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# 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	: 32" (82 cm), 16:9
	: 42" (107 cm), 16:9
Resolution (HxV pixels)	: 1366 × 768
Dyn. contrast ratio	: 24000:1
Min. light output (cd/m <sup>2</sup> )	: 500
Typ. response time (ms)	: 6
Viewing angle (HxV degrees)	: 176 × 176
Tuning system	: PLL
Presets/channels	: 99 presets
Tuner bands	: VHF, UHF, S, H
TV Colour systems	: PAL B/G, D/K, I
	: SECAM B/G, D/K, L/L'
Video playback	: NTSC
	: PAL
	: SECAM
Supported computer formats	: 640 × 480
	: 720 × 480
	: 800 × 600
	: 1024 × 768
	: 1280 × 720
Supported video formats	: 480i @ 60 Hz
	: 480p @ 60 Hz
	: 576i @ 50 Hz
	: 576p @ 50 Hz
	: 720p @ 50, 60 Hz
	: 1080i @ 50, 60 Hz
	: 1080p @ 24, 25, 30, 50, 60 Hz

### 1.1.2 Sound

Sound systems	: Nicam Stereo
Maximum power (W <sub>RMS</sub> )	: 2 × 10

### 1.1.3 Miscellaneous

#### Power supply:

- Mains voltage (V <sub>AC</sub> )	: 220 - 240
- Mains frequency (Hz)	: 50 / 60

#### Ambient conditions:

- Temperature range (°C)	: +5 to +35
- Maximum humidity	: 90% R.H.

#### Power consumption (values are indicative)

- Normal operation (W)	: ≈ 130 (32")
	: ≈ 200 (42")
- Stand-by (W)	: < 0.15

Dimensions (W × H × D mm)	: 809 × 544 × 92 (32")
	: 1033 × 667 × 88 (42")

Weight incl. packaging (kg)	: 18 (32")
	: 39 (42")

## 1.2 Connection Overview

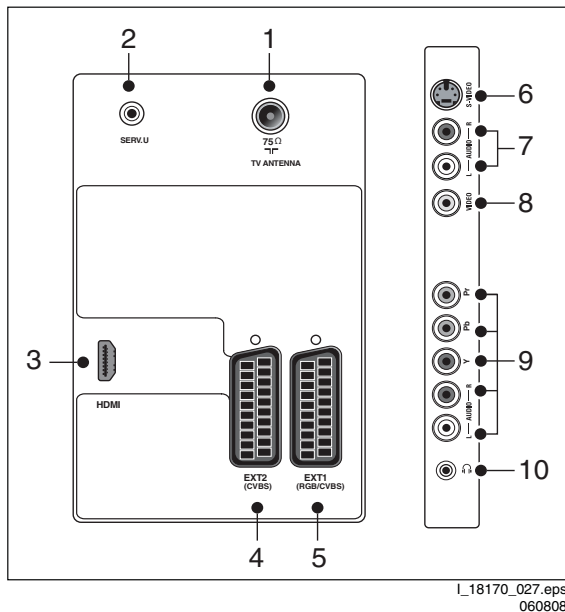


Figure 1-1 Side and rear I/O connections

**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 Connections

#### 1 - Aerial - In

- IEC-type (EU) Coax, 75 ohm



#### 2 - Service Connector (UART)

1 - UART\_TX Transmit  
2 - Ground Gnd  
3 - UART\_RX Receive



#### 3 - HDMI: Digital Video, Digital Audio - In

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 - CEC Control channel  
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



#### 4 - EXT2: CVBS - In/Out, Audio - In/Out

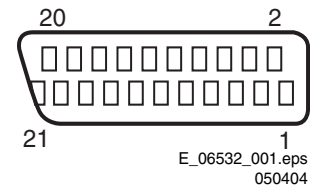


Figure 1-2 SCART connector

1 - Audio R 0.5 V<sub>RMS</sub> / 1 kohm  
2 - Audio R 0.5 V<sub>RMS</sub> / 10 kohm  
3 - Audio L 0.5 V<sub>RMS</sub> / 1 kohm  
4 - Ground Gnd  
5 - Ground Gnd  
6 - Audio L 0.5 V<sub>RMS</sub> / 10 kohm  
7 - n.c.  
8 - Function Select 0 - 2 V: INT  
4.5 - 7 V: EXT 16:9  
9.5 - 12 V: EXT 4:3  
9 - Ground Gnd  
10 - n.c.  
11 - n.c.  
12 - n.c.  
13 - Ground Gnd  
14 - Ground Gnd  
15 - Video/C 0.7 V<sub>PP</sub> / 75 ohm  
16 - n.c.  
17 - Ground Gnd  
18 - Ground Gnd  
19 - Video CVBS 1 V<sub>PP</sub> / 75 ohm  
20 - Video CVBS 1 V<sub>PP</sub> / 75 ohm  
21 - Shield Gnd



#### 5 - EXT1: Video RGB - In, CVBS - In/Out, Audio - In/Out

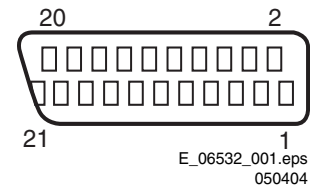


Figure 1-3 SCART connector

1 - Audio R 0.5 V<sub>RMS</sub> / 1 kohm  
2 - Audio R 0.5 V<sub>RMS</sub> / 10 kohm  
3 - Audio L 0.5 V<sub>RMS</sub> / 1 kohm  
4 - Ground Gnd  
5 - Ground Gnd  
6 - Audio L 0.5 V<sub>RMS</sub> / 10 kohm  
7 - Video Blue 0.7 V<sub>PP</sub> / 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 Gnd  
10 - n.c.  
11 - Video Green 0.7 V<sub>PP</sub> / 75 ohm  
12 - n.c.  
13 - Ground Gnd  
14 - Ground Gnd  
15 - Video Red 0.7 V<sub>PP</sub> / 75 ohm  
16 - Status/FBL 0 - 0.4 V: INT  
1 - 3 V: EXT / 75 ohm  
17 - Ground Gnd  
18 - Ground Gnd  
19 - Video CVBS 1 V<sub>PP</sub> / 75 ohm  
20 - Video CVBS 1 V<sub>PP</sub> / 75 ohm  
21 - Shield Gnd



**6 - S-Video (Hosiden): Video Y/C - In**

1	- Ground Y	Gnd	⏏
2	- Ground C	Gnd	⏏
3	- Video Y	1 V <sub>PP</sub> / 75 ohm	⊕⊖
4	- Video C	0.3 V <sub>PP</sub> / 75 ohm	⊕⊖

**7, 8 - Cinch: Video CVBS - In, Audio - In**

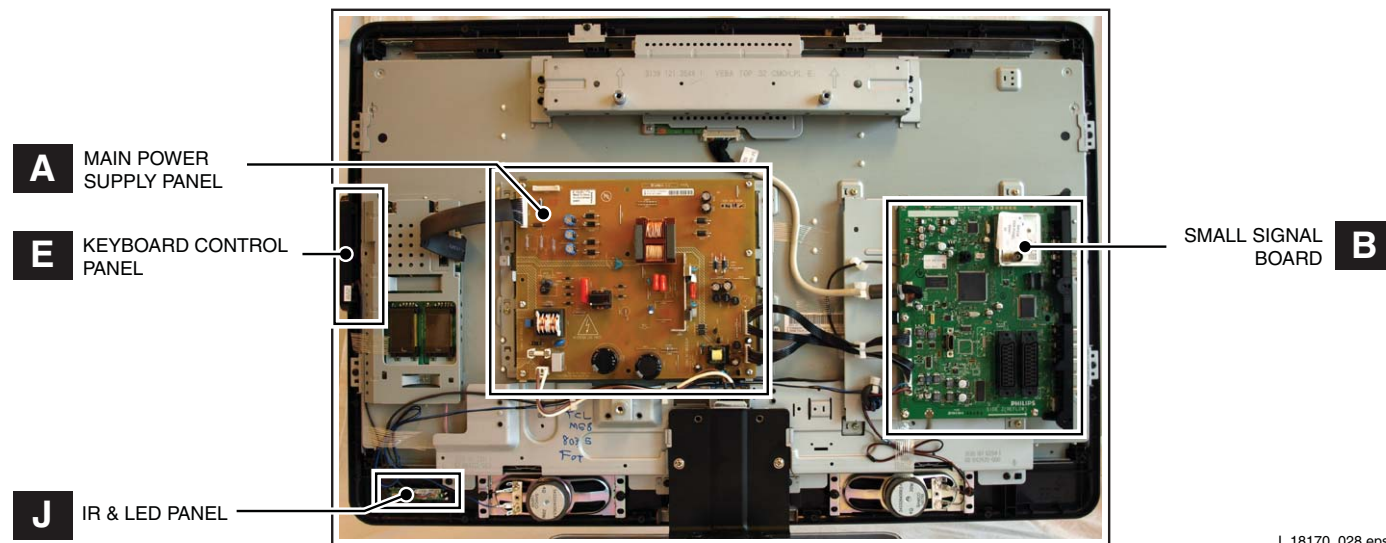
Ye	- Video CVBS	1 V <sub>PP</sub> / 75 ohm	⊕⊖
Wh	- Audio L	0.5 V <sub>RMS</sub> / 10 kohm	⊕⊖
Rd	- Audio R	0.5 V <sub>RMS</sub> / 10 kohm	⊕⊖

**9 - Cinch: Video YPbPr - In, Audio - In**

Gn	- Video Y	1 V <sub>PP</sub> / 75 ohm	⊕⊖
Bu	- Video Pb	0.7 V <sub>PP</sub> / 75 ohm	⊕⊖
Rd	- Video Pr	0.7 V <sub>PP</sub> / 75 ohm	⊕⊖
Wh	- Audio L	0.5 V <sub>RMS</sub> / 10 kohm	⊕⊖
Rd	- Audio R	0.5 V <sub>RMS</sub> / 10 kohm	⊕⊖

**10 - Head phone - Out**

Bk	- Head phone	32 - 600 ohm / 10 mW	⊕⊖
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**1.3 Chassis Overview**

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Figure 1-4 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 MΩ and 12 MΩ.
  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 kΩ).
- Resistor values with no multiplier may be indicated with either an "E" or an "R" (e.g. 220E or 220R indicates 220 Ω).
- 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](http://www.atyourservice.ce.philips.com) (needs subscription, not available for all regions). After login, 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](http://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

It should be noted that on the European Service website, "Alternative BOM" is referred to as "Design variant".

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 center (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

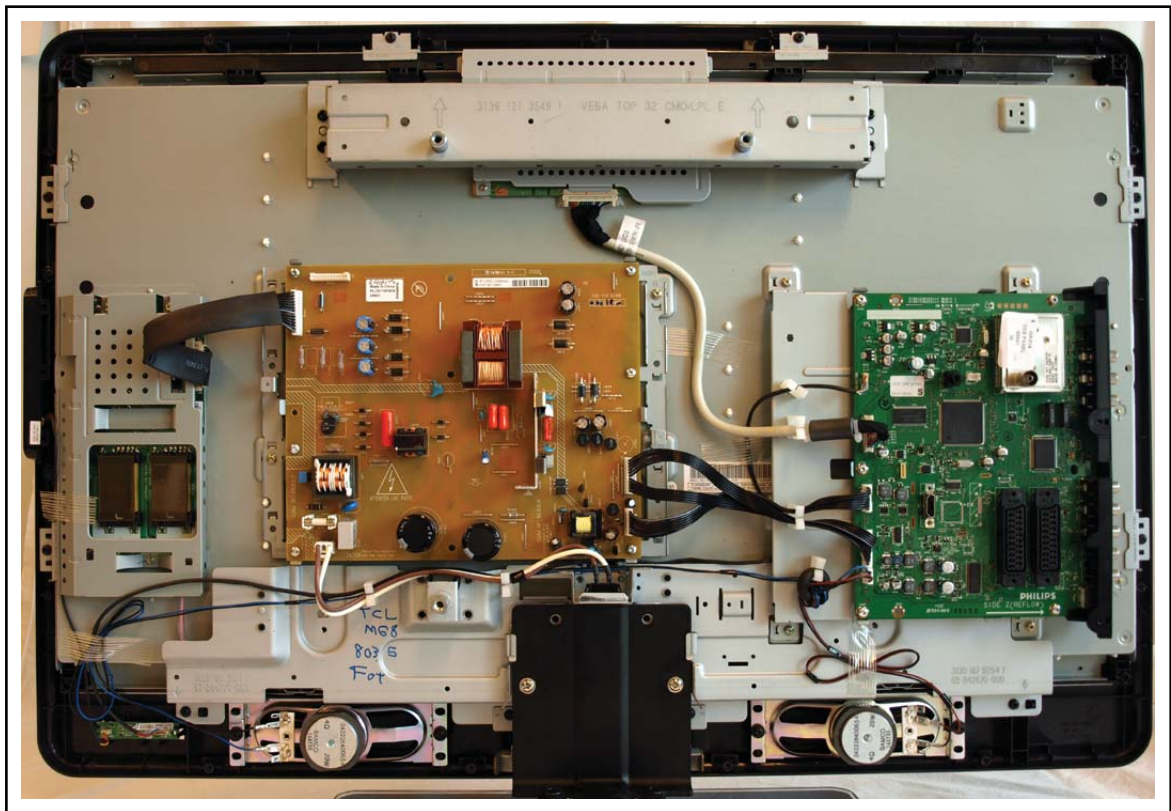
### Index of this chapter:

- 4.1 Cable Dressing
- 4.2 Service Positions
- 4.3 Assy/Panel Removal MG8 Styling
- 4.4 Set Re-assembly

### Notes:

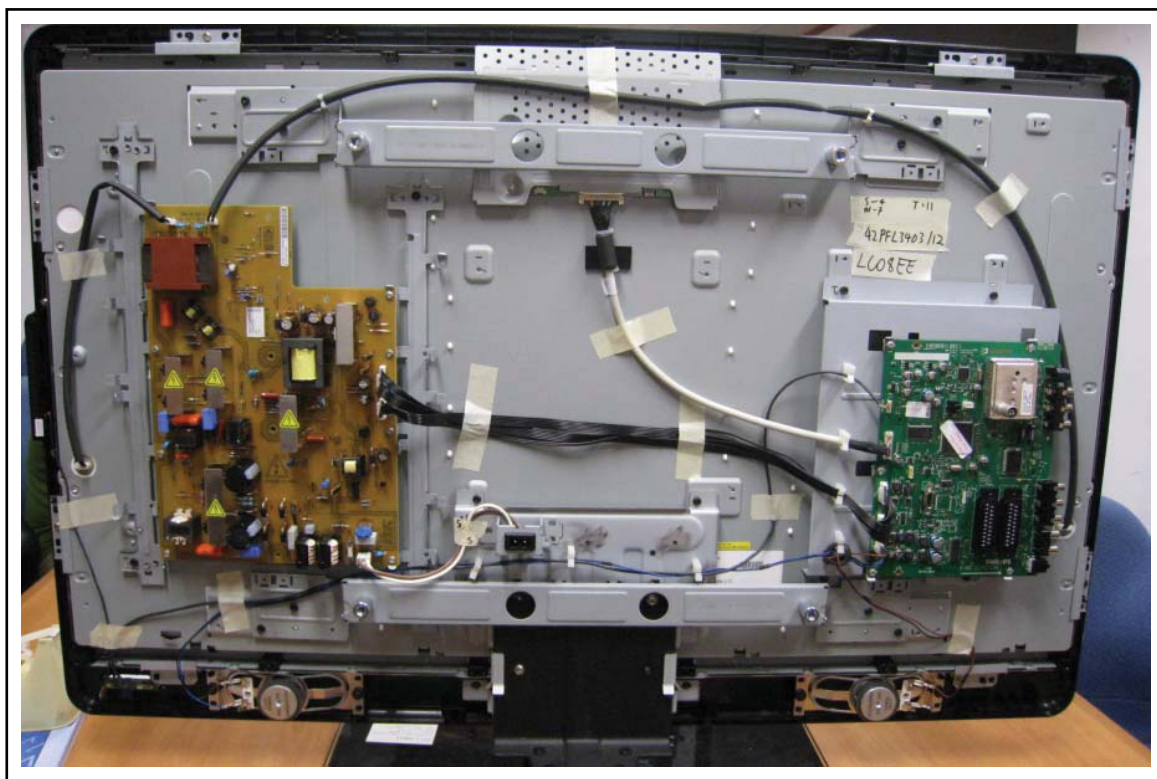
- Figures below can deviate slightly from the actual situation, due to the different set executions.

### 4.1 Cable Dressing



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Figure 4-1 Cable dressing 32" sets



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Figure 4-2 Cable dressing 42" sets

## 4.2 Service Positions

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

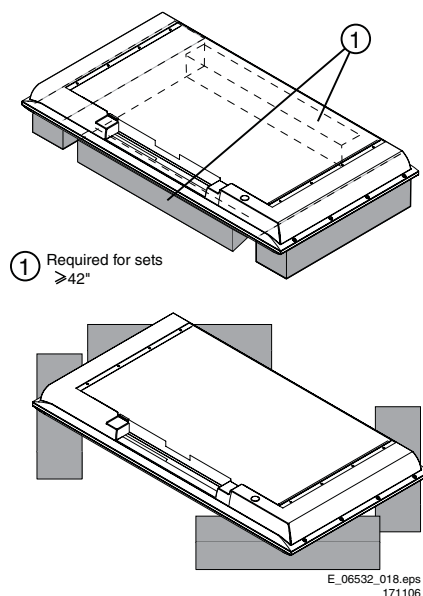
- The buffers from the packaging (see figure "Rear cover").
- Foam bars (created for Service).

### 4.2.1 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.



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Figure 4-3 Foam bars



### 4.3 Assy/Panel Removal MG8 Styling

Pictures are taken from 32" set.

#### 4.3.1 Rear Cover

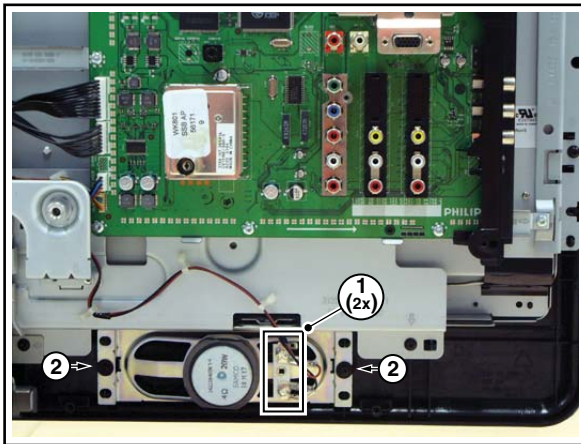
**Warning:** Disconnect the mains power cord before you remove the rear cover.

You can remove the backcover without removing the stand.

#### 4.3.2 Speakers

Refer to next figure for details.

1. Unplug the connectors [1].
2. Remove the screws [2] and lift the speaker from the back cover.



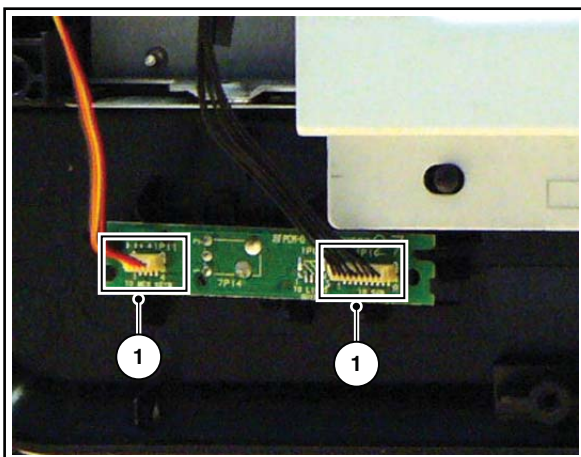
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Figure 4-4 Speakers

#### 4.3.3 IR & LED Panel

Refer to next figure for details.

1. Unplug connectors [1].
  2. Release the clips and take the panel out.
- When defective, replace the whole unit.



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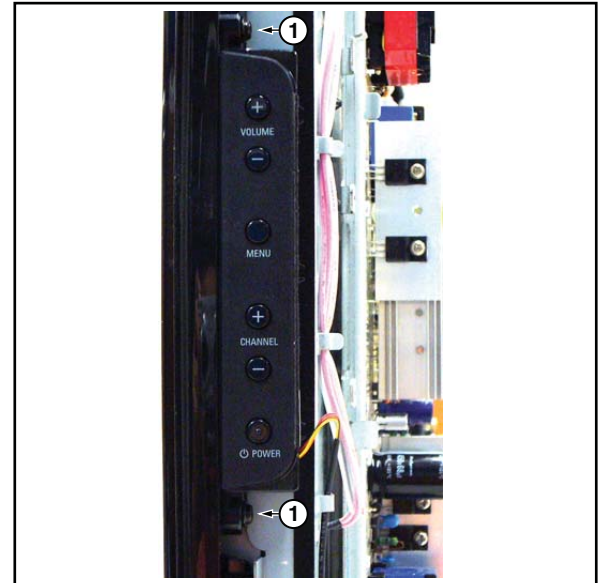
Figure 4-5 IR & LED Board

#### 4.3.4 Keyboard Control Panel

Refer to next figure for details.

1. Unplug the key board connector from the IR & LED board.
2. Remove the screws [1].
3. Lift the unit and take it out of the set.

When defective, replace the whole unit.



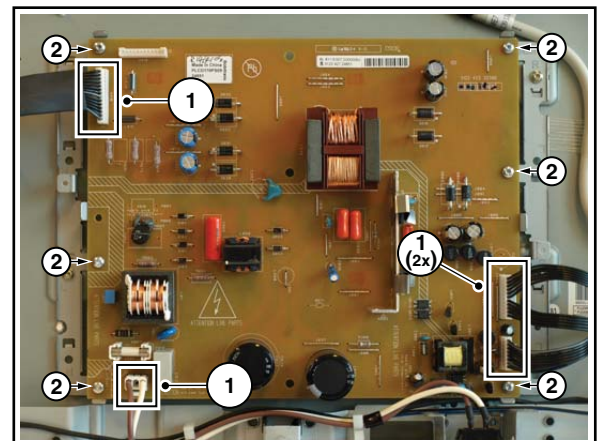
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Figure 4-6 Key Board

#### 4.3.5 Main Power Supply Panel 32"

Refer to next figure for details.

1. Unplug connectors [1].
  2. Remove the fixation screws [2].
  3. Take the board out.
- When defective, replace the whole unit.



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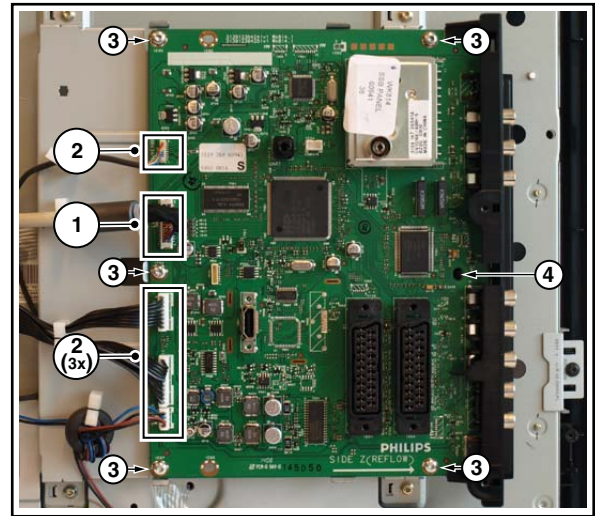
Figure 4-7 Main Power Supply Panel 32"

#### 4.3.6 Small Signal Board (SSB)

Refer to next figure for details.

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

1. Unplug the LVDS connector [1].
- Caution:** be careful, as this is a very fragile connector!
2. Unplug the connectors [2].
3. Remove the screws [3].
4. The SSB can now be taken out of the set, together with the side cover.
5. To remove the side cover, push back the clamp [4] using a screw driver.
6. Pull the cover sideways from the SSB.



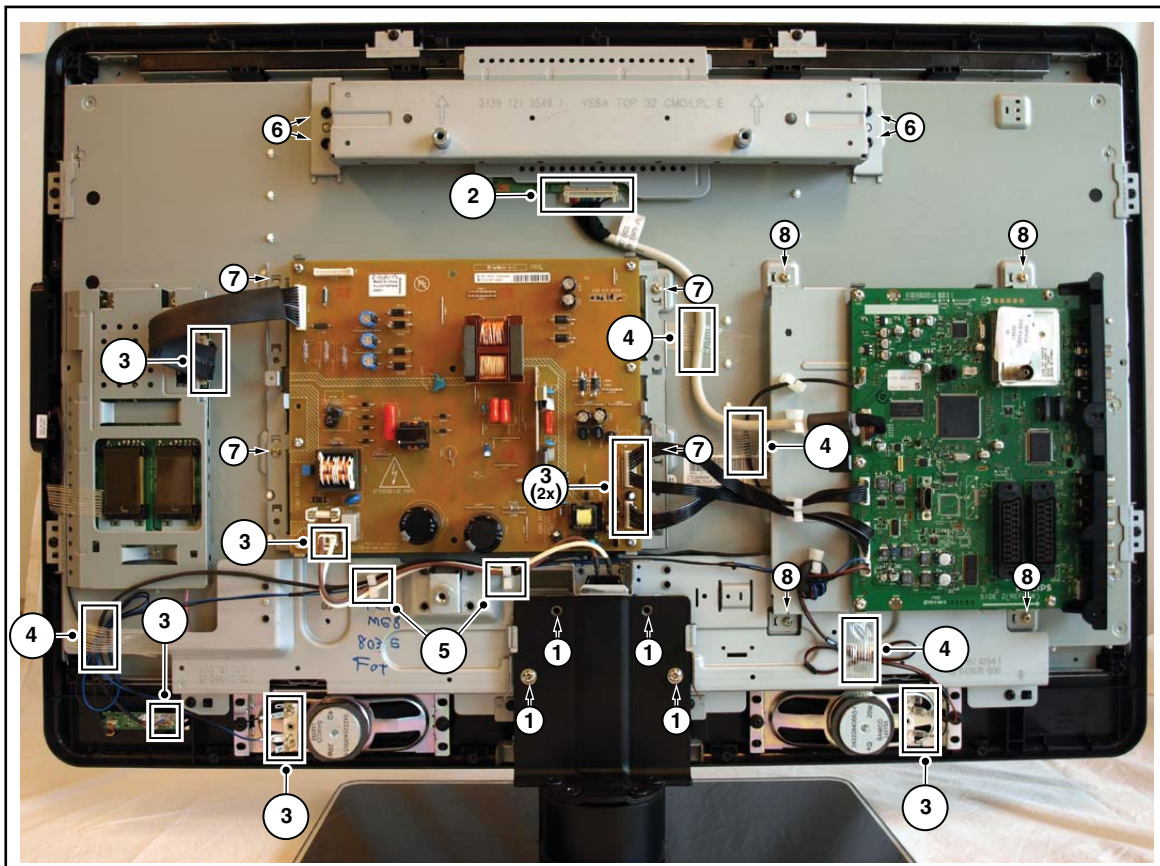
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Figure 4-8 Small Signal Board

#### 4.3.7 LCD Panel

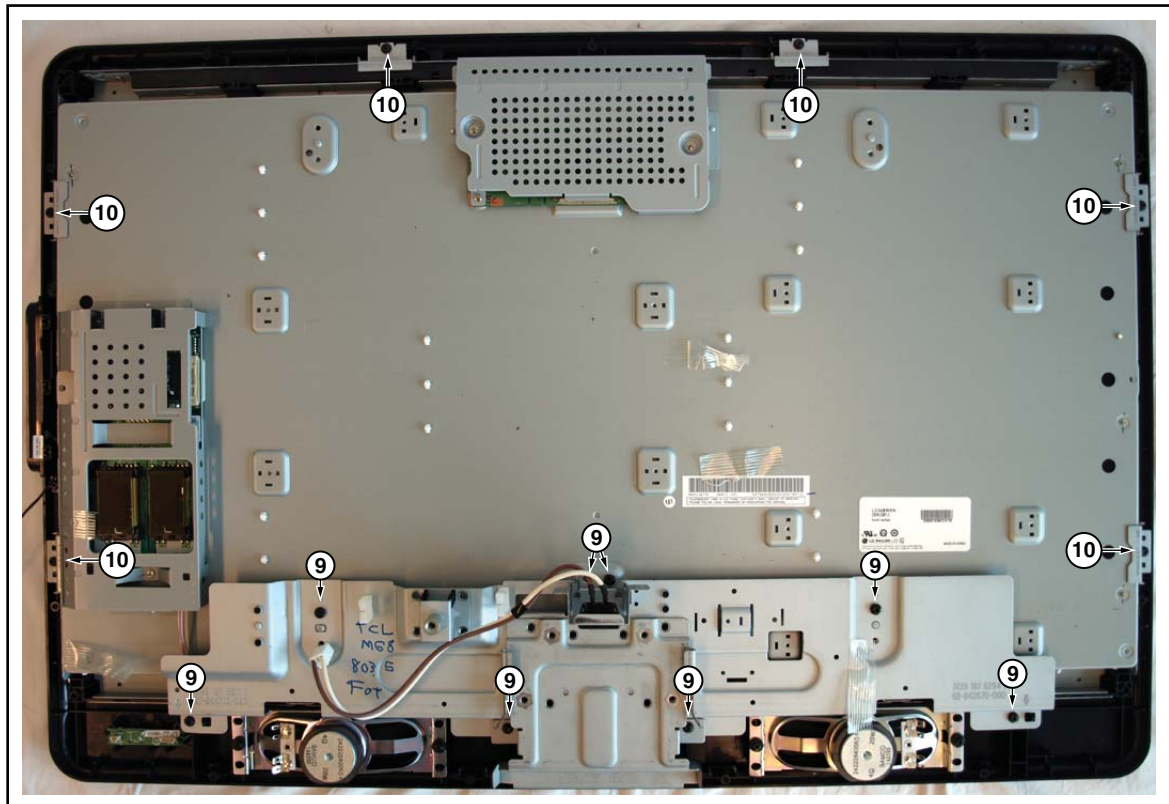
Refer to next figures for details.

1. Remove the stand [1].
2. Unplug the LVDS connector [2].
3. Unplug connectors [3] from
  - Main Power Supply Panel
  - Speakers
  - IR & LED Panel.
4. Remove any adhesive tape [4] that prevents cables being removed from the set.
5. Remove all cables from clamps [5] that prevents them from being removed from the set.
6. Remove the VESA stand [6].
7. Remove the Main Power Supply Panel **together with it's subframe** [7].
8. Remove the Small Signal Board **together with it's subframe** [8].
9. Remove the subframe that holds the stand [9].
10. Remove the clamps that secure the LCD Panel [10] and take the panel out.



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Figure 4-9 LCD Panel -1-



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Figure 4-10 LCD Panel -2-

#### 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 on the SSB shields. Ensure that EMC foams are mounted correctly.



## 5. Service Modes, Error Codes, and Fault Finding

### Index of this chapter:

- 5.1 Test Points
- 5.2 Service Modes
- 5.3 Service Tools
- 5.4 Error Codes
- 5.5 The Blinking LED Procedure
- 5.6 Software Upgrading
- 5.7 Fault Finding and Repair Tips

### 5.1 Test Points

In the chassis schematics and layout overviews, the test points (Fxxx) are mentioned. In the schematics, test points are indicated with a rectangular box around "Fxxx" or "Ixxx", in the layout overviews with a "half-moon" sign.

As most signals are digital, it will be difficult to measure waveforms with a standard oscilloscope. Several key ICs are capable of generating test patterns, which can be controlled via ComPair. In this way it is possible to determine which part is defective.

### 5.2 Service Modes

The Service Mode feature is split into four parts:

- Simplified Service Default Mode (SDM).
- Service Alignment Mode (SAM).
- Customer Service Mode (CSM).
- Computer Aided Repair Mode (ComPair).

SDM and SAM offer features, which can be used by the Service engineer to repair/align a TV set. Some features are:

- Activates the blinking LED procedure for error identification when no picture is available (SDM).
- Make alignments (e.g. white tone), (de)select options, enter options codes, reset the error buffer (SAM).
- Display information ("SAM" indication in upper right corner of screen, error buffer, software version, options and option codes, sub menus).

The CSM is a Service Mode that can be enabled by the consumer. The CSM displays diagnosis information, which the customer can forward to the dealer or call centre. In CSM mode, "CSM", is displayed in the top right corner of the screen. The information provided in CSM and the purpose of CSM is to:

- Increase the home repair hit rate.
- Decrease the number of nuisance calls.
- Solved customers' problem without home visit.

