

Service
Service
Service

TPN15.1E
LA



Service Manual

Contents	Page	Contents	Page
1. Revision List	2	AL 715G7035 Ambilight Board	129 131
2. Technical Specs. Diversity. and Connections	2	AL 715G7036 Ambilight Board	132 133
3. Precautions, Notes, and Abbreviation List	6	AL 715G7004 Ambilight Board	134 136
4. Mechanical Instructions	10	AL 715G6981 Ambilight Board	137 139
Cable dressing (22" 4000 series)	10	11. Styling Sheets	
Cable dressing (24" 4000 series)	11	4000 series 22"	140
Cable dressing (24PHH/T5210 series)	11	4000 series 24"	141
Cable dressing (24PHK5210 series)	12	5210 series 24"	142
Cable dressing (32PHT4100/60 series)	12	32PHT4100/60	143
Cable dressing (other 32" 4x00 series)	13	other 4x00 series 32"	144
Cable dressing (39" 4x00 series)	13	4x00 series 39"	145
Cable dressing (40" 4x00 series)	14	4x00 series 40"	146
Cable dressing (40" 6300 series)	14	6300 series 40"	147
Cable dressing (48" 4x00 series)	15	4x00 series 48"	148
Cable dressing (48" 6300 series)	15	6300 series 48"	149
Cable dressing (55" 6300 series)	16	6300 series 55"	150
5. Service Modes and Fault Finding	31		
6. Alignments	39		
7. Circuit Descriptions	43		
8. IC Data Sheets	49		
9. Block Diagrams			
Block diagram 4x00/6300/5210 series	55		
10. Circuit Diagrams and PWB Layouts	<i>Drawing PWB</i>		
A 715G6863 PSU	56		57-58
A 715G6550 PSU	59		61-62
A 715G6934 PSU	63		65-66
A 715G6940 PSU	67		72-73
A 715G6338 PSU	74		79-80
A 715G6743 PSU	81		86-87
B 715G6947 SSB	88		103-104
O 715G7048 Option Board	105		111-112
J 715G5964 IR/LED Panel	113		114
J 715G6167 IR/LED Panel	115		116
J 715G7055 IR/LED Panel	117		118
J 715G7045 IR/LED Panel	119		120
E 715G6316 Keyboard control panel	121		122
E 715G7088 Keyboard control panel	123		124
E 715G7188 Keyboard control panel	125		126
ALC 715G7046 LED Board (LOGO)	127		128

1. Revision List

Manual xxxx xxx xxxx.0

- First release.

Manual xxxx xxx xxxx.1

- **Chapter 2:** Updated table [2.1 Technical Specifications](#).
- **Chapter 4:** Added figures [4-5 Cable dressing \(32PHT4100/60 series\)](#), [4-6 Cable dressing \(other 32" 4x00 series\)](#), [4-7 Cable dressing \(39" 4x00 series\)](#) and [4-8 Cable dressing \(40" 4x00 series\)](#), added sections [4.4 Assembly/Panel Removal \(for 32"/39"/40"Pxx4x00\)](#) and [4.5 Assembly/Panel Removal \(only for 32PHT4100/60\)](#).
- **Chapter 5:** Updated table [5-2 Factory mode overview](#).
- **Chapter 6:** Updated tables [6-2 White tone default settings](#) and [6-3 Display code overview](#).
- **Chapter 7:** Updated figure [7-2 Power Architecture](#) and table [7-1 Connector overview](#).
- **Chapter 10:** Added circuit diagrams [10.3 A 715G6934 PSU](#), [10.10 J 715G6167 IR/LED Panel](#), [10.11 J 715G7055 IR/LED Panel](#), [10.14 E 715G7088 Keyboard control panel](#) and [10.14 E 715G7088 Keyboard control panel](#).
- **Chapter 11:** Added styling sheets [11.4 32PHT4100/60](#), [11.5 other 4x00 series 32"](#), [11.6 4x00 series 39"](#) and [11.7 4x00 series 40"](#).

Manual xxxx xxx xxxx.2

- **Chapter 2:** Updated table [2.1 Technical Specifications](#).
- **Chapter 4:** Added figures [4-9 Cable dressing \(40" 6300 series\)](#), [4-10 Cable dressing \(48" 4x00 series\)](#), [4-11 Cable dressing \(48" 6300 series\)](#) and [4-12 Cable dressing \(55" 6300 series\)](#), added section [4.6 Assembly/Panel Removal \(for 6300 series\)](#).
- **Chapter 5:** Updated table [5-2 Factory mode overview](#).
- **Chapter 6:** Updated tables [6-2 White tone default settings](#) and [6-3 Display code overview](#).

- **Chapter 7:** Updated figure [7-2 Power Architecture](#) and table [7-1 Connector overview](#).
- **Chapter 10:** Added circuit diagrams [10.4 A 715G6940 PSU](#), [10.5 A 715G6338 PSU](#), [10.6 A 715G6743 PSU](#), [10.8 O 715G7048 Option Board](#), [10.12 J 715G7045 IR/LED Panel](#), [10.15 E 715G7188 Keyboard control panel](#), [10.16 ALC 715G7046 LED Board\(LOGO\)](#), [10.17 AL 715G7035 Ambilight Board](#), [10.18 AL 715G7036 Ambilight Board](#), [10.19 AL 715G7004 Ambilight Board](#) and [10.20 AL 715G6981 Ambilight Board](#).
- **Chapter 11:** Added styling sheets [11.8 6300 series 40"](#), [11.9 4x00 series 48"](#), [11.10 6300 series 48"](#) and [11.11 6300 series 55"](#).

Manual xxxx xxx xxxx.3

- **Chapter 2:** Updated table [2.1 Technical Specifications](#).
- **Chapter 6:** Updated tables [6-2 White tone default settings](#) and [6-3 Display code overview](#).

Manual xxxx xxx xxxx.4

- **Chapter 5:** Updated chapter [5. Service Modes and Fault Finding](#).

Manual xxxx xxx xxxx.5

- **Chapter 2:** Updated table [2.1 Technical Specifications](#).
- **Chapter 4:** Added figures [4-3 Cable dressing \(24PHH/T5210 series\)](#) and [4-4 Cable dressing \(24PHK5210 series\)](#), added section [4.7 Assembly/Panel Removal \(for 24"PHx5210\)](#).
- **Chapter 5:** Updated table [5-2 Factory mode overview](#).
- **Chapter 6:** Updated tables [6-2 White tone default settings](#) and [6-3 Display code overview](#).
- **Chapter 11:** Added styling sheets [11.3 5210 series 24"](#).

2. Technical Specs, Diversity, and Connections

Index of this chapter:

[2.1 Technical Specifications](#)
[2.2 Directions for Use](#)
[2.3 Connections](#)
[2.4 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 Diagrams	Schematics				Styling
		Wire Dressing	Stand Removal	Rear Cover Removal	Speakers Removal	SSB Removal	IR/LED Board Removal		Power Supply	SSB	J (IR/LED)	E (Keyboard/Leading Edge)	
22PFH4000/88	2-1	4-1	-	4-13	4-14	4-15	-	9.1	10.1	10.7	10.9	-	11.1
22PFK4000/12	2-1	4-2	-	4-13	4-14	4-15	-	9.1	10.2	10.7	10.9	-	11.1
22PFT4000/12	2-1	4-1	-	4-13	4-14	4-15	-	9.1	10.1	10.7	10.9	-	11.1
22PFT4000/60	2-1	4-1	-	4-13	4-14	4-15	-	9.1	10.1	10.7	10.9	-	11.1
24PHH4000/88	2-1	4-1	-	4-13	4-14	4-15	-	9.1	10.1	10.7	10.9	-	11.2
24PHK4000/12	2-1	4-2	-	4-13	4-14	4-15	-	9.1	10.2	10.7	10.9	-	11.2
24PHT4000/12	2-1	4-1	-	4-13	4-14	4-15	-	9.1	10.1	10.7	10.9	-	11.2
24PHT4000/60	2-1	4-1	-	4-13	4-14	4-15	-	9.1	10.1	10.7	10.9	-	11.2
24PHH5210/88	2-1	4-3	-	4-30	4-31	4-32	-	9.1	10.1	10.7	10.12	10.14	11.3
24PHT5210/12	2-1	4-3	-	4-30	4-31	4-32	-	9.1	10.1	10.7	10.12	10.14	11.3

CTN	2	4						9	10					11
	Connection Overview	Mechanics						Block Diagrams	Schematics				Styling	
		Wire Dressing	Stand Removal	Rear Cover Removal	Speakers Removal	SSB Removal	IR/LED Board Removal	Block Diagram	Power Supply	SSB	J (IR/LED)	E (Keyboard/Leading Edge)		
24PHK5210/12	2-1	4-4	-	4-30	4-31	4-32	-	9.1	10.2	10.7	10.12	10.14	11.3	
24PHT5210/60	2-1	4-3	-	4-30	4-31	4-32	-	9.1	10.1	10.7	10.12	10.14	11.3	
32PFH4100/88	2-1	4-6	4-16	4-17	-	4-18	4-22	9.1	10.2	10.7	10.11	10.14	11.5	
32PFK4100/12	2-1	4-6	4-16	4-17	-	4-18	4-22	9.1	10.2	10.7	10.11	10.14	11.5	
32PFT4100/12	2-1	4-6	4-16	4-17	-	4-18	4-22	9.1	10.2	10.7	10.11	10.14	11.5	
32PFT4100/60	2-1	4-6	4-16	4-17	-	4-18	4-22	9.1	10.2	10.7	10.11	10.14	11.5	
32PHH4100/88	2-1	4-6	4-16	4-17	-	4-18	4-22	9.1	10.2	10.7	10.11	10.14	11.5	
32PHK4100/12	2-1	4-6	4-16	4-17	-	4-18	4-22	9.1	10.2	10.7	10.11	10.14	11.5	
32PHT4100/12	2-1	4-6	4-16	4-17	-	4-18	4-22	9.1	10.2	10.7	10.11	10.14	11.5	
32PHT4100/60	2-1	4-5	4-19	4-20	-	4-21	-	9.1	10.2	10.7	10.10	10.13	11.4	
32PHH4200/88	2-1	4-6	4-16	4-17	-	4-18	4-22	9.1	10.2	10.7	10.11	10.14	11.5	
32PHK4200/12	2-1	4-6	4-16	4-17	-	4-18	4-22	9.1	10.2	10.7	10.11	10.14	11.5	
32PHT4200/12	2-1	4-6	4-16	4-17	-	4-18	4-22	9.1	10.2	10.7	10.11	10.14	11.5	
39PFH4100/88	2-1	4-7	4-16	4-17	-	4-18	4-22	9.1	10.3	10.7	10.11	10.14	11.6	
39PFK4100/12	2-1	4-7	4-16	4-17	-	4-18	4-22	9.1	10.3	10.7	10.11	10.14	11.6	
39PFT4100/12	2-1	4-7	4-16	4-17	-	4-18	4-22	9.1	10.3	10.7	10.11	10.14	11.6	
39PFT4100/60	2-1	4-7	4-16	4-17	-	4-18	4-22	9.1	10.3	10.7	10.11	10.14	11.6	
39PFH4200/88	2-1	4-7	4-16	4-17	-	4-18	4-22	9.1	10.3	10.7	10.11	10.14	11.6	
39PFK4200/12	2-1	4-7	4-16	4-17	-	4-18	4-22	9.1	10.3	10.7	10.11	10.14	11.6	
39PFT4200/12	2-1	4-7	4-16	4-17	-	4-18	4-22	9.1	10.3	10.7	10.11	10.14	11.6	
40PFH4100/88	2-1	4-8	4-16	4-17	-	4-18	4-22	9.1	10.3	10.7	10.11	10.14	11.7	
40PFK4100/12	2-1	4-8	4-16	4-17	-	4-18	4-22	9.1	10.3	10.7	10.11	10.14	11.7	
40PFT4100/12	2-1	4-8	4-16	4-17	-	4-18	4-22	9.1	10.3	10.7	10.11	10.14	11.7	
40PFT4100/60	2-1	4-8	4-16	4-17	-	4-18	4-22	9.1	10.3	10.7	10.11	10.14	11.7	
40PFH4200/88	2-1	4-8	4-16	4-17	-	4-18	4-22	9.1	10.3	10.7	10.11	10.14	11.7	
40PFK4200/12	2-1	4-8	4-16	4-17	-	4-18	4-22	9.1	10.3	10.7	10.11	10.14	11.7	
40PFT4200/12	2-1	4-8	4-16	4-17	-	4-18	4-22	9.1	10.3	10.7	10.11	10.14	11.7	
40PFH6300/88	2-1	4-9	4-24	4-26	-	4-28	4-29	9.1	10.4	10.7	10.12	10.15	11.8	
40PFK6300/12	2-1	4-9	4-24	4-26	-	4-28	4-29	9.1	10.4	10.7	10.12	10.15	11.8	
40PFT6300/12	2-1	4-9	4-24	4-26	-	4-28	4-29	9.1	10.4	10.7	10.12	10.15	11.8	
40PFT6300/60	2-1	4-9	4-24	4-26	-	4-28	4-29	9.1	10.4	10.7	10.12	10.15	11.8	
48PFT4100/60	2-1	4-10	4-16	4-17	-	4-18	4-22	9.1	10.5	10.7	10.11	10.14	11.9	
48PFH4100/88	2-1	4-10	4-16	4-17	-	4-18	4-22	9.1	10.5	10.7	10.11	10.14	11.9	
48PFT4100/12	2-1	4-10	4-16	4-17	-	4-18	4-22	9.1	10.5	10.7	10.11	10.14	11.9	
48PFK4100/12	2-1	4-10	4-16	4-17	-	4-18	4-22	9.1	10.5	10.7	10.11	10.14	11.9	
48PFH6300/88	2-1	4-11	4-24	4-26	-	4-18	4-29	9.1	10.6	10.7	10.12	10.15	11.10	
48PFK6300/12	2-1	4-11	4-24	4-26	-	4-28	4-29	9.1	10.6	10.7	10.12	10.15	11.10	
48PFT6300/12	2-1	4-11	4-24	4-26	-	4-28	4-29	9.1	10.6	10.7	10.12	10.15	11.10	
48PFT6300/60	2-1	4-11	4-24	4-26	-	4-28	4-29	9.1	10.6	10.7	10.12	10.15	11.10	
55PFH6300/88	2-1	4-12	4-24	4-26	-	4-28	4-29	9.1	10.6	10.7	10.12	10.15	11.11	
55PFK6300/12	2-1	4-12	4-24	4-26	-	4-28	4-29	9.1	10.6	10.7	10.12	10.15	11.11	
55PFT6300/12	2-1	4-12	4-24	4-26	-	4-28	4-29	9.1	10.6	10.7	10.12	10.15	11.11	
55PFT6300/60	2-1	4-12	4-24	4-26	-	4-28	4-29	9.1	10.6	10.7	10.12	10.15	11.11	

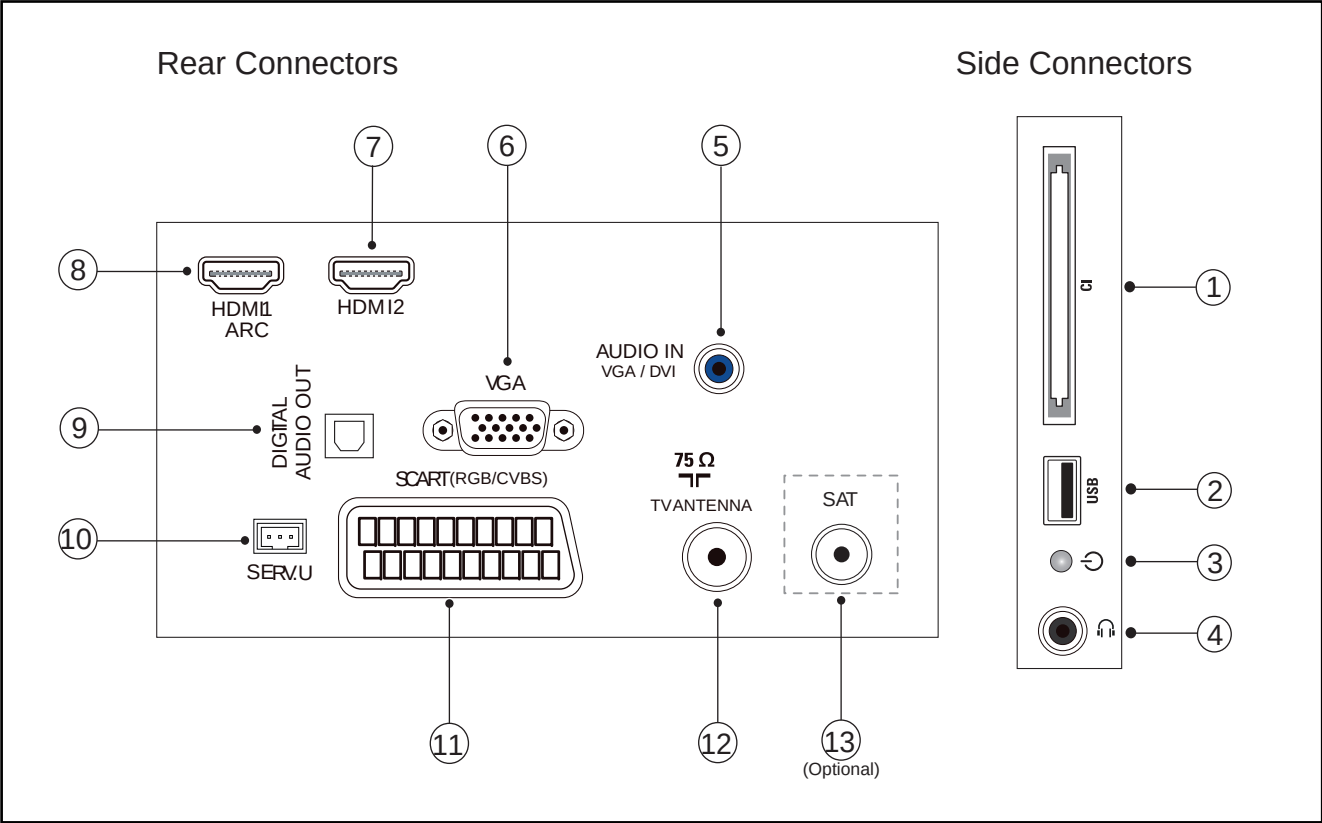
2.2 Directions for Use

Directions for use can be downloaded from the following websites:

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

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

2.3 Connections



19790_001.eps

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.

2.3.1 Side Connections

1 - Common Interface
68p- See figure 10-7-6

2 - USB 2.0

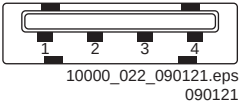


Figure 2-2 USB (type A)

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

3 - Power Button
Turn on/off the TV.

4 - Head phone (Output)
Bk - Head phone 80 - 600 Ω / 10 mW

6 - PC IN:VGA

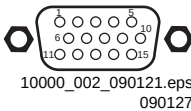


Figure 2-3 VGA connector

- | | | |
|----|---------------------|----------------------------|
| 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 |

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

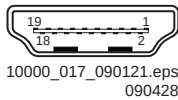


Figure 2-4 HDMI (type A) connector

- | | | |
|---|----------|--------------|
| 1 | - D2+ | Data channel |
| 2 | - Shield | Gnd |
| 3 | - D2- | Data channel |
| 4 | - D1+ | Data channel |

2.3.2 Rear Connections

5 - Audio - In: Left / Right, VGA
Bu - Audio L/R in 0.5 V_{RMS} / 10 kW

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	⊥

8 - HDMI 1 ARC: Digital Video - In, Digital Audio with ARC - In/Out

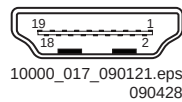


Figure 2-5 HDMI (type A) connector

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	⊥

9 - Cinch: Digital Audio - Out

BK - Coaxial 0.4 - 0.6V_{PP} / 75 W



10 - Service / UART

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

11 - EXT1: Video RGB/YC - In, CVBS - In/Out, Audio - In/Out

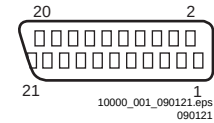


Figure 2-6 SCART connector

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	⊥

12 - TV ANTENNA - In

Signal input from an antenna, cable or satellite.

13 - SAT- In

Signal input from an antenna, cable or satellite.

2.4 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 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),

6 = play 16 : 9 format, 12 = play 4 : 3 format

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 Service / 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

DMSD

Digital Multi Standard Decoding

DNM

Digital Natural Motion

DNR	Digital Noise Reduction: noise reduction feature of the set		The SDI signal is self-synchronizing, uses 8 bit or 10 bit data words, and has a maximum data rate of 270 Mbit/s, with a minimum bandwidth of 135 MHz.
DRAM	Dynamic RAM		
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
EDID	Extended Display Identification Data (VESA standard)	LVDS	Low Voltage Differential Signalling
		Mbps	Mega bits per second
EEPROM	Electrically Erasable and Programmable Read Only Memory	M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz
EMI	Electro Magnetic Interference	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
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	MOP	Matrix Output Processor
FM	Field Memory or Frequency Modulation	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)
HDMI	High Definition Multimedia Interface	NVM	Non-Volatile Memory: IC containing TV related data such as alignments
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.	PCB	Printed Circuit Board (same as "PWB")
		PCM	Pulse Code Modulation

PDP	Plasma Display Panel	SWAN	Spatial temporal Weighted Averaging
PFC	Power Factor Corrector (or Pre-conditioner)	SXGA	Noise reduction 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)	TMDS	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	VS	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		

4. Mechanical Instructions

Index of this chapter:

[4.1 Cable Dressing](#)

[4.2 Service Positions](#)

[4.3 Assembly/Panel Removal \(for 22"/24"Pxx4000\)](#)

[4.4 Assembly/Panel Removal \(for 32"/39"/40"Pxx4x00\)](#)

[4.5 Assembly/Panel Removal \(only for 32PHT4100/60\)](#)

[4.6 Assembly/Panel Removal \(for 6300 series\)](#)

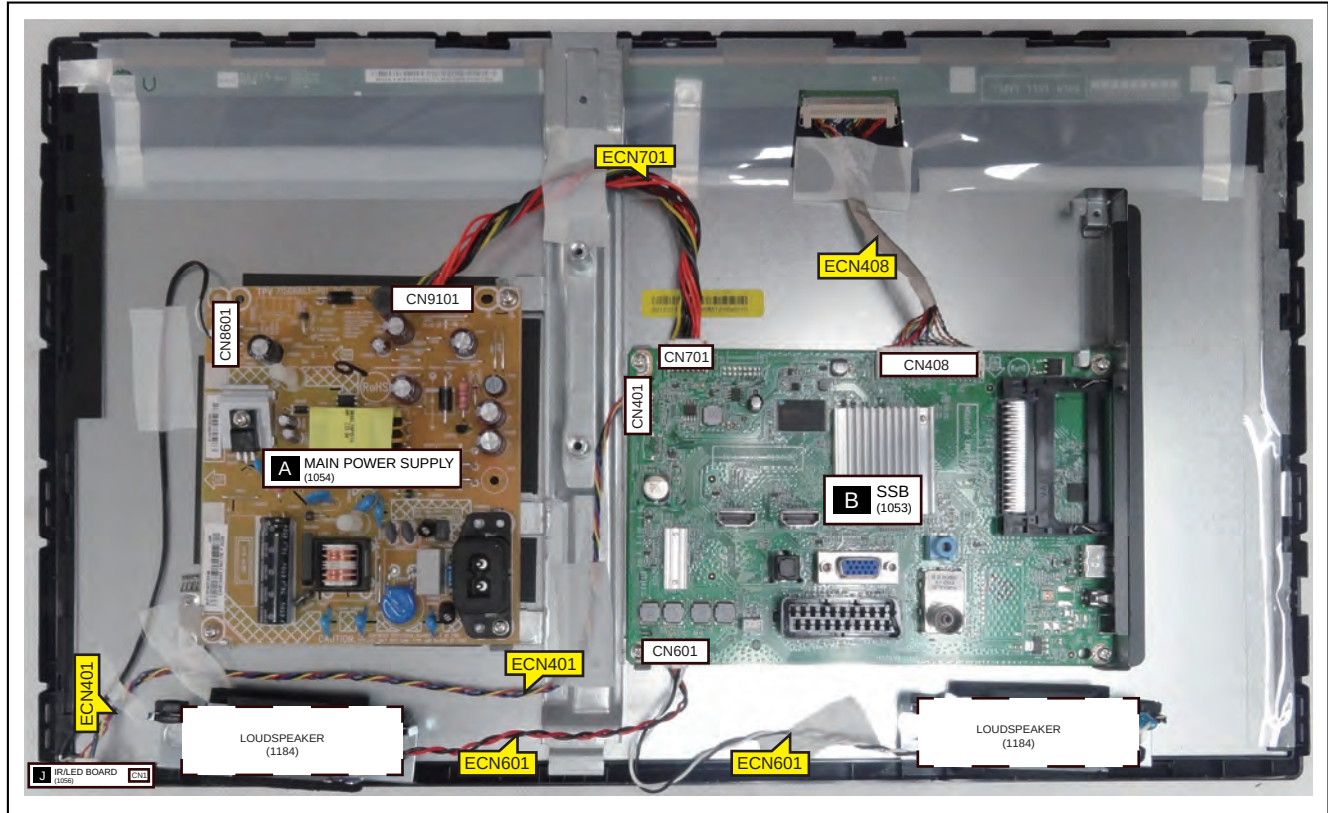
[4.7 Assembly/Panel Removal \(for 24"PHx5210\)](#)

[4.8 Set Re-assembly](#)

Notes:

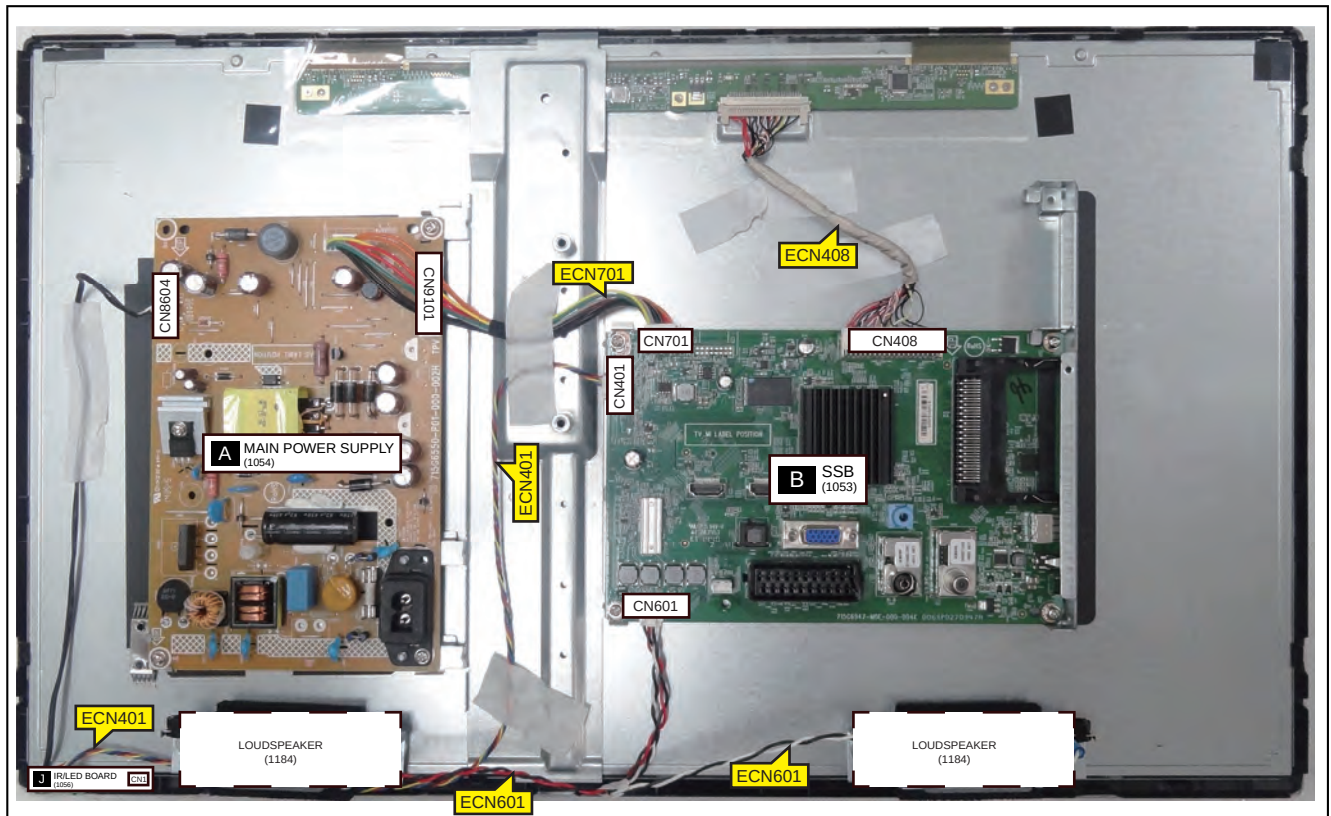
- Figures below can deviate slightly from the actual situation, due to the different set executions.

4.1 Cable Dressing



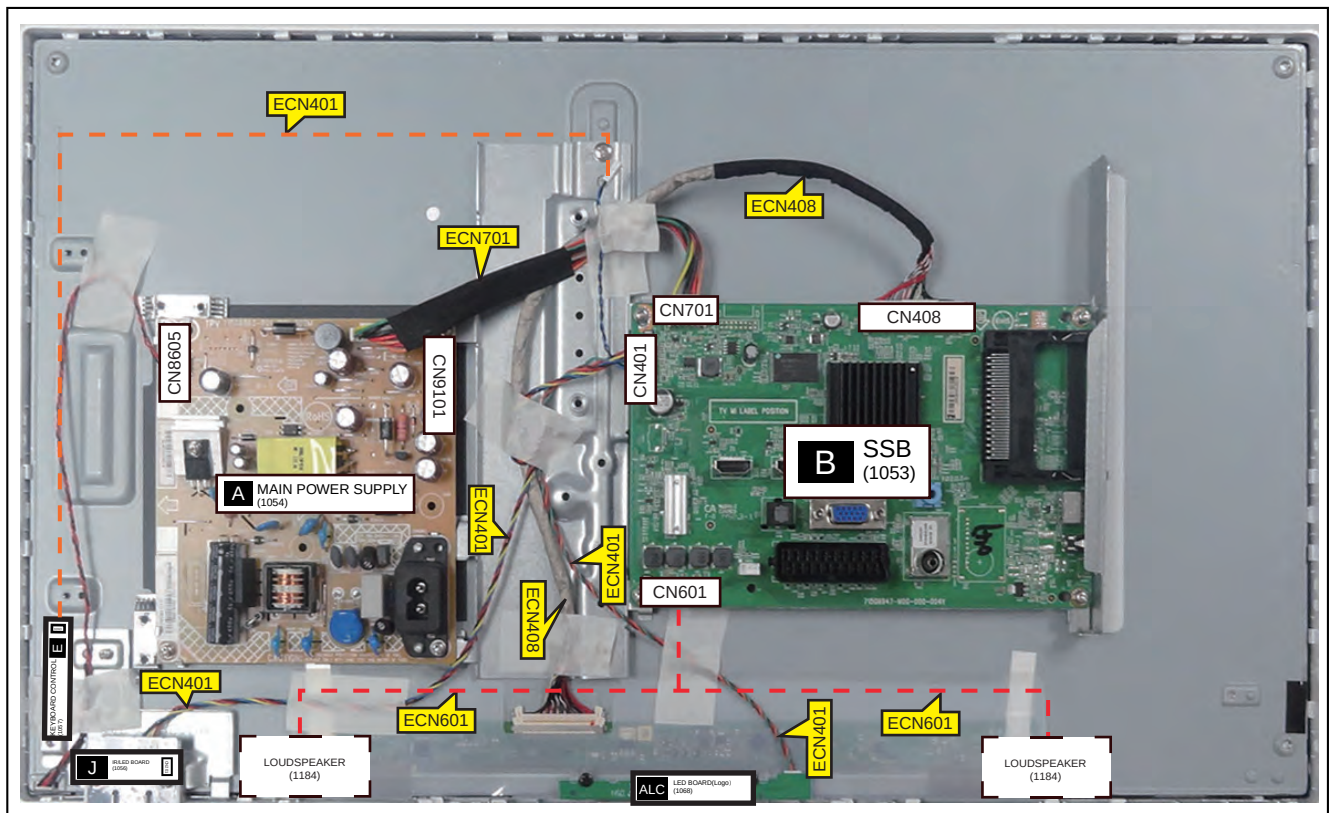
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Figure 4-1 Cable dressing (22" 4000 series)



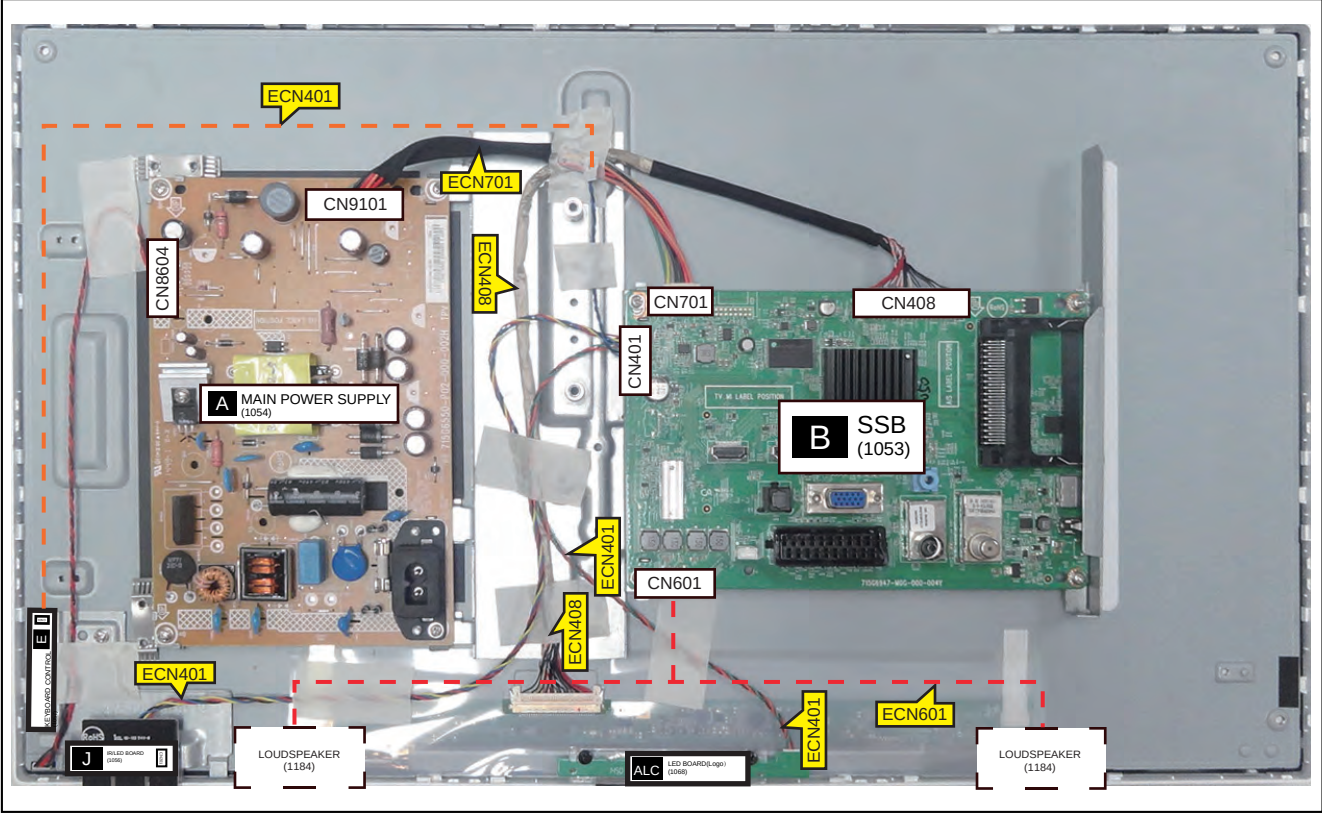
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Figure 4-2 Cable dressing (24" 4000 series)



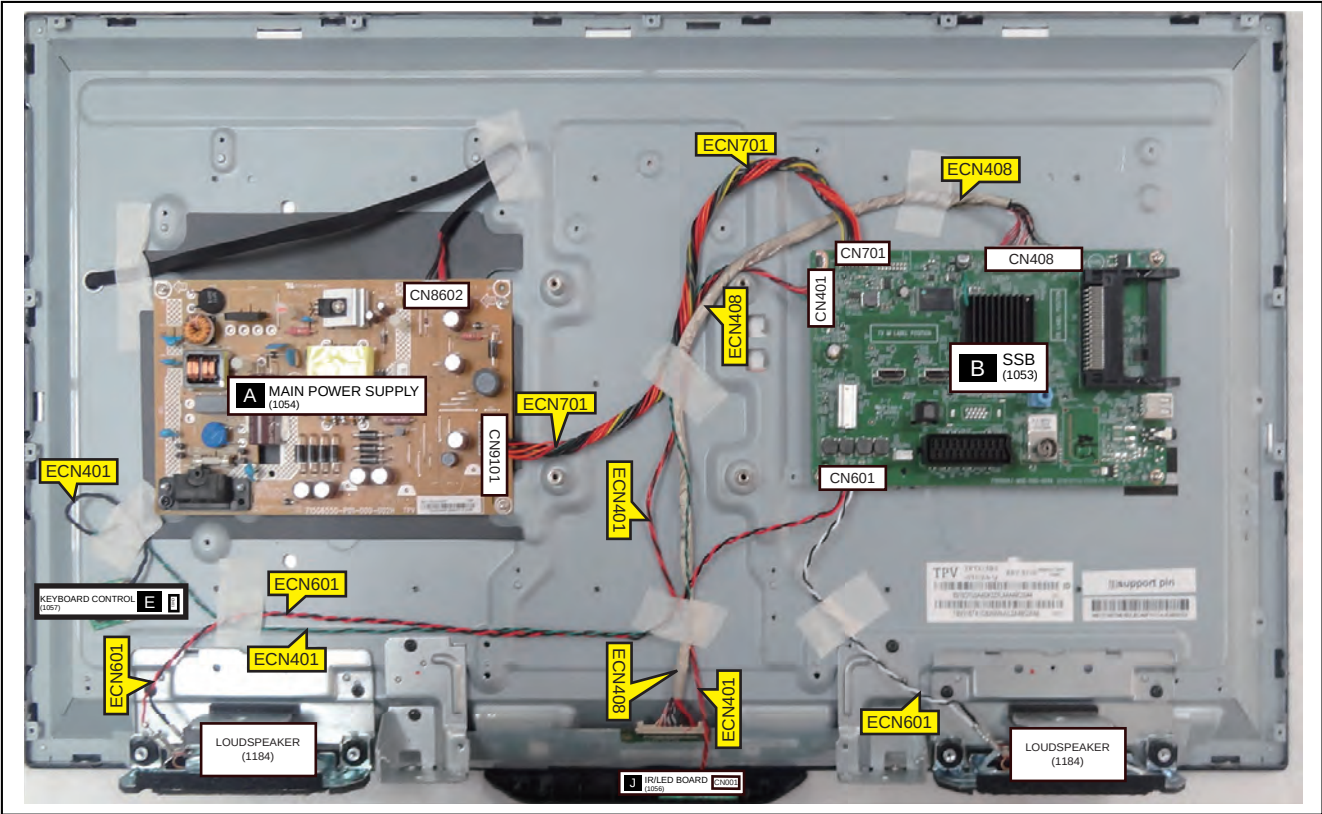
19794_100.eps

Figure 4-3 Cable dressing (24PHH/T5210 series)



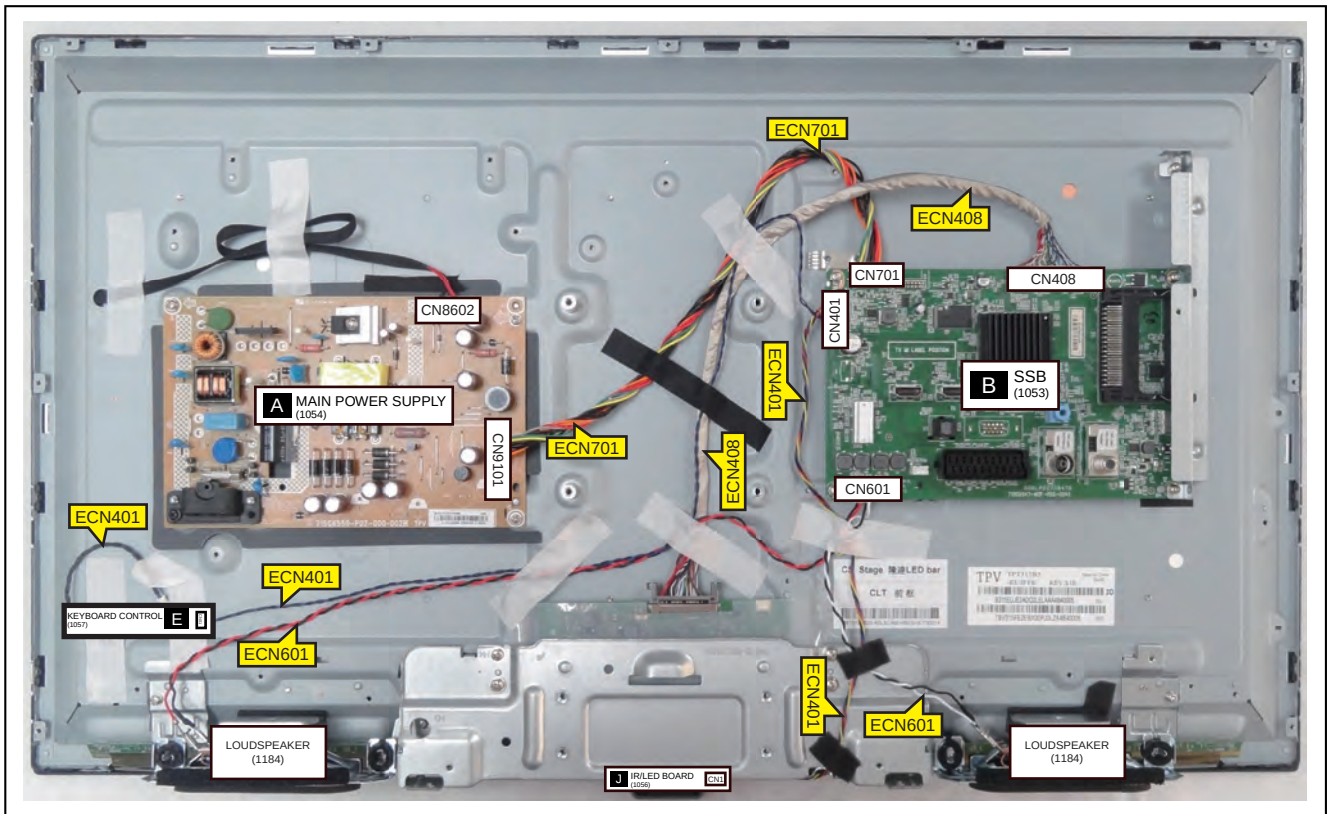
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Figure 4-4 Cable dressing (24PHK5210 series)



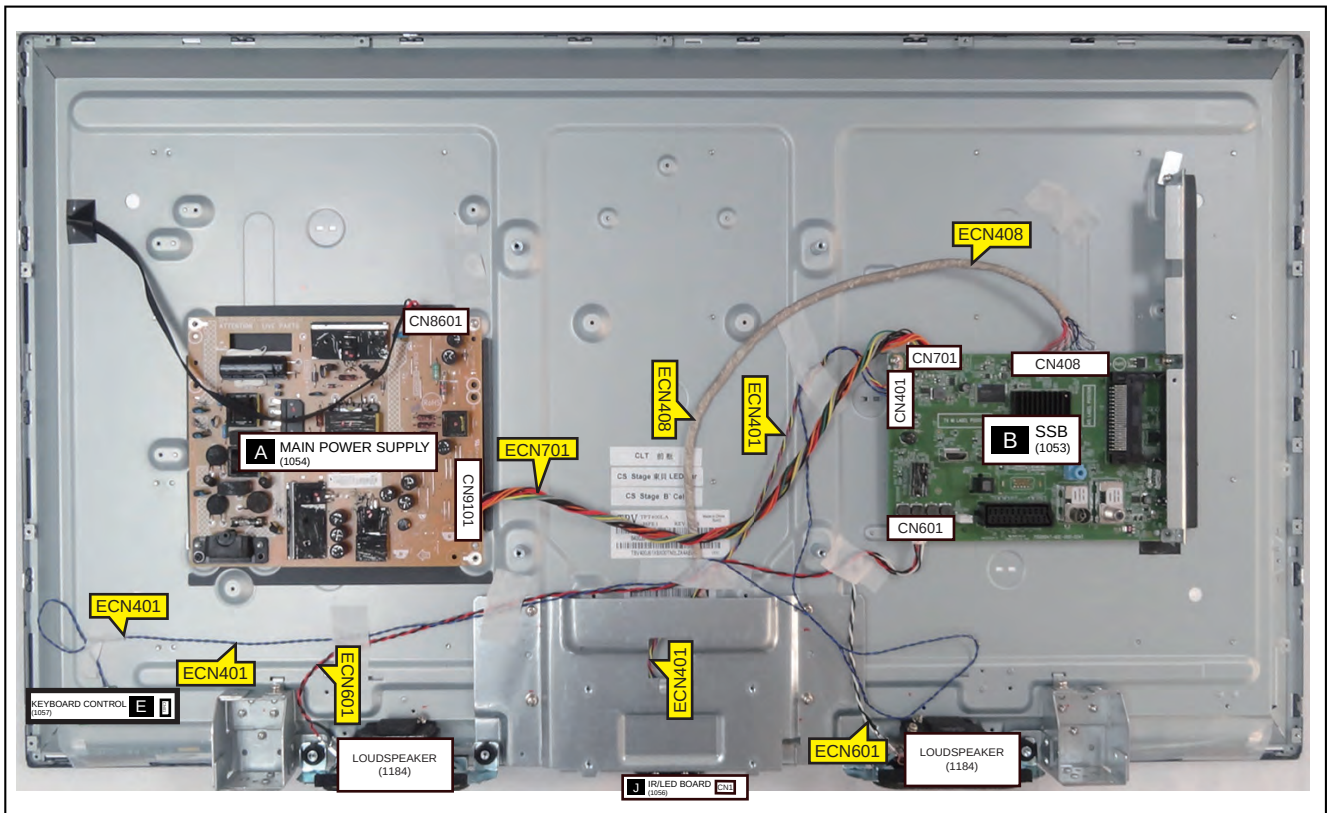
19791_101.eps

Figure 4-5 Cable dressing (32PHT4100/60 series)



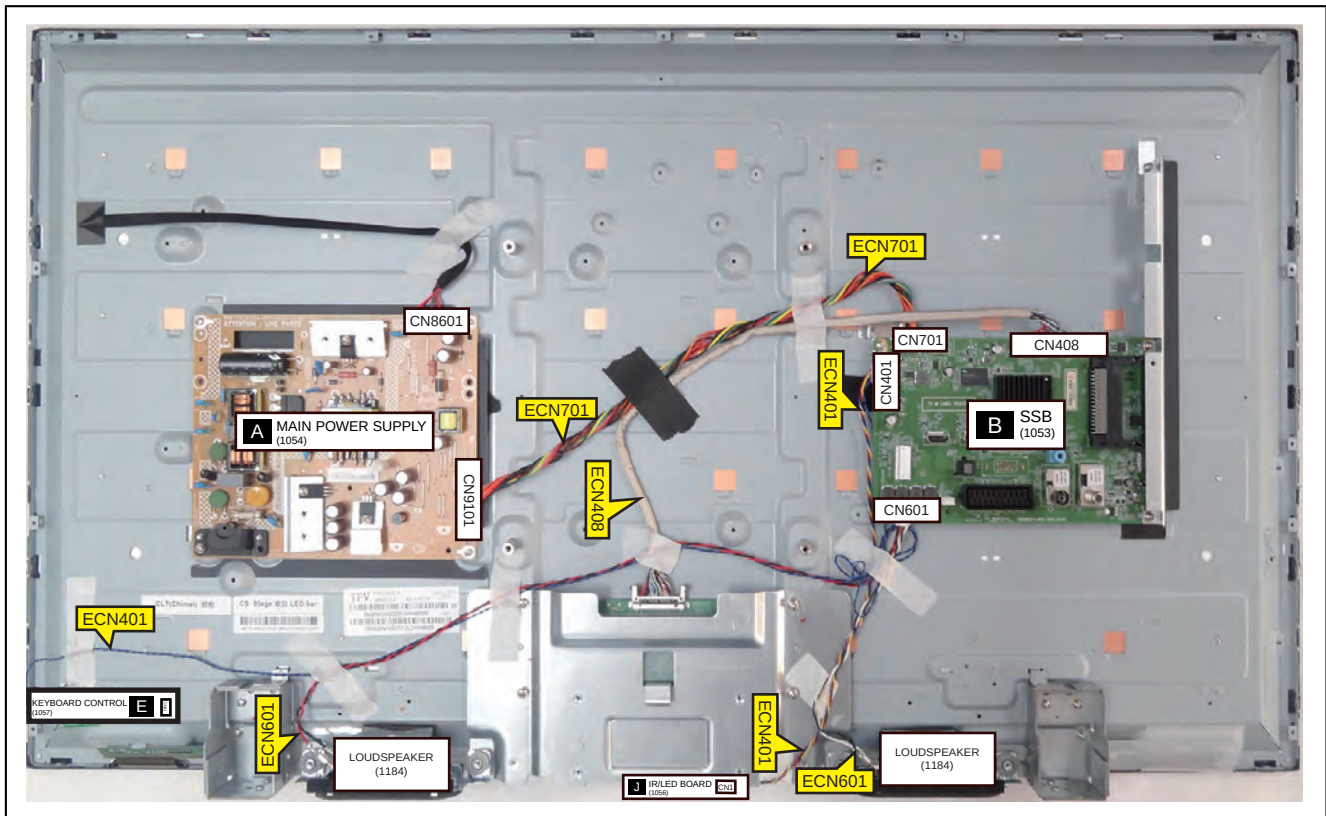
19791_100.eps

Figure 4-6 Cable dressing (other 32" 4x00 series)



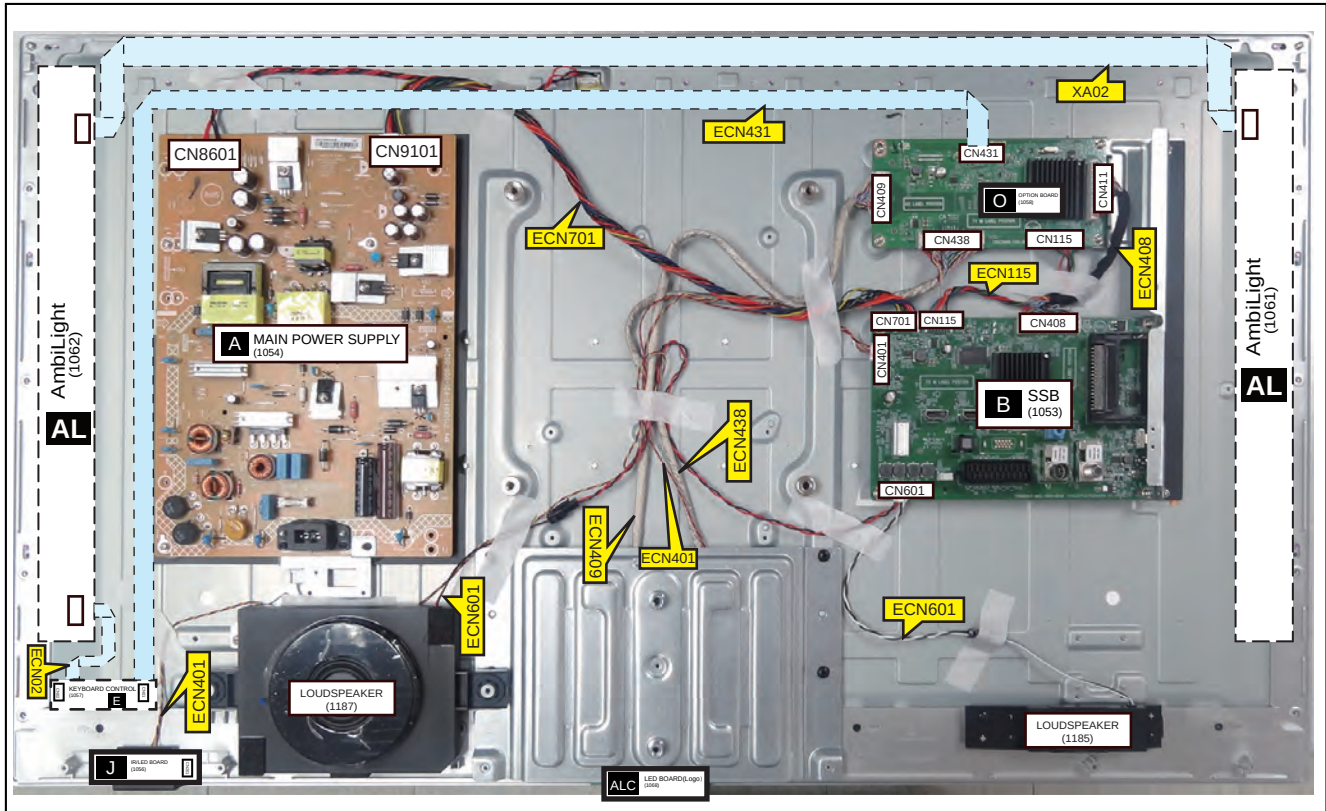
19791_102.eps

Figure 4-7 Cable dressing (39" 4x00 series)



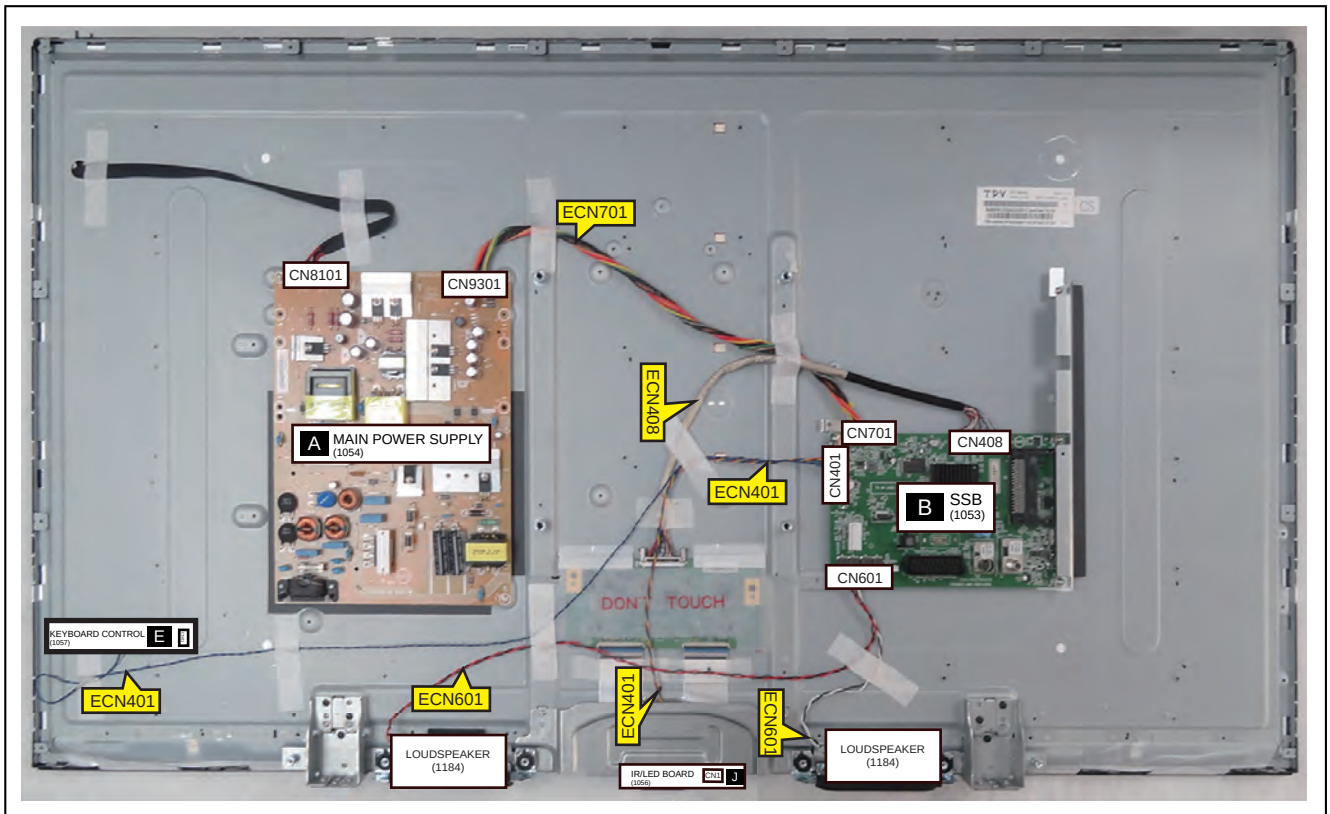
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Figure 4-8 Cable dressing (40" 4x00 series)



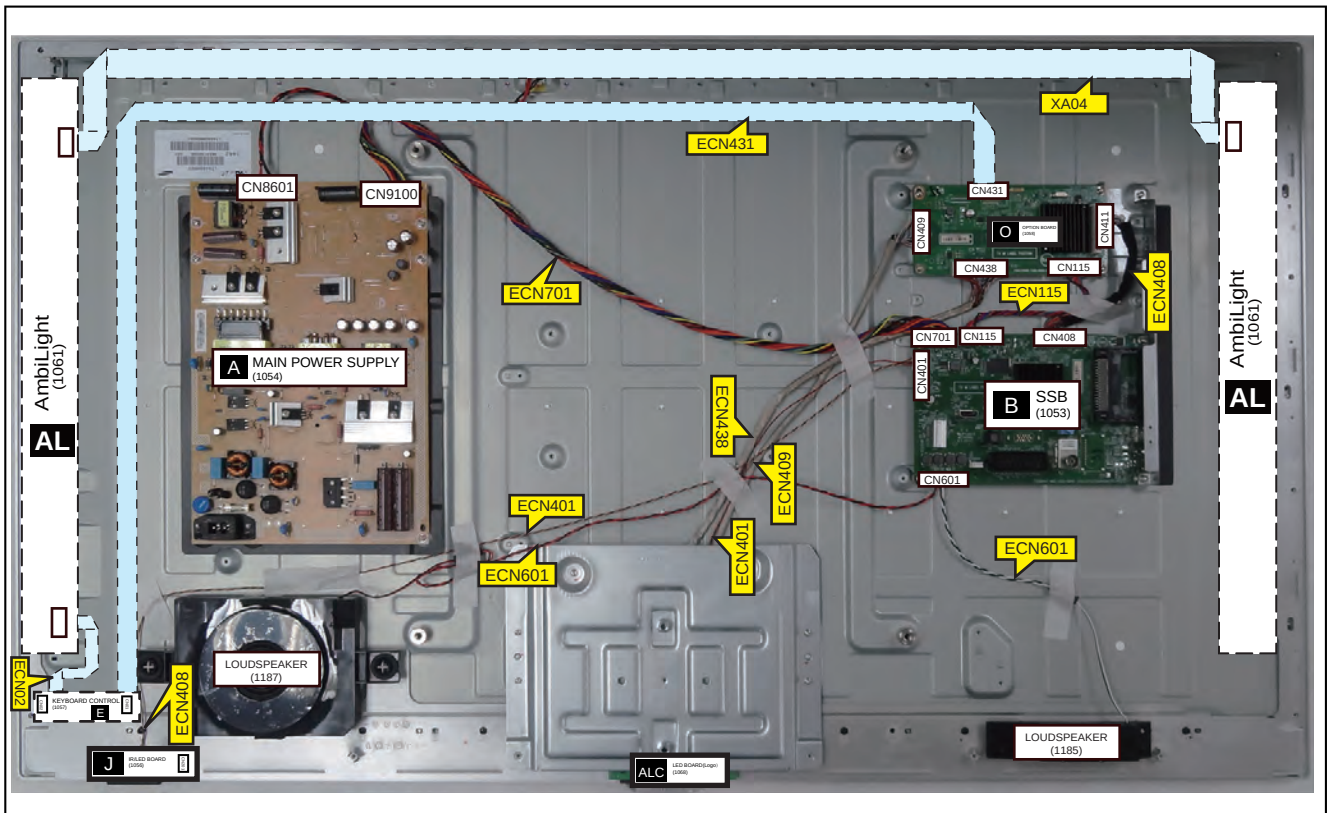
19792_100.eps

Figure 4-9 Cable dressing (40" 6300 series)



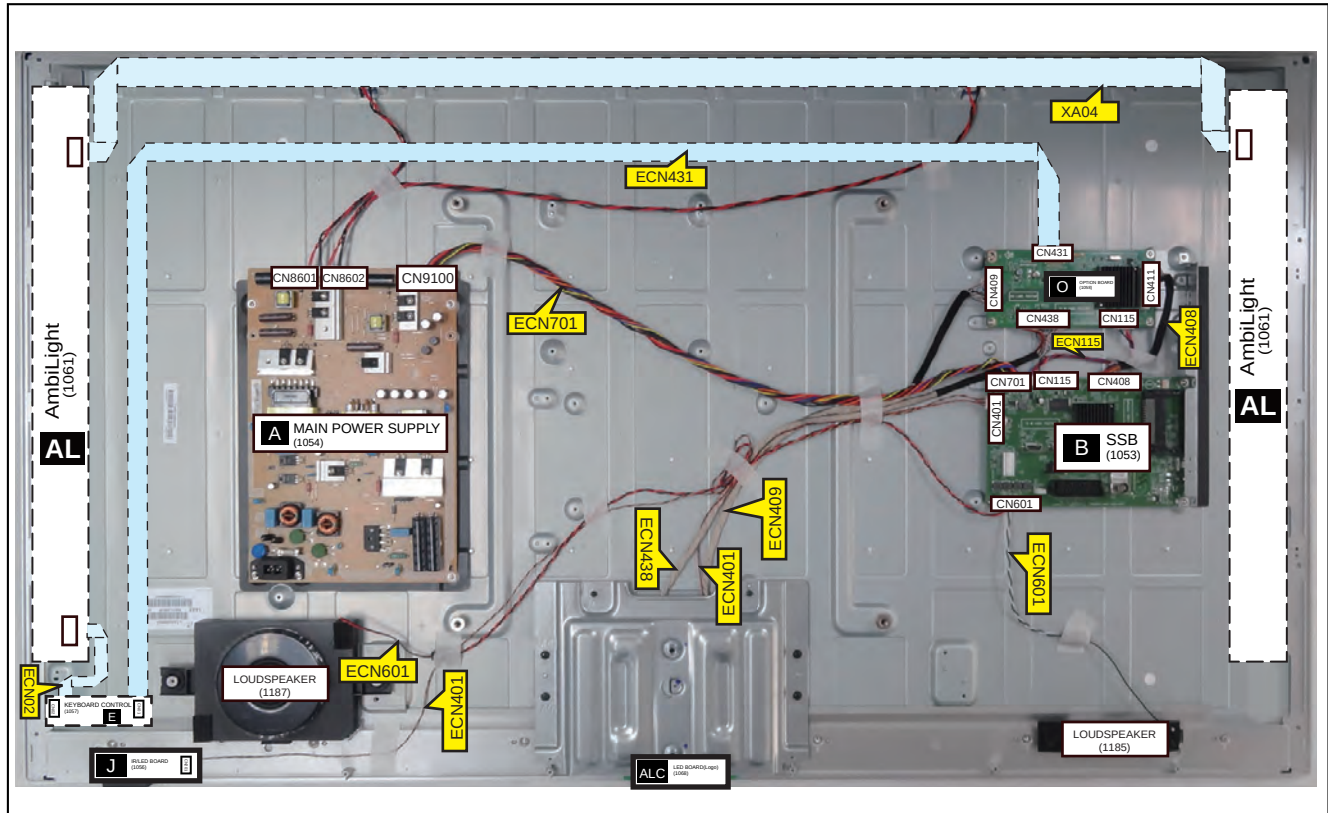
19792_101.eps

Figure 4-10 Cable dressing (48" 4x00 series)



19792_102.eps

Figure 4-11 Cable dressing (48" 6300 series)



19792_103.eps

Figure 4-12 Cable dressing (55" 6300 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 22"/24"Pxx4000)

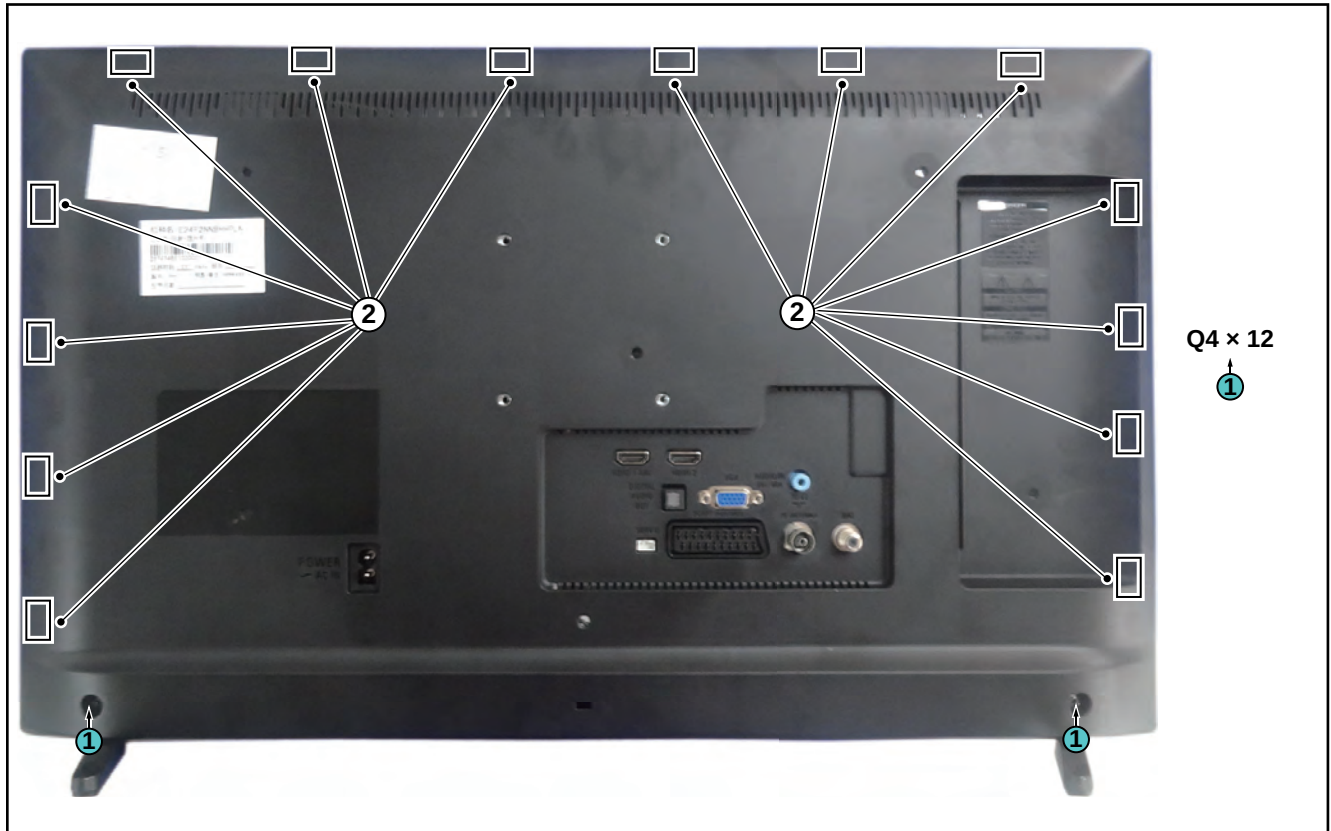
Instructions below apply to the 24PHK4000/12, but will be similar for other 22"/24"Pxx4000 models.

