Colour Television

Chassis

TPM15.6L

LA

Service
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Service

Service Manual

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1. Revision List

Manual xxxx xxx xxxx.0

- First release.

Manual xxxx xxx xxxx.1

- **Chapter 2:** Updated table 2.1 Technical Specifications and connection 2.4 Connections (for 4100 series).
- **Chapter 4:** Added figure 4-1 Cable dressing (24" PHG4100 series) and section 4.4 Assembly/Panel Removal (for 4100 series).
- **Chapter 6:** Updated tables 6-2 White tone default settings and 6-3 Display code overview.
- **Chapter 7:** Updated table 7-1 Connector overview.
- **Chapter 10:** Added circuit diagram 10.7 J 715G7325 IR/LED Panel.
- **Chapter 11:** Added styling sheet 11.2 4100 series 24".

2. Technical Specs, Diversity, and Connections

Index of this chapter:

2.1 Technical Specifications
2.2 Directions for Use
2.3 Connections (for 5000 series)
2.4 Connections (for 4100 series)
2.5 Chassis Overview

Notes:

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

2.1 Technical Specifications

For on-line product support please use the links in back to div.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

	2	4				9	10				11
		Mechanics					Schematics				
CTN	Connection Overview	Wire Dressing	Rear Cover Removal	Stand Removal	SSB Removal	Block Diagram	Power Supply	SSB	J (IR/LED)	E (Key board/Leading Edge)	Styling
24PHG4100/77	2-5	4-1	4-10	4-10	4-12	9.1	10.2	10.5	10.7	10.8	11 2
32PFG5000/77	2-1	4-2	4-7	4-6	4-9	9.1	10.1	10.5	10.6	10.8	11.1
32PHG5000/77	2-1	4-3	4-7	4-6	4-9	9.1	10.2	10.5	10.6	10.8	11.1
40PFG5000/77	2-1	4-4	4-7	4-6	4-9	9.1	10.3	10.5	10.6	10.8	11 3
48PFG5000/77	2-1	4-5	4-7	4-6	4-9	9.1	10.4	10.5	10.6	10.8	11.4

2.2 Directions for Use

Directions for use can be downloaded from the following websites:
http://www.philips.com/support
http://www.p4c.philips.com

2.3 Connections (for 5000 series)

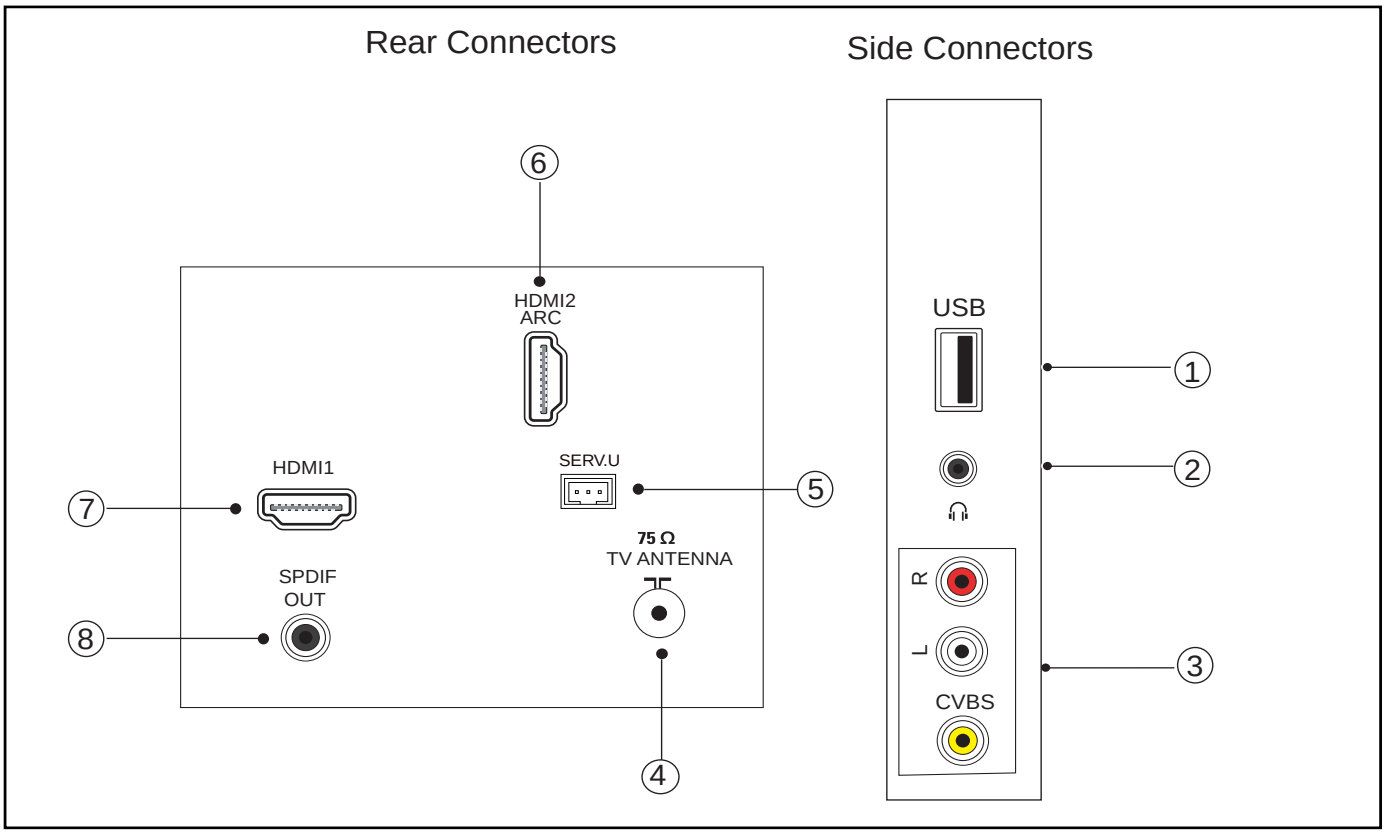

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Figure 2-1 Connection overview

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

2.3.1 Side Connections

1 - USB2 2.0

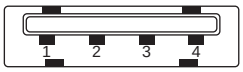

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Figure 2-2 USB (type A)

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

2- Head phone (Output)

Bk	- Head phone	80 - 600 W / 10 mW

3 - EXT: Video YPbPr - In, Audio - In

Gn	- Video - CBVS2	1 V_{PP} / 75 W
Wh	- Audio - L	0.5 V_{RMS} / 10 kW
Rd	- Audio - R	0.5 V_{RMS} / 10 kW

2.3.2 Rear Connections

4- TV ANTENNA - In

Signal input from an antenna, cable or satellite.

5 - Service / UART

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

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

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Figure 2-3 HDMI (type A) connector

1	- D2+	Data channel	
2	- Shield	Gnd	
3	- D2-	Data channel	
4	- D1+	Data channel	
5	- Shield	Gnd	
6	- D1-	Data channel	
7	- D0+	Data channel	
8	- Shield	Gnd	
9	- D0-	Data channel	
10	- CLK+	Data channel	
11	- Shield	Gnd	
12	- CLK-	Data channel	
13	- 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	

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

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Figure 2-4 HDMI (type A) connector

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

8 - Cinch: Digital Audio - Out

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

2.4 Connections (for 4100 series)

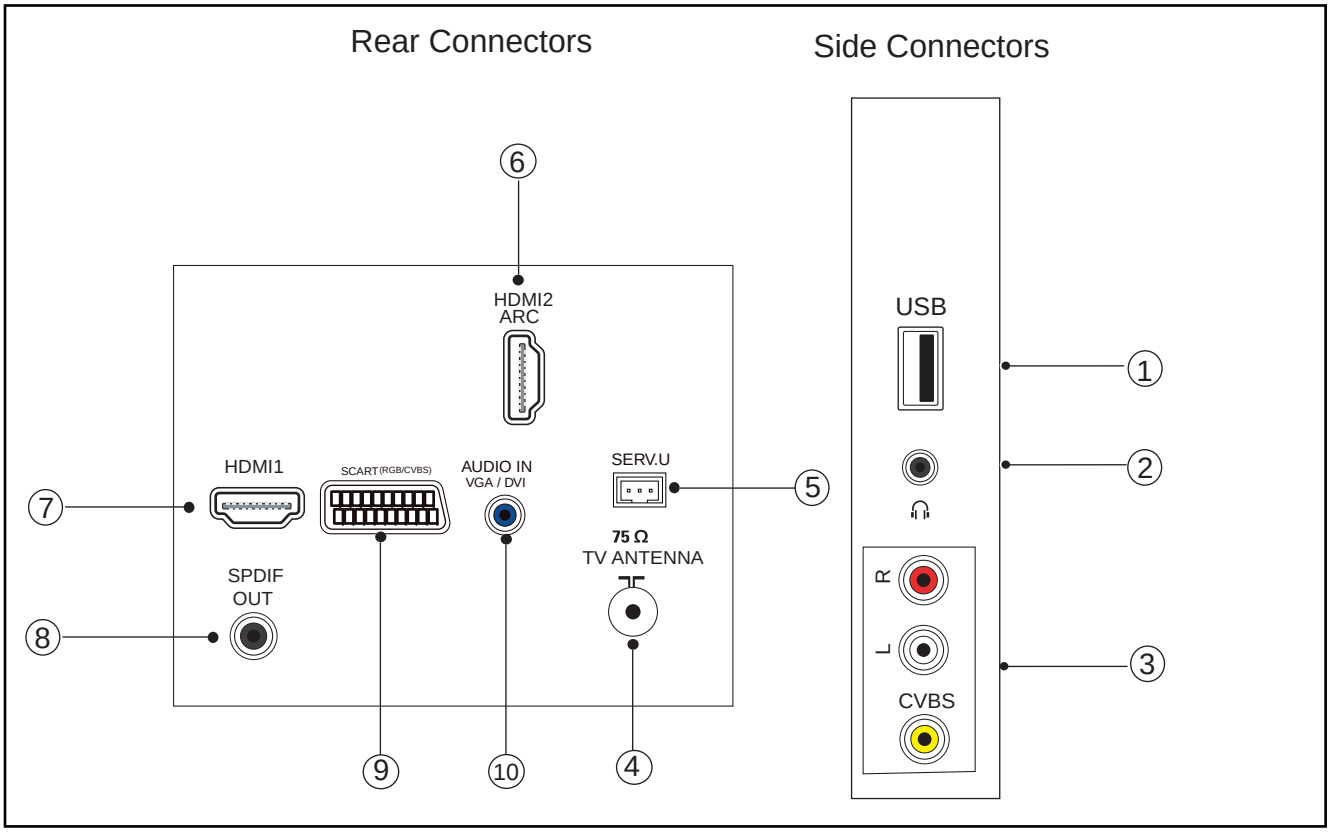

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Figure 2-5 Connection overview

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.

2.4.1 Side Connections

1 - USB2 2.0

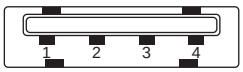

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Figure 2-6 USB (type A)

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

2- Head phone (Output)

Bk	- Head phone	80 - 600 W / 10 mW

3 - EXT: Video YPbPr - In, Audio - In

Gn	- Video - CBVS2	1 V_{PP} / 75 W
Wh	- Audio - L	0.5 V_{RMS} / 10 kW
Rd	- Audio - R	0.5 V_{RMS} / 10 kW

2.4.2 Rear Connections

4- TV ANTENNA - In

Signal input from an antenna, cable or satellite.

5 - Service / UART

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

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

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Figure 2-7 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	

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

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Figure 2-8 HDMI (type A) connector

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

8 - Cinch: Digital Audio - Out

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

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

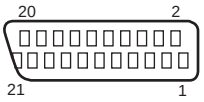

Figure 2-9 HDMI (type A) connector

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	

10 - Audio - In: Left / Right, VGA

Bu	- Audio L/R in	0.5 V_{RMS} / 10 kW	

2.5 Chassis Overview

Refer to 9. Block Diagrams for PWB/CBA locations.

3. Precautions, Notes, and Abbreviation List

Index of this chapter:

3.1 Safety Instructions
3.2 Warnings
3.3 Notes
3.4 Abbreviation List

3.1 Safety Instructions

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

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

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

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

3.2 Warnings

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

3.3 Notes

3.3.1 General

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground (⏚), or hot ground (⏚), depending on the tested area of circuitry. The voltages and waveforms shown in the diagrams are indicative. Measure them in the Service Default Mode with a colour bar signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 475.25 MHz for PAL, or 61.25 MHz for NTSC (channel 3).
- Where necessary, measure the waveforms and voltages with (⊓) and without (⊼) aerial signal. Measure the voltages in the power supply section both in normal operation (⏻) and in stand-by (⏻). These values are indicated by means of the appropriate symbols.

3.3.2 Schematic Notes

- All resistor values are in ohms, and the value multiplier is often used to indicate the decimal point location (e.g. 2K2 indicates 2.2 kΩ).
- Resistor values with no multiplier may be indicated with either an “E” or an “R” (e.g. 220E or 220R indicates 220 Ω).
- All capacitor values are given in micro-farads ($\mu = \times 10^{-6}$), nano-farads ($n = \times 10^{-9}$), or pico-farads ($p = \times 10^{-12}$).
- Capacitor values may also use the value multiplier as the decimal point indication (e.g. 2p2 indicates 2.2 pF).
- An “asterisk” (*) indicates component usage varies. Refer to the diversity tables for the correct values.
- The correct component values are listed on the Philips Spare Parts Web Portal.

3.3.3 Spare Parts

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

3.3.4 BGA (Ball Grid Array) ICs

Introduction

For more information on how to handle BGA devices, visit this URL: http://www.atyourservice-magazine.com. Select “Magazine”, then go to “Repair downloads”. Here you will find Information on how to deal with BGA-ICs.

BGA Temperature Profiles

For BGA-ICs, you **must** use the correct temperature-profile. Where applicable and available, this profile is added to the IC Data Sheet information section in this manual.

3.3.5 Lead-free Soldering

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

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

3.3.6 Alternative BOM identification

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

The **third digit** in the serial number (example: AG**2**B0335000001) 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: AG**1**B033500001), then the TV set has been manufactured according to B.O.M. number 1. If the third digit is a “2” (example: AG**2**B0335000001), 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 Planet / Copy Protection
CSM	Customer Service Mode
CTI	Color Transient Improvement: manipulates steepness of chroma transients
CVBS	Composite Video Blanking and Synchronization
DAC	Digital to Analogue Converter
DBE	Dynamic Bass Enhancement: extra low frequency amplification
DCM	Data Communication Module. Also referred to as System Card or Smartcard (for iTV).
DDC	See “E-DDC”
D/K	Monochrome TV system. Sound carrier distance is 6.5 MHz
DFI	Dynamic Frame Insertion
DFU	Directions For Use: owner's manual
DMR	Digital Media Reader: card reader
DMSD	Digital Multi Standard Decoding
DNM	Digital Natural Motion

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

PDP	Plasma Display Panel
PFC	Power Factor Corrector (or Pre-conditioner)
PIP	Picture In Picture
PLL	Phase Locked Loop. Used for e.g. FST tuning systems. The customer can give directly the desired frequency
POD	Point Of Deployment: a removable CAM module, implementing the CA system for a host (e.g. a TV-set)
POR	Power On Reset, signal to reset the uP
PSDL	Power Supply for Direct view LED backlight with 2D-dimming
PSL	Power Supply with integrated LED drivers
PSLS	Power Supply with integrated LED drivers with added Scanning functionality
PTC	Positive Temperature Coefficient, non-linear resistor
PWB	Printed Wiring Board (same as “PCB”)
PWM	Pulse Width Modulation
QRC	Quasi Resonant Converter
QTNR	Quality Temporal Noise Reduction
QVCP	Quality Video Composition Processor
RAM	Random Access Memory
RGB	Red, Green, and Blue. The primary color signals for TV. By mixing levels of R, G, and B, all colors (Y/C) are reproduced.
RC	Remote Control
RC5 / RC6	Signal protocol from the remote control receiver
RESET	RESET signal
ROM	Read Only Memory
RSDS	Reduced Swing Differential Signalling data interface
R-TXT	Red TeleteXT
SAM	Service Alignment Mode
S/C	Short Circuit
SCART	Syndicat des Constructeurs d'Appareils Radiorécepteurs et Téléviseurs
SCL	Serial Clock I^2C
SCL-F	CLock Signal on Fast I^2C bus
SD	Standard Definition
SDA	Serial Data I^2C
SDA-F	DAta Signal on Fast I^2C bus
SDI	Serial Digital Interface, see “ITU-656”
SDRAM	Synchronous DRAM
SECAM	SEequence Couleur Avec Mémoire. Colour system mainly used in France and East Europe. Colour carriers = 4.406250 MHz and 4.250000 MHz
SIF	Sound Intermediate Frequency
SMPS	Switched Mode Power Supply
SoC	System on Chip
SOG	Sync On Green
SOPS	Self Oscillating Power Supply
SPI	Serial Peripheral Interface bus; a 4-wire synchronous serial data link standard
S/PDIF	Sony Philips Digital InterFace
SRAM	Static RAM
SRP	Service Reference Protocol
SSB	Small Signal Board
SSC	Spread Spectrum Clocking, used to reduce the effects of EMI
STB	Set Top Box
STBY	STand-BY
SVGA	800 × 600 (4:3)
SVHS	Super Video Home System
SW	Software
SWAN	Spatial temporal Weighted Averaging Noise reduction
SXGA	1280 × 1024
TFT	Thin Film Transistor
THD	Total Harmonic Distortion
TMDS	Transmission Minimized Differential Signalling
TS	Transport Stream
TXT	TeleteXT
TXT-DW	Dual Window with TeleteXT
UI	User Interface
uP	Microprocessor
UXGA	1600 × 1200 (4:3)
V	V-sync to the module
VESA	Video Electronics Standards Association
VGA	640 × 480 (4:3)
VL	Variable Level out: processed audio output toward external amplifier
VSB	Vestigial Side Band; modulation method
WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
WXGA	1280 × 768 (15:9)
XTAL	Quartz crystal
XGA	1024 × 768 (4:3)
Y	Luminance signal
Y/C	Luminance (Y) and Chrominance (C) signal
YPbPr	Component video. Luminance and scaled color difference signals (B-Y and R-Y)
YUV	Component video

4. Mechanical Instructions

Index of this chapter:

4.1 Cable Dressing
4.2 Service Positions
4.3 Assembly/Panel Removal (for 5000 series)
4.4 Assembly/Panel Removal (for 4100 series)
4.5 Set Re-assembly

Notes:

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

4.1 Cable Dressing

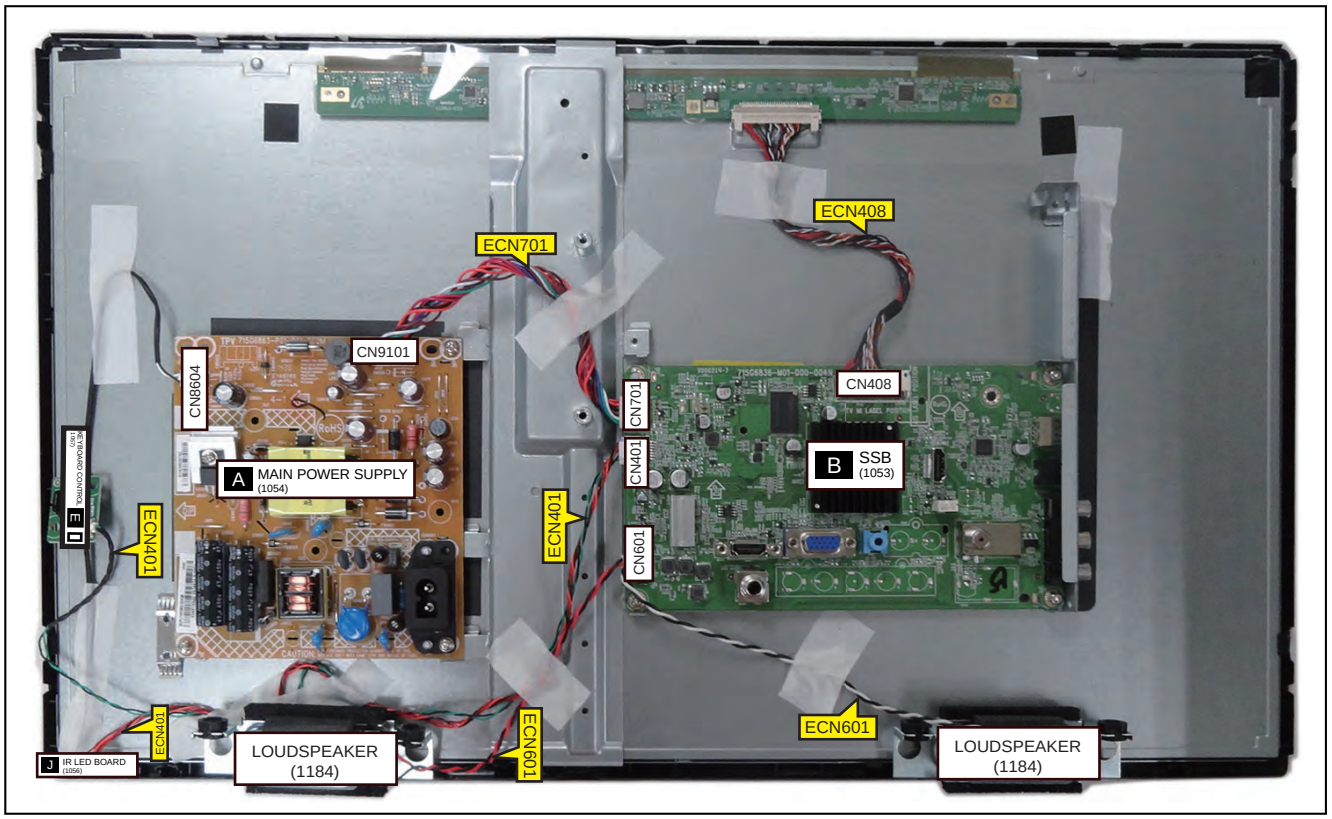

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Figure 4-1 Cable dressing (24" PHG4100 series)

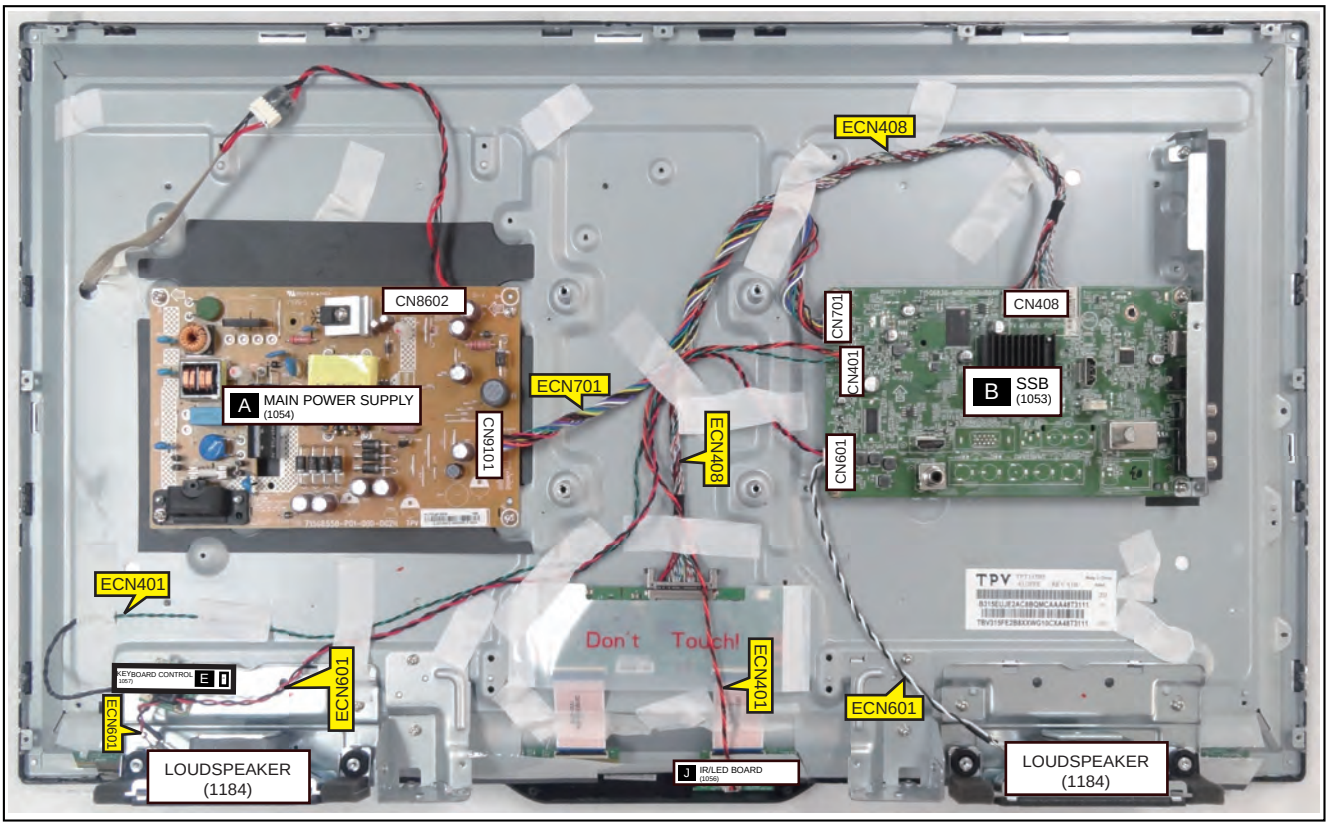

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Figure 4-2 Cable dressing (32" PFG5000 series)

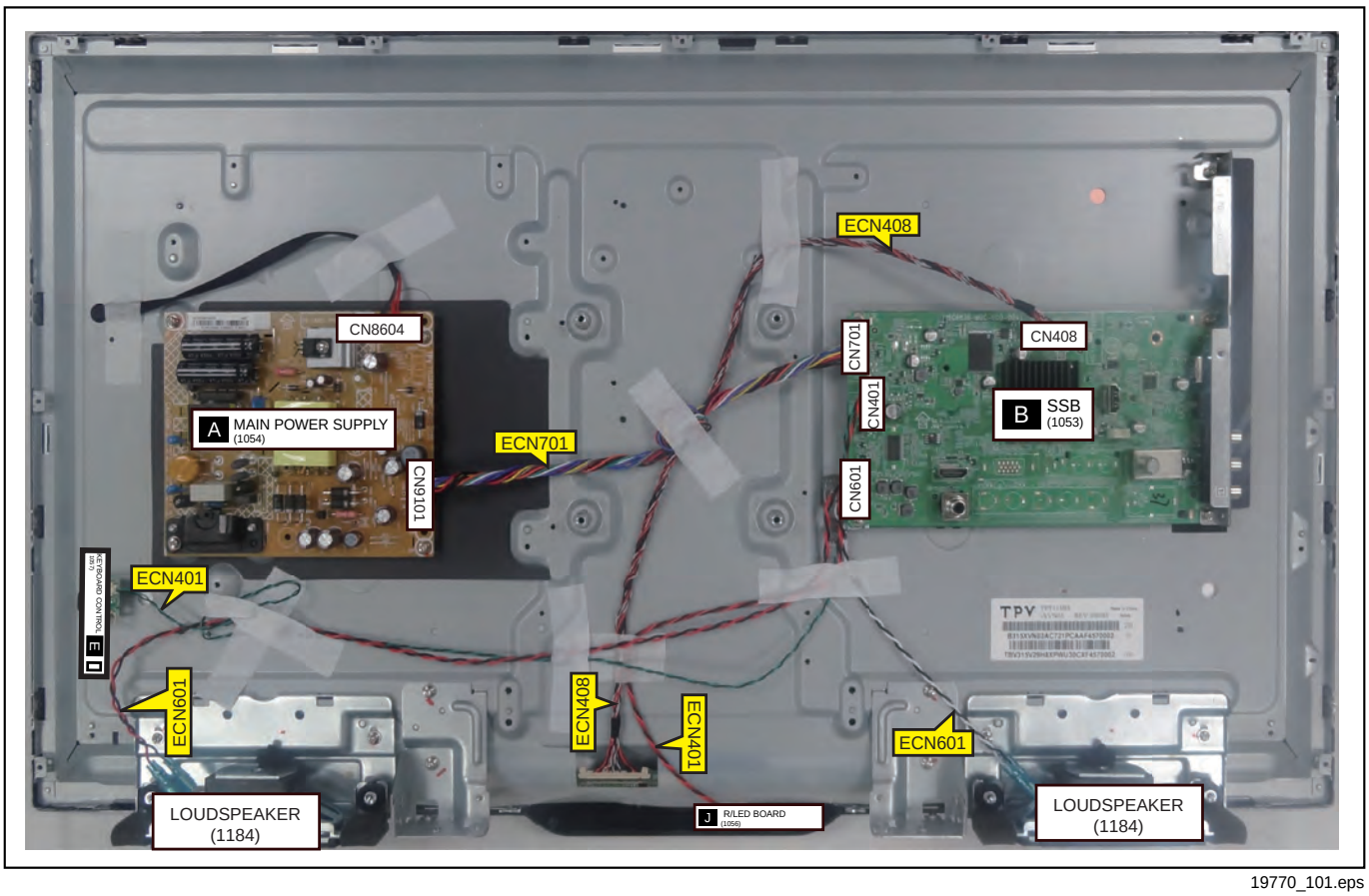

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Figure 4-3 Cable dressing (32"PHG5000 series)

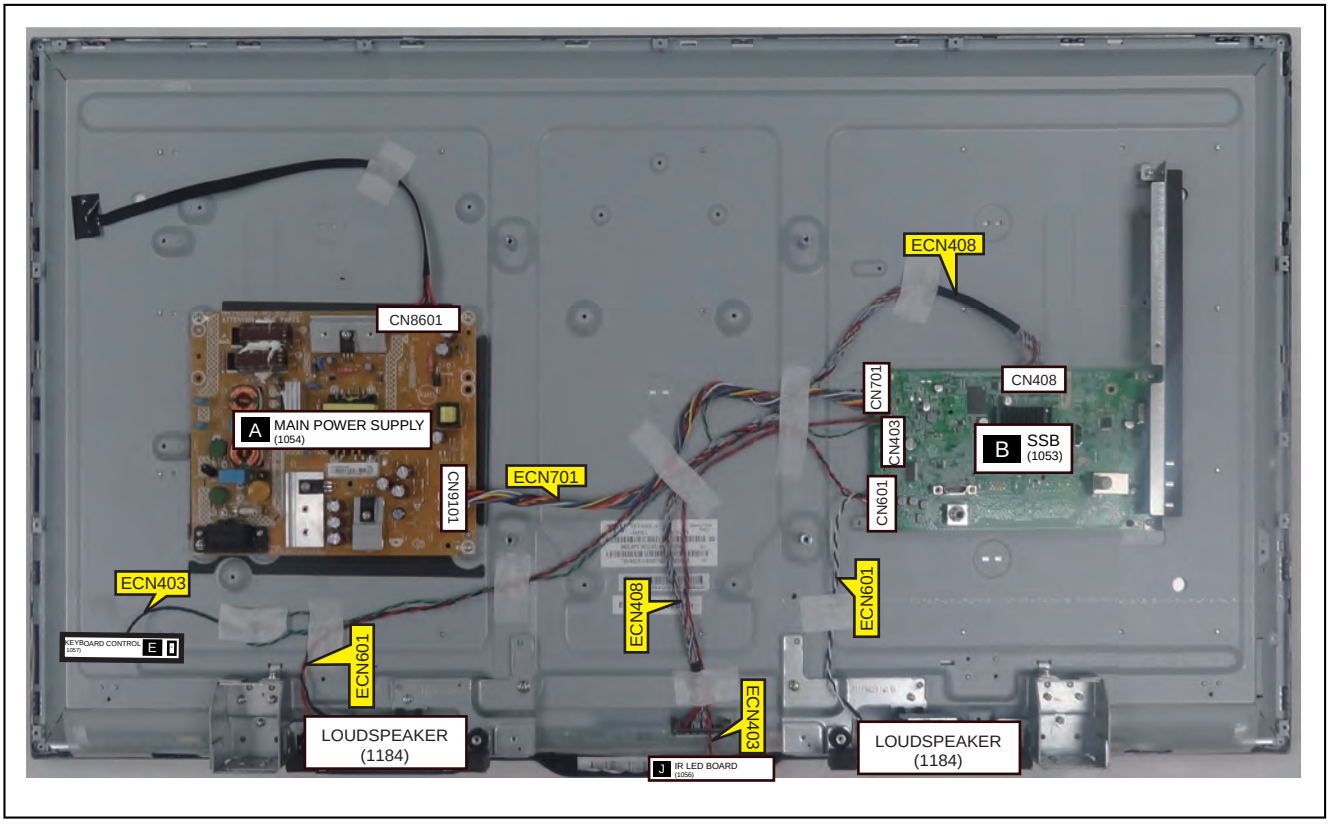

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Figure 4-4 Cable dressing (40" 5000 series)

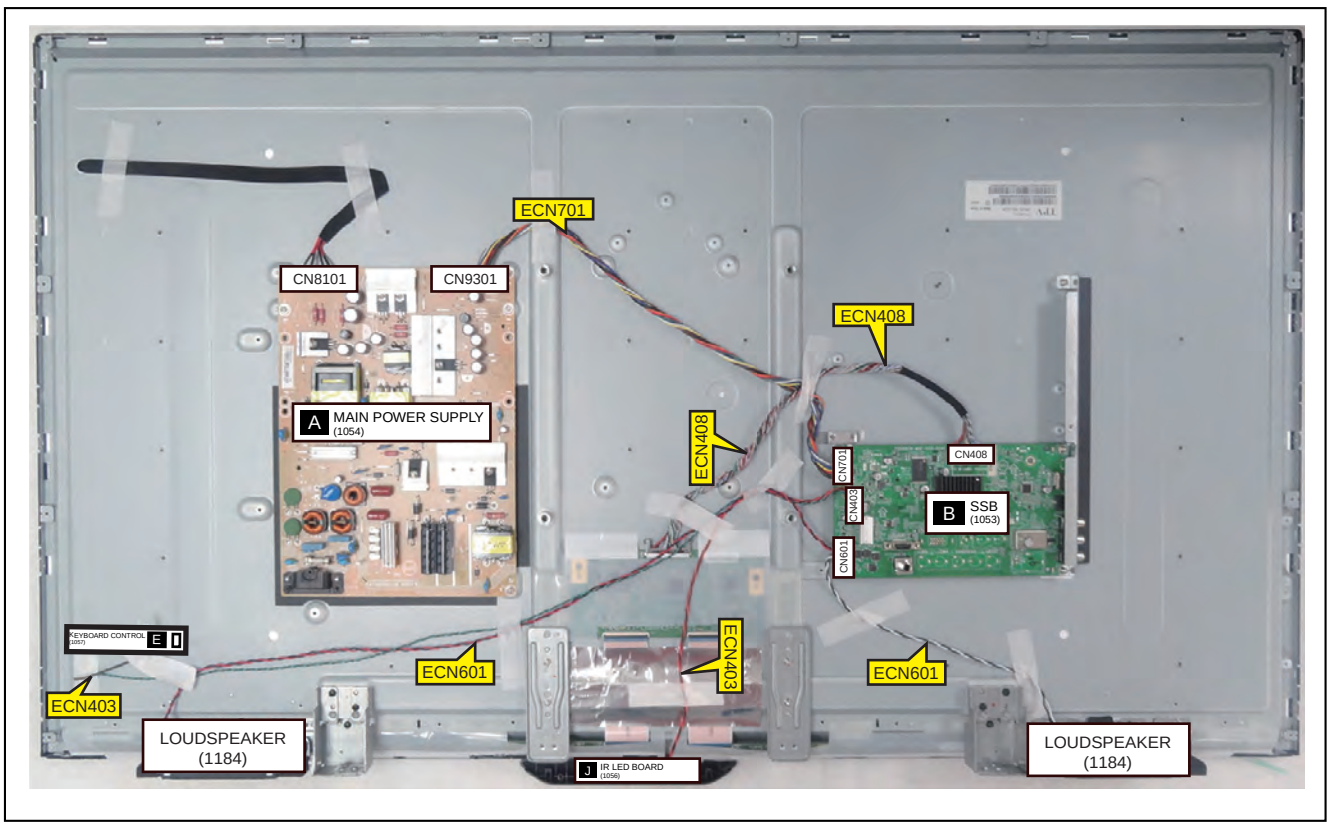

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Figure 4-5 Cable dressing (48" 5000 series)

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 5000 series)

Instructions below apply to the 32PFG5000/77, but will be similar for other 5000 series models.

4.3.1 Stand

Refer to Figure 4-6 for details.

1. Remove the fixation screws [1] that secure the stand bracket. Refer to Figure 4-6 for details.
2. Take the stand bracket out from the set.

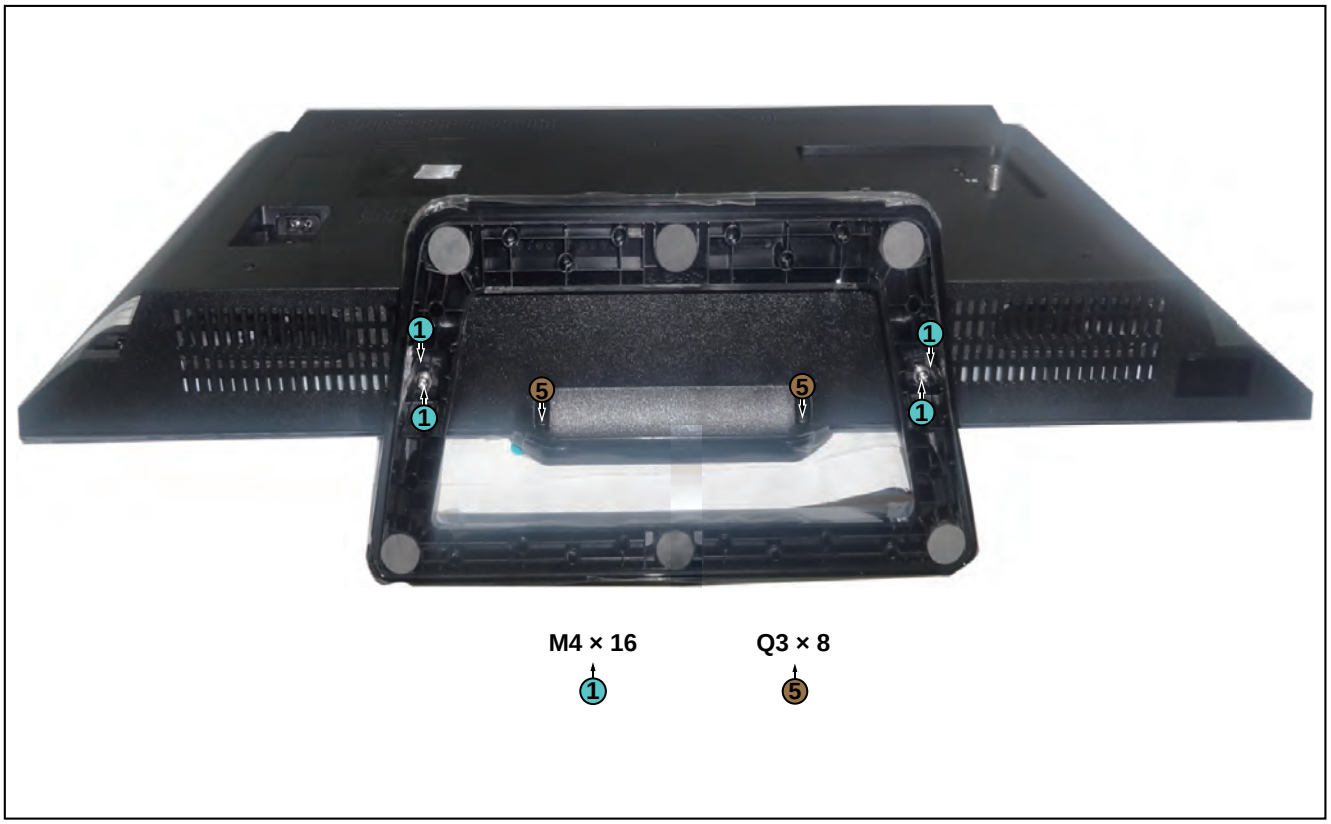

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Figure 4-6 Stand removal

4.3.2 Rear Cover

Refer to Figure 4-6 and Figure 4-7 for details.
Warning: Disconnect the mains power cord before removing the rear cover.

