



Model:SC-140

# CD-ROM service manual

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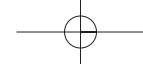


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The design and part of this product is subject to change without prior notice for performance improvement.



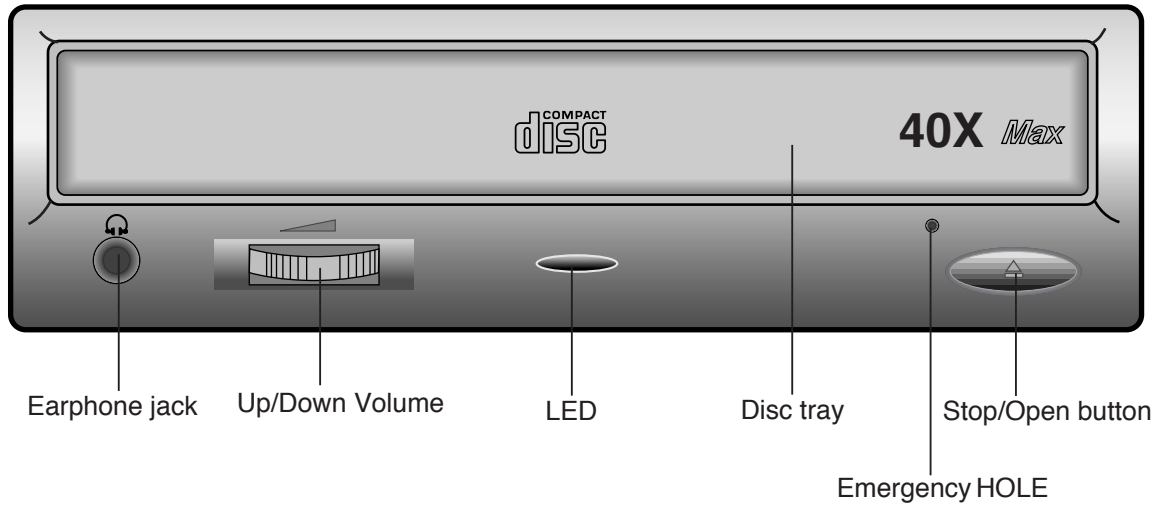
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MARCH, 1999  
Printed in Korea  
Code No.: BG68-00045A



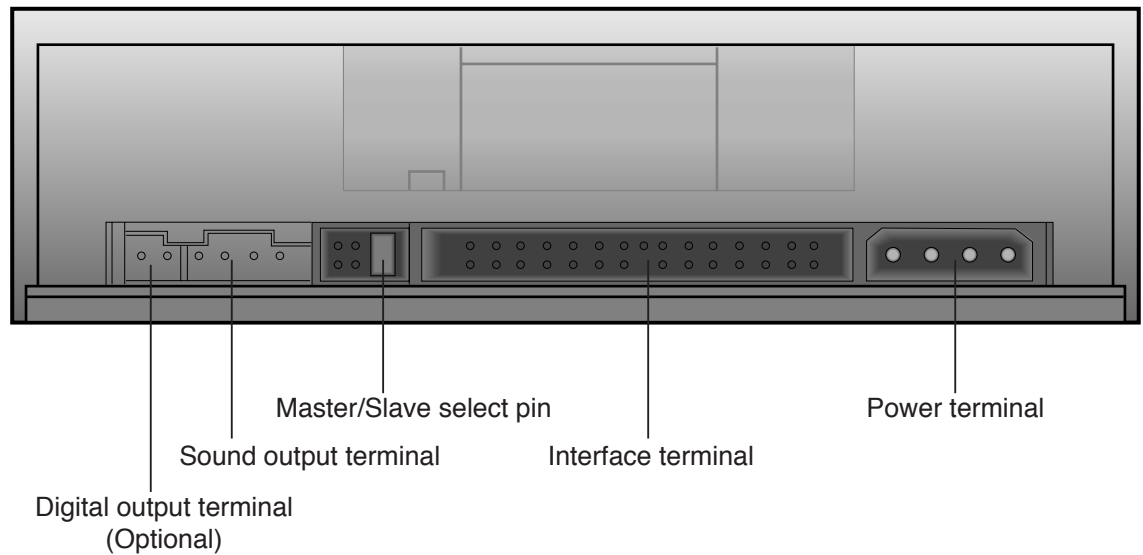
# External Part Name



## 1.Front



## 2.Rear



# Specifications

## 1. General Specifications

- Drive type : Computer built-in
- Power consumption : DC + 5V, 1.7A  
DC + 12V, 1.0A
- Dimensions : 149mm(W)X41.5mm(H)X202.6mm(L)
- Net Weight : 950g
- Frequency response : 20Hz~20KHz (Limeout)  
100Hz~20KHz (H/pout)
- Signal to noise ratio : 75dB(1KHz, Limeout)  
65dB(1KHz, H/pout)
- Distortion factor : 0.15% Less than(1KHz)
- Channel separation : 65dB(1KHz, Limeout)  
55dB(1KHz, H/pout)

## 2. Electrical Features

- Interface : ATAPI BUS(IDE)
- Data transfer rate 6000KByte/Sec MAX  
(3100KByte/Sec AVG.)
- ACCESS TIME : 1/3 stroke : Below 120msec  
full stroke : Below 190msec
- Buffer Capacity : 128Kbyte
- Error ratio : Mode 1: Below  $10^{-12}$   
Mode 2: Below  $10^{-9}$
- Signal output level : LINEOUT : 0.7 Vrms( $\pm 20\%$ )  
H/PHONE : 0.6 Vrms( $\pm 20\%$ )
- Used laser : Semiconductor laser

# Cautions at Service

## 1. General Items

- 1) Be careful not to have your eyes or a part of body touch with laser diode at repair because this product uses laser diode.
- 2) Do not disassemble Pick-up at repair. If the laser diode is bad, replace the entire Pick-up.
- 3) Keep away from TV or other electrical units at repair to prevent influence from surrounding units.
- 4) If you replace the parts during repair, be sure to unplug the power cable before replacement.
- 5) If you insert a disc into the drive, be sure to load it correctly.
- 6) Because this unit can't be used by itself, surely mount it on PC (486 DMA support) and check the operations in use of private device driver floppy diskette. Refer to Instruction manual.
- 7) This unit has many parts with features related to safety and especially, for essential parts, the importance is indicated on circuit diagram and part list.  
Be certain to use the parts with same specifications at replacing these parts.

## 2. Earthing cautions at handling Pick-up

- Because the laser diode in optical Pick-up is subject to get out of order due to the potential difference occurring by electricity load charged in clothes or bodies, observe the following earthing items at handling.
  - 1) Body earthing(hand) : Be sure to wear a wrist strip with one side earthed.(Impedance : Below 104). It removes the electricity formed in body.
  - 2) Work table earthing : Put the earthed conductive plate(Impedance : Below 104) such as copper plate on work table.
  - 3) Cautions for clothes : Do not have any clothes touch with Pick-up because the electricity formed in clothes is destroyed easily.



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## Disassembly Method

### 1. COVER BOTTOM ASSY disassembly

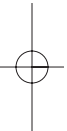
Remove 4 screws ③① on the bottom of COVER BOTTOM ASSY, lift the back up and disassemble ③①COVER BOTTOM ASSY as shown in the figure of the next page.

### 2. COVER-TOP disassembly

After disassembling 6 hooks of FRONT ASSY ②⑨ from COVER TOP ③⑩, pull COVER TOP ③⑩ forward and disassemble it.

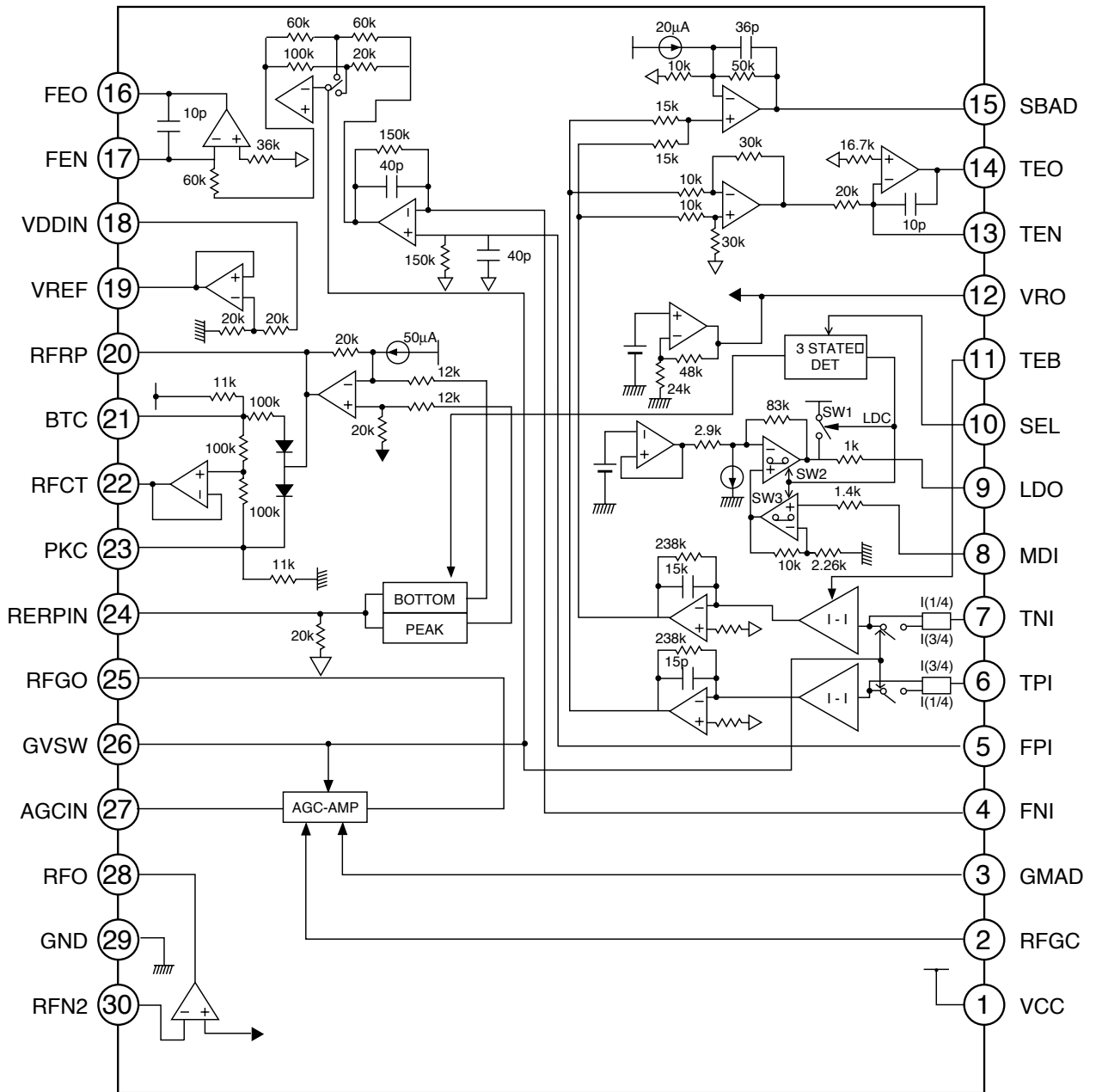
### 3. ASSY DECK+PCB MAIN disassembly

Disassemble FPC PICK-UP ②④ and FPC MOTOR ②⑤ connected between assy deck and PCB main, then disassemble between deck and PCB main.



# Main Components Block Diagram and Pin Description

## TA2140FN(I.C.-RF)



**PIN DESCRIPTIONS**

<b>PIN NO</b>	<b>PIN NAME</b>	<b>FUNCTION</b>
1	VCC	POWER SOURCE/VOLTAGE TERMINAL
2	RFGC	RF FREQUENCY CONTROL SIGNAL INPUT TERMINAL
3	GMAD	OPEN-LOOP GAIN CONTROL TERMINAL OF AGC AMP
4	FNI	MAIN BEAM AMP INPUT TERMINAL
5	FPI	MAIN BEAM AMP INPUT TERMINAL
6	TPI	SUB BEAM AMP INPUT TERMINAL
7	TNI	SUB BEAM AMP INPUT TERMINAL
8	MDI	MONITOR PHOTO-DIODE AMP INPUT TERMINAL
9	LDO	LASER DIODE AMP OUTPUT TERMINAL
10	SEL	INTERNAL GAIN AND SIGNAL SWITCH TERMINAL
11	TEB	TRACKING BALANCE CONTROL SIGNAL INPUT TERMINAL
12	VRO	STANDARD VOLTAGE RATING TERMINAL(VRO,2.1V)
13	TEN	TRACKING ERROR SIGNAL GENERATING AMP REVERSE INPUT TERMINAL
14	TEO	TRACKING ERROR SIGNAL GENERATING AMP OUTPUT TERMINAL
15	SBAD	SUB BEAM ADDITIONAL OUTPUT TERMINAL
16	FEO	FOCUS ERROR SIGNAL GENERATING AMP OUTPUT TERMINAL
17	FEN	FOCUS ERROR SIGNAL GENERATING AMP REVERSE INPUT TERMINAL
18	VDD	3.3V POWER SOURCE VOLTAGE TERMINAL
19	VREF	VOLTAGE RATING (VREF,1.6V) OUTPUT TERMINAL
20	RFRP	SIGNAL GENERATING AMP OUTPUT TERMINAL FOR TRACK COUNTER
21	BTC	RECT SIGNAL GENERATING BOTTOM DETECTOR CONTROL TERMINAL
22	RFCT	RFRP SIGNAL CENTER LEVEL OUTPUT TERMINAL
23	PKC	RFCT SIGNAL GENERATING PEAK DETECTOR CONTROL TERMINAL
24	RFRPIN	SIGNAL GENERATING AMP INPUT TERMINAL FOR TRACK COUNTER
25	RFGO	RF SIGNAL AMPLITUDE ADJUSTING AMP INPUT TERMINAL
26	GVSW	AGC,TE, FE AMP GAIN SWITCH TERMINAL
27	AGCIN	RF SIGNAL AMPLITUDE ADJUSTING AMP INPUT TERMINAL
28	RFO	RF SIGNAL GENERATING AMP OUTPUT TERMINAL
29	GND	GND TERMINAL
30	RFN2	RF SIGNAL GENERATING AMP INPUT TERMINAL

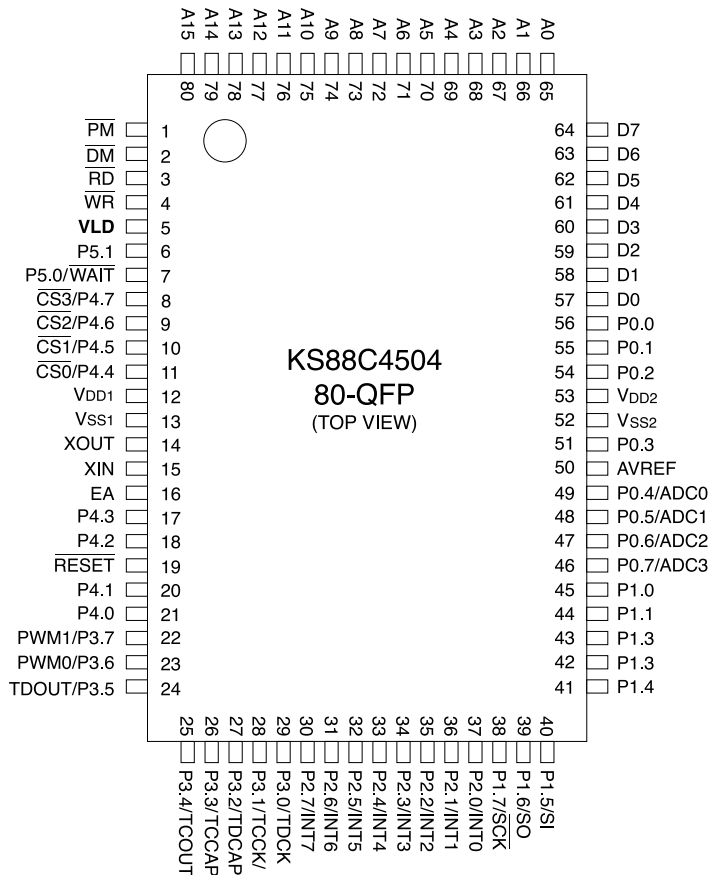
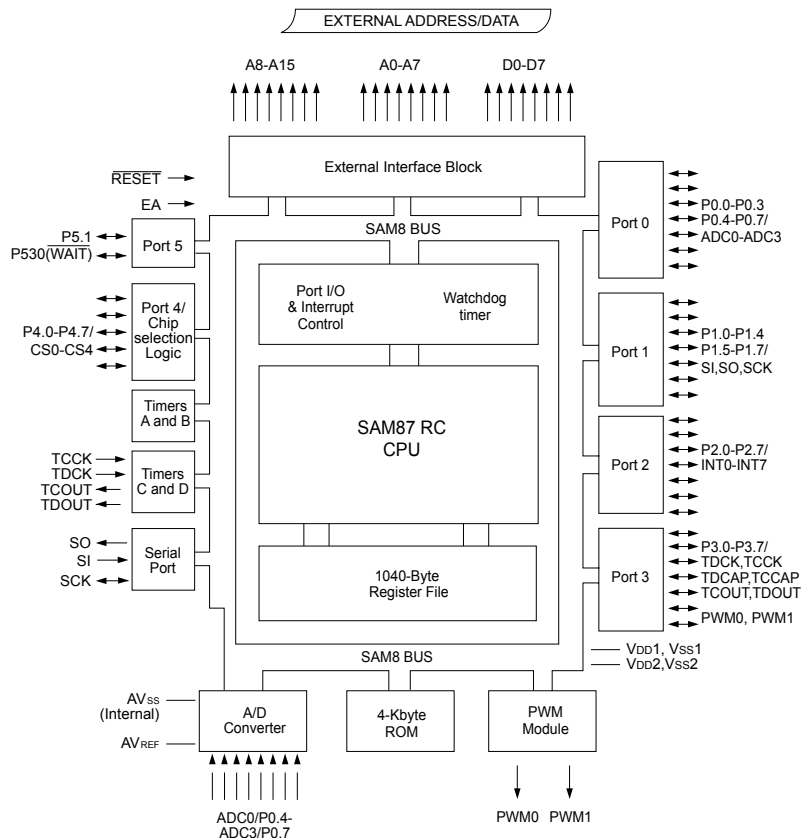