4.3.1 Rear Cover

Refer to [Figure 4-13](#) 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. Refer to [Figure 4-13](#) for details.
2. At the indicated areas [2] the cover is secured by clips. Be very careful with releasing those.
3. 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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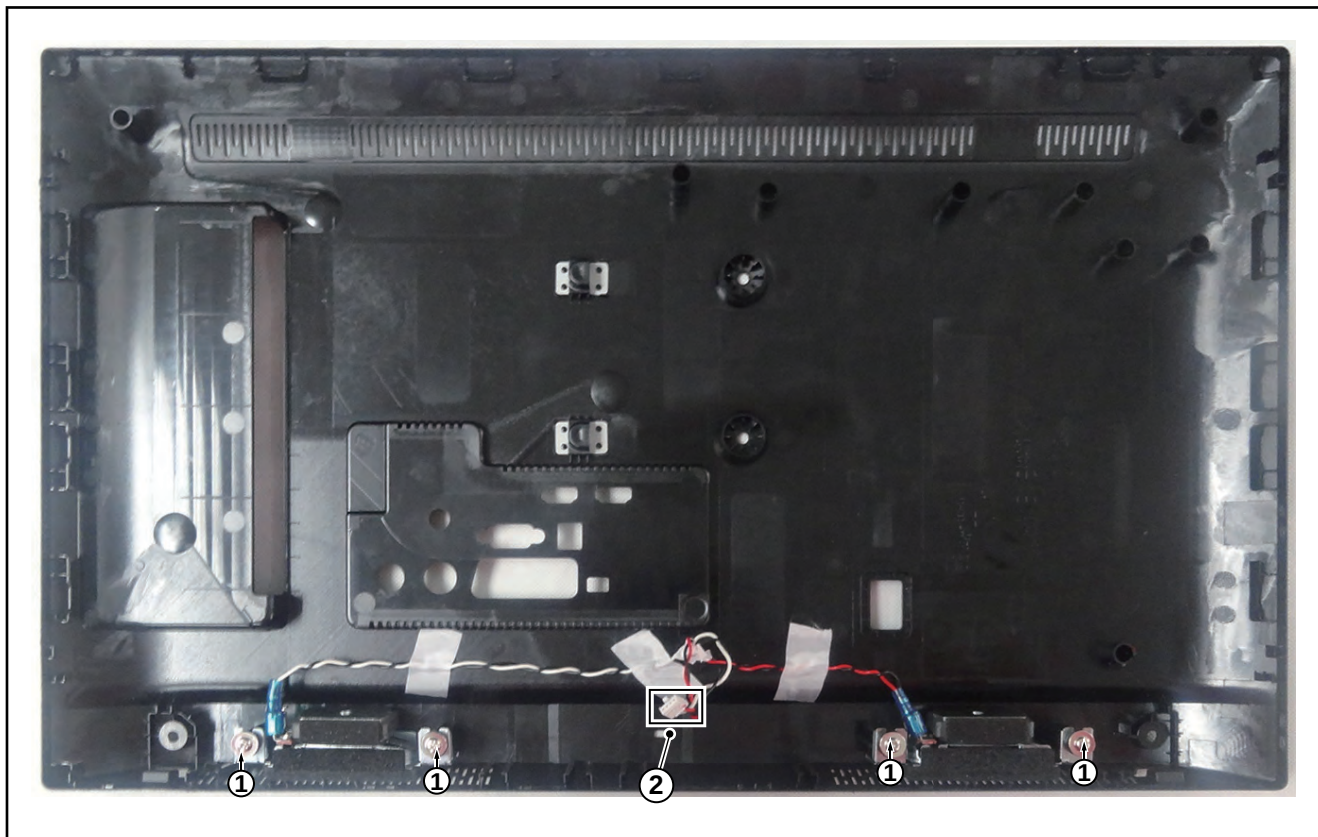
Figure 4-13 Rear cover removal

4.3.2 Speakers

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

1. Release the connector [2] from the SSB.
Caution: be careful, as these are very fragile connectors!
2. Remove fixation screws [1] that secure the speakers, refer to [Figure 4-14](#) for details.
3. Gently lift the speakers from the TV. Make sure that wires and cables are not damaged while lifting the speakers from the set.

When defective, replace the whole unit.



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Figure 4-14 Speakers removal

4.3.3 Small Signal Board (SSB)

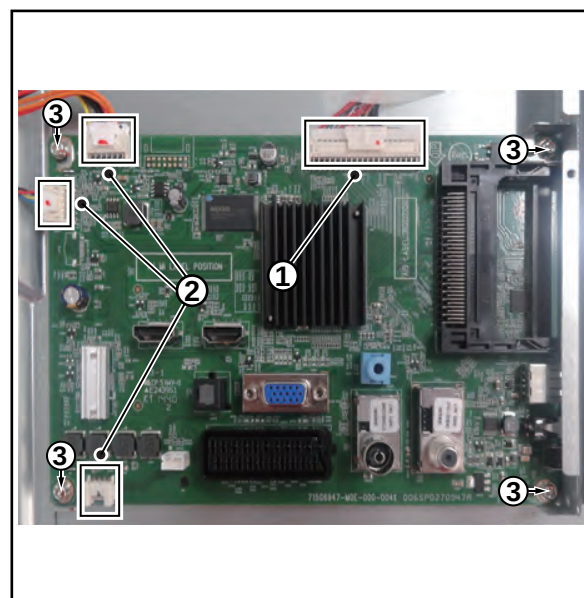
Refer to [Figure 4-15](#) for details.

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 [1] connector that connect with the SSB.

Caution: be careful, as these are very fragile connectors!

2. Unplug all other connectors [2].
3. Remove all the fixation screws [3] from the SSB.
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.



19790_104.eps

Figure 4-15 SSB removal

4.3.4 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.

4.3.5 Stand bracket

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

4.3.6 IR/LED panel

1. Remove the stand bracket, as described earlier.
2. Unplug the connector from the IR/LED panel.
3. Gently release the clip that holds the panel and take it out from the bezel.

When defective, replace the whole unit.

4.3.7 LCD Panel

1. Remove the SSB as described earlier.
2. Remove the PSU as described earlier.
3. Remove the stand bracket as described earlier.
4. Remove the IR/LED as described earlier.

5. Remove the fixations screws that fix the metal clamps to the front bezel. Take out those clamps.
 6. Remove all other metal parts not belonging to the panel.
 7. Lift the LCD Panel from the bezel.
- When defective, replace the whole unit.

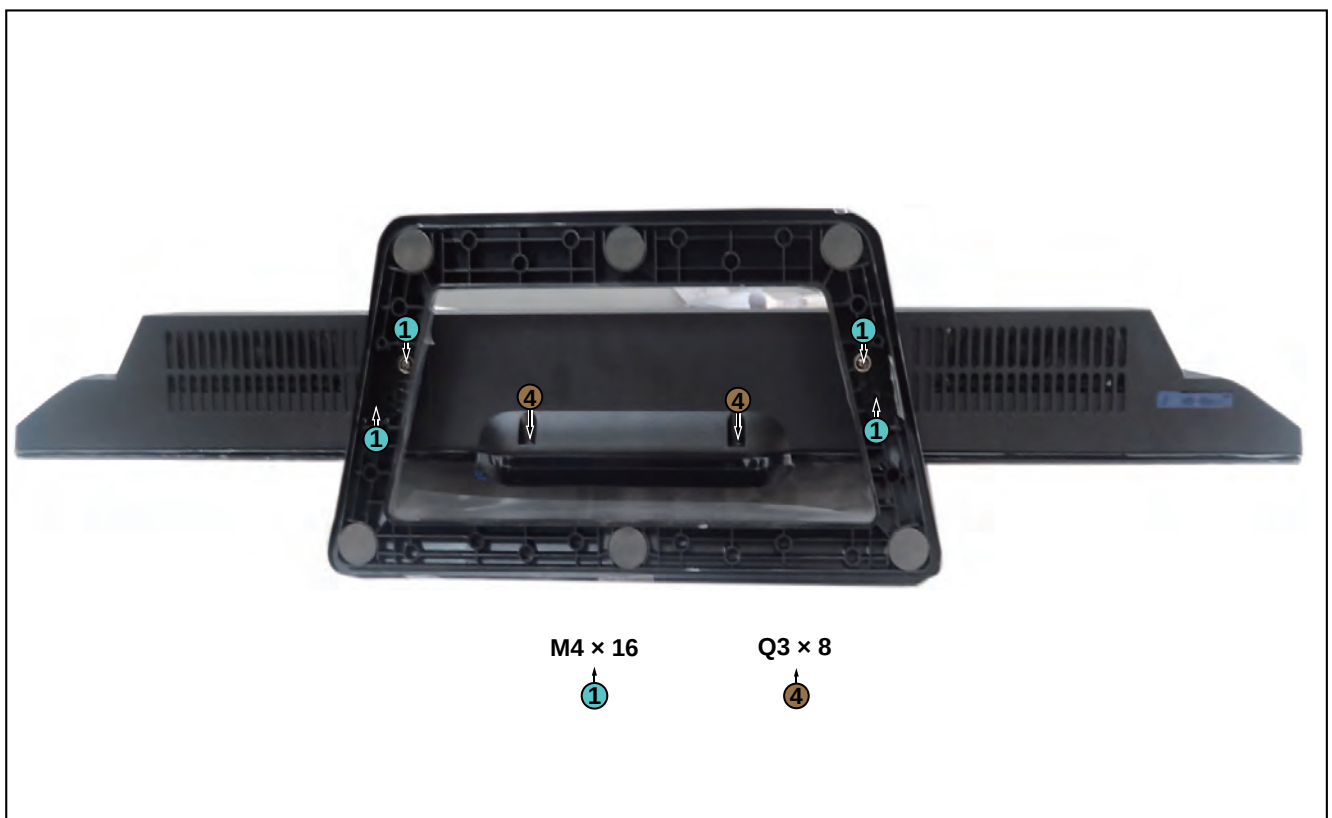
4.4 Assembly/Panel Removal (for 32"/39"/40"Pxx4x00)

Instructions below apply to the 32PFK4100/12, but will be similar for other 32"/39"/40"Pxx4x00 series models.

4.4.1 Stand

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

1. Remove the fixation screws [1] that secure the stand bracket. Refer to [Figure 4-16](#) for details.
2. Take the stand bracket out from the set.



19791_111.eps

Figure 4-16 Stand removal

4.4.2 Rear Cover

Refer to [Figure 4-16](#) and [Figure 4-17](#) for details.
Warning: Disconnect the mains power cord before removing the rear cover.

1. Remove the fixation screws [2], [3] and [4] that secure the rear cover. Refer to [Figure 4-16](#) and [Figure 4-17](#) 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.

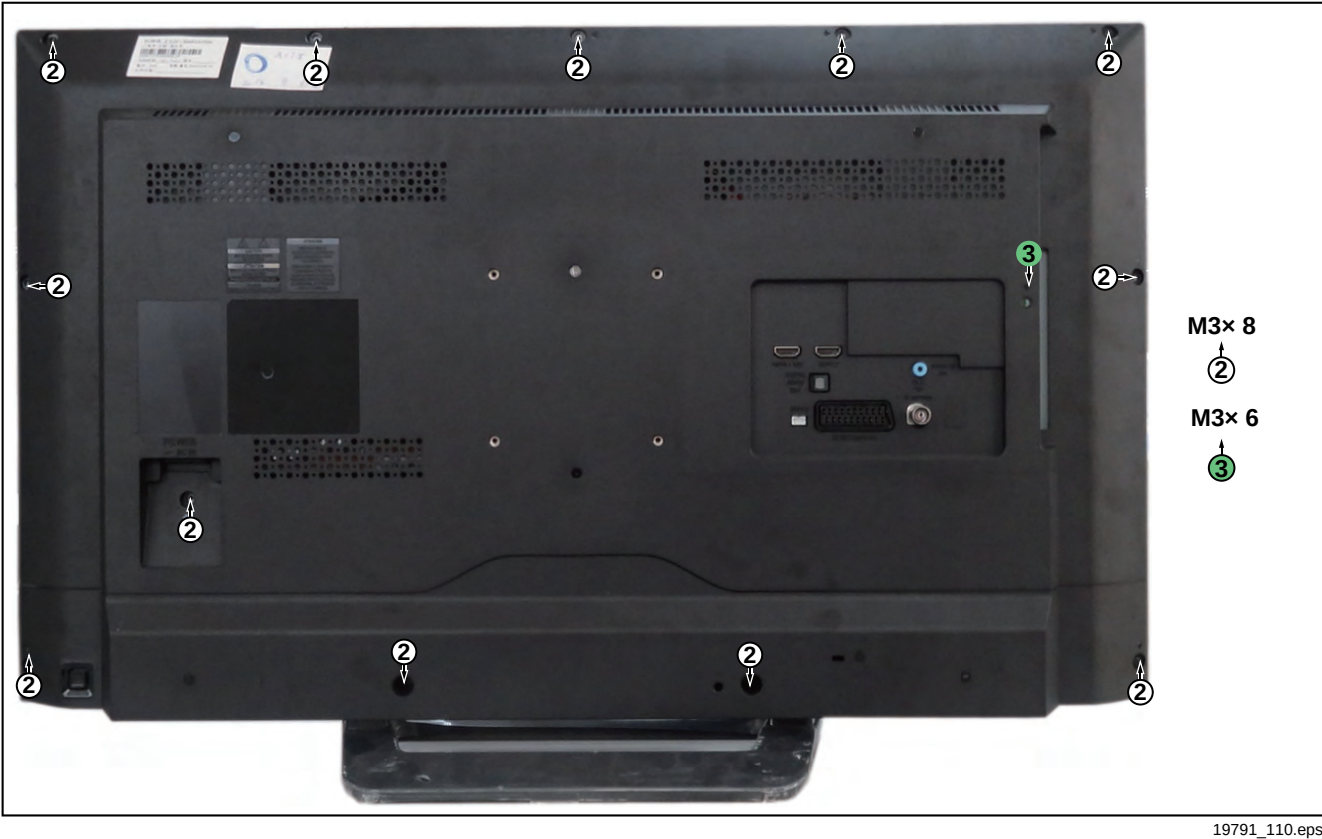


Figure 4-17 Rear cover removal

4.4.3 Keyboard Control unit

1. Unplug the connector from the keyboard control panel.
2. Remove the fixation screw that secure the keyboard
3. Gently take the keyboard out.
- When defective, replace the whole unit.

4.4.4 Small Signal Board (SSB)

Refer to [Figure 4-18](#) 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] .

3. Remove all the fixation screws from the SSB [3].

4. The SSB can now be shifted from side connector cover, then lifted and taken out of the I/O bracket. Refer to [Figure 4-18](#) for details.

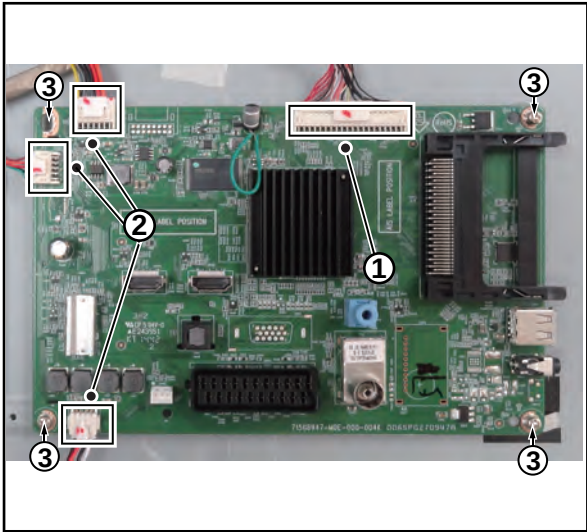


Figure 4-18 SSB removal

4.4.5 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.

4.4.6 Speakers

1. Gently release the tapes that secure the speaker cables.
2. Unplug the speaker connector from the SSB.
3. Take the speakers out.

When defective, replace the both units.

4.4.7 IR/LED Board

1. Remove the stand bracket as described earlier.
2. Gently release the clips that hold the board and take it out from the bezel.
3. Unplug both the connectors from the IR/LED board.

When defective, replace the whole unit.

4.4.8 LCD Panel

1. Remove the SSB as described earlier.
2. Remove the PSU as described earlier.
3. Remove the keyboard control panel as described earlier.
4. Remove the stand bracket as described earlier.
5. Remove the IR/LED as described earlier.
6. Remove the fixations screws that fix the metal clamps to the front bezel. Take out those clamps.
7. Remove all other metal parts not belonging to the panel.
8. Lift the LCD Panel from the bezel.

When defective, replace the whole unit.

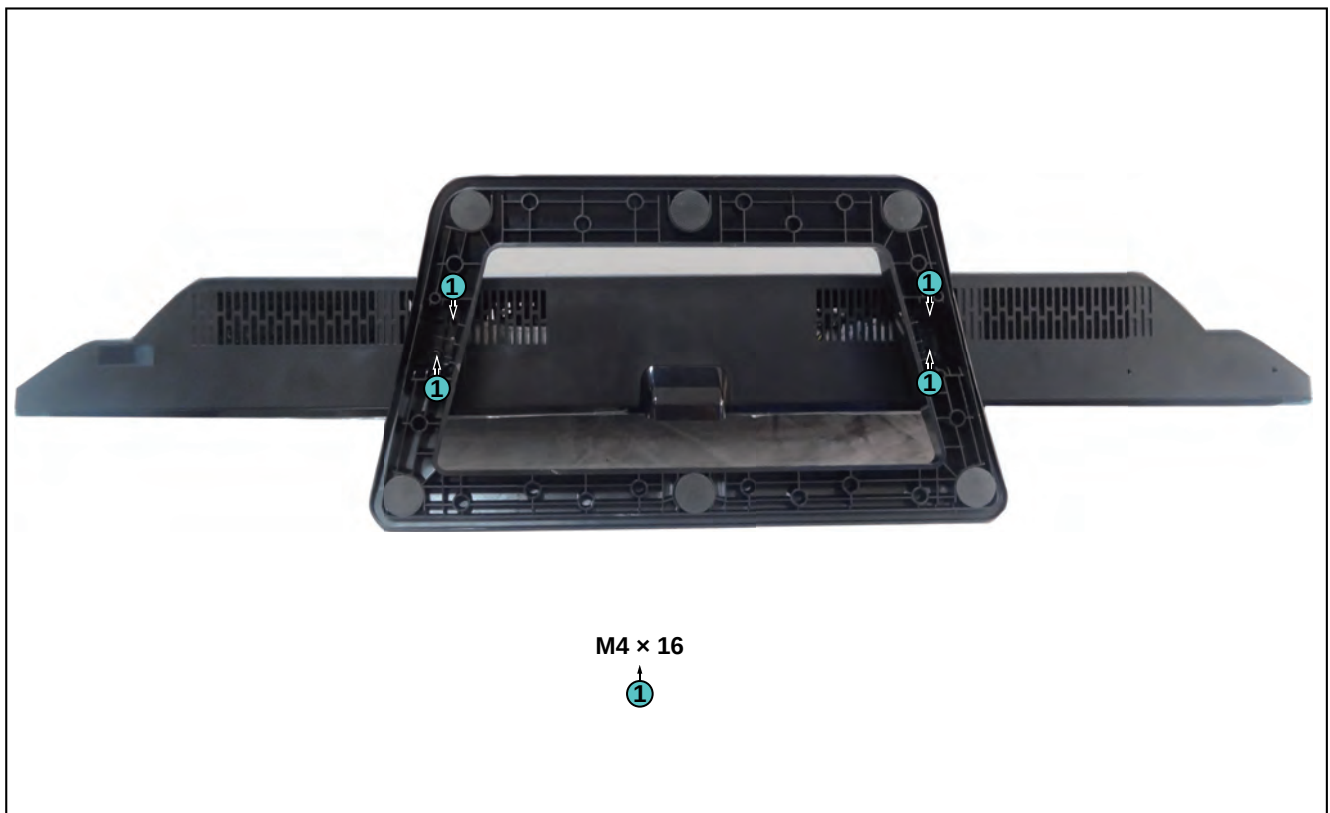
4.5 Assembly/Panel Removal (only for 32PHT4100/60)

Instructions below apply to the 32PHT4100/60 only.

4.5.1 Stand

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

1. Remove the fixation screws [1] that secure the stand bracket. Refer to [Figure 4-19](#) for details.
2. Take the stand bracket out from the set.



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Figure 4-19 Stand removal

4.5.2 Rear Cover

Refer to [Figure 4-20](#) for details.
Warning: Disconnect the mains power cord before removing the rear cover.

1. Remove the fixation screws [2] and [3] that secure the rear cover. Refer to [Figure 4-20](#) 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 4-20 Rear cover removal

4.5.3 Keyboard Control unit

1. Unplug the connector from the keyboard control panel.
2. Remove the fixation screw that secure the keyboard
3. Gently take the keyboard out.
- When defective, replace the whole unit.

4.5.4 Small Signal Board (SSB)

Refer to [Figure 4-21](#) 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.

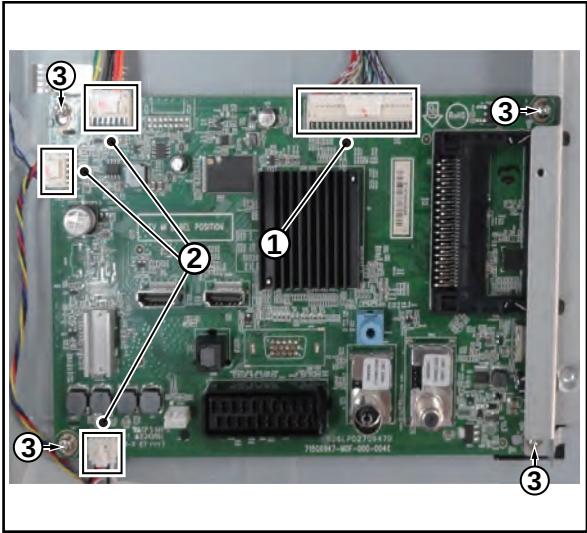
1. Release the clips from the LVDS connector that connect with the SSB[1].

Caution: be careful, as these are very fragile connectors!

2. Unplug all other connectors [2] .

3. Remove all the fixation screws from the SSB [3].

4. The SSB can now be shifted from side connector cover, then lifted and taken out of the I/O bracket. Refer to [Figure 4-21](#) for details.



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Figure 4-21 SSB removal

4.5.5 IR/LED Board

Refer to [Figure 4-22](#) and [Figure 4-23](#) for details.

1. Remove the fixation screws [1] from the stand bracket, pull out the assy from the set. Refer to [Figure 4-22](#) for details.
2. Carefully Release the cover secured by clips, then unplug the connector [2] from the IR/LED board. The IR/LED Board can now be lifted and taken out from the cover. Refer to [Figure 4-23](#) for details.

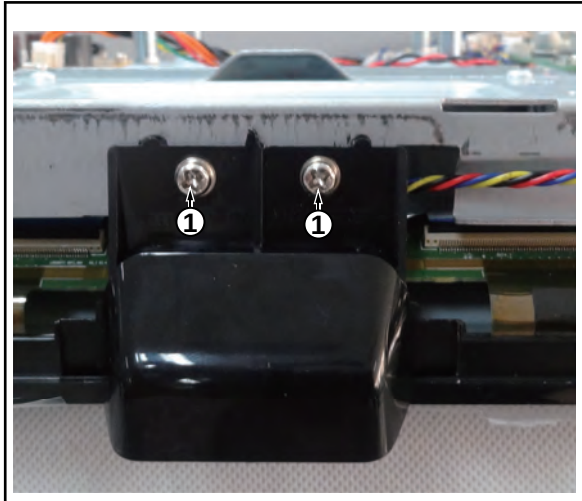


Figure 4-22 IR/LED Board removal[1]

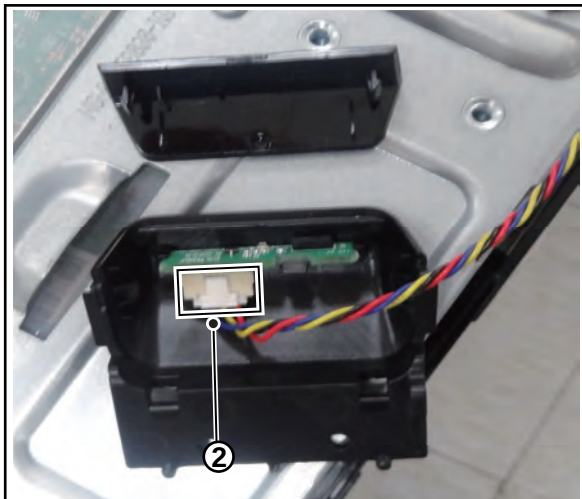


Figure 4-23 IR/LED Board removal[2]

4.5.6 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.

4.5.7 Speakers

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

4.5.8 LCD Panel

1. Remove the SSB as described earlier.
 2. Remove the PSU as described earlier.
 3. Remove the keyboard control panel as described earlier.
 4. Remove the stand bracket as described earlier.
 5. Remove the IR/LED as described earlier.
 6. Remove the fixations screws that fix the metal clamps to the front bezel. Take out those clamps.
 7. Remove all other metal parts not belonging to the panel.
 8. Lift the LCD Panel from the bezel.
- When defective, replace the whole unit.

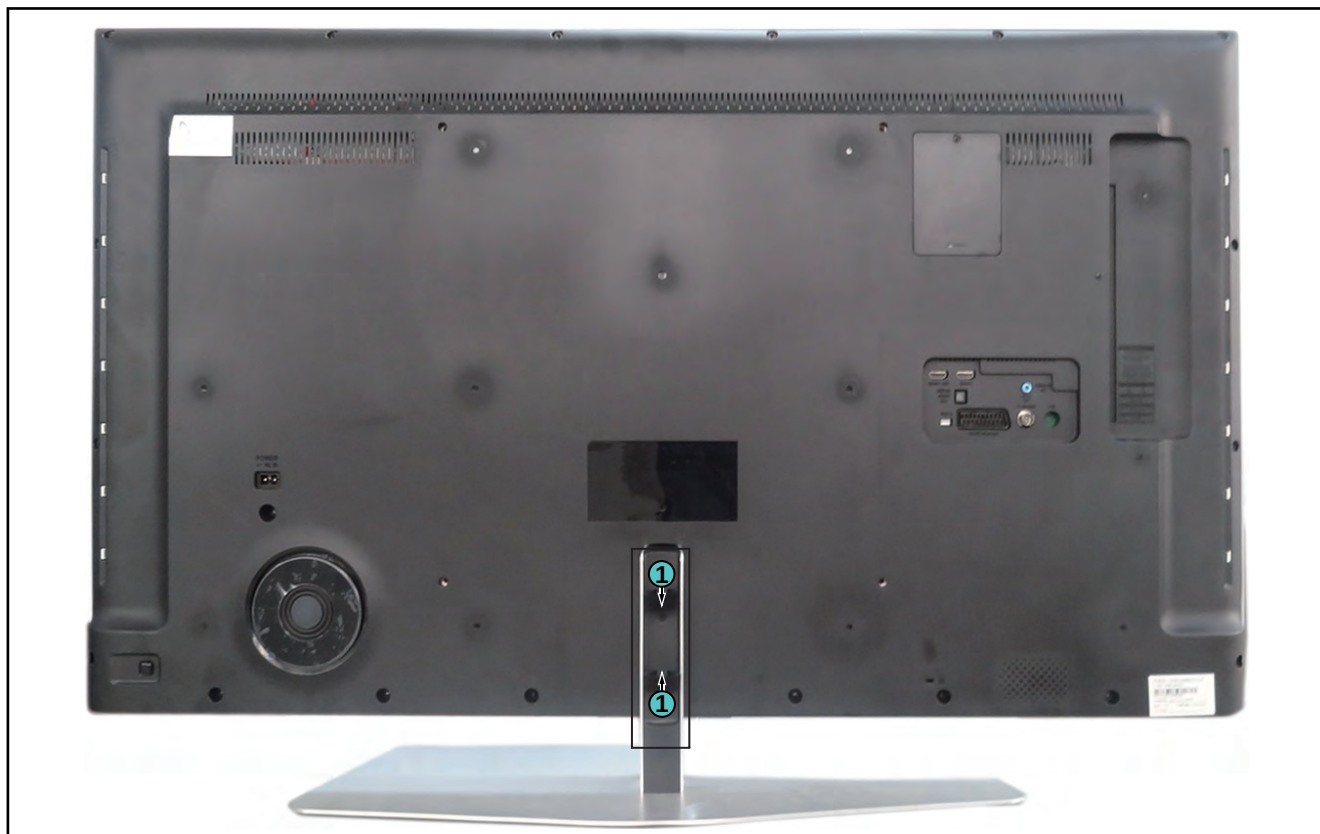
4.6 Assembly/Panel Removal (for 6300 series)

Instructions below apply to the 48PFT6300/12, but will be similar for other 6300 series models.

4.6.1 Stand

Refer to [Figure 4-24](#) and [Figure 4-25](#) for details.

1. Remove the screws [1] that secure the black plastic and, gently remove the black plastic casing that covers the stand bracket, refer to [Figure 4-24](#).
2. Remove the Allen screws [2] that secure the stand bracket and, pull out the stand downwards from the set, refer to [Figure 4-25](#).



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Figure 4-24 Stand removal[1]



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Figure 4-25 Stand removal[2]

4.6.2 Rear Cover

Refer to [Figure 4-26](#) for details.

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

1. Remove the fixation screws [1,2,3] that secure the rear cover.
2. Lift the rear cover from the TV. Make sure that wires and flat foils are not damaged while lifting the rear cover from the set.



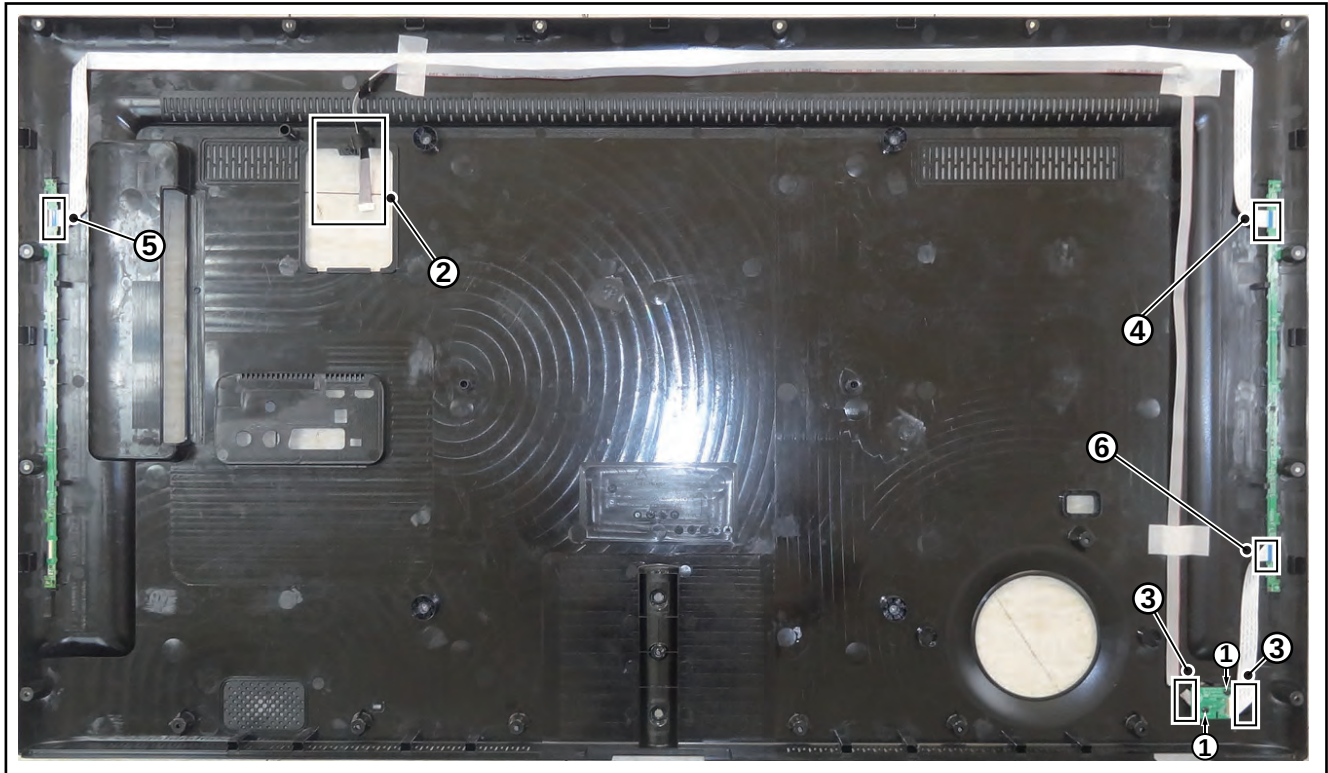
19792_106.eps

Figure 4-26 Rear cover removal[1]

4.6.3 AmbiLight Panel

Refer to [Figure 4-27](#) for details.

1. Gently release the clamps and unplug the two connectors [4, 5] that secure the ambilight panels. Release the clips from the FFC connector that connect with the keyboard [6].
2. Lift the AmbiLight panel from the rear cover. Make sure that wires and flat foils are not damaged while lifting the ambilight panel from the rear cover.



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Figure 4-27 Rear cover removal[2]

4.6.4 Keyboard Control Unit

Refer to [Figure 4-27](#) for details.

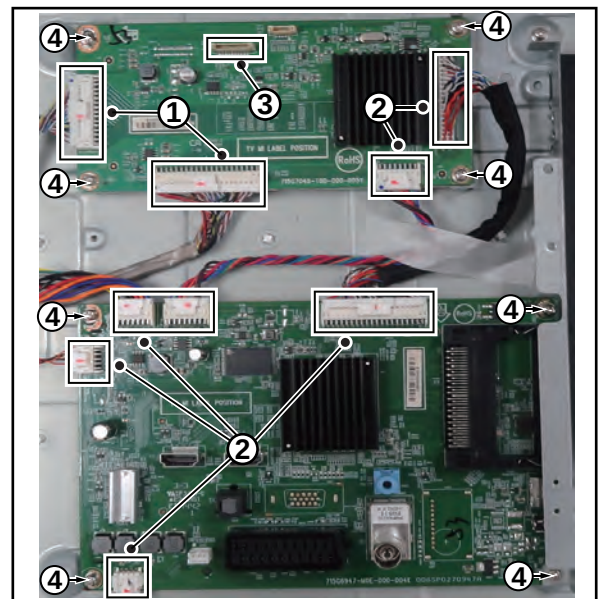
1. Release the connector [2] from the FRC Board, then release the connectors [3] from the keyboard control panel.
Caution: be careful, as these are very fragile connectors!
2. Remove all the fixation screws from the keyboard control panel [1] and take it out from the Back cover.
When defective, replace the whole unit.

4.6.5 Small Signal Board (SSB)+FRC Board

Refer to [Figure 4-28](#) 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 FRC Board [1].
Caution: be careful, as these are very fragile connectors!
2. Unplug all other connectors [2] and the FFC connector [3].
3. Remove all the fixation screws from the SSB and FRC Board [4].
4. The SSB and FRC Board can now be shifted from side connector cover, then lifted and taken out of the I/O bracket. Refer to [Figure 4-28](#) for details.



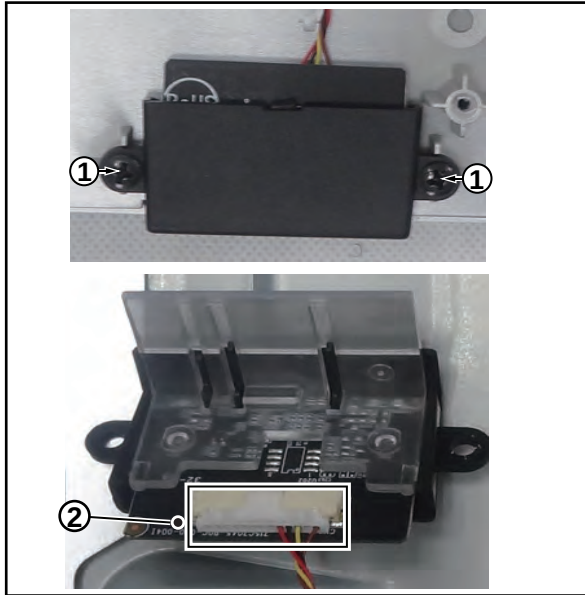
19792_107.eps

Figure 4-28 SSB + FRC Board removal

4.6.6 IR/LED Board

Refer to [Figure 4-29](#) for details.

1. Remove the fixation screws [1] from the stand bracket, pull out the assy from the set. Refer to [Figure 4-29](#) for details.
2. Carefully Release the cover secured by clips, then unplug the connector [2] from the IR/LED board. The IR/LED Board can now be lifted and taken out from the cover. Refer to [Figure 4-29](#) for details.



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Figure 4-29 IR/LED Board removal

4.6.7 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. 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.

4.6.8 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.

4.6.9 LCD Panel

1. Unplug the all the connector cables of the boards.
2. Lift the subframe with PSU, SSB, FRC board, Keyboard control panel, IR/LED board and AmbiLight control panel from the LCD panel and put it aside.
3. Gently take all the speakers out.

Warning: Cause the panels of 6300 series are bolt-on panels so the panel could not release from bezel. When defective, replace the whole unit.

4.7 Assembly/Panel Removal (for 24"PHx5210)

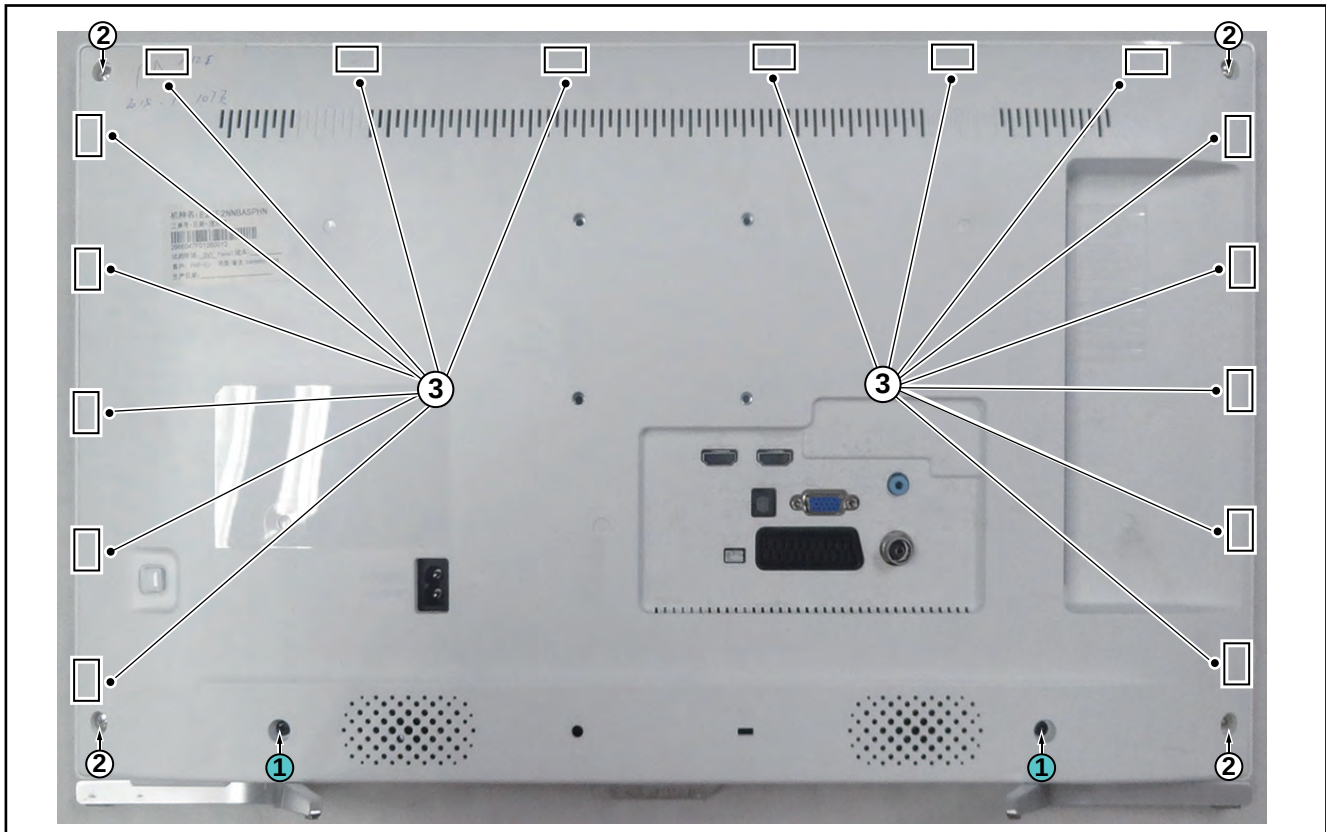
Instructions below apply to the 24PHH5210/88, but will be similar for other 24"PHx5210 models.

4.7.1 Rear Cover

Refer to [Figure 4-30](#) 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 4-30](#) for details.
2. At the indicated areas [3] the cover is secured by clips. Be very careful with releasing those.
3. 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 4-30 Rear cover removal

4.7.2 Speakers

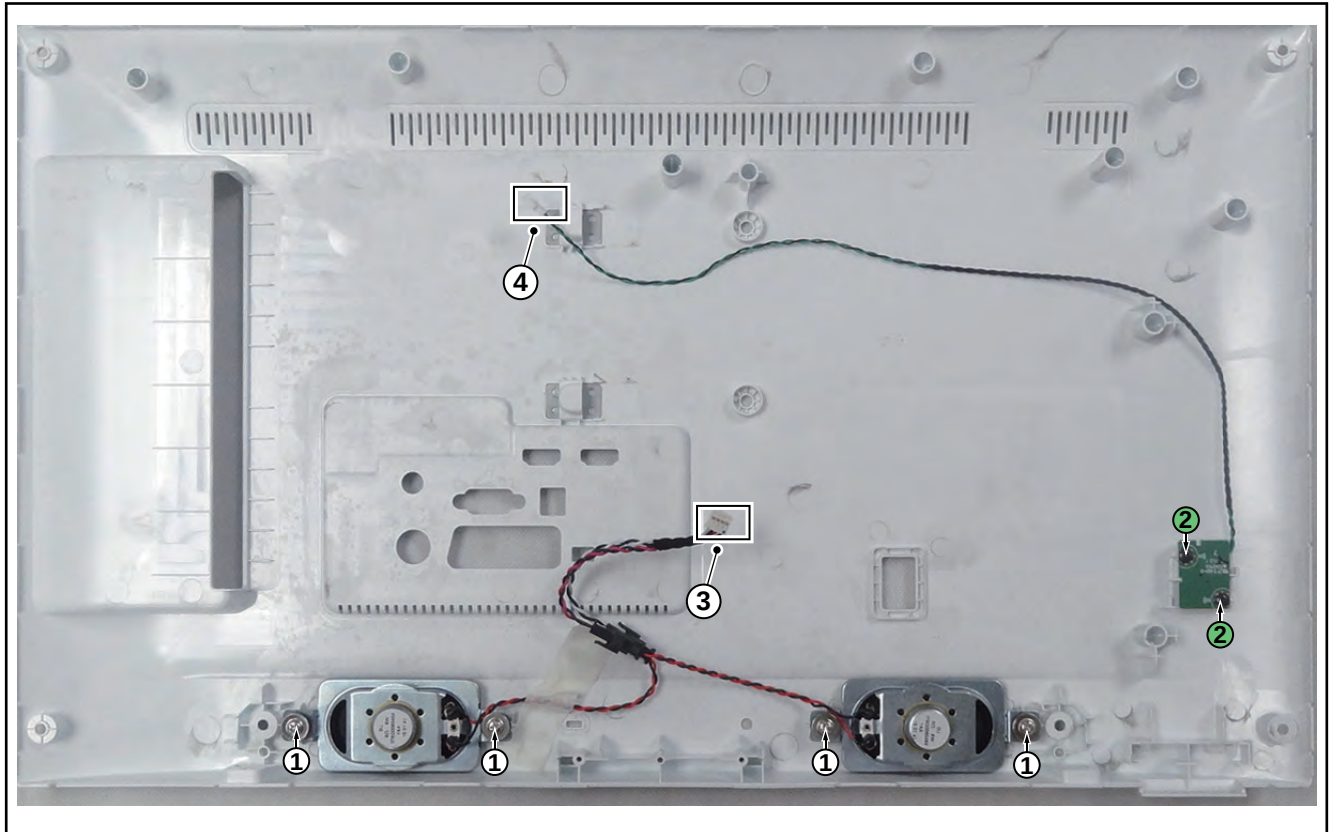
Refer to [Figure 4-31](#) for details.

1. Release the connector [3] from the SSB.

Caution: be careful, as these are very fragile connectors!

2. Remove fixation screws [1] that secure the speakers, refer to [Figure 4-31](#) for details.
3. Gently lift the speakers from the TV. Make sure that wires and cables are not damaged while lifting the speakers from the set.

When defective, replace the whole unit.



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Figure 4-31 Speakers and Keyboard removal

4.7.3 Keyboard Control Unit

Refer to [Figure 4-31](#) for details.

1. Release the connector [4] from the keyboard control panel which is connected to SSB Board.

Caution: be careful, as these are very fragile connectors!

2. Remove all the fixation screws from the keyboard control panel [2] and take it out from the Back cover.

When defective, replace the whole unit.

4.7.4 Small Signal Board (SSB)

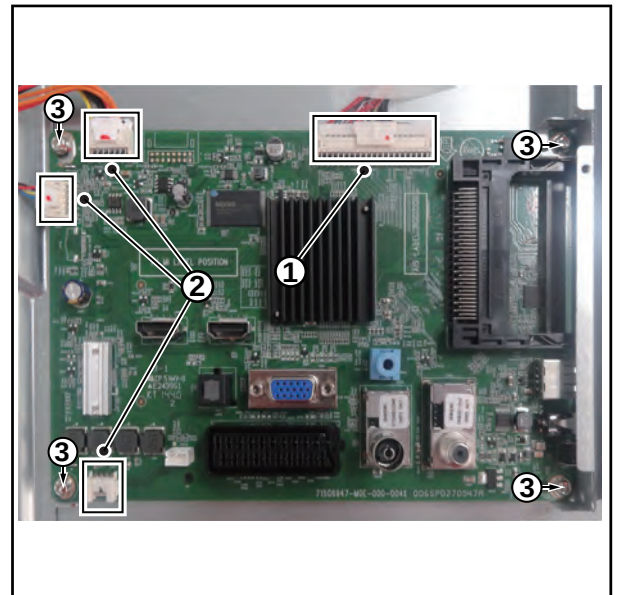
Refer to [Figure 4-32](#) for details.

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 [1] connector that connect with the SSB.

Caution: be careful, as these are very fragile connectors!

2. Unplug all other connectors [2].
3. Remove all the fixation screws [3] from the SSB.
4. The SSB can now be shifted from side connector cover, then lifted and taken out of the I/O bracket. Refer to [Figure 4-32](#) for details.



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Figure 4-32 SSB removal

4.7.5 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.

4.7.6 Stand bracket

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

4.7.7 IR/LED panel

1. Remove the stand bracket, as described earlier.
2. Unplug the connector from the IR/LED panel.
3. Gently release the clip that holds the panel and take it out from the bezel.

When defective, replace the whole unit.

4.7.8 LCD Panel

1. Remove the SSB as described earlier.
2. Remove the PSU as described earlier.
3. Remove the keyboard control panel as described earlier.
4. Remove the stand bracket as described earlier.
5. Remove the IR/LED as described earlier.
6. Remove the fixations screws that fix the metal clamps to the front bezel. Take out those clamps.
7. Remove all other metal parts not belonging to the panel.
8. Lift the LCD Panel from the 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](#) to [Figure 4-12](#).
- Pay special attention not to damage the EMC foams on the SSB shields. Ensure that EMC foams are mounted correctly.

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

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

- A pre-defined situation to ensure measurements can be made under uniform conditions (SDM).
- Activates the blinking LED procedure for error identification when no picture is available (SDM).
- Make alignments (e.g. White Tone), reset the error buffer (SAM and Factory Mode).
- Display information ("SDM" or "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 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 SDM and 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 SDM, SAM and CSM.

The screen will show: "AAAAB-X.YYY", where:

- AAAA is the chassis name: TPN151E x.yy.
- B is the region indication: E = Europe, A = AP/China, U = NAFTA, L = LATAM.
- X is the main version number: this is updated with a major change of specification (incompatible with the previous software version). Numbering will go from 1 - 99 and AA - ZZ.
 - If the main version number changes, the new version number is written in the NVM.
 - If the main version number changes, the default settings are loaded.
- YYY is the sub version number: this is updated with a minor change (backwards compatible with the previous versions). Numbering will go from 000 - 999.
 - If the sub version number changes, the new version number is written in the NVM.
 - If the NVM is refreshed, the software identification, version, and cluster will also be written to NVM.

Display Option Code Selection

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

To do so, press the following key sequence on a standard RC transmitter: "062598" directly followed by MENU 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 Default Mode (SDM)

Purpose

Set the TV in SDM mode in order to be able to create a predefined setting for measurements to be made. In this platform, a simplified SDM is introduced (without protection override and without tuning to a predefined frequency).

Specifications

- Set linear video and audio settings to 50%, but volume to 25%. Stored user settings are not affected.
- All service-unfriendly modes (if present) are disabled, since they interfere with diagnosing/repairing a set. These service unfriendly modes are:
 - (Sleep) timer.
 - Blue mute/Wall paper.
 - Auto switch "off" (when there is no "ident" signal).
 - Hotel or hospital mode.
 - Child lock or parental lock (manual or via V-chip).
 - Skipping, blanking of "Not favourite", "Skipped" or "Locked" presets/channels.
 - Automatic storing of Personal Preset or Last Status settings.

- Automatic user menu time-out (menu switches back/OFF automatically).
- Auto Volume levelling (AVL).

How to Activate SDM

To activate SDM, use the following methods:

- Press the following key sequence on the RC transmitter: "062596", directly followed by the "Home/Menu" button.

After activating this mode, "SDM" will appear in the upper left corner of the screen.

On Screen Menu

After activating SDM, the following items are displayed, with SDM in the upper right corner of the screen to indicate that the television is in Service Default Mode. Menu items and explanation:

- **xxxxx** Operating hours (in decimal).
- **AAAAB-X.YYY** See [Software Identification, Version, and Cluster](#) for the software name definition.
- **ERR** Shows all errors detected since the last time the buffer was erased in format <xxx> <xxx> <xxx> <xxx> <xxx> (five errors possible).
- **OP** Used to read-out the option bytes. In this chassis two times eight option codes are used.

How to Navigate

As this mode is read only, there is nothing to navigate. To switch to other modes, use one of the following methods:

- Command MENU from the user remote will exit SDM.
- To prevent the OSD from interfering with measurements in SDM, use the command "Adjust" or "Options" ("STATUS" or "INFO" for NAFTA and LATAM) from the user remote. This will switch the OSD "off" while remaining in the SDM mode. The "SDM" OSD is remains visible in the upper right corner of the screen. To exit SDM switch to "Stand-by" mode.
- Press the following key sequence on the remote control transmitter: "062596" directly followed by the OK button to switch to SAM (do not allow the display to time out between entries while keying the sequence). Remarks: new remote

controls will not have I+ button, but an "INFO" button instead.

How to Exit SDM

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

Note: If the TV is switched "off" by a power interrupt while in SDM, the TV will show up in the last status of SDM menu as soon as the power is supplied again. The error buffer will not be cleared.

5.2.3 Service Alignment Mode (SAM)

Purpose

- To modify the NVM.
- To perform alignments.

Specifications

- Operation hours counter (maximum five digits displayed).
- Software version 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/OK" 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. 00082	This represents the life timer. The timer counts normal operation hours, but does not count Stand-by hours.
Clear	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.
RGB Align	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
Upload to USB	Copy Channel List to USB		To upload several settings from the TV to an USB stick
Download from USB	Copy Channel List from USB		To download several settings from the USB stick to the TV

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 "Home/Menu" 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.

5.2.4 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" press "1999", directly followed by the "Back/Return" 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
		22"	24"	32"	39"	40"	48"	55"	
0	FW 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	Board ID	715G6079-3in1							Display the Board ID; be careful changing this, it can result in not correct displaying the screen!
2	PANEL_ID	8	9	4	6	5	11	12	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!
3	DB COPY TV to USB	Press OK							DB COPY TV to USB
4	DB READ USB to TV	Press OK							DB READ USB to TV
5	CLR_TEMP_R	119	128	128	128	128	128	128	Red colour temperature setting
6	CLR_TEMP_G	109	128	128	128	128	128	128	Green colour temperature setting
7	CLR_TEMP_B	128	128	128	128	128	128	128	Blue colour temperature setting
8	AUTO_COLOR	Press OK							PC: any pattern that has black and white, YPbPr: SMPTE bar (colour bar), any timing.
9	ADC_GAIN_R	0							Red ADC gain
10	ADC_GAIN_G	0							Green ADC gain
11	ADC_GAIN_B	0							Blue ADC gain
12	ADC_OFFSET_R	0							Red ADC offset
13	ADC_OFFSET_G	0							Green ADC offset
14	ADC_OFFSET_B	0							Blue ADC offset
15	VIRGING_MODE	off	off	off	off	off	off	off	Use this to return the set to virgin mode. Depends whether the set has been used already.
16	E_Fuse	on	on	on	on	on	on	on	E-fuse mode
17	ORT_MODE	off	off	off	off	off	on	off	ORT mode
18	AGEING MODE	off	off	off	off	off	off	off	Use this for aging a new LCD panel
19	AUD_LIMIT_MODE	1	1	1	1	1	1	1	Three modes, 0: off, 1: adaptive mode, 2: fixed mode
20	AUD_THRESHOLD_BYTE1	100	100	100	100	100	100	100	Limit threshold
21	AUD_THRESHOLD_BYTE2	200	200	200	200	200	200	200	Limit threshold
22	AUD_THRESHOLD_BYTE3	100	100	100	100	100	100	100	Limit threshold
23	AUD_GAIN_LINEIN	0	0	0	0	0	6	0	Line-in audio gain
24	AUD_GAIN_HDMI	0	0	0	0	0	6	0	HDMI audio gain
25	AUD_GAIN_ATV	0	0	0	0	0	6	0	Analogue TV audio gain
26	AUD_GAIN_DTV	0	0	0	0	0	6	0	Digital TV audio gain
27	AUD_GAIN_USB	0	0	0	0	0	6	0	USB audio gain
28	TUNER_ID	0	0	0	0	0	0	0	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.
29	CIPLUS QUERY	Press OK							Shows the Validity of the CI+ key and the supplier information
30	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
31	CI Key Type Selection	ProductKey							CI Key Type Selection
32	AQ_TABLE_INDEX	2	5	7	9	8	12	13	Audio Quality index
33	EDID UPDATE	Press OK							Used to enter a new EDID codes into the NVM
34	LVDS SSC Ratio	3%							LVDS SSC ratio
35	LVDS SSC Freq	30KHz							LVDS SSC frequency
36	DDR SSC Ratio	2%							DDR SSC ratio
37	DDR SSC Freq	30KHz							DDR SSC frequency
38	Panel H.Flip	off	off	off	on	off	on	on	Flip panel
39	Panel V.Flip	off	off	off	on	off	on	on	Flip panel
40	Panel ABSwap	off	off	off	off	off	off	off	ABSwap panel
41	Watchdog	5sec							Watchdog
42	Backlight PWM freq.(Hz)	150							Backlight PWM frequency
43	Backlight PWM Limit	20							Backlight PWM Limit
44	VGA_TxRx_Mode	off							VGA_TxRx_Mode

Item	Item value	Default value							Description
		22"	24"	32"	39"	40"	48"	55"	
45	LVDS Driving	3	3	3	3	3	3	3	LVDS Driving
46	LVDS Format	VESA 8bit	JEIDA 8bit	VESA 8bit	JEIDA 8bit	VESA 8bit	NS 10bit	NS 10bit	LVDS Format
47	Ziggo Aging	Press OK							Ziggo Aging
48	SPDIF	On							Enable/Disable SPDIF source
49	Standard PWM Gain	100	100	100	100	100	100	100	Standard PWM Gain
50	ECO PWM Gain	100	100	100	100	100	100	100	ECO PWM Gain
51	VGA port	on	On	Off	Off	Off	Off	Off	Enable/Disable VGA port
52	Zero Detect Enable	on	On	On	On	On	On	On	Zero Detect Enable
53	Copy PQ table to TV	Press OK							Copy PQ table to TV
54	Copy AQ table to TV	Press OK							Copy AQ table to TV
55	Headphone	on	On	On	On	On	On	On	Enable/Disable Headphone source
56	EnhancedH/88	on	On	On	On	On	On	On	EnhancedH/88
57	Joystick Enable	Off	Off	On	On	On	On	On	Joystick Enable
58	Ambilight Enable	Off	Off	Off	Off	Off	On	On	Ambilight Enable
59	Lounge Light Enable	Off	Off	Off	Off	Off	On	Off	Lounge Light Enable
60	FRC F/W Upgrade	Press OK							FRC F/W Upgrade
61	TUNERADDR	0xC4							TUNER Address
62	912_SSC_LVDS_PERCENT	0	0	0	0	0	30	30	Percent of 912_SSC_LVDS
63	912_SSC_LVDS_FREQ	0	0	0	0	0	20	20	912_SSC_LVDS_FREQ
64	912_LVDS_DRIVING	0	0	0	0	0	20	15	912_LVDS_DRIVING
65	912_LVDS_FORMAT	JEDIA 8bit	JEDIA 8bit	JEDIA 8bit	JEDIA 8bit	JEDIA 8bit	JEDIA 10bit	JEDIA 10bit	The format for 912_LVDS
66	EXIF_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.

