E.C	KSD526	2SC2613	HITACHI	KSC5021	2SC2813	SANYO	KSC2223
2SC2308	HITACHI	KSC945	2SC2613	HITACHI	KSC2335	2SC2816	HITACHI	KSC2335
2SC2309	HITACHI	KSC945	2SC2619	HITACHI	KSC1623	2SC2821	HITACHI	KSC2715
2SC2310	HITACHI	KSC945	2SC2620	HITACHI	KSC2223	2SC2824	TOSHIBA	KSC2690
2SC2314	SANYO	KSD794	2SC2621	SANYO	KSC2688	2SC2826	J.R.C	KSC2335
2SC2314	SANYO	KSC2690	2SC263	OKI	KSC945	2SC2827	J.R.C	KSC2335
2SC2320	MITSUBISHI	KSC945	2SC2646	MATSUSHITA	KSC1730	2SC2828	J.R.C	KSC2751
2SC2324	HITACHI	KSD985	2SC265	OKI	KSC945	2SC283	HITACHI	KSC945
2SC2333	N.E.C	KSC2333	2SC266	N.E.C	KSC838	2SC2839	SANYO	KSC2787
2SC2334	N.E.C	KSC2334	2SC2660A	MATSUSHITA	KSC2073	2SC284	HITACHI	KSC945
2SC2335	N.E.C	KSC2335	2SC2668	TOSHIBA	KSC2786	2SC2840	SANYO	KSC2786
2SC2348	TOSHIBA	KSC1393	2SC2669	TOSHIBA	KSC2787	2SC2855	HITACHI	KSC1845
2SC2362	SANYO	KSC1845	2SC2673	ROHM	KSD1616	2SC2856	HITACHI	KSC1845
2SC2363	SANYO	KSC2310	2SC268	N.E.C	KSC945	2SC2859	TOSHIBA	KSC2859
2SC2376	TOSHIBA	KSC2688	2SC2680	MATSUSHITA	KSC2223	2SC2860	MATSUSHITA	KSC2786
2SC2383	TOSHIBA	KSC2383	2SC2682	N.E.C	KSC2682	2SC2868	TOSHIBA	KSC2003
2SC2396	HITACHI	KSC945	2SC2688	N.E.C	KSC2688	2SC2872	ROHM	KSC2001
2SC24	N.E.C	KSD526	2SC2690	N.E.C	KSC2690	2SC2877	TOSHIBA	KSD794
2SC2404	MATSUSHITA	KSC2223	2SC2690A	N.E.C	KSC2690A	2SC287A	N.E.C	KSC388
2SC2412	ROHM	KSC1623	2SC2691	MITSUBISHI	KSC945	2SC2882	TOSHIBA	KSC2882
2SC2438	FUJI	KSC2334	2SC2699	TOSHIBA	KSC2699	2SC288A	N.E.C	KSC388
2SC2439	FUJI	KSC2334	2SC2704	TOSHIBA	KSC2682	2SC29	FUJITSU	KSC945
2SC2440	FUJI	KSC2335	2SC2710	TOSHIBA	KSC2710	2SC2907	FUJI	KSC2518
2SC2441	SANYO	KSC2310	2SC2712	TOSHIBA	KSC1623	2SC2911	SANYO	KSC2682
2SC2458	TOSHIBA	KSC2785	2SC2714	TOSHIBA	KSC2223	2SC2912	SANYO	KSC2682
2SC2459	TOSHIBA	KSC2784	2SC2715	TOSHIBA	KSC2715	2SC2929	FUJI	KSC2518
2SC2462	HITACHI	KSC1623	2SC2717	TOSHIBA	KSC1675	2SC2934	HITACHI	KSC2688
2SC2463	HITACHI	KSC1623	2SC2718	N.E.C	KSC945	2SC2935	HITACHI	KSC2688
2SC2464	HITACHI	KSC1070	2SC2724	MITSUBISHI	KSC2787	2SC2943	SONY	KSC2751
2SC2466	HITACHI	KSC1070	2SC273	N.E.C	KSC2310	2SC296	FUJITSU	KSC945
2SC2481	TOSHIBA	KSC2690A	2SC2732	HITACHI	KSC3121	2SC2963	J.R.C	KSC2517
2SC2497	MATSUSHITA	KSD794A	2SC2733	HITACHI	KSC3123	2SC2979	HITACHI	KSC5027
2SC250	FUJITSU	KSC838	2SC2734	HITACHI	KSC3120	2SC2986	TOSHIBA	KSC945
2SC2500	TOSHIBA	KSC2500	2SC2736	HITACHI	KSC3120	2SC2999	SANYO	KSC2786
2SC2501	J.R.C	KSC2335	2SC2749	N.E.C	KSC2749	2SC3000	SANYO	KSC1675
2SC2502	J.R.C	KSC2335	2SC2751	N.E.C	KSC2751	2SC3038	SANYO	KSC2518
2SC2517	N.E.C	KSC2517	2SC2752	N.E.C	KSC2752	2SC3039	SANYO	KSC2335

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TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG
2SC3042	SANYO	KSC2751	2SC3365	HITACHI	KSC5024	2SC3495	SANYO	KSC1845
2SC3052	mitsubishi	KSC1623	2SC337	OKI	KSC838	2SC350	HITACHI	KSC945
2SC3055	FUJITSU	KSC2333	2SC3374	HITACHI	KSC2233	2SC3502	SANYO	KSC3502
2SC3056	FUJITSU	KSC2335	2SC3375	TOSHIBA	KSC2001	2SC3503	SANYO	KSC2258
2SC3068	SANYO	KSC945	2SC3377	ROHM	KSC2001	2SC351	TOSHIBA	KSC1730
2SC3114	SANYO	KSC2002	2SC3378	TOSHIBA	KSC2784	2SC3521	HITACHI	KSC2712
2SC3120	TOSHIBA	KSC3120	2SC338	OKI	KSC945	2SC3522	T.D.K	KSC2335
2SC3121	TOSHIBA	KSC3121	2SC3382	SANYO	KSC2002	2SC3523	T.D.K	KSC2517
2SC3122	TOSHIBA	KSC2223	2SC3383	SANYO	KSC2002	2SC3524	T.D.K	KSC2334
2SC3123	TOSHIBA	KSC3123	2SC3384	TOSHIBA	KSC2751	2SC3527	MATSUSHITA	KSC2751
2SC3125	TOSHIBA	KSC3125	2SC3390	HITACHI	KSC2785	2SC3552	SANYO	KSC3552
2SC3133	mitsubishi	KSD568	2SC3391	HITACHI	KSC2786	2SC36	MATSUSHITA	KSC945
2SC3134	SANYO	KSC1623	2SC3395	SANYO	KSR1104	2SC361	TOSHIBA	KSC945
2SC3142	SANYO	KSC2223	2SC3396	SANYO	KSR1103	2SC3617	N.E.C	KSC2500
2SC316	MATSUSHITA	KSC945	2SC3397	SANYO	KSR1108	2SC362	TOSHIBA	KSC945
2SC3192	K.E.C	KSC1675	2SC3398	SANYO	KSR1102	2SC3624	N.E.C	KSC5037
2SC3193	K.E.C	KSC2787	2SC3399	SANYO	KSR1204	2SC3625	TOSHIBA	KSC2335
2SC194	K.E.C	KSC1674	2SC340	OKI	KSC945	2SC363	TOSHIBA	KSC945
2SC3195	K.E.C	KSC2785	2SC3400	SANYO	KSR1203	2SC364	TOSHIBA	KSC945
2SC3197	K.E.C	KSC1674	2SC3401	SANYO	KSR1208	2SC3653	SANYO	KSR1004
2SC3198	K.E.C	KSC945	2SC3402	SANYO	KSR1202	2SC3654	SANYO	KSR1003
2SC3199	K.E.C	KSC2785	2SC3413	HITACHI	KSC2785	2SC3655	SANYO	KSR1008
2SC3200	K.E.C	KSC1845	2SC3414	HITACHI	KSC2002	2SC3656	SANYO	KSR1002
2SC3201	K.E.C	KSC2784	2SC3416	SANYO	KSC2682	2SC3658	HITACHI	KSD5002
2SC3204	K.E.C	KSD1020	2SC3417	SANYO	KSC2688	2SC3659	HITACHI	KSD5002
2SC3206	K.E.C	KSC2310	2SC3418	SANYO	KSC2752	2SC366	TOSHIBA	KSC2002
2SC3226	K.E.C	KSC2500	2SC342	OKI	KSC2310	2SC367	TOSHIBA	KSC2002
2SC3228	K.E.C	KSC2383	2SC3421	TOSHIBA	KSC2690	2SC369	TOSHIBA	KSC945
2SC3230	K.E.C	KSC1173	2SC3422	TOSHIBA	KSD882	2SC37	N.E.C	KSC945
2SC3231	K.E.C	KSC2233	2SC3423	TOSHIBA	KSC2682	2SC370	TOSHIBA	KSC945
2SC324	FUJITSU	KSC945	2SC3424	TOSHIBA	KSC2688	2SC3705	SANYO	KSD985
2SC3242	mitsubishi	KSC2500	2SC3425	TOSHIBA	KSC2752	2SC371	TOSHIBA	KSC945
2SC3242A	mitsubishi	KSC2500	2SC3426	TOSHIBA	KSC3265	2SC3711	TOSHIBA	KSC2785
2SC3252	SANYO	KSD880	2SC3440	MITSUBISHI	KSC2785	2SC372	TOSHIBA	KSC945
2SC3254	SANYO	KSD569	2SC3442	MITSUBISHI	KSC2785	2SC3723	FUJI	KSC2518
2SC3258	TOSHIBA	KSC2517	2SC3446	SANYO	KSC5020	2SC373	TOSHIBA	KSC945
2SC3265	TOSHIBA	KSC3265	2SC3447	SANYO	KSC5021	2SC374	TOSHIBA	KSC945
2SC33	N.E.C	KSC945	2SC3448	SANYO	KSC5022	2SC3742	N.E.C	KSC3265
2SC3300	N.E.C	KSC5047	2SC3449	SANYO	KSC5023	2SC375	TOSHIBA	KSC1674
2SC3311	MATSUSHITA	KSC2785	2SC3450	SANYO	KSC5024	2SC377	TOSHIBA	KSC1675
2SC3312	MATSUSHITA	KSC2784	2SC3451	SANYO	KSC5025	2SC3771	SANYO	KSC2759
2SC3313	MATSUSHITA	KSC2787	2SC3456	SANYO	KSC5026	2SC378	TOSHIBA	KSC1675
2SC3314	MATSUSHITA	KSC2787	2SC3457	SANYO	KSC5027	2SC3784	SANYO	KSD985
2SC3315	MATSUSHITA	KSC2786	2SC3458	SANYO	KSC5028	2SC3786	SANYO	KSD985
2SC3330	SANYO	KSC2785	2SC3459	SANYO	KSC5029	2SC3788	SANYO	KSC2682
2SC3331	SANYO	KSC2002	2SC3470	HITACHI	KSC2785	2SC3789	SANYO	KSC2688
2SC3332	SANYO	KSC2383	2SC3471	HITACHI	KSC2002	2SC379	TOSHIBA	KSC1675
2SC3336	HITACHI	KSC5025	2SC3481	SANYO	KSD5002	2SC380	TOSHIBA	KSC838
2SC3339	TOSHIBA	KSC1623	2SC3482	SANYO	KSD5003	2SC3801	ROHM	KSC1730
2SC3342	HITACHI	KSD5006	2SC3485	SANYO	KSD5006	2SC3802	ROHM	KSC2757
2SC3343	HITACHI	KSD5006	2SC3486	SANYO	KSD5007	2SC381	TOSHIBA	KSC1675
2SC3359	ROHM	KSC2003	2SC3487	TOSHIBA	KSC945	2SC382	TOSHIBA	KSC1187
2SC3361	SANYO	KSC2712	2SC3488	TOSHIBA	KSD1020	2SC3823	HITACHI	KSC2517
			2SC3494	HITACHI	KSC2785	2SC3825	MATSUSHITA	KSC2333

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TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG
2SC3826	N.E.C	KSC2517	2SC463	HITACHI	KSC1394	2SC643	TOSHIBA	KSD5004
2SC383	TOSHIBA	KSC1674	2SC464	HITACHI	KSC1393	2SC643A	TOSHIBA	KSD5004
2SC3830	SANKEN	KSC2335	2SC465	HITACHI	KSC1393	2SC645	MATSUSHITA	KSC1675
2SC3832	SANKEN	KSC2335	2SC466	HITACHI	KSC1393	2SC648	HITACHI	KSC945
2SC3834	SANKEN	KSC2334	2SC467	FUJITSU	KSC945	2SC649	HITACHI	KSC945
2SC384	TOSHIBA	KSC1674	2SC469	N.E.C	KSC838	2SC65	SANYO	KSC2310
2SC3848	ROHM	KSC2859	2SC470	SONY	KSC2310	2SC650	HITACHI	KSC945
2SC385	TOSHIBA	KSC1674	2SC471	HITACHI	KSC945	2SC655	MATSUSHITA	KSC945
2SC3859	SANYO	KSR1110	2SC475	N.E.C	KSC945	2SC66	SANYO	KSC2310
2SC386	TOSHIBA	KSC1674	2SC476	N.E.C	KSC945	2SC660	MITSUBISHI	KSC1187
2SC3860	SANYO	KSR1210	2SC489	TOSHIBA	KSD526	2SC661	MITSUBISHI	KSC1187
2SC3875	K.E.C	KSC2712	2SC490	TOSHIBA	KSD526	2SC663	MITSUBISHI	KSC1674
2SC3876	K.E.C	KSC2859	2SC491	TOSHIBA	KSD526	2SC668	SANYO	KSC2786
2SC3879	K.E.C	KSC2715	2SC492	TOSHIBA	KSD526	2SC674	SANYO	KSC2786
2SC388	TOSHIBA	KSC1674	2SC493	TOSHIBA	KSD526	2SC684	HITACHI	KSC1730
2SC3881	K.E.C	KSC3125	2SC494	TOSHIBA	KSD526	2SC693	SANYO	KSC945
2SC388A	TOSHIBA	KSC388	2SC509	TOSHIBA	KSC2001	2SC705	SANYO	KSC1674
2SC3898	SANYO	KSR1112	2SC528	HITACHI	KSC945	2SC706	SANYO	KSC1674
2SC3899	SANYO	KSR1212	2SC529	HITACHI	KSC1675	2SC707	HITACHI	KSC1070
2SC3900	SANYO	KSR1109	2SC530	HITACHI	KSC1675	2SC709	MITSUBISHI	KSC1675
2SC3901	SANYO	KSR1209	2SC531	HITACHI	KSC1675	2SC710	MITSUBISHI	KSC1675
2SC3928	MITSUBISHI	KSC1623	2SC532	HITACHI	KSC1675	2SC711	MITSUBISHI	KSC945
2SC394	TOSHIBA	KSC1675	2SC533	HITACHI	KSC1675	2SC712	MITSUBISHI	KSC945
2SC3960	UNISON	KSC2517	2SC534	HITACHI	KSC1675	2SC714	MITSUBISHI	KSC945
2SC3961	UNISON	KSC2518	2SC535	HITACHI	KSC1675	2SC715	SANYO	KSC945
2SC3962	UNISON	KSC2518	2SC536	SANYO	KSC945	2SC716	SANYO	KSC945
2SC3968	ROHM	KSC 2333	2SC537	SANYO	KSC945	2SC720	FUJITSU	KSC1187
2SC398	TOSHIBA	KSR1393	2SC538	MATSUSHITA	KSC945	2SC721	FUJITSU	KSC1187
2SC398A	ROHM	KSC945	2SC538A	MATSUSHITA	KSC945	2SC733	TOSHIBA	KSC945
2SC399	TOSHIBA	KSC1394	2SC539	MATSUSHITA	KSC945	2SC734	TOSHIBA	KSC945
2SC4007	ROHM	KSD526	2SC54	FUJITSU	KSC945	2SC735	TOSHIBA	KSC2001
2SC401	SONY	KSC945	2SC540	N.E.C	KSC945	2SC738	MITSUBISHI	KSC1674
2SC4018	ROHM	KSC1623	2SC544	SANYO	KSC1674	2SC739	MITSUBISHI	KSC1674
2SC402	SONY	KSC945	2SC545	SANYO	KSC1674	2SC752	TOSHIBA	KSC945
2SC4027	SANYO	KSC2690A	2SC546	SANYO	KSC1187	2SC755	N.E.C	KSC945
2SC402A	SONY	KSC945	2SC56	FUJITSU	KSC945	2SC761	MATSUSHITA	KSC1070
2SC403	SONY	KSC945	2SC561	FUJITSU	KSC1675	2SC762	MATSUSHITA	KSC1070
2SC403A	SONY	KSC945	2SC562	MATSUSHITA	KSC1187	2SC763	MITSUBISHI	KSC1674
2SC404	SONY	KSC945	2SC581	MATSUSHITA	KSC1675	2SC772	SANYO	KSC1675
2SC4047	SANYO	KSR1105	2SC593	MATSUSHITA	KSC838	2SC773	MITSUBISHI	KSC2002
2SC4048	SANYO	KSR1205	2SC620	MITSUBISHI	KSC2002	2SC784	TOSHIBA	KSC1187
2SC4120	SANYO	KSR1111	2SC621	MITSUBISHI	KSC838	2SC785	TOSHIBA	KSC1187
2SC4121	SANYO	KSR1211	2SC622	MITSUBISHI	KSC838	2SC787	TOSHIBA	KSC1070
2SC4143	SANYO	KSR1214	2SC627	FUJITSU	KSC2310	2SC789	TOSHIBA	KSD526/D288
2SC4146	SANYO	KSR1114	2SC629	SONY	KSC1730	2SC790	TOSHIBA	KSD288
2SC454	HITACHI	KSC838	2SC631	SONY	KSC838	2SC791	TOSHIBA	KSD526
2SC455	HITACHI	KSC838	2SC632	SONY	KSC945	2SC815	N.E.C	KSC838
2SC458	HITACHI	KSC945	2SC633	SONY	KSC838	2SC817	MITSUBISHI	KSC1070
2SC459	HITACHI	KSC1675	2SC634	SONY	KSC945	2SC818	MITSUBISHI	KSC2310
2SC460	HITACHI	KSC1675	2SC640	N.E.C	KSC945	2SC828	MATSUSHITA	KSC945
2SC461	HITACHI	KSC1675	2SC642	TOSHIBA	KSD5004	2SC828A	MATSUSHITA	KSC945
2SC462	HITACHI	KSC1393	2SC642A	TOSHIBA	KSD5004	2SC829	MATSUSHITA	KSC838

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TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG
2SC830	HITACHI	KSD526	2SD1139	HITACHI	KSC2328A	2SD1398	SANYO	KSD5002
2SC836	N.E.C	KSC1187	2SD1147	FUJI	KSD560	2SD1399	SANYO	KSD5003
2SC837	N.E.C	KSC388	2SD1157	FUJI	KSD526	2SD1400	SANYO	KSD5004
2SC838	N.E.C	KSC838	2SD1161	SANYO	KSC2712	2SD1401	SANYO	KSD5005
2SC839	N.E.C	KSC838	2SD1163A	HITACHI	KSD560	2SD1402	SANYO	KSD5006
2SC860	SANYO	KSC1674	2SD1173	MATSUSHITA	KSD5003	2SD1403	SANYO	KSD5007
2SC870	MITSUBISHI	KSC945	2SD1179	HITACHI	KSC2690	2SD141	N.E.C	KSD880
2SC894	SONY	KSC1675	2SD1180	HITACHI	KSC2690	2SD1410A	HITACHI	KSD401
2SC899	N.E.C	KSC945	2SD1190	SANYO	KSD560	2SD142	N.E.C	KSD880
2SC900	N.E.C	KSC945	2SD1195	SANYO	KSD560	2SD1423	MATSUSHITA	KSD1020
2SC903	MITSUBISHI	KSC2001	2SD1201	HITACHI	KSC1871	2SD1424	MATSUSHITA	KSC2785
2SC904	MITSUBISHI	KSC2002	2SD1202	HITACHI	KSC1871	2SD1429	TOSHIBA	KSD5004
2SC905	MITSUBISHI	KSC2002	2SD1218	MATSUSHITA	KSD560	2SD143	N.E.C	KSD880
2SC912	MITSUBISHI	KSC945	2SD122	HITACHI	KSD526	2SD1430	TOSHIBA	KSD5005
2SC917	HITACHI	KSC1070	2SD1225M	ROHM	KSD882	2SD1431	TOSHIBA	KSD5006
2SC918	SONY	KSC1674	2SD124	HITACHI	KSD73	2SD1432	TOSHIBA	KSD5007
2SC923	N.E.C	KSC838	2SD1247	SANYO	KSC2500	2SD1438	TOSHIBA	KSD794A
2SC924	N.E.C	KSC838	2SD124A	HITACHI	KSD73	2SD144	N.E.C	KSD880
2SC927	SANYO	KSC1674	2SD125	HITACHI	KSD73	2SD1447	MITSUBISHI	KSD471A
2SC928	SANYO	KSC1674	2SD125A	HITACHI	KSD73	2SD1449	MATSUSHITA	KSC2784
2SC929	SANYO	KSC1675	2SD1290	MATSUSHITA	KSD5001	2SD1452	HITACHI	KSD5004
2SC930	SANYO	KSC1675	2SD1300	HITACHI	KSD5005	2SD1453	HITACHI	KSD5005
2SC931	SANYO	KSD526/D882	2SD1301	MATSUSHITA	KSD5000	2SD1455	HITACHI	KSD5006
2SC932	SANYO	KSD882	2SD1304	MATSUSHITA	KSC1623	2SD1456	HITACHI	KSD5007
2SC937	HITACHI	KSD5004	2SD1306	HITACHI	KSC3265	2SD146	FUJITSU	KSD880
2SC945	N.E.C	KSC945	2SD1328	MATSUSHITA	KSC3265	2SD1468	ROHM	KSC2001
2SC949	J.R.C	KSC945	2SD1337	SANYO	KSD5004	2SD1469	ROHM	KSC2001
2SC950	J.R.C	KSC945	2SD1338	SANYO	KSD5000	2SD147	FUJITSU	KSD880
2SC951	J.R.C	KSC945	2SD1339	SANYO	KSD5005	2SD148	FUJITSU	KSD880
2SC953	J.R.C	KSC2001	2SD1340	SANYO	KSD5001	2SD1482	MATSUSHITA	KSC1623
2SC955	J.R.C	KSC1675	2SD1341	SANYO	KSD5006	2SD1490	HITACHI	KSD1616
2SC956	J.R.C	KSC945	2SD1342	SANYO	KSD5002	2SD1493	HITACHI	KSD5004
2SC957	SONY	KSC1674	2SD1343	SANYO	KSD5007	2SD1494	HITACHI	KSD5005
2SC963	FUJITSU	KSC838	2SD1344	SANYO	KSD5003	2SD1496	HITACHI	KSD5006
2SC969	FUJITSU	KSC945	2SD1351	K.E.C	KSD880	2SD1497	HITACHI	KSD5007
2SC983	TOSHIBA	KSC2310	2SD1352	K.E.C	KSD526	2SD150	N.E.C	KSD880
2SD100A	TOSHIBA	KSC945	2SD1353	TOSHIBA	KSD288	2SD1506	ROHM	KSD794A
2SD1012	SANYO	KSC1072	2SD1354	TOSHIBA	KSD288	2SD1509	TOSHIBA	KSD794A
2SD1020	N.E.C	KSD1020	2SD1357	TOSHIBA	KSD2334	2SD1512	MATSUSHITA	KSC2784
2SD1022	J.R.C	KSD560	2SD1358	TOSHIBA	KSD569	2SD1517A	HITACHI	KSD794
2SD1029	SANYO	KSD526	2SD1359	TOSHIBA	KSD568	2SD152	N.E.C	KSD526
2SD1048	SANYO	KSC3265	2SD1362	TOSHIBA	KSD1221	2SD1521	HITACHI	KSD985
2SD1052	TOSHIBA	KSD560	2SD1363	TOSHIBA	KSD569	2SD1528	MATSUSHITA	KSC2233
2SD1069	TOSHIBA	KSC2335	2SD1369	TOSHIBA	KSD288	2SD1531	MATSUSHITA	KSD794
2SD1101	HITACHI	KSC3265	2SD1370	TOSHIBA	KSC2517	2SD154	N.E.C	KSD526
2SD1128	FUJITSU	KSD560	2SD1377	HITACHI	KSD986	2SD1543	TOSHIBA	KSD5014
2SD1131	HITACHI	KSD526	2SD1381	ROHM	KSC2690	2SD1544	TOSHIBA	KSD5015
2SD1132	HITACHI	KSD526	2SD1387	SANYO	KSC2500	2SD1545	TOSHIBA	KSD5016
2SD1133	HITACHI	KSD526	2SD1388	SANYO	KSD1616	2SD1546	TOSHIBA	KSD5017
2SD1134	HITACHI	KSD526	2SD1389	SANKEN	KSD5005	2SD155	N.E.C	KSD526
2SD1135	HITACHI	KSD526	2SD1396	SANYO	KSD5000	2SD1553	TOSHIBA	KSD5010
2SD1138	HITACHI	KSC2328A	2SD1397	SANYO	KSD5001	2SD1554	TOSHIBA	KSD5011

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TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG
2SD1555	TOSHIBA	KSD5012	2SD244	SANKEN	KSD362	2SD467	HITACHI	KSC2001
2SD1556	TOSHIBA	KSD5013	2SD246	MATSUSHITA	KSD5006	2SD471A	N.E.C	KSD471A
2SD1567	N.E.C	KSD880	2SD254	N.E.C	KSD880	2SD475	HITACHI	KSD526
2SD1569	N.E.C	KSD880	2SD255	N.E.C	KSD880	2SD476	HITACHI	KSD526
2SD1572	HITACHI	KSD560	2SD256	SANKEN	KSD880	2SD477	HITACHI	KSC2073
2SD1600	HITACHI	KSD560	2SD288	N.E.C	KSD880	2SD478	HITACHI	KSC2073
2SD1608	MATSUSHITA	KSD560	2SD289	N.E.C	KSD880	2SD488	MOTOROLA	KSD526
2SD1616	N.E.C	KSD1616	2SD291	SONY	KSD880	2SD489	MOTOROLA	KSD526
2SD1616A	N.E.C	KSD1616A	2SD292	SONY	KSD880	2SD490	MOTOROLA	KSD526
2SD1646	ROHM	KSD560	2SD299	MATSUSHITA	KSD5006	2SD526	TOSHIBA	KSD526
2SD1647	ROHM	KSD560	2SD300	MATSUSHITA	KSD5006	2SD538	FUJITSU	KSC1871
2SD1649	SANYO	KSD5010	2SD312	MATSUSHITA	KSD5004	2SD539	FUJITSU	KSC1871
2SD1650	SANYO	KSD5011	2SD313	SANYO	KSD526	2SD545	SANYO	KSC2001
2SD1651	SANYO	KSD5012	2SD314	SANYO	KSD526	2SD549	TOSHIBA	KSD985
2SD1652	SANYO	KSD5013	2SD315	SANYO	KSD526	2SD560	N.E.C	KSD560
2SD1653	SANYO	KSD5014	2SD317	MATSUSHITA	KSD526	2SD568	N.E.C	KSD568
2SD1654	SANYO	KSD5015	2SD317A	MATSUSHITA	KSD526	2SD569	N.E.C	KSD569
2SD1655	SANYO	KSD5016	2SD318	MATSUSHITA	KSD526	2SD57	MITSUBISHI	KSD880
2SD1656	SANYO	KSD5017	2SD318A	MATSUSHITA	KSD526	2SD570	MATSUSHITA	KSD526
2SD1658	TOSHIBA	KSD985	2SD325	SANYO	KSD288	2SD571	N.E.C	KSC1008
2SD1678	SANYO	KSD5010	2SD342	SONY	KSD880	2SD575	SANYO	KSD5005
2SD1682	SANYO	KSD794A	2SD343	SONY	KSD880	2SD576	FUJITSU	KSC2073
2SD1684	SANYO	KSC2690	2SD344	SONY	KSD880	2SD58	MITSUBISHI	KSD880
2SD1691	N.E.C	KSD1691	2SD345	SONY	KSD880	2SD580	FUJITSU	KSD880
2SD1692	N.E.C	KSD1692	2SD346	SONY	KSD526	2SD589	MATSUSHITA	KSD5006
2SD174F	FUJITSU	KSD73	2SD347	SONY	KSD526	2SD592	MATSUSHITA	KSD471
2SD1757	ROHM	KSC2859	2SD349	N.E.C	KSC945	2SD596	N.E.C	KSC3265
2SD1770	SANKEN	KSD401	2SD355	MITSUBISHI	KSC2001	2SD599	SANYO	KSD471
2SD1771	SANKEN	KSC2690A	2SD358	MITSUBISHI	KSD401	2SD600	SANYO	KSC2690
2SD1778	ROHM	KSD526	2SD359	MITSUBISHI	KSD880	2SD601	MATSUSHITA	KSC1623
2SD1807	MATSUSHITA	KSC2785	2SD360	MITSUBISHI	KSD880	2SD603	MATSUSHITA	KSC2785
2SD1812	ROHM	KSC2383	2SD361	MITSUBISHI	KSD880	2SD627	SANYO	KSD5004
2SD1864	ROHM	KSD794	2SD365	MATSUSHITA	KSD880	2SD633	TOSHIBA	KSD560
2SD1867	ROHM	KSD986	2SD365A	MATSUSHITA	KSD526	2SD634	TOSHIBA	KSD560
2SD1877	SANYO	KSD5011	2SD366	MATSUSHITA	KSD880	2SD635	TOSHIBA	KSD560
2SD1878	SANYO	KSD5056	2SD368	SANYO	KSD5006	2SD636	MATSUSHITA	KSC945
2SD1879	SANYO	KSD5057	2SD380	MATSUSHITA	KSD5006	2SD637	MATSUSHITA	KSC945
2SD1882	SANYO	KSD5014	2SD386	SANYO	KSC2073	2SD649	TOSHIBA	KSD5004
2SD1883	SANYO	KSD5015	2SD386A	SANYO	KSC2073	2SD655	HITACHI	KSC2001
2SD1884	SANYO	KSD5058	2SD387	SANYO	KSC2073	2SD661	MATSUSHITA	KSC945
2SD1885	SANYO	KSD5059	2SD387A	SANYO	KSC2073	2SD666A	HITACHI	KSC2310
2SD1888	ROHM	KSD560	2SD389	MATSUSHITA	KSD526	2SD671	MATSUSHITA	KSC2001
2SD1902	SANYO	KSD880	2SD390	MATSUSHITA	KSD526	2SD678A	MATSUSHITA	KSD560
2SD1912	SANYO	KSD880	2SD392	MITSUBISHI	KSC2001	2SD679A	MATSUSHITA	KSD560
2SD1918	ROHM	KSC2690A	2SD400	SANYO	KSD471	2SD686	TOSHIBA	KSD560
2SD199	MATSUSHITA	KSD5004	2SD401	N.E.C	KSD401	2SD687	TOSHIBA	KSD560
2SD200	MATSUSHITA	KSD5004	2SD404	TOSHIBA	KSD568	2SD691	MATSUSHITA	KSD560
2SD234	TOSHIBA	KSD880	2SD416	SANYO	KSD5004	2SD721	SANKEN	KSD560
2SD235	TOSHIBA	KSD880	2SD418	MATSUSHITA	KSD5006	2SD722	SANKEN	KSD560
2SD241	SANKEN	KSD362	2SD438	SANYO	KSC2316	2SD723	HITACHI	KSD526
2SD242	SANKEN	KSD362	2SD43A	TOSHIBA	KSC945	2SD724	HITACHI	KSC2233
2SD243	SANKEN	KSD362	2SD44	TOSHIBA	KSC945	2SD725	HITACHI	KSD5007

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TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG
2SD734	SANYO	KSC2001	2SD899	HITACHI	KSD5002	BC134	SGS	KSC945
2SD75	HITACHI	KSC945	2SD899A	HITACHI	KSD5002	BC135	SGS	KSC945
2SD754	HITACHI	KSC2001	2SD900	HITACHI	KSD5003	BC136	SGS	KSC945
2SD755	HITACHI	KSC2310	2SD900A	HITACHI	KSD5003	BC138	SGS	KSC1008
2SD756	HITACHI	KSC2310	2SD904	SANYO	KSD5001	BC140	SGS	KSC1008
2SD759	HITACHI	KSD401	2SD946	MATSUSHITA	KSD985	BC141	SGS	KSC945
2SD75A	HITACHI	KSC945	2SD947	ROHM	KSD985	BC147	SGS	KSC945
2SD760	HITACHI	KSD401	2SD949	MATSUSHITA	KSD5000	BC148	SGS	KSC945
2SD761	SANYO	KSD401	2SD954	MATSUSHITA	KSD5002	BC149	SGS	KSC945
2SD765	HITACHI	KSD5005	2SD956	HITACHI	KSD5000	BC150	SGS	KSC945
2SD768K	HITACHI	KSD560	2SD957	HITACHI	KSD5003	BC151	SGS	KSC945
2SD769	MATSUSHITA	KSC2001	2SD965	HITACHI	KSD5041	BC152	SGS	KSC945
2SD770	MATSUSHITA	KSC2002	2SD972	SANKEN	KSD560	BC153	SGS	KSA733
2SD771	MATSUSHITA	KSC945	2SD975	HITACHI	KSC2233	BC154	SGS	KSA733
2SD77A	HITACHI	KSC945	2SD979	SANYO	KSC2749	BC157	SGS	KSA733
2SD78	N.E.C	KSD880	2SD985	N.E.C	KSD985	BC158	SGS	KSA733
2SD782	HITACHI	KSC2233	2SD986	N.E.C	KSD986	BC159	SGS	KSA733
2SD784	HITACHI	KSD5006	2SK117	TOSHIBA	KSK117	BC160	SGS	KSA708
2SD787	HITACHI	KSC2328A	2SK161	TOSHIBA	KSK161	BC161	SGS	KSA708
2SD788	HITACHI	KSC2328A	2SK211	TOSHIBA	KSK211	BC167	SGS	KSC945
2SD794	N.E.C	KSD794	2SK30	TOSHIBA	KSK30	BC168	SGS	KSC945
2SD808	HITACHI	KSC2001	2SK65	MATSUSHITA	KSK65	BC169	SGS	KSC945
2SD818	TOSHIBA	KSD5004	AA1A4M	N.E.C	KSR1002	BC170	SGS	KSC945
2SD819	TOSHIBA	KSD5005	AA1A4P	N.E.C	KSR1005	BC171	SGS	KSC945
2SD820	TOSHIBA	KSD5006	AA1F4M	N.E.C	KSR1003	BC172	SGS	KSC945
2SD821	TOSHIBA	KSD5007	AA1F4N	N.E.C	KSR1006	BC173	SGS	KSC945
2SD823	SANYO	KSC2233	AA1L3Z	N.E.C	KSR1009	BC177	SGS	KSA733
2SD841	TOSHIBA	KSC2518	AA1L4L	N.E.C	KSR1008	BC178	SGS	KSA733
2SD849	MATSUSHITA	KSD5005	AA1L4M	N.E.C	KSR1004	BC181	SGS	KSA733
2SD850	MATSUSHITA	KSD5005	AN1A4M	N.E.C	KSR2002	BC182	SGS	KSC945
2SD856	MATSUSHITA	KSD880	AN1A4P	N.E.C	KSR2005	BC183	SGS	KSC945
2SD856A	MATSUSHITA	KSD880	AN1F4M	N.E.C	KSR2003	BC184	SGS	KSC945
2SD856B	MATSUSHITA	KSD880	AN1F4N	N.E.C	KSR2006	BC186	SGS	KSA733
2SD857A	MATSUSHITA	KSD526	AN1L3Z	N.E.C	KSR2009	BC187	SGS	KSA733
2SD857B	MATSUSHITA	KSD526	AN1L4L	N.E.C	KSR2008	BC190	SGS	KSC945
2SD866	MATSUSHITA	KSC2334	AN1L4M	N.E.C	KSR2004	BC200	SGS	KSA733
2SD866A	MATSUSHITA	KSC2334	BA1A4M	N.E.C	KSR1202	BC204	SGS	KSA733
2SD868	TOSHIBA	KSD5000	BA1A4P	N.E.C	KSR1205	BC205	SGS	KSA733
2SD869	TOSHIBA	KSD5001	BA1F4M	N.E.C	KSR1203	BC206	SGS	KSA733
2SD870	TOSHIBA	KSD5002	BA1F4N	N.E.C	KSR1206	BC207	SGS	KSC945
2SD871	TOSHIBA	KSC871	BA1L3Z	N.E.C	KSR1209	BC208	SGS	KSC945
2SD880	TOSHIBA	KSD880	BA1L4L	N.E.C	KSR1208	BC209	SGS	KSC945
2SD882	TOSHIBA	KSD882	BA1L4M	N.E.C	KSR1204	BC211	SGS	KSC1008
2SD884	MATSUSHITA	KSC2335	BC107	SGS	KSC945	BC212	SGS	KSA733
2SD885	MATSUSHITA	KSC2335	BC108	SGS	KSC945	BC213	SGS	KSA733
2SD887	MATSUSHITA	KSD560	BC109	SGS	KSC945	BC214	SGS	KSA733
2SD893	MATSUSHITA	KSD985	BC115	SGS	KSC1008	BC218	SGS	KSC945
2SD894	SANYO	KSC985	BC116	SGS	KSA708	BC237	SGS	BC237
2SD895	SANYO	KSC2334	BC118	SGS	KSC945	BC238	SGS	BC238
2SD897	HITACHI	KSD5000	BC120	SGS	KSC945	BC239	SGS	BC239
2SD897A	HITACHI	KSD5000	BC130	SGS	KSC945	BC250	SGS	KSA733
2SD898	HITACHI	KSD5001	BC131	SGS	KSC945	BC251	SGS	KSA733
			BC132	SGS	KSC945	BC252	SGS	KSA733

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TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG
BC253	SGS	KSA733	BC386	SGS	KSC945	BC856B	SGS	BC856
BC257	SGS	KSA733	BC395	SGS	KSC1008	BC857A	SGS	BC857
BC258	SGS	KSA733	BC396	SGS	KSA708	BC857B	SGS	BC857
BC259	SGS	KSA733	BC407	SGS	KSC945	BC857C	SGS	BC857
BC260	SGS	KSA733	BC408	SGS	KSC945	BC858A	SGS	BC858
BC261	SGS	KSA733	BC409	SGS	KSC945	BC858B	SGS	BC858
BC262	SGS	KSA733	BC417	SGS	KSA733	BC858C	SGS	BC858
BC263	SGS	KSA733	BC418	SGS	KSA733	BC859B	SGS	BC859
BC267	SGS	KSC945	BC419	SGS	KSA733	BC859C	SGS	BC859
BC268	SGS	KSC945	BC437	SGS	KSC945	BC860	SGS	BC860
BC269	SGS	KSC945	BC438	SGS	KSC945	BCW29	MOTOROLA	BCW29
BC270	SGS	KSC945	BC439	SGS	KSC945	BCW30	MOTOROLA	BCW30
BC281	SGS	KSA733	BC451	SGS	KSC945	BCW31	MOTOROLA	BCW31
BC294	SGS	KSA708	BC452	SGS	KSC945	BCW32	MOTOROLA	BCW32
BC295	SGS	KSC945	BC453	SGS	KSC945	BCW33	MOTOROLA	BCW33
BC307	SGS	BC307	BC454	SGS	KSA733	BCW60A	MOTOROLA	BCW60A
BC308	SGS	BC308	BC456	SGS	KSA733	BCW60B	MOTOROLA	BCW60B
BC309	SGS	BC309	BC467	SGS	KSC945	BCW60C	MOTOROLA	BCW60C
BC315	SGS	KSA733	BC468	SGS	KSC945	BCW60D	MOTOROLA	BCW60D
BC317	SGS	KSC945	BC469	SGS	KSC945	BCW61A	MOTOROLA	BCW61A
BC318	SGS	KSC945	BC512	SGS	KSA733	BCW61B	MOTOROLA	BCW61B
BC319	SGS	KSC945	BC513	SGS	KSA733	BCW61C	MOTOROLA	BCW61C
BC320	SGS	KSA733	BC514	SGS	KSA733	BCW61D	MOTOROLA	BCW61D
BC322	SGS	KSA733	BC524	SGS	KSC945	BCW69	MOTOROLA	BCW69
BC327	SGS	BC327	BC546	SGS	BC546	BCW70	MOTOROLA	BCW70
BC328	SGS	BC328	BC547	SGS	BC547	BCW71	MOTOROLA	BCW71
BC330	SGS	KSC945	BC548	SGS	BC548	BCW72	MOTOROLA	BCW72
BC332	SGS	KSC945	BC549	SGS	BC549	BCX70G	MOTOROLA	BCX70G
BC333	SGS	KSC945	BC550	SGS	BC550	BCX70H	MOTOROLA	BCX70H
BC334	SGS	KSA733	BC556	SGS	KSC1222	BCX70J	MOTOROLA	BCX70J
BC335	SGS	KSC945	BC557	SGS	KSC1222	BCX70K	MOTOROLA	BCX70K
BC336	SGS	KSA733	BC558	SGS	KSC1222	BCX71G	MOTOROLA	BCX71G
BC337	SGS	BC337	BC559	SGS	KSC1222	BCX71H	MOTOROLA	BCX71H
BC338	SGS	BC338	BC560	SGS	KSC1222	BCX71J	MOTOROLA	BCX71J
BC340	SGS	KSC1008	BC582	SGS	KSC945	BCX71K	MOTOROLA	BCX71K
BC341	SGS	KSC1008	BC583	SGS	KSC945	BD135	SGS	BD135
BC342	SGS	KSC1008	BC584	SGS	KSC945	BD136	SGS	BD136
BC343	SGS	KSA708	BC586	SGS	KSA733	BD137	SGS	BD137
BC347	SGS	KSC945	BC714	SGS	KSA733	BD138	SGS	BD138
BC348	SGS	KSC945	BC807	SGS	BC807	BD139	SGS	BD139
BC349	SGS	KSC945	BC808	SGS	BC808	BD140	SGS	BD140
BC350	SGS	KSA733	BC817	SGS	BC817	BD157	SGS	BD157
BC351	SGS	KSA733	BC818	SGS	BC818	BD158	SGS	BD158
BC352	SGS	KSA733	BC846A	SGS	BC846	BD159	SGS	BD159
BC358	SGS	KSA708	BC846B	SGS	BC846	BD175	SGS	BD175
BC360	SGS	KSA708	BC847A	SGS	BC847	BD176	SGS	BD176
BC361	SGS	KSD261	BC847B	SGS	BC847	BD177	SGS	BD177
BC368	SGS	KSA643	BC847C	SGS	BC847	BD178	SGS	BD178
BC369	SGS	KSA733	BC848A	SGS	BC848	BD179	SGS	BD179
BC381	SGS	KSC945	BC848B	SGS	BC848	BD180	SGS	BD180
BC382	SGS	KSC945	BC848C	SGS	BC848	BD233	SGS	BD233
BC383	SGS	KSC945	BC849B	SGS	BC849	BD234	SGS	BD234
BC384	SGS	KSC945	BC850B	SGS	BC850	BD235	SGS	BD235
BC385	SGS	KSC945	BC850C	SGS	BC850	BD236	SGS	BD236
			BC856A	SGS	BC856	BD237	SGS	BD237

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TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG
BD238	SGS	BD238	BN1A4P	N.E.C	BN1A4P	DTA143ES	ROHM	KSR2201
BD239	SGS	BD239	BN1F4M	N.E.C	KSR2203	DTA143TK	ROHM	KSR2109
BD240	SGS	BD240	BN1F4N	N.E.C	KSR2206	DTA143TN	ROHM	KSR2009
BD241	SGS	BD241	BN1L3Z	N.E.C	KSR2209	DTA143TS	ROHM	KSR2209
BD242	SGS	BD242	BN1L4L	N.E.C	KSR2208	DTA143XK	ROHM	KSR2107
BD243	SGS	BD243	BN1L4M	N.E.C	KSR2204	DTA143XN	ROHM	KSR2007
BD244	SGS	BD244	BU406	SGS	BU406	DTA143XS	ROHM	KSR2207
BD375	SGS	BD375	BU407	SGS	BU407	DTA144EK	ROHM	KSR2104
BD376	SGS	BD376	BU407H	SGS	BU407H	DTA144EN	ROHM	KSR2004
BD377	SGS	BD377	BU426	SGS	KSC5023	DTA144ES	ROHM	KSR2204
BD378	SGS	BD378	BU508	SGS	BU508	DTA144WK	ROHM	KSR2108
BD379	SGS	BD379	BU508DF	SGS	BU508DF	DTA144WN	ROHM	KSR2008
BD380	SGS	BD380	BU806	SGS	BU806	DTA144WS	ROHM	KSR2208
BD433	SGS	BD433	BU807	SGS	BU807	DTC114EK	ROHM	KSR1102
BD434	SGS	BD434	BUT11	SGS	BUT11	DTC114EN	ROHM	KSR1002
BD435	SGS	BD435	BUV46	SGS	BUV46	DTC114ES	ROHM	KSR1202
BD436	SGS	BD436	BUV47	SGS	BUV47	DTC114TK	ROHM	KSR1110
BD437	SGS	BD437	BUV47A	SGS	BUV47A	DTC114TN	ROHM	KSR1010
BD438	SGS	BD438	BUV48A	SGS	BUV48A	DTC114TS	ROHM	KSR1210
BD440	SGS	BD440	BUV48B	SGS	BUV48B	DTC114YK	ROHM	KSR1105
BD441	SGS	BD441	BUV48C	SGS	BUV48C	DTC114YN	ROHM	KSR1005
BD442	SGS	BD442	BUV64	SGS	TIP147	DTC114YS	ROHM	KSR1205
BD533	SGS	BD533	BUV65	SGS	TIP142	DTC124EK	ROHM	KSR1103
BD534	SGS	BD534	BUW11	SGS	BUW11	DTC124EN	ROHM	KSR1003
BD535	SGS	BD535	BUW11A	SGS	BUW11A	DTC124ES	ROHM	KSR1203
BD536	SGS	BD536	BUW12	SGS	BUW12	DTC124YK	ROHM	KSR1106
BD537	SGS	BD537	BUW12A	SGS	BUW12A	DTC124YN	ROHM	KSR1006
BD538	SGS	BD538	CS8050	FAIRCHILD	SS8050	DTC124YS	ROHM	KSR1206
BD675A	SGS	BD675A	CS8550	FAIRCHILD	SS8550	DTC143EK	ROHM	KSR1101
BD676A	SGS	BD676A	CS9011	FAIRCHILD	SS9011	DTC143EN	ROHM	KSR1001
BD677A	SGS	BD677A	CS9012	FAIRCHILD	SS9012	DTC143ES	ROHM	KSR1201
BD678A	SGS	BD678A	CS9013	FAIRCHILD	SS9013	DTC143TK	ROHM	KSR1109
BD679A	SGS	BD679A	CS9014	FAIRCHILD	SS9014	DTC143TN	ROHM	KSR1009
BD680A	SGS	BD680A	CS9015	FAIRCHILD	SS9015	DTC143TS	ROHM	KSR1209
BD681	SGS	BD681	CS9016	FAIRCHILD	SS9016	DTC143XK	ROHM	KSR1107
BD682	SGS	BD682	CS9018	FAIRCHILD	SS9018	DTC143XN	ROHM	KSR1007
BD683	SGS	BD683	DTA114EK	ROHM	KSR2102	DTC143XS	ROHM	KSR1207
BD684	SGS	BD684	DTA114EN	ROHM	KSR2002	DTA144EK	ROHM	KSR1104
BDV64	SGS	BDV64	DTA114ES	ROHM	KSR2202	DTC144EN	ROHM	KSR1004
BDV65	SGS	BDV65	DTA114TK	ROHM	KSR2110	DTC144ES	ROHM	KSR1204
BDW23	SGS	BDW23	DTA114TN	ROHM	KSR2010	DTC144WK	ROHM	KSR1108
BDW24	SGS	BDW24	DTA114TS	ROHM	KSR2210	DTC144WN	ROHM	KSR1008
BDW93	SGS	BDW93	DTA114YK	ROHM	KSR2105	DTC144WS	ROHM	KSR1208
BDW94	SGS	BDW94	DTA114YN	ROHM	KSR2005	FA1A4M	N.E.C	KSR1102
BDX33	SGS	BDX33	DTA114YS	ROHM	KSR2205	FA1A4P	N.E.C	KSR1105
BDX34	SGS	BDX34	DTA124EK	ROHM	KSR2103	FA1F4M	N.E.C	KSR1103
BDX53	SGS	BDX53	DTA124EN	ROHM	KSR2003	FA1F4N	N.E.C	KSR1106
BDX54	SGS	BDX54	DTA124ES	ROHM	KSR2203	FA1L3Z	N.E.C	KSR1109
BF254	SGS	BF254	DTA124YK	ROHM	KSR2106	FA1L4L	N.E.C	KSR1108
BF255	SGS	BF255	DTA124YN	ROHM	KSR2006	FA1L4M	N.E.C	KSR1104
BF291	SGS	BF291	DTA124YS	ROHM	KSR2206	FN1A4M	N.E.C	KSR2102
BF293	SGS	BF293	DTA143EK	ROHM	KSR2101	FN1A4P	N.E.C	KSR2105
BF321	SGS	BF321	DTA143EN	ROHM	KSR2001	FN1F4M	N.E.C	KSR2103
BN1A4M	N.E.C	BN1A4M						

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TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG
FN1F4N	N.E.C	KSR2106	KRC1205	K.E.C	KSR1213	KTC2235	K.E.C	KSC2316
FN1L3Z	N.E.C	KSR2109	KRC1206	K.E.C	KSR1214	KTC2236A	K.E.C	KSC2500
FN1L4L	N.E.C	KSR2108	KRC1207	K.E.C	KSR1206	KTC2238	K.E.C	KSC2073
FN1L4M	N.E.C	KSR2104	KRC1208	K.E.C	KSR1207	KTC2238A	K.E.C	KSD401
KRA2001	K.E.C	KSR2001	KRC1209	K.E.C	KSR1208	KTC2240	K.E.C	KSC1845
KRA2002	K.E.C	KSR2002	KRC1210	K.E.C	KSR1209	KTC2283	K.E.C	KSC2383
KRA2003	K.E.C	KSR2003	KRC1211	K.E.C	KSR1210	KTC2482	K.E.C	KSC2330
KRA2004	K.E.C	KSR2004	KRC1401	K.E.C	KSR1101	KTC2483	K.E.C	KSC1507
KRA2005	K.E.C	KSR2013	KRC1402	K.E.C	KSR1102	KTC2500	K.E.C	KSC2500
KRA2006	K.E.C	KSR2014	KRC1403	K.E.C	KSR1103	KTC2553	K.E.C	KSC2335
KRA2007	K.E.C	KSR2006	KRC1404	K.E.C	KSR1104	KTC3122	K.E.C	KSC3122
KRA2008	K.E.C	KSR2007	KRC1405	K.E.C	KSR1113	KTC380TM	K.E.C	KSC838
KRA2009	K.E.C	KSR2008	KRC1406	K.E.C	KSR1114	KTC382	K.E.C	KSC1187
KRA2010	K.E.C	KSR2009	KRC1407	K.E.C	KSR1106	KTC383	K.E.C	KSC1674
KRA2011	K.E.C	KSR2010	KRC1408	K.E.C	KSR1107	KTC388A	K.E.C	KSC1674
KRA2201	K.E.C	KSR2201	KRC1409	K.E.C	KSR1108	KTC732TM	K.E.C	KSC945
KRA2202	K.E.C	KSR2202	KRC1410	K.E.C	KSR1109	KTC941TM	K.E.C	KSC945
KRA2203	K.E.C	KSR2203	KRC1411	K.E.C	KSR1110	KTD525	K.E.C	KSD526
KRA2204	K.E.C	KSR2204	KTA1013	K.E.C	KSA1013	KTD526	K.E.C	KSD526
KRA2205	K.E.C	KSR2213	KTA1015	K.E.C	KSA733	KTD880	K.E.C	KSD880
KRA2206	K.E.C	KSR2214	KTA1015	K.E.C	KSA733	KTK117	K.E.C	KSK117
KRA2207	K.E.C	KSR2206	KTA473	K.E.C	KSA473	KTK161	K.E.C	KSK161
KRA2208	K.E.C	KSR2207	KTA562T6M	K.E.C	KSA539	KTK30	K.E.C	KSK30
KRA2209	K.E.C	KSR2208	KTA817A	K.E.C	KSA954	LC945	MOTOROLA	KSC945
KRA2210	K.E.C	KSR2209	KTA940	K.E.C	KSA940	MJE13004	MOTOROLA	MJE13004
KRA2211	K.E.C	KSR2210	KTA949	K.E.C	KSA1013	MJE13005	MOTOROLA	MJE13005
KRA2401	K.E.C	KSR2101	KTA950	K.E.C	KSA643	MJE13007	MOTOROLA	MJE13007
KRA2402	K.E.C	KSR2102	KTA965	K.E.C	KSA916	MJE13009	MOTOROLA	MJE13009
KRA2403	K.E.C	KSR2103	KTA966A	K.E.C	KSA928A	MJE170	MOTOROLA	MJE170
KRA2404	K.E.C	KSR2104	KTA968	K.E.C	KSA940	MJE171	MOTOROLA	MJE171
KRA2405	K.E.C	KSR2113	KTA968A	K.E.C	KSA940	MJE172	MOTOROLA	MJE172
KRA 2406	K.E.C	KSR2114	KTB595	K.E.C	KSB601	MJE180	MOTOROLA	MJE180
KRA2407	K.E.C	KSR2106	KTb596	K.E.C	KSB596	MJE181	MOTOROLA	MJE181
KRA2408	K.E.C	KSR2107	KTb686	K.E.C	KSB601	MJE182	MOTOROLA	MJE182
KRA2409	K.E.C	KSR2108	KTb688	K.E.C	KSB643	MJE2955T	MOTOROLA	MJE2955T
KRA2410	K.E.C	KSR2109	KTb834	K.E.C	KSB834	MJE3055T	MOTOROLA	MJE3055T
KRA2411	K.E.C	KSR2110	KTC100	K.E.C	KSC184	MJE340	MOTOROLA	MJE340
KRC1001	K.E.C	KSR1001	KTC1173	K.E.C	KSC1173	MJE350	MOTOROLA	MJE350
KRC1002	K.E.C	KSR1002	KTC1569	K.E.C	KSC1507	MMBA811C5	MOTOROLA	MMBA811C5
KRC1003	K.E.C	KSR1003	KTC1627	K.E.C	KSC2316	MMBA811C6	MOTOROLA	MMBA811C6
KRC1004	K.E.C	KSR1004	KTC1815	K.E.C	KSC945	MMBA811C7	MOTOROLA	MMBA811C7
KRC1005	K.E.C	KSR1013	KTC1815A	K.E.C	KSC945	MMBA811C8	MOTOROLA	MMBA811C8
KRC1006	K.E.C	KSR1014	KTC1923	K.E.C	KSC1674	MMBA812M5	MOTOROLA	MMBA812M5
KRC1007	K.E.C	KSR1006	KTC1923	K.E.C	KSC1674	MMBA812M6	MOTOROLA	MMBA812M6
KRC1008	K.E.C	KSR1007	KTC1959	K.E.C	KSD471A	MMBA812M7	MOTOROLA	MMBA812M7
KRC1009	K.E.C	KSR1008	KTC2073	K.E.C	KSC2073	MMBA812M8	MOTOROLA	MMBA812M8
KRC1010	K.E.C	KSR1009	KTC2075	K.E.C	KSD526	MMBC1009F1	MOTOROLA	MMBC1009F1
KRC1011	K.E.C	KSR1010	KTC2120	K.E.C	KSD471A	MMBC1009F2	MOTOROLA	MMBC1009F2
KRC1201	K.E.C	KSR1201	KTC2229	K.E.C	KSC2310	MMBC1009F3	MOTOROLA	MMBC1009F3
KRC1202	K.E.C	KSR1202	KTC2230	K.E.C	KSC2310	MMBC1009F4	MOTOROLA	MMBC1009F4
KRC1203	K.E.C	KSR1203	KTC2230A	K.E.C	KSC2310	MMBC1009F5	MOTOROLA	MMBC1009F5
KRC1204	K.E.C	KSR1204	KTC2231	K.E.C	KSC1507	MMBC1622D6	MOTOROLA	MMBC1622D6
			KTC2231A	K.E.C	KSC1507	MMBC1622D7	MOTOROLA	MMBC1622D7
			KTC2233	K.E.C	KSC2233			