## PIN DESCRIPTIONS

NO	SYMBOL	DESCRIPTIONS	NO	SYMBOL	DESCRIPTIONS
1	VSS3	DIGITAL GND TERMINAL	51	VDD3	DIGITAL +3.3V POWER SOURCE TERMINAL
2	BCK	BIT CLOCK OUTPUT TERMINAL (1.411MHz)	52	SEL	AUTO POWER CONTROL ON/OFF SIGNAL OUTPUT TERMINAL
3	AOUT	AUDIO DATA OUTPUT TERMINAL	53	FLGA	INTERNAL SIGNAL CHECKING FLAG TERMINAL
4	DOUT	DIGITAL DATA OUTPUT TERMINAL	54	FLGB	INTERNAL SIGNAL CHECKING FLAG TERMINAL
5	MBOV	BUFFER MEMORY OVER SIGNAL OUTPUT TERMINAL	55	FLGC	INTERNAL SIGNAL CHECKING FLAG TERMINAL
6	IPF	COMPLEMENTARY BLOCK OUTPUT TERMINAL	56	FLGD	INTERNAL SIGNAL CHECKING FLAG TERMINAL
7	SBOK	CRCC RESULT OUTPUT TERMINAL FOR SUBCODE Q DATA	57	VDD3	DIGITAL +3.3V POWER TERMINAL
8	CLKK	SUBCODE P-W DATA READ CLOCK TERMINAL	58	VSS3	DIGITAL GND
9	VDD3	DIGITAL +3.3V POWER TERMINAL	59	I00	GENERAL I/O TERMINAL
10	VSS5	DIGITAL GND TERMINAL	60	I01	GENERAL I/O TERMINAL
11	DATA	SUBCODE P-W OUTPUT TERMINAL	61	I02	GENERAL I/O TERMINAL
12	SFSY	PLAY DEVICE FRAME SYNC SIGNAL OUTPUT TERMINAL	62	I03	GENERAL I/O TERMINAL
13	SBSY	SUBCODE BLOCKING OUTPUT TERMINAL	63	/DMOUT	100-1 OUTPUT MODE SELECT TERMINAL
14	SPCK	DSP INTERNAL STATUS CHECKING CLOCK TERMINAL	64	/CKSE	OSCILLATING DEVICE SELECT TERMINAL
15	SPDA	DSP STATUS OUTPUT TERMINAL	65	/DACT	DIGITAL/ANALOG CONVERT TEST TERMINAL
16	COFS	ERROR CORRECTION CLOCK (7.35 MHz)/OUTPUT TERMINAL	66	FGIN	DIGITAL/ANALOG CONVERT TEST TERMINAL
17	MONIT	DSP INTERNAL STATUS OUTPUT TERMINAL	67	TESI01	TEST INPUT TERMINAL
18	VDD5	DIGITAL +5V TERMINAL	68	TESIN	TEST INPUT TERMINAL
19	TEST00	TEST TERMINAL	69	TEST0	TEST TERMINAL
20	AWRC	VCO OUTPUT TERMINAL FOR ACTIVE-WIDE RANGE PLL	70	TEST1	TEST TERMINAL
21	PVDD3	+3.3V POWER TERMINAL FOR PLL-EXCLUSIVELY	71	TEST2	TEST TERMINAL
22	PDOS	POSITION GAP SIGNAL OUTPUT TERMINAL OF EFM & PLCK SIGNALS	72	XVSS3	MICOM CLOCK DRIVING CIRCUIT GND TERMINAL
23	PDO	POSITION GAP SIGNAL OUTPUT TERMINAL OF EFM & PLCK SIGNALS	73	XI	MICOM CLOCK DRIVING CIRCUIT INPUT TERMINAL
24	TMAXS	TMAX DETECTION RESULT OUTPUT TERMINAL	74	XO	MICOM CLOCK DRIVING CIRCUIT OUTPUT TERMINAL
25	TMAX	TMAX DETECTION RESULT OUTPUT TERMINAL	75	XVDD3	MICOM CLOCK DRIVING CIRCUIT +3.3V POWER TERMINAL
26	LPFN	AMP REVERSE INPUT TERMINAL FOR LOW-PASS FILTER	76	DVSS3	D/A CONVERT R CHANNEL ANALOG GND TERMINAL
27	LPFO	AMP OUTPUT TERMINAL FOR LOW-PASS FILTER	77	RO	R CHANNEL AUDIO OUTPUT TERMINAL
28	PVREF	VREF(+1.65V) FOR PLL ONLY	78	DVDD3	DIGITAL/ANALOG CONVERT +3.3V POWER TERMINAL
29	VCOREF	VCO CENTER FREQUENCY BASE LEVEL VOLTAGE TERMINAL	79	DVR	DIGITAL/ANALOG CONVERT BASE VOLTAGE TERMINAL
30	VCOF	VCO FILTER TERMINAL	80	LO	L CHANNEL AUDIO OUTPUT TERMINAL
31	AVSS3	ANALOG GND TERMINAL	81	DVSS3	D/A CONVERT L CHANNEL ANALOG GND TERMINAL
32	SLCO	DATA SLICE GENERATING DIGITAL/ANALOG CONVERT OUTPUT TERMINAL	82	TEST3	TEST TERMINAL
33	RFI	RF SIGNAL INPUT TERMINAL	83	TEST4	TEST TERMINAL
34	AVDD3	ANALOG +3.3V POWER TERMINAL	84	BUS0	DATA INPUT TERMINAL FOR MICOM INTERFACE
35	RFCT	RERP SIGNAL INTERMEDIATE VOLTAGE	85	BUS1	DATA INPUT TERMINAL FOR MICOM INTERFACE
36	RFZI	INPUT TERMINAL FOR RERO ZERO CROSS	86	BUS2	DATA INPUT TERMINAL FOR MICOM INTERFACE
37	RFRP	RF RIPPLE SIGNAL INPUT TERMINAL	87	BUS3	DATA INPUT TERMINAL FOR MICOM INTERFACE
38	FEI	FOCUS ERROR SIGNAL INPUT TERMINAL	88	VDD5	DIGITAL 5V POWER SOURCE TERMINAL
39	SBAD	SUBBEAM ADDITION SIGNAL INPUT	89	VSS5	DIGITAL GND TERMINAL
40	TEI	TRACKING ERROR SIGNAL INPUT	90	/XRD	READ SIGNAL FOR MICOM INTERFACE
41	TEZI	TRACKING ERROR ZERO CROSS INPUT	91	/XWR	WRITE SIGNAL FOR MICOM INTERFACE
42	FDO	FOCUS EQ. OUTPUT TERMINAL	92	/XCM	FIRST WORD RECOGNIZE SIGNAL FOR MICOM INTERFACE
43	TRO	TRACKING EQ. OUTPUT TERMINAL	93	/XCE	MICOM INTERFACE CHIP ENABLE TERMINAL
44	VREF	ANALOG-BASED POWER(+1.65V)	94	TEST5	TEST MODE SELECT TERMINAL
45	RFGC	RF AMPLITUDE CONTROL SIGNAL OUTPUT TERMINAL	95	/RST	RESET INPUT TERMINAL
46	TEBC	TRACKING BALANCE CONTROL SIGNAL OUTPUT TERMINAL	96	/HSO	PLAY SPEED MODE FLAG OUTPUT TERMINAL
47	FMO	FEED EQ. OUTPUT TERMINAL	97	/UHSO	PLAY SPEED MODE FLAG OUTPUT TERMINAL
48	FVO	SPEED ERROR OR FEED EQ OUTPUT TERMINAL	98	/SHSO	PLAY SPEED MODE FLAG OUTPUT TERMINAL
49	DMO	DISK MOTOR EQ OUTPUT TERMINAL	99	EMPH	EMPHASIS FLAG OUTPUT TERMINAL OF SUBCODE QDATA
50	VSS3	DIGITAL GND TERMINAL	100	LRCK	CHANNEL CLOCK (44.1KHz) OUTPUT TERMINAL

# KS88C4504-12(I.C-MICOM)



## PIN DESCRIPTIONS

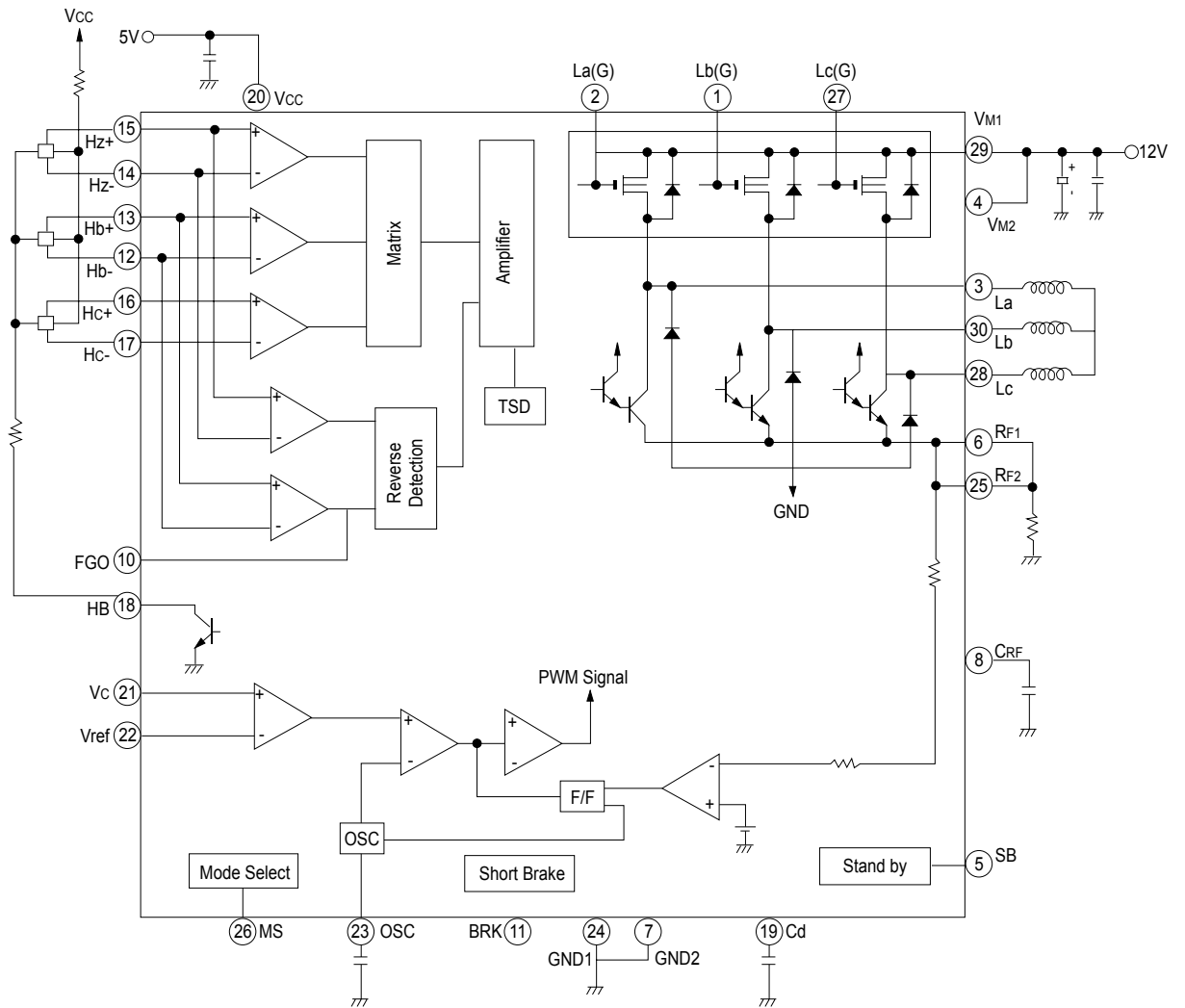
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1	/PM	/CE	O	EXT PROM CHIP ENABLE	41	P1.4	MT1	I	PRODUCT TEST PIN0
2	/DM	/UCS	O	INTERFACE CHIP SELECT	42	P1.3	MT2	I	PRODUCT TEST PIN1
3	/RD7	/URD	O	INTERFACE CHIP READ	43	P1.2	MT3	I	PRODUCT TEST PIN2
4	/WR	/UWR	O	INTERFACE CHIP WRITE	44	P1.2	TRO_SW	O	TRO CONTROL SWITCH
5	VLD	VLD	I	VOLTAGE LEVEL DETECT	45	P1.0	STEP_P1	O	STEP MOTOR ENABLE
6	P5.1/AS	N.C.	O	N.C	46	P0.7/ADC3	0.5Vref	O	RESET CONTROL
7	P5.0/	N.C.	O	N.C	47	R0.6/ADC2	FMO	I	FMO
8	P4.7/CS3	/XCE	O	DSP CHIP SELECT	48	P0.5/ADC1	/EJECT	I	EJECT BUTTON
9	P4.6/CS2	/XCM	O	DSP FIRST COMMAND	49	P0.4/ADC0	/PLAY	I	N.C
10	P4.5/CS1	/XRD	O	DSP READ	50	AVREF	AVREF	I	ADC REFERENCE VOLTAGE
11	P4.4/CS0	/XWR	I/O	DSP WRITE	51	P0.3	SLEEP_SW	O	SELLP MODE CONTROL
12	VDD1	VDD	I	VCC	52	VSS2	VSS2	I	VSS2
13	VSS1	VSS	I	GND	53	VDD2	VDD2	I	VDD2
14	Xout	Xout	O	CRYSTAL OUTPUT	54	P0.2	EMPHA	O	AUDIO EMPHASIS CONTROL
15	Xin	Xin	I	CRYSTAL INPUT	55	P0.1	/XRST	O	OUTPUT DEVICE RESET
16	VPP/EA	EA	I	ADDRESSING MODE SELECT	56	P0.0	LED_BUSY	O	LED BUSY CONTROL
17	P4.3	BUS3	I/O	DSP COMMAND BUS3	57	D0	D0	I	EXT PROM DATA0
18	P4.2	BUS2	I/O	DSP COMMAND BUS2	58	D1	D1	I	EXT PROM DATA1
19	/RESET	/RESET	I	MICOM RESET	59	D2	D2	I	EXT PROM DATA2
20	P4.1	BUS1	I/O	DSP COMMAND BUS1	60	D3	D3	I	EXT PROM DATA3
21	P4.0	BUS0	I/O	DSP COMMAND BUS0	61	D4	D4	I	EXT PROM DATA4
22	PWM1	PWM1	O	PWM CONTROL	62	D5	D5	I	EXT PROM DATA5
23	PWM0	PWM0	O	PWM CONTROL	63	D6	D6	I	EXT PROM DATA6
24	P3.5	CENT	O	DRIVE IC RESET	64	D7	D7	I	EXT PROM DATA7
25	P3.4	CENT	O	CENTER SERVO CONTROL	65	A0	A0	O	EXT PROM ADDRESS 0
26	P3.3	SPM_FG	I	SPINDLE MOTOR CONTROL	66	A1	A1	O	EXT PROM ADDRESS 1
27	P3.2	SPIN_CTL	O	CPINDLE BRAKE CONTROL	67	A2	A2	O	EXT PROM ADDRESS 2
28	P3.1	/OPEN	I	OPEN LIMIT SWITCH	68	A3	A3	O	EXT PROM ADDRESS 3
29	P3.0	/CLOSE	I	CLOSE LIMIT SWITCH	69	A4	A4	O	EXT PROM ADDRESS 4
30	P2.7/INT7	RF_CON	O	PLL CONTROL	70	A5	A5	O	EXT PROM ADDRESS 5
31	P2.6/INT6	N.C.	I/O	N.C	71	A6	A6	O	EXT PROM ADDRESS 6
32	P2.5/INT5	/SCOR	I	DSP SYNC INTERRUPT	72	A7	A7	O	EXT PROM ADDRESS 7
33	P2.4/INT4	TR_OUT	O	TRAY OPEN CONTROL	73	A8	A8	O	EXT PROM ADDRESS 8
34	P2.3/INT3	TR_IN	O	TRAY CLOSE CONTROL	74	A9	A9	O	EXT PROM ADDRESS 9
35	P2.2/INT2	D_INT	I	ROM DECODER INTERRUPT	75	A10	A10	O	EXT PROM ADDRESS 10
36	P2.1/INT1	FLGC	I	FOCUS O.K.	76	A11	A11	O	EXT PROM ADDRESS 11
37	P2.0/INT0	FLGA	I	TRACKING EPROR ZERO	77	A12	A12	O	EXT PROM ADDRESS 12
38	P1.7	MON	O	SPINDLE MOTOR ON/OFF	78	A13	A13	O	EXT PROM ADDRESS 13
39	P1.6	SPM_DIR	I	N.C	79	A14	A14	O	EXT PROM ADDRESS 14
40	P1.5	AMUTE	O	AUDIO MUTE CONTROL	80	A15	A15	O	EXT PROM ADDRESS 15



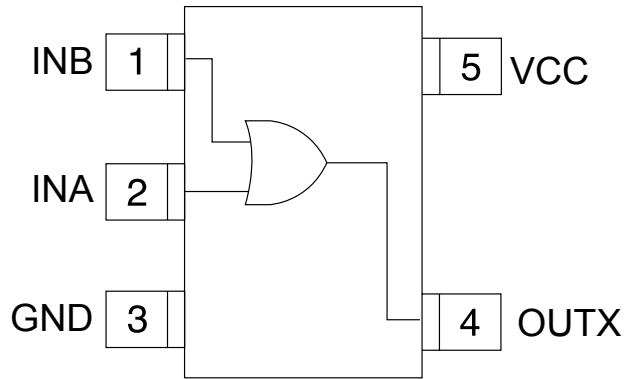
## PIN DESCRIPTIONS

NO	SYMBOL	DESCRIPTIONS	NO	SYMBOL	DESCRIPTIONS
1	MA4	MICOM ADDRESS INPUT	51	VDD	POWER SOURCE TERMINAL
2	MA5	MICOM ADDRESS INPUT	52	VDD	POWER SOURCE TERMINAL
3	MA6	MICOM ADDRESS INPUT	53	VSS	GROUND TERMINAL
4	MRD	MICOM READ SIGNAL INPUT	54	TEST0	TEST TERMINAL
5	MWR	MICOM WRITE SIGNAL INPUT	55	TEST1	TEST TERMINAL
6	MCE	CHIP ENABLE SIGNAL INPUT	56	TB2	TEST TERMINAL
7	MINT	INTERRUPT REQUEST OUTPUT	57	TB3	TEST TERMINAL
8	TESTOUT	TEST OUTPUT	58	TB4	TEST TERMINAL
9	RST	RESET TERMINAL	59	TB5	TEST TERMINAL
10	VDD	POWER SOURCE TERMINAL	60	TB6	TEST TERMINAL
11	HD7	HOST DATA INPUT	61	TB7	TEST TERMINAL
12	HD8	HOST DATA INPUT	62	TB8	TEST TERMINAL
13	HD6	HOST DATA INPUT	63	VPB	GROUND TERMINAL (DRAM AREA)
14	HD9	HOST DATA INPUT	64	TB9	TEST TERMINAL
15	VSS	GROUND TERMINAL	65	TB10	TEST TERMINAL
16	HD5	HOST DATA INPUT	66	TB11	TEST TERMINAL
17	HD10	HOST DATA INPUT	67	TB12	TEST TERMINAL
18	HD4	HOST DATA INPUT	68	TB13	TEST TERMINAL
19	HD11	HOST DATA INPUT	69	TB14	TEST TERMINAL
20	VSS	GROUND TERMINAL	70	TEST2	TEST TERMINAL
21	HD3	HOST DATA INPUT	71	TEST3	TEST TERMINAL
22	HD12	HOST DATA INPUT	72	VDDM	POWER SOURCE TERMINAL
23	HD2	HOST DATA INPUT	73	VSSM	GROUND TERMINAL
24	HD13	HOST DATA INPUT	74	ACHCK	LRCK OUTPUT FOR DAC ON FAST PLAY
25	VSS	GROUND TERMINAL	75	AZCK	BASE CLOCK INPUT ON FAST PLAY
26	HD1	HOST DATA INPUT	76	SBSY	SUBCODE BLOCK SYNC OUTPUT
27	HD14	HOST DATA INPUT	77	SFSY	SUBCODE DATA SYNC FRAME INPUT
28	HD0	HOST DATA INPUT	78	SBDI	SUBCODE DATA INPUT
29	HD15	HOST DATA INPUT	79	CLCK	SUBCODE DATA CLOCK OUTPUT
30	VSS	GROUND TERMINAL	80	C2PI	DATA CORRECTION FLAG INPUT
31	HDRQ	DATA REQUEST TERMINAL	81	LRCK	CHANNEL CLOCK INPUT
32	HWR	HOST WRITE SIGNAL INPUT	82	DAI	DATA SIGNAL INPUT
33	HRD	HOST READ SIGNAL INPUT	83	BCKI	BIT CLOCK INPUT
34	IORDY	IO TRANSFER READY OUTPUT	84	VSS	GROUND TERMINAL
35	VSS	GROUND TERMINAL	85	XI	MASTER CLOCK I/O
36	CSEL	CABLE SELECT INPUT	86	XO	MASTER CLOCK I/O
37	HDAK	DATA ACKNOWLEDGE INPUT	87	VDD	POWER SOURCE TERMINAL
38	INTRQ	INTERRUPT SIGNAL OUTPUT	88	MD0	MICOM DATA I/O
39	IOCS16	DATA BIT WIDE SELECT OUTPUT	89	MD1	MICOM DATA I/O
40	VSS	GROUND TERMINAL	90	MD2	MICOM DATA I/O
41	HA1	HOST ADDRESS 1 INPUT	91	MD3	MICOM DATA I/O
42	PDIAG	POST DIAGNOSTIC I/O	92	MD4	MICOM DATA I/O
43	HA0	HOST ADDRESS 0 INPUT	93	MD5	MICOM DATA I/O
44	HA2	HOST ADDRESS 2 INPUT	94	MD6	MICOM DATA I/O
45	HCS1	CHIP SELECT 1 INPUT	95	MD7	MICOM DATA I/O
46	HCS3	CHIP SELECT 3 INPUT	96	VSS	GROUND TERMINAL
47	VSS	GROUND TERMINAL	97	MA0	MICOM ADDRESS INPUT
48	DASP	DRIVE ACTIVE OUTPUT	98	MA1	MICOM ADDRESS INPUT
49	ADA	DATA OUTPUT FOR DAC ON FAST PLAY	99	MA2	MICOM ADDRESS INPUT
50	ABCK	BCK OUTPUT FOR DAC ON FAST PLAY	100	MA3	MICOM ADDRESS INPUT

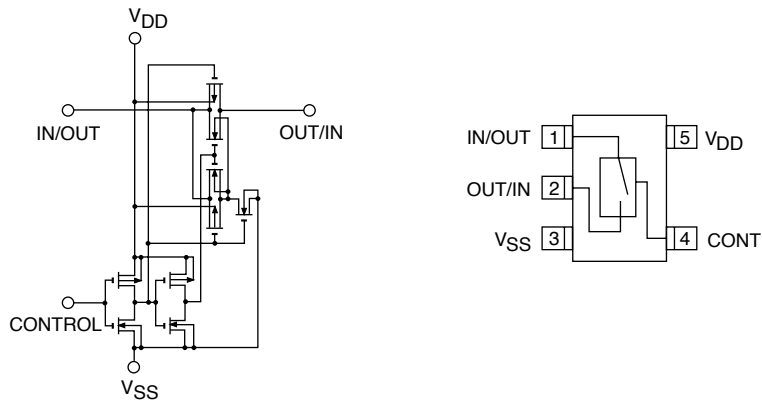
# TA8493AF(I.C-DRIVE)



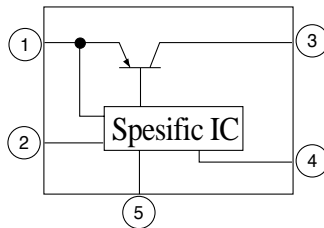
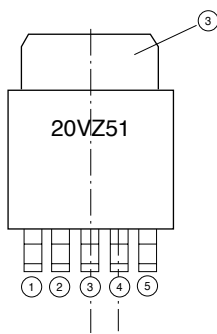
### 7S32(I.C-OR GATE)