5.2.5 Customer Service Mode (CSM)

Purpose

The Customer Service Mode shows 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.
- **1.4 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.
- **1.5 Display** 12NC NVM read/write.
- **1.6 PSU** 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 NVM version** Detects and displays NVM version.
- **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.

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

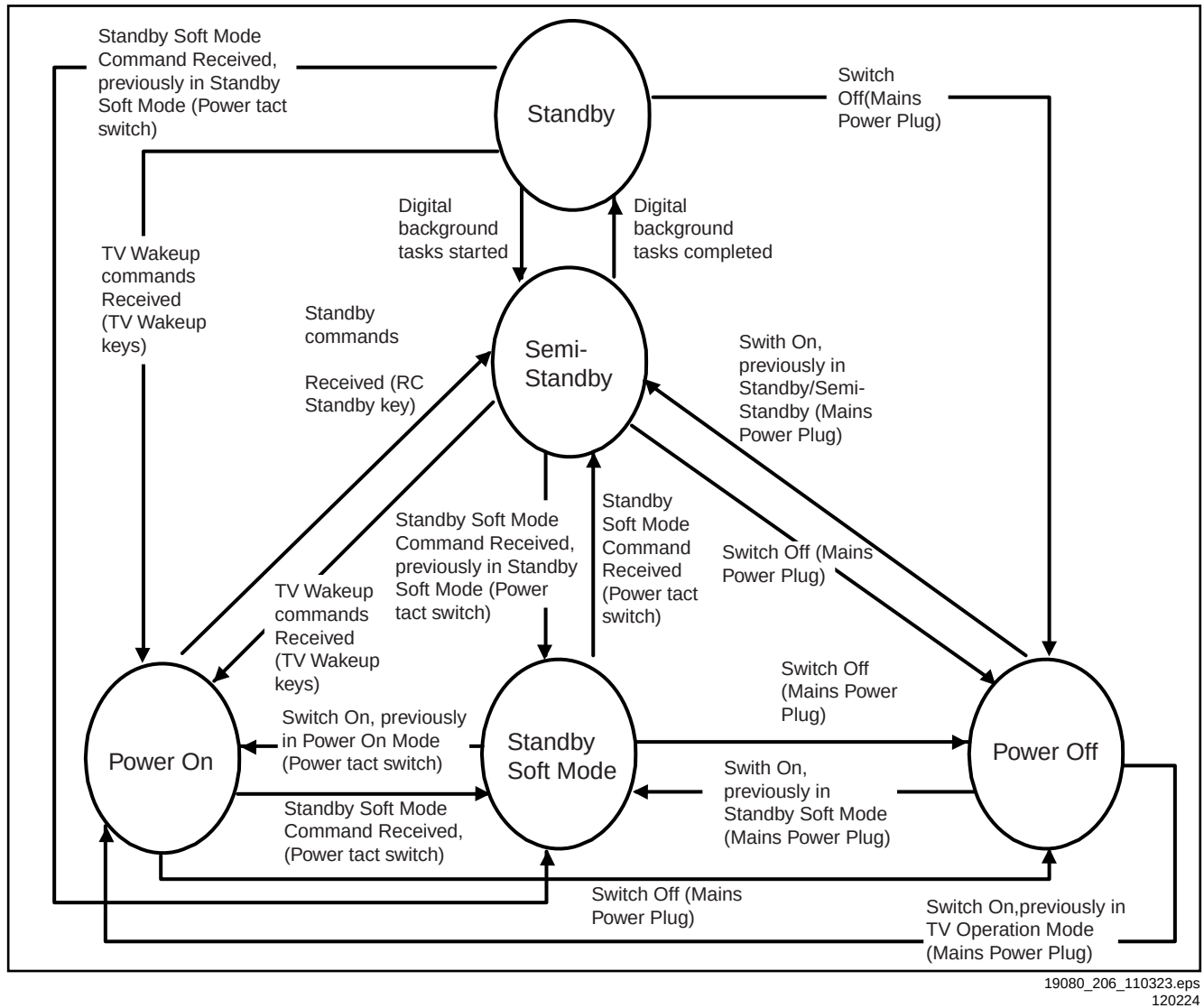


Figure 5-1 Stepwise Start-up

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.

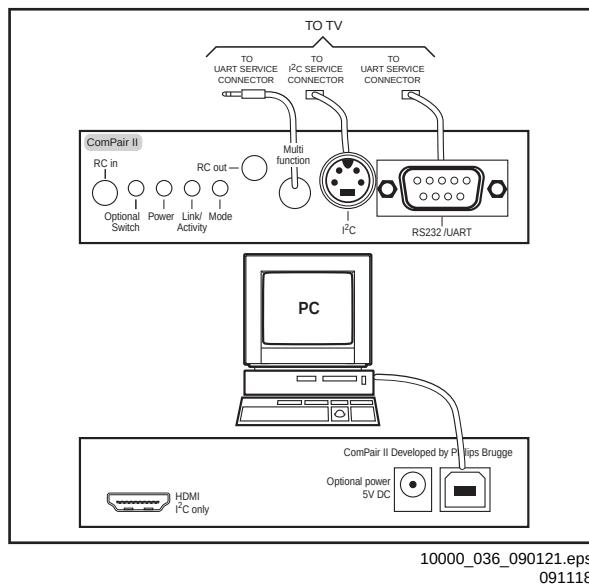


Figure 5-2 ComPair II interface connection

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](#).

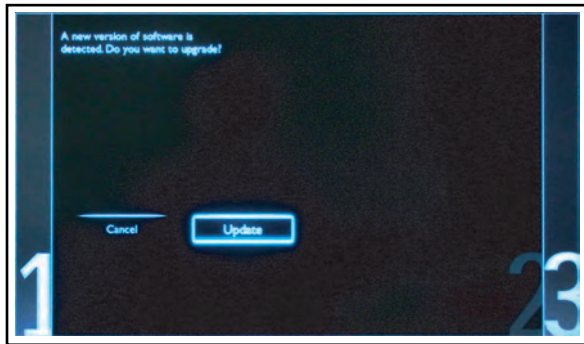
19080_207_110324.eps
110324

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

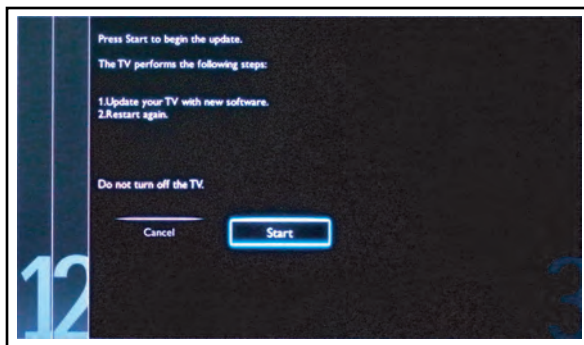
19080_208_110324.eps
110324

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

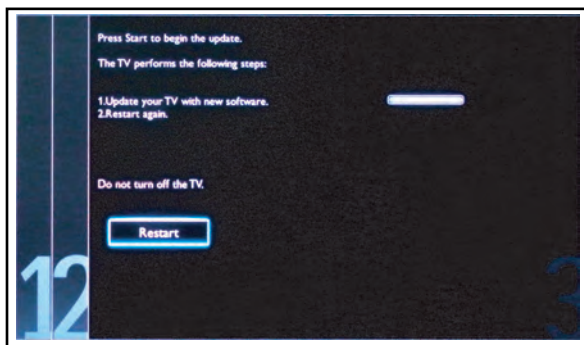
19080_209_110324.eps
110324

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 file downloaded 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
SDM	Service default Mode
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 NT72453 can be done via USB. The main SW can be upgraded via the ZIP file downloaded.
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 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.

5.6.1 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.

5.6.2 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.

5.6.3 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](#).

5.6.4 Unstable Picture via HDMI input

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

5.6.5 No Picture via HDMI input

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

5.6.6 TV Will Not Start-up from Stand-by

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

5.6.7 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.

5.6.8 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.

5.6.9 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!

5.6.10 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 MW, 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 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)	22PFH4000/88	128	114	116
	22PFK4000/12	128	113	115
	22PFT4000/12	128	112	113
	22PFT4000/60	128	113	116
	24PHH4000/88	128	114	115
	24PHK4000/12	126	112	114
	24PHT4000/12	127	114	116
	24PHT4000/60	126	114	115
	24PHH5210/88	76	101	123
	24PHT5210/12	76	100	123
	24PHK5210/12	103	106	128
	24PHT5210/60	75	101	122
	32PFH4100/88	128	113	105
	32PFK4100/12	127	113	105
	32PFT4100/12	124	110	105
	32PFT4100/60	126	112	105
	32PHH4100/88	91	99	128
	32PHK4100/12	91	99	127
	32PHT4100/12	90	98	128
	32PHT4100/60	127	120	128
	32PHH4200/88	91	98	128
	32PHK4200/12	90	99	127
	32PHT4200/12	91	96	126
	39PFH4100/88	126	111	109
	39PFK4100/12	127	113	109
	39PFT4100/12	128	113	109
	39PFT4100/60	128	112	108
	39PFH4200/88	127	114	109
	39PFK4200/12	125	112	109
	39PFT4200/12	126	111	108
	40PFH4100/88	128	123	112
	40PFK4100/12	128	125	112
	40PFT4100/12	127	125	112
	40PFT4100/60	126	125	111
	40PFH4200/88	125	124	112
	40PFK4200/12	127	122	110
	40PFT4200/12	125	125	111
	40PFH6300/88	128	113	115
	40PFK6300/12	127	114	116
	40PFT6300/12	128	114	116
	40PFT6300/60	126	112	115
	48PFT4100/60	122	128	124
	48PFH4100/88	123	127	122
	48PFT4100/12	124	128	124
	48PFK4100/12	121	126	123
	48PFH6300/88	127	112	115
	48PFK6300/12	126	113	114
	48PFT6300/12	128	114	116
	48PFT6300/60	126	112	115
	55PFH6300/88	128	88	97
	55PFK6300/12	126	86	97
	55PFT6300/12	127	85	97
	55PFT6300/60	126	87	95

Picture mode	Screen size	Colour temperature		
		Red	Green	Blue
Cool (11000K)	22PFH4000/88	119	109	128
	22PFK4000/12	119	108	127
	22PFT4000/12	118	109	128
	22PFT4000/60	119	108	128
	24PHH4000/88	119	109	127
	24PHK4000/12	116	106	126
	24PHT4000/12	117	109	128
	24PHT4000/60	119	107	126
	24PHH5210/88	61	92	127
	24PHT5210/12	85	95	128
	24PHK5210/12	62	91	127
	24PHT5210/60	63	92	126
	32PFH4100/88	126	116	127
	32PFK4100/12	127	119	128
	32PFT4100/12	128	119	128
	32PFT4100/60	128	118	128
	32PHH4100/88	73	89	128
	32PHK4100/12	71	88	127
	32PHT4100/12	73	86	128
	32PHT4100/60	128	114	108
	32PHH4200/88	74	88	127
	32PHK4200/12	72	85	127
	32PHT4200/12	70	86	126
	39PFH4100/88	125	117	124
	39PFK4100/12	126	115	128
	39PFT4100/12	126	117	128
	39PFT4100/60	128	116	128
	39PFH4200/88	126	115	128
	39PFK4200/12	124	115	127
	39PFT4200/12	126	117	128
	40PFH4100/88	122	127	127
	40PFK4100/12	122	128	128
	40PFT4100/12	121	128	128
	40PFT4100/60	120	127	126
	40PFH4200/88	122	125	127
	40PFK4200/12	123	124	125
	40PFT4200/12	121	127	128
	40PFH6300/88	118	109	127
	40PFK6300/12	119	108	128
	40PFT6300/12	120	109	128
	40PFT6300/60	121	110	128
	48PFT4100/60	106	121	122
	48PFH4100/88	107	120	126
	48PFT4100/12	108	121	128
	48PFK4100/12	107	121	125
	48PFH6300/88	118	108	127
	48PFK6300/12	117	106	128
	48PFT6300/12	119	109	128
	48PFT6300/60	118	108	126
	55PFH6300/88	128	93	114
	55PFK6300/12	128	92	113
	55PFT6300/12	126	93	112
	55PFT6300/60	125	94	111

Picture mode	Screen size	Colour temperature		
		Red	Green	Blue
Warm (6500K)	22PFH4000/88	128	102	74
	22PFK4000/12	128	102	73
	22PFT4000/12	127	102	74
	22PFT4000/60	128	101	74
	24PHH4000/88	127	102	72
	24PHK4000/12	126	102	73
	24PHT4000/12	128	101	73
	24PHT4000/60	128	103	74
	24PHH5210/88	109	123	114
	24PHT5210/12	128	117	110
	24PHK5210/12	108	122	111
	24PHT5210/60	109	121	114
	32PFH4100/88	127	96	58
	32PFK4100/12	128	96	60
	32PFT4100/12	128	94	60
	32PFT4100/60	125	92	59
	32PHH4100/88	127	121	120
	32PHK4100/12	128	121	120
	32PHT4100/12	127	120	119
	32PHT4100/60	128	102	67
	32PHH4200/88	121	119	120
	32PHK4200/12	127	120	119
	32PHT4200/12	126	118	118
	39PFH4100/88	128	98	66
	39PFK4100/12	128	98	67
	39PFT4100/12	128	97	67
	39PFT4100/60	127	98	67
	39PFH4200/88	124	95	66
	39PFK4200/12	125	97	63
	39PFT4200/12	127	98	67
	40PFH4100/88	127	111	72
	40PFK4100/12	128	111	72
	40PFT4100/12	128	110	72
	40PFT4100/60	125	111	72
	40PFH4200/88	128	112	71
	40PFK4200/12	127	110	70
	40PFT4200/12	128	111	72
	40PFH6300/88	127	102	73
	40PFK6300/12	128	101	74
	40PFT6300/12	128	102	74
	40PFT6300/60	127	100	72
	48PFT4100/60	128	122	86
	48PFH4100/88	127	123	87
	48PFT4100/12	128	123	88
	48PFK4100/12	126	121	88
	48PFH6300/88	128	101	73
	48PFK6300/12	125	100	74
	48PFT6300/12	128	102	74
	48PFT6300/60	126	101	72
	55PFH6300/88	128	77	63
	55PFK6300/12	127	76	63
	55PFT6300/12	128	77	62
	55PFT6300/60	126	75	61

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 NT72567 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 not 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
22PFH4000/88	TPM215HW01-DAT01	008
22PFK4000/12	TPM215HW01-DAT01	008
22PFT4000/12	TPM215HW01-DAT01	008
22PFT4000/60	TPM215HW01-DAT01	008
24PHH4000/88	TPM236H3-BJ1L01.N	009
24PHK4000/12	TPM236H3-BJ1L01.N	009
24PHT4000/12	TPM236H3-BJ1L01.N	009
24PHT4000/60	TPM236H3-BJ1L01.N	009
24PHH5210/88	TPM236H3-BJ1L01.N SCAH	013
24PHT5210/12	TPM236H3-BJ1L01.N SCAH	013
24PHK5210/12	TPM236H3-BJ1L01.N SCAH	013
24PHT5210/60	TPM236H3-BJ1L01.N SCAH	013
32PFH4100/88	TPT315B5-EUJFFE S1E	004
32PFH4100/88	TPT315B5-HVN05.A S600G	020
32PFK4100/12	TPT315B5-EUJFFE S1E	004
32PFK4100/12	TPT315B5-HVN05.A S600G	020
32PFT4100/12	TPT315B5-EUJFFE S1E	004
32PFT4100/12	TPT315B5-HVN05.A S600G	020
32PFT4100/60	TPT315B5-EUJFFE S1E	004
32PFT4100/60	TPT315B5-HVN05.A S600G	020
32PHH4100/88	TPT315B5-DXJSFE SE1E	002
32PHH4100/88	TPT315B5-AN02.S S2D	019
32PHK4100/12	TPT315B5-DXJSFE SE1E	002
32PHK4100/12	TPT315B5-AN02.S S2D	019
32PHT4100/12	TPT315B5-DXJSFE SE1E	002
32PHT4100/12	TPT315B5-AN02.S S2D	019
32PHT4100/60	TPT315B5-OTU3A.Q S11D	003
32PHT4100/60	TPT315B5-WHBN0.K S5941B	021
32PHH4200/88	TPT315B5-DXJSFE SE1E	001
32PHK4200/12	TPT315B5-DXJSFE SE1E	001
32PHT4200/12	TPT315B5-DXJSFE SE1E	001
39PFH4100/88	TPT400LA-J6PE1 SC1X	005
39PFK4100/12	TPT400LA-J6PE1 SC1X	005
39PFT4100/12	TPT400LA-J6PE1 SC1X	005
39PFT4100/60	TPT400LA-J6PE1 SC1X	005
39PFH4200/88	TPT400LA-J6PE1 SC1X	005
39PFK4200/12	TPT400LA-J6PE1 SC1X	005
39PFT4200/12	TPT400LA-J6PE1 SC1X	005
40PFH4100/88	TPT400LA-HM10.S S01A	006
40PFH4100/88	TPT400LA-HN02.S SS01B	018
40PFK4100/12	TPT400LA-HM10.S S01A	006
40PFK4100/12	TPT400LA-HN02.S SS01B	018
40PFT4100/12	TPT400LA-HM10.S S01A	006
40PFT4100/12	TPT400LA-HN02.S SS01B	018
40PFT4100/60	TPT400LA-HM10.S S01A	006
40PFT4100/60	TPT400LA-HN02.S SS01B	018
40PFH4200/88	TPT400LA-HM10.S S01A	006

CTN_ALT BOM#	Panel Type	Display Code
40PFK4200/12	TPT400LA-HM10.S S01A	006
40PFT4200/12	TPT400LA-HM10.S S01A	006
40PFH6300/88	LTA400HW02-G01 SZ	010
40PFK6300/12	LTA400HW02-G01 SZ	010
40PFT6300/12	LTA400HW02-G01 SZ	010
40PFT6300/60	LTA400HW02-G01 SZ	010
48PFT4100/60	TPT480H2-HWU23.K S48P0A	007
48PFT4100/60	TPT480LS-HN08.S SG01A	016
48PFH4100/88	TPT480H2-HWU23.K S48P0A	007
48PFH4100/88	TPT480LS-HN08.S SG01A	016
48PFT4100/12	TPT480H2-HWU23.K S48P0A	007
48PFT4100/12	TPT480LS-HN08.S SG01A	016
48PFK4100/12	TPT480H2-HWU23.K S48P0A	007
48PFK4100/12	TPT480LS-HN08.S SG01A	016
48PFH6300/88	LTA480HW03-G01 SZ	011
48PFK6300/12	LTA480HW03-G01 SZ	011
48PFT6300/12	LTA480HW03-G01 SZ	011
48PFT6300/60	LTA480HW03-G01 SZ	011
55PFH6300/88	LTA550HW04-G01 SZ	012
55PFK6300/12	LTA550HW04-G01 SZ	012
55PFT6300/12	LTA550HW04-G01 SZ	012
55PFT6300/60	LTA550HW04-G01 SZ	012

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 DVB-S\(2\) reception](#)
- [7.6 HDMI](#)
- [7.7 Video and Audio Processing - NT72453MBG-BA](#)
- [7.8 Ambilight \(only for 6300 series\)](#)

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 TPN15.1E LA is a new chassis launched in Europe in 2015. The whole range is covered by NT72453 platform. The major deltas versus its predecessor support DVB-TC; DVB-TC/T2; DVB-TC/S2 with also multi-media, ARC, CEC, 3D(for 6300), Ambilight(for 6300) function.

The TPN15.1E LA chassis comes with the following stylings:

- series xxPxx4100
- series xxPxx4200
- series xxPxx6300
- series xxPxx5210

7.1.1 Implementation

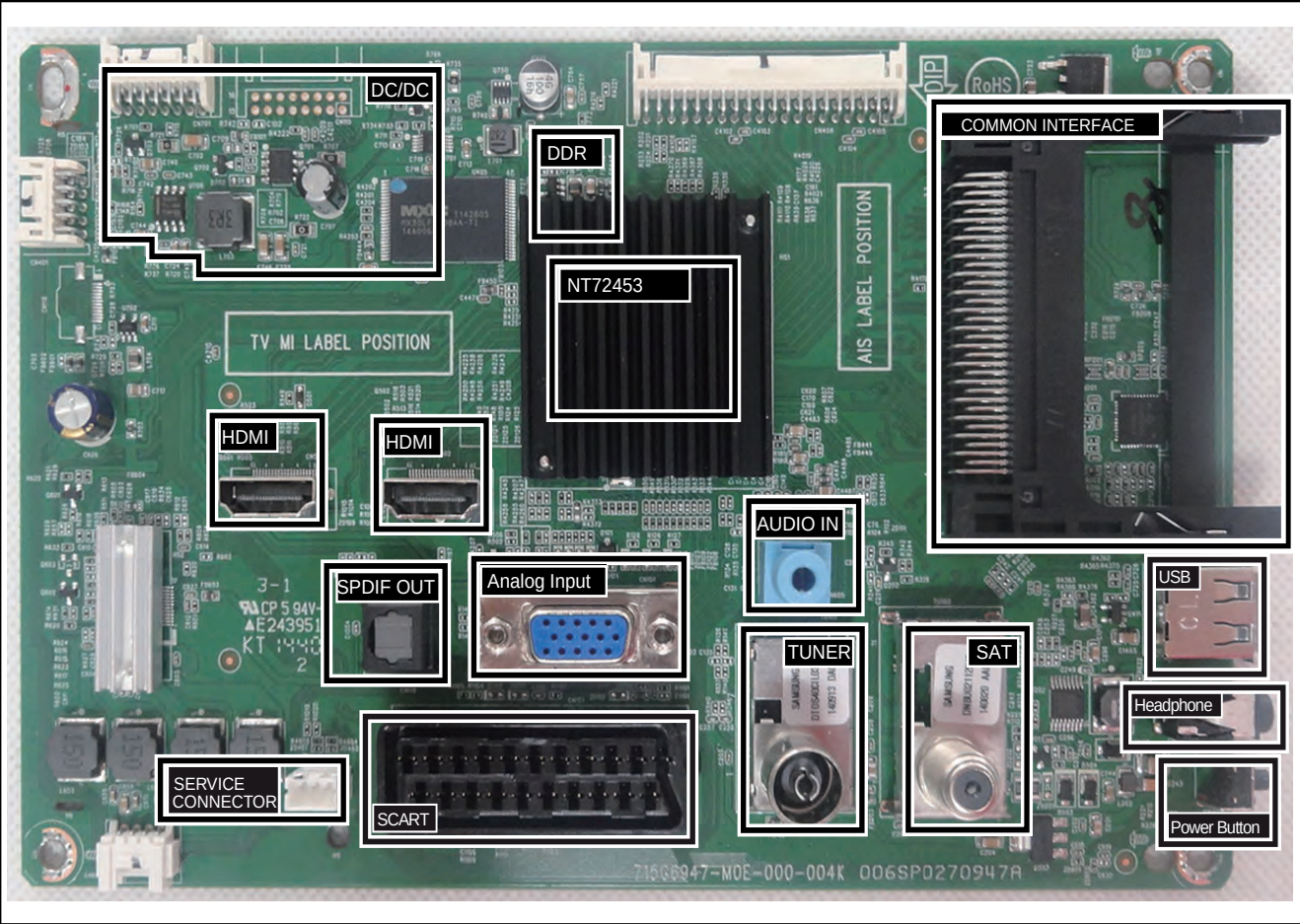
Key components of this chassis are:

- Scaler NT72453MBG-BA/B TFBGA-466 TV Processor for 4100/6300 series
- Scaler NT1912MBG-S/B TFBGA-364 TV Processor only for 6300 series
- Tuner EU ST42CS-2-E for K/H/T models (DVB-C/T/T2)
- Tuner EU DNBU02112IH2 for K models (DVB-S/S2)
- DEMODULATOR NT78822QG/A QFN-48 for T/T2
- AUDIO AD87588-LG48NAY 20W E-LQFP-48 150

7.1.2 TPN15.1E LA Architecture Overview

For details about the chassis block diagrams refer to [9. Block Diagrams](#). An overview architecture can be found in [Figure 9.1](#).

7.1.3 SSB Cell Layout

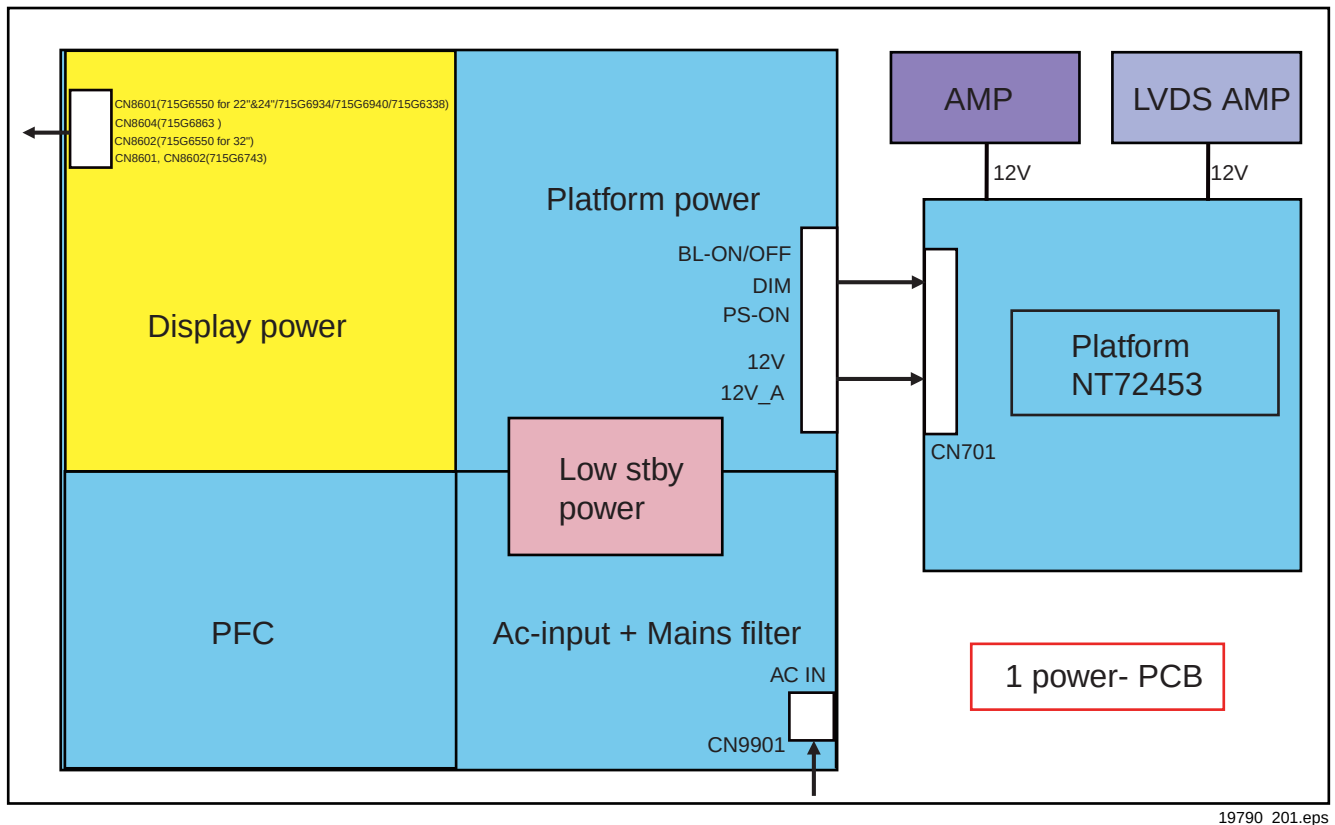


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Figure 7-1 SSB layout cells (top view)

7.2 Power Supply

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



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Figure 7-2 Power Architecture

7.2.1 Power Supply Unit

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

Important delta's with the TPN15.1E LA classis platform are:

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

The control signals are:

- PS_ON
- 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:

- +12V output (only for 32" stand-by and on-mode)
- +8.5V output follow main board designing(Stand-by mode)
- +12V (on-mode)
- +12V_audio (audio power)
- +36V (Boost for backlight for 715G6338)
- +36V (Boost for backlight for 715G6940)
- +36V (Boost for backlight for 715G6743)
- 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

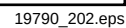
Number	Connector											
	22" & 24" 4000		32" 4x00		39" & 40" 4x00		40" 6300		48" 4x00		48" & 50" 6300	
	CN9101	CN8602	CN9101	CN8604	CN9101	CN8601	CN9101	CN8101	CN9101	CN8101	CN9101	CN8101/CN8102
Description	to SSB	to panel	to SSB	to panel	to SSB	to panel	to SSB	to panel	to SSB	to panel	to SSB	to panel
Pin	16	8	14	8	16	13	14	6	14	12	14	7
1	DIM	VLED+	DIM	VLED+	DIM	VLED+	DIM	VLED-	DIM	VLED+	DIM	VLED_1
2	On/off	VLED+	ON/OFF	VLED+	ON/OFF	n.c.	ON/OFF	VLED-	ON/OFF	n.c.	BL ON/OFF	VLED_1
3	PS_ON	n.c.	n.c.	n.c.	PS_ON	VLED1-	PS_ON	n.c.	PS_ON	VLED-	PS_ON	n.c.
4	n.c.	n.c.	n.c.	n.c.	n.c.	VLED1-	2D/3D	n.c.	2D/3D	VLED-	3D_ON	n.c.
5	GND	LED1-	GND	LED_a	GND	VLED1-	GND	VLED+	GND	n.c.	GND	n.c.
6	GND	LED1-	GND	LED_a	GND	n.c.	GND	VLED+	GND	n.c.	GND	VLED+
7	GND	n.c.	GND	n.c.	GND	n.c.	GND	-	GND	n.c.	GND	VLED+
8	GND	n.c.	GND	n.c.	GND	n.c.	GND	-	GND	n.c.	GND	-
9	+12V-A	-	+12V-AUDI O	-	+12V-AUDI O	n.c.	+12V-AUDI O	-	+12V-AUDI O	n.c.	+12V-A	-
10	+12V-A	-	+12V-AUDI O	-	+12V-AUDI O	VLED1-	+12V-AUDI O	-	+12V-AUDI O	n.c.	+12V-A	-
11	+12V	-	+12V	-	+12V	VLED1-	+12V	-	+12V	VLED-	+12V	-
12	+12V	-	+12V	-	+12V	n.c.	+12V	-	+12V	VLED-	+12V	-
13	+12V	-	+12_AL	-	+12_AL	VLED+	+12V	-	+12_AL	n.c.	+12	-
14	+12V	-	+12_AL	-	+12_AL	-	+12V	-	+12_AL	VLED+	+12	-
15	+5.2V	-	-	-	n.c.	-	-	-	-	-	-	-
16	+5.2V	-	-	-	n.c.	-	-	-	-	-	-	-

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 the AMP
- +1V5, from the power supply for the scaler IC NT72453
- +1V1, from the power supply for the scaler IC NT72453
- +3V3, from the power supply for the scaler IC NT72453
- +1V5, supply voltage for DDR2 (diagram B03B)
- +3V3, genenal supply voltage
- +5V, supply voltage for USB and CAM
- +3V3-TUN, supply voltage for tuner
- +3V3 from the power supply for the scaler IC NT72453
- +5V_SW, input intermediate supply voltage for USB
- +3V3_T2, voltage for Tuner single decoder
- +1V2_T2, voltage for Tuner single decoder

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



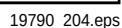
7.4 Front-End Analogue and DVB-T, DVB-C; ISDB-T reception

7.4.2 DVB-T2 DTV part

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

- TUNER EUROPE system ST42CS-2-E
- SCALER NT72453MBG-BA/B TFBGA-466
- DEMODULATOR NT78822QG/A QFN-48 for DVB-T2 DTV part

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



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[back to
div. table](#)

7.5 Front-End DVB-S(2) reception

The Front-End for the DVB-S(2) application consist of the following key components:

- TUNER EUROPE DNBU02112IH2
- SCALER NT72453MBG-BA/B TFBGA-466
- DEMODULATOR NT78822QG/A QFN-48 for T/T2

Below find a block diagram of the front-end application for DVB-S(2) reception.

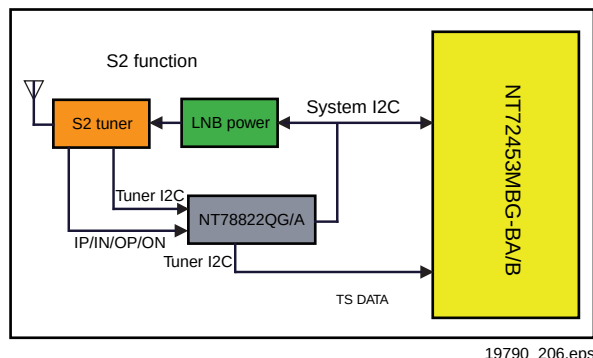


Figure 7-6 Front-End DVB-S2 DTV block diagram

The 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 2.0 protocol
- Reception of DVB-S (supporting QPSK encoded signals) and DVB-S2 (supporting QPSK, 8PSK encoded signals)

7.6 HDMI

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

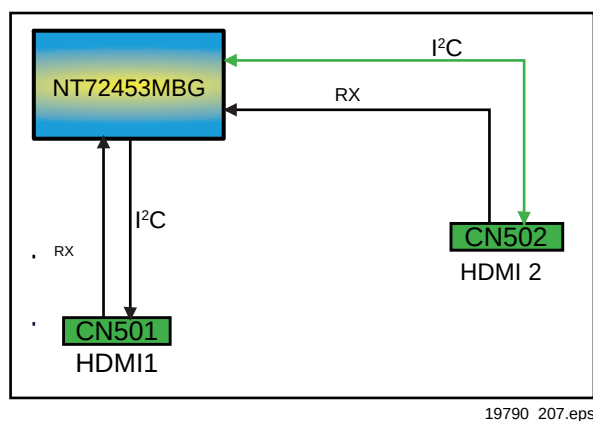


Figure 7-7 HDMI input configuration

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
- +5V detection mechanism
- Stable clock detection mechanism
- HPD control
- Sync detection
- TMDS output control
- CEC control

7.7 Video and Audio Processing - NT72453MBG-BA

The NT72453MBG-BA 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-1, MPEG-2, H.264, MPEG-4)
- Integrated ISDB-T, DVB-T/DVB-C, ITU-T J.83B, ATSC channel decoder
- Integrated video and audio ADC
- Integrated standby controller
- 2D-Graphic engine/OSD
- Integrated USB2.0 high speed host controller
- Visual effect processor
- Built-in 16bit DDR3-SDRAM KGD

The NT72453MBG-BA/D is an integrated TV system-on-chip which complies with variety ATV as NTSC, PAL and SECAM, and DTV standards as ISDB-T, DVB-T/C, integrates DTV and multi-media AV decoder, SIF demodulator, and support A/V post-processing. The integrated video ADC and video decoder support PC VGA port, YPbPr, SCART, CVBS and S-Video Input. Regarding the tuner input, The digital VIF performs the universal analog TV demodulation (NTSC, PAL, and SECAM), including IF processing, AGC, video demodulation, and second sound IF generation (SSIF). The video decoder supports universal TV video format. The integrated audio ADC supports stereo audio input corresponding to video input sources. The integrated TV sound decoder supports universal TV sound format. The advanced picture quality and color engine create more vivid image impression than ever. The HDMI receiver v1.4a, supports deep color, CEC features and 3D formats. The USB high speed host supports updating firmware code, multi-media playback from the external USB flash devices. The standby controller can operate solely from the main system, powered by the standby power source from power module, consumes as low current as possible. It meets the requirement of Green appliance.

For a functional diagram of the NT72453MBG-BA, refer to [Figure 8-1](#).

7.8 Ambilight (only for 6300 series)

- The power supply voltage 12V
- Ambilight will adjust the TV lights around according to the picture changing color and brightness in order to create a sense of the effect of be personally on the scene.

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 10-7-4 NT72453 ADC/DAC/AUDIO/SIF, B04, NT72453MBG-BA (IC U401)

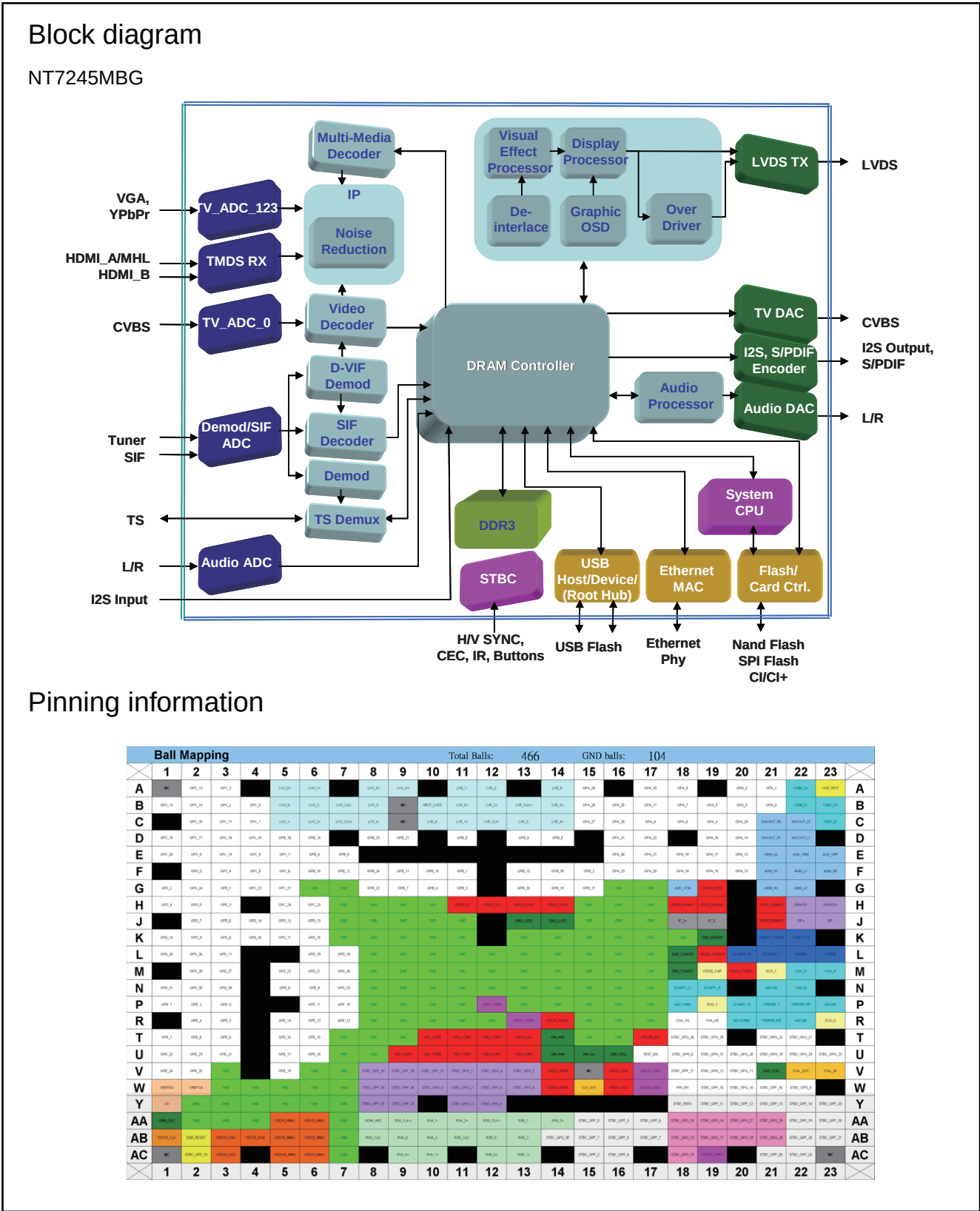
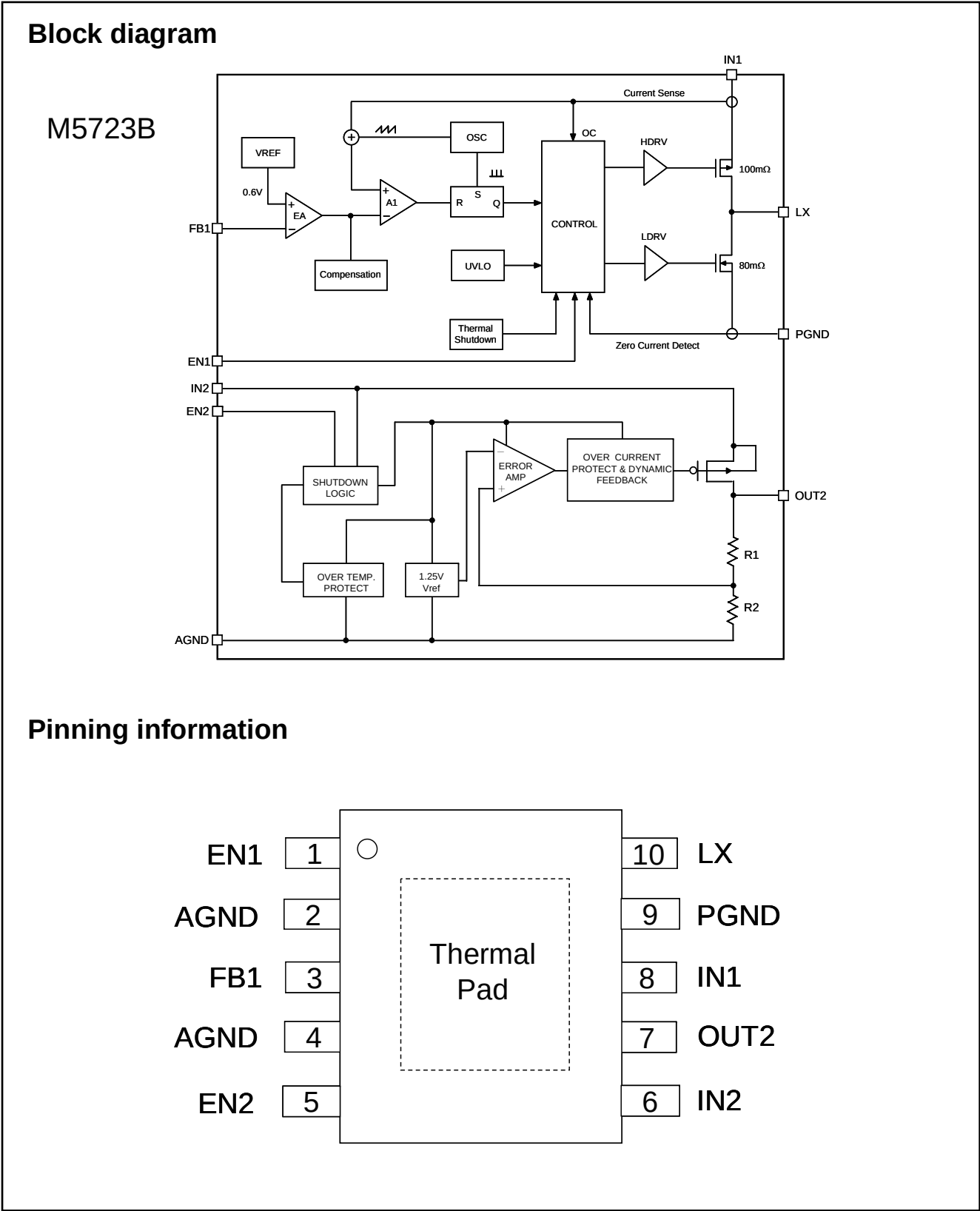


Figure 8-1 Internal block diagram and pin configuration

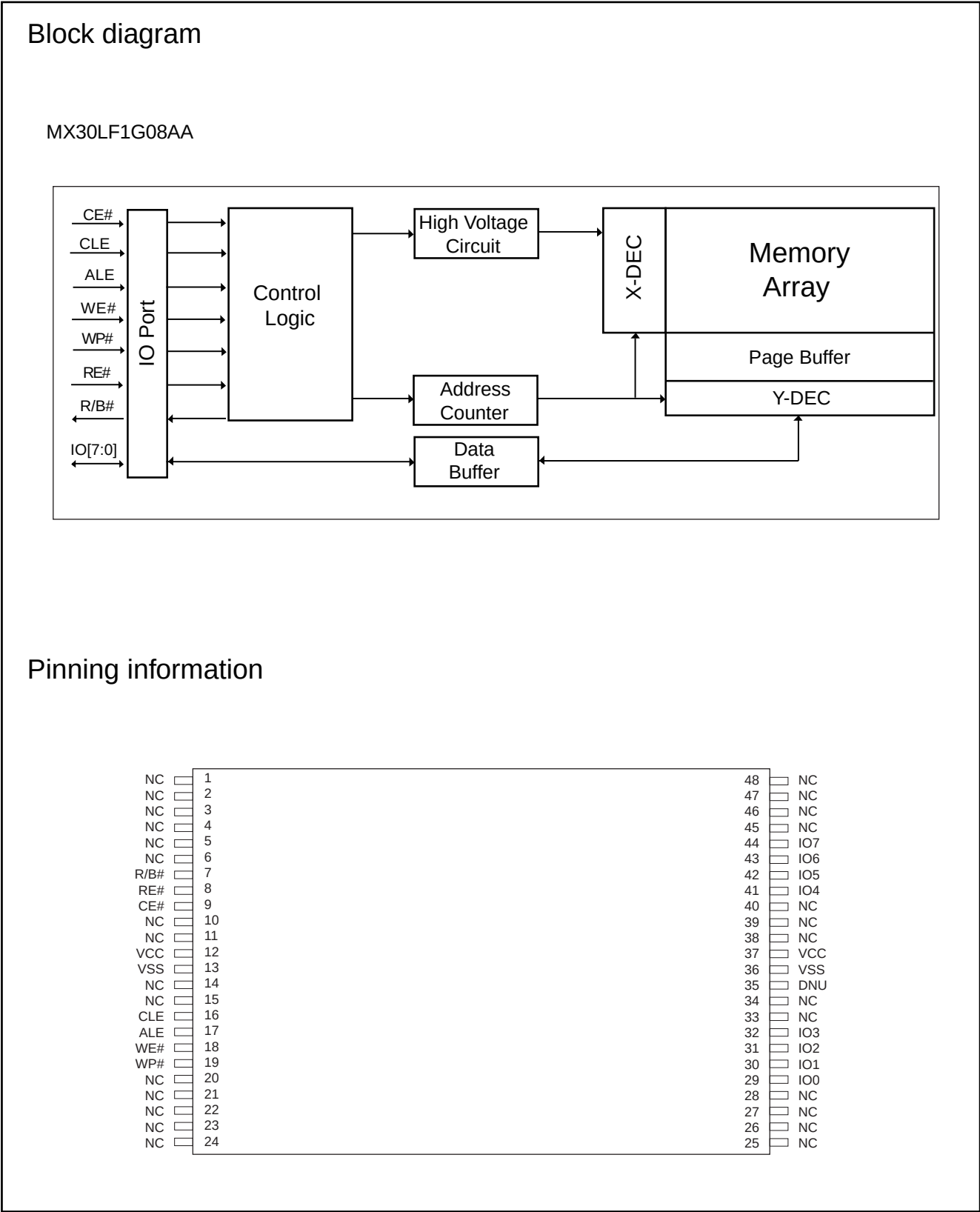
8.2 Diagram [10-7-1 System Power](#), B01, M5723B (IC U701)



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Figure 8-2 Internal block diagram and pin configuration

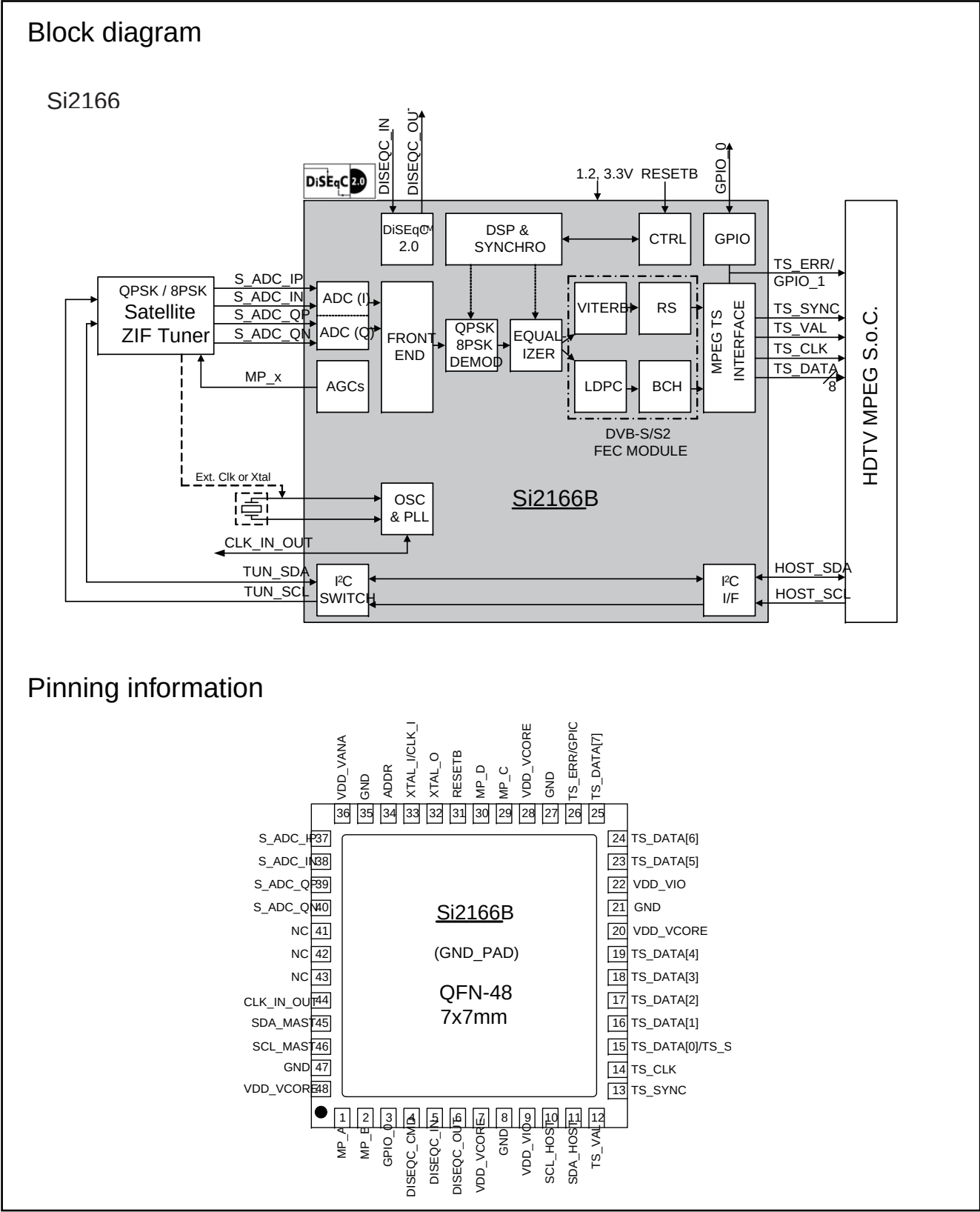
8.3 Diagram [10-7-7 NT72453 STBC/FLASH](#), B07, MX30LF1G08AA (IC U405)



19790_300.eps

Figure 8-3 Internal block diagram and pin configuration

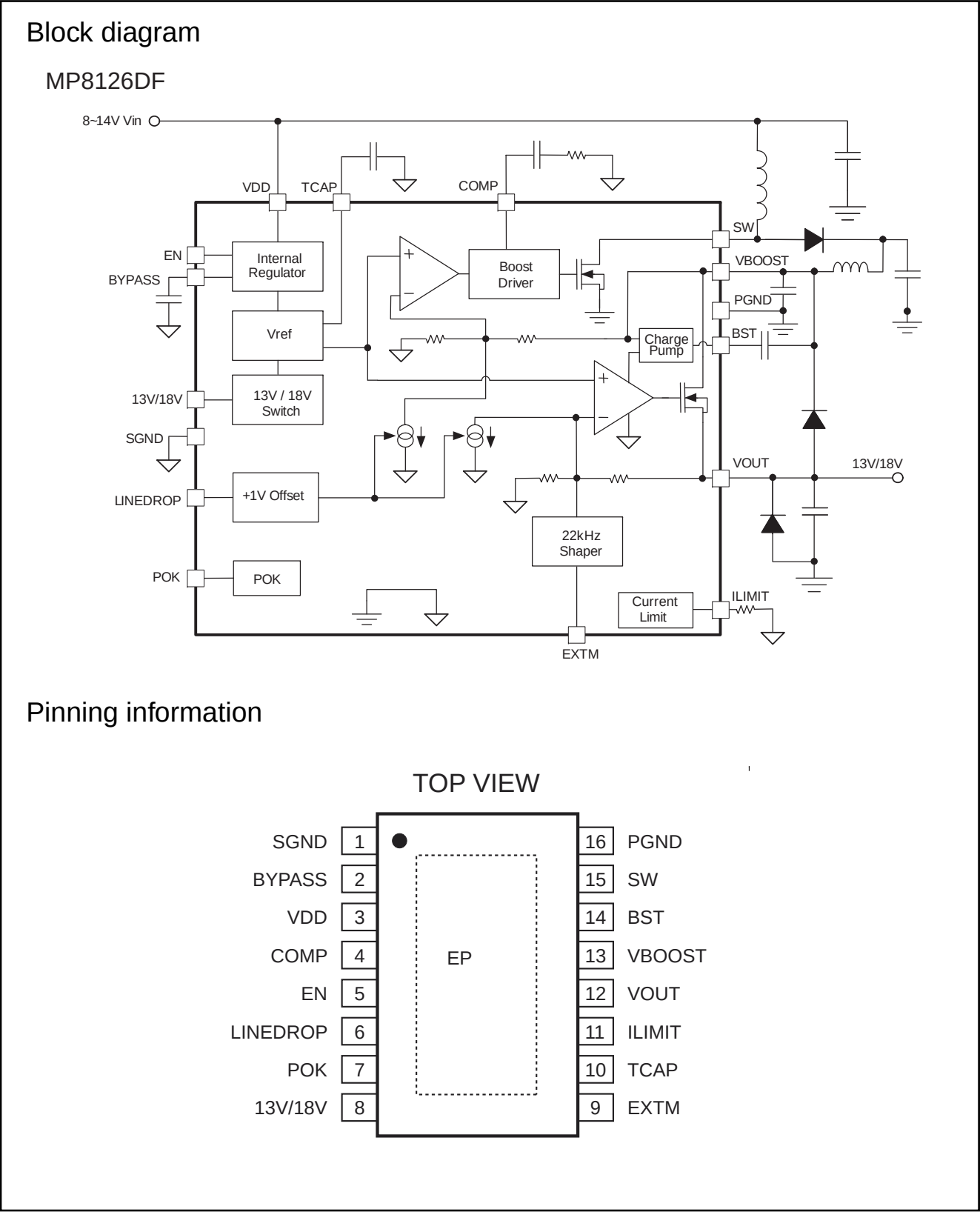
8.4 Diagram [10-7-10 Tuner/T2 demod](#), B10, Si2166-B22 (IC U201)



19790_303.eps

Figure 8-4 Internal block diagram and pin configuration

8.5 Diagram [10-7-10 Tuner/T2 demod](#), B10, MP8126DF (IC U202)



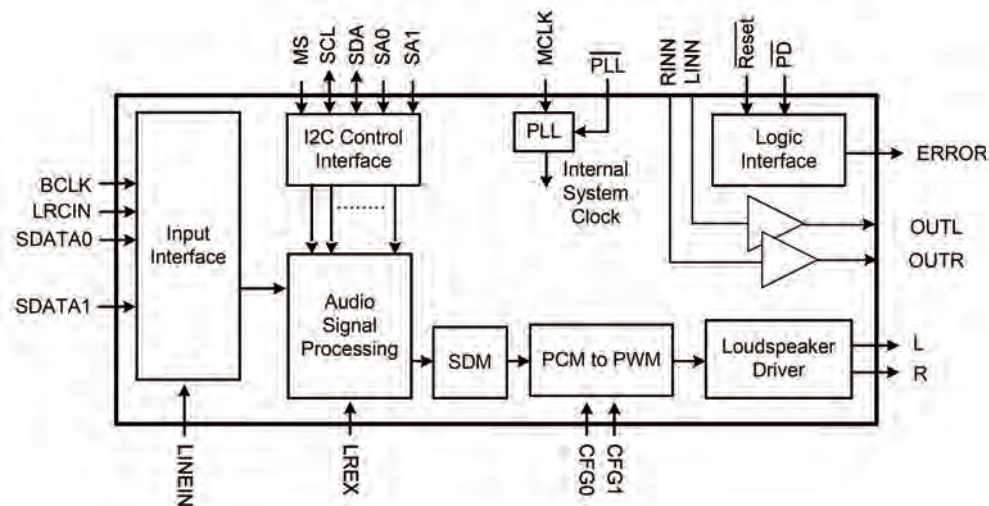
19790_304.eps

Figure 8-5 Internal block diagram and pin configuration

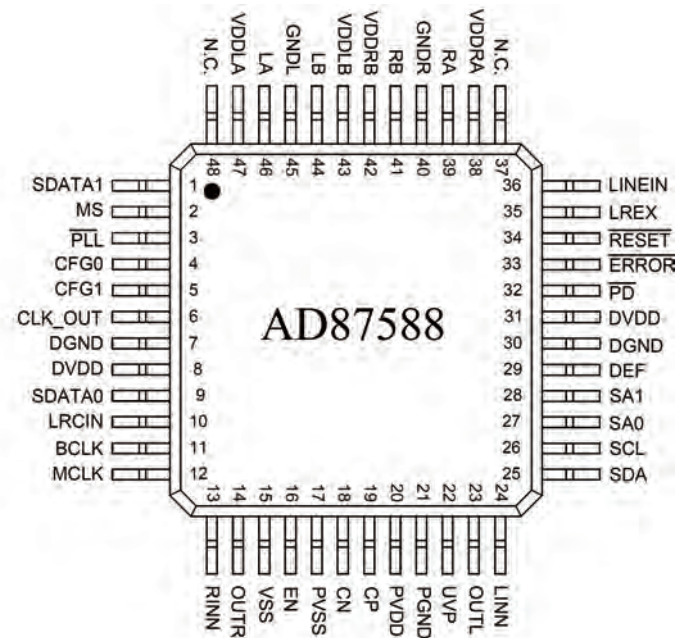
8.6 Diagram [10-7-11 SPK AMP/HP OUT](#), B11, AD87588 (IC U601)

