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Service Manual

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1. Revision List

Manual xxxx xxx xxxx.0

- First release

2. Technical Specs, Diversity, and Connections

Index of this chapter:

- [2.1 Technical Specifications](#)
- [2.2 Directions for Use](#)
- [2.3 Connections \(for 3009D series\)](#)
- [2.4 Connections \(for 5009D series\)](#)
- [2.5 Chassis Overview](#)

Notes:

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

2.1 Technical Specifications

For on-line product support please use the links in [Table 2-1](#). Here is product information available, as well as getting started, user manuals, frequently asked questions and software & drivers.

Table 2-1 Described Model Numbers and Diversity

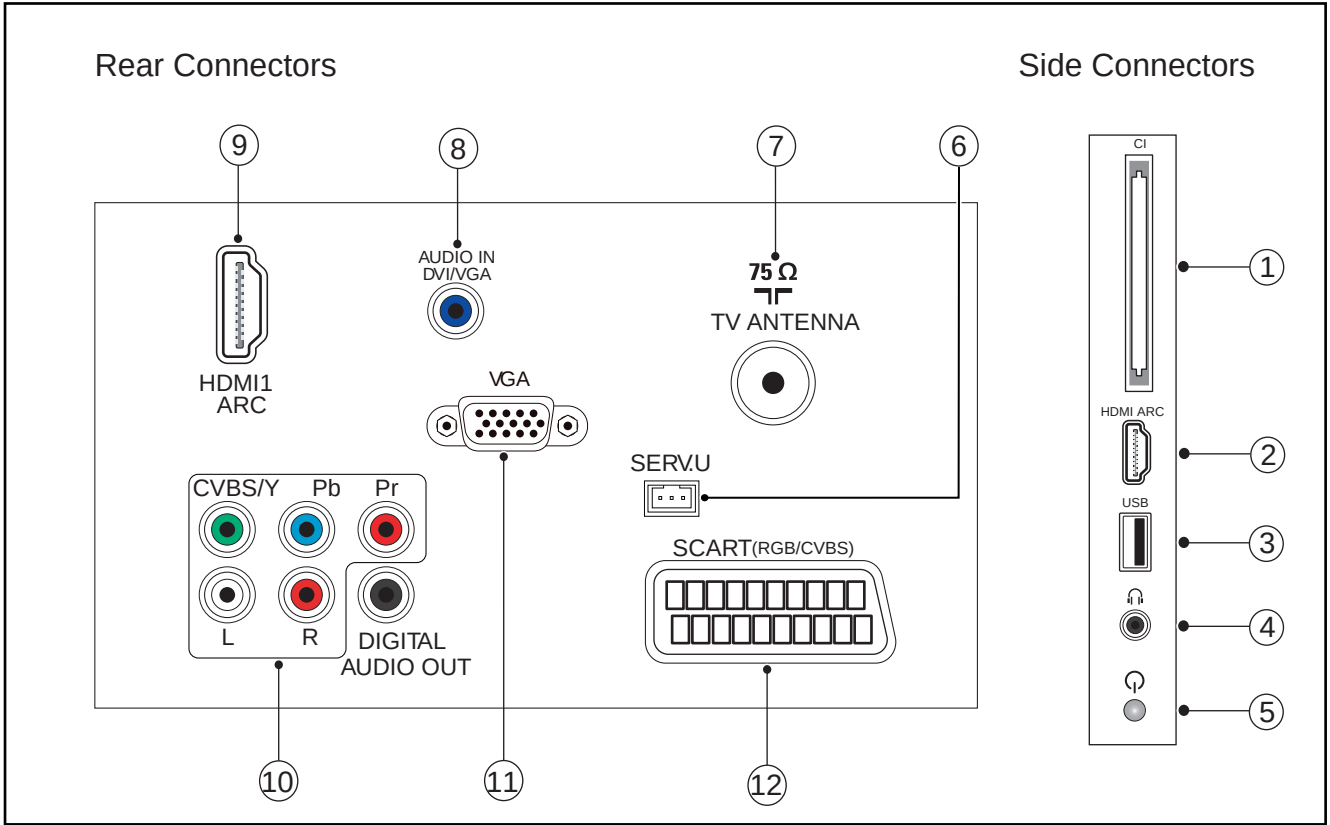
CTN	2	4			9	10					11
	Connection Overview	Mechanics			Block Diagram	Schematics					Styling
		Wire Dressing	Rear Cover Removal	SSB Removal		Power Supply	SSB	J (IR/LED panel)	E (Keyboard/Leading Edge)	HC (BOL T-ON board)	
24HFL3009D/12	2-1	4-1	4-10	4-11	9.1	10.3	10.7	10.8	-	10.11	11.1
28HFL3009D/12	2-1	4-2	4-10	4-11	9.1	10.2	10.7	10.8	-	10.11	11.2
28HFL5009D/12	2-7	4-3	4-12	4-13	9.1	10.2	10.7	10.8	-	10.11	11.3
32HFL3009D/12	2-1	4-4	4-10	4-11	9.1	10.2	10.7	10.9	-	10.11	11.4
32HFL5009D/12	2-7	4-5	4-14	4-15	9.1	10.1	10.7	-	10.10	10.11	11.5
40HFL3009D/12	2-1	4-6	4-16	4-17	9.1	10.5	10.7	10.9	-	10.11	11.6
40HFL5009D/12	2-7	4-7	4-18	4-19	9.1	10.4	10.7	-	10.10	10.11	11.7
48HFL5009D/12	2-7	4-8	4-14	4-15	9.1	10.4	10.7	-	10.10	10.11	11.8
55HFL5009D/12	2-7	4-9	4-18	4-19	9.1	10.6	10.7	-	10.10	10.11	11.9

2.2 Directions for Use

Directions for use can be downloaded from the following websites:

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

2.3 Connections (for 3009D series)



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Figure 2-1 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.

20 - Ground

Gnd



3 - USB 2.0

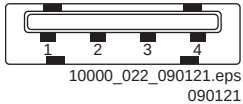


Figure 2-3 USB (type A)

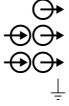
1 - +5V

2 - Data (-)

3 - Data (+)

4 - Ground

Gnd



4 - Head phone (Output)

Bk - Head phone 80 - 600 Ω / 10 mW



5 - Power Button

Turn on/off the TV.

2.3.2 Rear Connections

6 - Service / UART

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



7 - TV ANTENNA - In

Signal input from an antenna, cable or satellite.

8 - Audio - In: Left / Right, VGA

Gn - Audio L/R in 0.5 V_{RMS} / 10 kΩ



2.3.1 Side Connections

1 - Common Interface

68p - See figure [10-7-11](#)



2 - HDMI ARC: Digital Video - In, Digital Audio with ARC - In/Out

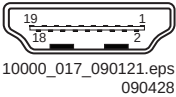


Figure 2-2 HDMI (type A) connector

1 - D2+	Data channel	→
2 - Shield	Gnd	⊥
3 - D2-	Data channel	→
4 - D1+	Data channel	→
5 - Shield	Gnd	⊥
6 - D1-	Data channel	→
7 - D0+	Data channel	→
8 - Shield	Gnd	⊥
9 - D0-	Data channel	→
10 - CLK+	Data channel	→
11 - Shield	Gnd	⊥
12 - CLK-	Data channel	→
13 - Easylink/CEC	Control channel	↔
14 - ARC	Audio Return Channel	→
15 - DDC_SCL	DDC clock	→
16 - DDC_SDA	DDC data	↔
17 - Ground	Gnd	⊥
18 - +5V		→
19 - HPD	Hot Plug Detect	→

9 - HDMI1 ARC: Digital Video - In, Digital Audio with ARC - In/Out

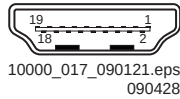


Figure 2-4 HDMI (type A) connector

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	- Easylink/CEC	Control channel	⊕⊕
14	- ARC	Audio Return Channel	⊕
15	- DDC_SCL	DDC clock	⊕
16	- DDC_SDA	DDC data	⊕⊕
17	- Ground	Gnd	⊥
18	- +5V		⊕
19	- HPD	Hot Plug Detect	⊕
20	- Ground	Gnd	⊥

4	- Ground Audio	Gnd	⊥
5	- Ground Blue	Gnd	⊥
6	- Audio L	$0.5 V_{RMS} / 10 k\Omega$	⊕
7	- Video Blue/C-out	$0.7 V_{PP} / 75 \Omega$	⊕⊕
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	$0.7 V_{PP} / 75 \Omega$	⊕
12	- n.c.		
13	- Ground Red	Gnd	⊥
14	- Ground P50	Gnd	⊥
15	- Video Red/C	$0.7 V_{PP} / 75 \Omega$	⊕
16	- Status/FBL	0 - 0.4 V: INT 1 - 3 V: EXT / 75 Ω	⊕
17	- Ground Video	Gnd	⊥
18	- Ground FBL	Gnd	⊥
19	- Video CVBS	$1 V_{PP} / 75 \Omega$	⊕
20	- Video CVBS/Y	$1 V_{PP} / 75 \Omega$	⊕
21	- Shield	Gnd	⊥

10 - Cinch: Video YPbPr - In, Audio - In

Gn	- Video - Y	$1 V_{PP} / 75 \Omega$	⊕⊕⊕
Bu	- Video - Pb	$0.7 V_{PP} / 75 \Omega$	⊕⊕⊕
Rd	- Video - Pr	$0.7 V_{PP} / 75 \Omega$	⊕⊕⊕
Wh	- Audio - L	$0.5 V_{RMS} / 10 k\Omega$	⊕⊕⊕
Rd	- Audio - R	$0.5 V_{RMS} / 10 k\Omega$	⊕⊕⊕

11 - PC IN:VGA

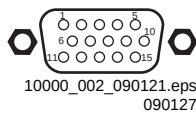


Figure 2-5 VGA connector

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

12 - SCART: Video RGB/YC - In, CVBS - In/Out, Audio - In/Out

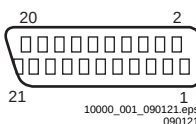
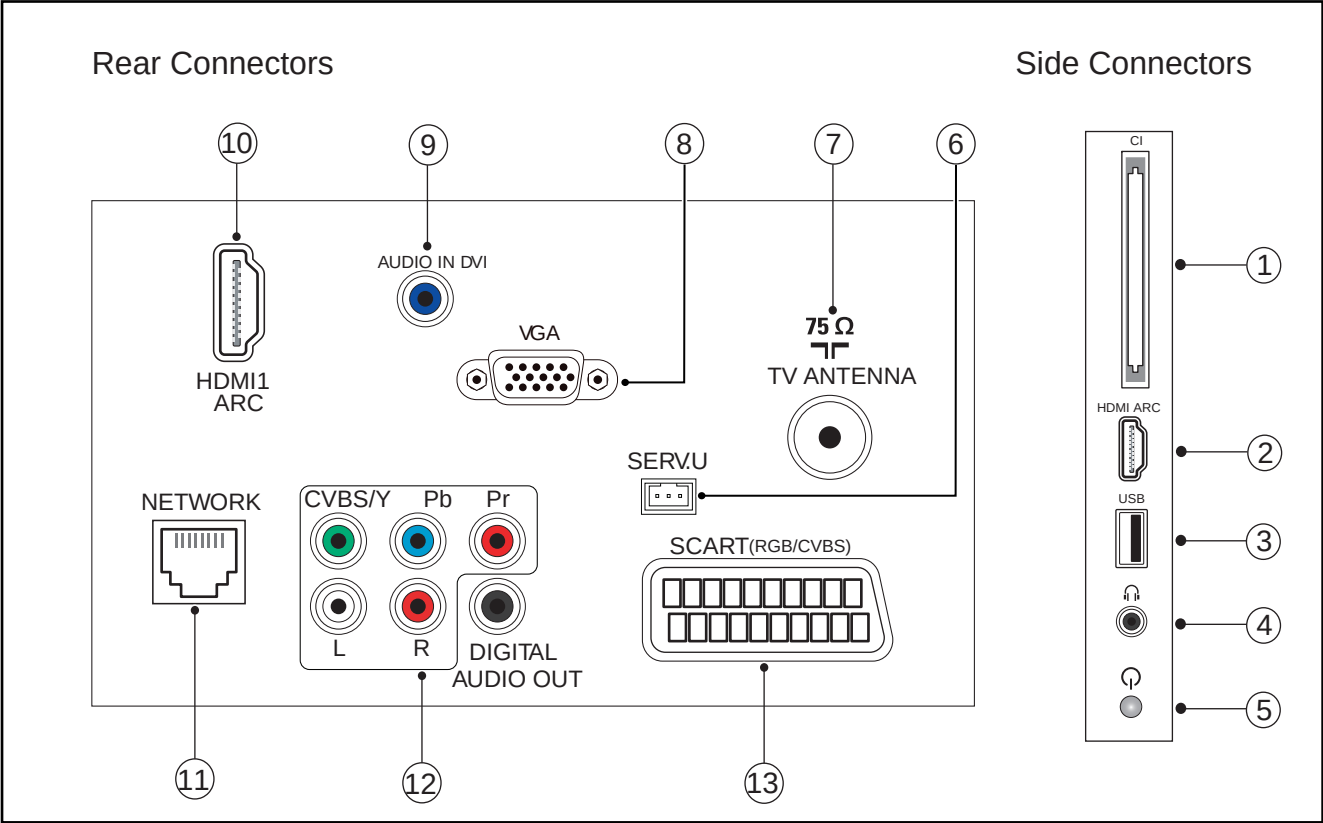


Figure 2-6 SCART connector

1	- Audio R	$0.5 V_{RMS} / 1 k\Omega$	⊕
2	- Audio R	$0.5 V_{RMS} / 10 k\Omega$	⊕
3	- Audio L	$0.5 V_{RMS} / 1 k\Omega$	⊕

2.4 Connections (for 5009D series)



19680_002.eps

Figure 2-7 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.

20 - Ground

Gnd

3 - USB 2.0

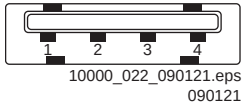


Figure 2-9 USB (type A)

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

Gnd

4 - Head phone (Output)

Bk - Head phone 80 - 600 Ω / 10 mW

5 - Power Button

Turn on/off the TV.

2.4.2 Rear Connections

6 - Service / UART

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

7 - TV ANTENNA - In

Signal input from an antenna, cable or satellite.

2.4.1 Side Connections

1 - Common Interface

68p - See figure 10-7-11



2 - HDMI ARC: Digital Video - In, Digital Audio with ARC - In/Out

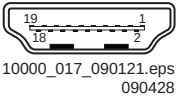
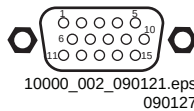


Figure 2-8 HDMI (type A) connector

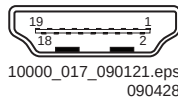
- | | | |
|-------------------|----------------------|---|
| 1 - D2+ | Data channel | ⊕ |
| 2 - Shield | Gnd | ⊕ |
| 3 - D2- | Data channel | ⊕ |
| 4 - D1+ | Data channel | ⊕ |
| 5 - Shield | Gnd | ⊕ |
| 6 - D1- | Data channel | ⊕ |
| 7 - D0+ | Data channel | ⊕ |
| 8 - Shield | Gnd | ⊕ |
| 9 - D0- | Data channel | ⊕ |
| 10 - CLK+ | Data channel | ⊕ |
| 11 - Shield | Gnd | ⊕ |
| 12 - CLK- | Data channel | ⊕ |
| 13 - Easylink/CEC | Control channel | ⊕ |
| 14 - ARC | Audio Return Channel | ⊕ |
| 15 - DDC_SCL | DDC clock | ⊕ |
| 16 - DDC_SDA | DDC data | ⊕ |
| 17 - Ground | Gnd | ⊕ |
| 18 - +5V | | ⊕ |
| 19 - HPD | Hot Plug Detect | ⊕ |

8 - PC IN:VGA**Figure 2-10 VGA connector**

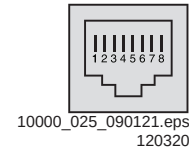
1	- Video Red	0.7 V _{PP} / 75 W	⊕
2	- Video Green	0.7 V _{PP} / 75 W	⊕
3	- Video Blue	0.7 V _{PP} / 75 W	⊕
4	- n.c.		
5	- Ground	Gnd	⊥
6	- Ground Red	Gnd	⊥
7	- Ground Green	Gnd	⊥
8	- Ground Blue	Gnd	⊥
9	- +5V _{DC}	+5 V	⊕
10	- Ground Sync	Gnd	⊥
11	- Ground Red	Gnd	⊥
12	- DDC_SDA	DDC data	⊕
13	- H-sync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

9 - Audio - In: Left / Right, VGA

Gn	- Audio L/R in	0.5 V _{RMS} / 10 kΩ	⊕⊖
----	----------------	------------------------------	----

10 - HDMI 1: Digital Video - In, Digital Audio with ARC - In/Out**Figure 2-11 HDMI (type A) connector**

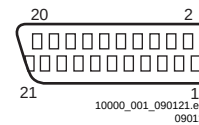
1	- D2+	Data channel	⊕
2	- Shield	Gnd	⊥
3	- D2-	Data channel	⊕
4	- D1+	Data channel	⊕
5	- Shield	Gnd	⊥
6	- D1-	Data channel	⊕
7	- D0+	Data channel	⊕
8	- Shield	Gnd	⊥
9	- D0-	Data channel	⊕
10	- CLK+	Data channel	⊕
11	- Shield	Gnd	⊥
12	- CLK-	Data channel	⊕
13	- Easylink/CEC	Control channel	⊕⊖
14	- ARC	Audio Return Channel	⊕
15	- DDC_SCL	DDC clock	⊕
16	- DDC_SDA	DDC data	⊕⊖
17	- Ground	Gnd	⊥
18	- +5V		⊕
19	- HPD	Hot Plug Detect	⊕
20	- Ground	Gnd	⊥

11 - RJ45: Ethernet**Figure 2-12 Ethernet connector**

1	- TD+	Transmit signal	⊕
2	- TD-	Transmit signal	⊕
3	- RD+	Receive signal	⊕
4	- CT	Centre Tap: DC level fixation	
5	- CT	Centre Tap: DC level fixation	
6	- RD-	Receive signal	⊕
7	- GND	Gnd	⊥
8	- GND	Gnd	⊥

12 - Cinch: Video YPbPr - In, Audio - In

Gn	- Video - Y	1 V _{PP} / 75 W	⊕⊖
Bu	- Video - Pb	0.7 V _{PP} / 75 Ω	⊕⊖
Rd	- Video - Pr	0.7 V _{PP} / 75 Ω	⊕⊖
Wh	- Audio - L	0.5 V _{RMS} / 10 kΩ	⊕⊖
Rd	- Audio - R	0.5 V _{RMS} / 10 kΩ	⊕⊖

13 - SCART: Video RGB/YC - In, CVBS - In/Out, Audio - In/Out**Figure 2-13 SCART connector**

1	- Audio R	0.5 V _{RMS} / 1 kΩ	⊕
2	- Audio R	0.5 V _{RMS} / 10 kΩ	⊕
3	- Audio L	0.5 V _{RMS} / 1 kΩ	⊕
4	- Ground Audio	Gnd	⊥
5	- Ground Blue	Gnd	⊥
6	- Audio L	0.5 V _{RMS} / 10 kΩ	⊕
7	- Video Blue/C-out	0.7 V _{PP} / 75 Ω	⊕⊖
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 _{PP} / 75 Ω	⊕
12	- n.c.		
13	- Ground Red	Gnd	⊥
14	- Ground P50	Gnd	⊥
15	- Video Red/C	0.7 V _{PP} / 75 Ω	⊕
16	- Status/FBL	0 - 0.4 V: INT 1 - 3 V: EXT / 75 Ω	⊕
17	- Ground Video	Gnd	⊥
18	- Ground FBL	Gnd	⊥
19	- Video CVBS	1 V _{PP} / 75 Ω	⊕
20	- Video CVBS/Y	1 V _{PP} / 75 Ω	⊕
21	- Shield	Gnd	⊥

2.5 Chassis Overview

Refer to [9. Block Diagrams](#) for PWB/CBA locations.

3. Precautions, Notes, and Abbreviation List

Index of this chapter:

- [3.1 Safety Instructions](#)
- [3.2 Warnings](#)
- [3.3 Notes](#)
- [3.4 Abbreviation List](#)

3.1 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.

3.2 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.

3.3 Notes

3.3.1 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 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.

3.3.2 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 on the Philips Spare Parts Web Portal.

3.3.3 Spare Parts

For the latest spare part overview, consult your Philips Spare Part web portal.

3.3.4 BGA (Ball Grid Array) ICs

Introduction

For more information on how to handle BGA devices, visit this URL: <http://www.atyourservice-magazine.com>. 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. Where applicable and available, this profile is added to the IC Data Sheet information section in this manual.

3.3.5 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. 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.

3.3.6 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: AG1B033500001), then the TV set has been manufactured according to B.O.M. number 1. If the third digit is a "2" (example: AG2B033500001), 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: $9 \text{ plus } 26 = 35$ 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. SN is Lysomice, RJ is Kobierzyce), 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 2010 week 10 / 2010 week 17). The 6 last digits contain the serial number.



Figure 3-1 Serial number (example)

3.3.7 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!

3.3.8 Practical Service Precautions

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

3.4 Abbreviation List

0/6/12	SCART switch control signal on A/V board. 0 = loop through (AUX to TV),
DNR	Digital Noise Reduction: noise

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
AP	Asia Pacific
AR	Aspect Ratio: 4 by 3 or 16 by 9
ASF	Auto Screen Fit: algorithm that adapts aspect ratio to remove horizontal black bars without discarding video information
ATSC	Advanced Television Systems Committee, the digital TV standard in the USA
ATV	See Auto TV
Auto TV	A hardware and software control system that measures picture content, and adapts image parameters in a dynamic way
AV	External Audio Video
AVC	Audio Video Controller
AVIP	Audio Video Input Processor
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz
BDS	Business Display Solutions (iTV)
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	Color Transient Improvement: manipulates steepness of chroma transients
CVBS	Composite Video Blanking and Synchronization
DAC	Digital to Analogue Converter
DBE	Dynamic Bass Enhancement: extra low frequency amplification
DCM	Data Communication Module. Also referred to as System Card or Smartcard (for iTV).
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
DSMD	Digital Multi Standard Decoding
DNM	Digital Natural Motion reduction feature of the set

DRAM	Dynamic RAM		a maximum data rate of 270 Mbit/s, with a minimum bandwidth of 135 MHz.
DRM	Digital Rights Management		
DSP	Digital Signal Processing		
DST	Dealer Service Tool: special remote control designed for service technicians	iTV	Institutional TeleVision; TV sets for hotels, hospitals etc.
		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
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	LATAM	Latin America
DVB-T	Digital Video Broadcast - Terrestrial	LCD	Liquid Crystal Display
DVD	Digital Versatile Disc	LED	Light Emitting Diode
DVI(-d)	Digital Visual Interface (d= digital only)	L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I
E-DDC	Enhanced Display Data Channel (VESA standard for communication channel and display). Using E-DDC, the video source can read the EDID information from the display.	LPL	LG.Philips LCD (supplier)
		LS	Loudspeaker
		LVDS	Low Voltage Differential Signalling
EDID	Extended Display Identification Data (VESA standard)	Mbps	Mega bits per second
		M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz
EEPROM	Electrically Erasable and Programmable Read Only Memory	MHEG	Part of a set of international standards related to the presentation of multimedia information, standardised by the Multimedia and Hypermedia Experts Group. It is commonly used as a language to describe interactive television services
EMI	Electro Magnetic Interference		
EPG	Electronic Program Guide		
EPLD	Erasable Programmable Logic Device		
EU	Europe		
EXT	EXternal (source), entering the set by SCART or by cinches (jacks)		
FDS	Full Dual Screen (same as FDW)	MIPS	Microprocessor without Interlocked Pipeline-Stages; A RISC-based microprocessor
FDW	Full Dual Window (same as FDS)		
FLASH	FLASH memory		
FM	Field Memory or Frequency Modulation	MOP	Matrix Output Processor
		MOSFET	Metal Oxide Silicon Field Effect Transistor, switching device
FPGA	Field-Programmable Gate Array		
FTV	Flat TeleVision	MPEG	Motion Pictures Experts Group
Gb/s	Giga bits per second	MPIF	Multi Platform InterFace
G-TXT	Green TeleteXT	MUTE	MUTE Line
H	H_sync to the module	MTV	Mainstream TV: TV-mode with Consumer TV features enabled (iTV)
HD	High Definition		
HDD	Hard Disk Drive	NC	Not Connected
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.	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. Color system mainly used in North America and Japan. Color carrier NTSC M/N= 3.579545 MHz, NTSC 4.43= 4.433619 MHz (this is a VCR norm, it is not transmitted off-air)
		NVM	Non-Volatile Memory: IC containing TV related data such as alignments
HDMI	High Definition Multimedia Interface		
HP	HeadPhone	O/C	Open Circuit
I	Monochrome TV system. Sound carrier distance is 6.0 MHz	OSD	On Screen Display
		OAD	Over the Air Download. Method of software upgrade via RF transmission. Upgrade software is broadcasted in TS with TV channels.
I ² C	Inter IC bus		
I ² D	Inter IC Data bus		
I ² S	Inter IC Sound bus		
IF	Intermediate Frequency	OTC	On screen display Teletext and Control; also called Artistic (SAA5800)
IR	Infra Red		
IRQ	Interrupt Request	P50	Project 50: communication protocol between TV and peripherals
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.	PAL	Phase Alternating Line. Color 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)
	Uncompressed digital component or digital composite signals can be used. The SDI signal is self-synchronizing, uses 8 bit or 10 bit data words, and has	PCB	Printed Circuit Board (same as "PWB")
		PCM	Pulse Code Modulation
		PDP	Plasma Display Panel

PFC	Power Factor Corrector (or Pre-conditioner)	SXGA	1280 × 1024
PIP	Picture In Picture	TFT	Thin Film Transistor
PLL	Phase Locked Loop. Used for e.g. FST tuning systems. The customer can give directly the desired frequency	THD	Total Harmonic Distortion
POD	Point Of Deployment: a removable CAM module, implementing the CA system for a host (e.g. a TV-set)	TMD5	Transmission Minimized Differential Signalling
POR	Power On Reset, signal to reset the uP	TS	Transport Stream
PSDL	Power Supply for Direct view LED backlight with 2D-dimming	TXT	TeleteXT
PSL	Power Supply with integrated LED drivers	TXT-DW	Dual Window with TeleteXT
PSLS	Power Supply with integrated LED drivers with added Scanning functionality	UI	User Interface
PTC	Positive Temperature Coefficient, non-linear resistor	uP	Microprocessor
PWB	Printed Wiring Board (same as "PCB")	UXGA	1600 × 1200 (4:3)
PWM	Pulse Width Modulation	V	V-sync to the module
QRC	Quasi Resonant Converter	VESA	Video Electronics Standards Association
QTNR	Quality Temporal Noise Reduction	VGA	640 × 480 (4:3)
QVCP	Quality Video Composition Processor	VL	Variable Level out: processed audio output toward external amplifier
RAM	Random Access Memory	VSF	Vestigial Side Band; modulation method
RGB	Red, Green, and Blue. The primary color signals for TV. By mixing levels of R, G, and B, all colors (Y/C) are reproduced.	WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
RC	Remote Control	WXGA	1280 × 768 (15:9)
RC5 / RC6	Signal protocol from the remote control receiver	XTAL	Quartz crystal
RESET	RESET signal	XGA	1024 × 768 (4:3)
ROM	Read Only Memory	Y	Luminance signal
RSDS	Reduced Swing Differential Signalling data interface	Y/C	Luminance (Y) and Chrominance (C) signal
R-TXT	Red TeleteXT	YPbPr	Component video. Luminance and scaled color difference signals (B-Y and R-Y)
SAM	Service Alignment Mode	YUV	Component video
S/C	Short Circuit		
SCART	Syndicat des Constructeurs d'Appareils Radiorécepteurs et Téléviseurs		
SCL	Serial Clock I ² C		
SCL-F	CLock Signal on Fast I ² C bus		
SD	Standard Definition		
SDA	Serial Data I ² C		
SDA-F	DAta Signal on Fast I ² C bus		
SDI	Serial Digital Interface, see "ITU-656"		
SDRAM	Synchronous DRAM		
SECAM	SEquence Couleur Avec Mémoire. 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		
SPI	Serial Peripheral Interface bus; a 4-wire synchronous serial data link standard		
S/PDIF	Sony Philips Digital InterFace		
SRAM	Static RAM		
SRP	Service Reference Protocol		
SSB	Small Signal Board		
SSC	Spread Spectrum Clocking, used to reduce the effects of EMI		
STB	Set Top Box		
STBY	STand-BY		
SVGA	800 × 600 (4:3)		
SVHS	Super Video Home System		
SW	Software		
SWAN	Spatial temporal Weighted Averaging Noise reduction		

4. Mechanical Instructions

Index of this chapter:

[4.1 Cable Dressing](#)

[4.2 Service Positions](#)

[4.3 Assembly/Panel Removal\(for 24"/28"/32" 3009D series\)](#)

[4.4 Assembly/Panel Removal\(for 28" 5009D series\)](#)

[4.5 Assembly/Panel Removal\(for 32"/48" 5009D series\)](#)

[4.6 Assembly/Panel Removal\(for 40" 3009D series\)](#)

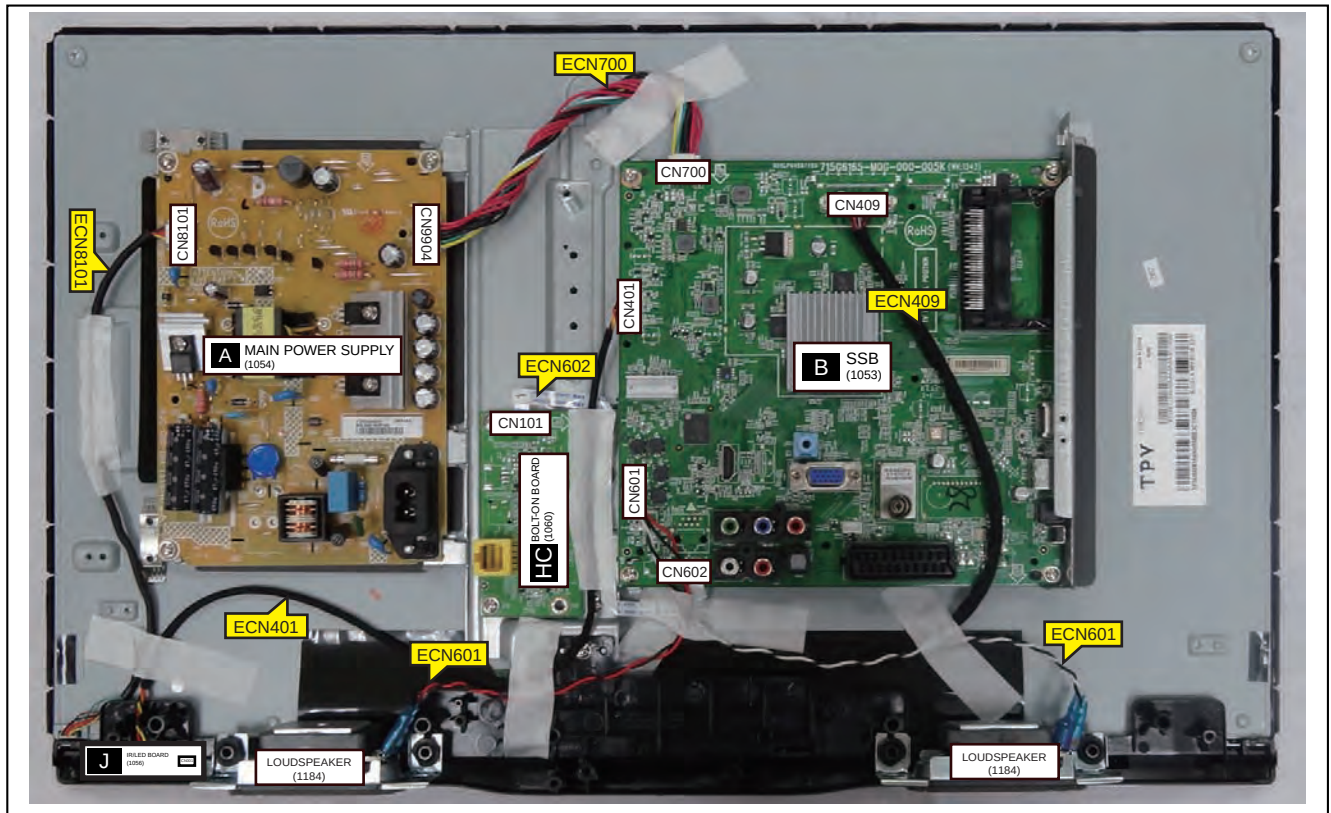
[4.7 Assembly/Panel Removal\(for 40"/55" 5009D series\)](#)

[4.8 Set Re-assembly](#)

Notes:

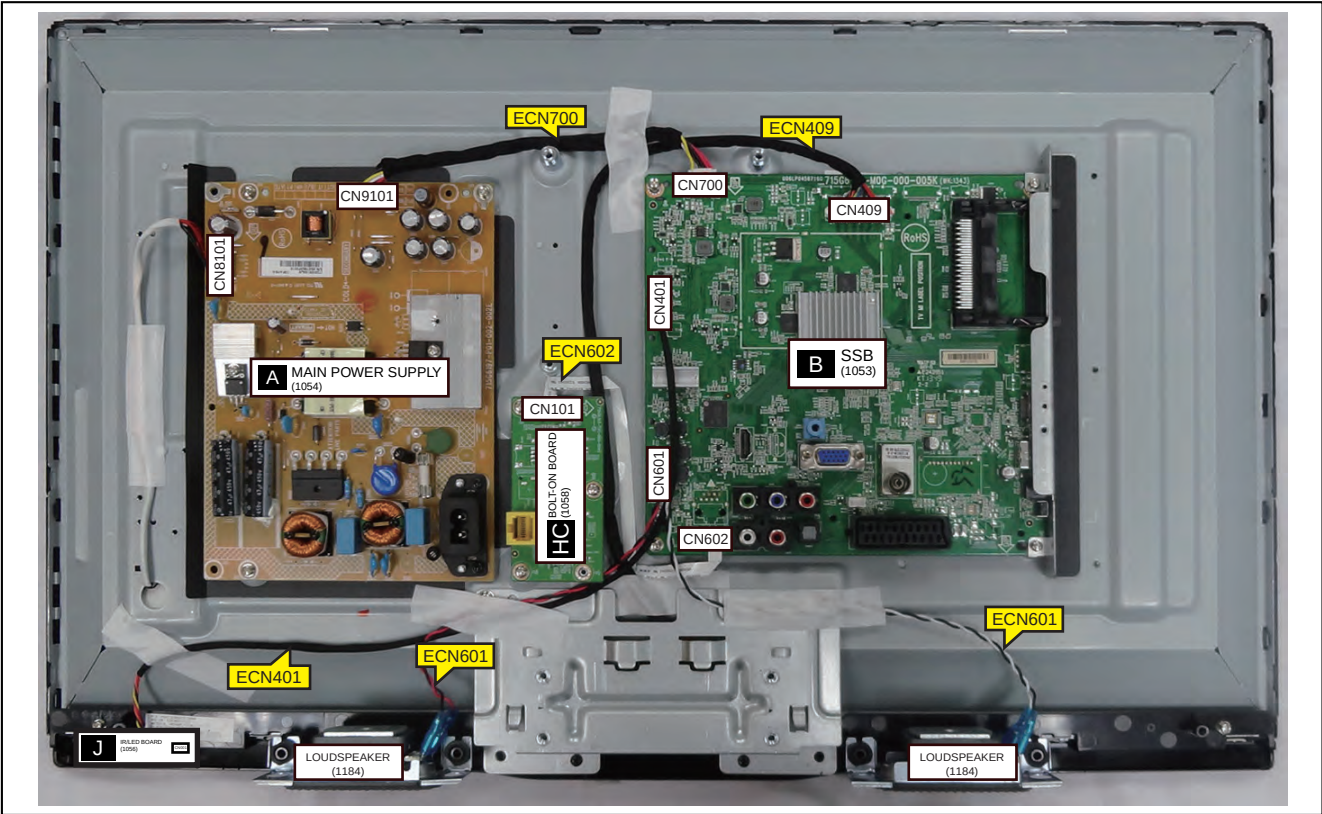
- Figures below can deviate slightly from the actual situation, due to the different set executions.

4.1 Cable Dressing



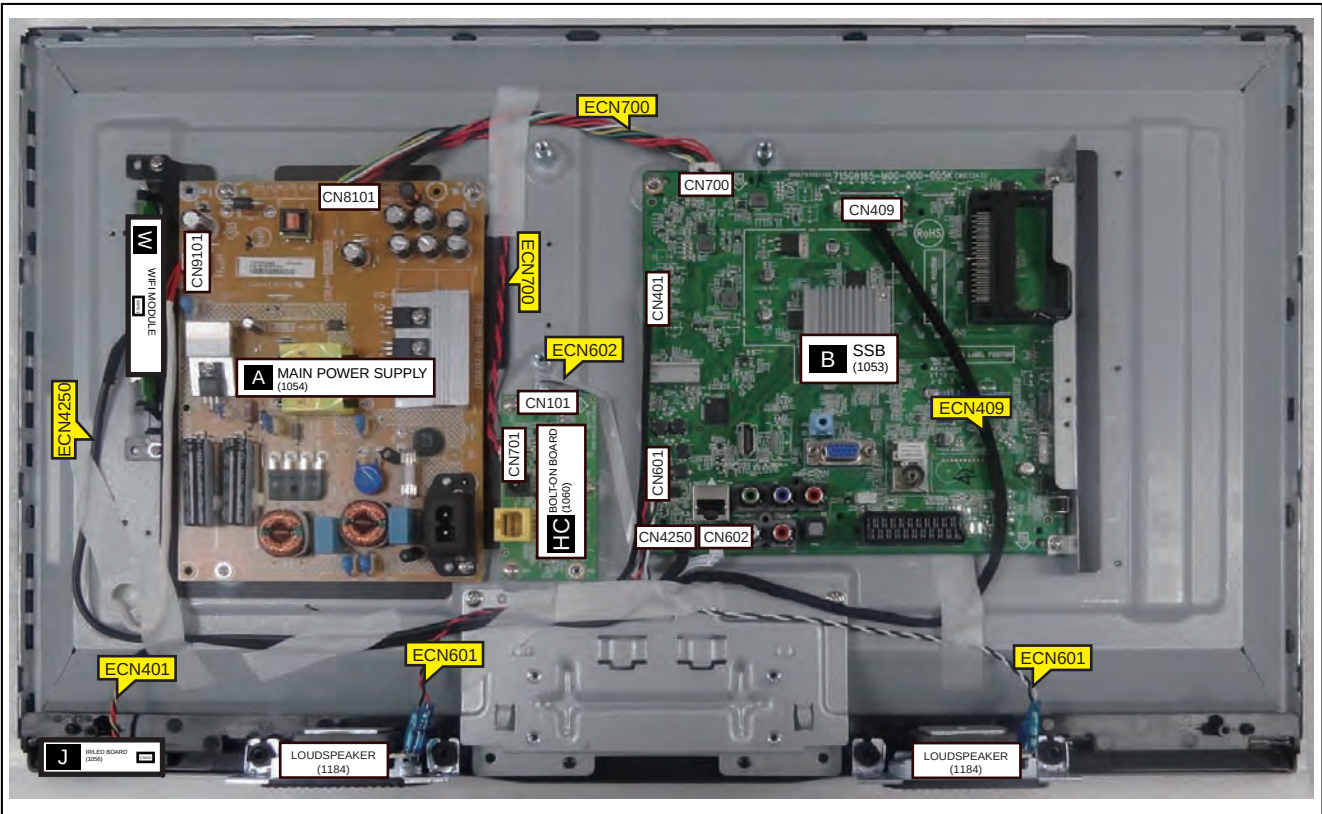
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Figure 4-1 Cable dressing (24" 3009D series)



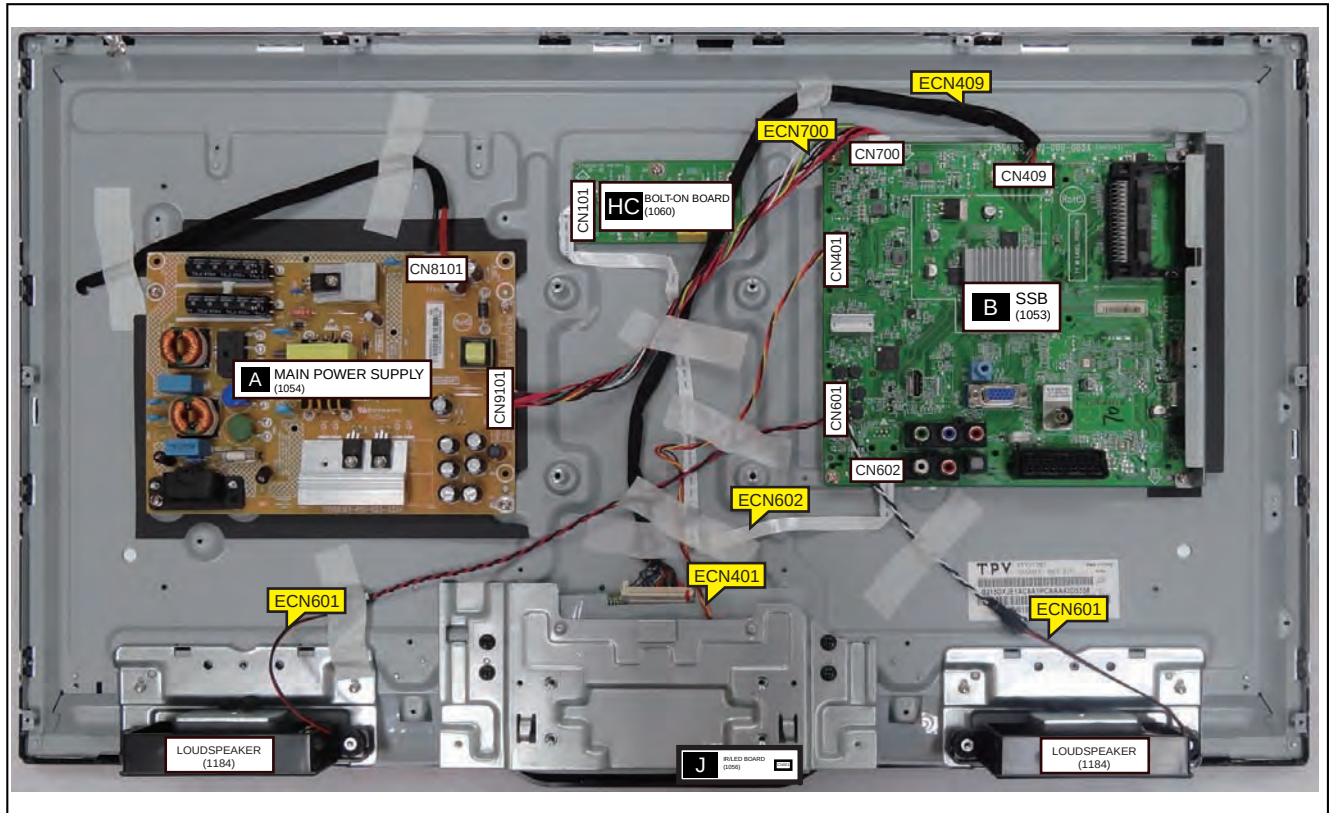
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Figure 4-2 Cable dressing (28" 3009D series)



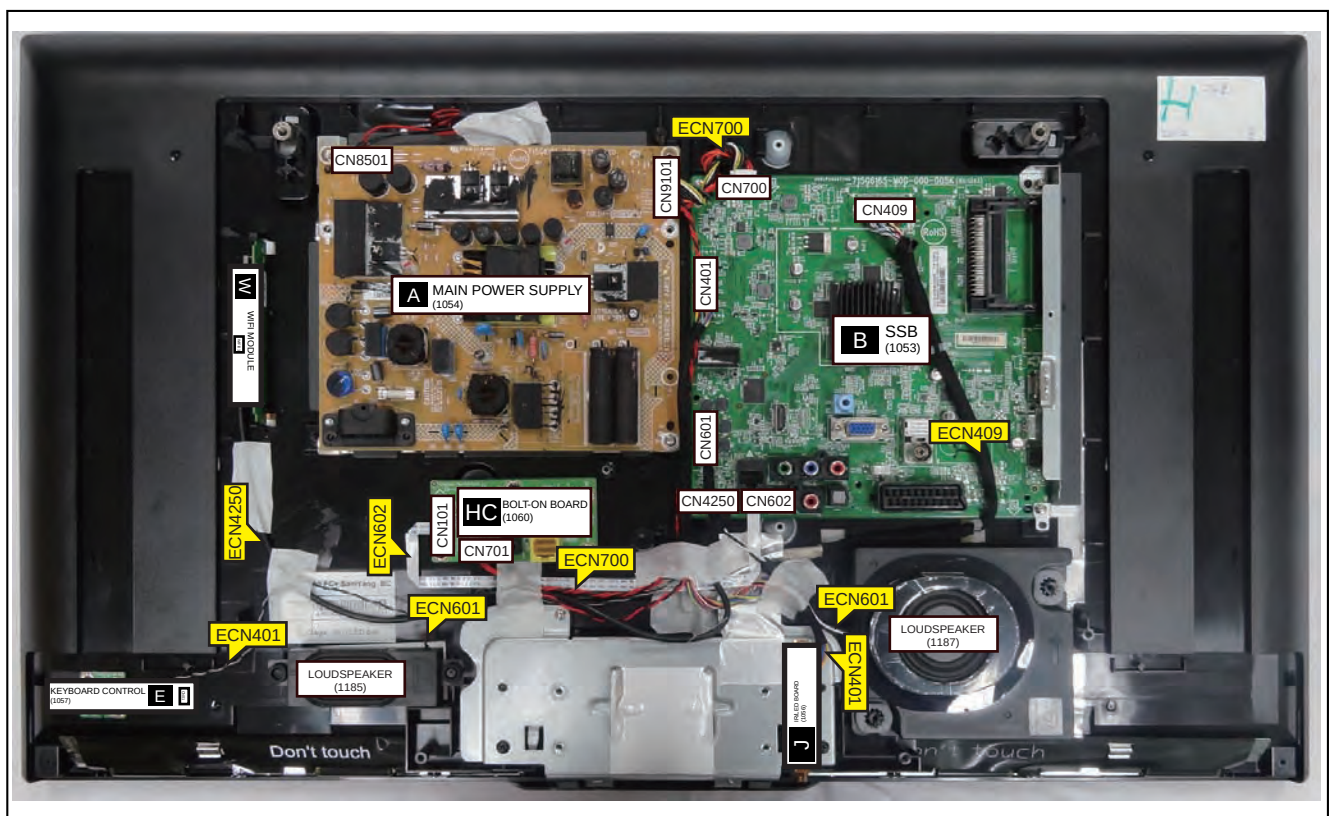
19680_102.eps

Figure 4-3 Cable dressing (28" 5009D series)



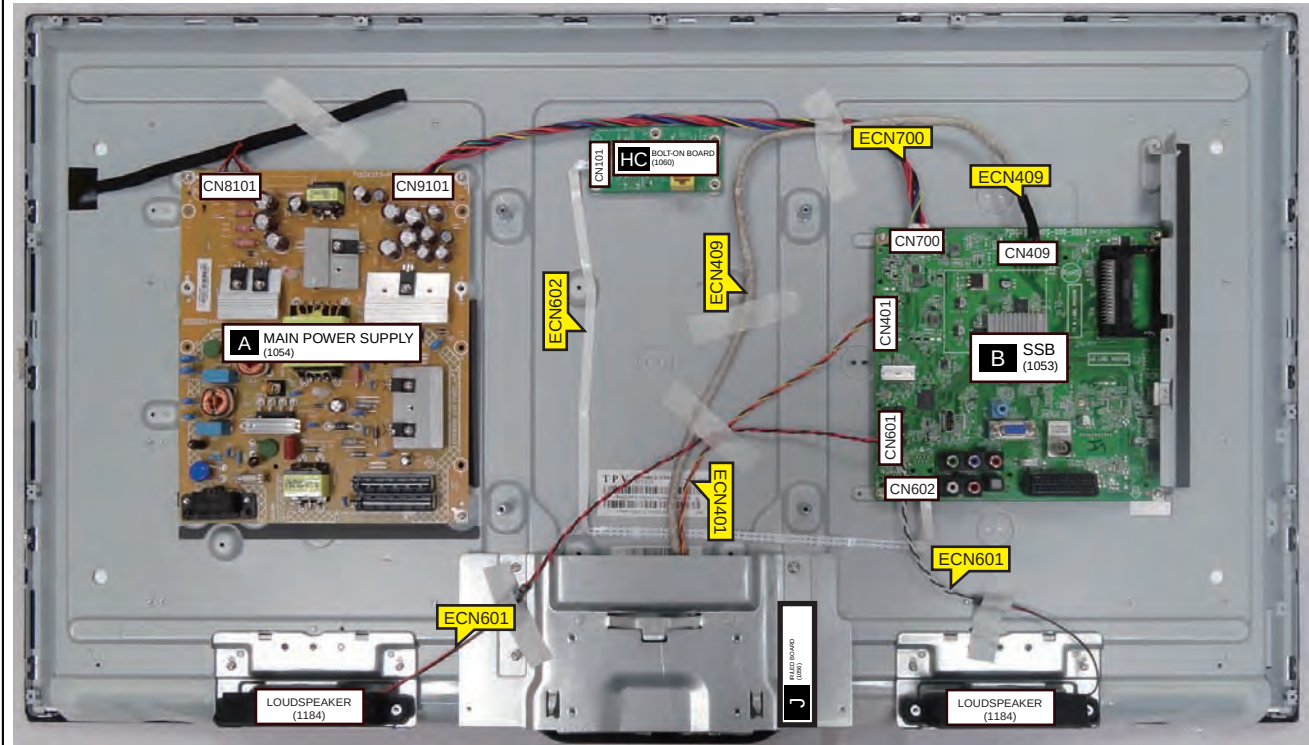
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Figure 4-4 Cable dressing (32" 3009D series)



