S/M No. : TWP795MEF0

Service Manual

Color Television 66cm Wide Stereo

CHASSIS : WP-795

Model : DWP-28W2ZZF
DWP-28W2ZLF

Specification

Items Model	DWP-28W2ZZF/DWP-28W2ZLF
TV Standard	PAL-SECAM B/G D/K,PAL I/I,SECAM L/L
Sound System	NICAM B/G,I,D/K,L, FM2Carrier B/G, D/K
Power Consumption	70W approx.
Sound Output Power Speaker	6W X 2(at60% mod, 10%THD) 12W 8 ohm X 2
Teletext System	10page memory FASTEXT(FLOF or top)
Aerial input	75ohm unbalanced
Channel coverage	Off-air channels, S-cable channels and hyperband
Tuning System	Frequency synthesiser tuning system
Visual screen size	66cm(wide screen)
Channel indication	On Screen Display
Program Selection	100programmes
Aux. terminal	EURO-SCART1: Audio/Video In and Out, R/G/B In, slow and fast switching. EURO-SCART2:Audio/Video In and Out, S-VHS In. Audio-Video Jack on front of cabinet in common connection with EURO-SCART2. Headphone jack(3.5mm)on front of cabinet
Remote Control Unit	R-40A13

DAEWOO ELECTRONICS CO., LTD

http : //svc.dwe.co.kr Dec. 2000

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1 - Main features

1-1 Specifications

TV standard	PAL - SECAM B/G D/K, PAL I/I, SECAM L/L'
Sound system	NICAM B/G, I, D/K, L, FM 2Carrier B/G, D/K
Power consumption	70 W approx.
Sound Output Power	6Wx 2 (at 60% mod, 10%THD)
Speaker	12W 8 ohm x2
Teletext system	10 pages memory FASTEXT (FLOF or TOP)
Aerial input	75 ohm unbalanced
Channel coverage	Off-air channels, S-cable channels and hyperband
Tuning system	Frequency synthesiser tuning system
Visual screen size	66cm (Wide Screen)
Channel indication	On Screen Display
Program Selection	100 programmes
Aux. terminal	EURO-SCART 1 : Audio / Video In and Out, R/G/B In, Slow and Fast switching. EURO-SCART 2 : Audio / Video In and Out, S-VHS In. Audio-Video Jack on front of cabinet in common connection with EURO-SCART 2. Headphone jack (3.5 mm) on front of cabinet
Remote Control Unit	R-40A13

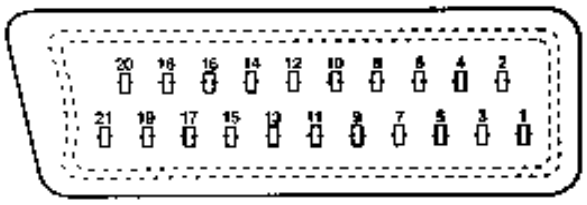
21 Pin EURO-SCART 1 :

Pin	Signal Description	Matching value
1	Audio Output Right	0.5 Vrms, Impedance < 1 kΩ, (RF 54% Mod)
2	Audio Input Right	0.5 Vrms, Impedance > 10 kΩ
3	Audio Output Left	0.5 Vrms, Impedance < 1 kΩ, (RF 54% Mod)
4	Audio Earth	
5	Blue Earth	
6	Audio Input Left	0.5 Vrms, Impedance > 10 kΩ
7	Blue Input	0.7 Vpp ±0.1V, Impedance 75Ω
8	Slow Switching	TV : 0 to 2V, AV 16/9 : 4.5 to 7V, AV Auto : 9.5 to 12V , Impedance > 10 kΩ
9	Green Earth	
10	N.C.	
11	Green Input	0.7 Vpp ± 0.1V, Impedance 75Ω
12	N.C.	
13	Red Earth	
14	Blanking Earth	
15	Red Input	0.7 Vpp ± 0.1V, Impedance 75Ω
16	Fast Switching	0 to 0.4V : Logic "0", 1 to 3V : Logic "1", Impedance 75Ω
17	Video Out Earth	
18	Video In Earth	
19	Video Output	1 Vpp ± 3dB, Impedance 75Ω

20	Video Input	1 Vpp ± 3dB, Impedance 75Ω
21	Common Earth	

21 Pin EURO-SCART 2 :

Pin	**Signal Description**	**Matching value**
1	Audio Output Right	0.5 Vrms, Impedance < 1 kΩ, (RF 54% Mod)
2	Audio Input Right	0.5 Vrms, Impedance > 10 kΩ
3	Audio Output Left	0.5 Vrms, Impedance < 1 kΩ, (RF 54% Mod)
4	Audio Earth	
5	Earth	
6	Audio Input Left	0.5 Vrms, Impedance > 10 kΩ
7	N.C.	
8	N.C.	
9	N.C.	
10	N.C.	
11	N.C.	
12	N.C.	
13	Earth	
14	Earth	
15	Chroma Input	± 3dB for a luminance signal of 1 Vpp
16	N.C.	
17	Video Out Earth	
18	Video In Earth	
19	Video Output	1 Vpp ± 3dB, Impedance 75Ω
20	Video Input, Y In.	1 Vpp ± 3dB, Impedance 75Ω
21	Common Earth	



1-2 Channel table

FREQUENCY TABLE

CH	EUROPE CCIR	FRANCE	GB(IRELAND)	EAST OIRT
C01	46.25	-	45.75	49.75
C02	48.25	55.75 (L')	53.75	59.25
C03	55.25	60.5 (L')	61.75	77.25
C04	62.25	63.75 (L')	175.25	85.25
C05	175.25	176.00	183.25	93.25
C06	182.25	184.00	191.25	175.25
C07	189.25	192.00	199.25	183.25
C08	196.25	200.00	207.25	191.25
C09	203.25	208.00	215.25	199.25
C10	210.25	216.00	223.25	207.25
C11	217.25	189.25 (LUX)	231.25	215.25
C12	224.25	69.25 (L')	239.25	223.25
C13	53.75	76.25 (L')	247.25	-
C14	-	83.25 (L')	49.75	-
C15	82.25	90.25	57.75	-
C16	-	97.25	65.75	-
C17	183.75	-	77.75	-
C18	192.25	-	85.75	-
C19	201.25	-	-	-
C20	-	-	-	-
C21	471.25	471.25	471.25	471.25
C22	479.25	479.25	479.25	479.25
C23	487.25	487.25	487.25	487.25
C24	495.25	495.25	495.25	495.25
C25	503.25	503.25	503.25	503.25
C26	511.25	511.25	511.25	511.25
C27	519.25	519.25	519.25	519.25
C28	527.25	527.25	527.25	527.25
C29	535.25	535.25	535.25	535.25
C30	543.25	543.25	543.25	543.25
C31	551.25	551.25	551.25	551.25
C32	559.25	559.25	559.25	559.25
C33	567.25	567.25	567.25	567.25
C34	575.25	575.25	575.25	575.25
C35	583.25	583.25	583.25	583.25
C36	591.25	591.25	591.25	591.25
C37	599.25	599.25	599.25	599.25
C38	607.25	607.25	607.25	607.25
C39	615.25	615.25	615.25	615.25
C40	623.25	623.25	623.25	623.25
C41	631.25	631.25	631.25	631.25
C42	639.25	639.25	639.25	639.25
C43	647.25	647.25	647.25	647.25
C44	655.25	655.25	655.25	655.25
C45	663.25	663.25	663.25	663.25

C46	671.25	671.25	671.25	671.25
C47	679.25	679.25	679.25	679.25
C48	687.25	687.25	687.25	687.25
C49	695.25	695.25	695.25	695.25
C50	703.25	703.25	703.25	703.25
C51	711.25	711.25	711.25	711.25
C52	719.25	719.25	719.25	719.25
C53	727.25	727.25	727.25	727.25
C54	735.25	735.25	735.25	735.25
C55	743.25	743.25	743.25	743.25
C56	751.25	751.25	751.25	751.25
C57	759.25	759.25	759.25	759.25
C58	767.25	767.25	767.25	767.25
C59	775.25	775.25	775.25	775.25
C60	783.25	783.25	783.25	783.25
C61	791.25	791.25	791.25	791.25
C62	799.25	799.25	799.25	799.25
C63	807.25	807.25	807.25	807.25
C64	815.25	815.25	815.25	815.25
C65	823.25	823.25	823.25	823.25
C66	831.25	831.25	831.25	831.25
C67	839.25	839.25	839.25	839.25
C68	847.25	847.25	847.25	847.25
C69	855.25	855.25	855.25	855.25
C70	863.25	863.25	863.25	863.25
C71	69.25	-	-	-
C72	76.25	-	-	-
C73	83.25	-	-	-
C74	90.25	-	-	-
C75	97.25	-	-	-
C76	59.25	-	-	-
C77	93.25	-	-	-
S01	105.25	104.75	103.25	105.25
S02	112.25	116.75	111.25	112.25
S03	119.25	128.75	119.25	119.25
S04	126.25	140.75	127.25	126.25
S05	133.25	152.75	135.25	133.25
S06	140.25	164.75	143.25	140.25
S07	147.25	176.75	151.25	147.25
S08	154.25	188.75	159.25	154.25
S09	161.25	200.75	167.25	161.25
S10	168.25	212.75	-	168.25
S11	231.25	224.75	-	231.25
S12	238.25	236.75	-	238.25
S13	245.25	248.75	255.25	245.25
S14	252.25	260.75	263.25	252.25
S15	259.25	272.75	271.25	259.25
S16	266.25	284.75	279.25	266.25
S17	273.25	296.75	287.25	273.25

S18	280.25	136.00	295.25	280.25
S19	287.25	160.00	303.25	287.25
S20	294.25	-	-	294.25
S21	303.25	303.25	-	303.25
S22	311.25	311.25	311.25	311.25
S23	319.25	319.25	319.25	319.25
S24	327.25	327.25	327.25	327.25
S25	335.25	335.25	335.25	335.25
S26	343.25	343.25	343.25	343.25
S27	351.25	351.25	351.25	351.25
S28	359.25	359.25	359.25	359.25
S29	367.25	367.25	367.25	367.25
S30	375.25	375.25	375.25	375.25
S31	383.25	383.25	383.25	383.25
S32	391.25	391.25	391.25	391.25
S33	399.25	399.25	399.25	399.25
S34	407.25	407.25	407.25	407.25
S35	415.25	415.25	415.25	415.25
S36	423.25	423.25	423.25	423.25
S37	431.25	431.25	431.25	431.25
S38	439.25	439.25	439.25	439.25
S39	447.25	447.25	447.25	447.25
S40	455.25	455.25	455.25	455.25
S41	463.25	463.25	463.25	463.25

1-3 ATSS sorting method

The TV set sweeps all the TV bands from beginning of VHF to end of UHF. The TV controlling software for each program checks if a VPS CNI code is transmitted. If no VPS CNI code is found, the system check if a CNI code is transmitted in the teletext lines (Packet 8/30 format 1). If such a code (VPS or teletext) is found and if this code is in the ATSS list, the program is automatically named.
The programs found are then sorted in 4 groups :

Group I : It contains all the programs from the selected country and named by the TV controlling software. Within this group the sorting order is fixed by the ATSS list.
Group II : It contains all the programs with a strong signal strength which are not listed in group I.
Group III : It contains all the programs with a weak signal strength which are not listed in group I.
Group IV : If two or more programs with the same code are found, only the strongest (or if they have the same level the one with the lowest frequency) is listed in group I, II or III. The others are listed in group IV.

Note : If two programs with the same name but a different code are found these two programs are listed in group I, II or III (e.g. Regional program SW3 in Germany).

The sorting order within group II, III, and IV is based on the channel frequency. The program with the lowest frequency is allocated the first rank in its group, and so forth until the last program of the group which has the highest frequency.

Program number	Group	Skip
1	Group I	
2		
...		
n		
n+1	Group II	
...		
m		
m+1	Group III	
...		
p		
p+1	Group IV	
...		
q		
q+1	not used	➨
...		
99		
0		

Program number	Group	Skip
1	Group II	
...		
m		
m+1	Group III	
...		
p		
p+1	Group IV	
...		
q		
q+1	not used	➨
...		
99		
0		

Special case : **Country selection = Others**

Special case : **France**
If France is selected the TV controlling software sweeps the whole TV bands firstly with France system selected (positive video modulation) and secondly with Europe system selected (negative video modulation).

Special case : **Switzerland**
If Switzerland is selected the TV controlling software sweeps the whole TV bands firstly with Europe system selected (negative video modulation) and secondly with France system selected (positive video modulation).

Special case : **GB**
Note for satellite receiver users : Before starting ATSS turn On your satellite receiver and tune " SKY NEWS ".
If GB is selected the TV controlling software seeks for programs only in UHF (C21 to C70). The sorting order is :
1 - BBC1
2 - BBC2
3 - ITV
4 - CH4
5 - CH5
6 - NEWS

If two or more " identical "programs (same name but different code e.g. BBC1 and BBC1 Scotland) are found the following programs in the list will be shifted up. (1 - BBC1, 2 - BBC1, 3 - BBC2, 4 - ITV, 5 - CH4, 6 - CH5, 7 - NEWS, ..)

If one of the program above is not found, the associated program number remains empty (freq.=467.25 Mhz - Skip selected - no name - system=GB).
example A : 1 - BBC1, 2 - BBC2, 3 - ITV, 4 - -----, 5 - CH5, 6 - NEWS, ...
example B (if 2 BBC1 found) : 1 - BBC1, 2 - BBC1, 3 - BBC2, 4 - ITV, 5 - -----, 6 - CH5, 7 - NEWS, ...

2 - Safety instruction

WARNING: Only competent service personnel may carry out work involving the testing or repair of this equipment.

X-RAY RADIATION PRECAUTION

1. Excessive high voltage can produce potentially hazardous X-RAY RADIATION. To avoid such hazards, the high voltage must not exceed the specified limit. The nominal value of the high voltage of this receiver is 26 KV at max beam current. The high voltage must not, under any circumstances, exceed 30KV. Each time a receiver requires servicing, the high voltage should be checked. It is important to use an accurate and reliable high voltage meter.
2. The only source of X-RAY Radiation in this TV receiver is the picture tube. For continued X-RAY RADIATION protection, the replacement tube must be exactly the same type tube as specified in the parts list.

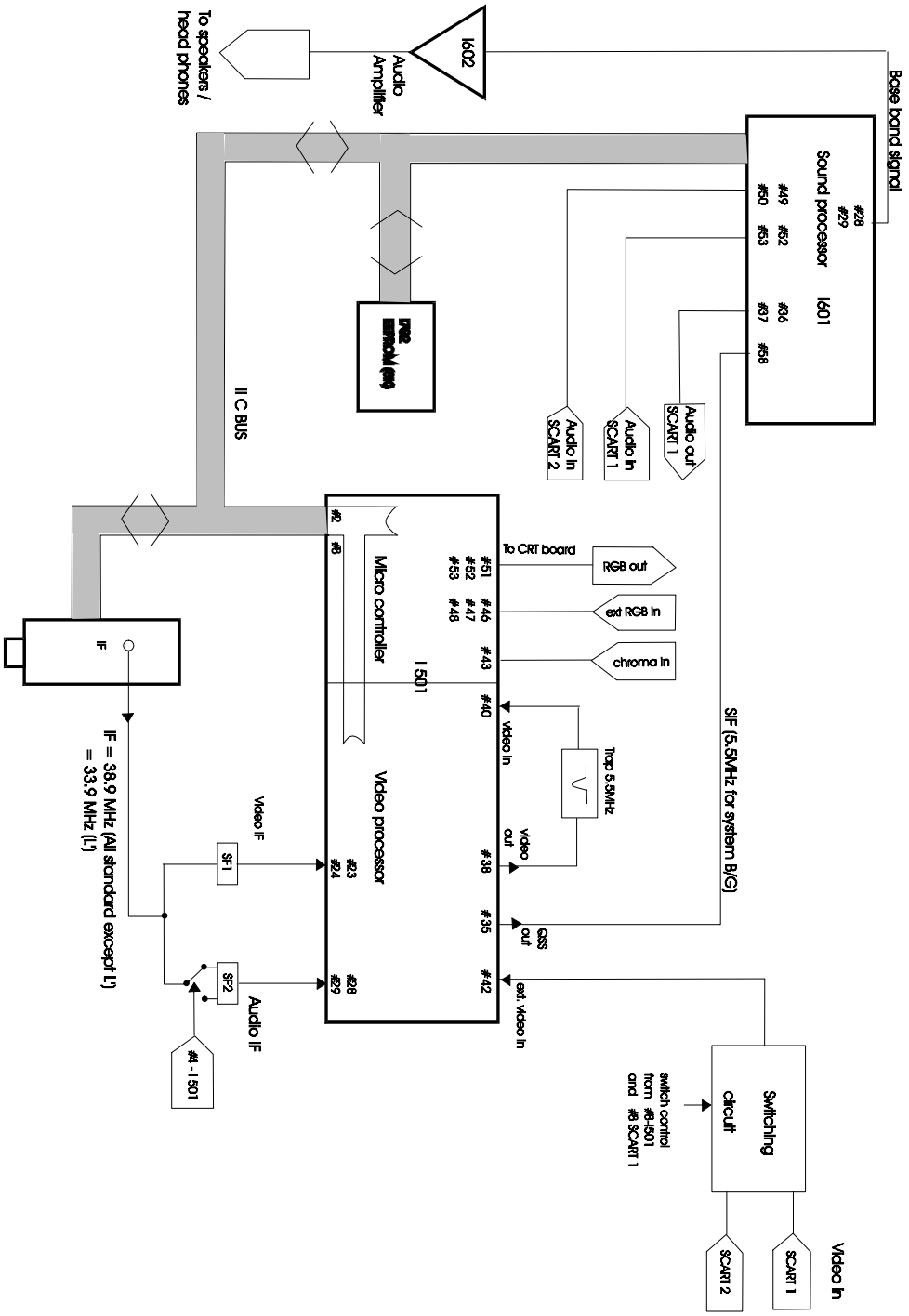
SAFETY PRECAUTION

1. Potentials of high voltage are present when this receiver is operating. Operation of the receiver outside the cabinet or with the back board removed involves a shock hazard from the receiver.
   1) Servicing should not be attempted by anyone who is not thoroughly familiar with the precautions necessary when working on high voltage equipment.
   2) Discharge the high potential of the picture tube before handling the tube. The picture tube is highly evacuated and if broken, glass fragments will be violently expelled.
2. If any Fuse in this TV receiver is blown, replace it with the FUSE specified in the Replacement Parts List.
3. When replacing a high wattage resistor (oxide metal film resistor) in circuit board, keep the resistor 10 mm away from circuit board.
4. Keep wires away from high voltage or high temperature components.
5. This receiver must operate under AC 230 volts, 5O Hz. NEVER connect to DC supply or any other power or frequency.

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in this equipment have special safety-related characteristics. These characteristics are often passed unnoticed by a visual inspection and the X-RAY RADIATION protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this manual and its supplements, electrical components having such features are identified by designated symbol on the parts list. Before replacing any of these components, read the parts list in this manual carefully. The use of substitutes replacement parts which do not have the same safety characteristics as specified in the parts list may create X-RAY Radiation.

3 - Circuit Block diagram



4 - Alignment instructions

4-1 Microcontroller configuration : Service mode
To switch the TV set into service mode please sees instruction below.

1 - Select pr. number 91
2 - Adjust sharpness to minimum and exit all menu.
3 - Quickly press the key sequence : **RED - GREEN - menu**

To exit SERVICE menu press **menu** key or **Std By** key.

In Service Mode press "**OK**" to stop the microcontroller i.e. the I2C bus is free and the set can be controlled by external equipment. Press "**OK**" again to allow the microcontroller to control the set again

4-2 Microcontroller configuration : Option

Option	Tuner maker
0	DAEWOO / SAMSUNG
1	DAEWOO / SAMSUNG
2	SIEL
3	PHILIPS

4-3 TV set Alignment
4-3-1 - G2 alignment
- TV in AV mode without video signal ⇒ Black screen.
- TV preset with WP Red, WP Green and WP Blue equal to 32.
- TV preset with Black R, Black G equal to 8.
- Set TV in NORMAL I mode
- Adjust screen volume (on FBT) such that the highest cathode cut-off voltage measured on CRT board, is Vcut off ± 5V.

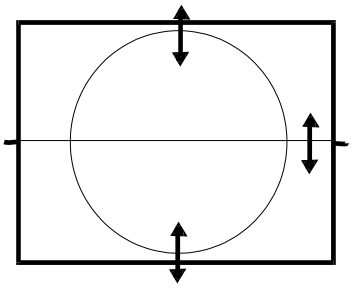
Screen size	Vcut-off
28"	142 V

4-3-2 - White balance
- Select a dark picture and adjust Black G and Black R to the desired colour temperature.
- Select a bright picture and adjust WP Red, WP Green, WP Blue to the desired colour temperature.

4-3-3 - Focus
- Adjust the Focus volume (on FBT) to have the best resolution on screen.

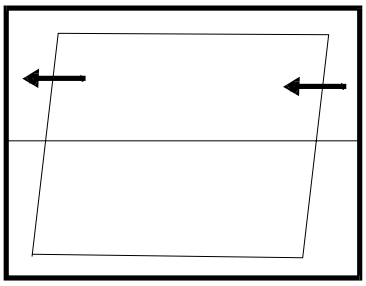
4-3-4 - Vertical geometry

- Adjust the Vertical Amplitude, Shift, S-Correction and Slope to compensate for vertical distortion.

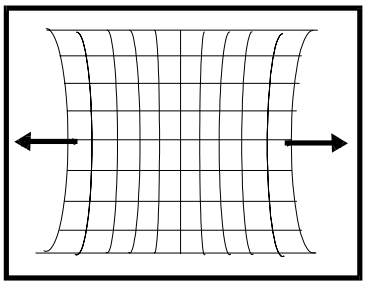


4-3-5 - Horizontal picture centering
- Adjust H Shift to have the picture in the center of the screen.

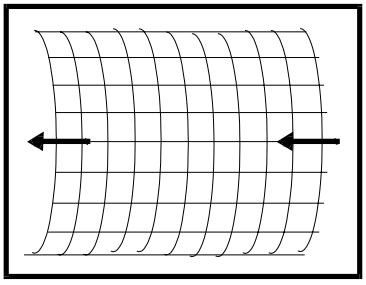
4-3-6 - East / West correction
- Adjust the H Parall, H Bow, H Width, EW Parabo, Up Corner, Dw Corner, EW trapez to compensate for geometrical distortion.



