

Service Service Service



Service Manual

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1. Technical Specifications, Connections, and Chassis Overview

Index of this chapter:

- 1.1 Technical Specifications
- 1.2 Connection Overview
- 1.3 Chassis Overview

Notes:

- Figures can deviate due to the different set executions.
- Specifications are indicative (subject to change).

1.1 Technical Specifications

1.1.1 Vision

Display type	: LCD
Screen size	: 19" (48 cm), 4 : 3
	: 20" (51 cm), 4 : 3
	: 26" (66 cm), 16 : 9
Resolution (H × V pixels)	: 640 × 480 (20")
Light output (cd/m ²)	: 300 (20")
	: 500 (26")
Contrast ratio	: 800 : 1
Viewing angle (H × V degrees)	: 170 × 160 (19")
	: 178 × 178 (20")
	: 160 × 160 (26")
Tuning system	: PLL
Colour systems	: PAL, SECAM
Video playback	: PAL, SECAM, NTSC
Tuner bands	: UHF, VHF, S & Hyper
Supported Computer Formats	
60 Hz	: 640 × 480
60 Hz	: 800 × 600
60 Hz	: 1024 × 768
60 Hz	: 1280 × 1024 (19/26")
60 Hz	: 1366 × 768 (26")
50 Hz, 75 Hz	: 1440 × 900 (26")
Supported Video Formats	
60 Hz	: 480i
60 Hz	: 480p
50 Hz	: 576i
50 Hz	: 576p
50 Hz, 60 Hz	: 720p
50 Hz, 60 Hz	: 1080i

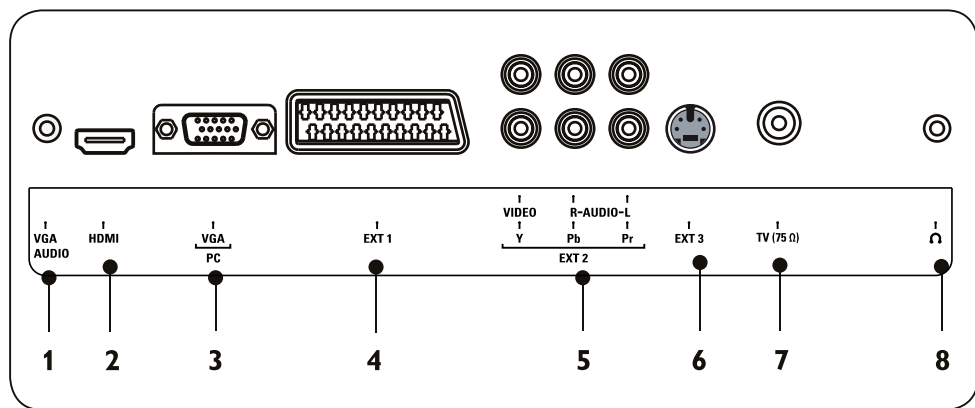
1.1.2 Sound

Sound systems	: Mono
	: Stereo
Maximum power (W)	: 2 × 3 (19")
	: 2 × 3 (20")
	: 2 × 5 (26")

1.1.3 Miscellaneous

Power supply	
- Mains voltage (V _{AC})	: 100 to 240
- Mains frequency (Hz)	: 50, 60
Power consumption (W)	: 50 (19")
	: 45 (20")
	: 80 (26")
Stand-by (W)	: < 0.3
Dimensions (W × H × D in mm)	: 473 × 353 × 69 (19")
	: 470 × 406 × 71 (20")
	: 671 × 458 × 90 (26")
Weight (kg)	: 4.9 (19")
	: 5.8 (20")
	: 7.7 (26")

1.2 Connection Overview



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Figure 1-1 Rear I/O connections

Note: The following connector colour abbreviations are used (acc. to DIN/IEC 757): Bk= Black, Bu= Blue, Gn= Green, Gy= Grey, Rd= Red, Wh= White, and Ye= Yellow.

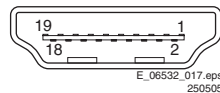
1.2.1 Rear Connections

1, Mini Jack: VGA Audio - In

Bk - Audio L/R 0.5 V_{RMS} / 10 kohm



2, HDMI: Digital Video, Digital Audio - In

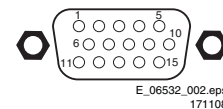


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Figure 1-2 HDMI (type A) connector

1	- D2+	Data channel	⊕
2	- Shield	Gnd	⊥
3	- D2-	Data channel	⊕
4	- D1+	Data channel	⊕
5	- Shield	Gnd	⊥
6	- D1-	Data channel	⊕
7	- D0+	Data channel	⊕
8	- Shield	Gnd	⊥
9	- D0-	Data channel	⊕
10	- CLK+	Data channel	⊕
11	- Shield	Gnd	⊥
12	- CLK-	Data channel	⊕
13	- n.c.		
14	- n.c.		
15	- DDC_SCL	DDC clock	⊕
16	- DDC_SDA	DDC data	⊕
17	- Ground	Gnd	⊥
18	- +5V		⊕
19	- HPD	Hot Plug Detect	⊕
20	- Ground	Gnd	⊥

3, VGA PC: Video RGB - In and Service UART

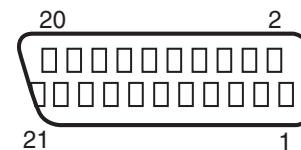


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Figure 1-3 VGA Connector

1	- Video Red	0.7 V _{PP} / 75 ohm	⊕
2	- Video Green	0.7 V _{PP} / 75 ohm	⊕
3	- Video Blue	0.7 V _{PP} / 75 ohm	⊕
4	- n.c.		
5	- Ground	Gnd	⊥
6	- Ground Red	Gnd	⊥
7	- Ground Green	Gnd	⊥
8	- Ground Blue	Gnd	⊥
9	- +5V _{dc}	+5 V	⊕
10	- Ground Sync	Gnd	⊥
11	- n.c.		
12	- DDC_SDA	DDC data	⊕
13	- H-sync	0 - 5 V	⊕
14	- V-sync	0 - 5 V	⊕
15	- DDC_SCL	DDC clock	⊕

4, EXT 1: Video RGB/YC - In, CVBS - In/Out, Audio - In/Out



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Figure 1-4 SCART connector

1	- Audio R	0.5 V _{RMS} / 1 kohm	⊕
2	- Audio R	0.5 V _{RMS} / 10 kohm	⊕
3	- Audio L	0.5 V _{RMS} / 1 kohm	⊕
4	- Ground Audio	Gnd	⊥
5	- Ground Blue	Gnd	⊥
6	- Audio L	0.5 V _{RMS} / 10 kohm	⊕
7	- Video Blue/C-out	0.7 V _{PP} / 75 ohm	⊕
8	- Function Select	0 - 2 V: INT 4.5 - 7 V: EXT 16:9 9.5 - 12 V: EXT 4:3	⊕
9	- Ground Green	Gnd	⊥
10	- Easylink P50	0 - 5 V / 4.7 kohm	⊕
11	- Video Green	0.7 V _{PP} / 75 ohm	⊕
12	- n.c.		

13 - Ground Red	Gnd	⏏
14 - Ground P50	Gnd	⏏
15 - Video Red/C	0.7 V _{PP} / 75 ohm	⊕
16 - Status/FBL	0 - 0.4 V: INT 1 - 3 V: EXT / 75 ohm	⊕
17 - Ground Video	Gnd	⏏
18 - Ground FBL	Gnd	⏏
19 - Video CVBS	1 V _{PP} / 75 ohm	⊕
20 - Video CVBS/Y	1 V _{PP} / 75 ohm	⊕
21 - Shield	Gnd	⏏

5, EXT 2: Cinch: Video YPbPr - In, Audio - In

Gn - Video Y	1 V _{PP} / 75 ohm	⊕
Bu - Video Pb	0.7 V _{PP} / 75 ohm	⊕
Rd - Video Pr	0.7 V _{PP} / 75 ohm	⊕
Ye - Video CVBS	1 V _{PP} / 75 ohm	⊕
Wh - Audio L	0.5 V _{RMS} / 10 kohm	⊕
Rd - Audio R	0.5 V _{RMS} / 10 kohm	⊕

6, EXT 3 Input: S-Video (Hosiden): Video Y/C - In

1 - Ground Y	Gnd	⏏
2 - Ground C	Gnd	⏏
3 - Video Y	1 V _{PP} / 75 ohm	⊕
4 - Video C	0.3 V _{PP} / 75 ohm	⊕

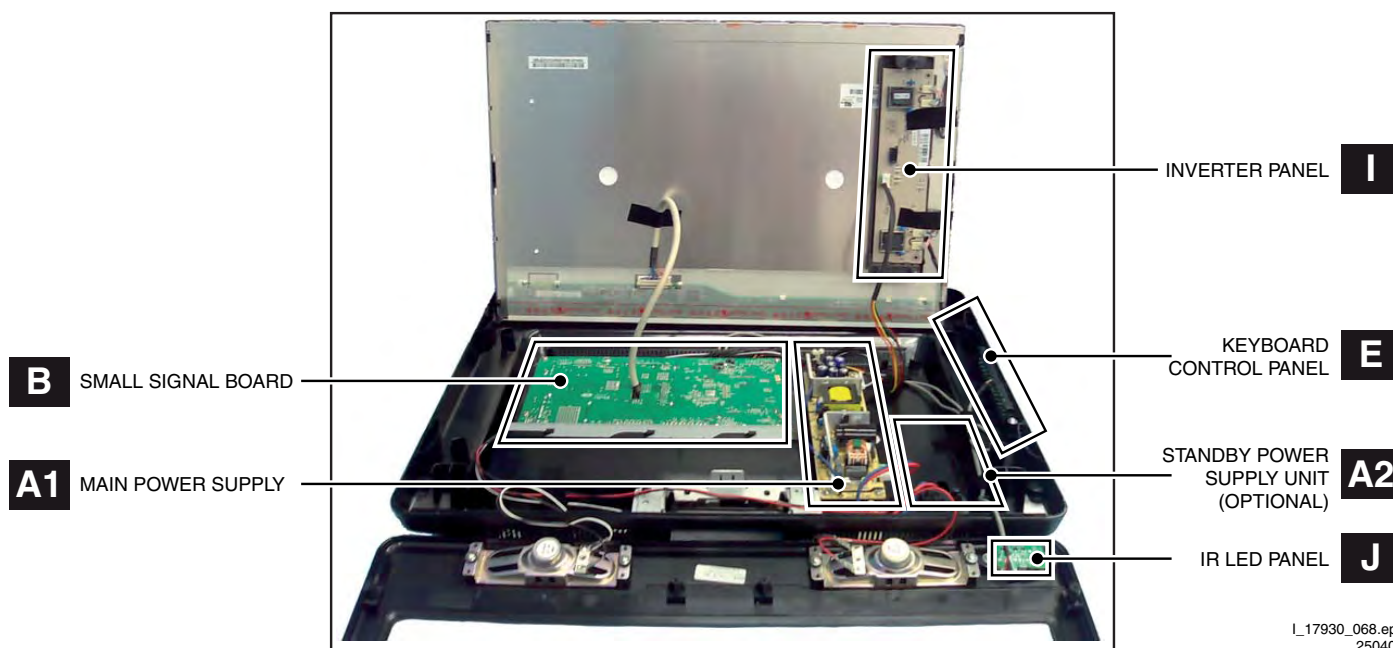
7, Aerial - In

- IEC-type (EU)	Coax, 75 ohm	⏏
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8, Mini Jack: Audio Head phone - Out

Bk - Head phone	32 - 600 ohm / 10 mW	⏏
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1.3 Chassis Overview



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Figure 1-5 PWB/CBA locations


2. Safety Instructions, Warnings, and Notes

Index of this chapter:

- 2.1 Safety Instructions
- 2.2 Warnings
- 2.3 Notes

2.1 Safety Instructions


Safety regulations require the following **during** a repair:

- Connect the set to the Mains/AC Power via an isolation transformer (> 800 VA).
- Replace safety components, indicated by the symbol , only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard.

Safety regulations require that **after** a repair, the set must be returned in its original condition. Pay in particular attention to the following points:



- Route the wire trees correctly and fix them with the mounted cable clamps.
- Check the insulation of the Mains/AC Power lead for external damage.
- Check the strain relief of the Mains/AC Power cord for proper function.
- Check the electrical DC resistance between the Mains/AC Power plug and the secondary side (only for sets that have a Mains/AC Power isolated power supply):
 1. Unplug the Mains/AC Power cord and connect a wire between the two pins of the Mains/AC Power plug.
 2. Set the Mains/AC Power switch to the "on" position (keep the Mains/AC Power cord unplugged!).
 3. Measure the resistance value between the pins of the Mains/AC Power plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be between 4.5 Mohm and 12 Mohm.
 4. Switch "off" the set, and remove the wire between the two pins of the Mains/AC Power plug.
- Check the cabinet for defects, to prevent touching of any inner parts by the customer.





2.2 Warnings

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD ) . Careless handling during repair can reduce life drastically. Make sure that, during repair, you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential.
- Be careful during measurements in the high voltage section.
- Never replace modules or other components while the unit is switched "on".
- When you align the set, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.

2.3 Notes

2.3.1 General

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground () , or hot ground () , depending on the tested area of circuitry. The voltages and waveforms shown in the diagrams are indicative. Measure them in the Service Default Mode (see chapter 5) with a colour bar signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 475.25 MHz for PAL, or 61.25 MHz for NTSC (channel 3).

- Where necessary, measure the waveforms and voltages with () and without () aerial signal. Measure the voltages in the power supply section both in normal operation () and in stand-by () . These values are indicated by means of the appropriate symbols.

2.3.2 Schematic Notes

- All resistor values are in ohms, and the value multiplier is often used to indicate the decimal point location (e.g. 2K2 indicates 2.2 kohm).
- Resistor values with no multiplier may be indicated with either an "E" or an "R" (e.g. 220E or 220R indicates 220 ohm).
- All capacitor values are given in micro-farads ($\mu = \times 10^{-6}$), nano-farads ($n = \times 10^{-9}$), or pico-farads ($p = \times 10^{-12}$).
- Capacitor values may also use the value multiplier as the decimal point indication (e.g. 2p2 indicates 2.2 pF).
- An "asterisk" (*) indicates component usage varies. Refer to the diversity tables for the correct values.
- The correct component values are listed in the Spare Parts List. Therefore, always check this list when there is any doubt.

2.3.3 BGA (Ball Grid Array) ICs

Introduction

For more information on how to handle BGA devices, visit this URL: www.atyourservice.ce.philips.com (needs subscription, not available for all regions). After log-in, select "Magazine", then go to "Repair downloads". Here you will find Information on how to deal with BGA-ICs.

BGA Temperature Profiles

For BGA-ICs, you **must** use the correct temperature-profile, which is coupled to the 12NC. For an overview of these profiles, visit the website www.atyourservice.ce.philips.com (needs subscription, but is not available for all regions) You will find this and more technical information within the "Magazine", chapter "Repair downloads".

For additional questions please contact your local repair help desk.

2.3.4 Lead-free Soldering

Due to lead-free technology some rules have to be respected by the workshop during a repair:

- Use only lead-free soldering tin Philips SAC305 with order code 0622 149 00106. If lead-free solder paste is required, please contact the manufacturer of your soldering equipment. In general, use of solder paste within workshops should be avoided because paste is not easy to store and to handle.
- Use only adequate solder tools applicable for lead-free soldering tin. The solder tool must be able:
 - To reach a solder-tip temperature of at least 400°C.
 - To stabilize the adjusted temperature at the solder-tip.
 - To exchange solder-tips for different applications.
- Adjust your solder tool so that a temperature of around 360°C - 380°C is reached and stabilized at the solder joint. Heating time of the solder-joint should not exceed ~ 4 sec. Avoid temperatures above 400°C, otherwise wear-out of tips will increase drastically and flux-fluid will be destroyed. To avoid wear-out of tips, switch "off" unused equipment or reduce heat.
- Mix of lead-free soldering tin/parts with leaded soldering tin/parts is possible but PHILIPS recommends strongly **to avoid** mixed regimes. If this cannot be avoided, carefully clear the solder-joint from old tin and re-solder with new tin.

2.3.5 Alternative BOM identification

The **third digit** in the serial number (example: AG2B0335000001) indicates the number of the alternative B.O.M. (Bill Of Materials) that has been used for producing the specific TV set. In general, it is possible that the same TV model on the market is produced with e.g. two different types of displays, coming from two different suppliers. This will then result in sets which have the same CTN (Commercial Type Number; e.g. 28PW9515/12) but which have a different B.O.M. number.

By looking at the third digit of the serial number, one can identify which B.O.M. is used for the TV set he is working with. If the third digit of the serial number contains the number "1" (example: AG1B0335000001), then the TV set has been manufactured according to B.O.M. number 1. If the third digit is a "2" (example: AG2B0335000001), then the set has been produced according to B.O.M. no. 2. ***This is important for ordering the correct spare parts!***

For the third digit, the numbers 1...9 and the characters A...Z can be used, so in total: 9 plus 26= 35 different B.O.M.s can be indicated by the third digit of the serial number.

Identification: The bottom line of a type plate gives a 14-digit serial number. Digits 1 and 2 refer to the production centre (e.g. AG is Bruges), digit 3 refers to the B.O.M. code, digit 4 refers to the Service version change code, digits 5 and 6 refer to the production year, and digits 7 and 8 refer to production week (in example below it is 2006 week 17). The 6 last digits contain the serial number.



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Figure 2-1 Serial number (example)

2.3.6 Board Level Repair (BLR) or Component Level Repair (CLR)

If a board is defective, consult your repair procedure to decide if the board has to be exchanged or if it should be repaired on component level.

If your repair procedure says the board should be exchanged completely, do not solder on the defective board. Otherwise, it cannot be returned to the O.E.M. supplier for back charging!

2.3.7 Practical Service Precautions

- **It makes sense to avoid exposure to electrical shock.** While some sources are expected to have a possible dangerous impact, others of quite high potential are of limited current and are sometimes held in less regard.
- **Always respect voltages.** While some may not be dangerous in themselves, they can cause unexpected reactions that are best avoided. Before reaching into a powered TV set, it is best to test the high voltage insulation. It is easy to do, and is a good service precaution.

3. Directions for Use

You can download this information from the following websites:

<http://www.philips.com/support>

<http://www.p4c.philips.com>

4. Mechanical Instructions

Index of this chapter:

- 4.1 Cable Dressing
- 4.2 Service Positions
- 4.3 Assy/Panel Removal
- 4.4 Set Re-assembly

Notes:

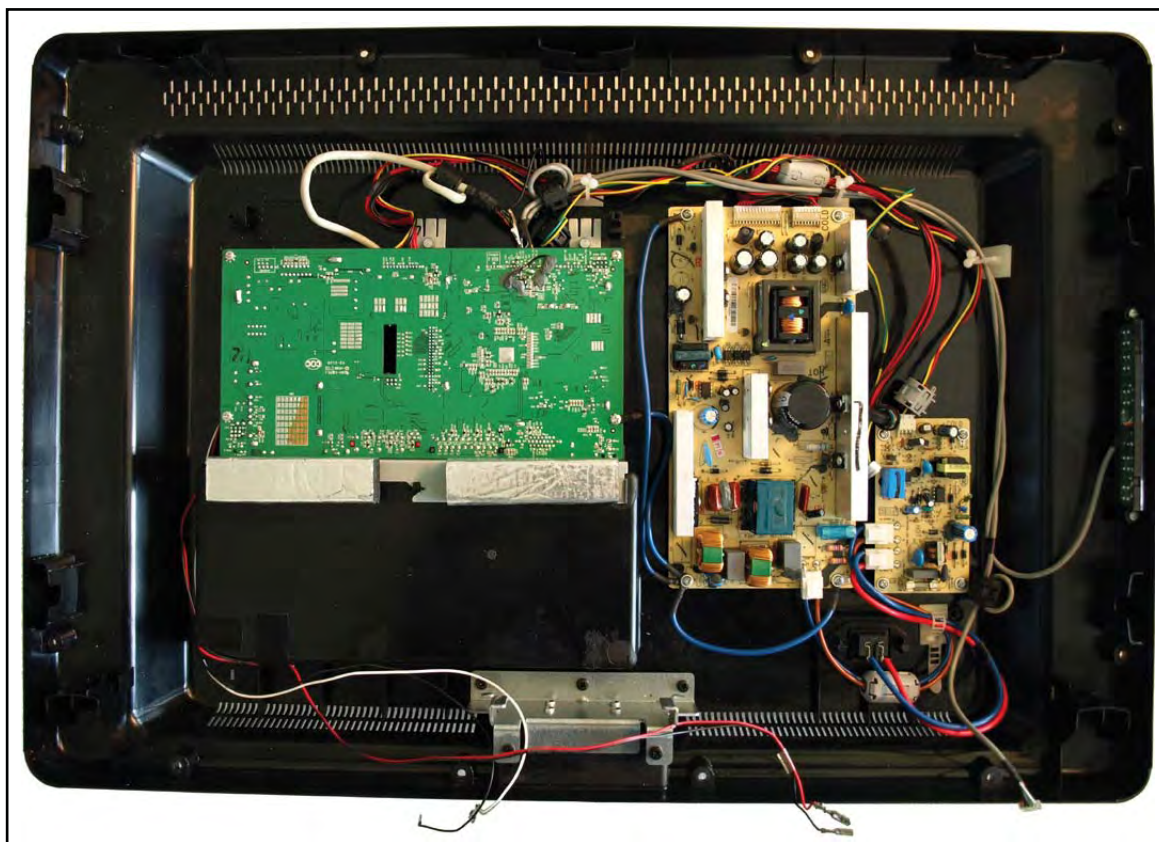
- Figures below can deviate slightly from the actual situation, due to the different set executions.
- Follow the disassemble instructions in described order. They apply mostly to the 26" model unless otherwise specified, but the described method is comparable for the other screen sizes.