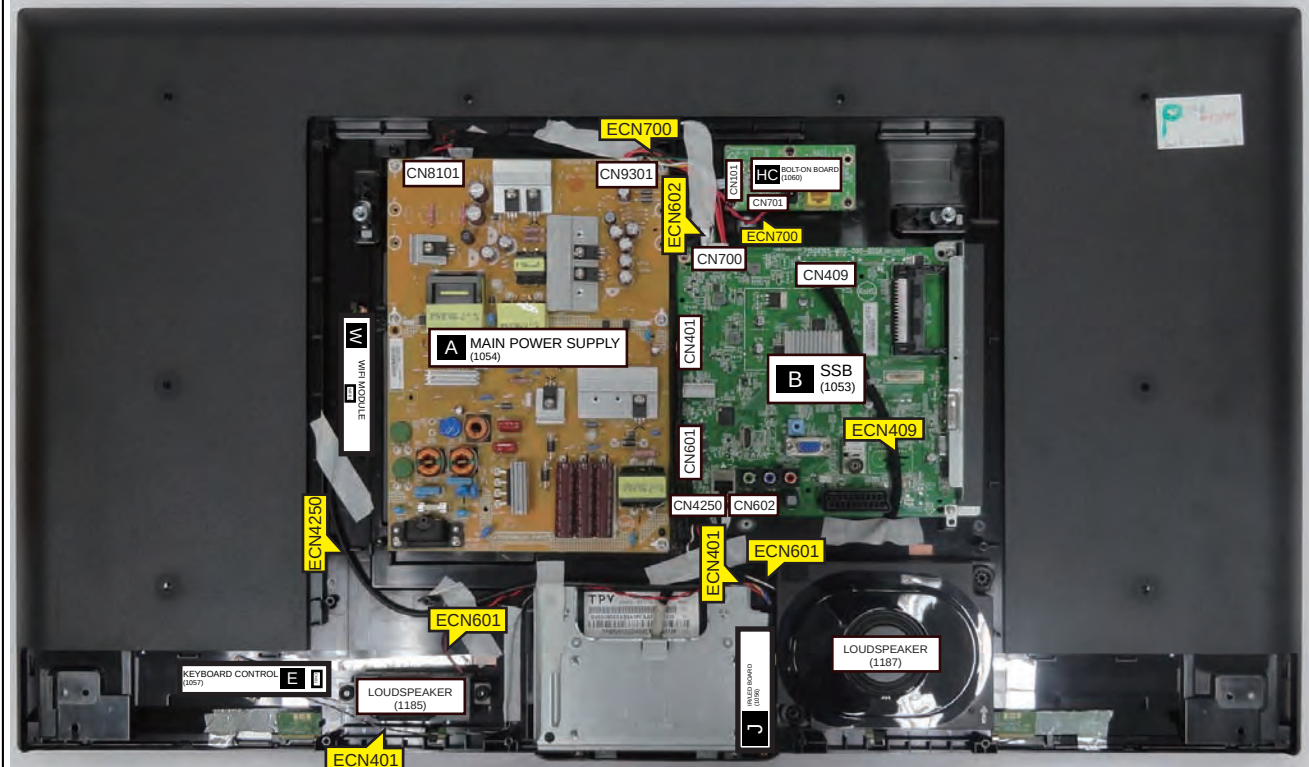
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Figure 4-5 Cable dressing (32" 5009D series)



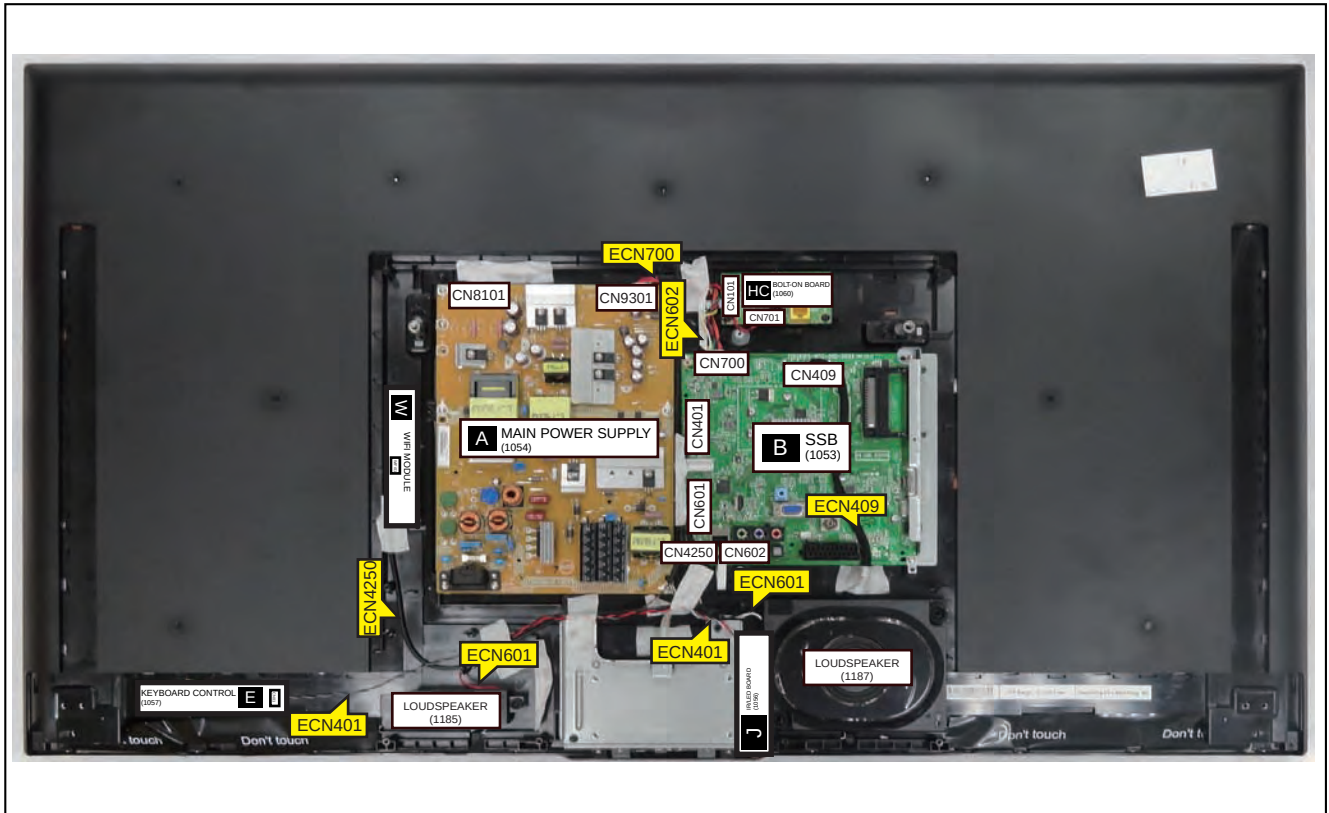
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Figure 4-6 Cable dressing (40" 3009D series)



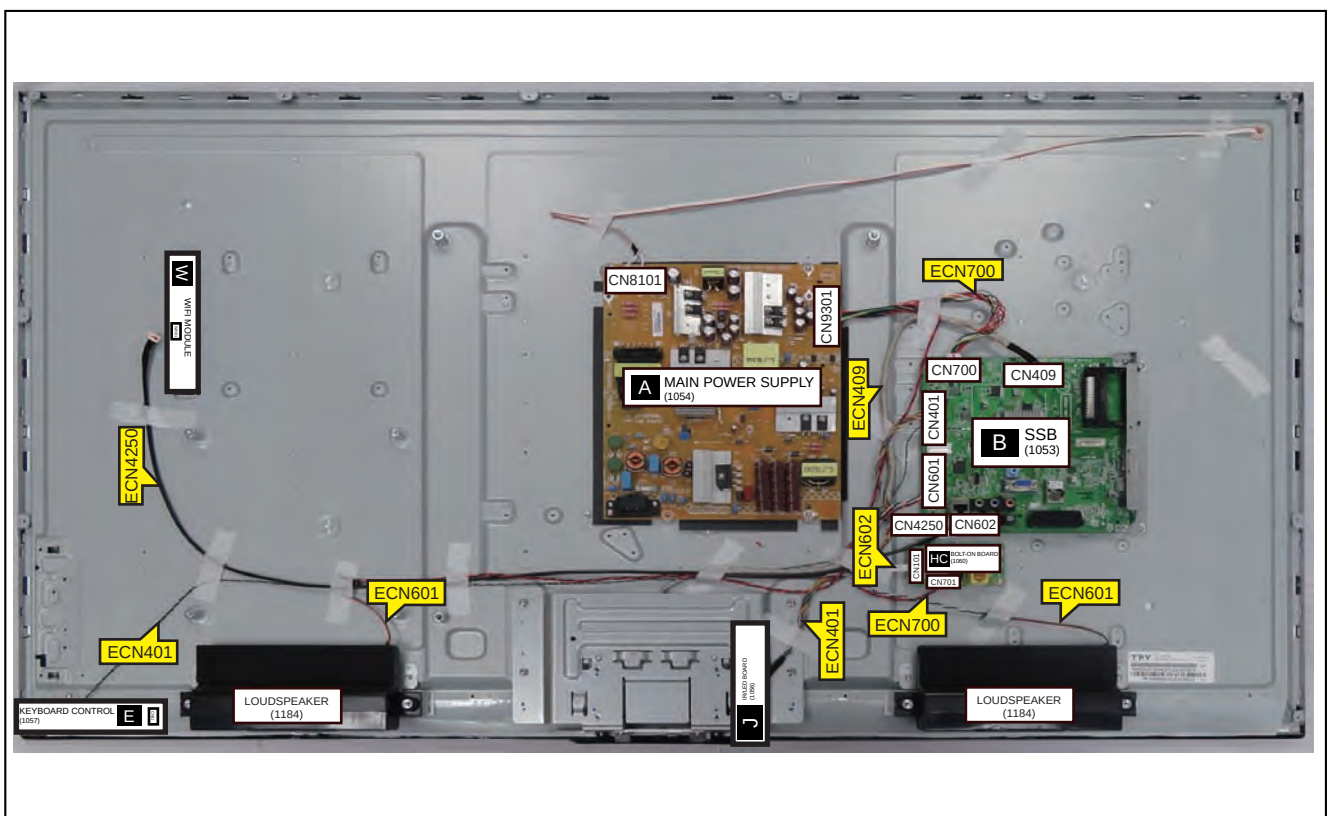
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Figure 4-7 Cable dressing (40" 5009D series)



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Figure 4-8 Cable dressing (48" 5009D series)



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Figure 4-9 Cable dressing (55" 5009D series)

4.2 Service Positions

For easy servicing of a TV set, the set should be put face down on a soft flat surface, foam buffers or other specific workshop tools. Ensure that a stable situation is created to perform measurements and alignments. When using foam bars take care that these always support the cabinet and **never** only the display. **Caution:** Failure to follow these guidelines can seriously damage the display!

Ensure that ESD safe measures are taken.

4.3 Assembly/Panel Removal(for 24"/28"/32" 3009D series)

Instructions below apply to the 24HFL3009D/12, but will be similar for other 24"/28"/32" 3009D series models.

4.3.1 Rear Cover

Refer to [Figure 4-10](#) for details.

Warning: Disconnect the mains power cord before removing the rear cover.

1. Remove fixation screws [1] that secure the base assy, pull out the base assy from the set. Then remove the fixation screws [2] that secure the rear cover. Refer to [Figure 4-10](#) for details.
2. Gently lift the rear cover from the TV. Make sure that wires and cables are not damaged while lifting the rear cover from the set.



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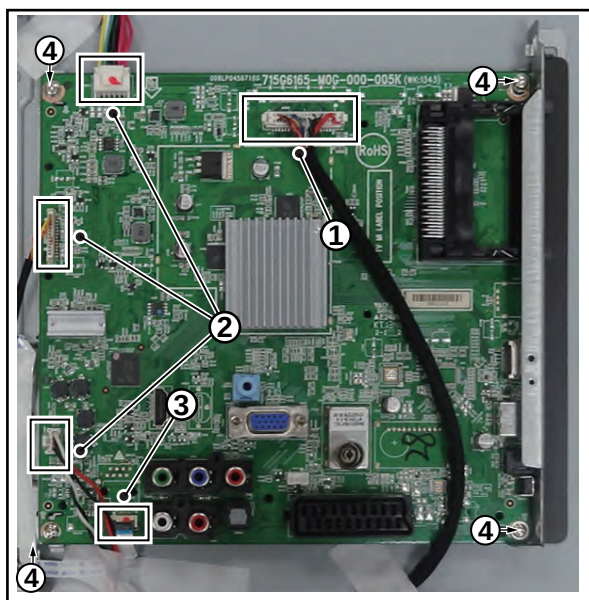
Figure 4-10 Rear cover removal

4.3.2 Small Signal Board (SSB)

Refer to [Figure 4-11](#) for details.

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

1. Release the clips from the LVDS connector that connect with the SSB [1].
Caution: be careful, as these are very fragile connectors!
2. Unplug all other connectors [2] and FFC connector [3].
3. Remove all the fixation screws from the SSB [4].
4. The SSB can now be shifted from side connector cover, then lifted and taken out of the I/O bracket. Refer to [Figure 4-11](#) for details.



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Figure 4-11 SSB removal

4.4.1 Rear Cover

Refer to [Figure 4-12](#) for details.

Warning: Disconnect the mains power cord before removing the rear cover.

1. Remove fixation screws [1] that secure the base assy, pull out the base assy from the set. Then remove the fixation screws [2], [3] that secure the rear cover. Refer to [Figure 4-12](#) for details.
2. Gently lift the rear cover from the TV. Make sure that wires and cables are not damaged while lifting the rear cover from the set.

4.3.3 Power Supply Unit (PSU)

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

1. Gently unplug all connectors from the PSU.
2. Remove all fixation screws from the PSU.
3. The PSU can be taken out of the set now.

4.3.4 Speakers

1. Gently release the tapes that secures the speaker cables.
 2. Unplug the speaker connectors from the SSB.
 3. Take the speakers out.
- When defective, replace the both units.

4.3.5 Stand bracket

1. Remove all fixation screws of the bracket.
2. Lift the bracket from the set.

4.3.6 IR/LED Board

1. Unplug the connector from the IR/LED board.
2. Gently release the clip that holds the board and take it out from the bezel.

When defective, replace the whole unit.

4.3.7 LCD Panel

1. Remove the stand as described earlier.
 2. Remove the SSB as described earlier.
 3. Remove the PSU as described earlier.
 4. Remove the speakers as described earlier.
 5. Remove the IR/LED board as described earlier.
 6. Remove all other metal parts that do not belong to the LCD panel.
 7. Release all fixing clips that secure the front bezel to the LCD panel.
 8. Lift the LCD Panel from the front bezel.
- When defective, replace the whole unit.

4.4 Assembly/Panel Removal(for 28" 5009D series)

Instructions below apply to the 28HFL5009D/12.



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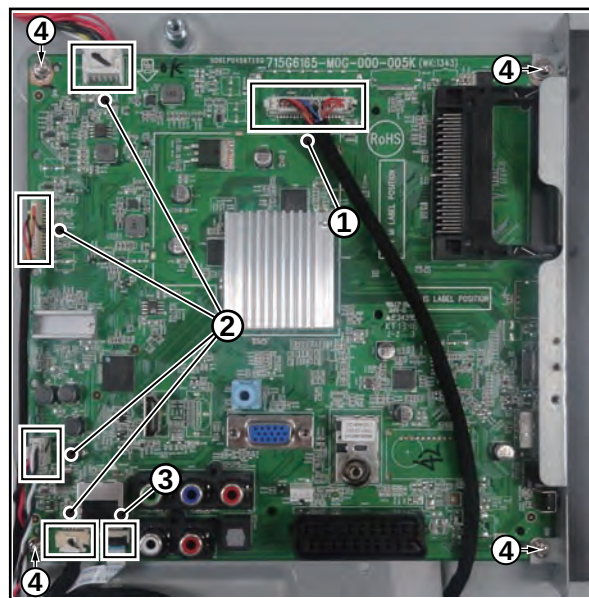
Figure 4-12 Rear cover removal

4.4.2 Small Signal Board (SSB)

Refer to [Figure 4-13](#) for details.

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

1. Release the clips from the LVDS connector that connect with the SSB [1].
- Caution:** be careful, as these are very fragile connectors!
2. Unplug all other connectors [2] and FFC connector [3].
3. Remove all the fixation screws from the SSB [4].
4. The SSB can now be shifted from side connector cover, then lifted and taken out of the I/O bracket. Refer to [Figure 4-13](#) for details.



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Figure 4-13 SSB removal

4.4.3 Power Supply Unit (PSU)

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

1. Gently unplug all connectors from the PSU.
2. Remove all fixation screws from the PSU.
3. The PSU can be taken out of the set now.

4.4.4 Speakers

1. Gently release the tapes that secures the speaker cables.
 2. Unplug the speaker connectors from the SSB.
 3. Take the speakers out.
- When defective, replace the both units.

4.4.5 Stand bracket

1. Remove all fixation screws of the bracket.
2. Lift the bracket from the set.

4.4.6 IR/LED Board

1. Unplug the connector from the IR/LED board.
 2. Gently release the clip that holds the board and take it out from the bezel.
- When defective, replace the whole unit.

4.4.7 WIFI module

1. Unplug the connector from the SSB.
 2. Remove fixation screw that secure the WIFI module, getntly remove the module from the set.
- When defective, replace the whole unit.

4.4.8 LCD Panel

1. Remove the stand as described earlier

2. Remove the SSB as described earlier.
 3. Remove the PSU as described earlier.
 4. Remove the speakers as described earlier.
 5. Remove the IR/LED board as described earlier.
 6. Remove the WiFi module board as described earlier.
 7. Remove all other metal parts that do not belong to the LCD panel.
 8. Release all fixing clips that secure the front bezel to the LCD panel.
 9. Lift the LCD Panel from the front bezel.
- When defective, replace the whole unit.

4.5 Assembly/Panel Removal(for 32"/48" 5009D series)

Instructions below apply to the 32HFL5009D/12, but will be similar for other 32"/48" 5009D series models.

4.5.1 Rear Cover

Refer to [Figure 4-14](#) for details.

Warning: Disconnect the mains power cord before removing the rear cover.

1. Remove fixation screws [1] that secure the base assy, pull out the base assy from the set. Then remove the fixation screws [2], [3] that secure the rear cover. Refer to [Figure 4-14](#) for details.
2. Gently lift the rear cover from the TV. Make sure that wires and cables are not damaged while lifting the rear cover from the set.



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Figure 4-14 Rear cover removal

4.5.2 Small Signal Board (SSB)

Refer to [Figure 4-15](#) for details.

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

1. Release the clips from the LVDS connector that connect with the SSB [1].
Caution: be careful, as these are very fragile connectors!
2. Unplug all other connectors [2] and FFC connector [3].
3. Remove all the fixation screws from the SSB [4].
4. The SSB can now be shifted from side connector cover, then lifted and taken out of the I/O bracket. Refer to [Figure 4-15](#) for details.

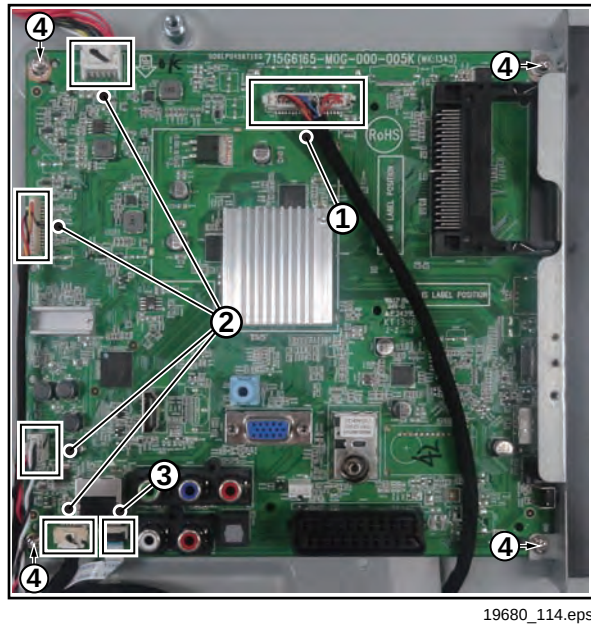


Figure 4-15 SSB removal

4.5.3 Power Supply Unit (PSU)

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

1. Gently unplug all connectors from the PSU.
2. Remove all fixation screws from the PSU.
3. The PSU can be taken out of the set now.

4.5.4 Speakers

1. Gently release the tapes that secures the speaker cables.
 2. Unplug the speaker connectors from the SSB.
 3. Take the speakers out.
- When defective, replace the both units.

4.5.5 Stand bracket

1. Remove all fixation screws of the bracket.
2. Lift the bracket from the set.

4.5.6 Keyboard Control unit

1. Unplug the connector from the SSB.
 2. Remove the fixation screw that secure the keyboard control panel.
 3. Unplug the connector from the keyboard control panel.
 4. Gently release the tapes that secures the keyboard cables.
 5. Take the keyboard out.
- When defective, replace the whole unit.

4.5.7 IR/LED Panel

1. Remove the stand bracket, as described earlier.
 2. Remove fixation screw that secure the deco rear cover and take it out from the deco.
 3. Unplug the connector from the IR/LED panel.
 4. Gently release the double faced adhesive tape that pasted the panel and take it out from the deco.
- When defective, replace the whole unit.

4.5.8 WIFI module

1. Unplug the connector from the SSB.

2. Remove fixation screw that secure the WIFI module, getntly remove the module from the set.
- When defective, replace the whole unit.

4.5.9 LCD Panel

1. Unplug all the connector cables of the boards.
 2. Lift the subframe with SSB, PSU, Keyboard control panel, IR/LED board and WIFI module panel from the LCD panel and put it aside.
 3. Gently take all the speakers out.
- Warning:** Cause the panels of 32"/48" 5009D series are bolt-on panels, the panel could not release from bezel.
- When defective, replace the whole unit.

4.6 Assembly/Panel Removal(for 40" 3009D series)

Instructions below apply to the 40HFL3009D/12.

4.6.1 Rear Cover

Refer to [Figure 4-16](#) for details.

Warning: Disconnect the mains power cord before removing the rear cover.

1. Remove fixation screws [1] that secure the base assy, pull out the base assy from the set. Then remove the fixation screws [2], [3] that secure the rear cover. Refer to [Figure 4-16](#) for details.
2. Gently lift the rear cover from the TV. Make sure that wires and cables are not damaged while lifting the rear cover from the set.



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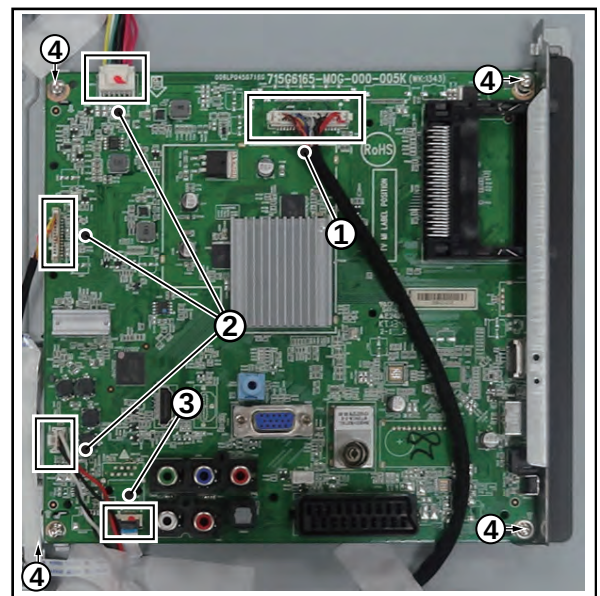
Figure 4-16 Rear cover removal

4.6.2 Small Signal Board (SSB)

Refer to [Figure 4-17](#) for details.

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

1. Release the clips from the LVDS connector that connect with the SSB [1].
Caution: be careful, as these are very fragile connectors!
2. Unplug all other connectors [2] and FFC connector [3].
3. Remove all the fixation screws from the SSB [4].
4. The SSB can now be shifted from side connector cover, then lifted and taken out of the I/O bracket. Refer to [Figure 4-17](#) for details.



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Figure 4-17 SSB removal

4.6.3 Power Supply Unit (PSU)

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

1. Gently unplug all connectors from the PSU.
2. Remove all fixation screws from the PSU.
3. The PSU can be taken out of the set now.

4.6.4 Speakers

- Gently release the tapes that secures the speaker cables.
 - Unplug the speaker connectors from the SSB.
 - Take the speakers out.
- When defective, replace the both units.

4.6.5 Stand bracket

- Remove all fixation screws of the bracket.
- Lift the bracket from the set.

4.6.6 IR/LED Board

- Unplug the connector from the IR/LED board.
 - Gently release the clip that holds the board and take it out from the bezel.
- When defective, replace the whole unit.

4.6.7 LCD Panel

- Unplug all the connector cables of the boards.
- Lift the subframe with SSB, PSU, IR/LED board from the LCD panel and put it aside.

- Gently take all the speakers out.
- Warning:** Cause the panels of 40" 3009D series are bolt-on panels, the panel could not release from bezel. When defective, replace the whole unit.

4.7 Assembly/Panel Removal(for 40"/55" 5009D series)

Instructions below apply to the 40HFL5009D/12, but will be similar to the other 40"/55" 5009D series models.

4.7.1 Rear Cover

- Refer to [Figure 4-18](#) for details.
- Warning:** Disconnect the mains power cord before removing the rear cover.
- Remove fixation screws [1] that secure the base assy, pull out the base assy from the set. Then remove the fixation screws [2], [3] that secure the rear cover. Refer to [Figure 4-18](#) for details.
 - Gently lift the rear cover from the TV. Make sure that wires and cables are not damaged while lifting the rear cover from the set.

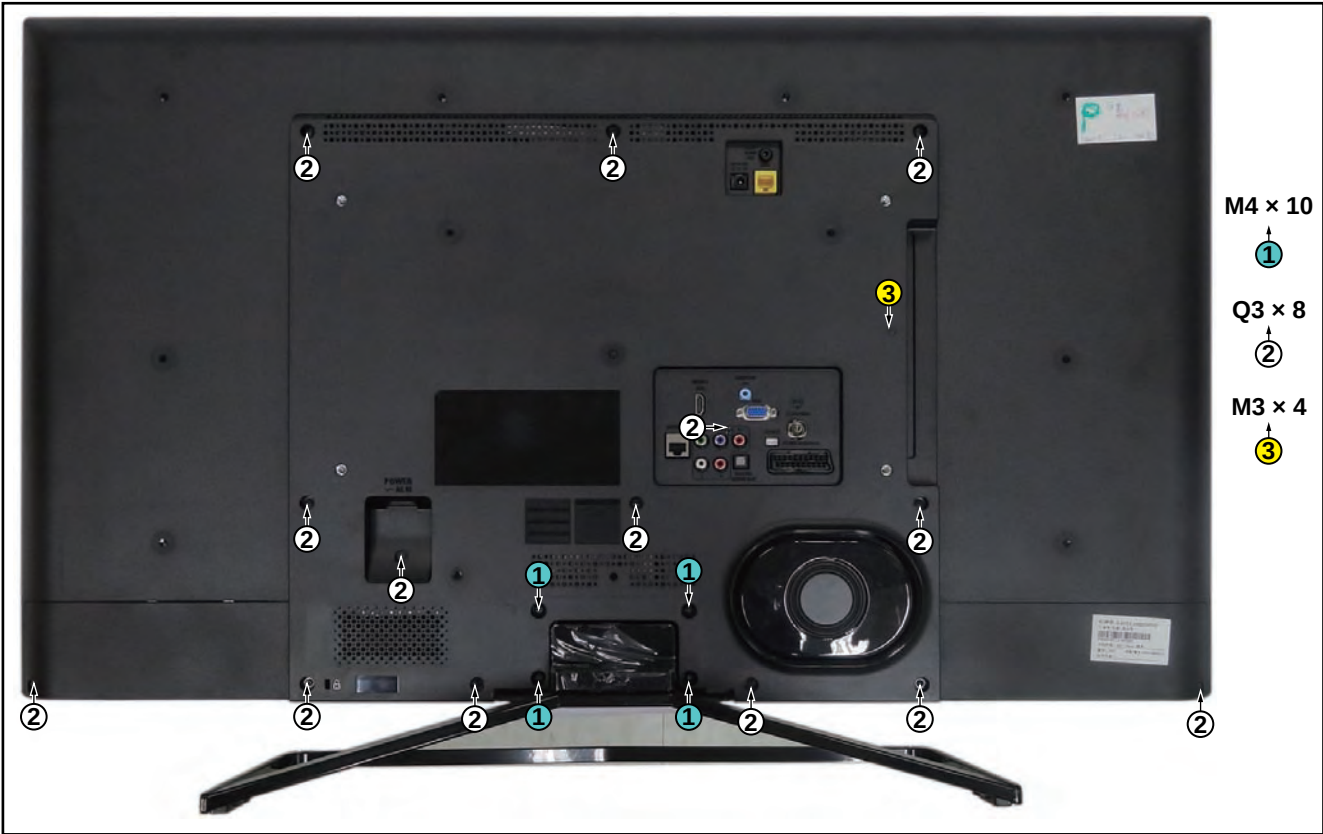


Figure 4-18 Rear cover removal

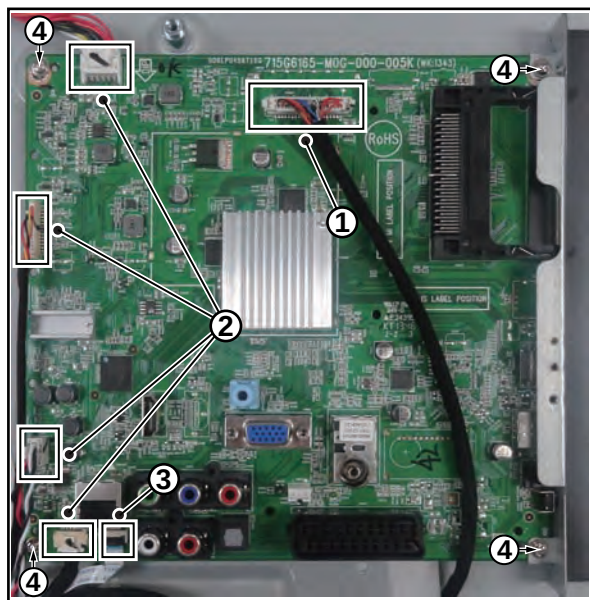
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4.7.2 Small Signal Board (SSB)

Refer to [Figure 4-19](#) for details.

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

1. Release the clips from the LVDS connector that connect with the SSB [1].
Caution: be careful, as these are very fragile connectors!
2. Unplug all other connectors [2] and FFC connector [3].
3. Remove all the fixation screws from the SSB [4].
4. The SSB can now be shifted from side connector cover, then lifted and taken out of the I/O bracket. Refer to [Figure 4-19](#) for details.



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Figure 4-19 SSB removal

4.7.3 Power Supply Unit (PSU)

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

1. Gently unplug all connectors from the PSU.
2. Remove all fixation screws from the PSU.
3. The PSU can be taken out of the set now.

4.7.4 Speakers

1. Gently release the tapes that secures the speaker cables.
 2. Unplug the speaker connectors from the SSB.
 3. Take the speakers out.
- When defective, replace the both units.

4.7.5 Stand bracket

1. Remove all fixation screws of the bracket.
2. Lift the bracket from the set.

4.7.6 Keyboard Control unit

1. Unplug the connector from the SSB.
 2. Remove the fixation screw that secure the keyboard control panel.
 3. Unplug the connector from the keyboard control panel.
 4. Gently release the tapes that secures the keyboard cables.
 5. Take the keyboard out.
- When defective, replace the whole unit.

4.7.7 IR/LED Panel

1. Remove the stand bracket, as described earlier.
 2. Remove fixation screw that secure the deco rear cover and take it out from the deco.
 3. Unplug the connector from the IR/LED panel.
 4. Gently release the double faced adhesive tape that pasted the panel and take it out from the deco.
- When defective, replace the whole unit.

4.7.8 WIFI module

1. Unplug the connector from the SSB.
 2. Remove fixation screw that secure the WIFI module, getntly remove the module from the set.
- When defective, replace the whole unit.

4.7.9 LCD Panel

1. Remove the stand as described earlier
 2. Remove the SSB as described earlier.
 3. Remove the PSU as described earlier.
 4. Remove the speakers as described earlier.
 5. Remove the Keyboard as described earlier.
 6. Remove the IR/LED board as described earlier.
 7. Remove the WiFi module board as described earlier.
 8. Remove all other metal parts that do not belong to the LCD panel.
 9. Release all fixing clips that secure the front bezel to the LCD panel.
 10. Lift the LCD Panel from the front bezel.
- When defective, replace the whole unit.

4.8 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 4-1](#) and [Figure 4-9](#).
- Pay special attention not to damage the EMC foams on the SSB shields. Ensure that EMC foams are mounted correctly.

5. Service Modes, Error Codes, and Fault Finding

Index of this chapter:

- [5.1 Test Points](#)
- [5.2 Service Modes](#)
- [5.3 Stepwise Start-up](#)
- [5.4 Service Tools](#)
- [5.5 Software Upgrading](#)
- [5.6 Error Codes](#)
- [5.7 The Blinking LED Procedure](#)
- [5.8 Fault Finding and Repair Tips](#)

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

The Service Mode feature is split into five parts:

- Service Alignment Mode (SAM).
- Factory Mode.
- Customer Service Mode (CSM).
- Computer Aided Repair Mode (ComPair).

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

- Make alignments (e.g. White Tone), reset the error buffer (SAM and Factory Mode).
- Display information ("SAM" indication in upper right corner of screen, error buffer, software version, operating hours, options and option codes, sub menus).

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

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

ComPair Mode is used for communication between a computer and a TV on I²C /UART level and can be used by a Service engineer to quickly diagnose the TV set by reading out error codes, read and write in NVMS, communicate with ICs and the micro processor (PWM, registers, etc.), and by making use of a fault finding database. It will also be possible to up and download the software of the TV set via I²C with help of ComPair. To do this, ComPair has to be connected to the TV set via the ComPair connector, which will be accessible through the rear of the set (without removing the rear cover).

Note: For the new model range, a new remote control (RC) is used with some renamed buttons. This has an impact on the activation of the Service modes. For instance the old "MENU" button is now called "HOME" (or is indicated by a "house" icon).

5.2.1 General

Next items are applicable to all Service Modes or are general.

Life Timer

During the life time cycle of the TV set, a timer is kept (called "Op. Hour"). It counts the normal operation hours (not the Stand-by hours). The actual value of the timer is displayed in

SAM in a decimal value. Every two soft-resets increase the hour by + 1. Stand-by hours are not counted.

Software Identification, Version, and Cluster

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

The screen will show: "AAAAAAB-XXX.YYY.MMM.TTT", where:

- AAAAAA is the chassis name: TPN142HE.
- B is the region indication: E = Europe, A = AP/China, U = NAFTA, L = LATAM.
- XXX is the main version number: this is updated with a major change of specification (incompatible with the previous software version). Numbering will go from 0- 255.
- YYY is the sub version number: this is updated with a minor change of specification (incompatible with the previous versions). Numbering will go from 0- 255.
- MMM is the number of the mandatory (upgrade) release in association with the area of the mandatory (upgrade) release. Numbering will go from 0 - 255.
- TTT bit 7 to 1 is the area of the mandatory (upgrade) release where 0 - none, 1 - Netflix, rest reserved.
- TTT bit 0 : 0 = development release, 1 = production release.

Display Option Code Selection

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

To do so, press the following key sequence on a standard RC transmitter: "062596" directly followed by MENU and "xxx", where "xxx" is a 3 digit decimal value of the panel type: see column "Display Code" in [Table 6-3](#). When the value is accepted and stored in NVM, the set will switch to Stand-by, to indicate that the process has been completed.

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

5.2.2 Service Alignment Mode (SAM)

Purpose

- To modify the NVM.
- To display/clear the error code buffer.
- To perform alignments.

Specifications

- Operation hours counter (maximum five digits displayed).
- Software version, error codes, and option settings display.
- Error buffer clearing.
- Option settings.
- Software alignments (White Tone).
- NVM Editor.
- Set screen mode to full screen (all content is visible).

How to Activate SAM

To activate SAM, use one of the following methods:

- Press the following key sequence on the remote control transmitter: "062596", directly followed by the "INFO" button. Do not allow the display to time out between entries while keying the sequence.
- Or via ComPair.

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

Table 5-1 SAM mode overview

Main Menu	Sub-menu 1	Sub-menu 2	Description
System Information	Op Hour	e.g. 02335	This represents the life timer. The timer counts normal operation hours, but does not count Stand-by hours.
	Main SW ID	e.g. "TPN142HE_005.001.07"	See paragraph Software Identification, Version, and Cluster for the software name definition.
	ERR	e.g. "016 000 000 000 000"	Shows all errors detected since the last time the buffer was erased. Five errors possible.
	OP1	e.g. "000 016 071 000 000 000 000 C"	Used to read-out the option bytes. See paragraph 6.4 Option Settings in the Alignments section for a detailed description. Ten codes are possible.
	OP2	e.g. "002 002 064 064 010 014 206 C"	
Clear Codes	Press [OK] to clean the Error Codes immediately		Erases the contents of the error buffer. Select this menu item and press the MENU RIGHT key on the remote control. The content of the error buffer is cleared.
Options	OP#1-OP#8	e.g. "032"	Option code
Alignments	Warm	R Gain	To align the White Tone. See paragraph 6.3 Software Alignments in the Alignments section for a detailed description
		G Gain	
		B Gain	
	Normal	R Gain	
		G Gain	
		B Gain	
	Cool	R Gain	
		G Gain	
		B Gain	
	Store		Store the RGB value
NVM editor	Address		Select and fill the NVM address
	Value		Select and fill the NVM value
	Store		Store the value in the address
Upload to USB	Channel List		To upload several settings from the TV to an USB stick
	NVM Copy		
	Readable Info		
	EDID Copy		
Download from USB	Channel List		To download several settings from the USB stick to the TV
	NVM Copy		
	EDID Copy		
Initialize NVM	Press [OK] to Initialize NVM immediately		To initialize a (corrupted) NVM. Be careful, this will erase all settings.
Dealer Options	Set Virgin mode	Virgin mode:Off	Set Virgin mode
	Store	Press [OK] to store virgin mode immediately	Store the virgin mode in the address

How to Navigate

- In the SAM menu, select menu items with the UP/DOWN keys on the remote control transmitter. The selected item will be indicated. When not all menu items fit on the screen, use the UP/DOWN keys to display the next/previous menu items.
- With the "LEFT/RIGHT" keys, it is possible to:
 - (De) activate the selected menu item.
 - (De) activate the selected sub menu.
 - Change the value of the selected menu item.
- When you press the MENU button once while in top level SAM, the set will switch to the normal user menu (with the SAM mode still active in the background).
- Press the following key sequence on the remote control transmitter: "062596" directly followed by the "Menu/Home" button to switch to SDM (do not allow the display to time out between entries while keying the sequence).

How to Store SAM Settings

To store the settings changed in SAM mode (except the RGB Align settings), leave the top level SAM menu by using the POWER button on the remote control transmitter or the television set. The mentioned exceptions must be stored separately via the STORE button.

How to Exit SAM

Use one of the following methods:

- Switch the set to STANDBY by pressing the mains button on the remote control transmitter or the television set.
- Via a standard RC-transmitter, key in "00" sequence.

Note: When the TV is switched "off" by a power interrupt while in SAM, the TV will show up in "normal operation mode" as soon as the power is supplied again. The error buffer will not be cleared.

5.2.3 Contents of the Factory mode:**Purpose**

- To perform extended alignments.

Specifications

- Displaying and or changing Panel ID information.
- Displaying and or changing Tuner ID information.
- Error buffer clearing.
- Various software alignment settings.
- Testpattern displaying.
- Public Broadcasting Service password Reset.
- etc.

How to Activate the Factory mode

To activate the Factory mode, use the following method:

- Press the following key sequence on the remote control transmitter: from the "Menu/Home screen" press "1999", directly followed by the "Back" button. Do not allow the display to time out between entries while keying the sequence.

After entering the Factory mode, the following items are displayed,

Table 5-2 Factory mode overview

Item	Item value	Default value						Description
		24"	28"	32"	40"	48"	55"	
0	F/W VERSION	Press OK						Displays the software versions of the supplier, Flash PQ, Smart Picture, BL Dimming, Source Meter, the Picture Quality checksum, the Dimming library, the Source meter library, the Flash AQ, MCU and OAD software versions.
1	PANEL_ID	See table 6-3 Display code overview						Displays and changes the Panel ID with the left and right cursor; be careful changing this, it can result in not correct displaying the screen!
2	TUNER_ID	4	4	4	4	6	6	Displays and changes the Tuner ID with the left and right cursor. Not to be changed when the tuner is replaced with the correct service part.
3	DEMOD_TYPE	0	0	1	1	2	2	Choose demod type.
4	ERR Code: xxx xxx xxx xxx xxx	000 000 000 000 000						Values showing the last 5 errors during the last 50 hours of operation, according to table 5-4 Error code table
5	CLEAR ERROR BUFFER	Press OK						Selecting this clear all current error codes.
6	NVM ADDRESS	0						NVM address 0 to 8191, Use Item 6 to change and 7 to store the data to the correct NVM address
7	NVM VALUE	0						Displays the value at the NVM address of item 5
8	NVM STORE	Press OK						Use this option to save the data of item 6 to NVM address of item 5
9	NVM COPY TV to USB	Press OK						Use this to store the NVM data to the REPAIR folder of a FAT formatted USB memory stick. The TV will write two files in the REPAIR folder of the memory stick. It will create this folder if it does not exist. The items are "Channel list", "Personal settings", "Option codes", "Display-related alignments" and "History list". 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. Now the settings are stored onto the 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 a picture is available. This method is created to be able to save the customer's TV settings and to store them into another SSB.
10	NVM READ USB to TV	Press OK						Use this to store the NVM data from the USB memory stick to the TV. The TV will save the two files which were created in item 8 to the NVM of the set. Use these options when replacing a SSB. When "USB to TV Success" is displayed remove the power and restart the TV
11	RESET_PBS_PWD	Press OK						Use this to reset the Child Lock
12	DIM_LIB RESET	Press OK						Reset the Dimming
13	SRC_METER RESET	Press OK						Reset the Source meter
14	AMBLIGHT RESET	Press OK						Reset Ambilight
15	ACFG RESET	Press OK						Reset ACFG
16	CIPLUS QUERY	Press OK						Shows the Validity of the CI+ key and the supplier information
17	CIPLUS UPDATE	Press OK						Used to enter a new CI+ code into the NVM. This can only be used when no CI+ code exists in the NVM
18	EDID UPDATE	Press OK						Used to enter a new EDID codes into the NVM
19	TEST PATTERN	Press OK						With the "left" and "right" keys of the remote control various test patterns can be chosen
20	VIRGIN_MODE	Off						Use this to return the set to virgin mode. Depends whether the set has been used already.
21	E-Fuse	On						E-fuse mode
22	ORT_MODE	Off						ORT mode
23	VGA_UART_SWITCH	Off						When switched "on" the VGA port can be used for UART logging.
24	DRMWARNING	Off	Off	Off	Off	On	On	Warning the data rights management
25	AGEING MODE	Off	On	Off	Off	Off	Off	Use this for aging a new LCD panel
26	CLR_TEMP_R	255	230	255	255	255	255	Red colour temperature setting
27	CLR_TEMP_G	255	231	255	255	255	255	Green colour temperature setting
28	CLR_TEMP_B	255	255	255	255	255	255	Red colour temperature setting
29	AUTO_COLOR	Press OK						PC: any pattern that has black and white, YPbPr: SMPTE bar (colour bar), any timing.
30	ADC_GAIN_R	0	0	0	0	0	0	Red ADC gain
31	ADC_GAIN_G	0	0	0	0	0	0	Green ADC gain
32	ADC_GAIN_B	0	0	0	0	0	0	Blue ADC gain
33	ADC_OFFSET_R	128	128	128	128	128	128	Red ADC offset
34	ADC_OFFSET_G	128	128	128	128	128	128	Green ADC offset
35	ADC_OFFSET_B	128	128	128	128	128	128	Blue ADC offset
36	YPBPR_PHASE	InValid	InValid	InValid	InValid	InValid	InValid	Not available for this chassis
37	AUD_GAIN_LINEIN	0						Line-in audio gain
38	AUD_GAIN_HDMI	0						HDMI audio gain
39	AUD_GAIN_ATV	0						Analogue TV audio gain
40	AUD_GAIN_DTV	0						Digital TV audio gain
41	AUD_GAIN_USB	0						USB audio gain
42	AQ_INDEX	14	14	16	16	10	10	Audio Quality index
43	AUDIO TEST MODE	Off						Used for audio testing during production
44	AUDIO CHANNEL TYPE	0.0	0.0	0.0	0.0	0.0	0.0	Defines the installed speaker system
45	AUDIO SRS	Off						SRS Audio
46	DUMP PQ FROM TV	Press OK						Saves the picture quality data to a file "pq.bin" to the root of a FAT formatted USB memory stick
47	LOAD PQ to TV	Press OK						Loads the picture quality data from a file "pq.bin" in to the TV
48	DUMP AQ FROM TV	Press OK						Saves the audio quality data to a file "AQ.bin" to the root of a FAT formatted USB memory stick
49	LOAD AQ to TV	Press OK						Loads the audio quality data from a file "AQ.bin" in to the TV

Item	Item value	Default value						Description
		24"	28"	32"	40"	48"	55"	
50	COPY BIN CHL to TV	Press OK						Copy the USB channel list to TV
51	COPY BIN CHL to USB	Press OK						Copy the TV channel list to USB
52	FEF CHECK	Off						FEF Check
53	PANEL FLIP	On	Off	Off	Off	On	On	Flip panel
54	VGA_SOURCE	On	On	On	On	On	On	Enable/Disable VGA source
55	HDMI3	Off	Off	Off	Off	Off	Off	Enable/Disable HDMI3 source
56	HDMI4	Off	Off	Off	Off	Off	Off	Enable/Disable HDMI4 source
57	USB2	Off	Off	Off	Off	On	On	Enable/Disable USB2 source
58	USB3	Off	Off	Off	Off	Off	Off	Enable/Disable USB3 source
59	KEYBOARD CONFIG	Off	Off	Off	Off	On	On	Enable/Disable HDMI3 source
60	LIGHT SENEOR TUNING	0						Light sensor
61	LIGHT SENSOR TYPE	0						Light sensor
62	TEMP SENSOR TYPE	0	0	0	0	0	0	Tempreture sensor
63	AMBILIGHT_DRIVER	0	0	0	0	0	0	Drive the Ambient light
64	AMBILIGHT TYPE	0	0	0	0	0	0	The type of Ambient light
65	LED TYPE	0	0	0	0	0	0	The type of LED
66	MHP APP	Off	Off	Off	Off	Off	Off	MHP APP
67	3D	0	0	0	0	0	0	3D on/off
68	SMALL SCREEEN	Off	Off	Off	Off	Off	Off	Small screen
69	BLUETOOTH	Off	Off	Off	Off	Off	Off	BLUETOOTH
70	ARC TEST	-	Off	Off	Off	Off	Off	ARC Test
71	EXIT_FACTORY	Press OK						Exits the Factory mode

How to Exit the Factory mode

Use one of the following methods:

- Select EXIT_FACTORY from the menu and press the "OK" button.

Note: When the TV is switched "off" by a power interrupt, or normal switch to "stand-by" while in the factory mode, the TV will show up in "normal operation mode" as soon as the power is supplied again. The error buffer will not be cleared.

5.2.4 Customer Service Mode (CSM)

Purpose

The Customer Service Mode shows error codes and information on the TVs operation settings. The call centre can instruct the customer (by telephone) to enter CSM in order to identify the status of the set. This helps the call centre to diagnose problems and failures in the TV set before making a service call.

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

Specifications

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

How to Activate CSM

To activate CSM, press the following key sequence on a standard remote control transmitter: "123654" (do not allow the display to time out between entries while keying the sequence). After entering the Customer Service Mode, the following items are displayed.

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

Contents of CSM

- **1.1 Set Type** This information is very helpful for a helpdesk/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.