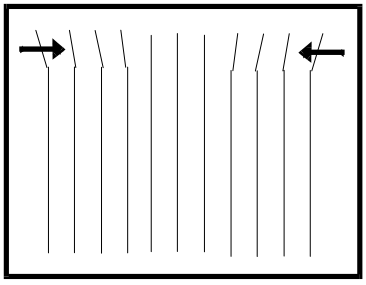
H. Parall



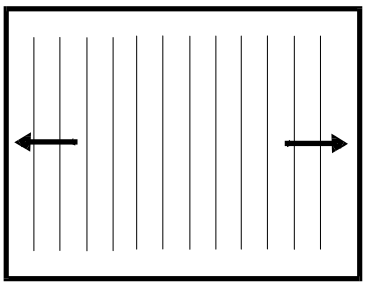
EW.Parabo



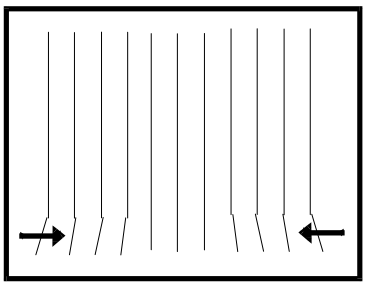
H. Bow



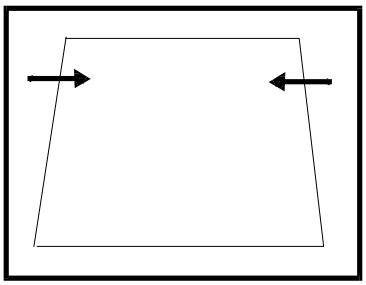
Up Corner



H.Width



Dw Corner



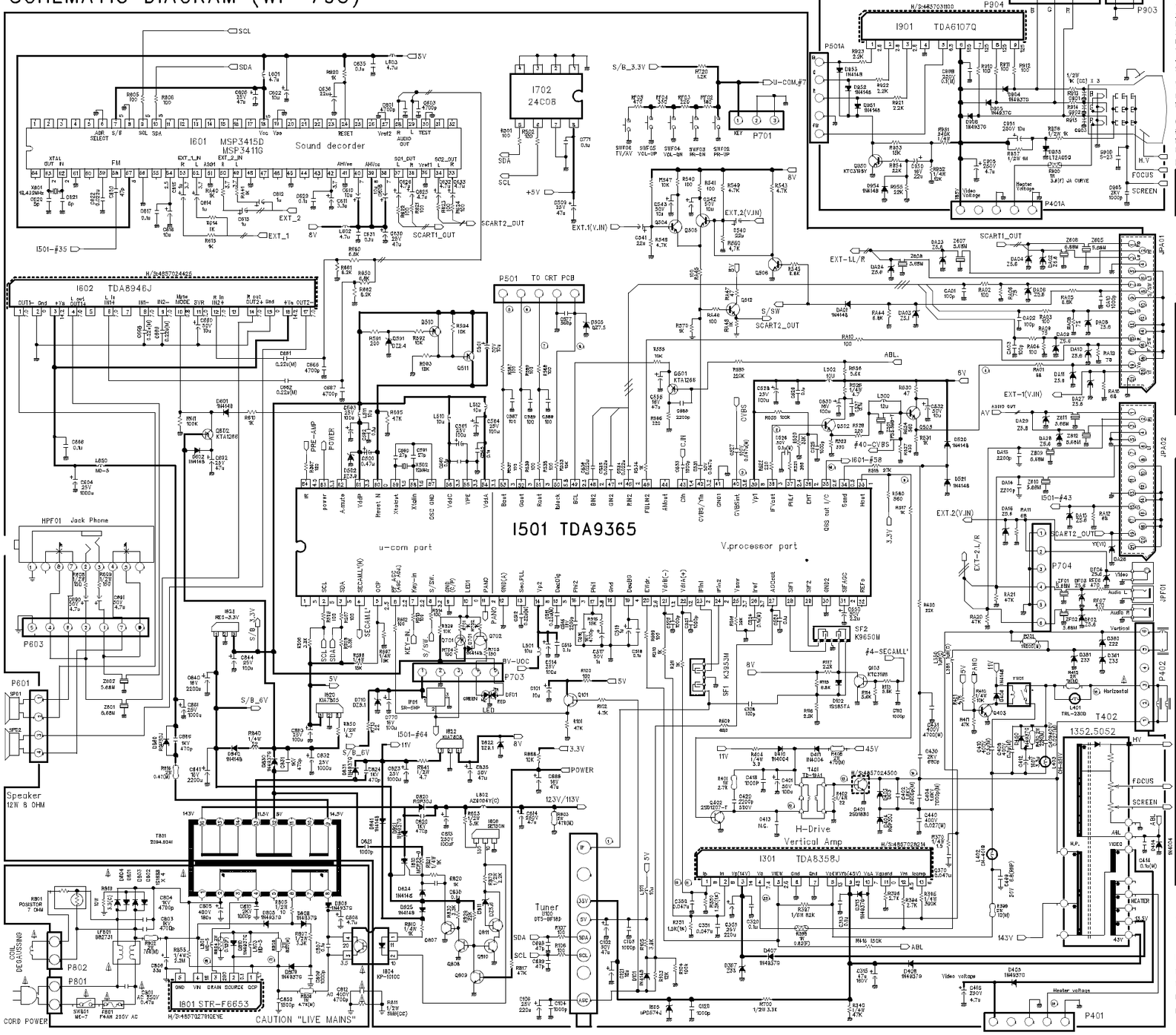
EW Trapez

4-3-7 - AGC

- Adjust the antenna signal level at 68 dBµV± 2
- Set RF AGC to 0.
- Increase RF AGC level and stop when the level on pin 6 of TDA936x goes below 2.5 Vdc

SCHEMATIC DIAGRAM

SCHEMATIC DIAGRAM (WP-795)



NOTE:
1. RESISTANCE IS SHOWN IN OHM. K=1000, M=1000000
2. UNLESS OTHERWISE NOTED IN SCHEMATIC ALL CAPACITOR VALUES ARE EXPRESSED IN uF
3. VOLTAGES READ WITH "VTVM" FROM POINT INDICATED TO CHASSIS GROUND USING A COLOR BAR SIGNAL WITH ALL CONTROLS AT NORMAL LINE 230V AC VOLTAGE READINGS SHOWN ARE NORMAL VALUES AND MAY VARY +20% EXCEPT H.V
4. THIS CIRCUIT DIAGRAM IS A STANDARD ONE CIRCUIT PRINTED MAY BE SUBJECT TO CHANGE FOR PRODUCT IMPROVEMENT WITHOUT PRIOR NOTICE

WARNING:
BEFORE SERVICING THE CHASSIS, READ "X-RAY RADIATION", "SAFETY PRECAUTION", AND "PRODUCT SAFETY NOTICE" IN SERVICE MANUAL

CAUTION TO SERVICE TECHNICIANS:
BEFORE RETURNING THE RECEIVER TO CUSTOMER, LEAKAGE CURRENT OR RESISTANCE MEASUREMENTS SHOULD BE PERFORMED TO DETERMINE THAT EXPOSED PARTS ARE PROPERLY INSULATED FROM THE SUPPLY CIRCUIT.

RESISTOR

CARBON FILM	(M)
M-OXIDE	(MO)
CARBON COMP	(CC)
FUSIBLE	(F)
CEMENT	(C)

CAPACITOR

ELECTRO	
CERAMIC	
CERAMIC CH	(CH)
ELECTRO NONPOLAR	(NP)
MYLAR	(M)

COIL

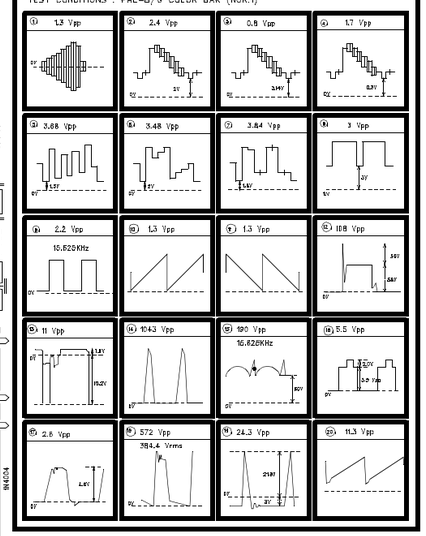
PEAKING	
CHOKE	(C)
BEAD	(B)

THE DIFFERENT PARTS FOR CRT(*)

LOC.	29" PHILIPS	29" THOMSON	28" TESLA CRT	
C402	1.6KV 560PF(M)			
C424	1.6KV 700PF(M)			
C405	400V 0.3u (M)			
L401	TRL-2300			
R361	1.5K (1W)			
R351	1.5K (1W)			
R920	1K 3.0 JA (F)			
V301	WORECKOOM13			

* WAVEFORMS

TEST CONDITIONS : PAL-B/G COLOR BAR (NOR.1)

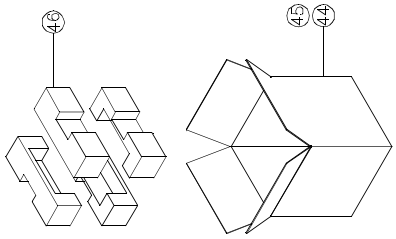


S/N : 4859804793-00 (SEP. '00)

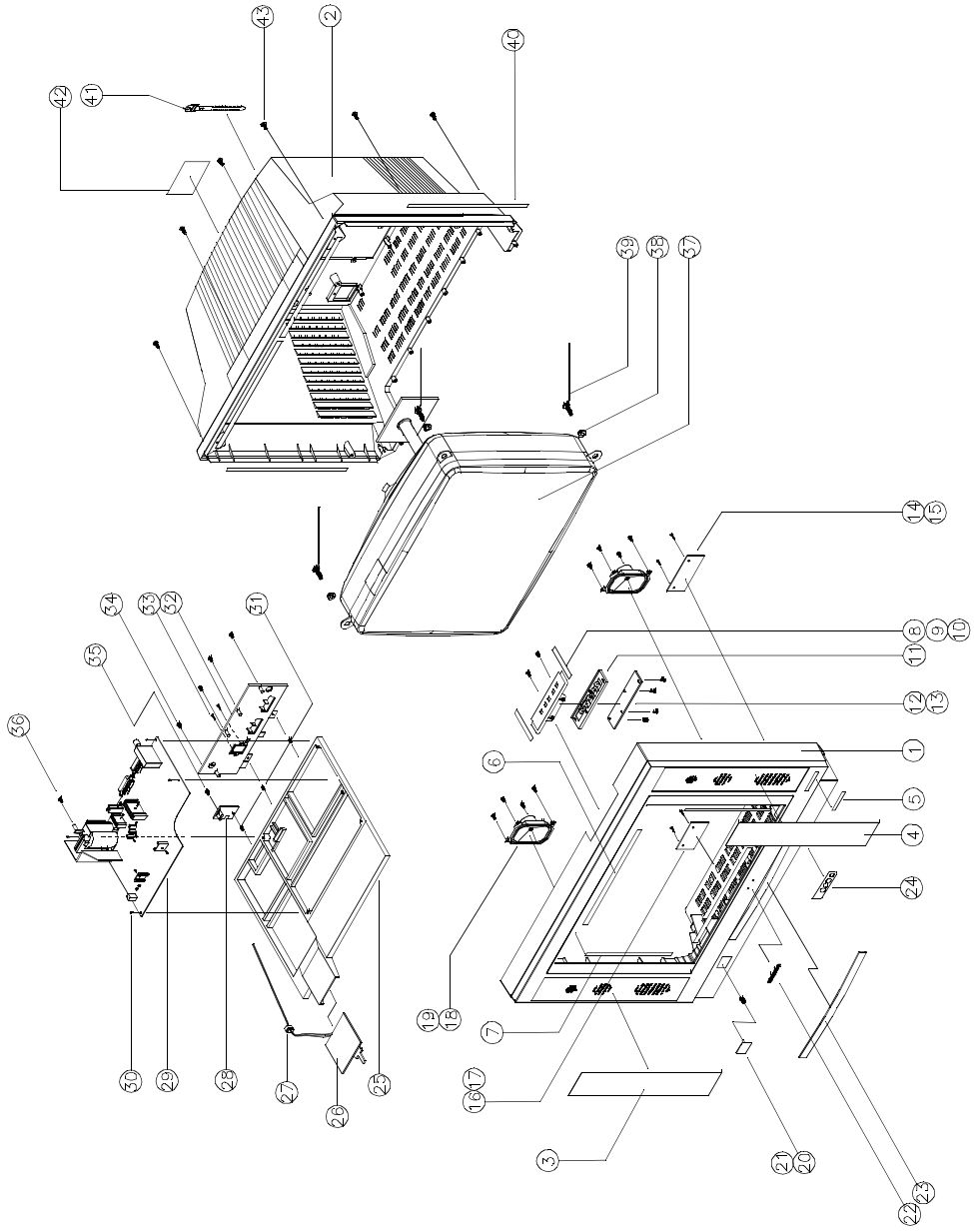
PRODUCT SAFETY NOTE :
THE COMPONENTS MARKED WITH ⚠ ARE IMPORTANT FOR MAINTAINING THE SAFETY OF THE SET AND SHOULD BE REPLACED ONLY WITH TYPES IDENTICAL TO THOSE IN THE ORIGINAL OR SPECIFIED ONE IN THE PART LIST. DON'T DEGRADE THE SAFETY OF THE SET THROUGH IMPROPER SERVICING.

EXPLODED VIEW

1. DWP-28W2ZZF/28W2ZLF



NO	PART CODE	PART NAME	QTY	MATERIAL	REMARKS
46	4958160700	PAD	1	EPS 28W3	
45	4856215400	BAG P.E	1	PE FOAM 40.5X1800X1270	
44	4858450B5K	BOX CARTON	1	DW-3	
43	7172401612	SCREW TAPPITE	8	TT2 TRS 4X16 MFZN BK	
42	4855415800	SHEET PLATE	1	180ART P/E FILM (CUT)	
41	4854612700	CLAMP CORD	1	NYLON 66 BLK 5280N	
40	4856512400	SCREW ANT FIX	4	FELT 4.8X2.0X2.5	
39	4856215800	SCREW DRT FIX	4	SWRM+SW5 L=35	
38	4856215402	WASHER RUBBER	4	OP T2.0	
37	4858530260	CRT	1	W68EBCK001X44	
36	7172401412	SCREW TAPPITE	1	TT2 TRS 4X14 MFZN BK	
35	7172401612	SCREW TAPPITE	1	TT2 TRS 4X16 MFZN BK	
34	7172401612	SCREW TAPPITE	4	TT2 TRS 4X16 MFZN BK	
33	7178351212	SCREW TAPPITE	2	TT2 WAS 3X12 MFZN BK	
32	4853531102	TERMINAL ANT	1	FR HIPS GY (778A)	
31	7172401412	SCREW TAPPITE	3	TT2 TRS 4X14 MFZN BK	
30	7178351212	SCREW TAPPITE	4	TT2 WAS 3X12 MFZN BK	
29	4859603193	PCB MAIN	1	WP-811	
28	4853529903	HOLDER CORD	1	FR HIPS GY (778A)	
27	97P2516600	HOLDER AC CORD	1	NYLON66 UL/CSA	
26		B/POWER PCB	1	FR HIPS BK	
25	4853617500	FRAME MAIN PCB	1	FR HIPS BK	
24	4856533601	DECO AV	1	PVC T0.5	
23	4856534600	DECO SENSOR	1	PVC GY	
22	4853511430	MARK BRAND	1	SILKET ITM-CUTTING	
21	4854856702	BUTTON POWER	1	ABS BK	
20	7172401612	SCREW TAPPITE	8	TT2 TRS 4X16 MFZN BK	
19	7178351212	SPEAKER	2		
18	7178351212	SCREW TAPPITE	2	TT2 WAS 3X12 MFZN BK	
17	7178351212	PREAMP PCB	1		
16	7178351212	SCREW TAPPITE	2	TT2 WAS 3X12 MFZN BK	
15	7178351212	AV JACK PCB	1		
14	7178351212	SCREW TAPPITE	4	TT2 WAS 3X12 MFZN BK	
13	7178351212	CTRL PCB	1		
12		BUTTON	1		
11	4854944601	SCREW TAPPITE	1	ABS BK	
10	7172401612	CLOTH BLACK	2	TT2 TRS 4X16 MFZN BK	
9	4857518600	PANEL CTRL	2	CLOTH 60X10X0.5	
8	4852326372	CLOTH BLACK	1	HIPS GY (503A)	
7	4857821103	CLOTH BLACK	2	FELT 180X10X1.5	
6	4856935700	DECO MARK	2	FELT 415X10X1.5	
5	4852253201	GRILL SPKR R/L	1	A1G50P-H24	
4	4852534210	GRILL SPKR R/L	1	PS T0.5 28W2(L)	
3	4852155102	CABINET BACK	1	PS T0.5 28W2(R)	
2	4852075102	MASK FRONT	1	HIPS GY	
1	4852075102	MASK FRONT	1	HIPS GY (503A)	



PRINTED CIRCUIT BOARD

PCB MAIN

ELECTRICAL PARTS LIST

CAUTION

"⚠ "is a safety part, so it must be used the same part.
"Ⓡ "is a recommendable part for essential stock.

LOC	PART CODE	PART NAME	PART DESCRIPTION	REMARK
ZZ100	48B3740A13	TRANSMITTER REMOCON	R-40A13 (AAA)	Ⓡ
ZZ110	PTACPWD395	ACCESSORY AS	DWP-28W2ZZF	
10	4850Q00910	BATTERY	R03/NN	
M821	4858213800	BAG INSTRUCTION	L.D.P.E T0.05X250X400	
ZZ120	PTBCSHD395	COVER BACK AS	DWP-28W2ZZF	
M211	4852155102	COVER BACK	HIPS GY (778A)	
M211D	4857817630	CLOTH BLACK	FELT 400X20X0.7	
M541	4855415800	SPEC PLATE	150ART P/E FILM (C/TV)	
ZZ130	PTPKCPD395	PACKING AS	DWP-28W2ZZF	
M681	4856812400	BAND	18MM X 3M	
M801	485805085K	BOX CARTON	DW-3	
M811	4858180700	PAD	EPS 28W3	
M822	4858215600	BAG P.E	PE FOAM t0.5x1600x1270	
ZZ131	4851902110	CRT GROUND NET	24/5/0.12-1560+4850702029	
ZZ132	58G0000151	COIL DEGAUSSING	DC-28SFW	
ZZ140	PTCACAD395	CABINET AS	DWP-28W2ZZF	
M201A	4857821103	CLOTH BLACK	FELT 180X10X1.5	
M201B	4857821101	CLOTH BLACK	FELT 415X10X1.5	
M201C	4856215402	WASHER RUBBER	CR T2.0	
M201D	4856015820	SCREW CRT FIX	SWRM+SK5 L=35	
M201E	7178301212	SCREW TAPPTITE	TT2 WAS 3X12 MFZN BK	
M201F	7178301212	SCREW TAPPTITE	TT2 WAS 3X12 MFZN BK	
M211A	7172401612	SCREW TAPPTITE	TT2 TRS 4X16 MFZN BK	
M211B	7172401612	SCREW TAPPTITE	TT2 TRS 4X16 MFZN BK	
M211C	7172401612	SCREW TAPPTITE	TT2 TRS 4X16 MFZN BK	
M231	4852326302	PANEL CTRL	HIPS GY (503A)	
M231A	7172401612	SCREW TAPPTITE	TT2 TRS 4X16 MFZN BK	
M231B	4857818500	CLOTH BLACK	CLOTH 60X10X0.5	
M352	97P4602700	CLAMP CORD	NYLON 66 BLK 5280N	
M481	4854856002	BUTTON POWER	ABS GY (503A)	
M481A	4856716000	SPRING	SWPA PIE0.5	
M491	4854944601	BUTTON	ABS BK	
M491A	7178301212	SCREW TAPPTITE	TT2 WAS 3X12 MFZN BK	
M511	4855540600	DECO SENSOR	PC GY	
M561	48556174SD	MARK BRAND	SILVER DIA-CUTTING	
M562	4855930702	DECO MARK	A1050P-H24	
M681	4856812001	TIE CABLE	NYLON66 DA100	
M682	4856816300	CLAMP WIRE	NYLON 6 (V0)	
P405	4850706S21	CONNECTOR	35135-0620+YLT502+ULW=500	
SP01A	7172401612	SCREW TAPPTITE	TT2 TRS 4X16 MFZN BK	
SP02A	7172401612	SCREW TAPPTITE	TT2 TRS 4X16 MFZN BK	
V901	4859628160	CRT	W66ECK001X13	Ⓡ ⚠
ZZ200	PTFMSJD395	MASK FRONT AS	DWP-28W2ZZF	
M201	4852073102	MASK FRONT	HIPS GY (503A)	
M251	4852534202	GRILL SPKR R	PS T0.5 28W2 (R)	
M252	4852534203	GRILL SPKR L	PS T0.5 28W2 (L)	
M591	4855933601	DECO AV	PVC T0.5	
ZZ202	PTU1MSD395	PCB UNION-1 MANUAL A	DWP-28W2ZZF	
DF01	DSD50RH51B	LED	SD50-RH51BGRW	
HPF01	4859105240	JACK PHONO	LGT1516-0100	Ⓡ
IF01	1SR9HP----	IC PREAMP	SR-9HP	
JPF01	4859105450	JACK PIN BOARD	YSC03P-4120-9S	
P603A	4850707S02	CONNECTOR	YH025-07+YST025+ULW=400	
P701A	4850703S21	CONNECTOR	YH025-03+YST025+ULW=600	
P703A	4850705S04	CONNECTOR	YH025-05+YST025+ULW=400	
P704A	4850706S02	CONNECTOR	YH025-06+YST025+ULW=400	
P803A	4850702S09	CONNECTOR	BL102NG+MXH40058-02=300	
SWF01	5S40202142	SW POWER PUSH	ME-7 (70063-072)	
ZZ200	PTU1JRD395	PCB UNION RADIAL AS	DWP-28W2ZZF	
SWF02	5S50101Z90	SW TACT	THVV502GDA	
SWF03	5S50101Z90	SW TACT	THVV502GDA	
SWF04	5S50101Z90	SW TACT	THVV502GDA	
SWF05	5S50101Z90	SW TACT	THVV502GDA	
SWF06	5S50101Z90	SW TACT	THVV502GDA	
ZF01	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF	
ZF02	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF	
ZZ200	PTU1JAD395	PCB UNION AXIAL AS	DWP-28W2ZZF	
A001	4859806360	PCB UNION	246X246(246X98.9/1X2)	
DF02	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM	
DF03	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM	
DF04	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM	
JF01	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
JF02	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
JF06	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
RF02	RD-AZ181J-	R CARBON FILM	1/6 180 OHM J	
RF03	RD-4Z221J-	R CARBON FILM	1/4 220 OHM J	
RF04	RD-AZ331J-	R CARBON FILM	1/6 330 OHM J	
RF05	RD-4Z471J-	R CARBON FILM	1/4 470 OHM J	
RF06	RD-AZ471J-	R CARBON FILM	1/6 470 OHM J	
RF07	RD-AZ471J-	R CARBON FILM	1/6 470 OHM J	
ZZ220	PTSPPWD395	SPEAKER AS	DWP-28W2ZZF	Ⓡ
P601A	4850704S30	CONNECTOR	YH025-04+35098+ULW=700	
SP01	4858314810	SPEAKER	SP-80F02 10W 8 OHM	
SP02	4858314810	SPEAKER	SP-80F02 10W 8 OHM	
ZZ290	PTMPMSD395	PCB MAIN MANUAL AS	DWP-28W2ZZF	Ⓡ
C402	CMYH3C562J	C MYLAR	1.6KV BUP 5600PF J	
C404	CMYH3C702J	C MYLAR	1.6KV BUP 7000PF J	
C408	CMYE2G304J	C MYLAR	400V PU 0.3MF J	
C410	CMYE2G104J	C MYLAR	400V PU 0.1MF J	
C499	CEYD1H689W	C ELECTRO	50V RHD 6.8MF (16X35.5)	

ELECTRICAL PARTS LIST

LOC	PART CODE	PART NAME	PART DESCRIPTION	REMARK
C801	CL1JB3474K	C LINE ACROSS	AC250V 0.47MF U/C/SNDF/SV	⚠
C805	CEYN2G181P	C ELECTRO	400V LHS 180MF (25X35)	
C812	CH1AFE472M	C CERA AC	4KV 4700PF M KX DE1610	⚠
C813	CEXF2E101V	C ELECTRO	250V RSS 100MF 18X35.5	
D403	DDG3------	DIODE	DG3	
D404	DRGP30J---	DIODE	RGP30J	
D820	DRGP30J---	DIODE	RGP30J	
D860	DRGP30J---	DIODE	RGP30J	
F801	5FSCB4022R	FUSE CERA	SEMKO F4AH 4A 250V MF51	⚠
G900	4SG0D00103	SPARK GAP	S-23 900V-1.5KV	
G901	4SG0D00103	SPARK GAP	S-23 900V-1.5KV	
G902	4SG0D00103	SPARK GAP	S-23 900V-1.5KV	
G903	4SG0D00103	SPARK GAP	S-23 900V-1.5KV	
I301	PTA2SW8214	HEAT SINK ASS'Y	1TDA8358J- + 7174301011	
1	1TDA8358J-	IC VERTICAL	TDA8358J	®
0000A	4857028214	HEAT SINK	AL EX	
0000B	7174301011	SCREW TAPPTITE	TT2 RND 3X10 MFZN	
I501	1TDA9365L-	IC MICOM OTP	TDA9365TS/N1/5L	
I601	1MSP3415D-	IC AUDIO	MSP3415D	®
I601	1MSP3411G-	IC SOUND PROCESSOR	MSP3411G	
I602	PTA2SW8215	HEAT SINK ASS'Y	1TDA8946J- + 7174301011	
1	1TDA8946J-	IC AUDIO	TDA8946J	
0000A	4857028215	HEAT SINK	AL EX	
0000B	7174301011	SCREW TAPPTITE	TT2 RND 3X10 MFZN	
I702	1AT24C08PC	IC	AT24C08-10PC	®
I801	PTC2SW7910	HEAT SINK ASS'Y	1STRF6653- + 7174300811	
1	1STRF6653-	IC SMPS	STR-F6653	®
0000A	4857027910	HEAT SINK	AL EX	
0000B	7174300811	SCREW TAPPTITE	TT2 RND 3X8 MFZN	
I804	1KP1010C--	IC PHOTO COUPLER	KP-1010C	
I806	1SE130N---	IC	SE130N	®
I810	TX0202DA--	THYRISTOR	X0202DA1BA2	
I820	1K1A7805P1	IC REGULATOR	KIA7805API	
I822	1K1A7808P1	IC REGULATOR	KIA7808API	
I823	1LP295033-	IC REGULATOR	LP2950 3.3V	
I901	PTC3SW1100	HEAT SINK ASS'Y	1TDA6107Q- + 7174300811	
1	1TDA6107Q-	IC VIDEO	TDA6107Q	®
0000A	4857031100	HEAT SINK	A1050P-H24 T2.0	
0000B	7174300811	SCREW TAPPTITE	TT2 RND 3X8 MFZN	
JPA1	4859200401	SOCKET RGB	YRS21-R1	
JPA2	4859200401	SOCKET RGB	YRS21-R1	
L401	58H0000066	COIL H-LINEARITY	TRL-230D	
L402	58C0000122	COIL CHOKE	CH-401B	
L403	58C0000117	COIL CHOKE	CH-951V	
L802	58C9430599	COIL CHOKE	AZ-9004Y(94MH)	
LF801	5PLF24A1--	FILTER LINE	LF-24A1	
M351	4853529903	HOLDER CORD	FR HIPS GY(778A)	
M351A	7122401411	SCREW TAPPING	T2S TRS 4X14 MFZN	
M361	4853631110	TERMINAL ANT	FR HIPS GY	