ComPair Mode is used for communication between a computer and a TV on I<sup>2</sup>C /UART level and can be used by a Service engineer to quickly diagnose the TV set by reading out error codes, read and write in NVMs, communicate with ICs and the uP (PWM, registers, etc.), and by making use of a fault finding database. It will also be possible to up and download the software of the TV set via I<sup>2</sup>C with help of ComPair. To do this, ComPair has to be connected to the TV set via the compare connector, which will be accessible through the rear of the set (without removing the rear cover).

#### 5.2.1 General

Some items are applicable to all Service Modes or are general. These are listed below.

#### Software Identification, Version, and Cluster

The software ID, version, and cluster will be shown in the main menu display of SDM, SAM, and CSM.

The screen will show: "AAAABCD X.YY", where:

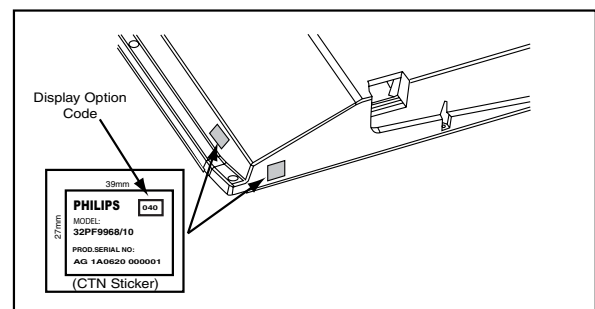
- AAAA is the chassis name: LC81.

- **B** is the region indication: E= Europe, A= AP/China, U=NAFTA, L= LATAM.
- **C** is the display indication: L= LCD, P= Plasma.
- **D** is the language/feature indication: 1= standard, H=1080p full HD.
- **X** is the main version number: this is updated with a major change of specification (incompatible with the previous software version). Numbering will go from 1 - 9 and A - Z.
  - If the main version number changes, the new version number is written in the NVM.
  - If the main version number changes, the default settings are loaded.
- **YY** is the sub version number: this is updated with a minor change (backwards compatible with the previous versions) Numbering will go from 00 - 99.
  - If the sub version number changes, the new version number is written in the NVM.
  - If the NVM is fresh, the software identification, version, and cluster will be written to NVM.

#### Display Option Code Selection

When after an SSB or display exchange, the display option code is not set properly; it will result in a TV with "no display". Therefore, it is required to set this display option code after such a repair.

To do so, press the following key sequence on a standard RC transmitter: "062598" directly followed by **MENU** the OSD "Panel Selection" will displayed on screen and "xxx", where "xxx" is a 3 digit decimal value of the panel type: see column "Display code" in table "Option code overview" (ch. 8), or see sticker on the side/bottom of the cabinet. When the value is accepted and stored in NVM, the OSD "Panel Selection" will be disappear set remain on, to indicate that the process has been completed.



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Figure 5-1 Location of Display Option Code sticker

During this algorithm, the NVM-content must be filtered, because several items in the NVM are TV-related and not SSB related (e.g. Model and Prod. S/N). Therefore, "Model" and "Prod. S/N" data is changed into "See Type Plate".

In case a call centre or consumer reads "See Type Plate" in CSM mode, he needs to look to the side/bottom sticker to identify the set, for further actions.

#### 5.2.2 Service Default Mode (SDM)

##### Purpose

This simplified SDM mode in LC8.1E LB chassis is used for Error blinking only.

- Start the blinking LED procedure.

##### How to Activate

- Press the following key sequence on the remote control transmitter: "062596" directly followed by the **MENU**



button (do not allow the display to time out between entries while keying the sequence).

**Note:**

No SDM "Service" jumpers in this LC08.1E LB chassis.  
No SDM "OSD" menu displayed on screen.

**How to Exit**

Switch the set to STANDBY by pressing the mains button on the remote control transmitter or on the television set.  
The error buffer will only be cleared when the "clear" command is used in the SAM menu.

**Note:**

- If you switch the television set "off" by removing the mains (i.e., unplugging the television), the television set will remain in SDM when mains is re-applied, and the error buffer is not cleared.
- In case the set is in Factory mode by accident (with "F" displayed on screen), by pressing and hold "VOL-" and "CH-" together should leave Factory mode.

### 5.2.3 Service Alignment Mode (SAM)

**Purpose**

- To change option settings.
- To display / clear the error code buffer.
- To perform alignments.

**Specifications**

- Software version, error codes, and option settings display.
- Error buffer clearing.
- Option settings.
- Software alignments (Tuner, White Tone).
- ISP Mode (ComPair Mode) switching.

**How to Activate**

To activate SAM, use one of the following methods:

- Press the following key sequence on the remote control transmitter: "062596" directly followed by the **OSD/STATUS/INFO/i+** button (it depends on region which button is present on the RC). Do not allow the display to time out between entries while keying the sequence.
- Or via ComPair.

After entering SAM, the following screen is visible, with SAM in the upper right corner of the screen to indicate that the television is in Service Alignment Mode.

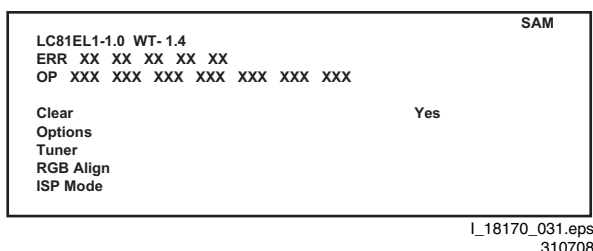


Figure 5-2 SAM menu

Menu explanation:

1. **AAAABCD-X.YY.** See paragraph "Service Modes" -> "General" -> "Software Identification, Version, and Cluster" for the SW name definition. WT - X.Y. Weltrend standby microprocessor Software Identification and Version.
2. **SAM.** Indication of the Service Alignment Mode.
3. **ERR (ERR or buffer).** Shows all errors detected since the last time the buffer was erased. Five errors possible.
4. **OP (Option Bytes).** Used to read-out the option bytes. See "Options" in the Alignments section for a detailed description. Seven codes are possible.

5. **Clear.** Erases the contents of the error buffer. Select the CLEAR menu item and press the MENU RIGHT key. The content of the error buffer is cleared.
6. **Options.** Used to set the option bits. See "Options" in the "Alignments" chapter for a detailed description.
7. **Tuner.** Used to align the tuner. See "Tuner" in the "Alignments" chapter for a detailed description.
8. **RGB Align.** Used to align the White Tone. See "White Tone" in the "Alignments" chapter for a detailed description.
9. **ISP Mode.** Can be used to switch the television to "In System Programming" mode (ISP), for software uploading via ComPair. Read paragraph "Service Tools" -> "ComPair".

**Note:** When this mode is selected, the TV will be blocked. Select ISP mode "Off" the TV will be back to normal TV mode.

**How to Navigate**

- In the SAM menu, select menu items with the MENU UP/DOWN keys on the remote control transmitter. The selected item will be indicated.
- With the MENU LEFT/RIGHT keys, it is possible to:
  - Activate the selected menu item.
  - Change the value of the selected menu item.
  - Activate the selected sub menu.
- When you press the MENU button twice while in top level SAM, the set will switch to the normal user menu (with the SAM mode still active in the background). To return to the SAM menu press the MENU button twice.

**How to Store SAM Settings**

To store the settings changed in SAM mode (except the OPTIONS settings), leave the top level SAM menu by using the POWER button on the remote control transmitter or the television set.

**How to Exit**

Switch the set to STANDBY by pressing the mains button on the remote control transmitter or the television set.

**Note:**

- When the TV is switched "off" by a power interrupt while in SAM, the TV will show up in "normal operation mode" as soon as the power is supplied again. The error buffer will not be cleared.
- In case the set is in Factory mode by accident (with "F" displayed on screen), by pressing and hold "VOL-" and "CH-" together should leave Factory mode.

### 5.2.4 Customer Service Mode (CSM)

**Purpose**

The Customer Service Mode shows error codes and information on the TV's operation settings. A call centre can instruct the customer (by telephone) to enter CSM in order to identify the status of the set. This helps them to diagnose problems and failures in the TV before making a service call. The CSM is a read-only mode; therefore, modifications are not possible in this mode.

**Specifications**

- Ignore "Service unfriendly modes".
- Line number for every line (to make CSM language independent).
- Set the screen mode to full screen (all contents on screen are viewable).
- After leaving the Customer Service Mode, the original settings are restored.
- Possibility to use "CH+" or "CH-" for channel surfing, or enter the specific channel number on the RC.

**How to Activate**

To activate CSM, press the following key sequence on the remote control transmitter: “123654” (do not allow the display to time out between entries while keying the sequence). Upon entering the Customer Service Mode, the following screen will appear:

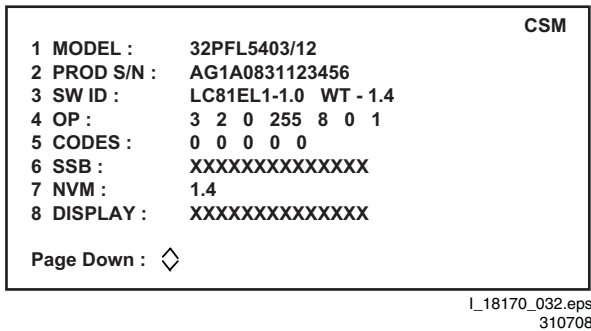


Figure 5-3 CSM menu -1- (example)

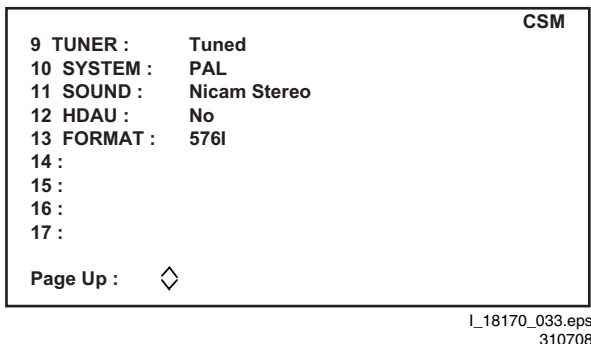


Figure 5-4 CSM menu -2- (example)

**Menu Explanation**

1. **MODEL.** Type number, e.g. 32PFL5403/12. (\*)
2. **PROD S/N.** Product serial no., e.g. AG1A0831123456. (\*)
3. **SW ID.** Software cluster and version is displayed.
4. **OP.** Option code information.
5. **CODES.** Error buffer contents.
6. **SSB.** Indication of the SSB factory ID (= 12nc). (\*)
7. **NVM.** The NVM software version no.
8. **DISPLAY.** Indication of the display ID (=12 nc).
9. **TUNER.** Indicates the tuner signal condition: “Weak” when signal falls below threshold value, “Medium” when signal is at mid-range, and “Strong” when signal falls above threshold value.
10. **SYSTEM.** Gives information about the video system of the selected transmitter (PAL/SECAM/NTSC).
11. **SOUND.** Gives information about the audio system of the selected transmitter (MONO/STEREO/NICAM).
12. **HDAU.** HDMI audio stream detection. “YES” means audio stream detected. “NO” means no audio stream present. Only displayed when HDMI source is selected.
13. **FORMAT.** Gives information about the video format of the selected transmitter (480i/480p/720p/1080i).
14. **Reserved.**
15. **Reserved.**
16. **Reserved.**
17. **Reserved.**

(\*) If an NVM IC is replaced or initialised, the Model Number, Serial Number, and SSB Code Number must be re-written to the NVM. ComPair will foresee in a possibility to do this.

**How to Exit**

To exit CSM, use one of the following methods:

- Press the MENU button once, or POWER button on the remote control transmitter.
- Press the POWER button on the television set.

**5.3 Service Tools****5.3.1 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 up 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 a 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.

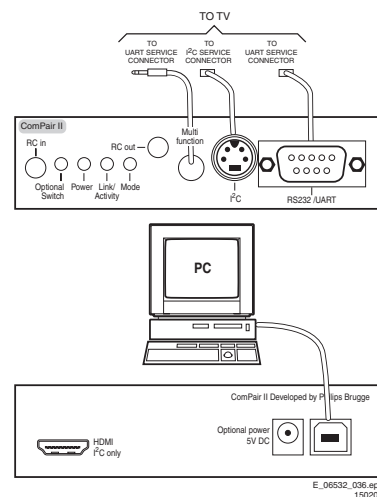


Figure 5-5 ComPair II interface connection

**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.
- The latest ComPair software can be found on the Philips Service website.
- ComPair UART interface cable: 3138 188 75051 (to be used for upgrading the Main software).

In the unlikely event that the Standby software should be upgraded, you will be informed via the appropriate channels (Philips Service website). To upgrade:

- Remove backcover of set.
- Use ComPair I<sup>2</sup>C interface cable: 3122 785 90004.
- Use ComPair I<sup>2</sup>C adapter cable: 3139 131 03791.

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

**5.4.3 Error Codes**

In case of non-intermittent faults, write down the errors present in the error buffer and clear the error buffer before you begin the repair. This ensures that old error codes are no longer present.

If possible, check the entire contents of the error buffer. In some situations, an error code is only the result of another error and not the actual cause of the problem (for example, a fault in the protection detection circuitry can also lead to a protection).

**5.3.2 LVDS Tool**

Support of the LVDS Tool has been discontinued.

**5.4 Error Codes****5.4.1 Introduction**

Error codes are required to indicate failures in the TV set. In principle a unique error code is available for every:

- Activated protection.
- Failing I<sup>2</sup>C device.
- General I<sup>2</sup>C error.

The last errors, stored in the NVM, are shown in the Service menu's. This is called the error buffer.

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.

An error will be added to the buffer if this error differs from any error in the buffer. The last found error is displayed on the left.

An error with a designated error code may never lead to a deadlock situation. This means that it must always be diagnosable (e.g. error buffer via OSD or blinking LED procedure, ComPair to read from the NVM).

In case a failure identified by an error code automatically results in other error codes (cause and effect), only the error code of the MAIN failure is displayed.

**Example:** In case of a failure of the I<sup>2</sup>C bus (CAUSE), the error code for a "General I<sup>2</sup>C failure" and "Protection errors" is displayed. The error code for the single devices (EFFECT) is not displayed. All error codes are stored in the same error buffer (TV's NVM) except when the NVM itself is defective.

**5.4.2 How to Read the Error Buffer**

You can read the error buffer in 2 ways:

- On screen via the SAM/CSM (if you have a picture).  
**Example:**
  - ERROR: 0 0 0 0 0: No errors detected
  - ERROR: 6 0 0 0 0: Error code 6 is the last and only detected error
  - ERROR: 9 6 0 0 0: Error code 6 was detected first and error code 9 is the last detected (newest) error
- Via the blinking LED procedure (when you have no picture). See "The Blinking LED Procedure".
- Via ComPair.

Table 5-1 Error code overview

Error code	Description	Item no.	Remarks
1	DC Protection of speakers	7C01	1) TV in protection mode 2) Red LED blinking 1 time (Error 1) *Error 1 logged in SAM and CSM mode
2	+12V protection error		1) TV in protection mode 2) Red LED blinking 2 times (Error 2) *No error buffer logged in SAM and CSM mode (protect time very short)
3	I <sup>2</sup> C Standby uP	7303	1) TV turn on with picture, but without Sound output from speaker 2) Red LED blinking 3 times & 4 times (Error 3 & 4) *No communication between LOCTOP and WT *First check WT and Second check LOCTOP general I <sup>2</sup> C *Error 3 logged in SAM and CSM mode
4	General I <sup>2</sup> C error	7C01	1) TV turn on without Picture & Sound output from speaker 2) Red LED blinking 3 times & 4 times (Error 3 & 4) *No communication between LOCTOP and WT *First check WT and second check LOCTOP general I <sup>2</sup> C *No error buffer logged in SAM and CSM mode
6	I <sup>2</sup> C error while communicating with the NVM	7302	1) TV turn on after 3 seconds in Standby mode. 2) Power on TV set (RC) again (wait until TV turn on with blue screen displayed) 3) Input RC sequence (062596 + menu) 4) White LED blink 6 times (Error 6) *No error buffer logged in SAM and CSM mode
7	I <sup>2</sup> C error while communicating with the Tuner.	1104	1) TV turn on after 3 seconds in Standby mode. 2) Power on TV set (RC) again. TV with snow (no video) displayed. 3) Input RC sequence (062596 + menu) 4) White LED blink 7 times (Error 7) *Error 7 logged in SAM and CSM mode
8	I <sup>2</sup> C error while communicating with the IF Demodulator.	7401	1) TV turn on after 3 seconds in Standby mode 2) Power on TV set (RC again). (wait for 45 seconds, until the system completed the power on state check) 3) Input RC sequence (062596 + menu) 4) White LED blink 8 times (Error 8) *Error 8 logged in SAM and CSM mode

**Notes**

- Some of the error codes reported are depending on the option code configurations.
- This error means: no I<sup>2</sup>C device is responding to the particular I<sup>2</sup>C bus. Possible causes: SCL/SDA shorted to GND, SCL shorted to SDA, or SCL/SDA open (at uP pin). The internal bus of the NXP (Loctop) platform should not cause the entire system to halt as such an error can be reported.

1.5 seconds in which the LED is “off”. Then this sequence is repeated.

**Example (1):** error code 4 will result in four times the sequence LED “on” for 0.25 seconds / LED “off” for 0.25 seconds. After this sequence, the LED will be “off” for 1.5 seconds. Any RC5 command terminates the sequence. Error code LED blinking is in red / White colour (refer to Error codes overview).

**Example (2):** the content of the error buffer is “1 2 9 6 0 0”

After entering SDM, the following occurs:

- 1 long blinks of 5 seconds to start the sequence,
- 12 short blinks followed by a pause of 1.5 seconds,
- 9 short blinks followed by a pause of 1.5 seconds,
- 6 short blinks followed by a pause of 1.5 seconds,
- 1 long blinks of 1.5 seconds to finish the sequence,
- The sequence starts again with 12 short blinks.

**5.4.4 How to Clear the Error Buffer**

The error code buffer is cleared in the following cases:

- By using the CLEAR command in the SAM menu:
  - To enter SAM, press the following key sequence on the remote control transmitter: “062596” directly followed by the **OSD/STATUS/INFO/i+** button (do not allow the display to time out between entries while keying the sequence).
  - Make sure the menu item CLEAR is selected. Use the MENU UP/DOWN buttons, if necessary.
  - Press the MENU RIGHT button to clear the error buffer. Press the right button twice (1st is to select the text “Yes” on the right side menu and the 2nd press is to clear the error buffer in NVM the text “CLEARED” will appear).
- If the contents of the error buffer have not changed for 50 hours, the error buffer resets automatically.

**Note:** If you exit SAM by disconnecting the mains from the television set, the error buffer is not reset.

**5.5 The Blinking LED Procedure****5.5.1 Introduction**

The software is capable of identifying different kinds of errors. Because it is possible that more than one error can occur over time, an error buffer is available, which is capable of storing the last five errors that occurred. This is useful if the OSD is not working properly.

Errors can also be displayed by the blinking LED procedure. The method is to repeatedly let the front LED pulse with as many pulses as the error code number, followed by a period of

**5.6 Software Upgrading**

In this chassis, the following SW “stacks” is used:

- TV main SW (processor and processor NVM).

**5.6.1 TV Main SW Upgrade**

For instructions on how to upgrade the TV Main software, refer to ComPair.

**5.6.2 Service SSB**

It should be noted that in this chassis the HDCP-key is embedded in the main processor. Therefore there is no need for a separate Service-SSB.

## 5.7 Fault Finding and Repair Tips

### Notes:

- It is assumed that the components are mounted correctly with correct values and no bad solder joints.
- Before any fault finding actions, check if the correct options are set.

### 5.7.1 Load Default NVM Values

It is possible to download default values automatically into the NVM in case a blank NVM is placed or when the NVM first 20 address contents are "FF". After the default values are downloaded, it is possible to start-up and to start aligning the TV set.

#### Alternative method:

It is also possible to upload the default values to the NVM with ComPair in case the SW is changed, the NVM is replaced with a new (empty) one, or when the NVM content is corrupted. After replacing an EEPROM (or with a defective/no EEPROM), default settings should be used to enable the set to start-up and allow the Service Default Mode and Service Alignment Mode to be accessed.

### 5.7.2 Start-up/Shut-down Flowcharts

On the next pages you will find start-up and shut-down flowcharts, followed by a trouble shooting flowchart, which might be helpful during fault finding.

Please note that some events are only related to PDP sets, and therefore not applicable to this LCD chassis.

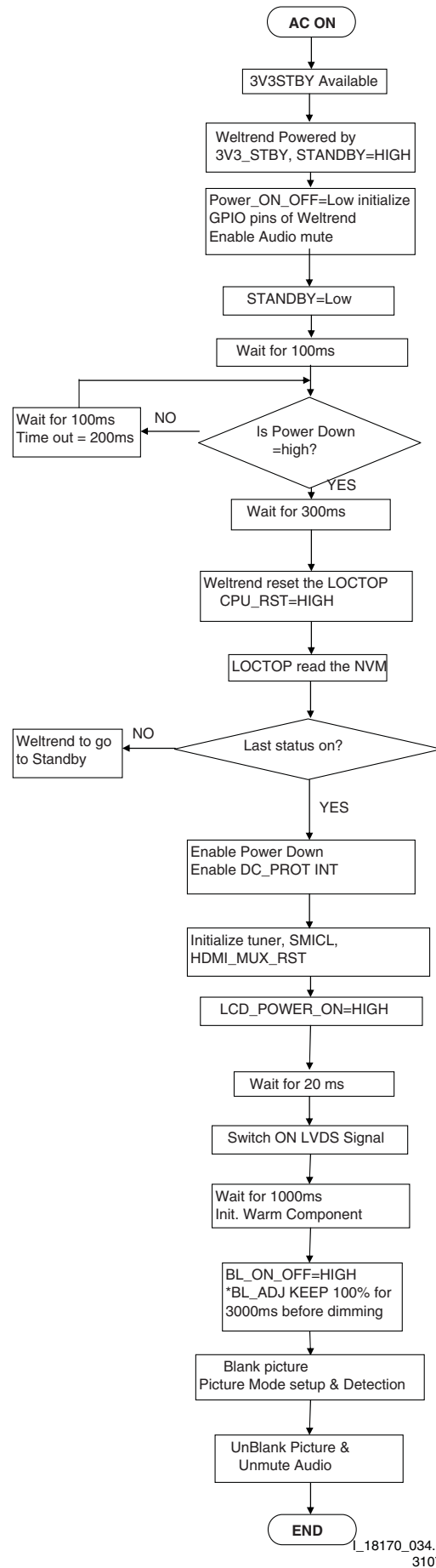


Figure 5-6 Start-up flowchart

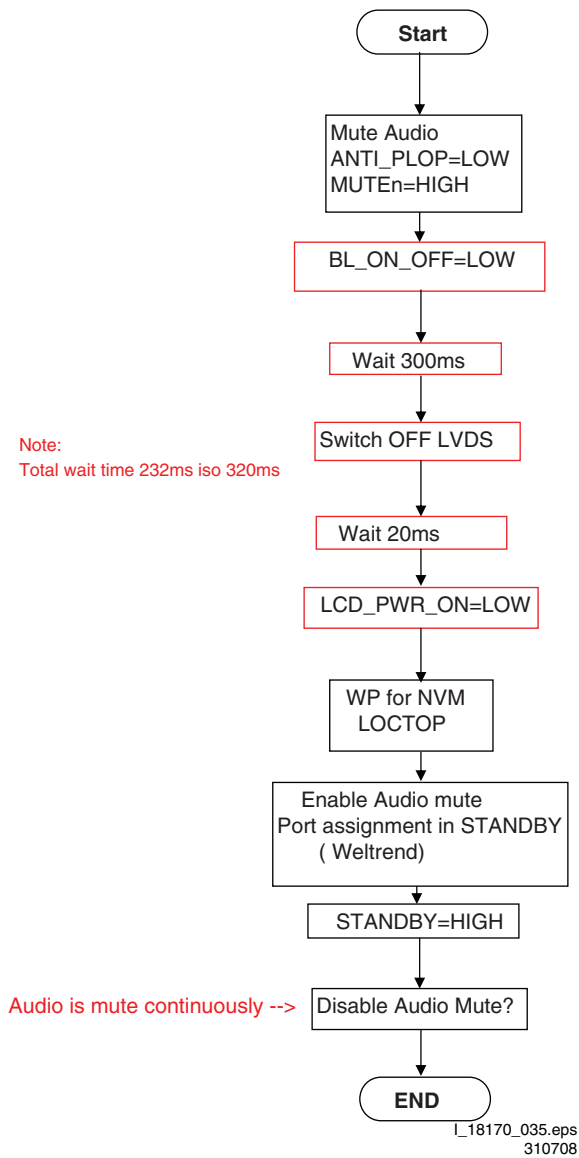
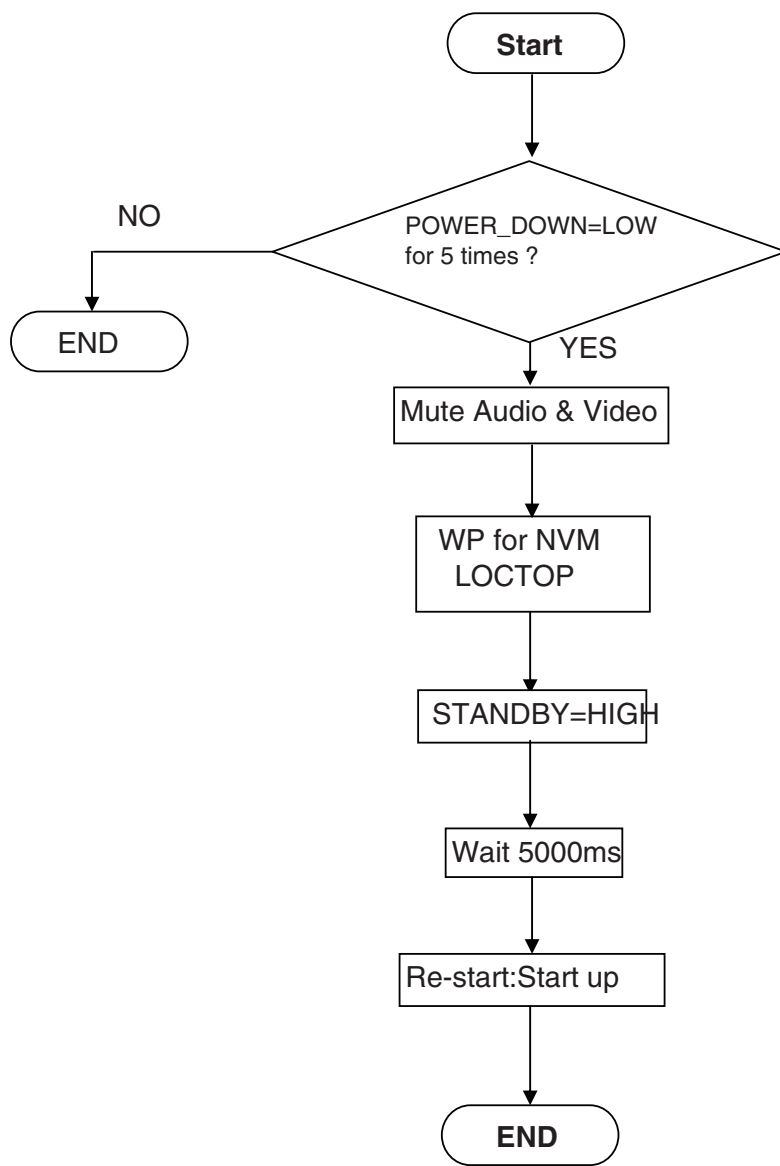