1. Remove the fixation screws [2], [3] and [5] that secure the rear cover. Refer to Figure 4-6 and Figure 4-7 for details.
2. At the indicated areas [4] 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.

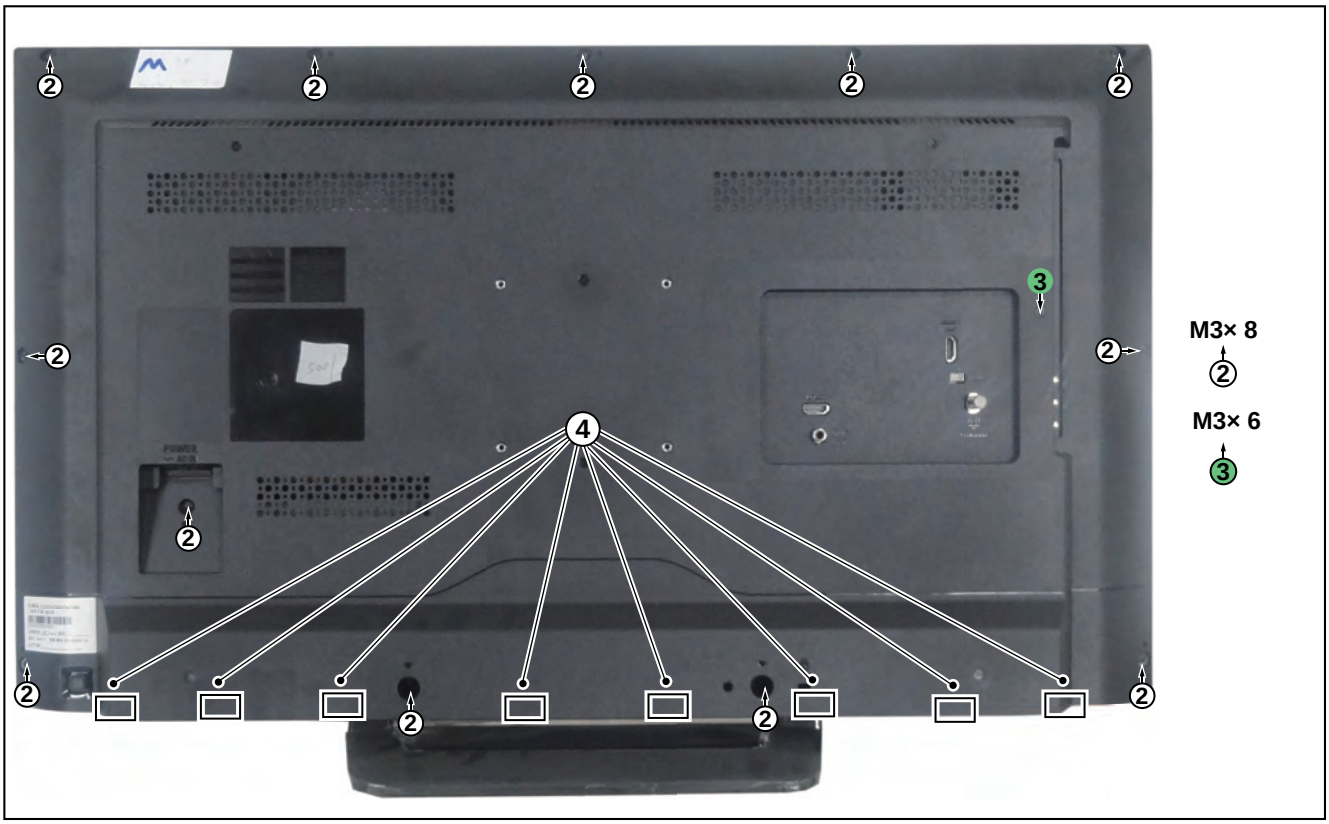

Figure 4-7 Rear cover removal

4.3.3 Keyboard Control Unit

Refer to Figure 4-8 for details.

1. Release the connector [2] 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].

When defective, replace the whole unit.

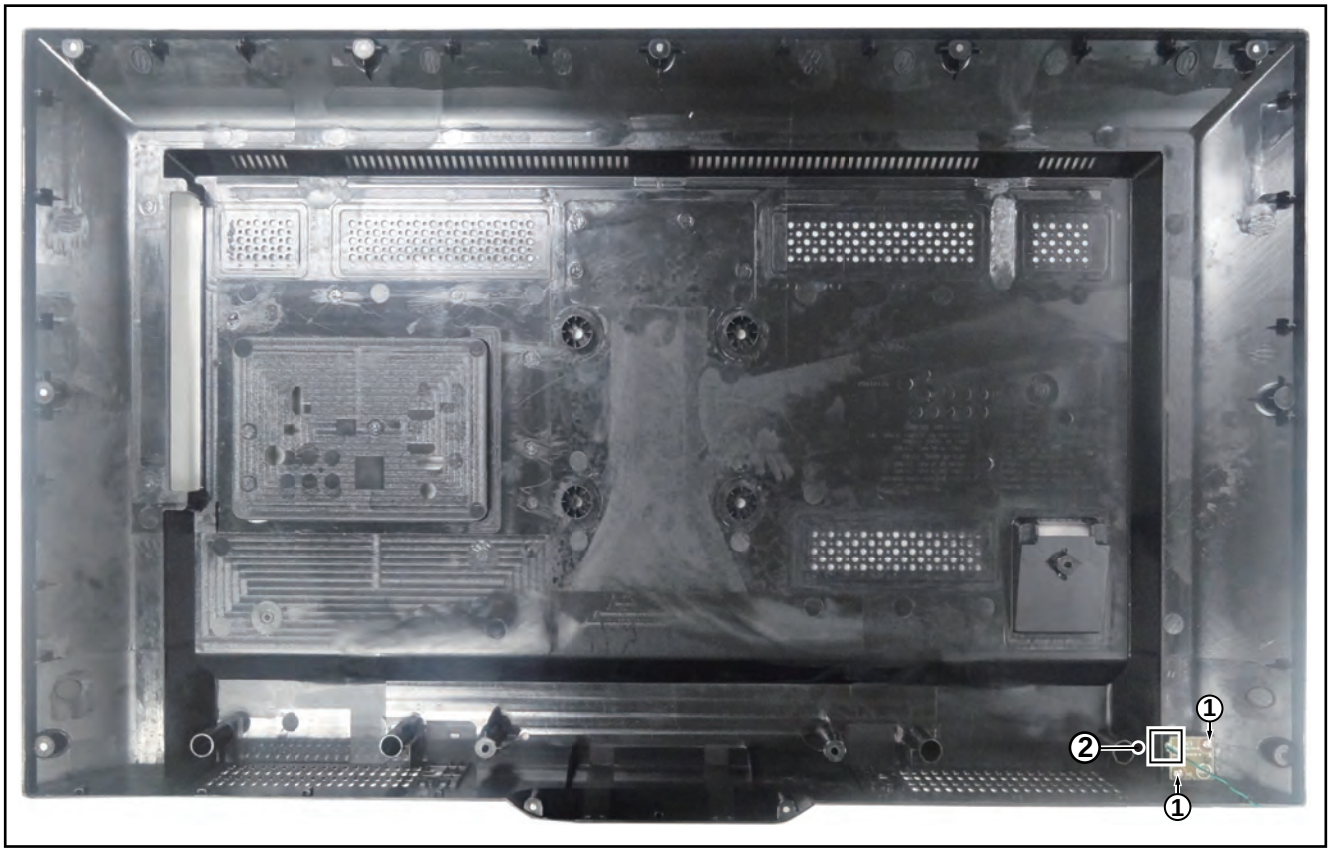

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Figure 4-8 Keyboard Control unit removal

4.3.4 Small Signal Board (SSB)

Refer to Figure 4-9 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 4-9 for details.

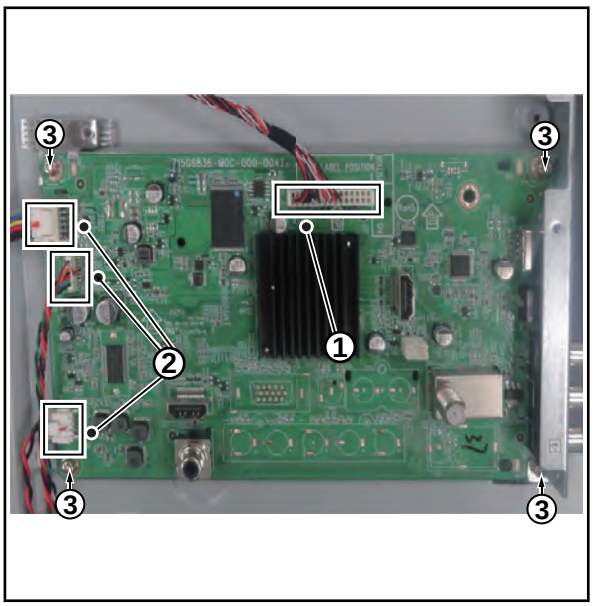

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Figure 4-9 SSB removal

4.3.5 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.

4.3.6 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.

4.3.7 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.

4.3.8 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 descr bed 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.

4.4 Assembly/Panel Removal (for 4100 series)

Instructions below apply to the 24PHG4100/77.

4.4.1 Stand and Rear cover

Refer to Figure 4-10 for details.

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

1. Remove the fixation screws [1] that secure the stand bracket. Refer to Figure 4-10 for details.
2. Remove the fixation screws [2] that secure the rear cover.
3. At the indicated areas [3] the cover is secured by clips. Be very careful with releasing those.
4. Gently lift the rear cover from the TV. Make sure that wires and cables are not damaged while lifting the rear cover from the set.

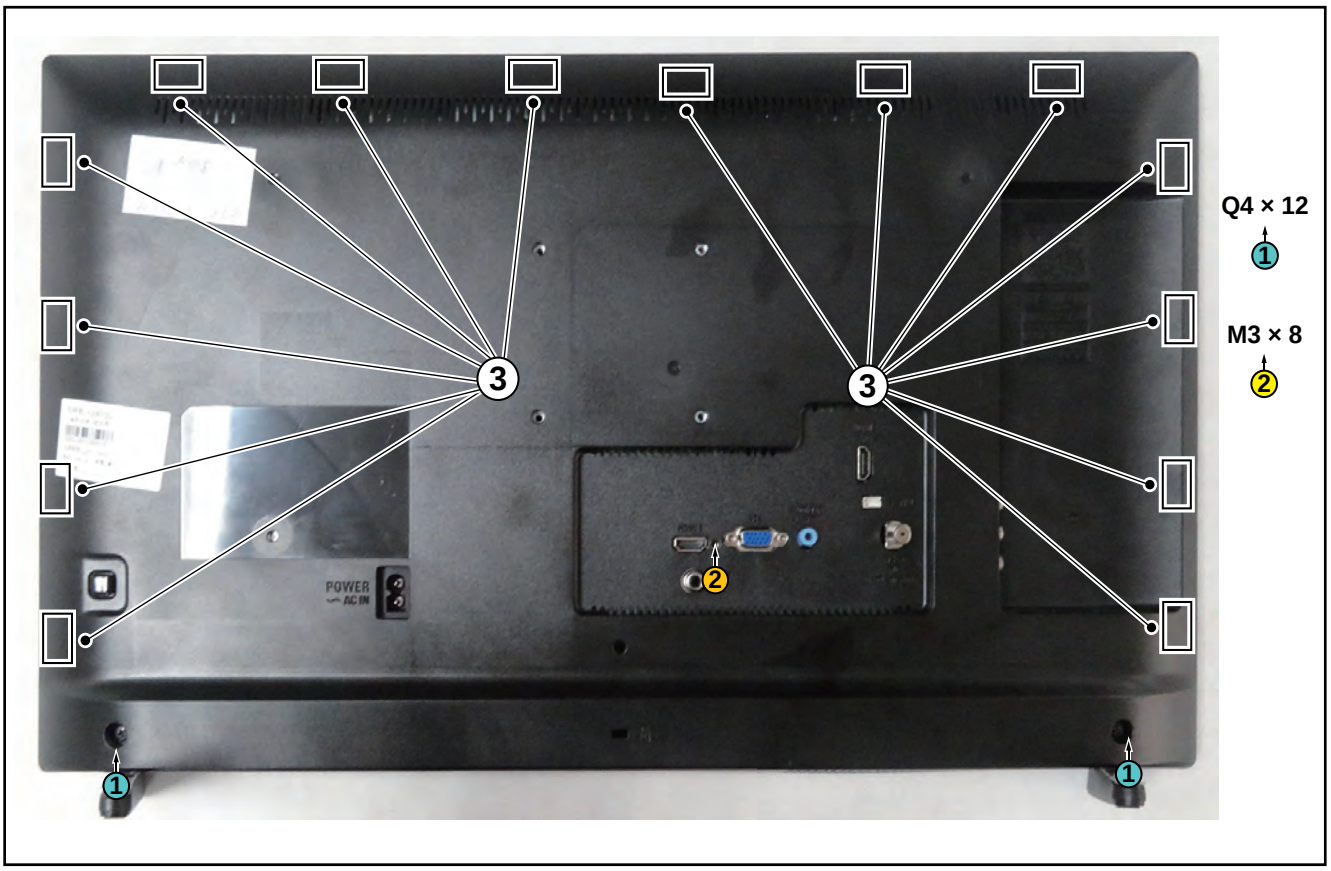

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Figure 4-10 Stand & Rear cover removal

4.4.2 Speakers & Keyboard Control Unit

Refer to Figure 4-11 for details.

1. Gently release the tapes that secure speakers and keyboard cables.
2. Release the connector [3] from the keyboard control panel.
3. Remove fixation screws[1] and [2] that secure speskers and keyboard.
4. Gently take the speakers and keyboard out.Refer to Figure 4-11 for details.
   When defective, replace the whole unit.

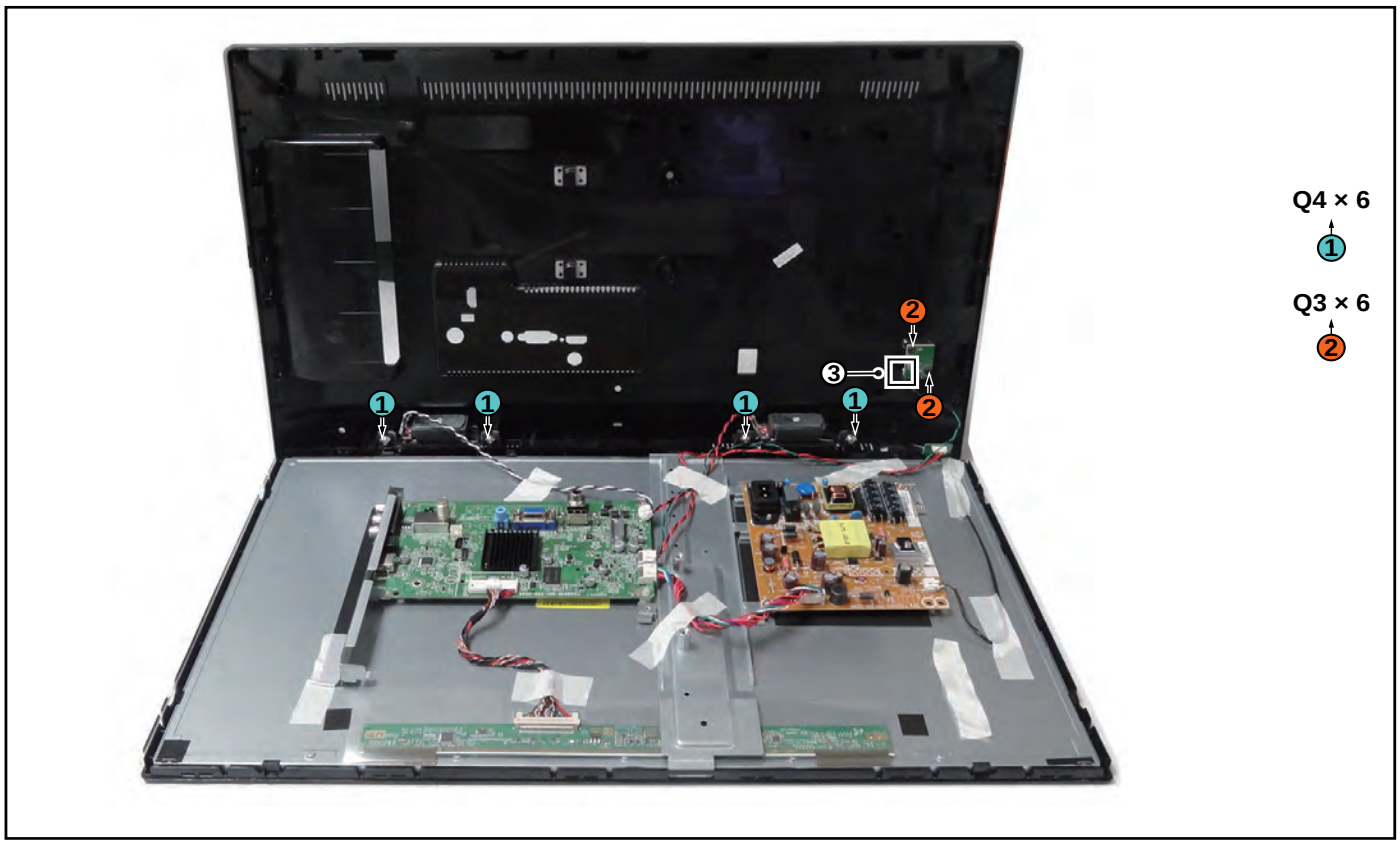

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Figure 4-11 Speakers & Keyboard control unit removal

4.4.3 Small Signal Board (SSB)

Refer to Figure 4-12 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 4-12 for details.

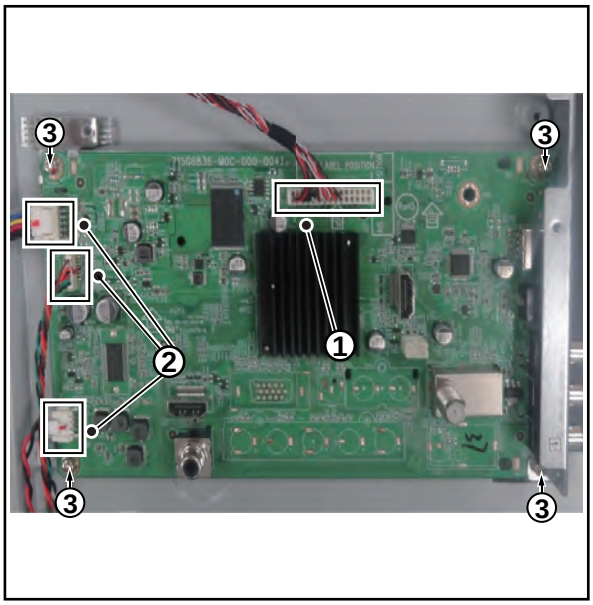

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Figure 4-12 SSB removal

4.4.4 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.

4.4.5 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.

4.4.6 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 descr bed 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 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 4-5.
- Pay special attention not to damage the EMC foams on the SSB shields. Ensure that EMC foams are mounted correctly.

5. Service Modes, Error Codes, and Fault Finding

Index of this chapter:

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

5.1 Test Points

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

Perform measurements under the following conditions:
- Service Default Mode.
- Video: Colour bar signal.
- Audio: 3 kHz left, 1 kHz right.

5.2 Service Modes

The Service Mode feature is split into five parts:
- Service Alignment Mode (SAM).
- Factory Mode.
- Customer Service Mode (CSM).
- Computer Aided Repair Mode (ComPair).

SAM and the Factory mode offer features, which can be used by the Service engineer to repair/align a TV set. Some features are:
- Make alignments (e.g. White Tone), reset the error buffer (SAM and Factory Mode).
- Display information (“SAM” indication in upper right corner of screen, error buffer, software version, operating hours, options and option codes, sub menus).

The CSM is a Service Mode that can be enabled by the consumer. The CSM displays diagnosis information, which the customer can forward to the dealer or call centre. In CSM mode, “CSM”, is displayed in the top right corner of the screen. The information provided in CSM and the purpose of CSM is to:
- Increase the home repair hit rate.
- Decrease the number of nuisance calls.
- Solved customers’ problem without home visit.

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

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

5.2.1 General

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

Life Timer

During the life time cycle of the TV set, a timer is kept (called “Op. Hour”). It counts the normal operation hours (not the Stand-by hours). The actual value of the timer is displayed in SAM in a decimal value. Every two soft-resets increase the hour by + 1. Stand-by hours are not counted.

Software Identification, Version, and Cluster

The software ID, version, and cluster will be shown in the main menu display of SAM and CSM.
The screen will show: “AAAAAAB-XXX.YYY.MMM.TTT”, where:
- AAAAAA is the chassis name: TPM144L.
- B is the region indication: E = Europe, A = AP/China, U = NAFTA, L = LATAM.
- XXX is the main version number: this is updated with a major change of specification (incompatible with the previous software version). Numbering will go from 0- 255.
- YYY is the sub version number: this is updated with a minor change of specification (incompat ble with the previous versions). Numbering will go from 0- 255.
- MMM is the number of the mandatory (upgrade) release in association with the area of the mandatory (upgrade) release. Numbering will go from 0 - 255.
- TTT bit 7 to 1 is the area of the mandatory (upgrade) release where 0 - none, 1 - Netflix, rest reserved.
- TTT bit 0 : 0 = development release, 1 = production release.

Display Option Code Selection

When after an SSB or display exchange, the display option code is not set properly, it will result in a TV with “no display”. Therefore, it is required to set this display option code after such a repair.
To do so, press the following key sequence on a standard RC transmitter: “062598” directly followed by MENU and “xxx”, where “xxx” is a 3 digit decimal value of the panel type: see column “Display Code” in back to div.table 6-3. When the value is accepted and stored in NVM, the set will switch to Stand-by, to indicate that the process has been completed.
During this algorithm, the NVM-content must be filtered, because several items in the NVM are TV-related and not SSB related (e.g. Model and Prod. S/N). Therefore, “Model” and “Prod. S/N” data is changed into “See Type Plate”. In case a call centre or consumer reads “See Type Plate” in CSM mode.

5.2.2 Service Alignment Mode (SAM)

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

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

How to Activate SAM

To activate SAM, use one of the following methods:
- Press the following key sequence on the remote control transmitter: “062596”, directly followed by the “INFO/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. 00057	This represents the life timer. The timer counts normal operation hours, but does not count Stand-by hours.
	Main SW ID	e.g. "TPM144L_002.004 000.00 1"	See paragraph Software Identification Version and Cluster for the software name definition.
	ERR	e.g. "000 000 000 000 000"	Shows all errors detected since the last time the buffer was erased. Five errors possible.
	OP1	e.g. "001 224 032 000 038 137 220 015"	Used to read-out the option bytes. See paragraph 6.4 Option Settings in the Alignments section for a detailed description. Ten codes are possible.
	OP2	e.g. "159 255 127 045 011 017 000 000"	
Clear Codes	Press [OK] to clean the Error Codes immediately		Erases the contents of the error buffer. Select this menu item and press the MENU RIGHT key on the remote control. The content of the error buffer is cleared.
Options	OP#1-OP#8	e.g. "032"	Option code
Alignments	Warm	R Gain	To align the White Tone. See paragraph 6.3 Software Alignments in the Alignments section for a detailed description
		G Gain	
		B Gain	
	Normal	R Gain	
		G Gain	
		B Gain	
	Cool	R Gain	
		G Gain	
		B Gain	
	Store		Store the RGB value
NVM editor	NVM editor		NVM-editor will function as in the past: Address and Value field is a decimal value via digit entry
	Service Date		Edit and display the applicable service data by using the displayed key pad.
Upload to USB	Channel List		To upload several settings from the TV to an USB stick
	NVM Copy		
	Readable info		
	EDID Copy		
Download from USB	Channel List		To download several settings from the USB stick to the TV
	NVM Copy		
	EDID Copy		
Initialize NVM	Press [OK] to Initialize NVM immediately		To initialize a (corrupted) NVM. Be careful, this will erase all settings.

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).

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.

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,

5.2.3 Contents of the Factory mode:

Purpose

- To perform extended alignments.

Table 5-2 Factory mode overview

Item	Item value	Default value				Description
		24"	32"	40"	48"	
0	F/W VERSION	Press OK				Displays the software versions of the supplier, Flash PQ, Smart Picture, BL Dimming, Source Meter, the Picture Quality checksum, the Dimming library, the Source meter library, the Flash AQ, the MTK, MCU and OAD software versions.
1	PANEL_ID	see back to div.table 6-3				Displays and changes the Panel D with the left and right cursor; be careful changing this, it can result in not correct displaying the screen!
2	ERR Code: xxx xxx xxx xxx xxx	000 000 000 000 000				Values showing the last 5 errors during the last 50 hours of operation, according to table 5-4 Error code table
3	CLEAR ERROR BUFFER	Press OK				Selecting this clear all current error codes.
4	NVM ADDRESS	0				NVM address 0 to 8191, Use Item 6 to change and 7 to store the data to the correct NVM address
5	NVM VALUE	0				Displays the value at the NVM address of item 5
6	NVM STORE	Press OK				Use this option to save the data of item 6 to NVM address of item 5
7	NVM COPY TV to USB	Press OK				Use this to store the NVM data to the REPAIR folder of a FAT formatted USB memory stick. The TV will write two files in the REPAIR folder of the memory stick. It will create this folder if it does not exist. The items are “Channel list”, “Personal settings”, “Option codes”, “Display-related alignments” and “History list”. In case the download to the USB stick was not successful “Failure” will appear. In this case, check if the USB stick is connected properly. Now the settings are stored onto the USB stick and can be used to download onto another TV or other SSB. Uploading is of course only possible if the software is running and if a picture is available. This method is created to be able to save the customer’s TV settings and to store them into another SSB.
8	NVM READ USB to TV	Press OK				Use this to store the NVM data from the USB memory stick to the TV. The TV will save the two files which were created in item 8 to the NVM of the set. Use these options when replacing a SSB. When “USB to TV Success” is displayed remove the power and restart the TV
9	CLR_TEMP_R	128	128	128	128	Red colour temperature setting
10	CLR_TEMP_G	120	125	128	128	Green colour temperature setting
11	CLR_TEMP_B	111	102	128	128	Blue colour temperature setting
12	AUTO_COLOR	Press OK				PC: any pattern that has black and white, YPbPr: SMPTE bar (colour bar), any timing.
13	ADC_GAIN_R	0				Red ADC gain
14	ADC_GAIN_G	128	128	128	128	Green ADC gain
15	ADC_GAIN_B	128	128	128	128	Blue ADC gain
16	ADC_OFFSET_R	255	255	255	255	Red ADC offset
17	ADC_OFFSET_G	255	255	255	255	Green ADC offset
18	ADC_OFFSET_B	255	255	255	255	Blue ADC offset
19	VIRGING_MODE	off				Use this to return the set to virgin mode. Depends whether the set has been used already.
20	E_Fuse	on				E-fuse mode
21	ORT_MODE	off				ORT mode
22	AGEING MODE	off				Use this for aging a new LCD panel
23	RESET_PBS_PWD	Press OK				Use this to reset the Child Lock
24	V DEO_PWM_MEDIUM	0				VIDEO PWM Medium value
25	V DEO_PWM_M NIIMUN	0				VIDEO PWM Minimum value
26	V DEO_PWM_MAX MUN	0				VIDEO PWM Maximum value
27	PWM_RATIO_BEST_PICTURE	0				PWM ratio best picture
28	PWM_RATIO_STD_TOP	0				PWM ratio standard top
29	PWM_RATIO_STD_BOTTOM	0				PWM ratio standard bottom
30	PWM_RATIO_BEST_POWER	0				PWM ratio best power
31	VIDEO_STD_TH_HIGH	0				VIDEO standard threshold high
32	VIDEO_STD_TH_LOW	0				VIDEO standard threshold low
33	YPBPR_PHASE	InValid				Not available for this chassis
34	AUD_GAIN_L NE N	0	0	1	1	Line-in audio gain
35	AUD_GAIN_HDMI	0	0	0	0	HDMI audio gain
36	AUD_GAIN_ATV	0	0	0	0	Analogue TV audio gain
37	AUD_GAIN_DTV	0	0	0	0	Digital TV audio gain
38	AUD_GAIN_USB	0	0	0	0	USB audio gain
39	ESTICKER NVM1	0	0	0	0	ESTICKER value
40	ESTICKER NVM2	0	0	0	0	ESTICKER value
41	ESTICKER NVM3	0	0	0	0	ESTICKER value
42	ESTICKER NVM4	0	0	0	0	ESTICKER value
43	ESTICKER NVM5	0	0	0	0	ESTICKER value
44	ESTICKER NVM6	0	0	0	0	ESTICKER value
45	ESTICKER NVM7	0	0	0	0	ESTICKER value
46	ESTICKER NVM8	0	0	0	0	ESTICKER value
47	ESTICKER NVM9	0	0	0	0	ESTICKER value
48	ESTICKER NVM10	0	0	0	0	ESTICKER value
49	ESTICKER NVM11	0	0	0	0	ESTICKER value
50	ESTICKER NVM12	0	0	0	0	ESTICKER value
51	ESTICKER NVM13	0	0	0	0	ESTICKER value
52	ESTICKER NVM14	0	0	0	0	ESTICKER value
53	ESTICKER NVM15	0	0	0	0	ESTICKER value
54	ESTICKER NVM16	0	0	0	0	ESTICKER value
55	ESTICKER NVM17	0	0	0	0	ESTICKER value
56	ESTICKER NVM18	0	0	0	0	ESTICKER value

Item	Item value	Default value				Description
		24"	32"	40"	48"	
57	ESTICKER NVM19	0	0	0	0	ESTICKER value
58	ESTICKER NVM20	0	0	0	0	ESTICKER value
59	ESTICKER RESET	Press OK				ESTICKER reset
60	DIM_L B RESET	Press OK				Reset the Dimming
61	SRC_METER-RESET	Press OK				Reset the Source meter
62	AMBLIGHT RESET	Press OK				AMBLIGHT RESET
63	ACFG RESET	Press OK				REST ACFG
64	AQ_INDEX	7	5	5	6	Audio Quality index
65	AUDIO TEST MODE	off				Used for audio testing during production
66	AUDIO CHANNEL TYPE	2.0				Defines the installed speaker system
67	TEST PATTERN	Press OK				With the “left” and “right” keys of the remote control various test patterns can be chosen
68	EDID UPDATE	Press OK				Used to enter a new ED D codes into the NVM
69	TCON_GAMMA_UPDATE	Invalid				TCON gamma update
70	DUMP PQ FROM TV	Press OK				Saves the picture quality data to a file “pq bin” to the root of a FAT formatted USB memory stick
71	LOAD PQ to TV	Press OK				Loads the picture quality data from a file “pq bin” in to the TV
72	DUMP AQ FROM TV	Press OK				Saves the audio quality data to a file “AQ.bin” to the root of a FAT formatted USB memory stick
73	LOAD AQ to TV	Press OK				Loads the audio quality data from a file “AQ.bin” in to the TV
74	PANEL FLIP	OFF	OFF	OFF	OFF	Flip panel
75	CVI_SOURCE	OFF	OFF	OFF	OFF	Enable/Disable CVI source
76	VGA_SOURCE	OFF	OFF	OFF	OFF	Enable/Disable VGA source
77	HDMI2	OFF				Enable/Disable HDMI2 source
78	HDMI SIDE	ON				Enable/Disable HDMI S DEsource
79	RESET_OPTION_CODE	Press OK				Reset Option Code
80	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.

5.2.4 Customer Service Mode (CSM)

Purpose

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

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

Specifications

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

How to Activate CSM

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

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

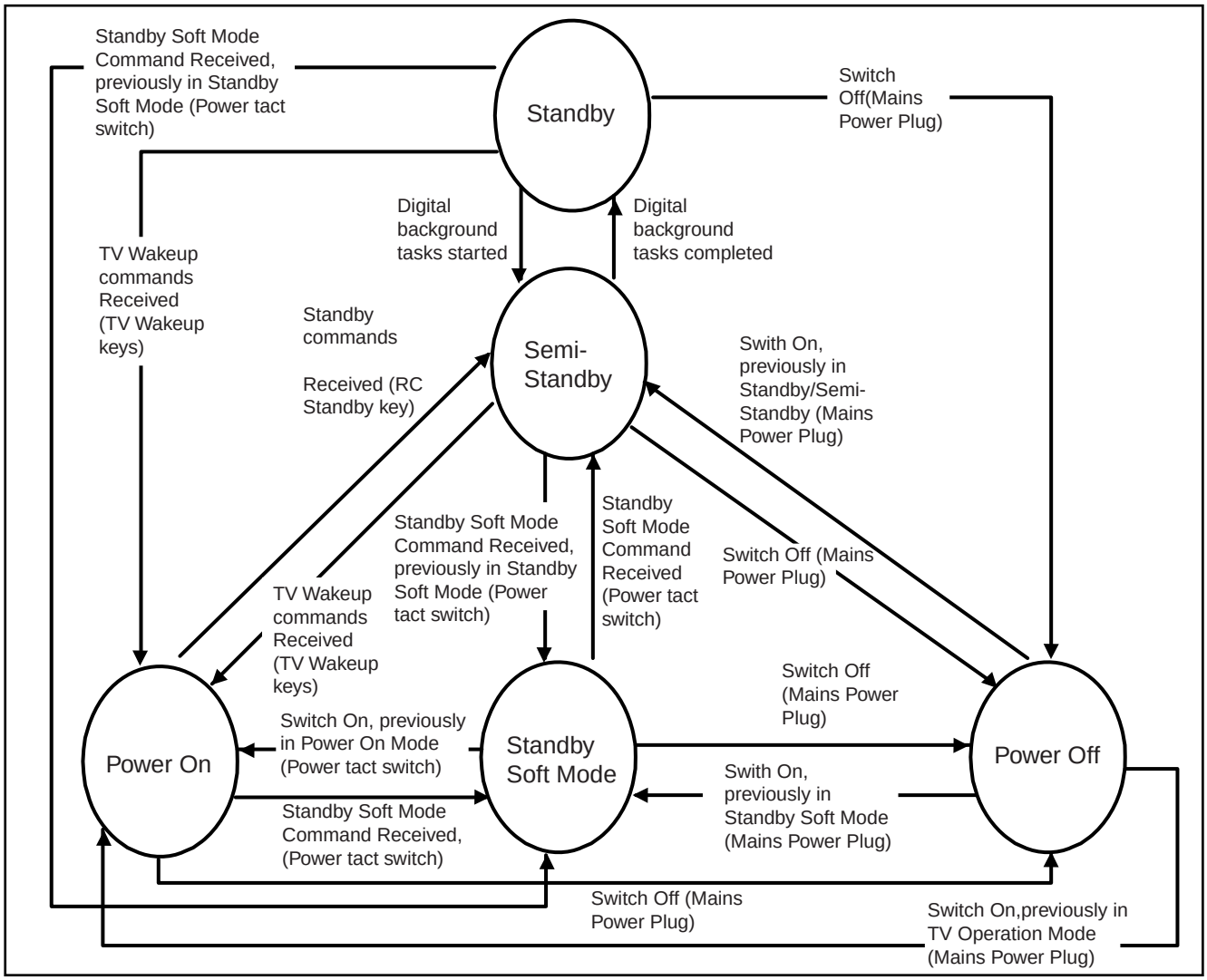
Contents of CSM

- **1.1 Set Type** This information is very helpful for a helpdesk/workshop as reference for further diagnosis. In this way, it is not necessary for the customer to look at the rear of the TV-set. Note that if an NVM is replaced or is initialized after corruption, this set type has to be re-written to NVM.
- **1.2 Production code** Displays the production code (the serial number) of the TV. Note that if an NVM is replaced or is initialized after corruption, this production code has to be re-written to NVM.
- **1.3 Installation date** Indicates the date of the first installation of the TV. This date is acquired via time extraction.
- **1.4 a Option Code 1** Gives the option codes of option group 1 as set in SAM.
- **1.4b Option Code 2** Gives the option codes of option group 2 as set in SAM.
- **1.5 SSB** Gives an identification of the SSB as stored in NVM. Note that if an NVM is replaced or is initialized after corruption, this identification number has to be re-written to NVM. This identification number is the 12NC number of the SSB.
- **1.6 Display** 12NC NVM read/write.
- **1.7 PSU** 12NC NVM read/write.
- **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 poss ble via USB.
- **2.3 Panel Code** Displays the Display Code number.
- **2.4 Bootloader ID** ID of Bootloader.
- **2.5 NVM version** Detects and displays NVM version.
- **2.6 Flash ID** ID of flash model.
- **2.7 e-UM version** eDFU (help) version.
- **2.8 Channel Table Structure Version** version of channel table structure.
- **2.9 Error Codes** Detects and displays errors.
- **3.1 Signal Quality** Analog/digital signal strength.
- **3.2 Child lock** Not active / active. This is a combined item for locks. If any lock (channel lock, parental lock) is active,it is indicated as “active”.
- **3.3 HDCP keys** Indicates the validity of the HDMI keys (or HDCP keys). In case these keys are not valid and the customer wants to make use of the HDMI functionality, the SSB has to be replaced.

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

How to Exit CSM
To exit CSM, use one of the following methods.
- Press the MENU/HOME button on the remote control transmitter.
- Press the POWER button on the remote control transmitter.
- Press the POWER button on the television set.

5.3 Stepwise Start-up



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120224

Figure 5-1 Stepwise Start-up

5.4 Service Tools

5.4.1 ComPair

Introduction

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

1. ComPair helps to quickly get an understanding on how to repair the chassis in a short and effective way.
2. ComPair allows very detailed diagnostics and is therefore capable of accurately indicating problem areas. No knowledge on I^2C 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 poss bilities.

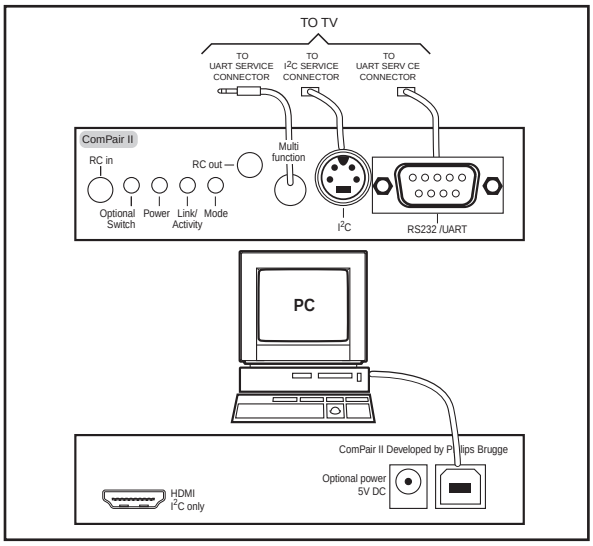
Specifications

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.



10000_036_090121 eps 091118

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.

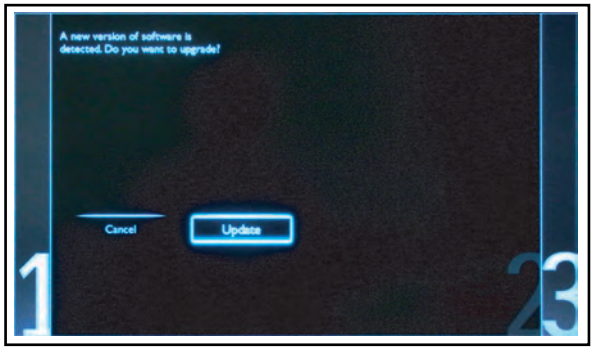


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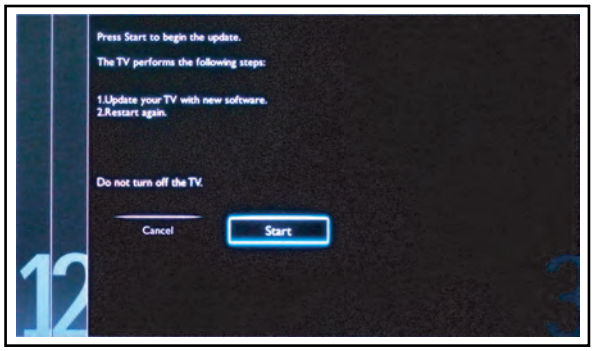
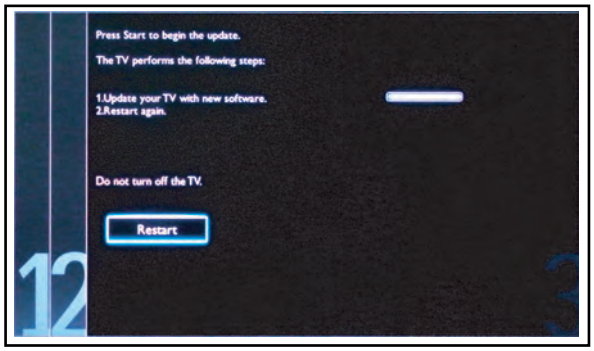
Figure 5-3 Update the TV software [1/3]



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
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 MT5561LVNT 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 Error Codes

5.6.1 Introduction

Error codes are required to indicate failures in the TV set. In principle a unique error code is available for every:
- Activated (SW) protection.
- Failing I^2C device.
- General I^2C error.