Block diagram

AD87588



Pinning information

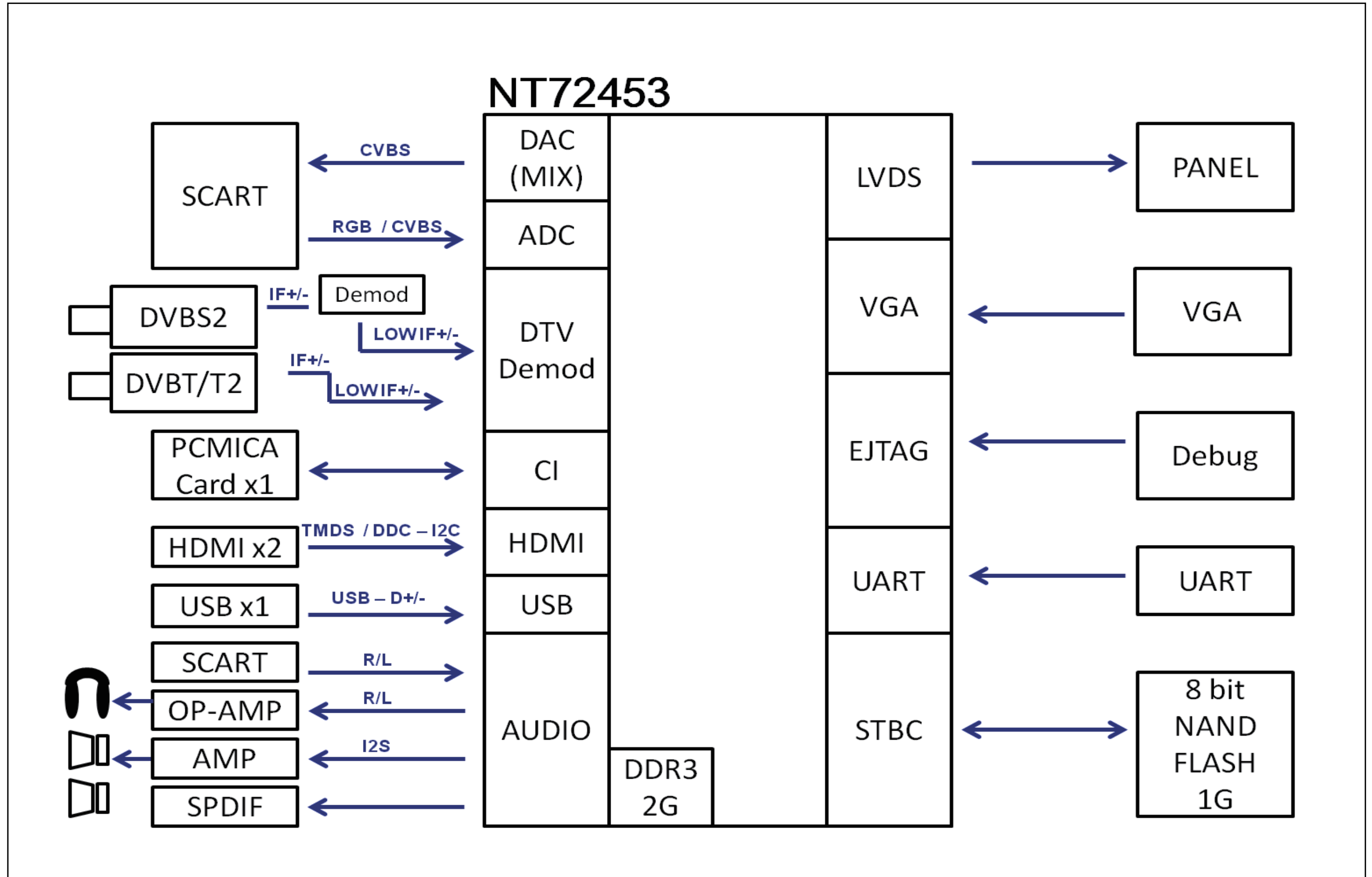


19790_301.eps

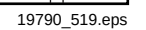
Figure 8-6 Internal block diagram and pin configuration

9. Block Diagrams

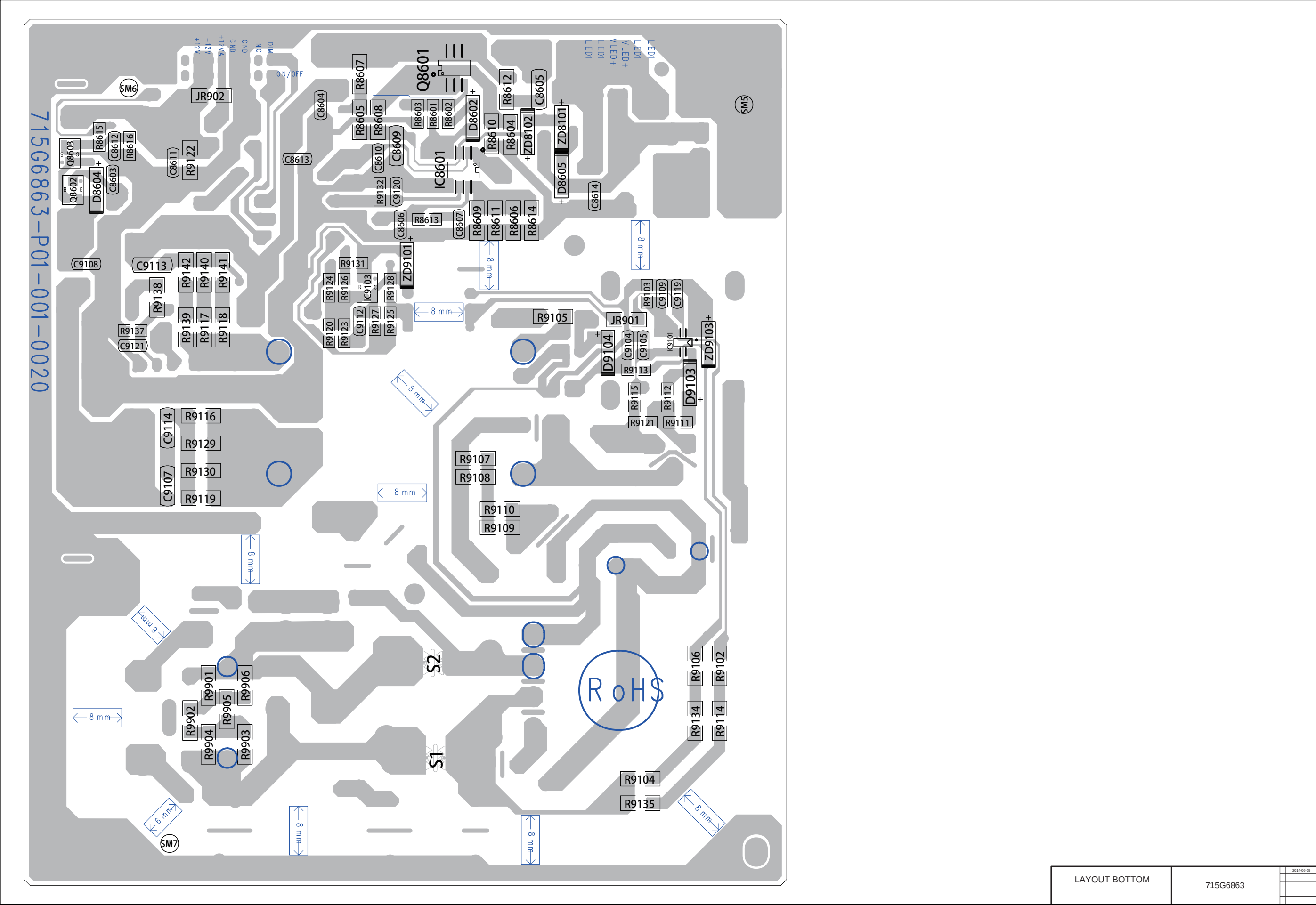
9.1 Block diagram 4x00/6300/5210 series



10.1 A 715G6863 PSU



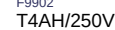
10-1-3 Power layout bottom



10-2-1 POWER

POWER

A01



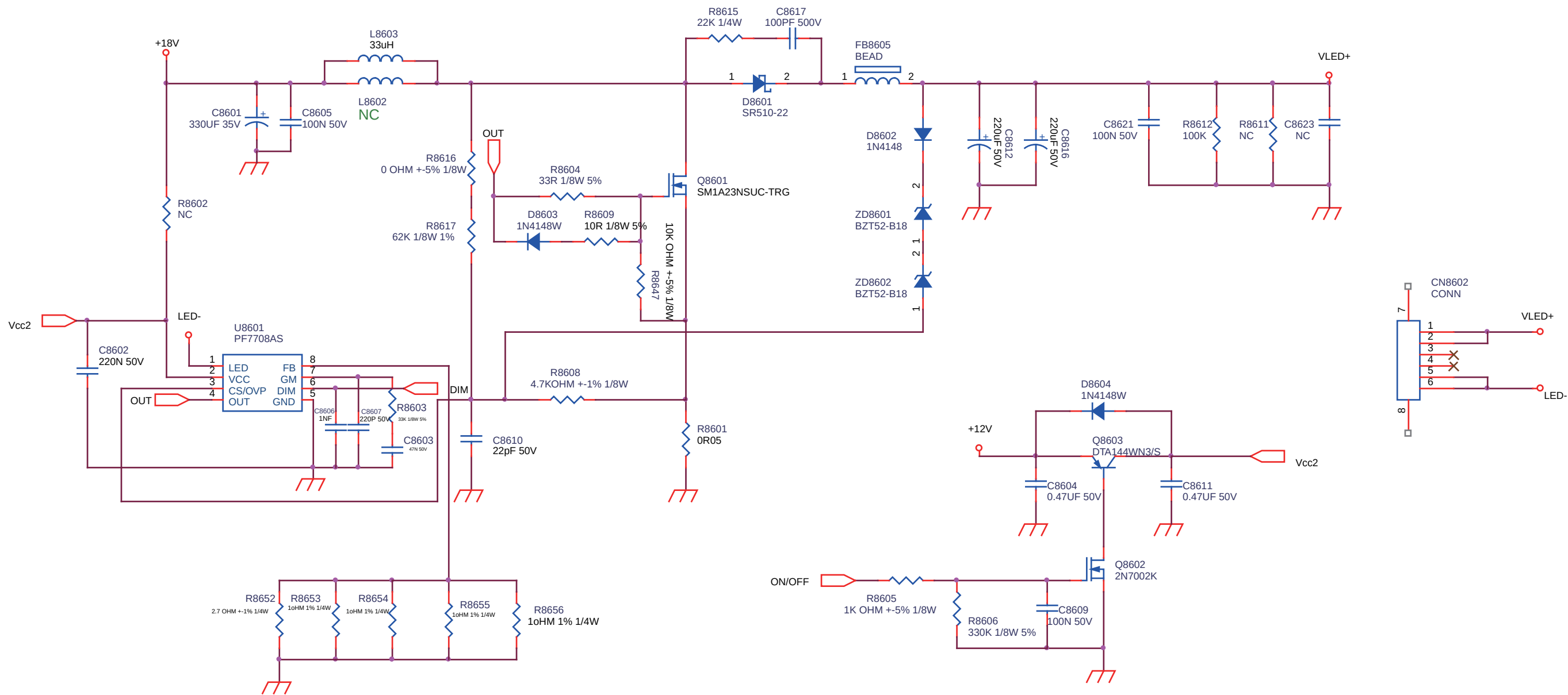
715G6550

19597_500.eps

A02

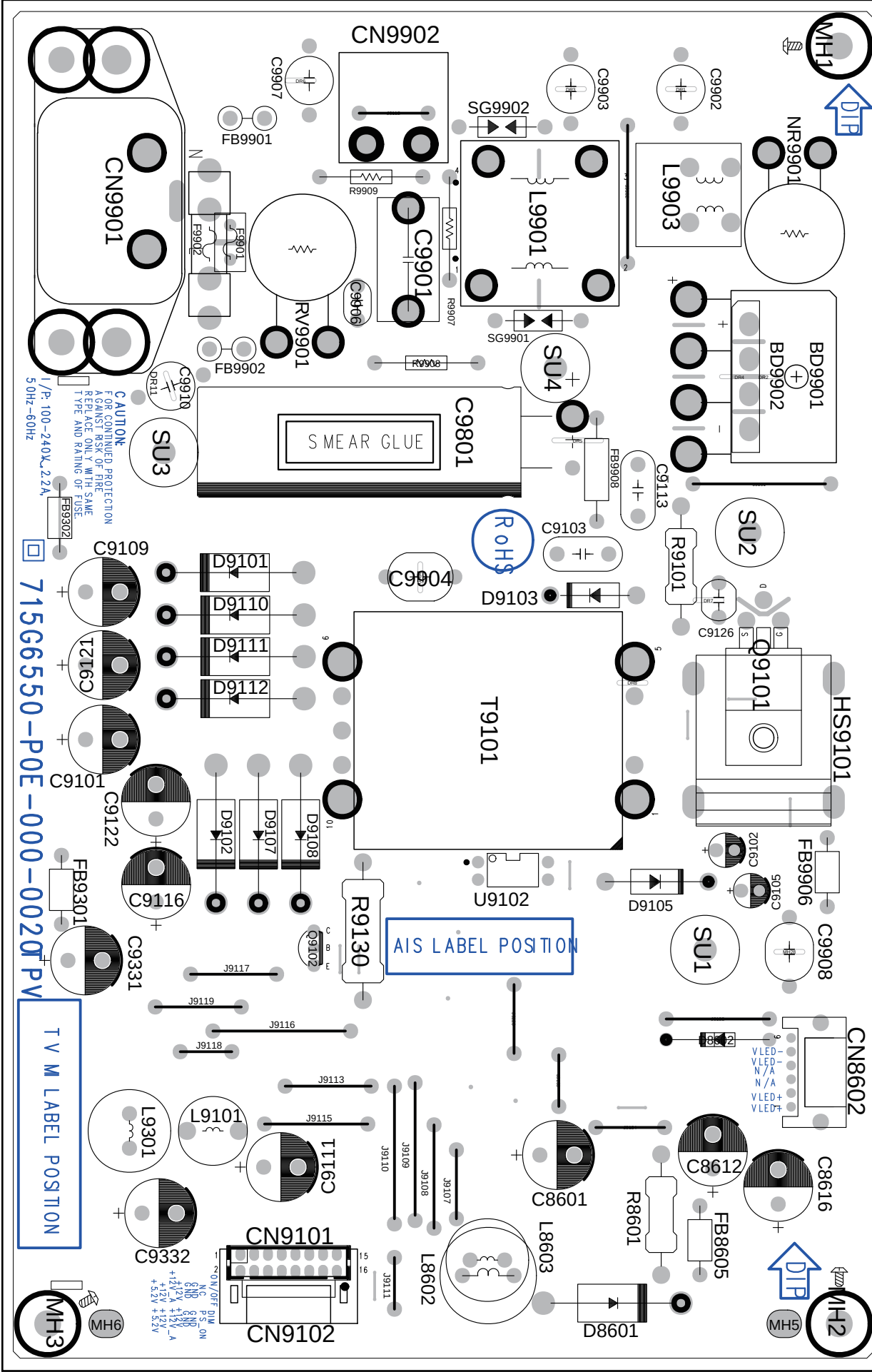
LED DRIVER

A02



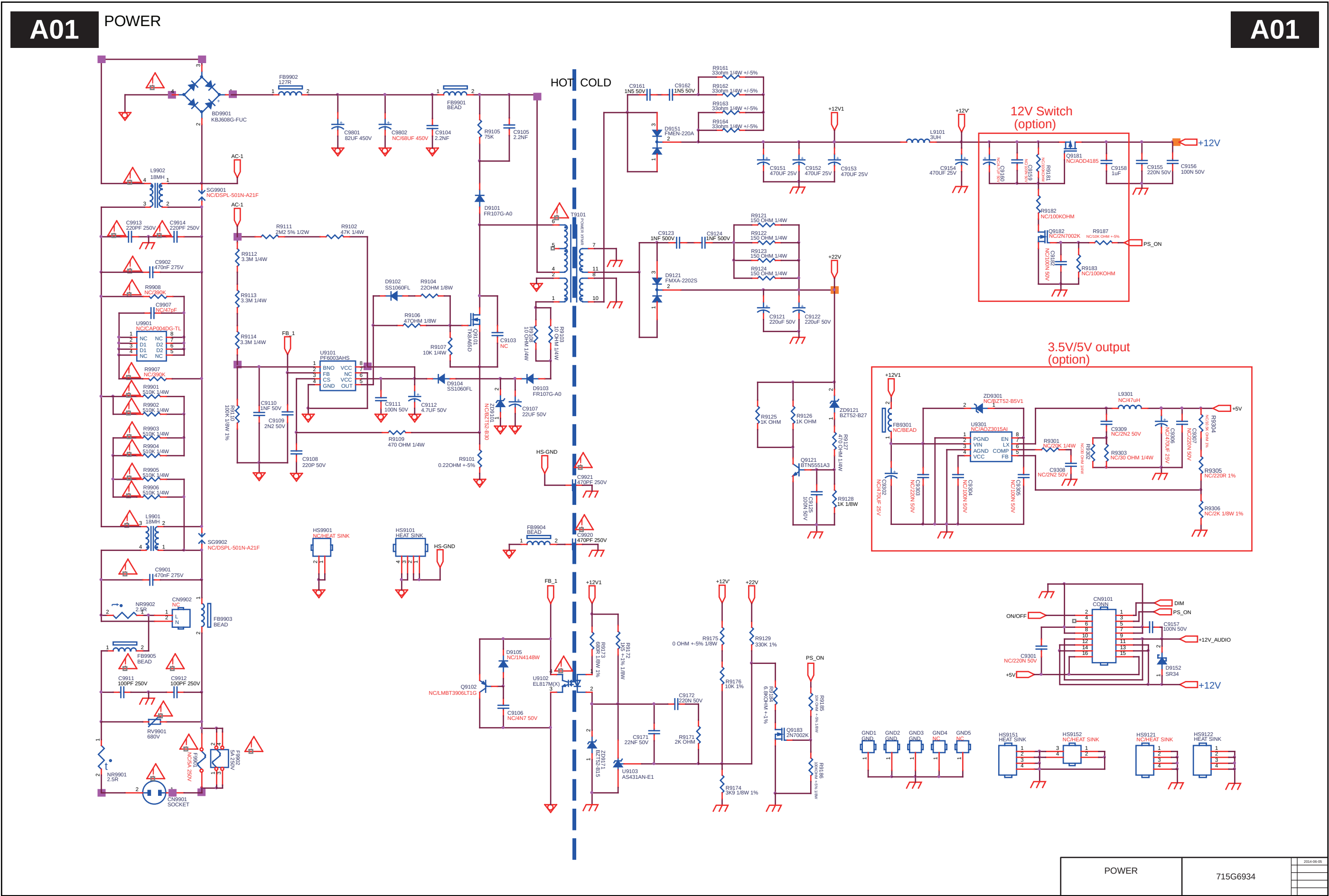
LED DRIVER	715G6550	2014-06-14

10-2-3 Power layout top



LAYOUT TOP	715G6550	2014-05-14

10.3 A 715G6934 PSU
10-3-1 POWER

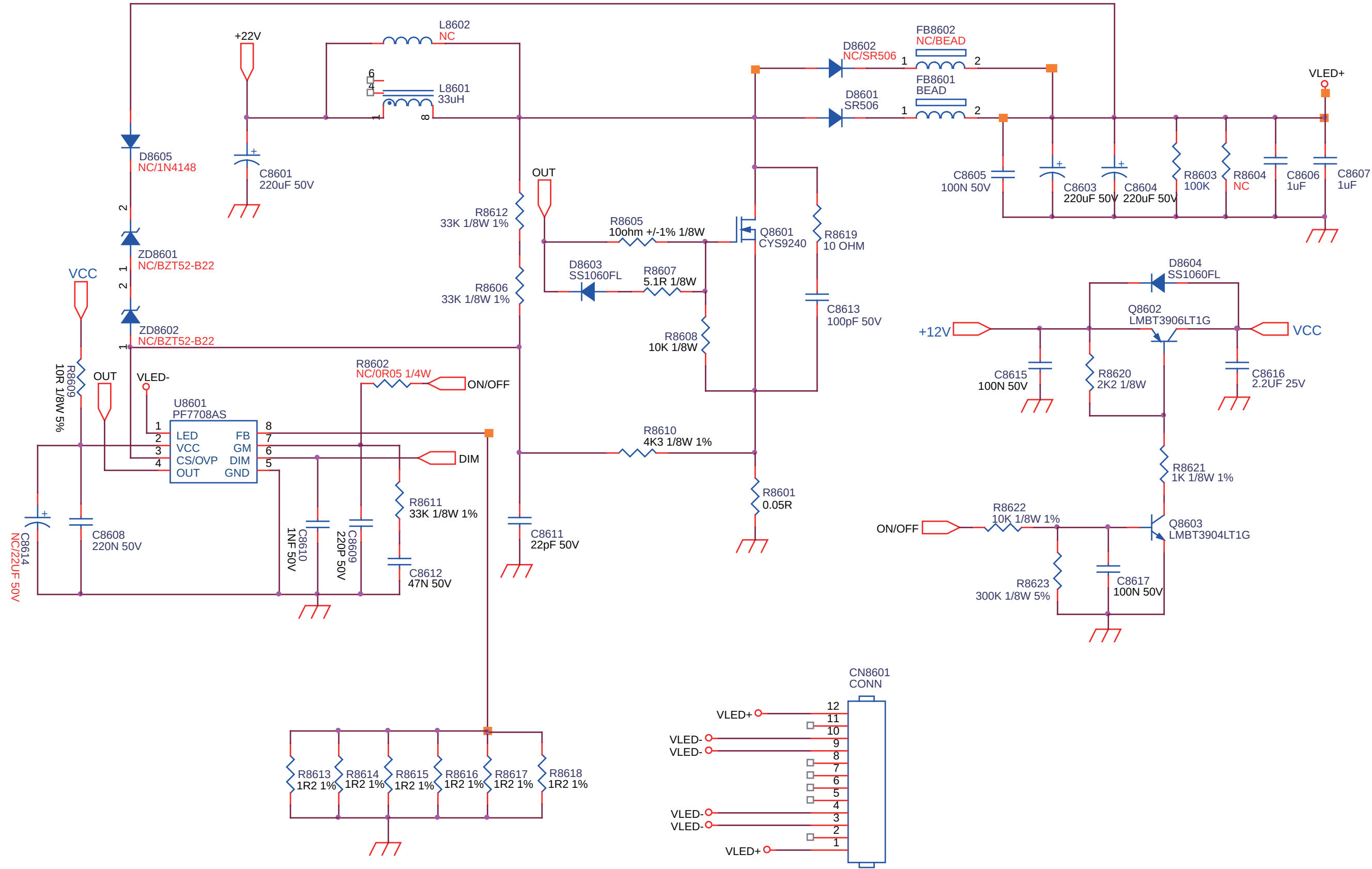


10-3-2 LED DRIVER

A02

LED DRIVER

A02

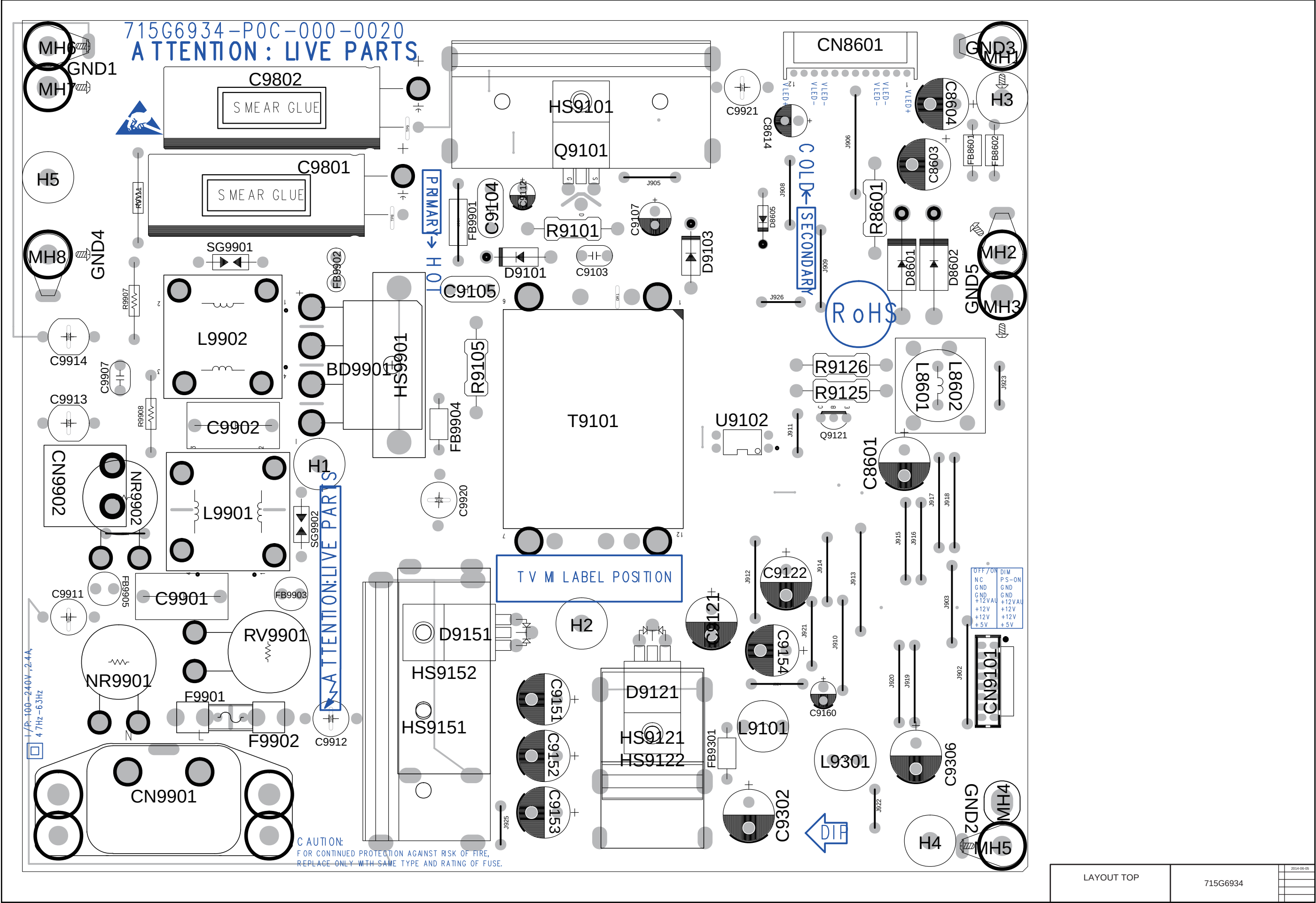


LED DRIVER

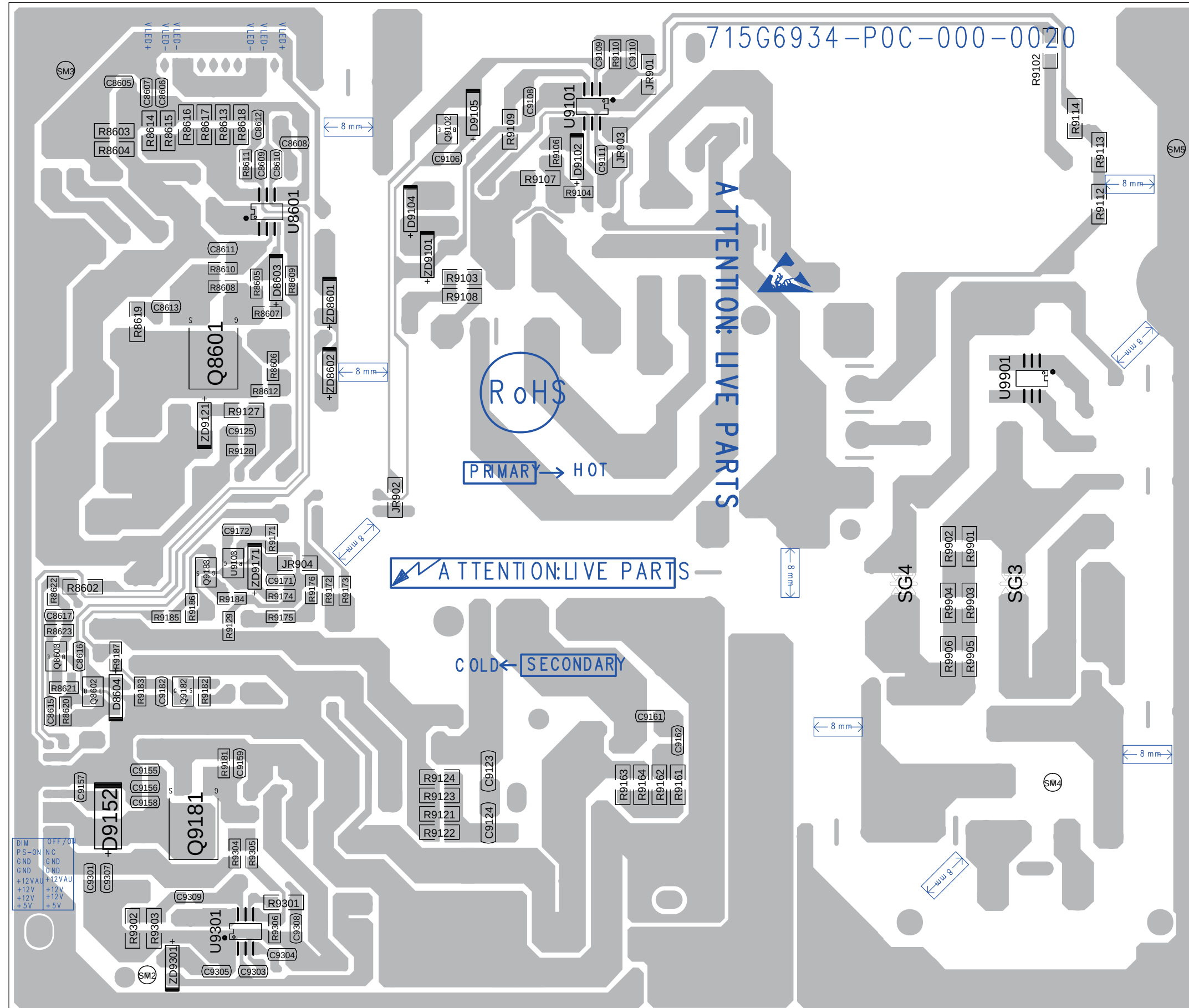
715G6934

2014-08-05

10-3-3 Power layout top



10-3-4 Power layout bottom



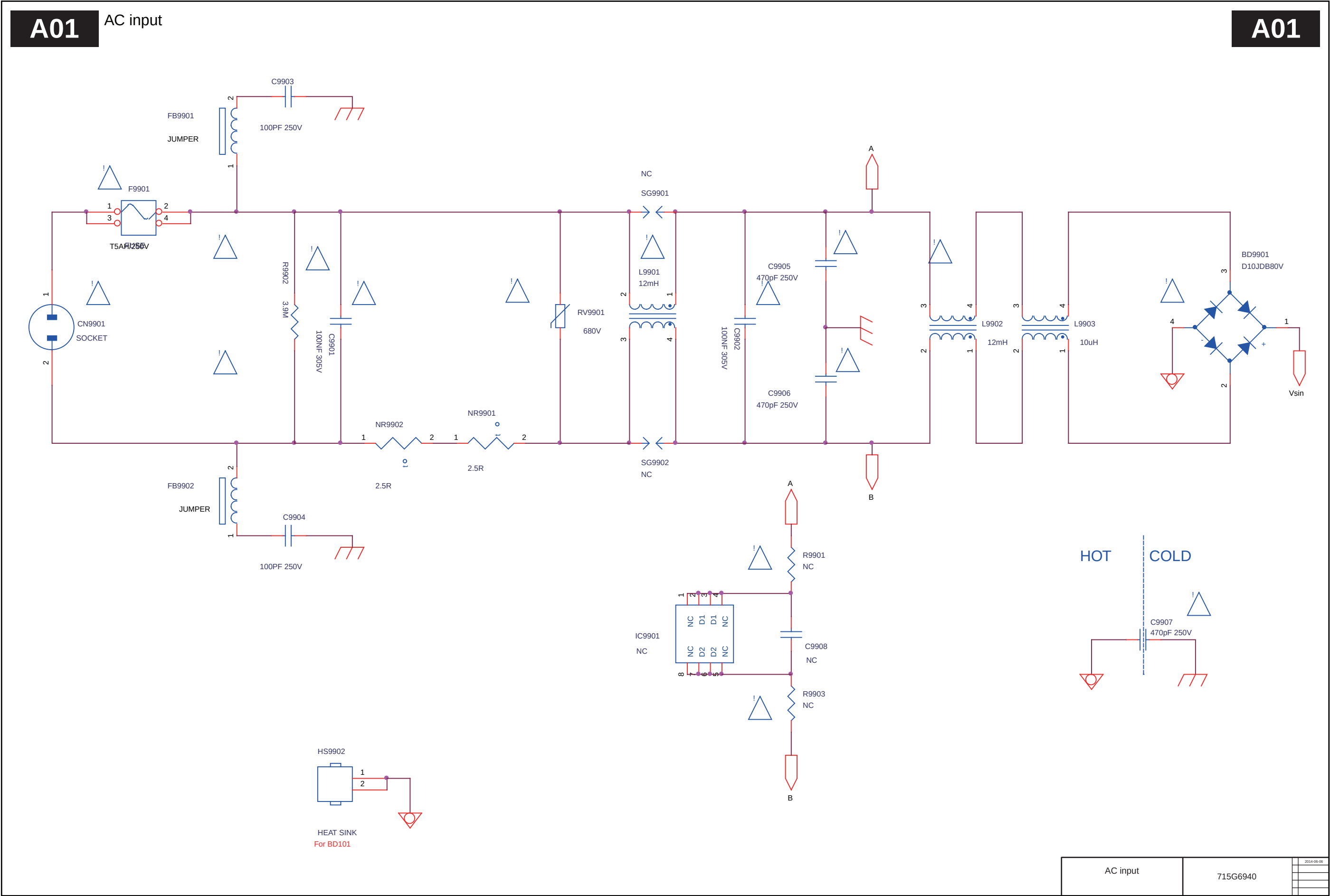
LAYOUT BOTTOM

715G6934

2014-06-05

10.4 A 715G6940 PSU

10-4-1 AC input

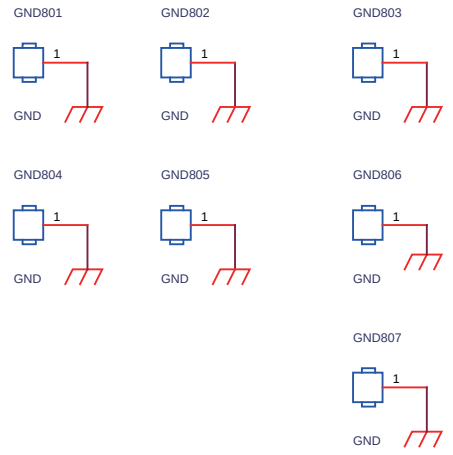
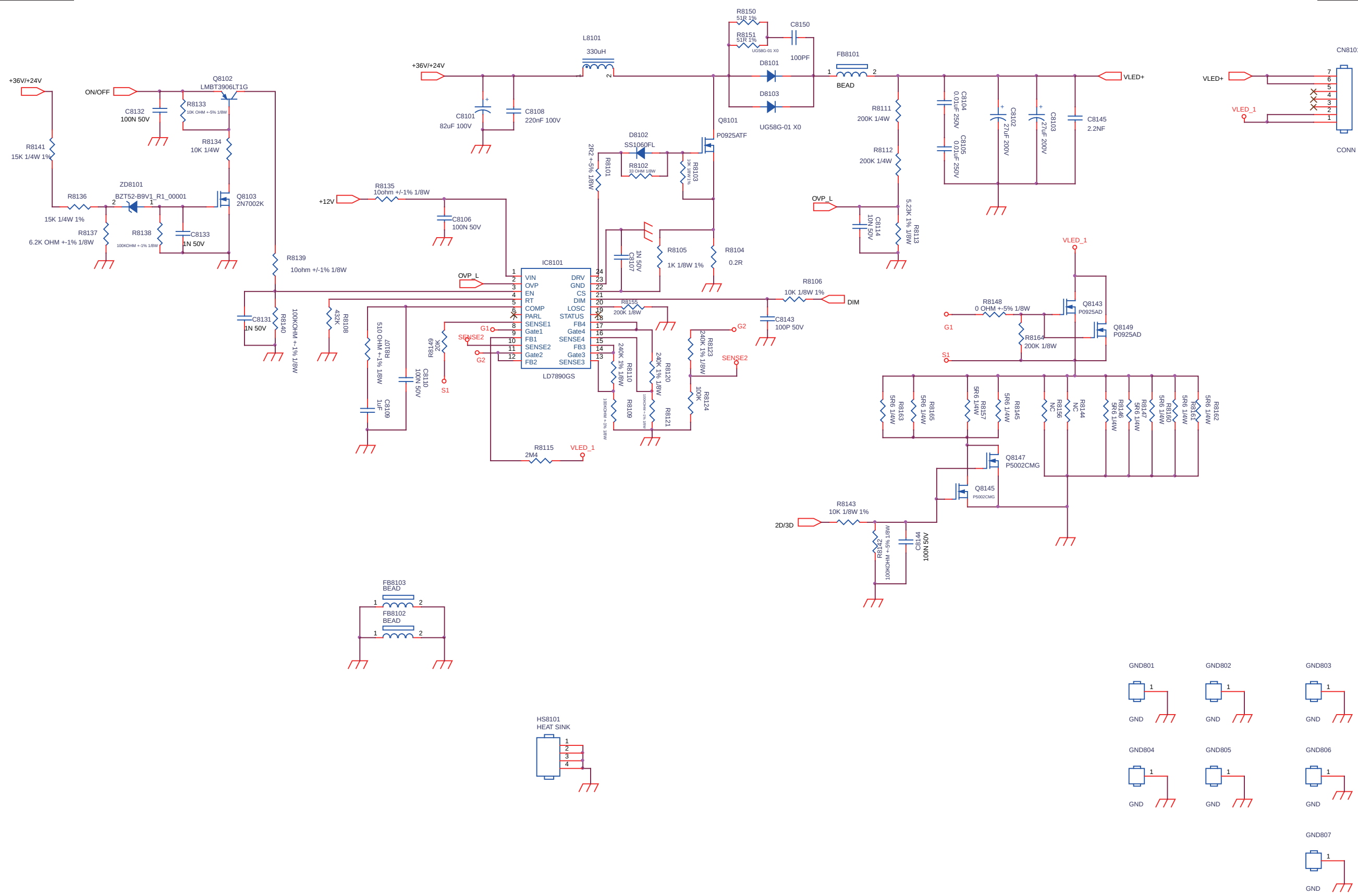


10-4-2 LED Driver

A02

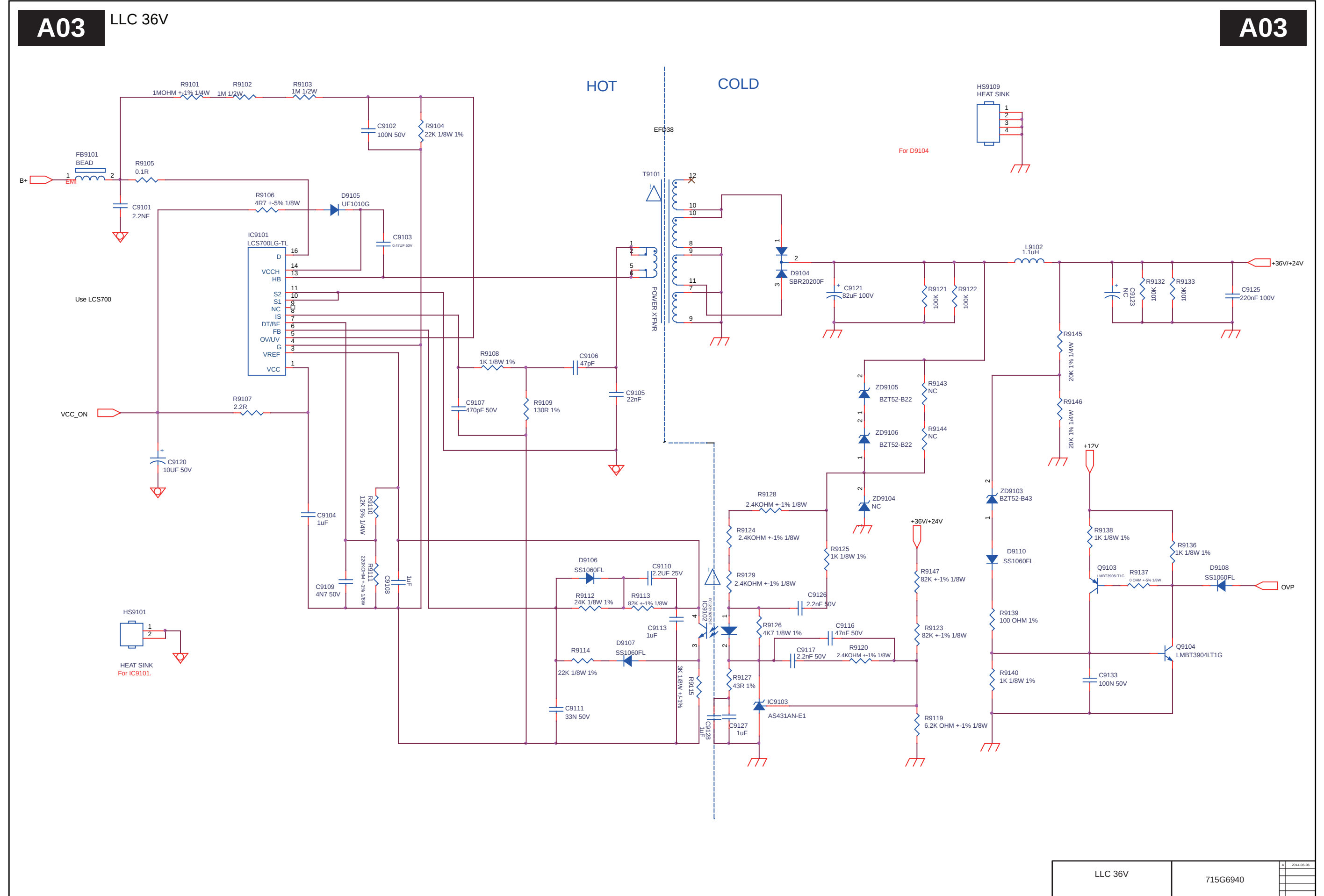
LED Driver

A02



LED Driver	715G6940	2014-7-10

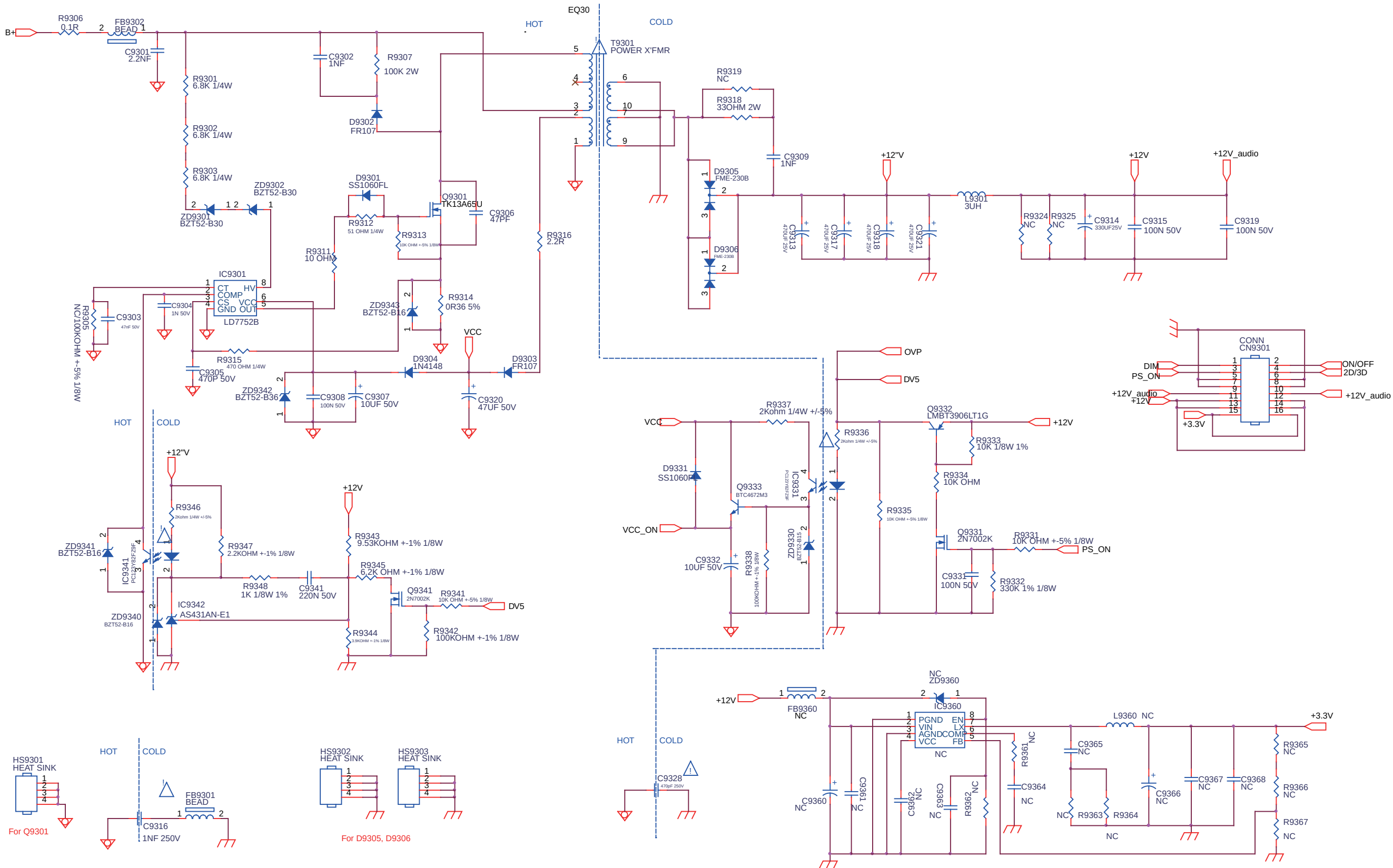
10-4-3 LLC 36V



A04

Main Power 12V

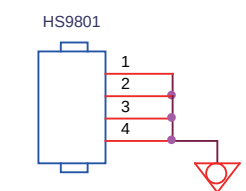
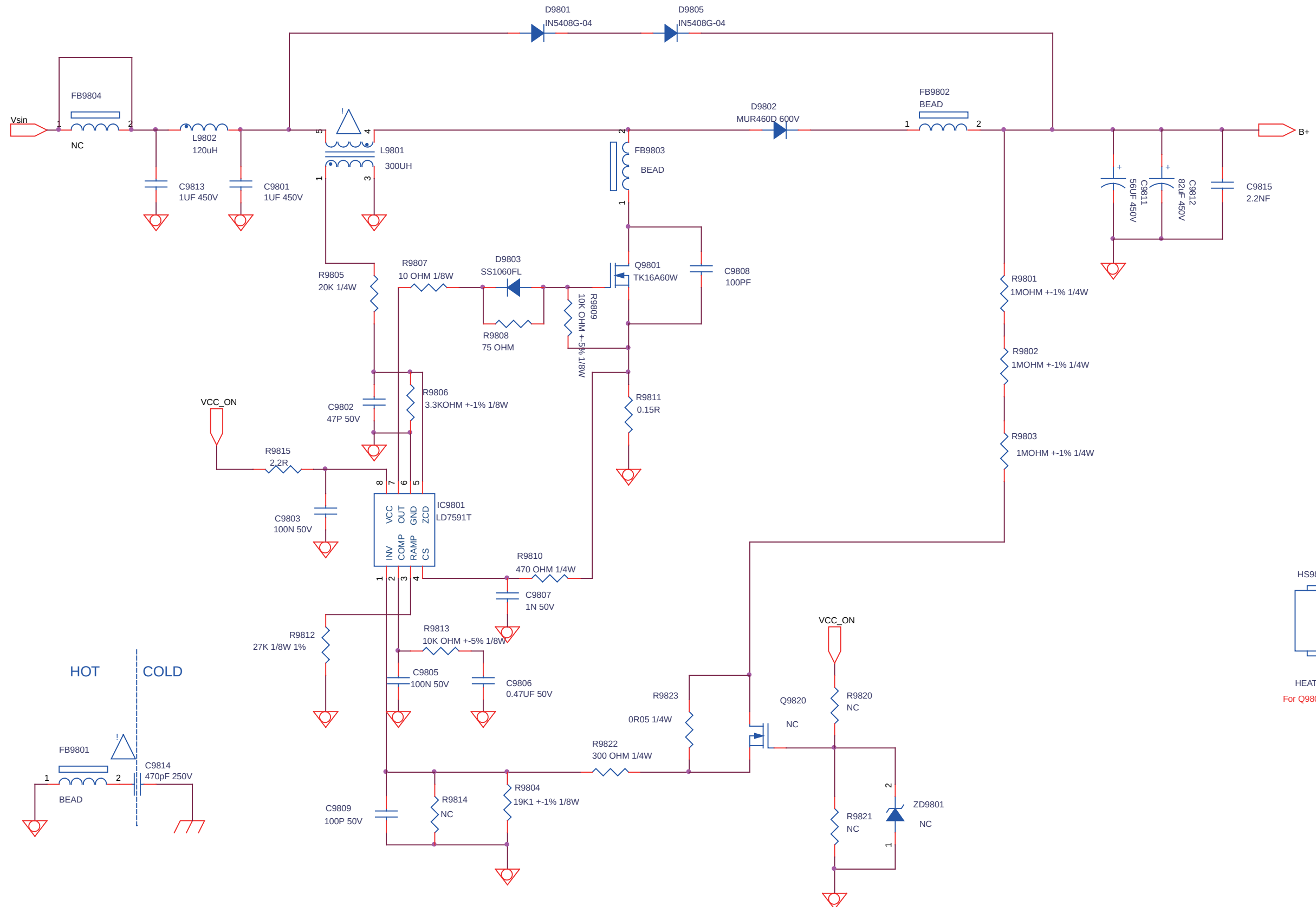
A04



PFC

PFC

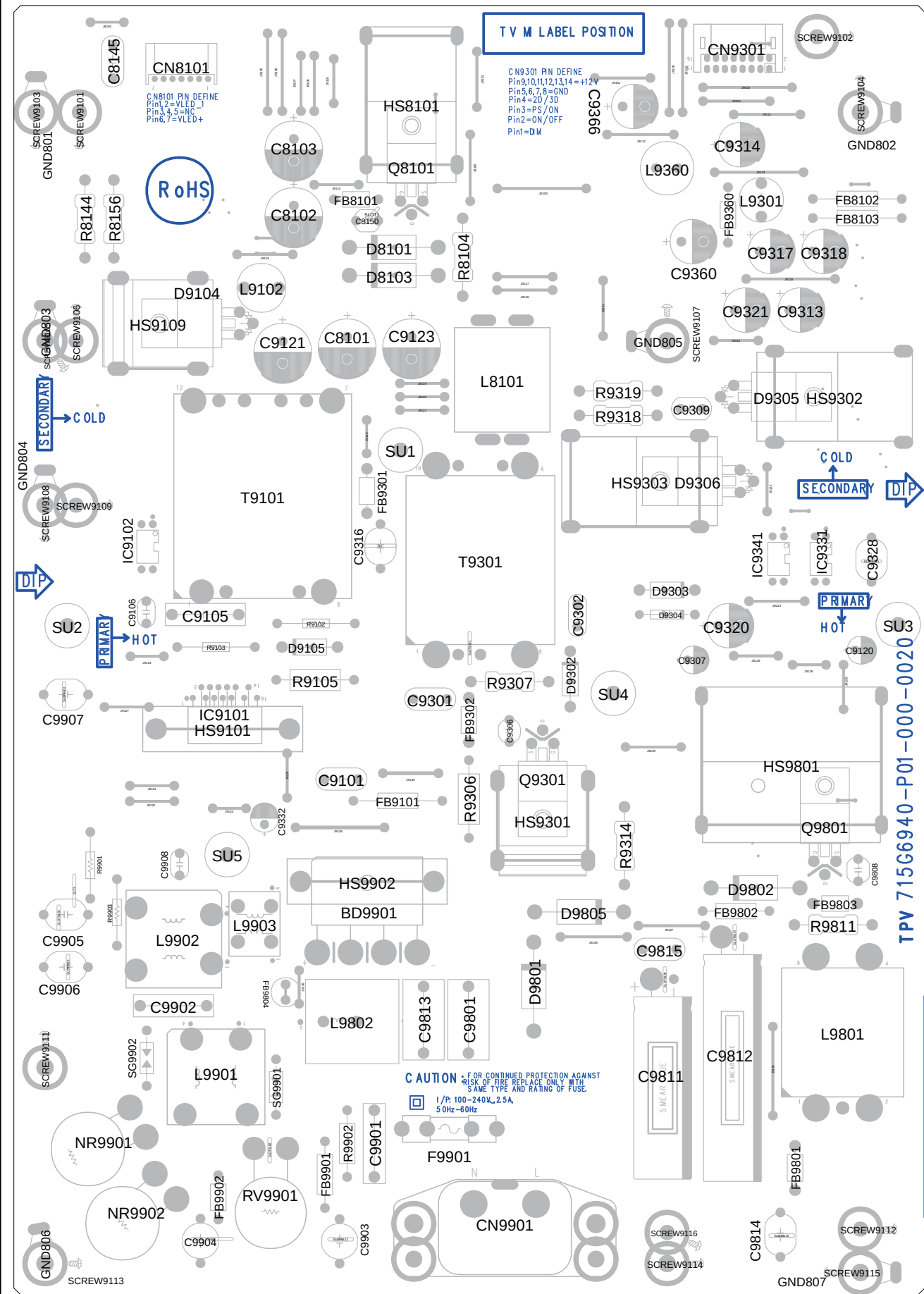
A05



HEAT SINK
For Q9801,D9802

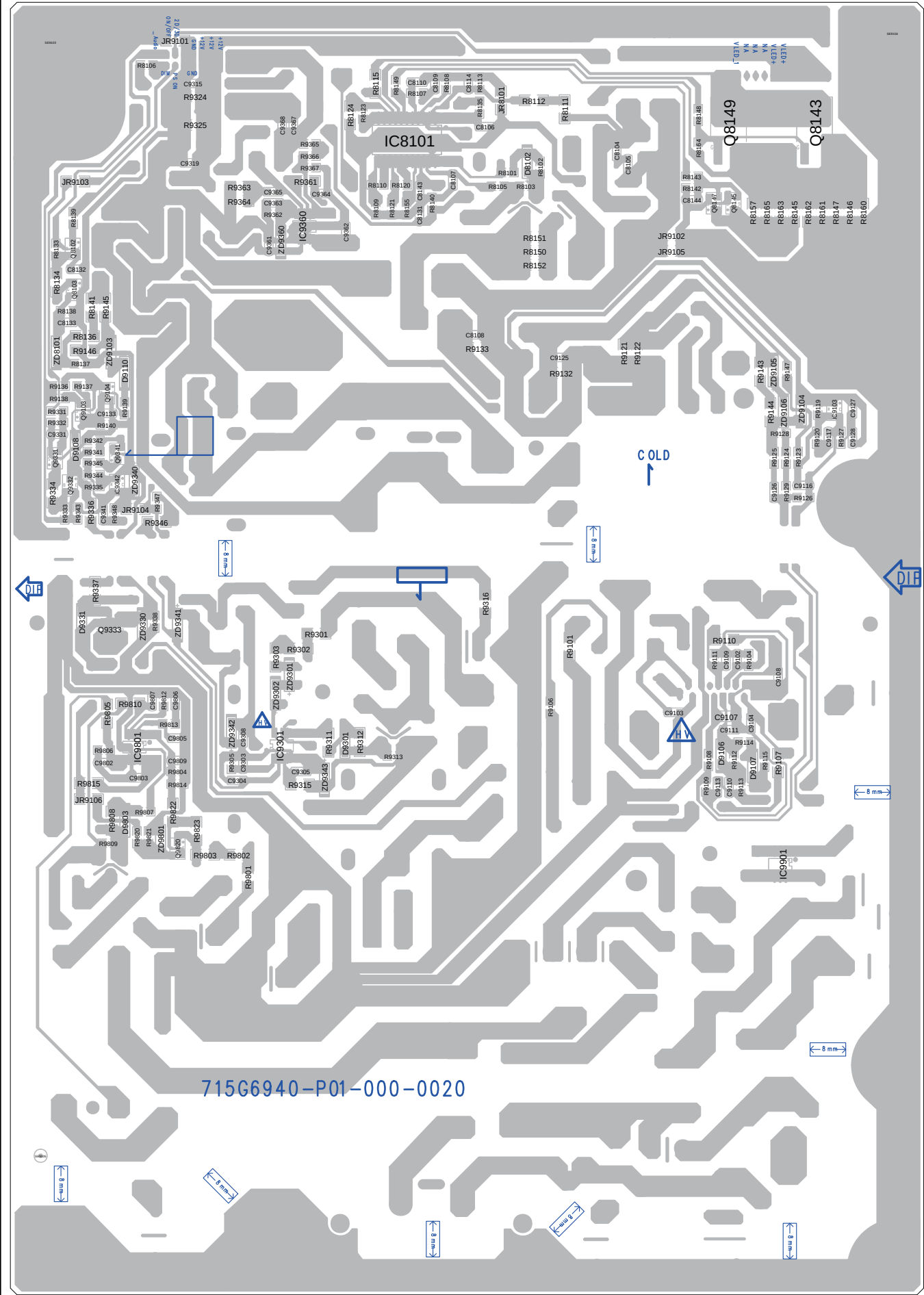
PFC	715G6940	2014-06-06

10-4-6 Power layout top



LAYOUT TOP	715G6940	2014-06-30

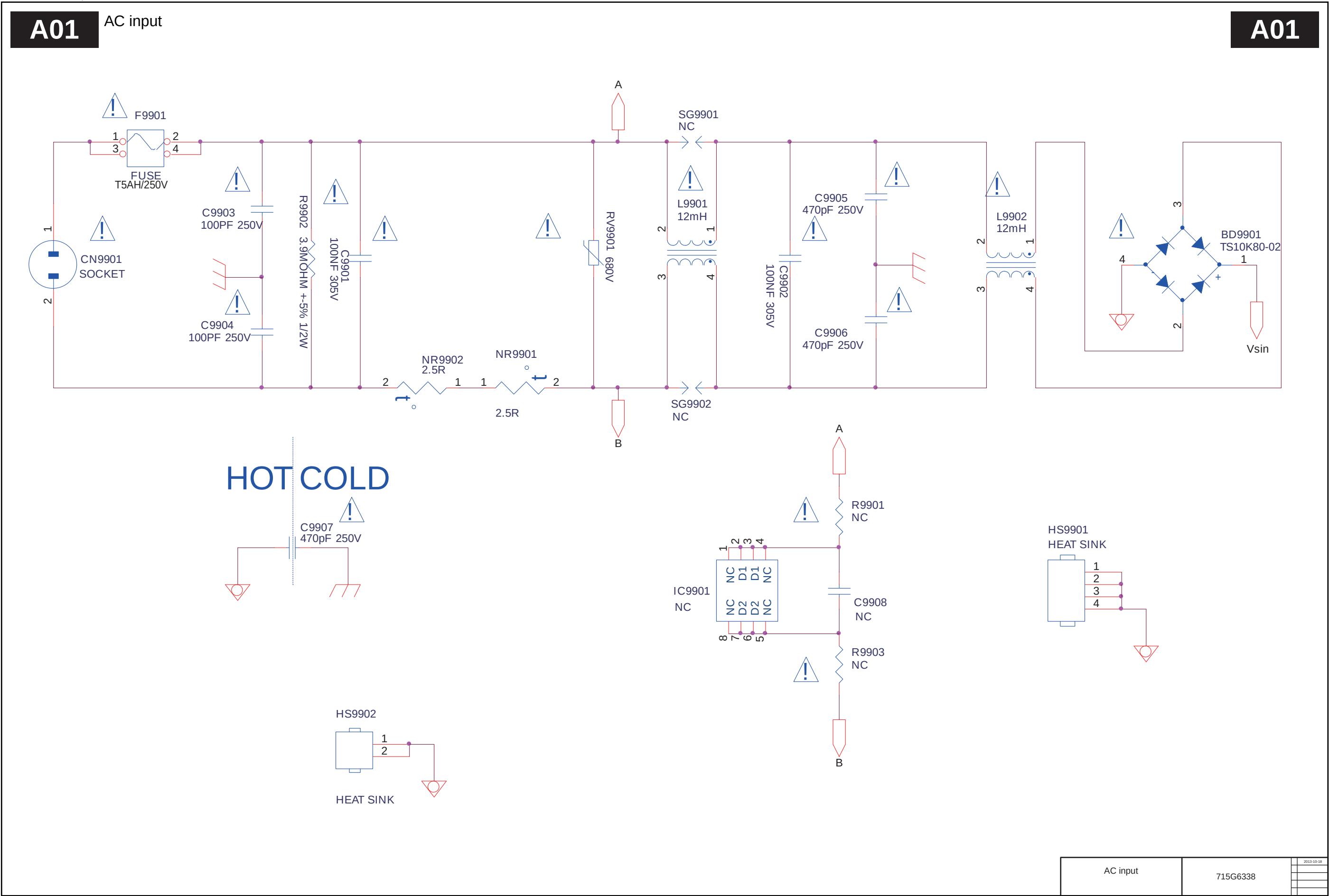
10-4-7 Power layout bottom



SSB Layout Bottom	715G6940	2014-06-30

10.5 A 715G6338 PSU

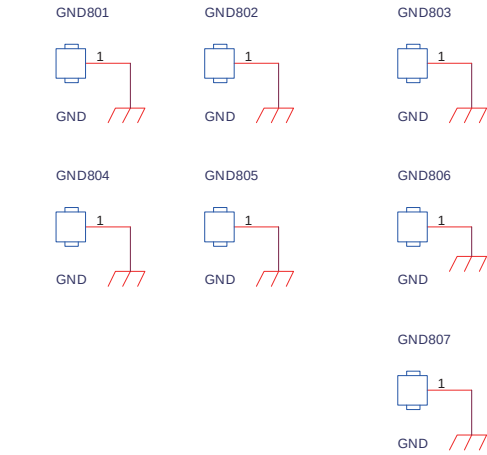
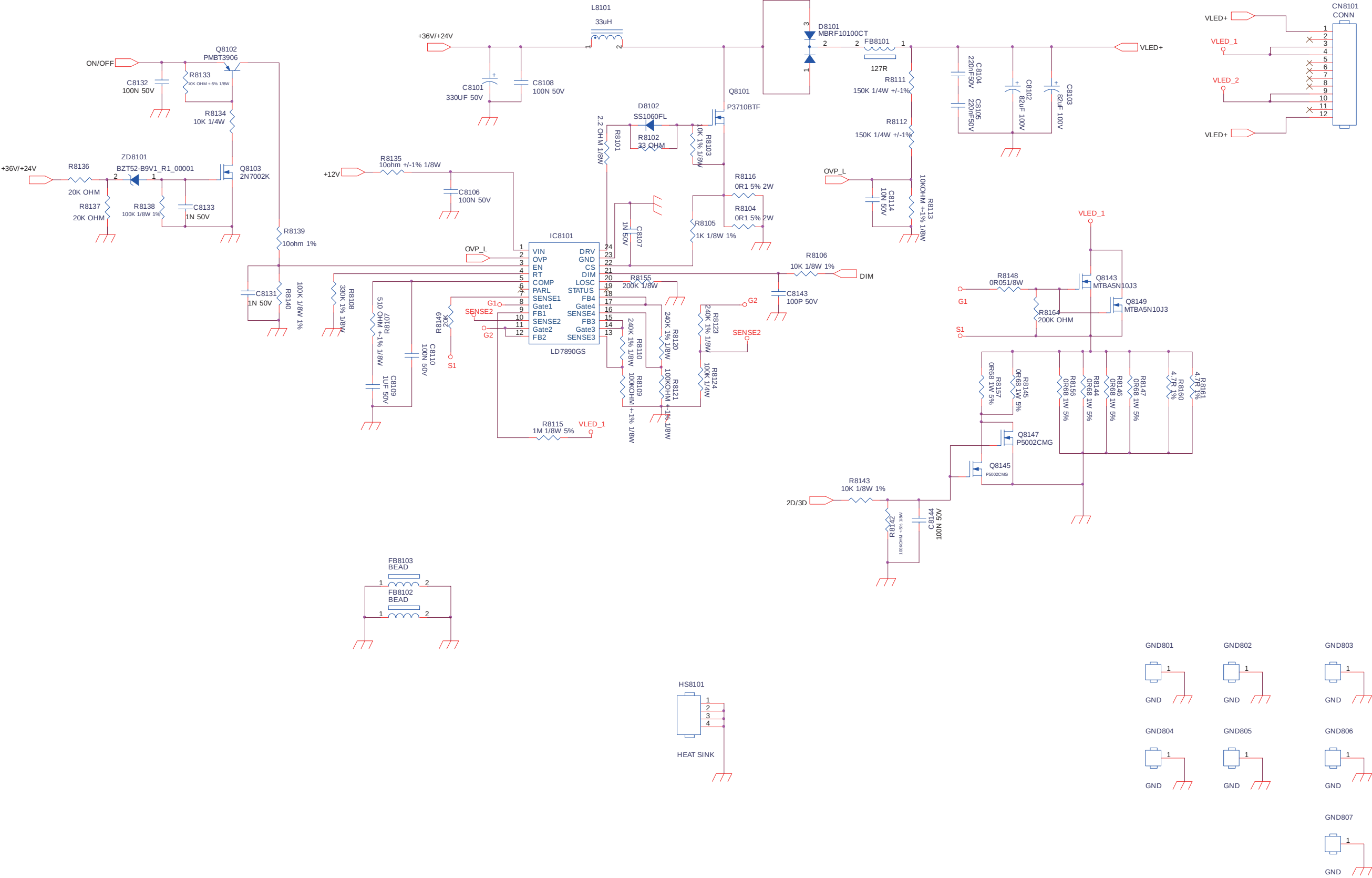
10-5-1 AC input



