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**Service**



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240408

# Service Manual

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# 1. Technical Specifications, Connections, and Chassis Overview

## Index of this chapter:

- 1.1 Technical Specifications
- 1.2 Connections
- 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 : 37" (94 cm), 16:9 : 42" (107 cm), 16:9 : 47" (120 cm), 16:9
Resolution (H × V pixels)	: 1366×768 (32 & 37") : 1920×1080 (42 & 47")
Light output (cd/m <sup>2</sup> )	: 500
Contrast ratio	: 24000:1 (37") : 30000:1 (32, 42 & 47")
Viewing angle (H × V degrees)	: 176 × 176
Max. response time (ms)	: ≈ 5
Tuning system	: PLL
Colour systems	: PAL B/G, D/K, I : SECAM B/G, D/K, L/L' : DVB COFDM 2K/8K
Video playback	: NTSC : PAL : SECAM
Tuner bands	: UHF, VHF, S, Hyper
Supported video formats	:
- @ 60 Hz	: 480i
- @ 60 Hz	: 480p
- @ 50 Hz	: 576i
- @ 50 Hz	: 576p
- @ 50, 60 Hz	: 720p
- @ 50, 60 Hz	: 1080i
- @ 24, 25, 30, 50, 60 Hz	: 1080p
Supported computer formats	:
- @ 60, 70, 75, 85 Hz	: 1024 × 768
- @ 60, 72, 75, 85 Hz	: 800 × 600
- @ 60, 70, 75, 85 Hz	: 640 × 480

### 1.1.2 Sound

Maximum power (W <sub>RMS</sub> )	: 2 × 15
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### 1.1.3 Multimedia

Supported file formats	: JPEG : MP3 : Slideshow (.alb)
USB input	: USB2.0

### 1.1.4 Miscellaneous

Power supply:	
- Mains voltage (V <sub>AC</sub> )	: 220 - 240 ± 10%
- Mains frequency (Hz)	: 50 / 60

Ambient conditions:	
- Temperature range (°C)	: +5 to +35

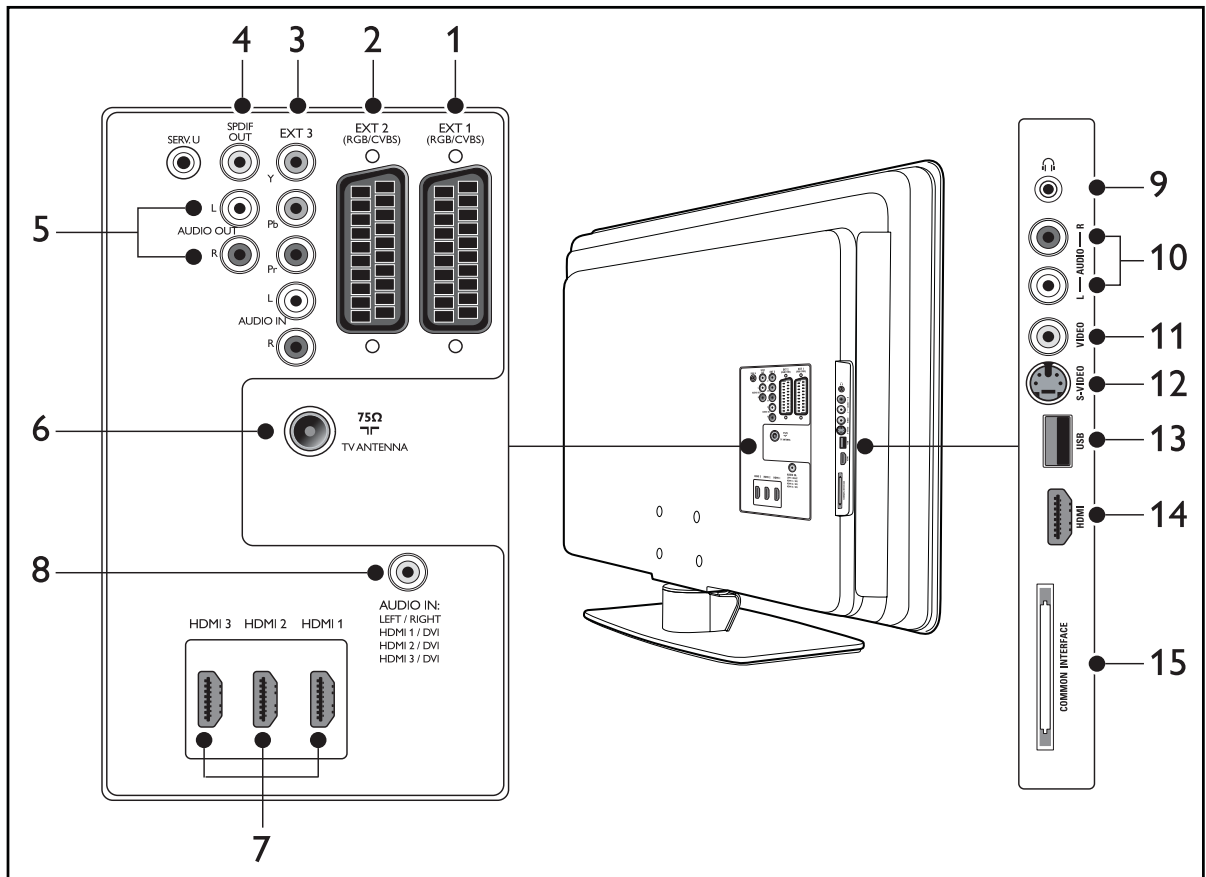
#### Power consumption (values are indicative)

- Normal operation (W)	: 130 (32") : 170 (37") : 200 (42") : 260 (47")
- Stand-by (W)	: < 0.15

Dimensions (W × H × D in mm)	: 819 × 518 × 92 (32") : 930 × 611 × 99 (37") : 1046 × 644 × 88 (42") : 1163 × 712 × 104 (47")
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Weight (kg)	: 13 (32") : 17.5 (37") : 21 (42") : 27.5 (47")
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1.2 Connections



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Figure 1-1 Connection overview

**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, Ye= Yellow.

1.2.1 Rear Connections

**1 & 2 - EXT1 & 2: Video RGB - In, CVBS - In/Out, Audio - In/Out**

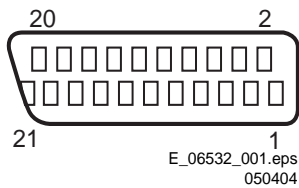


Figure 1-2 SCART connector

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 Audio	Gnd	⊥
5 - Ground Blue	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 Green	Gnd	⊥
10 - n.c.		
11 - Video Green	0.7 V <sub>PP</sub> / 75 ohm	⊕
12 - n.c.		

13 - Ground Red	Gnd	⊥
14 - Ground P50	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 Video	Gnd	⊥
18 - Ground FBL	Gnd	⊥
19 - Video CVBS/Y	1 V <sub>PP</sub> / 75 ohm	⊕
20 - Video CVBS	1 V <sub>PP</sub> / 75 ohm	⊕
21 - Shield	Gnd	⊥

**3 - EXT3: 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	⊕
Rd - Audio - R	0.5 V <sub>RMS</sub> / 10 kohm	⊕
Wh - Audio - L	0.5 V <sub>RMS</sub> / 10 kohm	⊕

**4 - Cinch: S/PDIF - Out**

Bk - Coaxial	0.4 - 0.6V <sub>PP</sub> / 75 ohm	⊕
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**Service Connector (UART)**

1 - Ground	Gnd	⊥
2 - UART_TX	Transmit	⊕
3 - UART_RX	Receive	⊕

**5 - Cinch: Audio - Out**

Rd - Audio - R	0.5 V <sub>RMS</sub> / 10 kohm	⊕
Wh - Audio - L	0.5 V <sub>RMS</sub> / 10 kohm	⊕

**6 - Aerial - In**

- IEC-type (EU)	Coax, 75 ohm	⊥
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7 - HDMI 1, 2 & 3 Digital Video, Digital Audio - In

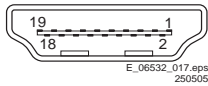


Figure 1-3 HDMI (type A) connector

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

8 - Mini Jack: HDMI/DVI Audio - In

Rd - Audio - R	0.5 V <sub>RMS</sub> / 10 kohm	⊕
Wh - Audio - L	0.5 V <sub>RMS</sub> / 10 kohm	⊕

10 - Cinch: Audio - In

Rd - Audio R	0.5 V <sub>RMS</sub> / 10 kohm	⊕
Wh - Audio L	0.5 V <sub>RMS</sub> / 10 kohm	⊕

11 - Cinch: Video CVBS - In

Ye - Video CVBS	1 V <sub>PP</sub> / 75 ohm	⊕
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12 - 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	⊕

13 - USB2.0

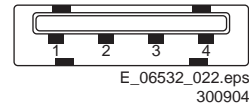


Figure 1-4 USB (type A)

1 - +5V		⊕
2 - Data (-)		⊕
3 - Data (+)		⊕
4 - Ground	Gnd	⊕

14 - HDMI: Digital Video, Digital Audio - In (see connector 7)

15 - Common Interface

68p - See diagram B09A		⊕
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1.2.2 Side Connections

9. Head phone (Output)

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

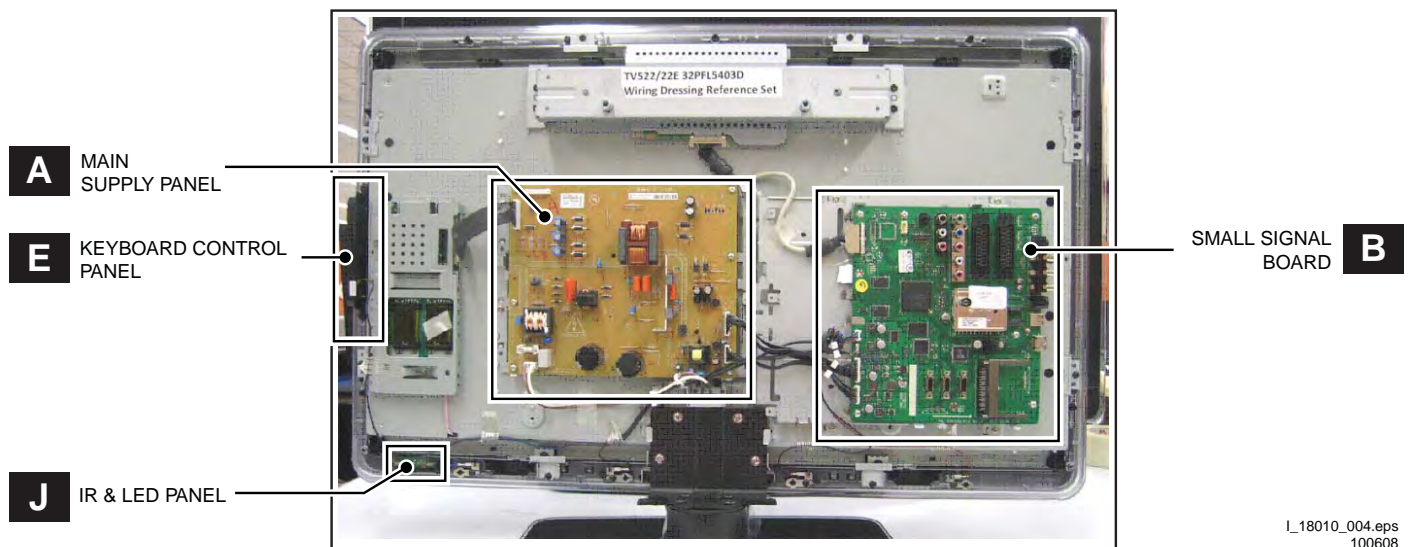


Figure 1-5 PWB locations 32"



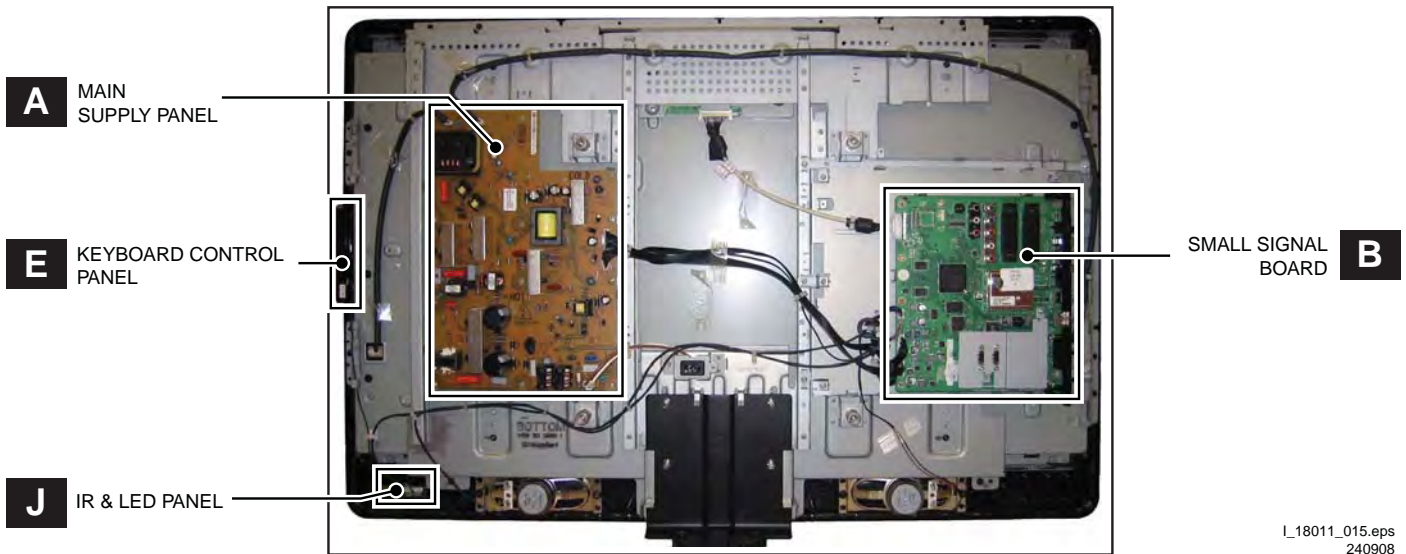


Figure 1-6 PWB locations 37"

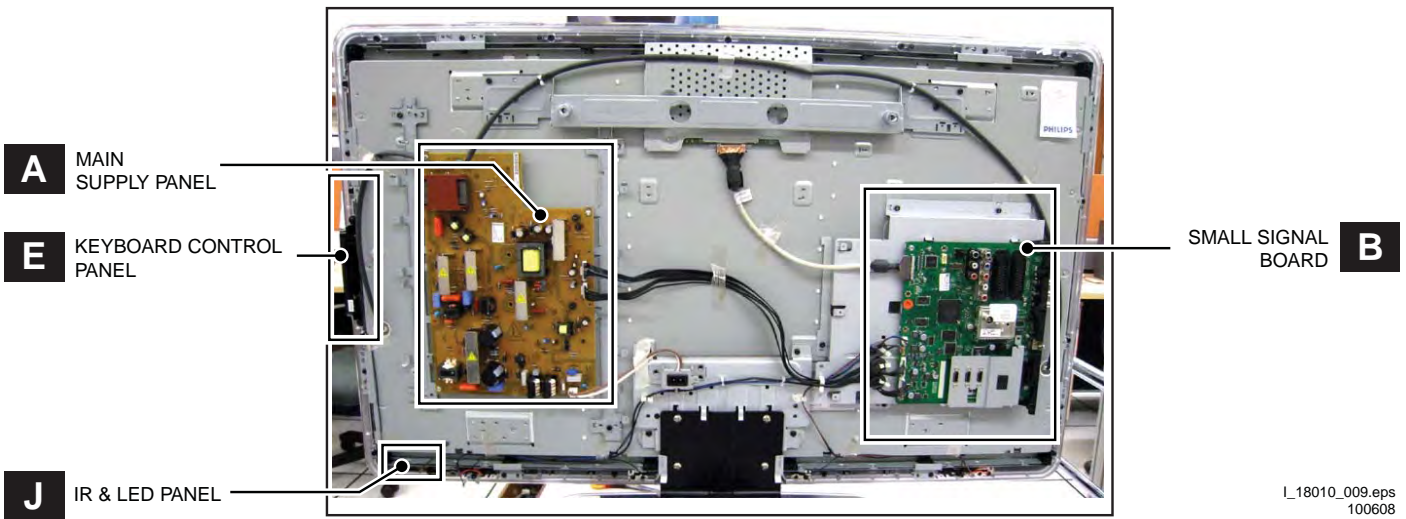


Figure 1-7 PWB locations 42"

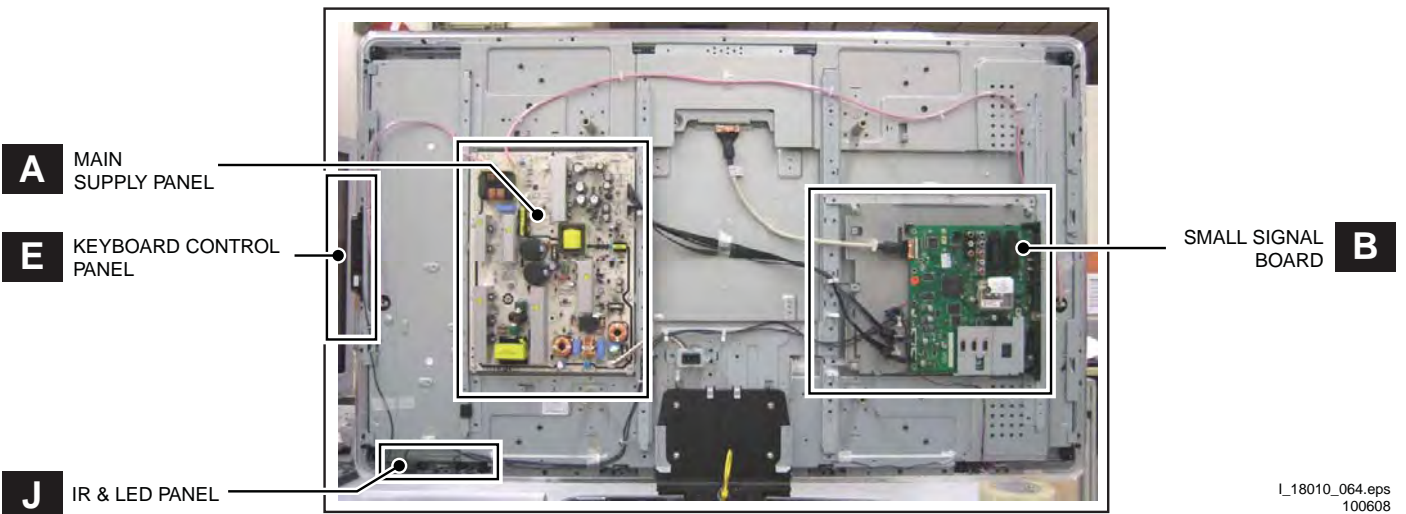


Figure 1-8 PWB locations 47"

## 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 centre (e.g. AG is Bruges), digit 3 refers to the B.O.M. code, digit 4 refers to the Service version change code, digits 5 and 6 refer to the production year, and digits 7 and 8 refer to production week (in example below it is 2006 week 17). The 6 last digits contain the serial number.

## 3. Directions for Use

You can download this information from the following websites:  
<http://www.philips.com/support>  
<http://www.p4c.philips.com>



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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.

# 4. Mechanical Instructions

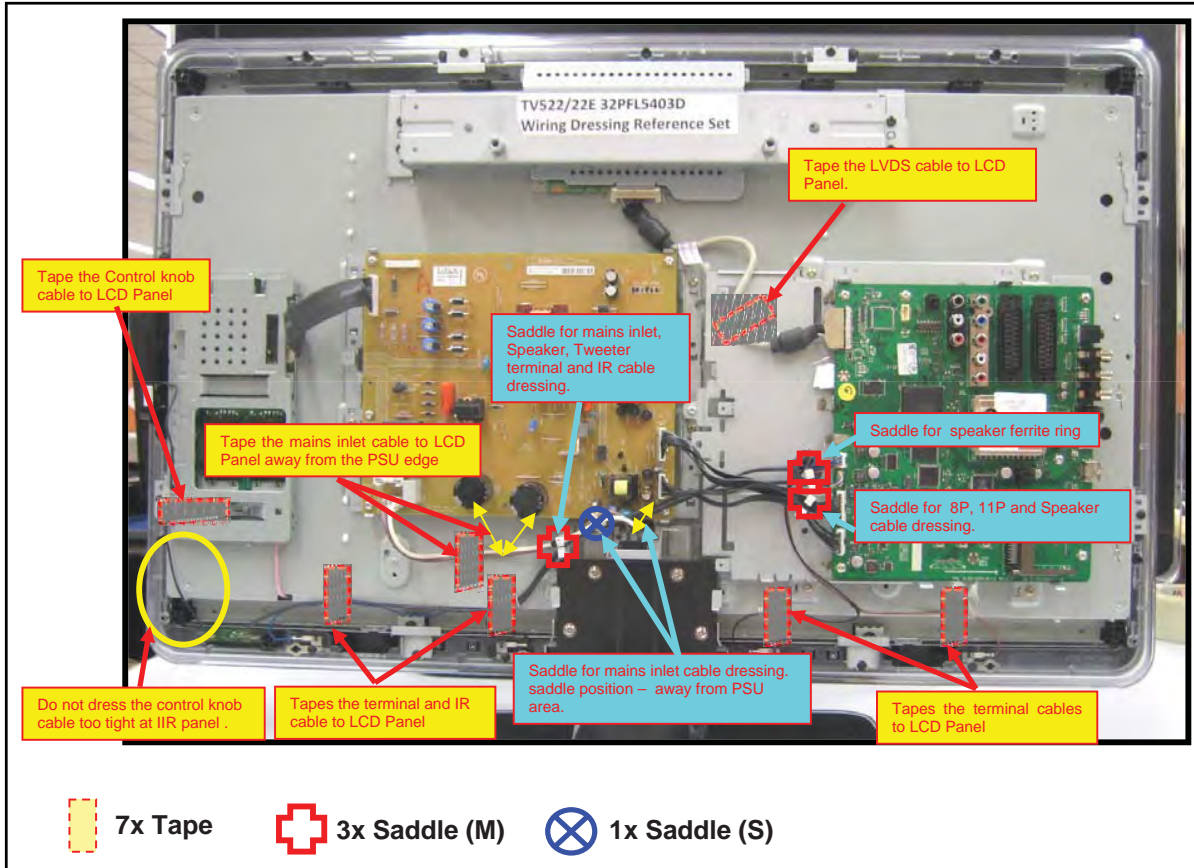
**Index of this chapter:**

- 4.1 Cable Dressing
- 4.2 Service Positions
- 4.3 Assy/Panel Removal ME8 Styling
- 4.4 Assy/Panel Removal MG8 Styling
- 4.5 Set Re-assembly

**Notes:**

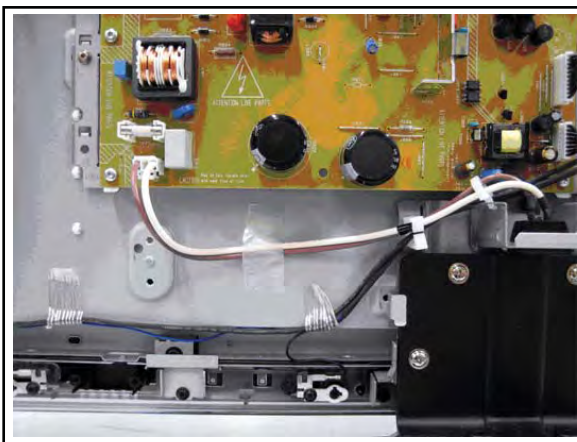
- Figures below can deviate slightly from the actual situation, due to the different set executions.

## 4.1 Cable Dressing



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Figure 4-1 Cable dressing 32”



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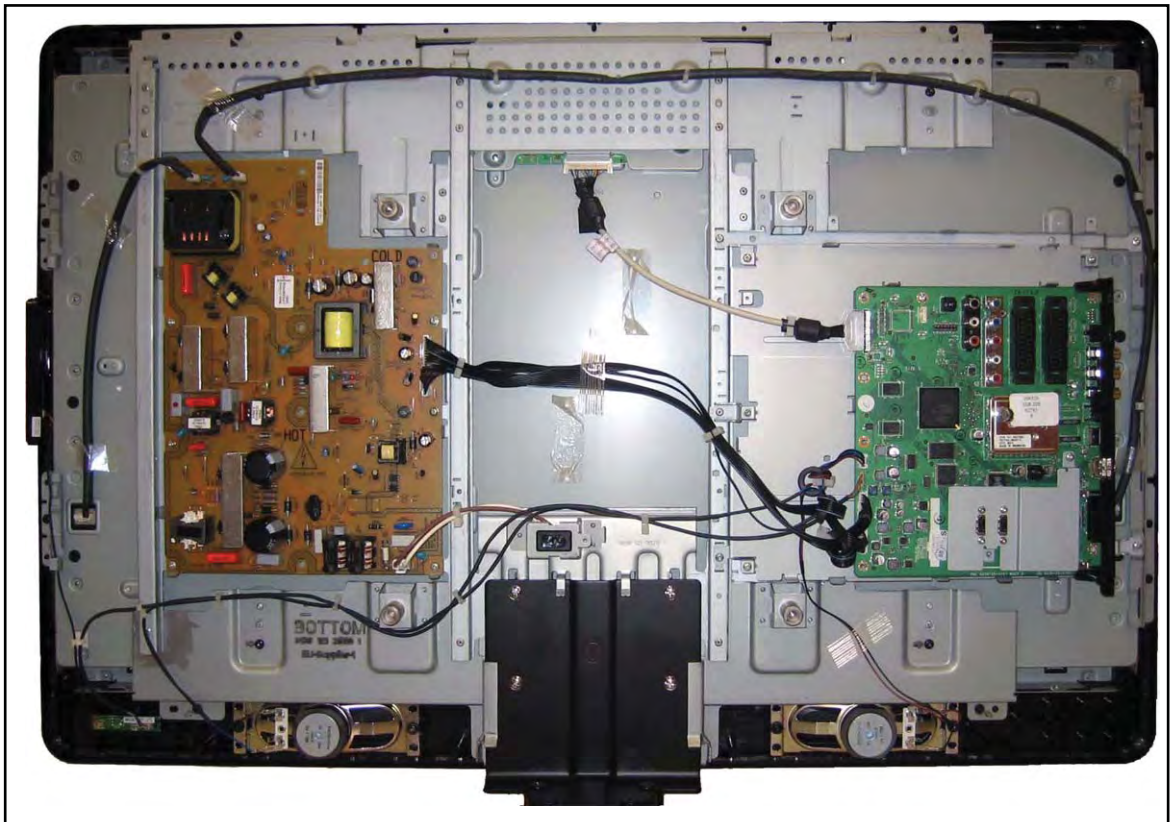
Figure 4-2 Mains inlet & left speaker cables 32”



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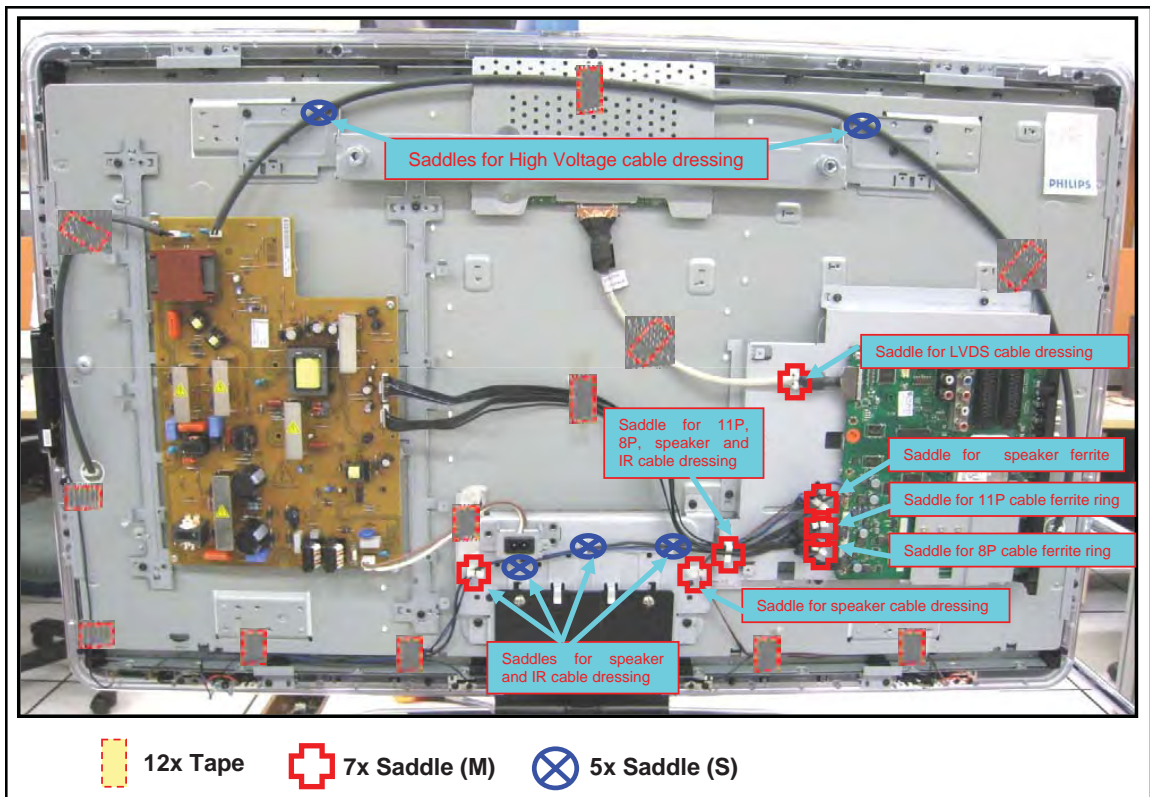
Figure 4-3 LVDS & PSU\_SSB cables 32”





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250908

Figure 4-4 Cable dressing 37''



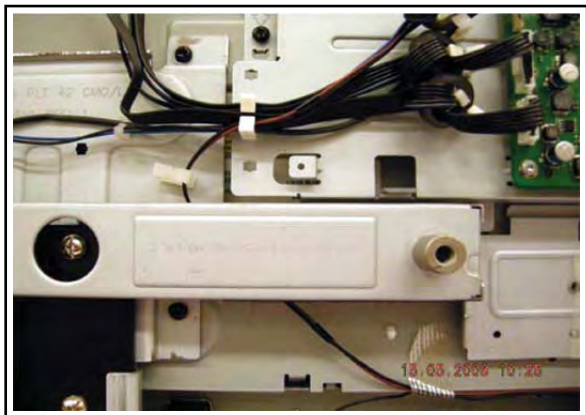
L\_18050\_010.eps  
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Figure 4-5 Cable dressing 42''



L\_18010\_061.eps  
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Figure 4-6 Right speaker cables 42”



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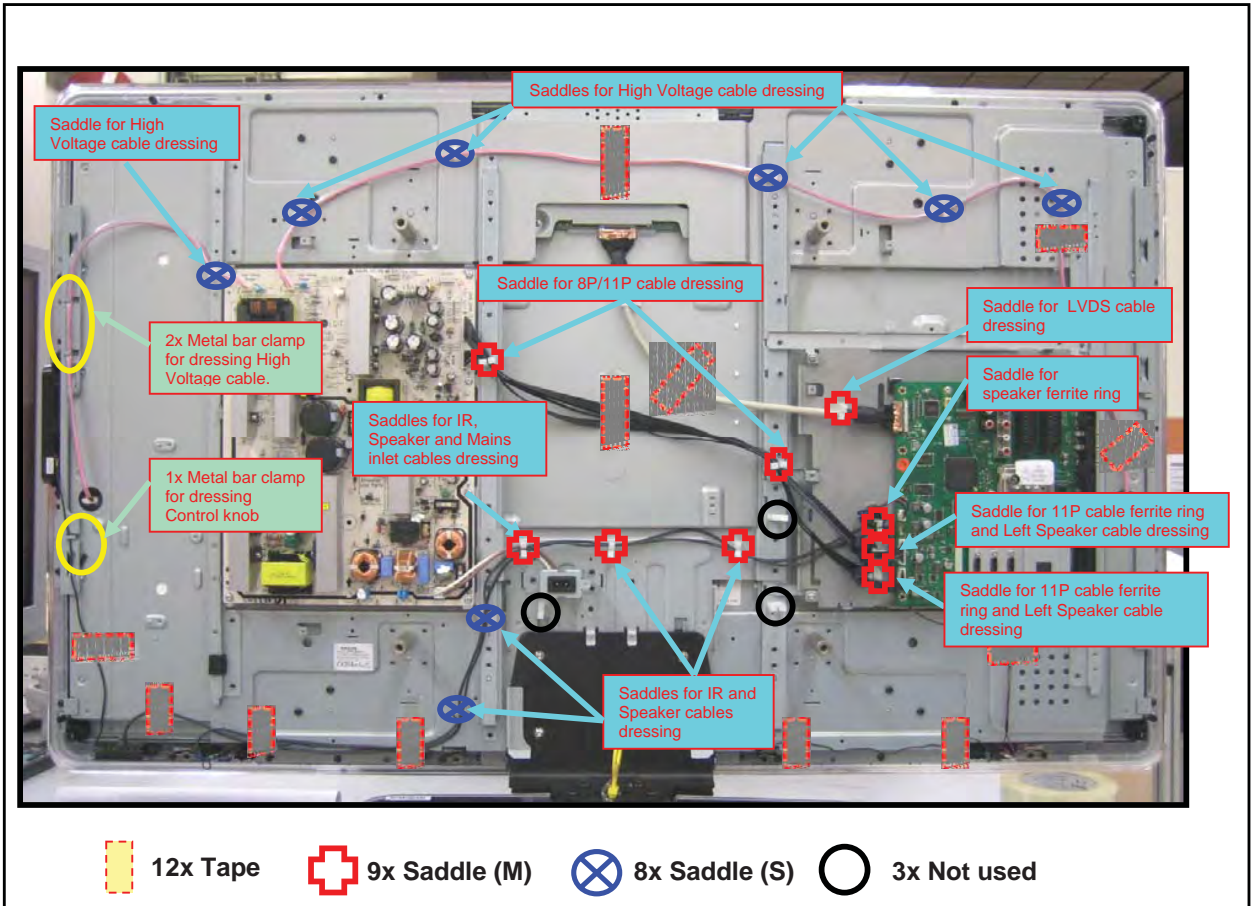
Figure 4-7 Right speaker cables (with bar mounted) 42”



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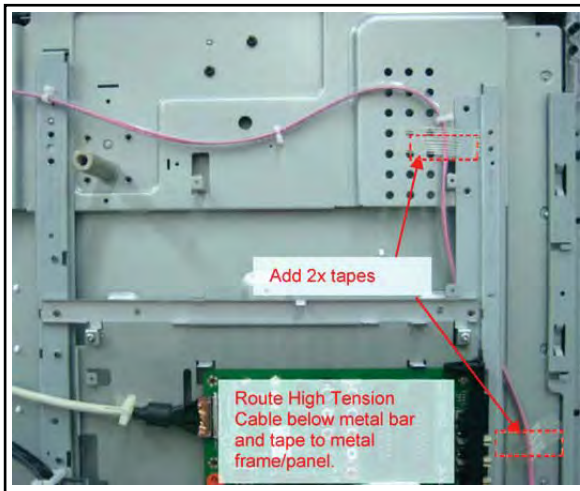
Figure 4-8 Felt and tape position for LVDS cable 42”





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Figure 4-9 Cable dressing 47"



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Figure 4-10 Dressing details for HV cable 47"



## 4.2 Service Positions

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

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

### 4.2.1 Foam Bars

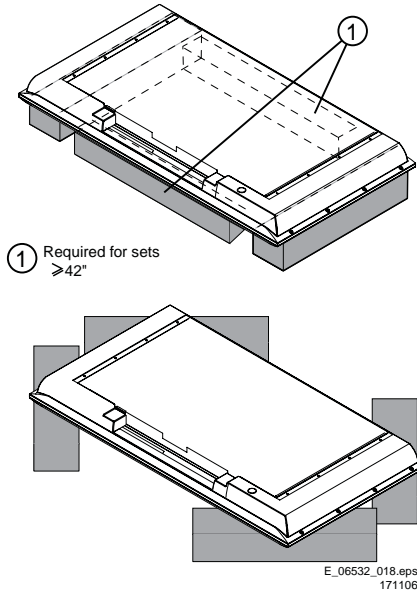


Figure 4-11 Foam bars

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

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

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

## 4.3 Assy/Panel Removal ME8 Styling

### 4.3.1 Rear Cover

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

**Note:** it is **not** necessary to remove the stand while removing the rear cover.

1. Remove all screws of the rear cover.
2. Lift the rear cover from the TV. Make sure that wires and flat coils are not damaged while lifting the rear cover from the set.

### 4.3.2 Speakers

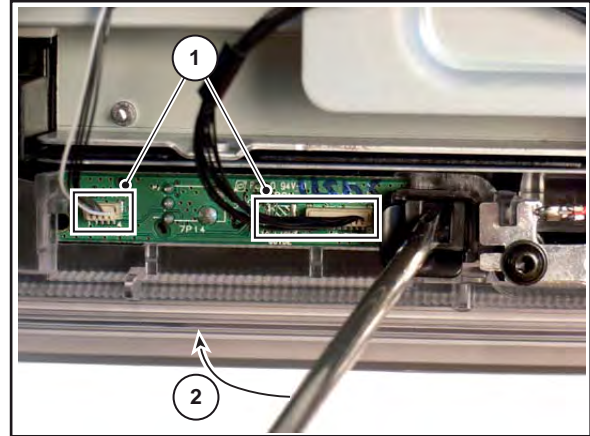
Remove the screws [1] and lift the whole unit from the rear cover. Take the speakers out together with their casing. When defective, replace the whole unit.

### 4.3.3 IR & LED Board

Refer to next figure for details.

1. Unplug connectors [1].
2. Use a flat screw driver to release the clip by pushing in the indicated direction [2].
3. Lift the board and take it out.

When defective, replace the whole unit.



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Figure 4-12 IR & LED Board

### 4.3.4 Key Board

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.

### 4.3.5 Main Supply Panel

1. Unplug all connectors.
2. Remove the fixation screws.
3. Take the board out.

When defective, replace the whole unit.

### 4.3.6 Small Signal Board (SSB)

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

1. Unplug the LVDS connector.  
**Caution:** be careful, as this is a very fragile connector!
2. Unplug all other connectors.
3. Remove all screws that hold the board.
4. The SSB can now be taken out of the set, together with the front shield and the side cover.
5. To remove the shield, remove the screws and lift it of.
6. To remove the side cover, remove the screws and pull the cover sideways from the SSB.

### 4.3.7 LCD Panel

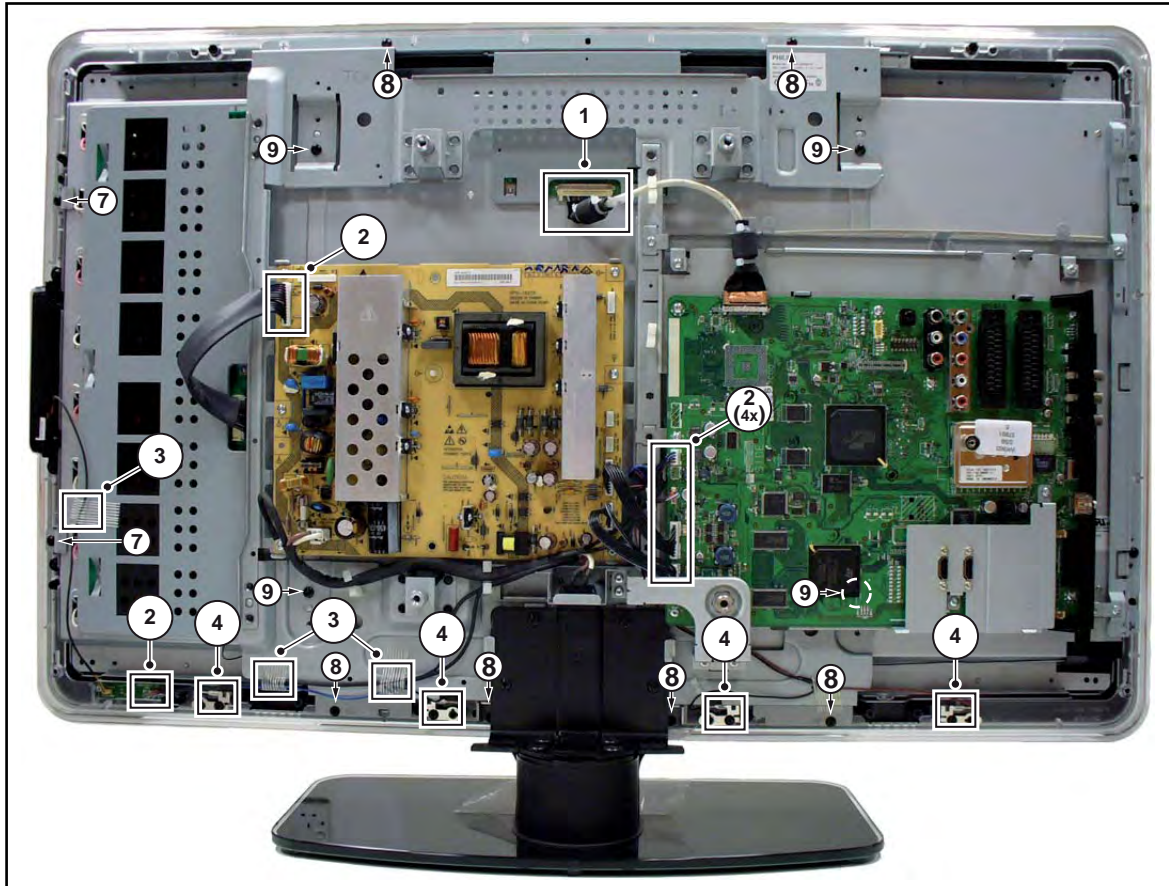
Refer to next figure for details. As every screen size has a (slightly) different mechanical construction (some have the boards directly mounted on the LCD display, others use brackets), we only describe one model. Disassembly method of other LCD panels is similar to the one described below.

1. Unplug the LVDS connector [1].

**Caution:** be careful, as this is a very fragile connector!

2. Unplug the connectors [2].
3. Release the wiring tape [3].

4. Release the speaker connectors [4].
5. Remove the fixation screws from the SSB support bracket and take the SSB out together with the bracket.
6. Do the same for the PSU.
7. Remove the fixation screws and the clamps [7].
8. Remove the fixation screws [8], that hold the subframe and the fixation screws [9], that hold the LCD panel.
9. Lift out the sub frame.
10. The LCD panel can now be lifted from the front cabinet.



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250208

Figure 4-13 LCD Panel removal (photo from Q522.1E chassis)

## 4.4 Assy/Panel Removal MG8 Styling

### 4.4.1 Stand

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



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Figure 4-14 Stand

## 4.4.2 Rear Cover

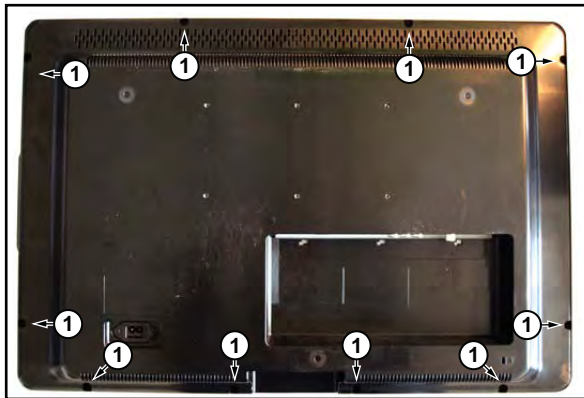
**Warning:** Disconnect the mains power cord before you remove the rear cover.

1. Refer to next figures.
2. Place the TV set upside down on a table top, using the foam bars (see section "Service Positions").
3. Remove the screws [1] that secure the rear cover. The screws are located at the sides.

**Be careful:** Now the rear cover could be lifted but the SSB and power supply panel(s) are mounted in the rear cover and still connected to the LCD panel and other boards.

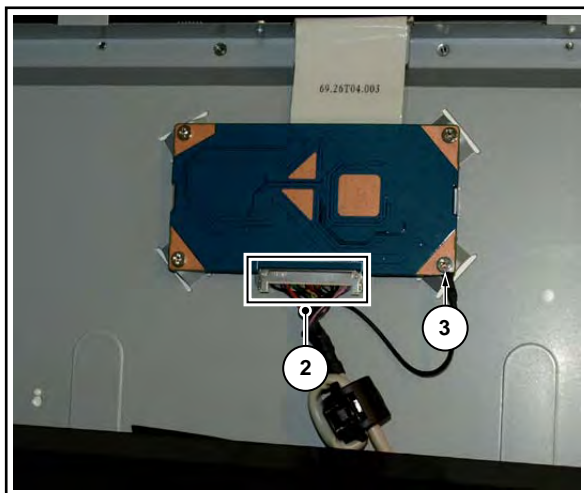
**Those cables should be released first.**

4. To release the LVDS cable lift the back cover a few centimetres and move it downwards the set. Now unplug the LVDS connector [2].  
**Caution:** be careful, as this is a very fragile connector!
5. Remove the screw [3].
6. Now the rear cover can be lifted to gain access to the speaker cables and the IR/LED panel cable. Release the connectors [4].



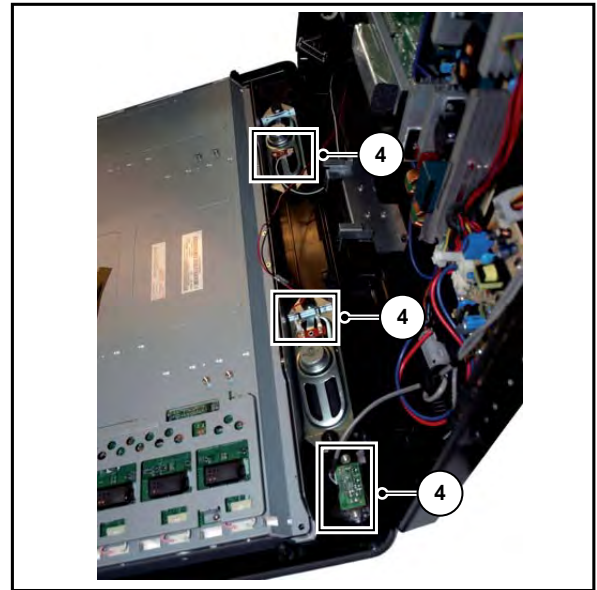
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Figure 4-15 Rear cover



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Figure 4-16 LVDS release



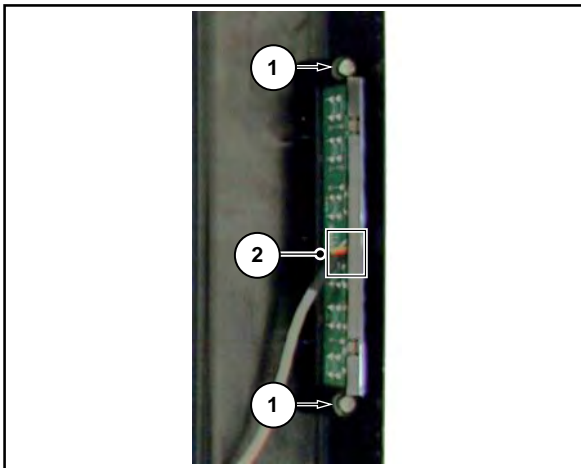
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Figure 4-17 Speaker and IR/LED panel cable release



4.4.3 Keyboard Control Board

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

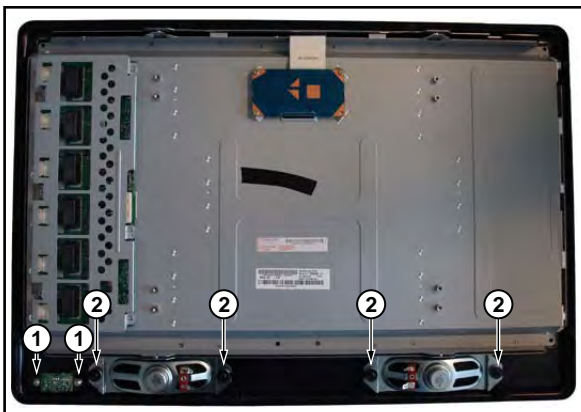


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Figure 4-18 Keyboard control board

4.4.4 IR/LED Board and Speakers

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



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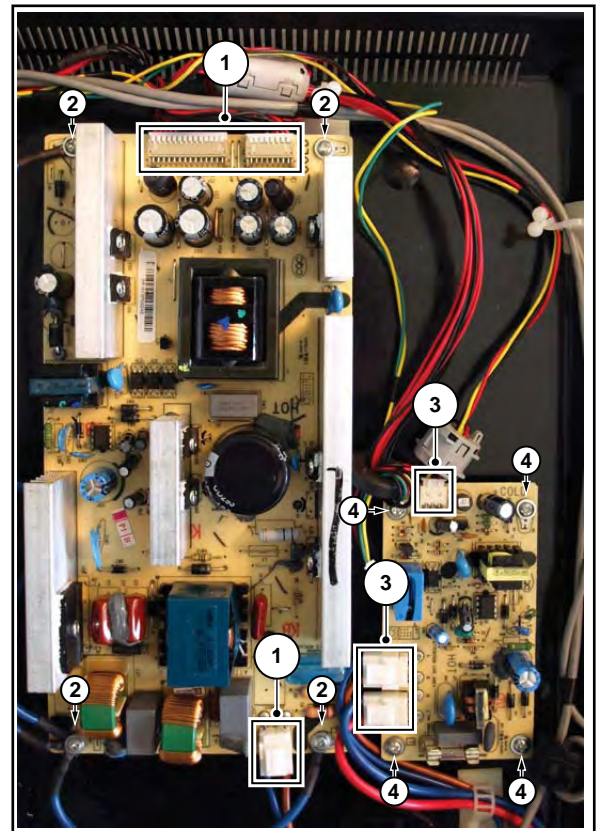
Figure 4-19 IR/LED Board and Speakers

4.4.5 Power Supply Board

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

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

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



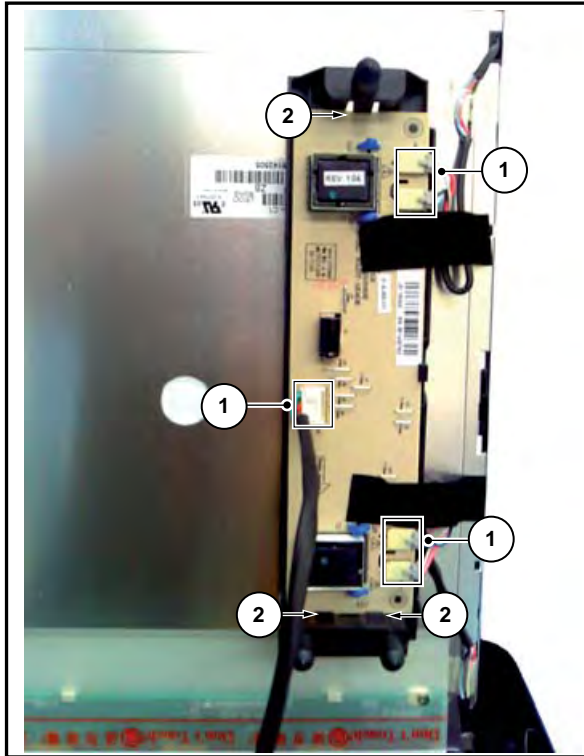
L\_17930\_045.eps  
240408

Figure 4-20 Power Supply Unit(s)

#### 4.4.6 Inverter Board

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

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



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Figure 4-21 Inverter Board

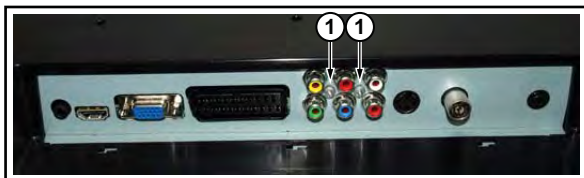
#### 4.4.7 Small Signal Board (SSB)

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

##### Removing the SSB

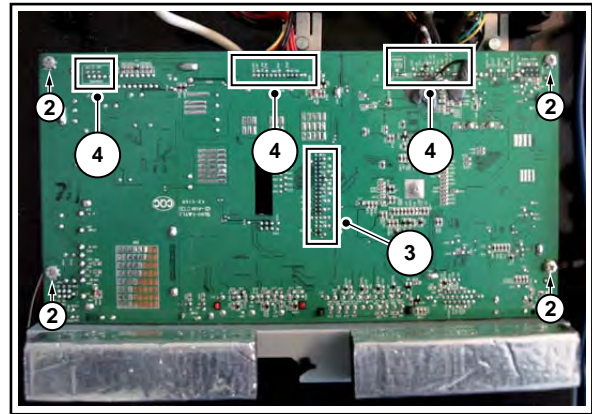
1. See next figures.
2. Remove the screws [1] from the SSB connector plate.
3. Remove the screws [2] from the SSB.
4. Gently lift the board from the rear cover.
5. Now unplug the LVDS connector [3].

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



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Figure 4-22 SSB connector plate



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Figure 4-23 SSB

#### 4.5 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 in the set. 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 Stepwise Start-up
- 5.4 Service Tools
- 5.5 Error Codes
- 5.6 The Blinking LED Procedure
- 5.7 Protections
- 5.8 Fault Finding and Repair Tips
- 5.9 Software Upgrading

- Picture mute (blue mute or black mute).
- Automatic volume levelling (AVL).
- Skip/blank of non-favourite pre-sets.

## 5.1 Test Points

As most signals are digital, it will be difficult to measure waveforms with a standard oscilloscope. However, 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.

Perform measurements under the following conditions:

- Service Default Mode.
- Video: Colour bar signal.
- Audio: 3 kHz left, 1 kHz right.

## 5.2 Service Modes

Service Default mode (SDM) and Service Alignment Mode (SAM) offers several features for the service technician, while the Customer Service Mode (CSM) is used for communication between the call centre and the customer.

This chassis also offers the option of using ComPair, a hardware interface between a computer and the TV chassis. It offers the abilities of structured troubleshooting, error code reading, and software version read-out for all chassis. (see also paragraph "ComPair").

### 5.2.1 Service Default Mode (SDM)

**Purpose**

- To create a pre-defined setting, to get the same measurement results as given in this manual.
- To override SW protections detected by stand-by processor and make the TV start up to the step just before protection (a sort of automatic stepwise start up). See paragraph "Stepwise Start Up".
- To override SW protections detected by MIPS. See also paragraph "Error codes".
- To start the blinking LED procedure (not valid for protections detected by stand-by software).

**Specifications**

**Table 5-1 SDM default settings**

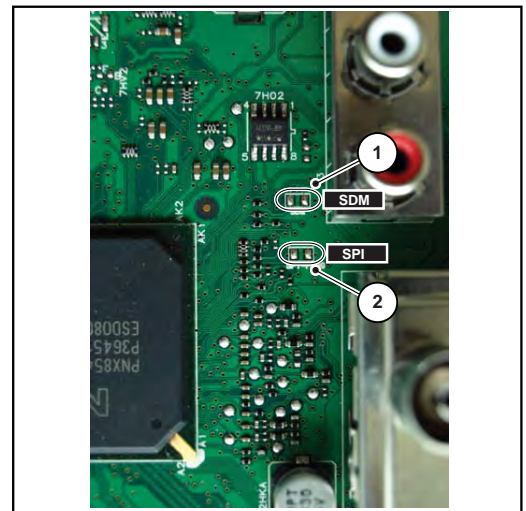
Region	Freq. (MHz)	Default system
Europe, AP(PAL/Multi)	475.25	PAL B/G
Europe, AP DVB-T	546.00 PID Video: 0B 06 PID PCR: 0B 06 PID Audio: 0B 07	DVB-T

- All picture settings at 50% (brightness, colour, contrast).
- All sound settings at 50%, except volume at 25%.
- All service-unfriendly modes (if present) are disabled, like:
  - (Sleep) timer.
  - Child/parental lock.

**How to Activate SDM**

For this chassis there are two kinds of SDM: an **analogue SDM** and a **digital SDM**. Tuning will happen according table "SDM Default Settings".

- **Analogue SDM:** use the standard RC-transmitter and key in the code "062596", directly followed by the "MENU" button.  
**Note:** It is possible that, together with the SDM, the main menu will appear. To switch it "off", push the "MENU" button again.
- **Digital SDM:** use the standard RC-transmitter and key in the code "062593", directly followed by the "MENU" button.  
**Note:** It is possible that, together with the SDM, the main menu will appear. To switch it "off", push the "MENU" button again.
- **Analogue SDM** can also be activated by shorting for a moment the two solder pads [1] (see figure "Service mode pads") on the SSB, with the indication "SDM". Activation can be performed in all modes, except when the set has a problem with the Stand-by Processor.



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**Figure 5-1 Service mode pads**

After activating this mode, "SDM" will appear in the upper right corner of the screen (if you have picture).

**How to Navigate**

When you press the "MENU" button on the RC transmitter, the set will toggle between the SDM and the normal user menu (with the SDM mode still active in the background).

**How to Exit SDM**

Use one of the following methods:

- Switch the set to STAND-BY via the RC-transmitter.
- Via a standard customer RC-transmitter: key in "00"-sequence.

### 5.2.2 Service Alignment Mode (SAM)

**Purpose**

- To perform (software) alignments.
- To change option settings.
- To easily identify the used software version.
- To view operation hours.
- To display (or clear) the error code buffer.



### How to Activate SAM

Via a standard RC transmitter: key in the code "062596" directly followed by the "INFO" button. After activating SAM with this method a service warning will appear on the screen, you can continue by pressing the red button on the RC.

### Contents of SAM:

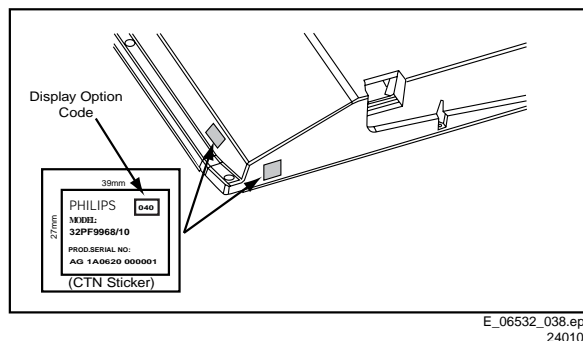
#### • Hardware Info.

- **A. SW Version.** Displays the software version of the main software (**example:** Q522E-1.2.3.4 = AAAAB\_X.Y.W.Z).
  - **AAAA**= the chassis name.
  - **B**= the region: A= AP, E= EU, L= LatAm, U = US. For AP sets it is possible that the Europe software version is used.
  - **X.Y.W.Z**= the software version, where X is the main version number (different numbers are not compatible with one another) and Y.W.Z is the sub version number (a higher number is always compatible with a lower number).
- **B. SBY PROC Version.** Displays the software version of the stand-by processor.
- **C. Production Code.** Displays the production code of the TV, this is the serial number as printed on the back of the TV set. Note that if an NVM is replaced or is initialized after corruption, this production code has to be re-written to NVM. ComPair will foresee in a possibility to do this.
- **Operation Hours.** Displays the accumulated total of operation hours (not the stand-by hours). Every time the TV is switched "on/off", 0.5 hours is added to this number.
- **Errors** (followed by maximal 10 errors). The most recent error is displayed at the upper left (for an error explanation see paragraph "Error Codes").
- **Reset Error Buffer.** When you press "cursor right" (or the "OK" button) and then the "OK" button, the error buffer is reset.
- **Alignments.** This will activate the "ALIGNMENTS" sub-menu.
- **Dealer Options.** Extra features for the dealers.
- **Options.** Extra features for Service. For more info regarding option codes, see chapter 8 "Alignments". Note that if you change the option code numbers, you have to confirm your changes with the "OK" button before you store the options. Otherwise you will loose your changes.
- **Initialise NVM.** The moment the processor recognizes a corrupted NVM, the "initialize NVM" line will be highlighted. Now, you can do two things (dependent of the service instructions at that moment):
  - Save the content of the NVM via ComPair for development analysis, **before** initializing. This will give the Service department an extra possibility for diagnosis (e.g. when Development asks for this).
  - Initialize the NVM.

**Note:** When you have a corrupted NVM, or you have replaced the NVM, there is a high possibility that you will not have picture anymore because your display code is not correct. So, before you can initialize your NVM via the SAM, you need to have a picture and therefore you need the correct display option. Refer to chapter 8 for details. To adapt this option, you can use ComPair (the correct HEX values for the options can be found in chapter 8 "Alignments") or a method via a standard RC (described below).

**Changing the display option via a standard RC:** Key in the code "062598" directly followed by the "MENU" button and "XXX", where XXX is the 3 digit decimal display code (see table "Option code overview" in chapter 8 "Alignments", or sticker on the side/bottom of the cabinet). Make sure to key in all three digits, also the leading zero's. If the above action is successful, the front LED will go out as an indication that the RC sequence was correct. After the display option is changed in the NVM, the TV will go to the Stand-by mode. If the NVM was corrupted or

empty before this action, it will be initialized first (loaded with default values). This initializing can take up to 20 seconds.



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Figure 5-2 Location of Display Option Code sticker

- **Store.** All options and alignments are stored when pressing "cursor right" (or the "OK" button) and then the "OK"-button.
- **SW Maintenance.**
  - **SW Events.** Not useful for Service purposes. In case of specific software problems, the development department can ask for this info.
  - **HW Events.** Not useful for Service purposes. In case of specific software problems, the development department can ask for this info.
- **Test settings.** For development purposes only.
- **Upload to USB.** To upload several settings from the TV to a USB stick, which is connected to the Side I/O. The items are "Channel list", "Personal settings", "Option codes", "Display-related alignments" and "History list". First you have to create a directory "repair" in the root of the USB stick. To upload the settings you have to select each item separately, press "cursor right" (or the "OK" button), confirm with "OK" and wait until "Done" appears. In case the download to the USB stick was not successful "Failure" will appear. In this case, check if the USB stick is connected properly and if the directory "repair" is present in the root of the USB stick. Now the settings are stored onto your USB stick and can be used to download onto another TV or other SSB. Uploading is of course only possible if the software is running and if you have a picture. This method is created to be able to save the customer's TV settings and to store them into another SSB.
- **Download from USB.** To download several settings from the USB stick to the TV. Same way of working as with uploading. To make sure that the download of the channel list from USB to the TV is executed properly, it is necessary to restart the TV and tune to a valid preset if necessary. **Note:** The "History list item" can not be downloaded from USB to the TV. This is a "read-only" item. In case of specific problems, the development department can ask for this info.

### How to Navigate

- In SAM, you can select the menu items with the "CURSOR UP/DOWN" key on the RC-transmitter. The selected item will be highlighted. When not all menu items fit on the screen, move the "CURSOR UP/DOWN" key to display the next/previous menu items.
- With the "CURSOR LEFT/RIGHT" keys, it is possible to:
  - (De) activate the selected menu item.
  - (De) activate the selected sub menu.
- With the "OK" key, it is possible to activate the selected action.

### How to Exit SAM

Use one of the following methods:

- Press the "MENU" button on the RC-transmitter.
- Switch the set to STAND-BY via the RC-transmitter.



### 5.2.3 Customer Service Mode (CSM)

#### Purpose

When a customer is having problems with his TV-set, he can call his dealer or the Customer Help desk. The service technician can then ask the customer to activate the CSM, in order to identify the status of the set. Now, the service technician can judge the severity of the complaint. In many cases, he can advise the customer how to solve the problem, or he can decide if it is necessary to visit the customer.

The CSM is a read only mode; therefore, modifications in this mode are not possible.

When in this chassis CSM is activated, a colour bar test pattern will be visible for 5 seconds. This test pattern is generated by the Pacific3. So if you see this test pattern you can determine that the back end video chain (Pacific3, LVDS, and display) of the SSB is working. In case of a set with DFI panel, an extra test picture is generated. So you will see the Pacific3 test picture for 3 seconds and then the DFI EPLD test picture for another 3 seconds. With this extra test picture you can determine if the DFI board is working properly.

Also new in this chassis: when you activate CSM and there is a USB stick connected to the TV, the software will dump the complete CSM content to the USB stick. The file (Csm.txt) will be saved in the root of your USB stick. This info can be handy if you do not have picture.

Another new item in this chassis is when CSM is activated, the complete error-buffer content will be shown via the blinking LED procedure.

#### How to Activate CSM

Key in the code "123654" via the standard RC transmitter.

**Note:** Activation of the CSM is only possible if there is no (user) menu on the screen!

#### How to Navigate

By means of the "CURSOR-DOWN/UP" knob on the RC-transmitter, you can navigate through the menus.