Figure 5-7 Stand-by flowchart



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310708

Figure 5-8 Power Down flowchart



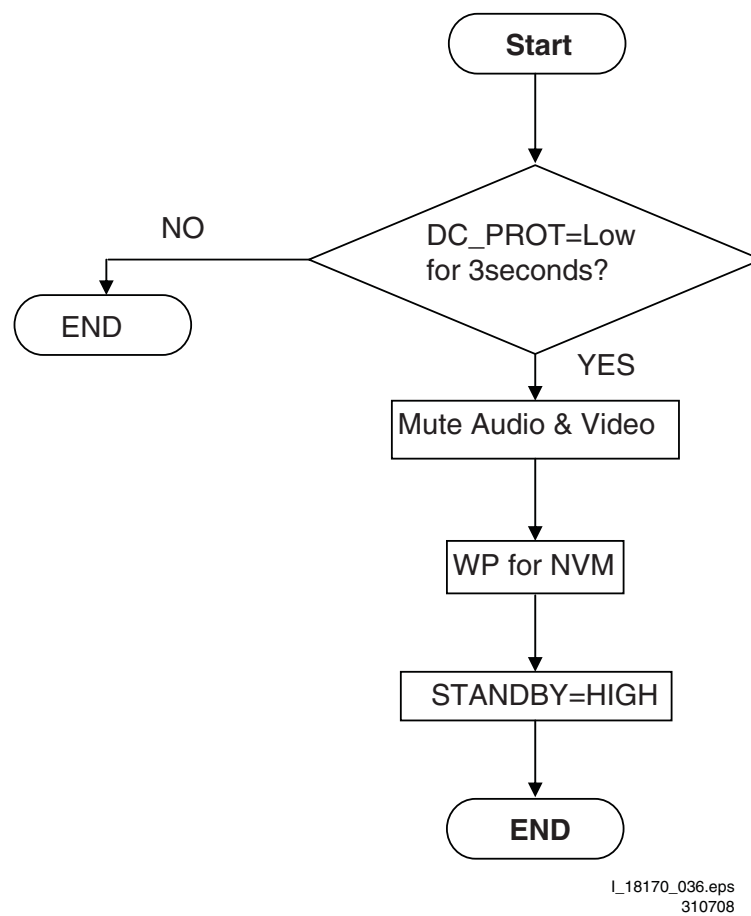


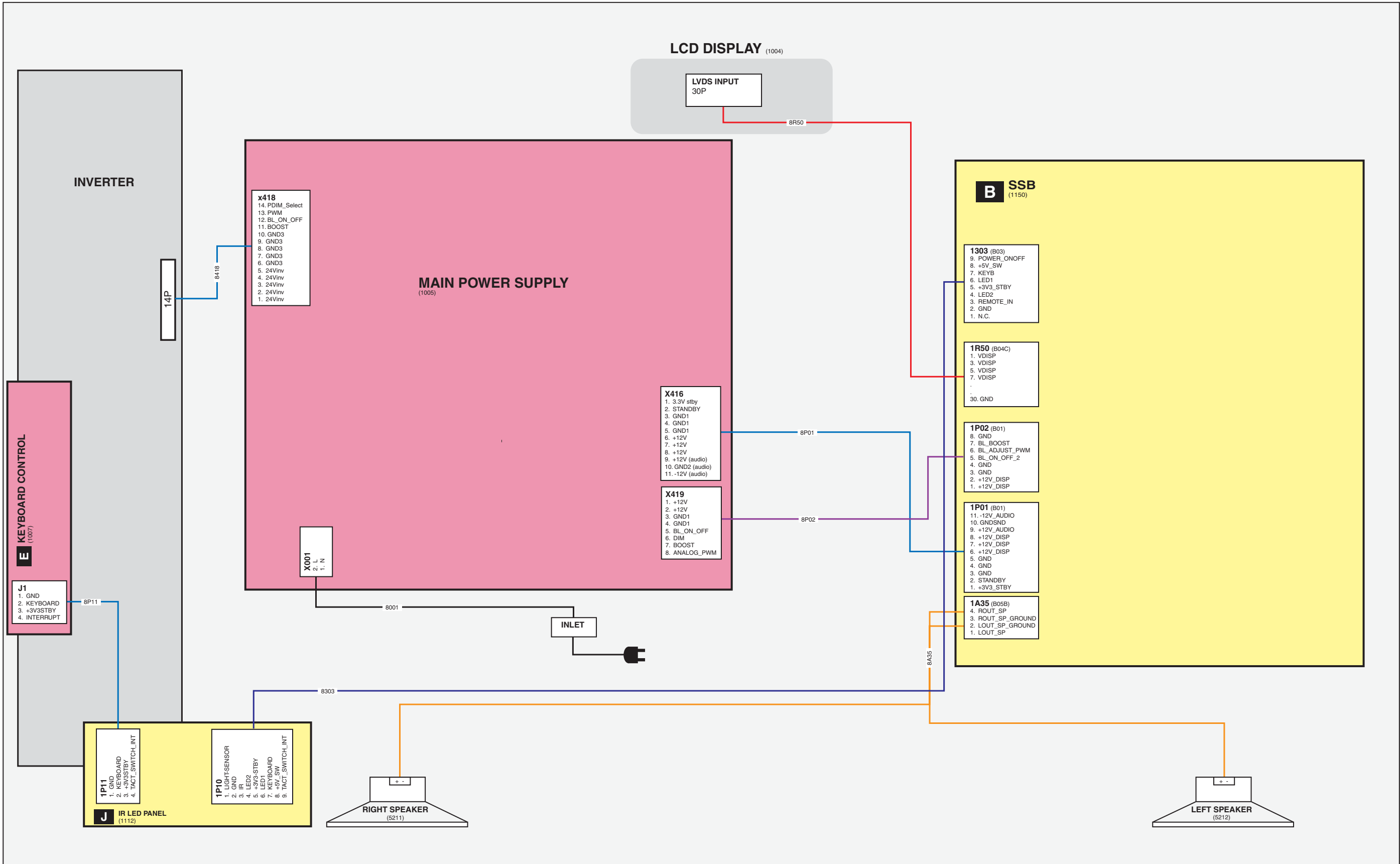
Figure 5-9 DC\_PROT flowchart

***Personal Notes:***

6. Block Diagrams, Test Point Overview, and Waveforms

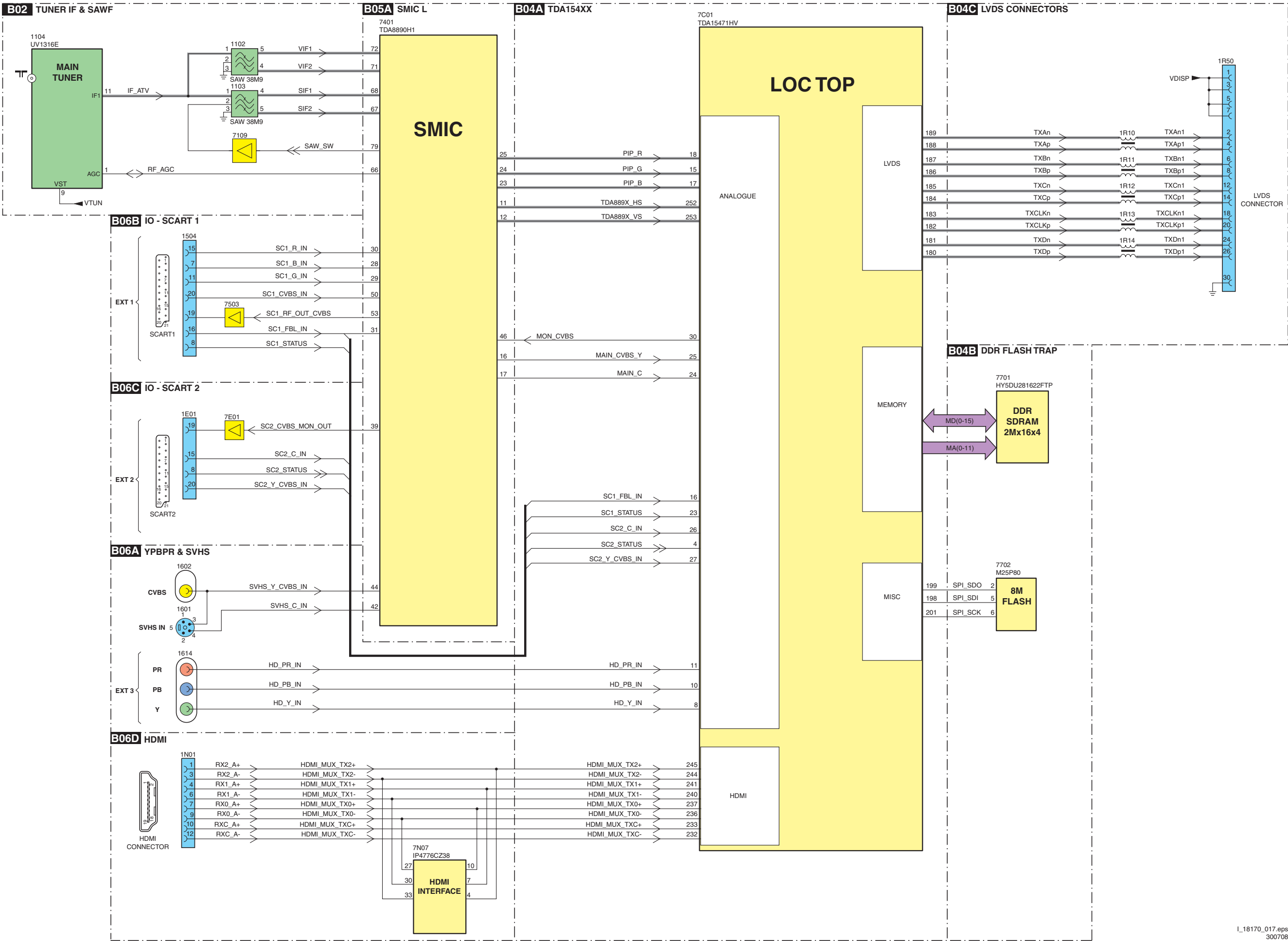
Wiring Diagram 32" (MG8)

WIRING 32" (STYLING MG8)



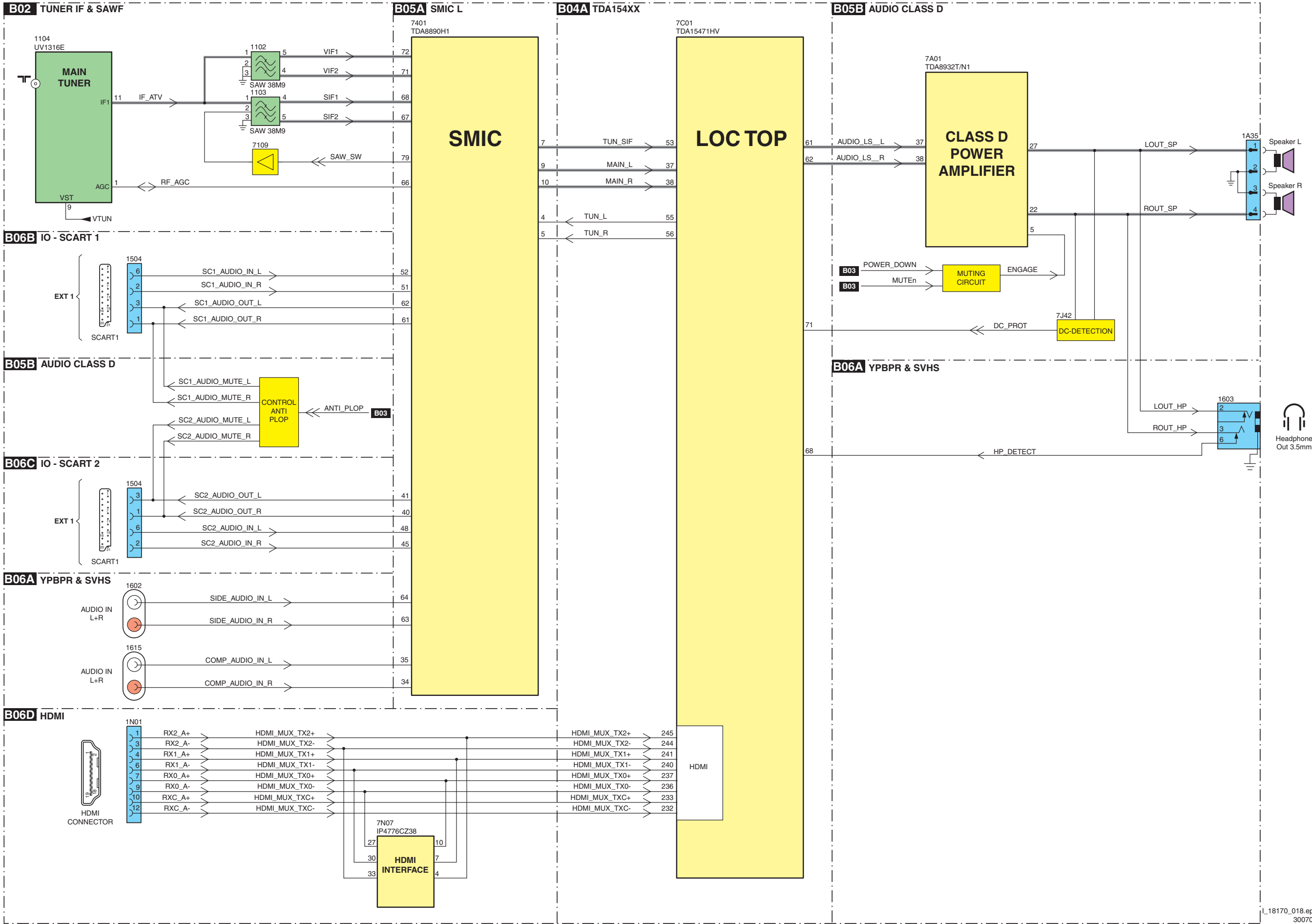


Block Diagram Video



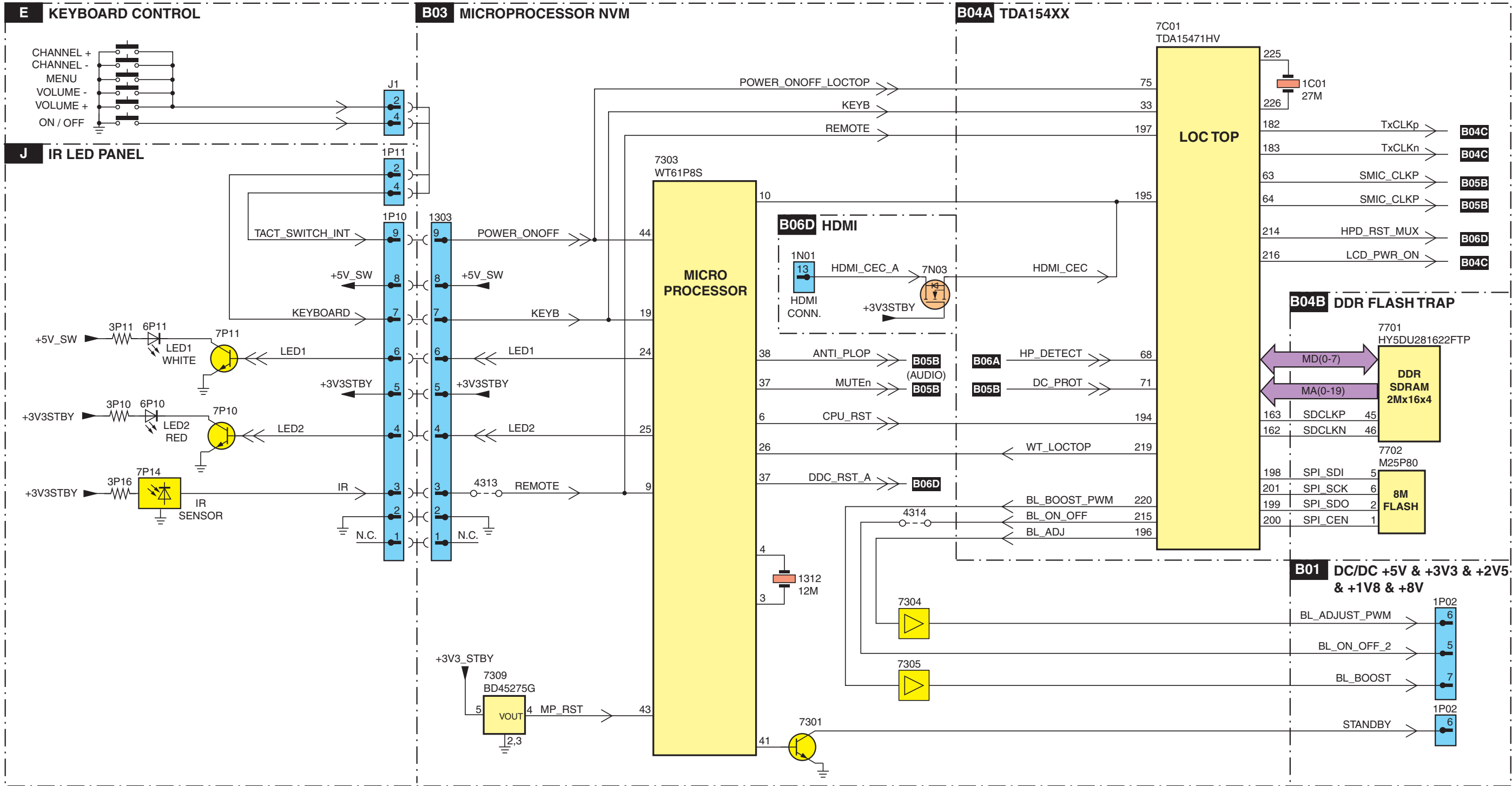
Block Diagram Audio

AUDIO



Block Diagram Control & Clock Signals

CONTROL & CLOCK SIGNALS



Part 1  
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Part 2  
I\_18170\_014b.eps

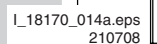
3139 123 6425.1

I\_18170\_014.eps  
310708

A115	C1	F710	C4	I105	B1	IA50	F1
A116	C1	F711	C3	I106	B1	IA51	F1
A124	C1	F712	C3	I108	B2	IA52	F1
A125	C1	FA01	F3	I109	C1	IA53	F1
F101	C1	FA02	E3	I301	A2	IA67	A3
F102	B1	FA03	F2	I302	C3	IA68	B3
F103	B1	FA04	F2	I304	A2	IA69	A3
F104	B1	FA05	F2	I305	A3	IA70	A3
F105	B1	FA06	F2	I306	A3	IA71	A3
F106	A1	FA07	F4	I307	A2	IA72	A3
F107	A1	FA08	F4	I308	B4	IA73	F3
F108	A1	FA09	F2	I310	A2	IC01	C2
F109	A1	FA10	F4	I311	A3	IC02	C2
F110	A1	FA11	F4	I314	B1	IC03	C2
F111	A1	FA12	F2	I315	A2	IC04	C2
F112	A1	FA13	F2	I316	A2	IC05	C2
F113	C2	FA14	E3	I317	A2	IC06	D2
F114	C1	FA15	E1	I318	C2	IC07	C2
F115	B1	FA32	F2	I319	A2	IC08	C2
F116	C1	FA33	F3	I320	C3	IC09	C2
F117	C1	FC01	C2	I321	A2	IE01	D1
F118	B1	FC02	B2	I323	A2	IE02	D1
F301	B2	FC03	B3	I324	A3	IE03	D1
F302	A3	FC04	D2	I325	A3	IE04	D1
F303	A2	FC05	D2	I326	A3	IN01	D3
F304	A2	FC06	D2	I327	A2	IN02	D3
F305	A2	FC07	D2	I328	A2	IN03	D2
F306	B2	FC08	D1	I331	A2	IN04	D2
F307	B2	FC09	C2	I332	A2	IN06	D3
F308	B4	FC10	B3	I333	A2	IN07	D2
F309	B4	FC11	B2	I334	D3	IN10	D2
F310	B4	FE01	F1	I401	D1	IN11	D2
F311	B4	FE02	E1	I402	D1	IN12	D2
F312	B4	FE03	E1	I403	D1	IN13	D3
F314	B4	FE04	E2	I404	D1	IN14	D3
F315	C1	FE05	E1	I405	D1	IN15	E3
F316	C1	FE06	E1	I406	C1	IN16	E3
F317	A3	FE07	E1	I407	D1	IN17	D3
F318	C1	FE08	D2	I408	D1	IN18	D3
F319	A2	FE09	D1	I410	C1	IN19	D2
F320	A2	FE10	D1	I411	C1	IN20	D2
F321	A4	FE12	C3	I416	D1	IP01	E4
F322	A2	FE12	B2	I417	D1	IP02	A4
F323	A3	FE16	B2	I418	D1	IP03	E4
F324	B3	FE17	B3	I419	D1	IP04	E4
F325	A3	FE18	C3	I420	D1	IP05	E4
F327	C3	FE19	C3	I421	C1	IP06	E4
F328	A2	FE20	C3	I422	C1	IP07	E4
F330	C3	FE21	C4	I423	D1	IP08	E4
F331	C3	FE22	F1	I427	C1	IP09	E4
F332	B3	FE23	E1	I428	C1	IP10	E4
F334	B3	FE24	E1	I431	C1	IP11	A4
F335	B4	FE25	E1	I432	C1	IP12	F4
F336	B1	FE26	E1	I433	C1	IP13	E3
F337	B2	FE27	E1	I434	C1	IP14	F4
F338	A2	FE28	D1	I435	C1	IP15	F4
F339	A2	FE29	D1	I436	C1	IP16	E4
F340	A2	FE30	E1	I437	C1	IP17	E4
F341	A2	FE31	E1	I438	C1	IP18	F1
F342	A2	FN01	E3	I439	C1	IP19	E4
F343	A2	FN02	D2	I440	C1	IP20	E4
F344	A2	FN03	E3	I441	C1	IP21	E3
F345	A2	FN04	D2	I442	C1	IP22	E4
FA01	C1	FN05	D3	I443	C1	IP23	A3
FA02	C1	FN06	D3	I444	C1	IP24	A4
FA03	C1	FN07	D3	I445	C1	IP25	E4
FA04	C1	FN08	D3	I446	C1	IP26	E4
FA05	C1	FN09	D3	I447	C1	IP27	E4
FA06	C1	FN10	D2	I448	C1	IP28	E4
FA07	C1	FN11	D2	I449	D1	IP29	E4
F511	F1	FN12	D2	I450	D1	IP30	E3
F513	E1	FN13	D2	I451	C1	IP31	E4
F515	E1	FN14	D2	I452	D1	IP32	E4
F517	E1	FN15	E3	I453	D1	IP33	E4
F518	E1	FN16	E3	I454	C1	IP34	E3
F520	E1	FN17	D3	I455	C1	IP35	E4
F521	E1	FN18	D3	I525	E1	IP37	E4
F522	E1	FN19	E3	I541	E1	IP38	E4
F524	E1	FN20	E3	I548	E1	IP39	E4
F525	E1	FN21	E3	I549	D1	IP40	E4
F526	D1	FN22	E3	I550	E1	IP41	E4
F528	D1	FN23	E2	I553	E1	IP42	E4
F530	D1	FN24	E2	I610	E1	IP43	F4
F531	E1	FP01	E3	I611	B1	IR01	C4
F534	E1	FP01	E4	I621	B1	IR02	C3
F535	E1	FP02	E4	I623	E1	IR03	C3
F536	E1	FP03	D4	I624	C1	IR04	C4
F537	E1	FP04	D4	I627	F1	IR05	C3
F538	E1	FP05	D4	I701	C3		
F539	E1	FP06	F4	IA01	F2		
F540	E1	FP07	F4	IA02	F2		
F541	E1	FP08	D4	IA03	F2		
F542	E1	FP09	E4	IA04	F3		
F601	A1	FP10	D4	IA05	F2		
F602	A1	FP11	D4	IA06	F2		
F603	A1	FP12	D4	IA07	F2		
F604	E1	FP13	D4	IA08	F3		
F605	D1	FP14	F4	IA09	F2		
F606	C1	FP15	E4	IA10	E2		
F607	E1	FP16	A3	IA11	E2		
F608	E1	FP17	E3	IA12	E1		
F609	F1	FP18	B3	IA13	F2		
F610	B1	FP19	A4	IA14	F2		
F611	B1	FP20	A3	IA15	F2		
F612	B1	FP21	F4	IA16	F2		
F613	C1	FP22	A3	IA17	E2		
F614	E1	FP23	F4	IA18	F2		
F615	A1	FR01	C4	IA19	F2		
F616	C1	FR02	C4	IA20	F2		
F617	F1	FR03	C4	IA22	F2		
F618	F1	FR04	C4	IA30	F3		
F619	F2	FR05	C4	IA31	F3		
F620	F1	FR06	C4	IA33	F2		
F701	C3	FR07	C4	IA35	F3		
F702	C3	FR08	C4	IA36	F3		
F703	C3	FR09	C4	IA38	F3		
F704	C3	FR10	C4	IA42	F3		
F705	C3	FR11	C4	IA42	B2		
F706	C3	FR12	C4	IA44	C1		
F707	C3	FR13	C3	IA45	C1		
F708	C3	I102	B1	IA48	C1		
F709	C3	I103	C1	IA49	C1		



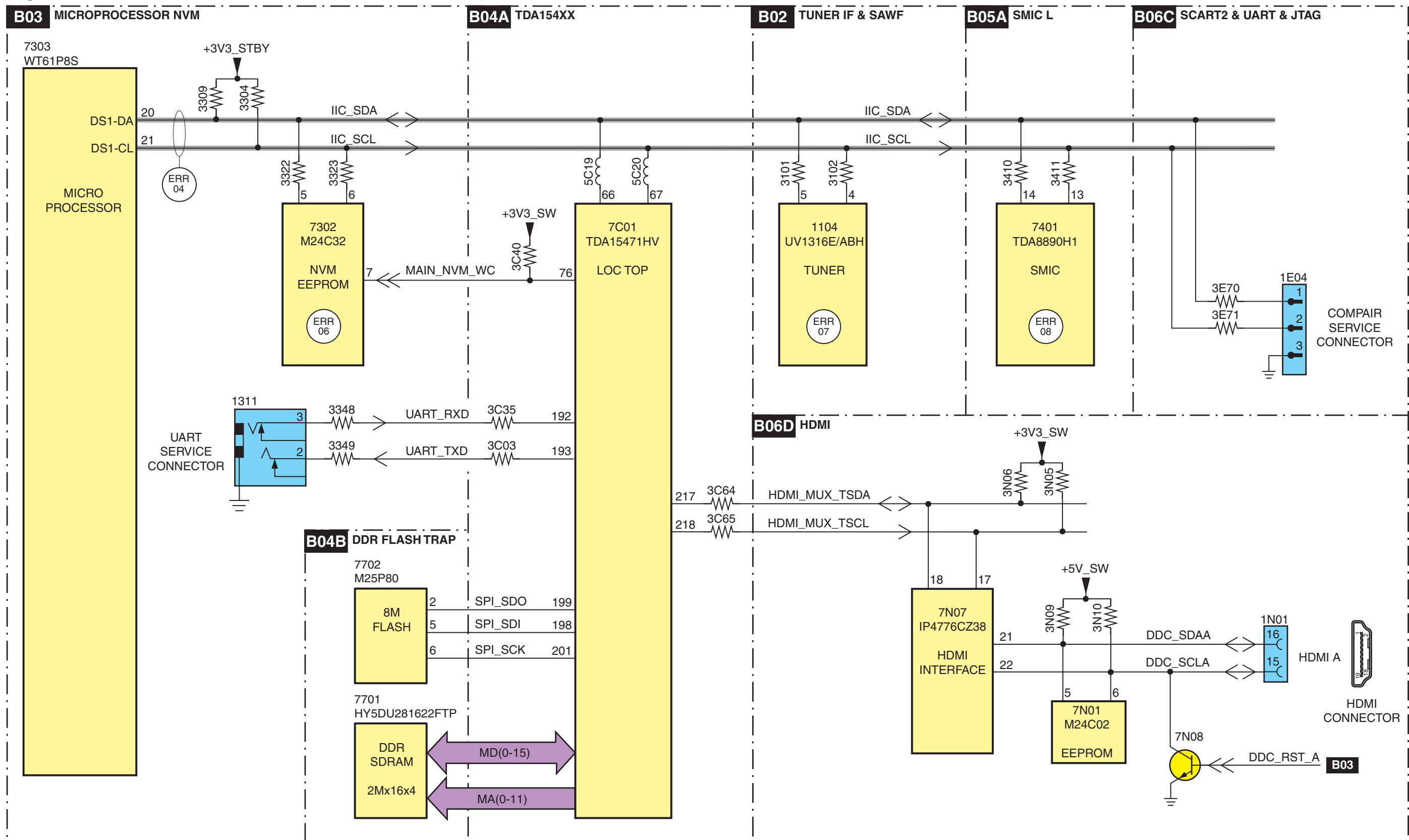
4



## F



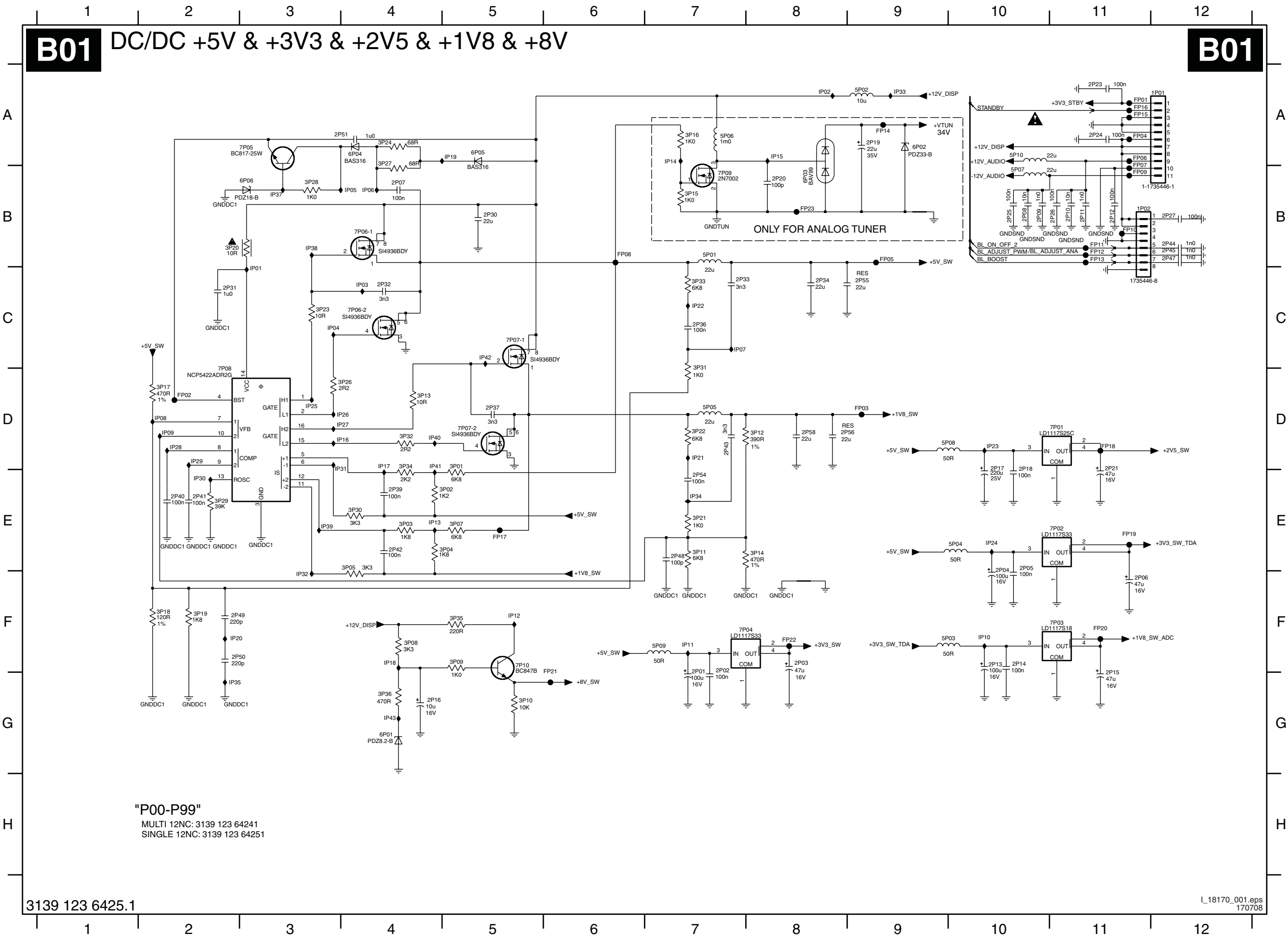
## I2C IC Overview

I<sup>2</sup>C



7. Circuit Diagrams and PWB Layouts

SSB: DC/DC

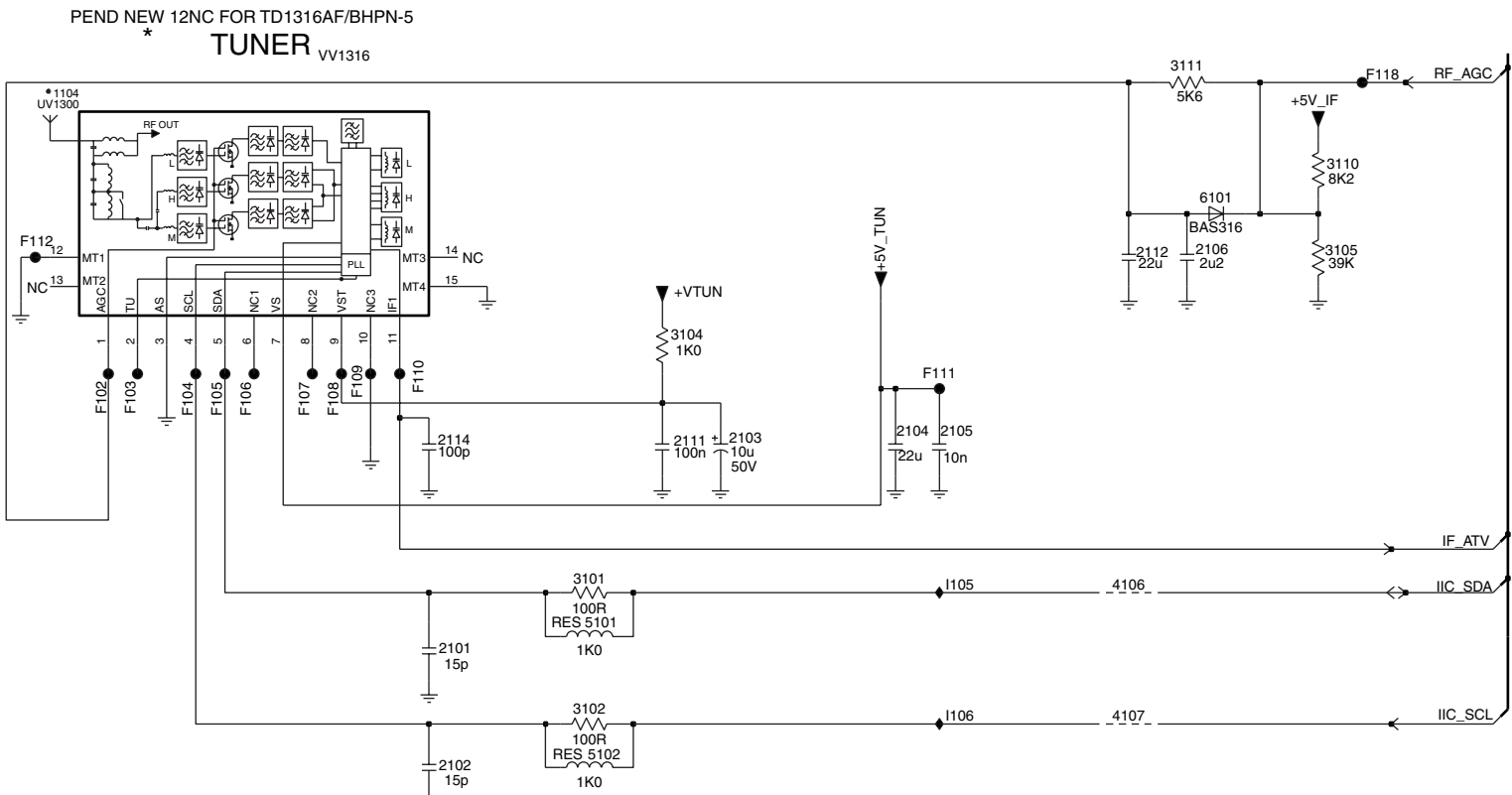
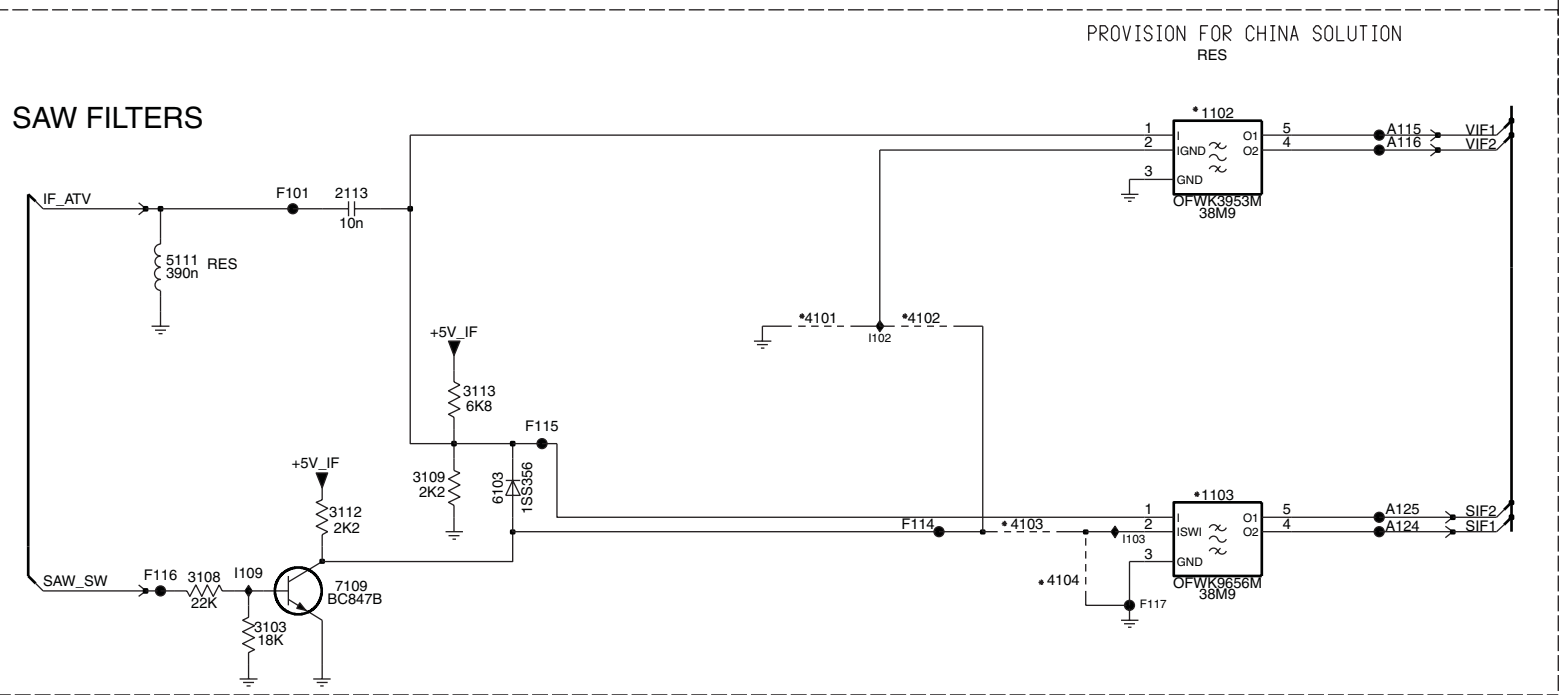


