

Service Manual

Color Television

CHASSIS : CP-185N and CP-185C



Specification

| | |
|----------------------------------|--|
| Version | Pal multi system |
| TV Standard | PAL-SECAM B/G, D/K, H, I/I (NTSC : AV Only) |
| Sound system | Mono |
| Power consumption | * 1 Speaker 14":49W / 20":60W / 21" 68W * 2Speaker 14":57W / 20":64W / 21":74W |
| Speaker | 3W 8 Ohm o 7.5W 8 Ohm |
| Teletext system | Option |
| Aerial Input | 75 Ohm unbalanced |
| Channel coverage | off-air channels, S-cable channels and hyperband |
| Tuning system | Ferquency synthesiser tuning system |
| Visual screen size | 14":34cm 20":48cm 21":51cm |
| Channel indication | On screen display |
| Program selection | 100 Programmes |
| Auxiliary Outpup Terminal | RCA jack : Audio input and Vidio input ERUO SCART Jack : Audio/Video and R/G/B input. Sloe and fast swtching, SVHsin Audio - Video jack on front of cabinet in common connection with EURO-SCART Headphone jack on front of cabinet |
| Remote control | R-40A10 (None teletext) → AAA Battery type R-40A01 (With teletext) → AAA Battery type R-44C05 (With teletext) → AA Battery type |

DAEWOO ELECTRONICS CO., LTD

<http://svc.dwe.co.kr>

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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.

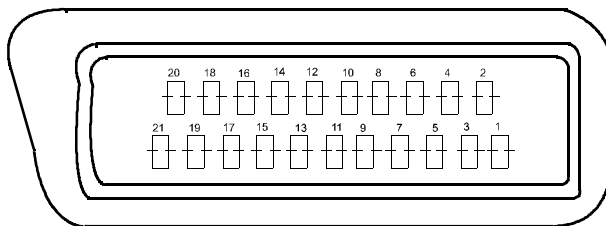
■ PRODUCT SAFETY NOTICE

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.

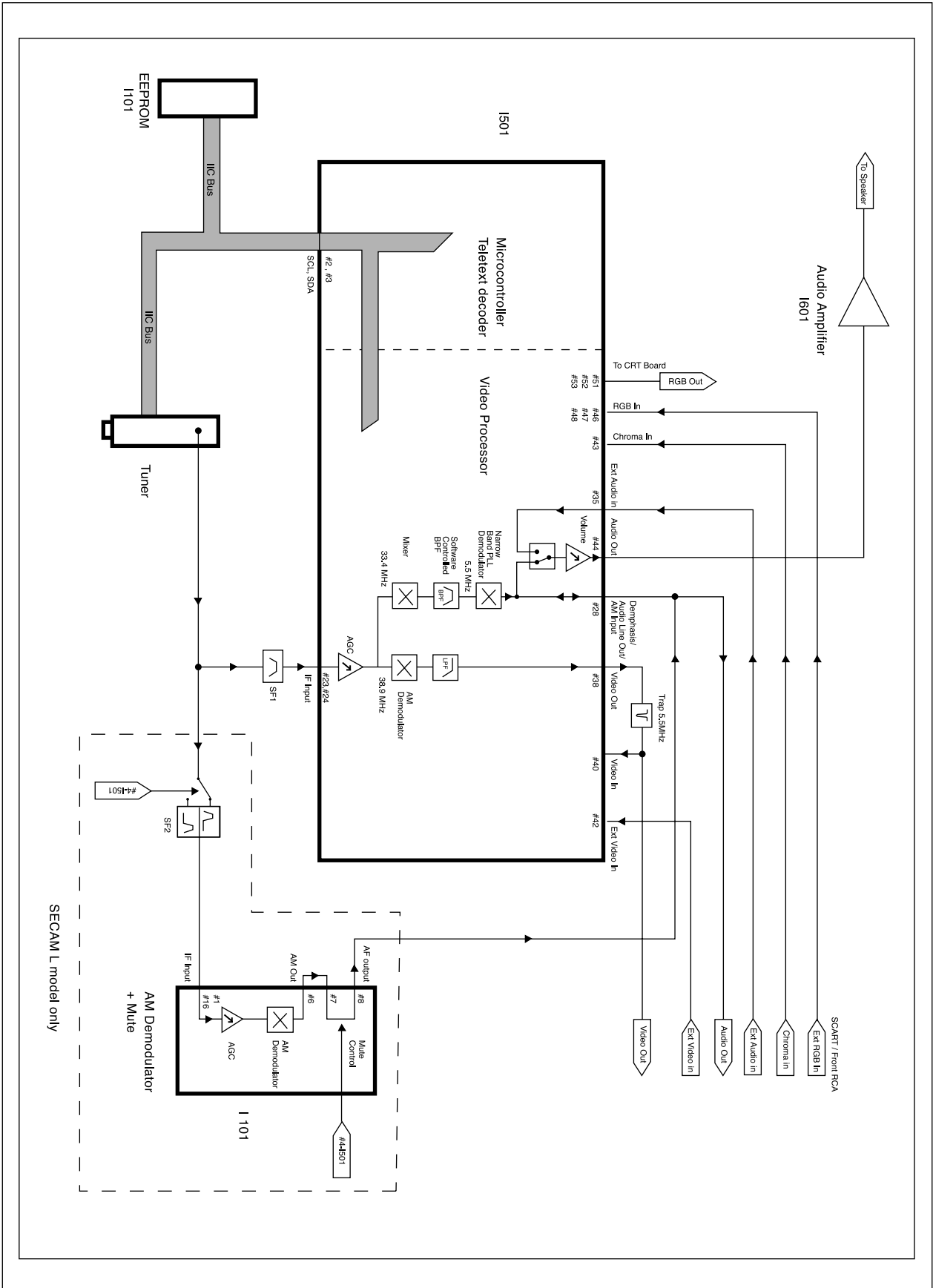
SPECIFICATIONS

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 + 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 + 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 | |



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 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 |
| PHI | LIPS (tuner internal AGC) |
| PH2 | PHILIPS (Video processor AGC) |

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 Vcut-off 5V

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

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.

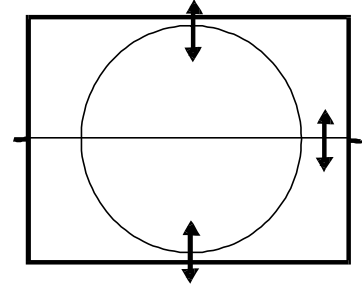
ALIGNMENT INSTRUCTIONS

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



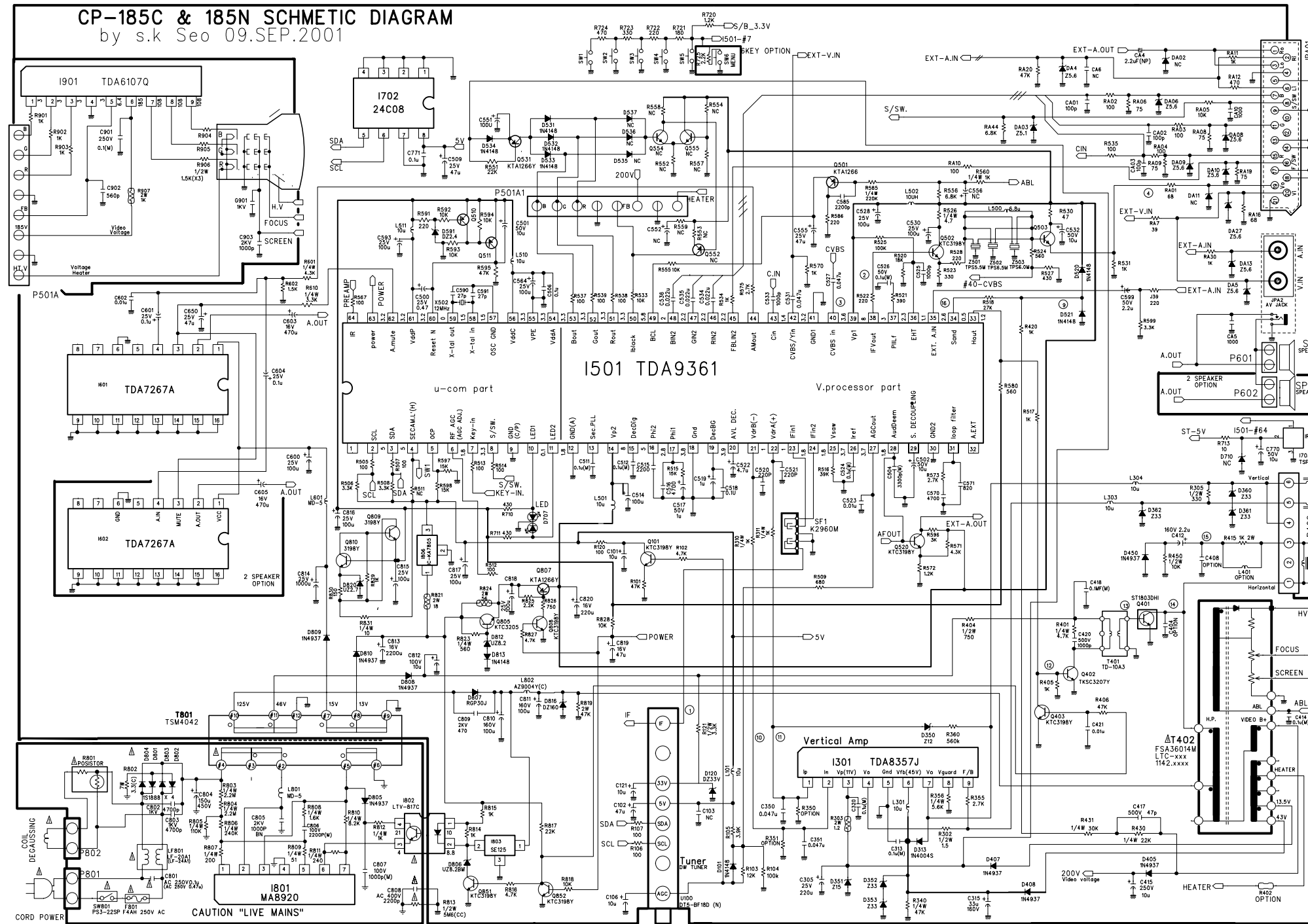
5 - Horizontal picture centering

- 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

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.

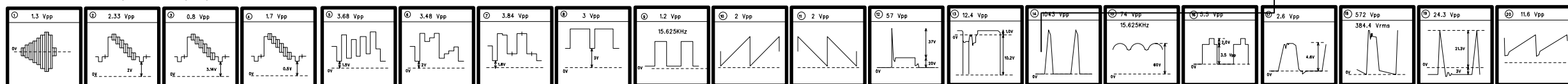
THE DIFFERENT PARTS FOR CRT

| LOC. | 14 INCH(CPT) | 20 INCH(CPT) | 21 INCH(PHILIPS) |
|-------|--------------|---------------|------------------|
| C404 | 1.6KV 6200PF | 1.6KV 9100PF | 1.6KV 7500PF |
| C408 | 200V 0.36UF | 200V 0.47UF | 200V 0.68UF |
| L401 | NONE | NONE | L-76 |
| R801 | 140M290 | 70M290 | 70M290 |
| SC11 | PCSE33A | PCSE29-03C | PCSE29-03C |
| J007 | WIRE COPPER | WIRE COPPER | NONE |
| R350 | 1/4W 1K | 1/4W 1.2K | 1/4W 1.5K |
| R351 | 1/4W 1K | 1/4W 1.2K | 1/4W 1.5K |
| R556 | 1/6W 7.5K | 1/6W 6.8K | 1/6W 5.6K |
| R810 | 1/4W 6.8K | 1/4W 7.5K | 1/4W 7.5K |
| R402 | 1W 2 OHM | 1W 2.4 OHM | 1W 1.2 OHM |
| V001 | ODY-M1401 | CDY-S2017 | W/ITC |
| V901 | A34JL90X | A48AGY13X | A51EFK155X01 |
| Z213 | 401S-101S-1P | 2001S-101S-1P | 2101S-101S-1P |
| Z2131 | DC-1450 | DC-20SF | DC-21SF |

