

Service Manual

Color Television

CHASSIS : CP-185M

**Model : KR14E5/DTA-14V3VM
 KR20E5/DTA-20V3VM
 KR21E5/DTA-21V3VM**



14V3/20V3/21V3

■ Specification

Version	TK
TV Standard	PAL-SECAM B/G-D/K
Sound system	MONO
Power Consumption	14": 39W; 20": 42W; 21": 45W
Sound Output Power	2.5W(at 60% mod, 10% THD)
Speaker	3W 8 ohm
Teletext system	NONE
Aerial Input	75ohm unbalanced
Channel coverage	Off-air cannels, S-cable channels and hyperband
Tuning System	Frequency synthesiser tuning system
Visual screen size	14" : 34cm 20" : 48cm 21" : 51cm
Channel indication	On screen Display
Program selection	100 programmes
Auxiliary Output Terminal	EURO-SCART:Audio /Video and Out, R/G/B in, slow and fast wtching, SVHS in. Audio-Video jack on front of cabinet in common connection with EURO-SCART. Headphone jack(3.5mm)on front of cabinet
Remote Control	R-40A10

DAEWOO ELECTRONICS CO., LTD

[http : //svc.dwe.co.kr](http://svc.dwe.co.kr)

Feb. 2001

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APPENDIX (Appendix is provide only by internet [<http://svc.dwe.co.kr>])

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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 22-23 kV (14") or 24-26 kV (20" - 21") at max beam current. The high voltage must not, under any circumstances, exceed 27.5 kV (14", 20"), 29KV (21"). 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 cover 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 body 10 mm away from the circuit board.
4. Keep wires away from high voltage or high temperature components.
5. This receiver must operate under AC 230 volts, 50 Hz. NEVER connect to a DC supply of any other voltage or frequency.

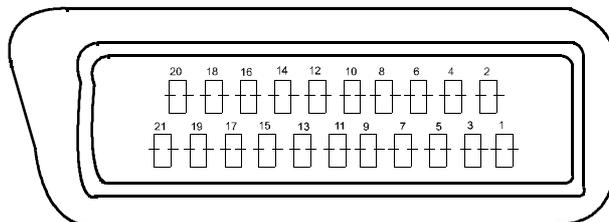
■ PRODUCT SAFETY NOTICE

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.

SPECIFICATIONS

21Pin EURO-SCART

PIN	SIGNAL DESCRIPTION	MATCHING VALUE
1	Audio Output Right	0.5 Vrms, Impedance < 1k Ω , (RF 54% Mod)
2	Audio Input Right	0.5Vrms, Impedance > 10k Ω
3	Audio Output Left	0.5 Vrms, Impedance < 1k Ω , (RF 54% Mod)
4	Audio Earth	
5	Blue Earth	
6	Audio Input Left	0.5Vrms, Impedance > 10k Ω
7	Blue Input	0.7Vpp \pm 0.1V, Impedance 75 Ω
8	Slow Switching	TV : 0 to 2V, AV : 4.5 to 12V, Impedance > 10k Ω
9	Green Earth	
10	N.C	
11	Green Input	0.7Vpp \pm 0.1V, Impedance 75 Ω
12	N.C	
13	Red Earth	
14	Blanking Earth	
15	Red Input Chroma Input	0.7Vpp \pm 0.1V, Impedance 75 Ω \pm 3dB for a luminance signal of 1 Vpp
16	Fast Switching	0 to 0.4V : Logic "0", 1 to 3V : Logic "1", Impedance 75 Ω
17	Video Out Earth	
18	Video In Earth	
19	Video Output	1 Vpp \pm 3dB, Impedance 75 Ω
20	Video Input	1 Vpp \pm 3dB, Impedance 75 Ω
21	Common Earth	



SPECIFICATIONS

Channel table

FREQUENCY TABLE CP-185M

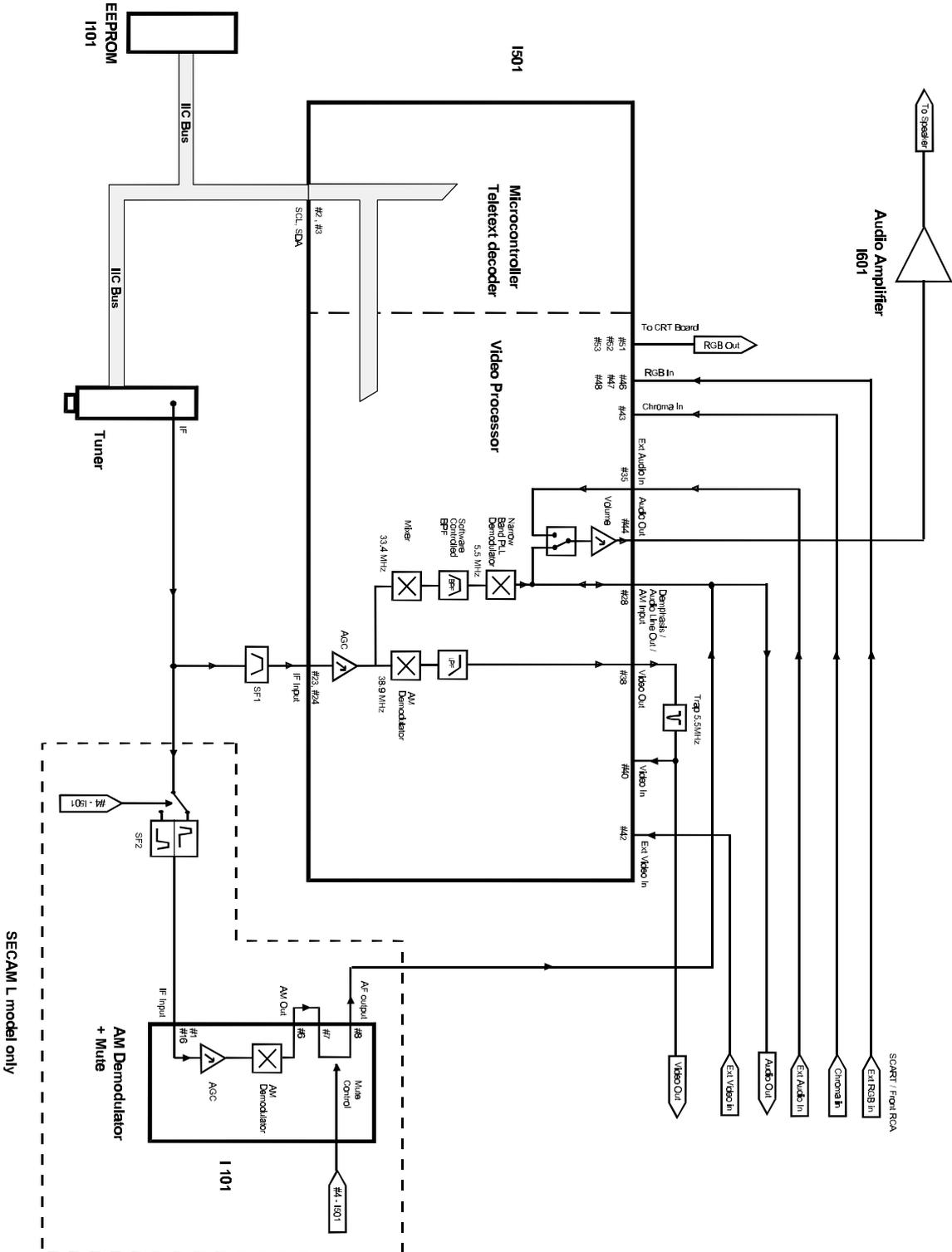
CH	EUROPE CCIR	FRANCE	GB(IRELAND)	EAST OIRT
C01	46.25	-	45.75	49.75
C02	48.25	55.75 (L')	53.75	59.25
C03	55.25	60.5 (L)	61.75	77.25
C04	62.25	63.75 (L')	175.25	85.25
C05	175.25	176.00	183.25	93.25
C06	182.25	184.00	191.25	175.25
C07	189.25	192.00	199.25	183.25
C08	196.25	200.00	207.25	191.25
C09	203.25	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

CH	EUROPE CCIR	FRANCE	GB(IRELAND)	EAST OIRT
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

CH	EUROPE CCIR	FRANCE	GB(IRELAND)	EAST OIRT
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

CH	EUROPE CCIR	FRANCE	GB(IRELAND)	EAST OIRT
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

CIRCUIT BLOCK DIAGRAM



ALIGNMENT INSTRUCTIONS

Microcontroller configuration : Service mode

To switch the TV set into service mode please see 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

Microcontroller configuration :

Tuner Option

Option	Tuner maker
DW	DAEWOO / SAMSUNG
PH1	PHILIPS (Video processor AGC)
PH2	PHILIPS (tuner internal AGC)

System Option

Option	System
TF	PAL - B/G
TK	PAL/SECAM - B/G, D/K (set for Russia)
TU	PAL - I/I
TA	PAL/SECAM - B/G, SECAM - L/L'

TV set Alignment

1 - G2 alignment

- Set TV in NORMAL I mode
- 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.
- Adjust screen volume (on FBT) such that the highest cathode cut-off voltage measured on CRT board, is $V_{cut-off} \pm 5V$.

Screen size	Vcut-off
14"	115 V
20" & 21"	125 V

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.

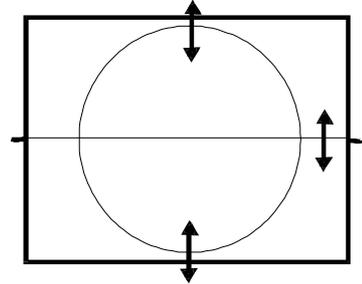
ALIGNMENT INSTRUCTIONS

3 - Focus

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

4 - Vertical geometry

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



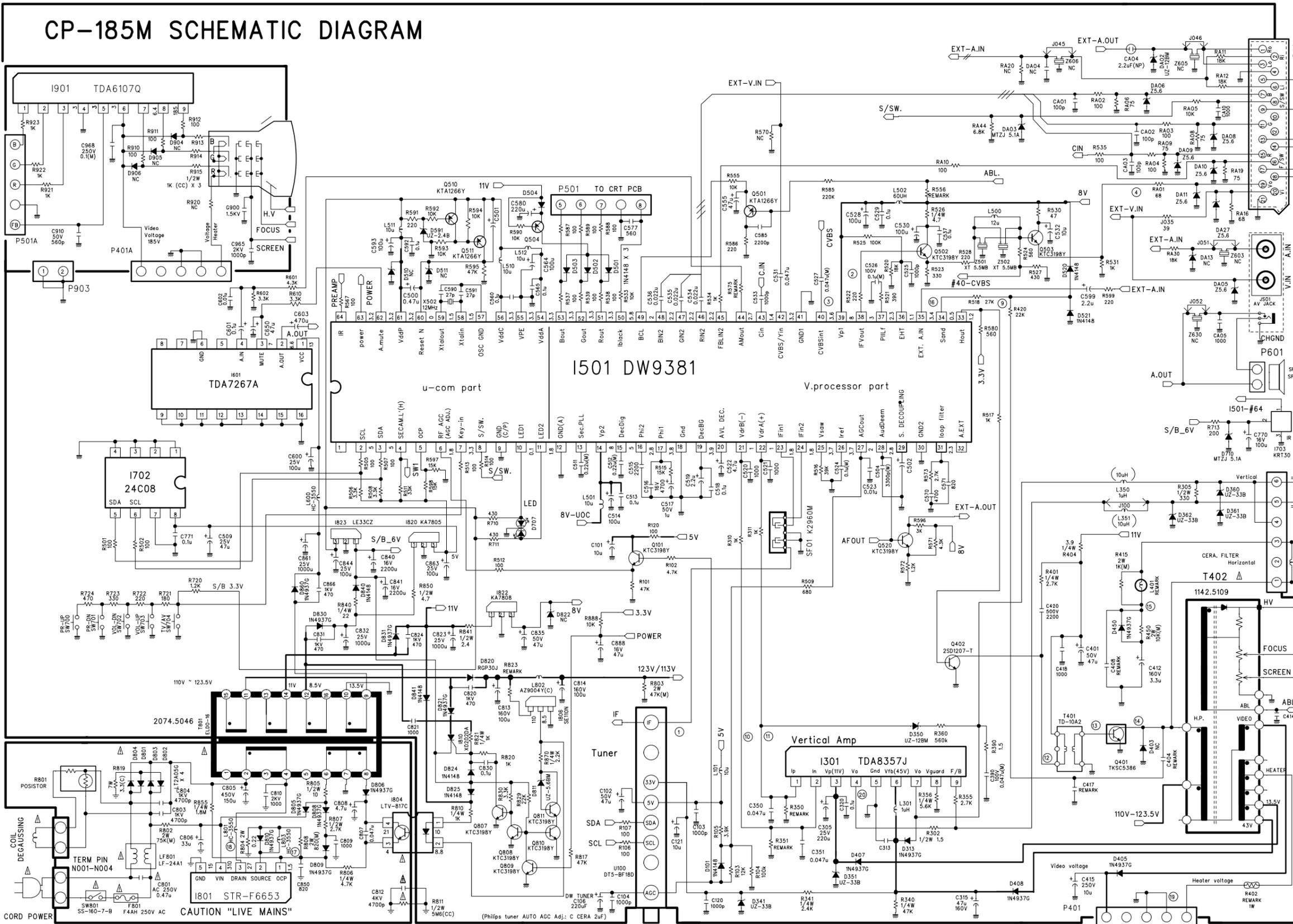
5 - Horizontal picture centering

- Adjust H Shift to have the picture in the center of the screen.

7 - AGC

- Adjust the antenna signal level to $68 \text{ dB}\mu\text{V} \pm 2$ for Daewoo tuner ($63 \text{ dB}\mu\text{V} \pm 1$ for Philips tuner).
- Set RF AGC to 0.
- Increase RF AGC level and stop when the level on pin 6 of I501 goes below 2.5 Vdc

CP-185M SCHEMATIC DIAGRAM



NOTE:

1. RESISTANCE IS SHOWN IN OHM. K=1000, M=1000000
2. UNLESS OTHERWISE NOTED IN SCHEMATIC ALL CAPACITOR VALUES ARE EXPRESSED IN μ F
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 $\pm 20\%$ 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.

THE DIFFERENT PARTS FOR CRT

LOC.	14 INCH	20 INCH	21 INCH
R350	1/4 1.50K	1/4 1.80K	1/4 2.0K
R351	1/4 1.50K	1/4 1.80K	1/4 2.0K
R402	1W 1.2	1W 0.68	1W 1.2
R556	1/6 8.2K	1/6 7.5K	1/6 6.8K
R575	1/6 12K	1/6 10K	1/6 12K
R801	ECPCD140M290	ECPCD70M290	ECPCD70M290
R823	1/4 4.3K	1/4 3K	1/4 3K
L401	L-102 (102 μ H)	L-76 (76.5 μ H)	L-102 (102 μ H)
C404	1.6KV 8200PF	1.6KV 8200PF	1.6KV 7500PF
C408	200V 0.33 μ F	200V 0.27 μ F	200V 0.27 μ F
C417	250V 0.1 μ F	100V 0.22 μ F	250V 0.1 μ F

THE DIFFERENT PARTS FOR SYSTEM

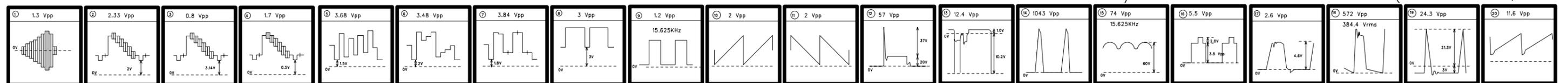
LOC.	NAME	B/G, D/K	B/G, 1/1
SF01	SAW FILTER	K2960M	J1981M
Z501	CERA. FILTER	XT 5.5MB	XT 5.5MB
Z502	CERA. FILTER	XT 6.5MB	XT 6.0MB

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.