LOC	PART CODE	PART NAME	PART DESCRIPTION	REMARK
M361A	7178301212	SCREW TAPPTITE	TT2 WAS 3X12 MFZN BK	
M361B	7172401412	SCREW TAPPTITE	TT2 TRS 4X14 MFZN BK	
M361C	7172401412	SCREW TAPPTITE	TT2 TRS 4X14 MFZN BK	
M381	4853817500	FRAME MAIN PCB	FR HIPS BK	
M381A	7178301212	SCREW TAPPTITE	TT2 WAS 3X12 MFZN BK	
M951B	4853535500	HOLDER CORD	NYROLN 66	
P401	4850705N14	CONNECTOR	BIC-05T-25T+ULW=500	
P402	4859240120	CONN WAFER	YFW500-06	
P501	4850705N14	CONNECTOR	BIC-05T-25T+ULW=500	
P601A	4850704S30	CONNECTOR	YH025-04+35098+ULW=700	
P801	4859242220	CONN WAFER	YFW800-02	
P802	4859242220	CONN WAFER	YFW800-02	
P803	4859242220	CONN WAFER	YFW800-02	
P903	4859238620	CONN WAFER	YPW500-02	
PWC1	PTWBSW7410	CORD POWER ASS'Y	906111+HOUSING+TUBE+17700	
PW000	4859906111	CORD POWER	M5206+H03VVH2-F=2250	
PW001	4857417700	TERM CLAMP	PT-01-T3	
Q401	PTS2SW4500	HEAT SINK ASS'Y	T2SW2499-- + 7174300811	®
Q401	T2SD2499--	TR	2SD2499	
Q401A	4857024500	HEAT SINK	AL EX B/K	
Q401B	7174300811	SCREW TAPPTITE	TT2 RND 3X8 MFZN	
R801	DPC7R0M290	POSISTOR	2322 662 96709	
R802	RS02Y753JS	R M-OXIDE FILM	2W 75K OHM J SMALL	
R819	RX10B339JN	R CEMENT	10W 3.3 OHM J BENCH 4P	®
R920	RF01Y399JA	R FUSIBLE	1W 3.9 OHM J A CURVE	
SCT1	4859303530	SOCKET CRT	PCS629-03C	
SF1	5PK3953M--	FILTER SAW	K3953M	
SF2	5PK9650M--	FILTER SAW	K9650M	
T401	50D19A1---	TRANS DRIVE	TD-19A1	
T402	50H0000216	FBT	1352.5052	® ⚠
T801	50M4936B1-	TRANS SMPS	2094.0041	⚠
U100	4859719930	TUNER VARACTOR	DT5-BF18D	®
W1	WP-0BK2015	WIRE LEAD 1007	AWG22 7/0.26 BK 5-200-5	
X502	5XE12R000E	CRYSTAL QUARTZ	HC-49/U 12.00000MHZ 30PPM	
X601	5XE18R432E	CRYSTAL QUARTZ	HC-49/U 18.43200MHZ 30PPM	
YW01	5SC0101326	SW RELAY	DJ12D1-0(M)-Q	
Z501	5PYXT5R5MB	FILTER CERA	XT 5.5MB	
ZZ200	PTMPJ0D395	PCB MAIN (RHU) AS	DWP-28W2ZZF	
C305	CEXF1E471V	C ELECTRO	25V RSS 470MF (10X16) TP	
C315	CEXF2C470C	C ELECTRO	160V RUS 47MF (13X25) TP	
C409	CMXE2G273J	C MYLAR	400V PU 0.027MF J (TP)	
C415	CEXF2E479V	C ELECTRO	250V RSS 4.7MF (10X16)TP	
C430	CCXB3D681K	C CERA	2KV B 680PF K (TAPPING)	
C431	CMXB2G472J	C MYLAR	400V EU 4700PF J (TP)	
C440	CMXE2G273J	C MYLAR	400V PU 0.027MF J (TP)	
C511	CMXM2A224J	C MYLAR	100V 0.22MF J	
C512	CMXM2A224J	C MYLAR	100V 0.22MF J	
C604	CEXF1E102V	C ELECTRO	25V RSS 1000MF (13X20) TP	
C661	CMXM2A224J	C MYLAR	100V 0.22MF J	

LOC	PART CODE	PART NAME	PART DESCRIPTION	REMARK	LOC	PART CODE	PART NAME	PART DESCRIPTION	REMARK
C662	CMXM2A224J	C MYLAR	100V 0.22MF J		E041	4856310600	EYE LET	BSR T0.2 (R2.3)	
C668	CMXM2A224J	C MYLAR	100V 0.22MF J		E042	4856310600	EYE LET	BSR T0.2 (R2.3)	
C669	CMXM2A224J	C MYLAR	100V 0.22MF J		E043	4856310600	EYE LET	BSR T0.2 (R2.3)	
C810	CBXB3D102K	C CERA SEMI	2KV BL(N) 1000PF K (T)		E044	4856310600	EYE LET	BSR T0.2 (R2.3)	
C814	CEXF2E470V	C ELECTRO	250V RSS 47MF (16X25) TP		E045	4856310600	EYE LET	BSR T0.2 (R2.3)	
C823	CEXF1E102V	C ELECTRO	25V RSS 1000MF (13X20) TP		E046	4856310600	EYE LET	BSR T0.2 (R2.3)	
C832	CEXF1E102V	C ELECTRO	25V RSS 1000MF (13X20) TP		E047	4856310600	EYE LET	BSR T0.2 (R2.3)	
C840	CEXF1C222V	C ELECTRO	16V RSS 2200MF (13X25) TP		E048	4856310600	EYE LET	BSR T0.2 (R2.3)	
C841	CEXF1C222V	C ELECTRO	16V RSS 2200MF (13X25) TP		E049	4856310600	EYE LET	BSR T0.2 (R2.3)	
C861	CEXF1E102V	C ELECTRO	25V RSS 1000MF (13X20) TP		E050	4856310600	EYE LET	BSR T0.2 (R2.3)	
C905	CEXF2E479V	C ELECTRO	250V RSS 4.7MF (10X16)TP		E051	4856310600	EYE LET	BSR T0.2 (R2.3)	
C951	CEXF2E100V	C ELECTRO	250V RSS 10MF (10X20) TP		E052	4856310600	EYE LET	BSR T0.2 (R2.3)	
C965	CCXB3D102K	C CERA	2KV B 1000PF K (TAPPING)		E053	4856310600	EYE LET	BSR T0.2 (R2.3)	
ZZ200	PTMPJBD395	PCB MAIN M-10 AS	DWP-28W2ZZF		E054	4856310600	EYE LET	BSR T0.2 (R2.3)	
10	2TM18006BE	TAPE MASKING	6.2X500		E055	4856310600	EYE LET	BSR T0.2 (R2.3)	
E001	4856310300	EYE LET	BSR T0.2 (R1.6)		E056	4856310600	EYE LET	BSR T0.2 (R2.3)	
E002	4856310300	EYE LET	BSR T0.2 (R1.6)		E057	4856310600	EYE LET	BSR T0.2 (R2.3)	
E003	4856310300	EYE LET	BSR T0.2 (R1.6)		E058	4856310600	EYE LET	BSR T0.2 (R2.3)	
E004	4856310300	EYE LET	BSR T0.2 (R1.6)		E059	4856310600	EYE LET	BSR T0.2 (R2.3)	
E005	4856310300	EYE LET	BSR T0.2 (R1.6)		E060	4856310600	EYE LET	BSR T0.2 (R2.3)	
E006	4856310300	EYE LET	BSR T0.2 (R1.6)		E061	4856310600	EYE LET	BSR T0.2 (R2.3)	
E007	4856310300	EYE LET	BSR T0.2 (R1.6)		E062	4856310600	EYE LET	BSR T0.2 (R2.3)	
E008	4856310300	EYE LET	BSR T0.2 (R1.6)		E065	4856310600	EYE LET	BSR T0.2 (R2.3)	
E009	4856310300	EYE LET	BSR T0.2 (R1.6)		E066	4856310600	EYE LET	BSR T0.2 (R2.3)	
E010	4856310300	EYE LET	BSR T0.2 (R1.6)		P601	485923172S	CONN WAFER	YW025-04 (STICK)	
E011	4856310300	EYE LET	BSR T0.2 (R1.6)		P603	485923202S	CONN WAFER	YW025-07 (STICK)	
E012	4856310300	EYE LET	BSR T0.2 (R1.6)		P701	485923162S	CONN WAFER	YW025-03 (STICK)	
E013	4856310300	EYE LET	BSR T0.2 (R1.6)		P703	485923182S	CONN WAFER	YW025-05 (STICK)	
E014	4856310300	EYE LET	BSR T0.2 (R1.6)		P704	485923192S	CONN WAFER	YW025-06 (STICK)	
E015	4856310300	EYE LET	BSR T0.2 (R1.6)		R331	RS01Z201J-	R M-OXIDE FILM	1W 200 OHM J (TAPPING)	
E016	4856310300	EYE LET	BSR T0.2 (R1.6)		R398	RF01Z828K-	R FUSIBLE	1W 0.82 OHM K (TAPPING)	
E017	4856310300	EYE LET	BSR T0.2 (R1.6)		R399	RS02Z120JS	R M-OXIDE FILM	2W 12 OHM J SMALL	
E018	4856310300	EYE LET	BSR T0.2 (R1.6)		R406	RS02Z471JS	R M-OXIDE FILM	2W 470 OHM J SMALL	
E019	4856310300	EYE LET	BSR T0.2 (R1.6)		R803	RS02Z473JS	R M-OXIDE FILM	2W 47K OHM J SMALL	
E020	4856310300	EYE LET	BSR T0.2 (R1.6)		R804	RF02Z158K-	R FUSIBLE	2W 0.15 OHM K (TAPPING)	
E021	4856310300	EYE LET	BSR T0.2 (R1.6)		R806	RS01Z472J-	R M-OXIDE FILM	1W 4.7K OHM J (TAPPING)	
E022	4856310300	EYE LET	BSR T0.2 (R1.6)		R808	RS02Z821JS	R M-OXIDE FILM	2W 820 OHM J SMALL	
E023	4856310300	EYE LET	BSR T0.2 (R1.6)		ZZ200	PTMPJRD395	PCB MAIN RADIAL AS	DWP-28W2ZZF	
E024	4856310300	EYE LET	BSR T0.2 (R1.6)		C101	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP	
E025	4856310300	EYE LET	BSR T0.2 (R1.6)		C102	CEXF1H470V	C ELECTRO	50V RSS 47MF (6.3X11) TP	
E026	4856310300	EYE LET	BSR T0.2 (R1.6)		C106	CEXF1E221V	C ELECTRO	25V RSS 220MF (8X11.5) TP	
E027	4856310300	EYE LET	BSR T0.2 (R1.6)		C120	CCXB1H102K	C CERA	50V B 1000PF K (TAPPING)	
E028	4856310300	EYE LET	BSR T0.2 (R1.6)		C121	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP	
E029	4856310300	EYE LET	BSR T0.2 (R1.6)		C313	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)	
E030	4856310300	EYE LET	BSR T0.2 (R1.6)		C320	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)	
E031	4856310300	EYE LET	BSR T0.2 (R1.6)		C350	CCXF1H473Z	C CERA	50V F 0.047MF Z (TAPPING)	
E032	4856310300	EYE LET	BSR T0.2 (R1.6)		C351	CCXF1H473Z	C CERA	50V F 0.047MF Z (TAPPING)	
E033	4856310300	EYE LET	BSR T0.2 (R1.6)		C370	CMXM2A473J	C MYLAR	100V 0.047MF J (TP)	
E040	4856310600	EYE LET	BSR T0.2 (R2.3)		C401	CEXF1H101V	C ELECTRO	50V RSS 100MF (8X11.5) TP	

ELECTRICAL PARTS LIST

LOC	PART CODE	PART NAME	PART DESCRIPTION	REMARK	LOC	PART CODE	PART NAME	PART DESCRIPTION	REMARK
C412	CEXF2C339V	C ELECTRO	160V RSS 3.3MF (8X16) TP		C622	CCXF1H223Z	C CERA	50V F 0.022MF Z (TAPPING)	
C414	CMXM2A104J	C MYLAR	100V 0.1MF J (TP)		C625	CEXF1H479V	C ELECTRO	50V RSS 4.7MF (5X11) TP	
C418	CCXB1H102K	C CERA	50V B 1000PF K (TAPPING)		C626	CEXF1H479V	C ELECTRO	50V RSS 4.7MF (5X11) TP	
C420	CCXB2H222K	C CERA	500V B 2200PF K (TAPPING)		C629	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)	
C500	CEXF1H478V	C ELECTRO	50V RSS 0.47MF (5X11) TP		C630	CEXF1E470V	C ELECTRO	25V RSS 47MF (5X11) TP	
C501	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP		C631	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)	
C509	CEXF1E470V	C ELECTRO	25V RSS 47MF (5X11) TP		C632	CEXF1H479V	C ELECTRO	50V RSS 4.7MF (5X11) TP	
C514	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP		C633	CEXF1H479V	C ELECTRO	50V RSS 4.7MF (5X11) TP	
C517	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP		C635	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)	
C519	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP		C636	CEXF1H220V	C ELECTRO	50V RSS 22MF (5X11) TP	
C524	CMXL1J104J	C MYLAR	63V MEU 0.1MF J		C650	CXCH1H470J	C CERA	50V CH 47PF J (TAPPING)	
C525	CCXB1H102K	C CERA	50V B 1000PF K (TAPPING)		C660	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP	
C526	CMXL1J104J	C MYLAR	63V MEU 0.1MF J		C665	CCXB1H472K	C CERA	50V B 4700PF K (TAPPING)	
C527	CMXB2A473J	C MYLAR	100V EU 0.047MF J (TP)		C666	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)	
C528	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP		C667	CCXB1H472K	C CERA	50V B 4700PF K (TAPPING)	
C530	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP		C690	CEXF1H479V	C ELECTRO	50V RSS 4.7MF (5X11) TP	
C531	CCXF1H473Z	C CERA	50V F 0.047MF Z (TAPPING)		C691	CEXF1H479V	C ELECTRO	50V RSS 4.7MF (5X11) TP	
C532	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP		C692	CEXF1E470V	C ELECTRO	25V RSS 47MF (5X11) TP	
C537	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)		C698	CXCH1H470J	C CERA	50V CH 47PF J (TAPPING)	
C540	CEXF1H220V	C ELECTRO	50V RSS 22MF (5X11) TP		C699	CXCH1H470J	C CERA	50V CH 47PF J (TAPPING)	
C541	CEXF1H220V	C ELECTRO	50V RSS 22MF (5X11) TP		C770	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP	
C542	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP		C803	CCXF3A472Z	C CERA	1KV F 4700PF Z (T)	
C543	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP		C804	CCXF3A472Z	C CERA	1KV F 4700PF Z (T)	
C550	CEXF1H229V	C ELECTRO	50V RSS 2.2MF (5X11) TP		C806	CEXF1H330V	C ELECTRO	50V RSS 33MF (6.3X11) TP	
C555	CEXF1C470V	C ELECTRO	16V RSS 47MF (5X11) TP		C807	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)	
C560	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)		C808	CEXF1H479V	C ELECTRO	50V RSS 4.7MF (5X11) TP	
C561	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP		C820	CCXB3A471K	C CERA	1KV B 470PF K (T)	
C564	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP		C821	CCXB1H102K	C CERA	50V B 1000PF K (TAPPING)	
C565	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)		C824	CCXB3A471K	C CERA	1KV B 470PF K (T)	
C585	CCXB1H222K	C CERA	50V B 2200PF K (TAPPING)		C831	CCXB3A471K	C CERA	1KV B 470PF K (T)	
C590	CXCH1H270J	C CERA	50V CH 27PF J (TAPPING)		C835	CEXF1H470V	C ELECTRO	50V RSS 47MF (6.3X11) TP	
C591	CXCH1H270J	C CERA	50V CH 27PF J (TAPPING)		C844	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP	
C592	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)		C863	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP	
C593	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP		C866	CCXB3A471K	C CERA	1KV B 470PF K (T)	
C601	CCXB1H472K	C CERA	50V B 4700PF K (TAPPING)		C888	CEXF1C470V	C ELECTRO	16V RSS 47MF (5X11) TP	
C602	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP		C950	CEXF1H220V	C ELECTRO	50V RSS 22MF (5X11) TP	
C603	CCXB1H472K	C CERA	50V B 4700PF K (TAPPING)		C968	CMXL2E104K	C MYLAR	250V MEU 0.1MF K	
C605	CEXF1E470V	C ELECTRO	25V RSS 47MF (5X11) TP		CA10	CCXB1H102K	C CERA	50V B 1000PF K (TAPPING)	
C608	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP		F801A	4857415001	CLIP FUSE	PFC5000-0702	
C610	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP		F801B	4857415001	CLIP FUSE	PFC5000-0702	
C611	CEXF1H339V	C ELECTRO	50V RSS 3.3MF (5X11) TP		I805	1UPC574J--	IC	UPC574J	
C612	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP		Q101	TKTC3198Y-	TR	KTC3198Y	
C613	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP		Q103	TKTC3202Y-	TR	KTC3202Y (TP)	
C614	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP		Q402	T2SD1207T-	TR	2SD1207-T (TAPPING)	®
C615	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP		Q403	TKTC3198Y-	TR	KTC3198Y	
C616	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP		Q501	TKTA1266Y-	TR	KTA1266Y (TP)	
C617	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)		Q502	TKTC3198Y-	TR	KTC3198Y	
C620	CXCH1H509D	C CERA	50V CH 5PF D (TAPPING)		Q503	TKTC3198Y-	TR	KTC3198Y	
C621	CXCH1H509D	C CERA	50V CH 5PF D (TAPPING)		Q504	TKTC3198Y-	TR	KTC3198Y	

LOC	PART CODE	PART NAME	PART DESCRIPTION	REMARK	LOC	PART CODE	PART NAME	PART DESCRIPTION	REMARK
Q505	TKTC3198Y-	TR	KTC3198Y		C587	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)	
Q508	TKTC3198Y-	TR	KTC3198Y		C588	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)	
Q510	TKTA1266Y-	TR	KTA1266Y (TP)		C589	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)	
Q511	TKTA1266Y-	TR	KTA1266Y (TP)		C771	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z	
Q512	TKTC3198Y-	TR	KTC3198Y		C809	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
Q602	TKTA1266Y-	TR	KTA1266Y (TP)		C830	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z	
Q701	TKTA1266Y-	TR	KTA1266Y (TP)		C850	CCZB1H152K	C CERA	50V B 1500PF K (AXIAL)	
Q702	TKTC3198Y-	TR	KTC3198Y		CA01	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)	
Q807	TKTC3198Y-	TR	KTC3198Y		CA02	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)	
Q808	TKTC3198Y-	TR	KTC3198Y		CA03	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)	
Q809	TKTC3198Y-	TR	KTC3198Y		D101	D1N4148---	DIODE	1N4148 (TAPPING)	
Q810	TKTC3198Y-	TR	KTC3198Y		D102	D1SS85TA--	DIODE	1SS85TA	
Q811	TKTC3198Y-	TR	KTC3198Y		D313	D1N4937G--	DIODE	1N4937G (TAPPING)	
Q950	TKTC3198Y-	TR	KTC3198Y		D360	DUZ22BM---	DIODE ZENER	UZ-22BM	
R401	RN01B272JS	R METAL FILM	1W 2.7K OHM J SMALL		D361	DUZ33B----	DIODE ZENER	UZ-33B	
R415	RN02B102JS	R METAL FILM	2W 1K OHM J SMALL		D367	DUZ33B----	DIODE ZENER	UZ-33B	
R450	RN02B223JS	R METAL FILM	2W 22K OHM J SMALL		D381	DUZ33B----	DIODE ZENER	UZ-33B	
R816	RN02B478JS	R METAL FILM	2W 0.47 OHM J SMALL		D405	D1N4937G--	DIODE	1N4937G (TAPPING)	
Z601	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF		D406	D1N4148---	DIODE	1N4148 (TAPPING)	
Z602	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF		D407	D1N4937G--	DIODE	1N4937G (TAPPING)	
Z605	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF		D408	D1N4937G--	DIODE	1N4937G (TAPPING)	
Z606	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF		D410	D1N4004S--	DIODE	1N4004S	
Z607	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF		D411	D1N4004S--	DIODE	1N4004S	
Z608	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF		D414	D1N4004S--	DIODE	1N4004S	
Z609	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF		D450	D1N4937G--	DIODE	1N4937G (TAPPING)	
Z610	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF		D502	DUZ3R9B---	DIODE ZENER	UZ-3.9B	
Z611	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF		D505	DUZ7R5BM--	DIODE ZENER	UZ-7.5BM	
Z612	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF		D520	D1N4148---	DIODE	1N4148 (TAPPING)	
ZZ200	PTMPJAD395	PCB MAIN AXIAL AS	DWP-28W2ZZF		D521	D1N4148---	DIODE	1N4148 (TAPPING)	
10	2TM14006LB	TAPE MASKING	3M #232 6.0X2000M		D591	DUZ2R4B---	DIODE ZENER	UZ-2.4B	
20	2TM10006LB	TAPE MASKING	3M #232-MAP-C 6.2X2000M		D601	D1N4148---	DIODE	1N4148 (TAPPING)	
A001	4859804793	PCB MAIN	330X246 S1B		D602	D1N4148---	DIODE	1N4148 (TAPPING)	
C103	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)		D701	D1N4148---	DIODE	1N4148 (TAPPING)	
C104	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)		D710	DUZ5R1B---	DIODE ZENER	UZ-5.1B	
C108	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)		D801	DLT2A05G--	DIODE	LT2A05G (TP)	
C110	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)		D802	DLT2A05G--	DIODE	LT2A05G (TP)	
C513	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z		D803	DLT2A05G--	DIODE	LT2A05G (TP)	
C515	CBZR1C222M	C CERA	16V Y5R 2200PF M (AXIAL)		D804	DLT2A05G--	DIODE	LT2A05G (TP)	
C516	CBZR1C472M	C CERA	16V Y5R 4700PF M (AXIAL)		D805	D1N4937G--	DIODE	1N4937G (TAPPING)	
C518	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z		D806	D1N4937G--	DIODE	1N4937G (TAPPING)	
C520	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)		D808	D1N4937G--	DIODE	1N4937G (TAPPING)	
C521	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)		D809	D1N4937G--	DIODE	1N4937G (TAPPING)	
C523	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z		D810	D1N4937G--	DIODE	1N4937G (TAPPING)	
C529	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z		D811	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM	
C533	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)		D821	D1N4937G--	DIODE	1N4937G (TAPPING)	
C534	CCZF1H223Z	C CERA	50V F 0.022MF Z		D822	DUZ9R1BM--	DIODE ZENER	UZ-9.1BM	
C535	CCZF1H223Z	C CERA	50V F 0.022MF Z		D824	D1N4148---	DIODE	1N4148 (TAPPING)	
C536	CCZF1H223Z	C CERA	50V F 0.022MF Z		D825	D1N4148---	DIODE	1N4148 (TAPPING)	
C577	CCZB1H561K	C CERA	50V B 560PF K		D830	D1N4937G--	DIODE	1N4937G (TAPPING)	