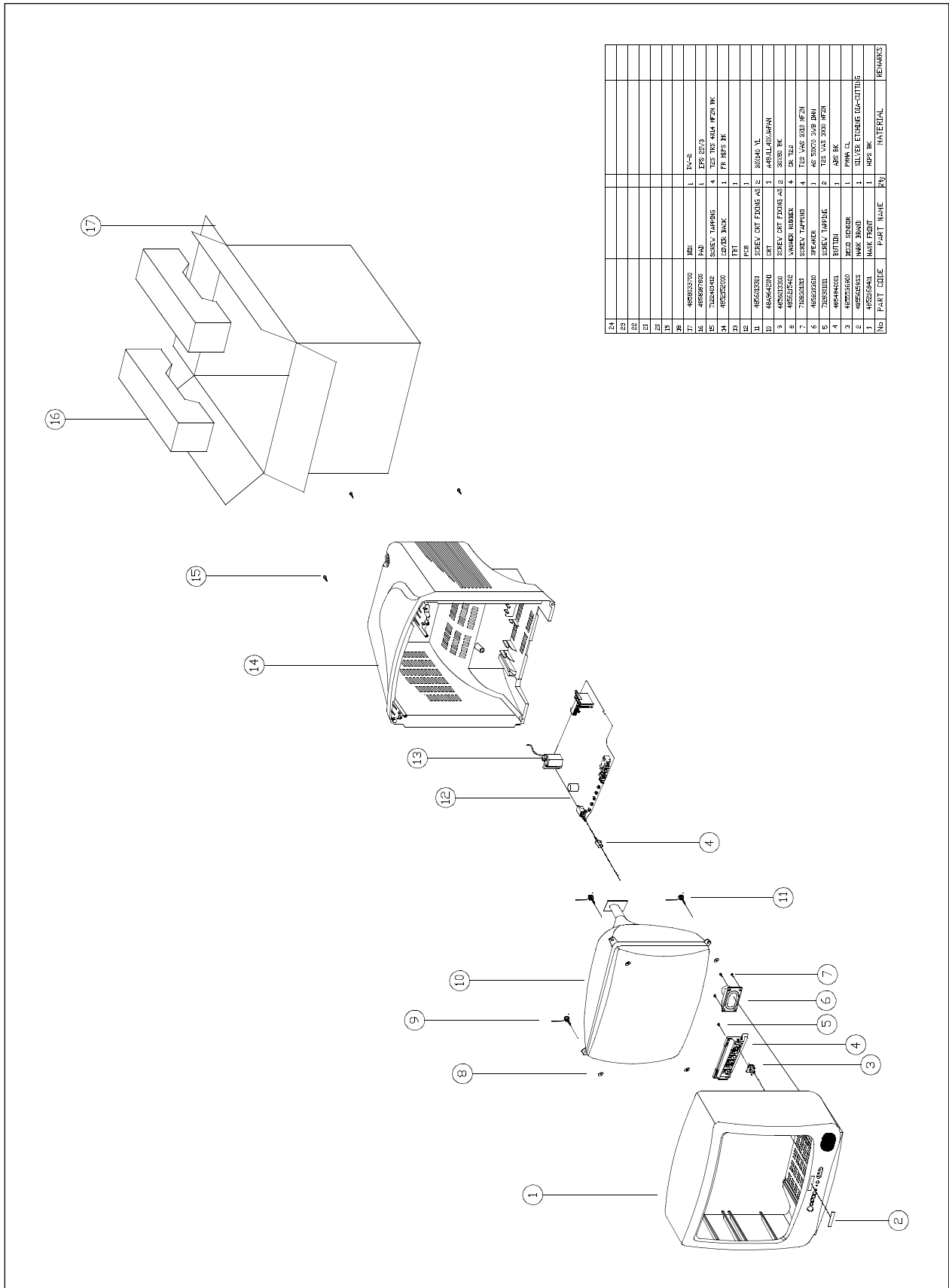
PRODUCT SAFETY NOTE :
 THE COMPONENTS MARKED WITH Δ ARE IMPORTANT FOR MAINTAINING THE SAFETY OF THE SET AND SHOULD BE REPLACED ONLY WITH TYPES IDENTICAL TO THOSE IN THE ORIGINAL OR SPECIFIED ONE IN THE PART LIST. DON'T DEGRADE THE SAFETY OF THE SET THROUGH IMPROPER SERVICING.

*** WAVEFORMS**

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



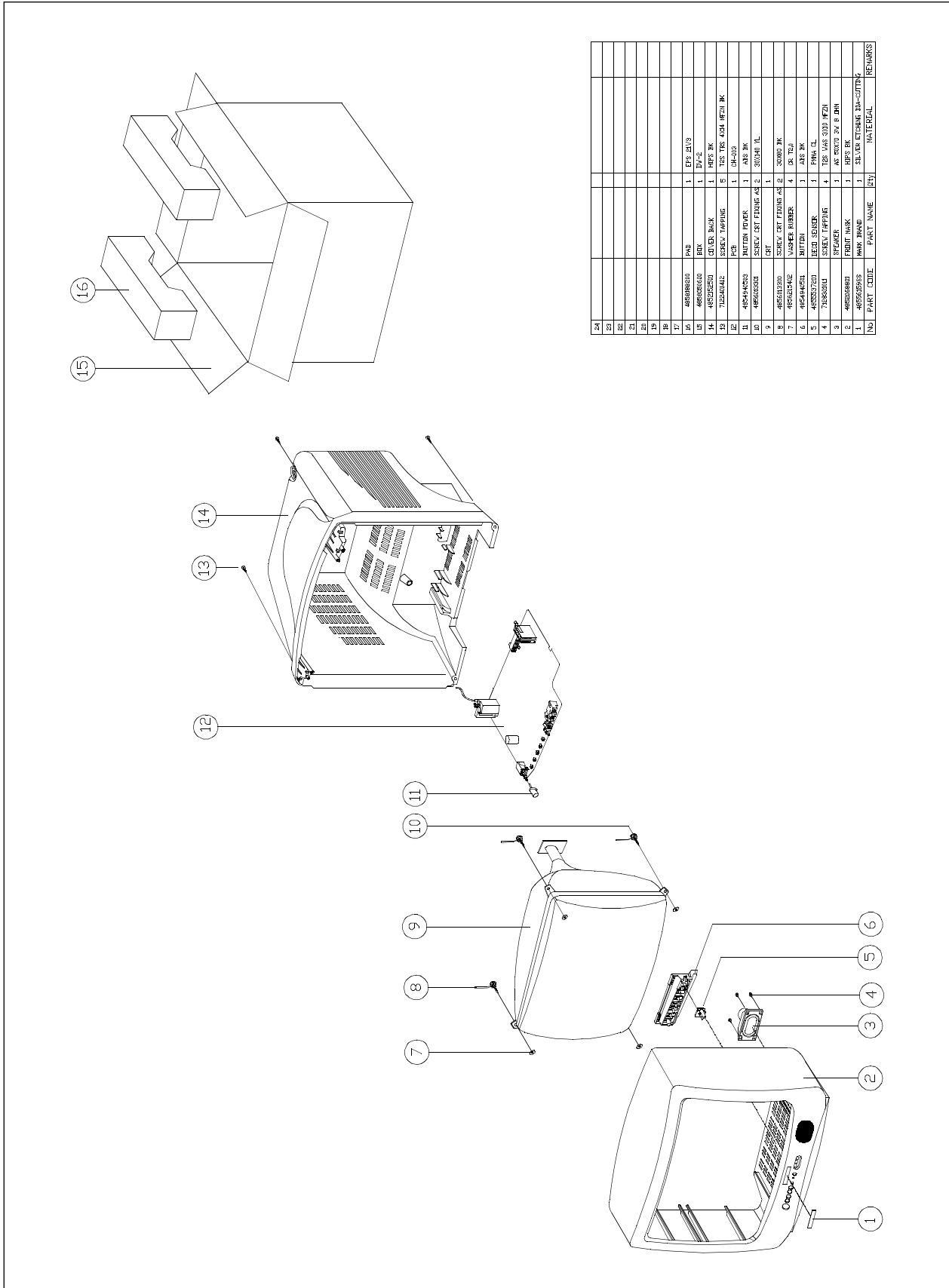
2. 20V3



| NO | PART CODE | PART NAME | QTY | MATERIAL | REMARKS |
|-----|-----------|--------------------|-----|---------------------|---------|
| 14 | | | | | |
| 15 | | | | | |
| 16 | | | | | |
| 17 | | | | | |
| 18 | | | | | |
| 19 | | | | | |
| 20 | | | | | |
| 21 | | | | | |
| 22 | | | | | |
| 23 | | | | | |
| 24 | | | | | |
| 25 | | | | | |
| 26 | 485033700 | BOX | 1 | PA-45 | |
| 27 | 485037000 | IND | 1 | EPS 5073 | |
| 28 | 710244410 | SCREEN TAPPING | 4 | TES WAS 4014 W2N BK | |
| 29 | 485235000 | TOP/LS BACK | 1 | FR HIPS BK | |
| 30 | | TRF | 1 | | |
| 31 | 485235000 | TRF | 1 | | |
| 32 | 485235000 | SCREEN TAPPING SET | 2 | 50000 VL | |
| 33 | 485235000 | SCREEN TAPPING SET | 2 | 50000 VL | |
| 34 | 485235000 | SCREEN TAPPING SET | 2 | 50000 VL | |
| 35 | 485235000 | SCREEN TAPPING SET | 2 | 50000 VL | |
| 36 | 485235000 | SCREEN TAPPING SET | 2 | 50000 VL | |
| 37 | 485235000 | SCREEN TAPPING SET | 2 | 50000 VL | |
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| 96 | 485235000 | SCREEN TAPPING SET | 2 | 50000 VL | |
| 97 | 485235000 | SCREEN TAPPING SET | 2 | 50000 VL | |
| 98 | 485235000 | SCREEN TAPPING SET | 2 | 50000 VL | |
| 99 | 485235000 | SCREEN TAPPING SET | 2 | 50000 VL | |
| 100 | 485235000 | SCREEN TAPPING SET | 2 | 50000 VL | |

EXPLODED VIEW

3. 21V3



PRINTED CIRCUIT BOARD

ELECTRICAL PARTS LIST

CAUTION

“△” is safety part, so it must be used the same part.

“®” is a recommendable part for essential stock.

| LOC | PART CODE | PART NAME | DESCRIPTION | REMARK |
|-------|------------|---------------------|---------------------------|--------|
| ZZ100 | 48B3740A10 | TRANSMITTER REMOCON | R-40A10 | ® |
| ZZ110 | PTACPWD434 | ACCESSORY AS | DTA-20V1MZ | |
| 00100 | 4850Q00910 | BATTERY | R03/NN | |
| 00200 | 48586002E2 | MANUAL INSTRUCTION | ENGLISH,ARABIC | |
| M821 | 4858213800 | BAG INSTRUCTION | L.D.P.E T0.05X250X400 | |
| ZZ120 | PTBCSHD435 | COVER BACK AS | DTA-21V1MZ | |
| M211 | 4852151601 | COVER BACK | HIPS BK | |
| M541 | 4855415800 | SPEC PLATE | 150ART P/E FILM (C/TV) | |
| M781 | 4857820300 | CLOTH BLACK | T0.5 L=150 | |
| ZZ130 | PTPKCPD435 | PACKING AS | DTA-21V1MZ | |
| 10 | 6520010100 | STAPLE PIN | AUTO W65 | |
| M801 | 485805063B | BOX CARTON | DW-3A | |
| M811 | 4858186800 | PAD | EPS 21V1 | |
| M821 | 4858211800 | BAG P.E | L.D.P.E T0.03X1300X1100 | |
| ZZ131 | 48519A5310 | CRT GROUND NET | 2101S-1015-1P | |
| ZZ132 | 58G0000147 | COIL DEGAUSSING | DC-21SF | △ |
| ZZ140 | PTCACAD435 | CABINET AS | DTA-21V1MZ | |
| M201A | 4856013300 | SCREW CRT FIXING | 30X80 BK | |
| M201B | 4856215402 | WASHER RUBBER | CR T2.0 | |
| M201C | 4856013302 | SCREW CRT FIXING | 30X190 BK | |
| M211A | 7172401412 | SCREW TAPPTITE | TT2 TRS 4X14 MFZN BK | |
| M211D | 7172401412 | SCREW TAPPTITE | TT2 TRS 4X14 MFZN BK | |
| M492 | 4854939403 | BUTTON POWER | ABS BK | |
| M591 | 4855930900 | DECO TERM | PVC CL T0.2 | |
| SP01A | 7178301011 | SCREW TAPPTITE | TT2 WAS 3X10 MFZN | |
| V901 | 4859625560 | CRT | A51EFK155X01 | ® △ |
| ZZ200 | PTFMSJD435 | MASK FRONT AS | DTA-21V1MZ | |
| M191 | 4851932302 | BUTTON CTRL | 4939402+5536301 | |
| M201 | 4852067601 | MASK FRONT | HIPS BK | |
| M561 | 48556159SS | MARK BRAND | SILVER ETCHING DIA-CUTTIN | |
| ZZ210 | PTSPWA652 | SPEAKER AS | DTA-14C4TFF | |
| P601A | 4850703S50 | CONNECTOR | YH025-03+35098+ULW=200 | |
| SP01 | 4858314010 | SPEAKER | SP-5070F01 3W 8 OHM | ® |
| ZZ290 | PTMPMSD435 | PCB MAIN MANUAL AS | DTA-21V1MZ | |
| 10 | 2193102005 | SOLDER BAR | SN:PB=63:47 S63S-1320 | |
| 30 | 2291050616 | FLUX SOLDER | JS-64T3 | |
| 40 | 2291050301 | FLUX SOLVENT | IM-1000 | |
| C404 | CMYH3C752J | C MYLAR | 1.6KV BUP 7500PF J | |
| C408 | CMYE2D474J | C MYLAR | 200V PU 0.47MF J | |
| C801 | CL1UC3104M | C LINE ACROSS | WORLD AC250V 0.1UF M R.47 | |
| C804 | CEYN2W151P | C ELECTRO | 450V LHS 150MF (25X40) | ® |