- **1.2 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.
- **1.3 Installation date** Indicates the date of the first installation of the TV. This date is acquired via time extraction.
- **1.4a Option Code 1** Gives the option codes of option group 1 as set in SAM.
- **1.4b Option Code 2** Gives the option codes of option group 2 as set in SAM.
- **1.5 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. This identification number is the 12NC number of the SSB.
- **1.6 Display** 12NC NVM read/write.
- **1.7 PSU** 12NC NVM read/write.
- **1.8 RF4CE** 12NC NVM read/write.
- **2.1 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 upgradeable, it will also be published on the internet.
- **2.2 Standby SW** Displays the built-in stand-by processor software version. Upgrading this software will be possible via USB.
- **2.3 Panel Code** Displays the Display Code number.
- **2.4 Bootloader ID** ID of Bootloader.
- **2.5 NVM version** Detects and displays NVM version.
- **2.6 Flash ID** ID of flash model.
- **2.7 e-UM version** eDFU (help) version.
- **2.8 Channel Table Structure Version** version of channel table structure.
- **2.9 Error Codes** Detects and displays errors.
- **3.1 Signal Quality** Analog/digital signal strength.
- **3.2 Child lock** Not active / active. This is a combined item for locks. If any lock (channel lock, parental lock) is active, it is indicated as "active".
- **3.3 HDCP keys** Indicates the validity of the HDMI keys (or HDCP keys). In case these keys are not valid and the customer wants to make use of the HDMI functionality, the SSB has to be replaced.
- **3.4 Ethernet MAC address** A Media Access Control address (MAC address) is a unique identifier assigned to network interfaces for communications on the physical network segment.

- 3.5 Wireless MAC address Wireless Media Access Control address.

How to Navigate

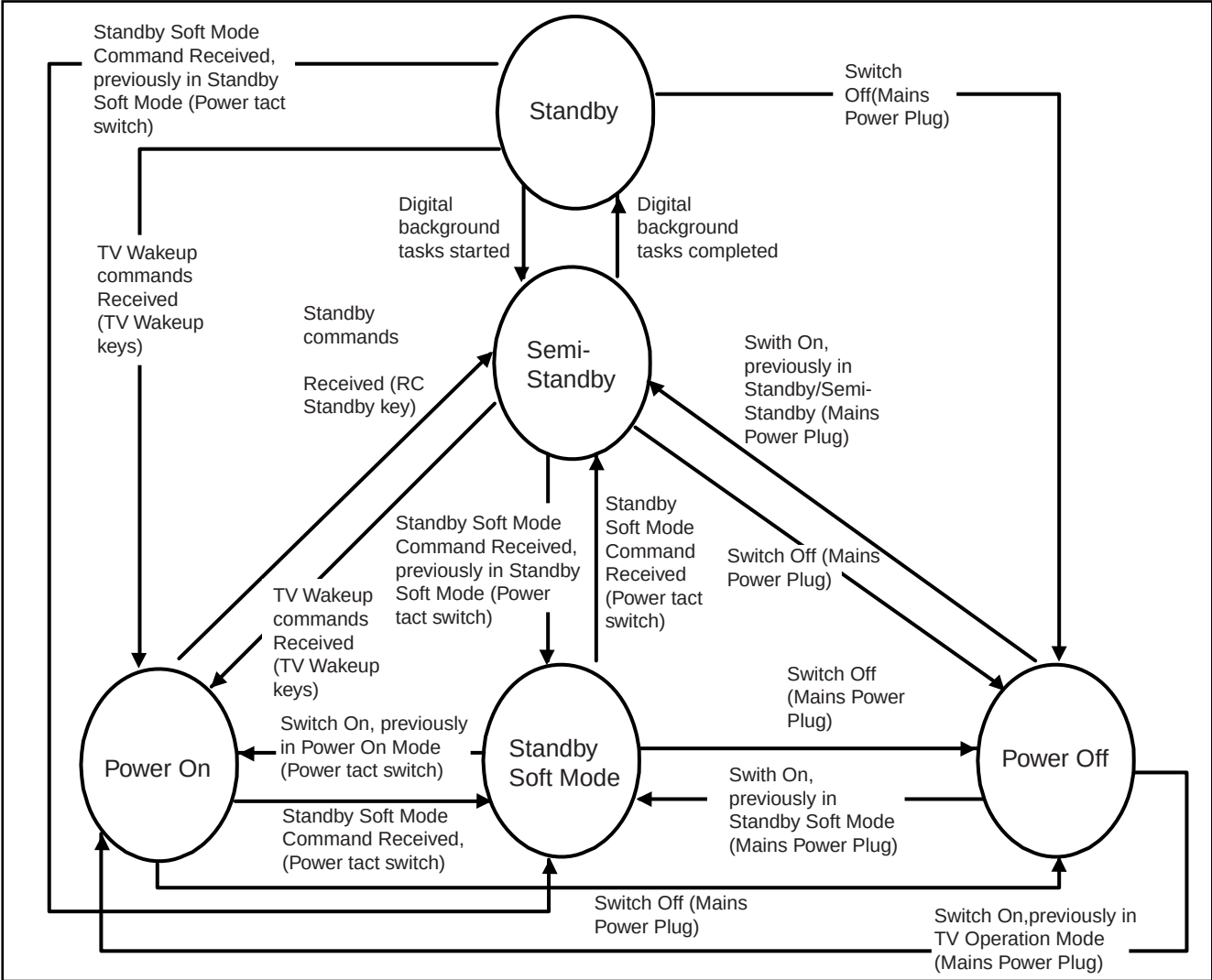
By means of the "CURSOR-DOWN/UP" knob (or the scroll wheel) on the RC-transmitter, can be navigated through the menus.

How to Exit CSM

To exit CSM, use one of the following methods.

- Press the MENU/HOME button on the remote control transmitter.
- Press the POWER button on the remote control transmitter.
- Press the POWER button on the television set.

5.3 Stepwise Start-up



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120224

Figure 5-1 Stepwise Start-up

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 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. No knowledge on I²C or UART commands is necessary, because ComPair takes care of this.
3. ComPair speeds up the repair time since it can automatically communicate with the chassis (when the micro processor is working) and all repair information is directly available.
4. ComPair features TV software up possibilities.

Specifications

ComPair consists of a Windows based fault finding program and an interface box between PC and the (defective) product. The 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).

The ComPair fault finding program is able to determine the problem of the defective television, by a combination of automatic diagnostics and an interactive question/answer procedure.

How to Connect

This is described in the chassis fault finding database in ComPair.

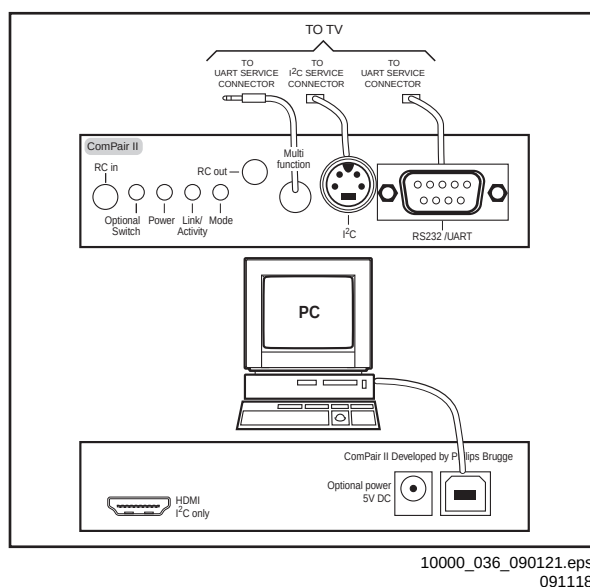


Figure 5-2 ComPair II interface connection

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

How to Order

ComPair II order codes:

- ComPair II interface: 3122 785 91020.
- Software is available via the Philips Service web portal.
- ComPair UART interface cable for TPM10.1x xx.
(using DB9 to 2mm pitch JST connector): 3122 785 90630.

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

5.5 Software Upgrading

5.5.1 Description

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. A description on how to upgrade the main software can be found in the DFU or on the Philips website.

5.5.2 Introduction

Philips continuously tries to improve its products, and it's recommend that the TV software is updated when updates are available. Software update files can be obtained from the dealer or can be downloaded from the following websites:

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

Preparing a portable memory for software upgrade

The following requirements have to be met:

1. A personal computer connected to the internet.
2. An archive utility that supports the ZIP-format (e.g. WinZip for Windows or Stuffit for Mac OS).
3. A FAT formatted USB memory stick (preferably empty).

Note:

1. Only FAT/DOS-formatted memory sticks are supported.
2. Only use software update files that can be found on the <http://www.philips.com/support> web site.

5.5.3 Check the current TV software version

Before starting the software upgrade procedure, it is advised to check that what the current TV software:

1. Press the "1 2 3 6 5 4" button on the remote control to enter the CSM mode.
2. Use the up/down cursor keys to select "Current Main Software".

If the current software version of the TV is the same as the latest update file found on <http://www.philips.com/support>, it is not necessary to update the TV software.

5.5.4 Download the latest software

1. Open the internet page <http://www.philips.com/support>.
2. Find information and software related to the TV.
3. Select the latest software update file and download it to the PC.
4. Insert the USB memory stick into one of the USB ports of the PC.
5. Decompress the downloaded ZIP file and copy it to the root directory of the USB flash drive.

5.5.5 Update the TV software

1. Turn the TV on and wait for it to boot completely.
2. Insert the USB memory stick that contains the software update files in one of the TV's USB ports.
3. The TV will detect the USB memory stick automatically. Then a window jumps out as [Figure 5-3](#).
Note: If the USB flash drive is not detected after power up, disconnect it and re-insert it.
4. Select [Update] and press OK. See [Figure 5-3](#).
5. To proceed, In next menu select [Start] and press OK to start software updates. See [Figure 5-4](#).
6. Upgrading will now begins and the status of the updating progress will be displayed.
7. When the TV software is updated. Remove your USB flash drive, then select [Restart] and press OK to restart the TV. See [Figure 5-5](#).

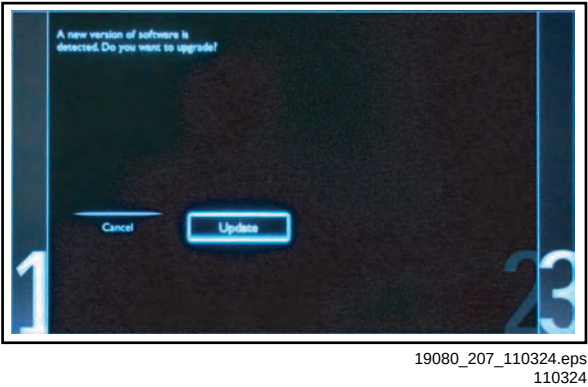


Figure 5-3 Update the TV software [1/3]

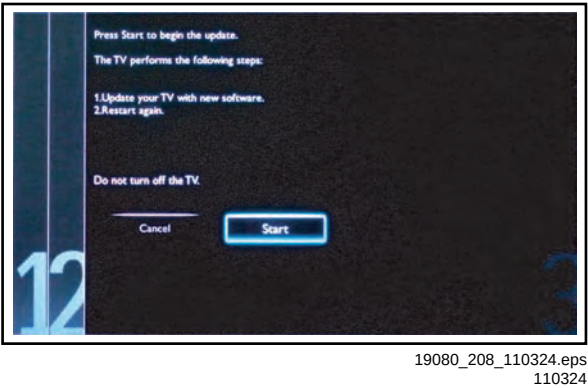


Figure 5-4 Update the TV software [2/3]

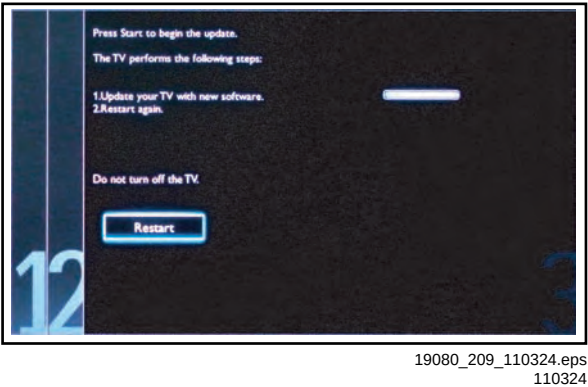


Figure 5-5 Update the TV software [3/3]

- Note:**
- Do not remove the USB flash drive during the software update.
 - If a power failure occurs during the update, do not remove the USB flash drive from the TV. The TV will continue the software update as soon as the power comes up again.
 - If an error occurs during the update retry the procedure or contact the dealer.
 - We do not recommend downgrading to an older version.
 - Once the upgrade is finished, use the PC to remove the TV software from the USB portable memory.

5.5.6 Content and Usage of the One-Zip Software File

- Below you find a content explanation of the One-Zip file, and instructions on how and when to use it. Only files that are relevant for Service are mentioned here.
- **EDID_clustername.zip:** Contains the EDID content of the different EDID NVMs. See ComPair for further instructions.

- **FUS_clustername_version.zip:** Contains the “autorun.upg” which is needed to upgrade the TV main software and the software download application.
- **NVM_clustername_version.zip:** Default NVM content. Must be programmed via ComPair.

5.5.7 How to Copy NVM Data to/from USB

When copying data to and from a USB memory stick, the folder “repair” is used. When inserting an empty USB memory stick, and downloading data to the stick, the TV will create this folder. When sending data from a USB memory stick to a TV, the intended data must be available in the “repair” folder. Note that when copying EDID data to the TV, all necessary EDID files must be in this folder. Service mode overview for your reference.

Table 5-3 Service mode overview

Service Modes	Description
SAM	Service alignment mode
Factory Mode	Used for extended alignments
CSM	3-page compact CSM pages. There will be CSM dump to USB-stick upon entering CSM-mode
USB SW upgradeable	SW-upgrading of flash memories can be done via USB. The main SW can be upgraded via the ZIP
NVM-Editor in SAM	NVM-editor will function as in the past: Address and Value field is a decimal value via digit entry
Service Data	New Service data in SAM for CTN, Prod. no., 12NC programming with virtual keyboard
USB copy/paste in SAM	Channel list, NVM data, Readable info, EDID
UART logging	There will be printout available in UART. No specifications of the printout, per MTK provision/definition.
Blind SAM	RC sequence “062598” + “Menu” + “Panel code”
Clear Buffer	RC sequence “062599” + “OK” or via SAM

5.6 Error Codes

5.6.1 Introduction

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

- Activated (SW) protection.
- Failing I²C device.
- General I²C error.

The last five errors, stored in the NVM, are shown in the Service menu’s. This is called the error buffer. The error code buffer contains all errors detected since the last time the buffer was erased. The buffer is written from left to right. When an error occurs that is not yet in the error code buffer, it is displayed at the left side and all other errors shift one position to the right. An error will be added to the buffer if this error differs from any error in the buffer. The last found error is displayed on the left. An error with a designated error code **never** leads to a deadlock situation. It must always be diagnosable (e.g. error buffer via OSD or blinking LED or via ComPair). In case a failure identified by an error code automatically results in other error codes (cause and effect), only the error code of the MAIN failure is displayed.

5.6.2 How to Read the Error Buffer

- You can read the error buffer in three ways:
- On screen via the SAM/SDM/CSM (if you have a picture). Example:
 - **ERROR: 000 000 000 000 000:** No errors detected
 - **ERROR: 013 000 000 000 000:** Error code 13 is the last and only detected error
 - **ERROR: 034 013 000 000 000:** Error code 13 was detected first and error code 34 is the last detected (newest) error

- Via the blinking LED procedure (when you have no picture). See paragraph [5.7 The Blinking LED Procedure](#).
- Via ComPair.

5.6.3 Error codes

In this chassis only "layer 2" error codes are available and point to problems on the SSB. They are triggered by LED blinking when CSM is activated. Only the following layer 2 errors are defined:

Table 5-4 Error code table

Layer-2 error code	Defective device
13	General I ² C bus error on the SSB
16	+12 V missing or low, PSU defective
27	Channel decoder error on the SSB
34	Tuner I ² C bus error on the SSB
35	EEPROM I ² C error on SSB, M24C64

5.6.4 How to Clear the Error Buffer

The error code buffer is cleared in the following cases:

- By using the CLEAR command in the SAM menu
- By using the CLEAR command in the Factory mode:
- By using the following key sequence on the remote control transmitter: "062599" directly followed by the OK button.
- If the contents of the error buffer have not changed for 50 hours, the error buffer resets automatically.

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

5.7 The Blinking LED Procedure

5.7.1 Introduction

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

Errors can also be displayed by the blinking LED procedure. The method is to repeatedly let the front LED pulse with as many pulses as the error code number, followed by a period of 1.5 seconds in which the LED is "off". Then this sequence is repeated.

Example (1): error code 4 will result in four times the sequence LED "on" for 0.25 seconds / LED "off" for 0.25 seconds. After this sequence, the LED will be "off" for 1.5 seconds. Any RC command terminates the sequence. Error code LED blinking is in red color.

Example (2): the content of the error buffer is "12 9 6 0 0" After entering SDM, the following occurs.

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

5.8 Fault Finding and Repair Tips

Note:

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

5.8.1 NVM Editor

In some cases, it can be convenient if one directly can change the NVM contents. This can be done with the "NVM Editor" in SAM mode. With this option, single bytes can be changed.

Caution:

- Do not change these, without understanding the function of each setting, because incorrect NVM settings may seriously hamper the correct functioning of the TV set!
- Always write down the existing NVM settings, before changing the settings. This will enable you to return to the original settings, if the new settings turn out to be incorrect.

5.8.2 Load Default NVM Values

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

5.8.3 No Picture

When you have no picture, first make sure you have entered the correct display code. See paragraph [6.4 Option Settings](#) for the instructions. See also [Table 6-3](#).

5.8.4 Unstable Picture via HDMI input

Check (via ComPair or factory mode) if HDMI EDID data is properly programmed.

5.8.5 No Picture via HDMI input

Check if HDCP key is valid. This can be done in CSM.

5.8.6 TV Will Not Start-up from Stand-by

Possible Stand-by Controller failure. Re-flash the software.

5.8.7 Audio Amplifier

The Class D-IC U606 has a powerpad for cooling. When the IC is replaced it must be ensured that the powerpad is very well pushed to the PWB while the solder is still liquid. This is needed to insure that the cooling is guaranteed, otherwise the Class D-IC could break down in short time.

5.8.8 CSM

When CSM is activated and there is a USB memory stick connected to the TV, the software will dump the complete CSM content to the USB memory stick. The file (Csm.txt) will be saved in the root of the USB memory stick.

5.8.9 Loudspeakers

Make sure that the volume is set to minimum during disconnecting the speakers in the ON-state of the TV. The audio amplifier can be damaged by disconnecting the speakers during ON-state of the set!

5.8.10 Display option code

Attention: In case the SSB is replaced, always check the Panel Code in CSM, even when picture is available. Performance with the incorrect display option code can lead to unwanted side-effects for certain conditions.

6. Alignments

Index of this chapter:

- [6.1 General Alignment Conditions](#)
- [6.2 Hardware Alignments](#)
- [6.3 Software Alignments](#)
- [6.4 Option Settings](#)
- [6.5 Reset of Repaired SSB](#)

6.1 General Alignment Conditions

- Perform all electrical adjustments under the following conditions:
- Power supply voltage: 90 - 264 V_{AC}, 50/ 60 ± 3 Hz.
 - 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 heat sinks as ground.
 - Test probe: R_i > 10 MΩ, C_i < 20 pF.
 - Use an isolated trimmer/screwdriver to perform alignments.

6.2 Hardware Alignments

Not applicable.

6.3 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 RGB Align and go to one of the sub menus. The alignments are explained below. The following items can be aligned:
- White point.

To store the data:

- Press OK on the RC **before the cursor is moved to the left**.
- Select “Store” and press OK on the RC.
- 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).

6.3.1 RGB Alignment

Before alignment, set the picture as follows:

Picture Setting	
Dynamic backlight	Off
Dynamic Contrast	Off
Color Enhancement	Off
Picture Format	Unscaled
Light Sensor	Off
Brightness	50
Color	0
Contrast	100

White Tone Alignment:

- Activate SAM.
- Select “RGB Align.” and choose a color temperature.
- Use a 100% white screen as input signal and set the following values:
 - “Red BL Offset” and “Green BL Offset” to “7” (if present).
 - All “White point” values initial to “128”.

In case you have a colour analyser:

- Measure with a calibrated (phosphor- independent) color analyser (e.g. Minolta CA-210) in the centre of the screen. Consequently, the measurement needs to be done in a dark environment.
- Adjust the correct x, y coordinates (while holding one of the White point registers R, G or B on max. value) by means of decreasing the value of one or two other white points to the correct x, y coordinates (see Table [6-1 White D alignment values](#)). Tolerance: dx: ± 0.003, dy: ± 0.003.
- Repeat this step for the other colour Temperatures that need to be aligned.
- When finished return to the SAM root menu and press STANDBY on the RC to store the aligned values to the NVM.

Table 6-1 White D alignment values

Value	Cool (11000 K)	Normal (9000 K)	Warm (6500 K)
x	0.276	0.287	0.313
y	0.282	0.296	0.329

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).

6.3.2 Display Adjustment

You can use the default values. The default values are average values coming from production.

- Enter SAM mode.
- Select a colour temperature (e.g. COOL, NORMAL, or WARM).
- Set the RED, GREEN and BLUE default values according to the values in [Table 6-2](#).
- When finished press OK on the RC, then press STORE to store the aligned values to the NVM.
- Restore the initial picture settings after the alignments.

Table 6-2 White tone default settings

Picture mode	Screen size	Colour temperature		
		Red	Green	Blue
Normal (9000K)	24HFL3009D/12	209	218	255
	28HFL3009D/12	255	247	244
	28HFL5009D/12	221	239	255
	32HFL3009D/12	255	213	217
	32HFL5009D/12	255	254	191
	40HFL3009D/12	255	232	207
	40HFL5009D/12	255	255	236
	48HFL5009D/12	255	231	219
	55HFL5009D/12	255	240	220
Cool (11000K)	24HFL3009D/12	175	195	255
	28HFL3009D/12	230	231	255
	28HFL5009D/12	188	215	255
	32HFL3009D/12	253	231	255
	32HFL5009D/12	255	255	148
	40HFL3009D/12	255	249	250
	40HFL5009D/12	220	255	255
	48HFL5009D/12	255	243	255
	55HFL5009D/12	255	240	255
Warm (6500K)	24HFL3009D/12	255	237	217
	28HFL3009D/12	255	219	161
	28HFL5009D/12	255	246	204
	32HFL3009D/12	255	219	167
	32HFL5009D/12	255	255	060
	40HFL3009D/12	255	197	120
	40HFL5009D/12	255	212	135
	48HFL5009D/12	255	255	138
	55HFL5009D/12	255	243	214

This group setting of colour temperature will be applied automatically to the TV / VGA / HDMI / AV sources.

6.4 Option Settings

6.4.1 Introduction

The microprocessor communicates with a large number of I²C 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 MT5580 ICs 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 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).

6.4.2 Option Code Overview

Enter SAM mode to check the option codes. they could be edited in the NVM.

6.4.3 Display Code Overview

Press the following key sequence on a standard RC transmitter: "062598" directly followed by MENU and "xxx", where "xxx" is a 3 digit decimal value of the panel type: see column "Display Code" in [Table 6-3](#). After resetting the Display Code, restart the set immediately.

Table 6-3 Display code overview

CTN_ALT BOM#	Panel Type	Display Code
24HFL3009D/12	TPM236H3-BJ1L03.N SC1B	206
28HFL3009D/12	TPT275B5-A014 S11C	105
28HFL5009D/12	TPT275B5-A014 S11C	105
32HFL3009D/12	TPT315B5-DXJSFE S1U	112
32HFL5009D/12	TPT315B5-EUJFFA S1P	061
40HFL3009D/12	TPT400LA-J6PE1 SC1R	113
40HFL5009D/12	TPT400LA-HM06 SC1D	062
48HFL5009D/12	TPT480LS-HN03 SC1D	103
55HFL5009D/12	TPT550J1-DUJSGE S1A	063

6.5 Reset of Repaired SSB

A very important issue towards a repaired SSB from a Service repair shop (SSB repair on component level) 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 or use the "NVM editor" and "Dealer options" items in SAM (do not forget to "store").

After a repaired SSB has been mounted in the set (set repair on board level), the type number (CTN) and production code of the TV has to be set according to the type plate of the set. For this, you can use the NVM editor in SAM. The loading of the CTN and production code can also be done via ComPair (Model number programming).

In case of a display replacement, reset the "Operation hours display" to "0", or to the operation hours of the replacement display.

Remark:

- After the NVM has been replaced, go to SAM and scroll to the <Reload MAC address> (see figure 1*).
- Select the item and press <OK> on the RC.

6.5.1 Reset of Repaired SSB

Instruction

After NVM replacement, reload MAC address via SAM menu. This ensures the correct MAC address to be available in CSM for future repair actions.

Way of working:

- After the NVM has been replaced, go to SAM and scroll to the <Reload MAC address> .
- Select the item and press <OK> on the RC.

Notes:

- Only applicable to all related models that are "**Smart TV level 0**" enabled (only YouTube access). For models without internet connection feature, **no action** is needed.
- HDCP keys are located in the NVM. If you are loading NVM with the ComPair tool, there is warning message displayed.

New NVM EEPROMs are shipped with pre-loaded HDCP keys.

6.5.2 SSB Identification

SSB's of this chassis are identified by a "715" code on the SSB. 715Axxxx-Nnn-MMM-OOOO

- **715** main category, Printed Wiring Board
- **Axxxx** sub category, sequential coding number
- **Nnn** Version code
 - **N** Development number
 - **nn** Production number
- **MMM** Mounting variation code
- **OOOO** Optional variation code

Make sure when replacing an SSB the SSB identification codes match the replacement panel.

7. Circuit Descriptions

Index of this chapter:

- [7.1 Introduction](#)
- [7.2 Power Supply](#)
- [7.3 DC/DC Converters](#)
- [7.4 Front-End Analogue and DVB-T, DVB-C, ISDB-T reception](#)
- [7.5 Front-End Analogue and DVB-S2 reception](#)
- [7.6 HDMI](#)
- [7.7 Video and Audio Processing - MT5580PUEI/B](#)

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 (see chapter [9. Block Diagrams](#)) and circuit diagrams (see chapter [10. Circuit Diagrams and PWB Layouts](#)). Where necessary, you will find a separate drawing for clarification.

7.1 Introduction

The TPM14.1HE LA is a new chassis launched in Europe in 2014. The whole range is covered by SCALER MT5580.

The major deltas versus its predecessor support DVB-TC; DVB-TC/T2, DVB-TC/S2 with also multi-media, 3D, WIFI, Smart TV, Word Mark brightness, Light Sensor functionality.

The TPM14.1E LA chassis comes with the following stylings:

- series xxHFL3009D
- series xxHFL5009D

7.1.1 Implementation

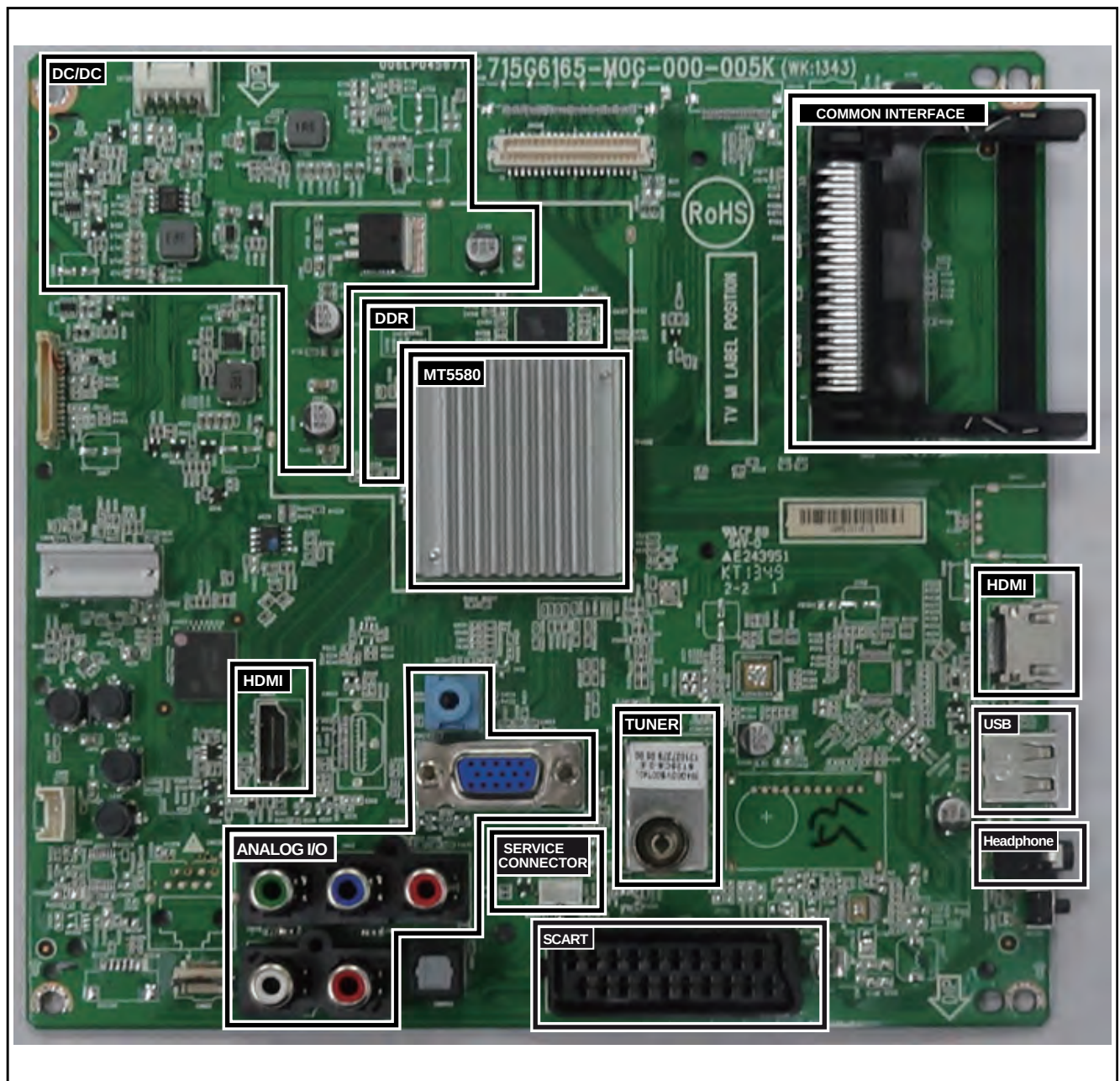
Key components of this chassis are:

- SCALER MT5580PUEI/B PBGA-511 TV Processor
- TUNER EUROPE ST25CS-2-E for H series (DVB-T/C)
- TUNER-TDSY-G720D for T series (DVB-T2)
- TUNER EUROPE TDQS-A901F for K series (DVB-S2)
- DEMODULATOR CXD2837ER-T4 VQFN-48 for T2 Demond
- TEST ONLY Others AVL6211LA LQFP-64 for S2 Demond
- TAS5760LDDCAR 20W TSSOP-48 for AUDIO Amplifier
- THGBM5G5A1JBAIR 4GB FBGA153 for EMMC IC
- MP8126DF-LF-Z 550mA 13V TSSOOP-16EP for LNB Power supply IC

7.1.2 TPM14.1HE LA Architecture Overview

For details about the chassis block diagrams refer to [Figure 9.1](#).

7.1.3 SSB Cell Layout



19680_200.eps

Figure 7-1 SSB layout cells (top view)

7.2 Power Supply

Refer to figure [Figure 7-2](#) for the power architecture of this platform.

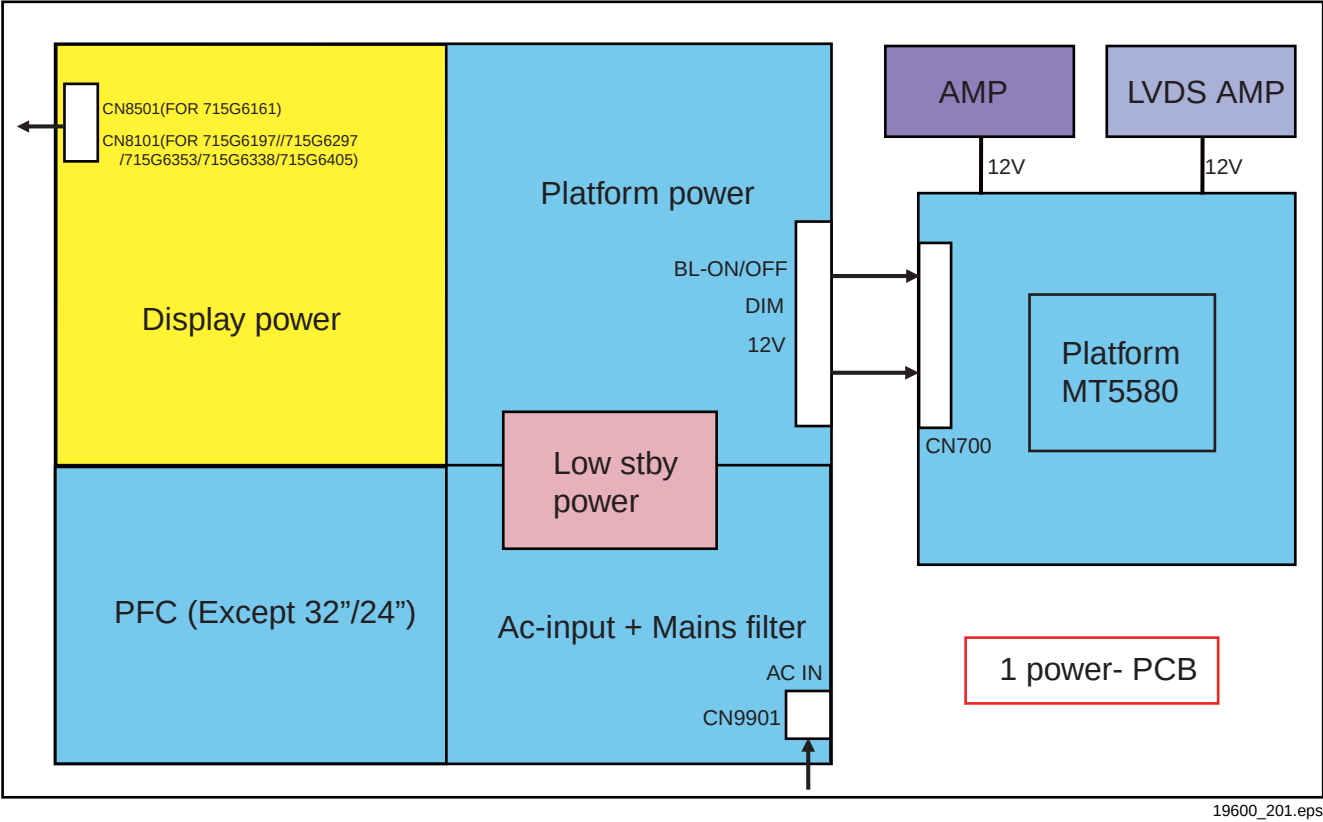


Figure 7-2 Power Architecture

7.2.1 Power Supply Unit

All power supplies are a black box for Service. When defective, a new panel must be ordered and the defective one must be returned, unless the main fuse of the panel is broken. Always replace a defective fuse with one with the correct specifications! This part is available in the regular market. Consult the Philips Service web portal for the order codes of the panels.

Important delta's with the TPM14.1HE LA classis platform are:

- New power architecture for LED backlight
- "Boost"-signal is now a PWM-signal + continuous variable.

The control signals are:

- Stand-by
- Lamp "on/off"
- DIM (PWM) (not for PSDL)

In this manual, no detailed information is available because of design protection issues.

The output voltages to the chassis are:

- +4V7-STANDBY (Stand-by mode only)
- +12V (on-mode)
- +Vsnd (+24V) (audio power) (on-mode)
- +12V (bolt-on power) (on-mode)

- Output to the display; in case of
 - IPB: High voltage to the LCD panel
 - PSL and PSLS (LED-driver outputs)
 - PSDL (high frequent) AC-current.

7.2.2 Diversity

The diversity in power supply units is mainly determined by the diversity in displays.

The following displays can be distinguished:

- CCFL/EEFL backlight: power panel is conventional IPB
- LED backlight:
 - side-view LED without scanning: PSL power panel
 - side-view LED with scanning: PSLS power panel
 - direct-view LED without 2D-dimming: PSL power panel
 - direct-view LED with 2D-dimming: PSDL power panel.

PSL stands for **P**ower **S**upply with integrated **L**ED-drivers.
PSLS stands for a **P**ower **S**upply with integrated **L**ED-drivers with added **S**canning functionality (added microcontroller).
PSDL stands for a **P**ower **S**upply for **D**irect-view **L**ED backlight with 2D-dimming.

7.2.3 Connector overview

Table 7-1 Connector overview

Connector												
Model	24"		28" & 32HFL3009D/12		32HFL5009D/12		40HFL3009D/12		40" & 48" 5009D		55"	
Number	CN8101	CN9904	CN8101	CN9101	CN9101	CN8501	CN8101		CN8101	CN9301	CN9301	CN8101
Description	to panel	to SSB	o panel	to SSB	to panel	to SSB	to panel	to SSB	to panel	to SSB	to SSB	to panel
Pin	8	14	6	14	14	6	12	14	12	14	14	12
1	LED1	DIM	VLED+	DIM	DIM	VLED+	LED1+	DIM	VLED+	DIM	DIM	VLED+_1
2	LED2	ON/OFF	VLED+	ON/OFF	ON/OFF	VLED+	n.c.	ON/OFF	n.c.	ON/OFF	On/Off	n.c.

Connector												
Model	24"		28" & 32HFL3009D/12		32HFL5009D/12		40HFL3009D/12		40" & 48" 5009D		55"	
Number	CN8101	CN9904	CN8101	CN9101	CN9101	CN8501	CN8101		CN8101	CN9301	CN9301	CN8101
Description	to panel	to SSB	o panel	to SSB	to panel	to SSB	to panel	to SSB	to panel	to SSB	to SSB	to panel
Pin	8	14	6	14	14	6	12	14	12	14	14	12
3	VLED+	n.c.	n.c.	n.c.	n.c.	n.c.	LED1-	PS_ON	VLED_1	PS_ON	PS_ON	VLED_1
4	VLED+	n.c.	n.c.	n.c.	n.c.	n.c.	LED1-	2D/3D	VLED_1	2D/3D	2D/3D	VLED_1
5	LED3	GND	VLED-	GND	GND	VLED-	n.c.	GND	n.c.	GND	GND	n.c.
6	LED4	GND	VLED-	GND	GND	VLED-	n.c.	GND	n.c.	GND	GND	n.c.
7	n.c.	GND	-	GND	GND	-	n.c.	GND	n.c.	GND	GND	n.c.
8	n.c.	GND	-	GND	GND	-	n.c.	GND	n.c.	GND	GND	n.c.
9	-	n.c.	-	+12V_audio	+12V_audio	-	VLED2-	+12V_AL	VLED_2	+12V	+12V_Audio	VLED_2
10	-	n.c.	-	+12V_audio	+12V_audio	-	VLED2-	+12V_AL	VLED_2	+12V	+12V_Audio	VLED_2
11	-	+12V	-	+12V	+12V	-	n.c.	+12V_AL	n.c.	+12V	+12v	n.c.
12	-	+12V	-	+12V	+12V	-	VLED2+	+12V_AL	VLED+	+12V	+12v	VLED+
13	-	+12V	-	+12V_AL	+12V	-		+12V_AL	-	+12V	+12v	-
14	-	+12V	-	+12V_AL	+12V	-		+12V_AL	-	+12V	+12v	-

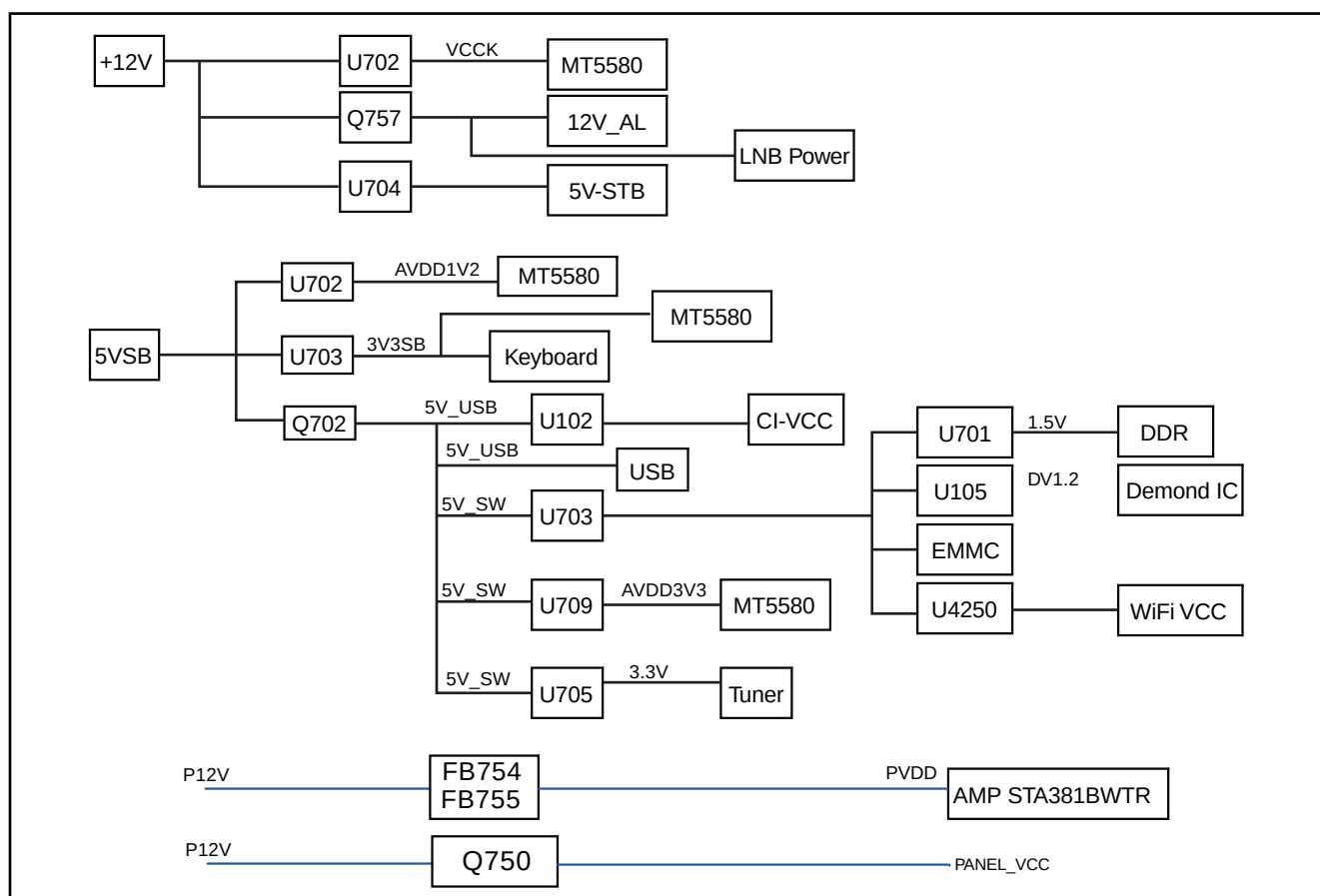
7.3 DC/DC Converters

The on-board DC/DC converters deliver the following voltages (depending on set execution):

- +5V-STANDBY, permanent voltage for the Stand-by controller, LED/IR receiver and controls
- +12V, input from the power supply for the panel common (active mode)
- +12V, input from the power supply for audio amplifier
- +1V2, from the power supply for the scaler IC MT5580
- +1V5, supply voltage for DDR2 (diagram B03B)
- +3V3, general supply voltage

- +5V, supply voltage for USB and CAM
- +3V3-TUN, supply voltage for tuner
- +5V-USB, input intermediate supply voltage for USB
- +3V3 from the power supply for the scaler IC MT5580
- +12V, input from the Power supply for the Ambilight common.
- +3V3-DVBS, clean voltage for DVB-S2 channel decoder.
- +1V2-DVBS, core voltage for DVB-S2 channel decoder.

Figures gives a graphical representation of the DC/DC converters with its current consumptions:



19600_202.eps

Figure 7-3 DC/DC converters

7.4 Front-End Analogue and DVB-T, DVB-C, ISDB-T reception

7.4.1 Front-END Analogue part

The Front-End for Analogue tuner consist of the following key components:

- TUNER EUROPE ST25CS-2-E(DVB-T/C)
- SCALER MT5580PUEI/B PBGA-511 TV Processor

Below find a block diagram of the front-end application for the front-end application for analogue part.

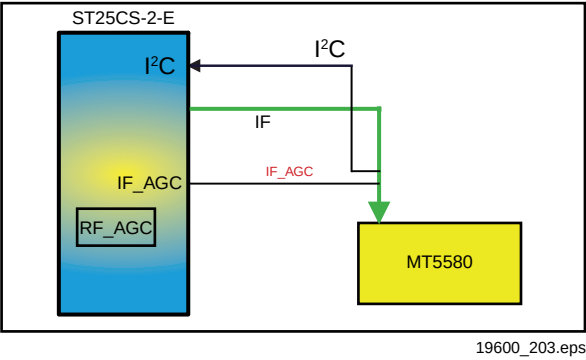


Figure 7-4 Front-End Analogue block diagram

7.4.2 DVB-T2 DTV part

The Front-End for DVB-T2 DTV consist of the following key components:

- TDSY-G720D (DVB-T2)
- SCALER MT5580PUEI/B PBGA-511 TV Processor
- DEMODULATOR CXD2842ER-T4 VQFN-48

Below find a block diagram of the front-end application for DVB-T2 DTV.

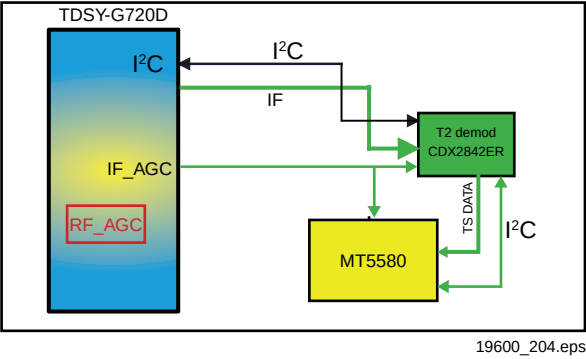


Figure 7-5 Front-End DVB-T2 DTV block diagram

7.5 Front-End Analogue and DVB-S2 reception

7.5.1 Front-END DVB-S2 part

The Front-End for DVB-S2 application consist of the following key components:

- TUNER EUROPE TDQS-A901F for K series (DVB-S2)
- TUNER EUROPE ST25CS-2-E (DVB-T/C)
- TEST ONLY Others AVL6211LA LQFP-64 for (K model) S2 Demond
- SCALER MT5580PUEI/B PBGA-511 TV Processor

Below find a block diagram of the front-end application for DVB-S2 part.

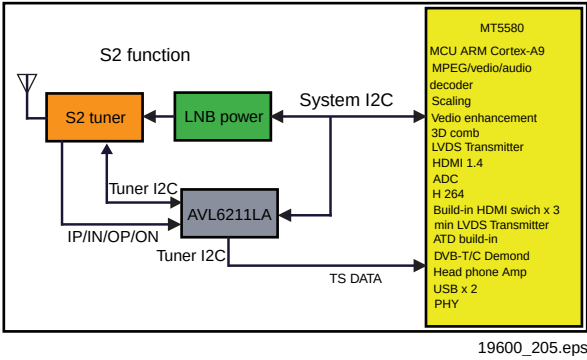


Figure 7-6 Front-End DVB-S2 block diagram

This application supports the following protocols:

- Polarization selection via supply voltage (18V=horizontal, 13V=vertical)
- Band selection via “toneburst” (22kHz): tone “on”= “high” band tone “off” = “low” band
- Satellite (LNB) selection via DiSEqC 1.0 protocol
- Reception of DVB-S (supporting QPSK encoded signals) and DVB-S2 (supporting QPSK, 8PSK, 16APSK and 32APSK encoded signals), introducing LDPC low-density parity check techniques.

7.6 HDMI

Refer to figure [7-7 HDMI input configuration](#) for the application.

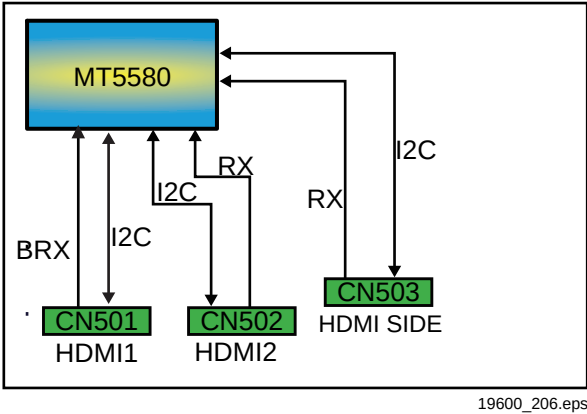


Figure 7-7 HDMI input configuration

The following HDMI connector can be used:

- HDMI 1: HDMI input (TV digital interface support HDCP) with digital audio / PC DVI input/ARC
- HDMI 2: HDMI input (TV digital interface support HDCP) with digital audio / PC DVI input
- HDMI input (TV digital interface support HDCP) with digital audio / PC DVI input
- +5V detection mechanism
- Stable clock detection mechanism
- Integrated EDID
- HPD control
- Sync detection
- TMDS output control
- CEC control

7.7 Video and Audio Processing - MT5580PUEI/B

The MT5580PUEI/B is the main audio and video processor (or System-on-Chip) for this platform. It has the following features:

- Multi-standard digital video decoder (MPEG-2, H.264, MPEG-4)

- ATSC (option)/DVB-T (option)/DVB-C (option) demodulator
- Worldwide multi-standard analog TV demodulator
- A multi-standard video decoder
- A transport de-multiplexer
- HDMI 1.4a receiver with 3D support
- 2D/3D converter
- Rich format audio codec
- Powerful dual core CPU
- Local dimming (LED backlight)

The MT5580PUEI/B combines front-end video processing functions, such as ATSC, DVB-T/T2, DVB-C, DVB-S/S2 channel decoding, MPEG1-2/H.264 decoding, analog video decode and HDMI reception, with advanced back-end video picture improvements. It also includes next generation Motion Accurate Picture Processing High flat panel screen resolutions and refresh rates are supported with formats including 1360 × 768 @ 60Hz and 1920 × 1080 @ 60Hz. The combination of Ethernet, CI+ and H.264 supports new TV experiences with IPTV and VOD. A 3D comb filter added to the TV decoder recovers great details for still picture. The special color processing technology provides a nature, deep colors and true studio quality video. Professional error-concealment provides stable, smooth and mosaic-free video quality.