#### Contents of CSM

- **Set Type.** This information is very helpful for a help desk/workshop as reference for further diagnosis. In this way, it is not necessary for the customer to look at the rear of the TV-set. Note that if an NVM is replaced or is initialized after corruption, this set type has to be re-written to NVM. ComPair will foresee in a possibility to do this.
- **Production Code.** Displays the production code (the serial number) of the TV. Note that if an NVM is replaced or is initialized after corruption, this production code has to be re-written to NVM. ComPair will foresee in a possibility to do this.
- **Code 1.** Gives the last five errors of the error buffer. As soon as the built-in diagnose software has detected an error, the buffer is adapted. The last occurred error is displayed on the leftmost position. Each error code is displayed as a 2-digit number. When less than 10 errors occur, the rest of the buffer is empty (00). See also paragraph "Error Codes" for a description.
- **Code 2.** Gives the first five errors of the error buffer. See also paragraph "Error Codes" for a description.
- **Options 1.** Gives the option codes of option group 1 as set in SAM (Service Alignment Mode).
- **Options 2.** Gives the option codes of option group 2 as set in SAM (Service Alignment Mode).
- **12NC SSB.** Gives an identification of the SSB as stored in NVM. Note that if an NVM is replaced or is initialized after corruption, this identification number has to be re-written to NVM. ComPair will foresee in a possibility to do this. This identification number consists of 14 characters and is built up as follows:
  - Seven last characters of the 12NC of the SSB itself.
  - the serial number of the SSB, which consists of seven digits. Both can be found on a sticker on the PWB of the

SSB itself. The format of the identification number is then as follows: <last seven characters of 12NC of SSB><serial number of SSB> (total fourteen characters).

- **Installed date.** Indicates the date of the first installation of the TV. This date is acquired via time extraction.
- **Digital Natural Motion.** Gives the status of the Digital Natural Motion setting as set by the customer. Remark: a customer can choose between "OFF", "MINIMUM" and "MAXIMUM", but in CSM this item will only show "OFF" or "ON" ("ON" in case the customer has chosen "MINIMUM" or "MAXIMUM")
- **Pixel Plus.** Gives the last status of the Perfect Pixel HD setting, as set by the customer. Possible values are "ON" and "OFF". See DFU on how to change this item.
- **DNR.** Gives the last status of the Noise reduction setting, as set by the customer. Possible values are "OFF", "MINIMUM", "MEDIUM" and "MAXIMUM". See DFU on how to change this item.
- **Noise Figure.** Gives an indication of the signal quality for the selected transmitter. Possible values are "BAD", "AVERAGE", "GOOD" and "DIGITAL". In case of a digital channel, this item will never indicate: "BAD", "GOOD" or "AVERAGE" but only displays "DIGITAL".
- **12NC Display.** Shows the 12NC of the display.
- **Head phone Volume.** Gives the last status of the head phone volume, as set by the customer. The value can vary from 0 (volume is minimum) to 100 (volume is maximum). See DFU on how to change this item.
- **Surround Mode.** Indicates the by the customer selected sound mode (or automatically chosen mode). Possible values are "STEREO" and "VIRTUAL DOLBY SURROUND". It can also have been selected automatically by signalling bits (internal software). See DFU on how to change this item.
- **AVL.** Indicates the last status of AVL (Automatic Volume Level) as set by the customer: See DFU on how to change this item.
- **Delta Volume.** Indicates the last status of the delta volume for the selected preset as set by the customer: from "-12" to "+12". See DFU on how to change this item.
- **Volume.** Indicates the last status of the volume for the selected preset as set by the customer: from "0" to "100". See DFU on how to change this item.
- **Balance.** Indicates the last status of the balance for the selected preset as set by the customer: from "-10" to "+10". See DFU on how to change this item.
- **Preset Lock.** Indicates if the selected preset has a child lock: "LOCKED" or "UNLOCKED". See DFU on how to change this item.
- **Child Lock.** Indicates the status of the Child lock. See DFU on how to change this item.
- **Lock After.** Indicates at what time the channel lock is set: "OFF" or e.g. "18:45" (lock time). See DFU on how to change this item.
- **Parental Rating Lock.** Indicates the "Parental rating" as set by the customer. See DFU on how to change this item.
- **Parental Rating Status.** Indicates the "Parental rating" as transmitted by the broadcaster (if applicable). If the parental rating status is indicating a higher age then the parental rating lock as set by the customer, you will need to enter the child lock code.
- **TV Ratings Lock.** Only applicable for US.
- **Movie Ratings Lock.** Only applicable for US.
- **On timer.** Indicates if the "On timer" is set "ON" or "OFF" and when it is set to "ON", also start time, start day and program number is displayed. See DFU on how to change this item.
- **Location.** Gives the last status of the location setting as set via the installation menu. Possible values are "SHOP" and "HOME". If the location is set to "SHOP", several settings are fixed. So for a customer location must be set to "HOME". Can be changed via the installation menu (see also DFU).
- **HDMI Key Validity.** Indicates if the HDMI keys (or HDCP keys) are valid or not. In case these keys are not valid and

the customer wants to make use of the HDMI functionality, the SSB has to be replaced.

- **Tuner Frequency.** Indicates the frequency the transmitter is tuned to.
- **TV System.** Gives information about the video system of the selected transmitter. In case a DVBT signal is received this item will also show ATSC.
  - BG: PAL BG signal received
  - DK: PAL DK signal received
  - L/La: SECAM L/La signal received
  - I: PAL I signal received
  - M: NTSC M signal received
  - ATSC: ATSC signal received
  - DVB: DVBT signal received
- **12NC One Zip SW.** Displays the 12NC number of the one-zip file as it is used for programming software in production. In this one-zip file all below software versions can be found.
- **Initial Main SW.** Displays the main software version which was initially loaded by the factory.
- **Current Main SW.** Displays the built-in main software version. In case of field problems related to software, software can be upgraded. As this software is consumer upgradable, it will also be published on the Internet. Example: Q582E\_1.2.3.4.
- **Flash Utils SW.** Displays the software version of the software which contains all necessary components of the download application. To program this software, EJTAG tooling is needed. Example: Q582E\_1.2.3.4.
- **Stand-by SW.** Displays the built-in stand-by processor software version. Upgrading this software will be possible via ComPair or via USB (see chapter Software upgrade). Example: STDBY\_3.0.1.2.
- **MOP SW.** Only applicable for US. At the time of release of this manual, there was still a problem with this item, and some rubbish was displayed. Ignore this.
- **Pacific 3 Flash SW (if applicable).** Displays the Pacific 3 software version.
- **NVM Version.** Displays the NVM version as programmed by factory.
- **Display Parameters.** for development purposes only.
- **Private PQ Parameters.** for development purposes only.
- **Public PQ Parameters.** for development purposes only.
- **Ambilight Parameters.** for development purposes only.
- **Acoustics Parameters.** for development purposes only.

- **DFI Software (if applicable).** Displays the DFI EPLD software.
- **DFI Ambilight software (if applicable).** Displays the DFI ambilight EPLD software.

**How to Exit CSM**

Press "MENU" on the RC-transmitter.

**5.3 Stepwise Start-up**

There are two possible situations: one for protections detected by the stand-by software and one for protections detected by the main software.

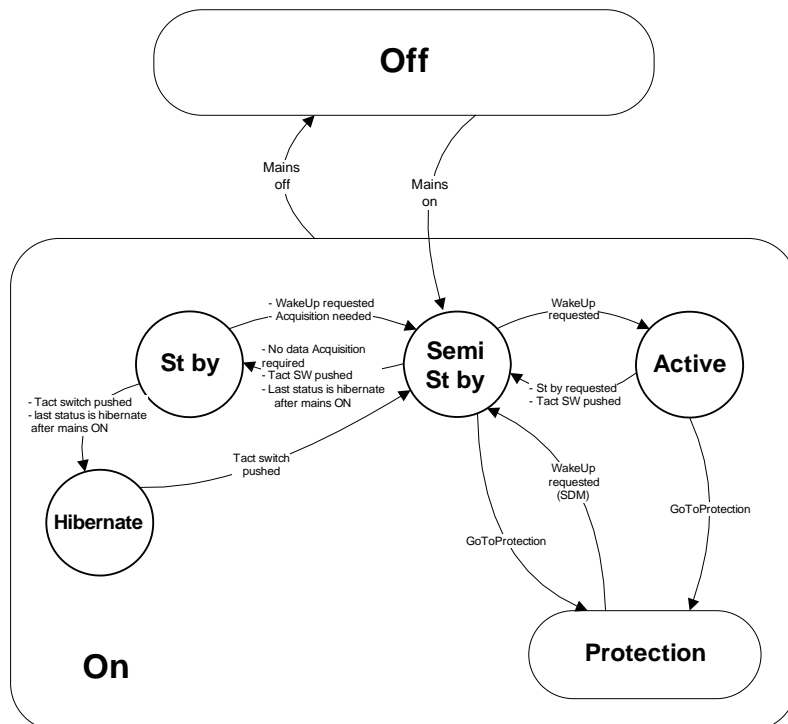
When the TV is in a protection state due to an error detected by stand-by software (and thus blinking an error) **and** SDM is activated via short-circuiting the pins on the SSB, the TV starts up until it reaches the situation just before protection. So, this is a kind of automatic stepwise start-up. In combination with the start-up diagrams below, you can see which supplies are present at a certain moment. Important to know is, that if e.g. the 3V3 detection fails (and thus error 8 is blinking) **and** the TV is restarted via SDM, the Stand-by Processor will enable the 3V3, but will not go to protection now. The TV will stay in this situation until it is reset (Mains/AC Power supply interrupted). Caution: in case the start up in this mode with a faulty FET 7U08 is done, you can destroy all ICs supplied by the +3V3, due to overvoltage. It is recommended to measure first the FET 7U08 on short-circuit before activating SDM via the service pads.

When the TV is in protection state due to an error detected by main software (MIPS protection) **and** SDM is activated via short-cutting the service pads on the SSB, the TV starts up and ignores the error.

In this chassis, only error "63" (power-ok) is a MIPS protection and already displays the failure via blinking LED.

The abbreviations "SP" and "MP" in the figures stand for:

- SP: protection or error detected by the Stand-by Processor.
- MP: protection or error detected by the MIPS Main Processor.



The Protection state and the Hibernate state are hardware wise identical to the Standby state but have other, more limited wake up reasons.

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Figure 5-3 Transition diagram

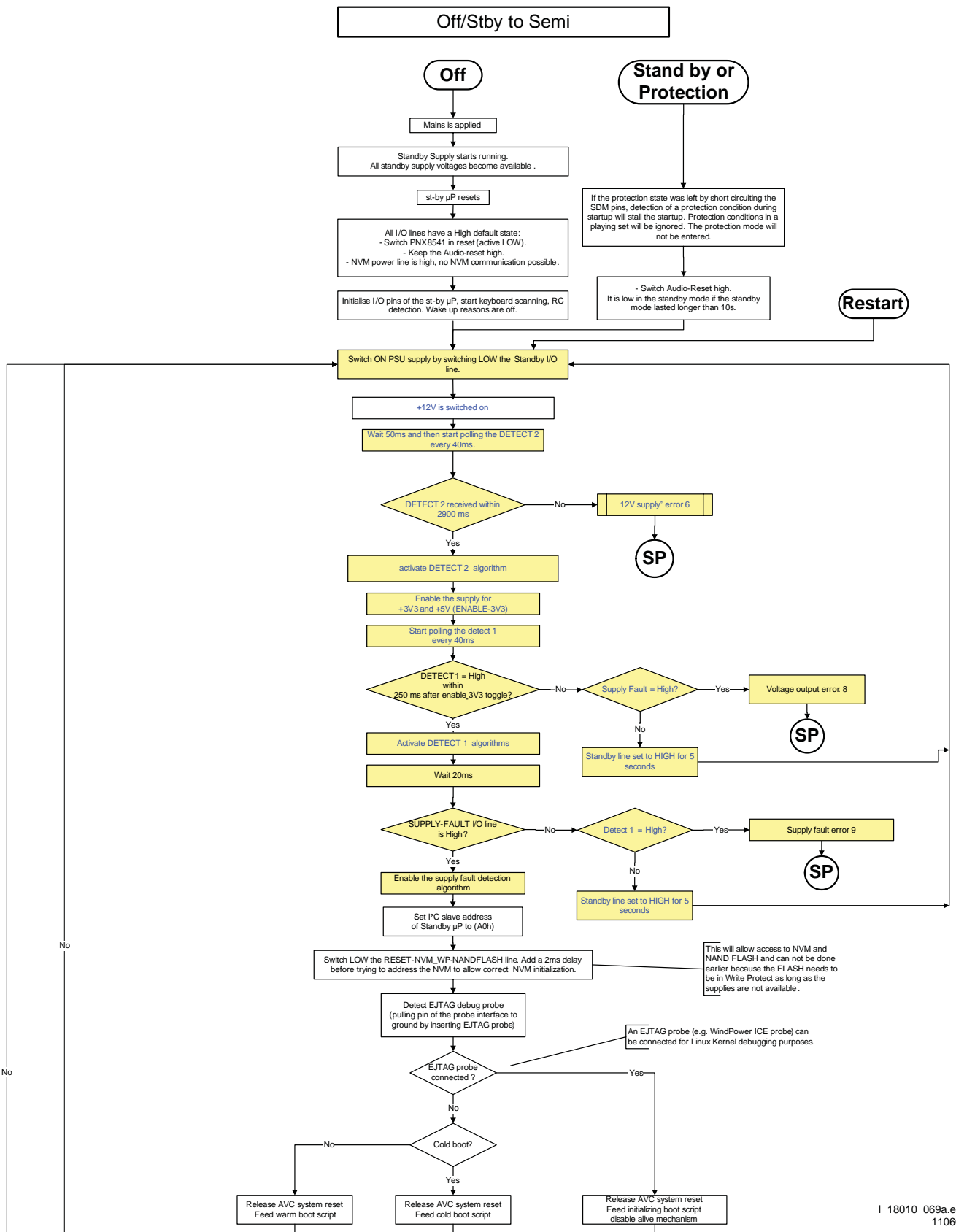


Figure 5-4 "Off" to "Semi Stand-by" flowchart (part 1)

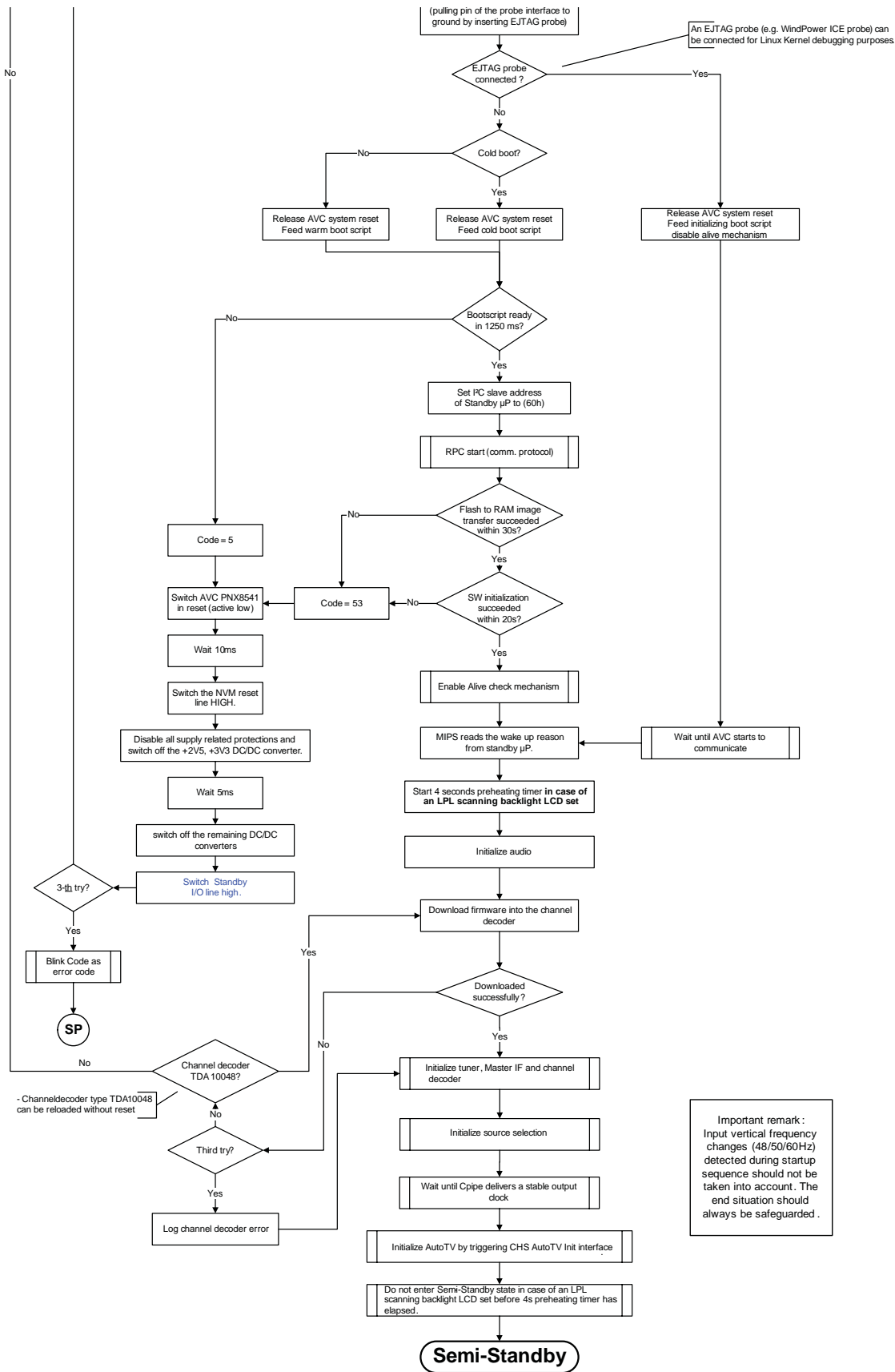


Figure 5-5 “Off” to “Semi Stand-by” flowchart (part 2)

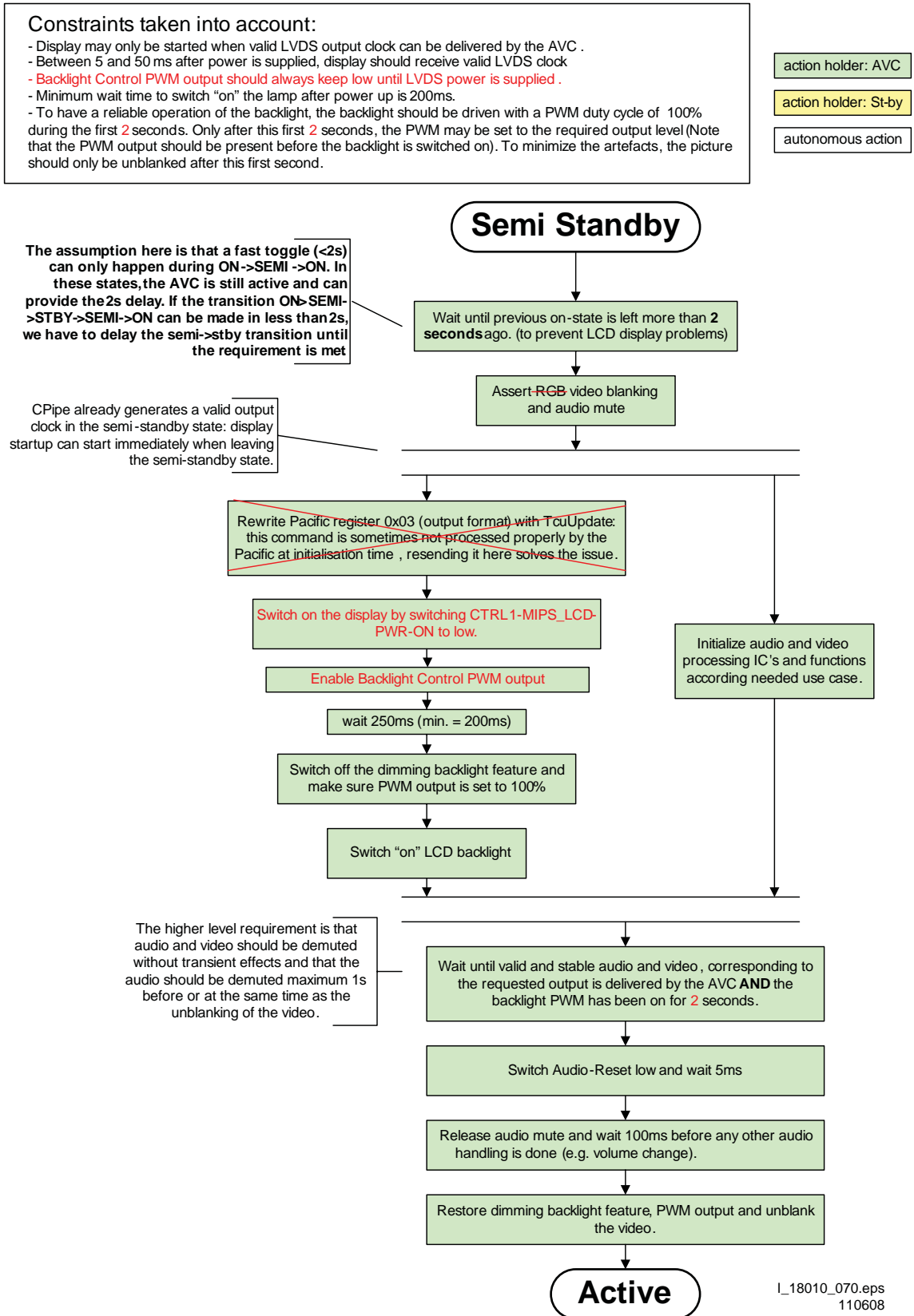


Figure 5-6 "Semi Stand-by" to "Active" flowchart (non-DFI)

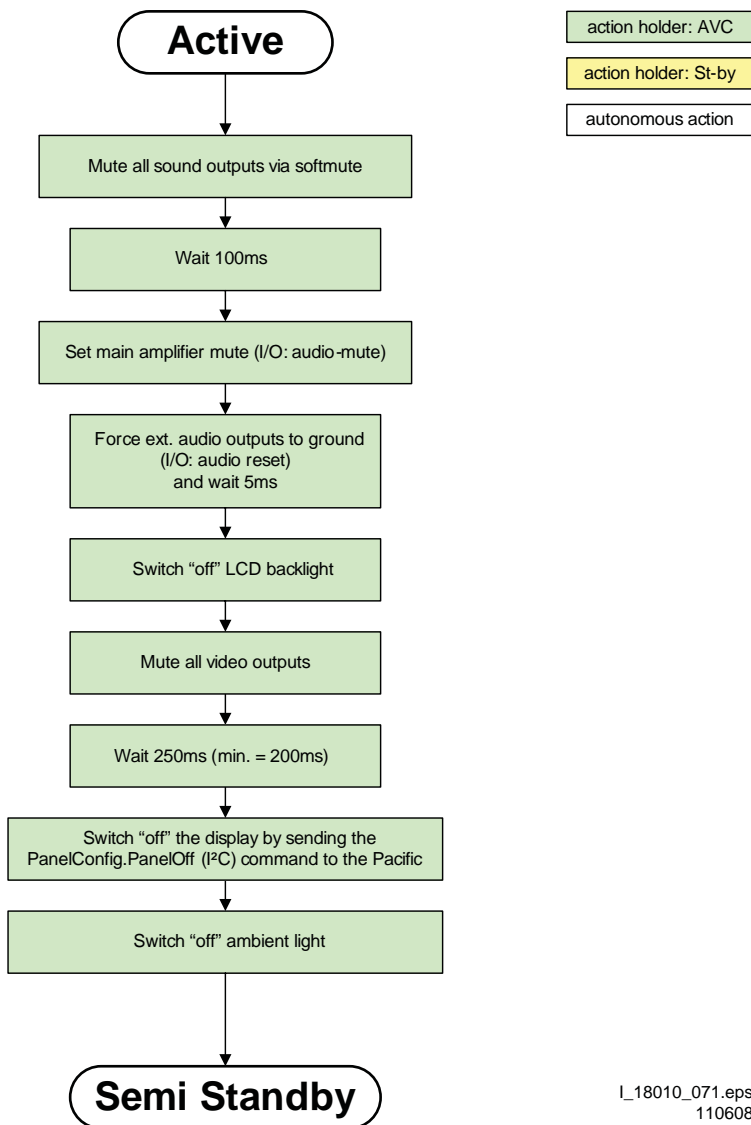


Figure 5-7 "Active" to "Semi Stand-by" flowchart (non-DFI)

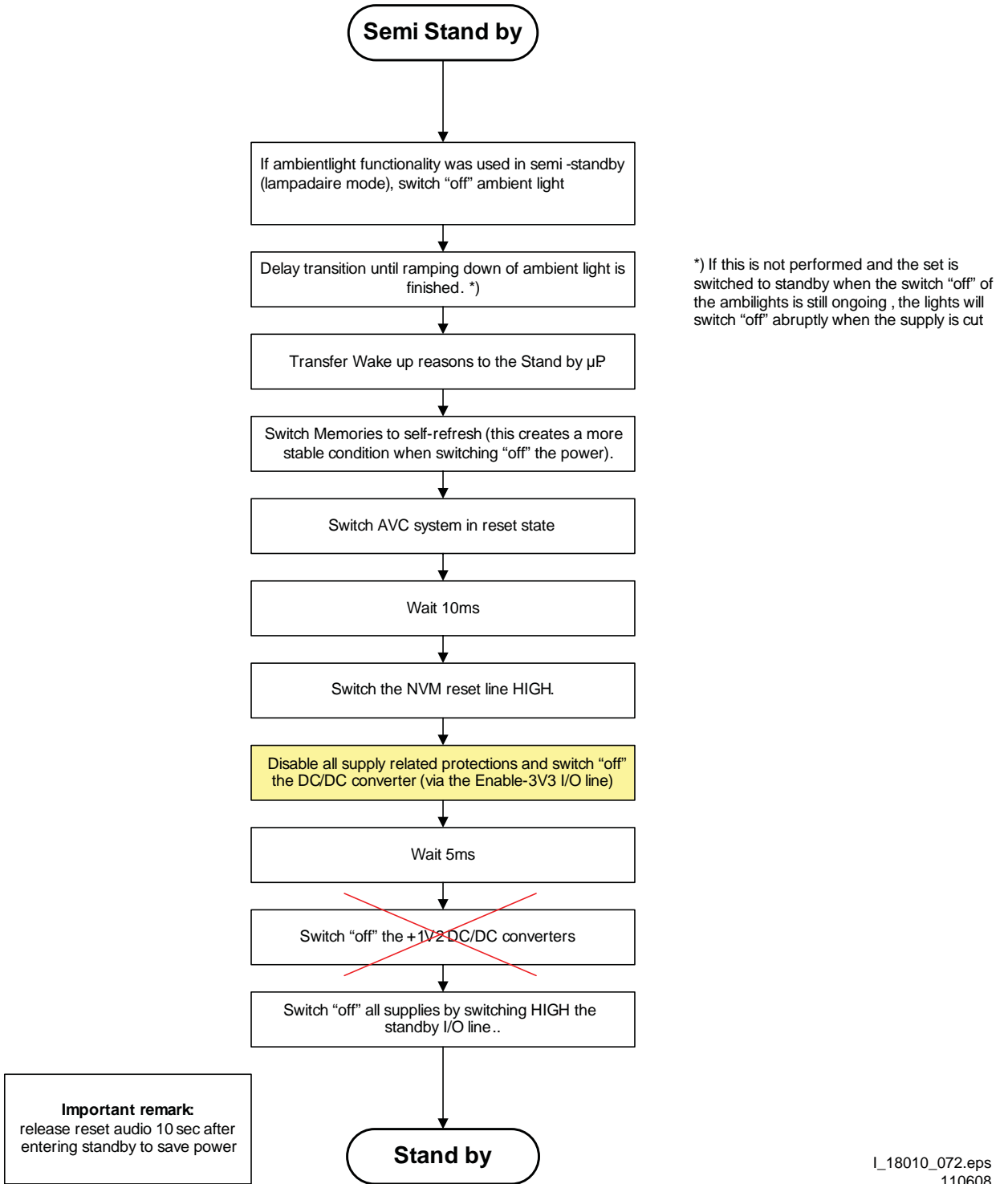


Figure 5-8 "Semi Stand-by" to "Stand-by" flowchart



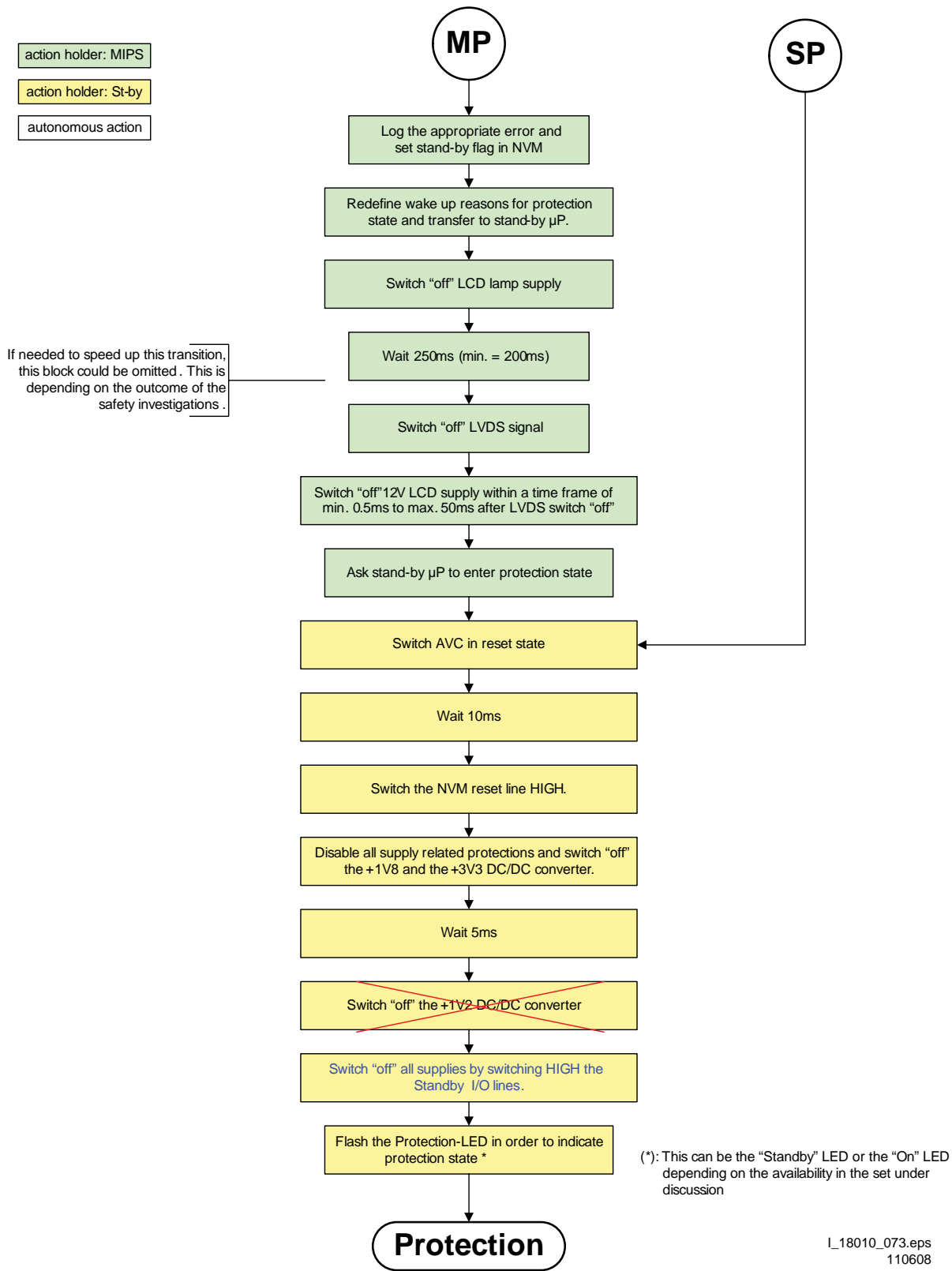


Figure 5-9 "To Protection" state flowchart

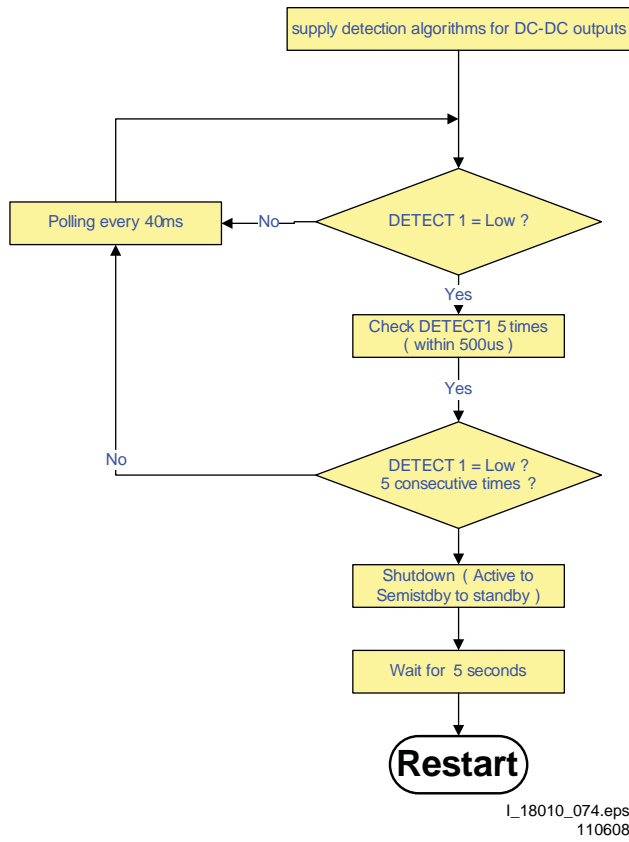


Figure 5-10 “DC-DC output control” flowchart

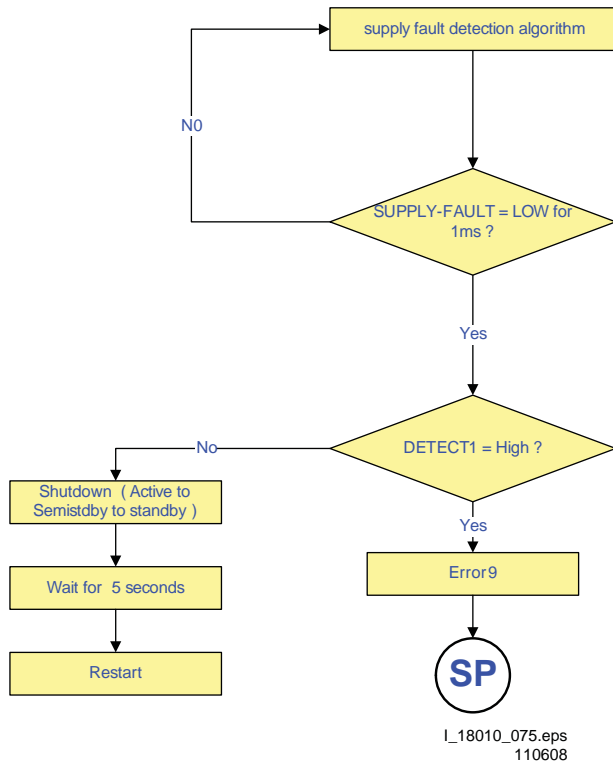
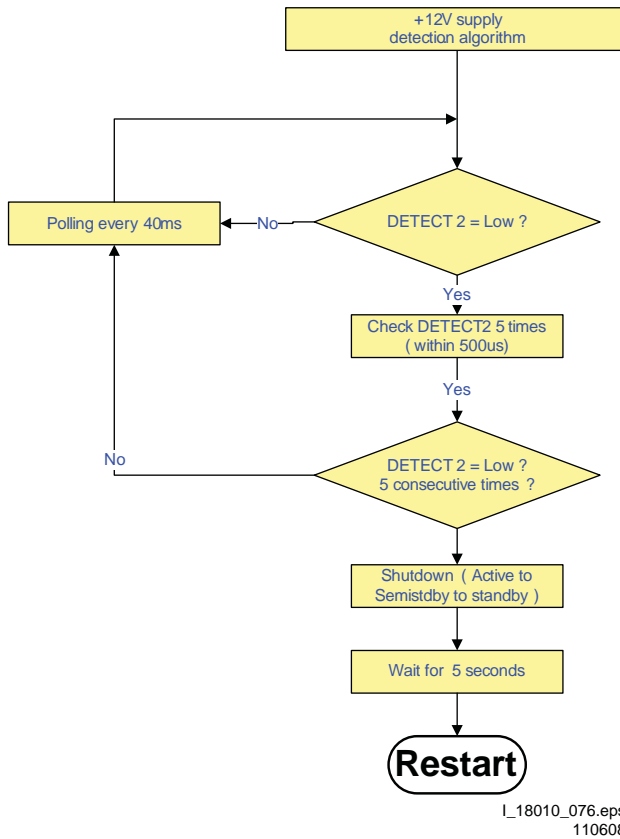


Figure 5-11 “Supply fault detection” flowchart



L\_18010\_076.eps  
110608

Figure 5-12 “+12V fault detection” flowchart

## 5.4 Service Tools

### 5.4.1 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 I<sup>2</sup>C or UART commands yourself, because ComPair takes care of this.
3. ComPair speeds up the repair time since it can automatically communicate with the chassis (when the up is working) and all repair information is directly available.
4. ComPair features TV software upgrade possibilities.

#### Specifications

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

#### How to Connect

This is described in the ComPair chassis fault finding database.

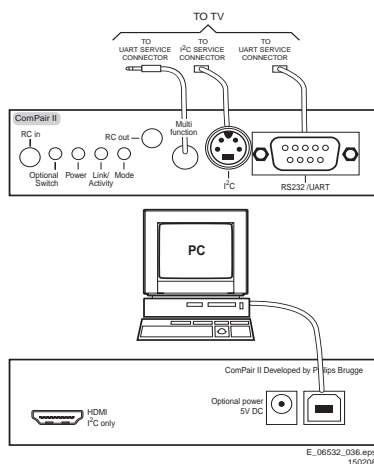


Figure 5-13 ComPair II interface connection

**Caution:** The way of connection for this chassis is different compared to the other Q52x chassis! This chassis uses UART communication instead of RS232 which means that the voltage levels are different. When you connect this chassis with a ComPair RS232 cable, this might result in damaging the TV! **Therefore, it is compulsory to use ComPair II interface together with the below mentioned Jack/Jack cable.**

#### 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 Jack/Jack cable: 3138 188 75051.

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

### 5.4.2 LVDS Tool

Support of the LVDS Tool has been discontinued.

## 5.5 Error Codes

### 5.5.1 Introduction

The error code buffer contains all detected errors since the last time the buffer was erased. The buffer is written from left to right, new errors are logged at the left side, and all other errors shift one position to the right.

When an error occurs, it is added to the list of errors, provided the list is not full. When an error occurs and the error buffer is full, then the new error is not added, and the error buffer stays intact (history is maintained).

To prevent that an occasional error stays in the list forever, the error is removed from the list after more than 50 hrs. of operation.

When multiple errors occur (errors occurred within a short time span), there is a high probability that there is some relation between them.

Basically there are three kinds of errors:

- **Errors detected by the Stand-by software.** These errors will always lead to protection and an automatic start of the blinking LED for the concerned error (see paragraph "The Blinking LED Procedure"). In these cases SDM can be used to start up (see chapter "Stepwise Start-up"). Note that it can take up to 90 seconds before the TV goes to protection and starts blinking the error (e.g. error 53)
- **Errors detected by main software that lead to protection.** In this case the TV will go to protection and the front LED should also blink the concerned error. See also paragraph "Error Codes" -> "Error Buffer" -> "Extra Info". For this chassis only error 63 is a protection error detected by main software.
- **Errors detected by main software that do not lead to protection.** In this case the error will be logged into the error buffer and can be read out via ComPair, via blinking LED method, or in case you have picture, via SAM.

### 5.5.2 How to Read the Error Buffer

Use one of the following methods:

- On screen via the SAM (only if you have a picture). E.g.:
  - **00 00 00 00 00:** No errors detected
  - **06 00 00 00 00:** Error code 6 is the last and only detected error
  - **09 06 00 00 00:** Error code 6 was first detected and error code 9 is the last detected error
- Via the blinking LED procedure (when you have no picture). See next paragraph.
- Via ComPair.
- Via CSM. when CSM is activated the blinking LED procedure will start and the CSM content will be written to a USB stick (if present).

### 5.5.3 How to Clear the Error Buffer

Use one of the following methods:

- By activation of the "RESET ERROR BUFFER" command in the SAM menu.
- With a normal RC, key in sequence "MUTE" followed by "062599" and "OK".
- If the content of the error buffer has not changed for 50+ hours, it resets automatically.

### 5.5.4 Error Buffer

In case of non-intermittent faults, clear the error buffer before you begin the repair (**before** clearing the buffer, write down the content, as this history can give you significant information). This to ensure 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

code and not the actual cause (e.g., a fault in the protection detection circuitry can also lead to a protection).

There are several mechanisms of error detection:

- Via error bits in the status registers of ICs.
- Via polling on I/O pins going to the stand-by processor.
- Via sensing of analogue values on the stand-by processor or the PNX85xx.
- Via a "not acknowledge" of an I<sup>2</sup>C communication.

Take notice that some errors need more than 90 seconds before they start blinking or before they will be logged. So in case of problems wait 2 minutes from start-up onwards, and then check if the front LED is blinking or if an error is logged.

Error	Description	Error/Prot	Detected by	Device	Result
3	I2C3	E	MIPS	PNX85xx	Error ogged.
5	PNX85xx does not boot (HW cause)	E	Stby P	PNX85xx	Error blinking.
6	5V, 12V supply	P	Stby P	/	Protection + Error blinking.
8	1V2, 1V4, 2V5, 3V3 supply	P	Stby P	/	Protection + Error blinking.
9	Supply fault	P	Stby P	/	Protection + Error blinking.
23	HDMI mux	E	MIPS	AD8190/8191/8197	Error logged.
26	Master IF	E	MIPS	TDA9898/9897/9890	Error logged.
34	Tuner	E	MIPS	TD1716	Error logged.
37	Channel decoder	E	MIPS	TDA10060/TDA10048	Error logged.
53	PNX85xx does not boot (SW cause)	E	Stby P	PNX85xx	Error blinking.

#### Extra Info

- **Rebooting.** When a TV is constantly rebooting due to internal problems, most of the time no errors will be logged or blinked. This rebooting can be recognized via a ComPair interface and Hyperterminal (for Hyperterminal settings, see paragraph "Stand-by software upgrade). You will see that the loggings which are generated by the main software keep continuing. In this case (rebooting) diagnose has to be done via ComPair.
- **Error 3 (I<sup>2</sup>C bus 3 blocked).** When this error occurs, the TV will constantly reboot due to the blocked bus. The best way for further diagnosis here, is to use ComPair (e.g. read out the NVM content). Instead of error "3" it is possible you will see error "2" in the error buffer.
- **Error 5 (PNX85xx doesn't boot).** When this error occurs, the TV main processor was not able to read his bootscript. This error will point to a hardware problem around the PNX85xx (supplies not OK, PNX 8535 completely dead, I2C link between PNX and Stand-by Processor broken, etc...). When error 5 occurs it is also possible that I2C2 bus is blocked (NVM). I2C2 can be indicated in the schematics as follows: SCLUP-MIPS, SDA-UP-MIPS, SCL-SLAVE, SDA-SLAVE, SCL-2 or SDA-2.
- **Error 5 (PNX85xx doesn't boot).** When this error occurs, the TV main processor was not able to read his bootscript. This error will point to a hardware problem around the PNX85xx (supplies not OK, PNX 8535 completely dead, I2C link between PNX and Stand-by Processor broken, etc...). When error 5 occurs it is also possible that I2C2 bus is blocked (NVM). I2C2 can be indicated in the schematics as follows: SCLUP-MIPS, SDA-UP-MIPS, SCL-SLAVE, SDA-SLAVE, SCL-2 or SDA-2.
- **Error 6 (5V, 12V supply).** When this error occurs, the TV set shutdown in protection mode and follow with the Error blinking. This error will point to a hardware problem around the DC/DC (B02C) probably 5V supply is under voltage cause the "PROT-DC" (B02C) line activated. Or another possibility is the 12V supply under voltage cause the "DETECT2" (B04A) line activated.
- **Error 8 (1V2, 3V3 supply).** When this error occurs, the TV set shutdown in protection mode and follow with the Error blinking. This error will point to a hardware problem around

the DC/DC +3V3-STANDBY\_+1V2-STANDBY (B02B) probably 1V2 STANDBY and 3V3 STANDBY under voltage cause the "DETECT1" (B04A) line activated.

- **Error 9 (Supply fault).** When this error occurs, the TV set shutdown in protection mode and follow with the Error blinking. This error will point to a hardware problem around the DC/DC 3V3\_1V2 (B02A) probably the CLASS D amplifier output cause the "SUPPLY FAULT" (B10A) line activated.
- **Error 23 (HDMI MUX).** When this error occurs it means that there is a problem with the I2C communication towards the HDMI MUX IC AD8197. This error will point to a hardware problem around the Digi IO HDMI MUX (B08C). It is possible you will see error "23" logged in the error buffer. The best way for further diagnosis, is to use ComPair (e.g. read out the NVM content).
- **Error 26 (Master IF).** When this error occurs it means that there is a problem with the I2C communication towards the MASTER IF TDA9898. it is probably will be no picture and sound from tuner input. This error will point to a hardware problem around the Main Tuner (B03A) IF processing IC. It is possible you will see error "26" logged in the error buffer.
- **Error 34 (Tuner).** When this error occurs it means that there is a problem with the I2C communication towards the Tuner 1716. There probably will be no picture and sound from tuner input.
- This error will point to a hardware problem around the Main Tuner (B03A). As a side effect of error 34, it is possible that error 24 (no existing error) is also logged.
- **Error 37 (Channel decoder).** When this error occurs, there probably will be no picture and sound from tuner input. As a side effect of error 37 it is possible that error 4 (no existing error) is also logged.
- **Error 53.** This error will indicate that the PNX85xx has read his bootscript (if this would have failed, error 5 would blink) but initialization was never completed because of hardware problems (NAND flash, ...) or software initialization problems. Possible cause could be that there is no valid software loaded (try to upgrade to the latest main software version). Note that it can take up to 2 minutes before the TV starts blinking error 53.

## 5.6 The Blinking LED Procedure

### 5.6.1 Introduction

The blinking LED procedure can be split up into two situations:

- **Blinking LED procedure in case of a protection.** In this case the error is automatically blinked. This will be only one error, namely the one that is causing the protection. Therefore, you do not have to do anything special, just read out the blinks. A long blink indicates the decimal digit, a short blink indicates the units.
- **Blinking LED procedure in the "on" state.** Via this procedure, you can make the contents of the error buffer visible via the front LED. This is especially useful for fault finding, when there is no picture.

When the blinking LED procedure is activated in the "on" state, the front LED will show (blink) the contents of the error-buffer.

Error-codes > 10 are shown as follows:

1. "n" long blinks (where "n" = 1 - 9) indicating decimal digit,
2. A pause of 1.5 s,
3. "n" short blinks (where "n" = 1 - 9),
4. A pause of approx. 3 s,
5. When all the error-codes are displayed, the sequence finishes with a LED blink of 3 s,
6. The sequence starts again.

**Example:** Error 12 8 6 0 0.

After activation of the SDM, the front LED will show:

1. 1 long blink of 750 ms (which is an indication of the decimal digit) followed by a pause of 1.5 s,
2. 2 short blinks of 250 ms followed by a pause of 3 s,
3. 8 short blinks followed by a pause of 3 s,
4. 6 short blinks followed by a pause of 3 s,
5. 1 long blink of 3 s to finish the sequence,
6. The sequence starts again.

### 5.6.2 How to Activate

Use one of the following methods:

- **Activate the SDM or CSM.** The blinking front LED will show the entire contents of the error buffer (this works in "normal operation" mode).
- **Transmit the commands "MUTE" - "062500" - "OK" with a normal RC.** The complete error buffer is shown. Take notice that it takes some seconds before the blinking LED starts.
- **Transmit the commands "MUTE" - "06250x" - "OK" with a normal RC** (where "x" is a number between 1 and 5). When x= 1 the last detected error is shown, x= 2 the second last error, etc.... Take notice that it takes some seconds before the blinking LED starts.

## 5.7 Protections

### 5.7.1 Software Protections

Most of the protections and errors use either the stand-by microprocessor or the MIPS controller as detection device. Since in these cases, checking of observers, polling of ADCs, and filtering of input values are all heavily software based, these protections are referred to as software protections.

There are several types of software related protections, solving a variety of fault conditions:

- **Protections related to supplies:** check of the 12V, +5V, +1V2, and +3V3.
- **Protections related to breakdown of the safety check mechanism.** E.g. since the protection detections are done by means of software, failing of the software will have to initiate a protection mode since safety cannot be guaranteed any more.

#### **Remark on the Supply Errors**

The detection of a supply dip or supply loss during the normal playing of the set does not lead to a protection, but to a cold reboot of the set. If the supply is still missing after the reboot, the TV will go to protection.

#### **Protections during Start-up**

During TV start-up, some voltages and IC observers are actively monitored to be able to optimise the start-up speed, and to assure good operation of all components. If these monitors do not respond in a defined way, this indicates a malfunction of the system and leads to a protection. As the observers are only used during start-up, they are described in the start-up flow in detail (see paragraph "Stepwise Start-up").

### 5.7.2 Hardware Protections

The only real hardware protection in this chassis is (in case of an audio problem) the audio protection circuit that will switch "off" immediately the supply of the SSB. The supply will buzz during the protection and +12VS drops to approx. 5V5 and +5V Stand-by to approx. to 1V9. Other indication of the audio protection is that the red LED lights up with an intensity of 50%.

#### **Repair Tips**

- It is also possible that you have an audio DC protection because of an interruption in one or both speakers (the DC voltage that is still on the circuit cannot disappear through the speakers).  
**Caution:** (dis)connecting the speaker wires during the ON state of the TV at high volume can damage the audio amplifier.

## 5.8 Fault Finding and Repair Tips

Read also paragraph "Error Codes" -> "Error Buffer" -> "Extra Info".

### 5.8.1 CSM

When you activate CSM and there is a USB stick connected to the TV, the software will dump the complete CSM content to the USB stick. The file (Csm.txt) will be saved in the root of your USB stick. If this mechanism works you can conclude that a large part of the operating system is already working (MIPS, USB...)

### 5.8.2 DC/DC Converter

#### Introduction

- The best way to find a failure in the DC-DC converters is to check their starting-up sequence at "power-on via the mains cord", presuming that the stand-by microprocessor is operational.
- If the input voltage of DC-DC converters is around 12.7 V (measured on decoupling capacitors 2U0W and 2U0Y) and the enable signals are "low" (active), then the output voltages should have their normal values. The +1.2 V supply starts-up when +12 V appears, then at least 100 ms later, the +3.3 V will be activated via the ENABLE-3V3 signal from the stand-by microprocessor. If +12 V value is less than 10 V then the last enumerated voltages will not show-up due to the under-voltage detection circuit 7U01-1 + 6U04 and surrounding components. Furthermore, if +12 V is less than 8 V then also +1.2 V will not be available.
- The consumption of controller IC 7U0A is around 19 mA (that means almost 200 mV drop voltage across resistor 3U70).
- The current capability of DC-DC converters is quite high (short-circuit current is 7 to 10 A), therefore if there is a linear integrated stabiliser that, for example, delivers 1.8 V from +3.3 V with its output overloaded, the +3.3 V stays usually at its normal value even though the consumption from +3.3 V increases significantly.
- The SUPPLY-FAULT signal (active low) is an internal protection (error 9) of the DC-DC convertor and will occur if the output voltage of any DC-DC convertor is out of limits (10% of the normal value).

#### Fault Finding

- **Symptom:** +1.2 V not present (only for a short while ~10 ms)
  1. Check 12 V availability (resistor 3U70, MOS-FETs 7U05 and 7U06), value of +12 V, and surrounding components).
  2. Check the voltage on pin 9 (1.5 V).
  3. Check for +1.2 V output voltage short-circuit to GND that can generate pulsed over-currents 7 to 10 A through coil 5U00.
  4. Check the over-current detection circuit (2U00 or 3U17 interrupted).
- **Symptom:** +1.2 V present for about 100 ms, +3.3 V not rising.
  1. Check the ENABLE-3V3 signal (active "low").
  2. Check the voltage on pin 8 (1.5 V).
  3. Check the under-voltage detection circuit (the voltage on collector of transistor 7U01-1 should be less than 0.8 V).
  4. Check for output voltages short-circuits to GND (+3.3 V) that can generate pulsed overcurrents 7 to 10 A through coil 5U01.
  5. Check the over-current detection circuit (2U04 or 3U14 interrupted).
- **Symptom:** +1.2 V OK, +2.5 V and +3.3 V present for about 100 ms. **Possible cause:** SUPPLY-FAULT line stays "low" even though the +3.3 V and +1.2 V is available

- the stand-by microprocessor is detecting that and switching "off" all supply voltages.

1. Check the drop voltage across resistor 3U70 or 3U3T (they could be too high, meaning a defective controller IC or MOS-FETs).
  2. Check if the boost voltage on pin 4 of controller IC 7U0A is less than 14 V (should be 19 V).
  3. Check if +1.2 V or +3.3 V are higher than their normal values. That can be due to defective DC feedback of the respective DC-DC convertor (ex. 3U1J, 3U75)
- **Symptom:** +1.2 V or +3.3 V show a high level of ripple voltage (audible noise can come from the filtering coils 5U00 or 5U01). **Possible cause:** instability of the frequency and/or duty cycle of a DC-DC converter or stabiliser.
    1. Check the resistor 3U0H and 3U2E, capacitors 2U0C and 2U0A, input and output decoupling capacitors.
    2. Check a.c. feedback circuits (2U08+2U09+3U07+3U08 for +1.2 V and 2U03+2U05+3U04 for +3.3 V)

**Note:** when a pair of power MOSFETs (7U08-1/2 or 7U05-1/2) becomes defective, the controller IC 7U0A must be replaced as well.

### 5.8.3 Exit "Factory Mode"

When an "F" is displayed in the screen's right corner, this means that the set is in "Factory" mode, and it normally happens after a new SSB has been mounted.

To exit this mode, push the "Volume minus" button on the TV's keyboard control for 5 seconds and restart the set.



5.8.4 SSB Replacement

Follow the instructions in the flowchart in case you have to exchange the SSB. See figure "SSB replacement flowchart".

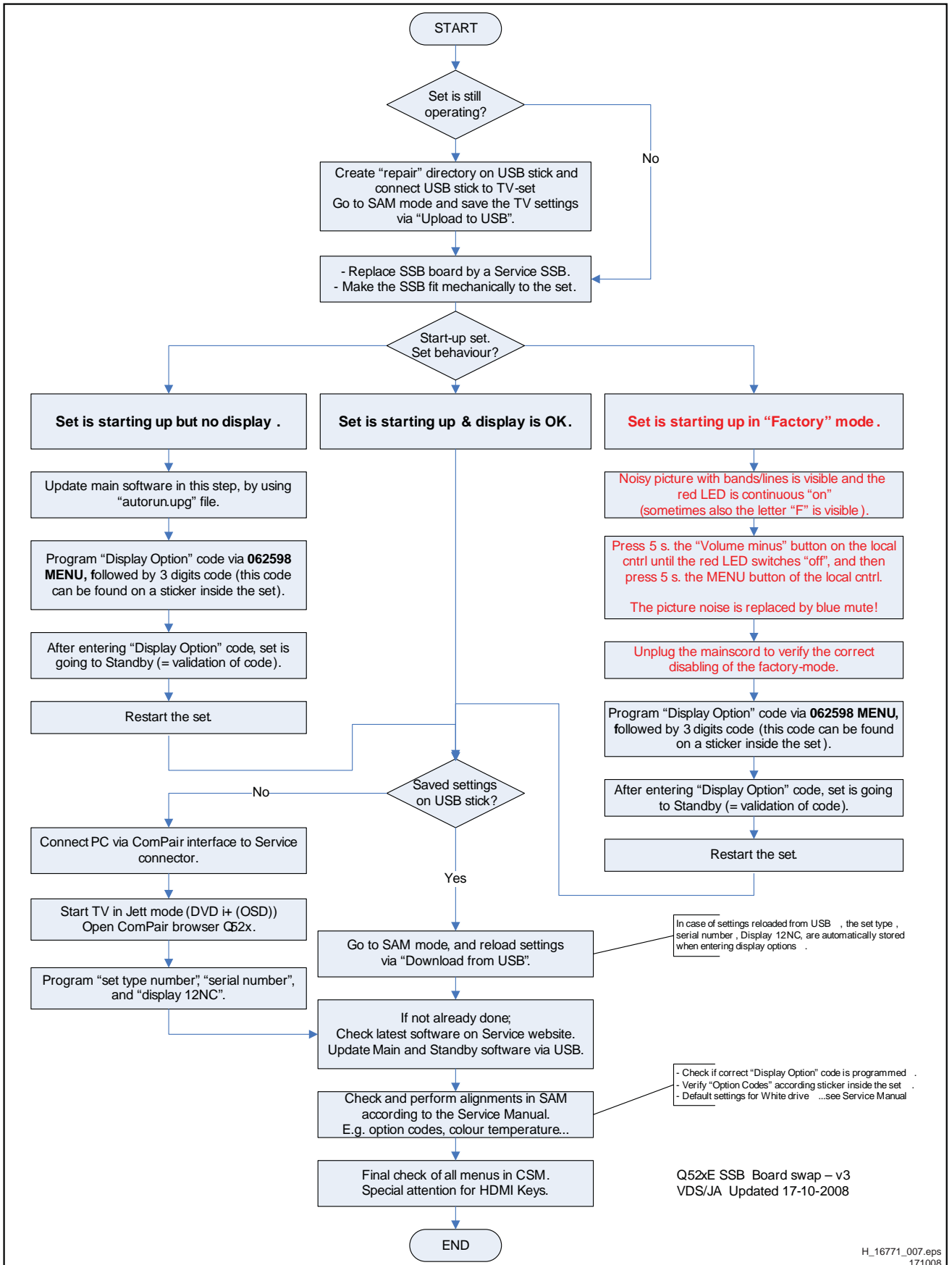


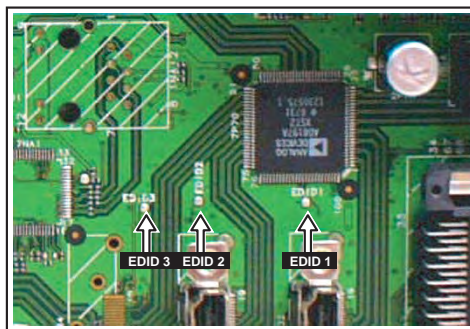
Figure 5-14 SSB replacement flowchart

5.8.5 Display option code

**Caution:** In case you have replaced the SSB, **always** check the display option code in SAM, even if you have picture. With a wrong display option code it is possible that you have picture, but that in certain conditions you have unwanted side-effects.

5.8.6 Upgrade EDID NVM

To upgrade the EDID NVM you must short circuit pin 7 of the EDID NVM to ground. Therefore some test points (EDID1, EDID2 and EDID3) are foreseen next to the HDMI connectors (figure “EDID-NVM pins”). See ComPair for further instructions.



H\_17650\_089.eps  
160108

Figure 5-15 EDID-NVM pins

5.9 Software Upgrading

5.9.1 Introduction

The set software and security keys are stored in a NAND-Flash, which is connected to the PNX85xx via the PCI bus.

It is possible **for the user** to upgrade the **main** software via the USB port. This allows replacement of a software image in a stand alone set, without the need of an E-JTAG debugger. A description on how to upgrade the main software can be found in the DFU.

**Important:** When the NAND-Flash must be replaced, a new SSB must be ordered, due to the presence of the security keys!!! (copy protection keys, MAC address, ...).

Perform the following actions after SSB replacement:

1. Set the correct option codes (see sticker inside the TV).
2. Update the TV software (see the DFU for instructions).
3. Perform the alignments as described in chapter 8 (section “Reset of Repaired SSB”).
4. Check in CSM if the HDMI keys are valid.

5.9.2 Main Software Upgrade

The software image resides in the NAND-Flash, and is formatted in the following way (refer to table “NAND-flash content”):

Table 5-2 NAND flash content

NAND Flash content		One ZIP					
		Fuse UPG		Upgrade all UPG		Flash Utils UPG	
Partition	Content	Erase	Program	Erase	Program	Erase	Program
JFFS2 partition 1 (application read write data)	Channel table, EPG data,...		X	X	X		
JFFS2 partition 0 (Application read only once data)	HDMI keys, back up display file, ...			X	X		
JFFS2 partition 0 (Application read only upgradable data)	wizard pictures, display file, cabinet file, upgrade assistant, ...		X	X	X		
SQUASHFS partition	Main software (Mips), Linux structure (root file system)	X	X	X	X		
BFFS partition 2 (DVD OK)	Default software upgrade application TriMedia software boot batch file 2	X	X	X	X		
BFFS partition 1 (DVD cursor down)	Back up software upgrade application boot batch file 1 Linux kernel JETT: needed for ComPair			X	X	X	X
BFFS partition 0	Jaguar Boot loader boot batch file 0					X	X
Block 0	mBTM partition table						X

- The above overview of the NAND Flash shows the content of the different partitions. It also shows which part of the one-zip file erases and programs which part of the NAND Flash.
- Remark: the above does not mean that you can reprogram your HDMI keys with the “UpgradeAll.upg” file from the one zip file. This can only be done in a secure environment (e.g. the factory).
- The “UpgradeAll.upg” file is only used in the factory.
- The “FlashUtils.upg” file is only used by service centra which are allowed to do component level repair on the SSB.

**Automatic Software Upgrade**

In "normal" conditions, so when there is no major problem with the TV, the main software and the default software upgrade application can be upgraded with the "AUTORUN.UPG" (FUS part of the one-zip file: e.g. 3104 337 03801 \_FUS \_Q582E\_0.37.0.0\_commercial.zip). This can also be done by the consumers themselves, but they will have to get their software from the commercial Philips website or via the Software Update Assistant in the user menu (see DFU). The "autorun.upg" file must be placed in the root of your USB stick.

How to upgrade:

1. Copy "AUTORUN.UPG" to the root of your USB stick.
2. Insert USB stick in the side I/O while the set is in ON MODE. The set will restart and the upgrading will start automatically. As soon as the programming is finished, you will get the message that you can remove your USB stick and restart the set.

**Manual Software Upgrade**

In case that the software upgrade application does not start automatically, you can also start it manually.

How to start the software upgrade application manually:

1. Disconnect the TV from the Mains/AC Power.
2. Press the "OK" button on a Philips DVD RC-6 remote control (it is also possible to use the TV remote in "DVD" mode). Keep the "OK" button pressed while reconnecting the TV to the Mains/AC Power.
3. The software upgrade application will start.

**Attention!**

In case that you have started the download application manually, the "autorun.upg" will maybe not be recognized.

What to do in this case:

1. Create a directory "UPGRADES" on your USB stick.
2. Rename the "autorun.upg" to something else, e.g. to "software.upg". Do not use long or complicated names, keep it simple. Make sure that "AUTORUN.UPG" is no longer present in the root of your USB stick.
3. Copy the renamed "upg" file into this directory.
4. Insert USB stick in the side I/O.
5. The renamed "upg" file will be visible and selectable in the upgrade application.

**Back-up Software Upgrade Application**

If the default software upgrade application does not start (could be due to a corrupted boot 2 sector) via the above described method, you can try to activate the "back-up software upgrade application".

How to start the "back-up software upgrade application" manually:

1. Disconnect the TV from the Mains/AC Power.
2. Press the "CURSOR DOWN" button on a Philips DVD RC-6 remote control (it is also possible to use the TV remote in "DVD" mode). Keep the "cursor down" button pressed while reconnecting the TV to the Mains/AC Power.
3. The software upgrade application will start.

**5.9.3 Stand-by Software Upgrade**

There are two methods now to upgrade stand-by software:

**Upgrade via USB**

In this chassis it is possible to upgrade the Stand-by software via a USB stick. The method is similar to upgrading the main software via USB.

Use the following steps:

1. Create a directory "UPGRADES" on your USB stick.
2. Copy the Stand-by software (part of the one-zip file, e.g. StandbySW\_CFT01\_9.0.0.0.upg) into this directory.
3. Insert the USB stick into the TV.
4. Start the download application manually (see paragraph "Manual start of the Software Upgrade Application").
5. Select the appropriate file and press the "red" button to upgrade.

**Upgrade via PC and ComPair interface**

It will be possible to upgrade the Stand-by software via a PC and the ComPair interface. Check paragraph "ComPair" on how to connect the interface. To upgrade the Stand-by software, use the following steps:

1. Disconnect the TV from the Mains/AC Power.
  2. Short circuit the SPI pins [2] on the SSB (see figure "Service mode pads" earlier in this chapter).
  3. Keep the SPI pins shorted while connecting the TV to the Mains/AC Power.
  4. Release the short circuit after approx. two seconds.
  5. Start up HyperTerminal (can be found in every Windows application via Programs -> Accessories -> Communications -> HyperTerminal). Use the following settings:
    - COM1
    - Bits per second = 38400 (9600)\*
    - Data bits = 8
    - Parity = none
    - Stop bits = 1
    - Flow control = None
  6. Press "Shift U" on your PC keyboard. You should now see the following info:
    - PNX2015 Loader V1.0
    - 19-09-2003
    - DEVID=0x05
    - Erasing
    - MCSUM=0x0000
    - =
  7. If you do not see the above info, restart the above procedure, and check your HyperTerminal settings and the connections between PC and TV.
  8. Via "Transfer" -> "Send text file ...", you can send the proper upgrade file to the TV (e.g. \*.hex).
  9. After successful programming, you must see the following info (this can take several minutes!):
    - DCSUM=0xC67E
    - :Ok
    - MCSUM=0xC67E
    - Programming
    - PCSUM=0xC67E
    - Finished
  10. If you do not see this info, restart the complete procedure.
  11. Close HyperTerminal.
  12. Disconnect and connect Mains/AC Power again.
- (\* ) When having problems with upgrading, use the values between brackets.