4.1 Cable Dressing



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Figure 4-1 Cable dressing (20" model)



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Figure 4-2 Cable dressing (26" model) [1/2]



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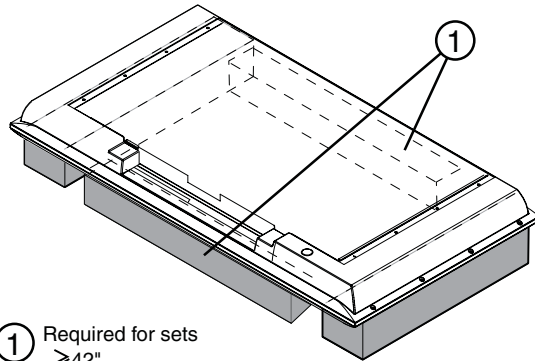
Figure 4-3 Cable dressing (26" model) [2/2]

4.2 Service Positions

For easy servicing of this set, there are a few possibilities created:

- The buffers from the packaging.
- Foam bars (created for Service).

4.2.1 Foam Bars



① Required for sets
≥42"

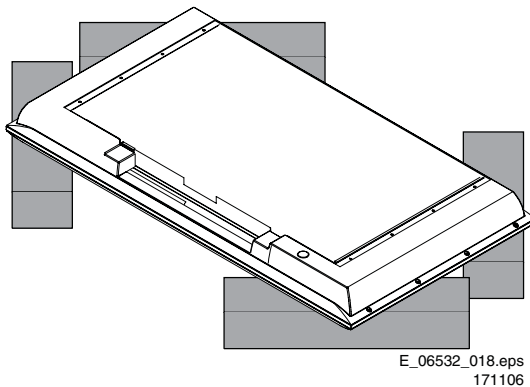


Figure 4-4 Foam bars

The foam bars (order code 3122 785 90580 for two pieces) can be used for all types and sizes of Flat TVs. See figure "Foam bars" for details. Sets with a display of 42" and larger, require **four** foam bars [1]. Ensure that the foam bars are always supporting the cabinet and **never** only the display.

Caution: Failure to follow these guidelines can seriously damage the display!

By laying the TV face down on the (ESD protective) foam bars, a stable situation is created to perform measurements and alignments. By placing a mirror under the TV, you can monitor the screen.

4.3 Assy/Panel Removal

4.3.1 Stand

1. Refer to next figure.
2. Place the TV set upside down on a table top, using the foam bars (see section "Service Position").
3. Remove the screws that secure the stand and remove the stand.



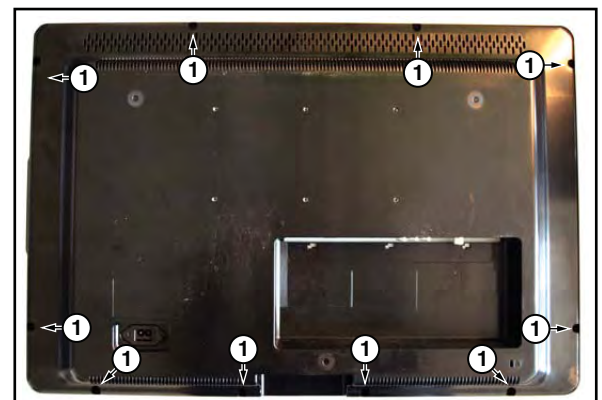
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Figure 4-5 Stand

4.3.2 Rear Cover

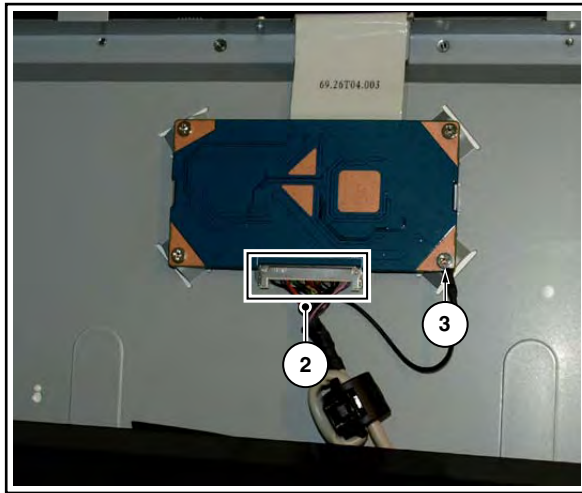
Warning: Disconnect the mains power cord before you remove the rear cover.

1. Refer to next figures.
2. Place the TV set upside down on a table top, using the foam bars (see section "Service Positions").
3. Remove the screws [1] that secure the rear cover. The screws are located at the sides.
Be careful: Now the rear cover could be lifted but the SSB and power supply panel(s) are mounted in the rear cover and still connected to the LCD panel and other boards.
Those cables should be released first.
4. To release the LVDS cable lift the back cover a few centimetres and move it downwards the set. Now unplug the LVDS connector [2].
Caution: be careful, as this is a very fragile connector!
5. Remove the screw [3].
6. Now the rear cover can be lifted to gain access to the speaker cables and the IR/LED panel cable. Release the connectors [4].



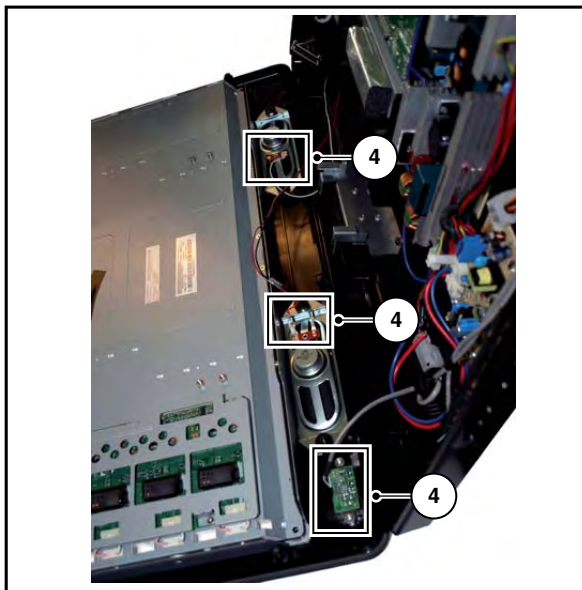
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Figure 4-6 Rear cover



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Figure 4-7 LVDS release

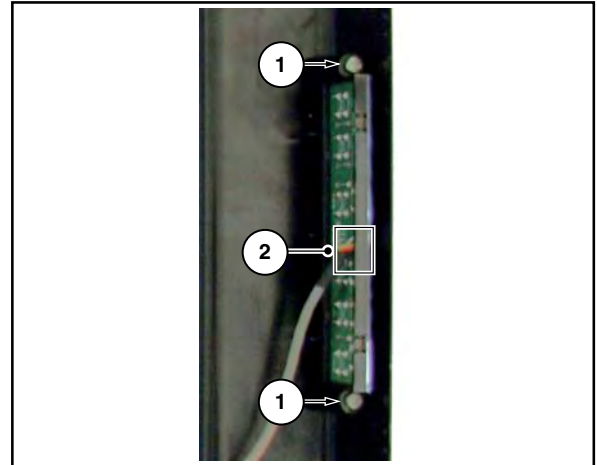


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Figure 4-8 Speaker and IR/LED panel cable release

4.3.3 Keyboard Control Board

1. Refer to next figure.
2. Unscrew two screws [1]
3. Unplug connector [2] and remove the board.
When defective, replace the whole unit

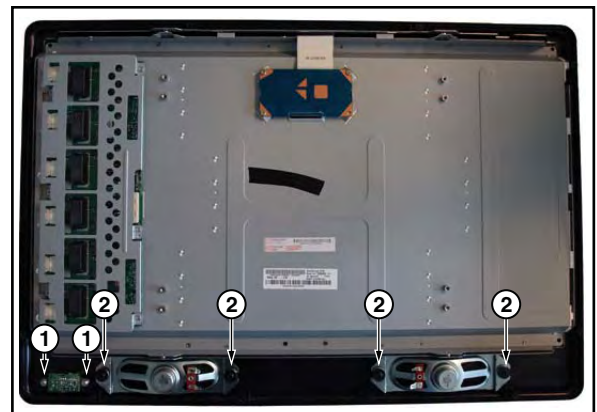


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Figure 4-9 Keyboard control board

4.3.4 IR/LED Board and Speakers

1. Refer to next figure.
2. Remove the screws [1] and remove the IR/LED board.
3. Remove the screws [2] and remove the speakers.
When defective, replace the whole unit.



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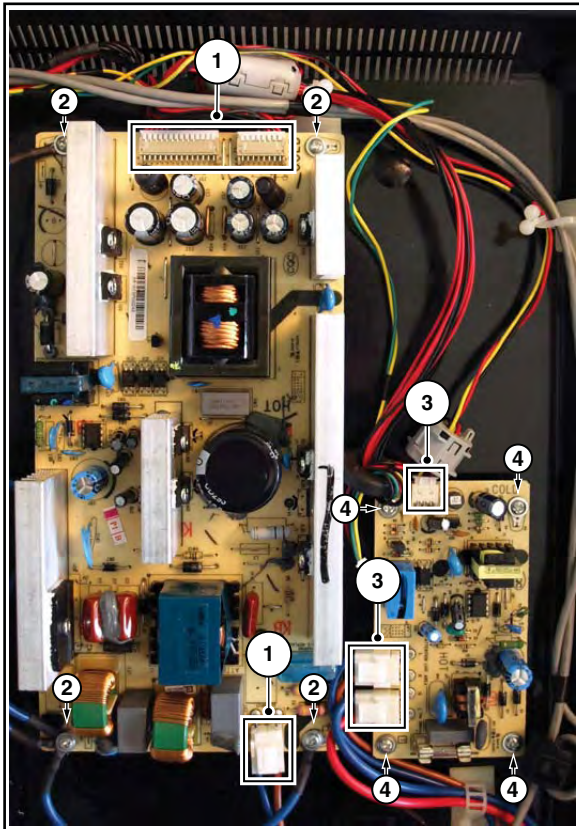
Figure 4-10 IR/LED Board and Speakers

4.3.5 Power Supply Board

Due to different set executions this chassis is supplied with one or two power supply boards and figures may differ.

Caution: it is absolutely mandatory to remount all different screws and cables at their original position during re-assembly. Failure to do so may result in damaging the power supply.

1. Refer to next figure.
2. Unplug all the connectors [1].
3. Remove the fixation screws [2]
4. Remove the main power supply board.
5. Unplug all the connectors [3].
6. Remove the fixation screws [4]
7. Remove the stand-by power supply board.



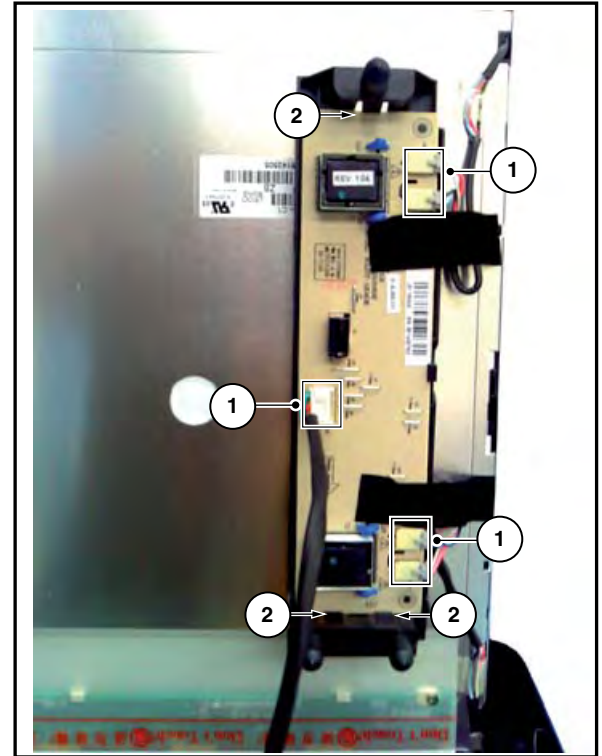
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Figure 4-11 Power Supply Unit(s)

4.3.6 Inverter Board (19", 20" and 22" versions)

Due to different set executions this chassis some versions are supplied with an inverter board. Figures may differ.

1. Refer to next figure.
2. Unplug all connectors [1].
3. Release the clips [2]
4. Take out the inverter board.



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Figure 4-12 Inverter Board

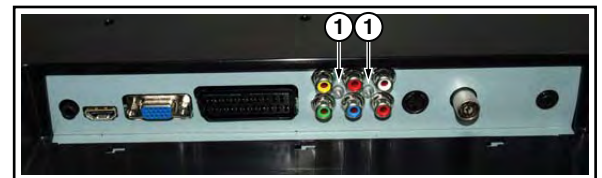
4.3.7 Small Signal Board (SSB)

Caution: it is absolutely mandatory to remount all different screws at their original position during re-assembly. Failure to do so may result in damaging the SSB.

Removing the SSB

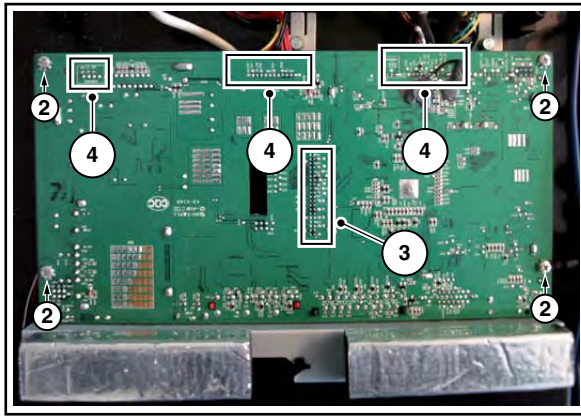
1. See next figures.
2. Remove the screws [1] from the SSB connector plate.
3. Remove the screws [2] from the SSB.
4. Gently lift the board from the rear cover.
5. Now unplug the LVDS connector [3].

Caution: be careful, as this is a very fragile connector! Unplug the rest of the cables [4].



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240408

Figure 4-13 SSB connector plate



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240408

Figure 4-14 SSB

4.4 Set Re-assembly

To re-assemble the whole set, execute all processes in reverse order.

Notes:

- While re-assembling, make sure that all cables are placed and connected in their original position. See figure "Cable dressing".
- Pay special attention not to damage the EMC foams at the SB shields. Make sure, that EMC foams are put correctly on their places.

5. Service Modes, Error Codes, and Fault Finding

Index of this chapter:

- 5.1 Test Points
- 5.2 Service Mode
- 5.3 Error Codes
- 5.5 Software Upgrading

5.1 Test Points

This chassis is NOT equipped with test points in the service printing. These test points are NOT specifically mentioned in the service manual.

5.2 Service Mode

5.2.1 Factory Mode or Service Alignment Mode (SAM)

How to Enter

To enter the Factory mode, use the following method:

- Press on the remote control the code "062596" directly followed by the "INFO" key.

After entering the Factory mode, the following screen is visible, the values can be adjusted according to the requested (see Chapter 8).

Factory	Apr 11 2008 11:10:52	SAM
System	PowerMode	Remember
Balance	FactoryKey	On
	TunerAGC	12
TVGeo	KeyBoardLock	Off
	Pattern	0
Nicam	BackLight	200
Mono	Presetprogram	Off...
	Reset	User
Sound		
Other		
Info		

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Figure 5-1 Factory mode menu, System

Factory	Apr 11 2008 11:10:52	SAM
System	Source	TV
	Tone	Cold
Balance	White R	-7
TVGeo	White G	-4
	White B	5
Nicam	Gray R	0
	Gray G	0
Mono	Gray B	0
Sound	RGB Calibrate	
	Scaling Brightness	-3
Other	Scaling Contrast	20
	Scaling Saturation	29
Info	Scaling Hue	0

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Figure 5-2 Factory mode menu, Balance

Factory	Apr 11 2008 11:10:52	SAM
System	Color system	PAL
Balance	HPos	71
	HSize	53
TVGeo	VPos	89
	VSize	87
Nicam		
Mono		
Sound		
Other		
Info		

I_17930_057.eps
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Figure 5-3 Factory mode menu, TV Geometry

Factory	Apr 11 2008 11:10:52	SAM
System	Correct Thres	5
Balance	Sync Loop	50
	Error Thre	6
TVGeo	Parity Error Thres	47
	Every Num Frames	32
Nicam	A2 System	4
Mono		
Sound		
Other		
Info		

I_17930_058.eps
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Figure 5-4 Factory mode menu, Nicam

Factory	Apr 11 2008 11:10:52	SAM
System	Source	TV
	VOL_0	0
Balance	VOL_10	4
TVGeo	VOL_30	25
	VOL_50	90
Nicam	VOL_90	150
Mono	VOL_100	254
	TV Pre	53
Sound	AV Pre	60
Other	SW Freq	10
Info		

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Figure 5-5 Factory mode menu, Mono



I_17930_060.eps
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Figure 5-6 Factory mode menu, Sound



I_17930_061.eps
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Figure 5-7 Factory mode menu, Other



I_17930_061.eps
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Figure 5-8 Factory mode menu, Info

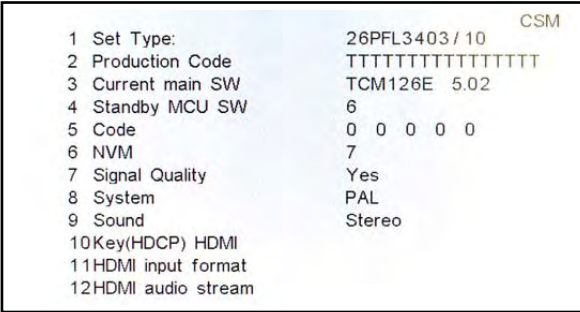
How to EXIT
Choose "EXIT", then press the "MENU" button on the remote control.

5.2.2 Customer Service Mode (CSM)

Purpose
When a customer is having problems with his TV-set, he can call his dealer or the Customer Help desk. The service technician can then ask the customer to activate the CSM, in order to identify the status of the set. Now, the service technician can judge the severity of the complaint. In many cases, he can advise the customer how to solve the problem, or he can decide if it is necessary to visit the customer. The CSM is a read only mode; therefore, modifications in this mode are not possible.

How to Activate CSM
Key in the code "123654" via the standard RC transmitter.

Contents of CSM



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Figure 5-9 CSM Menu

Menu Explanation

1. **Set Type** Type number and region.
2. **Production code** Product serial no.
3. **SW naming main-processor** Software cluster and version is displayed.
4. **Standby MCU SW** Software version stand-by μ Processor.
5. **Code** Error buffer contents.
6. **NVM** NVM version.
7. **Signal Quality** Yes/No (antenna signal).
8. **System** TV system (PAL)
9. **Sound** Audio system (Mono/Stereo/Nicam stereo)

10. **Key (HDCP)** HDMI Shows Valid or invalid when HDMI connected. Else blank.
11. **HDMI input format** Shows HDMI picture format display, i.e. 480p30, when HDMI connected. Else blank.
12. **HDMI audio Stream** Show Yes/No when HDMI connected. Else blank.

How to exit

Press "MENU" on the RC-transmitter.