ELECTRICAL PARTS LIST

| LOC | PART CODE | PART NAME | DESCRIPTION | REMARK |
|-------|------------|------------------|---------------------------|--------|
| C808 | CH1AFE222M | C CERA AC | 4KV 2200PF M KX DE1210 | ® ▲ |
| D707 | DSML1216W- | LED | SML1216W | |
| D807 | DRGP30J— | DIODE | RGP30J | |
| F801 | 5FSGB4022L | FUSE GLASS TUBE | SEMKO TL 4A 250V MF51 | ® ▲ |
| G901 | 4SG0DX0001 | SPARK GAP | SSG-102-A1(1.0KV) | |
| G902 | 4SG0DX0001 | SPARK GAP | SSG-102-A1(1.0KV) | |
| G903 | 4SG0DX0001 | SPARK GAP | SSG-102-A1(1.0KV) | |
| G904 | 4SG0DX0001 | SPARK GAP | SSG-102-A1(1.0KV) | |
| I301 | PTA2SW5405 | HEAT SINK ASS`Y | 1TDA8357J- + 7174301011 | |
| 00001 | 1TDA8357J- | IC VERTICAL | TDA8357J | ® |
| 0000A | 4857025405 | HEAT SINK | A1050P-H24 T=2 | |
| 0000B | 7174300811 | SCREW TAPPTITE | TT2 RND 3X8 MFZN | |
| I501 | 1DW3812EB1 | IC MICOM | DW9381/N1/2S-2B1 | ® |
| I601 | 1TDA7267A- | IC AMP | TDA7267A | ® |
| I702 | 1AT24C08PC | IC | AT24C08-10PC | ® |
| I703 | 1SRV21M— | IC PREAMP | SRV-21M | |
| I801 | PTA2SW7919 | HEAT SINK ASS`Y | 1MA8920— + 7174301211 | |
| 00001 | 1MA8920— | IC POWER | MA8920 | ® |
| 0000A | 4857027919 | HEAT SINK | AL EX | |
| 0000B | 7174301211 | SCREW TAPPTITE | TT2 RND 3X12 MFZN | |
| 0000C | 4853938501 | BRKT TR | SBHG1-A T1.5 | |
| I802 | 1LTV817C— | IC PHOTO COUPLER | LTV-817C | ® ▲ |
| I803 | 1DP123— | IC ERROR AMP | DP123 | ® |
| I805 | 1KA7805— | IC REGULATOR | KA7805 | ® |
| I901 | PTC3SW1100 | HEAT SINK ASS`Y | 1TDA6107Q- + 7174300811 | |
| 00001 | 1TDA6107Q- | IC VIDEO | TDA6107Q | ® |
| 0000A | 4857031100 | HEAT SINK | A1050P-H24 T2.0 | |
| 0000B | 7174300811 | SCREW TAPPTITE | TT2 RND 3X8 MFZN | |
| JPA01 | 4859200401 | SOCKET RGB | YRS21-R1 | |
| JPA02 | 4859109950 | JACK PIN BOARD | PH-JB-9710A | |
| L401 | 58H0000020 | COIL H-LINEARITY | L-76(76.5UH) | |
| LF801 | 5PLF20A1— | FILTER LINE | LF-20A1 | ® ▲ |
| M561 | 4853533600 | HOLDER LED | P.P BK | |
| P401 | 4859240120 | CONN WAFER | YFW500-06 | |
| P501 | 4850708N08 | CONNECTOR | BIC-08T-25T+C-20T+ULW=400 | |
| PWC1 | 4859908110 | CORD POWER AS | 1-L0+H03VVH2-F+HOU=2200 | |
| Q401 | PTJ2SW7200 | HEAT SINK ASS`Y | TST1803DH- + 7174301011 | |
| 00001 | TST1803DH- | TR | ST1803DHI | |
| 0000A | 4857027200 | HEAT SINK | AL T1.0 | |
| 0000B | 7174301011 | SCREW TAPPTITE | TT2 RND 3X10 MFZN | |
| R801 | DDC7R0M290 | POSISTOR | ECPCD7R0M290 | |
| R802 | RX07B339JP | R CEMENT | 7W 3.3 OHM J BEN 15MM 4P | |
| SCT1 | 4859303530 | SOCKET CRT | PCS629-03C | |
| SF01 | 5PK7252M— | FILTER SAW | K7252M | |
| SW801 | 5S40101146 | SW POWER PUSH | SS-160-7-B | |

ELECTRICAL PARTS LIST

| LOC | PART CODE | PART NAME | DESCRIPTION | REMARK |
|-------|------------|-------------------|---------------------------|--------|
| T401 | 50D10A3— | TRANS DRIVE | TD-10A3 | |
| T402 | 50H0000211 | FBT | 1142.5109 | Ⓡ △ |
| T802 | 50M4042A7- | TRANS SMPS | TSM-4042A7 | Ⓡ △ |
| U100 | 4859721530 | TUNER VARACTOR | DT5-BF18D N | Ⓡ |
| X502 | 5XE12R000E | CRYSTAL QUARTZ | HC-49/U 12.00000MHZ 30PPM | |
| Z501 | 5PYXT5R5MB | FILTER CERA | XT 5.5MB | |
| Z502 | 5PYXT6R5MB | FILTER CERA | XT 6.5MB | |
| Z503 | 5PYXT6R0MB | FILTER CERA | XT 6.0MB | |
| ZZ200 | PTMPJ0D435 | PCB MAIN (RHU) AS | DTA-21V1MZ | |
| C315 | CEXF2C330V | C ELECTRO | 160V RSS 33MF (13X20) TP | |
| C415 | CEXF2E100V | C ELECTRO | 250V RSS 10MF (10X20) TP | |
| C805 | CBXB3D102K | C CERA SEMI | 2KV BL(N) 1000PF K (T) | |
| C810 | CEXF2C101V | C ELECTRO | 160V RSS 100MF (16X25) TP | |
| C811 | CEXF2C101V | C ELECTRO | 160V RSS 100MF (16X25) TP | |
| C813 | CEXF1C222V | C ELECTRO | 16V RSS 2200MF (13X25) TP | |
| C814 | CEXF1E102V | C ELECTRO | 25V RSS 1000MF (13X20) TP | |
| C903 | CCXB3D102K | C CERA | 2KV B 1000PF K (TAPPING) | |
| ZZ200 | PTMPJBD435 | PCB MAIN M-10 AS | DTA-21V1MZ | |
| 10 | 2TM18006BE | TAPE MASKING | 6.2X500 | |
| E001 | 4856310300 | EYE LET | BSR T0.2 (R1.6) | |
| E002 | 4856310300 | EYE LET | BSR T0.2 (R1.6) | |
| E003 | 4856310300 | EYE LET | BSR T0.2 (R1.6) | |
| E004 | 4856310300 | EYE LET | BSR T0.2 (R1.6) | |
| E005 | 4856310300 | EYE LET | BSR T0.2 (R1.6) | |
| E006 | 4856310300 | EYE LET | BSR T0.2 (R1.6) | |
| E007 | 4856310300 | EYE LET | BSR T0.2 (R1.6) | |
| E008 | 4856310300 | EYE LET | BSR T0.2 (R1.6) | |
| E009 | 4856310300 | EYE LET | BSR T0.2 (R1.6) | |
| E010 | 4856310300 | EYE LET | BSR T0.2 (R1.6) | |
| E011 | 4856310300 | EYE LET | BSR T0.2 (R1.6) | |
| E012 | 4856310300 | EYE LET | BSR T0.2 (R1.6) | |
| E013 | 4856310300 | EYE LET | BSR T0.2 (R1.6) | |
| E014 | 4856310300 | EYE LET | BSR T0.2 (R1.6) | |
| E015 | 4856310300 | EYE LET | BSR T0.2 (R1.6) | |
| E016 | 4856310300 | EYE LET | BSR T0.2 (R1.6) | |
| E017 | 4856310300 | EYE LET | BSR T0.2 (R1.6) | |
| E018 | 4856310300 | EYE LET | BSR T0.2 (R1.6) | |
| E019 | 4856310300 | EYE LET | BSR T0.2 (R1.6) | |
| E020 | 4856310300 | EYE LET | BSR T0.2 (R1.6) | |
| E021 | 4856310300 | EYE LET | BSR T0.2 (R1.6) | |
| E022 | 4856310300 | EYE LET | BSR T0.2 (R1.6) | |
| E023 | 4856310300 | EYE LET | BSR T0.2 (R1.6) | |
| E024 | 4856310300 | EYE LET | BSR T0.2 (R1.6) | |
| E100 | 4856310600 | EYE LET | BSR T0.2 (R2.3) | |
| E101 | 4856310600 | EYE LET | BSR T0.2 (R2.3) | |

ELECTRICAL PARTS LIST

| LOC | PART CODE | PART NAME | DESCRIPTION | REMARK |
|-------|------------|--------------------|---------------------------|--------|
| E102 | 4856310600 | EYE LET | BSR T0.2 (R2.3) | |
| E103 | 4856310600 | EYE LET | BSR T0.2 (R2.3) | |
| E104 | 4856310600 | EYE LET | BSR T0.2 (R2.3) | |
| E105 | 4856310600 | EYE LET | BSR T0.2 (R2.3) | |
| E106 | 4856310600 | EYE LET | BSR T0.2 (R2.3) | |
| E107 | 4856310600 | EYE LET | BSR T0.2 (R2.3) | |
| E108 | 4856310600 | EYE LET | BSR T0.2 (R2.3) | |
| E109 | 4856310600 | EYE LET | BSR T0.2 (R2.3) | |
| E110 | 4856310600 | EYE LET | BSR T0.2 (R2.3) | |
| E111 | 4856310600 | EYE LET | BSR T0.2 (R2.3) | |
| E112 | 4856310600 | EYE LET | BSR T0.2 (R2.3) | |
| E113 | 4856310600 | EYE LET | BSR T0.2 (R2.3) | |
| E114 | 4856310600 | EYE LET | BSR T0.2 (R2.3) | |
| E115 | 4856310600 | EYE LET | BSR T0.2 (R2.3) | |
| E116 | 4856310600 | EYE LET | BSR T0.2 (R2.3) | |
| E117 | 4856310600 | EYE LET | BSR T0.2 (R2.3) | |
| E118 | 4856310600 | EYE LET | BSR T0.2 (R2.3) | |
| E119 | 4856310600 | EYE LET | BSR T0.2 (R2.3) | |
| N001 | 4857417500 | TERM PIN | DA-IB0214(D2.3/DY PIN) | |
| N002 | 4857417500 | TERM PIN | DA-IB0214(D2.3/DY PIN) | |
| N003 | 4857417500 | TERM PIN | DA-IB0214(D2.3/DY PIN) | |
| N004 | 4857417500 | TERM PIN | DA-IB0214(D2.3/DY PIN) | |
| P601 | 485923162S | CONN WAFER | YW025-03 (STICK) | |
| R303 | RS02Z129JS | R M-OXIDE FILM | 2W 1.2 OHM J SMALL | |
| R402 | RS01Z279J- | R M-OXIDE FILM | 1W 2.7 OHM J (TAPPING) | |
| R415 | RS02Z102JS | R M-OXIDE FILM | 2W 1K OHM J SMALL | |
| R819 | RS02Z473JS | R M-OXIDE FILM | 2W 47K OHM J SMALL | |
| R821 | RS02Z180JS | R M-OXIDE FILM | 2W 18 OHM J SMALL | |
| R822 | RS02Z101JS | R M-OXIDE FILM | 2W 100 OHM J SMALL | |
| R824 | RS02Z560JS | R M-OXIDE FILM | 2W 56 OHM J SMALL | |
| ZZ200 | PTMPJRD435 | PCB MAIN RADIAL AS | DTA-21V1MZ | |
| C101 | CEXF1H100V | C ELECTRO | 50V RSS 10MF (5X11) TP | |
| C102 | CEXF1E470V | C ELECTRO | 25V RSS 47MF (5X11) TP | |
| C106 | CEXF1H100V | C ELECTRO | 50V RSS 10MF (5X11) TP | |
| C121 | CEXF1H100V | C ELECTRO | 50V RSS 10MF (5X11) TP | |
| C305 | CEXF1E221V | C ELECTRO | 25V RSS 220MF (8X11.5) TP | |
| C313 | CMXM2A104J | C MYLAR | 100V 0.1MF J (TP) | |
| C314 | CMXM2A104J | C MYLAR | 100V 0.1MF J (TP) | |
| C412 | CEXF2C229V | C ELECTRO | 160V RSS 2.2MF (8X11.5)TP | |
| C414 | CMXM2A104J | C MYLAR | 100V 0.1MF J (TP) | |
| C417 | CXSL2H470J | C CERA | 500V SL 47PF J (TAPPING) | |
| C418 | CMXM2A104J | C MYLAR | 100V 0.1MF J (TP) | |
| C420 | CCXB1H102K | C CERA | 50V B 1000PF K (TAPPING) | |
| C500 | CEXF1H478V | C ELECTRO | 50V RSS 0.47MF (5X11) TP | |
| C501 | CEXF1H100V | C ELECTRO | 50V RSS 10MF (5X11) TP | |

