Colour Television

Chassis

TPM8.2E

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Service Manual

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2011-Jun-01

PHILIPS

1. Revision List

Manual xxxx xxx xxxx.0

- First release.

2. Technical Specs, Diversity, and Connections

Index of this chapter:

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. Here is product information available, as well as getting started, user manuals, frequently asked questions and software & drivers.

Table 2-1 Described Model Numbers:

Model Number	Styling	Published in
19HFL3233D/10	Golden horse	3122 785 19120
19PFL3606H/12	Golden horse	3122 785 19120
19PFL3606H/58	Golden horse	3122 785 19120
19PFL3606H/60	Golden horse	3122 785 19120
22PFL3606H/12	Golden horse	3122 785 19120
22PFL3606H/58	Golden horse	3122 785 19120
22PFL3606H/60	Golden horse	3122 785 19120
26PFL3606H/12	Golden horse	3122 785 19120
26PFL3606H/58	Golden horse	3122 785 19120
26PFL3606H/60	Golden horse	3122 785 19120

Note: The given Model Numbers are subject to change.

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

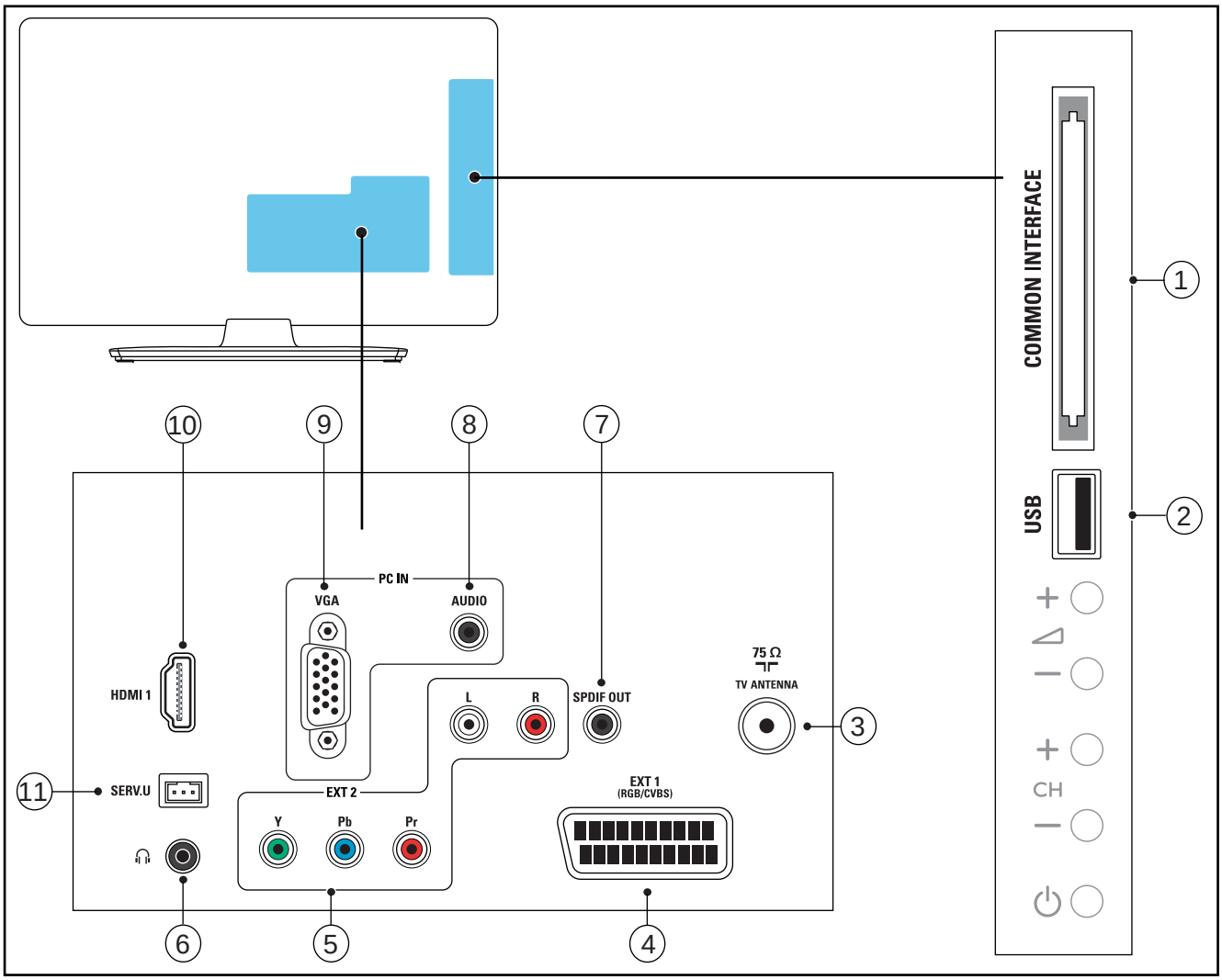

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Figure 2-1 Connection overview

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 - Common Interface
68p - See diagram
DVB-T+C_DEMOD MT5135 / CI.

2 - USB2.0

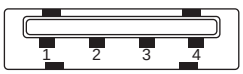

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Figure 2-2 USB (type A)

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

2.3.2 Rear Connections

3 - TV ANTENNA - In
Signal input from an antenna, cable or satellite.

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

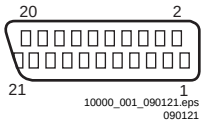

Figure 2-3 SCART connector

1	- Audio R	0.5 V_{RMS} / 1 kΩ	
2	- Audio R	0.5 V_{RMS} / 10 kΩ	
3	- Audio L	0.5 V_{RMS} / 1 kΩ	
4	- Ground Audio	Gnd	
5	- Ground Blue	Gnd	
6	- Audio L	0.5 V_{RMS} / 10 kΩ	
7	- Video Blue/C-out	0.7 V_{PP} / 75 Ω	
8	- Function Select	0 - 2 V: INT 4.5 - 7 V: EXT 16:9 9.5 - 12 V: EXT 4:3	
9	- Ground Green	Gnd	
10	- n.c.		
11	- Video Green	0.7 V_{PP} / 75 Ω	
12	- n.c.		
13	- Ground Red	Gnd	
14	- Ground P50	Gnd	
15	- Video Red/C	0.7 V_{PP} / 75 Ω	
16	- Status/FBL	0 - 0.4 V: INT 1 - 3 V: EXT / 75 Ω	
17	- Ground Video	Gnd	
18	- Ground FBL	Gnd	
19	- Video CVBS	1 V_{PP} / 75 Ω	
20	- Video CVBS/Y	1 V_{PP} / 75 Ω	
21	- Shield	Gnd	

5 - EXT2: Video YPbPr - In, Audio - In

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

6 - Head phone (Output)

Bk	- Head phone	80 - 600 Ω / 10 mW	

7 - Cinch: S/PDIF - Out

Bk	- Coaxial	0.4 - 0.6V_{PP} / 75 Ω	

8 - Audio - In: Left / Right, VGA

Gn	- Audio L/R in	0.5 V_{RMS} / 10 kΩ	

9 - PC IN:VGA

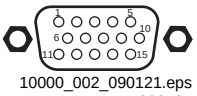

Figure 2-4 VGA connector

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

10 - HDMI: Digital Video, Digital Audio - In

Figure 2-5 HDMI (type A) connector

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

11 - Service / UART

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

2.4 Chassis Overview

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

3. Precautions, Notes, and Abbreviation List

Index of this chapter:

3.1 Safety Instructions

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.

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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 describe 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:

Notes:

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

4.1 Cable Dressing

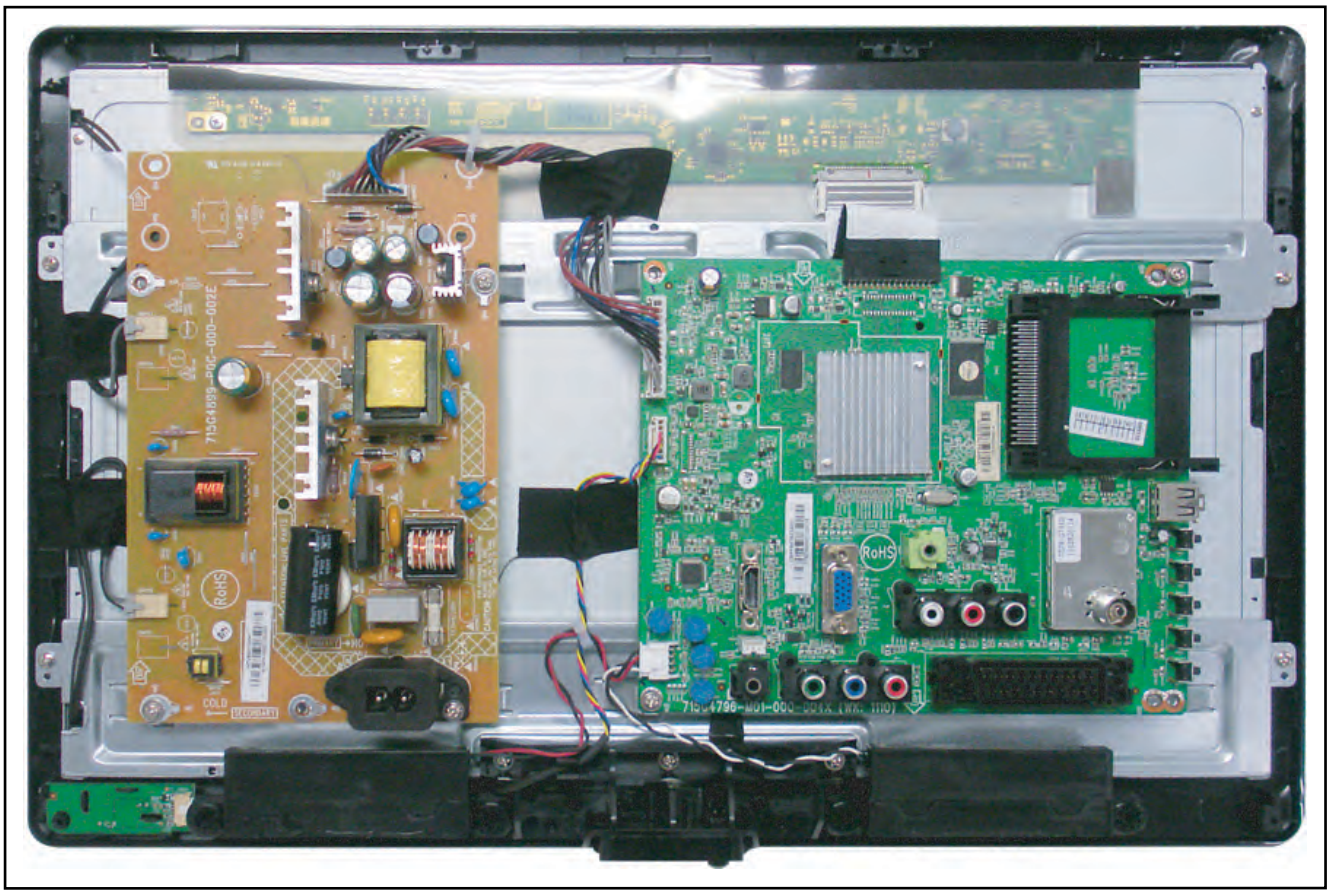

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Figure 4-1 Cable dressing 19"

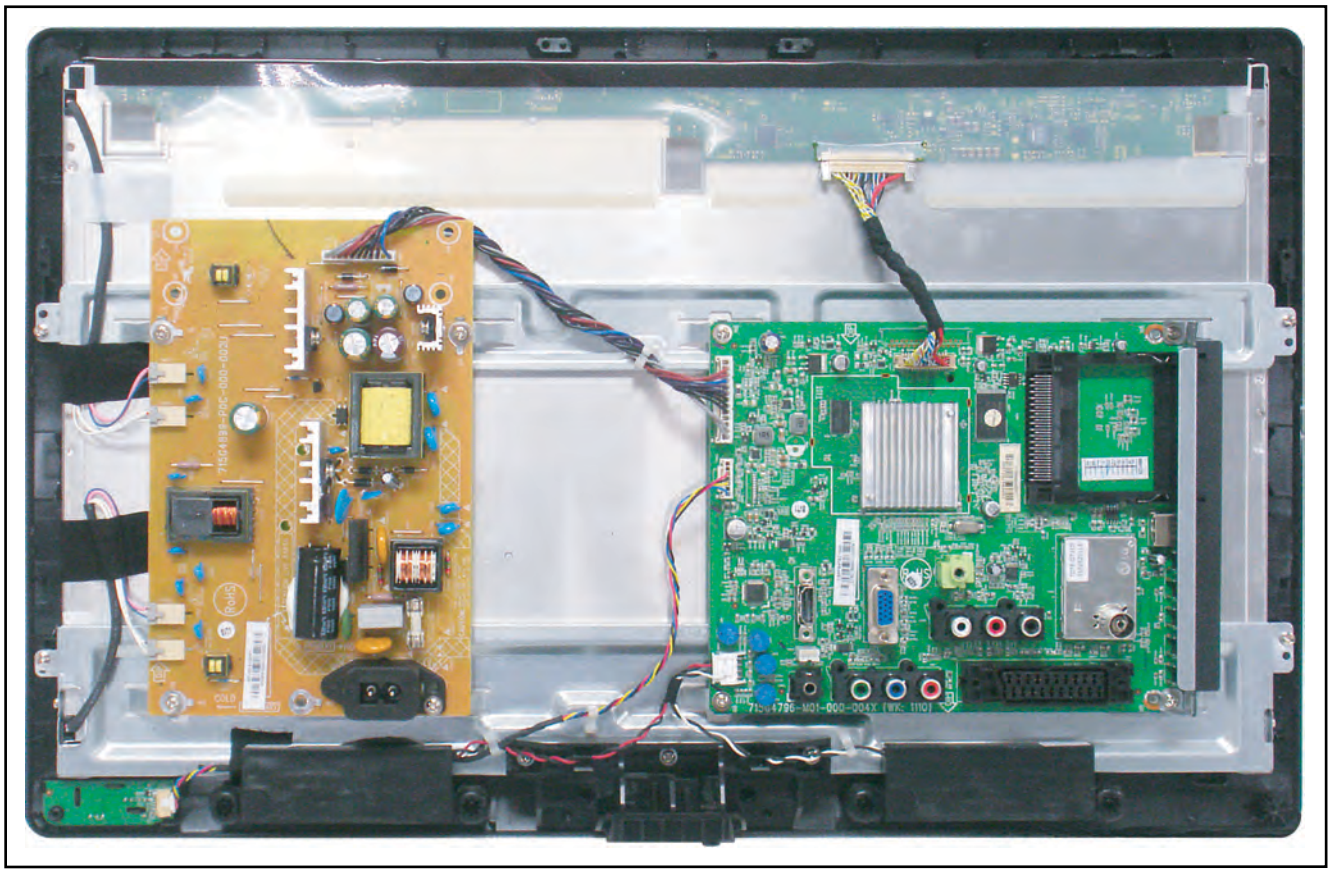

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Figure 4-2 Cable dressing 22"

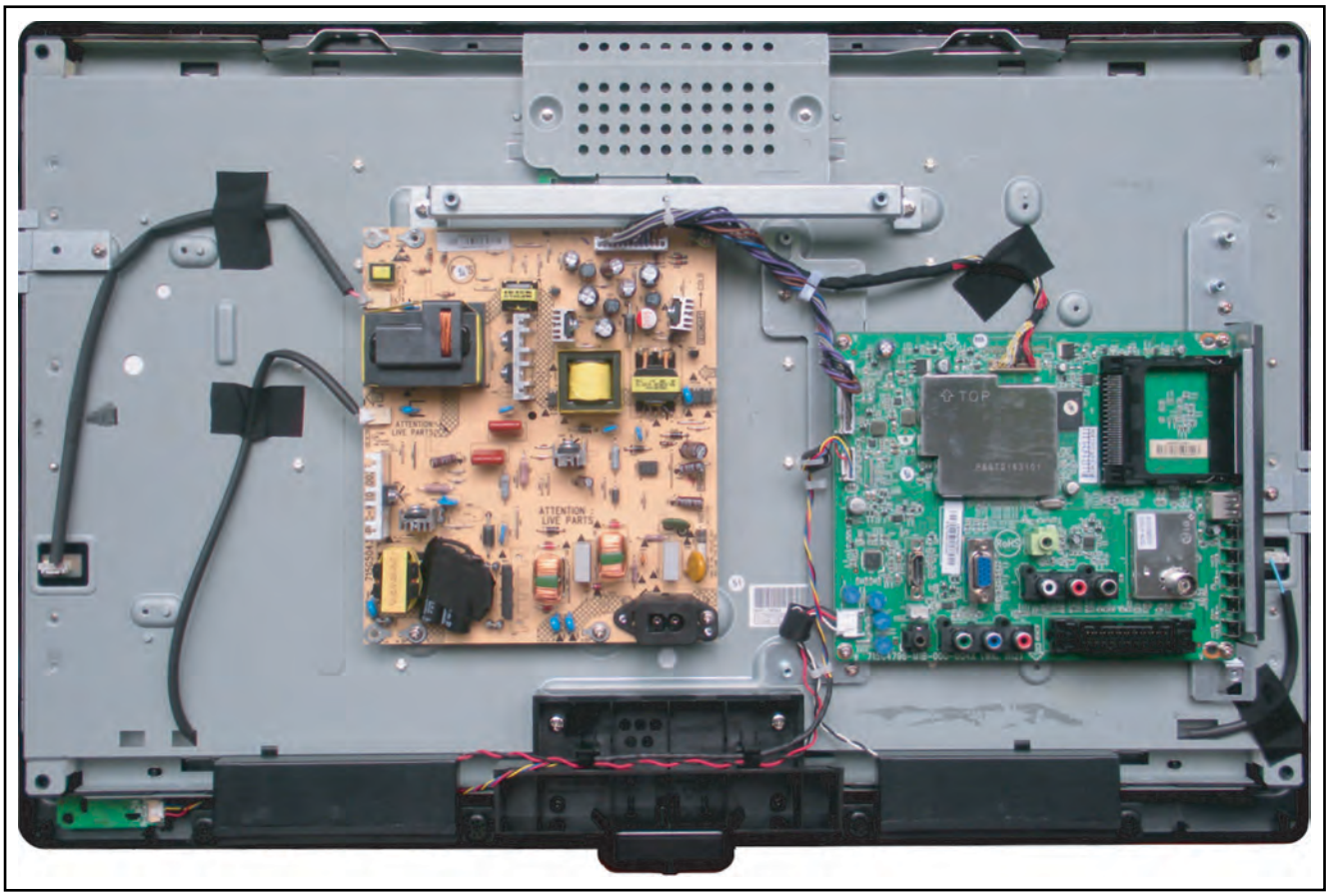

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Figure 4-3 Cable dressing 26"

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.

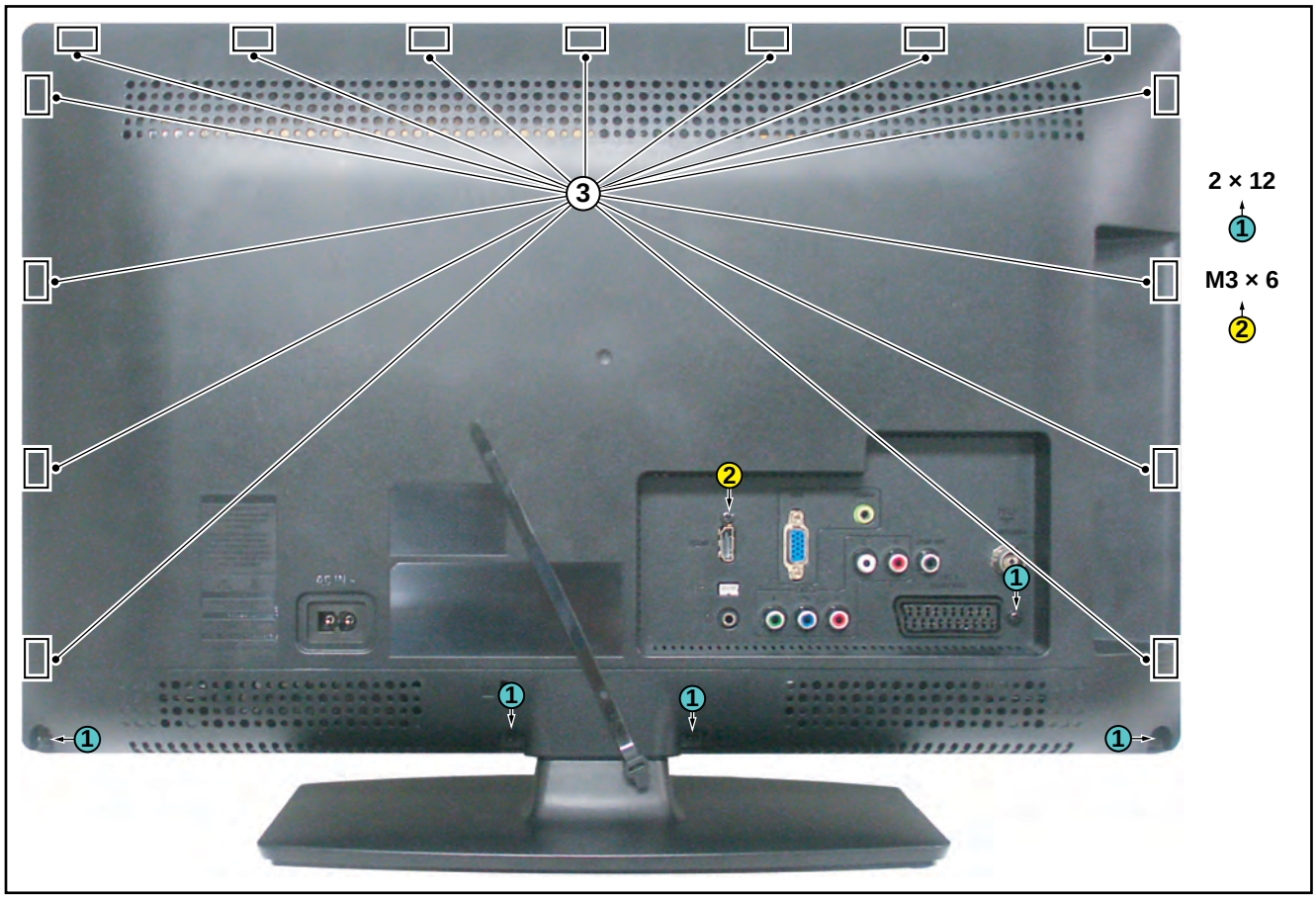
4.3 Assembly/Panel Removal

Instructions below apply to the 22PFL3606H/12, but will be similar for other models.

4.3.1 Rear Cover

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

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



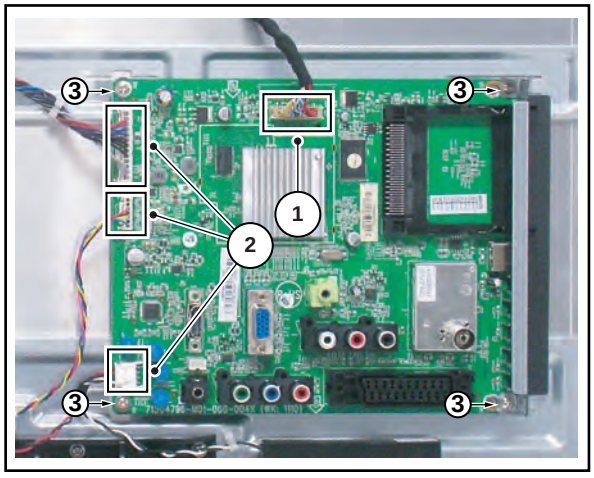
19120_103_110512.eps
110526

Figure 4-4 Rear cover removal

4.3.2 Small Signal Board (SSB)

Refer to Figure 4-5 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 both the LVDS cables/Flat Foils connectors that connect to the SSB [1].
   Caution: be careful, as these are very fragile connectors!
2. Release the clamps and unplug all other connectors [2].
3. Remove all fixation screws [3] from the SSB.
4. Take out of the SSB. Refer to Figure 4-5 for details.



19120_104_110512.eps
110530

Figure 4-5 SSB removal

4.3.3 Power Supply Unit (PSU)

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

1. Release the Power board cables from their clamps.
2. Unplug power connectors from the SSB, as it is not unpluggable at the PSU itself (soldered connector).
3. Unplug all other connectors from the PSU.
4. Remove all fixation screws from the PSU.
5. The PSU can be taken out of the set now.

4.3.4 Speakers

1. Unplug speaker connector from the SSB.
2. Release speaker cables from the clamps.
3. Take the speakers out.

When defective, replace both units.

4.3.5 IR/LED Board

1. Unplug the connectors from the IR/LED board.
2. Release the clips that hold the board and take it out from the bezel.

When defective, replace both units.

4.3.6 LCD Panel 19"/22"

1. Release the LVDS connector from the LCD panel.
2. Release the lamp connectors from the PSU.
3. Take out the speakers, as described earlier.
4. Remove the IR/LED board as described earlier.

5. Release all tapes that fit cables to the back side of the LCD panel.
6. Remove all fixation screws of the sub frames on the sides of the LCD panel.
7. Lift the sub frames, together with the mounted panels from the LCD panel and put it aside.
8. Lift the LCD panel from the front bezel.

When defective, replace the whole unit.

4.3.7 LCD Panel 26"

1. Release the LVDS connector from the LCD panel.
2. Release the lamp connectors from the PSU.
3. Take out the speakers, as described earlier.
4. Remove the IR/LED board as described earlier.
5. Remove the PSU, as described earlier.
6. Remove the SSB, as described earlier.
7. Release all tapes that fit cables to the back side of the LCD panel.
8. Remove all fixation screws of the sub frames and take out these frames.
9. Remove all fixation screws of the clamps on the sides of the LCD panel and take out these clamps.
10. Lift the LCD panel from the front bezel.

When defective, replace the whole unit.

4.4 Set Re-assembly

To re-assemble the whole set, execute all processes in reverse order.

Notes:

- While re-assembling, make sure that all cables are placed and connected in their original position. See Figure 4-1 to Figure 4-3.
- 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

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

Table 5-1 Service mode overview

Service Modes	Description
SAM	Service alignment mode
SDM	Service default Mode
CSM	Customer Service Mode, a 3-page compact status overview of the set. These pages will be written to a dump file on a USB memory stick upon entering CSM-mode
USB software upgradeable	Software upgrading of flash memories MTK-chips MT5366 can be done via USB. The main software can be upgraded via Autorun.upg
NVM-Editor in SAM	NVM-editor provides address and data field editing
Service Data	New Service data in SAM for CTN, Prod. no., and 12NC programming with a virtual keyboard
USB copy/paste in SAM	Channel list, NVM data, Readable info, EDID
UART logging	UART logging is available , however no specification of the output, according to MTK definition.
Blind SAM	Remote control sequence “062598” + “Menu” + “Panel code”
Clear Buffer	RC sequence “062599” + “OK” or via SAM

SDM and SAM offer features, which can be used by the Service engineer to repair/align a TV set. Some features are:
- A pre-defined situation to ensure measurements can be made under uniform conditions (SDM).
- Activates the blinking LED procedure for error identification when no picture is available (SDM).
- Make alignments (e.g. White Tone), reset the error buffer (SAM).
- Display information (“SDM” or “SAM” indication in upper right corner of screen, error buffer, software version, operating hours, options and option codes, sub menus).

CSM is a Service Mode that can be enabled by the consumer. 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.
- Solve customer problems 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 µP (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 SDM and SAM in a decimal value. Every two soft-resets increase the hour by + 1. Stand-by hours are not counted.

Software Identification, Version, and Cluster
The software ID, version, and cluster will be shown in the main menu display of SDM, SAM, and CSM.
The screen will show: “AAAAAB X.YY”, where:
- AAAAA is the chassis name.
- B is the region indication: E = Europe, A = AP/China, U = NAFTA, L = LATAM.
- X is the main version number: this is updated with a major change of specification (incompatible with the previous software version). Numbering will go from 01 - 99 and AA - ZZ.
  - If the main version number changes, the new version number is written in the NVM.
  - If the main version number changes, the default settings are loaded.
- YY is the sub version number: this is updated with a minor change (backwards compatible with the previous versions). Numbering will go from 00 - 99.
  - If the sub version number changes, the new version number is written in the NVM.
  - If the NVM is fresh, the software identification, version, and cluster will be written to NVM.

5.2.2 Service Default Mode (SDM)

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

Specifications

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

How to Activate SDM

To activate SDM, use the following methods:

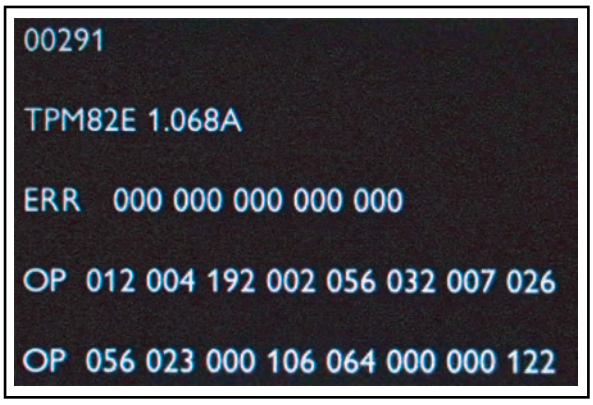
- Press the following key sequence on the RC transmitter: “062596”, directly followed by the “MENU” button.
  Note: It is possible that, together with the SDM, the main menu will appear. To switch it “off”, push the “MENU” button again.

After activating this mode, “SDM” will appear in the upper left corner of the screen (when a picture is available).

On Screen Menu

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

- **xxxxx** Operating hours (in decimal).
- **AAAAAB X.YY** See paragraph Software Identification, Version, and Cluster for the SW name definition.
- **ERR** Shows all errors detected since the last time the buffer was erased in format <xxx> <xxx> <xxx> <xxx> <xxx> (five errors possible).
- **OP** Used to read-out the option bytes. Ten codes (in two rows) are possible.



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110512

Figure 5-1 SDM menu

How to Navigate

As this mode is read only, there is not much to navigate. To switch to other modes, use one of the following methods:

- Command MENU from the user remote will enter the normal user menu (brightness, contrast, colour, etc...) with “SDM” OSD remaining, and pressing MENU key again will return to the last status of SDM again.
- To prevent the OSD from interfering with measurements in SDM, command “OSD” or “i+” (“STATUS” or “INFO” for NAFTA and LATAM) from the user remote will toggle the OSD “on/off” with “SDM” OSD remaining always “on”.
- Press the following key sequence on the remote control transmitter: “062596” directly followed by the OK button to switch to SAM (do not allow the display to time out between entries while keying the sequence). Remarks: new RC will not have I+ button, but function still remains.

How to Exit SDM

- Switch the set to Stand-by, by pressing the standby button on the remote control transmitter or on the television set.
- Via a standard customer RC-transmitter: key in “00”-sequence.
  Note: If the TV is switched “off” by a power interrupt while in SDM, the TV will show up in the last status of SDM menu as soon as the power is supplied again. The error buffer will not be cleared.