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

5.6.2 How to Read the Error Buffer

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

  - **ERROR: 034 013 000 000 000**: Error code 13 was detected first and error code 34 is the last detected (newest) error
- Via the blinking LED procedure (when you have no picture). See paragraph 5.7 The Blinking LED Procedure.
- Via ComPair.

5.6.3 Error codes

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

Table 5-4 Error code table

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

5.6.4 How to Clear the Error Buffer

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

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

5.7 The Blinking LED Procedure

5.7.1 Introduction

The software is capable of identifying different kinds of errors. Because it is poss ble that more than one error can occur over time, an error buffer is available, which is capable of storing the last five errors that occurred. This is useful if the OSD is not working properly.
Errors can also be displayed by the blinking LED procedure. The method is to repeatedly let the front LED pulse with as many pulses as the error code number, followed by a period of 1.5 seconds in which the LED is “off”. Then this sequence is repeated.
Example (1): error code 4 will result in four times the sequence LED “on” for 0.25 seconds / LED “off” for 0.25 seconds. After this sequence, the LED will be “off” for 1.5 seconds. Any RC command terminates the sequence. Error code LED blinking is in red color.

5.8 Fault Finding and Repair Tips

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

5.8.1 NVM Editor

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

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

5.8.2 Load Default NVM Values

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

5.8.3 No Picture

When you have no picture, first make sure you have entered the correct display code. See paragraph 6.4 Option Settings for the instructions. See also back to div.table 6-3.

5.8.4 Unstable Picture via HDMI input

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

5.8.5 No Picture via HDMI input

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

5.8.6 TV Will Not Start-up from Stand-by

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

5.8.7 Audio Amplifier

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

5.8.8 CSM

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

5.8.9 Loudspeakers

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

5.8.10 Display option code

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

6. Alignments

Index of this chapter:

6.1 General Alignment Conditions
6.2 Hardware Alignments
6.3 Software Alignments
6.4 Option Settings
6.5 Reset of Repaired SSB

6.1 General Alignment Conditions

Perform all electrical adjustments under the following conditions:

- Power supply voltage: 90 - 264 V_{AC}, 50/ 60 ± 3 Hz.
- Connect the set to the mains via an isolation transformer with low internal resistance.
- Allow the set to warm up for approximately 15 minutes.
- Measure voltages and waveforms in relation to correct ground (e.g. measure audio signals in relation to AUDIO_GND).
  Caution: It is not allowed to use heat sinks as ground.
- Test probe: R_i > 10 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, Error Codes, and Fault Finding). The SAM menu will now appear on the screen. Select RGB Align and go to one of the sub menus. The alignments are explained below.
The following items can be aligned:

- White point.

To store the data:

- Press OK on the RC **before the cursor is moved to the left**.
- Select “Store” and press OK on the RC.
- Switch the set to stand-by mode.

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

- **EU/AP-PAL models:** a PAL B/G TV-signal with a signal strength of at least 1 mV and a frequency of 475.25 MHz
- **US/AP-NTSC models:** an NTSC M/N TV-signal with a signal strength of at least 1 mV and a frequency of 61.25 MHz (channel 3).
- **LATAM models:** an NTSC M TV-signal with a signal strength of at least 1 mV and a frequency of 61.25 MHz (channel 3).

6.3.1 RGB Alignment

Before alignment, set the picture as follows:

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

White Tone Alignment:

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

In case you have a colour analyser:

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

Table 6-1 White D alignment values

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

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

6.3.2 Display Adjustment

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

- Enter SAM mode.
- Select a colour temperature (e.g. COOL, NORMAL, or WARM).
- Set the RED, GREEN and BLUE default values according to the values in back to div.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)	24PHG4100/77	128	120	111
	32PFG5000/77	128	123	102
	32PHG5000/77	125	125	103
	40PFG5000/77	128	127	112
	48PFG5000/77	128	124	128
Cool (11000K)	24PHG4100/77	124	124	128
	32PFG5000/77	124	128	116
	32PHG5000/77	123	128	118
	40PFG5000/77	115	128	125
	48PFG5000/77	109	107	128
Warm (6500K)	24PHG4100/77	128	99	67
	32PFG5000/77	124	105	56
	32PHG5000/77	123	106	58
	40PFG5000/77	128	117	72
	48PFG5000/77	128	108	78

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 I^2C 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 MT5561 ICs is made known by the option codes.

Notes:
- After changing the option(s), save them by pressing the OK button on the RC before the cursor is moved to the left, select STORE and press OK on the RC.
- The new option setting is only active after the TV is switched “off” / “stand-by” and “on” again with the mains switch (the NVM is then read again).

6.4.2 Option Code Overview

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

6.4.3 Display Code Overview

Press the following key sequence on a standard RC transmitter: “062598” directly followed by MENU and “xxx”, where “xxx” is a 3 digit decimal value of the panel type: see column “Display Code” in back to div.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
24PHG4100/77	TPM236H3-BJ1L01	188
32PFG5000/77	TPT315B5-EUJFFE S1J	185
32PHG5000/77	TPT315B5-0TU3A.Q S11E	172
32PHG5000/77	TPT315B5-XVN02 S900J	178
40PFG5000/77	TPT400LA-J6PE1 SC1AN	173
40PFG5000/77	TPT400LA-J6PE1 SC1AL	186
48PFG5000/77	TPT480H2-HWU23 SC2C	174
48PFG5000/77	TPT480H2-HWU23 SC2G	183
48PFG5000/77	TPT480LS-HN05.S SB01J	189

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.

- 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.
Notes:

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 HDMI
7.6 Video and Audio Processing - MT5561LVNT/B PBGA-329

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 TPM15.6L LA is a new chassis launched in LATAM in 2015. The whole range is covered by MT5561.
The major deltas versus its predecessor support NTSC; PAL-M; PAL-N AND ISDB-T with also multi-media, CEC, ARC, SPDIF functionality.

The TPM15.6L LA chassis comes with the following stylings:

- series xxPxG5000xx
- series xxPHG4100xx

7.1.1 Implementation

Key components of this chassis are:

- SCALER MT5561LVNT/B PBGA-329
- FLASH TC58NVG1S3HTAI0 2GB TSOP-48
- Tuner: RF V/T 5P 1*1 - 9mm
- Silicon Tuner MxL661-AG-R
- DEMODULATOR TC90537FG LQFP-48 for tuner signal demodulation
- AUDIO TAS5729MDDCAR 10W TSSOP-48 for AUDIO Amplifier.

7.1.2 TPM15.6L LA Architecture Overview

For details about the chassis block diagrams refer to 9. Block Diagrams.

7.1.3 SSB Cell Layout

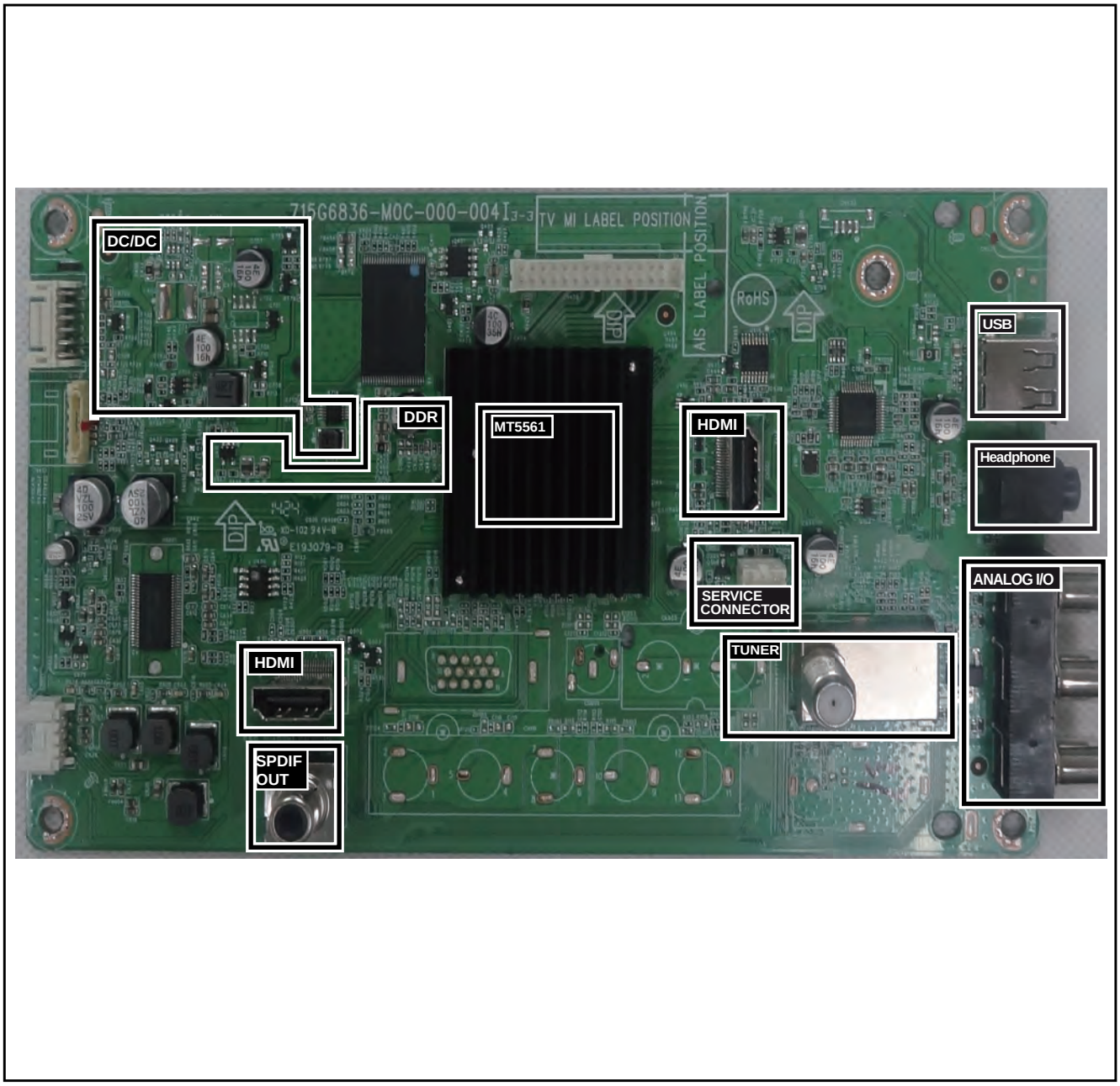


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Figure 7-1 SSB layout cells (top view)

7.2 Power Supply

Refer to figure Figure 7-2 for the power architecture of this platform.

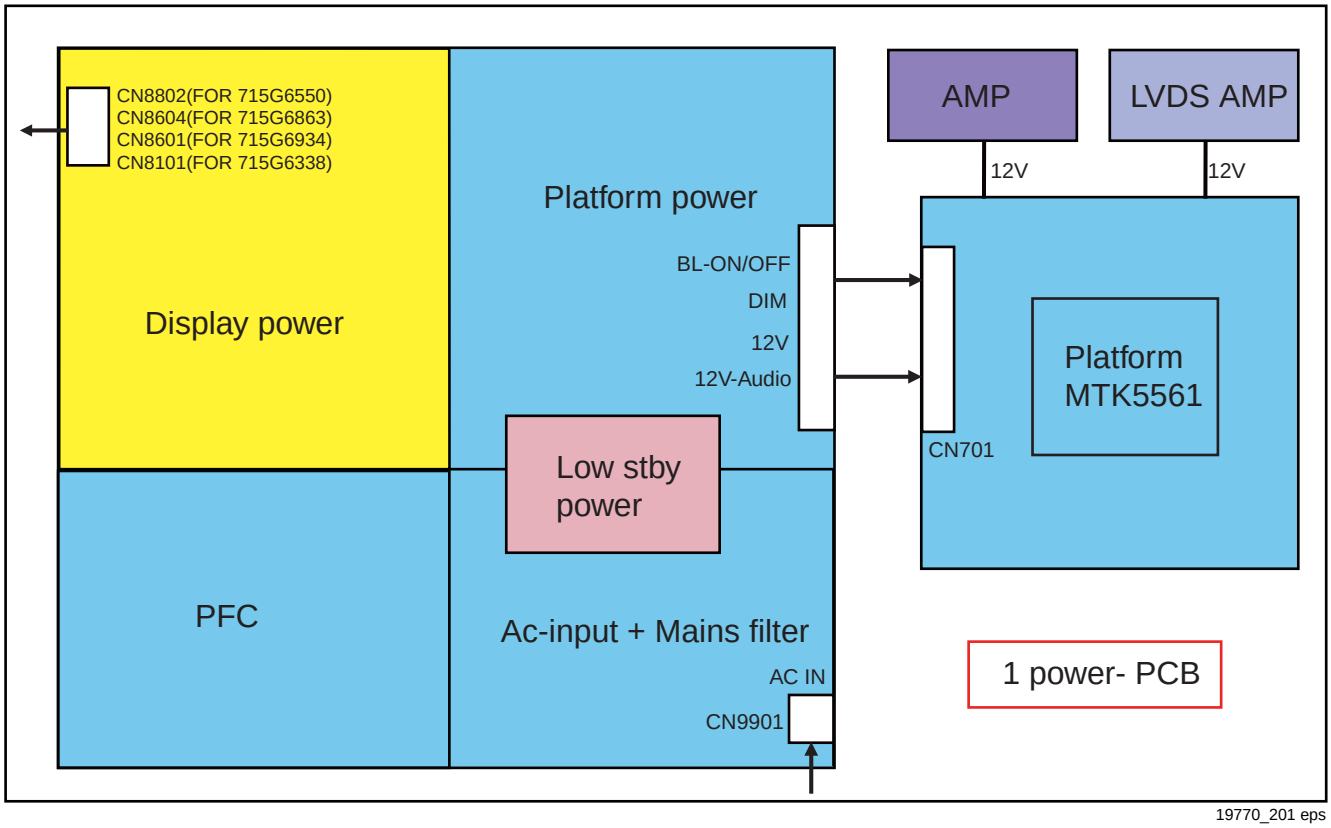

Figure 7-2 Power Architecture

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 TPM15.6L LA classis platform are:
- New power architecture for LED backlight
- "Boost"-signal is now a PWM-signal + continuous variable.

The control signals are:
- Stand-by (PS_ON)(only for 48 inch-715G6338)
- Lamp "on/off"
- Backlight adjust (DIM) (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 (stand-by and on-mode for 32 and 40 inch)
- 8.5V output (stand-by for 48 inch)
- 12V output (on-mode for 48 inch)
- +12V_audio (audio AMP power) (on-mode)
- Output to the display; in case of
  - IPB: High voltage to the LCD panel
  - PSL and PSLS (LED-driver outputs)
  - PSDL (high frequent) AC-current.

7.2.2 Diversity

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

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

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

7.2.3 Connector overview

Table 7-1 Connector overview

	Connector							
	32"PFG5000		32"PHG5000 & 32"PHG4100		40"		48"	
Number	CN9101	CN8602	CN9101	CN8604	CN9101	CN8601	CN9301	CN8101
Description	to SSB	to Panel	to SSB	to Panel	to SSB	to panel	to SSB	to panel
Pin	14	6	14	6	14	9	14	12
1	D M	VLED+	DIM	VLED+	DIM	VLED+	D M	VLED+
2	ON/OFF	VLED+	ON/OFF	VLED+	ON/OFF	n.c.	ON/OFF	n.c.
3	PS_ON	n.c.	PS_ON	n c.	PS_ON	n.c.	PS_ON	VLED_1
4	n c.	n.c.	n.c.	n c.	n.c.	n.c.	n c.	VLED_1
5	GND	LED-	GND	LED_	GND	n.c.	GND-	n.c.
6	GND	LED-	GND	LED_	GND	VLED-	GND	n.c.
7	GND	-	GND	-	GND	VLED-	GND	n.c.
8	GND	-	GND	-	GND	n.c.	GND	n.c.
9	+12V_AUDIO	-	+12V_AUDIO	-	+12V_AUDIO	VLED-	+12V_AUDIO	VLED_2
10	+12V_AUDIO	-	+12V_AUDIO	-	+12V_AUDIO	-	+12V_AUDIO	VLED_2
11	+12V	-	+12V	-	+12V	-	+12V	n.c.
12	+12V	-	+12V	-	+12V	-	+12V	VLED+
13	+12V	-	+12V_AL	-	+12V_AL	-	+12V	-
14	+12V	-	+12V_AL	-	+12V_AL	-	+12V	-
15	-	-	-	-	-	-	-	-
16	-	-	-	-	-	-	-	-

7.3 DC/DC Converters

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

- +3V3SB, transform from +12V and +5VSB by DCDC, permanent voltage for the Stand-by controller, LED/IR receiver and controls.
- +12V, input from the power supply for the panel common (active mode)
- +12V, input from the power supply for audio amplifier
- VCCK,AVDD1V2, core voltage supply for MT5561
- +DDRV(1.5V),for the DDR integrated in Scaler IC
- +3V3, general supply voltage
- +5V_sw, supply voltage for USB
- TUNER3.3V, supply voltage for tuner
- TUNER3.3V TUNER1V8, voltage for ATV single decoder.
- +1V2, voltage for DTV single decoder.

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

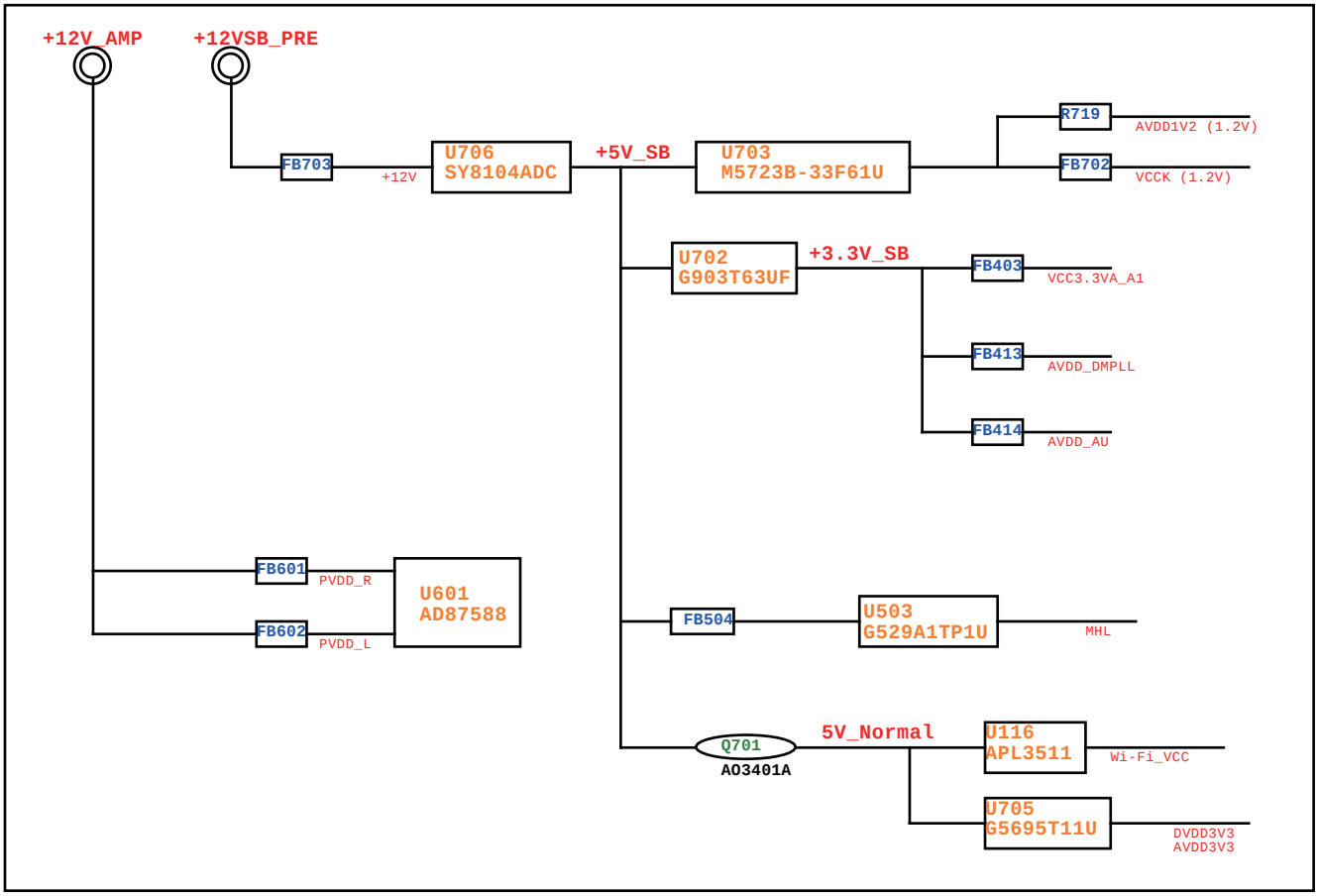

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Figure 7-3 DC/DC converters

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

7.4.1 Front-End Analogue part

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

- Tuner: RF V/T 5P 1*1 - 9mm
- Silicon Tuner MxL661-AG-R
- SCALER MT5561LVNT/B PBGA-329

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

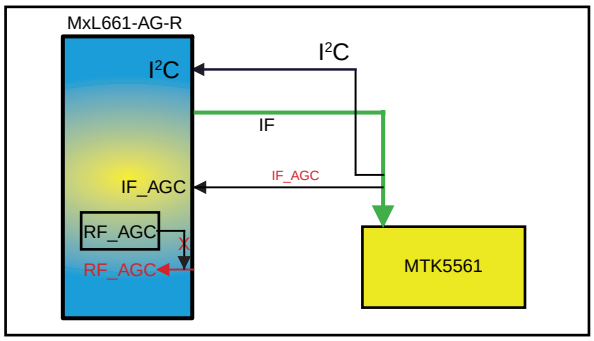

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Figure 7-4 Front-End Analogue block diagram

7.4.2 DTV part

The Front-End for DVT part consist of the following key components:

- Tuner: RF V/T 5P 1*1 - 9mm
- Silicon Tuner MxL661-AG-R (NTSC,PAL-M, PAL-N and ISDB-T)
- SCALER MT5561LVNT/B PBGA-329
- DEMODULATOR TC90537FG LQFP-48 for tuner signal demodulation

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

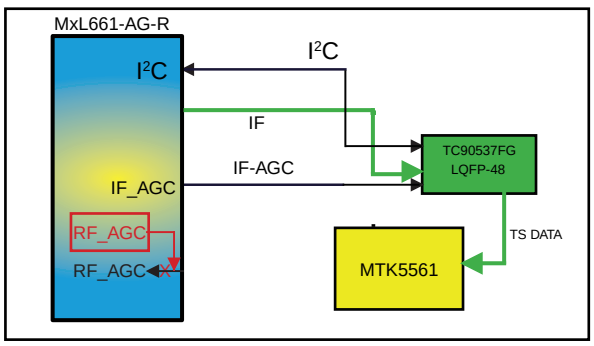

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Figure 7-5 Front-End DVB-T2 DTV block diagram

7.5 HDMI

Refer to figure 7-6 HDMI input configuration for the application.

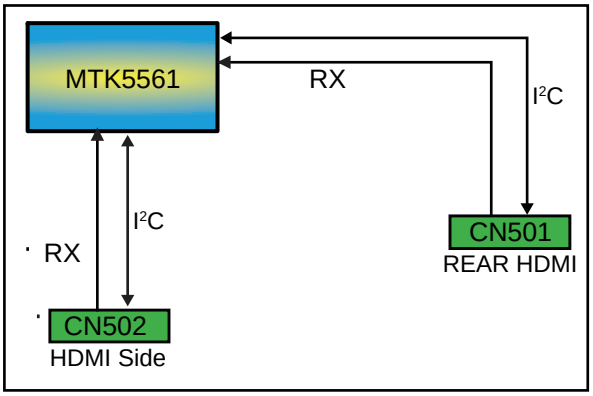

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Figure 7-6 HDMI input configuration

The following HDMI connector can be used:

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

7.6 Video and Audio Processing - MT5561LVNT/B PBGA-329

The MT5561LVNT/B is the main audio and video processor (or System-on-Chip) for this platform. It has the following features:

- Multi-standard digital video decoder (MPEG 1-2, H.264, MPEG-4)
- A transport de-multiplexer
- A muti-standard video decoder
- Rich format audio codec
- HDMI 1.4a receiver with 3D support
- 2D/3D converter
- Local dimming (LED backlight)(0ption)
- Panel overdrive control
- Two-link LVDS

The MT5561LVNT/B combines front-end video processing functions, such as ATSC,DVB-T/T2,DVB-C,DVB-S2 channel decoding, MPEG 1-2/H.264 decode, analog video decode and HDMI reception, with advanced back-end video picture improvements. It also includes next generation Motion Accurate Picture Processing High flat panel screen resolutions and refresh rates are supported with formats including 1360 × 768 @ 60Hz and 1920 x 1080 @ 60Hz.It integrates high-quality HDMI 1.4a, USB 2.0 receiver, Ethernet MAC+PHY, Single core CPU. Professional error-concealment provides stable, smooth and mosaic-free video quality

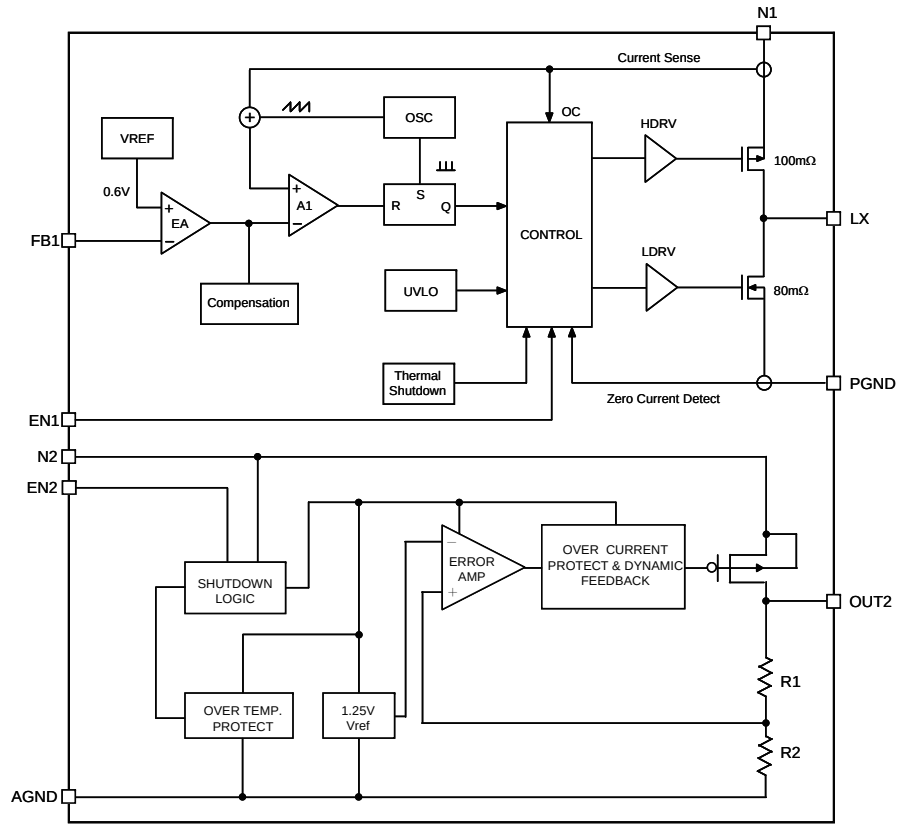
For a functional diagram of the MT5561LVNT/B, refer to Figure 8-2.

8. IC Data Sheets

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

8.1 Diagram 10-5-1 System Power B01, M5723B (IC U703)

Block diagram



Pinning information

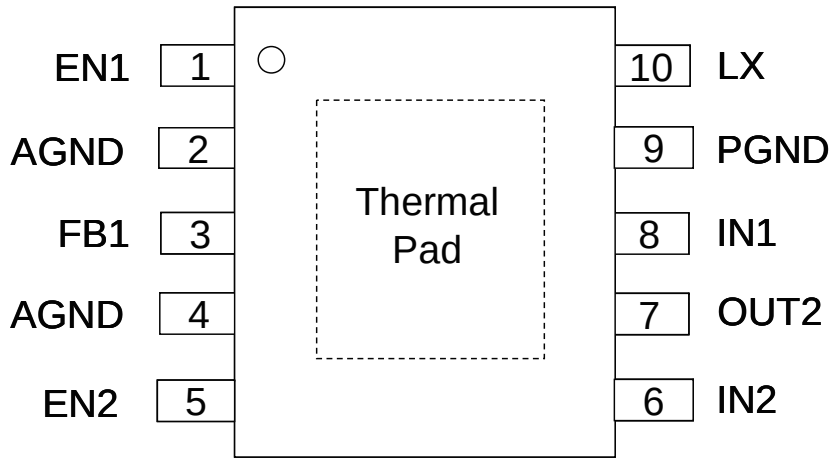


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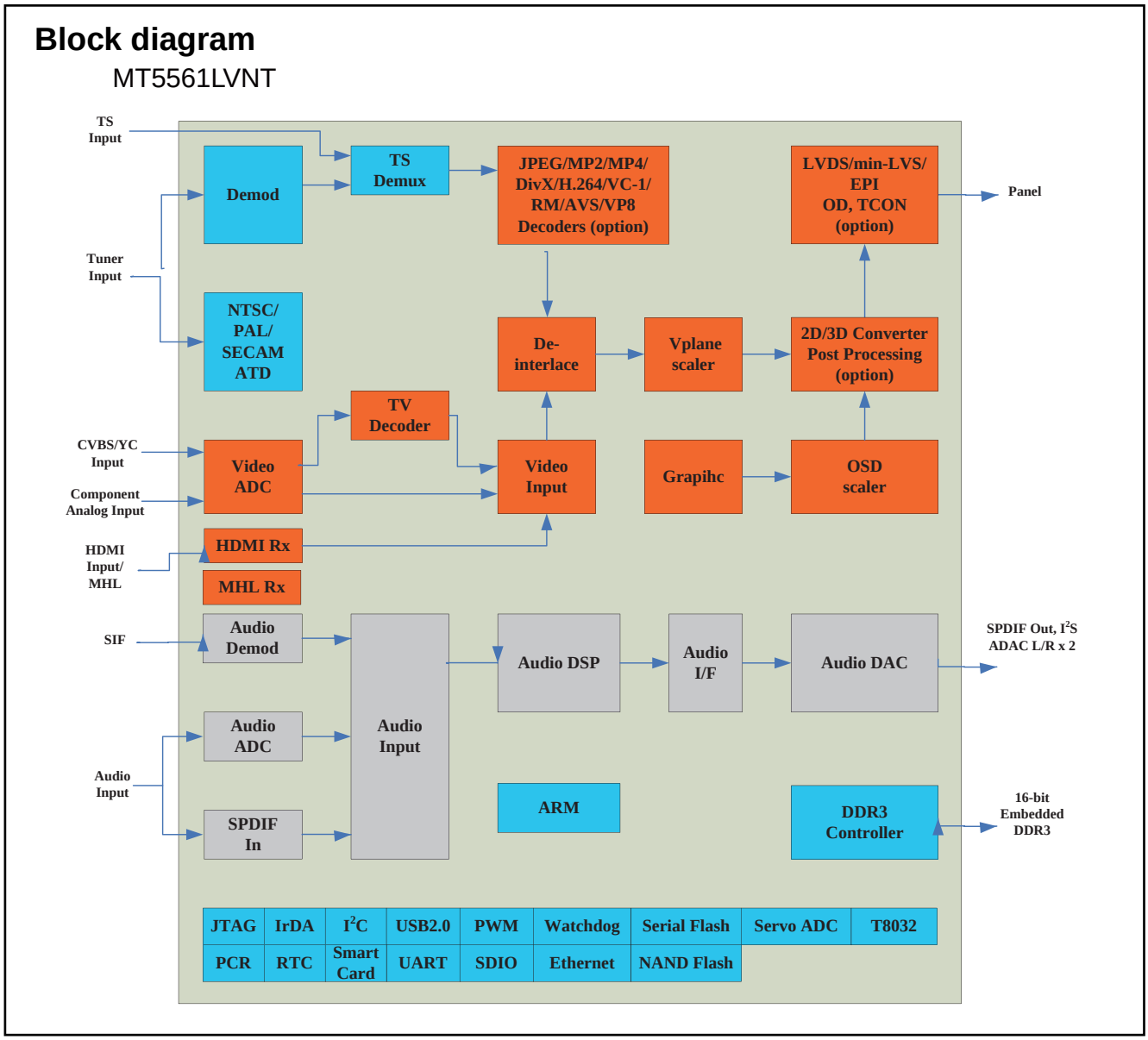
Figure 8-1 Internal block diagram and pin configuration

8.2 Diagram 10-5-2 Peripheral, B02, MT5561LVNT (IC U401B)



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140111

Figure 8-2 Internal block diagram

Pinning Information

MT5561LVNT

329	1	2	3	4	5	6	7	8	9	10
A	DVSS	AO0P		AOCKP		AE1P		DVSS		CI_A3
B	GPIO0	AO0N		AOCKN		AE1N		CI_D0		CI_REG#
C	TCON4	TCON2	AO1P	AO2P	AO3P	AE0P	AE2P	AE3P	CI_A1	CI_MOVAL
D	TCON5	TCON7	AO1N	AO2N	AO3N	AE0N	AE2N	AE3N	CI_A0	CI_A4
E			TCON3	TCON0	GPIO1	OPWM0	CI_MDO1	CI_MDO2	CI_A12	CI_A5
F	TCON8	TCON1	TCON6	OSCL1	OSDA1	DVSS	CI_CD2#		CI_D2	CI_A2
G	PDD6	PDD0	PDD3	PDD1	OPWM1	OPWM2	DVSS	DVSS		
H			PDD4	GPIO4	GPIO3				DVSS	DVSS
J	POOE#	POCE1#	PDD7	POCE0#	POWE#	PDD5	DVSS		VCCK	DVSS
K	PACLE	PAALE	PDD2	PARB#	VCCK	VCCK	VCCK	VCCK	DVSS	DVSS
L	VCCK	VCCK	VCCK	VCCK	VCCK	VCCK	VCCK	VCCK	DVSS	DVSS
M	DVSS	DVSS	DVSS	DVSS	DVSS	DVSS	VCCK	VCCK	DVSS	DVSS
N	DDRV	DDRV	DDRV	DDRV	DDRV	DDRV	DVSS	DVSS	DVSS	VCC3IO
P	DDRVREF	ZQ	AOLRCK		OSDA0		DVSS	ADIN1	VCC3IO	VCC3IO
R	AOBCK	AOMCLK	AOSDATA0	ASPDIFO	OSCL0	DVSS		ADIN7	AVDD33_ETH	AVDD33_HDMI
T		OPWRSB	OIRI	AOSDATA1	DVSS	ADIN6	ADIN0	ADIN4		
U	U0TX	U0RX	OPCTRL0	OPCTRL4	ADIN5	ADIN3	HDMI_0_SCL	ADIN2	HDMI_0_RX_1B	HSYNC
V	OPCTRL3	OPCTRL1	OPCTRL2	VGA_SDA	VGA_SCL	HDMI_0_SDA	HDMI_0_RX_0B	HDMI_0_RX_0	HDMI_0_RX_1	VSYNC
W		RXVN	RXVP	REXT_ETH	HDMI_0_HPD		HDMI_0_RX_CB		HDMI_0_RX_2B	ORESETB
Y	TXVN	TXVP	DVSS	AVDD12_ETH	AVDD12_HDMI_0		HDMI_0_RX_C		HDMI_0_RX_2	AVDD10_LDO
	1	2	3	4	5	6	7	8	9	10

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140111

Figure 8-3 Internal pin configuration [1/2]

Pinning Information

MT5561LVNT

	11	12	13	14	15	16	17	18	19	20
A		CI_MCLKO	CI_MDI4		CI_A14	CI_MDI0		CI_IORD#	CI_A10	FSRC_WR
B		CI_A6	CI_MIVAL		CI_WE#	CI_A13		CI_A11	CI_CE1#	CI_D7
C	CI_WAIT#	CI_RESET	CI_MDI3	CI_MDI2	CI_MDI1	CI_A8	CI_A9	CI_OE#	CI_MDO7	CI_MDO6
D	CI_MOSTRT	CI_A7	CI_D1	CI_MCLKI		CI_MISTRT	CI_IOWR#	CI_D6	CI_MDO5	CI_D5
E	CI_MDO0	CI_MDI5	CI_MDI7			CI_MDO3	CI_D3	CI_CD1#	CI_D4	CI_MDO4
F	CI_IREQ#	CI_MDI6				ASPDIFI	GPIO5	CI_PWR_EN	USB_DP1	DVSS
G							GPIO2	DVSS	USB_DM1	
H	DVSS	DVSS	DVSS	DVSS		DVSS		USB_DP0	USB_DM0	AVDD12_HDMI_1
J	DVSS	DVSS	DVSS	HDMI_2_SDA	IF_AGC	HDMI_2_HPD_CBUS	HDMI_2_SCL	HDMI_1_SCL	HDMI_2_RX_2	HDMI_2_RX_2B
K	DVSS	DVSS		HDMI_1_SDA	MHL_SENCE	HDMI_CEC		HDMI_2_RX_0	HDMI_2_RX_1	HDMI_2_RX_1B
L	DVSS	DVSS	DVSS		AVDD33_CAP	RF_AGC	HDMI_1_HPD	HDMI_2_RX_0B		
M	DVSS	DVSS	DVSS	AVDD33_AADC		AVDD33_ADAC	HDMI_2_RX_C	HDMI_2_RX_CB	HDMI_1_RX_2	HDMI_1_RX_2B
N	DVSS	DVSS	DVSS	AVSS33_CLN	DVSS	DVSS	HDMI_1_RX_1	HDMI_1_RX_1B		
P	DVSS	DVSS		DVSS		AR0_ADAC	HDMI_1_RX_0	HDMI_1_RX_0B	HDMI_1_RX_C	HDMI_1_RX_CB
R	DVSS	DVSS	DVSS	DVSS		AL0_ADAC	AIN_R1	AIN_R3	AIN_R2	AIN_R0
T		AVSS33_RGB	DVSS	AVSS33_VIDEO	DVSS	VMID_AADC	AVDD33_REG_STB	AL1_ADAC	AIN_L3	AIN_L2
U	SOG	SOY1	COM1	Y0	PB0	DVSS	AVDD33_VIDEO_STB		AR1_ADAC	AIN_L0
V	BP	RP	Y1	SOY0	COM0	DVSS	AVDD33_RGB_STB	CVBS0	XTALI	AIN_L1
W		GP		PB1		PR0	VDAC_OUT	ADCINP_DEMOD	DVSS	XTALO
Y		COM		PR1		CVBS_COM	CVBS1		ADCINN_DEMOD	AVDD12_DEMOD
	11	12	13	14	15	16	17	18	19	20