A02

LED Driver

A02



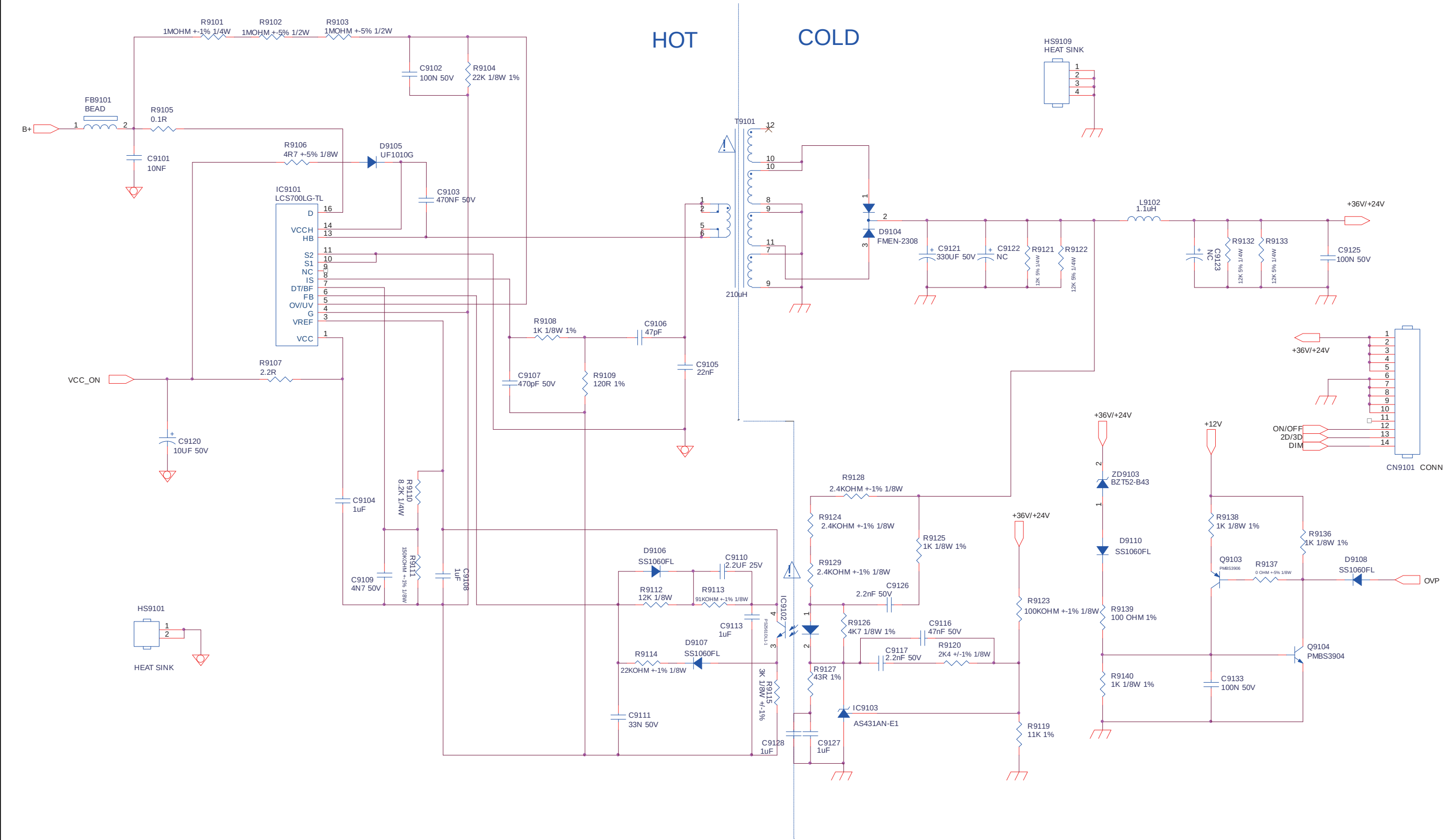
LED Driver	715G6338	2013-10-28

10-5-3 LLC 36V

A03

LLC 36V

A03

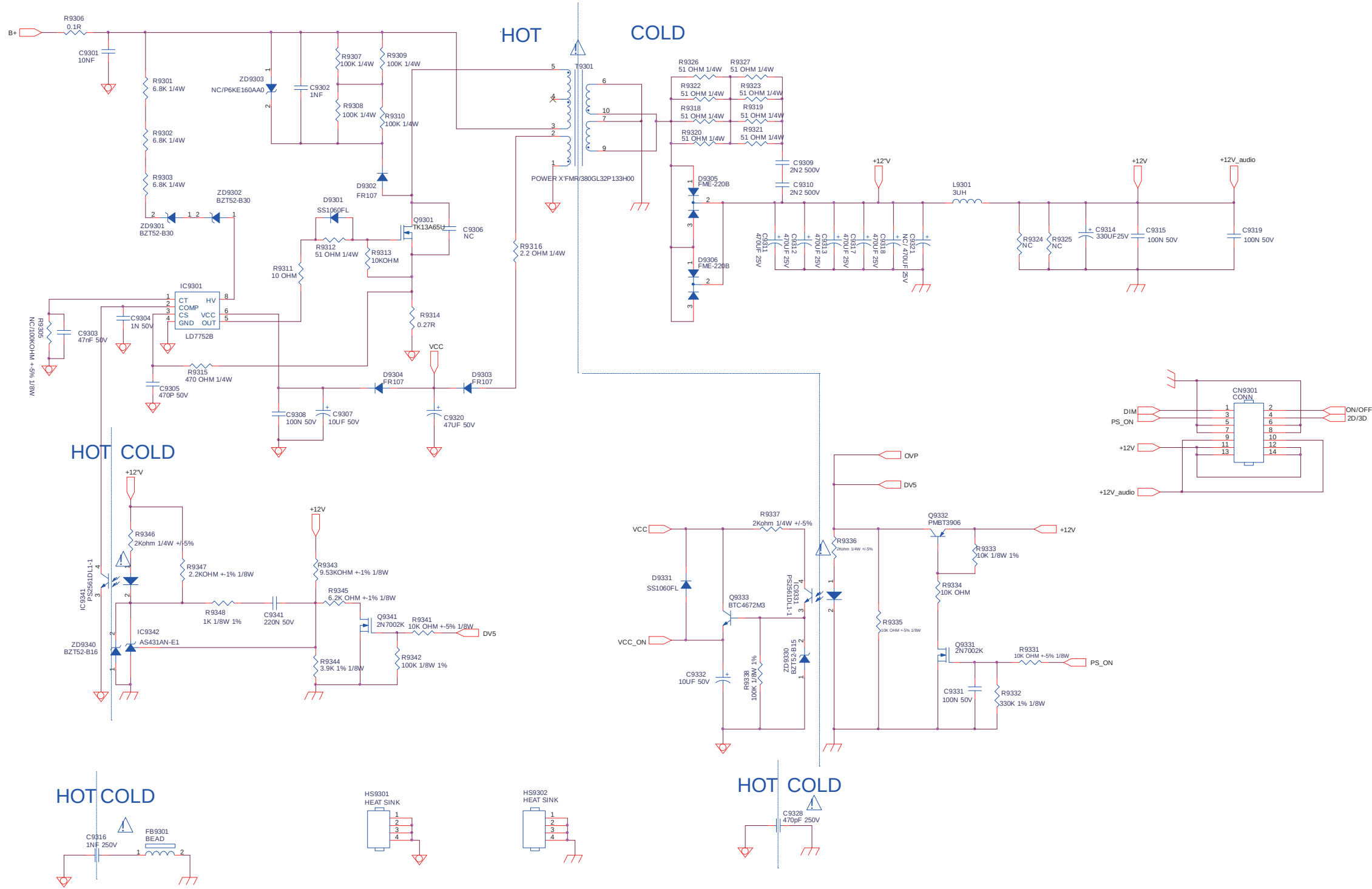


LLC 36V	715G6338	A1	2013-10-28

A04

Main Power 12V

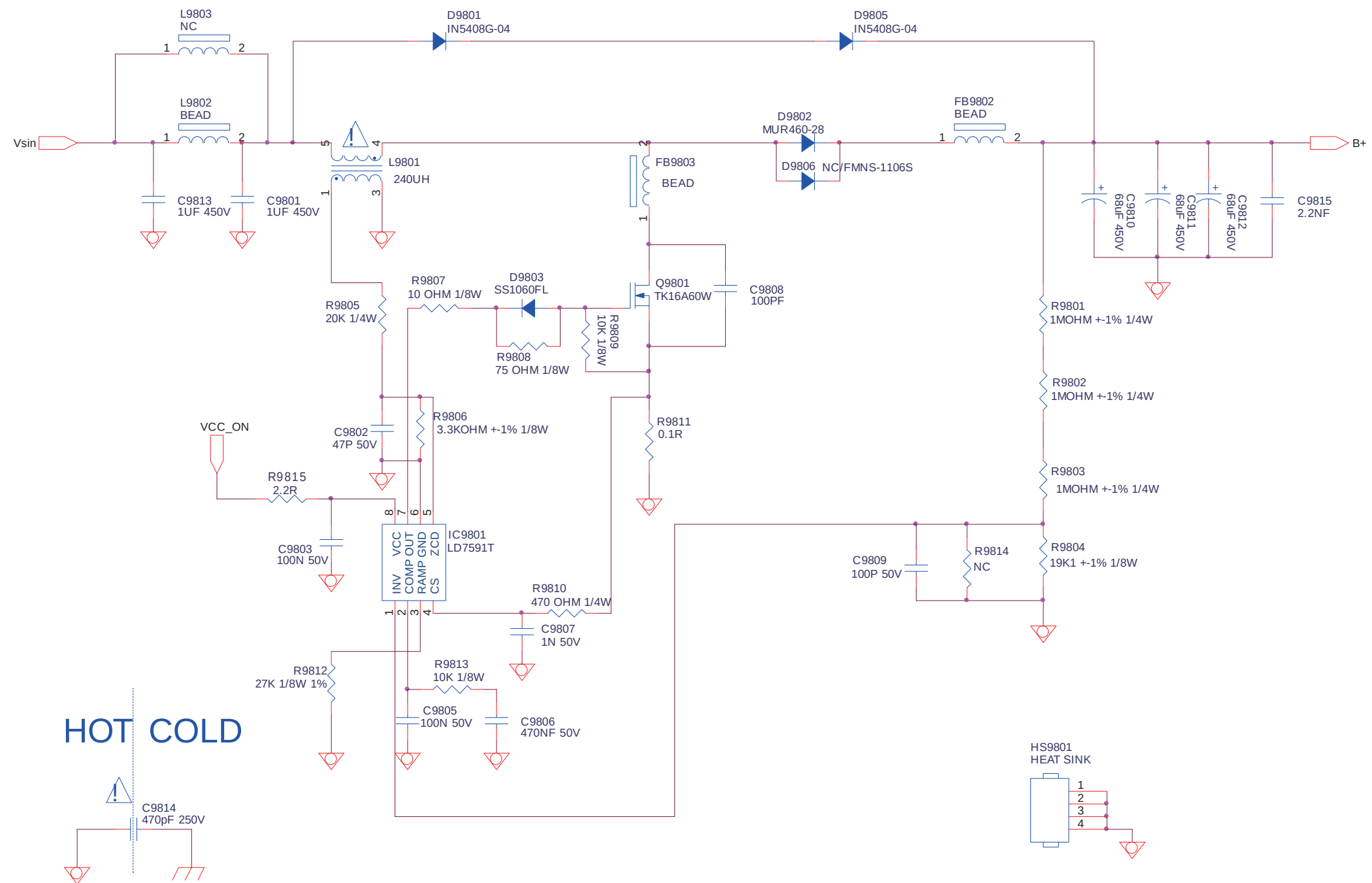
A04



Main Power 12V	715G6338	A	2013-10-28

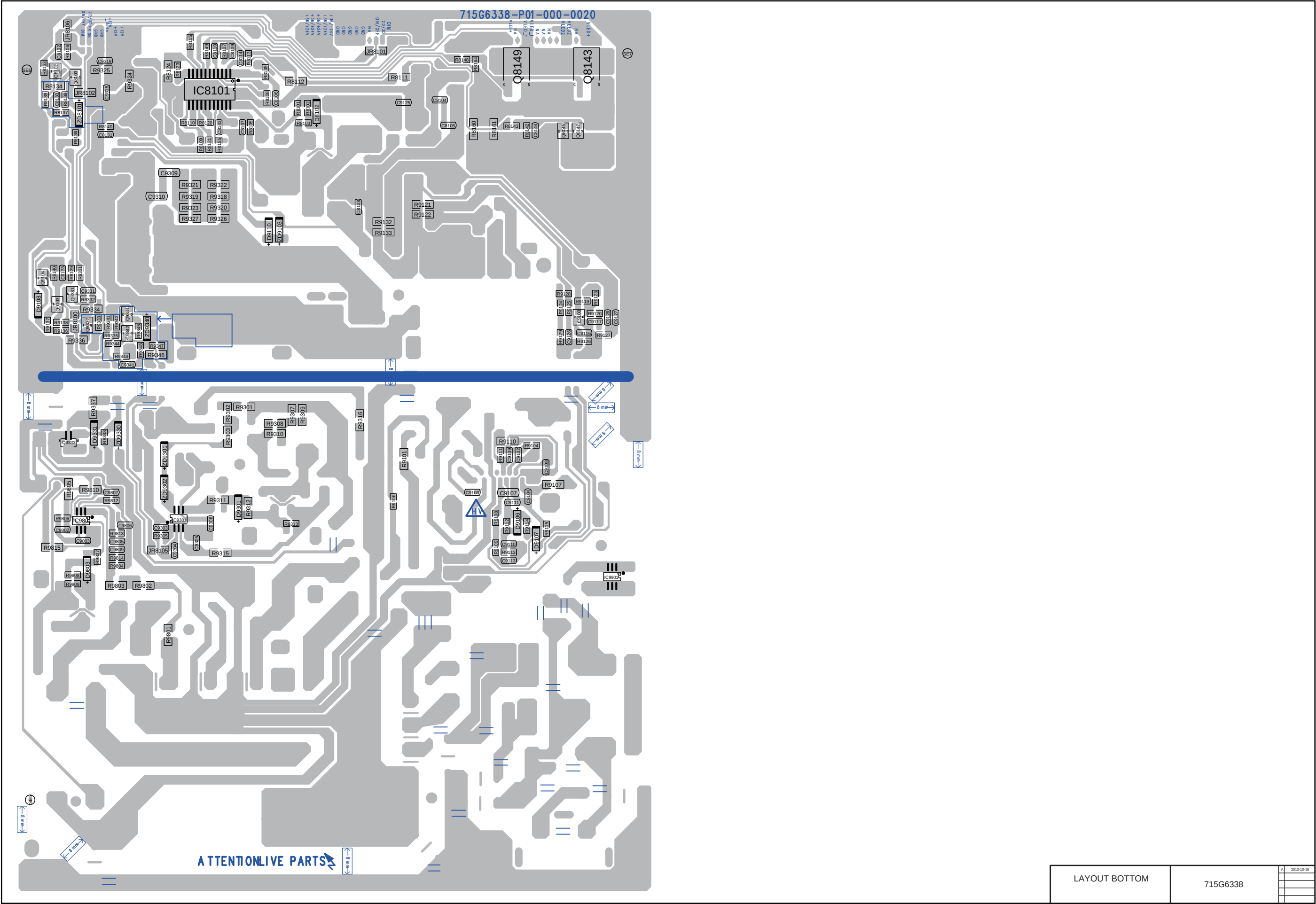
PFC

A05



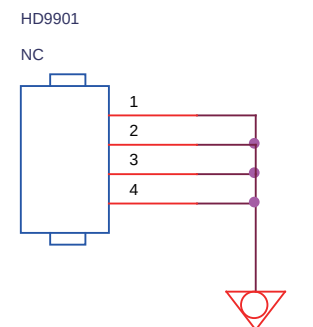
PFC	715G6338	A	2013-10-18

10-5-7 Power layout bottom



10-6-1 AC input

A01

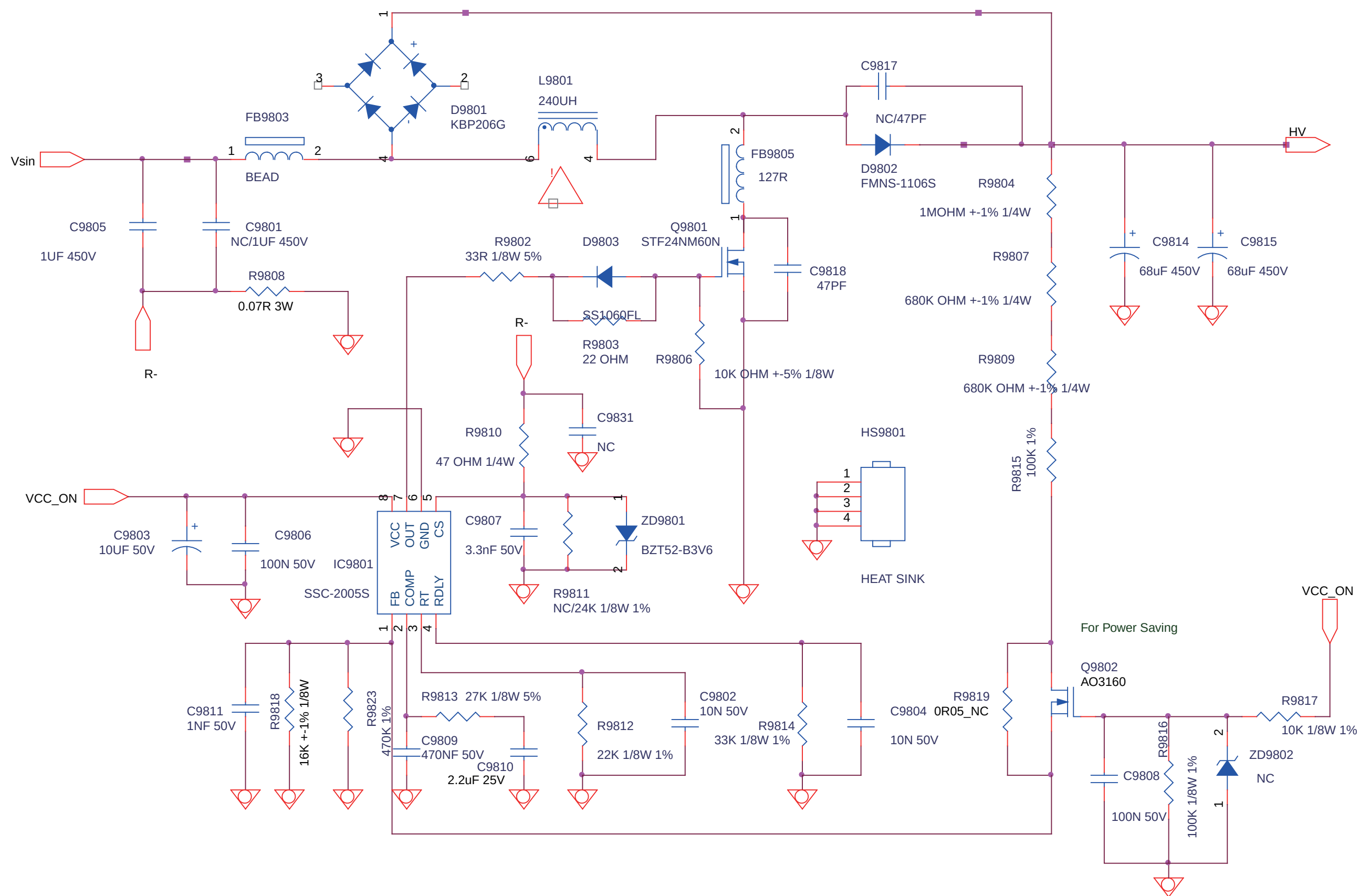


2014-07-15

A02

PFC-Sanken

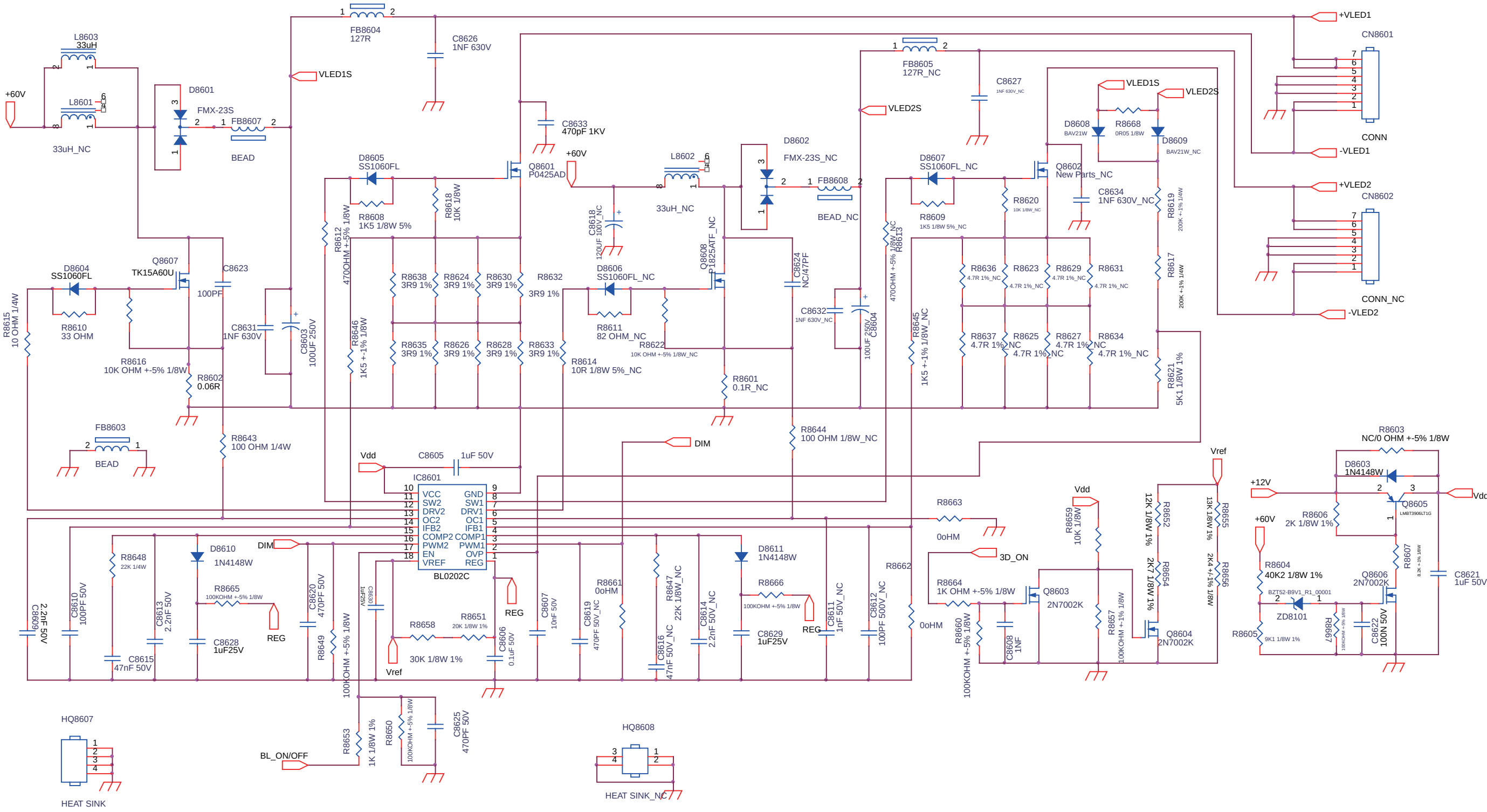
A02



A05

Driver with Sanken BL0202B

A05



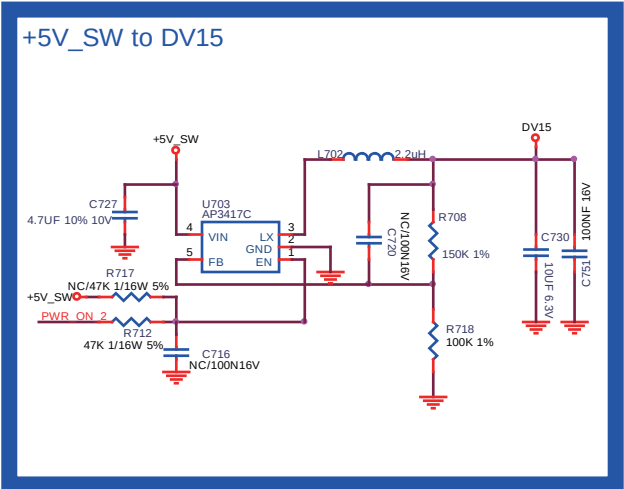
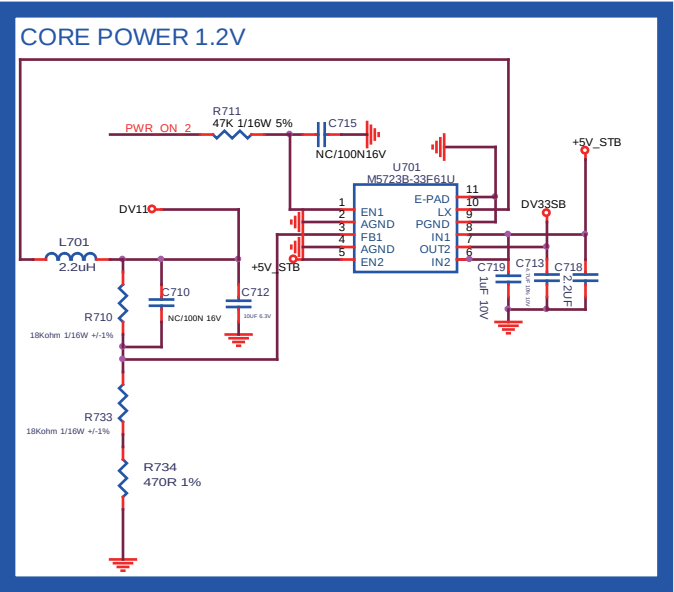
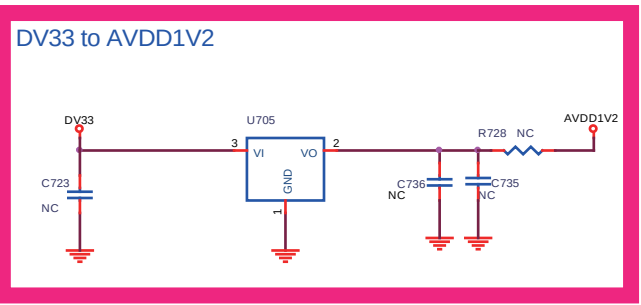
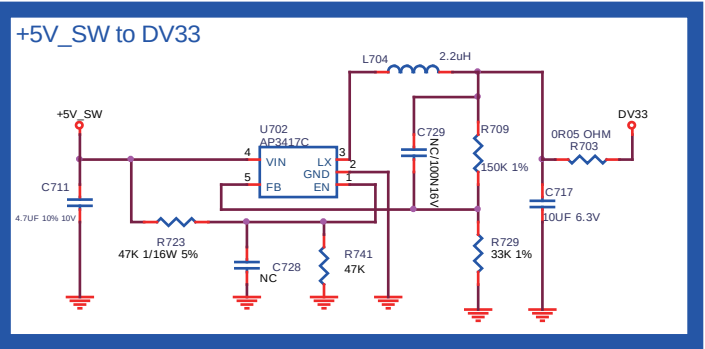
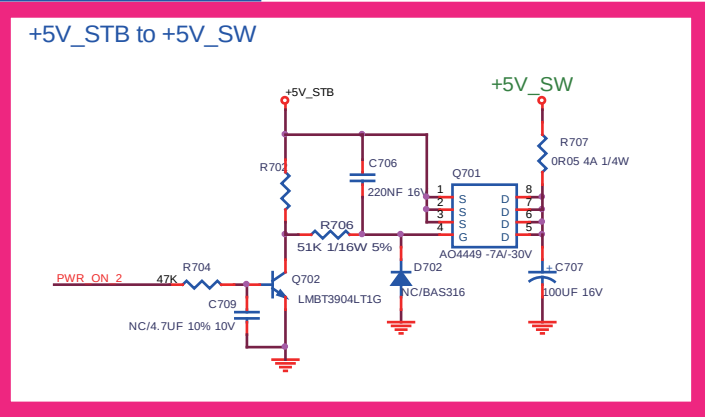
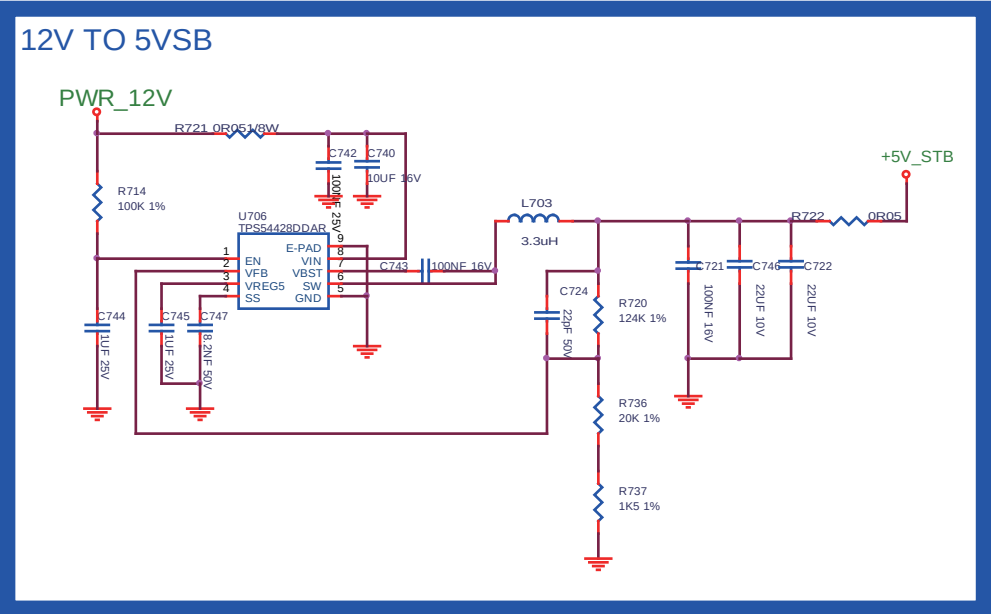
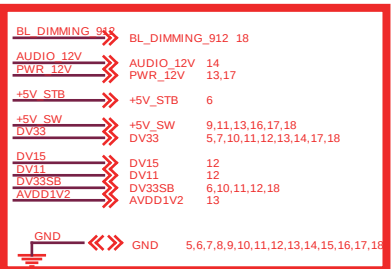
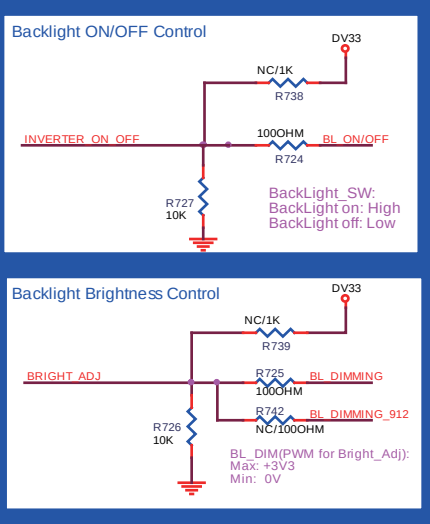
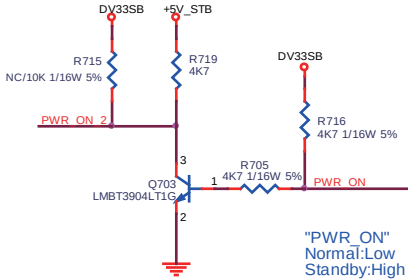
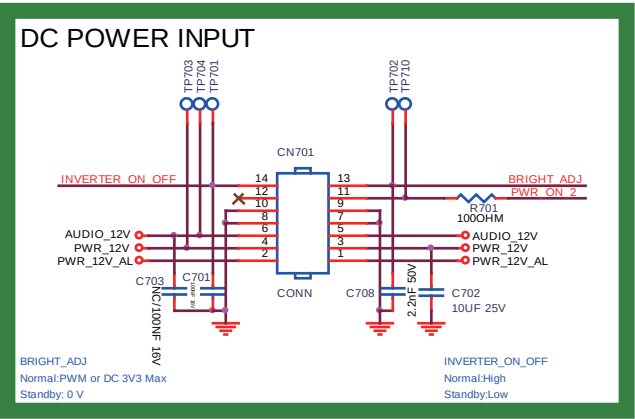
Driver with Sanken BL0202B	715G6743	2014-07-15

10.7 B 715G6947 SSB
10-7-1 System Power

B01

System Power

B01



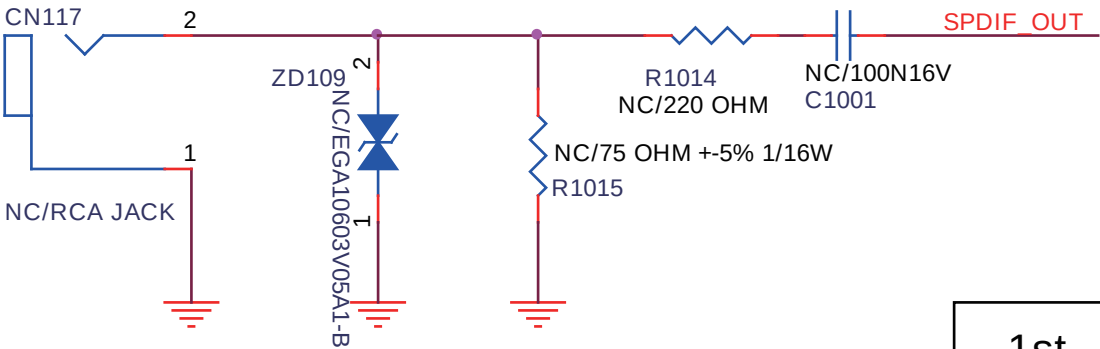
System Power

715G6947

B02

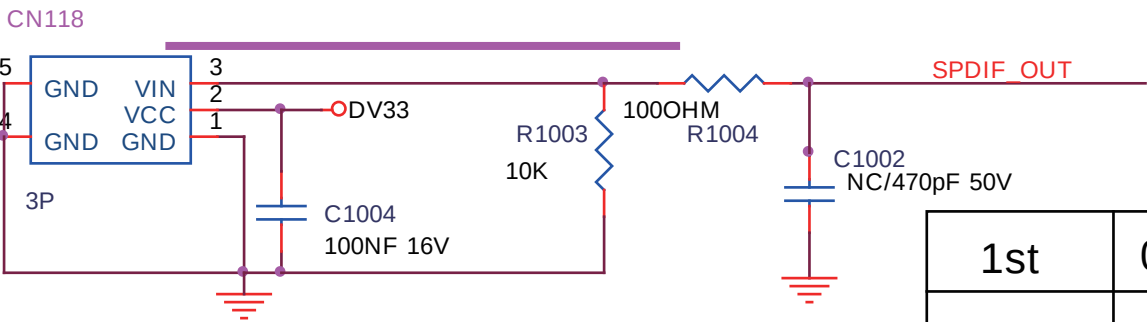
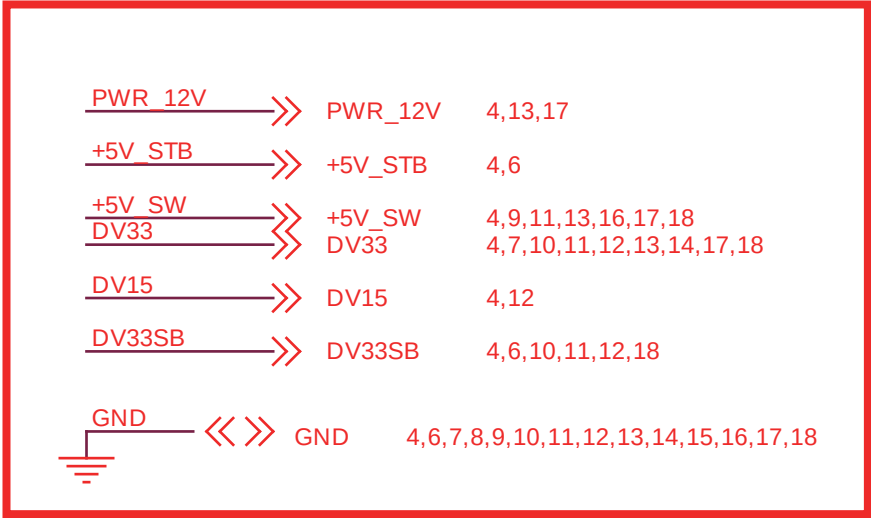
SPDIF/UART INPUT

B02

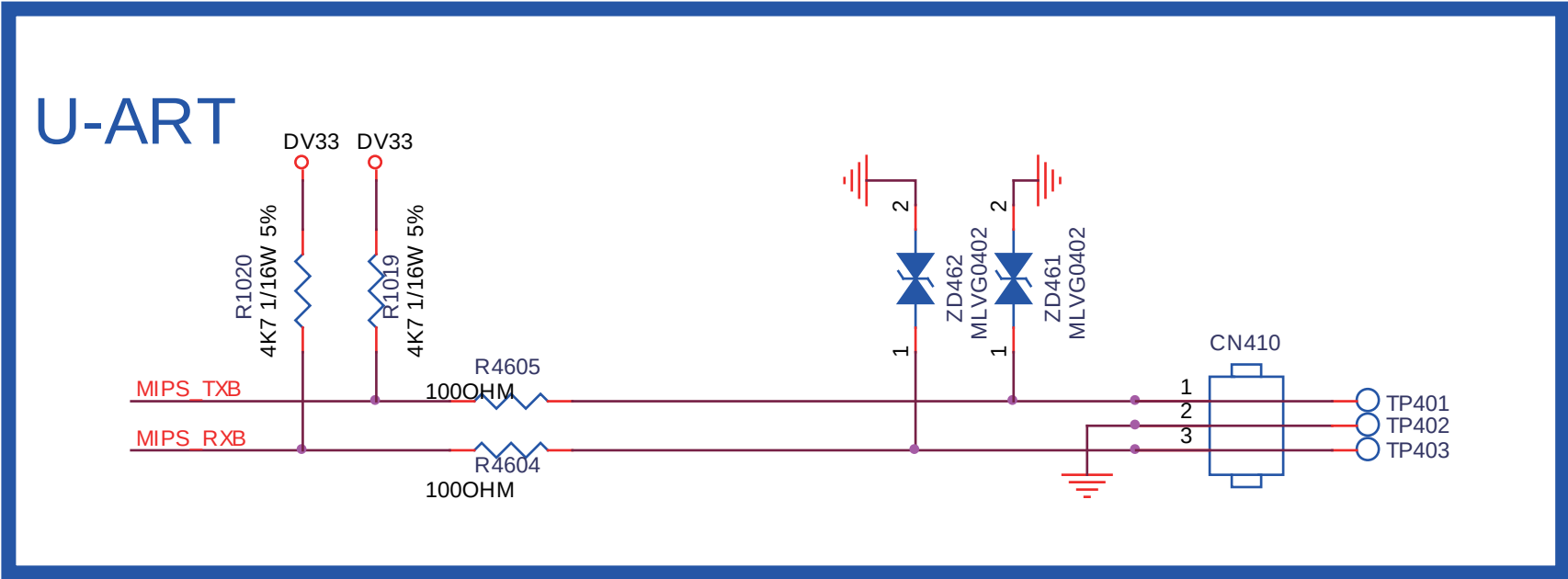
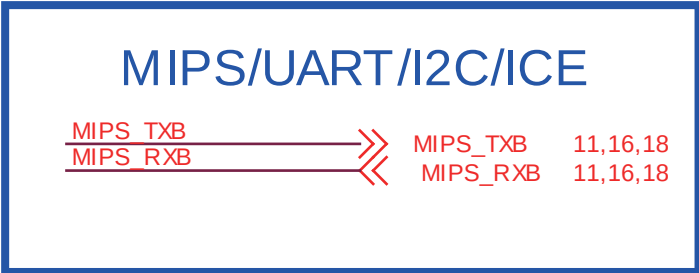
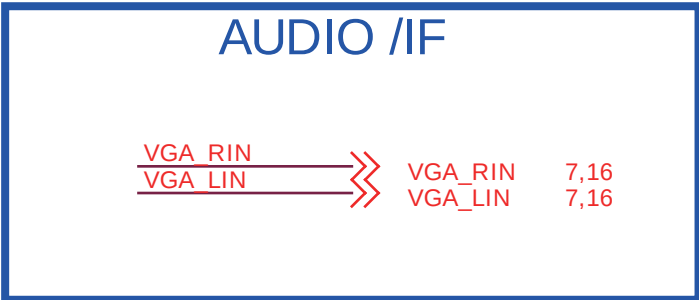


SPDIF Out(Co-Layout)

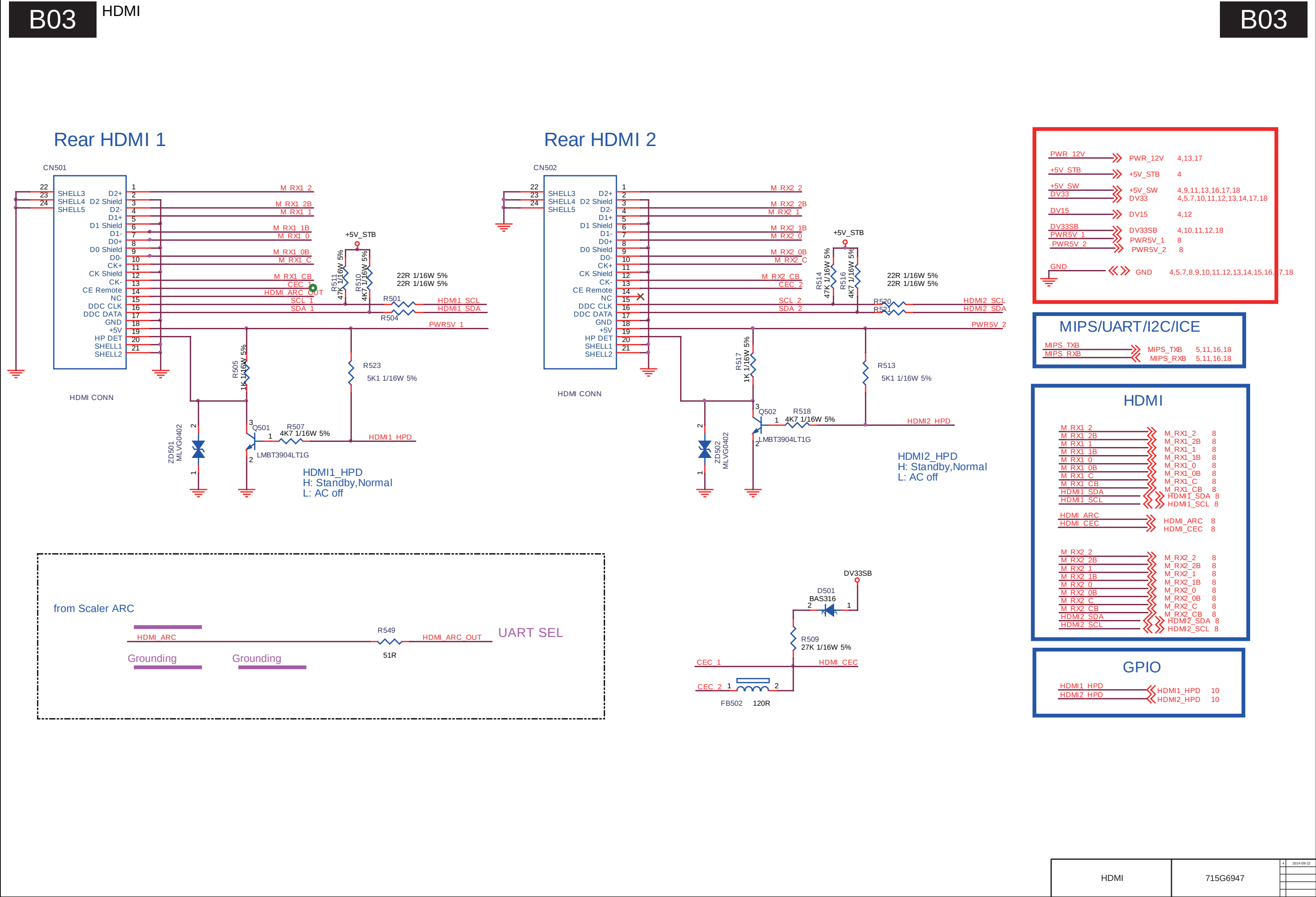
1st	088G 359 10 JT
2nd	388G0359010VAT



1st	088G 78F112VCL
2nd	388G078F118VQS



SPDIF/UART INPUT	715G6947	4	2014-09-22
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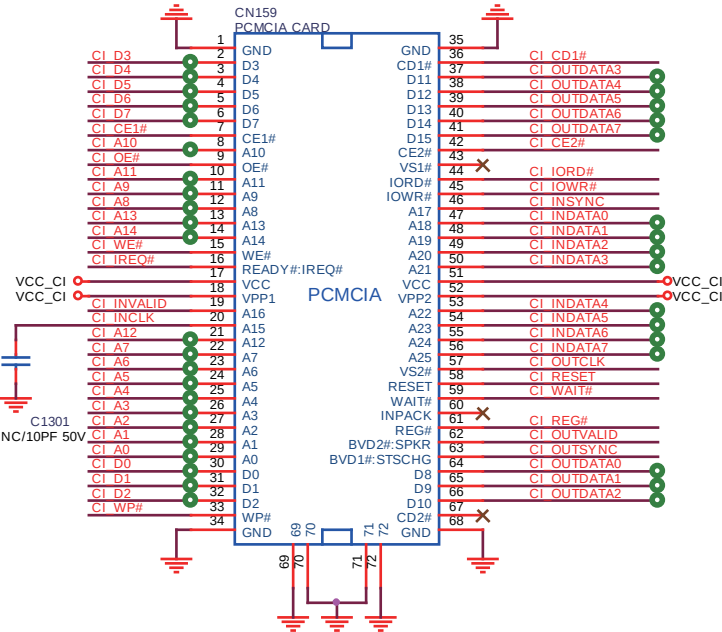


B06

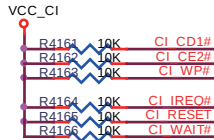
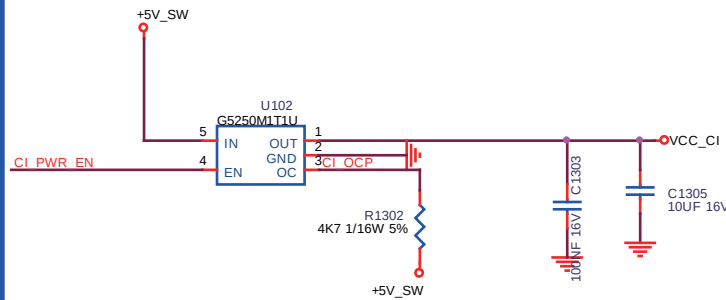
NT72453_CI

B06

PCMCIA Slot



CI Bus Power Control



NT72453 GPIO	
CI A 0	G11
CI A 1	F15
CI A 2	G10
CI A 3	D14
CI A 4	D13
CI A 5	G8
CI A 6	E6
CI A 7	E7
CI A 8	F10
CI A 9	F9
CI A 10	F13
CI A 11	D8
CI A 12	F6
CI A 13	D5
CI A 14	D5
CI D 0	F15
CI D 1	F14
CI D 2	G14
CI D 3	G13
CI D 4	D9
CI D 5	G8
CI D 6	D8
CI D 7	F8
CI RESET	C20
CI CD1#	C16
CI CE1#	B16
CI IREQ#	C15
CI OE#	E16
CI WE#	D16
CI REG#	D11
CI WAIT#	F11
CI IORD#	B15
CI IOWR#	A15

NT72453 GPIO

NT72453 GPIO	
STSI0_CLK/CI_CD_1#/INT_1/GPC_0	B4
STSI0_VALID/INT_2/GPC_1	C4
STSI0_START/INT_3/GPC_2	B3
STSI0_DATA/INT_4/GPC_3	A3
PTSIN1_ERROR/STSI0_ERROR/I2C_MA_SDA/GPA_0	B21
PTSIN1_CLK/STSI1_CLK/I2C_MA_SCL/GPA_1	A21
PTSIN1_VALID/STSI1_VALID/I2C_MB_SDA/GPA_2	A20
PTSIN1_START/STSI1_START/I2C_MB_SCL/GPA_3	B20
PTSIN1_D0/STSI1_DATA/I2C_MC_SDA/GPA_4	C19
PTSIN1_D1/I2C_MC_SCL/GPA_5	B19
PTSIN1_D2/I2S_IN_DATA/GPA_6	C18
PTSIN1_D3/I2S_IN_WS/GPA_7	B18
PTSIN1_D4/I2S_IN_MCLK/DEMOUT_DEMOUT_LED/GPA_8	A18
PTSIN1_D5/I2S_OUT_A_DATA/GPA_9	C17
PTSIN1_D6/I2S_OUT_A_WS/GPA_10	B17
PTSIN1_D7/I2S_OUT_A_BCLK/GPA_11	B17
PTSIN2_ERROR/DEMOUT_ERROR/I2S_OUT_A_MCLK/CI_CD1#/GPA_12	E20
PTSOUT_CLK/PTSIN2_CLK/DEMOUT_CLK/GPA_13	F20
PTSOUT_VALID/PTSIN2_VALID/DEMOUT_VALID/VIF_IF_AGC/DEMOUT_IF_AGC/GPA_14	D20
PTSOUT_START/PTSIN2_START/DEMOUT_START/DEMOUT_Emergency/GPA_15	F19
PTSOUT_D0/PTSIN2_D0/DEMOUT_D0/RMII_RX_D0/GPA_16	D19
PTSOUT_D1/PTSIN2_D1/DEMOUT_D1/RMII_RX_D1/GPA_17	E19
PTSOUT_D2/PTSIN2_D2/DEMOUT_D2/RMII_REF_CLK/GPA_18	F18
PTSOUT_D3/PTSIN2_D3/DEMOUT_D3/RMII_TX_D0/GPA_19	E18
PTSOUT_D4/PTSIN2_D4/DEMOUT_D4/RMII_TX_D1/GPA_20	F17
PTSOUT_D5/PTSIN2_D5/DEMOUT_D5/RMII_TX_EN/GPA_21	E17
PTSOUT_D6/PTSIN2_D6/DEMOUT_D6/RMII_MDC/GPA_22	D17
PTSOUT_D7/PTSIN2_D7/DEMOUT_D7/RMII_MDIO/GPA_23	F16

CI OUTDATA2	CI OUTDATA 2	CI A5	CI A 5
CI D2	CI D 2	CI INDATA7	CI INDATA 7
CI D1	CI D 1	CI A6	CI A 6
		CI A7	CI A 7
CI OUTDATA1	CI OUTDATA 1	CI INDATA6	CI INDATA 6
CI D0	CI D 0	CI A12	CI A 12
CI A0	CI A 0	CI INDATA5	CI INDATA 5
CI OUTDATA0	CI OUTDATA 0	CI INDATA4	CI INDATA 4
CI A1	CI A 1	CI INDATA3	CI INDATA 3
CI A2	CI A 2	CI INDATA2	CI INDATA 2
CI A3	CI A 3	CI INDATA1	CI INDATA 1
CI A4	CI A 4	CI A14	CI A 14

CI A13	CI A 13	CI D7	CI D 7
CI INDATA0	CI INDATA 0	CI D6	CI D 6
CI A8	CI A 8	CI OUTDATA5	CI OUTDATA 5
CI A9	CI A 9	CI D5	CI D 5
CI A11	CI A 11	CI D4	CI D 4
CI A10	CI A 10	CI OUTDATA4	CI OUTDATA 4
CI OUTDATA7	CI OUTDATA 7	CI D3	CI D 3
CI OUTDATA6	CI OUTDATA 6	CI OUTDATA3	CI OUTDATA 3

PWR_12V	PWR_12V	4,13,17
+5V_STB	+5V_STB	4,6
+5V_SW	+5V_SW	4,11,13,16,17,18
DV15	DV15	4,12
DV11	DV11	4,12
DV33SB	DV33SB	4,6,10,11,12,18
GND	GND	4,5,6,7,8,10,11,12,13,14,15,16,17,18

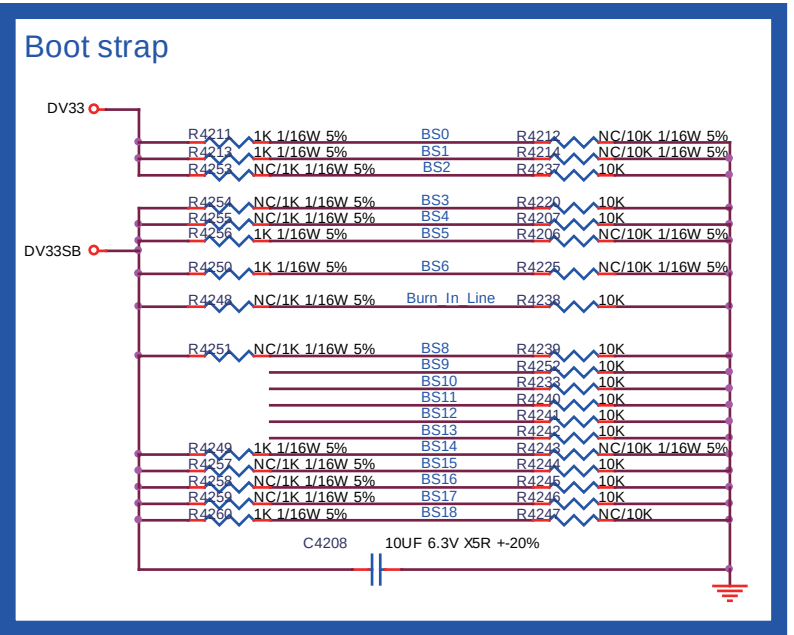
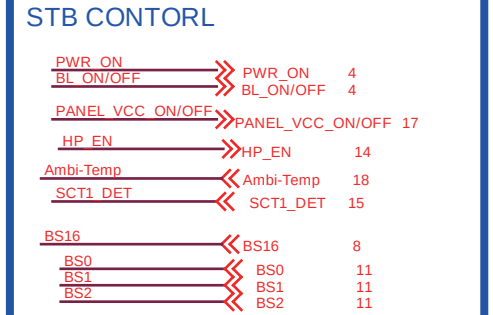
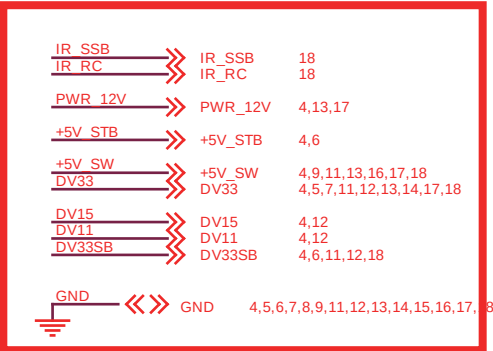
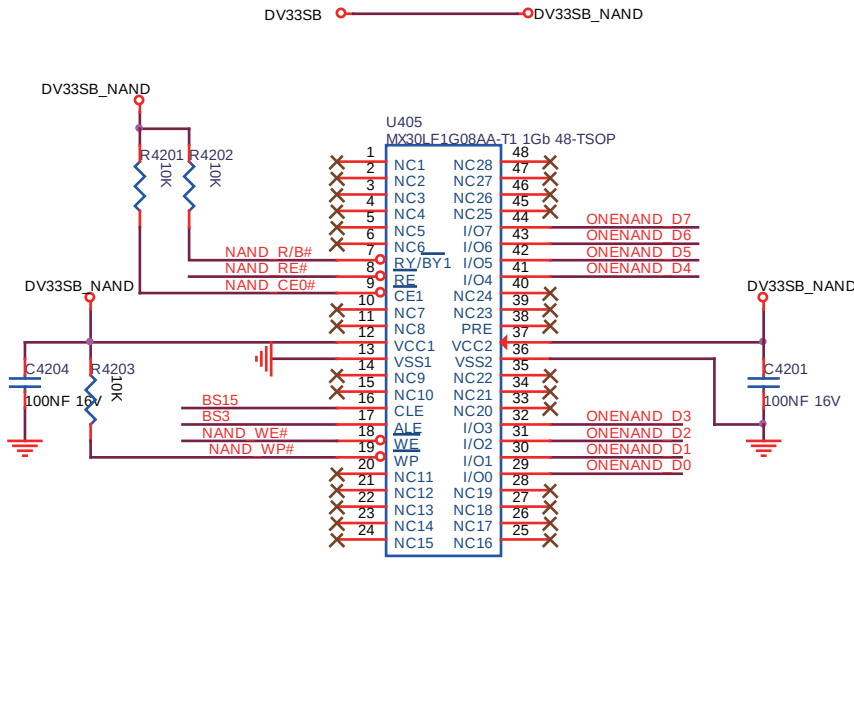
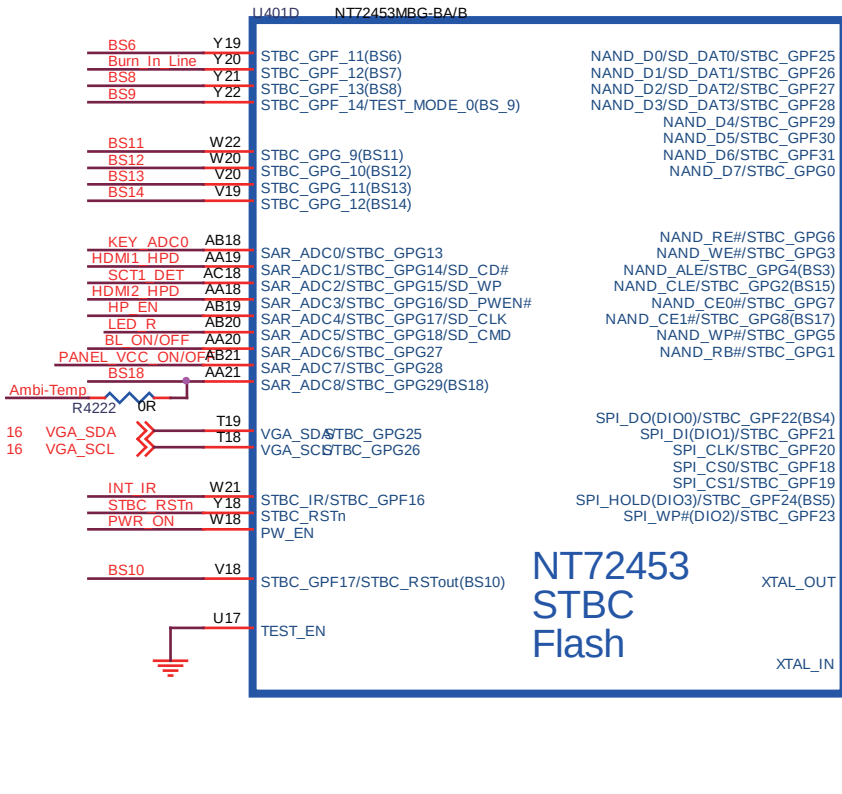
GPIO	
CI INCLK	CI_INCLK 13
CI INVALID	CI_INVALID 13
CI INSYNC	CI_INSYNC 13
CI INDATA7	CI_INDATA7 13
CI INDATA6	CI_INDATA6 13
CI INDATA5	CI_INDATA5 13
CI INDATA4	CI_INDATA4 13
CI INDATA3	CI_INDATA3 13
CI INDATA2	CI_INDATA2 13
CI INDATA1	CI_INDATA1 13
CI INDATA0	CI_INDATA0 13