### 4S66F(I.C-SWITCH)

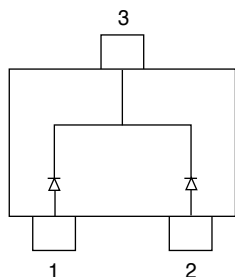


### PQ20WZ51(I.C-REGULATOR)

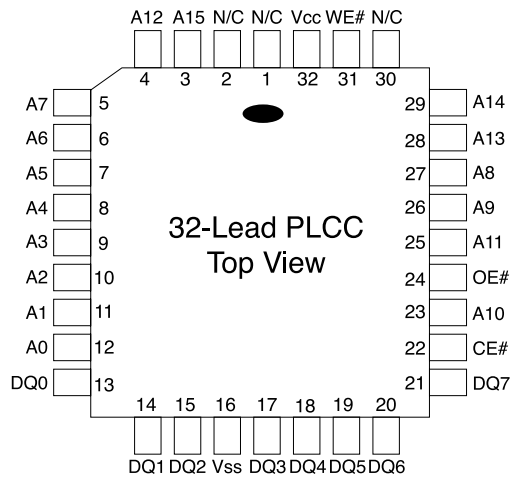


Pin No	Pin Name
1	DC input (VIN)
2	ON/OFF control terminal (VC)
3	DC output (VO)
4	Output voltage minute adjustment terminal (VADJ)
5	G N D

### DAP202K(DIODE ARRAY)



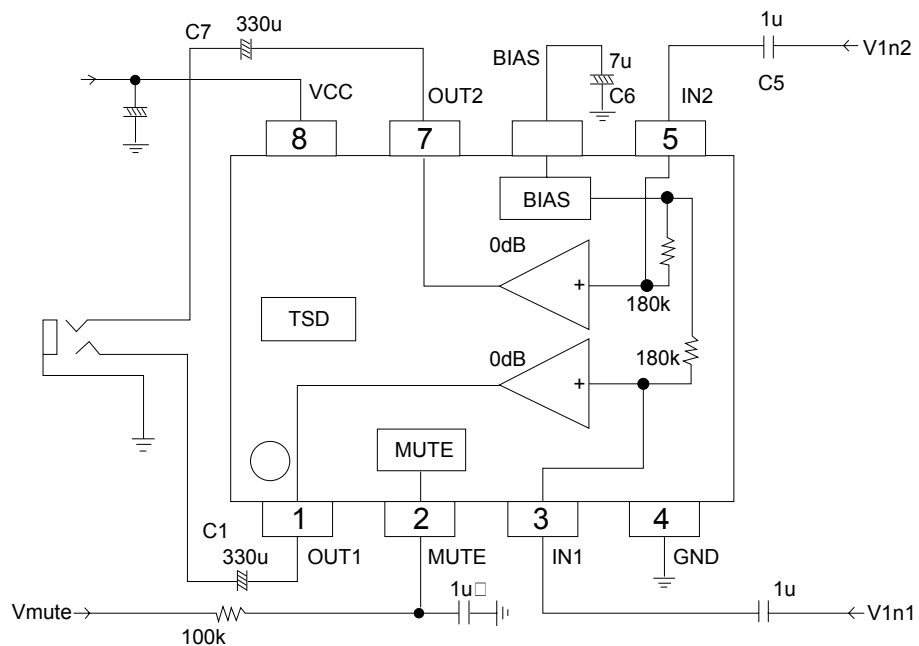
## 29EE512-70(I.C-FLASH MEMORY)



### - PIN DESCRIPTION

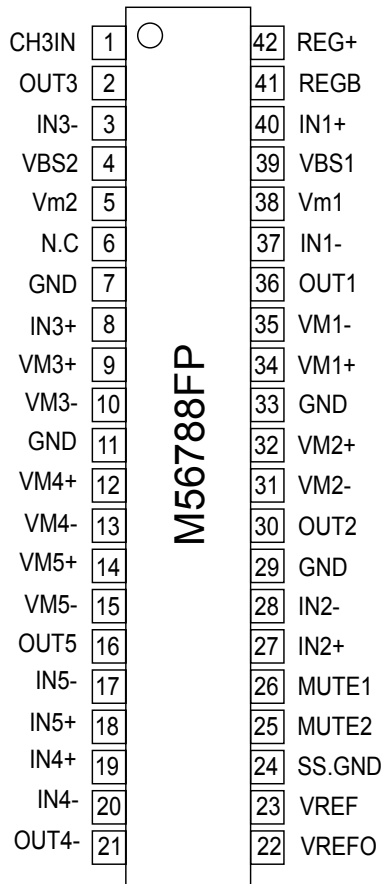
Symbol	Pin Name	Functions
A15-A7	Row Address Inputs	To provide memory addresses. Row addresses define a page for a write cycle.
A6-A0 DQ7-DQ0	Column Address Inputs Data Input/output	Column Addresses are toggled to load page data. To output data during read cycles and receive input data during write cycles. Data is internally latched during a write cycle. The outputs are in tri-state when OE# or CE# is high.
OE#	Chip Enable	To activate the device when CE# is low.
OE#	Output Enable	To gate the data output buffers.
WE#	Write Enable	To control the write operations
Vcc	Power Supply	To provide 5-volt supply(± 10%)
Vss	Ground	
NC	No Connection	Unconnected pins.

## BH3541F(I.C-H/P AMP)





## M56788FP(I.C-DRIVE)



### - PIN DESCRIPTION

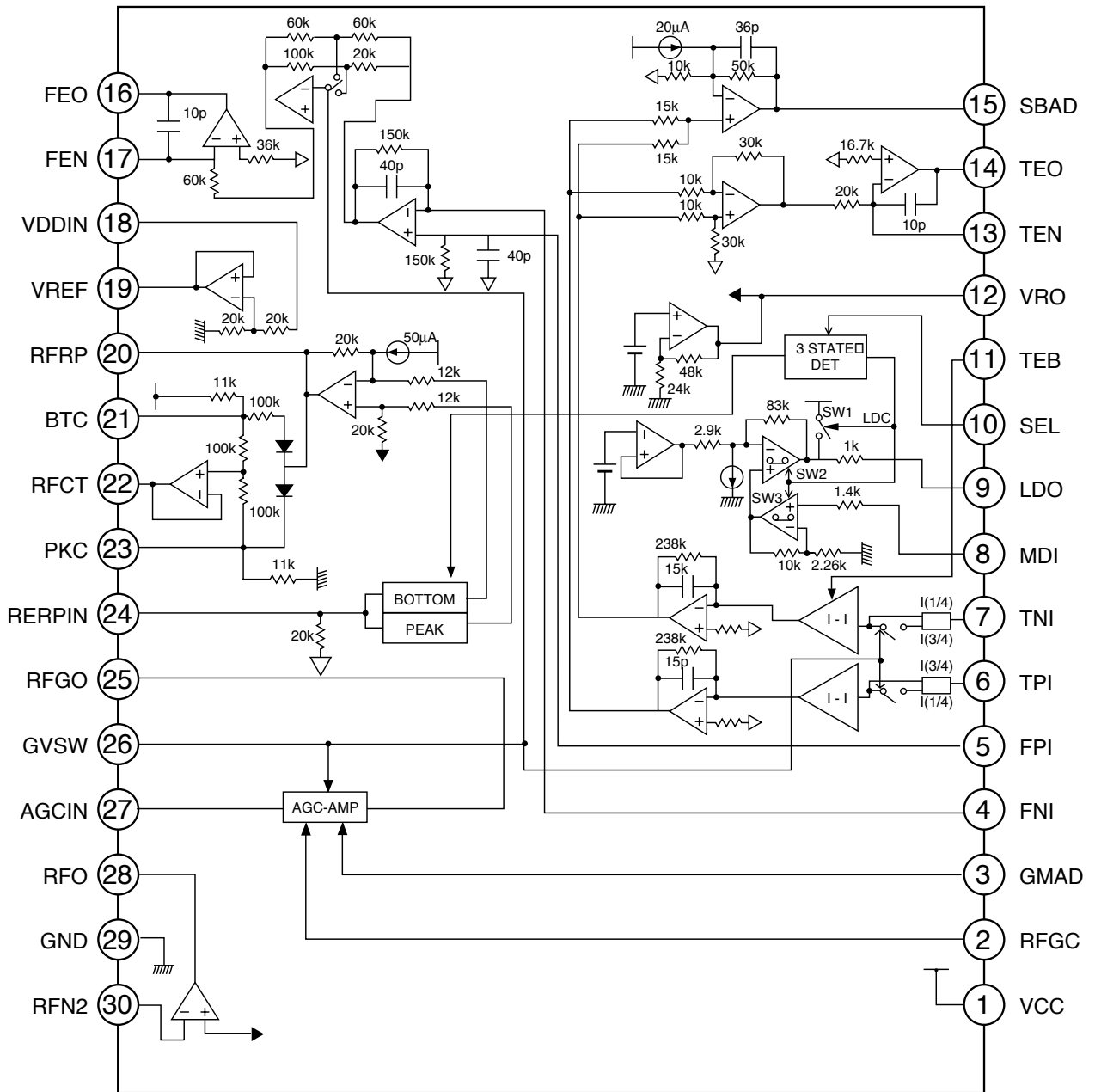
Terminal	Symbol	Terminal function	Terminal	Symbol	Terminal function
①	CH3IN	CH3 non-inverted input	②②	VREF0	Reference voltage output
②	OUT3	E3 amplifier output	②③	VREF	Reference voltage input
③	IN3-	E3 amplifier inverted input	②④	SS.GND	Small signal GND
④	VBS2	Bootstrap power supply	②⑤	MUTE2	CH5 mute
⑤	Vm2	Motor power supply	②⑥	MUTE1	CH1-4mute
⑥	N.C	N.C	②⑦	IN2+	E2 amplifier non-inverted input
⑦, ①①	GND	Motor GND	②⑧	IN2-	E2 amplifier inverted input
⑧	IN3+	E3 amplifier non-inverted input	②⑨, ③③	GND	Motor GND
⑨	VM3(-)	CH3 inverted output	③④	OUT2	E2 amplifier output
⑩	VM3(+)	CH3 non-inverted output	③⑤	VM2(-)	CH2 inverted output
⑫	VM4(+)	CH4 non-inverted output	③⑥	VM2(+)	CH2 non-inverted output
⑬	VM4(-)	CH4 inverted output	③⑦	VM1(+)	CH1 non-inverted output
⑭	VM5(+)	CH5 non-inverted output	③⑧	VM1(-)	CH1 inverted output
⑮	VM5(-)	CH5 inverted output	③⑨	OUT1	E1 amplifier output
⑯	OUT5	E5 amplifier output	④⑦	IN1-	E1 amplifier inverted input
⑰	IN5-	E5 amplifier inverted input	④⑧	Vm1	Motor power supply
⑱	IN5+	E5 amplifier non-inverted input	④⑨	VBS1	Bootstrap power supply
⑲	IN4+	E4 amplifier non-inverted input	④⑩	IN1+	E1 amplifier non-inverted input
⑳	IN4-	E4 amplifier inverted input	④⑪	REGB	Regulator PNP base connect
㉑	OUT4	E4 amplifier output	④⑫	REG+	Regulator voltage setting resistor

## PIN ASSIGNMENT

TERMINAL NO.	TERMINAL SYMBOL	FUNCTION	REMARKS
1	L <sub>b</sub> (G)	b-phase upper side power transistor (base)output terminal	Keep open.
2	L <sub>a</sub> (G)	a-phase upper side power transistor (base)output terminal	Keep open.
3	L <sub>a</sub>	a-phase output terminal	Connect to the coil.
4	V <sub>M2</sub>	Supply voltage terminal for motor drive	Connect to V <sub>M1</sub> externally.
5	SB	RUN/STOP control terminal	H:RUN, L:STOP
6	R <sub>F1</sub>	Output current detection terminal	Sets limiter current value. Connect to R <sub>F2</sub> externally and between this terminal and GND.
7	GND2	GND	-
8	C <sub>RF</sub>	Output current filter terminal	Connect a capacitor between this terminal and GND.
9	N.C		
10	FGO	FG amplifier output terminal	Outputs a signal whose frequency is determined by the CD rotation frequency.
11	BRK	Brake mode select terminal	Output mode when V <sub>C</sub> >V <sub>ref</sub>
12	H <sub>b</sub> -	b-phase negative hall signal input terminal	Connect to hall element output terminal.
13	H <sub>b</sub> +	b-phase positive hall signal input terminal	Connect to hall element output terminal.
14	H <sub>a</sub> -	a-phase negative hall signal input terminal	Connect to hall element output terminal.
15	H <sub>a</sub> +	a-phase positive hall signal input terminal	Connect to hall element output terminal.
16	H <sub>c</sub> +	c-phase positive hall signal input terminal	Connect to hall element output terminal.
17	H <sub>c</sub> -	a-phase negative hall signal input terminal	Connect to hall element output terminal.
18	HB	Hall element bias terminal	Open collector output, Connect to the negative side of hall element bias line.
19	Cd	Forward/reverse changeover gain adjustment terminal	Adjust a rotation direction changeover gain
20	V <sub>CC</sub>	Supply voltage terminal for control circuits	V <sub>CC</sub> (opr)=4.4~5.5V
21	V <sub>C</sub>	Control amplifier input terminal	Use the control signal as input.
22	V <sub>ref</sub>	Control amplifier reference voltage input terminal	Use the reference voltage for the control amplifier as input.
23	OSC	Triangular wave oscillation terminal	Connect a capacitor between the control amplifier as input.
24	GND1	GND	-
25	R <sub>F2</sub>	Output current detection terminal	Sets limiter current value. Connect to R <sub>F1</sub> externally and between this terminal and GND.
26	MS	Mode select terminal	Determines output mode.
27	L <sub>C</sub> (G)	c-phase upper side power transistor (base) output terminal	Keep open.
28	L <sub>C</sub>	c-phase output terminal	Connect to the coil.
29	V <sub>M1</sub>	Supply voltage terminal for motor drive	Connect to V <sub>M2</sub> externally.
30	L <sub>b</sub>	b-phase output terminal	Connect to the coil.

# Main Components Block Diagram and Pin Description

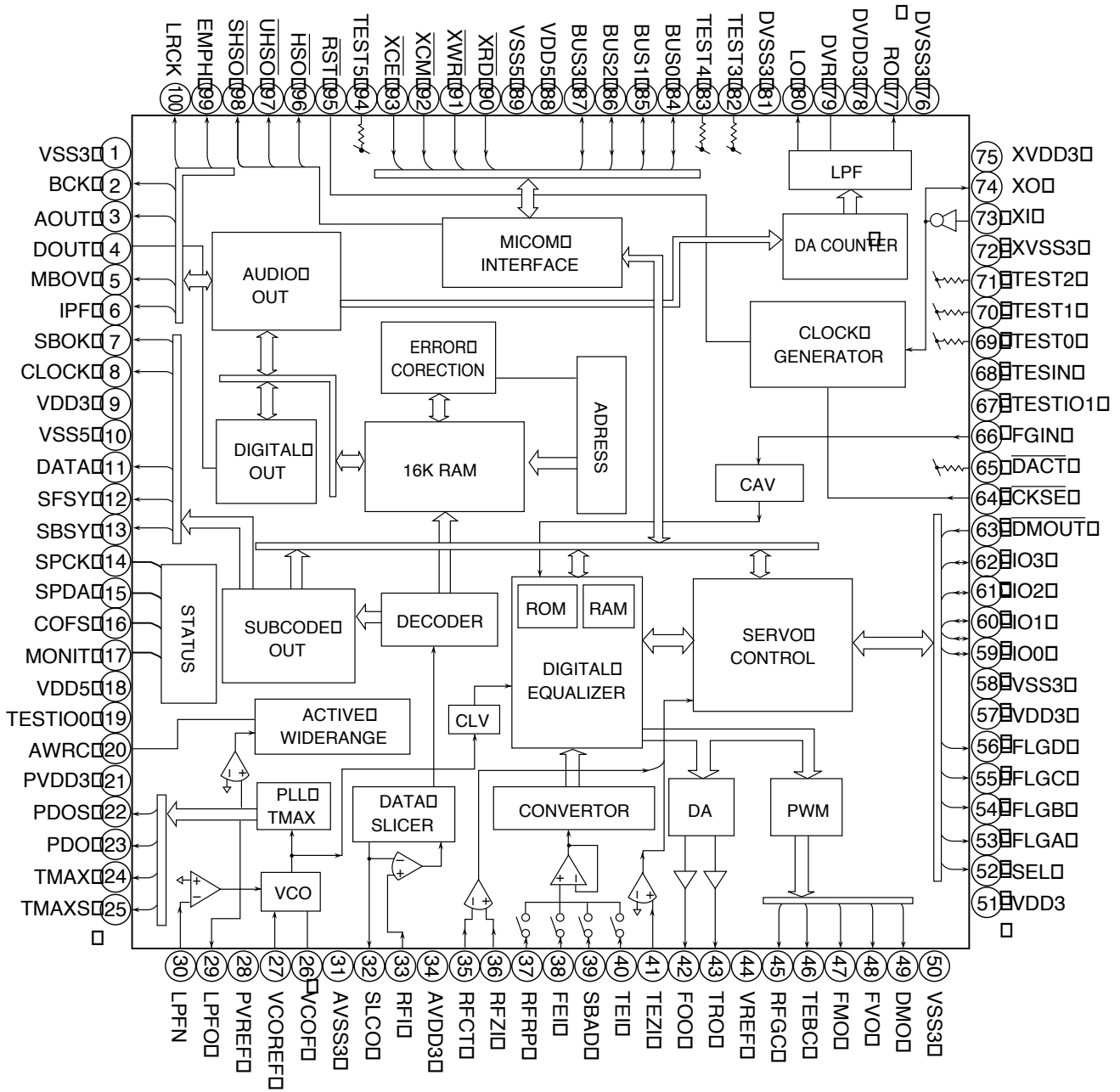
## TA2140FN(I.C.-RF)



**PIN DESCRIPTIONS**

<b>PIN NO</b>	<b>PIN NAME</b>	<b>FUNCTION</b>
1	VCC	POWER SOURCE/VOLTAGE TERMINAL
2	RFGC	RF FREQUENCY CONTROL SIGNAL INPUT TERMINAL
3	GMAD	OPEN-LOOP GAIN CONTROL TERMINAL OF AGC AMP
4	FNI	MAIN BEAM AMP INPUT TERMINAL
5	FPI	MAIN BEAM AMP INPUT TERMINAL
6	TPI	SUB BEAM AMP INPUT TERMINAL
7	TNI	SUB BEAM AMP INPUT TERMINAL
8	MDI	MONITOR PHOTO-DIODE AMP INPUT TERMINAL
9	LDO	LASER DIODE AMP OUTPUT TERMINAL
10	SEL	INTERNAL GAIN AND SIGNAL SWITCH TERMINAL
11	TEB	TRACKING BALANCE CONTROL SIGNAL INPUT TERMINAL
12	VRO	STANDARD VOLTAGE RATING TERMINAL(VRO,2.1V)
13	TEN	TRACKING ERROR SIGNAL GENERATING AMP REVERSE INPUT TERMINAL
14	TEO	TRACKING ERROR SIGNAL GENERATING AMP OUTPUT TERMINAL
15	SBAD	SUB BEAM ADDITIONAL OUTPUT TERMINAL
16	FEO	FOCUS ERROR SIGNAL GENERATING AMP OUTPUT TERMINAL
17	FEN	FOCUS ERROR SIGNAL GENERATING AMP REVERSE INPUT TERMINAL
18	VDD	3.3V POWER SOURCE VOLTAGE TERMINAL
19	VREF	VOLTAGE RATING (VREF,1.6V) OUTPUT TERMINAL
20	RFRP	SIGNAL GENERATING AMP OUTPUT TERMINAL FOR TRACK COUNTER
21	BTC	RECT SIGNAL GENERATING BOTTOM DETECTOR CONTROL TERMINAL
22	RFCT	RFRP SIGNAL CENTER LEVEL OUTPUT TERMINAL
23	PKC	RFCT SIGNAL GENERATING PEAK DETECTOR CONTROL TERMINAL
24	RFRPIN	SIGNAL GENERATING AMP INPUT TERMINAL FOR TRACK COUNTER
25	RFGO	RF SIGNAL AMPLITUDE ADJUSTING AMP INPUT TERMINAL
26	GVSW	AGC,TE, FE AMP GAIN SWITCH TERMINAL
27	AGCIN	RF SIGNAL AMPLITUDE ADJUSTING AMP INPUT TERMINAL
28	RFO	RF SIGNAL GENERATING AMP OUTPUT TERMINAL
29	GND	GND TERMINAL
30	RFN2	RF SIGNAL GENERATING AMP INPUT TERMINAL