#### 5.9.4 Content and Usage of the One-Zip Software File

Below you find a content explanation of the One-Zip file (content may vary per chassis), and instructions on how and when to use it.

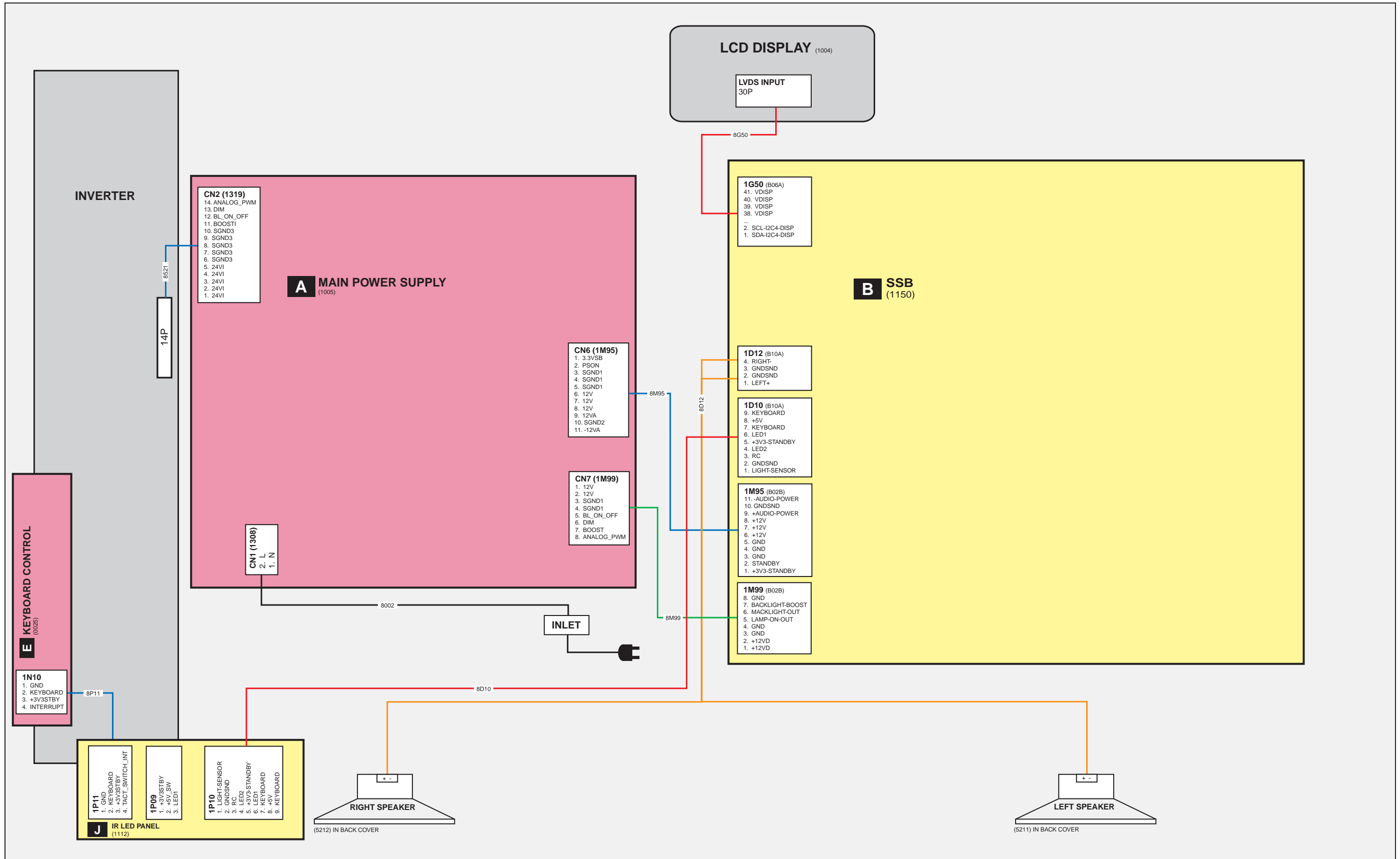
- **1.1 Ambilight\_PRFAM\_x.x.x.x.zip.** Not to be used by Service technicians.
- **1.2 Cabinet\_ACOUS\_x.x.x.x.zip.** Not to be used by Service technicians.
- **1.3 Ceisp2padII\_P2PAD\_x.x.x.x.zip.** Not to be used by Service technicians. For ComPair development only.
- **1.4 Display\_DISPT\_x.x.x.x.zip.** Not to be used by Service technicians.
- **1.5 EDID\_Q582E\_x.x.x.x.zip.** Contains the EDID content of the different EDID NVMs. See ComPair for further instructions.  
For sets with three HDMI connectors.
  - For **HDMI 1** NVM, use `***port 1*.bin`
  - For **HDMI 2** NVM, use `***port 2*.bin`
  - For **HDMI 3** NVM, use `***port 3*.bin`
- **1.6 EJTAGDownload\_Q582X\_x.x.x.x.zip.** Only used by service centra which are allowed to do component level repair.
- **1.7 Factory\_Q582X\_x.x.x.x\_commercial.zip.** Only for production purposes, not to be used by Service technicians.
- **1.8 FlashUtils\_Q582X\_x.x.x.x\_commercial.zip.** Not to be used by Service technicians.
- **1.9 FUS\_Q582X\_x.x.x.x\_commercial.zip.** Contains the "autorun.upg" which is needed to upgrade the TV main software and the software download application.
- **2.0 MOP\_IACXX\_x.x.x.x.zip.** Not to be used by Service technicians. A programmed MOP device can be ordered via your regional Service organization.
- **2.1 OpenSourceFile\_Q582X\_x.x.x.x.zip.** Not to be used by Service technicians.
- **2.2 Pacific3\_P3FW0\_x.x.x.x.zip.** Not to be used by Service technicians. A programmed PACIFIC device can be ordered via your regional Service organization.
- **2.3 PQPrivate\_U5207\_x.x.x.x.zip.** Not to be used by Service technicians.
- **2.4 PQPublic\_U5207\_x.x.x.x.zip.** Not to be used by Service technicians.
- **2.5 Processor\_NVM\_SW\_Q522\_x.x.x.x.zip.** Default NVM content. Must be programmed via ComPair.
- **2.6 StandbySW\_CFTxx\_x.x.x.x\_commercial.zip.** Contains the Stand-by software in "upg" and "hex" format.
  - The "StandbySW\_xxxxx\_prod.upg" file can be used to upgrade the Stand-by software via USB.
  - The "StandbySW\_xxxxx.hex" file can be used to upgrade the Stand-by software via ComPair.
  - The files "StandbySW\_xxxxx\_exhex.hex" and "StandbySW\_xxxxx\_dev.upg" may not be used by Service technicians (only for development purposes).
- **2.7 UpgradeAll\_Q531X\_x.x.x.x\_commercial.zip.** Only for production purposes, not to be used by Service technicians.

**Caution: Never use this file, because it will overwrite the HDCP keys !!!**

# 6. Block Diagrams, Test Point Overview, and Waveforms

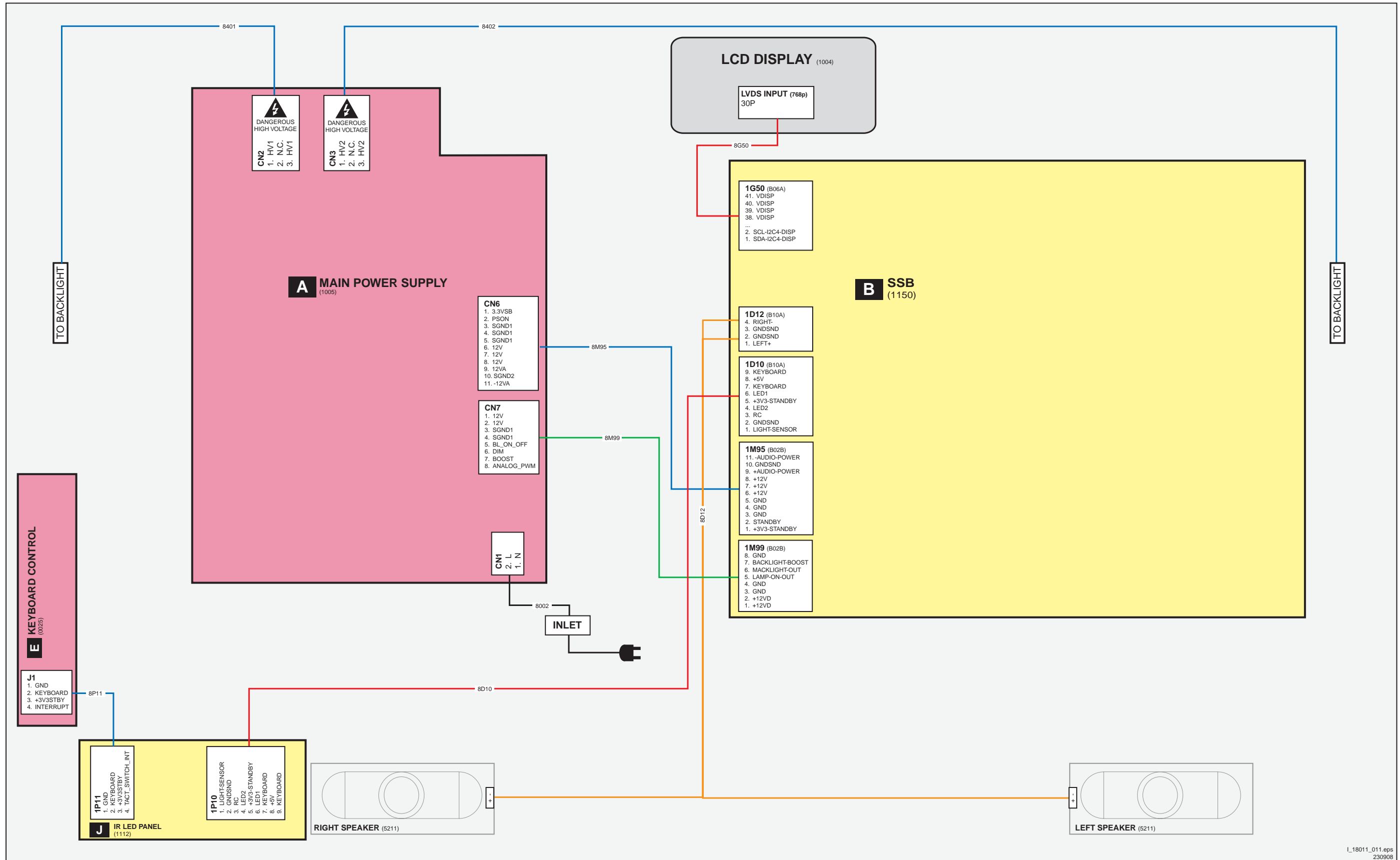
## Wiring Diagram 32" (ME8)

WIRING DIAGRAM 32" (STYLING ME8)

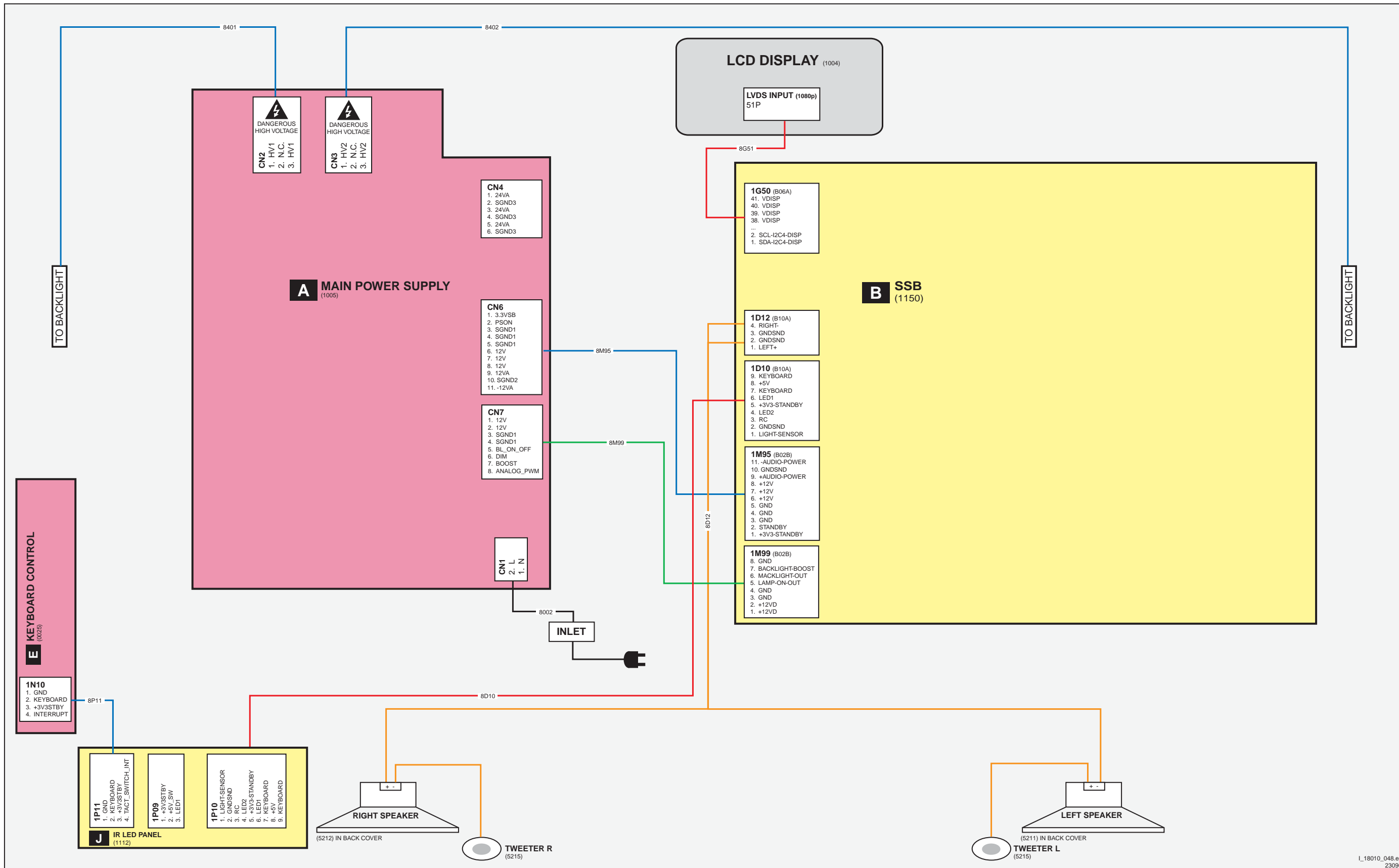


### Wiring Diagram 37" (MG8)

WIRING DIAGRAM 37" (STYLING MG8)

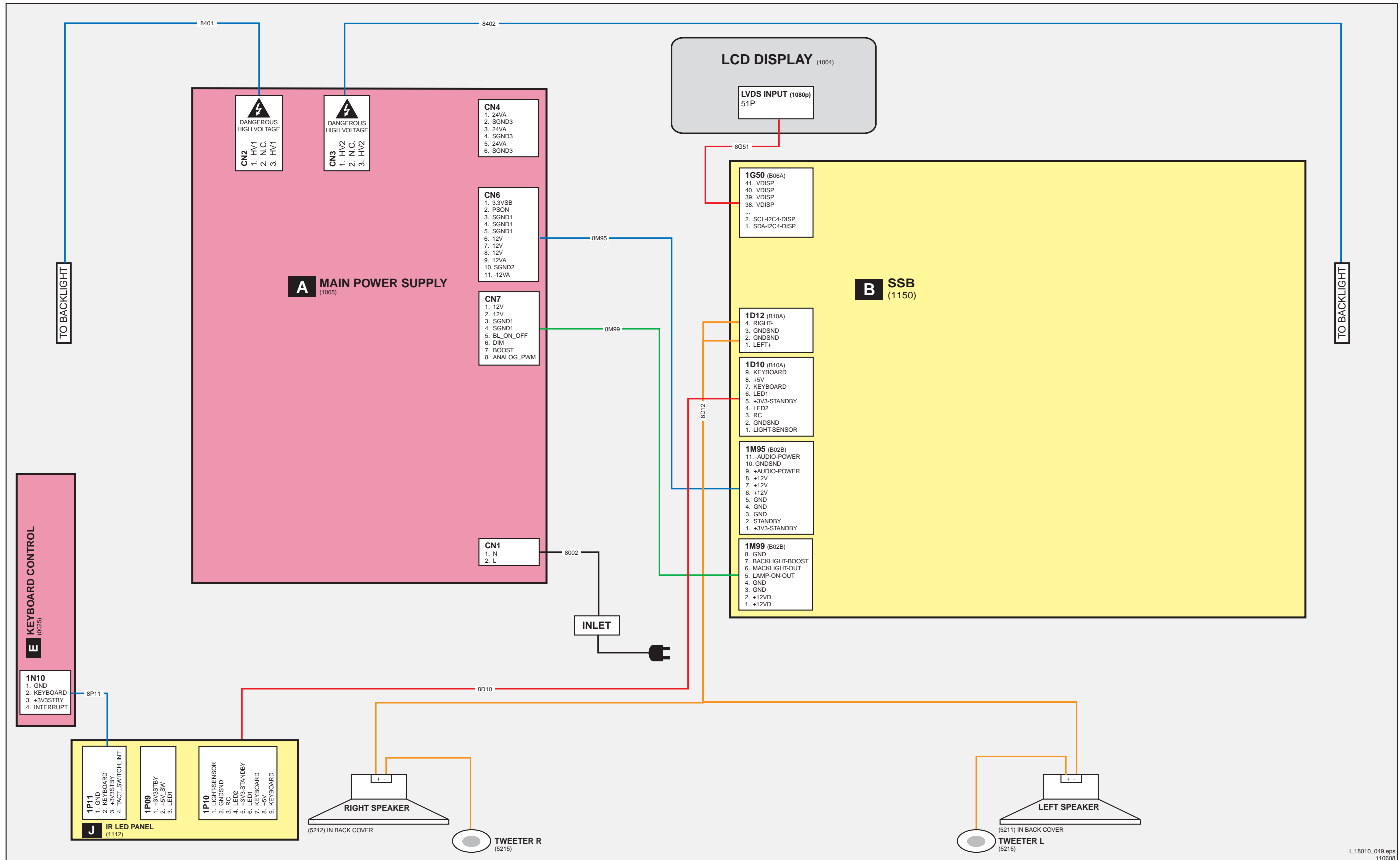


**Wiring Diagram 42" (ME8)**  
**WIRING DIAGRAM 37"- 42" (STYLING ME8)**



### Wiring Diagram 47" (ME8)

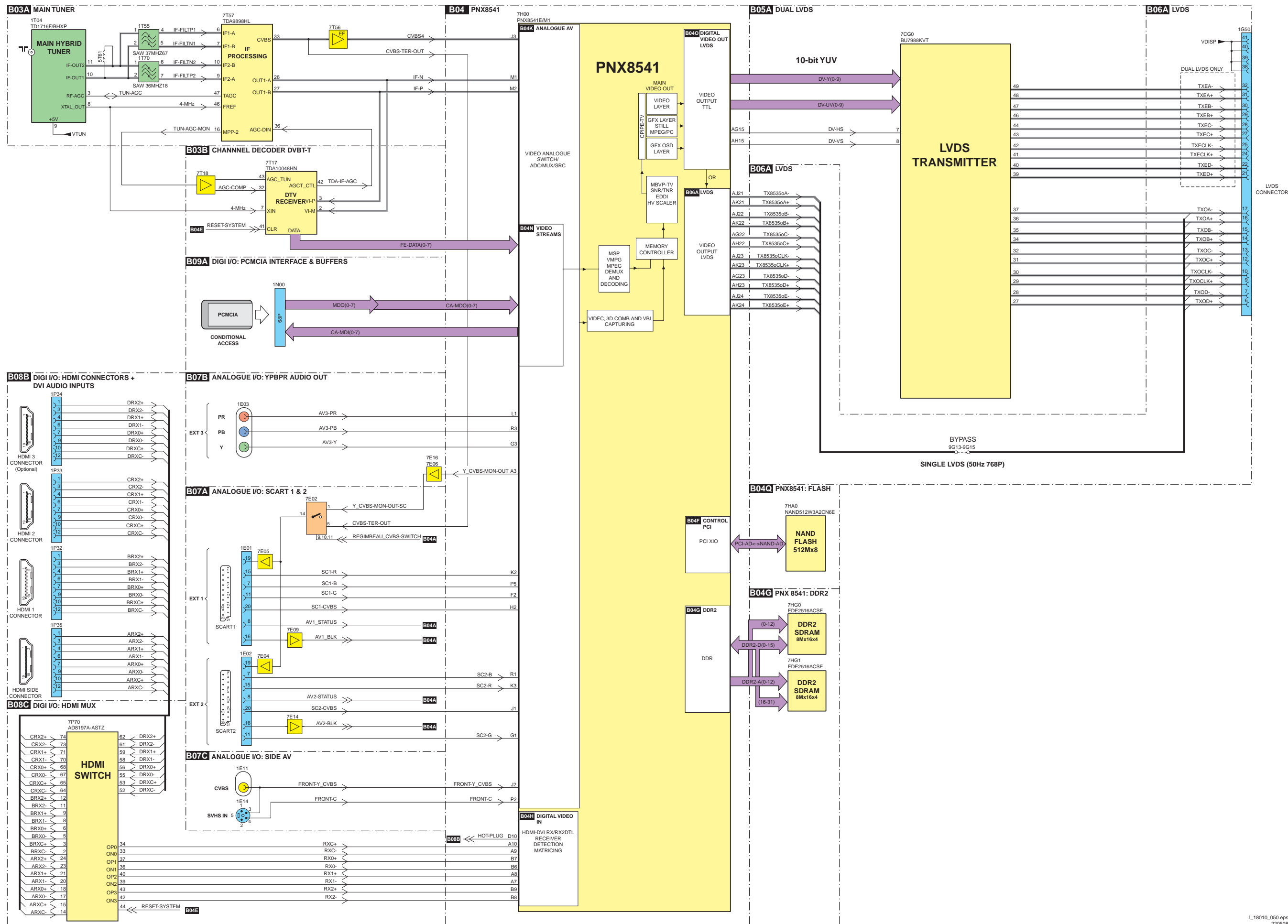
WIRING DIAGRAM 47" (STYLING ME8)





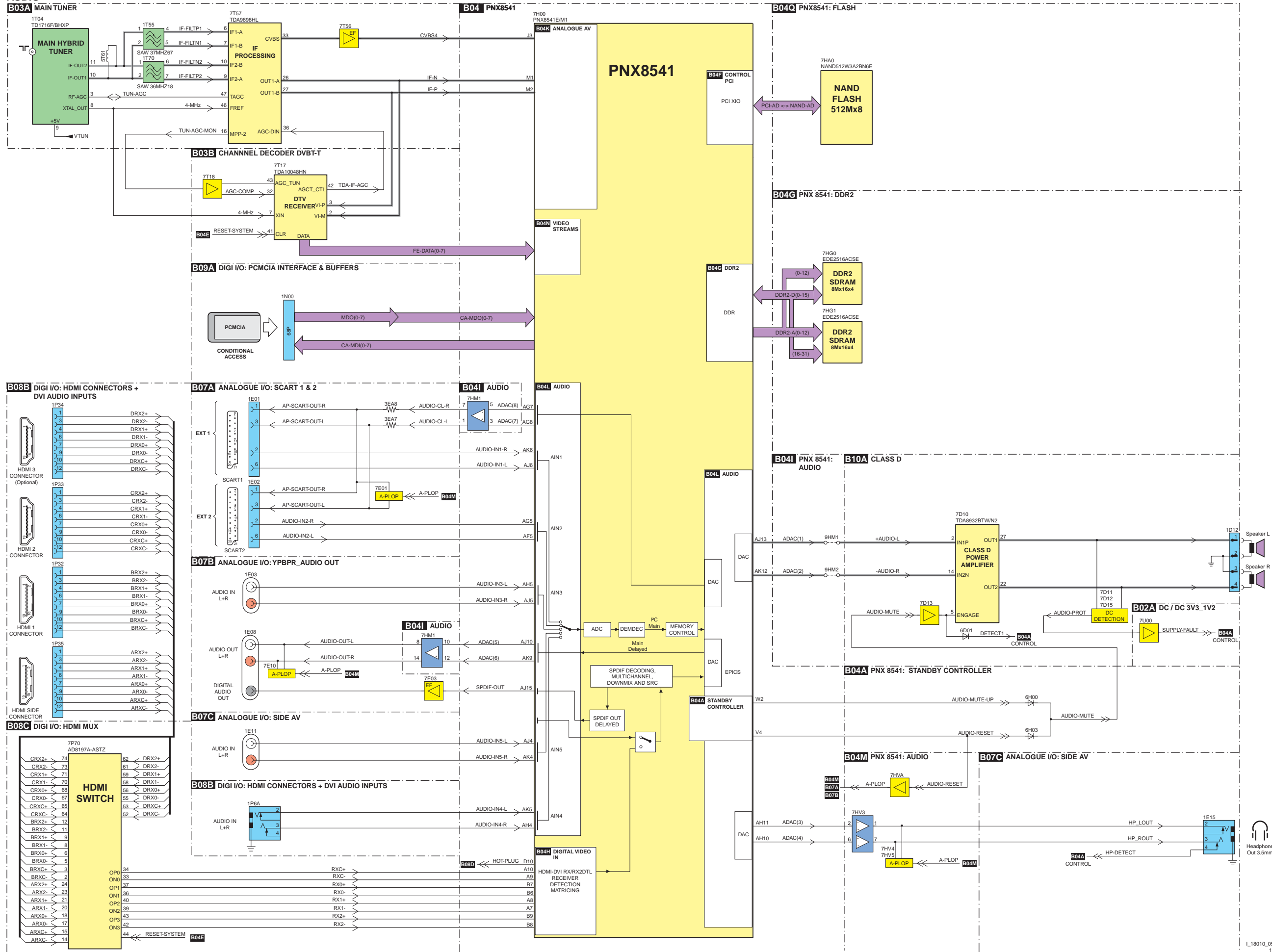
# Block Diagram Video

## VIDEO



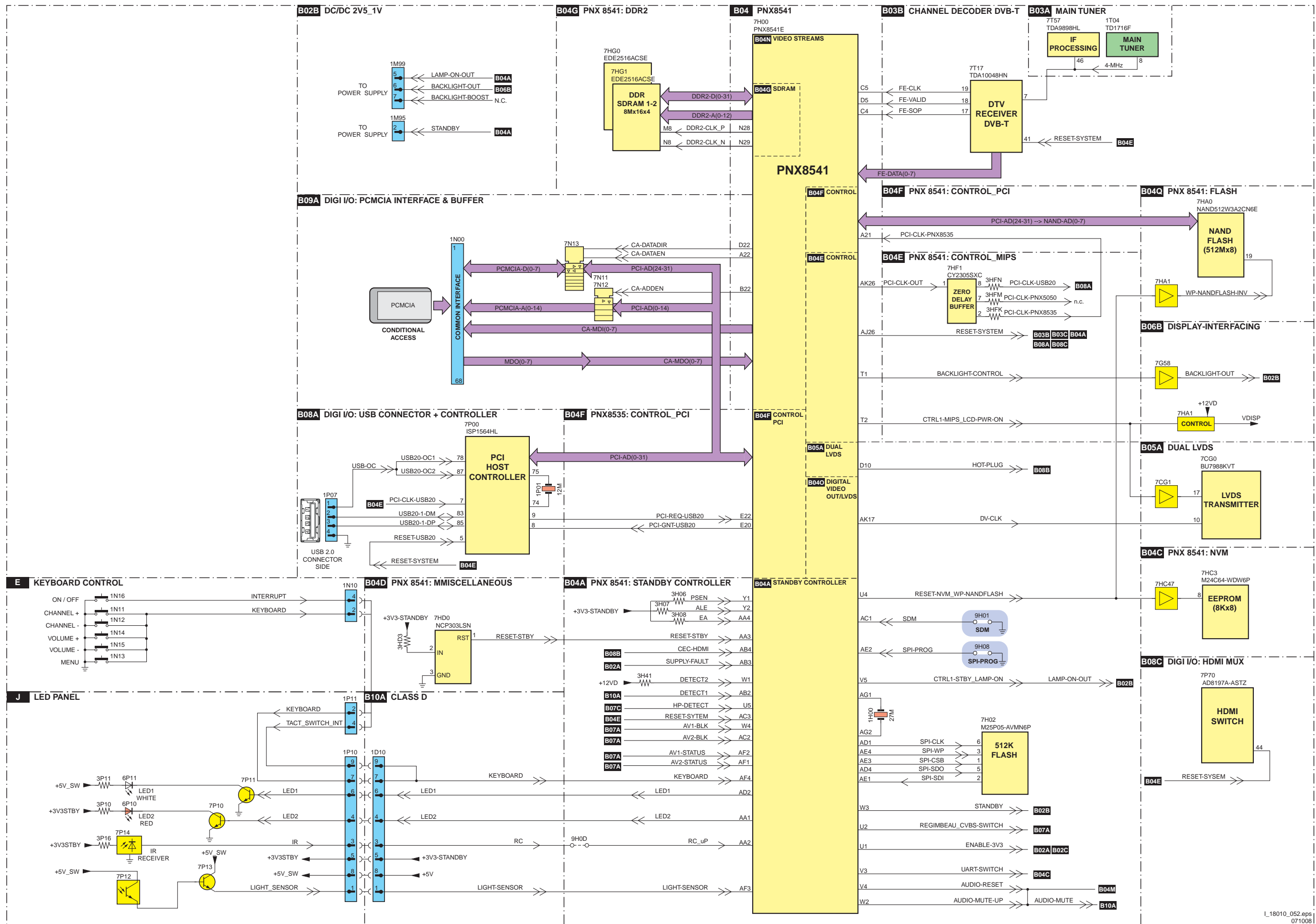
### Block Diagram Audio

#### AUDIO

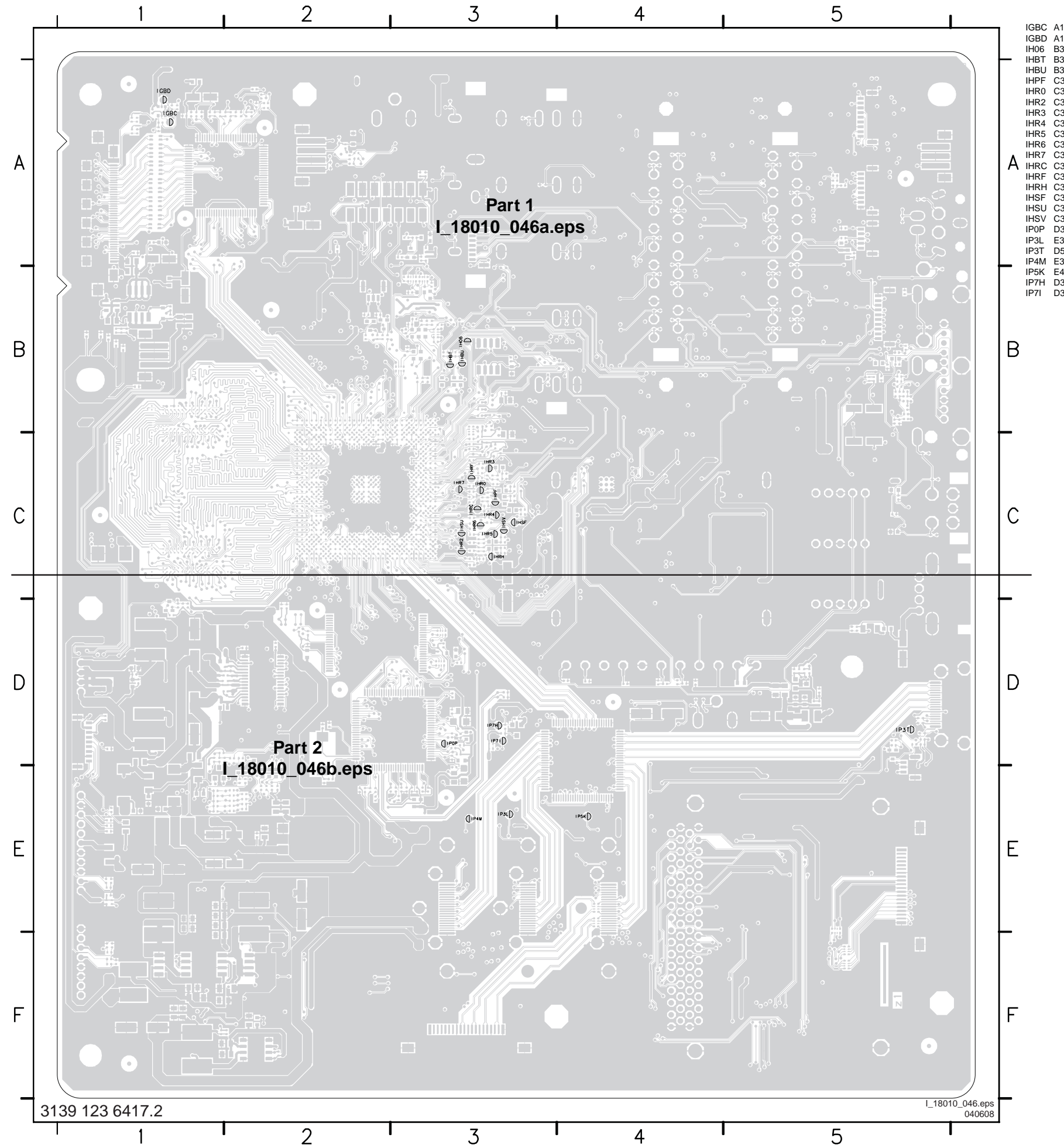


# Block Diagram Control & Clock Signals

## CONTROL + CLOCK SIGNALS

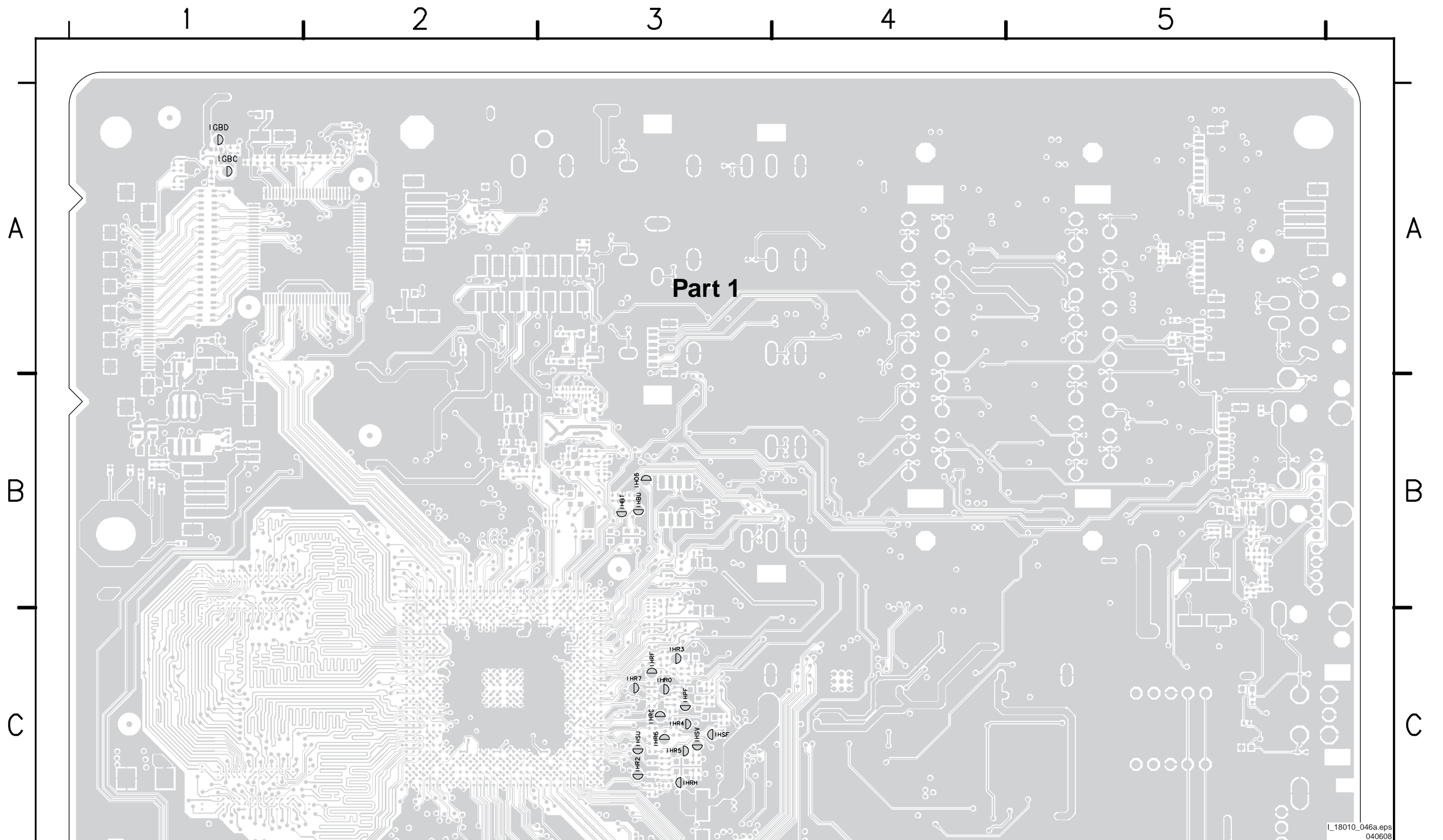


### SSB: Test Points (Overview Top Side)

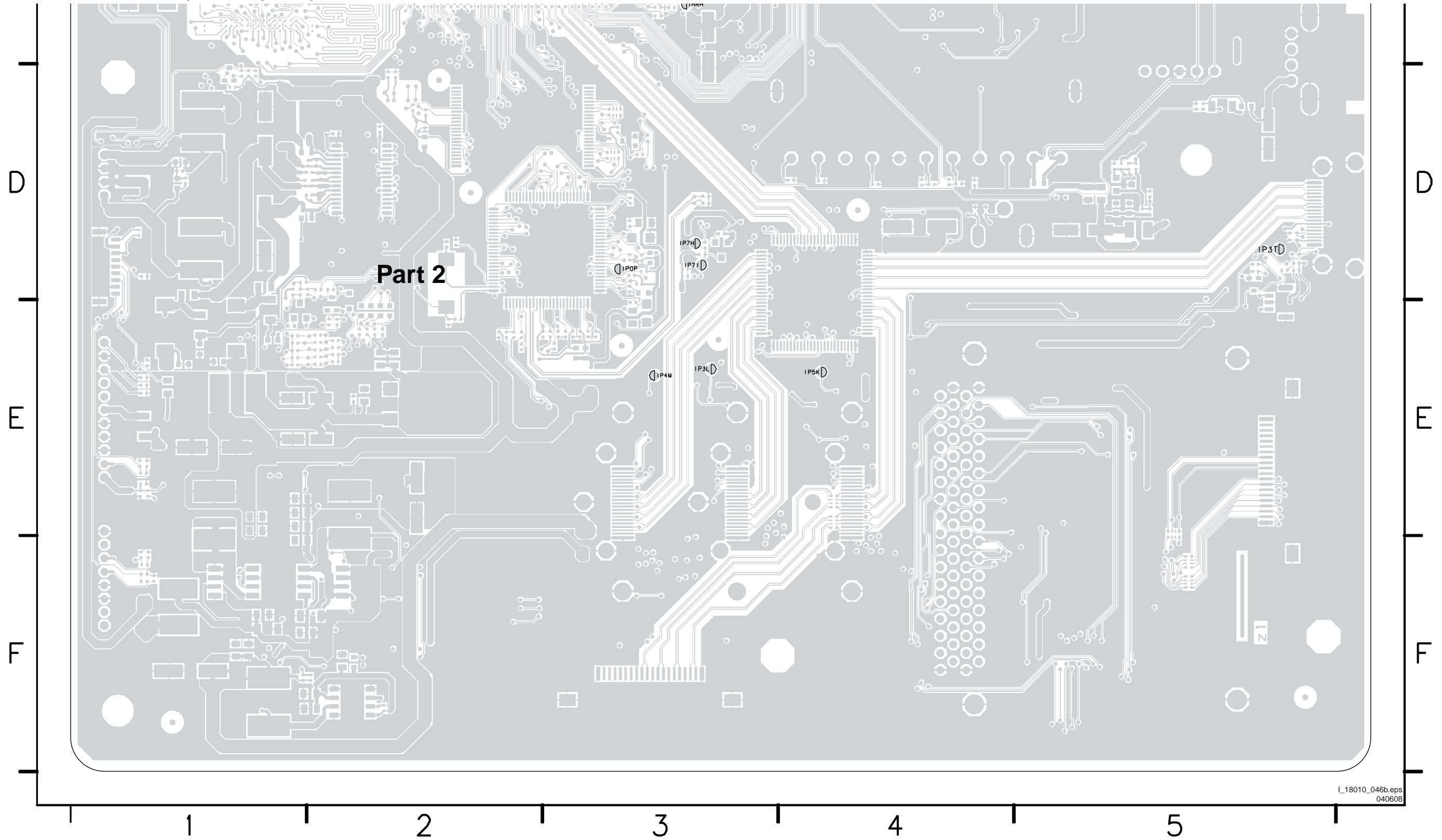




SSB: Test Points (Part 1 Top Side)

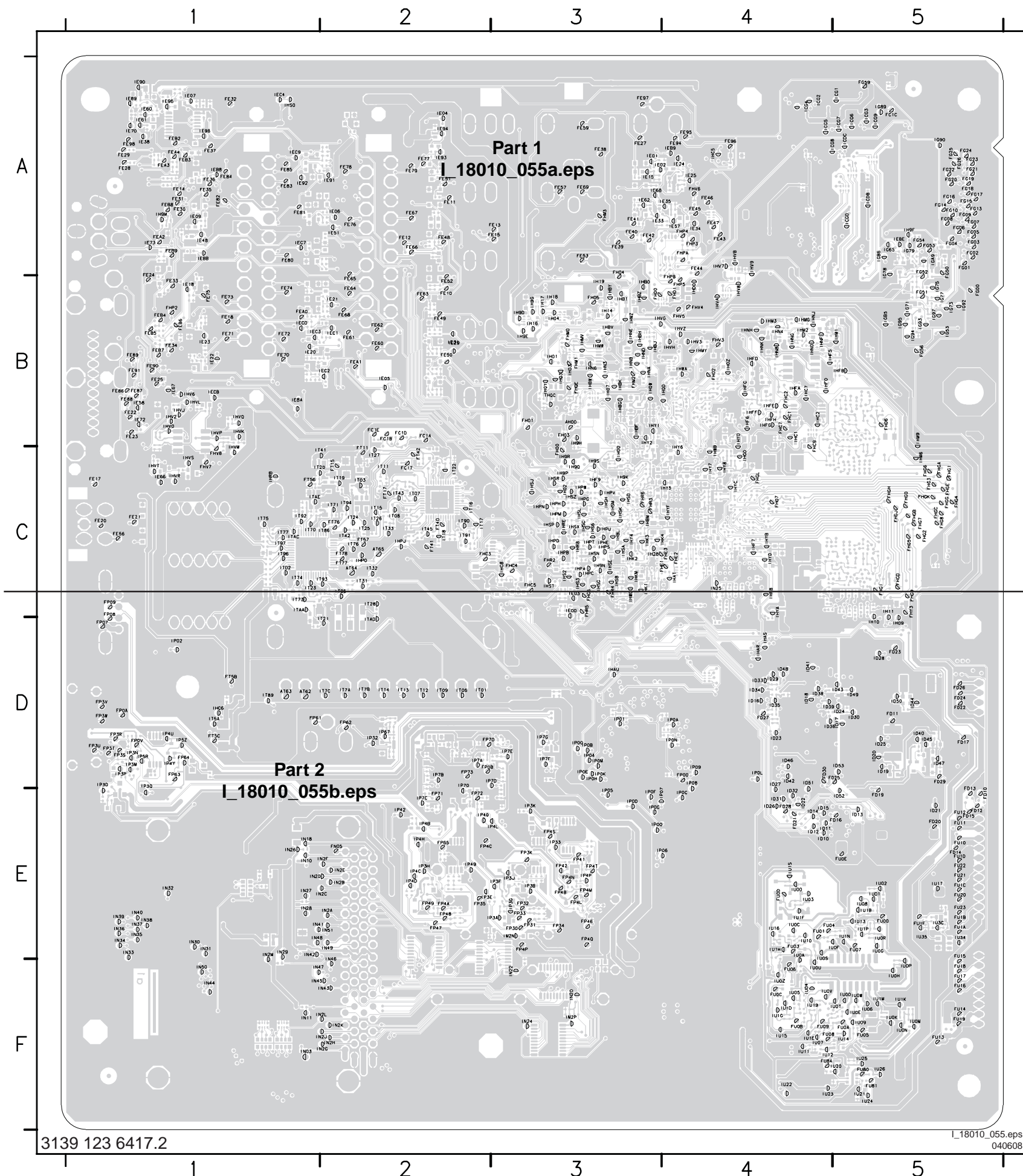


SSB: Test Points (Part 2 Top Side)



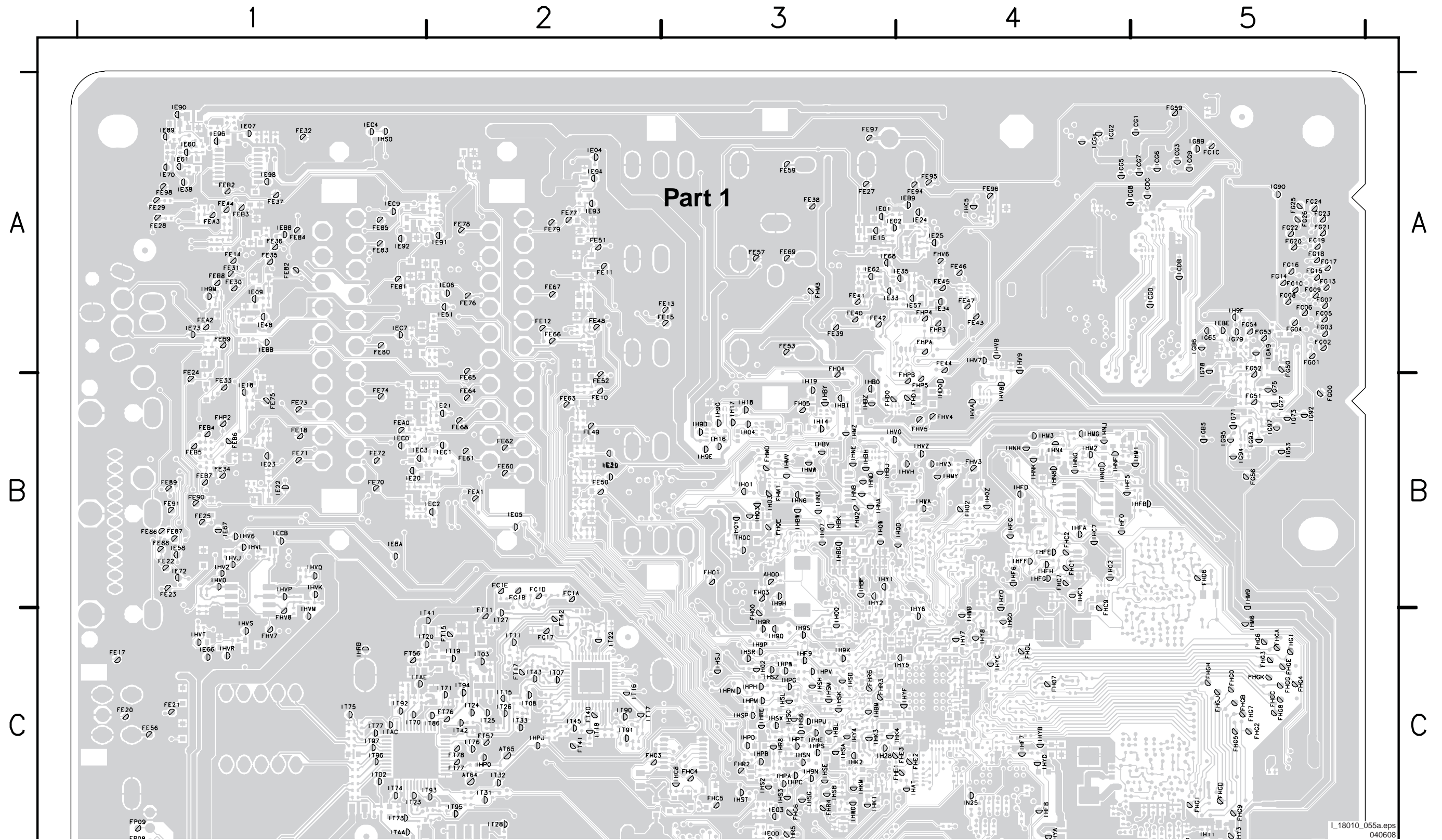


SSB: Test Points (Overview Bottom Side)



1U21	F5	FEB8	A1	FP48	E2	ID53	D5	IHC6	D1	IHYA	C4	IT15	C2
AH00	B3	FEB9	A1	FP49	E2	IE00	C3	IHC7	B4	IHYB	C4	IT16	C2
AT62	D1	FG00	B5	FP4A	E2	IE01	A3	IHC8	C3	IHYC	C4	IT17	C2
AT63	D1	FG01	A5	FP4B	E3	IE02	A3	IHD0	B4	IHYD	C4	IT18	C2
AT64	C2	FG02	A5	FP4C	E2	IE03	C3	IHF0	B4	IHYF	C4	IT19	C2
AT65	C2	FG03	A5	FP4L	E3	IE04	A2	IHF5	B4	IM2N	E3	IT20	C2
FC17	C2	FG04	A5	FP4M	E3	IE05	A2	IHF6	B4	IN2P	E3	IT21	C2
FC1A	B2	FG05	A5	FP4N	E3	IE06	A2	IHF7	C4	IN03	F1	IT22	C2
FC1B	B2	FG06	A5	FP4P	E3	IE07	A1	IHF8	C4	IN10	E1	IT23	C1
FC1C	A5	FG07	A5	FP4Q	E3	IE09	A1	IHF9	C3	IN11	F1	IT24	C2
FC1D	B2	FG08	A5	FP4S	E3	IE15	A3	IHFA	B4	IN18	E1	IT25	C2
FC1E	B2	FG09	A5	FP4T	E3	IE18	B1	IHFB	B5	IN20	F3	IT26	C2
FD10	E5	FG10	A5	FP61	D1	IE20	B1	IHFC	B4	IN22	F3	IT27	C2
FD11	D5	FG13	A5	FP62	D2	IE21	B2	IHFD	B4	IN24	F3	IT28	C2
FD12	E5	FG14	A5	FP63	D1	IE22	B1	IHFE	B4	IN25	C4	IT31	C2
FD13	E5	FG15	A5	FP64	D1	IE23	B1	IHFF	B4	IN26	E1	IT32	C2
FD14	A5	FG16	A5	FP65	D2	IE24	A4	IHFG	B4	IN27	F1	IT33	C2
FD15	E5	FG17	A5	FP70	D2	IE25	A4	IHFH	B4	IN28	E1	IT41	C2
FD16	E5	FG18	A5	FP71	E2	IE29	B2	IHGO	C4	IN29	E1	IT42	C2
FD17	D5	FG19	A5	FP72	E2	IE31	B2	IHK1	C3	IN2A	E2	IT43	C2
FD19	E5	FG20	A5	FP73	D2	IE33	A3	IHK2	C3	IN2B	E2	IT45	C2
FD20	E5	FG21	A5	FT11	C2	IE34	A4	IHK3	C3	IN2C	E2	IT5A	D1
FD21	E4	FG22	A5	FT15	C2	IE35	A4	IHK4	C4	IN2D	E1	IT70	C1
FD22	D5	FG23	A5	FT17	C2	IE38	A1	IHKM	C3	IN2E	E2	IT71	C2
FD23	D5	FG24	A5	FT20	D5	IE48	A1	IHM1	B5	IN2I	E2	IT73	C1
FD24	D5	FG25	A5	FT41	C2	IE51	A2	IHM2	B4	IN2G	F2	IT74	C1
FD25	D5	FG26	A5	FT42	C2	IE57	A4	IHM3	B4	IN2H	F2	IT75	C1
FD26	D5	FG29	A5	FT56	C1	IE58	B1	IHM6	C5	IN2J	F2	IT76	C2
FD27	D4	FG51	B5	FT57	C2	IE60	A1	IHM9	B5	IN2K	F2	IT77	C1
FD28	E4	FG52	A5	FT5B	D1	IE61	A1	IHMG	B4	IN2L	F2	IT7A	D2
FD29	D5	FG53	A5	FT5C	D1	IE62	A3	IHMV	B3	IN2M	E1	IT7B	D2
FD30	D4	FG54	A5	FT76	C2	IE66	C1	IHMW	B3	IN30	E1	IT7C	D2
FE10	B2	FG56	B5	FT77	C2	IE67	B1	IHMY	B4	IN31	E1	IT86	C2
FE11	A2	FG59	A5	FT78	C2	IE68	A3	IHMZ	B3	IN32	E1	IT89	D1
FE12	E2	FH00	E5	FU00	E5	IE70	A1	IHN0	B4	IN33	E1	IT90	C2
FE13	A3	FH01	B3	FU01	E4	IE72	B1	IHN3	B3	IN34	E1	IT91	C2
FE14	A1	FH02	B4	FU03	E4	IE73	A1	IHN4	B4	IN35	E1	IT92	C1
FE15	A3	FH03	B3	FU04	E4	IE89	A1	IHN6	B3	IN36	E1	IT93	C2
FE17	C1	FH04	A3	FU05	F5	IE90	A1	IHN8	B4	IN37	E1	IT94	C2
FE18	B1	FH05	B3	FU06	F4	IE91	A2	IHNA	B3	IN38	E1	IT95	C2
FE20	C1	FH06	B5	FU07	E5	IE92	A1	IHNB	B3	IN39	E1	IT96	C1
FE21	C1	FH07	C4	FU08	F4	IE93	A2	IHND	B3	IN40	E1	IT97	C1
FE22	B1	FH0C	F4	FU0A	E5	IE94	A2	IHNE	B3	IN41	E1	IT9A	C1
FE24	A1	FHC3	B2	FU0A	F5	IE96	A1	IHNE	B3	IN42	E1	IT9C	C1
FE24	A1	FHC3	C2	FU0B	F4	IE98	A1	IHNG	B4	IN43	F2	ITAD	D2
FE25	B1	FHC4	C3	FU0C	F4	IE98	A1	IHNH	B4	IN44	F1	ITAE	C1
FE27	A3	FHC5	C3	FU0D	E4	IEB9	A4	IHNJ	B4	IN45	F1	IU00	E4
FE28	A1	FHC6	C3	FU0E	E5	IEBA	B1	IHNK	B4	IN46	E2	IU01	E5
FE29	A1	FHC7	B4	FU10	E5	IEBB	A1	IHPA	C3	IN47	F1	IU02	E5
FE30	A1	FHC9	B4	FU11	E5	IEBE	A5	IHPB	C3	IN48	E1	IU03	E4
FE31	A1	FHD0	B3	FU12	E5	IEC0	B1	IHPC	C3	IN49	E2	IU04	F4
FE32	A1	FHD1	B4	FU13	F5	IEC1	B2	IHPD	C3	IN50	F1	IU05	F4
FE33	B1	FHE1	C3	FU15	E5	IEC2	B2	IHPG	B3	IP00	D3	IU06	F5
FE34	B1	FHE2	C4	FU15	E5	IEC3	B1	IHPH	C3	IP00	D3	IU07	F4
FE35	A1	FHE3	C4	FU16	F5	IEC4	A1	IHPJ	C2	IP01	D3	IU08	E5
FE36	A1	FHG1	C5	FU17	F5	IEC7	A1	IHPM	C3	IP02	D1	IU09	F5
FE37	A1	FHG2	C5	FU18	F5	IEC9	A1	IHPN	C3	IP04	D3	IU0A	E4
FE38	A3	FHG3	C5	FU19	F5	IECB	B1	IHPO	C2	IP05	E3	IU0C	E4
FE39	A3	FHG4	C5	FU1A	E5	IG53	B5	IHPS	C3	IP06	E4	IU0D	F5
FE40	A3	FHG5	C5	FU1B	E5	IG65	A5	IHPT	C3	IP07	E3	IU0E	F5
FE41	A3	FHG6	C5	FU1C	E5	IG71	B5	IHPQ	C3	IP08	D4	IU0F	E5
FE42	A3	FHG7	C5	FU1D	E5	IG73	B5	IHPV	C3	IP09	D4	IU0G	E5
FE43	A4	FHG8	C5	FU1F	E5	IG75	B5	IHPW	C3	IP0A	D4	IU0H	F5
FE44	A4	FHG9	C5	FU20	E5	IG77	B5	IHO3	B3	IP0B	D3	IU0K	F5
FE45	A4	FHGA	C5	FU21	E5	IG78	A5	IHQ0	B3	IP0C	E4	IU0M	F5
FE46	A4	FHGB	C5	FU22	E5	IG79	A5	IHQD	B4	IP0D	E3	IU0N	F5
FE47	A4	FHGC	C5	FU23	E5	IG89	A5	IHQW	B3	IP0E	D3	IU0P	F5
FE48	A2	FHGD	C5	FU80	F5	IG90	A5	IHOY	B3	IP0F	E3	IU0R	E5
FE49	B2	FHGE	C5	FU81	F5	IG92	B5	IHR8	C3	IP0G	E3	IU0S	F4
FE50	A2	FHGF	C5	FU8A	F5	IG93	B5	IHR9	C1	IP0H	F1	IU0T	F5
FE51	A2	FHGH	C5	ICDB	A5	IG94	B5	IHRE	C3	IP0K	D3	IU0U	F4
FE52	B2	FHGI	C5	ICDC	A5	IG95	B5	IHS2	C3	IP0L	D4	IU0V	F4
FE53	A3	FHGX	C5	ICG0	A5	IG97	B5	IHS3	C3	IP0M	D3	IU0W	F5
FE56	C1	FHGX	C5	ICG1	A5	IGA9	A5	IHS6	C3	IP0N	D4	IU0Z	F4
FE57	A3	FHGL	C4	ICG2	A4	IGB5	B5	IHSA	C3	IP0Q	E3	IU10	E4
FE59	A3	FHGO	C5	ICG3	A5	IGB6	A5	IHSB	C3	IP22	D2	IU11	F4
FE60	B2	FHM0	B3	ICG4	A4	IH00	C3	IHSC	C3	IP33	E3	IU12	F4
FE61	B2	FHM1	B3	ICG5	A4	IH01	B3	IHSD	C3	IP3A	E3	IU13	E5
FE62	B2	FHM2	B3	ICG6	A5	IH02	B3	IHSE	C3	IP3B	E3	IU14	F5
FE63	B2	FHM3	B2	ICG7	A5	IH03	B3	IHSG	C3	IP3D	D1	IU15	F4
FE64	B2	FHP2	B1	ICG8	A4	IH04	B3	IHSH	C3	IP3E	E2	IU16	E4
FE65	B2	FHP3	A4	ICG9	A5	IH07	B3	IHSJ	C3	IP3F	E3	IU19	F4
FE66	A2	FHP4	A4	ID10	E4	IH09	D5	IHSK	C3	IP3G	E3	IU1B	E5
FE67	A2	FHP5	B4	ID11	E4	IH0Z	B4	IHSL	C3	IP3H	E2	IU1D	F4
FE68	B2	FHPA	A4	ID12	E4	IH10	D5	IHSM	C3	IP3J	E3	IU1E	F4
FE69	A3	FHPB	B4	ID13	E5	IH11	C5	IHSN	C3	IP3K	E3	IU1F	E4
FE70	B1	FHQE	C3	ID14	E4	IH14	B3	IHSO	A1	IP3M	D1	IU1G	F4
FE71	B1	FHR2	C3	ID15	E4	IH16	B3	IHSP	C3	IP3P	D1	IU1H	E4
FE72	B1	FHR3	D3	ID16	D3	IH18	D3	IHSR	D3	IP3P	D1	IU1K	F5
FE73	B1	FHR4	C3	ID17	D5	IH18	B3	IHST	C3	IP3Q	D1	IU1M	F5
FE74	B1	FHR5	C3	ID18	D4	IH19	B3	IHSX	C3	IP42	E2	IU1N	E5
FE75	B1	FHR6	C3	ID19	D5	IH28	C3	IHSZ	C3	IP49	E2	IU1P	E5
FE76	A2	FHV3	B4	ID20	D5	IH9D	B3	IHV2	B1	IP4B	E2	IU1S	E4
FE77	A2	FHV4	B4	ID21	E5	IH9E	B3	IHV3	B4	IP4C	E2	IU1T	F5
FE78	A2	FHV5	B4	ID22	E4	IH9F	A5	IHV6	B1	IP4D	E2	IU20	F5
FE79	A2	FHV6	A4	ID23	D4	IH9G	B3	IHV7	A4	IP4H	E2	IU22	F4
FE80	A1	FHV7	C1	ID24	D5	IH9H	B3	IHV8	B4	IP4L	E3	IU23	F4
FE81	A1	FHV8	C1	ID25	D5	IH9I	C3	IHV9	A4	IP4P	E3	IU24	F5
FE82	A1	FHY3	E5	ID26	E4	IH9M	A1	IHVA	B4	IP4Q	E2	IU25	F5
FE83	A1	FN05	E2	ID27	D4	IH9N	C3	IHV4	A4	IP4U	D1	IU26	F5
FE84	A1	FP00	D4	ID28	D5	IH9P	C3	IHV5	B3	IP4Y	D1	IU3A	E5
FE85	A1	FP07	D1	ID29	D4	IH9Q	C3	IHV6	B4	IP5R	D1	IU35	E5
FE86	B1	FP08	C1	ID30	D5	IH9R	C3	IHV7	B1	IP5Z	D1	IU3C	E5
FE87	B1	FP09	C1	ID31	E4	IH9S	C3	IHV8	B1	IP67	D2		
FE88	B1	FP0A	D1	ID32	E4	IHAR	D4	IHLV	B1	IP70	D2		
FE89	B1	FP0B	D2	ID33	D5	IHR0	D4	IHS3	D4	IP73	D2		
FE90	B1	FP0V	D1	ID34	D4	IHAT	D4	IHOV	D1	IP7B	D2		
FE91	B1	FP30	E3	ID35	D4	IHAU	D3	IHPV	B1	IP7C	E2		
FE94	A4	FP31	E3	ID36	D4	IHB0	B3	IHVQ	B1	IP7D	E2		
FE95	A4	FP32	E3	ID38	D4	IHB1	B3	IHVR	C1	IP7E	D3		
FE96	A4	FP33	E3	ID39	D4	IHB2	B3	IHVS	C1	IP7F	D3		
FE97	A3	FP34	E3	ID40	D5	IHB3	B3	IHVT	C1	IP7G	D3		
FE98	A1	FP35	E2	ID41	D4	IHB4	B3	IHVZ	B4	IPHE	C3		
FEA0	B1	FP3K	E3	ID42	D4	IHB5	B3	IHW0	C3	IT01	D2		
FEA1	B2	FP3M	D1	ID43	D5	IHB6	B3	IHW1	B4	IT02	C1		
FEA2	A1	FP3S	D1	ID44	D5	IIBL	C3	IHW2	B4	IT03	C2		
FEA3	A1	FP3T	D1	ID45	D5	IIBM	C3	IHY0	B4	IT06	D2		
FEA4	A1	FP3U	D1	ID46	D4	IIBV	B3	IHY1	B3	IT07	C2		
FEA5	A1	FP3V	D1	ID47	D5	IIBW	B3	IHY2	B3	IT08	C2		
FEA6	B1	FP41	E3	ID49	D5	IIBZ	B3	IHY5	C4	IT11	C2		

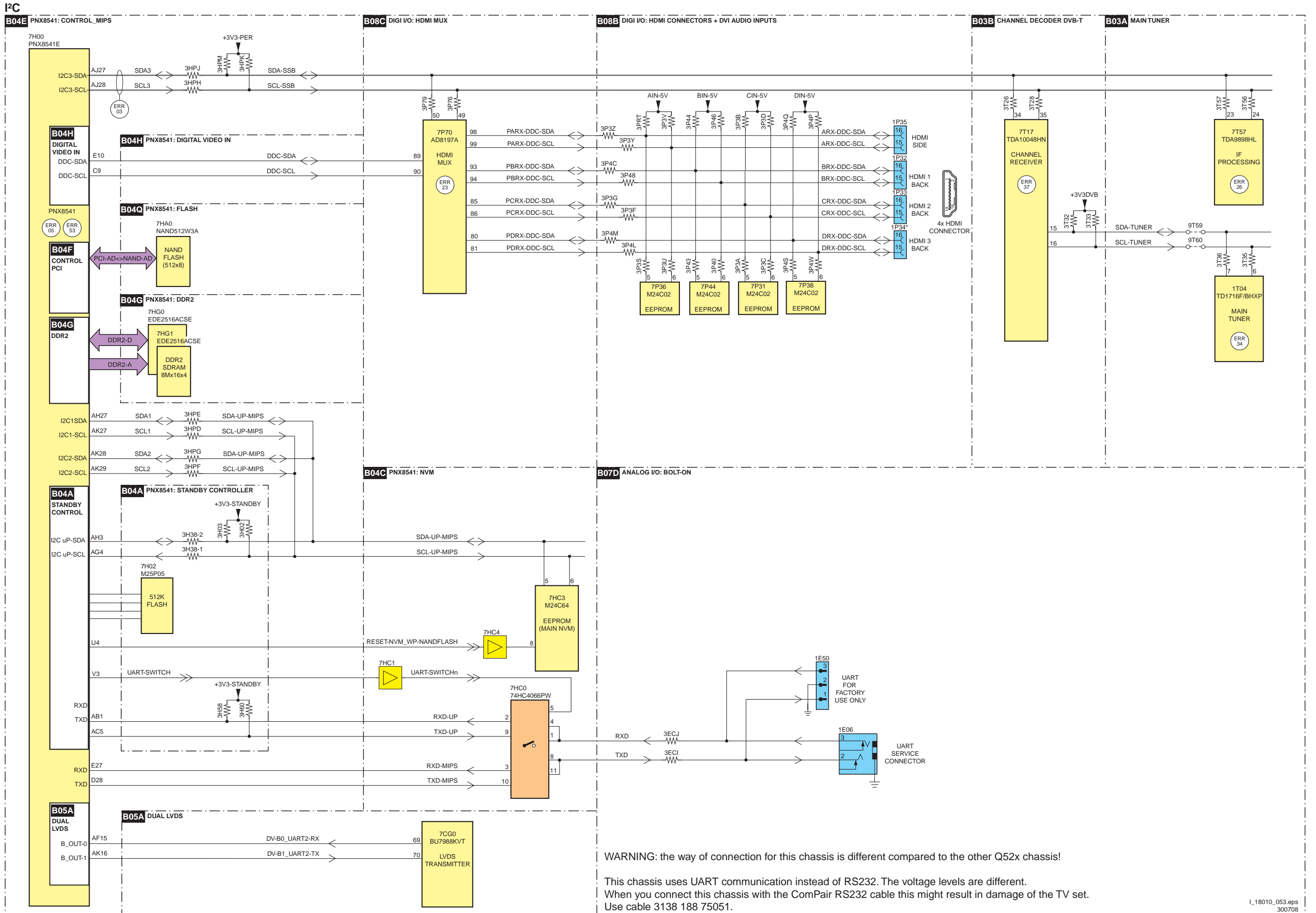
SSB: Test Points (Part 1 Bottom Side)







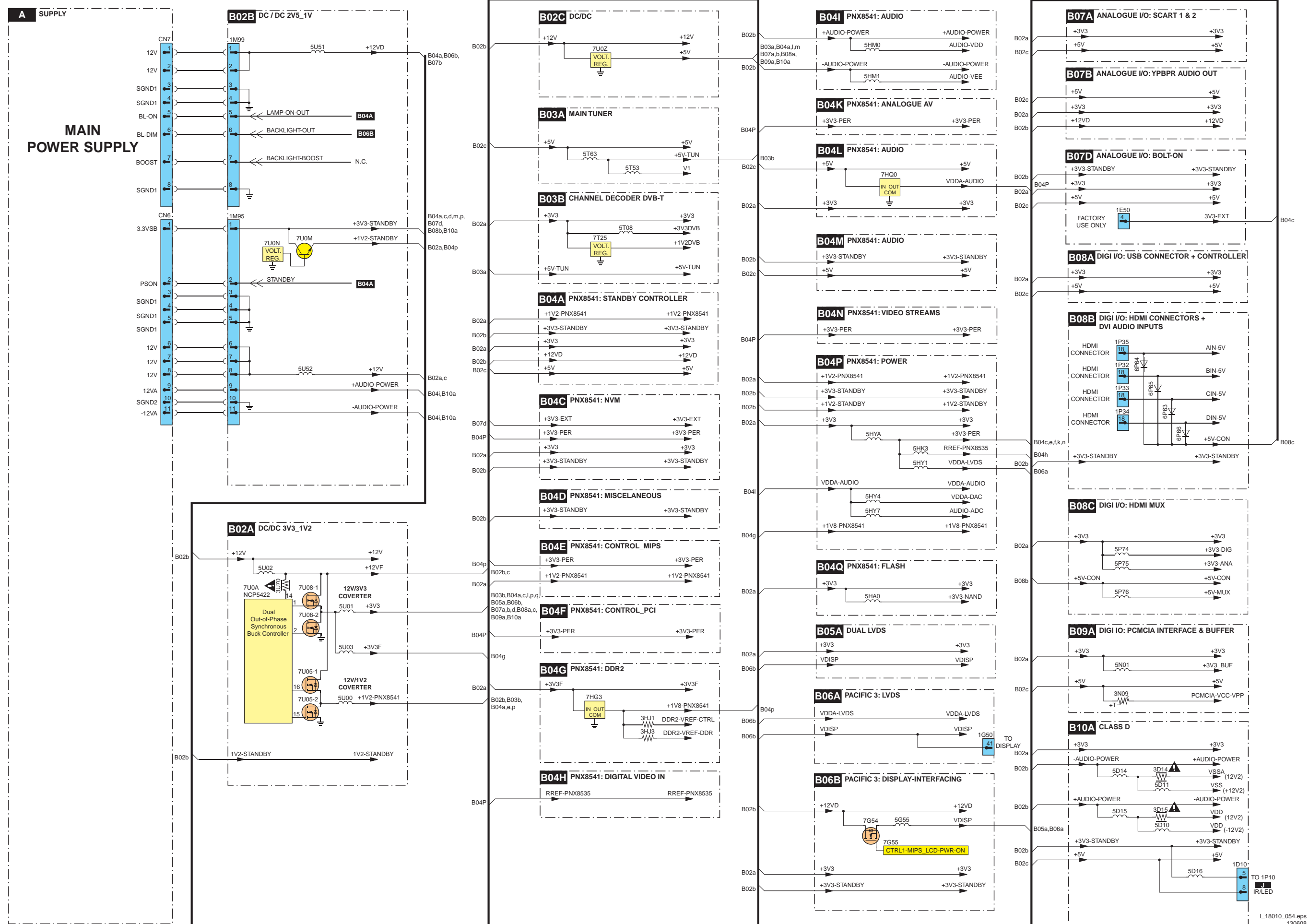
I2C IC Overview



WARNING: the way of connection for this chassis is different compared to the other Q52x chassis!