10-7-7 NT72453_STBC/FLASH

B07

NT72453_STBC/FLASH

B07

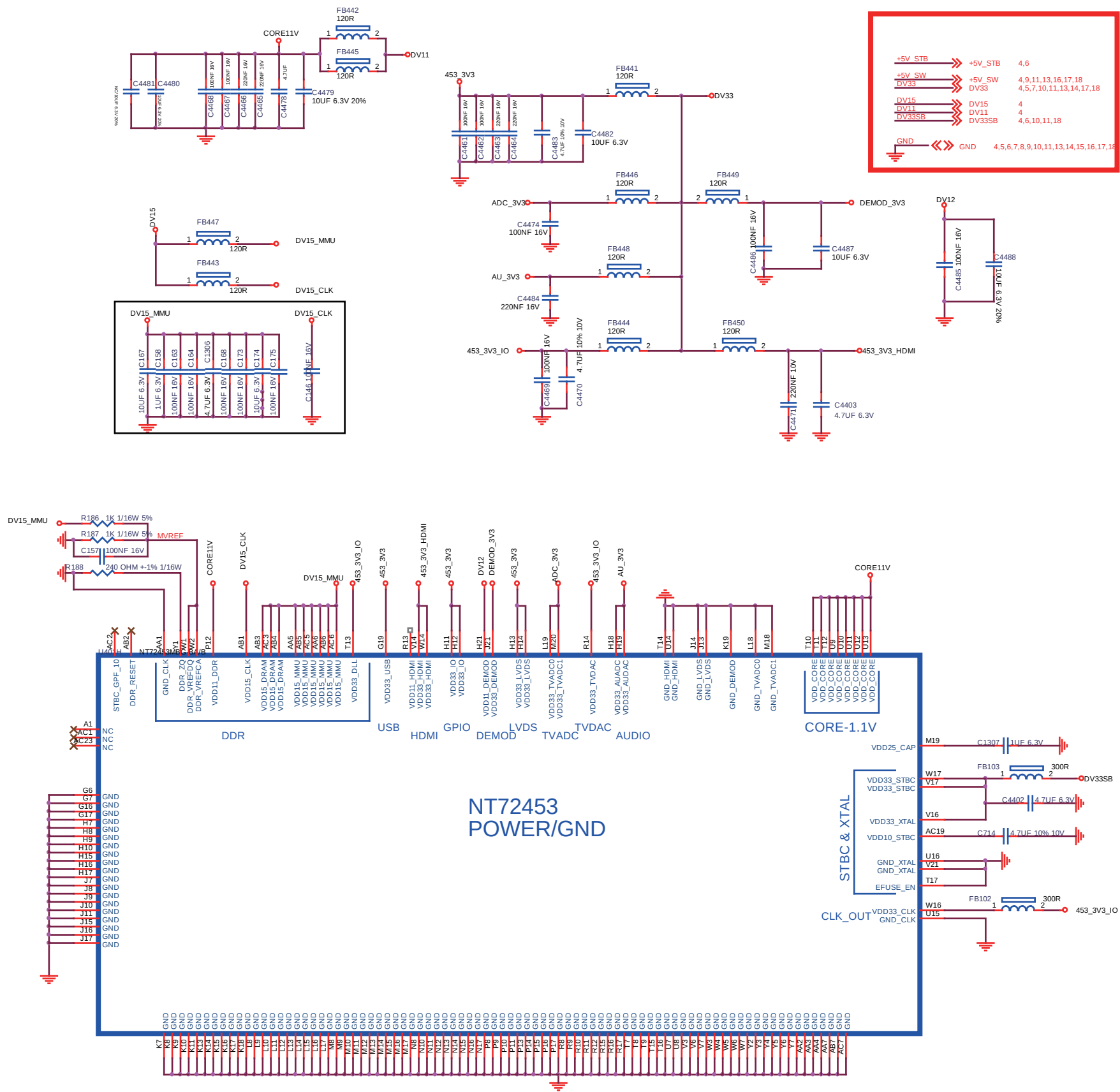


2015-May-29 [back to div.table](#)

B09

NT72453_POWER

B09



NT72453_POWER	715G6947	4	2014-10-22

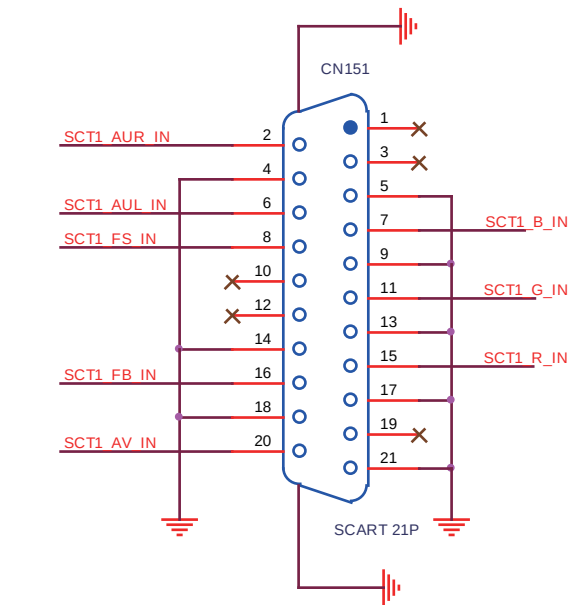
S2_T2_SCL	↔	S2_T2_SDA	11
S2_T2_SCL	↔	S2_T2_SCL	11
T2_DEMOD_RSTn	↔	T2_DEMOD_RSTn	7
CI_INCLK	↔	CI_INCLK	9
CI_INVALID	↔	CI_INVALID	9
CI_INSYNC	↔	CI_INSYNC	9
CI_INDATA7	↔	CI_INDATA7	9
CI_INDATA8	↔	CI_INDATA8	9
CI_INDATA5	↔	CI_INDATA5	9
CI_INDATA4	↔	CI_INDATA4	9
CI_INDATA3	↔	CI_INDATA3	9
CI_INDATA2	↔	CI_INDATA2	9
CI_INDATA1	↔	CI_INDATA1	9
CI_INDATA0	↔	CI_INDATA0	9

B12

SCART

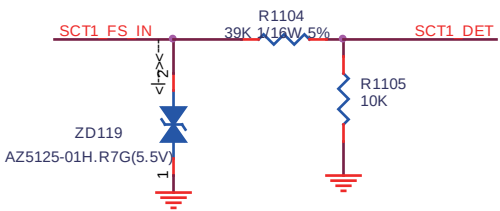
B12

Half SCART(RGB+CVBS+L/R IN)

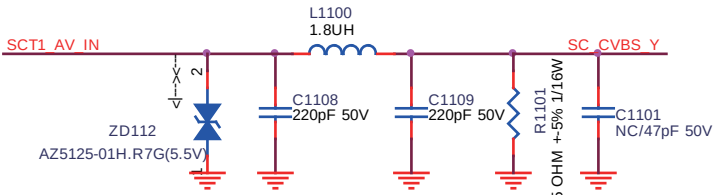


1st	388G355HLB1VVA
2nd	388G355HLB1VYG

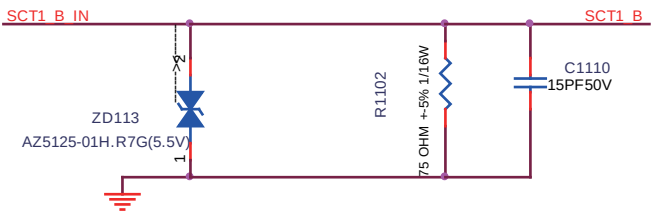
Function Select



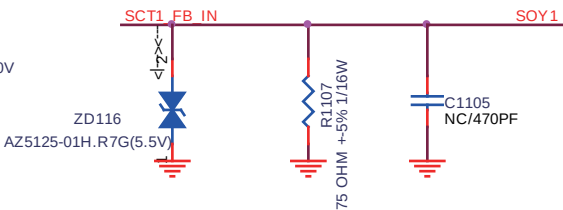
CVBS IN



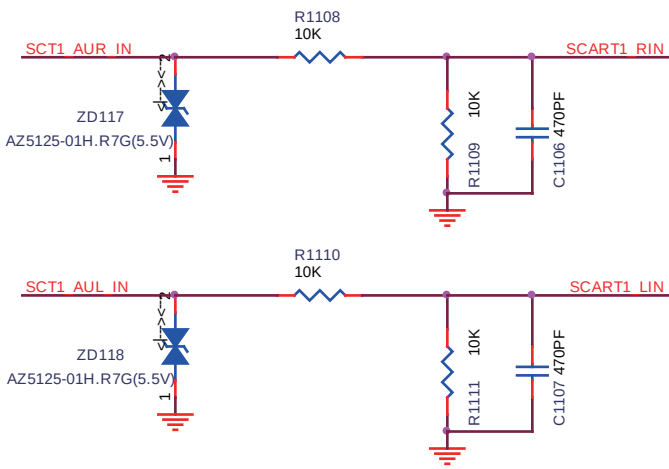
RGB IN



FAST BLANKING/SOY



SCART Audio Input



ADC/DAC

SC_CVBS_Y	SC_CVBS_Y	7
SOY1	SOY1	7
SCT1_B	SCT1_B	7
SCT1_G	SCT1_G	7
SCT1_R	SCT1_R	7

AUDIO /IF

SCART1_RIN	SCART1_RIN	7
SCART1_LIN	SCART1_LIN	7

STB CONTORL

SCT1_DET	SCT1_DET	10
----------	----------	----

GND <<>> GND 4,5,6,7,8,9,10,11,12,13,14,16,17,18

SCART

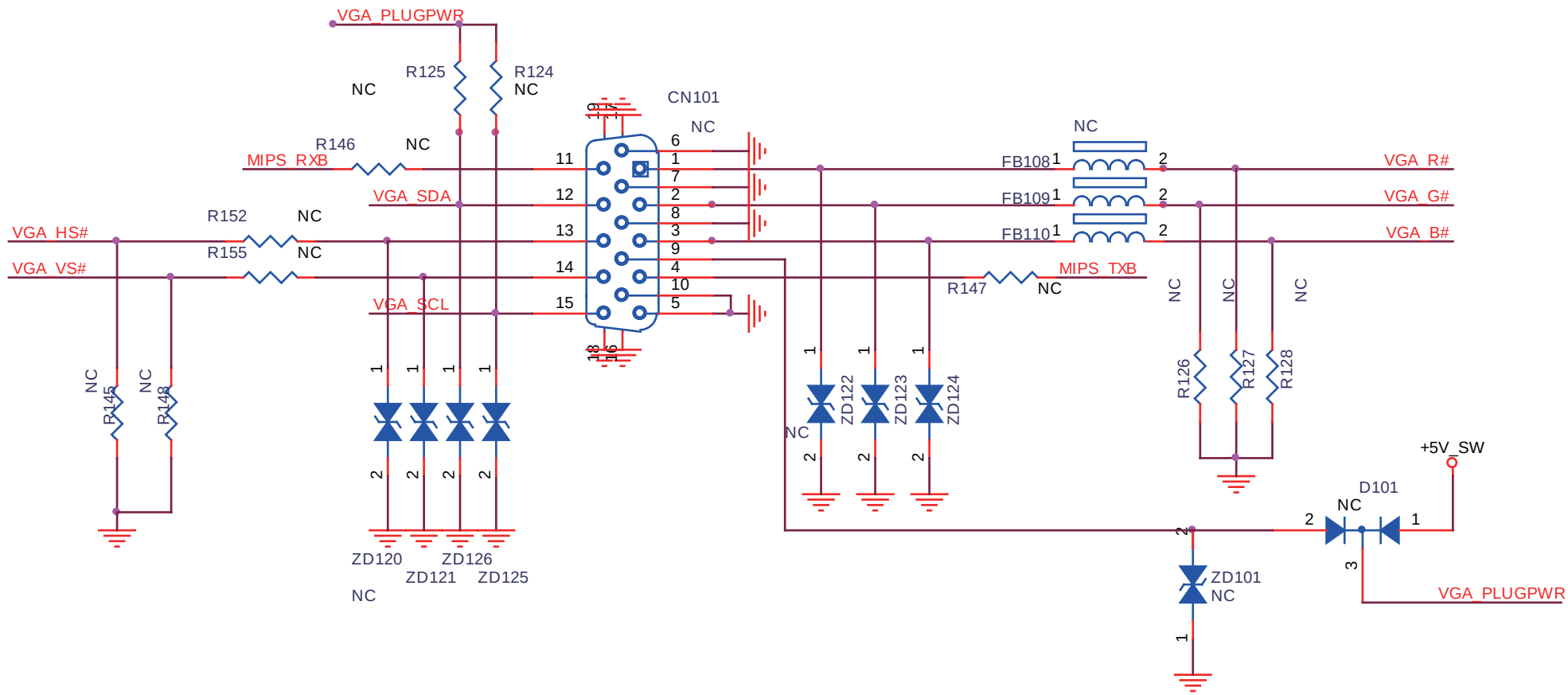
715G6947

B13

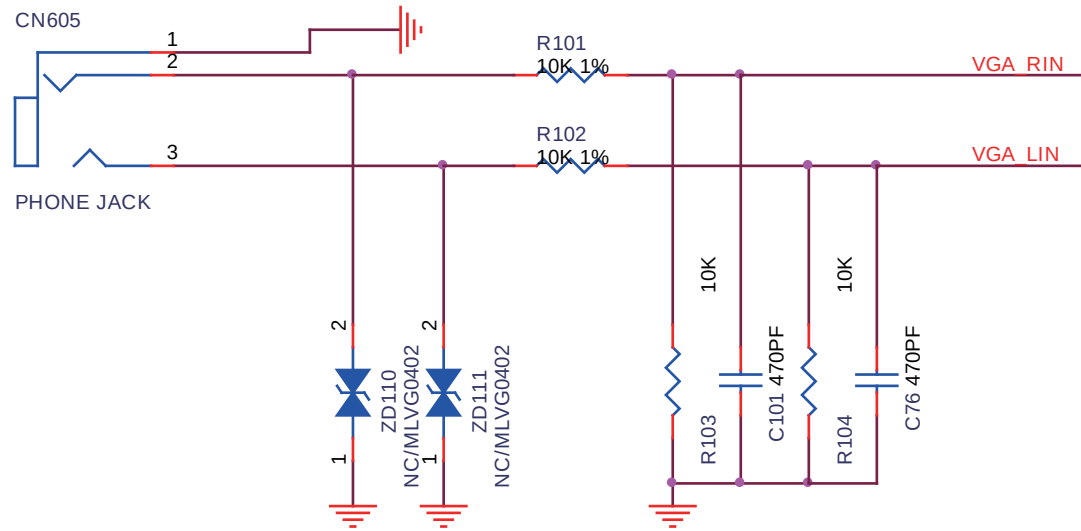
VGA

B13

VGA In



PC / DVI Audio in



VGA R#	»»	VGA_R#	7
VGA G#	»»	VGA_G#	7
VGA B#	»»	VGA_B#	7
VGA HS#	»»	VGA_HS#	7
VGA VS#	»»	VGA_VS#	7
VGA SDA	»»	VGA_SDA	10
VGA SCL	»»	VGA_SCL	10
VGA RIN	»»	VGA_RIN	7
VGA LIN	»»	VGA_LIN	7
+5V SW	««	+5V_SW	4,9,11,13,17,18
	««»	GND	4,5,6,7,8,9,10,11,12,13,14,15,17,18
MIPS RXB	»»	MIPS_RXB	5,11,18
MIPS TXB	»»	MIPS_TXB	5,11,18

VGA

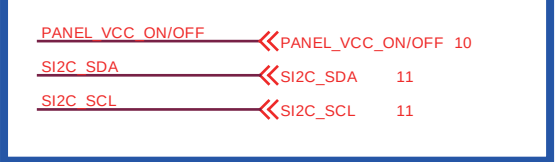
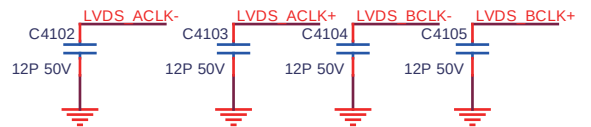
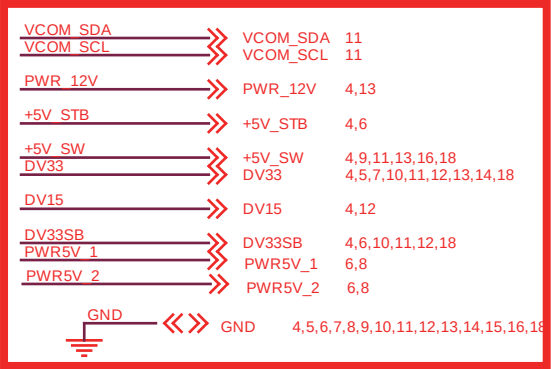
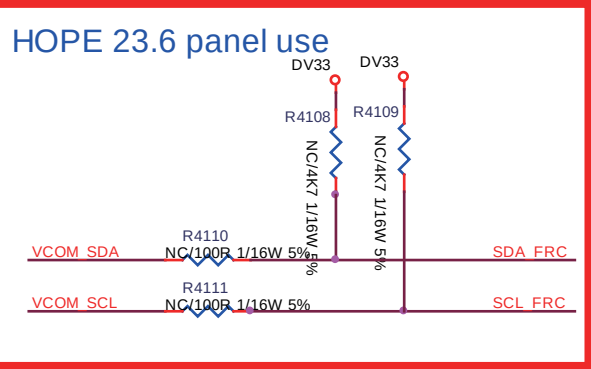
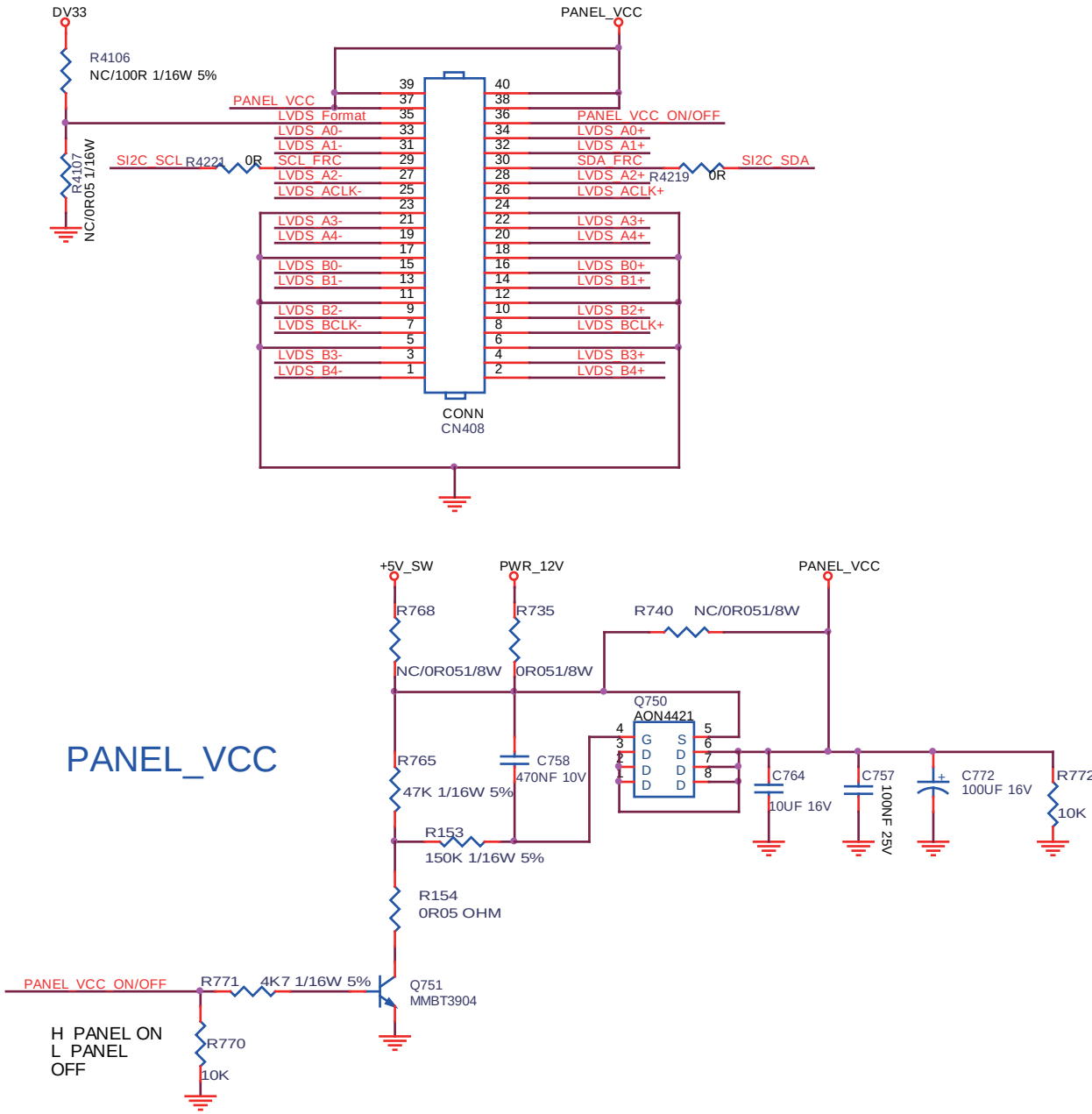
715G6947

4	2014-10-09

B14

LVDS

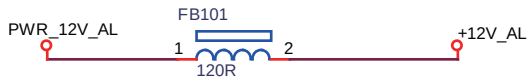
B14



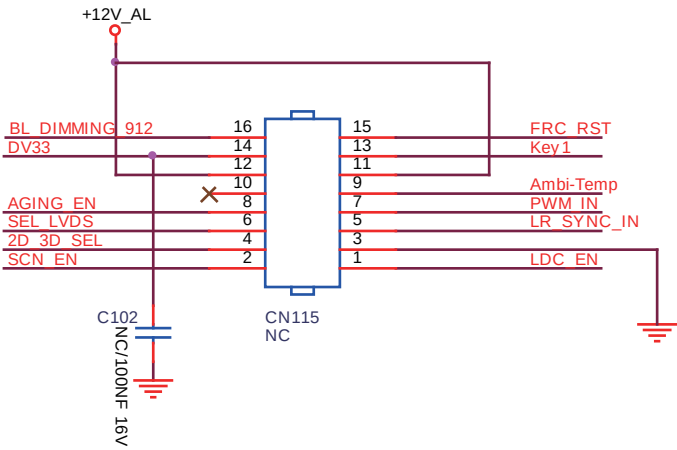
B15 AmbiLight

B15

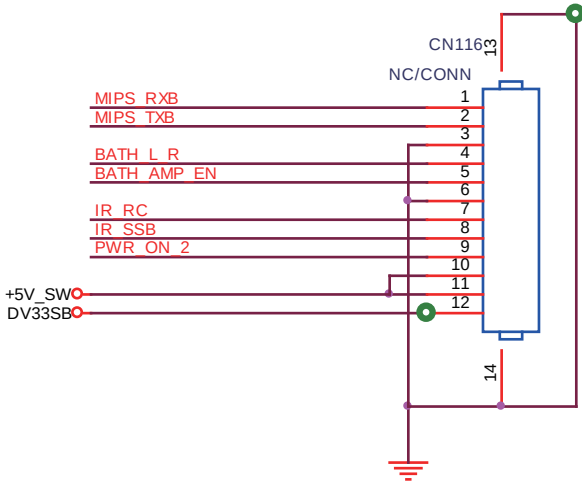
Ambient Light Power



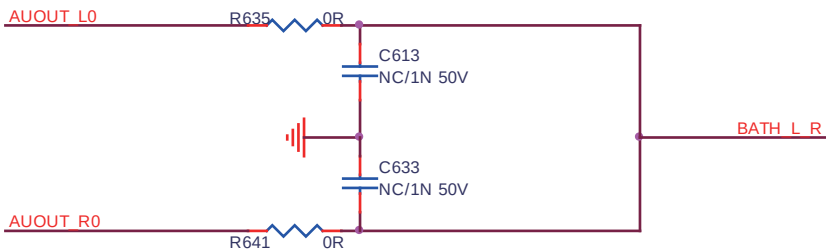
Ambient Light Connector



For BUH daughter board



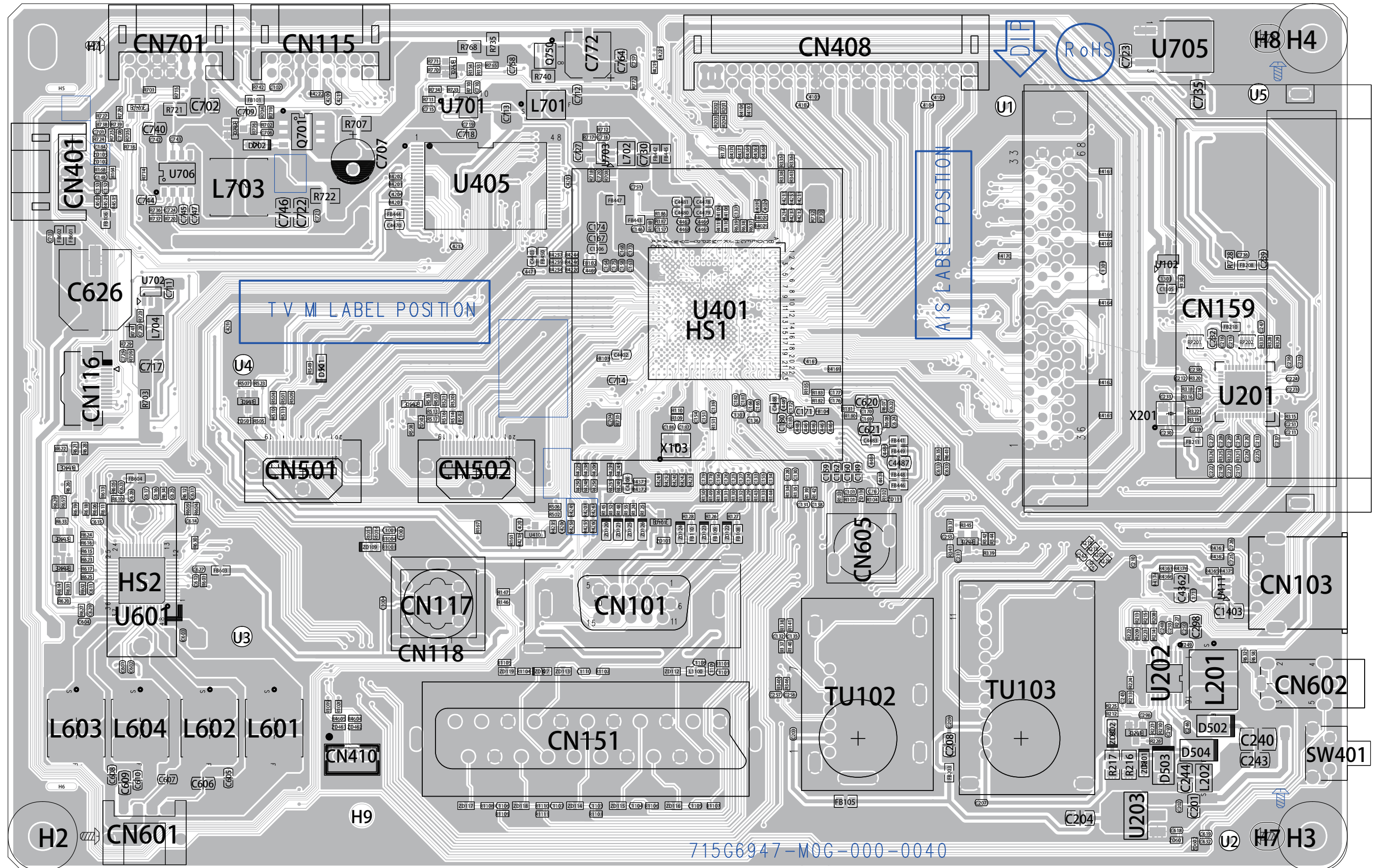
Bathroom SPK audio out for BUH



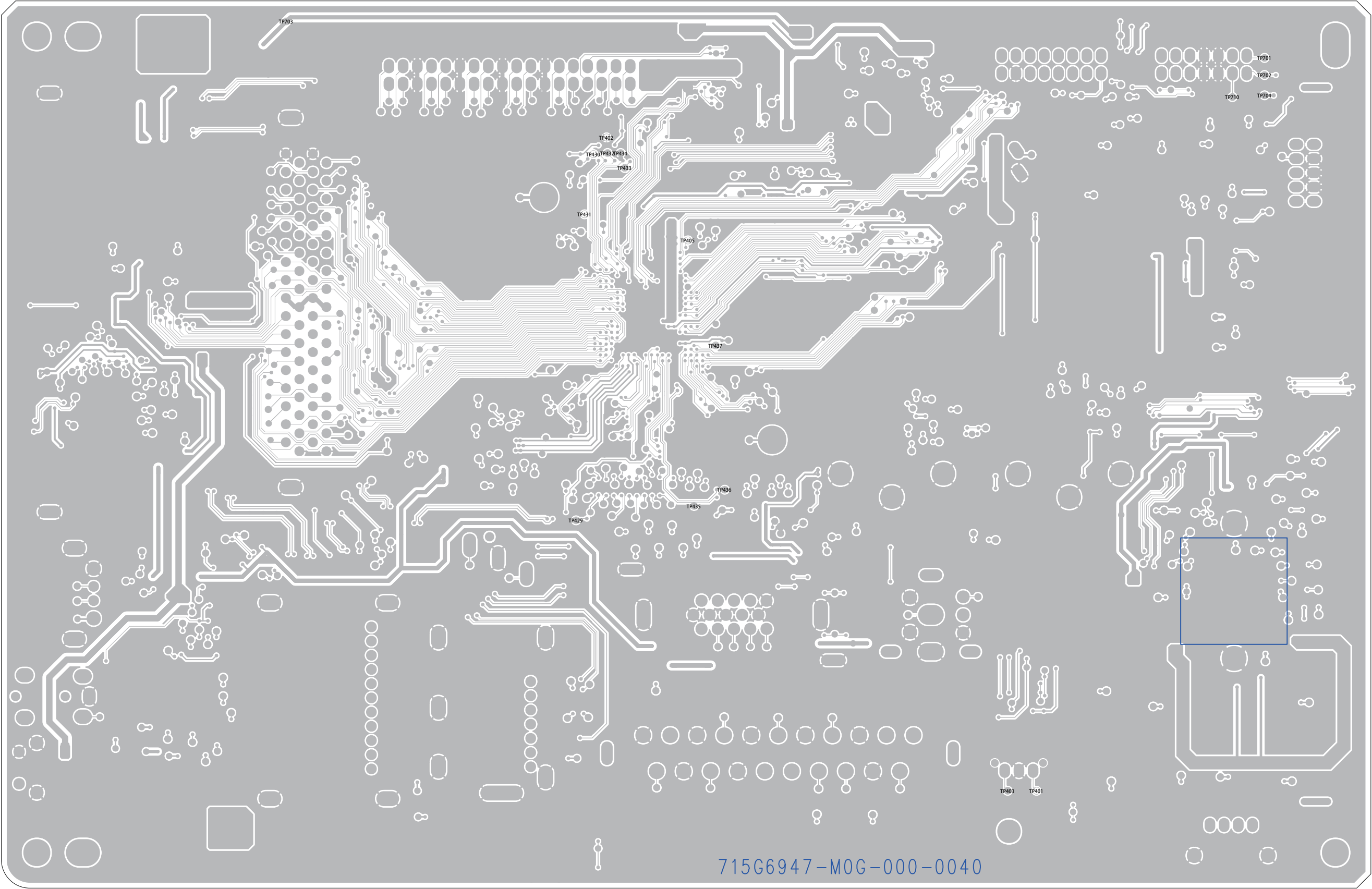
Ambi-Temp	↔	Ambi-Temp	10
Key1	↔	Key1	10
PWM_IN	↔	PWM_IN	11
LR_SYNC_IN	↔	LR_SYNC_IN	11
AGING_EN	↔	AGING_EN	11
SEL_LVDS	↔	SEL_LVDS	11
2D_3D_SEL	↔	2D_3D_SEL	11
LDC_EN	↔	LDC_EN	11
SCN_EN	↔	SCN_EN	11
PWR_12V	↔	PWR_12V	4,13,17
DV33	↔	DV33	4,5,7,10,11,12,13,14,17
GND	↔	GND	4,5,6,7,8,9,10,11,12,13,14,15,16,17

MIPS_RXB	↔	MIPS_RXB	5,11,16
MIPS_TXB	↔	MIPS_TXB	5,11,16
IR_SSB	↔	IR_SSB	10
IR_RC	↔	IR_RC	10
PWR_ON_2	↔	PWR_ON_2	4
BATH_AMP_EN	↔	BATH_AMP_EN	10
AUOUT_L0	↔	AUOUT_L0	7
AUOUT_R0	↔	AUOUT_R0	7
FRC_RST	↔	FRC_RST	11
+5V_SW	↔	+5V_SW	4,9,11,13,16,17
DV33SB	↔	DV33SB	4,6,10,11,12
BL_DIMMING_912	↔	BL_DIMMING_912	4

10-7-16 SSB layout top



10-7-17 SSB layout bottom

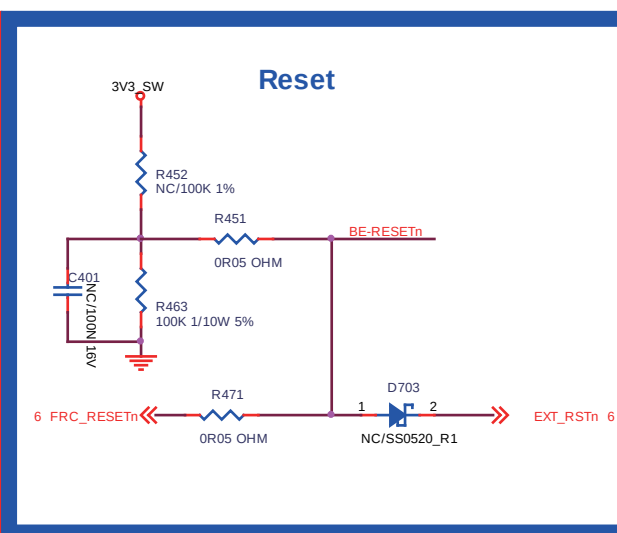
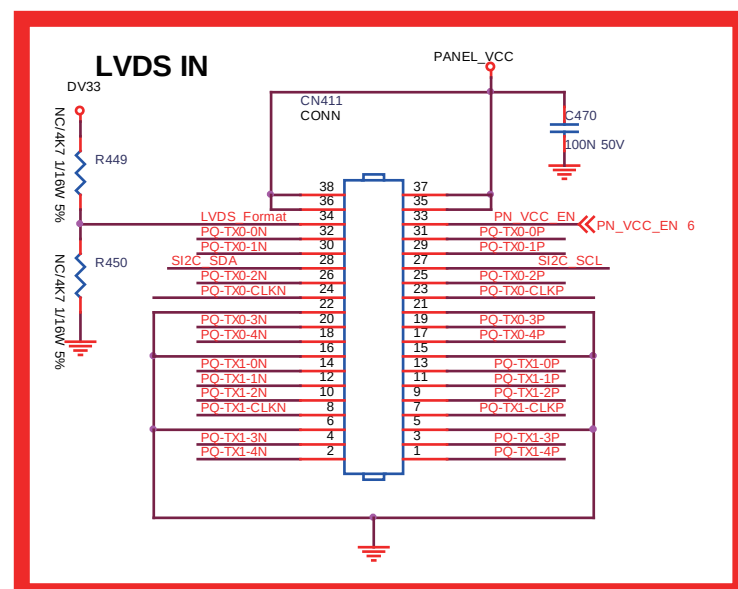
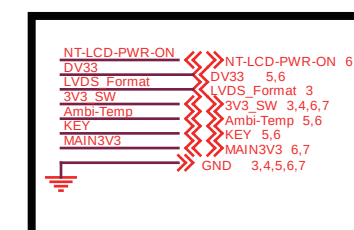
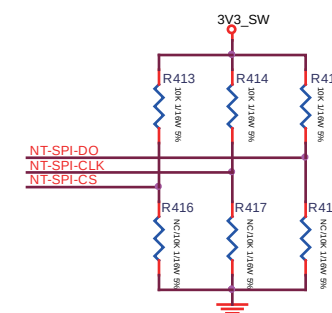
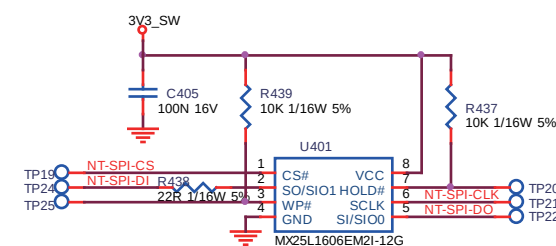
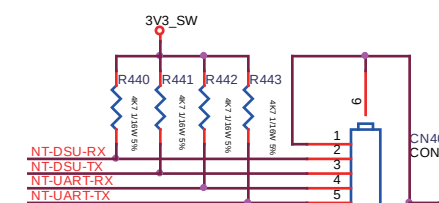
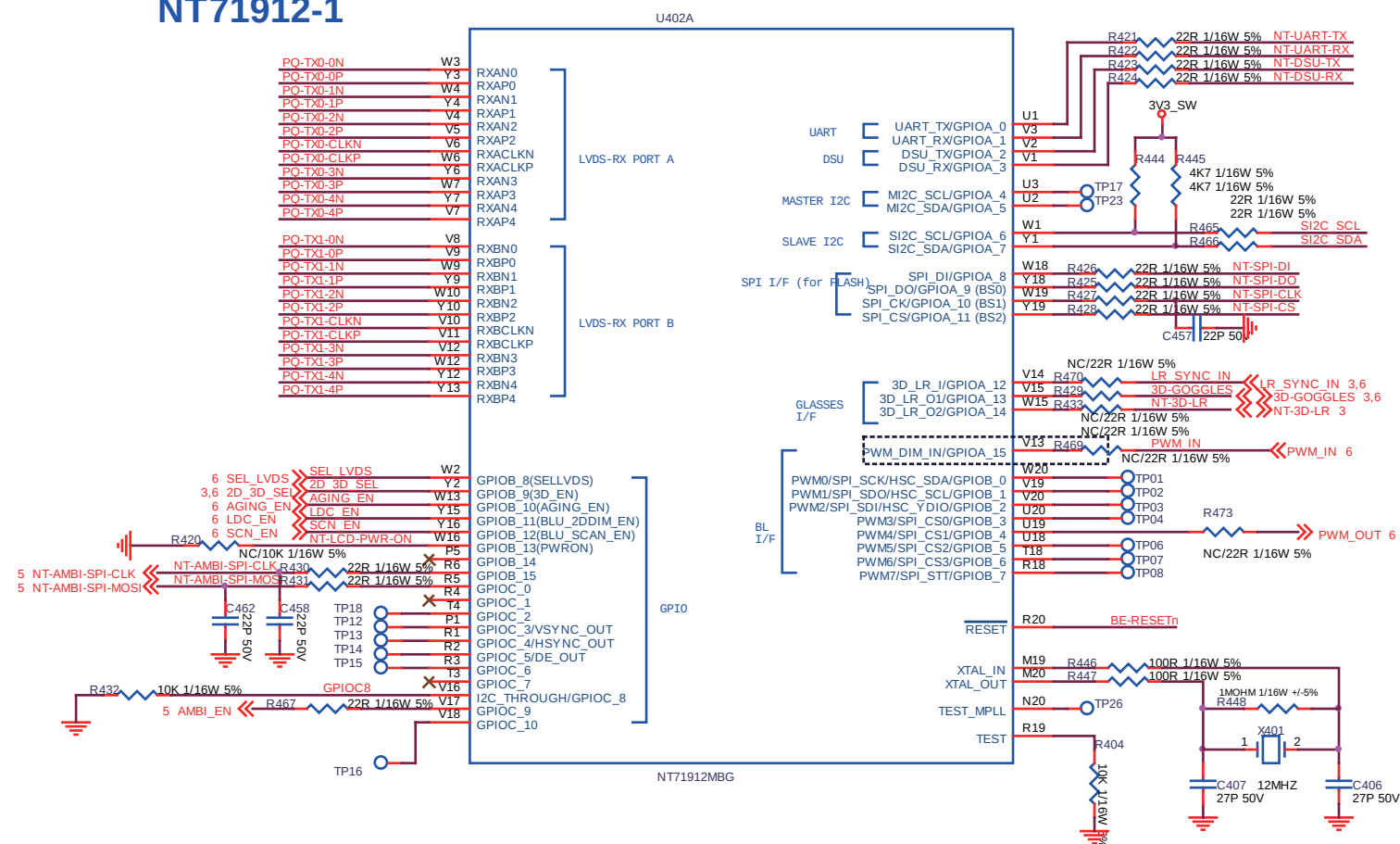


Power layout bottom	715G6947	3	2014-11-11

NT71912-1 GPIO LVDS IN

NT71912-1

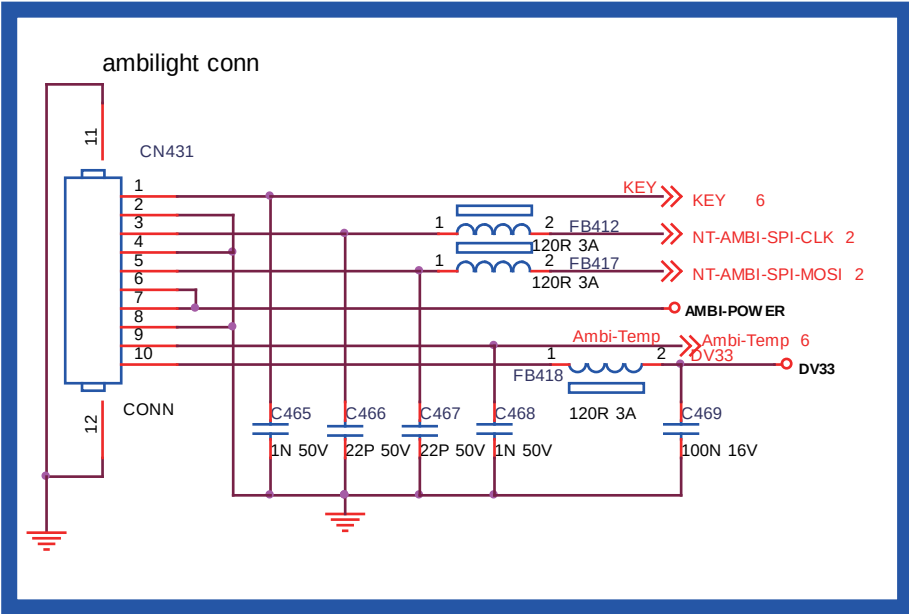
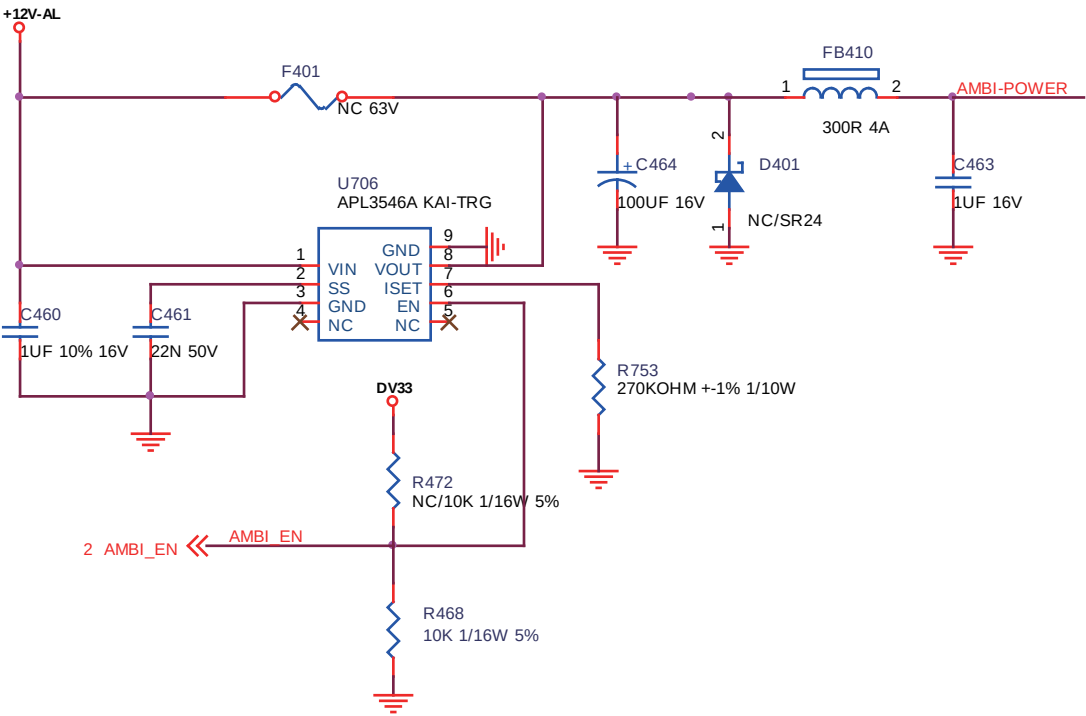
001



O04 AL PROTECTION

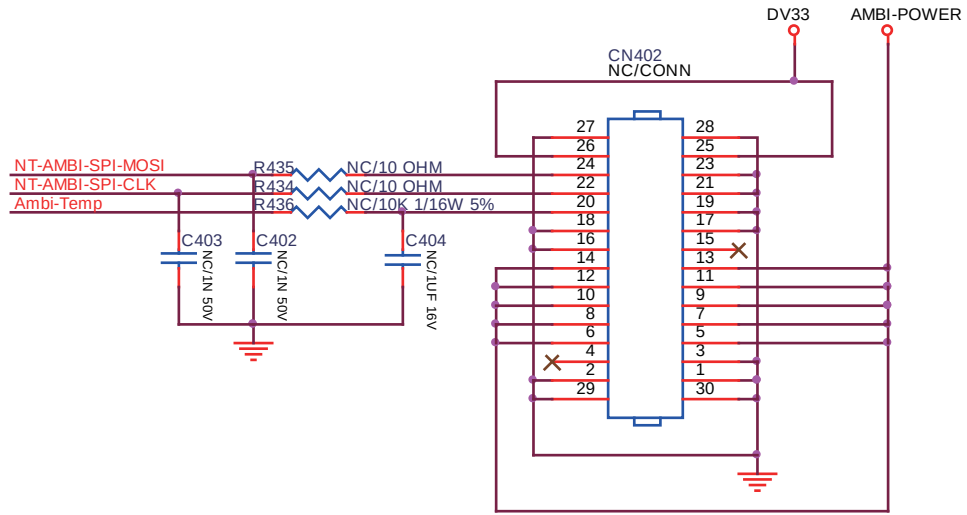
O04

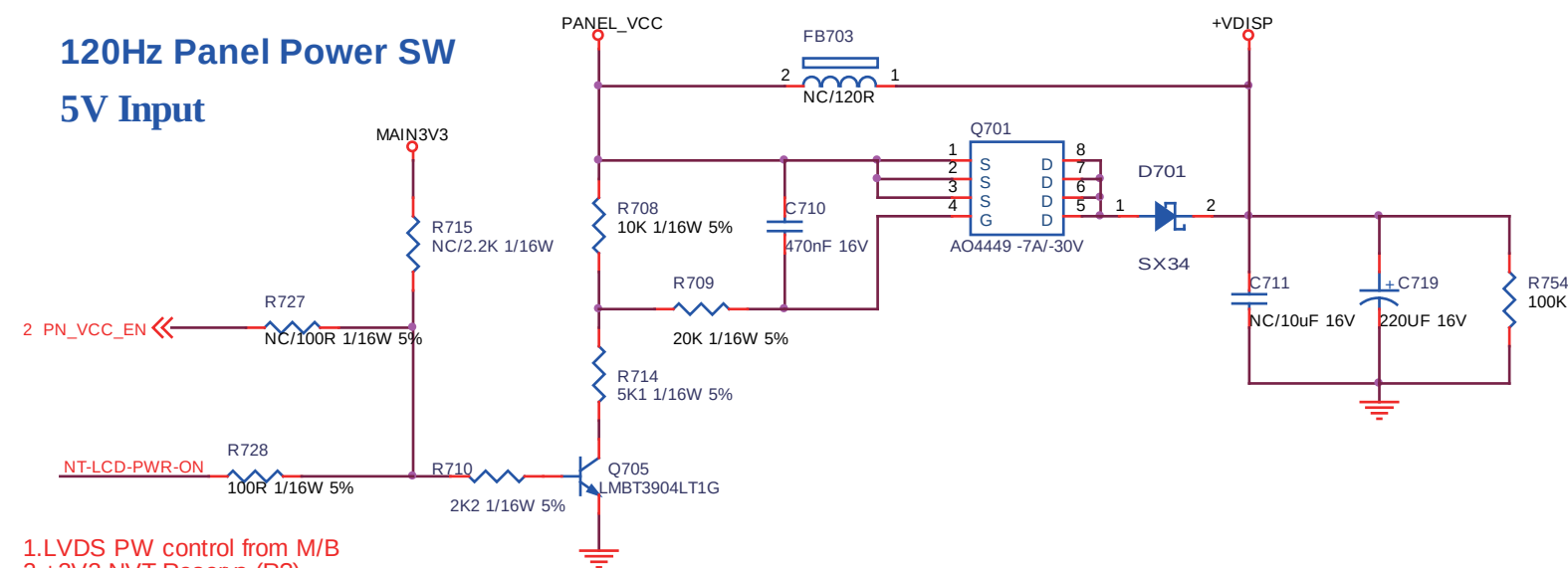
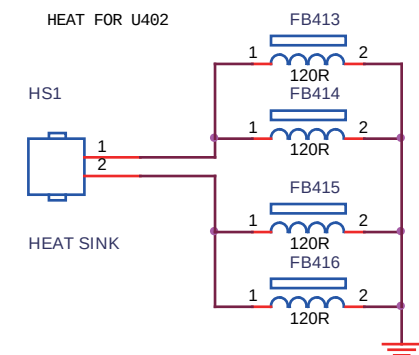
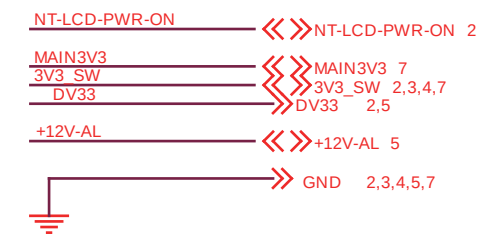
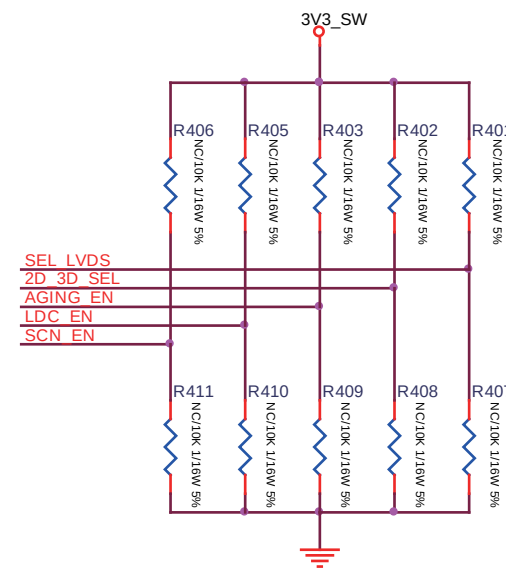
AL PROTECTION



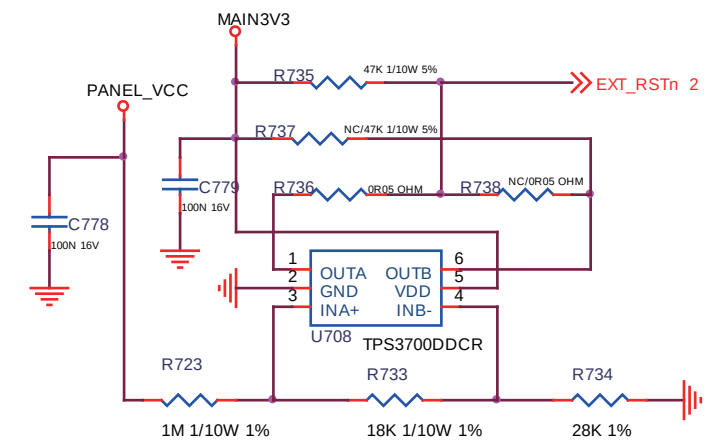
2-SIDE AMBILIGHT	3- or 4- SIDE AMBILIGHT
X011U C016U C018U	COMMON: R050U C006U C016U C018U AND 1. U004U + R011U + C005U or 2. U022U + R099U + C164U

26 Pin Reserve for 3 side ambi-light

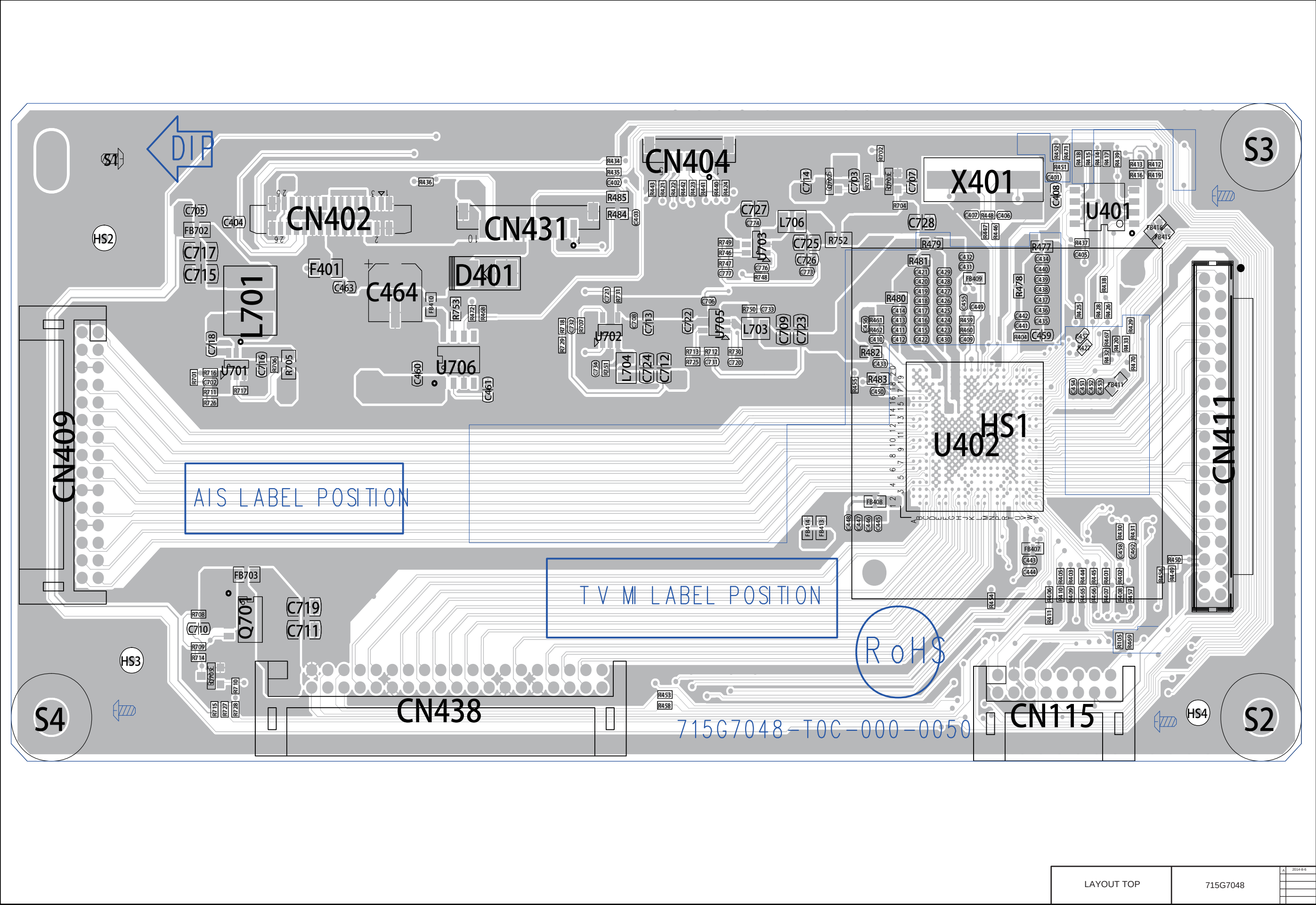




H => POWER_ON
L => POWER_OFF

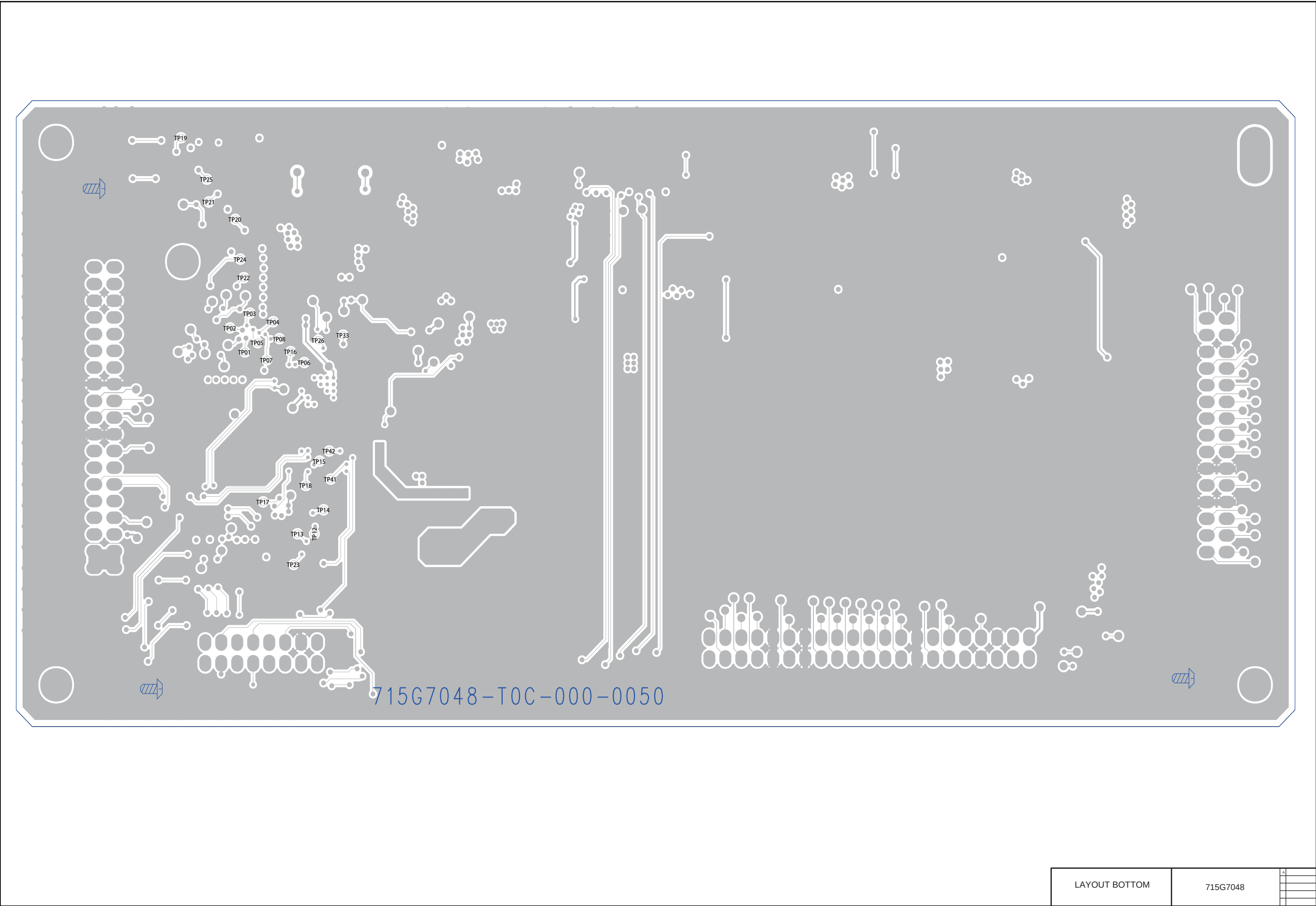


10-8-7 Option Board layout top



LAYOUT TOP	715G7048	A	2014-06
		B	
		C	
		D	
		E	
		F	
		G	
		H	
		I	
		J	
		K	
		L	
		M	
		N	
		O	
		P	
		Q	
		R	
		S	
		T	
		U	
		V	
		W	
		X	
		Y	
		Z	