# TC9450AF(I.C-DSP)

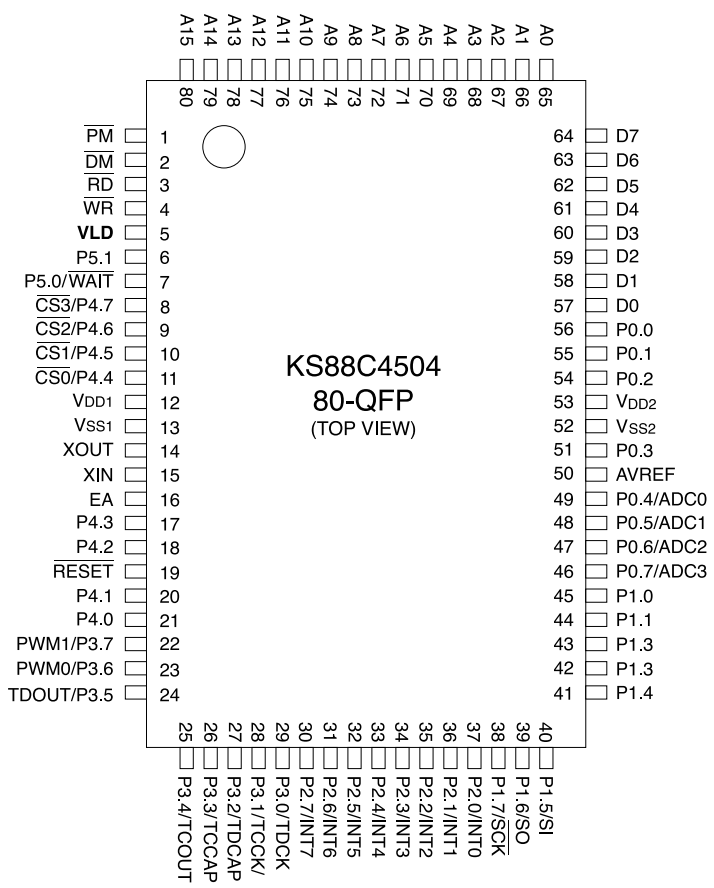
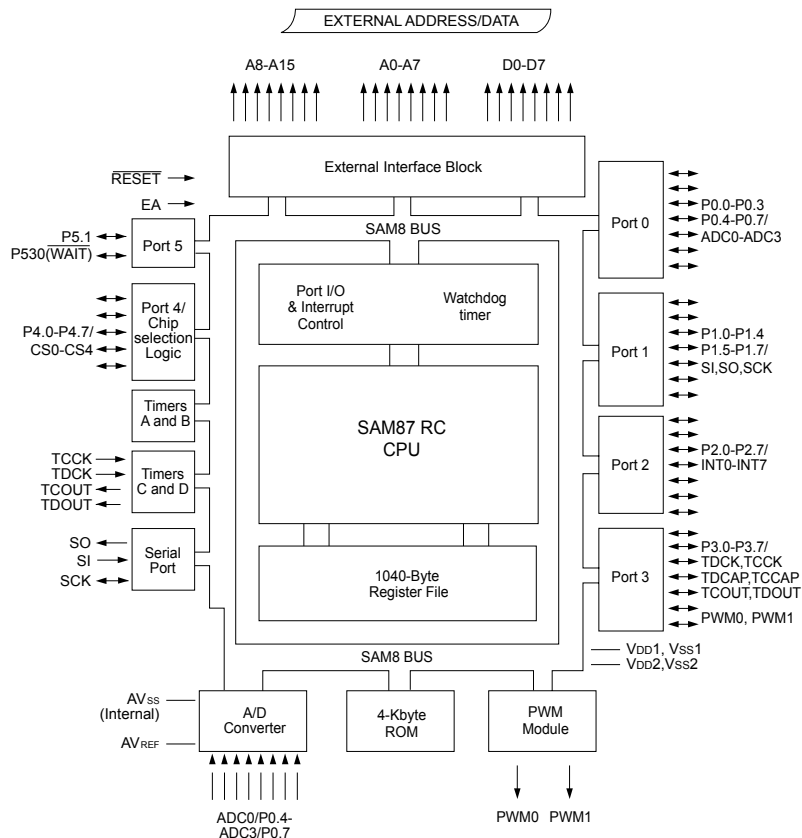


## PIN DESCRIPTIONS

NO	SYMBOL	DESCRIPTIONS	NO	SYMBOL	DESCRIPTIONS
1	VSS3	DIGITAL GND TERMINAL	51	VDD3	DIGITAL +3.3V POWER SOURCE TERMINAL
2	BCK	BIT CLOCK OUTPUT TERMINAL (1.411MHz)	52	SEL	AUTO POWER CONTROL ON/OFF SIGNAL OUTPUT TERMINAL
3	AOUT	AUDIO DATA OUTPUT TERMINAL	53	FLGA	INTERNAL SIGNAL CHECKING FLAG TERMINAL
4	DOUT	DIGITAL DATA OUTPUT TERMINAL	54	FLGB	INTERNAL SIGNAL CHECKING FLAG TERMINAL
5	MBOV	BUFFER MEMORY OVER SIGNAL OUTPUT TERMINAL	55	FLGC	INTERNAL SIGNAL CHECKING FLAG TERMINAL
6	IPF	COMPLEMENTARY BLOCK OUTPUT TERMINAL	56	FLGD	INTERNAL SIGNAL CHECKING FLAG TERMINAL
7	SBOK	CRCC RESULT OUTPUT TERMINAL FOR SUBCODE Q DATA	57	VDD3	DIGITAL +3.3V POWER TERMINAL
8	CLKK	SUBCODE P-W DATA READ CLOCK TERMINAL	58	VSS3	DIGITAL GND
9	VDD3	DIGITAL +3.3V POWER TERMINAL	59	I00	GENERAL I/O TERMINAL
10	VSS5	DIGITAL GND TERMINAL	60	I01	GENERAL I/O TERMINAL
11	DATA	SUBCODE P-W OUTPUT TERMINAL	61	I02	GENERAL I/O TERMINAL
12	SFSY	PLAY DEVICE FRAME SYNC SIGNAL OUTPUT TERMINAL	62	I03	GENERAL I/O TERMINAL
13	SBSY	SUBCODE BLOCKING OUTPUT TERMINAL	63	/DMOUT	100-1 OUTPUT MODE SELECT TERMINAL
14	SPCK	DSP INTERNAL STATUS CHECKING CLOCK TERMINAL	64	/CKSE	OSCILLATING DEVICE SELECT TERMINAL
15	SPDA	DSP STATUS OUTPUT TERMINAL	65	/DACT	DIGITAL/ANALOG CONVERT TEST TERMINAL
16	COFS	ERROR CORRECTION CLOCK (7.35 MHz)/OUTPUT TERMINAL	66	FGIN	DIGITAL/ANALOG CONVERT TEST TERMINAL
17	MONIT	DSP INTERNAL STATUS OUTPUT TERMINAL	67	TESI01	TEST INPUT TERMINAL
18	VDD5	DIGITAL +5V TERMINAL	68	TESIN	TEST INPUT TERMINAL
19	TEST00	TEST TERMINAL	69	TEST0	TEST TERMINAL
20	AWRC	VCO OUTPUT TERMINAL FOR ACTIVE-WIDE RANGE PLL	70	TEST1	TEST TERMINAL
21	PVDD3	+3.3V POWER TERMINAL FOR PLL-EXCLUSIVELY	71	TEST2	TEST TERMINAL
22	PDOS	POSITION GAP SIGNAL OUTPUT TERMINAL OF EFM & PLCK SIGNALS	72	XVSS3	MICOM CLOCK DRIVING CIRCUIT GND TERMINAL
23	PDO	POSITION GAP SIGNAL OUTPUT TERMINAL OF EFM & PLCK SIGNALS	73	XI	MICOM CLOCK DRIVING CIRCUIT INPUT TERMINAL
24	TMAXS	TMAX DETECTION RESULT OUTPUT TERMINAL	74	XO	MICOM CLOCK DRIVING CIRCUIT OUTPUT TERMINAL
25	TMAX	TMAX DETECTION RESULT OUTPUT TERMINAL	75	XVDD3	MICOM CLOCK DRIVING CIRCUIT +3.3V POWER TERMINAL
26	LPFN	AMP REVERSE INPUT TERMINAL FOR LOW-PASS FILTER	76	DVSS3	D/A CONVERT R CHANNEL ANALOG GND TERMINAL
27	LPFO	AMP OUTPUT TERMINAL FOR LOW-PASS FILTER	77	RO	R CHANNEL AUDIO OUTPUT TERMINAL
28	PVREF	VREF(+1.65V) FOR PLL ONLY	78	DVDD3	DIGITAL/ANALOG CONVERT +3.3V POWER TERMINAL
29	VCOREF	VCO CENTER FREQUENCY BASE LEVEL VOLTAGE TERMINAL	79	DVR	DIGITAL/ANALOG CONVERT BASE VOLTAGE TERMINAL
30	VCOF	VCO FILTER TERMINAL	80	LO	L CHANNEL AUDIO OUTPUT TERMINAL
31	AVSS3	ANALOG GND TERMINAL	81	DVSS3	D/A CONVERT L CHANNEL ANALOG GND TERMINAL
32	SLCO	DATA SLICE GENERATING DIGITAL/ANALOG CONVERT OUTPUT TERMINAL	82	TEST3	TEST TERMINAL
33	RFI	RF SIGNAL INPUT TERMINAL	83	TEST4	TEST TERMINAL
34	AVDD3	ANALOG +3.3V POWER TERMINAL	84	BUS0	DATA INPUT TERMINAL FOR MICOM INTERFACE
35	RFCT	RERP SIGNAL INTERMEDIATE VOLTAGE	85	BUS1	DATA INPUT TERMINAL FOR MICOM INTERFACE
36	RFZI	INPUT TERMINAL FOR RERO ZERO CROSS	86	BUS2	DATA INPUT TERMINAL FOR MICOM INTERFACE
37	RFRP	RF RIPPLE SIGNAL INPUT TERMINAL	87	BUS3	DATA INPUT TERMINAL FOR MICOM INTERFACE
38	FEI	FOCUS ERROR SIGNAL INPUT TERMINAL	88	VDD5	DIGITAL 5V POWER SOURCE TERMINAL
39	SBAD	SUBBEAM ADDITION SIGNAL INPUT	89	VSS5	DIGITAL GND TERMINAL
40	TEI	TRACKING ERROR SIGNAL INPUT	90	/XRD	READ SIGNAL FOR MICOM INTERFACE
41	TEZI	TRACKING ERROR ZERO CROSS INPUT	91	/XWR	WRITE SIGNAL FOR MICOM INTERFACE
42	FDO	FOCUS EQ. OUTPUT TERMINAL	92	/XCM	FIRST WORD RECOGNIZE SIGNAL FOR MICOM INTERFACE
43	TRO	TRACKING EQ. OUTPUT TERMINAL	93	/XCE	MICOM INTERFACE CHIP ENABLE TERMINAL
44	VREF	ANALOG-BASED POWER(+1.65V)	94	TEST5	TEST MODE SELECT TERMINAL
45	RFGC	RF AMPLITUDE CONTROL SIGNAL OUTPUT TERMINAL	95	/RST	RESET INPUT TERMINAL
46	TEBC	TRACKING BALANCE CONTROL SIGNAL OUTPUT TERMINAL	96	/HSO	PLAY SPEED MODE FLAG OUTPUT TERMINAL
47	FMO	FEED EQ. OUTPUT TERMINAL	97	/UHSO	PLAY SPEED MODE FLAG OUTPUT TERMINAL
48	FVO	SPEED ERROR OR FEED EQ OUTPUT TERMINAL	98	/SHSO	PLAY SPEED MODE FLAG OUTPUT TERMINAL
49	DMO	DISK MOTOR EQ OUTPUT TERMINAL	99	EMPH	EMPHASIS FLAG OUTPUT TERMINAL OF SUBCODE QDATA
50	VSS3	DIGITAL GND TERMINAL	100	LRCK	CHANNEL CLOCK (44.1KHz) OUTPUT TERMINAL



# KS88C4504-12(I.C-MICOM)



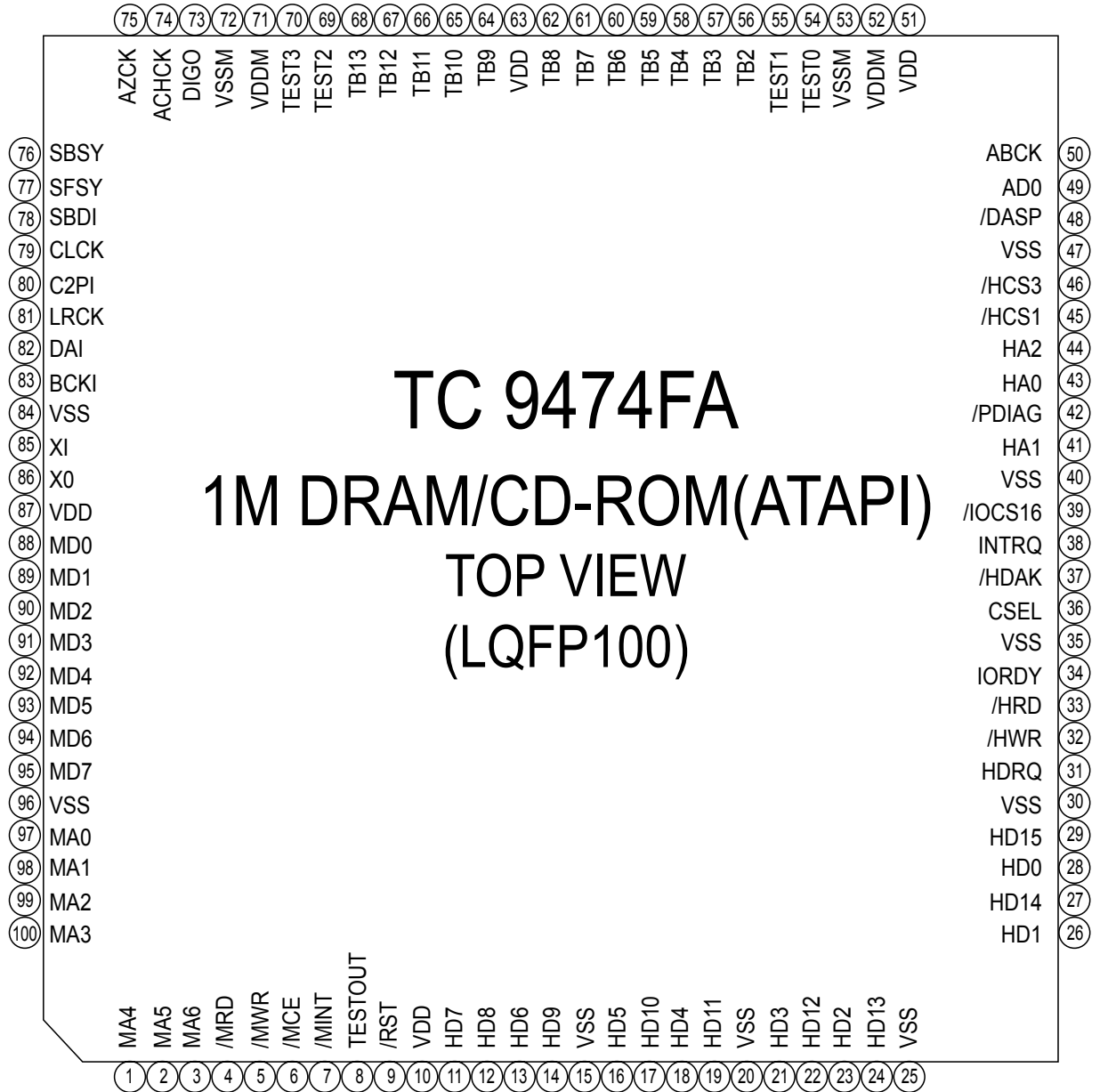
## PIN DESCRIPTIONS

NO	ORIGIN	NAME	I/O	FUNCTION	NO	ORIGIN	NAME	I/O	FUNCTION
1	/PM	/CE	O	EXT PROM CHIP ENABLE	41	P1.4	MT1	I	PRODUCT TEST PIN0
2	/DM	/UCS	O	INTERFACE CHIP SELECT	42	P1.3	MT2	I	PRODUCT TEST PIN1
3	/RD7	/URD	O	INTERFACE CHIP READ	43	P1.2	MT3	I	PRODUCT TEST PIN2
4	/WR	/UWR	O	INTERFACE CHIP WRITE	44	P1.2	TRO_SW	O	TRO CONTROL SWITCH
5	VLD	VLD	I	VOLTAGE LEVEL DETECT	45	P1.0	STEP_P1	O	STEP MOTOR ENABLE
6	P5.1/AS	N.C.	O	N.C	46	P0.7/ADC3	0.5Vref	O	RESET CONTROL
7	P5.0/	N.C.	O	N.C	47	R0.6/ADC2	FMO	I	FMO
8	P4.7/CS3	/XCE	O	DSP CHIP SELECT	48	P0.5/ADC1	/EJECT	I	EJECT BUTTON
9	P4.6/CS2	/XCM	O	DSP FIRST COMMAND	49	P0.4/ADC0	/PLAY	I	N.C
10	P4.5/CS1	/XRD	O	DSP READ	50	AVREF	AVREF	I	ADC REFERENCE VOLTAGE
11	P4.4/CS0	/XWR	I/O	DSP WRITE	51	P0.3	SLEEP_SW	O	SELLP MODE CONTROL
12	VDD1	VDD	I	VCC	52	VSS2	VSS2	I	VSS2
13	VSS1	VSS	I	GND	53	VDD2	VDD2	I	VDD2
14	Xout	Xout	O	CRYSTAL OUTPUT	54	P0.2	EMPHA	O	AUDIO EMPHASIS CONTROL
15	Xin	Xin	I	CRYSTAL INPUT	55	P0.1	/XRST	O	OUTPUT DEVICE RESET
16	VPP/EA	EA	I	ADDRESSING MODE SELECT	56	P0.0	LED_BUSY	O	LED BUSY CONTROL
17	P4.3	BUS3	I/O	DSP COMMAND BUS3	57	D0	D0	I	EXT PROM DATA0
18	P4.2	BUS2	I/O	DSP COMMAND BUS2	58	D1	D1	I	EXT PROM DATA1
19	/RESET	/RESET	I	MICOM RESET	59	D2	D2	I	EXT PROM DATA2
20	P4.1	BUS1	I/O	DSP COMMAND BUS1	60	D3	D3	I	EXT PROM DATA3
21	P4.0	BUS0	I/O	DSP COMMAND BUS0	61	D4	D4	I	EXT PROM DATA4
22	PWM1	PWM1	O	PWM CONTROL	62	D5	D5	I	EXT PROM DATA5
23	PWM0	PWM0	O	PWM CONTROL	63	D6	D6	I	EXT PROM DATA6
24	P3.5	CENT	O	DRIVE IC RESET	64	D7	D7	I	EXT PROM DATA7
25	P3.4	CENT	O	CENTER SERVO CONTROL	65	A0	A0	O	EXT PROM ADDRESS 0
26	P3.3	SPM_FG	I	SPINDLE MOTOR CONTROL	66	A1	A1	O	EXT PROM ADDRESS 1
27	P3.2	SPIN_CTL	O	CPINDLE BRAKE CONTROL	67	A2	A2	O	EXT PROM ADDRESS 2
28	P3.1	/OPEN	I	OPEN LIMIT SWITCH	68	A3	A3	O	EXT PROM ADDRESS 3
29	P3.0	/CLOSE	I	CLOSE LIMIT SWITCH	69	A4	A4	O	EXT PROM ADDRESS 4
30	P2.7/INT7	RF_CON	O	PLL CONTROL	70	A5	A5	O	EXT PROM ADDRESS 5
31	P2.6/INT6	N.C.	I/O	N.C	71	A6	A6	O	EXT PROM ADDRESS 6
32	P2.5/INT5	/SCOR	I	DSP SYNC INTERRUPT	72	A7	A7	O	EXT PROM ADDRESS 7
33	P2.4/INT4	TR_OUT	O	TRAY OPEN CONTROL	73	A8	A8	O	EXT PROM ADDRESS 8
34	P2.3/INT3	TR_IN	O	TRAY CLOSE CONTROL	74	A9	A9	O	EXT PROM ADDRESS 9
35	P2.2/INT2	D_INT	I	ROM DECODER INTERRUPT	75	A10	A10	O	EXT PROM ADDRESS 10
36	P2.1/INT1	FLGC	I	FOCUS O.K.	76	A11	A11	O	EXT PROM ADDRESS 11
37	P2.0/INT0	FLGA	I	TRACKING EPROR ZERO	77	A12	A12	O	EXT PROM ADDRESS 12
38	P1.7	MON	O	SPINDLE MOTOR ON/OFF	78	A13	A13	O	EXT PROM ADDRESS 13
39	P1.6	SPM_DIR	I	N.C	79	A14	A14	O	EXT PROM ADDRESS 14
40	P1.5	AMUTE	O	AUDIO MUTE CONTROL	80	A15	A15	O	EXT PROM ADDRESS 15