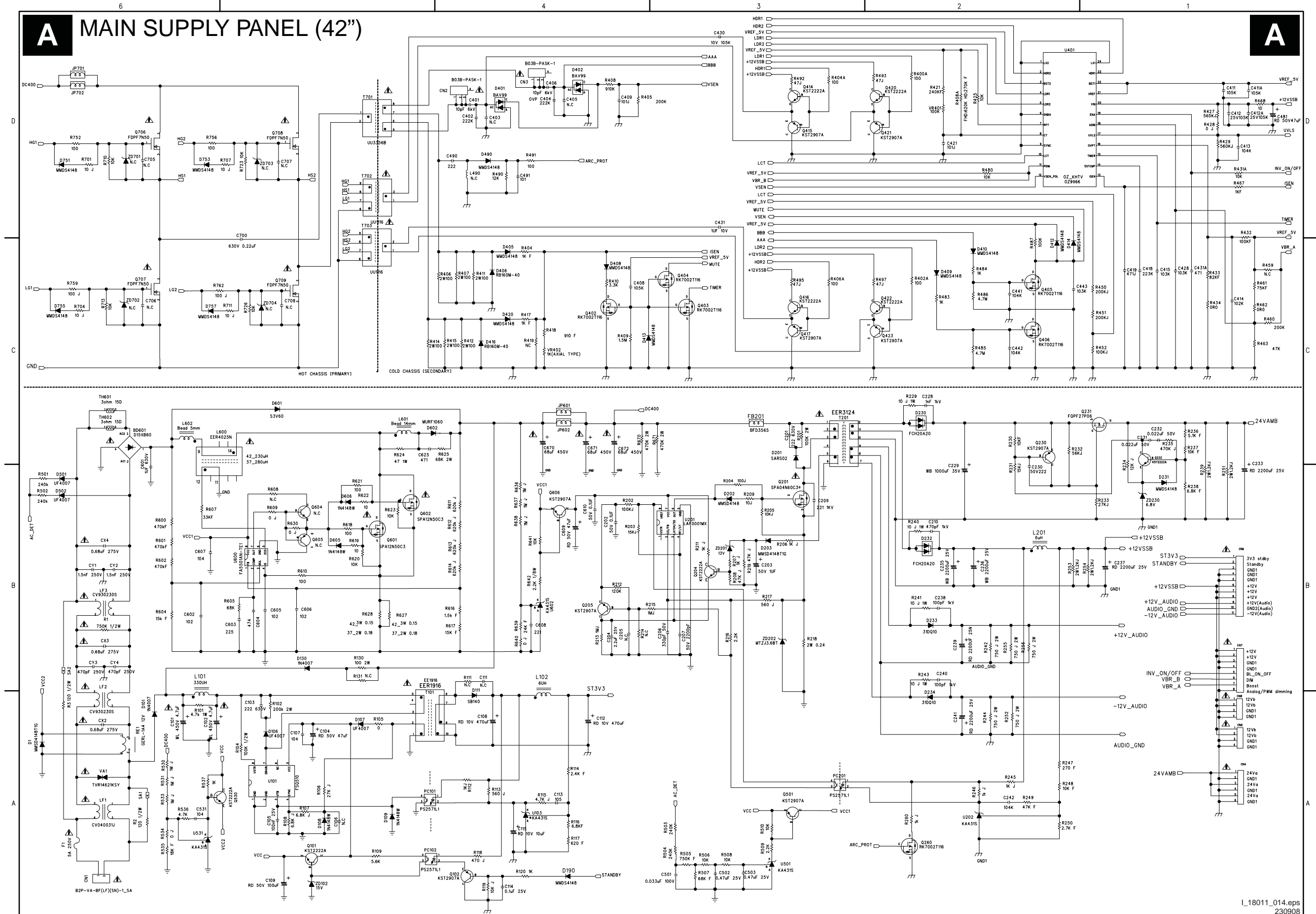
This chassis uses UART communication instead of RS232. The voltage levels are different. When you connect this chassis with the ComPair RS232 cable this might result in damage of the TV set. Use cable 3138 188 75051.

### Supply Lines Overview SUPPLY LINES OVERVIEW



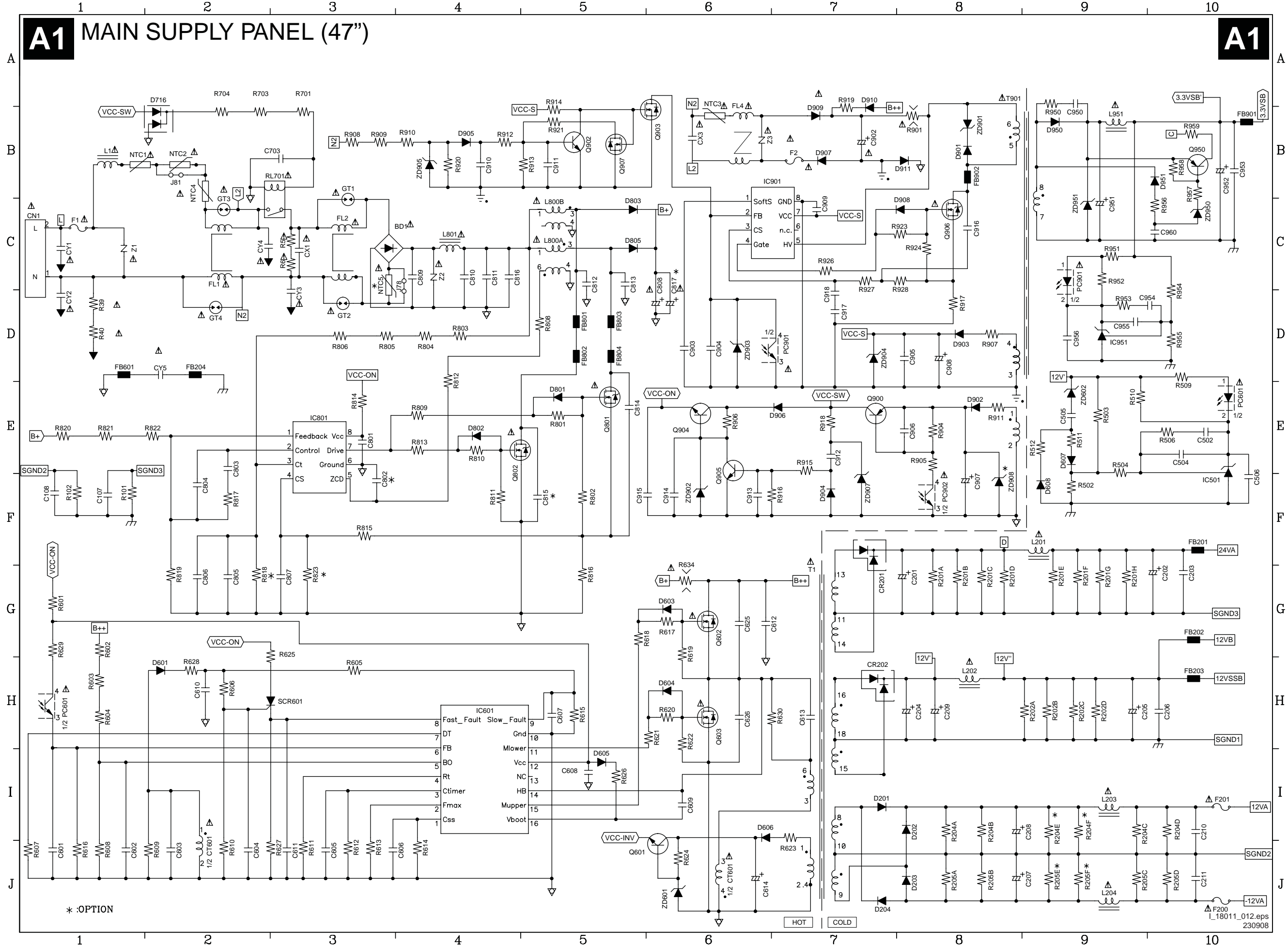
# 7. Circuit Diagrams and PWB Layouts

## Main Supply Panel (42")

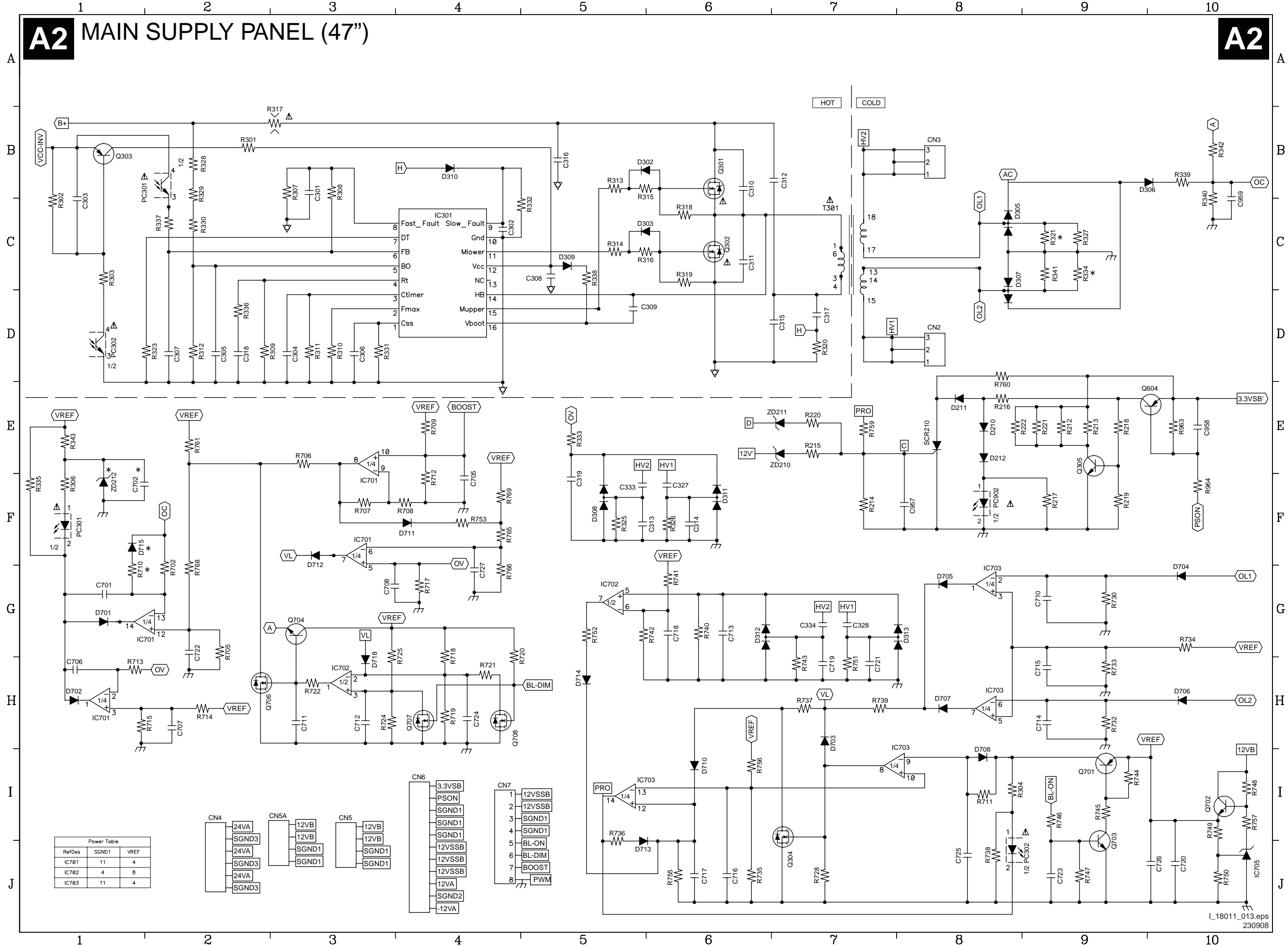




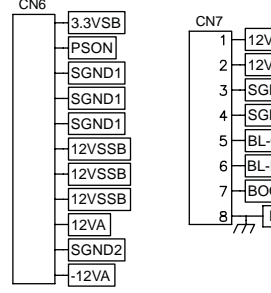
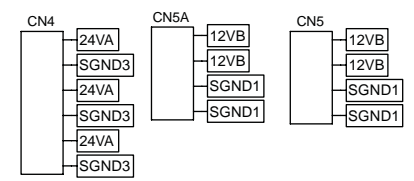
Main Supply Panel (47") (Part 1)



Main Supply Panel (47") (Part 2)



Power Table		
RefDes	SGND1	VREF
IC701	11	4
IC702	4	8
IC703	11	4





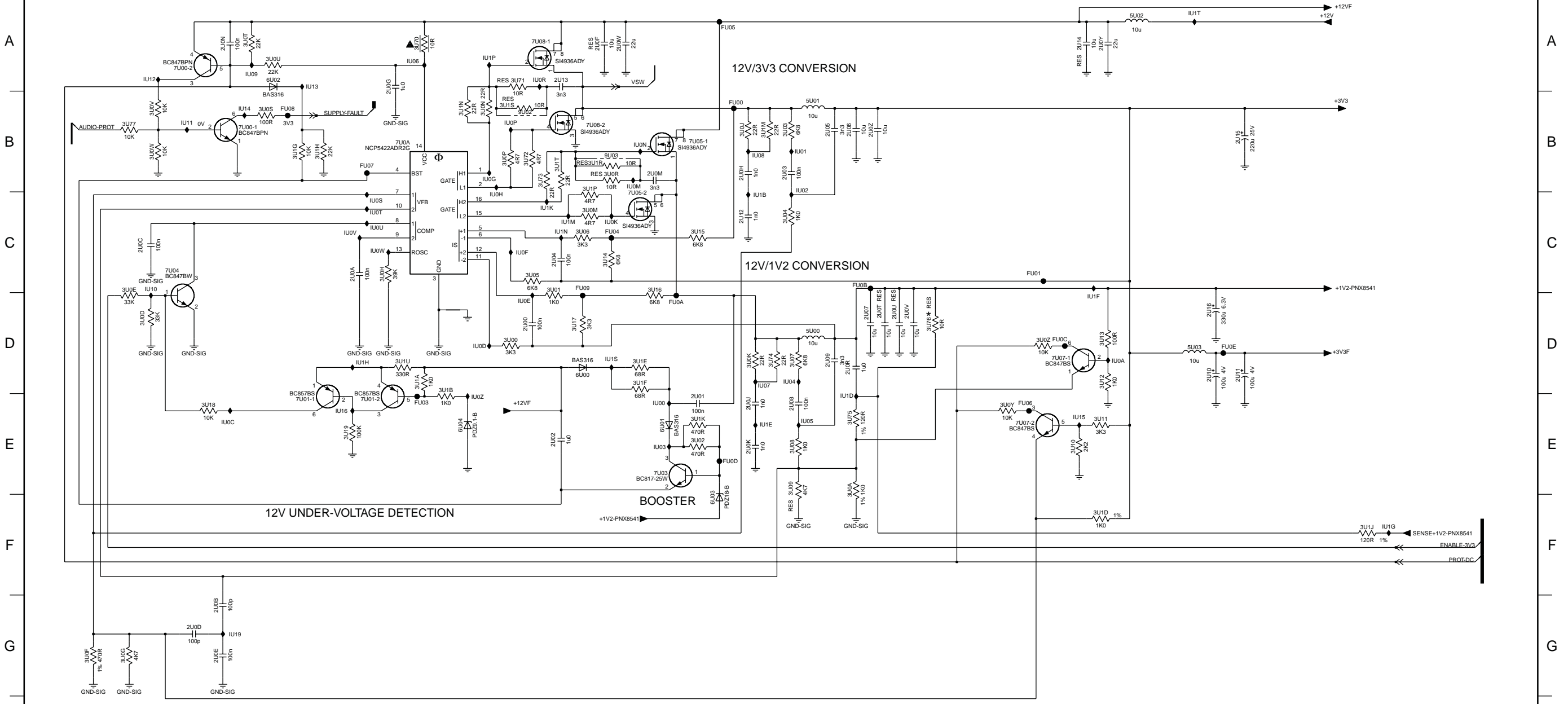
SSB: DC / DC 3V3 1V2

2U00 D5	2U07 D9	2U0E G2	2U0N A2	2U0Z B9	2U16 D12	3U0E C6	3U0F G1	3U0P B5	3U0Y E10	3U15 C7	3U1D F11	3U1M B8	3U70 A4	3U77 B2	6U02 A3	7U03 E7	7U08-2 B6	FU04 C6	FU0B C9	IU03 E7	IU0A D11	IU0K C6	IU0U C4	IU13 A3	IU1E E8	IU1P A5
2U01 E7	2U08 E8	2U0F A6	2U0R D9	2U10 D12	3U00 D5	3U07 D8	3U0G G1	3U0R B6	3U0Z D11	3U16 C7	3U1E D7	3U1N B5	3U71 A5	3U77 B2	6U03 F7	7U04 C2	7U0A B4	FU05 A7	FU0C D11	IU04 D8	IU0C E3	IU0V C4	IU14 B3	IU1F D11	IU1S D6	
2U02 E6	2U09 D8	2U0G A4	2U0T D9	2U11 D13	3U01 C6	3U08 E8	3U0H C4	3U0S B3	3U10 E11	3U17 D6	3U1F D7	3U1P B6	3U72 B5	3U77 B2	6U04 E5	7U05-1 B7	7U0B B5	FU06 E10	FU0D E7	IU05 E8	IU0D D5	IU0W C4	IU15 E11	IU1G F14	IU1T A12	
2U03 B8	2U0A C4	2U0H B8	2U0U D9	2U12 C8	3U02 E7	3U09 E8	3U0J B8	3U0T A3	3U11 E11	3U18 E2	3U1G B3	3U1R B6	3U73 B6	3U77 B2	6U05 A2	7U05-2 C6	7U0C B6	FU07 B4	FU0E D12	IU06 A4	IU0E D5	IU0Z E5	IU16 E4	IU1H D4		
2U04 C6	2U0B G2	2U0J E8	2U0V D9	2U13 A6	3U03 B8	3U0A E8	3U0K D8	3U0U A3	3U12 D11	3U19 E4	3U1H B3	3U1S B5	3U74 D8	3U77 B2	6U06 D6	7U07-1 D11	FU08 B8	FU08 B3	IU07 D8	IU07 D8	IU0F C5	IU0R A6	IU10 C2	IU19 G3	IU1K C6	
2U05 B8	2U0C C2	2U0K E8	2U0W A6	2U14 A11	3U04 C8	3U0D D2	3U0M C6	3U0V B2	3U13 D11	3U1A D4	3U1J F14	3U1T B6	3U75 E9	3U77 B2	6U07 D6	7U07-2 E11	FU09 C6	FU09 C6	IU08 B8	IU08 B8	IU0G B5	IU0S C4	IU11 B2	IU1B C8	IU1M C6	
2U06 B9	2U0D G2	2U0M B7	2U0Y A11	2U15 B13	3U05 C6	3U0E C2	3U0N B5	3U0W B2	3U14 C6	3U1B D5	3U1K E7	3U1U D4	3U76 D9	3U77 B2	6U08 E7	7U08-1 A6	FU03 E4	FU0A D7	IU02 B8	IU09 A3	IU0H C5	IU0T C4	IU12 A2	IU1D E9	IU1N C6	

B02A

DC / DC 3V3 1V2

B02A



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SSB: DC / DC +3V3 +1V2 Standby

**B02B**

DC / DC +3V3-STANDBY +1V2-STANDBY

**B02B**

A

B

C

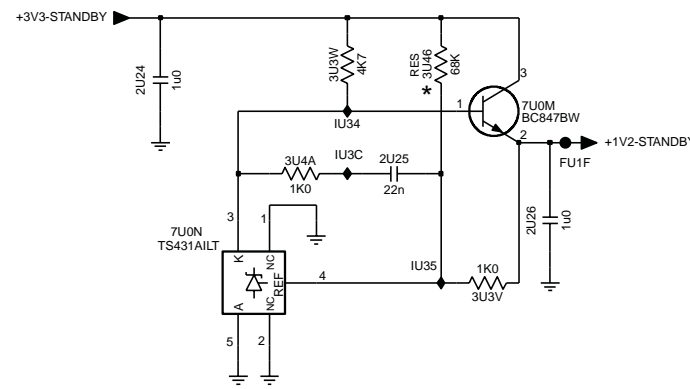
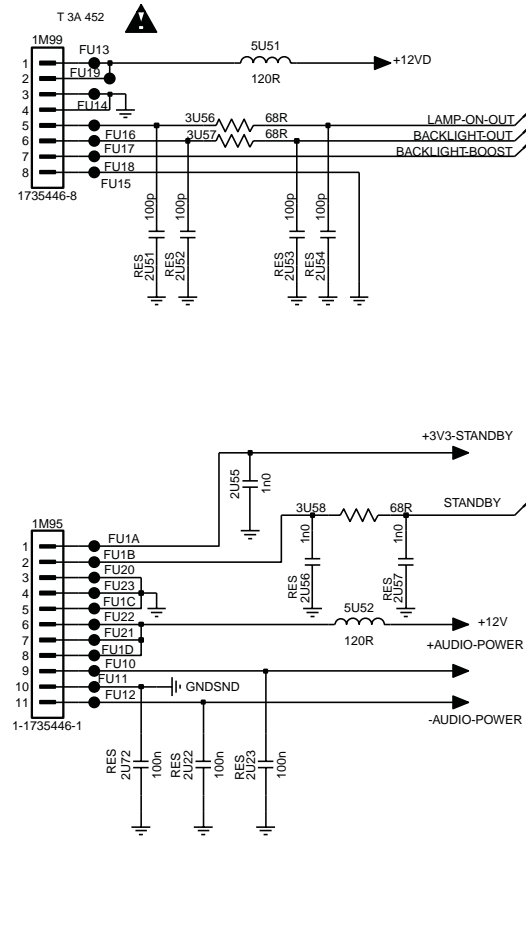
D

E

F

G

H



- 1M95 D2
- 1M99 B2
- 2U22 E3
- 2U23 E3
- 2U24 D5
- 2U25 D6
- 2U26 E7
- 2U51 C3
- 2U52 C3
- 2U53 C3
- 2U54 C3
- 2U55 D3
- 2U56 E3
- 2U57 E4
- 2U72 E2
- 3U3V E7
- 3U3W D6
- 3U46 D7
- 3U4A D6
- 3U56 B3
- 3U57 C3
- 3U58 D3
- 5U51 B3
- 5U52 E4
- 7U0M D7
- 7U0N E6
- FU10 E2
- FU11 E2
- FU12 E2
- FU13 B2
- FU14 B2
- FU15 C2
- FU16 C2
- FU17 C2
- FU18 C2
- FU19 B2
- FU1A D2
- FU1B D2
- FU1C E2
- FU1D E2
- FU1F D7
- FU20 E2
- FU21 E2
- FU22 E2
- FU23 E2
- IU34 D6
- IU35 E7
- IU3C D6

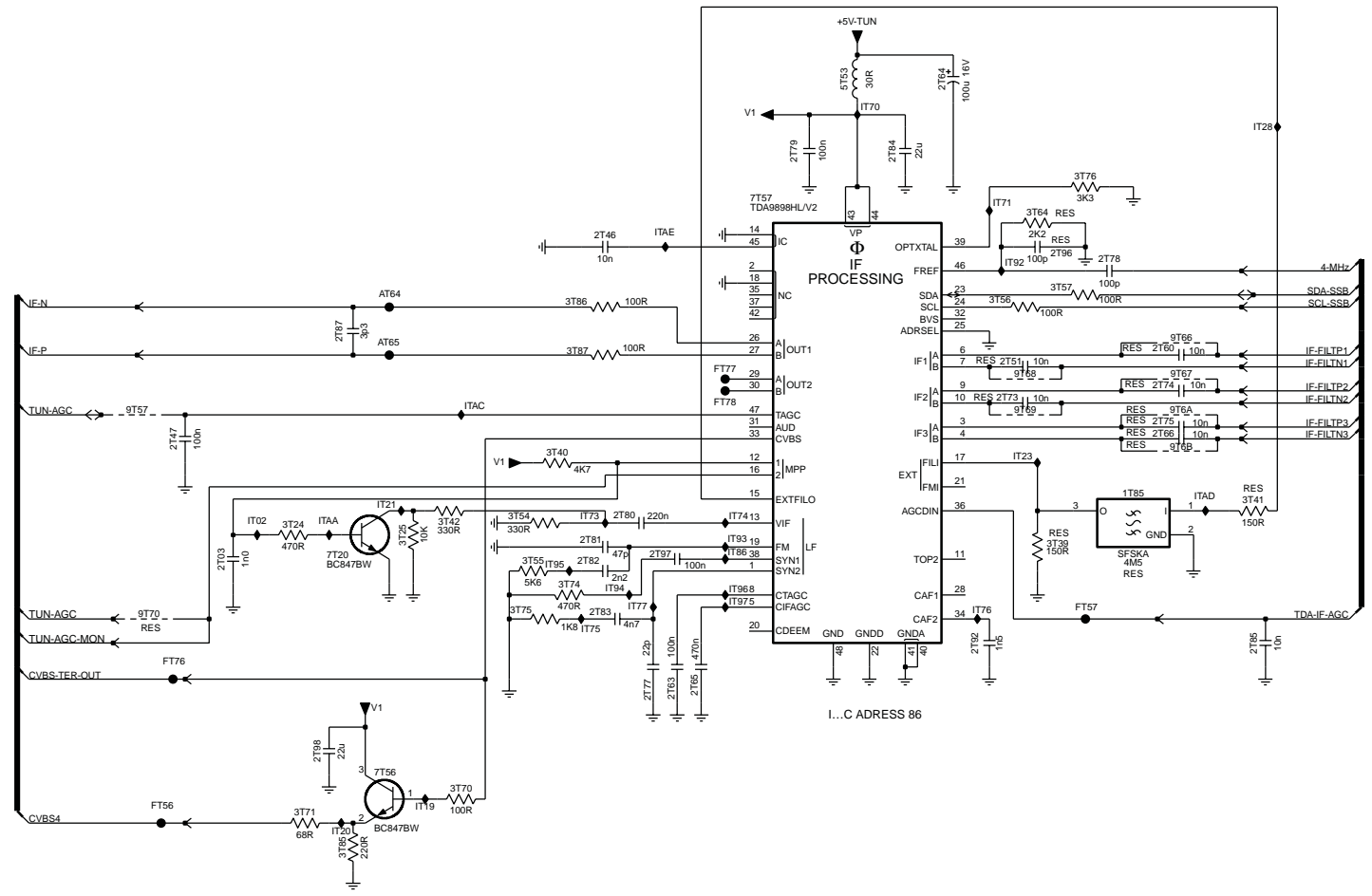
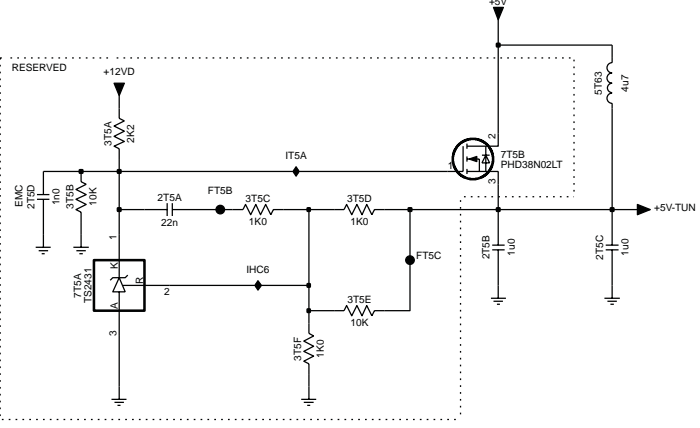
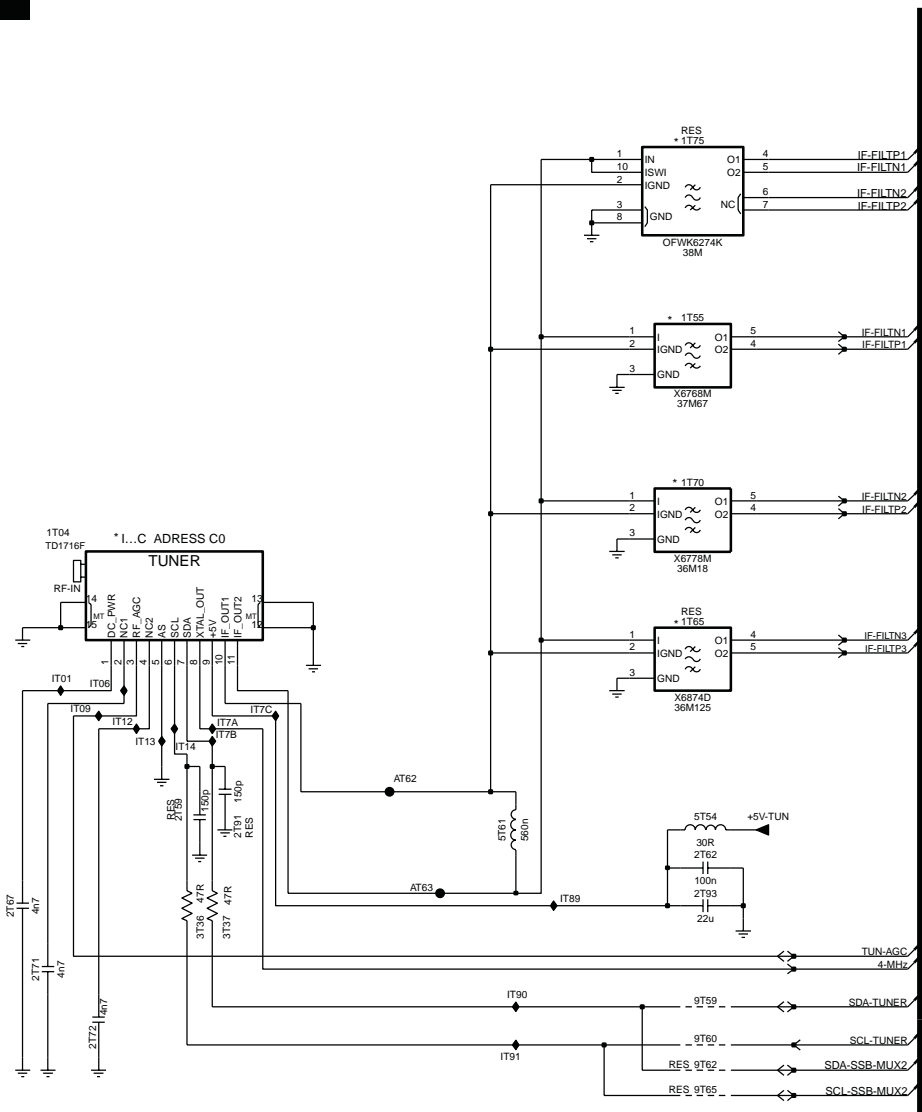


SSB: Main Tuner

1T04 D2	1T75 B5	2T47 G8	2T5B B9	2T62 F5	2T66 G14	2T73 G13	2T78 F13	2T82 H10	2T87 F9	2T96 F13	3T25 G9	3T40 G10	3T55 H10	3T5B B7	3T5F C8	3T74 H10	3T86 F10	5T61 F4	7T57 E11	9T59 F5	9T66 F14	9T6A G14	AT63 F4	FT57 H13	FT77 F11	IT02 G8	IT13 E2	IT21 G9	IT70 E12	IT75 H10	IT7B E3	IT90 F4	IT94 H10	ITAA G9
1T55 C5	1T85 G13	2T51 F13	2T5C B10	2T63 H11	2T67 F1	2T74 F14	2T79 E11	2T83 H10	2T91 E3	2T97 G11	3T36 F2	3T41 G14	3T56 F13	3T5C B8	3T64 E13	3T75 H10	3T87 F10	5T63 A10	7T5A B7	9T60 G5	9T67 F14	9T6B G14	AT64 F9	FT58 B8	FT78 G11	IT06 E2	IT14 E2	IT23 G13	IT71 E13	IT76 H13	IT7C E3	IT91 G4	IT96 H10	ITAC G9
1T65 D5	2T03 H8	2T59 E2	2T5D B7	2T64 E12	2T71 F1	2T75 G14	2T80 G10	2T84 E12	2T92 H12	2T98 I9	3T37 F3	3T42 G9	3T57 F13	3T5D B9	3T70 I9	3T76 E13	5T53 E12	7T20 G9	7T5B B9	9T62 G5	9T68 F13	9T70 H8	AT65 F9	FT59 B9	IHC6 B8	IT09 E2	IT19 I9	IT28 E14	IT73 G10	IT77 H10	IT86 G11	IT92 F13	IT96 H11	ITAD G14
1T70 D5	2T46 F10	2T5A B8	2T60 F14	2T65 H11	2T72 G2	2T77 H11	2T81 G10	2T85 H14	2T93 F5	3T24 G8	3T39 G13	3T54 G10	3T5A B7	3T5E B9	3T71 I8	3T85 I9	5T54 E5	7T56 I9	9T57 G7	9T65 G5	9T69 G13	AT62 E4	FT56 I8	FT76 H8	IT01 E2	IT12 E2	IT5A B8	IT74 G11	IT7A E3	IT89 F4	IT93 G11	IT97 H11	ITAE G11	

B03A MAIN TUNER

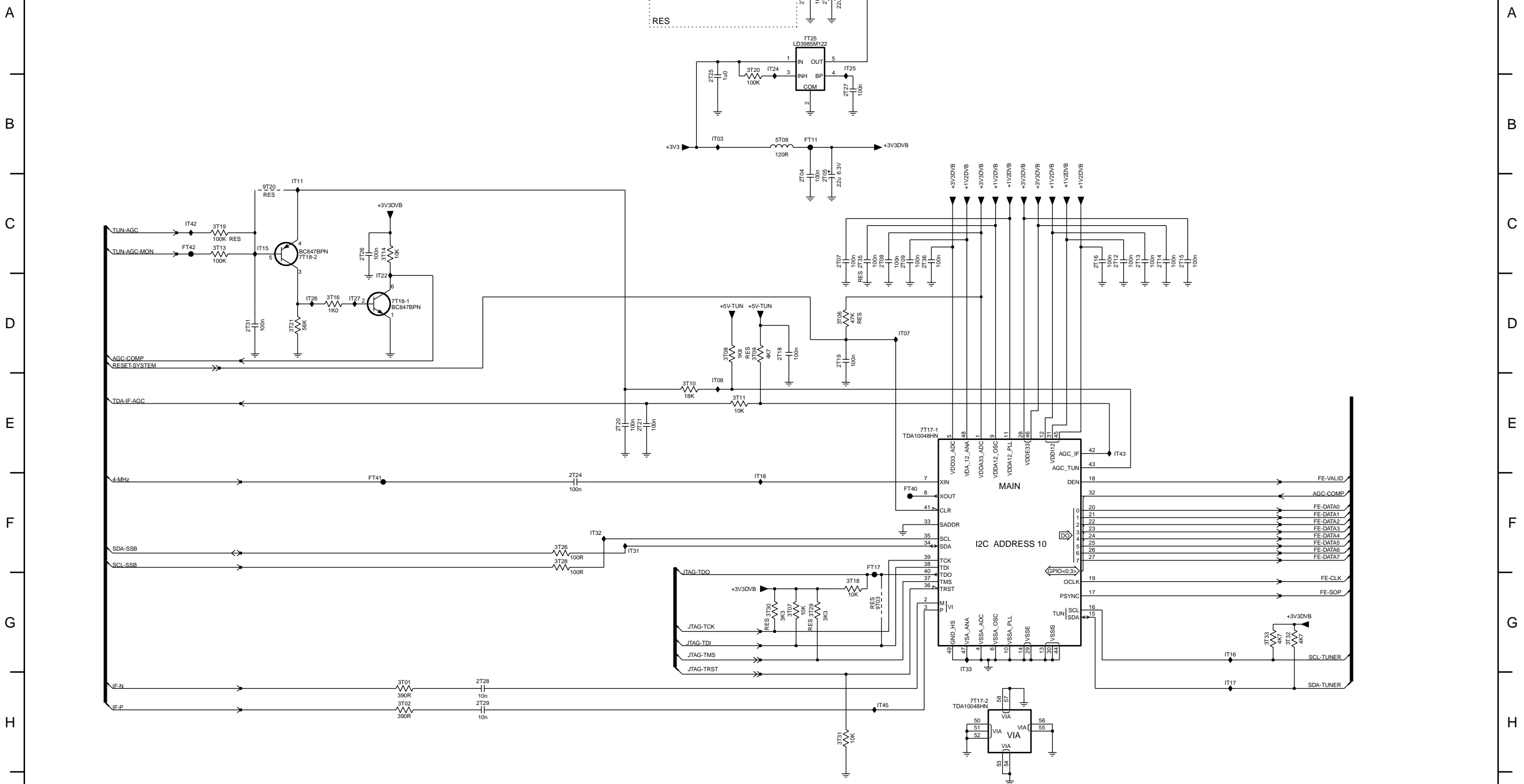
B03A



SSB: Channel Decoder DVB-T

2T01 A8	2T07 C8	2T12 C11	2T15 C12	2T19 D8	2T24 F6	2T27 B8	2T31 D2	2T36 C9	3T06 D8	3T09 D7	3T13 C2	3T18 G8	3T21 D3	3T29 G8	3T32 G13	5T09 A8	7T18-1 D4	9T03 G9	FT15 A8	FT41 F4	IT07 D9	IT15 C2	IT18 F7	IT25 A8	IT31 F6	IT41 A7	IT45 H9
2T04 C8	2T08 C9	2T13 C11	2T16 C11	2T20 E6	2T25 B7	2T28 H5	2T32 A8	3T01 H4	3T07 G8	3T10 E7	3T14 C4	3T19 C2	3T26 F5	3T30 G8	3T33 G13	7T17-1 E9	7T18-2 C3	9T20 C3	FT17 F9	FT42 C2	IT08 E7	IT16 G12	IT22 D4	IT26 D3	IT32 F6	IT42 C2	IT43 E11
2T05 C8	2T09 C9	2T14 C12	2T18 D8	2T21 E6	2T26 C4	2T29 H5	2T35 C9	3T02 H4	3T08 D7	3T11 E7	3T16 D3	3T20 A7	3T28 F5	3T31 H8	5T08 B8	7T17-2 H10	7T25 A8	FT11 B8	FT40 F9	IT03 C3	IT17 H12	IT24 A8	IT27 D3	IT33 G10	IT43 E11		

B03B CHANNEL DECODER DVB-T B03B



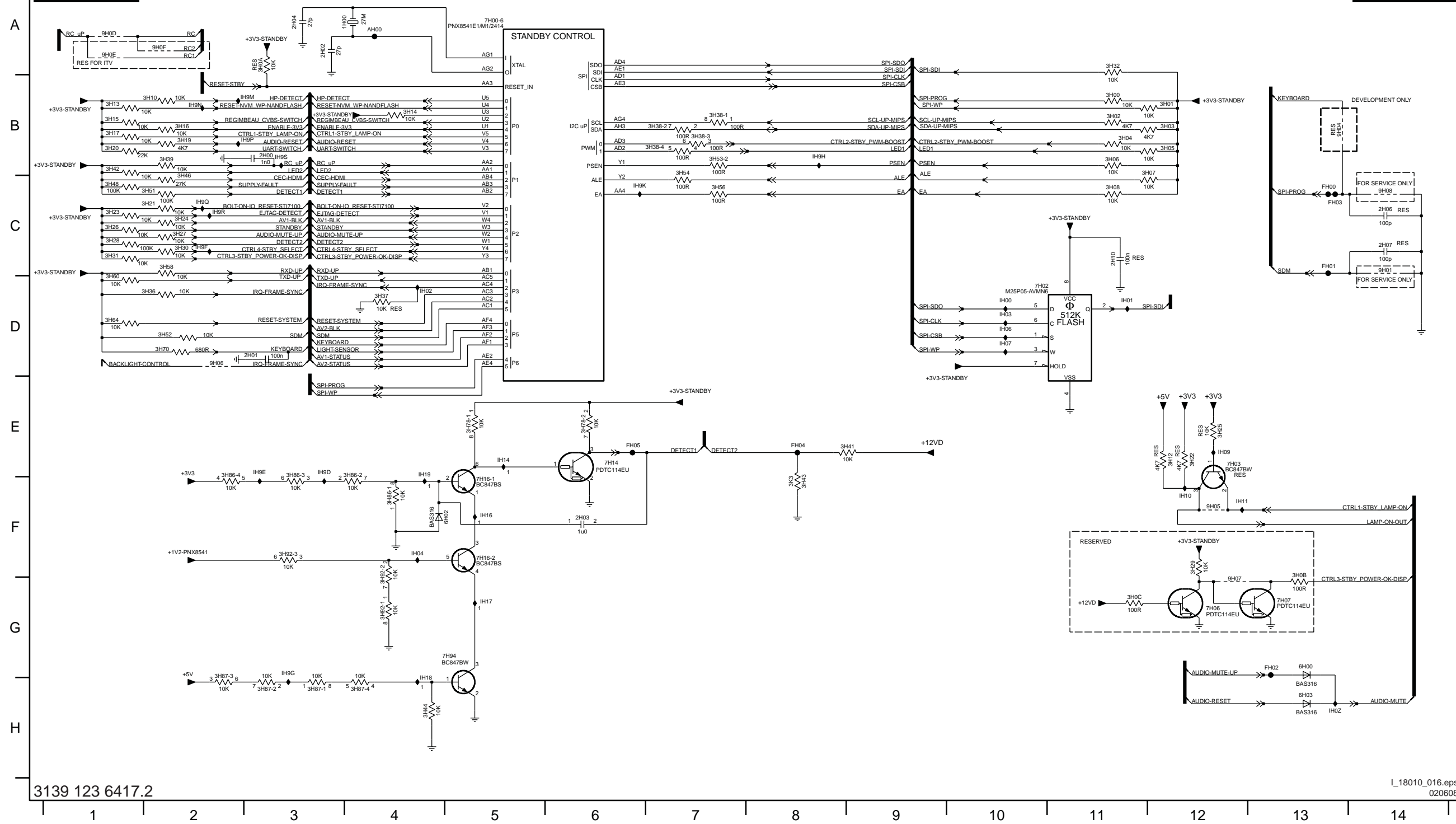
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SSB: PNX8541: Standby Controller

B04A PNX 8541: STANDBY CONTROLLER

B04A



- IH00 A4
- 2H00 B3
- 2H01 D3
- 2H02 A3
- 2H03 F6
- 2H04 A3
- 2H06 C14
- 2H07 C14
- 2H10 C11
- 3H00 B11
- 3H01 B12
- 3H02 B11
- 3H03 B12
- 3H04 B11
- 3H05 B12
- 3H06 B11
- 3H07 B12
- 3H08 C11
- 3H0A A3
- 3H0B G13
- 3H0C G11
- 3H10 B2
- 3H12 E12
- 3H13 B1
- 3H14 B4
- 3H15 B1
- 3H16 B2
- 3H17 B1
- 3H19 B2
- 3H20 C1
- 3H21 C2
- 3H22 E12
- 3H23 C1
- 3H24 C2
- 3H26 C1
- 3H27 C2
- 3H28 C1
- 3H29 F12
- 3H30 C2
- 3H31 C1
- 3H32 A11
- 3H36 D2
- 3H37 D4
- 3H38-1 B7
- 3H38-2 B7
- 3H38-3 B7
- 3H38-4 B7
- 3H39 B2
- 3H41 E9
- 3H42 B1
- 3H43 F3
- 3H44 H4
- 3H46 C2
- 3H48 C1
- 3H51 C2
- 3H52 D2
- 3H53-2 B7
- 3H54 B7
- 3H56 C7
- 3H58 C2
- 3H60 D1
- 3H64 D1
- 3H70 D2
- 3H78-1 E5
- 3H78-2 E6
- 3H86-1 F4
- 3H86-2 F4
- 3H86-3 F3
- 3H86-4 F2
- 3H87-1 H3
- 3H87-2 H3
- 3H87-3 H2
- 3H87-4 H4
- 3H92-1 G4
- 3H92-2 F4
- 3H92-3 F3
- 6H00 G13
- 6H02 F4
- 6H03 H13
- 7H00-6 A5
- 7H02 D11
- 7H03 E12
- 7H06 G12
- 7H07 G13
- 7H14 E6
- 7H16-1 F5
- 7H16-2 F5
- 7H94 G4
- 9H01 C14
- 9H04 B13
- 9H05 F12
- 9H06 D2
- 9H07 G12
- 9H08 C14
- 9H0D A1
- 9H0E A1
- 9H0F A2
- AH00 A4
- FH00 C13
- FH01 C13
- FH02 G13
- FH03 C13
- FH04 E8
- FH05 E6
- IH00 D10
- IH01 D11
- IH02 D4
- IH03 D10
- IH04 F4
- IH05 D10
- IH07 D10
- IH09 E12
- IH0Z H13
- IH10 F12
- IH11 F12
- IH14 E5
- IH16 F5
- IH17 G5
- IH18 G4
- IH19 E4
- IH9D E3
- IH9F C2
- IH9G G3
- IH9H B8
- IH9K C6
- IH9M B3
- IH9N B2
- IH9P B3
- IH9Q C2
- IH9R C2
- IH9S B3

SSB: PNX8541: NVM

**B04B** PNX 8541: NVM

**B04B**

A

B

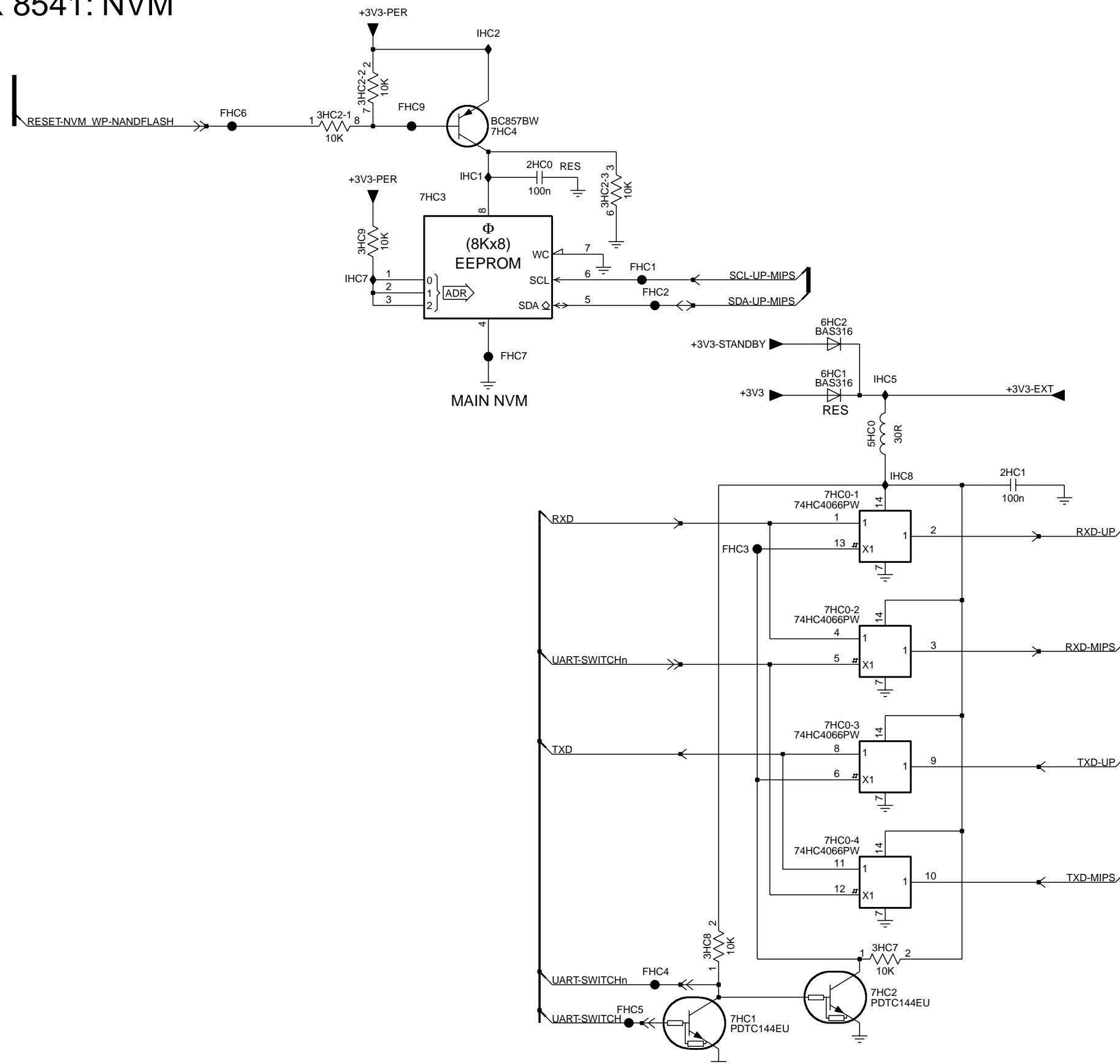
C

D

E

F

- 2HC0 A5
- 2HC1 C7
- 3HC2-1 A3
- 3HC2-2 A4
- 3HC2-3 B5
- 3HC7 F6
- 3HC8 F5
- 3HC9 B4
- 5HC0 C6
- 6HC1 C6
- 6HC2 B6
- 7HC0-1 C6
- 7HC0-2 D6
- 7HC0-3 E6
- 7HC0-4 E6
- 7HC1 F6
- 7HC2 F6
- 7HC3 B4
- 7HC4 A4
- FHC1 B5
- FHC2 B5
- FHC3 D6
- FHC4 F5
- FHC5 F5
- FHC6 A3
- FHC7 C4
- FHC9 A4
- IHC1 A4
- IHC2 A4
- IHC5 C6
- IHC7 B3
- IHC8 C7



SSB: PNX8541: Miscellaneous

**B04C**

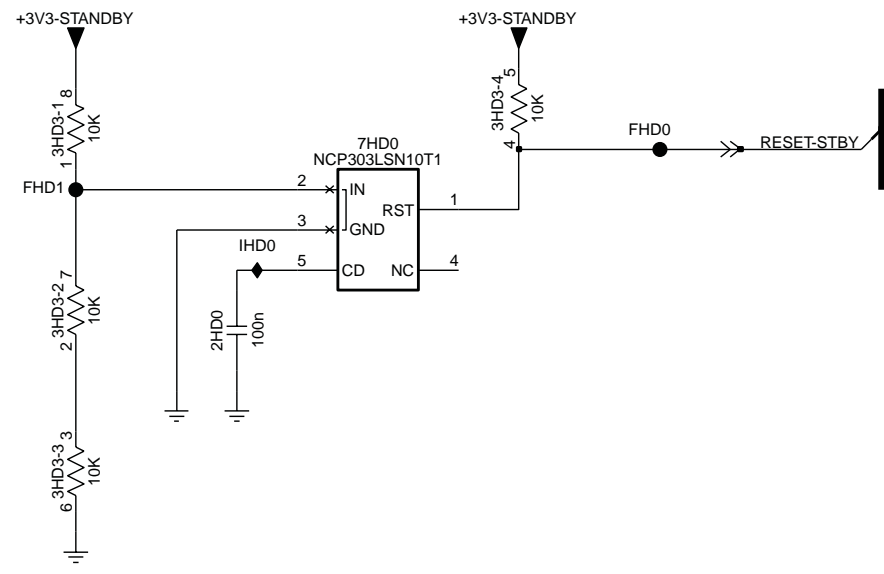
PNX 8541: MISCELLANEOUS

**B04C**

- 2HD0 C3
- 3HD3-1 B2
- 3HD3-2 C2
- 3HD3-3 D2
- 3HD3-4 B4
- 7HD0 B3
- FHD0 B4
- FHD1 C2
- IHD0 C3

A  
B  
C  
D

A  
B  
C  
D



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1 2 3 4 5 6 7 8 9

SSB: PNX8541: Control MIPS

B04E PNX8541: CONTROL MIPS

B04E

A

B

C

D

E

F

A

B

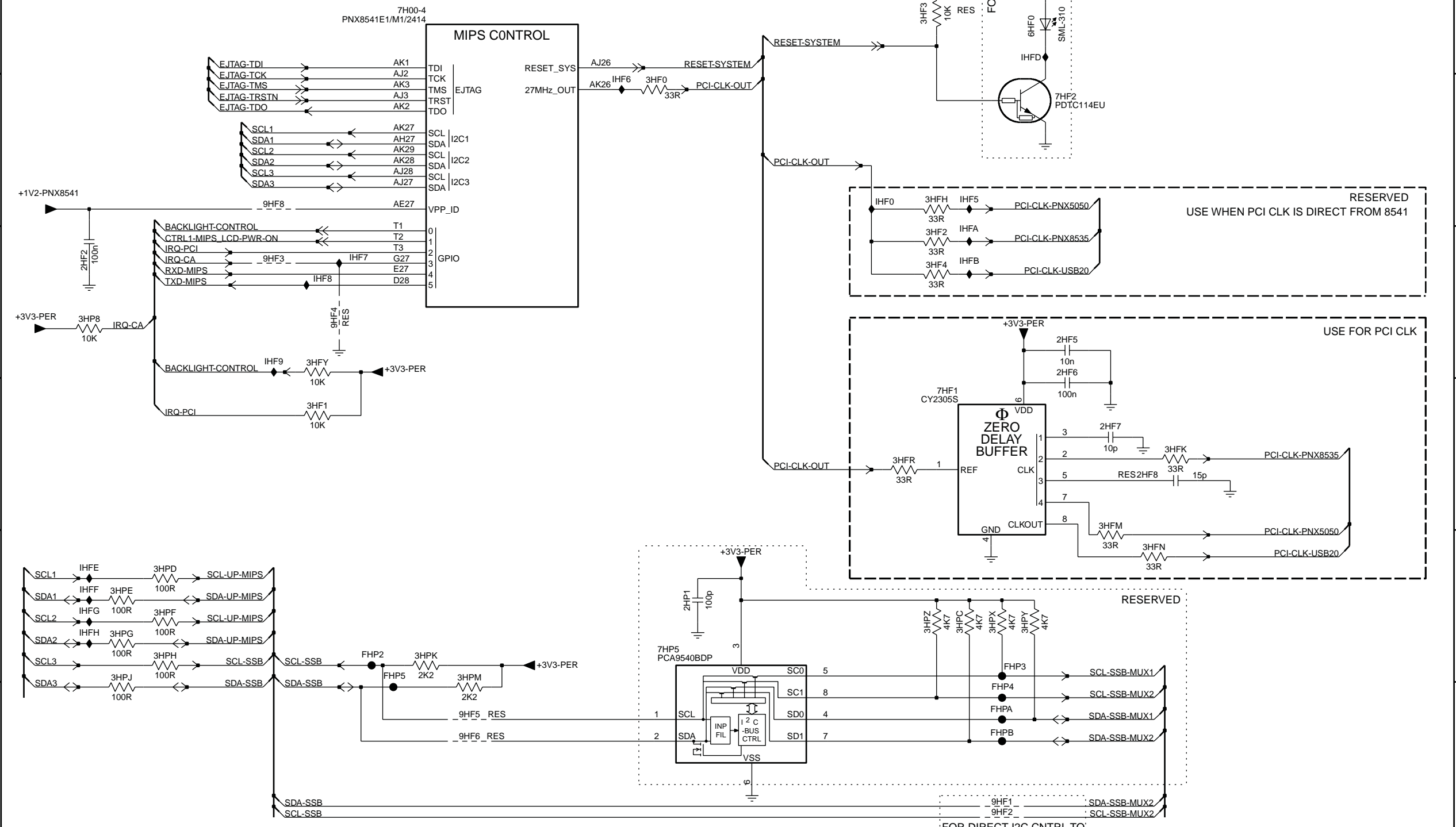
C

D

E

F

- 2HF2 C1
- 2HF5 C7
- 2HF6 C7
- 2HF7 D8
- 2HF8 D8
- 2HP1 E5
- 3HF0 B5
- 3HF1 D2
- 3HF2 C6
- 3HF3 A6
- 3HF4 C6
- 3HF9 A7
- 3HFH B6
- 3HFK D8
- 3HFM D8
- 3HFN E8
- 3HFR D6
- 3HFY C2
- 3HP8 C1
- 3HPC E7
- 3HPD E1
- 3HPE E1
- 3HPF E1
- 3HPG E1
- 3HPH E1
- 3HPJ E1
- 3HPK E3
- 3HPM E3
- 3HPX E7
- 3HPY E7
- 3HPZ E6
- 6HF0 A7
- 7H00-4 A3
- 7HF1 D7
- 7HF2 B7
- 7HP5 E5
- 9HF1 F7
- 9HF2 F7
- 9HF3 C2
- 9HF4 C2
- 9HF5 F3
- 9HF6 B3
- 9HF8 B2
- FHP2 E3
- FHP3 E7
- FHP4 F7
- FHP5 E3
- FHPA F7
- FHPB F7
- IHF0 B6
- IHF5 B7
- IHF6 B4
- IHF7 C3
- IHF8 C2
- IHF9 C2
- IHFA C7
- IHFB C7
- IHFC A7
- IHFD A7
- IHFE E1
- IHFF E1
- IHFG E1
- IHFH E1



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FOR DIRECT I2C CNTRL TO TUNER W/O MUX