1P01 A12	7P04 F8
1P02 B11	7P05 A3
2P01 F7	7P06-1 B4
2P02 F7	7P06-2 C4
2P03 F8	7P07-1 C5
2P04 E10	7P07-2 D5
2P05 E10	7P08 D2
2P06 F11	7P09 B7
2P07 B4	7P10 F5
2P08 B10	FP01 A11
2P09 B10	FP02 D2
2P10 B11	FP03 D9
2P11 B11	FP04 A11
2P12 B11	FP05 B9
2P13 F10	FP06 A11
2P14 F10	FP07 B11
2P15 F11	FP08 B6
2P16 G4	FP09 B11
2P17 E10	FP10 B11
2P18 D10	FP11 B11
2P19 A9	FP12 B11
2P20 B8	FP13 B11
2P21 D11	FP14 A9
2P23 A11	FP15 A11
2P24 A11	FP16 A11
2P25 B10	FP17 E5
2P26 B11	FP18 D11
2P27 B12	FP19 E11
2P30 B5	FP20 F11
2P31 C2	FP21 G6
2P32 C4	FP22 F8
2P33 C7	FP23 B8
2P34 C8	IP01 C3
2P36 C7	IP02 A8
2P37 D5	IP03 C4
2P39 E4	IP04 C3
2P40 E2	IP05 B4
2P41 E2	IP06 B4
2P42 E4	IP07 C7
2P43 D7	IP08 D2
2P44 B12	IP09 D2
2P45 B12	IP10 F10
2P47 B12	IP11 F7
2P48 E7	IP12 F5
2P49 F2	IP13 E4
2P50 F2	IP14 A7
2P51 A4	IP15 A8
2P54 E7	IP16 D4
2P55 C9	IP17 D4
2P56 D8	IP18 F4
2P58 D9	IP19 A5
3P01 D5	IP20 F2
3P02 E5	IP21 D7
3P03 E4	IP22 C7
3P04 E5	IP23 D10
3P05 E4	IP24 E10
3P07 E5	IP25 D3
3P08 F4	IP26 D4
3P09 F5	IP27 D4
3P10 G5	IP28 D2
3P11 E7	IP29 D2
3P12 D8	IP30 E2
3P13 D4	IP31 D4
3P14 E8	IP32 F3
3P15 B7	IP33 A9
3P16 A7	IP34 F7
3P17 D2	IP35 G2
3P18 F2	IP37 B3
3P19 F2	IP38 B3
3P20 B7	IP39 E3
3P21 E2	IP40 D4
3P22 D7	IP41 D4
3P23 C3	IP42 C5
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3P29 E2	
3P30 E4	
3P31 C7	
3P32 D4	
3P33 C7	
3P34 D4	
3P35 F5	
3P36 G4	
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5P03 F10	
5P04 E10	
5P05 D7	
5P06 A7	
5P07 B10	
5P08 D10	
5P09 F7	
5P10 A10	
6P01 G4	
6P02 A9	
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6P05 A5	
6P06 B3	
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7P02 E11	
7P03 F11	

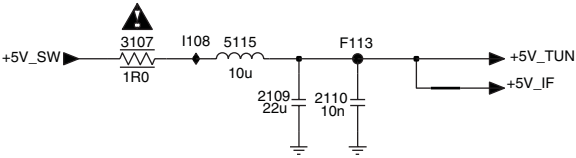
SSB: Tuner IF & SAWF

B02 TUNER IF & SAWF

B02



*	EUROPE	AP	CHINA	LATAM
1104	UV1316E	UV1316E	UV1356	UV1336
1102	K3953	K7257M	TBC	M1971M
1103	K9656M	K9362	K9352	-
4101	Y	-	Y	Y
4102	-	Y	-	-
4103	Y	-	-	-
4104	-	Y	Y	-



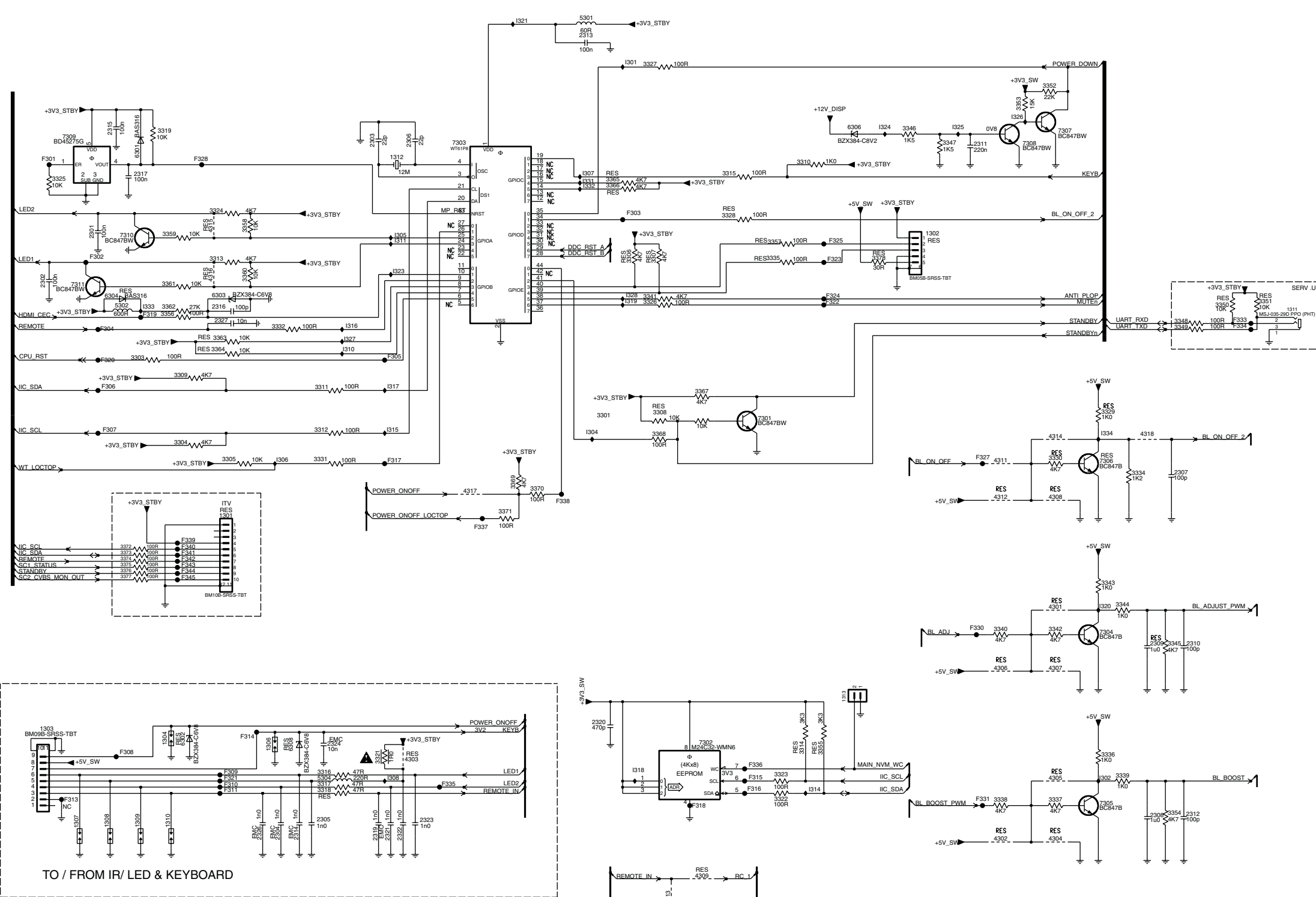


SSB: Micro Processor NVM

B03

MICROPROCESSOR NVM

B03



"300 ~ 399"  
MULTI 12NC : 3139 123 64241  
SINGLE 12NC : 3139 123 64251

TO / FROM IR/ LED & KEYBOARD

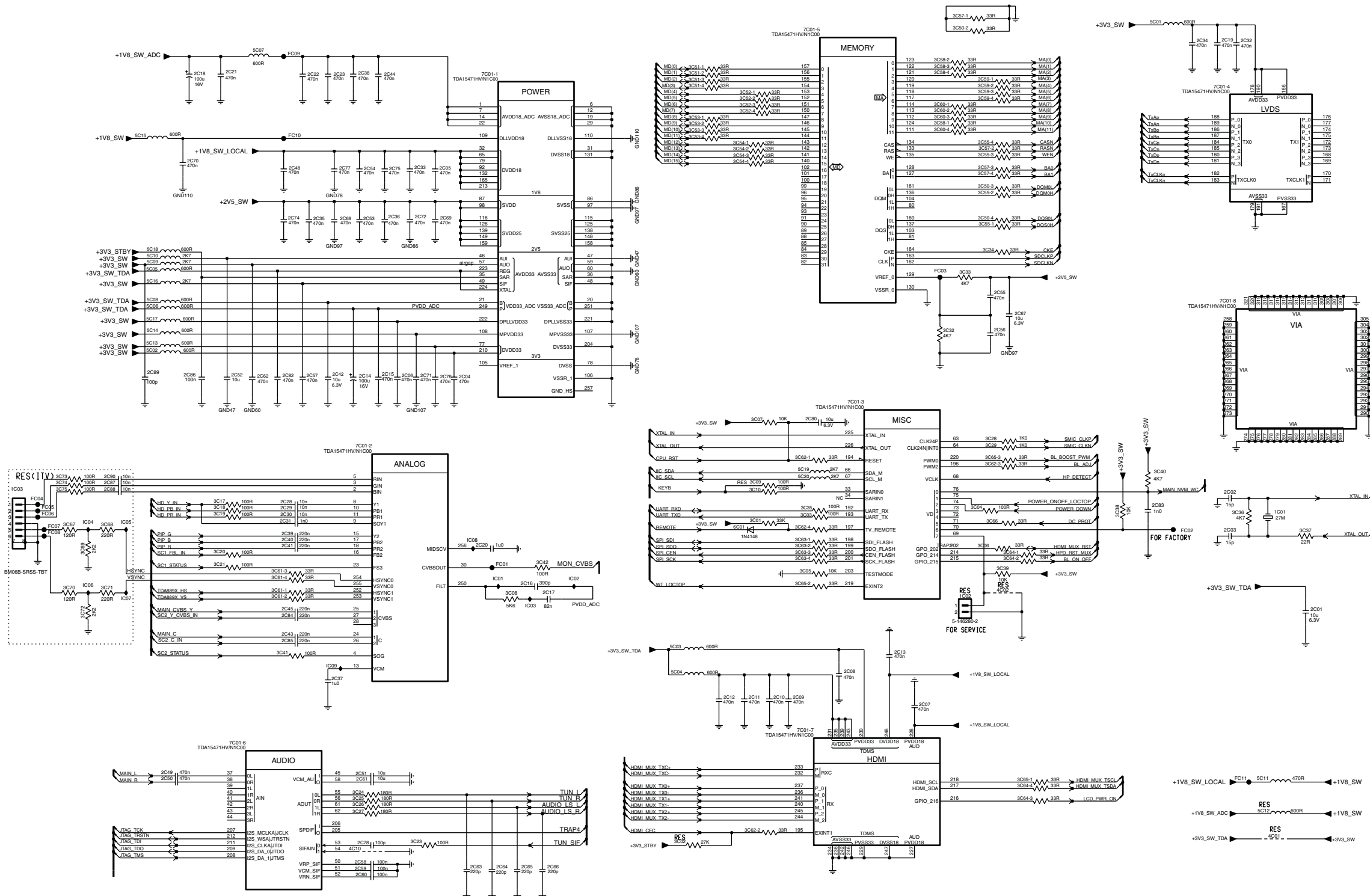
REMOTE IN  
REMOTE  
RES 4909  
RES 4910  
RC 1  
RC 2

- 1301 G4 F306 E3
- 1302 C13 F307 F3
- 1303 I2 F308 J3
- 1304 I4 F309 J4
- 1306 I5 F310 J4
- 1307 J3 F311 J4
- 1308 J3 F313 J3
- 1309 J3 F314 I5
- 1310 J4 F315 J11
- 1311 D17 F316 J11
- 1312 C6 F317 F6
- 2301 C3 F318 J10
- 2302 D2 F319 D3
- 2303 B6 F320 E3
- 2304 J5 F321 J4
- 2305 J5 F322 D11
- 2306 B7 F323 D11
- 2307 F16 F324 D11
- 2308 I15 F325 D11
- 2309 H15 F327 F13
- 2310 H16 F328 C4
- 2311 B13 F330 H13
- 2312 I16 F331 J13
- 2313 A9 F333 D16
- 2314 J5 F334 E16
- 2315 B3 F335 J7
- 2316 D4 F336 J11
- 2317 C3 F337 G7
- 2319 J6 F338 G8
- 2320 I9 F339 G4
- 2321 J6 F340 G4
- 2322 J6 F341 G4
- 2323 J7 F342 G4
- 2324 I6 F343 G4
- 2326 J5 F344 G4
- 2327 D4 F345 G4
- 3301 F9 I301 A9
- 3303 E3 I302 J15
- 3304 F4 I304 F9
- 3305 F4 I305 C6
- 3306 D9 I306 F5
- 3307 D9 I307 C9
- 3308 F9 I308 J6
- 3309 E4 I310 E6
- 3310 C11 I311 D6
- 3311 E5 I314 J11
- 3312 F5 I315 F6
- 3313 D4 I316 E6
- 3314 I1 I317 E6
- 3315 C10 I318 J9
- 3316 J5 I319 D9
- 3317 J5 I320 H15
- 3318 J5 I321 A8
- 3319 B4 I323 D6
- 3321 J6 I324 B12
- 3322 J11 I325 B13
- 3323 J11 I326 B14
- 3324 C4 I327 E6
- 3325 C2 I328 D9
- 3326 D9 I331 C9
- 3327 A9 I332 C9
- 3328 C10 I333 D3
- 3329 F15 I334 F15
- 3330 F14
- 3331 F5
- 3332 E5
- 3334 F15
- 3335 D11
- 3336 I15
- 3337 J14
- 3338 J13
- 3339 I15
- 3340 H13
- 3341 D9
- 3342 H14
- 3343 H15
- 3344 H15
- 3345 H15
- 3346 B12
- 3347 B13
- 3348 D16
- 3349 E16
- 3350 D16
- 3351 D17
- 3352 B14
- 3353 B14
- 3354 J15
- 3355 I11
- 3356 D4
- 3357 D11
- 3358 C5
- 3359 C4
- 3360 D5
- 3361 D4
- 3362 D4
- 3363 E4
- 3364 E4
- 3365 C9
- 3366 C9
- 3367 E10
- 3368 F9
- 3369 F8
- 3370 F8
- 3371 G8
- 3372 G3
- 3373 G3
- 3374 G3
- 3375 G3
- 3376 G3
- 3377 G3
- 3378 D12
- 4301 H14
- 4302 K13
- 4303 J7
- 4304 K14
- 4305 J14
- 4306 I13
- 4307 I14
- 4308 G14
- 4309 K10
- 4310 K10
- 4311 F13
- 4312 G13
- 4313 K10
- 4314 F14
- 4315 C4
- 4316 D4
- 4317 F7
- 4318 F15
- 5301 A9
- 5302 D3
- 5304 J5
- 6301 B3
- 6302 I4
- 6303 D4
- 6304 D3
- 6306 B12
- 6308 I5
- 7301 F11
- 7302 I10
- 7303 B7
- 7304 H15
- 7305 I15
- 7306 F15
- 7307 B14
- 7308 B14
- 7309 B3
- 7310 C3
- 7311 D3
- F301 C2
- F302 D3
- F303 C9
- F304 E3
- F305 E6

## SSB: TDA154XX

B04A TDA154XX

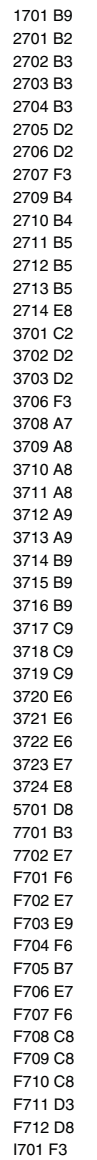
B04A



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IC03 G1  
IC04 E6  
IC05 C6  
IC06 E6  
IC07 H12  
IC08 H11  
IC09 H10  
IC10 H10  
IC11 H10  
IC12 I9  
IC13 H11  
IC14 E5  
IC15 E5  
IC16 H7  
IC17 H7  
IC18 B3  
IC19 B15  
IC20 G7  
IC21 B4  
IC22 B5  
IC23 B5  
IC24 G4  
IC25 G4  
IC26 G4  
IC27 G4  
IC28 G2  
IC29 G4  
IC30 G4  
IC31 G4  
IC32 B15  
IC33 C6  
IC34 B15  
IC35 D5  
IC36 D5  
IC37 I5  
IC38 B5  
IC39 G4  
IC40 G4  
IC41 G4  
IC42 E5  
IC43 H4  
IC44 B5  
IC45 H4  
IC46 C4  
IC47 J3  
IC48 J3  
IC49 J3  
IC50 J3  
IC51 J5  
IC52 E4  
IC53 D5  
IC54 C5  
IC55 D12  
IC56 E12  
IC57 E5  
IC58 K5  
IC59 K5  
IC60 K5  
IC61 J5  
IC62 E4  
IC63 K5  
IC64 K7  
IC65 K7  
IC66 K7  
IC67 E13  
IC68 D5  
IC69 D6  
IC70 C3  
IC71 E6  
IC72 D6  
IC73 D4  
IC74 C6  
IC75 C6  
IC76 E6  
IC77 C5  
IC78 K5  
IC79 F10  
IC80 F10  
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IC91 G4  
IC92 G4  
IC93 G4  
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IC96 G4  
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IC99 G4  
IC100 G4



## B04B DDR FLASH TRAP

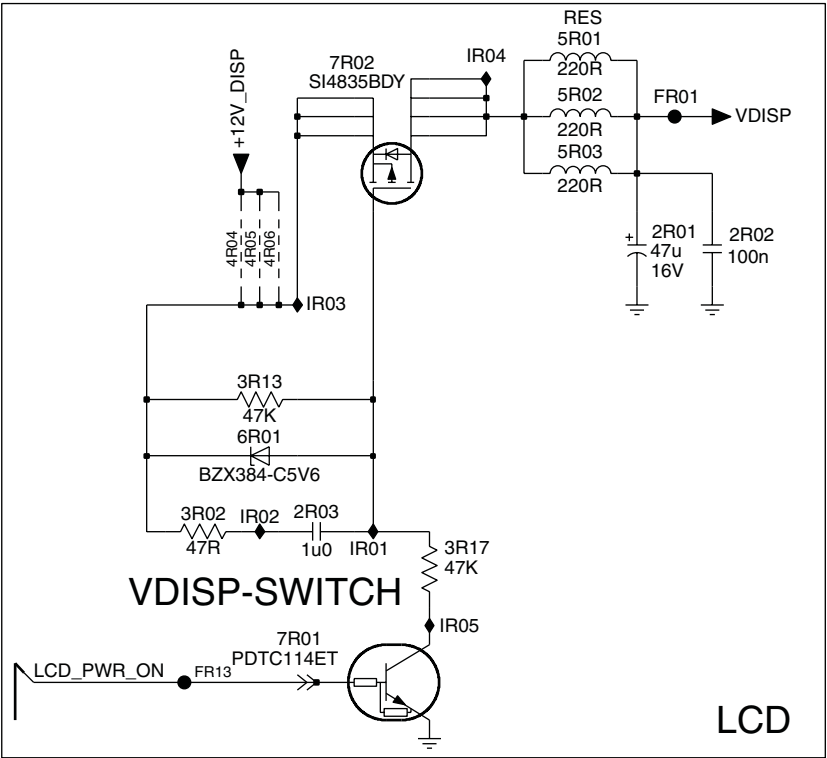
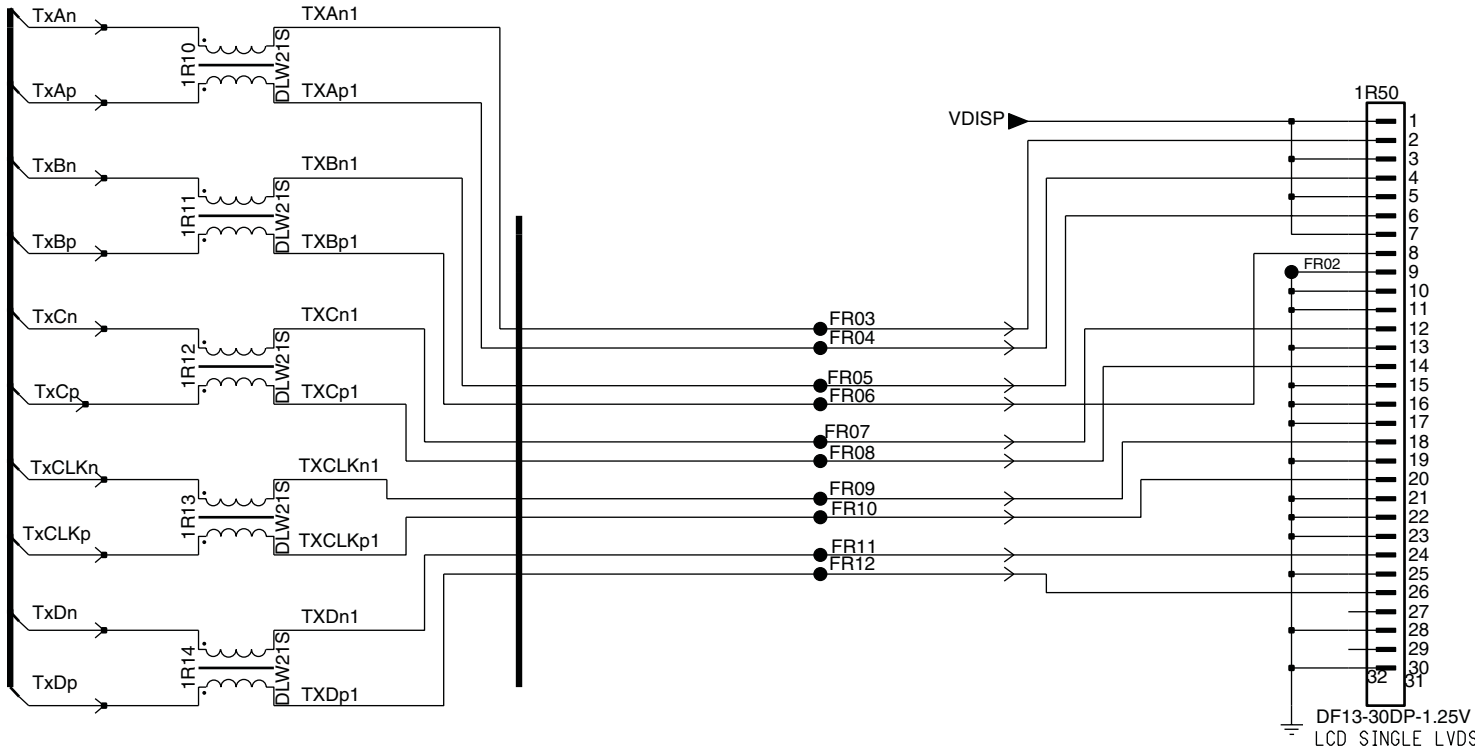


SSB: LVDS Connectors

B04C

LVDS CONNECTORS

B04C



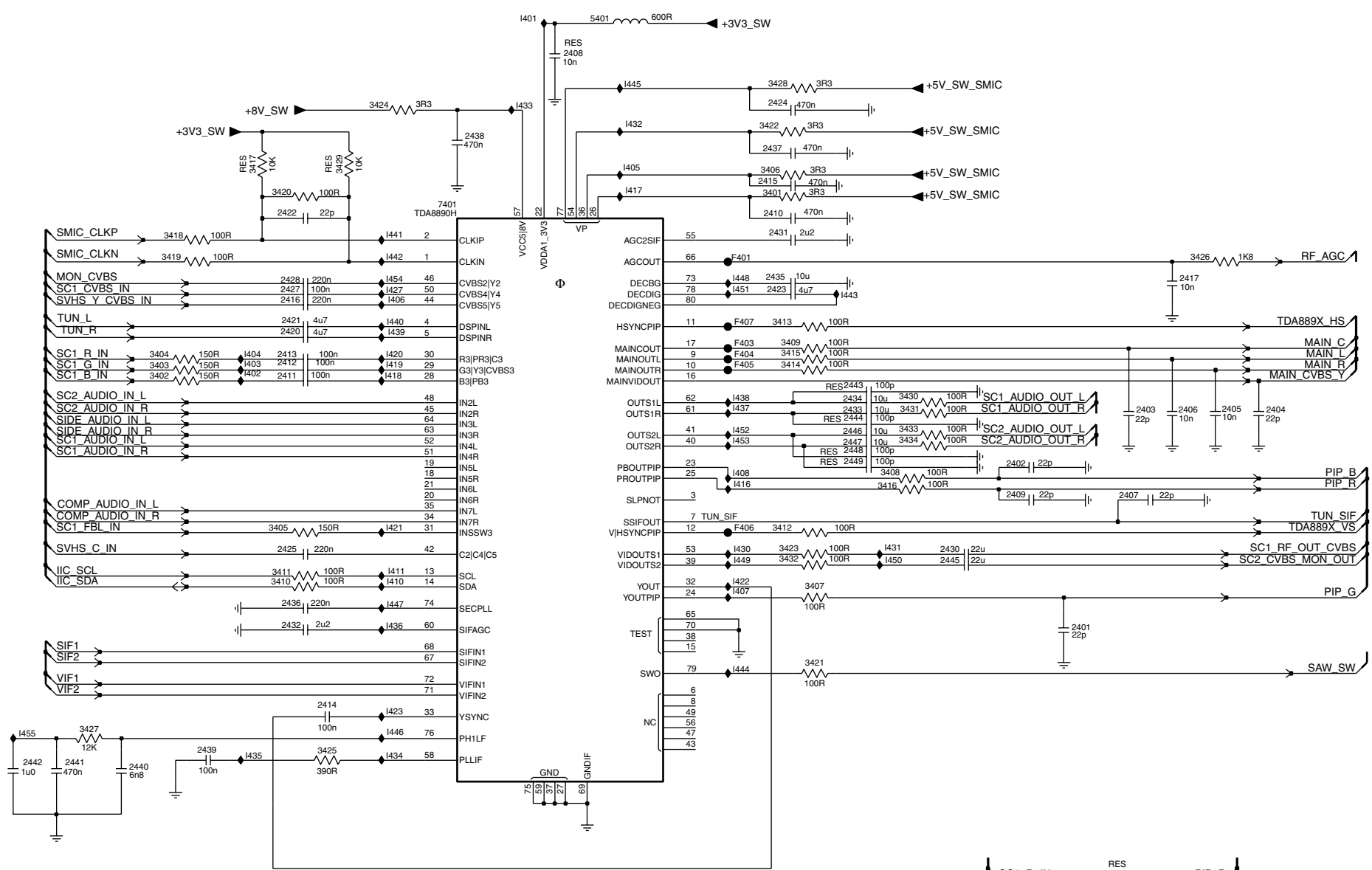
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- 1R11 B2
- 1R12 C2
- 1R13 D2
- 1R14 D2
- 1R50 B6
- 2R01 B9
- 2R02 B9
- 2R03 C8
- 3R02 C7
- 3R13 C7
- 3R17 C8
- 4R04 B7
- 4R05 B7
- 4R06 B8
- 5R01 A9
- 5R02 A9
- 5R03 B9
- 6R01 C7
- 7R01 D8
- 7R02 A8
- FR01 A9
- FR02 C6
- FR03 C4
- FR04 C4
- FR05 C4
- FR06 C4
- FR07 C4
- FR08 C4
- FR09 C4
- FR10 D4
- FR11 D4
- FR12 D4
- FR13 D7
- IR01 C8
- IR02 C7
- IR03 B8
- IR04 A8
- IR05 C8

SSB: SMIC L

B05A

SMIC L

B05A



"400-499"