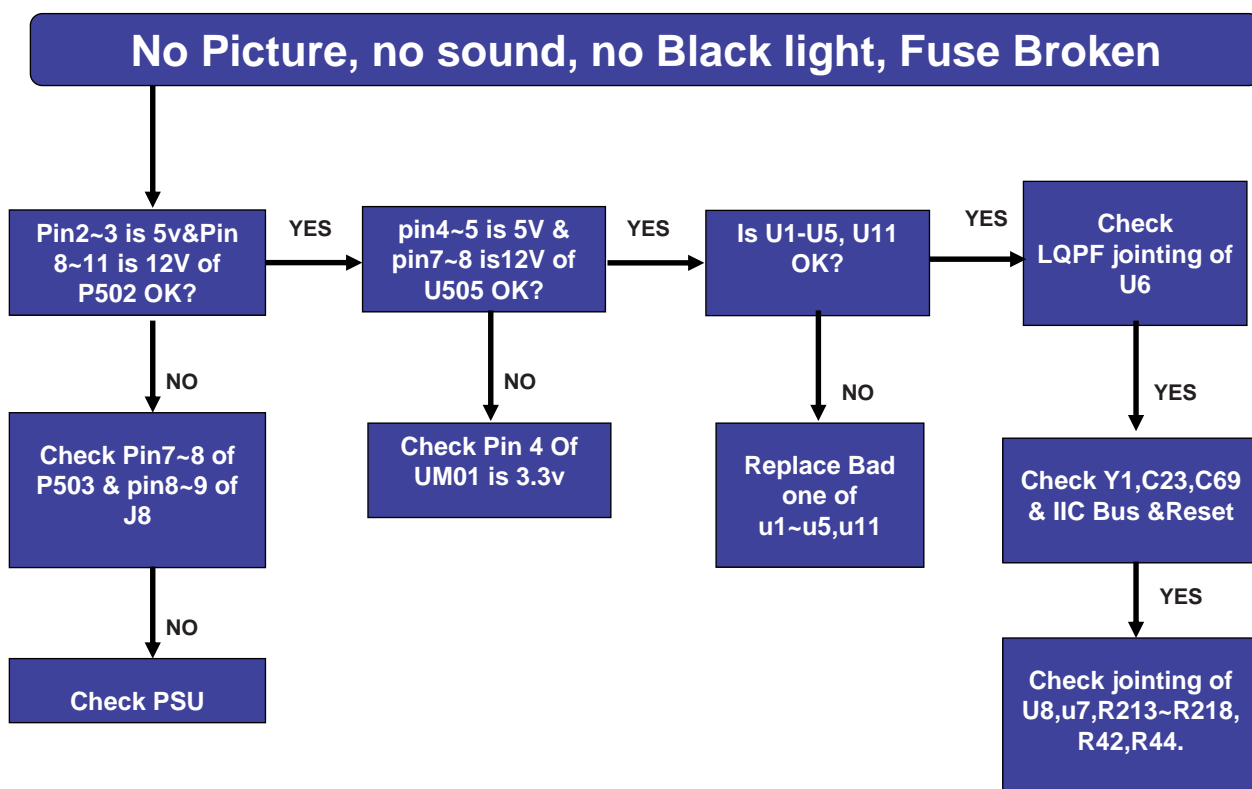
5.3 Error Codes

The error code buffer contains all errors detected since the last time the buffer was erased. The buffer is written from left to right. When an error occurs that is not yet in the error code buffer, it is displayed at the left side and all other errors shift one position to the right.

Basically there are six kind of errors:

Error code	Area	Description
2	MT8293	Communication error with MT8293
3	μ P Control	Communication error with standby MCU

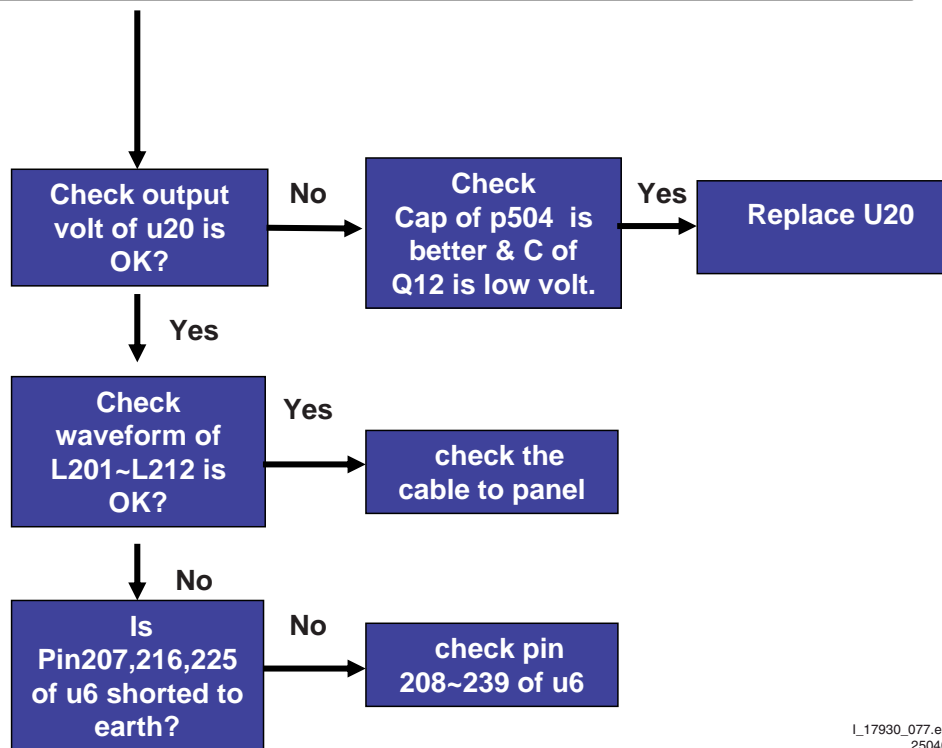
Error code	Area	Description
4	IIC bus Error	Communication error on I ² C bus (none of the I ² C devices respond)
6	System EEPROM (NVM)	Communication error with system EEPROM
7	Tuner	Communication error with tuner.
8	Demodulator	Communication error with demodulator.

5.4 Fault Finding

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Figure 5-10 No Picture, no sound, noBlack light, Fuse Broken

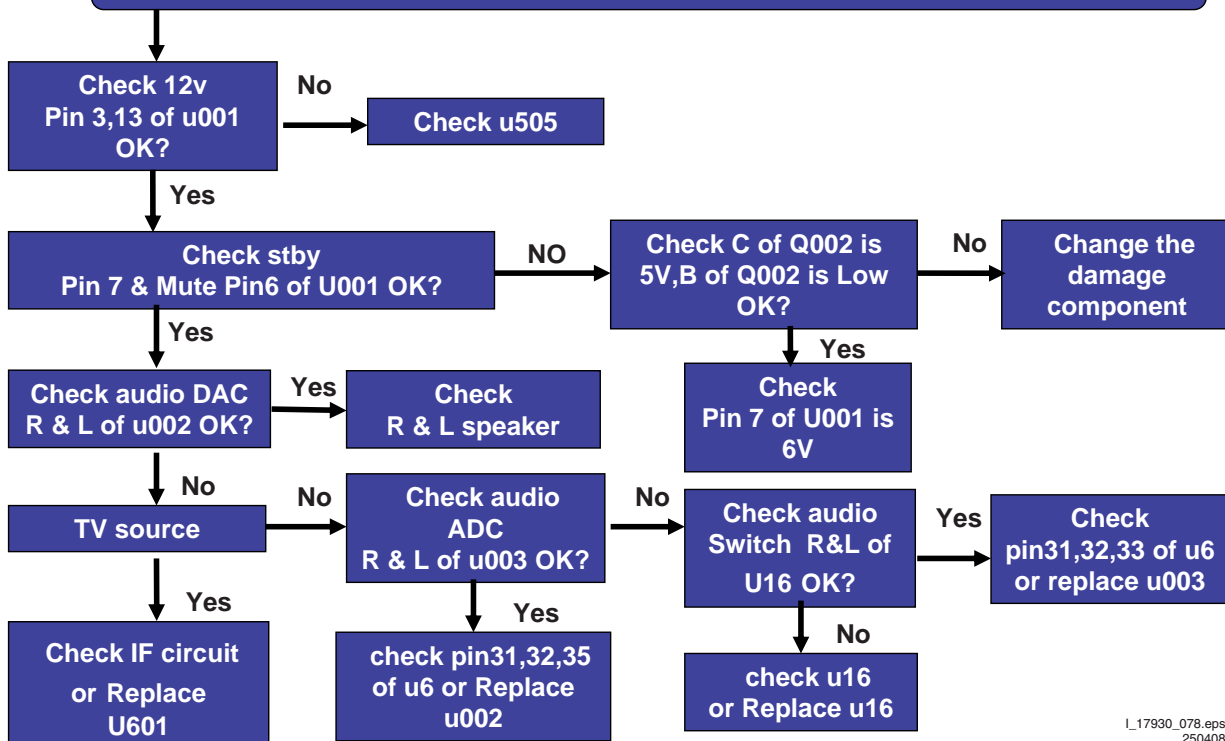
No Picture, Black light & Sound OK



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Figure 5-11 No Picture, Black light & Sound OK

Picture OK, No sound



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Figure 5-12 Picture OK, No sound

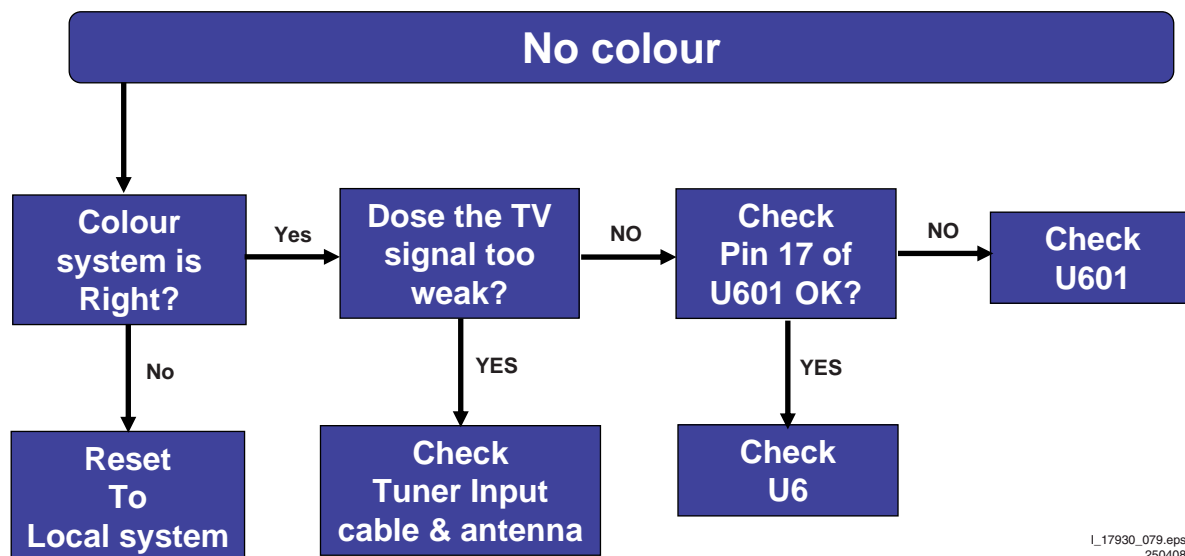


Figure 5-13 No colour

5.5 Software Upgrading

5.5.1 ComPair

Introduction

ComPair (Computer Aided Repair) is a Service tool for Philips Consumer Electronics products. and offers the following:

1. ComPair helps you to quickly get an understanding on how to repair the chassis in a short and effective way.
2. ComPair allows very detailed diagnostics and is therefore capable of accurately indicating problem areas. You do not have to know anything about I²C or UART commands yourself, because ComPair takes care of this.
3. ComPair speeds up the repair time since it can automatically communicate with the chassis (when the uP is working) and all repair information is directly available.
4. ComPair features TV software upgrade possibilities.

Specifications

ComPair consists of a Windows based fault finding program and an interface box between PC and the (defective) product. The (new) ComPair II interface box is connected **to the PC** via an USB cable. For the TV chassis, the ComPair interface box and the TV communicate via a bi-directional cable via the service connector(s).

How to Connect

This is described in the ComPair chassis fault finding database.

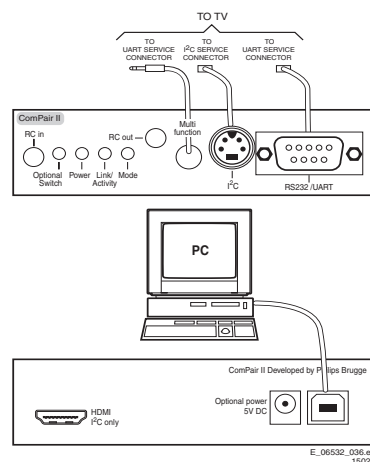


Figure 5-14 ComPair II interface connection

Caution: It is compulsory to connect the TV to the PC as shown in the picture above (with the ComPair interface in between), as the ComPair interface acts as a level shifter. If one connects the TV directly to the PC (via UART), ICs will be blown!

How to Order

ComPair II order codes:

- ComPair II interface: 3122 785 91020.
- For SW see Philips service website.
- ComPair/UART interconnection cable: 3122 785 90630.
- ComPair/UART adapter cable: 3122 785 91070.

Note: If you encounter any problems, contact your local support desk.

5.5.2 LVDS Tool

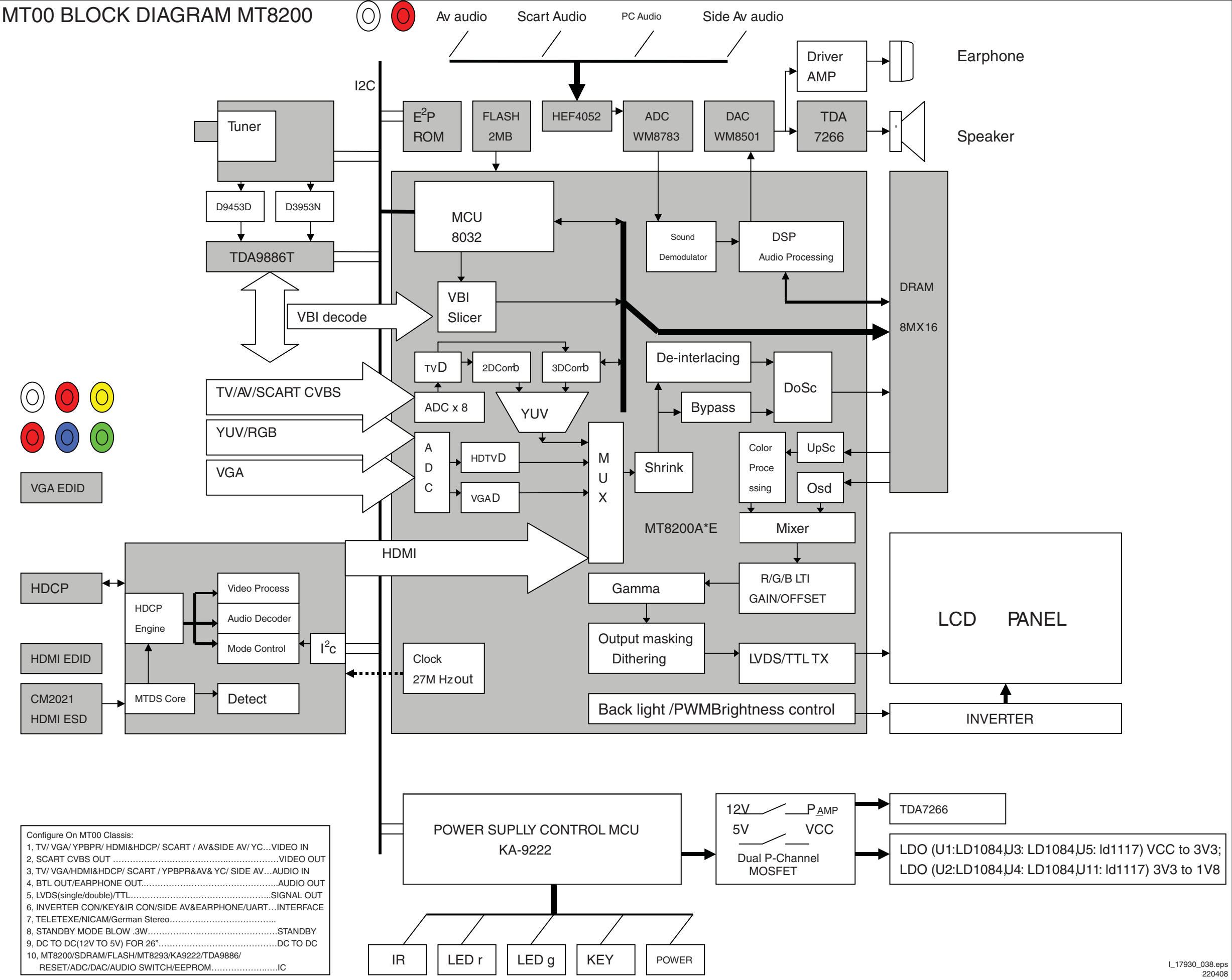
Support of the LVDS Tool has been discontinued.

6. Block Diagrams, Test Point Overview, and Waveforms

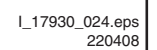
Wiring diagram not available at time of publishing.
For wiring see chapter 4 figure: cable dressing.

Block Diagram MT8200

MT00 BLOCK DIAGRAM MT8200

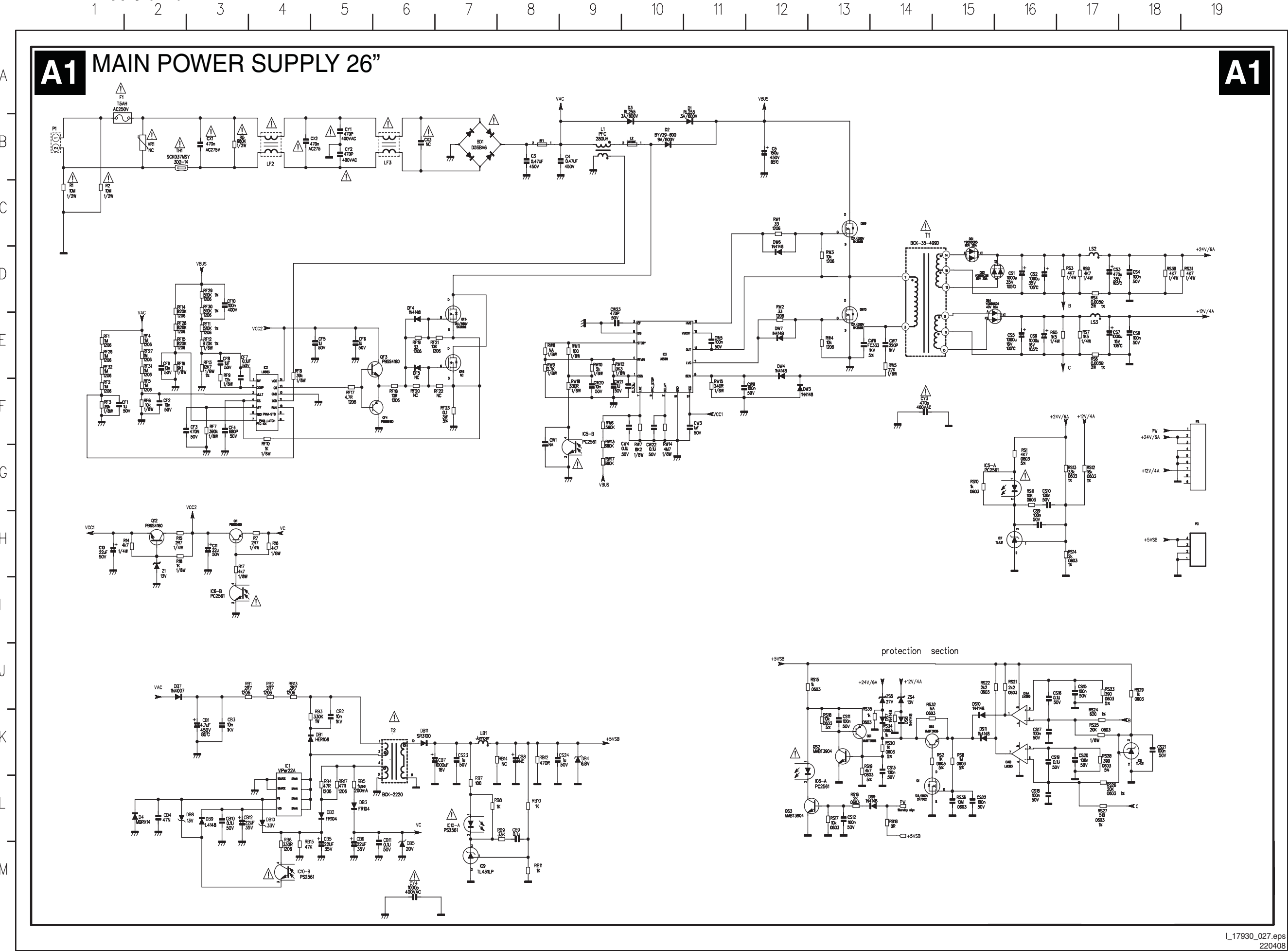


Main Power Supply (19" & 20")