TRANSISTORS

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TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG
MMBC1622D8	MOTOROLA	MMBC1622D8	MPS3705	MOTOROLA	MPS3705	MPSH24	MOTOROLA	MPSH24
MMBC1623L3	MOTOROLA	MMBC1623L3	MPS3706	MOTOROLA	MPS3706	MPSL01	MOTOROLA	MPSL01
MMBC1623L4	MOTOROLA	MMBC1623L4	MPS4249	MOTOROLA	MPS4249	MPSL51	MOTOROLA	MPSL51
MMBC1623L5	MOTOROLA	MMBC1623L5	MPS4250	MOTOROLA	MPS4250	RN1001	TOSHIBA	KSR1001
MMBC1623L6	MOTOROLA	MMBC1623L6	MPS4250A	MOTOROLA	MPS4250A	RN1002	TOSHIBA	KSR1002
MMBC1623L7	MOTOROLA	MMBC1623L7	MPS5172	MOTOROLA	MPS5172	RN1003	TOSHIBA	KSR1003
MMBR5179	MOTOROLA	MMBR5179	MPS5179	MOTOROLA	MPS5179	RN1004	TOSHIBA	KSR1004
MMBT2222	MOTOROLA	MMBT2222	MPS6513	MOTOROLA	MPS6513	RN1005	TOSHIBA	KSR1013
MMBT2222A	MOTOROLA	MMBT2222A	MPS6517	MOTOROLA	MPS6517	RN1006	TOSHIBA	KSR1014
MMBT2484	MOTOROLA	MMBT2484	MPS6520	MOTOROLA	MPS6520	RN1007	TOSHIBA	KSR1005
MMBT2907	MOTOROLA	MMBT2907	MPS6521	MOTOROLA	MPS6521	RN1008	TOSHIBA	KSR1006
MMBT2907A	MOTOROLA	MMBT2907A	MPS6522	MOTOROLA	MPS6522	RN1009	TOSHIBA	KSR1008
MMBT3903	MOTOROLA	MMBT3903	MPS6523	MOTOROLA	MPS6523	RN1010	TOSHIBA	KSR1009
MMBT3904	MOTOROLA	MMBT3904	MPS6560	MOTOROLA	MPS6560	RN1011	TOSHIBA	KSR1010
MMBT3906	MOTOROLA	MMBT3906	MPS6562	MOTOROLA	MPS6562	RN1201	TOSHIBA	KSR1201
MMBT4123	MOTOROLA	MMBT4123	MPS6601	MOTOROLA	MPS6601	RN1202	TOSHIBA	KSR1202
MMBT4124	MOTOROLA	MMBT4124	MPS6602	MOTOROLA	MPS6602	RN1203	TOSHIBA	KSR1203
MMBT4126	MOTOROLA	MMBT4126	MPS6651	MOTOROLA	MPS6651	RN1204	TOSHIBA	KSR1204
MMBT4401	MOTOROLA	MMBT4401	MPS8097	MOTOROLA	MPS8097	RN1205	TOSHIBA	KSR1213
MMBT4403	MOTOROLA	MMBT4403	MPS8098	MOTOROLA	MPS8098	RN1206	TOSHIBA	KSR1214
MMBT5086	MOTOROLA	MMBT5086	MPS8099	MOTOROLA	MPS8099	RN1207	TOSHIBA	KSR1205
MMBT5087	MOTOROLA	MMBT5087	MPS8598	MOTOROLA	MPS8598	RN1208	TOSHIBA	KSR1206
MMBT5088	MOTOROLA	MMBT5088	MPS8599	MOTOROLA	MPS8599	RN1209	TOSHIBA	KSR1208
MMBT5089	MOTOROLA	MMBT5089	MPSA05	MOTOROLA	MPSA05	RN1210	TOSHIBA	KSR1209
MMBT5401	MOTOROLA	MMBT5401	MPSA06	MOTOROLA	MPSA06	RN1211	TOSHIBA	KSR1210
MMBT5550	MOTOROLA	MMBT5550	MPSA10	MOTOROLA	MPSA10	RN1401	TOSHIBA	KSR1101
MMBT6427	MOTOROLA	MMBT6427	MPSA12	MOTOROLA	MPSA12	RN1402	TOSHIBA	KSR1102
MMBT6428	MOTOROLA	MMBT6428	MPSA13	MOTOROLA	MPSA13	RN1403	TOSHIBA	KSR1103
MMBT6429	MOTOROLA	MMBT6429	MPSA14	MOTOROLA	MPSA14	RN1404	TOSHIBA	KSR1104
MMBTA05	MOTOROLA	MMBTA05	MPSA20	MOTOROLA	MPSA20	RN1405	TOSHIBA	KSR1113
MMBTA06	MOTOROLA	MMBTA06	MPSA25	MOTOROLA	MPSA25	RN1406	TOSHIBA	KSR1114
MMBTA13	MOTOROLA	MMBTA13	MPSA26	MOTOROLA	MPSA26	RN1407	TOSHIBA	KSR1105
MMBTA14	MOTOROLA	MMBTA14	MPSA27	MOTOROLA	MPSA27	RN1408	TOSHIBA	KSR1106
MMBTA20	MOTOROLA	MMBTA20	MPSA42	MOTOROLA	MPSA42	RN1409	TOSHIBA	KSR1108
MMBTA42	MOTOROLA	MMBTA42	MPSA43	MOTOROLA	MPSA43	RN1410	TOSHIBA	KSR1109
MMBTA43	MOTOROLA	MMBTA43	MPSA44	MOTOROLA	MPSA44	RN1411	TOSHIBA	KSR1110
MMBT A55	MOTOROLA	MMBT A55	MPSA45	MOTOROLA	MPSA45	RN2001	TOSHIBA	KSR2001
MMBT A56	MOTOROLA	MMBT A56	MPSA55	MOTOROLA	MPSA55	RN2002	TOSHIBA	KSR2002
MMBT A63	MOTOROLA	MMBT A63	MPSA56	MOTOROLA	MPSA56	RN2003	TOSHIBA	KSR2003
MMBT A64	MOTOROLA	MMBT A64	MPSA62	MOTOROLA	MPSA62	RN2004	TOSHIBA	KSR2004
MMBT A70	MOTOROLA	MMBT A70	MPSA63	MOTOROLA	MPSA63	RN2005	TOSHIBA	KSR2013
MMBT A92	MOTOROLA	MMBT A92	MPSA64	MOTOROLA	MPSA64	RN2006	TOSHIBA	KSR2014
MMBT A93	MOTOROLA	MMBT A93	MPSA70	MOTOROLA	MPSA70	RN2007	TOSHIBA	KSR2005
MMBTH10	MOTOROLA	MMBTH10	MPSA75	MOTOROLA	MPSA75	RN2008	TOSHIBA	KSR2006
MMBTH24	MOTOROLA	MMBTH24	MPSA76	MOTOROLA	MPSA76	RN2009	TOSHIBA	KSR2008
MPS2222	MOTOROLA	MPS2222	MPSA77	MOTOROLA	MPSA77	RN2010	TOSHIBA	KSR2009
MPS2222A	MOTOROLA	MPS2222A	MPSA92	MOTOROLA	MPSA92	RN2011	TOSHIBA	KSR2010
MPS2907	MOTOROLA	MPS2907	MPSA93	MOTOROLA	MPSA93	RN2201	TOSHIBA	KSR2201
MPS2907A	MOTOROLA	MPS2907A	MPSH10	MOTOROLA	MPSH10	RN2202	TOSHIBA	KSR2202
MPS3702	MOTOROLA	MPS3702	MPSH11	MOTOROLA	MPSH11	RN2203	TOSHIBA	KSR2203
MPS3703	MOTOROLA	MPS3703	MPSH17	MOTOROLA	MPSH17	RN2204	TOSHIBA	KSR2204
MPS3704	MOTOROLA	MPS3704	MPSH20	MOTOROLA	MPSH20	RN2205	TOSHIBA	KSR2213

TRANSISTORS

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TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG	TYPE	MAKER	SAMSUNG
RN2206	TOSHIBA	KSR2214	TIP146T	T.I	TIP146T	UN2114	MATSUSHITA	KSR2105
RN2207	TOSHIBA	KSR2205	TIP147	T.I	TIP147	UN2115	MATSUSHITA	KSR2110
RN2208	TOSHIBA	KSR2206	TIP147F	T.I	TIP147F	UN2116	MATSUSHITA	KSR2109
RN2209	TOSHIBA	KSR2208	TIP147T	T.I	TIP147T	UN2117	MATSUSHITA	KSR2111
RN2210	TOSHIBA	KSR2209	TIP29	T.I	TIP29	UN211F	MATSUSHITA	KSR2107
RN2211	TOSHIBA	KSR2210	TIP29A	T.I	TIP29A	UN212E	MATSUSHITA	KSR2108
RN2401	TOSHIBA	KSR2101	TIP29B	T.I	TIP29B	UN2210	MATSUSHITA	KSR1112
RN2402	TOSHIBA	KSR2102	TIP29C	T.I	TIP29C	UN2211	MATSUSHITA	KSR1102
RN2403	TOSHIBA	KSR2103	TIP30	T.I	TIP30	UN2212	MATSUSHITA	KSR1103
RN2404	TOSHIBA	KSR2104	TIP30A	T.I	TIP30A	UN2213	MATSUSHITA	KSR1104
RN2405	TOSHIBA	KSR2113	TIP30B	T.I	TIP30B	UN2214	MATSUSHITA	KSR1105
RN2406	TOSHIBA	KSR2114	TIP30C	T.I	TIP30C	UN2215	MATSUSHITA	KSR1110
RN2407	TOSHIBA	KSR2105	TIP31	T.I	TIP31	UN2216	MATSUSHITA	KSR1109
RN2408	TOSHIBA	KSR2106	TIP31A	T.I	TIP31A	UN2217	MATSUSHITA	KSR1111
RN2409	TOSHIBA	KSR2108	TIP31B	T.I	TIP31B	UN221E	MATSUSHITA	KSR1108
RN2410	TOSHIBA	KSR2109	TIP31C	T.I	TIP31C	UN221F	MATSUSHITA	KSR1107
RN2411	TOSHIBA	KSR2110	TIP32	T.I	TIP32	UN4110	MATSUSHITA	KSR2212
S2000A	TOSHIBA	KSD5006	TIP32A	T.I	TIP32A	UN4111	MATSUSHITA	KSR2202
S2055	TOSHIBA	KSD5006	TIP32B	T.I	TIP32B	UN4112	MATSUSHITA	KSR2203
S2056	TOSHIBA	KSD5004	TIP32C	T.I	TIP32C	UN4113	MATSUSHITA	KSR2204
TIP100	T.I	TIP100	TIP41	T.I	TIP41	UN4114	MATSUSHITA	KSR2205
TIP101	T.I	TIP101	TIP41A	T.I	TIP41A	UN4115	MATSUSHITA	KSR2210
TIP102	T.I	TIP102	TIP41B	T.I	TIP41B	UN4116	MATSUSHITA	KSR2209
TIP105	T.I	TIP105	TIP41C	T.I	TIP41C	UN4117	MATSUSHITA	KSR2211
TIP106	T.I	TIP106	TIP42	T.I	TIP42	UN411E	MATSUSHITA	KSR2208
TIP107	T.I	TIP107	TIP42A	T.I	TIP42A	UN411F	MATSUSHITA	KSR2207
TIP110	T.I	TIP110	TIP42B	T.I	TIP42B	UN4210	MATSUSHITA	KSR1212
TIP111	T.I	TIP111	TIP42C	T.I	TIP42C	UN4211	MATSUSHITA	KSR1202
TIP112	T.I	TIP112	UN1110	MATSUSHITA	KSR2012	UN4212	MATSUSHITA	KSR1203
TIP115	T.I	TIP115	UN1111	MATSUSHITA	KSR2002	UN4213	MATSUSHITA	KSR1204
TIP116	T.I	TIP116	UN1112	MATSUSHITA	KSR2003	UN4214	MATSUSHITA	KSR1205
TIP117	T.I	TIP117	UN1113	MATSUSHITA	KSR2004	UN4215	MATSUSHITA	KSR1210
TIP120	T.I	TIP120	UN1114	MATSUSHITA	KSR2005	UN4216	MATSUSHITA	KSR1209
TIP121	T.I	TIP121	UN1115	MATSUSHITA	KSR2010	UN4217	MATSUSHITA	KSR1211
TIP122	T.I	TIP122	UN1116	MATSUSHITA	KSR2009	UN421E	MATSUSHITA	KSR1208
TIP125	T.I	TIP125	UN1117	MATSUSHITA	KSR2011	UN421F	MATSUSHITA	KSR1207
TIP126	T.I	TIP126	UN111E	MATSUSHITA	KSR2008			
TIP127	T.I	TIP127	UN111F	MATSUSHITA	KSR2007			
TIP140	T.I	TIP140	UN1210	MATSUSHITA	KSR1012			
TIP140F	T.I	TIP140F	UN1211	MATSUSHITA	KSR1002			
TIP140T	T.I	TIP140T	UN1212	MATSUSHITA	KSR1003			
TIP141	T.I	TIP141	UN1213	MATSUSHITA	KSR1004			
TIP141F	T.I	TIP141F	UN1214	MATSUSHITA	KSR1005			
TIP141T	T.I	TIP141T	UN1215	MATSUSHITA	KSR1010			
TIP142	T.I	TIP142	UN1216	MATSUSHITA	KSR1009			
TIP142F	T.I	TIP142F	UN1217	MATSUSHITA	KSR1012			
TIP142T	T.I	TIP142T	UN121E	MATSUSHITA	KSR1008			
TIP145	T.I	TIP145	UN121F	MATSUSHITA	KSR1007			
TIP145F	T.I	TIP145F	UN2110	MATSUSHITA	KSR2112			
TIP145T	T.I	TIP145T	UN2111	MATSUSHITA	KSR2102			
TIP146	T.I	TIP146	UN2112	MATSUSHITA	KSR2103			
TIP146F	T.I	TIP146F	UN2113	MATSUSHITA	KSR2104			

Inter-national Rectifier	SAMSUNG Direct Replacement	Inter-national Rectifier	SAMSUNG Direct Replacement	Inter-national Rectifier	SAMSUNG Direct Replacement	Inter-national Rectifier	SAMSUNG Direct Replacement
IRF120	IRF120	IRF352	IRF352	IRF713	IRF713	IRF9620	IRF9620
IRF121	IRF121	IRF353	IRF353	IRF720	IRF720	IRF9621	IRF9621
IRF122	IRF122	IRF420	IRF420	IRF721	IRF721	IRF9622	IRF9622
IRF123	IRF123	IRF421	IRF421	IRF722	IRF722	IRF9623	IRF9623
IRF130	IRF130	IRF422	IRF422	IRF723	IRF723	IRF9630	IRF9630
IRF131	IRF131	IRF423	IRF423	IRF730	IRF730	IRF9631	IRF9631
IRF132	IRF132	IRF430	IRF430	IRF731	IRF731	IRF9632	IRF9632
IRF133	IRF133	IRF431	IRF431	IRF732	IRF732	IRF9633	IRF9633
IRF140	IRF140	IRF432	IRF432	IRF733	IRF733	IRF9640	IRF9640
IRF141	IRF141	IRF433	IRF433	IRF740	IRF740	IRF9641	IRF9641
IRF142	IRF142	IRF440	IRF440	IRF741	IRF741	IRF9642	IRF9642
IRF143	IRF143	IRF441	IRF441	IRF742	IRF742	IRF9643	IRF9643
IRF150	IRF150	IRF442	IRF442	IRF743	IRF743	IRFD1Z0	IRFA1Z0
IRF151	IRF151	IRF443	IRF443	IRF820	IRF820	IRFD1Z3	IRFA1Z3
IRF152	IRF152	IRF450	IRF450	IRF821	IRF821	IRFP131	IRFP131
IRF153	IRF153	IRF451	IRF451	IRF822	IRF822	IRFP132	IRFP132
IRF220	IRF220	IRF452	IRF452	IRF823	IRF823	IRFP133	IRFP133
IRF221	IRF221	IRF453	IRF453	IRF830	IRF830	IRFP140	IRFP140
IRF222	IRF222	IRF510	IRF510	IRF831	IRF831	IRFP141	IRFP141
IRF223	IRF223	IRF511	IRF511	IRF832	IRF832	IRFP142	IRFP142
IRF231	IRF231	IRF512	IRF512	IRF833	IRF833	IRFP143	IRFP143
IRF232	IRF232	IRF513	IRF513	IRF840	IRF840	IRFP150	IRFP150
IRF233	IRF233	IRF520	IRF520	IRF841	IRF841	IRFP151	IRFP151
IRF240	IRF240	IRF521	IRF521	IRF842	IRF842	IRFP152	IRFP152
IRF241	IRF241	IRF522	IRF522	IRF843	IRF843	IRFP153	IRFP153
IRF242	IRF242	IRF523	IRF523	IRF9510	IRF9510	IRFP230	IRFP230
IRF243	IRF243	IRF610	IRF610	IRF9511	IRF9511	IRFP231	IRFP231
IRF250	IRF250	IRF611	IRF611	IRF9512	IRF9512	IRFP232	IRFP232
IRF251	IRF251	IRF612	IRF612	IRF9513	IRF9513	IRFP233	IRFP233
IRF252	IRF252	IRF613	IRF613	IRF9520	IRF9520	IRFP240	IRFP240
IRF253	IRF253	IRF620	IRF620	IRF9521	IRF9521	IRFP241	IRFP241
IRF320	IRF320	IRF621	IRF621	IRF9522	IRF9522	IRFP242	IRFP242
IRF321	IRF321	IRF622	IRF622	IRF9523	IRF9523	IRFP243	IRFP243
IRF322	IRF322	IRF623	IRF623	IRF9530	IRF9530	IRFP250	IRFP250
IRF323	IRF323	IRF630	IRF630	IRF9531	IRF9531	IRFP251	IRFP251
IRF330	IRF330	IRF631	IRF631	IRF9532	IRF9532	IRFP252	IRFP252
IRF331	IRF331	IRF632	IRF632	IRF9533	IRF9533	IRFP253	IRFP253
IRF332	IRF332	IRF633	IRF633	IRF9540	IRF9540	IRFP330	IRFP330
IRF333	IRF333	IRF640	IRF640	IRF9541	IRF9541	IRFP331	IRFP331
IRF340	IRF340	IRF641	IRF641	IRF9542	IRF9542	IRFP332	IRFP332
IRF341	IRF341	IRF642	IRF642	IRF9543	IRF9543	IRFP333	IRFP333
IRF342	IRF342	IRF643	IRF643	IRF9610	IRF9610	IRFP340	IRFP340
IRF343	IRF343	IRF710	IRF710	IRF9611	IRF9611	IRFP341	IRFP341
IRF350	IRF350	IRF711	IRF711	IRF9612	IRF9612	IRFP342	IRFP342
IRF351	IRF351	IRF712	IRF712	IRF9613	IRF9613		

Inter-national Rectifier	SAMSUNG Direct Replacement	Inter-national Rectifier	SAMSUNG Direct Replacement	Inter-national Rectifier	SAMSUNG Direct Replacement	Inter-national Rectifier	SAMSUNG Direct Replacement
IRFP343 IRFP350 IRFP351 IRFP352 IRFP353	IRFP343 IRFP350 IRFP351 IRFP352 IRFP353	IRFP9241 IRFP9242 IRFP9243 IRFBC30 IRFBC40	IRFP9241 IRFP9242 IRFP9243 SSP4N60 SSP6N60	IRFP121 IRFR110 IRFR111 IRFR020 IRFU220	IRFR121 IRFR110 IRFR111 †IRFR020 IRFU220	IRFR9220 IRFR9222 IRFR9210 IRFR9212 IRFR9120	IRFR9220 IRFR9222 IRFR9210 IRFR9212 IRFR9120
IRFP430 IRFP431 IRFP432 IRFP433 IRFP440	IRFP430 IRFP431 IRFP432 IRFP433 IRFP440	IRFP9133 IRFP9140 IRFP9141 IRFP9142 IRFP9143	IRFP9133 IRFP9140 IRFP9141 IRFP9142 IRFP9143	IRFU222 IRFU210 IRFU212 IRFU120 IRFU121	IRFU222 IRFU212 IRFU120 IRFU210 IRFU121	IRFR9110 IRFR9111 IRFR9020 IRFR9022 IRFR9010	IRFR9110 IRFR9111 †IRFR9020 †IRFR9022 †IRFR9010
IRFP441 IRFP442 IRFP443 IRFP450 IRFP451	IRFP441 IRFP442 IRFP443 IRFP450 IRFP451	IRFP9230 IRFP9231 IRFP9232 IRFP9233 IRFP9240	IRFP9230 IRFP9231 IRFP9232 IRFP9233 IRFP9240	IRFU110 IRFU111 IRFU020 IRFU022 IRFR022	IRFU110 IRFU111 †IRFU020 †IRFU022 †IRFR022	IRFR9012 IRF614 IRF624 IRF634 IRF644	†IRFR9012 IRF614 IRF624 IRF634 IRF644
IRFP452 IRFP453 IRFP9130 IRFP9131 IRFP9132	IRFP452 IRFP453 IRFP9130 IRFP9131 IRFP9132	IRFR220 IRFR222 IRFR210 IRFR212 IRFR120	IRFR220 IRFR222 IRFR210 IRFR212 IRFR120	IRFR010 IRFR012	†IRFR010 †IRFR012	IRFP254	IRFP254

HITACHI	SAMSUNG Direct Replacement	HITACHI	SAMSUNG Direct Replacement	HITACHI	SAMSUNG Direct Replacement	HITACHI	SAMSUNG Direct Replacement
2SK132 2SK134(H) 2SK220 2SK220(H) 2SK221(H)	IRF122 IRF223 IRF222 IRF222 IRF222	2SK310 2SK311 2SK312 2SK313 2SK319	IRF710 IRF823 IRF342 IRF441 IRF720	2SK409 2SK411 2SK412 2SK413 2SK414	IRF612 IRF420 IRFP353 IRFP243 IRFP242	2SJ112 2SJ113 2SJ114 2SJ117 2SJ118	IRF9142 IRFP9142 IRFP9242 IRF9612 IRFP9241
2SK258(H) 2SK259 2SK260 2SK261 2SK262	IRF331 IRF323 IRF332 IRF512 IRF613	2SK320 2SK345 2SK346 2SK349 2SK350	IRF833 IRF523 IRF523 IRFP342 IRFP441	2SK428 2SK440 2SK556 2SK557 2SK559	IRF543 IRF630 IRFP453 IRFP453 IRFP451	2SJ119 2SJ47 2SJ49(H) 2SJ50(H) 2SJ55(H)	IRFP9240 IRF9132 IRF9233 IRF9232 IRF9233
2SK263 2SK289 2SK290 2SK294 2SK295	IRF613 IRF123 IRF122 IRF522 IRF522	2SK382 2SK383 2SK393 2SK399 2SK400	IRF822 IRF530 IRF132 IRFP142 IRFP242	2SK560 2SK622 2SK623 2SK642 2SK682	IRFP450 IRFP251 IRFP441 IRFP442 IRFP453	2SJ56(H) 2SJ85 2SJ86 2SJ86 2SJ88	IRF9232 IRF9512 IRF9611 IRF9613 IRF9610
2SK296 2SK298 2SK299 2SK308 2SK309	IRF612 IRF332 IRF431 IRF243 IRF722	2SK401 2SK402 2SK403 2SK408	IRF353 IRFP342 IRFP443 IRF612	2SK683 2SJ101 2SJ102	IRFP452 IRF9533 IRF9533		

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MATSUSHITA	SAMSUNG Direct Replacement	MATSUSHITA	SAMSUNG Direct Replacement	MATSUSHITA	SAMSUNG Direct Replacement	MATSUSHITA	SAMSUNG Direct Replacement
2SK500	IRFP141	2SK627	IRFP151	2SK633A	IRFP252		
2SK501	IRFP342	IRFP342	IRFP151	2SK634	IRFP352		
2SK501A	IRFP441	2SK629	IRFP150	2SK634A	IRFP451		
2SK610	IRFP342	2SK629A	IRFP251	2SK636	IRFP440		
2SK626	IRFP151	2SK633	IRFP252	2SK637	IRFP452		

MOTOROLA	SAMSUNG Direct Replacement	MOTOROLA	SAMSUNG Direct Replacement	MOTOROLA	SAMSUNG Direct Replacement	MOTOROLA	SAMSUNG Direct Replacement
MTH6N55	SSH6N55	MTM7N12	IRF233	MTM12N20	IRF242	MTP2N35	IRF723
MTH6N60	SSH6N60	MTM7N15	IRF233	MTM15N05	IRF143	MTP2N40	IRF722
MTH8N55	SSH8N55	MTM1N18	IRF232	MTM15N06	IRF143	MTP2N45	IRF823
MTH8N60	SSH8N60	MTM7N20	IRF232	MTM15N12	IRF243	MTP2N50	IRF822
MTH7N35	IRFP343	MTM7N45	IRF441	MTM15N15	IRF243	MTP3N12	IRF623
MTH7N40	IRFP342	MTM7N50	IRF442	MTM15N18	IRF242	MTP3N15	IRF623
MTH8N35	IRFP343	MTM8N08	IRF120	MTM15N20	IRF242	MTP3N18	IRF622
MTH8N40	IRFP342	MTM8N10	IRF120	MTM15N35	IRF351	MTP3N20	IRF620
MTH15N18	IRFP242	MTM8N12	IRF233	MTM15N40	IRF350	MTP3N35	IRF721
MTH15N20	IRFP242	MTM8N15	IRF233	MTM15N45	SSM20N45	MTP3N40	IRF720
MTH20N12	IRFP253	MTM8N18	IRF232	MTM15N50	SSM20N50	MTP3N55	SSP4N55
MTH20N15	IRFP253	MTM8N20	IRF232	MTM20N08	IRF142	MTP3N60	SSP4N60
MTH25N08	IRFP140	MTM8N35	IRF343	MTM20N10	IRF142	MTP4N08	IRF510
MTH25N10	IRFP140	MTM8N40	IRF342	MTM20N12	IRF253	MTP4N10	IRF510
MTH35N05	IRFP151	MTM8P08	IRF9132	MTM20N15	IRF253	MTP4N12	IRF623
MTH35N06	IRFP151	MTM8P10	IRF9132	MTM25N05	IRF141	MTP4N15	IRF623
MTM2N45	IRF421	MTM10N05	IRF133	MTM25N06	IRF141	MTP4N45	IRF833
MTM2N50	IRF422	MTM10N06	IRF133	MTM25N08	IRF140	MTP4N50	IRF832
MTM3N35	IRF321	MTM10N08	IRF132	MTM25N10	IRF140	MTP4N45	IRF833
MTM3N40	IRF320	MTM10N10	IRF132	MTM35N05	IRF151	MTP5N05	IRF523
MTM3N55	SSM4N55	MTM10N12	IRF243	MTM35N06	IRF151	MTP5N18	IRF620
MTM3N60	SSM4N60	MTM10N15	IRF243	MTM40N18	SSM40N20	MTP5N20	IRF620
MTM4N45	IRF433	MTM10N25	IRF353	MTM40N20	SSM40N20	MTP5N35	IRF731
MTM4N50	IRF432	MTM12N05	IRF133	MTP1N45	IRF823	MTP5N40	IRF730
MTM5N18	IRF220	MTM12N06	IRF133	MTP1N50	IRF822	MTP7N12	IRF633
MTM5N20	IRF220	MTM12N08	IRF132	MTP2N18	IRF612	MTP7N15	IRF633
MTM5N35	IRF333	MTM12N10	IRF132	MTP2N20	IRF612	MTP7N18	IRF632
MTM5N40	IRF330	MTM12N12	IRF243	MTP2N25	IRF723	MTP7N20	IRF632
MTM6N55	SSM6N55	MTM12N15	IRF243	MTP12N06	IRF533	MTP15N15	IRF643
MTM6N60	SSM6N60	MTM12N18	IRF242	MTP12N08	IRF532	MTP20N08	IRF542
MTP8N08	IRF520	MTP10N05	IRF533	MTP12N10	IRF532	MTP20N20	IRF542
MTP8N10	IRF520	MTP10N06	IRF533	MTP2N18	IRF642	MTP20N05	IRF541
MTP8N12	IRF633	MTP10N08	IRF532	MTP12N20	IRF642	MTP25N06	IRF541
MTP8N15	IRF633	MTP10N10	IRF532	MTP15N05	IRF543		
MTP8N18	IRF632	MTP10N12	IRF643	MTP15N06	IRF543		
MTP8P08	MTP8N20	IRF632	MTP10N15	IRF643	MTP15N12	IRF643	
MTP8P10	IRF9532	MTP10N25	IRF743				
	IRF9532	MTP12N05	IRF533				

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MOTOROLA	SAMSUNG Direct Replacement	MOTOROLA	SAMSUNG Direct Replacement
MTD10N05A	IRFR020	MTM3N60	SSM4N60
MTD4P05	IRFR9020	MTP10N05	†IRFZ10
MTD5N05A	†IRFR010	MTP16N05A	†IRFZ42
MTH6N60	SSH6N60	MTP6N60	SSP6N60
MTM6N60	SSM6N60	MTM6N60	SSM6N60

RCA	SAMSUNG Direct Replacement	RCA	SAMSUNG Direct Replacement	RCA	SAMSUNG Direct Replacement	RCA	SAMSUNG Direct Replacement
RCA9192A	IRF120	RFM3N45	IRF421	RFM15N12	IRF253	RFP5P12	IRF9631
RCA9192B	IRF243	RFM3N50	IRF420	RFM15N15	IRF253	RFP5P15	IRF9631
RCA9195A	IRF142	RFM4N35	IRF321	RFM18N08	IRF142	RFP6P08	IRF9520
RCA9195B	IRF253	RFM4N40	IRF320	RFM18N10	IRF142	RFP6P10	IRF9520
RCA9212A	IRF520	RFM5P12	IRF9231	RFM25N05	IRF141	RFP7N45	IRF831
RCA9212B	IRF643	RFM5P15	IRF9231	RFM25N06	IRF141	RFP7N50	IRF830
RCA9213A	IRF512	RFM6P08	IRF9132	RFP1N35	IRF713	RFP8N18	IRF630
RCA9213B	IRF613	RFM6P10	IRF9232	RFP1N40	IRF712	RFP8N20	IRF630
RCA9230A	IRF542	RFM7N45	IRF431	RFP2N08	IRF512	RFP8N08	IRF9532
RFK15N35	IRF353	RFM7N50	IRF430	RFP2N10	IRF512	RFP8N10	IRF9532
RFK15N40	IRF352	RFM8N18	IRF230	RFP2N12	IRF611	RFP10N12	IRF643
RFK15N45	IRF441	RFM8N20	IRF230	RFP2N15	IRF611	RFP10N15	IRF643
RFK15N50	IRF440	RFM8P08	IRF9132	RFP2N18	IRF612	RFP10P12	IRF9532
RFK20P05	IRF9140	RFM8P10	IRF9132	RFP2N20	IRF612	RFP12N08	IRF530
RFK20P10	IRF9140	RFM10N12	IRF243	RFP2P08	IRF9512	RFP12N10	IRF530
RFK25N18	IRF252	RFM10N15	IRF243	RFP2P10	IRF9512	RFP12N20	IRF642
RFK25N20	IRF252	RFM10P12	IRF9241	RFP3N45	IRF821	RFP15N05	IRF543
RFK30N12	IRF251	RFM10P15	IRF9241	RFP3N50	IRF820	RFP15N06	IRF543
RFK30N15	IRF251	RFM12N18	IRF242	RFP4N05	IRF513	RFP15N12	IRF643
RFK35N08	IRF150	RFM12N20	IRF242	RFP4N06	IRF513	RFP18N10	IRF542
RFK35N10	IRF150	RFM15N05	IRF143	RFP4N35	IRF721	RFP25N05	IRF541
		RFM15N06	IRF143	RFP4N40	IRF720		

SGS	SAMSUNG Direct Replacement	SGS	SAMSUNG Direct Replacement	SGS	SAMSUNG Direct Replacement	SGS	SAMSUNG Direct Replacement
SEFH15N18	IRFP240	SEFH35N06	IRFP151	SGSP464	IRFP443	SGSP474	IRFP440
SEFH15N20	IRFP241	SEFH7N45	IRFP441	SGSP465	IRFP342	SGSP475	IRFP340
SEFH25N08	IRFP140	SEFH7N50	IRFP440	SGSP466	IRFP343	SGSP476	IRFP341
SEFH25N10	IRFP140	SGSP421	IRFP143	SGSP467	IRFP242	SGSP477	IRFP240
SEFH35N05	IRFP151	SGSP422	IRFP143	SGSP469	IRFP442	SGSP479	IRFP440
						SGSP481	IRFP151
SEFH35N06	IRFP151	SGSP461	IRFP142	SGSP471	IRFP140	SGSP482	IRFP151
SEFH7N45	IRFP441	SGSP462	IRFP142	SGSP472	IRFP150	SGSP491	IRFP151
SEFH7N50	IRFP440	SGSP463	IRFP342	SGSP473	IRFP351	SGSP492	IRFP151

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Siemens	SAMSUNG Direct Re- placement	Siemens	SAMSUNG Direct Re- placement	Siemens	SAMSUNG Direct Re- placement	Siemens	SAMSUNG Direct Re- placement
BUZ10 BUZ10A BUZ10B BUZ11A BUZ14A	IRF541 IRF543 IRF533 IRF543 IRF151	BUZ25 BUZ27 BUZ28 BUZ31 BUZ32	IRF140 IRFP140 IRFP141 IRF640 IRF630	BUZ41A BUZ41B BUZ42 IRF42A IRF42B	IRF830 IRF831 IRF832 IRF833 IRF820	BUZ60B BUZ60C BUZ60D BUZ63 BUZ63A	IRF732 IRF733 IRF720 IRF330 IRF331
BUZ14B BUZ17 BUZ18 BUZ20 BUZ20A	IRF153 IRF153 IRF151 IRF530 IRF532	BUZ32A BUZ32B BUZ32C BUZ34 BUZ35	IRF631 IRF632 IRF633 IRF240 IRF230	BUZ42C BUZ44 BUZ44A BUZ44B BUZ45	IRF821 IRF422 IRF430 IRF431 IRF452	BUZ63B BUZ63C BUZ63D BUZ64 BUZ64A	IRF332 IRF333 IRF320 IRF352 IRF353
BUZ20B BUZ201 BUZ21 BUZ211 BUZ23	IRF520 IRF353 IRF540 IRF452 IRF130	BUZ35A BUZ351 BUZ353 BUZ354 BUZ36	IRF231 IRFP353 IRFP453 IRFP453 IRF252	BUZ45A BUZ45B BUZ45C BUZ46 BUZ46A	IRF452 IRF452 IRF453 IRF432 IRF433	BUZ67 BUZ71 BUZ71A BUZ72A BUZ73A	IRFP340 IRF541 IRF543 IRF532 IRF632
BUZ23A BUZ23B BUZ24 BUZ24A BUZ24B	IRF130 IRF120 IRF150 IRF150 IRF152	BUZ237 BUZ38 BUZ382 BUZ385 BUZ41	IRFP242 IRFP240 IRFP353 IRFP440 IRF840	BUZ46B BUZ48 BUZ48A BUZ60 BUZ60A	IRF420 IRFP450 IRFP452 IRF730 IRF730	BUZ74 BUZ74A BUZ76 BUZ76A	IRF820 IRF822 IRF720 IRF722

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Siliconix	SAMSUNG Direct Replacement	Siliconix	SAMSUNG Direct Replacement	Siliconix	SAMSUNG Direct Replacement	Siliconix	SAMSUNG Direct Replacement
VN30AA VN33AJ VN35AA VN35AJ VN40AD	IRF123 IRF123 IRF123 IRF123 IRF513	VN0109N5 VN0110N1 VN0110N5 VN0114N1 VN0114N5	IRF512 IRF122 IRF512 IRF223 IRF613	VN0440N1 VN0445N1 VN0450N1 VN0600A VN0600D	IRF340 IRF453 IRF440 IRF143 IRF543	VN1115N5 VN1116N1 VN1116N5 VN1120N1 VN1120N5	IRF611 IRF222 IRF612 IRF222 IRF612
VN46AD VN64AG VN66AD VN66AJ VN67AA	IRF513 IRF123 IRF513 IRF123 IRF123	VN0116N1 VN0116N5 VN0120N1 VN0120N5 VN0202N1	IRF222 IRF612 IRF222 IRF612 IRF123	VN0601A VN0601D VN0600A VN0800D VN0801A	IRF143 IRF543 IRF130 IRF530 IRF132	VN1200A VN1200D VN1201A VN1201D VN1202N1	IRF241 IRF641 IRF243 IRF643 IRF133
VN67AD VN67AJ VN88AD VN89AA VN89AD	IRF513 IRF123 IRF512 IRF122 IRF512	VN0202N5 VN0203N1 VN0203N5 VN0204N1 VN0204N5	IRF513 IRF123 IRF513 IRF123 IRF513	VN1202N5 VN1203N1 VN1203N5 VN1204N1 VN1204N5	IRF533 IRF133 IRF533 IRF123 IRF523	VN2406D VN3500A VN3500D VN3501A VN3501D	IRF713 IRF331 IRF731 IRF333 IRF733
VN90AA VN98AJ VN99AA VN99AJ VN0102N1	IRF122 IRF122 IRF122 IRF122 IRF123	VN0206N1 VN0206N5 VN0208N1 VN0208N5 VN0209N1	IRF123 IRF513 IRF122 IRF512 IRF122	VN1206D VN1206N1 VN1206N5 VN1208N1 VN1208N5	IRF613 IRF123 IRF523 IRF122 IRF522	VN3502A VN4000A VN4000D VN4001A VN4001D	IRF321 IRF330 IRF730 IRF332 IRF732
VN0102N5 VN0103N1 VN0103N5 VN0104N1 VN0104N5	IRF513 IRF123 IRF513 IRF123 IRF513	VN0209N5 VN0201N1 VN0201N5 VN0214N1 VN0214N5	IRF512 IRF122 IRF512 IRF223 IRF613	VN1209N1 VN1209N5 VN1210N1 VN1210N5 VN1215N1	IRF122 IRF522 IRF122 IRF522 IRF233	VN4002A VN4501A VN4501D VN4502A VN4502D	IRF320 IRF431 IRF831 IRF433 IRF833
VN0106N1 VN0106N5 VN0108N1 VN0108N5 VN0109N1	IRF123 IRF513 IRF122 IRF512 IRF122	VN0215N5 VN0216N1 VN0216N5 VN0220N1 VN0220N5	IRF613 IRF222 IRF612 IRF222 IRF612	VN1215N5 VN1216N1 VN1216N5 VN1220N1 VN1220N5	IRF633 IRF222 IRF610 IRF222 IRF610	VN5001A VN5001D VN5002A VN5002D VNL001A	IRF430 IRF830 IRF432 IRF732 IRF331
VN0300D VN0330N1 VN0330N5 VN0335N1 VN0335N5	IRF513 IRF323 IRF723 IRF323 IRF723	VN0810D VN1000A VN1000D VN1001A VN1001D	IRF532 IRF130 IRF530 IRF132 IRF532	VN1706D VN2306N1 VN2306N5 VN2310N1 VN2310N5	IRF612 IRF141 IRF541 IRF140 IRF540	VNM001A VNM002A VNP002A VNS008A VNS008D	IRF330 IRF431 IRF430 SSM6N60 SSP6N60
VN0340N1 VN0340N5 VN0345A1 VN0345N1 VN0345N5	IRF322 IRF722 IRF441 IRF421 IRF821	VN1102N1 VN1102N5 VN1103N1 VN1103N5 VN1104N1	IRF123 IRF523 IRF123 IRF523 IRF123	VN2315N1 VN2315N5 VN2320N1 VN2320N5 VN2330N1	IRF241 IRF641 IRF242 IRF642 IRF341	VNS009A VNS009D VNT008A VNT008D VNT009A	SSM5N60 SSP5N60 SSM6N70 SSP6N70 SSM6N70
VN0350A1 VN0350N1 VN0355N1 VN0360N1 VN0400A	IRF440 IRF422 SSM4N55 SSM4N60 IRF143	VN1104N5 VN1106N1 VN1106N5 VN1109N1 VN1109N5	IRF523 IRF123 IRF523 IRF122 IRF522	VN2330N5 VN2335N1 VN2335N5 VN2340N1 VN2340N5	IRF741 IRF341 IRF741 IRF340 IRF740	VNT009D VP0102N5 VP0103N5 VP0104N5 VP0106N5	SSP6N70 IRF9513 IRF9513 IRF9513 IRF9513
VN0400D VN0401A VN0401D VN0430N1 VN0435N1	IRF543 IRF143 IRF543 IRF341 IRF341	VN1110N1 VN1110N5 VN1114N1 VN1114N5 VN1115N1	IRF122 IRF522 IRF223 IRF611 IRF223	VN2345N1 VN2350N1 VN2350N5	IRF453 IRF442 IRF842	VP0108N1 VP0108N5 VP0109N1	IRF9132 IRF9512 IRF9132

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Siliconix	SAMSUNG Direct Replacement	Siliconix	SAMSUNG Direct Replacement	Siliconix	SAMSUNG Direct Replacement	Siliconix	SAMSUNG Direct Replacement
VP0109N5	IRF9512	VP1109N1	IRF9132	VP0216N1	IRF9232	VP1209N1	IRF9132
VP0110N5	IRF9512	VP1109N5	IRF9512	VP0216N5	IRF9612	VP1210N1	IRF9132
VP0114N5	IRF9613	VP1110N1	IRF9132	VP0220N1	IRF9232	VP1210N5	IRF9522
VP0202N1	IRF9133	VP1110N5	IRF9512	VP0220N5	IRF9612	VP1215N1	IRF9233
VP0202N5	IRF9513	VP1114N1	IRF9233	VP0335N1	IRF9232	VP1215N5	IRF9621
VP0203N1	IRF9133	VP1114N5	IRF9611	VP0335N5	IRF9612	VP1216N1	IRF9232
VP0203N5	IRF9513	VP1115N1	IRF9233	VP0340N1	IRF9232	VP1216N5	IRF9610
VP0204N1	IRF9133	VP1115N5	IRF9611	VP0340N5	IRF9612	VP1220N1	IRF9232
VP0204N5	IRF9513	VP1116N1	IRF9232	VP0345N1	IRF9232	VP1220N5	IRF9610
VP0206N1	IRF9133	VP1116N5	IRF9612	VP0345N5	IRF9612	ZVN0102L	IRF513
VP0206N5	IRF9513	VP1120N1	IRF9232	VP1102N1	IRF9133	ZNV0106L	IRF513
VP0208N1	IRF9132	VP1120N5	IRF9612	VP1102N5	IRF9523	ZNV0108L	IRF512
VP0208N5	IRF9512	VP1202N1	IRF9133	VP1103N1	IRF9133		
VP0209N1	IRF9132	VP1202N5	IRF9533	VP1103N5	IRF9523		
VP0209N5	IRF9512	VP1203N1	IRF9133	VP1104N1	IRF9133		
VP0210N1	IRF9132	VP1203N5	IRF9533	VP1104N5	IRF9513		
VP0210N5	IRF9512	VP1204N1	IRF9133	VP1106N1	IRF9133		
VP0214N1	IRF9233	VP1204N5	IRF9523	VP1106N5	IRF9513		
VP0214N5	IRF9613	VP1206N1	IRF9133	VP1208N1	IRF9132		
VP0215N5	IRF9613	VP1206N5	IRF9523	VP1208N5	IRF9522		

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TOSHIBA	SAMSUNG Direct Replacement	TOSHIBA	SAMSUNG Direct Replacement	TOSHIBA	SAMSUNG Direct Replacement	TOSHIBA	SAMSUNG Direct Replacement
2SK385	IRFP340	2SK405	IRFP242	2SK643	IRFP441	2SK694	IRFP452
2SK386	IRFP453	2SK447	IRFP351	2SK675	IRFP151	2SJ115	IRFP9242
2SK387	IRFP241	2SK572	IRFP241	2SK678	IRFP450		
2SK388	IRFP351	2SK573	IRFP351	2SK693	IRFP451		

1. AUDIO

Application	SAMSUNG	SANYO	TOSHIBA	MATSUSHITA	ROHM	Others
Power Amplifier	KA2201/N	LA4145		AN7116	BA527	*TBA820M
	KA2201B	LA4145		AN7116	BA527	*TBA820M
	KA2212	*LA4140	*TA7313AP	*AN7112	BA526	
	†KA22101		*TA7250BP			
	KA8602					MC34119
Dual Power Amplifier	LM386		TA7336P		BA546	*LM386/*NJM386
	KA2206	*LA4182/3	TA7769P	AN7143	BA534	TEA2025
	KA22062		*TA7283AP		BA5406	
	KA22063		*TA7282			
	††KA22065		*TA8207			
	KA2209	LA4530	TA7376P	AN7118		*TDA2822M
	KA2210	*LA4445	TA7227P	AN7147	BA532	
	†KA22102		*TA8205			
†KA22103		*TA8210				
EQ AMP + Power	KA2211	LA4440	*TA7240AP	AN7178	BA532	
	KA2214					*μPC1263C
Dual EQ AMP + Power	KA2213	*LA4160	TA7628P			μPC1165C
	KA22130	*LA4160	TA7628			
	KA22131	LA4560M			*BA3502F	
EQ AMP + ALC	†KA22134		*TA8119P			
	KA22135					*LAG637D
	††KA22136					*LAG665
Dual EQ AMP	KA2220	*LA3210	*TA7137P	AN7320	*BA333	μPC1158H
	KA1222	*LA3160	TA7312P			*M51521L
	KA2221	*LA3161	*TA7375P	AN7310	*BA328	*M5152L
Graphic EQ AMP	KA22211	*LA3160	TA7312P			*M51521L
	KA2223	*LA3600	*TA7796P			*M5226P
	KA22231	LA3610M				TK10586M
	KA22232					TK10580M
	KA22233			AN7330K		
Dual EQ AMP + ALC	KA22234				*BA3822L	
	KA22235				*BA3812L	
	KA2224	*LA3220		AN7312	BA343	
	KA22241	LA3225/6N			*BA3308	M51544L
	KA22242	LA3225/6N			*BA3312N	M51544L
	KA22261		*TA7668BP			
Quad EQ AMP	KA7226		*TA7658P	AN7312	BA343	
	KA2228		*TA7417P		BA3416BL	
Dual EQ AMP + Mute	††KA22291		TA8189N			M51166P
Music Selector	KA2225	LA3230	*TA7709P/F	AN7315	BA3304	
	KA2230	LC7517	TC9167P			*IR3R24
AM 1 Chip Radio	KA2231	*LA2010	TA7341P	AN6262N/3N	BA335	
	KA22421		*TA7641BP			*CIC7641
DAT	††KA9301					*HA12133MP
	††KA9302					*HA12062
	††KA9310					*HD49212
	††KA9320					*HD49011A

† New Product †† Under Development * Direct Replacement

AUDIO (Continued)

Application	SAMSUNG	SANYO	TOSHIBA	MATSUSHITA	ROHM	Others
AM/FM 1 Chip Radio	††KA22426					*CXA1019
	KA22427		*TA7613AT			*TDA1083/*ULN2204
	†KA22429		*TDA7021T			
AM/FM IF + DET	KA2243				*BA4220	*HA12413
FM IF + DET	KA2244		*TA7303P	AN278	*BA404	
	KA22441	*LA1140		AN7277	*BA4110	
	KA2245	*LA1150	*TA7130P		*BA403	*μPC1028H
AM Tuner System	KA22461	LA1135	TA7402P	AN7250S		*μPC1215V
AM Tuner + AM/FM IF + DET	KA2247	*LA1260		AN7223	*BA4260	
	KA22471		*TA7640AP	AN7223		
	KA2248A	LA1270	*TA7687AP		BA4228L	
FM Front End	KA2249	LA1180	TA7335P	*AN7213	BA4402	
	KA22495	*LA1185	*TA7358AP	*AN7205		
	KA22496		*TA7358P			
FM Stereo Multiplex Decoder	KA2261	*LA3361	*TA7604P	*AN7410	*BA1330	*HA11227/*μPC1197C
	KA2262	*LA3370	TA7401AP	AN7417	BA1356	
	KA2263		*TA7343AP	*AN7420		
	KA2264	LA3330	*TA342P	*AN7421	BA1360	
	KA2265	*LA3410	TA7413AP	AN7470		
	KA2266	*LA3375	TA7401AP			
Noise Reduction	†KA2270					*CXA1011P
	KA2271		TA7719P			*CXA1101P
	†KA22711					*CXA1163
	†KA22712					*CXA1102
	KA2272	*LA2110				
	†KA2273					*LM1894
μ-COM	††KS55C232					*μPD1719
	††KS56C820					CXP5024
	††KS56C460	LC652001				
LED Level Meter Driver	KA2281		*TA7666P			IR2E27
	KA2283		*TA7667P			
	KA2284	*LB1403	TA7366P	*AN6884	*BA6124	
	KA2285	*LB1423	TA7366P		*BA6137	
	KA2286	*LB1433			BA656	
	KA2287	*LB1413			*BA6125	
	KA2288					*IR2E02
AM/FM 1 Chip Tuner	††KA2291					*CX20111
AM Tuner + MPX	††KA2292		*TA8167			
	††KA2293		*TA8122			
CDP	KA9256		*TA7256			
	†KA9257				*BA6290	
	††KA9210					CXD1135 + SRAM
	†KA9255				*BA6280	
	†KA9201					*CXA1081Q
	†KA8309					*CXA1082Q
	†KS5990	LC7860				CXD1167
	†KS5991					CXD1247
	††KDA0313					*CXD1140
KDA0316	*LC7881				*CXD1161	

† New Product †† Under Development * Direct Replacement

2. VIDEO

A. TV Use

Application	SAMSUNG	SANYO	MATSUSHITA	TOSHIBA	HITACHI	NEC	Others
SIF System	KA2101	*LA1365	*AN240	*TA7176	*HA1125	μPC1382	*ULN2165N
SIF Subsystem For MPX	KA2105		AN5215	*TA7337			
SIF + Audio Output	KA2102A		AN5250		HA1364	*μPC1353C	
Sound MPX (Two Carrier System in Korea)	KA2268N						
	KA22682						
Sound MPX (USA)	Decoder	KA2269					CX20112
	dbx NR	KA2270					CXA1011
Sound MPX (Japan)	††KA22683			*TA7762			
Sound Muting	KA2103L						
Sound Muting + Auto Power Off	KA2104						
VIF System	KA2911	LA1357	AN5111	*TA7607	HA11225	μPC1356	*TDA2544
	KA2916			*TA7611			
	KA2912	LA7507				*μPC1366	
VIF + SIF System	KA2913A			*TA7678		*μPC1414	
	KA2914A			*TA7680		μPC1411C	
	KA2917						
	KA2918						
	KA2919	*LA7520					
	KA2922	*LA7535					
KA2923	*LA7530N						
Quasi-IF	††KA2924			*TA8712N			
VIF + SIF + Def	KA2915		*AN5151N				
NTSC Chroma/ Deflection	KA2153			*TA7644BP		μPC1401C	*IROPO4
	KA2155	*LA7625					
	KA2156	*LA7626					
PAL Chroma/ Deflection	KA2154			*TA7698			
C/TV 1 Chip (NTSC)	††KA2159	*LA7655					
Vertical System	KA2130A	*LA1385		*TA7242		*μPC1031H2	
	KA2132						*TDA1044U
	KA2136						*TDA1170N
Vertical Output	KA2131	LA7830	*AN5512			μPC1378H	
Horizontal System	KA2135		*AN5790N				
	KA2137						*TDA1180P

† New Product †† Under Development * Direct Replacement

TV Use (Continued)

Application	SAMSUNG	SANYO	MATSUSHITA	TOSHIBA	HITACHI	NEC	Others
Def. System	KA2133					*μPC1379	
	KA2134		*AN5436				
	††KA2138	*LA7851					
Remocon Transmitter	KS5803A					*μPD1913C	
	KS5803B					*μPD1943G	
	†KS5410			*TC9012F			
Infrared Preamp	KA2181					*μPC1373H	
	KA2182/3					*μPC1374H	
	†KA2184						*CX20106A
DC Volume & Tone Control	KA2107		*AN5836	TA7630P			
Sync Separator	KA2605						
	KA2606						
R.G.B. Interface	KA6101		*AN5355				
	KA6102		*AN5356				
Audio & Video Switch	KA2186						*TEA2014
PLL + Prescaler	††KA2185			*TD6359P			

† New Product †† Under Development * Direct Replacement

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B. VTR & Camcorder

Application	SAMSUNG	HITACHI	NEC	TOSHIBA	SANYO	ROHM	mitsubishi	Others
REC/PB Pre-Amplifier	KA2944	*HA11744	*μPC1534C					
	†KA8102		*μPC2313CA					
	†KA8115							original
Luminance Signal Processor	KA2945	*HA11745	*μPC1524C					
	†KA8103		*μPC2317CA					
	††KA8113				*LA7323			
	††KA8108			*TA8744N				
Chrominance Signal Processor	KA2988	*HA11741	*μPC1536C					
	†KA8104		*μPC2315CA					
	††KA8109			*TA8678N				
Y/C 1-Chip	††KA8111				*LA7380			
PAL/SECAM/SVHS Detector	††KA8107				*LA7311			
S-VHS Sub-Emphasis	†KA8106							*VC2031
Audio Processor	KA2983					*BA5102		
	KA8401					*BA7751LS		
	††KA8404			*TA8692AN				
Sound MPX	KA22682							original
	†KA2269							*CX20112
	†KA2270							*CXA1011
	††KA8405			*TA8694N				
Digital Servo Controller Controller	KA8303			*TD6362N				
	†KA8308					*BU2758S		
	†KA8313/4		*μPD6163					
	†KA8316	*HD49748						
	††KA8318							original
Servo Control Amplifier	KA8302			*TA8617S				
A/V Switch	KA8402			*TA7347P				
	†KA8403			*TA7348P				
RF Modulator	KA2981		*μPC1507C	*TA7673P				

† New Product †† Under Development * Direct Replacement

VTR & Camcorder (Continued)

Application	SAMSUNG	HITACHI	NEC	TOSHIBA	SANYO	ROHM	MITSUBISHI	Others
Motor Driver	KA8301					*BA6209		
	KA8304					*BA6411		
	KA8306			*TA7288P				
	†KA8310						*M51721ATL	
	††KA8311						*M52440ASP	
Demodulator	KA2914A		*μPC1411C	*TA7680P				
	KA2917			*TA7625				
	KA2919					*LA7520		
	KA2923					*LA7530N		
Character Generator	††KS5512						*M50554	
	††KS5513							original
LED & Lamp Driver	KA2618			*TD62555S				
CCD Delay Line	††KS7100							*MSM6964-3RS
	††KS7104			*TL8808P				
	††KS7105			*TL8809P				
	††KS7106							*MSM6989-3RS
	††KS7107							*MSM6834-3MS
CCD Time Generator	††KS7210							original
CCD Clock Driver	††KS7226			*TC9224F				
Remocon	Tx	KS5803A		*μPD1319C				
		KS5803B		*μPD1319G				
		†KS5410			*TC9012F			
	Pre Amp	KA2181		*μPC1373H				
		†KA2184						
System Controller (μ-Com)	†KS56C400	PB only, ROM 4K, RAM 256 words						
	KS56C460	ROM 4K, RAM 320 words						
	†KS56C1610	ROM 16K, RAM 512 words, 45V drive						
	†KS56C1660	ROM 16K, RAM 512 words						

† New Product †† Under Development * Direct Replacement

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3. TELECOMMUNICATION ICs

A. Dialer

Application	SAMSUNG	MOSTEK	AMI	UMC	SHARP	Others
Pulse Dialer	KS5805A KS5805B KS58C05N †KS5851 KS58D05N †KS5852 KS58E05N †KS5853	*MK50992 *MK50993 MK50981 MK50981 MK50982 MK50982 MK50991/2 UK50991/2	S2560A/B	*T40992 *T40993 UM9151 UM9151 UM9151-3 UM9151-3	*LR40992 *LR40993	
DTMF Dialer	KS5808 KS5809 KS5810 KS5811 KA2413	*MK5089 MK5087 MK5380	*S25089	*UM95089 UM95087 UM9559	*LR4089 LR4087	*SBA5089 SBA5091 SBA5099 *PBD3535
DTMF/Pulse Switchable with Redial	KS5819 †KS58000/1/2/3 KS5820 †KS58004/5/6/7	MK5370 MK5370		*UM91230 *UM91230 *UM91210 *UM91210	LR48081 LR48081 LR48082 LR48082	*S7230A/B *S7230A/B S7235 S7235 *LC7360
DTMF/Pulse Switchable with 10 No. Memory	KS5822 †KS58500 KS5823 †KS58501/2/3/4	MK5375/6 MK5375/6		*UM91261 *UM91261 *UM91260 *UM91260	LR4803 LR4803	PCD3315 PCD3315
DTMF/Pulse Switchable with 20 No. Memory	†KS58528/29/ 30/31/32/33/34/ 35/36/37/38/39	*MK5087	*S2559E	*UM91271	*LR4087	*HM9120 *S7241

B. Tone Ringer

Application	SAMSUNG	MOTOROLA	SGS	MITEL	CHERRY	Others
Tone Ringer	KA2410 KA2411			*ML8204 *ML8205	*CS8204 *CS8205	*TA31001 *TA31002
1 Chip Tone Ringer	KA2418	MC34012 MC34017	*LS1240 LS3240			Included Bridge Diode

C. Speech Network

Application	SAMSUNG	SGS	RIFA	ITT	ERSO	Others
Subset Amplifier	KA2412A/F †KA8503	*LS285/A	PBL3726 *PBL3726/16	TEA1045	*CIC9185	
Speech Network with Dialer Interface	KA2425A KA2425B †KA8500A/B †KA8501A/B †KA8502A/B	*LS156 *LS256 *LS356	PBL3781			U4053/7 U4055/6 TP5700 IR3N31

† New Product †† Under Development * Direct Replacement

D. Speaker Phone

Application	SAMSUNG	MOTOROLA	SGS	Sharp	Others
Speaker Phone with Speech Network	KA8601				