* WAVEFORMS

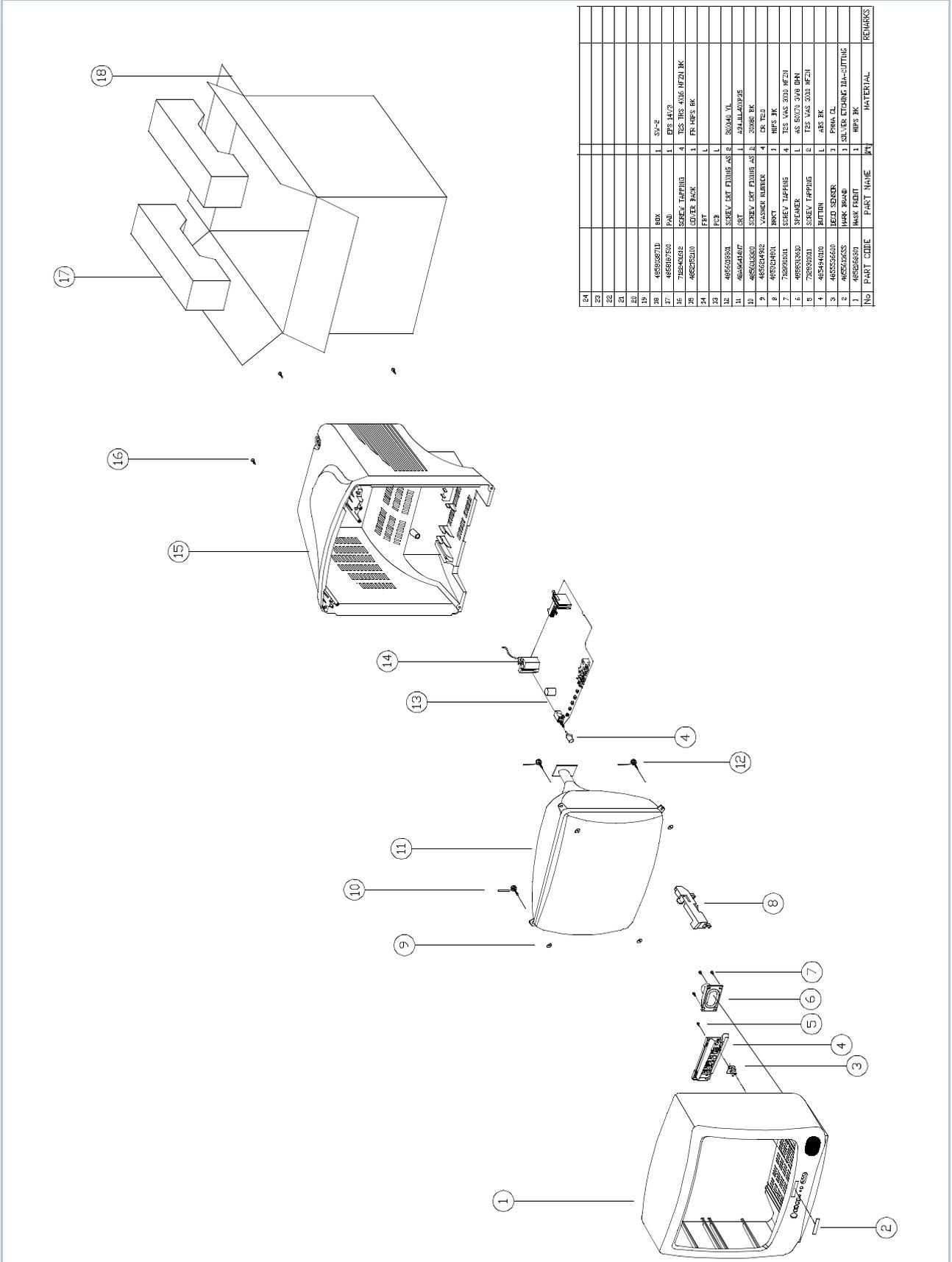
TEST CONDITIONS : PAL-B/G COLOR BAR (NOR.1)



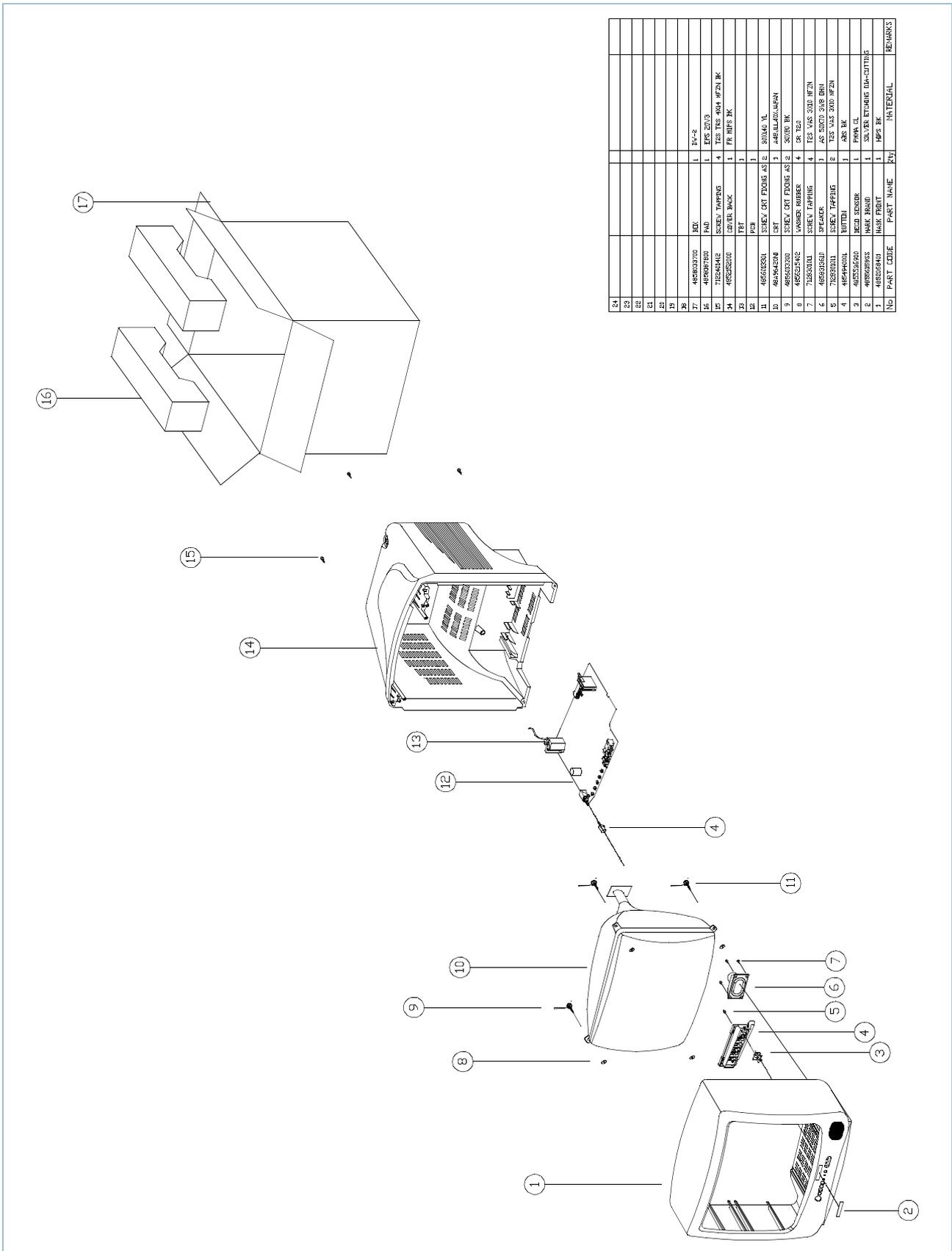
S/N: 4858904993-00 (JANUARY, 2001)

EXPLODED VIEW

1. 14V3

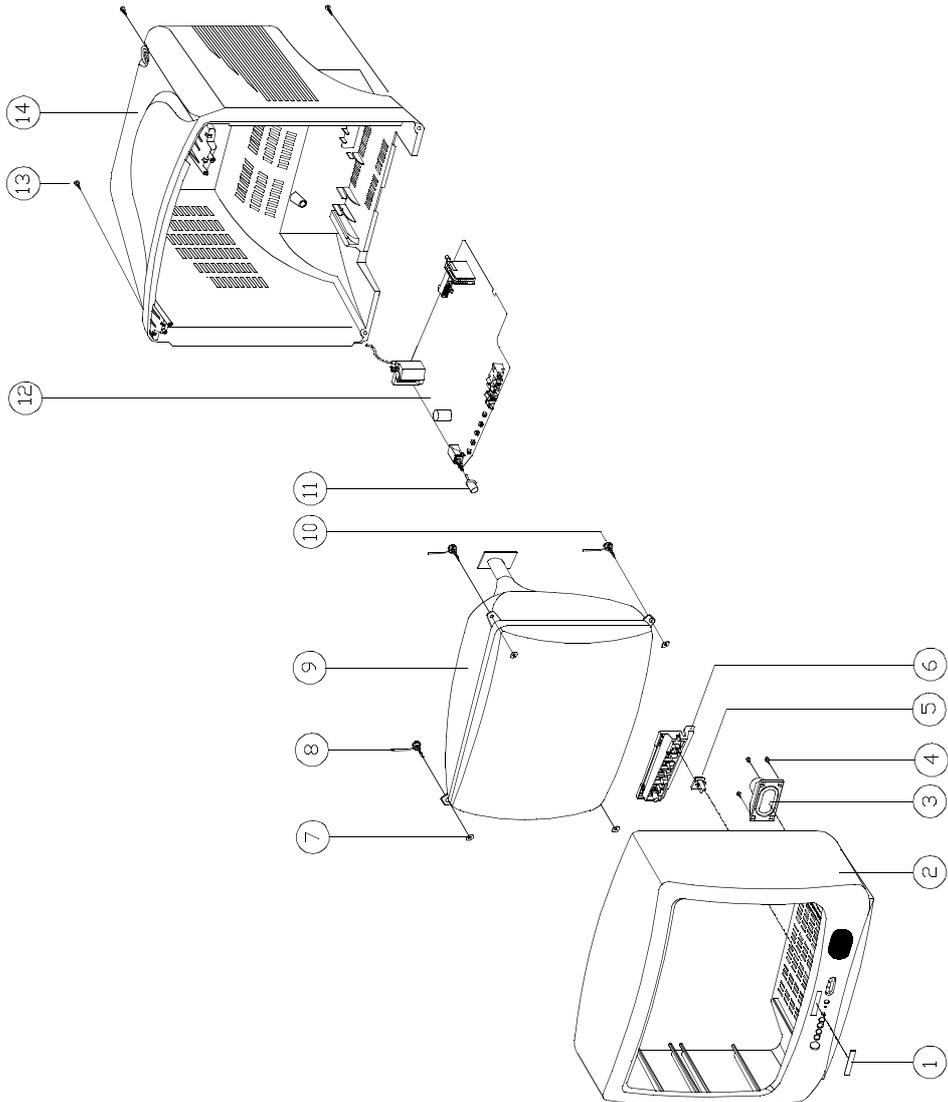
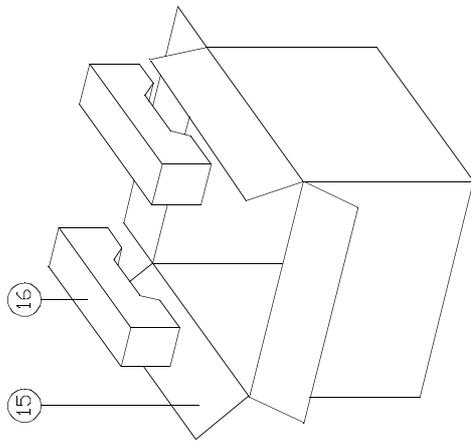


2. 20V3



NO	PART CODE	PART NAME	QTY	MATERIAL	REMARKS
14					
15					
16					
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24					
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26					
27	485043700	HD.	1	1V-2	
28	485047000	FD.	1	EP2 20V3	
29	718244448	SCREW TAPPING	4	TES TES 40X4 HF20 BK	
30	485042000	CORNER BRACK	1	FR 10P5 BK	
31		FR	1		
32		PCB	1		
33	485040300	SCREW CRT FIXING AS	2	50X140 VL	
34	485040400	CR	1	485040400KAPAN	
35	485040300	SCREW CRT FIXING AS	2	50X100 BK	
36	485040400	WASHER RUBBER	4	CR 100	
37	718200000	SCREW TAPPING	4	TES VAS 30X1 HF20	
38	485039500	SPEAKER	1	AS 50007 30X6 DPH	
39	718200000	SCREW TAPPING	2	TES VAS 30X1 HF20	
40	485040000	BUITDI	1	ABS BK	
41	485039600	FEED SENSOR	1	PPA CL	
42	485039500	MARK BRUSH	1	30V18 EPDMG DM-CITTING	
43	485039400	MARK FRONT	1	HPS BK	
44					

3. 21V3



NO	PART CODE	PART NAME	QTY	REMARKS
14				
15				
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ELECTRICAL PARTS LIST

CAUTION

"A" is a safety part, so it must be used the same part.

"R" is a recommendable part for essential stock.