5.2.3 Service Alignment Mode (SAM)

Purpose

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

Specifications

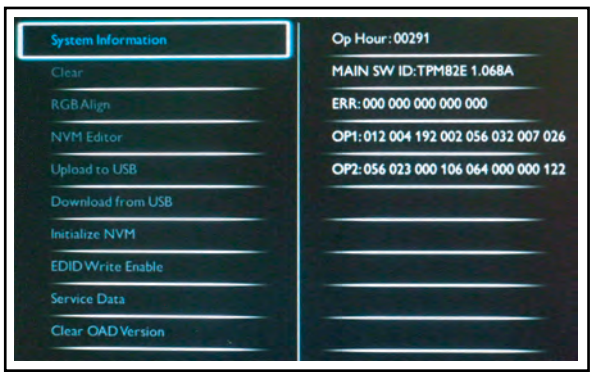
- Operation hours counter (maximum five digits displayed).
- Software version, error codes, and option settings display.
- Error buffer clearing.
- Option settings.
- Software alignments (White Tone).
- NVM Editor.
- Set screen mode to full screen (all content is visible).

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 “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.



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110512

Figure 5-2 Example of SAM

Table 5-2 SAM mode overview

Main Menu	Sub-menu 1	Sub-menu 2	Description
System Information	Op Hour		This represents the life timer. The timer counts normal operation hours, but does not count Stand-by hours.
	Main SW ID	e.g. “TPM82E 1.068A”	See paragraph Software Identification, Version, and Cluster for the SW 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. “012 004 192 002 156 032 007 026”	Option code is hard coded in SW, it cannot be edited in SAM mode. Only to show in SAM system information.
	OP2	e.g. “056 023 000 106 064 000 000 122”	
Clear	Press [OK] to clean the Error Codes immediately		Erases the contents of the error buffer. Select this menu item and press the MENU RIGHT key on the remote control. The content of the error buffer is cleared.
RGB Align	Warm	R Gain	To align the White Tone. See paragraph 6.3 Software Alignments in the Alignments section for a detailed description
		G Gain	
		B Gain	
	Normal	R Gain	
		G Gain	
		B Gain	
	Cool	R Gain	
		G Gain	
		B Gain	
	Store		Store the RGB value
NVM editor	Address		Select and fill the NVM address
	Value		Select and fill the NVM value
	Store		Store the value in the address
Upload to USB	Copy Channel List to USB		To upload several settings from the TV to an USB stick
	Copy NVM to USB		
	Copy Readable Info to USB		
	Copy Edid to USB		
Download from USB	Copy Channel List from USB		To download several settings from the USB stick to the TV
	Copy NVM from USB		
	Copy Readable Info from USB		
	Copy Edid from USB		
Initialize NVM	Press [OK] to Initialize NVM immediately		To initialize a (corrupted) NVM. Be careful, this will erase all settings.
EDID Write Enable	Press [OK] to enable EDID writable immediately		Enable EDID writable
Service Data	Type Number	Press [OK] use key pad edit type number immediately	Use Key pad to edit several service data
	Production Number	Press [OK] use key pad edit production number immediately	
	12NC SSB	Press [OK] use key pad edit SSB immediately	
	12NC PSU	Press [OK] use key pad edit PSU immediately	
	12NC Display	Press [OK] use key pad edit display immediately	
Clear OAD Version	Press [OK] to clean OAD Version immediately		Clean OAD Version

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 twice while in top level SAM, the set will switch to the normal user menu (with the SAM mode still active in the background). To return to the SAM menu press the MENU button.
- The “INFO [i+]” key from the user remote will toggle the OSD “on/off” with “SAM” OSD remaining always “on”.
- Press the following key sequence on the remote control transmitter: ì062596î directly followed by the MENU button to switch to SDM (do not allow the display to time out between entries while keying the sequence). Remarks: new RC will not have I+ button, but function still remain.

How to Store SAM Settings

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

How to Exit SAM

Use one of the following methods:

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

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

5.2.4 Customer Service Mode (CSM)

Purpose

The Customer Service Mode shows error codes and information on the TV’s 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!

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110512

Figure 5-3 CSM Menu [1/3]

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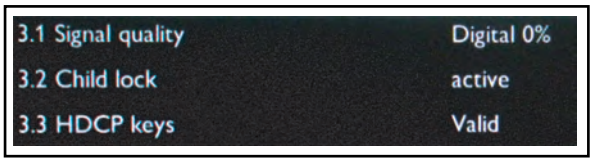
110512

Figure 5-4 CSM Menu [2/3]



19120_204_110512.eps
110512

Figure 5-5 CSM Menu [3/3]

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 Option Code 1** Gives the option codes of option group 1 as set in SAM.
- **1.5 Option Code 2** Gives the option codes of option group 2 as set in SAM.
- **1.6 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.
- **1.7 Display** Displays the 12NC of the NVM.
- **1.8 PSU** Displays the 12NC of the PSU.
- **2.1 Current Main SW** Displays the built-in main software version. In case of field problems related to software, software can be upgraded. As this software is consumer upgradeable, it will also be published on the Internet.
- **2.2 Standby SW** Displays the built-in stand-by processor software version. Upgrading this software will be possible via USB.
- **2.3 Panel Code** Displays the Display Code number.
- **2.4 NVM version** Detects and displays NVM version.
- **3.1 Signal Quality/Present** Analogue/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, the item shall show “active”.
- **3.3 HDCP keys** Indicates if the HDMI keys (or HDCP keys) are valid or not. In case these keys are not valid and the customer wants to make use of the HDMI functionality, the SSB has to be replaced.

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

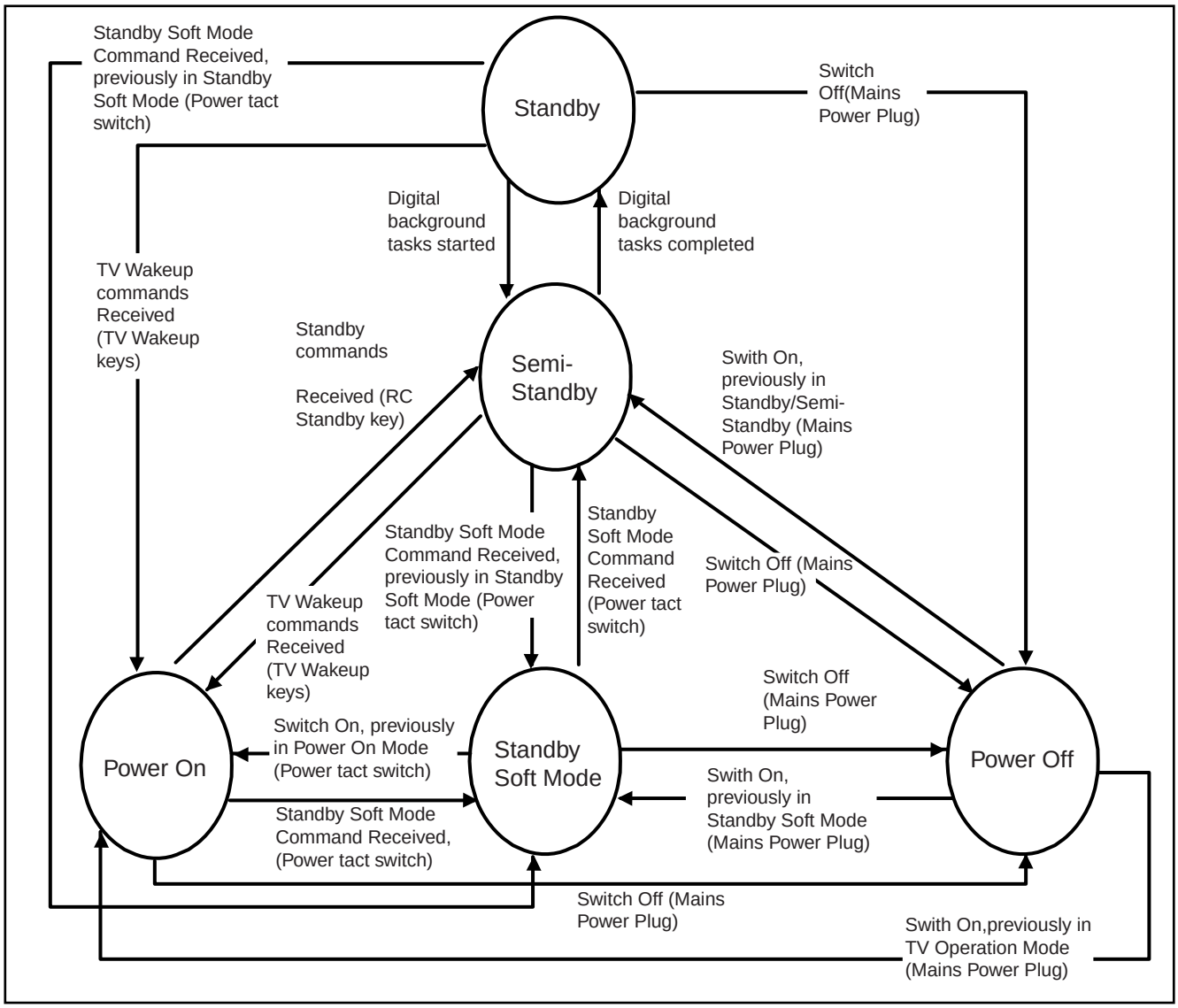
To exit CSM, use one of the following methods.

- 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.

5.2.5 Blind SAM Display Option Code Selection

When after an SSB or display exchange, the display option code is not set properly, it will result in a TV with “no display”. Therefore, it is required to set this display option code after such a repair.
To do so, press the following key sequence on a standard RC transmitter: “062598” directly followed by MENU and “xxx”, where “xxx” is a 3 digit decimal value of the panel type: see column “Display Code” in Table 6-2. 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, he needs to look to the side/bottom sticker to identify the set, for further actions.

5.3 Stepwise Start-up



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110401

Figure 5-6 Stepwise Start-up

5.4 Service Tools

5.4.1 ComPair

Introduction

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

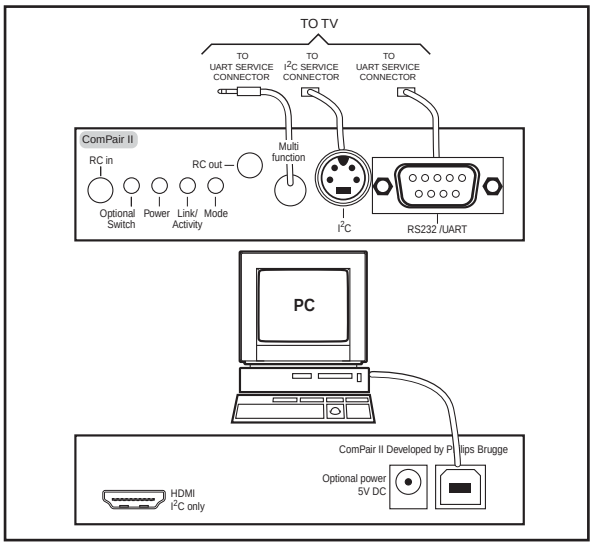
1. ComPair helps to quickly get an understanding on how to repair the chassis in a short and effective way.
2. ComPair allows very detailed diagnostics and is therefore capable of accurately indicating problem areas. No knowledge on I²C or UART commands is necessary, because ComPair takes care of this.
3. ComPair speeds up the repair time since it can automatically communicate with the chassis (when the microprocessor is working) and all repair information is directly available.
4. ComPair features TV software up possibilities.

Specifications

ComPair consists of a Windows based fault finding program and an interface box between PC and the (defective) product. The ComPair II interface box is connected **to the PC** via an USB cable. For the TV chassis, the ComPair interface box and the TV communicate via a bi-directional cable via the service connector(s).
The ComPair fault finding program is able to determine the problem of the defective television, by a combination of automatic diagnostics and an interactive question/answer procedure.

How to Connect

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



10000_036_090121.eps
091118

Figure 5-7 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 TPM8.2x xx. (using DB9 to 2mm pitch JST connector): 3122 785 90630.

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

Additional cables for VCOM Alignment

- ComPair/I2C interface cable: 3122 785 90004.
- ComPair/VGA adapter cable: 9965 100 09269.

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 USB flash drive (preferably empty).

Note:

1. Only FAT/DOS-formatted flash drives 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 "123654" 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.

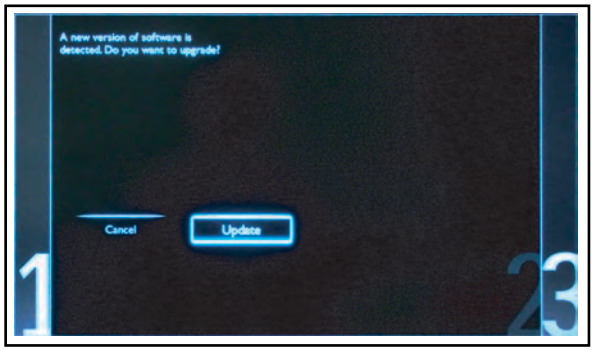
5.5.4 Download the latest software

1. Point the web browser to 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 a USB flash drive into one of the USB ports of the PC.
5. Decompress the downloaded ZIP file and copy the "autorun.upg" to the root directory of the USB flash drive.

5.5.5 Update the TV software

1. Insert mains power and wait for system to boot completely.
2. Insert the USB flash drive that contains the software update files.
3. The TV will detect the USB flash drive automatically. Then a window jumps out as Figure 5-8.
   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 5-8.

5. To proceed, In next menu select [Start] and press OK to start software updates. See Figure 5-9.
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 5-10.



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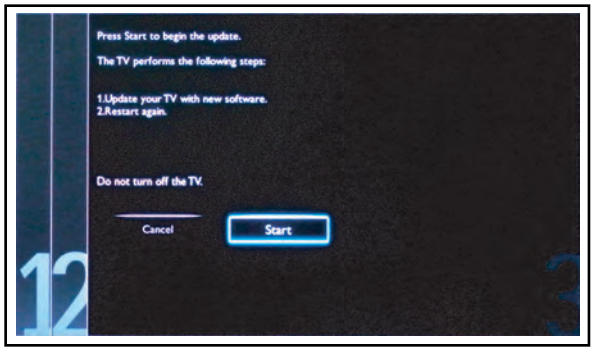
110324

Figure 5-8 Update the TV software [1/3]



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110324

Figure 5-9 Update the TV software [2/3]

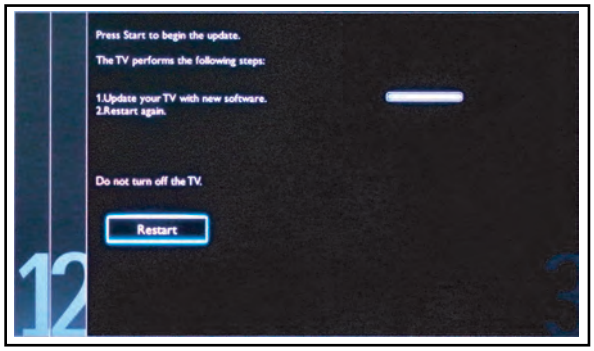

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Figure 5-10 Update the TV software [3/3]

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

5.5.6 Content and Usage of the One-Zip Software File

Below you find a content explanation of the One-Zip file, and instructions on how and when to use it. Only files that are relevant for Service are mentioned here.
- **EDID_clustername.zip:** Contains the EDID content of the different EDID NVMs. See ComPair for further instructions.
- **FUS_clustername_version.zip:** Contains the "autorun.upg" which is needed to upgrade the TV main software and the software download application.
- **NVM_clustername_version.zip:** Default NVM content. Must be programmed via ComPair.

5.5.7 How to Copy NVM Data to/from USB

When copying data to and from a USB memory stick, the folder "repair" is used. When inserting an empty USB memory stick, and downloading data to the stick, the TV will create this folder. When sending data from a USB memory stick to a TV, the intended data must be available in the "repair" folder.
Note that when copying EDID data to the TV, all necessary EDID files must be in this folder.
While copying to or from the USB "Repair" Folder to TV, the files need to be named accordingly:
- Channel List: CM_TPS82E_LA_CK.BIN
- EDID 1: HDMI_1_EDID_TPM82E_LA_CK.BIN
- EDID 2: HDMI_2_EDID_TPM82E_LA_CK.BIN
- VGA_EDID: VAG_EDID_TPM82E_LA_CK.BIN
- NVM: NVM_TPM82E_LA_CK.BIN

For copying EDID data to the TV, all 3 EDID files need to be available in repair directory.

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.

Errors code information:
- **Error 000:** No problem.
- **Error 011:** I^2C bus error. When this error occurs, the TV will not start up due to the blocked bus.
- **Error 012:** Tuner error. There is no I^2C communication towards the tuner after start-up.
- **Error 013:** Panel VCC error. This voltage is made in the power supply and results in protection in case of absence.

5.6.2 How to Clear the Error Buffer

You can read the error buffer in three ways:
- On screen via the SAM/SDM/CSM (if you have a picture). Example:
  - **ERROR: 0 0 0 0 0:** No errors detected.

  - **ERROR: 6 0 0 0 0:** Error code 6 is the last and only detected error.
  - **ERROR: 9 6 0 0 0:** Error code 6 was detected first and error code 9 is the last detected (newest) error.
- Via the blinking LED procedure (when you have no picture). See paragraph 5.7 The Blinking LED Procedure.
- Via ComPair.

5.6.3 Error codes

Errors code information:
- **Error 000:** No problem.
- **Error 011:** I^2C bus error. When this error occurs, the TV will not start up due to the blocked bus.
- **Error 012:** Tuner error. There is no I^2C communication towards the tuner after start-up.
- **Error 013:** Panel VCC error. This voltage is made in the power supply and results in protection in case of absence.

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 following key sequence on the remote control transmitter: “062599” directly followed by the OK button.
- If the contents of the error buffer have not changed for 50 hours, the error buffer resets automatically.

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

5.7 The Blinking LED Procedure

5.7.1 Introduction

The software is capable of identifying different kinds of errors. Because it is possible that more than one error can occur over time, an error buffer is available, which is capable of storing the last five errors that occurred. This is useful if the OSD is not working properly.
Errors can also be displayed by the blinking LED procedure. The method is to repeatedly let the front LED pulse with as many pulses as the error code number, followed by a period of 1.5 seconds in which the LED is “off”. Then this sequence is repeated.
Example (1): error code 4 will result in four times the sequence LED “on” for 0.25 seconds / LED “off” for 0.25 seconds. After this sequence, the LED will be “off” for 1.5 seconds. Any RC command terminates the sequence. Error code LED blinking is in red colour.
Example (2): the content of the error buffer is “12 9 6 0 0” After entering SDM, the following occurs.
- 1 long blink of 5 seconds to start the sequence.
- 12 short blinks followed by a pause of 1.5 seconds.
- 9 short blinks followed by a pause of 1.5 seconds.
- 6 short blinks followed by a pause of 1.5 seconds.
- 1 long blink of 1.5 seconds to finish the sequence.
- The sequence starts again with 12 short blinks.

5.7.2 Displaying the Entire Error Buffer

Additionally, the entire error buffer is displayed when Service Mode “SDM” is entered.

5.8 Fault Finding and Repair Tips

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

5.8.1 NVM Editor

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

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

5.8.2 Load Default NVM Values

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

5.8.3 No Picture

When you have no picture, first make sure you have entered the correct display code. See paragraph 6.4 Option Settings for the instructions. See also Table 6-2.

5.8.4 Unstable Picture via HDMI input

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

5.8.5 No Picture via HDMI input

Check whether the 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. Reflash the software.

5.8.7 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_CTN name_serial no.txt) will be saved in the root of the USB memory stick.

5.8.8 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!

5.8.9 Display option code

Attention: In case the SSB is replaced, always check the Display 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

Perform all electrical adjustments under the following conditions:

- Power supply voltage: 195 - 264 V_{AC}, 50/ 60 ± 3 Hz.
- Connect the set to the mains via an isolation transformer with low internal resistance.
- Allow the set to warm up for approximately 15 minutes.
- Measure voltages and waveforms in relation to correct ground (e.g. measure audio signals in relation to AUDIO_GND).
  Caution: It is not allowed to use heat sinks as ground.
- Test probe: R_i > 10 MΩ, C_i < 20 pF.
- Use an isolated trimmer/screwdriver to perform alignments.

6.2 Hardware Alignments

Not applicable.

6.3 Software Alignments

Put the set in SAM mode (see Chapter 5. Service Modes, Error Codes, and Fault Finding). The SAM menu will now appear on the screen. Select RGB Align and go to one of the sub menus. The alignments are explained below.
The following items can be aligned:

- White point

To store the data:

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

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

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

6.3.1 Display adjustment

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

- Enter SAM mode.
- Select a colour temperature (e.g. COOL, NORMAL, or WARM).
- Set the RED, GREEN and BLUE default values according to the values in Table 6-1.
- 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.

A repaired SSB in Service should get the service Set type

Table 6-1 White tone default settings

Picture mode	Screen size	Colour temperature		
		Red	Green	Blue
Normal (9000K)	19"	128	118	100
	22"	128	105	97
	26"	128	115	109
Cool (11000K)	19"	128	122	118
	22"	128	106	114
	26"	128	114	124
Warm (6500K)	19"	128	108	61
	22"	128	95	59
	26"	128	106	67

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 MT5366 ICs (back-end advanced video picture improvement IC which offers motion estimation and compensation features (commercially called HDNM) is made known by the option codes.

6.4.2 Option Code Overview

Enter SAM mode to check the option codes. They can not be edited in the NVM.

6.4.3 Display Code Overview

Press the following key sequence on a standard RC transmitter: “062598” directly followed by MENU and “xxx”, where “xxx” is a 3 digit decimal value of the panel type: see column “Display Code” in Table 6-2. When the value is accepted and stored in NVM, the set will switch to Stand-by, to indicate that the process has been completed.

Table 6-2 Display code overview

CTN_ALT BOM#	Panel Type	Display Code
19HFL3233D/10	LGD LC185WH1-TLG1	131
19PFL3606H/12	LGD LC185WH1-TLG1	131
19PFL3606H/58	LGD LC185WH1-TLG1	131
19PFL3606H/60	LGD LC185WH1-TLG1	131
22PFL3606H/12	LGD LC215WUE-TCA1	132
22PFL3606H/58	LGD LC215WUE-TCA1	132
22PFL3606H/60	LGD LC215WUE-TCA1	132
26PFL3606H/12	LGD LC260WXE-SBB1	133
26PFL3606H/58	LGD LC260WXE-SBB1	133
26PFL3606H/60	LGD LC260WXE-SBB1	133

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.
“00PF0000000000” and Production code “00000000000000”.

Also the virgin bit (MENU > Setup > TV settings > Reinstall TV > Start now) is to be set. To set all this, you can use the ComPair tool or use the “NVM editor” and “Service Data” 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.

7. Circuit Descriptions

Index of this chapter:

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 TPM8.2E LA platform uses MT5366/MT5135. It supports decoder and a TV controller offers high integration for advanced applications. It combines a transport de-multiplexer, a high definition video decode, an AC3 decode, a dual-link LVDS/mini-LVDS transmitter, and an NTSC/PAL/SECAM TV decoder with a 3D comb filter (NTSC/PAL).

7.1.1 Implementation

Key components of this chassis are:

- MT5366CVOU System-On-Chip (SOC) TV Processor
- TDTK-G731D Tuner (DVB T/C, analogue)
- MT5135AE DVB T/C demodulator
- TAS5717 Audio amplifier

7.1.2 TPM8.2E Architecture Overview

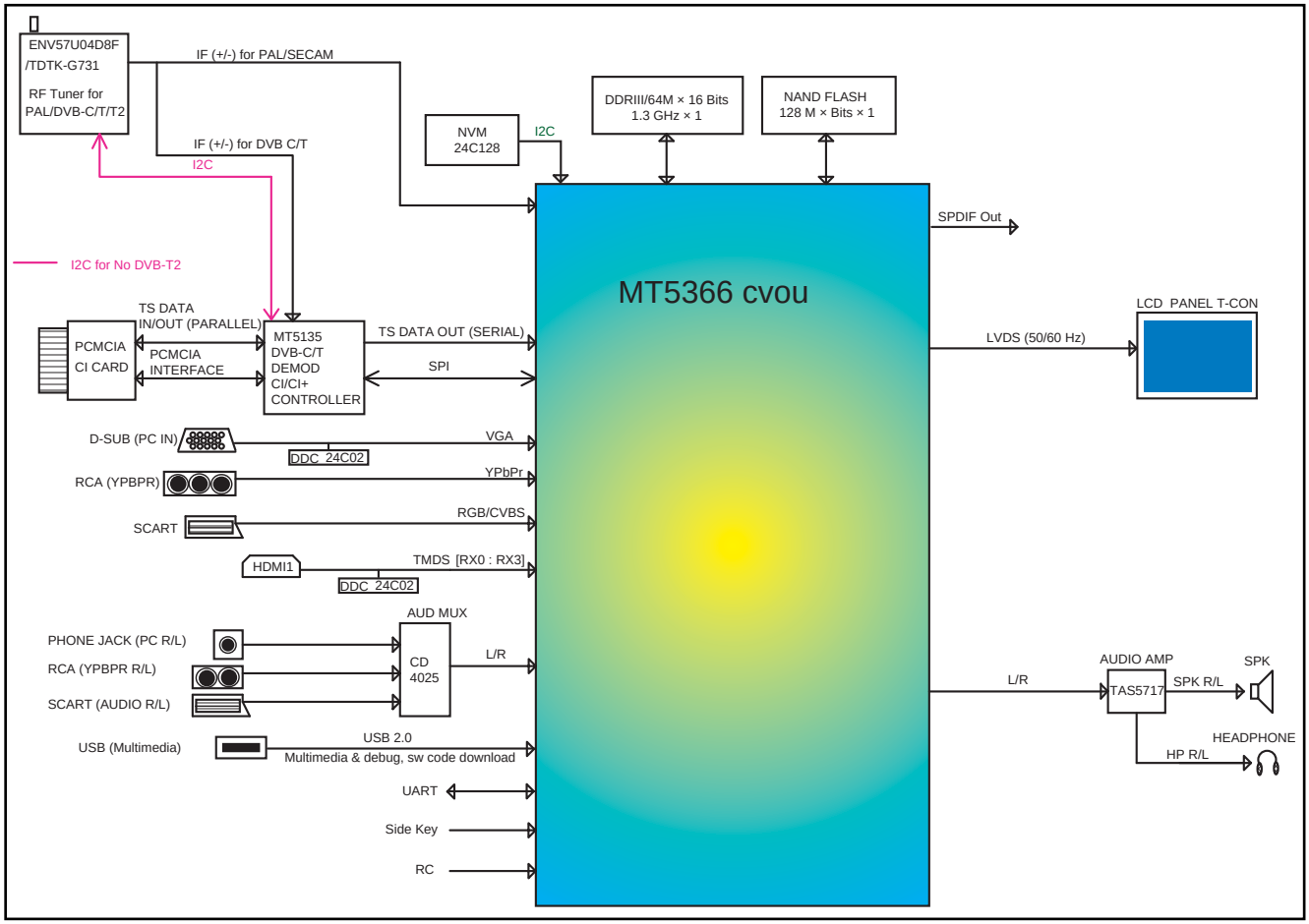

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Figure 7-1 Architecture of TPM8.2E LA

7.1.3 SSB Cell Layout

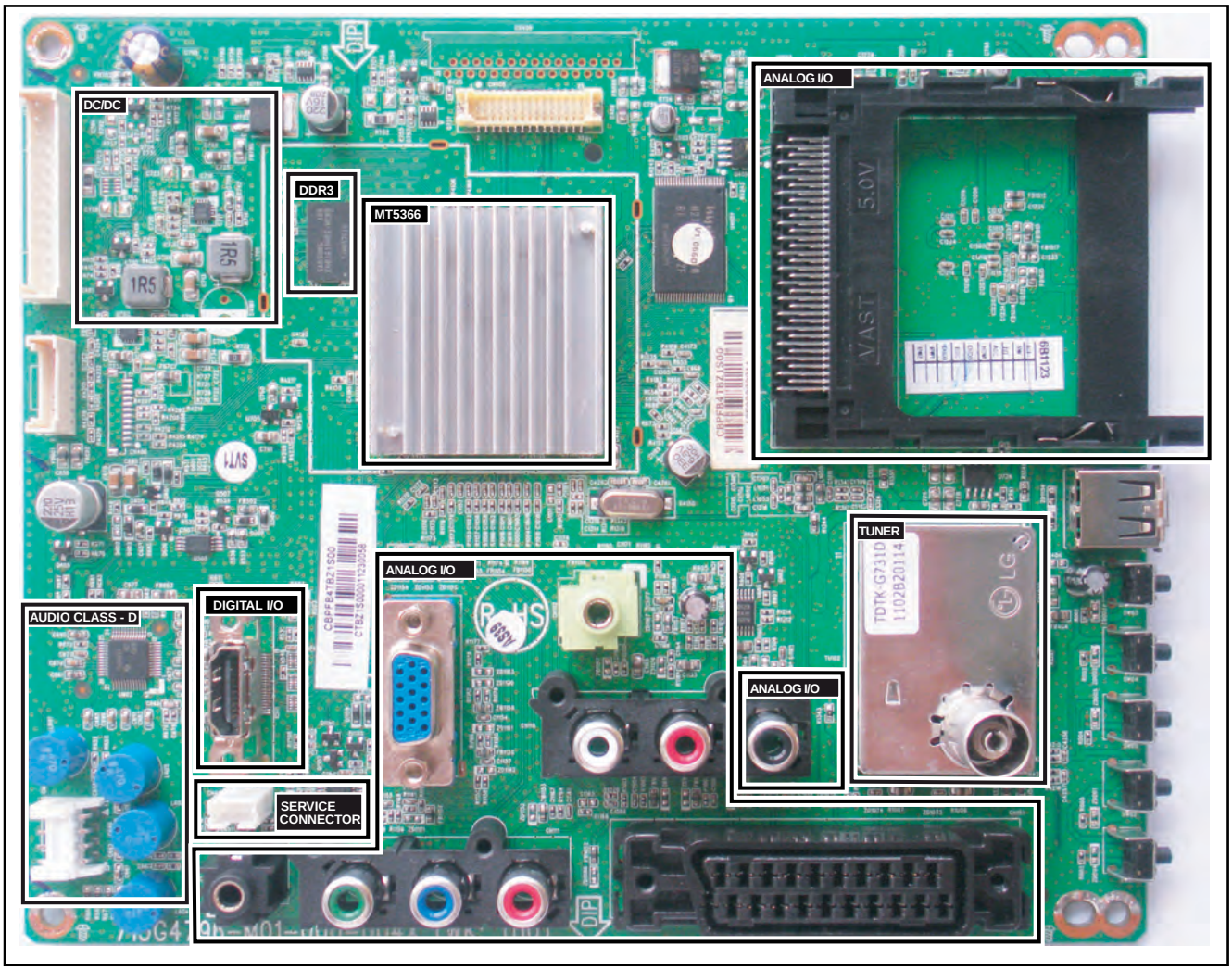

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Figure 7-2 SSB layout cells (top view)

7.2 Power Supply

7.2.1 Power Supply Unit

Before checking other parts first check whether fuse on the PSU is not 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.