E. Audio Amplifier

Application	SAMSUNG	MOTOROLA	SGS	National	Others
Audio Amplifier	KA8602	MC34119			

F. Tone Decoder

Application	SAMSUNG	NATIONAL	SHARP	SIGNETICS	Others
Tone Decoder	LM567C	*LM567	*IR3N05	*NE567	*XR567 (EXAR)
	LM567L				*XRL567 (EXAR)

G. FM IF Amplifier

Application	SAMSUNG	MOTOROLA	SHARP	SPRAGUE	Others
FM IF Amplifier	MC3361	*MC3361	IR3N06	ULN3859	*LM3361

H. DTMF Receiver

Application	SAMSUNG	MITEL	GTE	Others
DTMF Receiver	†KT3170	*MT8870	*G8870	

I. CODEC, CODEC FILTER, COMBO CODEC

Application	SAMSUNG	N.S	FAIRCHILD	SGS	INTEL	MOTOROLA	THOMSON
μ-Law CODEC	KT5116	*TP5116	*μA5116	*M5116	2910		
CODEC FILTER	KT3040	*TP3040	*μA5912	*M5912	*2912		*ETC5040
μ-Law COMBO CODEC	KT8564	*TP3064			2913	*MC145564	*ETC5064
μ-Law COMBO CODEC	KT8554	*TP3054	*μA3054		*2916	*MC145554	*ETC5054
A-Law COMBO CODEC	KT8567	*TP3067				*MC145567	*ETC5067
A-Law COMBO CODEC	KT8557	*TP3057	*μA3057		*2917	*MC145557	*ETC5057
μ-Law CODEC	†KT8520	*TP3020	μA5151		*2910		
A-Law CODEC	††KT8521	*TP3021			*2911		
TSAC	KT8555	*TP3155					

† New Product †† Under Development * Direct Replacement

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J. INTERFACES

Application		SAMSUNG	MOTOROLA	TI	N/S	FAIRCHILD	SIGNETICS
RS-232C	Line Driver	†KS5788			*DS14C88		
		MC1488	*MC1488	*SN75188	*DS1488	*μA1488	*MC1488
	Line Receiver	MC1489	*MC1489	*SN75189	*DS1489	*μA1489	*MC1489
		MC1489A	*MC1489A	*SN75189A	*DS1489A	*μA1489A	*MC1489A
		††KS5789A			*DS14C89A		
Transceiver	KA2654		*SN751701				

K. Driver

Application	SAMSUNG	SPRAGUE	EXAR	MOTOROLA	TI	Others
8ch Source Driver	KA2580A	*UDN2580A				
	KA2588A	*UDN2588A				
Flousscent Display Driver	KA2651	*UDN6118	*XR6118			
Peripheral Driver Array	KA2655	*ULN2001		*MC1411	SN75476	
	KA2656	*ULN2002		*MC1412	SN75477	
	KA2657	*ULN2003		*MC1413	SN75478	
	KA2658	*ULN2004		*MC1416		
	KA2659	*ULN2005				

L. UART

Application	SAMSUNG	HITACHI	MOTOROLA	Others
Single UART	KS5824	*HD6350	*MC6850	
Quad UART	KS5812			

M. Crosspoint Switch

Application	SAMSUNG	RCA	SGS. THOMSON	MITEL	MOTOROLA
4 × 4 Array	†KT8592	*CD22100			*MC142100
12 × 8 Array	†KT8593		*M093	*MT8812	

N. Phase Locked Loop

Application	SAMSUNG	MOTOROLA	SANYO	Others
15 Channel Selector	†KS8800	MC145168	LC7151	

† New Product †† Under Development * Direct Replacement

4. VOLTAGE REGULATOR

A. 3-Terminal Fixed Positive Voltage Regulator

Description	SAMSUNG	MOTOROLA	FAIRCHILD	NEC	MATSUSHITA	Package
KA78TXX Series (I _o = 3A)	KA78T05 ††KA78T06 ††KA78T08 ††KA78T12 ††KA78T15 ††KA78T18 ††KA78T24	MC78T05 MC78T06 MC78T08 MC78T12 MC78T15 MC78T18 MC78T24				TO-220 TO-3P
LM323 (I _o = 3A)	LM323	LM323				TO-3P
MC78XXAC/C Series (I _o = 1A)	MC7805AC/C MC7852C MC7806AC/C MC7808AC/C MC7885AC/C MC7809AC/C MC7810AC/C MC7811AC/C MC7812AC/C MC7815AC/C MC7818AC/C MC7824AC/C	MC7805AC/C MC7806AC/C MC7808AC/C MC7812AC/C MC7815AC/C MC7818AC/C MC7824AC/C	μA7805 μA7806 μA7808 μA7885 μA7812 μA7815 μA7818 μA7824	μPC7805 μPC7808 μPC7812 μPC7815 μPC7818 μPC7824	AN7805 AN7806 AN7808 AN7812 AN7815 AN7818 AN7824	TO-220
KA340XX Series (I _o = 1A)	†KA340T05 †KA340T06 †KA340T08 †KA340T09 †KA340T10 †KA340T11 †KA340T12 †KA340T15 †KA340T18 †KA340T24	LM340-5.0 LM340-6.0 LM340-8.0 LM340-12 LM340-15 LM340-18 LM340-24				TO-220
MC78MXXC Series (I _o = 0.5A)	MC78M05C MC78M06C MC78M08C MC78M10C MC78M12C MC78M15C MC78M18C MC78M20C MC78M24C	MC78M05C MC78M06C MC78M08C MC78M12C MC78M15C MC78M18C MC78M20C MC78M24C	μA78M05C μA78M06C μA78M08C μA78M12C μA78M15C μA78M20C μA78M24C	μPC78M05 μPC78M08 μPC78M10 μPC78M12 μPC78M15 μPC78M18 μPC78M20 μPC78M24	AN78M05 AN78M06 AN78M08 AN78M10 AN78M12 AN78M15 AN78M18 AN78M20 AN78M24	TO-220
MC78LXXAC (I _o = 0.1A)	MC78L26AC MC78L05AC MC78L62AC MC78L08AC MC78L82AC MC78L09AC MC78L12AC MC78L15AC MC78L18AC MC78L24AC	MC78L05AC MC78L08AC MC78L12AC MC78L15AC MC78L18AC MC78L24AC	μA78L05AC μA78L62AC μA78L82AC μA78L09AC μA78L12AC μA78L15AC			TO-92

† New Product
†† Under Development

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B. 3-Terminal Fixed Negative Voltage Regulator

Description	SAMSUNG	MOTOROLA	FAIRCHILD	NEC	MATSUSHITA	Package
MC79XXC Series ($I_o = 1A$)	MC7902C MC7905C MC7906C MC7908C MC7912C MC7915C MC7918C MC7924C	MC7905C MC7906C MC7908C MC7912C MC7915C MC7918C MC7924C	$\mu A7905$ $\mu A7908$ $\mu A7912$ $\mu A7915$	$\mu PC7905$ $\mu PC7908$ $\mu PC7912$ $\mu PC7915$ $\mu PC7918$ $\mu PC7924$	AN7905 AN7906 AN7908 AN7912 AN7915 AN7918 AN7924	
MC79MXXC ($I_o = 0.5A$)	MC79M05C MC79M06C MC79M08C MC79M12C MC79M15C MC79M18C MC79M24C	MC79M05C MC79M12 MC79M15	$\mu A79M05$ $\mu A79M08$ $\mu A79M12$ $\mu A79M15$			TO-220
MC79LXXAC ($I_o = 0.1A$)	MC79L05AC ††MC79L12AC ††MC79L15AC ††MC79L18AC ††MC79L24AC	MC79L05AC MC79L12AC MC79L15AC MC79L18AC MC79L24AC				TO-92

C. Precision Voltage Regulator

Description	SAMSUNG	MOTOROLA	FAIRCHILD	NEC	MATSUSHITA	Package
Adjustable Voltage	LM723	MC1723	$\mu A723$	LM723		14 DIP/14 SOP
	LM317	LM317	$\mu A317$	LM317		TO-220
	KA337	LM337		LM337		TO-220
33V Regulator	KA33V				$\mu PC574$	TO-92
Adjustable Voltage	KA350	LM350	$\mu A350$	LM350		TO-92 TO-220
	†KA317L	LM317L				
	†KA317M	LM317M		LM317M		
	KA337L	LM337L				
	KA337M	LM337M		LM337M		

D. Switching Voltage Regulator

Description	SAMSUNG	MOTOROLA	FAIRCHILD	SGS	UNITRODE	Package
DC to DC Converter	KA34063	MC34063				8 DIP
PWM Control IC	KA3524	SG3524	SG3524	SG3524	UC3524	16 DIP
	KA7500	TL494	$\mu A494$		UC494AC	16 DIP
	†KA3842	UC3842A		UC3842	UC3842	8 DIP
	††KA3525A	SG3525A		SG3525A	UC3525A	16 DIP
	††KA3526A	SG3526			UC3526A	18 DIP
	††KA3846			UC3846	UC3846	16 DIP
	††KA51977P					16 DIP

5. PRECISION VOLTAGE REFERENCE

Description	SAMSUNG	MOTOROLA	FAIRCHILD	N/S	TI	Package
Adjustable Reference (2.5V ~ 36V)	KA431	TL431	μ A431		TL431	TO-92 8 DIP 8 SOP
Reference	5V	KA336		LM336		TO-92
	2.5V	KA336		LM336		TO-92

6. OPERATIONAL AMPLIFIER

Description	SAMSUNG	MOTOROLA	NATIONAL	FAIRCHILD	JRC	Others
Single OP Amp	LM741 KA301 KF351	MC1741 LM301 LF351	LM741 LM301 LF351	μ A741 μ A301	NJM741	μ PC301A TL081
Dual OP Amp	KA5532 LM358/A LM258/A LM2904 MC1458 MC4558 KA9256 KF353 KF442 KS272	LM358/A LM258 LM2904 MC1458 MC4558 LF353	LM358/A LM258/A LM2904 LM1458 LF353 LF442	 μ A1458 μ A4558 NJM353	NJM5532 NJM358 NJM2904 NJM1458 NJM4558	NE5532, RC5332 TA75358 BA4558 TA7256 TL802 TLC272, ICL7621
Quad OP Amp	LM324/A LM224/A LM2902 LM348 LM248 MC3403 MC3303 KF347 KS274	LM324/A LM224 LM2902 LM348 LM248 LM3403 MC3303 LF347	LM324/A LM224/A LM2902 LM348 LM248 LF347	μ A324 μ A224 μ A2902 μ A348 μ A248 μ A3403 μ A3303	NJM324 NJM2902 NJM340J	TA75324 CA224 μ PC451 μ PC3403 μ PC452 TL084 TLC274, ICL7641

2

7. VOLTAGE COMPARATOR

Description	SAMSUNG	MOTOROLA	NATIONAL	FAIRCHILD	JRC	Others
Single Comparator	LM311 KA710C	LM311 MC710C	LM311 LM710C	LM311 μ A710C	NJM311	μ PC311 MB4001
Dual Comparator	LM393/A LM2903 LM293 KA319 KA219 KA711C	LM393/A LM2903 LM293	LM393/A LM2903 LM293 LM319 LM219 LM711C	μ A393 μ A711C	NJM2903 NJM319	TA75393 μ PC277
Quad Comparator	LM339/A LM2901 LM239 LM3302	LM339/A LM2901 LM239	LM339/A LM2901 LM239 LM3302	μ A339 μ A2901 μ A239 μ A3302	NJM2901	TA75339 μ PC177 CA239 CA3302

8. TIMER

Function	SAMSUNG	MOTOROLA	NATIONAL	SIGNETICS	TI	Others
Single Timer	NE555 KS555 KS5357	MC1455	LM555	NE555	TA75555 TLC555	ICM7555
Dual Timer	NE556 KS556		LM556	NE556	NE555 TLC556	ICM7556
Quad Timer	NE558			NE558		

9. MISCELLANEOUS ICs

Function	SAMSUNG	TOSHIBA	NATIONAL	MATSUSHITA	NEC	Others
Toy Radio Control Actuator	KA2303					3 Function
	KA2304					2 Function
	†KA2309	TA7657D			Turbo +	7 Function (RX)
	†KA2310	TA7330			Turbo +	7 Function (TX)
DC Motor Speed Controller	KA2401				μPC1470H	
	KA2402			AN6612		*LA5521D
	KA2404			AN6610		μPC1470H
	†KA2407			*AN6651		
Earth Leakage Detector	KA2803		LM1851			*M54123
Earth Leakage Detector	KA2807		LM1851			
Zero Voltage SW	KA2804				μPC1701C	
FDD Read AMP	KA6201					*HA16631P
Smoke Detector	KS3502					S566
Conventional Timer	KS8701	TD6347S				
Flasher Controller	KA8702	TA8027P				UAA1041
V/F Converter	KA331		LM331			

10. DATA CONVERTER

Application	SAMSUNG	N.S.	TI	Intersil	Other	Remark
A/D + D/A Converter	KSV3110				UVC3130	Functional Replacement
High Speed A/D	KSV3208 (8 bit)				CXA1096	Functional Replacement
	*KAD0206 (6 bit)				MB40576	Functional Replacement
RAMDAC	*KDA0476				IMSG176	BT476, ADV476
	*KDA0471				BT471	ADV471
	*KDA0478				BT478	ADV478
8 bit A/D Converter	*KAD0804	ADC0804	ADC0804			
	KAD0808/09	ADC0808/09	ADC0808/09			
	KAD0816/17	ADC0816/17	ADC0816/17			
	KAD0820	ADC0820	ADC0820			
3-1/2 Digit A/D	KS7126			ICL7126	TSC7126	
High Speed D/A	KDA3310 (10 bit)				TDC1016	Functional Replacement
	*KDA0406 (6 bit)					
8 bit D/A Converter	KDA0800/08	DAC0800/08		DAC-08	MC1408	DAC-08/AD1408, AM1408
S.A.R.	KS25C02/03	DM25C02/03				
	KS25C04	DM25C04				
CDP	**KDA0313				CXD1140	
	*KDA0316				LC7881	

2

1. TIMEPIECE (WATCH/CLOCK)

Application	SAMSUNG	OKI	EUROSIL	SANYO	UMC	Other
LCD Watch	KS5120/KS5199A	MSM5001N	e1325B		UM3219	STP3691
	KS5195	MSM5004				
	KS5190/†KS5191	MSM5006			UM3217	
	KS5112					JT6649A
	†KS5121					Original
Analog LCD Watch	KS5113	MSM5008	e1331		UM3210	STP5721
Analog Watch	†KS5243	MSM6002	e1208		UM3230	STP5490
	††KS5250	MSM6004	e1211			PCA1460
Analog Clock	KS5206	MSM5093			UM3252A	
	KS5207					
	KS5210		e1444N			
	KS5211					Original
	KS5221					Original
	†KS5212			e1461		

2. CALCULATOR

Application	SAMSUNG	SHARP	TOSHIBA	UMC	EUROSIL	Other
Basic Function	†KS6325/†KS6125	LI3135		UM3128		
	†KS6326/†KS6126	LI3140		UM3135	e3142	
	KS6028	LI3136				
	KS6029/†KS6129					Original
Desk Top	KS6027A		T6899			
Scientific	KS6041		SC6992			

3. DATA BANK

Application	SAMSUNG	SHARP	TOSHIBA	UMC	Other
Simple Function	†KS6033				Original

† New Product

†† Under Development

4. MELODY

Application	SAMSUNG	OKI	SEIKO	TOSHIBA	ERSO	Other
Simple Melody	KS5310		SVM7952			
	KS5313		SVM7920		CIC3821	
	†KS537/KS5327					UM66T
Multi Melody	KS5381	MSM5041				
Dual Tone Melody	††KS5318		SVM7910			
	†KS5319		SVM7860C			
Sound Effect	KS5814					MN6223
	KS5401					HT-88

5. SPEECH SYNTHESIZER

Application	SAMSUNG	OKI	SEIKO	TOSHIBA	Others
Voice Synthesizer	KS5901A			T6721	
	KS5902			T6803	SP0256, LC8100
	KS5911/5917			T6668	UM5101
	KS5912			T6667	CIC560
	†KS5915			TC8831F	CIC5500

* KS5917—Internal \overline{EoS}

1) Standard MPR

AMD	SAMSUNG	INTEL	SAMSUNG	NCR	SAMSUNG
AM5380	KS53C80	82C37A 82C37A-4 82C37A-5	KS82C37A-5 KS82C37A-5 KS82C37A-5	5380	KS53C80
D8237A D8237A-4 D8237A-5	KS82C37A-5 KS82C37A-5 KS82C37A-5	8255A 8255A-5	KS82C55A-5 KS82C55A-5	NEC	SAMSUNG
D82C54-8 D82C54-10	KS82C54-8 KS82C54-10	82C54A	KS82C54-8	82C37A-5	KS82C37A-5
D8255A-2 D8255A-3	KS82C55A-5 KS82C55A-5	82C55A-8 82C55A-8	KS82C55A-8 KS82C55A-8	82C54-8	KS82C54-8
D8259A-5 D8259A-8	KS82C59A-8 KS82C59A-8	82C59A 82C59A-2 82C59A-8	KS82C59A-8 KS82C59A-8 KS82C59A-8	82C55A-8	KS82C55A-8
D8284A-8 D8284A-10	KS82C84A-8 KS82C84A-10	82C84 82C84A 82C84A-1	KS82C84A-5 KS82C84A-8 KS82C84A-10	82C59A-8	KS82C59A-8
D8288-5	KS82C88A-5	82C88 8288	KS82C88A-8 KS82C88A-8	82C84A-8	KS82C84A-8
HARRIS	SAMSUNG	LOGIC DEVICES	SAMSUNG	82C88-8	KS82C88A-8
82C37A-5 8237A-8	KS82C37A-5 KS82C37A-8	L5380 L53C80	KS53C80 KS53C80	OKI	SAMSUNG
82C52	KS82C52	LOGIC DEVICES	SAMSUNG	M82C37A-5	KS82C37A-5
82C54-8	KS82C54-8	L5380 L53C80	KS53C80 KS53C80	M82C54-8 M82C54-10	KS82C54-8 KS82C54-10
82C55A-5 82C55A-8	KS82C55A-5 KS82C55A-8	MITSUBISHI	SAMSUNG	M82C55A-8	KS82C55A-8
82C59A-5 82C59A-8	KS82C59A-8 KS82C59A-8	82C37A-4 82C37A-5	KS82C37A-5 KS82C37A-5	M82C59A-5 M82C59A-8	KS82C59A-8 KS82C59A-8
82C84A-8	KS82C84A-8	82C54-6 82C54-8	KS82C54-8 KS82C54-8	M82C84A-5 M82C84A-8	KS82C84A-5 KS82C84A-8
82C88-5 82C88-8	KS82C88A-5 KS82C88A-8	82C55A-5 82C55A-8	KS82C55A-5 KS82C55A-8	M82C88-5 M82C88-8	KS82C88A-5 KS82C88A-8
		82C59A-5 82C59A-8	KS82C59A-8 KS82C59A-8	UMC	SAMSUNG
				UM8237A-3	KS8237A-5
				UM8237A-4	KS82C37A-5
				UM8237A-5	KS82C37A-5
				UM8250A	KS82C50A
				UM8250B	KS82C50A
				UM8254-2	KS82C54-8
				UM8255A	KS82C55A-5
				UM8259A-5	KS82C59A-8
				UM82C84AE-8	KS82C84A-8
				UM82C84AE-10	KS82C84A-10
				UM82C88-5	KS82C88A-5

2) CHIPSET

(1) AT 4 Chip

Function	SAMSUNG	C&T	SOLUTIONS	UMC
Bus Controller	KS83C211	P82C211C	88C211	UM82C211
Memory Controller	KS83C212	P82C212B	88C212	UM82C212
Address/Data Buffer	KS83C215	P82C215	88C215	UM82C215
Integrated Peripheral Controller	KS83C206	P82C206H		UM82C206

(2) Communication IC

Application	SAMSUNG	UMC	Western Digital	ACER	VLSI	TI	Others
Parallel Controller	KS82C411	UM82C11-C	—	M2201A	—	TMS77211	82C11 (SIS) PPC1 (paradise)
Two Serial and One Parallel Controller	KS82C452	—	WD16C452	—	VL16C452	—	82C605 (C&T)

2

1. LCD PRODUCTS

Application	SAMSUNG	HITACHI	OKI	SHARP	SEIKO EPSON
LCD 40 CH. Driver	KS0061	*HD44100	MSM5259GS	LH5006A	—
LCD Controller	KS0062	*HD44780	*MSM6222	LH5008	*SED1278F
LCD 80 CH. Driver	KS0063	HD66100	—	—	—
LCD 80 CH. COM/SEG Driver	KS0081	—	—	LH5022 LH5021A	—
Video-LCD Interface	KS0082	—	—	—	*SED1341F
68 CH. Common Driver	KS0101	HD44103	MSM5298	LH5030 LH5031	SED1190 SED1191
80 CH. Segment Driver	KS0102	HD44102	MSM5299	LH5826 LH5025A	SED1180 SED1181 LH5036A

(* Direct Replacement)

2. TELETEXT, FAX PRODUCTS

Application	SAMSUNG	ROLM	SEIKO EPSON	KOYCERA	NS	HITACHI
TPH Driver	KS5064	BU2120CH	SED5600 Series	KJT256	—	—
LED Driver	KS5164	D4264 D0B	—	—	—	S6561A
Digital Teletext Processor	TXT4000	—	—	—	SCX6244 QGQ	—

1. DRAM

Density	Org.	Mode	Samsung	Toshiba	Hltachi	Fujitsu	NEC	OkI	TI
64K	× 1	Page	KM4164B					MSM3764A	
256K	× 1	F. Page	KM41C256	TMM41256A	HM50256 HM51256	MB81256	μPD41256	MSM41256A MSM51C256	TMS4256
		Nibble	KM41257A(NMOS) KM41C257(CMOS)	TMM41257A	HM50257	MB81257	μPD41257	MSM41257A	TMS4257
		S. Column	KM41C258(CMOS)		HM51258	MB81C258			
	64K × 4	F. Page	KM41464A(NMOS) KM41C464(CMOS)	TMM41464A	HM50464	MB81464	μPD41464	MSM41464	TMS4464
		S. Column	KM41C466(CMOS)			MB81C466			
1M	× 1	F. Page	KM41C1000A	TC511000A(L)	HM511000S/A/H	MB81C1000	μPD421000	MSM511000	TMS4C1024
		Nibble	KM41C1001A	TC511001A	HM511001S/A	MB81C1001	μPD421001	MSM511001	TMS4C1025
		S. Column	KM41C1002A	TC511002A	HM511002S/A	MB81C1002	μPD421002	MSM511002	TMS4C1027
	256K × 4	F. Page	KM44C256A	TC514256A(L)	HM514256S/A/H	MB81C4256	μPD424256	MSM514256	TMS44C256
		S. Column	KM44C258A	TC514258A	HM514258S/A	MB81C4258	μPD424258	MSM514258	
4M	× 1	F. Page	KM41C4000	TC514100	HM514100	MB814100	μPD424100	MSM514100	
	1M × 4	F. Page	KM44C1000	TC514400	HM514400	MB814400	μPD424400	MSM514400	

2

2. MODULE

Organization	Samsung	Toshiba	Hltachi	Mitsubishi	NEC	TI
256K × 8	KMM58256/AP		HB56D25608		MC-41256A8	TM4256GU8
256K × 9	KMM59256/AN		HB56D25609		MC-41256A9	TM4256GU9
1M × 8	KMM581000A/P	THM81000A	HB56A18	MH1M08	MC-421000A8	TM024GAD8
1M × 9	KMM591000A/N	THM91000A	HB56A19	MH1M09J	MC-421000A9	TM024GAD9
4M × 8	KMM584000		HB56A48			
4M × 9	KMM594000		HB56A49			
256K × 36	KMM536256	THM362500A	HB56D25636			
512K × 36	KMM536512	THM365120A	HB56D51236			
1M × 36	KMM5361000	THM361020S	HB56D136B			
2M × 36	KMM5362000		HB56D236B			
1M × 40	KMM5401000					
2M × 40	KMM5402000					

3. SRAM

3.1 SLOW SRAM

Density	Org.	Package	Samsung	Hitachi	NEC	Toshiba	Fujitsu	Sony
64K	8K x 8	DIP	KM6284AP/ALP	HM6264P/LP	μPD4364C/L	TC5565AP/APL	MB8464A/L	CXK5864AP/L
		SOIC	KM6284AG/ALG	HM6264PF/LFP	μPD4364G/L	TC5565AF/AFL	MB8464AF/L	CXK5864AM/L
256K	32K x 8	DIP	KM62256AP/ALP	HM62256AP/ALP	μPD43256C/L	TC55257AP/APL	MB84256A/L	CXK58256AP/L
		SOIC	KM62256AG/ALG	HM62256APF/ALFP	μPD43256G/L	TC55257AF/AFL	MB84256AF/L	CXK58256AM/L
1M	128K x 8	DIP	KM681000P/LP	HM628128P/LP	μPD431000C/L	TC551001AP/APL	MB841000A/L	CXK581000/1/L
		SOIC	KM681000G/LG	HM68128PF/LFP	μPD431000G/L	TC551001AF/AFL	MB841000AF/L	CXK581000/1M/L

3.2 FAST SRAM

Density	Org.	Option	Samsung	Hitachi	NEC	Mitsubishi	Fujitsu	Sharp	Cypress	Motorola
64K	64K x 1		KM6165AP/AJ	HM6287P/J	μPD4361C	M5M5187	MB81C71	LH5161	CY7C187	MCM6287
			KM6465AP	HM6288P	μPD4362C	M5M5188	MB81C74	LH5267	CY7C164	MCM6288
		with \overline{OE}	KM6466AP/AJ				MB81C75		CY7C166	MCM6290
			KM6865AP			M5M5178	MB81C78			MCM6264
256K	256K x 1		KM61257P/J	HM6207P/J	μPD43251C	M5M5257		LH52251	CY7C197	MCM6207
			KM64257P/J	HM6208P/J	μPD43254C	M5M5258	MB81C86	LH52255	CY7C191	MCM6208
			KM68257P					LH52258		MCM6206

4. EEPROM

Density	Samsung	Xicor	Seeq	Exel	Atmel	Hitachi	Fujitsu	OkI	NS	Rohm	Catalyst
256	KM93C06								NMC9306		
	KM93C07								NMC9307		
1K	KM93C46								NMC9346	BR93C46	CAT93C46
16K	KM28C16	X2816A X2816B	DQ2816A DQ5516A	XL2816A	AT28C16			MSM28C16A		BR2816	
			DQ2817A DQ5517A	XL2817A	AT28C17						
64K	KM28C64	X2864A X2864B	DQ28C64	XL2864	AT28C64 AT28PC64	HN58064	MBH28C64	MSM28C64A		BR2864A	
			DQ28C65 DQ2864	XL2865		HN58C65 HN58C66				BR2865A	
256K	KM28C256	X28256 X28C256	DQ28C256		AT28C256	HN58C256	MBM28C256				

5. MASK ROM

Density	Pkg.	Org.	Samsung	NEC	Hitachi	Toshiba	Sharp	Mitsubishi	Fujitsu	Oki
1M	28 DIP	X8	KM23C1000	UPD23C1000A	HN62321E HN62321 HN62331 HN63221E	TC531000	LH531000 LH531001	M5M231000 M5M231001 M5M23C100	MB831124	MSM531000
	40 DIP	X8/X16	KM23C2100	UPD23C2001	HN62412 HN62422		LH532100		MB832000 MB832001	
4M	32 DIP	X8	KM23C4000	UPD23C4001E	HN62304 HN62324	TC534000	LH534100 LH534100A LH534200A		HB834100	
	40 DIP	X8/X16	KM23C4100	UPD23C4000	HN62404 HN62424		LH534500			
	44 QFP	X8/X16	KM23C4100FP		HN62404 HN62424					

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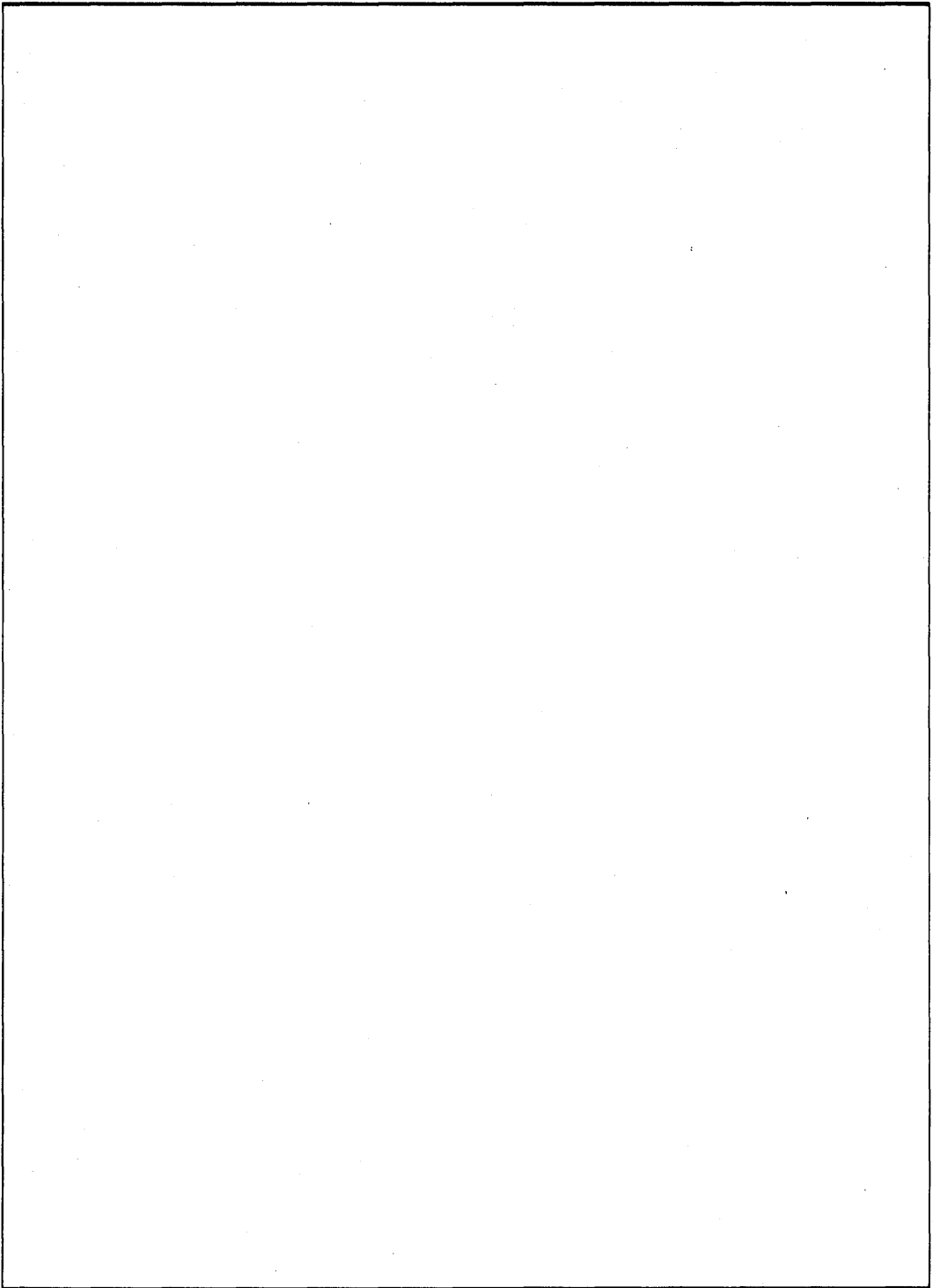
6. VIDEO MEMORY

Density	Org.	Samsung	Toshiba	NEC	Hitachi	TI	Oki
256K	64K × 4	KM424C64		μPD41264	HM53461	TMS4461	
1M	256K × 4	KM424C256	TC524256	μPD42273	HM534251	TMS44C251	HSM514252
	128K × 8	KM428C128	TC528128		HM538123		

7. FIFO

Capacity	Org	Samsung	AMD	IDT	Sharp	Cypress	TI
Standard FiFo	512K × 9	KM75C01A	Am7201	IDT7201SA/LA	LH5496/D	CY7C420(1)	74ACT7201A
	1K × 9	KM75C02A	Am7202	IDT7202SA/LA	LH5497/D	CY7C424(5)	74ACT7202
	2K × 9	KM75C03A	Am7203	IDT7203S/L	LH5498/DKM	CY7C428(9)	
Programmable Flag FiFo	512K × 9	KM75C101A	Am4601				
	1K × 9	KM75C102A		IDT7202			
	2K × 9	KM75C103A					

NOTES

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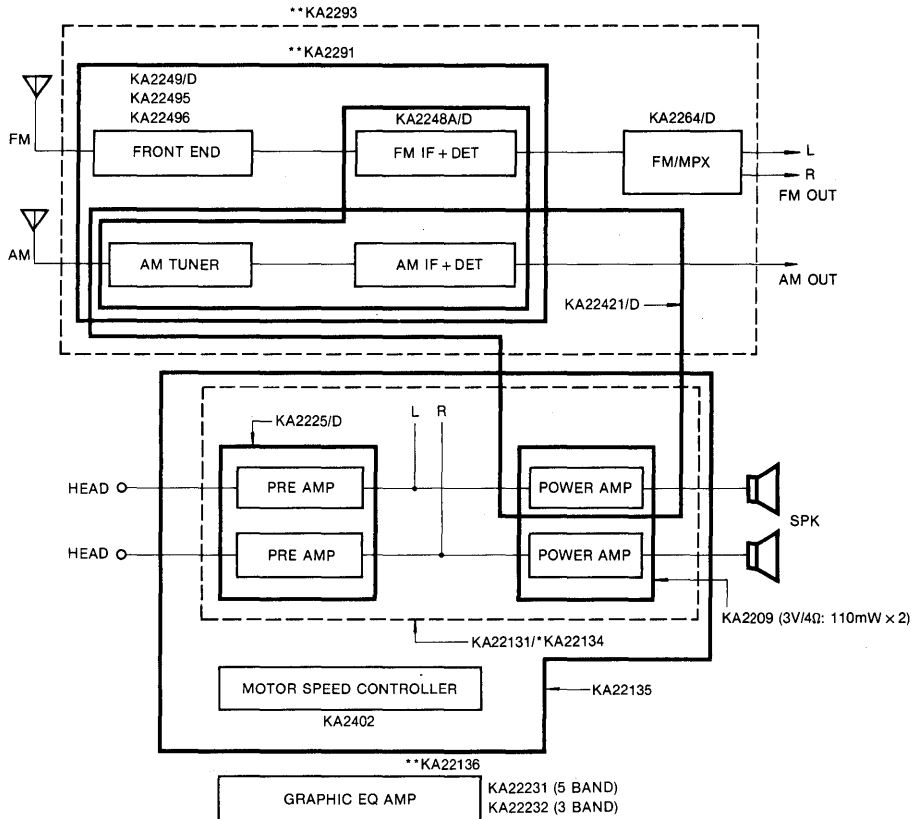
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1. AUDIO APPLICATION

1.1 Mini Radio Cassette

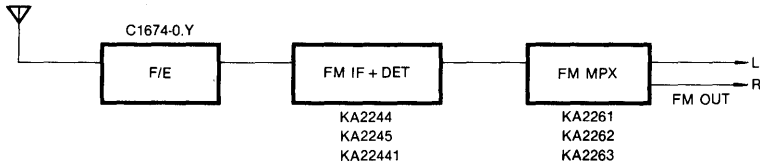


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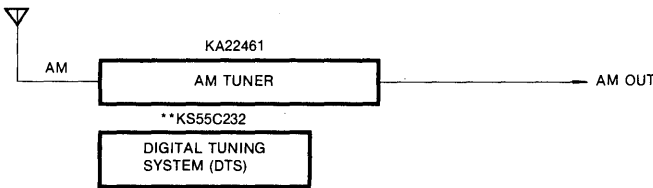
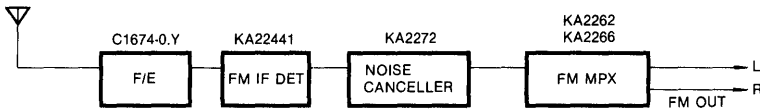
* New Product
 ** Under Development

1.3 Car Audio

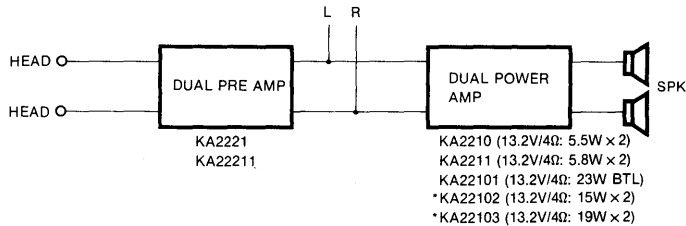
1) Popular Type Tuner Block



2) High-Grade Type Tuner Block

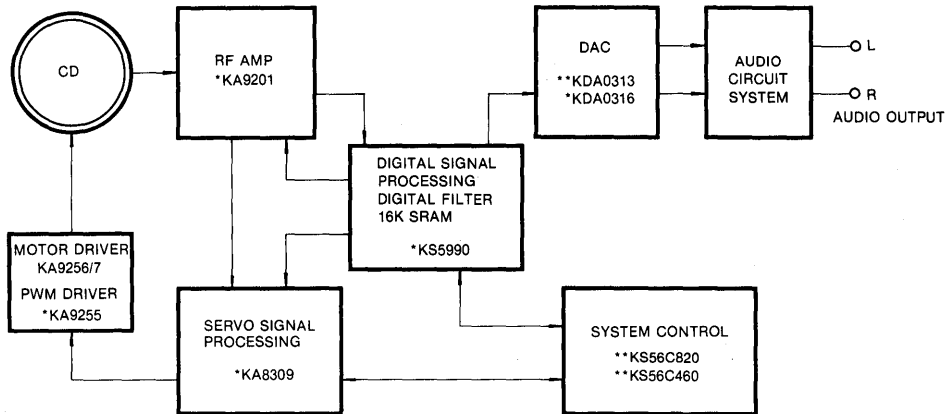


3) Deck & PWR Block



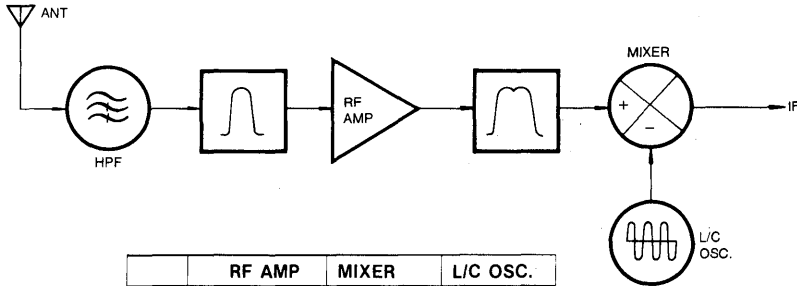
* New Product
** Under Development

1.4 CDP System



2. VIDEO APPLICATION

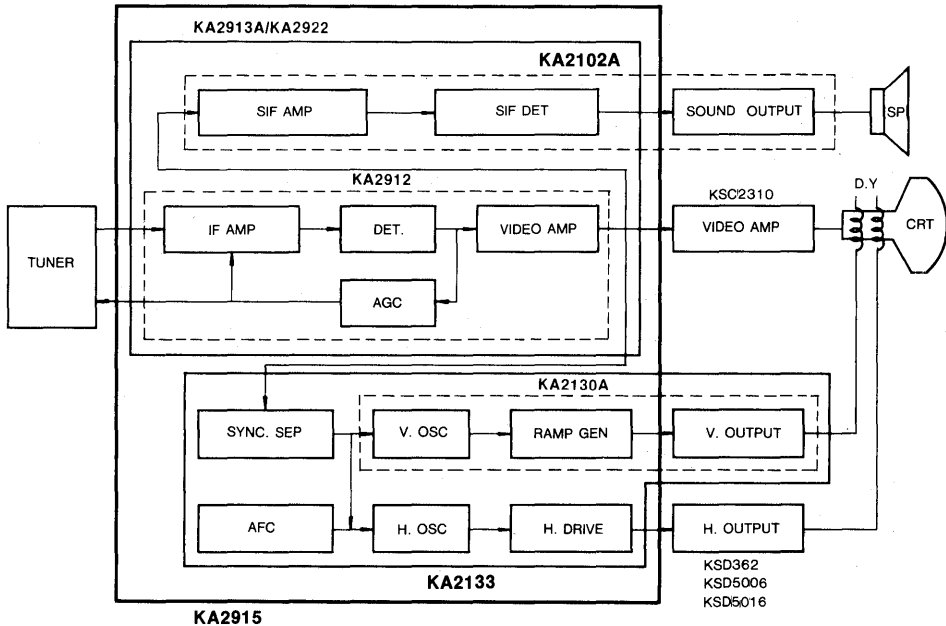
2.1 Tuner for TV



	RF AMP	MIXER	L/C OSC.
VHF	KSC1393	KSC1394	KSC1730
	KSC2755	KSC2756	KSC2757
	** K5043	KSC3120	KSC2759
		MPSH24	KSC3121
UHF	KSC2758	MPSH20	KSC3867
	KSC1070	MMBTH24	MPSH10
			MPSH11
			MPS5179
	** K5044		MMBTH10

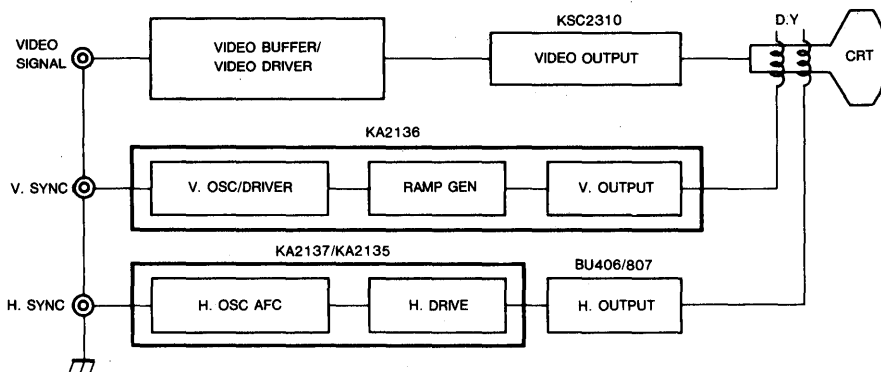
3

2.2 Linear IC for B/W TV

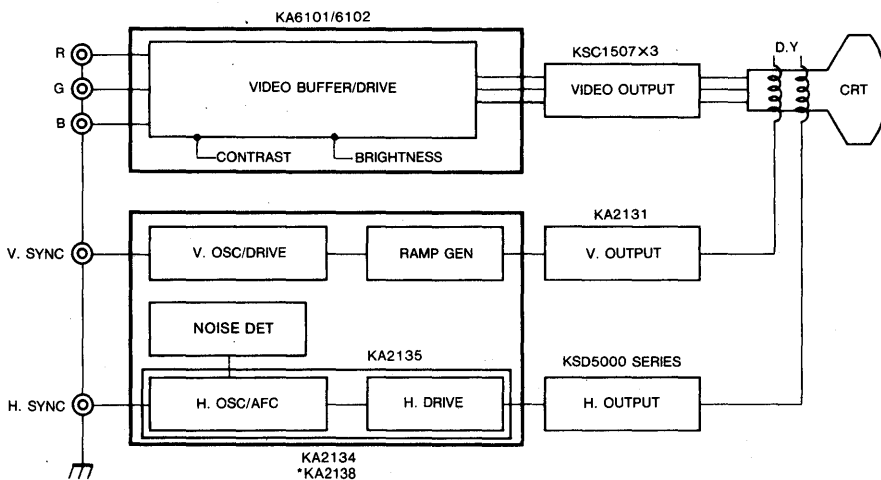


2.3 Linear IC for Monitor

2.3.1 Monochrome Monitor



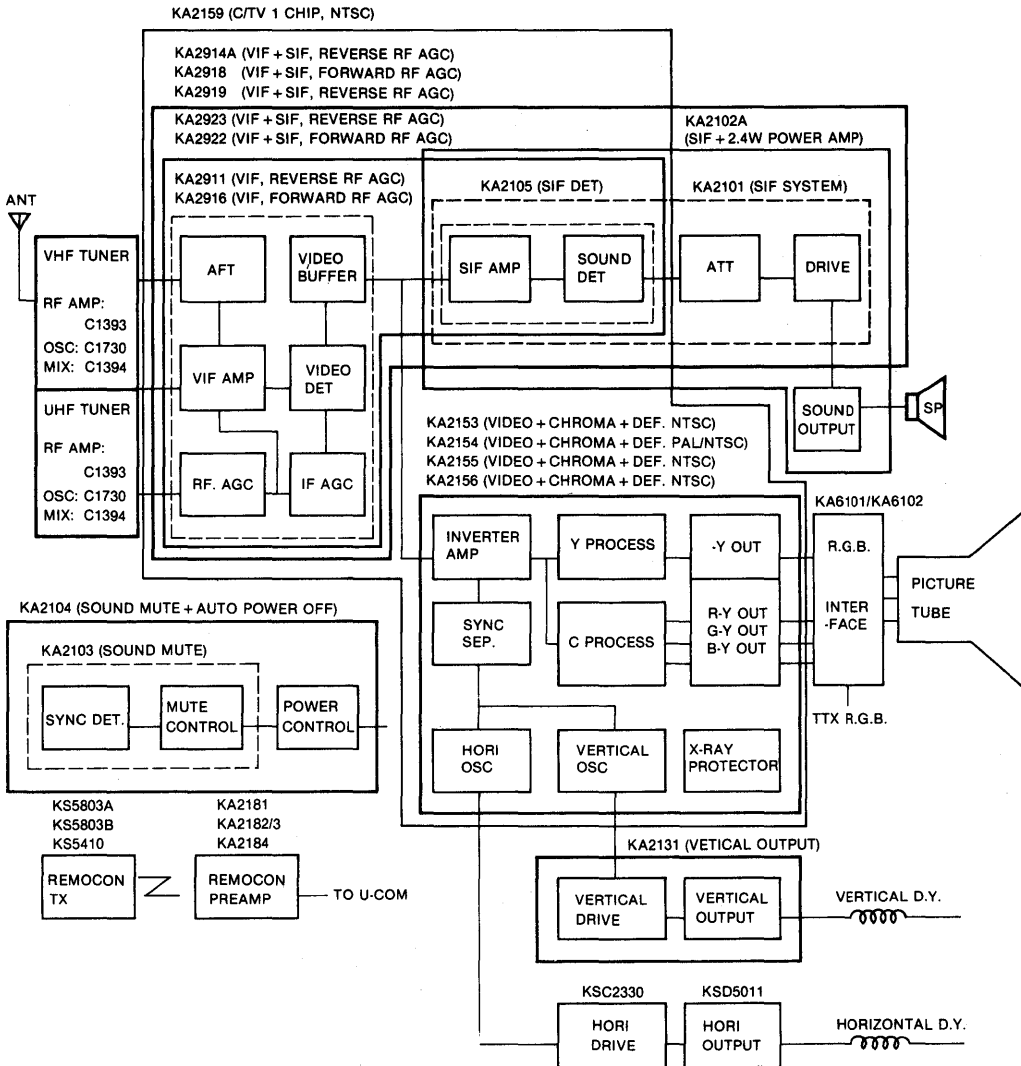
2.3.2 Color Monitor



* New Product

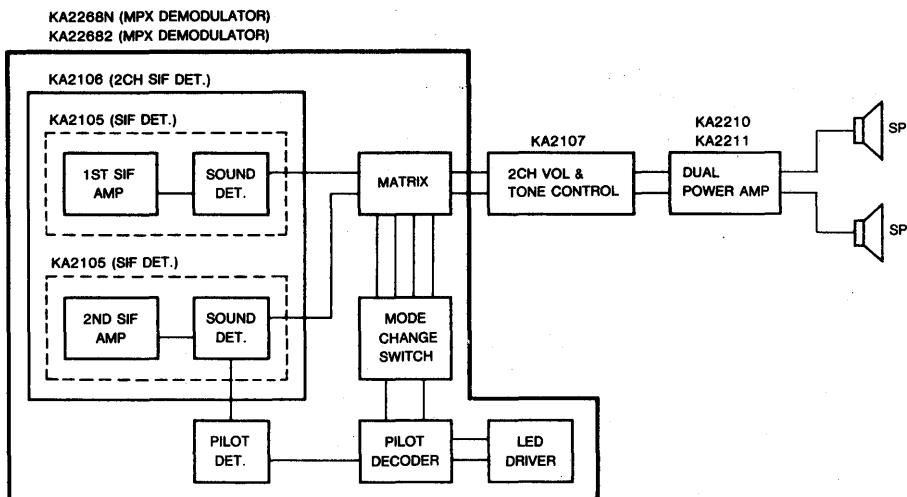
APPLICATION GUIDE

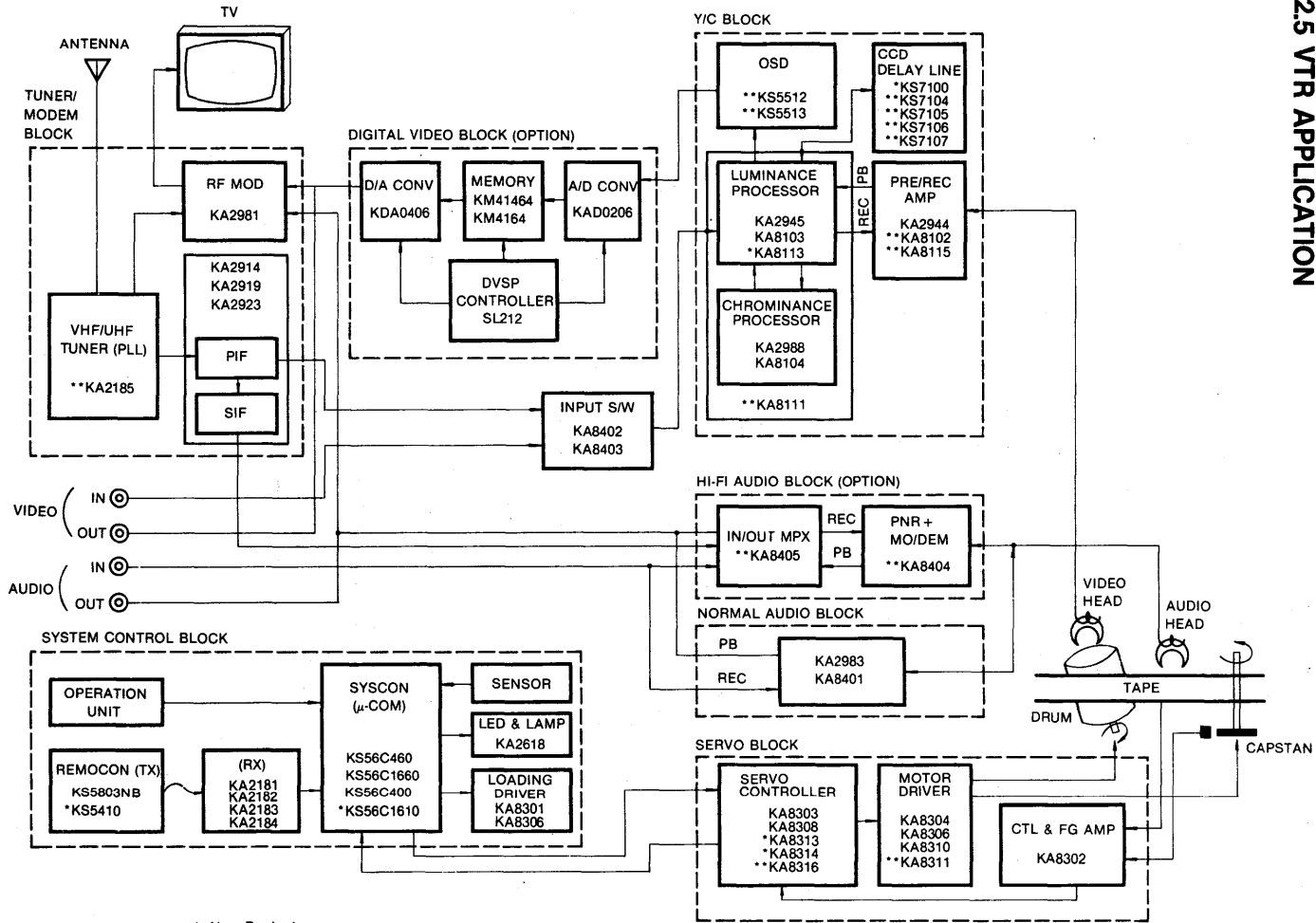
2.4 Color Television Block Diagram



* NEW PRODUCT
 ** UNDER DEVELOPMENT

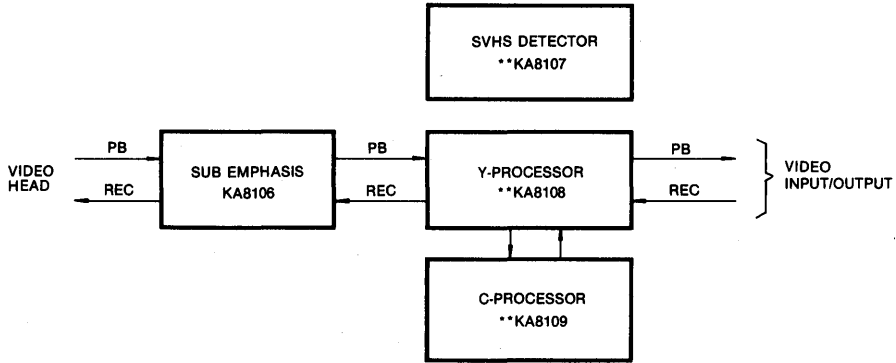
APPLICATION GUIDE



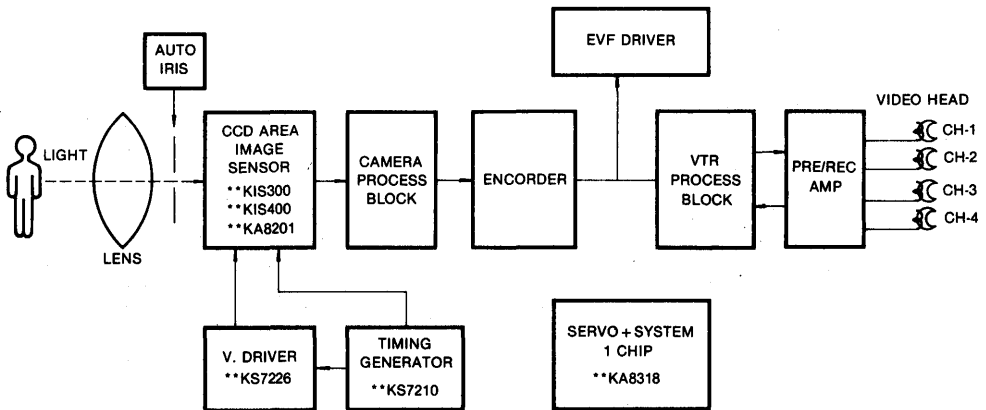


*: New Product
**: Under Development

2.6 SUPER VHS VTR APPLICATION



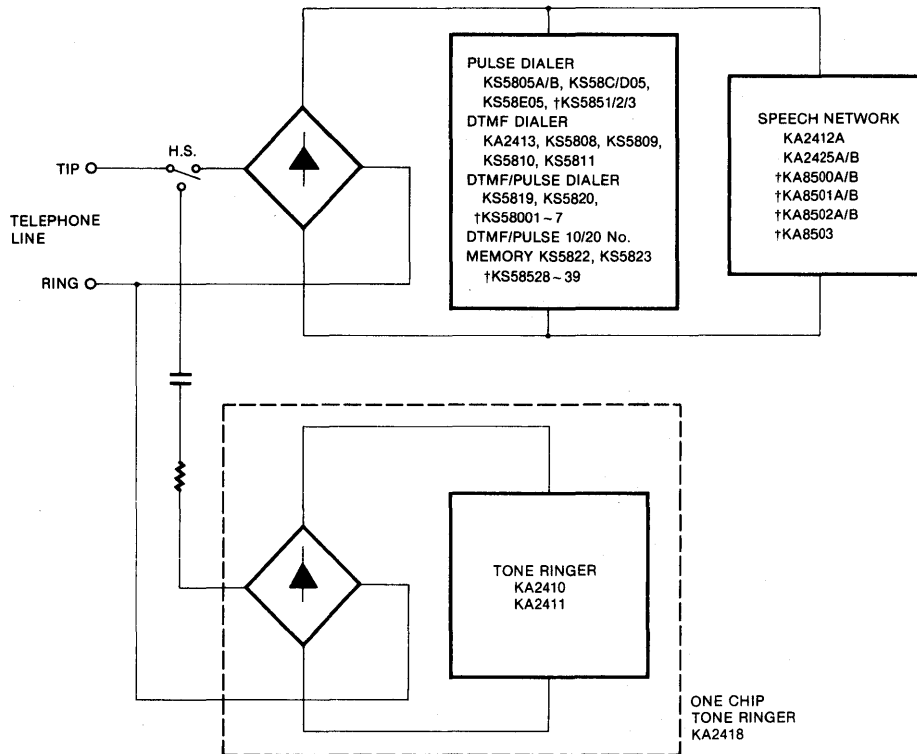
2.7 CAMCORDER APPLICATION



** Under Development

3. TELECOMMUNICATION APPLICATION

3.1 Telephone

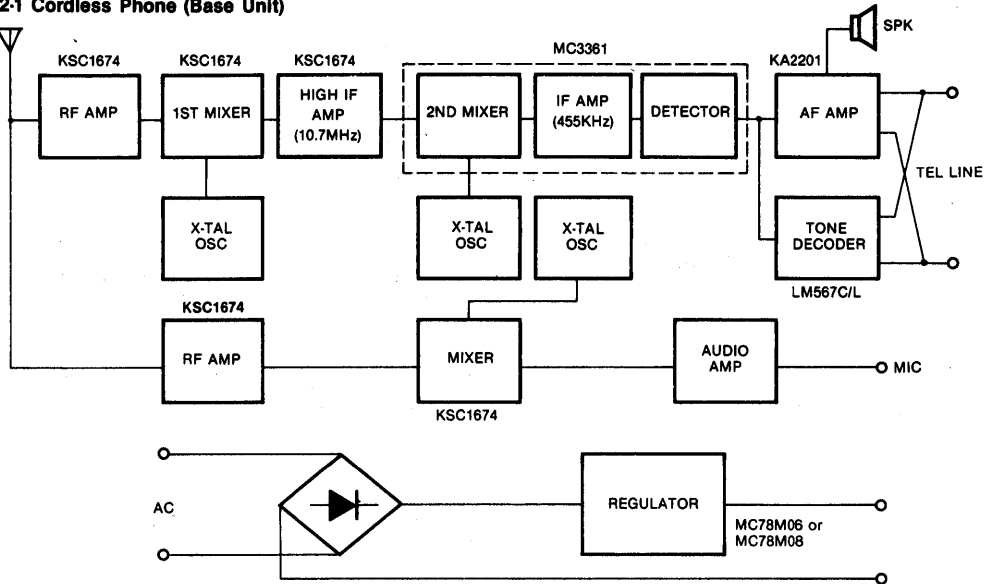


3

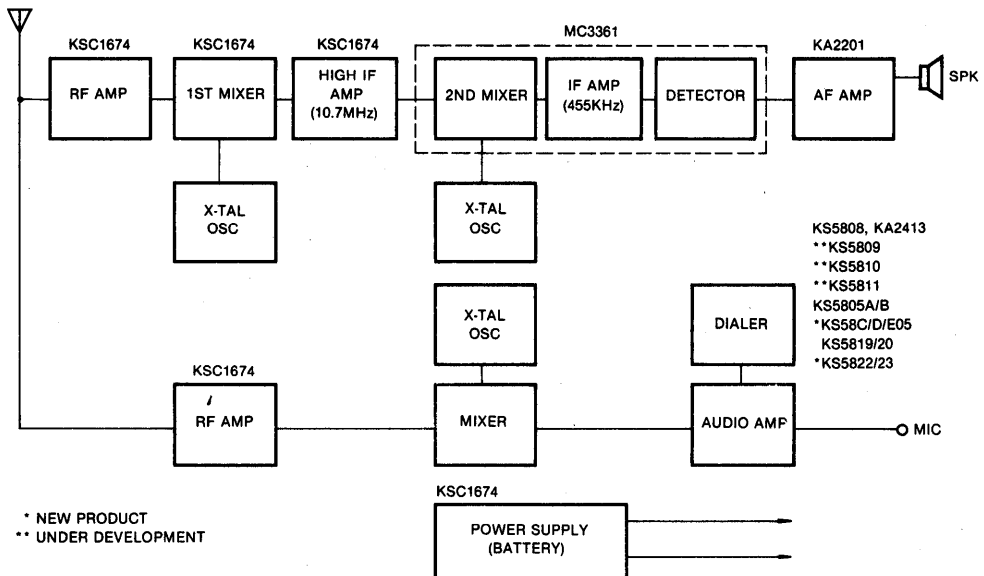
* New Product
 ** Under Development

3.2 Cordless Phone

3-2-1 Cordless Phone (Base Unit)