LOC.	PART CODE	PART NAME	PART DESCRIPTION	REMARK	LOC.	PART CODE	PART NAME	PART DESCRIPTION	REMARK
ZZ110	PTACPWA652	ACCESSORY AS	DTA-14C4TFF		C805	CEYN2W151P	C ELECTRO	450V LHS 150MF (25X40)	(R)
00040	4850A03310	ANT ROD	PH-RM-008A		C812	CH1AFE472M	C CERA AC	4KV 4700PF M KX DE1610	(R) A
00100	4850Q00910	BATTERY	R03/NN		D707	DSML1216W-	LED	SML1216W	
M821	4858213800	BAG INSTRUCTION	L.D.P.E T0.05X250X400		D820	DRGP30J---	DIODE	RGP30J	
ZZ100	48B3740A10	TRANSMITTER REMOCON	R-40A10	(R)	F801	5FSCB4022R	FUSE CERA	SEMKO F44H 4A 250V MF51	A
ZZ120	PTBCSHA670	COVER BACK AS	DTA-14V3VM		G900	4SG0D00103	SPARK GAP	S-23 900V-1.5KV	
M211	4852152101	COVER BACK	HIPS BK		I301	PTA2SW5405	HEAT SINK ASS'Y	1TDA8357J- + 7174301011	(R)
M541	4855415800	SPEC PLATE	150ART P/E FILM (C/TV)		00001	1TDA8357J-	IC VERTICAL	TDA8357J	(R)
ZZ130	PTPKCPA670	PACKING AS	DTA-14V3VM		0000A	4857025405	HEAT SINK	A1050P-H24 T=2	
10	6520010100	STAPLE PIN	18M/M J D O		0000B	7174301011	SCREW TAPPTITE	TT2 RND 3X10 MFZN	
20	6520010200	STAPLE PIN	#3417		I501	1DW3813DE1	IC MICOM	DW9381/N1/3-DE1	(R)
M801	4858038700	BOX CARTON	SW-2 DTQ-1463FW		I601	1TDA7267A-	IC AMP	TDA7267A	(R)
M811	4858187500	PAD	EPS 14V3		I702	1AT24C08PC	IC	AT24C08-10PC	
M821	4858210702	BAG P.E	L.D.P.E T0.03X1200X1000		I703	1KRT30----	IC PREAMP	KRT30	
ZZ131	48519A4710	CRT GROUND NET	1401S-1015-1P		I801	PTA2SW4618	HEAT SINK ASS'Y	1STRF6653- + 7174300811	
ZZ132	58G0000084	COIL DEGAUSSING	DC-1450	(?)	I801	1STRF6653-	IC SMPS	STR-F6653	(R)
ZZ140	PTCACAA670	CABINET AS	DTA-14V3VM		I801A	4857024618	HEAT SINK	AL EX	
M191	4851933402	BUTTON CTRL	4940102+5536600		I801B	7174300811	SCREW TAPPTITE	TT2 RND 3X8 MFZN	
M201A	4856013301	SCREW CRT FIXING	30X140 YL		I804	1LTV817C--	IC PHOTO COUPLER	LTV-817C	(R) A
M201B	4856215402	WASHER RUBBER	CR T2.0		I806	1SE110N---	IC REGULATOR	SE110N	(R)
M201C	4856013300	SCREW CRT FIXING	30X80 BK		I810	TX0202DA--	THYRISTOR	X0202DA1BA2	
M211A	7172401412	SCREW TAPPTITE	TT2 TRS 4X14 MFZN BK		I820	1KA7805---	IC REGULATOR	KA7805	
M211D	7172401412	SCREW TAPPTITE	TT2 TRS 4X14 MFZN BK		I822	1KA7808---	IC REGULATOR	KA7808	
M321	4853214800	BRKT	FR HIPS BK		I823	1LE33CZ---	IC REGULATOR	LE33CZ	
M481	4854940103	BUTTON	ABS BK		I901	PTC3SW1100	HEAT SINK ASS'Y	1TDA6107Q- + 7174300811	(R)
M561	4855613600	MARK BRAND	COPPER T0.4		00001	1TDA6107Q-	IC VIDEO	TDA6107Q	(R)
M681	4856812001	TIE CABLE	NYLON66 DA100		0000A	4857031100	HEAT SINK	A1050P-H24 T2.0	
SP01A	7178301011	SCREW TAPPTITE	TT2 WAS 3X10 MFZN		0000B	7174300811	SCREW TAPPTITE	TT2 RND 3X8 MFZN	
V901	PTRTPWA001	CRT AS	PAL 14" ITC CRT AS	(R) A	JPA1	4859200401	SOCKET RGB	YRS21-R1	
V01	58D1000046	COIL DY	ODY-M1401		JS1	4859109950	JACK PIN BOARD	PH-JB-9710A	
V02	48A96R004-	RUBBER WEDGE	HMR 28 SR (10X54)		L401	58H0000016	COIL H-LINEARITY	L-102 (102UH)	
V03	4850PM001-	MAGNET CP	NY-225 (MINI NECK)		LF801	5PLF24A1--	FILTER LINE	LF-24A1	A
V04	2TC26019BE	TAPE CLOTH	19X30 BEIGE		M351	4853533600	HOLDER LED	P.P BK	
V05	2224050026	BOND SILICON	RTV 122 CARTRIDGE		M791	4857913304	RUBBER CUSHION	FR RUBBER SPONGE	
V901	48A96414P1	CRT BARE	A34JLL90X		P401	4850705N16	CONNECTOR	BIC-05T-25T+ULW=300	
ZZ200	PTFMSJA670	MASK FRONT AS	DTA-14V3VM		P402	4859240020	CONN WAFER	YFW500-05	
M201	4852068301	MASK FRONT	HIPS BK		P501	4850705N16	CONNECTOR	BIC-05T-25T+ULW=300	
ZZ210	PTSPWA652	SPEAKER AS	DTA-14C4TFF		PWC1	4859908110	CORD POWER AS	1-L0+H03VVH2-F+HOU=2200	A
P601A	4850703S50	CONNECTOR	YH025-03+35098+ULW=200		Q401	PTP2SW4510	HEAT SINK ASS'Y	TKSC5386-- + 7174300811	(R)
SP01	4858314010	SPEAKER	SP-5070F01 3W 8 OHM	(R)	00001	TKSC5386--	TR	KSC5386	
ZZ290	PTMPMSA670	PCB MAIN MANUAL AS	DTA-14V3VM		0000A	4857024510	HEAT SINK	AL EX	
C404	CMYH3C822J	C MYLAR	1.6KV BUP 8200PF J		0000B	7174300811	SCREW TAPPTITE	TT2 RND 3X8 MFZN	
C408	CMYE2D334J	C MYLAR	200V PU 0.33MF J		R801	DEC140M290	POSISTOR	ECPC140M290	
C801	CL1JB3474K	C LINE ACROSS	AC250V 0.47MF U/C/SNDF/SV	A	R819	RX07B339JP	R CEMENT	7W 3.3 OHM J BEN 15MM 4P	

ELECTRICAL PARTS LIST

LOC.	PART CODE	PART NAME	PART DESCRIPTION	REMARK	LOC.	PART CODE	PART NAME	PART DESCRIPTION	REMARK
SCT1	4859303430	SOCKET CRT	PCS633A		C412	CEXF2C339V	C ELECTRO	160V RSS 3.3MF (8X16) TP	
SF1	5PK2960M--	FILTER SAW	K2960M		C414	CMXM2A104J	C MYLAR	100V 0.1MF J (TP)	
SW801	5S40101146	SW POWER PUSH	SS-160-7-B	△	C417	CMXL2E104K	C MYLAR	250V MEU 0.1MF K	
T401	50D10A2---	TRANS DRIVE	TD-10A2		C418	CCXB1H102K	C CERA	50V B 1000PF K (TAPPING)	
T402	50H000211	FBT	1142.5109		C420	CCXB2H222K	C CERA	500V B 2200PF K (TAPPING)	
T801	50M3535A1-	TRANS SMPS	2074.5046	△	C500	CEXF1H478V	C ELECTRO	50V RSS 0.47MF (5X11) TP	
U100	4859719930	TUNER VARACTOR	DT5-BF18D		C501	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP	
X502	5XE12R000E	CRYSTAL QUARTZ	HC-49/U 12.00000MHZ 30PPM		C502	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP	
Z501	5PYXT5R5MB	FILTER CERA	XT 5.5MB		C504	CMXM2A332J	C MYLAR	100V 3300PF J (TP)	
Z502	5PYXT6R5MB	FILTER CERA	XT 6.5MB		C509	CEXF1E470V	C ELECTRO	25V RSS 47MF (5X11) TP	
ZZ200	PTMPJ0A670	PCB MAIN (RHU) AS	DTA-14V3VM		C511	CMXM2A224J	C MYLAR	100V 0.22MF J	
C315	CEXF2C470C	C ELECTRO	160V RUS 47MF (13X25) TP		C512	CMXM2A224J	C MYLAR	100V 0.22MF J	
C415	CEXF2E100V	C ELECTRO	250V RSS 10MF (10X20) TP		C513	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)	
C603	CEXF1C471V	C ELECTRO	16V RSS 470MF (10X12.5)TP		C514	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP	
C810	CCXB3D102K	C CERA	2KV B 1000PF K (TAPPING)		C517	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP	
C813	CEXF2C101V	C ELECTRO	160V RSS 100MF (16X25) TP		C519	CEXF1H229V	C ELECTRO	50V RSS 2.2MF (5X11) TP	
C814	CEXF2C101V	C ELECTRO	160V RSS 100MF (16X25) TP		C522	CEXF1H479V	C ELECTRO	50V RSS 4.7MF (5X11) TP	
C823	CEXF1E102V	C ELECTRO	25V RSS 1000MF (13X20) TP		C524	CMXM2A104J	C MYLAR	100V 0.1MF J (TP)	
C832	CEXF1E102V	C ELECTRO	25V RSS 1000MF (13X20) TP		C525	CCXB1H102K	C CERA	50V B 1000PF K (TAPPING)	
C840	CEXF1C222V	C ELECTRO	16V RSS 2200MF (13X25) TP		C526	CMXM2A104J	C MYLAR	100V 0.1MF J (TP)	
C841	CEXF1C222V	C ELECTRO	16V RSS 2200MF (13X25) TP		C527	CMXM2A473J	C MYLAR	100V 0.047MF J (TP)	
C861	CEXF1E102V	C ELECTRO	25V RSS 1000MF (13X20) TP		C528	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP	
C965	CCXB3D102K	C CERA	2KV B 1000PF K (TAPPING)		C530	CEXF1C101V	C ELECTRO	16V RSS 100MF (6.3X11) TP	
ZZ200	PTMPJBA670	PCB MAIN M-10 AS	DTA-14V3VM		C532	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP	
N001	4857417500	TERM PIN	DA-IB0214(D2.3/DY PIN)		C533	CCXB1H102K	C CERA	50V B 1000PF K (TAPPING)	
N002	4857417500	TERM PIN	DA-IB0214(D2.3/DY PIN)		C537	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)	
N003	4857417500	TERM PIN	DA-IB0214(D2.3/DY PIN)		C555	CEXF1C470V	C ELECTRO	16V RSS 47MF (5X11) TP	
N004	4857417500	TERM PIN	DA-IB0214(D2.3/DY PIN)		C560	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)	
P601	485923162S	CONN WAFER	YW025-03 (STICK)		C564	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP	
R305	RS02Z331JS	R M-OXIDE FILM	2W 330 OHM J SMALL		C565	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)	
R402	RF01Z129J-	R FUSIBLE	1W 1.2 OHM J (TAPPING)		C570	CCXB1H472K	C CERA	50V B 4700PF K (TAPPING)	
R415	RS02Z102JS	R M-OXIDE FILM	2W 1K OHM J SMALL		C571	CCXB1H821K	C CERA	50V B 820PF K (TAPPING)	
R450	RS02Z103JS	R M-OXIDE FILM	2W 10K OHM J SMALL		C580	CEXF1E221V	C ELECTRO	25V RSS 220MF (8X11.5) TP	
R802	RS02Z753JS	R M-OXIDE FILM	2W 75K OHM J SMALL		C585	CCXB1H222K	C CERA	50V B 2200PF K (TAPPING)	
R803	RS02Z473JS	R M-OXIDE FILM	2W 47K OHM J SMALL		C590	CXCH1H270J	C CERA	50V CH 27PF J (TAPPING)	
R804	RF02Z228K-	R FUSIBLE	2W 0.22 OHM K (TAPPING)		C591	CXCH1H270J	C CERA	50V CH 27PF J (TAPPING)	
R808	RS02Z821JS	R M-OXIDE FILM	2W 820 OHM J SMALL		C592	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)	
ZZ200	PTMPJRA670	PCB MAIN RADIAL AS	DTA-14V3VM		C593	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP	
C101	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP		C599	CEXF1H229V	C ELECTRO	50V RSS 2.2MF (5X11) TP	
C102	CEXF1H470V	C ELECTRO	50V RSS 47MF (6.3X11) TP		C600	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP	
C106	CEXF1E221V	C ELECTRO	25V RSS 220MF (8X11.5) TP		C601	CEXF1H108V	C ELECTRO	50V RSS 0.1MF (5X11) TP	
C120	CCXB1H102K	C CERA	50V B 1000PF K (TAPPING)		C602	CCXF1H103Z	C CERA	50V F 0.01MF Z (TAPPING)	
C121	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP		C650	CEXF1E470V	C ELECTRO	25V RSS 47MF (5X11) TP	
C305	CEXF1E221V	C ELECTRO	25V RSS 220MF (8X11.5) TP		C770	CEXF1C101V	C ELECTRO	16V RSS 100MF (6.3X11) TP	
C313	CMXM2A104J	C MYLAR	100V 0.1MF J (TP)		C803	CCXF3A472Z	C CERA	1KV F 4700PF Z (T)	
C320	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)		C804	CCXF3A472Z	C CERA	1KV F 4700PF Z (T)	
C390	CMXM2A473J	C MYLAR	100V 0.047MF J (TP)		C806	CEXF1H330V	C ELECTRO	50V RSS 33MF (6.3X11) TP	
C401	CEXF1H470V	C ELECTRO	50V RSS 47MF (6.3X11) TP		C807	CCXF1H473Z	C CERA	50V F 0.047MF Z (TAPPING)	

ELECTRICAL PARTS LIST

LOC.	PART CODE	PART NAME	PART DESCRIPTION	REMARK	LOC.	PART CODE	PART NAME	PART DESCRIPTION	REMARK
C808	CEXF1H479V	C ELECTRO	50V RSS 4.7MF (5X11) TP		C523	CCZF1H103Z	C CERA	50V F 0.01MF Z	
C820	CCXB3A471K	C CERA	1KV B 470PF K (T)		C529	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z	
C821	CCXB1H102K	C CERA	50V B 1000PF K (TAPPING)		C531	CCZF1H473Z	C CERA	50V F 0.047MF Z (AXIAL)	
C824	CCXB3A471K	C CERA	1KV B 470PF K (T)		C534	CCZF1H223Z	C CERA	50V F 0.022MF Z	
C831	CCXB3A471K	C CERA	1KV B 470PF K (T)		C535	CCZF1H223Z	C CERA	50V F 0.022MF Z	
C835	CEXF1H470V	C ELECTRO	50V RSS 47MF (6.3X11) TP		C536	CCZF1H223Z	C CERA	50V F 0.022MF Z	
C844	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP		C577	CCZB1H561K	C CERA	50V B 560PF K	
C863	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP		C771	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z	
C866	CCXB3A471K	C CERA	1KV B 470PF K (T)		C809	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
C888	CEXF1C470V	C ELECTRO	16V RSS 47MF (5X11) TP		C830	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z	
C910	CCXB1H561K	C CERA	50V B 560PF K (TAPPING)		C850	CCZB1H821K	C CERA	50V B 820PF K AXIAL	
C968	CMXL2E104K	C MYLAR	250V MEU 0.1MF K		CA01	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)	
CA04	CEXD1H229F	C ELECTRO	50V RND 2.2MF (5X11) TP		CA02	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)	
CA05	CCXB1H102K	C CERA	50V B 1000PF K (TAPPING)		CA03	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)	
F801A	4857415001	CLIP FUSE	PFC5000-0702		CA10	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
F801B	4857415001	CLIP FUSE	PFC5000-0702		D101	D1N4148---	DIODE	1N4148 (TAPPING)	
L802	58C9430599	COIL CHOKE	AZ-9004Y(94MH)		D313	D1N4937G--	DIODE	1N4937G (TAPPING)	
Q101	TKTC3198Y-	TR	KTC3198Y		D341	DUZ33B----	DIODE ZENER	UZ-33B	
Q402	T2SD1207T-	TR	2SD1207-T (TAPPING)		D350	DUZ12BM---	DIODE ZENER	UZ-12BM (UNIZON)	
Q501	TKTA1266Y-	TR	KTA1266Y (TP)		D351	DUZ33B----	DIODE ZENER	UZ-33B	
Q502	TKTC3198Y-	TR	KTC3198Y		D360	DUZ33B----	DIODE ZENER	UZ-33B	
Q503	TKTC3198Y-	TR	KTC3198Y		D361	DUZ33B----	DIODE ZENER	UZ-33B	
Q510	TKTA1266Y-	TR	KTA1266Y (TP)		D362	DUZ33B----	DIODE ZENER	UZ-33B	
Q511	TKTA1266Y-	TR	KTA1266Y (TP)		D405	D1N4937G--	DIODE	1N4937G (TAPPING)	
Q520	TKTC3198Y-	TR	KTC3198Y		D407	D1N4937G--	DIODE	1N4937G (TAPPING)	
Q807	TKTC3198Y-	TR	KTC3198Y		D408	D1N4937G--	DIODE	1N4937G (TAPPING)	
Q808	TKTC3198Y-	TR	KTC3198Y		D450	D1N4937G--	DIODE	1N4937G (TAPPING)	
Q809	TKTC3198Y-	TR	KTC3198Y		D501	D1N4148---	DIODE	1N4148 (TAPPING)	
Q810	TKTC3198Y-	TR	KTC3198Y		D502	D1N4148---	DIODE	1N4148 (TAPPING)	
Q811	TKTC3198Y-	TR	KTC3198Y		D503	D1N4148---	DIODE	1N4148 (TAPPING)	
SW700	5S50101090	SW TACT	THVH472GCA		D504	D1N4148---	DIODE	1N4148 (TAPPING)	
SW701	5S50101090	SW TACT	THVH472GCA		D520	D1N4148---	DIODE	1N4148 (TAPPING)	
SW702	5S50101090	SW TACT	THVH472GCA		D521	D1N4148---	DIODE	1N4148 (TAPPING)	
SW703	5S50101090	SW TACT	THVH472GCA		D591	DUZ2R4B---	DIODE ZENER	UZ-2.4B	
SW704	5S50101090	SW TACT	THVH472GCA		D710	DMTZJ5R1A-	DIODE ZENER	MTZJ 5.1A	
ZZ200	PTMPJAA670	PCB MAIN AXIAL AS	DTA-14V3VM		D801	DLT2A05G--	DIODE	LT2A05G (TP)	⚠
10	2TM14006LB	TAPE MASKING	3M #232 6.0X2000M		D802	DLT2A05G--	DIODE	LT2A05G (TP)	⚠
20	2TM10006LB	TAPE MASKING	3M #232-MAP-C 6.2X2000M		D803	DLT2A05G--	DIODE	LT2A05G (TP)	⚠
A001	4859804993	PCB MAIN	246X246		D804	DLT2A05G--	DIODE	LT2A05G (TP)	⚠
C103	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)		D805	D1N4937G--	DIODE	1N4937G (TAPPING)	
C104	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)		D806	D1N4937G--	DIODE	1N4937G (TAPPING)	
C350	CCZF1H473Z	C CERA	50V F 0.047MF Z (AXIAL)		D808	D1N4937G--	DIODE	1N4937G (TAPPING)	
C351	CCZF1H473Z	C CERA	50V F 0.047MF Z (AXIAL)		D809	D1N4937G--	DIODE	1N4937G (TAPPING)	
C515	CBZR1C222M	C CERA	16V Y5R 2200PF M (AXIAL)		D810	D1N4937G--	DIODE	1N4937G (TAPPING)	
C516	CBZR1C472M	C CERA	16V Y5R 4700PF M (AXIAL)		D811	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM	
C518	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z		D821	D1N4937G--	DIODE	1N4937G (TAPPING)	
C520	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)		D824	D1N4148---	DIODE	1N4148 (TAPPING)	
C521	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)		D825	D1N4148---	DIODE	1N4148 (TAPPING)	