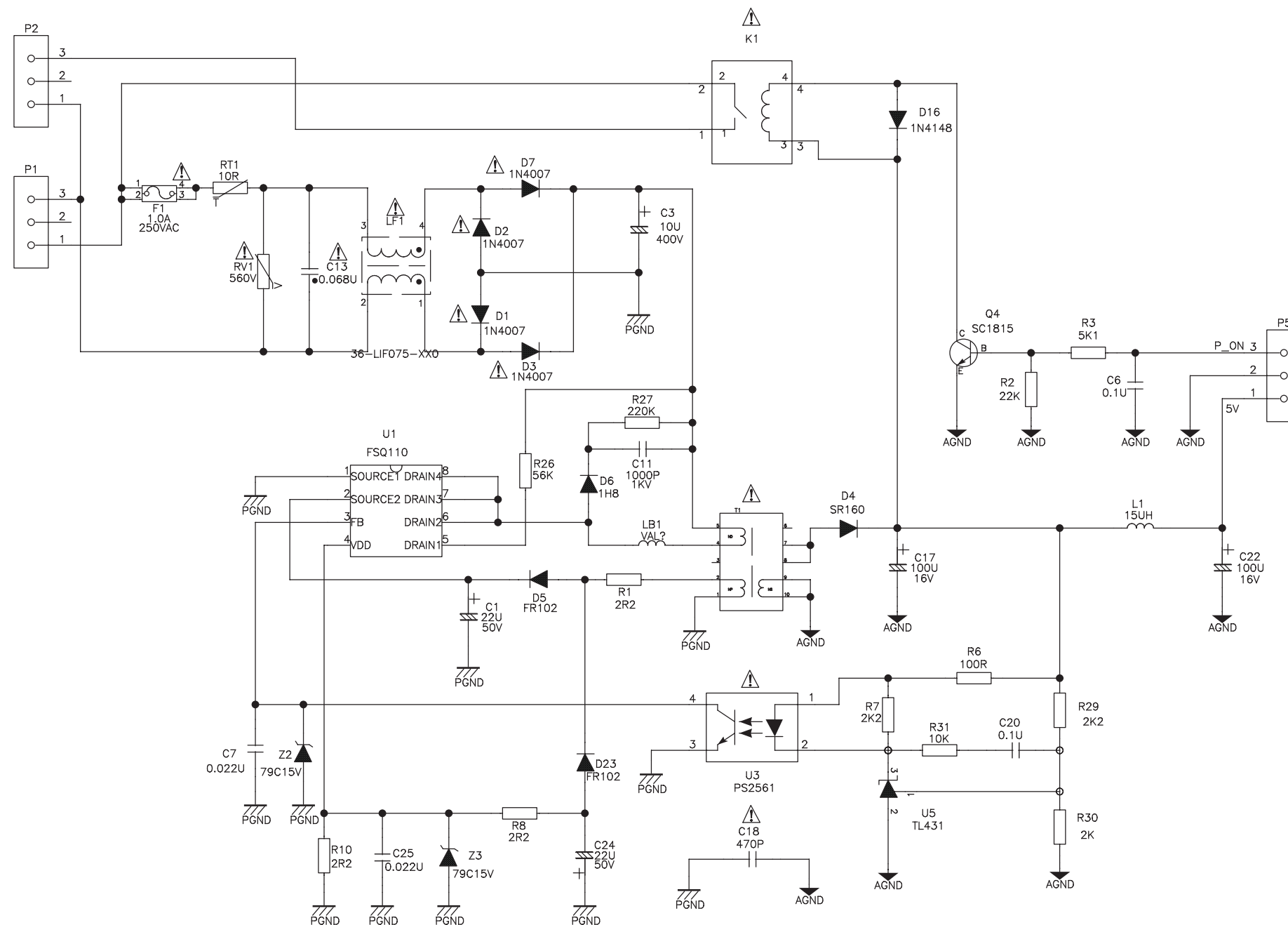
I_17930_026.eps
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Main Power Supply (26")



A2 STANDBY POWER SUPPLY 26"

A2



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Personal Notes:

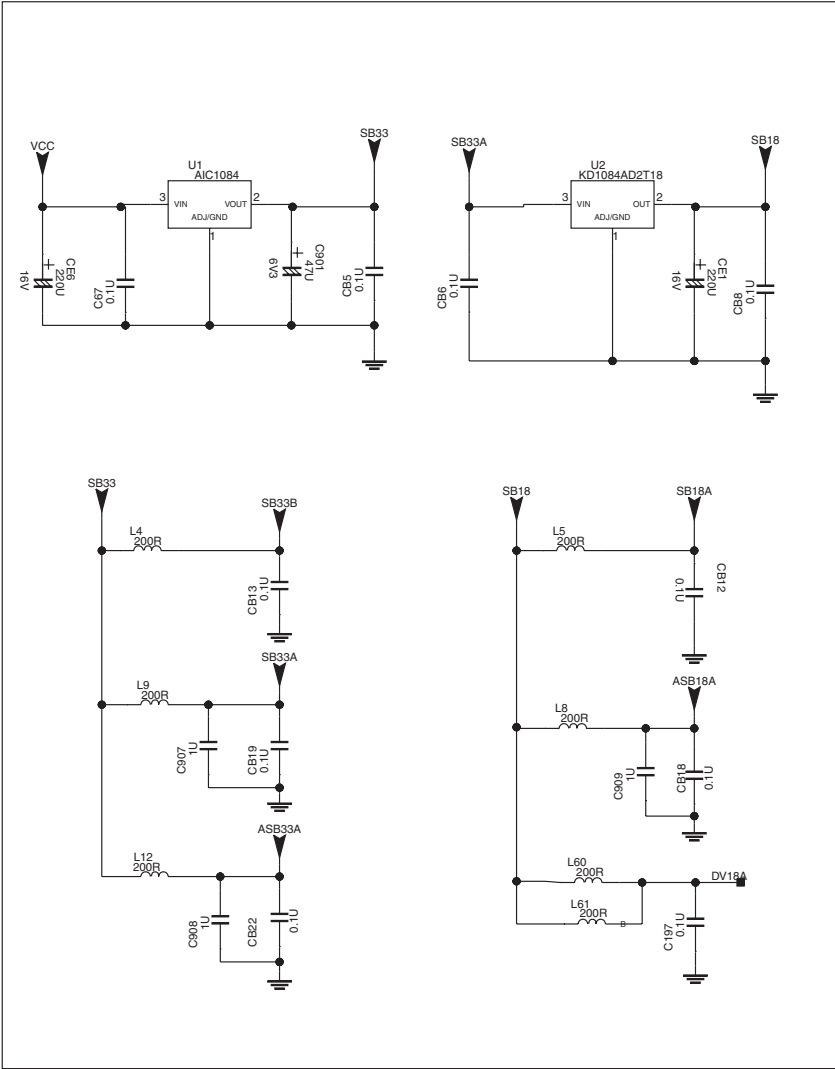
[illegible]

- MT8200_SZ_V1
- 1. INDEX /GPIO LIST /LDO
 - 2. MT8200 LQFP256
 - 3. DDR MEMORY & FLASH
 - 4. VGA INPUT
 - 5. INTERFACE FOR LVDS\ TTL\ KEY BOARD\ RS-232
 - 6. TUNER BLOCK
 - 7. SCART INPUT INTERFACE
 - 8. AV & S_VIDEO & PC-AUDIO INPUT
 - 9. AUDIO SWITCH & AUDIO POWER AMPLIFIER & EARPHONE INTERFACE
 - 10. HDMI BLOCK
 - 11. POWER SUPPLY& MUC FOR STANDBY & INVERTER

GPIO LIST

I2C LVDS---SDA:ERO1;SCL:ERO0
TTL---SDA:GPIO10;SCL:F_A21
WRITE ENABLE FOR EEPROM:GPIO8
UPDATE BY VGA:DQ17
LVDS POWER:GPIO9
GPIO_PANEL:GPIO/TXD
KEY:ADIN1
LED:FCICLK
POWER_STBY:UP3_4
BL ON/OFF: PWM1
TIMING:PWM0
SWITCH 4052 :SCL0 SDA0 11-AV1;01-PC;00-AV3
SW_MUTE:DQ23
USB_IR_INPUT:DQ20
GPIO_DVB1:GPIO/RXD

Schematic For MT01(8200) Chassis

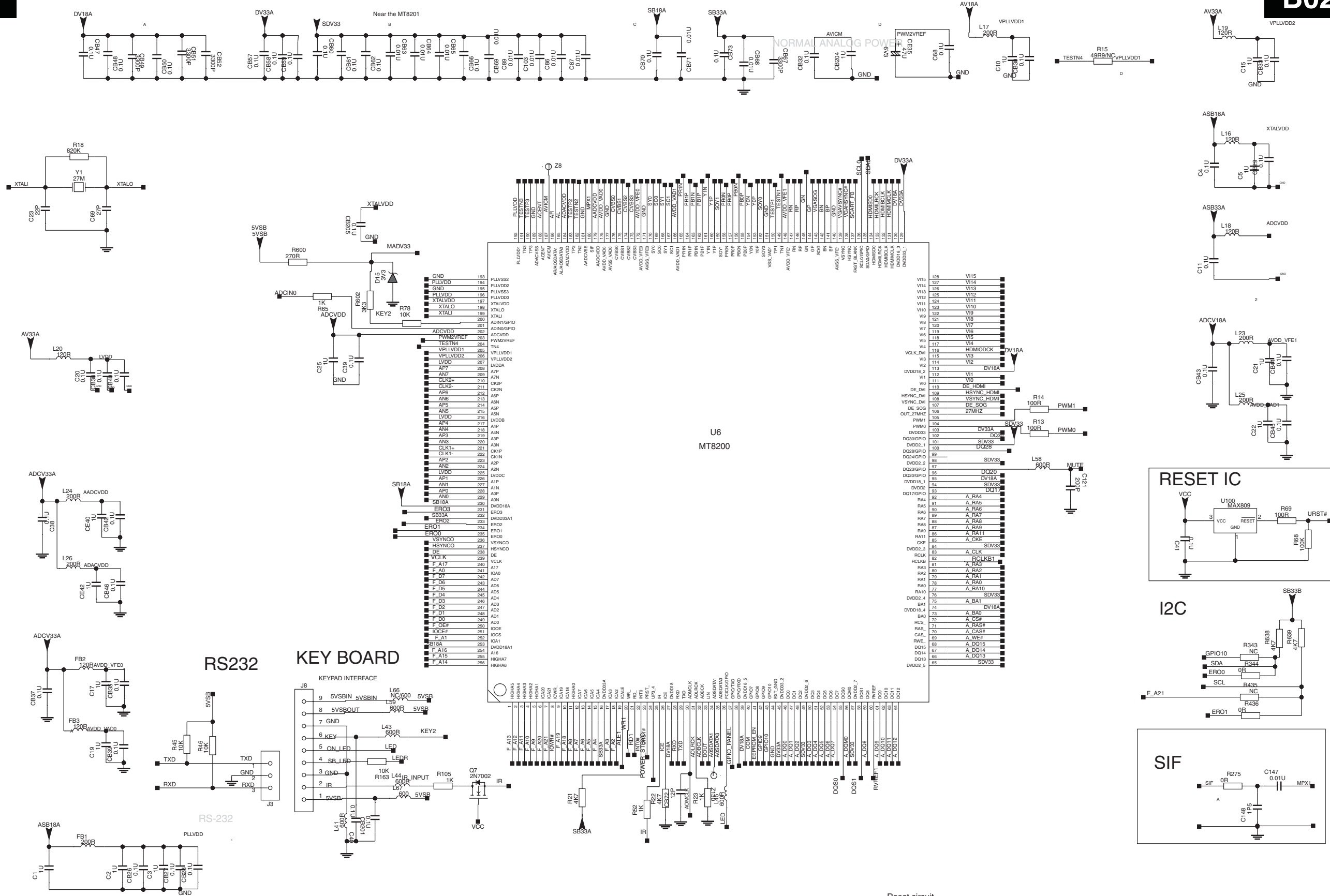


SSB: MT8200 LQFP256

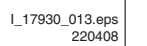
B02

MT8200 LQFP256

B02



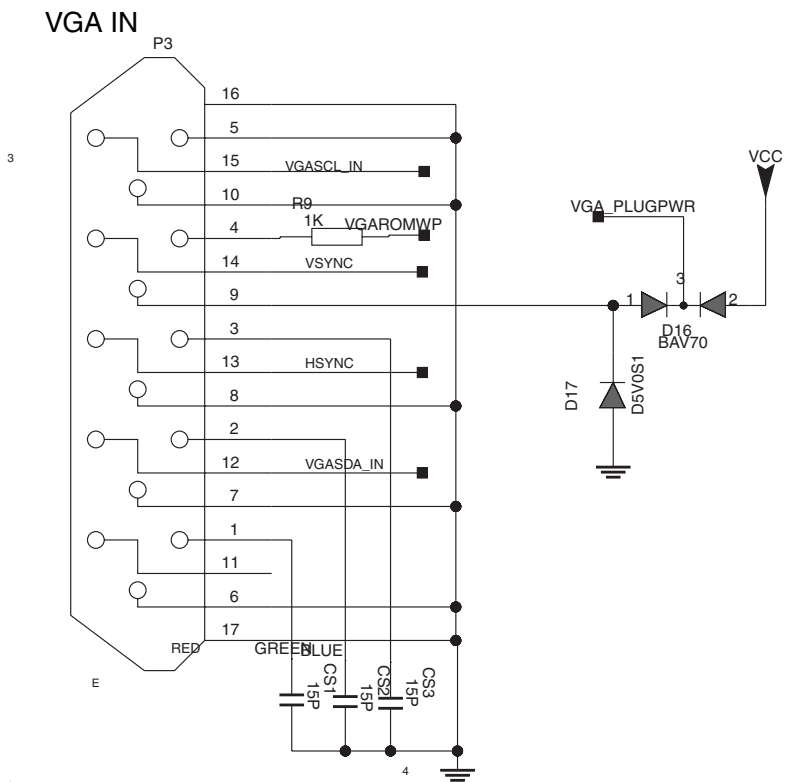
B03



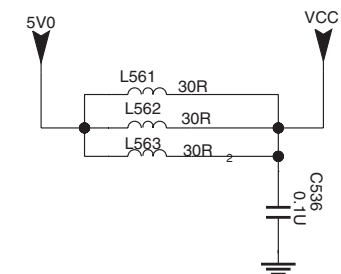
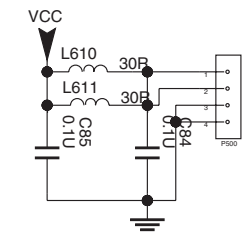
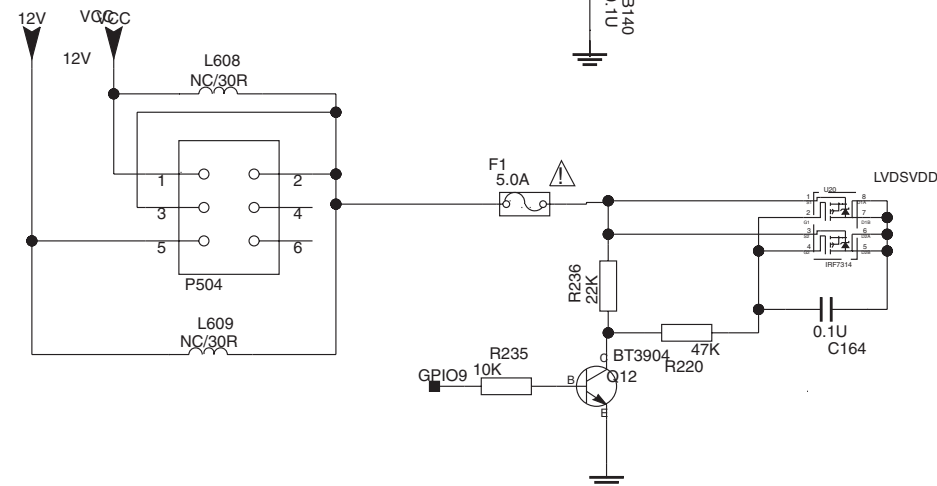
SSB: VGA Input