ELECTRICAL PARTS LIST

| LOC | PART CODE | PART NAME | DESCRIPTION | REMARK |
|-------|------------|------------|---------------------------|--------|
| C502 | CEXF1E470V | C ELECTRO | 25V RSS 47MF (5X11) TP | |
| C504 | CMXM2A332J | C MYLAR | 100V 3300PF J (TP) | |
| C509 | CEXF1E470V | C ELECTRO | 25V RSS 47MF (5X11) TP | |
| C511 | CMXM2A104J | C MYLAR | 100V 0.1MF J (TP) | |
| C512 | CMXM2A104J | C MYLAR | 100V 0.1MF J (TP) | |
| C514 | CEXF1E101V | C ELECTRO | 25V RSS 100MF (6.3X11) TP | |
| C517 | CEXF1H109V | C ELECTRO | 50V RSS 1MF (5X11) TP | |
| C519 | CEXF1H109V | C ELECTRO | 50V RSS 1MF (5X11) TP | |
| C522 | CEXF1H479V | C ELECTRO | 50V RSS 4.7MF (5X11) TP | |
| C524 | CMXM2A104J | C MYLAR | 100V 0.1MF J (TP) | |
| C526 | CMXM2A104J | C MYLAR | 100V 0.1MF J (TP) | |
| C528 | CEXF1E101V | C ELECTRO | 25V RSS 100MF (6.3X11) TP | |
| C530 | CEXF1E101V | C ELECTRO | 25V RSS 100MF (6.3X11) TP | |
| C532 | CEXF1H100V | C ELECTRO | 50V RSS 10MF (5X11) TP | |
| C551 | CEXF1E470V | C ELECTRO | 25V RSS 47MF (5X11) TP | |
| C555 | CEXF1E470V | C ELECTRO | 25V RSS 47MF (5X11) TP | |
| C564 | CEXF1E101V | C ELECTRO | 25V RSS 100MF (6.3X11) TP | |
| C593 | CEXF1E101V | C ELECTRO | 25V RSS 100MF (6.3X11) TP | |
| C599 | CEXF1H229V | C ELECTRO | 50V RSS 2.2MF (5X11) TP | |
| C600 | CEXF1E101V | C ELECTRO | 25V RSS 100MF (6.3X11) TP | |
| C601 | CEXF1H108V | C ELECTRO | 50V RSS 0.1MF (5X11) TP | |
| C603 | CEXF1C101V | C ELECTRO | 16V RSS 100MF (6.3X11) TP | |
| C650 | CEXF1E470V | C ELECTRO | 25V RSS 47MF (5X11) TP | |
| C770 | CEXF1H100V | C ELECTRO | 50V RSS 10MF (5X11) TP | |
| C802 | CCXF3A472Z | C CERA | 1KV F 4700PF Z (T) | |
| C803 | CCXF3A472Z | C CERA | 1KV F 4700PF Z (T) | |
| C806 | CMXM2A222J | C MYLAR | 100V 2200PF J (TP) | |
| C807 | CMXM2A102J | C MYLAR | 100V 1000PF J (TP) | |
| C809 | CCXB3A471K | C CERA | 1KV B 470PF K (T) | |
| C812 | CEXF2A100V | C ELECTRO | 100V RSS 10MF (6.3X11) TP | |
| C815 | CEXF1E101V | C ELECTRO | 25V RSS 100MF (6.3X11) TP | |
| C816 | CEXF1E101V | C ELECTRO | 25V RSS 100MF (6.3X11) TP | |
| C817 | CEXF1E101V | C ELECTRO | 25V RSS 100MF (6.3X11) TP | |
| C818 | CEXF1E101V | C ELECTRO | 25V RSS 100MF (6.3X11) TP | |
| C819 | CEXF1E470V | C ELECTRO | 25V RSS 47MF (5X11) TP | |
| C820 | CEXF1C221V | C ELECTRO | 16V RSS 220MF (8X11.5) TP | |
| C901 | CMXL2E104K | C MYLAR | 250V MEU 0.1MF K | |
| C902 | CCXB1H561K | C CERA | 50V B 560PF K (TAPPING) | |
| CA04 | CEXD1H229F | C ELECTRO | 50V RND 2.2MF (5X11) TP | |
| CA05 | CCXB1H102K | C CERA | 50V B 1000PF K (TAPPING) | |
| F801A | 4857415001 | CLIP FUSE | PFC5000-0702 | |
| F801B | 4857415001 | CLIP FUSE | PFC5000-0702 | |
| L802 | 58C9430599 | COIL CHOKE | AZ-9004Y(94MH) | |
| Q101 | TKTC3198Y- | TR | KTC3198Y | |
| Q402 | TKTC3207— | TR | KTC3207 (TP) | |

ELECTRICAL PARTS LIST

| LOC | PART CODE | PART NAME | DESCRIPTION | REMARK |
|-------|------------|-------------------|--------------------------|--------|
| Q403 | TKTC3198Y- | TR | KTC3198Y | |
| Q501 | TKTA1266Y- | TR | KTA1266Y (TP) | |
| Q502 | TKTC3198Y- | TR | KTC3198Y | |
| Q503 | TKTC3198Y- | TR | KTC3198Y | |
| Q510 | TKTA1266Y- | TR | KTA1266Y (TP) | |
| Q511 | TKTA1266Y- | TR | KTA1266Y (TP) | |
| Q520 | TKTC3198Y- | TR | KTC3198Y | |
| Q531 | TKTA1266Y- | TR | KTA1266Y (TP) | |
| Q805 | TKTC3205Y- | TR | KTC3205Y (TP) | |
| Q807 | TKTA1266Y- | TR | KTA1266Y (TP) | |
| Q808 | TKTC3198Y- | TR | KTC3198Y | |
| Q809 | TKTC3198Y- | TR | KTC3198Y | |
| Q810 | TKTC3198Y- | TR | KTC3198Y | |
| Q851 | TKTC3198Y- | TR | KTC3198Y | |
| Q852 | TKTC3198Y- | TR | KTC3198Y | |
| SW700 | 5S50101090 | SW TACT | THVH472GCA | |
| SW701 | 5S50101090 | SW TACT | THVH472GCA | |
| SW702 | 5S50101090 | SW TACT | THVH472GCA | |
| SW703 | 5S50101090 | SW TACT | THVH472GCA | |
| SW704 | 5S50101090 | SW TACT | THVH472GCA | |
| ZZ200 | PTMPJAD435 | PCB MAIN AXIAL AS | DTA-21V1MZ | |
| 10 | 2TM14006LB | TAPE MASKING | 3M #232 6.0X2000M | |
| 20 | 2TM10006LB | TAPE MASKING | 3M #232-MAP-C 6.2X2000M | |
| A001 | 4859805293 | PCB MAIN | 246X246 S1B | |
| C350 | CCZF1H473Z | C CERA | 50V F 0.047MF Z | |
| C351 | CCZB1H222K | C CERA | 50V B 2200PF K AXIAL | |
| C421 | CCZF1H103Z | C CERA | 50V F 0.01MF Z | |
| C506 | CBZF1H104Z | C CERA SEMI | 50V F 0.1MF Z | |
| C515 | CBZR1C222M | C CERA | 16V Y5R 2200PF M (AXIAL) | |
| C516 | CBZR1C472M | C CERA | 16V Y5R 4700PF M (AXIAL) | |
| C518 | CBZF1H104Z | C CERA SEMI | 50V F 0.1MF Z | |
| C520 | CCZB1H221K | C CERA | 50V B 220PF K (AXIAL) | |
| C521 | CCZB1H221K | C CERA | 50V B 220PF K (AXIAL) | |
| C523 | CCZF1H103Z | C CERA | 50V F 0.01MF Z | |
| C525 | CCZB1H102K | C CERA | 50V B 1000PF K (AXIAL) | |
| C527 | CCZF1H473Z | C CERA | 50V F 0.047MF Z | |
| C531 | CCZF1H473Z | C CERA | 50V F 0.047MF Z | |
| C533 | CCZB1H102K | C CERA | 50V B 1000PF K (AXIAL) | |
| C534 | CCZF1H223Z | C CERA | 50V F 0.022MF Z | |
| C535 | CCZF1H223Z | C CERA | 50V F 0.022MF Z | |
| C536 | CCZF1H223Z | C CERA | 50V F 0.022MF Z | |
| C570 | CBZR1C472M | C CERA | 16V Y5R 4700PF M (AXIAL) | |
| C571 | CCZB1H821K | C CERA | 50V B 820PF K AXIAL | |
| C585 | CBZR1C222M | C CERA | 16V Y5R 2200PF M (AXIAL) | |
| C590 | CZCH1H270J | C CERA | CH 50V 27PF J AXL 52MM | |

ELECTRICAL PARTS LIST

| LOC | PART CODE | PART NAME | DESCRIPTION | REMARK |
|------|------------|-------------|------------------------|--------|
| C591 | CZCH1H270J | C CERA | CH 50V 27PF J AXL 52MM | |
| C602 | CCZF1H103Z | C CERA | 50V F 0.01MF Z | |
| C771 | CBZF1H104Z | C CERA SEMI | 50V F 0.1MF Z | |
| CA01 | CCZB1H101K | C CERA | 50V B 100PF K (AXIAL) | |
| CA02 | CCZB1H101K | C CERA | 50V B 100PF K (AXIAL) | |
| CA03 | CCZB1H101K | C CERA | 50V B 100PF K (AXIAL) | |
| CA10 | CCZB1H102K | C CERA | 50V B 1000PF K (AXIAL) | |
| D101 | D1N4148— | DIODE | 1N4148 (TAPPING) | |
| D120 | DUZ33B— | DIODE ZENER | UZ-33B | |
| D313 | D1N4004S— | DIODE | 1N4004S | |
| D350 | DUZ12BM— | DIODE ZENER | UZ-12BM (UNIZON) | |
| D351 | DUZ15BM— | DIODE ZENER | UZ-15BM | |
| D352 | DUZ33B— | DIODE ZENER | UZ-33B | |
| D353 | DUZ33B— | DIODE ZENER | UZ-33B | |
| D360 | DUZ33B— | DIODE ZENER | UZ-33B | |
| D361 | DUZ33B— | DIODE ZENER | UZ-33B | |
| D362 | DUZ33B— | DIODE ZENER | UZ-33B | |
| D405 | D1N4937G— | DIODE | 1N4937G (TAPPING) | |
| D407 | D1N4937G— | DIODE | 1N4937G (TAPPING) | |
| D408 | D1N4937G— | DIODE | 1N4937G (TAPPING) | |
| D450 | D1N4937G— | DIODE | 1N4937G (TAPPING) | |
| D520 | D1N4148— | DIODE | 1N4148 (TAPPING) | |
| D521 | D1N4148— | DIODE | 1N4148 (TAPPING) | |
| D531 | D1N4148— | DIODE | 1N4148 (TAPPING) | |
| D532 | D1N4148— | DIODE | 1N4148 (TAPPING) | |
| D533 | D1N4148— | DIODE | 1N4148 (TAPPING) | |
| D534 | D1N4148— | DIODE | 1N4148 (TAPPING) | |
| D591 | DUZ2R4B— | DIODE ZENER | UZ-2.4B | |
| D710 | DMTZJ5R1A- | DIODE ZENER | MTZJ 5.1A | |
| D801 | DLT2A05G— | DIODE | LT2A05G (TP) | |
| D802 | DLT2A05G— | DIODE | LT2A05G (TP) | |
| D803 | DLT2A05G— | DIODE | LT2A05G (TP) | |
| D804 | DLT2A05G— | DIODE | LT2A05G (TP) | |
| D805 | D1N4937G— | DIODE | 1N4937G (TAPPING) | |
| D806 | DUZ8R2BM— | DIODE ZENER | UZ-8.2B | |
| D808 | D1N4937G— | DIODE | 1N4937G (TAPPING) | |
| D810 | D1N4937G— | DIODE | 1N4937G (TAPPING) | |
| D812 | DUZ8R2BM— | DIODE ZENER | UZ-8.2B | |
| D813 | D1N4148— | DIODE | 1N4148 (TAPPING) | |
| D816 | DZY160— | DIODE ZENER | ZY160 | |
| D820 | DUZ2R7B— | DIODE ZENER | UZ-2.7B | |
| D821 | DRGP15J— | DIODE | RGP15J | |
| DA03 | DUZ5R1B— | DIODE ZENER | UZ-5.1B | |
| DA04 | DUZ5R6BM— | DIODE ZENER | UZ-5.6BM | |
| DA05 | DUZ5R6BM— | DIODE ZENER | UZ-5.6BM | |