MULTI 12NC: 3139 123 64241  
SINGLE 12NC: 3139 123 64251

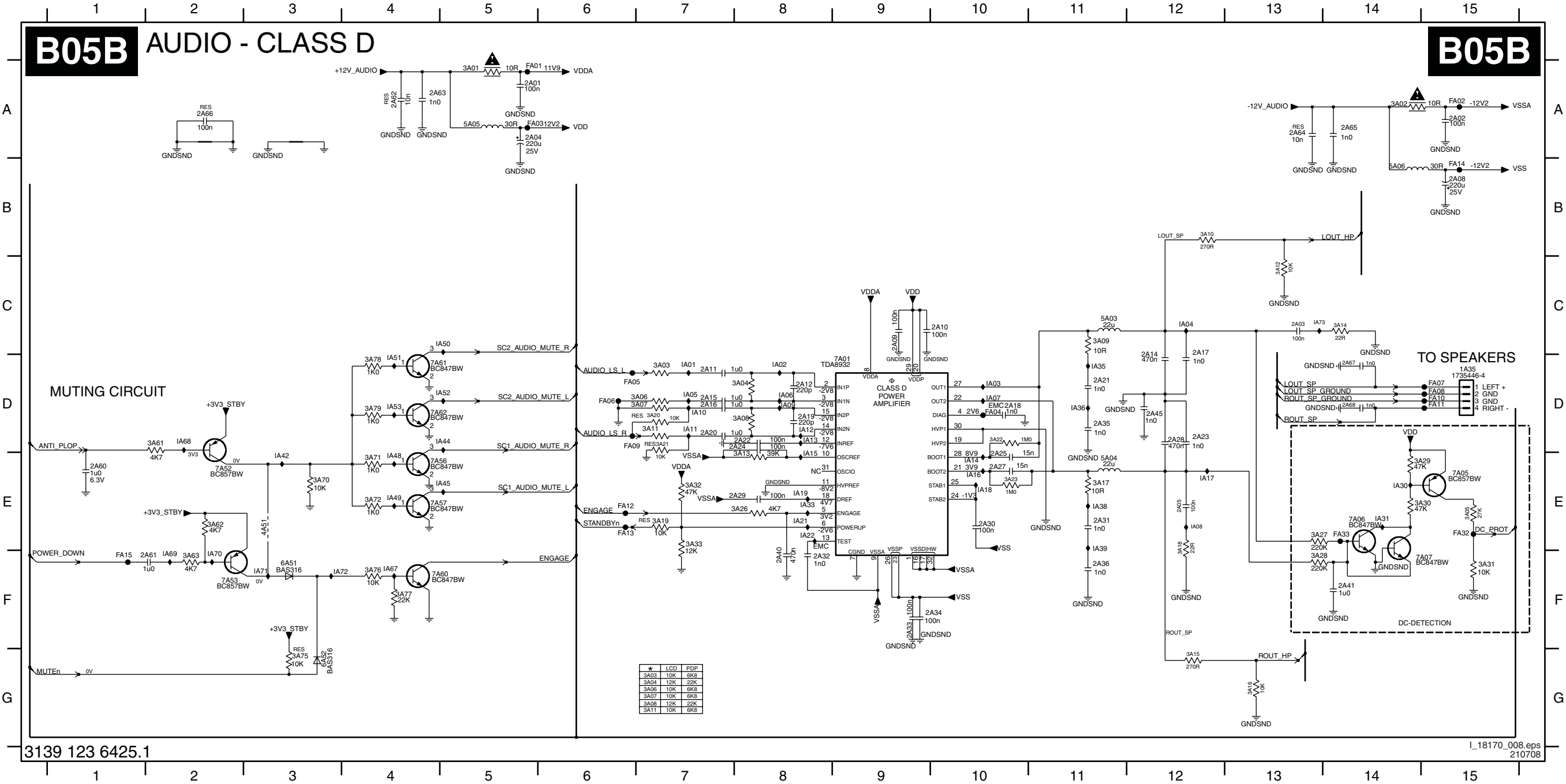
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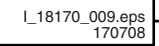
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- 2402 D9
- 2403 C10
- 2404 C11
- 2405 C11
- 2406 C11
- 2407 D10
- 2408 A7
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- 2410 B8
- 2411 C5
- 2412 C5
- 2413 C5
- 2414 E5
- 2415 B8
- 2416 C5
- 2417 B11
- 2418 G5
- 2419 G6
- 2420 C5
- 2421 C5
- 2422 B5
- 2423 C8
- 2424 A8
- 2425 D5
- 2427 C5
- 2428 C5
- 2430 D9
- 2431 B8
- 2432 E5
- 2433 C8
- 2434 C8
- 2435 B8
- 2436 E5
- 2437 B8
- 2438 B6
- 2439 F4
- 2440 F4
- 2441 F3
- 2442 F3
- 2443 C8
- 2444 C8
- 2445 D9
- 2446 D8
- 2447 D8
- 2448 D8
- 2449 D8
- 3401 B8
- 3402 C4
- 3403 C4
- 3404 C4
- 3405 D5
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- 3407 E8
- 3408 D9
- 3409 C8
- 3410 E5
- 3411 D5
- 3412 D8
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- 3415 C8
- 3416 D9
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- 3425 F5
- 3426 B11
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- 3430 C9
- 3431 C9
- 3432 D8
- 3433 D9
- 3434 D9
- 4401 F10
- 4402 G10
- 4403 G10
- 5401 A7
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- F401 B8
- F402 H5
- F403 C8
- F404 C8
- F405 C8
- F406 D8
- F407 C8
- I401 A6
- I402 C4
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- I407 E8
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- I423 E5
- I427 C5
- I430 D8
- I431 D9
- I432 A7
- I433 A6
- I434 F5
- I435 F4
- I436 E5
- I437 C8
- I438 C8
- I439 C5
- I440 C5
- I441 B5
- I442 B5
- I443 C8
- I444 E8
- I445 A7
- I446 E5
- I447 E5
- I448 B8
- I449 D8
- I450 D9
- I451 C8
- I452 C8
- I453 D8
- I454 C5
- I455 E3

SSB: Audio Class D

1A35 D15 2A05 E12 2A12 D8 2A18 D10 2A23 D12 2A29 E8 2A34 F10 2A45 D12 2A64 A13 3A01 A5 3A06 D7 3A11 D7 3A16 G13 3A21 D7 3A28 F13 3A33 E7 3A71 E4 3A78 D4 5A05 A5 7A05 E15 7A56 E4 FA01 A5 FA06 D6 FA11 D15 FA32 E15 IA04 C12 IA09 D8 IA14 E10 IA19 E8 IA33 E8 IA42 E3 IA50 C5 IA68 D2 IA73 C13  
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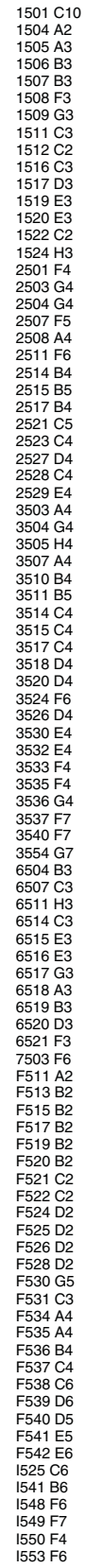


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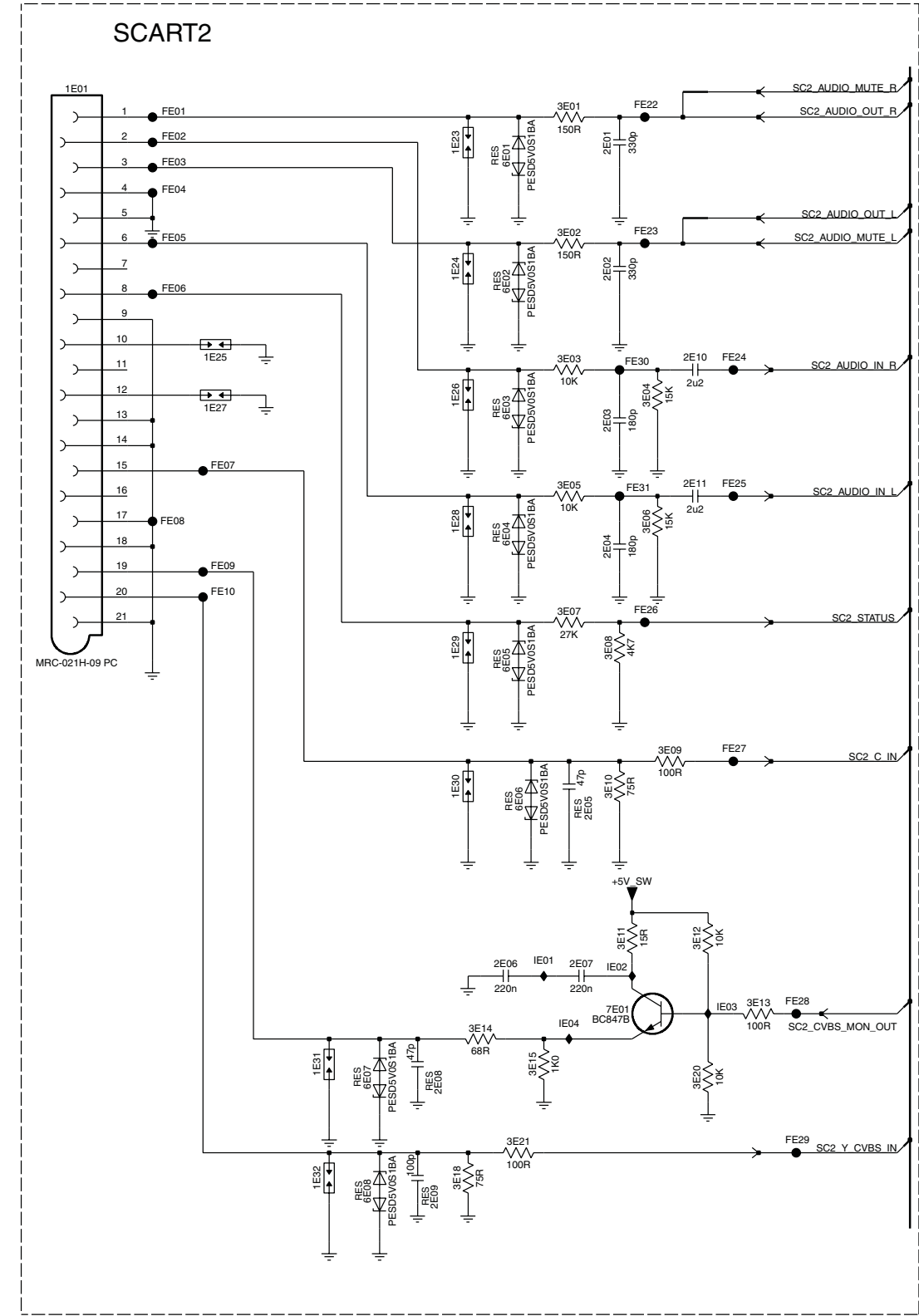
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1606 E2	6614 C2
1607 D2	6615 F7
1608 C7	6616 F7
1609 B7	6621 D7
1610 F2	6622 D7
1611 C2	F601 B7
1613 C2	F602 B7
1614-1 B1	F603 B8
1614-2 C1	F604 D2
1614-3 C1	F605 E2
1615-1 C1	F606 C8
1615-2 C1	F607 E2
1616 D7	F608 C2
1617 D7	F609 C2
1618 F6	F610 C7
1619 F6	F611 D7
1620 F6	F612 C8
2600 B7	F613 D8
2602 E3	F614 C1
2603 D3	F615 B7
2606 C3	F616 E6
2607 C4	F617 E6
2608 C3	F618 E6
2609 C8	F619 E6
2610 C4	F620 F6
2612 C3	I610 C4
2613 F8	I611 C4
2614 F8	I621 C8
2615 F8	I623 C3
2616 F8	I624 D8
2621 C8	I627 C3
2622 D8	
2623 D8	
2624 D8	
2625 B8	
2626 C8	
2627 D7	
2628 E7	
3600 B8	
3601 E4	
3602 C8	
3603 D4	
3604 B8	
3605 E4	
3606 E6	
3607 C3	
3608 C4	
3609 C7	
3611 C3	
3612 C4	
3621 C7	
3622 D8	
3623 D7	
3624 D8	
4601 D6	
4602 D6	
4603 E7	
4604 E7	
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4606 F9	
4607 E8	
4608 E8	
4609 E8	
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4613 F8	
4614 F8	

**B06B** IO - SCART 1



SSB: Scart2 & UART & JTAG

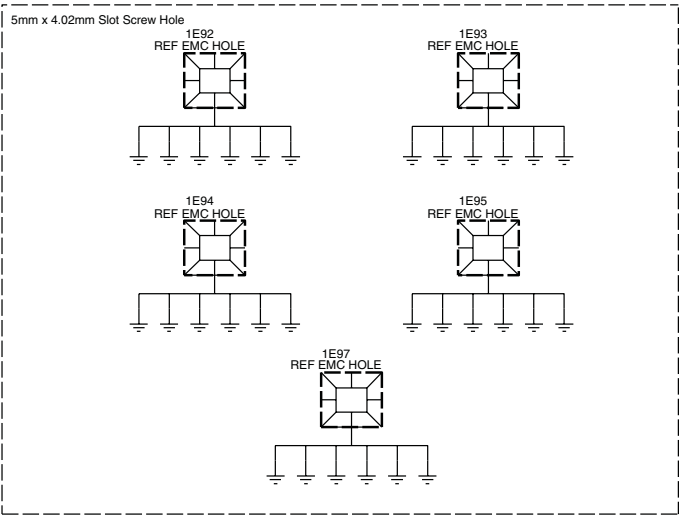
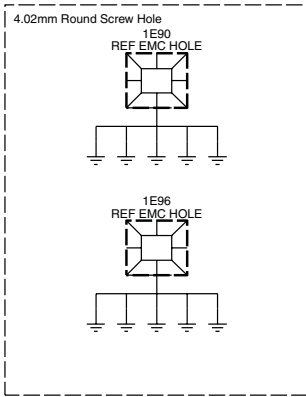
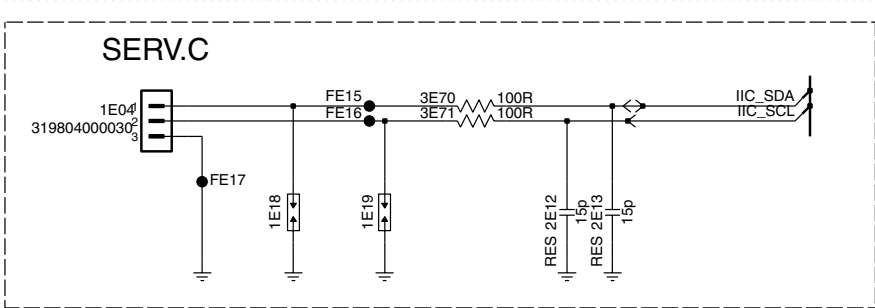
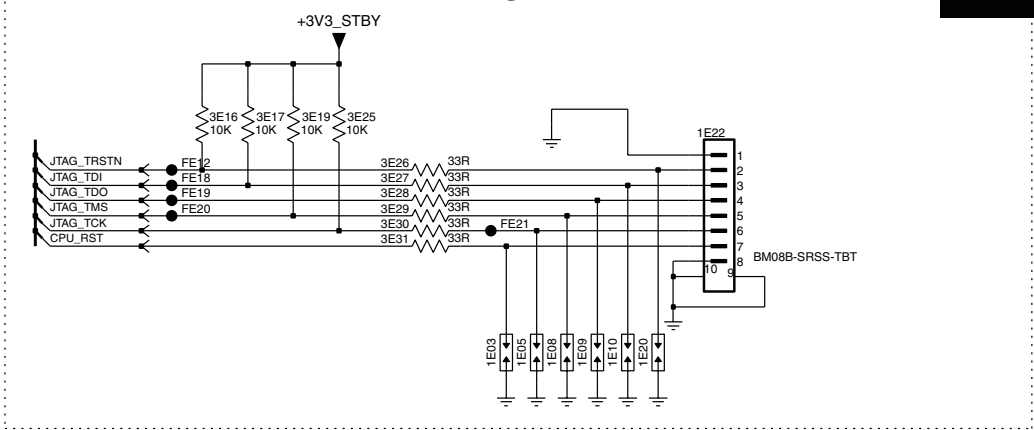
B06C SCART2 & UART & JTAG



JTAG INTERFACE

RESERVED

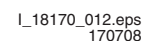
B06C



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- 1E03 B8
- 1E04 C6
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- 1E09 B8
- 1E10 B8
- 1E18 C7
- 1E19 C7
- 1E20 B9
- 1E22 A9
- 1E23 A3
- 1E24 B3
- 1E25 C1
- 1E26 C3
- 1E27 C1
- 1E28 D3
- 1E29 D3
- 1E30 E3
- 1E31 G2
- 1E32 G2
- 1E90 F6
- 1E92 F8
- 1E93 F9
- 1E94 G8
- 1E95 G9
- 1E96 G6
- 1E97 H9
- 2E01 A4
- 2E02 B4
- 2E03 C4
- 2E04 D4
- 2E05 E4
- 2E06 F3
- 2E07 F4
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- 2E10 C4
- 2E11 C4
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- 3E28 A7
- 3E29 A7
- 3E30 B7
- 3E31 B7
- 3E70 C8
- 3E71 C8
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- 6E02 B3
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- 6E04 D3
- 6E05 D3
- 6E06 E3
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- 6E08 G2
- 7E01 F4
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- FE02 A1
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- FE04 B1
- FE05 B1
- FE06 B1
- FE07 C2
- FE08 D1
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- FE10 D2
- FE12 A7
- FE15 C7
- FE16 C7
- FE17 C7
- FE18 A7
- FE19 A7
- FE20 A7
- FE21 B8
- FE22 A4
- FE23 B4
- FE24 C4
- FE25 C4
- FE26 D4
- FE27 E4
- FE28 F5
- FE29 G5
- FE30 C4
- FE31 C4
- IE01 F3
- IE02 F4
- IE03 F4
- IE04 F3



**B06D**





SSB: SRP List Explanation

Example

Net Name	Diagram
+12-15V	AP1 (4x)
+12-15V	AP4 (4x)
+12-15V	AP5 (12x)
+12-15V	AP6 (4x)
+12-15V	AP7 (8x)
+12V	AP1 (4x)
+12V_NF	AP1 (2x)
+12VAL	AP1 (2x)
+25VLP	AP1 (4x)
+25VLP	AP2 (1x)
+3V3-STANDBY	AP5 (3x)
+400V-F	AP1 (2x)
+400V-F	AP2 (2x)
+400V-F	AP3 (2x)
+5V2	AP1 (6x)
+5V2	AP2 (1x)
+5V2-NF	AP1 (1x)
+5V2-NF	AP2 (1x)
+5V-SW	AP1 (6x)
+5V-SW	AP2 (1x)
+8V6	AP1 (3x)
+AUX	AP1 (2x)
+AUX	AP2 (1x)
+DC-F	AP1 (2x)
+DC-F	AP3 (2x)
+SUB-SPEAKER	AP5 (1x)
+SUB-SPEAKER	AP6 (2x)
-12-15V	AP1 (4x)
-12-15V	AP4 (6x)
-12-15V	AP5 (14x)
-12-15V	AP6 (6x)
-12-15V	AP7 (8x)
AL-OFF	AP1 (2x)
AUDIO-L	AP4 (1x)
AUDIO-L	AP5 (1x)
AUDIO-PROT	AP5 (3x)
AUDIO-R	AP4 (1x)
AUDIO-R	AP5 (1x)
AUDIO-SW	AP5 (1x)
AUDIO-SW	AP7 (1x)
BOOST	AP1 (2x)
CPROT	AP4 (2x)
CPROT	AP5 (1x)
CPROT-SW	AP5 (1x)
CPROT-SW	AP6 (2x)
-DC-F	AP1 (2x)
-DC-F	AP3 (2x)
DC-PROT	AP1 (1x)
DC-PROT	AP5 (2x)
DIM-CONTROL	AP1 (2x)
FEEDBACK+SW	AP6 (2x)
FEEDBACK-L	AP4 (2x)
FEEDBACK-R	AP4 (2x)
FEEDBACK-SW	AP6 (2x)
GND-AL	AP1 (2x)
GNDHA	AP1 (40x)
GNDHA	AP2 (20x)
GNDHA	AP3 (2x)
GNDHOT	AP3 (2x)
GND-L	AP1 (2x)
GND-L	AP4 (4x)
GND-L	AP5 (34x)
GND-LL	AP4 (7x)
GND-LL	AP5 (1x)
GND-LR	AP4 (7x)
GND-LR	AP5 (1x)
GND-LSW	AP5 (1x)
GND-LSW	AP6 (15x)
GND-S	AP1 (11x)
GND-SA	AP4 (8x)
GND-SA	AP5 (2x)
GND-SA	AP6 (8x)
GND-SA	AP7 (6x)
GNDscrew	AP3 (2x)
GNDscrew	AP5 (2x)
GND-SSB	AP5 (3x)
GND-SSP	AP1 (51x)
GND-SSP	AP2 (15x)
IN+SW	AP6 (2x)
IN-L	AP4 (2x)
IN-R	AP4 (2x)
IN-SW	AP6 (2x)
INV-MUTE	AP4 (1x)
INV-MUTE	AP5 (1x)
INV-MUTE	AP6 (1x)
LEFT-SPEAKER	AP4 (1x)
LEFT-SPEAKER	AP5 (1x)
MUTE	AP4 (2x)
MUTE	AP5 (1x)
MUTE	AP6 (2x)
ON-OFF	AP1 (3x)
OUT	AP6 (1x)
OUT	AP7 (2x)
OUTN	AP6 (1x)
OUTN	AP7 (1x)
POWER-GOOD	AP1 (2x)
POWER-OK-PLATFORM	AP1 (2x)
RIGHT-SPEAKER	AP4 (1x)
RIGHT-SPEAKER	AP5 (1x)
SOUND-ENABLE	AP5 (3x)
STANDBY	AP1 (5x)
STANDBY	AP2 (1x)
-SUB-SPEAKER	AP5 (1x)
-SUB-SPEAKER	AP6 (2x)
V-CLAMP	AP1 (1x)
V-CLAMP	AP3 (2x)

1.1. Introduction

SRP (Service Reference Protocol) is a software tool that creates a list with all references to signal lines. The list contains references to the signals within all schematics of a PWB. It replaces the text references currently printed next to the signal names in the schematics. These printed references are created manually and are therefore not guaranteed to be 100% correct. In addition, in the current crowded schematics there is often none or very little place for these references. Some of the PWB schematics will use SRP while others will still use the manual references. Either there will be an SRP reference list for a schematic, or there will be printed references in the schematic.

1.2. Non-SRP Schematics

There are several different signals available in a schematic:

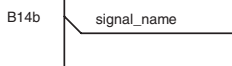
1.2.1. Power Supply Lines

All power supply lines are available in the supply line overview (see chapter 6). In the schematics (see chapter 7) is not indicated where supplies are coming from or going to. It is however indicated if a supply is incoming (created elsewhere), or outgoing (created or adapted in the current schematic).



1.2.2. Normal Signals

For normal signals, a schematic reference (e.g. B14b) is placed next to the signals.

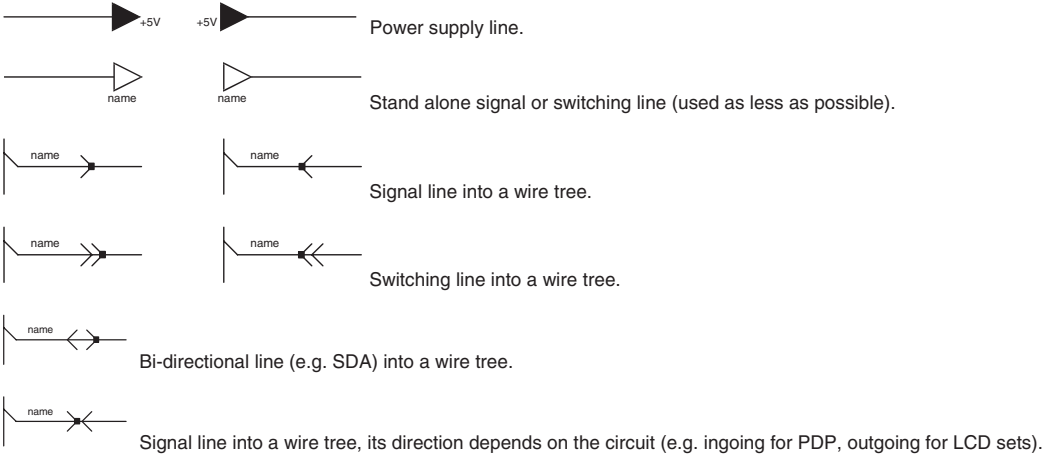


1.2.3. Grounds

For normal and special grounds (e.g. GNDHOT or GND3V3 etc.), nothing is indicated.

1.3. SRP Schematics

SRP is a tool, which automatically creates a list with signal references, indicating on which schematic the signals are used. A reference is created for all signals indicated with an SRP symbol, these symbols are:



Remarks:

- When there is a black dot on the "signal direction arrow" it is an SRP symbol, so there will be a reference to the signal name in the SRP list.
- All references to normal grounds (Ground symbols without additional text) are not listed in the reference list, this to keep it concise.
- Signals that are not used in multiple schematics, but only once or several times in the same schematic, are included in the SRP reference list, but only with one reference.

Additional Tip:

When using the PDF service manual file, you can very easily search for signal names and follow the signal over all the schematics. In Adobe PDF reader:

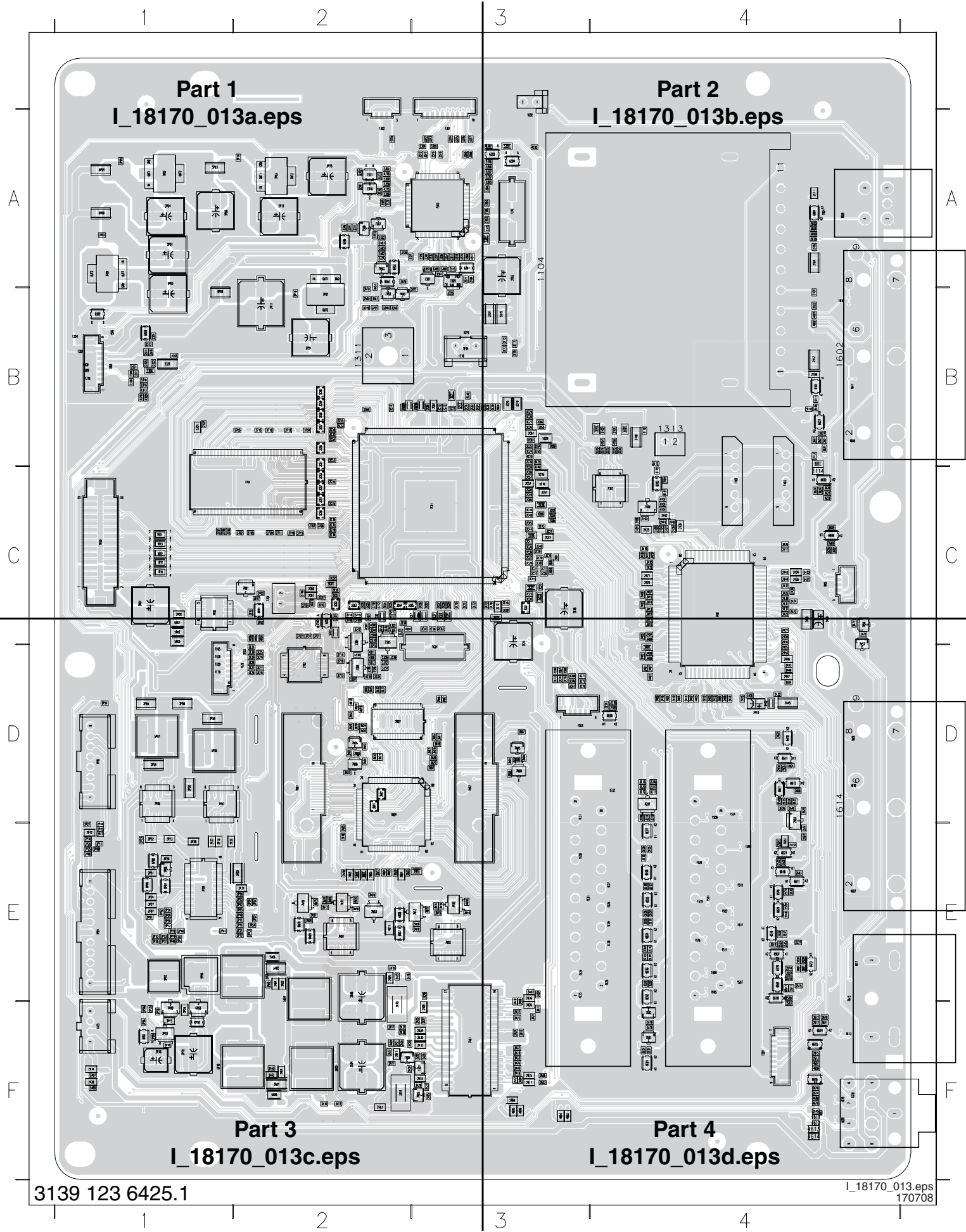
- Select the signal name you want to search for, with the "Select text" tool.
- Copy and paste the signal name in the "Search PDF" tool.
- Search for all occurrences of the signal name.
- Now you can quickly jump between the different occurrences and follow the signal over all schematics. It is advised to "zoom in" to e.g. 150% to see clearly, which text is selected. Then you can zoom out, to get an overview of the complete schematic.

PS. It is recommended to use at least Adobe PDF (reader) version 6.x, due to better search possibilities in this version.

Personal Notes:

[illegible]

Layout Small Signal Board (Overview Top Side)

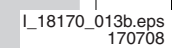


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1103 C4	2317 A3	2624 C4	2C29 C3	2P02 A1	3326 A3	3503 F4	3A31 F3	3E15 D4	3P33 E1	5C08 C3	7305 C2
1104 A3	2319 B1	2625 A4	2C30 C3	2P03 A1	3327 A2	3504 D4	3A32 F3	3E16 D2	3P34 E1	5C09 B3	7306 D2
1301 A3	2320 B4	2626 C4	2C31 C3	2P04 A1	3328 A2	3505 D4	3A33 F3	3E17 D2	3P35 F1	5C10 C3	7307 A2
1302 A2	2321 B1	2627 B4	2C32 C2	2P05 A1	3329 D2	3507 E4	3A61 B2	3E18 D4	3P36 F1	5C11 B3	7308 A2
1303 B1	2322 B1	2628 C4	2C33 C2	2P06 A1	3330 D2	3510 E4	3A62 A2	3E19 D2	3R02 C2	5C12 C3	7309 A3
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1619 F4	2424 C4	2A18 F3	2C63 B3	2P39 E1	3359 A2	3612 F4	3C26 B3	3N17 D3	4402 D4	6302 B1	7N09 D3
1620 F4	2425 D4	2A19 F3	2C64 B3	2P40 E1	3360 A2	3621 B4	3C27 B3	3N18 D3	4403 D4	6303 A3	7N10 E2
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1E04 B3	2435 C4	2A28 F1	2C72 B3	2P49 E1	3368 A3	3708 C2	3C37 C3	3N28 D2	4608 F4	6515 E4	7P05 E1
1E05 D1	2436 C4	2A29 E3	2C74 B2	2P50 E1	3369 A3	3709 C2	3C38 B3	3N29 D2	4609 F4	6516 E4	7P06 D1
1E08 D1	2437 C4	2A30 F3	2C75 B3	2P51 E1	3370 A3	3710 C2	3C39 B3	3N30 D2	4610 F4	6517 D4	7P07 D1
1E09 D1	2438 C4	2A31 F2	2C76 B3	2P54 E2	3371 A3	3711 C2	3C40 B3	3N31 D2	4611 F4	6518 E4	7P08 E1
1E10 D1	2439 C4	2A32 F3	2C77 B3	2P55 D1	3372 A3	3712 C2	3C41 C3	3N32 D2	4612 F4	6519 E4	7P09 F1
1E20 D1	2440 C4	2A33 F3	2C78 B3	2P56 D1	3373 A3	3713 C2	3C42 C3	3N33 D2	4613 F4	6520 E4	7P10 F1
1E22 D2	2441 C4	2A34 F3	2C80 C2	2P58 D1	3374 A3	3714 C2	3C50 C2	3N34 D2	4614 F4	6521 E4	7R01 C2
1N01 D2	2442 C4	2A35 F2	2C82 C3	2R01 C1	3375 A3	3715 C2	3C51 C2	3N35 D3	4A51 A2	6604 A4	7R02 C1
1N02 D3	2443 C4	2A36 F2	2C83 B3	2R02 C1	3376 A3	3716 C2	3C52 C2	3N36 D3	4C01 C2	6606 C4	
1P01 E1	2444 C4	2A40 F3	2C84 C3	2R03 C2	3377 A3	3717 C2	3C53 C2	3N37 E2	4C02 A3	6610 D4	
1P02 D1	2445 D4	2A41 F2	2C85 C3	3101 B4	3378 A2	3718 C2	3C54 B2	3N38 E2	4C10 B3	6611 E4	
1R10 C1	2446 D4	2A45 F4	2C86 C3	3102 B4	3401 D4	3719 C2	3C55 B2	3N39 E3	4N03 E2	6612 D4	
1R11 C1	2447 D4	2A60 B2	2C87 D3	3103 C4	3402 D4	3720 D2	3C57 B2	3N40 E3	4N04 E2	6613 E4	
1R12 C1	2448 D4	2A61 A2	2C88 D3	3104 A3	3403 D4	3721 C2	3C58 B2	3N41 D2	4N11 E2	6614 F4	
1R13 C1	2449 D4	2A62 F2	2C89 B3	3105 B4	3404 D4	3722 C2	3C59 B2	3N42 D2	4N12 D2	6615 F4	
1R14 C1	2501 E4	2A63 F2	2C90 D3	3107 B3	3405 D4	3723 D2	3C60 B2	3P01 E1	4N13 D2	6616 F4	
1R50 C1	2503 D4	2A64 E2	2E01 F4	3108 C4	3406 D4	3724 C2	3C61 C3	3P02 E1	4N14 D2	6621 B4	
2101 B4	2504 D4	2A65 E2	2E02 F4	3109 C4	3407 D4	3A01 F2	3C62 C2	3P03 E2	4N15 E2	6622 C4	
2102 B4	2507 E4	2A66 F3	2E03 E4	3110 B4	3408 D4	3A02 E2	3C63 C2	3P04 E2	4N16 E2	6A51 A2	
2103 A3	2508 E4	2A67 F1	2E04 E4	3111 B4	3409 C4	3A03 F3	3C64 C2	3P05 E2	4N17 E3	6A52 A2	
2104 A4	2511 E4	2A68 F1	2E05 E4	3112 B4	3410 C4	3A04 F3	3C65 C2	3P07 E2	4N18 E3	6C01 C2	
2105 A4	2514 E4	2C01 C2	2E06 D4	3113 C4	3411 C4	3A05 F3	3C66 B3	3P08 F1	4R04 C2	6E01 F4	
2106 B4	2515 E4	2C02 C3	2E07 D4	3301 A3	3412 C4	3A06 F3	3C67 D3	3P09 F1	4R05 C2	6E02 E4	
2109 B4	2517 E4	2C03 C3	2E08 D4	3303 A3	3413 C4	3A07 E3	3C68 D3	3P10 F1	4R06 C2	6E03 E4	
2110 B4	2521 E4	2C04 C2	2E09 D4	3304 A3	3414 C4	3A08 F3	3C69 D3	3P11 E2	5101 B4	6E04 E4	
2111 A4	2523 E4	2C05 C2	2E10 E4	3305 A2	3415 C4	3A09 F2	3C70 D3	3P12 E2	5102 B4	6E05 E4	
2112 B4	2527 E4	2C06 C3	2E11 E4	3306 A3	3416 D4	3A10 F2	3C71 D3	3P13 E1	5111 B4	6E06 E4	
2113 B4	2528 E4	2C07 C3	2E12 B3	3307 A3	3417 C4	3A11 F3	3C72 D3	3P14 E2	5115 B3	6E07 E4	
2114 C4	2529 E4	2C08 C3	2E13 B3	3308 A3	3418 C4	3A12 F2	3C73 D3	3P15 F1	5301 A3	6E08 D4	
2301 A2	2600 A4	2C09 C3	2N01 E2	3309 A3	3419 C4	3A13 F3	3C74 D3	3P16 F1	5302 A3	6N07 E2	
2302 A2	2602 D4	2C10 C3	2N02 D3	3310 A3	3420 C4	3A14 F2	3C75 D3	3P17 E1	5304 B1	6N08 E2	
2303 A3	2603 E4	2C11 C3	2N03 E2	3311 A3	3421 C4	3A15 E2	3E01 F4	3P18 E1	5401 D4	6N09 E2	
2304 B1	2606 D4	2C12 C3	2N04 E2	3312 A3	3422 C4	3A16 E2	3E02 E4	3P19 E1	5402 D4	6N10 E2	
2305 B1	2607 E4	2C13 C3	2N05 E2	3313 A2	3423 C4	3A17 F2	3E03 E4	3P20 E2	5701 C2	6P01 F1	
2306 A3	2608 E4	2C14 C3	2N06 D3	3314 B4	3424 C4	3A18 F2	3E04 E4	3P21 E2	5A03 F2	6P02 F1	
2307 D2	2609 C4	2C15 C3	2N07 D3	3315 A3	3425 C4	3A19 F3	3E05 E4	3P22 E2	5A04 E2	6P03 F1	
2308 D2	2610 F4	2C16 C3	2N10 E3	3316 B1	3426 C4	3A20 E3	3E06 E4	3P23 E1	5A05 F2	6P04 E1	
2309 C2	2612 F4	2C17 C3	2N17 E2	3317 B1	3427 C4	3A21 F3	3E07 E4	3P24 E1	5A06 E2	6P05 E1	
2310 C2	2613 F4	2C18 C3	2N18 E2	3318 B1	3428 C4	3A22 F3	3E08 E4	3P26 E1	5C01 C2	6P06 E1	
2311 A2	2614 F4	2C19 C2	2N19 D2	3319 A3	3429 C4	3A23 F3	3E09 E4	3P27 E1	5C02 C2	6R01 C2	
2312 D2	2615 F4	2C20 C3	2N29 E2	3321 B1	3430 C4	3A26 F3	3E10 E4	3P28 E1	5C03 C3	7109 C4	
2313 A3	2616 F4	2C21 C3	2N30 E2	3322 B4	3431 C4	3A27 F2	3E11 D4	3P29 E2	5C04 C3	7301 A3	
2314 B1	2621 B4	2C22 C3	2N33 E2	3323 B4	3432 D4	3A28 F2	3E12 D4	3P30 E1	5C05 C3	7302 C4	
2315 A3	2622 B4	2C23 C3	2N39 E2	3324 A2	3433 D4	3A29 F3	3E13 D4	3P31 E1	5C06 C3	7303 A3	