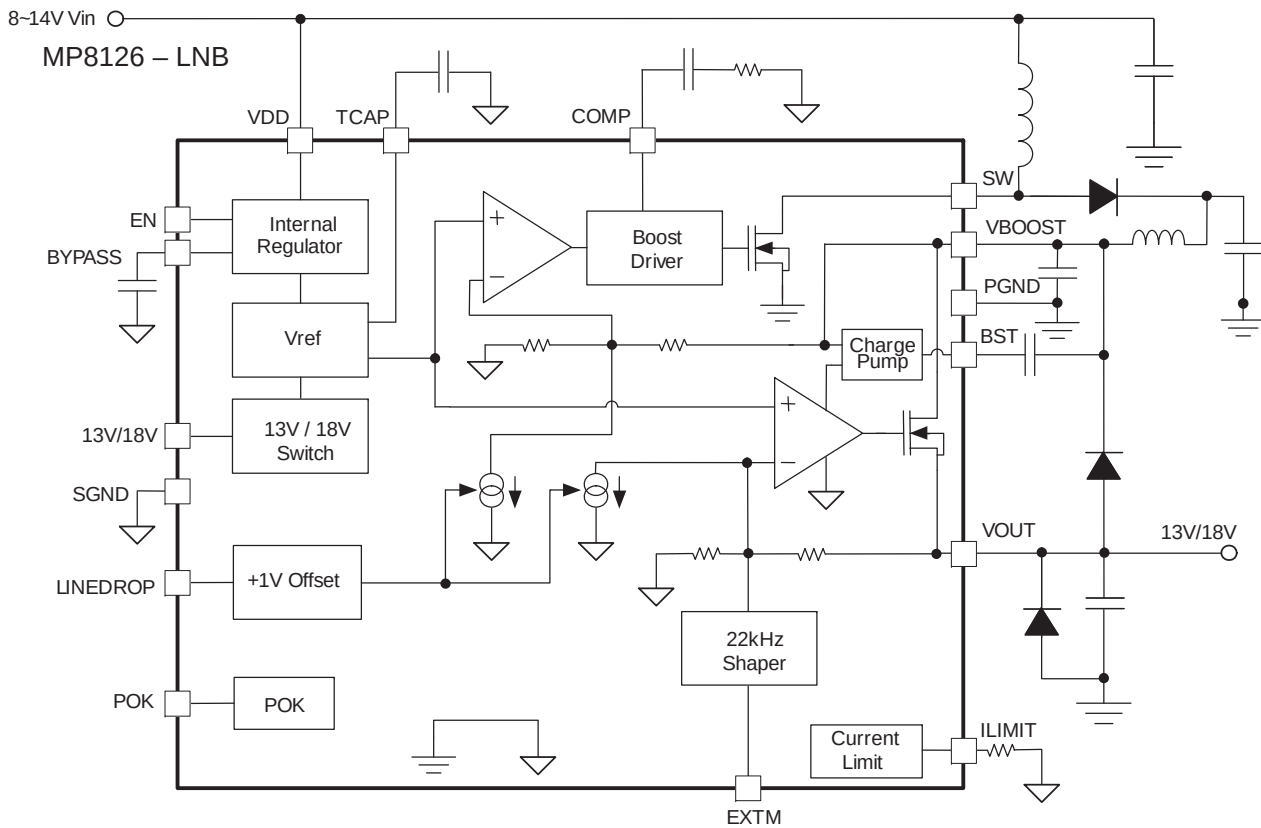
For a functional diagram of the MT5580PUEI/B, refer to [Figure 8-2](#).

8. IC Data Sheets

This chapter 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).

8.1 Diagram [10-7-2 System Power 2](#), B02,MP8126DF-LF-Z (IC U751)

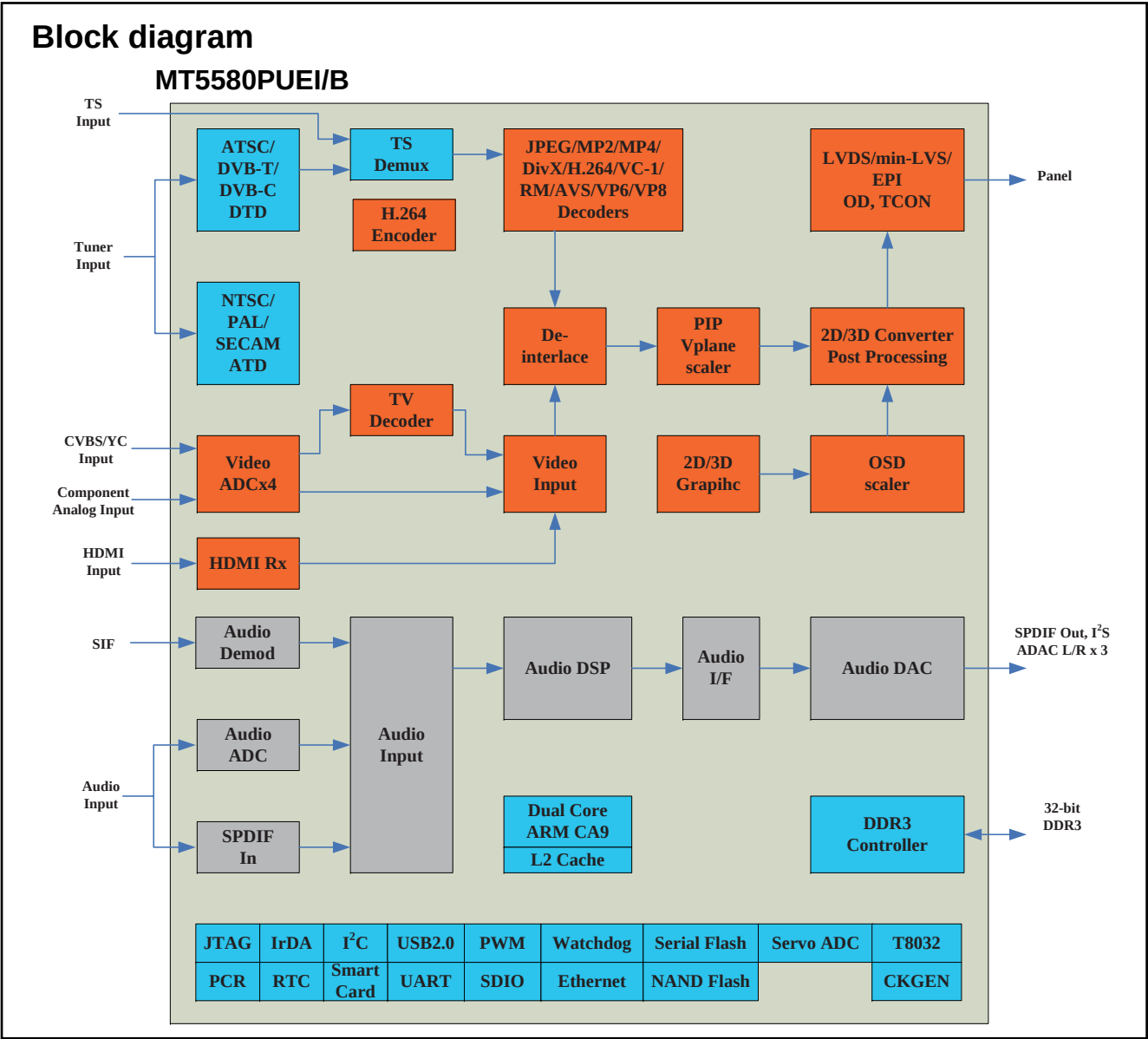
Block diagram



19610_300.eps

Figure 8-1 Internal block diagram

8.2 Diagram 10-7-3 Peripheral, B03,MT5580PUEI/B (IC U401I)



19600_300.eps

Figure 8-2 Internal block diagram

Pinning Information

MT5580PUEI/B

511	1	2	3	4	5	6	7	8	9	10	11	12	13
A	RODT	RRAS#	RCSX#		DDR3_RST#	RA9	RBA2		RDQ19		RDQS3	RCLK1#	RDQS2
B	RDQ6	RCAS#	RCS#		RA7	RA3	RBA0		RDQ17	RDQM2	RDQS3#	RCLK1	RDQS2#
C	RDQ0	RDQ4	RWE#	RA5	RA2	RA13	RA8	RDQ21	RDQ23	AVDD33_MEMPLL	DVSS	DVSS	RDQM3
D	RDQS0#	RDQS0	RDQ2	RA0	RA11	RA6	RA14	RA1	RBA1	RDQ24			RDQ28
E	RCLK0#	RCLK0	RVREF	RDQ11	DVSS	RA12	RA4		RCKE	RDQ26		RDQ30	RDQ31
F	RDQS1	RDQS1#			RDQ9	DVSS	DVSS	DVSS	RA10				RDQ29
G	DVSS	RDQM0	RDQ13	RDQ15	RDQM1		DVSS	DVSS	DVSS	AVSS33_MEMPLL	MEMTP	MEMTN	
H		RDQ3	RDQ1	RDQ10	RDQ12	DVSS	DDRV						
J	RDQ5	RDQ7	RDQ14	RDQ8	DDRV	DVSS			DVSS	VCCK	VCCK	DVSS	DVSS
K	DDRV	DDRV	DDRV	DDRV	DDRV	DDRV	DDRV		DVSS	DVSS	DVSS	DVSS	DVSS
L	VCCK	VCCK	VCCK	VCCK	VCCK	VCCK	VCCK	VCCK	DVSS	DVSS	DVSS	DVSS	DVSS
M	VCCK	VCCK	VCCK	VCCK	VCCK	VCCK	VCCK	VCCK	DVSS	DVSS	DVSS	DVSS	DVSS
N		AVDD33_HDMI_RX_X	HDMI_1_RX_CB	HDMI_1_RX_C	VCCK	VCCK	AVSS33_HDMI_RX_X	VCCK	VCCK	DVSS	DVSS	DVSS	DVSS
P			HDMI_1_RX_0B	HDMI_1_RX_0	HDMI_1_SCL	HDMI_1_SDA	GPIO0	DVSS	VCCK	DVSS	DVSS	DVSS	DVSS
R	HDMI_1_RX_1B	HDMI_1_RX_1	HDMI_1_RX_2B	HDMI_1_RX_2		OSCL0	OSDA0		VCCK	DVSS	DVSS	DVSS	DVSS
T			HDMI_2_RX_CB	HDMI_2_RX_C	HDMI_2_SCL	HDMI_2_SDA	HDMI_2_HPD	HDMI_1_HPD	VCCK	DVSS	DVSS	DVSS	DVSS
U	HDMI_2_RX_0B	HDMI_2_RX_0	HDMI_2_RX_1B	HDMI_2_RX_1	HDMI_C_EC	GPIO7	GPIO2	DVSS	DVSS	VCCK	VCCK	VCCK	VCCK
V			HDMI_2_RX_2B	HDMI_2_RX_2		GPIO8		DVSS	AVSS33_ELDO	AVSS33_VGA_STB	ADIN1_SRV	DVSS	AVSS12_RGB
W	AVDD12_HDMI_RX_X	AVDD12_HDMI_RX_X	HDMI_3_SCL	HDMI_3_SDA	HDMI_3_HPD		GPIO5	AVSS33_COM	POR_BND	U0TX		ADIN0_SRV	
Y	PDD7	PDD6	PDD5		GPIO3	GPIO9	OPCTRL2	AVSS33_LD	OPWRSB	U0RX		OPCTRL3	
AA		PDD4	PDD3	VCC3IO_C	PAALE	ADIN3_SRV	GPIO1		ADIN2_SRV	OPCTRL4			
AB	PDD1	PDD2	VCC3IO_B	ASPDIF_O0	PACLE	POWE#	ADIN4_SRV	OPCTRL1	ADIN5_SRV	OIRI		BP	RP
AC	PARB#	PDD0	GPIO6	POCE0#	POOE#	POCE1#	AOSDAT_A1	AOBCK	OPCTRL0	VSYNC	HSYNC	SOG	SOY1
AD	GPIO4	RXVN_1	TXVN_0	AVDD33_ETH		AOSDAT_A0	AOLRCK	AOMCLK	VGA_SDA	AVDD10_LDO		COM	
AE	REXT	RXVP_1	TXVP_0	AVDD10_ELDO		ALIN		ORESET_B	VGA_SCL	AVDD33_VGA_STB		GP	

19600_301.eps

Figure 8-3 Pin configuration [1/2]

Pinning Information

MT5580PUEI

14	15	16	17	18	19	20	21	22	23	24	25	
RDQ16		AO0P	AO1P	AO2P	AOCKP	AO3P	AO4P	AO5P	AVDD33_L_VDSA	TCON5	TCON12	A
RDQ18	RDQ20	AO0N	AO1N	AO2N	AOCKN	AO3N	AO4N	AO5N	AVDD12_L_VDSA	TCON3	TCON7	B
RDQ22		AE1N	AE1P	AECKN	AECKP	AE4N	AE4P	TCON0	TCON1	TCON8	TCON4	C
	DVSS	AE0P	AE2N		AE3N		AE5N	TCON6	TCON11	TCON2	TCON10	D
RDQ27	DVSS	AE0N	AE2P		AE3P	AVSS33_L_VDSA	AE5P	OPWM2	OPWM3	TCON9	VCC3IO	E
RDQ25	DVSS		AVSS33_L_VDSA				FSRC_WR	OPWM6	OPWM1			F
DVSS	AVSS33_C_PUPLL	AVSS33_L_VDSA					OPWM4	OPWM5	OPWM0	CIGPIO52	CIGPIO36	G
VCKK	AVSS12_L_VDSA	CIGPIO5	CIGPIO55	CIGPIO6	CIGPIO12	CIGPIO35	CIGPIO34	CIGPIO0	CIGPIO26	CIGPIO28	CIGPIO27	H
DVSS	VCKK	DVSS	DVSS		CIGPIO44	CIGPIO49	CIGPIO24	CIGPIO23	CIGPIO45			J
DVSS	DVSS	VCKK	DVSS	CIGPIO8	CIGPIO14				CIGPIO1	CIGPIO46	CIGPIO2	K
DVSS	DVSS	DVSS	DVSS	DVSS				CIGPIO48	CIGPIO4	CIGPIO56	CIGPIO3	L
DVSS	DVSS	DVSS	DVSS	CIGPIO17	IF_AGC	RF_AGC	OSCL2	OSDA2	CIGPIO25			M
DVSS	DVSS	DVSS	DVSS	CIGPIO47	CIGPIO43	CIGPIO11	CIGPIO9	CIGPIO50	CIGPIO15	CIGPIO20	CIGPIO19	N
DVSS	DVSS	DVSS	AVSS33_U_SB	CIGPIO10					CIGPIO7	CIGPIO13	AVDD33_USB	P
DVSS	DVSS	DVSS	VCKK	AVSS33_H_DM1_3_RX						GPIO10	GPIO11	R
DVSS	DVSS	DVSS	VCKK	CIGPIO41	CIGPIO33	CIGPIO32	CIGPIO40	CIGPIO39		USB_DP_P1	USB_DM_P1	T
VCKK	VCKK	VCKK	DVSS	CIGPIO38	CIGPIO30	CIGPIO31	CIGPIO21	CIGPIO22	CIGPIO16	USB_DP_P0	USB_DM_P0	U
AVSS33_V_DAC	AVSS33_P_LLGP	AVSS33_D_EMOD	AVSS33_H_PA	CIGPIO37						HDMI_3_R_X_2B	HDMI_3_R_X_2	V
MPXP	AVSS33_V_DAC_BG	CVBS0P	AVSS33_C_VBS_1	DVSS	AVSS33_A_DAC					HDMI_3_R_X_1B	HDMI_3_R_X_1	W
VDACY_O_UT		CVBS3P	AVSS33_C_VBS_2	AVSS33_A_ADC	CIGPIO29	CIGPIO54	CIGPIO53	CIGPIO51		HDMI_3_R_X_0B	HDMI_3_R_X_0	Y
VDACX_O_UT	CVBS_CO_M	CVBS2P		AVSS33_C_LN			CIGPIO18		CIGPIO42	HDMI_3_R_X_CB	HDMI_3_R_X_C	AA
Y1P	SOY0	CVBS1P		AIN2_I_A_ADC	AIN1_I_A_ADC	AIN3_I_A_ADC	AIN1_R_A_ADC	AIN2_R_A_ADC	AIN4_R_A_ADC	AVDD12_HDMI_3_R_X	AVDD33_HDMI_3_R_X	AB
PR1P	Y0P	COM0	AVDD12_RGB	AVSS12_D_EMOD		AIN4_I_A_ADC		AIN3_R_A_ADC		AL1_ADA_C	AR2_ADA_C	AC
COM1		PB0P	AVDD33_VIDEO	AVDD12_DEMOD	ADCINP_D_EMOD	AVSS33_X_TAL_STB	XTALO	AVDD33_AADC	VMIID_AA_DC	AL2_ADA_C	AR0_ADA_C	AD
PB1P		PR0P	AVDD33_PLL	AVDD33_DEMOD	ADCINN_DEMOD	AVDD33_X_TAL_STB	XTALI	AVDD33_HPA	AVDD33_ADAC	AL0_ADA_C	AR1_ADA_C	AE
14	15	16	17	18	19	20	21	22	23	24	25	

19600_302.eps

Figure 8-4 Pin configuration [2/2]

8.3 Diagram [10-7-6 Speaker/Headphone B06, TAS5760LD \(IC U602\)](#)

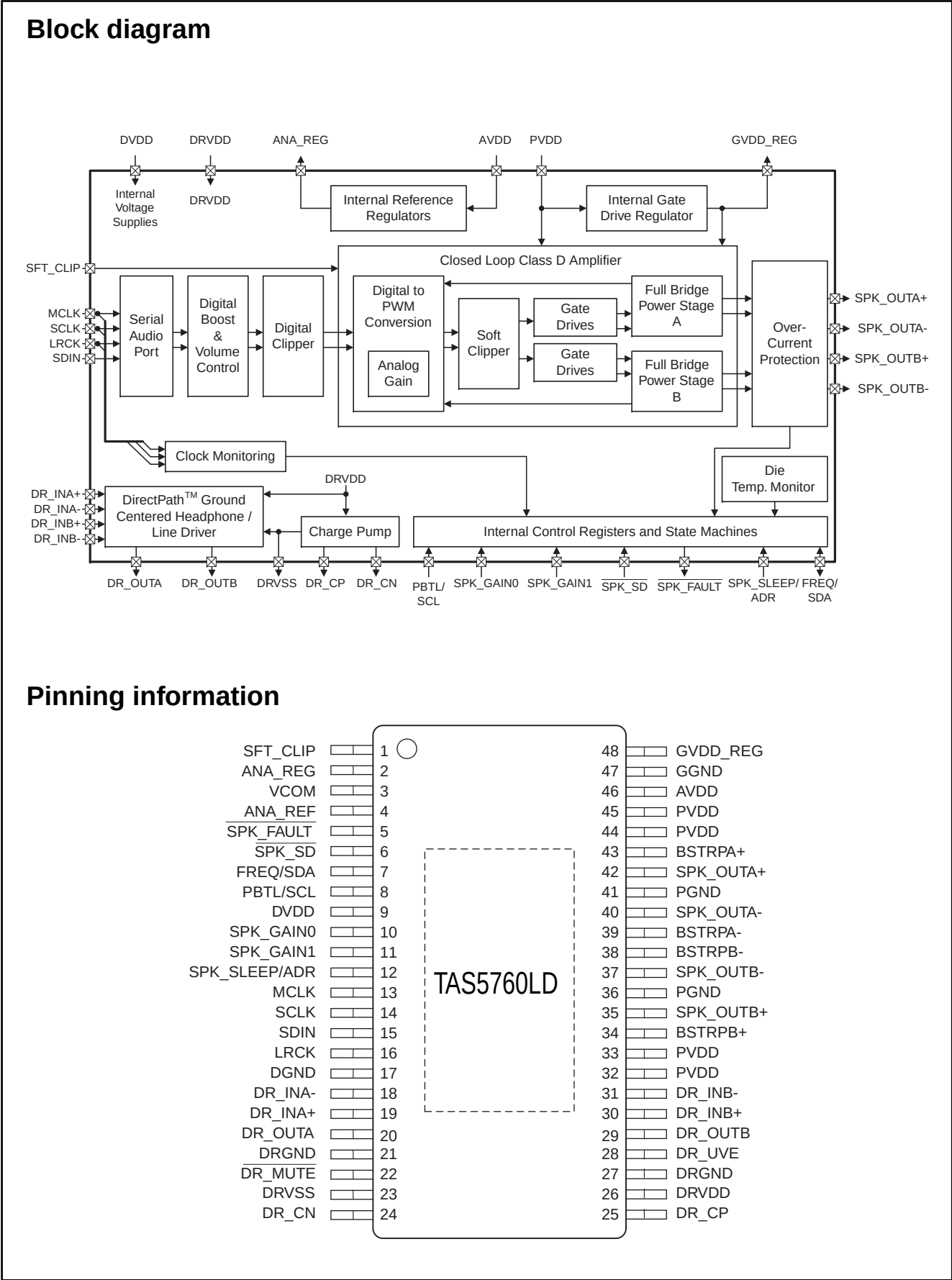


Figure 8-5 Internal block diagram and pin configuration

8.4 Diagram 10-7-13 DVB/T2/C/S2 Tuner B13, AVL6211LA (IC U104)

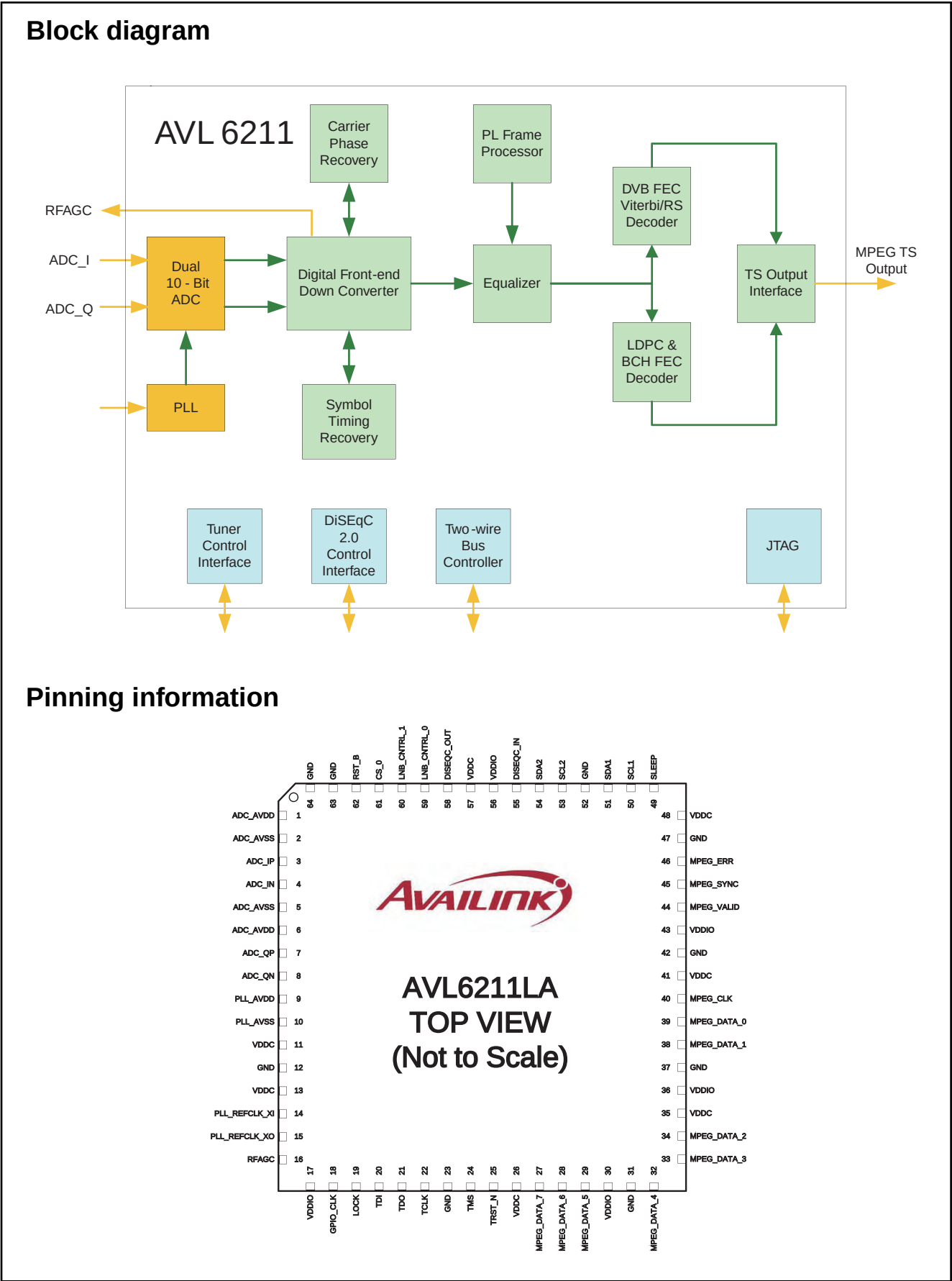
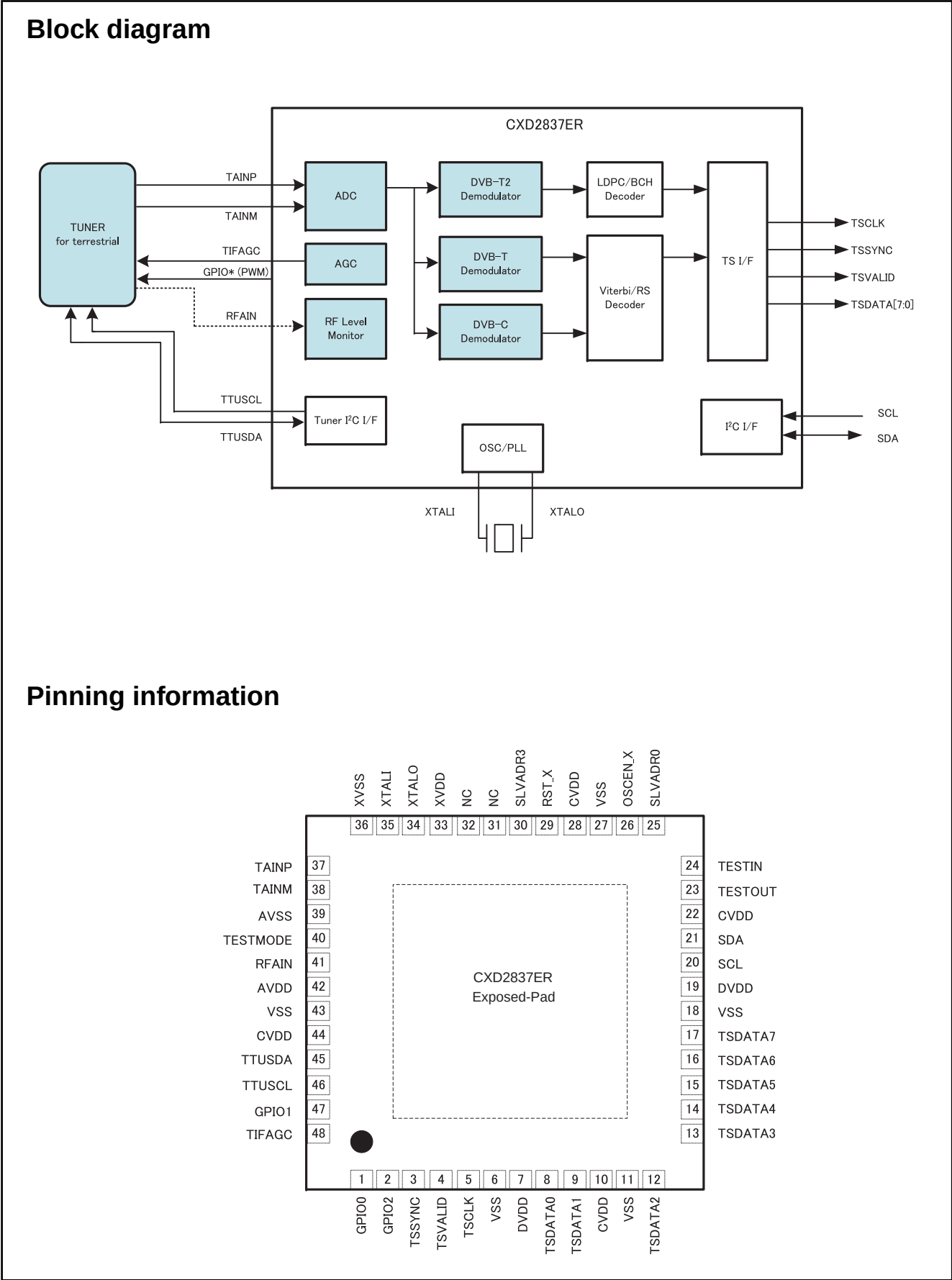


Figure 8-6 Internal block diagram and pin configuration

8.5 Diagram [10-7-13 DVB/T2/C/S2 Tuner B13, CXD2837ER \(IC U103\)](#)

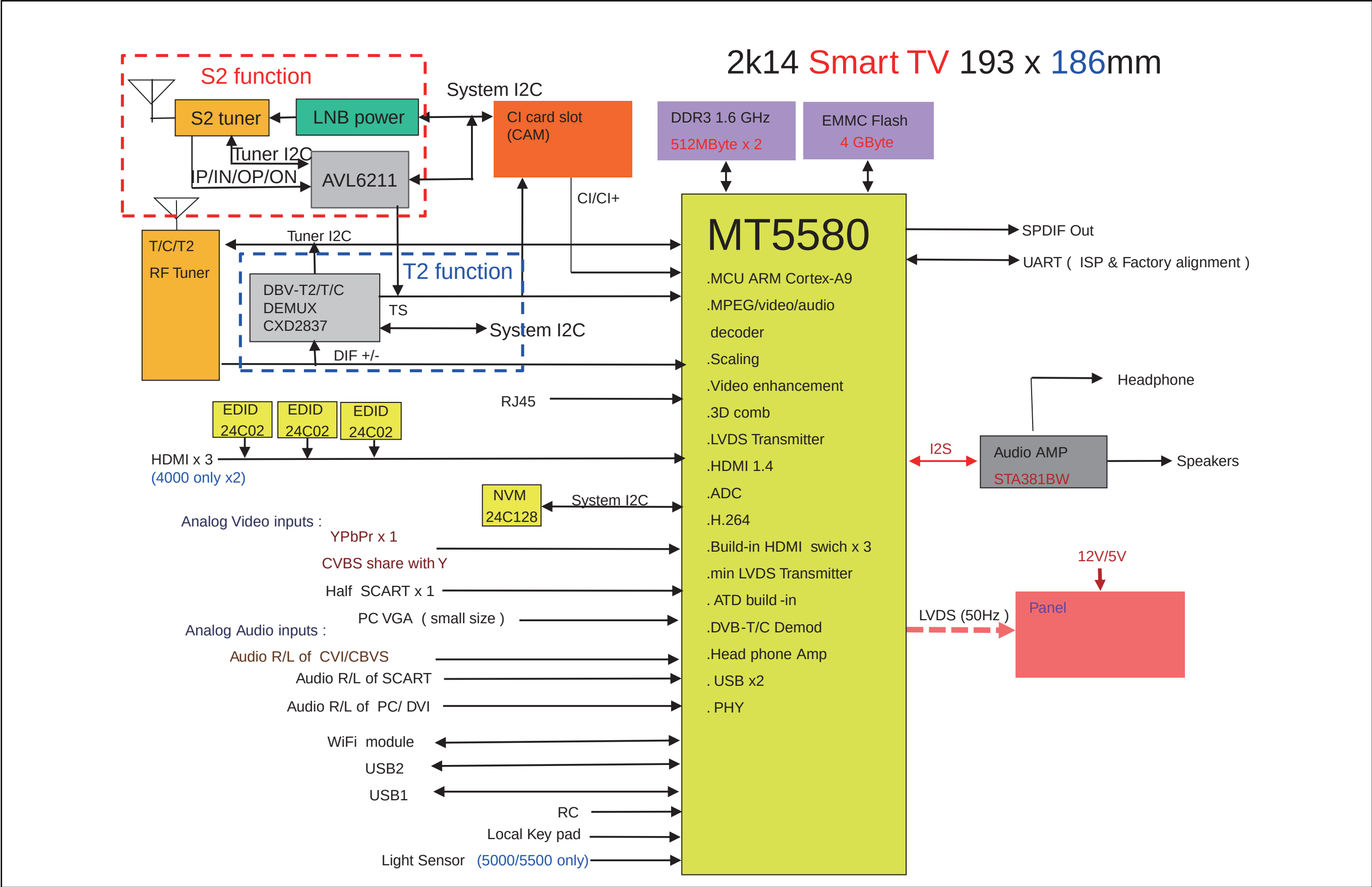


19600_305.eps

Figure 8-7 Internal block diagram and pin configuration

9. Block Diagrams

9.1 Block diagram 3009D/5000D series

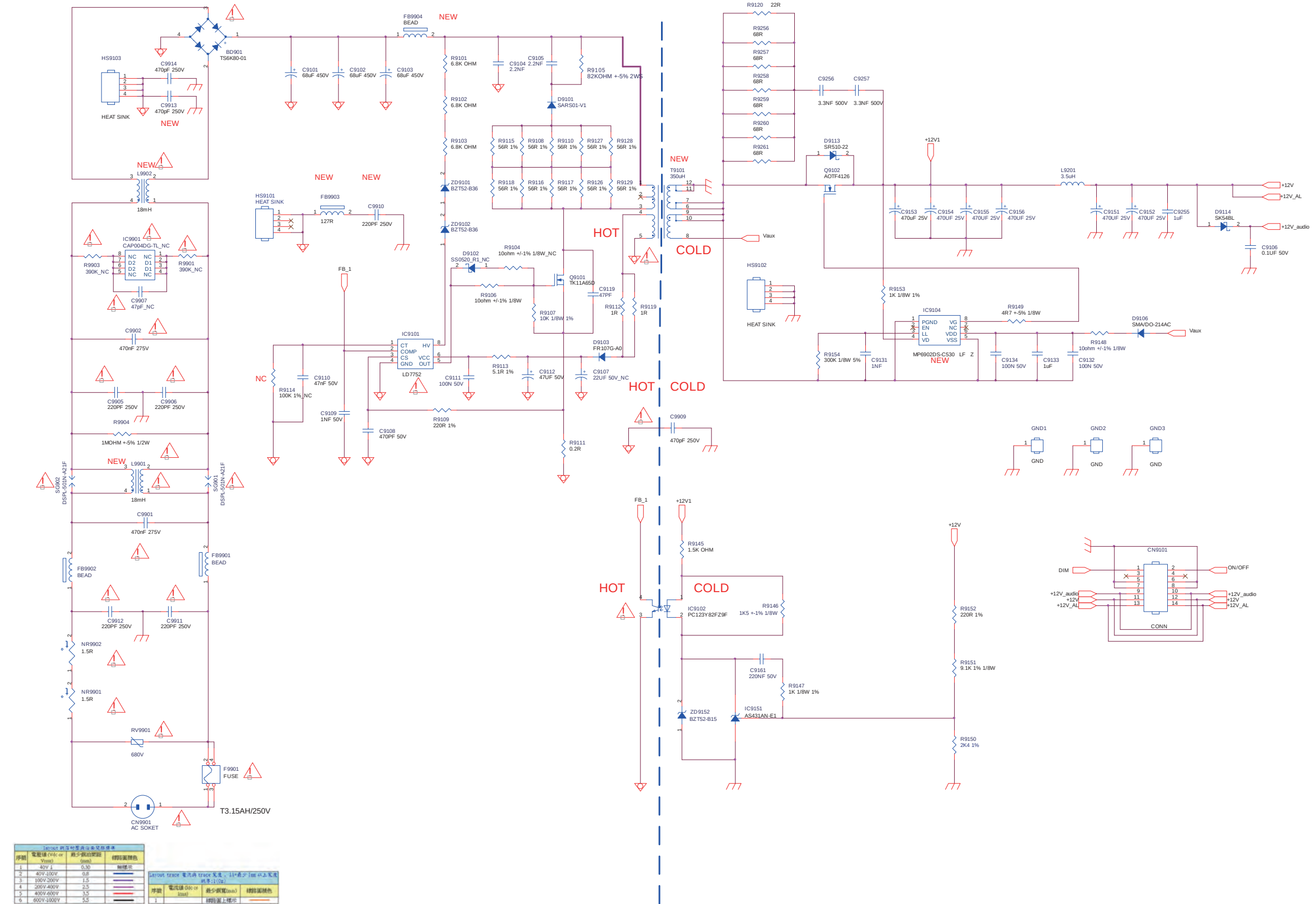


10.1 A 715G6161 PSU

A01

POWER

A01



LAYOUT 版面設計注意事項與標準			
序號	電線線徑 (Wire or Ymm)	最小銅箔厚度 (mm)	線路圖例
1	40V 1	0.30	
2	40V 100V	0.8	
3	100V 500V	1.5	
4	200V 400V	2.5	
5	400V 600V	3.5	
6	600V 1000V	5	