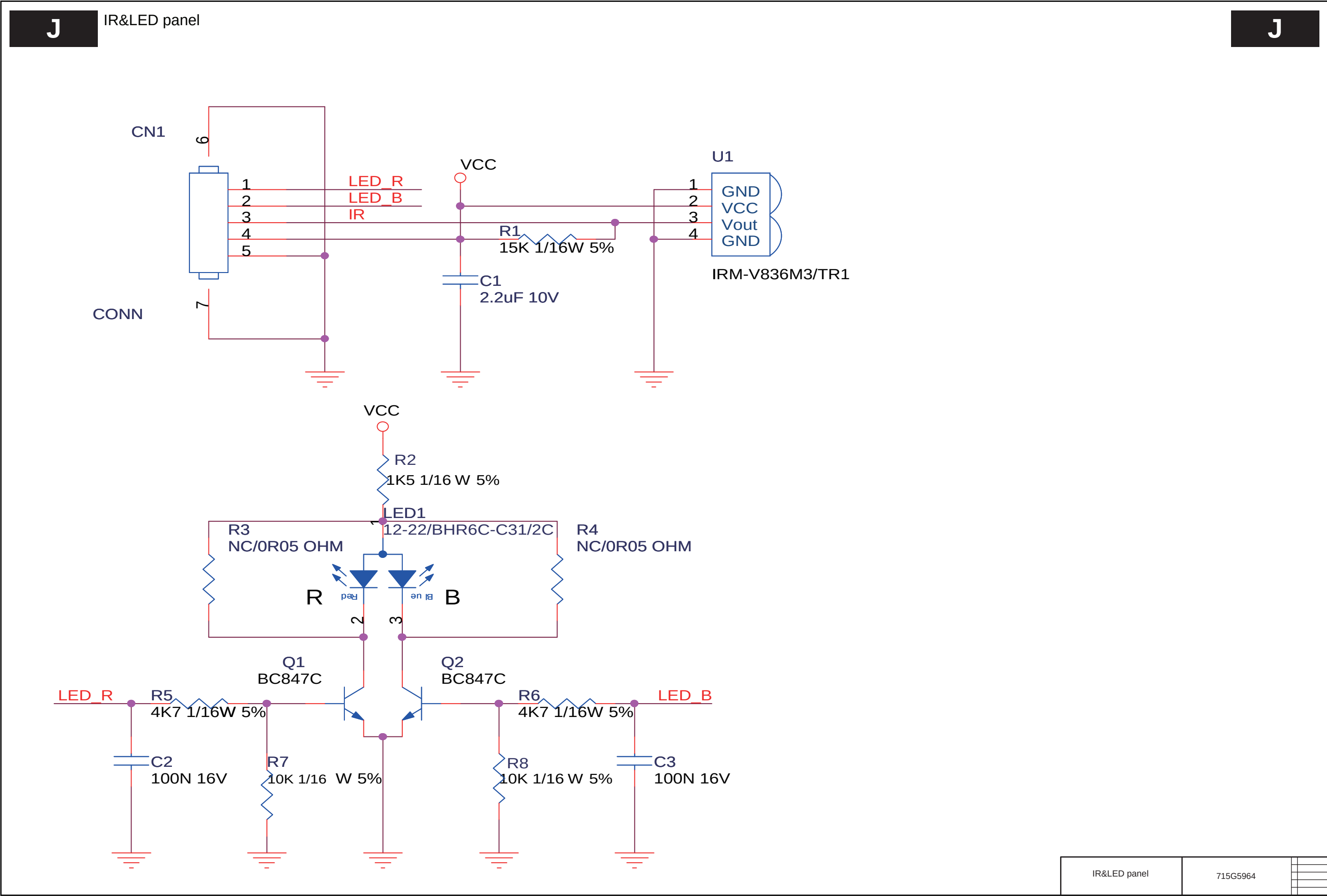
10-8-8 Option Board layout bottom



LAYOUT BOTTOM	715G7048	A

10.9 J 715G5964 IR/LED Panel

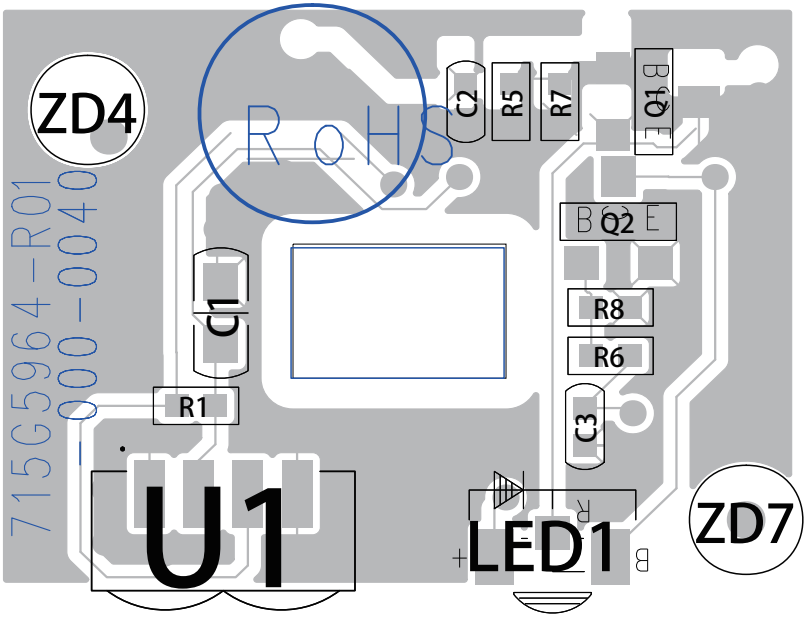
10-9-1 IR&LED Panel



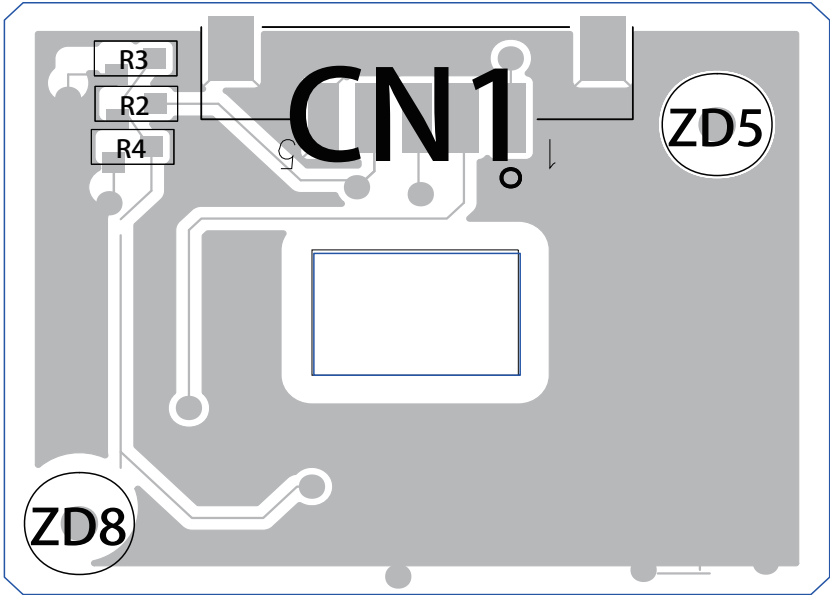
IR&LED panel	715G5964	

10-9-2 IR&LED board layout

Layout LED Board (top side)



Layout LED Board (bottom side)



LED Board layout top/bottom	715G5964	1	2012-10-26

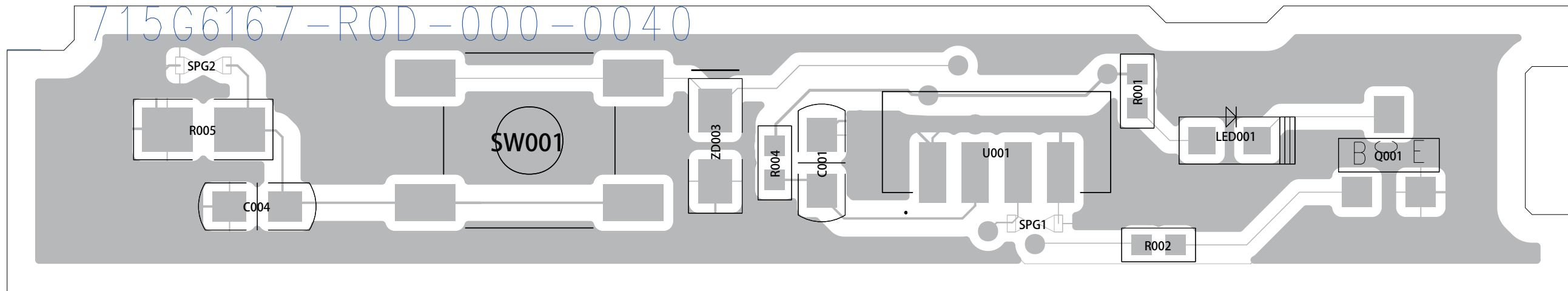
10-10-1 IR/LED Panel

The schematic diagram illustrates the electrical circuit for an IR/LED panel. Key components and their connections are as follows:

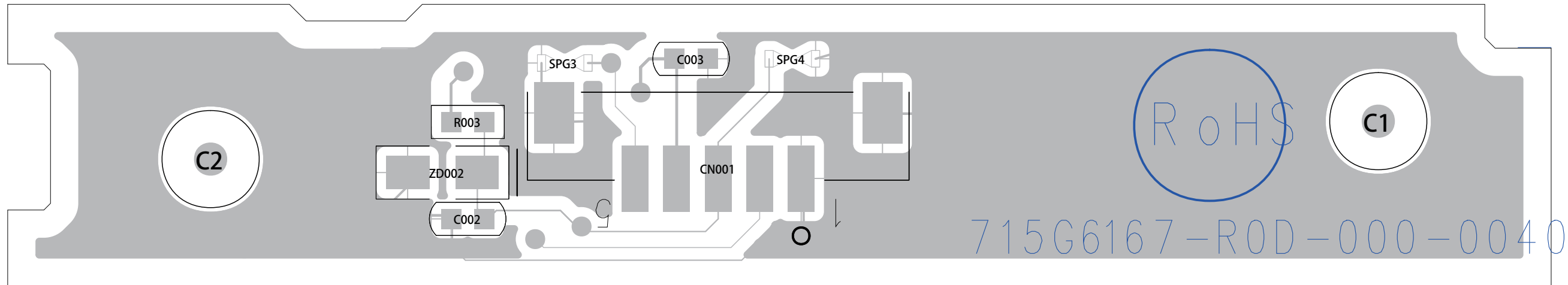
- Power Supply:** A 3V3SB supply is connected to the circuit. A 470R resistor (R001) is connected to the 3V3SB supply, leading to the LED (LED001).
- LED and Transistor:** The LED (LED001) is connected to the 3V3SB supply. A 1K resistor (R002) is connected to the LED's cathode, which is also connected to the base of a BC847C transistor (Q001). The transistor's emitter is grounded, and its collector is connected to the 3V3SB supply.
- Receiver and Timing:** A TSOP75436WTT receiver (U001) is connected to the 3V3SB supply. A 100R resistor (R004) is connected to the receiver's input. A 1UF16V capacitor (C001) is connected to the receiver's output. A 100N 16V capacitor (C003) is connected to the 3V3SB supply.
- Switch and Diodes:** A switch (SW001) is labeled 'POWER'. A diode (ZD003) is connected to the switch. A diode (ZD002) is connected to the 3V3SB supply. A 0R05 1/8W resistor (R005) is connected to the switch.
- Connector:** A connector (CONN) is shown with pins 1-7. Pin 1 is connected to the 3V3SB supply. Pin 2 is connected to the LED's anode. Pin 3 is connected to the LED's cathode. Pin 4 is connected to the transistor's base. Pin 5 is connected to the transistor's emitter. Pin 6 is connected to the receiver's input. Pin 7 is connected to the receiver's output.

10-10-2 IR/LED board layout

Layout IR/LED panel (top side)



Layout IR/LED panel (bottom side)



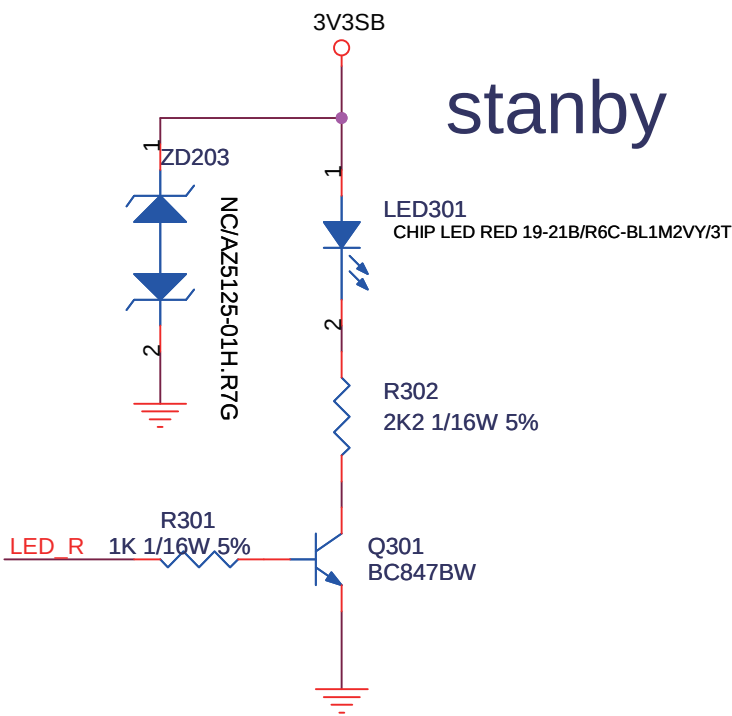
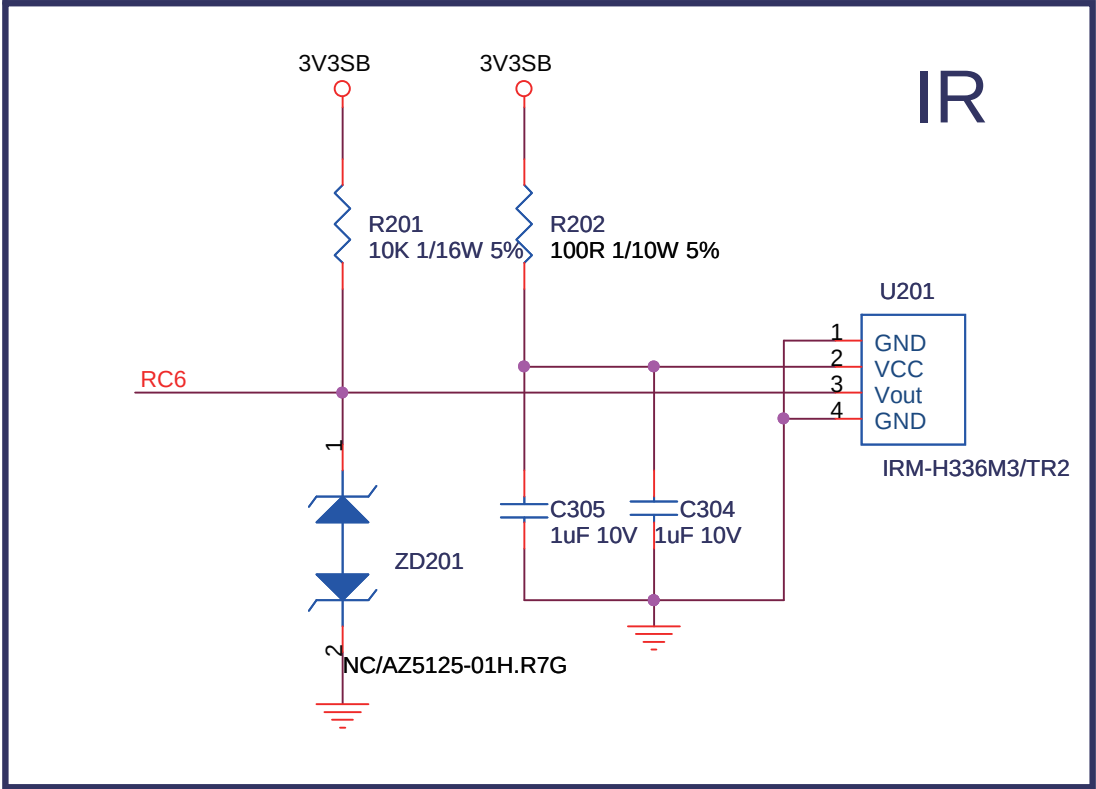
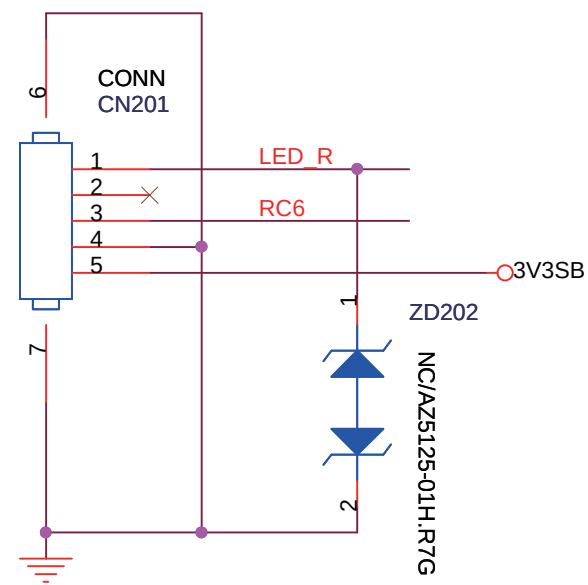
IR/LED panel layout top/bottom	715G6167	C	2013-04-20

10.11 J 715G7055 IR/LED Panel
10-11-1 LED&IR&3D&Light sensor

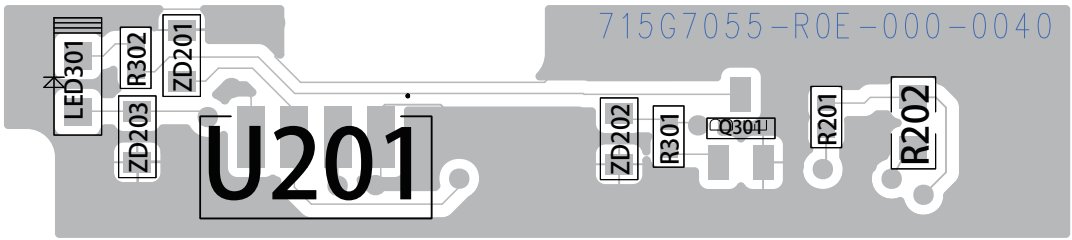
J

LED&IR&3D&Light sensor

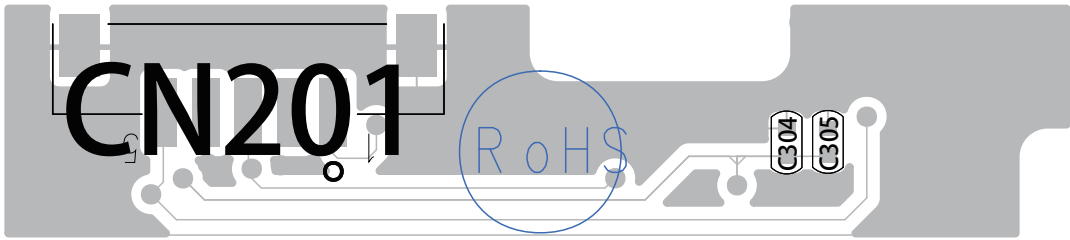
J



Layout LED Board (top side)

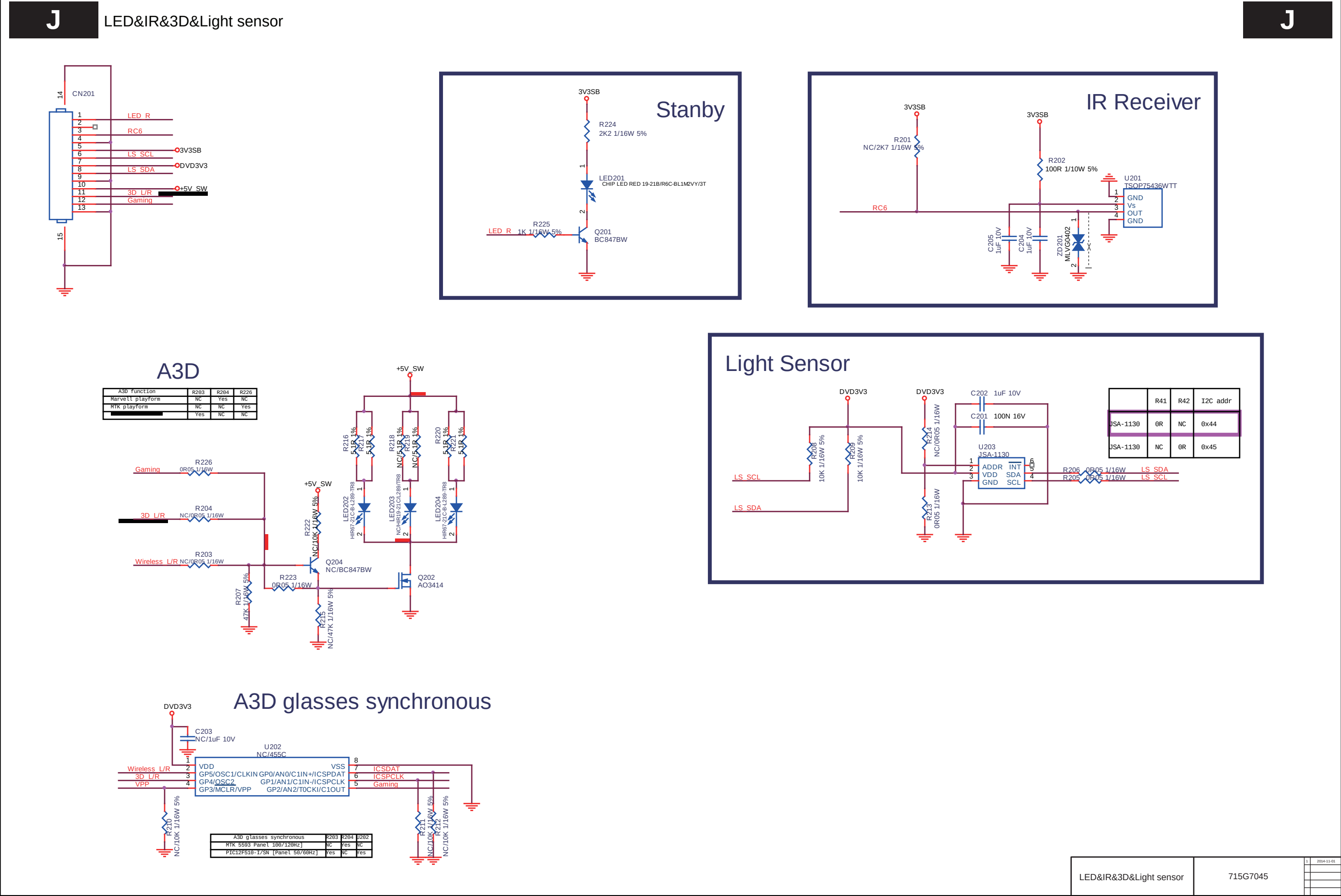


Layout LED Board (bottom side)

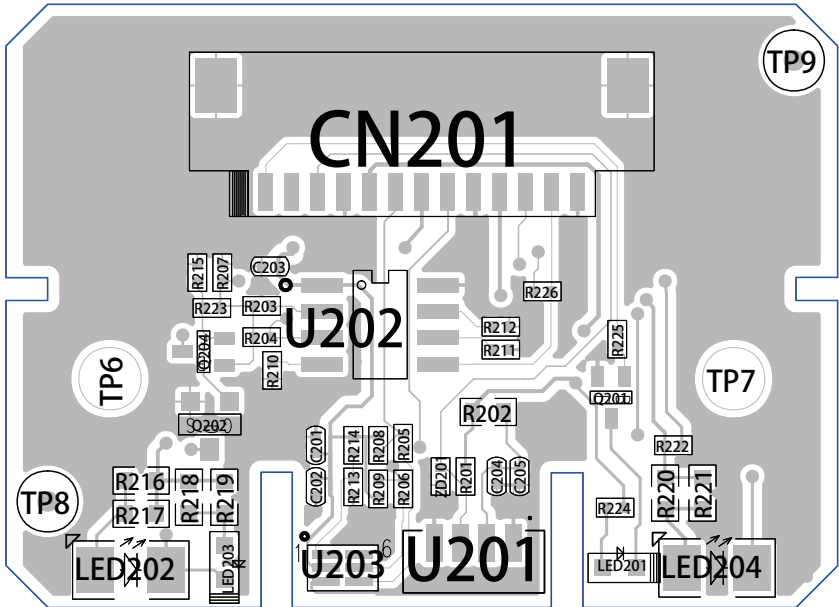


LED Board layout top/bottom	715G7055	1	2012-10-26

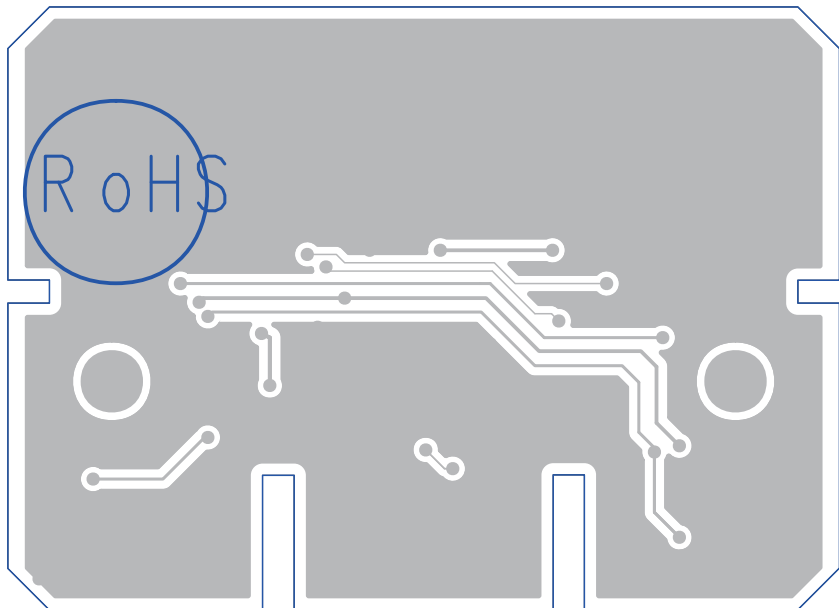
10.12 J 715G7045 IR/LED Panel
10-12-1 LED&IR&3D&Light sensor



Layout LED Board (top side)



Layout LED Board (bottom side)



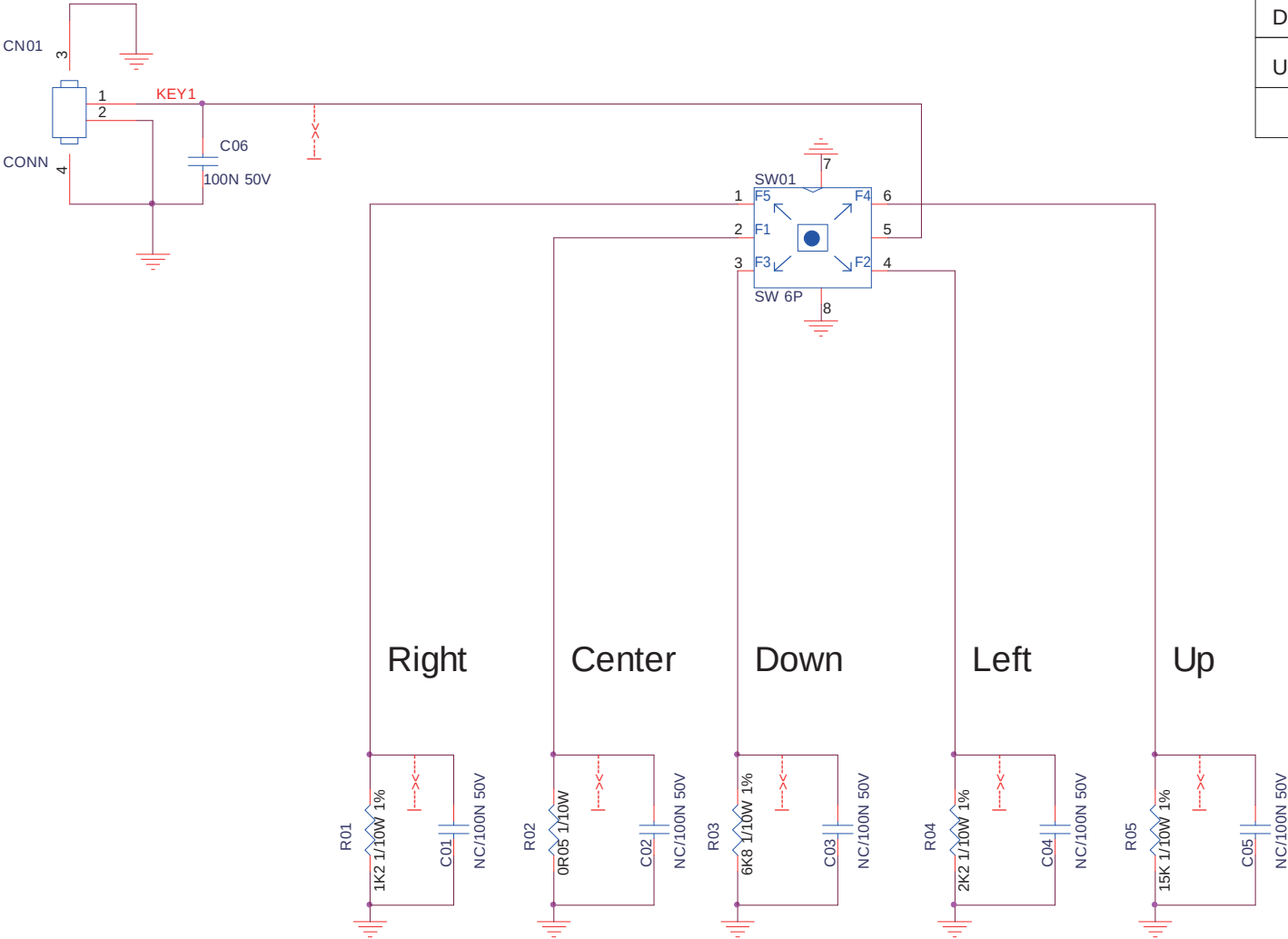
LED Board layout top/bottom	715G7045	1	2014-11-04

10.13 E 715G6316 Keyboard control panel

E

Key

E



Direction	switch	Key function	Resistance	Voltage
Center	2-5 short	Menu	0R	0V
Right	1-5 short	CH+	1K2	0.5V
Left	4-5 short	CH-	2K2	0.81V
Down	3-5 short	VOL-	6K8	1.65V
Up	6-5 short	VOL+	15K	2.27V
		No function		3.3V

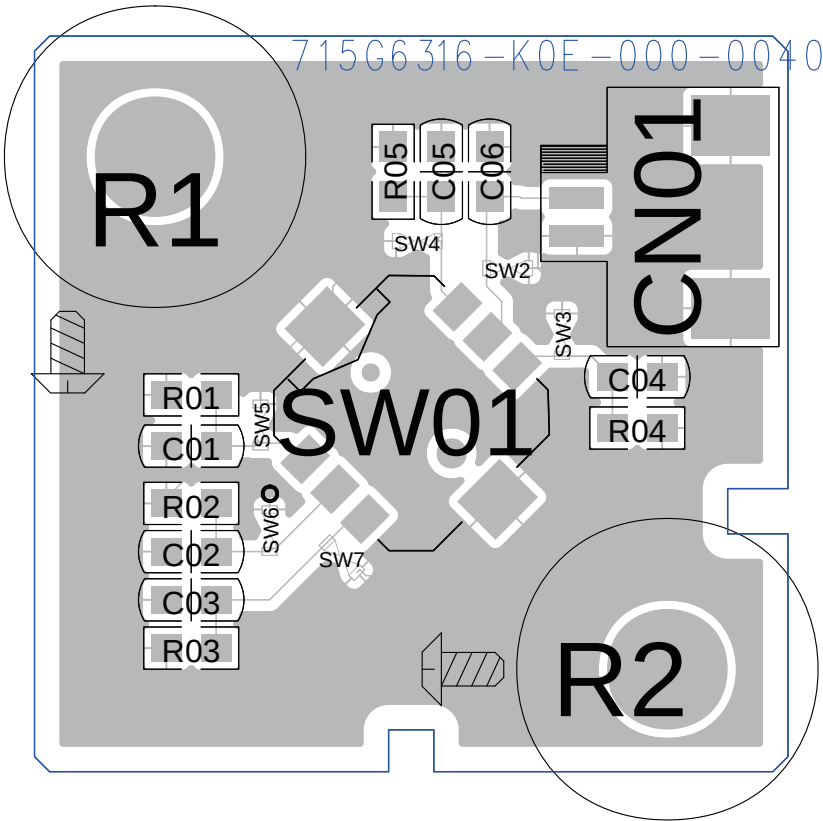
Joystick circuit diagram

	pin1	pin2	pin3	pin4	pin5	pin6
F1		○	—	—	○	
F2				○	○	
F3			○	—	○	
F4					○	○
F5	○	—	—	—	○	

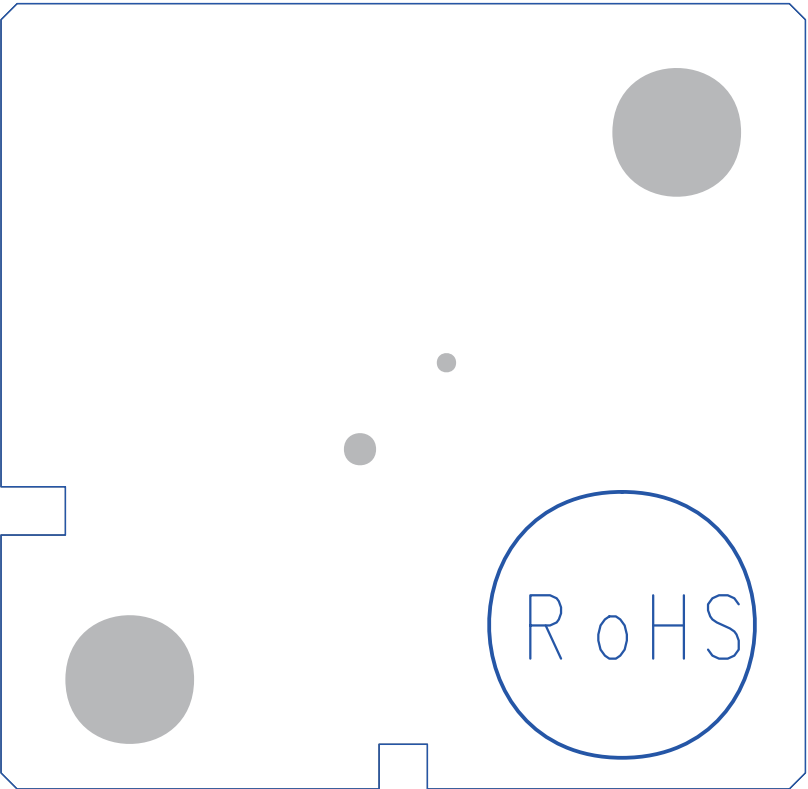
Keyboard control panel	715G6316	1	2013-09-17

10-13-2 Key board layout

Layout Keyboard control panel (top side)

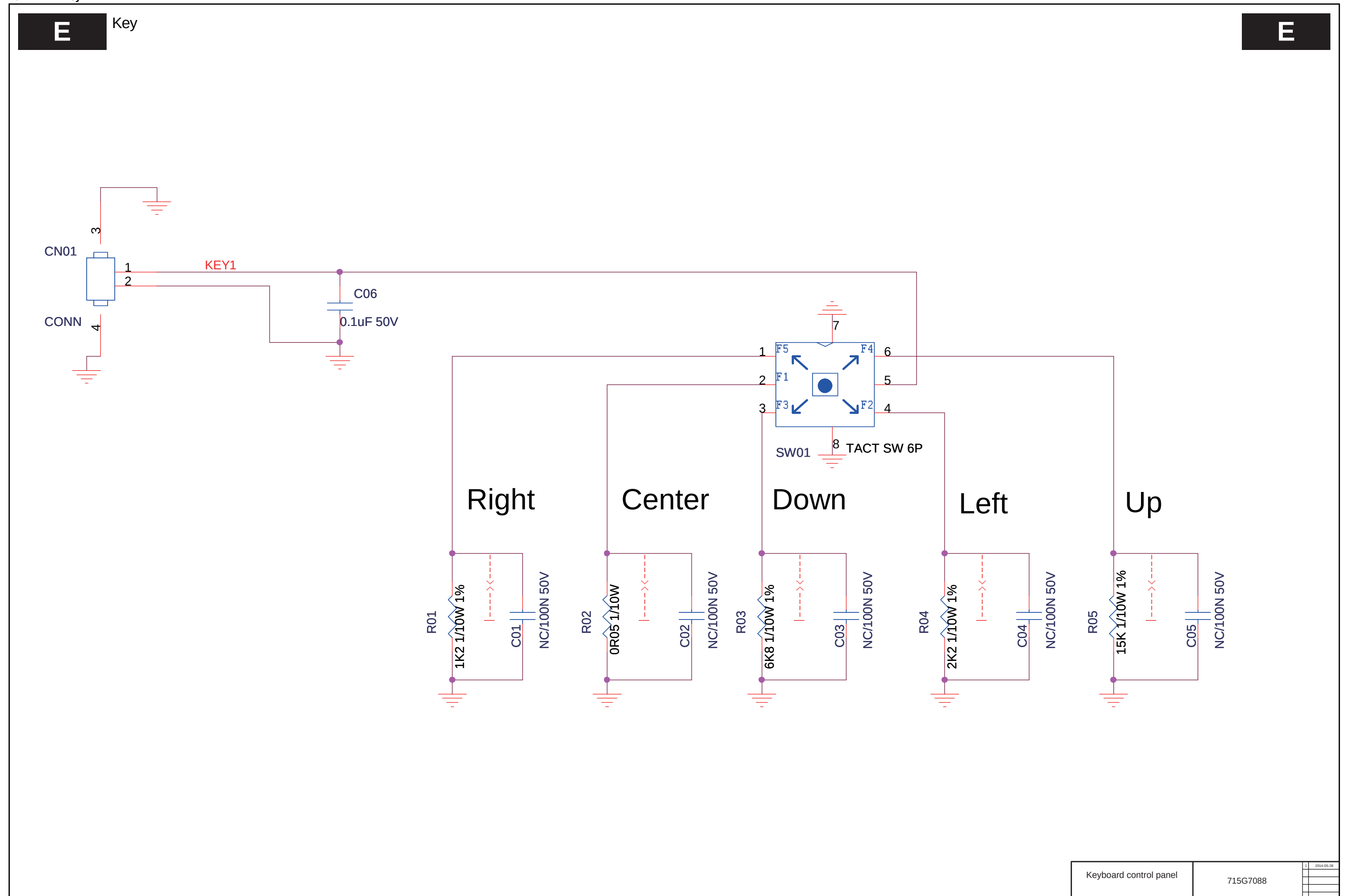


Layout Keyboard control panel (bottom side)

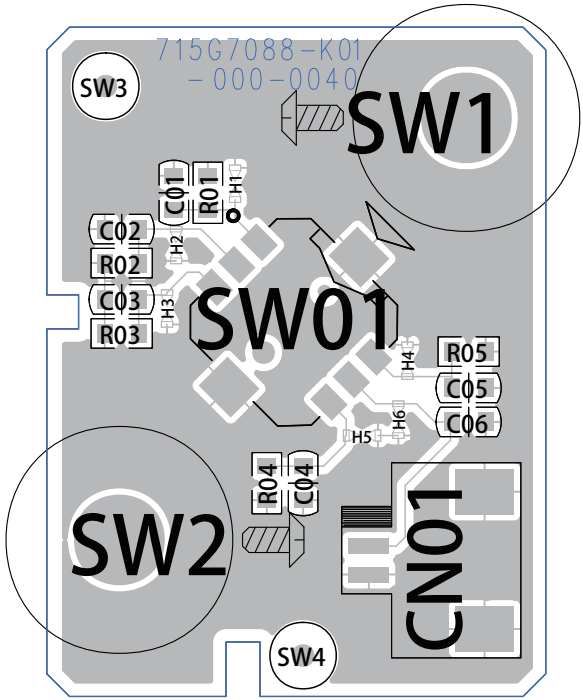


Keyboard control panel layout top/bottom	715G6316	1	2013-09-17

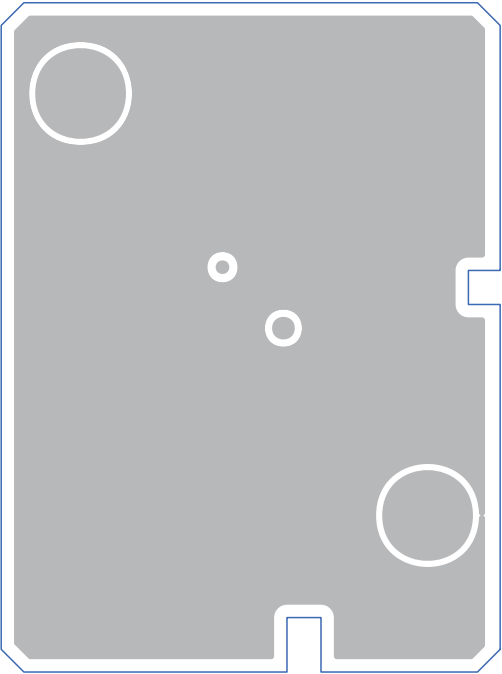
10-14-1 Key



Layout Keyboard control panel (top side)



Layout Keyboard control panel (bottom side)



Keyboard control panel layout top/bottom	715G7088	1	2014-06-08

10.15 E 715G7188 Keyboard control panel

10-15-1 Key

E

Key

E

CONN TO SSB

JOYSTICK

TO AMBI LIGHT (AL2/AL3)

Key+AL Side

Main Board Side

10	10	10	AL3 TI/AMS
10	8	10	AL3 TI only
10	6	10	AL2 TI only
13	13	13	AL4 TI/AMS

Direction

switch

Key function

Resistance

Voltage

Center	2-5 short	Menu	0R	0V
Right	1-5 short	CH+	1K2	0.5V
Left	4-5 short	CH-	2K2	0.81V
Down	3-5 short	VOL-	6K8	1.65V
Up	6-5 short	VOL+	15K	2.27V
		No function		3.3V

Joystick circuit diagram

	pin1	pin2	pin3	pin4	pin5	pin6
F1						
F2						
F3						
F4						
F5						

KEY

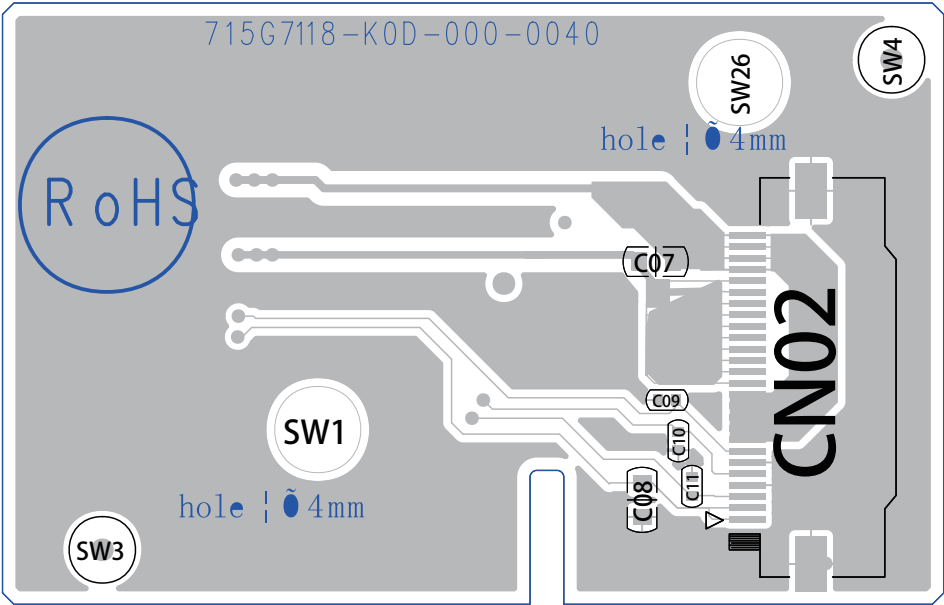
715G7118

1

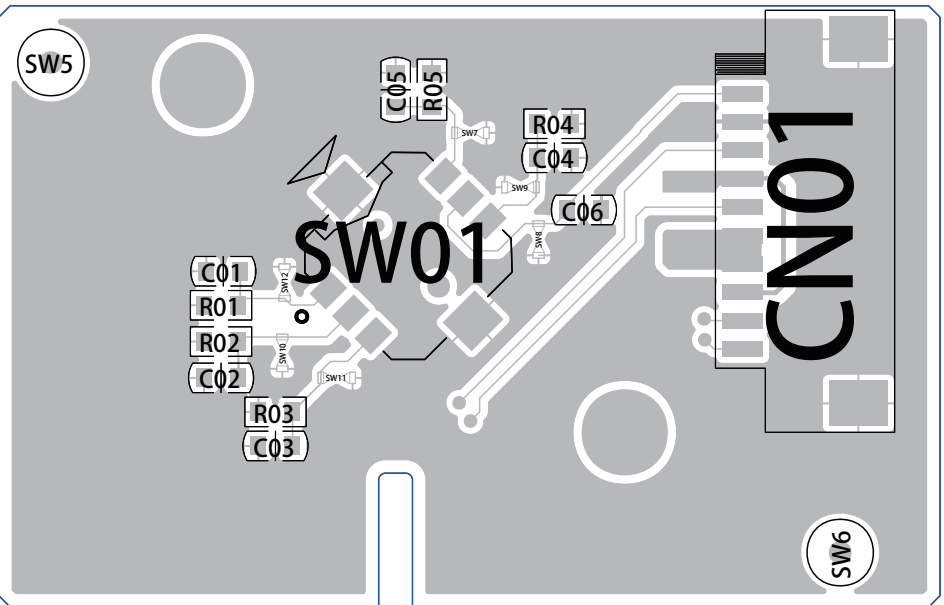
2014-08-26

10-15-2 Key board layout

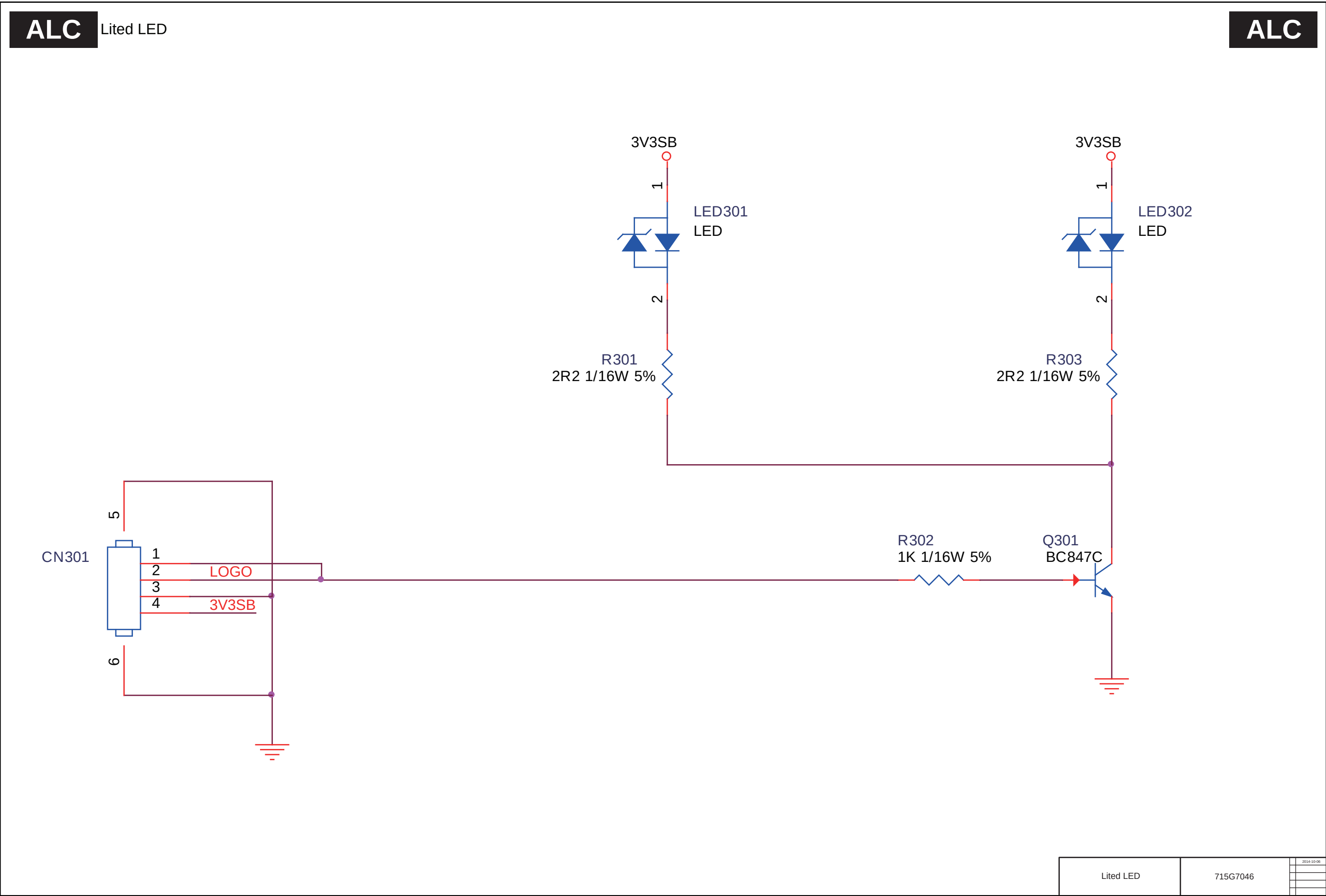
Layout Keyboard control panel (top side)



Layout Keyboard control panel (bottom side)



10.16 ALC 715G7046 LED Board (LOGO)
10-16-1 Lited LED



Lited LED	715G7046	2014-10-06

10-16-2 LED LOGO Board layout top/buttom

Layout LED LOGO Board (top side)



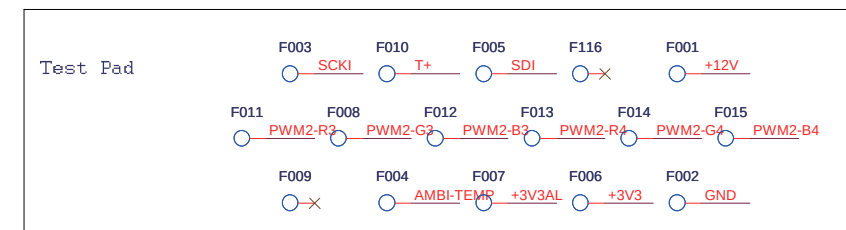
Layout LED LOGO Board (bottom side)



LED LOGO Board layout top/bottom	715G7046	1	2014-11-01

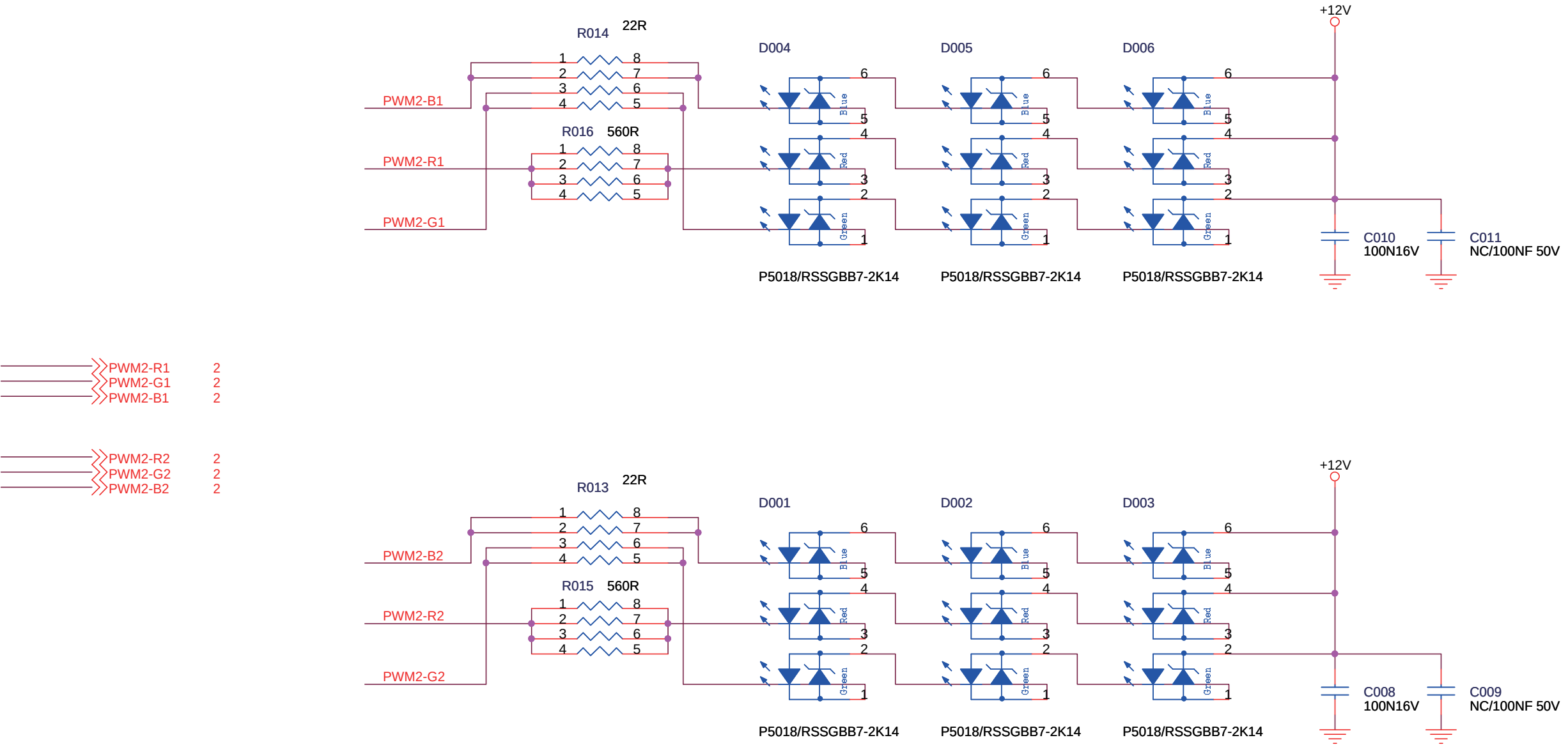
10-17-1 TCL5971

AL01



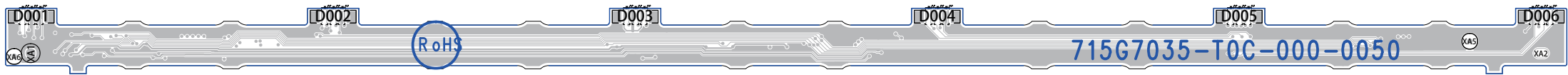
AL02 Ambilight 8-LED Master Clockwise

AL02

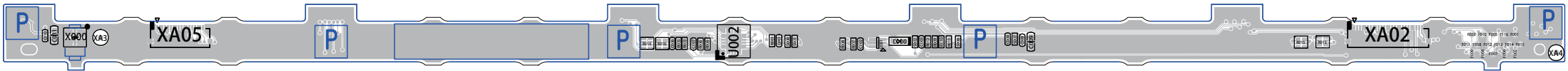


10-17-3 Ambilight Board layout

Layout Amblilight Board (top side)

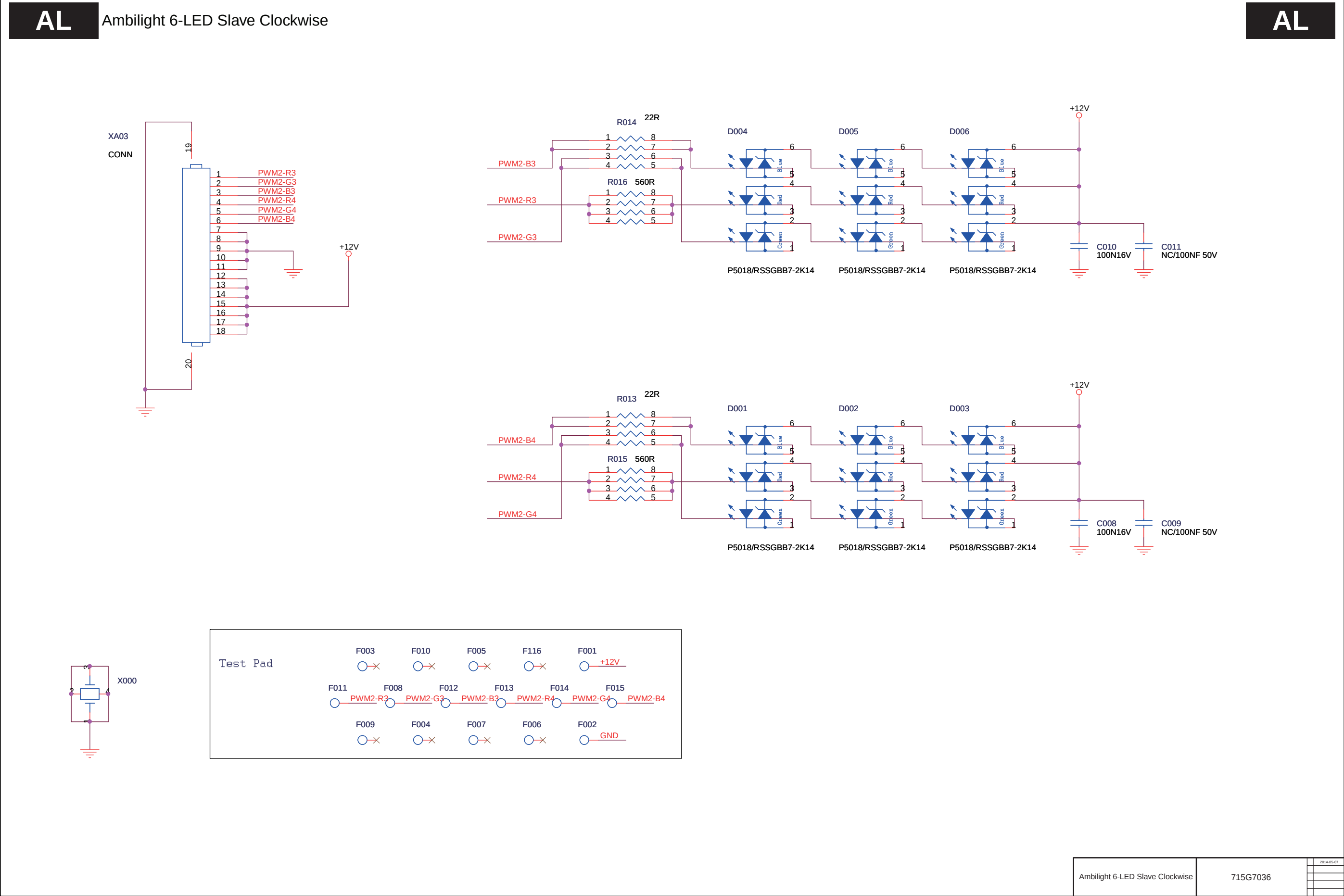


Layout Amblilight Board (bottom side)



Ambilight Board layout top/bottom	715G7035	1	2014-04-28

10.18 AL 715G7036 Amiblight Board
10-18-1 Ambilight 6-LED Slave Clockwise



Ambilight 6-LED Slave Clockwise

715G7036

2014-05-07

19792_517.eps

2015-May-29 [back to div.table](#)

10-18-2 Ambilight Board layout

Layout Ambilight Board (top side)



Layout Ambilight Board (bottom side)