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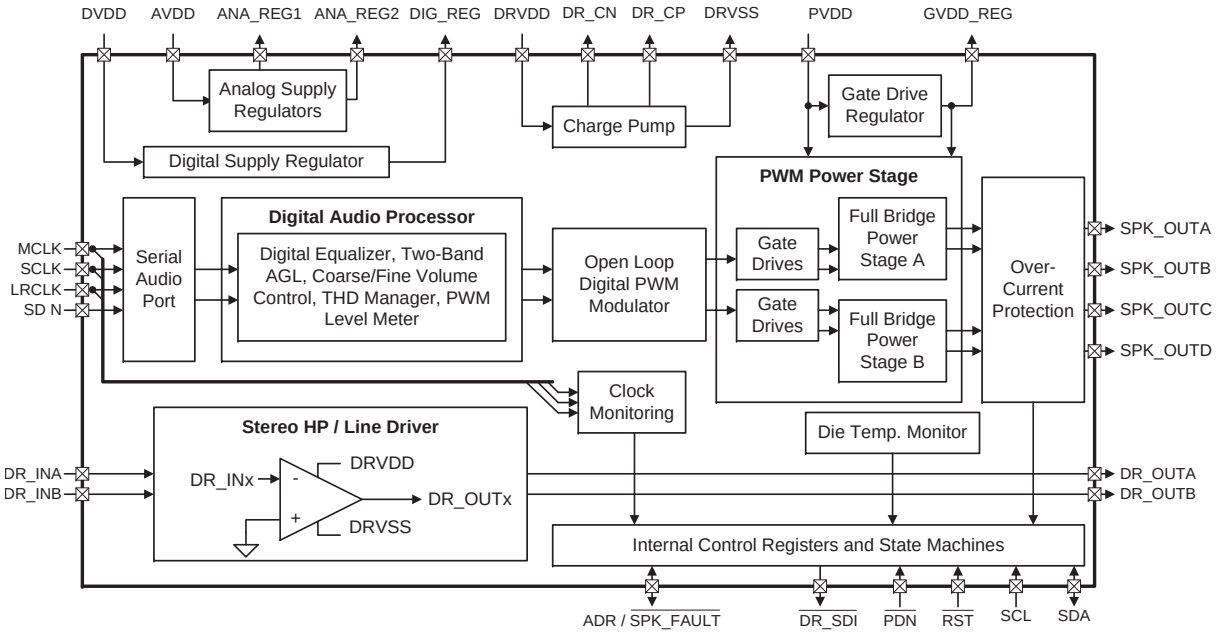
140111

Figure 8-4 Internal pin configuration [2/2]

8.3 Diagram 10-5-4 Speaker Amp B04, TAS5729MDDCAR (IC U601)

Block diagram

TAS5729MD



Pinning information

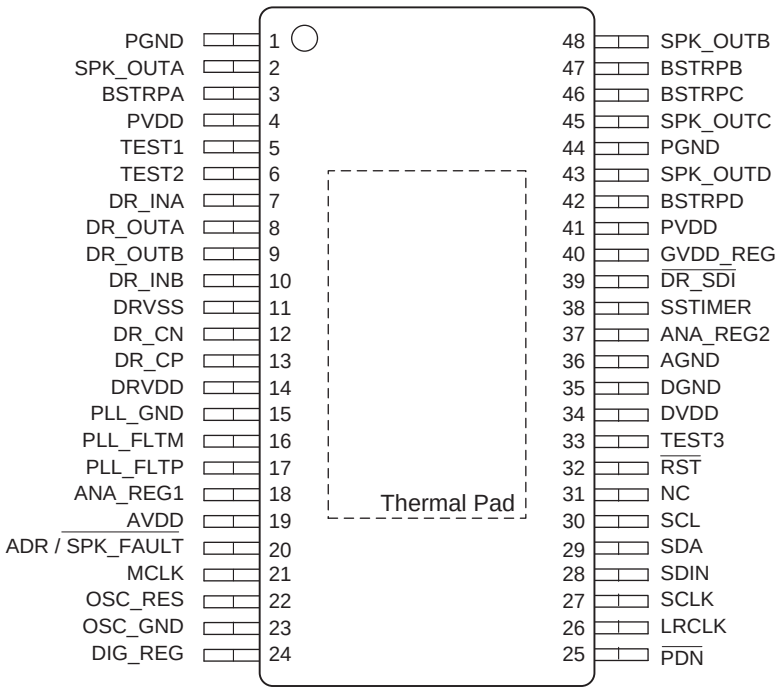


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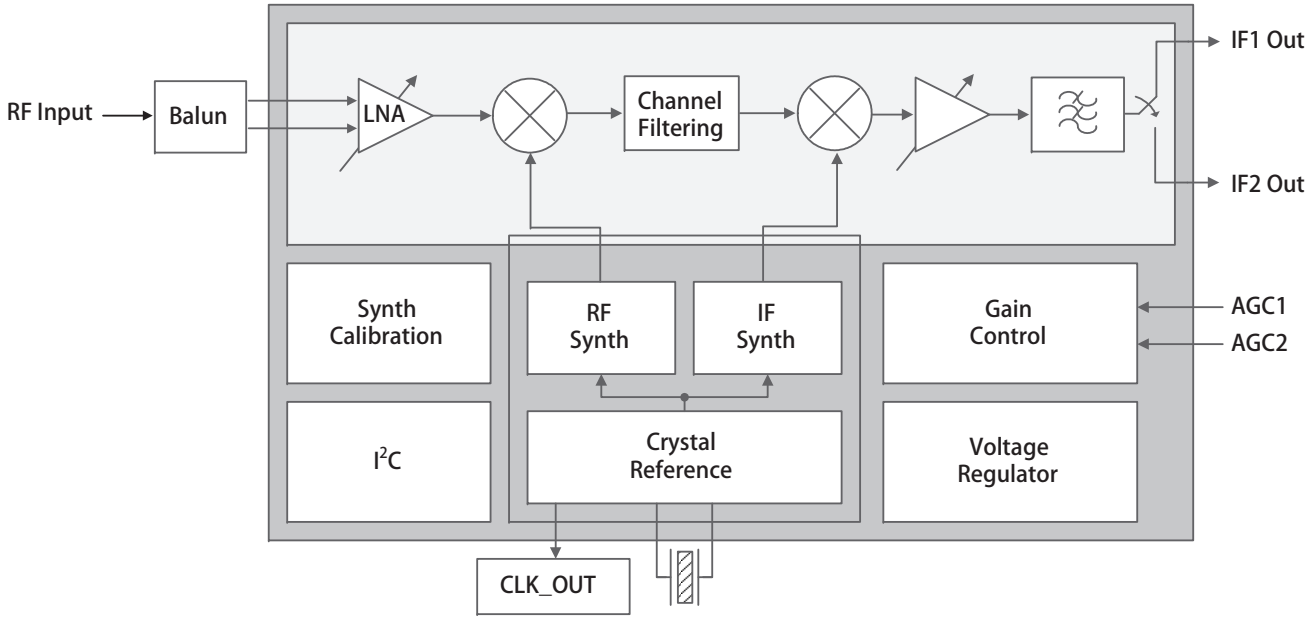
Figure 8-5 Internal block diagram and pin configuration

8.4 Diagram 10-5-6 Video YPbPr/CVBS B09, MxL661 (IC U104)

Block diagram



Pinning information

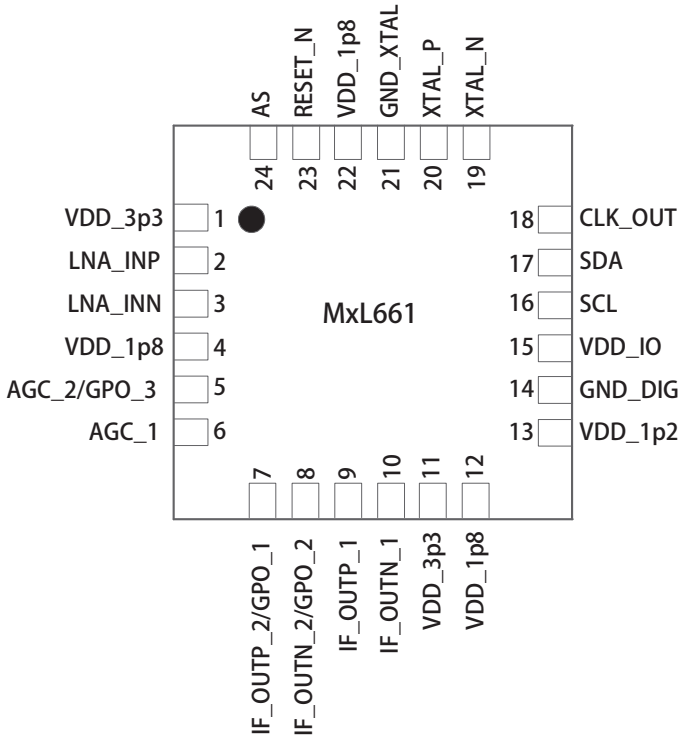


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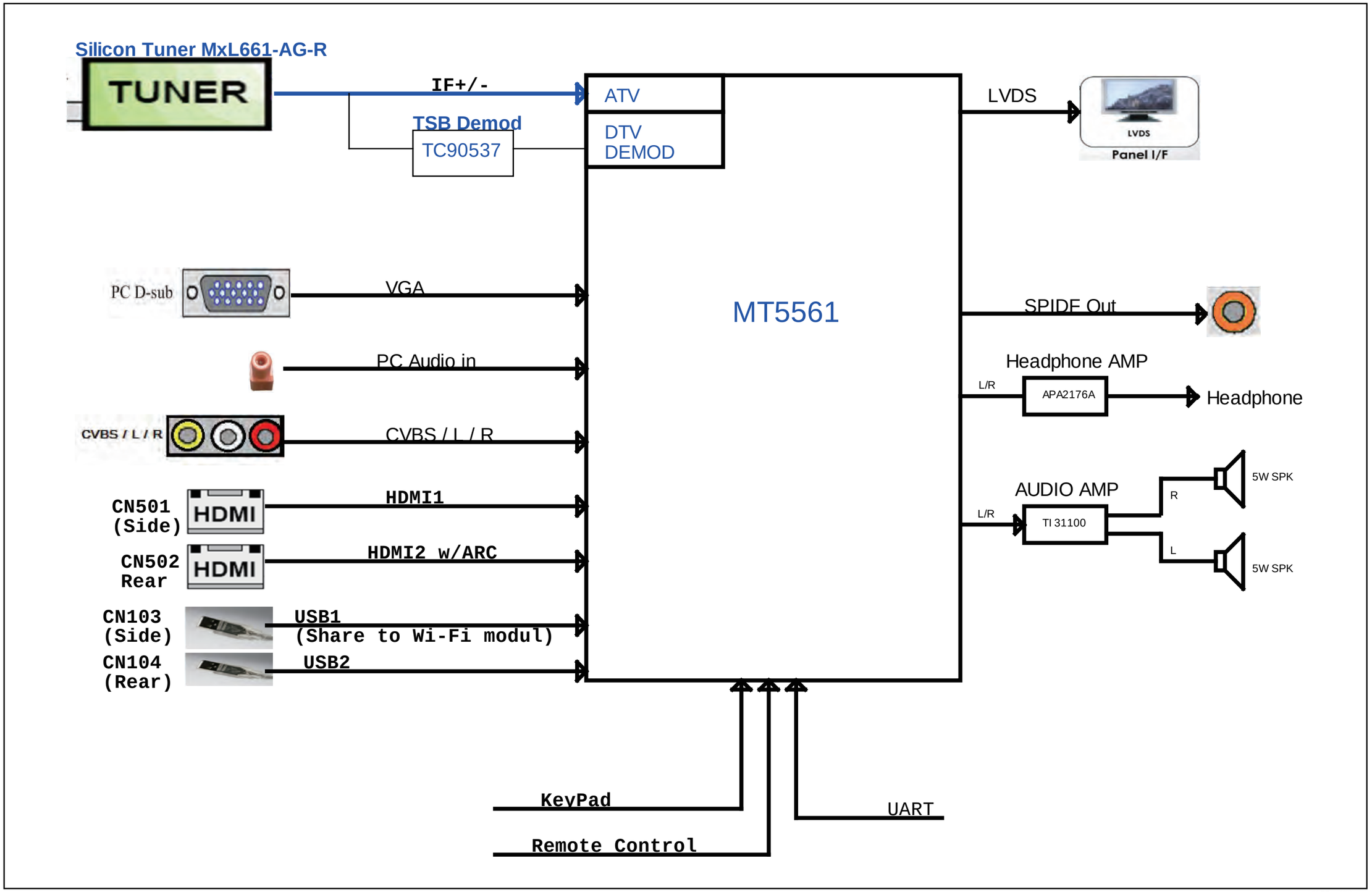
Figure 8-6 Internal block diagram and pin configuration

9. Block Diagrams

9.1 Block diagram 4100 & 5000 series



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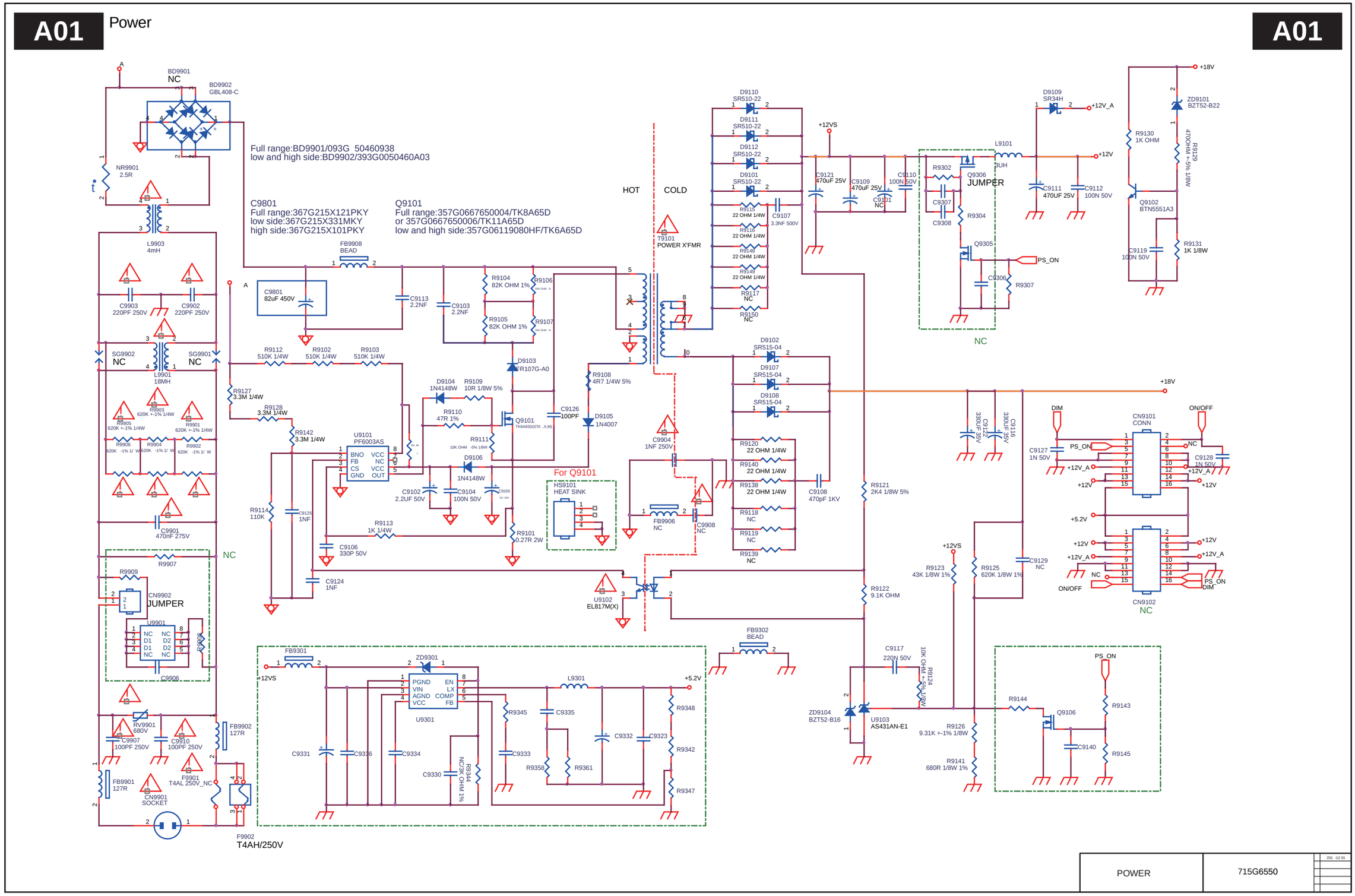
10. Circuit Diagrams and PWB Layouts

10.1 A 715G6550 PSU

A01 Power



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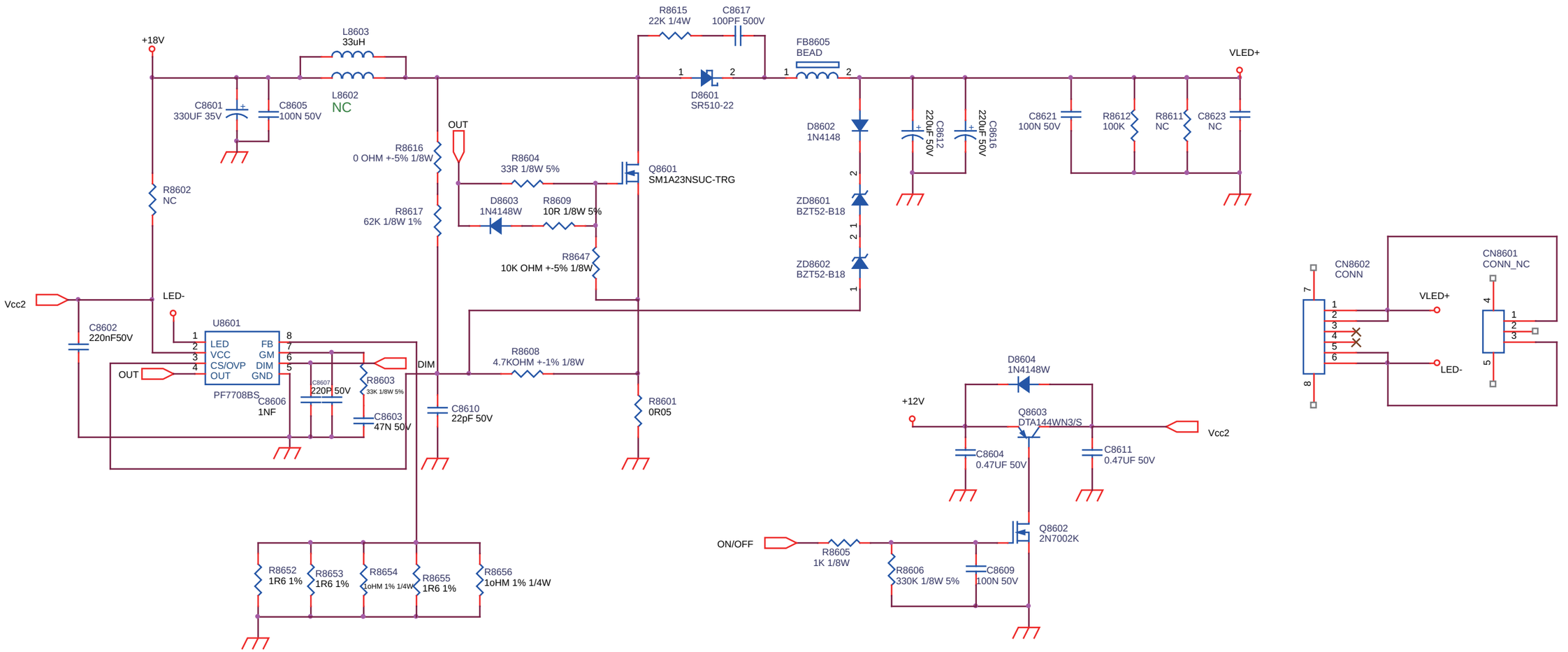
10-1-2 LED DRIVER