ELECTRICAL PARTS LIST

LOC.	PART CODE	PART NAME	PART DESCRIPTION	REMARK	LOC.	PART CODE	PART NAME	PART DESCRIPTION	REMARK
D830	D1N4937G--	DIODE	1N4937G (TAPPING)		R401	RD-4Z272J-	R CARBON FILM	1/4 2.7K OHM J	
D831	D1N4937G--	DIODE	1N4937G (TAPPING)		R404	RD-4Z399J-	R CARBON FILM	1/4 3.9 OHM J	
D840	D1N4148--	DIODE	1N4148 (TAPPING)		R420	RD-AZ223J-	R CARBON FILM	1/6 22K OHM J	
D841	D1N4148--	DIODE	1N4148 (TAPPING)		R501	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
D860	D1N4937G--	DIODE	1N4937G (TAPPING)		R502	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
DA02	DUZ12BM---	DIODE ZENER	UZ-12BM (UNIZON)		R505	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
DA03	DMTZJ5R1A-	DIODE ZENER	MTZJ 5.1A		R506	RD-AZ332J-	R CARBON FILM	1/6 3.3K OHM J	
DA05	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM		R507	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
DA06	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM		R508	RD-AZ332J-	R CARBON FILM	1/6 3.3K OHM J	
DA08	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM		R509	RD-AZ681J-	R CARBON FILM	1/6 680 OHM J	
DA09	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM		R511	RD-AZ333J-	R CARBON FILM	1/6 33K OHM J	
DA10	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM		R512	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
DA11	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM		R513	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
DA27	DUZ5R6BM--	DIODE ZENER	UZ-5.6BM		R514	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
J035	RD-4Z390J-	R CARBON FILM	1/4 39 OHM J		R515	RD-AZ153J-	R CARBON FILM	1/6 15K OHM J	
L101	5CPZ100K02	COIL PEAKING	10UH K (AXIAL 3.5MM)		R516	RD-AZ393J-	R CARBON FILM	1/6 39K OHM J	
L301	5CPZ109M04	COIL PEAKING	1UH 10.5MM M (LAL04TB)		R517	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
L350	5CPZ109M04	COIL PEAKING	1UH 10.5MM M (LAL04TB)		R518	RD-AZ273J-	R CARBON FILM	1/6 27K OHM J	
L351	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING		R520	RD-AZ183J-	R CARBON FILM	1/6 18K OHM J	
L500	5CPZ120K02	COIL PEAKING	12UH K (AXIAL 3.5MM)		R521	RD-AZ391J-	R CARBON FILM	1/6 390 OHM J	
L501	5CPZ100K02	COIL PEAKING	10UH K (AXIAL 3.5MM)		R522	RD-AZ221J-	R CARBON FILM	1/6 220 OHM J	
L502	5CPZ100K02	COIL PEAKING	10UH K (AXIAL 3.5MM)		R523	RD-AZ331J-	R CARBON FILM	1/6 330 OHM J	
L510	5CPZ100K02	COIL PEAKING	10UH K (AXIAL 3.5MM)		R524	RD-AZ561J-	R CARBON FILM	1/6 560 OHM J	
L511	5CPZ100K02	COIL PEAKING	10UH K (AXIAL 3.5MM)		R525	RD-AZ104J-	R CARBON FILM	1/6 100K OHM J	
L512	5CPZ100K02	COIL PEAKING	10UH K (AXIAL 3.5MM)		R526	RD-4Z479J-	R CARBON FILM	1/4 4.7 OHM J	
L600	5MC0000100	COIL BEAD	HC-3550		R527	RD-AZ431J-	R CARBON FILM	1/6 430 OHM J	
L801	5MC0000100	COIL BEAD	HC-3550		R528	RD-AZ221J-	R CARBON FILM	1/6 220 OHM J	
L803	5MC0000100	COIL BEAD	HC-3550		R530	RD-AZ470J-	R CARBON FILM	1/6 47 OHM J	
R101	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J		R531	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
R102	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J		R533	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J	
R103	RD-AZ123J-	R CARBON FILM	1/6 12K OHM J		R534	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
R104	RD-AZ104J-	R CARBON FILM	1/6 100K OHM J		R535	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R105	RD-AZ392J-	R CARBON FILM	1/6 3.9K OHM J		R537	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R106	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J		R538	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R107	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J		R539	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R120	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J		R555	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J	
R170	RD-AZ133J-	R CARBON FILM	1/6 13K OHM J		R556	RD-AZ822J-	R CARBON FILM	1/6 8.2K OHM J	
R302	RD-2Z159J-	R CARBON FILM	1/2 1.5 OHM J		R567	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R310	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J		R571	RD-AZ432J-	R CARBON FILM	1/6 4.3K OHM J	
R311	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J		R572	RD-AZ122J-	R CARBON FILM	1/6 1.2K OHM J	
R340	RD-4Z473J-	R CARBON FILM	1/4 47K OHM J		R573	RD-AZ272J-	R CARBON FILM	1/6 2.7K OHM J	
R341	RD-4Z242J-	R CARBON FILM	1/4 2.4K OHM J		R575	RD-AZ123J-	R CARBON FILM	1/6 12K OHM J	
R350	RN-4Z1501F	R METAL FILM	1/4 1.50K OHM F		R580	RD-AZ561J-	R CARBON FILM	1/6 560 OHM J	
R351	RN-4Z1501F	R METAL FILM	1/4 1.50K OHM F		R585	RD-AZ224J-	R CARBON FILM	1/6 220K OHM J	
R355	RD-AZ272J-	R CARBON FILM	1/6 2.7K OHM J		R586	RD-AZ221J-	R CARBON FILM	1/6 220 OHM J	
R356	RD-4Z562J-	R CARBON FILM	1/4 5.6K OHM J		R587	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R360	RD-4Z564J-	R CARBON FILM	1/4 560K OHM J		R588	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R390	RD-4Z159J-	R CARBON FILM	1/4 1.5 OHM J		R589	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	

ELECTRICAL PARTS LIST

LOC.	PART CODE	PART NAME	PART DESCRIPTION	REMARK	LOC.	PART CODE	PART NAME	PART DESCRIPTION	REMARK
R590	RD-4Z103J-	R CARBON FILM	1/4 10K OHM J		R830	RD-AZ332J-	R CARBON FILM	1/6 3.3K OHM J	
R591	RD-AZ221J-	R CARBON FILM	1/6 220 OHM J		R840	RD-4Z220J-	R CARBON FILM	1/4 22 OHM J	
R592	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J		R841	RD-2Z249J-	R CARBON FILM	1/2 2.4 OHM J	
R593	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J		R850	RD-2Z479J-	R CARBON FILM	1/2 4.7 OHM J	
R594	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J		R855	RD-4Z185J-	R CARBON FILM	1/4 1.8M OHM J	
R595	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J		R870	RD-4Z222J-	R CARBON FILM	1/4 2.2K OHM J	
R596	RD-AZ302J-	R CARBON FILM	1/6 3K OHM J		R888	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J	
R597	RD-AZ153J-	R CARBON FILM	1/6 15K OHM J		R910	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R598	RD-AZ153J-	R CARBON FILM	1/6 15K OHM J		R911	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R599	RD-AZ221J-	R CARBON FILM	1/6 220 OHM J		R912	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R601	RD-AZ432J-	R CARBON FILM	1/6 4.3K OHM J		R913	RC-2Z102K-	R CARBON COMP	1/2 1K OHM K	
R602	RD-AZ332J-	R CARBON FILM	1/6 3.3K OHM J		R914	RC-2Z102K-	R CARBON COMP	1/2 1K OHM K	
R610	RD-AZ332J-	R CARBON FILM	1/6 3.3K OHM J		R915	RC-2Z102K-	R CARBON COMP	1/2 1K OHM K	
R710	RD-AZ431J-	R CARBON FILM	1/6 430 OHM J		R921	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
R711	RD-AZ431J-	R CARBON FILM	1/6 430 OHM J		R922	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
R713	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J		R923	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
R720	RD-AZ122J-	R CARBON FILM	1/6 1.2K OHM J		RA01	RD-AZ680J-	R CARBON FILM	1/6 68 OHM J	
R721	RD-AZ181J-	R CARBON FILM	1/6 180 OHM J		RA02	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R722	RD-AZ221J-	R CARBON FILM	1/6 220 OHM J		RA03	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R723	RD-AZ331J-	R CARBON FILM	1/6 330 OHM J		RA04	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R724	RD-AZ471J-	R CARBON FILM	1/6 470 OHM J		RA05	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J	
R805	RD-2Z100J-	R CARBON FILM	1/2 10 OHM J		RA06	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J	
R806	RD-4Z472J-	R CARBON FILM	1/4 4.7K OHM J		RA08	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J	
R807	RD-2Z272J-	R CARBON FILM	1/2 2.7K OHM J		RA09	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J	
R810	RD-4Z102J-	R CARBON FILM	1/4 1K OHM J		RA10	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R811	RC-2Z565KP	R CARBON COMP	1/2 5.6M OHM K		RA11	RD-AZ183J-	R CARBON FILM	1/6 18K OHM J	
R817	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J		RA12	RD-AZ183J-	R CARBON FILM	1/6 18K OHM J	
R820	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J		RA16	RD-AZ680J-	R CARBON FILM	1/6 68 OHM J	
R821	RD-4Z102J-	R CARBON FILM	1/4 1K OHM J		RA19	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J	
R823	RD-4Z432J-	R CARBON FILM	1/4 4.3K OHM J		RA30	RD-AZ183J-	R CARBON FILM	1/6 18K OHM J	
R829	RD-AZ223J-	R CARBON FILM	1/6 22K OHM J		RA44	RD-AZ682J-	R CARBON FILM	1/6 6.8K OHM J	

ELECTRICAL PARTS LIST

DIFFERENT PART LIST

LOC	PART NAME	14 INCH	20 INCH	21 INCH
C404	C MYLAR	1.6KV BUP 8200PF J	1.6KV BUP 8200PF J	1.6KV BUP 7500PF J
C408	C MYLAR	200V PU 0.33MF J	200V PU 0.27MF J	200V PU 0.27MF J
C417	C MYLAR	250V MEU 0.1MF K	100V 0.22MF J	250V MEU 0.1MF K
L401	COIL H-LINEARITY	L-102 (102UH)	L-76(76.5UH)	L-102 (102UH)
P401	CONNECTOR	BIC-05T-25T+ULW=300	BIC-05T-25T+ULW=400	BIC-05T-25T+ULW=400
P402	CONN WAFER	YFW500-05	YFW500-05	YFW500-06
P501	CONNECTOR	BIC-05T-25T+ULW=300	BIC-05T-25T+ULW=400	BIC-05T-25T+ULW=400
R350	R METAL FILM	1/4 1.50K OHM F	1/4 1.80K OHM F	1/4 2.0K OHM F
R351	R METAL FILM	1/4 1.50K OHM F	1/4 1.80K OHM F	1/4 2.0K OHM F
R402	R FUSIBLE	1W 1.2 OHM J (TAPPING)	1W 0.68 OHM K (TAPPING)	1W 1.2 OHM J (TAPPING)
R556	R CARBON FILM	1/6 8.2K OHM J	1/6 7.5K OHM J	1/6 6.8K OHM J
R575	R CARBON FILM	1/6 12K OHM J	1/6 10K OHM J	1/6 12K OHM J
R801	POSISTOR	ECPC140M290	ECPCD7R0M290	ECPCD7R0M290
R823	R CARBON FILM	1/4 4.3K OHM J	1/4 3K OHM J	1/4 3K OHM J
SCT1	SOCKET CRT	PCS633A	PCS629-03C	PCS629-03C
M191	BUTTON CTRL	4940102+5536600	4940002+5536900	
M201	MASK FRONT	HIPS BK	HIPS BK	
M201A	SCREW CRT FIXING	30X140 YL	30X80 BK	
M201B	WASHER RUBBER	CR T2.0	CR T2.0	
M201C	SCREW CRT FIXING	30X80 BK	30X190 BK	
M211	COVER BACK	HIPS BK	HIPS BK	
M321	BRKT	FR HIPS BK		FR HIPS BK
M351	HOLDER CORD		FR HIPS BK	
M481	BUTTON	ABS BK	ABS BK	ABS
M561	MARK BRAND	COPPER T0.4		A1050P-H24 T0.4
M781	CLOTH BLACK		FELT 250X20X0.7	FELT 250X20X0.7
M801	BOX CARTON	SW-2 DTQ-1463FW	"DW-3 2058,2051"	DW-2
M811	PAD	EPS 14V3	EPS 20V3	EPS 21V3
M821	BAG P.E	L.D.P.E T0.03X1200X1000	L.D.P.E T0.03X1200X1000	L.D.P.E T0.03X1300X1000
V01	COIL DY	ODY-M1401	ODY-M2002	
V901	CRT BARE	A34JLL90X	A48JLL90X (P)	
V901	CRT(with DY COIL)			A51EFK155X01
ZZ290	PCB MAIN MANUAL AS	DTA-14V3VM	DTA-20V3VM	DTA-21V3VM

DAEWOO

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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 (33.9 MHz for system L' and 38.9 MHz for all other systems). Because of the internal VCO, the IF circuit has a high immunity to EMC interference.

1. IF demodulator and audio amplifier

The FM demodulator is realised as a narrow band PLL with external loop filter, which provides the necessary selectivity without using an extra band pass filter. To obtain good selectivity a linear phase detector and a constant input signal amplitude are required. For this reason the intercarrier signal is internally supplied to the demodulator via a gain controlled amplifier and AGC circuit. The nominal frequency of the demodulator is set via a gain controlled amplifier and AGC circuit. The nominal frequency of the demodulator is tuned to the required frequency (5.5 / 6.0 / 6.5 MHz) by means of a calibration circuit which uses the clock frequency of the microcontroller as a reference. Selection of the required frequency is done by the controlling software.

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.

APPENDIX

FUNCTIONAL DESCRIPTION

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.

The following geometry parameters can be adjusted:

- Horizontal shift
- Vertical amplitude
- Vertical slope
- S-correction
- Vertical shift

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 20H) prevents oversaturation occurring 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 reception, 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. IF

The TDA9361/TDA9381 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 window 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 a channel with the TV search function (manual or ATSS) or by using the direct channel entry to enable the Automatic Frequency Control.