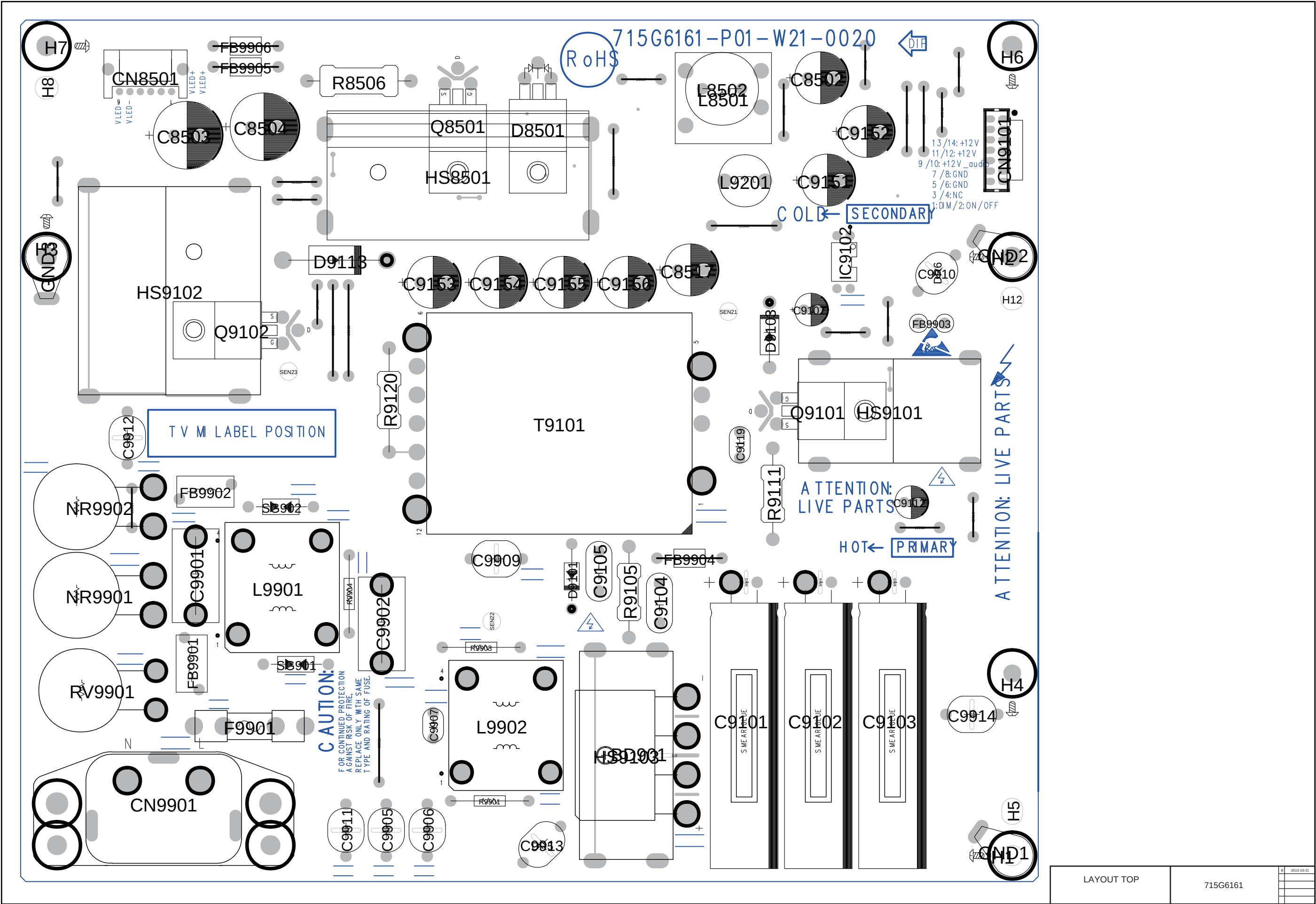
POWER

715G6161

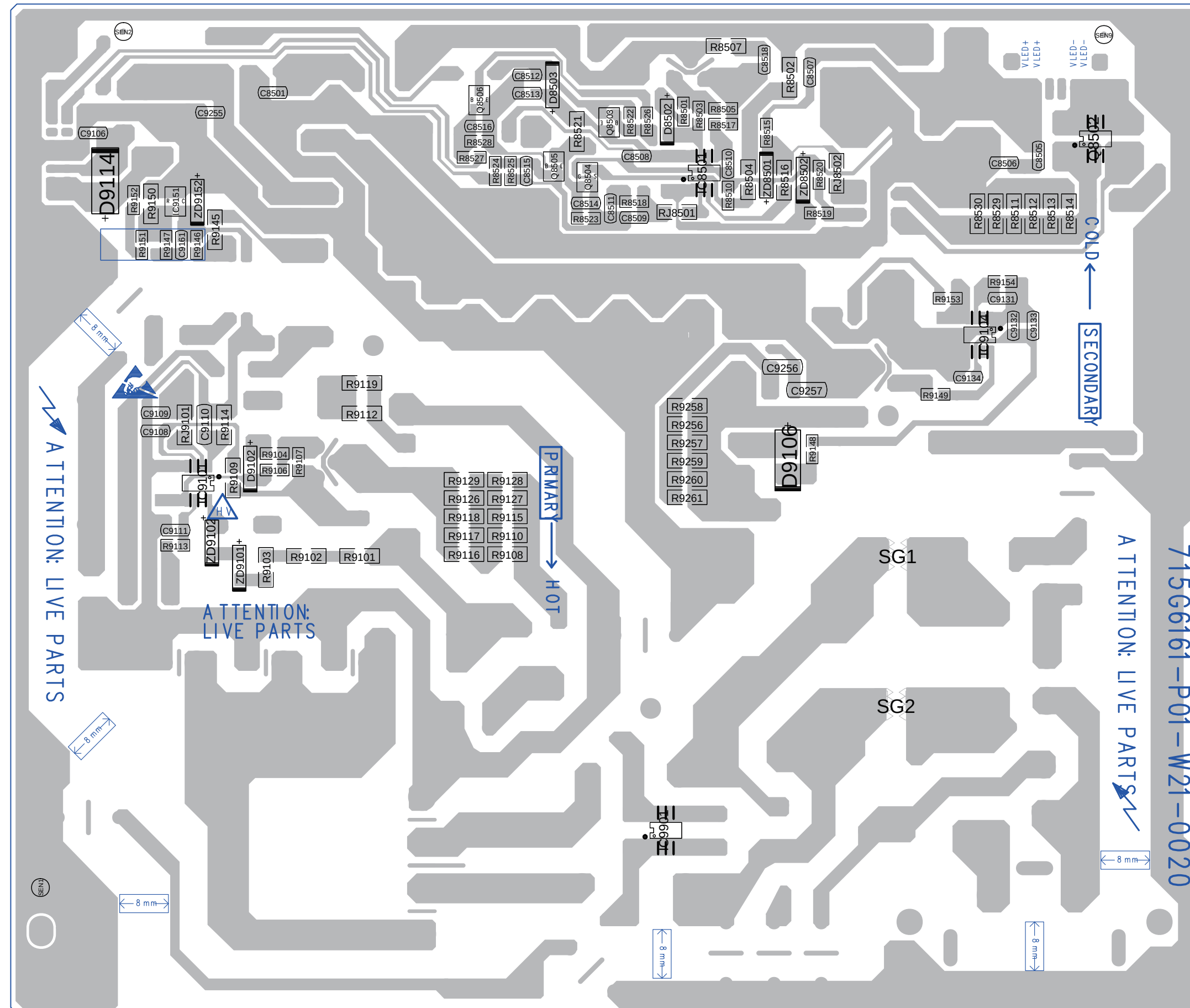
2013-10-21

19602_500.eps

10-1-3 Power layout top



10-1-4 Power layout bottom

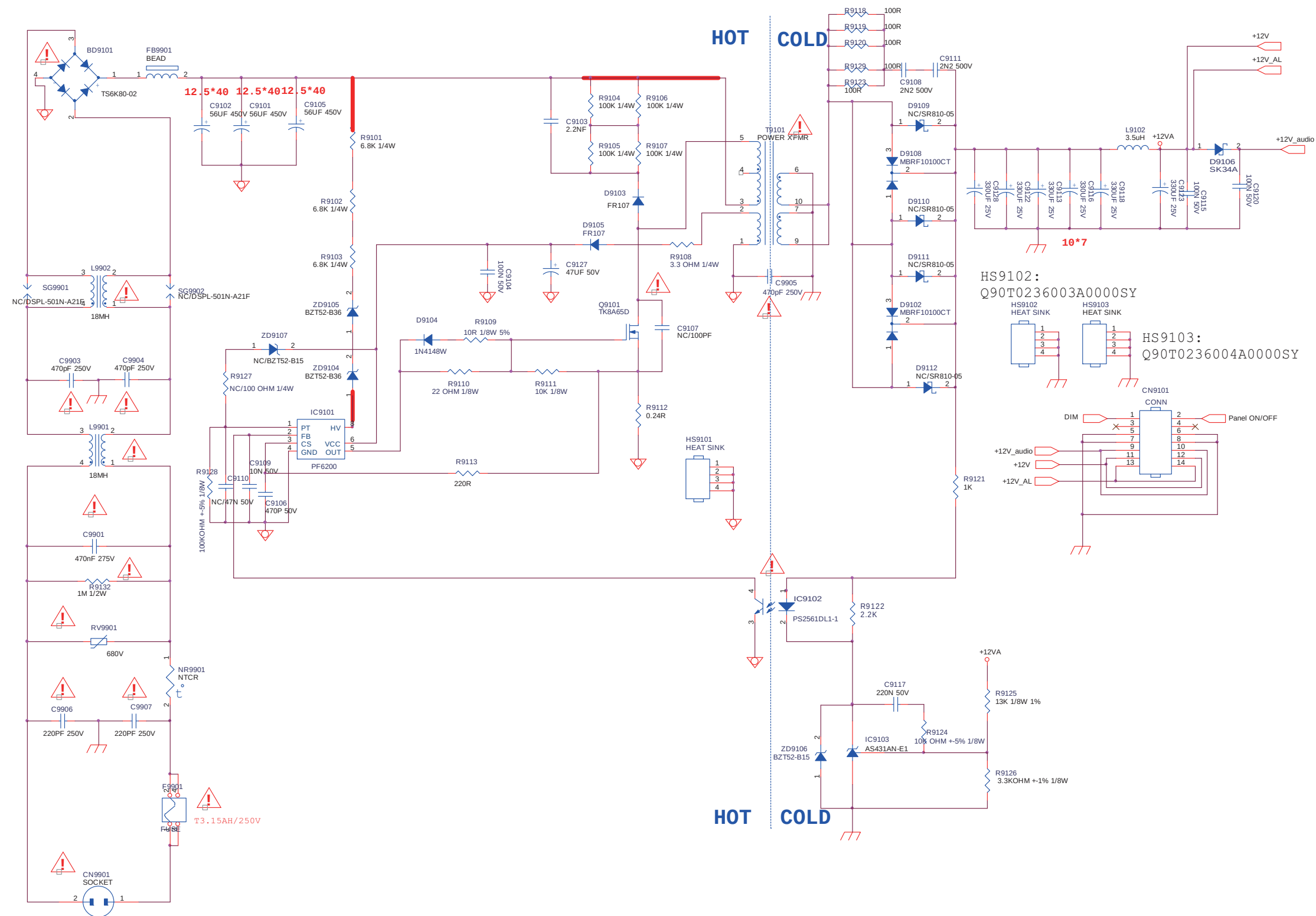


LAYOUT BOTTOM	715G6161	B	2013-10-21

10-2-1 Power

Power

A01

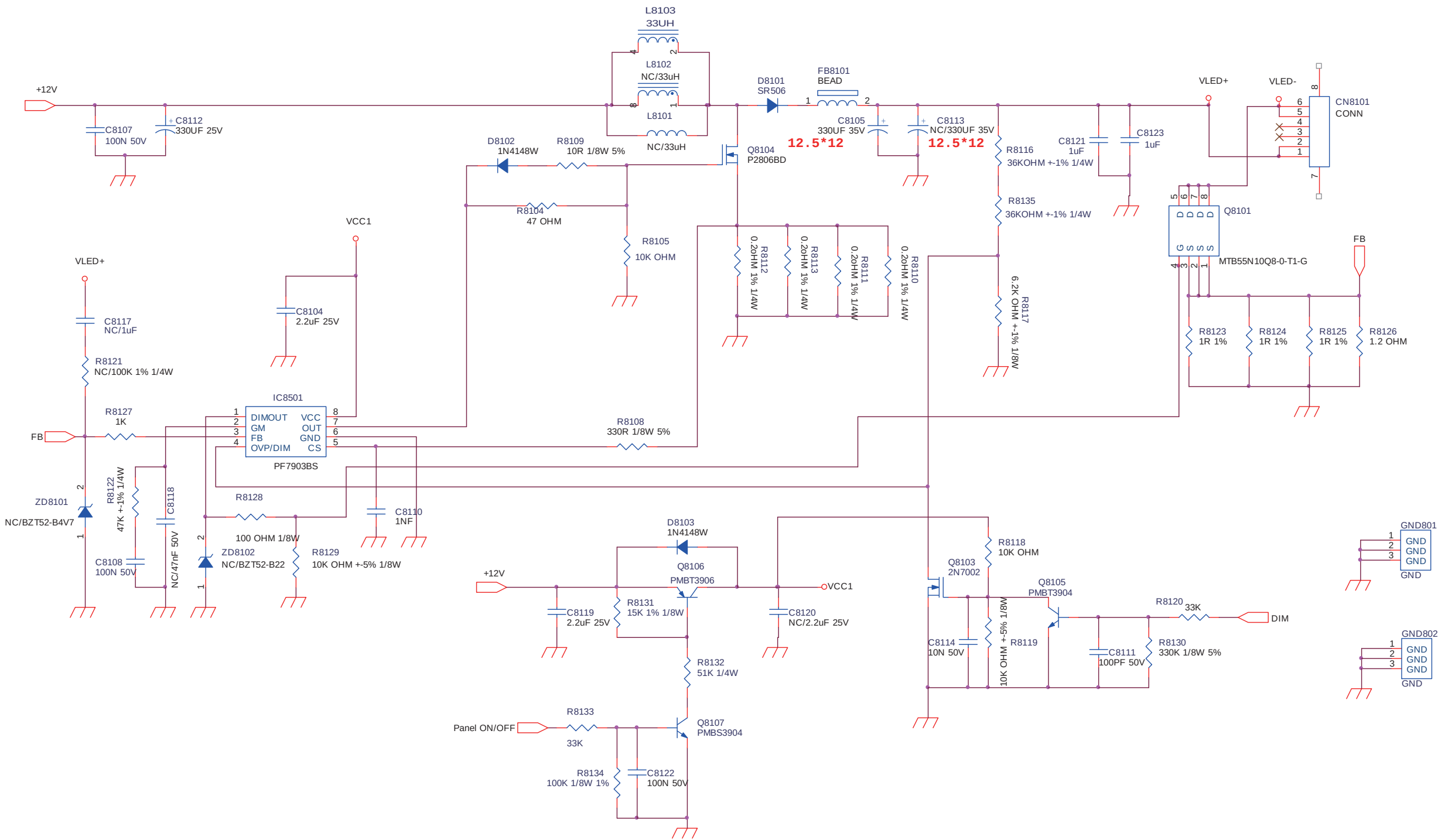


POWER	715G6197	3	2013-10-19

A02

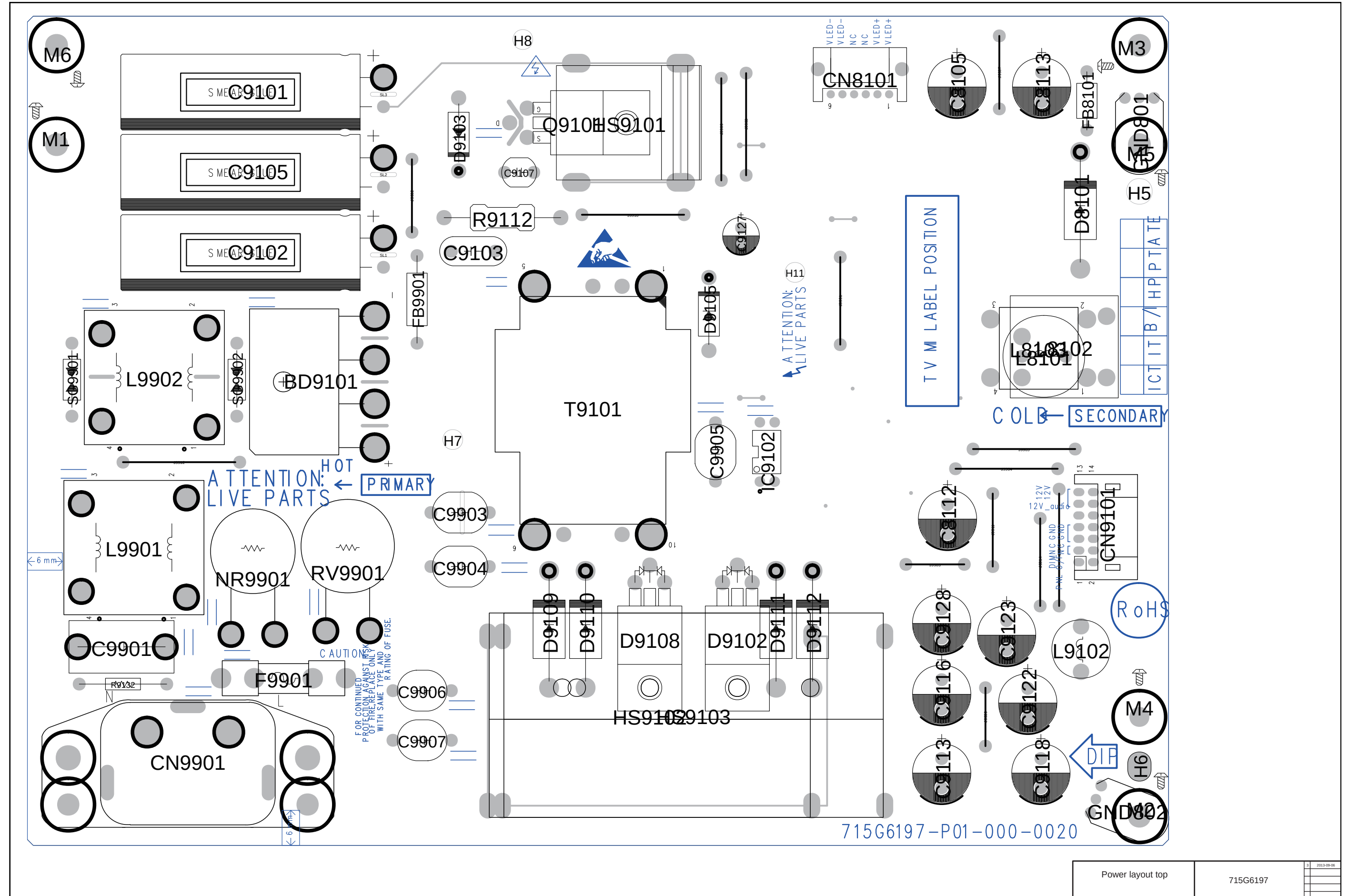
LED DRIVER

A02



LED DRIVER	715G6197	3	2013-10-09

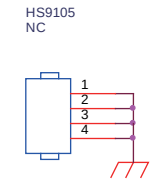
10-2-3 Power layout top



10-3-1 POWER

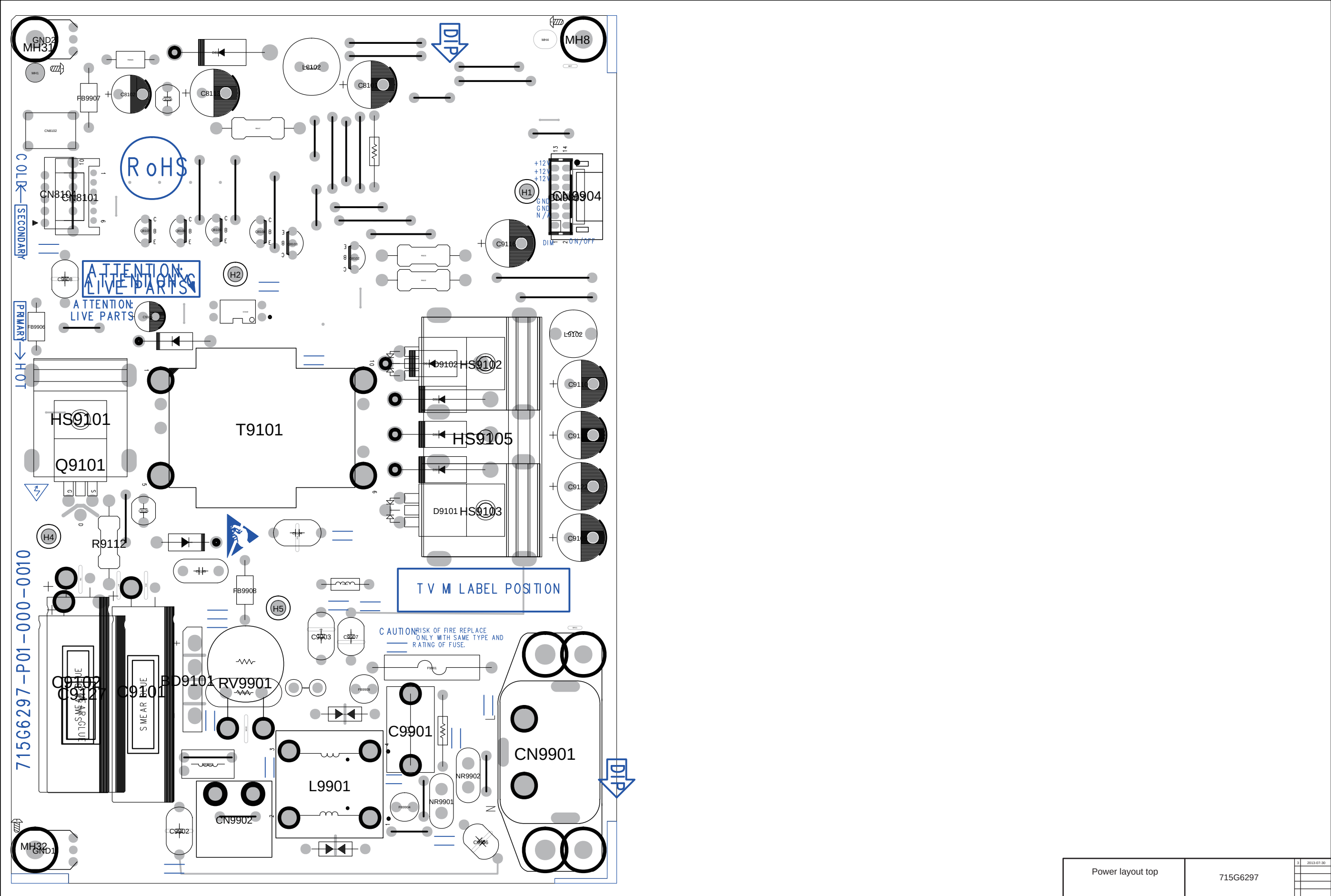
POWER

A01



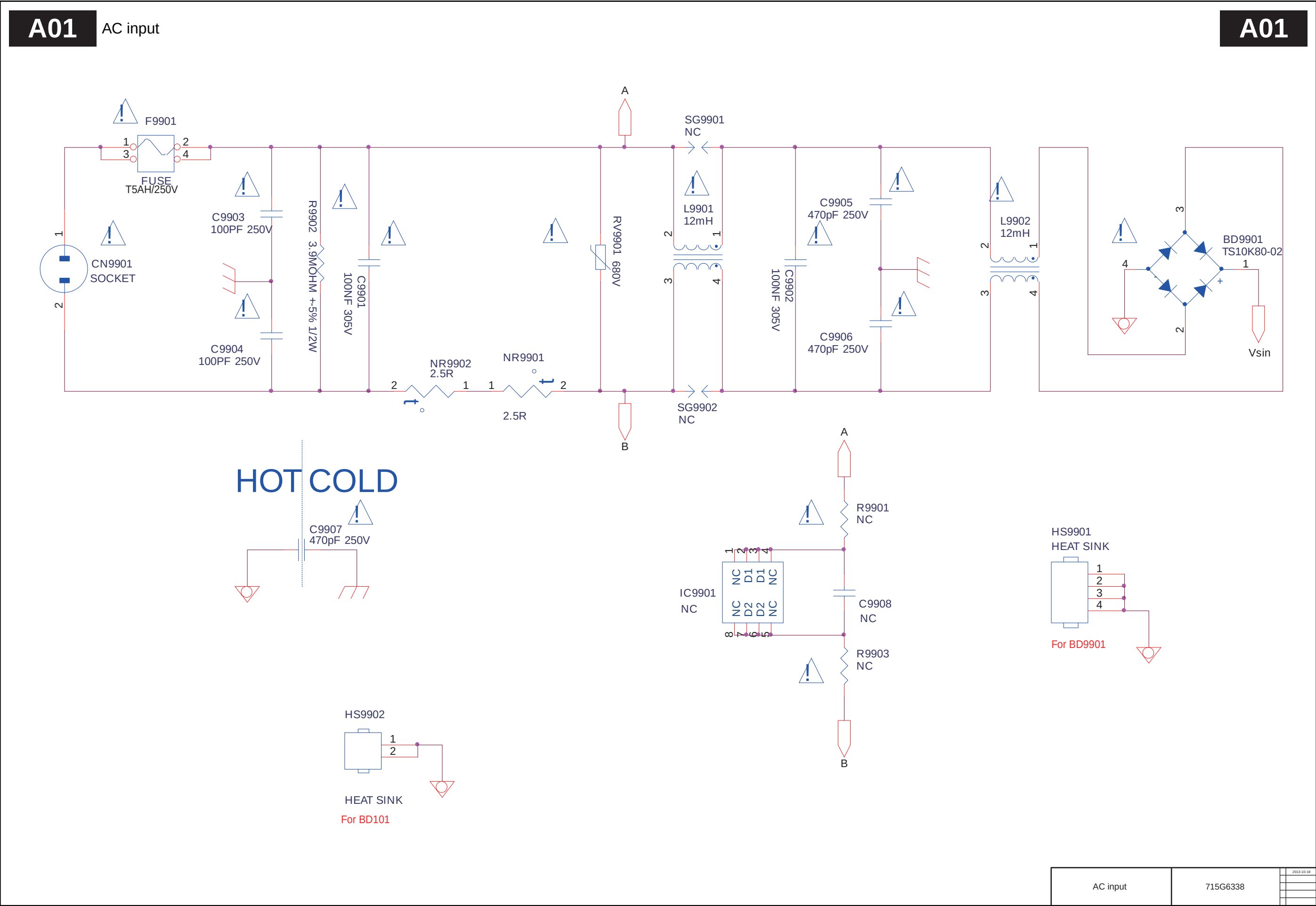
19531_500_130826.eps
130826

10-3-3 Power layout top



Power layout top	715G6297	3	2013-07-30

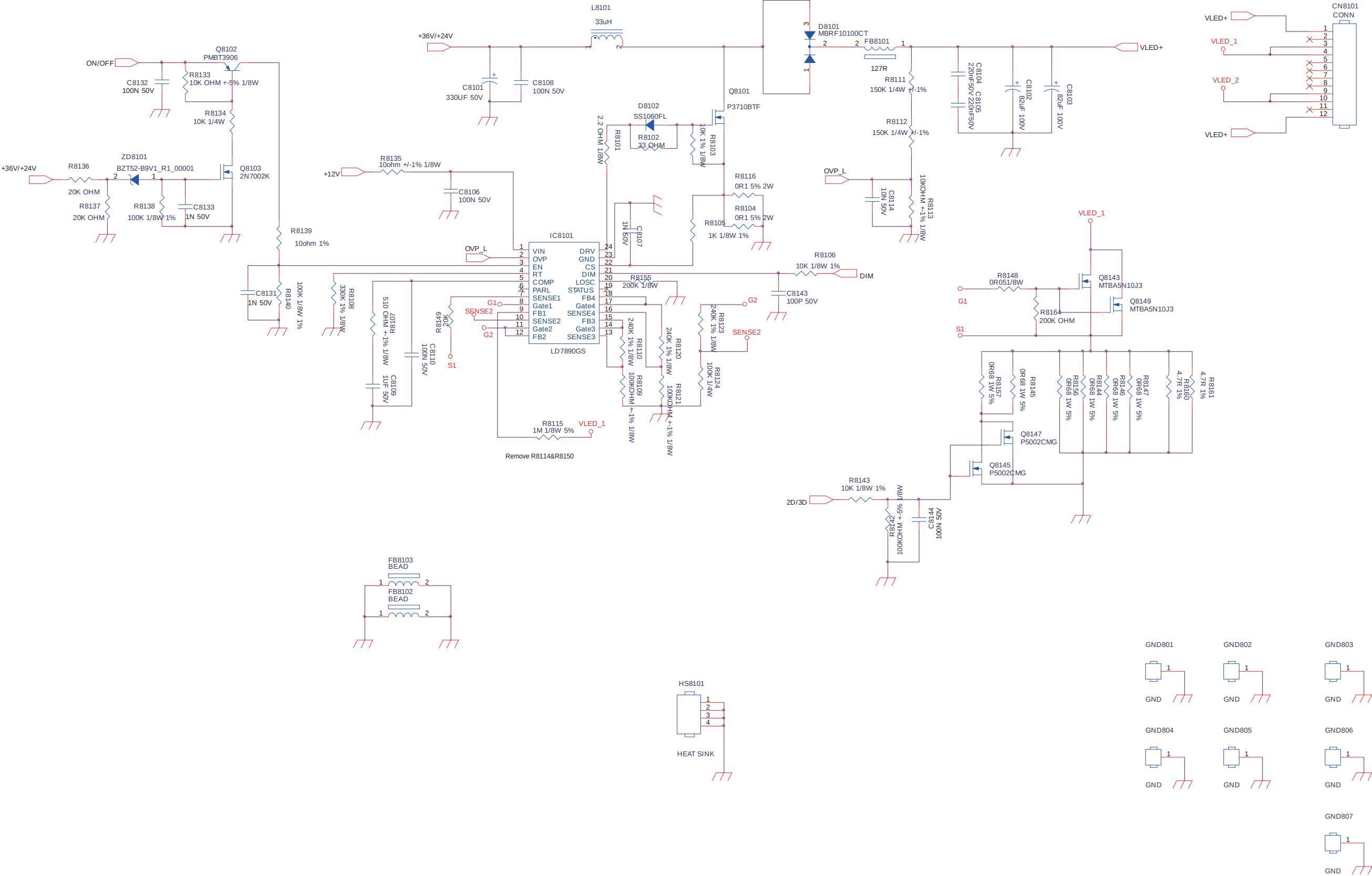
10.4 A 715G6338 PSU
10-4-1 AC input



A02

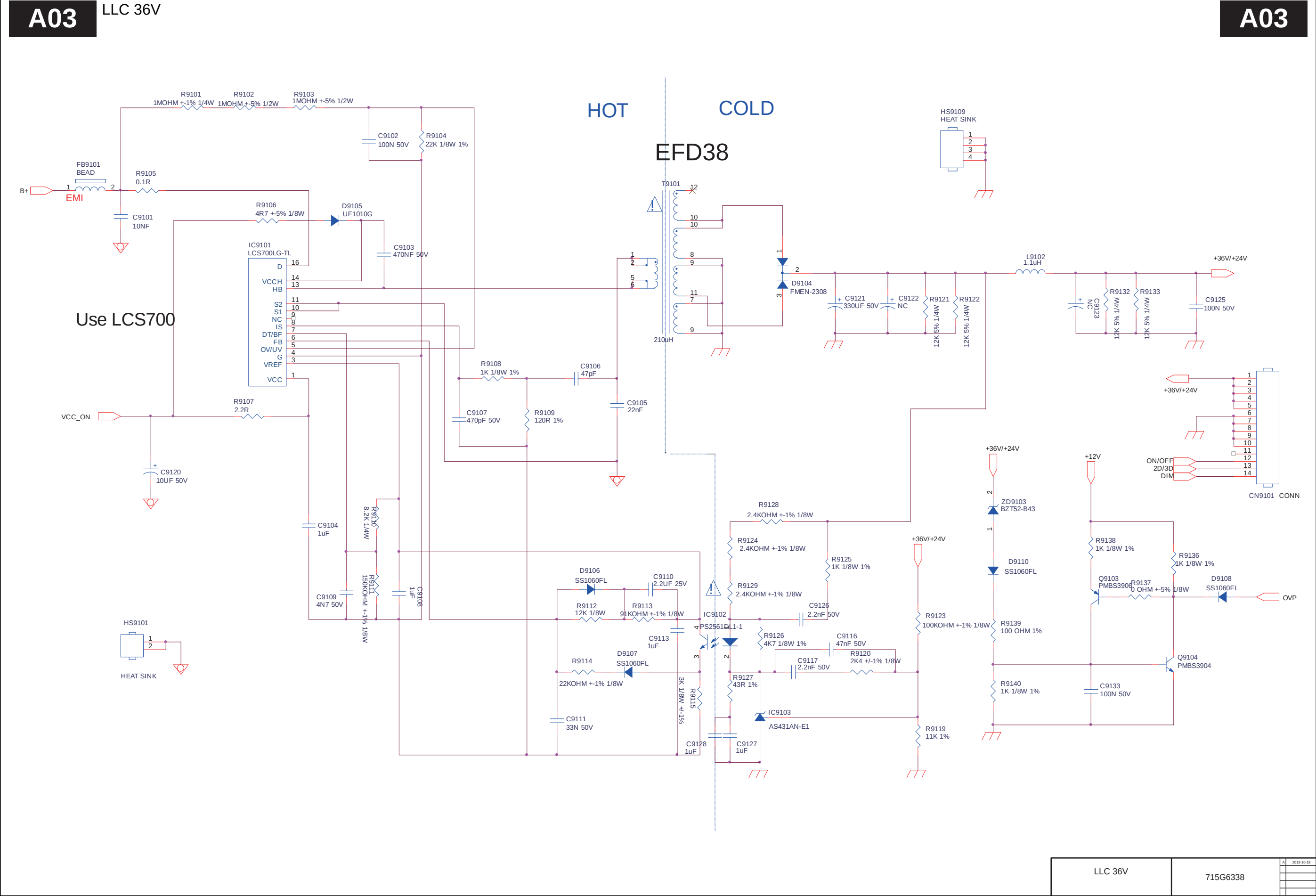
LED Driver

A02

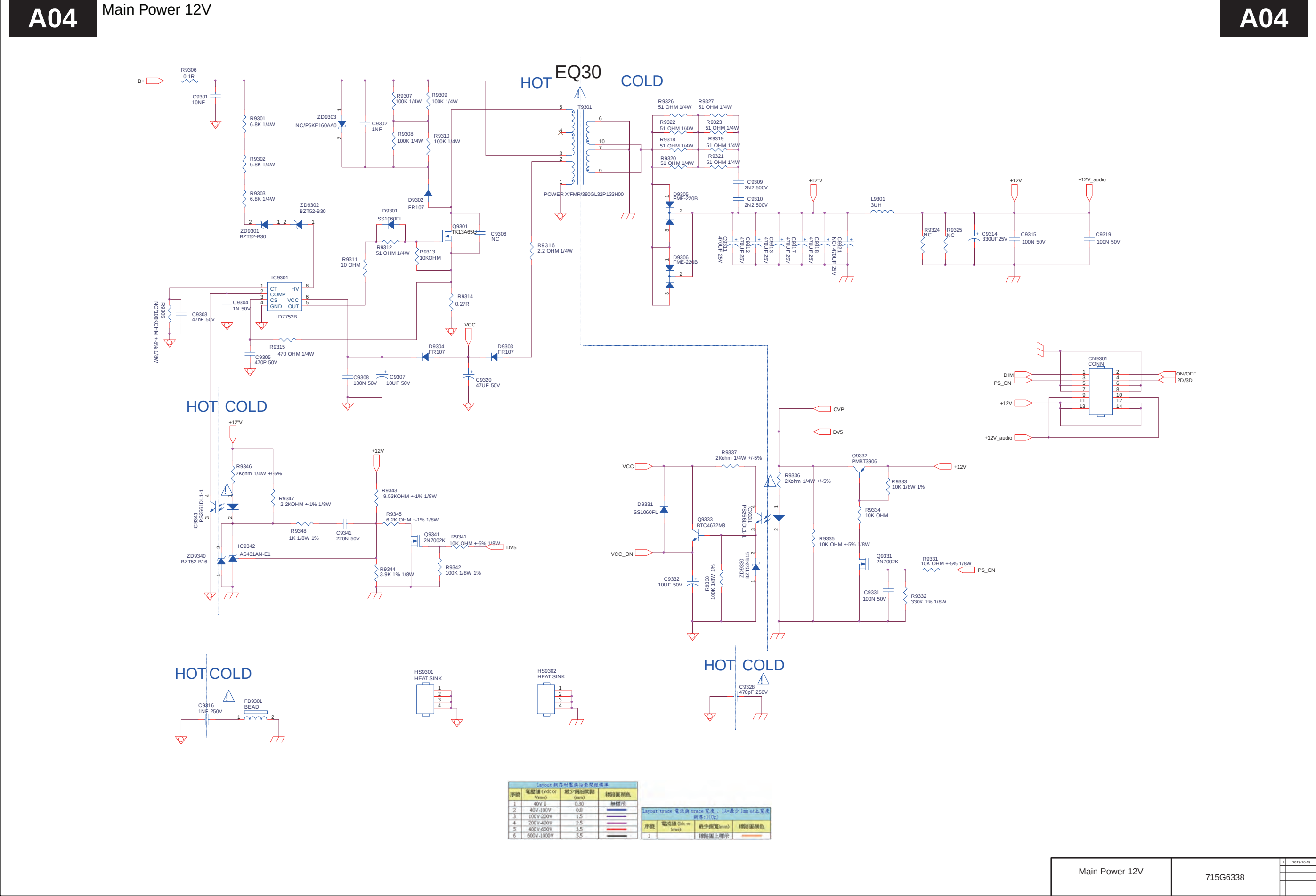


LED Driver	715G6338	2013-10-28

10-4-3 LLC 36V



LLC 36V	715G6338	A	2013-10-28



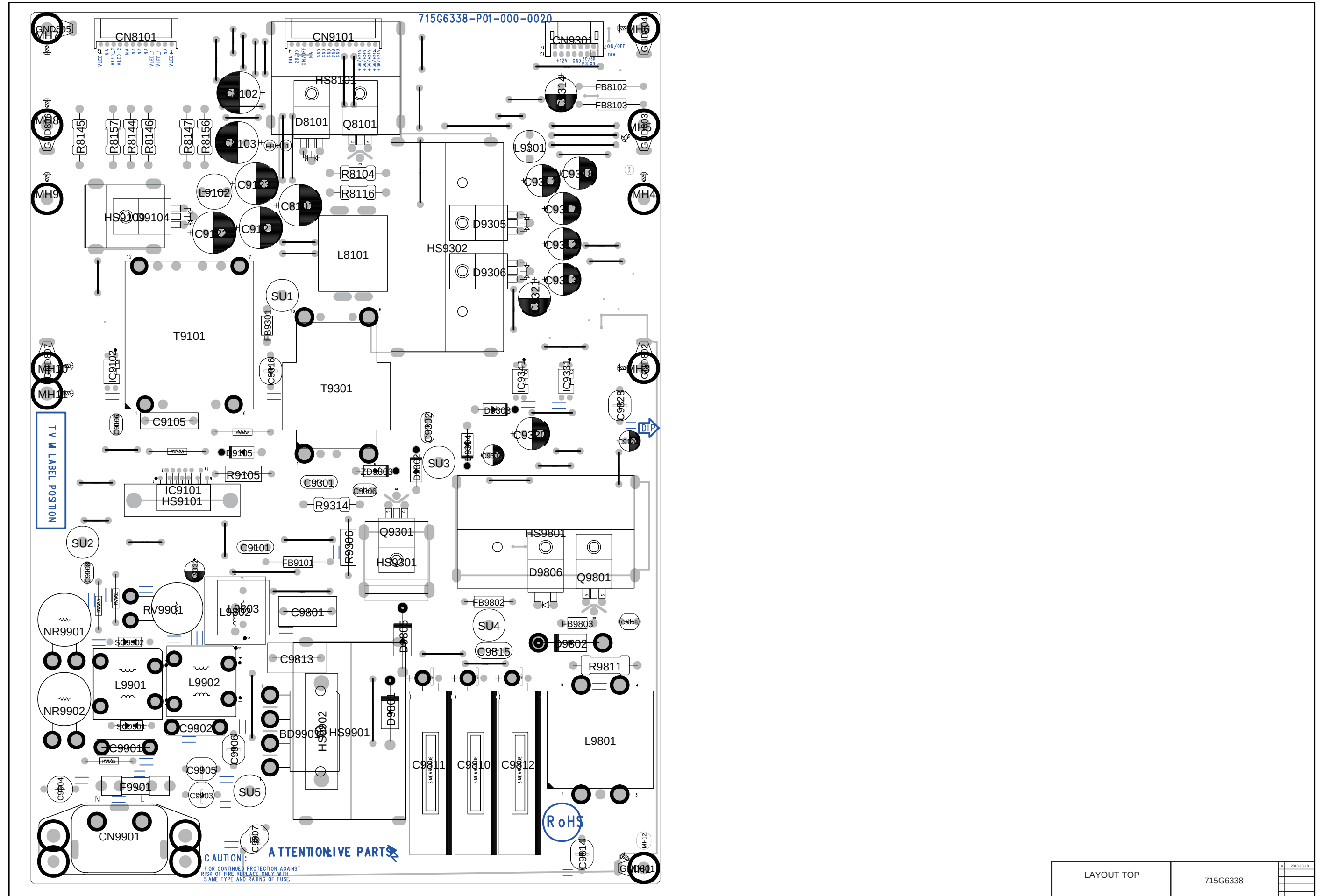
PFC

A05

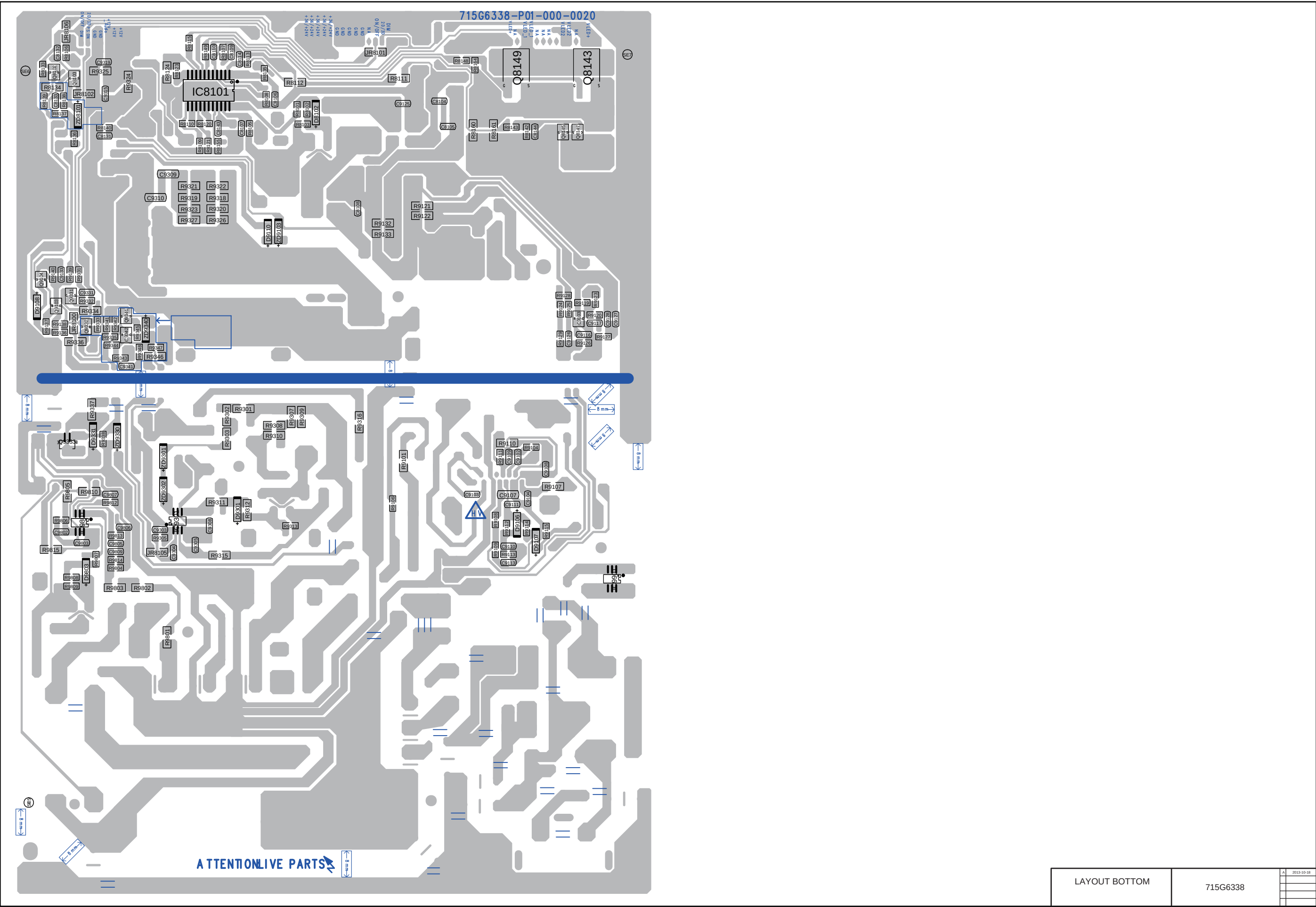


序號	電流值(I _{dc} or I _{rms})	最少銅寬(mm)	線路圖顏色
1		線路圖上標示	——

10-4-6 Power layout top

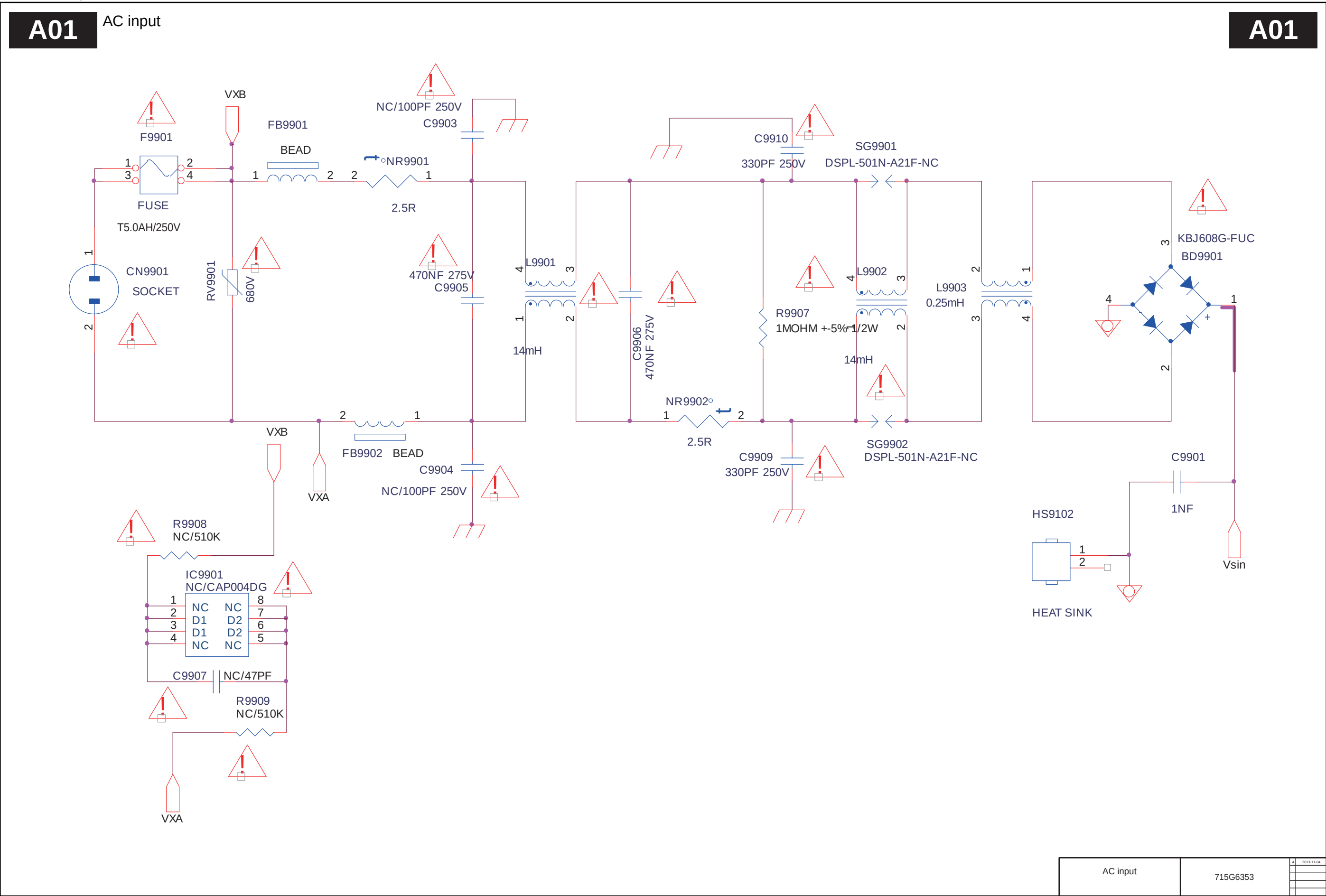


10-4-7 Power layout bottom



LAYOUT BOTTOM	715G6338	A	2013-10-18

10.5 A 715G6353 PSU
10-5-1 AC input

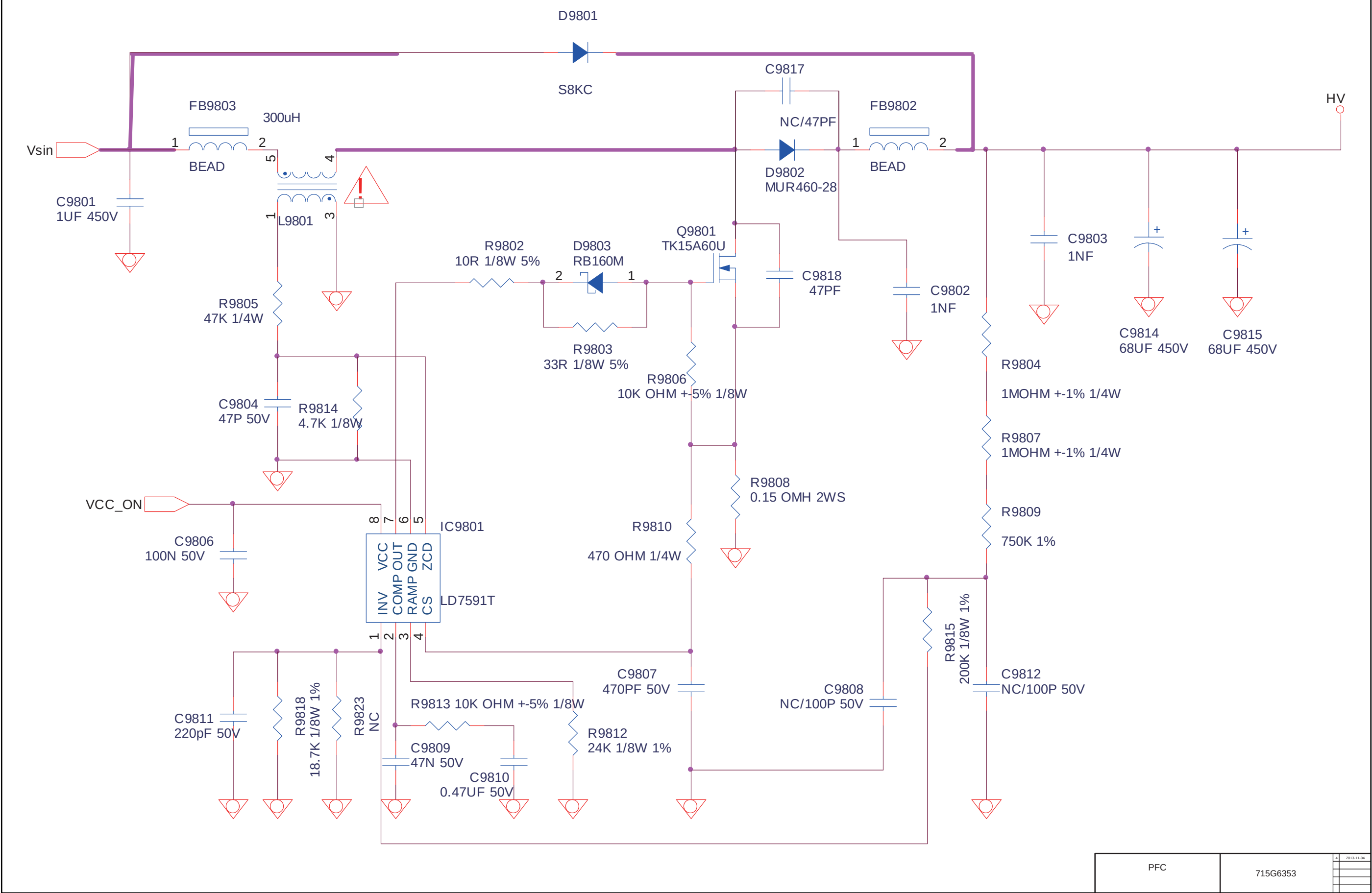


10-5-2 PFC

A02

PFC

A02

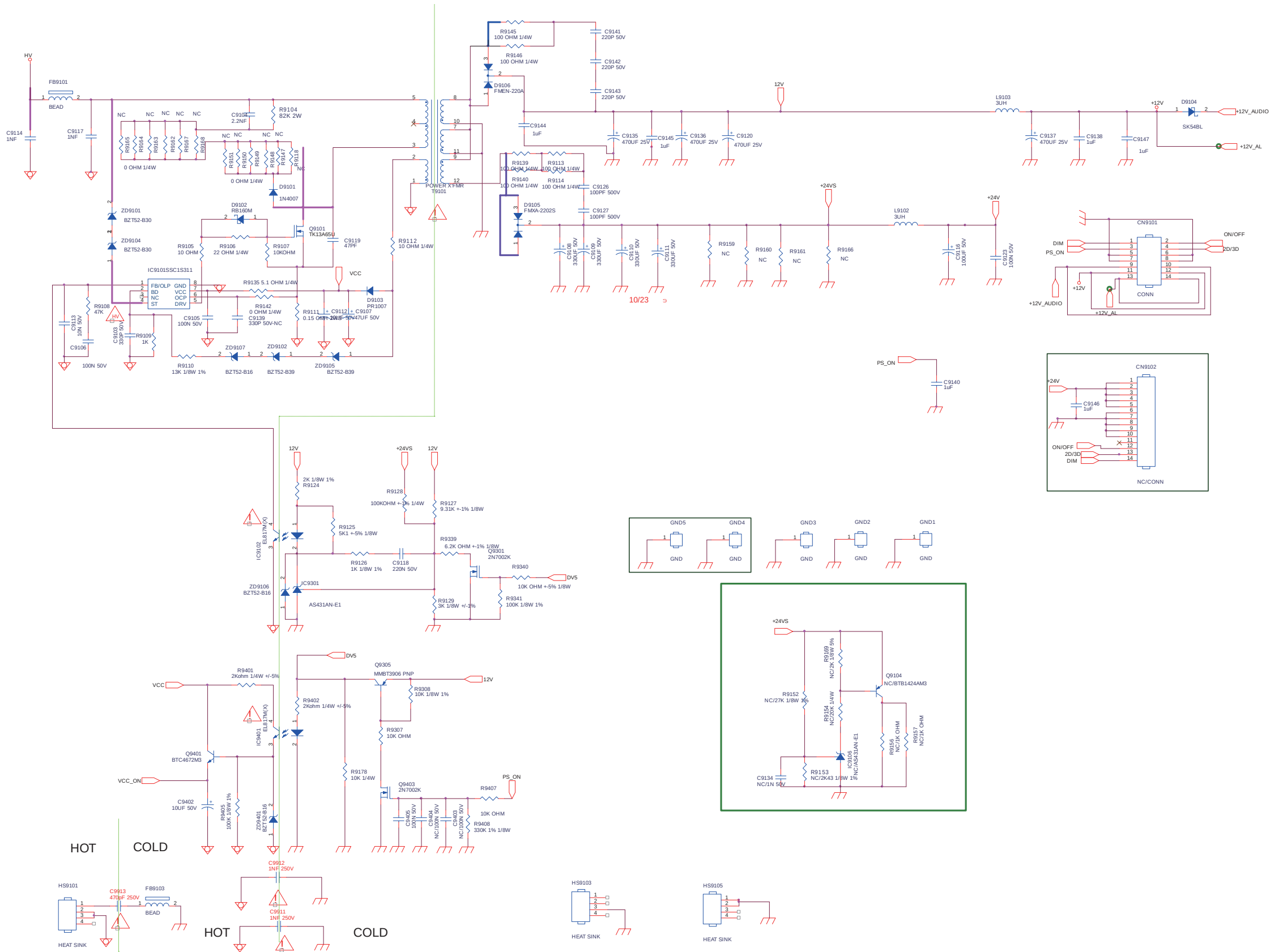


PFC	715G6353	4	2013-11-06

A03

Main Power

A03

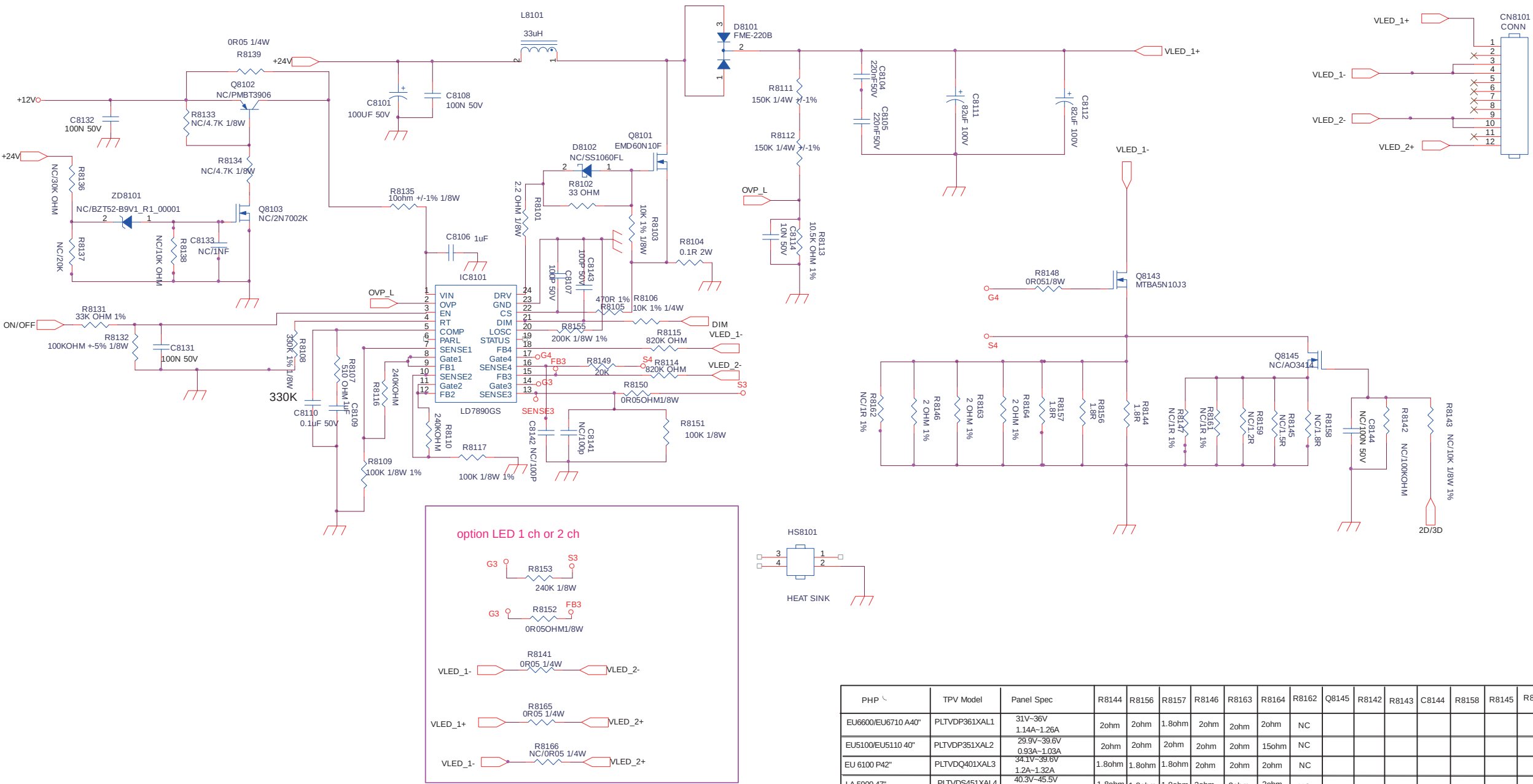


Main Power	715G6353	4	2013-11-04

A04

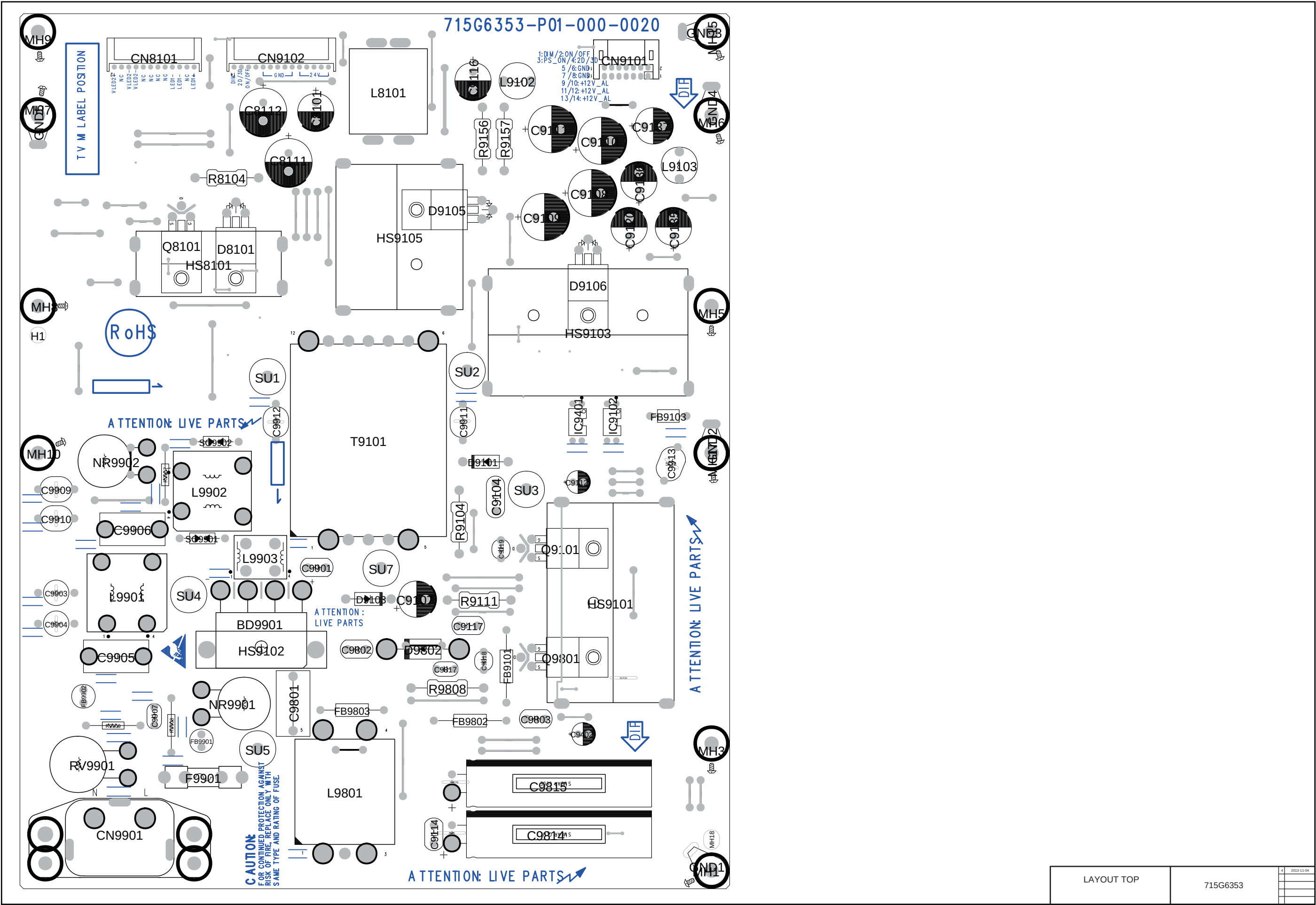
LED Driver for A3D

A04

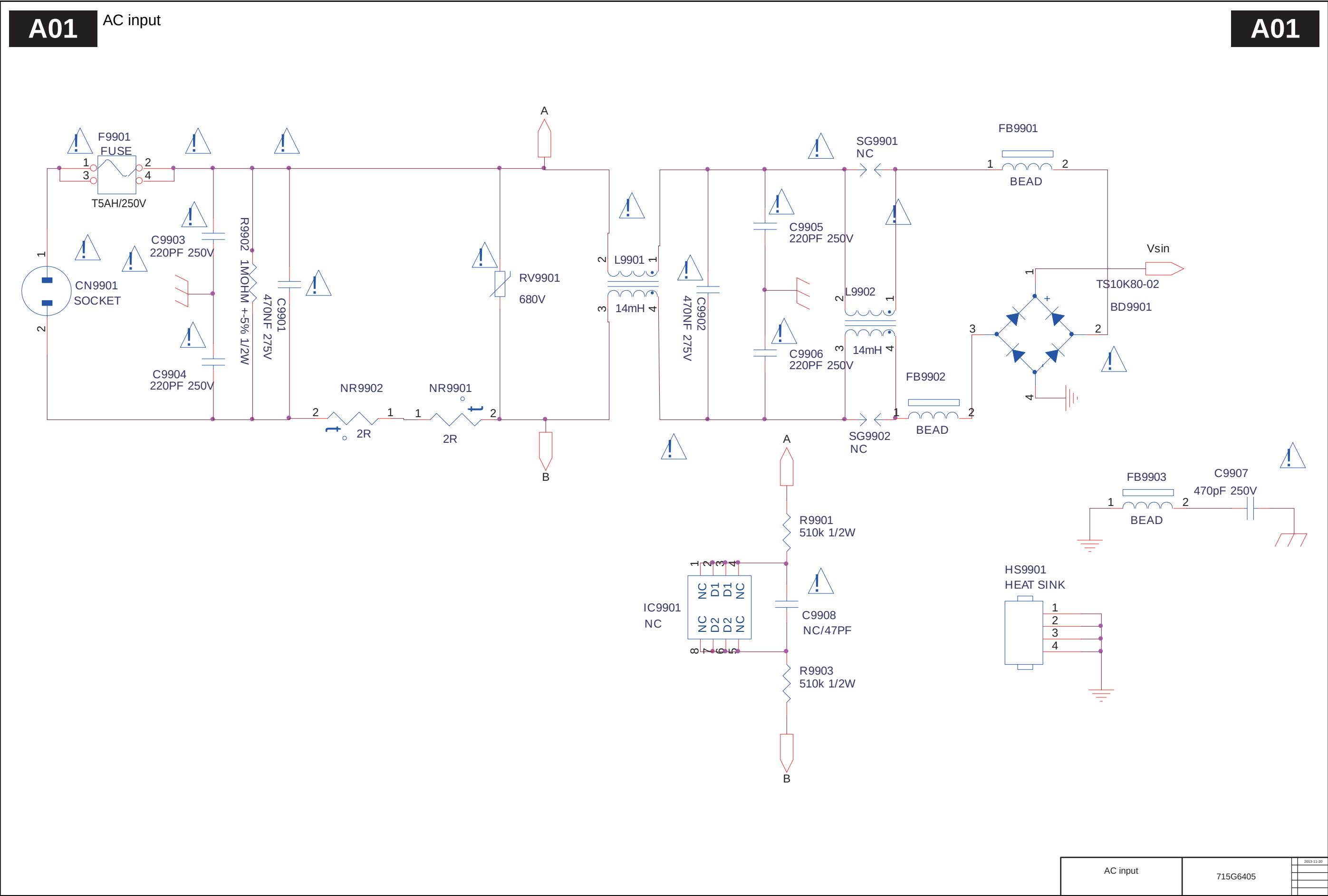


PHP	TPV Model	Panel Spec	R8144	R8156	R8157	R8146	R8163	R8164	R8162	Q8145	R8142	R8143	C8144	R8158	R8145	R8159		
EU6600/EU6710 A40"	PLTVDP361XAL1	31V~36V 1.14A~1.26A	2ohm	2ohm	1.8ohm	2ohm	2ohm	2ohm	NC									
EU5100/EU5110 40"	PLTVDP351XAL2	29.9V~39.6V 0.93A~1.03A	2ohm	2ohm	2ohm	2ohm	2ohm	15ohm	NC									
EU 6100 P42"	PLTVDP401XAL3	34.1V~39.6V 1.2A~1.32A	1.8ohm	1.8ohm	1.8ohm	2ohm	2ohm	2ohm	NC									
LA 5900 47"	PLTVDS451XAL4	40.3V~45.5V 1.16A~1.29A	1.8ohm	1.8ohm	1.8ohm	2ohm	2ohm	2ohm	NC									
LA 5900 42"	PLTVDP391XAL5	34.1V~39.6V 1.06A~1.18A	1.8ohm	1.8ohm	1.8ohm	2ohm	2ohm	5.1ohm	NC									
LA 5500 P40"	PLTVDS361XAL6	34V~40V 0.97A~1.07A	2ohm	2ohm	11ohm	2ohm	2ohm	2ohm	NC									
LA6300/EU6200 A40"	PLTVDP361XAQ3	31V~36V 0.97A~1.07A	2ohm	2ohm	11ohm	2ohm	2ohm	2ohm	NC									

10-5-5 Power layout top



10.6 A 715G6405 PSU
10-6-1 POWER

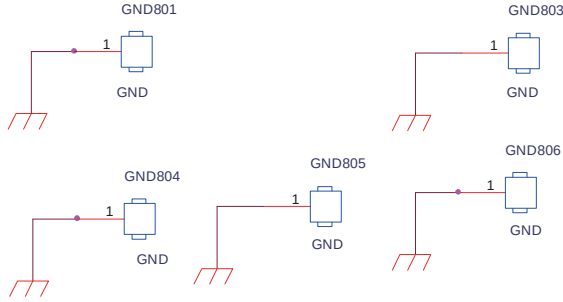
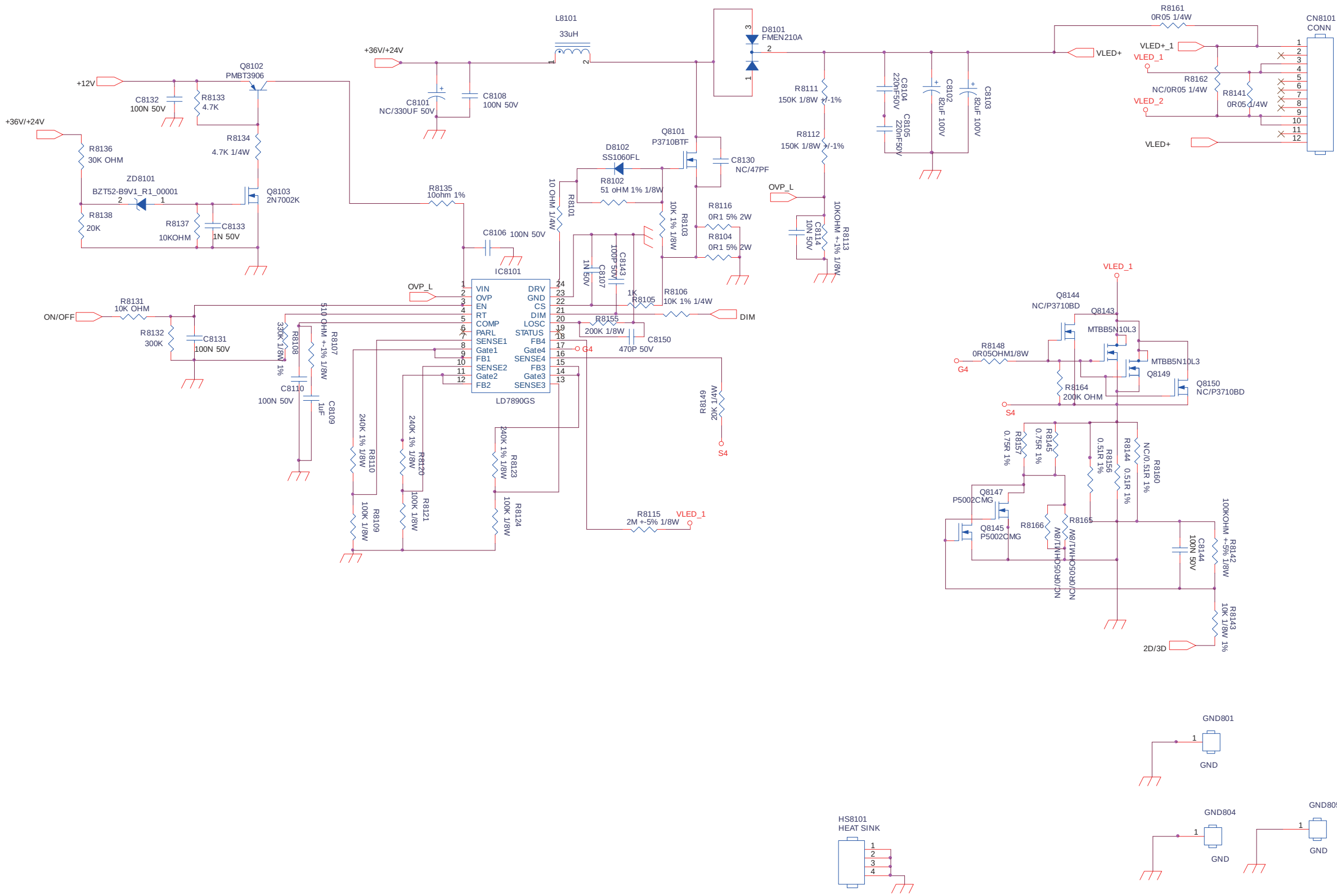


AC input	715G6405	2013-11-20

A02

LED Driver

A02

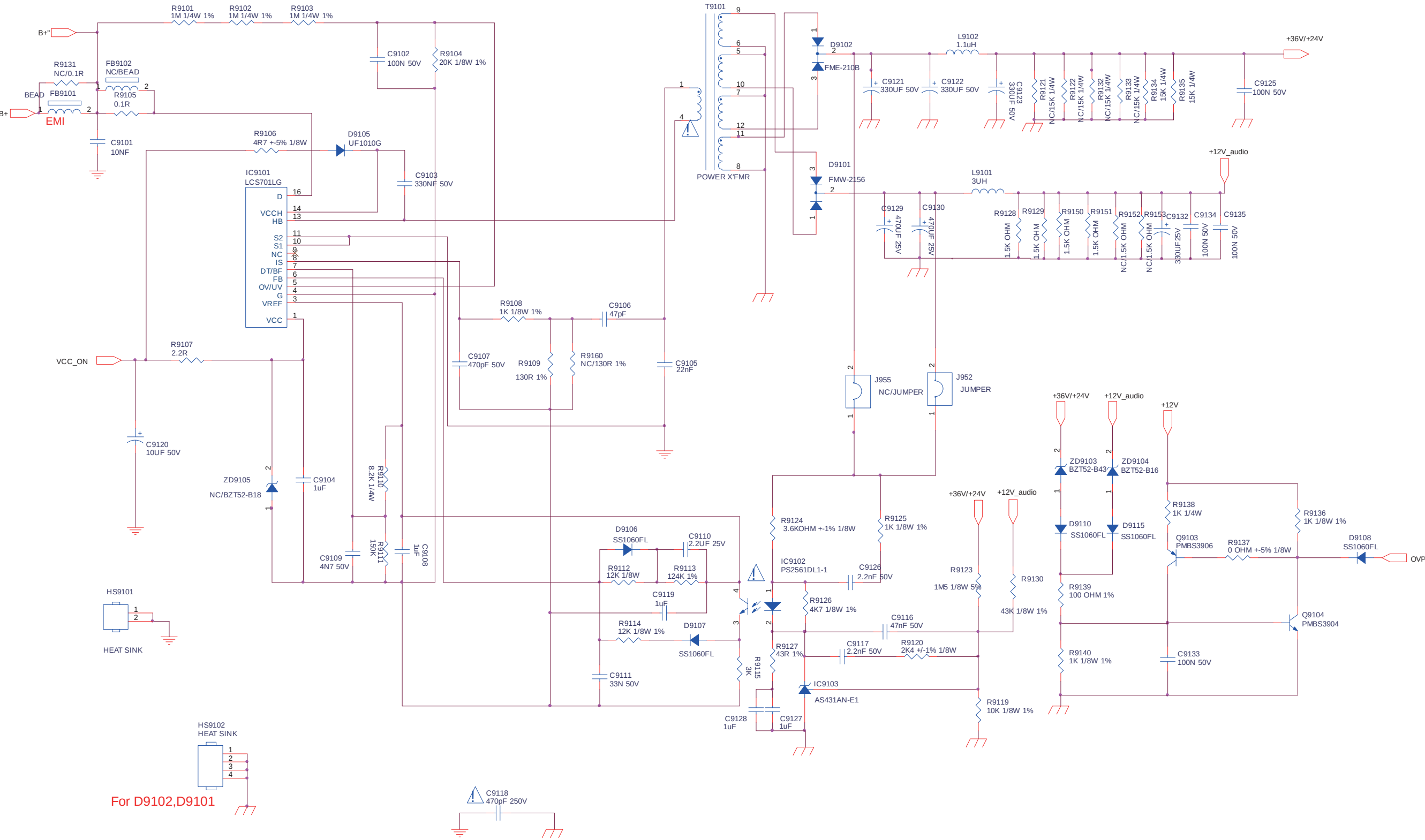