A01 LED DRIVER

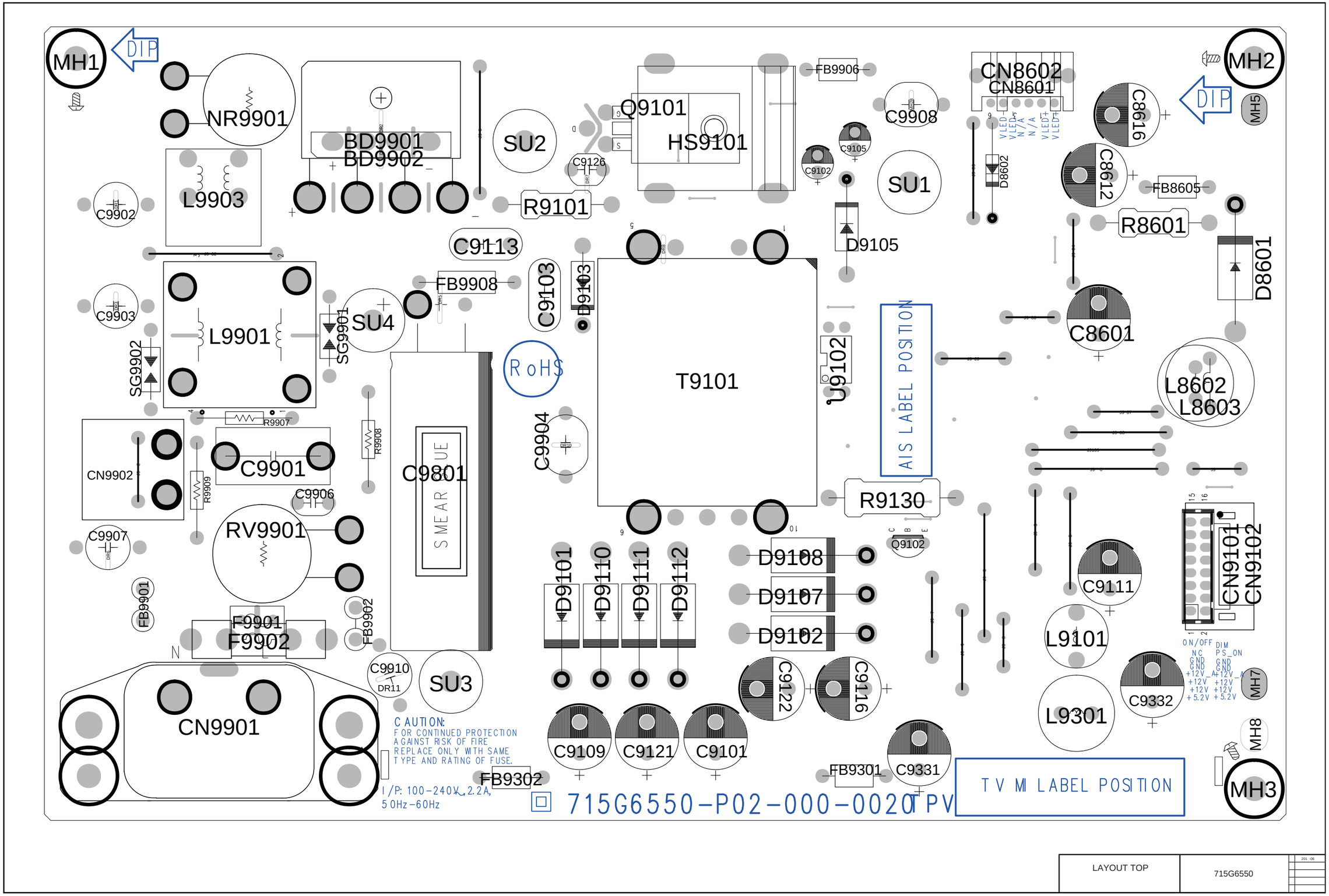
A01



LED DRIVER	715G6550

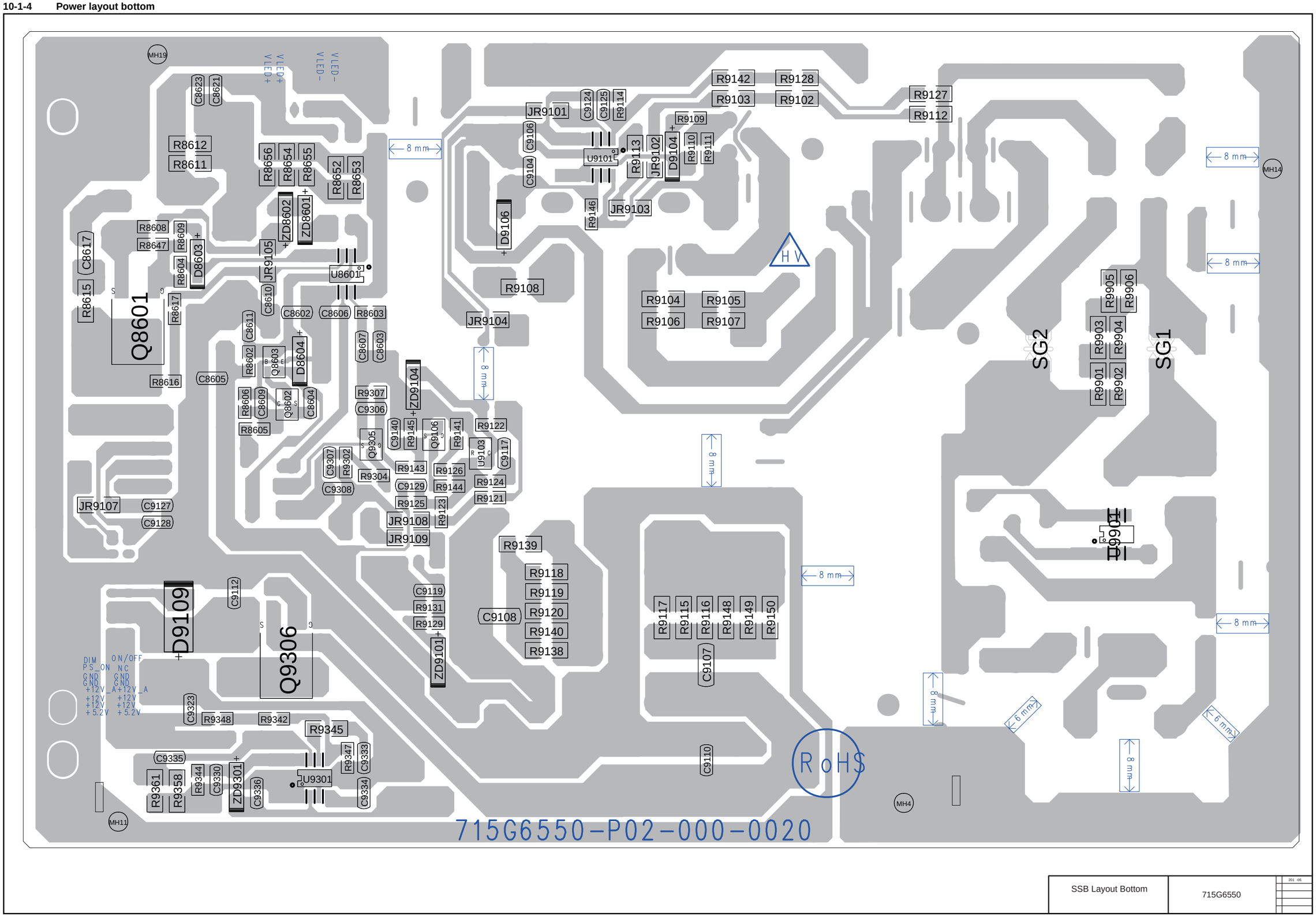
19770_501 eps

10-1-3 Power layout top



19770_502.eps

10-1-4 Power layout bottom

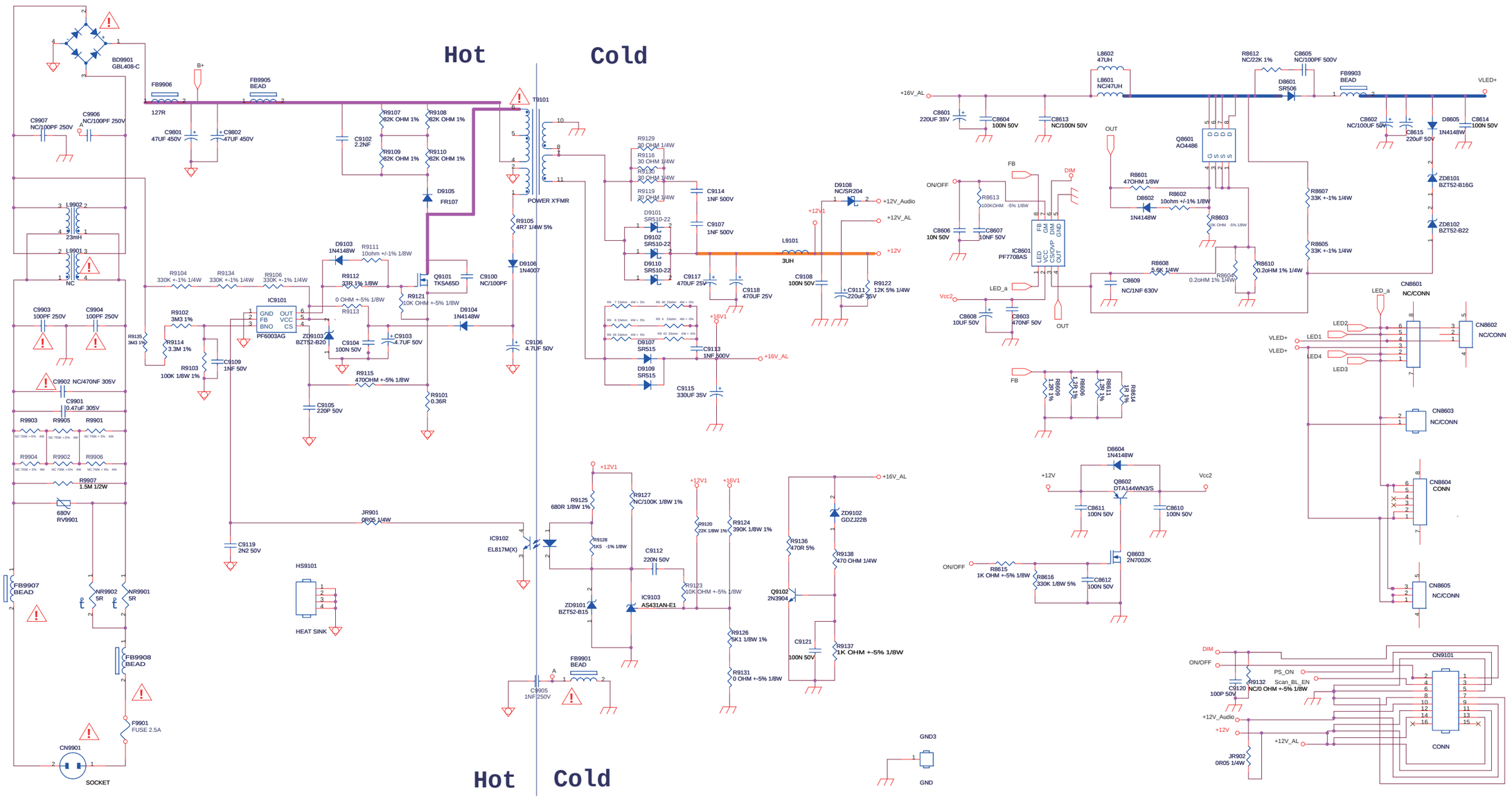


19770_503 eps

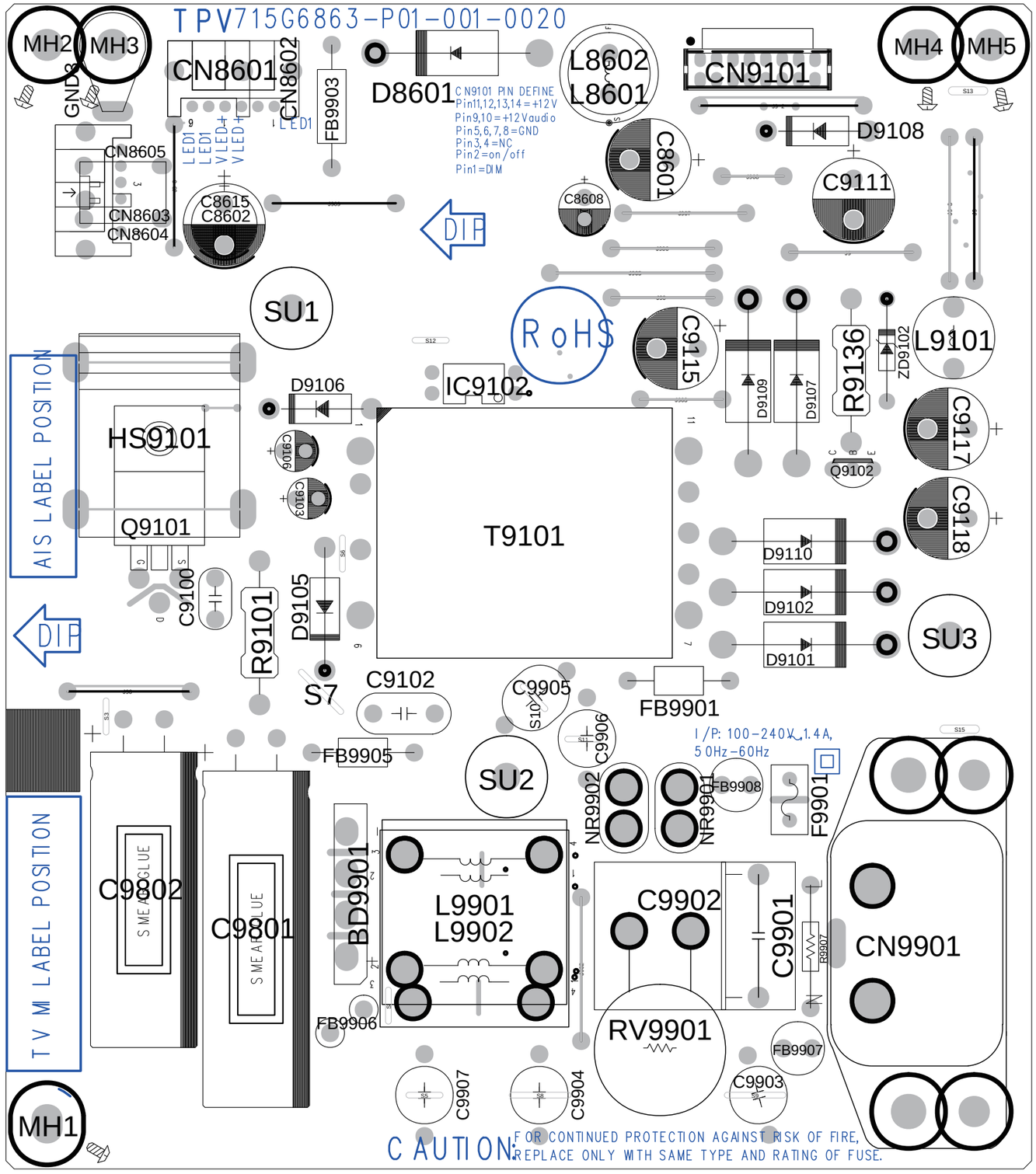
10.2 A 715G6863 PSU

10-2-1 Power

A01 POWER **A01**



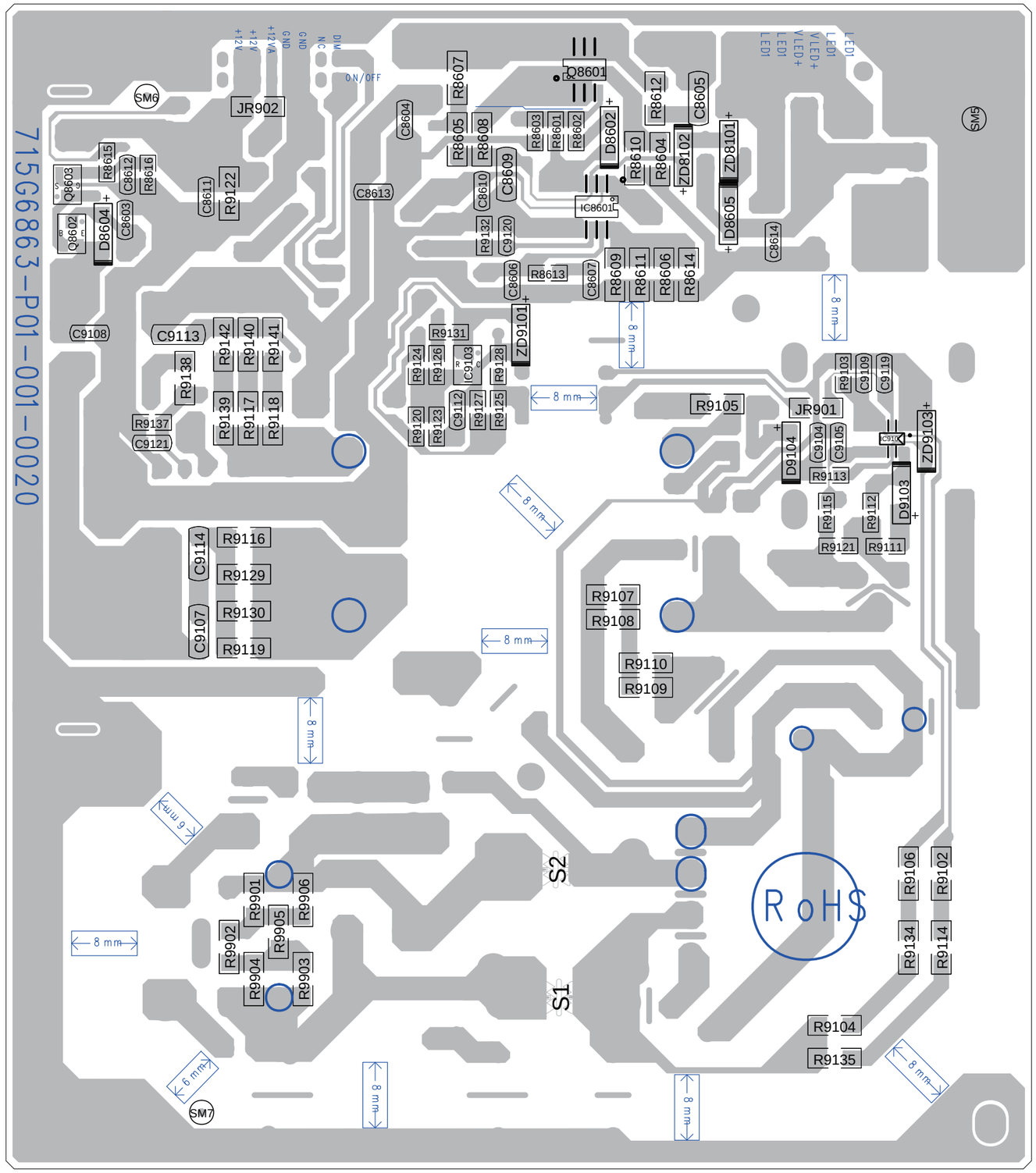
10-2-2 power layout top



LAYOUT TOP	715G6863	201 -06 05

19760_501 eps

10-2-3 Power layout bottom



LAYOUT BOTTOM	715G6863	201 -06 05

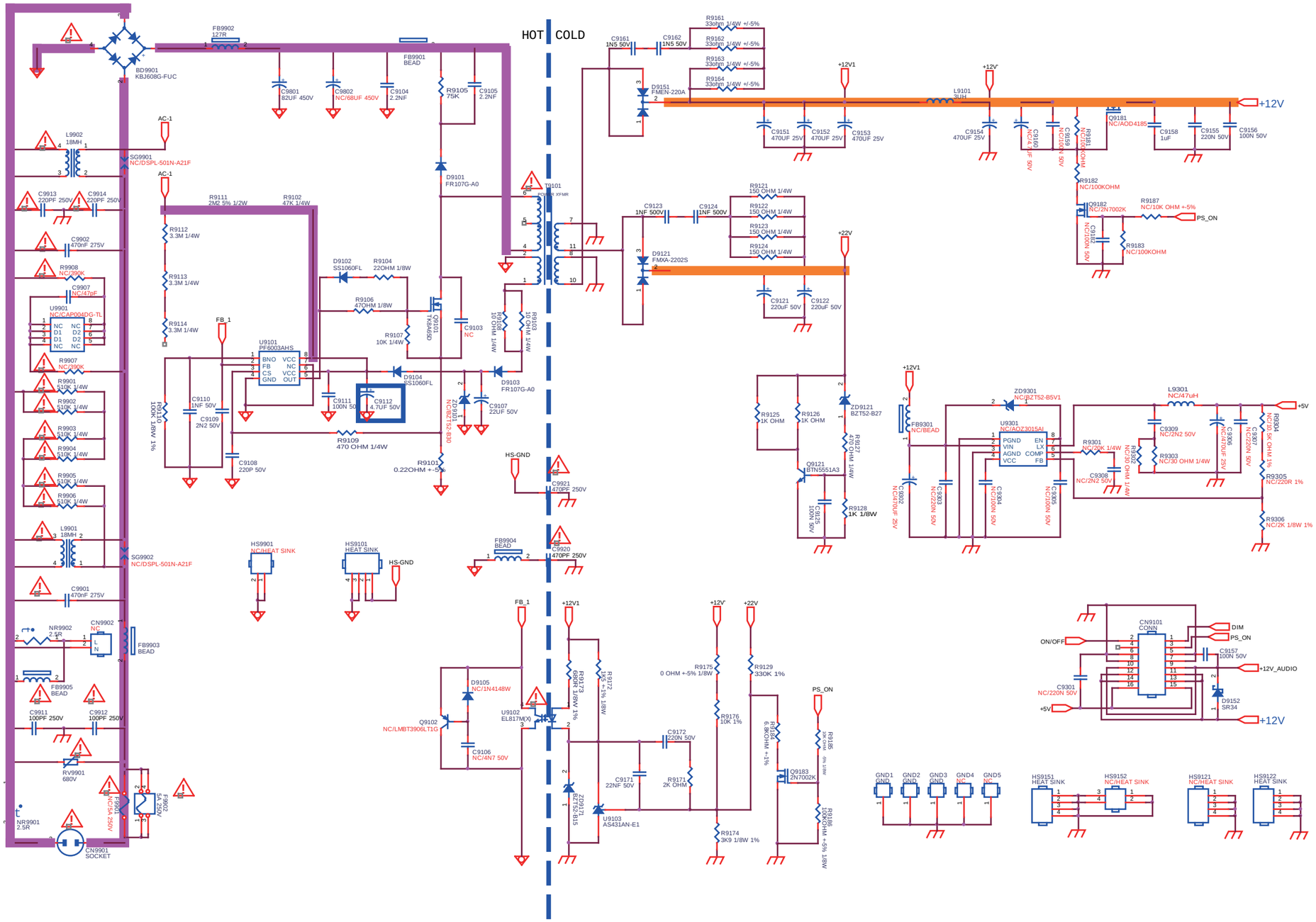
19760_502 eps

10.3 A 715G6934 PSU

10-3-1 POWER

A01 Power

A01



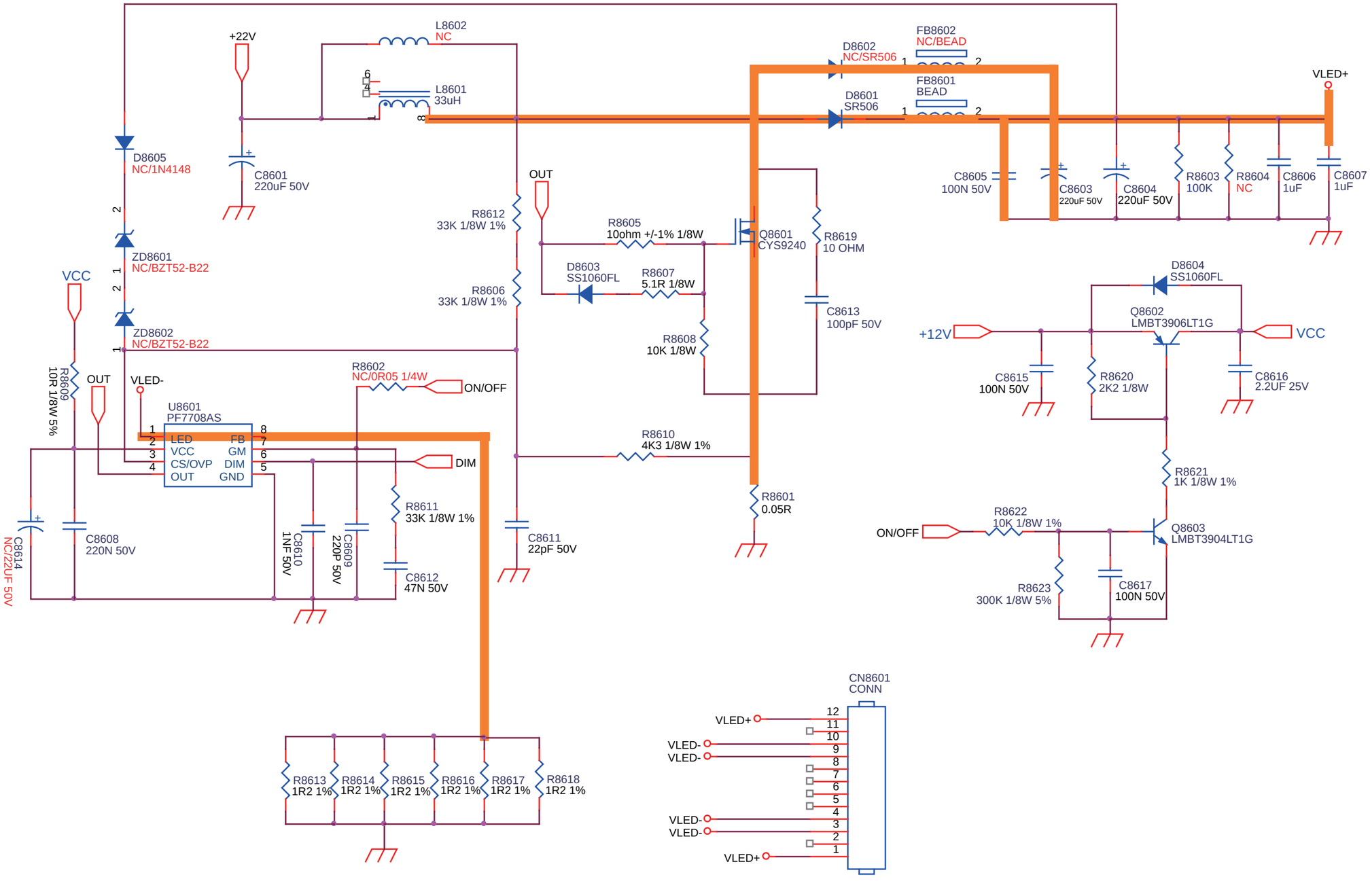
POWER	715G6934	201 -03 05

19760_503 eps

10-3-2 LED DRIVER

A02 LED DRIVER

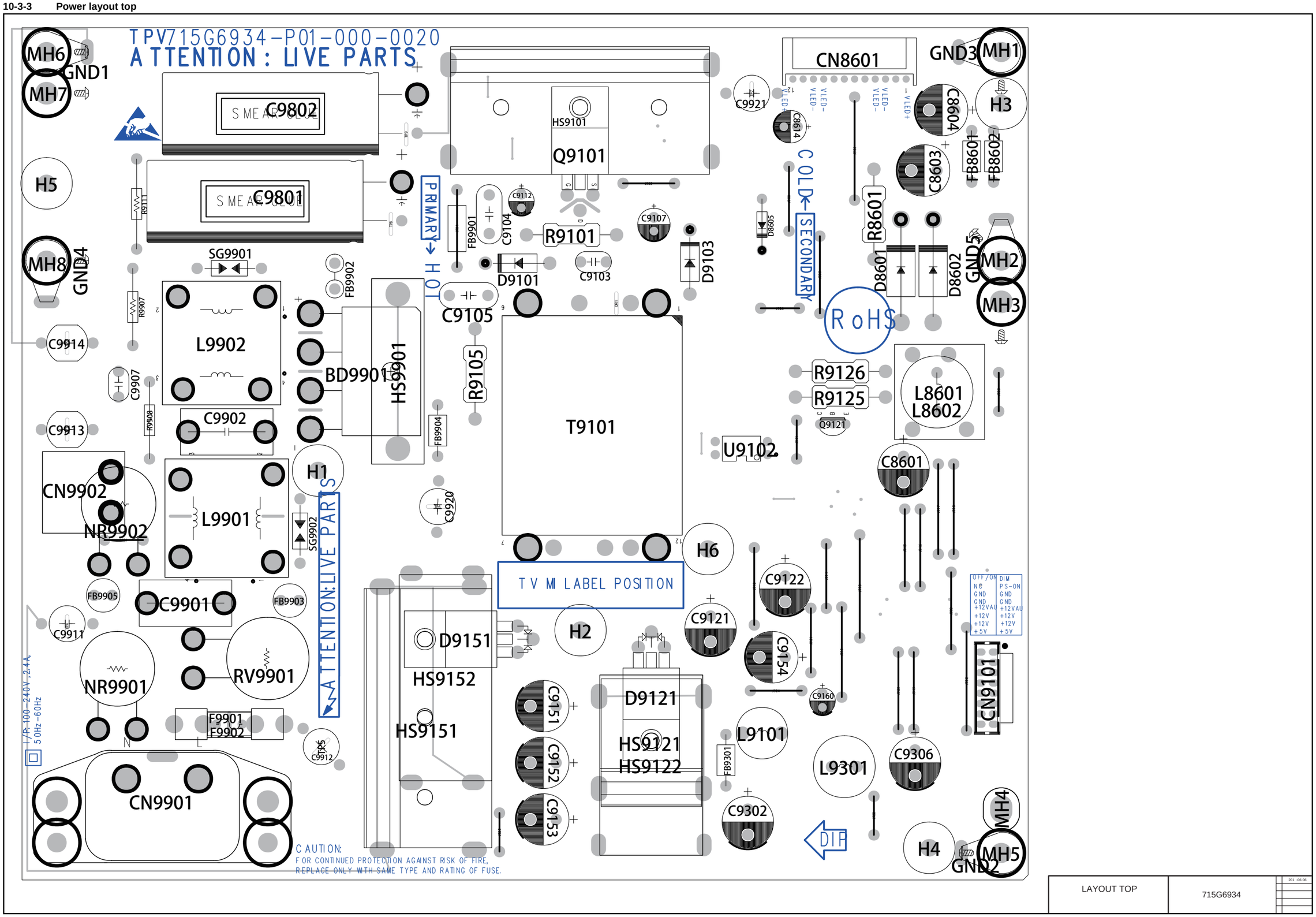
A02



LED DRIVER	715G6934	201 -06 05

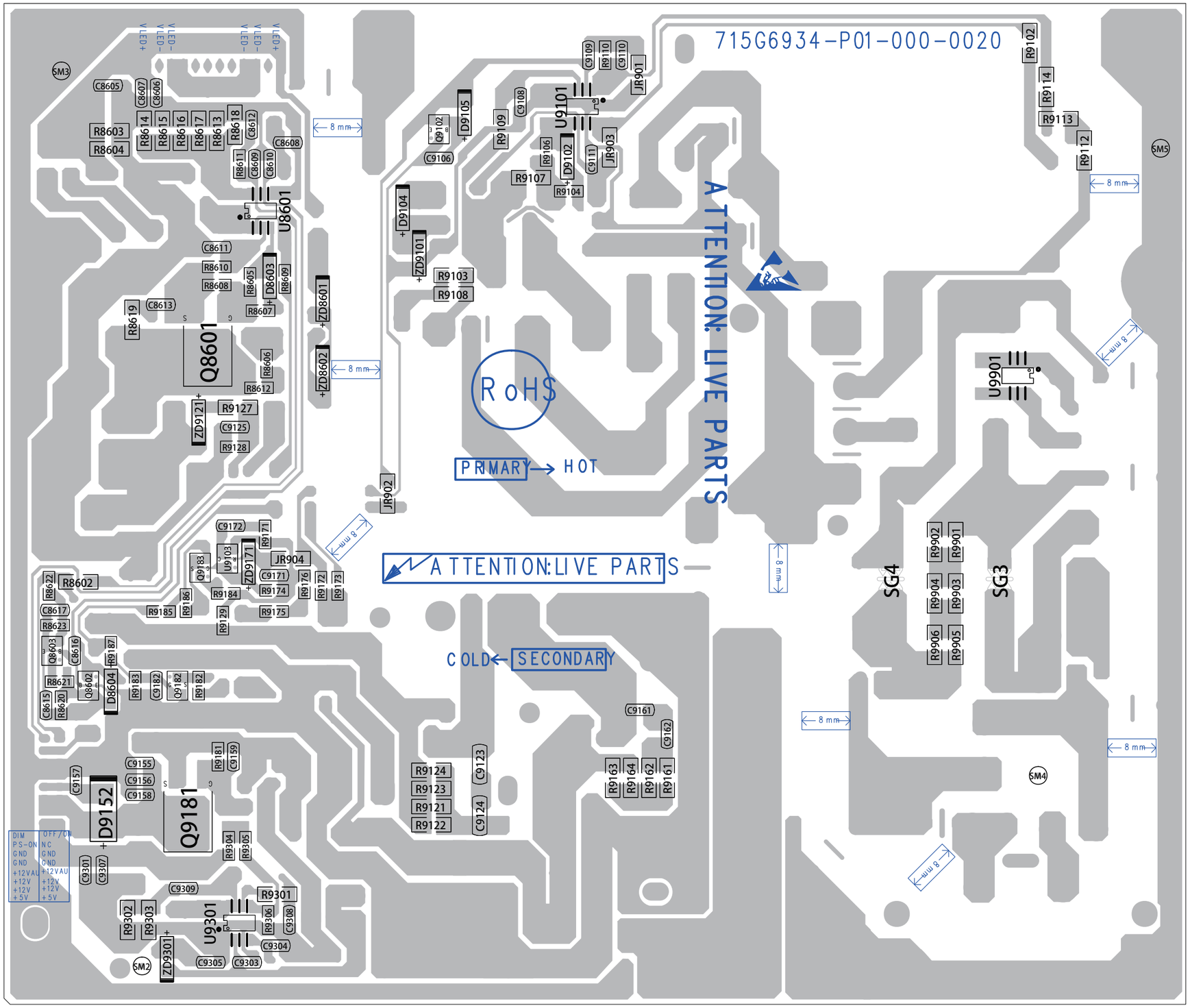
19760_504 eps

10-3-3 Power layout top



19760_505 eps

10-3-4 Power layout bottom



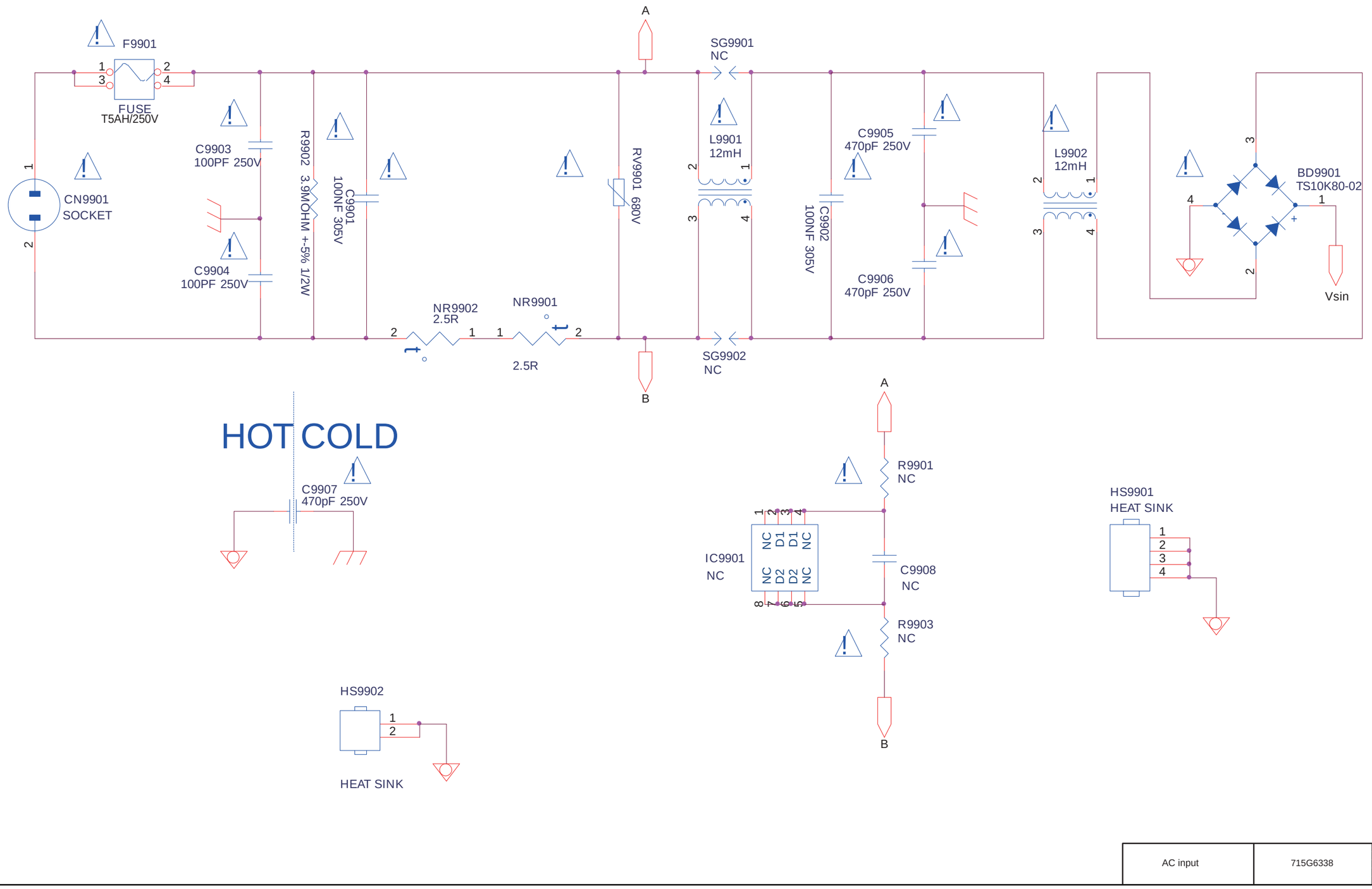
LAYOUT BOTTOM	715G6934	201 06 06

19760_506 eps

10.4 A 715G6338 PSU
10-4-1 POWER

A01 AC input

A01

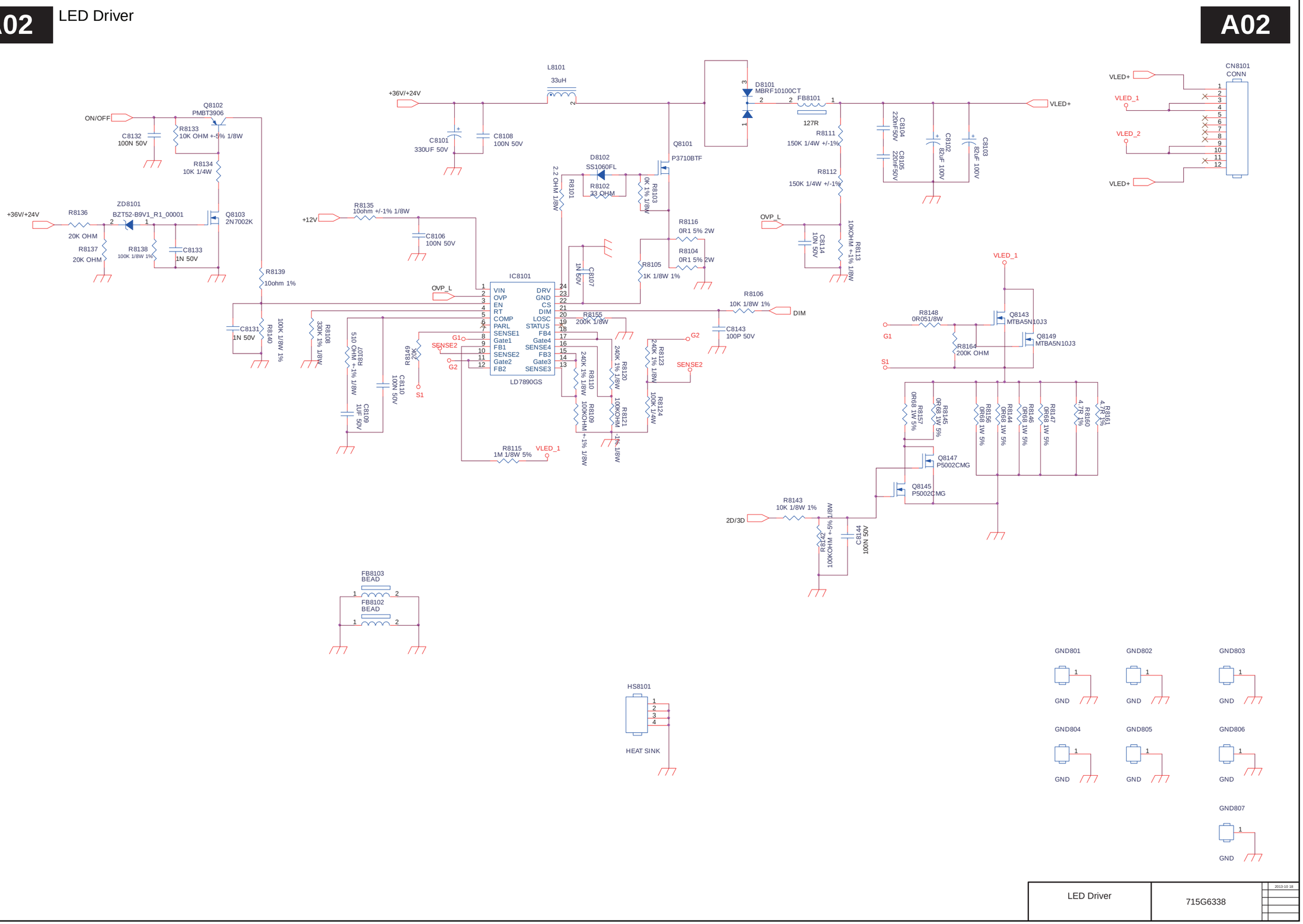


AC input	715G6338	2013-10 18

19610_500 eps

10-4-2 LED DRIVER

A02 LED Driver

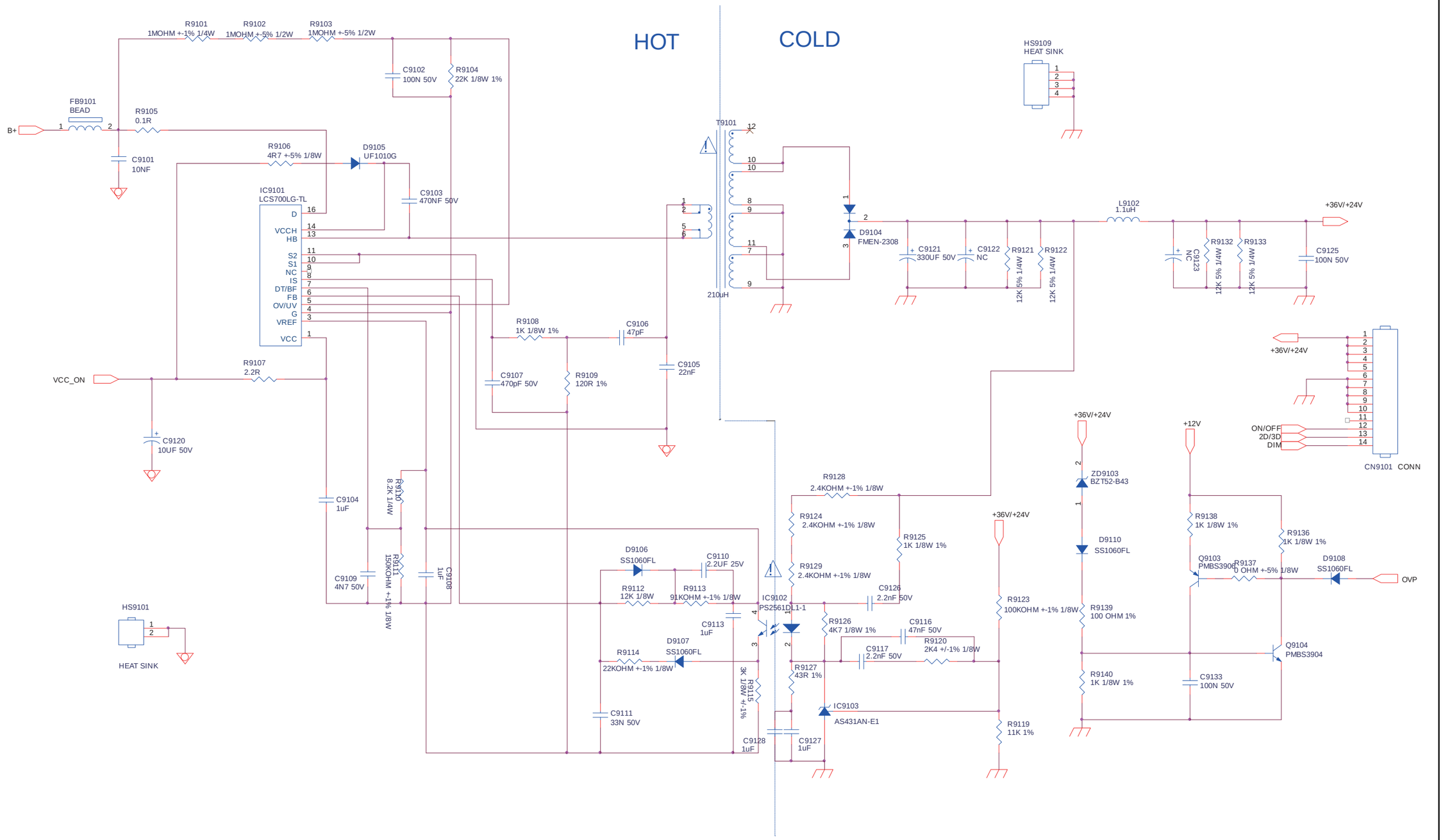


19610_501 eps

10-4-3 LLC 36V

A03 LLC 36V

A03



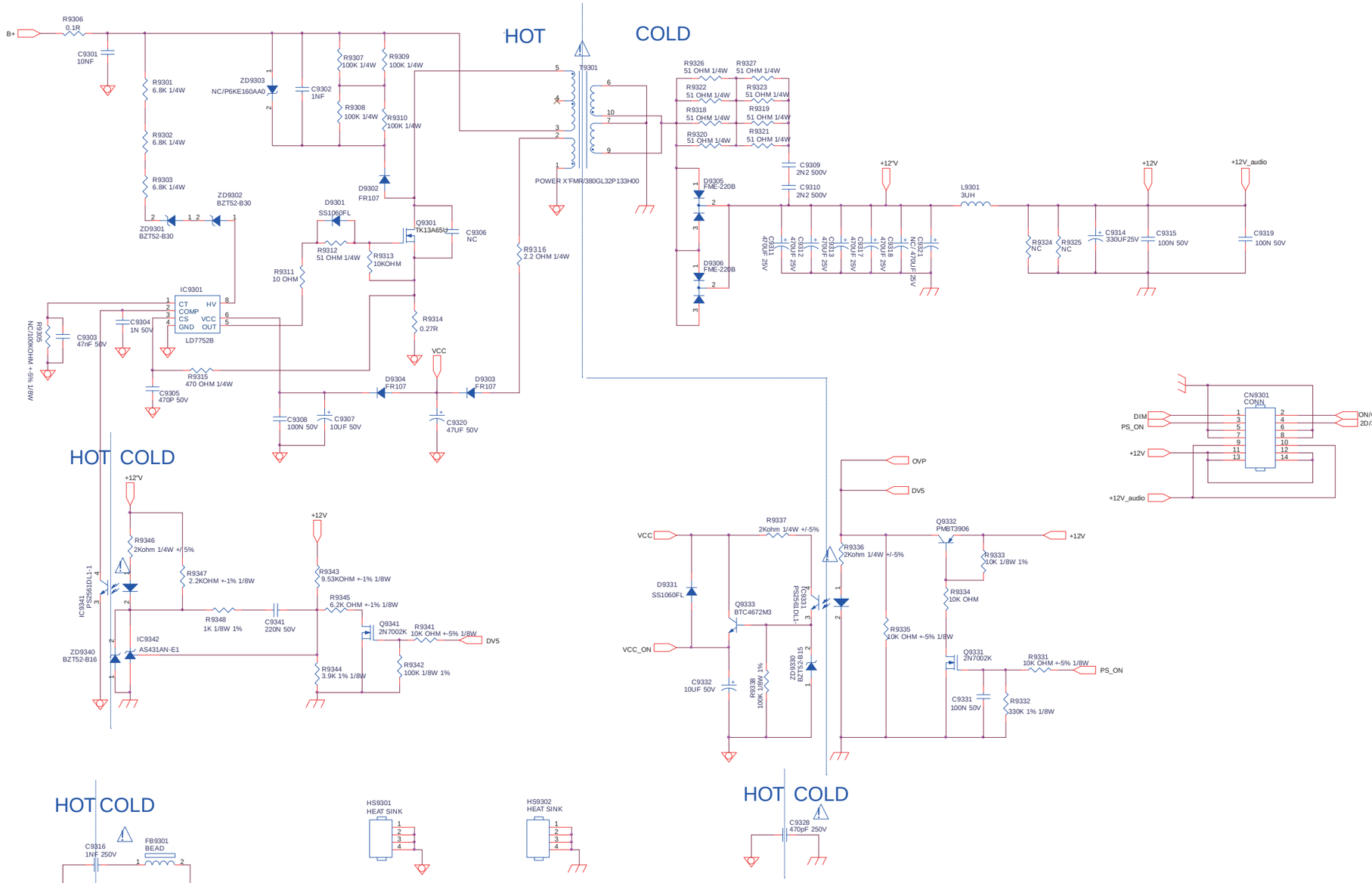
LLC 36V	715G6338	A 2013-10 18

19610_502 eps

10-4-4 Main Power 12V

A04 Main Power 12V

A04



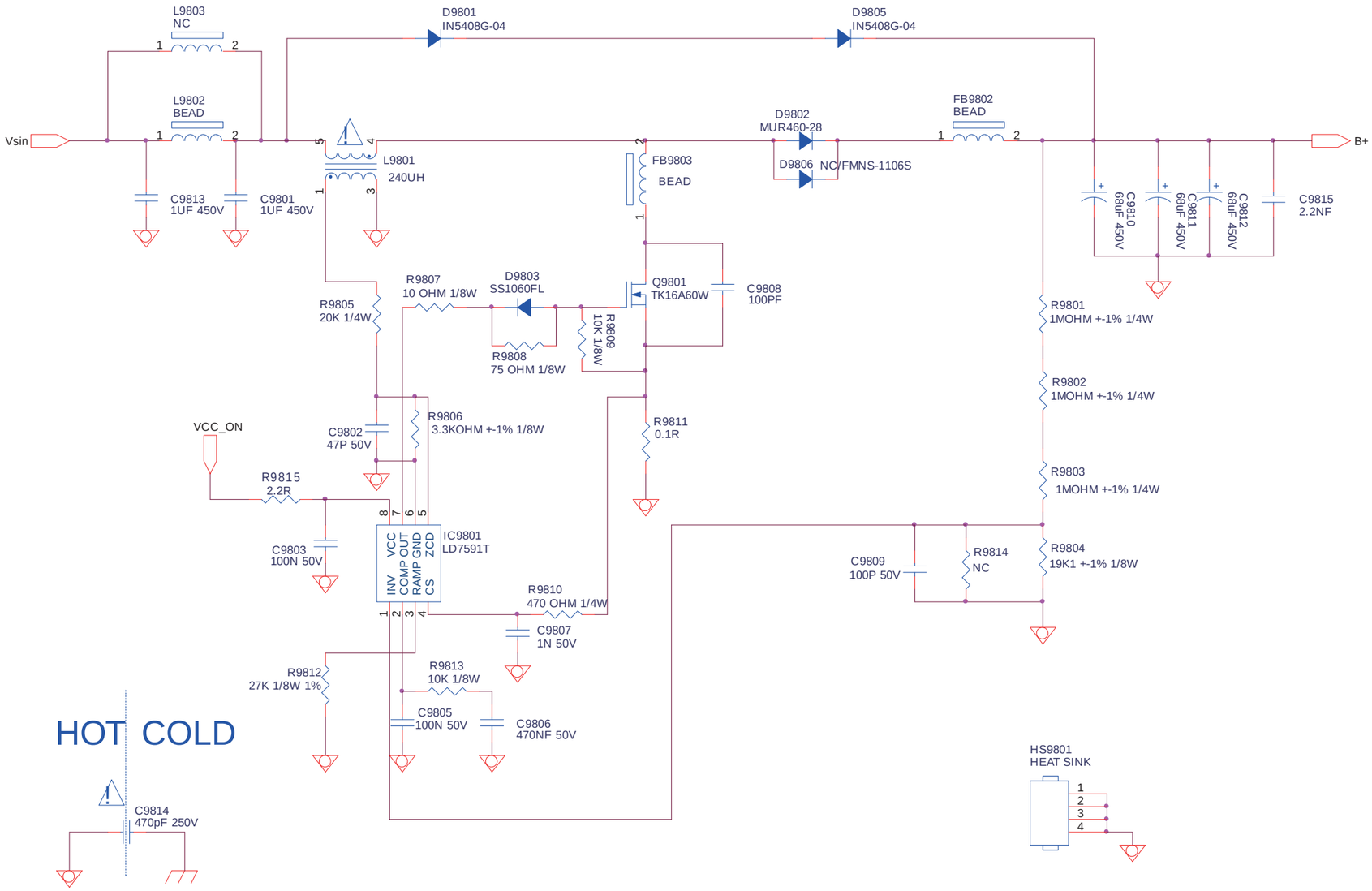
Main Power 12V	715G6338	A 2013-10 18

19610_503 eps

10-4-5 PFC

A05 PFC

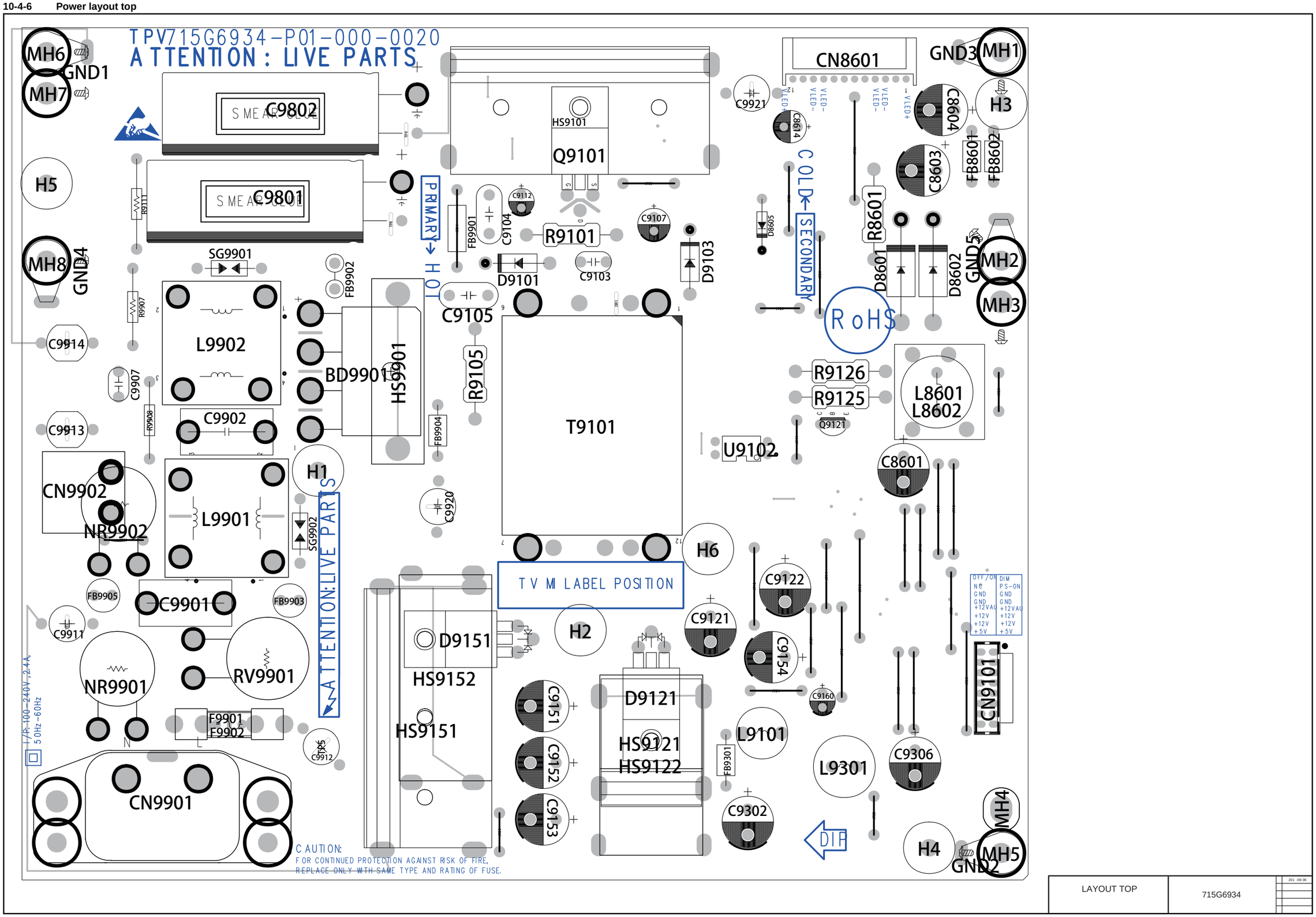
A05



PFC	715G6338	A 2013-10 18

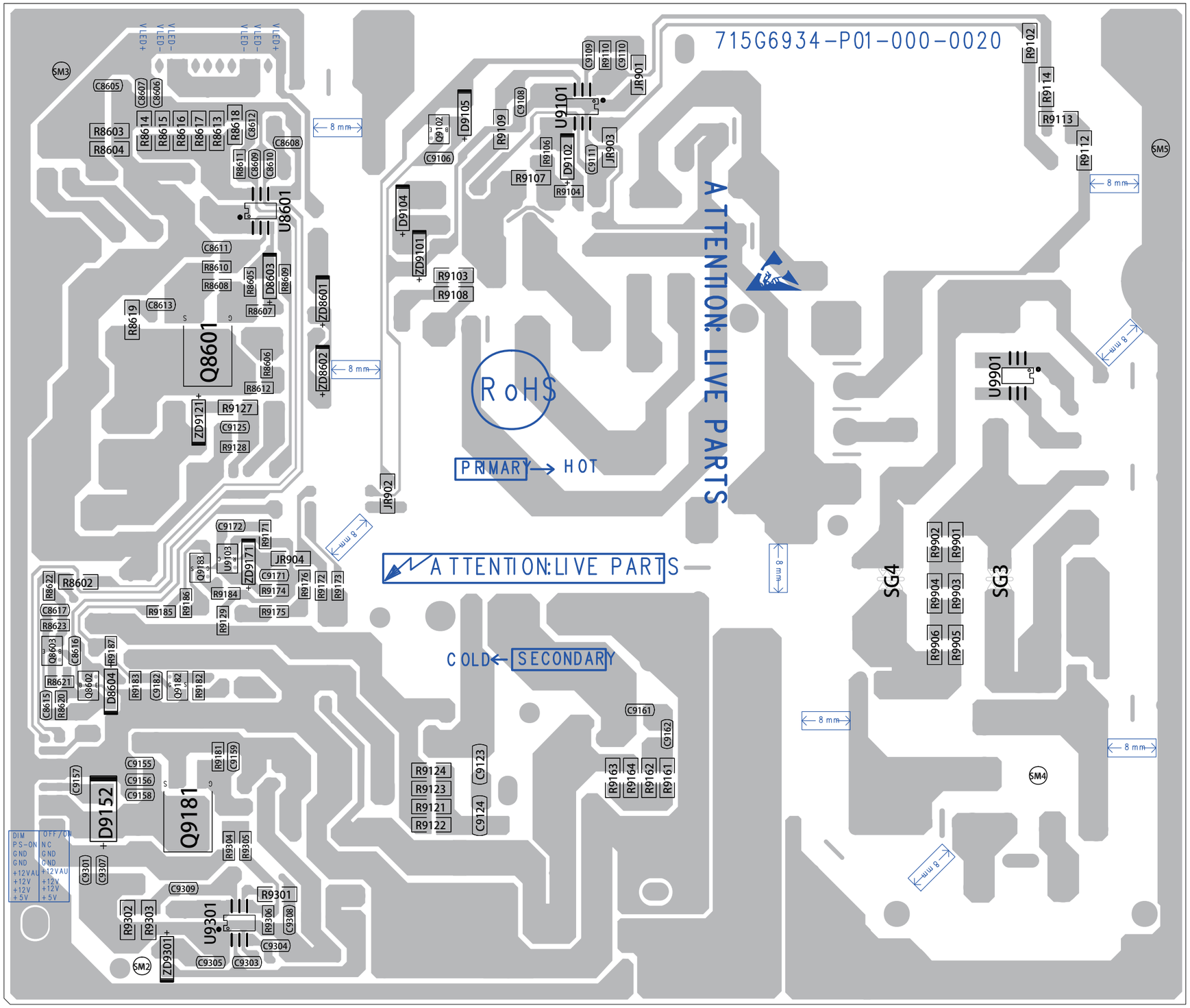
19610_504 eps

10-4-6 Power layout top



19760_505 eps

10-4-7 Power layout bottom



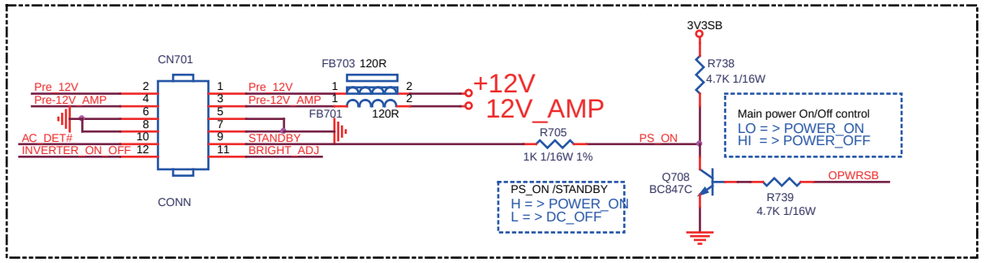
LAYOUT BOTTOM | 715G6934 | 201 06 06

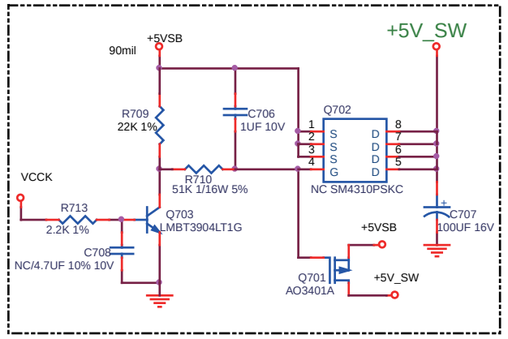
19760_506 eps

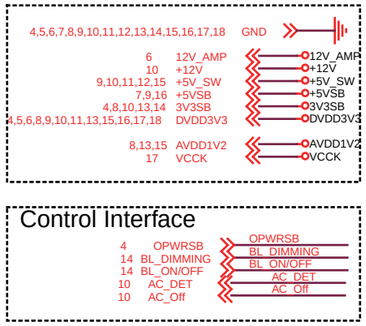
10.5 B 715G6836 SSB
10-5-1 System Power

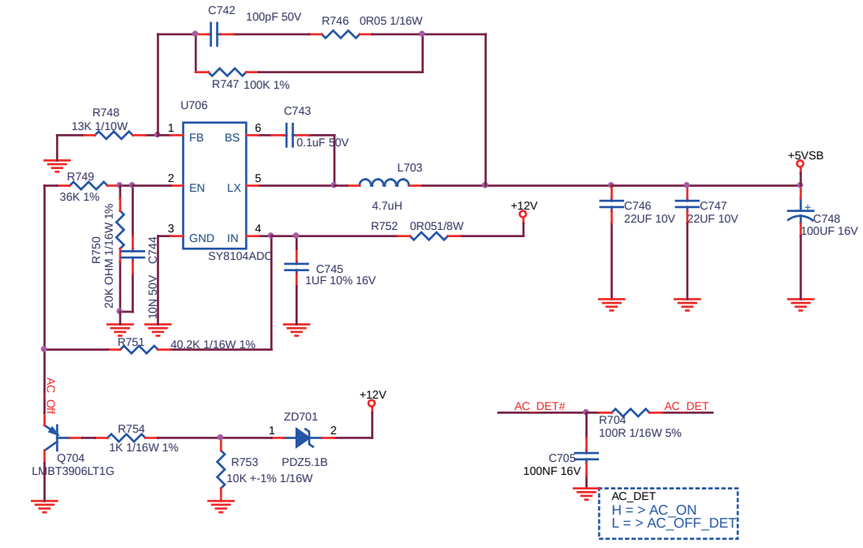
B01 System Power

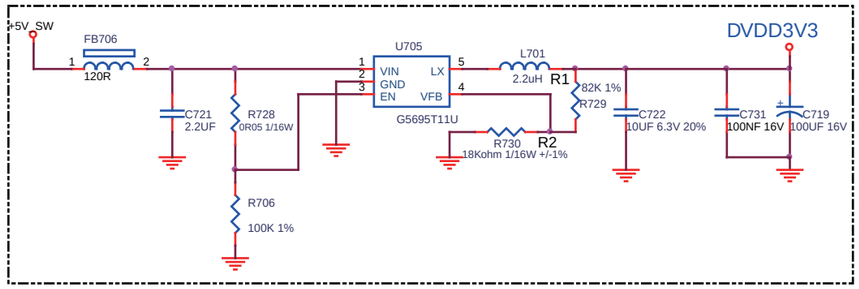
B01

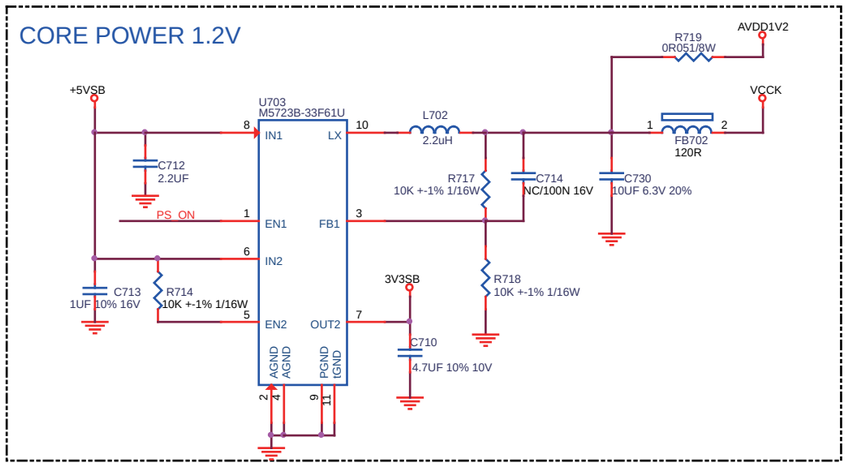


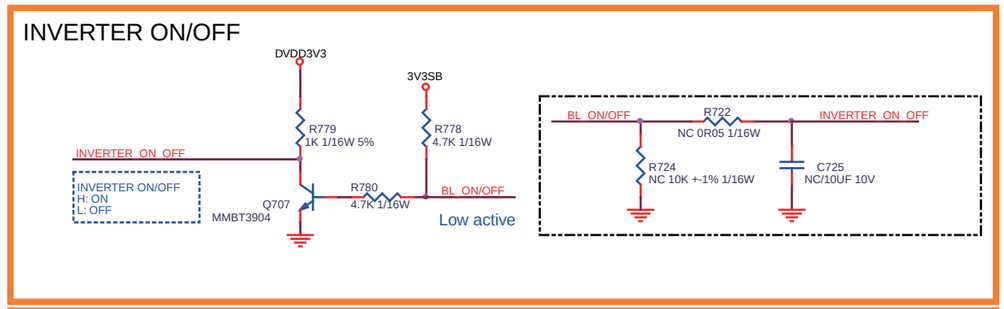


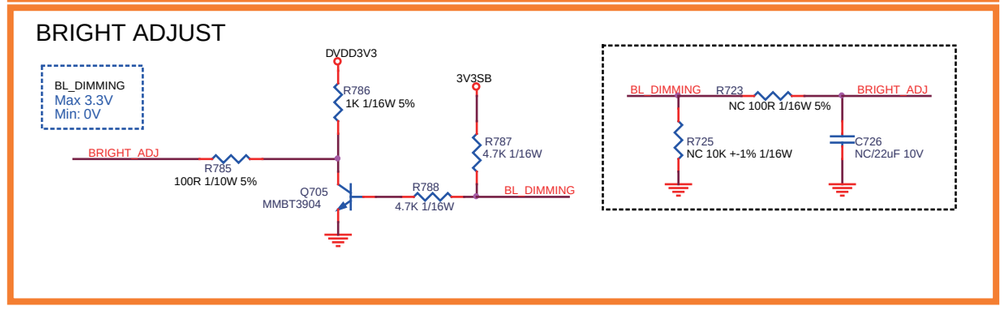












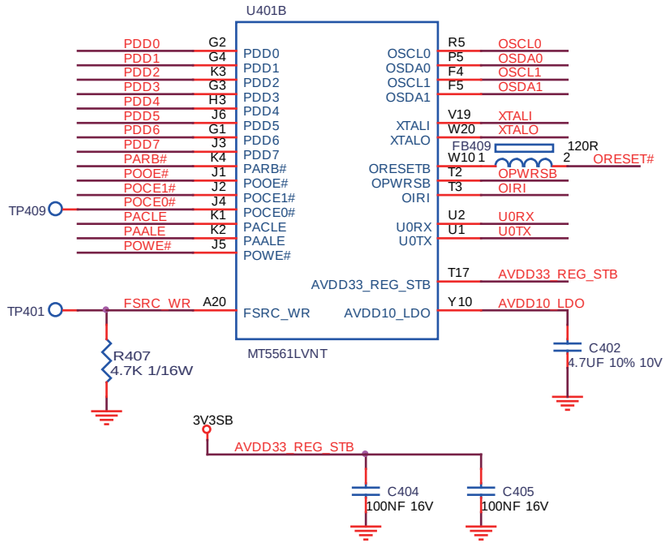
System Power	715G6836	3 201 -07 07

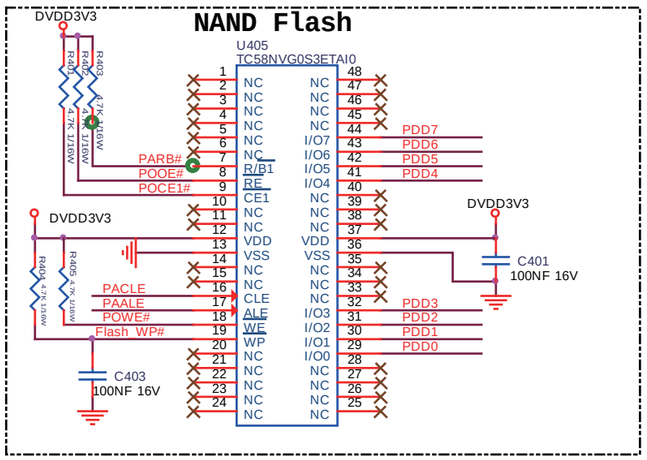
19760_507 eps

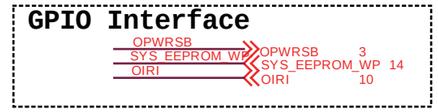
10-5-2 Peripheral

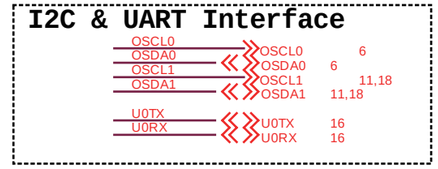
B02 Peripheral

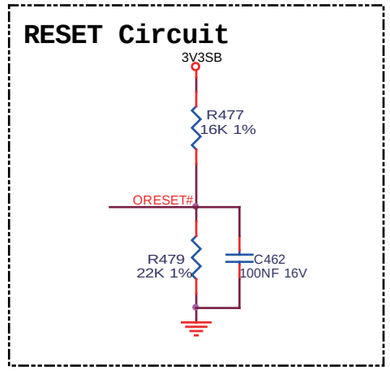
B02

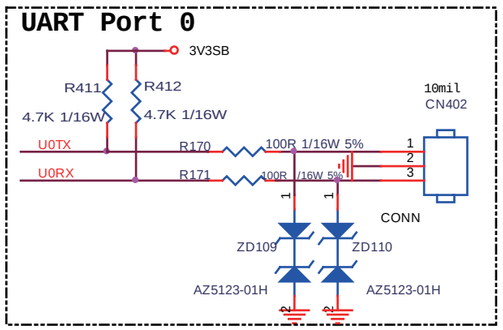


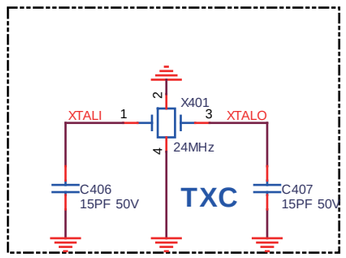


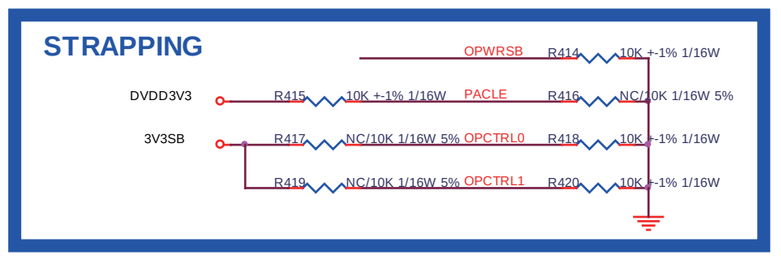


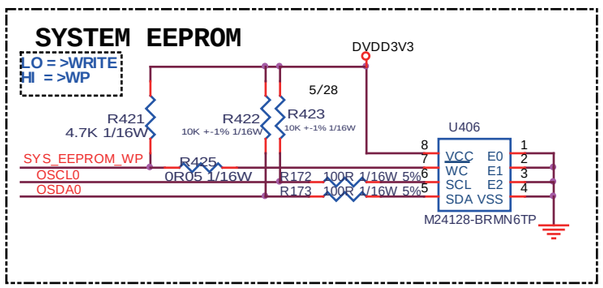


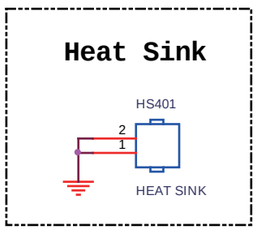












BGA Strapping	OPCTRL1	PACLE	OPWRSB	OPCTRL0
ICE mode + 24M + serial boot	X	0	0	0
ICE moce + 24M + ROM to Nand boot	X	1	0	0
ICE mode + 27M + serial boot	X	0	0	1
ICE moce + 27M + ROM to Nand boot	X	1	0	1

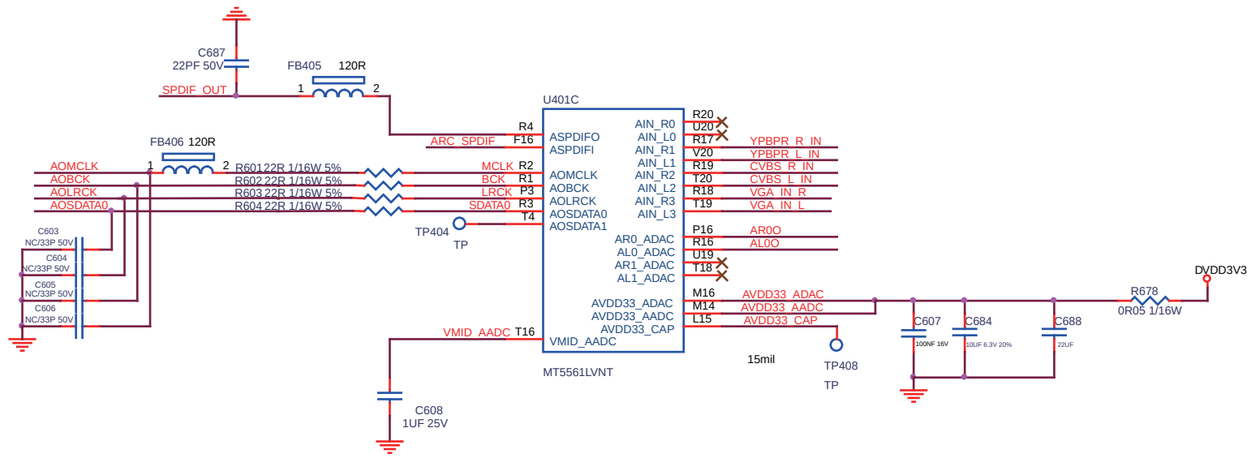
Peripheral	715G6836

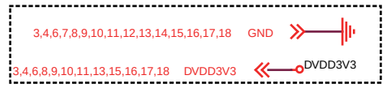
19760_508 eps

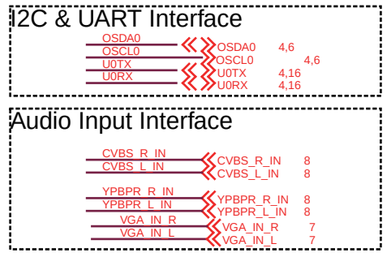
10-5-3 Audio A-in/I2S/HP

B03 Audio A-in/I2S/HP

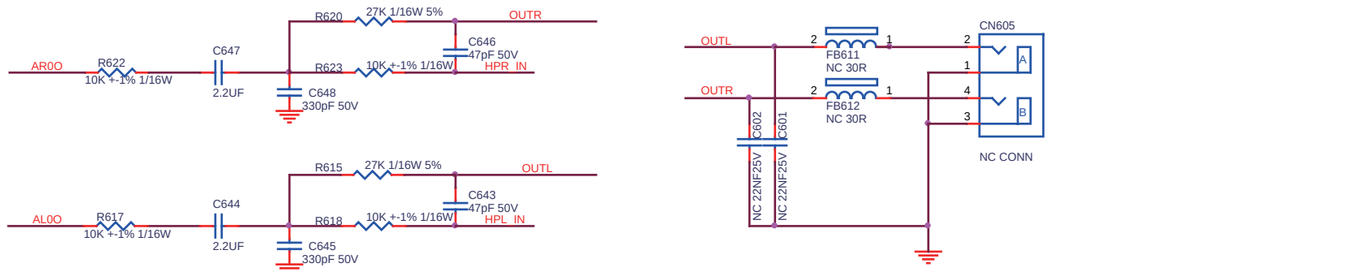
B03



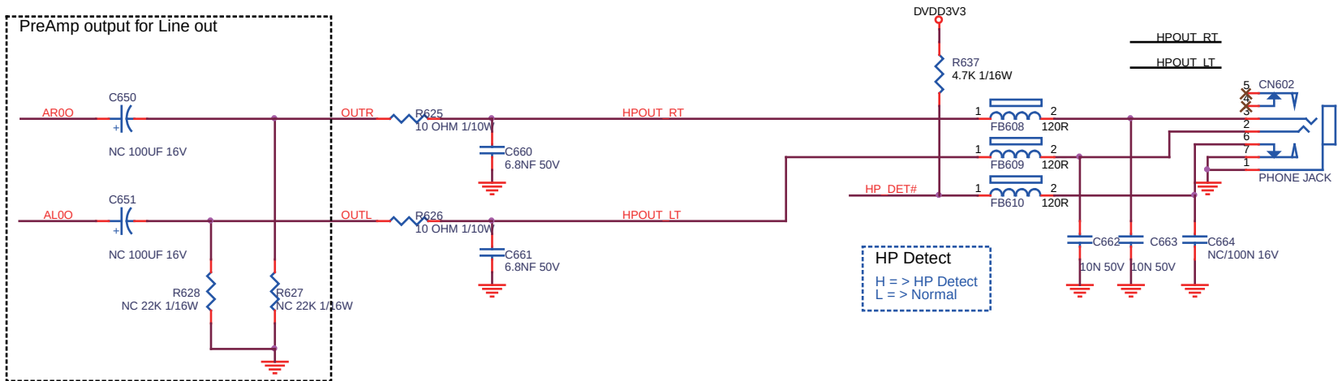




PreAmp output for Headphone



