

Service
Service
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Service Manual

Chassis name	Platform	Model name
TPM17.3E LA	MTK5596+333/334	43PUS6412/05
		49PUS6412/05
		49PUS6482/05
		49PUS7502/05
		55POS9002/05
		55PUS7502/05
		65PUS6412/05
		65PUS7502/05

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1. Product information

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Display Type

Diagonal screen size

- 108 cm / 43 inch
- 123 cm / 49 inch
- 126 cm / 50 inch
- 139 cm / 55 inch
- 164 cm / 65 inch

Display resolution

- 3840 x 2160

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Display Input Resolution

Video formats

Resolution — Refresh rate

- 480i - 60 Hz
- 480p - 60 Hz
- 576i - 50 Hz
- 576p - 50 Hz
- 720p - 50 Hz, 60 Hz
- 1080i - 50 Hz, 60 Hz
- 1080p - 24 Hz, 25 Hz, 30 Hz
- 2160p - 24 Hz, 25 Hz, 30 Hz, 50 Hz, 60 Hz

Computer formats

Resolutions (amongst others)

- 640 x 480p - 60 Hz
- 800 x 600p - 60 Hz
- 1024 x 768p - 60 Hz
- 1280 x 768p - 60 Hz
- 1360 x 765p - 60 Hz
- 1360 x 768p - 60 Hz
- 1280 x 1024p - 60 Hz
- 1920 x 1080p - 60 Hz
- 3840 x 2160p - 24 Hz, 25 Hz, 30 Hz, 50 Hz, 60 Hz

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Connectivity

TV Side

- Common Interface slot: CI+/CAM
- USB 1 - USB 2.0
- USB 2 - USB 3.0
- Headphones - Stereo mini-jack 3.5mm
- HDMI 1 in - ARC - MHL - Ultra HD - HDR
- HDMI 2 in - ARC - Ultra HD - HDR

TV Bottom

- Audio out - Optical Toslink
- Network LAN - RJ45
- YPbPr, L/R
- HDMI 4 in - ARC
- HDMI 3 in - ARC

- Antenna (75 ohm)
- YPbPr, L/R
- Satellite tuner

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Sound

- Output power (RMS) : 20W
- Dolby Audio
- DTS Premium Sound™

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Multimedia

Connections

- USB 2.0 / USB 3.0
- Ethernet LAN RJ-45
- Wi-Fi 802.11a/b/g/n/ac (built-in)
- BT2.1 with EDR & BT4.0 with BLE (* Your TV doesn't support Bluetooth subwoofer and Bluetooth speakers)