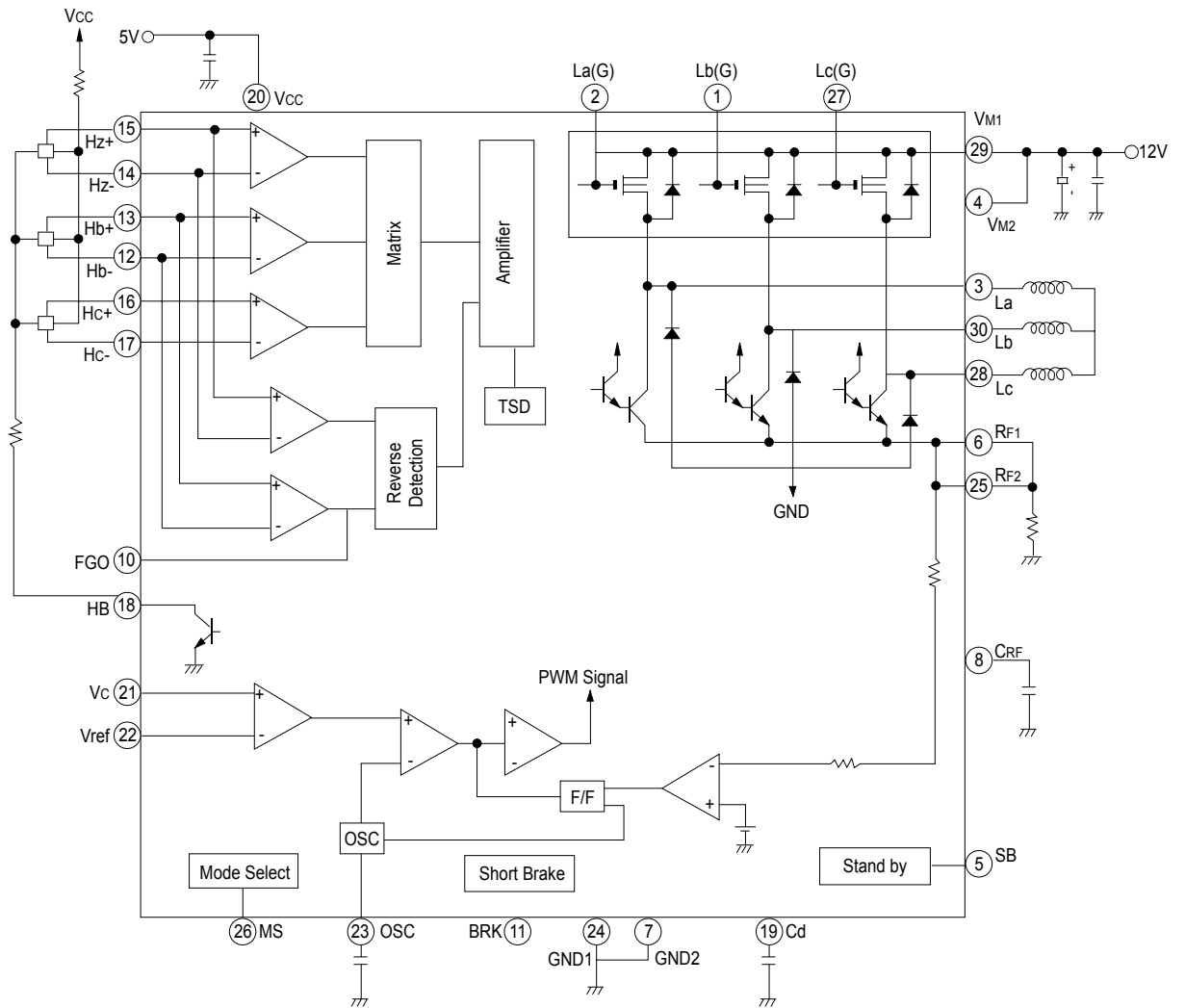
# TC9474FA(I.C-DECODER)



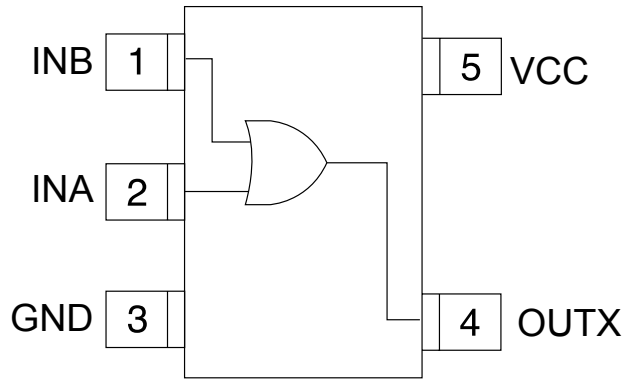
## PIN DESCRIPTIONS

NO	SYMBOL	DESCRIPTIONS	NO	SYMBOL	DESCRIPTIONS
1	MA4	MICOM ADDRESS INPUT	51	VDD	POWER SOURCE TERMINAL
2	MA5	MICOM ADDRESS INPUT	52	VDD	POWER SOURCE TERMINAL
3	MA6	MICOM ADDRESS INPUT	53	VSS	GROUND TERMINAL
4	MRD	MICOM READ SIGNAL INPUT	54	TEST0	TEST TERMINAL
5	MWR	MICOM WRITE SIGNAL INPUT	55	TEST1	TEST TERMINAL
6	MCE	CHIP ENABLE SIGNAL INPUT	56	TB2	TEST TERMINAL
7	MINT	INTERRUPT REQUEST OUTPUT	57	TB3	TEST TERMINAL
8	TESTOUT	TEST OUTPUT	58	TB4	TEST TERMINAL
9	RST	RESET TERMINAL	59	TB5	TEST TERMINAL
10	VDD	POWER SOURCE TERMINAL	60	TB6	TEST TERMINAL
11	HD7	HOST DATA INPUT	61	TB7	TEST TERMINAL
12	HD8	HOST DATA INPUT	62	TB8	TEST TERMINAL
13	HD6	HOST DATA INPUT	63	VPB	GROUND TERMINAL (DRAM AREA)
14	HD9	HOST DATA INPUT	64	TB9	TEST TERMINAL
15	VSS	GROUND TERMINAL	65	TB10	TEST TERMINAL
16	HD5	HOST DATA INPUT	66	TB11	TEST TERMINAL
17	HD10	HOST DATA INPUT	67	TB12	TEST TERMINAL
18	HD4	HOST DATA INPUT	68	TB13	TEST TERMINAL
19	HD11	HOST DATA INPUT	69	TB14	TEST TERMINAL
20	VSS	GROUND TERMINAL	70	TEST2	TEST TERMINAL
21	HD3	HOST DATA INPUT	71	TEST3	TEST TERMINAL
22	HD12	HOST DATA INPUT	72	VDDM	POWER SOURCE TERMINAL
23	HD2	HOST DATA INPUT	73	VSSM	GROUND TERMINAL
24	HD13	HOST DATA INPUT	74	ACHCK	LRCK OUTPUT FOR DAC ON FAST PLAY
25	VSS	GROUND TERMINAL	75	AZCK	BASE CLOCK INPUT ON FAST PLAY
26	HD1	HOST DATA INPUT	76	SBSY	SUBCODE BLOCK SYNC OUTPUT
27	HD14	HOST DATA INPUT	77	SFSY	SUBCODE DATA SYNC FRAME INPUT
28	HD0	HOST DATA INPUT	78	SBDI	SUBCODE DATA INPUT
29	HD15	HOST DATA INPUT	79	CLCK	SUBCODE DATA CLOCK OUTPUT
30	VSS	GROUND TERMINAL	80	C2PI	DATA CORRECTION FLAG INPUT
31	HDRQ	DATA REQUEST TERMINAL	81	LRCK	CHANNEL CLOCK INPUT
32	HWR	HOST WRITE SIGNAL INPUT	82	DAI	DATA SIGNAL INPUT
33	HRD	HOST READ SIGNAL INPUT	83	BCKI	BIT CLOCK INPUT
34	IORDY	IO TRANSFER READY OUTPUT	84	VSS	GROUND TERMINAL
35	VSS	GROUND TERMINAL	85	XI	MASTER CLOCK I/O
36	CSEL	CABLE SELECT INPUT	86	XO	MASTER CLOCK I/O
37	HDAK	DATA ACKNOWLEDGE INPUT	87	VDD	POWER SOURCE TERMINAL
38	INTRQ	INTERRUPT SIGNAL OUTPUT	88	MD0	MICOM DATA I/O
39	IOCS16	DATA BIT WIDE SELECT OUTPUT	89	MD1	MICOM DATA I/O
40	VSS	GROUND TERMINAL	90	MD2	MICOM DATA I/O
41	HA1	HOST ADDRESS 1 INPUT	91	MD3	MICOM DATA I/O
42	PDIAG	POST DIAGNOSTIC I/O	92	MD4	MICOM DATA I/O
43	HA0	HOST ADDRESS 0 INPUT	93	MD5	MICOM DATA I/O
44	HA2	HOST ADDRESS 2 INPUT	94	MD6	MICOM DATA I/O
45	HCS1	CHIP SELECT 1 INPUT	95	MD7	MICOM DATA I/O
46	HCS3	CHIP SELECT 3 INPUT	96	VSS	GROUND TERMINAL
47	VSS	GROUND TERMINAL	97	MA0	MICOM ADDRESS INPUT
48	DASP	DRIVE ACTIVE OUTPUT	98	MA1	MICOM ADDRESS INPUT
49	ADA	DATA OUTPUT FOR DAC ON FAST PLAY	99	MA2	MICOM ADDRESS INPUT
50	ABCK	BCK OUTPUT FOR DAC ON FAST PLAY	100	MA3	MICOM ADDRESS INPUT

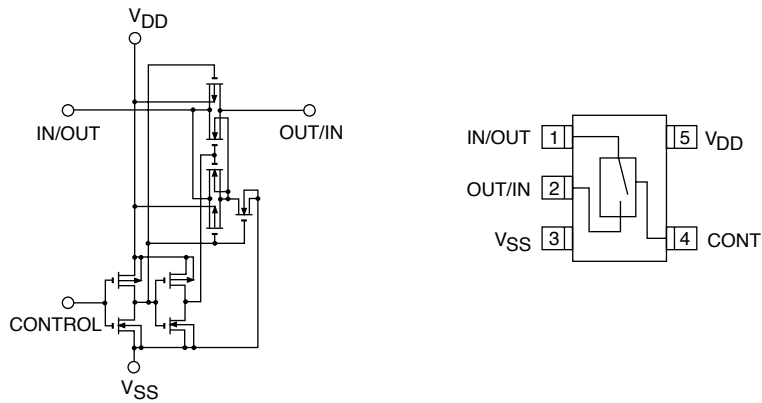
# TA8493AF(I.C-DRIVE)



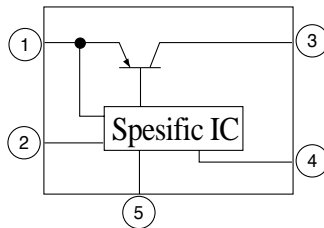
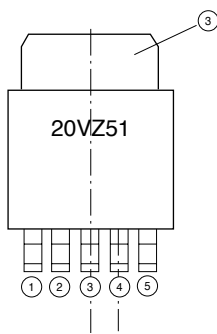
### 7S32(I.C-OR GATE)



### 4S66F(I.C-SWITCH)

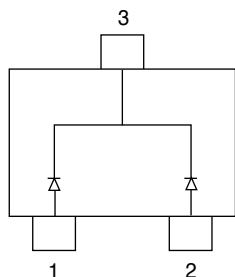


### PQ20WZ51(I.C-REGULATOR)

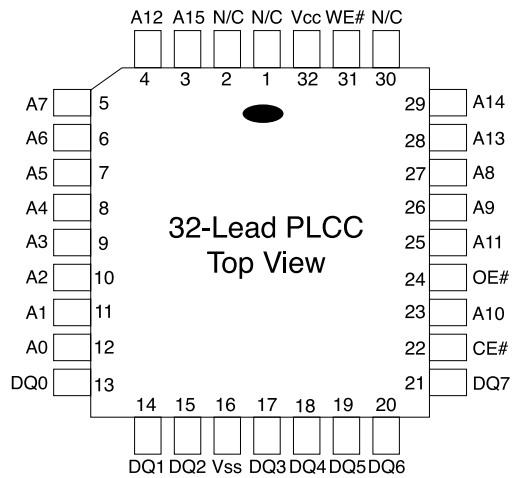


Pin No	Pin Name
1	DC input (VIN)
2	ON/OFF control terminal (VC)
3	DC output (VO)
4	Output voltage minute adjustment terminal (VADJ)
5	G N D

### DAP202K(DIODE ARRAY)



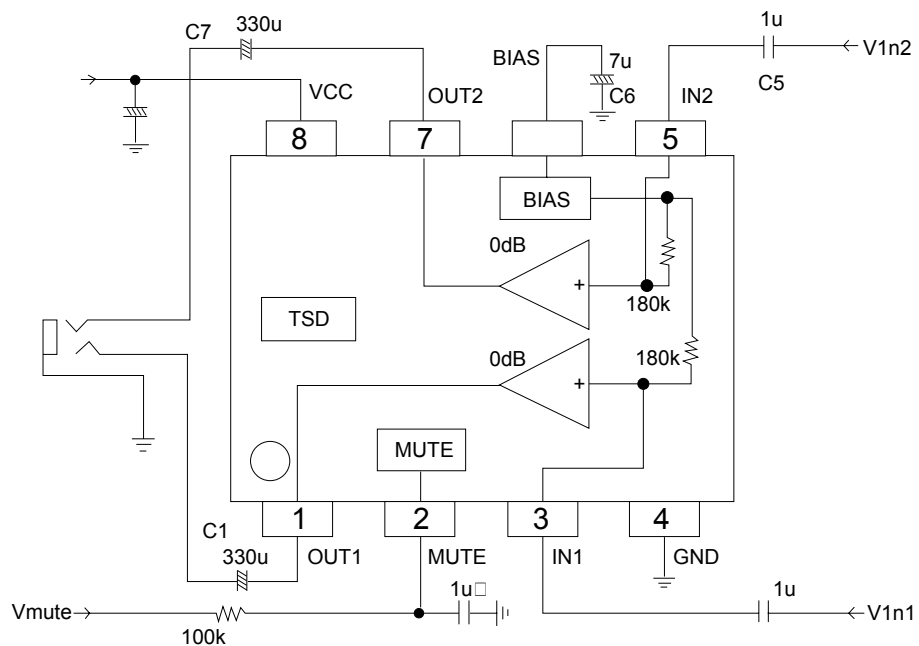
## 29EE512-70(I.C-FLASH MEMORY)



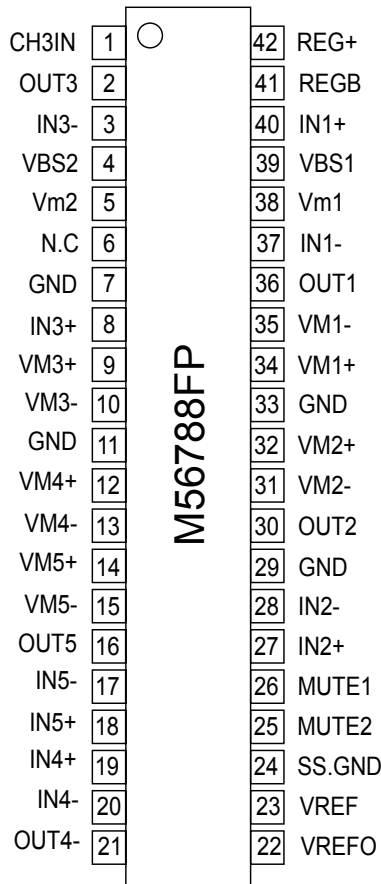
### - PIN DESCRIPTION

Symbol	Pin Name	Functions
A15-A7	Row Address Inputs	To provide memory addresses. Row addresses define a page for a write cycle.
A6-A0 DQ7-DQ0	Column Address Inputs Data Input/output	Column Addresses are toggled to load page data. To output data during read cycles and receive input data during write cycles. Data is internally latched during a write cycle. The outputs are in tri-state when OE# or CE# is high.
OE#	Chip Enable	To activate the device when CE# is low.
OE#	Output Enable	To gate the data output buffers.
WE#	Write Enable	To control the write operations
Vcc	Power Supply	To provide 5-volt supply(± 10%)
Vss	Ground	
NC	No Connection	Unconnected pins.

## BH3541F(I.C-H/P AMP)



## M56788FP(I.C-DRIVE)



### - PIN DESCRIPTION

Terminal	Symbol	Terminal function	Terminal	Symbol	Terminal function
①	CH3IN	CH3 non-inverted input	②②	VREF0	Reference voltage output
②	OUT3	E3 amplifier output	②③	VREF	Reference voltage input
③	IN3-	E3 amplifier inverted input	②④	SS.GND	Small signal GND
④	VBS2	Bootstrap power supply	②⑤	MUTE2	CH5 mute
⑤	Vm2	Motor power supply	②⑥	MUTE1	CH1-4mute
⑥	N.C	N.C	②⑦	IN2+	E2 amplifier non-inverted input
⑦, ①①	GND	Motor GND	②⑧	IN2-	E2 amplifier inverted input
⑧	IN3+	E3 amplifier non-inverted input	②⑨, ③③	GND	Motor GND
⑨	VM3(-)	CH3 inverted output	③④	OUT2	E2 amplifier output
⑩	VM3(+)	CH3 non-inverted output	③①	VM2(-)	CH2 inverted output
⑫	VM4(+)	CH4 non-inverted output	③②	VM2(+)	CH2 non-inverted output
⑬	VM4(-)	CH4 inverted output	③④	VM1(+)	CH1 non-inverted output
⑭	VM5(+)	CH5 non-inverted output	③⑤	VM1(-)	CH1 inverted output
⑮	VM5(-)	CH5 inverted output	③⑥	OUT1	E1 amplifier output
⑯	OUT5	E5 amplifier output	③⑦	IN1-	E1 amplifier inverted input
⑰	IN5-	E5 amplifier inverted input	③⑧	Vm1	Motor power supply
⑱	IN5+	E5 amplifier non-inverted input	③⑨	VBS1	Bootstrap power supply
⑲	IN4+	E4 amplifier non-inverted input	④④	IN1+	E1 amplifier non-inverted input
⑳	IN4-	E4 amplifier inverted input	④①	REGB	Regulator PNP base connect
㉑	OUT4	E4 amplifier output	④②	REG+	Regulator voltage setting resistor