PreAmp output for Line out



Audio A-in/I2S/HP	715G6836

19760_509 eps

10-5-4 **Speaker Amp**

B04 Speaker Amp

B04

12V_AMP
PVDD
FB602
120R
C609 100uF 25V
C616 100nF 50V
PVDD
C690 100uF 25V
C617 100nF 50V

DVDD3V3
AMP3V3
FB603 120R
C614 10UF 6 3V 20%
C612 100NF 16V
C610 10UF 6.3V 20%
C613 100NF 16V
C615 10UF 6 3V 20%
C611 100NF 16V

AMP Mute

DVDD3V3
R634 NC 10K 1/16W 5%
TP063
AMP_PDN
TP065
AMP_MUTE
R633 NC 10K 1/16W 5%
Q602 NC MMBT3904
C691 100NF 16V
R635 NC 22R 1/16W 5%
AMP_MUTE
AMP_PDN

U601 TAS5729MD

1	GND	OUTB	48
2	OUTA	BSTB	47
3	BSTA	BSTC	46
4	PVDD	OUTC	45
5	PWM1	GND	44
6	PWM2	OUTD	43
7	HPIL	BSTD	42
8	HPOL	PVDD	41
9	HPOR	GVDD_REG	40
10	HPIR	HP_SD	39
11	HPVSS	SSTIMER	38
12	CN	AVDD_REG2	37
13	CP	GND	36
14	HPVDD	GND	35
15	GND	DVDD	34
16	FLTM	TEST	33
17	FTLP	RESET	32
18	AVDD_REG1	NC	31
19	AVDD	SCL	30
20	ADR	SDA	29
21	MCLK	SDIN1	28
22	ROSC	SCLK	27
23	GND	LRCLK	26
24	DVDD_REG	PDN	25
49	E-Pad		

OUTA C624 33nF50V
PVDD
HPL_N
OUTL
OUTR
HPR_N
C634 1UF 25V
C636 1UF 25V
AMP3V3
C637 47nF 16V
C638 4.7nF 50V
R612 470R 1/16W 5%
R610 470R 1/16W 5%
C639 4.7nF 50V
C641 47nF 16V
AMP3V3
AMP3V3
R613 10K +-1% 1/16W
ADR
AOMCLK
R614 18.2K OHM +-1% 1/16W
C642 4.7UF 10% 10V
OUTB C623 33nF50V
C625 33nF50V
OUTC
OUTD C628 33nF50V
PVDD
C630 1UF 25V
HP_AC_MUTE
C633 2.2nF 50V
C635 100NF 16V
AMP3V3
R609 10K +-1% 1/16W
AMP_RESETN
R611 1K 1/16W 1%
C640 2.2UF
R631 33R 1/16W 5%
OSCL0
R632 33R 1/16W 5%
OSDA0
AMP3V3
AOSDATA0
AOBCK
AOLRCK
AMP_PDN
R616 10K +-1% 1/16W

3,4,5,7,8,9,10,11,12,13,14,15,16,17,18 GND
3 12V_AMP 12V_AMP
3,4,5,8,9,10,11,13,15,16,17,18 DVDD3V3 DVDD3V3

GPIO & I2C Control

HP_AC_MUTE HP_AC_MUTE 9
OSDA0 OSDA0 4
OSCL0 OSCL0 4

I2S Interface

AOMCLK AOMCLK 5
AOBCK AOBCK 5
AOLRCK AOLRCK 5
AOSDATA0 AOSDATA0 5
HPL_IN HPL_ N 5
HPR_IN HPR_ N 5
OUTR OUTR 5
OUTL OUTL 5
AMP_MUTE AMP_MUTE 14

FB604 120R 3A
OUTA L601 10uH C618 330pF 50V R605 18R 1/10W 5%
C620 1UF 16V
C619 470NF 16V
FB605 120R 3A
OUTB L602 10uH C622 330pF 50V R606 18R 1/10W 5%
C621 470NF 16V
FB606 120R 3A
OUTC L603 10uH C627 330pF 50V R607 18R 1/10W 5%
C629 1UF 16V
C626 470NF 16V
FB607 120R 3A
OUTD L604 10uH C632 330pF 50V R608 18R 1/10W 5%
C631 470NF 16V

CN601
L+ 4
L- 3
R+ 2
R- 1
6
5
CONN
L+
L-
R+
R-
5/28

Heat Sink

HS601
2
1
NC/HEAT S NK

Speaker Amp	715G6836	3 201 -07 07

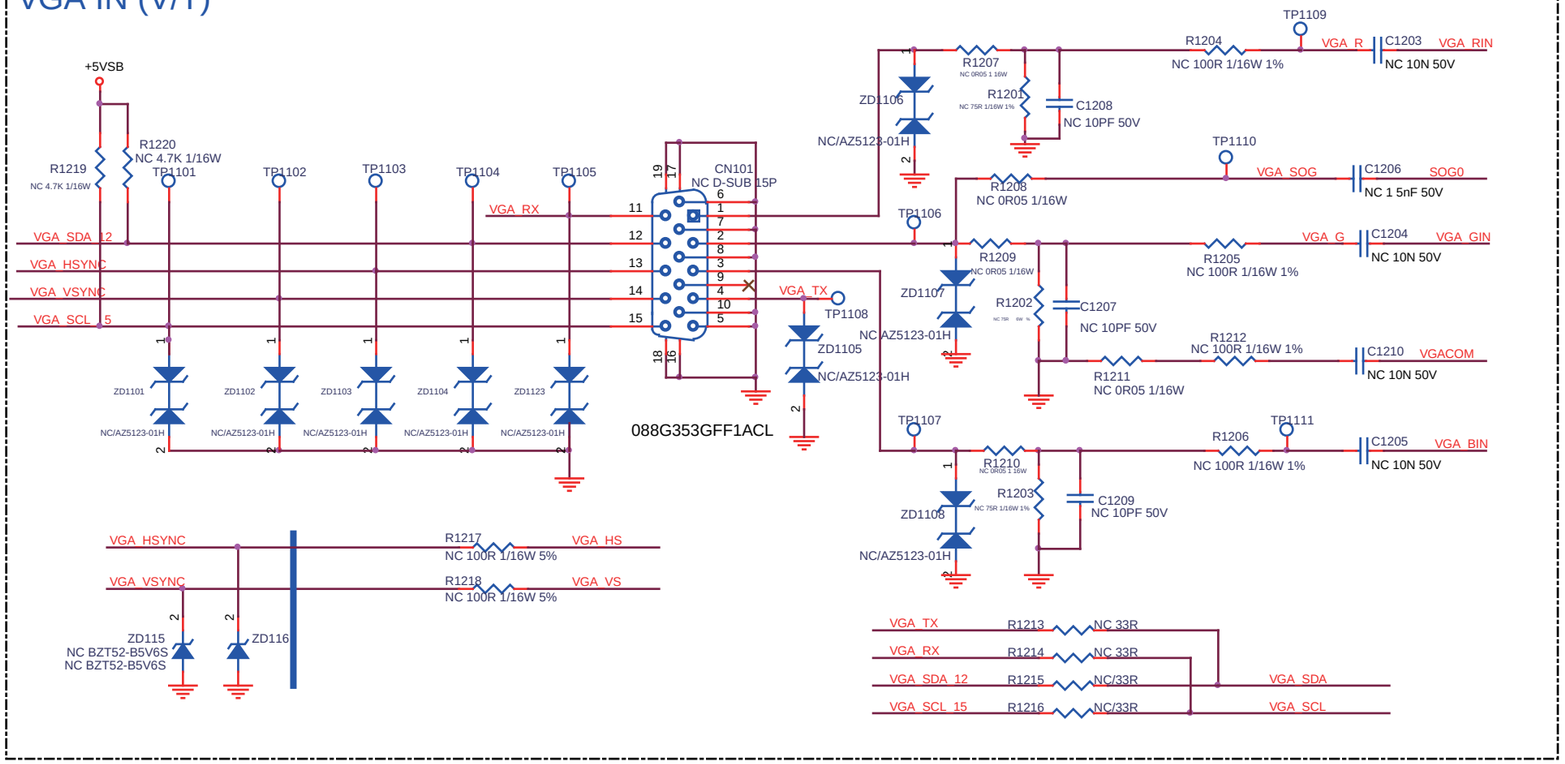
19760_510 eps

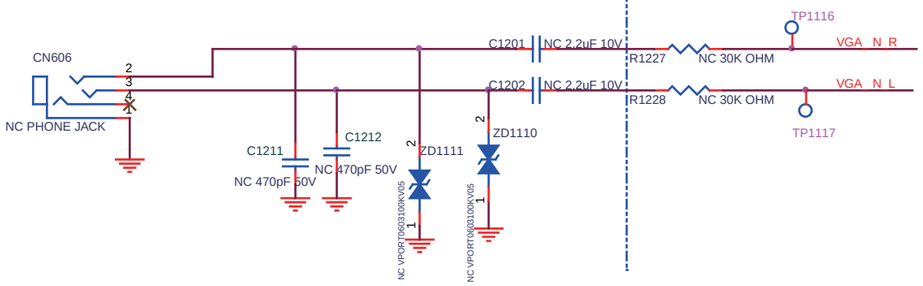
10-5-5 VGA

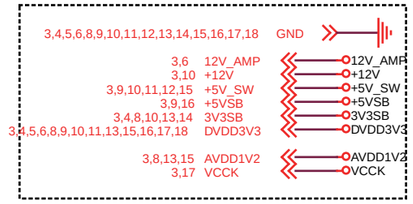
B05 VGA

B05

VGA IN (V/T)







VGA	715G6836	3 201 -07-07

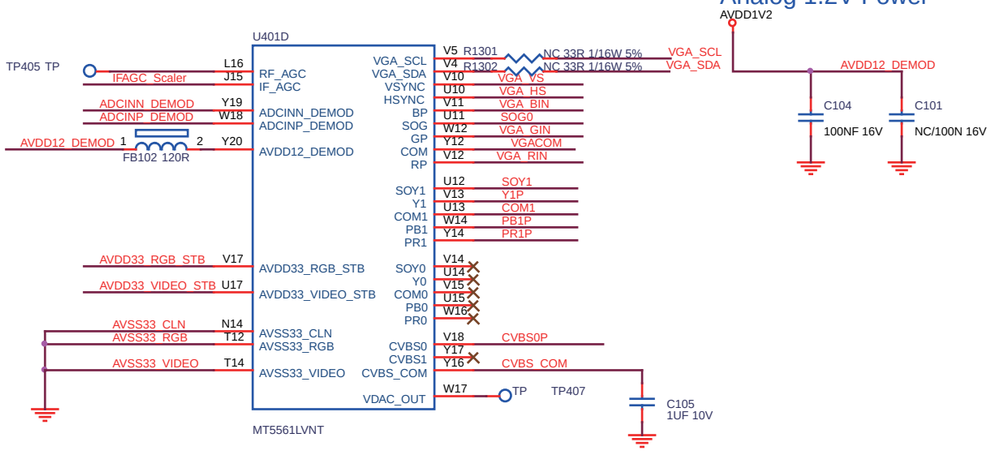
19760_511 eps
130114

10-5-6 Video YPbPr/CVBS

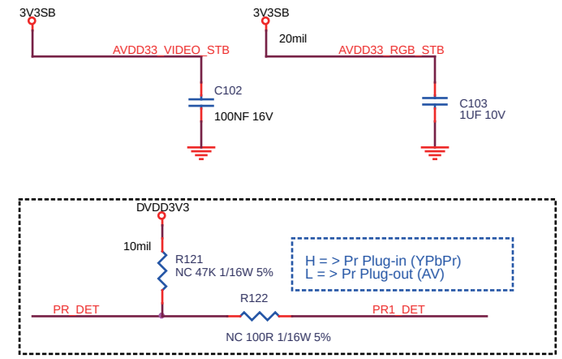
B06 Video YPbPr/CVBS

B06

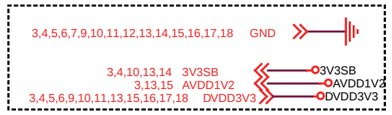
Analog 1.2V Power



Merged Analog 3.3V Power

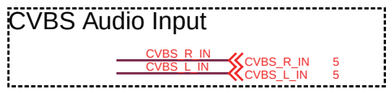


B06



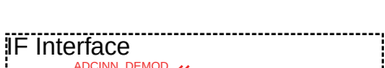
YPbPr Audio Input

CVBS Audio Input



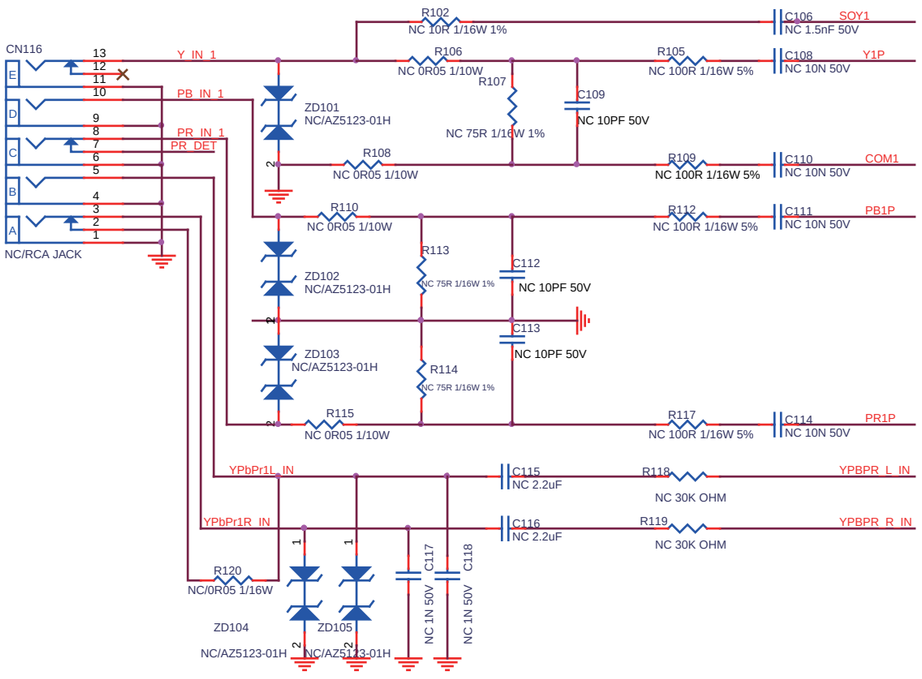
Control Interface

IF Interface

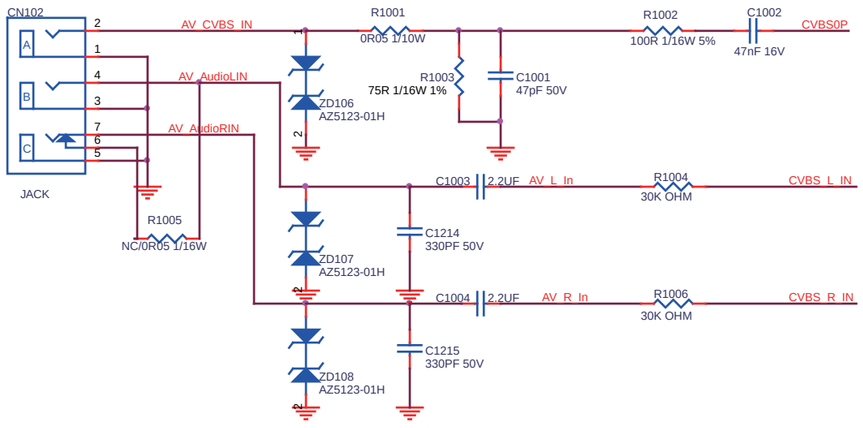


Control Interface

YPbPr Video/Audio Input



Side CVBS Video/Audio input



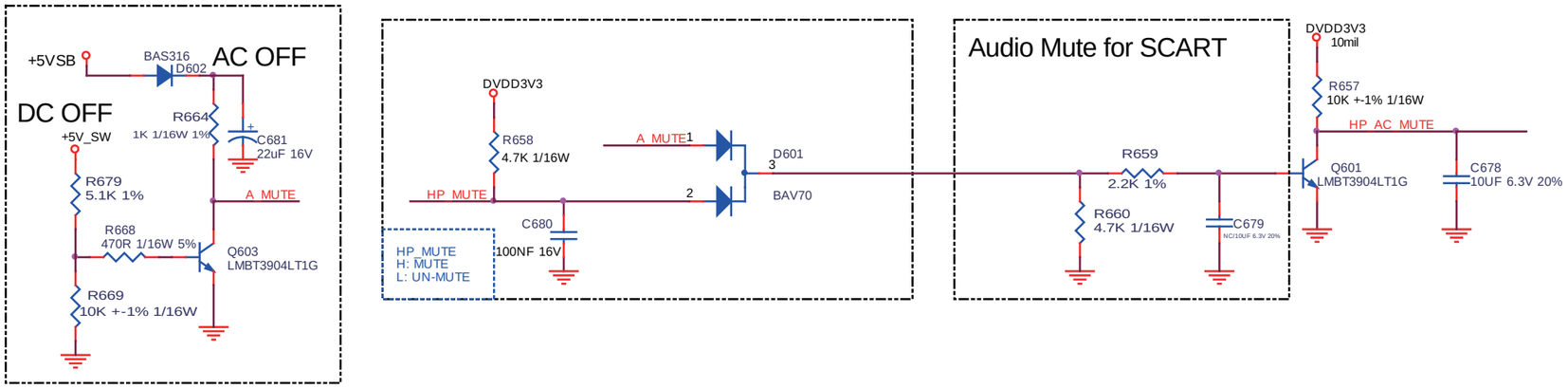
Video YPbPr/CVBS	715G6836	1 201 -07 07

19760_512 eps

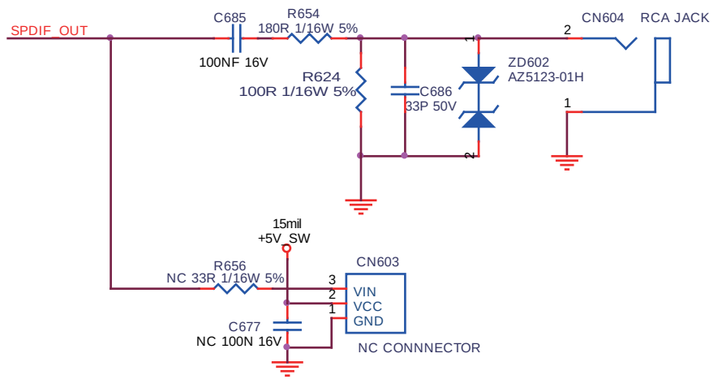
10-5-7 SPDIF/Mute contorl

B07 SPDIF/ Mute contorl

B07



SPDIF OUT



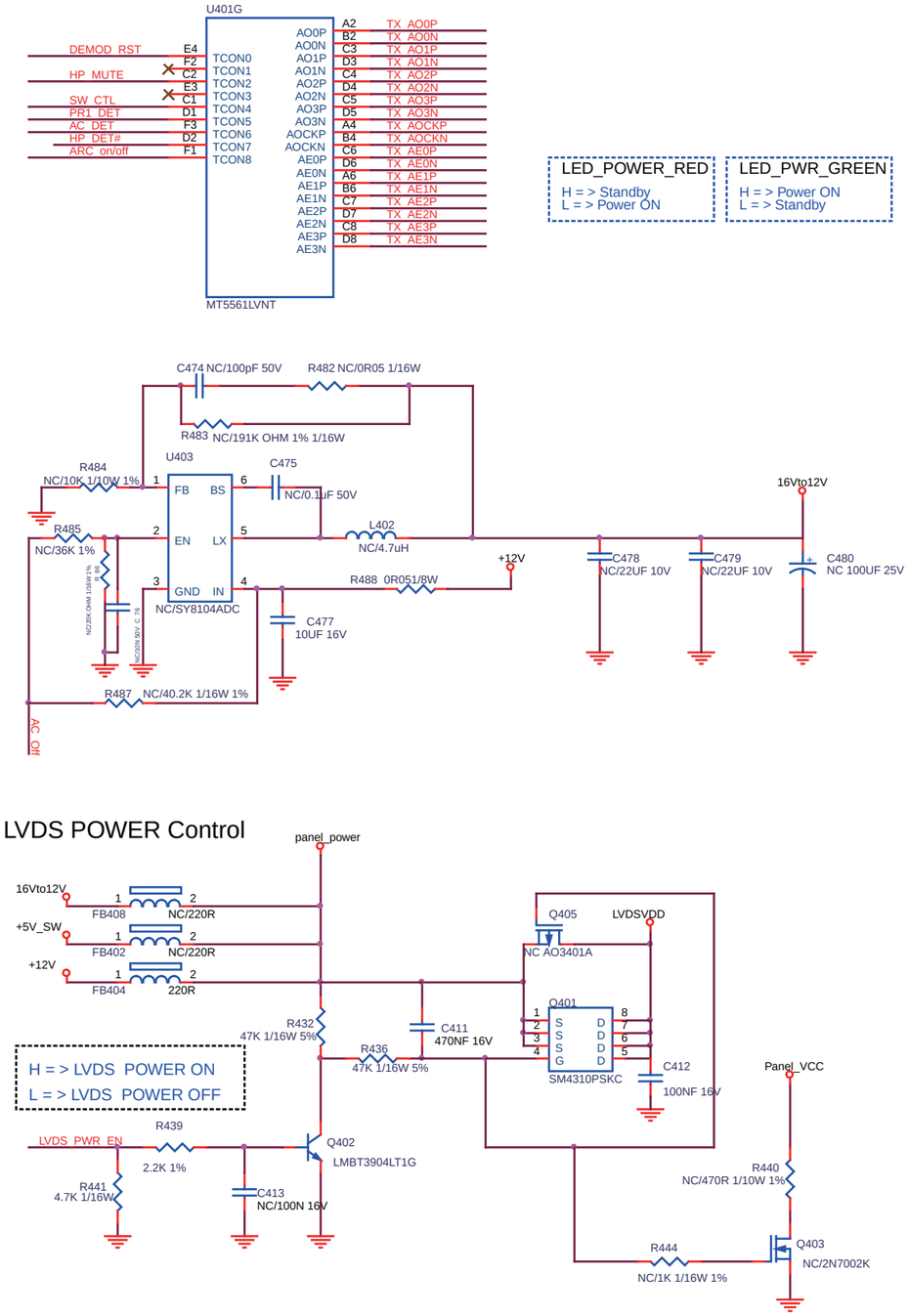
SPDIF/ Mute contorl	715G6836	1 201-07-07