The output voltages to the chassis are:
- +5V-STANDBY (Stand-by mode only)
- +12V (on-mode)
- +18V for audio circuit

7.2.2 Diversity

The diversity in power supply units is mainly determined by the diversity in screen sizes, but please note to always order the correct replacement.

7.3 Power Management

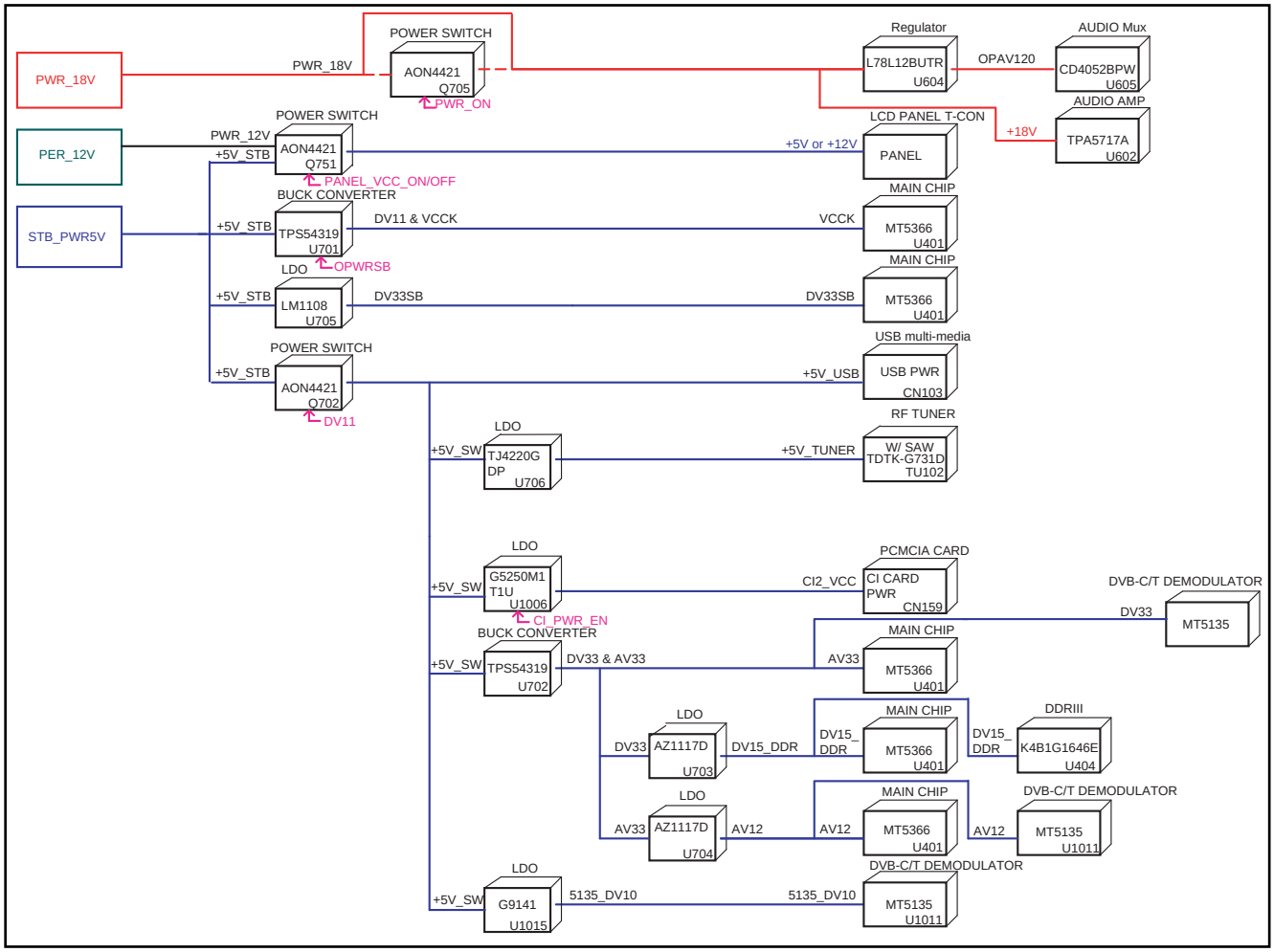

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Figure 7-3 Power Architecture

The on-board DC/DC converters deliver the following voltages (depending on set execution):
- +5V-STANDBY, permanent voltage for the Stand-by controller, LED/IR receiver and controls; connector CN701 pin 11 and 12.
- +12V, input from the power supply for T-con, audio amp in SCART out; connector CN701 pins 3 and 4.
- +18V, input from the power supply for audio (in active mode); connector CN701 pins 8 and 9.

7.4 Circuit Description

7.4.1 System power

The main board power is received at connector CN701 from power board, to receive the power and signals from the PSU. See Table 7-1 for the correct pining, The shown test points in Figure 7-4.

Table 7-1 Connector CN701 overview

Item	Pin	Description
1	1	INVERTER_ON_OFF, Inverter board control (Low: OFF, High: ON)
2	2	BRIGHT_ADJ, Inverter bright PWM control (Max.: 0 V, Min.: 3.3 V)
3	3, 4	+12 V Supply
4	5, 6, 7	Ground
5	8, 9	+18 V Supply
6	10	STANDBY, Standby control (High: Normal, Low: Stand by)
7	11, 12	STB_PWR5V, +5VSB Supply

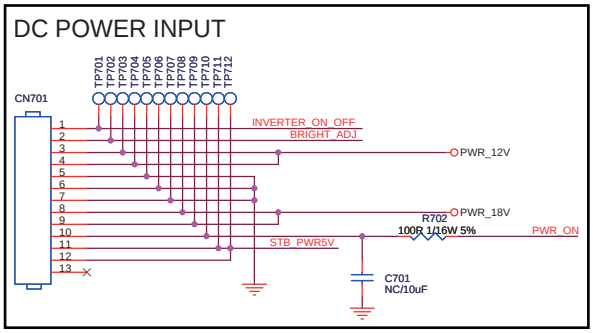

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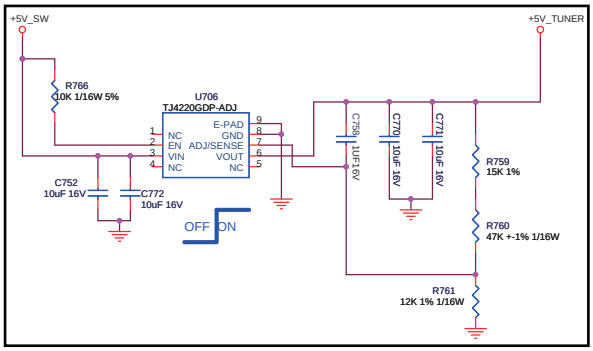
Figure 7-4 System power

7.4.2 Tuner power

TJ4220GDP provides the tuner power of approximately 5 V.



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110518

Figure 7-5 Tuner power

7.4.3 DDR3 1.5V

This AZ117D provides the 1.5 V power supply for the DDR memory (U404).

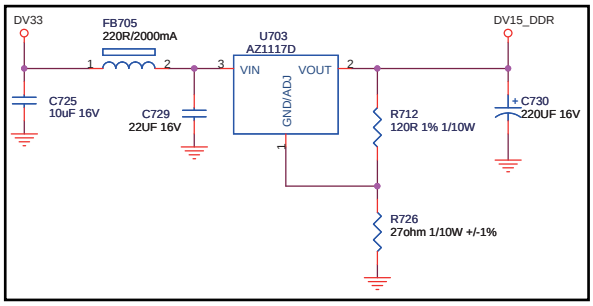

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Figure 7-6 DDR3 1.5V

7.4.4 AV12 (U704)

This AZ117D provides the 1.2 V power supply for the DVBT/C demodulator (U1011)

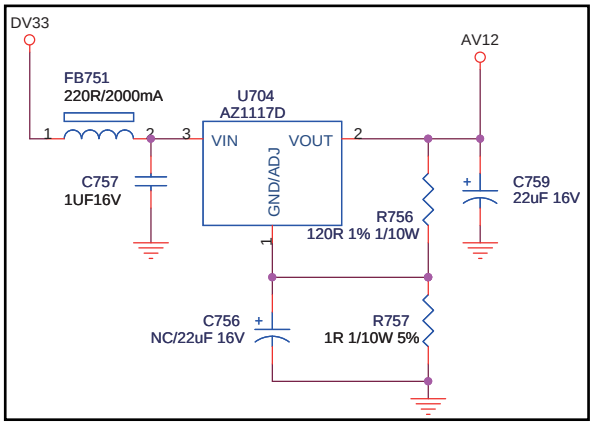

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Figure 7-7 AV12 (U704)

7.4.5 Nand flash Memory (U4051)

The set uses a 128 MB NAND flash for software code

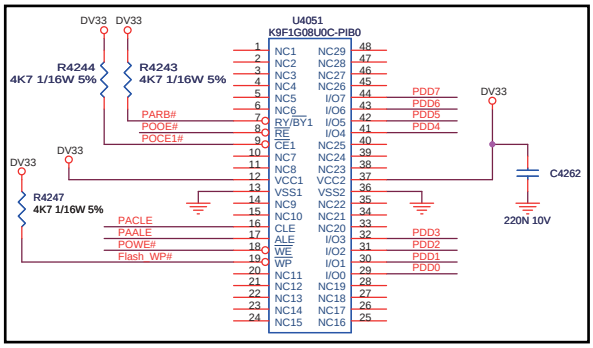

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Figure 7-8 Nand flash Memory (U4051)

7.4.6 NVM (U409)

The system EEPROM is a 128 kB IC. It contains all system settings.

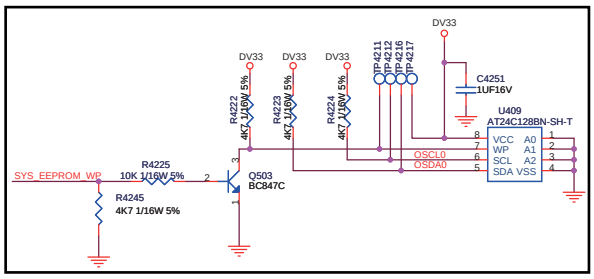

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Figure 7-9 NVM (U409)

7.4.7 Reset (U410)

When the input voltage for the MT5366 main processor drops below 2.9 V, a system reset will be enforced by U410.

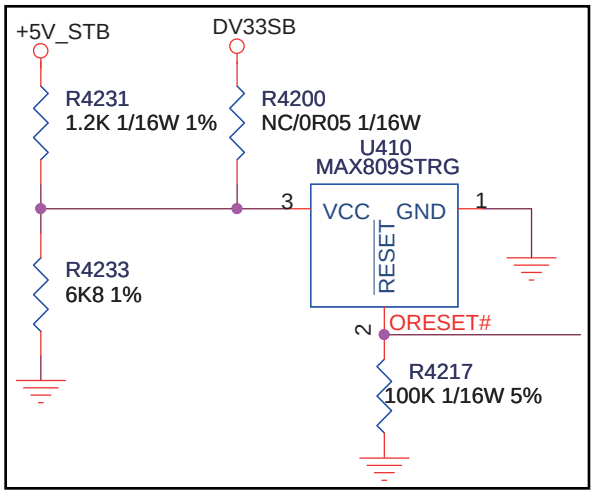

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Figure 7-10 Reset (U410)

7.4.8 Audio Mute circuit

This circuit will provide a “high-to-low” pulse when the +5 V SSB power line goes low. This will trigger the related audio mute circuit, preventing the audio circuit making uncontrolled sounds.

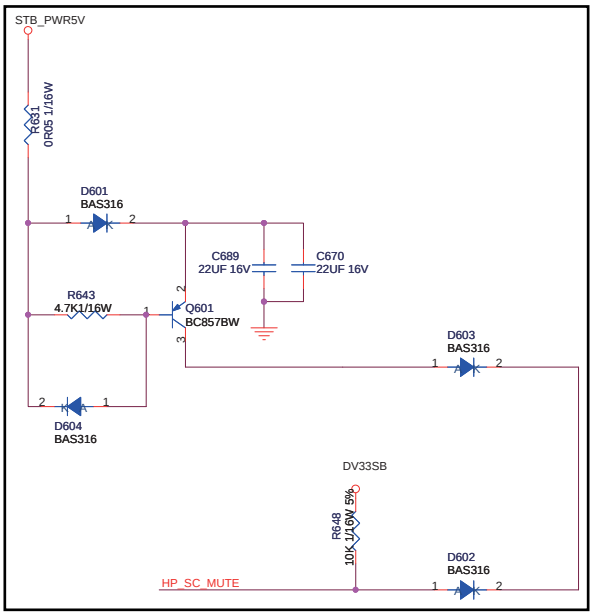

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Figure 7-11 Audio Mute circuit

7.4.9 AV33 and DV33 (U702)

The circuit around U702 will provide the main 3.3 V power supply to the SSB.

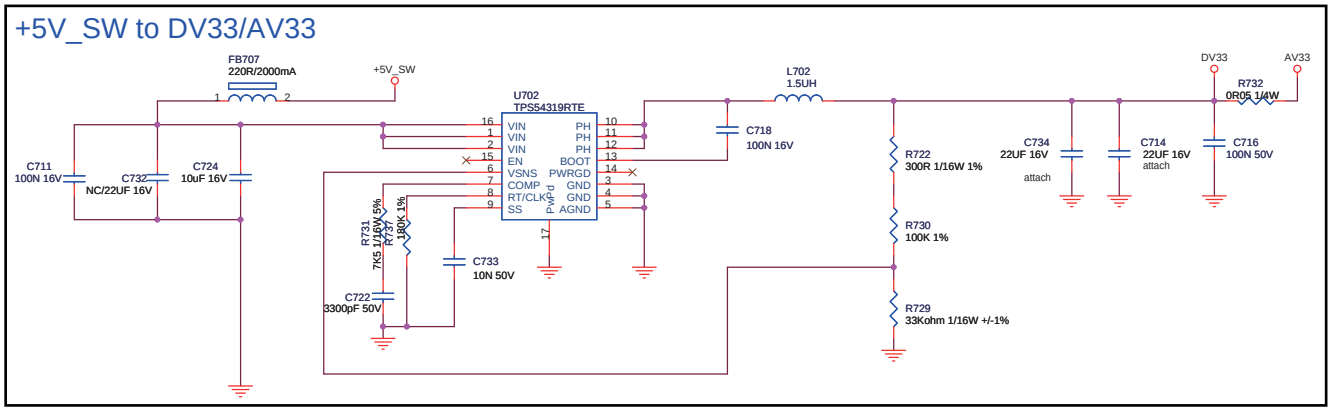

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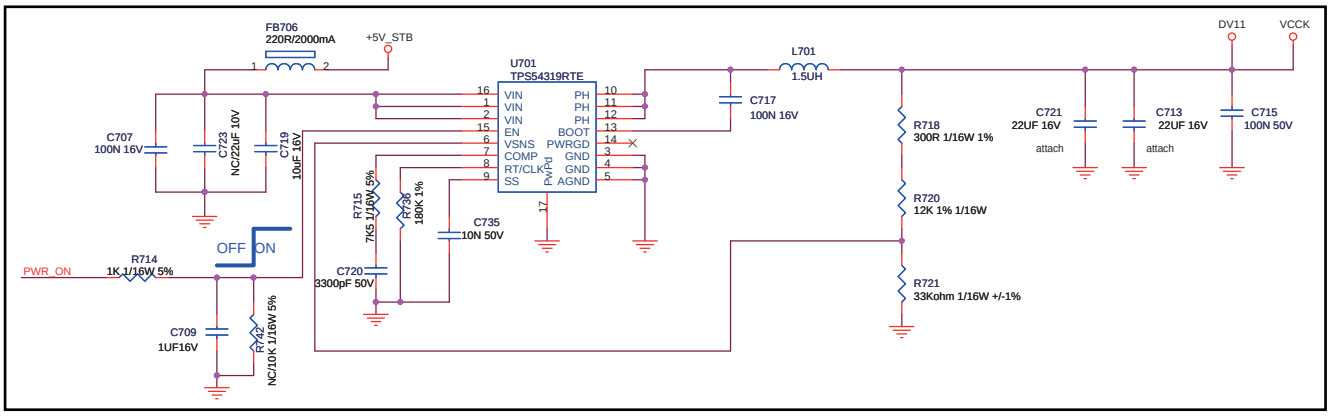
Figure 7-12 AV33 and DV33 (U702)

7.4.10 Core Power

The circuit around U701 will provide the main 1.1 V power supply to the MT5366 micro processor.



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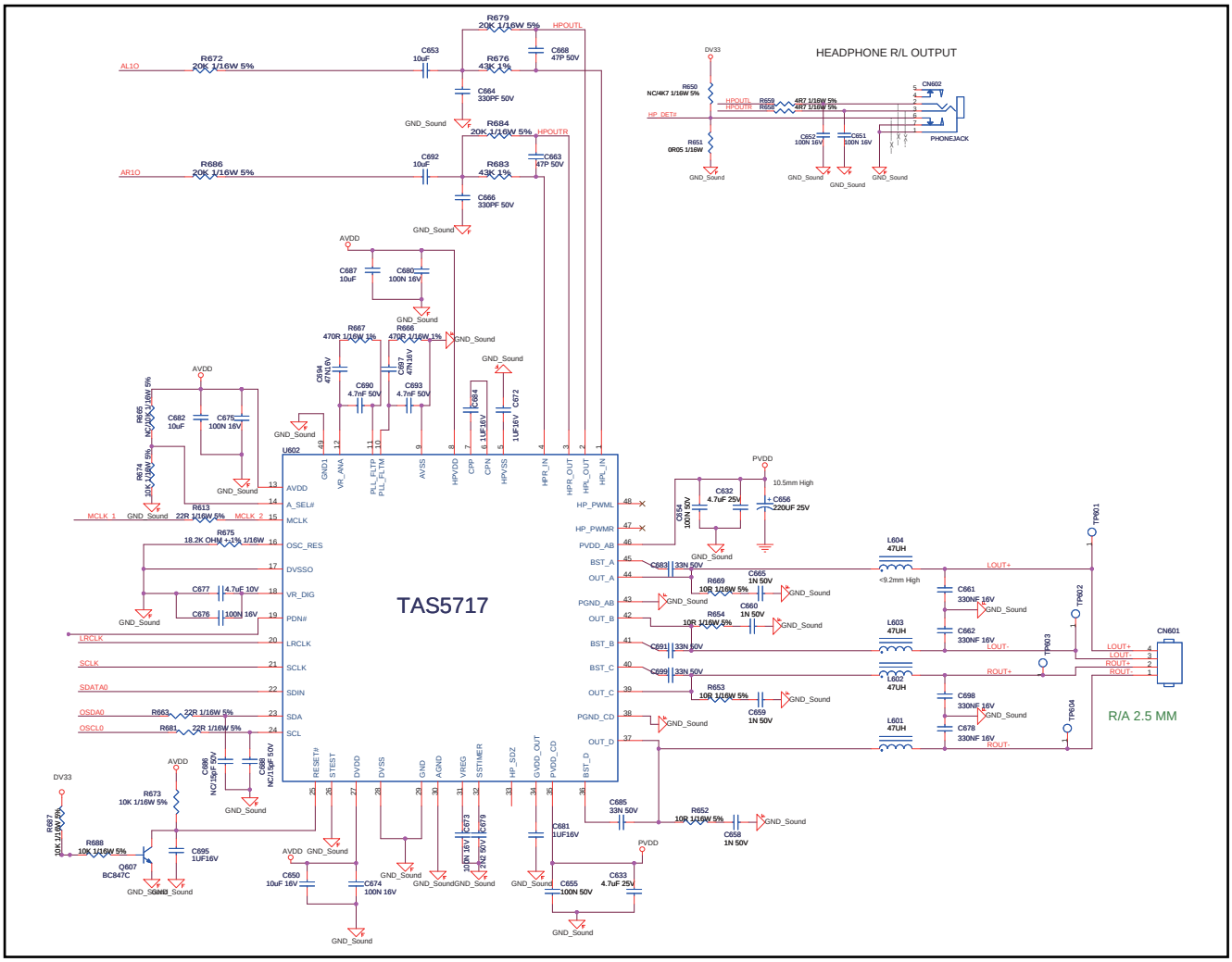
110518

Figure 7-13 Core Power

7.4.11 Audio Amplifier (U602)

The TAS5717 is providing the audio amplification to the speakers and headphone from digital input signals. It's I²S signals enter the IC via pins 20 to 24. The IC contains two separate stereo Class-D amplifiers for the normal speakers as well as for the headphone. In the headphone plug a signalling switch is coupled to the main processor which then via I²S controls the amplifier.



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110531

Figure 7-14 Audio Amplifier (U602)

7.4.12 Demodulator

The MT5135AE provides a high performance DVB-T and DVB-C demodulation function, the integrated CI+ controller and interface also reduces the complexity of TS routing.

Overall Features:

- Integrated DVB-T and DVB-C demodulators.
- Integrated CI/CI+ controller and interface.
- On-chip integrated SAW filter function.
- 10-Bit ADC accepting IF or low-IF inputs.
- RSSI measurement.
- Independent RF and IF AGC controls.
- One parallel or serial TS interface accepting output.

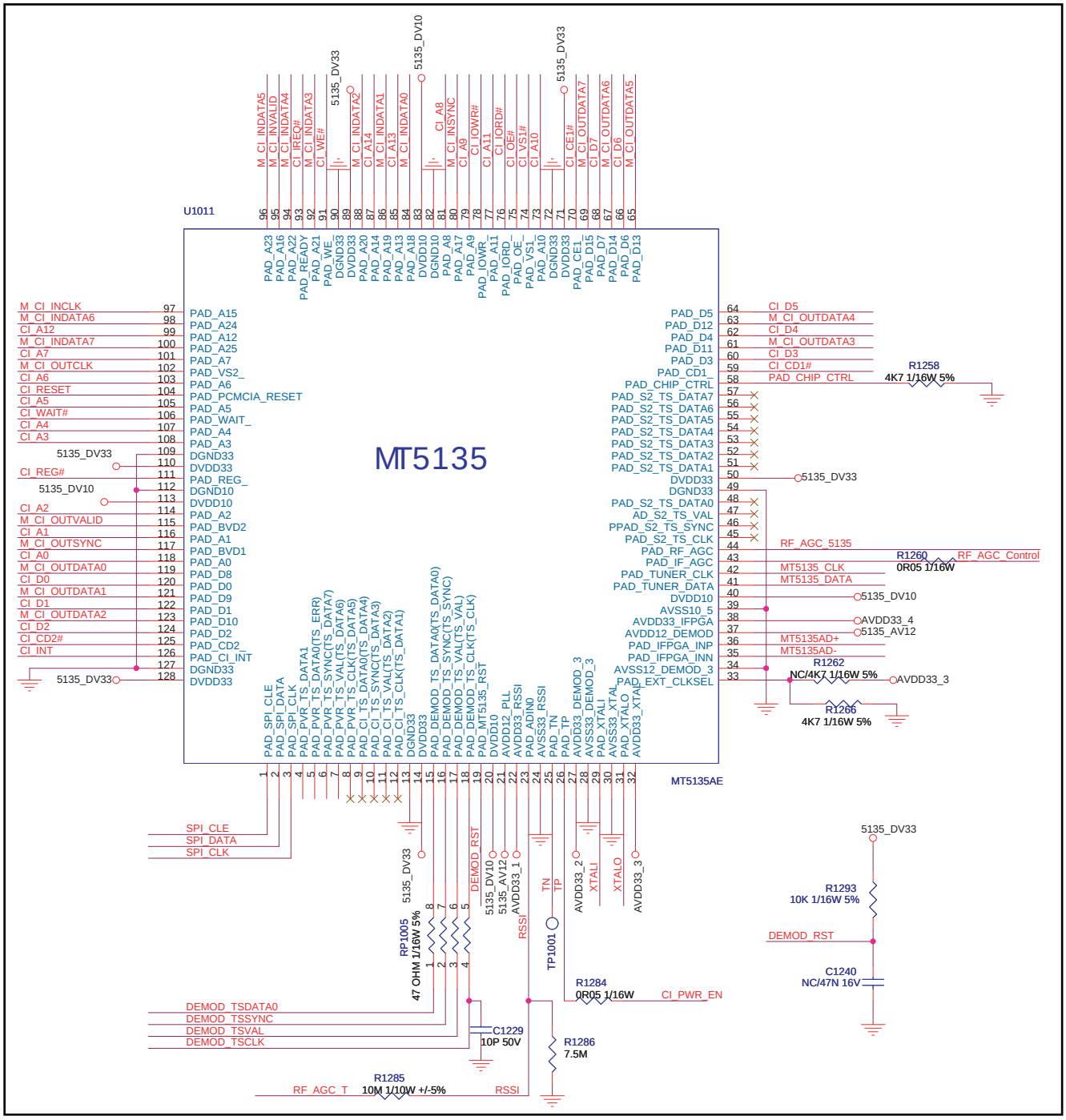

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Figure 7-15 Demodulator

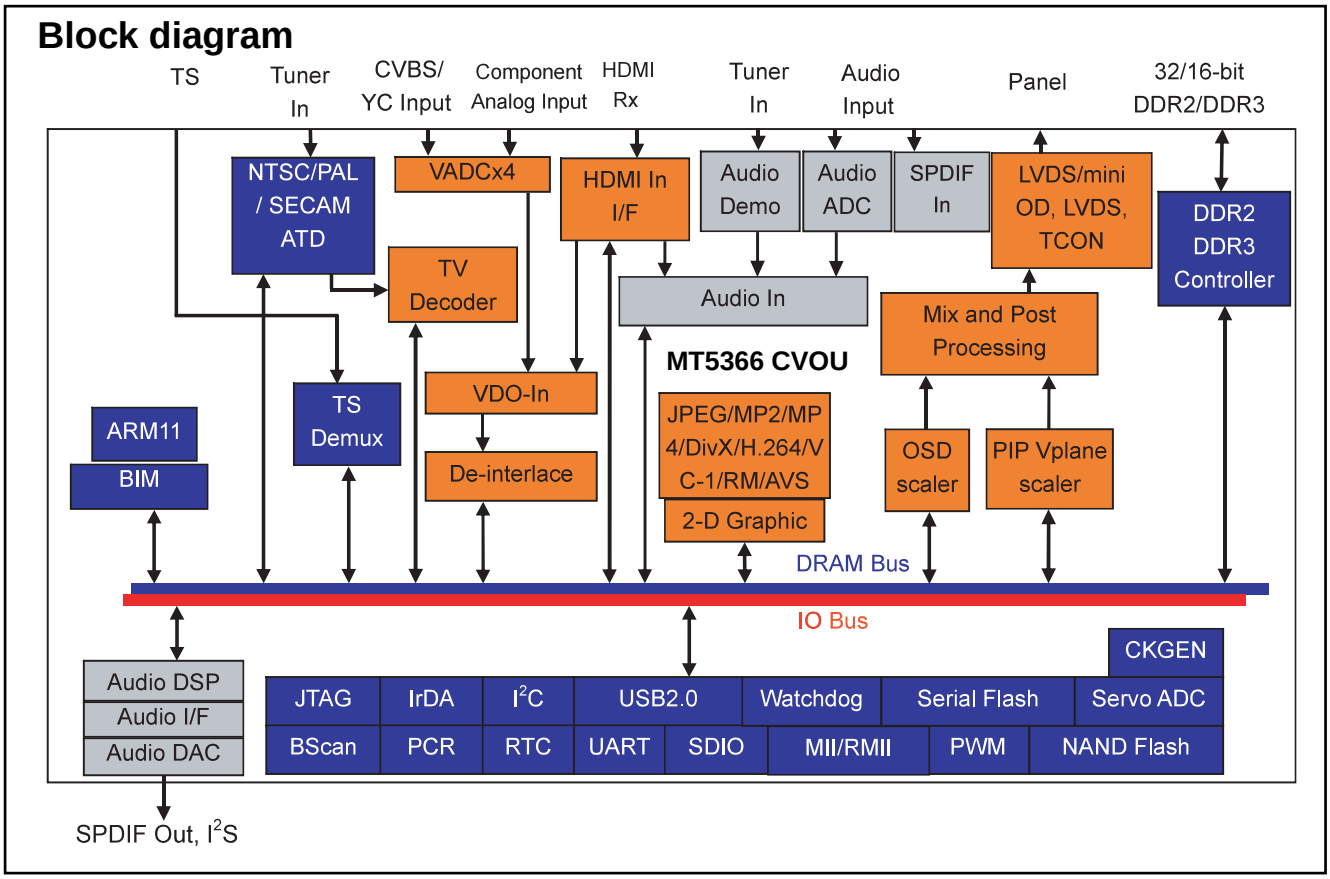
7.4.13 Tuner

The tuner covers all bands in VHF and UHF. It includes digital terrestrial (DVB-T), -cable (DVB-C), and analogue (PAL, Secam). The tuner is fully controlled via the I^2C bus for address selection, as well as broadcast system selection.