SAW filters

	TF	TK	TU	TA
SF01	G1984M	K2960M	J1981M	G1984M
SF02	-	-	-	L9653M

Ref.	Standard	Features
G1984M	B/G	<ul style="list-style-type: none"> - IF filter for Inter-carrier Applications - TV IF filter with Nyquist slope and sound shelf. - High colour carrier level - Reduced group delay pre-distortion as compared with standard B/G, half
K2960M	B/G - D/K	<ul style="list-style-type: none"> - IF filter for Inter-carrier Applications - TV IF filter with Nyquist slope and sound shelf.
J1981M	I	<ul style="list-style-type: none"> - IF filter for Inter-carrier Applications - TV IF filter with Nyquist slope and sound shelf. - High colour carrier level - Constant group delay
L9653M	L / L'	<ul style="list-style-type: none"> - Switchable sound filter

FUNCTIONAL DESCRIPTION

For SECAM L and L' the TDA9361/TDA9381 is switched to positive modulation via I2C bus. SECAM L' transmission 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 9361.

The tuner AGC time constant is slower for positive than for negative modulation, because the TDA9361 reduces its AGC current. To make the AGC time constant even slower 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.

3. Source switching

Video :

The TDA9361/TDA9381 has only one external video input. The SCART video in pin (#20) is connected to the front RCA video input.

The controlling software via I2C bus selects the signal source :

- Video signal from tuner (Pin 40).
- External video.
- External SVHS from SCART.

The sound source switching is done in the video processor part and in the AM demodulator by the μ -Controller via I2C bus.

The video processor pin 28 has multiple functions and provides in this application

- Deemphasis time constant
- Audio monitor output
- External AM input
- Deemphasis time constant : The time constant is given by the capacitor C504, needed to obtain the 54 μ s time constant for standard PAL signal.
- Audio monitor output : the nominal output signal is 500 mVrms, for all standards. The signal is also internally connected through to the audio switch. This signal is not controlled by the volume setting and can be used for SCART audio output.

The signal is buffered to avoid influencing the deemphasis time constant and to adjust the output level.

- External AM input : By software the deemphasis pin can be converted into an input pin. External AM signal for SECAM L/L' is directly connected to this pin. In this configuration the FM sound is internally muted, DC level remains at 3Vdc.

An external sound signal of 500mVrms is applied to pin 35 via a coupling capacitor. The input impedance of this pin is 25K Ω typical. Switching between internal FM, external AM or external audio from SCART is controlled internally by software.

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 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 signal insertion they must be synchronised with the selected video source.

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

The I/O pins of the μ -Controller can be configured in many ways. All port functions can be individually programmed by the controlling software.

Each I/O port pin can be individually programmed in these configurations :

Open drain

In this mode, the port can function as input 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 steep 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 and 11 have 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 / High impedance	SIF filter switching + AM/FM switching
5	OCP	High impedance	High impedance	Over Current Protection (Switch the set OFF if the voltage on this pin is $<2.3V$)
6	RF AGC in	High impedance	High impedance	Used during ATSS to measure RF signal level.
7	Key in	High impedance	High impedance	Local keyboard input
8	S/SW	High impedance	High impedance	external video switch
10	Red LED	High impedance	Open Drain	
11	Green LED	Open Drain	High impedance	
62	Audio mute	Push Pull	High impedance	

5. SECAM L/L' sound switching circuit.

The microcontroller pin 4 is a three levels output. The voltage and configuration of this port is described below :

Sound mode	Port configuration	Voltage
FM	Push Pull	Internally shorted to ground
AM L	Push Pull	Pull up to 3.3V
AM L'	High Impedance	Fixed by R511, R156, R157

In FM mode the microcontroller is internally grounded to pin 4. The TDA9830 output is muted

6. Sound amplification

The device TDA7267A is a mono audio amplifier in powerDIP package specially designed for TV application. Thanks to the fully complementary output configuration the device delivers a rail to rail voltage swing without need of bootstrap capacitors. No external heat sink is needed as the Cu ground plane of the PCB is used as heat dissipation.

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_{fb} . The principle of operation with two supply voltages (class G) makes it possible to fix the supply voltage V_p optimum for the scan voltage and the second supply voltage V_{fb} optimum for the flyback voltage. Using this method, very high efficiency is achieved. The supply voltage V_{fb} 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 TDA9361/ TDA9381 to blank the screen in case of a fault condition.

Damping resistor

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

8. Power supply (STR F6653)

8-1. STR-F6653 general description

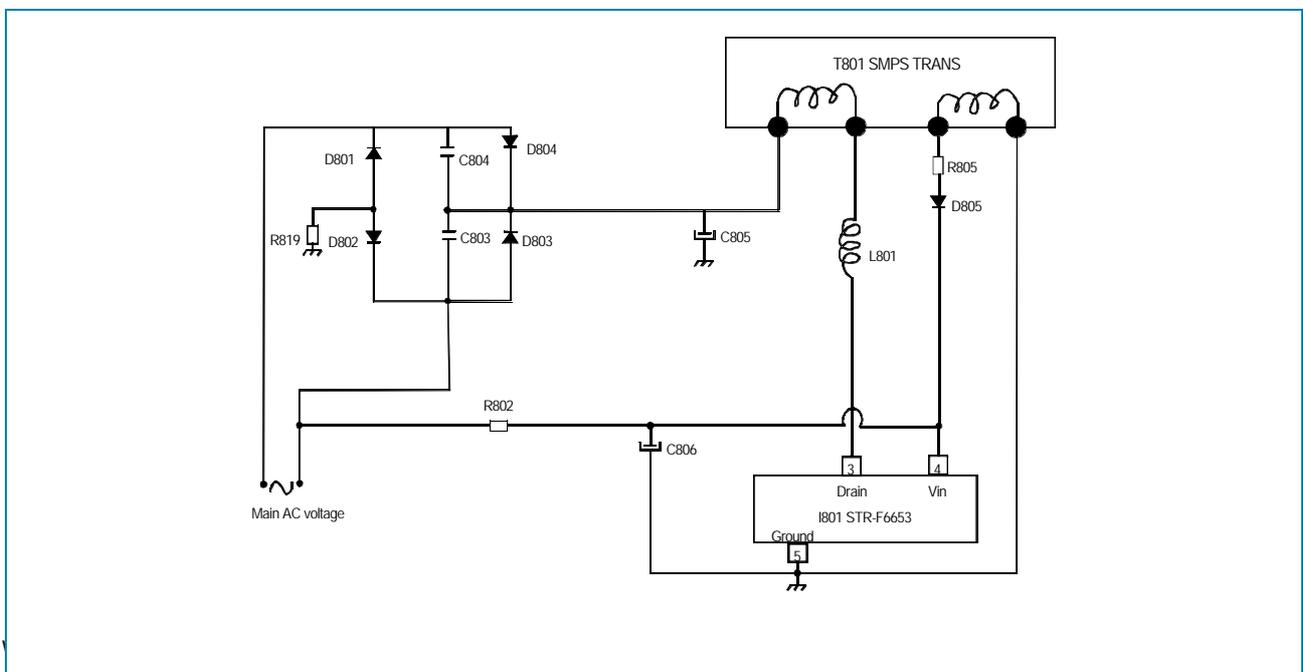
The STR-F6653 is an hybrid IC with a build-in MOSFET and control IC, designed for flyback converter type switch mode power supply applications.

8-2. Power supply primary part operations

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

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

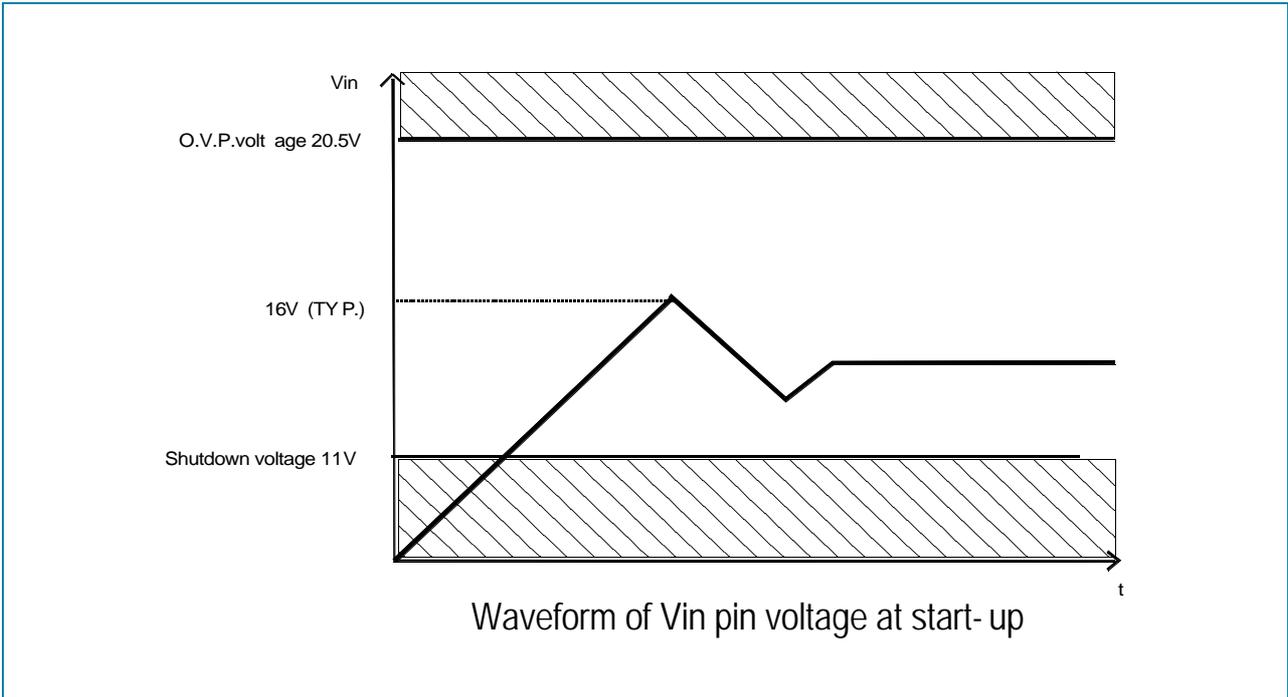
The start-up circuit is used to start and stop the operation of the control IC, by detecting a voltage appearing at the V_{IN} pin (pin 4).



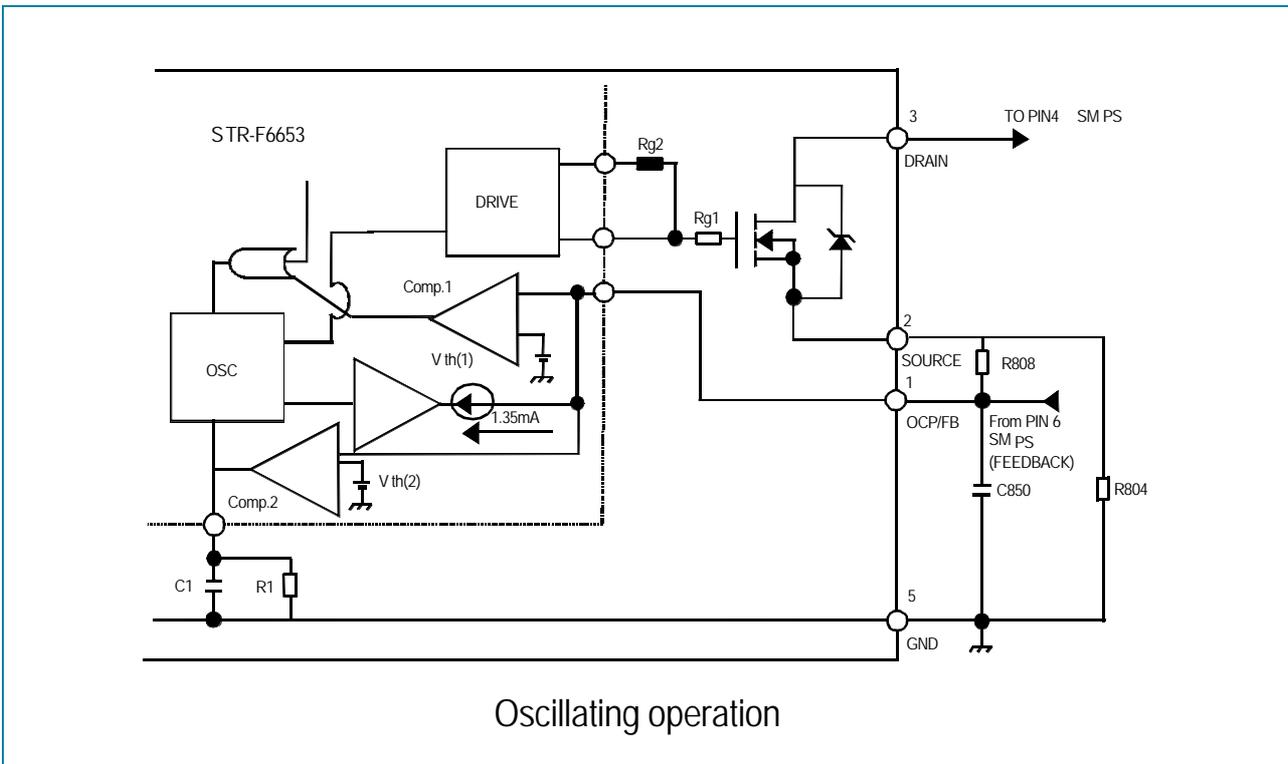
As soon as V_{IN} reaches 16V, the STR-F6653 control circuit starts operating. Then, V_{IN} is obtained by smoothing the winding voltage which appears between pin 6 and pin 7 of the SMPS transformer.

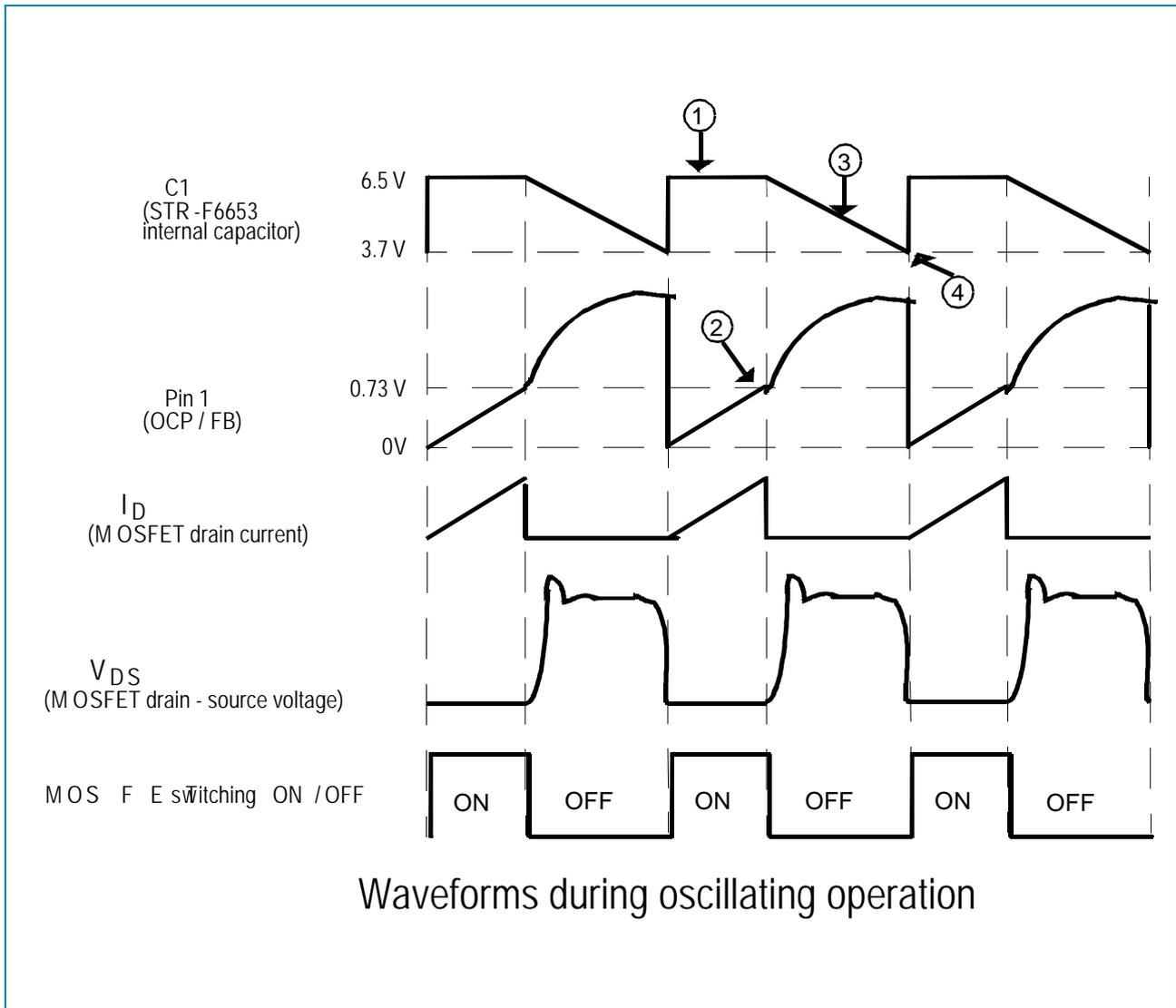
As this winding voltage does not increase to the set voltage immediately after the control circuit starts operating, V_{IN} starts dropping. However, as this winding voltage reaches the set value before V_{IN} voltage drops to the shutdown voltage (at 11V), the control circuit continues operating (see below, V_{IN} voltage at start-up). Resistor R805 prevents variations of voltage at the V_{IN} pin, as some regulation of the SMPS transformer occurs due to secondary side output current

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



8-2-1. STR-F6653 oscillating operation





- 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.
- 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.
- 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 to 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.
- 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.