B04 VGA INPUT

B04



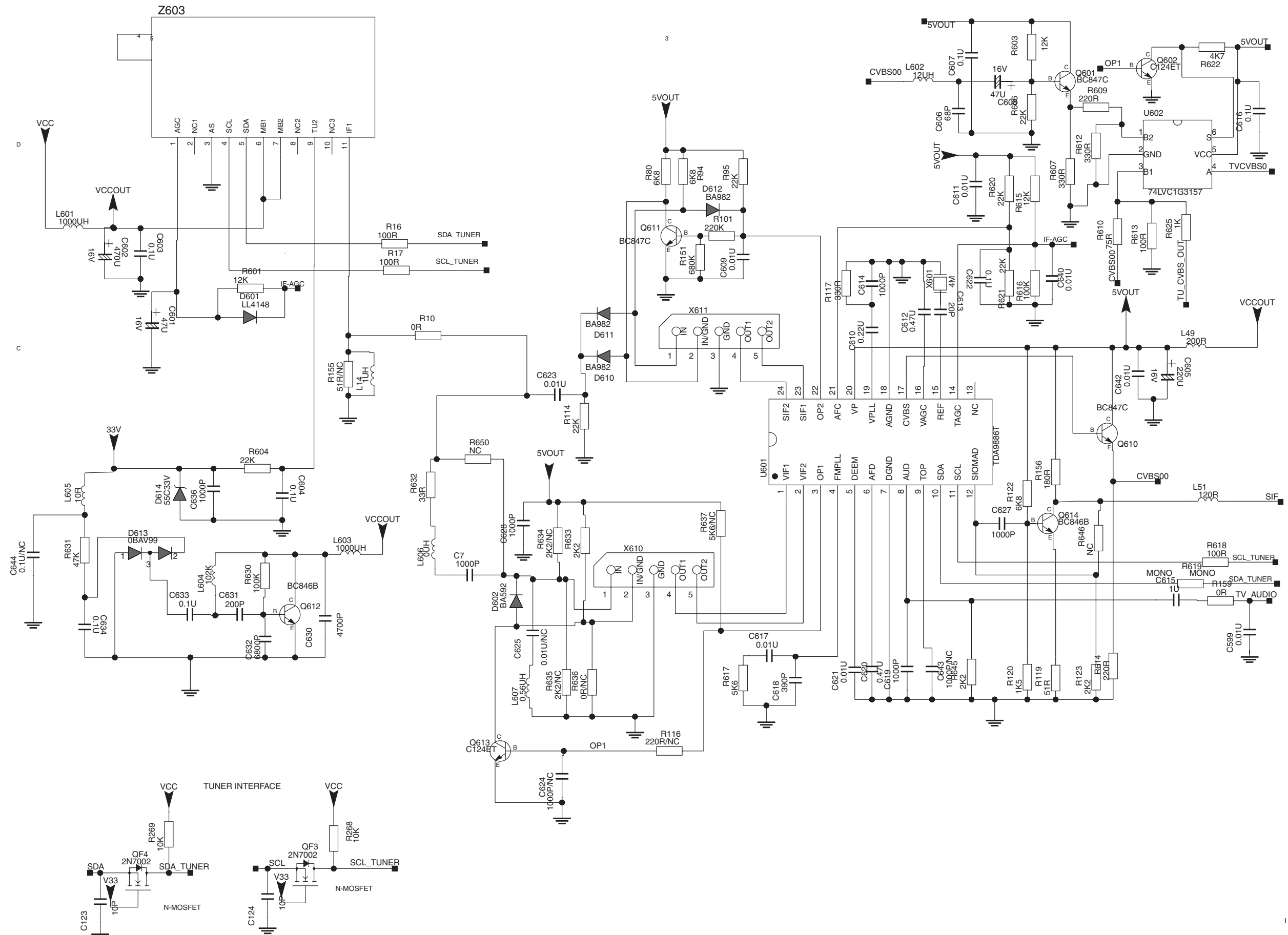
B05



SSB: Tuner Block

B06 TUNER BLOCK

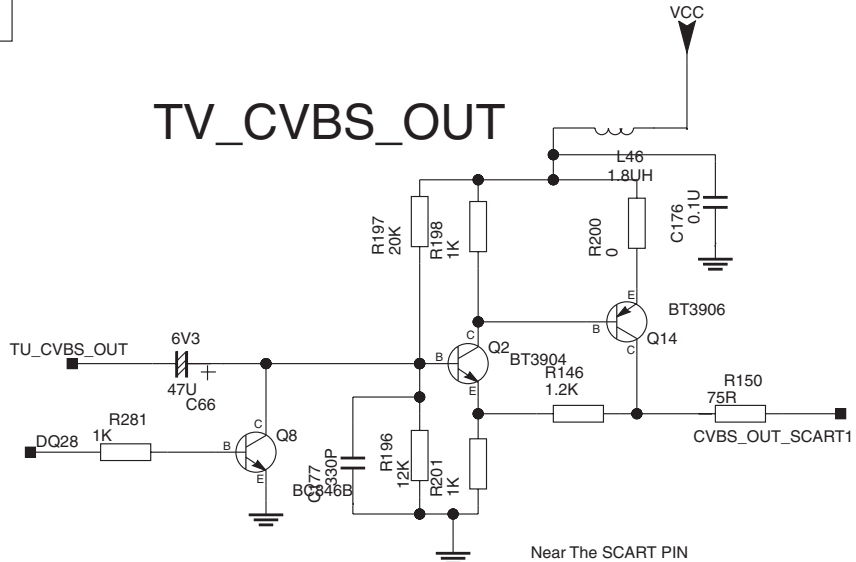
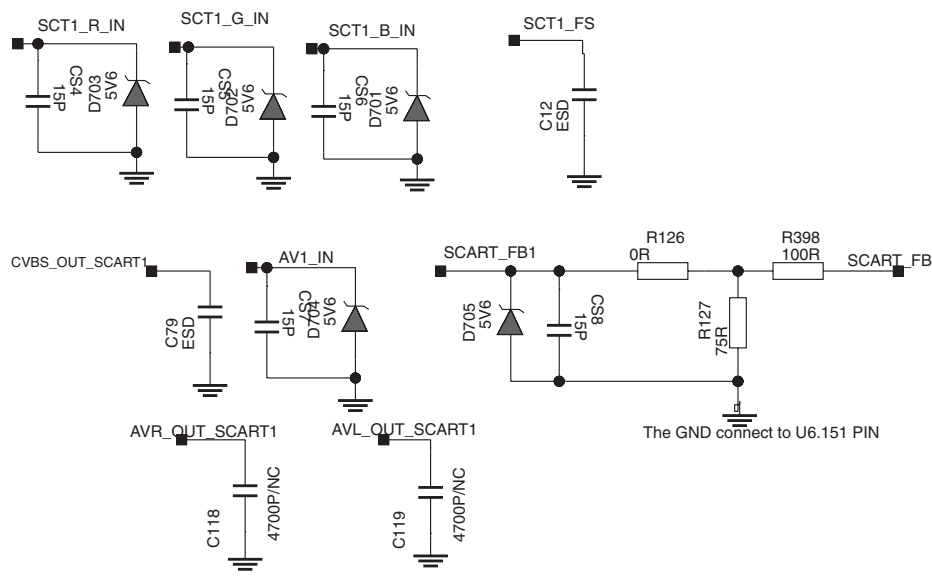
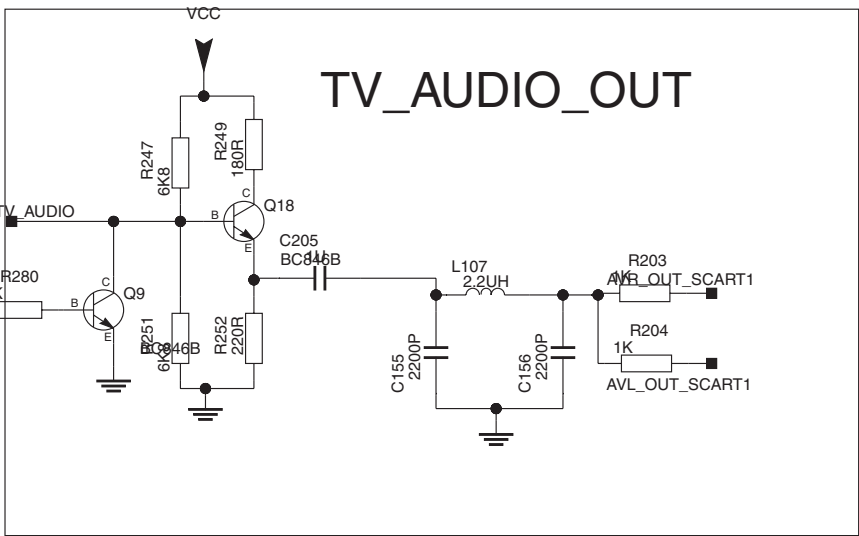
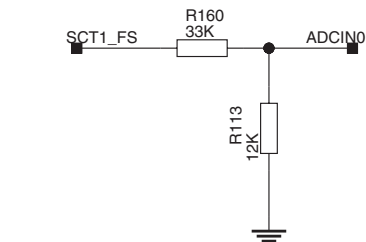
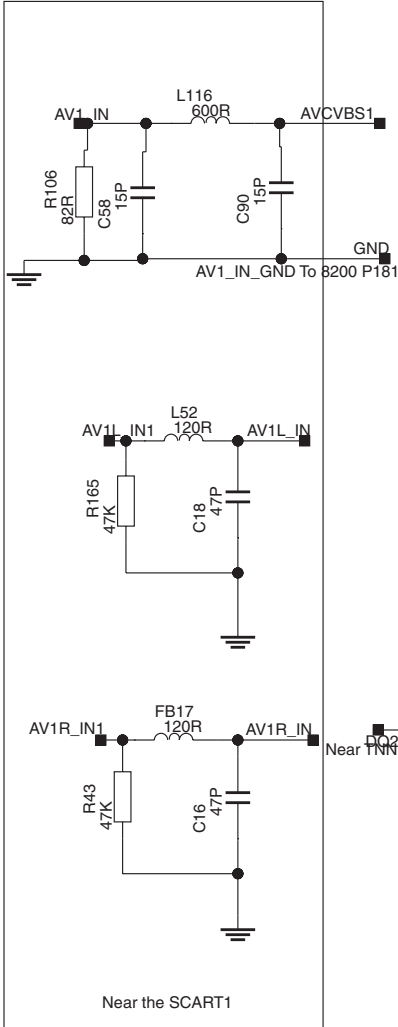
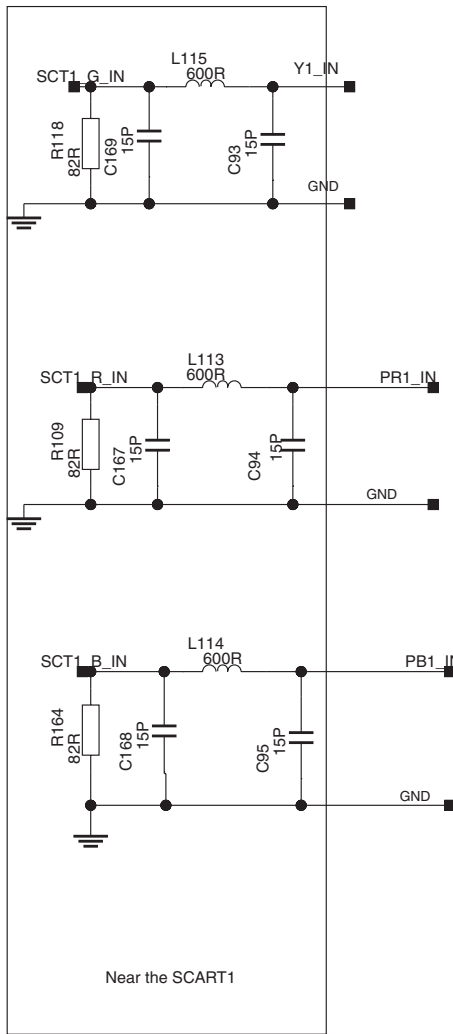
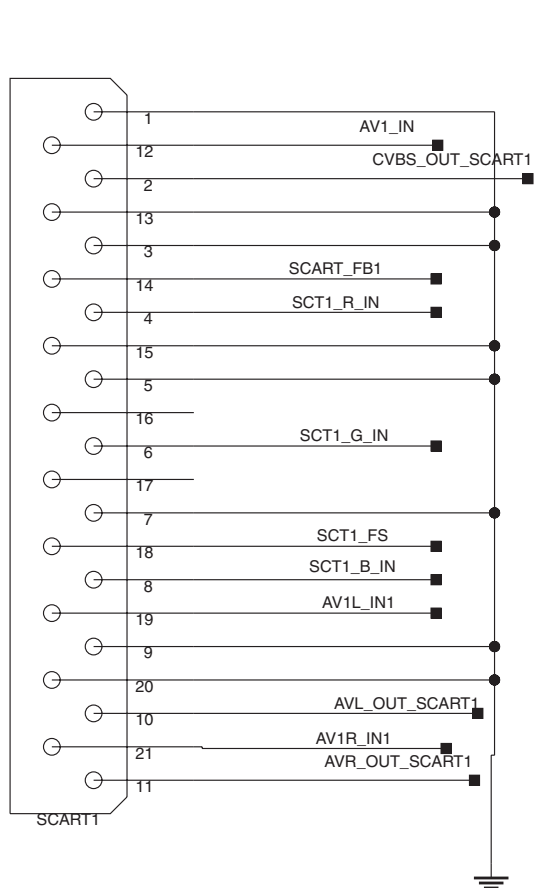
B06



SSB: SCART Input Interface

B07 SCART INPUT INTERFACE

B07

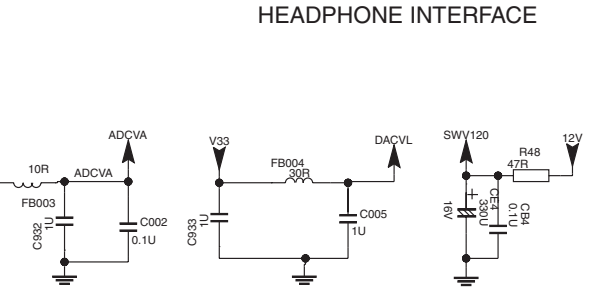
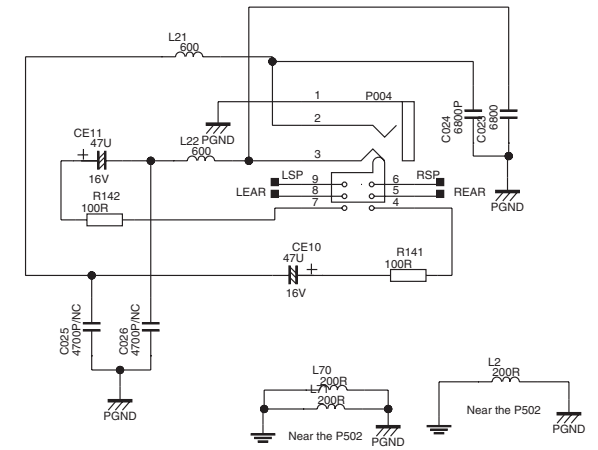
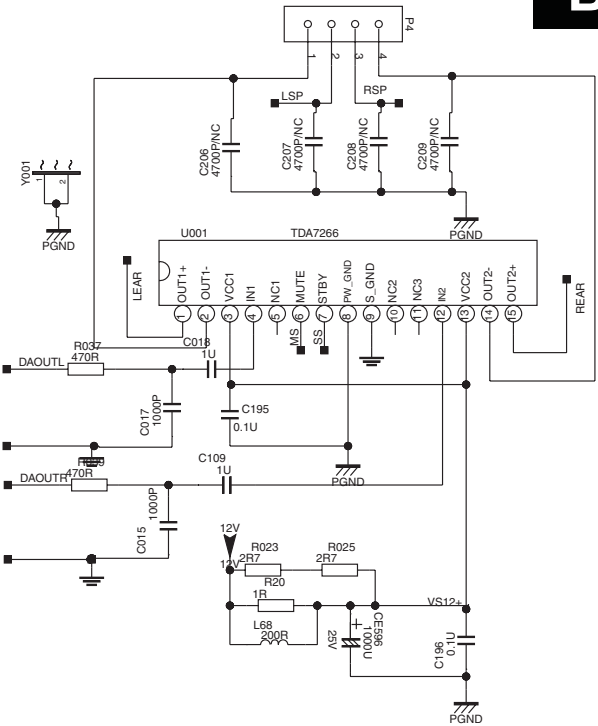
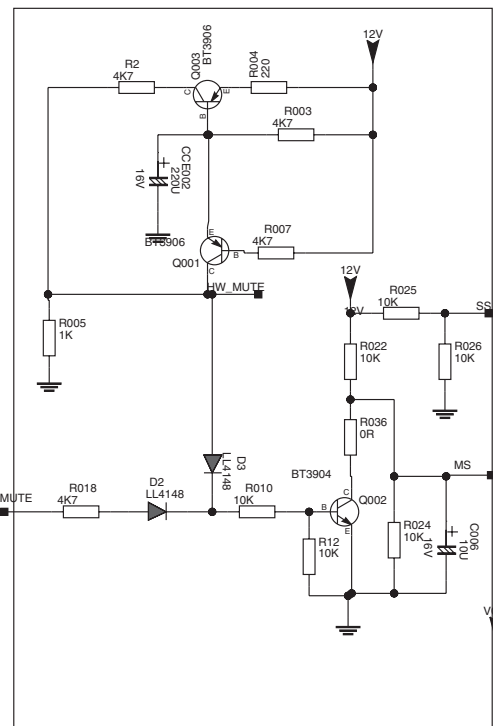
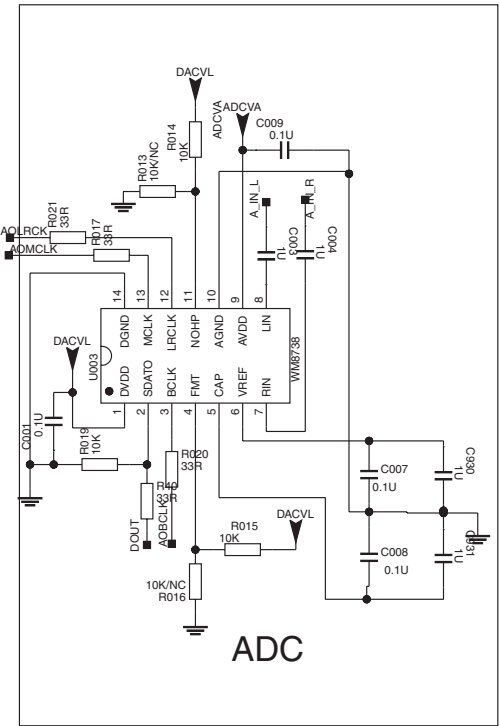
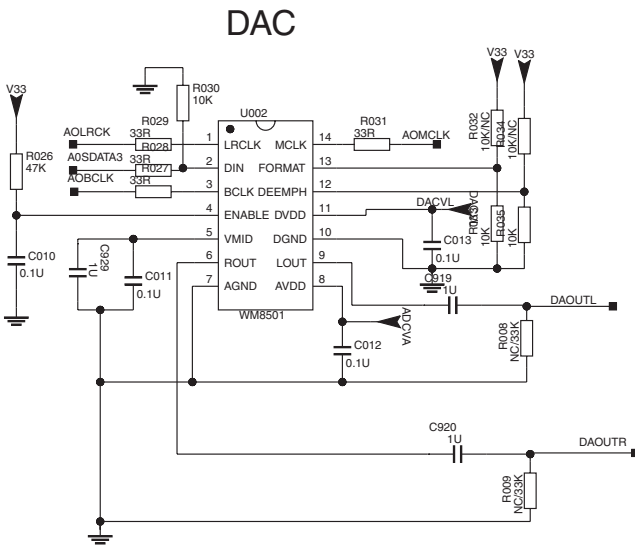
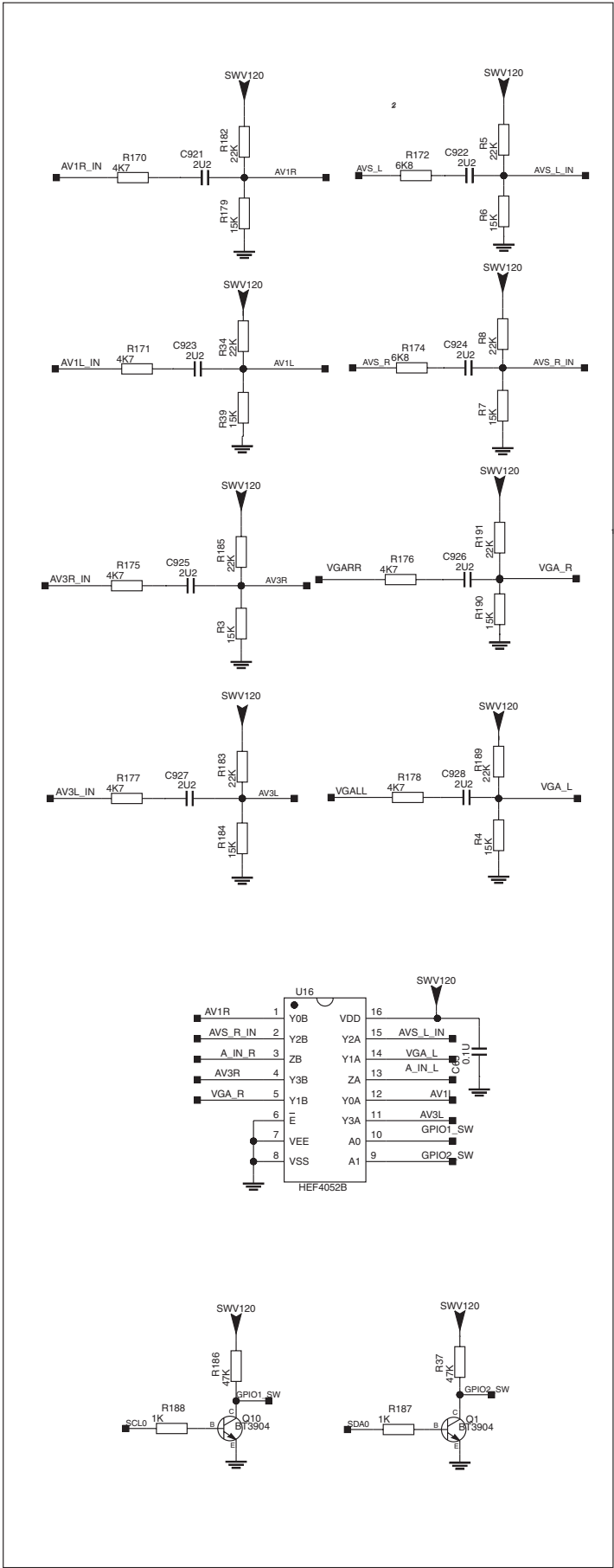