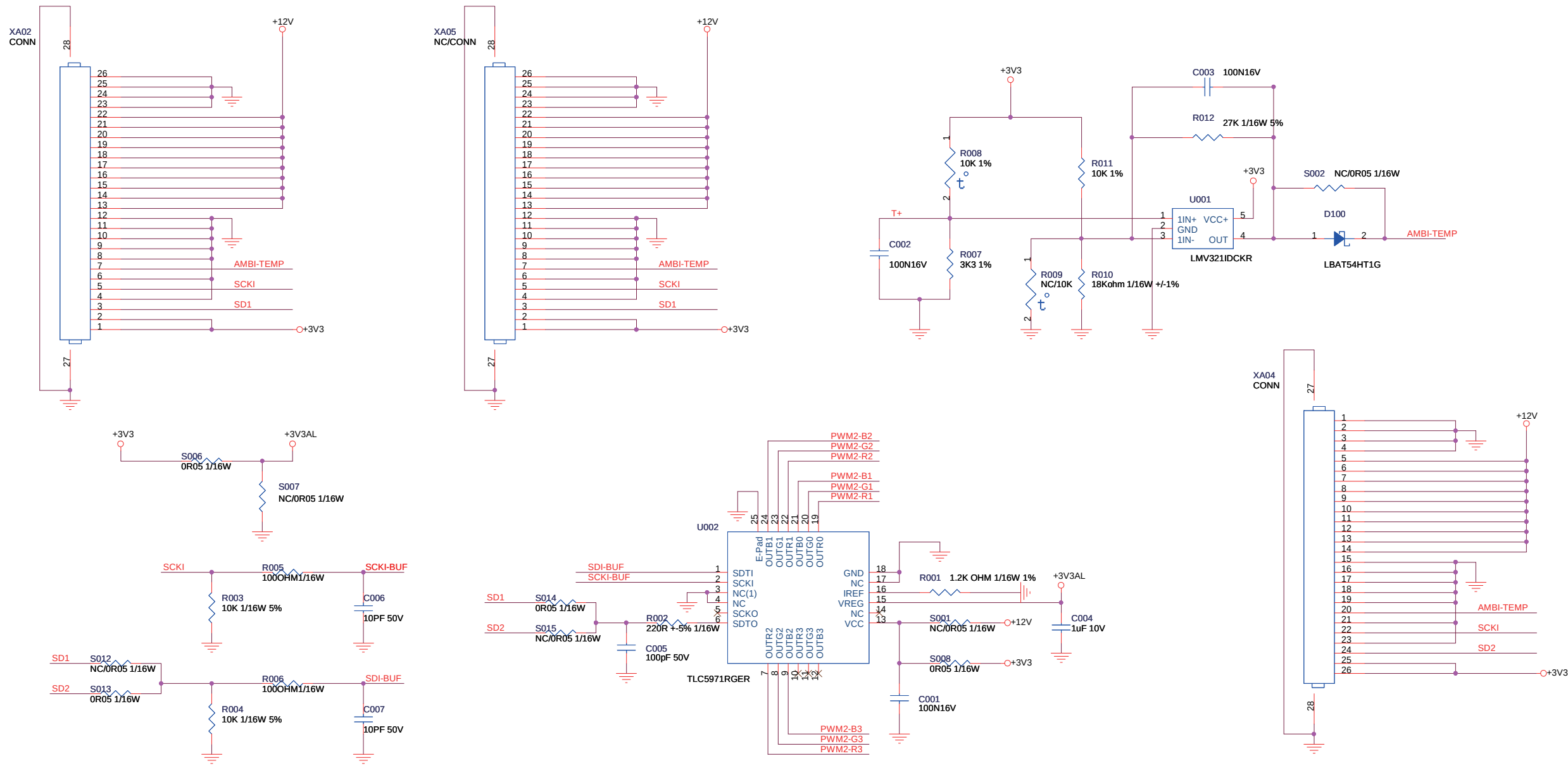


Ambilight Board layout top/bottom	715G7036	1	2014-11-01

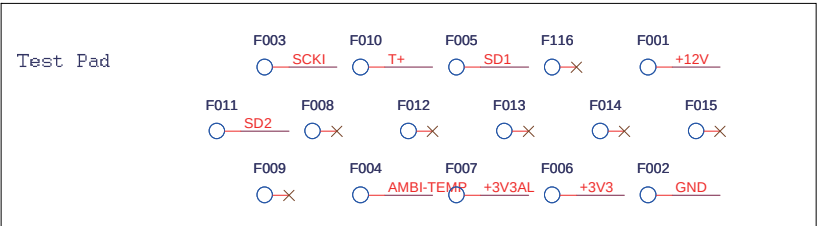
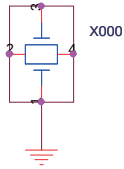
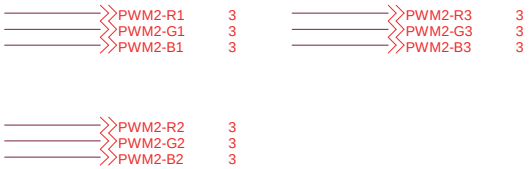
10.19 AL 715G7004 Ambilight Board
10-19-1 TCL5971

AL01 TCL5971

AL01



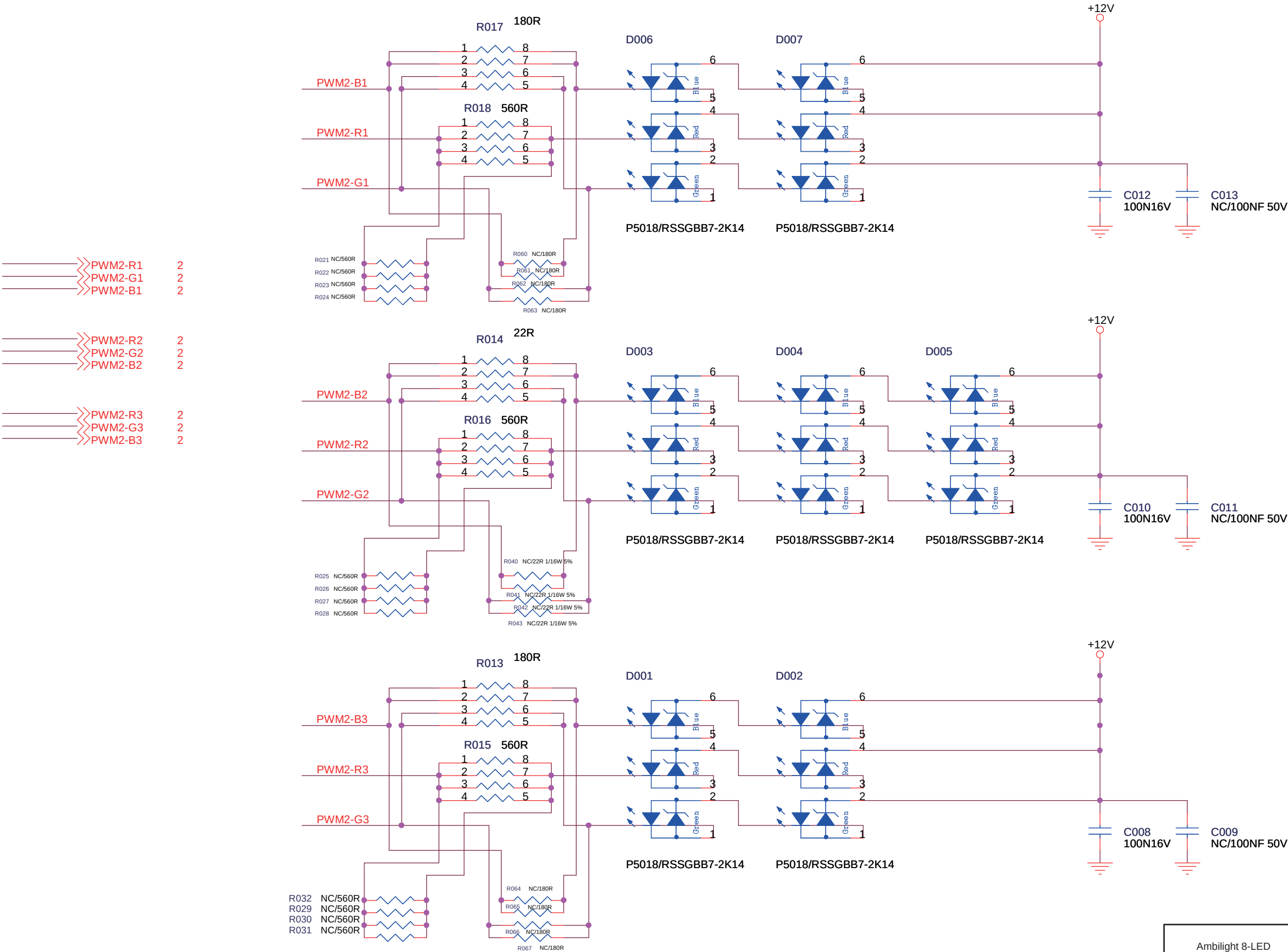
Function \ Item	S012	S013	S014	S015
CounterClockwise (XA02:IN, XA04:OUT)	YES	NO	NO	YES
Clockwise (XA02:OUT, XA04:IN)	NO	YES	YES	NO



TCL5971	715G7004	2014-08-04

AL02 Ambilight 8-LED

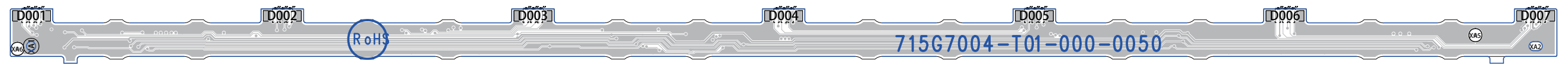
AL02



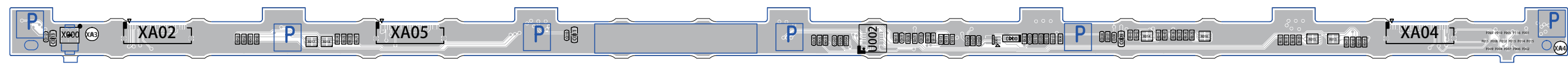
Ambilight 8-LED	715G7004	2014-07-01

10-19-3 Ambilight Board layout

Layout Ambilight Board (top side)



Layout Ambilight Board (bottom side)



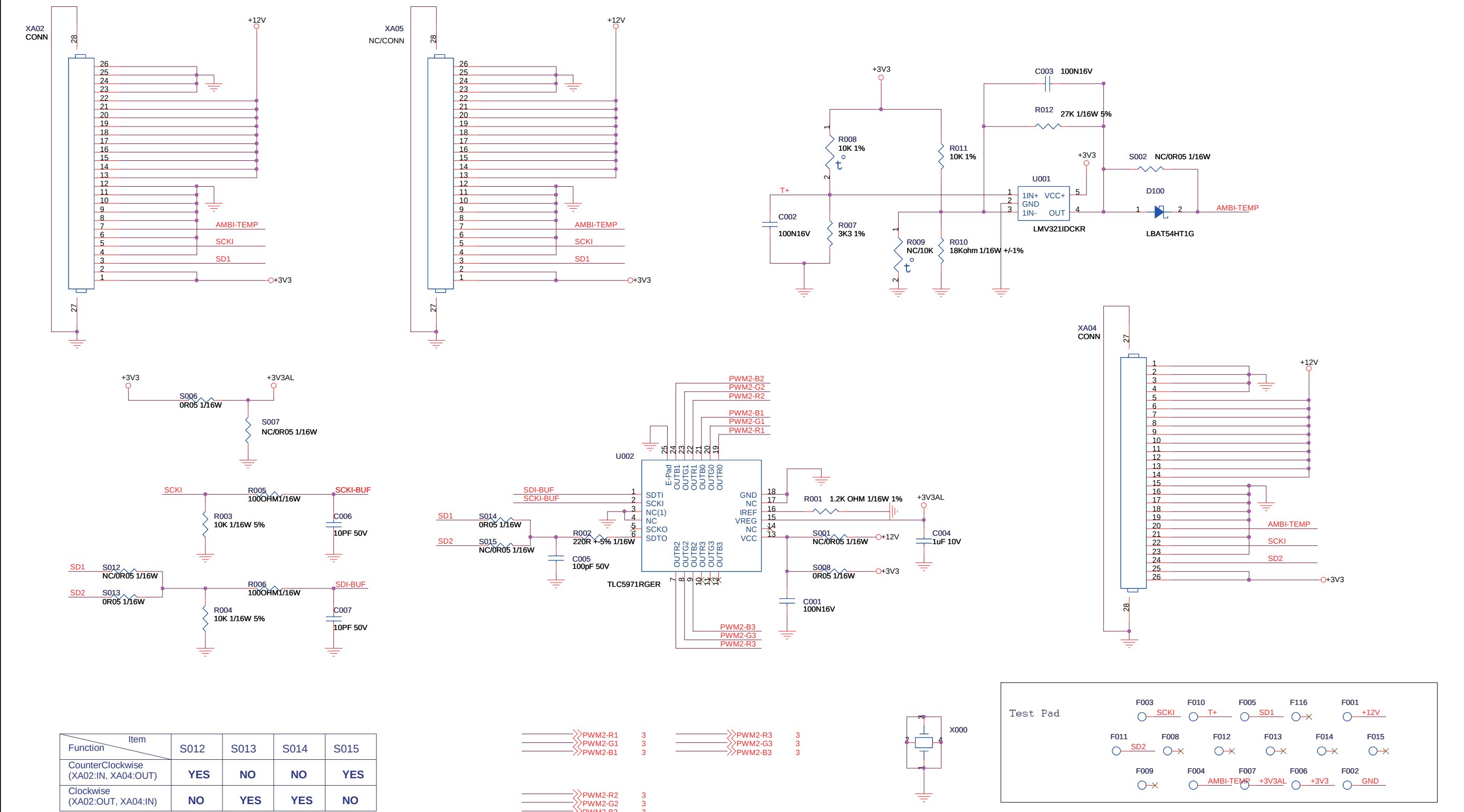
Ambilight Board layout top/bottom	715G7004	1	2014-10-01

10.20 AL 715G6981 Ambilight Board
10-20-1 TCL5971

AL01

TCL5971

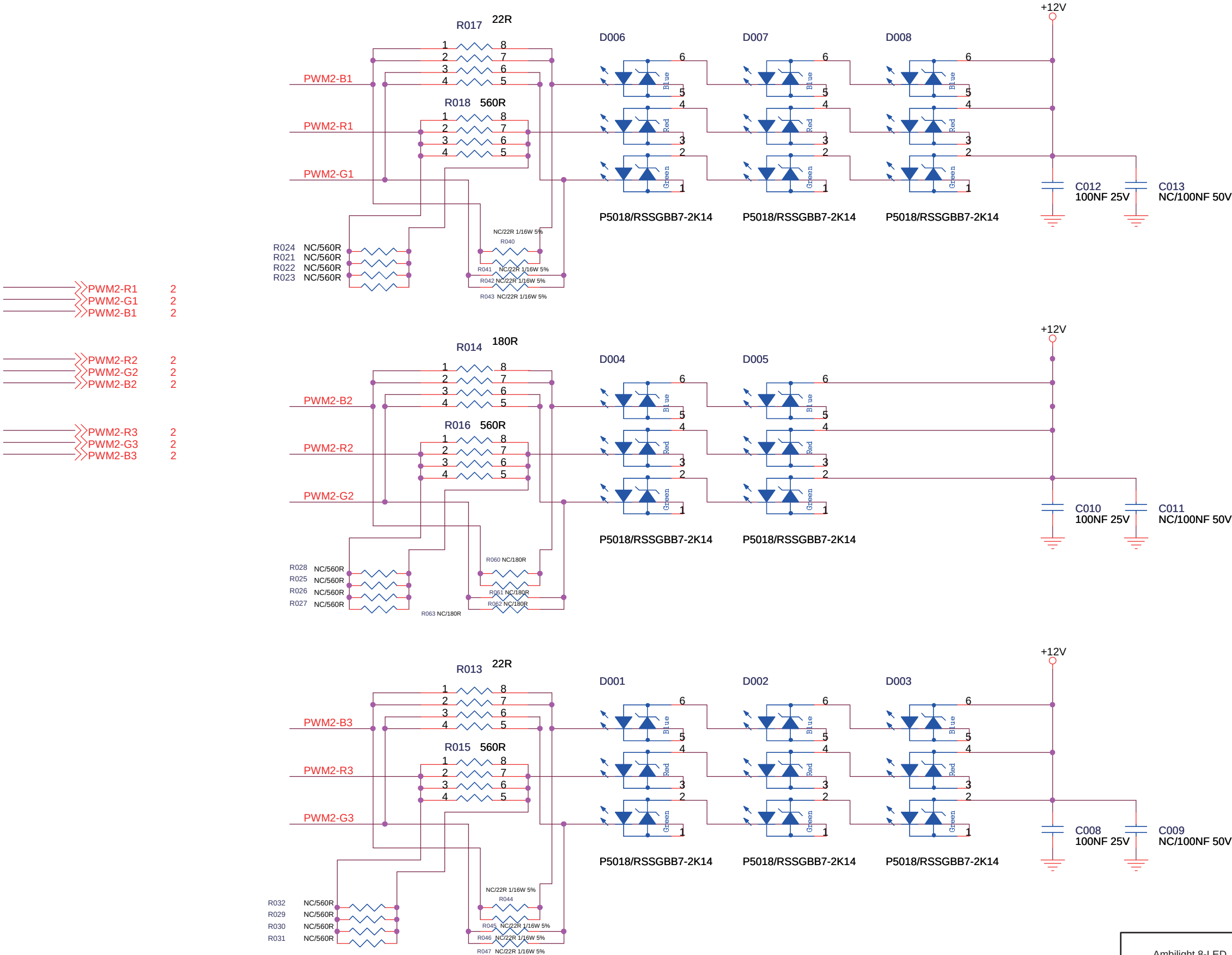
AL01



AL02

Ambilight 8-LED

AL02



Ambilight 8-LED	715G6981	2014-05-07

10-20-3 Ambilight Board layout

Layout Ambilight Board (top side)



Layout Ambilight Board (bottom side)

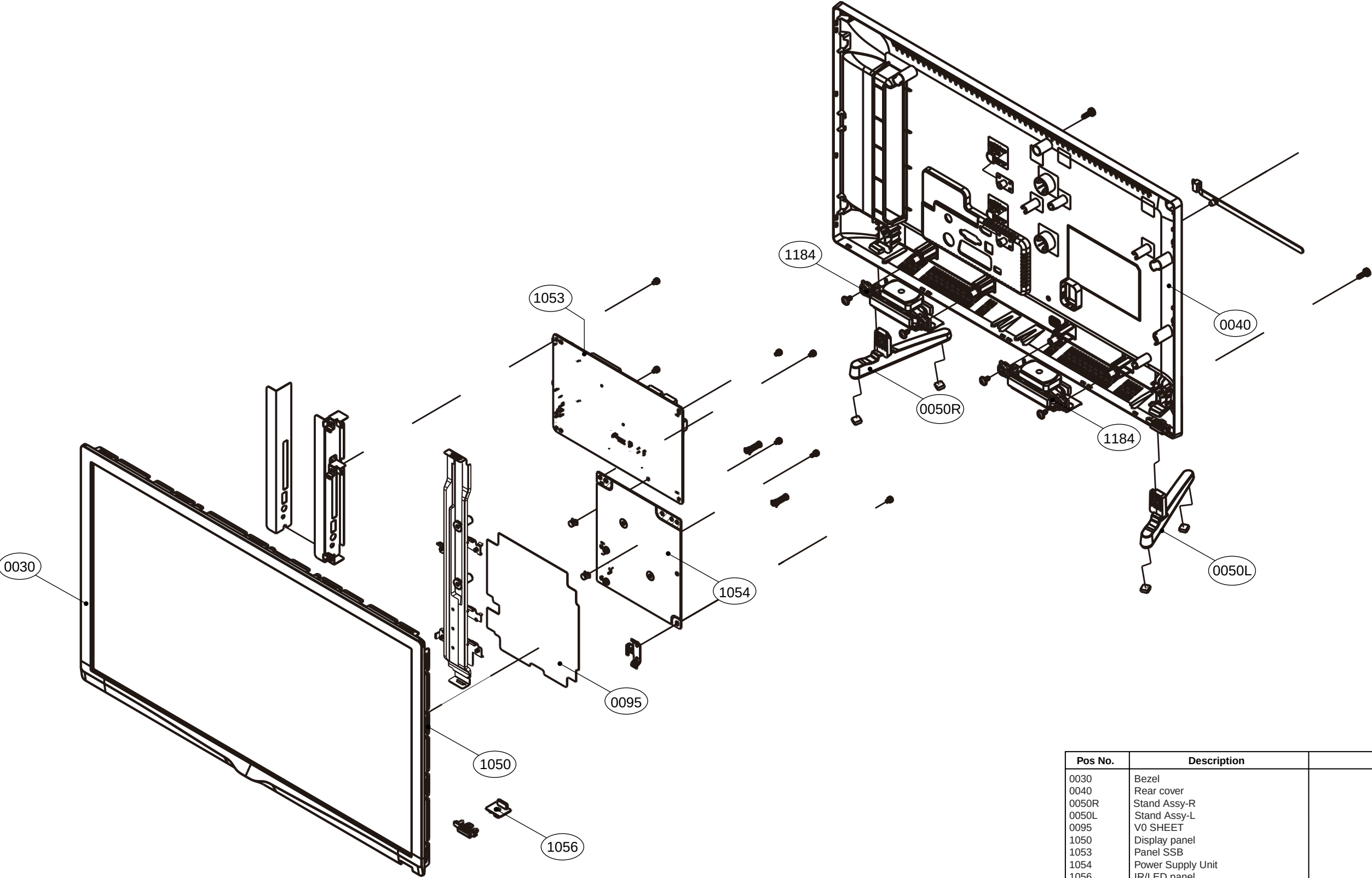


Ambilight Board layout top/bottom	715G6981	1	2024-10-22

11. Styling Sheets

11.1 4000 series 22"

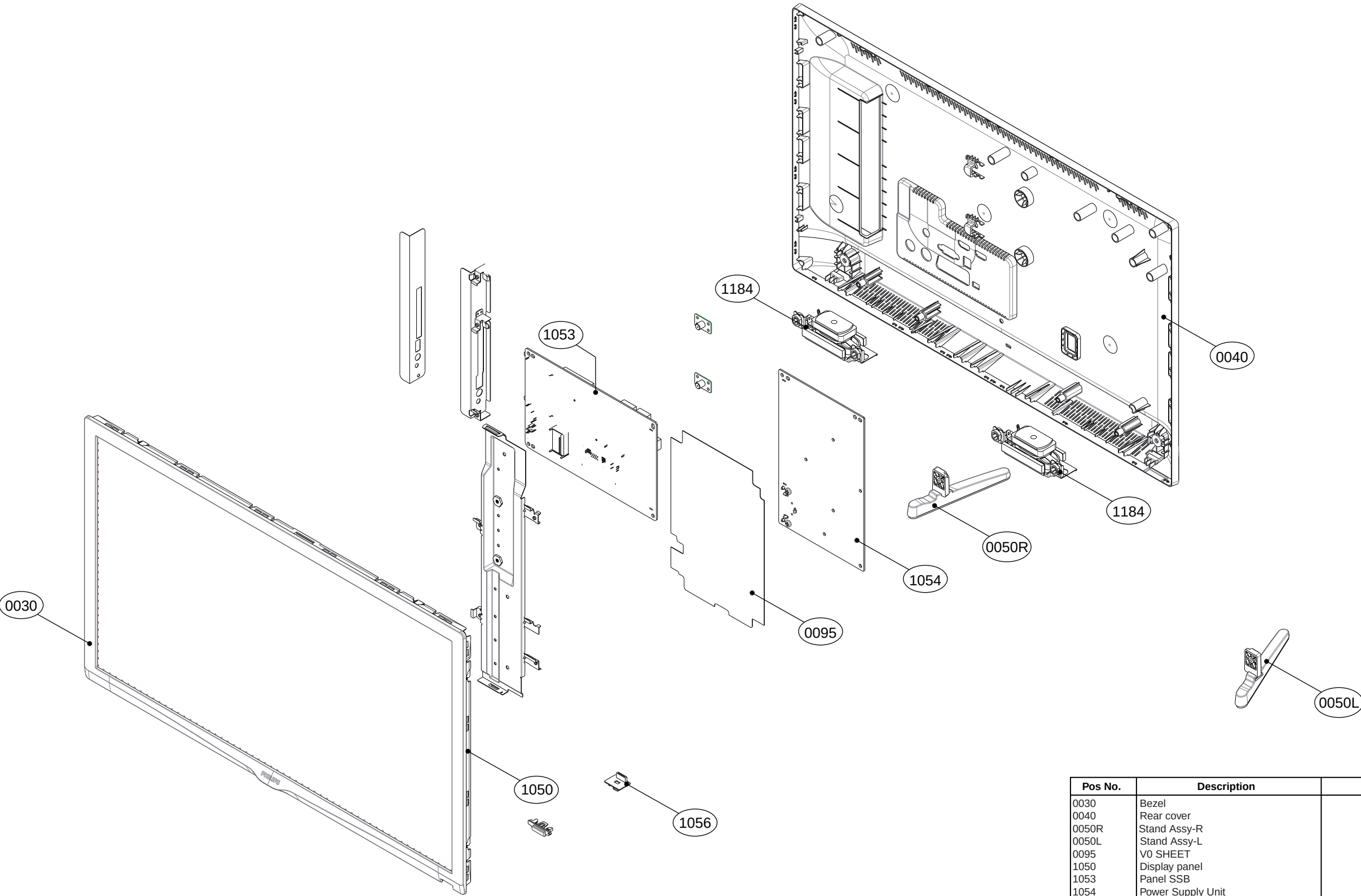
4000 series 22"



Pos No.	Description	Remarks
0030	Bezel	Not displayed
0040	Rear cover	
0050R	Stand Assy-R	
0050L	Stand Assy-L	
0095	V0 SHEET	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1176	Remote control	
1184	Speakers	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

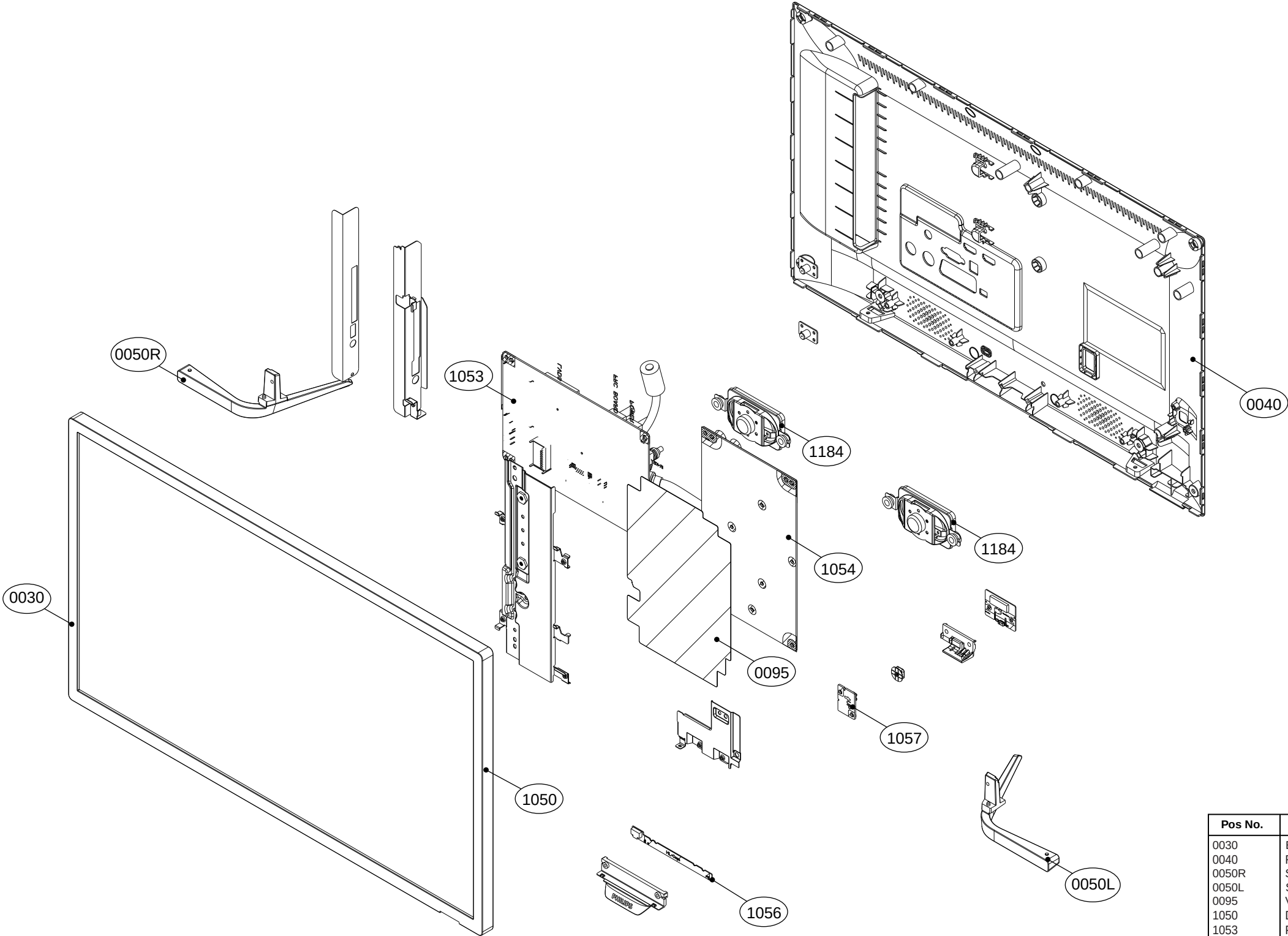
4000 series 24"



Pos No.	Description	Remarks
0030	Bezel	
0040	Rear cover	
0050R	Stand Assy-R	
0050L	Stand Assy-L	
0095	V0 SHEET	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1176	Remote control	Not displayed
1184	Speakers	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

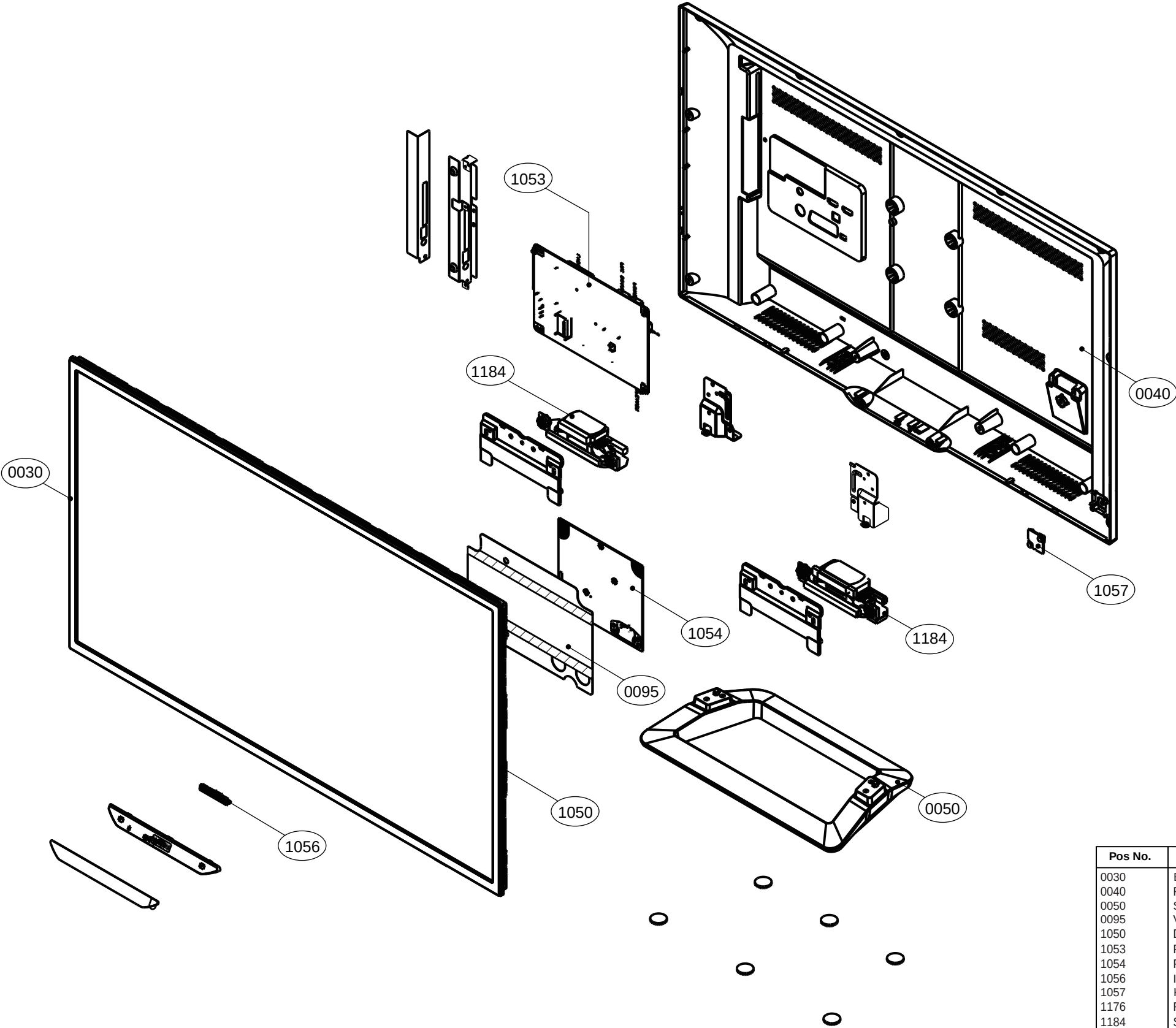
5210 series 24"



Pos No.	Description	Remarks
0030	Bezel	Not displayed
0040	Rear cover	
0050R	Stand Assy-R	
0050L	Stand Assy-L	
0095	V0 SHEET	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1057	Keyboard control panel	
1176	Remote control	
1184	Speakers	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

32PHT4100/60

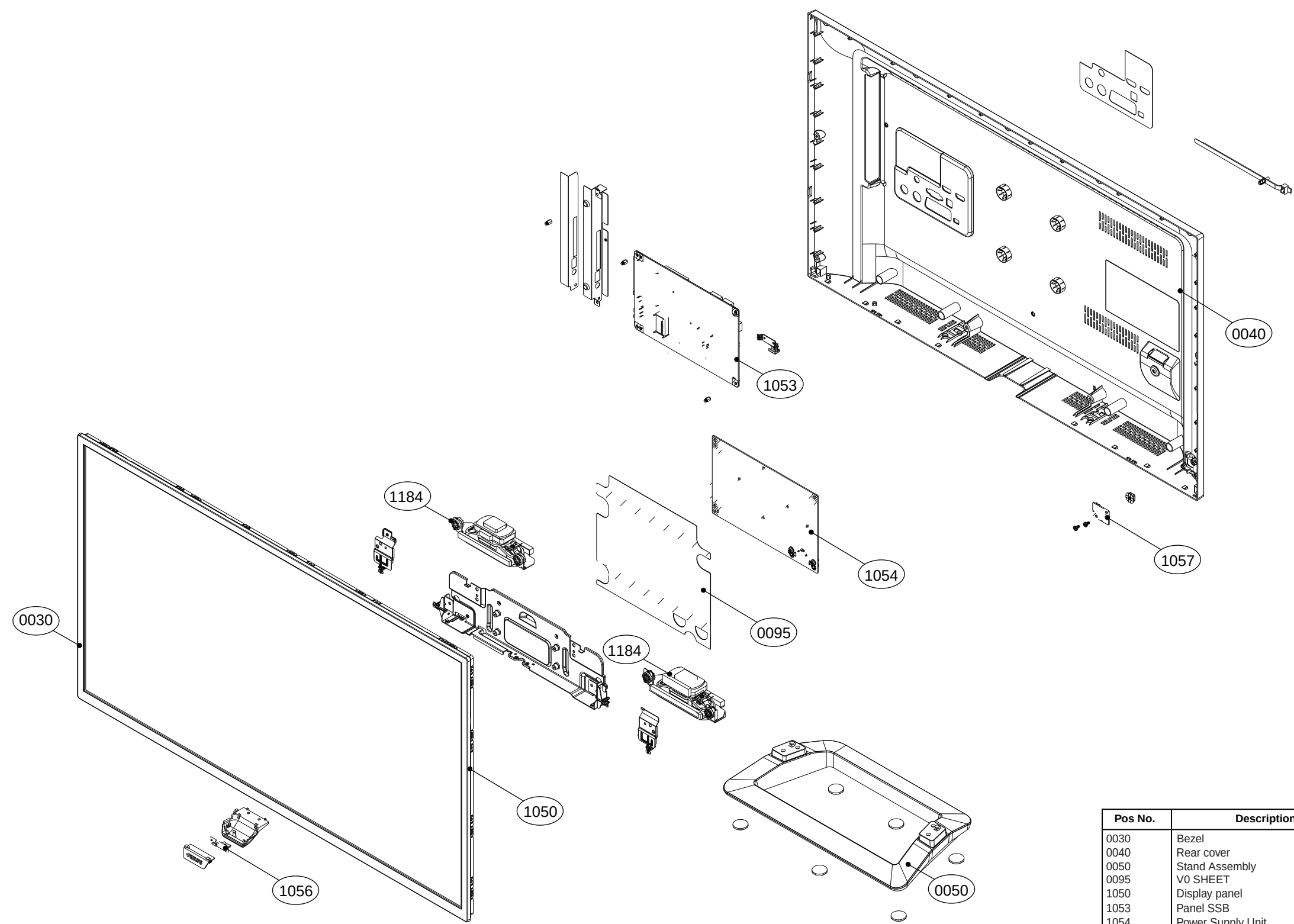


Pos No.	Description	Remarks
0030	Bezel	
0040	Rear cover	
0050	Stand Assembly	
0095	V0 SHEET	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1057	Keyboard control panel	
1176	Remote control	Not displayed
1184	Speakers	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

11.5 other 4x00 series 32"

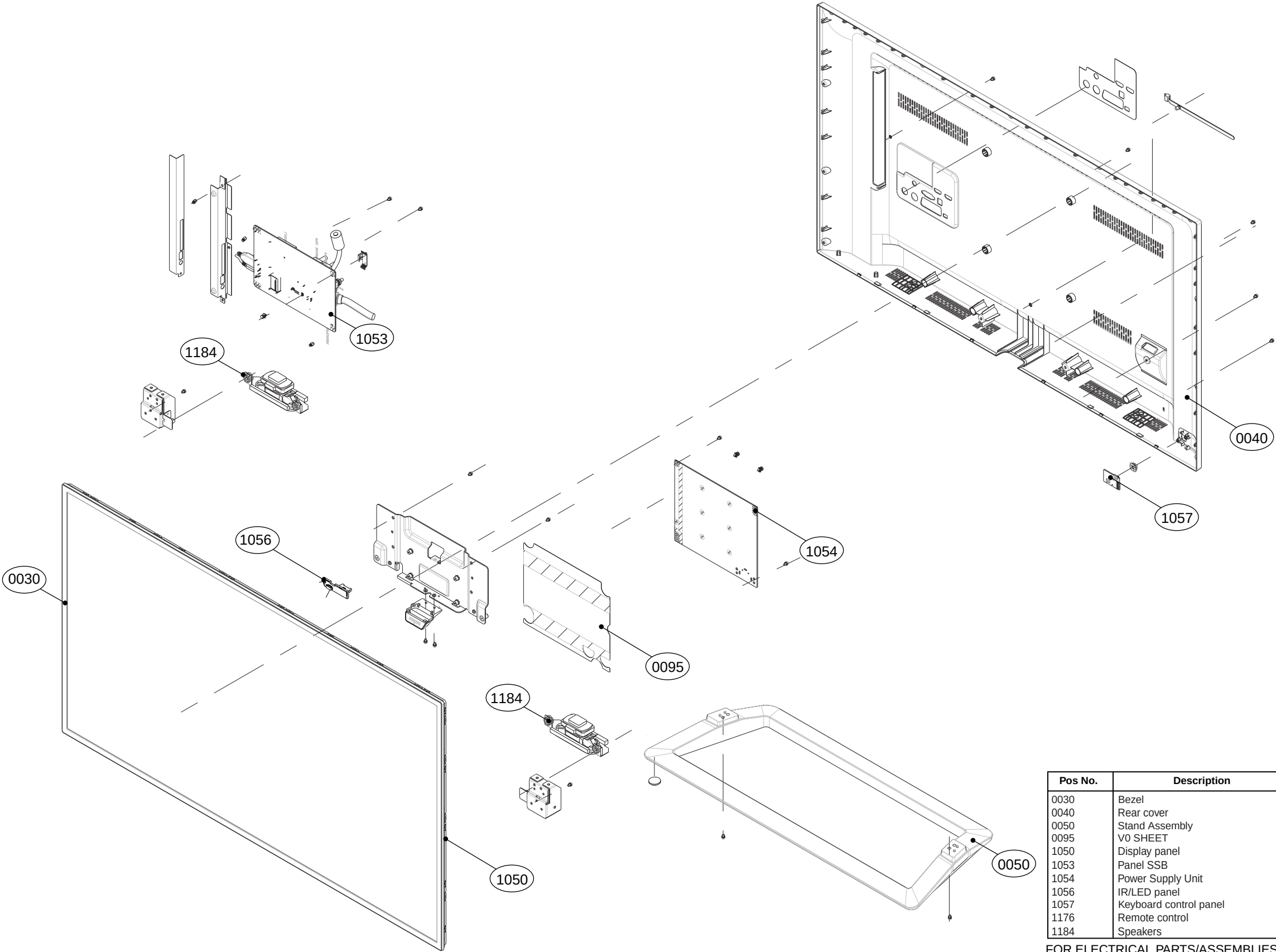
Other 4x00 series 32"



Pos No.	Description	Remarks
0030	Bezel	
0040	Rear cover	
0050	Stand Assembly	
0095	V0 SHEET	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1057	Keyboard control panel	
1176	Remote control	Not displayed
1184	Speakers	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

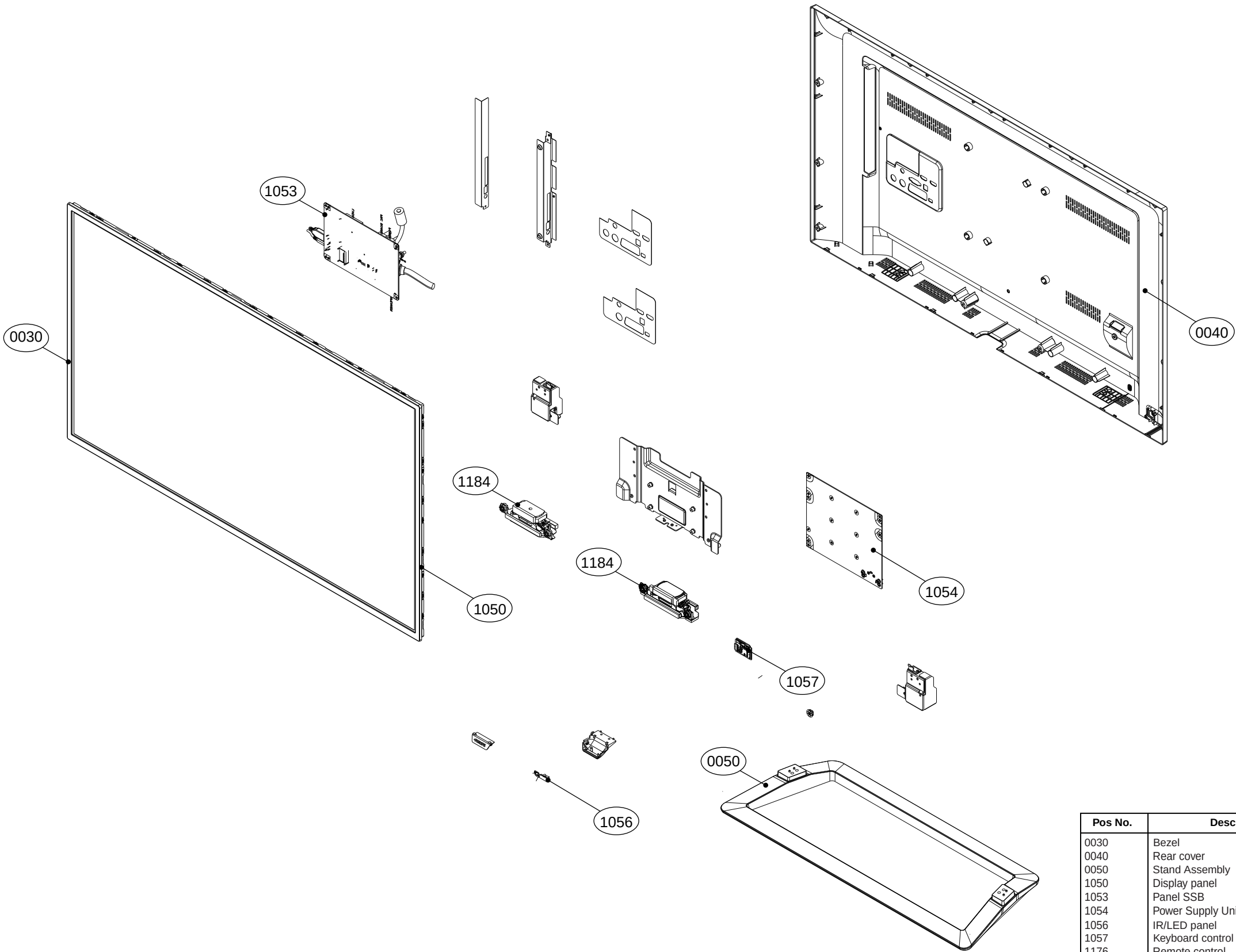
4x00 series 39"



Pos No.	Description	Remarks
0030	Bezel	
0040	Rear cover	
0050	Stand Assembly	
0095	V0 SHEET	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1057	Keyboard control panel	
1176	Remote control	Not displayed
1184	Speakers	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

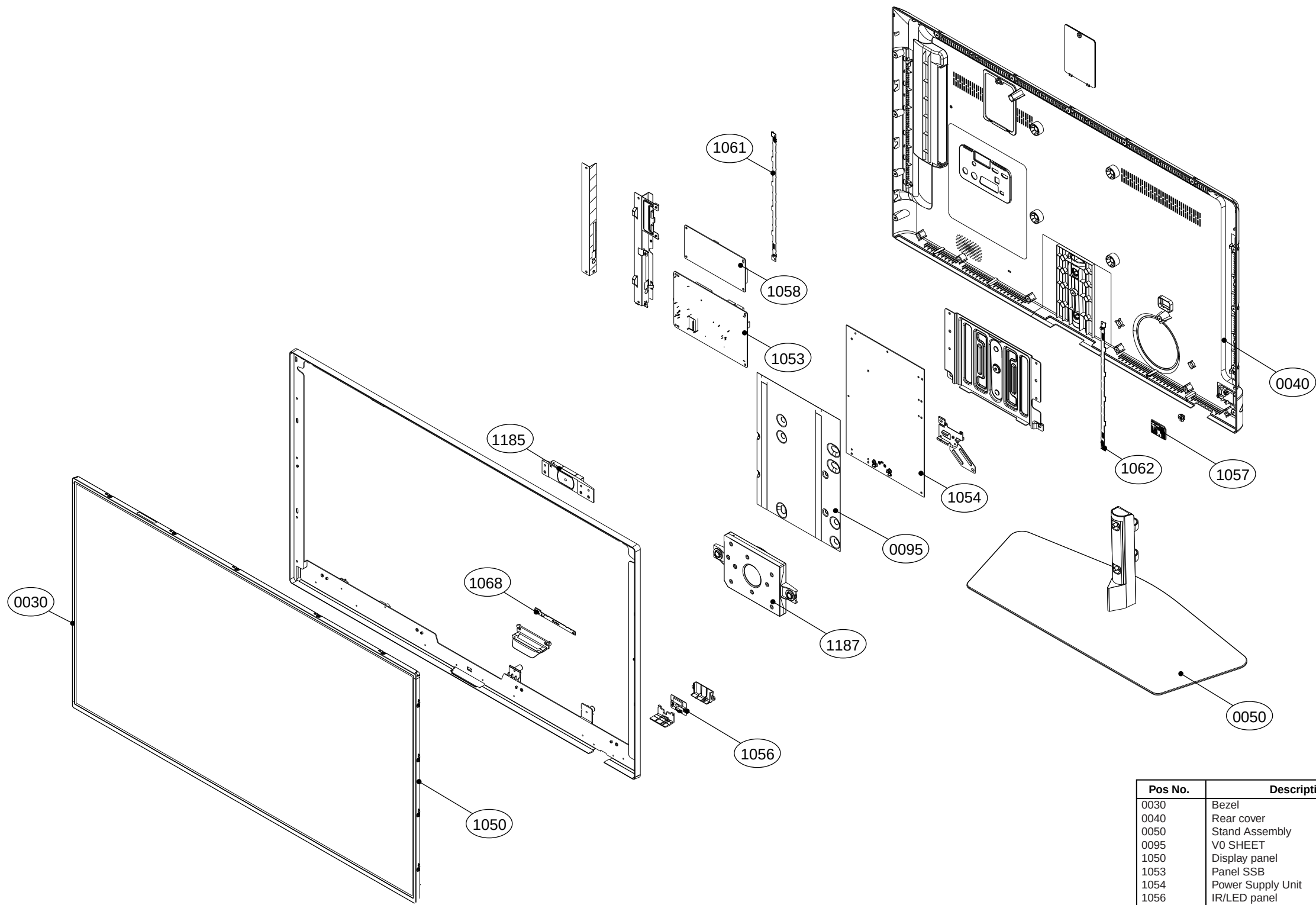
4x00 series 40"



Pos No.	Description	Remarks
0030	Bezel	Not displayed
0040	Rear cover	
0050	Stand Assembly	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1057	Keyboard control panel	
1176	Remote control	
1184	Speakers	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

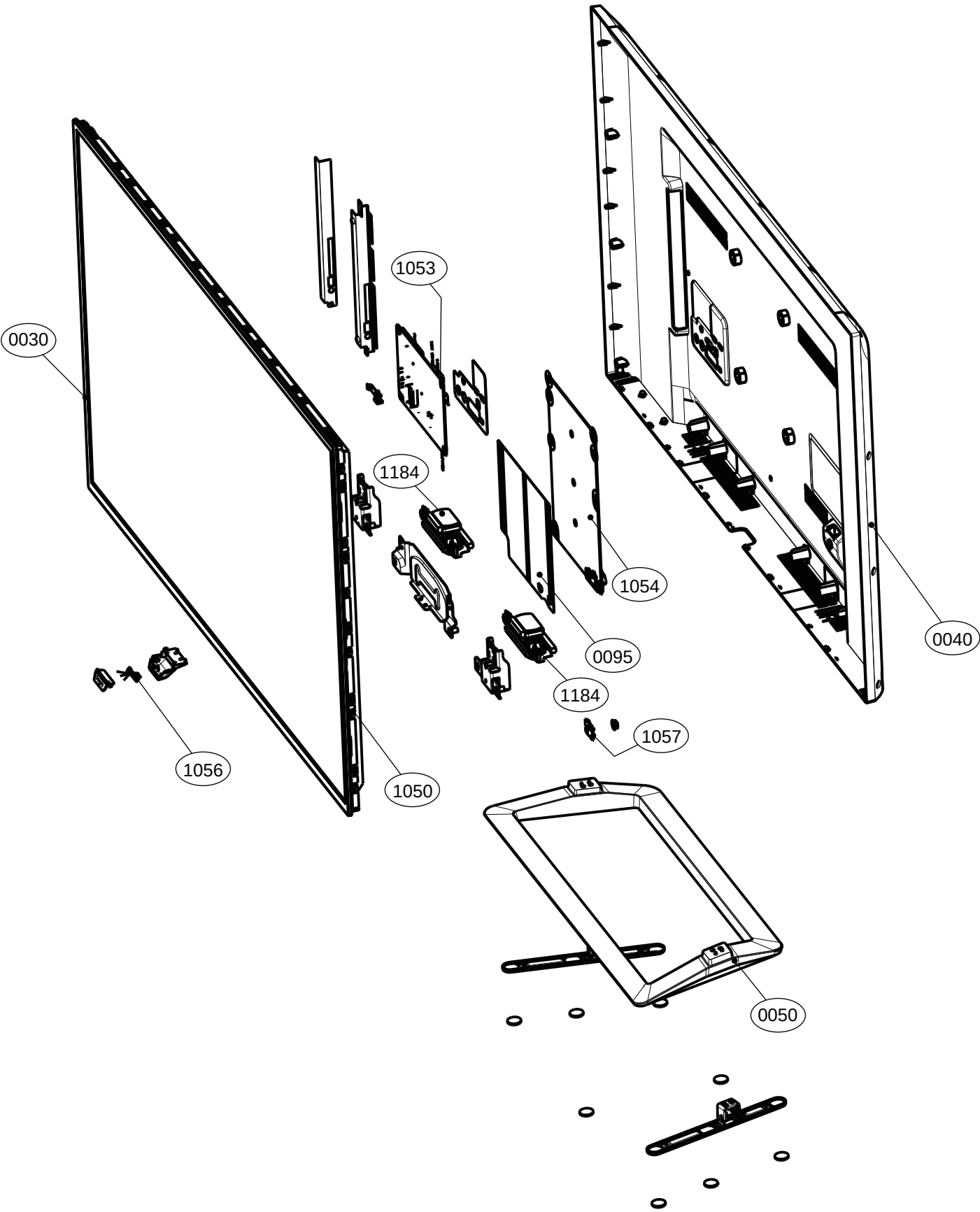
6300 series 40"



Pos No.	Description	Remarks
0030	Bezel	
0040	Rear cover	
0050	Stand Assembly	
0095	V0 SHEET	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1057	Keyboard control panel	
1058	Option Board	
1061	LED Module	
1062	LED Module	
1068	LED Logo	
1176	Remote control	Not displayed
1185	Speaker	
1187	Speaker	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

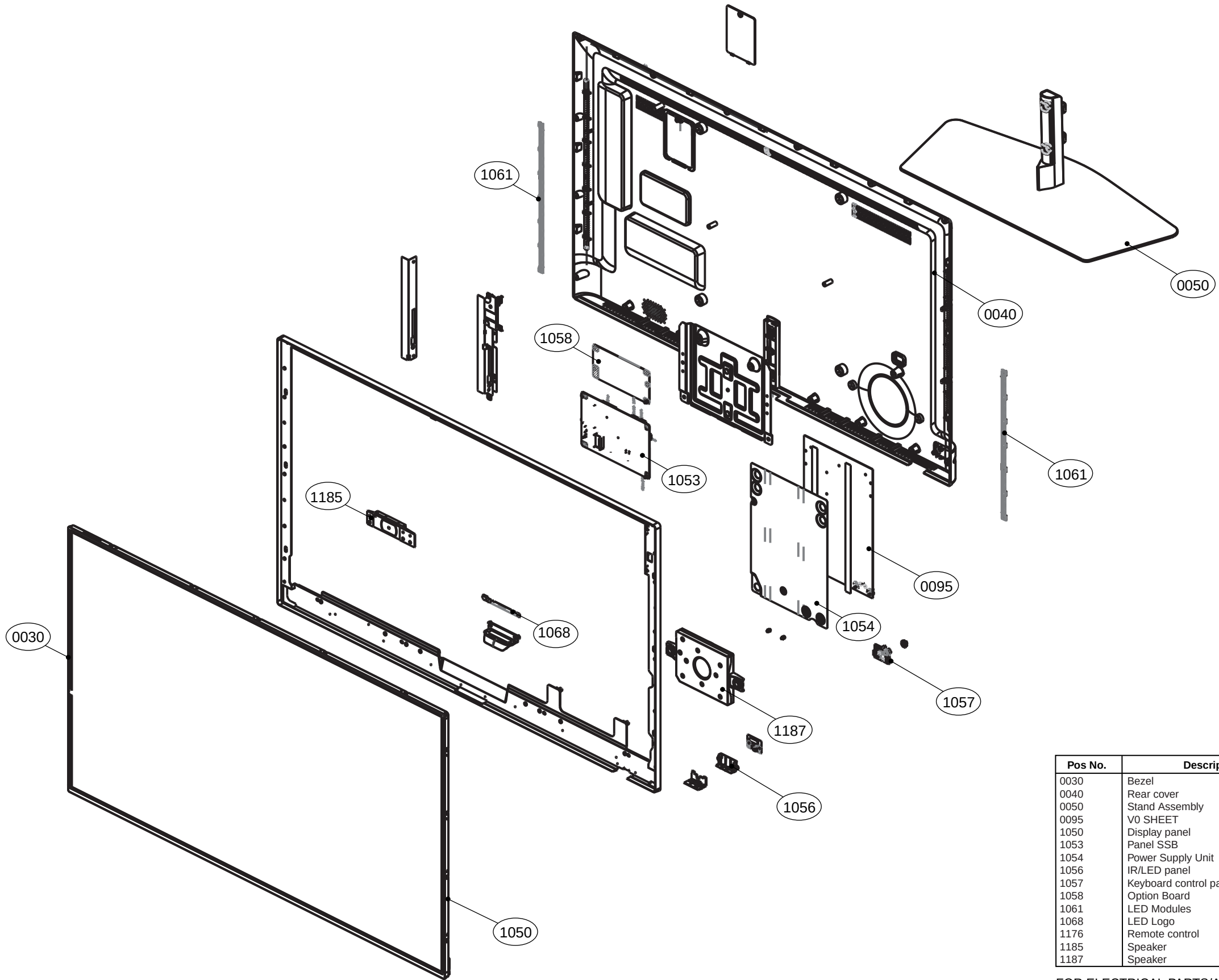
4x00 series 48"



Pos No.	Description	Remarks
0030	Bezel	Not displayed
0040	Rear cover	
0050	Stand Assembly	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1057	Keyboard control panel	
1176	Remote control	
1184	Speakers	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

6300 series 48"

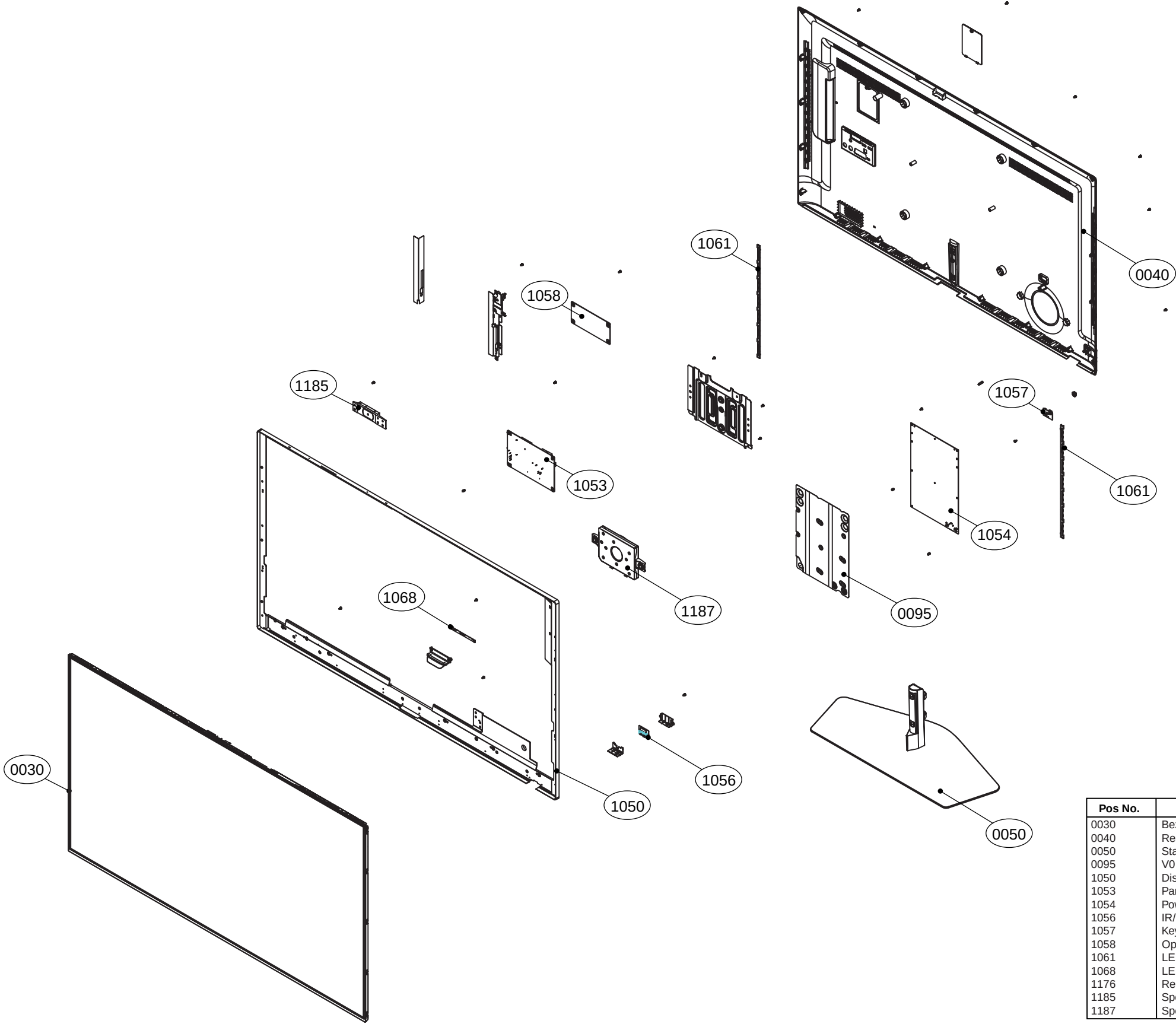


Pos No.	Description	Remarks
0030	Bezel	
0040	Rear cover	
0050	Stand Assembly	
0095	V0 SHEET	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1057	Keyboard control panel	
1058	Option Board	
1061	LED Modules	
1068	LED Logo	
1176	Remote control	Not displayed
1185	Speaker	
1187	Speaker	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

11.11 6300 series 55"

6300 series 55"



Pos No.	Description	Remarks
0030	Bezel	
0040	Rear cover	
0050	Stand Assembly	
0095	V0 SHEET	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1057	Keyboard control panel	
1058	Option Board	
1061	LED Modules	
1068	LED Logo	
1176	Remote control	Not displayed
1185	Speaker	
1187	Speaker	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9