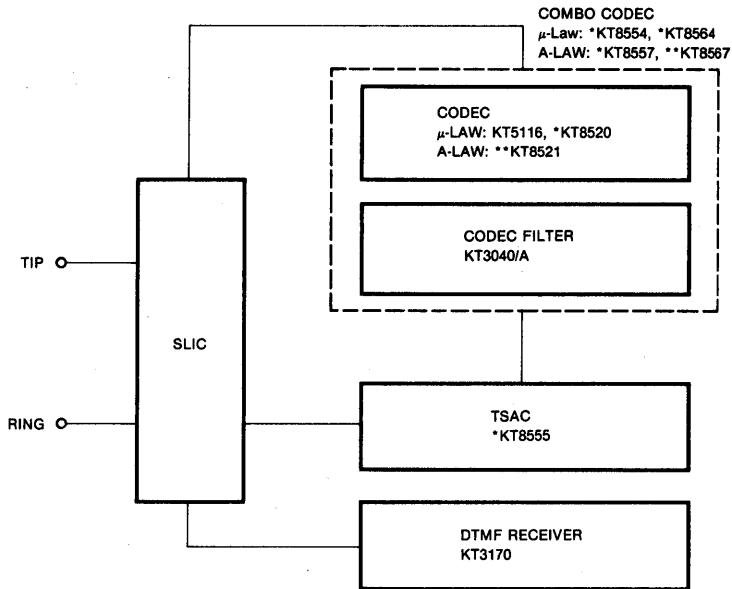


3-2-2 Cordless Phone (Handset Unit)



* NEW PRODUCT
 ** UNDER DEVELOPMENT

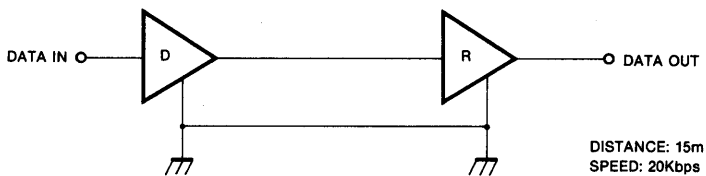
3.3 Exchange



3

3.4 Interface

RS-232C (CCITT. V28)

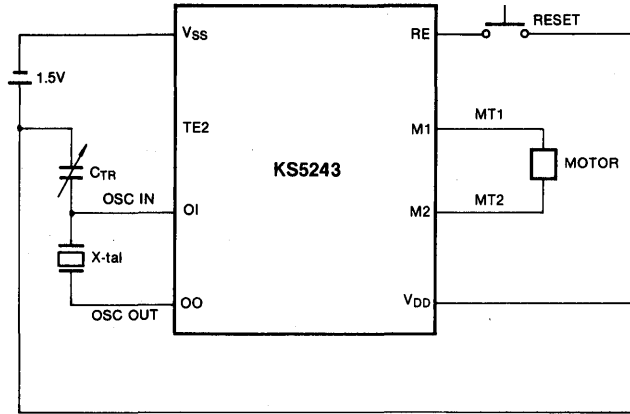


DRIVERS QUADS	RECEIVERS QUADS	TRANSCEIVERS SINGLE
MC1488 **KS5788	MC1489 MC1489A **KS5789A	KA2654

- * New Product
- ** Under Development

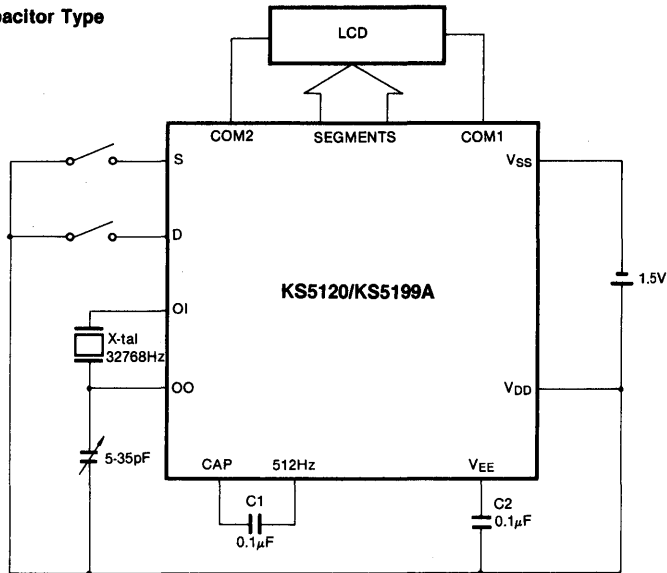
4. WATCH IC APPLICATION

4.1 KS5243

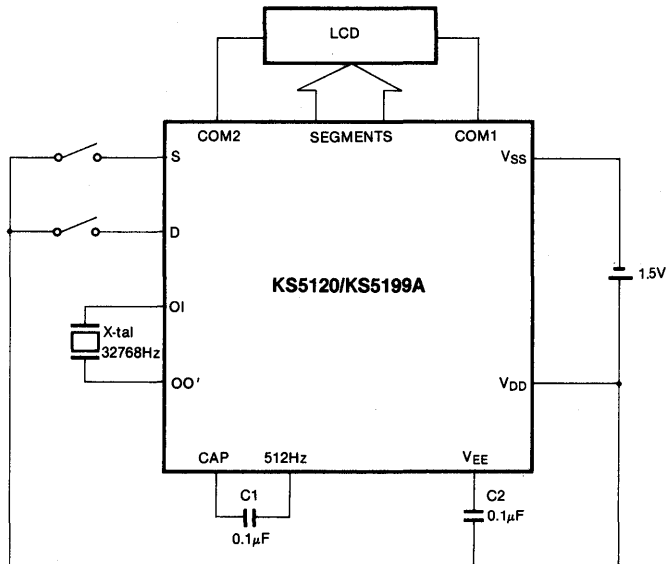


4.2 KS5120/KS5199A

A. External Capacitor Type

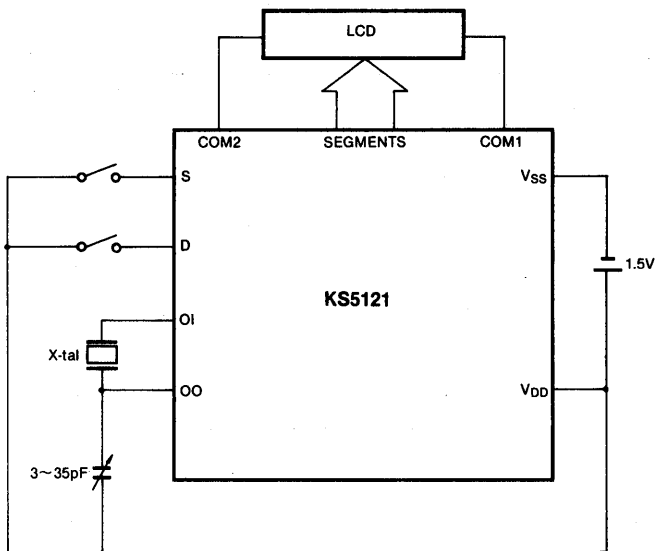


B. Internal Capacitor Type

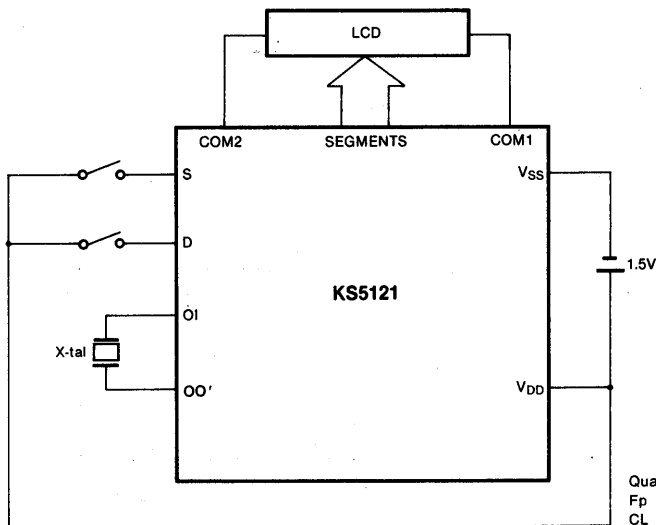


4.3 KS5121

A. External Trimmer Capacitor Type

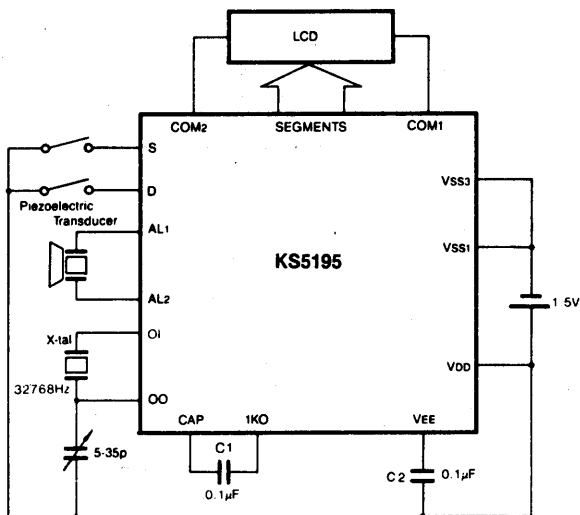


B. Internal Trimmer Capacitor Type



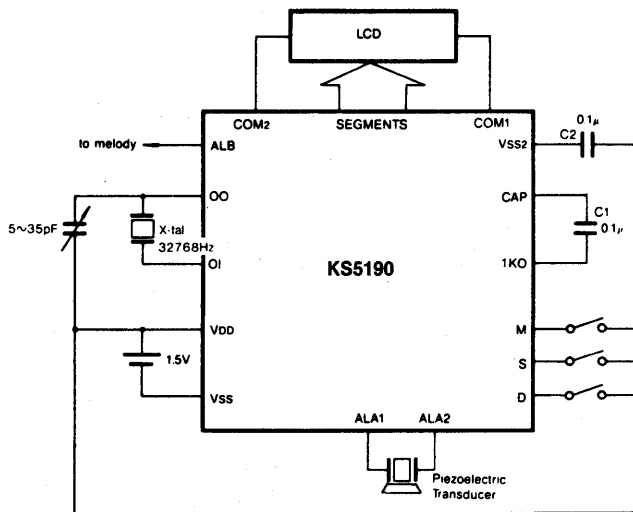
Quartz Crystal Parameter
 $F_p = 32.768\text{Hz}$
 $CL = 12.5\text{pF}$
 $CI = 4\text{pF}$
 $CO = 2.5\text{pF}$
 $R_s = 35\text{K}\Omega$
 $Q = 35.000$

4.4 KS5195



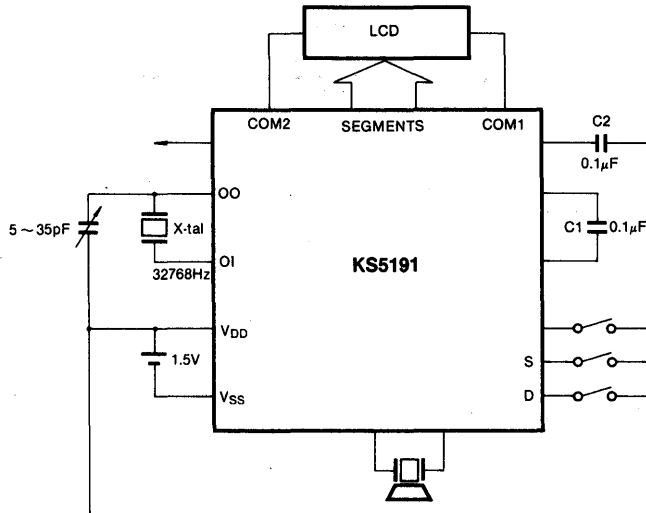
3

4.5 KS5190

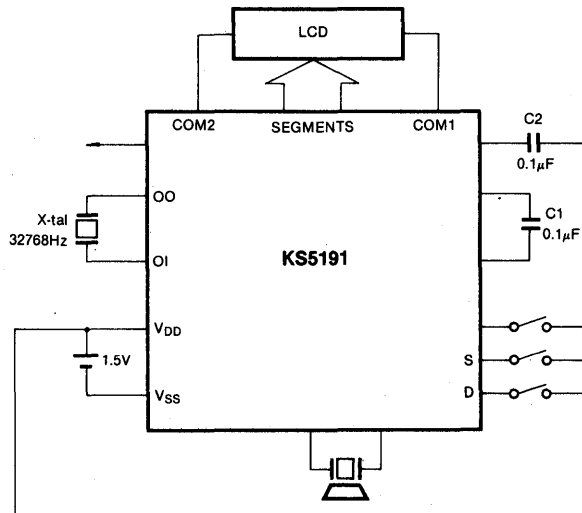


4.6 KS5191

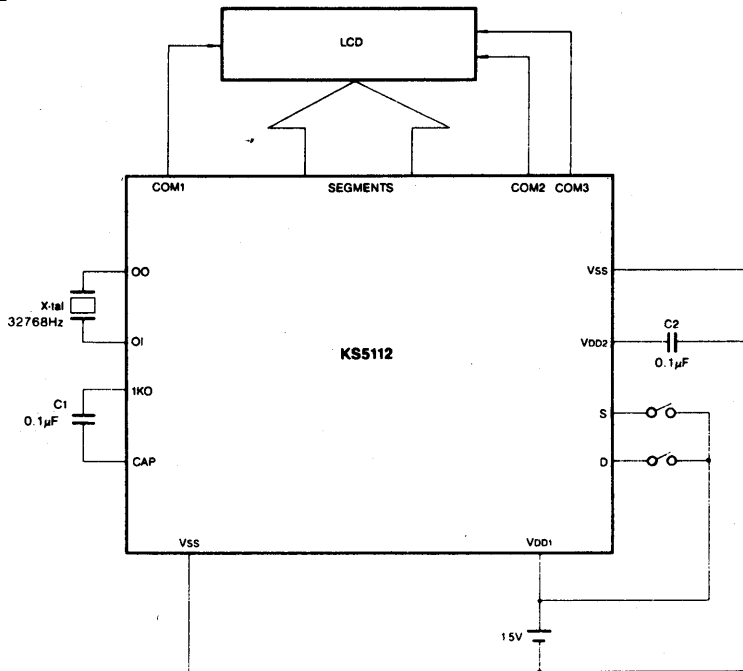
A. External Capacitor Type



B. Internal Capacitor Type

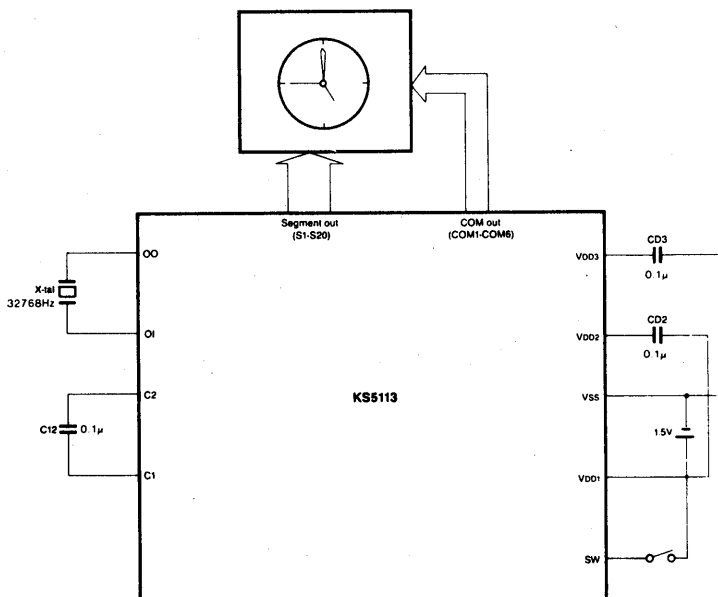


4.7 KS5112



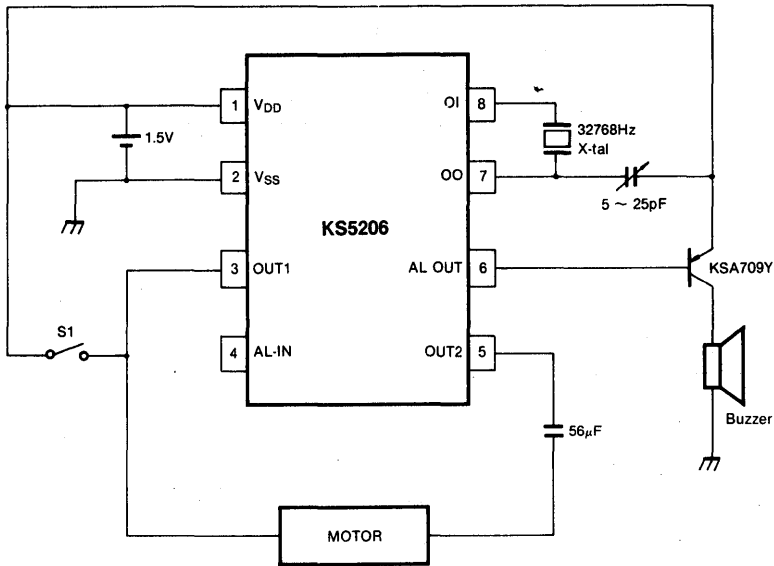
3

4.8 KS5113



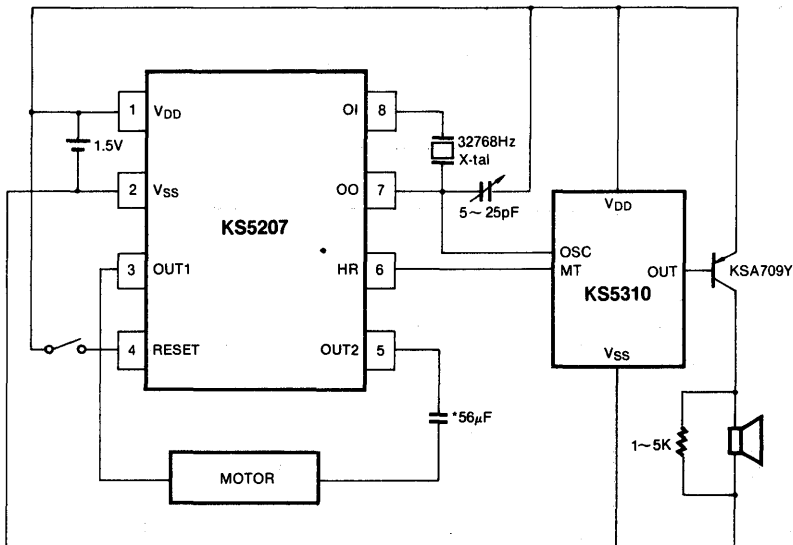
5. ANALOG CLOCK APPLICATION

5.1 KS5206



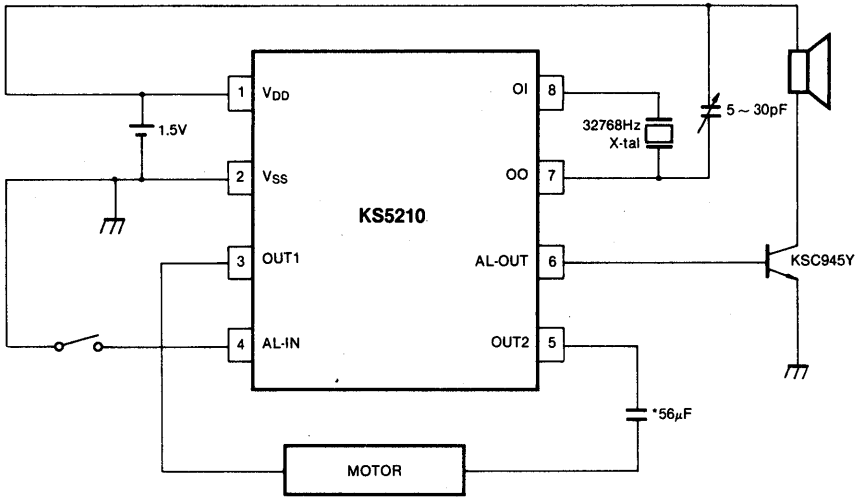
* NO NEED CAPACITOR IN KS5206E, F

5.2 KS5207



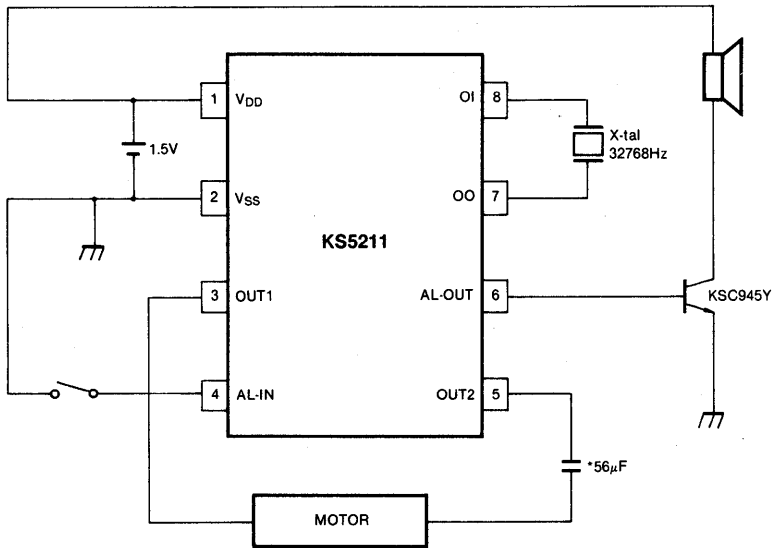
* NO NEED CAPACITOR IN KS5207E, F

5.3 KS5210

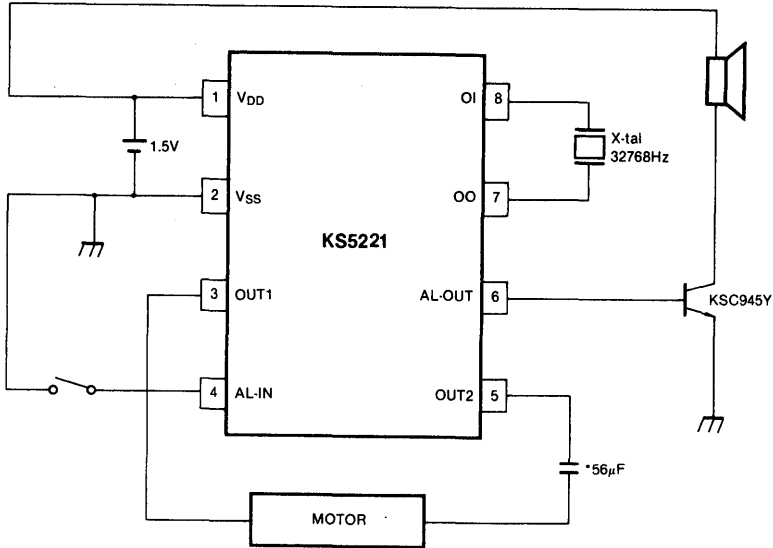


* NO NEED CAPACITOR IN KS5210E, F

5.4 KS5211

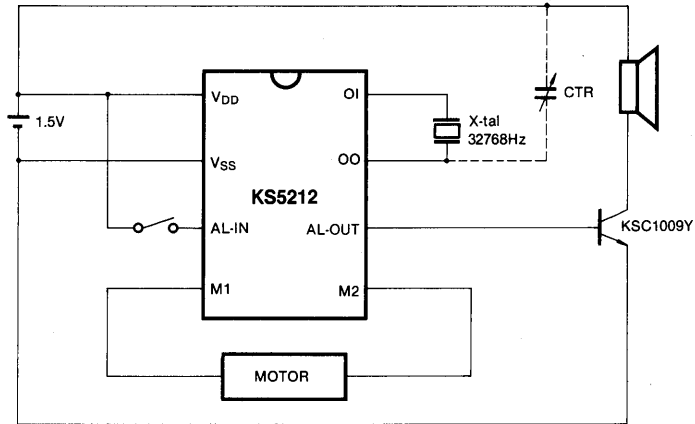


5.5 KS5221



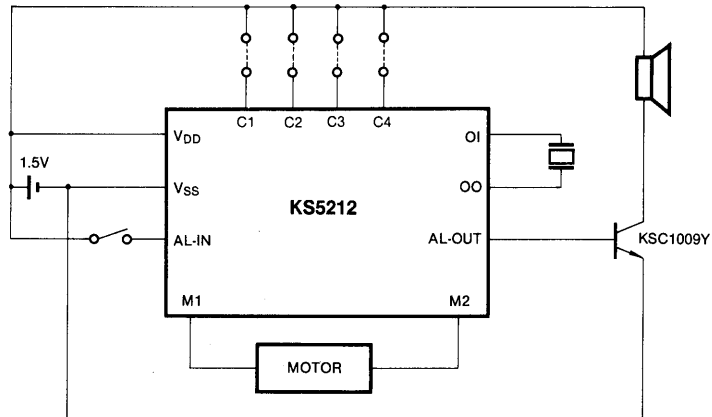
5.6 KS5212

A. 8 DIP Type



CTR: 5 ~ 35pF for KS5212X1, X2
KS5212X3, X4 does not use CTR.

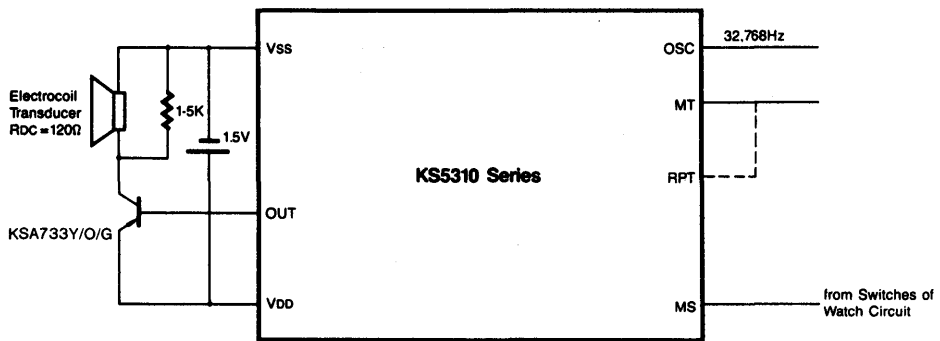
B. Bare Chip Type



3

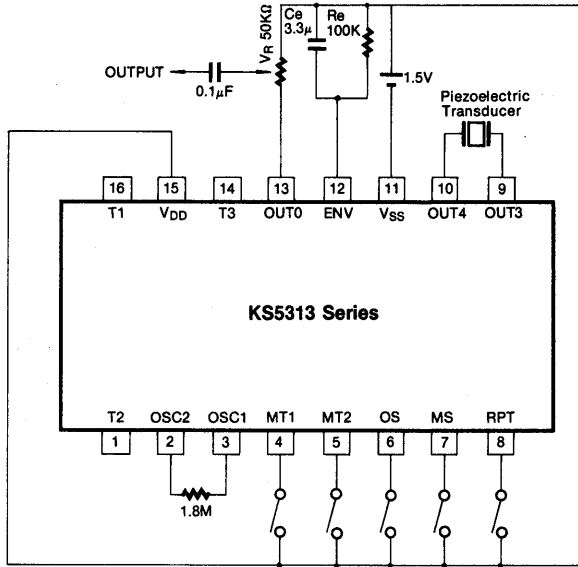
6. MELODY IC APPLICATION

6.1 KS5310 Series



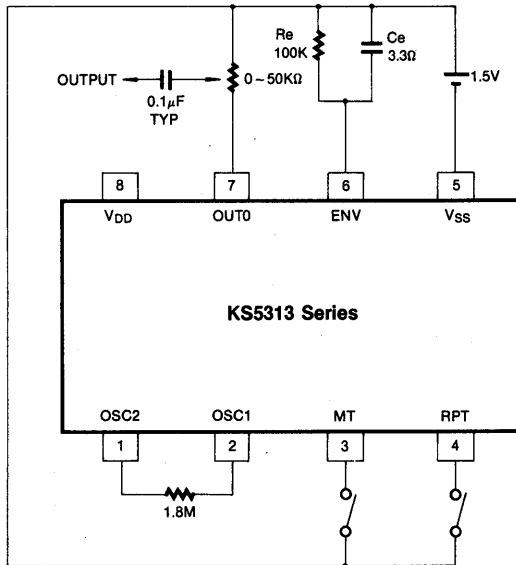
*Currently available type
KS5310A: Oh! Susanna

6.2 KS5313 Series



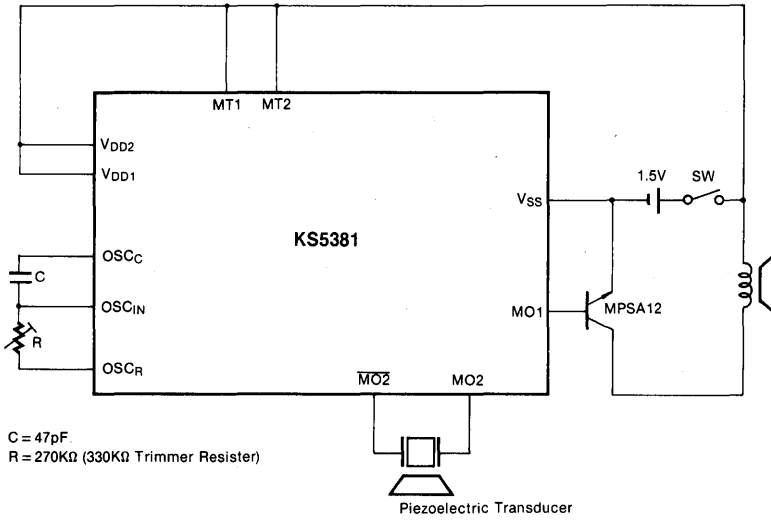
* Currently available types
 KS5313N: MINUET (BACH)
 KS5313P: Cuckoo's Waltz
 KS5313Q: Home Sweet Home
 KS5313R: Oh! Susanna
 KS5313S: Big Ben
 KS5313T: For Elise

3

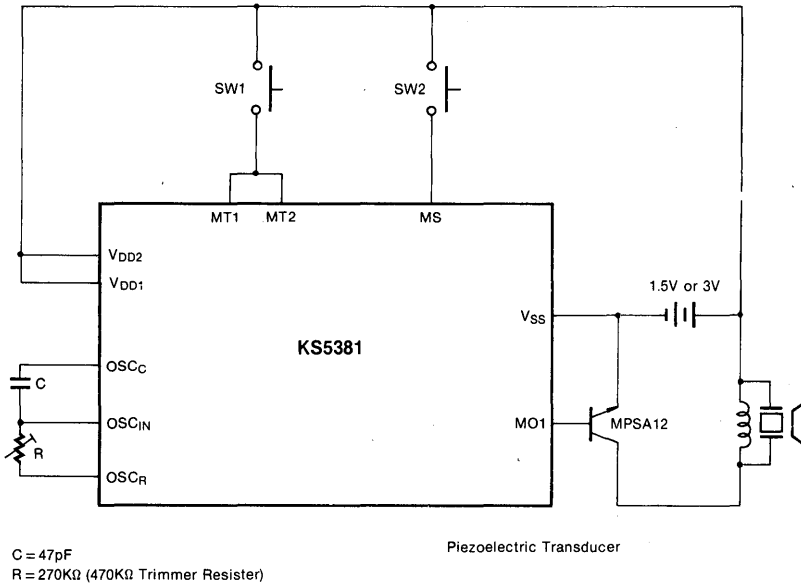


6.3 KS5381

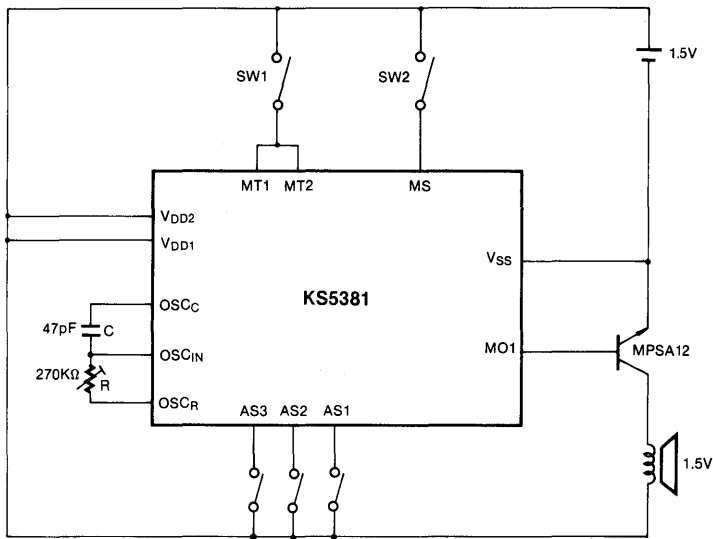
A. Repeat Mode



B Switch Select Mode

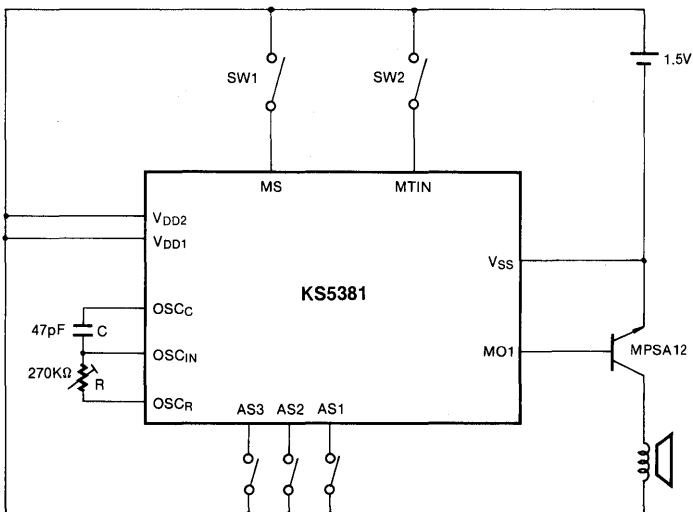


C. Application Select Mode



* Application Option for Melody Select (AS3 = L, AS2 = L, AS1 = H)

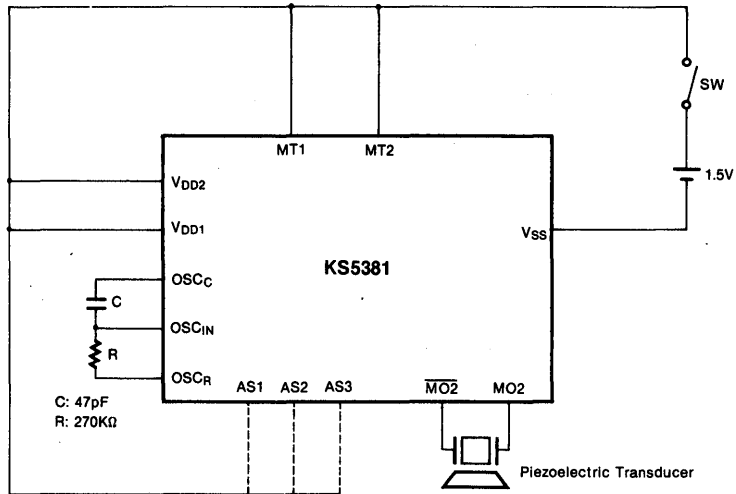
D. Trigger Mode



* All melodies can be available by the combination of AS3, AS2, and AS1.

3

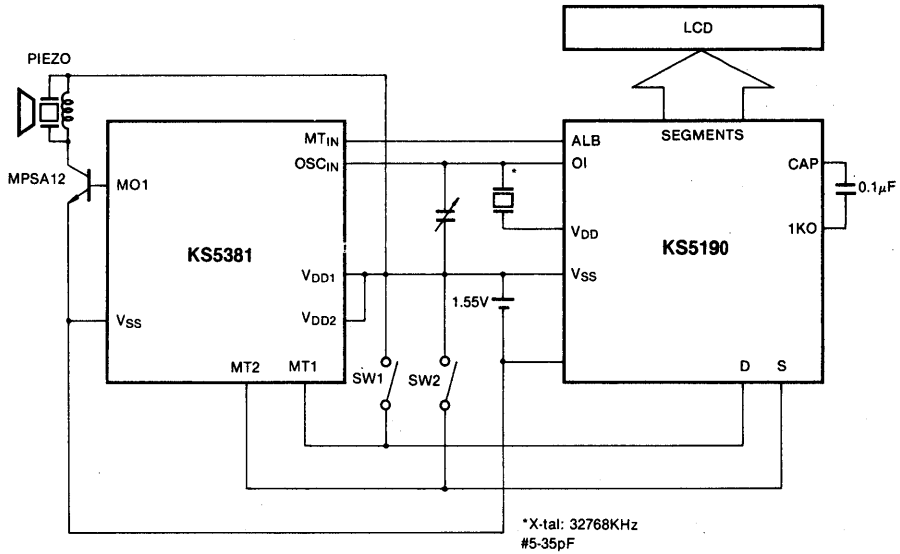
E. For Melody Card



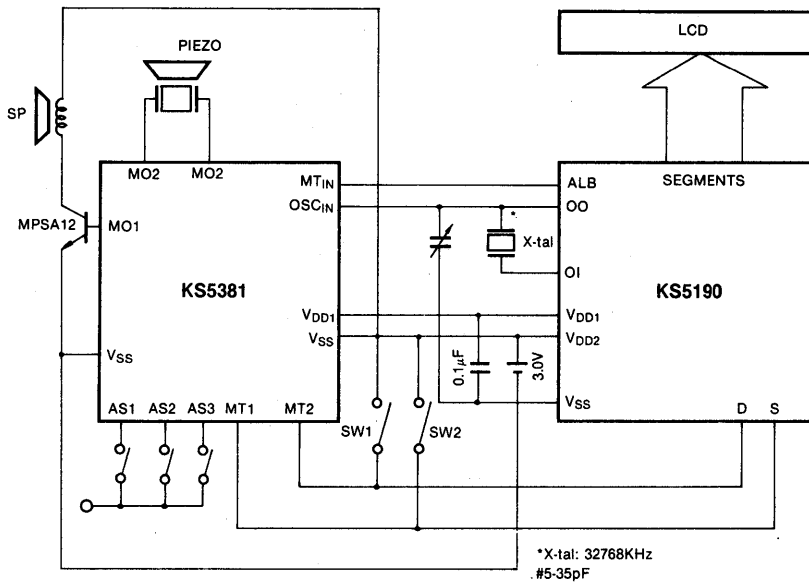
* Application Option for Melody Select (AS3, AS2, AS1)

F. Combination with Watch

1) 1.5V (AgO BATTERY)



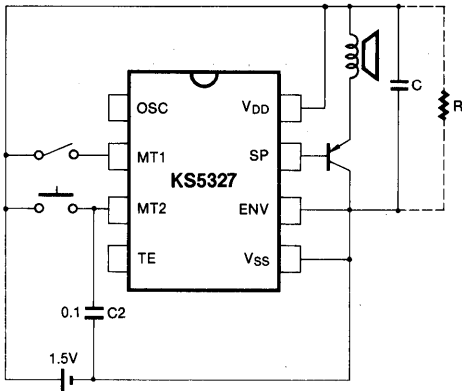
2) 3.0V (LITHIUM BATTERY)



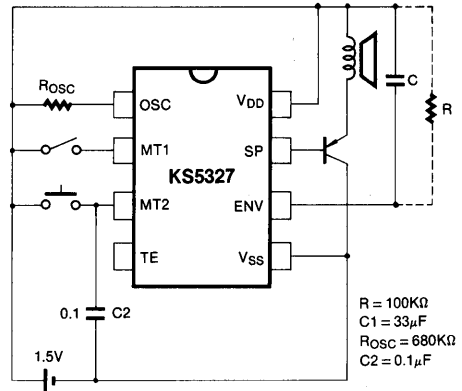
6.4 KS5327

A. For Speaker

i) Internal RC oscillator type

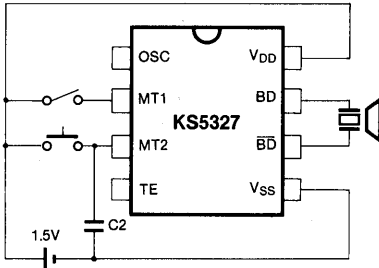


ii) only internal oscillator type

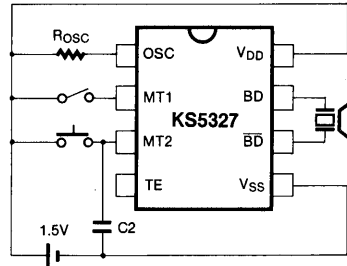


B. For Piezo

i) internal RC oscillator type



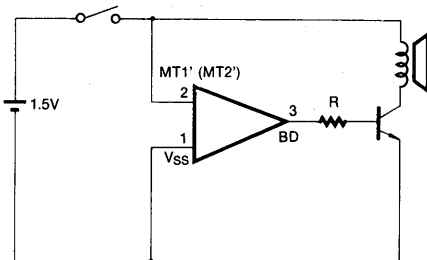
ii) only internal oscillator type



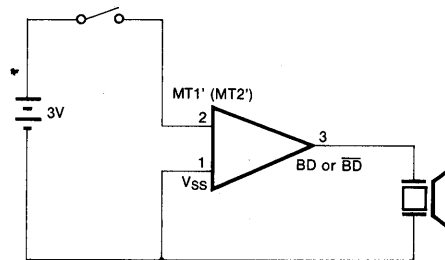
If MT2 performance is not required MT2 terminal must be connected to VSS and is removed capacitor C2

6.5 KS537

A. For Speaker

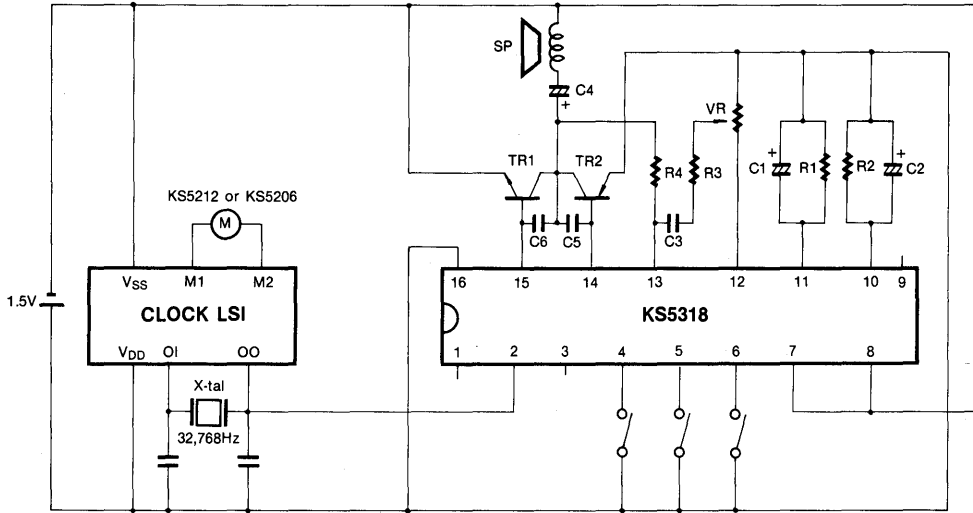


B. For Piezo



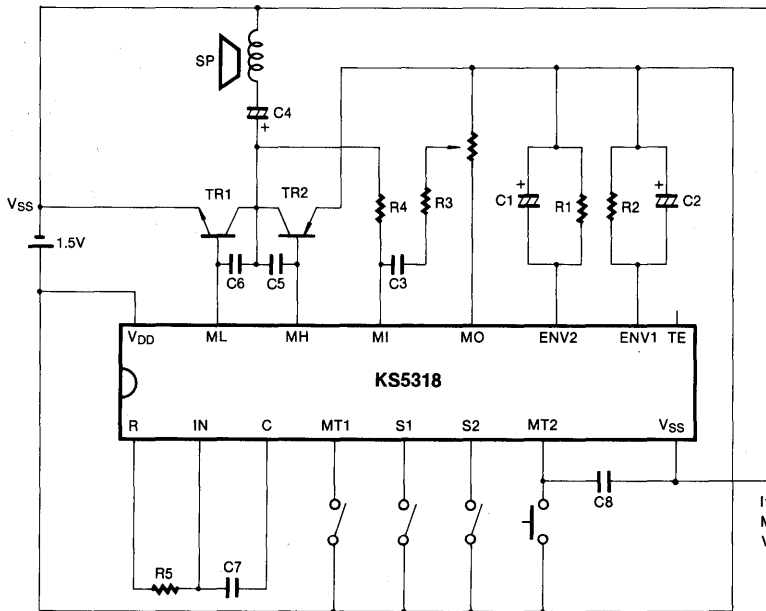
6.6 KS5318

A. Combination with Clocks



3

B. Examples of Application: Music Boxes, Door Bell etc.



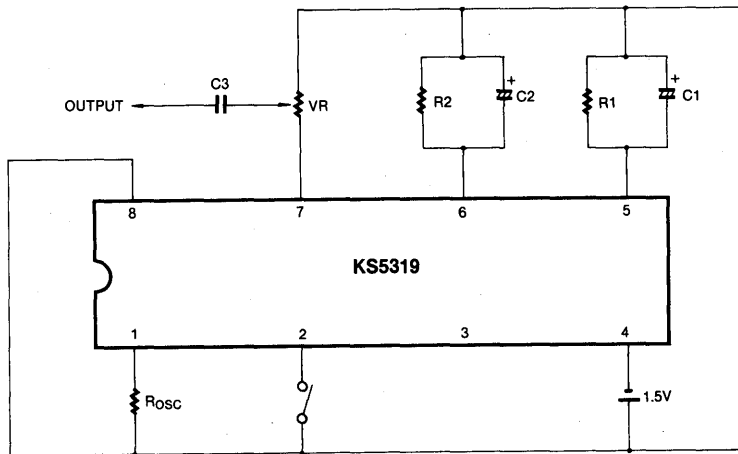
If MT2 performance is not required, MT2 terminal must be connected to V_{SS} and is removed capacitor

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RECOMMENDED CONDITIONS FOR DISCRETE PARTS

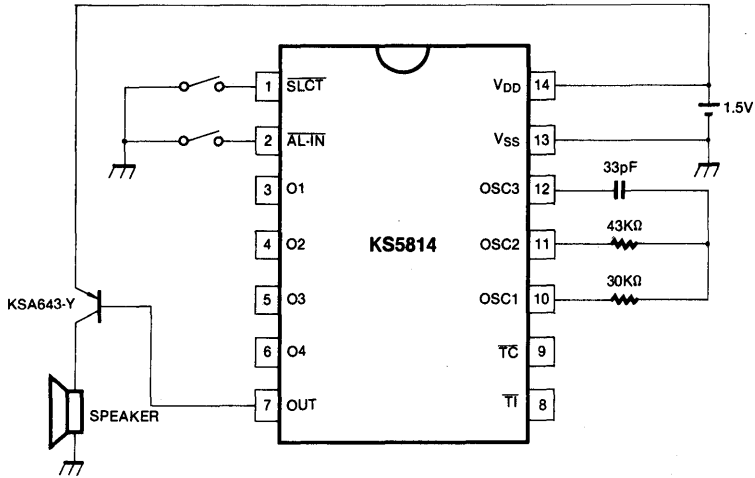
Symbol	Limits	Unit	Symbol	Limits	Unit
TR1	NPN DC $h_{FE} = 160$		C1, C2	4.7	μF
TR2	PNP DC $h_{FE} = 160$		C3	0.1	μF
SP	8 Ω dynamic speaker		C4	100~300	μF
VR	50	K Ω	C5	0.01~0.047	μF
R1, R2	100~120	K Ω	C6	0.01 or nothing	μF
R3	120~220	K Ω	C7	47	μF
R4	470	K Ω	C8	0.1	μF
R5	270	K Ω			

6.7 KS5319

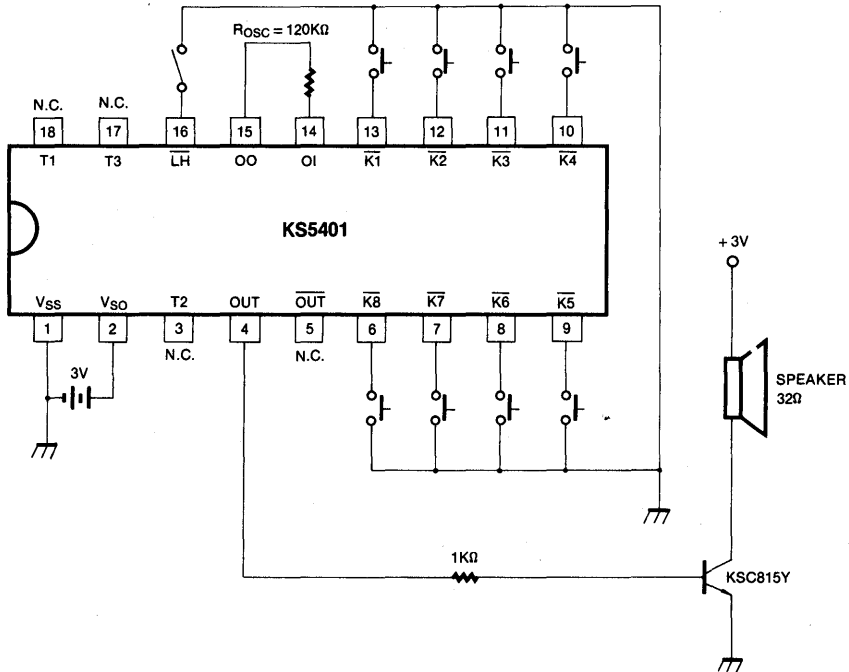


VR : 0~50K Ω
 R_{osc} : 820K Ω Typ
 R1, R2 : 100K Ω
 C1, C2 : 4.7 μF
 C3 : 0.1 μF Typ