LOC	PART CODE	PART NAME	PART DESCRIPTION	REMARK	LOC	PART CODE	PART NAME	PART DESCRIPTION	REMARK
D831	D1N4937G--	DIODE	1N4937G (TAPPING)		J020	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
D840	D1N4148---	DIODE	1N4148 (TAPPING)		J021	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
D841	D1N4148---	DIODE	1N4148 (TAPPING)		J022	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
D904	D1N4937G--	DIODE	1N4937G (TAPPING)		J023	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
D905	D1N4937G--	DIODE	1N4937G (TAPPING)		J024	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
D906	D1N4937G--	DIODE	1N4937G (TAPPING)		J025	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
D951	D1N4148---	DIODE	1N4148 (TAPPING)		J026	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
D952	D1N4148---	DIODE	1N4148 (TAPPING)		J028	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
D953	D1N4148---	DIODE	1N4148 (TAPPING)		J029	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
D954	D1N4148---	DIODE	1N4148 (TAPPING)		J030	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
D955	DLT2A05G--	DIODE	LT2A05G (TP)		J031	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
DA01	D1N4148---	DIODE	1N4148 (TAPPING)		J032	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
DA02	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM		J034	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
DA03	DUZ5R1B---	DIODE ZENER	UZ-5.1B		J035	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
DA04	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM		J036	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
DA06	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM		J037	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
DA08	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM		J038	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
DA09	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM		J039	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
DA10	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM		J040	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
DA11	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM		J041	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
DA13	CBZR1C222M	C CERA	16V Y5R 2200PF M (AXIAL)		J042	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
DA14	CBZR1C222M	C CERA	16V Y5R 2200PF M (AXIAL)		J043	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
DA15	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM		J044	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
DA16	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM		J045	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
DA20	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM		J046	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
DA23	CBZR1C222M	C CERA	16V Y5R 2200PF M (AXIAL)		J047	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
DA24	CBZR1C222M	C CERA	16V Y5R 2200PF M (AXIAL)		J048	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
DA27	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM		J049	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
DA28	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM		J050	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
DA29	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM		J051	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
J001	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		J052	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
J002	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		J053	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
J003	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		J054	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
J004	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		J055	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
J005	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		J056	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
J006	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		J057	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
J007	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		J058	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
J008	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		J059	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
J009	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		J061	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
J010	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		J062	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
J011	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		J063	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
J012	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		J064	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
J013	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		J065	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
J014	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		J066	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
J015	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		J067	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
J016	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		J068	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
J017	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		J069	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
J018	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		J070	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	
J019	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		J072	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING	

LOC	PART CODE	PART NAME	PART DESCRIPTION	REMARK	LOC	PART CODE	PART NAME	PART DESCRIPTION	REMARK
J073	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		R117	RD-AZ222J-	R CARBON FILM	1/6 2.2K OHM J	
J074	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		R120	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
J075	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		R310	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
J076	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		R311	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
J077	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		R340	RD-4Z473J-	R CARBON FILM	1/4 47K OHM J	
J078	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		R350	RN-4Z1501F	R METAL FILM	1/4 1.50K OHM F	
J079	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		R351	RN-4Z1501F	R METAL FILM	1/4 1.50K OHM F	
J080	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		R370	RD-4Z159J-	R CARBON FILM	1/4 1.5 OHM J	
J081	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		R394	RD-AZ272J-	R CARBON FILM	1/6 2.7K OHM J	
J082	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		R395	RD-4Z394J-	R CARBON FILM	1/4 390K OHM J	
J083	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		R396	RD-AZ272J-	R CARBON FILM	1/6 2.7K OHM J	
J084	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		R397	RD-AZ823J-	R CARBON FILM	1/6 82K OHM J	
J090	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		R402	RD-4Z220J-	R CARBON FILM	1/4 22 OHM J	
J098	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		R404	RD-4Z399J-	R CARBON FILM	1/4 3.9 OHM J	
J099	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		R410	RD-4Z103J-	R CARBON FILM	1/4 10K OHM J	
J100	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		R411	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J	
J101	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		R416	RD-AZ154J-	R CARBON FILM	1/6 150K OHM J	
J102	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		R420	RD-AZ223J-	R CARBON FILM	1/6 22K OHM J	
J103	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		R421	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J	
J816	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		R501	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
J826	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		R502	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
J888	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		R505	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
JLL2	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		R506	RD-AZ332J-	R CARBON FILM	1/6 3.3K OHM J	
L101	5CPZ100K02	COIL PEAKING	10UH K (AXIAL 3.5MM)		R507	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
L350	5CPZ109M04	COIL PEAKING	1UH 10.5MM M (LAL04TB)		R508	RD-AZ332J-	R CARBON FILM	1/6 3.3K OHM J	
L381	5CPZ109M04	COIL PEAKING	1UH 10.5MM M (LAL04TB)		R509	RD-AZ681J-	R CARBON FILM	1/6 680 OHM J	
L500	5CPZ120K02	COIL PEAKING	12UH K (AXIAL 3.5MM)		R512	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
L501	5CPZ100K02	COIL PEAKING	10UH K (AXIAL 3.5MM)		R513	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
L502	5CPZ100K02	COIL PEAKING	10UH K (AXIAL 3.5MM)		R514	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
L510	5CPZ100K02	COIL PEAKING	10UH K (AXIAL 3.5MM)		R515	RD-AZ153J-	R CARBON FILM	1/6 15K OHM J	
L511	5CPZ100K02	COIL PEAKING	10UH K (AXIAL 3.5MM)		R516	RD-AZ393J-	R CARBON FILM	1/6 39K OHM J	
L512	5CPZ100K02	COIL PEAKING	10UH K (AXIAL 3.5MM)		R517	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
L601	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)		R518	RD-AZ273J-	R CARBON FILM	1/6 27K OHM J	
L602	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)		R520	RD-AZ333J-	R CARBON FILM	1/6 33K OHM J	
L603	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)		R521	RD-AZ391J-	R CARBON FILM	1/6 390 OHM J	
L650	5MC0000100	COIL BEAD	HC-3550		R522	RD-AZ221J-	R CARBON FILM	1/6 220 OHM J	
L801	5MC0000100	COIL BEAD	HC-3550		R523	RD-AZ331J-	R CARBON FILM	1/6 330 OHM J	
L803	5MC0000100	COIL BEAD	HC-3550		R524	RD-AZ561J-	R CARBON FILM	1/6 560 OHM J	
R101	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J		R525	RD-AZ104J-	R CARBON FILM	1/6 100K OHM J	
R102	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J		R526	RD-4Z479J-	R CARBON FILM	1/4 4.7 OHM J	
R103	RD-AZ123J-	R CARBON FILM	1/6 12K OHM J		R527	RD-AZ431J-	R CARBON FILM	1/6 430 OHM J	
R104	RD-AZ104J-	R CARBON FILM	1/6 100K OHM J		R528	RD-AZ221J-	R CARBON FILM	1/6 220 OHM J	
R105	RD-AZ392J-	R CARBON FILM	1/6 3.9K OHM J		R529	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J	
R106	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J		R530	RD-AZ470J-	R CARBON FILM	1/6 47 OHM J	
R107	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J		R531	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
R113	RD-AZ562J-	R CARBON FILM	1/6 5.6K OHM J		R533	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J	
R114	RD-AZ562J-	R CARBON FILM	1/6 5.6K OHM J		R534	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
R115	RD-AZ682J-	R CARBON FILM	1/6 6.8K OHM J		R537	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R116	RD-AZ222J-	R CARBON FILM	1/6 2.2K OHM J		R538	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	

LOC	PART CODE	PART NAME	PART DESCRIPTION	REMARK	LOC	PART CODE	PART NAME	PART DESCRIPTION	REMARK
R539	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J		R713	RD-AZ220J-	R CARBON FILM	1/6 22 OHM J	
R540	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J		R720	RD-AZ122J-	R CARBON FILM	1/6 1.2K OHM J	
R541	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J		R805	RD-2Z100J-	R CARBON FILM	1/2 10 OHM J	
R543	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J		R807	RD-2Z332J-	R CARBON FILM	1/2 3.3K OHM J	
R545	RD-AZ682J-	R CARBON FILM	1/6 6.8K OHM J		R810	RD-4Z102J-	R CARBON FILM	1/4 1K OHM J	
R547	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J		R811	RC-2Z565KP	R CARBON COMP	1/2 5.6M OHM K	⚠
R548	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J		R817	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J	
R549	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J		R820	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
R550	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J		R821	RD-4Z102J-	R CARBON FILM	1/4 1K OHM J	
R555	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J		R823	RD-2Z512J-	R CARBON FILM	1/2 5.1K OHM J	
R556	RD-AZ562J-	R CARBON FILM	1/6 5.6K OHM J		R829	RD-AZ223J-	R CARBON FILM	1/6 22K OHM J	
R567	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J		R830	RD-AZ332J-	R CARBON FILM	1/6 3.3K OHM J	
R570	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J		R840	RD-4Z220J-	R CARBON FILM	1/4 22 OHM J	
R580	RD-AZ561J-	R CARBON FILM	1/6 560 OHM J		R841	RD-2Z479J-	R CARBON FILM	1/2 4.7 OHM J	
R585	RD-AZ224J-	R CARBON FILM	1/6 220K OHM J		R850	RD-2Z479J-	R CARBON FILM	1/2 4.7 OHM J	
R586	RD-AZ221J-	R CARBON FILM	1/6 220 OHM J		R855	RD-4Z225J-	R CARBON FILM	1/4 2.2M OHM J	
R587	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J		R870	RD-2Z222J-	R CARBON FILM	1/2 2.2K OHM J	
R588	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J		R888	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J	
R589	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J		R910	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R591	RD-AZ221J-	R CARBON FILM	1/6 220 OHM J		R911	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R592	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J		R912	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R593	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J		R913	RC-2Z102K-	R CARBON COMP	1/2 1K OHM K	
R594	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J		R914	RC-2Z102K-	R CARBON COMP	1/2 1K OHM K	
R595	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J		R915	RC-2Z102K-	R CARBON COMP	1/2 1K OHM K	
R597	RN-4Z1502F	R METAL FILM	1/4 15K OHM F		R921	RD-AZ222J-	R CARBON FILM	1/6 2.2K OHM J	
R598	RN-4Z1502F	R METAL FILM	1/4 15K OHM F		R922	RD-AZ222J-	R CARBON FILM	1/6 2.2K OHM J	
R599	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J		R923	RD-AZ222J-	R CARBON FILM	1/6 2.2K OHM J	
R605	RD-AZ751J-	R CARBON FILM	1/6 750 OHM J		R951	RD-4Z244J-	R CARBON FILM	1/4 240K OHM J	
R606	RD-AZ751J-	R CARBON FILM	1/6 750 OHM J		R952	RD-4Z123J-	R CARBON FILM	1/4 12K OHM J	
R608	RD-2Z151J-	R CARBON FILM	1/2 150 OHM J		R953	RD-AZ153J-	R CARBON FILM	1/6 15K OHM J	
R609	RD-2Z151J-	R CARBON FILM	1/2 150 OHM J		R954	RD-AZ223J-	R CARBON FILM	1/6 22K OHM J	
R610	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J		R955	RD-AZ223J-	R CARBON FILM	1/6 22K OHM J	
R611	RD-AZ104J-	R CARBON FILM	1/6 100K OHM J		R956	RD-2Z102J-	R CARBON FILM	1/2 1K OHM J	
R614	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J		R957	RD-2Z105J-	R CARBON FILM	1/2 1M OHM J	
R615	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J		RA01	RD-AZ680J-	R CARBON FILM	1/6 68 OHM J	
R620	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J		RA02	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R621	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J		RA03	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R622	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J		RA04	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R623	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J		RA05	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J	
R624	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J		RA06	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J	
R650	RD-AZ682J-	R CARBON FILM	1/6 6.8K OHM J		RA08	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J	
R660	RD-AZ682J-	R CARBON FILM	1/6 6.8K OHM J		RA09	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J	
R661	RD-AZ822J-	R CARBON FILM	1/6 8.2K OHM J		RA10	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R662	RD-AZ822J-	R CARBON FILM	1/6 8.2K OHM J		RA11	RD-AZ680J-	R CARBON FILM	1/6 68 OHM J	
R700	RD-2Z332J-	R CARBON FILM	1/2 3.3K OHM J		RA12	RD-AZ680J-	R CARBON FILM	1/6 68 OHM J	
R701	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J		RA16	RD-AZ680J-	R CARBON FILM	1/6 68 OHM J	
R702	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J		RA19	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J	
R703	RD-AZ151J-	R CARBON FILM	1/6 150 OHM J		RA20	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J	
R704	RD-AZ151J-	R CARBON FILM	1/6 150 OHM J		RA21	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J	

LOC	PART CODE	PART NAME	PART DESCRIPTION	REMARK
RA40	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
RA41	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
RA44	RD-AZ682J-	R CARBON FILM	1/6 6.8K OHM J	
RA45	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
RA46	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
RA47	RD-AZ470J-	R CARBON FILM	1/6 47 OHM J	
RA48	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	

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1 - IC description

1-1 TDA936x TV signal processor - Teletext decoder with embedded µ-Controller.

TV-signal Processor

- Multi-standard vision IF circuit with alignment-free PLL demodulator
- Internal (switchable) time-constant for the IF-AGC circuit
- Source selection between 'Internal' CVBS and external CVBS or Y/C signals
- Integrated chrominance trap circuit
- Integrated luminance delay line with adjustable delay time
- Asymmetrical ‘delay line type’ peaking in the luminance channel
- Black stretching for non-standard luminance signals
- lntegrated chroma band-pass filter with switchable centre frequency
- Only one reference (12 MHz) crystal required for the µ-Controller, Teletext and the colour decoder
- PAL / NTSC or multistandard colour decoder with automatic search system
- Internal base-band delay line
- RGB control circuit with 'Continuous Cathode Calibration', white point and black level off set adjustment so that the colour temperature of the dark and the bright parts of the screen can be chosen independently.
- Linear RGB or YUV input with fast blanking for external RGB/YUV sources. The Text/OSD signals are internally supplied from the µ-Controller/Teletext decoder
- Contrast reduction possibility during mixed-mode of OSD and Text signals
- Horizontal synchronisation with two control loops and alignment-free horizontal oscillator
- Vertical count-down circuit
- Vertical driver optimised for DC-coupled vertical output stages
- Horizontal and vertical geometry processing
- Horizontal and vertical zoom function for 16 : 9 applications
- Horizontal parallelogram and bow correction for large screen picture tubes

µ-Controller

- 80C51 µ-controller core standard instruction set and timing
- 1µs machine cycle
- 32 - 128Kx8-bit late programmed ROM
- 3 - 12Kx8-bit Auxiliary RAM (shared with Display and Acquisition)
- Interrupt controller for individual enable/disable with two level priority
- Two 16-bit Timer/Counter registers
- Watchdog timer
- Auxiliary RAM page pointer
- 16-bit Data pointer
- IDLE and Power Down (PD) mode
- 14 bits PWM for Voltage Synthesis Tuning
- 8-bit A/D converter
- 4 pins which can be programmed as general I/0 pin, ADC input or PWM (6-bit) output

Data Capture

- Text memory 10 pages
- Inventory of transmitted Teletext pages stored in the Transmitted Page Table (TPT) and Subtitle Page Table (SPT)
- Data Capture for US Closed Caption
- Data Capture for 525/625 line WST, VPS (PDC system A) and Wide Screen Signalling (WSS) bit decoding Automatic selection between 525 WST/625 WST
- Automatic selection between 625 WST/VPS on line 16 of VBI
- Real-time capture and decoding for WST Teletext in Hardware, to enable optimised µ-processor throughput
- Automatic detection of FASTEXT transmission
- Real-time packet 26 engine in Hardware for processing accented, G2 and G3 characters
- Signal quality detector for video and WST/VPS data types
- Comprehensive teletext language coverage
- Full Field and Vertical Blanking lnterval (VBI) data capture of WST data

Display

- Teletext and Enhanced OSD modes
- Features of lever 1.5 WST and US Close Caption
- Serial and Parallel Display Attributes
- Single/Double/Quadruple Width and Height for characters
- Scrolling of display region
- Variable flash rate controlled by software
- Enhanced display features including overlining, underlining and italics
- Soft colours using CLUT with 4096 colour palette
- Globally selectable scan lines per row (9/10/13/16) and character matrix [12x10, 12xl3, 12x16 (VxH)]
- Fringing (Shadow) selectable from N-S-E-W direction
- Fringe colour selectable
- Meshing of defined area
- Contrast reduction of defined area
- Cursor
- Special Graphics Characters with two planes, allowing four colours per character
- 32 software redefinable On-Screen display characters
- 4 WST Character sets (GO/G2) in single device (e.g. Latin, Cyrillic, Greek, Arabic)
- G1 Mosaic graphics, Limited G3 Line drawing characters
- WST Character sets and Closed Caption Character set in single device

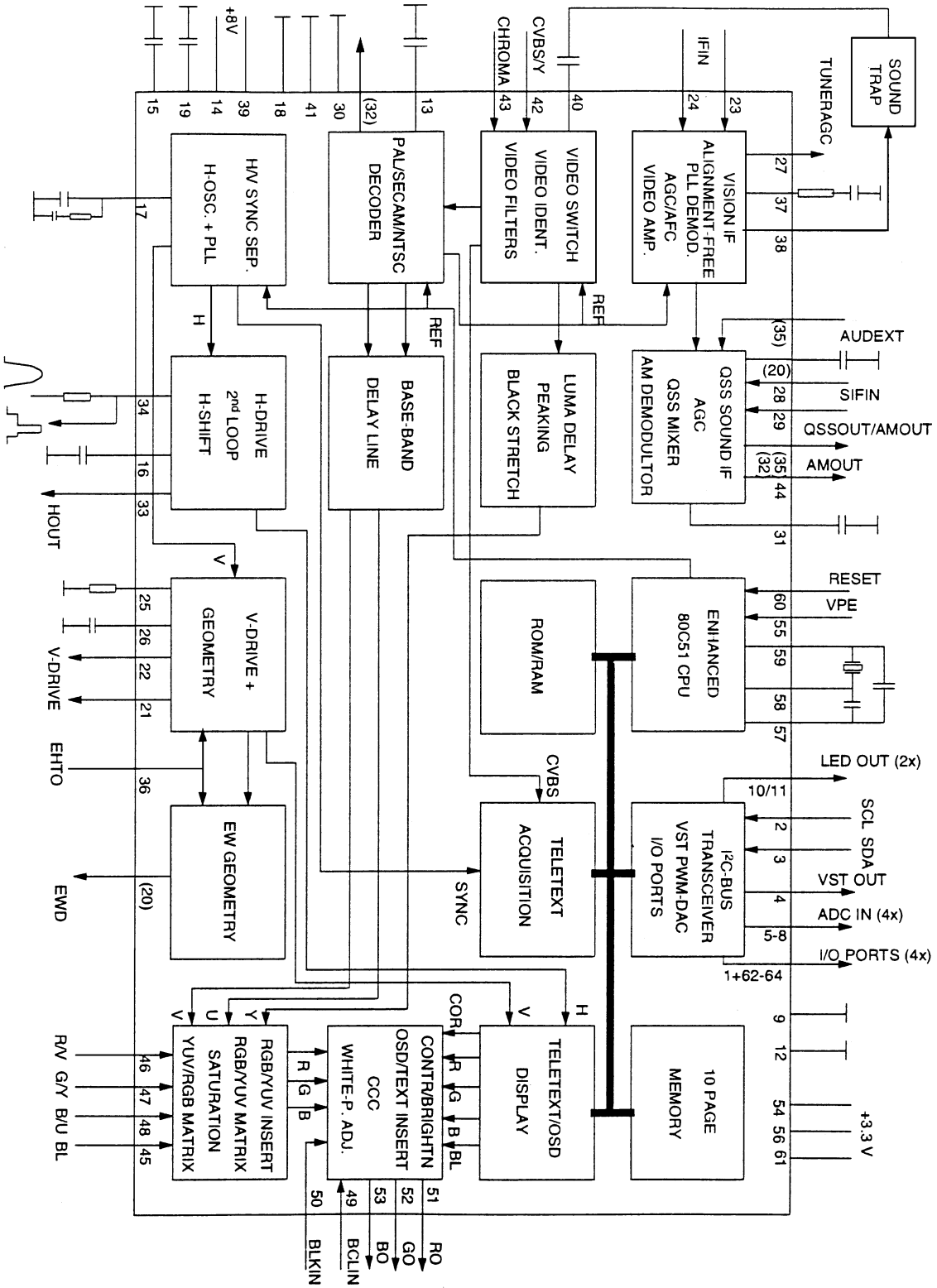
Data Capture

The Data Capture section takes in the analogue Composite Vidéo and Blanking Signal (CVBS), and from this extracts the required data, which is then decoded and stored in memory.

The extraction of the data is performed in the digital domain. The first stage is to convert the analogue CVBS signal into a digital form. This is done using an ADC sampling at 12MHz. The data and clock recovery is then performed by a Multi-Rate Video Input Processor (MuIVIP). From the recovered data and clock the following data types are extracted WST Teletext (625/525), Closed Caption, VPS, WSS. The extracted data is stored in either memory (DRAM) via the Memory Interface or in SFR locations.

Data Capture Features

- Video Signal Quality detector
- Data Capture for 625 line WST
- Data Capture for 525 line WST
- Data Capture for US Closed Caption
- Data Capture for VPS data (PDC system A)
- Data Capture for Wide Screen Signalling (WSS) bit decoding
- Automatic selection between 525 WST/625WST
- Automatic selection between 625WST/VPS on line 16 of VBI
- Real-time capture and decoding for WST Teletext in Hardware, to enable optimised microprocessor throughput
- 10 pages stored On-Chip
- lnventory of transmitted Teletext pages stored in the Transmitted Page Table (TPT) and Subtitle Page Table (SPT)
- Automatic detection of FASTEXT transmission
- Real-time packet 26 engine in Hardware for processing accented, G2 and G3 characters
- Signal quality detector for WST/VPS data types
- Comprehensive Teletext language coverage
- Full Field and Vertical Blanking Interval (VBI) data capture of WST data


SOUND TRAP
TUNERAGC
VISION IF ALIGNMENT-FREE PLL DEMOD. AGC/AFC VIDEO AMP.
VIDEO SWITCH VIDEO IDENT. VIDEO FILTERS
PAL/SECAM/NTSC DECODER
H/V SYNC SEP. H-OSC. + PLL
QSS SOUND IF AGC QSS MIXER AM DEMODULTOR
LUMA DELAY PEAKING BLACK STRETCH
BASE-BAND DELAY LINE
H-DRIVE 2nd LOOP H-SHIFT
V-DRIVE + GEOMETRY
EW GEOMETRY
ENHANCED 80C51 CPU
ROM/RAM
TELETEXT ACQUISITION
I²C-BUS TRANSCEIVER VST PWM-DAC I/O PORTS
TELETEXT/OSD DISPLAY
10 PAGE MEMORY
CONTR/BRIGHTN OSD/TEXT INSERT CCC WHITE-P. ADJ.
RGB/YUV INSERT RGB/YUV MATRIX SATURATION YUV/RGB MATRIX
IFIN
CVBS/Y
CHROMA
+8V
AUDEXT
SIFIN
QSSOUT/AMOUT
AMOUT
RESET
VPE
LED OUT (2x)
SCL SDA
VST OUT
ADC IN (4x)
I/O PORTS (4x)
+3.3 V
HOUT
V-DRIVE
EHTO
EWD
SYNC
CVBS
R/V G/Y B/U BL
RO GO BO BCLIN BLKIN

TV processor version and µ-Controller capacity

IC version	TDA9365 Nx / 5
TV range	110°
QSS sound IF amplifier with separated input and AGC circuit	✓
PAL decoder	✓
SECAM decoder	✓
NTSC decoder	✓
Horizontal geometry (E-W)	✓
Horizontal and vertical zoom	✓
ROM size	96 k
RAM size	2 k
Teletext	10 pages