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SSB: PNx8541: Control PCI

B04F

PNX 8541: CONTROL PCI

B04F

A

B

C

D

E

A

B

C

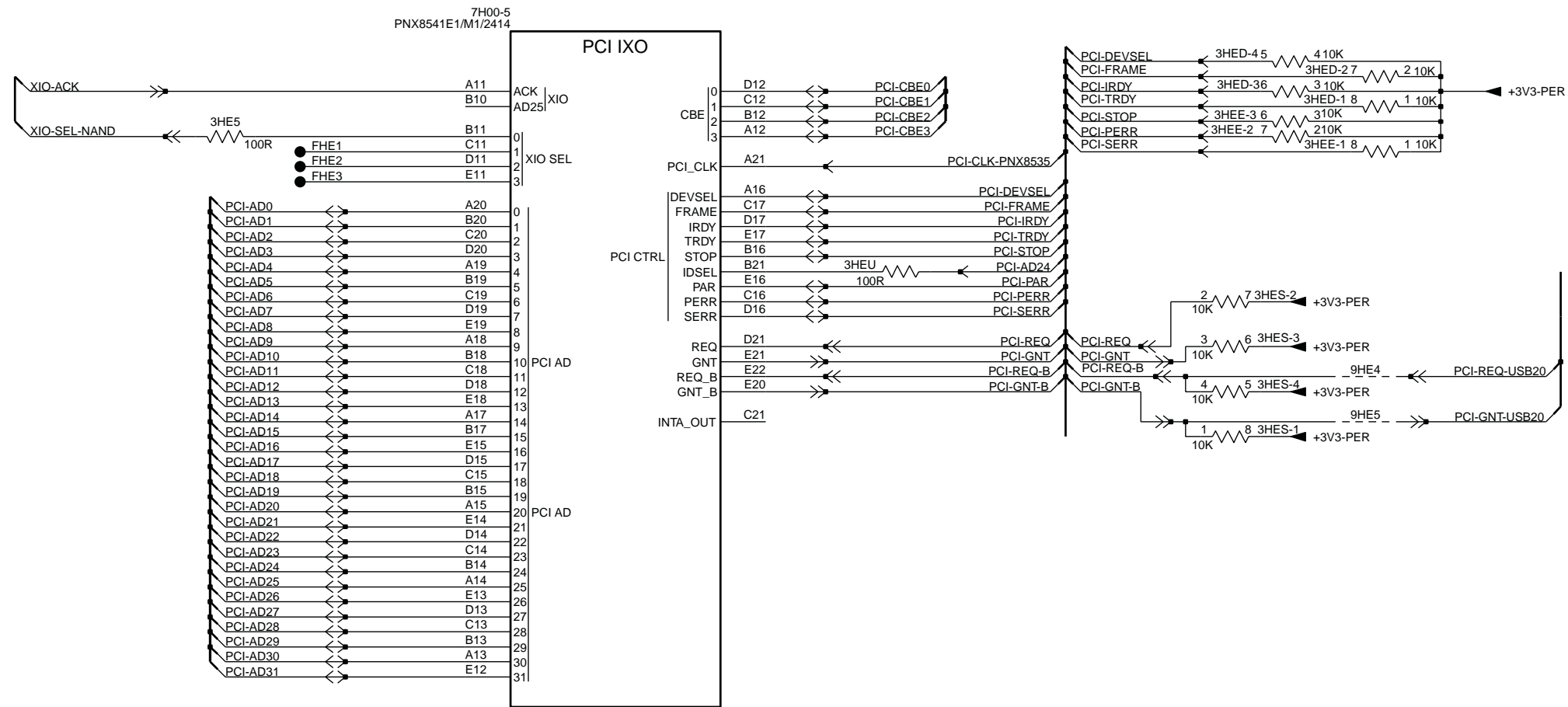
D

E

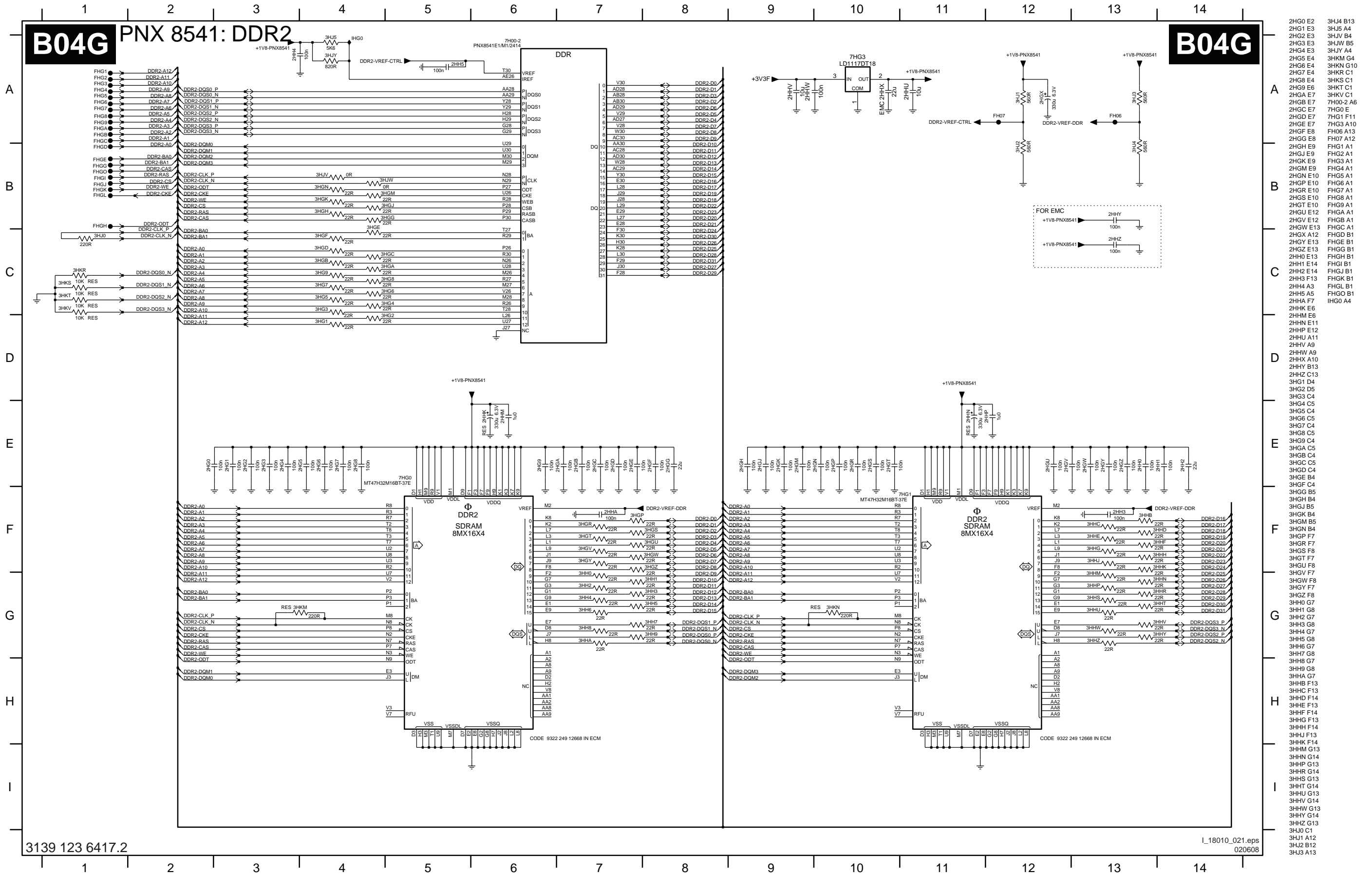
1 2 3 4 5 6 7 8 9

1 2 3 4 5 6 7 8 9

- 3HE5 B2
- 3HED-1 B7
- 3HED-2 B8
- 3HED-3 B8
- 3HED-4 B7
- 3HEE-1 B7
- 3HEE-2 C8
- 3HEE-3 B7
- 3HES-1 C7
- 3HES-2 C7
- 3HES-3 D7
- 3HES-4 D7
- 3HEU C5
- 7H00-5 B4
- 9HE4 D8
- 9HE5 D8
- FHE1 C3
- FHE2 C3
- FHE3 C3



SSB: PNX8541: DDR2



- 2HG0 E2
- 2HG1 E3
- 2HG2 E3
- 2HG3 E3
- 2HG4 E3
- 2HG5 E4
- 2HG6 E4
- 2HG7 E4
- 2HG8 E4
- 2HG9 E6
- 2HGA E7
- 2HGB E7
- 2HGC E7
- 2HGD E7
- 2HGE E7
- 2HGF E8
- 2HGG E8
- 2HGH E9
- 2HGJ E9
- 2HGK E9
- 2HGM E9
- 2HGN E10
- 2HGP E10
- 2HGR E10
- 2HGS E10
- 2HGT E10
- 2HGU E12
- 2HGV E12
- 2HGW E13
- 2HGX A12
- 2HGY E13
- 2HGZ E13
- 2HH0 E13
- 2HH1 E14
- 2HH2 E14
- 2HH3 F13
- 2HH4 A3
- 2HH5 A5
- 2HHA F7
- 2HHK E6
- 2HHM E6
- 2HHN E11
- 2HHP E12
- 2HHU A9
- 2HHV A9
- 2HHX A10
- 2HHY B13
- 2HHZ C13
- 3HG1 D5
- 3HG2 D5
- 3HG3 C4
- 3HG4 C5
- 3HG5 C4
- 3HG6 C5
- 3HG7 C4
- 3HG8 C5
- 3HG9 C4
- 3HGA C5
- 3HGB C4
- 3HGC C5
- 3HGD C4
- 3HGE B4
- 3HGF C4
- 3HGG B5
- 3HGH B4
- 3HGJ B5
- 3HGK B5
- 3HGM B5
- 3HGN B4
- 3HGP F7
- 3HGR F7
- 3HGS F8
- 3HGT F7
- 3HGU F8
- 3HGV F7
- 3HGW F8
- 3HGY F7
- 3HGZ F8
- 3HH0 G7
- 3HH1 G8
- 3HH2 G7
- 3HH3 G8
- 3HH4 G7
- 3HH5 G8
- 3HH6 G7
- 3HH7 G8
- 3HH8 G7
- 3HH9 G8
- 3HHA G7
- 3HHB F13
- 3HHC F13
- 3HHD F14
- 3HHE F13
- 3HHF F14
- 3HHG F13
- 3HHH F14
- 3HHJ F13
- 3HHK F14
- 3HHM G13
- 3HHN G14
- 3HHP G13
- 3HHR G14
- 3HHS G13
- 3HHT G14
- 3HHU G13
- 3HHV G14
- 3HHW G13
- 3HHY G14
- 3HHZ G13
- 3HU0 C1
- 3HU1 A12
- 3HU2 B12
- 3HU3 A13
- 3HJ4 B13
- 3HJ5 A4
- 3HJV B4
- 3HJW B5
- 3HJX A4
- 3HJY C4
- 3HKM G4
- 3HKR C10
- 3HKR C1
- 3HKT C1
- 3HKV C1
- 7H00-2 A6
- 7HG0 E
- 7HG1 F11
- 7HG3 A10
- 7HG6 A13
- 7HG7 A12
- 7HG8 A1
- 7HG9 A1
- 7HG2 A1
- 7HG3 A1
- 7HG4 A1
- 7HG5 A1
- 7HG6 A1
- 7HG7 A1
- 7HG8 A1
- 7HG9 A1
- 7HGA A1
- 7HGB A1
- 7HGC A1
- 7HGD A1
- 7HGE A1
- 7HGF A1
- 7HGG A1
- 7HGH A1
- 7HGI A1
- 7HJJ A1
- 7HJK A1
- 7HJM A1
- 7HJN A1
- 7HJP A1
- 7HJQ A1
- 7HJR A1
- 7HJS A1
- 7HJT A1
- 7HJU A1
- 7HJV A1
- 7HJW A1
- 7HJX A1
- 7HJY A1
- 7HJZ A1

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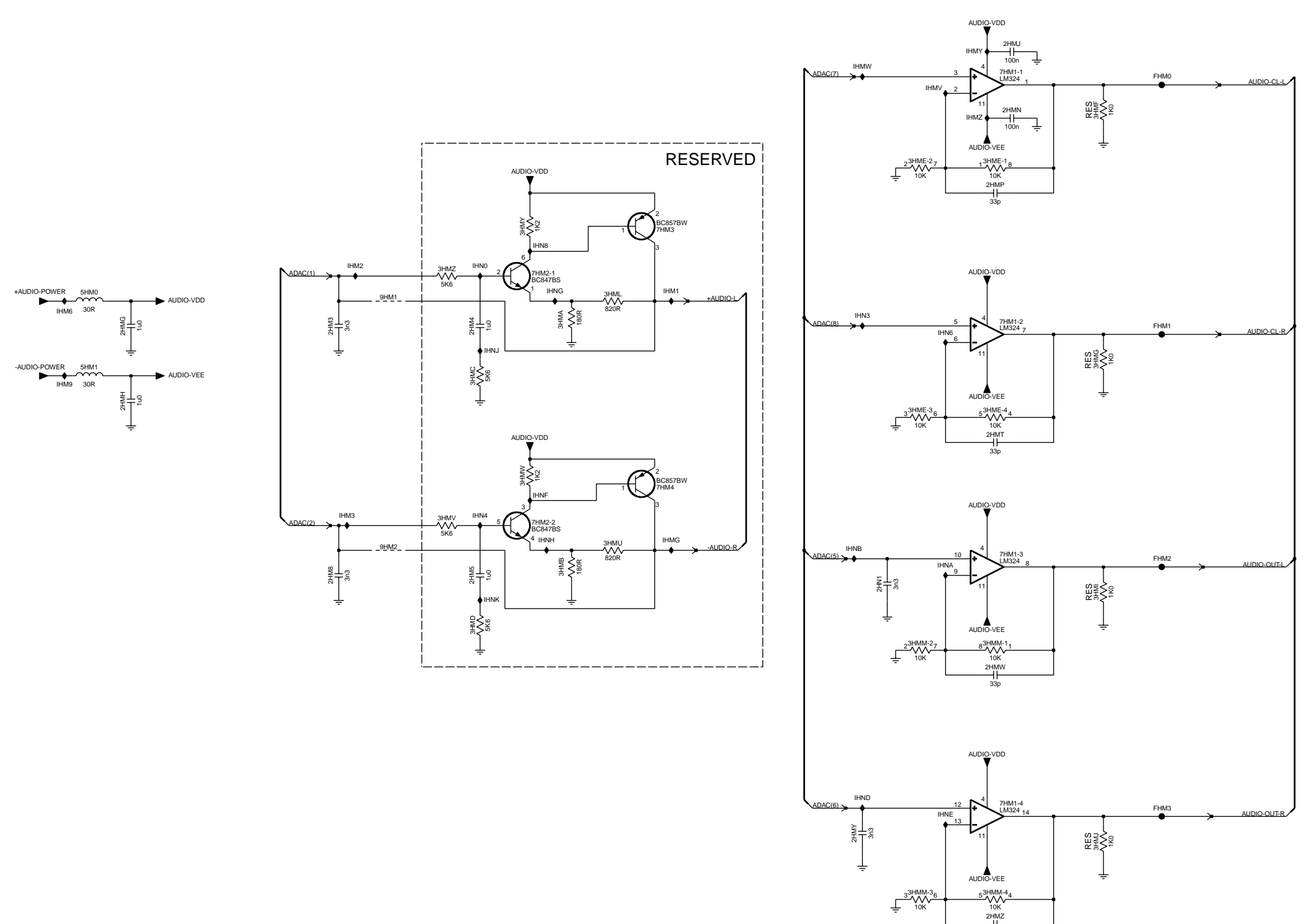
SSB: PNx8541: Audio

B041 PNx 8541: AUDIO

B041

A  
B  
C  
D  
E  
F  
G  
H

A  
B  
C  
D  
E  
F  
G  
H



- 2HM3 C4
- 2HM4 C6
- 2HM5 F6
- 2HM8 F4
- 2HM8 C3
- 2HMJ D3
- 2HMJ A10
- 2HMN B10
- 2HMP B10
- 2HMT D10
- 2HMV F10
- 2HMY H9
- 2HMZ H10
- 2HN1 F9
- 3HMA C6
- 3HMB F6
- 3HMC D6
- 3HMD F6
- 3HME-1 B10
- 3HME-2 B9
- 3HME-3 D9
- 3HME-4 D10
- 3HMF B11
- 3HMG D11
- 3HMI F11
- 3HMJ H11
- 3HML C7
- 3HMM-1 F9
- 3HMM-2 F10
- 3HMM-3 H9
- 3HMM-4 H10
- 3HMU E7
- 3HMV E5
- 3HMV E6
- 3HMY C6
- 3HMZ C5
- 5HM0 C2
- 5HM1 D2
- 7HM1-1 A10
- 7HM1-2 C10
- 7HM1-3 E10
- 7HM1-4 H10
- 7HM2-1 C6
- 7HM2-2 E6
- 7HM3 C7
- 7HM4 E7
- 9HM1 C5
- 9HM2 E5
- FHM0 A11
- FHM1 C11
- FHM2 E11
- FHM3 H11
- IHM1 C7
- IHM2 C4
- IHM3 E4
- IHM6 C2
- IHM9 D2
- IHM9 E7
- IHMV A9
- IHMV A9
- IHMY A10
- IHMZ B10
- IHN0 C6
- IHN3 C9
- IHN4 E6
- IHN6 D10
- IHN8 C6
- IHNA F10
- IHNB E9
- IHND H9
- IHNE H10
- IHNF E6
- IHNG C6
- IHNH E6
- IHNJ D6
- IHNK F6

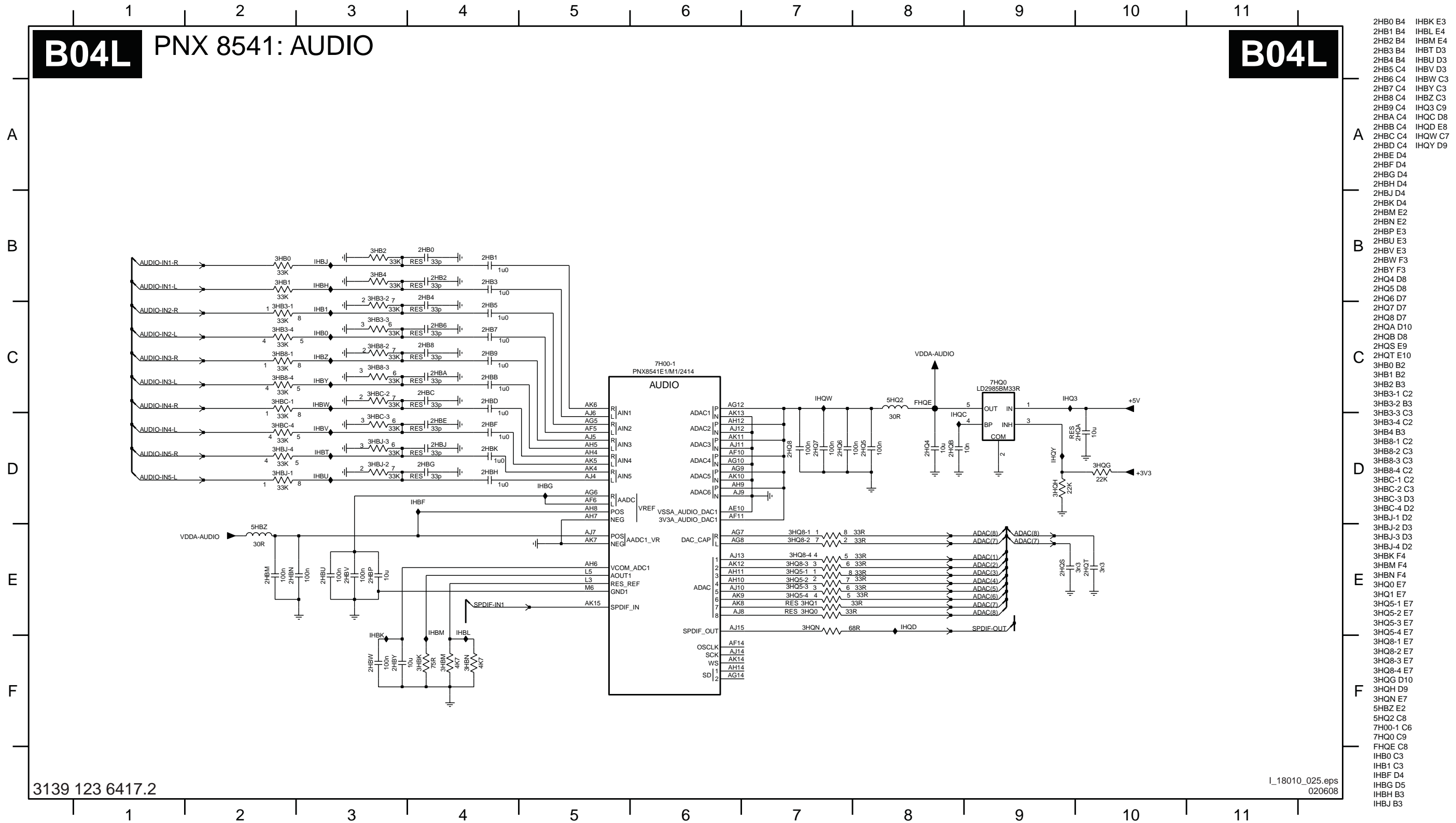
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SSB: PNX8541: Audio

B04L PNX 8541: AUDIO

B04L



- 2HB0 B4
- 2HB1 B4
- 2HB2 B4
- 2HB3 B4
- 2HB4 B4
- 2HB5 C4
- 2HB6 C4
- 2HB7 C4
- 2HB8 C4
- 2HB9 C4
- 2HBA C4
- 2HBB C4
- 2HBC C4
- 2HBD C4
- 2HBE D4
- 2HBF D4
- 2HBG D4
- 2HBH D4
- 2HBJ D4
- 2HBK D4
- 2HBM E2
- 2HBN E2
- 2HBP E3
- 2HBU E3
- 2HBV E3
- 2HBW F3
- 2HBY F3
- 2HQ4 D8
- 2HQ5 D8
- 2HQ6 D7
- 2HQ7 D7
- 2HQ8 D7
- 2HQ9 D10
- 2HQB D8
- 2HQ5 E9
- 2HQT E10
- 3HB0 B2
- 3HB1 B2
- 3HB2 B3
- 3HB3-1 C2
- 3HB3-2 B3
- 3HB3-3 C3
- 3HB3-4 C2
- 3HB4 B3
- 3HB8-1 C2
- 3HB8-2 C3
- 3HB8-3 C3
- 3HB8-4 C2
- 3HBC-1 C2
- 3HBC-2 C3
- 3HBC-3 D3
- 3HBC-4 D2
- 3HBJ-1 D2
- 3HBJ-2 D3
- 3HBJ-3 D3
- 3HBJ-4 D2
- 3HBK F4
- 3HBM F4
- 3HBN F4
- 3HQ0 E7
- 3HQ1 E7
- 3HQ5-1 E7
- 3HQ5-2 E7
- 3HQ5-3 E7
- 3HQ5-4 E7
- 3HQ8-1 E7
- 3HQ8-2 E7
- 3HQ8-3 E7
- 3HQ8-4 E7
- 3HQ9 D10
- 3HQH D9
- 3HQH E7
- 5HBZ E2
- 5HQ2 C8
- 7H00-1 C6
- 7HQ0 C9
- FHQE C8
- IHB0 C3
- IHB1 C3
- IHBF D4
- IHBG D5
- IHBH B3
- IHBJ B3
- IHBK E3
- IHBL E4
- IHBM E4
- IHBT D3
- IHBU D3
- IHBV D3
- IHBW C3
- IHBY C3
- IHC3 C9
- IHQ3 D8
- IHQ4 E8
- IHQ5 C7
- IHQY D9

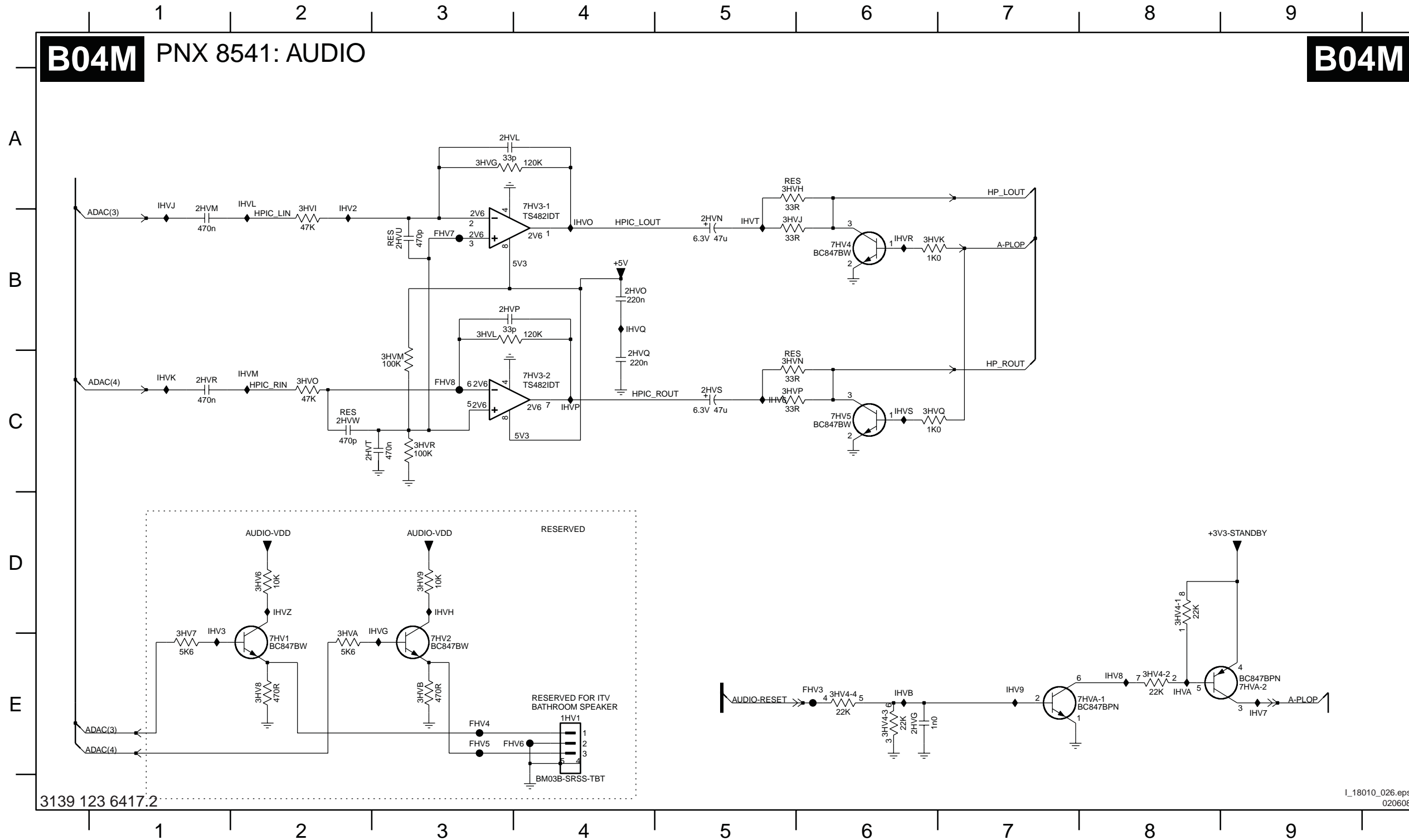
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SSB: PNx8541: Audio

B04M PNx 8541: AUDIO

B04M

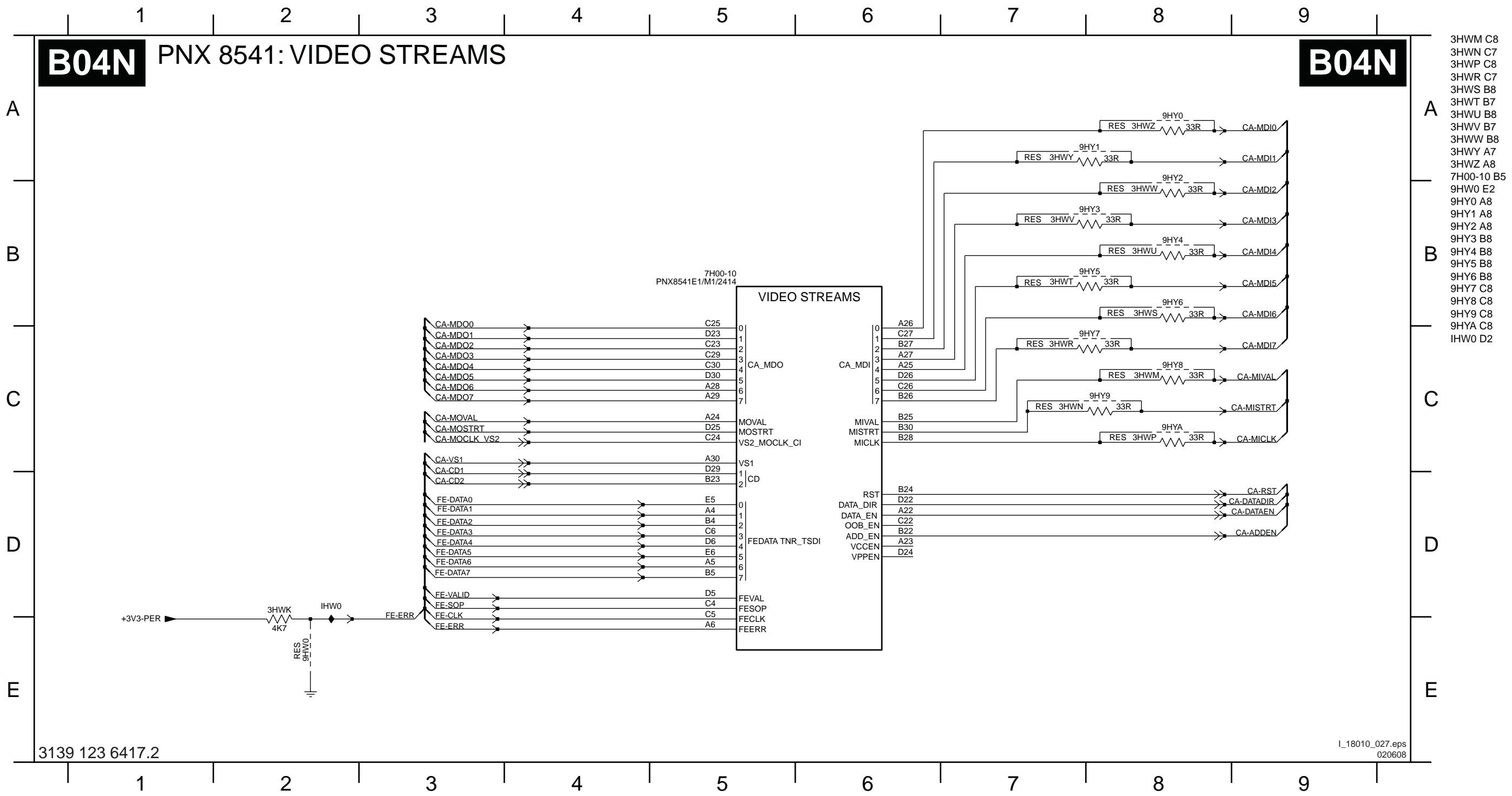


- 1HV1 E4
- 2HVG E6
- 2HVL A3
- 2HVM B1
- 2HVN B5
- 2HVO B4
- 2HVP B3
- 2HVQ B4
- 2HVR C1
- 2HVS C5
- 2HVT C2
- 2HVU B3
- 2HVW C2
- 3HV4-1 D8
- 3HV4-2 E8
- 3HV4-3 E6
- 3HV4-4 E6
- 3HV6 D2
- 3HV7 E1
- 3HV8 E2
- 3HV9 D3
- 3HVA E2
- 3HVB E3
- 3HVG A3
- 3HVH A5
- 3HVI B2
- 3HVJ B5
- 3HVK B6
- 3HVL B3
- 3HVM C3
- 3HVN C5
- 3HVO C2
- 3HVP C5
- 3HVQ C6
- 3HVR C3
- 7HV1 E2
- 7HV2 E3
- 7HV3-1 A4
- 7HV3-2 C4
- 7HV4 B6
- 7HV5 C6
- 7HVA-1 E7
- 7HVA-2 E9
- FHV3 E6
- FHV4 E3
- FHV5 E3
- FHV6 E4
- FHV7 B3
- FHV8 C3
- IHV2 A2
- IHV3 D1
- IHV6 C5
- IHV7 E9
- IHV8 E8
- IHV9 E7
- IHVA E8
- IHVB E6
- IHVG D3
- IHVL D3
- IHVJ A1
- IHKV C1
- IHLV A2
- IHVM C2
- IHVO B4
- IHVP C4
- IHVQ B4
- IHVR B6
- IHVS C6
- IHVT B5
- IHVZ D2

3139 123 6417.2

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SSB: PNX8541: Video Streams



3139 123 6417.2

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020608



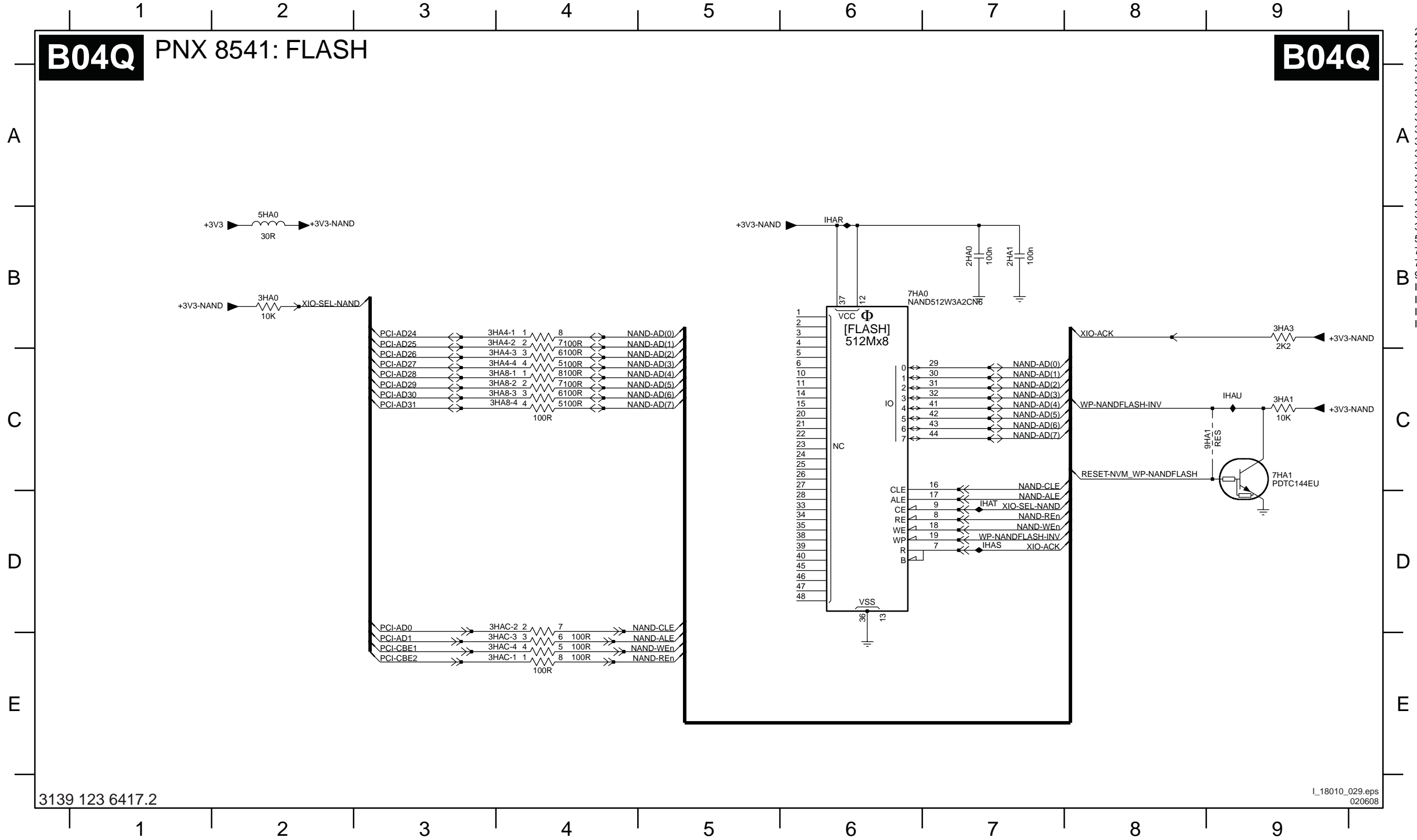


SSB: PNx8541: Flash

B04Q

PNx 8541: FLASH

B04Q

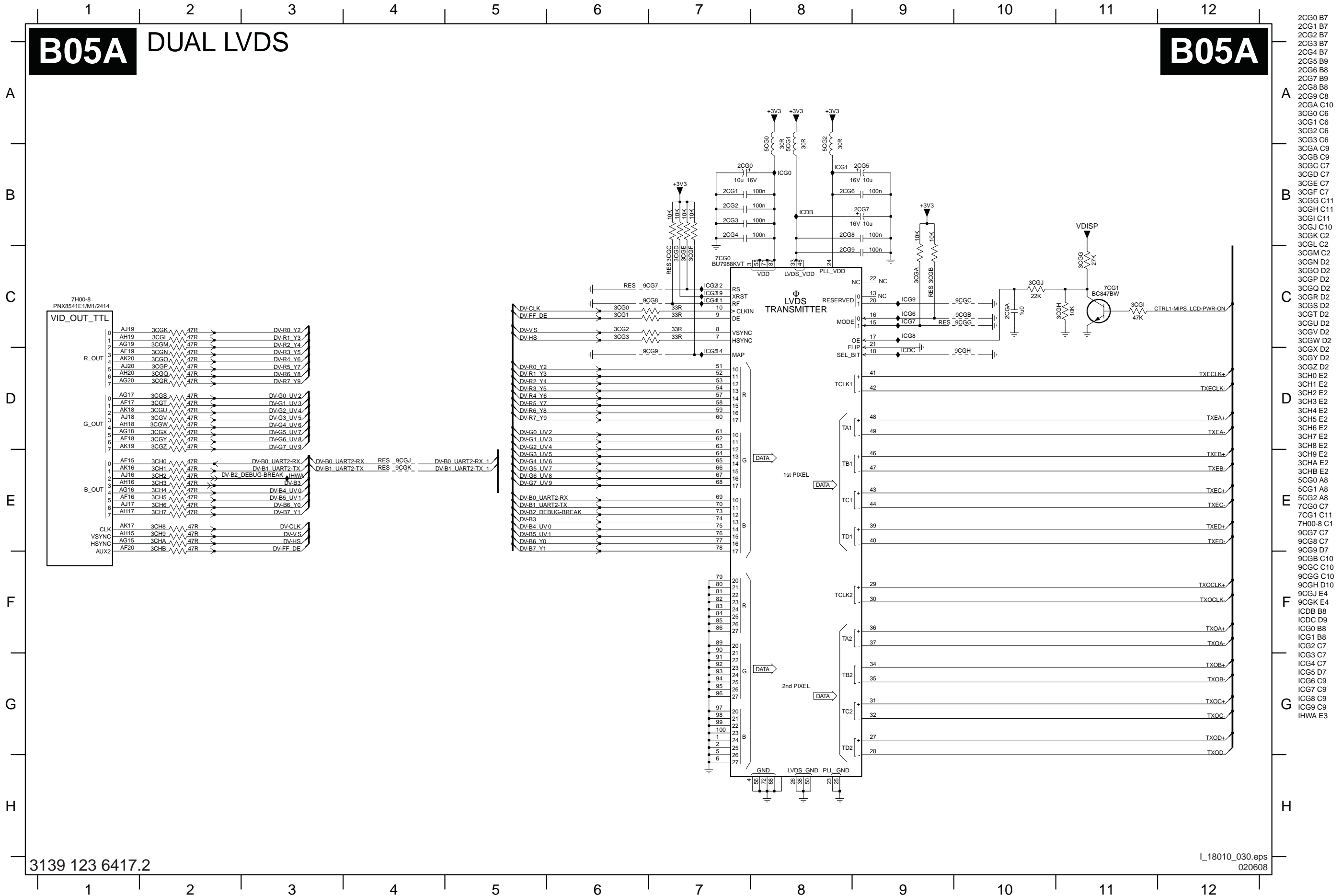


- 2HA0 B7
- 2HA1 B7
- 3HA0 B2
- 3HA1 C9
- 3HA3 B9
- 3HA4-1 B4
- 3HA4-2 B4
- 3HA4-3 C4
- 3HA4-4 C4
- 3HA8-1 C4
- 3HA8-2 C4
- 3HA8-3 C4
- 3HA8-4 C4
- 3HAC-1 E4
- 3HAC-2 D4
- 3HAC-3 E4
- 3HAC-4 E4
- 5HA0 B2
- 7HA0 B6
- 7HA1 C9
- 9HA1 C9
- IHAR B6
- IHAS D7
- IHAT D7
- IHAU C9

SSB: Dual LVDS

B05A DUAL LVDS

B05A

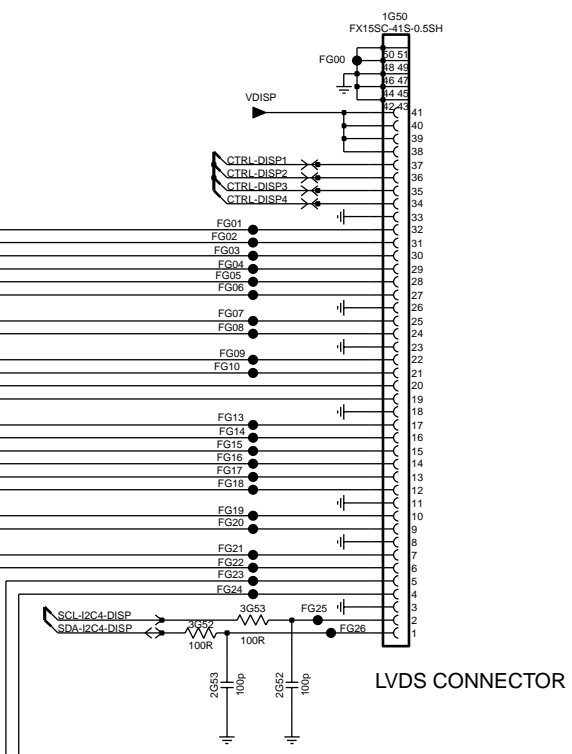
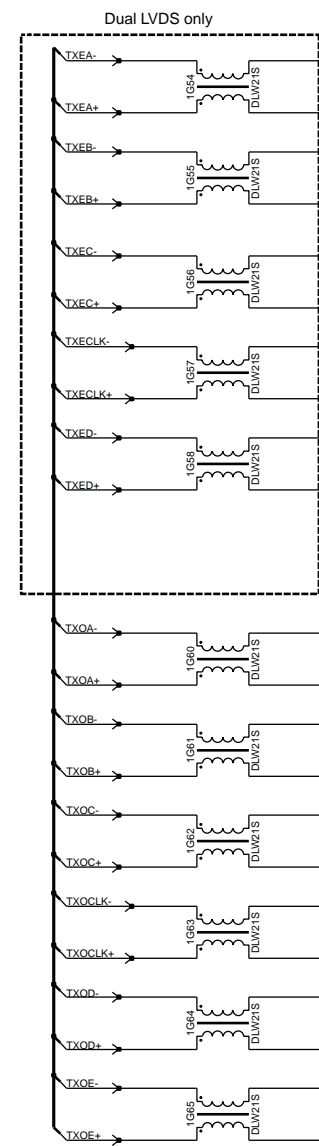
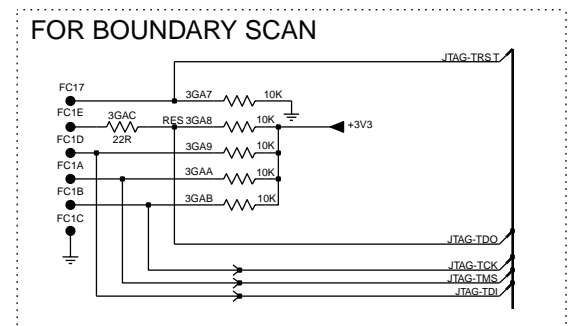
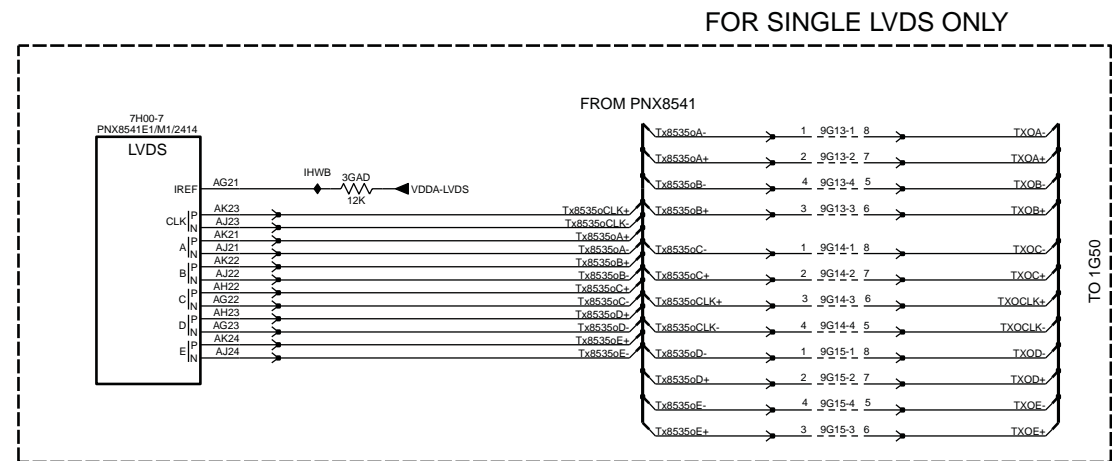


- 2CG0 B7
- 2CG1 B7
- 2CG2 B7
- 2CG3 B7
- 2CG4 B7
- 2CG5 B9
- 2CG6 B8
- 2CG7 B9
- 2CG8 B8
- 2CG9 C8
- 2CGA C10
- 3CG0 C6
- 3CG1 C6
- 3CG2 C6
- 3CG3 C6
- 3CGA C9
- 3CGB C9
- 3CGC C7
- 3CGD C7
- 3CGE C7
- 3CGF C7
- 3CGG C11
- 3CGH C11
- 3CGI C11
- 3CGJ C10
- 3CGK C2
- 3CGL C2
- 3CGM C2
- 3CGN D2
- 3CGO D2
- 3CGP D2
- 3CGQ D2
- 3CGR D2
- 3CGS D2
- 3CGT D2
- 3CGU D2
- 3CGV D2
- 3CGW D2
- 3CGX D2
- 3CGY D2
- 3CGZ D2
- 3CH0 E2
- 3CH1 E2
- 3CH2 E2
- 3CH3 E2
- 3CH4 E2
- 3CH5 E2
- 3CH6 E2
- 3CH7 E2
- 3CH8 E2
- 3CH9 E2
- 3CHA E2
- 3CHB E2
- 5CG0 A8
- 5CG1 A8
- 5CG2 A8
- 7CG0 C7
- 7CG1 C11
- 7H00-8 C1
- 9CG7 C7
- 9CG8 C7
- 9CG9 D7
- 9CGB C10
- 9CGC C10
- 9CGD C10
- 9CGE C10
- 9CGF E4
- 9CGG E4
- 9CGH D10
- 9CGI E4
- ICDB B8
- ICDC D9
- ICG0 B8
- ICG1 B8
- ICG2 C7
- ICG3 C7
- ICG4 C7
- ICG5 D7
- ICG6 C9
- ICG7 C9
- ICG8 C9
- ICG9 C9
- IHWA E3

SSB: LVDS

B06A LVDS

B06A

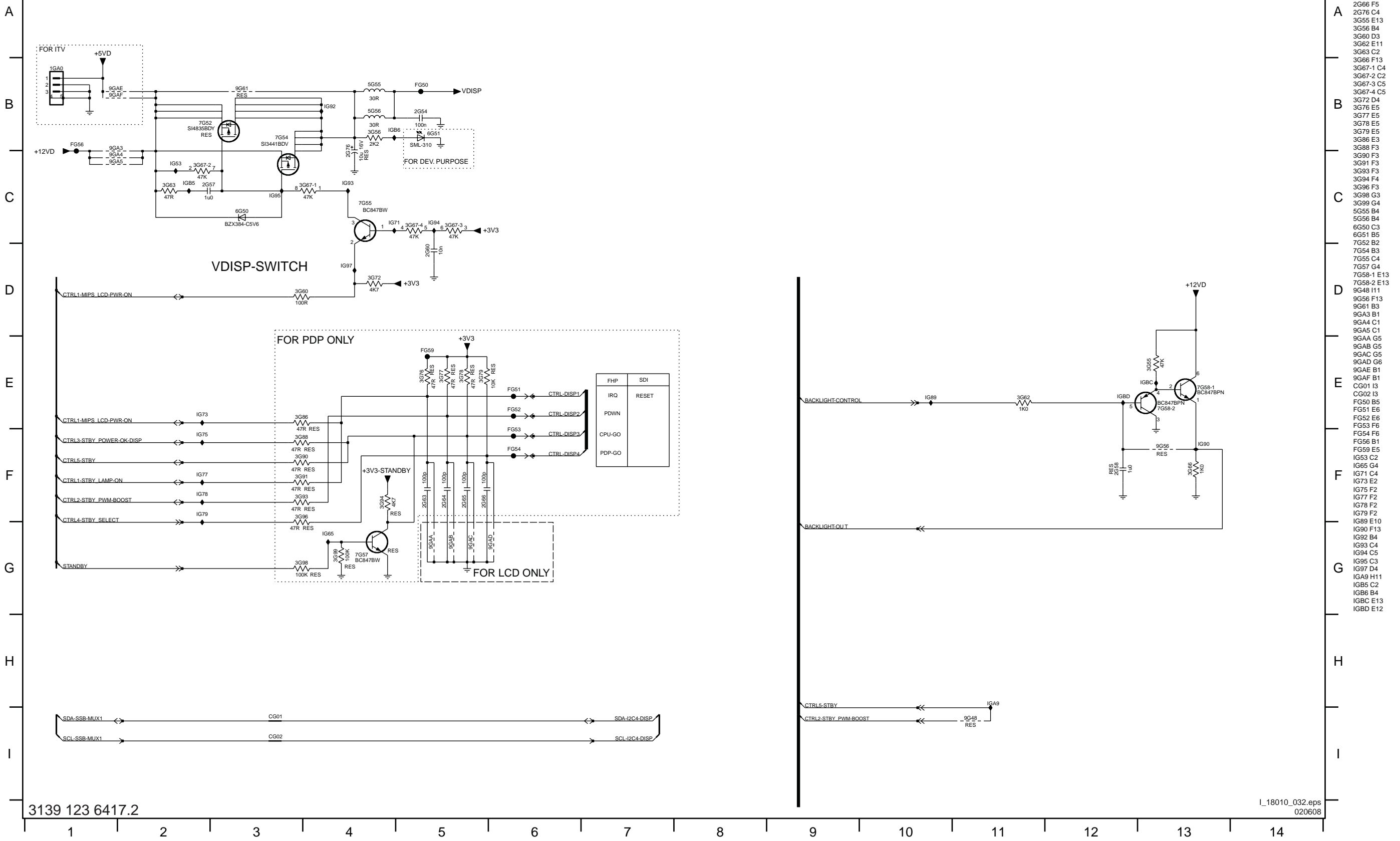


- 1G50 A13
- 1G54 C9
- 1G55 C9
- 1G56 D9
- 1G57 D9
- 1G58 E9
- 1G59 E9
- 1G60 F9
- 1G61 F9
- 1G62 G9
- 1G63 G9
- 1G64 H9
- 1G65 H9
- 2G52 E13
- 2G53 E12
- 3G52 E12
- 3G53 D13
- 3G47 D2
- 3G48 E2
- 3G49 E2
- 3GAA E2
- 3GAB E2
- 3GAC E1
- 3GAD B3
- 7H00-7 B2
- 9G13-1 B5
- 9G13-2 B5
- 9G13-3 B5
- 9G13-4 B5
- 9G14-1 C5
- 9G14-2 C5
- 9G14-3 C5
- 9G14-4 B5
- 9G15-1 C5
- 9G15-2 C5
- 9G15-3 C5
- 9G15-4 C5
- FC17 D1
- FC1A E1
- FC1B E1
- FC1C E1
- FC1D E1
- FC1E E1
- FG00 A13
- FG01 B13
- FG02 B12
- FG03 C12
- FG04 C13
- FG05 C12
- FG06 C13
- FG07 C13
- FG08 C13
- FG09 C13
- FG10 C12
- FG11 C12
- FG12 C13
- FG13 C13
- FG14 D13
- FG15 D13
- FG16 D13
- FG17 D13
- FG18 D13
- FG19 D13
- FG20 D13
- FG21 D13
- FG22 D13
- FG23 D13
- FG24 D13
- FG25 D13
- FG26 E13
- IHWB B2

SSB: Display Interfacing

B06B DISPLAY-INTERFACING

B06B



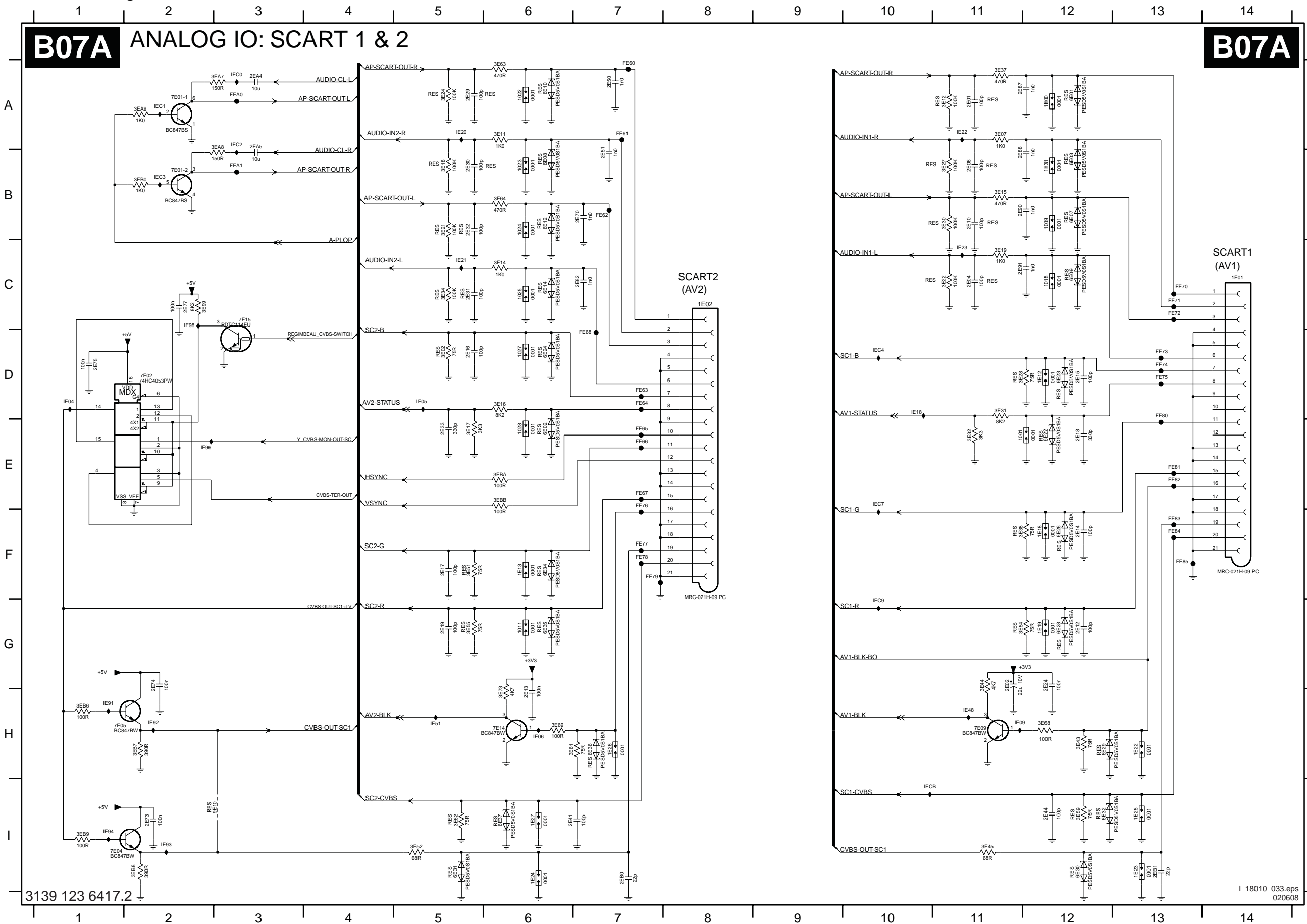
- 1GA0 B1
- 2G54 B5
- 2G57 C2
- 2G58 F12
- 2G60 D5
- 2G63 F5
- 2G64 F5
- 2G65 F5
- 2G66 F5
- 2G76 C4
- 3G55 E13
- 3G56 B4
- 3G60 D3
- 3G62 E11
- 3G63 C2
- 3G66 F13
- 3G67-1 C4
- 3G67-2 C2
- 3G67-3 C5
- 3G67-4 C5
- 3G72 D4
- 3G76 E5
- 3G77 E5
- 3G78 E5
- 3G79 E5
- 3G86 E3
- 3G88 F3
- 3G90 F3
- 3G91 F3
- 3G93 F3
- 3G94 F4
- 3G96 F3
- 3G98 G3
- 3G99 G4
- 5G55 B4
- 5G56 B4
- 6G50 C3
- 6G51 B5
- 7G52 B2
- 7G54 B3
- 7G55 C4
- 7G57 G4
- 7G58-1 E13
- 7G58-2 E13
- 9G48 I11
- 9G56 F13
- 9G61 B3
- 9GA3 B1
- 9GA4 C1
- 9GA5 C1
- 9GAA G5
- 9GAB G5
- 9GAC G5
- 9GAD G6
- 9GAE B1
- 9GAF B1
- CG01 I3
- CG02 I3
- FG50 B5
- FG51 E6
- FG52 E6
- FG53 F6
- FG54 F6
- FG56 B1
- FG59 E5
- IG53 C2
- IG71 C4
- IG73 E2
- IG75 F2
- IG77 F2
- IG78 F2
- IG79 F2
- IG89 E10
- IG90 F13
- IG92 B4
- IG93 C4
- IG94 C5
- IG95 C3
- IG97 D4
- IG99 H11
- IG95 C2
- IG98 B4
- IGBC E13
- IGBD E12

SSB: Analog IO: Scart 1 & 2

B07A

ANALOG IO: SCART 1 & 2

B07A



- 1001 E11
- 1009 B12
- 1011 C6
- 1015 C12
- 1022 A6
- 1023 B6
- 1024 B6
- 1025 C6
- 1027 D6
- 1028 E6
- 1E00 A12
- 1E01 C14
- 1E02 C8
- 1E12 D12
- 1E13 F6
- 1E18 F12
- 1E19 G12
- 1E22 H13
- 1E23 I13
- 1E24 I6
- 1E25 I13
- 1E29 H7
- 1E27 I6
- 1E31 B12
- 2E01 A11
- 2E02 G11
- 2E04 C11
- 2E06 B11
- 2E10 B11
- 2E12 G12
- 2E13 H6
- 2E14 F12
- 2E15 D12
- 2E16 D5
- 2E17 F5
- 2E18 E12
- 2E19 G5
- 2E24 G12
- 2E29 A5
- 2E30 B5
- 2E31 C5
- 2E32 B5
- 2E33 E5
- 2E41 I6
- 2E44 I12
- 2E50 A7
- 2E51 B7
- 2E70 B7
- 2E73 I2
- 2E74 G2
- 2E75 D1
- 2E77 C2
- 2E87 A11
- 2E88 B11
- 2E90 B11
- 2E91 C11
- 2E94 A3
- 2E95 A3
- 2E97 I7
- 2E98 I13
- 3E02 D5
- 3E07 A11
- 3E11 A6
- 3E12 A11
- 3E14 C6
- 3E15 B11
- 3E16 D6
- 3E17 E5
- 3E18 B5
- 3E19 C11
- 3E21 B5
- 3E22 C11
- 3E24 A5
- 3E27 B11
- 3E28 D11
- 3E30 B11
- 3E31 D11
- 3E32 E11
- 3E34 C5
- 3E37 A11
- 3E38 F11
- 3E43 H12
- 3E44 G11
- 3E45 I11
- 3E51 F5
- 3E52 I5
- 3E54 G11
- 3E55 G5
- 3E59 H12
- 3E61 H6
- 3E62 I5
- 3E63 A6
- 3E64 B6
- 3E68 H12
- 3E69 H6
- 3E73 H6
- 3E99 C2
- 3E97 A3
- 3E98 A3
- 3E99 A2
- 3E90 B2
- 3E96 H1
- 3E97 H2
- 3E98 I2
- 3E99 I1
- 3E9A E6
- 3E9B E6
- 6E01 A12
- 6E02 E6
- 6E03 B12
- 6E07 B12
- 6E08 B6
- 6E09 C12
- 6E10 A6
- 6E12 B6
- 6E14 C6
- 6E22 E12
- 6E23 D12
- 6E24 D6
- 6E26 F12
- 6E28 G12
- 6E29 H12
- 6E30 I12
- 6E31 I5
- 6E32 I12
- 6E34 F6
- 6E35 G6
- 6E36 H7
- 6E37 I6
- 7E01-1 A2
- 7E01-2 B2
- 7E02 D2
- 7E04 I1
- 7E05 H1
- 7E09 H11
- 7E14 H6
- 7E15 C3
- 9E10 I3
- FE60 A7
- FE61 A7
- FE62 B7
- FE63 D7
- FE64 D7
- FE65 E7
- FE66 E7
- FE67 E7
- FE68 D7
- FE70 C13
- FE71 C13
- FE72 C13
- FE73 D13
- FE74 D13
- FE75 D13
- FE76 E7
- FE77 F7
- FE78 F7
- FE79 F7
- FE80 D13
- FE81 E13
- FE82 E13
- FE83 F13
- FE84 F13
- FE85 F13
- FEA0 A3
- FEA1 B3
- IE04 D1
- IE05 D5
- IE06 H6
- IE09 H11
- IE18 D10
- IE20 A5
- IE21 C5
- IE22 A11
- IE23 C11
- IE48 H11
- IE51 H5
- IE91 H1
- IE92 H2
- IE93 I2
- IE94 I1
- IE96 E2
- IE98 C2
- IEC0 A3
- IEC1 A2
- IEC2 A3
- IEC3 B2
- IEC4 D10
- IEC7 E10
- IEC9 G10
- IECB I10

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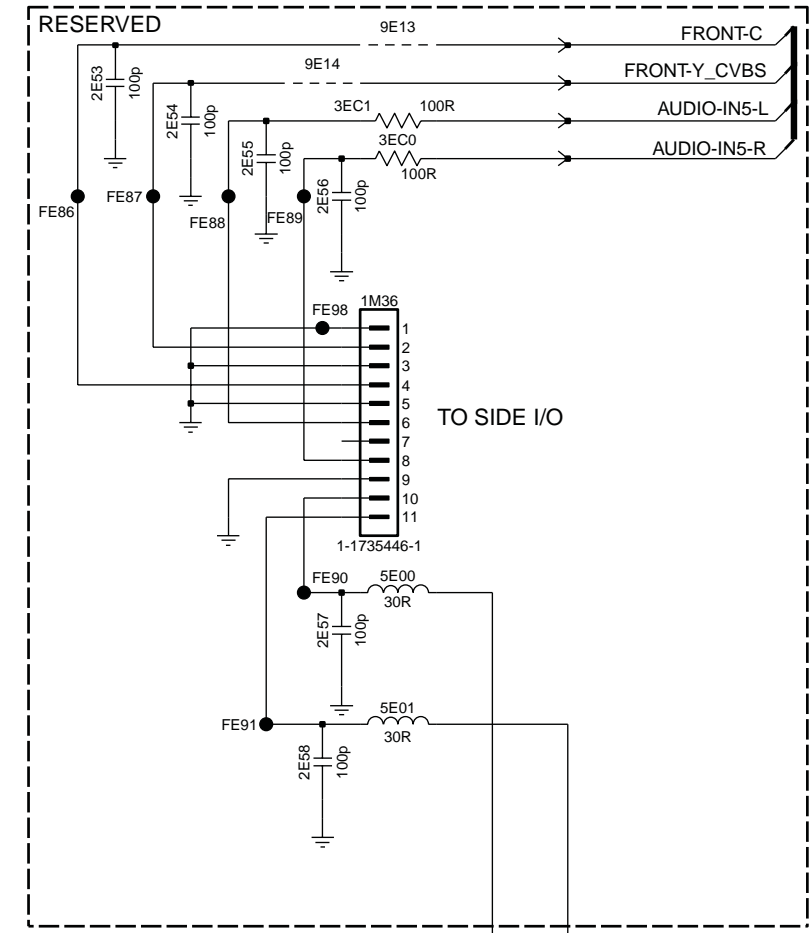
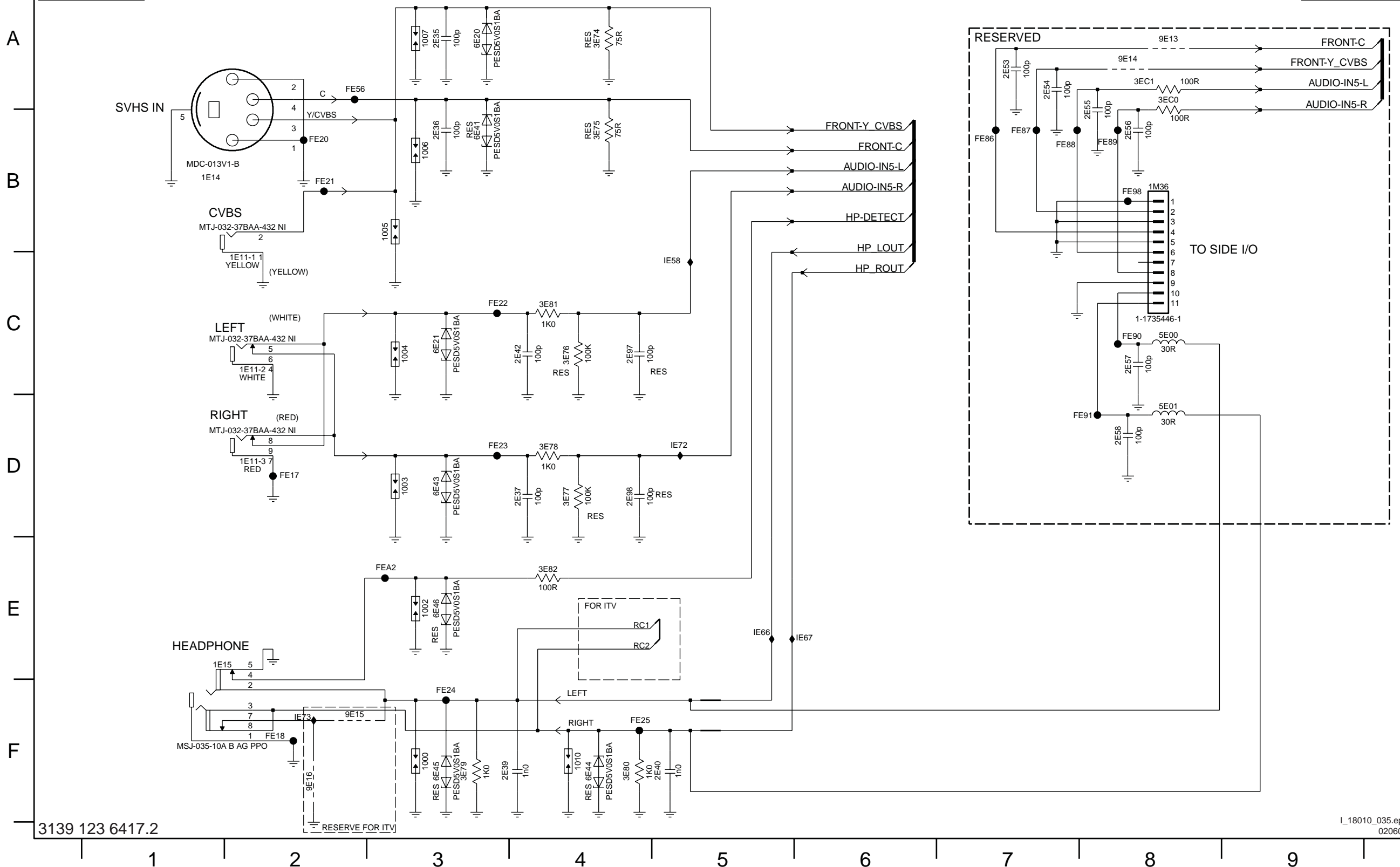