## PIN ASSIGNMENT

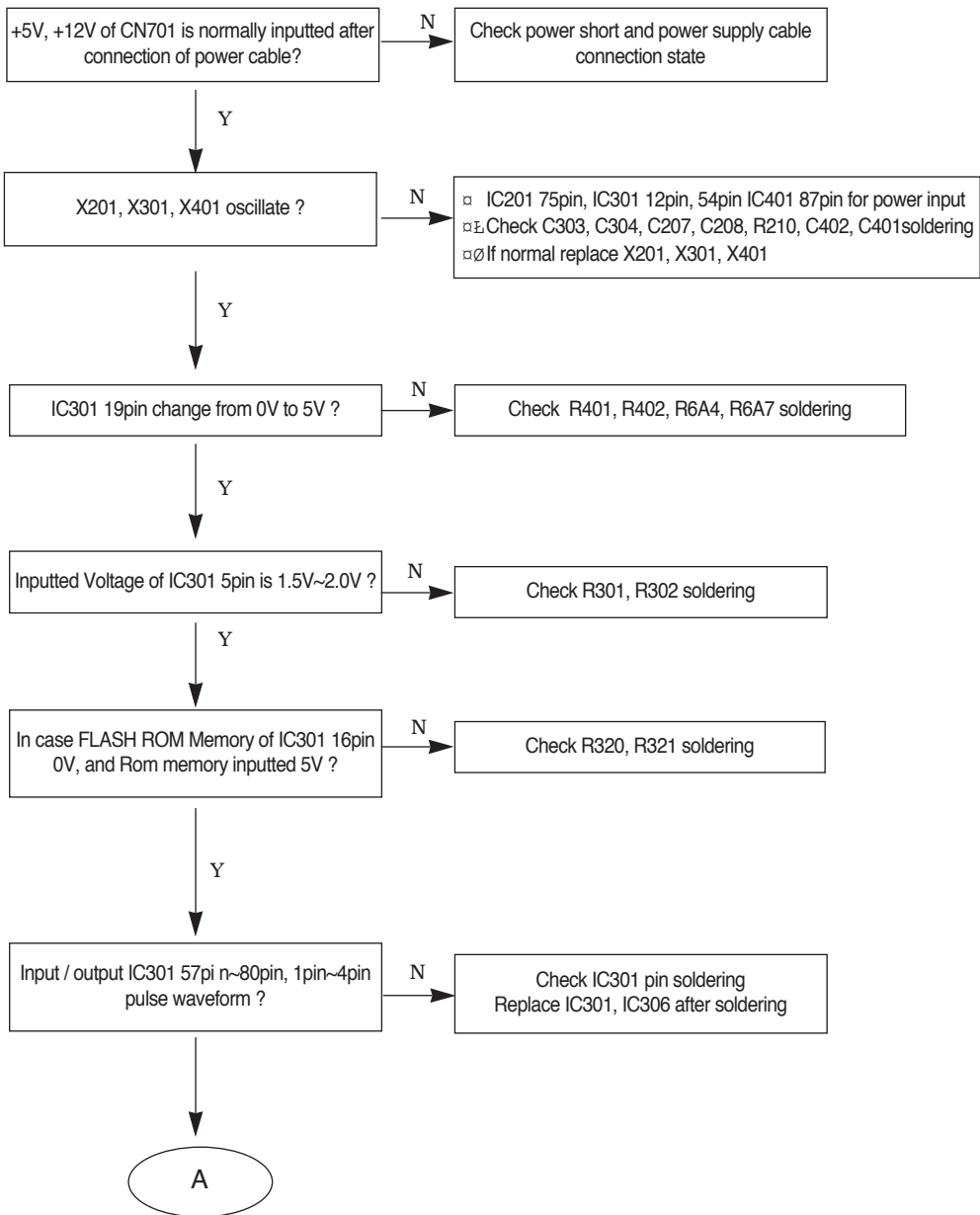
TERMINAL NO.	TERMINAL SYMBOL	FUNCTION	REMARKS
1	L <sub>b</sub> (G)	b-phase upper side power transistor (base)output terminal	Keep open.
2	L <sub>a</sub> (G)	a-phase upper side power transistor (base)output terminal	Keep open.
3	L <sub>a</sub>	a-phase output terminal	Connect to the coil.
4	V <sub>M2</sub>	Supply voltage terminal for motor drive	Connect to V <sub>M1</sub> externally.
5	SB	RUN/STOP control terminal	H:RUN, L:STOP
6	R <sub>F1</sub>	Output current detection terminal	Sets limiter current value. Connect to R <sub>F2</sub> externally and between this terminal and GND.
7	GND2	GND	-
8	C <sub>RF</sub>	Output current filter terminal	Connect a capacitor between this terminal and GND.
9	N.C		
10	FGO	FG amplifier output terminal	Outputs a signal whose frequency is determined by the CD rotation frequency.
11	BRK	Brake mode select terminal	Output mode when V <sub>C</sub> >V <sub>ref</sub>
12	H <sub>b</sub> -	b-phase negative hall signal input terminal	Connect to hall element output terminal.
13	H <sub>b</sub> +	b-phase positive hall signal input terminal	Connect to hall element output terminal.
14	H <sub>a</sub> -	a-phase negative hall signal input terminal	Connect to hall element output terminal.
15	H <sub>a</sub> +	a-phase positive hall signal input terminal	Connect to hall element output terminal.
16	H <sub>c</sub> +	c-phase positive hall signal input terminal	Connect to hall element output terminal.
17	H <sub>c</sub> -	a-phase negative hall signal input terminal	Connect to hall element output terminal.
18	HB	Hall element bias terminal	Open collector output, Connect to the negative side of hall element bias line.
19	Cd	Forward/reverse changeover gain adjustment terminal	Adjust a rotation direction changeover gain
20	V <sub>CC</sub>	Supply voltage terminal for control circuits	V <sub>CC</sub> (opr)=4.4~5.5V
21	V <sub>C</sub>	Control amplifier input terminal	Use the control signal as input.
22	V <sub>ref</sub>	Control amplifier reference voltage input terminal	Use the reference voltage for the control amplifier as input.
23	OSC	Triangular wave oscillation terminal	Connect a capacitor between the control amplifier as input.
24	GND1	GND	-
25	R <sub>F2</sub>	Output current detection terminal	Sets limiter current value. Connect to R <sub>F1</sub> externally and between this terminal and GND.
26	MS	Mode select terminal	Determines output mode.
27	L <sub>C</sub> (G)	c-phase upper side power transistor (base) output terminal	Keep open.
28	L <sub>C</sub>	c-phase output terminal	Connect to the coil.
29	V <sub>M1</sub>	Supply voltage terminal for motor drive	Connect to V <sub>M2</sub> externally.
30	L <sub>b</sub>	b-phase output terminal	Connect to the coil.

# Troubleshooting

Equipments required at repair

1. Oscilloscope(100MHz or more )
2. PROBE for Oscilloscope(10:1)
3. PC(486 or more)

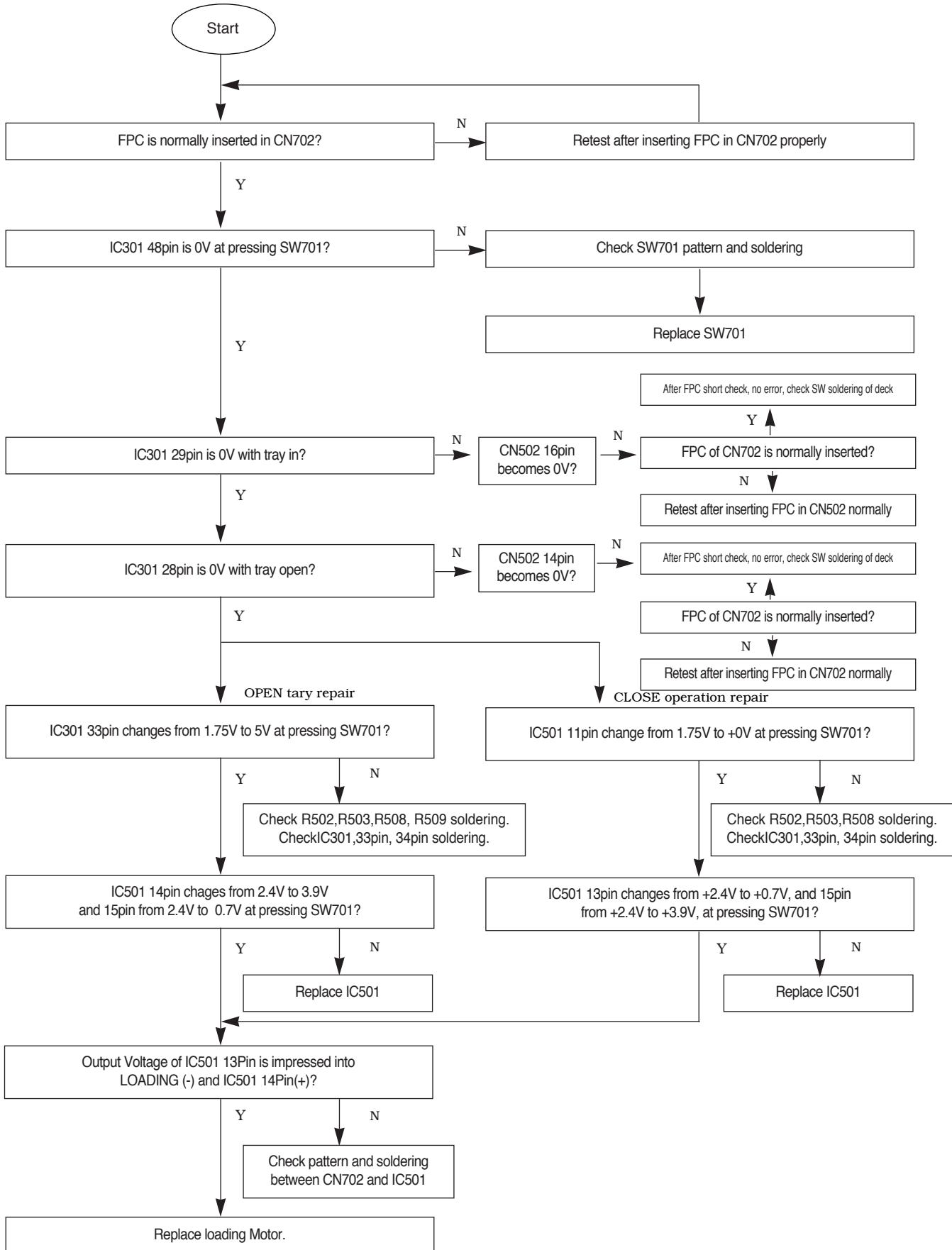
Verify the circuit of power unit and the first status(Plug-in the power cable without I/F cable and verify.)

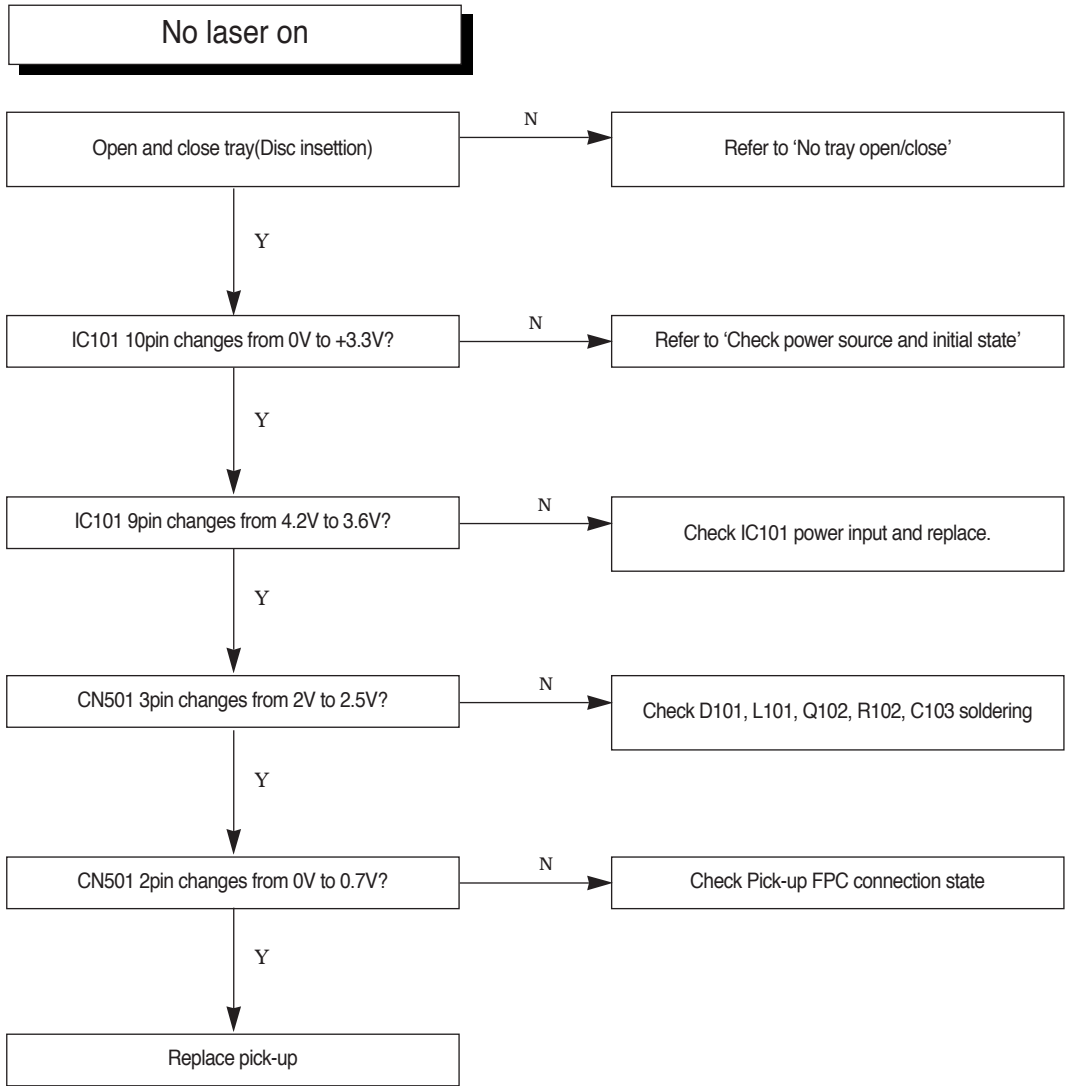


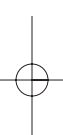
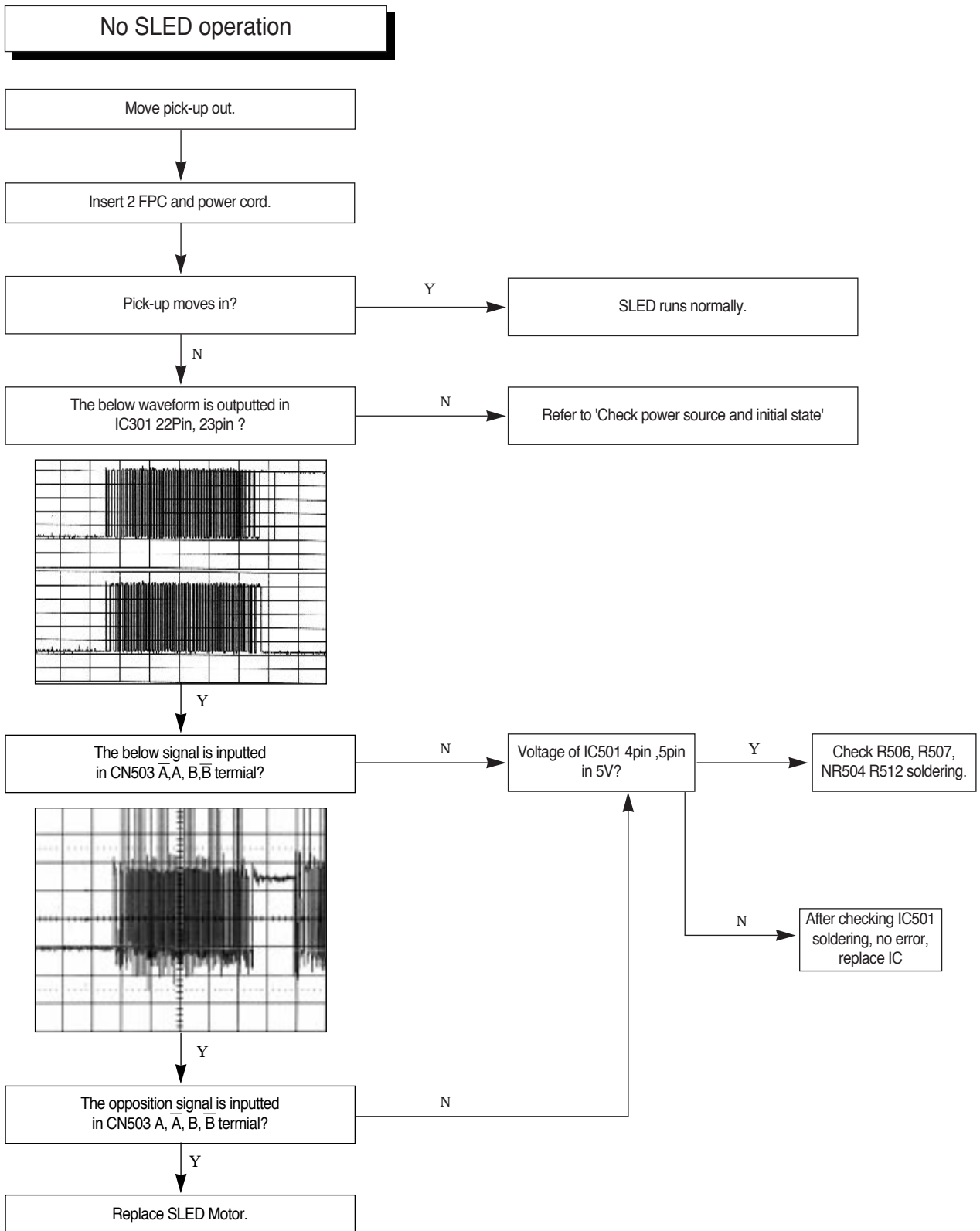
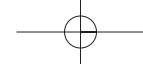


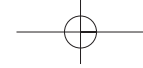
FPC : Flexible Printed Circuit

No tray open/close

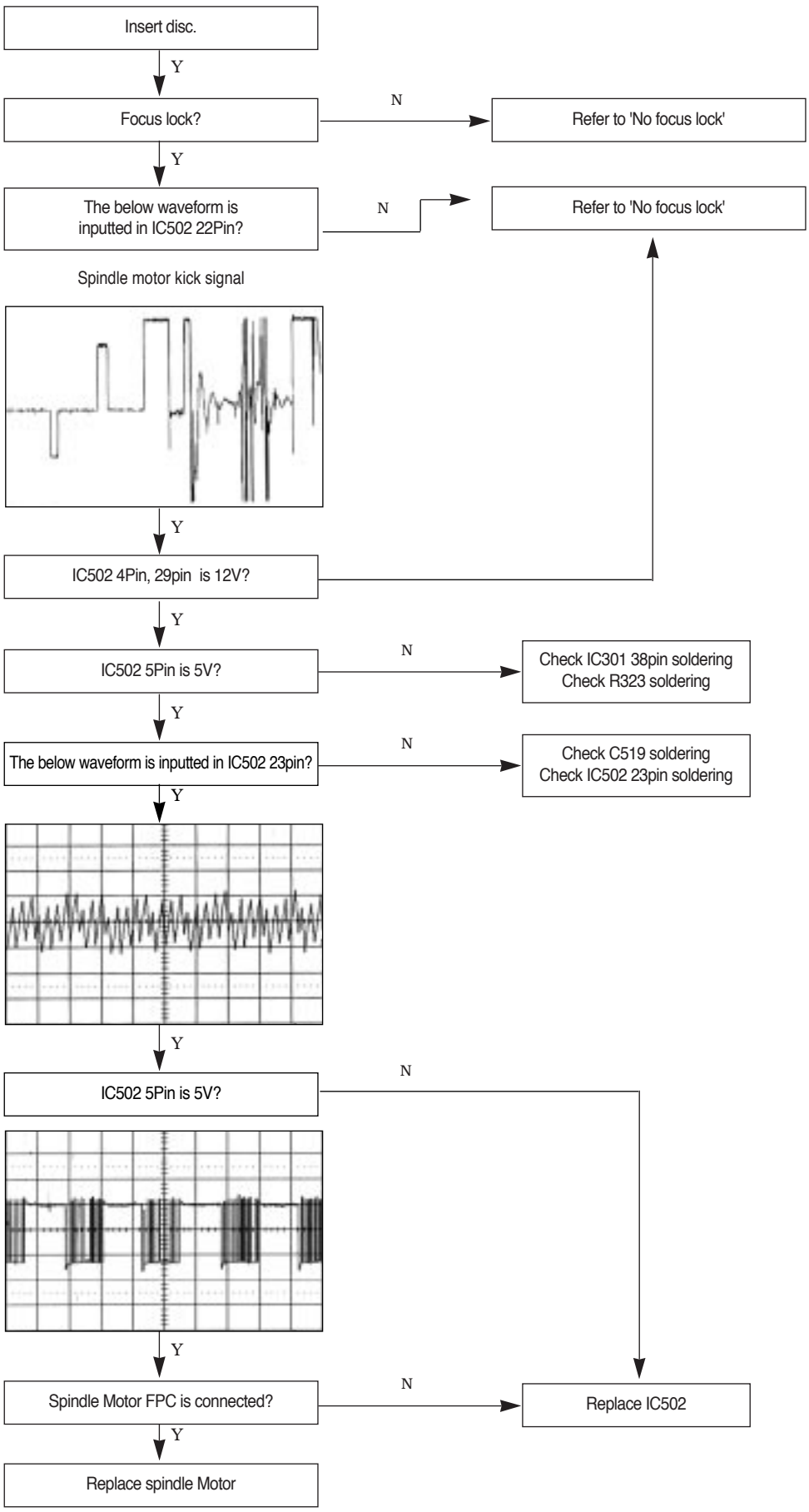






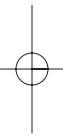
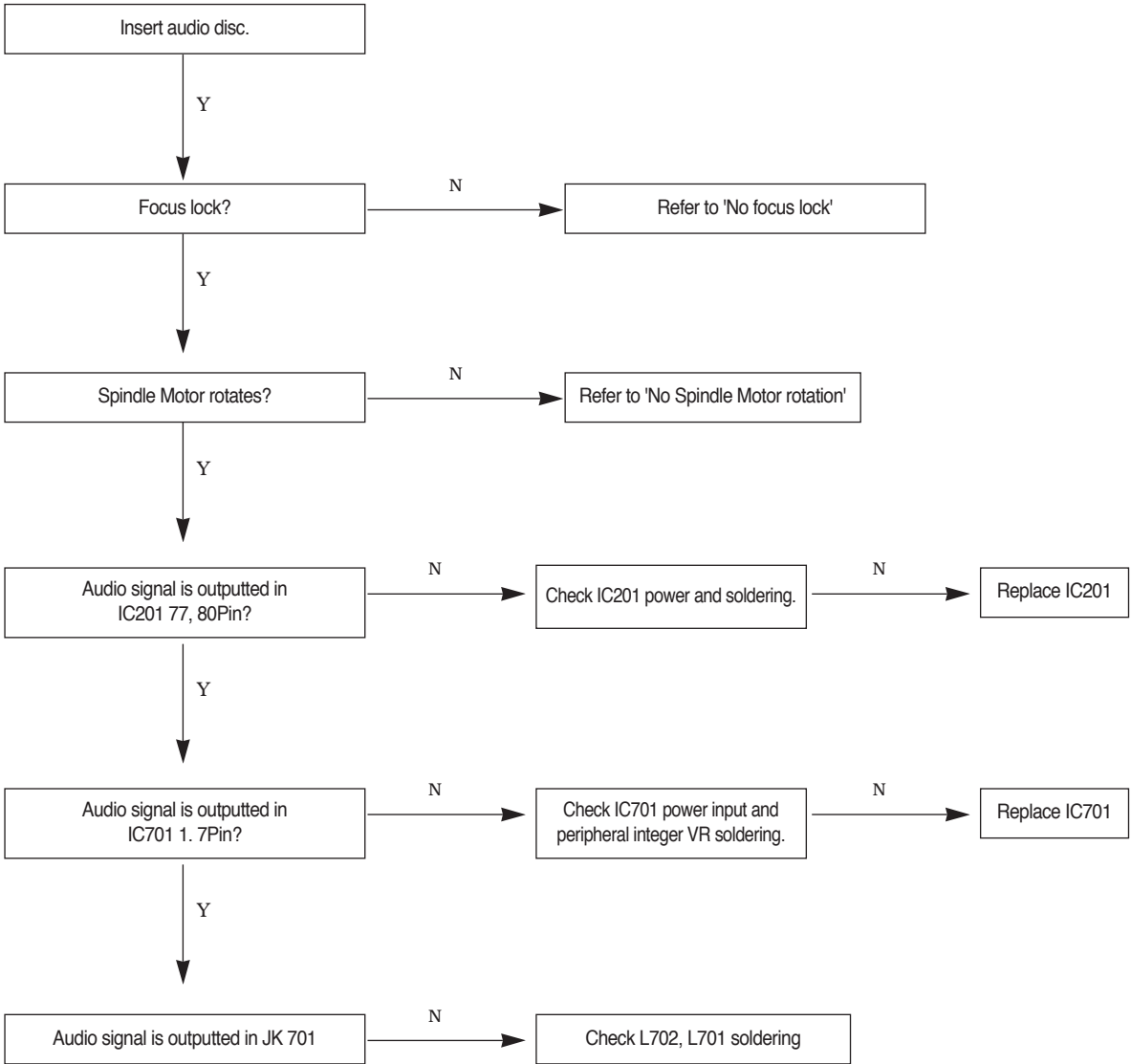