SSB: Audio / Power / Headphone

B09

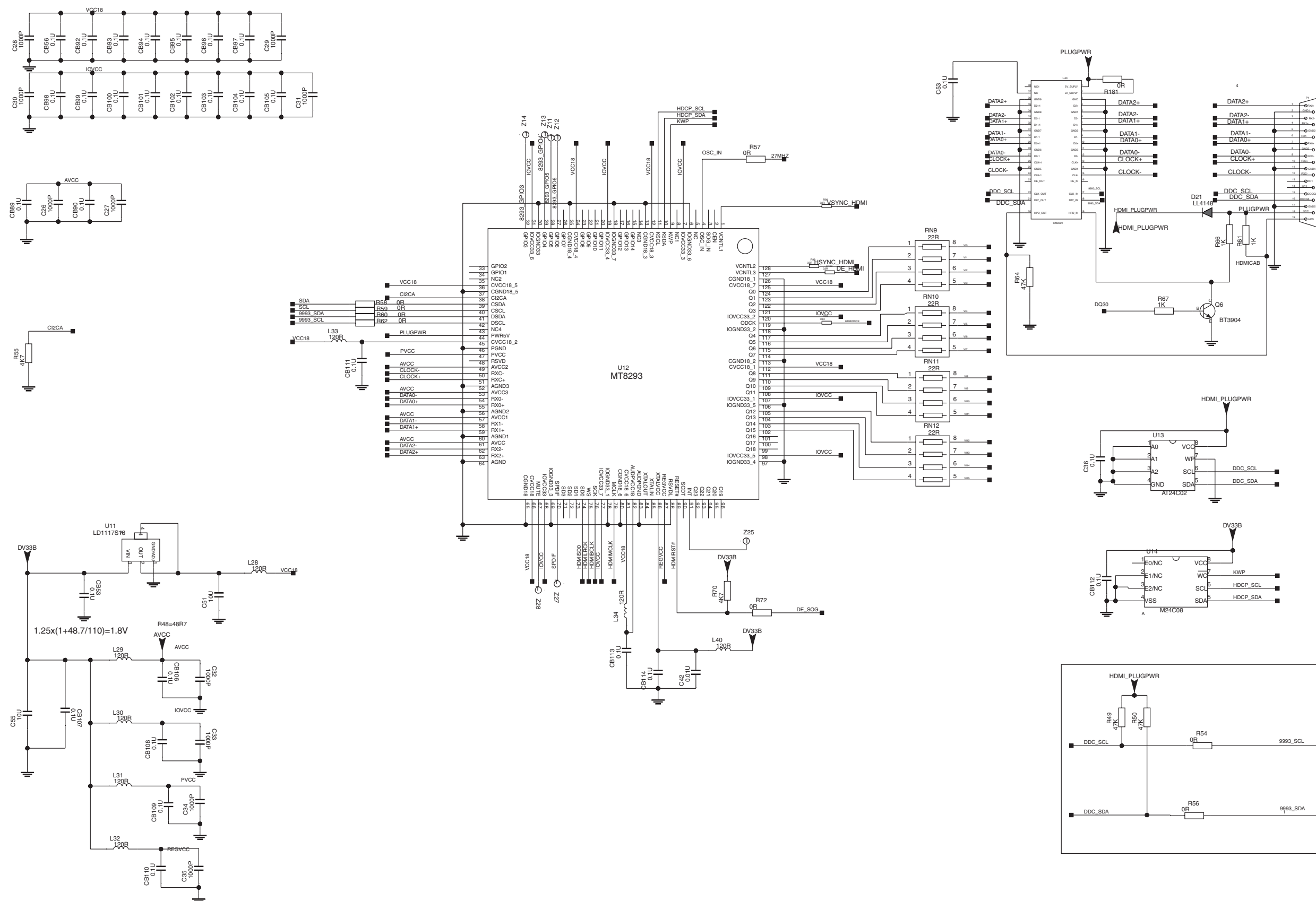
AUDIO SWITCH & POWER AMPLIFIER & HEADPHONE INTERFACE

B09



B10 HDMI INPUT MT8293

B10

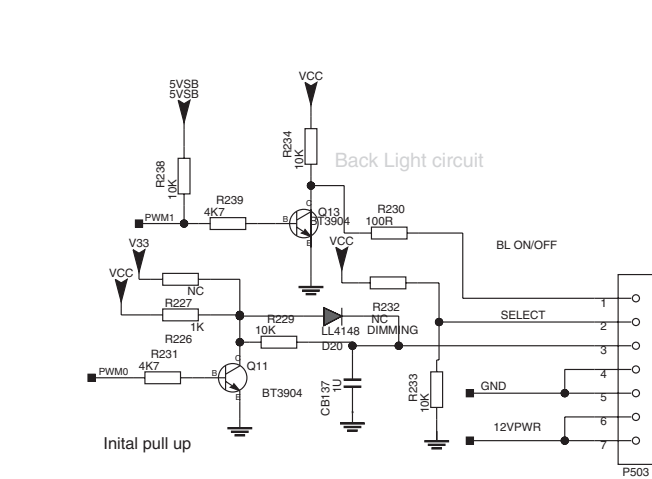
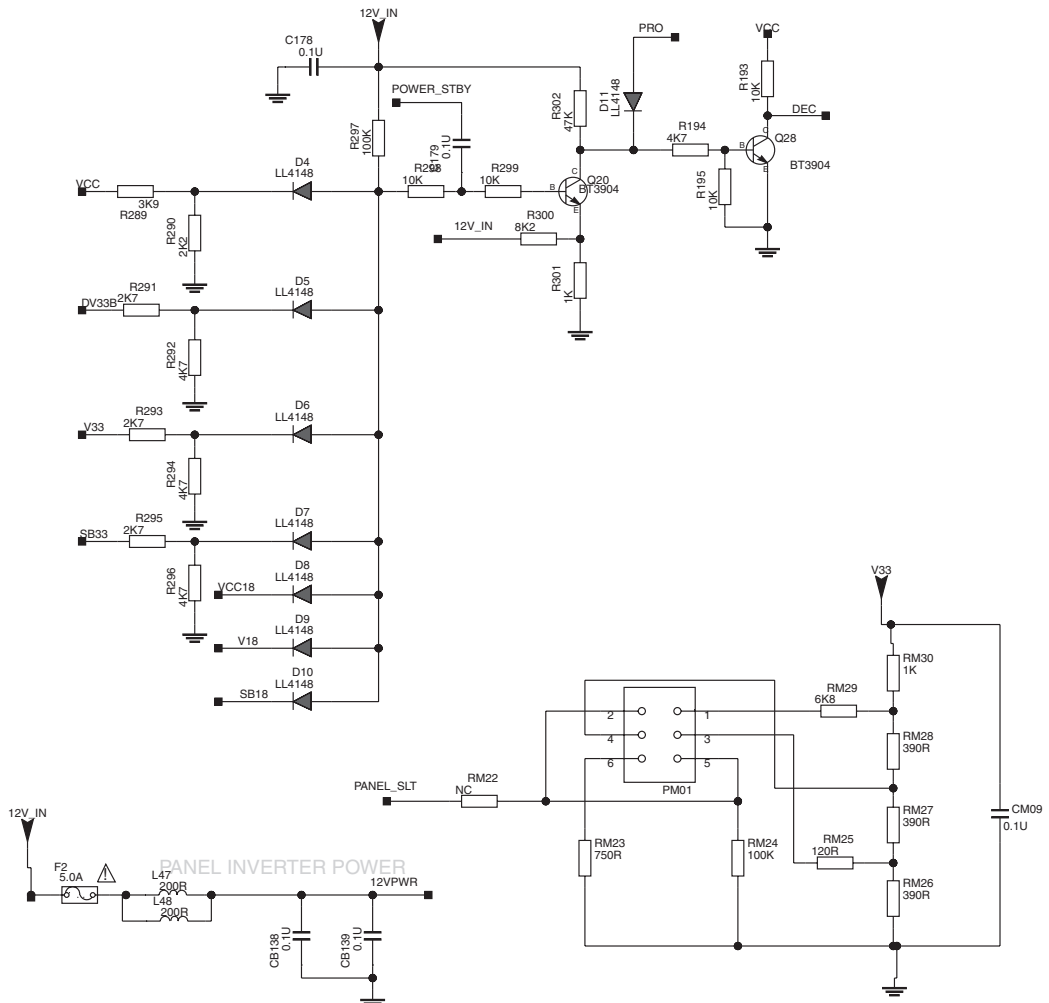
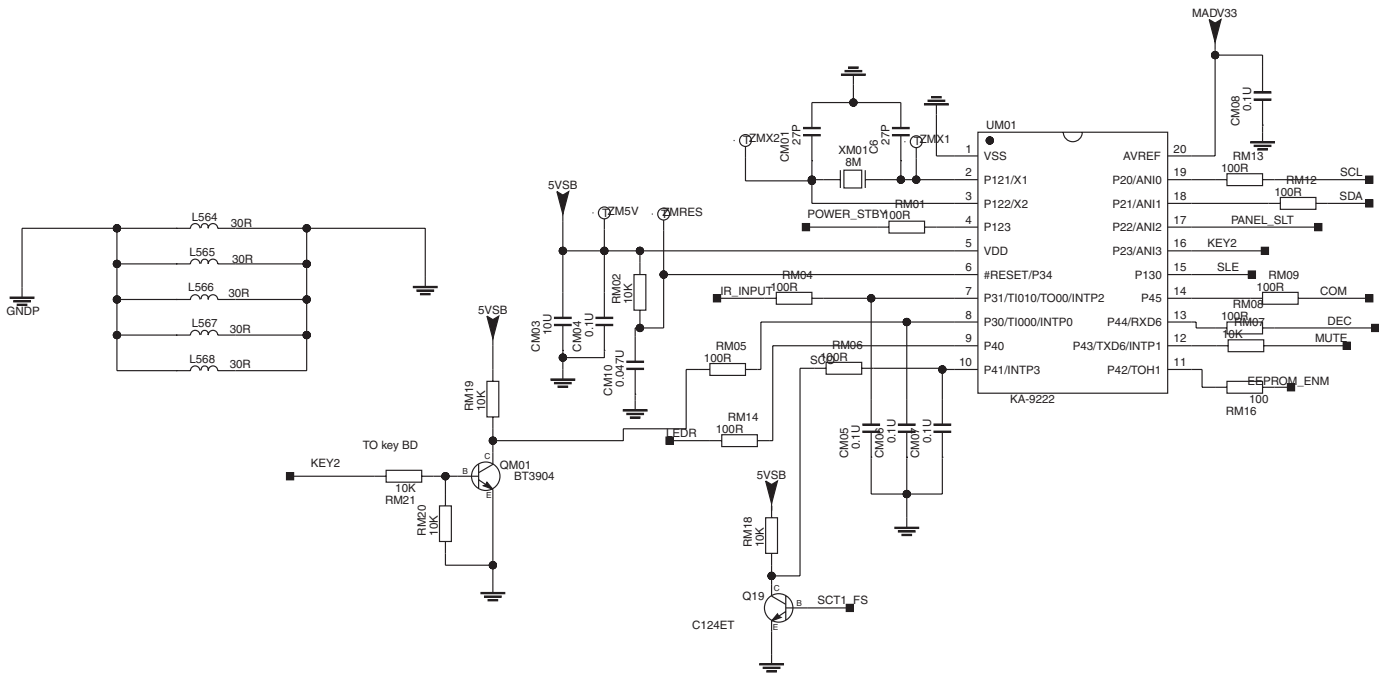
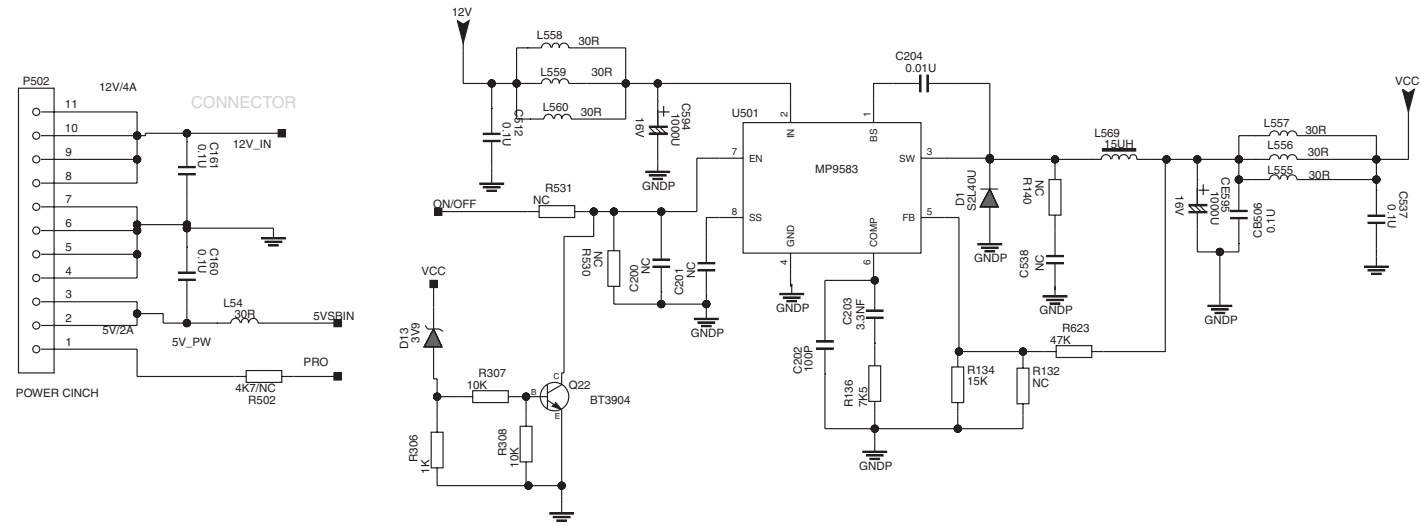
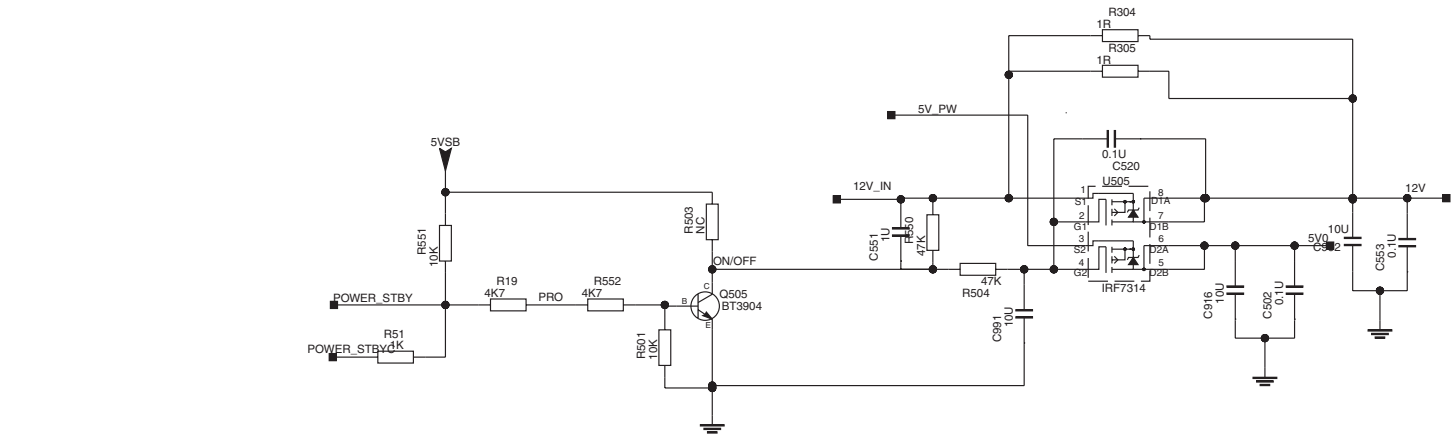


SSB: DC DC / MCU for Stby/Protect

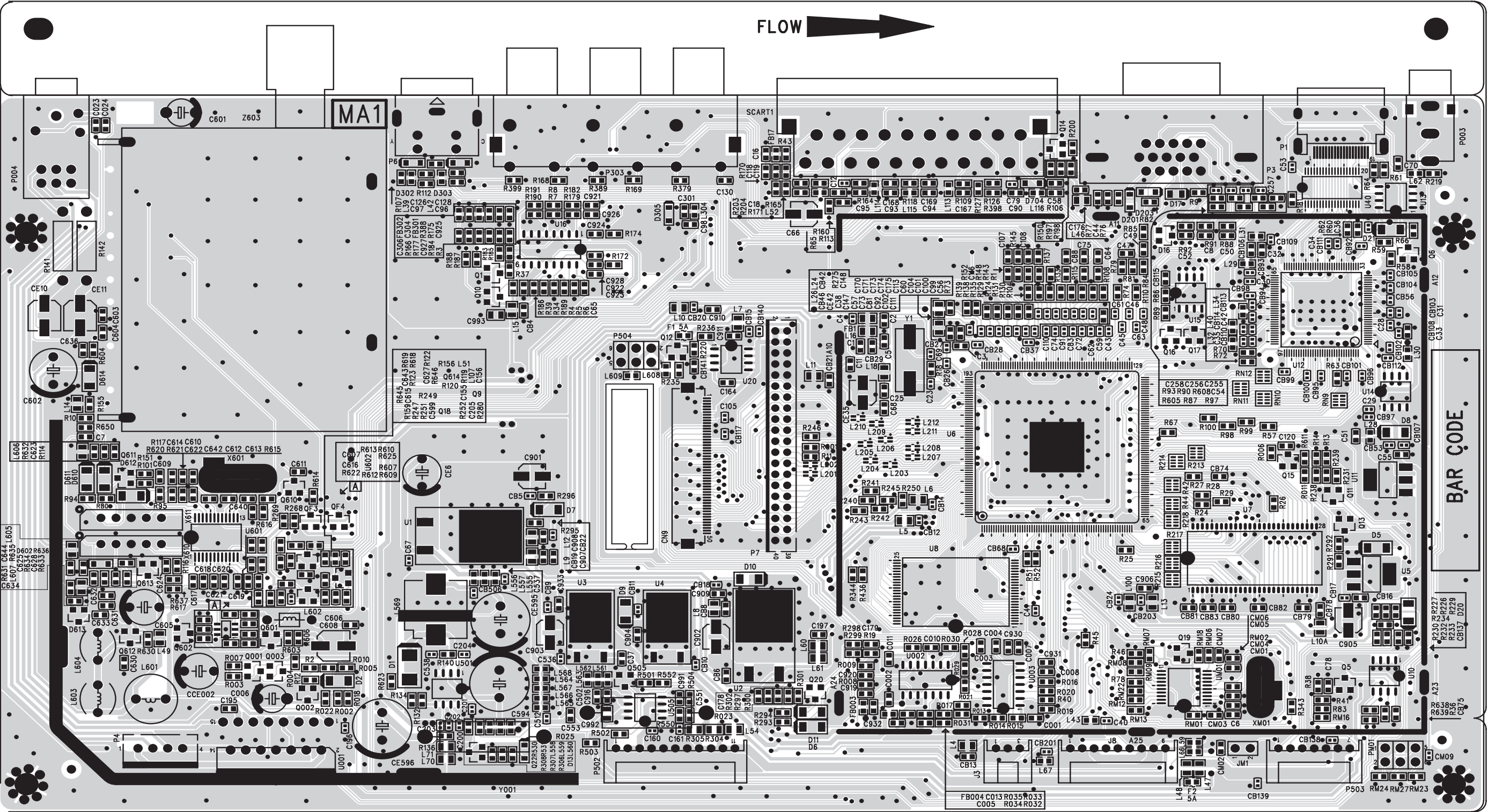
B11

DC DC/MCU FOR STANDBY/PROTECT

B11

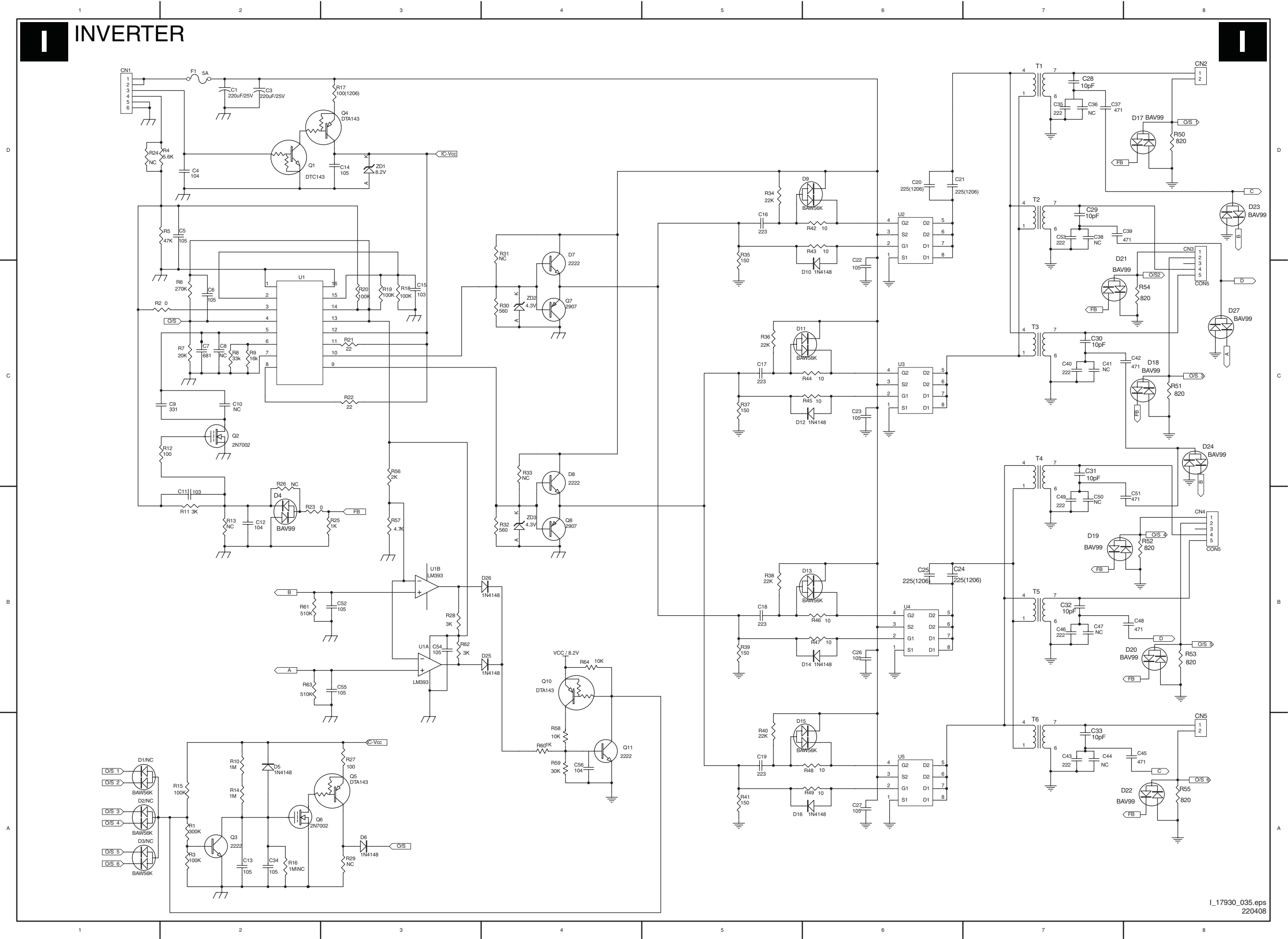


Layout Small Signal Board (Top Side)



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Inverter Panel



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8. Alignments

Index of this chapter:

- 8.1 Electrical Alignments
- 8.2 Hardware Alignments

Note:

The Service Modes are described in chapter 5. Menu navigation is done with the CURSOR UP, DOWN, LEFT or RIGHT keys of the remote control transmitter.

8.1 Electrical Alignments

Perform all electrical adjustments under the following conditions:

- Power supply voltage (depends on region):
 - AP-NTSC: 120 VAC or 230 VAC / 50 Hz ($\pm 10\%$).
 - AP-PAL-multi: 120 - 230 VAC / 50 Hz ($\pm 10\%$).
 - EU: 230 VAC / 50 Hz ($\pm 10\%$).
 - LATAM-NTSC: 120 - 230 VAC / 50 Hz ($\pm 10\%$).
 - US: 120 VAC / 60 Hz ($\pm 10\%$).
- Connect the set to the mains via an isolation transformer with low internal resistance.
- Allow the set to warm up for approximately 60 minutes.
- Measure voltages and waveforms in relation to correct ground (e.g. measure audio signals in relation to AUDIO_GND).

Caution: It is not allowed to use heatsinks as ground.
- Test probe: $R_i > 10 \text{ M}\Omega$, $C_i < 20 \text{ pF}$.
- Use an isolated trimmer/screwdriver to perform alignments.

8.2 Hardware Alignments

Not applicable.

8.2.1 White Balance Adjustment (VGA Mode)

Only VGA input requires color temperature adjustment as all other inputs or relative ones. Both warm and cool colour coordinates are also relatives to normal colour temperature mode ones.

Equipment Requirements: Colour analyser.

Pre conditions:

- PicturePreset: Standard
- BlackExpand: Off
- PicturePreset: Standard
- Tone: Normal
- DynamicContrast Off

Colour Temp Alignment

Apply a $1366 \times 768 / 50\text{Hz}$ signal with white pattern, set "brightness" at 100%, and "contrast" at 50%. Adjust the R, G, and B Sub-Gain for the screen centre.

The 1931 CIE chromaticity (x, y) co-ordinates shall be:

Table 8-1 Alignment for 19" & 20" with a colour analyser

	Normal (8000K)	Cool (9000K)	Warm (6500K)
x	0.296 +/- 0.010	0.289 +/- 0.010	0.314 +/- 0.010
y	0.299 +/- 0.010	0.291 +/- 0.010	0.319 +/- 0.010

Table 8-2 Alignment for 26" with a colour analyser

	Normal (9000K)	Cool (11000K)	Warm (6500K)
x	0.289 +/- 0.010	0.278 +/- 0.010	0.314 +/- 0.010
y	0.291 +/- 0.010	0.278 +/- 0.010	0.319 +/- 0.010

If you do not have a Colour Analyser, the following R, G, and B values are for your reference.