6.8 KS5814

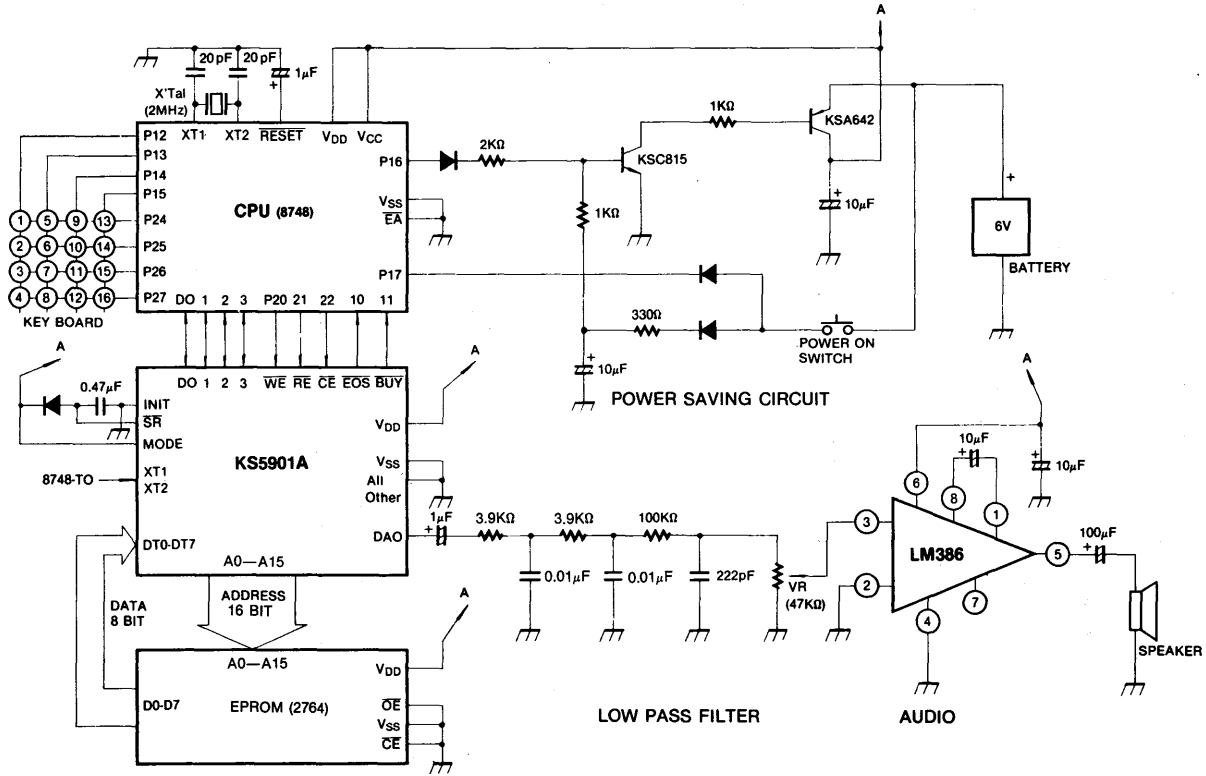


6.9 KS5401

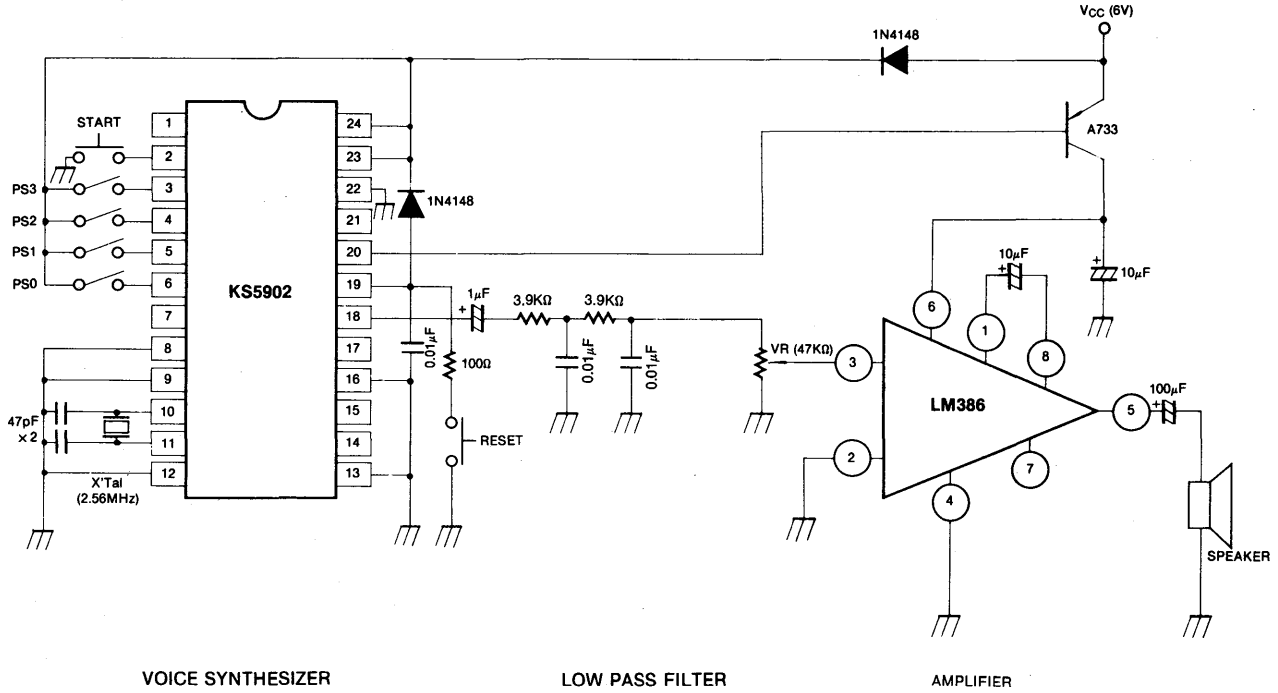


7. VOICE SYNTHESIS IC APPLICATION

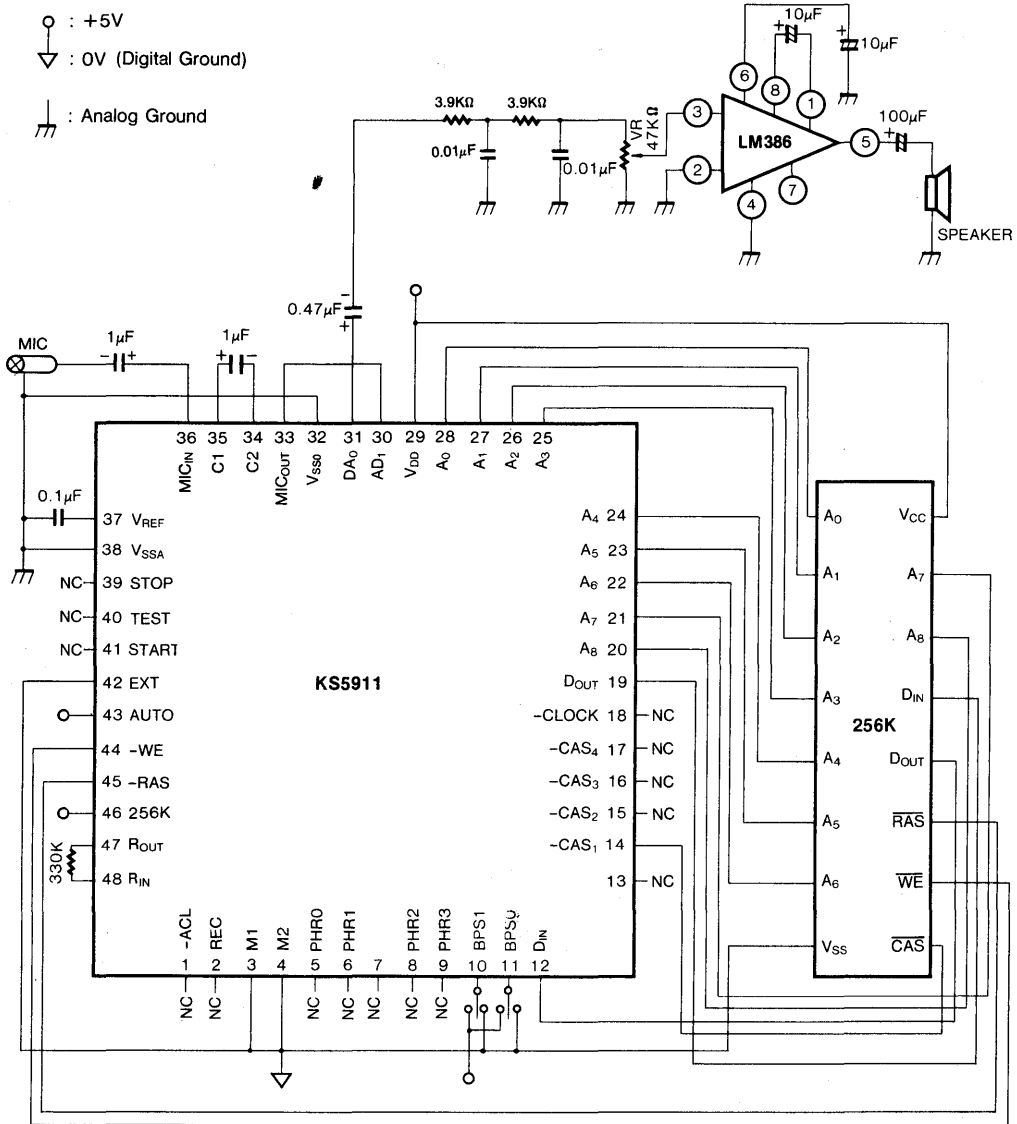
7.1 KS5901A



7.2 KS5902

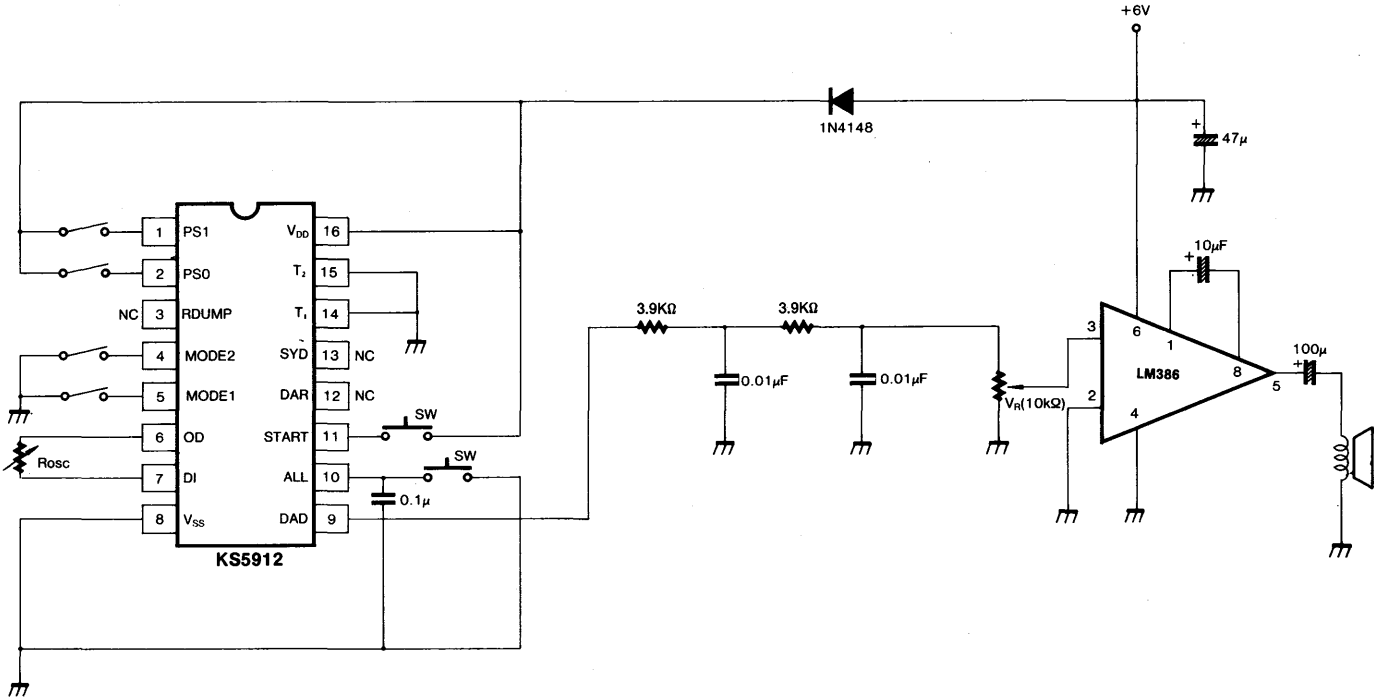


B. Auto Mode



*The type and number of memory are used 64K DRAM or 256K DRAM and used maximum 4pcs.
 Figure 4. Application circuit in the auto mode