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 MT5366 cvou B03, MT5366CVOU LQFP-256 (IC U401)



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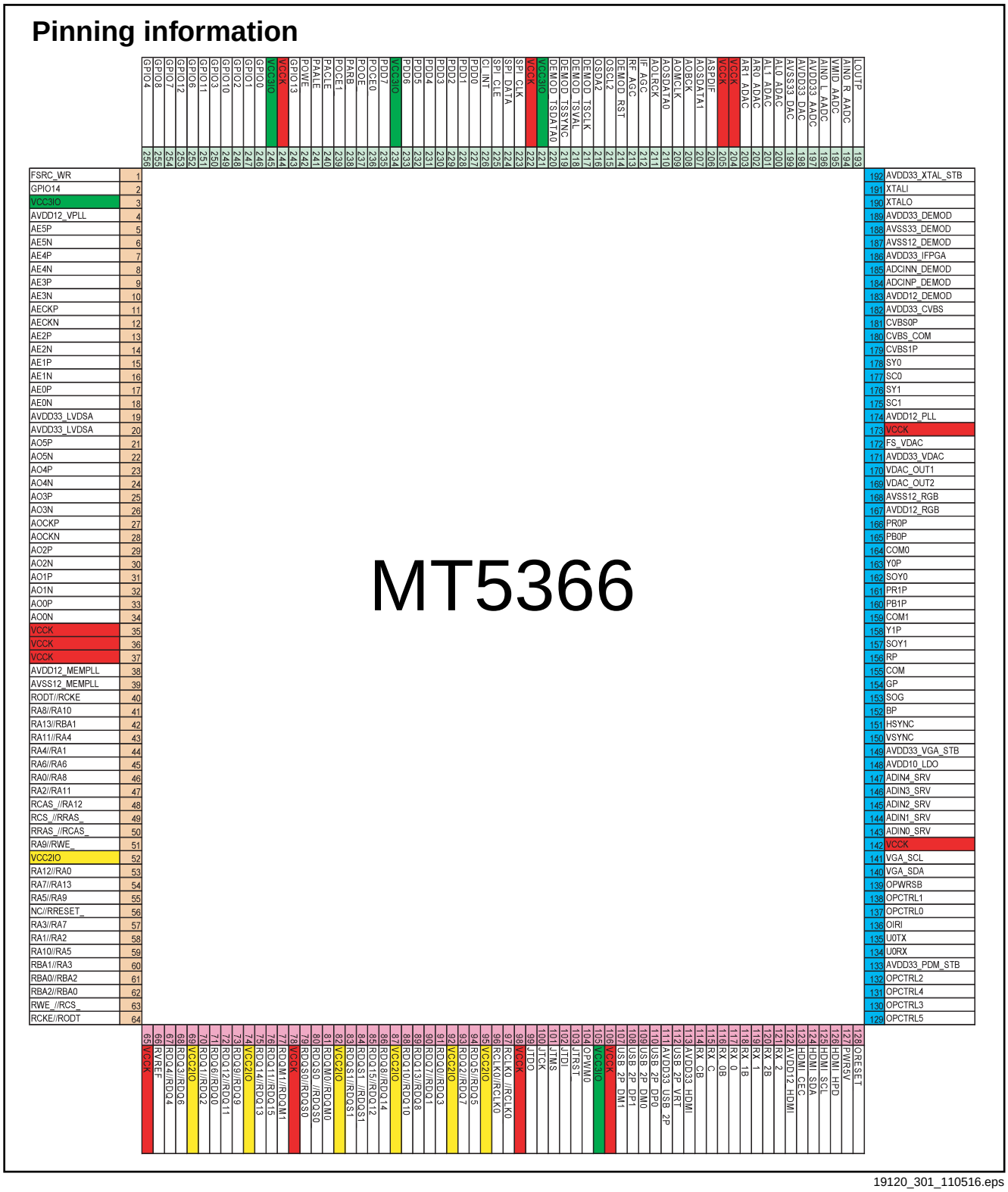
110526

Figure 8-1 Internal block diagram



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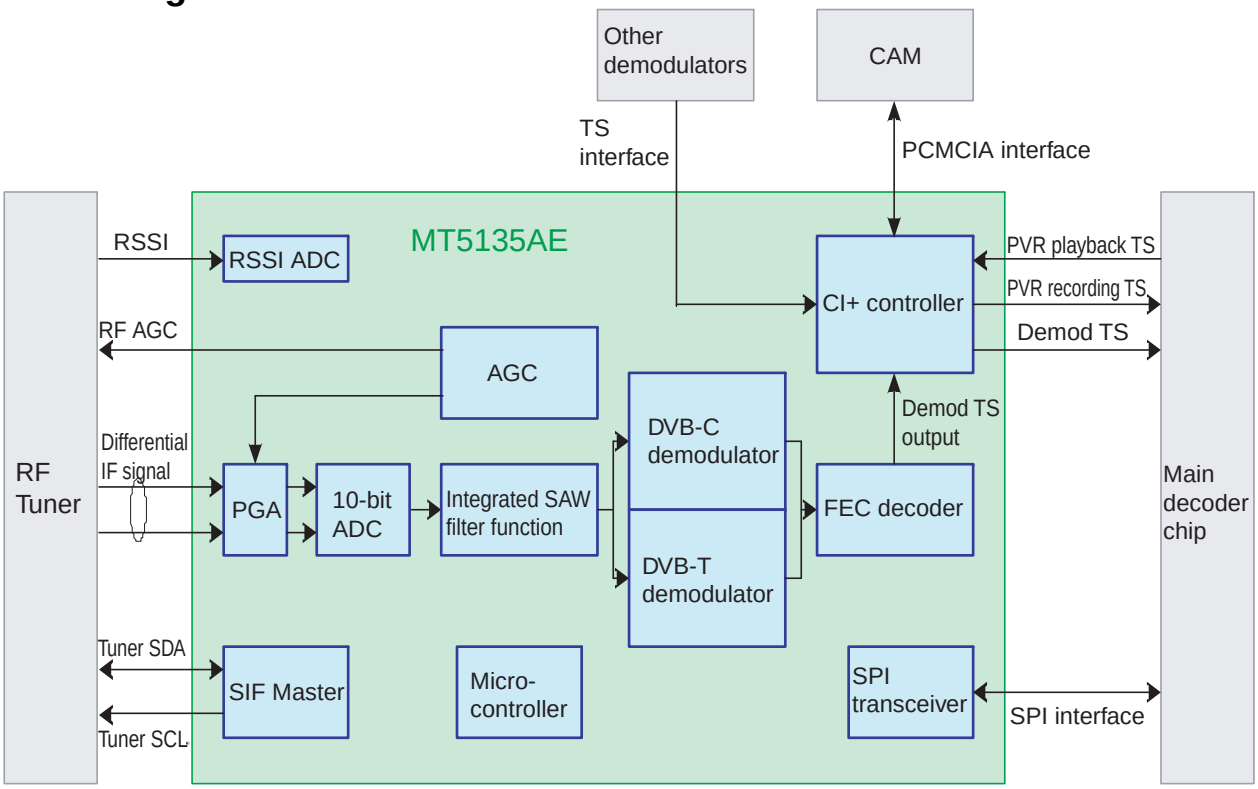
110524

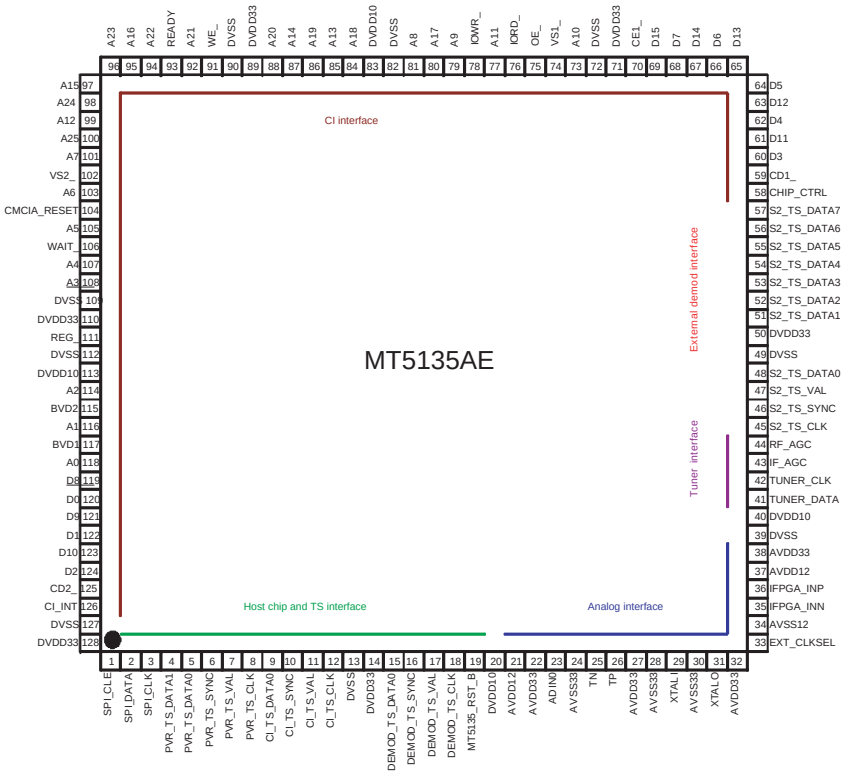
Figure 8-2 Pin configuration

8.2 Diagram DVB-T+C_DEMOD MT5135 / CI B10, MT5135AE/A LQFP-128 (IC U1011)

Block diagram



Pinning information

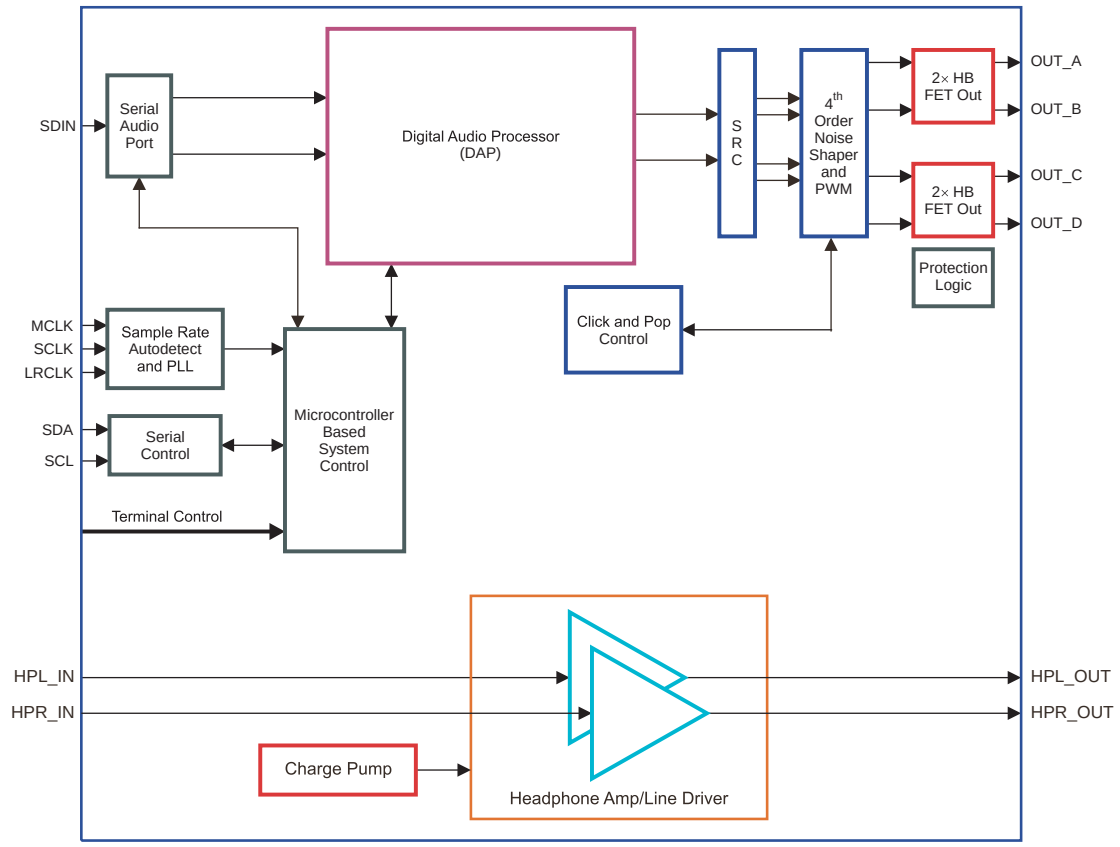


19080_303_110317.eps
110330

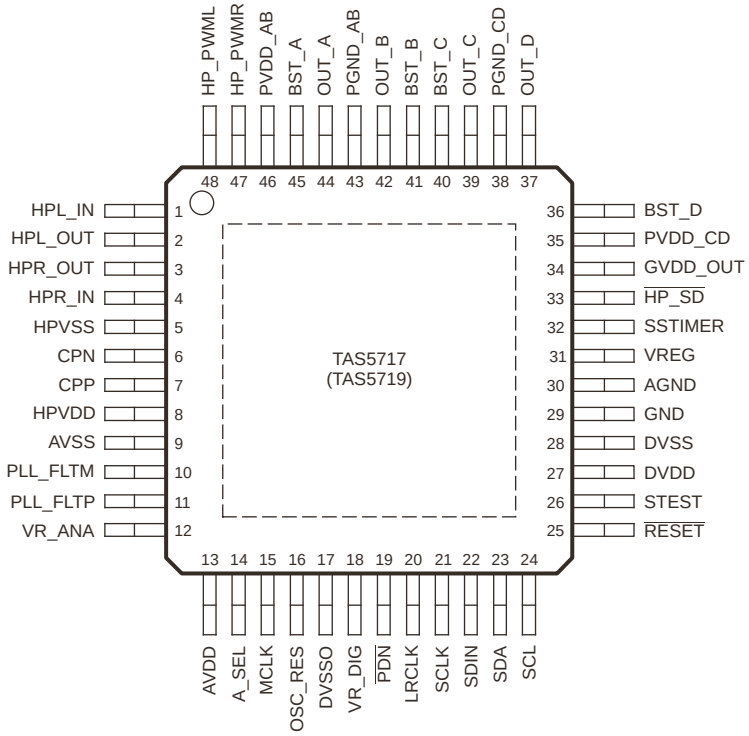
Figure 8-3 Internal block diagram and pin configuration

8.3 Diagram SPK AMP / HP AMP / AUD MUX B05, TAS5717 HTQFP-48 10W (IC U602)

Block diagram



Pinning information

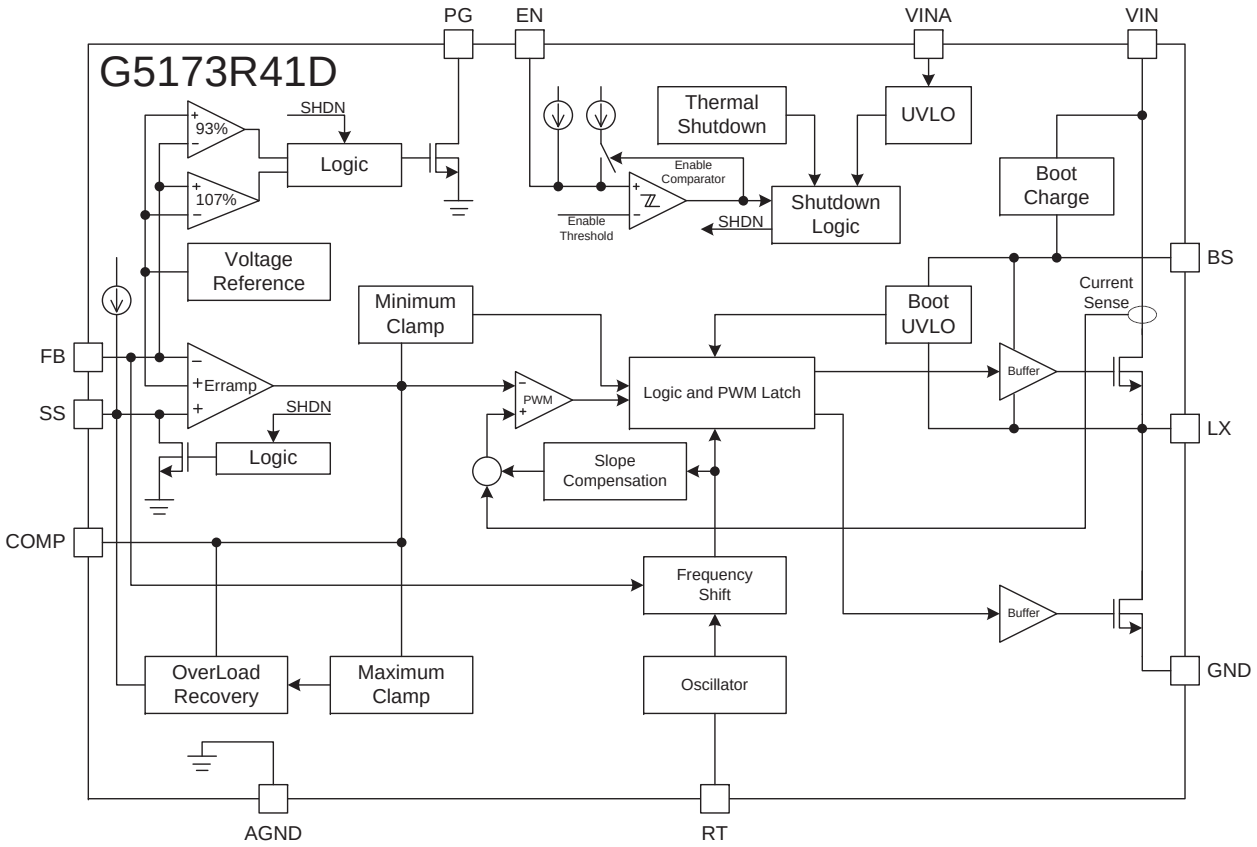


19120_302_110516.eps
110516

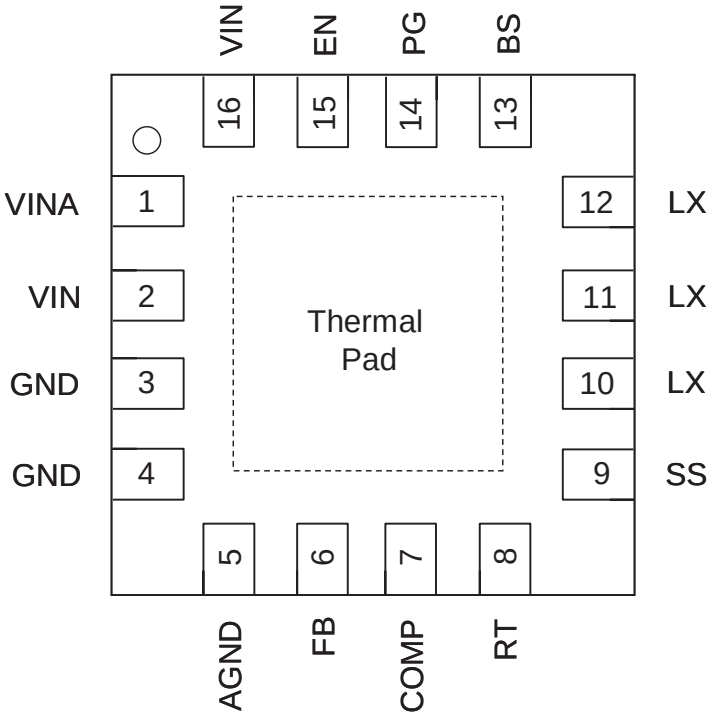
Figure 8-4 Internal block diagram and pin configuration

8.4 Diagram Power-1 B01, G5173R41D (IC U701)

Block diagram



Pinning information



19120_303_110517.eps
110524

Figure 8-5 Internal block diagram and pin configuration

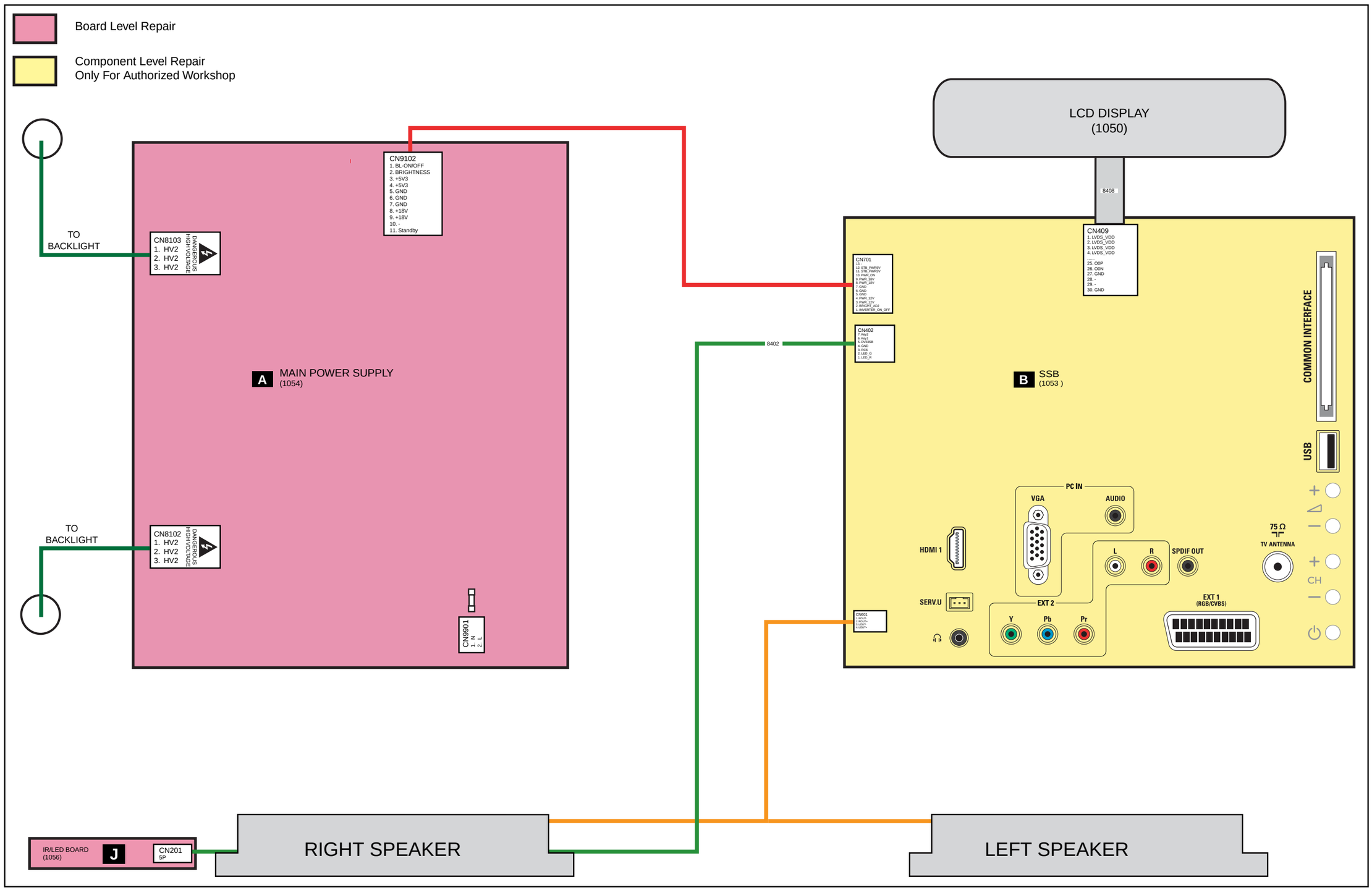
Personal Notes:

10000_012_090121.eps
090121

9. Block Diagrams

9-1 Wiring diagram 19"

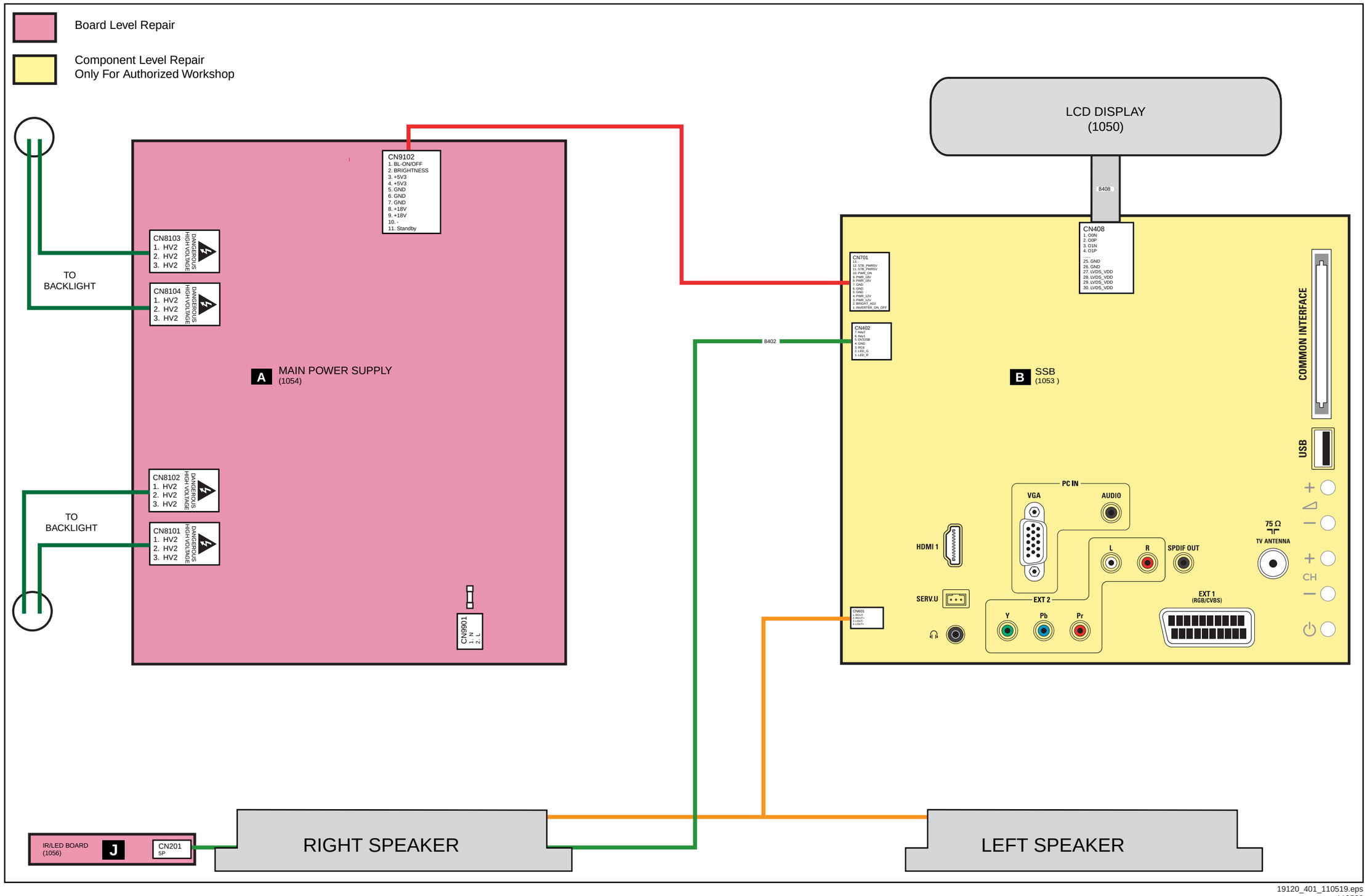
WIRING DIAGRAM 19" (Golden horse)



19120_400_110519.eps
110526

9-2 Wiring diagram 22"

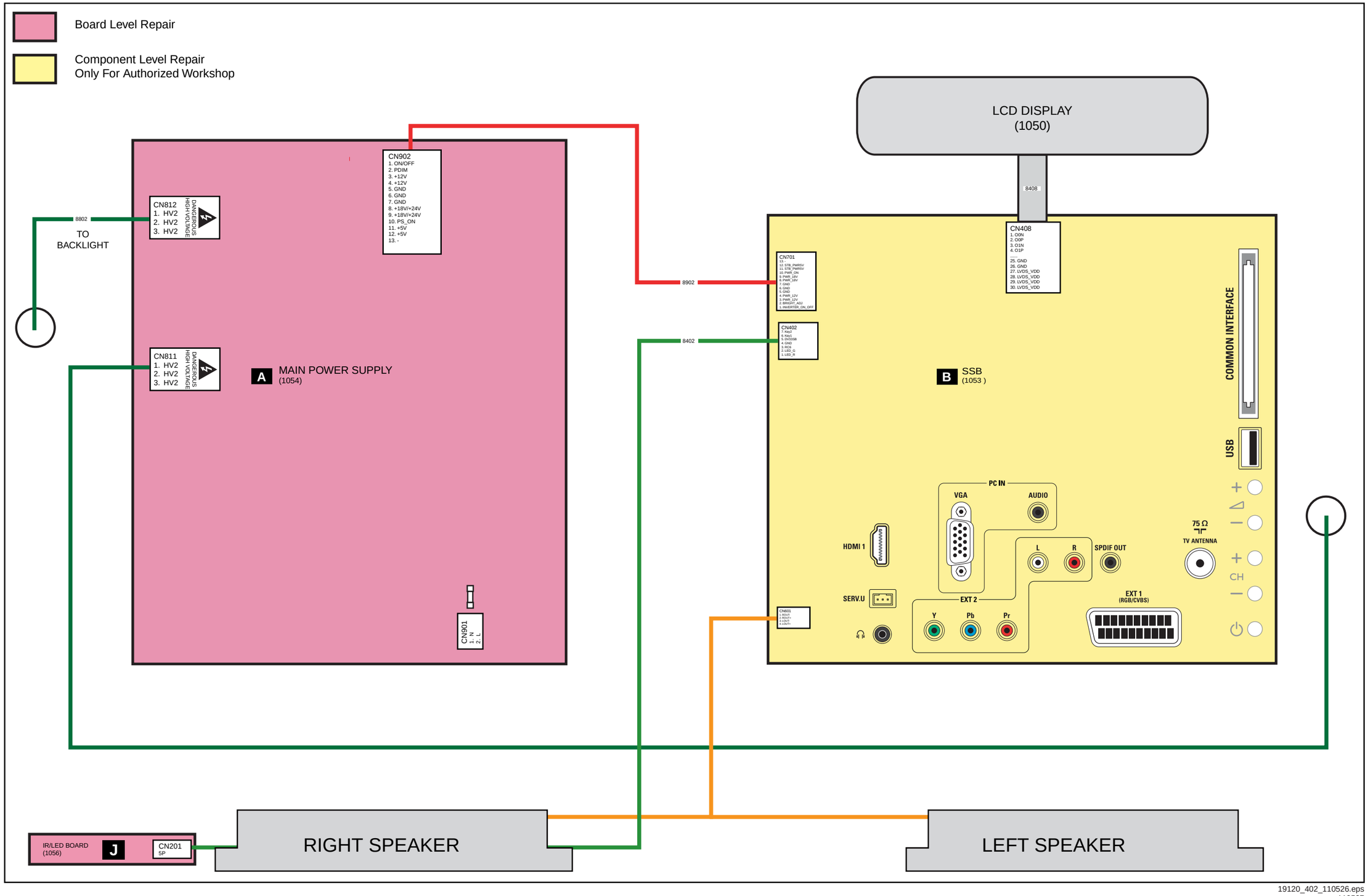
WIRING DIAGRAM 22" (Golden horse)