IC marking and version

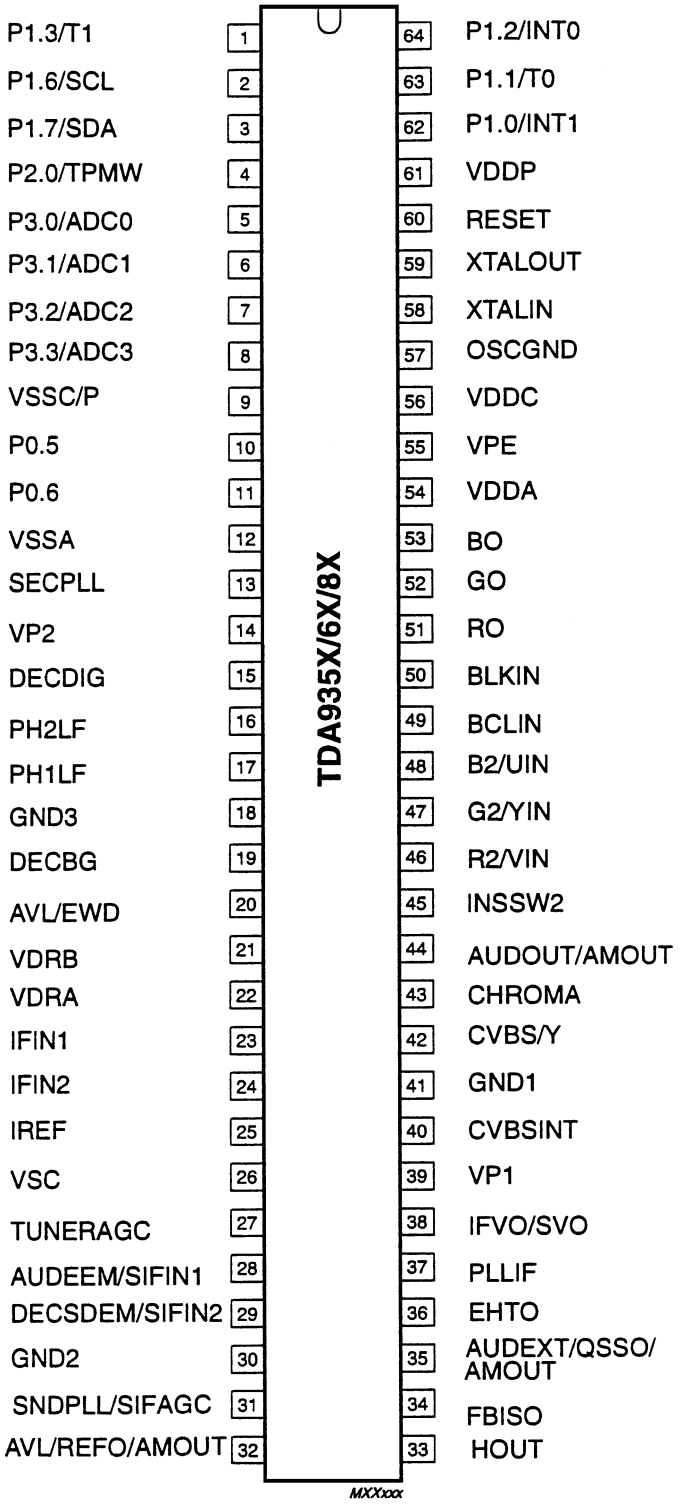
Chassis	IC marking (line 3)	OSD languages	ATSS country	Text
WP 795	DW9365/N1/5-BE x (note : x is the software version)	English, French, German, Italian, Spanish, Dutch, Danish, Finnish, Norwegian, Swedish, Greek, Hungarian	GB, France, Germany, Belgium, Spain, Italy, Switzerland, Austria, Denmark, Finland, Netherlands, Norway, Sweden, Ireland, Poland, Hungary, Czech rep., Others	English, German, Swedish/Finnish/Hungarian, Italian, French, Portuguese/Spanish, Turkish, Greek
		Polish, Czech, Slovakian, Romanian		Polish, German, Estonian, Serbian/Croatian/Slovenian, Czech/Slovak, Rumanian
		Russian		Polish, German, Estonian, Russian/Bulgarian, Serbian/Croatian/Slovenian, Czech/Slovak, Rumanian

PINNING

SYMBOL	PIN	DESCRIPTION
n.u.	1	Port 1.3 Not used.
SCL	2	I2C bus clock line
SDA	3	I2C Data line
SECAM L' out	4	Port 2.0 : High when L' selected (Push Pull)
OCP	5	Port 3.0 : Over Current Protection

RF AGC in	6	ADC 1 : For factory use only (High impedance)
Key-in	7	ADC 2 : local key input (High impedance)
S/SW	8	ADC 3 : Scart Slow switching input (See XXX)
VssC/P	9	digital ground for µ-controller core and peripheral
LED 1	10	port 0.5 (8mA current sinking capability)
PANO	11	port 0.6 (8mA current sinking capability)
VSSA	12	analog ground of teletext decoder and digital ground of TV processor
SEC PLL	13	SECAM PLL decoupling
VP2	14	2nd supply voltage TV-processor
DECDIG	15	decoupling digital supply of TV-processor
PH2LF	16	phase-2 filter
PH1LF	17	phase-1 filter
GND3	18	ground 3 for TV-processor
DECBG	19	bandgap decoupling
AVL/EWD	20	East / West drive output
VDRB	21	vertical drive B output
VDRA	22	vertical drive A output
IFIN1	23	IF input 1
IFIN2	24	IF input 2
IREF	25	reference current input
VSC	26	vertical sawtooth capacitor
TUNERAGC	27	tuner AGC output
SIFIN1	28	SIF input 1
SIFIN2	29	SIF input 2
GND2	30	ground 2 for TV processor
SIF AGC	31	AGC sound IF
REF0	32	n.u.
HOUT	33	horizontal output
FBISO	34	flyback input / sandcastle output
QSS out	35	QSS intercarrier output
EHT0	36	EHT/Overvoltage protection
PLLIF	37	IF PLL loop filter
IFVO	38	IF video output
VP1	39	main supply voltage TV-processor
CVBSINT	40	internal CVBS input
GND1	41	ground 1 for TV-processor
CVBS/Y	42	external CVBS/Y input
CHROMA	43	chrominance input (SVHS)
AMOUT	44	n.u.
INSSW2	45	2nd RGB insertion input
R2IN	46	2nd R input
G2IN	47	2nd G input
B2IN	48	2nd B input
BCLIN	49	beam current limiter input
BLKIN	50	black current input
R0	51	RED Output
G0	52	GREEN Output

B0	53	BLUE Output
VDDA	54	analog supply of Teletext decoder and digital supply of TV-Processor (3.3V)
VPE	55	OTP programming supply
VDDC	56	digital supply to core (3.3V)
OSCGND	57	oscillator ground supply
XTALIN	58	crystal oscillator input
XTALOUT	59	crystal oscillator output
RESET	60	reset
VDDP	61	digital supply to periphery (3.3V)
Audio Mute	62	Port 1.0 : Audio mute output (Push Pull)
Power	63	Port 1.1 : Power output (Push Pull)
IR in	64	Interrupt input 0 : R/C Infrared input


TDA935X/6X/8X
MXXxxx
1 P1.3/T1
2 P1.6/SCL
3 P1.7/SDA
4 P2.0/TPMW
5 P3.0/ADC0
6 P3.1/ADC1
7 P3.2/ADC2
8 P3.3/ADC3
9 VSSC/P
10 P0.5
11 P0.6
12 VSSA
13 SECPLL
14 VP2
15 DECDIG
16 PH2LF
17 PH1LF
18 GND3
19 DECBG
20 AVL/EWD
21 VDRB
22 VDRA
23 IFIN1
24 IFIN2
25 IREF
26 VSC
27 TUNERAGC
28 AUDEEM/SIFIN1
29 DECSDEM/SIFIN2
30 GND2
31 SNDPLL/SIFAGC
32 AVL/REFO/AMOUT
64 P1.2/INT0
63 P1.1/T0
62 P1.0/INT1
61 VDDP
60 RESET
59 XTALOUT
58 XTALIN
57 OSCGND
56 VDDC
55 VPE
54 VDDA
53 BO
52 GO
51 RO
50 BLKIN
49 BCLIN
48 B2/UIN
47 G2/YIN
46 R2/VIN
45 INSSW2
44 AUDOUT/AMOUT
43 CHROMA
42 CVBS/Y
41 GND1
40 CVBSINT
39 VP1
38 IFVO/SVO
37 PLLIF
36 EHTO
35 AUDEXT/QSSO/ AMOUT
34 FBISO
33 HOUT

1-2 MSP3415D Multistandard Sound Processor
The MSP 3415D is designed as a single-chip Multistandard Sound Processor for applications in analogue and digital TV sets, video recorders, and PC cards.

MSP 3415D features
- sound IF input
- No external filters required
- Stereo baseband input via integrated AD converters
- Two pairs of DA converters
- Two carrier FM or NICAM processing
- AVC : Automatic Volume Correction
- Bass, treble, volume processing
- Full SCART in/out matrix without restrictions
- Improved FM-identification
- Demodulator short programming
- Autodetection for terrestrial TV - sound standards
- Precise bit-error rate indication
- Automatic switching from NICAM to FM/AM or vice versa
- Improved NICAM synchronisation algorithm
- Improved carrier mute algorithm
- Improved AM-demodulation
- Reduction of necessary controlling
- Less external components

Basic Features of the MSP 3415D

Demodulator and NICAM Decoder Section

The MSP 3415D is designed to simultaneously perform digital demodulation and decoding of NICAM-coded TV stereo sound, as well as demodulation of FM or AM mono TV sound. Alternatively, two carrier FM systems according to the German terrestrial specs can be processed with the MSP 3415D.

The MSP 3415D facilitates profitable multistandard capability, offering the following advantages:
- Automatic Gain Control (AGC) for analogue input: input range: 0.10 - 3 Vpp
- integrated A/D converter for sound-IF input
- all demodulation and filtering is performed on chip and is individually programmable
- easy realisation of all digital NICAM standards (B/G, I, L and D/K)
- FM-demodulation of all terrestrial standards (include identification decoding)
- no external filter hardware is required
- only one crystal clock (18.432 MHz) is necessary
- high deviation FM-mono mode (max. deviation: approx. ±360 kHz)

DSP-Section (Audio Baseband Processing)
- flexible selection of audio sources to be processed
- performance of terrestrial de-emphasise systems (FM, NICAM)
- digitally performed FM-identification decoding and de-matrixing
- digital baseband processing: volume, bass, treble

- simple controlling of volume, bass, treble

Analogue Section
- two selectable analogue pairs of audio baseband input (= two SCART inputs) input level: <2 V RMS, input impedance: >25 kΩ
- one selectable analogue mono input (i.e. AM sound): Not used in this chassis
- two high-quality A/D converters, S/N-Ratio: >85 dB
- 20 Hz to 20 kHz bandwidth for SCART-to-SCART copy facilities
- loudspeaker: one pair of four-fold oversampled D/A converters
output level per channel: max. 1.4 VRMS output resistance: max. 5 kΩ
S/N-ratio: >85 dB at maximum volume max. noise voltage in mute mode: < 10 µV (BW: 20 Hz... 16 kHz)
- one pair of four-fold oversampled D/A converters supplying a pair of SCART-outputs.
output level per channel: max. 2 V RMS, output resistance: max. 0.5 kΩ,
S/N-Ratio: >85 dB (20 Hz... 16 kHz)

Application Fields of the MSP 3415D

In the following sections, a brief overview about the two main TV sound standards, NICAM 728 and German FM Stereo, demonstrates the complex requirements of a multistandard audio IC.

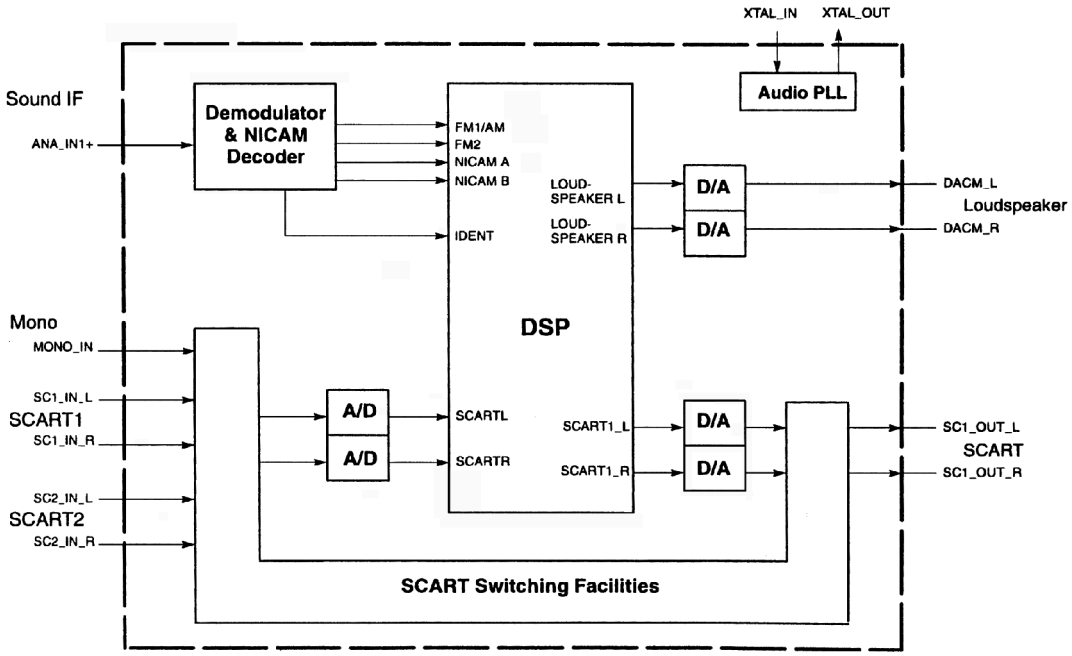
NICAM plus FM/AM-Mono

According to the British, Scandinavian, Spanish, and French TV-standards, high-quality stereo sound is transmitted digitally. The systems allow two high-quality digital sound channels to be added to the already existing FM/AM-channel. The sound coding follows the format of the so-called Near Instantaneous Companding System (NICAM 728). Transmission is performed using Differential Quadrature Phase Shift Keying (DQPSK. Table below offers an overview of the modulation parameters. In the case of NICAM/FM (AM) mode, there are three different audio channels available: NICAM A, NICAM B, and FM/AM-mono. NICAM A and B may belong either to a stereo or to a dual language transmission. Information about operation mode and about the quality of the NICAM signal can be read by the controlling software via the control bus. In the case of low quality (high bit error rate), the controlling software may decide to switch to the analogue FM/AM-mono sound. Alternatively, an automatic NICAM-FM/AM switching may be applied.

German 2-Carrier System (DUAL FM System)
Since September 1981, stereo and dual sound programs have been transmitted in Germany using the 2-carrier system. Sound transmission consists of the already existing first sound carrier and a second sound carrier additionally containing an identification signal. More details of this standard are given in Tables below. For D/K very similar system is used.

TV standards

TV system	Position of sound carrier (MHz)	Sound modulation	Color system	Country
B/G	5.5 / 5.7421875	FM Stereo	PAL	Germany
B/G	5.5 / 5.85	FM-Mono / NICAM	PAL	Scandinavia, Spain
L	6.5 / 5.85	AM - Mono / NICAM	SECAM-L	France
I	6.0 / 6.552	FM-Mono / NICAM	PAL	UK
D/K	6.5 / 6.2578125 D/K1 6.5 / 6.7421875 D/K2 6.5 / 5.85 D/K-NICAM	FM Stereo FM-Mono / NICAM	SECAM-East	USSR Hungary



Architecture of MSP3415D

Pin connections and short description

Pin No.	Pin Name	Type	Short description
1	TP	Out	Test pin
2	NC		Not Connected
3	NC		Not Connected
4	TP	Out	Test pin
5	TP	Out	Test pin
6	ADR_SEL	In	I2C bus Address select
7	STANDBYQ	In	Standby (Low-active)
8	NC		Not Connected
9	I2C_CL	In / Out	I2C Clock
10	I2C_DA	In / Out	I2C data

11	TP	In / Out	Test pin
12	TP	In / Out	Test pin
13	TP	Out	Test pin
14	NC		Not Connected
15	TP	Out	Test pin
16	TP	Out	Test pin
17	TP	Out	Test pin
18	DVSUP		Digital power supply +5V
19	DVSS		Digital Ground
20	NC		Not Connected
21	NC		Not Connected
22	NC		Not Connected
23	NC		Not Connected
24	RESETQ	In	Power-On-reset
25	NC		Not Connected
26	NC		Not Connected
27	VREF2		Reference ground 2 high voltage part
28	DACM_R	Out	Loudspeaker out Right
29	DACM_L	Out	Loudspeaker out Left
30	NC		Not Connected
31	TP	Out	Test pin
32	NC		Not Connected
33	SC2_OUT_R	Out	Scart Output 2, right
34	SC2_OUT_L	Out	Scart Output 2, left
35	VREF1		Reference ground 1 high voltage part
36	SC1_OUT_R	Out	Scart output 1, right
37	SC1_OUT_L	Out	Scart output 1, left
38	NC		Not Connected
39	AHVSUP		Analog power supply 8.0V
40	CAPL_M		Volume capacitor MAIN
41	AHVSS		Analog ground
42	AGNDC		Analog reference voltage high voltage part
43	NC		Not Connected
44	NC		Not Connected
45	NC		Not Connected
46	NC		Not Connected
47	NC		Not Connected
48	ASG2		Analog Shield Ground 2
49	SC2_IN_L	In	Scart input 2 in, left
50	SC2_IN_R	In	Scart input 2 in, right
51	ASG1		Analog Shield Ground 1
52	SC1_IN_L	In	Scart input 1 in, left
53	SC1_IN_R	In	Scart input 1 in, right
54	VREFTOP		Reference voltage IF A/D converter
55	MONO_IN	In	Mono input
56	AVSS		Analog ground
57	AVSUP		Analog power supply
58	ANA_IN1+	In	IF input 1

59	ANA_IN1-	In	IF common
60	NC		Not Connected
61	TESTEN	In	Test pin
62	XTAL_IN	In	Crystal oscillator
63	XTAL_OUT	Out	Crystal oscillator
64	NC		Test pin

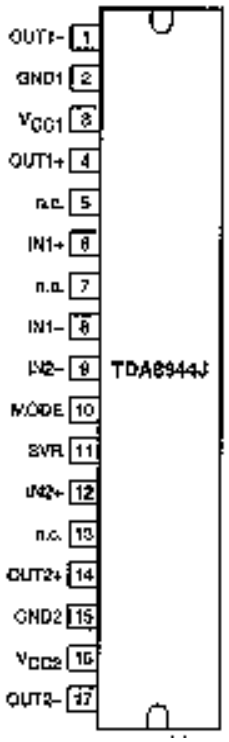
1-3 TDA894xJ Stereo Audio Amplifier

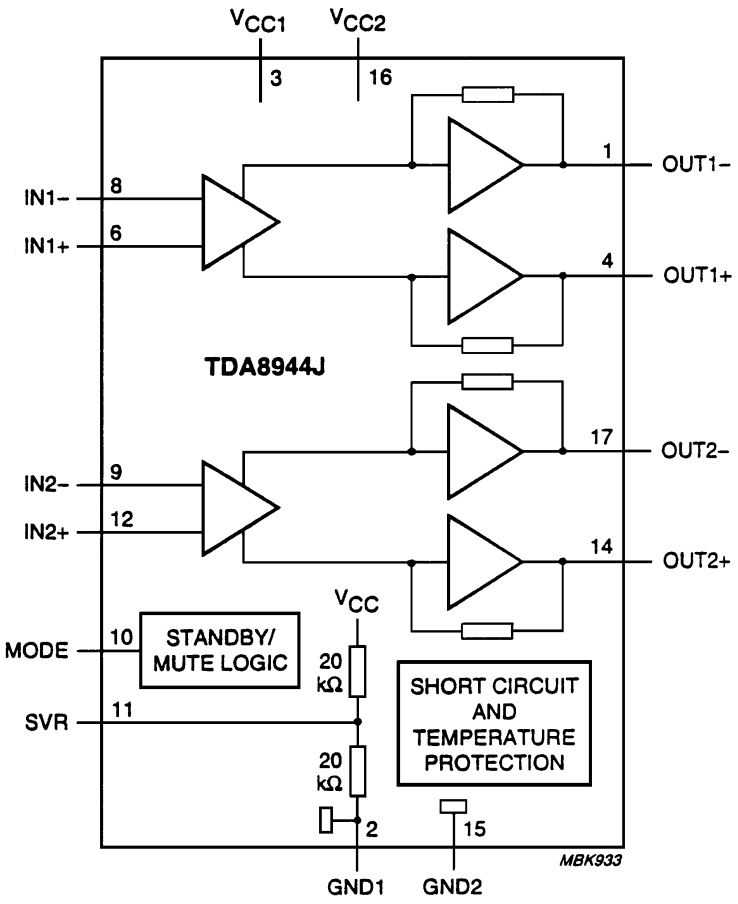
The TDA 8944J (TDA 8946J) is a dual-channel audio power amplifier with an output power of 2 x 7 W (2 x 15 W) at an 8 Ω load and a 12 V supply. The circuit contains two Bridges Tied Load (BTL) amplifiers with an all-NPN output stage and standby/mute logic. The TDA8944J comes in a 17-pin DIL power package.

Features
Few external components
Fixed gain
Standby and mute mode
No on/off switching plops
low standby current
High supply voltage ripple rejection
Outputs short-circuit protected to ground, supply and across the load
Thermally protected

Pin description

Pin	Symbol	Description
1	OUT1-	negative loudspeaker terminal 1
2	GND1	ground channel 1
3	Vcc1	supply voltage channel 1
4	OUT1+	positive loudspeaker terminal 1
5	n.c.	not connected
6	IN1+	positive input1
7	n.c.	not connected
8	IN1-	negative input1
9	IN2-	negative input2
10	MODE	mode selection input
11	SVR	half supply voltage decoupling (ripple rejection)
12	IN2+	positive input2





Block diagram TDA8944J

1-4 TDA835xJ Vertical Amplifier

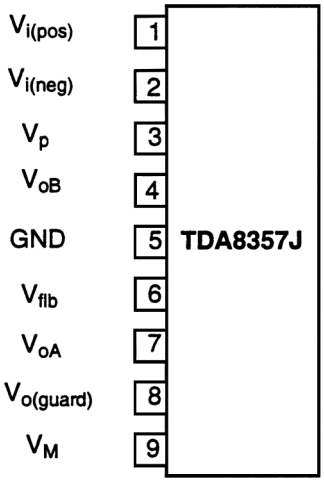
The TDA835xJ are power circuit for use in 90° and 110° colour deflection systems for field frequencies of 25 to 200Hz and 16/9 picture tubes. The circuit provides a DC driven vertical deflection output circuit, operating as a highly efficient class G system. Due to the full bridge output circuit the deflection coils can be DC coupled.
The IC is constructed in a Low Voltage DMOS process that combines Bipolar, CMOS and DMOS devices. MOS transistors are used in the output stage because of the absence of second breakdown.