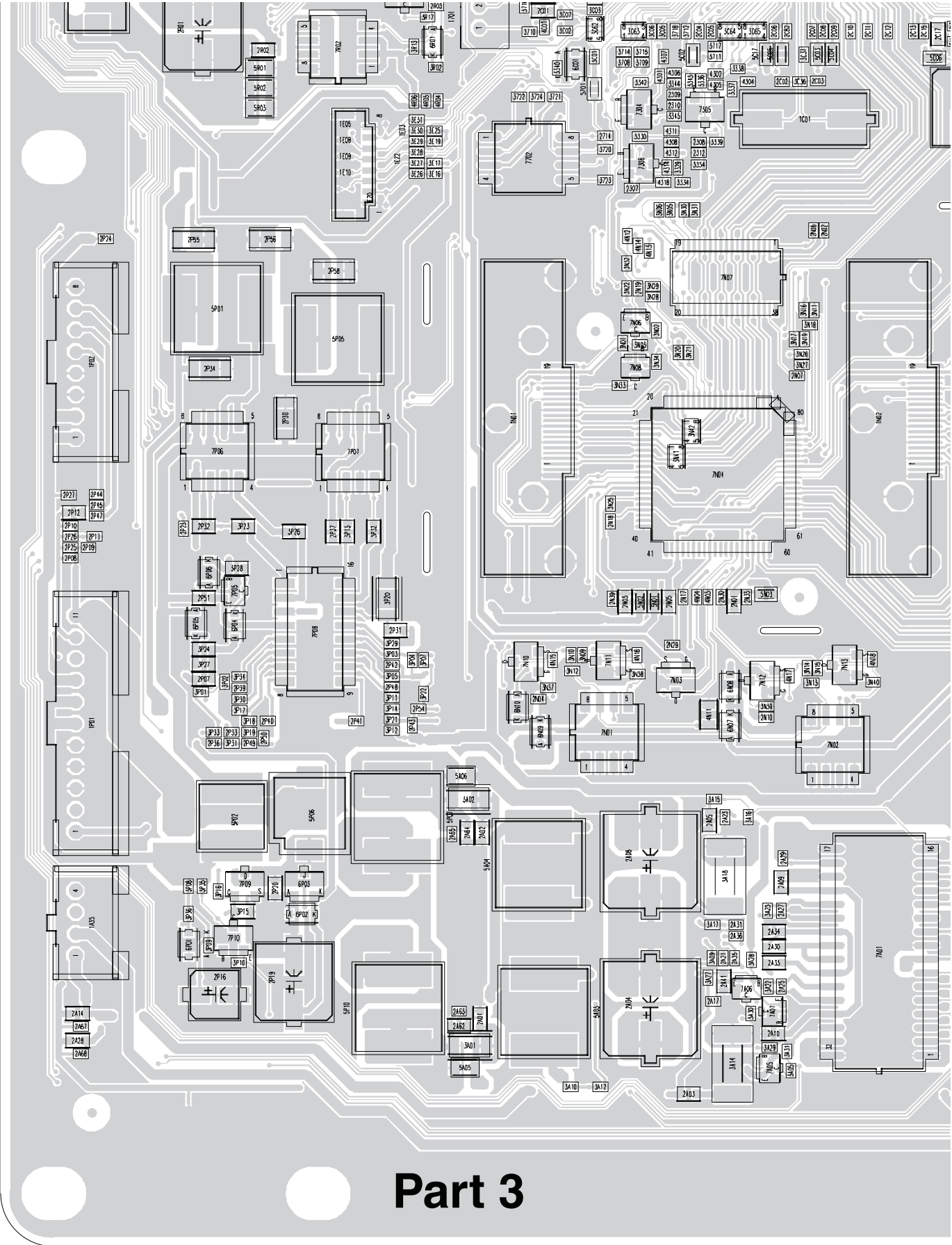




4

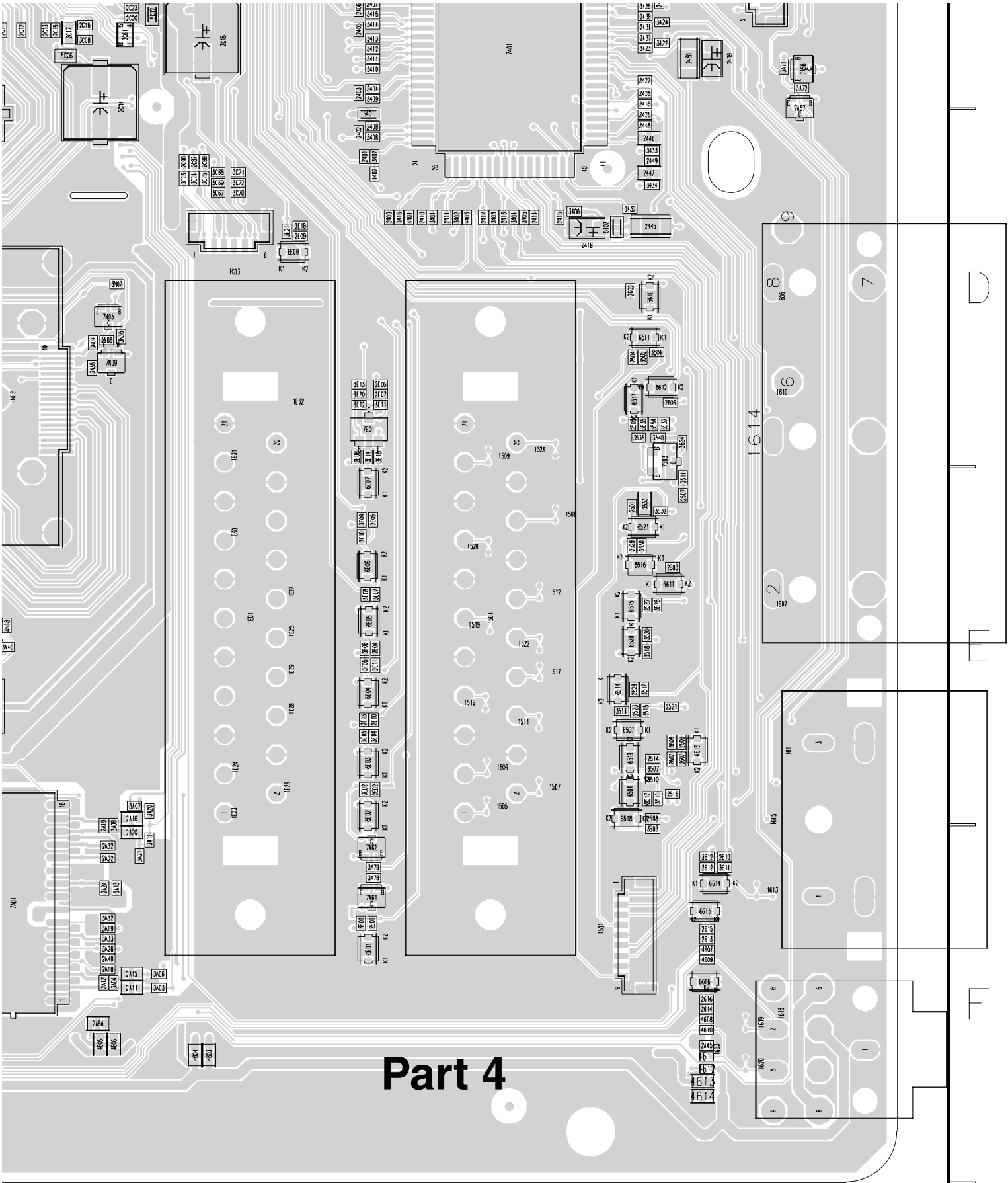


Layout Small Signal Board (Part 3 Top Side)





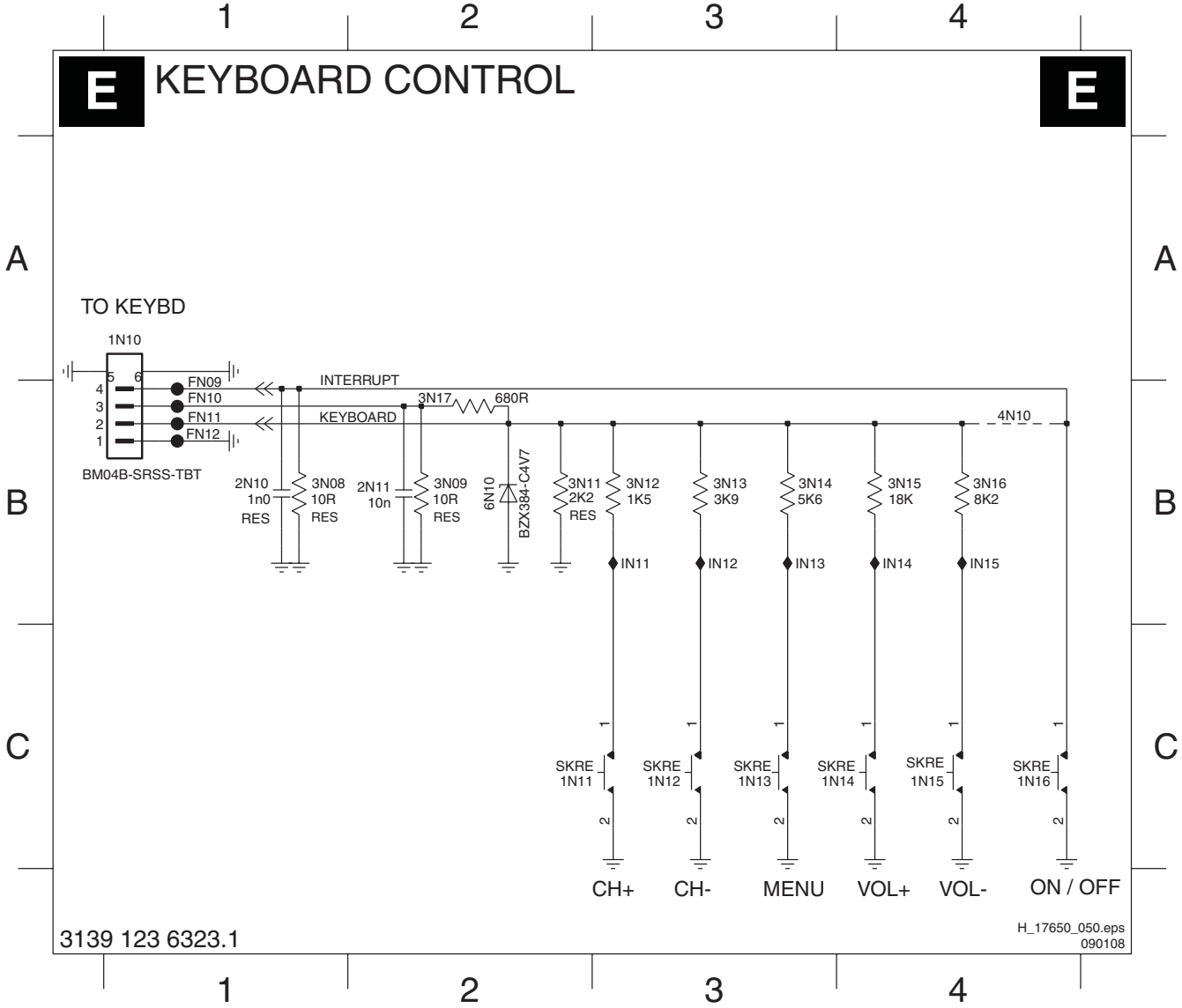
Layout Small Signal Board (Part 4 Top Side)



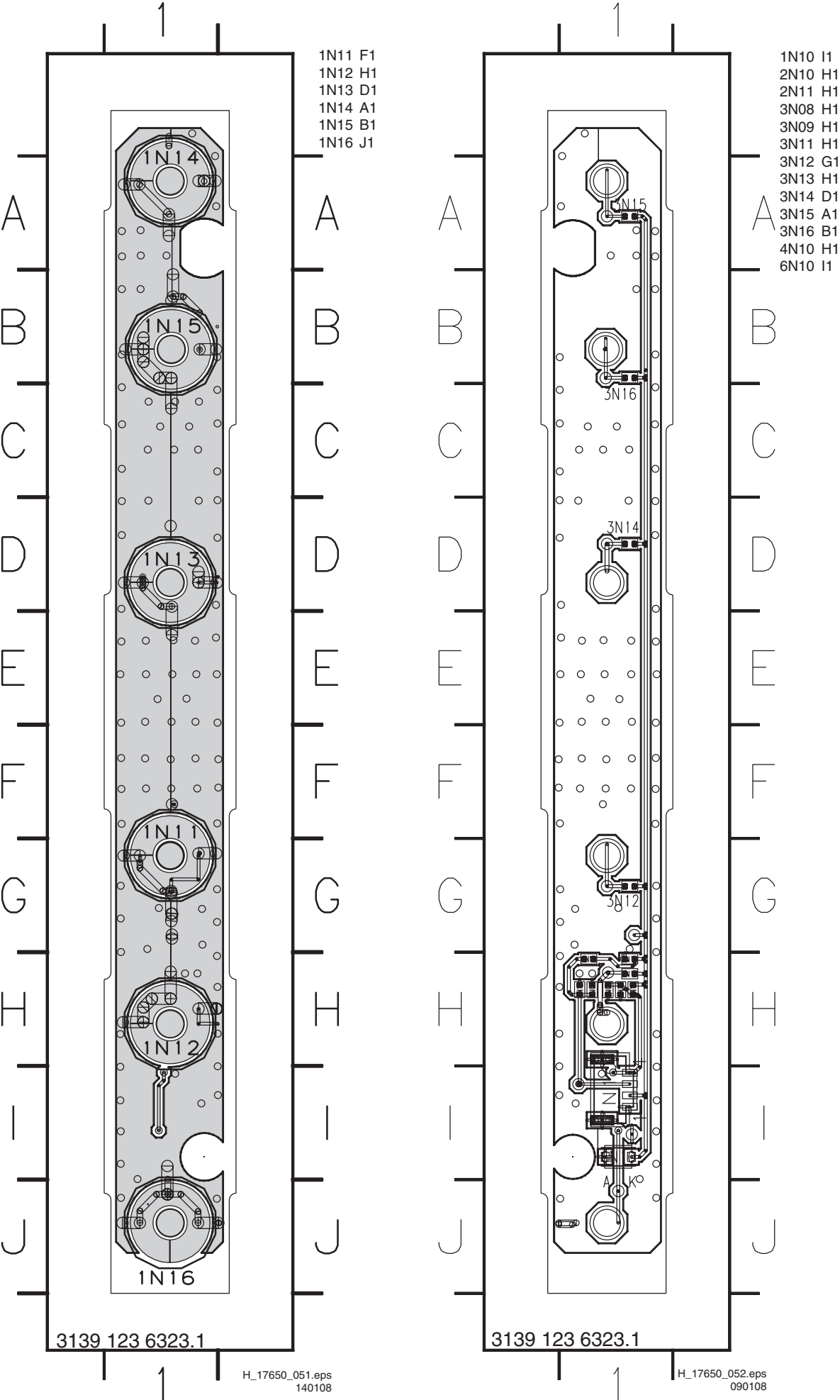
Part 4

Keyboard Control Panel

1N10 A1 1N13 C3 1N16 C4 3N08 B1 3N12 B3 3N15 B4 6N10 B2 FN11 B1 IN12 B3 IN15 B4  
1N11 C2 1N14 C4 2N10 B1 3N09 B2 3N13 B3 3N16 B4 FN09 B1 FN12 B1 IN13 B3  
1N12 C3 1N15 C4 2N11 B2 3N11 B2 3N14 B3 4N10 B4 FN10 B1 IN11 B3 IN14 B4



Layout Keyboard Control Panel (Top Side)



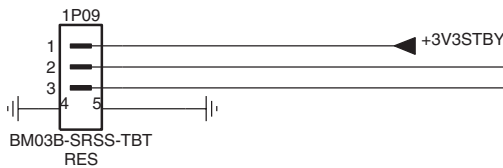
IR & LED Panel

J

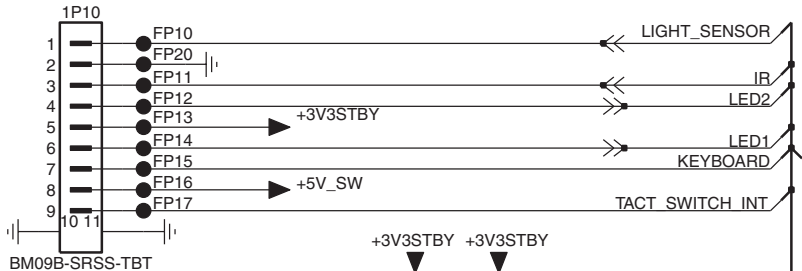
IR & LED PANEL

J

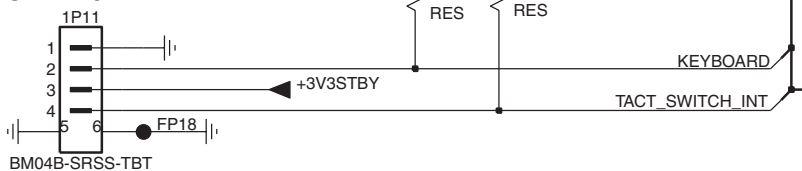
TO ME8 LIGHT GUIDE



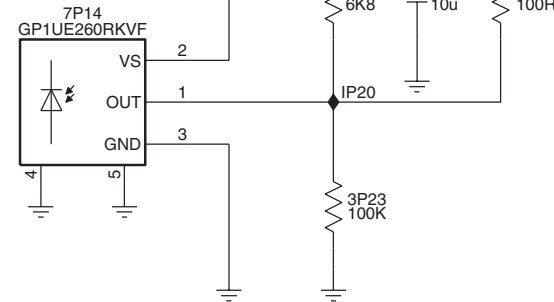
TO ME8 SSB



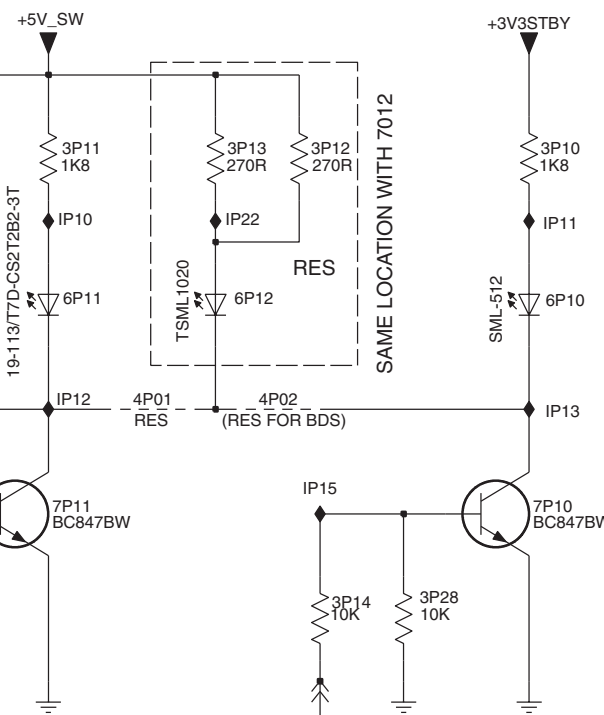
FROM ME8 KEYB



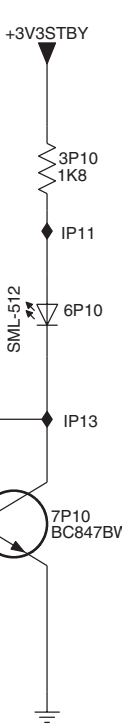
"IR RECEIVER"



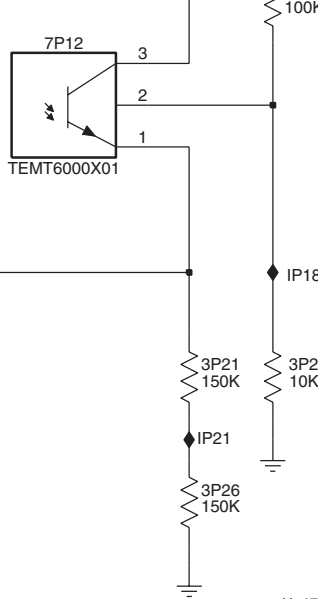
"WHITE"



"RED"



"LIGHT SENSOR"





## 8. Alignments

### Index of this chapter:

- 8.1 General Alignment Conditions
- 8.2 Hardware Alignments
- 8.3 Software Alignments
- 8.4 Option Settings

**Note:** Figures below can deviate slightly from the actual situation, due to the different set executions.

**General:** The Service Alignment Mode (SAM) is described in chapter 5. Menu navigation is done with the CURSOR UP, DOWN, LEFT or RIGHT keys of the remote control transmitter.

### 8.1 General Alignment Conditions

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 15 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:  $R_i > 10 \text{ Mohm}$ ,  $C_i < 20 \text{ pF}$ .
- Use an isolated trimmer/screwdriver to perform alignments.

### 8.2 Hardware Alignments

There are no hardware alignments foreseen for this chassis, but below find an overview of the most important DC voltages on the SSB. These can be used for checking proper functioning of the DC/DC converters.

**Table 8-1 DC voltages**

Description	Test Point	Specifications (V)			Diagram
		Min.	Typ.	Max.	
+VTUN	FP14	30	33	36	B01_DC-DC
+12V_AUDIO	FP06	11.40	12.00	12.60	B01_DC-DC
-12V_AUDIO	FP09	-11.40	-12.00	-12.60	B01_DC-DC
+12V_DISP	FP04	11.40	12.00	12.60	B01_DC-DC
+3V3_STBY	FP01	3.20	3.30	3.40	B01_DC-DC
+5V_SW	FP05	4.90	5.16	5.42	B01_DC-DC
+2V5_SW	FP18	2.40	2.50	2.60	B01_DC-DC
+1V8_SW	FP03	1.70	1.80	1.90	B01_DC-DC
+3V3_SW_TDA	FP19	3.10	3.30	3.50	B01_DC-DC
+1V8_SW_ADC	FP20	1.70	1.80	1.90	B01_DC-DC
+3V3_SW	FP22	3.10	3.30	3.50	B01_DC-DC
+8V_SW	FP21	7.60	8.00	8.40	B01_DC-DC
+5V_IF	F133	4.75	5.00	5.25	B02_Tuner IF & SAWF
+5V_TUN	F111	4.75	5.00	5.25	B02_Tuner IF & SAWF
+5V_SW_SMIC	F402	4.75	5.00	5.25	B05A_SMIC L
VDDA	FA01	11.40	12.00	12.60	B05B_Audio - CLASS D
VDD	FA03	11.40	12.00	12.60	B05B_Audio - CLASS D
VSSA	FA02	-11.40	-12.00	-12.60	B05B_Audio - CLASS D
VSS	FA14	-11.40	-12.00	-12.60	B05B_Audio - CLASS D
+5VHDMI_A	FN08	4.75	5.00	5.25	B06B_HDMI
+5VHDMI_B	FN13	4.75	5.00	5.25	B06B_HDMI
+1V8_ANA-MUX	FN03	1.70	1.80	1.90	B06B_HDMI
+1V8_DIG-MUX	FN02	1.70	1.80	1.90	B06B_HDMI
+3V3_ANA-MUX	FN74	3.10	3.30	3.50	B06B_HDMI

### 8.3 Software Alignments

With the software alignments of the Service Alignment Mode (SAM) the Tuner and RGB settings can be aligned.

To store the data: Use the RC button "Menu" to switch to the main menu and next, switch to "Stand-by" mode.

#### 8.3.1 Tuner Adjustment (RF AGC Take Over Point)

**Purpose:** To keep the tuner output signal constant as the input signal amplitude varies.

The LC8.1E LB chassis comes with the UV1316E analogue tuner. No alignment is necessary, as the AGC alignment is done automatically (standard value: "15"). However in case of problems use the following method (use multimeter and RF generator):

- Apply a 70 dB (1mv) RF signal with a Philips standard circuit pattern to antenna input.
- Adjust AGC (via SAM menu: TUNER -> AGC), until voltage on pin 1 is 3.3 +0.5/-1.0 V.
- Store settings and exit SAM.

#### 8.3.2 RGB Alignment

In RGB Alignment menu there are three items White Tone, ADC Gain & Align ADC to perform the colour temperature alignment for the RF and the input source calibration.

Before alignment, choose "TV MENU" -> "Picture" and set:

- "Brightness" to "50".
- "Colour" to "50".
- "Contrast" to "100".

#### White Tone Alignment:

- Activate SAM.
- Select "RGB Align." -> "White Tone" and choose a colour temperature.
- Use a 100% white screen as input signal and set the following values:
  - All "White point" values initial to "255".

In case you have a colour analyser:

- Measure with a calibrated (phosphor- independent) colour analyser (e.g. Minolta CA-210) in the centre of the screen. Consequently, the measurement needs to be done in a dark environment.
- Adjust the correct x,y coordinates (while holding one of the White point registers R, G or B on "256") by means of decreasing the value of one or two other white points to the correct x,y coordinates (see table "White D alignment values"). Tolerance: dx:  $\pm 0.004$ , dy:  $\pm 0.004$ .
- Repeat this step for the other colour Temperatures that need to be aligned.
- When finished return to the SAM root menu and press STANDBY on the RC to store the aligned values to the NVM.

**Table 8-2 White D alignment values**

Value	Cool (11000 K)	Normal (9000 K)	Warm (6500 K)
x	0.278	0.289	0.314
y	0.278	0.291	0.319

If you do **not** have a colour analyser, you can use the default values. This is the next best solution. The default values are average values coming from production (statistics).

- Set the RED, GREEN and BLUE default values per temperature according to the values in the "Tint settings" table.
- When finished return to the SAM root menu and press STANDBY on the RC to store the aligned values to the NVM.

Table 8-3 Tint settings 32"

Colour Temp.	R	G	B
Cool	120	126	128
Normal	128	128	128
Warm	128	120	126

Table 8-4 Tint settings 42"

Colour Temp.	R	G	B
Cool	127	120	124
Normal	127	115	114
Warm	127	110	96

ADC Alignment (external source)

When the grey scale displayed is not uniformity, use the following alignment method. This is to calibrate the input source to perform better output display.  
Two Input Source need to be calibrated:  
1. RGB (via Scart 1)  
2. YPbPr (Component Input)

- Instructions:**
- Apply a standard 100% colour bar to input source (1) & (2).
  - Activate SAM.
  - Cursor down to item "RGB Align" and select "Align ADC".
  - Select "Yes" with the Left Key to start calibration.
  - Power Off the set and calibrated values will be stored.
- Note:** The "In Progress" message indicates calibration in progress.  
The "Done" message will be displayed when completed successfully.

8.4 Option Settings

8.4.1 Introduction

The microprocessor communicates with a large number of I<sup>2</sup>C ICs in the set. To ensure good communication and to make

Table 8-5 Option code overview

Sets 12NC	Sets Type	Panel Type	Panel Code (Dec)	Option Byte (Dec)						
				1	2	3	4	5	6	7
8670 000 42116	32PFL3403/12	LPL- LC320WXN-SAB1	136	3	2	0	255	8	0	1
8670 000 42115	42PFL3403/12	LPL- LC420WXE-SAA1	138	3	2	0	255	8	0	0

Option Bit Overview

Below find an overview of the Option Codes on bit level.

digital diagnosis possible, the microprocessor has to know which ICs to address. The presence/absence of these specific ICs (or functions) is made known by the option codes.

- Notes:**
- After changing the option(s), save them with the STORE command.
  - The new option setting becomes active after the TV is switched "off" and "on" again with the mains switch (the EAROM is then read again).

8.4.2 How To Set Option Codes

When the NVM is replaced, all options will require resetting. To be certain that the factory settings are reproduced exactly, you must set all option numbers. You can find the correct option numbers in table "Option Codes OP1...OP7" below.

How to Change Options Codes

An option code (or "option byte") represents eight different options (bits). When you change these numbers directly, you can set all options very quickly. All options are controlled via seven option bytes (OP1... OP7).  
Activate SAM and select "Options". Now you can select the option byte (OP1 to OP7) with the CURSOR UP/ DOWN keys, and enter the new 3 digit (decimal) value. For the correct factory default settings, see the next table "Option codes OP1...OP7". For more detailed information, see the second table "Option codes at bit level". If an option is set (value "1"), it represents a certain decimal value.  
When all the correct options (bits) are set, the sum of the decimal values of each Option Byte (OP) will give the option code.