7.4 KS5912



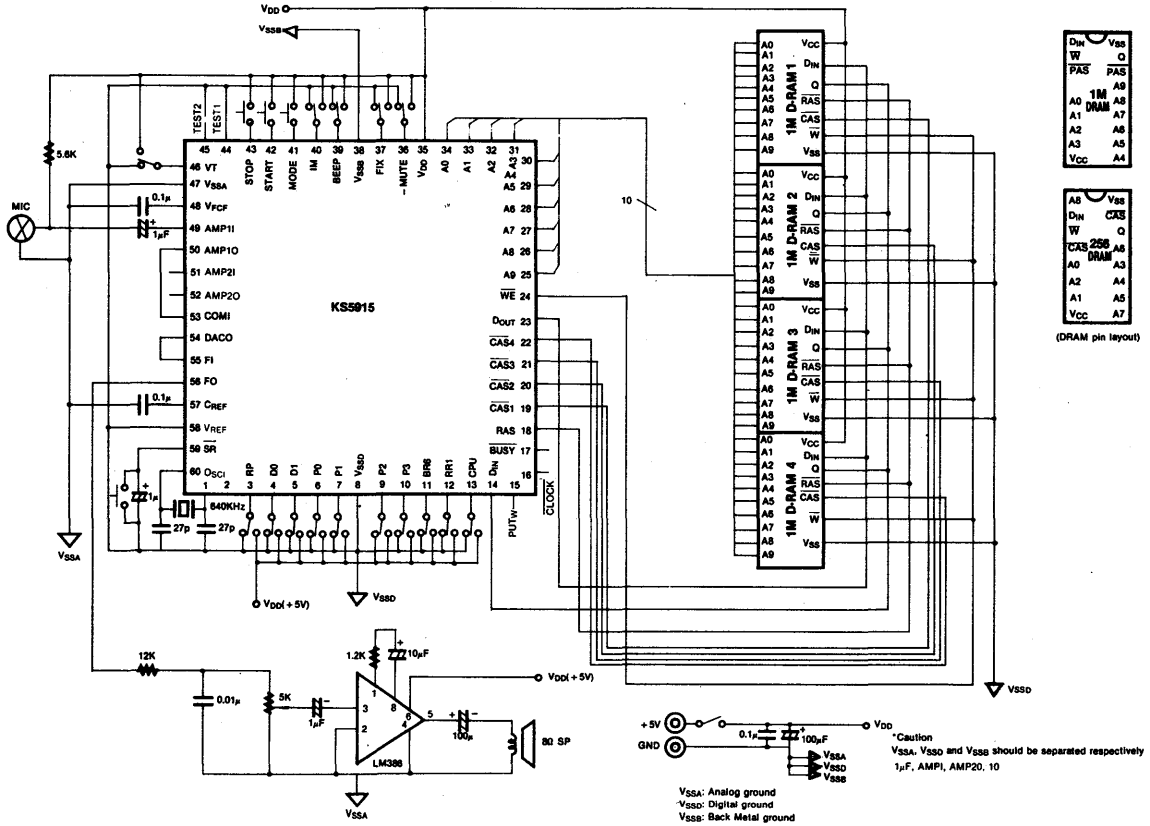
SOUND SYNTHESIZER

BAND PASS FILTER

AUDIO AMP

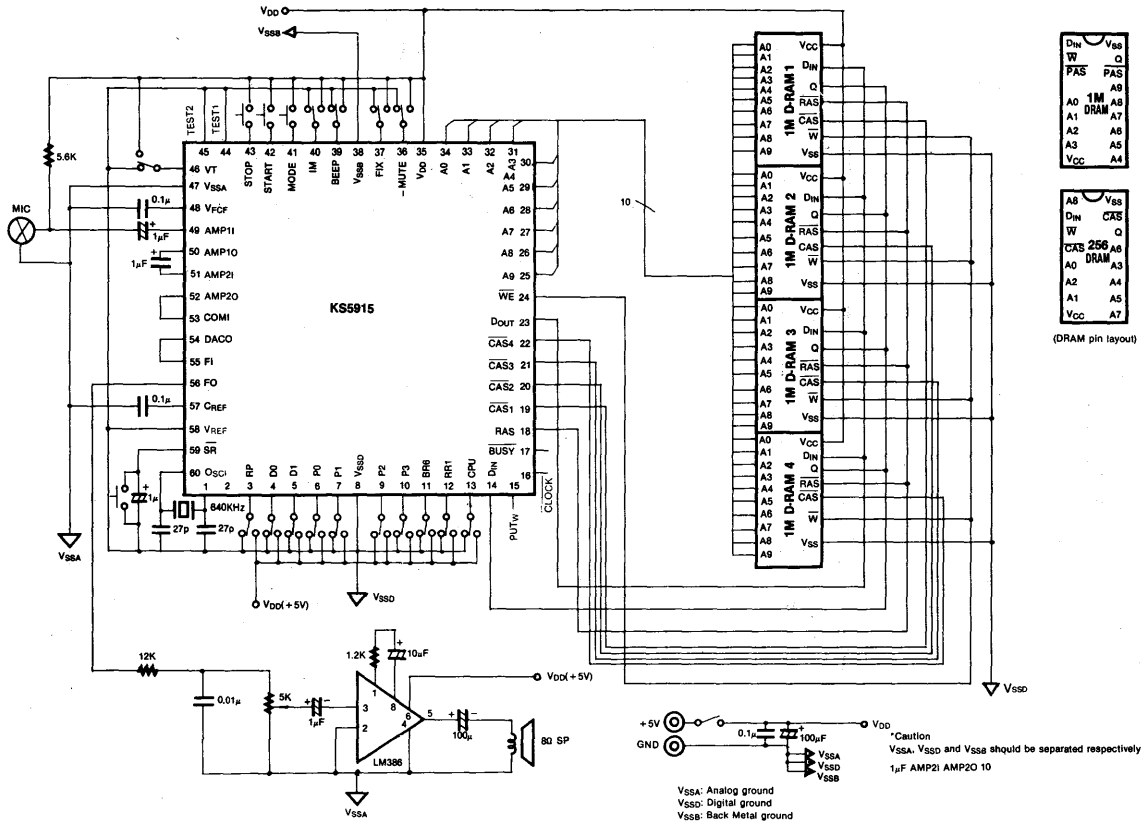
7.5 KS5915

A. In case of Using AMP1



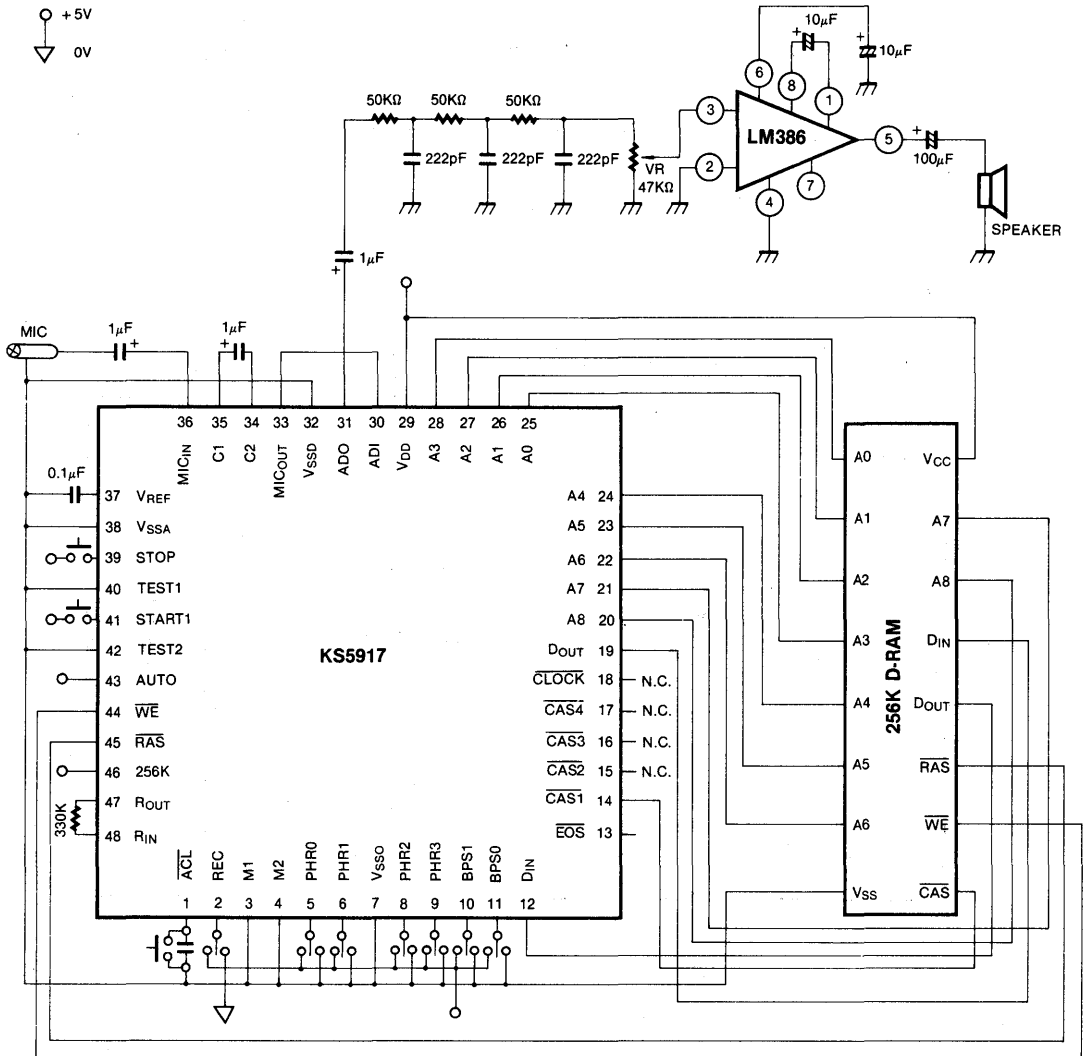
APPLICATION GUIDE

B. Incase of Using AMP1 + AMP2



7.6 KS5917

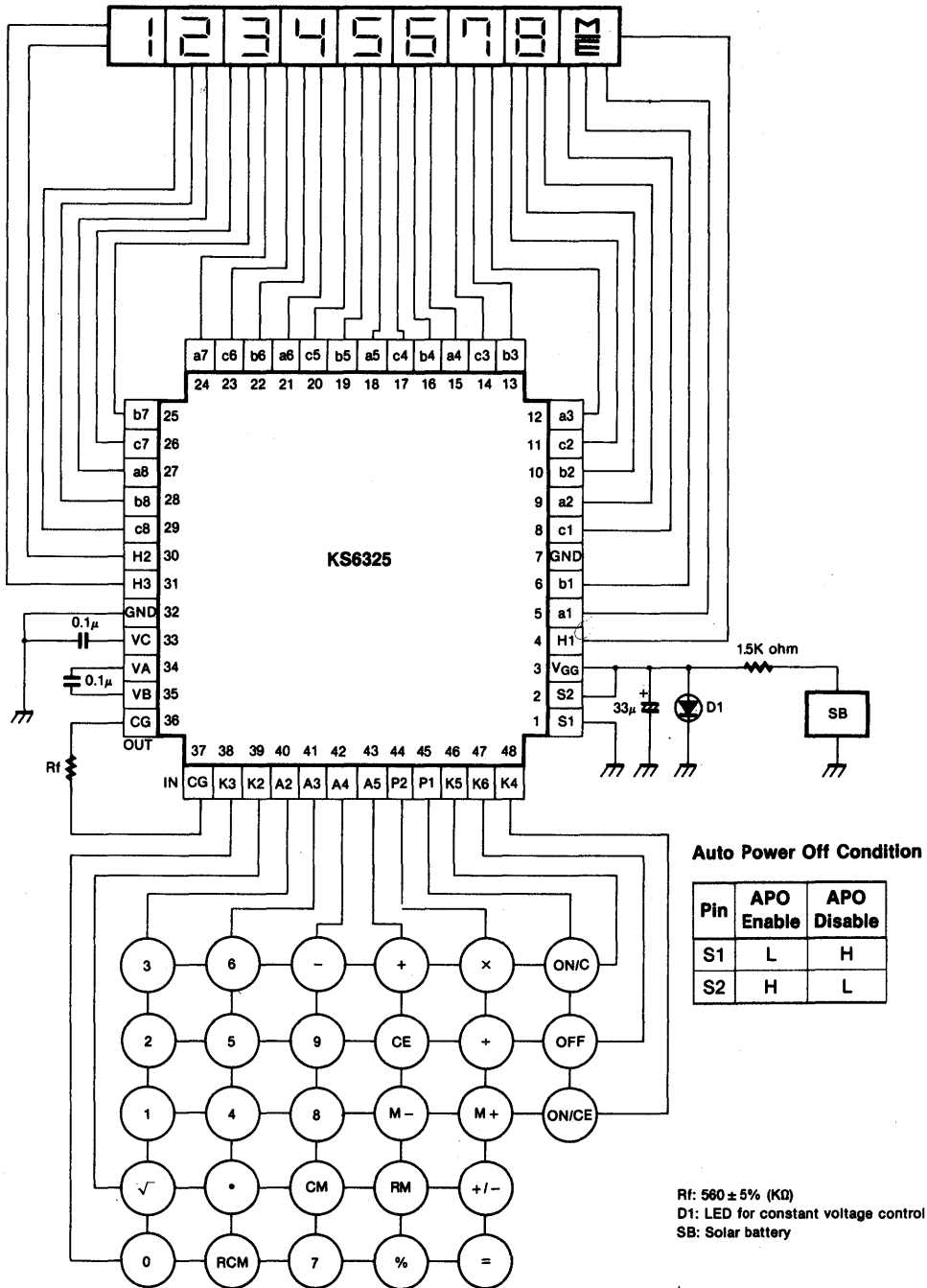
A. Manual Mode



3

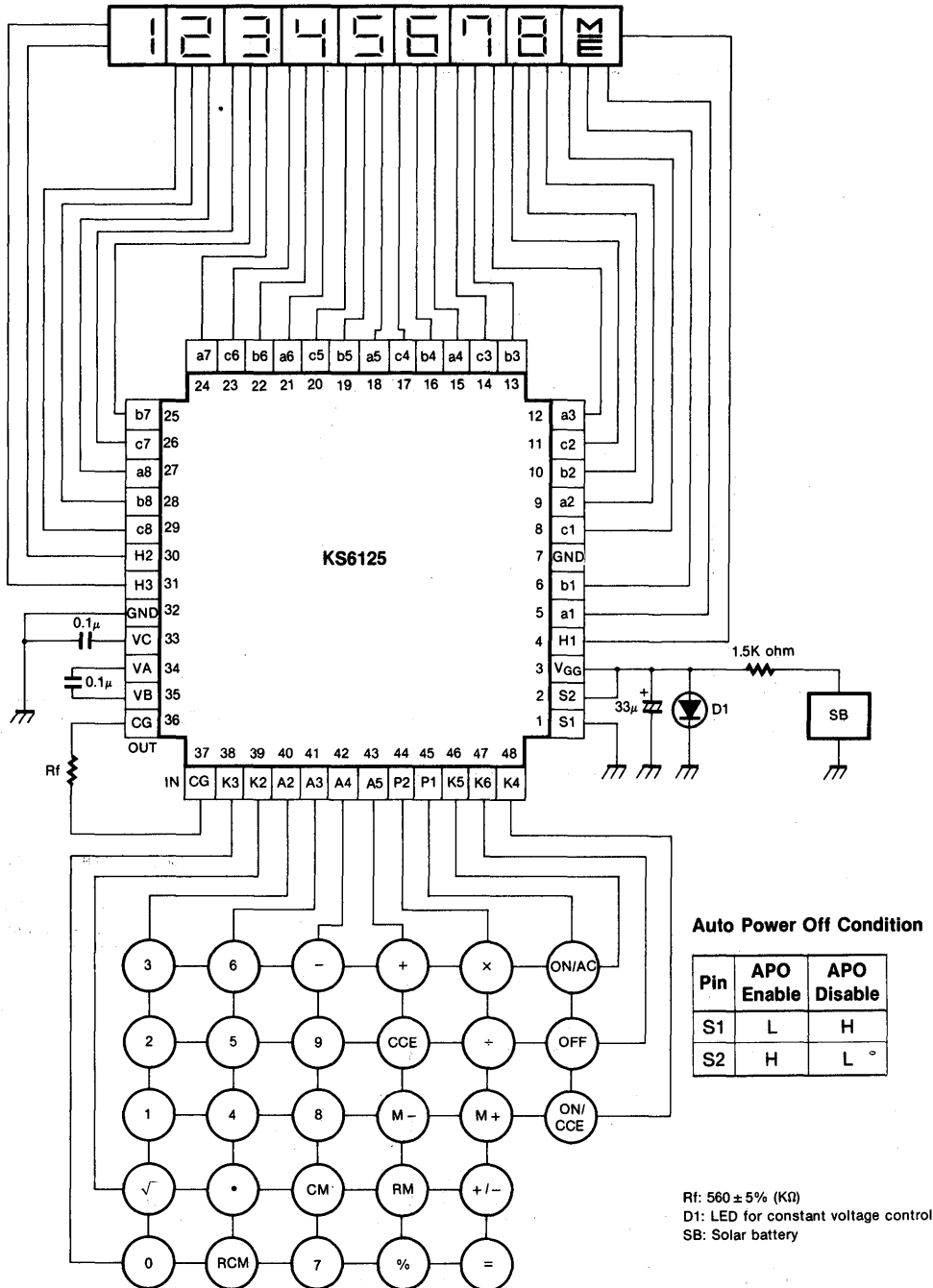
8. CALCULATION APPLICATION

8.1 KS6325



3

8.2 KS6125



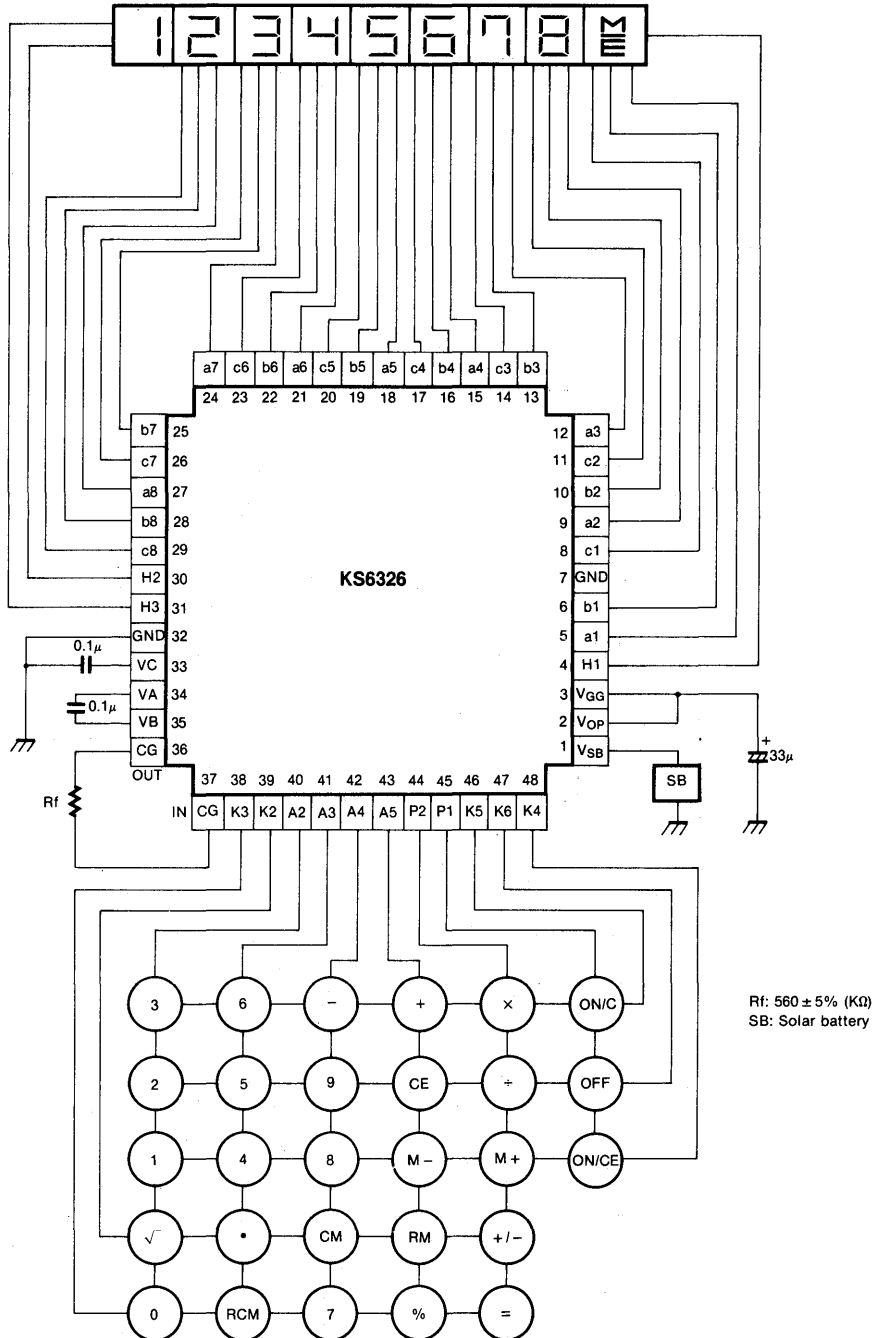
Auto Power Off Condition

Pin	APO Enable	APO Disable
S1	L	H
S2	H	L

Rf: 560 ± 5% (KΩ)
 D1: LED for constant voltage control
 SB: Solar battery

8.3 KS6326

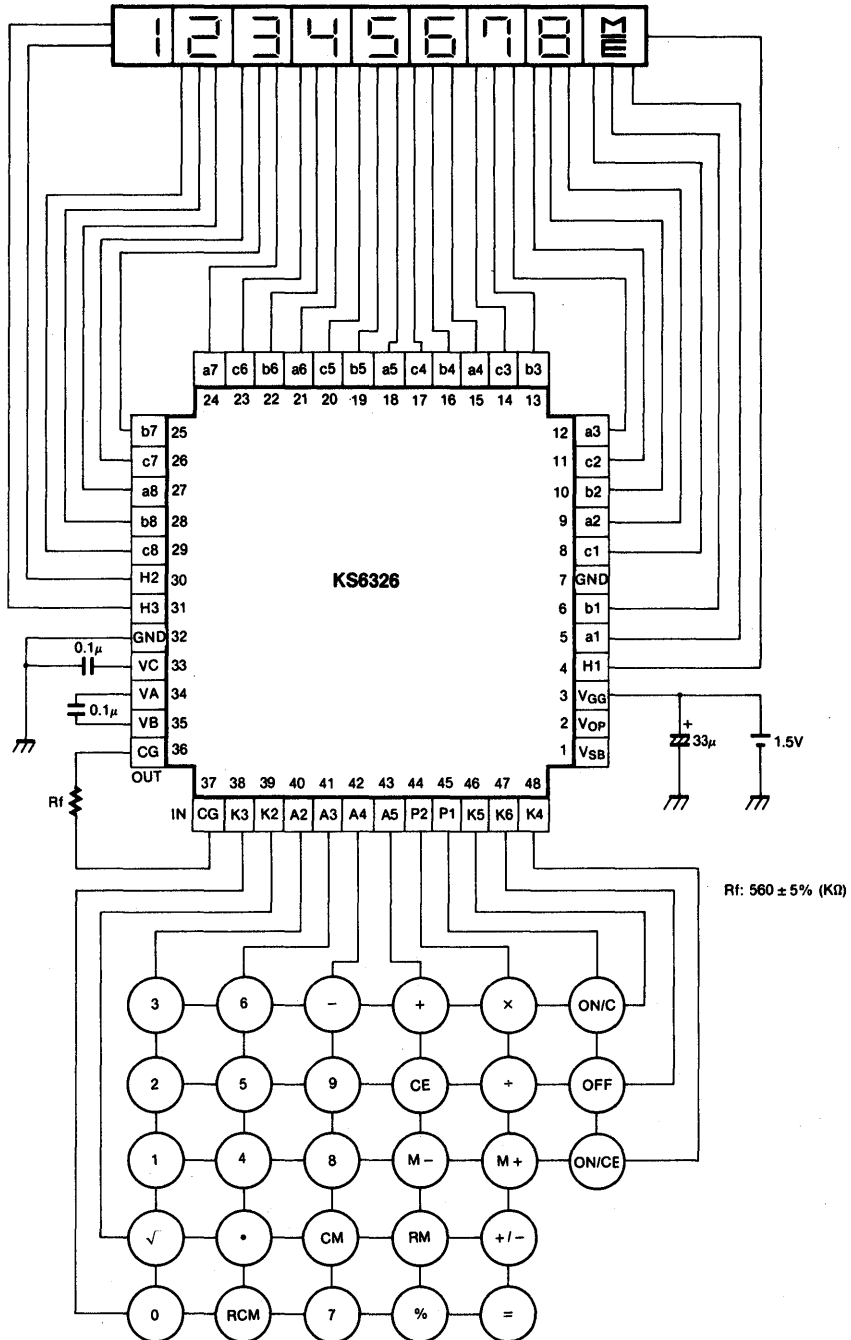
A. For use with a solar cell



3

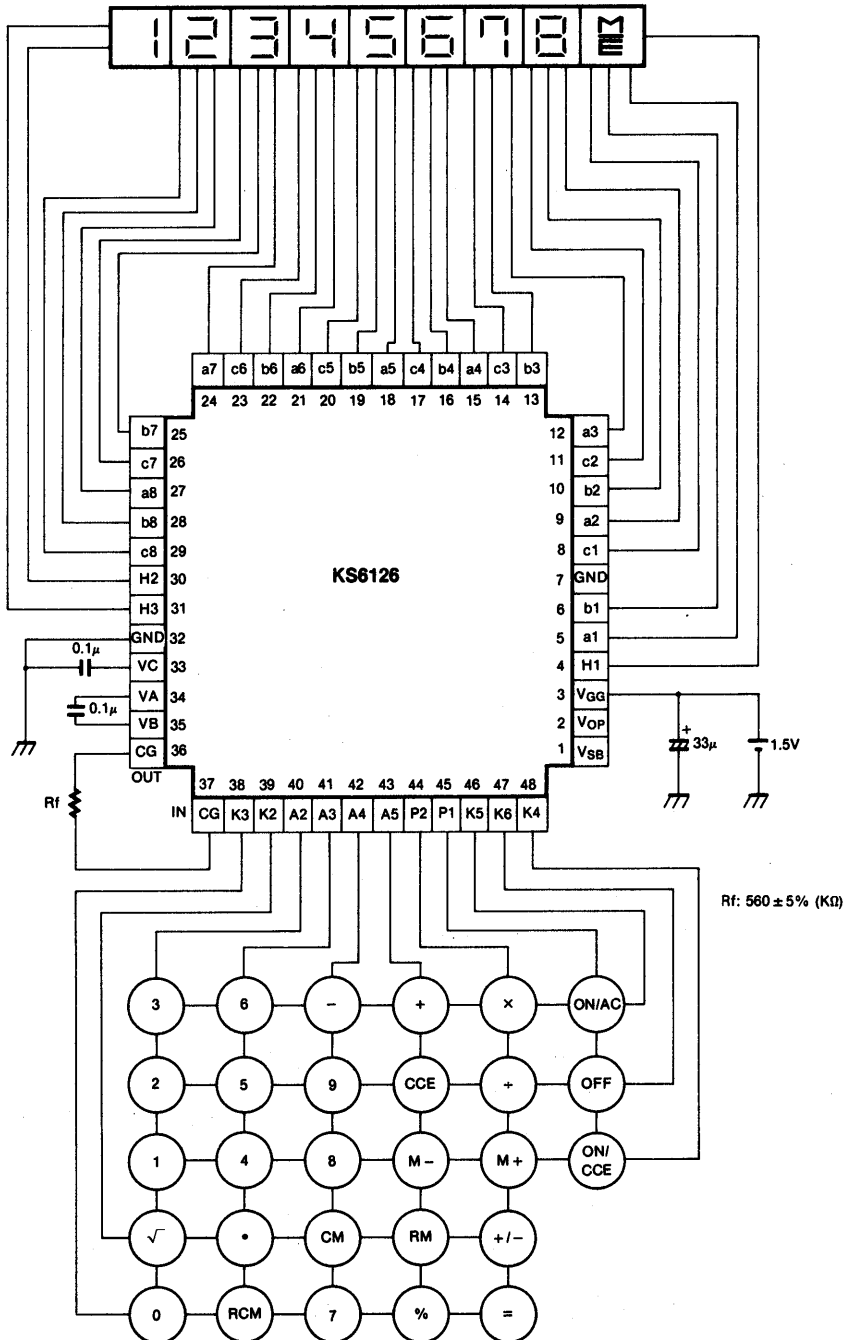
APPLICATION GUIDE

B. For use with a battery



8.4 KS6126

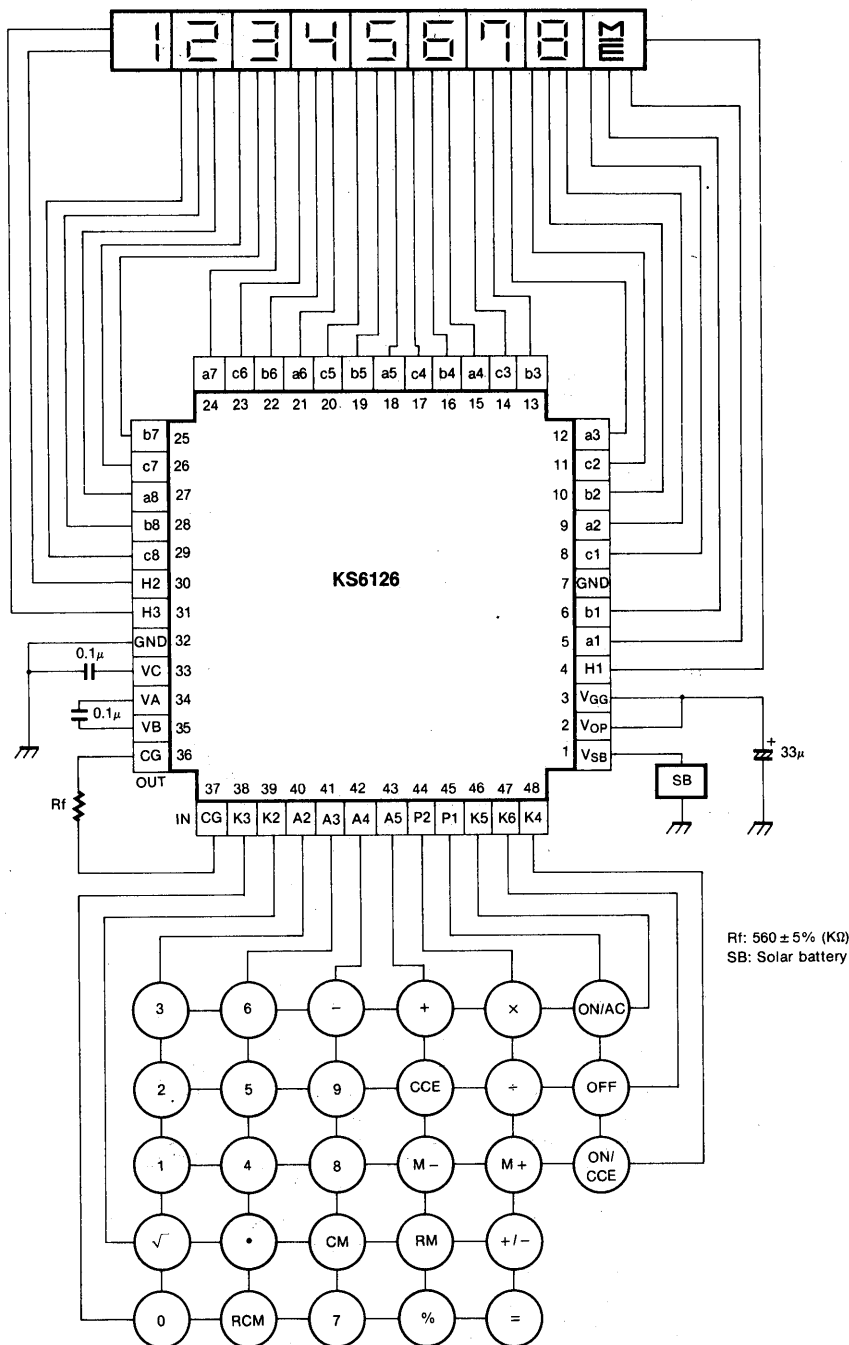
A. For use with a battery



3

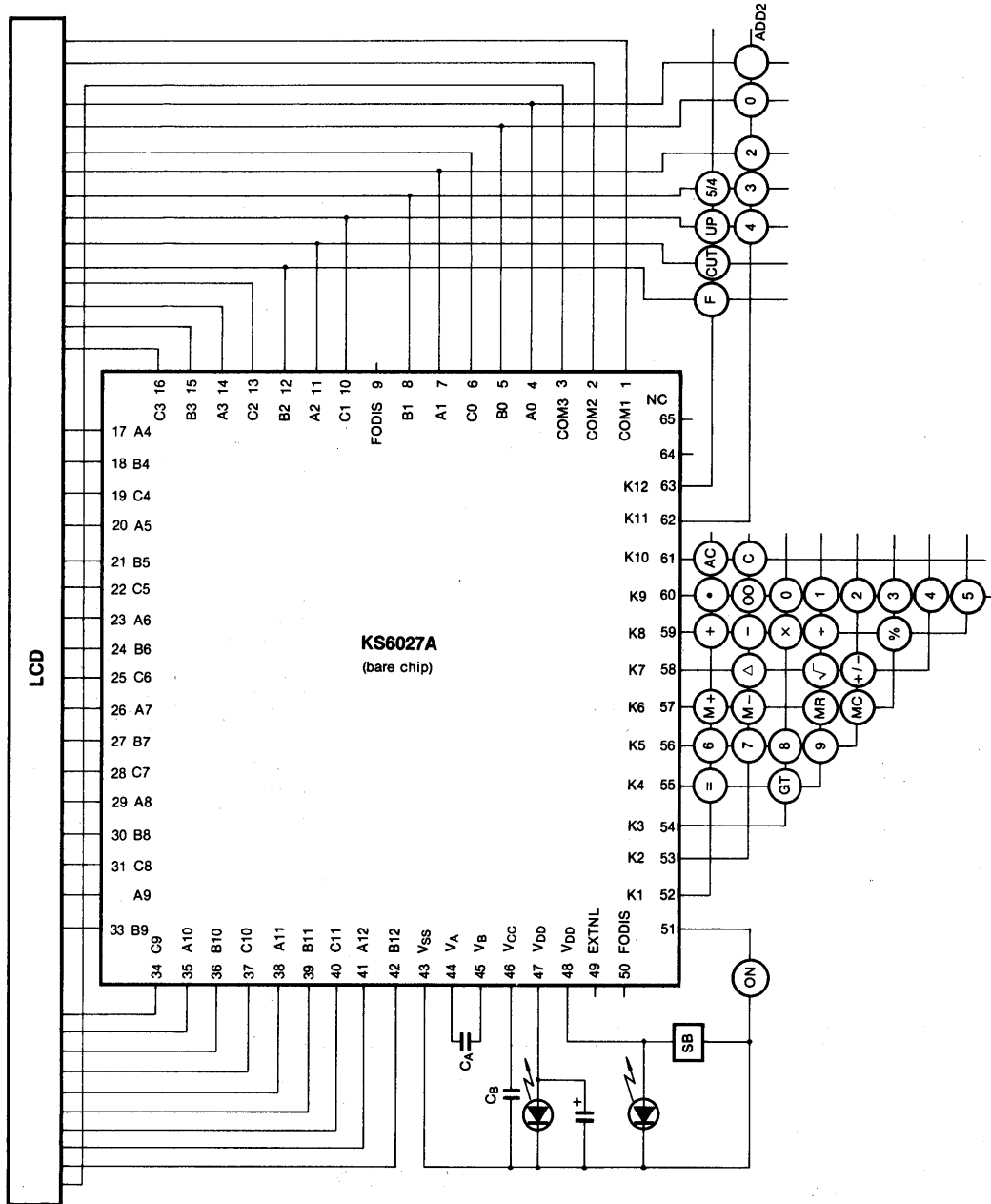
APPLICATION GUIDE

B. For use with a solar cell



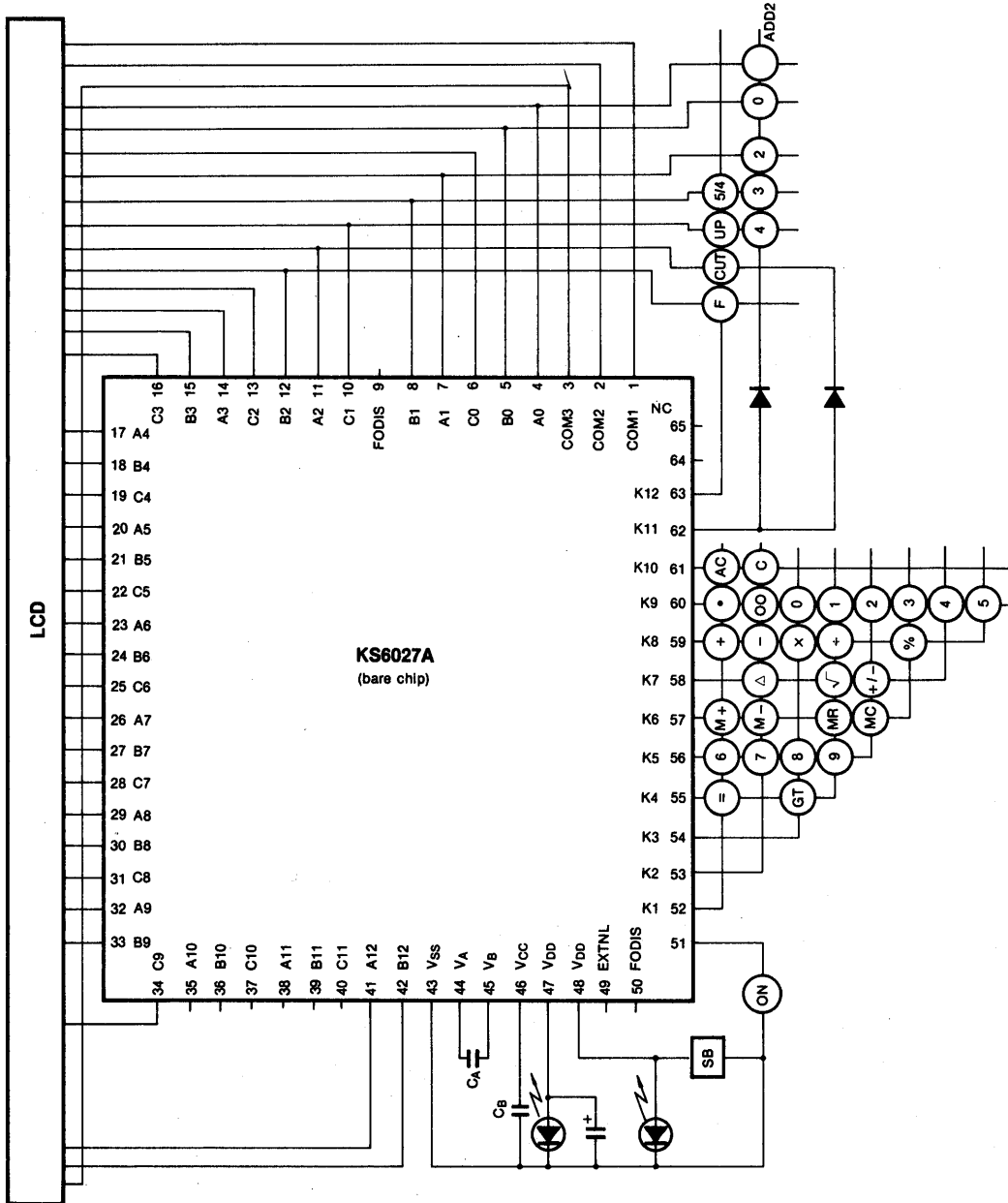
8.5 KS6027

A. KS6027A (12 Digit Desk Top)



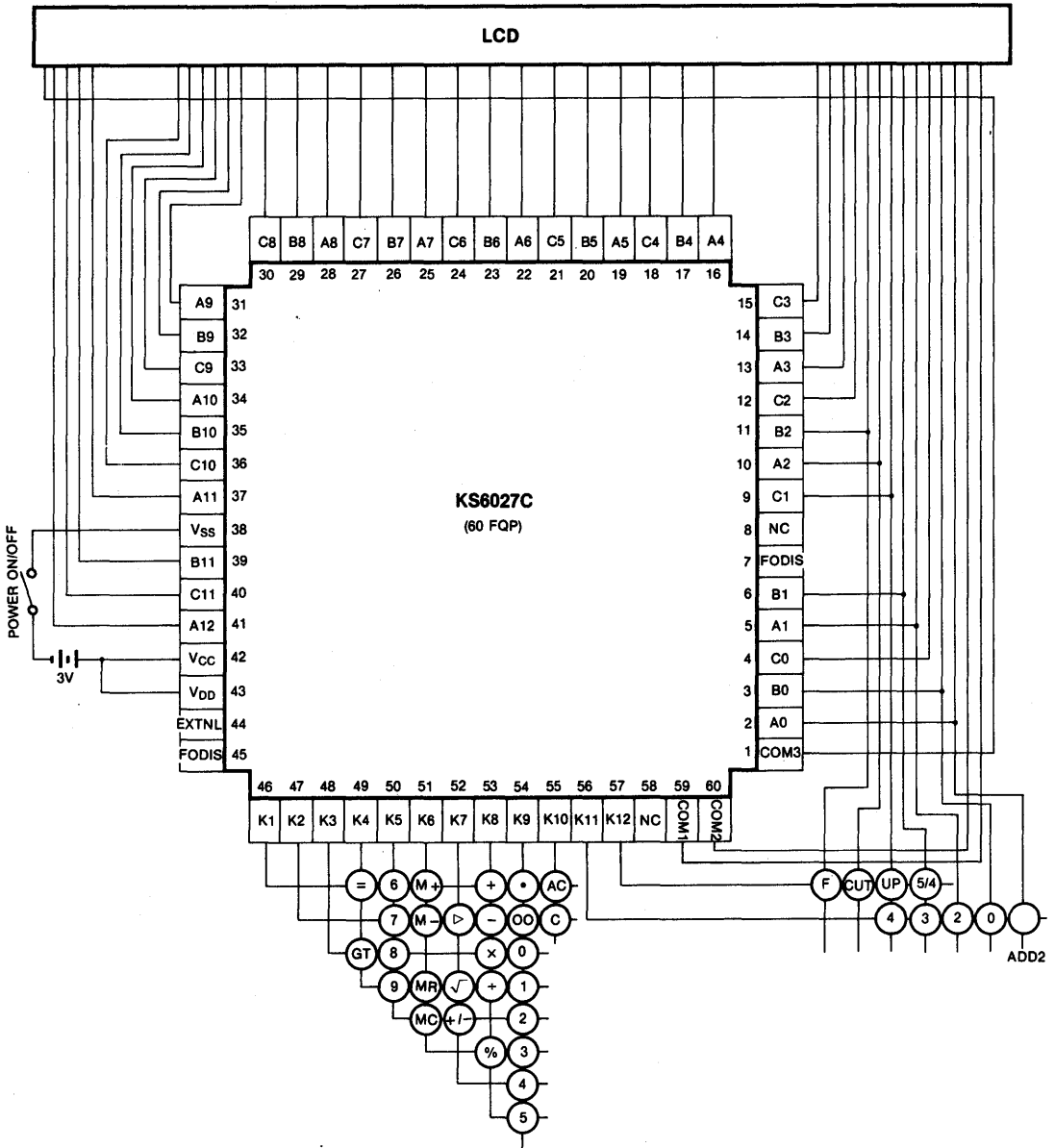
APPLICATION GUIDE

B. KS6027A (10 Digit Desk Top)



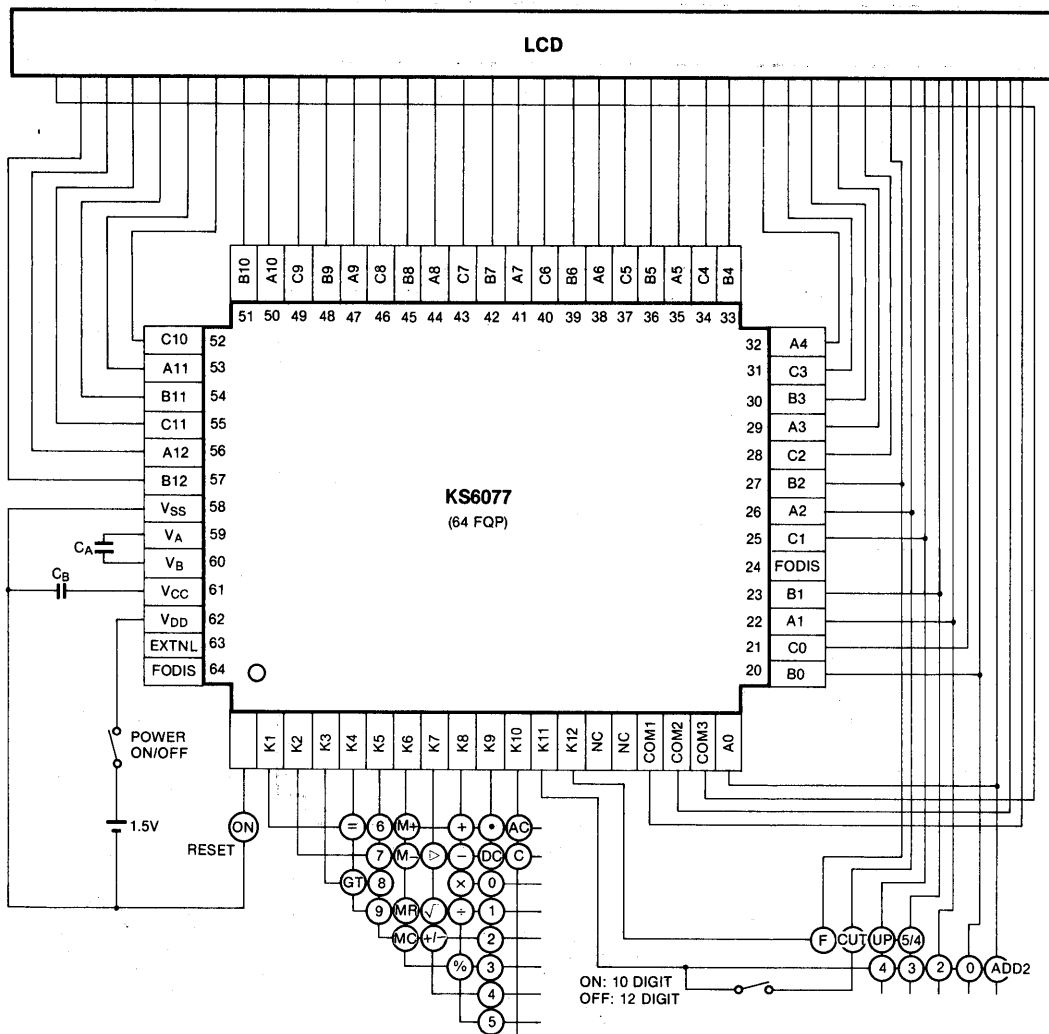
APPLICATION GUIDE

C. KS6027C (12 Digit Desk Top)

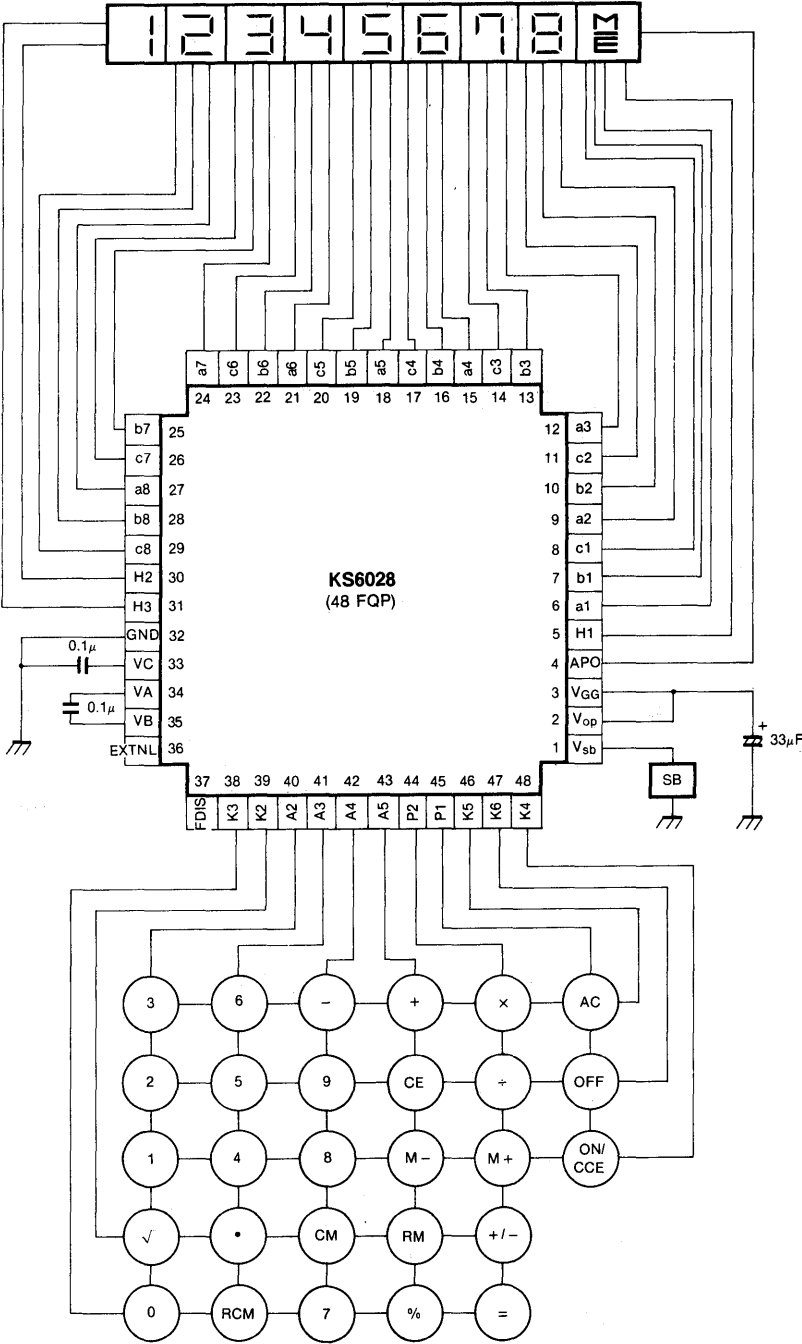


3

8.6 KS6077

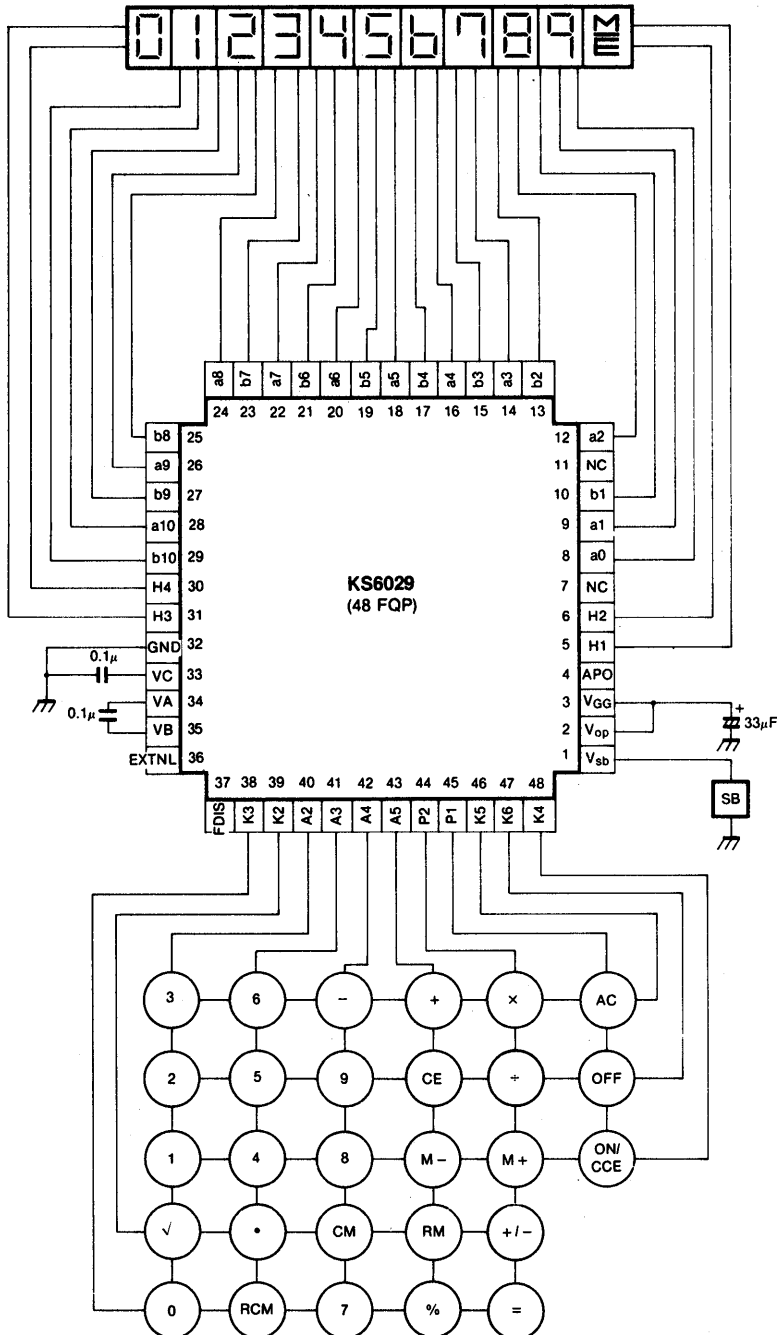


8.7 KS6028



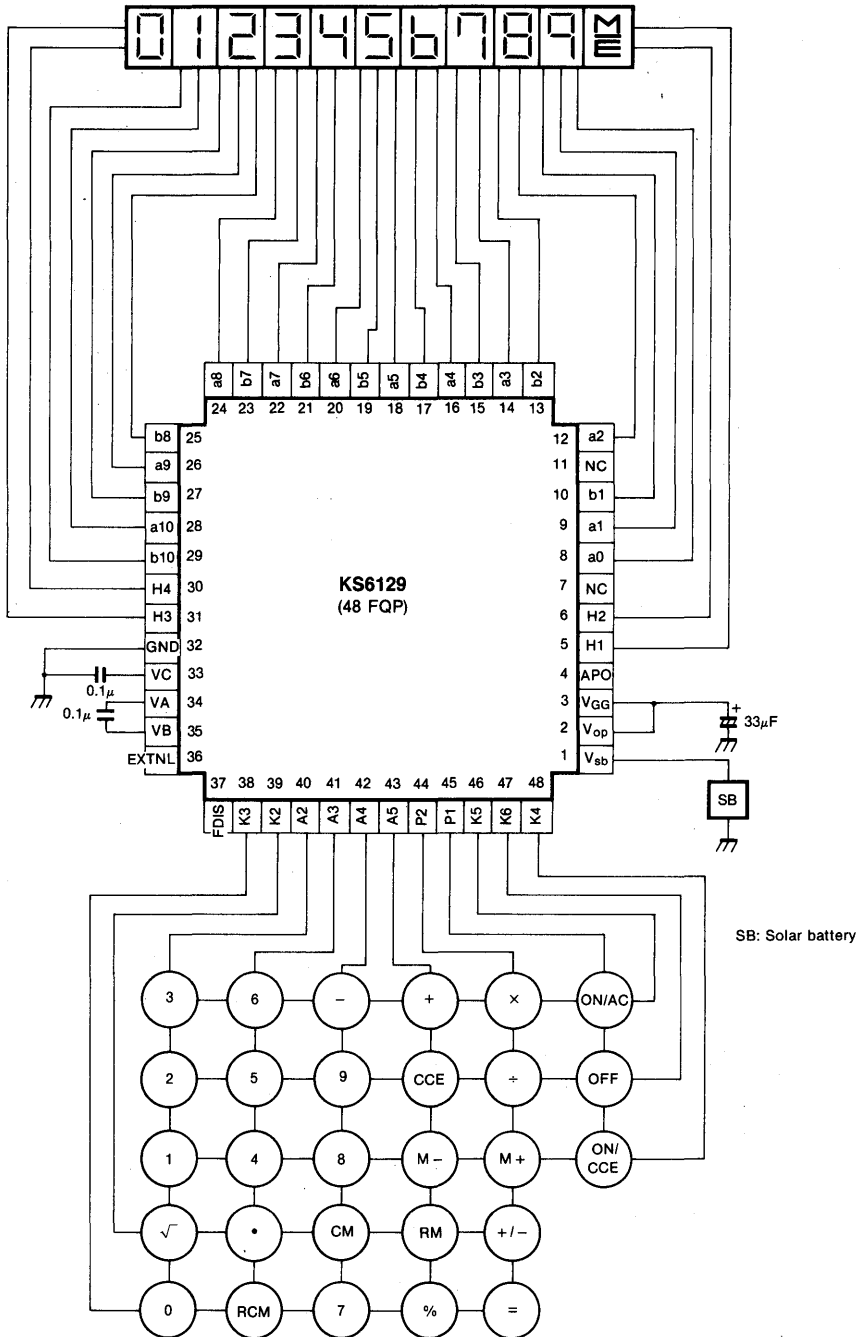
3

8.8 KS6029



8.9 KS6129

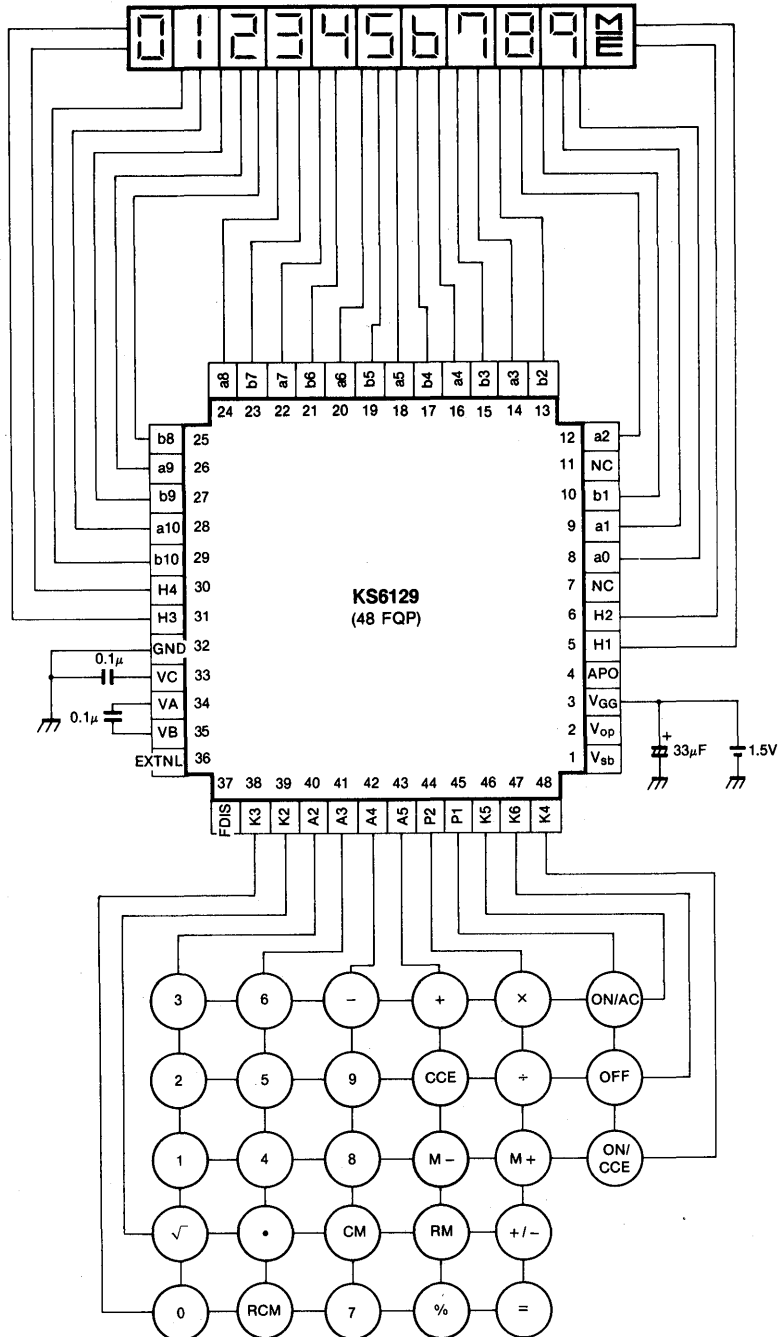
A. For use with a solar cell



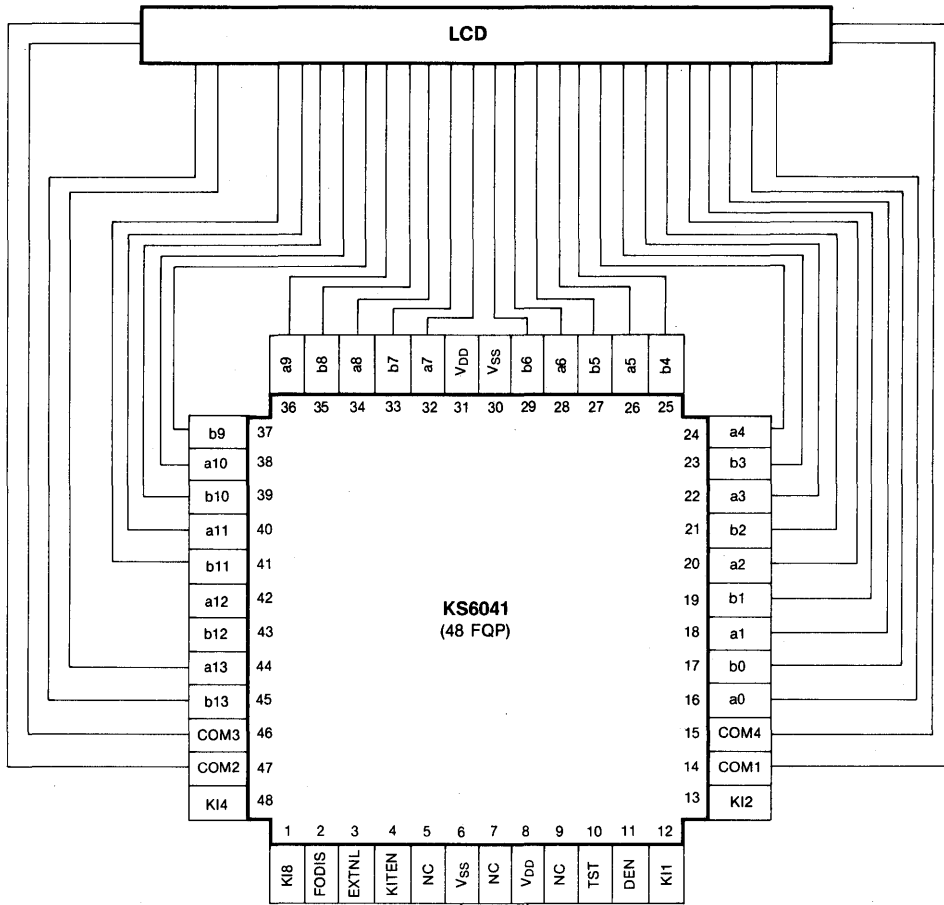
3

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B. For use with a battery

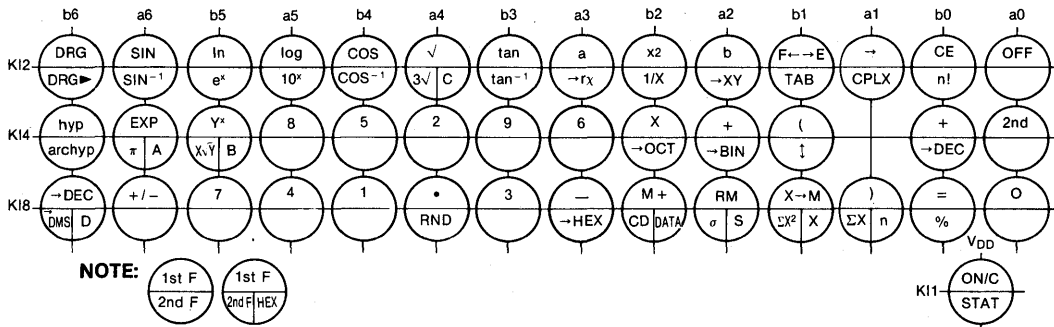


8.10 KS6041



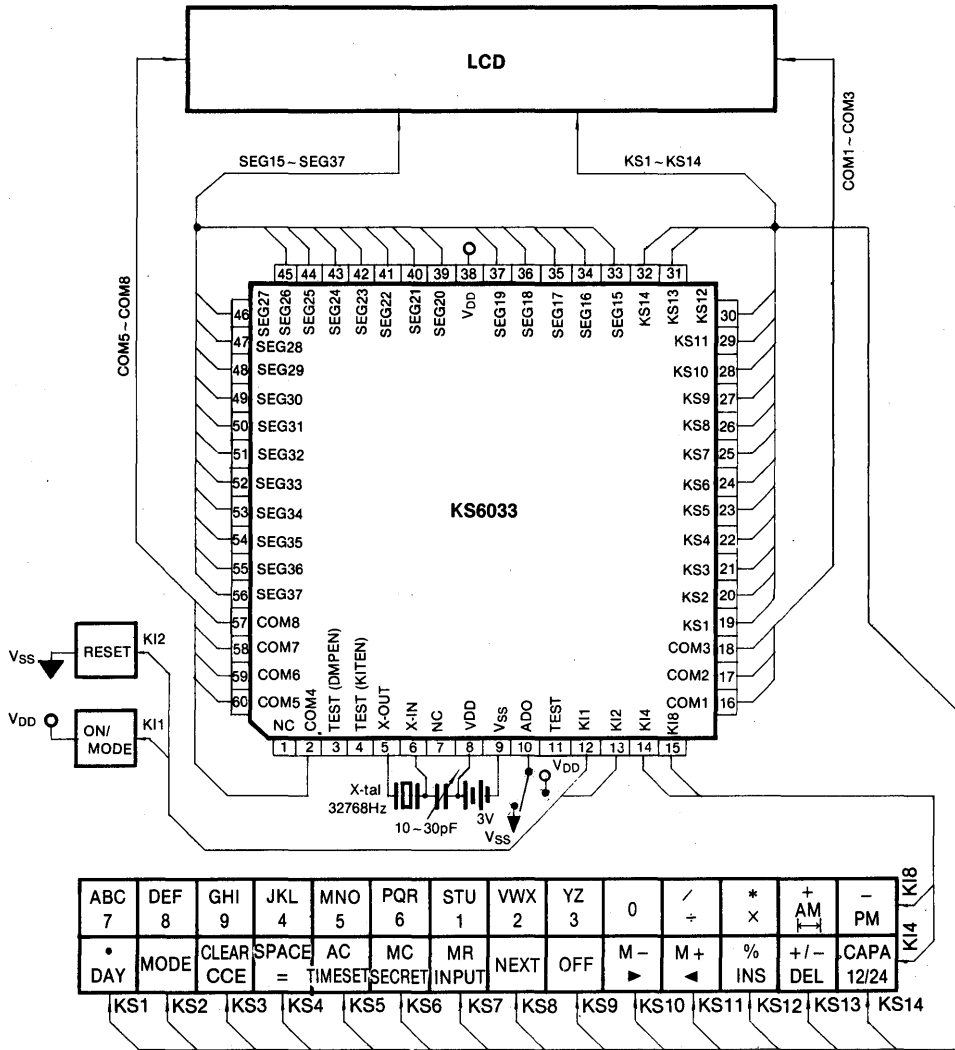
3

Key connection



APPLICATION GUIDE

8.11 KS6033



(1) ADD function

ADO → V _{DD}	enable
ADO → V _{SS}	disable

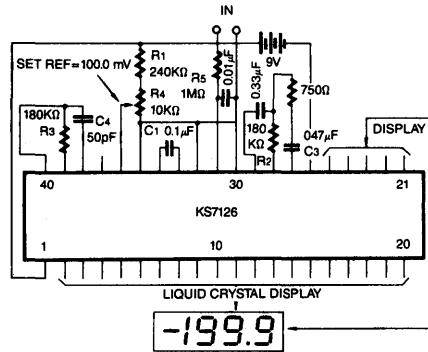
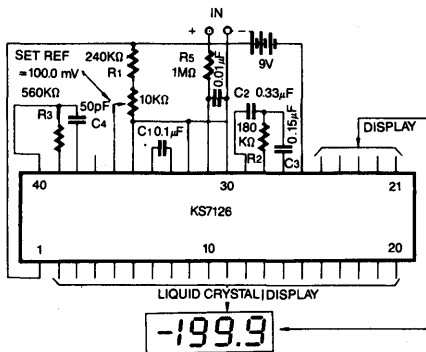
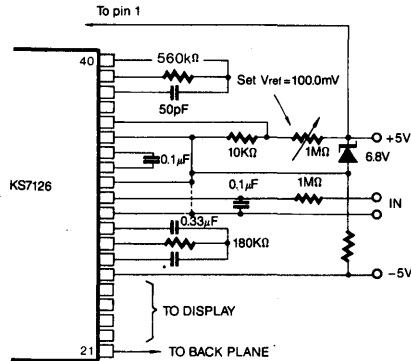
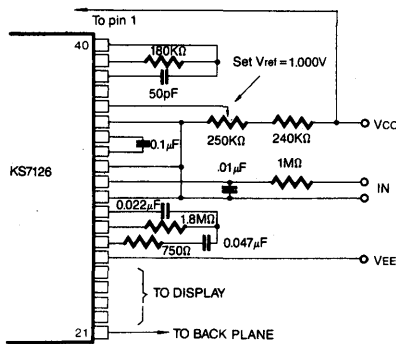
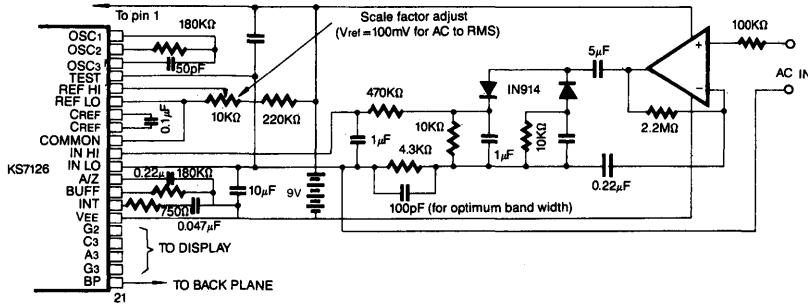
(2) LCD function

When connecting V_{SS} and K18, All symbol is displayed for LCD test.

* PAD on PCB which is placed on the chip must be connected to V_{DD} level.

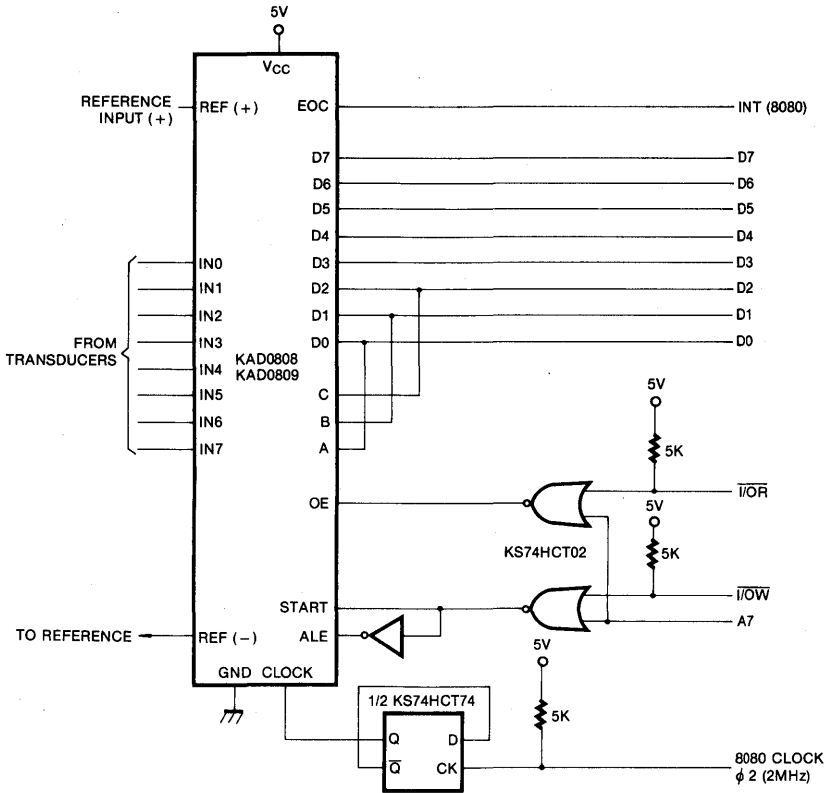
9. DATA CONVERTER IC APPLICATION

9.1 KS7126



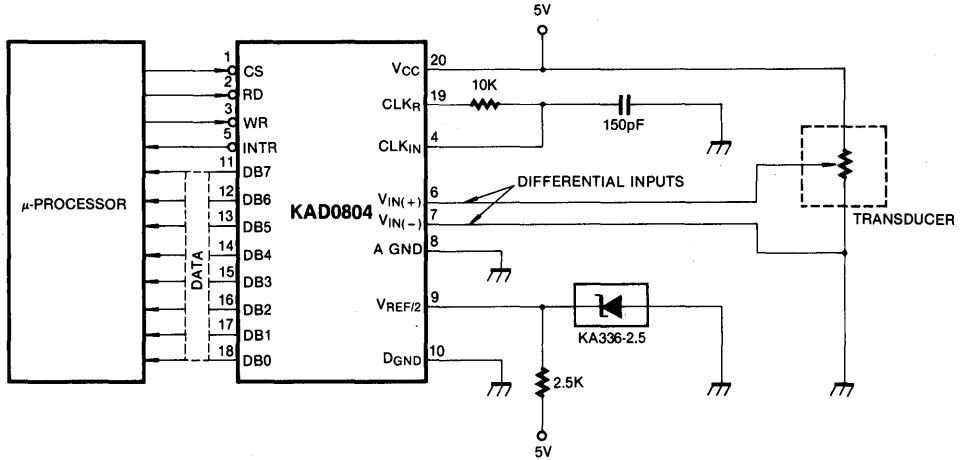
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9.3 KAD0808, KAD0809

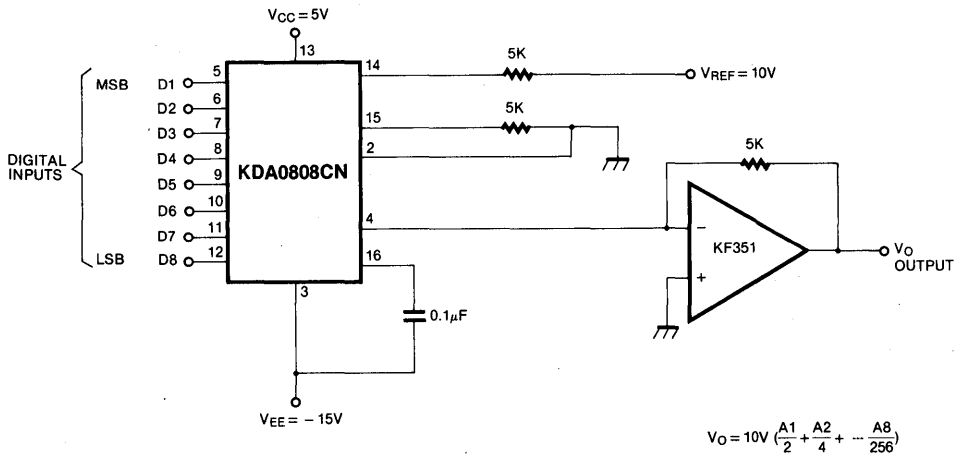


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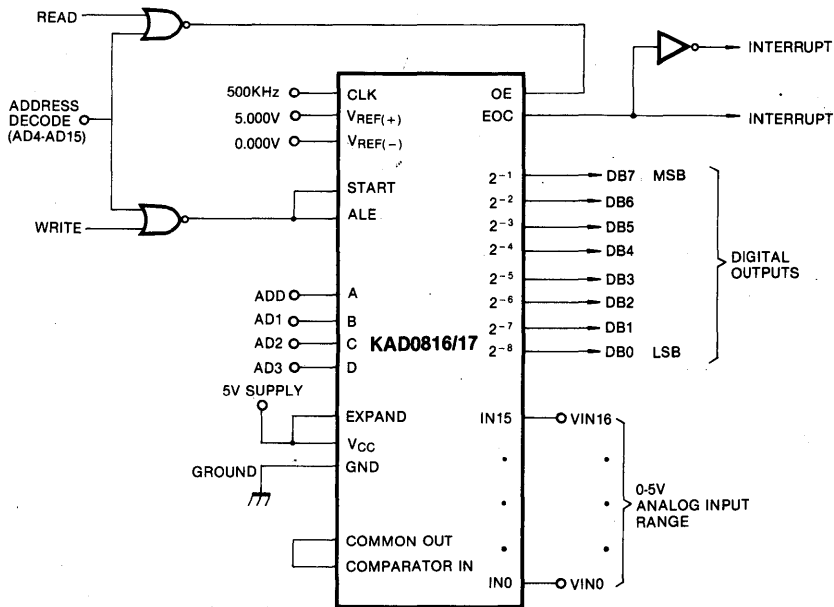
9.4 KAD0804



9.5 KDA0808



9.6 KAD0816, KAD0817

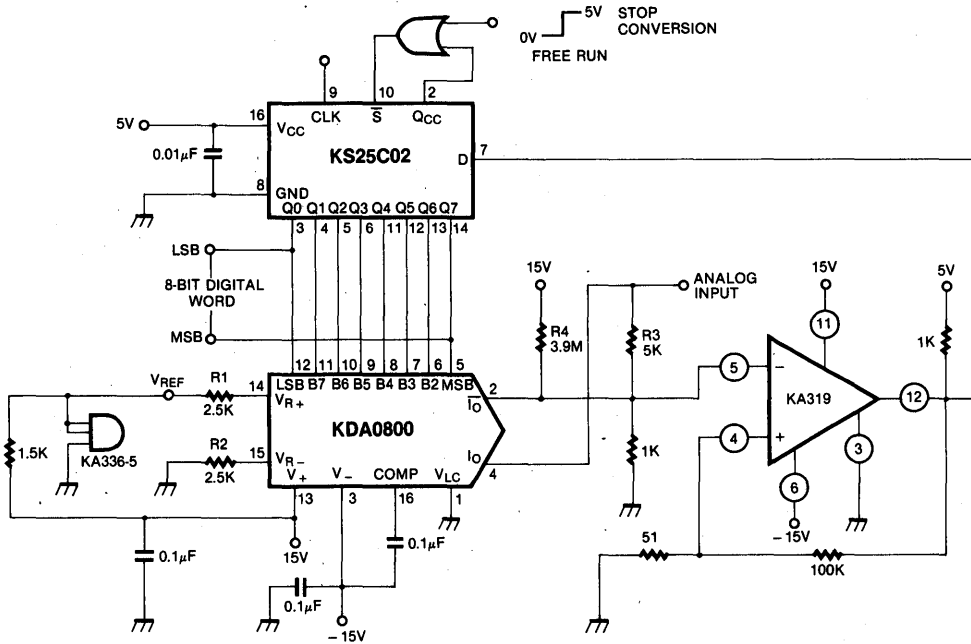


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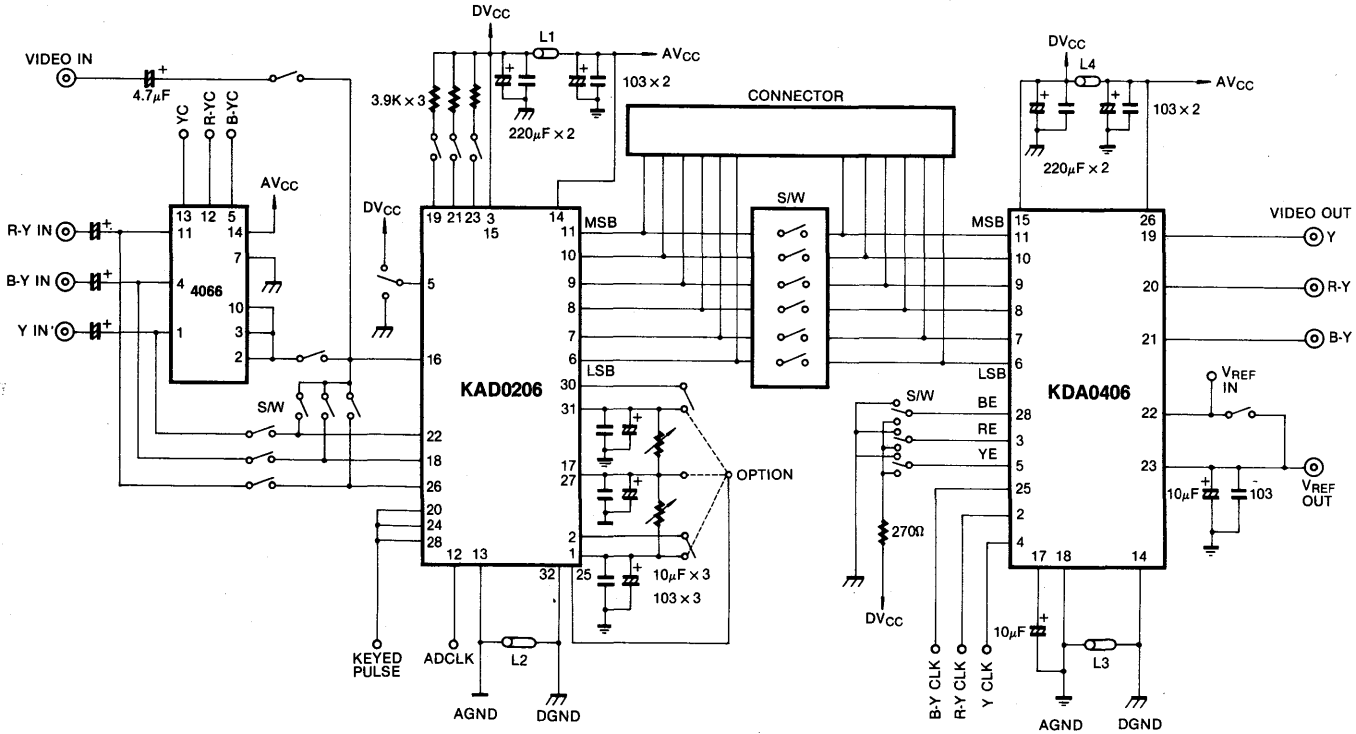
MICROPROCESSOR INTERFACE TABLE

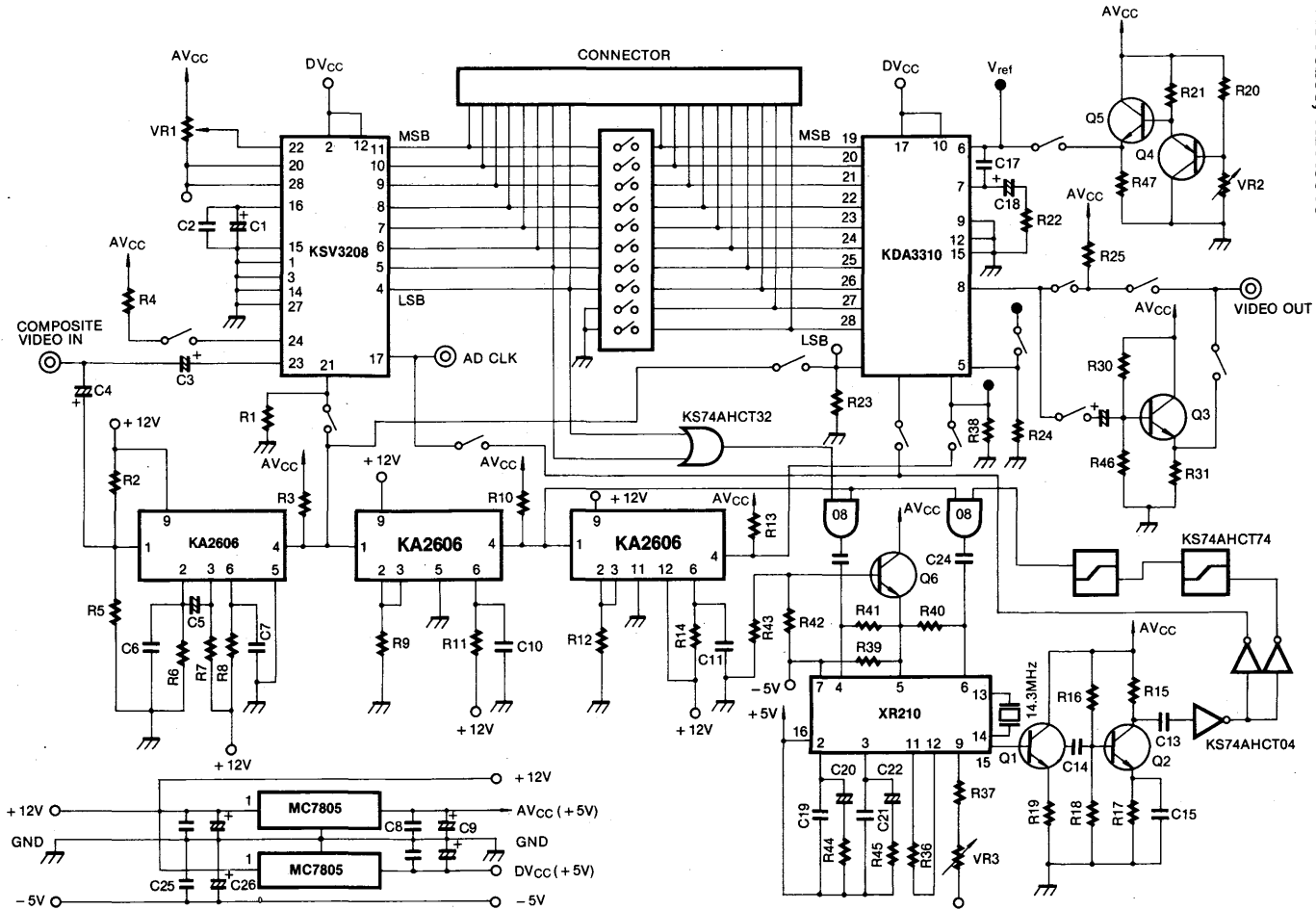
Processor	Read	Write	Interrupt (Comment)
8080	MEMR	MEMW	INTR (Thru RST Circuit)
8085	RD	WR	INTR (Thru RST Circuit)
Z-80	RD	WR	INT (Thru RST Circuit, Mode 0)
SC/MP	NRDS	NWDS	SA (Thru Sense A)
6800	VMA, ϕ 2, R/W	VMA, Q2, R/W	IRQA or IRQB (Thru PIA)

9.7 KS25C02, KDA0808 (SAR Method)



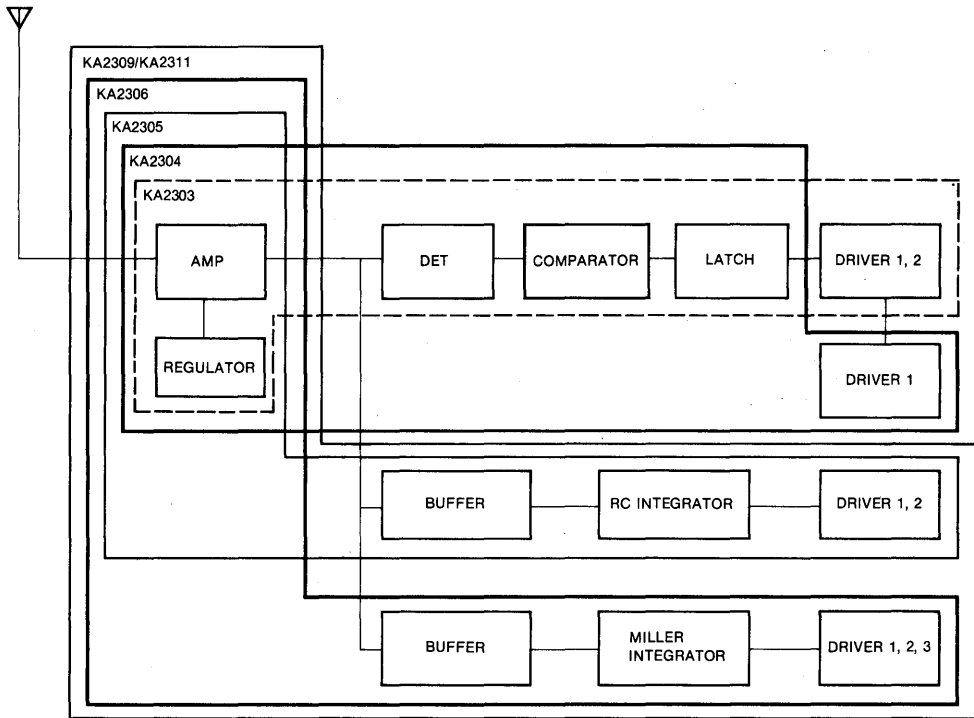
Note. For 1μs conversion time with 8-bit resolution and 7-bit accuracy, an KA361 comparator replaces the KA319 and the reference current is doubled by reducing R1, R2 and R3 to 1.25KΩ and R4 to 2MΩ.
 A Complete 2μs Conversion Time, 8-Bit A/D Converter





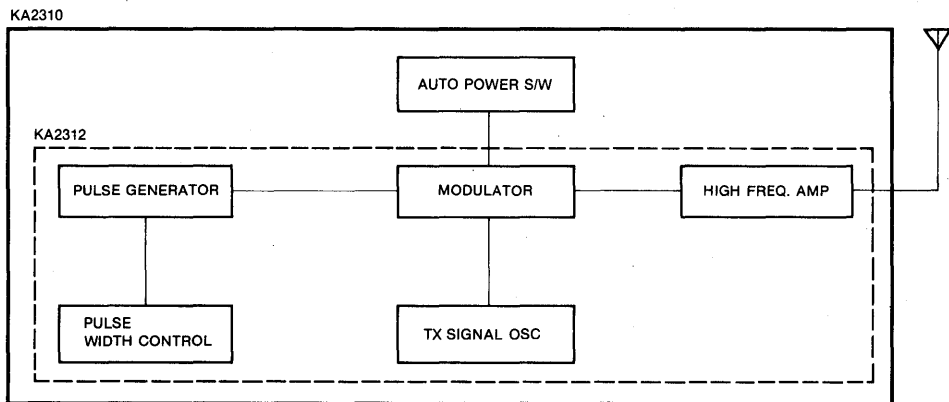
10. TOY BLOCKDIAGRAM

10.1 Radio Control Receiver



3

10.2 Transmitter

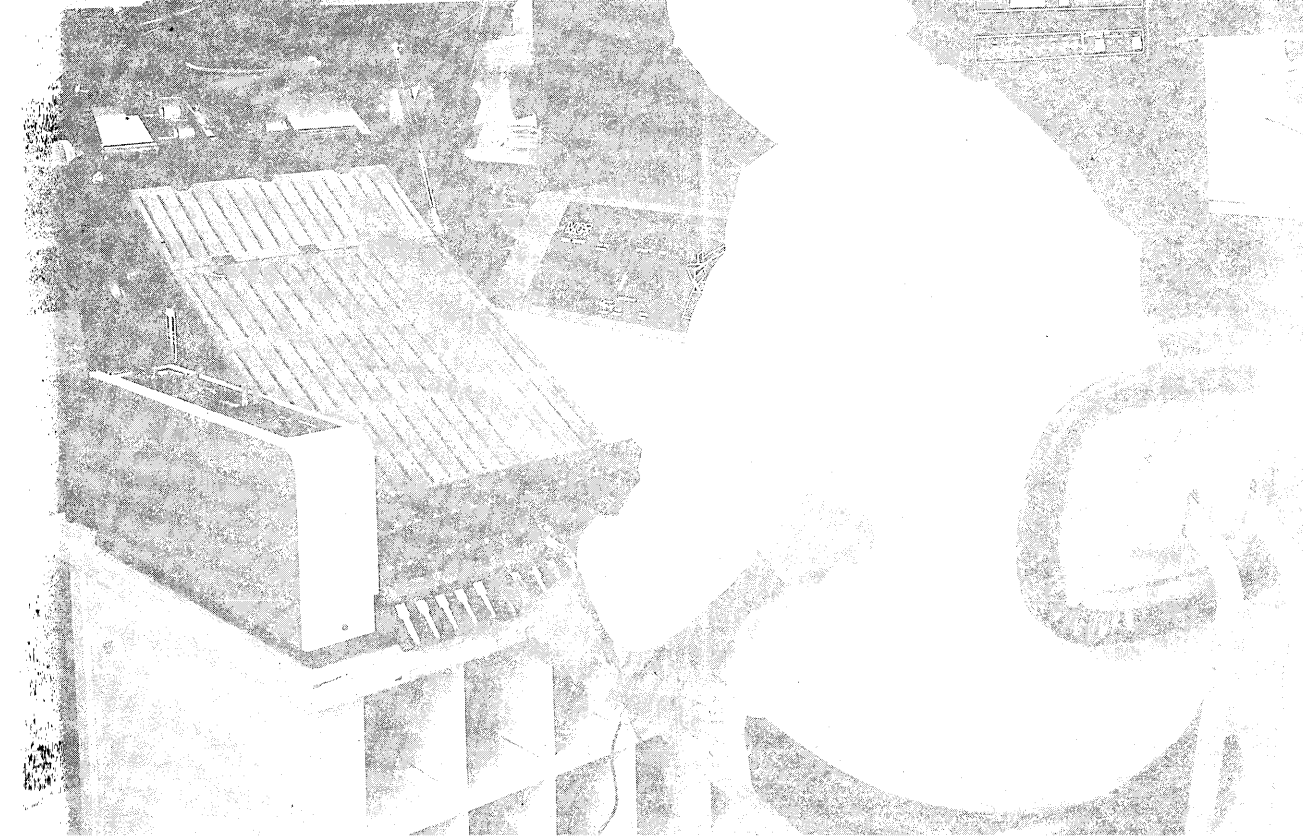


NOTES

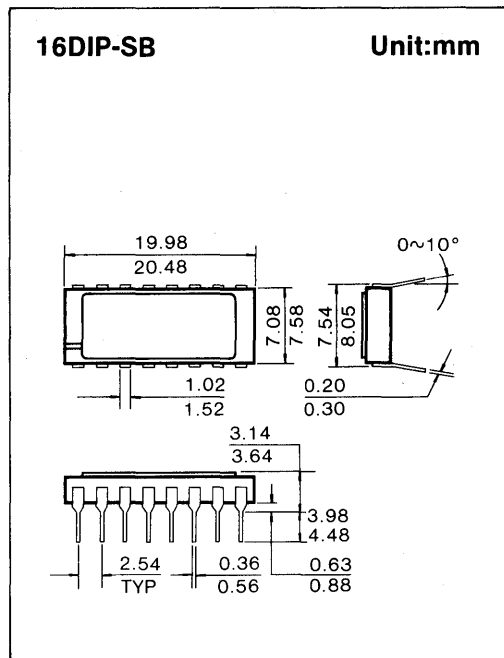
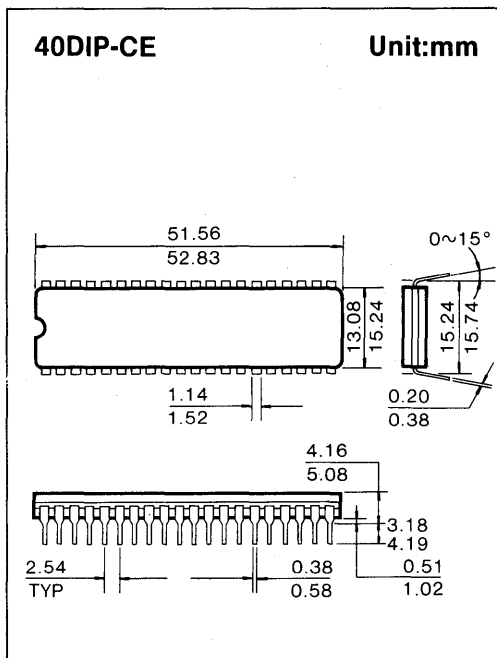
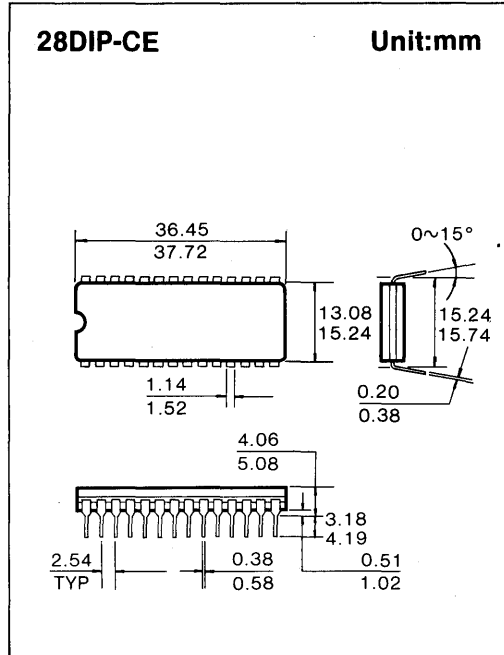
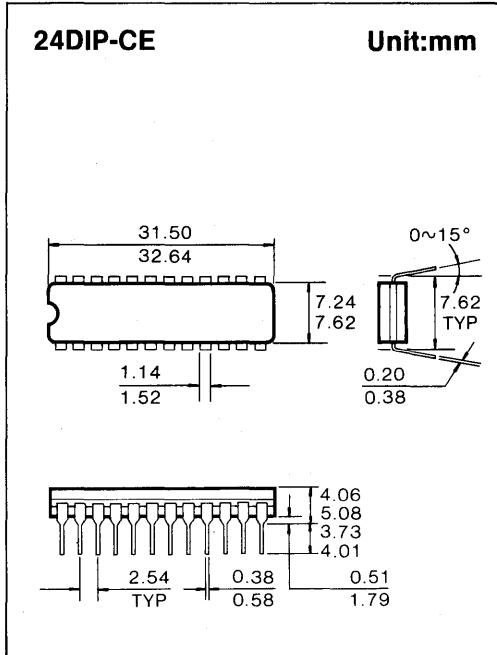
A large, empty rectangular box with a thin black border, occupying most of the page below the 'NOTES' header. It is intended for handwritten notes.