SSB: Analog IO: Side AV

B07C ANALOG IO: SIDE AV

B07C



3139 123 6417.2

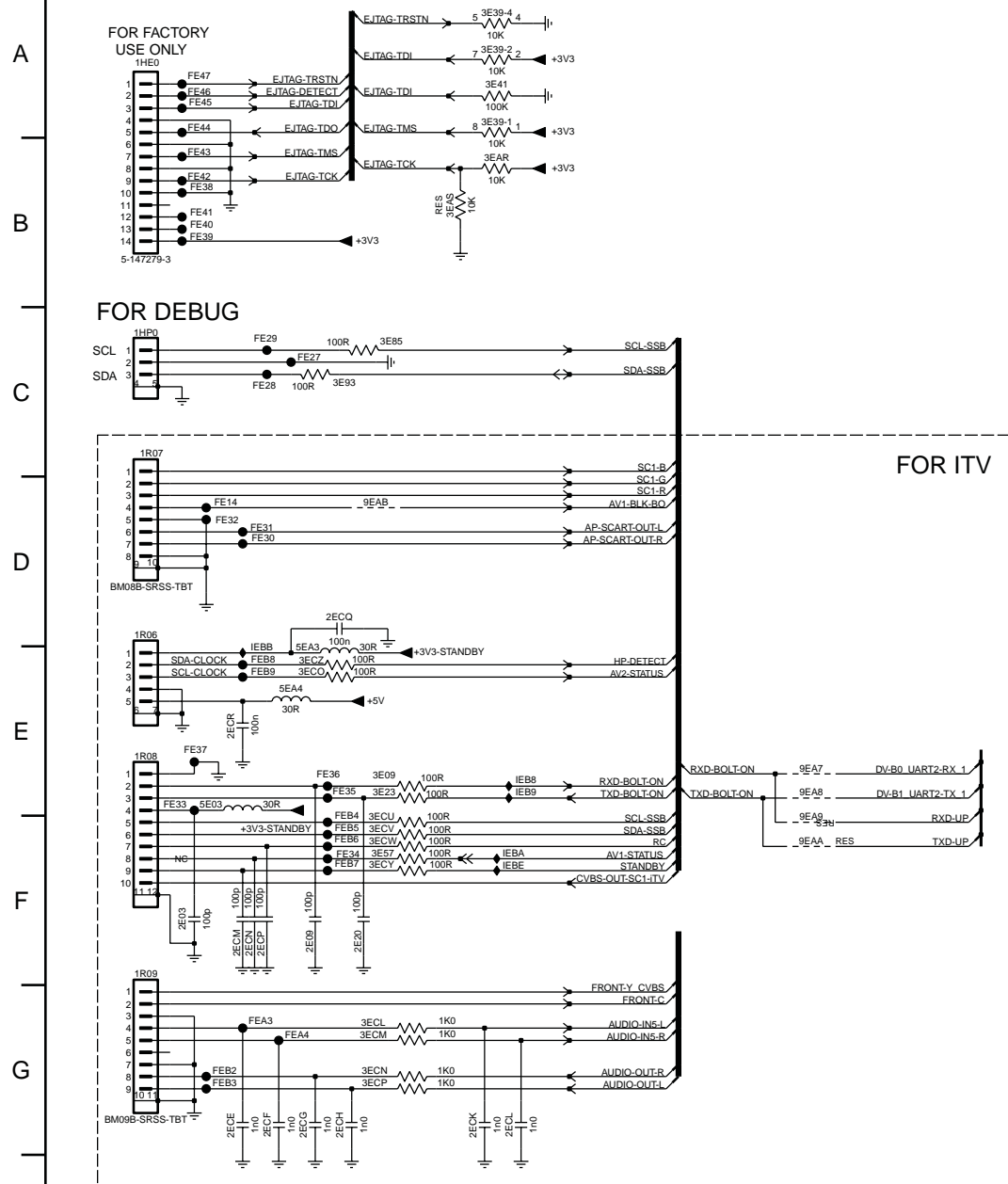
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- 1000 F3
- 1002 E3
- 1003 D3
- 1004 C3
- 1005 B3
- 1006 B3
- 1007 A3
- 1010 F4
- 1E11-1 C2
- 1E11-2 C2
- 1E11-3 D2
- 1E14 B1
- 1E15 E1
- 1M36 B8
- 2E35 A3
- 2E36 B3
- 2E37 D4
- 2E39 F3
- 2E40 F5
- 2E42 C4
- 2E53 A7
- 2E54 A7
- 2E55 B8
- 2E56 B8
- 2E57 C8
- 2E58 D8
- 2E97 C4
- 2E98 D4
- 3E74 A4
- 3E75 B4
- 3E76 C4
- 3E77 D4
- 3E78 D4
- 3E79 F3
- 3E80 F4
- 3E81 C4
- 3E82 E4
- 3EC0 A8
- 3EC1 A8
- 5E00 C8
- 5E01 D8
- 6E20 A3
- 6E21 C3
- 6E41 B3
- 6E43 D3
- 6E44 F4
- 6E45 F3
- 6E46 E3
- 9E13 A8
- 9E14 A8
- 9E15 F2
- 9E16 F2
- FE17 D2
- FE18 F2
- FE20 B2
- FE21 B2
- FE22 C3
- FE23 D3
- FE24 F3
- FE25 F4
- FE56 A2
- FE86 B7
- FE87 B7
- FE88 B7
- FE89 B8
- FE90 C8
- FE91 D8
- FE98 B8
- FEA2 E3
- IE58 C5
- IE66 E5
- IE67 E6
- IE72 D5
- IE73 F2

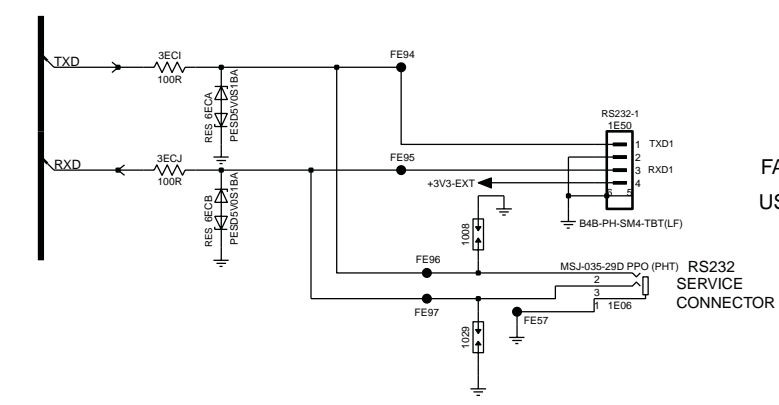
SSB: Analog IO: Bolt On

B07D ANALOG IO: BOLT - ON

B07C



DEBUG / RS232 INTERFACE



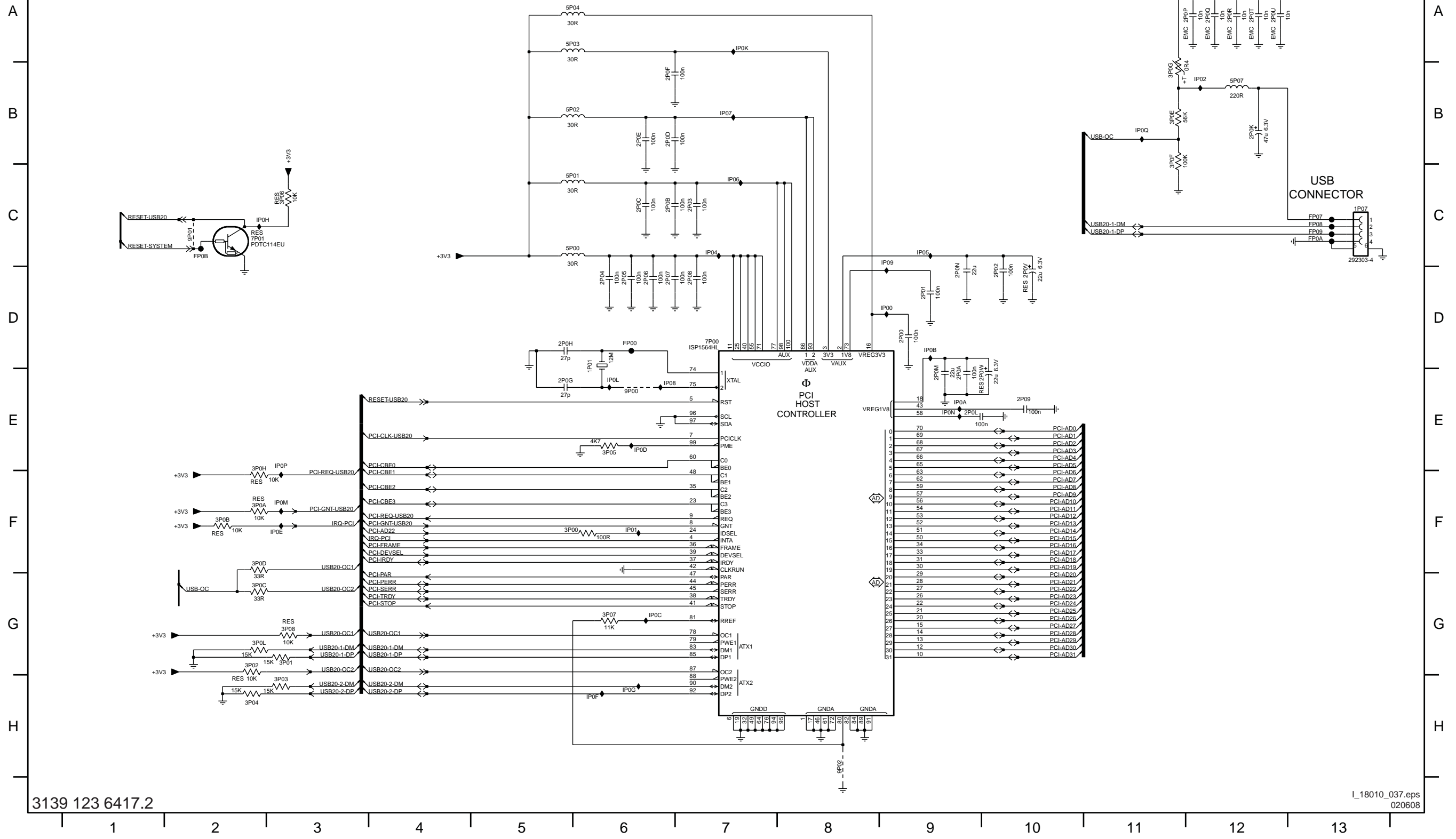
FOR FACTORY USE ONLY

- 1008 C12
- 1029 D12
- 1E08 C13
- 1E50 C13
- 1HE0 A1
- 1HP0 C1
- 1R06 D1
- 1R07 C1
- 1R08 E1
- 1R09 F1
- 2E03 F1
- 2E09 F2
- 2E20 F2
- 2ECE G2
- 2ECF G2
- 2ECG G2
- 2ECH G2
- 2ECK G3
- 2ECL G3
- 2ECM F2
- 2ECN F2
- 2ECP F2
- 2ECQ D2
- 2ECR E2
- 3E09 E2
- 3E23 E2
- 3E39-1 A3
- 3E39-2 A3
- 3E39-4 A3
- 3E41 A3
- 3E57 F2
- 3E85 C2
- 3E93 C2
- 3E9A B3
- 3E95 B3
- 3ECI B10
- 3ECJ C10
- 3ECL G2
- 3ECM G2
- 3ECO E2
- 3ECP G2
- 3ECU F2
- 3ECW F2
- 3ECY F2
- 3ECZ E2
- 5E03 E1
- 5EA3 E2
- 5EA4 E2
- 6ECA B11
- 6ECB C11
- 9EA7 E5
- 9EA8 E5
- 9EA9 F5
- 9EAA F5
- 9EAB D2
- FE14 D1
- FE27 C2
- FE28 C2
- FE29 C2
- FE30 D2
- FE31 D2
- FE32 D1
- FE33 E1
- FE34 F2
- FE35 E2
- FE36 E2
- FE37 E1
- FE38 B1
- FE39 B1
- FE40 B1
- FE41 B1
- FE42 B1
- FE43 B1
- FE44 A1
- FE45 A1
- FE46 A1
- FE47 A1
- FE57 D12
- FE94 B12
- FE95 C12
- FE96 C12
- FE97 D12
- FEA3 G2
- FEA4 G2
- FEB2 G1
- FEB3 G1
- FEB4 F2
- FEB5 F2
- FEB6 F2
- FEB7 F2
- FEB8 E2
- FEB9 E2
- IEB8 E3
- IEB9 E3
- IEBA F3
- IEBB E2
- IEBE F3

SSB: Digi IO: USB

# B08A DIGI IO: USB CONNECTOR + CONTROLLER

# B08A



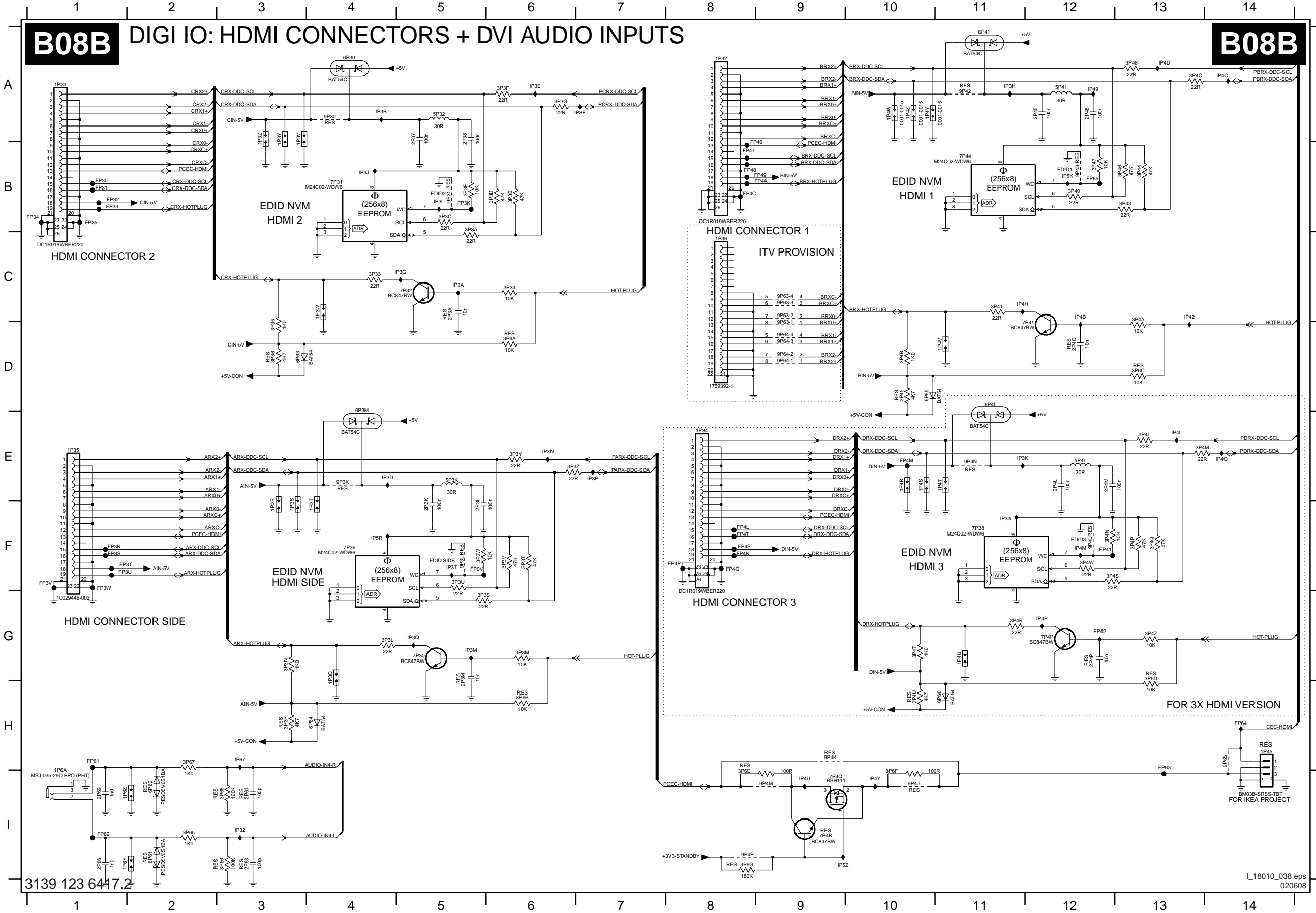
- 1P01 D6
- 1P07 C13
- 2P00 D9
- 2P01 D9
- 2P02 D10
- 2P03 C7
- 2P04 D6
- 2P05 D6
- 2P06 D6
- 2P07 D6
- 2P08 D7
- 2P09 E10
- 2P0A E9
- 2P0B C6
- 2P0C C6
- 2P0D B6
- 2P0E B6
- 2P0F B6
- 2P0G E5
- 2P0H D5
- 2P0K B12
- 2P0L E9
- 2P0M E9
- 2P0N D9
- 2P0Q A12
- 2P0R A12
- 2P0T A12
- 2P0U A12
- 2P0V D10
- 2P0W E10
- 3P00 F5
- 3P01 G3
- 3P02 G2
- 3P03 H3
- 3P04 H2
- 3P05 E6
- 3P06 C3
- 3P07 G6
- 3P08 G3
- 3P0A F2
- 3P0B F2
- 3P0C G2
- 3P0D F2
- 3P0E B11
- 3P0F B11
- 3P0G B11
- 3P0H E2
- 3P0L G2
- 5P00 C5
- 5P01 C5
- 5P02 B5
- 5P03 A5
- 5P04 A5
- 5P07 B12
- 7P00 D7
- 7P01 C2
- 9P00 E6
- 9P01 C2
- 9P02 H8
- FP00 D6
- FP07 C13
- FP08 C13
- FP09 C13
- FP0A C13
- FP0B C2
- IP00 D9
- IP01 F6
- IP02 B12
- IP04 C7
- IP05 C9
- IP06 C7
- IP07 B7
- IP08 E6
- IP09 C9
- IP0A E9
- IP0B D9
- IP0C G6
- IP0D E6
- IP0E F3
- IP0F H6
- IP0G H6
- IP0H C2
- IP0K A7
- IP0L E6
- IP0M F3
- IP0N E9
- IP0P E3
- IP0Q B11

3139 123 6417.2

L\_18010\_037.eps  
020608

SSB: Digi IO: HDMI & DVI

B08B DIGI IO: HDMI CONNECTORS + DVI AUDIO INPUTS



3139 123 64 17.2

L\_18010\_038.eps  
020608

- 1P32 A8
- 1P33 A1
- 1P34 E8
- 1P35 E1
- 1P36 C8
- 1P3Q G4
- 1P3R F3
- 1P3S F3
- 1P3T F4
- 1P3V A3
- 1P3W C4
- 1P3Y A3
- 1P3Z A3
- 1P45 H14
- 1P4R E10
- 1P4S E10
- 1P4T E11
- 1P4U G11
- 1P4V D11
- 1P4W A10
- 1P4Y A10
- 1P4Z A10
- 1P6A I1
- 1P6Y I1
- 1P6Z I1
- 2P37 A5
- 2P38 A5
- 2P3A C5
- 2P3K F5
- 2P3L F5
- 2P3M G5
- 2P45 A12
- 2P46 A12
- 2P4C D12
- 2P4L E12
- 2P4M E12
- 2P4P G12
- 2P61 I3
- 2P66 I1
- 2P68 I3
- 2P69 I1
- 3P33 C4
- 3P34 C6
- 3P35 D3
- 3P36 D3
- 3P3A B5
- 3P3B B6
- 3P3C B5
- 3P3D B6
- 3P3E B5
- 3P3F A6
- 3P3G A6
- 3P3L G4
- 3P3M G6
- 3P3N G3
- 3P3P H3
- 3P3S G5
- 3P3T F6
- 3P3U F5
- 3P3V F6
- 3P3W F5
- 3P3Y E6
- 3P3Z E6
- 3P40 B12
- 3P41 C11
- 3P43 B13
- 3P44 B13
- 3P45 D10
- 3P46 B13
- 3P47 B12
- 3P48 A13
- 3P4A C13
- 3P4B D10
- 3P4C A13
- 3P4L E13
- 3P4M E13
- 3P4N F12
- 3P4P F13
- 3P4Q F13
- 3P4R G11
- 3P4S F12
- 3P4T G10
- 3P4U H10
- 3P4W F12
- 3P4Z G13
- 3P65 I2
- 3P66 I3
- 3P67 H2
- 3P68 I3
- 3P6A D6
- 3P6B H6
- 3P6D G13
- 3P6E I8
- 3P6F I0
- 5P32 A5
- 5P3K E5
- 5P41 A12
- 5P4L E12
- 6P30 A4
- 6P3M E4
- 6P41 A11
- 6P4L D11
- 6P61 I2
- 6P62 I2
- 6P63 D3
- 6P64 H4
- 6P65 D10
- 6P66 H11
- 7P30 G5
- 7P31 B4
- 7P32 C5
- 7P36 F4
- 7P38 F11
- 7P41 D12
- 7P44 B11
- 7P4P G12
- 7P4R I9
- 9P30 A4
- 9P31 B5
- 9P3K E4
- 9P3L F5
- 9P42 A11
- 9P43 B12
- 9P4J I10
- 9P4K H9
- 9P4L F12
- 9P4M I9
- 9P4N E11
- 9P63-3 C9
- 9P63-4 C9
- 9P64-1 D9
- 9P64-2 D9
- 9P64-3 D9
- 9P64-4 D9
- 9P65 H14
- FP00 V5
- FP30 B1
- FP31 B1
- FP32 B1
- FP33 B1
- FP34 B1
- FP35 B1
- FP36 B5
- FP37 B5
- FP38 F1
- FP3S F1
- FP3T F1
- FP3U F1
- FP3V F1
- FP3W F1
- FP41 F12
- FP42 G12
- FP46 B9
- FP47 B8
- FP48 B8
- FP49 B9
- FP4A B9
- FP4C B8
- FP4L F8
- FP4M E10
- FP4N F8
- FP4P F8
- FP4Q F8
- FP4S F8
- FP4T F8
- FP61 H1
- FP62 H1
- FP63 H13
- FP64 H14
- FP65 B12
- IP32 I3
- IP33 F11
- IP3A C5
- IP3B A4
- IP3D E4
- IP3E A6
- IP3F A7
- IP3G C5
- IP3H A11
- IP3J B4
- IP3K E11
- IP3L B5
- IP3M G5
- IP3N E6
- IP3P E7
- IP3Q G5
- IP3T F5
- IP42 C13
- IP43 A12
- IP4B C12
- IP4C A14
- IP4D A13
- IP4H C11
- IP4L E13
- IP4M F12
- IP4P G12
- IP4Q E14
- IP4U I9
- IP4V I10
- IP5K B12
- IP5R F4
- IP5Z I9
- IP67 H3





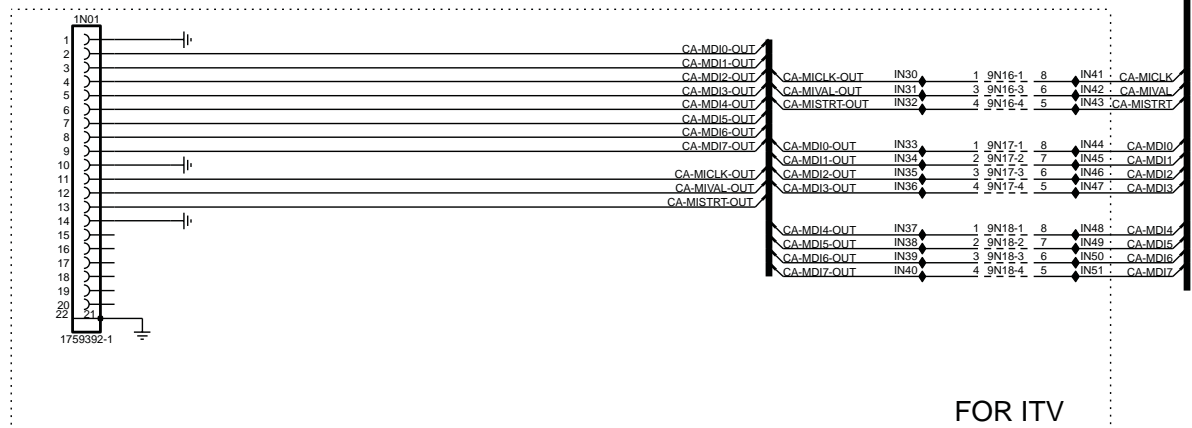
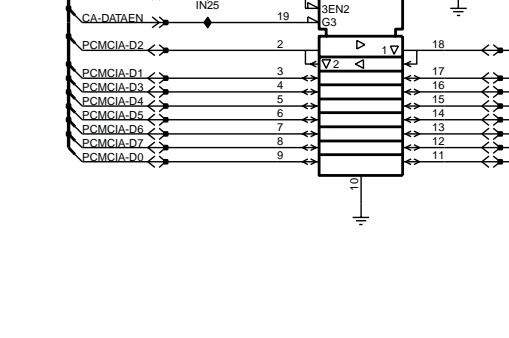
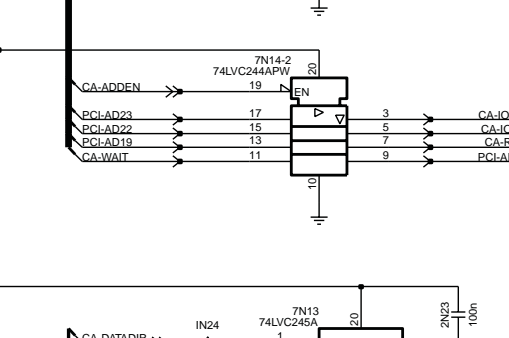
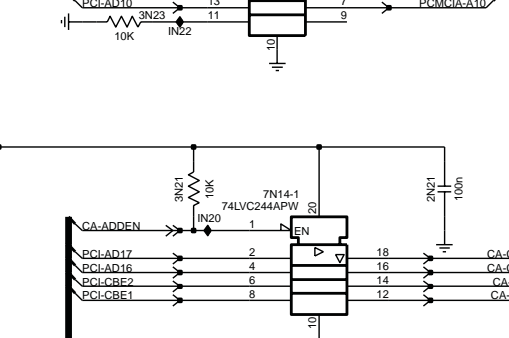
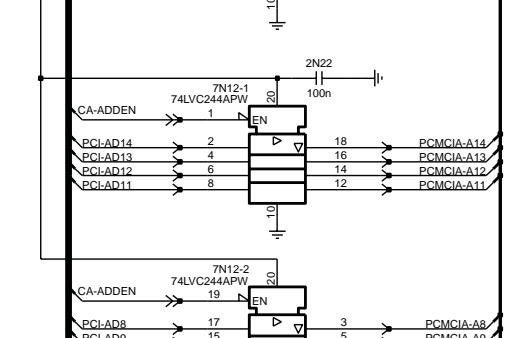
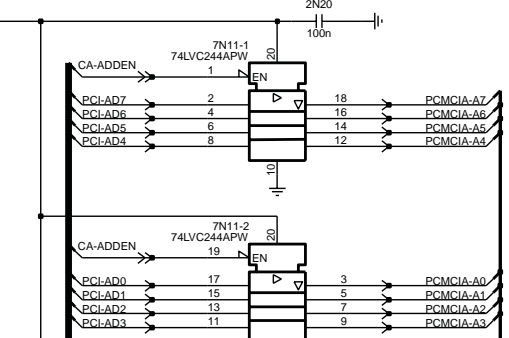
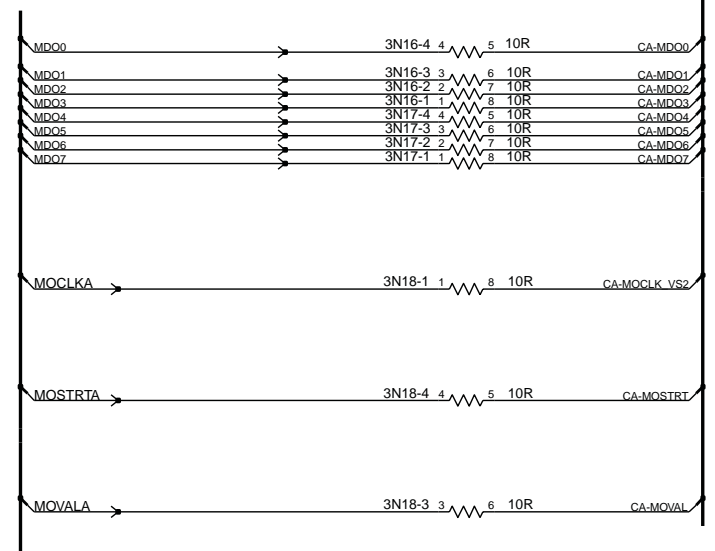
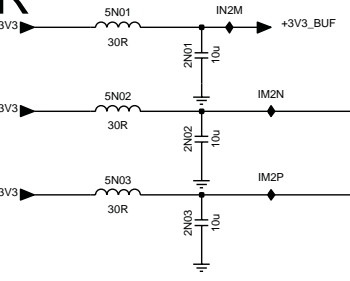
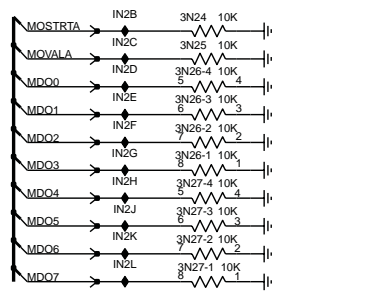
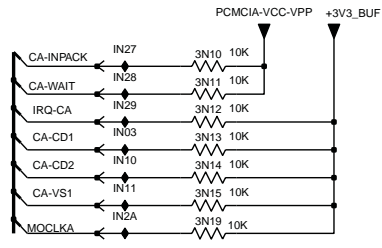
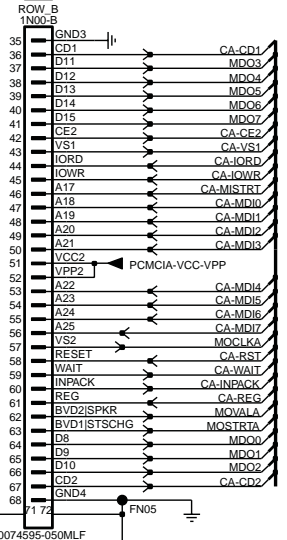
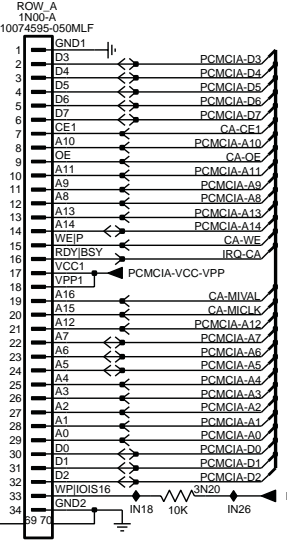
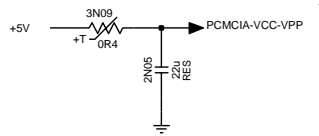
SSB: Digi IO: PCMCIA Interf. & Buffer

B09A

DIGI IO: PCMCIA INTERFACE & BUFFER

B09A

POD : SUPPLY / CONTROL  
(POD IS THE EQUIVALENT OF COMMON INTERFACE)  
CABLE CARD INTERFACE



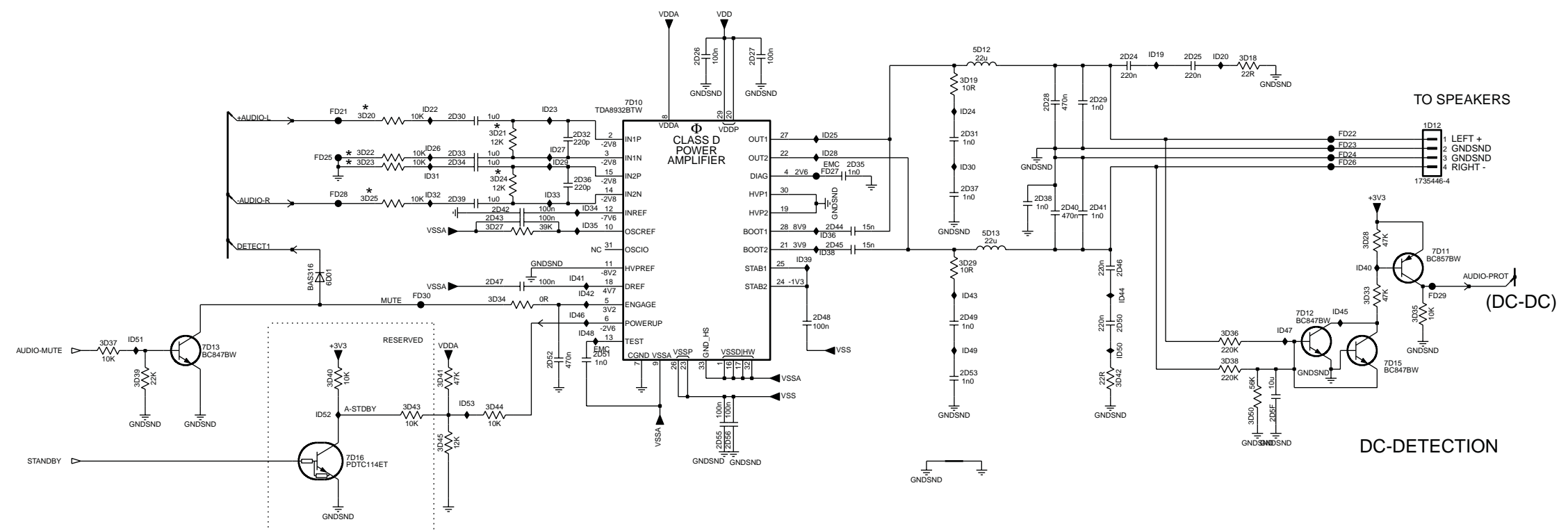
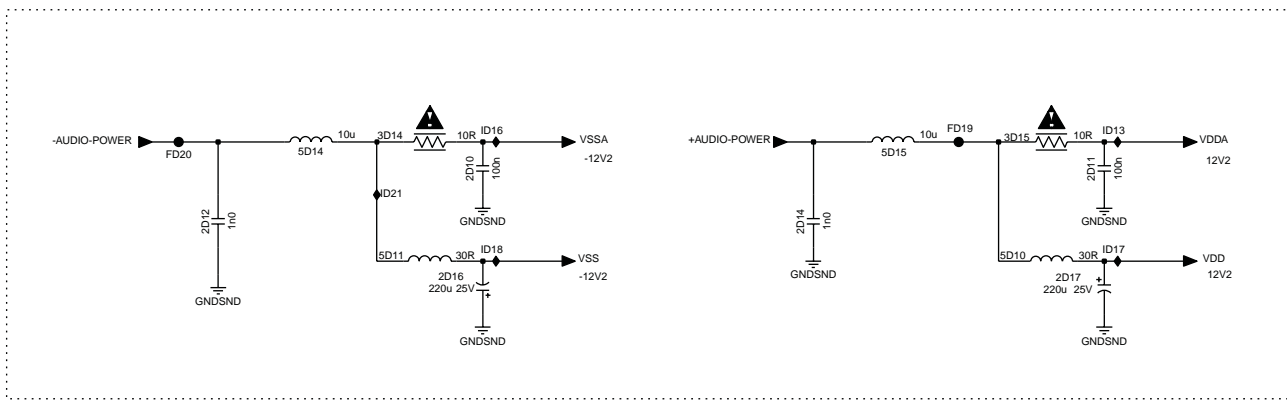
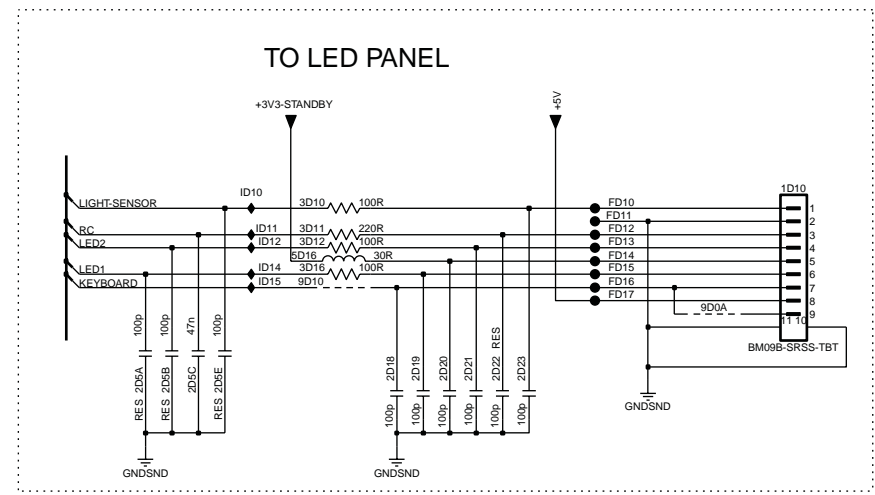
FOR ITV

- 1N00-A B2
1N00-B E2
1N01 H2
2N02 A7
2N03 B7
2N05 B1
2N20 A12
2N21 E12
2N22 C12
2N23 H12
3N09 B1
3N10 C5
3N11 C5
3N12 C5
3N13 C5
3N14 D5
3N15 D5
3N16-1 C8
3N16-2 C8
3N16-3 C8
3N17-1 D8
3N17-2 C8
3N17-3 C8
3N17-4 C8
3N18-1 D8
3N18-3 E8
3N18-4 E8
3N19 D5
3N20 D3
3N21 E11
3N23 D5
3N24 D5
3N26-1 E5
3N26-2 E5
3N26-3 E5
3N26-4 D5
3N27-1 E5
3N27-2 E5
3N27-3 E5
3N27-4 E5
5N01 A7
5N02 A7
5N03 A7
7N11-1 A11
7N11-2 B11
7N12-1 C11
7N12-2 D11
7N13 H12
7N14-1 E12
7N14-2 G12
9N16-1 H7
9N16-3 H7
9N16-4 H7
9N17-1 H7
9N17-2 H7
9N17-3 H7
9N17-4 H7
9N18-2 I7
9N18-3 I7
9N18-4 I7
FN05 G3
IM2N A8
IM2P A8
IN03 C5
IN10 D5
IN11 D5
IN18 D3
IN20 F11
IN22 E11
IN24 H11
IN25 H11
IN26 D3
IN27 C5
IN28 C5
IN29 C5
IN2A D5
IN2B D5
IN2C D5
IN2E E5
IN2H E5
IN2J E5
IN2K E5
IN2L E5
IN2M A7

SSB: Digi IO: Class-D

B10A CLASS D

B10A



- 1D10 B5
- 1D12 E12
- 2D10 B8
- 2D11 B12
- 2D12 B7
- 2D14 B10
- 2D16 C8
- 2D17 C12
- 2D18 C3
- 2D19 C3
- 2D20 C3
- 2D21 C3
- 2D22 C4
- 2D23 C4
- 2D24 E10
- 2D25 E10
- 2D26 E6
- 2D27 E7
- 2D28 E9
- 2D29 E9
- 2D30 E5
- 2D31 E8
- 2D32 E5
- 2D33 F5
- 2D34 F5
- 2D35 F8
- 2D36 F5
- 2D37 F8
- 2D38 F9
- 2D39 F5
- 2D40 F9
- 2D41 F9
- 2D42 F5
- 2D43 F5
- 2D44 F7
- 2D45 F7
- 2D46 F10
- 2D47 G5
- 2D48 G7
- 2D49 G8
- 2D50 G10
- 2D51 G6
- 2D52 G5
- 2D53 G8
- 2D55 H7
- 2D56 H7
- 2D5A C2
- 2D5B C2
- 2D5C C2
- 2D5E C2
- 2D5F H11
- 3D10 B3
- 3D11 B3
- 3D12 C3
- 3D14 B8
- 3D15 B11
- 3D16 C3
- 3D19 E8
- 3D20 E4
- 3D21 E5
- 3D22 F4
- 3D23 F4
- 3D24 F5
- 3D25 F4
- 3D27 F5
- 3D28 F12
- 3D29 F8
- 3D33 G12
- 3D34 G5
- 3D35 G12
- 3D36 G11
- 3D37 G2
- 3D38 G11
- 3D39 G2
- 3D40 G4
- 3D41 G4
- 3D42 G10
- 3D43 H4
- 3D44 H5
- 3D45 H4
- 3D50 H11
- 5D11 C8
- 5D12 E9
- 5D13 F9
- 5D14 B7
- 5D15 B11
- 5D16 C3
- 6D01 G3
- 7D10 E6
- 7D11 F12
- 7D12 G11
- 7D13 G3
- 7D15 G12
- 7D16 H4
- 9D0A C5
- 9D10 C3
- FD11 B4
- FD12 B4
- FD13 C4
- FD14 C4
- FD15 C4
- FD16 C4
- FD17 C4
- FD19 B11
- FD20 B7
- FD21 E4
- FD22 E11
- FD23 F11
- FD24 F11
- FD25 F3
- FD26 F11
- FD27 F7
- FD28 F4
- FD29 G12
- FD30 G4
- FD31 B2
- FD32 E4
- FD33 F11
- FD34 F11
- FD35 F3
- FD36 F11
- FD37 F7
- FD38 F4
- FD39 G12
- FD40 E10
- FD41 C2
- FD42 E2
- FD43 B8
- FD44 C8
- FD45 E10
- FD46 E8
- FD47 C8
- FD48 E10
- FD49 E10
- FD50 E10
- FD51 B8
- FD52 E4
- FD53 E5
- FD54 E5
- FD55 E7
- FD56 F4
- FD57 F5
- FD58 F5
- FD59 F5
- FD60 F8
- FD61 F4
- FD62 F4
- FD63 F6
- FD64 F6
- FD65 F7
- FD66 F7
- FD67 F7
- FD68 F7
- FD69 F7
- FD70 F12
- FD71 G5
- FD72 G6
- FD73 G8
- FD74 G10
- FD75 G11
- FD76 G5
- FD77 G11
- FD78 G8
- FD79 G8
- FD80 G11
- FD81 G11
- FD82 G11
- FD83 G11
- FD84 G11
- FD85 G11
- FD86 G11
- FD87 G11
- FD88 G11
- FD89 G11
- FD90 G11

# 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

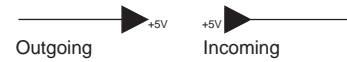
SRP (Service Reference Protocol) is a software tool that creates a list with all references to signal lines. The list contains references to the signals within all schematics of a PWB. It replaces the text references currently printed next to the signal names in the schematics. These printed references 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:

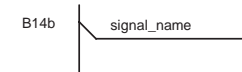
#### 1.2.1. Power Supply Lines

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.

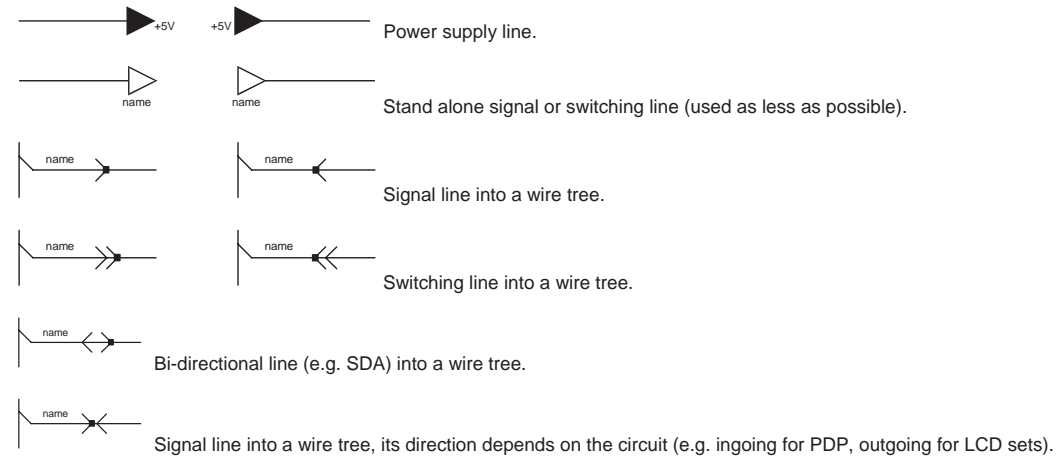


#### 1.2.3. Grounds

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:

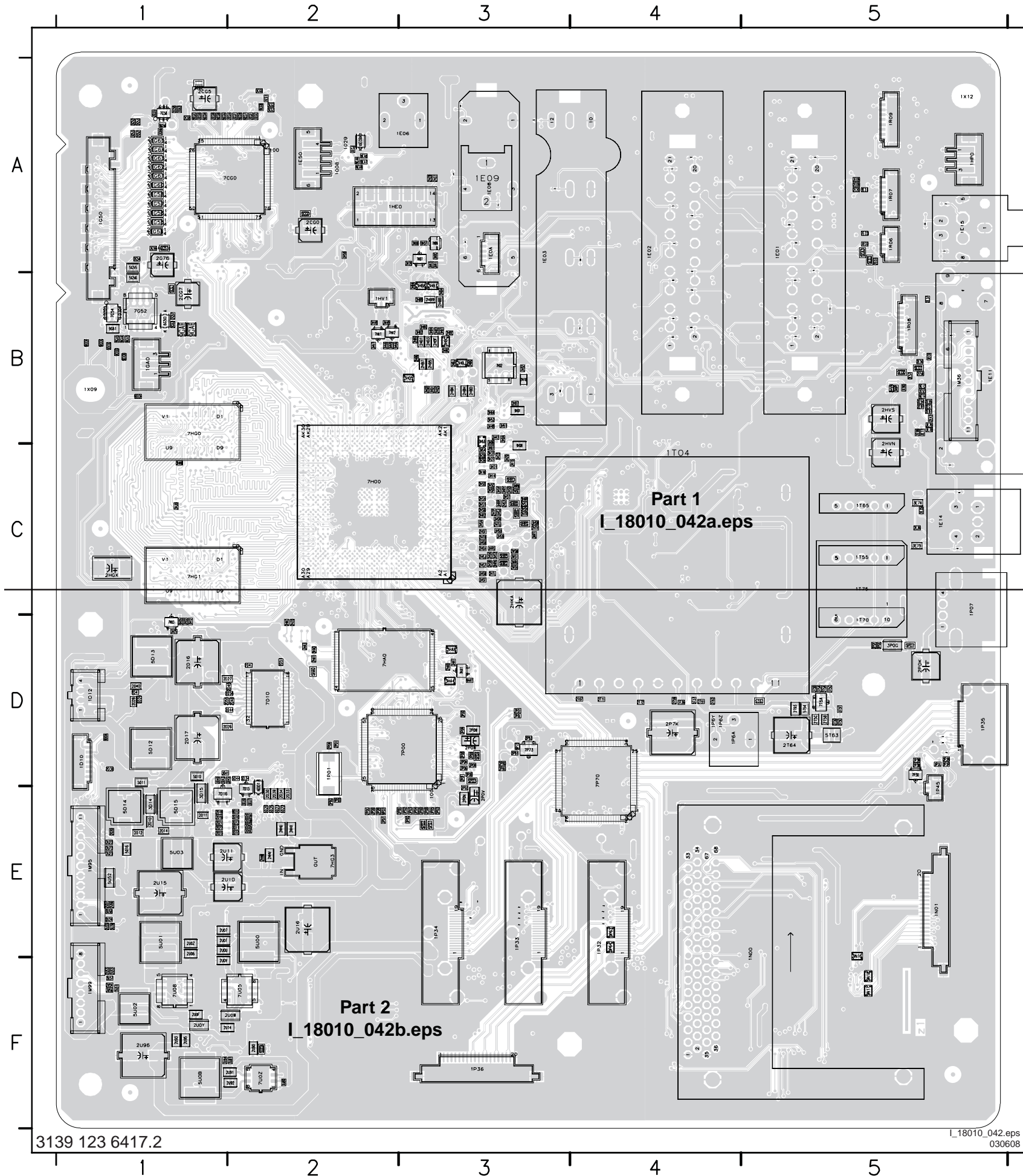








Layout Small Signal Board (Overview Top Side)



1000	A5	2D40	D1	2T5C	D5	3HB0	B3	7D10	D2
1001	A5	2D41	D1	2T62	D4	3HB1	B3	7D13	E2
1002	A5	2D44	D2	2T64	D5	3HB2	B3	7D16	E1
1003	B5	2D45	D2	2T67	D4	3HB3	B3	7G52	B1
1004	B5	2D47	D2	2T71	D4	3HB4	B3	7G54	B1
1005	C5	2D48	D2	2T72	D4	3HB8	B3	7G58	A1
1006	C5	2D51	D2	2T91	D4	3HB3	B3	7H00	C2
1007	C5	2D55	D1	2T83	D5	3HB3	B3	7H02	B3
1008	A2	2D56	D2	2U06	E1	3HJ0	C1	7H03	D1
1009	B5	2D5A	E2	2U07	E1	3HKM	C1	7H06	A3
1010	A5	2D5B	E2	2U0F	F1	3HQ0	B3	7H07	A3
1011	A4	2D5C	E2	2U0T	E1	3HQ1	B3	7HA0	D2
1015	B5	2D5E	E2	2U0U	E1	3HQ5	B3	7HA1	D3
1022	B4	2E03	A5	2U0V	F1	3HRR	C3	7HG0	B1
1023	B4	2E09	A5	2U0W	F2	3HRR	C3	7HG1	C1
1024	B4	2E20	A5	2U0Y	F1	3HRS	C3	7HG3	E2
1025	B4	2E35	C5	2U0Z	E1	3HRT	C3	7HV1	B2
1027	B4	2E36	C5	2U10	E2	3HRU	C3	7HV2	B2
1028	A4	2E37	B5	2U11	E1	3HRV	C3	7P00	D3
1029	A2	2E42	B5	2U14	F1	3HRW	C3	7P30	D5
1D10	D1	2E53	B5	2U15	E1	3HRY	C3	7P70	D4
1D12	D1	2E54	B5	2U16	E2	3HS0	C3	7P73	D3
1E00	B5	2E55	B5	2U22	E1	3HS1	C3	7T5A	D5
1E01	A5	2E56	B5	2U23	E1	3HS2	C3	7U05	F2
1E02	A4	2E57	B5	2U24	E1	3HS3	C3	7U08	F1
1E03	A3	2E58	B5	2U51	F1	3HS9	C3	7U0Z	F2
1E06	A3	2E97	B5	2U52	F1	3HSF	C3	9CG7	A2
1E08	A3	2E98	B5	2U53	F1	3HSH	C3	9CG8	A2
1E09	A3	2ECQ	A5	2U54	F1	3HSJ	C3	9CG9	A2
1E0A	A3	2G52	A1	2U55	E1	3HSM	C3	9CGB	A1
1E0Q	A3	2G53	A1	2U56	E1	3HSN	C3	9CGC	A1
1E0R	A3	2G54	A1	2U57	E1	3HST	C3	9CGG	A1
1E0S	A3	2G57	B1	2U72	E1	3HSV	C3	9CGH	A1
1E0T	A3	2G58	A1	2U80	F2	3HSW	C3	9D0A	D1
1E0V	A3	2G76	A1	2U81	F2	3HV0	B2	9D0B	B1
1E0W	A4	2H07	B3	2U92	F2	3HV7	B2	9D0C	B1
1E0X	A3	2H10	B3	2U93	F1	3HV8	B2	9D0D	B1
1E0Y	B4	2HA0	D3	2U94	F1	3HV9	B2	9D0F	B1
1E0Z	B3	2HA1	D2	2U95	F1	3HVA	B2	9D0G	B1
1E11	B5	2HB0	B3	2U96	F1	3HVB	B2	9D0H	B1
1E12	B5	2HB1	B3	3CG0	A2	3HVN	B5	9D10	E2
1E13	A4	2HB2	B3	3CG1	A2	3HVP	B5	9E13	B5
1E14	C5	2HB3	B3	3CG2	A2	3P00	D3	9E14	B5
1E15	A5	2HB4	B3	3CG3	A2	3P01	D3	9E7	A2
1E18	A5	2HB5	B3	3CGA	A2	3P02	E3	9E8	A2
1E19	A5	2HB6	B3	3CGB	A1	3P03	E3	9E9	A2
1E22	A5	2HB7	B3	3CGC	A2	3P04	E3	9EA	A2
1E23	A5	2HB8	B3	3CGD	A1	3P05	E3	9G56	A1
1E24	A4	2HB9	B3	3CGE	A2	3P06	D3	9G61	B1
1E25	A5	2HBA	B3	3CGF	A2	3P07	E2	9GA3	B1
1E26	A4	2HBB	B3	3D10	E2	3P08	E2	9GA4	B1
1E27	A4	2HBC	B3	3D11	E2	3P0A	D3	9GA5	B1
1E31	B5	2HBD	B3	3D12	E2	3P0B	D3	9GAE	B1
1E50	A2	2HBE	B3	3D14	E1	3P0C	E3	9GAF	B1
1G50	A1	2HBF	B3	3D15	E1	3P0D	E2	9H01	B3
1G54	A1	2HBG	B3	3D16	E2	3P0E	D5	9H05	D1
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1G56	A1	2HBJ	B3	3D22	E2	3P0G	D5	9H08	C3
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1G58	A1	2HGX	C1	3D25	E2	3P0L	D3	9N16	E5
1G60	A1	2HHU	E2	3D34	D2	3P3L	D5	9N17	F5
1G61	A1	2HV	E2	3D37	E2	3P3M	D5	9N18	F5
1G62	A1	2HHW	E2	3D39	E2	3P3N	D5	9P00	E2
1G63	A1	2HHX	E2	3D40	D1	3P3P	D5	9P02	E2
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1G65	A1	2HKC	D2	3D43	D1	3P83	D3	9P64	E4
1GA0	B1	2HQS	B3	3D44	D2	3T36	D4	9P73	D3
1HE0	A2	2HRZ	C3	3D45	D2	3T37	D4		
1HP0	A5	2HS0	C3	3E09	A5	3T5A	D5		
1HV1	B2	2HS1	C3	3E23	A5	3T5B	D5		
1M36	B5	2HP2	C3	3E74	C5	3T5D	D5		
1M95	E1	2HS3	C3	3E75	C5	3T5D	D5		
1M99	F1	2HS4	C3	3E76	B5	3T5E	D5		
1N00	E5	2HS7	C3	3E77	B5	3T5F	D5		
1N01	E5	2HS8	C3	3E78	B5	3U3W	E1		
1P01	D2	2HS9	C3	3E80	B5	3U56	F1		
1P07	C5	2HSA	C3	3E81	B5	3U57	F1		
1P32	E4	2HSB	C3	3E00	B5	3U58	E1		
1P33	E3	2HSC	C3	3EC1	B5	3U80	F2		
1P34	E5	2HSD	C3	3EC1	A2	3U81	F2		
1P35	D5	2HSE	C3	3ECO	A5	5CG0	A2		
1P36	F3	2HSF	C3	3G52	A1	5CG1	B1		
1P3Q	D5	2HSJ	C3	3G53	A1	5CG2	A1		
1P3R	D5	2HSK	C3	3G55	A1	5D10	D1		
1P3S	D5	2HSM	C3	3G56	A1	5D11	D1		
1P45	E5	2HSP	C3	3G62	A1	5D12	D1		
1P6A	D4	2HSV	C3	3G63	B1	5D13	D1		
1P6Y	D4	2HT8	C3	3G66	A1	5D14	E1		
1PEZ	D4	2HTL	C3	3H06	B3	5D15	E1		
1R06	A5	2HTP	C3	3H07	C3	5D16	E1		
1R07	A5	2HTR	C3	3H0A	B3	5E00	B5		
1R08	B5	2HTU	C3	3H0B	A3	5E01	B5		
1R09	A5	2HTV	C3	3H0C	A3	5E03	A5		
1T04	C4	2HVN	C5	3H12	D1	5EA3	A5		
1T55	C5	2HVS	B5	3H14	C3	5G55	A1		
1T65	C5	2HZQ	D2	3H15	C3	5G56	B1		
1T70	D5	2HZW	A3	3H16	C3	5HA0	D2		
1T75	C5	2HZZ	A3	3H20	C3	5HR0	C3		
2CG0	A2	2P00	D3	3H21	C3	5HR2	C3		
2CG5	A1	2P01	D2	3H22	D1	5HR3	C3		
2CG6	A1	2P02	E3	3H23	C3	5HR5	C3		
2CG7	B1	2P03	E3	3H25	D1	5HRC	C3		
2D10	E1	2P08	D3	3H26	C3	5HRG	C3		
2D11	E1	2P0A	D3	3H27	C3	5P01	E3		
2D12	E1	2P0B	E3	3H28	C3	5P02	E3		
2D14	E1	2P0C	E3	3H29	A3	5P03	D3		
2D16	D1	2P0D	E3	3H31	C3	5P04	D3		
2D17	D1	2P0E	E3	3H32	B3	5P07	D5		
2D18	E1	2P0F	D3	3H41	A3	5T54	D5		
2D19	E1	2P0G	E2	3H42	B3	5T61	D5		
2D20	E1	2P0H	D2	3H43	A3	5T63	D5		
2D21	E1	2P0K	D5	3H48	B3	5U00	E2		
2D22	E1	2P0M	D3	3H51	B3	5U01	E1		
2D23	E1	2P0N	E3	3H52	B3	5U02	F1		
2D26	D1	2P0Q	D3	3H53	B3	5U03	E1		
2D27	D1	2P0U	D3	3H54	C3	5U0A	F2		
2D28	D1	2P0V	E3	3H58	A2	5U0B	F1		
2D29	D1	2P0W	D3	3H64	B3	5U52	E1		
2D30	E2	2P3M	D5	3HA0	D2	6D01	E2		
2D33	E2	2P7K	D4	3HA1	D3	6ECB	A2		
2D34	E2	2T59	D4	3HA3	D2	6G50	B1		
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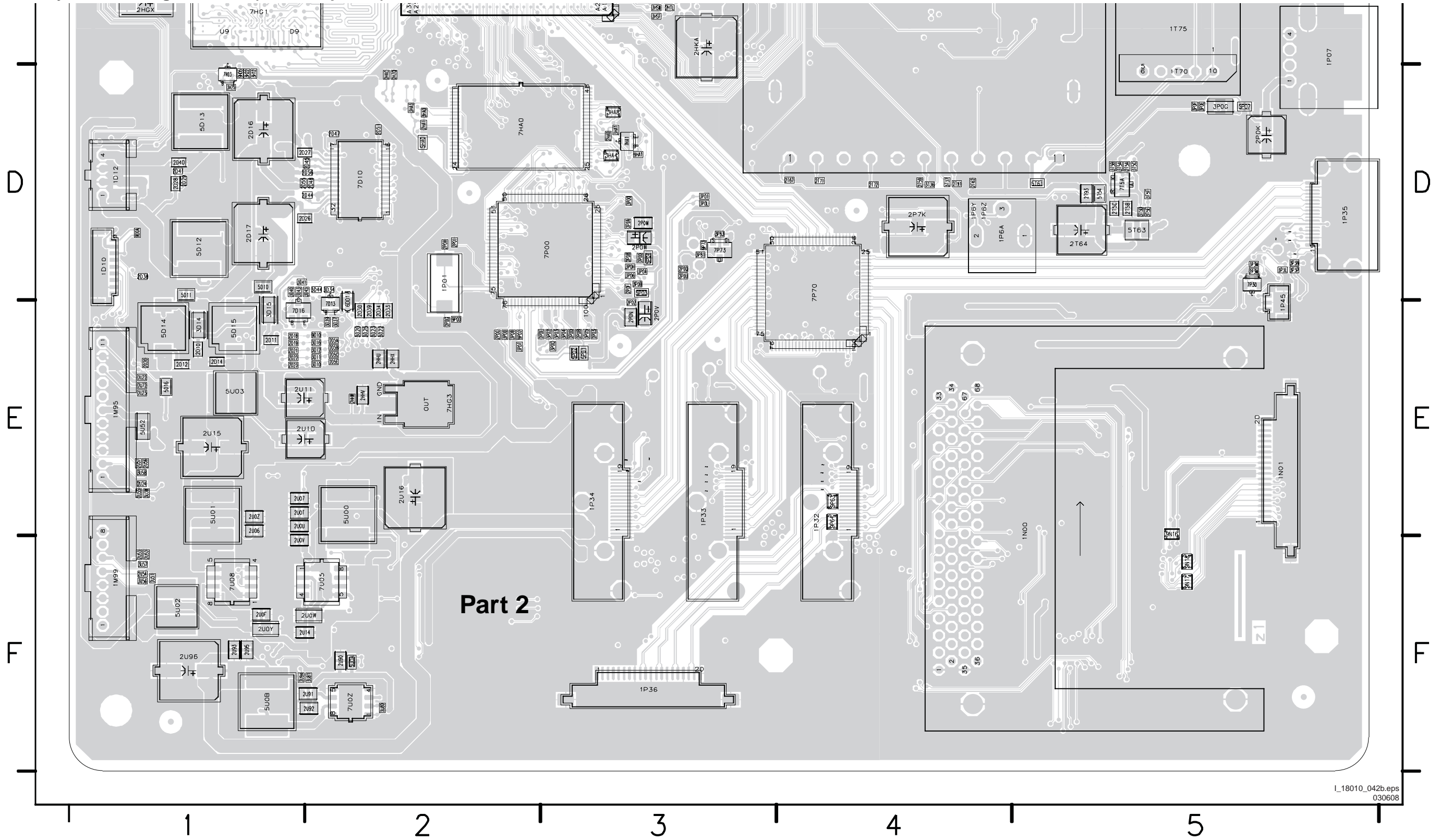
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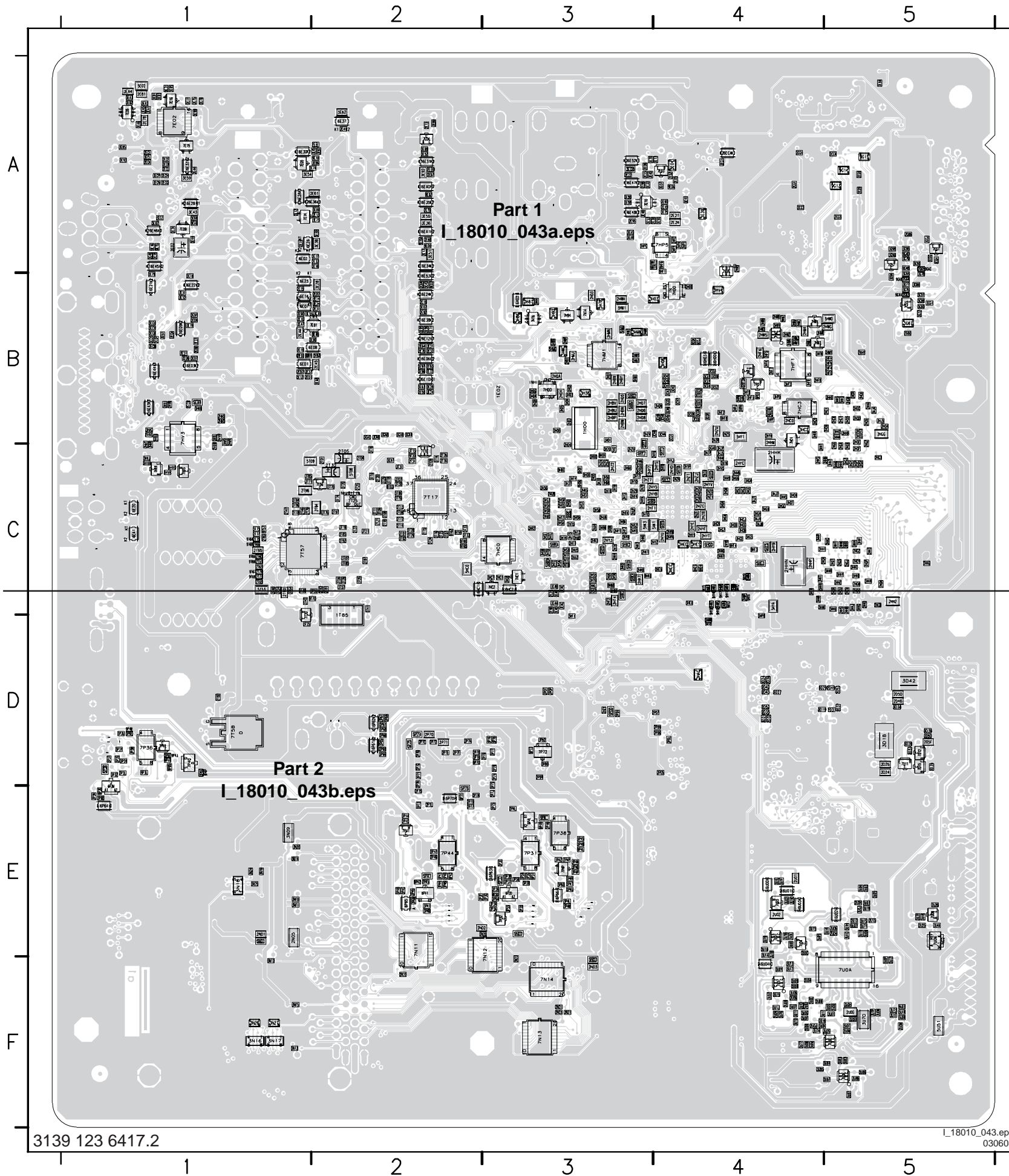