19120_401_110519.eps
110526

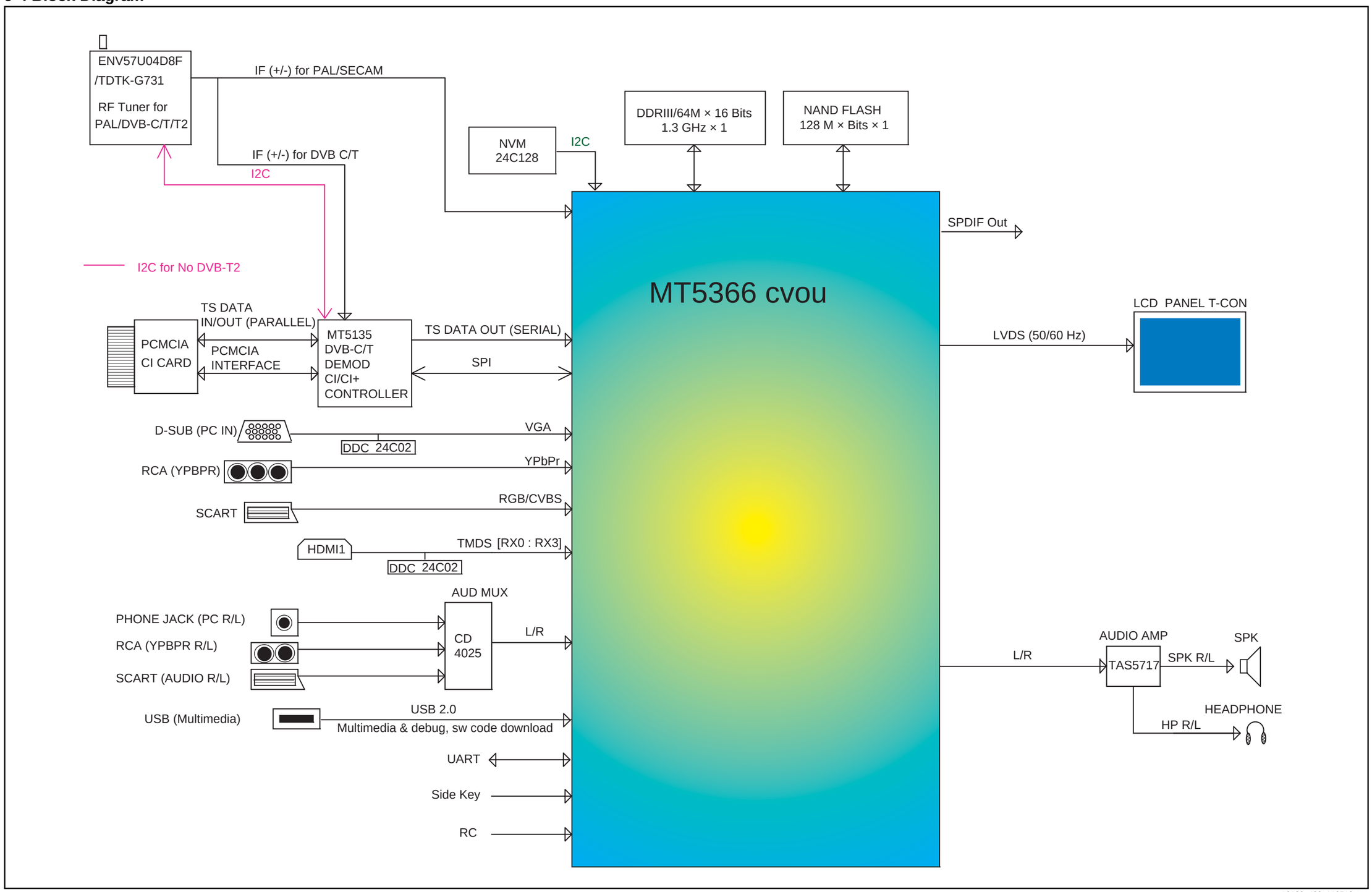
9-3 Wiring diagram 26"

WIRING DIAGRAM 26" (Golden horse)



19120_402_110526.eps
110527

9-4 Block Diagram

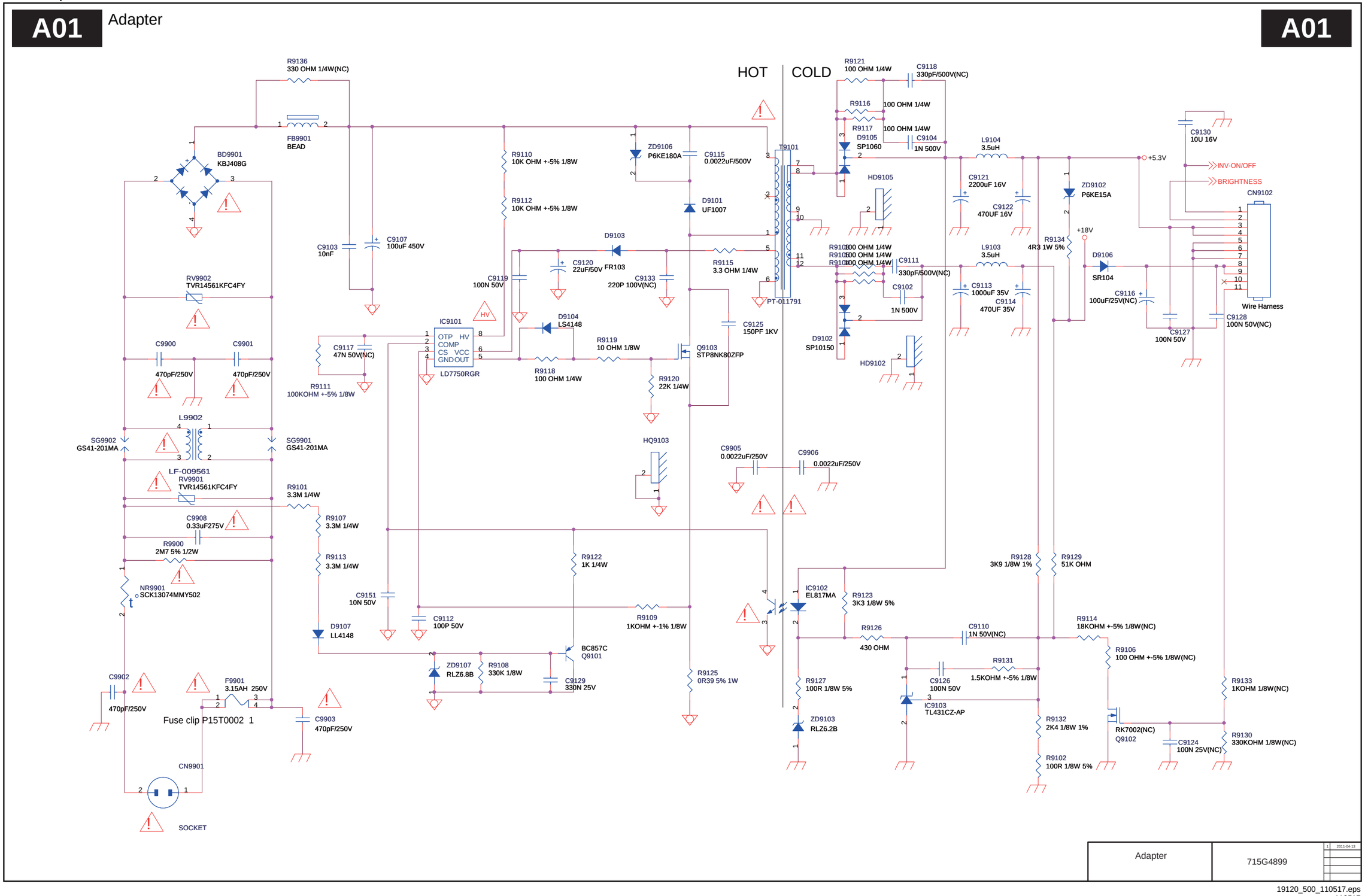


19120_403_110519.eps
110526

10. Circuit Diagrams and PWB Layouts

10-1 A01 715G4899 PSU 19" and 22"

Adapter

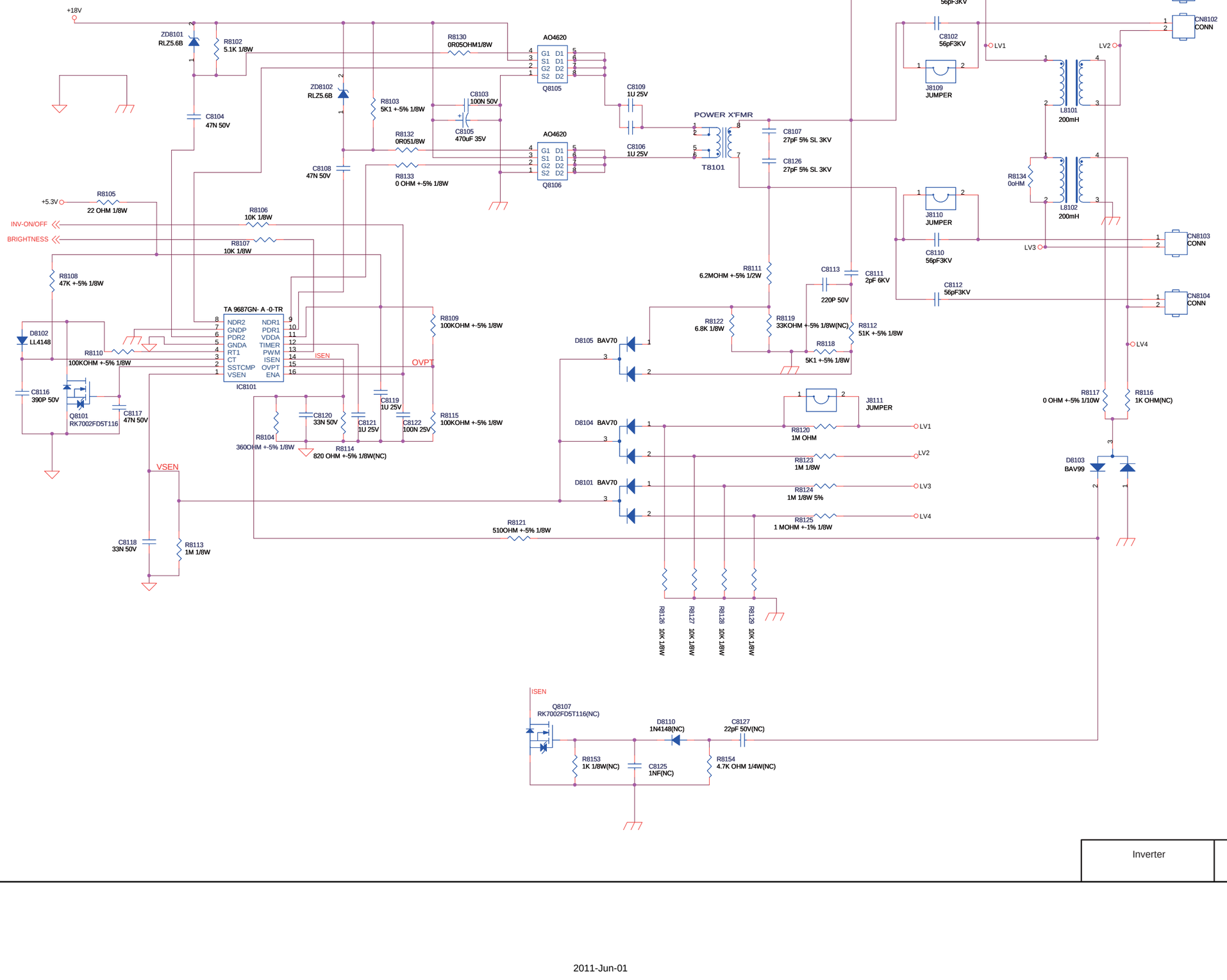


19120_500_110517.eps
110517

Inverter

A02 Inverter

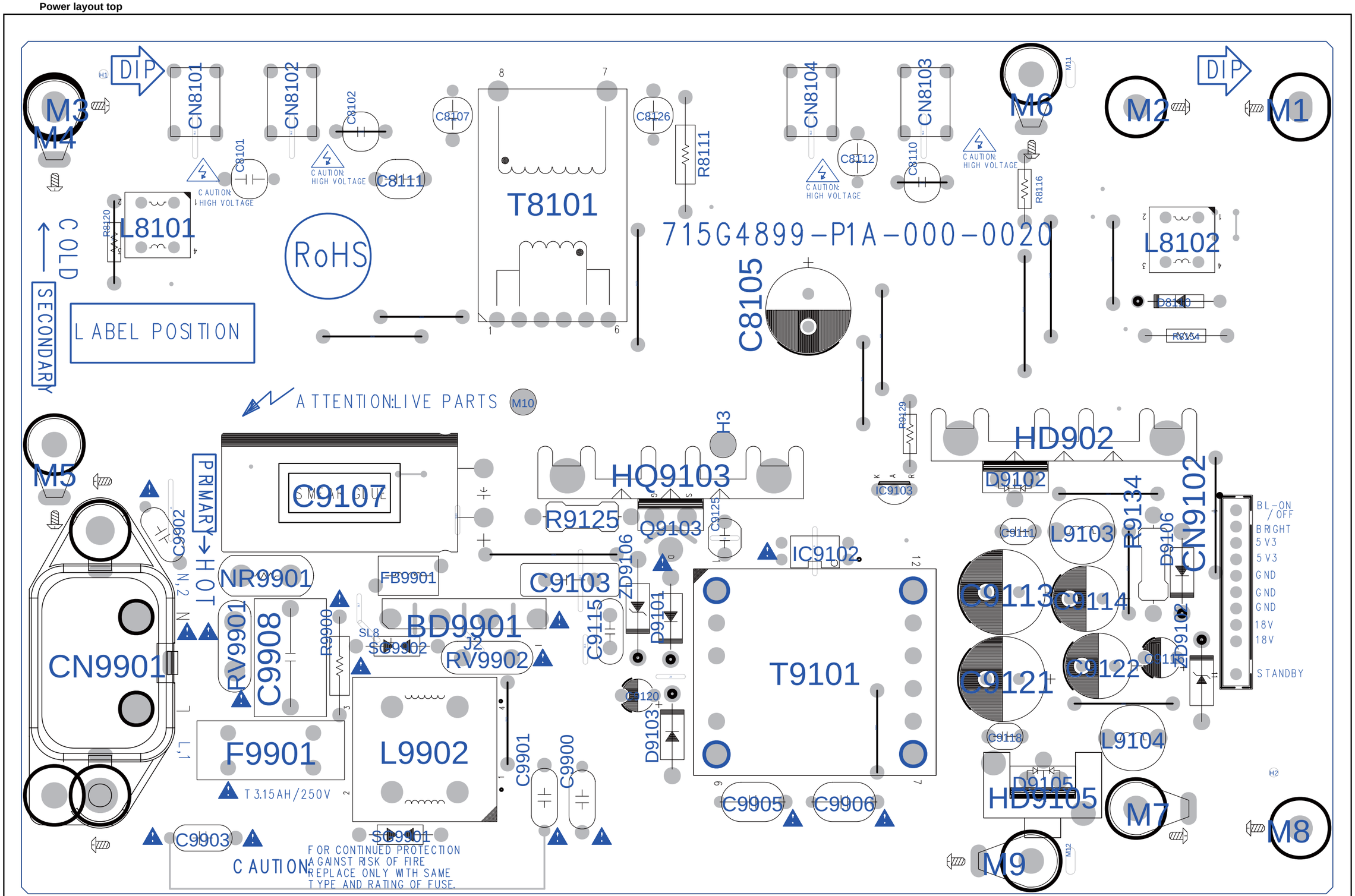
A02



Inverter	715G4899	1 2011-04-13

19120_501_110517.eps
110517

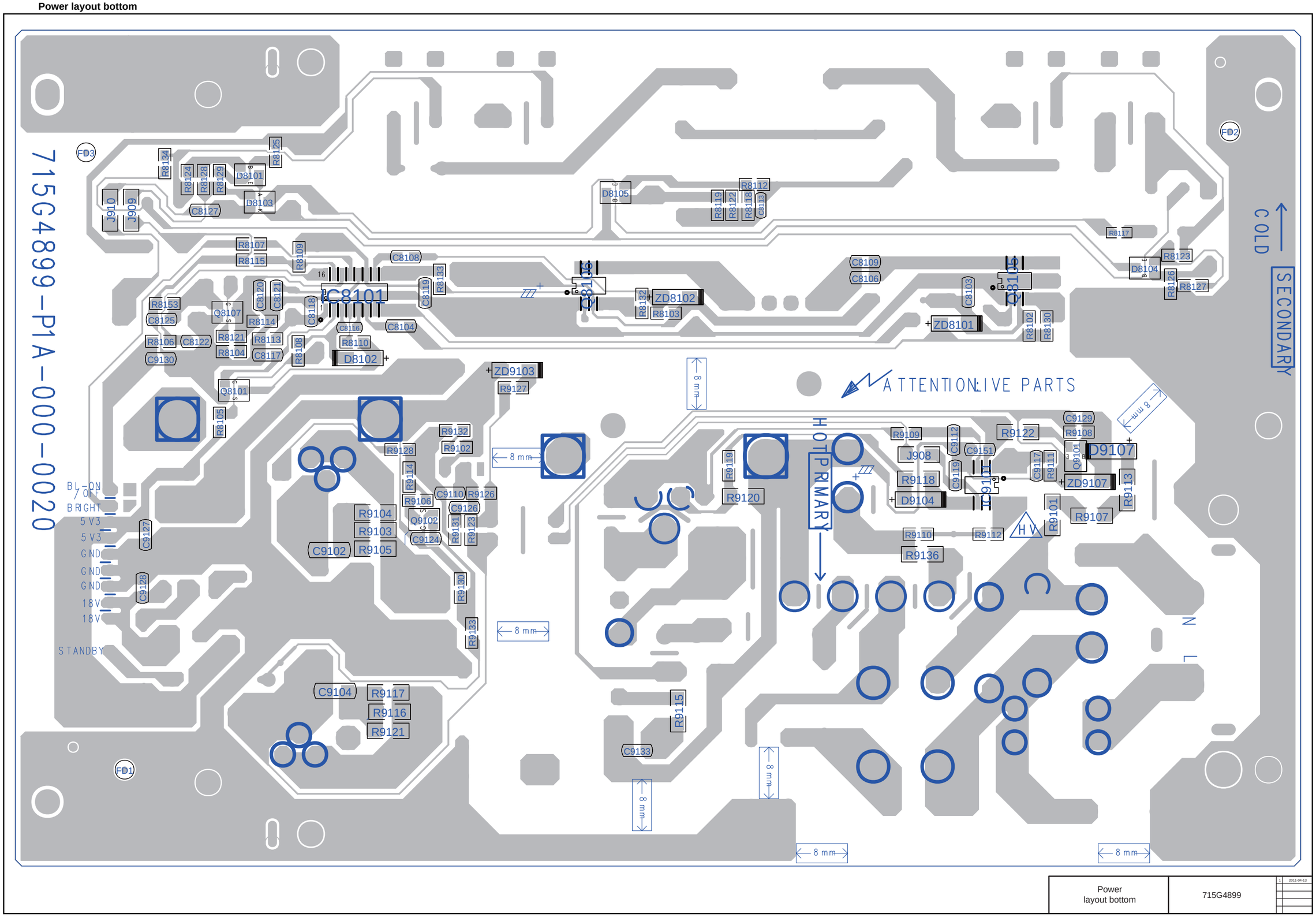
Power layout top



Power layout top	715G4899	1 2011-04-13

19120_502_110517.eps
110517

Power layout bottom



Power layout bottom	715G4899	1 2011-04-13

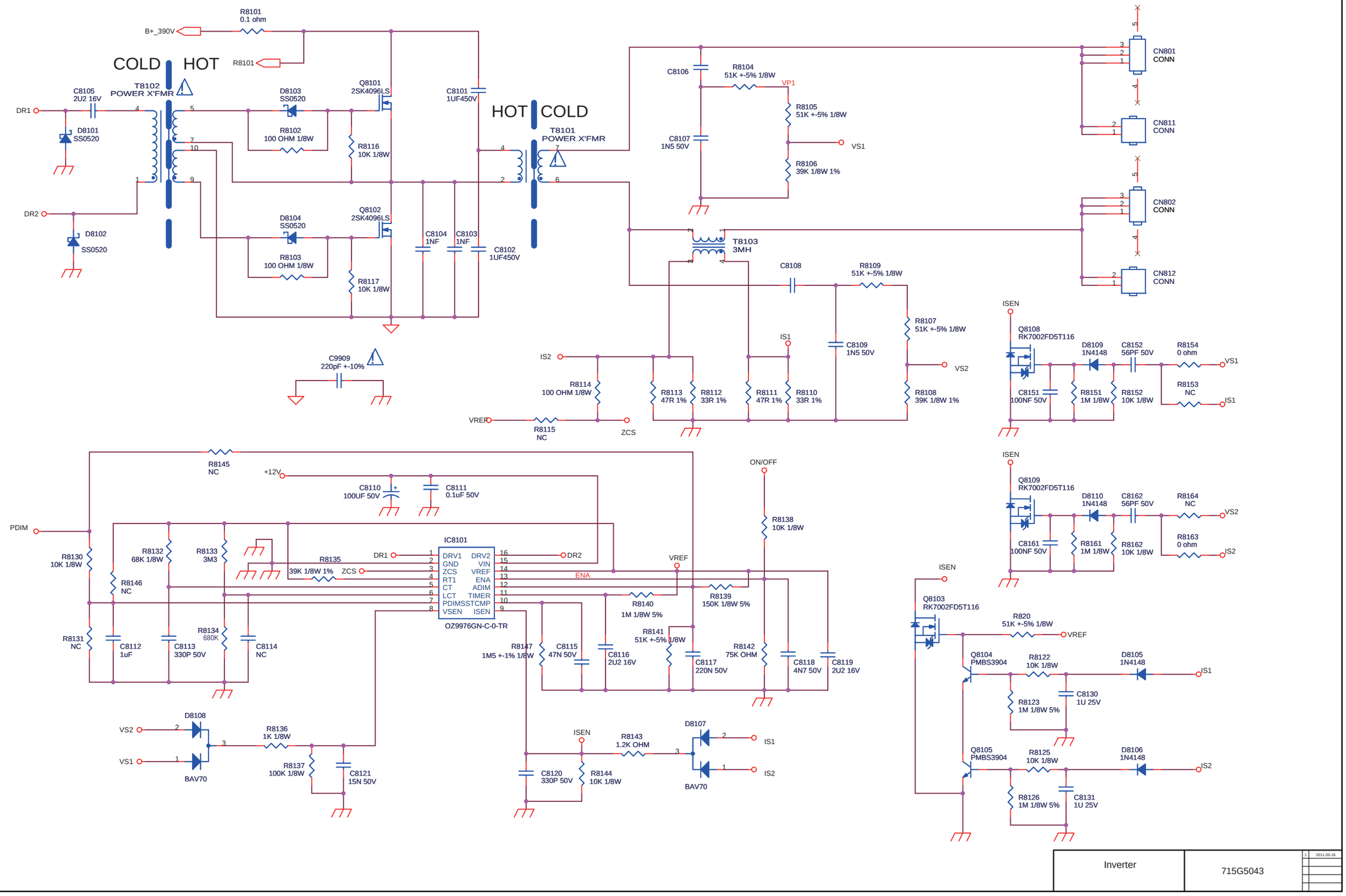
19120_503_110518.eps
110518

10-2 A01 715G5043 PSU 26"

Inverter

A01 Inverter

A01



19120_504_110518.eps
110518

A02 Power

A02

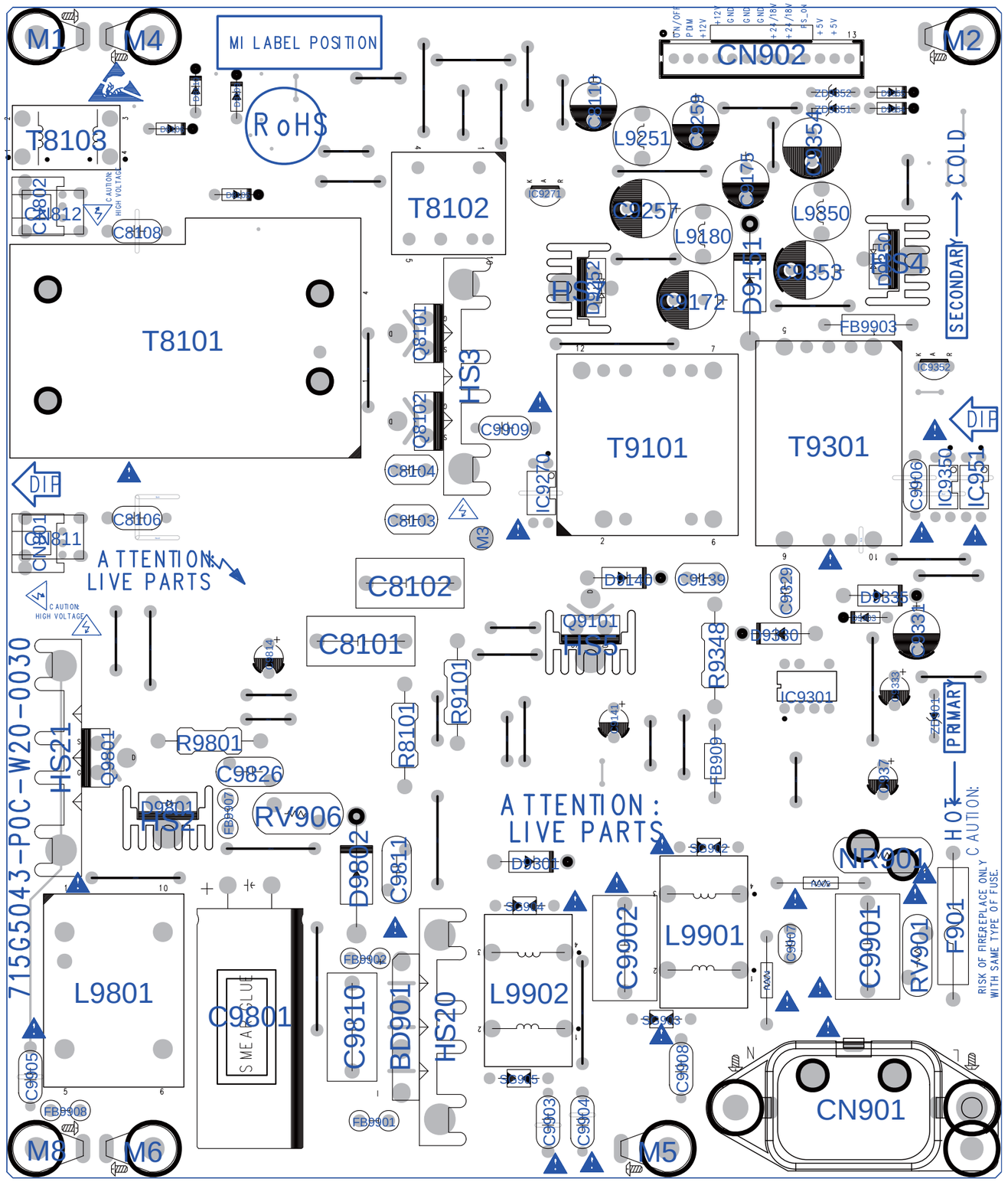
HOT COLD

BD901 S10B06G
FB9902 BEAD
FB9901 BEAD
C9810 1UF450V
D9802 IN5408G-04
L9801 300uH
D9801 FMN-1106S
FB9907 BEAD
C9826 10NF
B+_390V
RV906 NC
C9801 100uF M 450V
C9811 10NF
FB9909 BEAD
B+
R9348 0.1 ohm
C9329 1NF
R9305 100K 1/4W
R9303 100K 1/4W
R9306 100K 1/4W
R9304 100K 1/4W
D9330 PR1007
T9301 POWER XFMR
R9350 100OHM 1/4W
R9351 100OHM 1/4W
C9350 0.001uF
C9351 0.001uF
+5VS
D9350 MBRF1560CT
C9353 330uF 16V
L9350 3.5uH
+5V 2.5A
C9354 470uF 16V
C9374 0.1uF 50V
SG905 GS41-201MA
L9902 13mH
SG904 GS41-201MA
C9902 0.47uF 305V
C9903 220pF +-10%
C9904 220pF +-10%
SG903 GS41-201MA
L9901 13mH
SG902 GS41-201MA
D9301 PR1007
C9901 0.47uF 305V
R901 NC
R903 NC
R902 NC
R904 390K
IC901 CAP004DG
R905 390K
C9907 47pF
NR901
RV901 Varistor
F901 FUSE 3.15A H, 250V AC.
CN901
SOCKET
C9908 470pF/250V
FB9908 BEAD
C9905 220pF +-10%
C9906 470pF/250V
FB9903 BEAD
R9807 NC
R9808 10K 1/8W
D9805 SS0520
R9803 10 OHM 1/8W
R9804 22 OHM 1/8W
Q9801 2SK4087LS
IC9801 LD7591GS
Vcc_1
C9814 22uF/50V
C9813 0.1uF 50V
R9805 10K 1/8W
C9812 56PF 50V
R9809 1K 1/8W
R9806 470 OHM 1/8W
C9815 220P 50V
R9801 0.2OHM2W
R9810 36K 1/8W +/-5%
C9816 NC
R9811 10K 1/8W
C9817 100N 50V
C9818 0.47UF 50V
C9819 100P 50V
R9825 NC
R9824 19K1 +-1% 1/8W
R9821 1MOHM +-1% 1/4W
R9822 1MOHM +-1% 1/4W
R9823 1MOHM +-1% 1/4W
R9310 1M5 1/4W 1%
R9311 1M5 1/4W 1%
R9312 1M5 1/4W 1%
C9318 0.47UF 50V
R9307 560K 1/8W
FB_1
R9337 4.7 MOHM +-5% 1/4W
IC9301 A6069H
FB/OLP VCC
GND
BR D/ST
S/OCP D/ST
D9303 1N4148
Vcc
D9335 PR1007
R9331 2.4 OHM 1/4W
C9307 0.1uF 50V
C9309 4N7 50V
R9301 2.4 OHM 1/4W
R9302 2.4 OHM 1/4W
C9333 22uF/50V
C9308 0.1uF 50V
C9331 100UF 50V
IC9350 PC123X8YFZOF
R9354 220R 1/8W 5%
R9355 1K 1/8W
C9355 220N 50V
R9356 1K 1/8W
IC9352 AS431AZTR-E1
R9357 2K4 1/8W 1%
R9359 NC
R9358 2K2 1/8W 1%
+12V
+18V/+24V
ZD9351 MTZJ T-72 16B
ZD9352 MTZJ T-72 30B
D9354 1N4148
D9355 1N4148
R9383 1K 1/8W
R9381 1K 1/8W
R9382 10K 1/8W
C9378 0.1uF 50V
Q9370 PMBS3904
Vcc_1
Q921 2SD1624T-TD-E
R939 10K 1/8W
C937 10uF/50V
R960 1K 1/8W
IC951 PC123X8YFZOF
ZD901 MTZJ T-72 16B
Q950 PMBS3904
R961 1K 1/8W
PS_ON
C956 0.1uF 50V
R963 10K 1/8W
R9170 100OHM 1/4W
R9171 100OHM 1/4W
C9170 0.001uF
C9171 0.001uF
D9151 SR510-22
T9101 POWER X'FMR
L9180 3.5uH
+18V/+24V 1.33A/1.0A
C9172 470uF 35V
C9175 100UF 50V
R9168
R9169
R9165
R9166
C9179 0.1uF 50V
B+
C9139 1NF
R9111 100K 1/4W
R9113 100K 1/4W
R9112 100K 1/4W
R9114 100K 1/4W
D9140 PR1007
D9252 FCHS30A08
L9251 3.5uH
+12V 1A
C9259 100UF 50V
R9272
R9273
C9277 0.1uF 50V
R9253
R9252
C9260 C9261
C9257 470uF 35V
CN902
ON/OFF
PDIM
+12V
+18V/+24V
PS_ON
+5V
CONN
B+_
R9124 1M5 1/4W 1%
R9125 1M5 1/4W 1%
R9126 1M5 1/4W 1%
FB
IC9101 LD7523GS
BNO OVP
COMP VCC
NC OUT
CS GND
Vcc_1
D9106 SS0520
R9133 10 OHM 1/8W
R9143 22 OHM 1/8W
Q9101 2SK4101LS-MG5/FS
R9128 24KOHM +-1% 1/8W
C9143 0.1uF 50V
C9120 10N 50V
C9142 0.1uF 50V
C9141 10uF/50V
R9134 1K 1/8W
R9144 10K 1/4W
R9145 470 OHM 1/8W
C9144 220P 50V
R9101 0.43 OHM +-5% 2WS
IC9270 PC123X8YFZOF
R9274 1K 1/4W
R9275 3.9K 1/8W
C9276 330NF 50V
R9276 10K 1/8W
IC9271 AS431AZTR-E1
R9278 22KOHM 1/8W +-1%
R9287 20K 1/8W 1%
R9280 2KOHM +-1% 1/8W
R9279 NC
HS1 HEAT SINK
HS5 HEAT SINK
HS21 HEAT SINK
HS20 HEAT SINK