PACKAGE DIMENSIONS 4

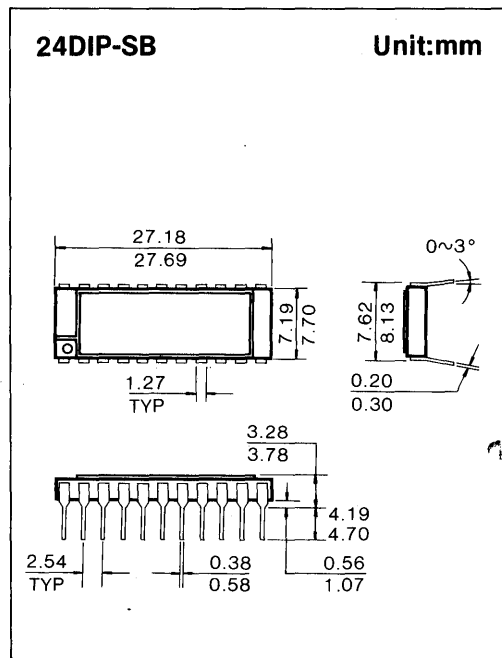
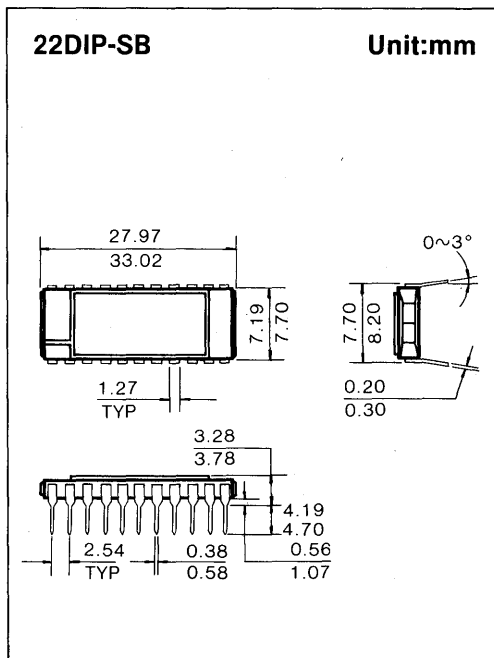
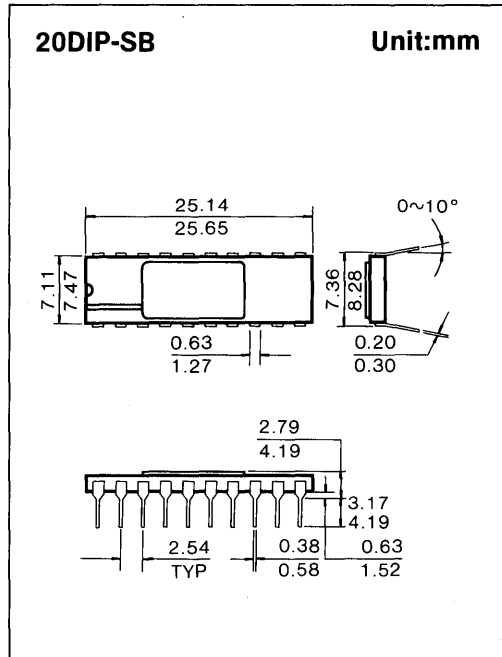
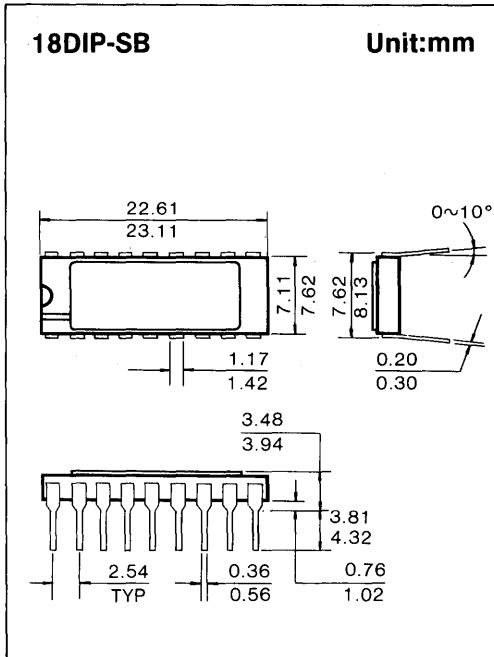


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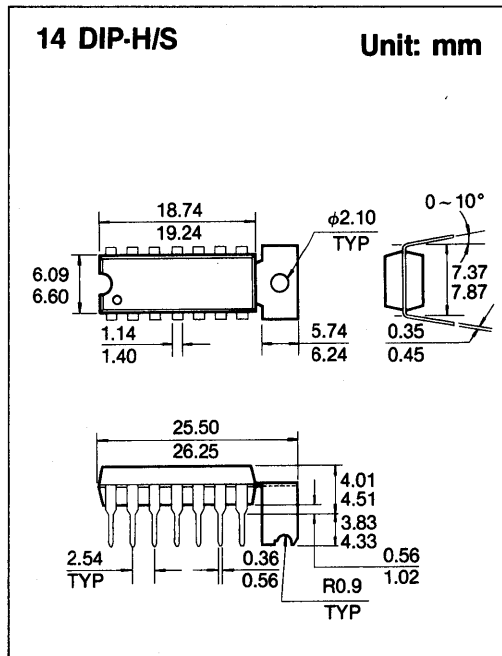
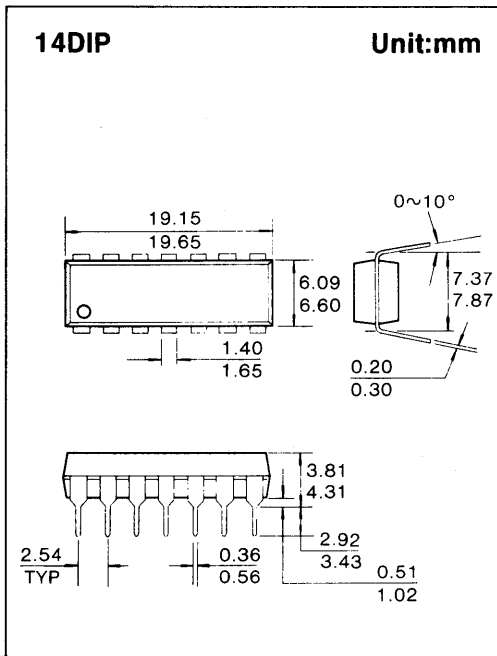
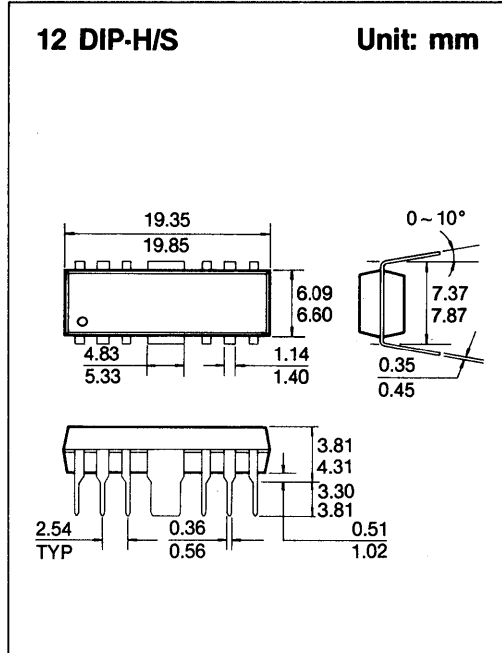
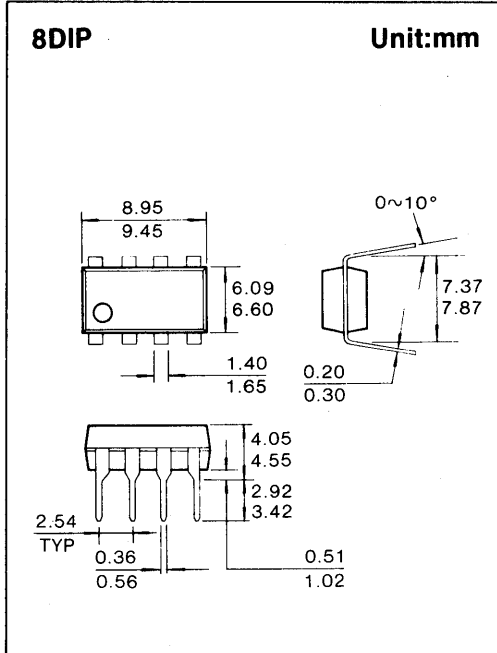


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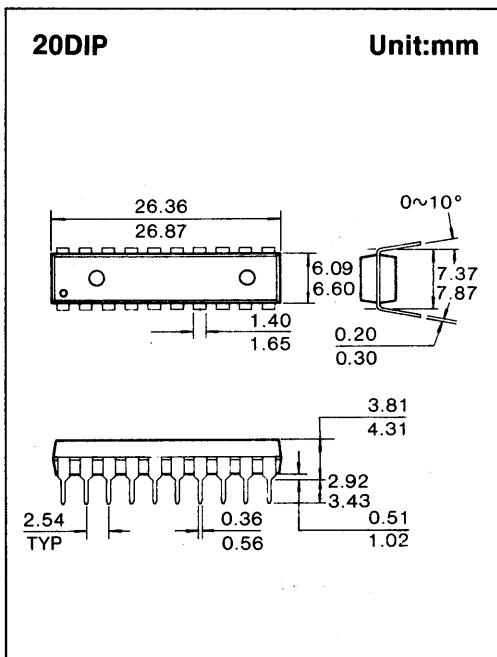
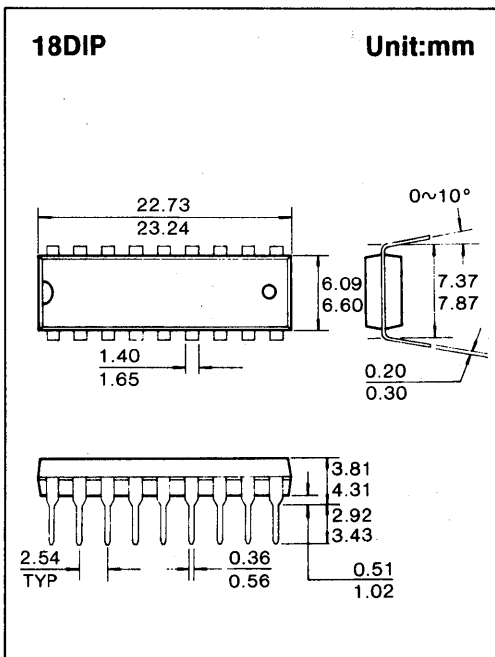
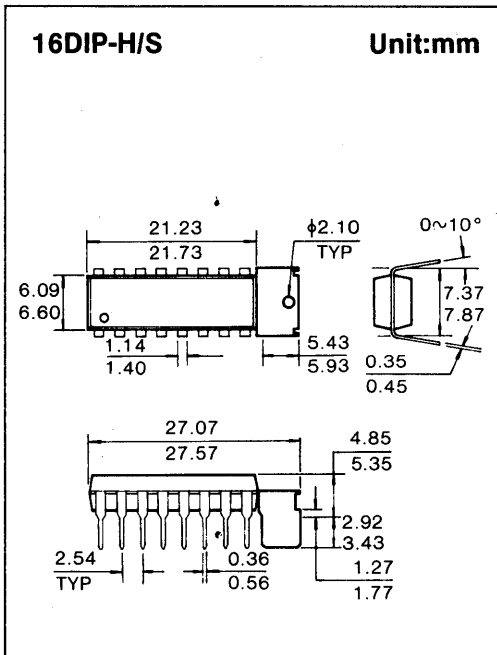
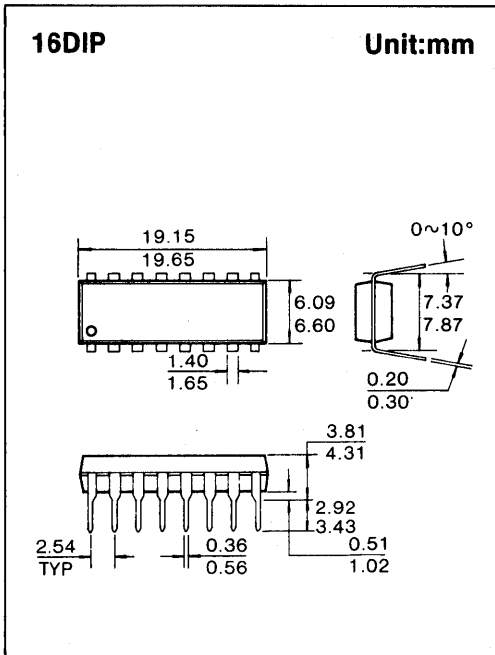


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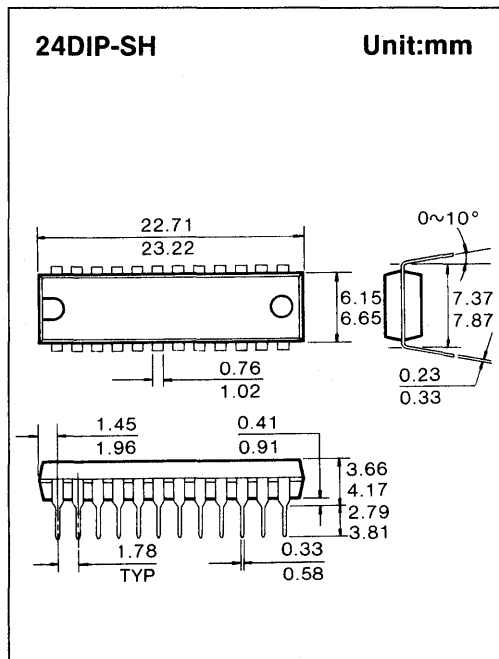
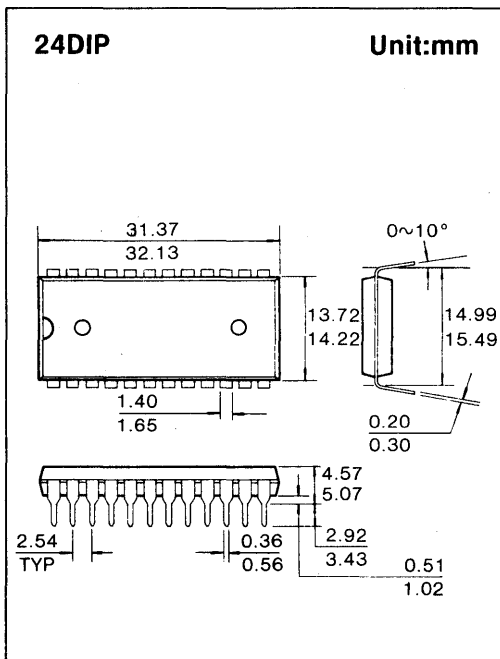
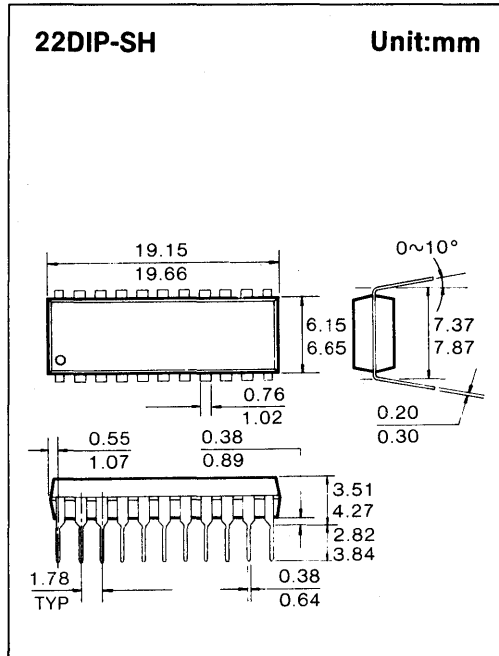
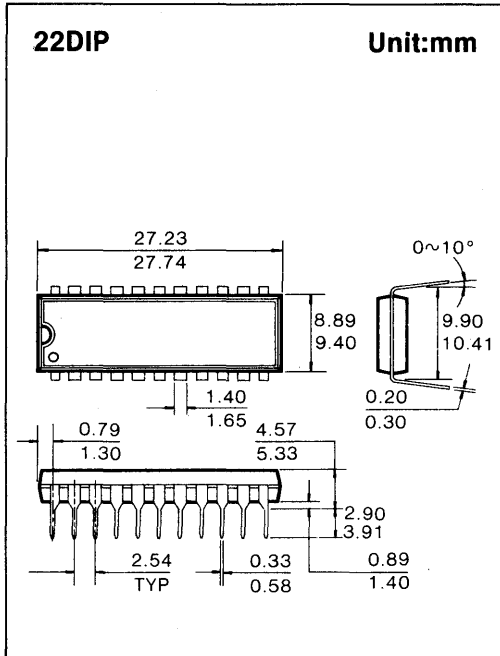


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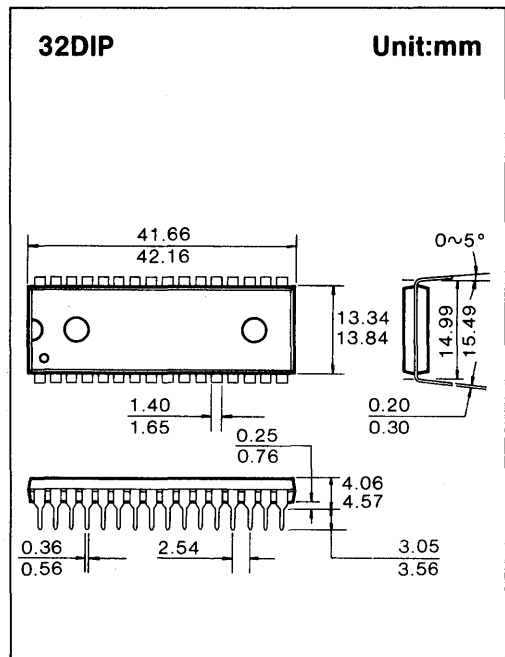
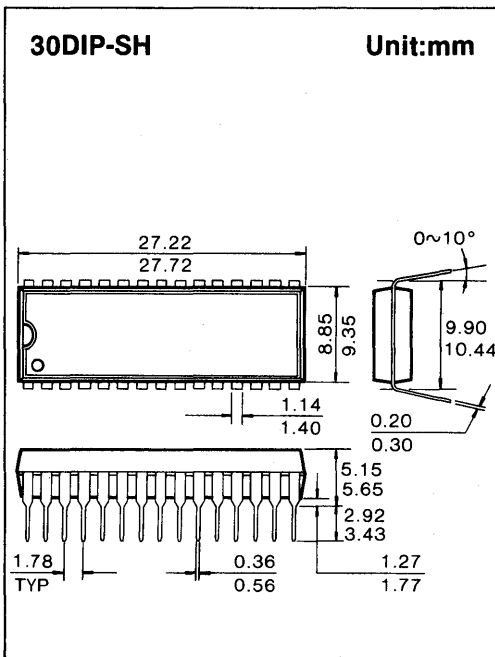
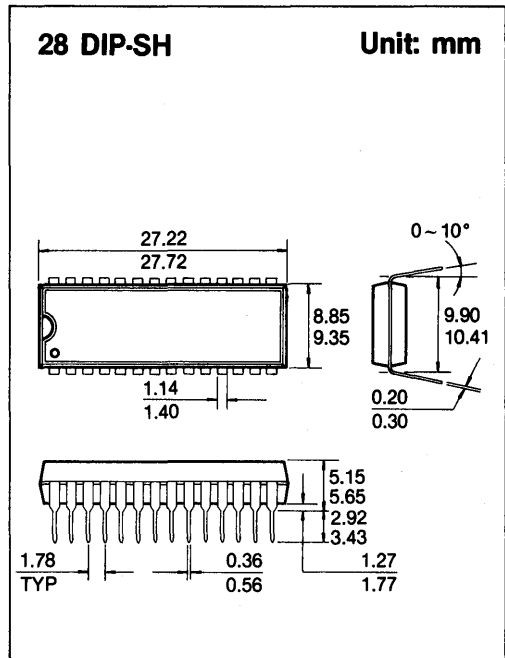
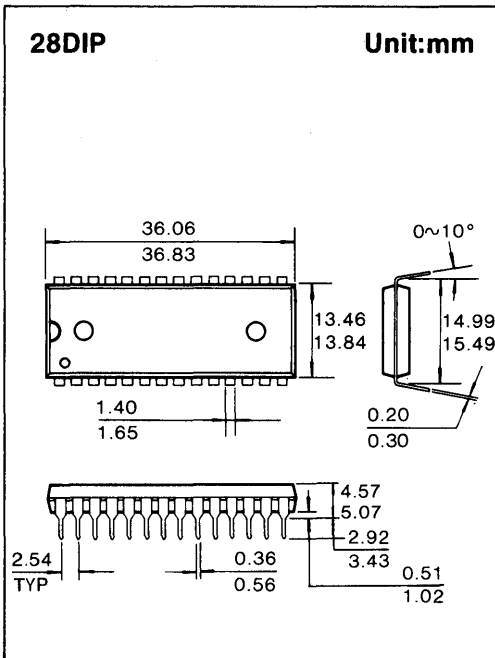


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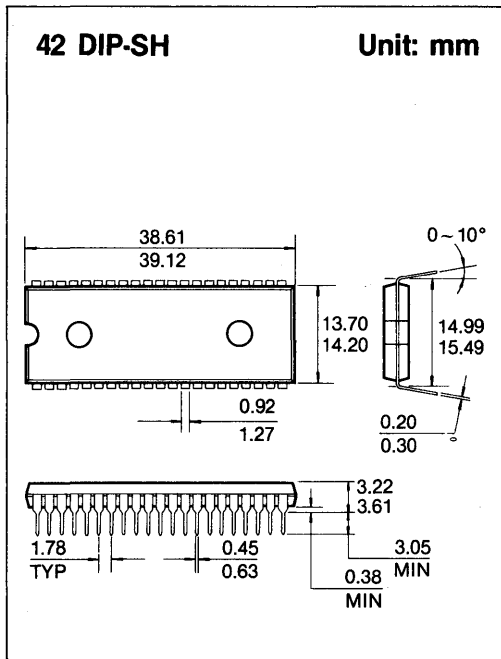
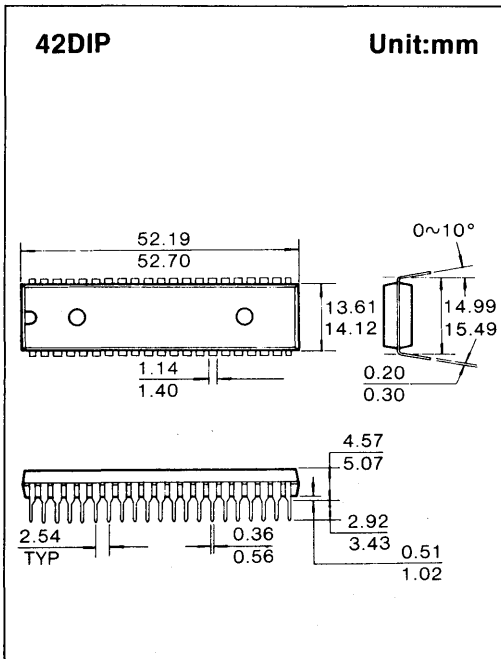
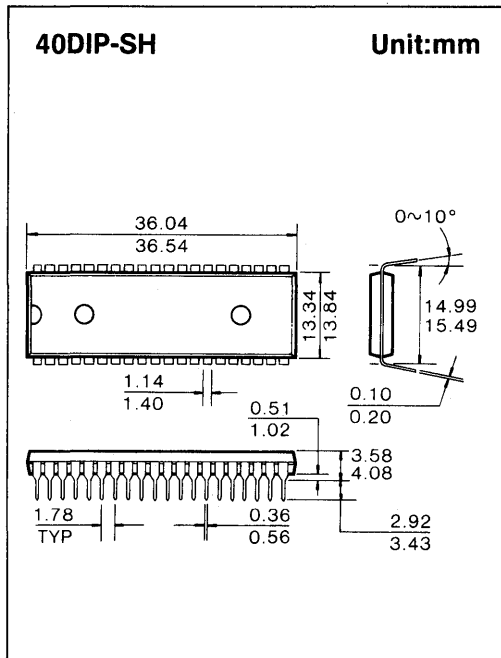
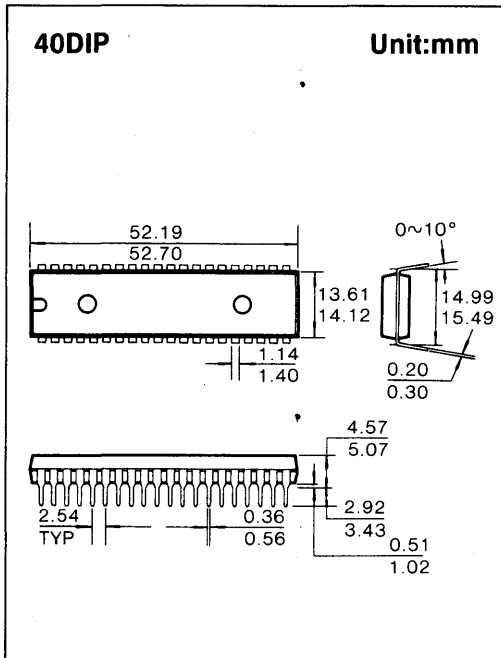


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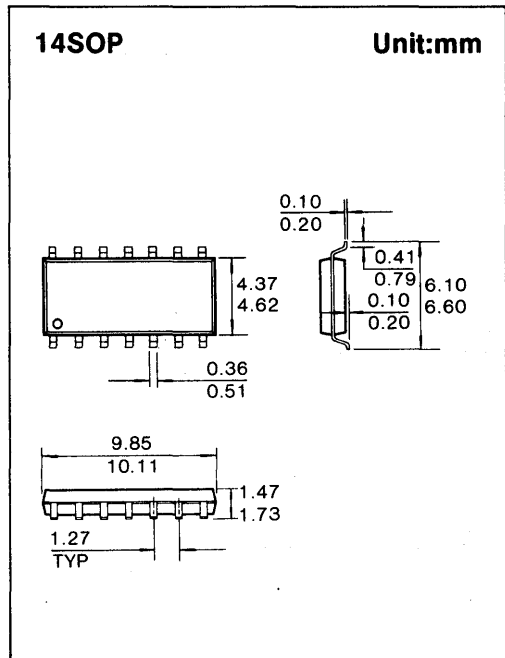
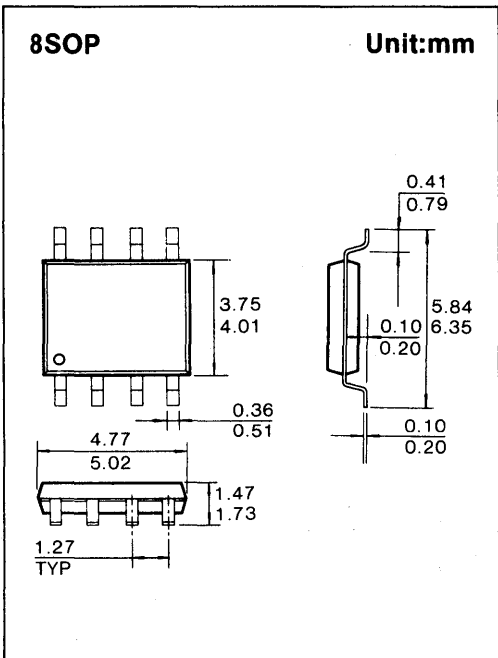
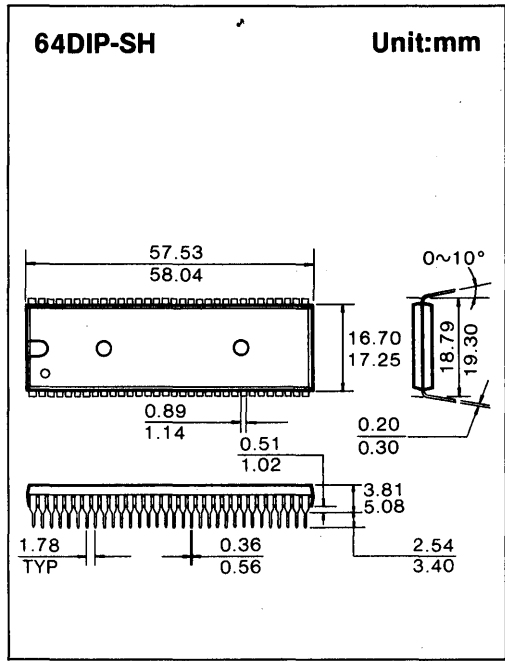
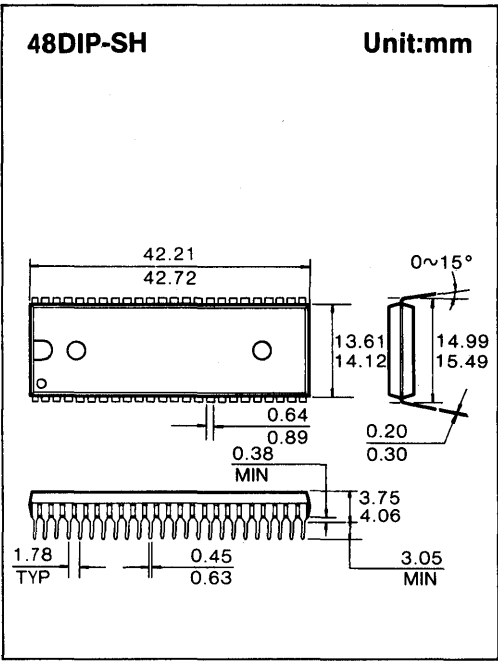


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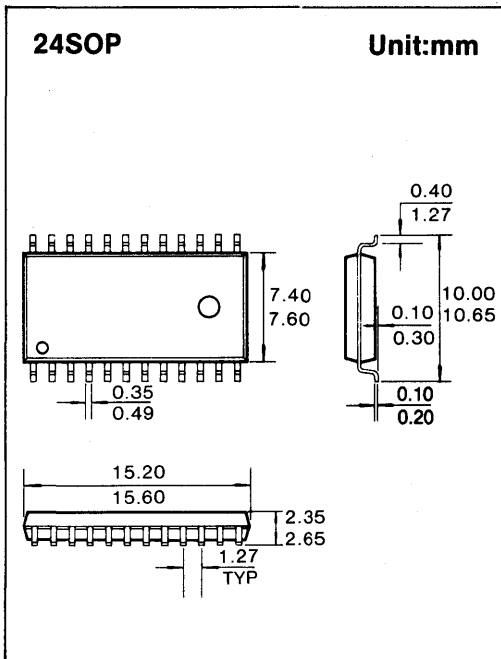
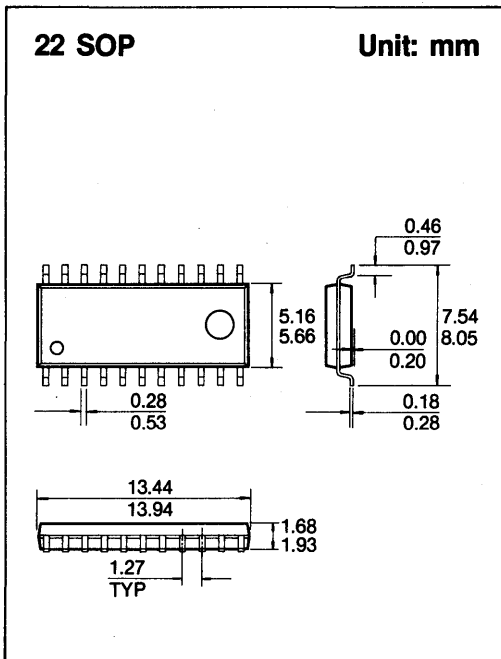
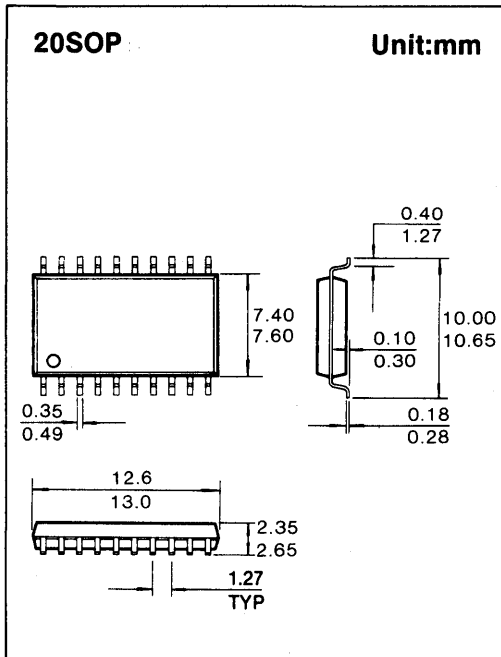
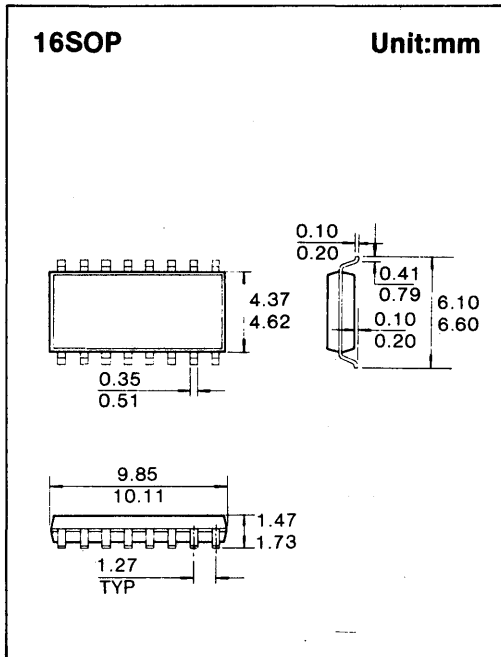


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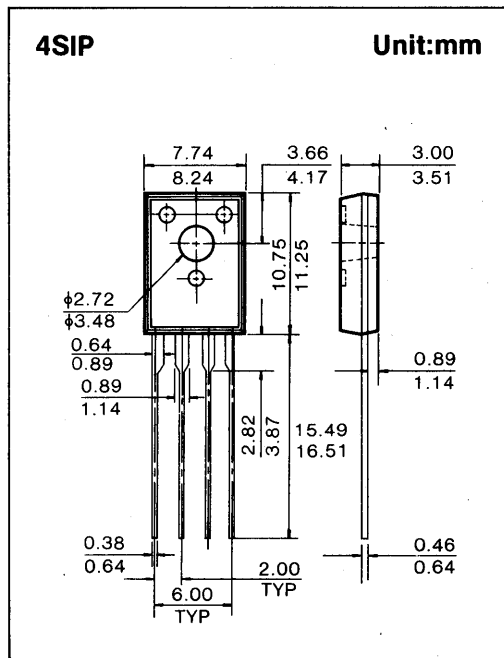
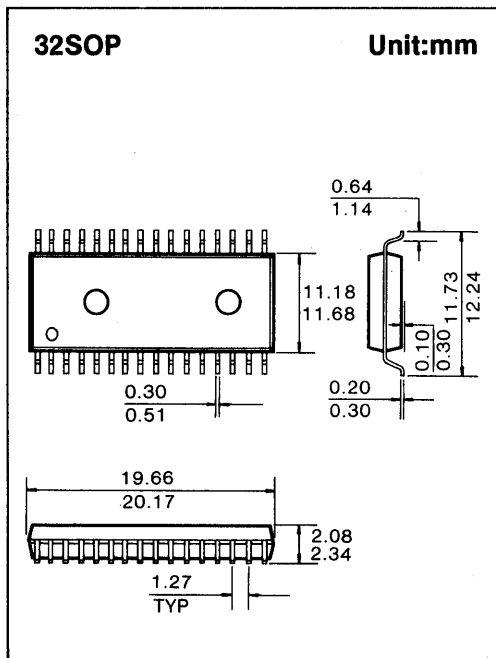
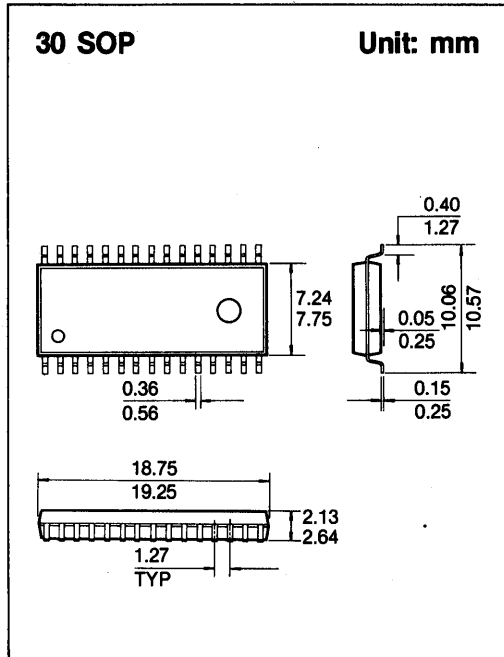
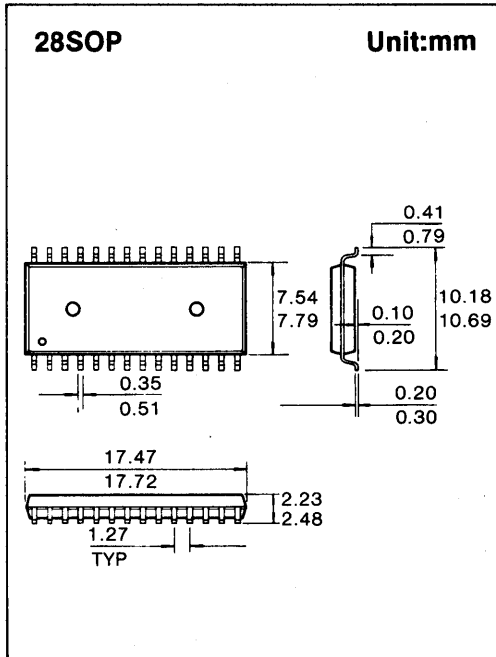


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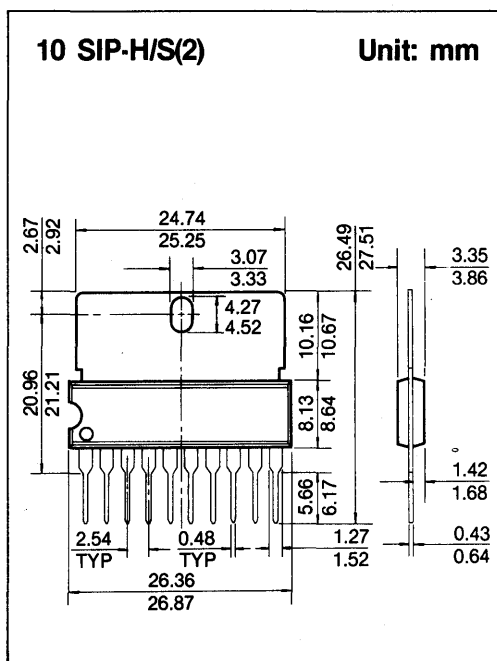
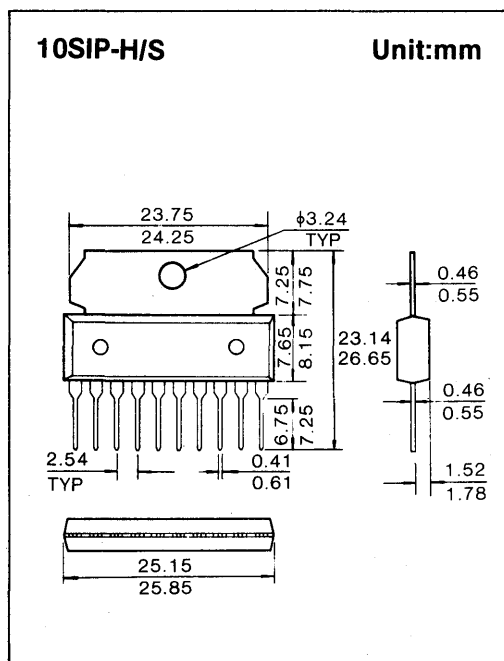
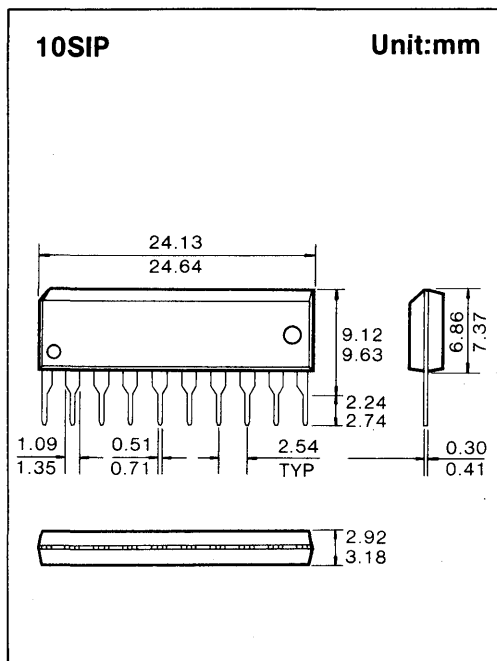
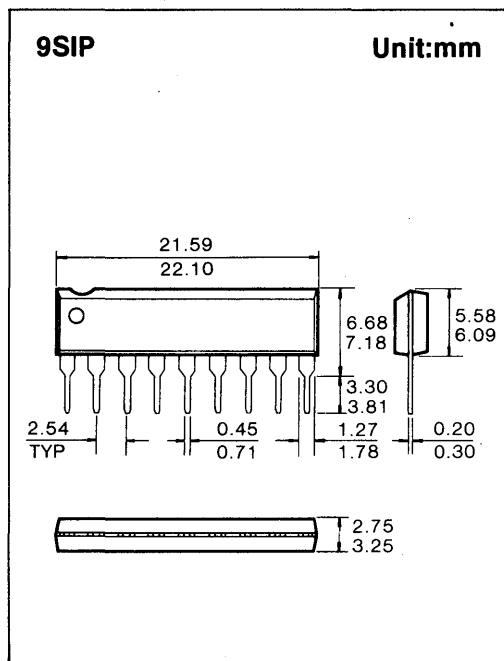


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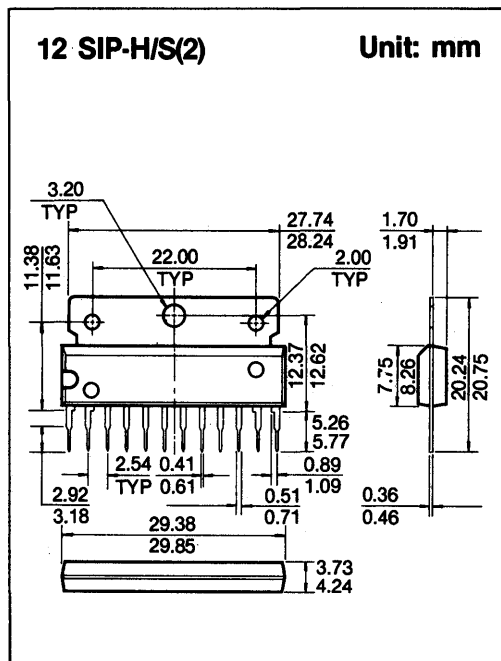
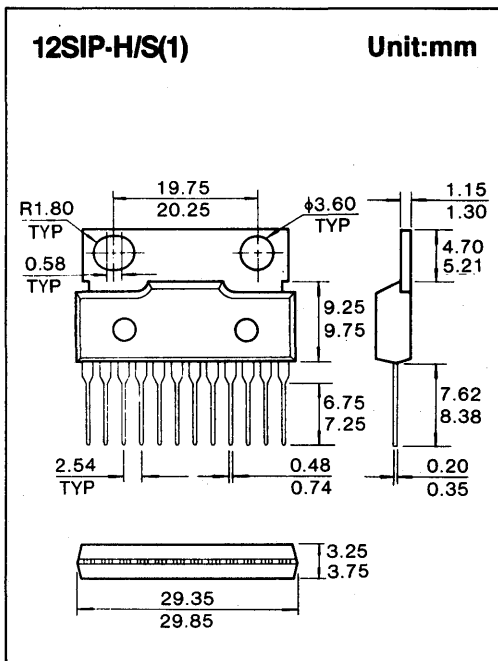
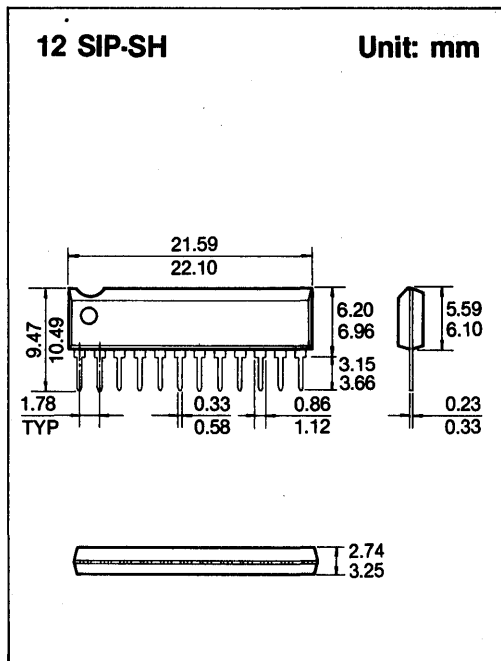
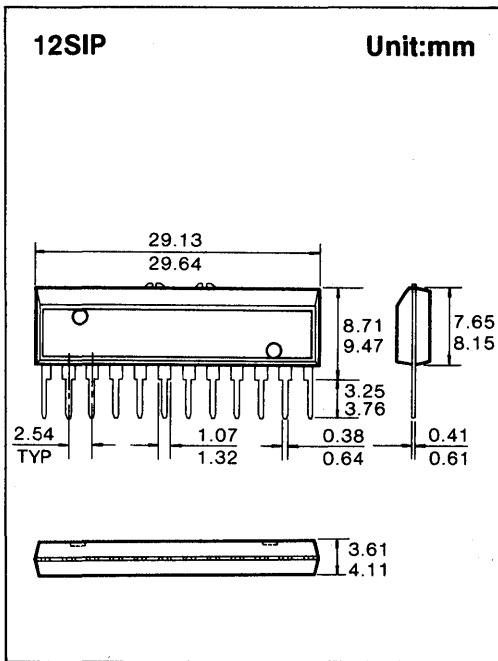


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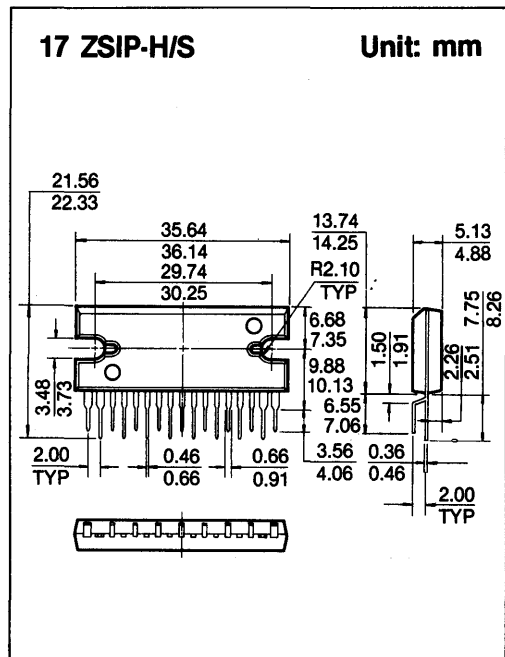
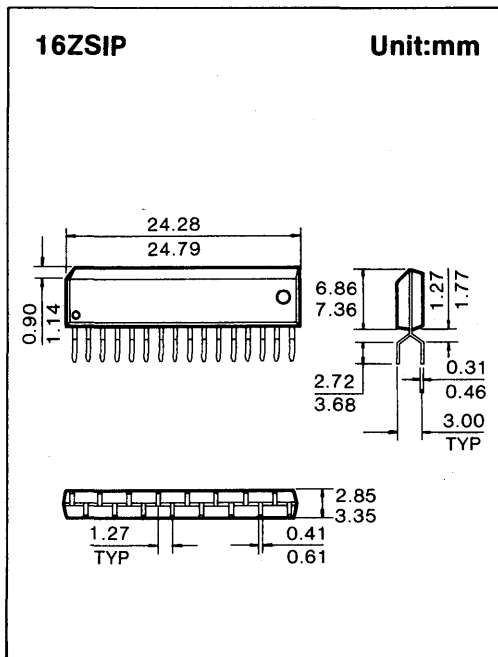
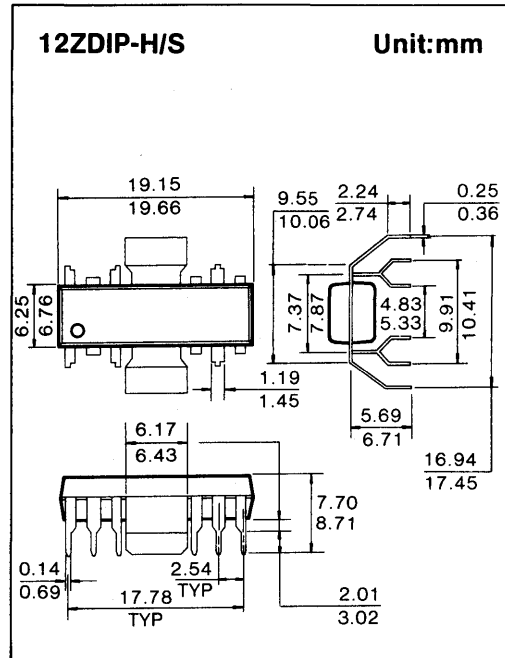
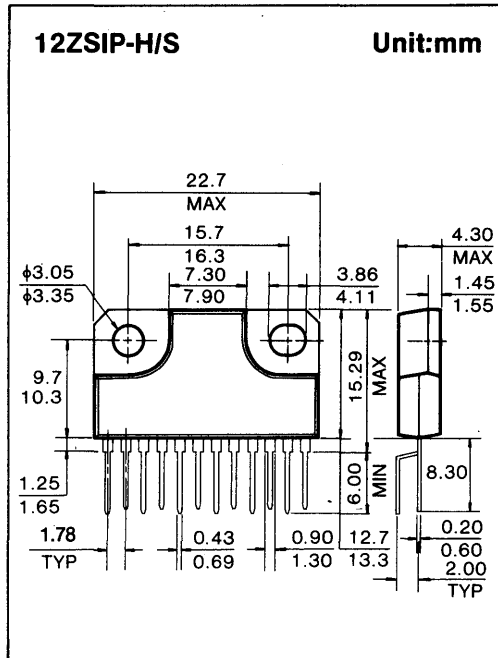


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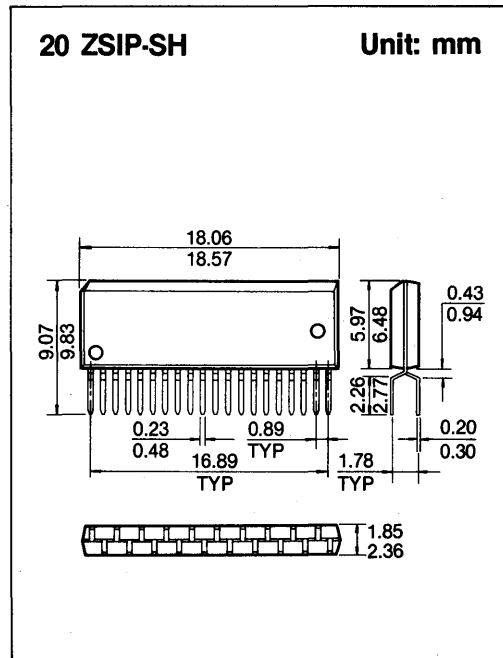
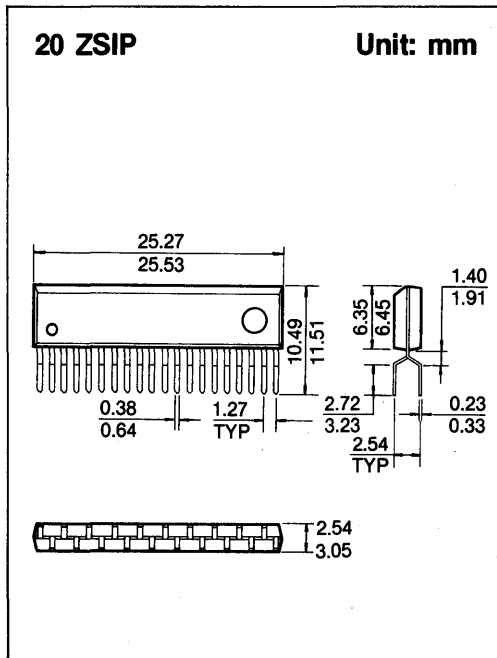
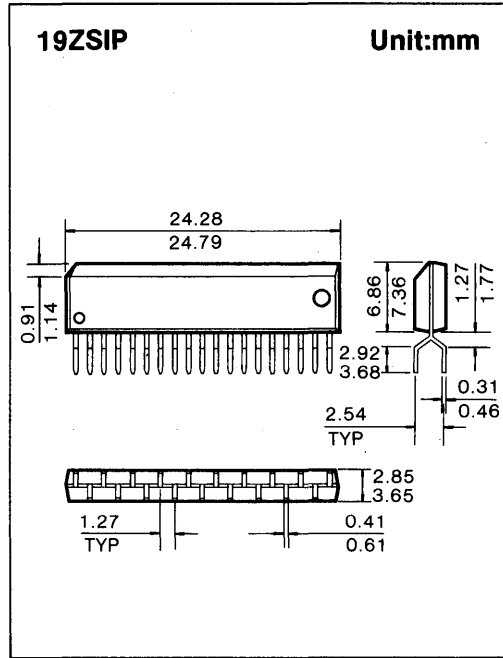
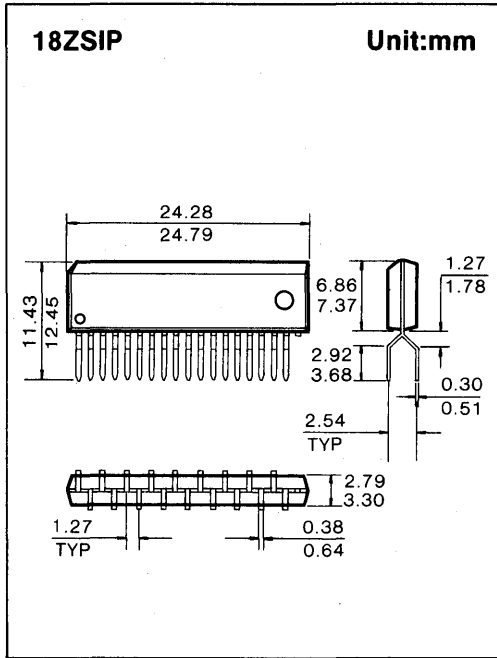


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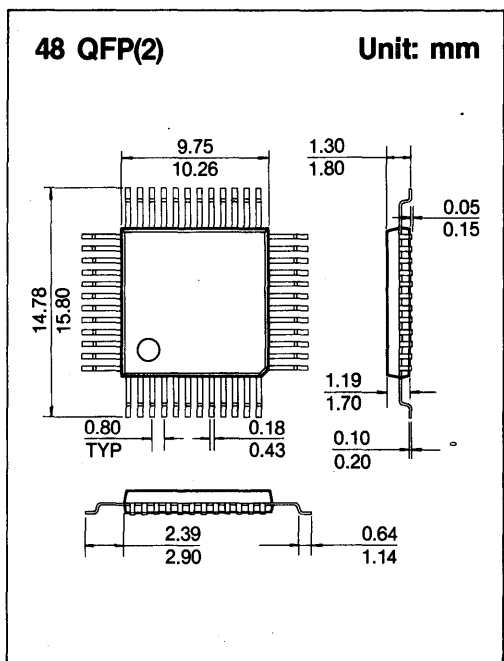
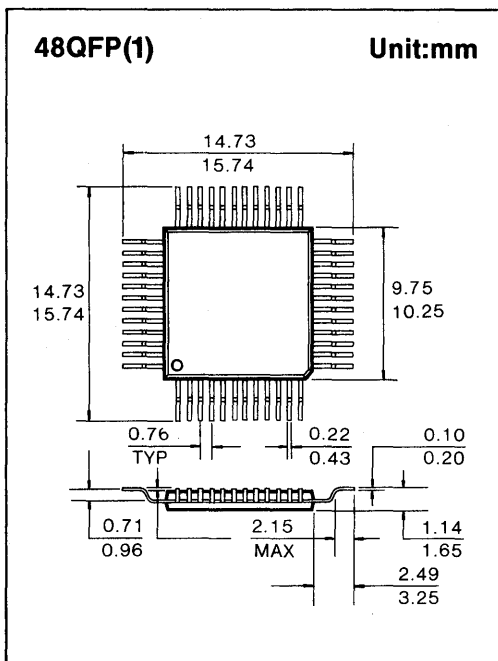
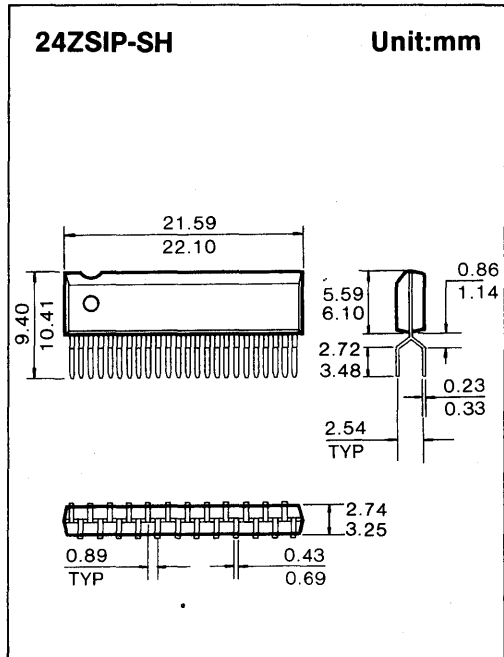
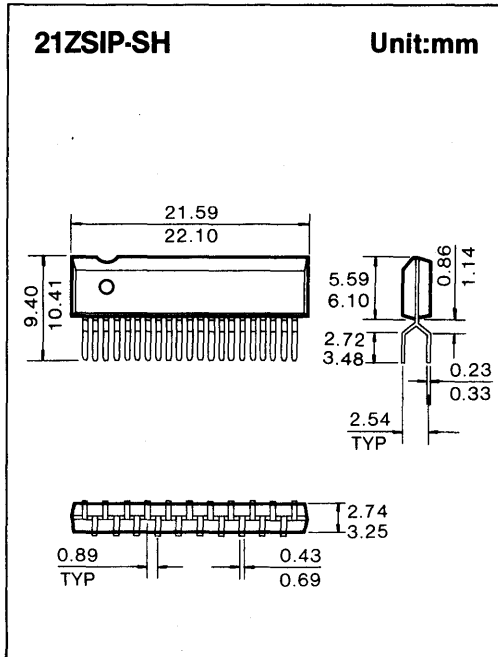


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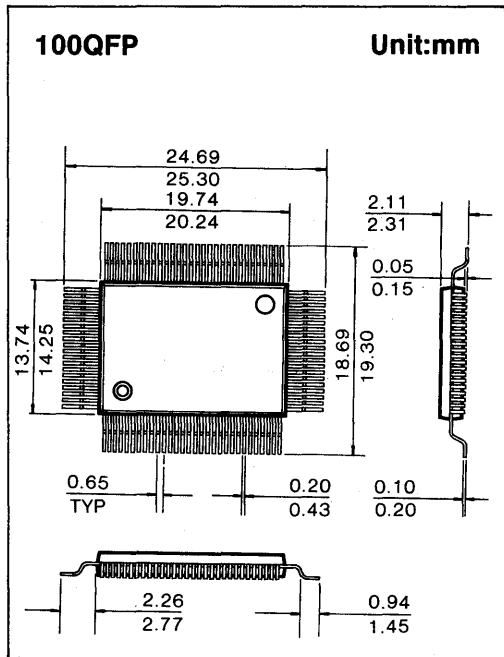
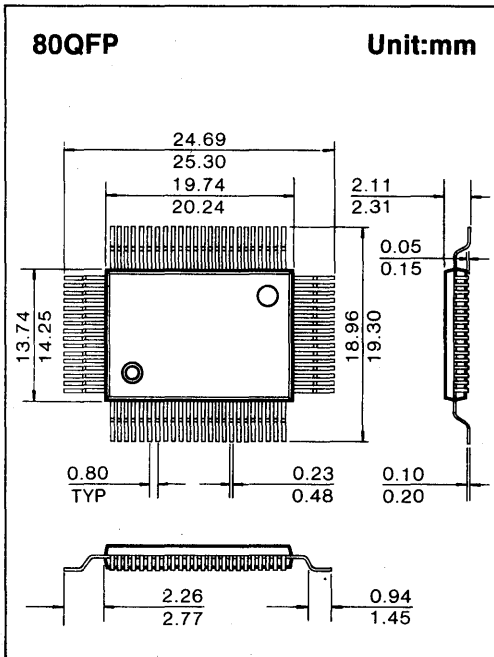
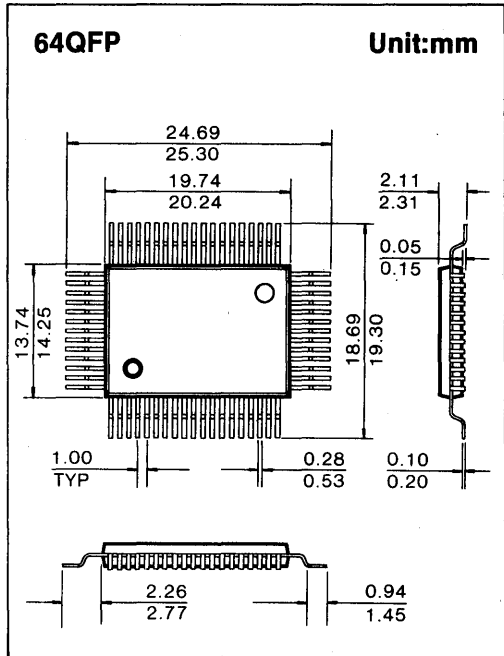
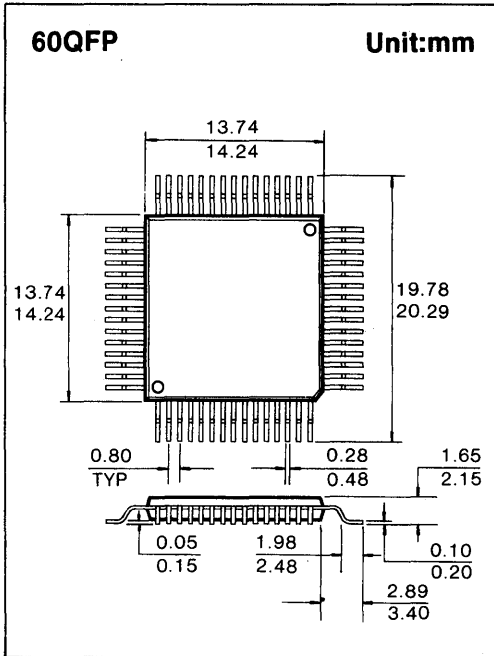