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 over-voltage protection (OVP) and thermal shutdown (TSD) circuit are in operation

thermal shutdown circuit (TSD)

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

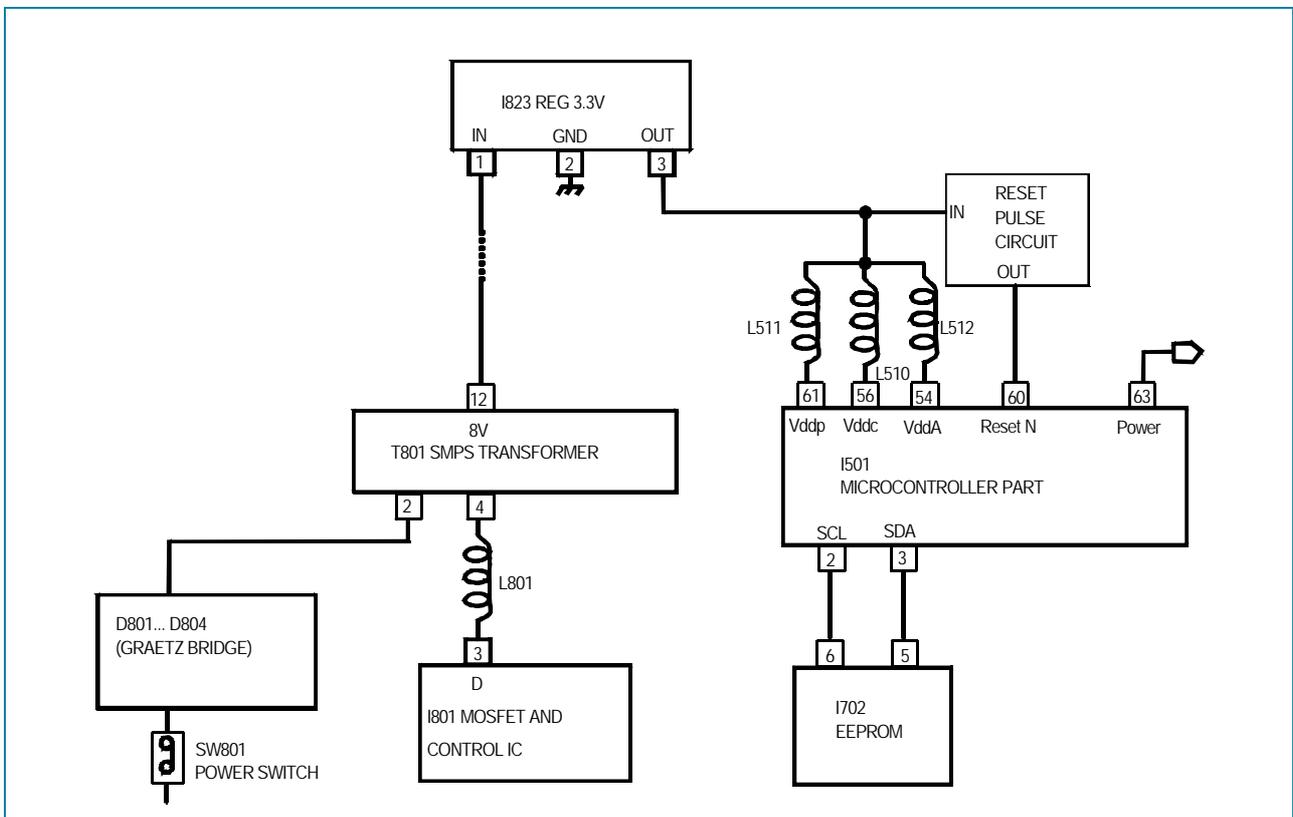
overvoltage protection circuit (OVP)

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

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

9-1. TV start-up operations

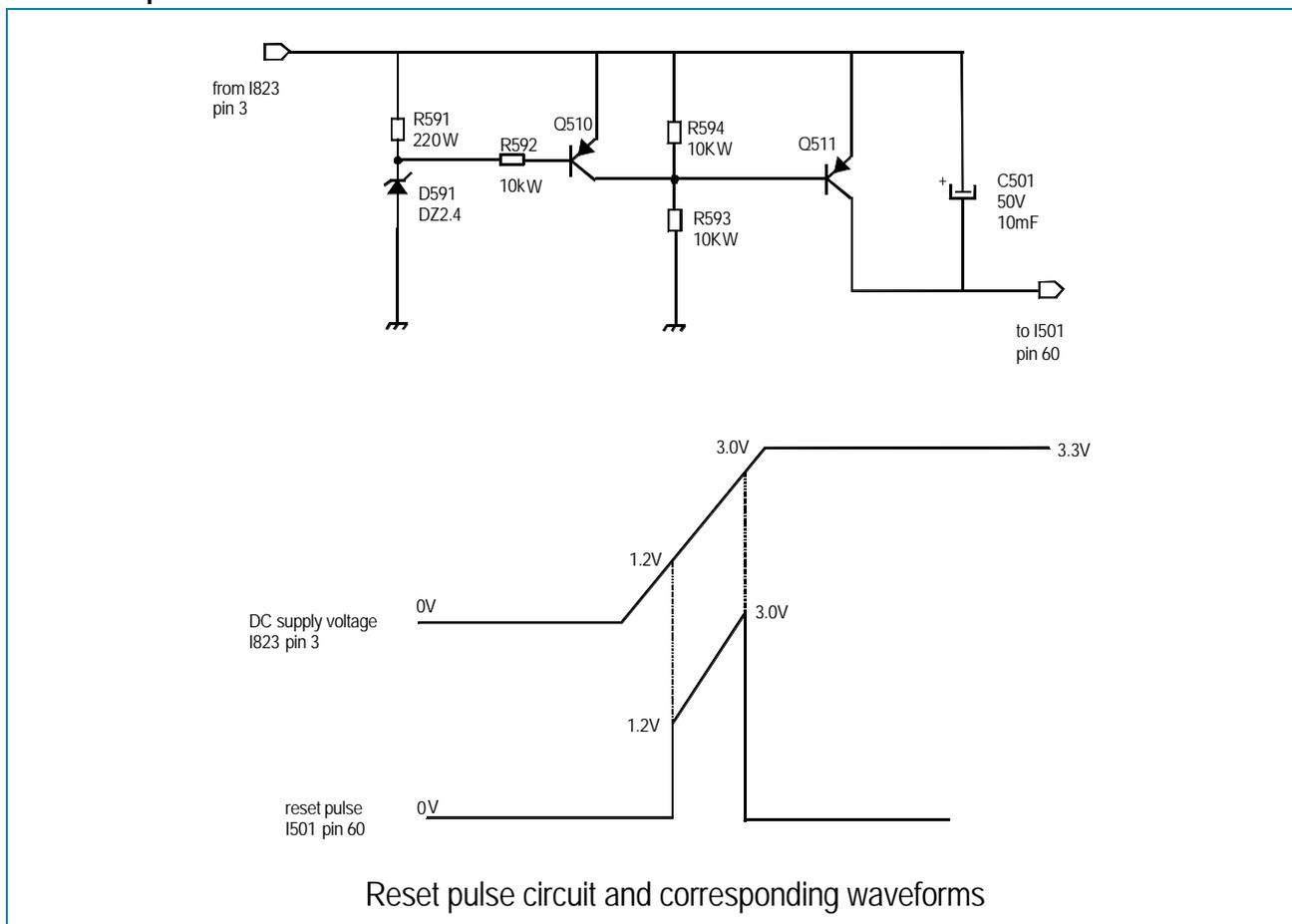
9-1-1. Schematic diagram for start-up operations



9-1-2. TV start-up and microcontroller initialisation

- 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 initialisation. Its power pin (pin 63) is set to high which allows delivery of power supply voltages (110/123V, 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 in paragraph 2.2.

9-1-3 Reset pulse circuit:



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 $V_{be\ Q511} = V_{cc}/2 - V_{cc} = -V_{cc}/2 > -0.6V$. 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 guarantee a defined reset pulse duration.

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

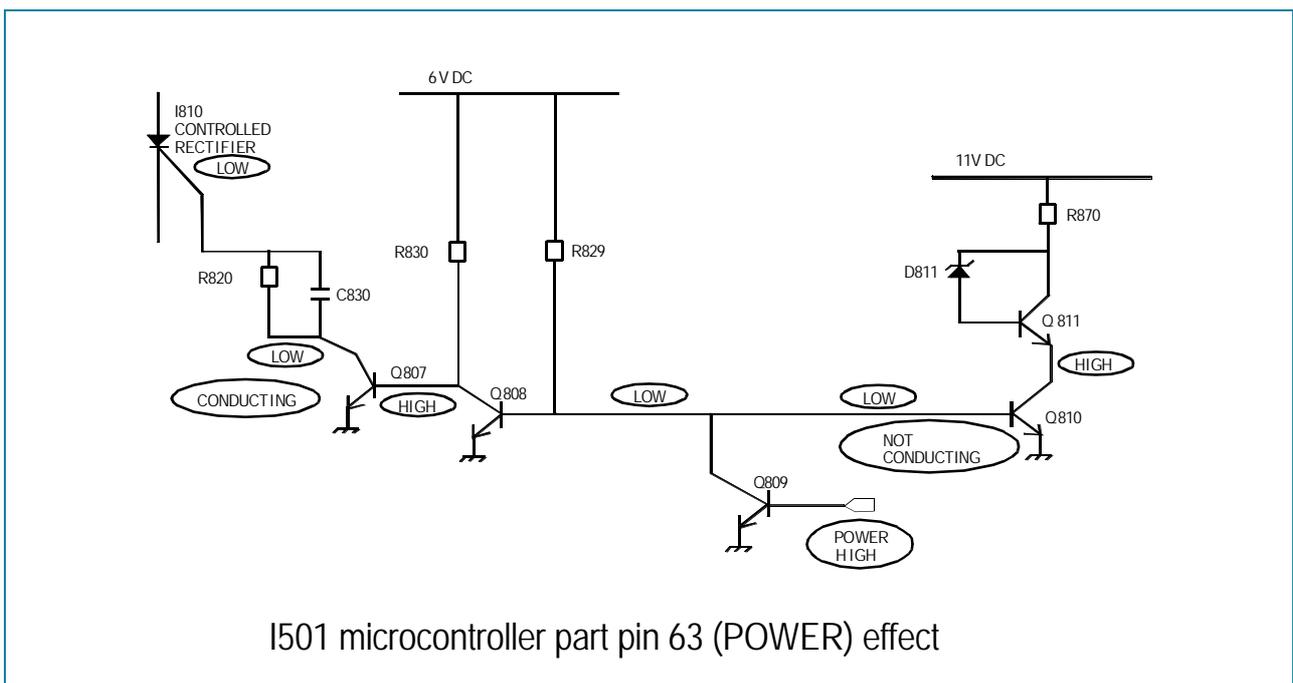
Depending on remote control commands, I501 microcontroller part pin 63 (power) is set to:

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

9-2-1. TV on normal run mode

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

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



I501 microcontroller part pin 63 (POWER) effect

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

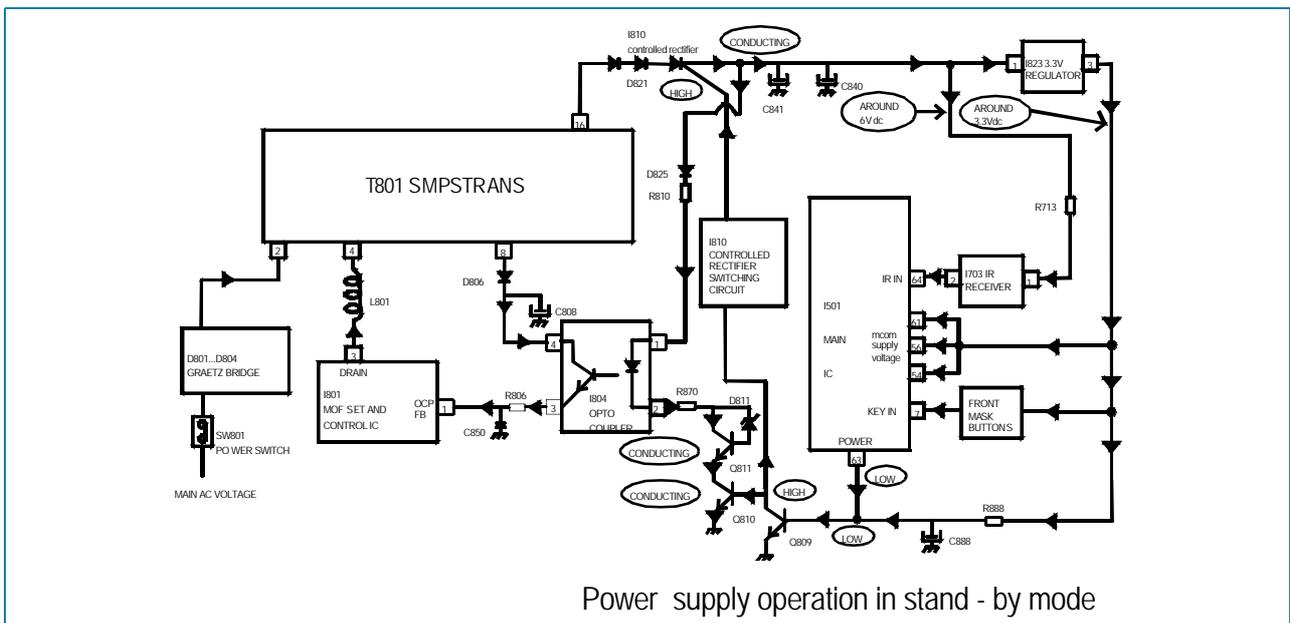
- I801 transmits controlled pulses to T801 which generates DC voltages after rectification by secondary side diodes and electrolytic capacitors (for example by D820 and C813 to give 124V -110V supply voltage line).
- 8V, 5V, 3.3V supply voltage lines have stabilised voltages obtained by I822, I820, I823 voltage regulators.
- On 124V-110V supply voltage line, R823 resistor has been chosen to give the exact DC voltage required on this line.
- 124V-110V supply voltage line includes an IC error amplifier (I806) which corrects unexpected DC voltage variations on this line.