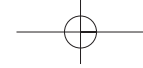
## No spindle motor rotation



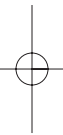
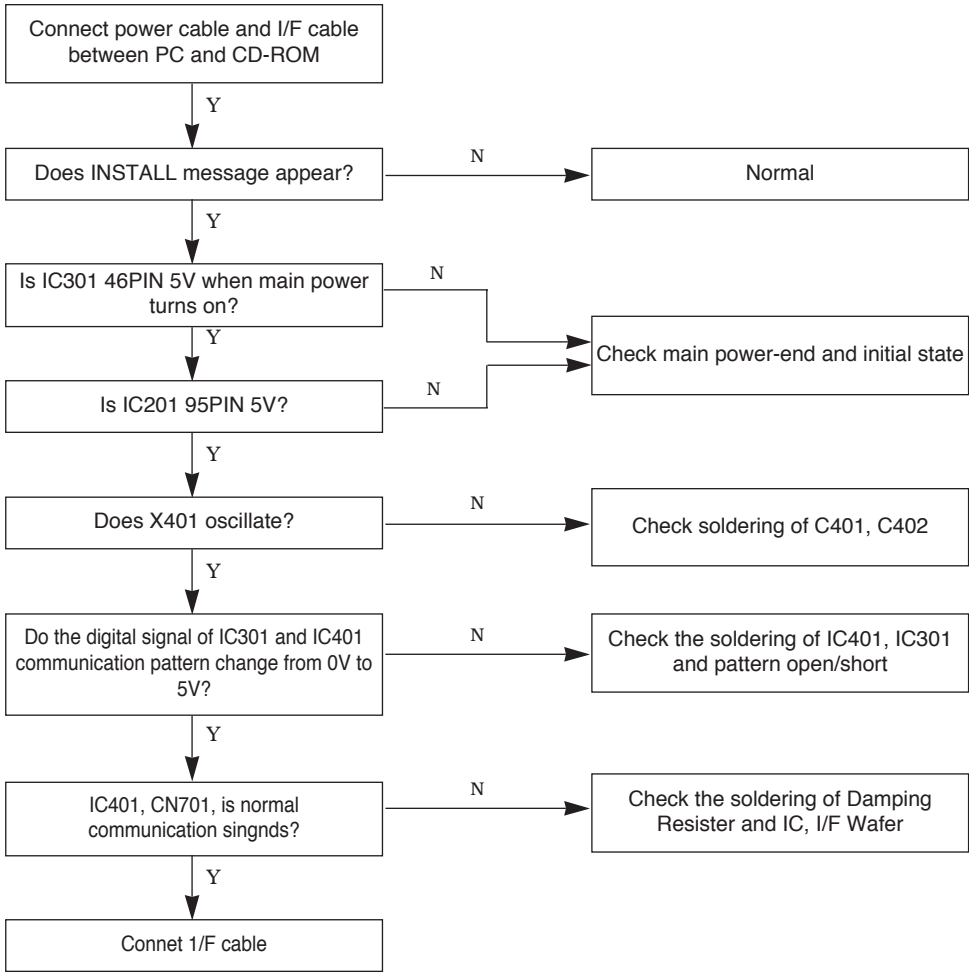


## No audio output



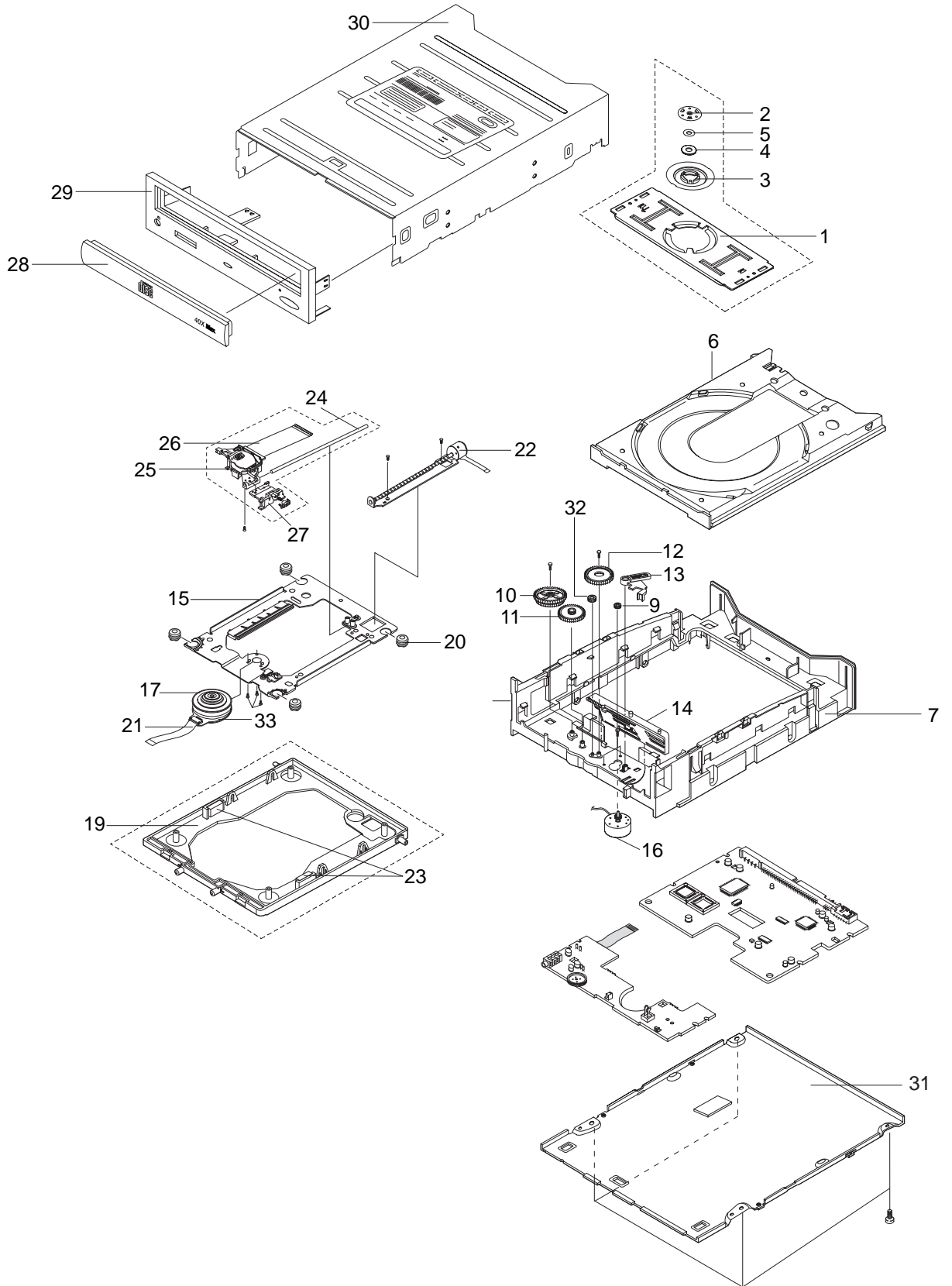


## When installing is impossible





# Exploded Views



## Device Part List

NO	PARTS	SPECIFICATION	COUNT	Code
	FULL DESK ASSY			
	ASS'Y CLAMPER			BG97-00013A
1	-BRKT CLAMPER	SECC 0.8T		BG61-00010A
2	-CLAMPER UPPER	POM		BG66-90013A
3	-CLAMPER LOWER	POM		BG66-00001A
4	-MAGNET CLAMPER	Nd-Fe-B(N35H)		BG33-30001D
5	-BRKT MAGNET	SECC 0.8T		BG61-00018A
6	TRAY DISC	PC/ABS		BG66-00002A
	ASS'Y LOADING			BG97-00017A
7	-MAIN FRAME	ABS		BG61-00011A
16	-MOTOR DC	SM-2412L		BG31-00002A
	-SCREW MACHNE	M1.7*3		AC60-10027A
9	-GEAR MOTOR	POM M90-44		BG66-20139A
11	-GEAR B	NYLON12(PA L-1724)		BG66-20140A
12	-GEAR A	POM(M90-44)		BG66-20141A
32	-GEAR D	NYLON66(ZYTEL 101L)		BG66-20143A
10	-GEAR TRAY	POM(M90-44)		BG66-00004A
13	-RING SPRING	POM(M90-44)		BG60-42003A
	-SPRING LEVER	SUS304WPB		BG61-60038A
	-LEVER SWITCH	POM(M90-44)		BG66-30017A
14	-SLIDE CAM	PBT		BG66-00003A
	-SCREW TAPTITE	M1.7*5		AH60-10145A
33	MOTOR SPINDLE	BML5E6CRE		BG31-00005A
17	ASS'Y TURN TABLE			BG97-00071A
	-TURN TABLE ABS	AL diecast		BG66-00010A
	-BRKT T/T	SECC 1.0T		BG61-00018A
	-COVER T/T	SUS 0.3T		BG63-30018A
	-BALL TURN TABLE	NI TRONIC		BG70-10316A
	-RUBBER T/T	CR 0.45T < 28*21		BG73-10107A
	SCREW SP MOTOR	M1.7*3		BG60-10020A
	ASSY FEEDING			BG97-00021A
19	-CHASSIS SUB	ABS+PC		BG61-00001A
15	MAIN BASE(M)	OUTSERT		BG61-00002A
	MAIN BASE(P)			BG61-00004A
20	-RUBBER INSULATOR	BUTYL		BG73-00001A
	-SCREW TAPPING			AH60-10143A
21	-FFC SP MOTOR	POLYESTER 11P		BG41-00006A
22	-MOTOR STEP	SPS-15RF-051K		BG31-00001A
	-SCREW TAPPING	M1.7*5(BLK)		AC60-10059A
23	-PAD DECK	PORON		BG69-00012A
24	SCREW SP MOTOR	M1.7*3		AC60-10059A
	SHAFT PU(R)	SUS420J2(89)		BG61-00009A
25	PICK UP	KSS575B		BG30-00002A
26	FFC PICK UP	POLYESTER 17P		BG41-00009A
27	ASS'Y SLIDER STEP			BG97-00018A
	SLIDER STEP	POM(NW-02)		BG66-00005A
	HOLDER-SLIDER			
	SPRING-STEP			
28	DOOR TRAY	ABS		BG64-00007A
29	PANEL FRONT ASSY			BG97-00024A
	-PANEL FRONT	ABS		
	-KNOB EJECT	ABS		
	-LENS LED	ACRYL MILKY		
30	COVER TOP	SECC 0.6T		BG63-00011A
31	ASS'Y COVER BOTTOM			BG97-00085A





## Electrical parts List

### SC-140B MAIN PCB

#### IC

N O	C O D E N O	L O C A T I O N N O	S P E C
1	1201-001399	IC101	TA2140FN
2	0904-001306	IC201	TC9450AF
3	1203-001500	IC202	PQ20WZ51
4	1001-001003	IC206	TC4S66F
5	0903-001149	IC301	KS88P4504
6	1103-001144	IC304	29EE512-70
7	0801-002143	IC310	7S32
8	1005-001006	IC401	TC9474FA
9	1003-001221	IC501	M56788FP
10	1003-001227	IC502	TA8496AF
11	0801-002279	IC503	74VHC4053
12	0801-002279	IC802	74VHC4053

#### C-CHIP

N O	C O D E N O	L O C A T I O N N O	S P E C
1	2203-000041	C207	100
2	2203-000041	C208	100
3	2203-000041	C401	100
4	2203-000041	C402	100
5	2203-000257	C111	103
6	2203-000257	C202	103
7	2203-000257	C203	103
8	2203-000257	C274	103
9	2203-000257	C306	103
10	2203-000257	C503	103
11	2203-000257	C521	103
12	2203-000257	C601	103
13	2203-000257	C609	103
14	2203-000189	C104	104
15	2203-000189	C106	104
16	2203-000189	C113	104
17	2203-000189	C213	104
18	2203-000189	C221	104
19	2203-000189	C275	104
20	2203-000189	C300	104
21	2203-000189	C301	104
22	2203-000189	C307	104
23	2203-000189	C308	104
24	2203-000189	C313	104
25	2203-000189	C403	104
26	2203-000189	C404	104
27	2203-000189	C405	104
28	2203-000189	C406	104
29	2203-000189	C407	104
30	2203-000189	C501	104
31	2203-000189	C507	104
32	2203-000189	C508	104
33	2203-000189	C516	104

**C-CHIP**

N O	C O D E N O	L O C A T I O N N O	S P E C
34	2203-000189	C517	104
35	2203-000189	C520	104
36	2203-000189	C522	104
37	2203-000189	C524	104
38	2203-000189	C602	104
39	2203-000189	C606	104
40	2203-000189	C807	104
41	2203-000222	C115	104(2012)
42	2203-000626	C408	220
43	2203-000560	C112	224
44	2203-000815	C110	330
45	2203-000783	C201	331
46	2203-000715	C204	332
47	2203-000715	C215	332
48	2203-000715	C216	332
49	2203-000715	C219	332
50	2203-000715	C220	332
51	2203-001630	C608	334
52	2203-001656	C502	471
53	2203-000062	C217	473
54	2203-000062	C218	473
55	2203-001724	C105	475
56	2203-001724	C107	475
57	2203-001724	C109	475
58	2203-001724	C150	475
59	2203-001724	C205	475
60	2203-001724	C210	475
61	2203-001724	C214	475
62	2203-001724	C278	475
63	2203-001724	C302	475
64	2203-001724	C504	475
65	2203-001724	C262	475
66	2203-001724	C525	475
67	2203-001052	C262	561
68	2203-001103	C509	686
69	2203-001222	C519	821
70	2203-001211	C273	822
71	2203-001211	C277	822
72	2402-000112	C712	10/16V
73	2402-000112	C715	10/16V
74-	2402-001009	C276	100/6.3V
75	2402-001009	C607	100/6.3V
76	2402-00008	C103	47/16V
77	2402-00008	C212	47/16V
78	2402-00008	C604	47/16V
79	2402-000371	C310	47/16V(C-TA)
80	2203-002233	C116	0.5P
81	2203-002233	C117	0.5V
82	2203-002233	C118	0.5V
83	2203-001422	C124	3P
84	2203-002605	C101	8P
85	2203-001195	C303	7P
86	2203-001195	C304	7P

**R-CHIP**

<b>N O</b>	<b>C O D E N O</b>	<b>L O C A T I O N N O</b>	<b>S P E C</b>
1	2007-000070	R108	0
2	2007-000070	R109	0
3	2007-000070	R124	0
4	2007-000070	R310	0
5	2007-000070	R325	0
6	2007-000070	R329	0
7	2007-000070	R508	0
8	2007-000070	R510	0
9	20007-000070	R511	0
10	2007-000070	R6A4	0
11	2007-000070	R6A7	0
12	2007-000070	R816	0
13	2007-000882	R211	0
14	2007-000309	R102	10
15	2007-000071	R402	22
16	2007-000071	R403	22
17	2007-000071	R406	22
18	2007-000071	R408	22
19	2007-000071	R409	22
20	2007-000071	R518	22
21	2007-001134	R519	68
22	2007-000074	R101	100
23	2007-000402	R404	150
24	2007-000402	R405	150
25	2007-000402	R407	150
26	2007-000402	R410	150
27	2007-000402	R411	150
28	2007-000402	R412	150
29	2007-000402	R413	150
30	2007-000402	R414	150
31	2007-000450	R307	150
32	2007-000075	R135	220
33	2007-000077	R732	470
34	2007-001157	R614	750
35	2007-000034	R520	1(1/8W)
36	2007-000034	R521	1(1/8W)
37	2007-000034	R523	1(1/8W)
38	2007-000034	R524	1(1/8W)
39	2007-000122	R436	1.2K
40	2007-000123	R715	1.5K
41	2007-000123	R720	1.5K
42	2007-000102	R273	100K
43	2007-000102	R274	100K
44	2007-000102	R304	100K
45	2007-000102	R305	100K
46	2007-000102	R319	100K
47	2007-000102	R504	100K
48	2007-000102	R506	100K
49	2007-000102	R532	100K
50	2007-000060	R516	100K-F
51	2007-000090	R432	10K

**R-CHIP**

<b>N O</b>	<b>C O D E N O</b>	<b>L O C A T I O N N O</b>	<b>S P E C</b>
52	2007-000090	R433	10K
53	2007-000090	R437	10K
54	2007-000090	R438	10K
55	2007-000090	R439	10K
56	2007-000090	R440	10K
57	2007-000090	R442	10K
58	2007-000090	R443	10K
59	2007-000090	R505	10K
60	2007-000090	R525	10K
61	2007-000090	R526	10K
62	2007-000090	R529	10K
63	2007-000090	R717	10K
64	2007-000090	R718	10K
65	2007-000092	R277	15K
66	2007-000092	R301	15K
67	2007-000092	R503	15K
68	2007-000078	R103	1K
69	2007-000078	R117	1K
70	2007-000078	R119	1K
71	2007-000078	R139	1K
72	2007-000078	R201	1K
73	2007-000078	R202	1K
74	2007-000078	R315	1K
75	2007-000078	R316	1K
76	2007-000078	R317	1K
77	2007-000078	R318	1K
78	2007-000078	R401	1K
79	2007-000065	R210	2.2M
80	2007-000094	R112	22K
81	2007-000094	R113	22K
82	2007-000094	R502	22K
83	2007-000655	R302	27K
84	2007-000080	R615	27K
85	2007-000082	R106	3.3K
86	2007-000082	R203	3.3K
87	2007-000082	R204	3.3K
88	2007-000082	R206	3.3K
89	2007-000082	R207	3.3K
90	2007-000082	R208	3.3K
91	2007-000082	R123	3.9k
92	2007-000125	R509	3.9k
93	2007-000134	R275	3.9k
94	2007-000134	R280	33k
95	2007-000134	R150	33k
96	2007-000130	R515	39k
97	2007-000130	R530	39k
98	2007-000881	R300	4.7(2012)
99	2007-000084	R118	4.7k
100	2007-000084	R311	4.7k
101	2007-000084	R312	4.7k
102	2007-000084	R314	4.7k

**R-CHIP**

<b>N O</b>	<b>C O D E N O</b>	<b>L O C A T I O N N O</b>	<b>S P E C</b>
103	2007-000097	R104	47k
104	2007-000097	R105	47k
105	2007-000097	R110	47k
106	2007-000097	R111	47k
107	2007-000097	R114	47k
108	2007-000097	R116	47k
109	2007-000097	R271	47k
110	2007-000097	R272	47k
111	2007-000097	R278	47k
112	2007-000097	R321	47k
113	2007-000097	R435	47k
114	2007-000097	R441	47k
115	2007-001007	R276	51k
116	2007-000098	R531	56k
117	2007-000098	R533	56k
118	2007-000100	R507	68k
119	2007-000100	R512	68k
120	2011-000002	NR701	22
121	2011-000002	NR702	22
122	2011-000002	NR703	22
123	2011-00002	NR704	22