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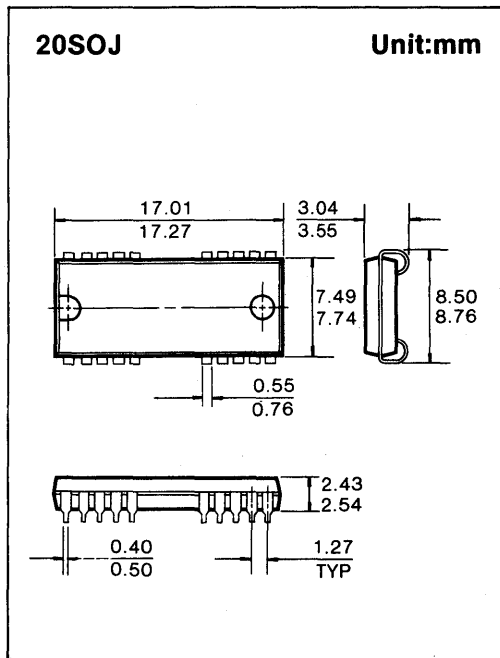
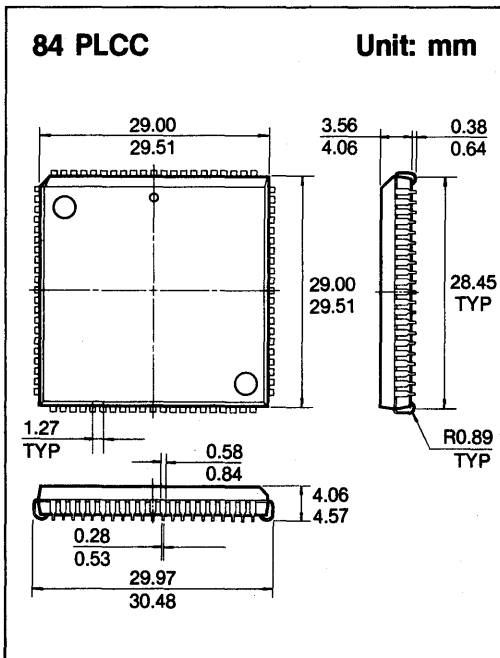
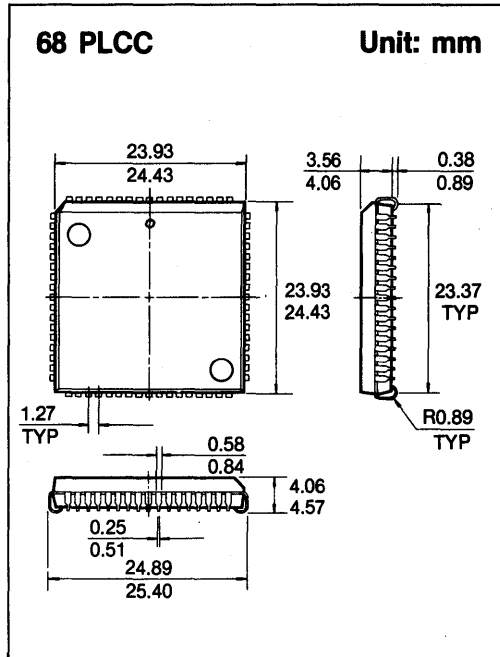
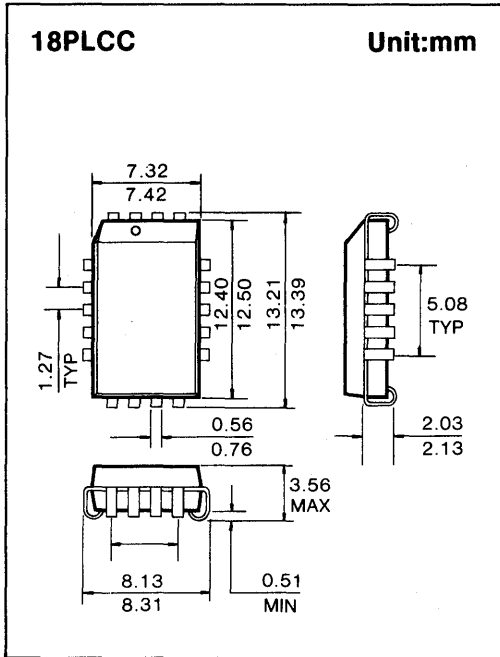


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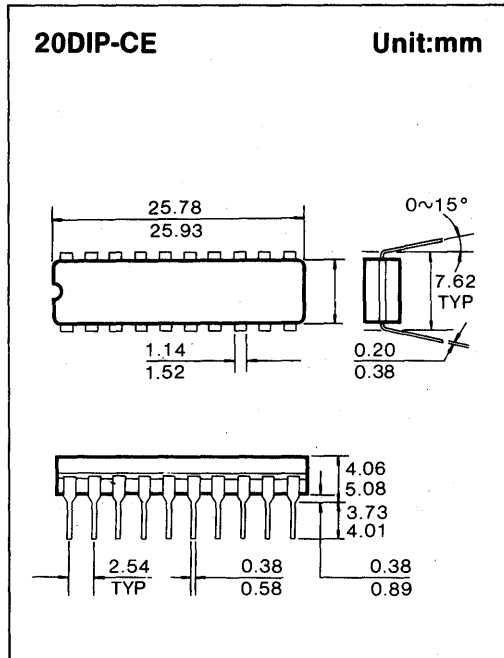
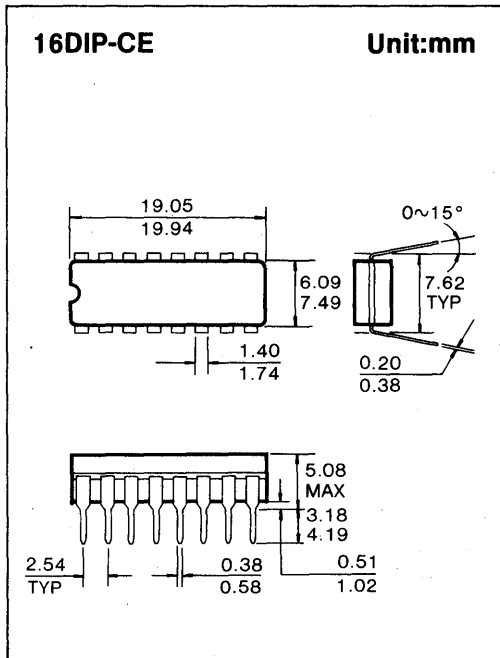
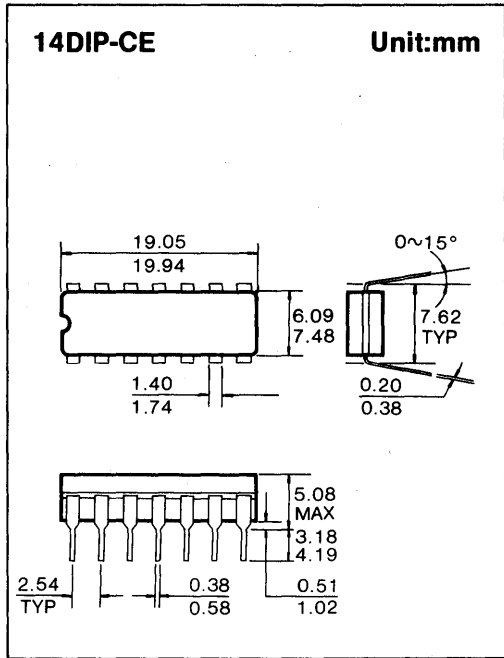
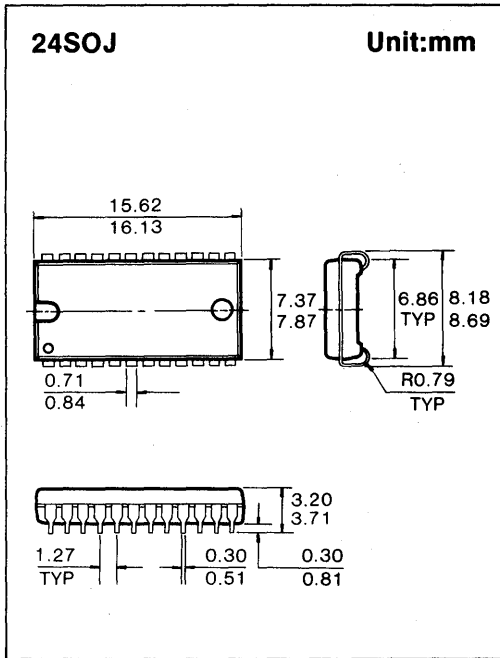


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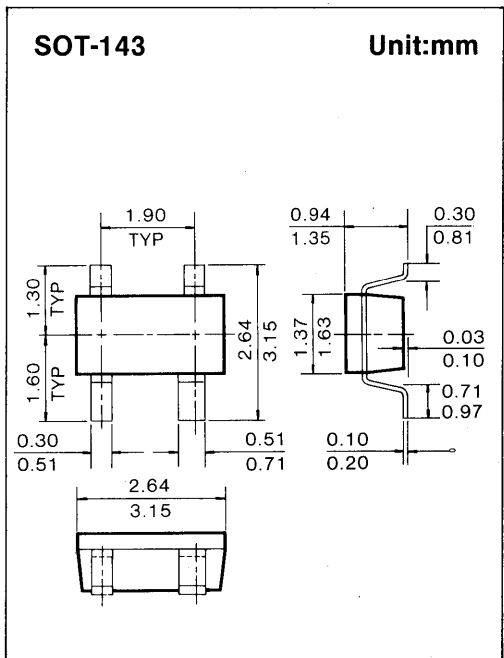
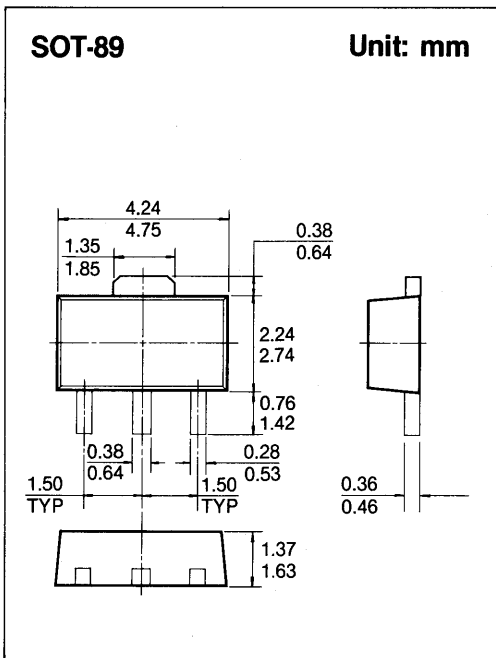
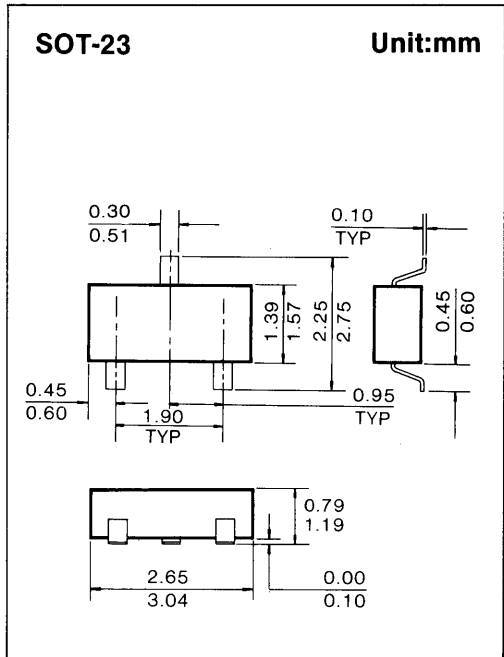
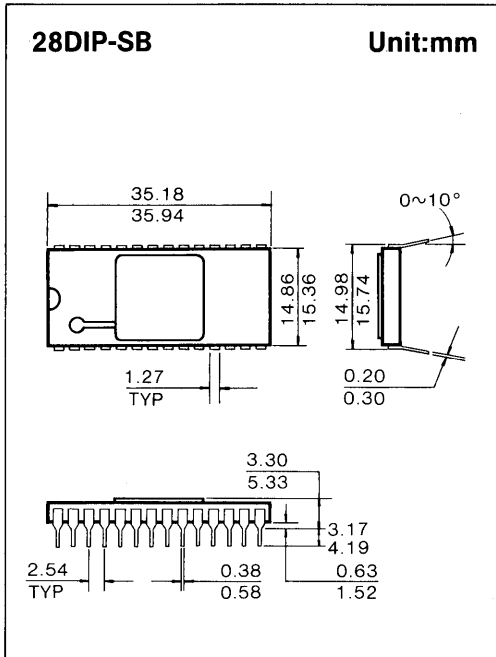


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PACKAGE DIMENSIONS

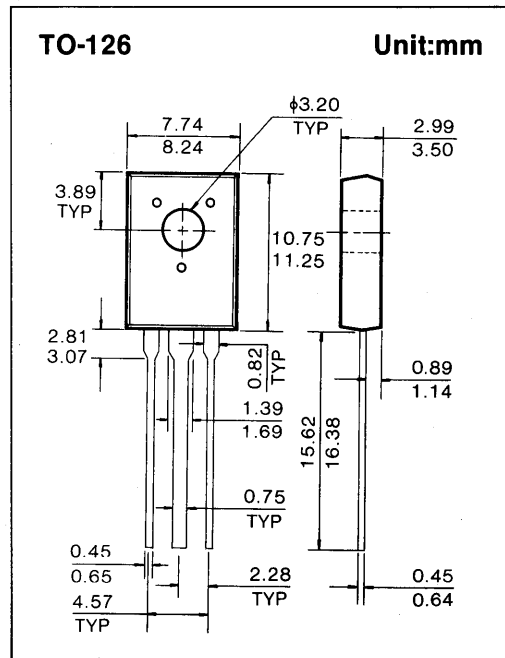
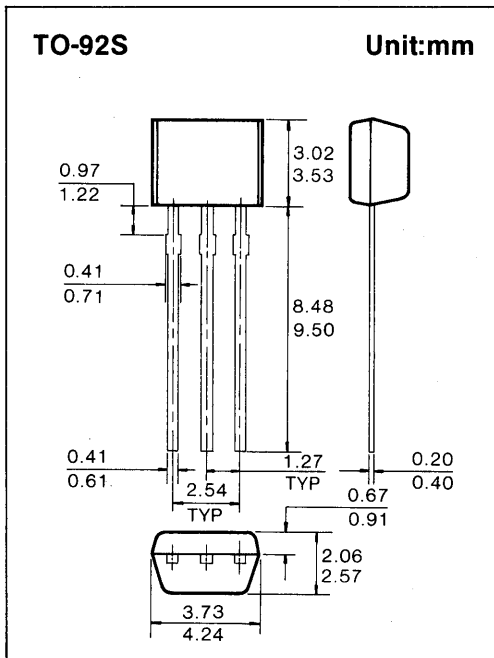
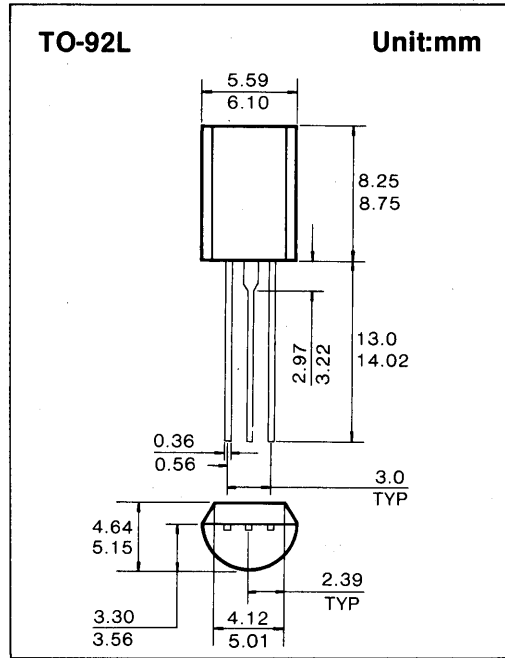
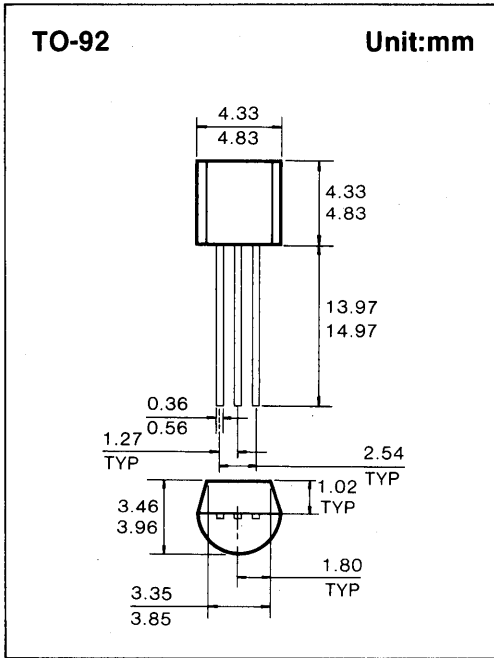


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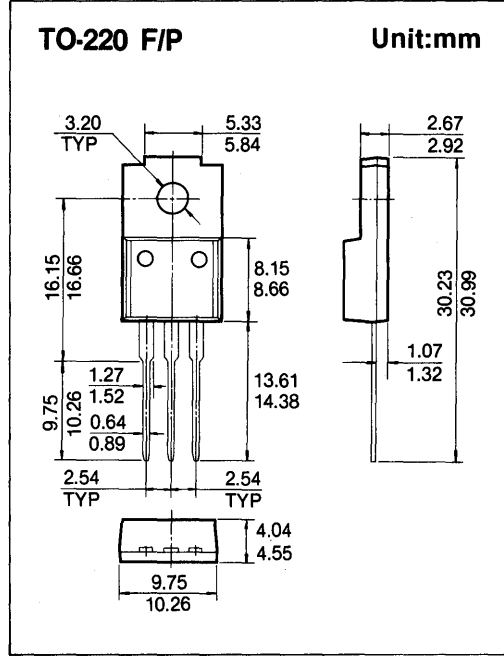
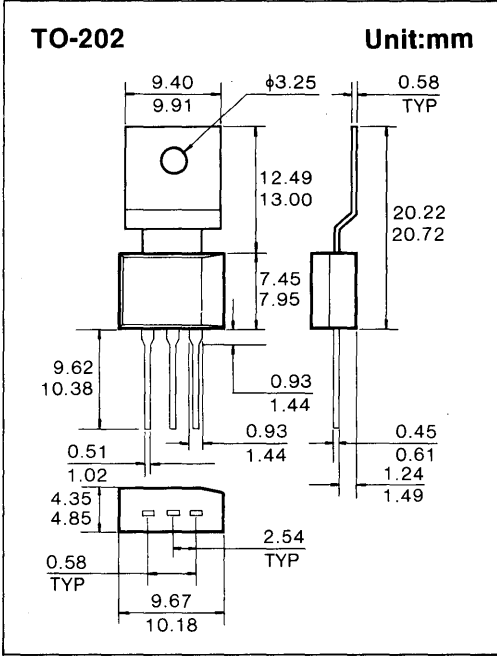


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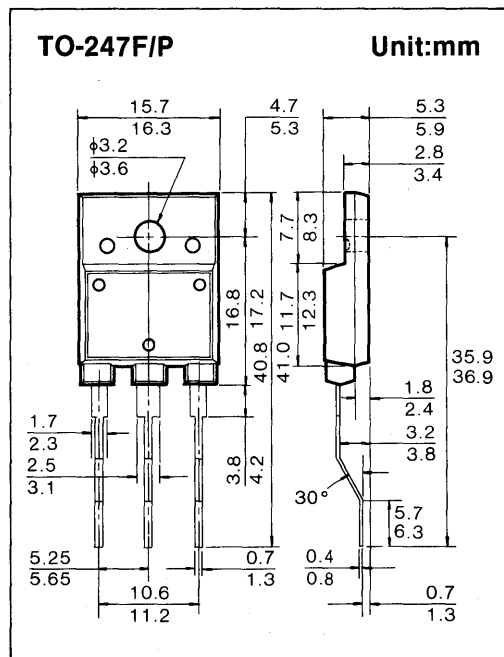
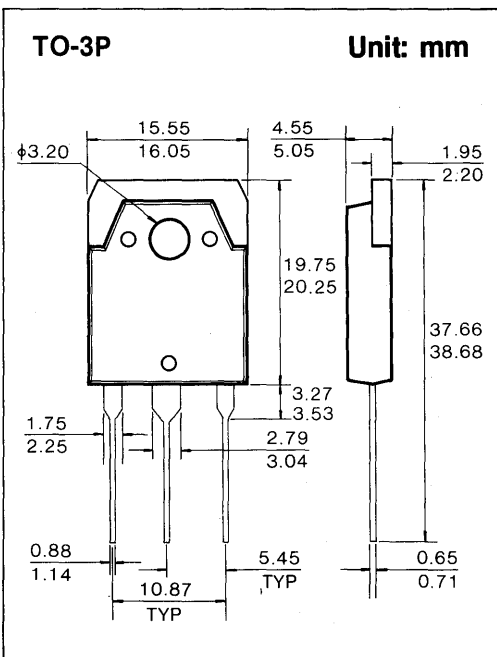
PACKAGE DIMENSIONS



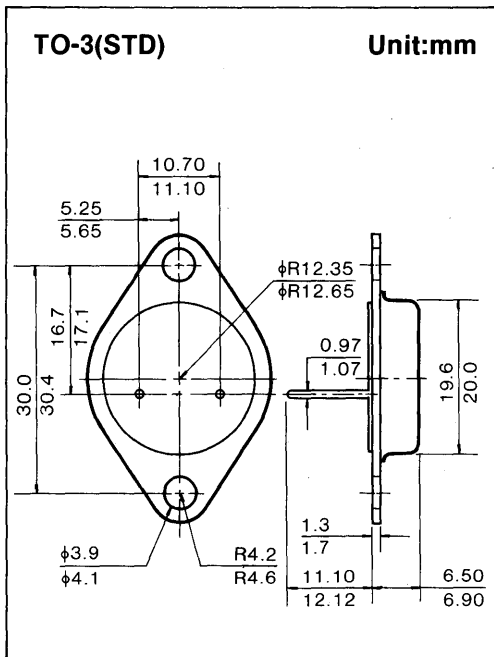
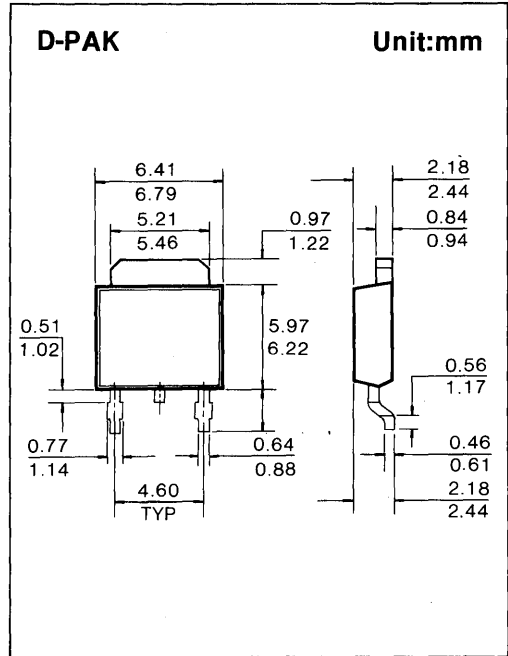
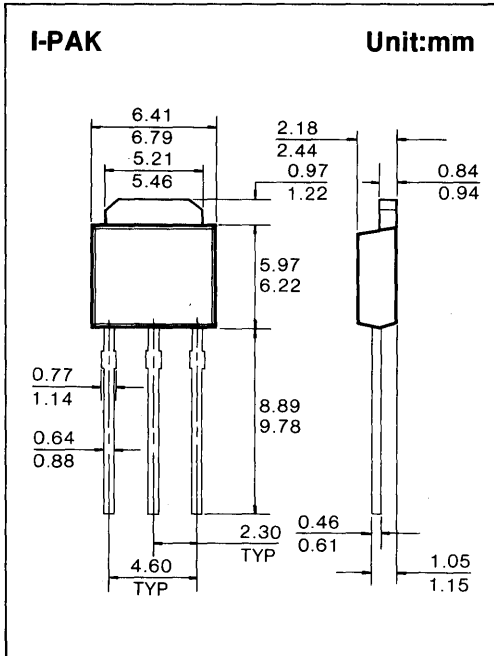
PACKAGE DIMENSIONS



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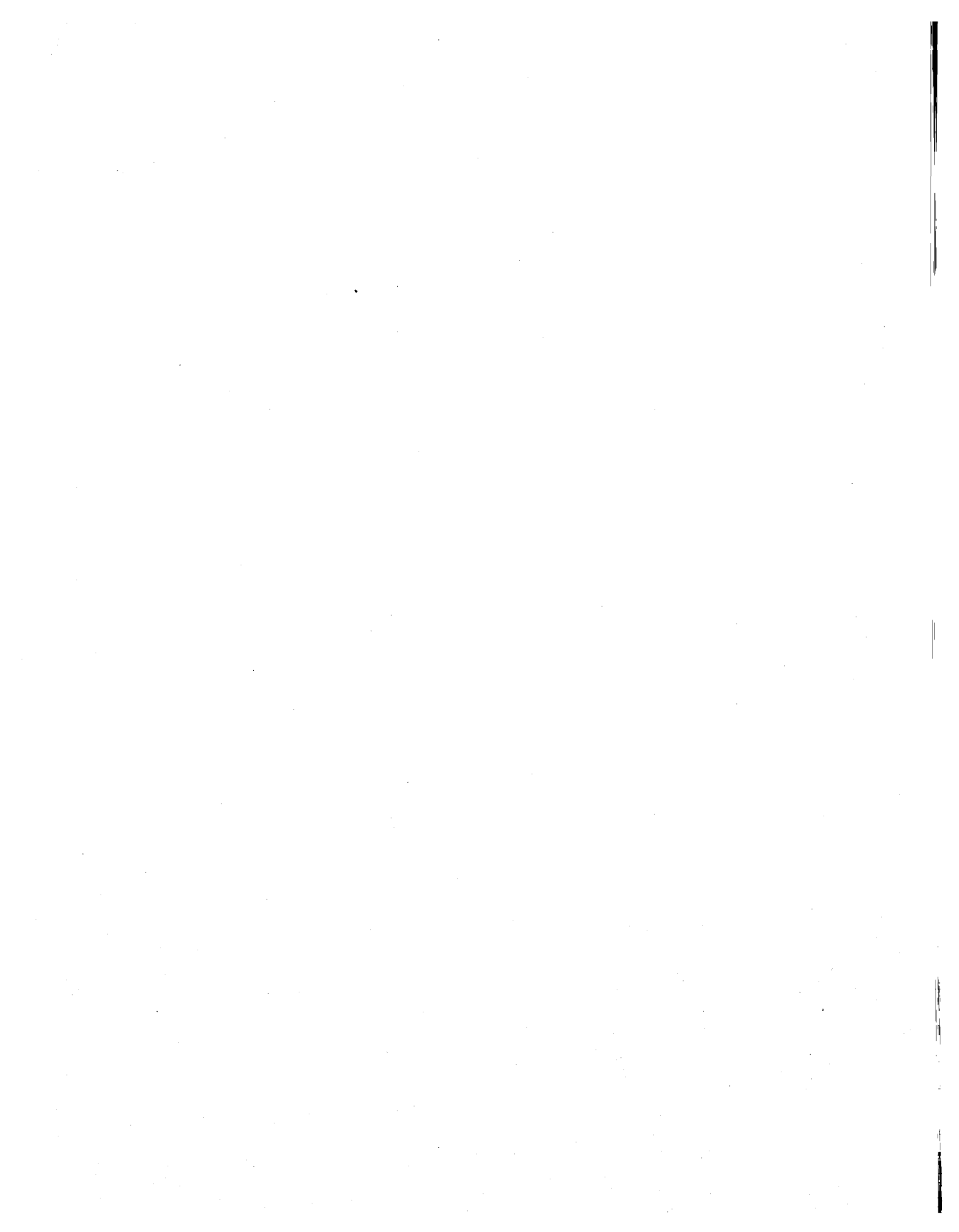


PACKAGE DIMENSIONS

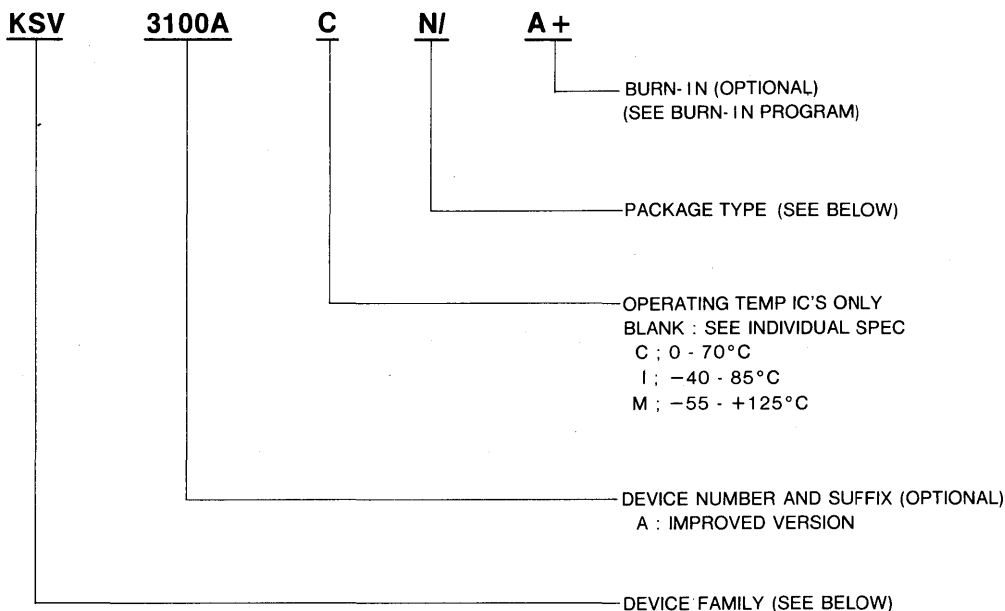




ORDERING INFORMATION 5



ORDERING INFORMATION



5

DEVICE FAMILY

TRANSISTOR / FET

- DKS DALINGTON TR
- IRF MOS POWER
- IRFA MOS POWER, TO-126
- IRFP MOS POWER, TO-3P
- KSA PNP TR
- KSB PNP TR
- KSC NPN TR
- KSD NPN TR
- MMBT TR, SOT-23
- MMBTA TR, SOT-23
- MMBTH TR, SOT-23
- MPS TR, SOT-23
- MPSA TR, TO-92
- MPSH TR, TO-92
- PN TR, TO-92
- SSH MOS POWER, TO-3P
- SSM MOS POWER, TO-3
- SSP MOS POWER, TO-220
- TIP BIPOLAR TR
- 2N TR

INTEGRATED CIRCUIT

- KA LINEAR IC
- KG GATE ARRAY
- KS CMOS IC
- KT TELECOM
- LM NATIONAL
- MC MOTOROLA
- NE SIGNETICS
- SA LINEAR ARRAY
- SD H.L AND LINERA ARRAY
- KSV A/D-D/A CONVERTER
- KAD A/D CONVERTER
- KDA D/A CONVERTER

PACKAGE TYPE

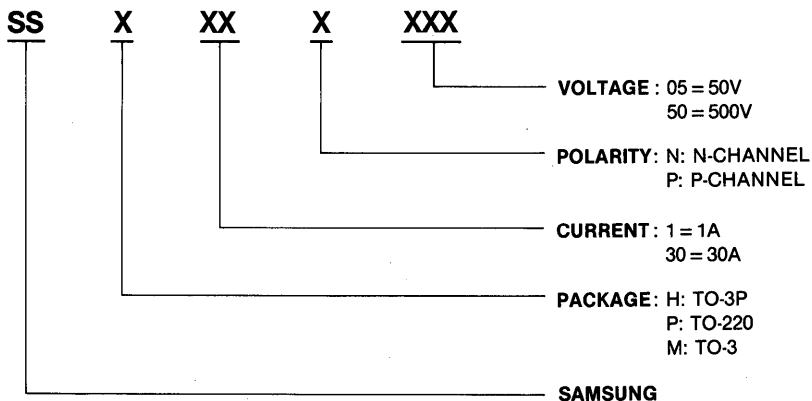
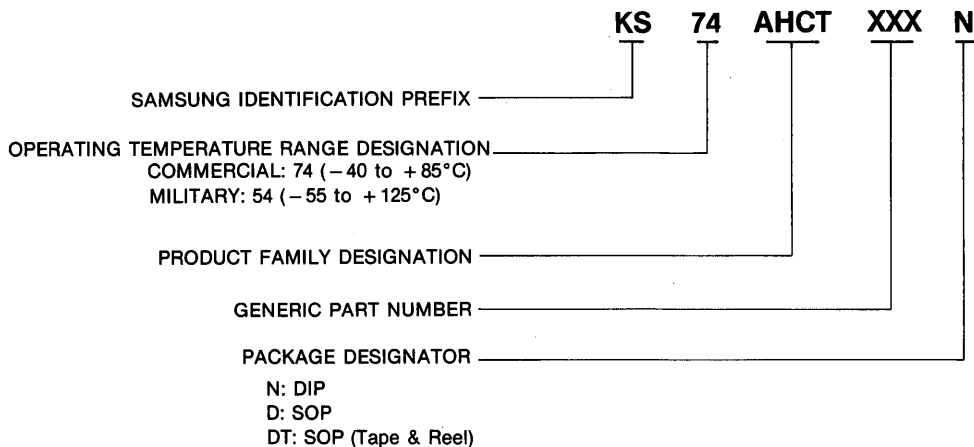
IC'S ONLY

- D SOP
- DT D-PACK
- J CERAMIC
- K TO-3P
- L LCCC
- N PLASTIC
- PL PLCC
- R TO-126
- T TO-220
- Z TO-92
- V TO-92L
- W ZIP
- S SIP
- G BARE CHIP
- E SSM

• NOTE: Direct-Replacement parts for products initiated by other manufacturers

ORDERING INFORMATION

HIGH SPEED CMOS LOGIC ICS

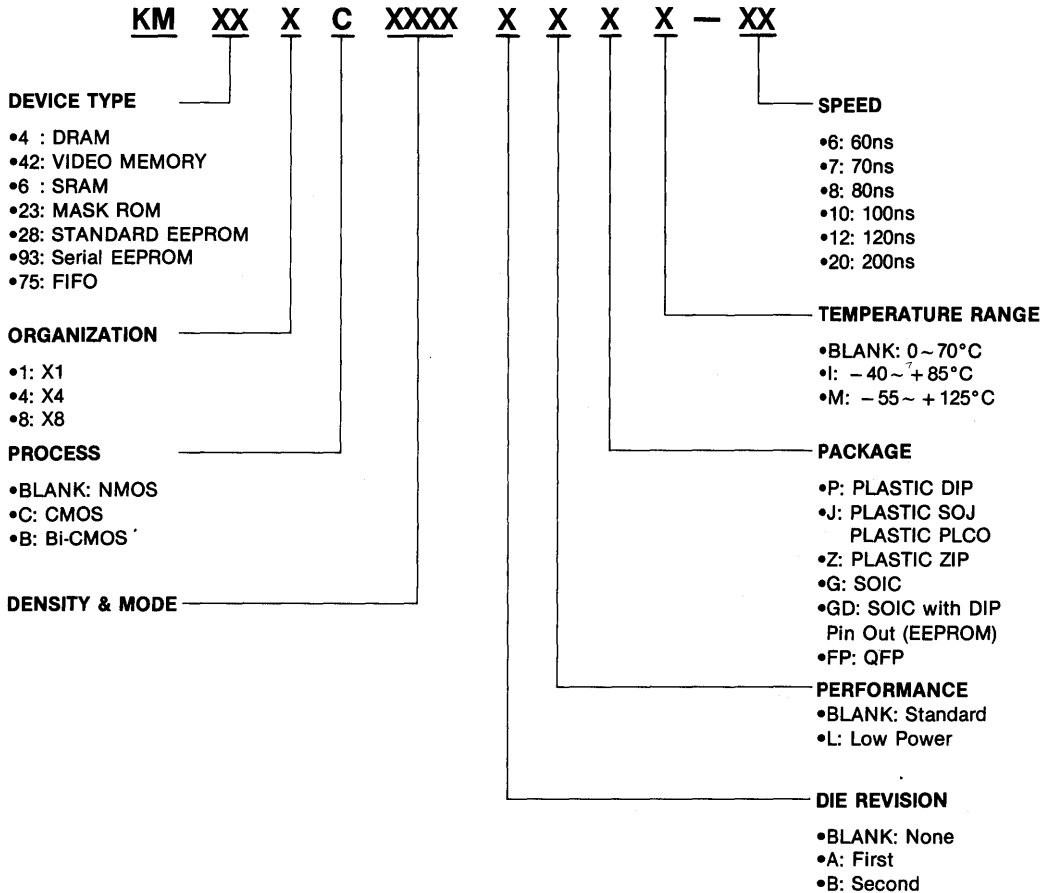


IRFP100 THRU 400 SERIES : TO-3P N-CH
 IRFP9100 THRU 9200 SERIES : TO-3P P-CH
 IRF500 THRU 800 SERIES : TO-220 N-CH
 IRF9500 THRU 9600 SERIES : TO-220 P-CH
 IRF100 THRU 400 SERIES : TO-3 N-CH
 IRF9100 THRU 9400 SERIES : TO-3 P-CH
 IRFA120 : TO-126 N-CH

ORDERING INFORMATION

MEMORY DEVICES

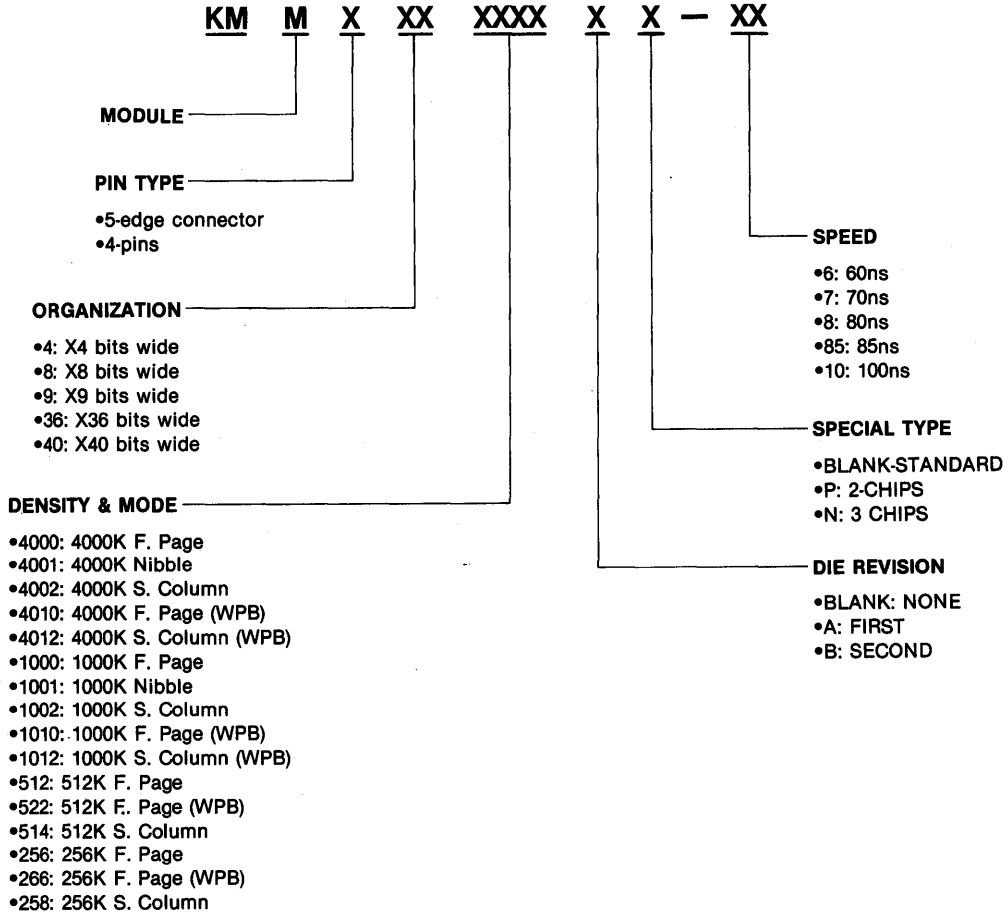
1 COMPONENT



5

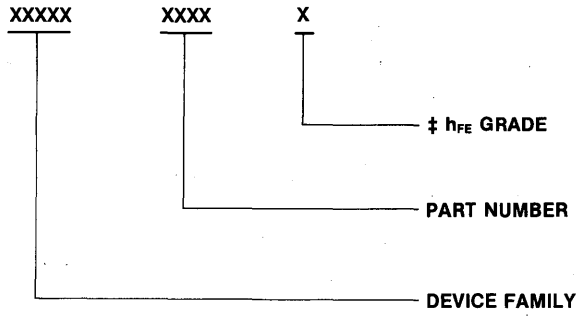
ORDERING INFORMATION

2. MODULE



ORDERING INFORMATION

BIPOLAR TRANSISTOR



† h_{FE} GRADE SEE INDIVIDUAL SPEC.

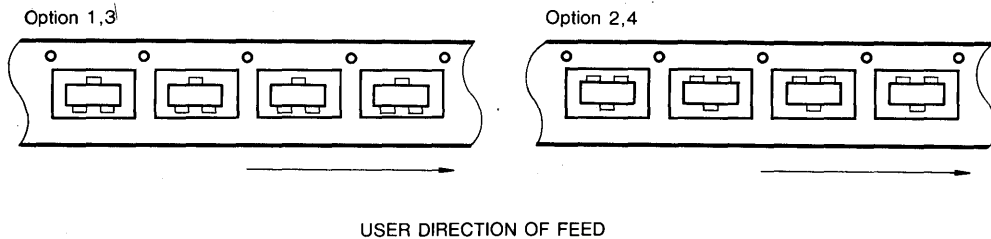
ORDERING INFORMATION

SOT-23 TAPE AND REEL SPECIFICATION

Samsung's tape and reel fully meets EIA standard RS481 (8mm Type) all parts will automatically be shipped in tape and reel unless customer specifies otherwise.

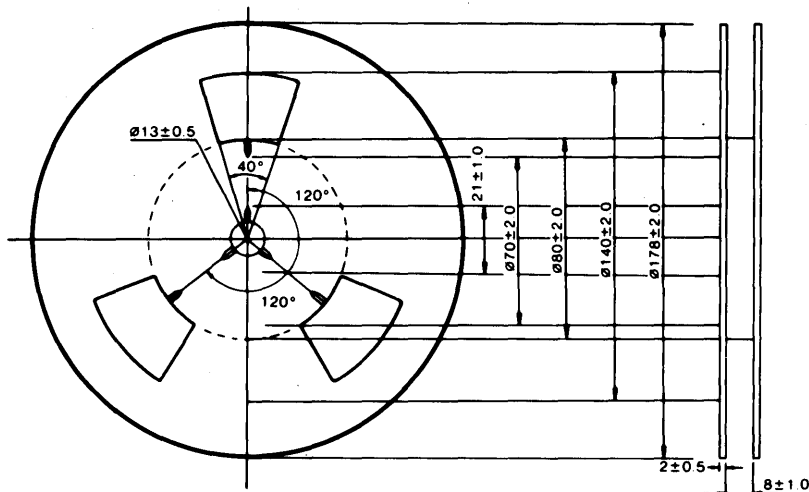
4 Options are available according to the suffix added to the device number.

DEVICE SUFFIX	OPTION	Q'TY PER REEL	MINIMUM ORDER
T1 or T2	1,2	3000	1 REEL
T3 or T4	3,4	10000	1 REEL



CARRIER TAPE REELS

Unit: mm



ORDERING INFORMATION

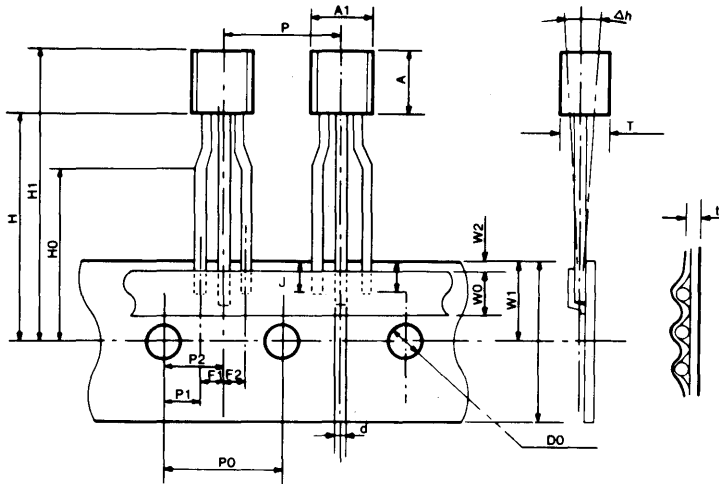
TO-92 ORDERING INFORMATION

AMMO PACK and BULK TYPE are available.

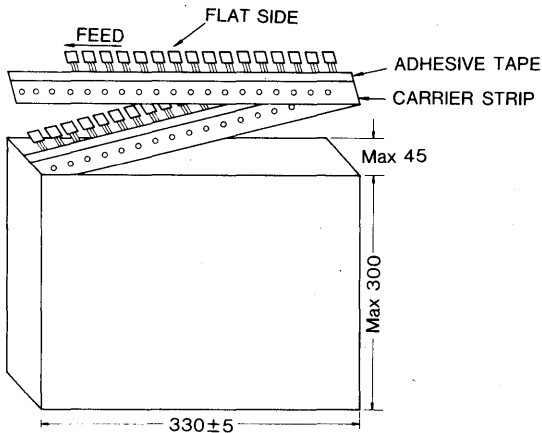
The device will automatically be shipped in bulk type unless "AMMO PACK" is indicated

AMMO PACK

TO-92 TAPING SPECIFICATION



P	12.7±0.5	H ₀	16±0.5
P ₀	12.7±0.2	F	5.0 ^{±0.1}
P ₁	3.85±0.5	F ₁ , F ₂	±0.3
P ₂	6.35±0.5	D ₀	4±0.2
W	18 ^{±0.2}	t	0.65±0.2
W ₀	6±0.5	Δh	C±1
W ₁	9±0.5	d	0.46
W ₂	Max. 0.5	T	3.56
H	Max. 21	L ₁	Min. 2.5
H ₁	Max. 27		



FLAT SIDE OF TRANSISTOR and ADHESIVE TAPE VISIBLE

1 AMMO PACK contains 2000 pcs Transistors.

SAMSUNG's AMMO PACK is equivalent to styles A,B,C,D of reel pack depending on which box-flat is opened and which end of the box the devices are fed from.

Minimum Order Quantity is 1 AMMO PACK.
Increment is 1 AMMO PACK

BULK TYPE

Minimum Order Quantity is 2000 pcs.
Increment is 1000pcs.

ORDERING INFORMATION

SAMSUNG'S A+ Program

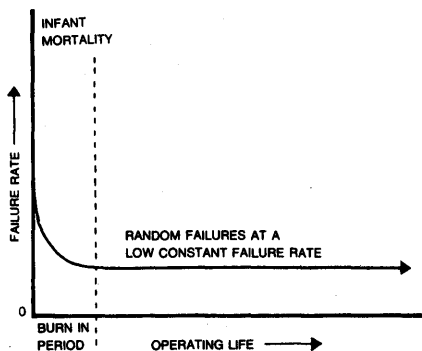
The Samsung A+ Program has been designed to offer the customer an alternative to standard off-the-shelf plastic encapsulated CMOS circuits. The A+ Program will significantly reduce incoming inspection requirements as well as early device failures (infant mortality). These results are achieved by a tightened AQL inspection plan and a burn-in of each unit for 160+8, -0 hours at 125°C or equivalent conditions established from a time/temperature regression curve.

The AQL Plan. Acceptable Quality Levels (AQL) are a measure of the quality of outgoing CMOS circuits. These levels are established by the manufacturer to show the process percent defective being produced and to ensure that the customer is receiving material that meets his requirements. The Samsung A+ Program has tightened these AQL levels to a point at which incoming inspection by the customer is no longer a necessity. A+ product quality is monitored significantly more closely than standard product; those lots which fall the AQL level are 100% reworked before resubmission to the AQL gate.

The Reliability Plan. Reliability is the statistical probability that a product will give satisfactory performance for a specified period of time when used under specified conditions. A typical rate curve is shown below:

Reliability theory assumes that devices fail according to the above curve. When a group of devices is manufactured a small portion of the units will be inherently weaker than the average. These weak units will probably fail during the first few hours of operation—hence the term "infant mortality." If the units are burned-in however, thereby allowing the weak units to fail, there is a much lower probability that those finally put into system use will fail.

The SAMSUNG A+ Flow. In order to achieve an extremely high quality unit and reduce infant mortality failures the following flow has been established:



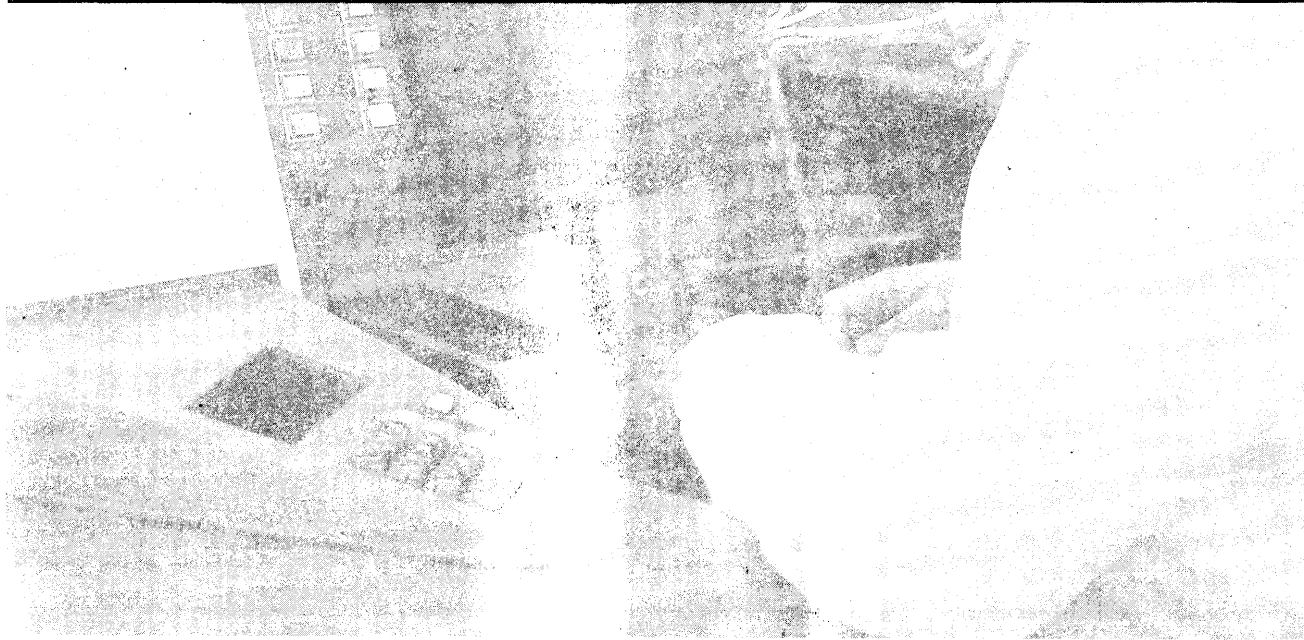
Process Flow

	DESCRIPTION
□	WAFER FABRICATION CMOS PROCESS CV PLOTS OXIDE AND NITRIDE THICKNESS MEASUREMENTS OPTICAL INSPECTIONS SEM ANALYSIS
□	ENCAPSULATION NITTO HC10 TYPE 2 EPOXY MOLDING COMPOUND ULTRA PURE FOR CMOS APPLICATIONS
□	POST MOLD BAKE 6 HOURS AT 175 DEG. C. CURES PLASTIC STRESSES ALL WIRE BONDS AND DIE
□	O/S FUNCTIONAL ELECTRICAL 100% TESTING OPENS/SHORTS AND INTERMITTENTS REMOVE
□	HIGH TEMPERATURE BURN-IN 160 HOURS AT 125 DEG. C. OR EQUIVALENT CONDITIONS ESTABLISHED FROM A TIME/ TEMPERATURE REGRESSION CURVE. 0.98 eV
□	FULL FUNCTIONAL AND PARAMETRIC ELECTRICAL TESTING 100% ELECTRICAL TESTING AC, DC 88 DEG. C.
■	THERMAL SHOCK MONITOR -65 DEG. C. TO + 125 DEG. C. LIQUID TO LIQUID 5 CYCLES- SAMPLES SELECTED AT RANDOM
□	TIGHT AQL SAMPLING PLAN ELECTRICAL-0.05% AQL AT 88 DEG. C. MECHANICAL-0.01% AQL CRITICAL & MAJOR
□	SHIP UNITS



**SALES OFFICES and
MANUFACTURER'S REPRESENTATIVES**

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<p style="text-align: center;">Southeast</p> <p>204 Battleground Corporate Park 3859 Battleground Ave. Greensboro, NC 27410 (919) 282-0665 FAX: (919) 282-0784</p>	<p style="text-align: center;">South Central</p> <p>15851 Dallas Parkway Suite 840 Dallas, TX 75248-3307 (214) 770-7970 FAX: (214) 770-7971</p>	<p style="text-align: center;">North Central</p> <p>901 Warrenville Road Suite 120 Lisle, IL 60532-1359 (708) 852-2011 FAX: (708) 852-3096</p>	<p style="text-align: center;">North East</p> <p>20 Burlington Mall Road Suite 205 Burlington, MA 01803 (617) 273-4888 FAX: (617) 273-9363</p>

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FAX: (407) 799-0923

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 FAX: 0032-2-2 42 89 30
 TLX: 046-2 58 20

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EXATEC ALS
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 FAX: 0033-1-47 60 15 82
 TLX: 042-61 38 90

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 6, Rue Le Corbusier
 Sillic 424
 F-94583 Rungis, Cedex
 TEL: 0033-1-46 86 81 70
 FAX: 0033-1-45 60 55 49
 TLX: 042-20 69 52

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 TLX: 85 2189

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 D-8000 München 22
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 FAX: (49)-0-89-2303 52 80
 TLX: 17 89 84 53

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 D-3000 Hannover 72
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 FAX: (49)-0-89-61 31 668
 TLX: 5 21 61 87

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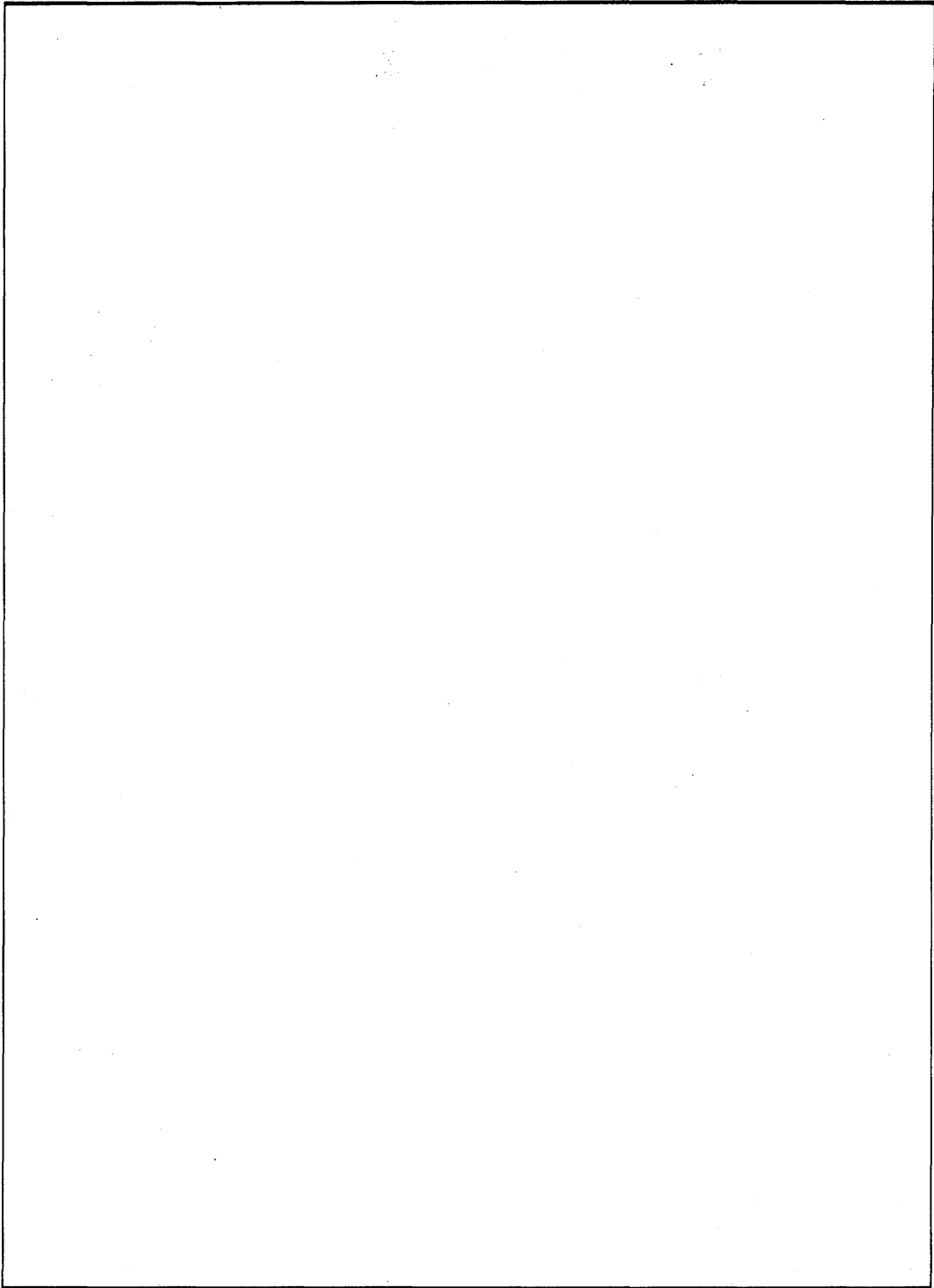
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