ELECTRICAL PARTS LIST

| LOC | PART CODE | PART NAME | DESCRIPTION | REMARK |
|------|------------|---------------|--------------------------|--------|
| DA06 | DUZ5R6BM— | DIODE ZENER | UZ-5.6BM | |
| DA08 | DUZ5R6BM— | DIODE ZENER | UZ-5.6BM | |
| DA09 | DUZ5R6BM— | DIODE ZENER | UZ-5.6BM | |
| DA10 | DUZ5R6BM— | DIODE ZENER | UZ-5.6BM | |
| DA13 | DUZ5R6BM— | DIODE ZENER | UZ-5.6BM | |
| DA27 | DUZ5R6BM— | DIODE ZENER | UZ-5.6BM | |
| J001 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J002 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J003 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J004 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J005 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J006 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J008 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J010 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J012 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J013 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J014 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J016 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J017 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J018 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J019 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J020 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J021 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J022 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J024 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J026 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J027 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J028 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J029 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J030 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J031 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J032 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J034 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J035 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J036 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J037 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J038 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J039 | RD-AZ221J- | R CARBON FILM | 1/6 220 OHM J | |
| J040 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J041 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J042 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J043 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J044 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J045 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J046 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |

ELECTRICAL PARTS LIST

| LOC | PART CODE | PART NAME | DESCRIPTION | REMARK |
|------|------------|---------------|--------------------------|--------|
| J047 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J048 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J049 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J050 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J051 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J052 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J053 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J054 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J055 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J056 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J061 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J062 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J063 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J064 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| J065 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| L101 | 5CPZ100K02 | COIL PEAKING | 10UH K (AXIAL 3.5MM) | |
| L301 | 5CPZ100K04 | COIL PEAKING | 10UH 10.5MM K (LAL04TB) | |
| L303 | 85801065GY | WIRE COPPER | AWG22 1/0.65 TIN COATING | |
| L304 | 5CPZ100K04 | COIL PEAKING | 10UH 10.5MM K (LAL04TB) | |
| L500 | 5CPZ829K02 | COIL PEAKING | 8.2UH K (AXIAL 3.5MM) | |
| L501 | 5CPZ100K02 | COIL PEAKING | 10UH K (AXIAL 3.5MM) | |
| L502 | 5CPZ100K02 | COIL PEAKING | 10UH K (AXIAL 3.5MM) | |
| L510 | 5CPZ100K02 | COIL PEAKING | 10UH K (AXIAL 3.5MM) | |
| L511 | 5CPZ100K02 | COIL PEAKING | 10UH K (AXIAL 3.5MM) | |
| L601 | 5MC0000100 | COIL BEAD | HC-3550 | |
| L801 | 5MC0000100 | COIL BEAD | HC-3550 | |
| R101 | RD-AZ473J- | R CARBON FILM | 1/6 47K OHM J | |
| R102 | RD-AZ472J- | R CARBON FILM | 1/6 4.7K OHM J | |
| R103 | RD-AZ123J- | R CARBON FILM | 1/6 12K OHM J | |
| R104 | RD-AZ104J- | R CARBON FILM | 1/6 100K OHM J | |
| R105 | RD-AZ392J- | R CARBON FILM | 1/6 3.9K OHM J | |
| R106 | RD-AZ101J- | R CARBON FILM | 1/6 100 OHM J | |
| R107 | RD-AZ101J- | R CARBON FILM | 1/6 100 OHM J | |
| R120 | RD-AZ101J- | R CARBON FILM | 1/6 100 OHM J | |
| R121 | RD-2Z332J- | R CARBON FILM | 1/2 3.3K OHM J | |
| R302 | RD-2Z109J- | R CARBON FILM | 1/2 1 OHM J | |
| R305 | RD-2Z331J- | R CARBON FILM | 1/2 330 OHM J | |
| R306 | RD-4Z564J- | R CARBON FILM | 1/4 560K OHM J | |
| R310 | RD-4Z102J- | R CARBON FILM | 1/4 1K OHM J | |
| R311 | RD-4Z102J- | R CARBON FILM | 1/4 1K OHM J | |
| R340 | RD-4Z473J- | R CARBON FILM | 1/4 47K OHM J | |
| R350 | RN-4Z1501F | R METAL FILM | 1/4 1.50K OHM F | |
| R351 | RN-4Z1501F | R METAL FILM | 1/4 1.50K OHM F | |
| R355 | RD-AZ272J- | R CARBON FILM | 1/6 2.7K OHM J | |
| R356 | RD-4Z562J- | R CARBON FILM | 1/4 5.6K OHM J | |

ELECTRICAL PARTS LIST

| LOC | PART CODE | PART NAME | DESCRIPTION | REMARK |
|------|------------|---------------|----------------|--------|
| R401 | RD-4Z472J- | R CARBON FILM | 1/4 4.7K OHM J | |
| R404 | RD-2Z751J- | R CARBON FILM | 1/2 750 OHM J | |
| R405 | RD-AZ102J- | R CARBON FILM | 1/6 1K OHM J | |
| R406 | RD-AZ473J- | R CARBON FILM | 1/6 47K OHM J | |
| R420 | RD-AZ102J- | R CARBON FILM | 1/6 1K OHM J | |
| R430 | RD-4Z223J- | R CARBON FILM | 1/4 22K OHM J | |
| R431 | RD-4Z303J- | R CARBON FILM | 1/4 30K OHM J | |
| R450 | RD-2Z103J- | R CARBON FILM | 1/2 10K OHM J | |
| R505 | RD-AZ101J- | R CARBON FILM | 1/6 100 OHM J | |
| R506 | RD-AZ332J- | R CARBON FILM | 1/6 3.3K OHM J | |
| R507 | RD-AZ101J- | R CARBON FILM | 1/6 100 OHM J | |
| R508 | RD-AZ332J- | R CARBON FILM | 1/6 3.3K OHM J | |
| R509 | RD-AZ681J- | R CARBON FILM | 1/6 680 OHM J | |
| R512 | RD-AZ101J- | R CARBON FILM | 1/6 100 OHM J | |
| R513 | RD-AZ101J- | R CARBON FILM | 1/6 100 OHM J | |
| R514 | RD-AZ101J- | R CARBON FILM | 1/6 100 OHM J | |
| R515 | RD-AZ153J- | R CARBON FILM | 1/6 15K OHM J | |
| R516 | RD-AZ393J- | R CARBON FILM | 1/6 39K OHM J | |
| R517 | RD-AZ102J- | R CARBON FILM | 1/6 1K OHM J | |
| R518 | RD-AZ273J- | R CARBON FILM | 1/6 27K OHM J | |
| R520 | RD-AZ183J- | R CARBON FILM | 1/6 18K OHM J | |
| R521 | RD-AZ391J- | R CARBON FILM | 1/6 390 OHM J | |
| R522 | RD-AZ221J- | R CARBON FILM | 1/6 220 OHM J | |
| R523 | RD-AZ331J- | R CARBON FILM | 1/6 330 OHM J | |
| R524 | RD-AZ561J- | R CARBON FILM | 1/6 560 OHM J | |
| R525 | RD-AZ104J- | R CARBON FILM | 1/6 100K OHM J | |
| R526 | RD-4Z479J- | R CARBON FILM | 1/4 4.7 OHM J | |
| R527 | RD-AZ431J- | R CARBON FILM | 1/6 430 OHM J | |
| R528 | RD-AZ221J- | R CARBON FILM | 1/6 220 OHM J | |
| R530 | RD-AZ470J- | R CARBON FILM | 1/6 47 OHM J | |
| R531 | RD-AZ102J- | R CARBON FILM | 1/6 1K OHM J | |
| R533 | RD-AZ103J- | R CARBON FILM | 1/6 10K OHM J | |
| R534 | RD-AZ102J- | R CARBON FILM | 1/6 1K OHM J | |
| R535 | RD-AZ101J- | R CARBON FILM | 1/6 100 OHM J | |
| R537 | RD-AZ101J- | R CARBON FILM | 1/6 100 OHM J | |
| R538 | RD-AZ101J- | R CARBON FILM | 1/6 100 OHM J | |
| R539 | RD-AZ101J- | R CARBON FILM | 1/6 100 OHM J | |
| R551 | RD-AZ223J- | R CARBON FILM | 1/6 22K OHM J | |
| R555 | RD-AZ103J- | R CARBON FILM | 1/6 10K OHM J | |
| R556 | RD-AZ562J- | R CARBON FILM | 1/6 5.6K OHM J | |
| R560 | RD-4Z102J- | R CARBON FILM | 1/4 1K OHM J | |
| R567 | RD-AZ101J- | R CARBON FILM | 1/6 100 OHM J | |
| R571 | RD-AZ432J- | R CARBON FILM | 1/6 4.3K OHM J | |
| R572 | RD-AZ122J- | R CARBON FILM | 1/6 1.2K OHM J | |
| R573 | RD-AZ272J- | R CARBON FILM | 1/6 2.7K OHM J | |