Table 8-3 Reference Value of R, G, and B

	Normal (9300K)	Cool (11500K)	Warm (6500K)
R	146	136	154
G	146	141	150
B	146	152	138

9. Circuit Descriptions, Abbreviation List, and IC Data Sheets

Index of this chapter:

- 9.1 Introduction
- 9.2 Abbreviation List
- 9.3 IC Data Sheets

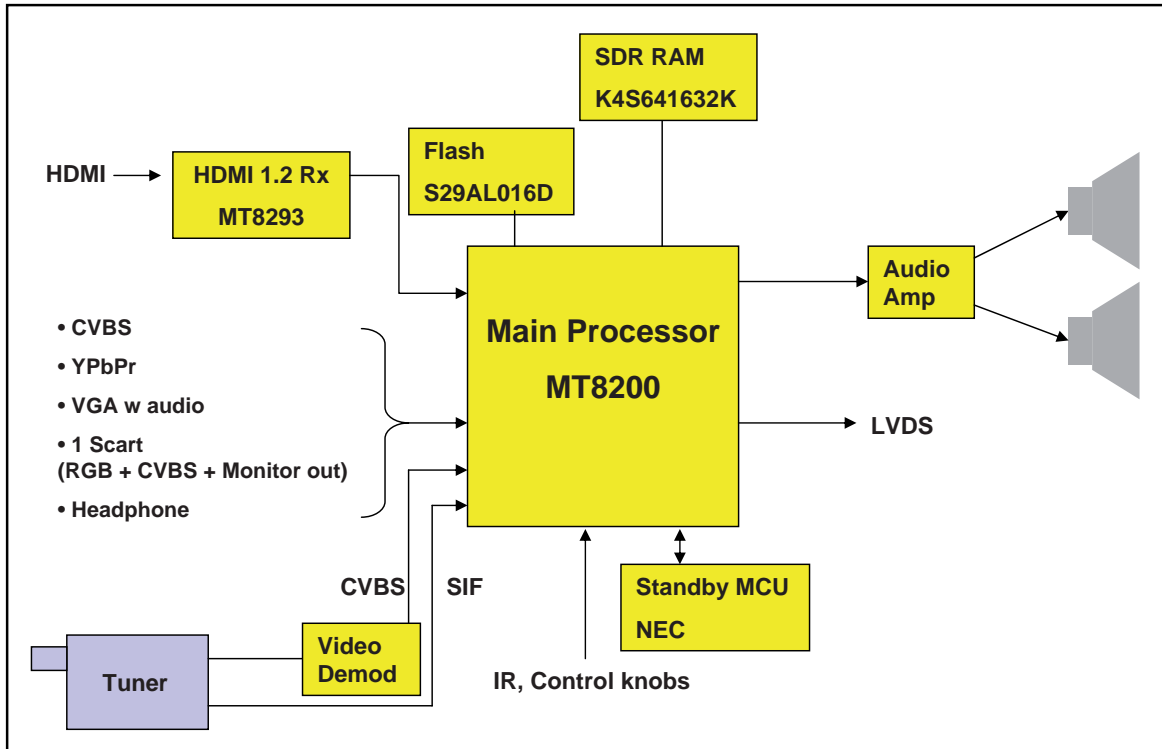
Notes:

- Only **new** circuits (circuits that are not published recently) are described.
- Figures can deviate slightly from the actual situation, due to different set executions.

9.1 Introduction

This chassis supports PC analogue input up to WXGA resolution, and supports TV (RF) for Europe systems: PAL B/G, PAL D/K, PAL I, SECAM B/G, SECAM D/K, CVBS, HDMI and VGA signal input.

The platform is also designed for the lowest power consumption in off/stand-by mode (<0.3W) to fulfil new Philips CE environment policy requirement.



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Figure 9-1 Set functional diagram

It uses one main ICs: MT8200ATE (One Chip LCD-TV Controller).

The MT8200ATE is a highly integrated single chip for LCD TV supporting video input and output format up to HDTV. It includes 3D comb filter TV decoder to retrieve the best image from popular composite signals. Embedded HDTV/VGA decoders let the high bandwidth input signals perfectly reproduced.

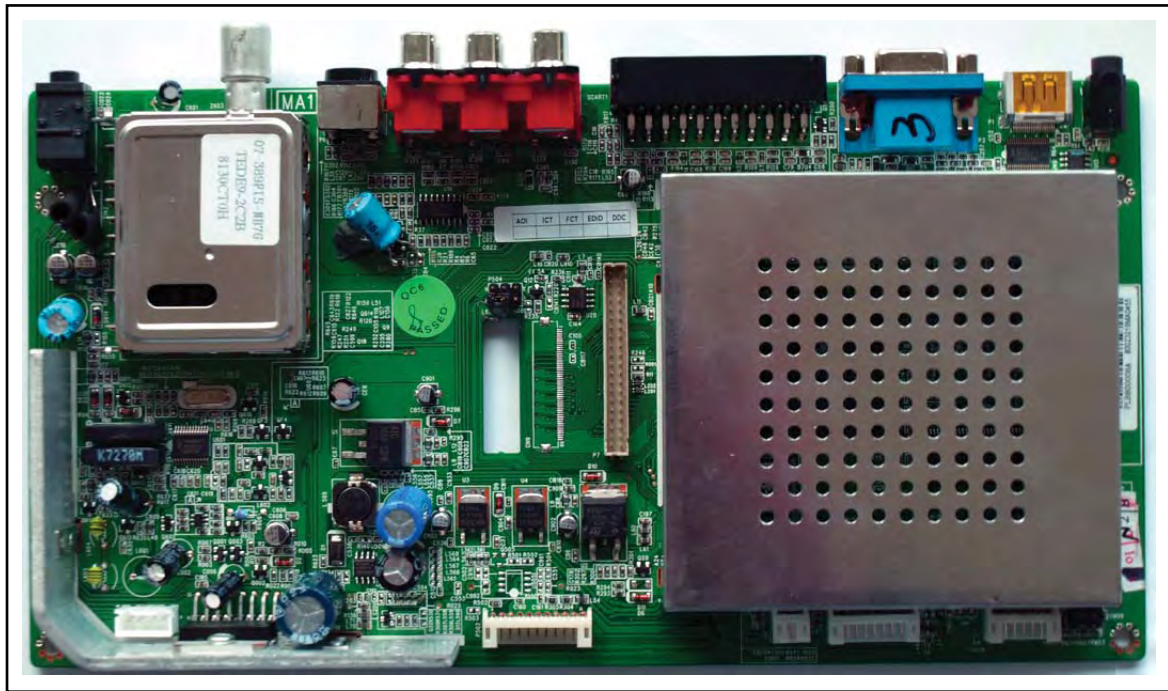
The 16/8 bits digital port may accept CCIR-656/601 external digital input video source. New 2nd generation advanced motion adaptive de-interlacer converts accordingly the interlace video into progressive one with overlay of a 2D Graphic processor. It incorporates advanced full function colour processing with fully 10-bit path provides high quality video contents.

Its on-chip audio processor decodes analog signals from tuner with lip sync control, delivering high quality post-processed sound effect to customers.

The on-chip microprocessor reduces the system BOM and shortens the schedule of UI design by high level C program.

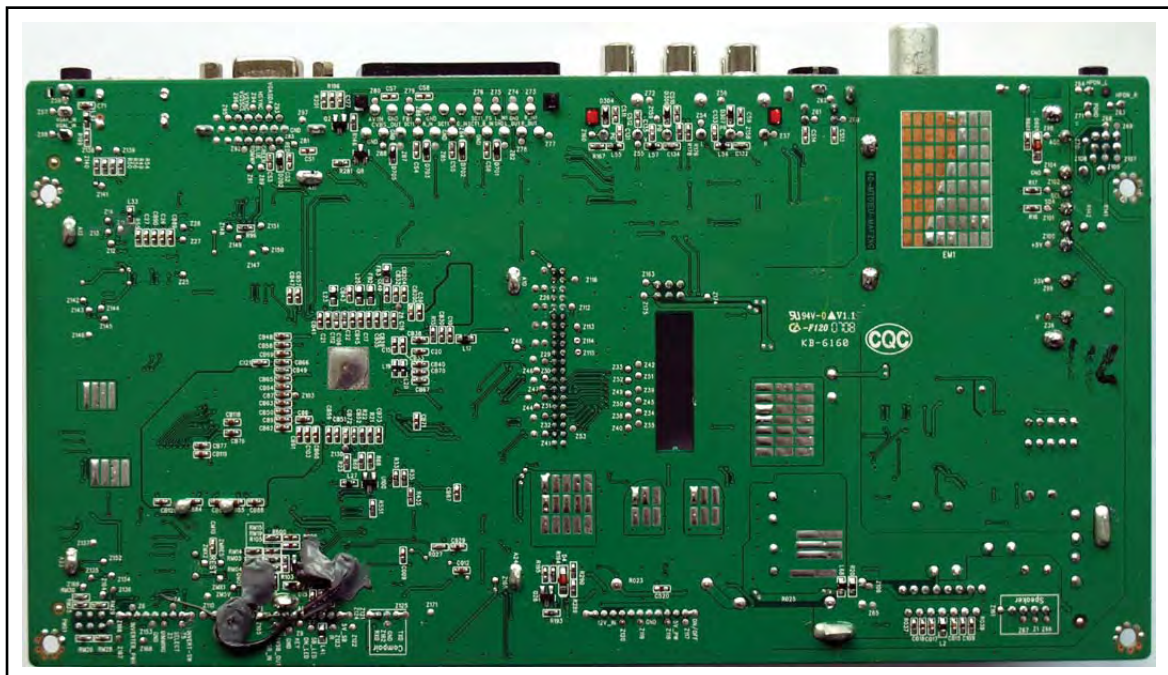
The MT8200 is surrounded by a tuner, a video demodulator, a HDMI interface, SDR and flash memory, an audio amplifier, and optionally a stand-by microprocessor (26"). For the smaller set versions also the inverter board is serviceable.

The CM2021 HDMI Receiver Port Protection and Interface Device is specifically designed for next generation HDMI Host interface protection. An integrated package provides all ESD, level shift and backdrive protection for an HDMI port in a single 38-Pin TSSOP package.



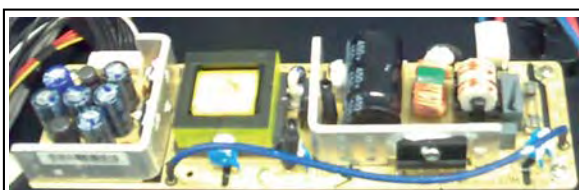
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Figure 9-2 SSB front



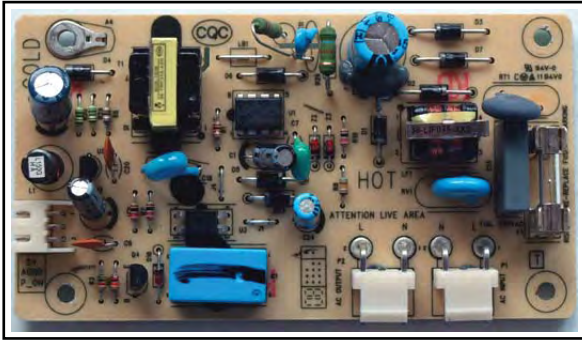
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Figure 9-3 SSB back



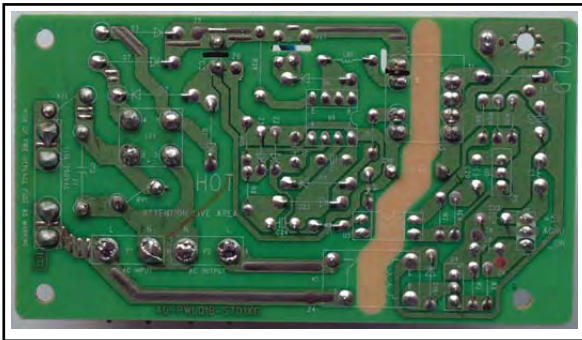
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Figure 9-4 Power supply unit (20V)



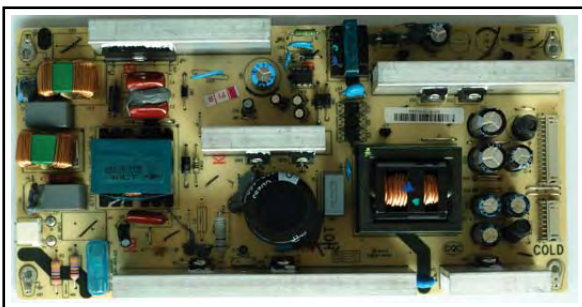
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Figure 9-5 Stand-by power supply unit front (26")



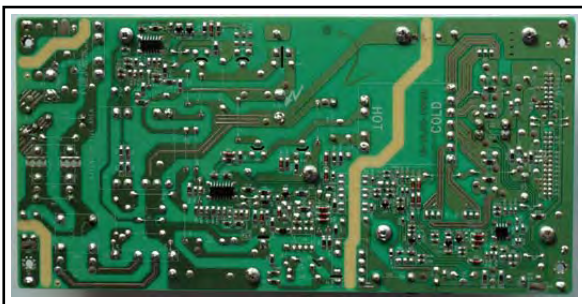
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Figure 9-6 Stand-by power supply unit back (26")



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Figure 9-7 Power supply unit front (26")



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Figure 9-8 Power supply unit back (26")

9.2 Abbreviation List

0/6/12	SCART switch control signal on A/V board. 0 = loop through (AUX to TV), 6 = play 16 : 9 format, 12 = play 4 : 3 format
1080i	1080 visible lines, interlaced
1080p	1080 visible lines, progressive scan
2DNR	Spatial (2D) Noise Reduction
3DNR	Temporal (3D) Noise Reduction
AARA	Automatic Aspect Ratio Adaptation: algorithm that adapts aspect ratio to remove horizontal black bars; keeps the original aspect ratio
ACI	Automatic Channel Installation: algorithm that installs TV channels directly from a cable network by means of a predefined TXT page
ADC	Analogue to Digital Converter
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency
AGC	Automatic Gain Control: algorithm that controls the video input of the feature box
AM	Amplitude Modulation
ANR	Automatic Noise Reduction: one of the algorithms of Auto TV
AP	Asia Pacific
AR	Aspect Ratio: 4 by 3 or 16 by 9
ASF	Auto Screen Fit: algorithm that adapts aspect ratio to remove horizontal black bars without discarding video information
ATSC	Advanced Television Systems Committee, the digital TV standard in the USA
ATV	See Auto TV
Auto TV	A hardware and software control system that measures picture content, and adapts image parameters in a dynamic way
AV	External Audio Video
AVC	Audio Video Controller
AVIP	Audio Video Input Processor
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz
BLR	Board-Level Repair
BTSC	Broadcast Television Standard Committee. Multiplex FM stereo sound system, originating from the USA and used e.g. in LATAM and AP-NTSC countries
B-TXT	Blue Teletext
C	Centre channel (audio)
CEC	Consumer Electronics Control bus: remote control bus on HDMI connections
CL	Constant Level: audio output to connect with an external amplifier
CLR	Component Level Repair
COLUMBUS	COlor LUMinance Baseband Universal Sub-system
ComPair	Computer aided rePair
CP	Connected Planet / Copy Protection
CSM	Customer Service Mode
CTI	Color Transient Improvement: manipulates steepness of chroma transients
CVBS	Composite Video Blanking and Synchronization
DAC	Digital to Analogue Converter
DBE	Dynamic Bass Enhancement: extra low frequency amplification

DDC	See "E-DDC"		half the number of the total amount of
D/K	Monochrome TV system. Sound carrier distance is 6.5 MHz		lines. The fields are written in "pairs", causing line flicker.
DFI	Dynamic Frame Insertion	IR	Infra Red
DFU	Directions For Use: owner's manual	IRQ	Interrupt Request
DMR	Digital Media Reader: card reader	ITU-656	The ITU Radio communication Sector (ITU-R) is a standards body
DMSD	Digital Multi Standard Decoding		subcommittee of the International
DNM	Digital Natural Motion		Telecommunication Union relating to
DNR	Digital Noise Reduction: noise reduction feature of the set		radio communication. ITU-656 (a.k.a. SDI), is a digitized video format used for broadcast grade video.
DRAM	Dynamic RAM		Uncompressed digital component or digital composite signals can be used.
DRM	Digital Rights Management		The SDI signal is self-synchronizing, uses 8 bit or 10 bit data words, and has a maximum data rate of 270 Mbit/s, with a minimum bandwidth of 135 MHz.
DSP	Digital Signal Processing		Institutional TeleVision; TV sets for hotels, hospitals etc.
DST	Dealer Service Tool: special remote control designed for service technicians	ITV	Jaguar Output Processor
DTCP	Digital Transmission Content Protection; A protocol for protecting digital audio/video content that is traversing a high speed serial bus, such as IEEE-1394	JOP	Last Status; The settings last chosen by the customer and read and stored in RAM or in the NVM. They are called at start-up of the set to configure it according to the customer's preferences
DVB-C	Digital Video Broadcast - Cable	LS	Latin America
DVB-T	Digital Video Broadcast - Terrestrial		Liquid Crystal Display
DVD	Digital Versatile Disc		Light Emitting Diode
DVI(-d)	Digital Visual Interface (d= digital only)		Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I
E-DDC	Enhanced Display Data Channel (VESA standard for communication channel and display). Using E-DDC, the video source can read the EDID information from the display.	LATAM	LOcal REgression approximation noise reduction
EDID	Extended Display Identification Data (VESA standard)	LCD	LG.Philips LCD (supplier)
EEPROM	Electrically Erasable and Programmable Read Only Memory	LED	Loudspeaker
EMI	Electro Magnetic Interference	L/L'	Low Voltage Differential Signalling
EPLD	Erasable Programmable Logic Device		Mega bits per second
EU	Europe	LORE	Monochrome TV system. Sound carrier distance is 4.5 MHz
EXT	EXTErnal (source), entering the set by SCART or by cinches (jacks)	LPL	Microprocessor without Interlocked
FBL	Fast BLanking: DC signal accompanying RGB signals	LS	Pipeline-Stages; A RISC-based microprocessor
FDS	Full Dual Screen (same as FDW)	LVDS	Matrix Output Processor
FDW	Full Dual Window (same as FDS)	Mbps	Metal Oxide Silicon Field Effect Transistor, switching device
FLASH	FLASH memory	M/N	Motion Pictures Experts Group
FM	Field Memory or Frequency Modulation		Multi Platform InterFace
FPGA	Field-Programmable Gate Array	MIPS	MUTE Line
FTV	Flat TeleVision		Not Connected
Gb/s	Giga bits per second	MOP	Near Instantaneous Compounded Audio Multiplexing. This is a digital sound system, mainly used in Europe.
G-TXT	Green TeleteXT	MOSFET	Negative Temperature Coefficient, non-linear resistor
H	H_sync to the module	MPEG	National Television Standard Committee. Color system mainly used in North America and Japan. Color carrier NTSC M/N= 3.579545 MHz, NTSC 4.43= 4.433619 MHz (this is a VCR norm, it is not transmitted off-air)
HD	High Definition	MPIF	Non-Volatile Memory: IC containing TV related data such as alignments
HDD	Hard Disk Drive	MUTE	Open Circuit
HDCP	High-bandwidth Digital Content Protection: A "key" encoded into the HDMI/DVI signal that prevents video data piracy. If a source is HDCP coded and connected via HDMI/DVI without the proper HDCP decoding, the picture is put into a "snow vision" mode or changed to a low resolution. For normal content distribution the source and the display device must be enabled for HDCP "software key" decoding.	NC	On Screen Display
HDMI	High Definition Multimedia Interface	NICAM	On screen display Teletext and Control; also called Artistic (SAA5800)
HP	HeadPhone		Project 50: communication protocol between TV and peripherals
I	Monochrome TV system. Sound carrier distance is 6.0 MHz	NTC	Phase Alternating Line. Color system mainly used in West Europe (color carrier= 4.433619 MHz) and South America (color carrier PAL M=
I ² C	Inter IC bus	NTSC	
I ² D	Inter IC Data bus		
I ² S	Inter IC Sound bus	NVM	
IF	Intermediate Frequency	O/C	
Interlaced	Scan mode where two fields are used to form one frame. Each field contains	OSD	
		OTC	
		P50	
		PAL	

	3.575612 MHz and PAL N= 3.582056 MHz)	V	V-sync to the module
PCB	Printed Circuit Board (same as "PWB")	VCR	Video Cassette Recorder
PCM	Pulse Code Modulation	VESA	Video Electronics Standards Association
PDP	Plasma Display Panel	VGA	640x480 (4:3)
PFC	Power Factor Corrector (or Pre-conditioner)	VL	Variable Level out: processed audio output toward external amplifier
PIP	Picture In Picture	VSF	Vestigial Side Band; modulation method
PLL	Phase Locked Loop. Used for e.g. FST tuning systems. The customer can give directly the desired frequency	WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
POR	Power On Reset, signal to reset the uP	WXGA	1280x768 (15:9)
Progressive Scan	Scan mode where all scan lines are displayed in one frame at the same time, creating a double vertical resolution.	XTAL	Quartz crystal
PTC	Positive Temperature Coefficient, non-linear resistor	XGA	1024x768 (4:3)
PWB	Printed Wiring Board (same as "PCB")	Y	Luminance signal
PWM	Pulse Width Modulation	Y/C	Luminance (Y) and Chrominance (C) signal
QRC	Quasi Resonant Converter	YPbPr	Component video. Luminance and scaled color difference signals (B-Y and R-Y)
QTNR	Quality Temporal Noise Reduction	YUV	Component video
QVCP	Quality Video Composition Processor		
RAM	Random Access Memory		
RGB	Red, Green, and Blue. The primary color signals for TV. By mixing levels of R, G, and B, all colors (Y/C) are reproduced.		
RC	Remote Control		
RC5 / RC6	Signal protocol from the remote control receiver		
RESET	RESET signal		
ROM	Read Only Memory		
R-TXT	Red TeleteXT		
SAM	Service Alignment Mode		
S/C	Short Circuit		
SCART	Syndicat des Constructeurs d'Appareils Radiorécepteurs et Téléviseurs		
SCL	Serial Clock I ² C		
SCL-F	CLock Signal on Fast I ² C bus		
SD	Standard Definition		
SDA	Serial Data I ² C		
SDA-F	DAta Signal on Fast I ² C bus		
SDI	Serial Digital Interface, see "ITU-656"		
SDRAM	Synchronous DRAM		
SECAM	SEquence Couleur Avec Mémoire. Color system mainly used in France and East Europe. Color carriers= 4.406250 MHz and 4.250000 MHz		
SIF	Sound Intermediate Frequency		
SMPS	Switched Mode Power Supply		
SoC	System on Chip		
SOG	Sync On Green		
SOPS	Self Oscillating Power Supply		
S/PDIF	Sony Philips Digital InterFace		
SRAM	Static RAM		
SRP	Service Reference Protocol		
SSB	Small Signal Board		
STBY	STand-BY		
SVGA	800x600 (4:3)		
SVHS	Super Video Home System		
SW	Software		
SWAN	Spatial temporal Weighted Averaging Noise reduction		
SXGA	1280x1024		
TFT	Thin Film Transistor		
THD	Total Harmonic Distortion		
TMDS	Transmission Minimized Differential Signalling		
TXT	TeleteXT		
TXT-DW	Dual Window with TeleteXT		
UI	User Interface		
uP	Microprocessor		
UXGA	1600x1200 (4:3)		

9.3 IC Data Sheets

This section shows the internal block diagrams and pin layouts of ICs that are drawn as "black boxes" in the electrical diagrams (with the exception of "memory" and "logic" ICs).