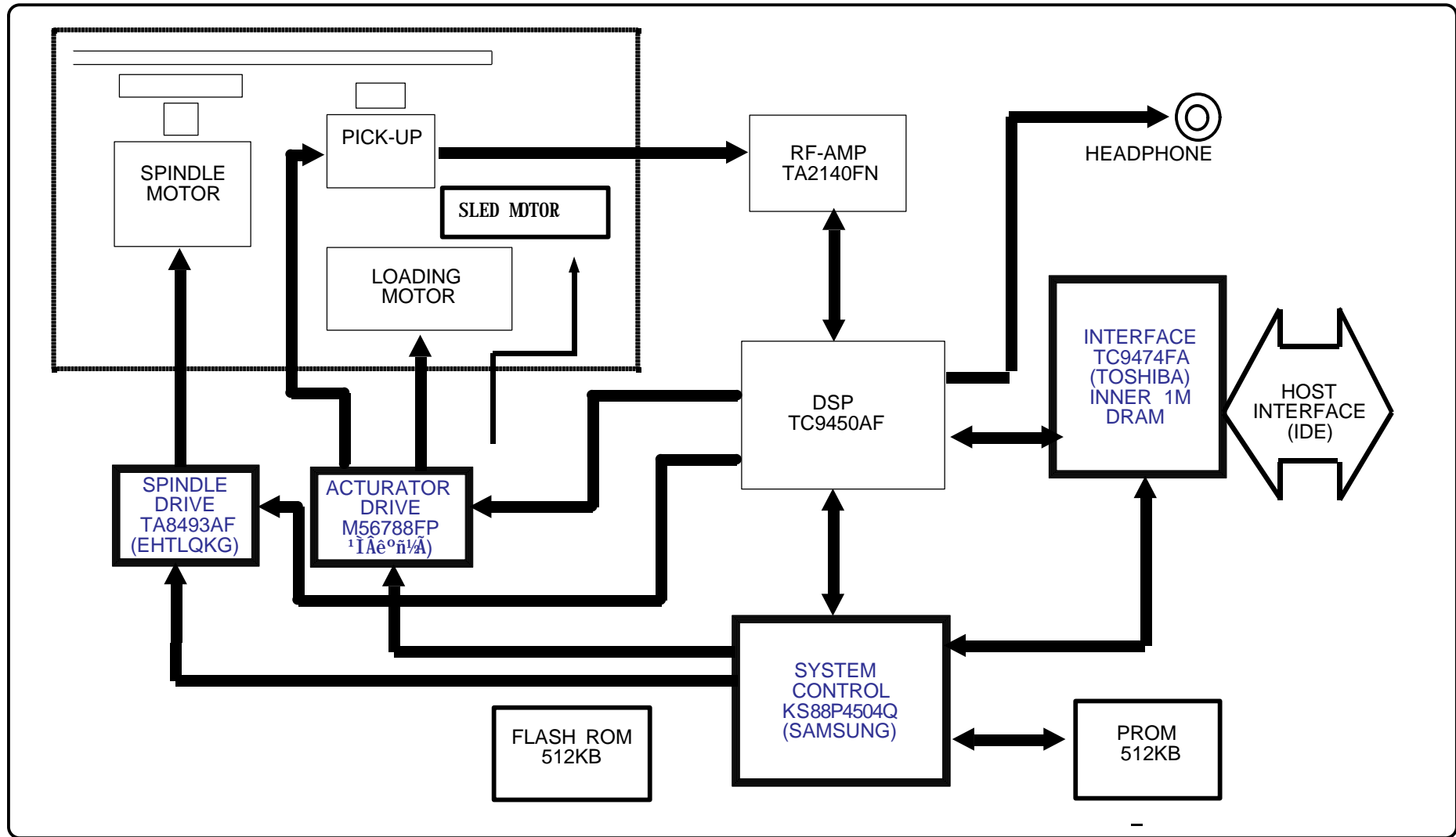
**OTHERS**

<b>N O</b>	<b>C O D E N O</b>	<b>L O C A T I O N N O</b>	<b>S P E C</b>
1	3301-001082	B601	BEAD
2	3301-001082	B602	BEAD
3	3301-001082	B613	BEAD
4	3708-001329	CN501	17PIN
5	3708-001348	CN502	11PIN
6	3708-001347	CN503	4PIN
7	3711-003262	CN701	56PIN
8	3708-001346	CN702	13PIN
9	0407-000116	D101	DAP202k
10	2703-000127	L101	10uH
11	BG41-00011A	PCB	PCB-MAIN
12	0504-000211	Q101	DTC143TUA
13	0501-000251	Q102	BC807
14	0504-000105	Q103	DTA114EU
15	2802-001047	X201	33.8688MHZ
16	2802-001068	X301	20MHZ
17	2802-001046	X401	50MHZ

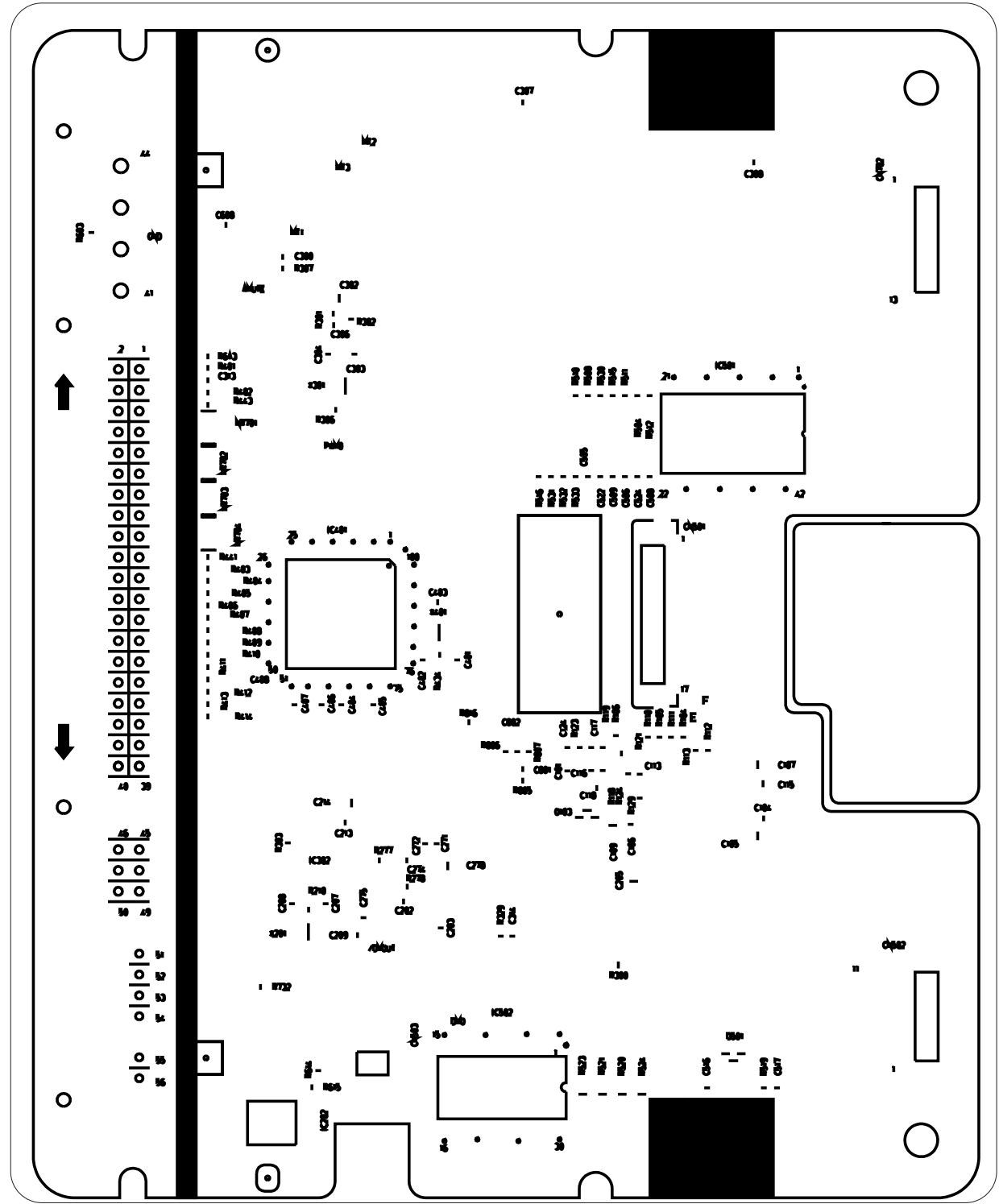
**SC-140B FRONT PCB**

<b>N O</b>	<b>C O D E</b>	<b>L O C A T I O N</b>	<b>P A R T N A M E</b>	<b>S P E C</b>
1	1201-001373	IC-701	I.C-H/P AMP	BH3541F
2	3301-000009	L703	BEAD	BLM21A601SPT
3	3301-000009	L704	BEAD	BLM21A602SPT
4	AH34-22001B	SW702	S/W-MECHA	PUSH LEVER
5	3404-001030	SW701	S/W-TACT	7.1X7.0X10
6	2101-001004	VR701	VR-ROTARY	20K
7	3722-001338	JK701	H/P JACK	PPJ 35F
8	0601-001332	D701	LED	GREEN
9	2001-000281	R705	R-AXIAL	100 ohm
10	2001-000515	R703	R-AXIAL	220 ohm
11	2001-000290	R704	R-AXIAL	10 Kohm
12	2001-000010	R701	R-AXIAL	68 Kohm
13	2001-000010	R702	R-AXIAL	68 Kohm
14	2401-000213	C706	C-RADIAL	100nF/50V
15	2401-000213	C707	C-RADIAL	100nF/50V
16	2401-001246	C701	C-RADIAL	4.7nF/25V
17	2401-001246	C702	C-RADIAL	4.7nF/25V
18	2401-001476	C704	C-RADIAL	47nF/10V
19	2401-003221	C703	C-RADIAL	100nF/16V
20	2401-003221	C705	C-RADIAL	100nF/16V
21	3811-000389	W701	JUMPER	
22	3811-000389	W702	JUMPER	
23	3811-000389	W703	JUMPER	
24	3811-000389	W704	JUMPER	
25	3811-000389	W705	JUMPER	
26	3811-000389	L701	JUMPER	
27	3811-000389	L702	JUMPER	
28	BG41-00004A	CN701	FFC	13PIN
29	BG41-00005A	PCB	PCB-FRONT	PHENOL

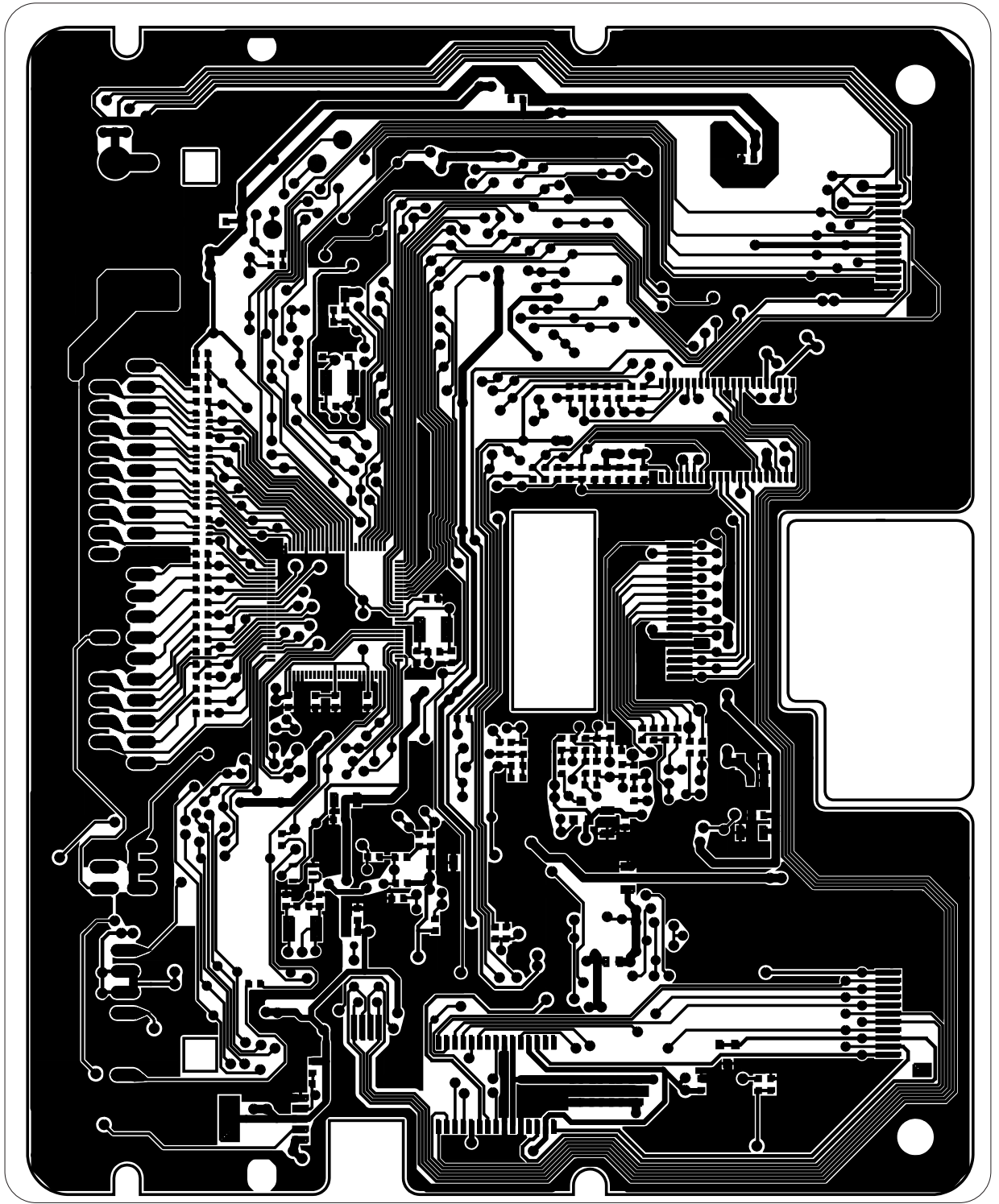
# SC-140 BLOCK DIAGRAM



# Operational Position Diagram



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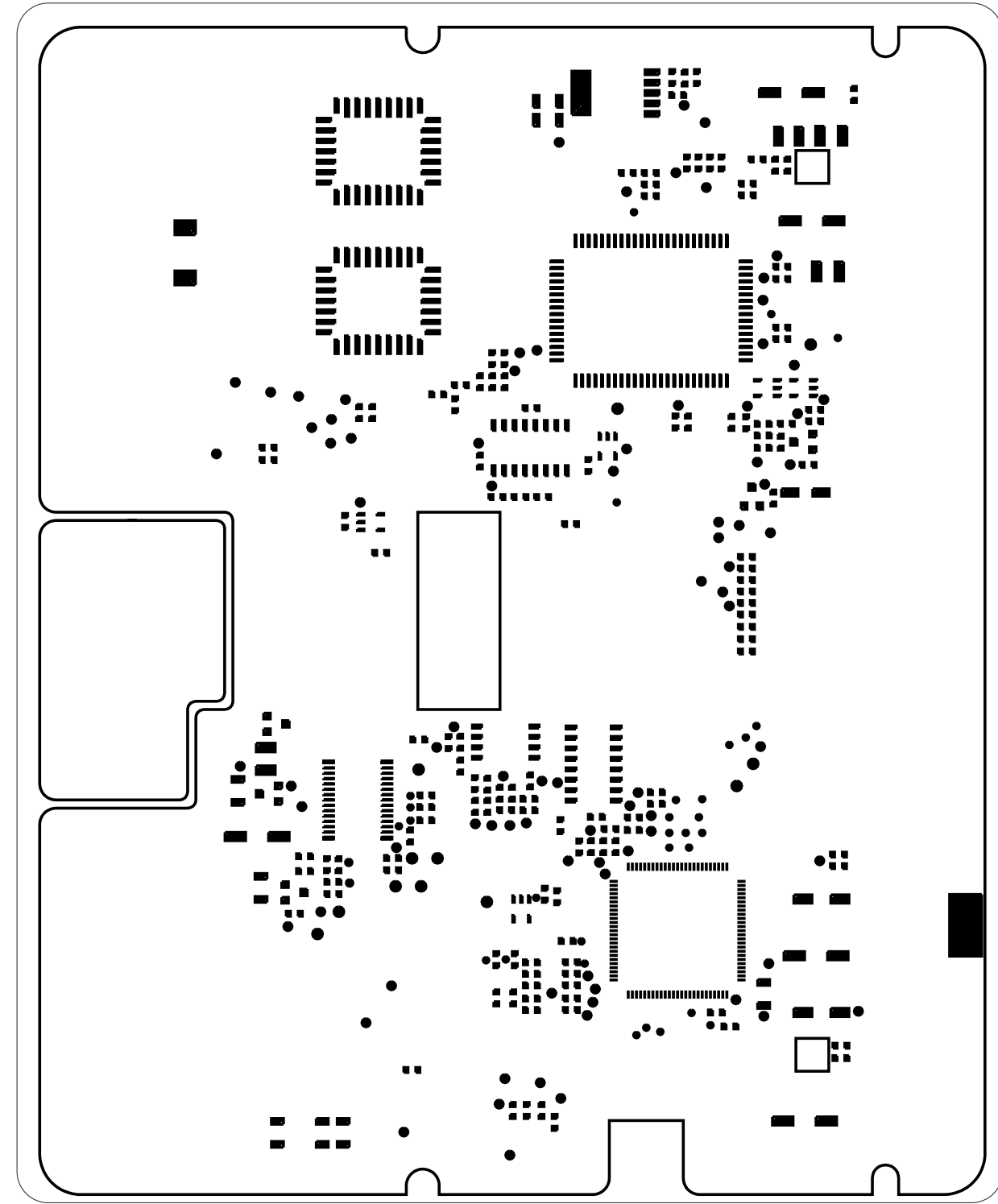
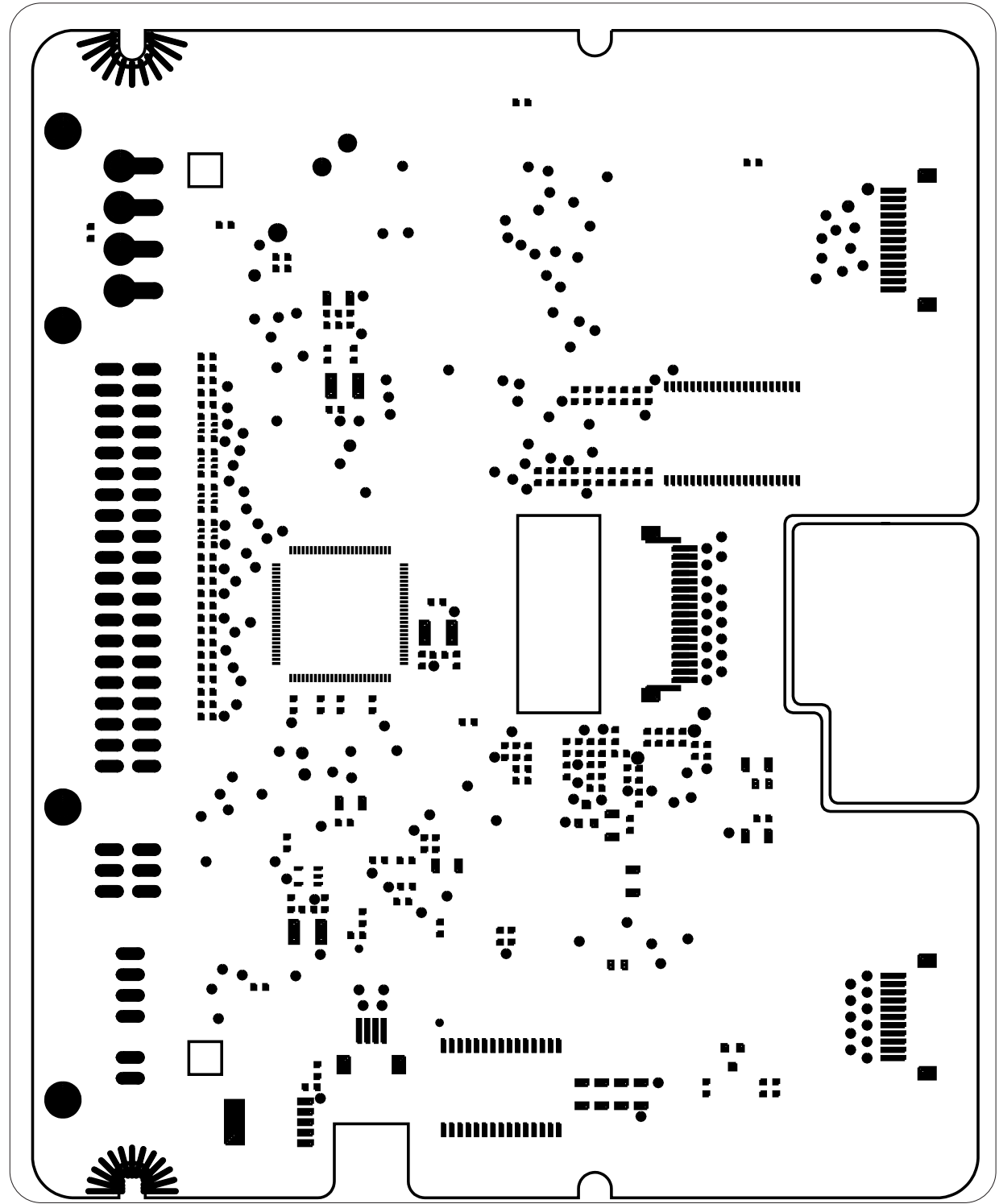


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# Operational Position Diagram



# Circuit Diagram