ELECTRICAL PARTS LIST

| LOC | PART CODE | PART NAME | DESCRIPTION | REMARK |
|------------|------------------|------------------|--------------------|---------------|
| R575 | RD-AZ272J- | R CARBON FILM | 1/6 2.7K OHM J | |
| R580 | RD-AZ561J- | R CARBON FILM | 1/6 560 OHM J | |
| R585 | RD-4Z224J- | R CARBON FILM | 1/4 220K OHM J | |
| R586 | RD-AZ221J- | R CARBON FILM | 1/6 220 OHM J | |
| R591 | RD-AZ221J- | R CARBON FILM | 1/6 220 OHM J | |
| R592 | RD-AZ103J- | R CARBON FILM | 1/6 10K OHM J | |
| R593 | RD-AZ103J- | R CARBON FILM | 1/6 10K OHM J | |
| R594 | RD-AZ103J- | R CARBON FILM | 1/6 10K OHM J | |
| R595 | RD-AZ473J- | R CARBON FILM | 1/6 47K OHM J | |
| R596 | RD-AZ302J- | R CARBON FILM | 1/6 3K OHM J | |
| R597 | RD-AZ153J- | R CARBON FILM | 1/6 15K OHM J | |
| R598 | RD-AZ153J- | R CARBON FILM | 1/6 15K OHM J | |
| R599 | RD-AZ392J- | R CARBON FILM | 1/6 3.9K OHM J | |
| R601 | RD-4Z332J- | R CARBON FILM | 1/4 3.3K OHM J | |
| R602 | RD-AZ152J- | R CARBON FILM | 1/6 1.5K OHM J | |
| R610 | RD-4Z332J- | R CARBON FILM | 1/4 3.3K OHM J | |
| R710 | RD-AZ431J- | R CARBON FILM | 1/6 430 OHM J | |
| R711 | RD-AZ431J- | R CARBON FILM | 1/6 430 OHM J | |
| R713 | RD-AZ100J- | R CARBON FILM | 1/6 10 OHM J | |
| R720 | RD-AZ122J- | R CARBON FILM | 1/6 1.2K OHM J | |
| R721 | RD-AZ181J- | R CARBON FILM | 1/6 180 OHM J | |
| R722 | RD-AZ221J- | R CARBON FILM | 1/6 220 OHM J | |
| R723 | RD-AZ331J- | R CARBON FILM | 1/6 330 OHM J | |
| R724 | RD-AZ471J- | R CARBON FILM | 1/6 470 OHM J | |
| R803 | RD-4Z185J- | R CARBON FILM | 1/4 1.8M OHM J | |
| R804 | RD-4Z185J- | R CARBON FILM | 1/4 1.8M OHM J | |
| R805 | RD-4Z114J- | R CARBON FILM | 1/4 110K OHM J | |
| R806 | RD-4Z244J- | R CARBON FILM | 1/4 240K OHM J | |
| R807 | RD-4Z201J- | R CARBON FILM | 1/4 200 OHM J | |
| R808 | RD-4Z162J- | R CARBON FILM | 1/4 1.6K OHM J | |
| R809 | RD-4Z510J- | R CARBON FILM | 1/4 51 OHM J | |
| R810 | RD-4Z752J- | R CARBON FILM | 1/4 7.5K OHM J | |
| R811 | RD-4Z241J- | R CARBON FILM | 1/4 240 OHM J | |
| R812 | RD-4Z102J- | R CARBON FILM | 1/4 1K OHM J | |
| R813 | RC-2Z565KP | R CARBON COMP | 1/2 5.6M OHM K | |
| R814 | RD-AZ102J- | R CARBON FILM | 1/6 1K OHM J | |
| R815 | RD-AZ102J- | R CARBON FILM | 1/6 1K OHM J | |
| R816 | RD-AZ472J- | R CARBON FILM | 1/6 4.7K OHM J | |
| R817 | RD-AZ223J- | R CARBON FILM | 1/6 22K OHM J | |
| R818 | RD-AZ103J- | R CARBON FILM | 1/6 10K OHM J | |
| R823 | RD-4Z561J- | R CARBON FILM | 1/4 560 OHM J | |
| R825 | RD-AZ222J- | R CARBON FILM | 1/6 2.2K OHM J | |
| R826 | RD-AZ751J- | R CARBON FILM | 1/6 750 OHM J | |
| R827 | RD-AZ472J- | R CARBON FILM | 1/6 4.7K OHM J | |
| R828 | RD-AZ103J- | R CARBON FILM | 1/6 10K OHM J | |

ELECTRICAL PARTS LIST

| LOC | PART CODE | PART NAME | DESCRIPTION | REMARK |
|------|------------|---------------|----------------|--------|
| R829 | RD-AZ102J- | R CARBON FILM | 1/6 1K OHM J | |
| R830 | RD-AZ151J- | R CARBON FILM | 1/6 150 OHM J | |
| R831 | RD-4Z100J- | R CARBON FILM | 1/4 10 OHM J | |
| R901 | RD-AZ102J- | R CARBON FILM | 1/6 1K OHM J | |
| R902 | RD-AZ102J- | R CARBON FILM | 1/6 1K OHM J | |
| R903 | RD-AZ102J- | R CARBON FILM | 1/6 1K OHM J | |
| R904 | RD-2Z152J- | R CARBON FILM | 1/2 1.5K OHM J | |
| R905 | RD-2Z152J- | R CARBON FILM | 1/2 1.5K OHM J | |
| R906 | RD-2Z152J- | R CARBON FILM | 1/2 1.5K OHM J | |
| R954 | RD-AZ103J- | R CARBON FILM | 1/6 10K OHM J | |
| RA01 | RD-AZ680J- | R CARBON FILM | 1/6 68 OHM J | |
| RA02 | RD-AZ101J- | R CARBON FILM | 1/6 100 OHM J | |
| RA03 | RD-AZ101J- | R CARBON FILM | 1/6 100 OHM J | |
| RA04 | RD-AZ101J- | R CARBON FILM | 1/6 100 OHM J | |
| RA06 | RD-AZ750J- | R CARBON FILM | 1/6 75 OHM J | |
| RA07 | RD-AZ390J- | R CARBON FILM | 1/6 39 OHM J | |
| RA08 | RD-AZ750J- | R CARBON FILM | 1/6 75 OHM J | |
| RA09 | RD-AZ750J- | R CARBON FILM | 1/6 75 OHM J | |
| RA10 | RD-AZ101J- | R CARBON FILM | 1/6 100 OHM J | |
| RA11 | RD-AZ102J- | R CARBON FILM | 1/6 1K OHM J | |
| RA12 | RD-AZ471J- | R CARBON FILM | 1/6 470 OHM J | |
| RA16 | RD-AZ680J- | R CARBON FILM | 1/6 68 OHM J | |
| RA19 | RD-AZ750J- | R CARBON FILM | 1/6 75 OHM J | |
| RA20 | RD-AZ473J- | R CARBON FILM | 1/6 47K OHM J | |
| RA30 | RD-AZ102J- | R CARBON FILM | 1/6 1K OHM J | |
| RA44 | RD-AZ682J- | R CARBON FILM | 1/6 6.8K OHM J | |

DIFFERENT PART LIST

| LOC | PART NAME | 14 INCH | 20 INCH CPT CRT | 20 INCH ORING CRT | 21 INCH |
|-------|---------------|---------------|-----------------|-------------------|---------------|
| C404 | C MYLAR | 1.6KV 7500PF | 1.6 KV 9100PF | 1.6KV 8200PF | 1.6KV 7500PF |
| C408 | C MYLAR | 200V 0.62μF | 200V 0.47μF | 200V 0.43μF | 200V 0.47μF |
| 1803 | IC ERROR AMP | DP123 | DP123 | DP133 | DP123 |
| L401 | COIL H-LIN | NONE | NONE | NONE | L-76 |
| R801 | POSISTOR | ECPC140M290 | ECPCD7R0M290 | ECPCD7RM290 | ECPCD7R0M290 |
| SCT1 | SOCKET CRT | PCS633A | PCS629-03C | PCS633A | PCS629-03C |
| P401 | CONN WAFER | YFW500-05 | YFW500-05 | YFW500-05 | YFW500-06 |
| J007 | WIRE COPPER | AWG22 1/0.65 | AWG22 1/0.65 | AWG22 1/0.65 | NONE |
| R350 | R METAL FILM | 1/4W 1K OHM | 1/4 1.2K OHM | 1/4W 1.2K OHM | 1/4W 1.5K OHM |
| R351 | R METAL FILM | 1/4W 1K OHM | 1/4 1.2K OHM | 1/4W 1.2K OHM | 1/4W 1.5K OHM |
| R556 | R METAL FILM | 1/6W 7.5K OHM | 1/6 6.8K OHM | 1/6 6.8K OHM | 1/6 5.6K OHM |
| R810 | R METAL FILM | 1/4W 6.8K OHM | 1/4 7.5K OHM | 1/4W 7.5K OHM | 1/4W 7.5K OHM |
| R402 | R METAL OXIDE | 1W 0.82 OHM | 1W 0.68 OHM | 1W 3.0 OHM | 1W 2.7 OHM |
| V01 | COIL DY | ODY-M1401 | CDY-S2017 | ODY-M2050 | ITC CRT |
| V03 | MAGNET CP | NY-225 | NY-88DTA | NY-225 | ITC CRT |
| V901 | CRT | A34JLL90X | A48AGY13X | A48JLL92X | A51EFK155X01 |
| ZZ131 | CRT GND NET | 1401S-1015-1P | 2001S-1015-1P | 2001S-1015-1P | 2101S-1015-1P |
| ZZ132 | COIL DEG. | DC-1450 | DC-20SF | DC-20SF | DC-21SF |

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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.

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 stabilization

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 Vg2d 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.

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 bus.

- 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 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 1 μ 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 7RF 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 feed-back 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 fly-back 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.

1. TDA9361 : TV signal processor - Teletext decoder with embedded μ -Controller. TDA9381 : TV signal processor - 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
- 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 offset 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 decode
- 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

μ -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 lever 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

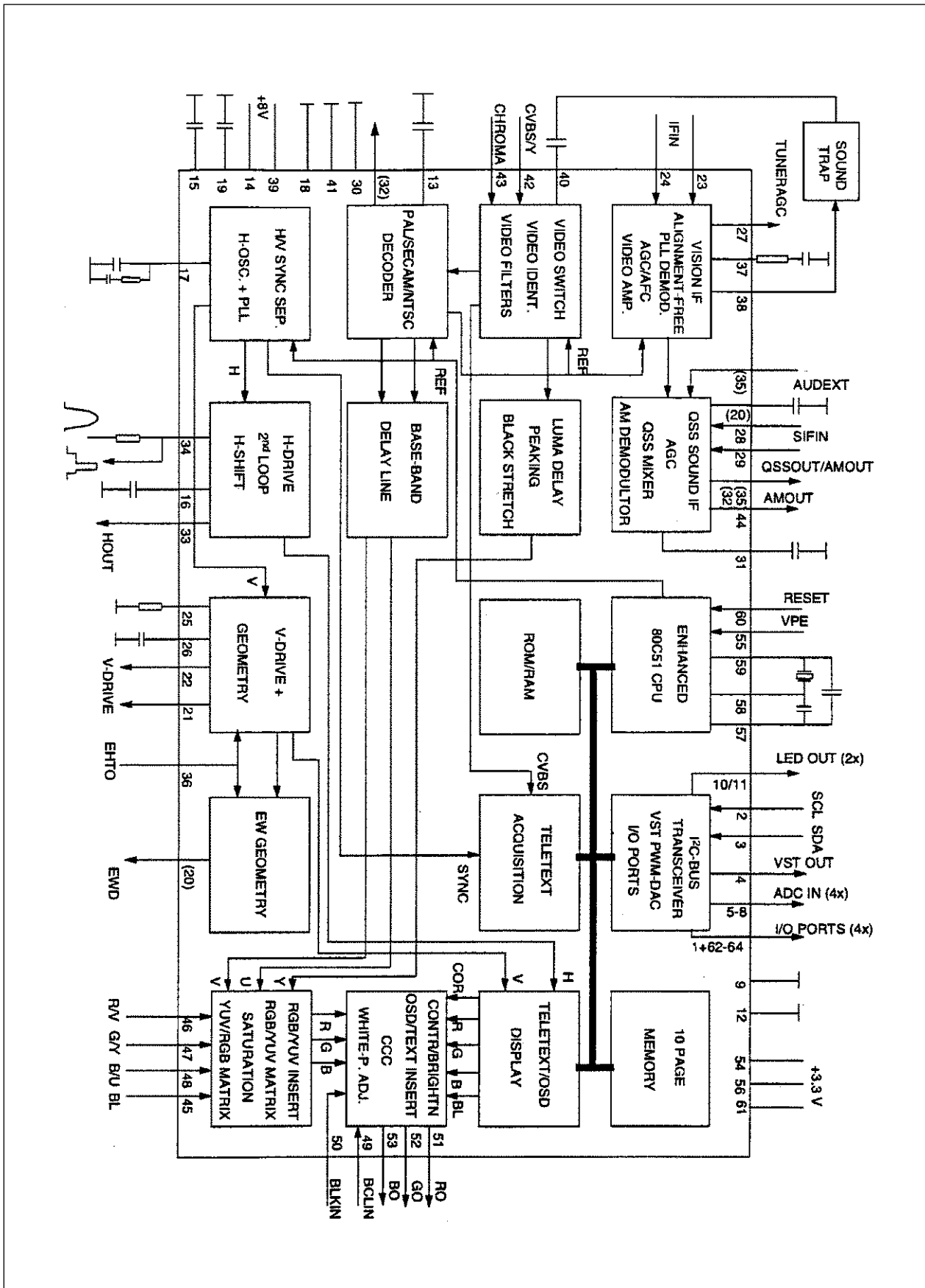
Data Capture

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.