Power	715G5043	1 2011-05-16

19120_505_110518.eps
110518

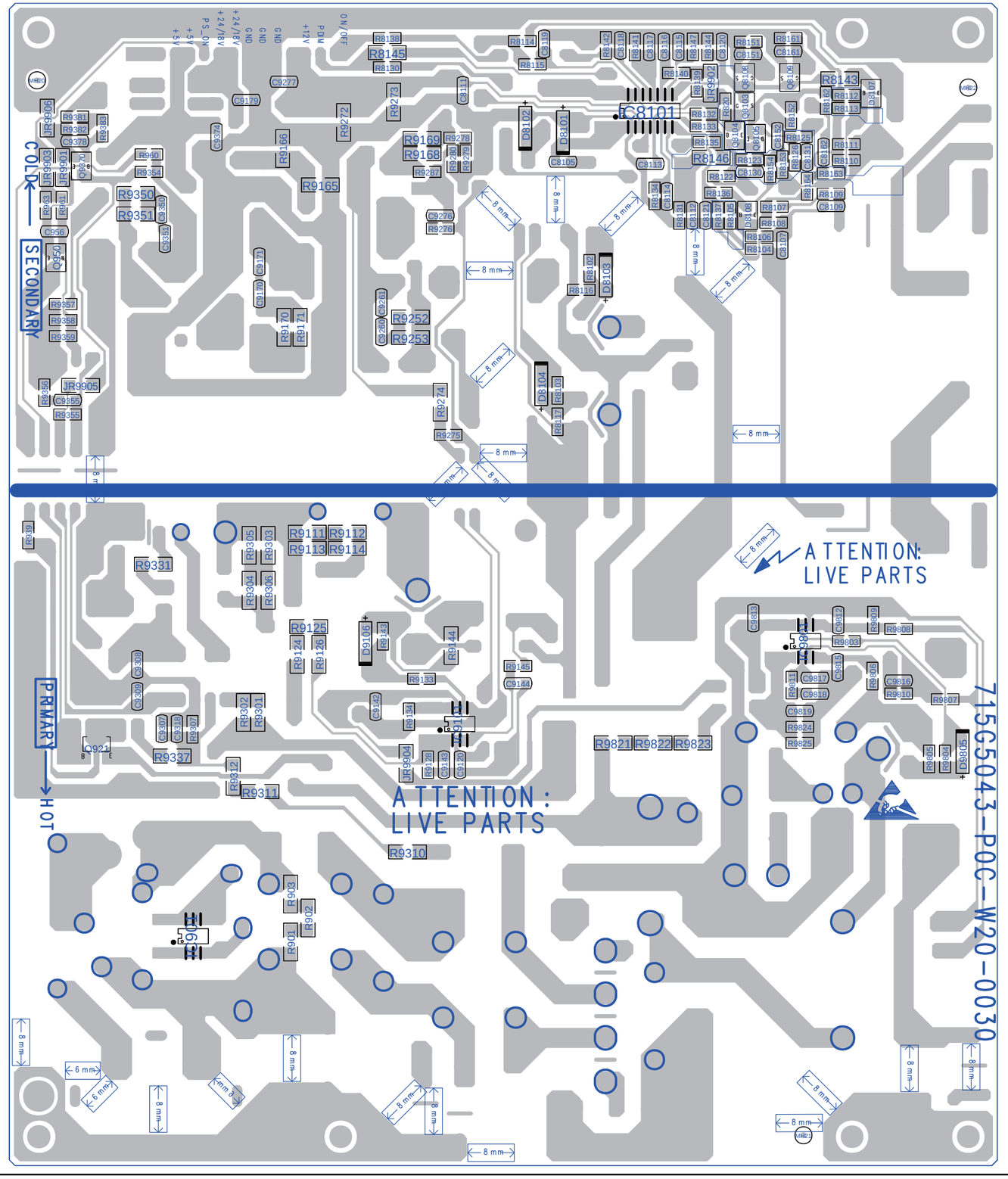
Power layout top



Power layout top	715G5043	1 2011-05-03

19120_506_110518.eps
110518

Power layout bottom



Power layout bottom	715G5043	2011-05-03

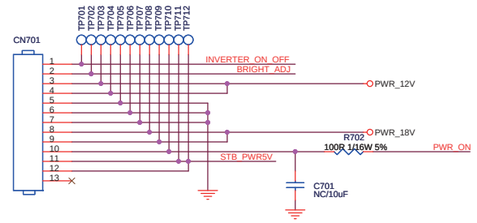
19120_507_110518.eps
110518

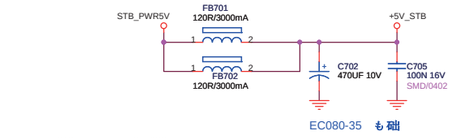
10-3 B 715G4796 SSB
Power-1

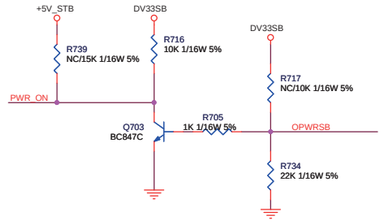
B01 Power-1

B01

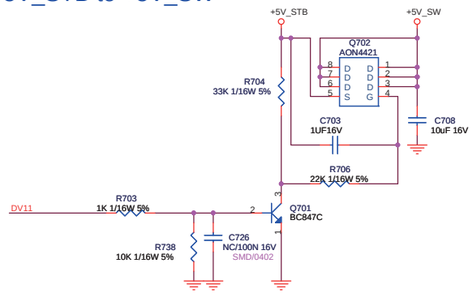
DC POWER INPUT

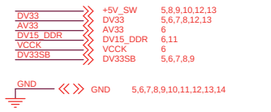




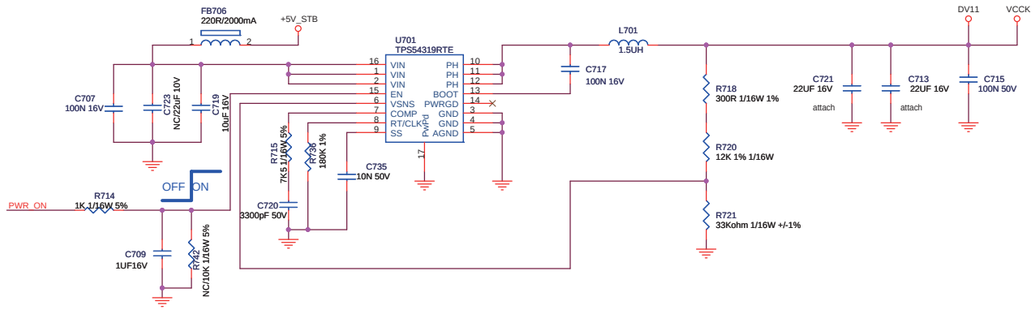


+5V_STB to +5V_SW

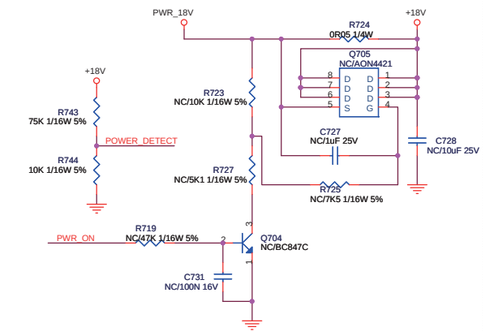




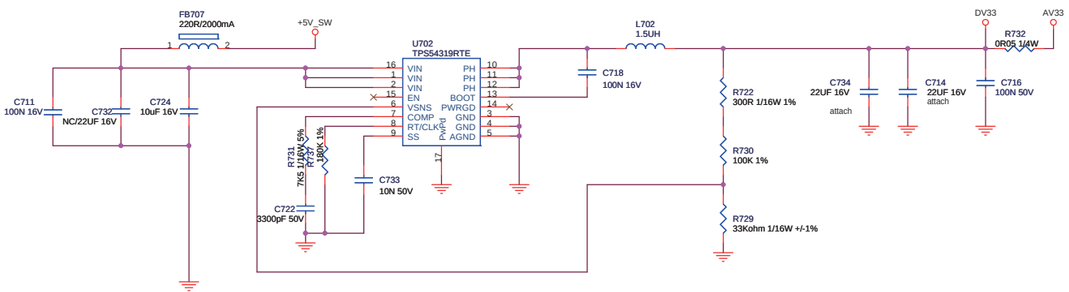
+5V_STB to DV11/VCCK



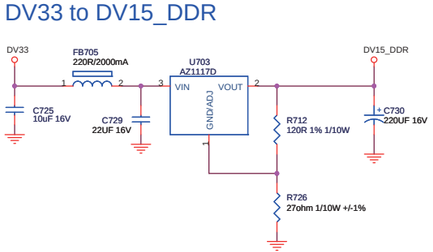
PWR_18V to +18V control by PWR_ON



+5V_SW to DV33/AV33



DV33 to DV15_DDR



Power-1	715G4796	1 2011-05-17

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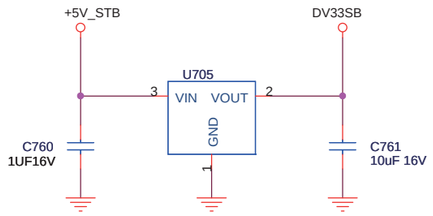
110518

Power-2

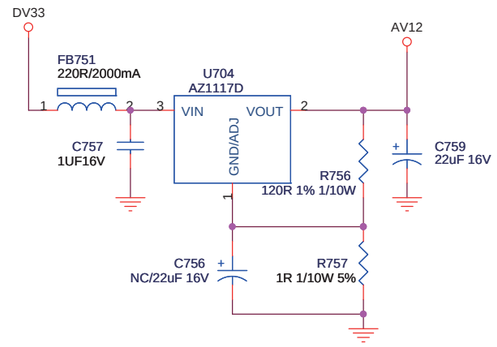
B02 Power-2

B02

+5V_STB to DV33SB



DV33 to AV12



PWR_12V ⟩⟩ PWR_12V 4

+5V_STB ⟩⟩ +5V_STB 4,7
+5V_SW ⟩⟩ +5V_SW 4,8,9,10,12,13
+5V_TUNER ⟩⟩ +5V_TUNER 14
DV33 ⟩⟩ DV33 4,6,7,8,12,13

DV33SB ⟩⟩ DV33SB 4,6,7,8,9
AV12 ⟩⟩ AV12 6,13

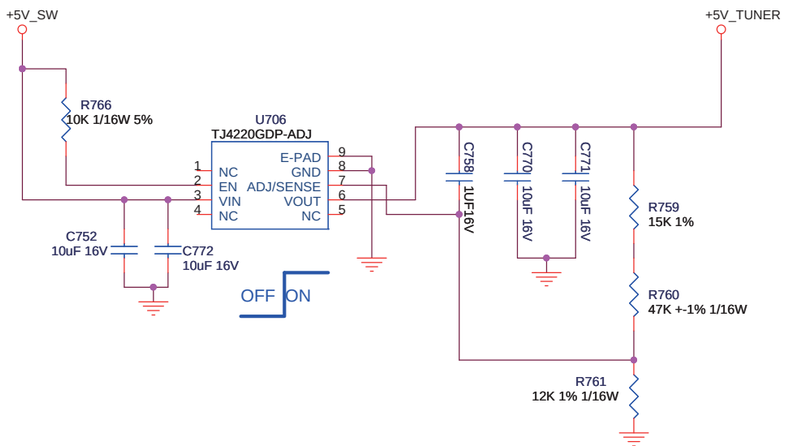
PANEL_VCC ⟩⟩ PANEL_VCC 12

GND ⟩⟩ GND 4,6,7,8,9,10,11,12,13,14

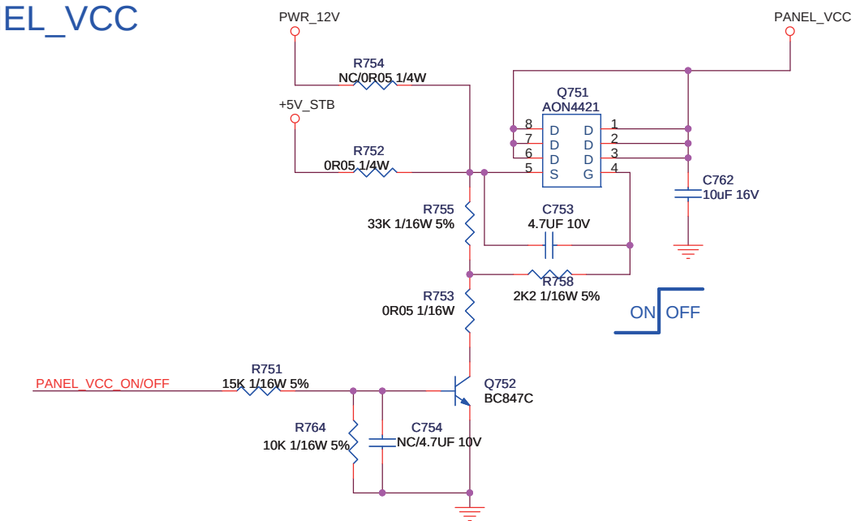
GPIO Contrl

PANEL_VCC_ON/OFF ⟩⟩ PANEL_VCC_ON/OFF 6

+5V_SW to +5V_TUNER



PANEL_VCC



Power-2	715G4796	1 2011-05-17

19120_509_110518.eps
110518

MT5366 cvou

B03 MT5366 cvou B03

MT5366CVOU

QFP256

3.3V IO Power

DV33 — C4200 4.7UF 10V, C4154 100N 16V, C4151 100N 16V, C4202 100N 16V, C4170 100N 16V, C4162 100N 16V

Analog Normal Power

AV12 — R4157 0R05 1/16W — AVDD12_PLL — C4190 100N 16V
AV12 — R4152 0R05 1/16W — AVDD12_VPLL — C4198 100N 16V — C4177 NC/100N 16V
AV12 — R4173 0R05 1/16W — AVDD12_MEMPLL — C4153 100N 16V
AV33 — R4155 0R05 1/16W — AVDD33_HDMI — C4195 100N 16V
AV12 — R4153 0R05 1/16W — AVDD12_HDMI — C4194 100N 16V
AV12 — R4161 0R05 1/16W — AVDD12_RGB — C4188 100N 16V
AV33 — R4162 0R05 1/16W — AVDD33_CVBS — C4181 100N 16V
AV33 — R4165 0R05 1/16W — AVDD33_VDAC — C4184 100N 16V

AV33 — R4151 47R 1/16W 5% — AVDD33_DAC — C1196 330UF 6.3V — C4201 100N 16V
AV33 — R4150 0R05 1/16W — AVDD33_AADC — C4199 100N 16V
AV33 — R4159 0R05 1/16W — AVDD33_DEMOD — C4182 100N 16V
AV33 — R4160 0R05 1/16W — AVDD33_IFPGA — C4183 100N 16V
AV12 — R4158 0R05 1/16W — AVDD12_DEMOD — C4178 100N 16V
AV33 — R4156 0R05 1/16W — AVDD33_USB_2P — C4193 100N 16V
AV33 — R4154 0R05 1/16W — AVDD33_LVDSTX — C4164 NC/100N 16V — C4197 100N 16V

DDRV — DV15_DDR — OPWRSB — DV33 — DV33SB — AV33 — AV12 — VCCK
DV15_DDR 4,11 | OPWRSB 4 | DV33 4,5,7,8,12,13 | DV33SB 4,5,7,8,9 | AV33 4 | AV12 5,13 | VCCK 4
GND 4,5,7,8,9,10,11,12,13,14

Standby Power

DV33SB — R4163 0R05 1/16W — AVDD33_XTAL_STB — C4172 10uF — C4189 100N 16V
DV33SB — R4164 0R05 1/16W — AVDD33_REG_STB — C4187 100N 16V
DV33SB — R4166 0R05 1/16W — AVDD33_PDM_STB — C4171 100N 16V

R4169 10K 1/16W 5% — MRF_AGC — RF_AGC_H — C4173 47N16V
R4183 NC/0R05 1/16W — AOMCLK_A — C4204 NC/22P 50V
R4175 0R05 1/16W — 5135_REFCLKP — VMID_AADC — C4167 1UF16V — C4168 100N 16V
R4177 1K 1/16W 5% — GPIO_10
R4167 4K7 1/16W 5%
R4168 560R 1/16W 1%
R4170 1Kohm 1/16W +/-1%
R4172 1Kohm 1/16W +/-1%
R4171 5.1K 1% — R4174 10K 1/16W 5% — R4176 1K 1/16W 5% — PWR5V
R4178 1.3K 1% — C4161 4.7UF 10V
R4179 4K7 1/16W 5% — R4180 4K7 1/16W 5% — R4181 10K 1/16W 5% — R4182 10K 1/16W 5%

U401

1	FSRC_WR	192	AVDD33_XTAL_STB
2	GPIO14	191	XTALI
3	VCC3IO	190	XTALO
4	AVDD12_VPLL	189	AVDD33_DEMOD
5	AE5P	188	AVSS33_DEMOD
6	AE5N	187	AVSS12_DEMOD
7	AE4P	186	AVDD33_IFPGA
8	AE4N	185	ADCINN_DEMOD
9	AE3P	184	ADCINP_DEMOD
10	AE3N	183	AVDD12_DEMOD
11	AECKP	182	AVDD33_CVBS
12	AECKN	181	CVBS1P
13	AE2P	180	CVBS_COM
14	AE2N	179	CVBS1P
15	AE1P	178	SY0
16	AE1N	177	SC0
17	AE0P	176	SY1
18	AE0N	175	SC1
19	AVDD33_LVDSA	174	AVDD12_PLL
20	AVDD33_LVDSA	173	VCCK
21	AO5P	172	FS_VDAC
22	AO5N	171	AVDD33_VDAC
23	AO4P	170	VDAC_OUT1
24	AO4N	169	VDAC_OUT2
25	AO3P	168	AVSS12_RGB
26	AO3N	167	AVDD12_RGB
27	AOCKP	166	PR0P
28	AOCKN	165	PB0P
29	AO2P	164	COM0
30	AO2N	163	Y0P
31	AO1P	162	SOY0
32	AO1N	161	PR1P
33	AO0P	160	PB1P
34	AO0N	159	COM1
35	VCCK	158	Y1P
36	VCCK	157	SOY1
37	VCCK	156	RP
38	AVDD12_MEMPLL	155	VGACOM
39	AVSS12_MEMPLL	154	GP
40	RODT/RCKE	153	SOG
41	RA8/RA10	152	BP
42	RA13/RBA1	151	HSYNC
43	RA11//RA4	150	VSYNC
44	RA4//RA1	149	AVDD33_REG_STB
45	RA6/RA6	148	AVDD10_LDO
46	RA0//RA8	147	ADIN4_SRV
47	RA2//RA11	146	ADIN3_SRV
48	RCAS_//RA12	145	ADIN2_SRV
49	RCS_//RRAS_	144	ADIN1_SRV
50	RRAS_//RCAS_	143	SCART_FS0
51	RA9//RWE_	142	VCCK
52	VCC2IO	141	VGASCL
53	RA12//RA0	140	VGASDA
54	RA7//RA13	139	OPWRSB
55	RA5//RA9	138	OPCTRL1
56	NC//RRESET_	137	OPCTRL0
57	RA3//RA7	136	RC6
58	RA1//RA2	135	U0TX
59	RA10//RA5	134	U0RX
60	RBA1//RA3	133	AVDD33_PDM_STB
61	RBA0//RBA2	132	OPCTRL2
62	RBA2//RBA0	131	OPCTRL4
63	RWE_//RCS_	130	OPCTRL3
64	RCKE//RODT	129	OPCTRL5
257	EPAD_GND		

DRAM IO Power

DV15_DDR — C4152 10uF — C4155 100N 16V — C4150 100N 16V — C4157 100N 16V — C4156 100N 16V — C4158 100N 16V — C4165 100N 16V — C4210 100N 16V

Core Power

VCCK — C4191 NC/220uF 16V — C4203 10uF — C4163 10uF — C4185 100N 16V — C4179 100N 16V — C4166 100N 16V — C4196 100N 16V — C4192 100N 16V — C4186 100N 16V — C4180 100N 16V — C4174 100N 16V — C4175 100N 16V — C4176 100N 16V — C4205 100N 16V

AADC Mux in

AIN0_R_AADC 8 — AIN0_L_AADC 8

System IO

ORESET# 7 — OXTALI 7 — OXTALO 7 — RC6 7 — U0TX 7,10 — U0RX 7,10 — OSDA0 7,8 — OSCL0 7,8

USB

USB_DM0 12 — USB_DP0 12

DVB/ATSC Only

DEMOD_TSCLK 13 — DEMOD_TSVAL 13 — DEMOD_TSSYNC 13 — DEMOD_TSDATA0 13

DVB only

CI_INT 13 — SPI_CLE 13 — SPI_DATA 13 — SPI_CLK 13 — DEMOD_RST 13

HDMI

M_RX1_CB 9 — M_RX1_C 9 — M_RX1_0B 9 — M_RX1_0 9 — M_RX1_1B 9 — M_RX1_1 9 — M_RX1_2B 9 — M_RX1_2 9 — HDMI_CEC 9 — HDMI_SDA 9 — HDMI_SCL 9 — HDMI_HPD 9 — PWR5V 9

DVB/DTMB/PureATV Only

RF_AGC_H 13,14 — IF_AGC 14

I2S & SPDIF Out

M_SPDIF_Out 10 — AOMCLK_A 8 — AOLRCK_A 8 — AOBCLK_A 8 — AOSDATA0_A 8 — AOSDATA1 7 — AOMCLK 8

GPIO

GPIO_1 — LED_G 7
GPIO_2 — VGA_RX/TX_EN 10
GPIO_3 — AIN_CTL1 8
GPIO_6 — CI_OCP 13
GPIO_8 — AMP_CTRL 8
GPIO_10 — BL_ON/OFF 12
GPIO_11 — PANEL_VCC_ON/OFF 5
GPIO_12 — HP_DET# 8
GPIO_13 — AIN_CTL0 8
GPIO_14 — SYS_EEPROM_WP 7,9,10
GPIO_0 — POWER_DETECT 4

DRAM

RDQ0 — RDQ1 — RDQ2 — RDQ3 — RDQ4 — RDQ5 — RDQ6 — RDQ7 — RDQ8 — RDQ9 — RDQ10 — RDQ11 — RDQ12 — RDQ13 — RDQ14 — RDQ15 — RDQS1 — RDQS1# — RDQS0 — RDQS0# — RDQM1 — RDQM0 — 1_A0 — 1_A1 — 1_A2 — 1_A3 — 1_A4 — 1_A5 — 1_A6 — 1_A7 — 1_A8 — 1_A9 — 1_A10 — 1_A11 — 1_A12 — 1_A13 — RCLK0 — RCLK0# — 1_WE# — 1_ODT — 1_CAS# — 1_RAS# — 1_CKE — 1_CS# — 1_BA0 — 1_BA1 — 1_BA2 — 1_RST#

ADAC

AR1O 8 — AL1O 8

JTAG

JTDO — JTCK — JTMS — JTDI — JTRST#

VGA in

HSYNC 10 — VSYNC 10 — RP 10 — GP 10 — BP 10 — VGACOM 10 — SOG 10 — VGASDA 10 — VGASCL 10

Full SCART 1

CVBS2P 9 — SOY1 9 — Y1P 9 — COM1 9 — PB1P 9 — PR1P 9 — SCART_FS0 9

Demod IF

TU_FAT_IN2+ 14 — TU_FAT_IN2- 14

SVideo/CVBS

CVBS1P 10 — CVBS_COM 10

YPbPr

SOY0 10 — Y0P 10 — COM0 10 — PB0P 10 — PR0P 10

LVDS out

E0P 12 — E0N 12 — E1P 12 — E1N 12 — E2P 12 — E2N 12 — ECKP 12 — ECKN 12 — E3P 12 — E3N 12
O0P 12 — O0N 12 — O1P 12 — O1N 12 — O2P 12 — O2N 12 — OCKP 12 — OCKN 12 — O3P 12 — O3N 12
BL_DIMMING 12

Stand by GPIO

OPCTRL2 8 — OPCTRL3 8 — OPCTRL4 7
ADIN3_SRV 7 — ADIN2_SRV 7

NAND/Serial Flash

POWE# 7 — PAALE 7 — PACLE 7 — POCE1# 7 — POOE# 7 — PARB# 7 — PDD7 7 — PDD6 7 — PDD5 7 — PDD4 7 — PDD3 7 — PDD2 7 — PDD1 7 — PDD0 7

Strapping

OPCTRL4 7 — OPCTRL5 7 — AOSDATA1 7

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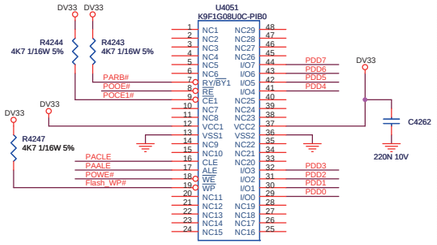
FLASH/UART/IR/JTAG

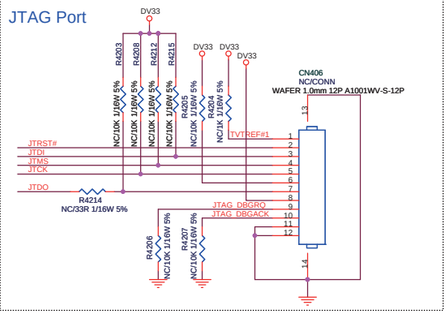
B04 FLASH/UART/IR/JTAG

B04

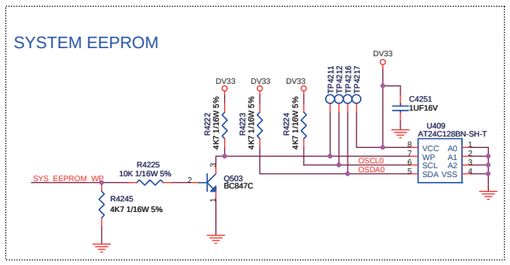
NAND Flash 128MBytex8



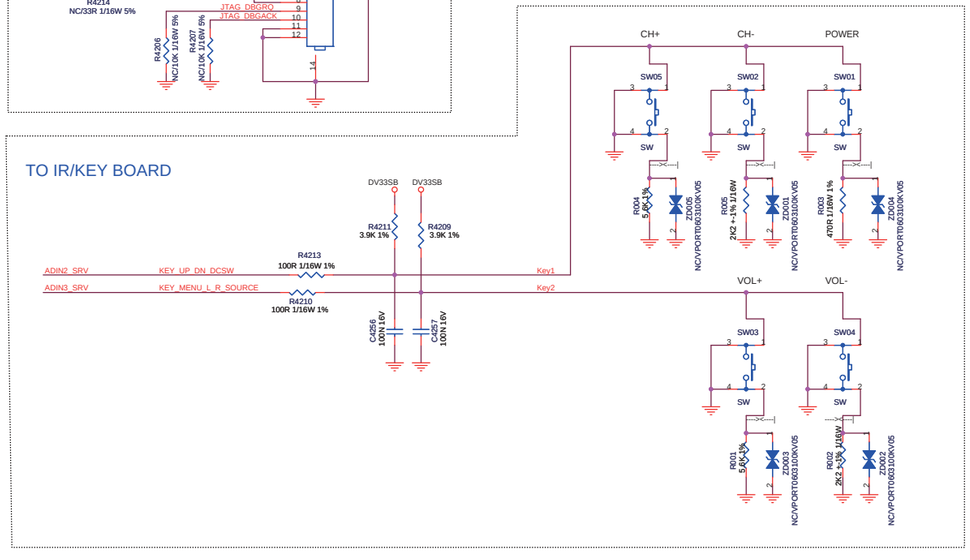
JTAG Port



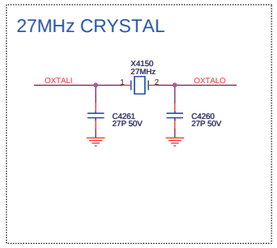
SYSTEM EEPROM



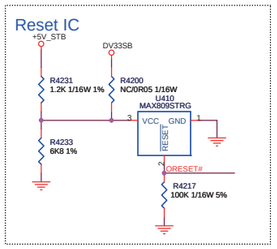
TO IR/KEY BOARD



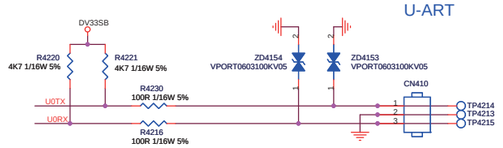
27MHz CRYSTAL



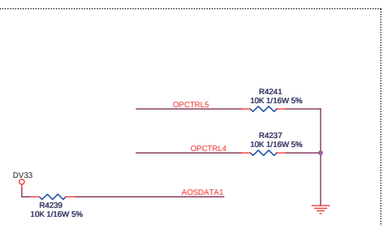
Reset IC

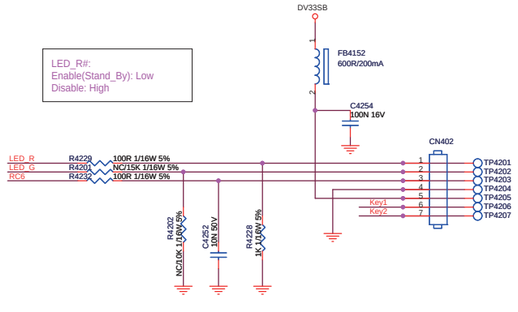


U-ART

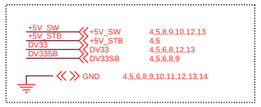


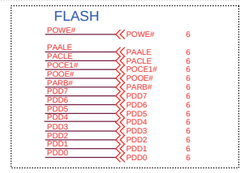
STRAPPING

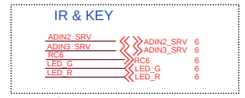


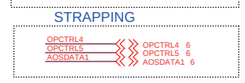


B04









FLASH/UART/IR/JTAG	715G4796	1 2011-05-17

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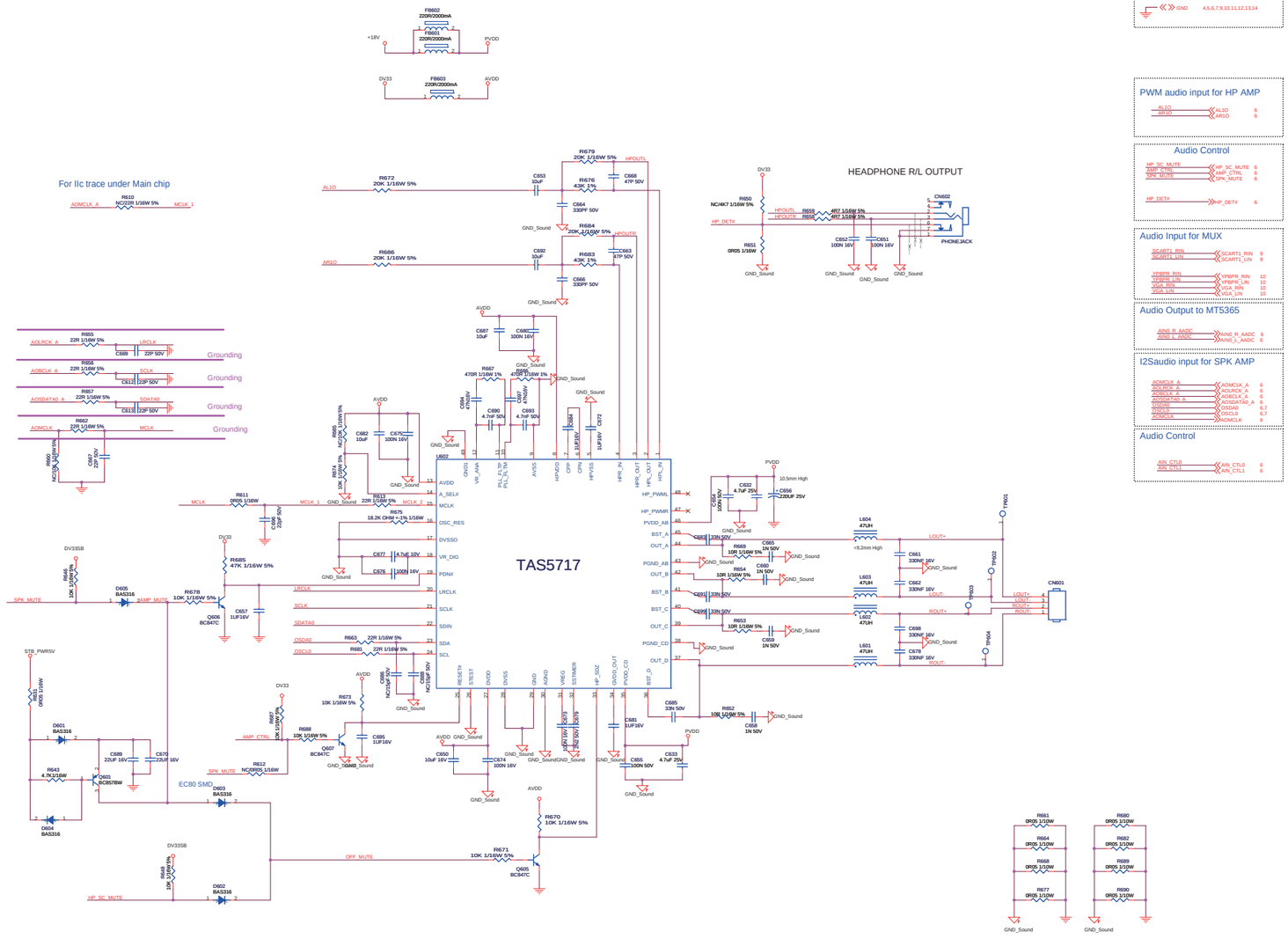
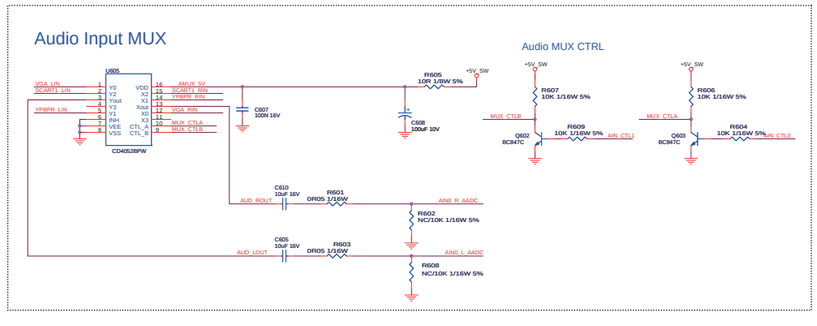
B05 SPK AMP / HP AMP / AUD MUX