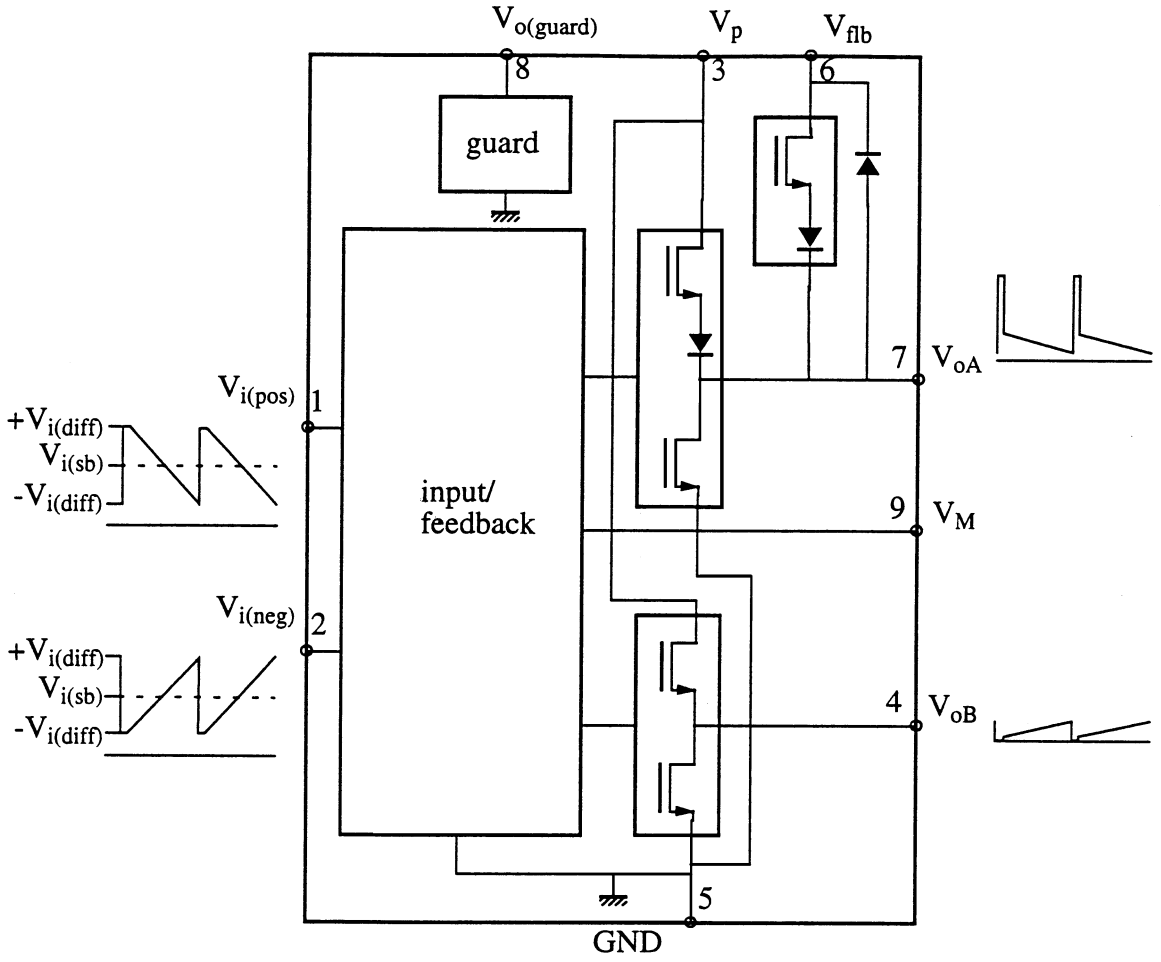
1-4-1 TDA8357J

Features :
- Few external components
- Highly efficient fully DC-coupled vertical output bridge circuit
- Short rise and fall time of the vertical flyback switch
- Guard circuit
- Temperature (thermal) protection
- High EMC because of common mode inputs

Pinning

Pin	Symbol	Description
1	Vi(pos)	input voltage (positive)
2	Vi(neg)	input voltage (negative)
3	Vp	supply voltage
4	V_{OB}	output voltage B
5	GND	ground
6	Vflb	flyback supply voltage
7	V_{OA}	output voltage A
8	$V_{O(guard)}$	guard output voltage
9	V_M	input measuring resistor

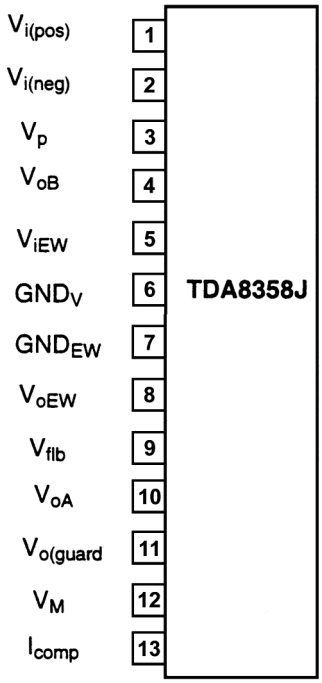


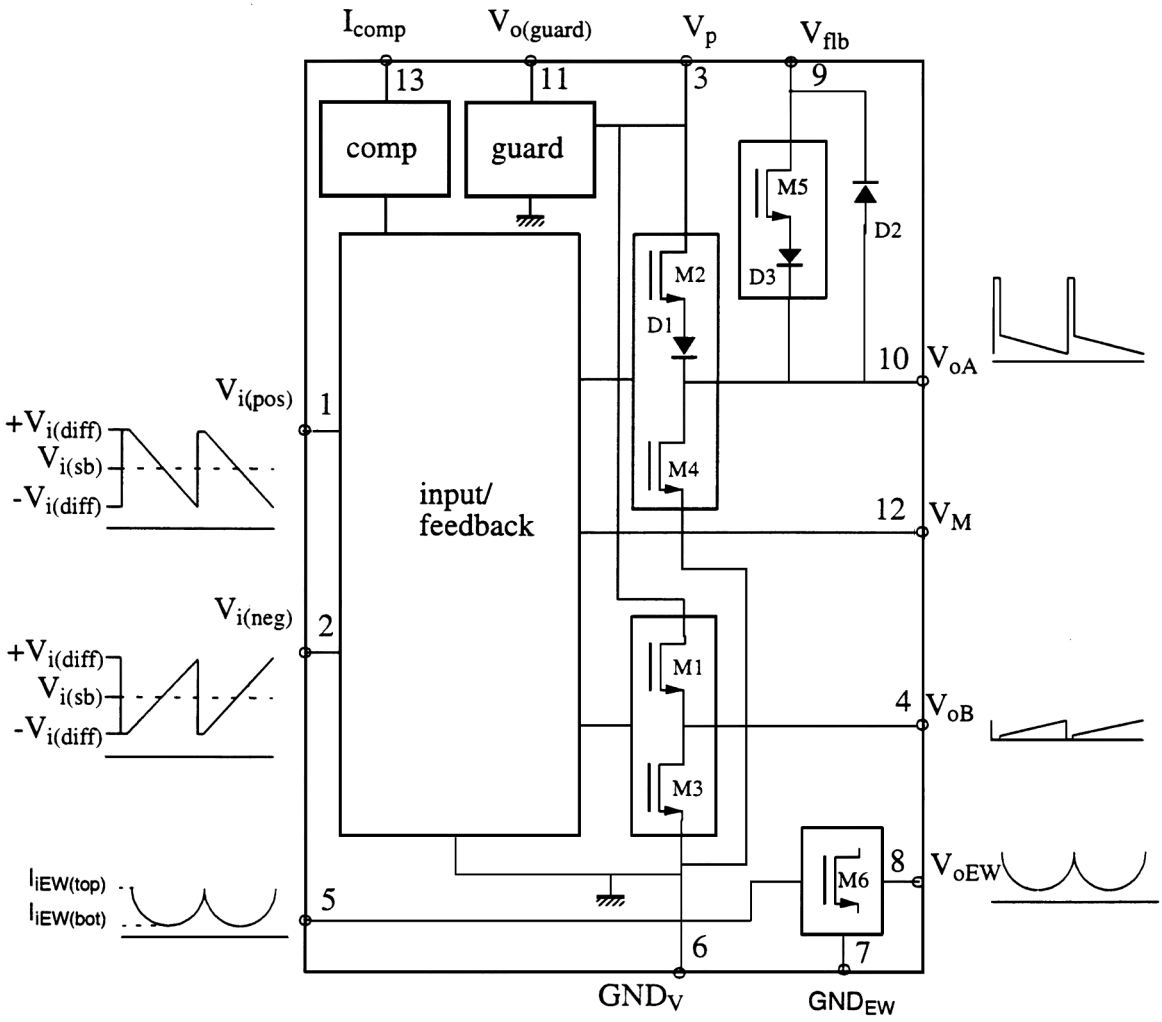


1-4-1 TDA8358J

An East-West output stage is provided that is able to sink current from the diode modulator circuit.

Features :
- Few external components
- Highly efficient fully DC-coupled vertical output bridge circuit
- Short rise and fall time of the vertical flyback switch
- Guard circuit
- Temperature (thermal) protection
- High EMC because of common mode inputs
- East-West output stage





1-5 TDA6107Q

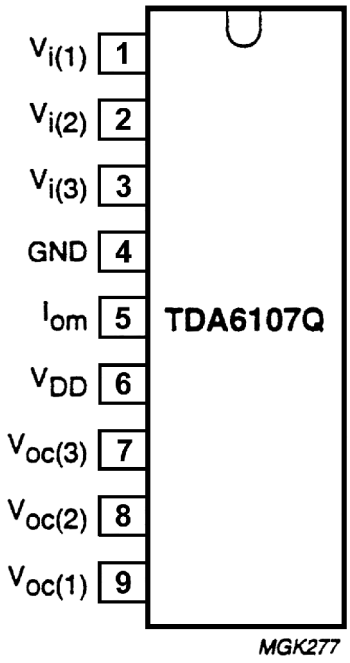
The TDA6107Q includes three video output amplifiers in one plastic DIL-Bent-SIL 9-pin medium power package, using high voltage DMOS technology, and is intended to drive the three cathodes of a colour CRT directly. To obtain maximum performance, the amplifier should be used with black-current control.

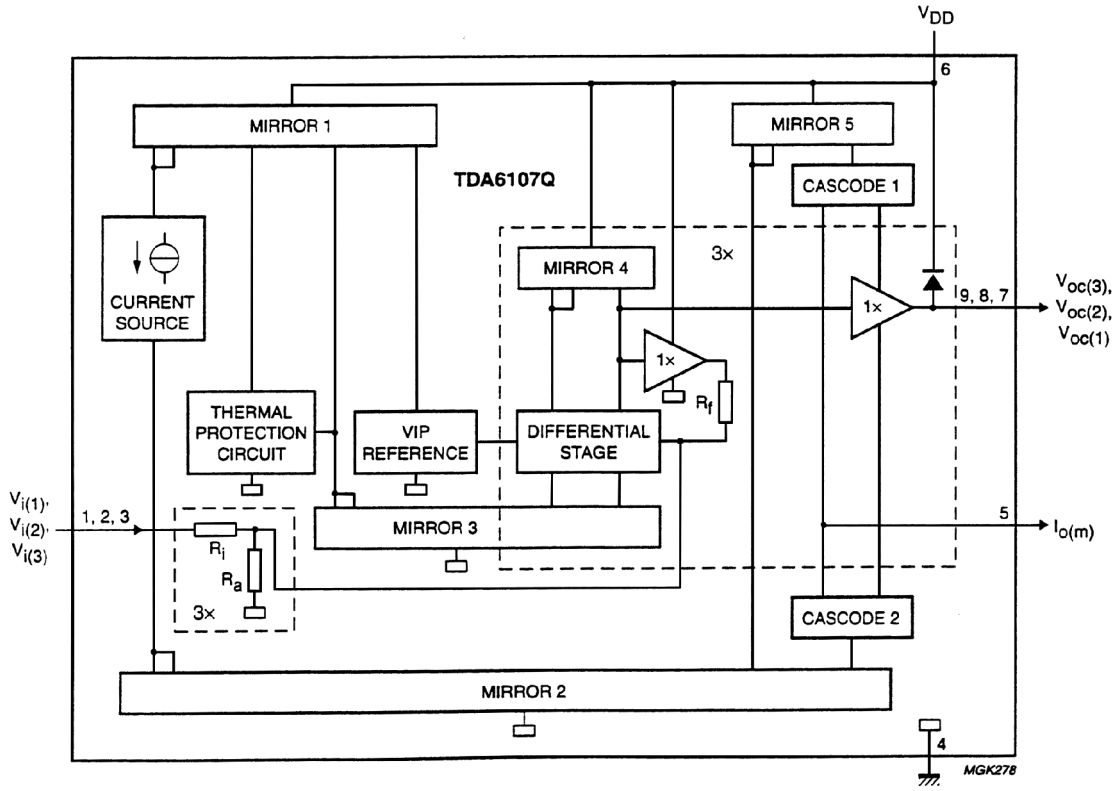
Features

- Typical bandwidth of 5.5 MHz for an output signal of 60 Vpp
- High slew rate of 900V/ s
- No external components required
- Very simple application
- Single supply voltage of 200V
- Internal reference voltage of 2.5 V
- Fixed gain of 50.
- Black-current stabilisation (BCS) circuit
- Thermal protection

Pin description

Pin	Symbol	Description
1	$V_{i(1)}$	inverting input 1
2	$V_{i(2)}$	inverting input 2
3	$V_{i(3)}$	inverting input 3
4	GND	ground (fin)
5	I_{om}	black current measurement output
6	V_{DD}	supply voltage
7	$V_{OC(3)}$	cathode output 3
8	$V_{OC(2)}$	cathode output 2
9	$V_{OC(1)}$	cathode output 1





Block diagram TDA6107Q

1-6 24C16 16 Kbit EEPROM
features :
- 16 Kbit serial I2C bus EEPROM
- Single supply voltage : 4.5 V to 5.5 V
- 1 Million Erase/Write cycles (minimum)
- 40 year data retention (minimum)

Pin description

Pin No.	Name	Description
1, 2, 3	E0, E1, E2	Device address
5	SDA	Serial Data/Address Input/Output
6	SCL	Serial clock
7	WC	Write control
8	Vcc	Supply voltage
4	Vss	Ground

The memory device is compatible with the I2C memory standard. This is a two wire serial interface that uses a bi-directionnal data bus and serial clock. The memory carries a built-in 4-bit unique device type identifier code (1010) in accordance with the I2C bus definition.

Serial Clock (SCL)
The SCL input is used to strobe all data in and out of the memory.
Serial Data (SDA)
The SDA pin is bi-directionnal, and is used to transfer data in or out of the memory

1-7 STR - F6653

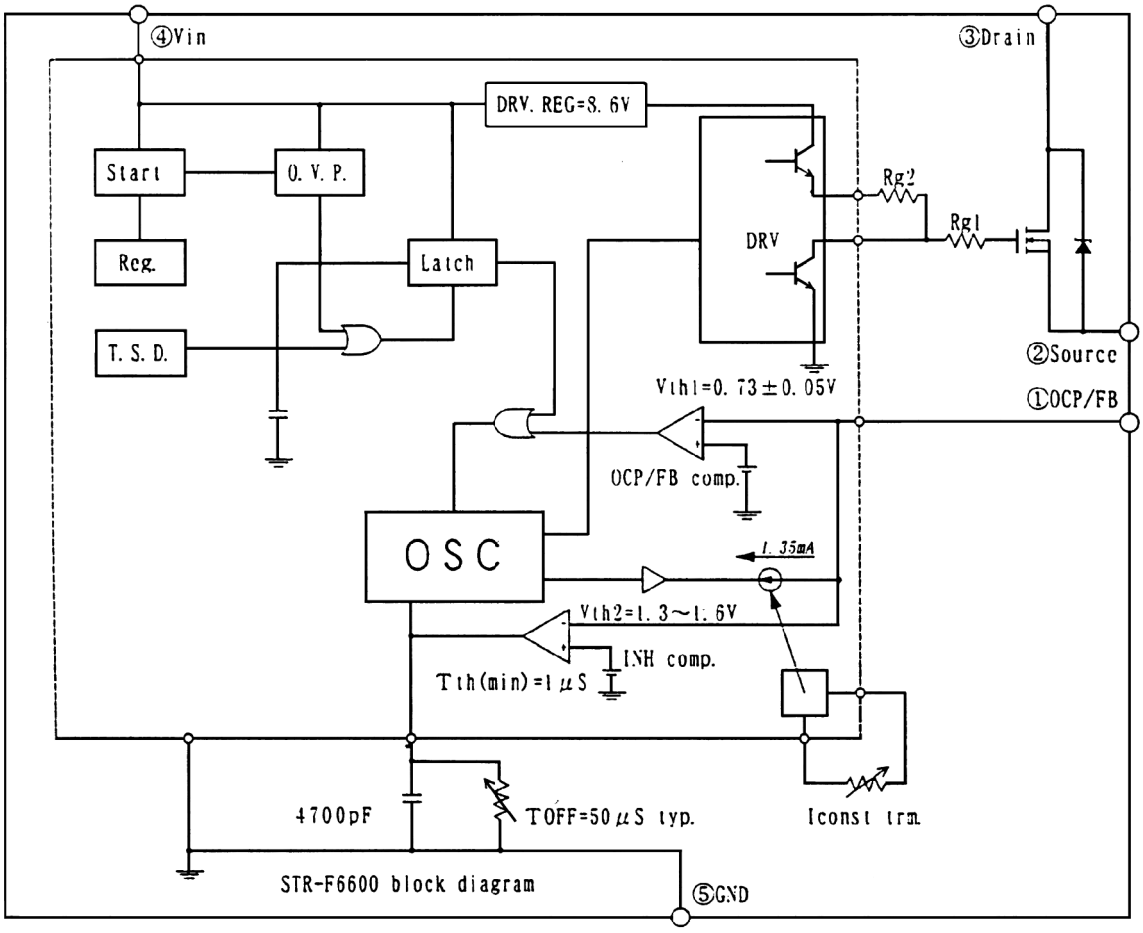
1-7-1 General description

The STR-F6653 is an hybrid IC with a build-in MOSFET and control IC, designed for flyback converter type switch mode power supply applications.

1-7-2 Features

- Small SIP fully isolated molded 5 pins package
- Many protection functions :
  - * Pulse-by-pulse overcurrent protection (OCP)
  - * Overvoltage protection with latch mode (OVP)
  - * Thermal protection with latch mode (TSD)

1-7-3 Block diagram



1-7 -4 pin description

PIN	NAME	SYMBOL	DESCRIPTION
1	Overcurrently feedback	O.C. P/E.B.	Input of over current detection signal and feedback signal
2	Source	S	Mosfet source
3	Drain	D	Mosfet drain
4	Supply	V_{IN}	Input of power supply for control circuit
5	Ground	GND	Ground

1-7 -5 Control part - electrical characteristics

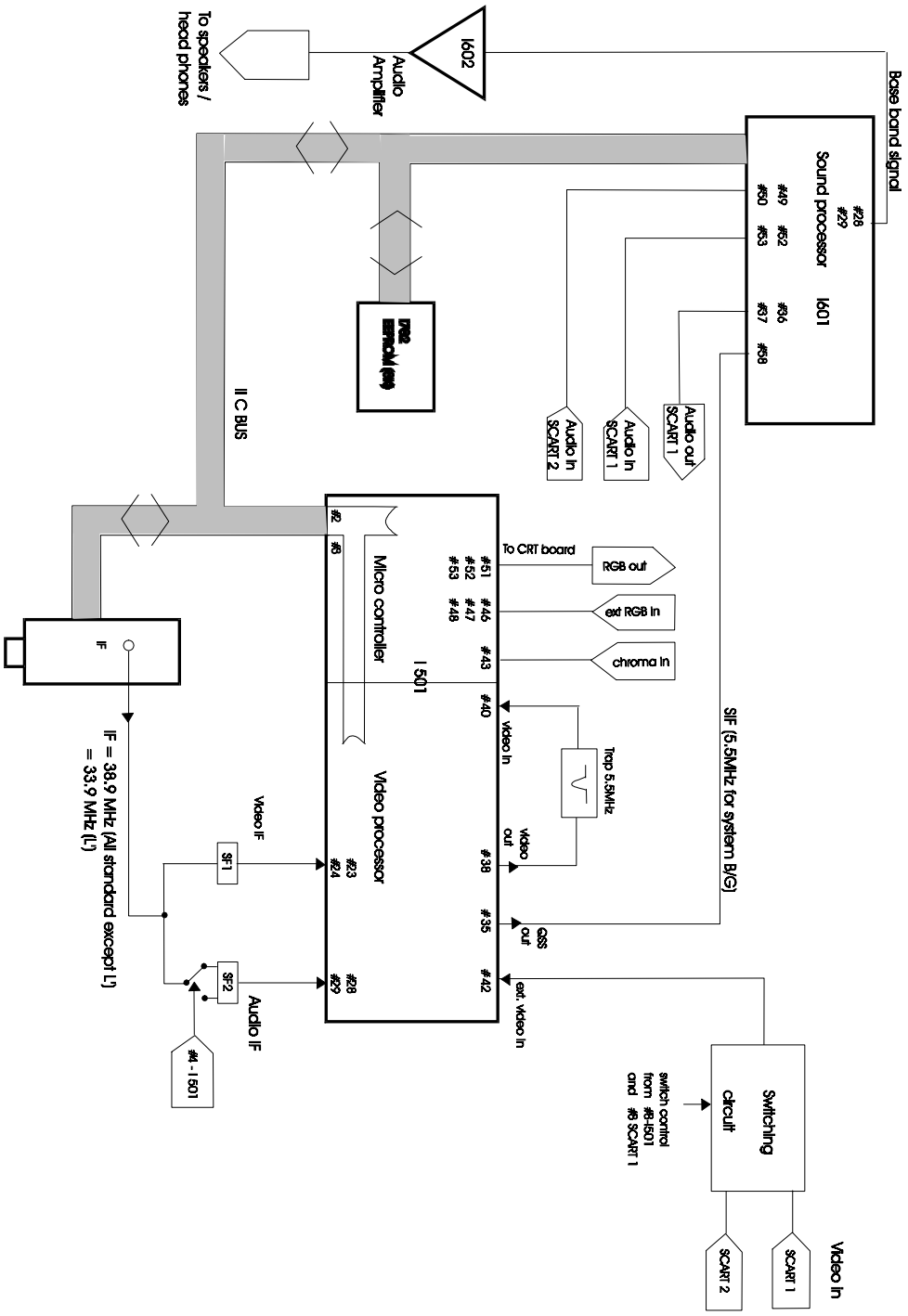
Description	IC pins Number	Symbol	Rating			Unit
			Min.	Type	Max.	
Operation start voltage	4-5	V_{IN} (on)	14.4	16	17.6	V
Operation stop voltage	4-5	V_{IN} (off)	9	10	111	V
Circuit current in operation	4-5	I_{IN} (on)	-	-	30	mA
Circ. current in non-operation	4-5	I_{IN} (off)	-	-	100	µA
Maximum off time	-	T_{OFF} (max)	45	-	55	µSEC
Minimum time for input of quaxi resonant signals	1-5	T_{TH} (2)	-	-	1.0	µSEC
Minimum off time	-	T_{OFF} (min)	-	-	1.5	µSEC
O.C.P./F.B. terminal threshold voltage 1	1-5	V_{TH} (1)	0.68	0.73	0.78	V
O.C.P./F.B. terminal threshold voltage 2	1-5	V_{TH} (2)	1.3	1.45	1.6	V
O.C.P./F.B. terminal extraction current	1-2	$I_{OCP/FB}$	1.2	1.35	1.5	mA
OVP operation voltage	4-5	V_{IN} (OVP)	20.5	22.5	24.5	V
Latch circuit sustaining voltage	4-5	I_{IN} (H)	-	-	400	µA
Latch circuit release voltage	4-5	V_{IN} (Loff)	6.6	-	8.4	V
Thermal shutdown operating temperature	-	T_J (TSD)	140	-	-	^{0}C

1-7 -6 MOSFET electrical characteristics

Description	IC pins Number	Symbol	Rating			Unit
			Min.	Type	Max.	
Drain-to-source break down voltage	3-2	V_{DSS}	650	-	-	V
Drain leakage current	3-2	I_{DSS}	-	-	300	µA
On-resistance	3-2	R_{DS} (on)	-	-	1.95	Ω
Switching time	3-2	tf	-	-	250	nsec
Thermal resistance	-	O_{CH} - F	-	-	0.95	^{0}C/W

2 - Circuit description

2-1 Block diagram



FUNCTIONAL DESCRIPTION OF VIDEO PROCESSOR Vision IF amplifier

The vision IF amplifier can demodulate signals with positive and negative modulation. The PLL demodulator is completely alignment-free.

The VCO of the PLL circuit is internal and the frequency is fixed to the required value by using the clock frequency of the µ-Controller/Teletext decoder as a reference. The setting of the various frequencies is made by the controlling software in subaddress 27H (38.9 MHz for all system except L' or 33.9 MHz for system L'). Because of the internal VCO the IF circuit has a high immunity to EMC interferences.

QSS Sound circuit

The sound IF amplifier is similar to the vision IF amplifier
and has an external AGC decoupling capacitor.

The single reference QSS mixer is realised by a multiplier. In this multiplier the SIF signal is converted to the intercarrier frequency by mixing it with the regenerated picture carrier from the VCO. The mixer output signal is supplied to the output via a high-pass filter for attenuation of the residual video signals. With this system a high performance hi-fi stereo sound processing can be achieved.

Video switches

The video switch has one input for an external CVBS or Y/C signal. The selected CVBS signal can be supplied to pin 38, the IF video output. The selection between both signals is realised by the controlling software in subaddress 22H.

The video ident circuit is connected to the selected signal. This ident circuit is independent of the synchronisation.

Synchronisation circuit

The IC contains separator circuits for the horizontal and vertical sync pulses and a data-slicing circuit which extracts the digital teletext data from the analogue signal.

The horizontal drive signal is obtained from an internal VCO which is running at a frequency of 25 MHz. This oscillator is stabilised to this frequency by using a 12 MHz signal coming from the reference oscillator of the µ-Controller/Teletext decoder.

The horizontal drive is switched on and off via the soft start/stop procedure. This function is realised by means of variation of the TON of the horizontal drive pulses.

The vertical synchronisation is realised by means of a divider circuit. The vertical ramp generator needs an external resistor and capacitor. For the vertical drive a differential output current is available. The outputs are DC coupled to the vertical output stage.

In the type TDA9367, intended for 90° picture tubes the following geometry parameters can be adjusted:
- Horizontal shift
- Vertical amplitude
- Vertical slope
- S-correction
- Vertical shift

The types which are intended to be used in combination with 110° picture tubes have an East-West control circuit. The additional controls for these types are:
- EW width
- EW parabola width
- EW upper and lower corner parabola correction
- EW trapezium correction
- Vertical zoom, horizontal parallelogram and bow correction.

Chroma and luminance processing

The chroma band-pass and trap circuits (including the SECAM cloche filter) are realised by means of gyrators and are tuned to the right frequency by comparing the tuning frequency with the reference frequency of the colour decoder. The luminance delay line and the delay cells for the peaking circuit are also realised with gyrators. The circuit contains a black stretcher function which corrects the black level for incoming signals which have a difference between the black level and the blanking level.

Colour decoder

The ICs can decode PAL, NTSC and SECAM signals. The PAL/NTSC decoder does not need external reference crystals but has an internal clock generator which is stabilised to the required frequency by using the 12 MHz clock signal from the reference oscillator of the µ-Controller/Teletext decoder.

The Automatic Colour Limiting (ACL) circuit (switchable via the ACL bit in subaddress 2OH) prevents that oversaturation occurs when signals with a high chroma-to-burst ratio are received. The ACL circuit is designed such that it only reduces the chroma signal and not the burst signal. This has the advantage that the colour sensitivity is not affected by this function.