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
- Inventory 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



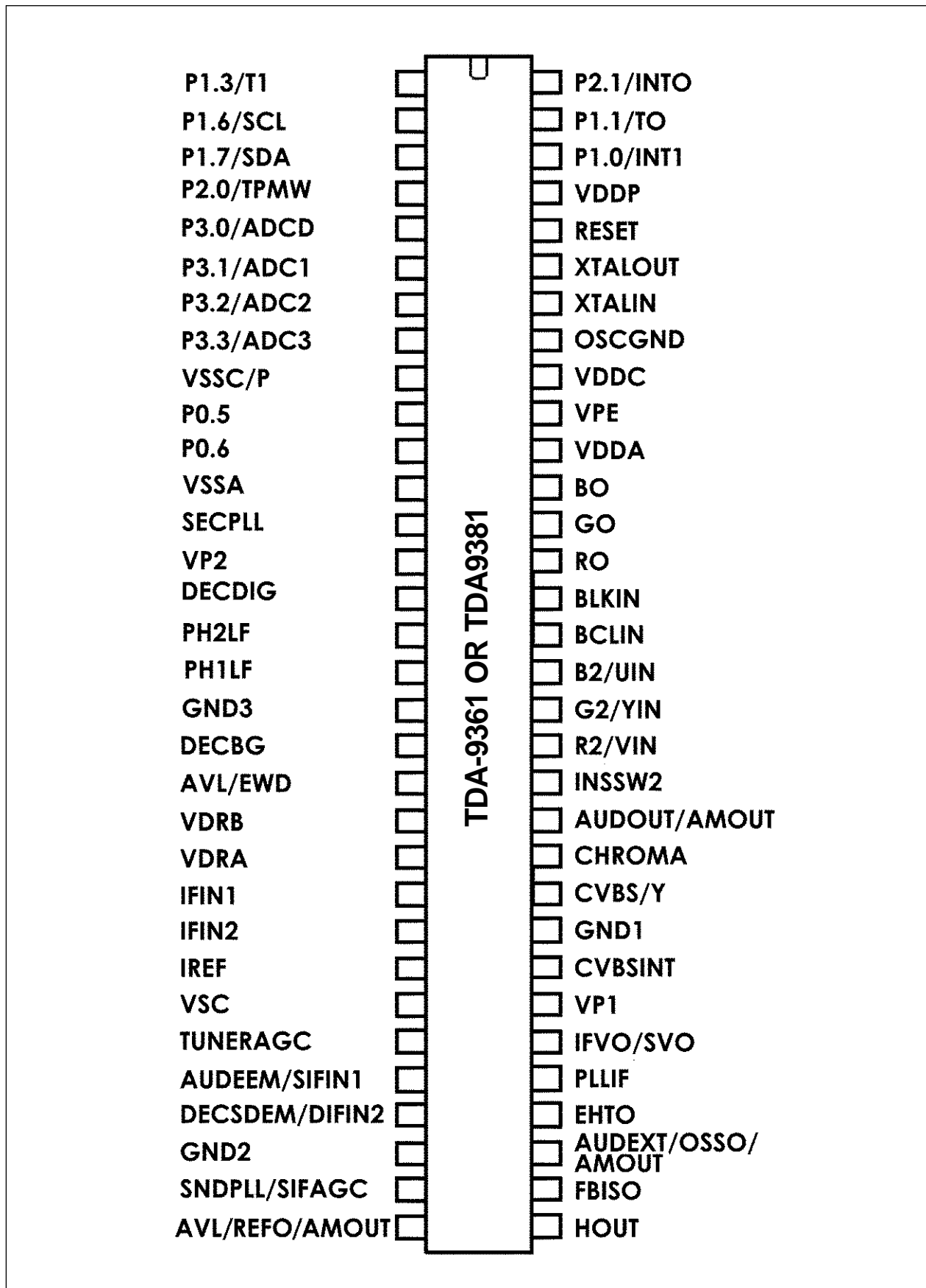
IC marking and version

| Chassis | IC marking (line 3) | OSD languages | Text |
|-----------|---|--|------------------------------------|
| CP 185 | DW9361/N1/3-DE1 (note : x is the software version) | English, Russian Arabic, Melayu | English, Russian Arabic, Melayu |
| | | | |
| | | | |
| CP 185N/C | DW9381/N3-DE1 (note : x is the software version) | English, Russian, Arabic Melayu, Thailand, HIND | |

PINNING

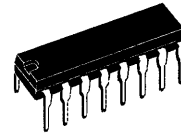
| SYMBOL | PIN | DESCRIPTION |
|--------------|-----|---|
| n.u. | 1 | Port 1.3 Not used. |
| SCL | 2 | I2C bus clock line |
| SDA | 3 | I2C Data line |
| SECAM L' out | 4 | Port 2.0 : FM sound : PushPull Low AM SECAM L'PushPull High AM SECAM L : High Impedance |
| OCP | 5 | Port 3.0 : Over Current Protection |
| 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 |

| SYMBOL | PIN | DESCRIPTION |
|------------|-----|---|
| 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/Overtoltage 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. TDA-7267A

- Can deliver 3w the 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



PowerDIP 8+8

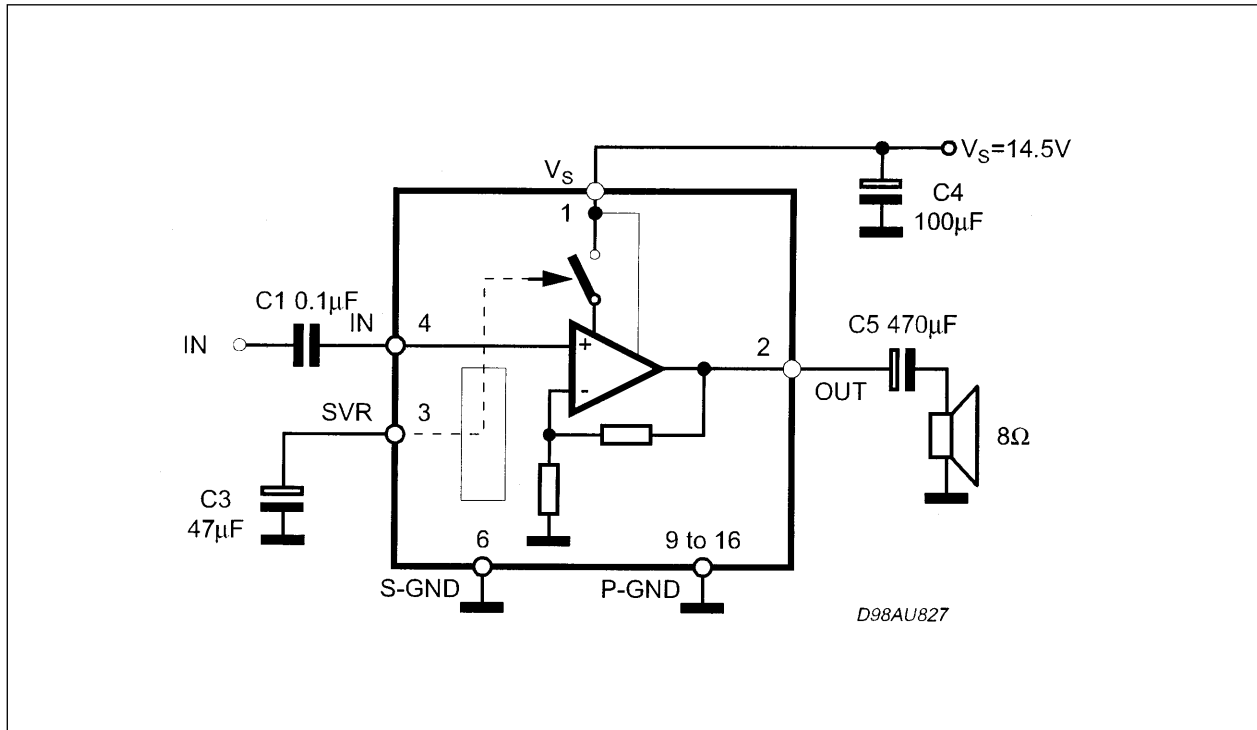
ORDERING NUMBER : TDA7267A

Decription

The device TDA7267A is a new technology Mono Audio Amplifier in Power DIP package specifically 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.

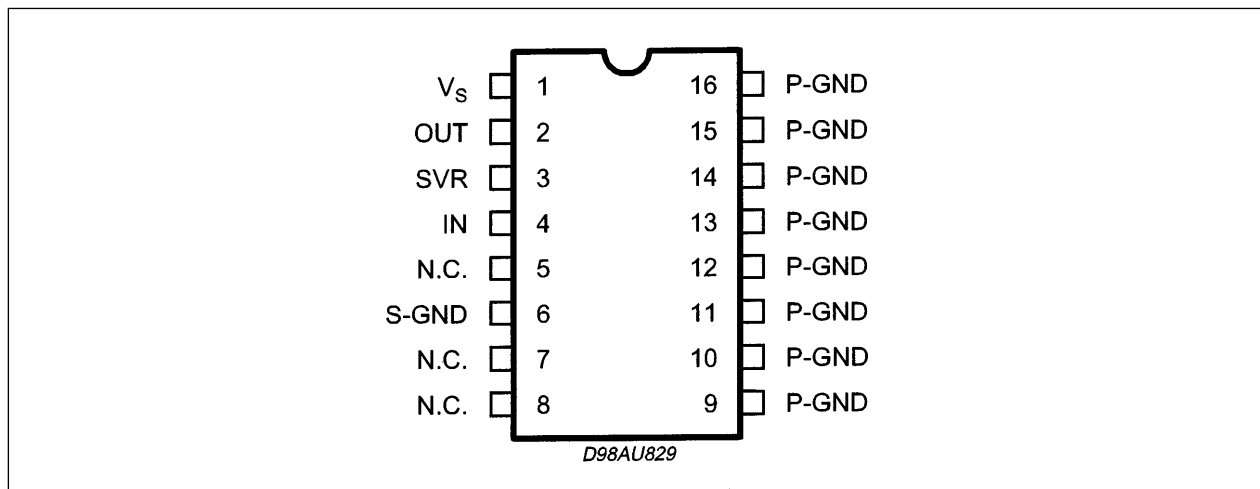
Black Diagram



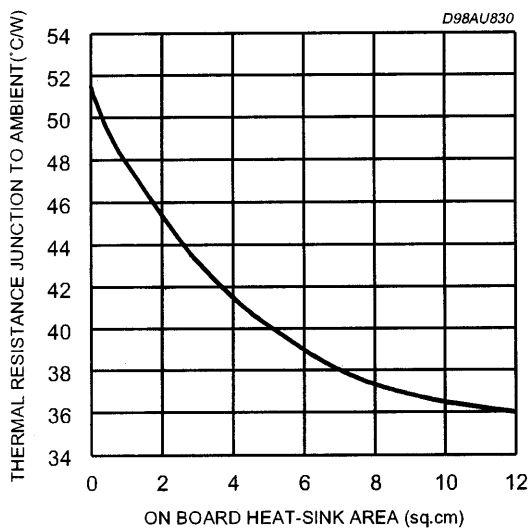
ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | unit |
|------------------|-----------------------------|------------|------|
| V _s | Operating Supply Voltage | 18 | V |
| I _o | Output Put Peak Current | 1.5 | A |
| T _{op} | Operating Temperature Range | 0 to 70 | °C |
| T _i | Junction Temperature | 150 | °C |
| T _{stg} | Storage Temperature Range | -40 to 125 | °C |

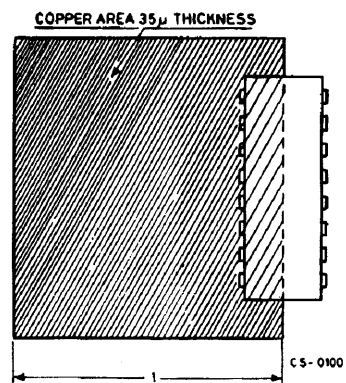
PIN CONNECTION (Top View)