B05





SPK AMP / HP AMP / AUD MUX	715G4796	1 2011-05-17

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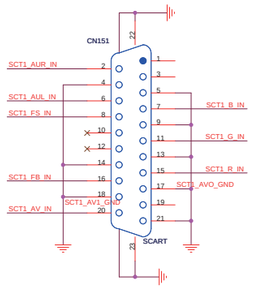
SCART I/O / HDMI1 INPUT

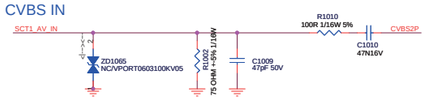
B06 SCART I/O / HDMI1 INPUT

B06

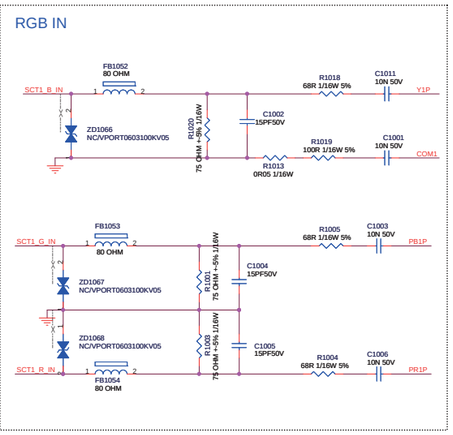
SCART(RGB + CVBS)



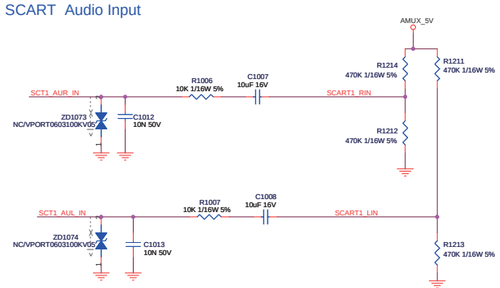
CVBS IN



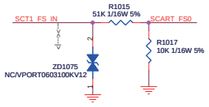
RGB IN

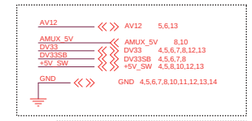


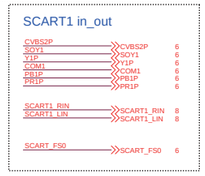
SCART Audio Input

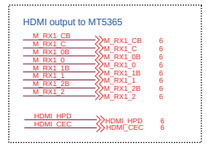


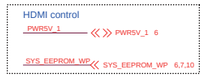
Function Select



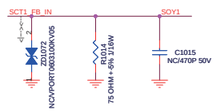




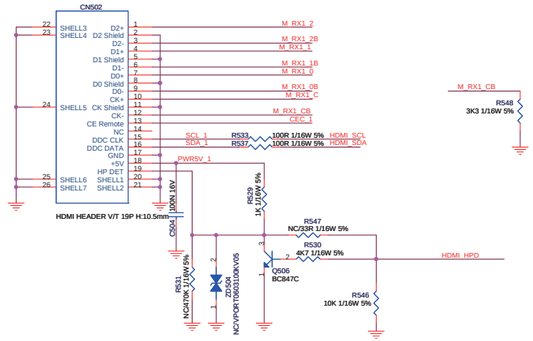




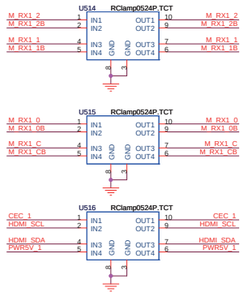
FAST BLANKING/SOY



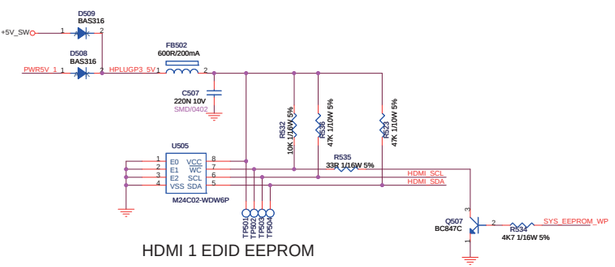
Rear HDMI 1

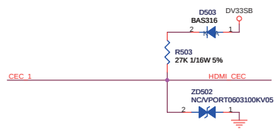


HDMI1 ESD PROTECTER



HDMI 1 EDID EEPROM





SCART I/O / HDMI1 INPUT	715G4796	1 2011-05-17

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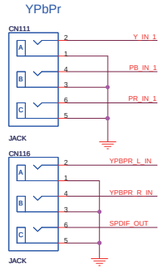
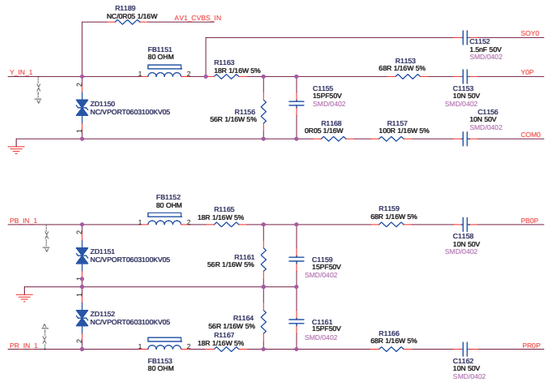
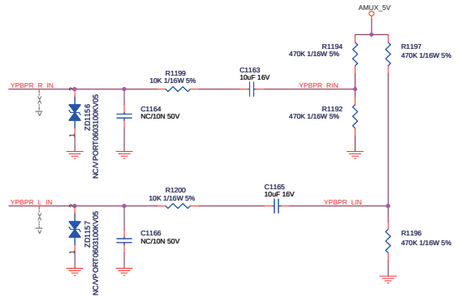
B07 YPBPR/ VGA INPUT

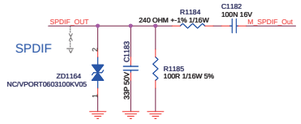
B07

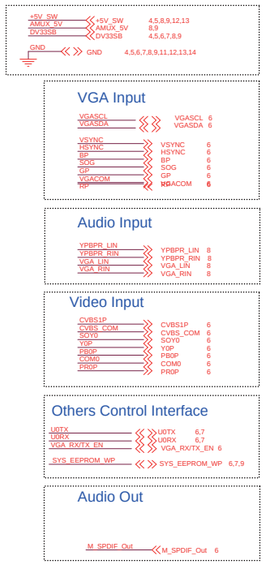
YPbPr in SPDIF output



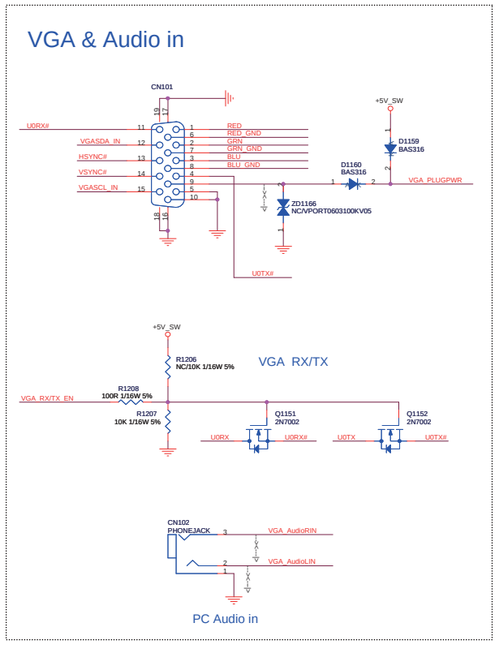


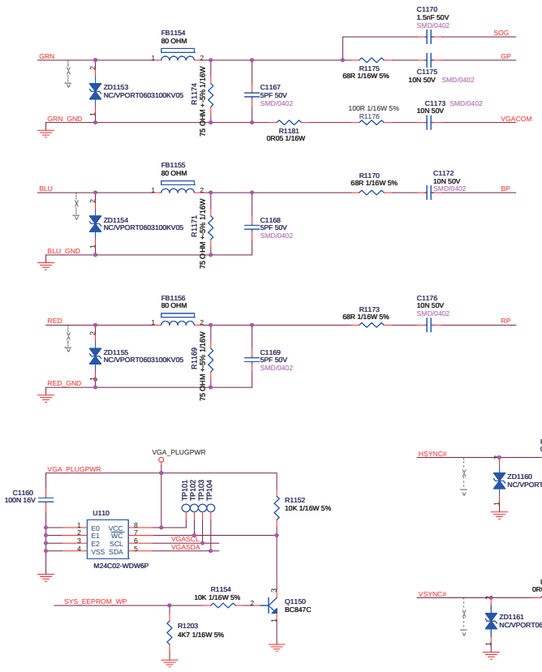




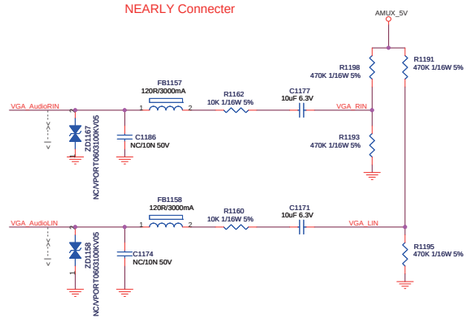


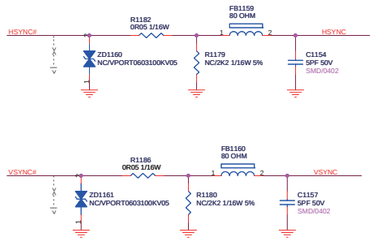
VGA & Audio in

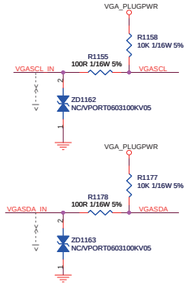




NEARLY Connecter







YPBPR/ VGA INPUT	715G4796	1 2011-05-17

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110519

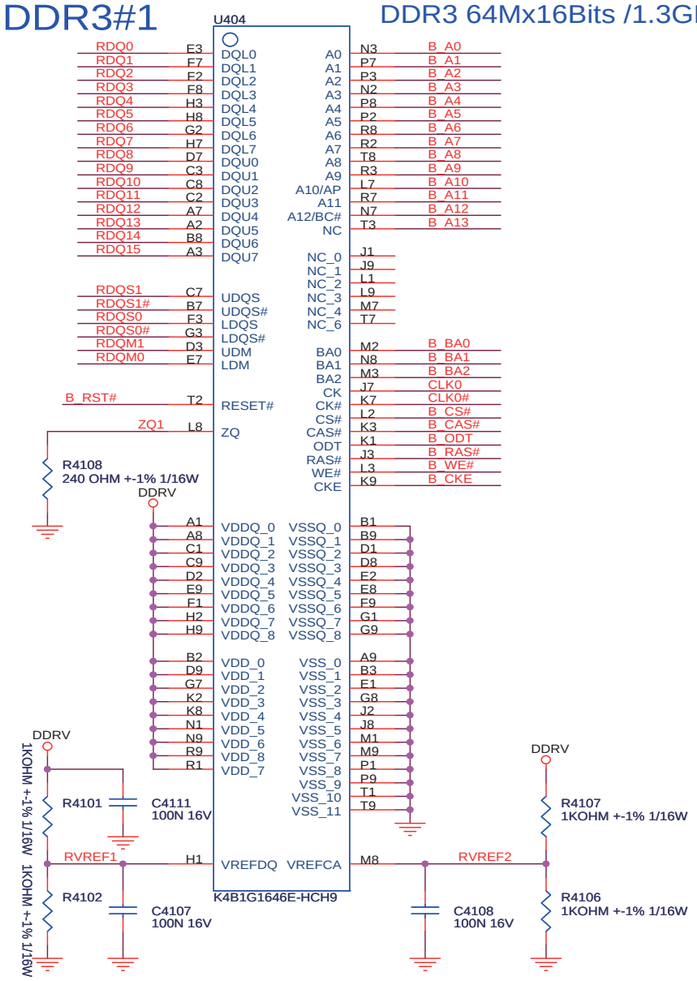
DDR3 DRAM

B08 DDR3 DRAM

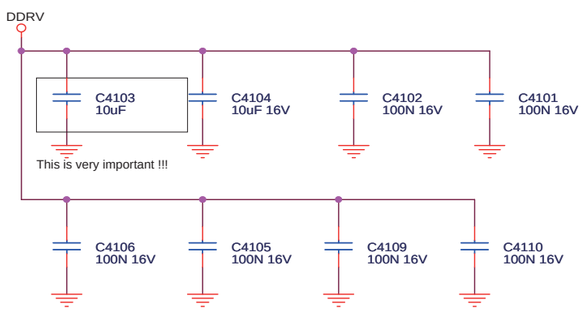
B08

DDR3#1

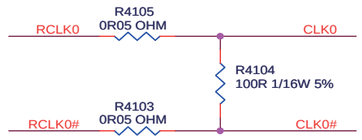
DDR3 64Mx16Bits /1.3GHz



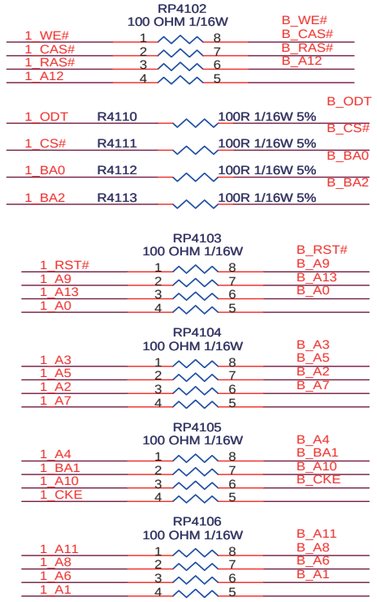
CAPs for DRAM IO Power (Close to DDR#1)



Damping and Termination for CLK

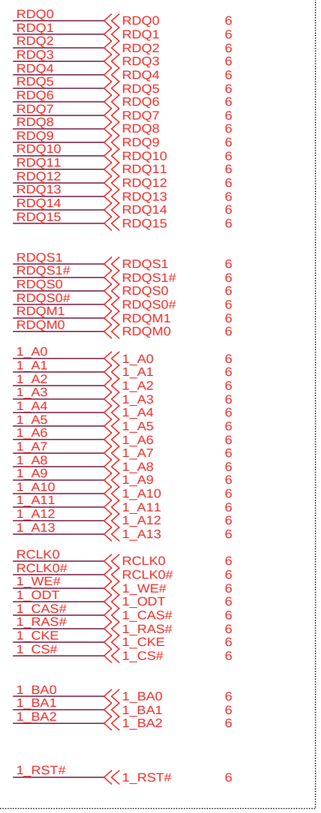


Damping for DDR#1 ADDR/CMD



B08

DDR interface from MT5365



DDR3 DRAM	715G4796	1 2011-05-17

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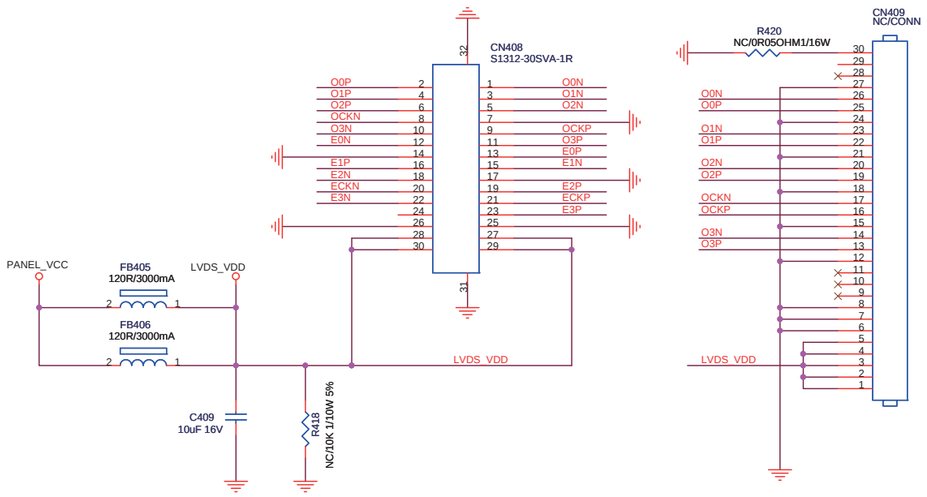
B09 LVDS OUTPUT/USB

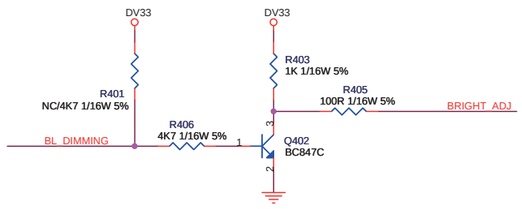
B09

O0N TP TP402
O0P TP TP403
O1N TP TP404
O1P TP TP405
O2N TP TP406
O2P TP TP407
O3N TP TP408
O3P TP TP409
E0N TP TP412
E0P TP413
E1N TP TP414
E1P TP TP415
E2N TP TP416
E2P TP TP417
E3N TP TP418
E3P TP TP419

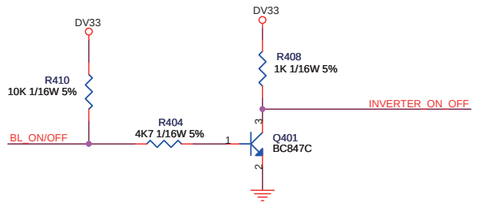
LVDS OUTPUT



Backlight Brightness Control



Backlight ON/OFF Control



PANEL_VCC → PANEL_VCC 5
+5V_SW → +5V_SW 4,5,8,9,10,13
DV33SB → DV33SB 4,5,6,7,8,9
DV33 → DV33 4,5,6,7,8,13
+5V_STB → +5V_STB 4,5,7
GND → GND 4,5,6,7,8,9,10,11,13,14

LVDS Interface

E0P 6
E0N 6
E1P 6
E1N 6
E2P 6
E2N 6
E3P 6
E3N 6
O0P 6
O0N 6
O1P 6
O1N 6
O2P 6
O2N 6
OCKP 6
OCKN 6
O3P 6
O3N 6
ECKP 6
ECKN 6

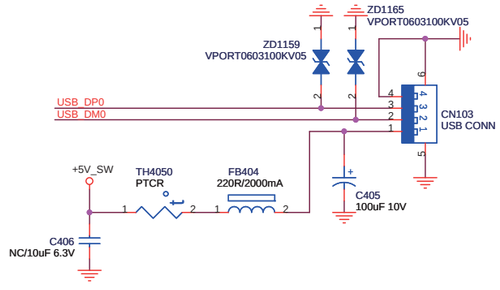
Backligh Control Interface

BL_ON/OFF → BL_ON/OFF 6
BL_DIMMING → BL_DIMMING 6
BRIGHT_ADJ → BRIGHT_ADJ 4
INVERTER_ON_OFF → INVERTER_ON_OFF 4

USB interface

USB_DM0 → USB_DM0 6
USB_DP0 → USB_DP0 6

USB 2.0



LVDS OUTPUT/USB	715G4796	1 2011-05-17

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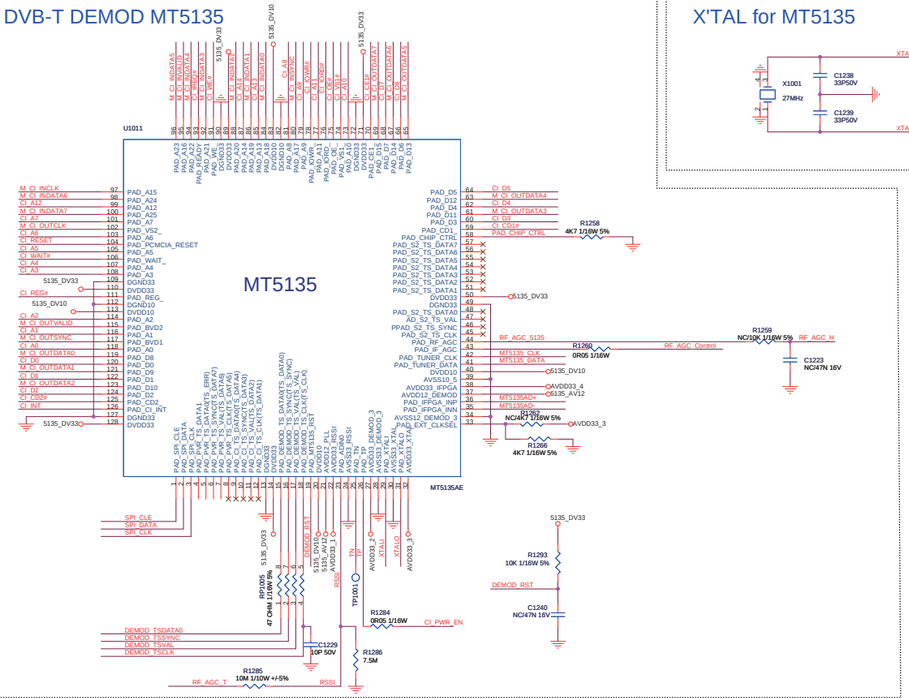
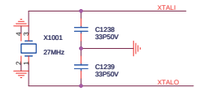
B10 DVB-T+C_DEMOD MT5135 / CI

B10

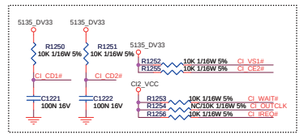
DVB-T DEMOD MT5135



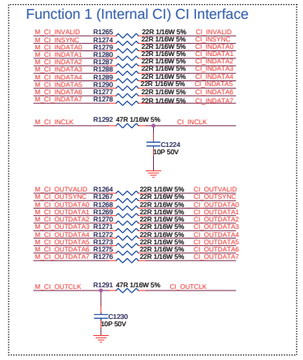
X'TAL for MT5135



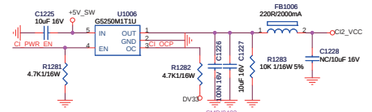
CI interface



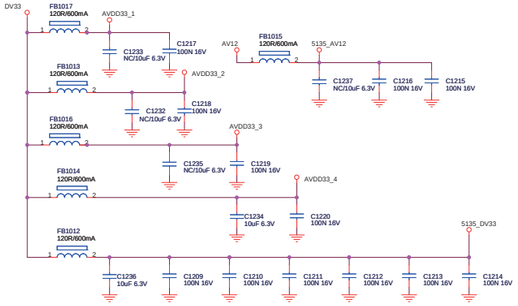
Function 1 (Internal CI) CI Interface



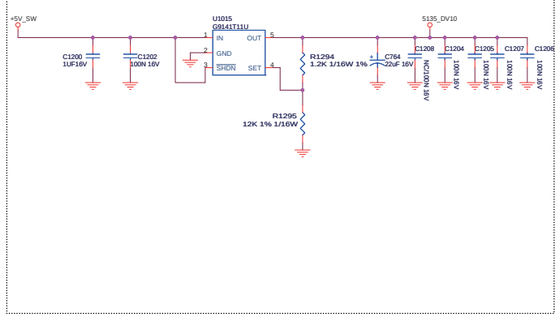
CI Bus Power Control



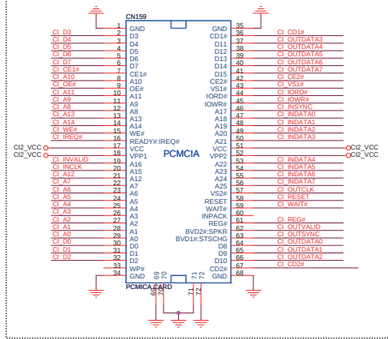
DV33 & AV12 for MT5135



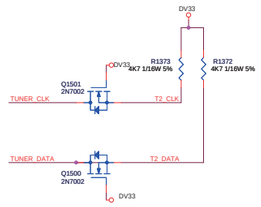
DV10 for MT5135



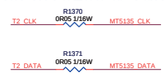
PCMCIA 5V Slot



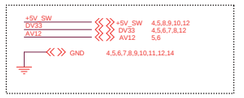
I2C for Tuner



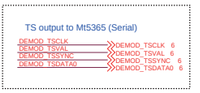
I2C for MT5135 & Tuner



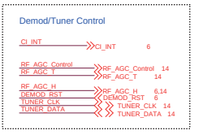
+5V_SW / DV33 / AV12 / GND



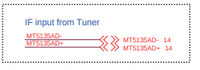
TS output to Mt5365 (Serial)



Demod/Tuner Control

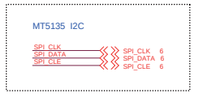


IF input from Tuner



GPIO Control

MT5135 I2C



DVB-T+C_DEMOD MT5135 / CI	715G4796	1 2011-05-17

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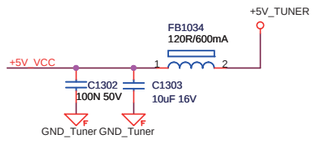
DVB-T+C_TUNER

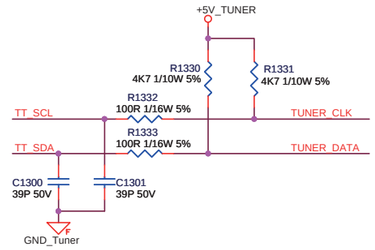
B11 DVB-T+C_TUNER

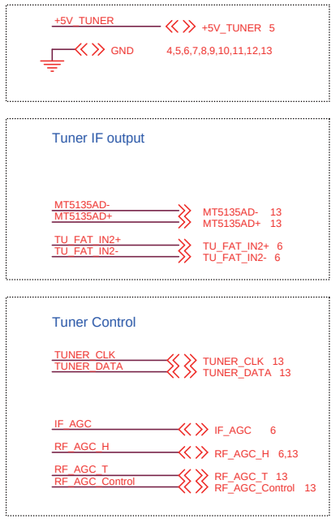
B11

+5V for Tuner



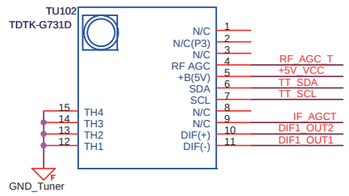
I2C for Tuner and MT5135

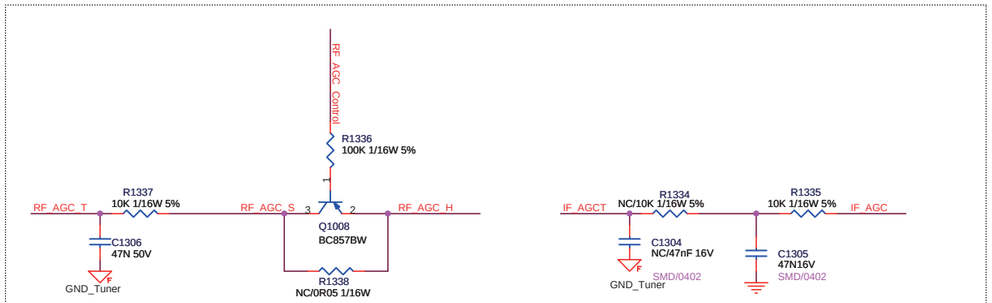




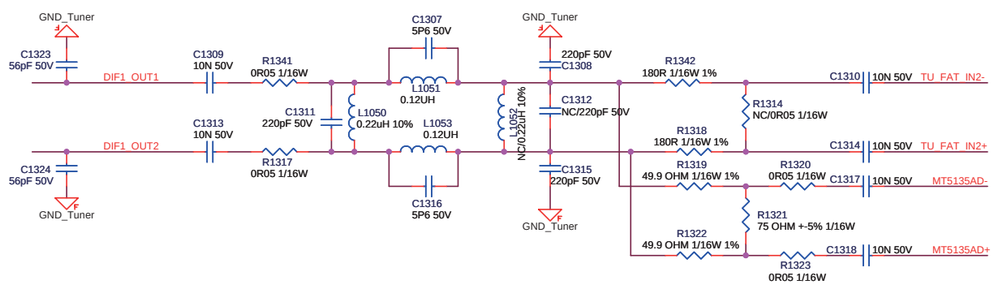
TUNER

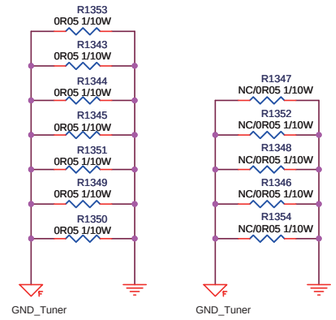
LG Tuner with DVB-C/T:G731D(sawless)