9.3.1 Diagram B, AT24C02B

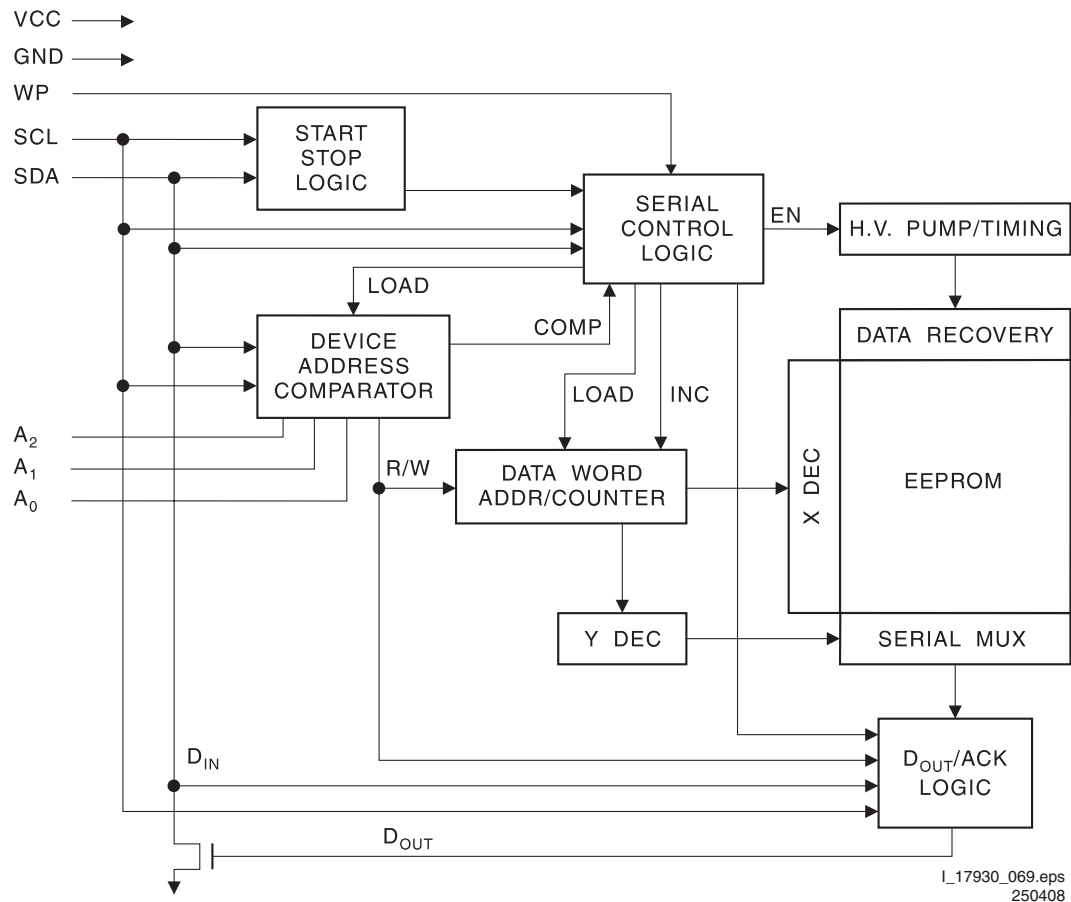


Figure 9-9 Block diagram

9.3.2 Diagram B, MT8200

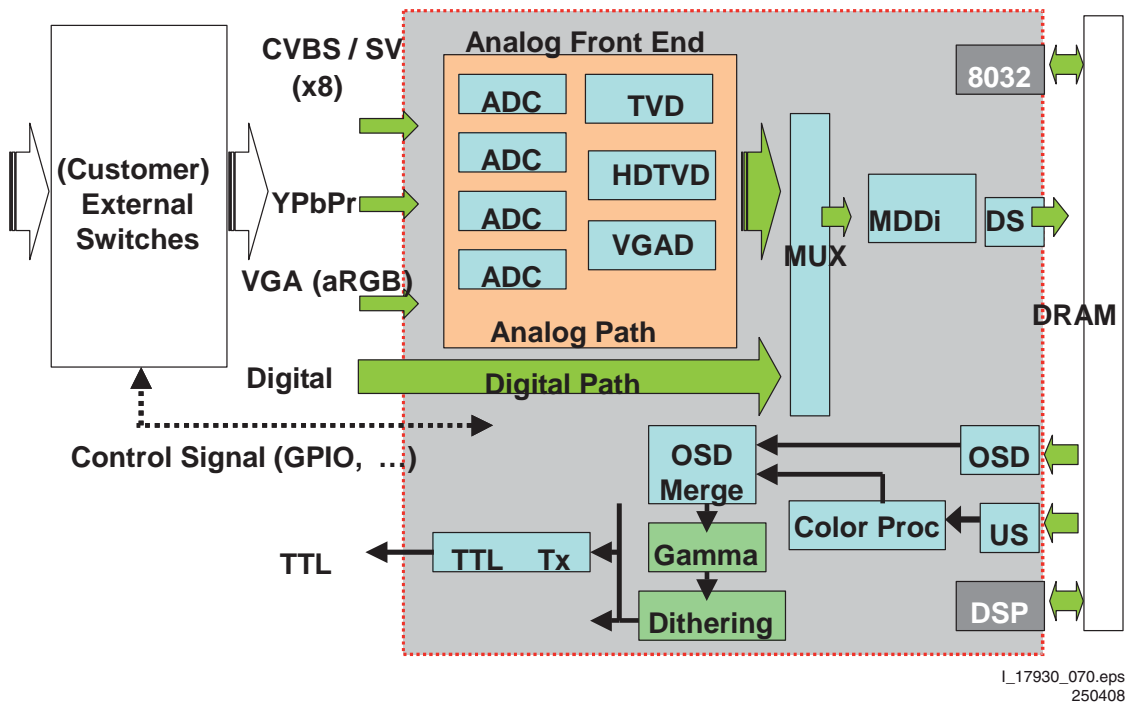


Figure 9-10 Block diagram

9.3.3 Diagram B, TDA7266

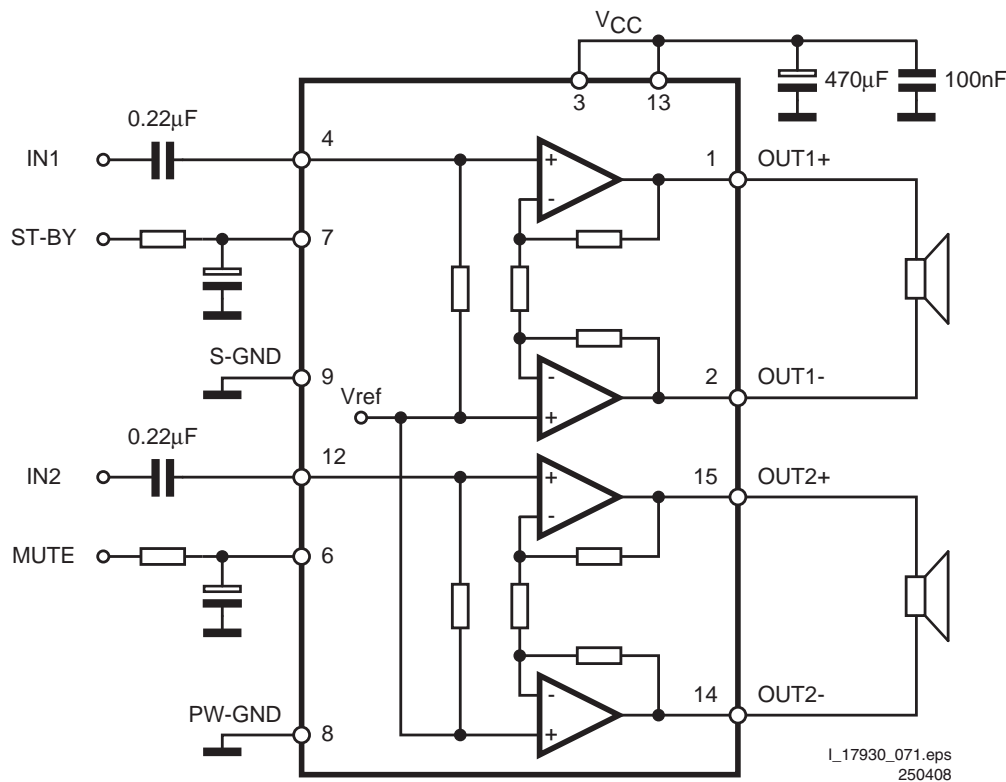


Figure 9-11 Block diagram

9.3.4 Diagram B, TDA9886

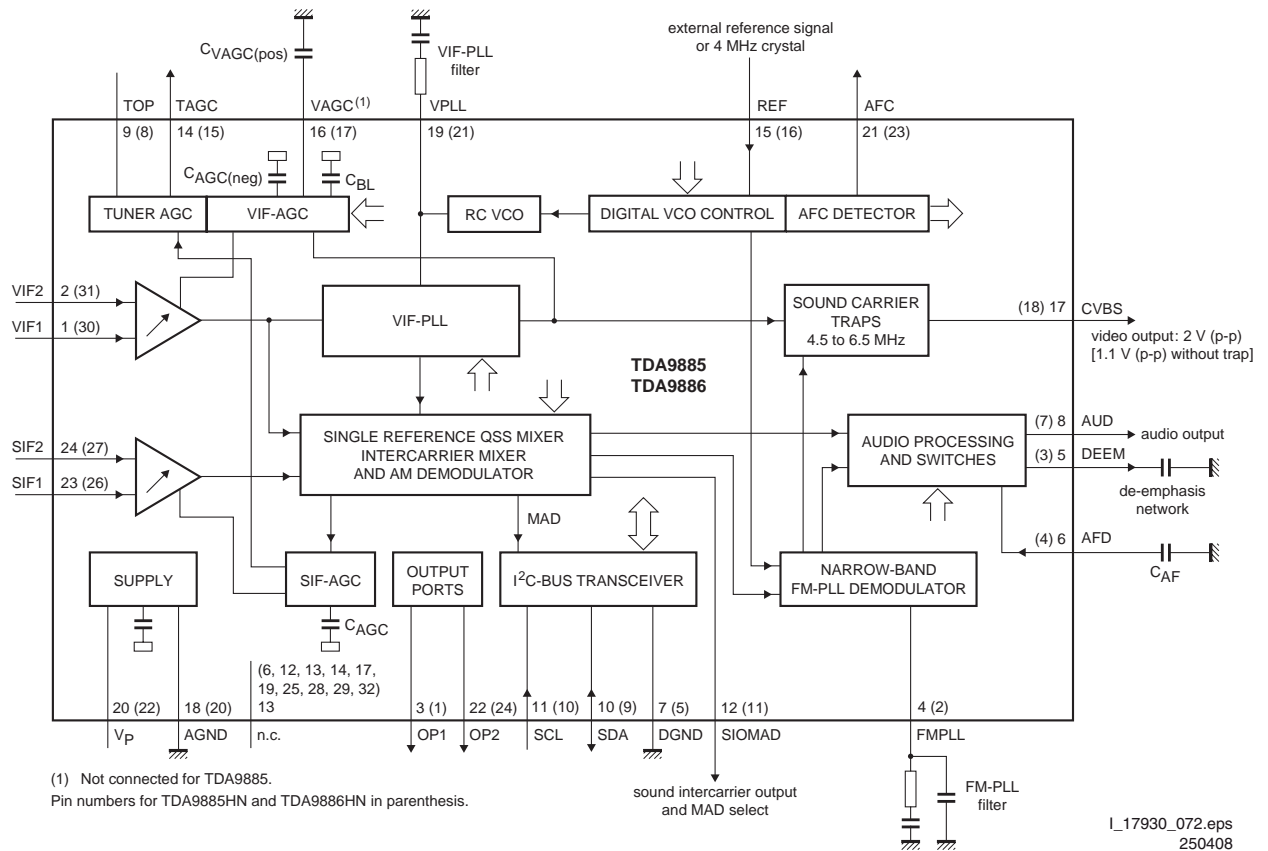


Figure 9-12 Block diagram

9.3.5 Diagram B, WM8501

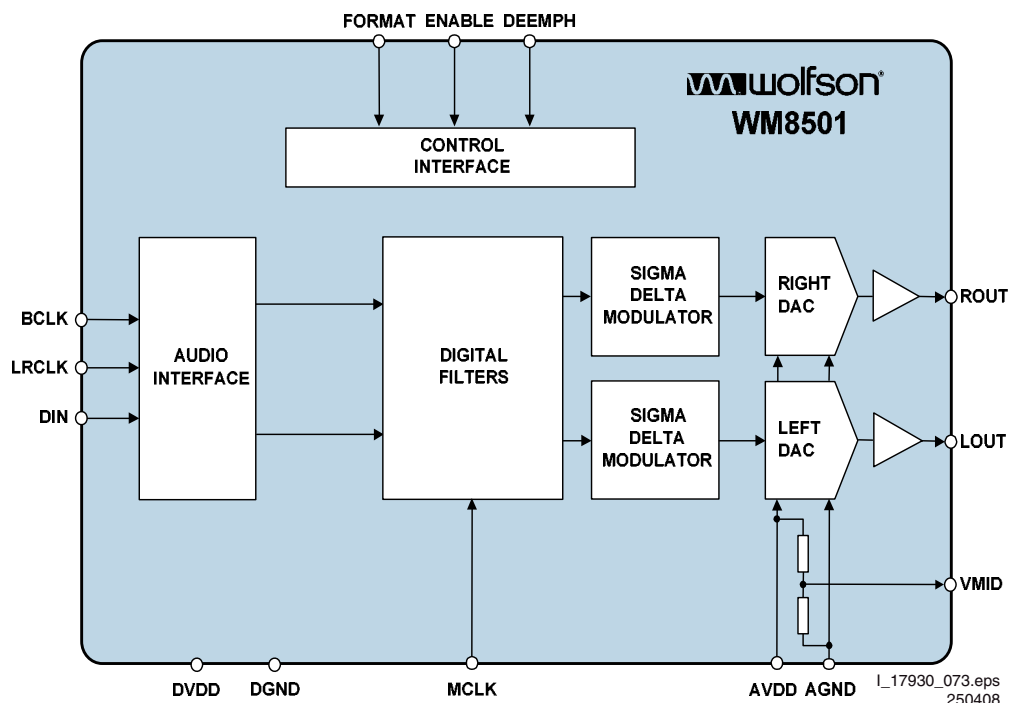
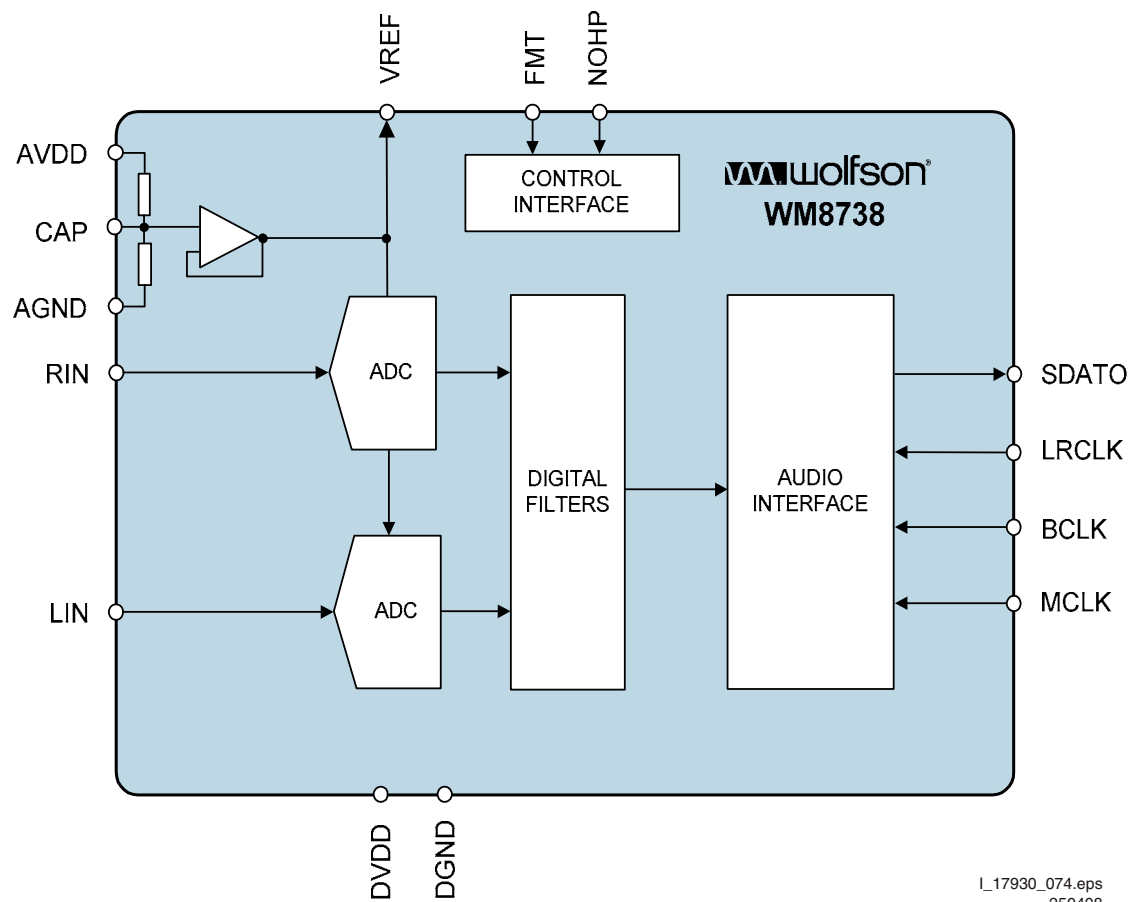


Figure 9-13 Block diagram

9.3.6 Diagram B, WM8738



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Figure 9-14 Block diagram

10. Spare Parts List & CTN Overview

For the latest spare part overview, please consult the Philips Service website.

Table 10-1 Sets described in this manual:

CTN	Styling	Published in:
19PFL3403/60	MG8	3122 785 17931
19PFL3403S/60	MG8	3122 785 17931
20PFL3403/10	MG8	3122 785 17930
20PFL3403/60	MG8	3122 785 17931
22PFL3403/60	MG8	3122 785 17931
26PFL3403/10	MG8	3122 785 17930
26PFL3403/60	MG8	3122 785 17931

11. Revision List

Manual xxxx xxx xxxx.0

- First release.

Manual xxxx xxx xxxx.1

- **All Chapters:** Russian sets (/60) added.
- **Chapter 5:** ComPair/UART cables: 12nc and descriptions updated.
- **Chapter 9:** Abbreviation list updated.