Rth with "on Board" Square heat Sink vs. Copper Area



Example of heatsink using PC board copper



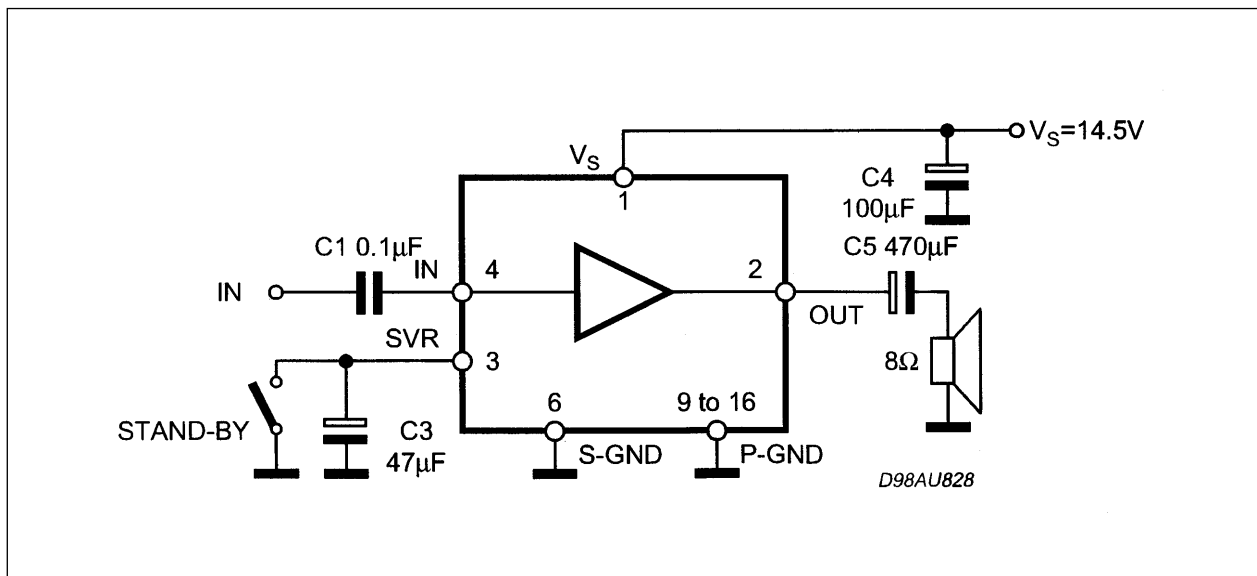
THERAML DATA

| Symbol | Parameter | Value | unit |
|------------------------|--|-------|------|
| R _{th j-amb} | Thermal Rasistance junction to ambient | 70 | °C/W |
| R _{th j-case} | Thermal Resistance Junction to case | 15 | °C/W |

ELECTRICAL CHARACTERISTICS (T_{amb} = 25°C; V_s = 14.5V; R_L=8Ω; f=1KHz; nules otherwise specified.)

| Symbol | Parameter | Value | unit |
|-----------------|--------------------------|---|-----------|
| V _s | Supply Voltage Range | 5 | 18 V |
| I _s | Quiescent Current | 23 | 35 mA |
| I _{sb} | Stand-By Current | Pin 3 shorted to GND | 0.3 mA |
| V _o | Quiescent Output Voltage | 7.5 | V |
| A _v | voltage Gain | 31 | 33 dB |
| R _{IN} | Input Impedance | 50 | 100 KΩ |
| P _o | Output Power | THD = 10% | 2.7 3 W |
| THD | Distortion | P _o = 1W | 0.1 0.3 % |
| SVR | Supply Voltage Rejection | V _{ripple} = 150mVrms; F _{ripple} = 1KHz | 50 dB |
| E _i | Input Noise Voltage | R _g = 10KΩ; BW = 20Hz to 20KHz | 5 10 μV |
| V _{sb} | Stand-By Enable Voltage | | 1 V |

Figure1. Application Circuit



APPLICATION HINTS :

For 14.5V supply and 8Ω speaker application, its maximum power dissipation is about 1.8W.

Assumming that max ambient temperature is 70°C, the required thermal resistance of the device mounted on the PCB with a dissipating area must be equal to : $(150-70)/1.8 = 44.4^{\circ}\text{C/W}$.

Junction to pin thermal resistance of the package is about 15°C/W. That means external heat sink of about 30°C C/W is required.

Cu ground plane of PCB can be used as heat dissipating means.

3. TDA8357J Vertical Amplifier

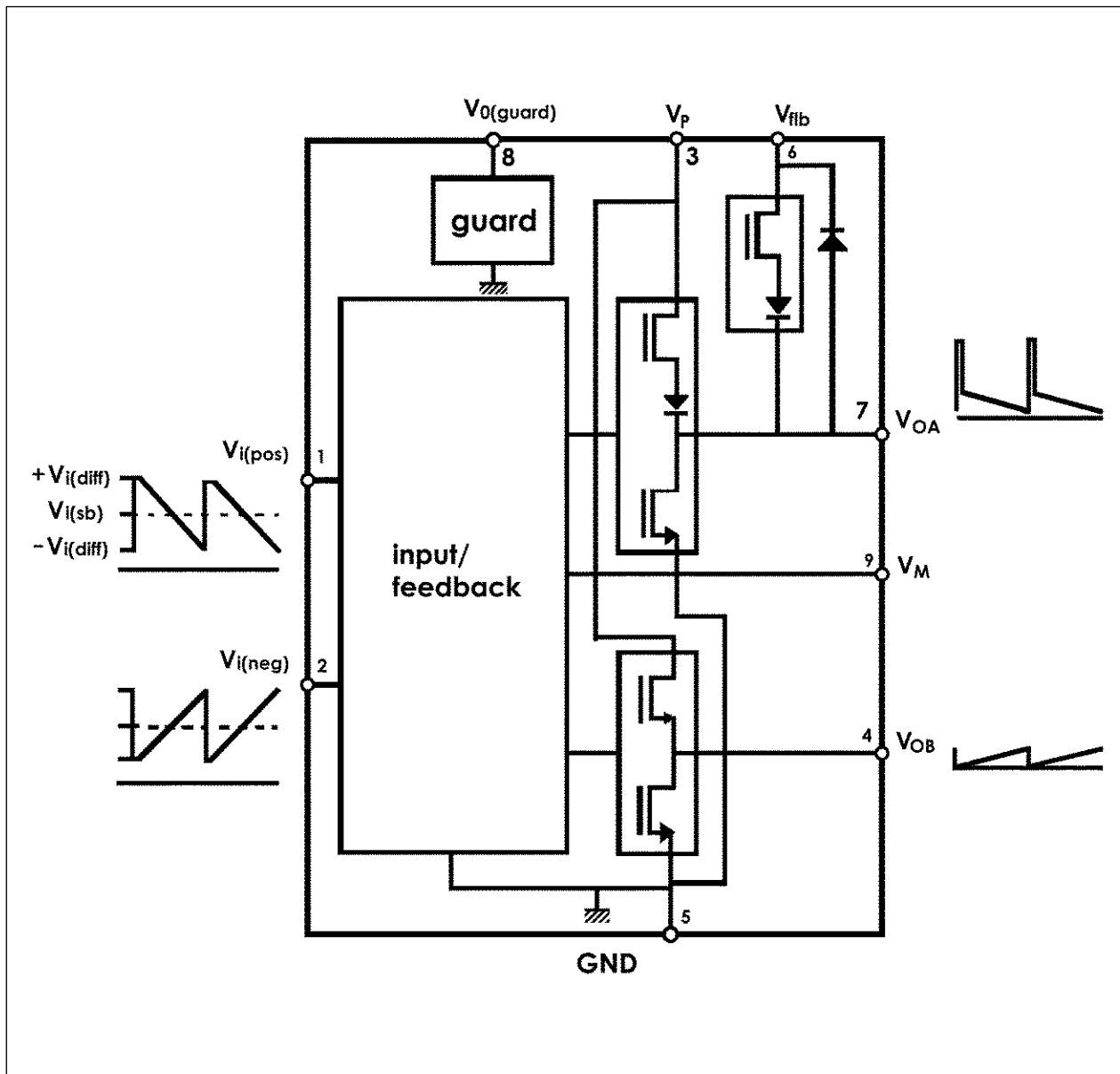
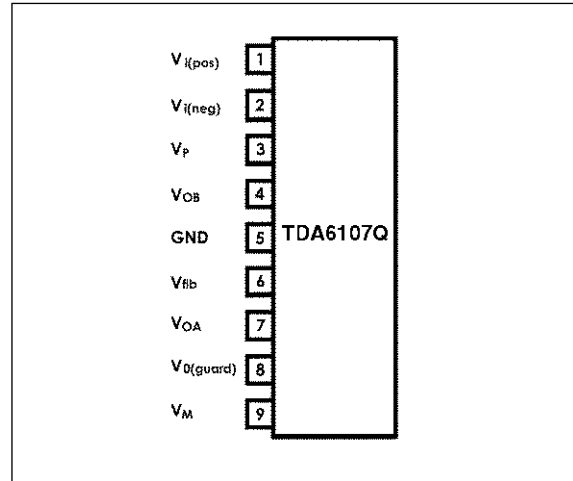
The TDA8357J is a power circuit for use in 90° TV systems for field frequencies of 25 to 200Hz and 16/9 picture tubes. The circuit provides a DC driven vertical deflection output circuit, operating as a highly efficient class G system. Due to the full bridge output circuit the deflection coils can be 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_{fb} | flyback supply voltage |
| 7 | V_{OA} | output voltage A |
| 8 | $V_{O(guard)}$ | guard output voltage |
| 9 | V_M | input measuring resistor |



4. TDA6107Q

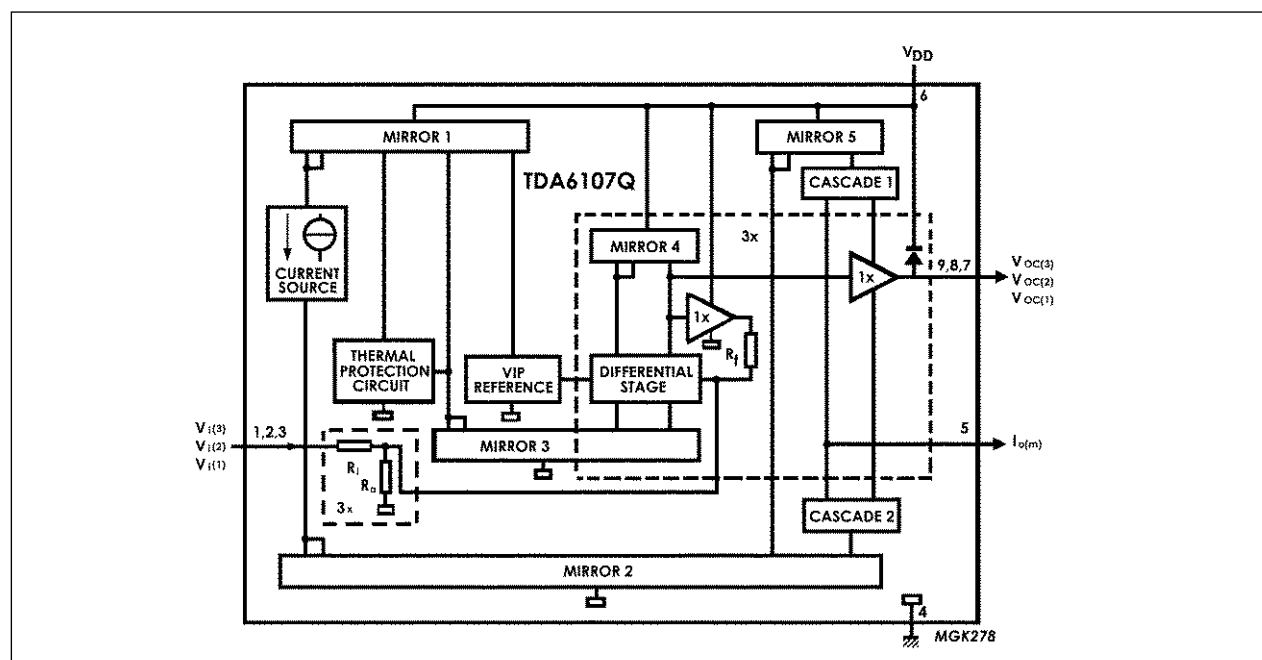
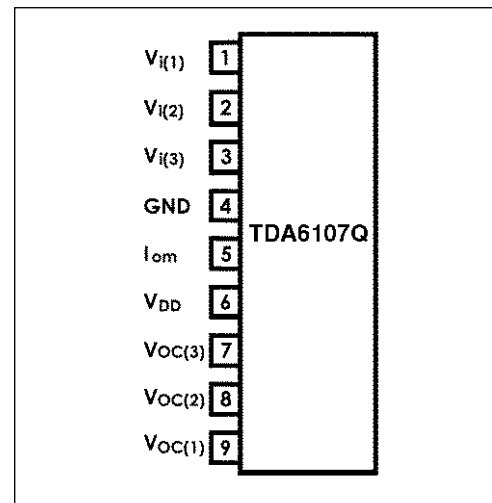
The TDA6107Q includes three video output amplifiers in one plastic DIL-Bent-SIL 9-pin medium power package, using high voltage DMOS technology, and is intended to drive the three cathodes of a colour CRT directly. To obtain maximum performance, the amplifier should be used with black-current control.

Features

- Typical bandwidth of 5.5 MHz for an output signal of 60 Vpp
- High slew rate of 900V/ μ 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 (firm) |
| 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 |



5. 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