19760_514 eps

10-5-8 LVDS_Keypad_IR

B08 LVDS_Keypad_IR

B08



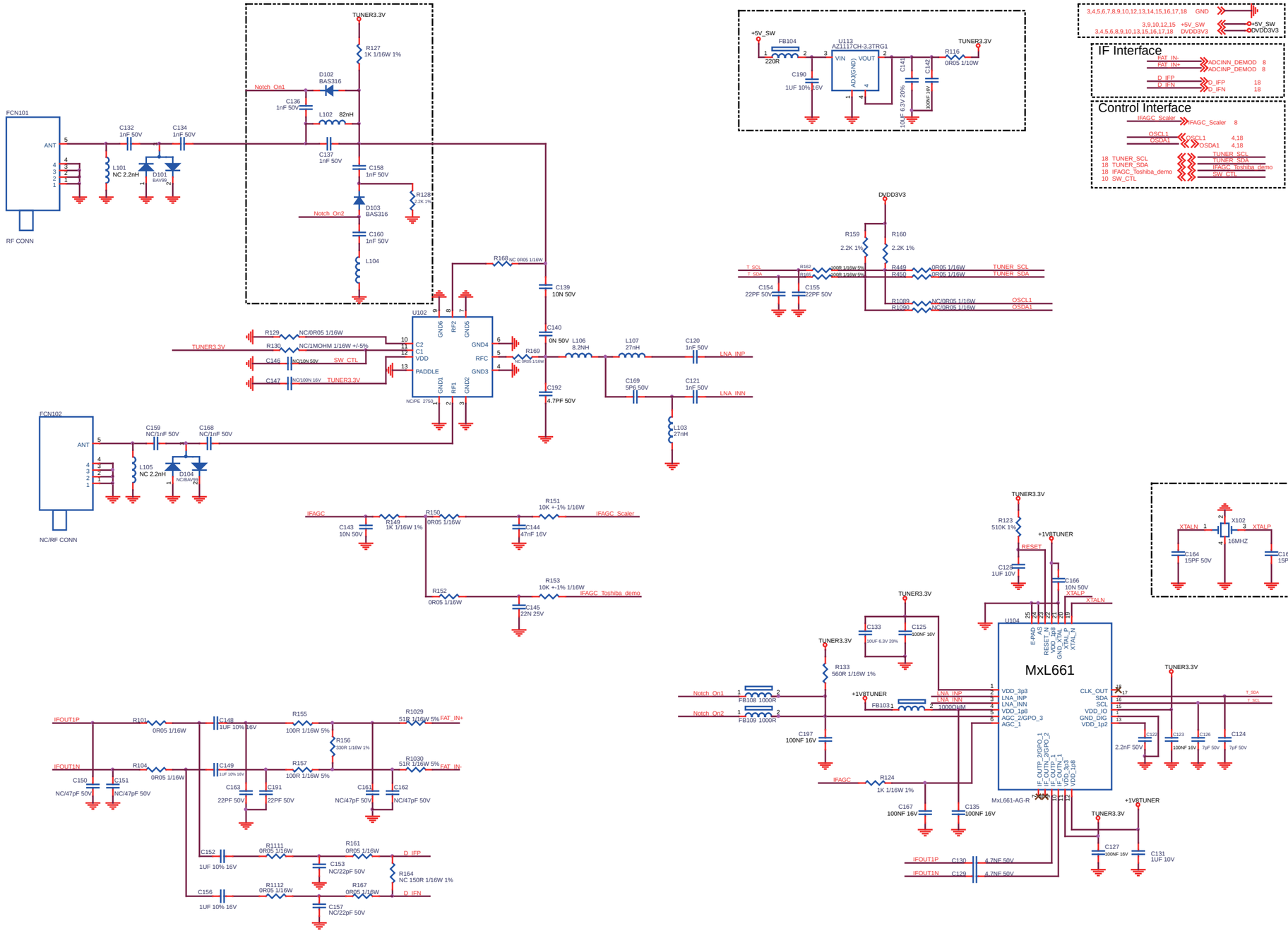
LVDS_Keypad_IR	715G6836

19760_515 eps

10-5-9 TUNER

B09 TUNER

B09



TUNER	715G6836

19760_516 eps

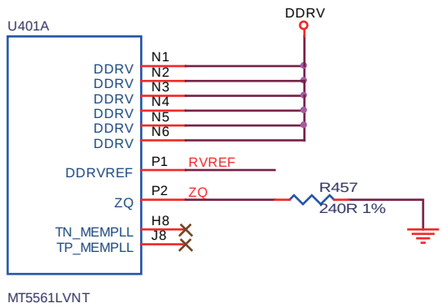
10-5-10 DDR3

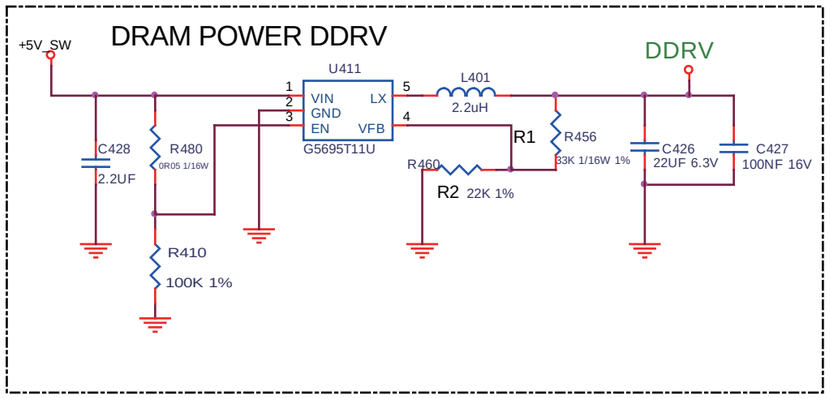
B10 DDR3

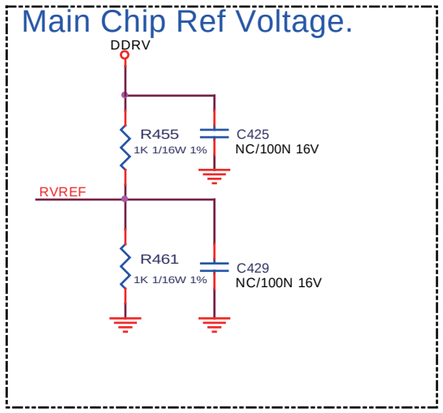
B10

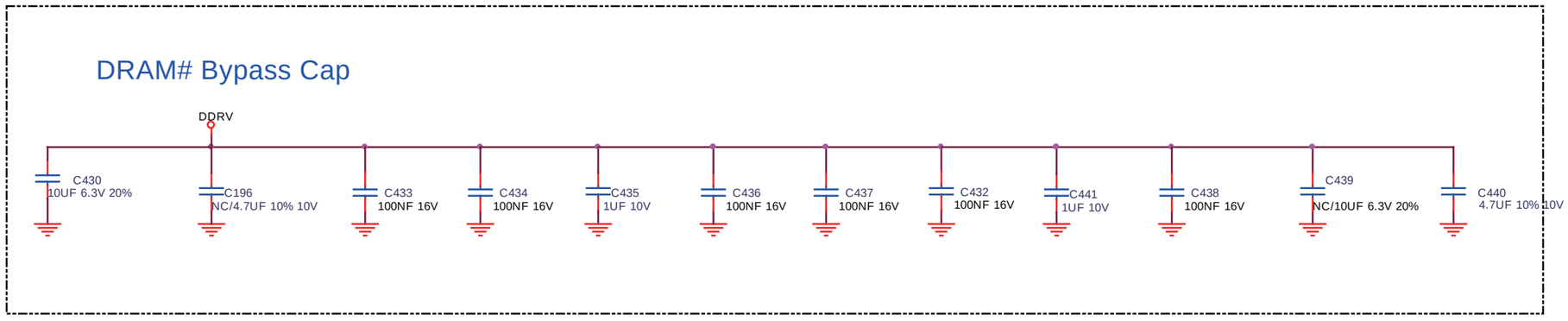
3,4,5,6,7,8,9,10,11,13,14,15,16,17,18 GND

3,9,10,11,15 +5V_SW +5V_SW







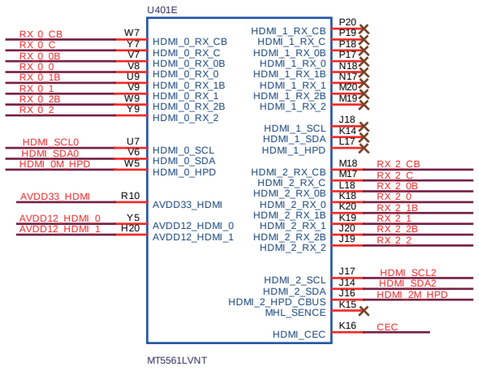


DDR3	715G6836	3 201 -07 07

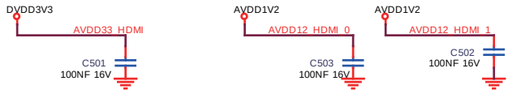
19760_517 eps

B11 HDMI/MHL

B11

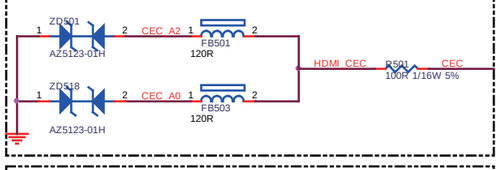


Analog Power

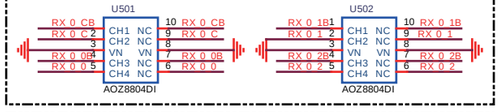


Merged Analog Power

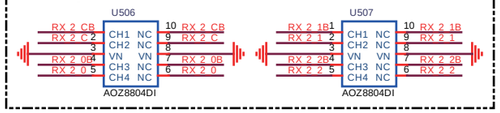
HDMI CEC



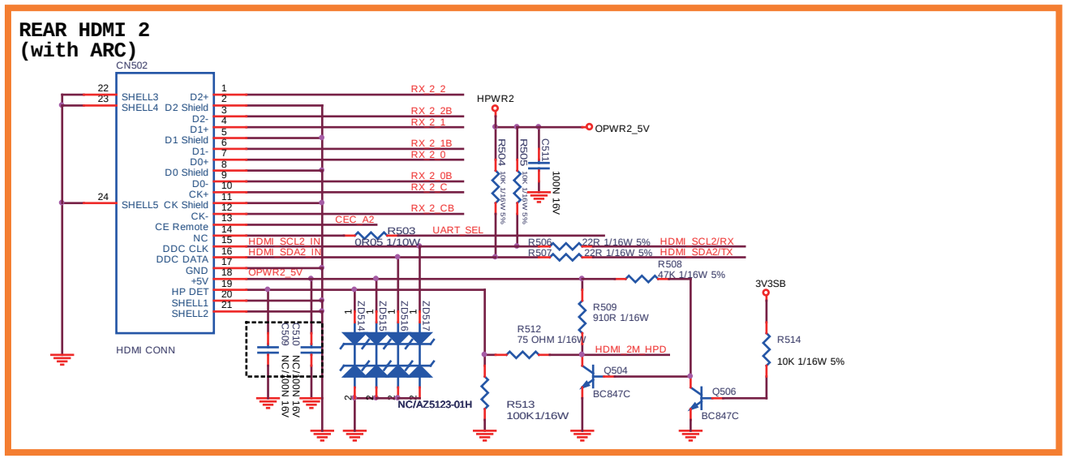
ESD protcetion



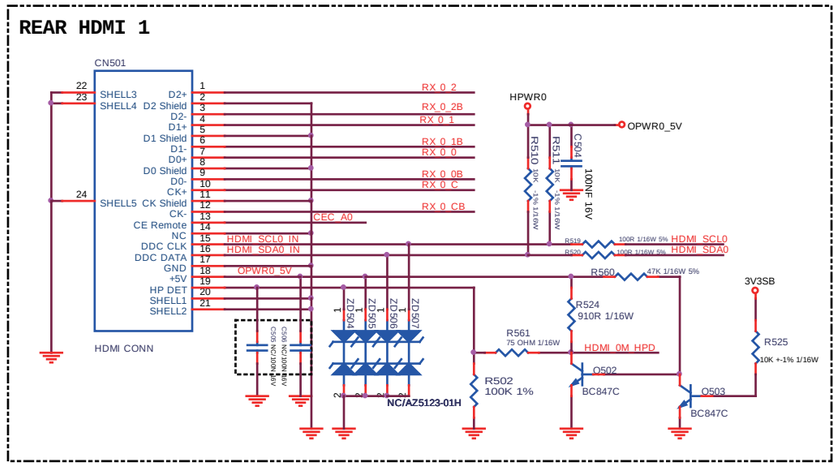
ESD protcetion

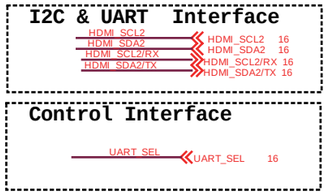


REAR HDMI 2 (with ARC)



REAR HDMI 1





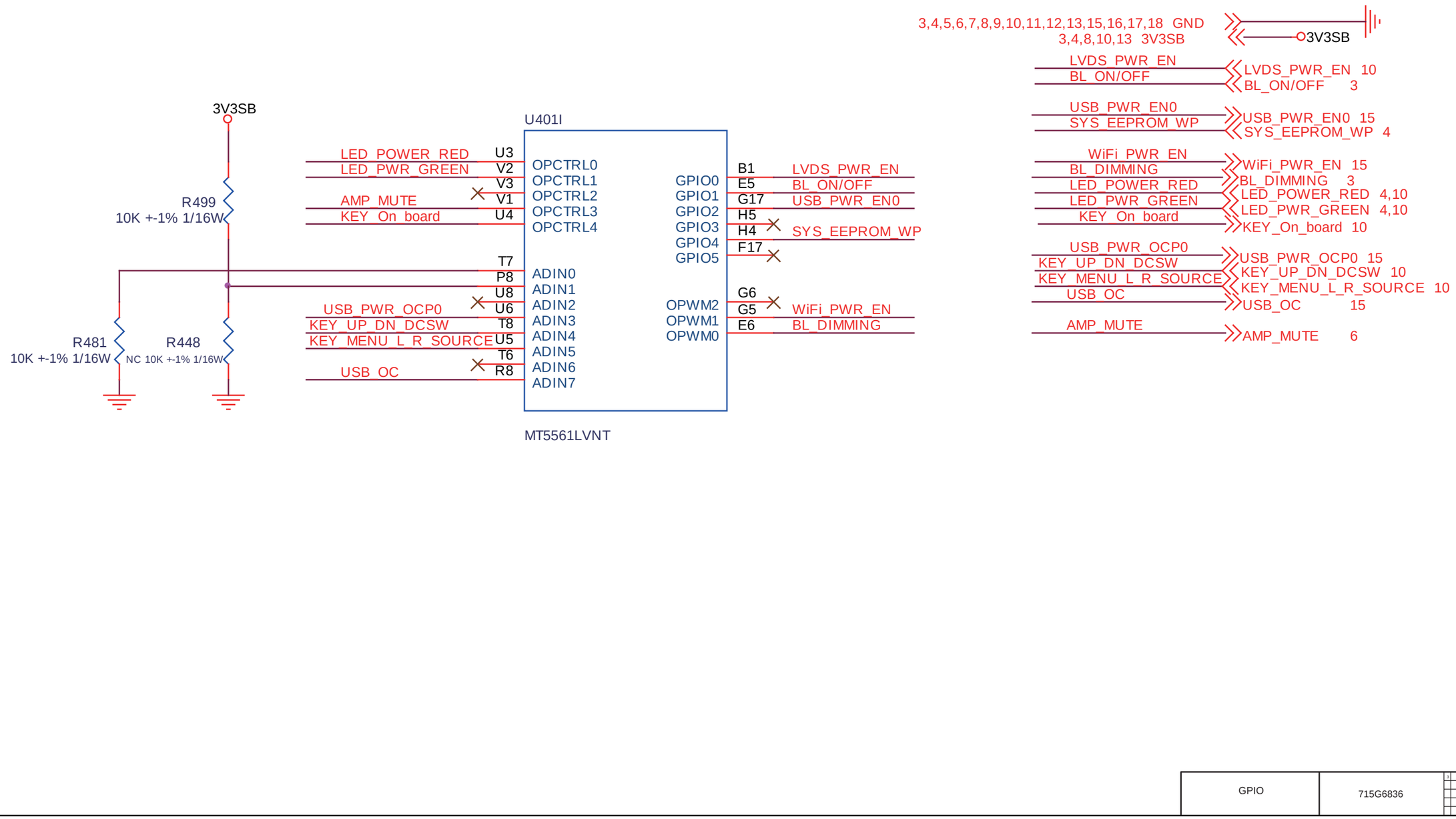
HDMI/MHL	715G6836	3 201 -07 07

19760_518 eps

10-5-12 GPIO

B12 GPIO

B12



GPIO	715G6836

19760_519 eps

10-5-13 USB/WiFi

B13 USB/ WiFi

B13

U401F

USB_DM0 H19 USB_DM_P0
USB_DP0 H18 USB_DP_P0
USB_DM1 G19 USB_DM_P1
USB_DP1 F19 USB_DP_P1

RXVN W2 TP410
RXVP W3 TP411
TXVN Y1 TP412
TXVP Y2 TP413
REXT_ETH W4 REXT

AVDD12_ETH Y4 AVDD12_ETH
AVDD33_ETH R9 AVDD33_ETH

R1027 24K 1%

MT5561LVNT

+5V_SW
DVDD3V3
TH101 PTCR
R1114 10K +-1% 1/16W
2.5 = > NORMAL
< 2.0 = >OC
USB_OC
R1024 NC 10K 1/16W 5%
R1032 10K +-1% 1/16W
HI = > POWER ON
LO = > POWER OFF
U404
IN OUT
GND
EN OC
USB_PWR_EN0
R1025 NC 0R05 1/16W
USB_PWR_OCP0
R1026 NC 4.7K 1/16W
NC/G5250M1T1U
HI = > NORMAL
LO => OC
USB_DP_P0
USB_DM_P0
USB_PR
ZD118
ZD119
C173 10UF 10V
C174 100NF 16V
C175 NC/10P 50V
C176 NC/10P 50V
CN103
USB CONN
NC/AZ5123-01H

AVDD1V2
AVDD12_ETH
C170 1UF 10% 16V
C171 NC/100N 16V

DVDD3V3
AVDD33_ETH
C172 NC/100N 16V

U401H

		CI_D0	B8
		CI_D1	D13
A12		CI_D2	F9
C10	CI_MCLKO	CI_D3	E17
D11	CI_MOVAL	CI_D4	E19
E11	CI_MOSTRT	CI_D5	D20
E7	CI_MDO0	CI_D6	D18
E8	CI_MDO1	CI_D7	B20
E16	CI_MDO2		
E20	CI_MDO3		D9
D19	CI_MDO4	CI_A0	C9
C20	CI_MDO5	CI_A1	F10
C19	CI_MDO6	CI_A2	A10
	CI_MDO7	CI_A3	D10
		CI_A4	E10
D14	CI_MCLKI	CI_A5	B12
B13	CI_MIVAL	CI_A6	D12
D16	CI_MISTRT	CI_A7	C16
A16	CI_MDI0	CI_A8	C17
C15	CI_MDI1	CI_A9	A19
C14	CI_MDI2	CI_A10	B18
C13	CI_MDI3	CI_A11	E9
A13	CI_MDI4	CI_A12	B16
E12	CI_MDI5	CI_A13	A15
F12	CI_MDI6	CI_A14	
E13	CI_MDI7		C18
		CI_OE#	B15
F18	CI_PWR_EN	CI_WE#	A18
		CI_IORD#	D17
		CI_IOWR#	C12
		CI_RESET	F11
		CI_IREQ#	C11
		CI_WAIT#	B10
		CI_REG#	B19
		CI_CE1#	F7
		CI_CD2#	E18
		CI_CD1#	

DEMOD_TSCLK
DEMOD_TSVAL
DEMOD_TSSYNC
DEMOD_TSDATA0

MT5561LVNT

DVDD3V3
R1115 NC 10K 1/16W 5% WiFi_PWR_EN
WiFi
Q706 NC AO3401A
+5V_SW
CN403 NC CONN
R451 NC 5R6 1/16W 5% USB_DM_P1
R452 NC 5R6 1/16W 5% USB_DP_P1

B13

3,4,5,6,7,8,9,10,11,12,13,14,16,17,18 GND
3,9,10,11,12 +5V_SW → +5V_SW
3,4,5,6,8,9,10,11,13,16,17,18 DVDD3V3 → DVDD3V3
3,8,13 AVDD1V2 → AVDD1V2

Control Interface

USB_PWR_OCP0 → USB_PWR_OCP0 14
USB_PWR_EN0 → USB_PWR_EN0 14
USB_OC → USB_OC 14
WiFi_PWR_EN → WiFi_PWR_EN 14

18 DEMOD_TSCLK → DEMOD_TSCLK
18 DEMOD_TSVAL → DEMOD_TSVAL
18 DEMOD_TSSYNC → DEMOD_TSSYNC
18 DEMOD_TSDATA0 → DEMOD_TSDATA0