SOFTWARE CONTROL

The CPU communicates with the peripheral functions using Special function Registers (SFRS) which are addressed as RAM locations. The registers for the Teletext decoder appear as normal SFRs in the µ-Controller memory map and are written to these functions by using a serial bus. This bus is controlled by dedicated hardware which uses a simple handshake system for software synchronisation.

For compatibility reasons and possible re-use of software blocks, the TV processor is controlled by I2C bus. The TV processor control registers cannot be read. Only the status registers can be read (Read address 8A).

The SECAM decoder contains an auto-calibrating PLL demodulator which has two references, via the divided 12 MHz reference frequency (obtained from the µ-Controller) which is used to tune the PLL to the desired free-running frequency and the bandgap reference to obtain the correct absolute value of the output signal. The VCO of the PLL is calibrated during each vertical blanking period, when the IC is in search or SECAM mode.

The base-band delay line (TDA 4665 function) is integrated. This delay line is also active during NTSC to obtain a good suppression of cross colour effects. The demodulated colour difference signals are internally supplied to the delay line.

RGB output circuit and black-current stabilisation

In the RGB control circuit the signal is controlled on contrast, brightness and saturation. The ICs have a linear input for external RGB signals. The signals for OSD and text are internally supplied to the control circuit. The output signal has an amplitude of about 2 Volts black-to-white at nominal input signals and nominal settings of the various controls.

To obtain an accurate biasing of the picture tube the 'Continuous Cathode Calibration' system has been included in these ICs. A black level off set can be made with respect to the level which is generated by the black current stabilisation system. In this way different colour temperatures can be obtained for the bright and the dark part of the picture.
The black current stabilisation system checks the output level of the 3 channels and indicates whether the black level of the highest output is in a certain window or below or above this window. This indication is read from the status byte 01 and is used for automatic adjustment of the Vg2 voltage during the production of the TV receiver.

During switch-off of the TV receiver a fixed beam current is generated by the black current control circuit. This current ensures that the picture tube capacitance is discharged. During the switch-off period the vertical deflection is placed in an overscan position so that the discharge is not visible on the screen.

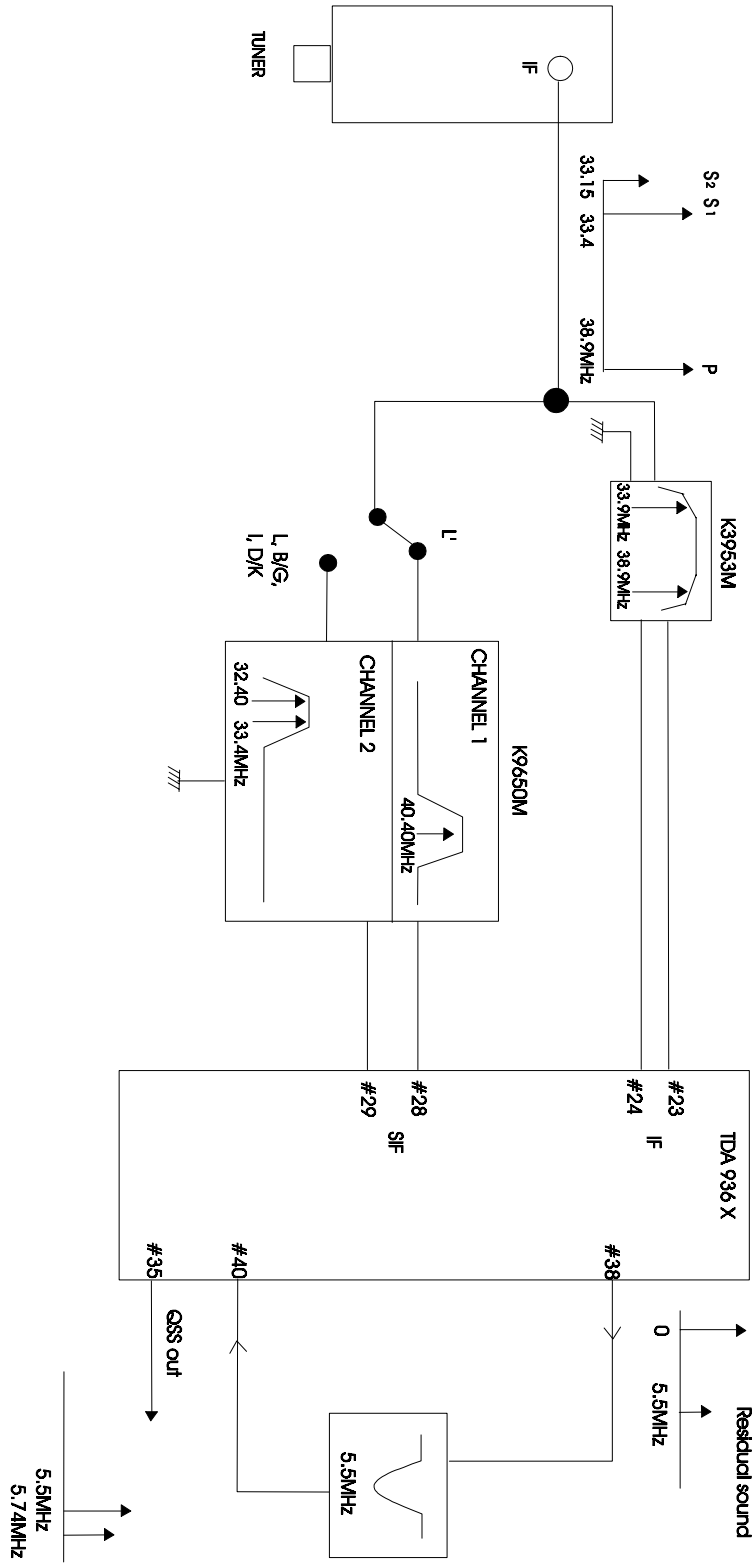
2-2 IF

The TDA936x has an alignment free IF PLL demodulator. The fully integrated oscillator is automatically calibrated, using the 12 MHz crystal as a frequency reference. The IF frequency is simply set in TV-Processor by I2C bus.
The AFC information is available via I2C bus from the TV-Processor status bytes. The controlling software uses this information for tuner frequency tracking (automatic following). The AFC windows is typically 125Khz wide. The minimum frequency step of the tuner is 62.5 KHz.
This AFC function is disabled when a program is tuned using the direct frequency entry or after fine tuning adjustment. Therefore it is recommended to tune channel with the TV search function (manual or ATSS) or using the direct channel entry to enable the Automatic Frequency Control.

SAW filters

Ref.	Standard	Features
K3953M	B/G - D/K - I - L/L’	- IF filter for video application - TV IF filter with Nyquist slopes at 33.9 MHz and 38.9 MHz - Constant group delay
K9650M	B/G - D/K - I - L/L’	- IF filter for audio application - TV IF audio filter with two channels - Channel 1 (L’) with one pass band for sound carrier at 40.40 MHz - Channel 2 (L, D/K, I, B/G) with one pass band for sound carriers between 32.40 MHz and 33.40 MHz

For SECAM L and L’ the TDA936x is switched to positive modulation via I2C bus. SECAM L’ only occur in VHF band I and have their picture and sound carrier interchanged, compared to SECAM L and PAL B/G channels. For SECAM L’ the picture carrier is situated at 33.9 MHz and the AM sound carrier at 40.40 MHz. The IF PLL reference is tuned from 38.9 to 33.9 MHz, this is done via I2C Bus and the SIF filter is switched from channel 2 to channel 1 ; this is done by pin 4 of TDA 936x. The tuner AGC time constant is slower than for negative modulation, because the TDA936x reduces its AGC current. To even slower the AGC time constant an extra series resistor R103 is added. To prevent IF overload when jumping from a very strong transmitter to a weak transmitter a diode D101 has been added
The SAW filter (SF1) has a double Nyquist slope at 38.9 MHz and 33.9 MHz needed for this multistandard application. The disadvantage of this choice is that a 5.5 MHz trap filter (Z501) is needed to suppress the residual sound carrier in the video for B/G signals.



Chassis block diagram : IF

2-3 Source switching

The TDA936x has only one external video input, the external video switching circuit made with Q504, Q505, Q507, Q508 and Q509 allows 2 external video signal inputs. The switching command can be either the SCART1 slow switching pin 8 or the µ-Controller pin 8 when the software takes control of the video source. The µ-Controller pin 8 is automatically configured by the controlling software (See table below). This pin is also capable of detecting the 3 Status (0, 1A, 1B) described in SCART specifications for automatic format switching.

TV mode	µ-Controller pin 8 Status	Level
RF auto	Input - High Impedance	< 1V
RF Forced	Input - High Impedance	not defined
AV 1 Auto	Input - High Impedance	> 2.7 V
AV 1 Auto 16:9	Input - High Impedance	1 V < x < 2.7 V
AV 1 forced	Output - Push Pull	Max. 3.3V
AV 2	Output - Push Pull	< 0.2 V
SVHS	Output - Push Pull	< 0.2 V

The controlling software via I2C bus selects the signal source :
- Video signal from tuner (Pin 40).
- External video (SCART 1 or 2) depending on Q508 base level.
- External SVHS from SCART 2.

The sound source switching is done in the MSP3415D (I601), by the µ-Controller via I2C bus.

Fast R, G, B insertion : The external R, G, B insertion needs a fast switching and cannot be controlled by the software (instruction cycle of 1µ sec). The fast switching pin 16 of SCART 1 is directly connected to the TV processor pin 45 (Fast blanking input). The display is synchronised with the selected video source, i.e. to get stable R, G, B inserted signal they must be synchronised with the selected video source. The controlling software only enable or disable (AV2, SVHS, or Forced RF source selected) fast blanking.

2-4 µ-Controller I/O pin configuration and function

The I/O pins of the µ-Controller can be configured in many way. All port functions can be individually programmed by use of the SFR registers.
Each I/O port pin can be individually programmed in these configurations :

Open drain
In this mode, the port can function as in and output. It requires an external pull-up resistor. The maximum allowable supply voltage for this pull up resistor is +5V.
So in this mode it is possible to interface a 5 Volt environment like I2C while the µ-Controller has a 3.3 Volt supply.

Push-Pull
The push pull mode can be used for output only. Both sinking and sourcing is active, which leads to sleep slopes. The levels are 0 and Vddp, the supply voltage 3.3Volts.

High impedance
This mode can be used for input only operation of the port.

Special port for LED
Pin 10 has the same functionality as the general I/O pins but in addition, their current source and sink capacity is 8 mA instead of 4 mA. These pins are used for driving LED's via a series current limiting resistor.

µ-Controller I/O pin configuration and function table

pin	name	configuration		description
		Stand by	TV ON	
1	n.u.	High impedance	High impedance	not used
2	SCL	Open Drain	Open Drain	Serial clock line
3	SDA	Open Drain	Open Drain	Serial data line
4	SECAM L'	High impedance	Push Pull	SIF filter swiching
5	OCP	High impedance	High impedance	Over Current Protection (Switch the set OFF if the voltage on this pin is <2.33V)
6	-	High impedance	High impedance	For factory use only
7	Key in	High impedance	High impedance	Local keyboard input
8	S/SW	High impedance	See table above	external video switch
10	Red/Green LED	High impedance	Open Drain	
11	Panorama	Push Pull	Push Pull	Panorama mode switch
62	Audio mute	Push Pull	Push Pull	High in stand by mode

2-5 Sound processing

Analogue sound IF - input section
The input pins ANA_IN1+ and ANA_IN- offer the possibility to connect sound IF sources to the MSP 3415D. The analogue-to-digital conversion of the preselected sound IF signal is done by an A/D converter, whose output is used to control an analogue automatic gain circuit (AGC), providing an optimal level for a wide range of input levels.

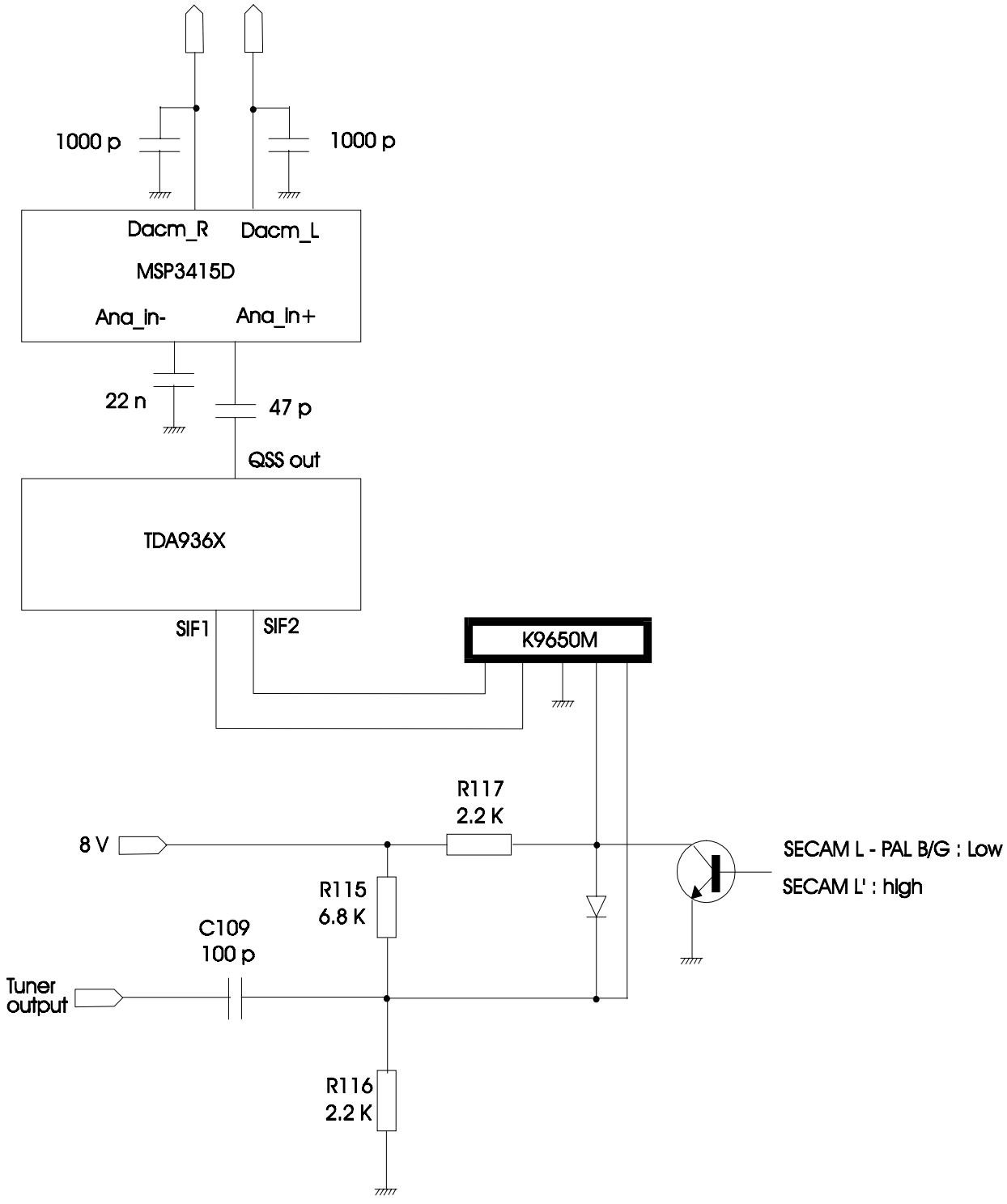
Quadrature Mixers
The digital input coming from the integrated A/D converter may contain audio information at a frequency range of theoretically 0 to 9 MHz corresponding to the selected standards. By means of two programmable quadrature mixers, two different audio sources ; for example, NICAM and FM-mono, may be shifted into baseband position.

Phase and AM discrimination
The filtered sound IF signals are demodulated by means of the phase and amplitude discriminator block. On the output, the phase and amplitude is available for further processing. AM signals are derived from the amplitude information, whereas the phase information serves for FM and NICAM demodulation.

NICAM decoder
In case of NICAM - mode, the phase samples are decoded according the DQPSK - coding scheme. The output of this block contains the original NICAM bitstream.

DSP section
All audio baseband functions are performed by digital signal processing (DSP). The DSP section controls the source and output selection, and the signals processing.

Sound Mode switching
In case of NICAM transmission, the controlling software read the bit error rate and the operation mode from the NICAM Decoder. When the set is in “Auto detection” mode (default mode after ATSS) the controlling software set automatically the sound mode (NICAM mono, NICAM Dual 1 or NICAM Dual 2) depending on the transmitted mode.
In case of 2 Carrier FM transmission, the controlling software read the transmission mode and the signal quality level from the Stereo Detection Register. When the set is in “Auto detection” mode the controlling software set automatically the sound mode (mono, Stereo, Dual 1, Dual 2) depending on the transmitted mode.
In “Auto detection” mode the controlling software evaluate the signal quality and automatically switch to the analogy sound carrier 1, if the transmission quality is too poor. To avoid unwanted automatic switching the threshold levels mono to stereo and stereo to mono is different.
In “forced mono “ mode (Red OSD in recall section), the controlling software configure the MSP3415D to demodulate only the analogue (FM or AM) sound carrier 1, no matter the signal quality. The sound mode “ forced “ or “ Autodetect” is stored for each programme.



Sound signal flow diagram

2-6 Sound amplification
The TDA8944J (TDA8946J) is a stereo BTL audio amplifier capable of delivering 2 x 7 W (2 x 15 W) output power to an 8 Ω load at THD = 10%, using a 12 V power supply and an external heatsink. The voltage gain is fixed at 32dB.

With the three-level MODE input the device can be switched from 'standby' to 'mute' and to 'operating' mode.
The TDA 8944J outputs are protected by an internal thermal shutdown protection mechanism and short-circuit protection.

Power amplifier
The power amplifier is a Bridge Tied Load (BTL) amplifier with an all-NPN output stage, capable of delivering a peak output current of 1.5 A.
The BTL principle offers the following advantages :
- Lower peak value of the supply current.
- The ripple frequency on the supply voltage is twice the signal frequency.
- No DC-blocking capacitor
- Good low frequency performance

Mode selection
The TDA894xJ has several functional modes, which can be selected by applying the proper DC voltage to pin MODE.

Mute : In this mode the amplifier is DC biased but not operational (no audio output). This allows the input coupling capacitors to be charged to avoid pop-noise. The devices is in mute mode when 2.5 V < V_{MODE} < (Vcc-1.5 V).

Operating : In this mode the amplifier is operating normally. The operating mode is activated at V_{MODE} < 0.5 V.

2-7 Vertical deflection
The vertical driver circuit is a bridge configuration. The deflection coil is connected between the output amplifiers, which are driven in phase opposition. The differential input circuit is voltage driven. The input circuit is especially intended for direct connection to driver circuits which deliver symmetrical current signals, but is also suitable for asymmetrical currents. The output current of these devices is converted to voltages at the input pins via resistors R350 and R351. The differential input voltage is compared with the output current through the deflection coils measured as voltage across R302, which provides internal feedback information. The voltage across R302 is proportional to the output current.
Flyback voltage
The flyback voltage is determined by an additional supply voltage V_{flb}. The principle of operation with two supply voltages (class G) makes it possible to fix the supply voltage Vp optimum for the scan voltage and the second supply voltage V_{flb} optimum for the flyback voltage. Using this method, very high efficiency is achieved. The supply voltage V_{flb} is almost totally available as flyback voltage across the coil, this being possible due to the absence of a coupling capacitor.
Protection
The output circuit has protection circuits for :
- Too high die temperature
- overvoltage of output stage A

Guard circuit

The guard signal is not used by the TDA936x to blank the screen in case of fault condition.

Damping resistor
For HF loop stability a damping resistor (R305) is connected across the deflection coil.

EAST-WEST Amplifier (TDA8358J only)
The East-West amplifier is current driven. It can only sink currents of the diode modulator circuit. A feedback resistor R397 is connected between the input and output of this inverting amplifier in order to convert the East-West correction input into an output voltage.

2-8 Power supply (STR F6653)

2-8 -1 STR-F6653 general description

The STR-F6653 is an hybrid IC with a build-in MOSFET and control IC, designed for flyback converter type switch mode power supply applications.

2-8 -2Power supply primary part operations

An oscillator generates pulses signals which turn on and off a MOSFET transistor.

2-8 -2-1 Start -up circuit: V_{IN}

The start-up circuit is used to start and stop the operation of the control IC, by detecting a voltage appearing at V_{IN} pin (pin 4).

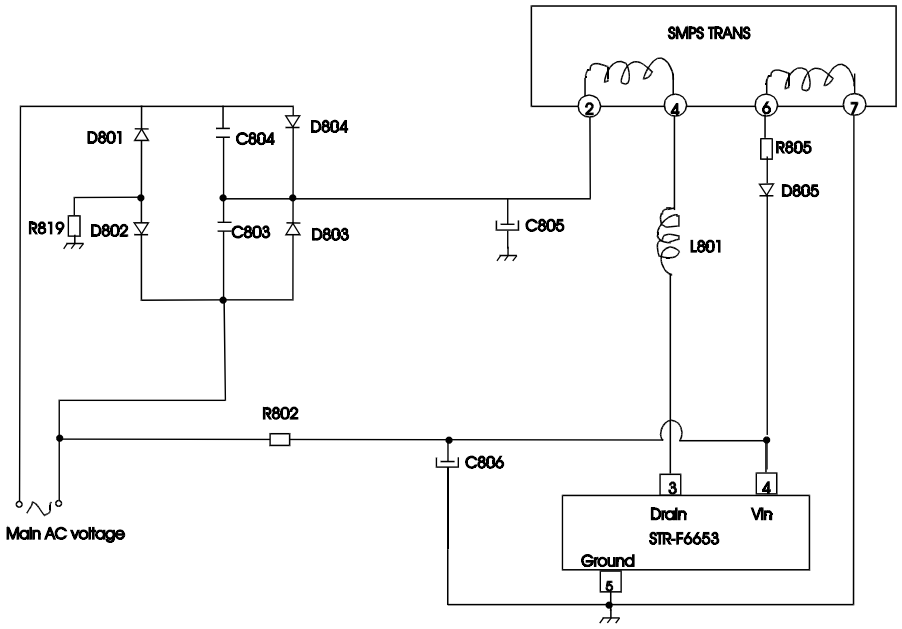


Fig :Power supply start-up circuit

When the power switch is pushed on, V_{IN} increases slowly. During this time, C806 is charged through R802.

As soon as V_{IN} reaches 16V, the STR-F6653 control circuit starts operating. Then, V_{IN} is obtained by smoothing the winding voltage which appears between pin6 and pin7 of the SMPS transformer.

As this winding voltage does not increase to the set voltage immediately after the control circuit starts operating, V_{IN} starts dropping. However, as this winding voltage reaches the set value before V_{IN} voltage drops to the shutdown voltage (at 11V), the control circuit continues operating (see below V_{IN} voltage at start-up). R805 resistor prevents that V_{IN} pin voltage varies according to the secondary side output current.