LED Driver	715G6405	2013-11-20

A03

LLC 36V

A03



LLC 36V

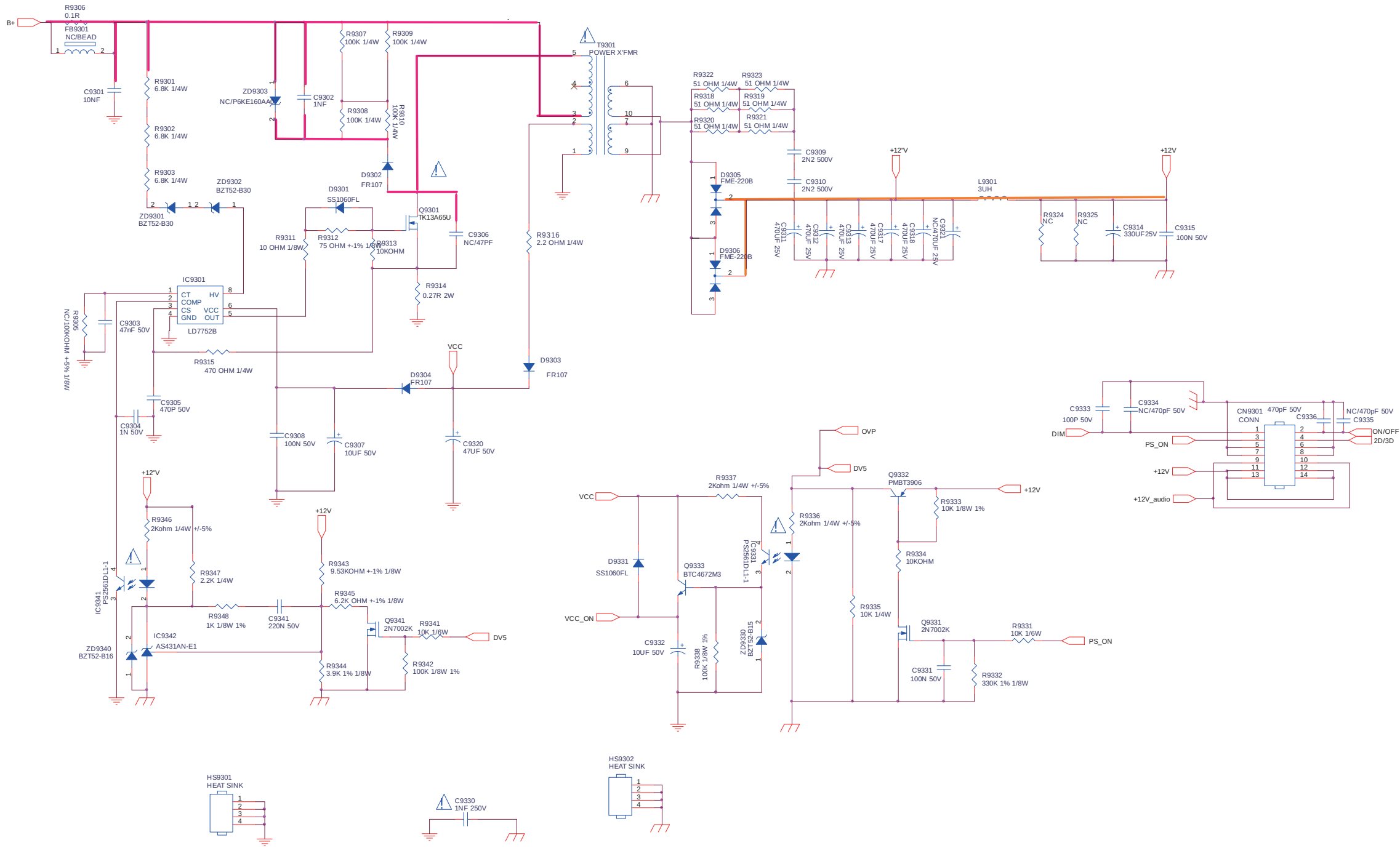
715G6405

2013-11-20

A04

Main Power 12V

A04



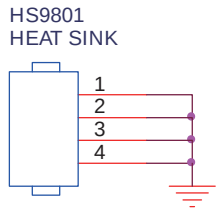
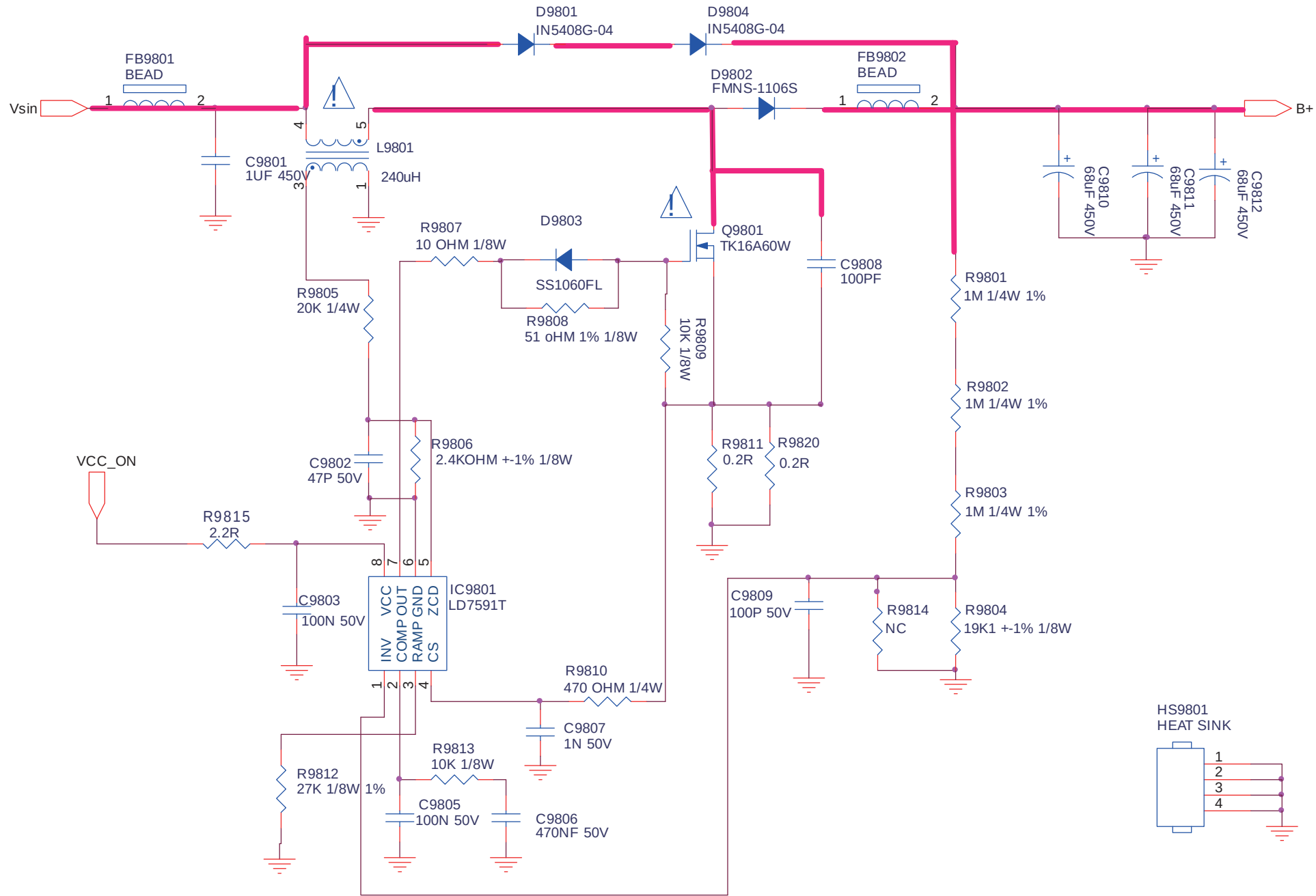
Layout 銅箔厚度與線寬標準			
序號	電壓值 (Vdc or Vrms)	最少銅箔厚度 (mm)	線路圖顏色
1	40V-100V	0.30	無標示
2	100V-200V	0.50	無標示
3	200V-300V	1.5	無標示
4	300V-400V	2.5	無標示
5	400V-600V	3.5	無標示
6	600V-1000V	5.5	無標示

Layout trace 電流與 trace 寬度 (1mm 以上電流)			
序號	電流值 (A)	最少銅箔厚度 (mm)	線路圖顏色
1	1	1.5	無標示

A05

PFC

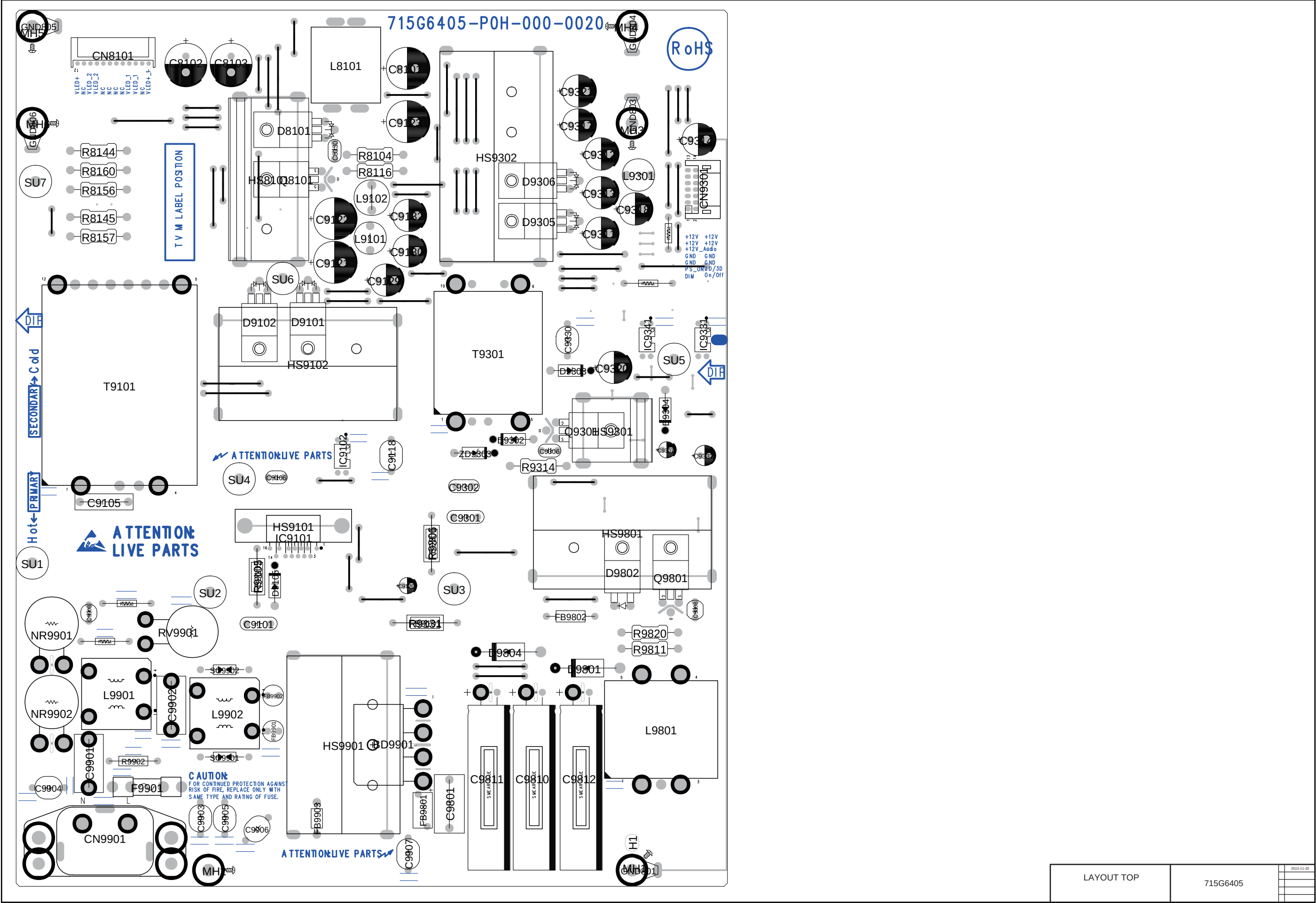
A05



layout 銅箔厚度與表面間距標準			
序號	電壓值 (Vdc or Vrms)	最少銅箔間距 (mm)	線路圖顏色
1	40V ↓	0.30	無標示
2	40V-100V	0.8	藍色
3	100V-200V	1.5	紫色
4	200V-400V	2.5	紅色
5	400V-600V	3.5	紅色
6	600V-1000V	5.5	黑色

Layout trace 電流與 trace 寬度, 1A=最少 1mm 以上寬度 銅厚:1(Oz)			
序號	電流值 (Idc or Irms)	最少銅寬(mm)	線路圖顏色
1		線路圖上標示	藍色

10-6-6 Power layout top



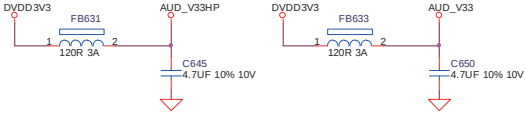
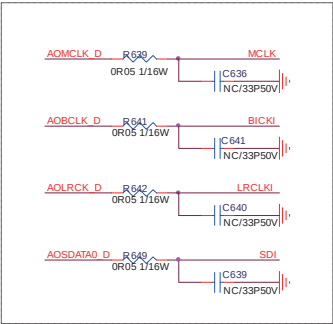
BGA Strapping	pdwnc_strap[2]	pdwnc_strap[1]	pdwnc_strap[0]
	OPCTRL0	OPCTRL3	OPCTRL4
ICE mode + 27M + serial boot	0	0	0
ICE mode + 27M + ROM to NAND boot	0	0	1
ICE mode + 27M + ROM to EMC boot	0	1	0

B06

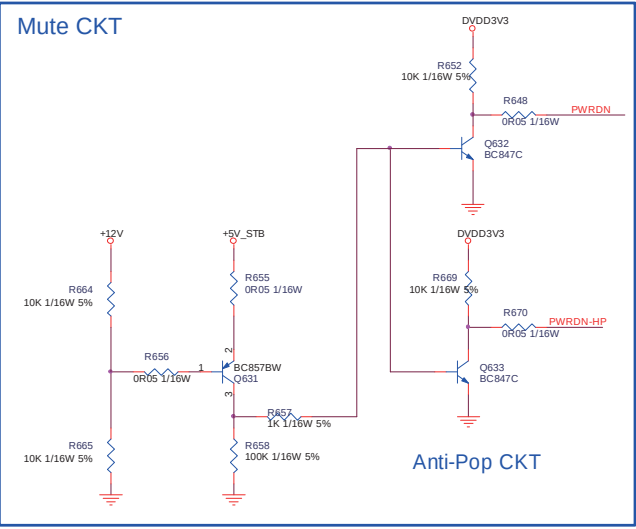
Speaker/Headphone

B06

Main Speak CKT



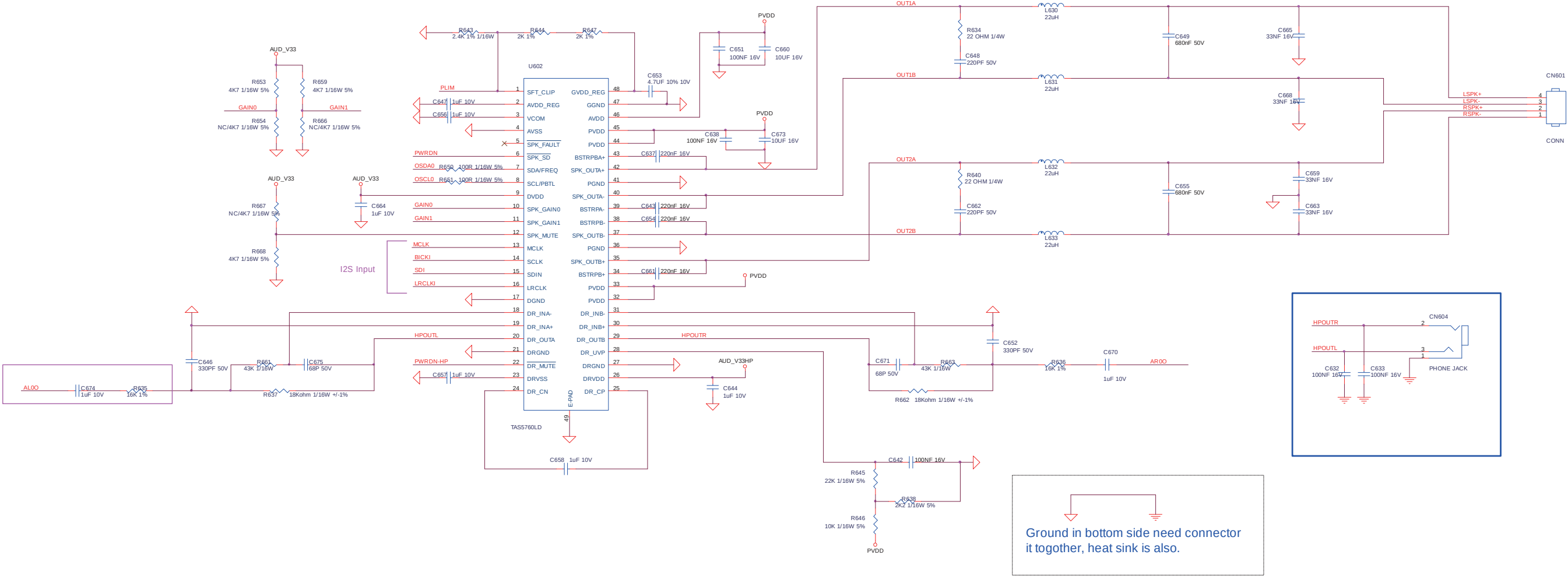
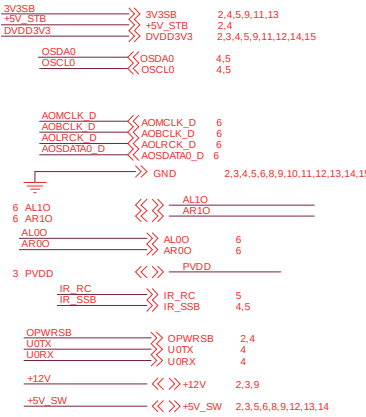
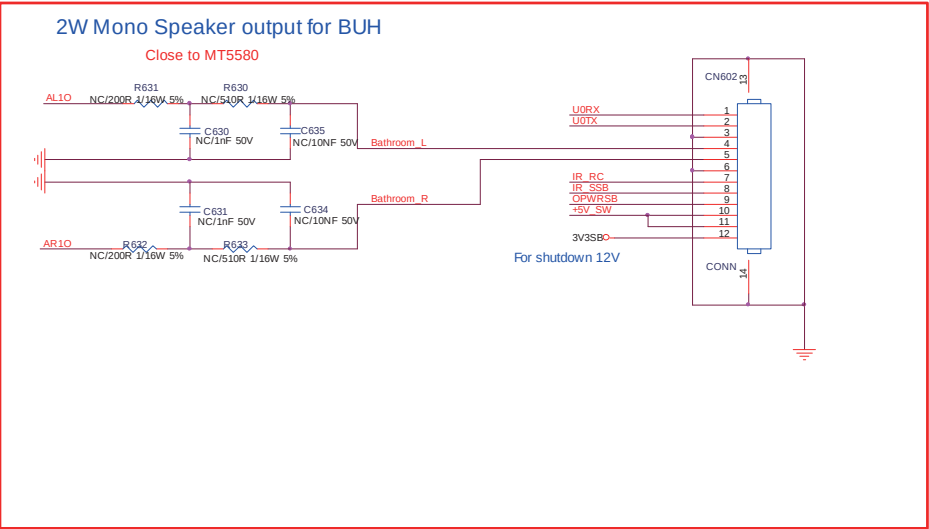
Mute CKT



Anti-Pop CKT

2W Mono Speaker output for BUH

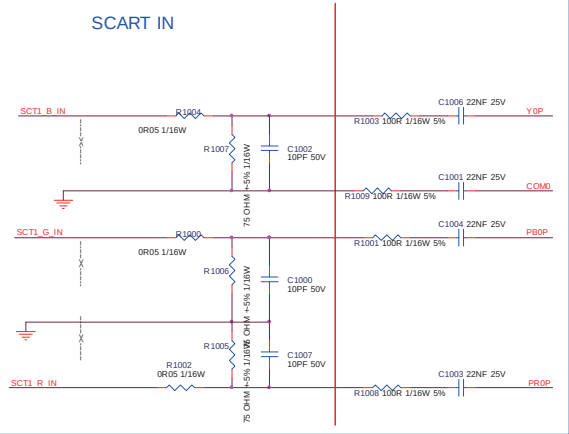
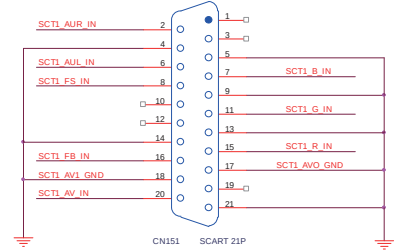
Close to MT5580



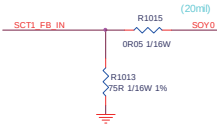
B07 SCART/VGA Input

B07

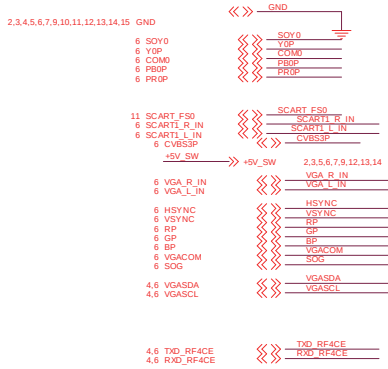
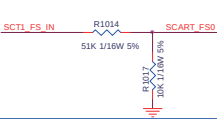
SCART (Full SCART) -- CVBS+SV+RGB



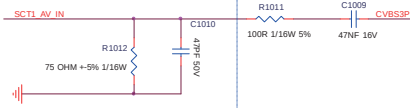
FAST BLANKING/SOY



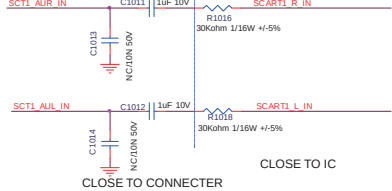
Function Select



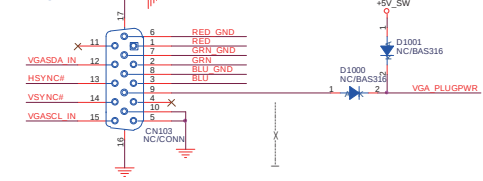
CVBS IN Close to CONNECTOR Close to MT5580



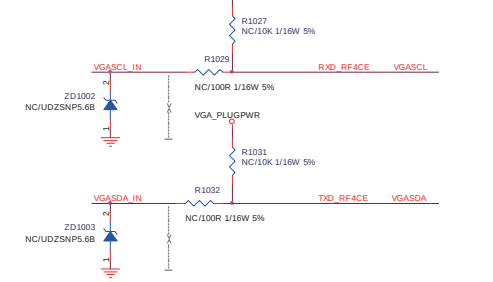
Audio Input



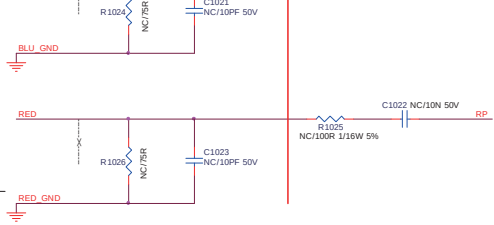
VGA Input



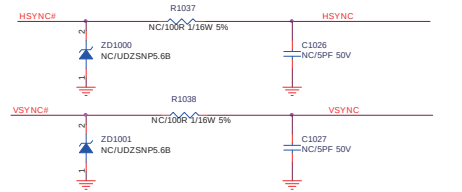
VGA I2C



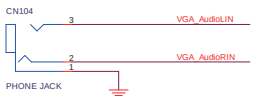
VGA IN



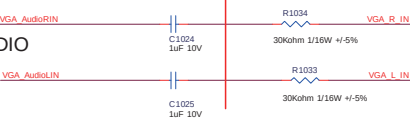
VGA SYNC SLICER



VGA Audio Input



VGA AUDIO

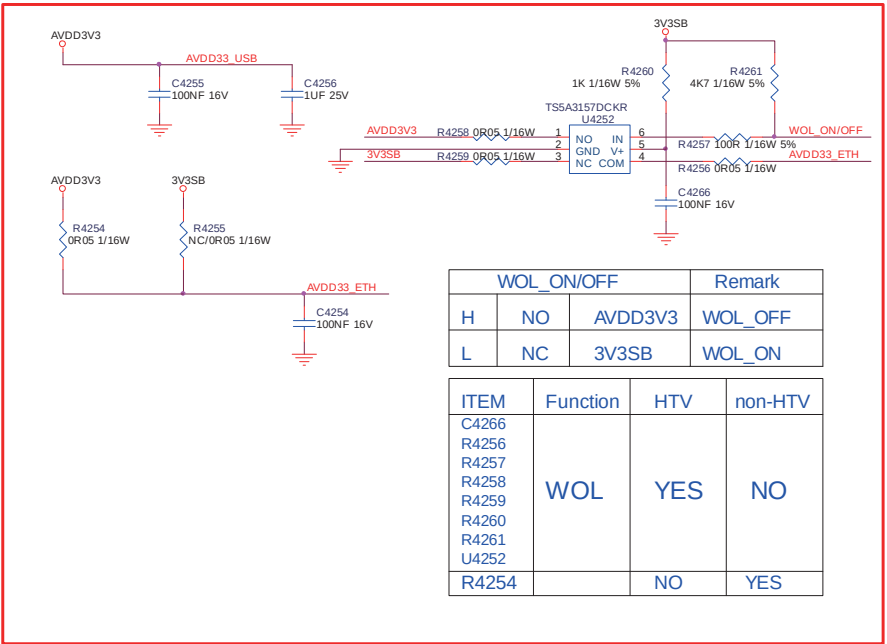
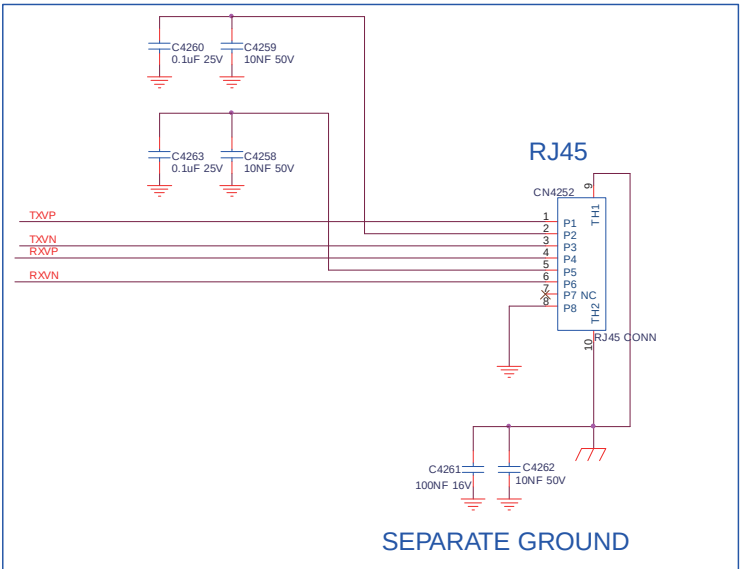
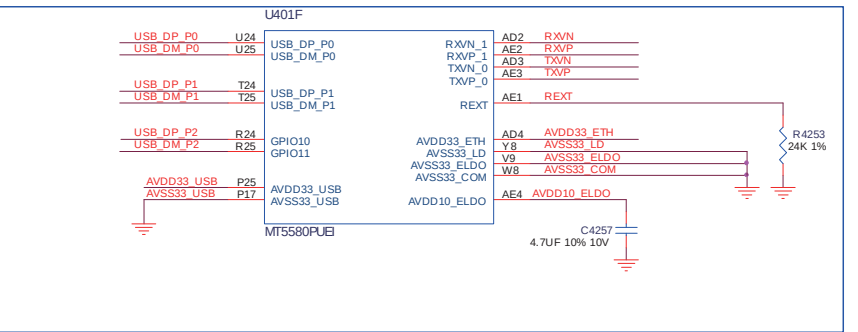
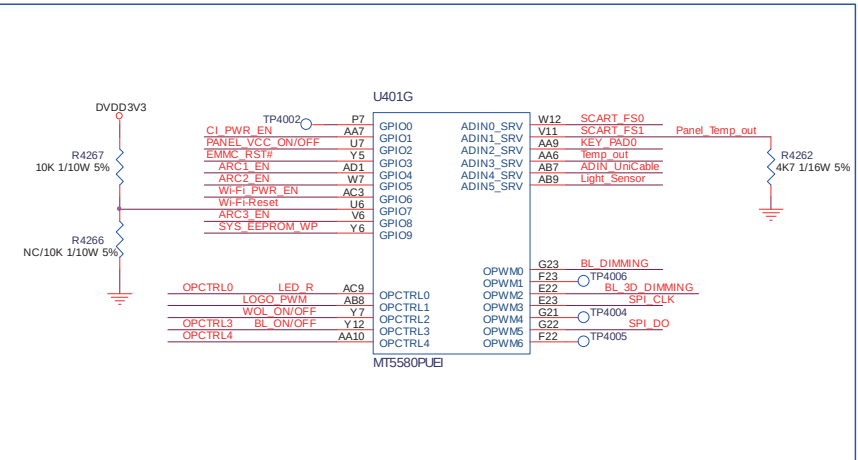
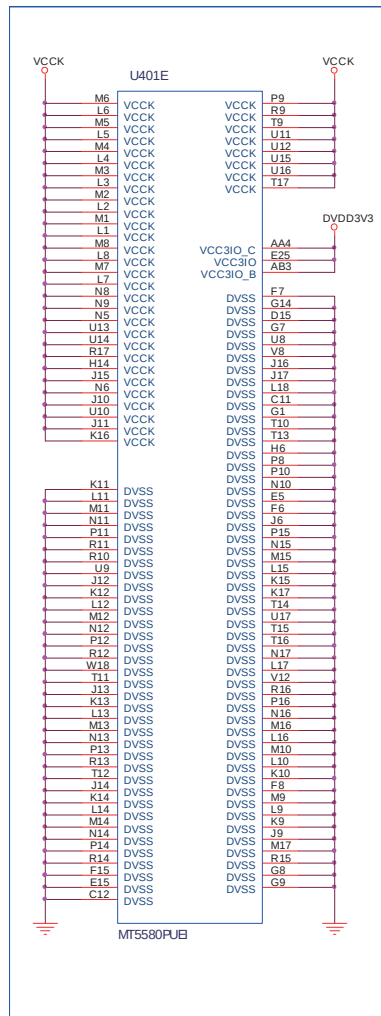


Model Item	5610 Small size (with VGA)	4500/5500/ 6100/6200 Large size (W/O VGA)
C1016 / C1017 C1018 / C1019 C1020 / C1021 C1022 / C1023 CN103 / D1000 D1001 / R1019 R1020 / R1021 R1022 / R1023 R1024 / R1025 R1026 / R1027 R1029 / R1031 R1032 / R1037 R1038 / ZD1002 ZD1003	Yes	NO