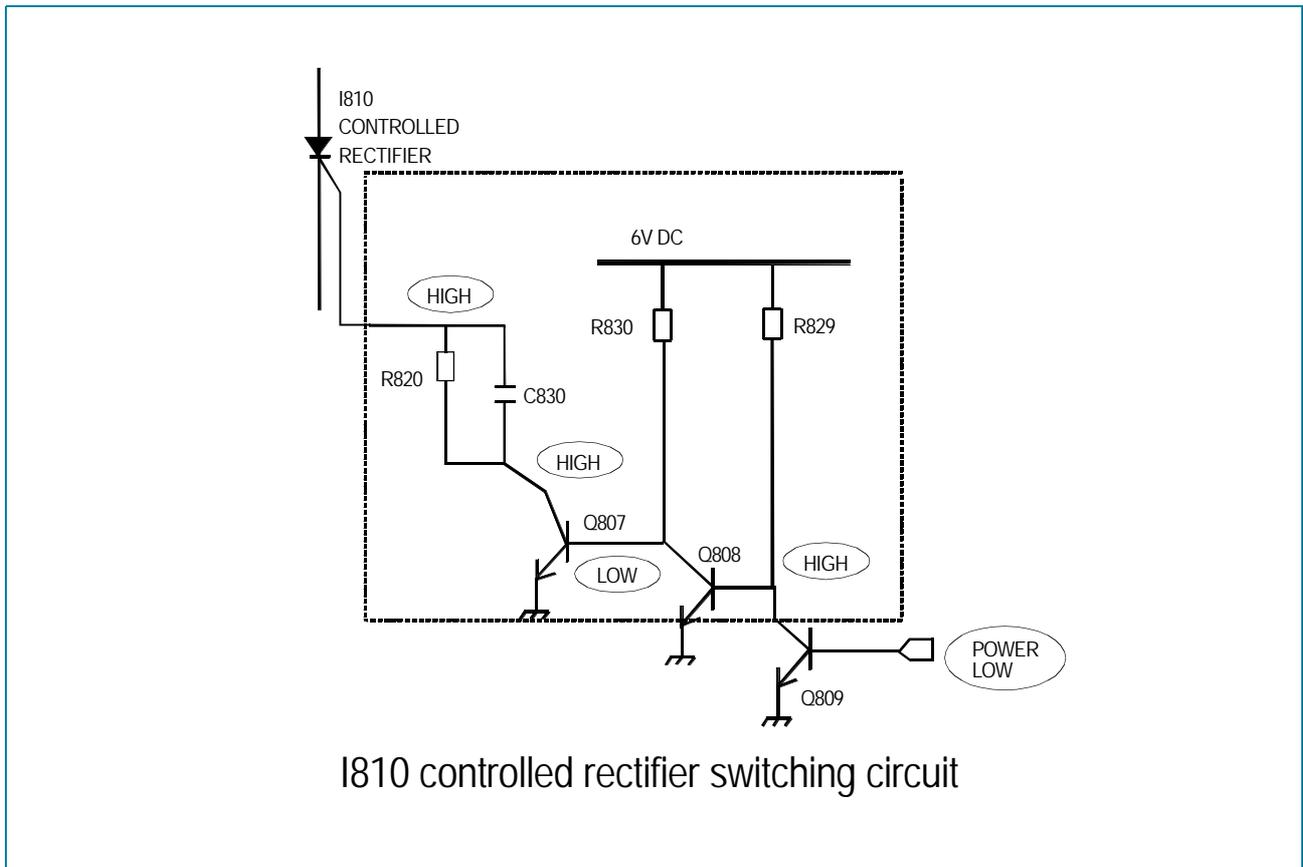
9-2-1-4. power supply IC delivery during TV set normal run

power supply line	IC power supply delivery	Remarks
124V-110V	FBT	FBT supplies 45V to I301 vertical IC FBT supplies 14V to I301 vertical IC FBT supplies 33V to the tuner FBT supplies 185V to I901 video amplifier pin 6
13.5V	I601 pin 1	
11V	T401 H- drive	
8V	I501 Main IC pins 14-39	
6V	I703 IR receiver pin 1	
5V	I702 EEPROM pin 8 tuner	
3.3V	Main IC μ com part pins 54-56-61	

9-2-2. TV set in stand-by mode

9-2-2-1. TV set circuit diagram in stand-by mode





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

- In 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 optocoupler 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 μ com, IR receiver and front mask buttons supply voltage (then, remote control or front mask buttons can be activated to leave stand-by mode).

IC DESCRIPTION

1. **TDA9361 : TV signal processor - Teletext decoder with embedded m-Controller.**
TDA9381 : TV signal processor - with embedded m-Controller.

TV-signal Processor

- Multi-standard vision IF circuit with alignment-free PLL demodulator
- Internal (switchable) time-constant for the IF-AGC circuit
- Mono intercarrier with a selective FM-PLL demodulator which can be switched to the different FM sound frequencies (5.5 / 6.0 / 6.5 MHz)
- 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
- Integrated 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

m-Controller

- 80C51 μ -controller core standard instruction set and timing
- 1 μ s machine cycle
- 64Kx8-bit 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
- 8-bit A/D converter
- 4 pins which can be programmed as general I/O pin or ADC input.

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 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 Interval (VBI) data capture of WST data

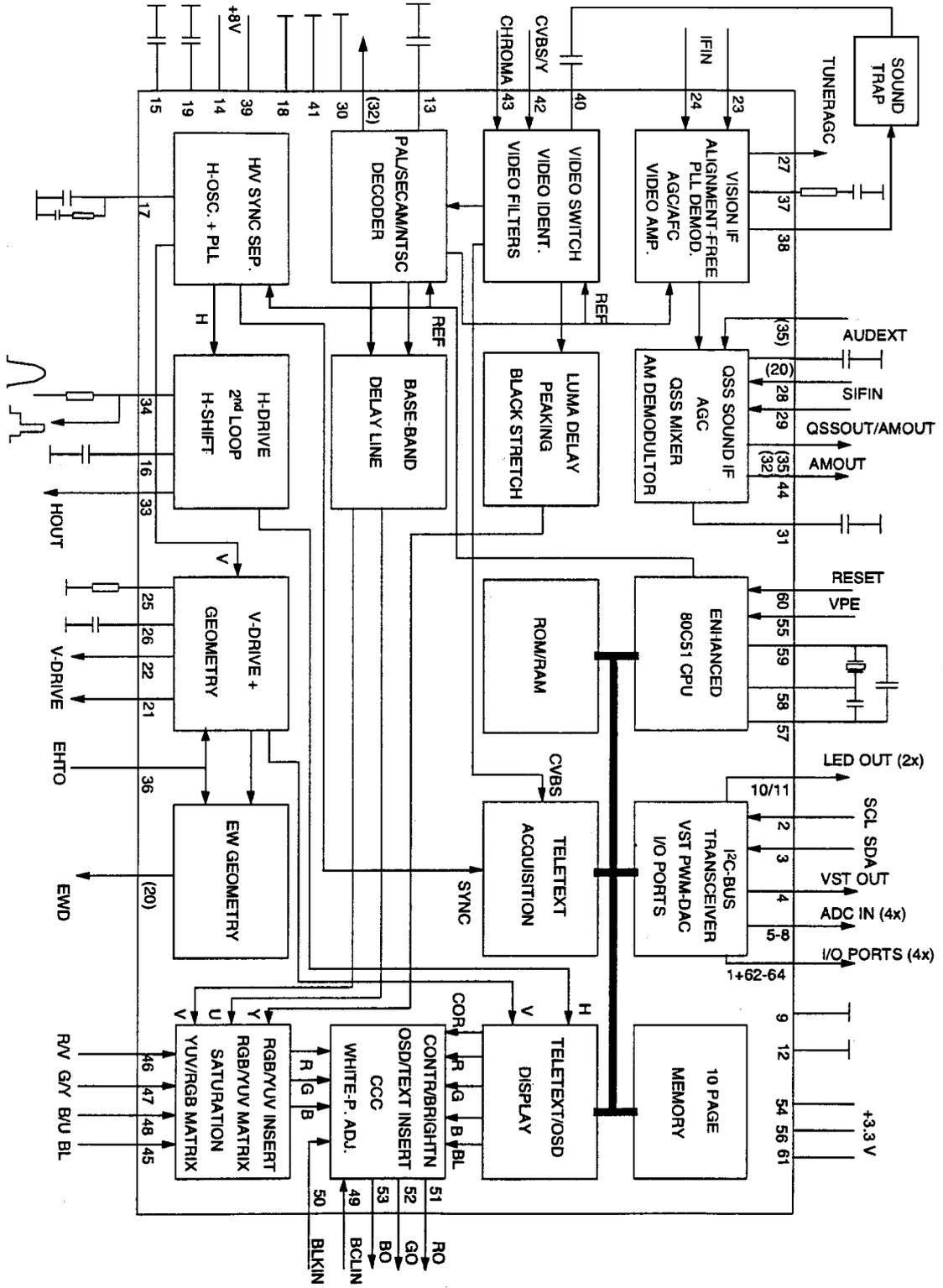
Display

- Teletext and Enhanced OSD modes
- Features of level 1.5 WST.
- 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, 12x13, 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 Video 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 (MuVIP). 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.



APPENDIX

IC DESCRIPTION

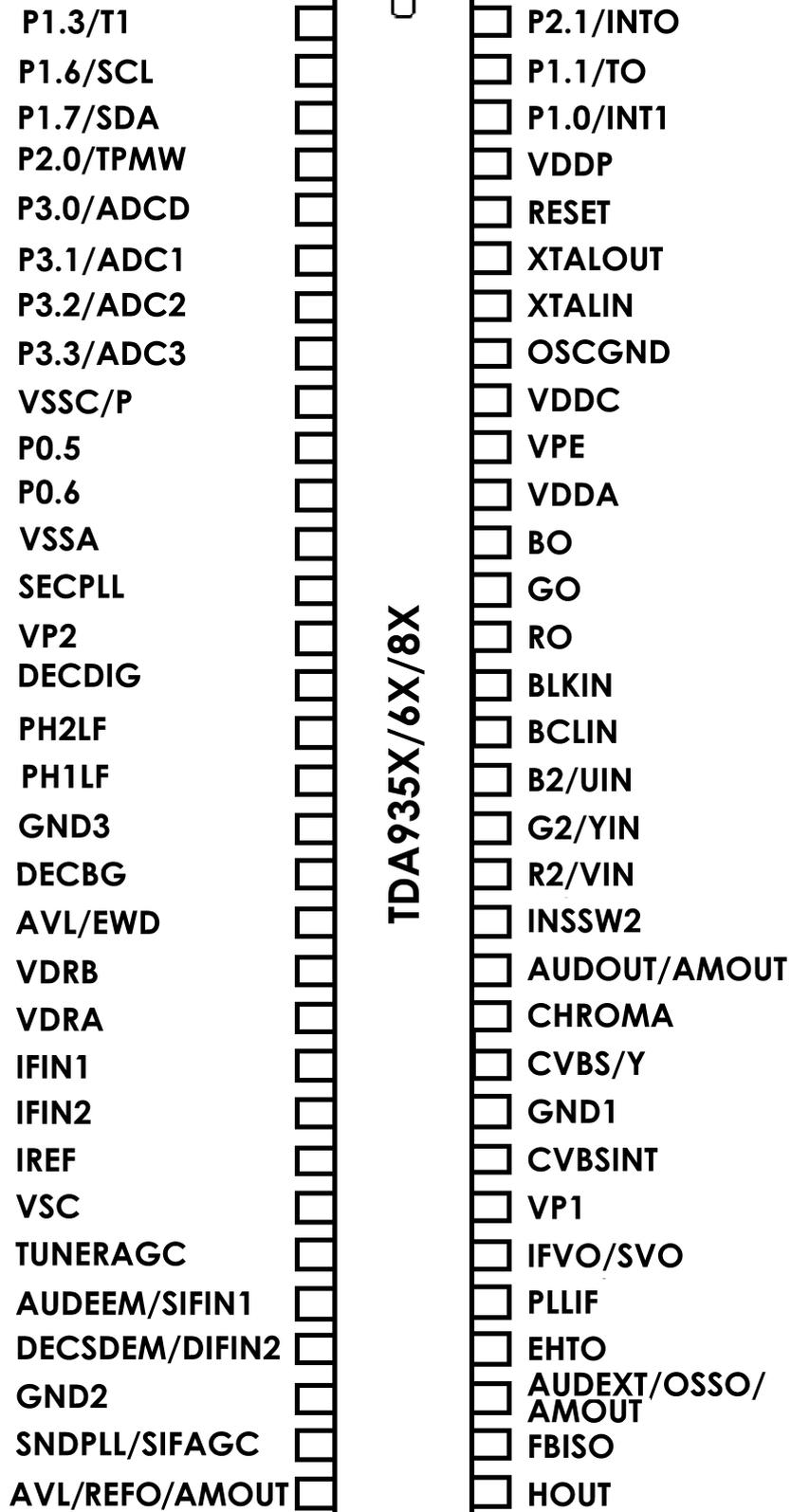
IC marking and version

Chassis	IC marking (line 3)	OSD languages	Text
CP 185	DW9361/N1/3-DE1 (note : x is the software version)	English, French, German, Italian, Spanish, Dutch, Danish, Finnish, Norwegian, Swedish, Greek, Hungarian,	English, German, Swedish/Finnish/Hungarian, Italian, French, Portuguese/Spanish, Turkish, Greek
		Polish, Czech, Rumanian	Polish, German, Estonian, Italian, French, Serbian/Croatian/Slovenian, Czech/Slovak, Rumanian
		Russian	Polish, German, Estonian, Russian/Bulgarian, Serbian/Croatian/Slovenian, Czech/Slovak, Rumanian
CP 185	DW9381/N1/3-DE1 (note : x is the software version)	English, French, German, Italian, Spanish, Dutch, Danish, Finnish, Norwegian, Swedish, Polish, Russian, Hungarian, Czech, Rumanian, Greek	No teletext