Table 8-6 Option codes at bit level (OP1-OP7)

Option Byte & Bit	Dec. Value	Option Name	Description
<b>Byte OP1</b>			
Bit 7 (MSB)	128	OPC_BBE	ON = BBE is available OFF = BBE is not available
Bit 6	64	RESERVED	RESERVED
Bit 5	32	RESERVED	RESERVED
Bit 4	16	FSRV_OPC_OPTION_CHECK_14	ON = NVM Integrity check enable OFF = NVM Integrity check disable
Bit 3	8	OPC_UK_PNP	ON = UK PNP is available OFF = UK PNP is not available
Bit 2	4	OPC_VIRGIN_MODE	ON = Virgin Mode (PNP) is available OFF = Virgin Mode (PNP) is not available
Bit 1	2	OPC_ACI	ON = ACI is available OFF = ACI is not available
Bit 0 (LSB)	1	OPC_ATS	ON = ATS is available OFF = ATS is not available
<b>Byte OP2</b>			
Bit 7 (MSB)	128	RESERVED	RESERVED
Bit 6	64	RESERVED	RESERVED
Bit 5	32	RESERVED	RESERVED
Bit 4	16	RESERVED	RESERVED
Bit 3	8	RESERVED	RESERVED
Bit 2	4	RESERVED	RESERVED
Bit 1	2	OPC_WSSB	ON = WSS is available OFF = WSS is not available
Bit 0 (LSB)	1	RESERVED	RESERVED
<b>Byte OP3</b>			
Bit 7 (MSB)	128	RESERVED	RESERVED
Bit 6	64	RESERVED	RESERVED
Bit 5	32	RESERVED	RESERVED
Bit 4	16	RESERVED	RESERVED
Bit 3	8	RESERVED	RESERVED
Bit 2	4	RESERVED	RESERVED
Bit 1	2	RESERVED	RESERVED
Bit 0 (LSB)	1	RESERVED	RESERVED
<b>Byte OP4</b>			
Bit 7 (MSB)	128	OPC_HDMI2	Must be set to 1, no optional control
Bit 6	64	OPC_HDMI1	Must be set to 1, no optional control
Bit 5	32	OPC_VGA	Must be set to 1, no optional control
Bit 4	16	OPC_SVHS3	Must be set to 1, no optional control
Bit 3	8	OPC_AV3	Must be set to 1, no optional control
Bit 2	4	OPC_CVI	Must be set to 1, no optional control
Bit 1	2	OPC_SVHS2	Must be set to 1, no optional control
Bit 0 (LSB)	1	OPC_AV2	Must be set to 1, no optional control
<b>Byte OP5</b>			
Bit 7 (MSB)	128	RESERVED	RESERVED
Bit 6	64	RESERVED	RESERVED
Bit 5	32	RESERVED	RESERVED
Bit 4	16	RESERVED	RESERVED
Bit 3	8	OPC_SYS_RECOVERY	ON = System Recovery is available OFF = System Recovery is not available
Bit 2	4	RESERVED	RESERVED
Bit 1	2	RESERVED	RESERVED
Bit 0 (LSB)	1	RESERVED	RESERVED
<b>Byte OP6</b>			
Bit 7 (MSB)	128	RESERVED	RESERVED
Bit 6	64	RESERVED	RESERVED
Bit 5	32	RESERVED	RESERVED
Bit 4	16	RESERVED	RESERVED
Bit 3	8	RESERVED	RESERVED
Bit 2	4	RESERVED	RESERVED
Bit 1	2	RESERVED	RESERVED
Bit 0 (LSB)	1	RESERVED	RESERVED
<b>Byte OP7</b>			
Bit 7 (MSB)	128	RESERVED	RESERVED
Bit 6	64	FSRV_PCE_OPTION_OP76	ON= Smart Clock enable OFF= Smart Clock disable
Bit 5	32	RESERVED	RESERVED
Bit 4	16	RESERVED	RESERVED
Bit 3	8	RESERVED	RESERVED
Bit 2	4	RESERVED	RESERVED
Bit 1	2	Cabinet Profile_1	0 = LC08EE_37_42inch_MG8 1 = LC08EE_32inch_MG8 2 = Reserved
Bit 0 (LSB)	1	Cabinet Profile_0	



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

### Index of this chapter:

- 9.1 Introduction
- 9.2 LCD Power Supply
- 9.3 DC/DC converters
- 9.4 Front-End
- 9.5 Video/Audio Processing
- 9.6 HDMI
- 9.7 Abbreviation List
- 9.8 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.
- For a good understanding of the following circuit descriptions, please use the Wiring, Block (chapter 6) and Circuit Diagrams (chapter 7). Where necessary, you will find a separate drawing for clarification.

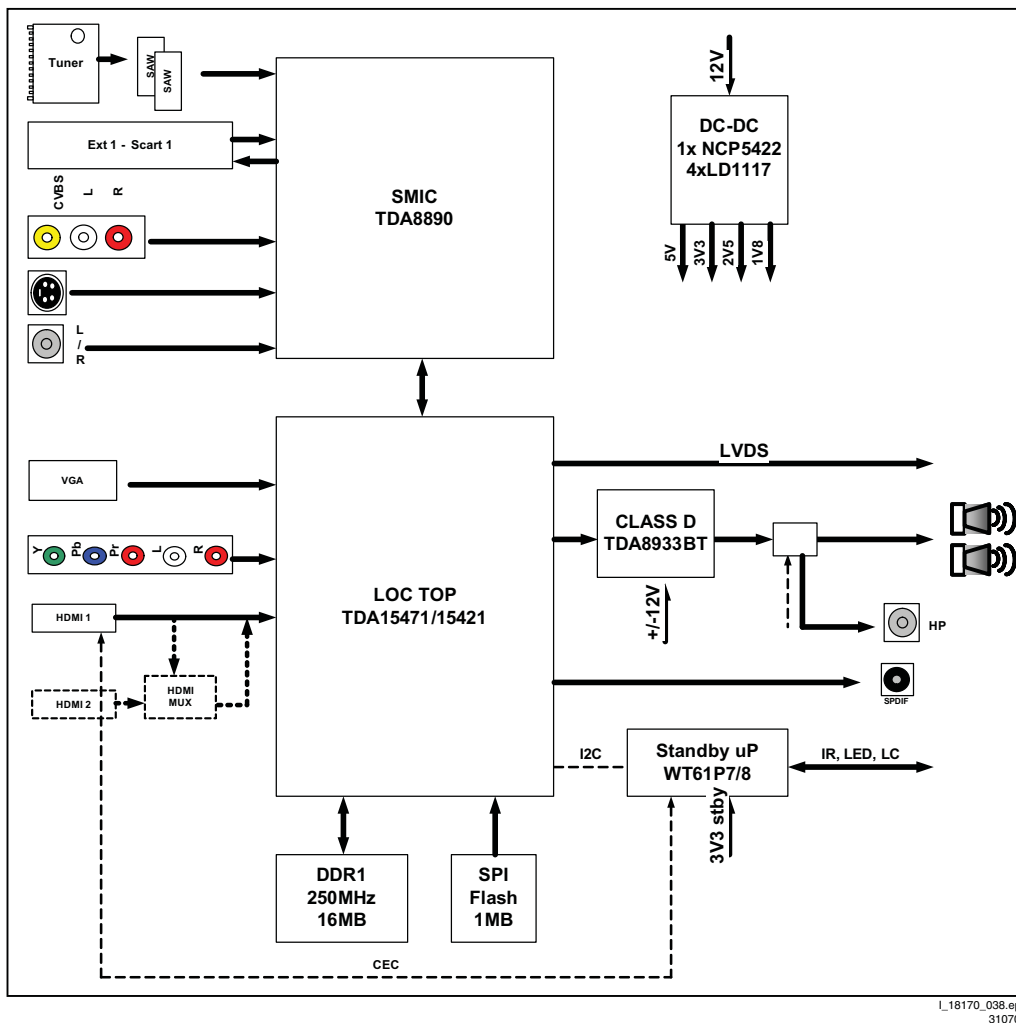
### 9.1 Introduction

The LC8.1E LB chassis (development name "LC08EE") is a new chassis using an NXP "LOC-TOP" chipset. It covers screen sizes of 32" and 42" with the "MG8" styling.

Main key components are:

- NXP TDA1547 "LOC-TOP" LCD TV controller
- NXP TDA8890 "LOC-TOP" Versatile Video processor
- Weltrend WT61P8S microprocessor
- NXP TDA8932 Class-D Audio processor
- UV1316E tuner.

Refer to figure "LC08EE Architecture" for details.



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Figure 9-1 LC08EE Architecture

### 9.1.1 SSB Cell Layout

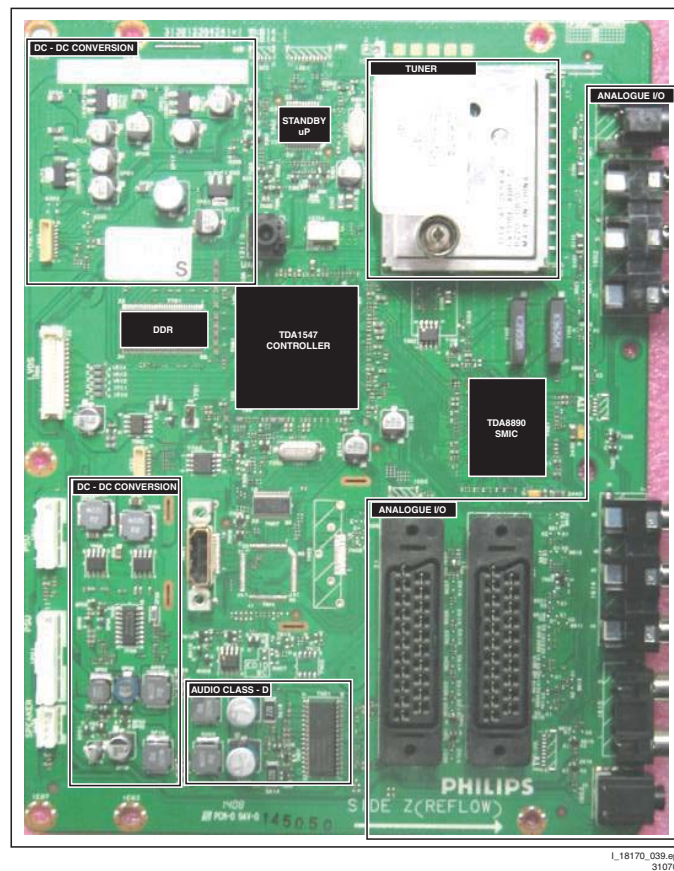


Figure 9-2 SSB top view

## 9.2 LCD Power Supply

The Power Supply Unit (PSU) in this chassis is a Bobitrans Power Solutions buy-in unit and is a black-box for Service. When defective, a new panel must be ordered and the defective panel must be returned for repair, unless the main fuse of the unit is broken. Always replace the fuse with one with the correct specifications! This part is commonly available in the regular market.

Different PSUs are used in this chassis:

- 32" sets use a "Bobitrans" PLCD170PS09 B unit.
- 42" sets use an "Bobitrans" LIPS250PS02 unit.

### 9.2.1 32" sets

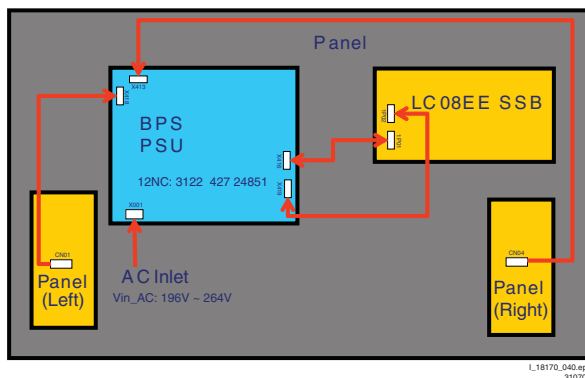


Figure 9-3 32" PSU connectivity

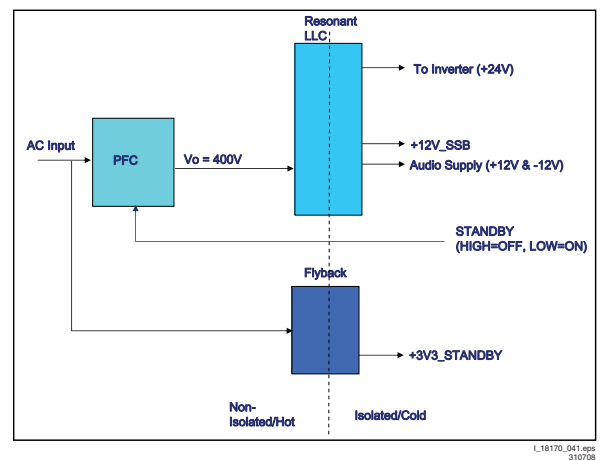
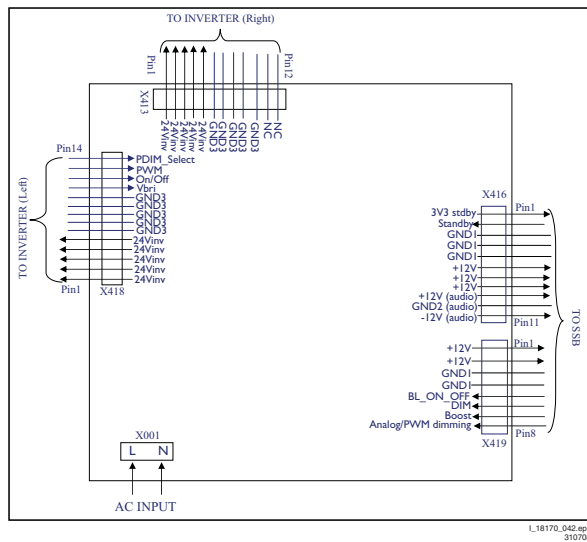
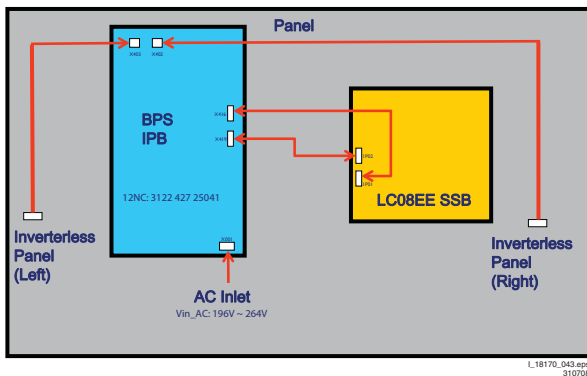


Figure 9-4 32" PSU block diagram

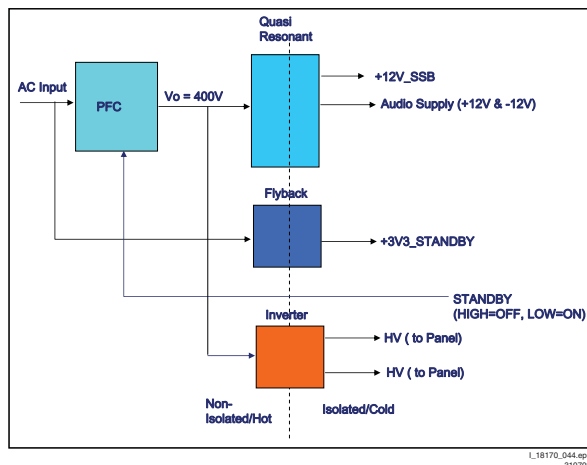


**Figure 9-5 32" PSU interface diagram**

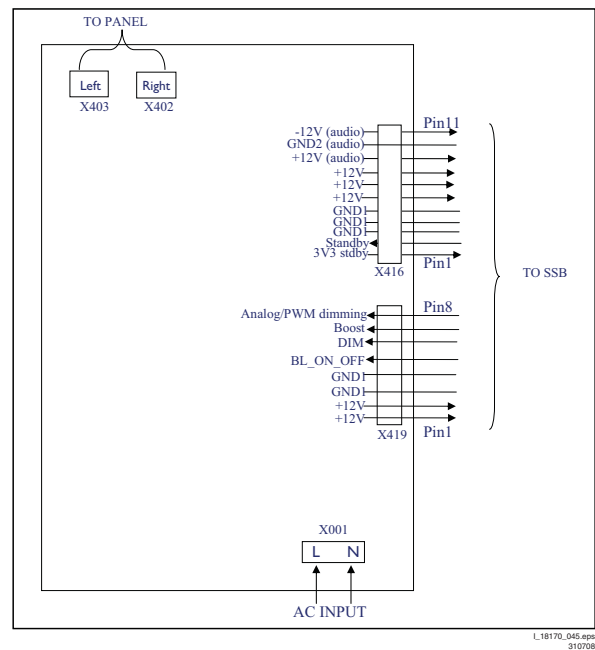
### 9.2.2 42" sets



**Figure 9-6 42" PSU connectivity**



**Figure 9-7 42" PSU block diagram**



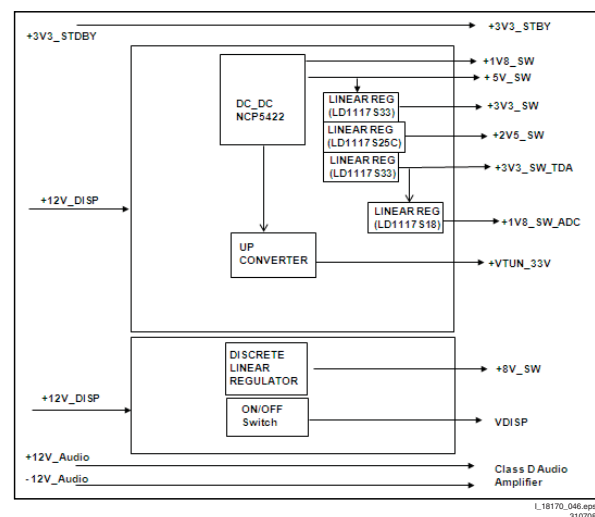
**Figure 9-8 42" PSU interface diagram**

### 9.3 DC/DC converters

On-board DC-DC converters convert the +12 V coming from the PSU and deliver the following voltages:

- +3.3 V (+3V3\_STBY)
- +1.8 V (+1V8\_SW)
- +5 V (+5V\_SW)
- +3.3 V (+3V3\_SW)
- +2.5 V (+2V5\_SW)
- +3.3 V (+3V3\_SW\_TDA)
- +1.8 V (+1V8\_SW\_ADC)
- +33 V (+VTUN\_33V)
- +8 V (+8V\_SW)

The following diagram shows the power supply architecture of the SSB:



### Figure 9-9 Power Supply Architecture

## 9.4 Front-End

This chassis uses the UV1316E analogue tuner.

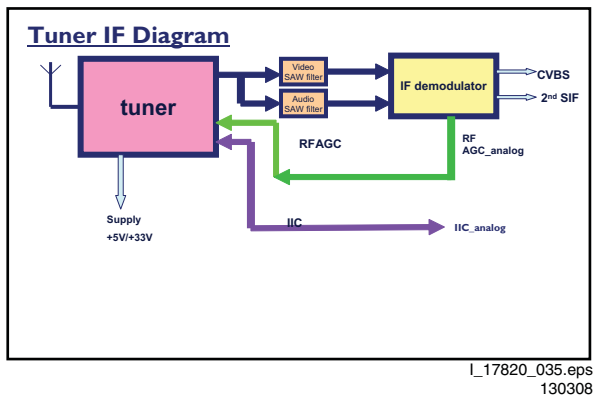


Figure 9-10 Tuner IF diagram

While receiving analogue signals, the signal coming from the tuner is fed to the IF demodulator (through the SAW filters) and then passed to the NXP TDA8890H1 LOC-TOP Front-End Signal Processor.

#### 9.4.1 Video IF Amplifier

The IF-filter is integrated in a SAW (Surface Acoustic Wave) filter. One for filtering IF-video (item 1102) and one for IF-audio (item 1103). The video IF filter can be switched to another standard, what makes it suitable for applications in multi-standard platforms (implemented in non-EU applications). If implemented, switching is done by the microcontroller via SAW\_SW. In table "SAW filter switching" is explained how to address the different system standards.

Table 9-1 SAW filter switching

Region	SAW_SW	System
AP	1	B/G, D/K, I
	0	M/N

The pin assignment of all analogue tuners is equal and can be found in table "Pin assignment analogue tuners".

Table 9-2 Pin assignment analogue tuners

Pin number	Description	DC voltage (V)
1	RF AGC voltage	3.3 - 4.5 (weak or no signal) < 3.3 (strong signal)
2	n.c.	
3	I <sup>2</sup> C-bus address select	0
4	SCL	0 to 3.3
5	SDA	0 to 3.3
6	n.c.	
7	supply voltage	5 ±0.25
8	n.c.	
9	fixed tuning voltage	33
10	n.c.	
11	TV IF output	

## 9.5 Video/Audio Processing

The video and audio processing is handled by the NXP "LOC-TOP" TDA8890H1 front-end signal processor in cooperation with the NXP "LOC-TOP" TDA15471HV video/audio processor. For the applications, see figures "Block diagram video processing" and "Block diagram audio processing".

The TDA8890H1 features:

- Multi-standard vision IF circuit with alignment-free PLL demodulator
- Internal (switchable) time-constant for the IF-AGC circuit

- Switchable group delay correction and sound trap (with switchable centre frequency) for the demodulated CVBS signal
- Separate SIF (Sound IF) input for single reference QSS (Quasi Split Sound) demodulation
- AM demodulator without extra reference circuit
- SSIF output is available for interfacing with a stereo sound decoder
- Audio switch circuit with 7 base band stereo sound inputs
- Audio switch circuit 3 stereo outputs
- Video switch with 4 external CVBS inputs
- Video switch with 3 CVBS outputs
- YPRPB outputs (YOUTPIP/PBOUTPIP/PROUTPIP), for back-end PIP processing
- Linear RGB/YBPBR input with fast insertion
- Video identification circuit
- One reference (24.576 MHz) clock required
- Indication of the Signal-to-Noise ratio of the incoming CVBS signal
- Horizontal synchronization with alignment-free horizontal oscillator
- Vertical count-down circuit to generate vertical timing signals.

The TDA15471HV features:

- Graphics and Video Input Ports
- HDMI receiver
- 3D Video Decoder
- Field-proven Multi-standard TV sound decoder
- Audio processor
- Analog sound interface
- Digital audio input and output interface
- High Quality Video Processing
- Pip and PoP
- High Quality Video Scaling Engine
- Embedded OSD and VBI Controller
- Embedded DDR/SDRAM controller
- Programmable Digital Output for LCD
- Powerful 32-bit RISC CPU.

#### 9.5.1 Video/Audio Application

"Block diagram video processing" and "Block diagram audio processing" shows the video/audio signal flow.

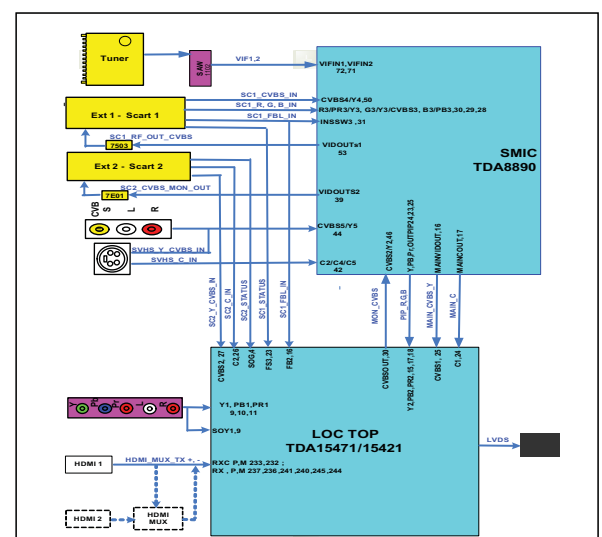


Figure 9-11 Block diagram video processing

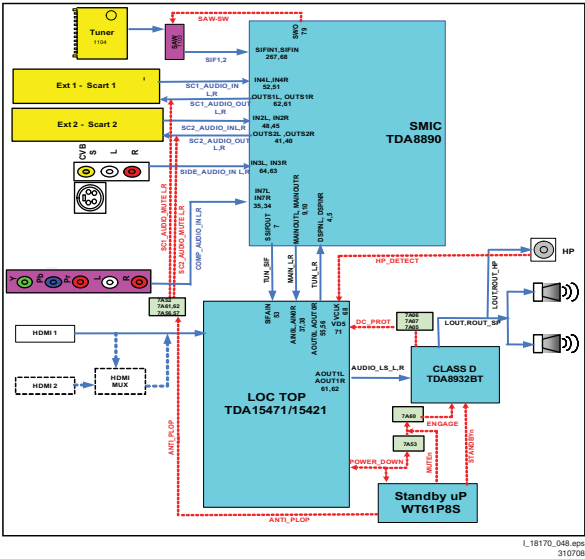


Figure 9-12 Block diagram audio processing

9.5.2 Audio Amplifier

The audio amplifier is an integrated class-D amplifier (TDA8932T, item 7A01). It combines a good performance with a high efficiency, resulting in a big reduction in heat generation.

Principle

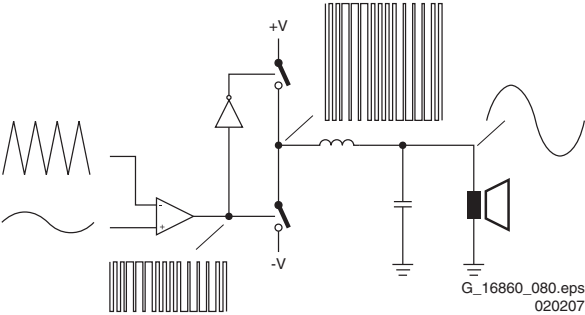


Figure 9-13 Principle Class-D Amplifier

The Class D amplifier works by varying the duty cycle of a Pulse Width Modulated (PWM) signal. By comparing the input voltage to a triangle wave, the amplifier increases duty cycle to increase output voltage, and decreases duty cycle to decrease output voltage. The output transistors of a Class D amplifier switch from 'full off' to 'full on' (saturated) and then back again, spending very little time in the linear region in between. Therefore, very little power is lost to heat. If the transistors have a low 'on' resistance (RDS(ON)), little voltage is dropped across them, further reducing losses. A Low Pass Filter at the output passes only the average of the output wave, which is an amplified version of the input signal. In order to keep the distortion low, negative feedback is applied.

The **advantage** of Class D is increased efficiency (= less heat dissipation). Class D amplifiers can drive the same output power as a Class AB amplifier using less supply current. The **disadvantage** is the large output filter. The main reason for this filter is that the switching waveform results in maximum current flow. This causes more loss in the load, which causes lower efficiency. An LC filter with a cut-off frequency less than the Class D switching frequency, allows the switching current to flow through the filter instead of the load, thus reducing the overall loss and increasing the efficiency.

DC-protection

A DC-detection circuit is foreseen to protect the speakers. It is built around three transistors (items 7A05 to 7A07) and generates a protection signal (DC\_PROT) to the microprocessor in case of a DC failure in the Class D amplifiers.

9.6 HDMI

9.6.1 Introduction

**Note:** Text below is an excerpt from the "HDMI Specification" that is issued by the HDMI founders (see <http://www.hdmi.org>).

The High-Definition Multimedia Interface is developed for transmitting digital signals from audiovisual sources to television sets, projectors and other video displays. HDMI can carry high quality multi-channel audio data and can carry all standard and high-definition consumer electronics video formats. Content protection technology is available. HDMI can also carry control and status information in both directions.

- HDMI is backward compatible with DVI (1.0). Compared with DVI, HDMI offers extra:
- YUV 4:4:4 (3 × 8-bit) or 4:2:2 (up to 2 × 12-bit), where DVI offers only RGB 4:4:4 (3 × 8 bit).
  - Digital audio in CD quality (16-bit, 32/44.1/48 kHz), higher quality available (8 channels, 192 kHz).
  - Remote control via CEC bus (Consumer Electronics Control): allows user to control all HDMI devices with the TV's remote control and menus.
  - Smaller connector (SCART successor).
  - Less cables: e.g. from 10 audio/9 video cables to 3 HDMI cables.

9.6.2 Implementation

- The HDMI implementation is built around the IP4776CZ38 HDMI Interface for host-interface protection, which features:
- Integrated high-level ESD protection, level shifting and backdrive protection
  - All TMDS lines with integrated rail-to-rail clamping diodes with downstream ESD protection of ±8 kV according to IEC 61000-4-2, level 4 standard
  - Bidirectional level shifting N-channel FETs provided for DDC clock and data channels
  - TMDS lines with ≤0.05 pF matching of capacitance between the TMDS pairs
  - Ultra low line capacitance of 0.7 pF per channel
  - HDMI 1.3 compliant
  - Backdrive protection.

Refer to figure "HDMI implementation" for details.

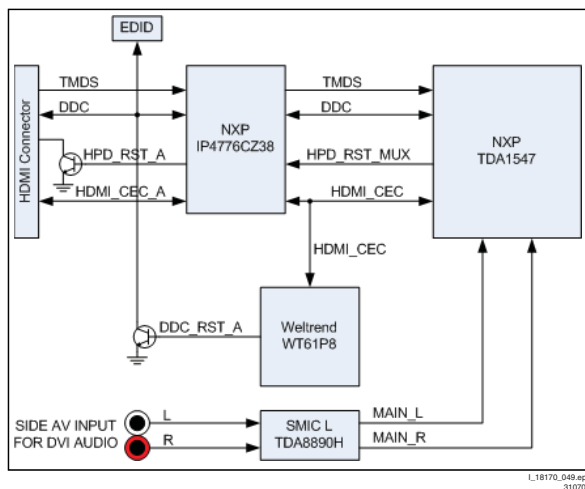


Figure 9-14 HDMI implementation

The description of the lines is as follows:

- TMDS (Time Minimized Differential Signal): the actual HDMI signal
- DDC (Digital Data Channel): the bus used by the source to read EDID data in the EEPROM and HDCP authentication
- HPD\_RST\_A (Hotplug Detect Reset signal): used to pull-down the HPD signal level at the connector when switching in/out of HDMI mode; the duration of the pulse is around 500-550 ms
- DDC\_RST\_A has the same behaviour as the HPD\_RST\_A signal. It is used to pull-down the I<sup>2</sup>C clock line to prevent some problems with certain video graphic cards
- HDMI\_CEC\_A is the Consumer Electronic Control remote control signal bus.

It should be noted that in this chassis the HDCP-key is embedded in the main processor (no need for a separate Service-SSB).