B10

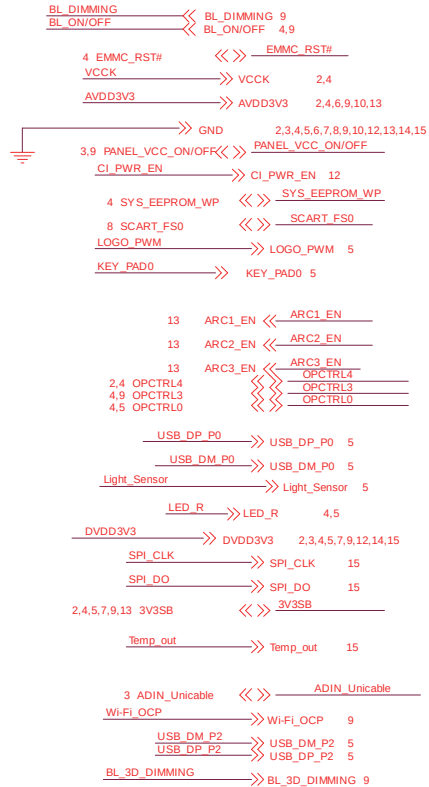
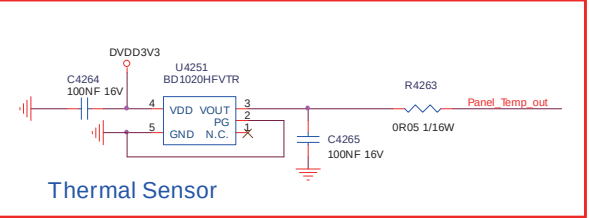
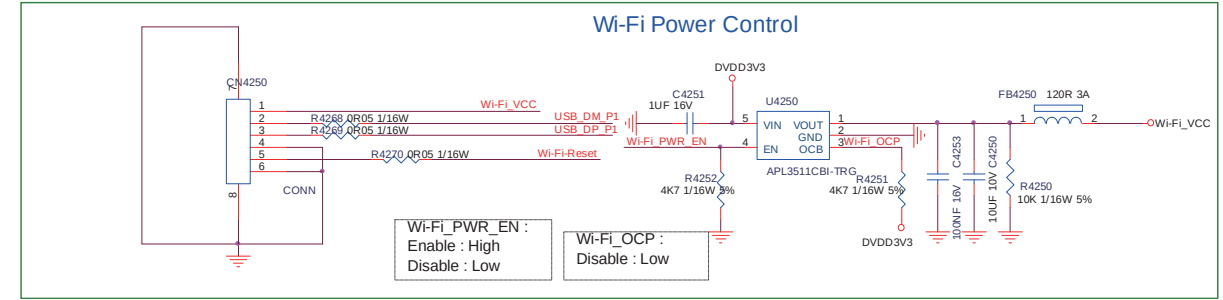
MII/GPIO/ServAD

B10



WOL_ON/OFF		Remark	
H	NO	AVDD3V3	WOL_OFF
L	NC	3V3SB	WOL_ON

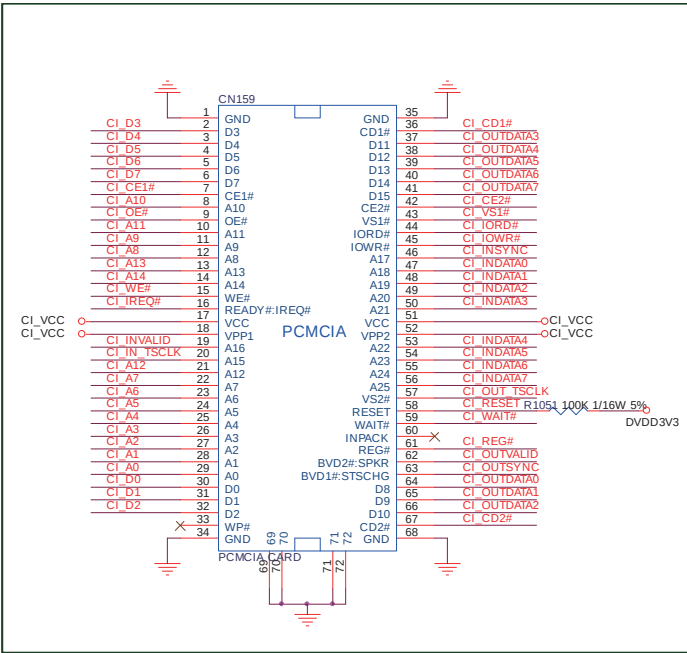
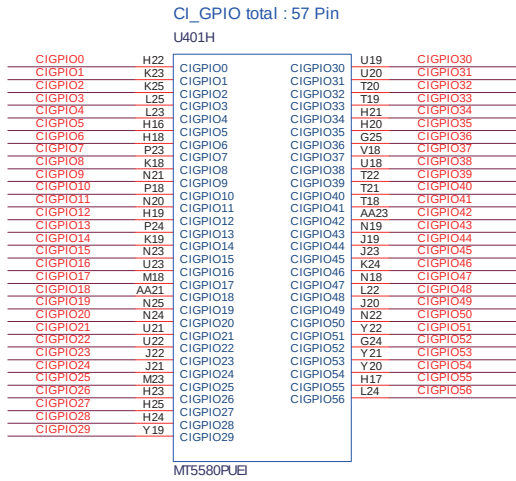
ITEM	Function	HTV	non-HTV
C4266 R4256 R4257 R4258 R4259 R4260 R4261 U4252	WOL	YES	NO
R4254		NO	YES



Item	Function	4500	5500	6100	6200
C4250 / C4251 C4253 / CN4250 FB4250 / R4250 R4251 / R4252 R4268 / R4269 R4270 / U4250	wi-fi	NO	Yes	Yes	Yes

C4264 C4265 R4263 U4251	Thermal sensor	NO	NO	NO	Yes
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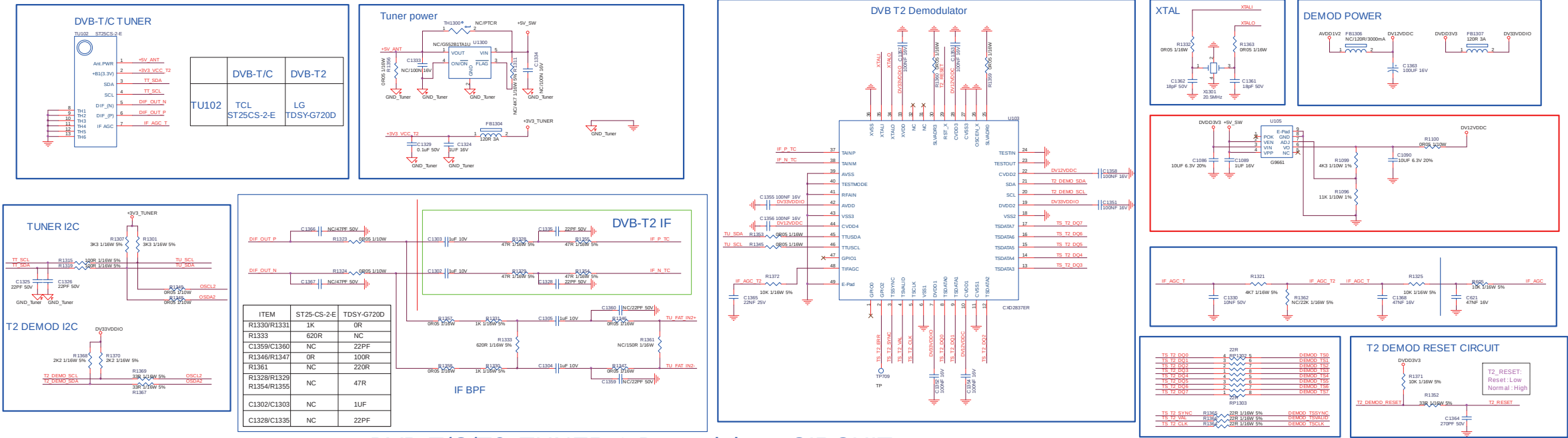
CI interface



B13

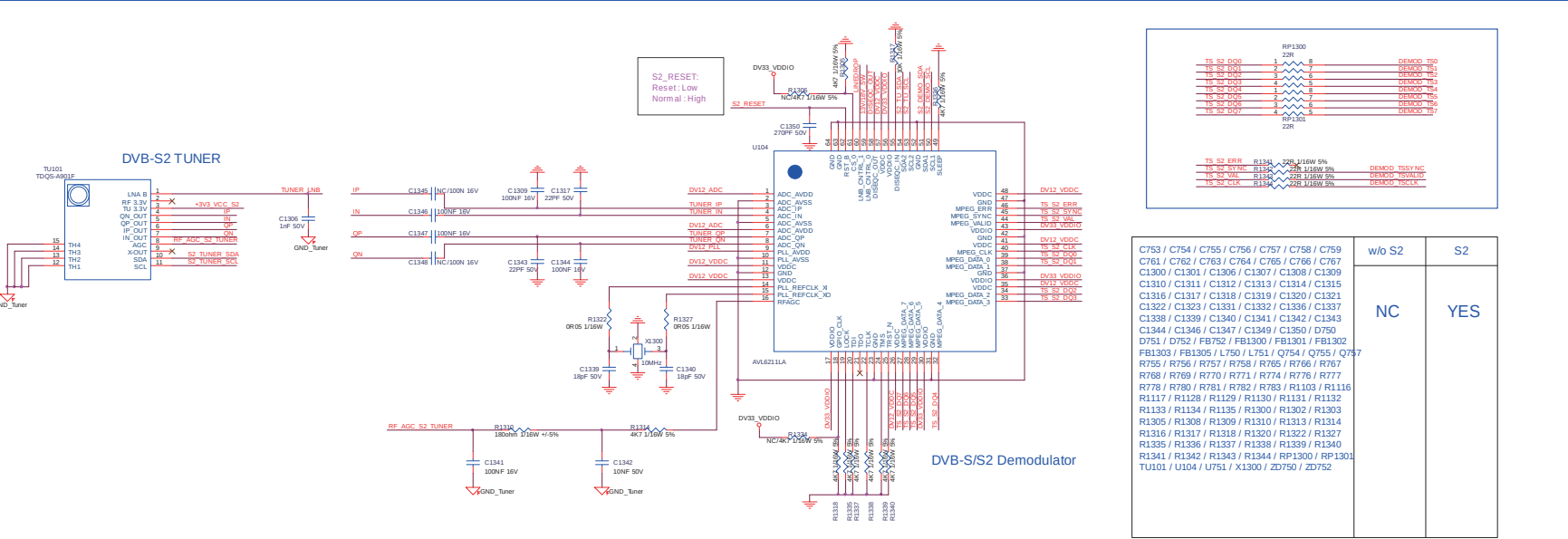
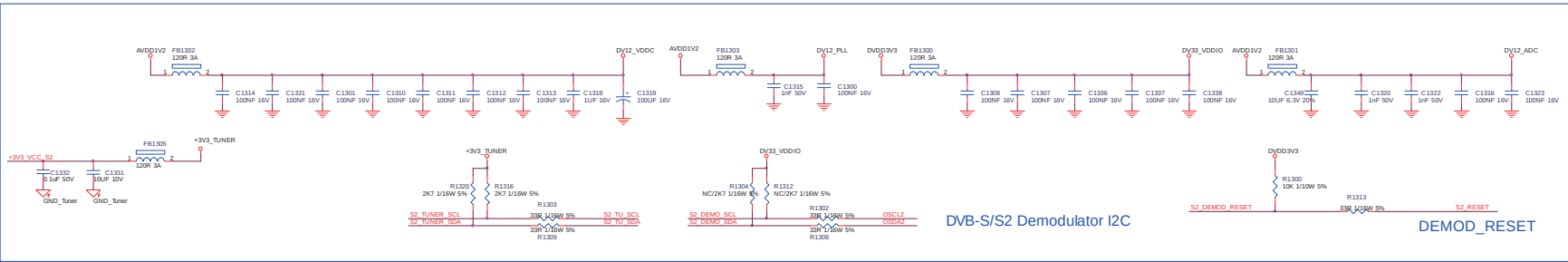
DVB/T2/C/S2 Tuner

B13



DVB-T/C/T2 TUNER & Demodulator CIRCUIT

DVB-S/S2 TUNER & Demodulator CIRCUIT



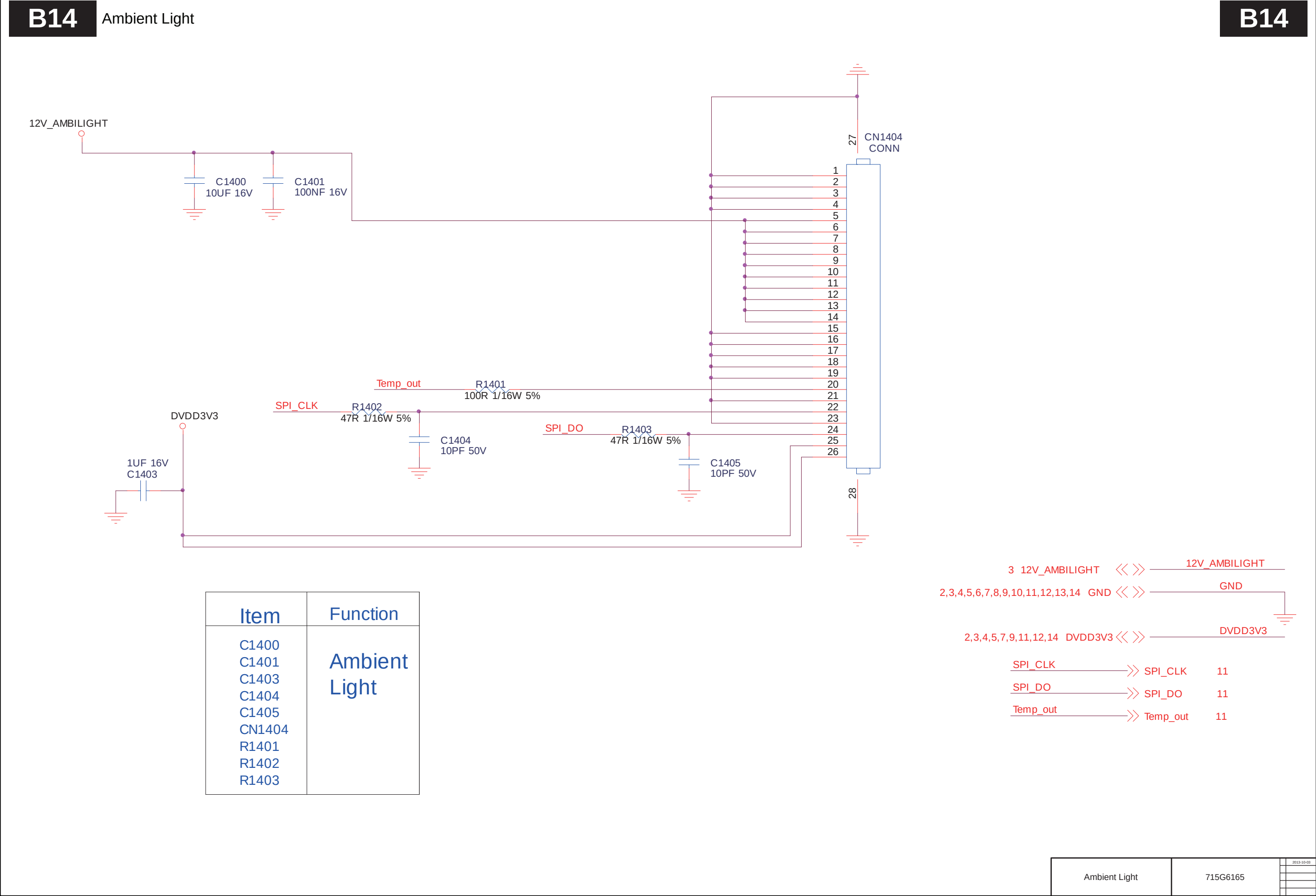
Function/Items\ Models	T model (T/C, T2)	K model (T/C, S2)	H model (T/C)
TUNER	TU102	TDSY_G720D	TCL ST25CS-2-E
T2 Demod IC	U103	NC	TDQS-A901F
S2 Demod IC	U104	NC	AVL6211LA

Function/Items\ Models	T model (T/C, T2)	K model (T/C, S2)	H model (T/C)
TUNER	TU102	TDSY_G720D	TCL ST25CS-2-E
T2 Demod IC	U103	NC	TDQS-A901F
S2 Demod IC	U104	NC	AVL6211LA

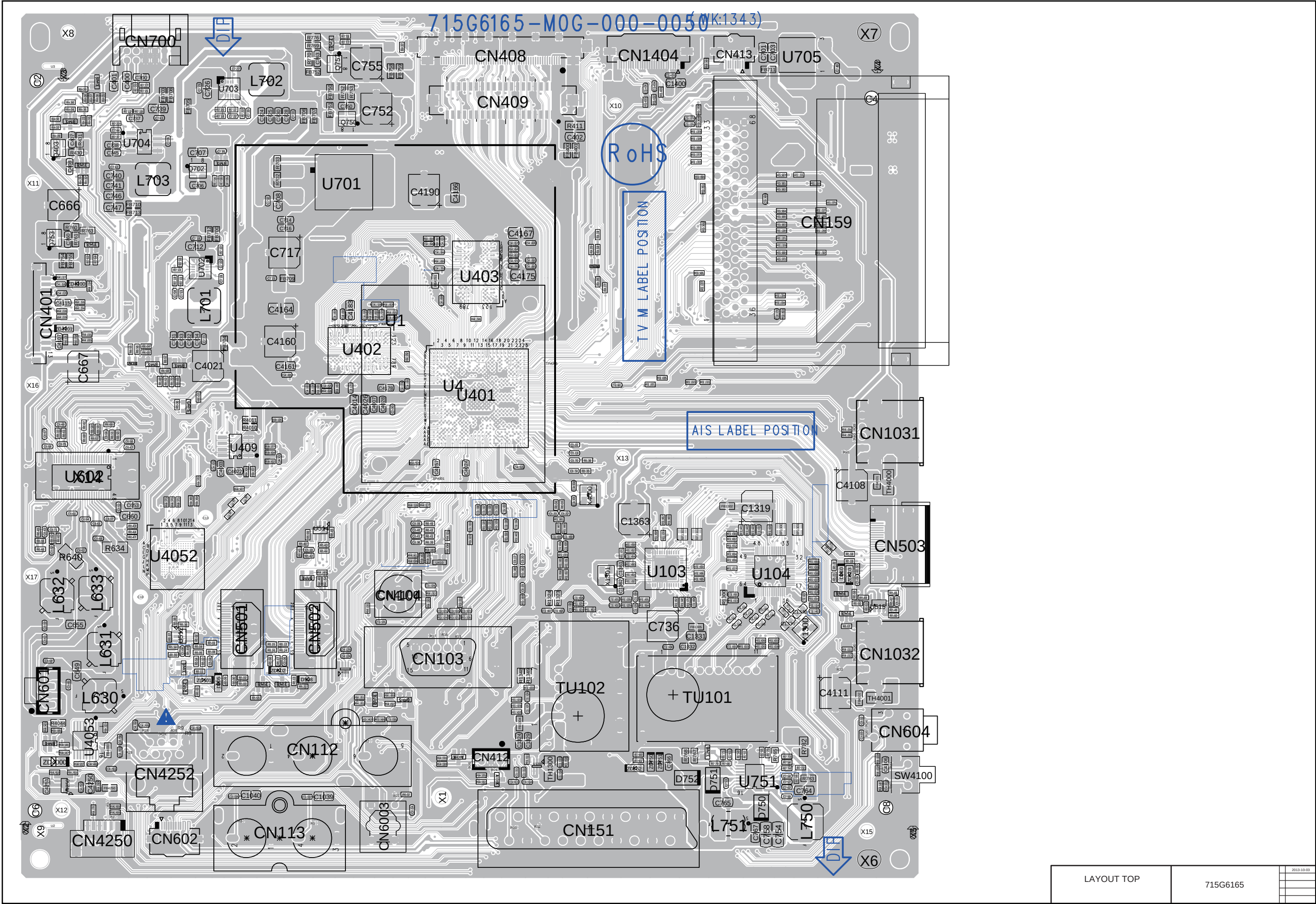
Function/Items\ Models	T model (T/C, T2)	K model (T/C, S2)	H model (T/C)
TUNER	TU102	TDSY_G720D	TCL ST25CS-2-E
T2 Demod IC	U103	NC	TDQS-A901F
S2 Demod IC	U104	NC	AVL6211LA

Function/Items\ Models	T model (T/C, T2)	K model (T/C, S2)	H model (T/C)
TUNER	TU102	TDSY_G720D	TCL ST25CS-2-E
T2 Demod IC	U103	NC	TDQS-A901F
S2 Demod IC	U104	NC	AVL6211LA

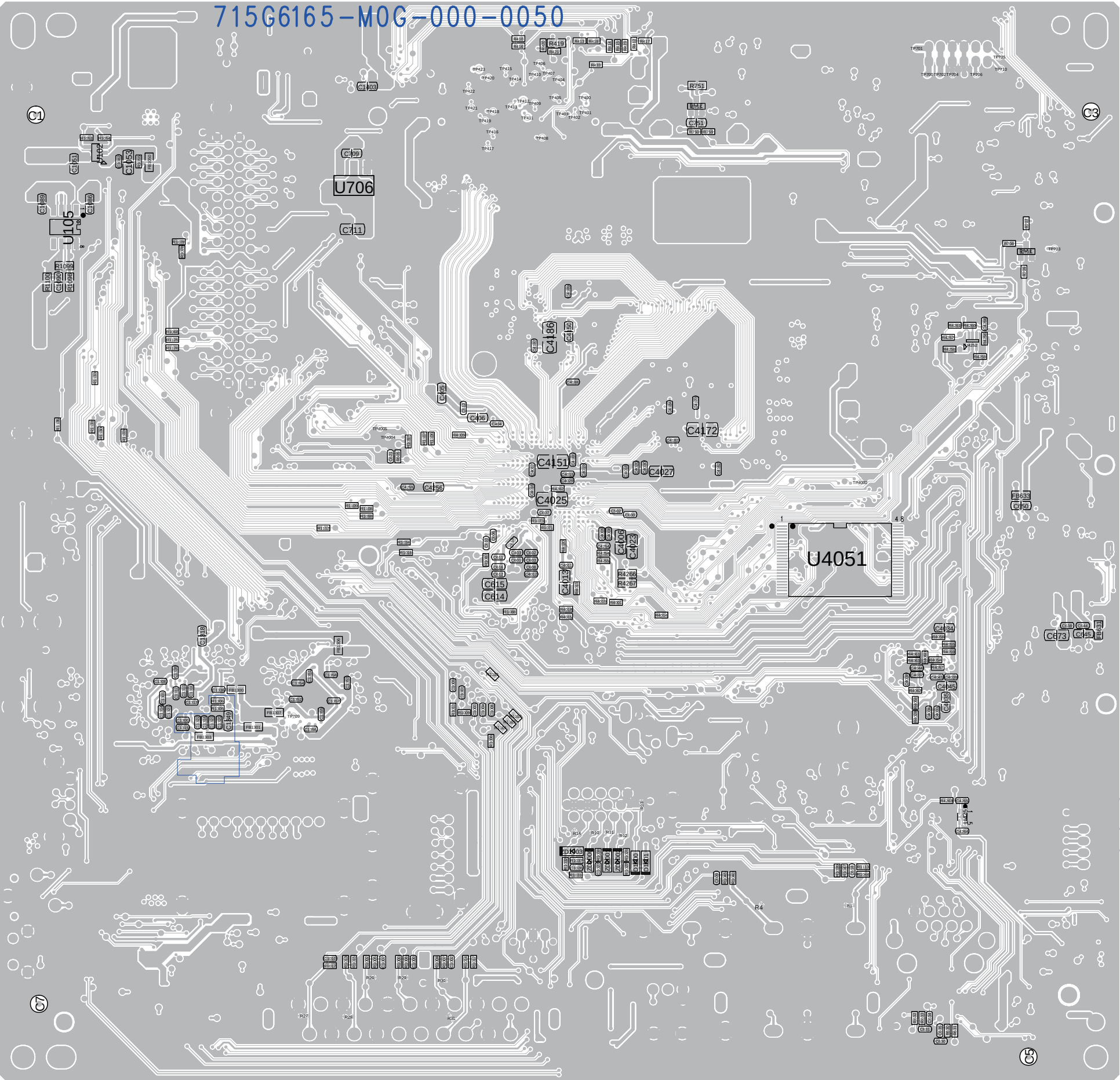
10-7-14 Ambient Light



10-7-15 SSB layout top



10-7-16 SSB layout bottom



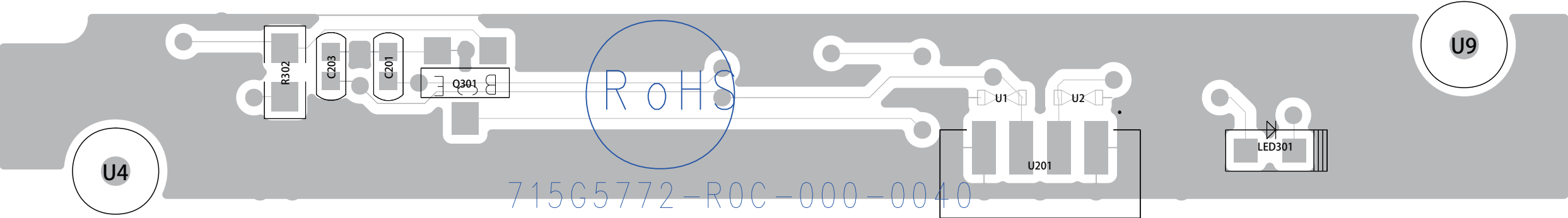
LAYOUT BOTTOM	715G6165	2013-10-01

10-8-1 IR/LED Panel

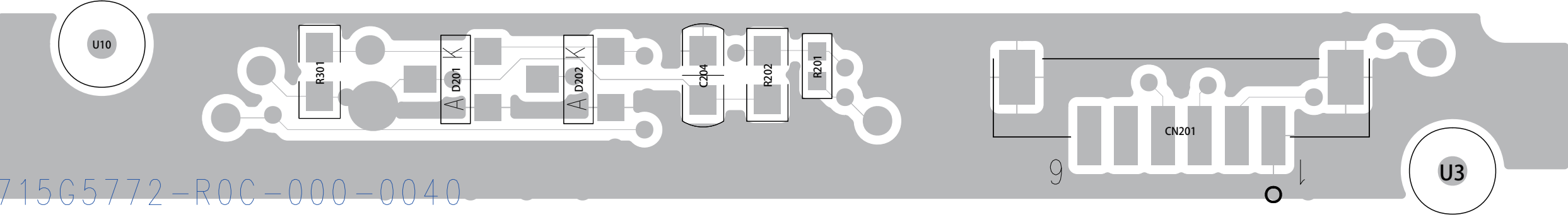


10-8-2 IR/LED board layout

Layout IR/LED panel (top side)



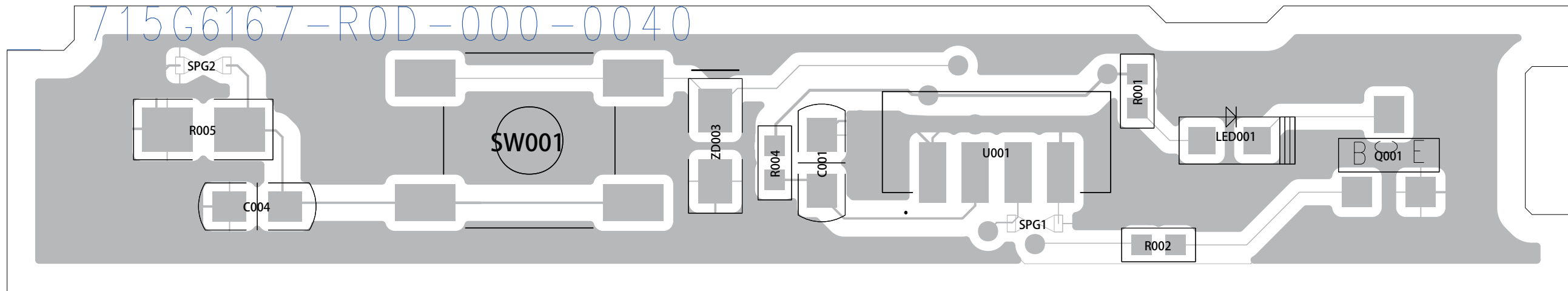
Layout IR/LED panel (bottom side)



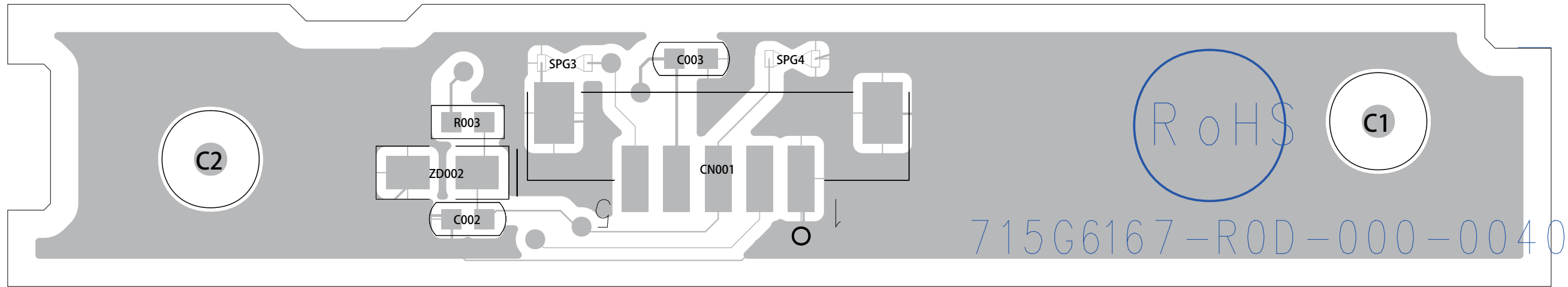
IR/LED panel layout top/bottom	715G5772	C	2012-09-20

10-9-2 IR/LED board layout

Layout IR/LED panel (top side)



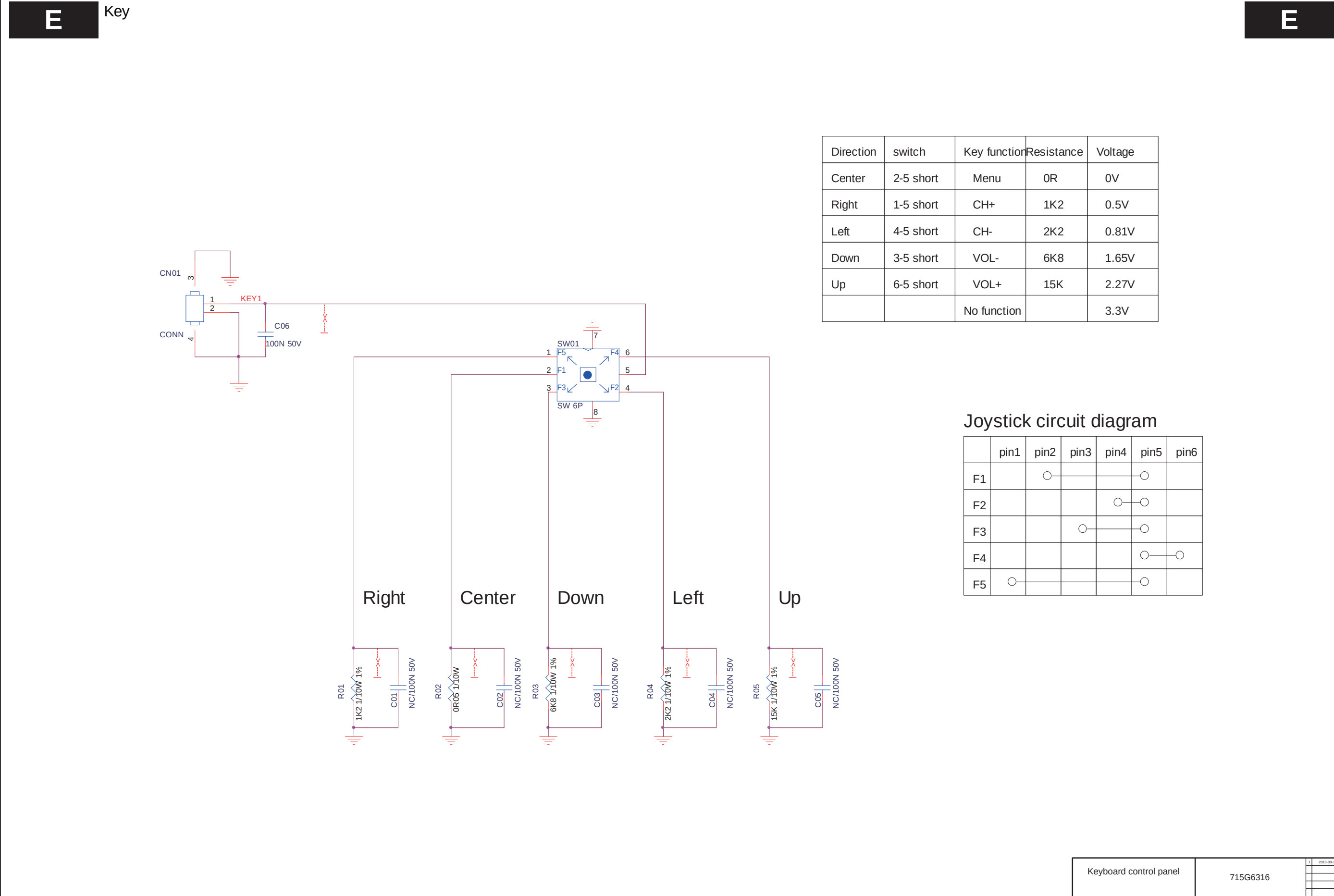
Layout IR/LED panel (bottom side)



IR/LED panel layout top/bottom	715G6167	C	2013-04-20

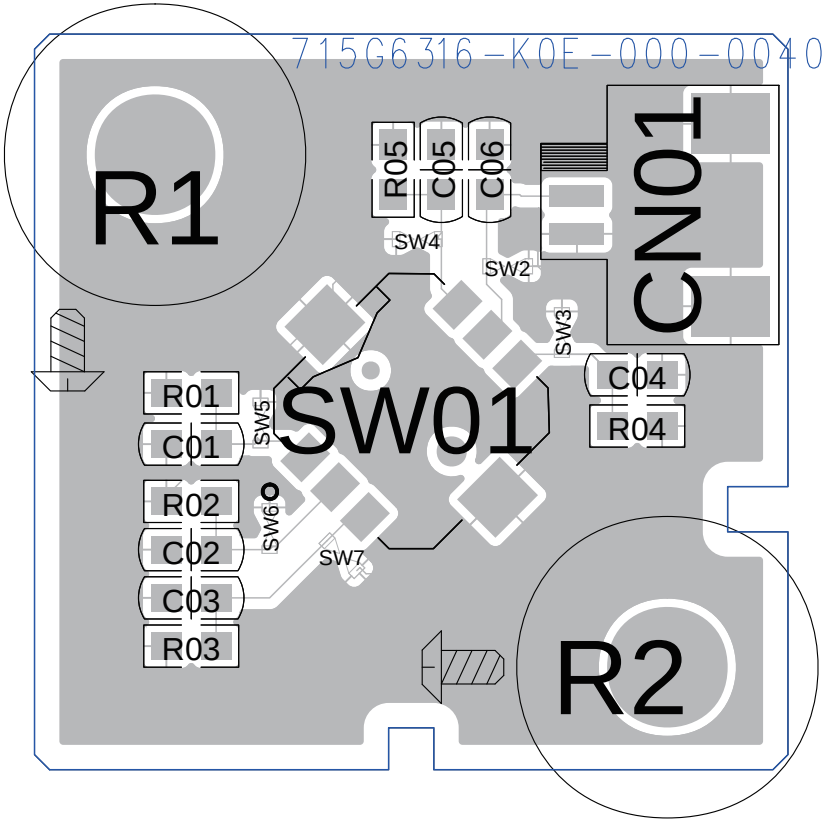
10.10 E 715G6316 Keyboard control panel

10-10-1 Key

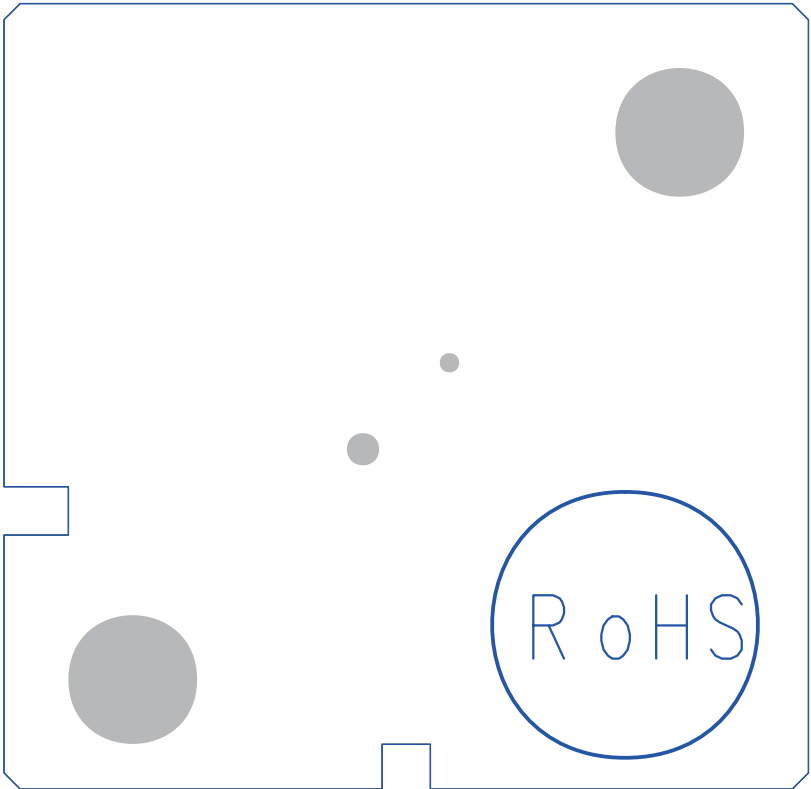


10-10-2 Key board layout

Layout Keyboard control panel (top side)



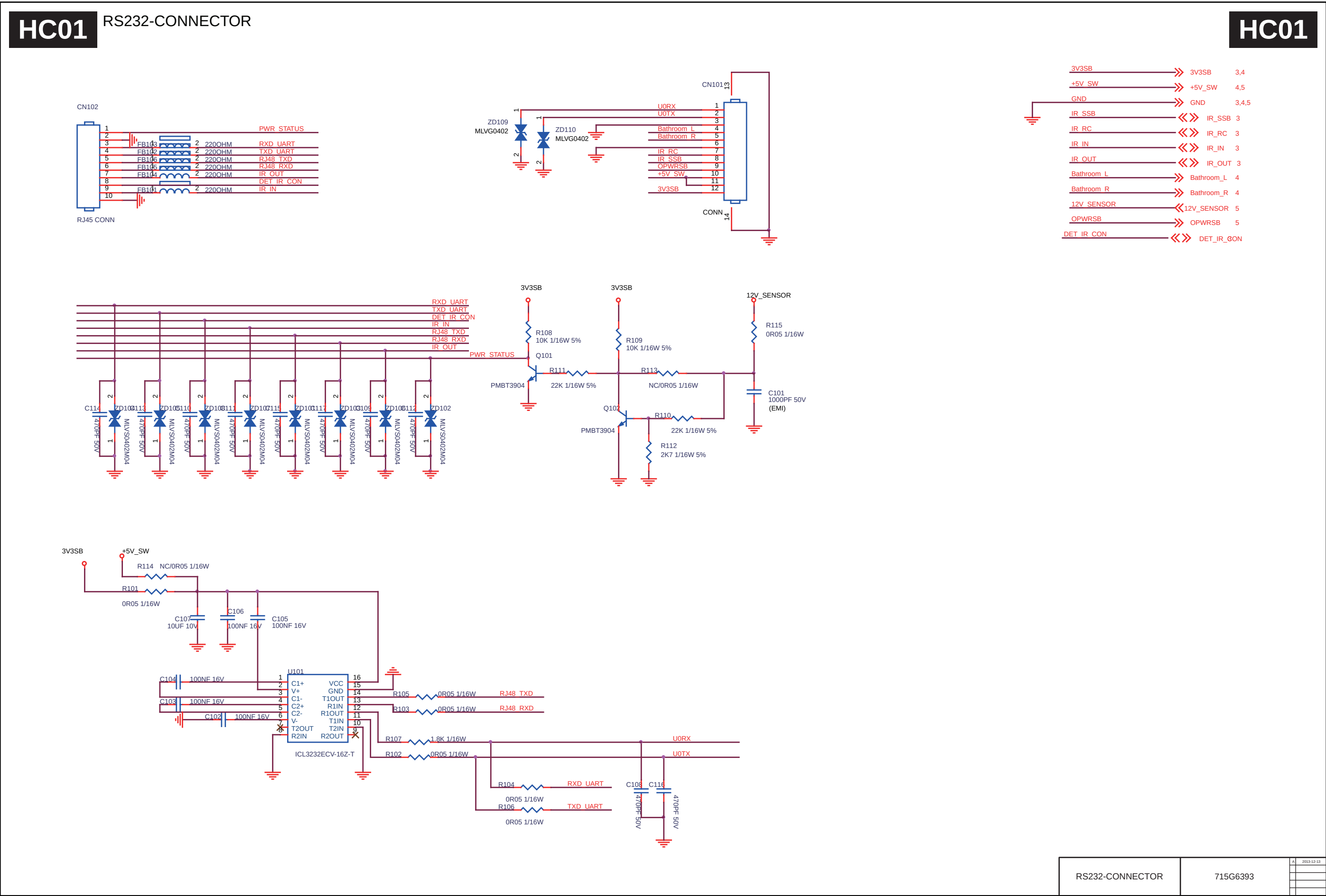
Layout Keyboard control panel (bottom side)



Keyboard control panel layout top/bottom	715G6316	1	2013-09-17

10.11 HC 715G6393 BOLT-ON board panel

10-11-1 RS232-CONNECTOR



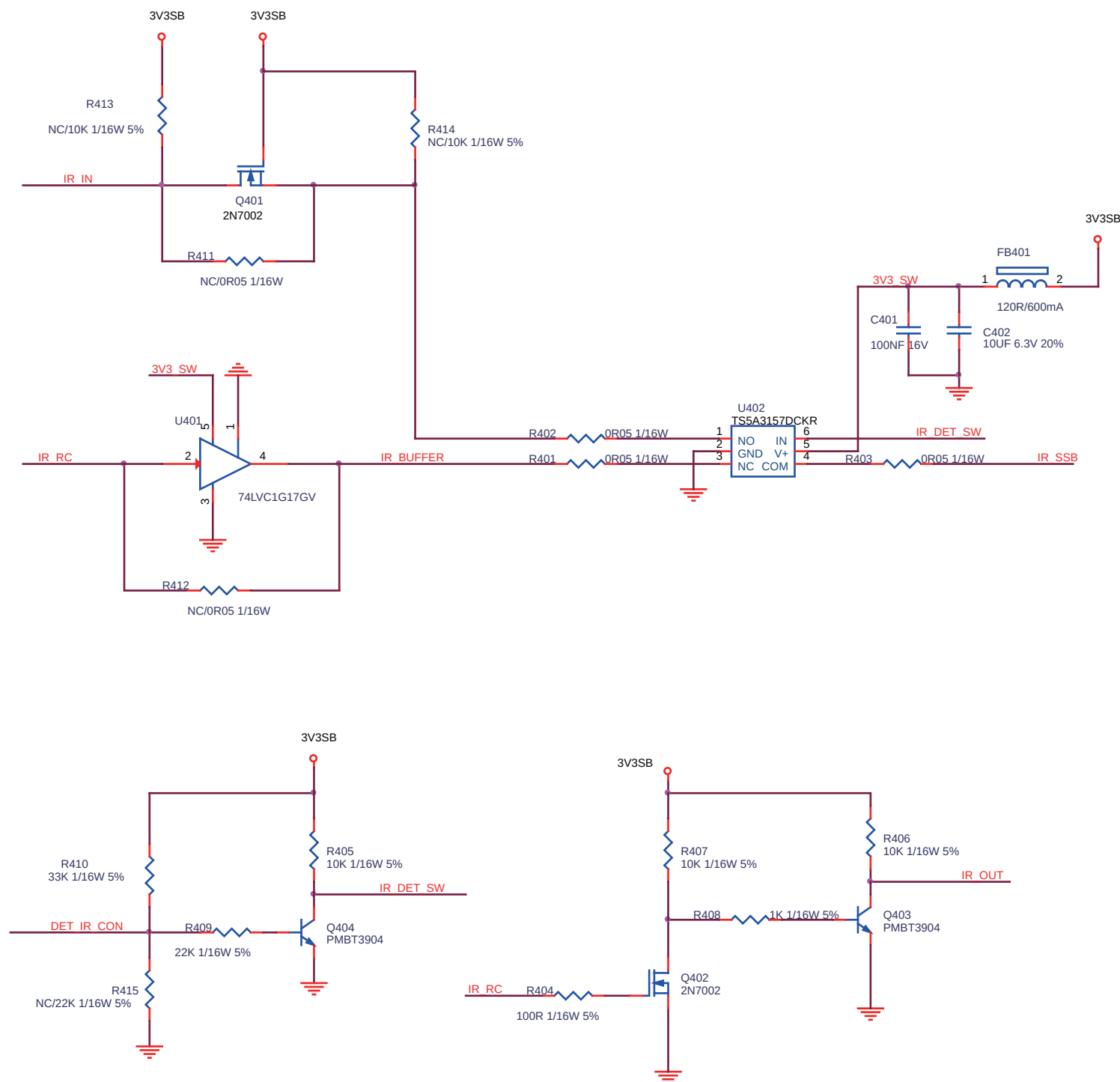
RS232-CONNECTOR

715G6393

A	2013-12-15

HC02 IR IN-OUT

HC02

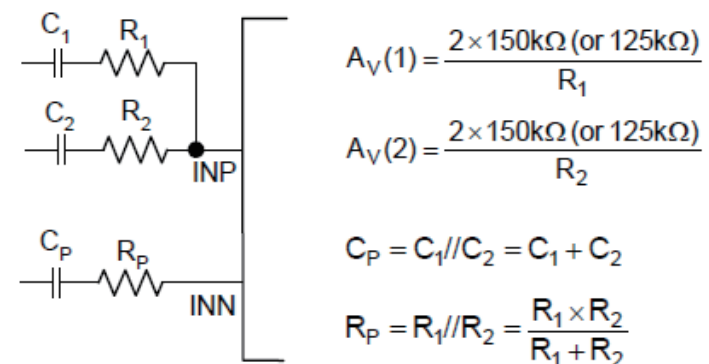
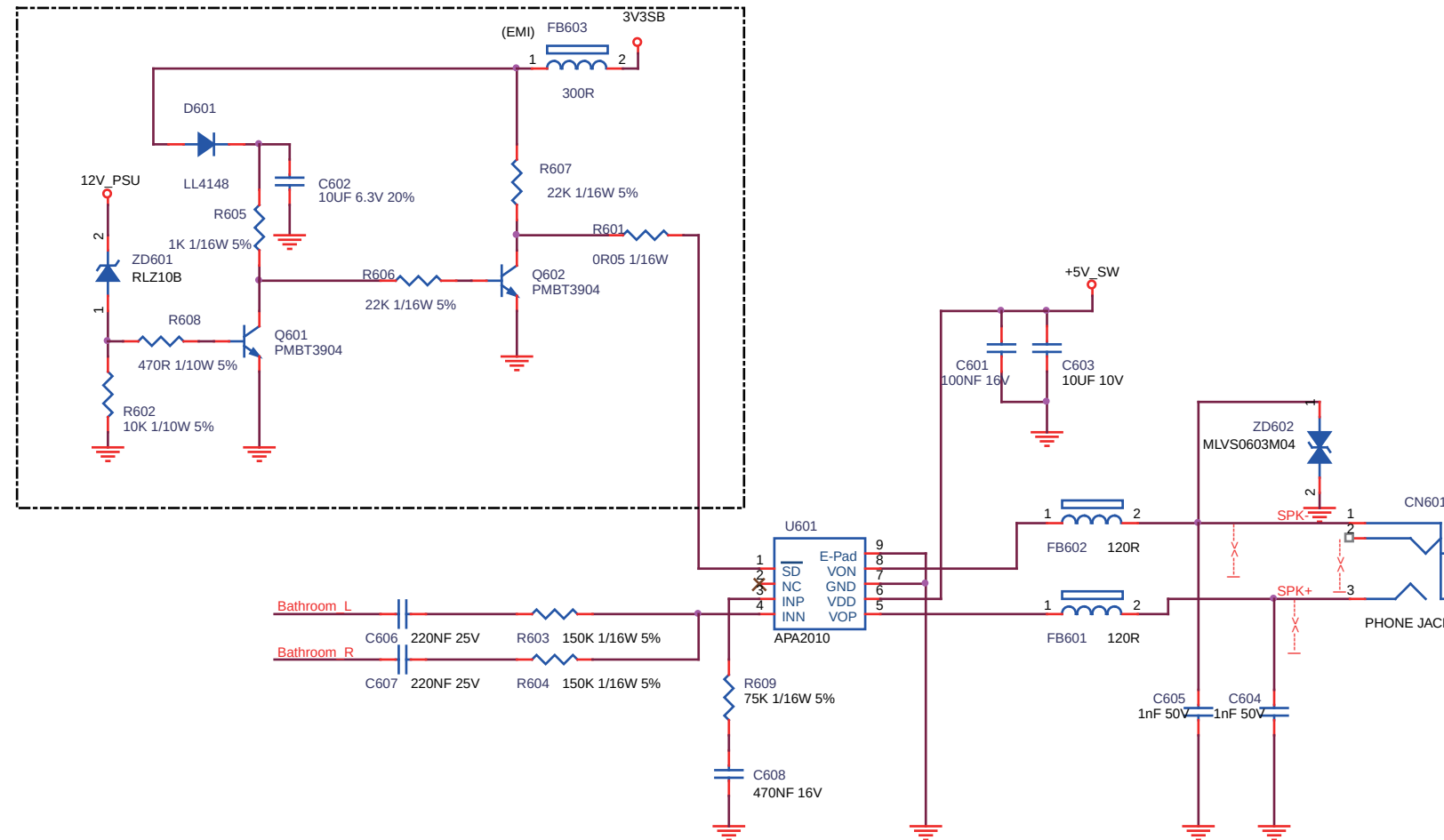