Layout Small Signal Board (Part 2 Top Side)



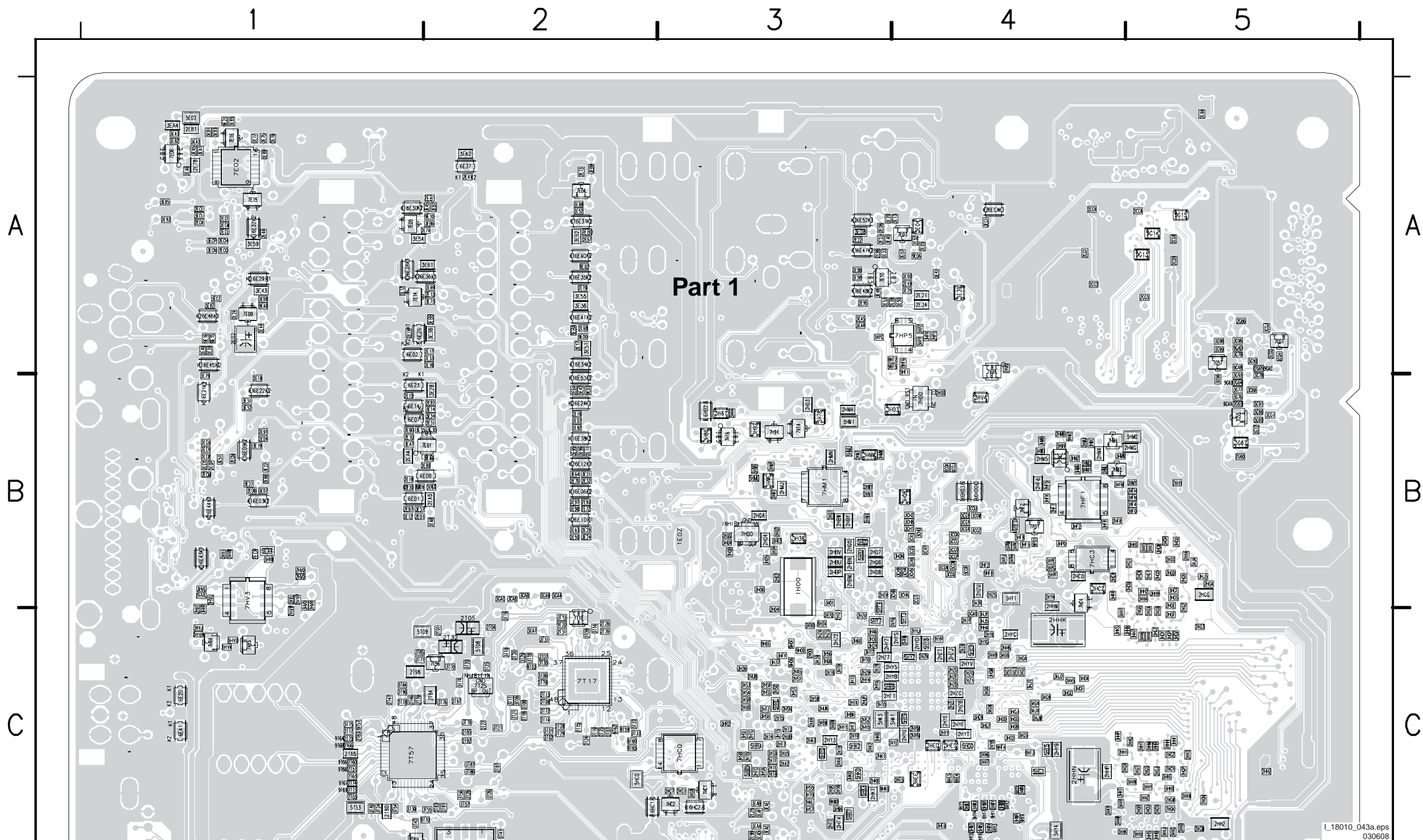
Layout Small Signal Board (Overview Bottom Side)



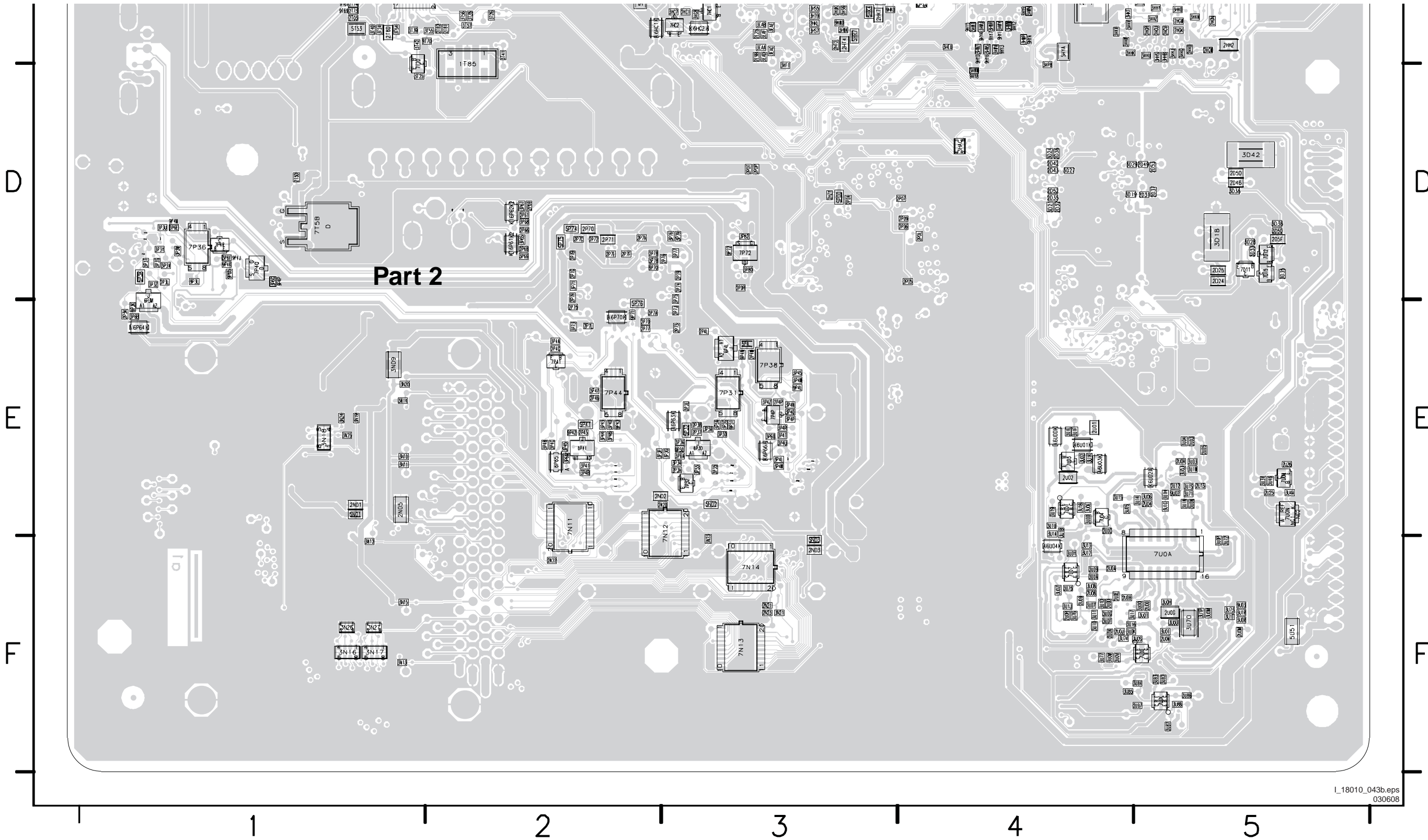
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1P3V	E3	2HA4	C3	2H0B	C3	2T03	C1	3E08	A3	3H01	B3	3HK3	C4	3P4N	E3	3U1S	E5	6U02	E5	9P3K	E5
1P3W	E3	2HA5	C3	2H0K	C3	2T04	C2	3E11	B1	3H02	B3	3HK4	C4	3P4P	E3	3U1T	F5	6U03	E4	9P3L	D1
1P3Y	E3	2HBM	B3	2H0L	C3	2T05	C2	3E12	B1	3H03	B3	3HKV	C4	3P4Q	E3	3U1U	E4	6U04	F4	9P42	E2
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1P4V	E3	2HBW	B3	2HVO	B1	2T13	C2	3E17	A2	3H13	C3	3HME	B4	3P4V	E3	3U1Z	E5	7E01	B2	9P4M	D1
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1P4Y	E2	2HCB	B4	2HVC	B1	2T15	C2	3E19	B1	3H19	C3	3HMG	B3	3P65	D2	3U73	F5	7E03	A4	9P4P	D1
1P4Z	E2	2HCC	C3	2HVD	B1	2T16	C2	3E20	A3	3H24	C3	3HMI	B3	3P66	D2	3U74	F4	7E04	A2	9P65	D1
1T85	D2	2HCD	D4	2HVE	C1	2T18	C2	3E21	B2	3H30	C3	3HMJ	B3	3P67	D2	3U75	F4	7E05	A1	9P70	D2
2CG1	A4	2HCE	E5	2HVF	B1	2T19	C2	3E22	B1	3H36	C3	3HML	B4	3P68	D2	3U76	F4	7E06	A1	9P71	E2
2CG2	A4	2HCF	B4	2HVG	C1	2T20	C2	3E24	B2	3H37	C3	3HMM	B3	3P6A	E3	3U77	F4	7E09	A1	9P72	D3
2CG3	A5	2HCG	B4	2HVI	C3	2T21	C2	3E25	A4	3H38	B3	3HMU	B4	3P6B	E1	3U78	F5	7E10	A3	9T03	C2
2CG4	A4	2HCH	C3	2HVJ	C3	2T24	C2	3E27	B1	3H39	C3	3HNV	B4	3P6C	E2	3U79	F5	7E14	A1	9T20	C2
2CG5	A4	2HCK	B4	2HVK	C3	2T25	C2	3E28	B2	3H44	B3	3HMW	B4	3P6D	E3	3U84	F5	7E15	A1	9T57	C1
2CG6	A5	2HCL	B5	2HVL	C3	2T26	C2	3E30	B2	3H46	C3	3HMY	B5	3P6E	D1	3U85	F4	7E16	A1	9T59	C2
2CG7	A5	2HCM	B5	2HVM	C3	2T27	C2	3E31	B1	3H56	C3	3HMZ	B4	3P6F	D1	3U86	F5	7G55	B5	9T60	C2
2CG8	A5	2HCO	B5	2HVN	C3	2T28	C2	3E32	B1	3H60	C3	3HP8	D4	3P6G	D1	3U87	F5	7G57	A5	9T62	C2
2CG9	A5	2HCP	B5	2HVO	C3	2T29	C2	3E33	A3	3H70	C3	3HPC	A3	3P71	D2	3U88	F5	7H14	B3	9T65	C2
2D24	D5	2HCR	B5	2HVP	C3	2T31	C2	3E34	B2	3H78	B3	3HPD	B4	3P73	E2	5E02	A1	7H16	B3	9T66	C1
2D25	D5	2HCS	B5	2HVR	C4	2T32	C2	3E36	A2	3H86	B3	3HPE	B4	3P75	D3	5E4A	B1	7H94	B3	9T67	C1
2D31	D5	2HCT	B5	2HVS	C4	2T35	C2	3E37	B1	3H87	B3	3HPF	B4	3P76	D3	5H2B	B3	7HC0	C3	9T68	C1
2D32	D4	2HCU	B5	2HVT	C3	2T36	C2	3E38	A2	3H92	B3	3HPG	B4	3P77	D3	5HC0	C2	7HC1	C3	9T69	C1
2D35	D4	2HCV	B5	2HVA	C3	2T39	C1	3E39	A4	3HAC	D4	3HPH	B4	3P78	D2	5HG0	C4	7HC2	C3	9T6A	C1
2D36	D4	2HCW	B5	2HVB	C4	2T47	C1	3E40	A3	3HAK	C3	3HPJ	B4	3P79	D3	5HG1	C4	7HC3	B4	9T6B	C1
2D37	D5	2HCA	C5	2HVC	C4	2T51	C1	3E41	A4	3HBM	C3	3HPK	B4	3P7A	E2	5HK0	C3	7HC4	B4	9T70	C2
2D42	D4	2HCB	C5	2HVD	C4	2T5D	D1	3E42	B2	3HBN	C3	3HPM	B4	3P80	D3	5HK1	C4	7HD0	B4	9U02	E5
2D43	D4	2HCC	B5	2HVE	C4	2T60	C1	3E43	A1	3HC2	B4	3HPX	A4	3P82	D3	5HK2	C3	7HF1	B4	9U03	F5
2D46	D5	2HCD	B5	2HVF	C4	2T63	C1	3E44	A1	3HC7	C3	3HPY	A4	3T01	C2	5HK3	C3	7HF2	B4		
2D49	D5	2HCE	B5	2HVG	B4	2T65	C1	3E45	A2	3HC8	C3	3HPZ	A4	3T02	C2	5HK4	C3	7HM1	B3		
2D50	D5	2HCF	C5	2HVI	C4	2T66	C1	3E48	A3	3HC9	B4	3HQ8	B4	3T06	C2	5HM0	B5	7HM2	B4		
2D52	D4	2HCG	B5	2HVK	C4	2T73	C1	3E50	A4	3HD3	B4	3HQG	B3	3T07	C2	5HM1	B3	7HM3	B4		
2D53	D5	2HCH	C5	2HVL	C4	2T74	C1	3E51	A2	3HD4	C4	3HQH	C3	3T08	C2	5HM2	B3	7HM4	B4		
2D54	D5	2HCK	B5	2HVM	C4	2T77	C1	3E52	A3	3HD5	C4	3HQI	B4	3T09	C3	5HM3	C3	7HM5	B4		
2E01	B1	2HCL	C5	2HVN	C4	2T77	C1	3E53	A3	3HEE	C4	3HRZ	C3	3T10	C2	5HR7	C3	7H00	B3		
2E02	A1	2HCM	C5	2HVO	C3	2T78	C1	3E54	A1	3HE5	C4	3HS3	C3	3T11	C2	5HR9	C3	7HV3	B1		
2E04	B1	2HCO	B5	2HVP	C4	2T79	C1	3E55	A2	3HEU	C4	3HS4	C3	3T13	C2	5HRA	C3	7HV4	C1		
2E05	A4	2HCP	C5	2HVR	C4	2T80	C1	3E56	A3	3HF0	B5	3HS5	C3	3T14	C2	5HRL	C3	7HV5	C1		
2E06	B1	2HCR	C5	2HVS	C4	2T81	C2	3E57	B1	3HF1	D3	3HS6	C3	3T16	C2	5HY0	C3	7HVA	A4		
2E07	A4	2HCS	C5	2HVT	C4	2T82	C2	3E58	A3	3HF2	B4	3HS7	C3	3T18	C2	5HY1	B4	7N11	E2		
2E08	A3	2HCT	C5	2HVA	C4	2T83	C1	3E59	A1	3HF3	B4	3HS8	C3	3T19	C2	5HY2	C4	7N12	E3		
2E10	B1	2HCU	C5	2HVB	C4	2T84	C2	3E60	A4	3HF4	B5	3HSB	C3	3T20	C2	5HY3	C4	7N13	F3		
2E11	B1	2HCV	C5	2HVC	C4	2T85	C2	3E61	A4	3HF5	C4	3HSD	C3	3T21	C2	5HY4	B3	7N14	F3		
2E13	A2	2HCA	C5	2HVD	C4	2T87	C2	3E62	A2	3HFH	B5	3HSE	C3	3T24	C1	5HY5	C4	7P01	B4		
2E14	A1	2HCB	C5	2HVE	C4	2T92	C2	3E63	B2	3HFK	B4	3HSR	C3	3T25	D1	5HY6	C4	7P31	E3		
2E15	B1	2HCC	C5	2HVF	C4	2T96	C1	3E64	B2	3HFM	B4	3HSU	C3	3T26	C2	5HY7	C3	7P32	E3		
2E16	B2	2HCD	C5	2HVG	C3	2T97	C2	3E68	A1	3HFN	B5	3HT3	C3	3T28	C2	5HY8	C4	7P36	D1		
2E17	A2	2HCE	C5	2HVI	C4	2T98	C1	3E69	A2	3HFR	B4	3HT4	C3	3T29	C2	5HY9	C4	7P38	E3		
2E18	B1	2HCF	C5	2HVJ	C3	2U00	F5	3E73	A2	3HFY	C3	3HT9	C3	3T30	C2	5HYA	C4	7P41	E2		
2E19	A2	2HCG	C5	2HVK	C3	2U01	E4	3E79	B1	3HG1	C4	3HV4	B4	3T31	C2	5N01	E1	7P44	E2		
2E21	A4	2HCH	C5	2HVM	C4	2U02	E4	3E82	A1	3HG2	C4	3HV5	B1	3T32	C2	5N02	E3	7P45	E3		
2E22	A3	2HCK	C5	2HVN	C4	2U03	E5	3E85	A1	3HG3	C4	3HV6	B1	3T33	C2	5N03	F3	7P40	D1		
2E23	A3	2HCL	C5	2HVO	C3	2U04	E5	3E92	A2	3HG4	C4	3HV7	B1	3T39	C1	5P00	D3	7P4R	D1		
2E24	A1	2HCM	C5	2HVP	C4	2U05	E5	3E93	A1	3HG5	C4	3HVJ	C1	3T40	C1	5P32	E3	7P72	D3		
2E25	C3	2HCO	C4	2HVR	C4	2U08	F4	3E95	B2	3HG6	C4	3HVK	C1	3T41	C2	5P3K	D1	7T17	C2		
2E28	A4	2HCP	C4	2HVS	C4	2U09	F4	3E96	B2	3HG7	C4	3HVL	B1	3T42	C1	5P41	E2	7T18	C2		
2E29	B2	2HCR	C4	2HVT	C4	2U0A	F4	3E97	B2	3HG8	C4	3HVM	B1	3T54	C1	5P4L	E3	7T20	D1		
2E30	B1	2HCS	C4	2HVA	C4	2U0B	F4	3E98	B2	3HG9	C4	3HVO	B1	3T55	C2	5P74	D2	7T25	C2		
2E31	B2	2HCT	C4	2HVB	C3	2U0C	E4	3E99	A1	3HGA	C4	3HVQ	C1	3T56	C2	5P75	D2	7T56	C2		
2E32	B2	2HCU	C4	2HVC	C4	2U0D	F4	3EA1	A1	3HGB	C4	3HVR	C1	3T57	C2	5P76	E2	7T57	C1		
2E33	A2	2HCV	C4	2HVD	C4	2U0E	F4	3EA2	A1	3HGC	C4	3HVS	C1	3T64	C1	5T08	C2	7T58	C2		
2E34	A2	2HCA	C4	2HVE	C4	2U0G	F5	3EA3	A1	3HGD	C4	3HW0	C3	3T70	C2	5T09	C1	7U00	F5		
2E39	A1	2HCB	C4	2HVF	C4	2U0H	E5	3EA4	A1	3HGE	C4	3HWN	C4	3T71	C1	5T53	C1	7U01	E4		
2E40	A1	2HCC	C4	2HVG	C4	2U0J	F4	3EA5	A1	3HGF	C4	3HWP	C4	3T74	C2	5U51	F5	7U03	E4		
2E41	A2	2HCD	C4	2HVI	C4	2U0K	F4	3EA6	A1	3HGG	C4	3HWR	C4	3T75	C1	6E01	B1	7U04	E4		
2E44	A1	2HCE	C4	2HVK	C4	2U0M	F5	3EA7	B1	3HGH	C4	3HWS	C4	3T76	C2	6E02	A1	7U07	F4		
2E49	A4	2HCF	C4	2HVM	C3	2U0N	F5	3EA8	B2	3HGI	C4	3HWT	C4	3T85	C1	6E03	B1	7U0A	F5		
2E50	B2	2HCG	C4	2HVN	C3	2U0R	F4	3EA9	B2	3HGM	C4	3HWU	C4	3T86	C2	6E06	B2	7U0M	E5		
2E51	B2	2HCH	C4	2HVO	E1	2U12	E5	3EA0	C3	3HGN	C4	3HWV	C4	3T87	C2	6E07	B1	7U0N	E5		
2E52	A4	2HCK	C4	2HVP	C3	2U13	E5	3EA8	C3	3HGN	C4	3HWX	C4	3U00	F5	6E08	B2	7U0X	F5		
2E54	B2	2HCL	C4	2HVR	B4	2U25	E5	3EAC	C3	3HGP	C5	3HWY	C4	3U01	F5	6E0					



# Layout Small Signal Board (Part 1 Bottom Side)



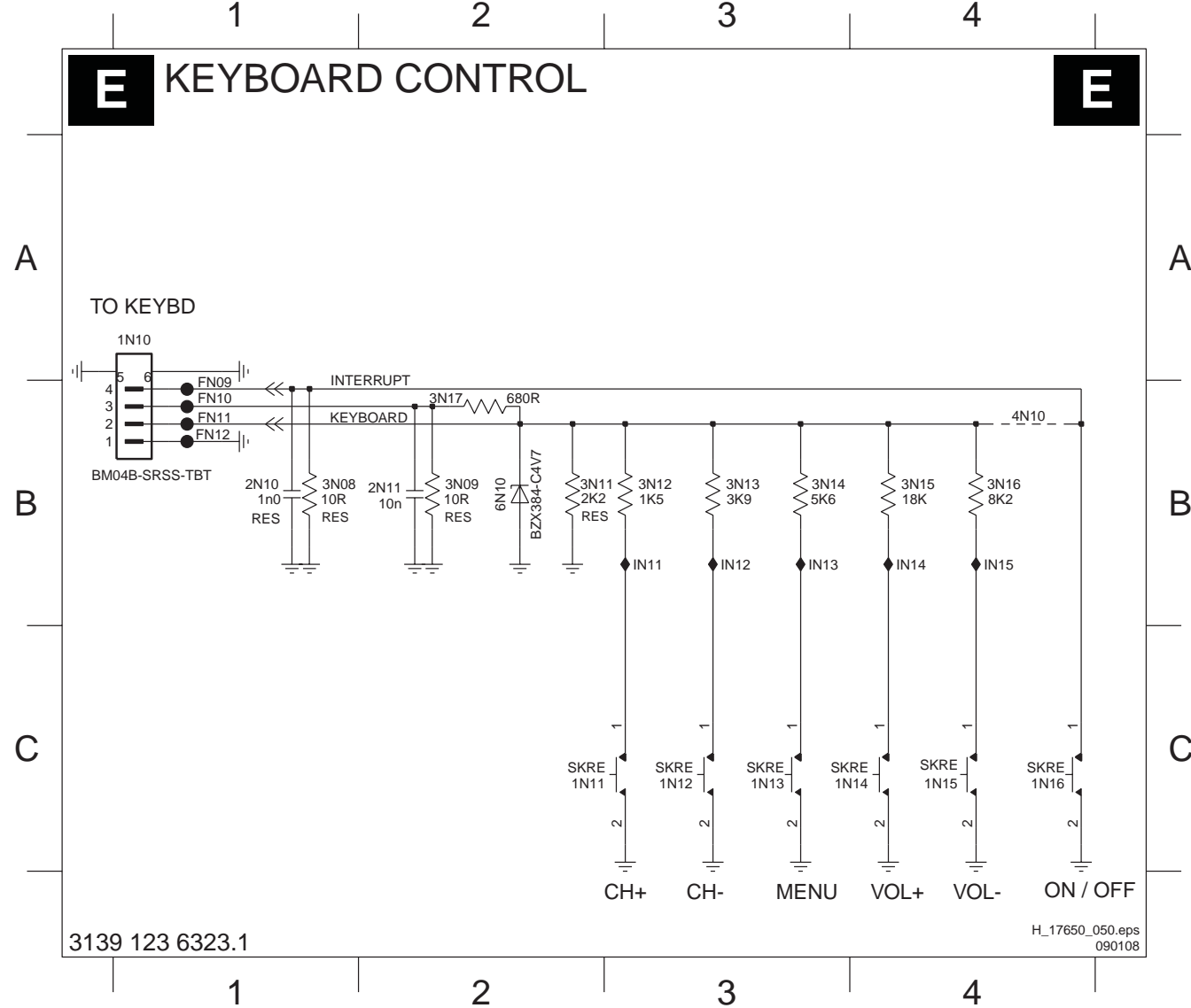
Layout Small Signal Board (Part 2 Bottom Side)



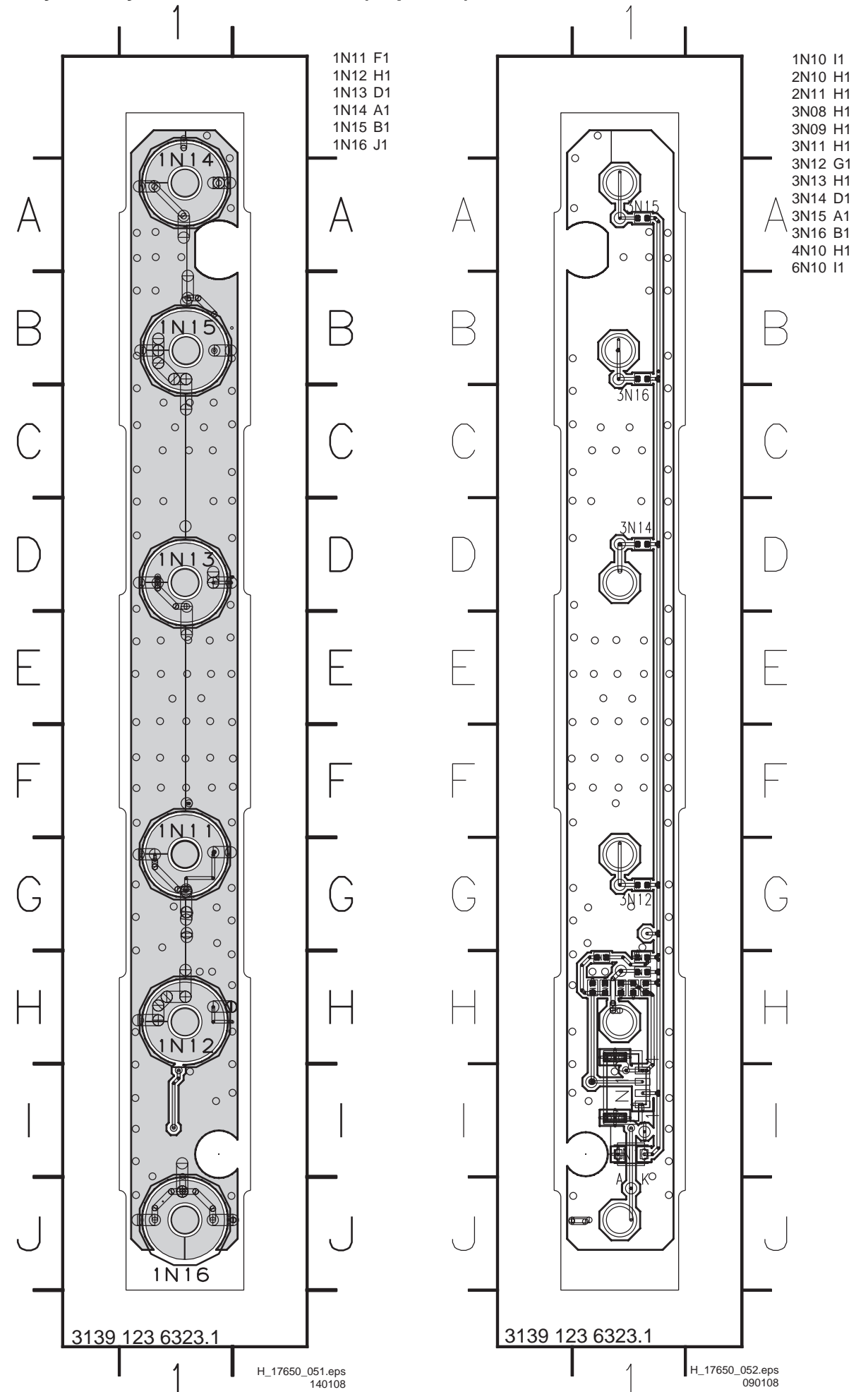


**Keyboard Control Panel**

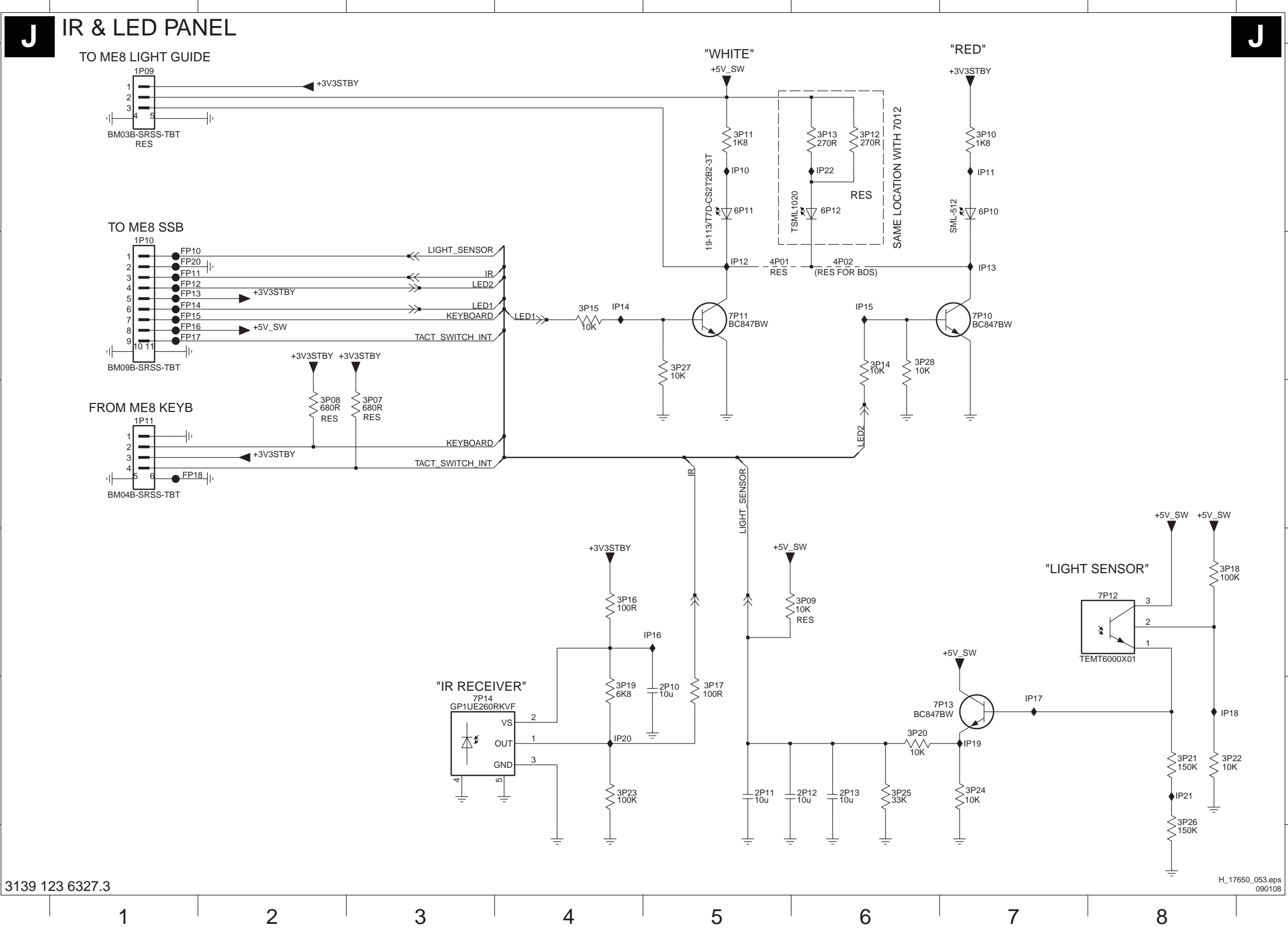
1N10 A1	1N13 C3	1N16 C4	3N08 B1	3N12 B3	3N15 B4	6N10 B2	FN11 B1	IN12 B3	IN15 B4
1N11 C2	1N14 C4	2N10 B1	3N09 B2	3N13 B3	3N16 B4	FN09 B1	FN12 B1	IN13 B3	
1N12 C3	1N15 C4	2N11 B2	3N11 B2	3N14 B3	4N10 B4	FN10 B1	IN11 B3	IN14 B4	



**Layout Keyboard Control Panel (Top Side)**



IR & LED Panel



- 1P09 A1
- 1P10 B1
- 1P11 C1
- 2P10 E5
- 2P11 E5
- 2P12 E6
- 2P13 E6
- 3P07 C3
- 3P08 C2
- 3P09 D6
- 3P10 A7
- 3P11 A5
- 3P12 A6
- 3P13 A6
- 3P14 B6
- 3P15 B4
- 3P16 D4
- 3P17 E5
- 3P18 D8
- 3P19 E4
- 3P20 E6
- 3P21 E8
- 3P22 E8
- 3P23 E4
- 3P24 E7
- 3P25 E6
- 3P26 E8
- 3P27 B5
- 3P28 B6
- 4P01 B5
- 4P02 B6
- 6P10 A7
- 6P11 A5
- 6P12 A6
- 7P10 B7
- 7P11 B5
- 7P12 D8
- 7P13 E7
- 7P14 E3
- FP10 B1
- FP11 B1
- FP12 B1
- FP13 B1
- FP14 B1
- FP15 B1
- FP16 B1
- FP17 B1
- FP18 C1
- FP20 B1
- IP10 A5
- IP11 A7
- IP12 B5
- IP13 B7
- IP14 B4
- IP15 B6
- IP16 D5
- IP17 E7
- IP18 E8
- IP19 E7
- IP20 E4
- IP21 E8
- IP22 A6





## 8. Alignments

### Index of this chapter:

- 8.1 General Alignment Conditions
- 8.2 Hardware Alignments
- 8.3 Software Alignments
- 8.4 Option Settings
- 8.5 Reset of Repaired SSB

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

### 8.1 General Alignment Conditions

Perform all electrical adjustments under the following conditions:

- Power supply voltage (depends on region):
  - AP-NTSC: 120 V<sub>AC</sub> or 230 V<sub>AC</sub> / 50 Hz (± 10%).
  - AP-PAL-multi: 120 - 230 V<sub>AC</sub> / 50 Hz (± 10%).
  - EU: 230 V<sub>AC</sub> / 50 Hz (± 10%).
  - LATAM-NTSC: 120 - 230 V<sub>AC</sub> / 50 Hz (± 10%).
  - US: 120 V<sub>AC</sub> / 60 Hz (± 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<sub>i</sub> > 10 Mohm, C<sub>i</sub> < 20 pF.
- Use an isolated trimmer/screwdriver to perform alignments.

#### 8.1.1 Alignment Sequence

- First, set the correct options:
  - In SAM, select “Options”, and then “Option numbers”.
  - Fill in the option settings for “Group 1” and “Group 2” according to the set sticker (see also paragraph “Option Settings”).
  - Press OK on the remote control **before** the cursor is moved to the left.
  - In submenu “Option numbers” select “Store” and press OK on the RC.

**OR:**

  - In main menu, select “Store” again and press OK on the RC.
  - Switch the set to Stand-by.
- Warming up (>15 minutes).

### 8.2 Hardware Alignments

Not applicable.

### 8.3 Software Alignments

Put the set in SAM mode (see Chapter 5 “Service Modes, Error Codes and Fault Finding”). The SAM menu will now appear on the screen. Select ALIGNMENTS and go to one of the sub menus. The alignments are explained below.

The following item can be aligned:

- Whitepoint.

To store the data:

- Press OK on the RC **before** the cursor is moved to the left.
- In main menu select “Store” and press OK on the RC.
- Press MENU on the RC to switch back to the main menu.

- Switch the set to stand-by mode.

For the next alignments, supply the following test signals via a video generator to the RF input:

- **EU/AP-PAL** models: a PAL B/G TV-signal with a signal strength of at least 1 mV and a frequency of 475.25 MHz
- **US/AP-NTSC** models: an NTSC M/N TV-signal with a signal strength of at least 1 mV and a frequency of 61.25 MHz (channel 3).
- **LATAM** models: an NTSC M TV-signal with a signal strength of at least 1 mV and a frequency of 61.25 MHz (channel 3).
- **DVB-T** models: see table “SDM default settings” in chapter 5.

#### 8.3.1 White Point

- Choose “TV menu”, “TV Settings”, “Picture”, and set:
  - “Contrast” to “100”.
  - “Brightness” to “50”.
  - “Colour” to “0”.
  - “Dynamic contrast” to “Off”.
  - “Colour enhancement” to “Off”.
  - “Active control” to “Off” (if present).
  - “Light sensor” to “Off” (if present).
  - “Clear LCD” to “On” (if present).
- Go to the SAM and select “Alignments”-> “Whitepoint”.

#### White point alignment LCD screens:

- Use a 100% white screen as input signal and set the following values (in SAM mode):
  - “Colour temperature” to “Normal”.
  - “Whitepoint red”, “Whitepoint green”, and “Whitepoint blue” values to “127”.
  - “Red BL offset” and “Green BL offset” values to “8”.

#### In case you have a colour analyser:

- Measure with a calibrated, contactless (max. 25 mm distance) colour analyser 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 127) 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: ± 0.004, dy: ± 0.004.
- Repeat this step for the other colour temperatures.
- When finished press “OK” on the RC and then press “Store” (in the SAM root menu) to store the aligned values into the NVM.
- Restore the initial picture settings after the alignments.

**Table 8-1 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).

- Select a “Colour Temperature” (e.g. “Cool”, “Normal”, or “Warm”).
- Set the “Whitepoint Red”, “- Green” and “- Blue” default values according to the values in the “Tint settings” table.
- When finished press “OK” on the RC, then press “Store” (in the SAM root menu) to store the aligned values into the NVM.
- Restore the initial picture settings after the alignments.

Table 8-2 Tint settings

Colour Temp.	R	G	B
	<b>32"</b>		
Cool	123	116	127
Normal	127	115	109
Warm	127	105	73
	<b>37"</b>		
Cool	127	102	116
Normal	127	97	100
Warm	127	89	69
	<b>42"</b>		
Cool	127	105	121
Normal	127	98	99
Warm	127	85	63
	<b>47"</b>		
Cool	127	127	125
Normal	127	122	97
Warm	127	109	50

## 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 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 by pressing the OK button on the RC **before** the cursor is moved to the left, select STORE in the SAM root menu and press OK on the RC.
- The new option setting is only active after the TV is switched "off" / "stand-by" and "on" again with the Mains switch (the NVM is then read again).

### 8.4.2 Dealer Options

For dealer options, in SAM select "Dealer options" and then "Personal options".

Table 8-3 Dealer options

Menu item	Subjects	Options	Description
Personal Options	Picture Mute	On	Picture is muted / not muted in case no input signal is detected at input connectors
		Off	
	Virgin Mode	On	TV starts up / does not start up (once) with a language selection menu after the Mains switch is turned "on" for the first time (virgin mode)
		Off	

Table 8-4 Option code overview (subject to change and as available at time of publishing)

CTN MODEL	Displ. code	Group 1				Group 2			
32PFL5403D/10_3	136	41472	04109	06223	45160	10120	00098	00004	00000
32PFL5403D/10_3	153	41472	04109	06223	45160	10137	00098	00004	00000
32PFL5403D/10_4	136	41472	04109	06223	45160	10120	00098	00004	00000
32PFL5403D/10_4	153	41472	04109	06223	45160	10137	00098	00004	00000
32PFL5403D/10_5	136	41472	04109	06223	45160	10120	00098	00004	00000
32PFL5403D/10_5	153	41472	04109	06223	45160	10137	00098	00004	00000
32PFL5403D/10_6	136	41472	04109	06223	45160	10120	00098	00004	00000
32PFL5403D/10_6	153	41472	04109	06223	45160	10137	00098	00004	00000
32PFL5403D/12_3	136	41472	04109	06223	45160	10120	00098	00004	00000
32PFL5403D/12_3	153	41472	04109	06223	45160	10137	00098	00004	00000
32PFL5403D/12_4	136	41472	04109	06223	45160	10120	00098	00004	00000
32PFL5403D/12_4	153	41472	04109	06223	45160	10137	00098	00004	00000
32PFL5403D/12_5	136	41472	04109	06223	45160	10120	00098	00004	00000
32PFL5403D/12_5	153	41472	04109	06223	45160	10137	00098	00004	00000
32PFL5403D/12_6	136	41472	04109	06223	45160	10120	00098	00004	00000

### 8.4.3 (Service) Options

Select the sub menu's to set the initialisation codes (options) of the set via text menus.

### 8.4.4 Opt. No. (Option numbers)

Select this sub menu to set all options at once (expressed in two long strings of numbers).

An option number (or "option byte") represents a number of different options. When you change these numbers directly, you can set all options very quickly. All options are controlled via eight option numbers.

When the NVM is replaced, all options will require resetting. To be certain that the factory settings are reproduced exactly, you must set both option number lines. You can find the correct option numbers on a sticker inside the TV set and in Table "Option code overview".

**Example:** The options sticker gives the following option numbers:

- 41472 04109 06223 45160
- 10120 00098 00004 00000

The first line (group 1) indicates hardware options 1 to 4.

Example: option no. "2" contains the "cabinet type".

The second line (group 2) indicates software options 5 to 8.

Example: option no. "5" contains the "display code".

Every 5-digit number represents 16 bits (so the maximum value will be 65536 if all options are set).

When all the correct options are set, the sum of the decimal values of each Option Byte (OB) will give the option number.

See table "Option code overview" for the options. Please note that this overview is indicative (subject to change). Always refer to the sticker in the TV-set as leading.

#### Diversity

Not all sets with the same Commercial Type Number (CTN) necessarily have the same option code!

#### Use of Alternative BOM

An alternative BOM number usually indicates the use of an alternative display. This results in another Display Code thus in another Option code. Refer to chapter 2 "Safety Instructions, Warnings, and Notes".

### 8.4.5 Option Code Overview



CTN MODEL	Displ. code	Group 1				Group 2			
32PFL5403D/12_6	153	41472	04109	06223	45160	10137	00098	00004	00000
32PFL5403S/60	136	41472	04109	06223	45160	10120	00098	00004	00000
32PFL5403S/60	153	41472	04109	06223	45160	10137	00098	00004	00000
37PFL3403D/12_1	139	33280	04111	06219	45160	10123	00098	00004	00000
37PFL3403D/12_1	176	33280	04111	06219	45160	10160	00098	00004	00000
37PFL3403D/12_2	139	33280	04111	06219	45160	10123	00098	00004	00000
37PFL3403D/12_2	176	33280	04111	06219	45160	10160	00098	00004	00000
37PFL5603D/10_2	166	41472	04109	06223	45160	10150	00098	00004	00000
37PFL5603S/60_2	166	41472	04109	06223	45160	10150	00098	00004	00000
42PFL5603D/10_4	130	41472	04107	06223	45160	10114	00098	00004	00000
42PFL5603D/10_4	132	41472	04107	06223	45160	10116	00098	00004	00000
42PFL5603D/10_6	130	41481	04107	06223	45160	10114	00098	00004	00000
42PFL5603D/10_6	132	41481	04107	06223	45160	10116	00098	00004	00000
42PFL5603D/12_4	130	41481	04107	06223	45160	10114	00098	00004	00000
42PFL5603D/12_4	132	41481	04107	06223	45160	10116	00098	00004	00000
42PFL5603D/12_6	132	41472	04107	06223	45160	10116	00098	00004	00000
47PFL5603D/10_3	130	41472	04107	06223	45160	10119	00098	00004	00000
47PFL5603D/10_3	159	41472	04107	06223	45160	10143	00098	00004	00000
47PFL5603D/10_5	130	41472	04107	06223	45160	10119	00098	00004	00000
47PFL5603D/10_5	159	41472	04107	06223	45160	10143	00098	00004	00000

**Important:** After having edited the option numbers as described above, you **must** press OK on the remote control **before** the cursor is moved to the left!

## 8.5 Reset of Repaired SSB

A very important issue towards a repaired SSB from a service repair shop, implies the reset of the NVM on the SSB.

A repaired SSB in service should get the service Set type "00PF0000000000" and Production code "00000000000000". Also the virgin bit is to be set. To set all this, you can use the ComPair tool.

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

### Index of this chapter:

- 9.1 Introduction
- 9.2 Power Supply
- 9.3 Abbreviation List
- 9.4 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 Q522.2E LA chassis (platform TV522/22E) is a derivative from the Q522.1E LA chassis (platform TV522/22M), which on its turn is derivative from the Q528.2E (platform TV522/82M). They are the successors of the BJ3.1 chassis.

This Q522.2E LA chassis is built around one Small Signal Board and some additional boards:

- Local Keyboard panel.
- IR/LED panel.
- Power Supply Unit.

For a description of all circuitry except the PSU, please refer to the Q528.1E LA Service Manual.

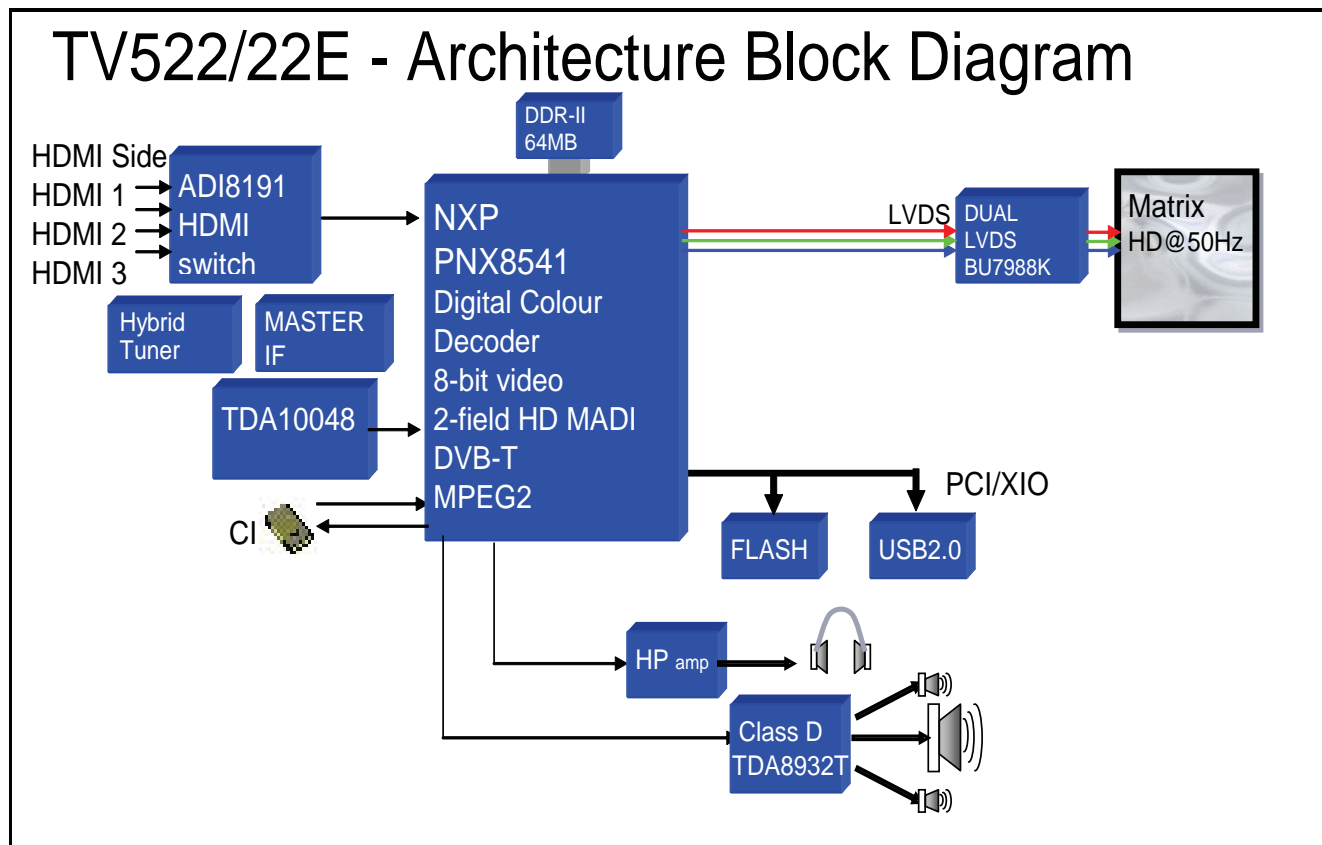
#### 9.1.1 Implementation

Details of the implementation are as follows:

- Removed items:
  - MPEG4.
  - PNX5050.
  - PACIFIC3.
  - DVB-C.
  - RS232 level shifter on UART.
  - I2C Mux (PCA9540).
  - TS buffering.
- Replaced items:
  - PNX8541 E1 package with 1mm pitch package.
  - Tantalum cap by SMD Elcap.

#### 9.1.2 TV522 Architecture Overview

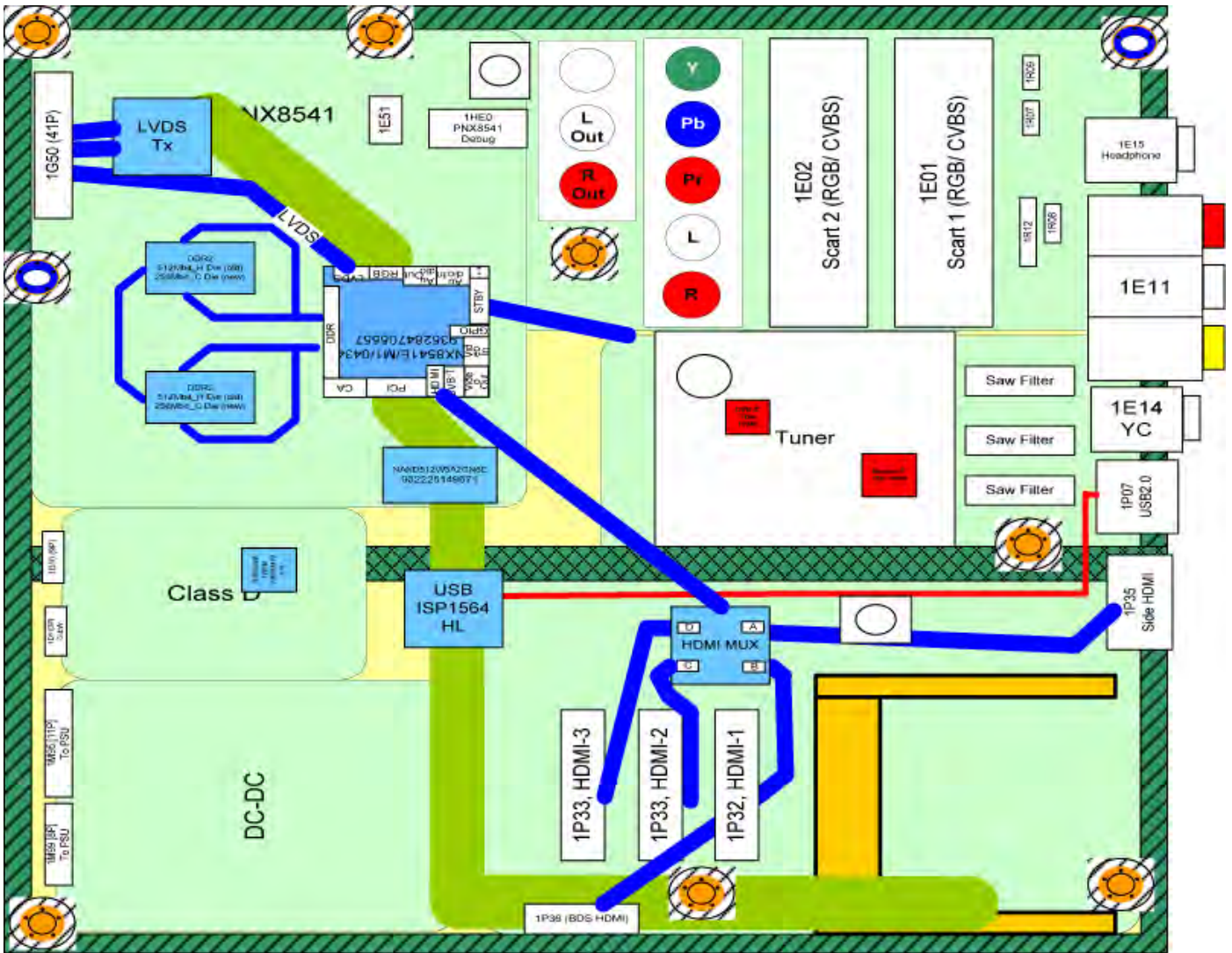
For details about the chassis block diagrams refer to chapter "Block diagrams, Test Point Overview, and Waveforms". An overview of the TV522 architecture can be found in next figure "Architecture of TV522 platform".



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Figure 9-1 Architecture of TV522/22E platform

9.1.3 SSB Cell Layout



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Figure 9-2 SSB layout cells (top view)

## 9.2 Power Supply

All power supplies described below are a black box for Service. When defective, a new board must be ordered and the defective one must be returned, unless the main fuse of the board is broken. Always replace a defective fuse with one with the correct specifications! This part is available in the regular market.

Consult the Service website for the order codes of the boards. Below some extra information of each board is given, in order to help to determine which part of the set is defective.

### 9.2.1 Specifications

There are two types of the power supply used in the TV522 platform:

- Power Supply (PSU) - without inverter - (for 32").
- Integrated Power Board (IPB) - incl. inverter - (for > 32").

### 9.2.2 Diversity

Below find an overview of the different PSUs that are used:

**Table 9-1 Supply diversity**

Supplier	PSU	Model	Input Voltage Range
BPS	PLCD170PS09	32" 768p	High Mains (196- 264 Vac)
BPS	LIPS250PS04	37" 768p	High Mains (196- 264 Vac)
Delta	DPS-279BP A	37" 1080p	Universal (90- 270 Vac)
BPS	LIPS250PS02	42" 768p	High Mains (196- 264 Vac)
BPS	LIPS250PS01	42" 1080p	High Mains (196- 264 Vac)
LGIT	PLHL-T722A	47" 1080p	High Mains (196- 264 Vac)

### 9.2.3 32" PSU (BPS PLCD170PS09)

#### Control Signals

The control/output signals are driven by open collector/open drain type circuits. The drive requirements are 3V3 Logic. Open Collector: 2.2K ohms pull up resistor to +3V3.

Signal Levels:

- Low or open: less than 0.4V.
- High: more than 2.4V.

The Power Supply Unit is controlled via a digital input "Standby # (Stdby)" and the "BL\_ON-OFF" signal at the secondary side.

**Table 9-2 Mode of operation**

Standby#	BL_ON-OFF CN7 pin 5	3V3	12Vssb	Vaudio	24V	Note
High	Low	ON	OFF	OFF	OFF	Standby
Low	Low	ON	ON	OFF	OFF	Semi-standby
Low	High	ON	ON	ON	ON	ON

#### Output Specifications

**Table 9-3 "Standby #" is "low" (ON mode)**

Description	Vo1	Vo2	Vo3	Vo4	Vo5
Symbol	3V3 stdby	12Vssb	+Vaudio	-Vaudio	24Vinv
Nominal voltage	3.3V	12V	+ 12V	- 12V	24V
Voltage tolerance	± 3%	± 5%	-5%, +10%	-5%, +10%	± 5%
Min. Current (A)	0	0.1	0	0	0
Nom. Current (A)	0.2	2.7	0.45	0.45	4
Max. Current (A)	0.2	2.7	2.5	2.5	5
Peak Current (A)	TBD	3.5	2.5	2.5	6.3
Ripple and noise	50mV	100mV	100mV	100mV	200mV
Ground	GND1	GND1	GND2 (isolated gnd)		GND3 (isolated gnd)

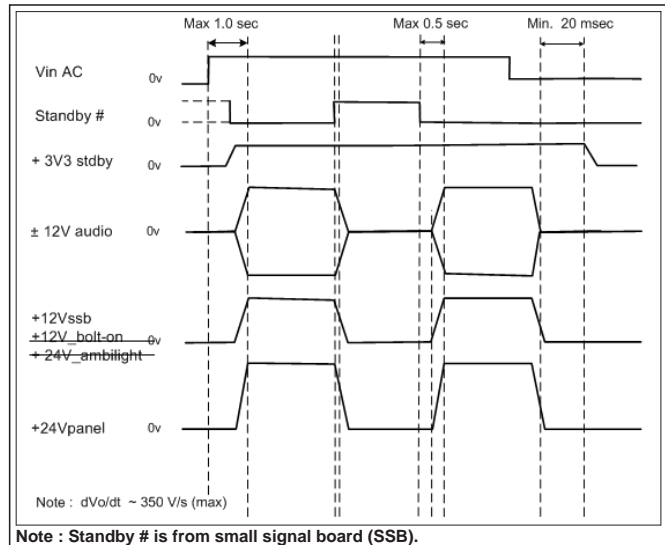
**Table 9-4 "Standby #" is "low" (Semi-standby mode)**

Description	Vo1	Vo2	Vo3	Vo4	Vo5
Symbol	3V3 stdby	12Vssb	+ Vaudio	- Vaudio	24Vinv
Nominal voltage	3.3V	12V	+ 12V	- 12V	24V
Voltage tolerance	± 3%	± 5%	11.4-17V	-11.4--17V	± 5%
Min. Current (A)	0	0.1	0	0	0
Nom. Current (A)	0.2	2.7	0	0	0
Max. Current (A)	0.2	2.7	0	0	0
Peak Current (A)	TBD	3.5	0	0	0

**Table 9-5 "Standby #" is "high" (Standby mode)**

Description	Vo1	Vo2	Vo3	Vo4	Vo5
Symbol	3V3 stdby	12Vssb	+ Vaudio	- Vaudio	24Vinv
Nominal voltage	3.3V	0	0	0	0
Voltage tolerance	± 3%	0	0	0	0
Min. Current (A)	0	0	0	0	0
Nom.	0.015	0	0	0	0

#### Start-up Sequence



**Figure 9-3 Rise and fall sequence 32" PSU**

#### Protections

- 3V3 stdby output
  - Short-circuit proof with auto restart.
  - Over voltage protection should operate within 120% ~ 140% of nominal value.
- 12Vssb
  - Short circuit protection with current limit or fuse.
  - Over voltage protection should operate within 120% ~ 140% of nominal value.
- Vaudio
  - Short circuit protection with current limit or fuse.
  - Over voltage protection should be less than absolute value 19V.
- 24 output
  - Short-circuit proof with auto restart.
  - Over voltage protection should operate within 120% ~ 140% of nominal value.

9.2.4 37" IPB (BPS LIPS250PS04 & DPS-279BP A)

**Control Signals**

The control/output signals are driven by open collector/open drain type circuits. The drive requirements are 3V3 Logic. Open Collector: 2.2 kohms pull up resistor to +3V3.

Signal Levels:

- Low or open: less than 0.4V.
- High: more than 2.4V.

The Power Supply Unit is controlled via a digital input "Standby # (Stdby)" and the "BL\_ON-OFF" signal at the secondary side.

**Table 9-6 Mode of operation**

Standby#	BL_ON-OFF CN7 pin 5	3V3	12Vssb	Vaudio	HV	Note
High	Low	ON	OFF	OFF	OFF	Standby
Low	Low	ON	ON	ON	OFF	Semi-standby
Low	High	ON	ON	ON	ON	ON

**Output Specifications**

**Table 9-7 "Standby #" is "low" (ON mode)**

Description	Vo1	Vo2	Vo3	Vo4	Vo5
Symbol	3V3stdby	12Vssb	+ Vaudio	- Vaudio	Inverter HV
Nominal voltage	3.3V	12V	+ 12V	- 12V	For details refer to panel specs)
Voltage tol.	± 3%	± 5%	-5%, +10%	-5%, +10%	
Min. Current (A)	0	0.1	0	0	
Nom. Current (A)	0.2	3.4	0.45	0.45	
Max. Current (A)	0.2	3.4	2.5	2.5	
Peak Current (A)	TBD	4	2.5	2.5	
Ripple and noise	50mV	100mV	100mV	100mV	
Ground	GND1	GND1	GND2 (isolated gnd)		

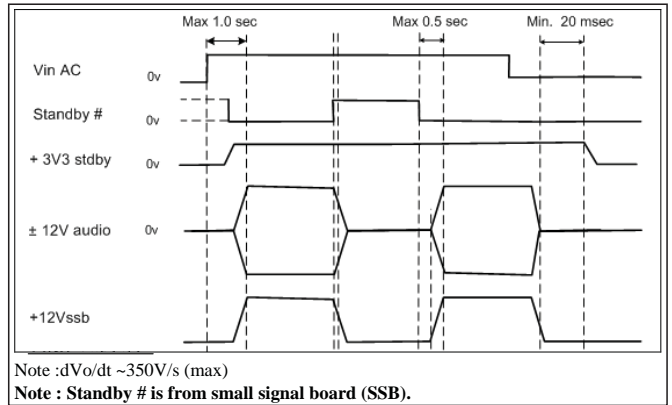
**Table 9-8 "Standby #" is "low" (Semi-standby mode)**

Description	Vo1	Vo2	Vo3	Vo4	Vo5
Symbol	3V3stdby	12Vssb	+ Vaudio	- Vaudio	HV
Nominal voltage	3.3V	12V	+ 12V	- 12V	0
Voltage tol.	± 3%	± 5%	11.4~17V	-11.4 ~ -17V	0
Min. Current (A)	0	0.1	0	0	0
Nom. Current (A)	0.2	3.4	0	0	0
Max. Current (A)	0.2	3.4	0	0	0
Peak Current	TBD	4	0	0	0

**Table 9-9 "Standby #" is "high" (Standby mode)**

Description	Vo1	Vo2	Vo3	Vo4	Vo5
Symbol	3V3 stdby	12Vssb	+ Vaudio	- Vaudio	HV
Nominal voltage	3.3V	0	0	0	0
Voltage tol.	± 3%	0	0	0	0
Min. Current (A)	0	0	0	0	0
Nom. Current	0.015	0	0	0	0

**Start-up Sequence**



**Figure 9-4 Rise and fall sequence 42" IPB**

**Protections**

- 3V3 stdby output
  - Short-circuit proof with auto restart.
  - Over voltage protection should operate within 120% ~ 140% of nominal value.
- 12Vssb
  - Short circuit protection with current limit or fuse.
  - Over voltage protection should operate within 120% ~ 140% of nominal value.
- Vaudio
  - Short circuit protection with current limit or fuse.
  - Over voltage protection should be less than absolute value 19V.
- HV output
  - Arcing protection.
  - Short circuit protection.
  - Over voltage protection should operate when more than 4 lamps are disconnected.

9.2.5 42" IPB (BPS LIPS250PS1)

**Control Signals**

The control/output signals are driven by open collector/open drain type circuits. The drive requirements are 3V3 Logic. Open Collector: 2.2 kohms pull up resistor to +3V3.

Signal Levels:

- Low or open: less than 0.4V.
- High: more than 2.4V.

The Power Supply Unit is controlled via a digital input "Standby # (Stdby)" and the "BL\_ON-OFF" signal at the secondary side.