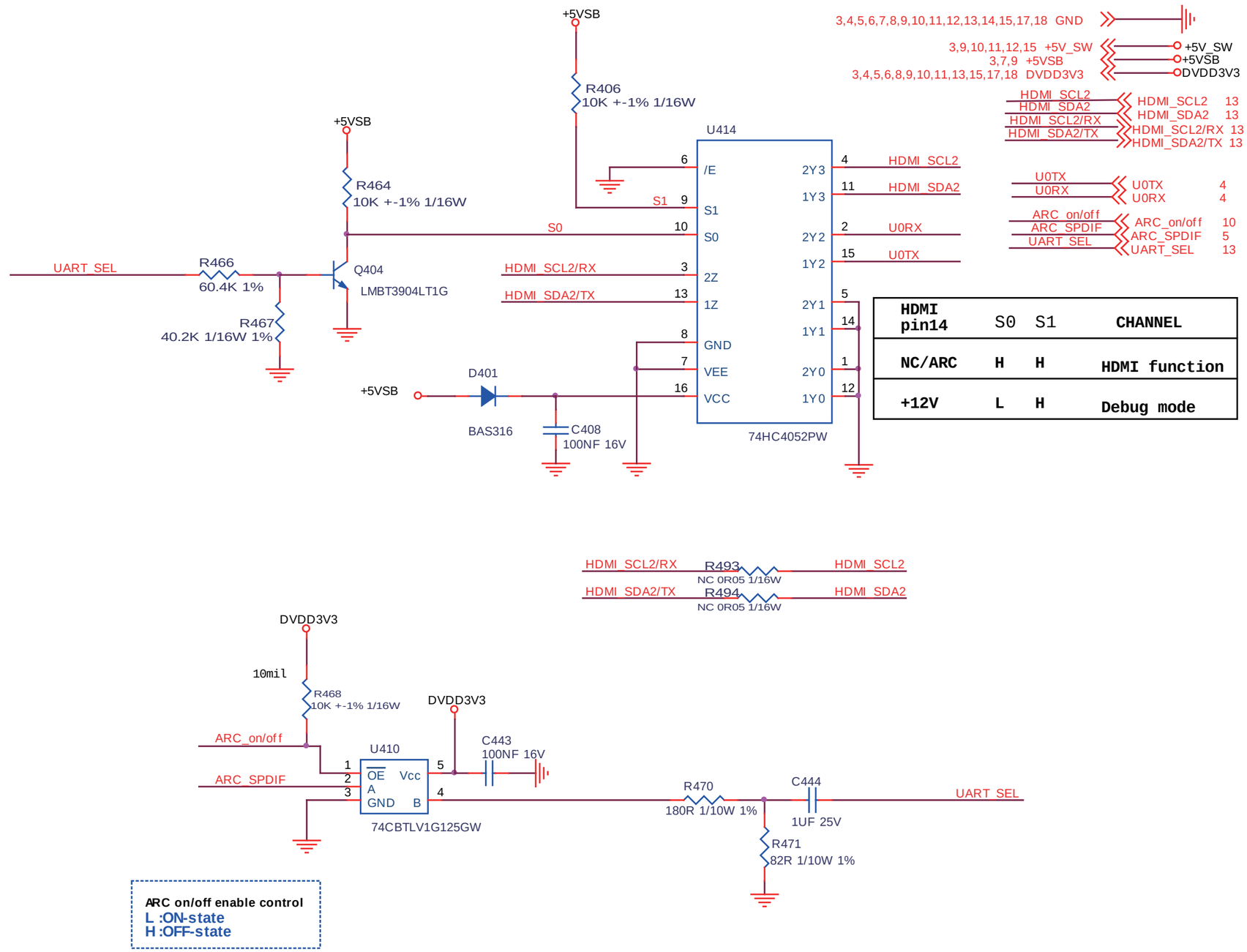
USB/ WiFi	715G6836	3 201 -07 07

19760_520 eps

10-5-14 FACTORY DEBUG PORT

B14 FACTORY DEBUG PORT

B14

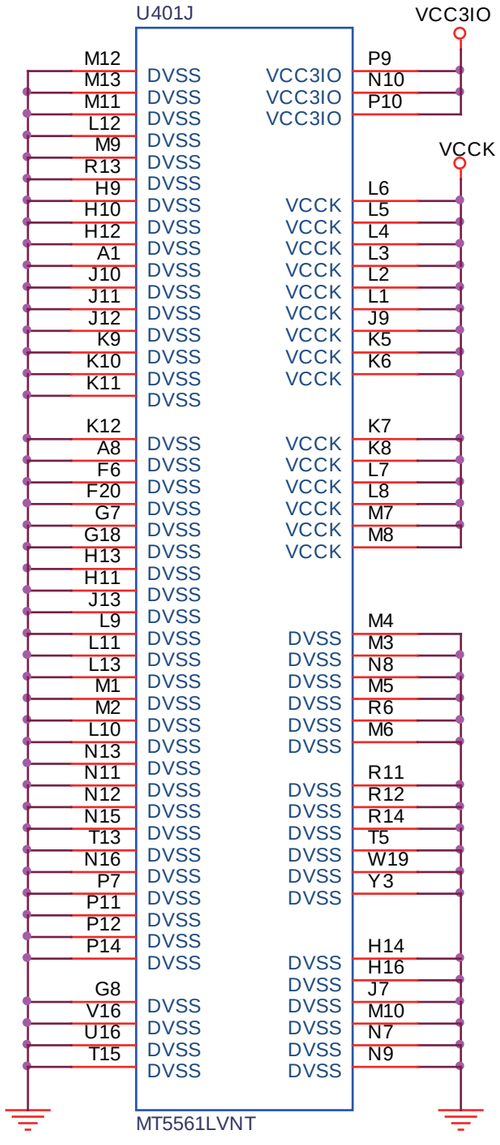


FACTORY DEBUG PORT	715G6836	3 2011-07-07

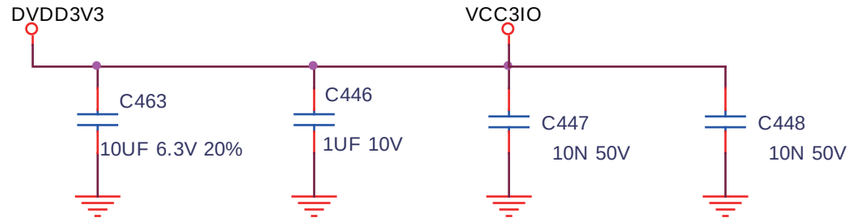
19760_521 eps

B15 VCCK & DVSS

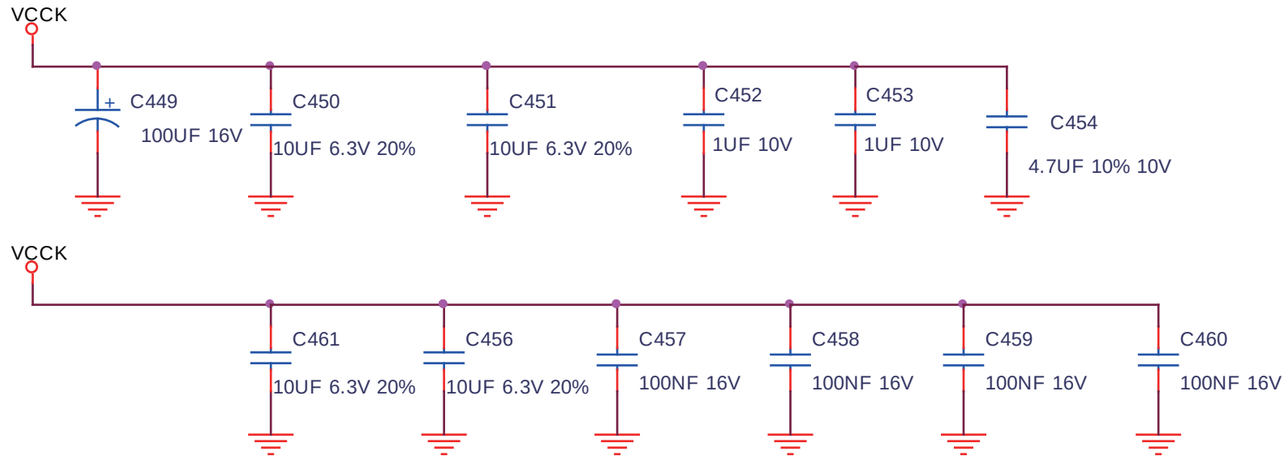
B15



3.3V IO Power



Core Power



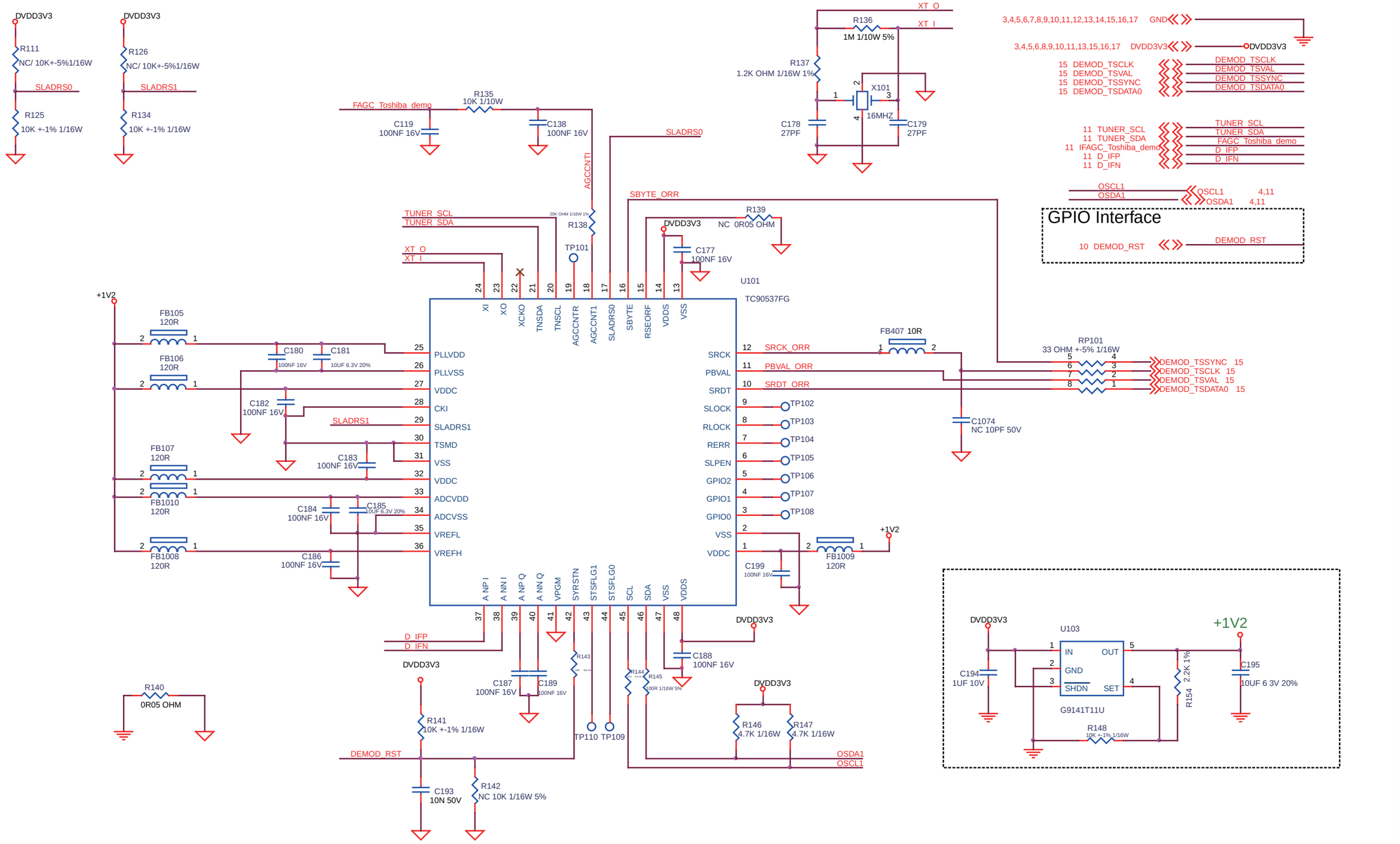
VCCK & DVSS	715G6836	3 201-07-07

19760_522 eps

10-5-16 DEMOD_Toshiba TC90537

B16 DEMOD_Toshiba TC90537

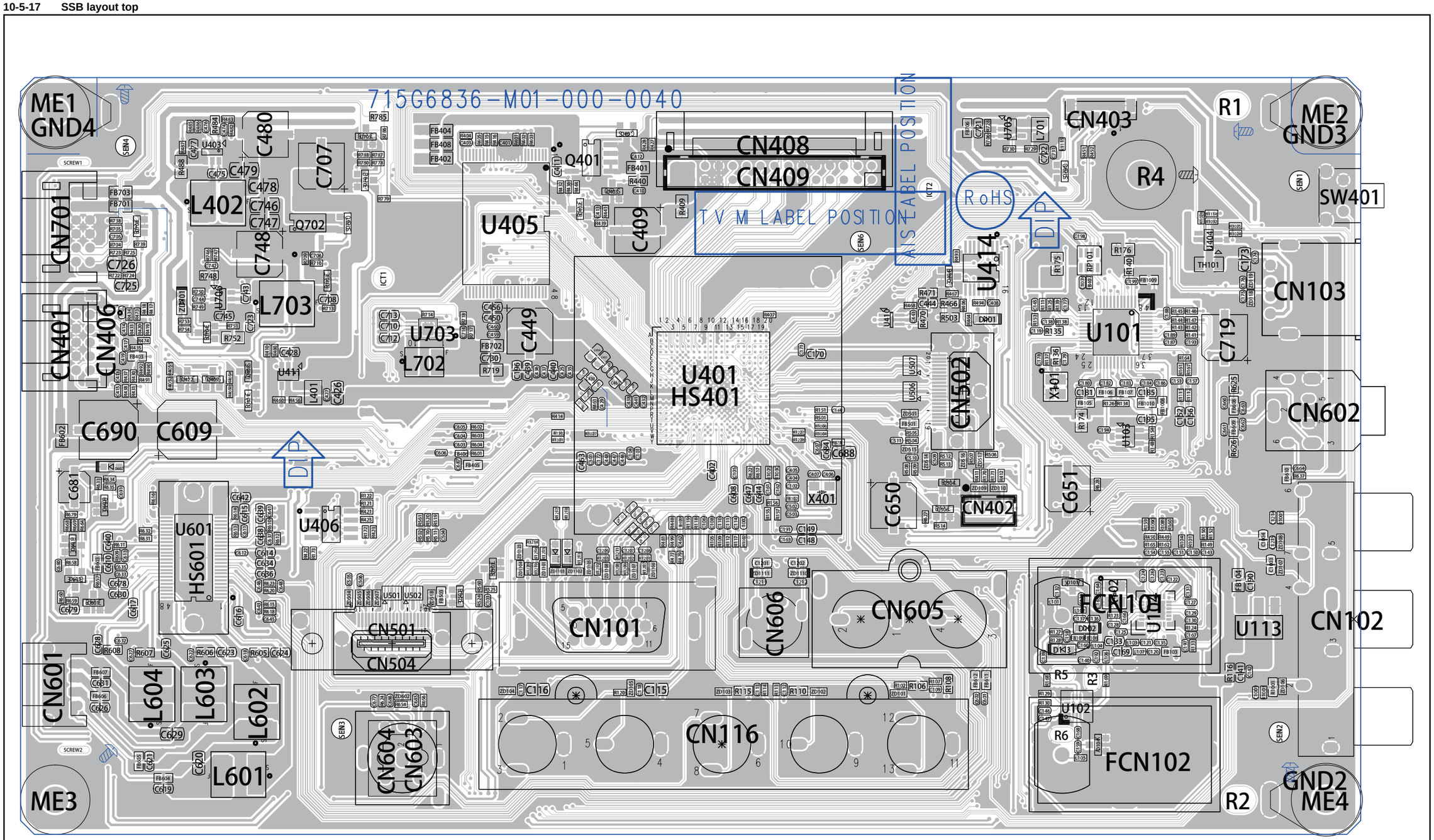
B16



DEMOD_Toshiba TC90537	715G6836	3 201 -07 07

19760_523 eps

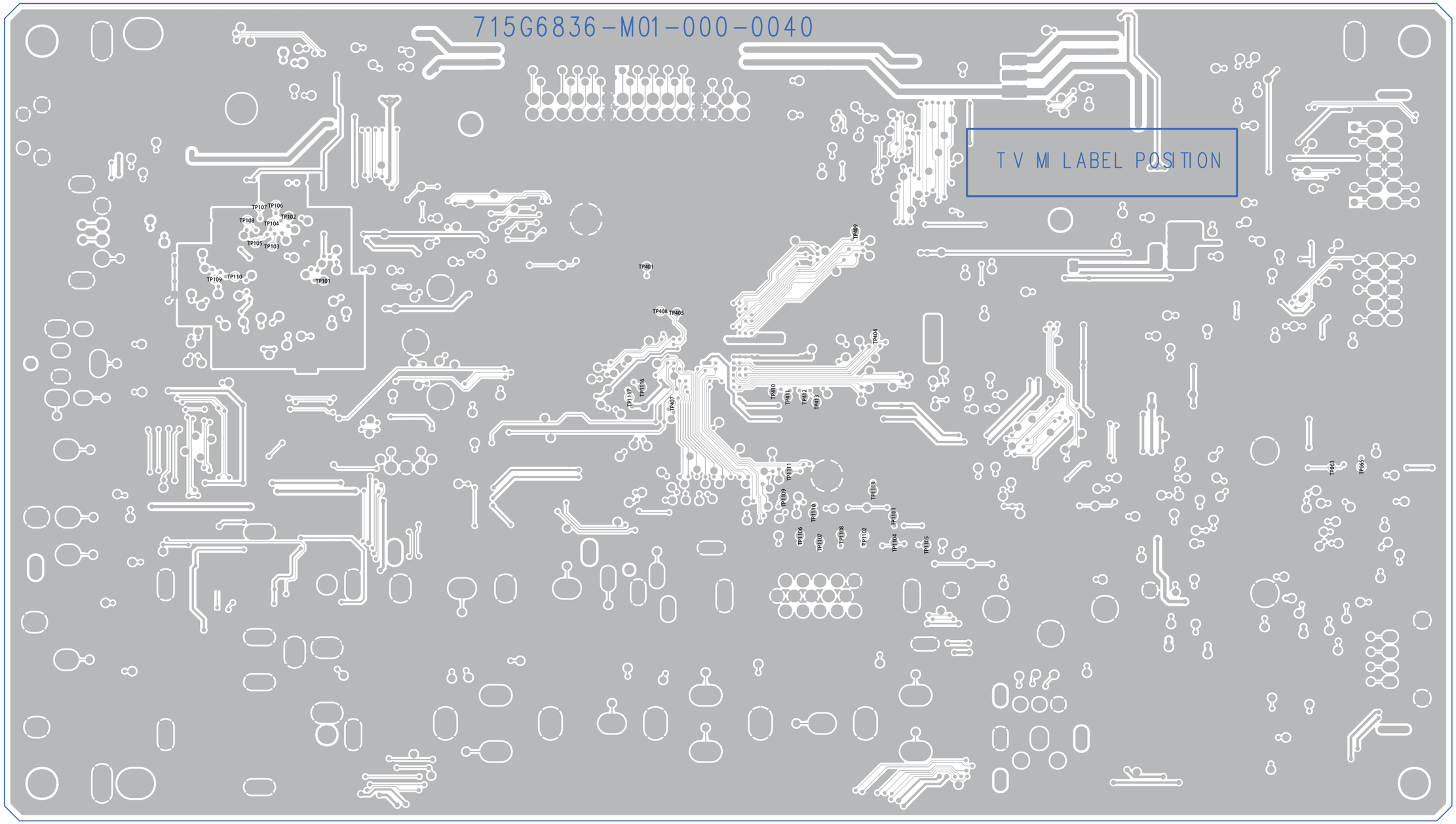
10-5-17 SSB layout top



LAYOUT TOP	715G6836

19760_524 eps

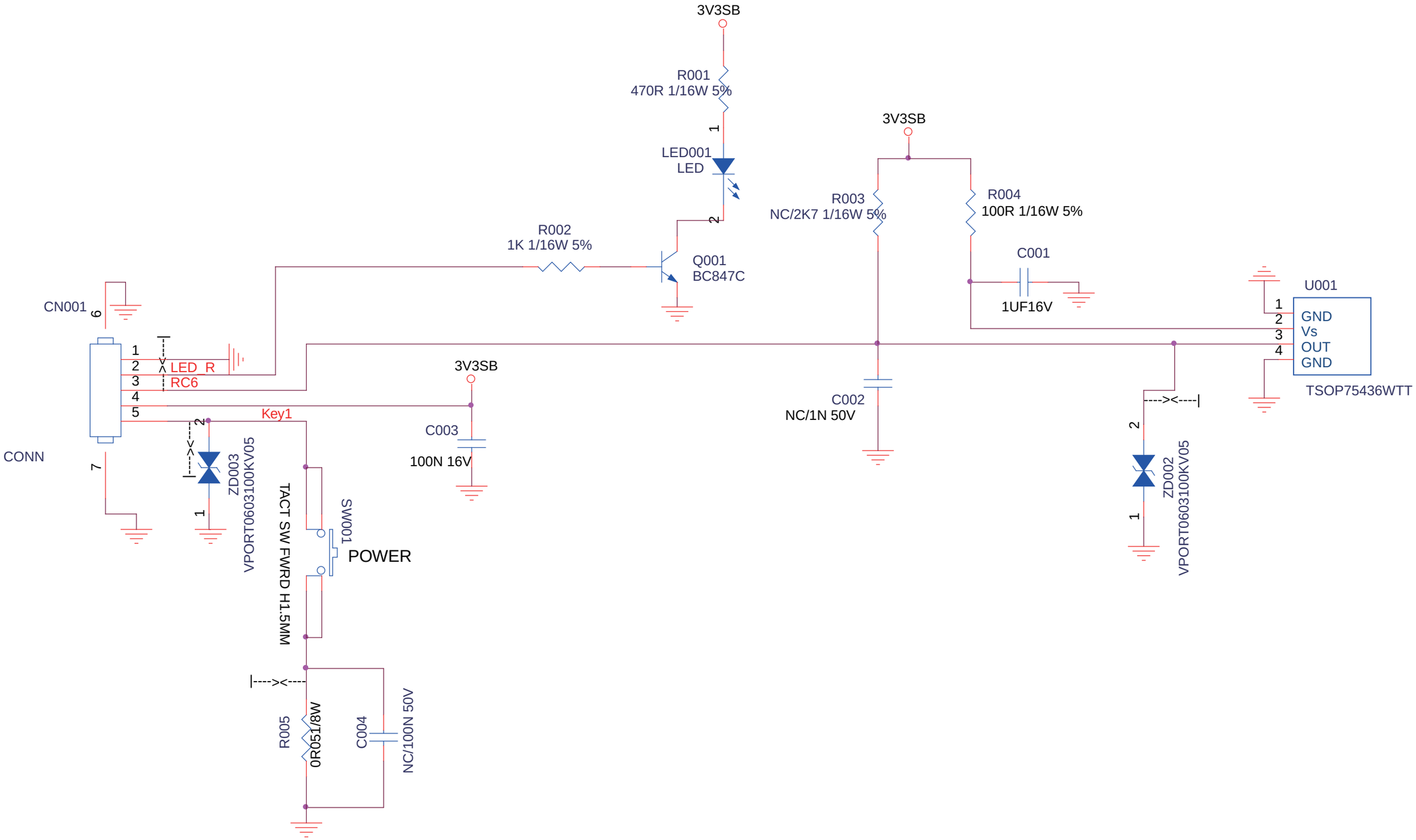
10-5-18 SSB layout bottom



10.6 J 715G61767 IR/LED Panel

10-6-1 IR

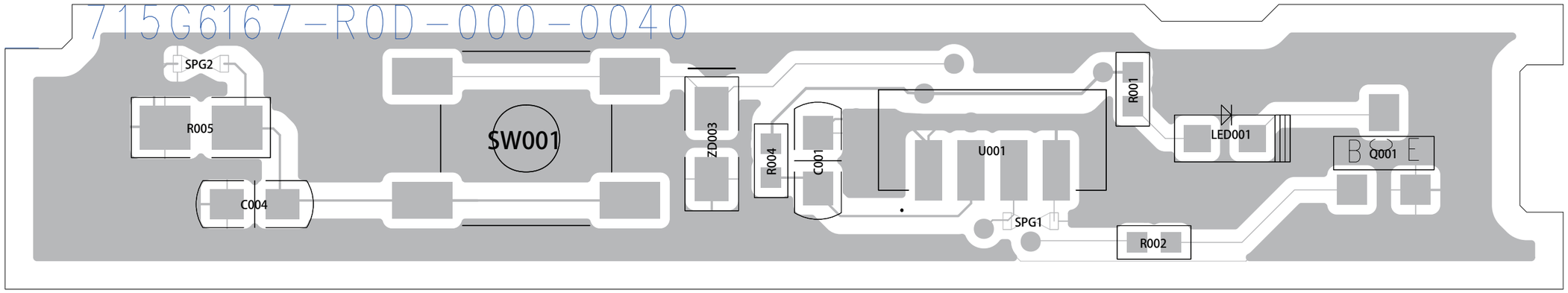
J IR/LED panel J



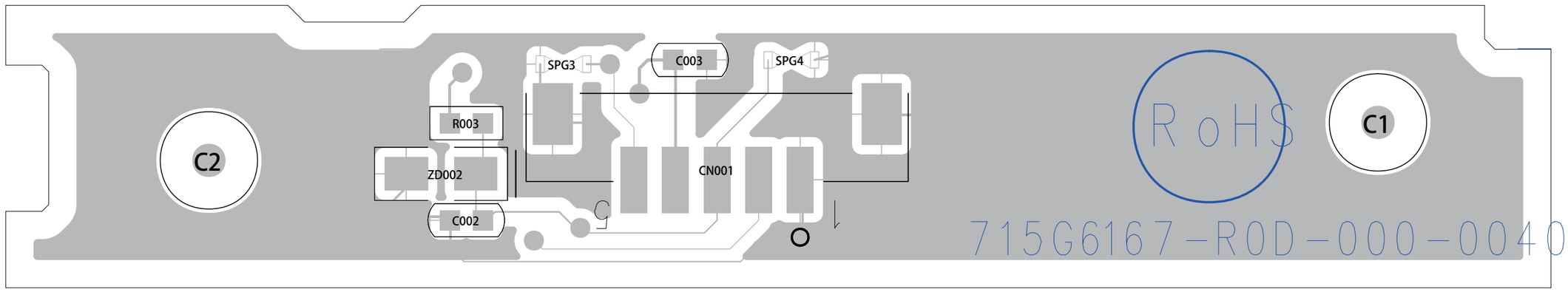
IR/LED panel	715G6167	C 2013-0 -29

19641_500.eps

Layout IR/LED panel (top side)



Layout IR/LED panel (bottom side)



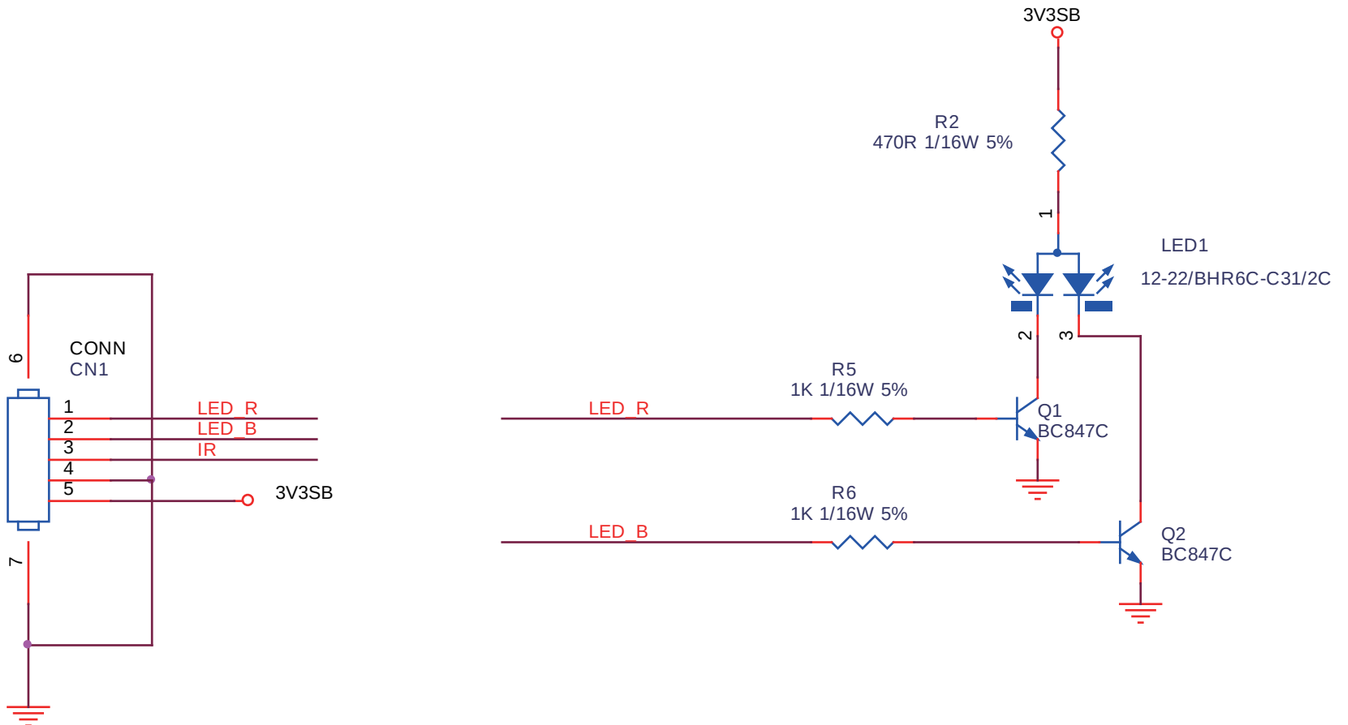
IR/LED panel layout top/bottom	715G6167	C 2013-0 -29

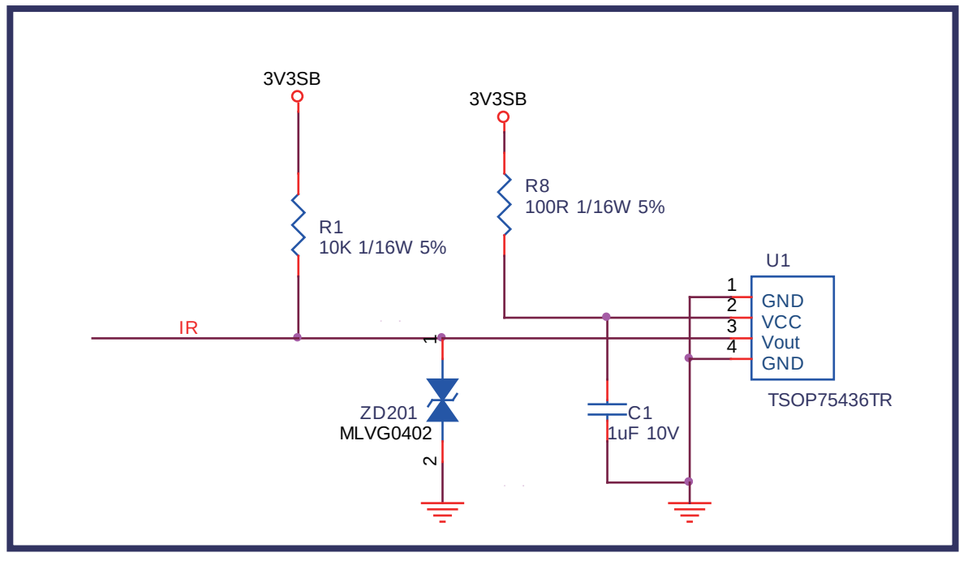
19641_501.eps

10.7 J 715G7325 IR/LED Panel

10-7-1 IR/LED panel

J IR/LED panel J



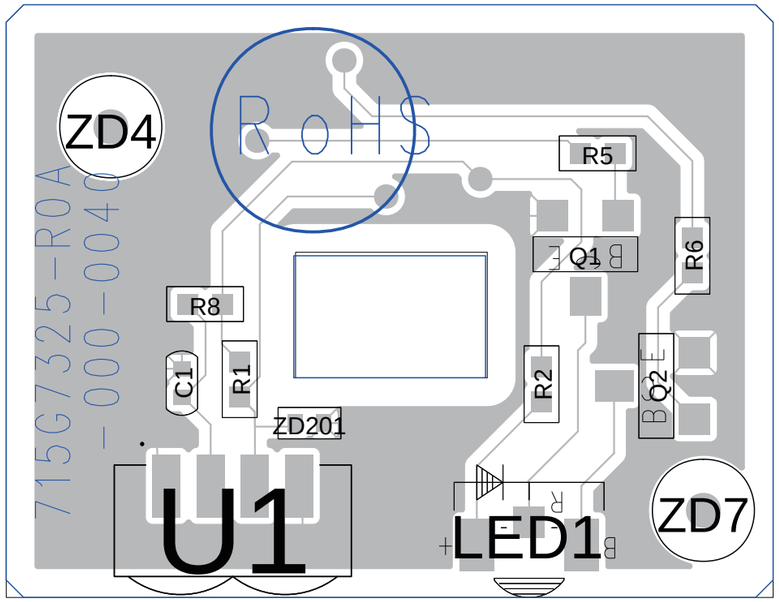


IR/LED panel	715G7325	201 -09-22

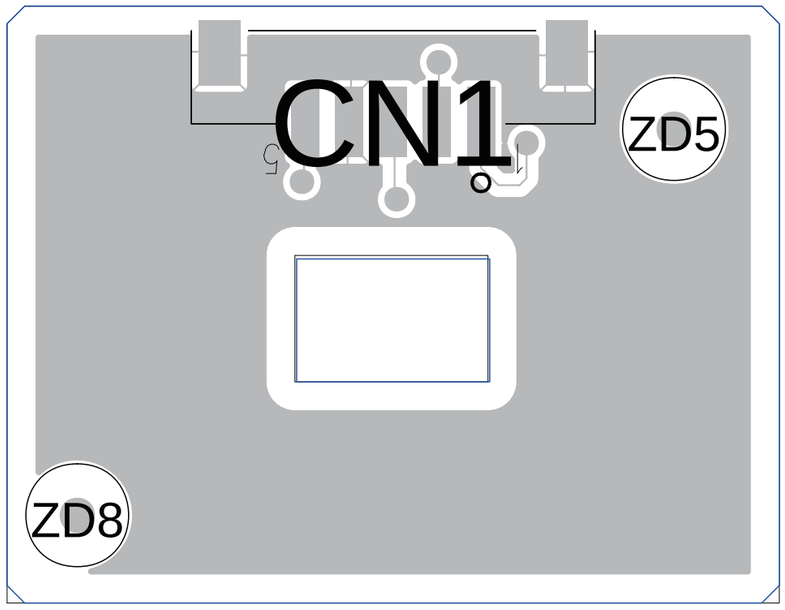
19771_500.eps

10-7-2 IR/LED board layout

Layout IR/LED panel (top side)



Layout IR/LED panel (bottom side)



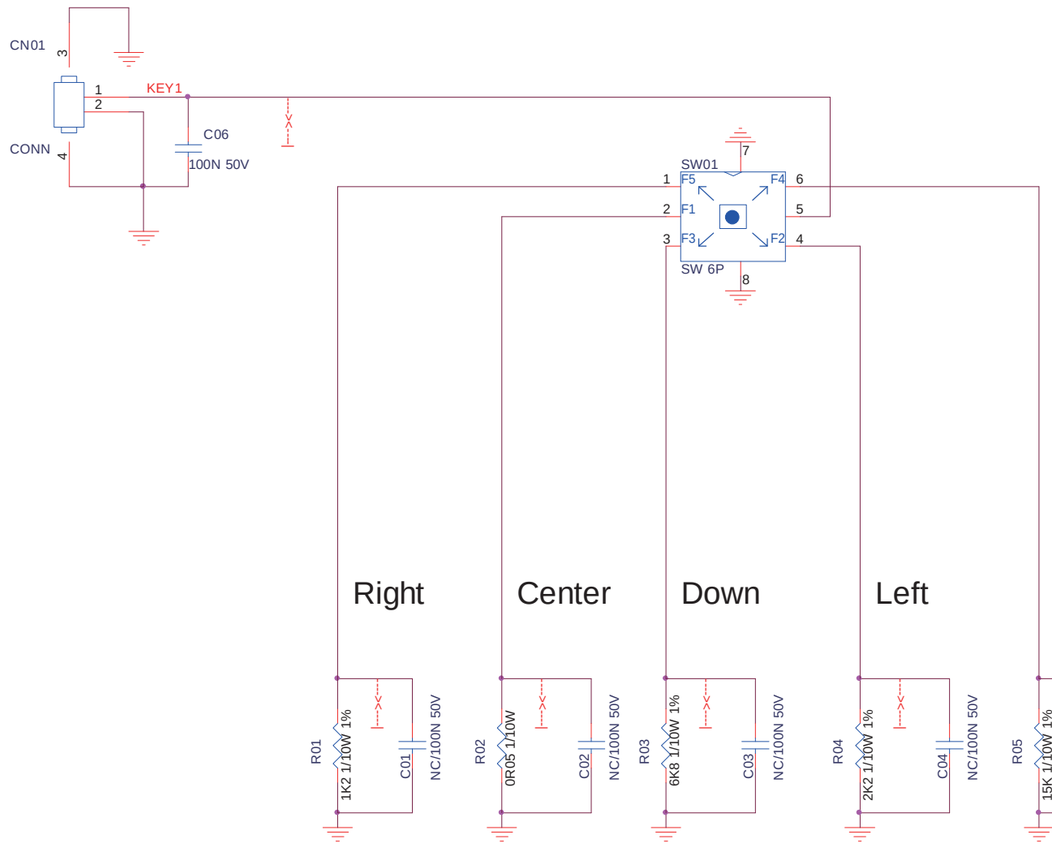
IR/LED panel layout top/bottom	715G7325	201 -08-29

19771_501.eps

10.8 E 715G6316 Keyboard control panel

10-8-1 Key

E Key



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

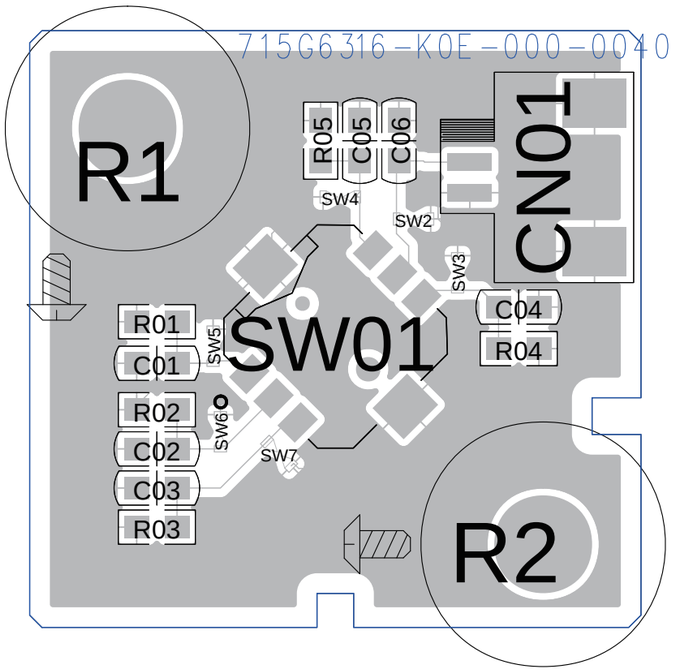
	pin1	pin2	pin3	pin4	pin5	pin6
F1		○			○	
F2				○	○	
F3			○		○	
F4					○	○
F5	○				○	

Keyboard control panel	715G6316	1 2013-09-17

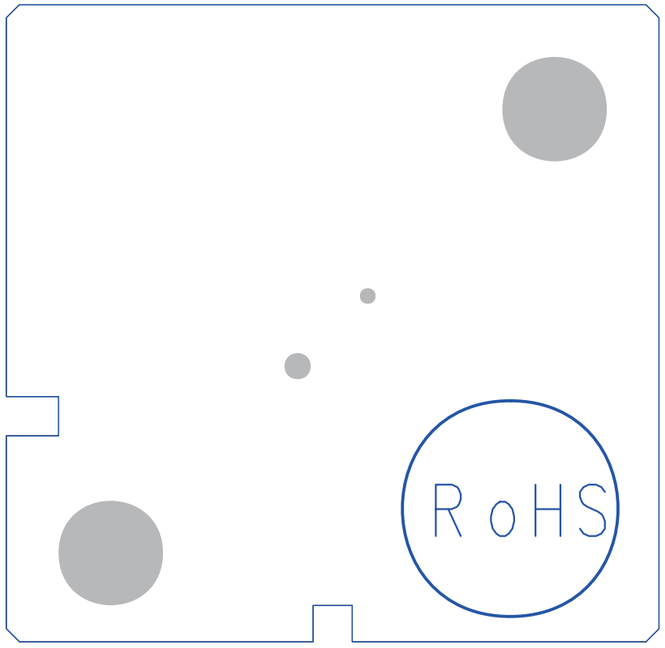
19610_545 eps

10-8-2 Key board layout

Layout Keyboard control panel (top side)



Layout Keyboard control panel (bottom side)



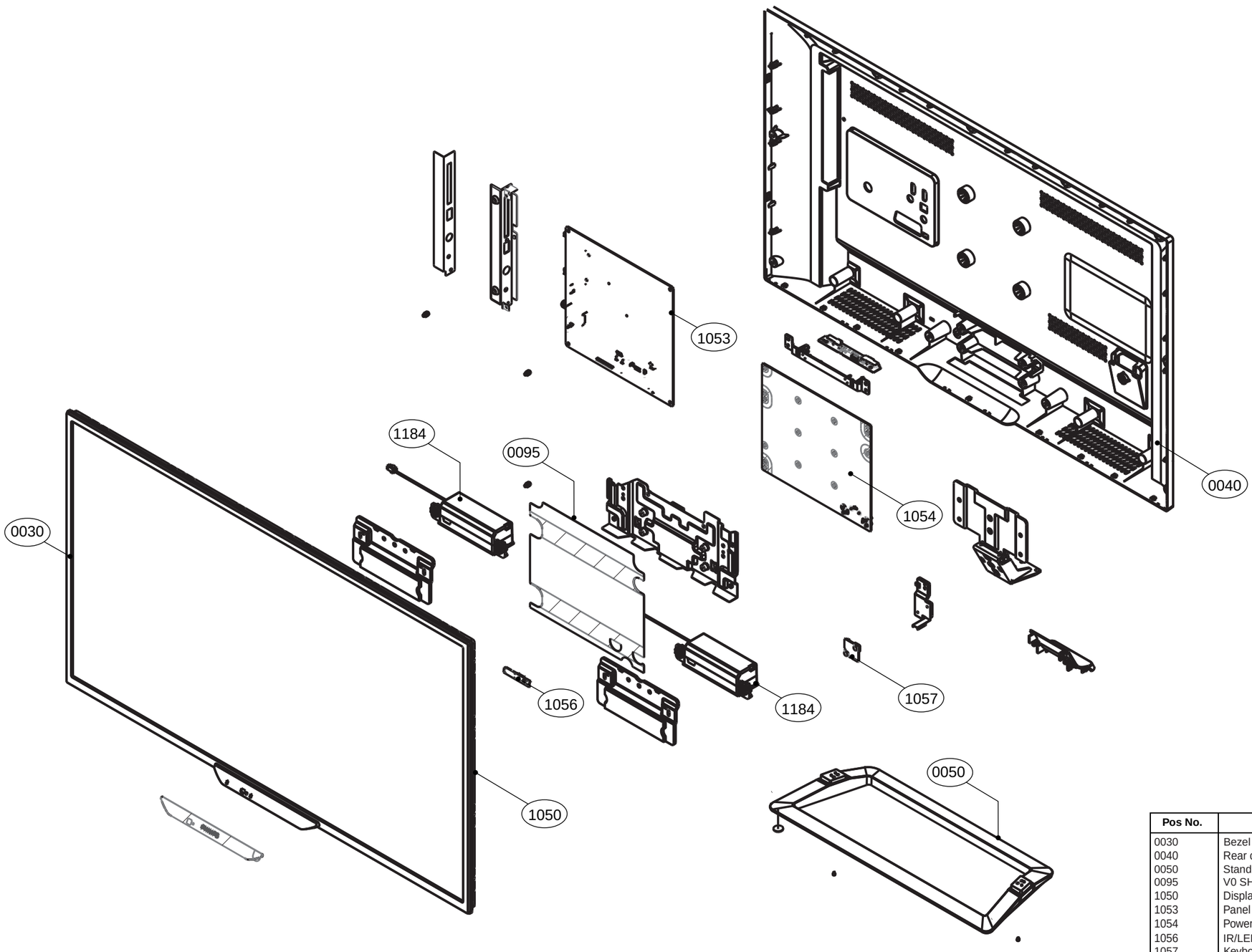
Keyboard control panel layout top/bottom	715G6316	1 2013-09 17

19610_546 eps

11. Styling Sheets

11.1 5000 series 32"

5000 series 32"



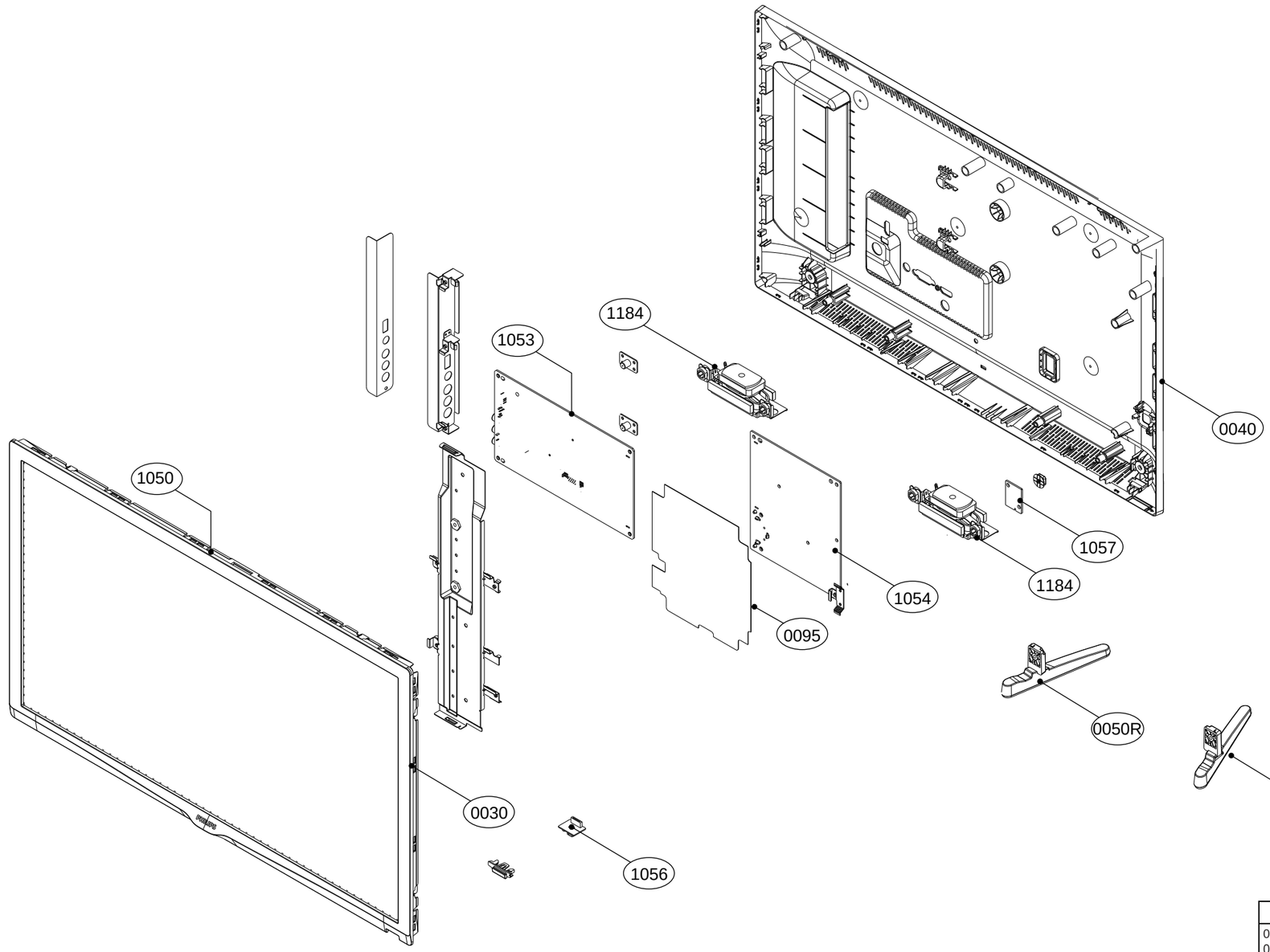
Pos No.	Description	Remarks
0030	Bezel	
0040	Rear cover	
0050	Stand Assembly	
0095	V0 SHEET	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1057	Keyboard control panel	
1176	Remote control	Not displayed
1184	Speakers	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

19770_800.eps

11.2 4100 series 24"

4100 series 24"



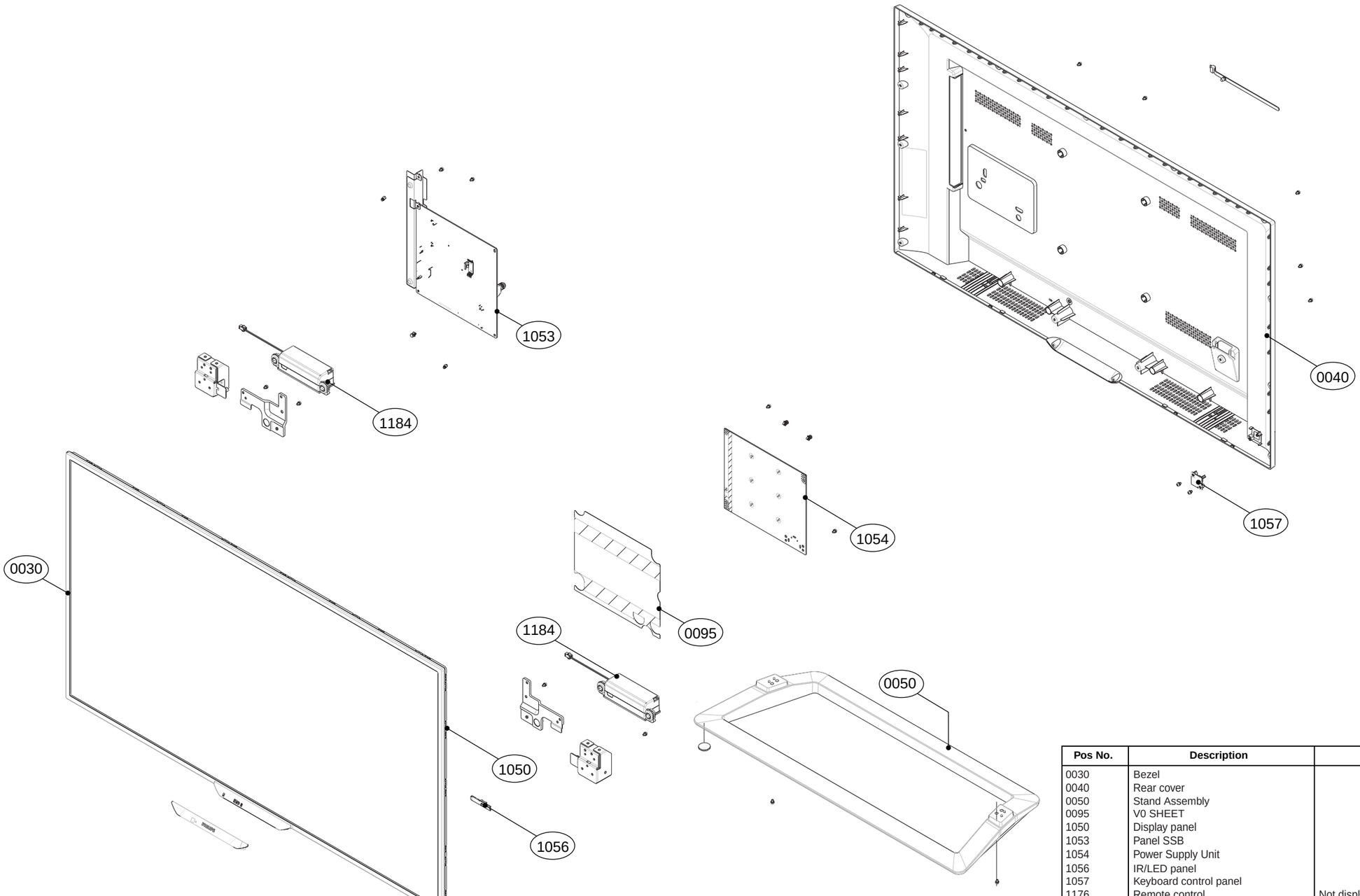
Pos No.	Description	Remarks
0030	Bezel	
0040	Rear cover	
0050	Stand Assembly	
0095	V0 SHEET	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1057	Keyboard control panel	
1176	Remote control	Not displayed
1184	Speakers	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

19771_800.eps

11.3 5000 series 40"

5000 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	
1176	Remote control	Not displayed
1184	Speakers	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

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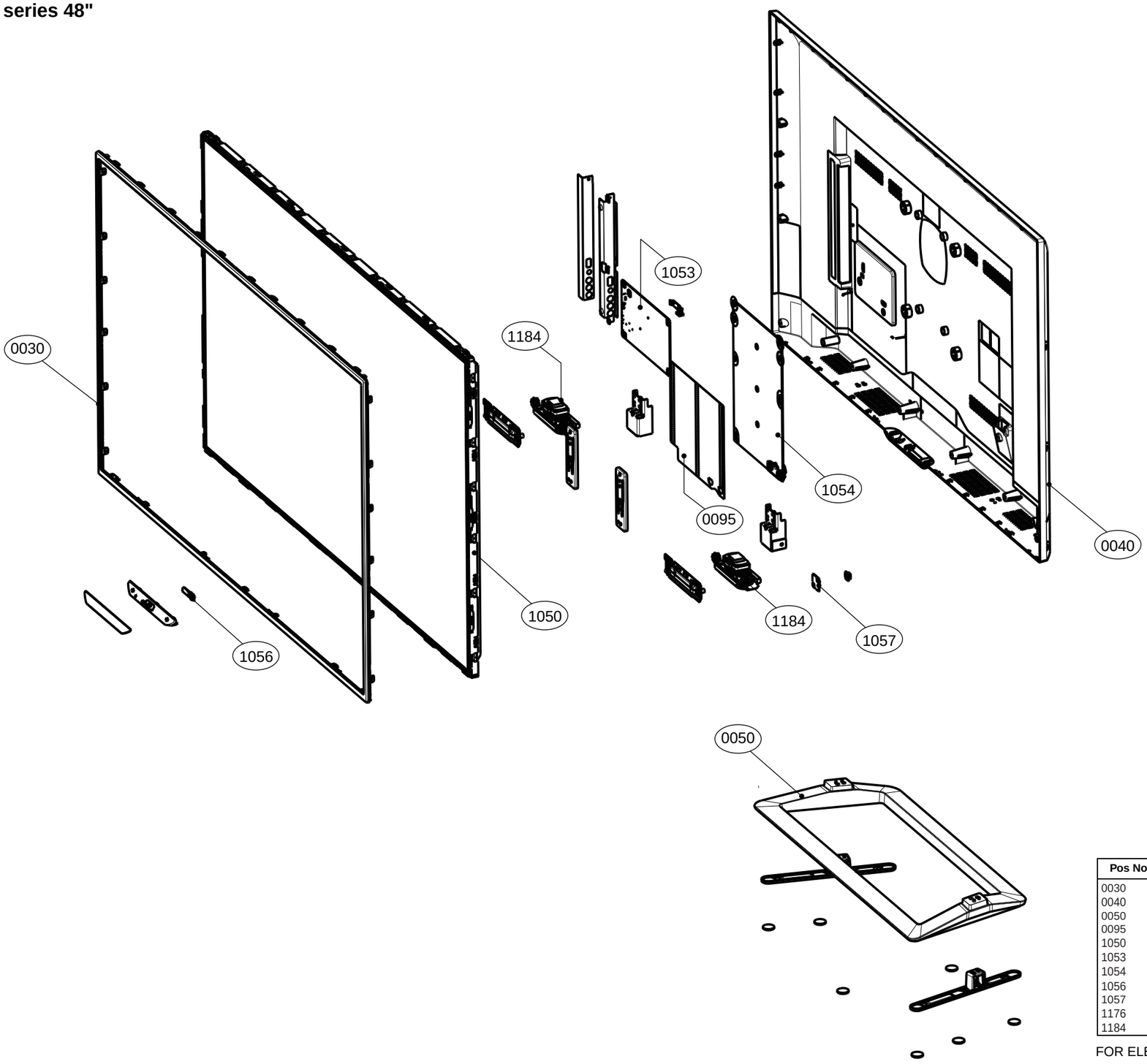
11.4 5000 series 48"

5000 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	
1176	Remote control	Not displayed
1184	Speakers	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

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