PINNING

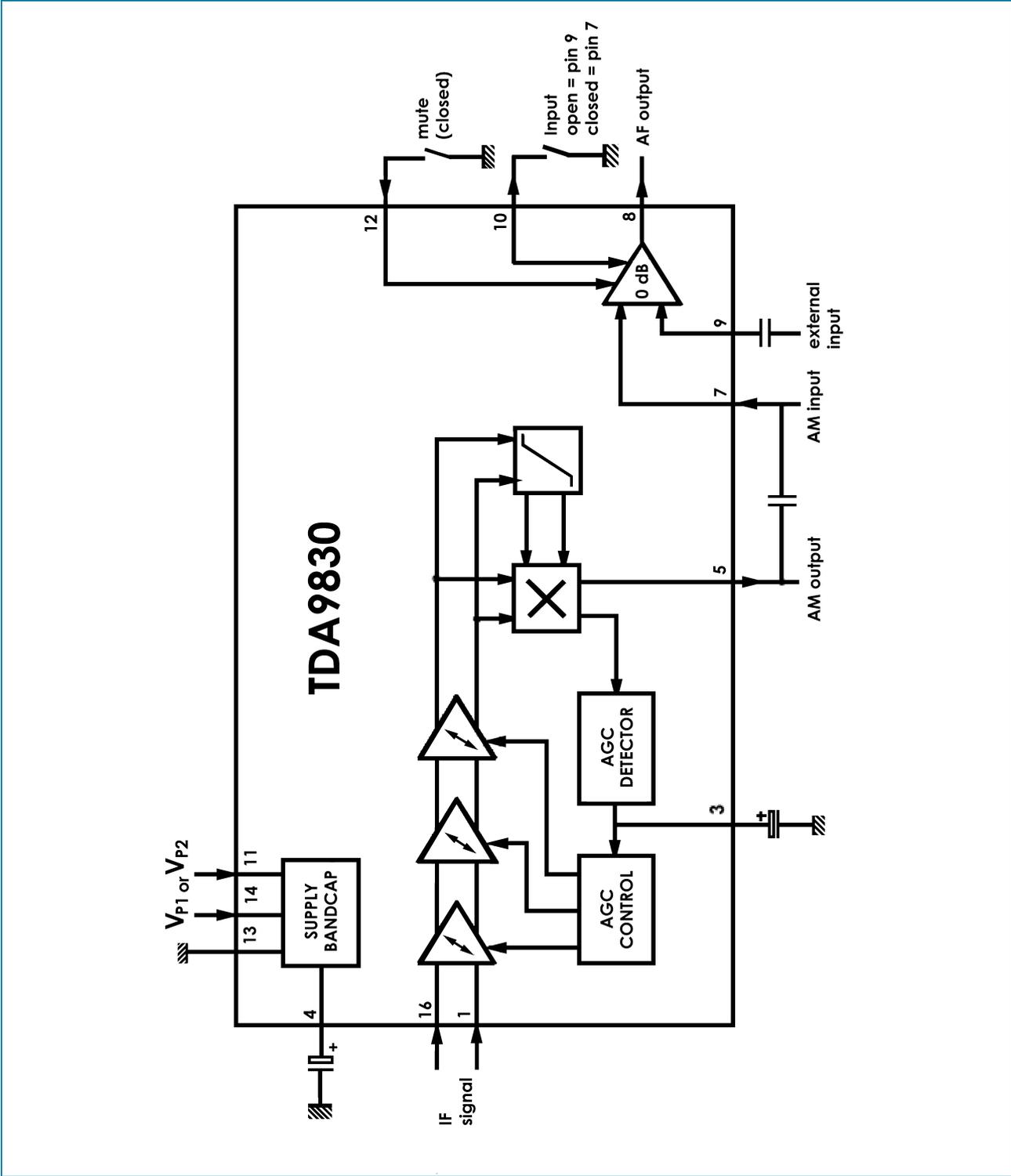
SYMBOL	PIN	DESCRIPTION
n.u.	1	Port 1.3 Not used.
SCL	2	I2C bus clock line
SDA	3	I2C Data line
SECAM L' out	4	Port 2.0 : FM sound : PushPull Low AM SECAM L' : PushPull High AM SECAM L : High Impedance
OCP	5	Port 3.0 : Over Current Protection
RF AGC in	6	ADC 1 : For program sorting in ATSS (High Impedance)
Key-in	7	ADC 2 : local key input (High impedance)
S/SW	8	ADC 3 : Scart Slow switching input
VssC/P	9	digital ground for μ -controller core and peripheral
LED 1	10	port 0.5 (8mA current sinking capability)
LED 2	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	20	n.u.
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
AUDEEM	28	audio deemphasis
DECSDEM	29	decoupling sound demodulator
GND2	30	ground 2 for TV processor
SNDPLL	31	narrow band PLL filter
SNDIF	32	n.u.
HOUT	33	horizontal output
FBISO	34	flyback input / sandcastle output
AUDEXT	35	external audio input
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)
AUDOUT	44	audio out
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 (PushPull)
Power	63	Port 1.1 : Power output (PushPull)
IR in	64	Interrupt input 0 : R/C Infrared input



2. TDA9830 TV sound AM-Demodulator and audio source switch

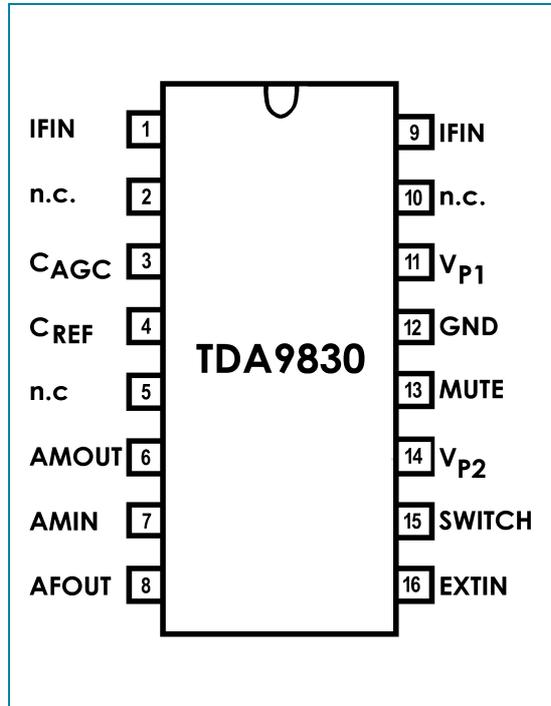
The TDA9830, a monolithic integrated circuit, is designed for AM-sound demodulation used in L and L' standard. The IC provides an audio source selector and also mute switch.



Block Diagram : TDA9830

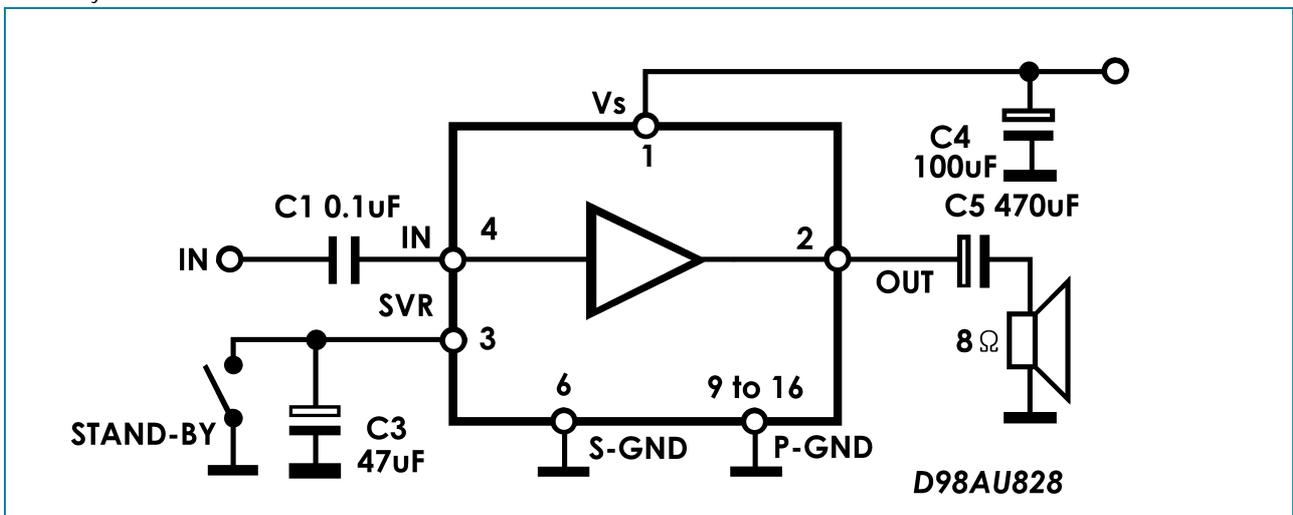
Pinning

Symbol	Pin	Description
IFIN	1	Sound IF differential input signal
n.c.	2	Not connected
C _{AGC}	3	AGC capacitor
C _{REF}	4	REF voltage filtering capacitor
n.c.	5	Not connected
AMOUT	6	AM demodulator output
AMIN	7	Input signal from audio switch
AFOUT	8	Output signal from audio switch
EXTIN	9	Input signal (from external) to audio switch
SWITCH	10	Switch input select control
V _{P2}	11	Supply voltage +12V (alternative)
MUTE	12	Mute control
GND	13	Ground (0V)
V _{P1}	14	Supply voltage +5V to +8V
n.c.	15	Not connected
IFIN	16	Sound IF differential input signal



3. TDA7267A - 3W Mono amplifier

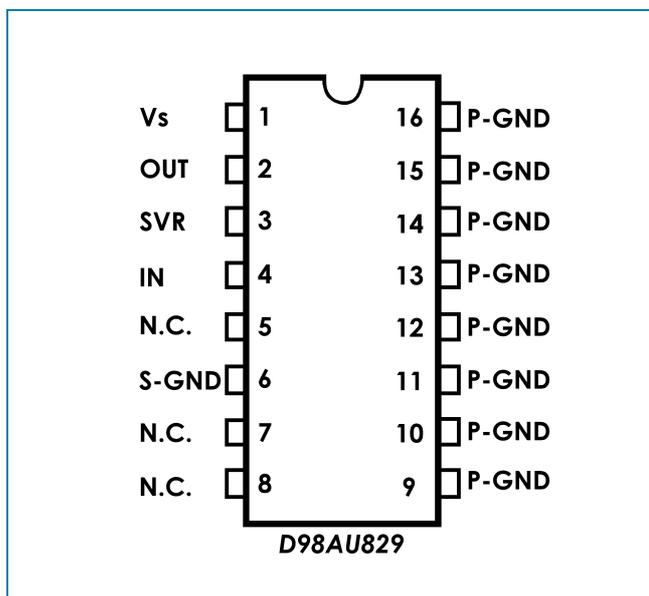
- Can deliver 3W THD 10% 14.5V/8Ω
- Internal fixed gain 32dB
- No feedback capacitor
- No boucherot cell
- Thermal protection
- AC short circuit protection
- SVR capacitor for better ripple rejection
- Low turn ON/OFF pop
- Stand-by mode



Block Diagram

Pinning

Symbol	Pin	Description
Vcc	1	Supply voltage
OUT	2	Audio output
SVR	3	Supply Voltage Rejection
IN	4	Audio input
n.c.	5	Not Connected
S-GND	6	Signal ground
n.c.	7	Not Connected
n.c.	8	Not Connected
P-GND	9	P Ground
P-GND	10	P Ground
P-GND	11	P Ground
P-GND	12	P Ground
P-GND	13	P Ground
P-GND	14	P Ground
P-GND	15	P Ground
P-GND	16	P Ground



4. TDA8357J Vertical Amplifier

The TDA8357J is a power circuit for use in 90° TV 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.

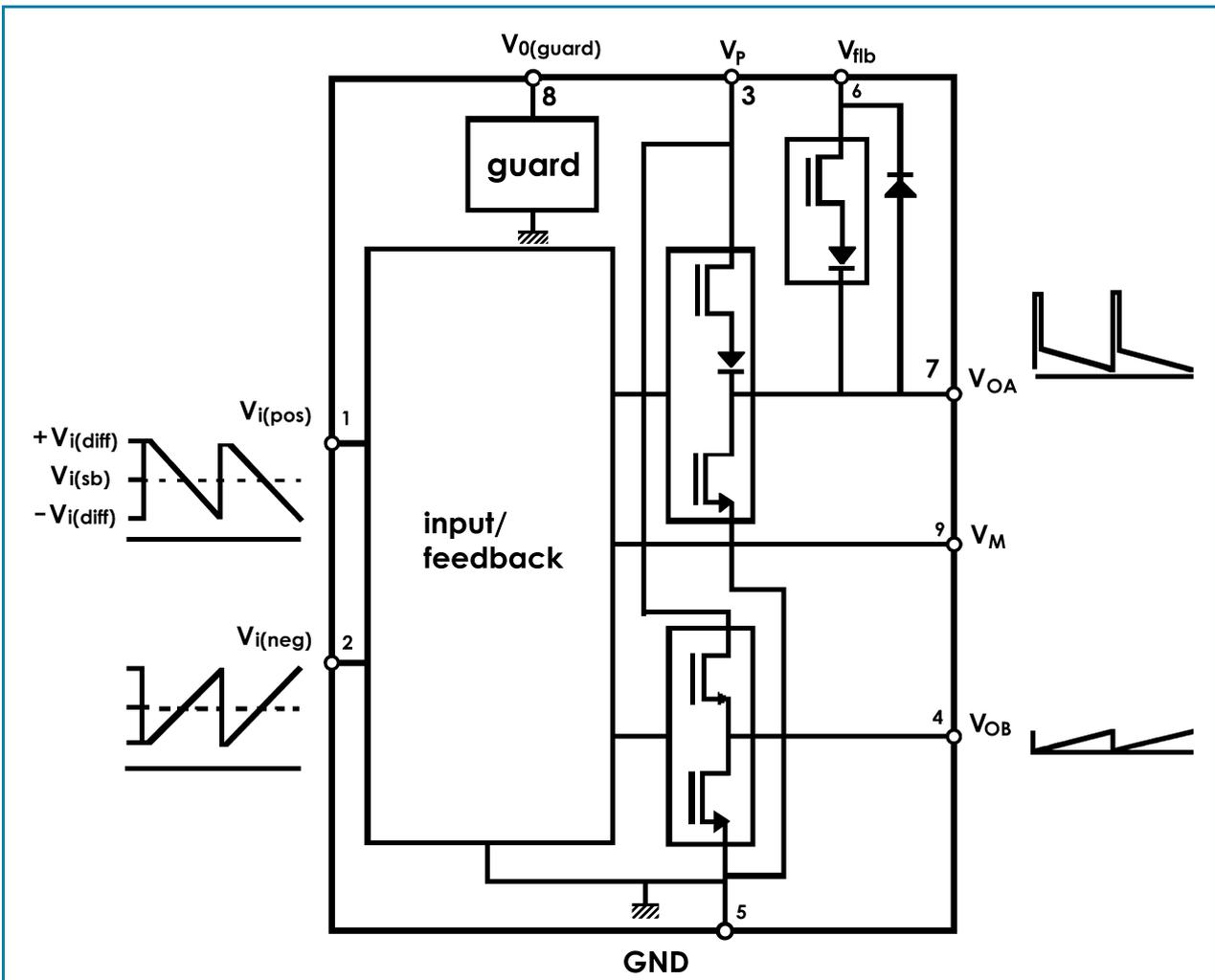
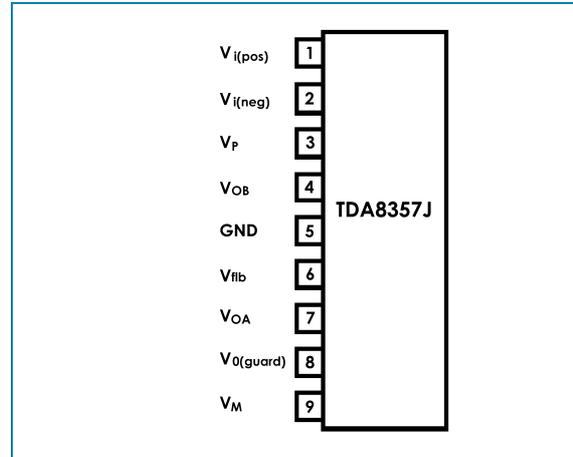
The IC is constructed in a Low Voltage DMOS process that combines Bipolar, CMOS and DMOS devices. MOS transistors are used in the output stage because of the absence of second breakdown.

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	$V_{i(pos)}$	input voltage (positive)
2	$V_{i(neg)}$	input voltage (negative)
3	V_P	supply voltage
4	V_{OB}	output voltage B
5	GND	ground
6	V_{flb}	flyback supply voltage
7	V_{OA}	output voltage A
8	$V_{O(guard)}$	guard output voltage
9	V_M	input measuring resistor



IC DESCRIPTION

6. 24C08 8 Kbit EEPROM

features :

- 8 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-directional 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-directional, and is used to transfer data in or out of the memory

7. STR - F6653

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.

7-2. features

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

APPENDIX

IC DESCRIPTION

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
Quiescent current in non-operation	4-5	I_{IN} (off)	-	-	100	μ A
Maximum off time	-	T_{OFF} (max)	45	-	55	μ SEC
Minimum time for input of quasi resonant signals	1-5	T_{TH} (2)	-	-	1.0	μ SEC
Minimum off time	-	T_{OFF} (min)	-	-	1.5	μ SEC
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	μ A
Latch circuit release voltage	4-5	V_{IN} (Loff)	6.6	-	8.4	V
Thermal shutdown operating temperature	-	T_j (TSD)	140	-	-	$^{\circ}$ C

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	μ A
On-resistance	3-2	R_{DS} (on)	-	-	1.95	W
Switching time	3-2	t_f	-	-	250	noec
Thermal resistance	-	O_{CH-F}	-	-	0.95	$^{\circ}$ C/W