V_{IN} must be set higher than the shutdown voltage (V_{IN} (off) = $11V_{max}$) and lower than the O.V.P. (overvoltage protection) operating voltage
(V_{OVP} = $20.5V_{min}$)

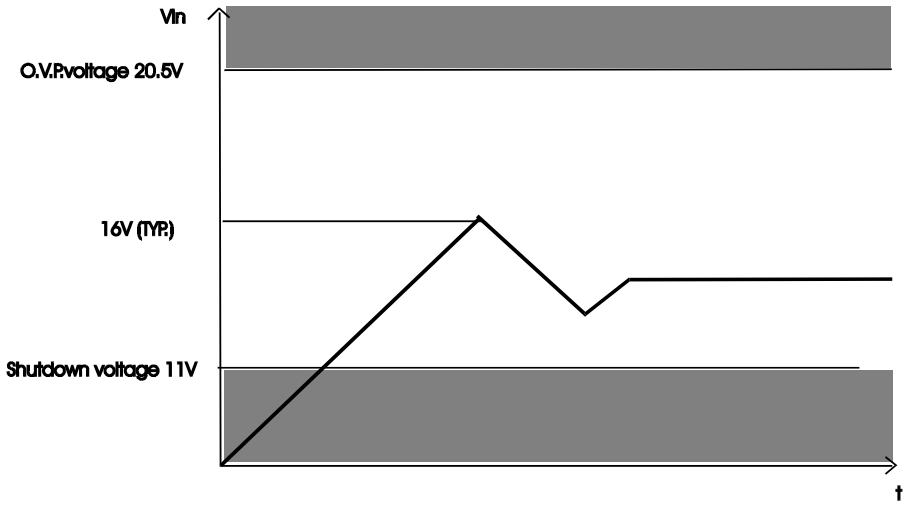


Fig. :Waveform of Vin pin voltage at start-up

2-8 -2-1 STR-F6653 oscillating operation

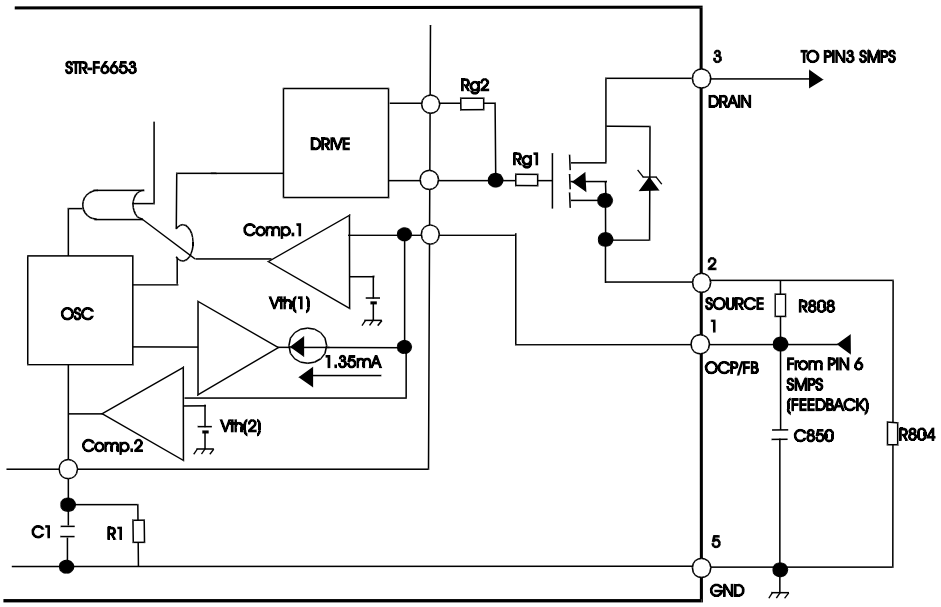


Fig. : oscillating operation

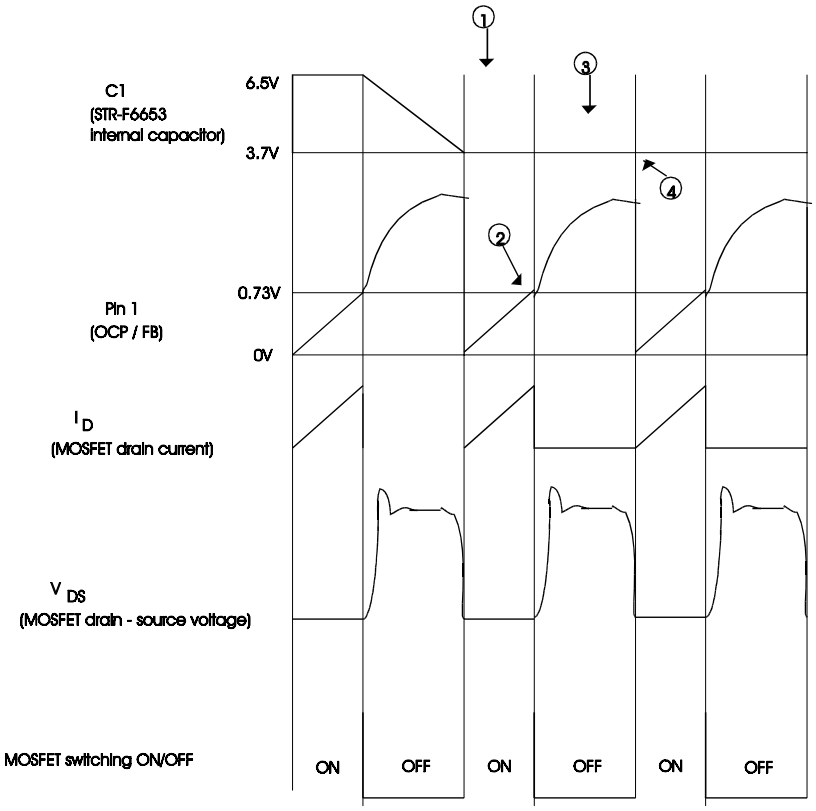


Fig. :Waveforms during oscillating operation

① When the MOSFET is ON, the STR-F6653 internal capacitor C1 is charged at the constant voltage 6.5V.
At the same time, the voltage at pin 1 (OCP / FB) increases with the same waveform as the MOSFET drain current.

② When the pin 1 voltage reaches the threshold voltage V_{TH1} = 0.73V, the STR-F6653 internal comparator 1 starts operating. The STR-F6653 internal oscillator is inverted and the MOSFET turns OFF.

③ When the MOSFET turns OFF, charging of STR-F6653 internal capacitor C1 is released and C1 starts discharging by the STR-F6653 internal resistance R1. So, C1 voltage starts falling in accordance with the gradient regulated by the constant discharging time of C1 and R1. So, this means that the fixed time determined by C1 and R1 is the OFF-time of the MOSFET.

④ When C1 voltage falls to around 3.7V, the STR-F6653 internal oscillator is reversed again and the MOSFET turns ON. C1 is quickly charged to around 6.5V

The MOSFET continues to oscillate by repeating the above procedure.

2-8 -2-3 STR-F6653 protection circuits

- **overcurrent protection function (OCP)**

Overcurrent protection is performed pulse by pulse detecting at STR-F6653 pin 1 (OCP) the peak of the MOSFET drain current in every pulse.

- **latch circuit**

This circuit sustains an output low from the STR-F6653 internal oscillator and stops operation of the power supply when overvoltage protection (OVP) and thermal shutdown (TSD) circuit are under operation

- **thermal shutdown circuit (TSD)**

This circuit triggers the latch circuit when the frame temperature of STR-F6653 IC exceeds 140°C

- **overvoltage protection circuit (OVP)**

This circuit triggers the latch circuit when the V_{in} voltage exceeds 22V (typ.)

2-9 TV start-up, TV normal run and stand-by mode operations

2-9 1 **TV start-up operations**

2-9-1-1 Schematic diagram for start-up operations

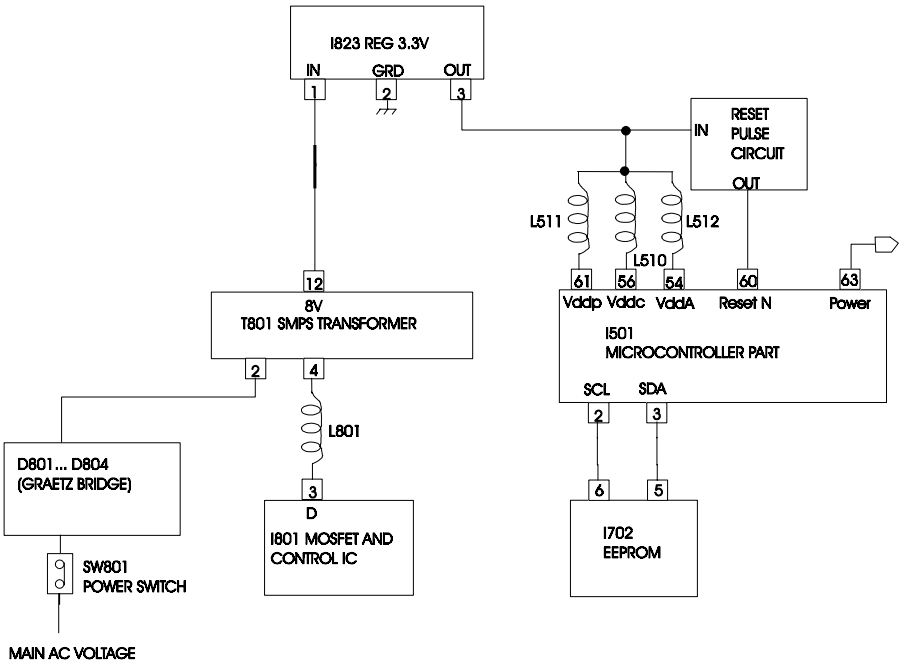


Fig. :Start-up operations

2-9-1-2 TV start-up and microcontroller initialization

- When SW801 power switch is pushed, main AC voltage is applied to T801 transformer (after rectification by D801...D804 diodes). Then, T801 SMPS transformer starts operating and supplies DC voltage to I823 (3.3V regulator).

- This regulator provides 3.3V DC voltage to I501 microcontroller power supply pins (pins 54, 56, 61) and to the reset pulse circuit which provides reset pulse to I501 microcontroller reset pin (pin 60).

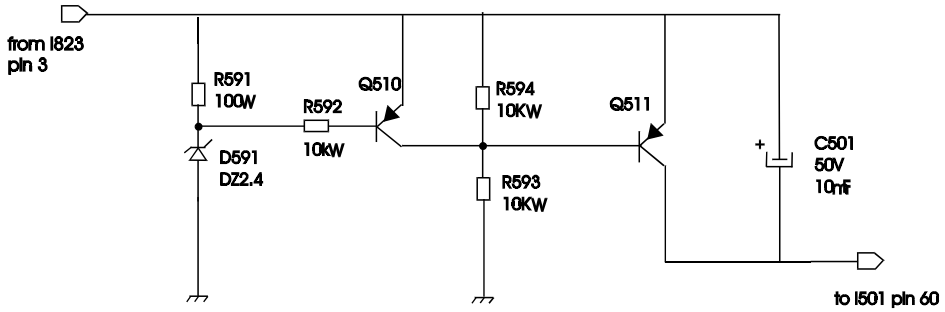
- Then, the microcontroller starts its initialization. Its power pin (pin 63) is set to high which allows delivery of power supply voltages (123V, 8V, 5V...). At this step, all IC's start working but no picture appears on screen: I501 IC doesn't provide horizontal drive voltage.

- Then, the microcontroller consults I702 EEPROM via I2C bus to know the last TV set mode (normal run mode or stand-by mode) before switching off.

  . If the TV set was on normal run mode before switching off, the microcontroller delivers horizontal drive voltage at pin 33 and picture appears on screen.

. If the TV set was on stand-by mode before switching off, the microcontroller switches TV set to stand-by mode, decreasing power pin voltage (pin 63). this matter will be explained on paragraph 5-9-2-b.

2-9-1-3 Reset pulse circuit:



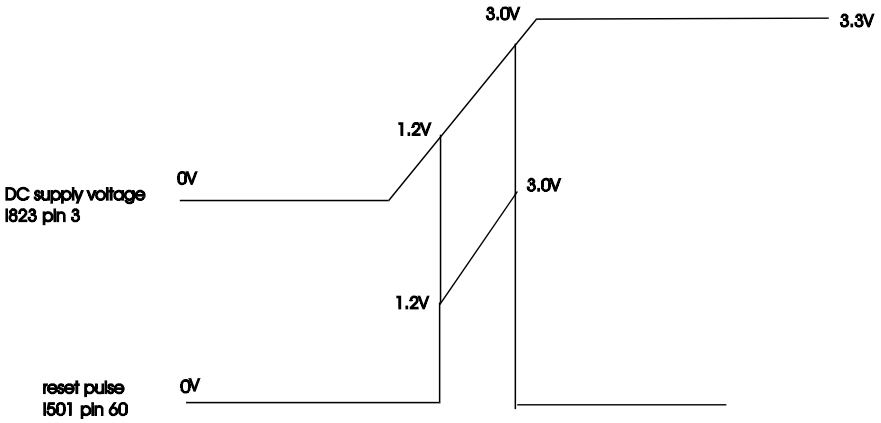


Fig. :Reset pulse and corresponding waveforms

2-9-1-4 Reset pulse circuit operations description

- When DC supply voltage from I823 regulator starts rising (from 0V to 1.2V), no current flows through D591 zener diode. So, Q510 is in off mode.
  Also $V_{be\ Q511}$ =Vcc/2 -Vcc = -Vcc/2 > -0.6V. So, Q511 is in off mode.
  Then, no voltage reaches I501 pin 60.

- When this voltage reaches 1.2 V, Q510 stays in off mode
  but $V_{be\ Q511}$ = -0.6V. So, Q511 is switched on and starts driving DC supply voltage to I501 pin 60.

- When the DC supply voltage reaches (2.4V +0.6V) =3.0V, Q510 starts conducting but as the Q511 base-emitter voltage is the same as the collector-emitter voltage of the saturated Q510, Q511 switches off and no voltage reaches I501 pin 60.

- If the DC supply voltage decreases below 3 V, Q510 switches off immediately. Q511 starts conducting, pulling I501 pin 60 high.
  At the same time, it discharges the reset capacitor C501. Discharging this capacitor is necessary to garantee a defined reset pulse duration.

2-9-2 TV normal run and stand-by mode operations

Depending on remote control commands, I501 microcontroller part pin 63 (power) is set to:

- high for normal run mode
- low for stand-by mode

2-9-2-1 TV on normal run mode

2-9-2-1-1 I501 microcontroller part pin 63 (power) effect

I501 microcontroller part pin 63 (power) is connected to the following circuit:

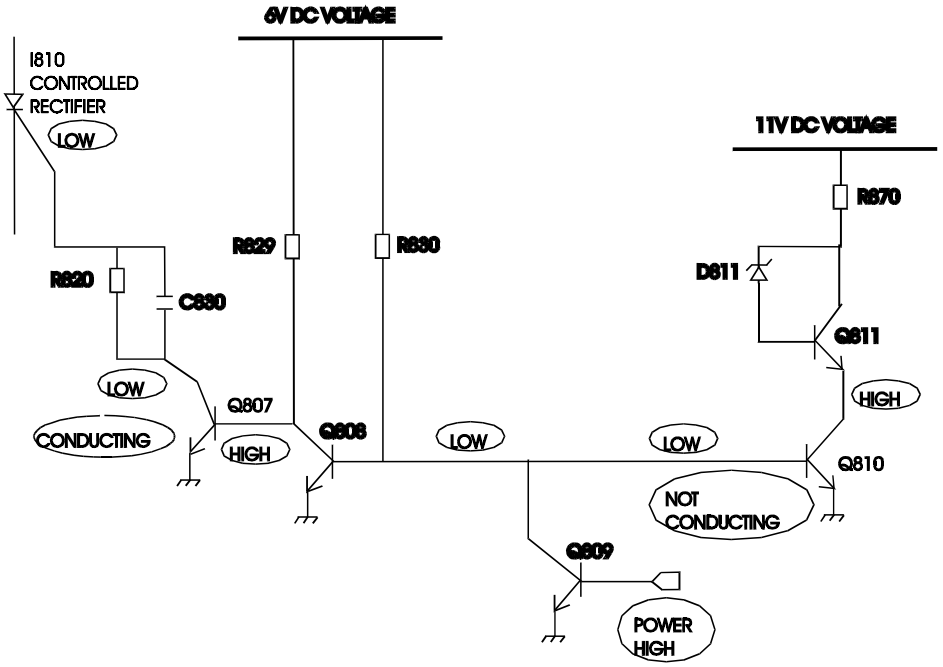


Fig. : I501 microcontroller part pin 63 (POWER) effect

On normal run mode, I501 microcontroller pin 63 (power) is set to high

- So, I810 controlled rectifier is not conducting

  - Q809 is conducting. So, Q808 is not conducting and Q807 is conducting
  - So, Q807 collector is connected to the ground and I810 controlled rectifier gate pin is set to low (no conducting)

- So, current from 11V DC voltage (from T801 SMPS transformer pin 13) does not flow through Q811 and Q810 transistors but flows through I806 IC error amplifier

  - Q809 is conducting. So, Q810 is not conducting and no current flows from Q810 collector to the ground

Therefore, the power circuit diagram is the following one:

2-9-2-1-2 power supply circuit diagram during TV set normal run

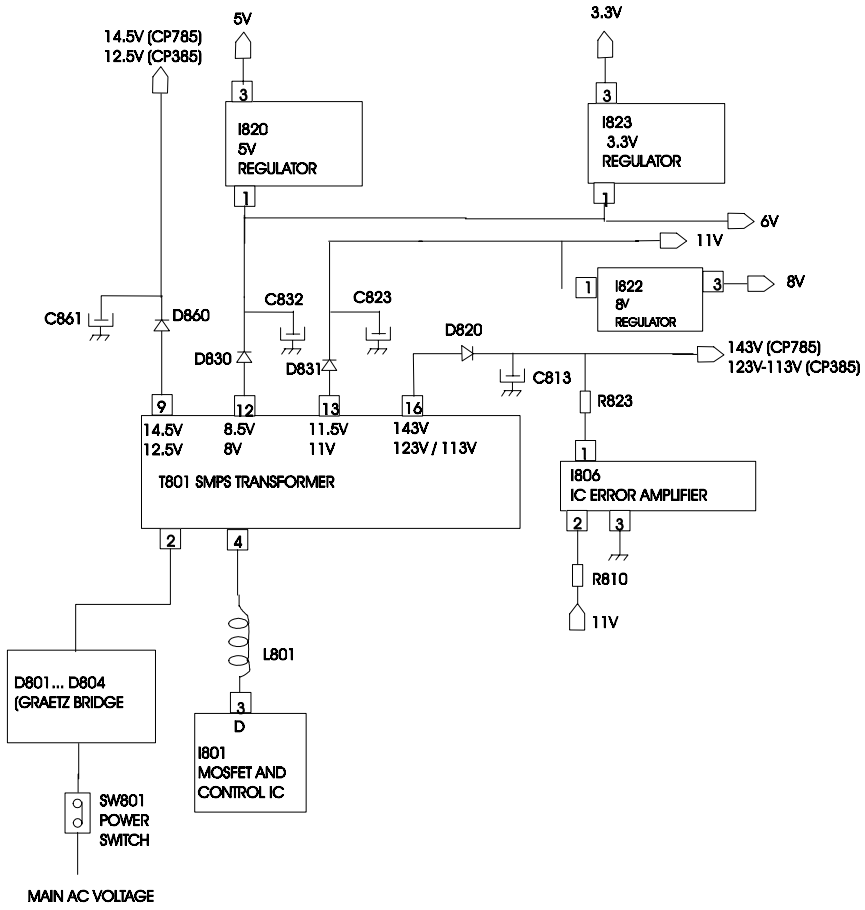


Fig. :Power supply operation during TV set normal run

2-9-2-1-3 power supply functioning during TV set normal run mode

- I801 transmits controlled pulses to T801 which generates DC voltages after rectifications by secondary part diodes and electro capacitors (by example by D820 and C813 on 143V supply voltage line).

- 8V, 5V, 3.3V supply voltage lines have stabilized voltages obtained by I820, I822, I823 voltage regulators.

- On 143V supply voltage line, R823 resistor has been chosen to reach exact DC voltage required on this line.

- 143V supply voltage line includes an IC error amplifier (I806) which corrects unexpected DC voltage variations on this line.

2-9-2-1-4 power supply IC delivery during TV set normal run

power supply line	IC power supply delivery	Remarks
143V	FBT	FBT supplies 45V to I301 vertical IC FBT supplies 45V to T401 H-drive FBT supplies 14V to I301 vertical IC FBT supplies 33V to the tuner FBT supplies 185V to I901 video amplifier pin 6
14.5V	I602 sound amplifier pins 3-16	
11V	T401 H- drive	
8V	I501 Main IC pins 14-39	
	I601 Sound Demod. pins 38-39-40	
6V	I703 IR receiver pin 1	
5V	I601 Sound Demod. pins 7-18-57	
	I702 EEPROM pin 8	
	tuner	
3.3V	Main IC µcom part pins 54-56-61	

2-9-2-2 TV set on stand-by mode

2-9-2-2-1 TV set circuit diagram on stand-by mode

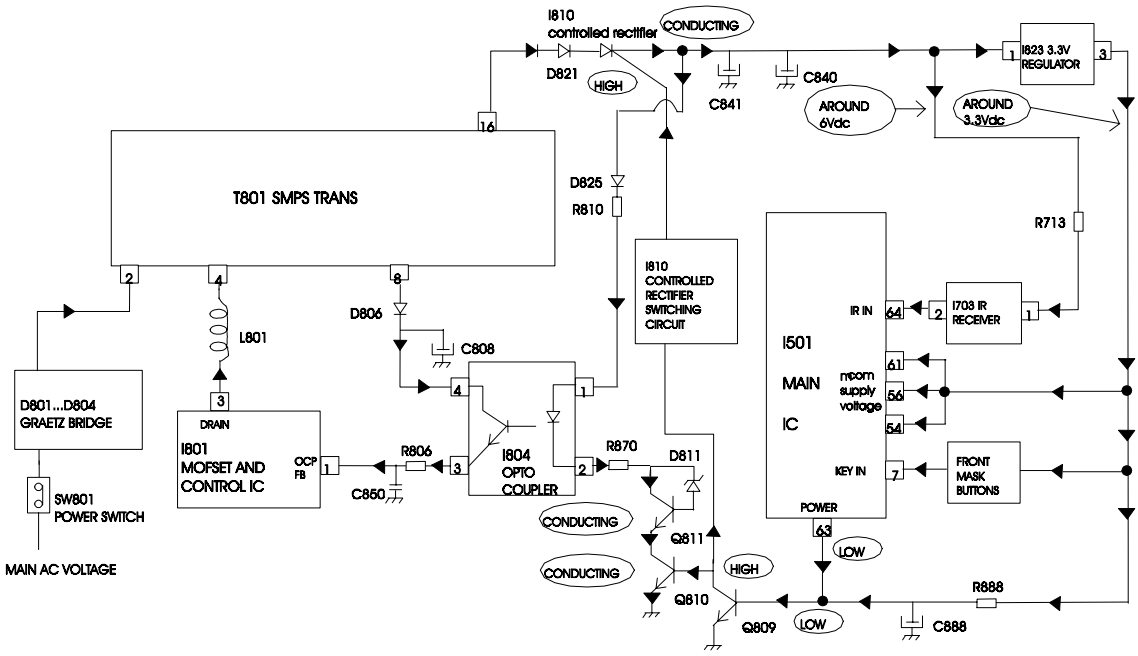


Fig. : Power supply operation in stand - by mode

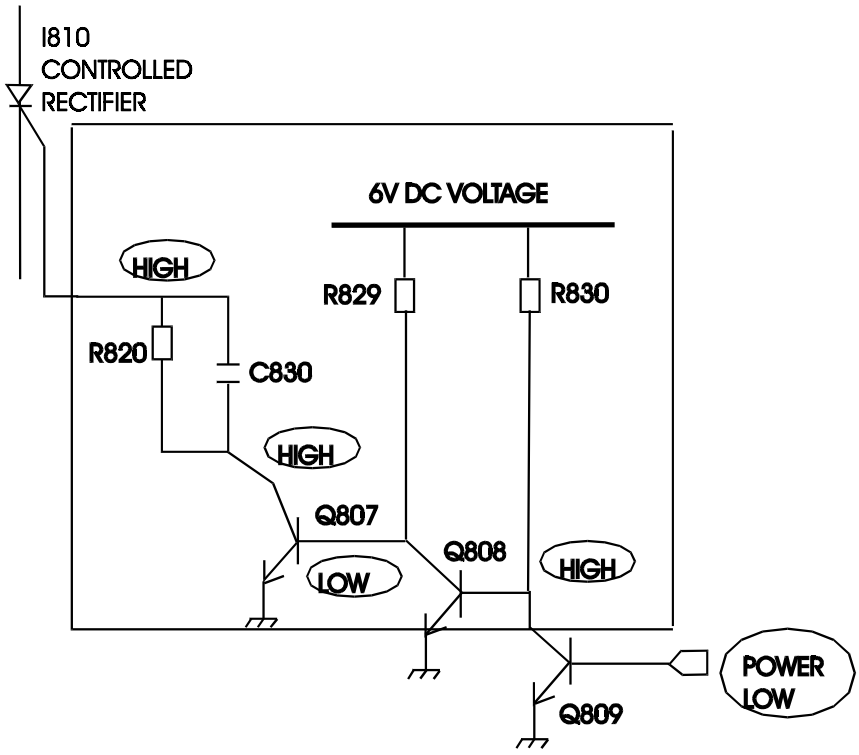


Fig. : I810 controlled rectifier switching circuit

2-9-2-2-2 TV set stand-by mode operations

-On stand-by mode, I501 microcontroller pin 63 (power) is set to low.
- So, Q809 collector is set to high.
-Then, I810 controlled rectifier gate pin is set to high and I810 is conducting.
- So, current flows from pin 16 SMPS transformer to the ground via I804 photo coupler and Q810 and Q811 transistors (which are conducting).
- In these conditions, I801 delivers pulses on light mode and T801 produces voltages with reduced power.
- As I810 is conducting, current flows also from pin 16 SMPS transformer to I823 (3.3V regulator) for I501 µcom, IR receiver and front mask buttons supply voltage (then, remote control or front mask buttons can be activated to leave stand-by mode).