IR IN-OUT	715G6393	A	2013-09-10

10-11-3 AUDIO AMPLIFIER

HC03 AUDIO AMPLIFIER

HC03

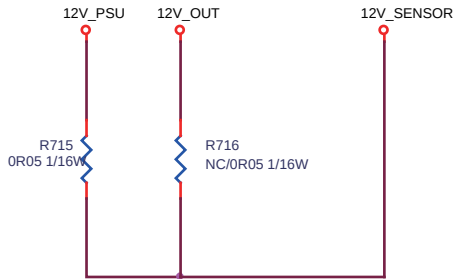
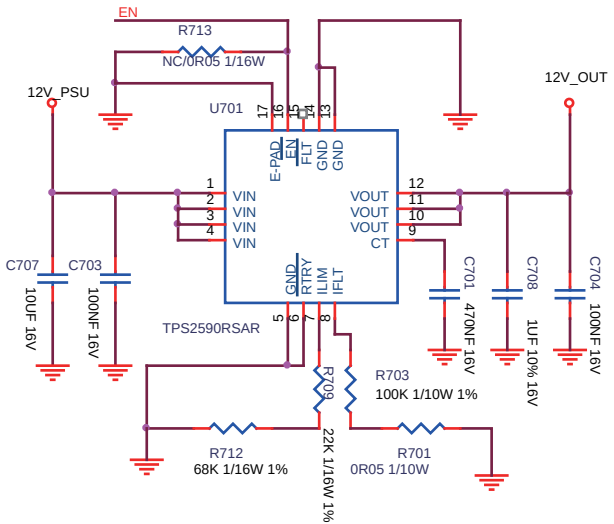
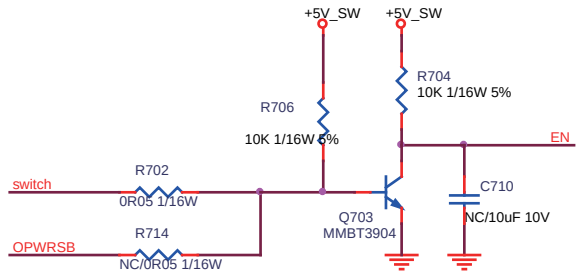
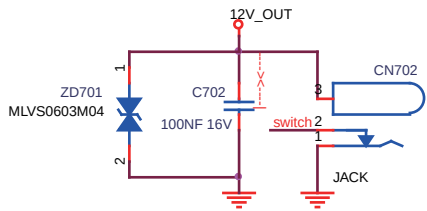
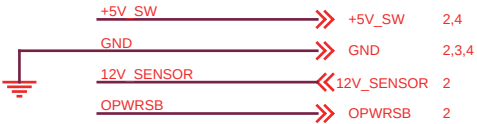
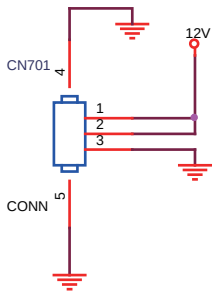
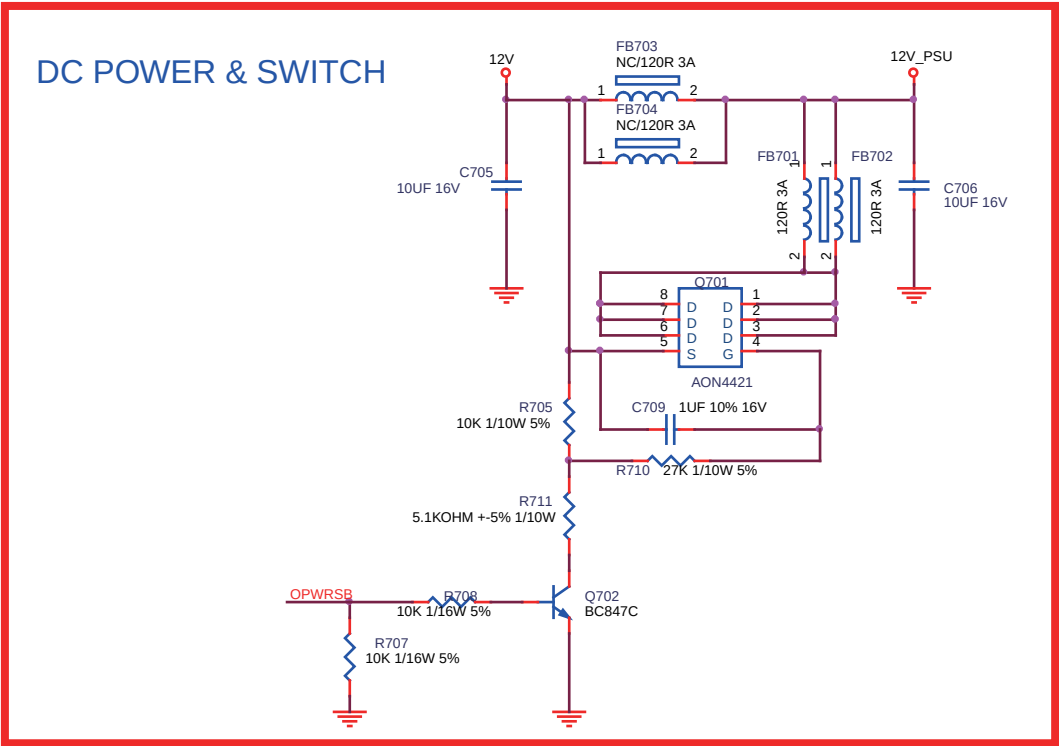


AUDIO AMPLIFIER	715G6393	A	2015-12-13

10-11-4 12V OUTPUT

HC04 12V OUTPUT

HC04

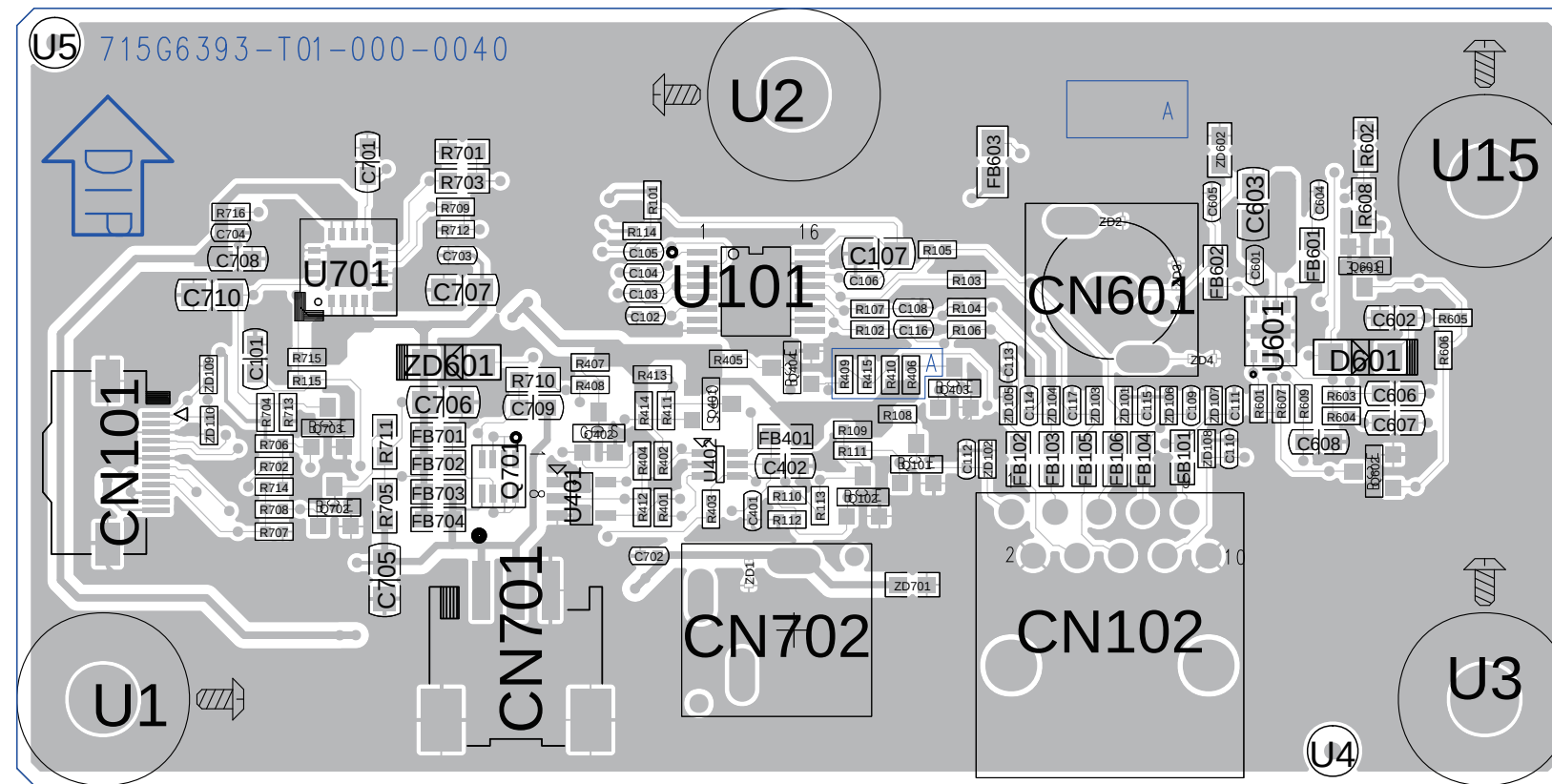


	12V switch by Q701	12V switch by U701
FB701,FB702 Q701,Q702 C705,C706,C709 R702,R705,R707,R708, R710,R711,R715	Yes	NC
FB703,FB704 R714,R716	NC	Yes

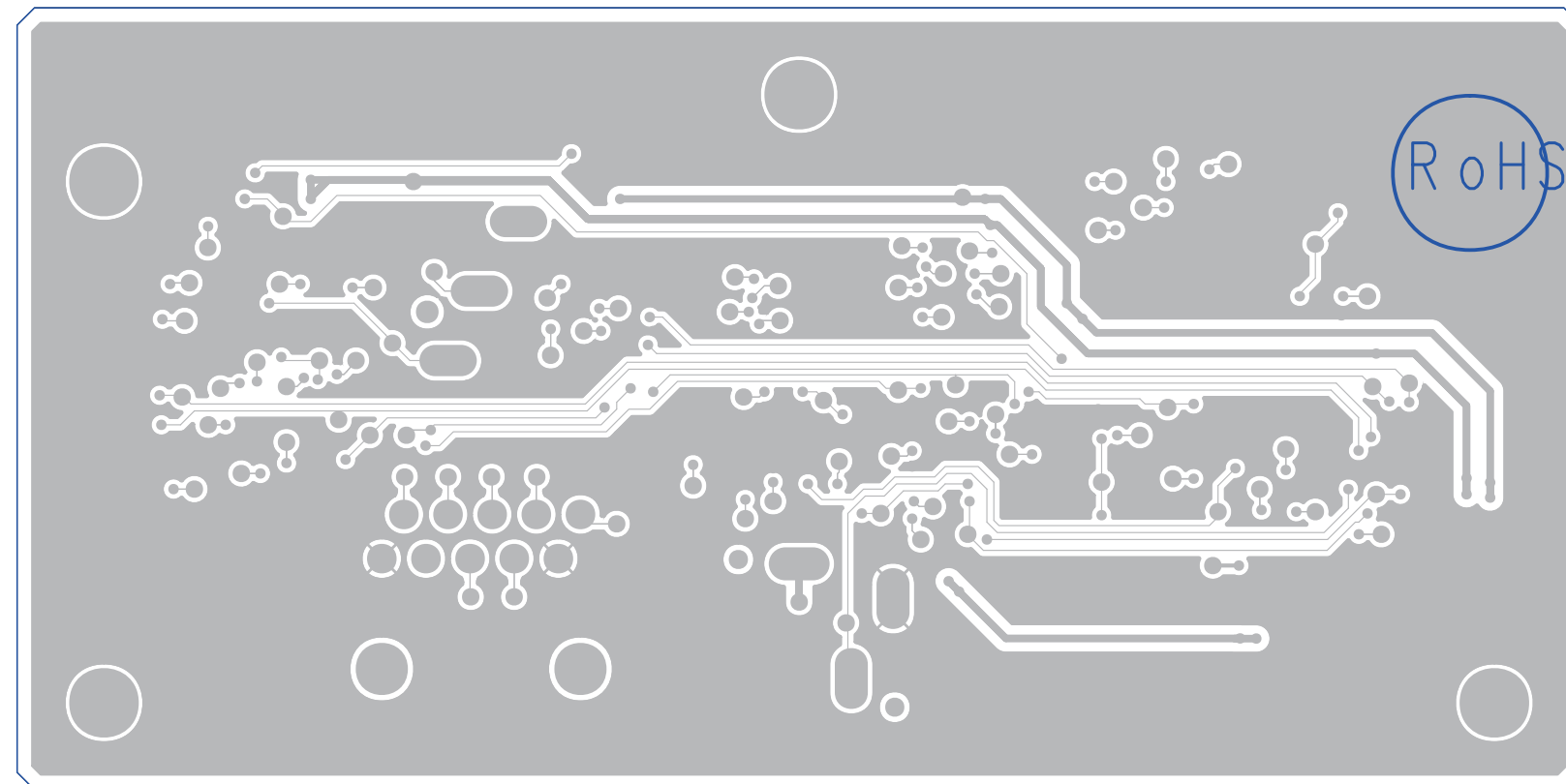
12V OUTPUT	715G6393	A 2013-12-11

10-11-5 BOLT-ON board layout

Layout BOLT-ON board panel (top side)



Layout BOLT-ON board panel (bottom side)

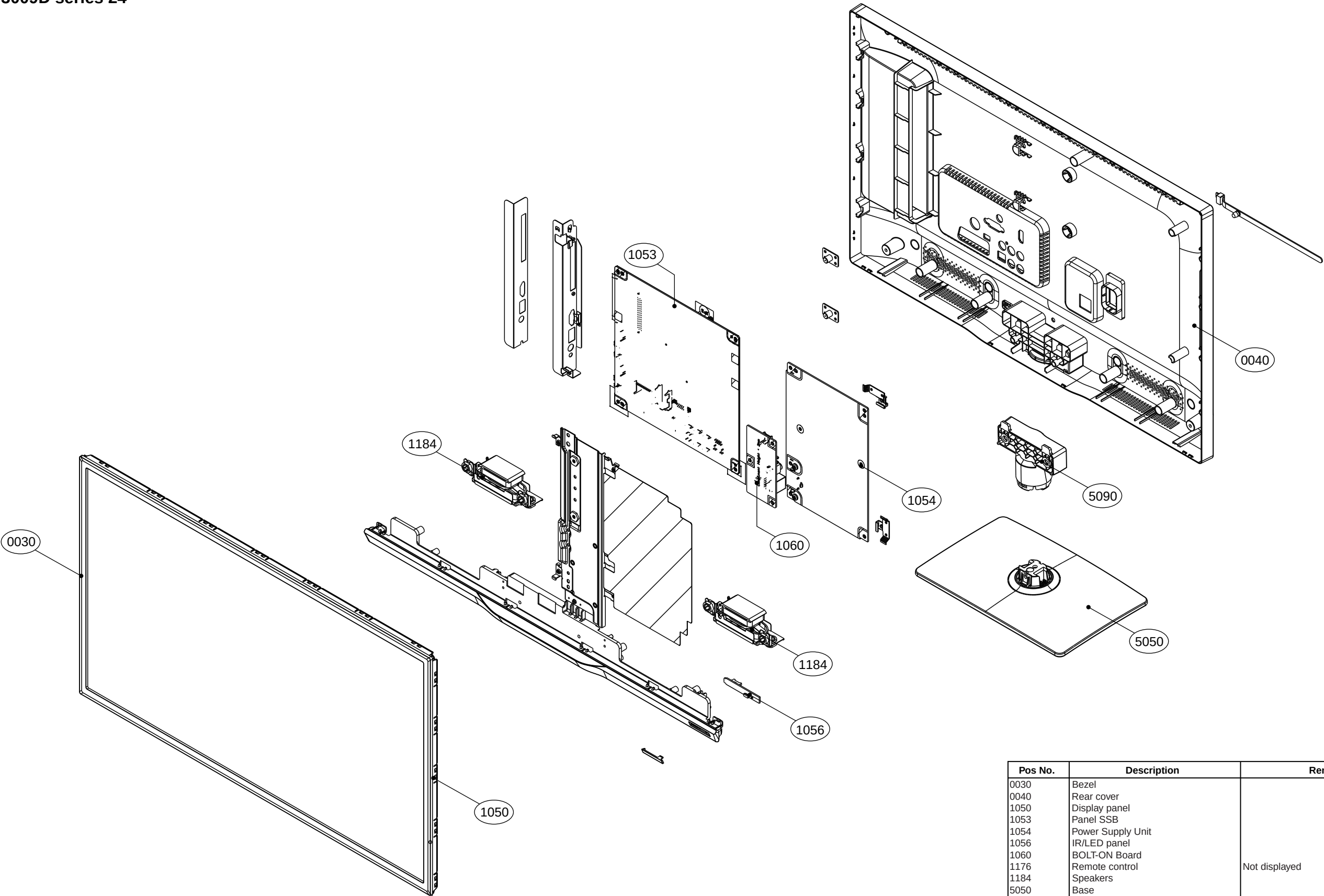


BOLT-ON board panel layout top/bottom	715G6393	A	2013-12-13

11. Styling Sheets

11.1 3009D series 24"

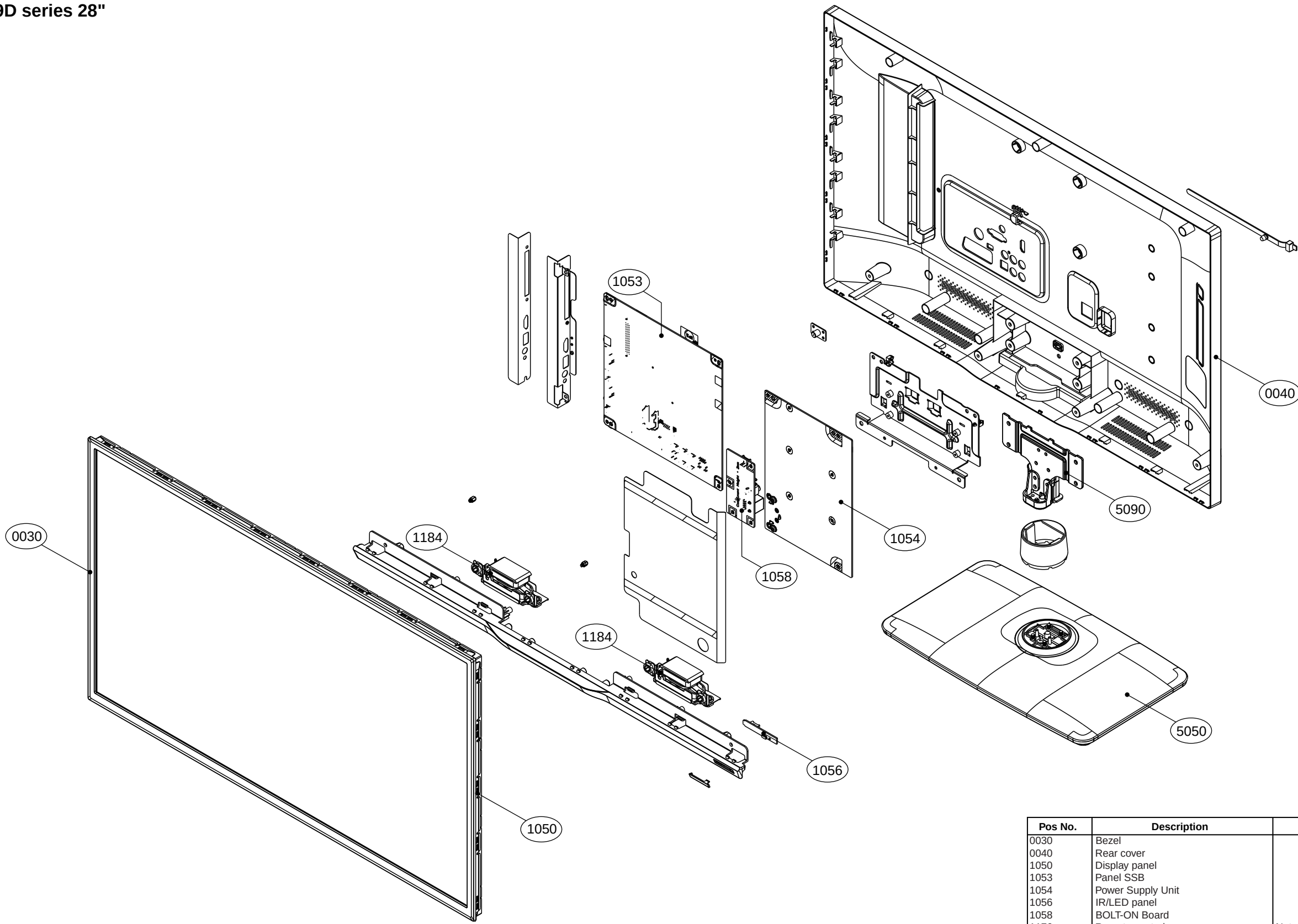
3009D series 24"



Pos No.	Description	Remarks
0030	Bezel	Not displayed
0040	Rear cover	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1060	BOLT-ON Board	
1176	Remote control	
1184	Speakers	
5050	Base	
5090	Stand	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

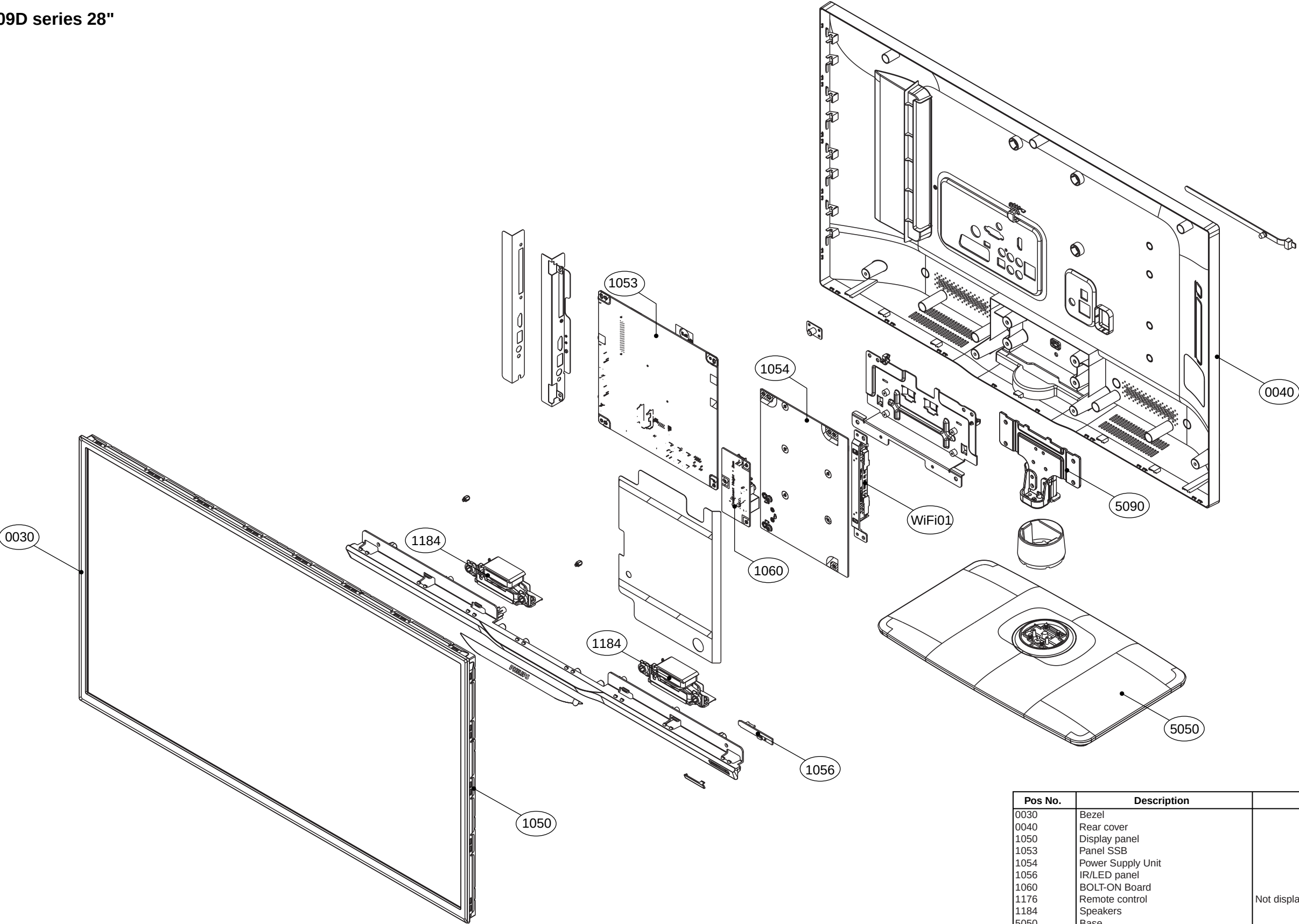
3009D series 28"



Pos No.	Description	Remarks
0030	Bezel	Not displayed
0040	Rear cover	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1058	BOLT-ON Board	
1176	Remote control	
1184	Speakers	
5050	Base	
5090	Stand	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

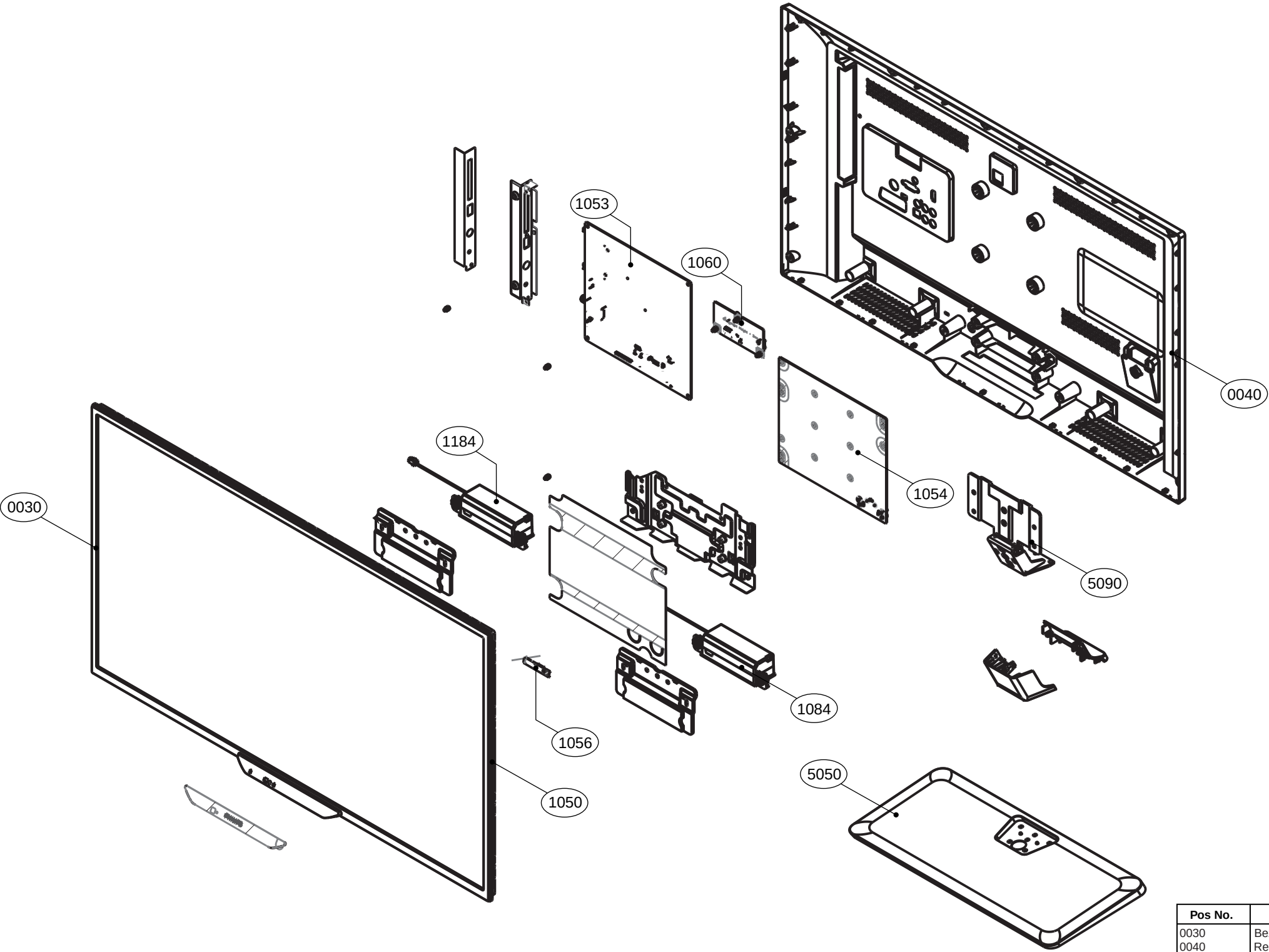
5009D series 28"



Pos No.	Description	Remarks
0030	Bezel	Not displayed
0040	Rear cover	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1060	BOLT-ON Board	
1176	Remote control	
1184	Speakers	
5050	Base	
5090	Stand	
WiFi01	WiFi_USB	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

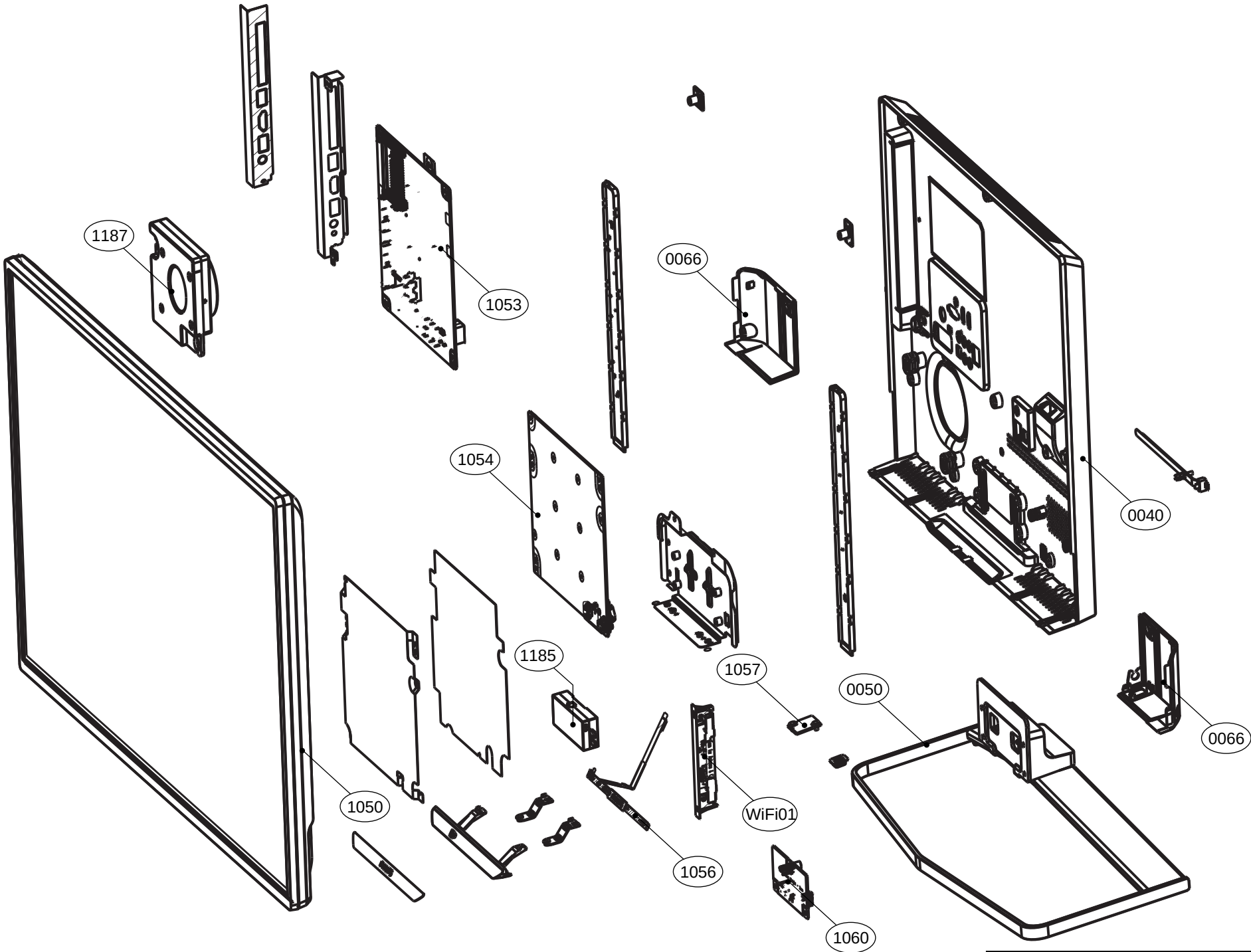
3009D series 32"



Pos No.	Description	Remarks
0030	Bezel	Not displayed
0040	Rear cover	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1060	BOLT-ON Board	
1176	Remote control	
1184	Speakers	
5050	Base	
5090	Stand	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

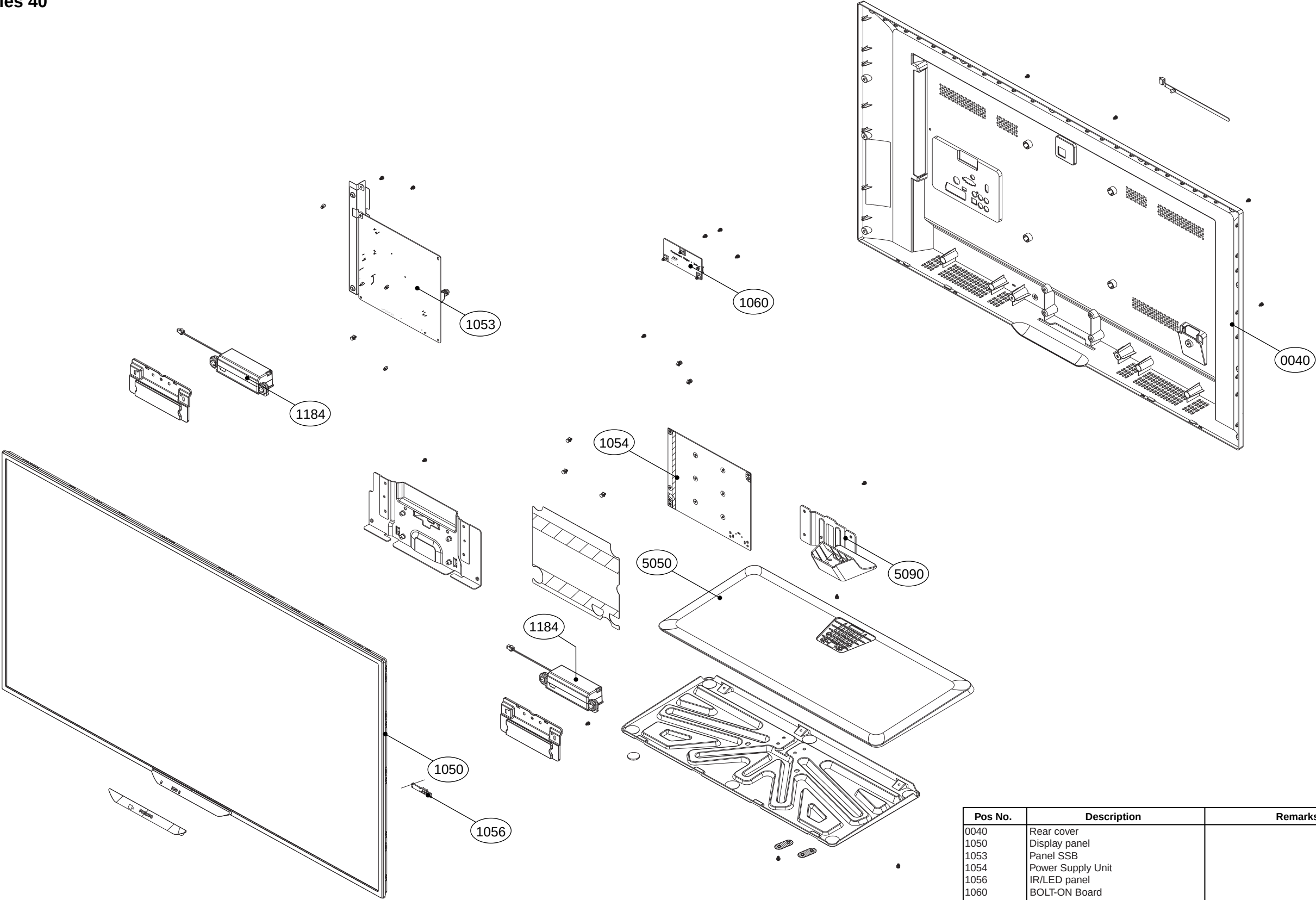
5009D series 32"



Pos No.	Description	Remarks
0040	Rear cover	Not displayed
0066	Cover speakers	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1057	Keyboard control panel	
1060	BOLT-ON Board	
1176	Remote control	
1185	Speaker_L	
1187	Speaker_Sub woofer	
5050	Base	
5090	Stand	
WiFi01	WiFi USB	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

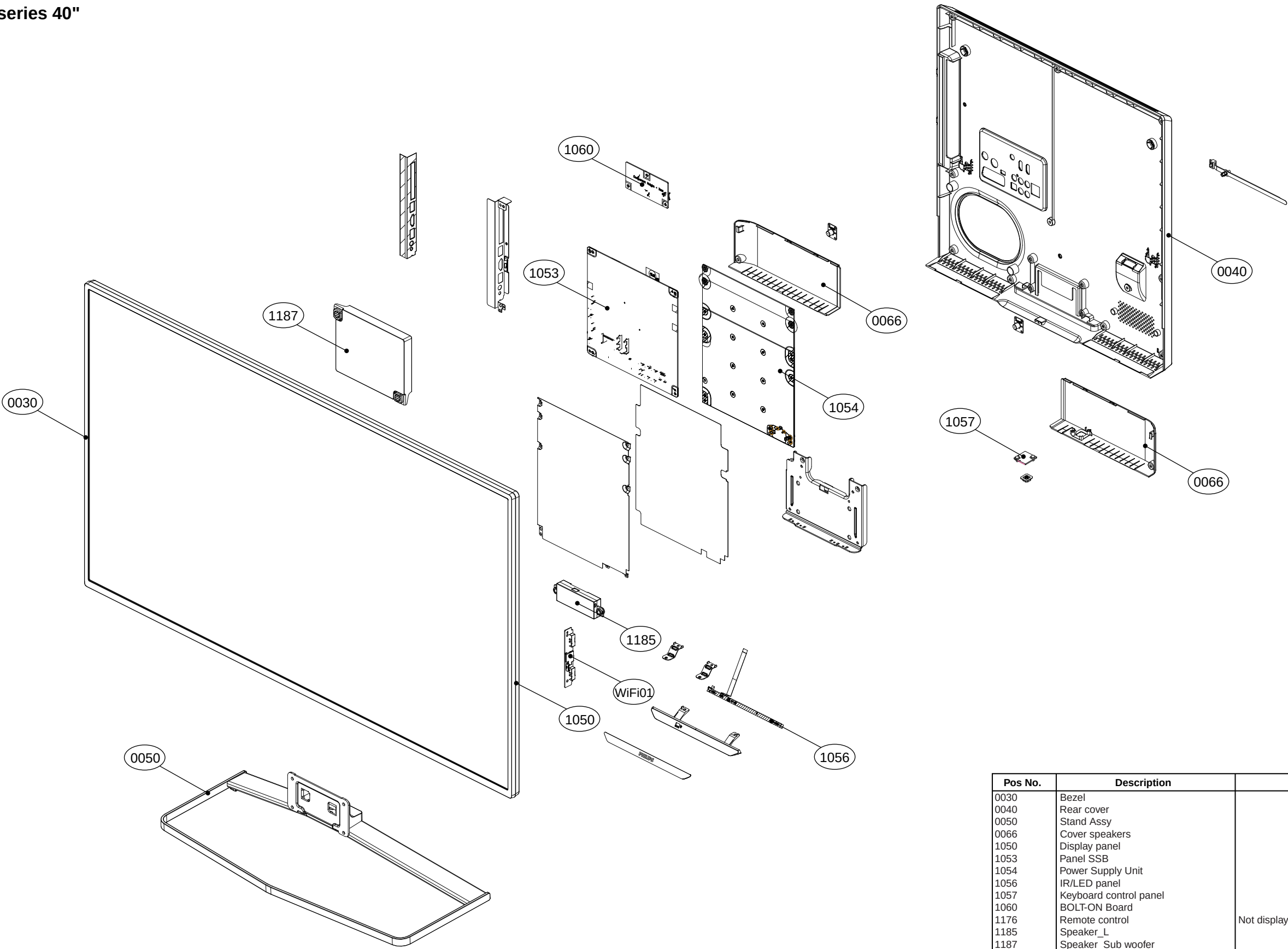
3009D series 40"



Pos No.	Description	Remarks
0040	Rear cover	Not displayed
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1060	BOLT-ON Board	
1176	Remote control	
1184	Speakers	
5050	Base	
5090	Stand	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

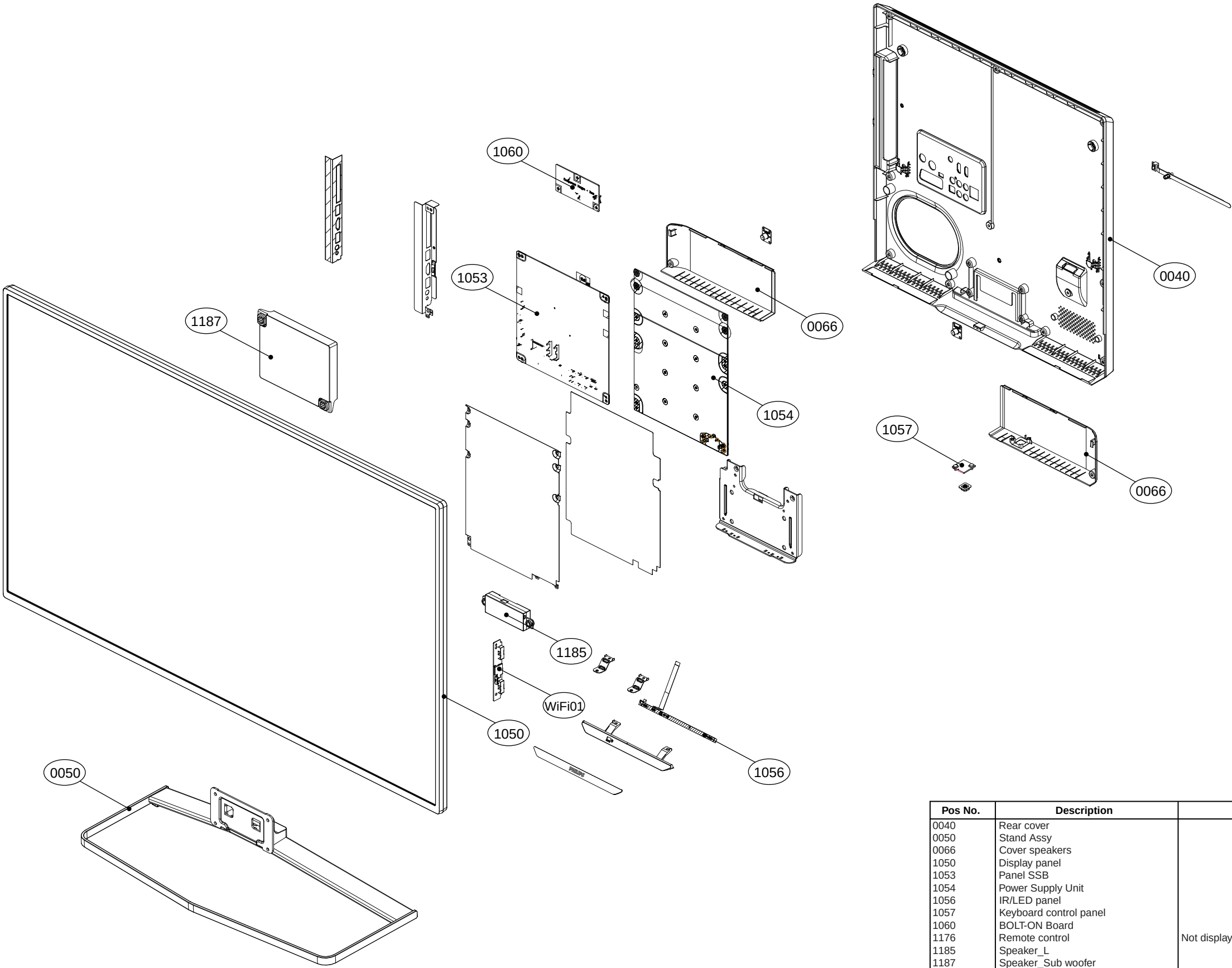
5009D series 40"



Pos No.	Description	Remarks
0030	Bezel	Not displayed
0040	Rear cover	
0050	Stand Assy	
0066	Cover speakers	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1057	Keyboard control panel	
1060	BOLT-ON Board	
1176	Remote control	
1185	Speaker_L	
1187	Speaker_Sub woofer	
WiFi01	WiFi_USB	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

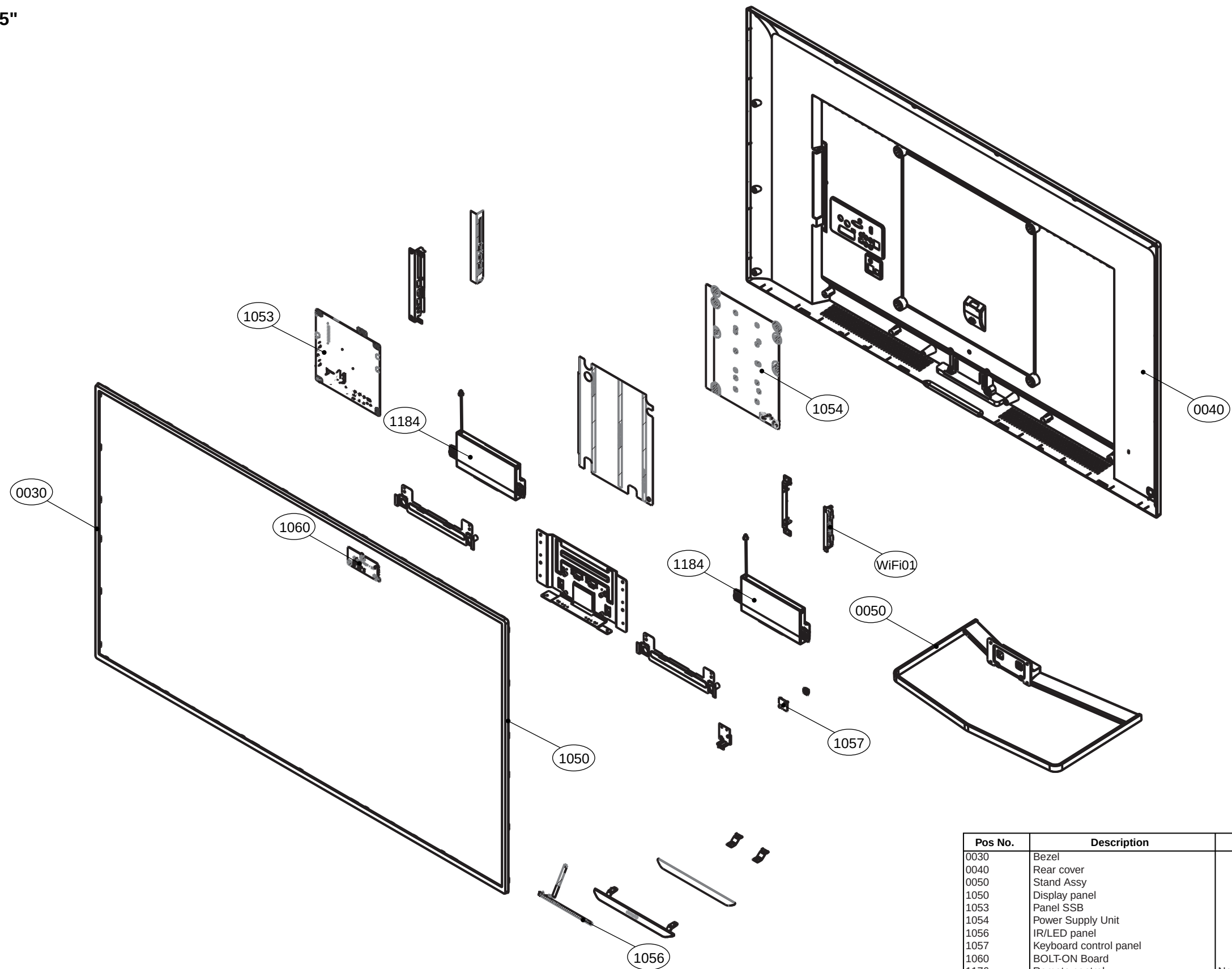
5009D series 48"



Pos No.	Description	Remarks
0040	Rear cover	Not displayed
0050	Stand Assy	
0066	Cover speakers	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1057	Keyboard control panel	
1060	BOLT-ON Board	
1176	Remote control	
1185	Speaker_L	
1187	Speaker_Sub woofer	
WiFi01	WiFi_USB	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

5009D series 55"



Pos No.	Description	Remarks
0030	Bezel	Not displayed
0040	Rear cover	
0050	Stand Assy	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1057	Keyboard control panel	
1060	BOLT-ON Board	
1176	Remote control	
1184	Speakers	
WiFi01	WiFi_USB	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9