BPF





DVB-T+C_TUNER	715G4796	1 2011-05-17

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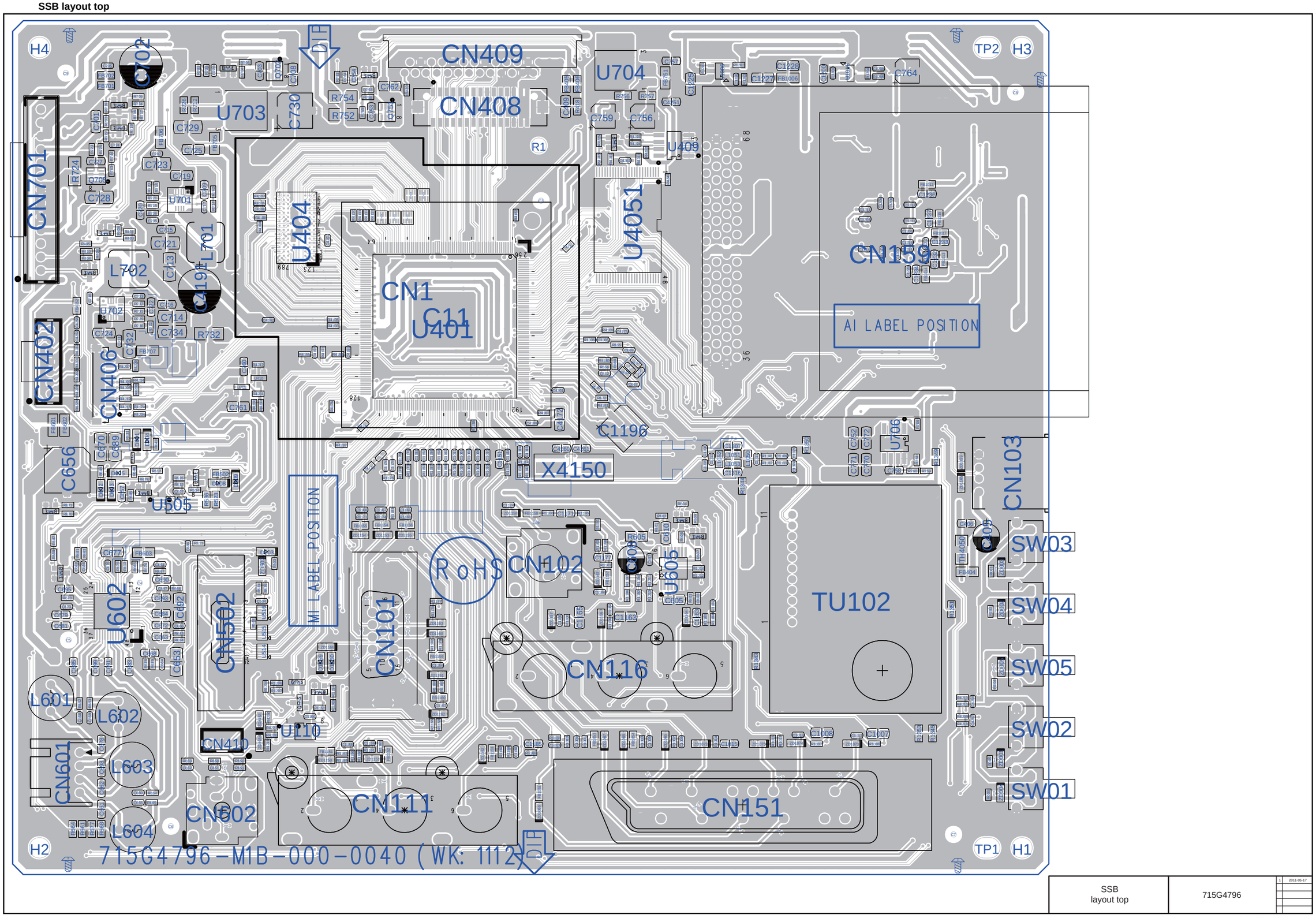
SSB layout top



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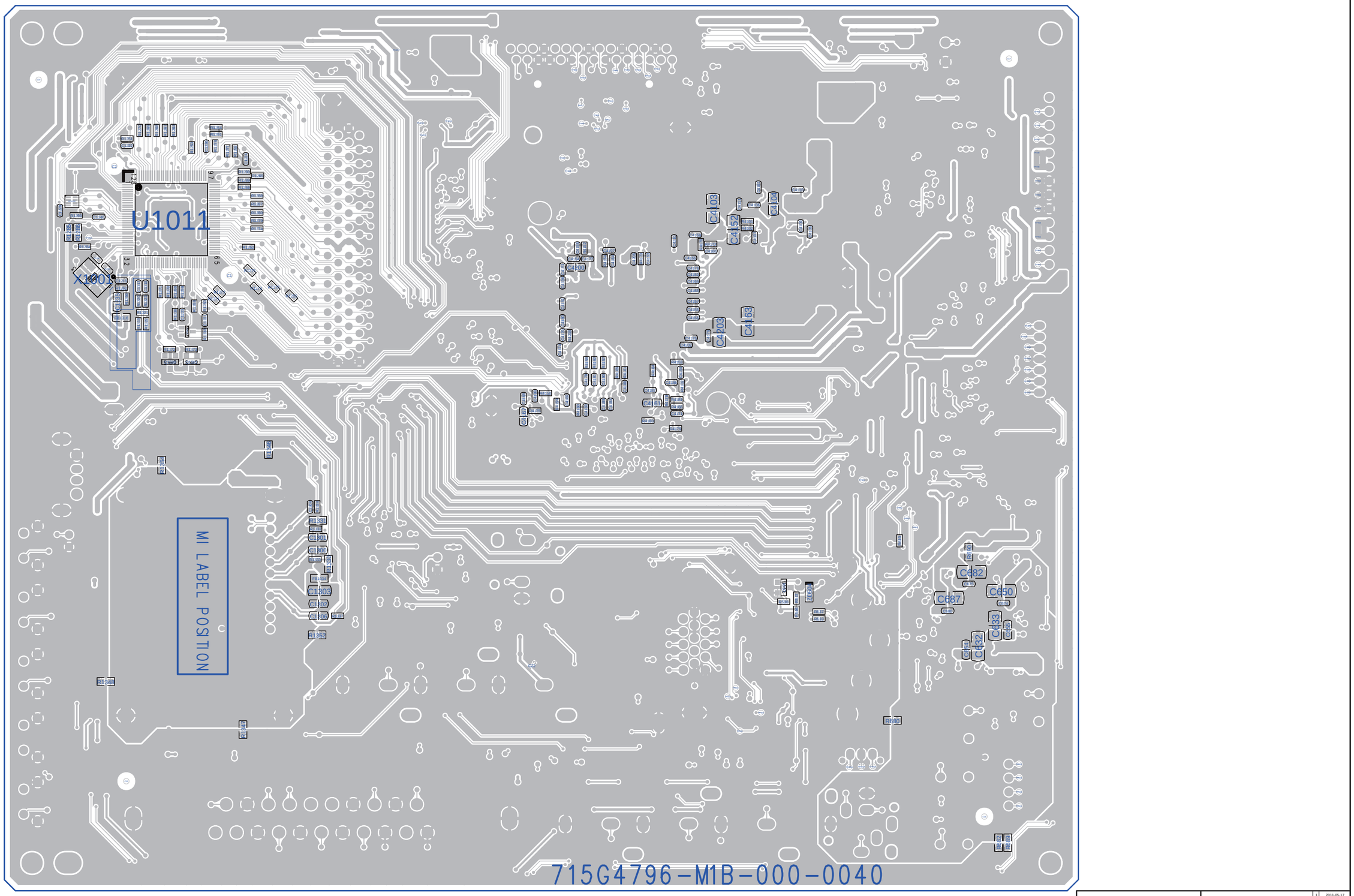
SSB layout bottom



SSB layout bottom	715G4796	1 2011-05-17

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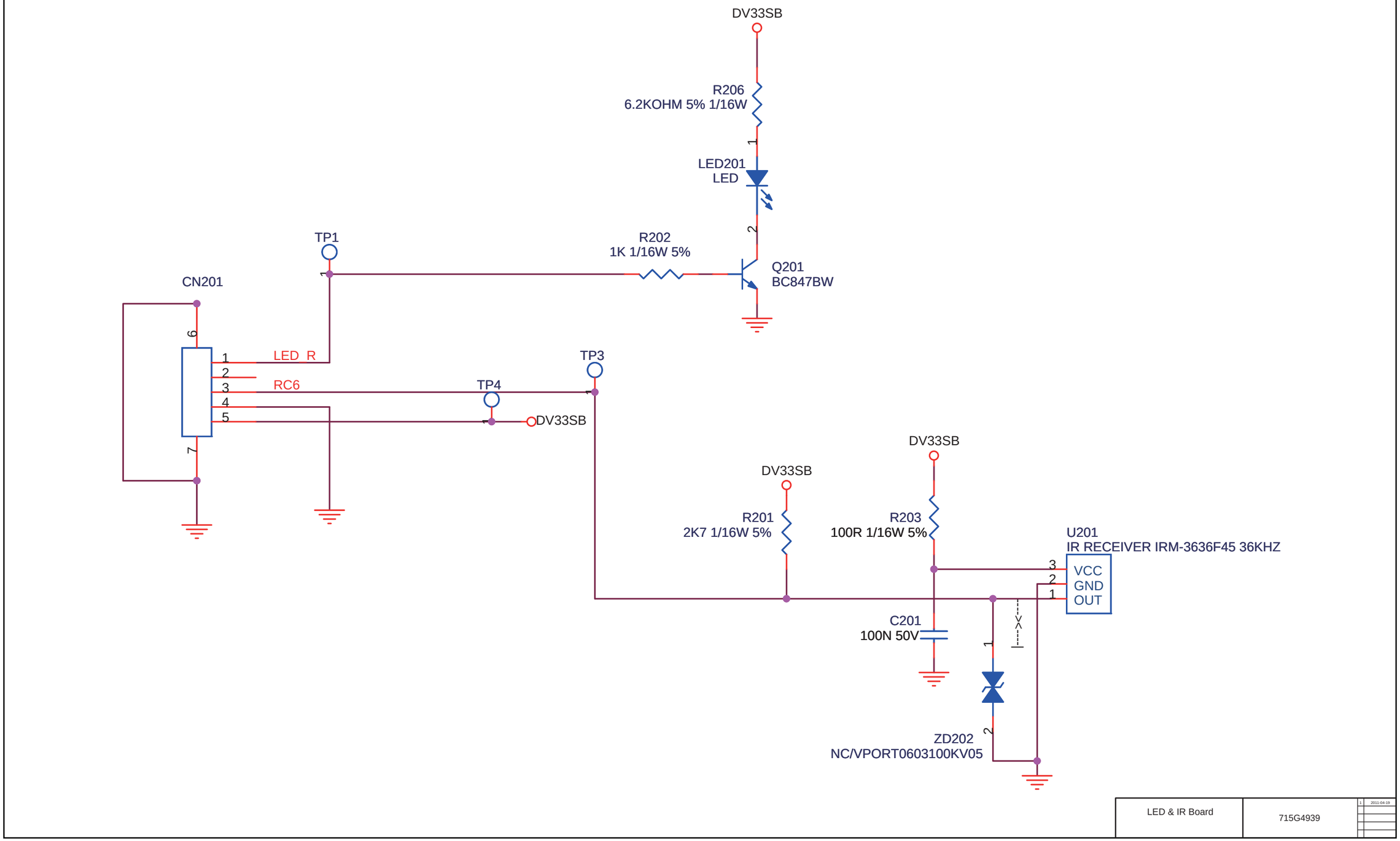
10-4 J 715G4939 IR Golden horse

LED & IR board

J LED & IR J



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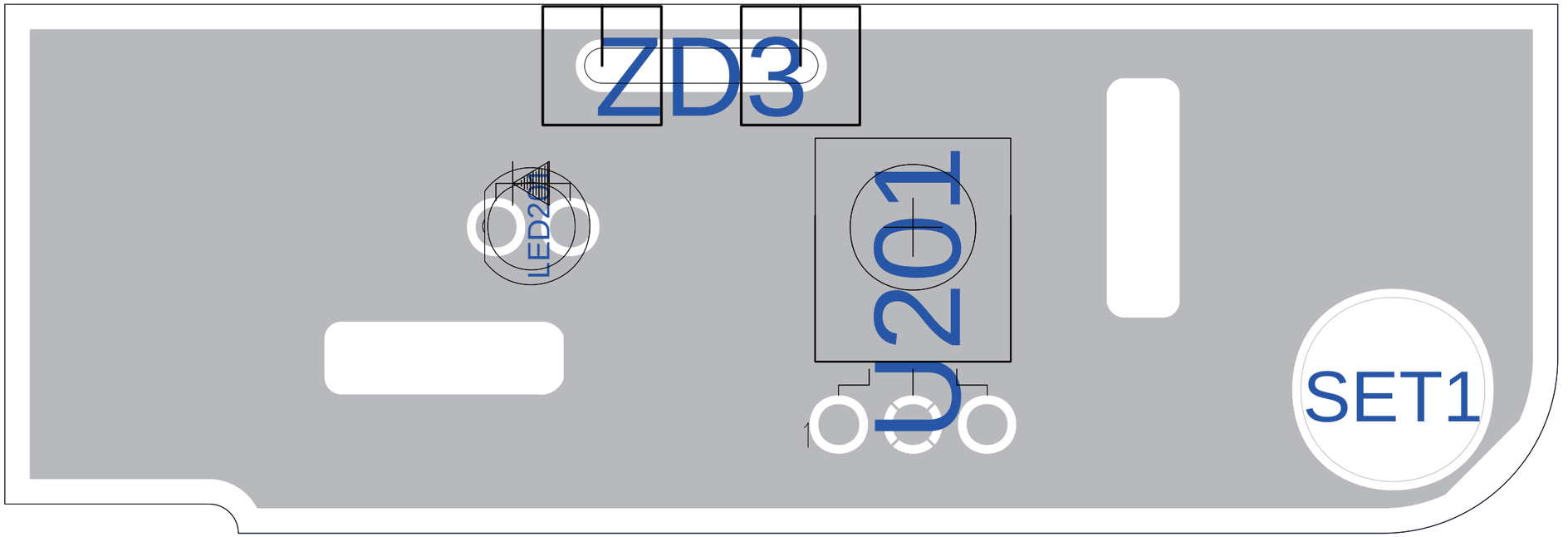
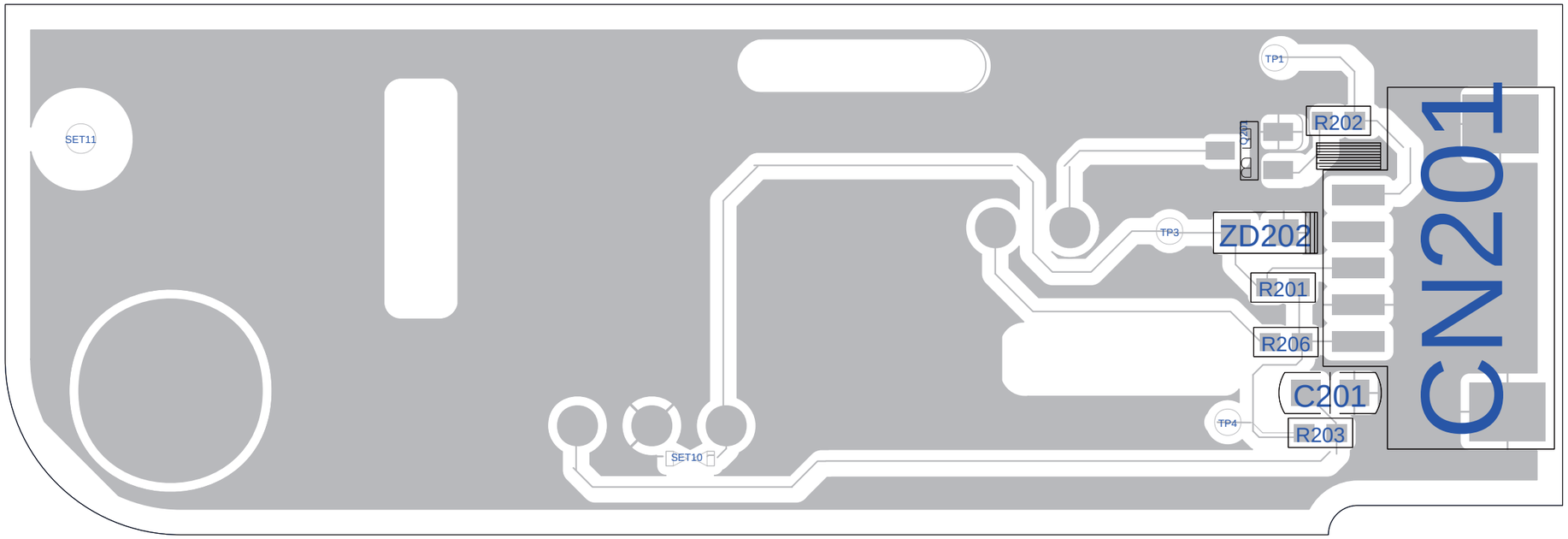
LED & IR board layout

Layout LED & IR Board (Top Side)



Layout LED & IR Board (Bottom Side)



LED & IR board layout top/bottom	715G4939	1 2011-04-19

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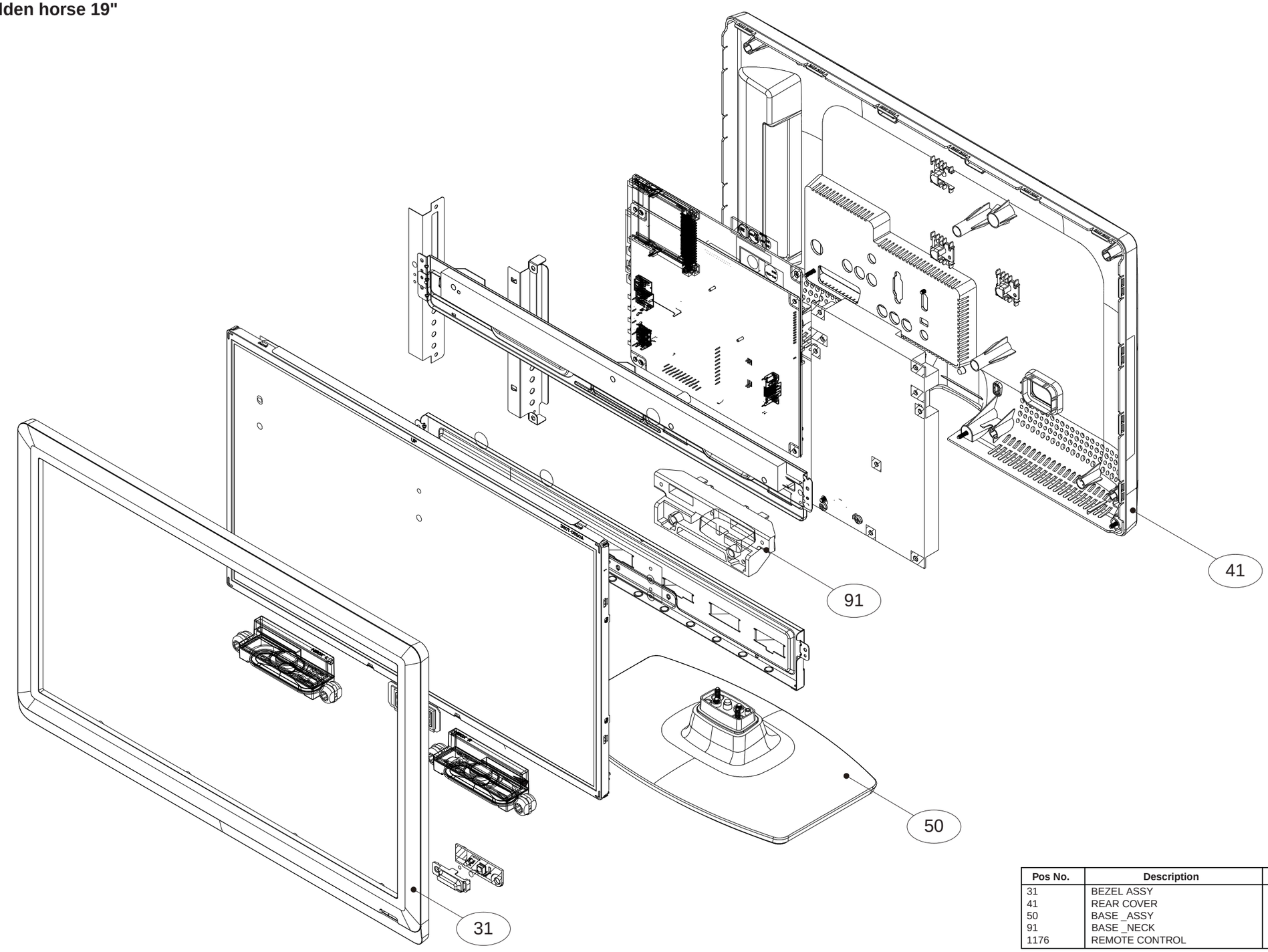
11. Styling Sheets

11-1 Golden horse 19"

Golden horse 19"



Pos No.	Description	Remarks
31	BEZEL ASSY	
41	REAR COVER	
50	BASE _ASSY	
91	BASE _NECK	
1176	REMOTE CONTROL	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

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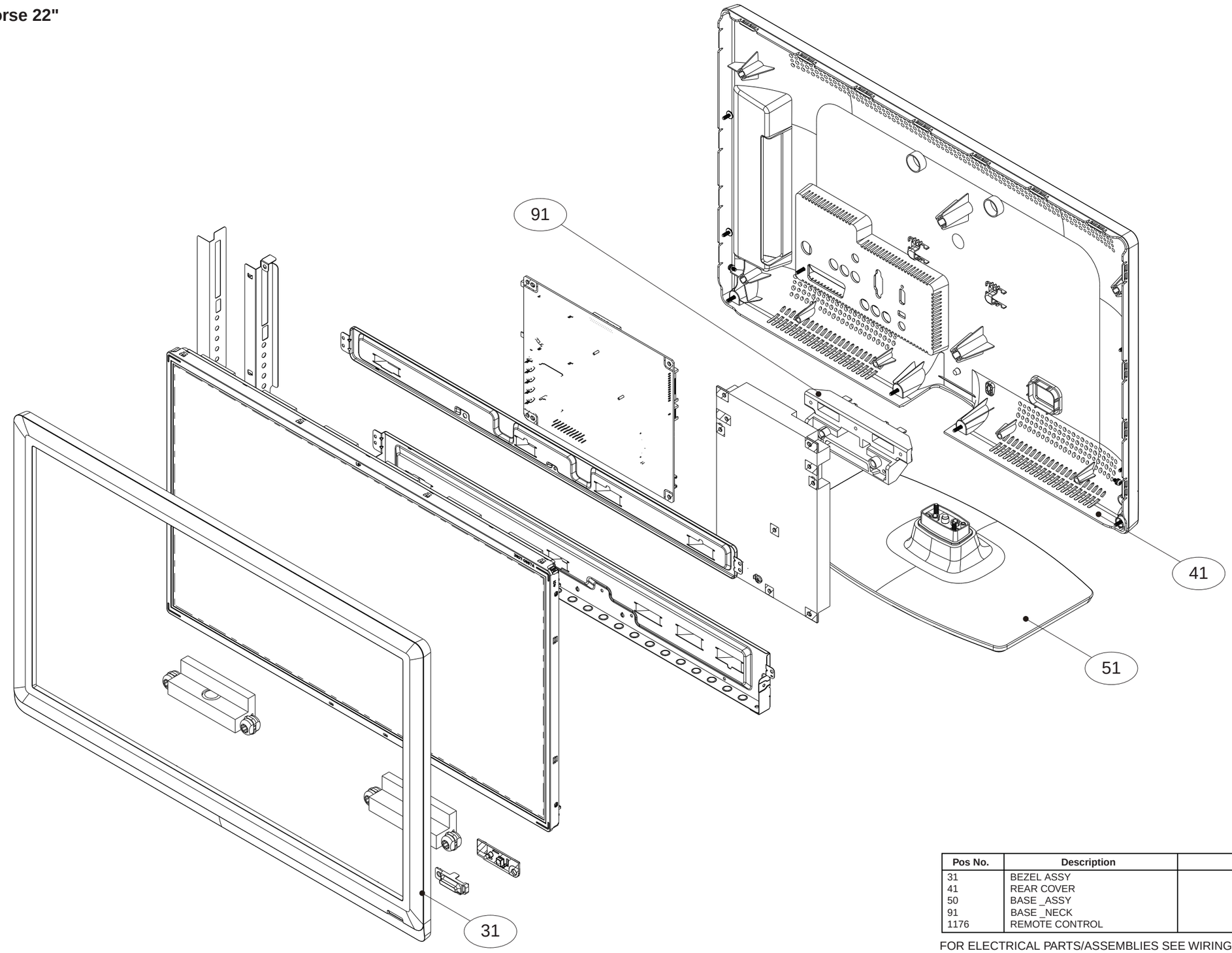
110526

11-2 Golden horse 22"

Golden horse 22"



Pos No.	Description	Remarks
31	BEZEL ASSY	
41	REAR COVER	
50	BASE _ASSY	
91	BASE _NECK	
1176	REMOTE CONTROL	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

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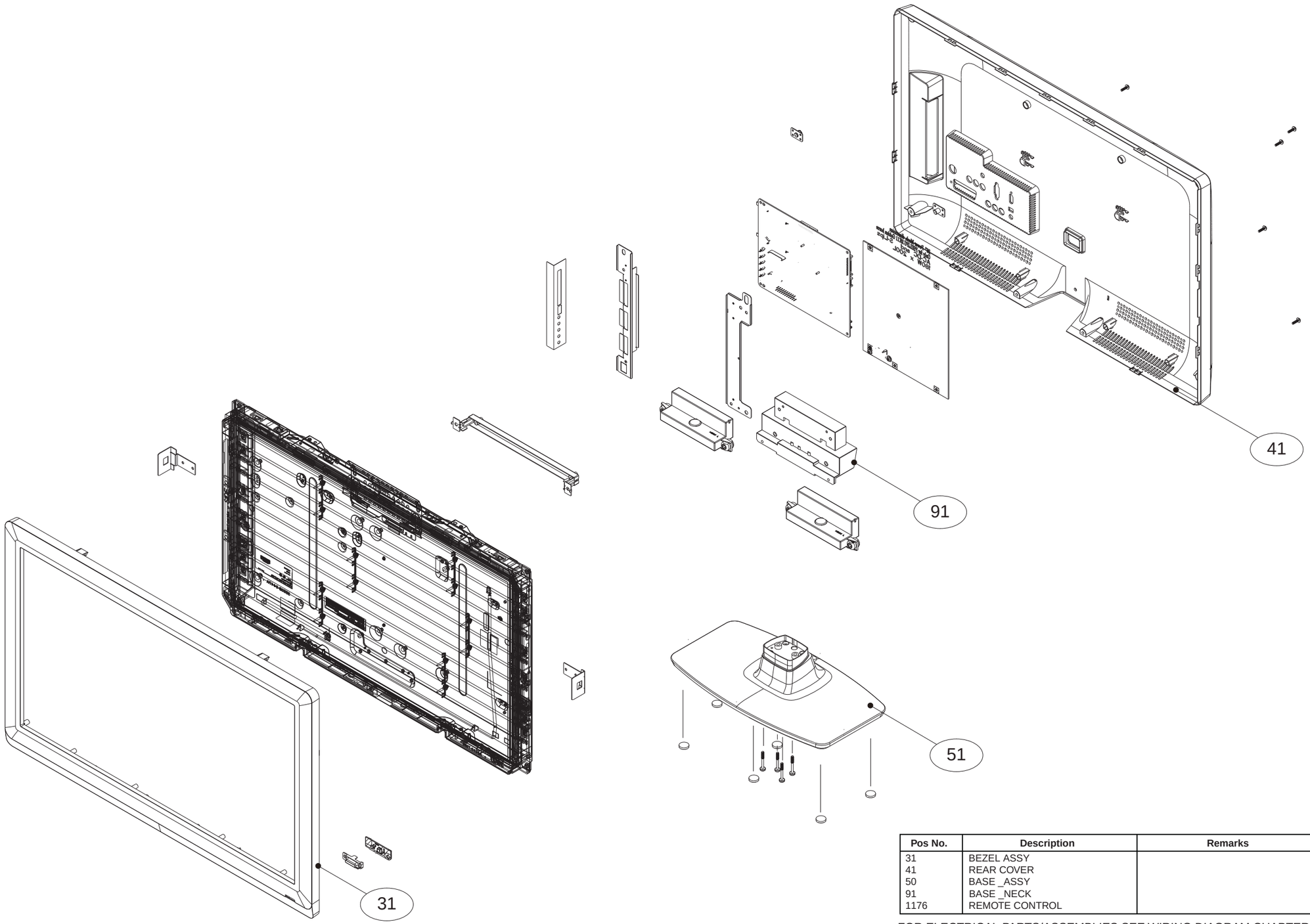
11-3 Golden horse 26"

Golden horse 26"



Pos No.	Description	Remarks
31	BEZEL ASSY	
41	REAR COVER	
50	BASE _ASSY	
91	BASE _NECK	
1176	REMOTE CONTROL	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

19120_802_110519.eps
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