## 9.7 Abbreviation List

1080i	1080 visible lines, interlaced
1080p	1080 visible lines, progressive scan
2CS	2 Carrier Sound
2DNR	Spatial (2D) Noise Reduction
3DNR	Temporal (3D) Noise Reduction
480i	480 visible lines, interlaced
480p	480 visible lines, progressive scan
AARA	Automatic Aspect Ratio Adaptation: algorithm that adapts aspect ratio to remove horizontal black bars; keeping up 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
AUO	Acer Unipack Optonics
AP	Asia Pacific
AR	Aspect Ratio: 4 by 3 or 16 by 9
ASD	Automatic Standard Detection
AV	Audio Video
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz

BTSC	Broadcast Television System Committee
CAM	Conditional Access Module
CBA	Circuit Board Assembly (or PWB)
CEC	Consumer Electronics Control bus; remote control bus on HDMI connections
CI	Common Interface; E.g PCMCIA slot for a CAM in a set top box
CL	Constant Level: audio output to connect with an external amplifier
CLUT	Colour Look Up Table
ComPair	Computer aided rePair
COFDM	Coded Orthogonal Frequency Division Multiplexing; A multiplexing technique that distributes the data to be transmitted over many carriers
CSM	Customer Service Mode
CVBS	Composite Video Blanking and Synchronisation
CVBS-MON	CVBS monitor signal
CVBS-TER-OUT	CVBS terrestrial out
CVI	Component Video Input
DAC	Digital to analogue Converter
DBE	Dynamic Bass Enhancement: extra low frequency amplification
DDC	Display Data Channel; is a part of the "Plug and Play" feature
DFU	Directions For Use: owner's manual
DNR	Dynamic Noise Reduction
DRAM	Dynamic RAM
DSP	Digital Signal Processing
DST	Dealer Service Tool: special (European) remote control designed for service technicians
DTS	Digital Theatre Sound
DVB(T)	Digital Video Broadcast; An MPEG2 based standard for transmitting digital audio and video. T= Terrestrial
DVD	Digital Versatile Disc
DVI	Digital Visual Interface
DW	Double Window
ED	Enhanced Definition: 480p, 576p
EDID	Extended Display Identification Data (VESA standard)
EEPROM	Electrically Erasable and Programmable Read Only Memory
EMC	Electro Magnetic Compatibility
EU	EUrope
EXT	EXTernal (source), entering the set by SCART or by cinches (jacks)
FBL	Fast Blanking: DC signal accompanying RGB signals
FBL-TXT	Fast Blanking Teletext
FET	Field Effect Transistor
FLASH	FLASH memory
FM	Field Memory / Frequency Modulation
FMR	FM Radio
FRC	Frame Rate Converter
FTV	Fiat TeleVision
H	H_sync to the module
HD	High Definition: 720p, 1080i, 1080p
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



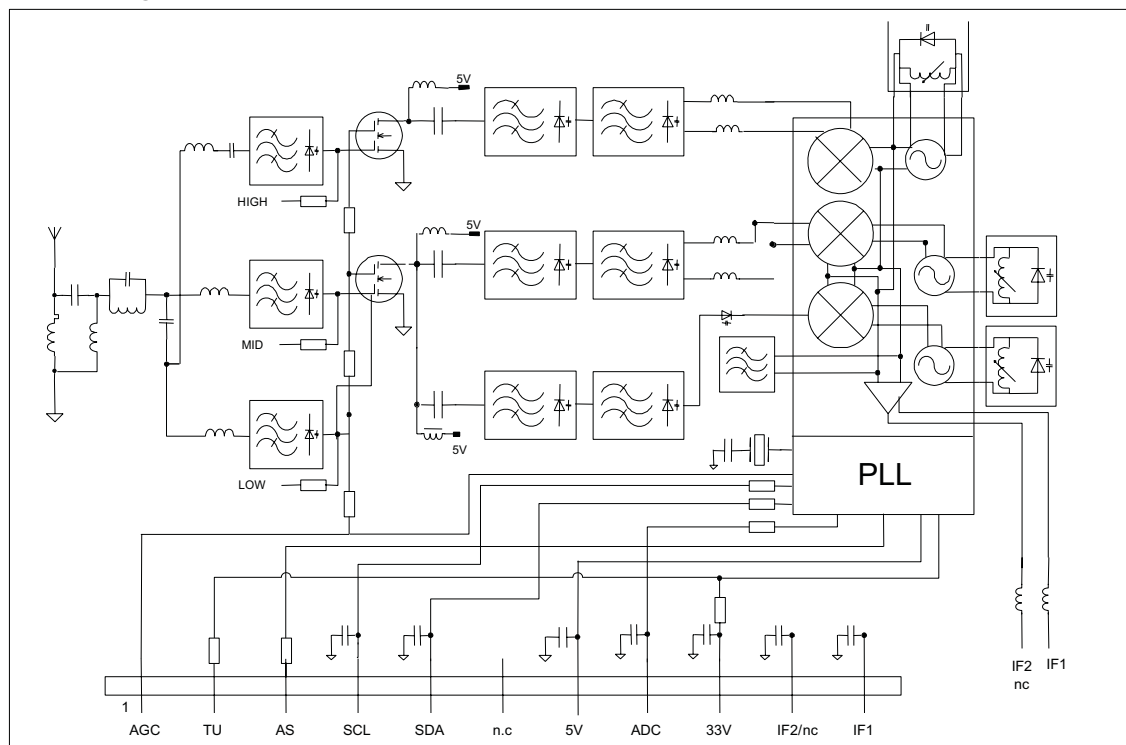
HDMI	High Definition Multimedia Interface, digital audio and video interface	PWB	Printed Wiring Board (or PCB)
HP	Head Phone	PWM	Pulse Width Modulation
I	Monochrome TV system. Sound carrier distance is 6.0 MHz	RAM	Random Access Memory
I2C	Integrated IC bus	RC	Remote Control transmitter
I2S	Integrated IC Sound bus	RC5 (6)	Remote Control system 5 (6), the signal from the remote control receiver
IBO(Z)	Intelligent Bolt On module. Z= Zapper; module for DVB reception.	RF	Radio Frequency
IC	Integrated Circuit	RGB	Red, Green, and Blue. The primary colour signals for TV. By mixing levels of R, G, and B, all colours (Y/C) are reproduced.
IF	Intermediate Frequency	RGBHV	Red, Green, Blue, Horizontal sync, and Vertical sync
IR	Infra Red	ROM	Read Only Memory
IRQ	Interrupt ReQuest	SAM	Service Alignment Mode
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 customers wishes	SC	SandCastle: two-level pulse derived from sync signals
LATAM	LATin America	SC1-OUT	SCART output of the MSP audio IC
LC08	Philips chassis name for LCD TV 2008 project	SC2-OUT	SCART output of the MSP audio IC
LCD	Liquid Crystal Display	S/C	Short Circuit
LED	Light Emitting Diode	SCL	Clock signal on I2C bus
L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I	SD	Standard Definition: 480i, 576i
LPL	LG Philips LCD	SDA	Data signal on I2C bus
LS	Loud Speaker	SDI	Samsung Display Industry
LVDS	Low Voltage Differential Signalling, data transmission system for high speed and low EMI communication.	SDM	Service Default Mode
M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz	SDRAM	Synchronous DRAM
MOSFET	Metal Oxide Semiconductor Field Effect Transistor	SECAM	SEquence Couleur Avec Memoire. Colour system used mainly in France and Eastern Europe. Colour carriers = 4.406250 MHz and 4.250000 MHz
MPEG	Motion Pictures Experts Group	SIF	Sound Intermediate Frequency
MSP	Multi-standard Sound Processor: ITT sound decoder	SMPS	Switch Mode Power Supply
MUTE	MUTE Line	SND	SouND
NAFTA	North American Free Trade Association: Trade agreement between Canada, USA and Mexico	SOPS	Self Oscillating Power Supply
NC	Not Connected	S/PDIF	Sony Philips Digital InterFace
NICAM	Near Instantaneous Compounded Audio Multiplexing. This is a digital sound system, used mainly in Europe.	SRAM	Static RAM
NTSC	National Television Standard Committee. Colour system used mainly in North America and Japan. Colour carrier NTSC M/N = 3.579545 MHz, NTSC 4.43 = 4.433619 MHz (this is a VCR norm, it is not transmitted off-air)	SSB	Small Signal Board
NVM	Non Volatile Memory: IC containing TV related data (for example, options)	STBY	Stand-by
O/C	Open Circuit	SVHS	Super Video Home System
ON/OFF LED	On/Off control signal for the LED	SW	Sub Woofer / SoftWare / Switch
OAD	Over the Air Download	THD	Total Harmonic Distortion
OSD	On Screen Display	TXT	TeleteXT
PAL	Phase Alternating Line. Colour system used mainly in Western Europe (colour carrier = 4.433619 MHz) and South America (colour carrier PAL M = 3.575612 MHz and PAL N = 3.582056 MHz)	UART	Universal Asynchronous Receiver/Transmitter
PC	Personal Computer	uP	Microprocessor
PCB	Printed Circuit Board (or PWB)	VL	Variable Level out: processed audio output toward external amplifier
PDP	Plasma Display Panel	TXT	TeleteXT
PIG	Picture In Graphic	VBI	Vertical Blanking Interval
PIP	Picture In Picture	VESA	Video Electronics Standards Association
PLL	Phase Locked Loop. Used, for example, in FST tuning systems. The customer can directly provide the desired frequency	VGA	Video Graphics Array
PSU	Power Supply Unit	WD	Watch Dog
		WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
		XTAL	Quartz crystal
		YPbPr	Component video (Y= Luminance, Pb/Pr= Colour difference signals B-Y and R-Y, other amplitudes w.r.t. to YUV)
		Y/C	Video related signals: Y consists of luminance signal, blanking level and sync; C consists of colour signal.
		Y-OUT	Luminance-signal
		YUV	Baseband component video (Y= Luminance, U/V= Colour difference signals)

## 9.8 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).

### 9.8.1 Diagram B02, Type UV1316E (IC1104), Tuner

#### Block Diagram



#### Pin Configuration

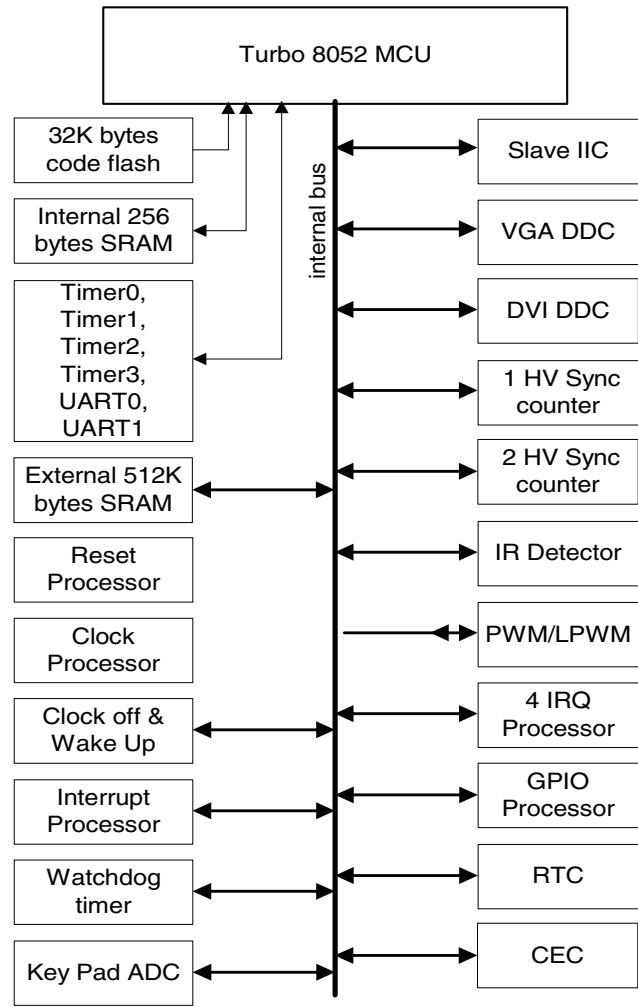
SYMBOL	PIN	DESCRIPTION
AGC	1	Automatic Gain Control Voltage
TU	2	Tuning voltage monitor (output)
AS	3	I <sup>2</sup> C-Bus Address Select
SCL	4	I <sup>2</sup> C-Bus Serial Clock
SDA	5	I <sup>2</sup> C-Bus Serial Data
n.c.	6	Not Connected
V <sub>s</sub>	7	Supply Voltage +5V
ADC	8	ADC Input <sup>(5)</sup>
V <sub>ST</sub>	9	Fixed tuning Supply Voltage +33V
I.F out 2 / d.n.c	10	Symmetrical I.F output 2 / Do not connect for asymmetrical
I.F out 1	11	Asymmetrical I.F Output / Symmetrical I.F output 1
GND	M1,M2,M3,M4	Mounting Tags (Ground)

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221106

Figure 9-15 Internal block diagram and pin configuration

9.8.2 Diagram B03, Type WT61P8S (IC7303), Weltrend Microprocessor

Block Diagram



Pin Configuration

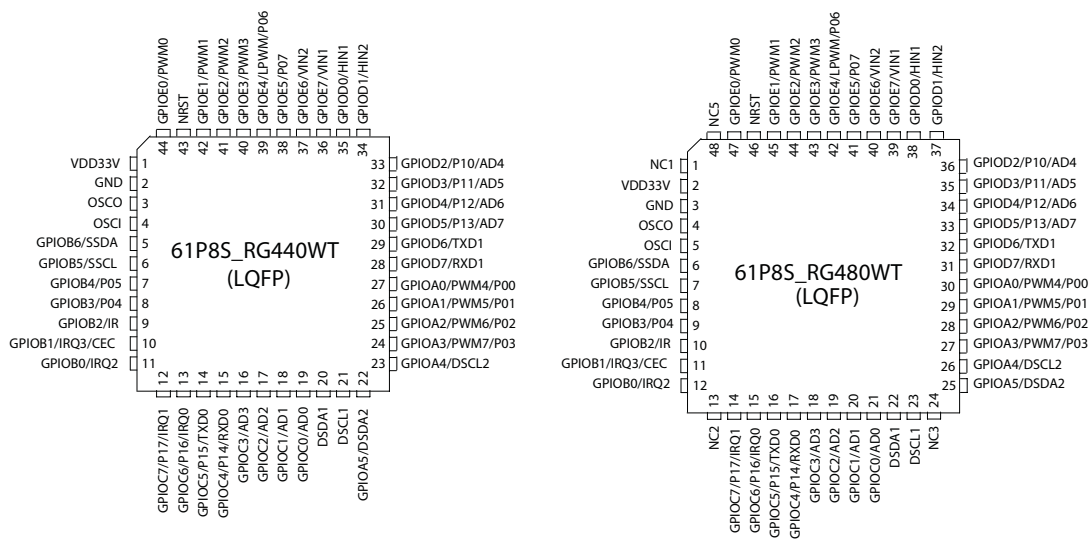
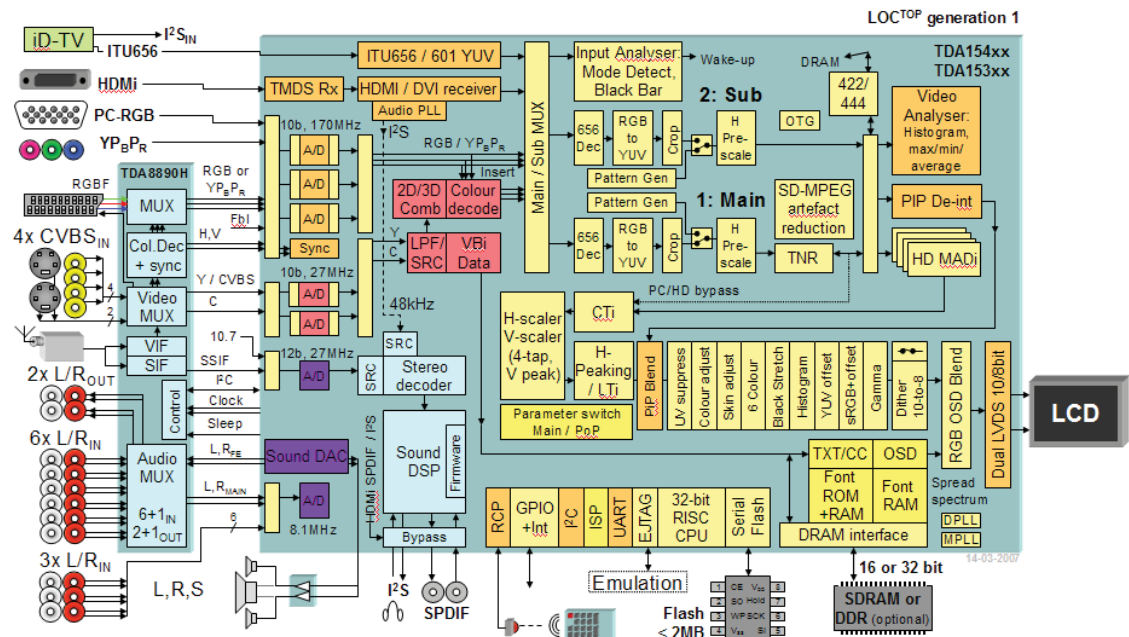


Figure 9-16 Internal block diagram and pin configuration

## 9.8.3 Diagram B04A, Type TDA15471HV (IC7C01), LOC-TOP Video/Audio Processor

## Block Diagram



## Pin Configuration

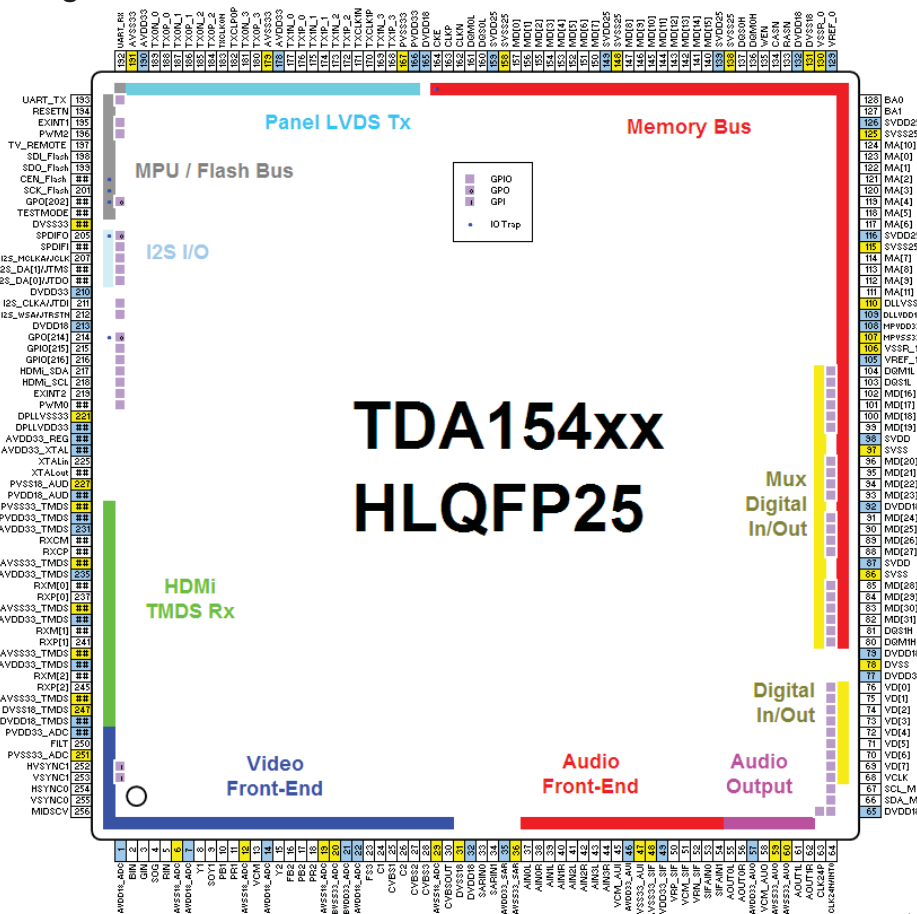
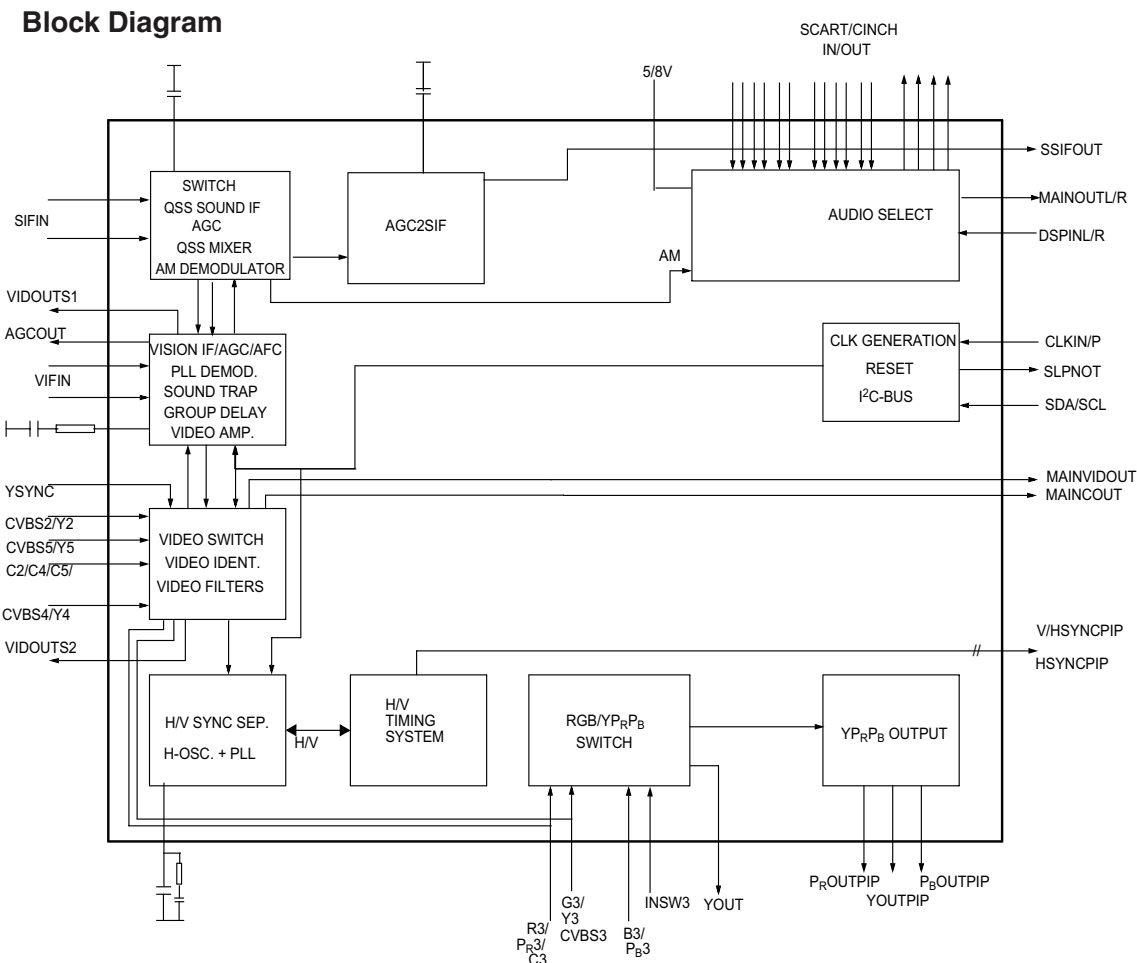
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Figure 9-17 Internal block diagram and pin configuration

9.8.4 Diagram B05A, Type TDA8890H1 (IC7401), Versatile Front-End Signal Processor



**Pin Configuration**

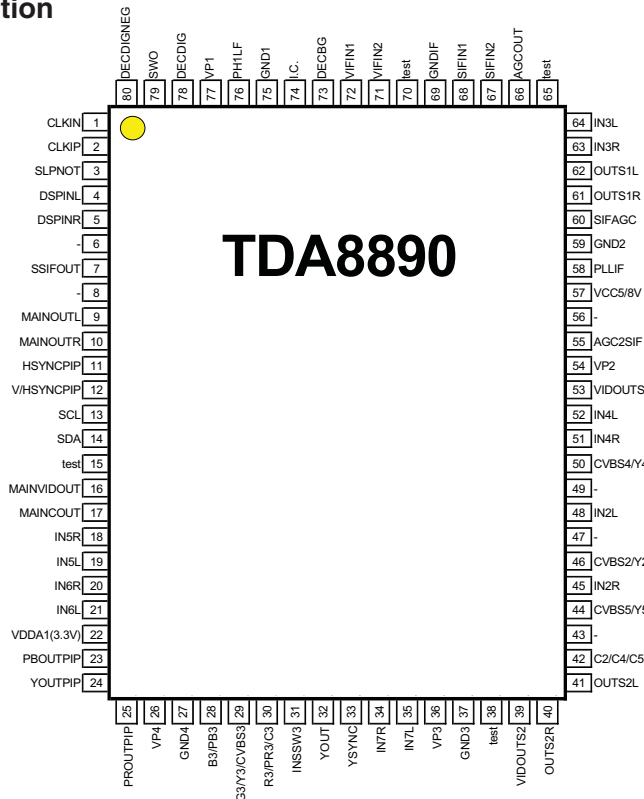
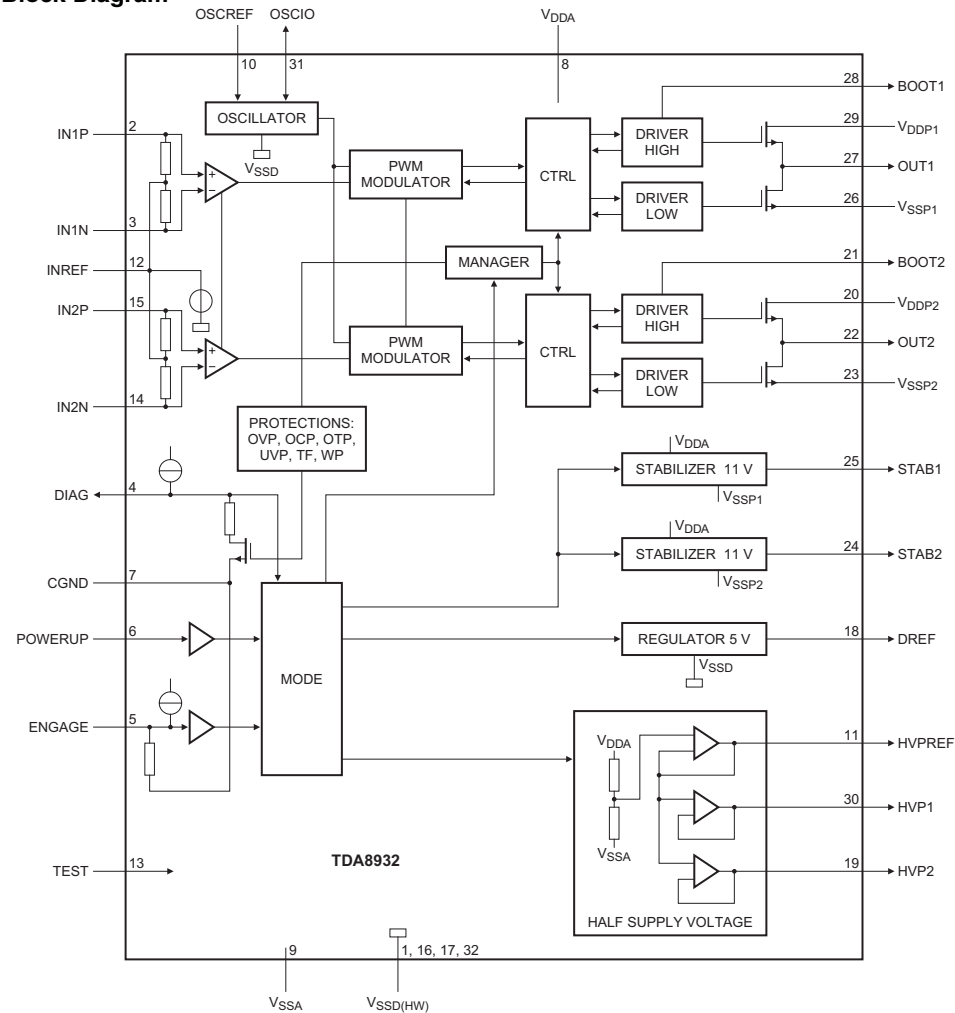


Figure 9-18 Internal block diagram and pin configuration

9.8.5 Diagram B05B, Type TDA8932BT (IC7A01), Audio Amplifier

Block Diagram



Pin Configuration

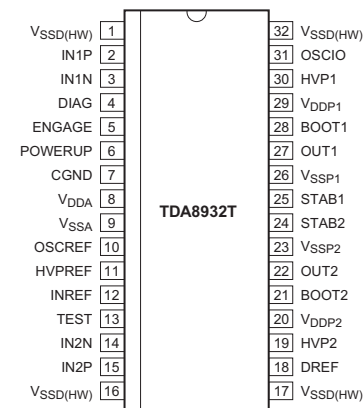
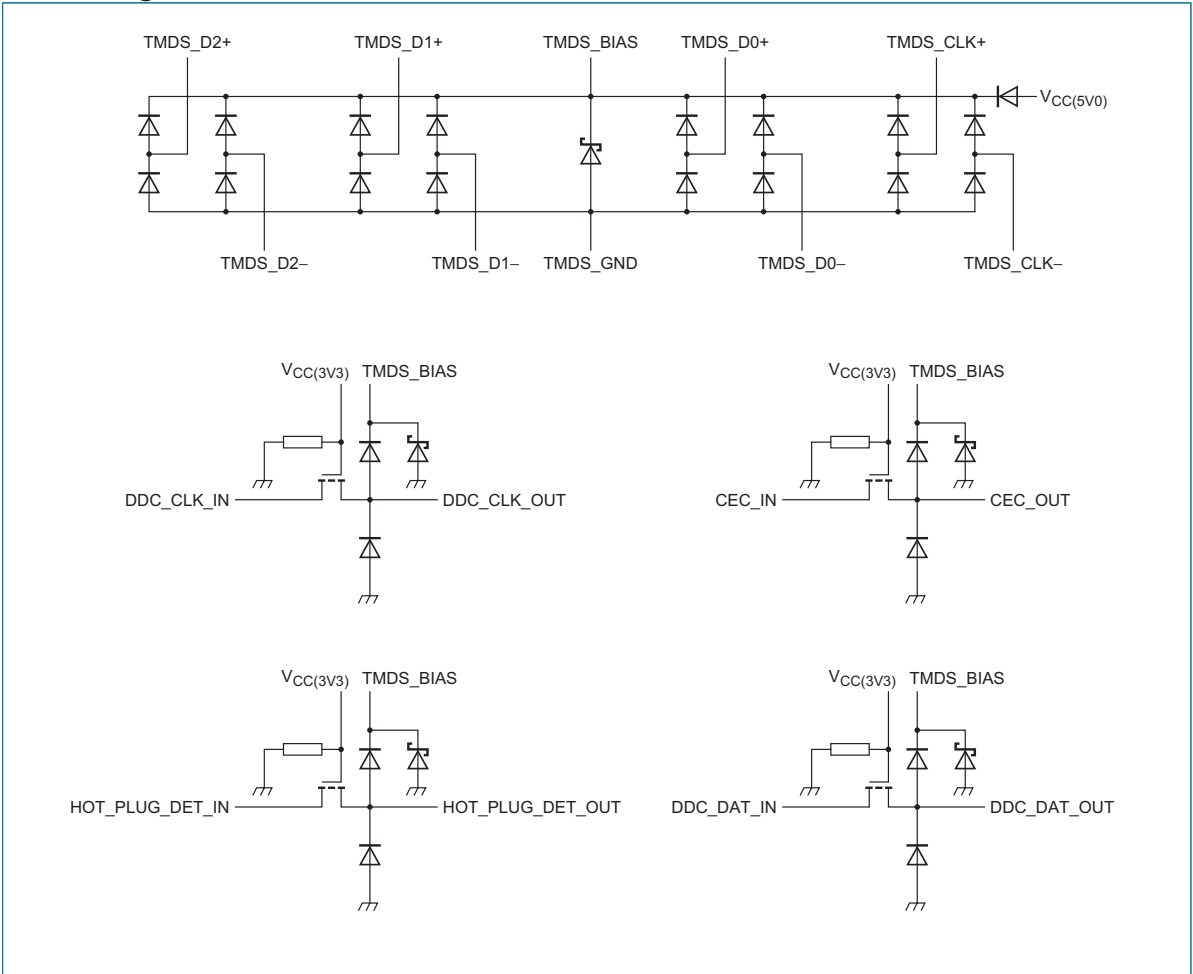


Figure 9-19 Internal block diagram and pin configuration

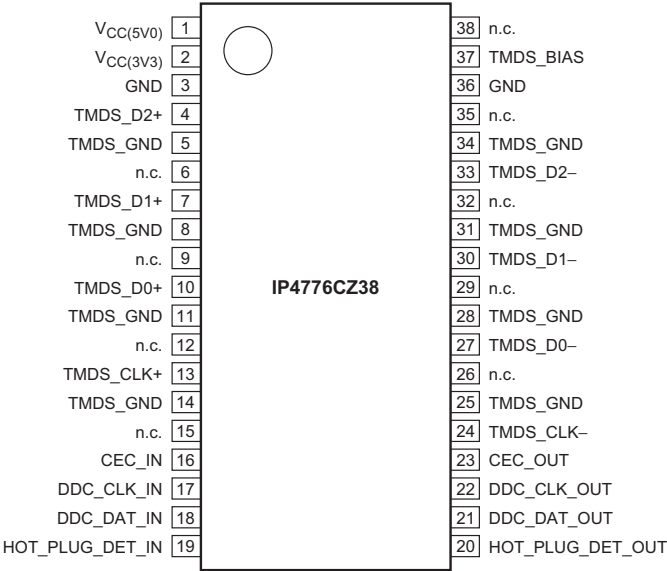


9.8.6 Diagram B06D, Type IP4776 (IC7N07), HDMI Interface

Block Diagram



Pin Configuration



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Figure 9-20 Internal block diagram and pin configuration

## 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:
32PFL3403/12	MG8	3122 785 18170
32PFL3403/60	MG8	3122 785 18171
32PFL3403S/60	MG8	3122 785 18171
42PFL3403/12	MG8	3122 785 18170
42PFL3403/60	MG8	3122 785 18171
42PFL3403S/60	MG8	3122 785 18171

## 11. Revision List

### Manual xxxx xxx xxxx.0

- First release.

### Manual xxxx xxx xxxx.1

- **All chapters:** Added 4 sets (See table chapter 10).
- **Chapter 5:** "LLLLL" removed from SAM explanations.