**Table 9-10 Mode of operation**

Standby#	BL_ON-OFF CN7 pin 5	3V3	12Vssb	Vaudio	HV	Note
High	Low	ON	OFF	OFF	OFF	Standby
Low	Low	ON	ON	ON	OFF	Semi-standby
Low	High	ON	ON	ON	ON	ON

**Output Specifications**

**Table 9-11 "Standby #" is "low" (ON mode)**

Description	Vo1	Vo2	Vo3	Vo4	Vo5
Symbol	3V3stdby	12Vssb	+ Vaudio	- Vaudio	Inverter HV



Description	Vo1	Vo2	Vo3	Vo4	Vo5
Nominal voltage	3.3V	12V	+ 12V	- 12V	For details refer to panel specs)
Voltage tol.	± 3%	± 5%	-5%, +10%	-5%, +10%	
Min. Current (A)	0	0.1	0	0	
Nom. Current (A)	0.2	3.4	0.45	0.45	
Max. Current (A)	0.2	3.4	2.5	2.5	
Peak Current (A)	TBD	4	2.5	2.5	
Ripple and noise	50mV	100mV	100mV	100mV	
Ground	GND1	GND1	GND2 (isolated gnd)		

Table 9-12 “Standby #” is “low” (Semi-standby mode)

Description	Vo1	Vo2	Vo3	Vo4	Vo5
Symbol	3V3 stbby	12Vssb	+ Vaudio	- Vaudio	HV
Nominal voltage	3.3V	12V	+ 12V	- 12V	0
Voltage tol.	± 3%	± 5%	11.4~17V	-11.4 ~ -17V	0
Min. Current (A)	0	0.1	0	0	0
Nom. Current (A)	0.2	3.4	0	0	0
Max. Current (A)	0.2	3.4	0	0	0
Peak Current	TBD	4	0	0	0

Table 9-13 “Standby #” is “high” (Standby mode)

Description	Vo1	Vo2	Vo3	Vo4	Vo5
Symbol	3V3 stbby	12Vssb	+ Vaudio	- Vaudio	HV
Nominal voltage	3.3V	0	0	0	0
Voltage tol.	± 3%	0	0	0	0
Min. Current (A)	0	0	0	0	0
Nom. Current	0.015	0	0	0	0

Start-up Sequence

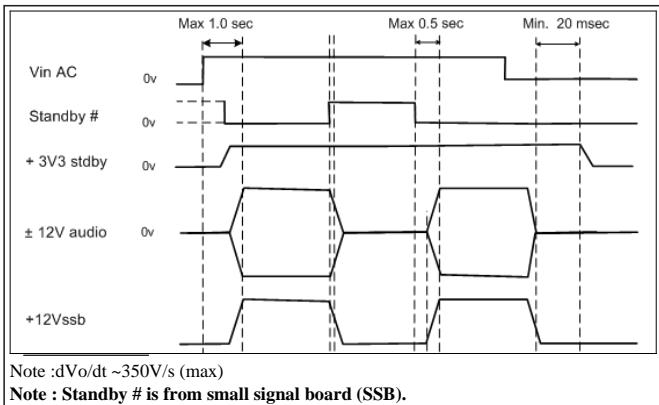


Figure 9-5 Rise and fall sequence 42” IPB

Protections

- 3V3 stbby output
  - Short-circuit proof with auto restart.
  - Over voltage protection should operate within 120% ~ 140% of nominal value.
- 12Vssb
  - Short circuit protection with current limit or fuse.
  - Over voltage protection should operate within 120% ~ 140% of nominal value.
- Vaudio
  - Short circuit protection with current limit or fuse.
  - Over voltage protection should be less than absolute value 19V.
- HV output
  - Arcing protection.
  - Short circuit protection.
  - Over voltage protection should operate when more than 4 lamps are disconnected.

9.2.6 47” IPB (LGIT PLHL-T722A)

Control Signals

Table 9-14 Mode of operation

Signal name	Explanation	Signal Direction	Action
DIM	Burst Dimming Ctrl	Input	Burst Dimming
BL_ON/OFF	Back Light ON Ctrl	Input	Hi: BL ON, Low: BL OFF
Boost	Boost Inv. Curr. Ctrl	Input	0~3.3V
STANDBY	STANDBY Signal	Input	Hi: Standby mode, Low: ON mode

Outputs

CN1		CN2, CN3	
Pin No.	Signal	Pin No.	Signal
1	Natural	1	HV
2	Live	2	HV
		3	HV

CN5, CN8		CN4	
Pin No.	Signal	Pin No.	Signal
1	+12V	1	24Vamb
2	+12V	2	GND
3	GND	3	24Vamb
4	GND	4	GND
		5	24Vamb
		6	GND

CN6		CN7	
Pin No.	Signal	Pin No.	Signal
1	3V3 Standby	1	+12V
2	Standby	2	+12V
3	GND	3	GND
4	GND	4	GND
5	GND	5	INV_ON
6	+12V	6	DIM
7	+12V	7	Boost
8	+12V	8	GND
9	+12V (Audio)		
10	GND_Audio		
11	-12V (Audio)		

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Figure 9-6 Connector overview

Protections

Protection	Output circuit	Trip point	Notes
Over voltage	3V3	3.96V ~ 4.62V	Shut down
	12Vssb	14.4V ~ 16.8V	
	+Vaudio	+19.0V	
	-Vaudio	-19.0V	
Short circuit	24Vamb	28.8V ~ 33.6V	Current limit or fuse
	All output	-	

### 9.3 Abbreviation List

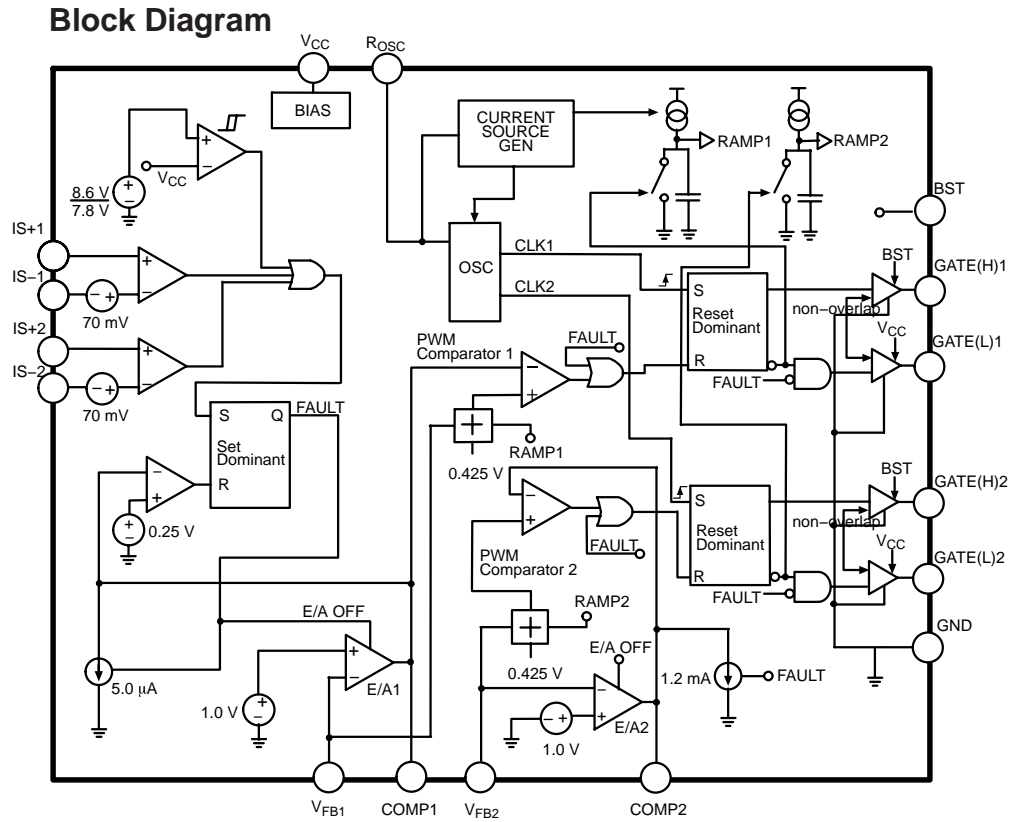
		DNR	Digital Noise Reduction: noise reduction feature of the set
		DRAM	Dynamic RAM
		DRM	Digital Rights Management
		DSP	Digital Signal Processing
		DST	Dealer Service Tool: special remote control designed for service technicians
		DTCP	Digital Transmission Content Protection; A protocol for protecting digital audio/video content that is traversing a high speed serial bus, such as IEEE-1394
		DVB-C	Digital Video Broadcast - Cable
		DVB-T	Digital Video Broadcast - Terrestrial
		DVD	Digital Versatile Disc
		DVI(-d)	Digital Visual Interface (d= digital only)
		E-DDC	Enhanced Display Data Channel (VESA standard for communication channel and display). Using E-DDC, the video source can read the EDID information from the display.
		EDID	Extended Display Identification Data (VESA standard)
		EEPROM	Electrically Erasable and Programmable Read Only Memory
		EMI	Electro Magnetic Interference
		EPLD	Erasable Programmable Logic Device
		EU	Europe
		EXT	EXTERNAL (source), entering the set by SCART or by cinches (jacks)
		FBL	Fast BLanking: DC signal accompanying RGB signals
		FDS	Full Dual Screen (same as FDW)
		FDW	Full Dual Window (same as FDS)
		FM	Field Memory or Frequency Modulation
		FPGA	Field-Programmable Gate Array
		FTV	Flat TeleVision
		Gb/s	Giga bits per second
		G-TXT	Green TeleteXT
		H	H_sync to the module
		HD	High Definition
		HDD	Hard Disk Drive
		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
		HP	HeadPhone
		I	Monochrome TV system. Sound carrier distance is 6.0 MHz
		I <sup>2</sup> C	Inter IC bus
		I <sup>2</sup> D	Inter IC Data bus
		I <sup>2</sup> S	Inter IC Sound bus
		IF	Intermediate Frequency
		IR	Infra Red
		IRQ	Interrupt Request
		ITU-656	The ITU Radio communication Sector (ITU-R) is a standards body subcommittee of the International Telecommunication Union relating to radio communication. ITU-656 (a.k.a. SDI), is a digitized video format used for broadcast grade video. Uncompressed digital component or digital composite signals can be used.
0/6/12	SCART switch control signal on A/V board. 0 = loop through (AUX to TV), 6 = play 16 : 9 format, 12 = play 4 : 3 format		
2DNR	Spatial (2D) Noise Reduction		
3DNR	Temporal (3D) Noise Reduction		
AARA	Automatic Aspect Ratio Adaptation: algorithm that adapts aspect ratio to remove horizontal black bars; keeps the original aspect ratio		
ACI	Automatic Channel Installation: algorithm that installs TV channels directly from a cable network by means of a predefined TXT page		
ADC	Analogue to Digital Converter		
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency		
AGC	Automatic Gain Control: algorithm that controls the video input of the feature box		
AM	Amplitude Modulation		
ANR	Automatic Noise Reduction: one of the algorithms of Auto TV		
AP	Asia Pacific		
AR	Aspect Ratio: 4 by 3 or 16 by 9		
ASF	Auto Screen Fit: algorithm that adapts aspect ratio to remove horizontal black bars without discarding video information		
ATV	See Auto TV		
Auto TV	A hardware and software control system that measures picture content, and adapts image parameters in a dynamic way		
AV	External Audio Video		
AVC	Audio Video Controller		
AVIP	Audio Video Input Processor		
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz		
BLR	Board-Level Repair		
BTSC	Broadcast Television Standard Committee. Multiplex FM stereo sound system, originating from the USA and used e.g. in LATAM and AP-NTSC countries		
B-TXT	Blue TeleteXT		
C	Centre channel (audio)		
CEC	Consumer Electronics Control bus: remote control bus on HDMI connections		
CL	Constant Level: audio output to connect with an external amplifier		
CLR	Component Level Repair		
ComPair	Computer aided rePair		
CP	Connected Planet / Copy Protection		
CSM	Customer Service Mode		
CTI	Colour Transient Improvement: manipulates steepness of chroma transients		
CVBS	Composite Video Blanking and Synchronization		
DAC	Digital to Analogue Converter		
DBE	Dynamic Bass Enhancement: extra low frequency amplification		
DDC	See "E-DDC"		
D/K	Monochrome TV system. Sound carrier distance is 6.5 MHz		
DFI	Dynamic Frame Insertion		
DFU	Directions For Use: owner's manual		
DMR	Digital Media Reader: card reader		
DNM	Digital Natural Motion		

	The SDI signal is self-synchronizing, uses 8 bit or 10 bit data words, and has a maximum data rate of 270 Mbit/s, with a minimum bandwidth of 135 MHz.		
ITV	Institutional TeleVision; TV sets for hotels, hospitals etc.		
JOP	Jaguar Output Processor		
LS	Last Status; The settings last chosen by the customer and read and stored in RAM or in the NVM. They are called at start-up of the set to configure it according to the customer's preferences		
LATAM	Latin America		
LCD	Liquid Crystal Display		
LED	Light Emitting Diode		
L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I		
LPL	LG.Philips LCD (supplier)		
LS	Loudspeaker		
LVDS	Low Voltage Differential Signalling		
Mbps	Mega bits per second		
M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz		
MIPS	Microprocessor without Interlocked Pipeline-Stages; A RISC-based microprocessor		
MOP	Matrix Output Processor		
MOSFET	Metal Oxide Silicon Field Effect Transistor, switching device		
MPEG	Motion Pictures Experts Group		
MPIF	Multi Platform InterFace		
MUTE	MUTE Line		
NC	Not Connected		
NICAM	Near Instantaneous Compounded Audio Multiplexing. This is a digital sound system, mainly used in Europe.		
NTC	Negative Temperature Coefficient, non-linear resistor		
NTSC	National Television Standard Committee. Colour system mainly used 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)		
NVM	Non-Volatile Memory: IC containing TV related data such as alignments		
O/C	Open Circuit		
OSD	On Screen Display		
OTC	On screen display Teletext and Control; also called Artistic (SAA5800)		
P50	Project 50: communication protocol between TV and peripherals		
PAL	Phase Alternating Line. Colour system mainly used in West Europe (colour carrier = 4.433619 MHz) and South America (colour carrier PAL M = 3.575612 MHz and PAL N = 3.582056 MHz)		
PCB	Printed Circuit Board (same as "PWB")		
PCM	Pulse Code Modulation		
PDP	Plasma Display Panel		
PFC	Power Factor Corrector (or Pre-conditioner)		
PIP	Picture In Picture		
PLL	Phase Locked Loop. Used for e.g. FST tuning systems. The customer can give directly the desired frequency		
POR	Power On Reset, signal to reset the uP		
PTC	Positive Temperature Coefficient, non-linear resistor		
PWB	Printed Wiring Board (same as "PCB")		
		PWM	Pulse Width Modulation
		QRC	Quasi Resonant Converter
		QTNR	Quality Temporal Noise Reduction
		QVCP	Quality Video Composition Processor
		RAM	Random Access Memory
		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.
		RC	Remote Control
		RC5 / RC6	Signal protocol from the remote control receiver
		ROM	Read Only Memory
		R-TXT	Red TeleteXT
		SAM	Service Alignment Mode
		S/C	Short Circuit
		SCART	Syndicat des Constructeurs d'Appareils Radiorecepteurs et Televisieurs
		SCL	Serial Clock I <sup>2</sup> C
		SCL-F	CLock Signal on Fast I <sup>2</sup> C bus
		SD	Standard Definition
		SDA	Serial Data I <sup>2</sup> C
		SDA-F	DAta Signal on Fast I <sup>2</sup> C bus
		SDI	Serial Digital Interface, see "ITU-656"
		SDRAM	Synchronous DRAM
		SECAM	SEquence Couleur Avec Memoire. Colour system mainly used in France and East Europe. Colour carriers= 4.406250 MHz and 4.250000 MHz
		SIF	Sound Intermediate Frequency
		SMPS	Switched Mode Power Supply
		SoC	System on Chip
		SOG	Sync On Green
		SOPS	Self Oscillating Power Supply
		S/PDIF	Sony Philips Digital InterFace
		SRAM	Static RAM
		SSB	Small Signal Board
		STBY	STand-BY
		SVGA	800 × 600 (4:3)
		SVHS	Super Video Home System
		SW	Software
		SWAN	Spatial temporal Weighted Averaging Noise reduction
		SXGA	1280 × 1024
		TFT	Thin Film Transistor
		THD	Total Harmonic Distortion
		TMD5	Transmission Minimized Differential Signalling
		TXT	TeleteXT
		TXT-DW	Dual Window with TeleteXT
		UI	User Interface
		uP	Microprocessor
		UXGA	1600 × 1200 (4:3)
		V	V-sync to the module
		VCR	Video Cassette Recorder
		VESA	Video Electronics Standards Association
		VGA	640 × 480 (4:3)
		VL	Variable Level out: processed audio output toward external amplifier
		VSB	Vestigial Side Band; modulation method
		WXGA	1280 × 768 (15:9)
		XTAL	Quartz crystal
		XGA	1024 × 768 (4:3)
		Y	Luminance signal
		Y/C	Luminance (Y) and Chrominance (C) signal
		YPbPr	Component video. Luminance and scaled colour difference signals (B-Y and R-Y)
		YUV	Component video

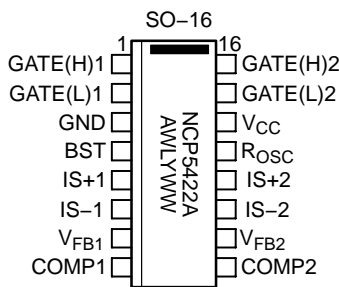
9.4 IC Data Sheets

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

9.4.1 Diagram B02A, NCP5422AD (IC 7U0A)



### Pin Configuration



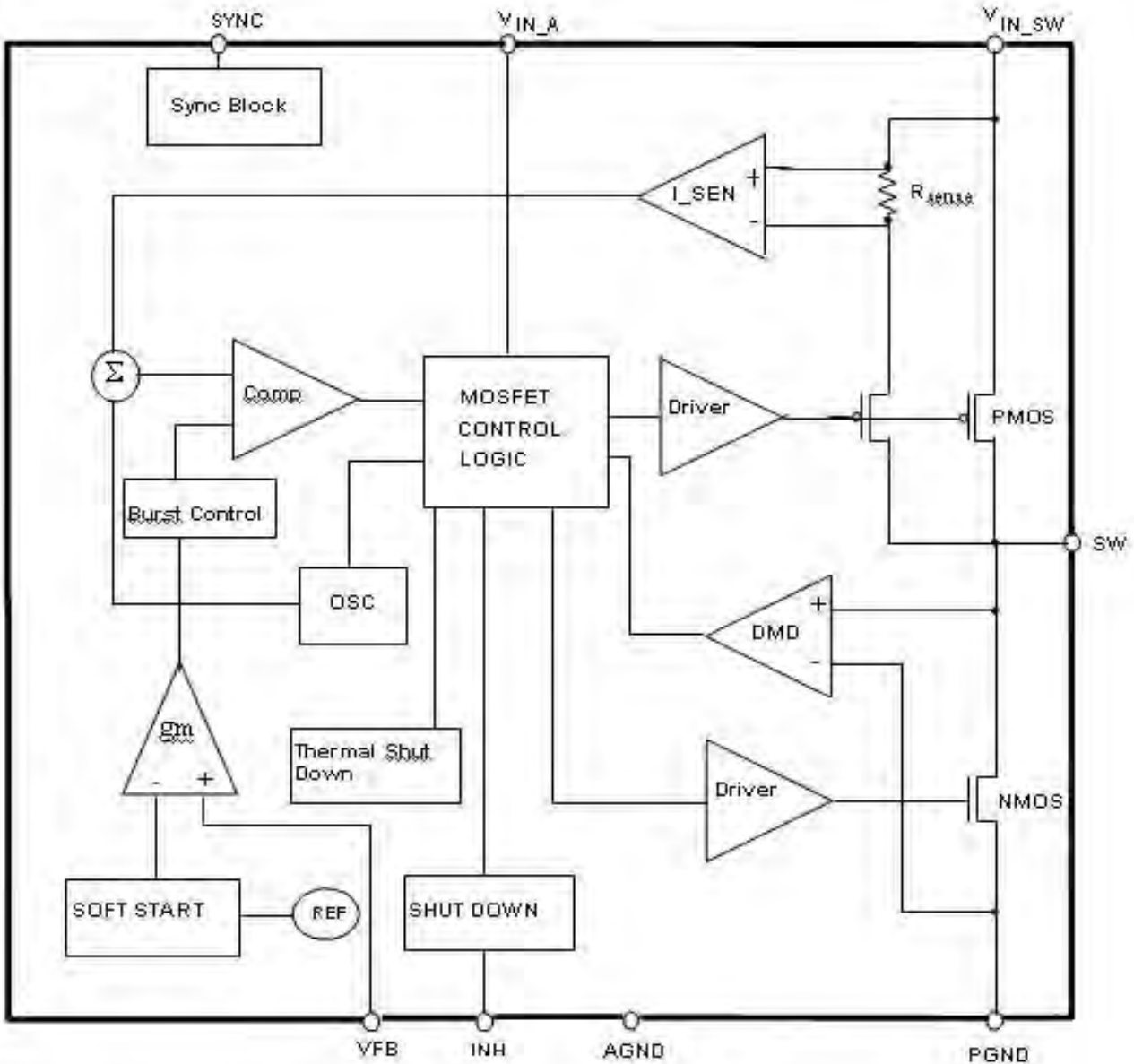
A = Assembly Location  
 WL = Wafer Lot  
 Y = Year  
 WW = Work Week

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 240505

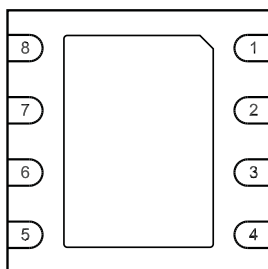
Figure 9-7 Internal block diagram and pin configuration

9.4.2 Diagram B02C, ST1S10PHD (IC 7U0Z)

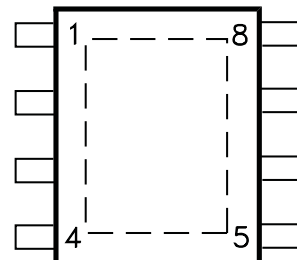
Block Diagram



Pin Configuration



DFN8 (4x4)



PowerSO-8

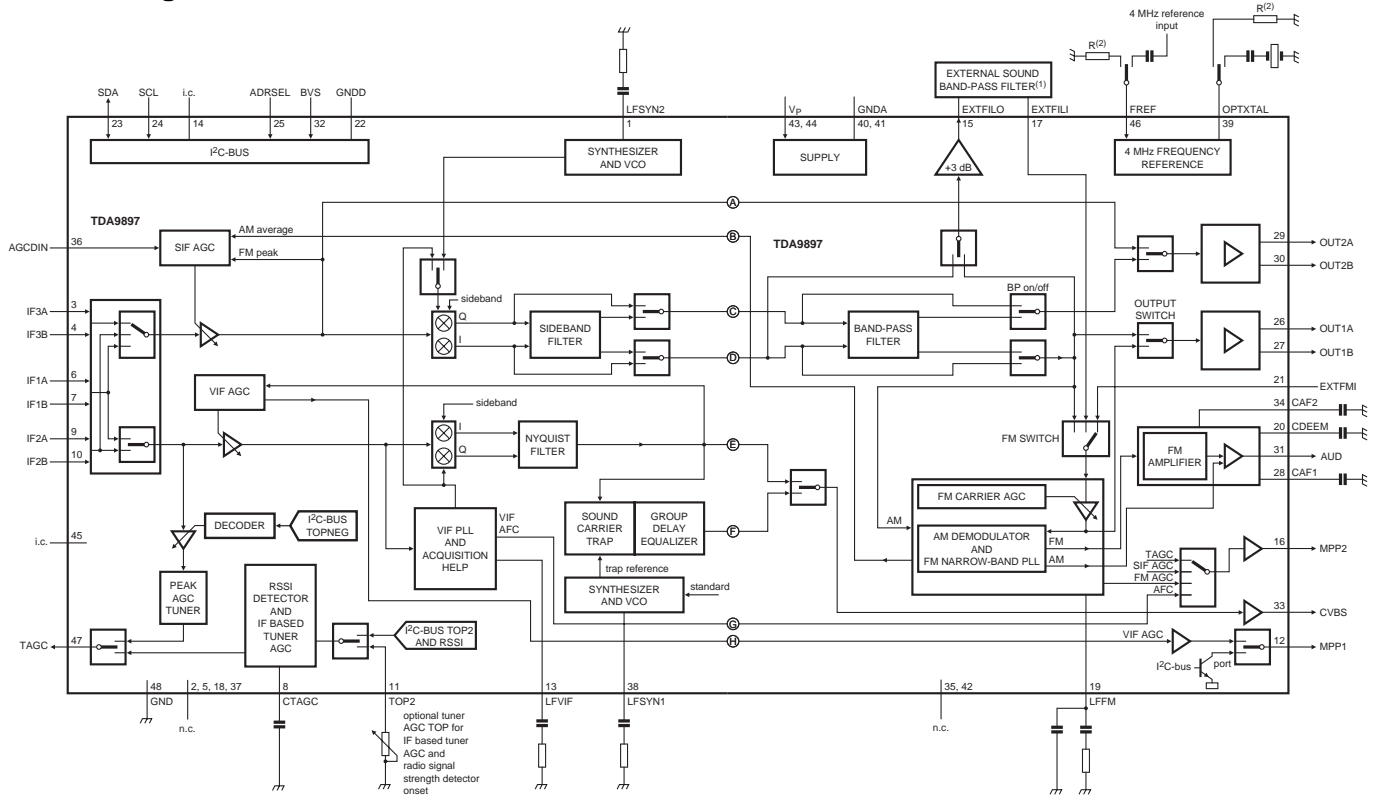
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Figure 9-8 Internal block diagram and pin configuration



9.4.3 Diagram B03A, TDA9898HL (IC 7T57)

Block Diagram



Pin Configuration

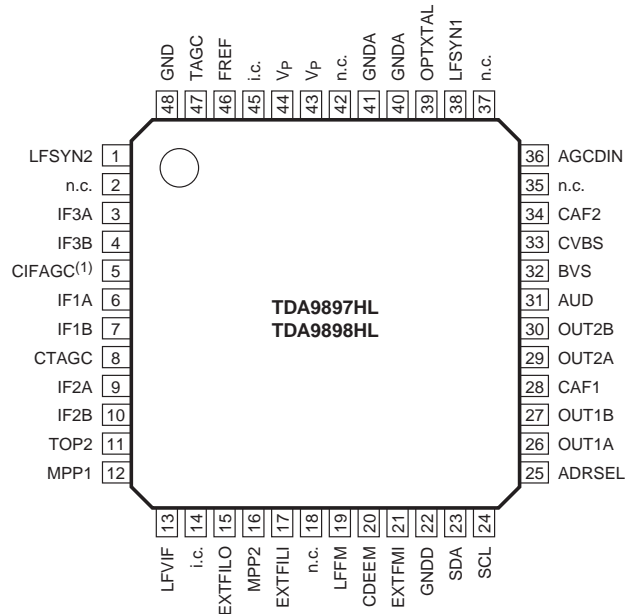
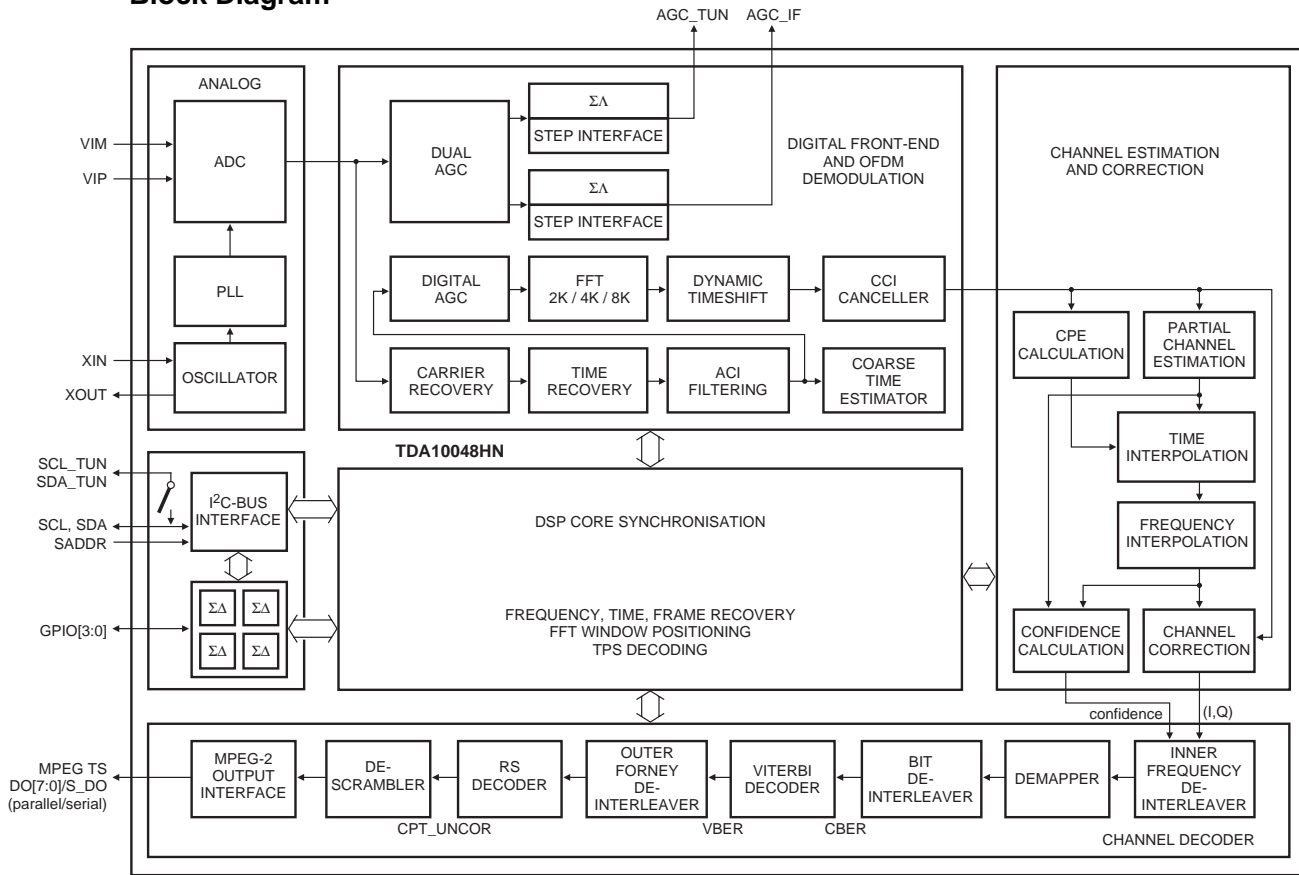


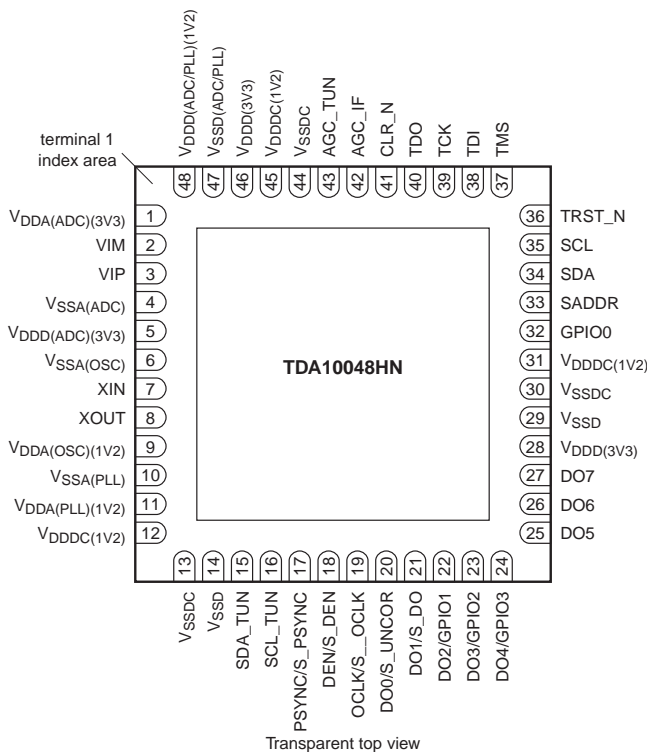
Figure 9-9 Pin configuration

9.4.4 Diagram B03B, TDA10048HN (IC7T17-1)

Block Diagram



Pin Configuration

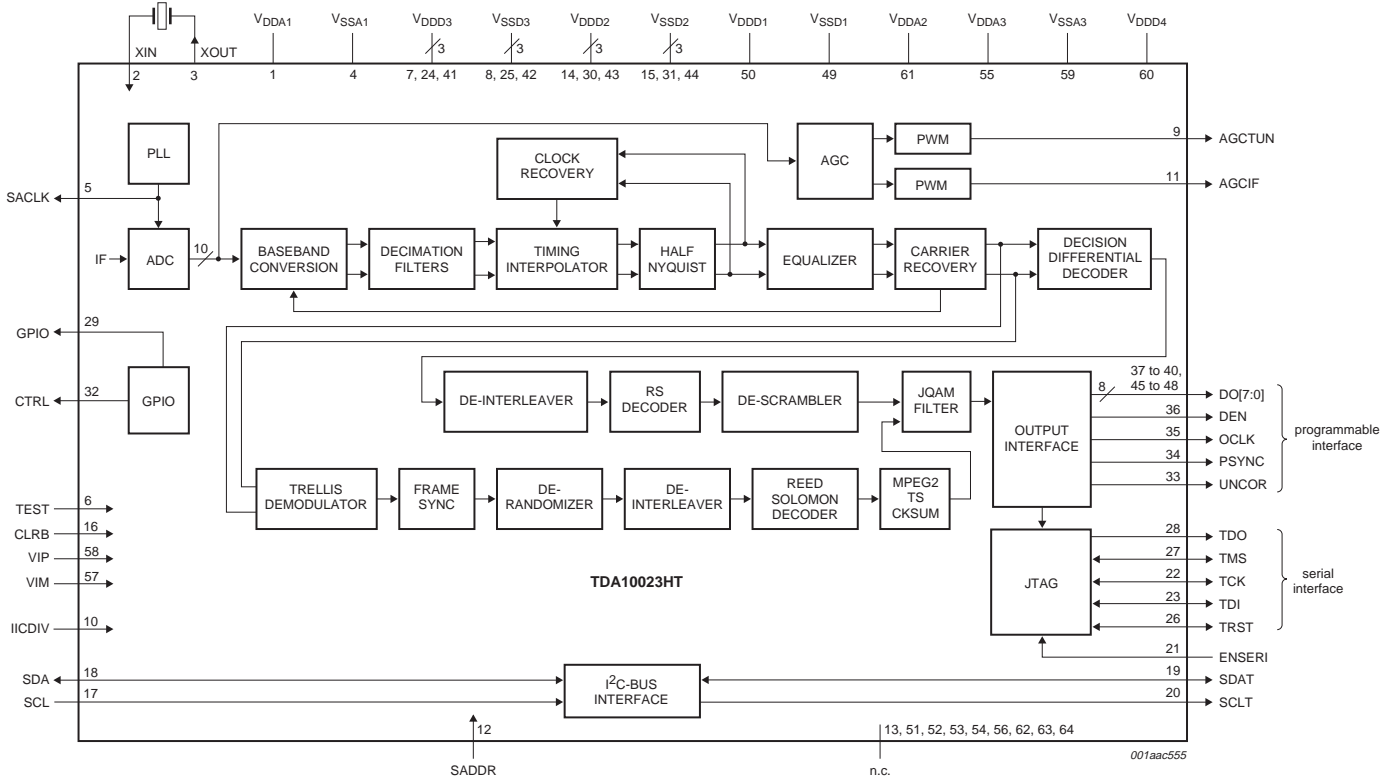


Transparent top view

Figure 9-10 Internal block diagram and pin configuration

9.4.5 Diagram B03C, TDA10023HT (IC7TA4)

Block Diagram



Pin Configuration

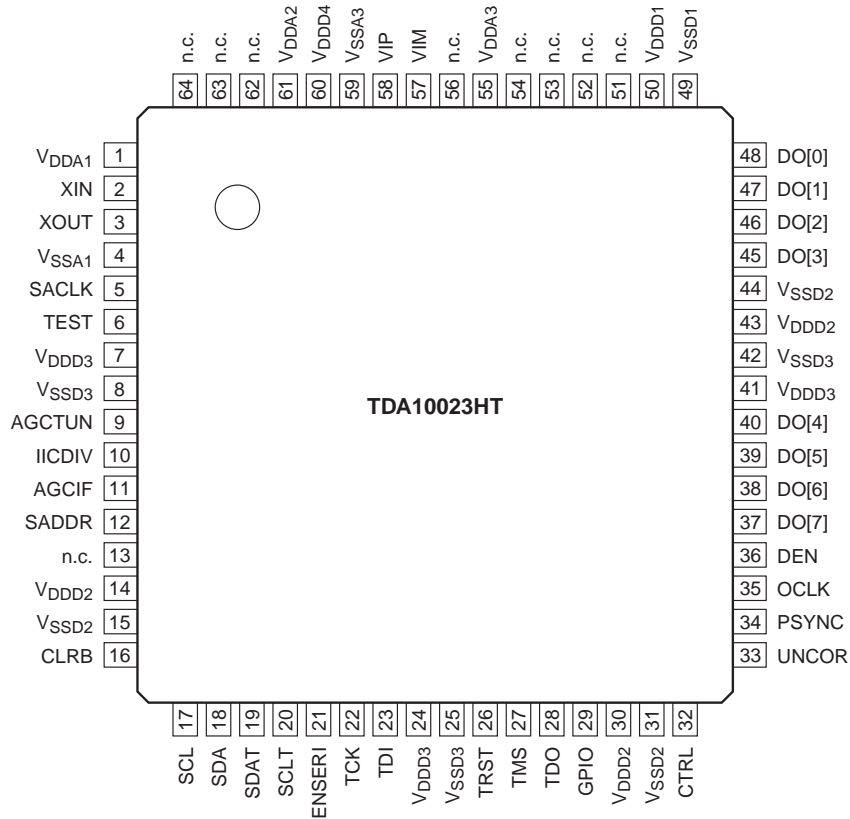
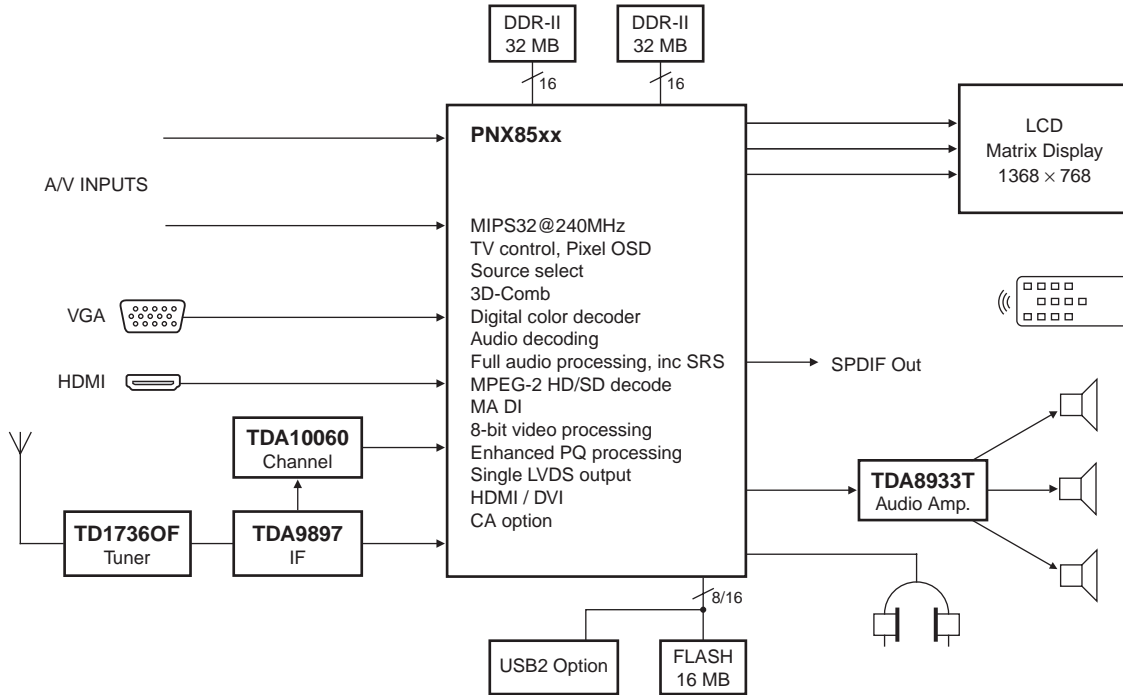


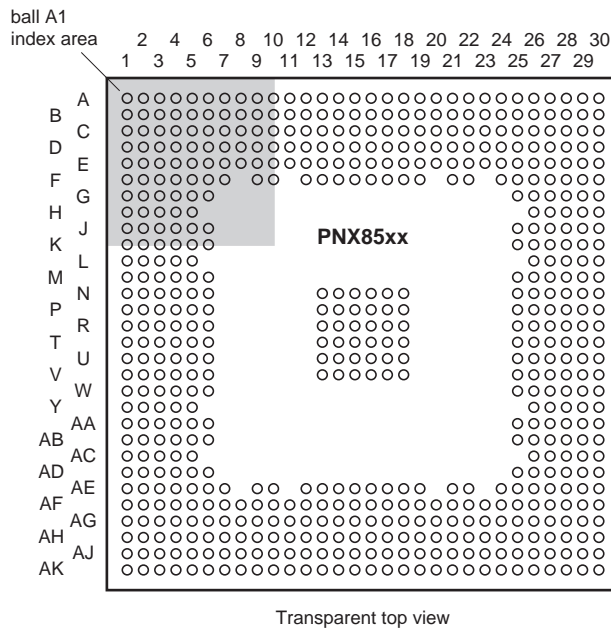
Figure 9-11 Internal block diagram and pin configuration

9.4.6 Diagram B04x, PNX85xx (IC 7H00)

Block Diagram



Pin Configuration

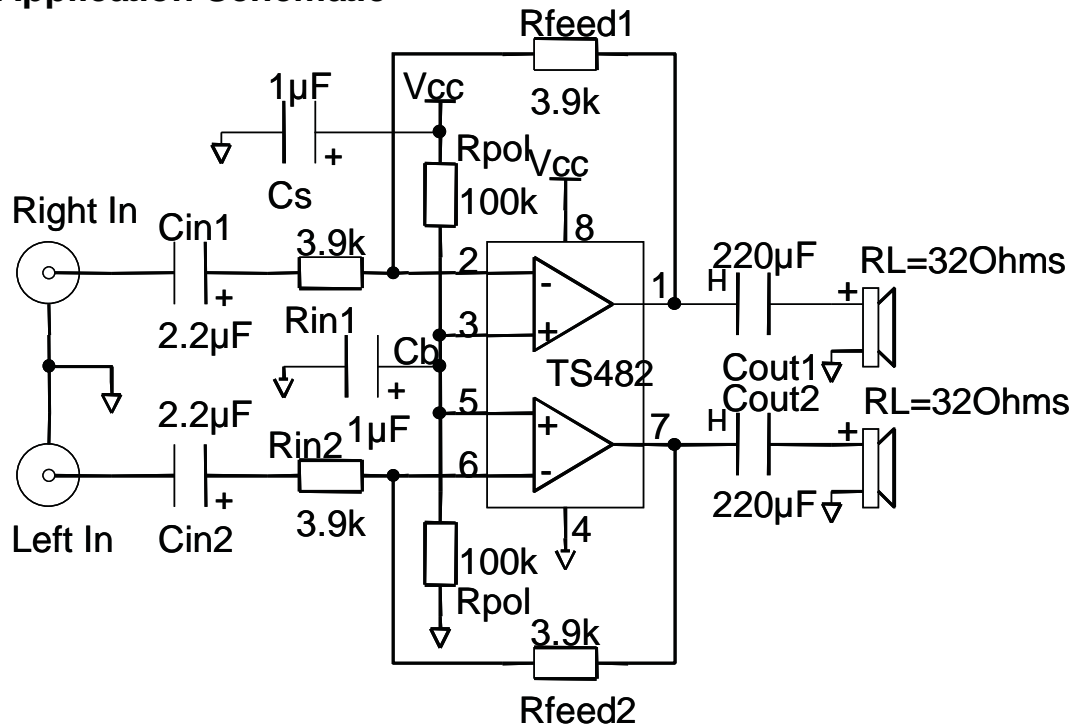


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Figure 9-12 Internal block diagram and pin configuration

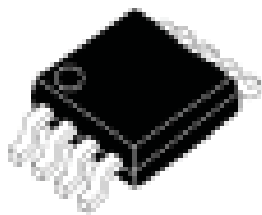
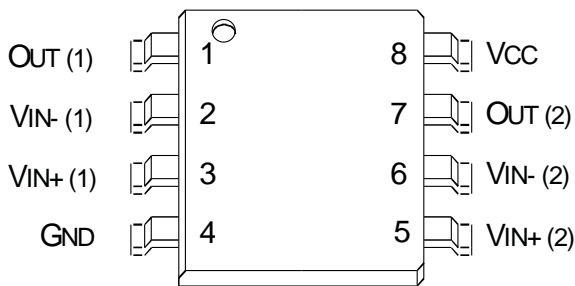
9.4.7 Diagram B04M, TS4821DT (IC 7HV3)

Typical Application Schematic

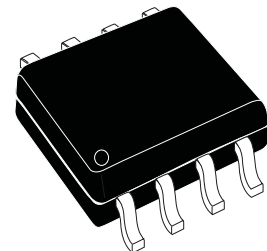
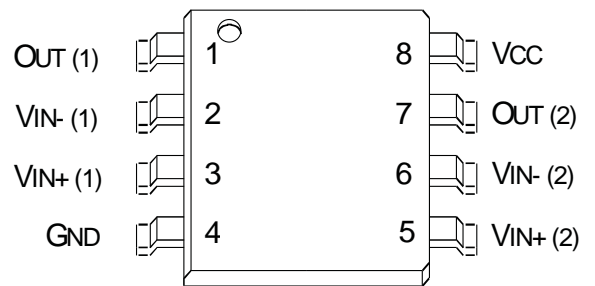


Pin Configuration

TS482IS, TS482IST - MiniSO8



TS482ID, TS482IDT - SO8



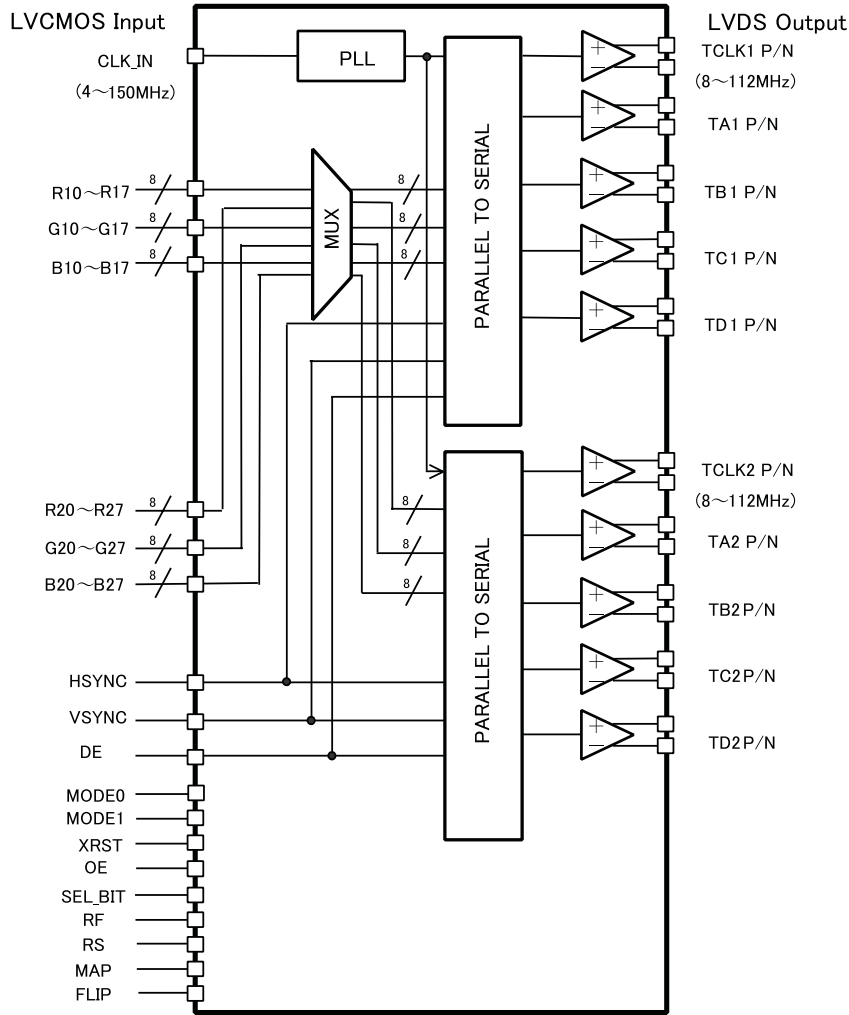
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Figure 9-13 Typical application schematic and pin configuration

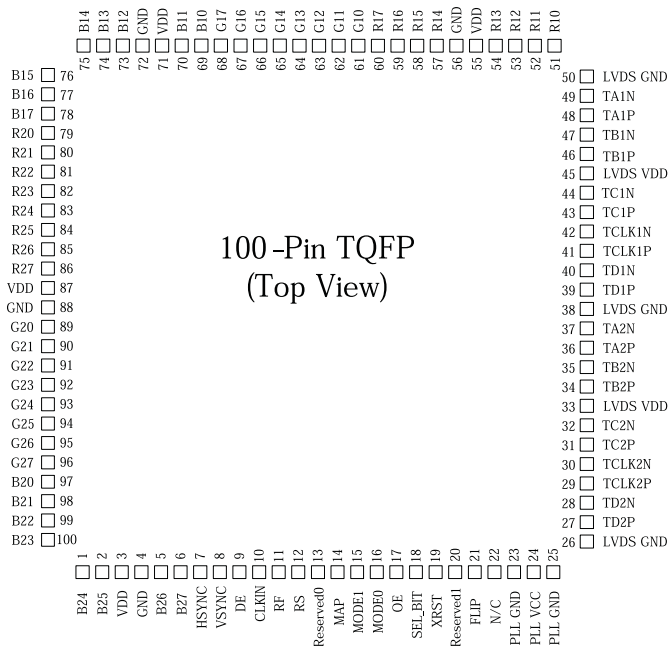


9.4.8 Diagram B05A, BU7988KVT (IC 7CG0)

Block Diagram



Pin Configuration

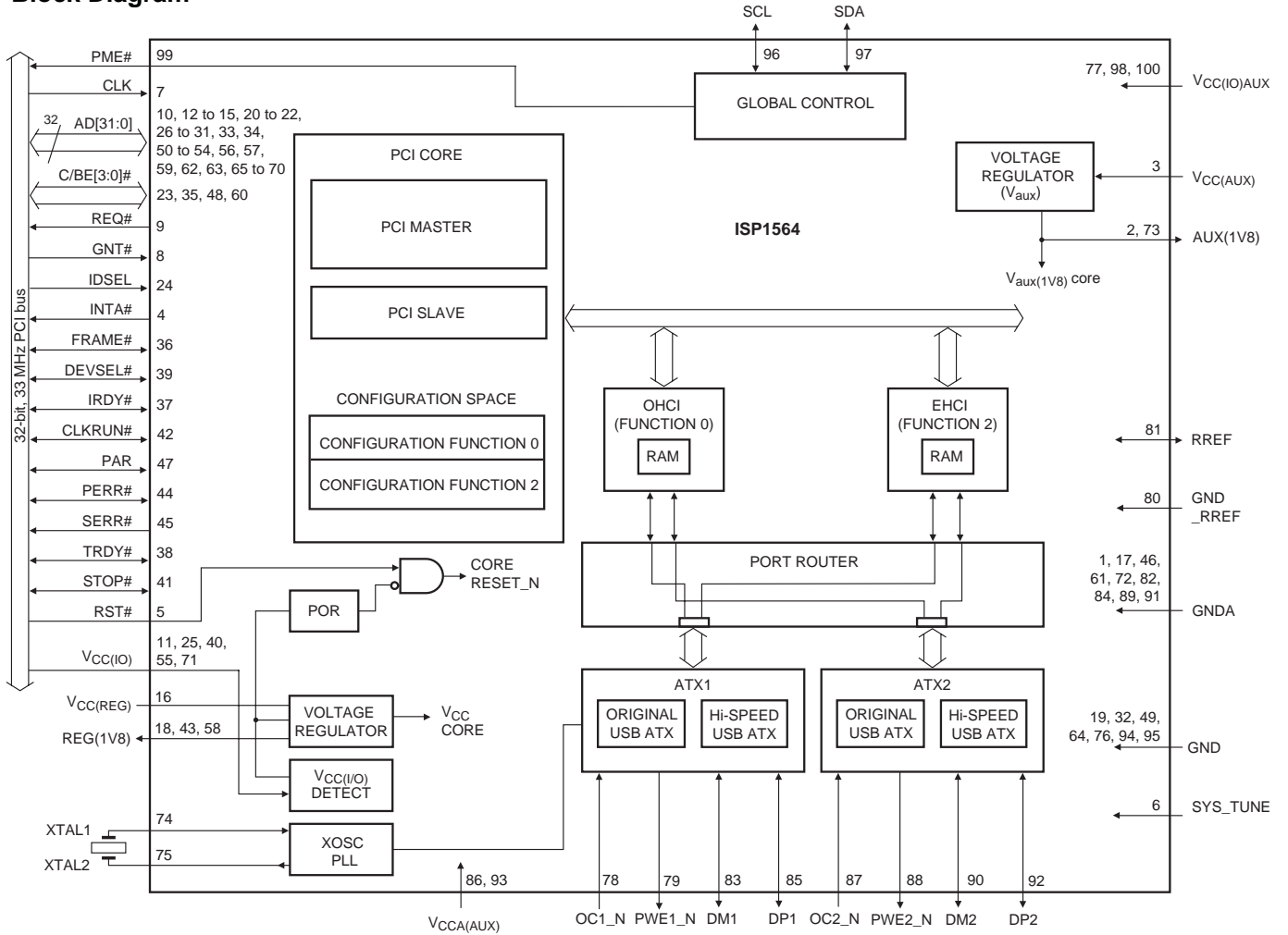


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Figure 9-14 Internal block diagram and pin configuration

9.4.9 Diagram B08A, ISP1564HL (IC 7P00)

Block Diagram



Pin Configuration

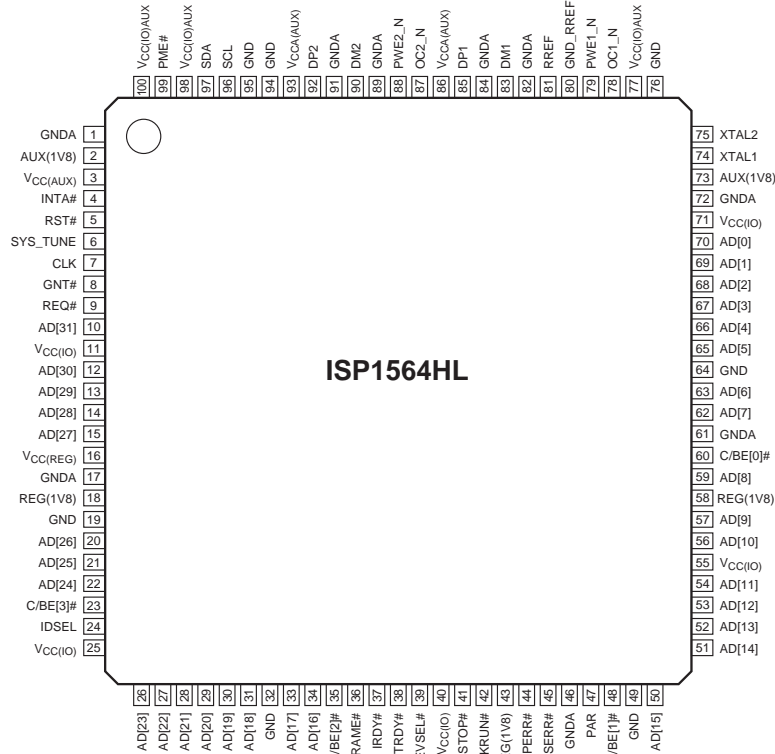


Figure 9-15 Internal block diagram and pin configuration

9.4.10 Diagram B08C, AD8197A (IC 7P70)

Block Diagram

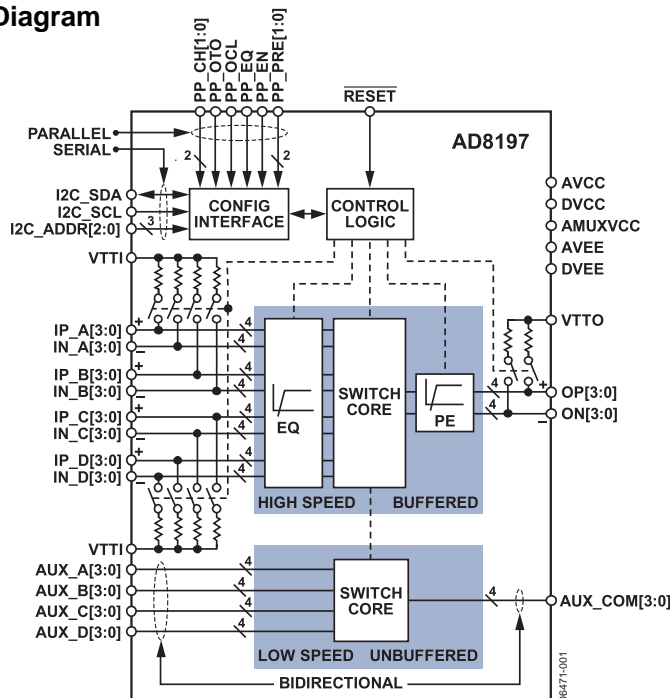
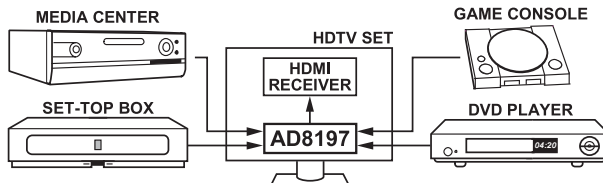
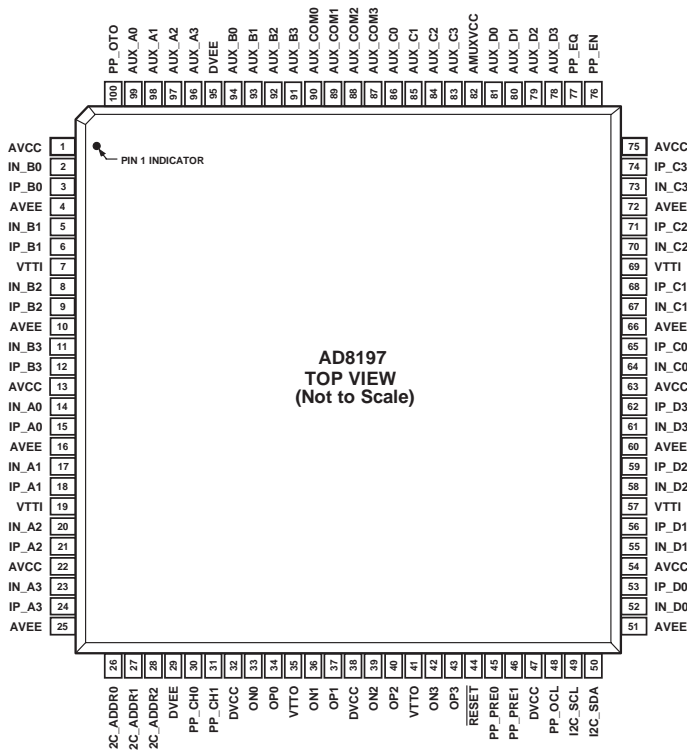


Figure 1.

TYPICAL APPLICATION



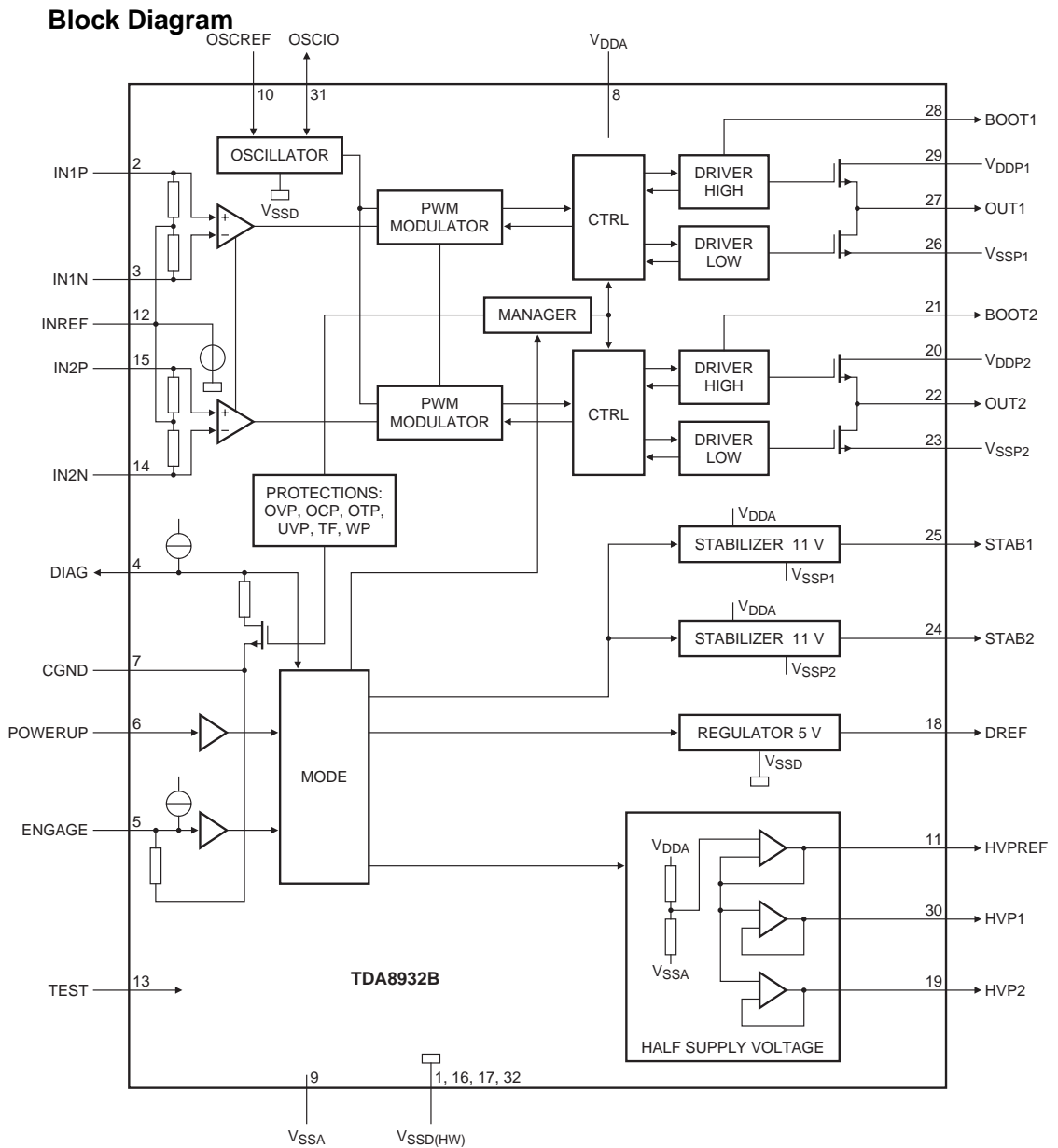
Pin Configuration



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150108

Figure 9-16 Internal block diagram and pin configuration

9.4.11 Diagram B10A, TDA8932B (IC 7D10)



### Pin Configuration

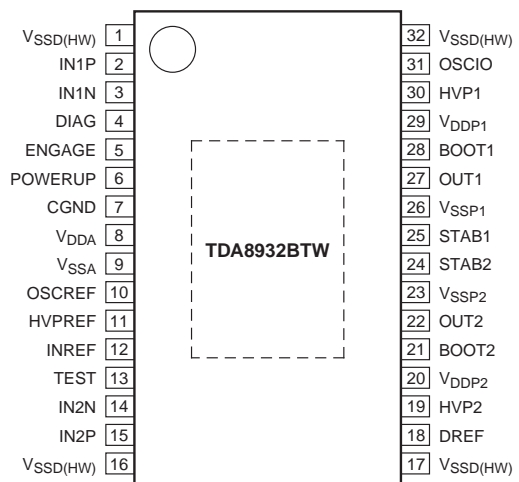
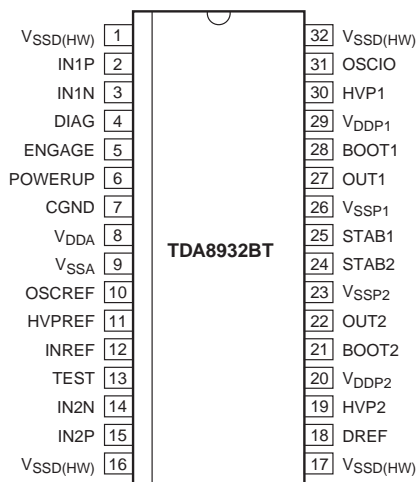


Figure 9-17 Internal block diagram and pin configuration

## 10. Spare Parts List & CTN Overview

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

**Table 10-1 Model numbers described in this manual:**

CTN	Styling	Published in:
32PFL5403D/10	ME8	3122 785 18010
32PFL5403D/12	ME8	3122 785 18010
32PFL5403/60	ME8	3122 785 18012
32PFL5403S/60	ME8	3122 785 18011
37PFL3403D/12	MG8	3122 785 18011
37PFL5603D/10	ME8	3122 785 18011
37PFL5603/60	ME8	3122 785 18012
37PFL5603S/60	ME8	3122 785 18011
42PFL5603D/10	ME8	3122 785 18010
42PFL5603D/12	ME8	3122 785 18010
47PFL5603D/10	ME8	3122 785 18010
47PFL5603/60	ME8	3122 785 18012
47PFL5603S/60	ME8	3122 785 18011

## 11. Revision List

### Manual xxxx xxx xxxx.0

- First release.

### Manual xxxx xxx xxxx.1

- Added the following sets to the manual: See table in chapter 10

### Manual xxxx xxx xxxx.2

- **All Chapters:** Added Russian sets (xxPFLxxxx/60).
- **Chapter 5:** Replaced figure "SSB replacement flowchart".