Supported USB file systems

- FAT 16, FAT 32, NTFS

Playback formats

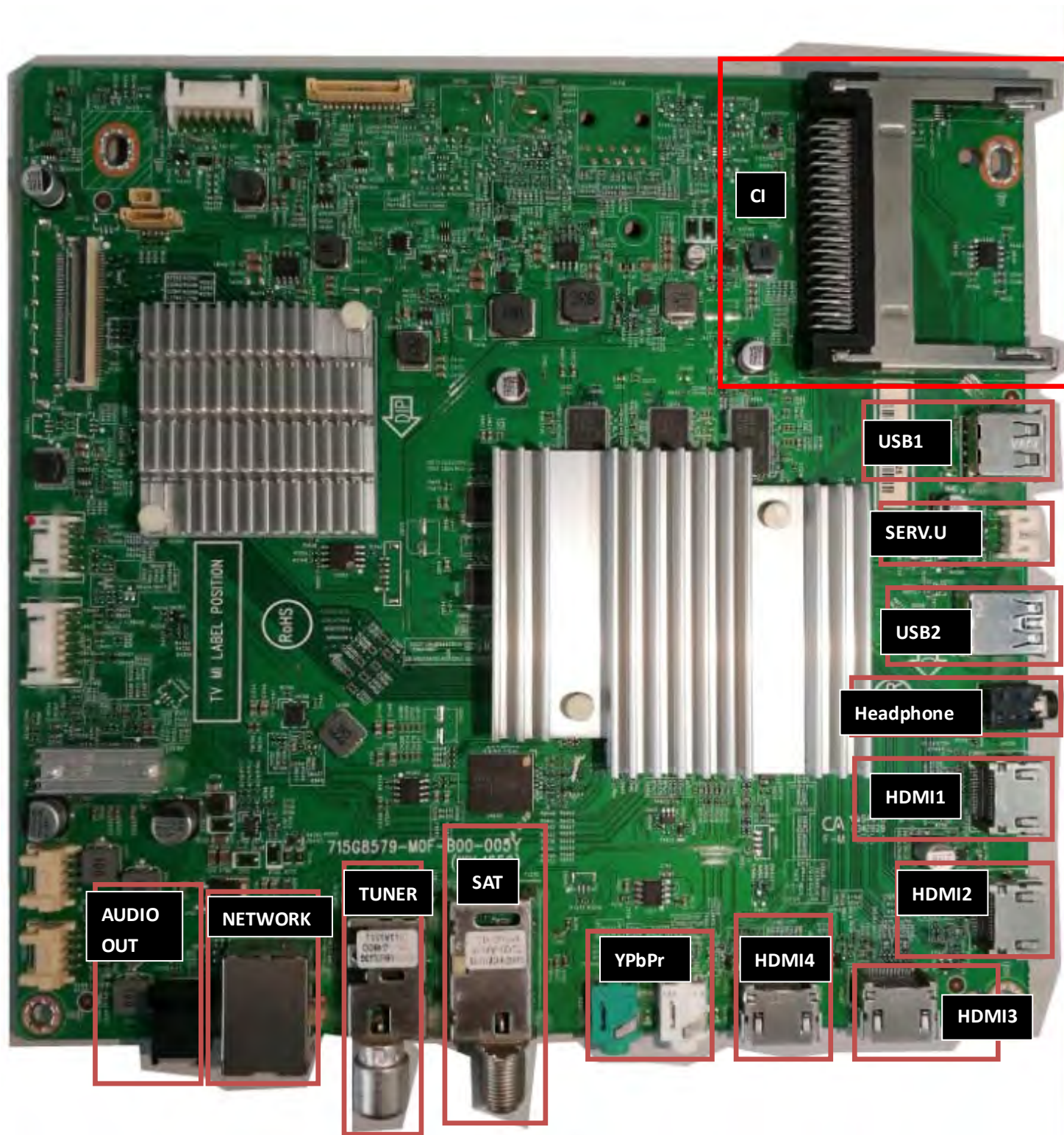
- Video Codecs : AVI, MKV, H264/MPEG-4 AVC, MPEG-1, MPEG-2, MPEG-4, WMV9/VC1, HEVC
- Audio Codecs : AAC, MP3, WAV, WMA (v2 up to v9.2), WMA-PRO (v9 and v10)
- Subtitles :
 - Formats : SRT, SUB, TXT, SMI
 - Character encodings : UTF-8, Central Europe and Eastern Europe (Windows-1250), Cyrillic (Windows-1251), Greek (Windows-1253), Turkish (Windows-1254), Western Europe (Windows-1252)
- Image Codecs : JPEG
- Limitations :
 - Maximum supported total bit rate for a media file is 30Mbps.
 - Maximum supported video bit rate for a media file is 20Mbps.
 - MPEG-4 AVC (H.264) is supported up to High Profile @ L5.1.
 - H.265 (HEVC) is supported upto Main / Main 10 Profile up to Level 5.1
 - VC-1 is supported up to Advanced Profile @ L3.

Supported media server software (DMS)

- You can use any DLNA V1.5 certified media server software (DMS class).
- You can use the Philips TV Remote app (iOS and Android) on mobile devices.

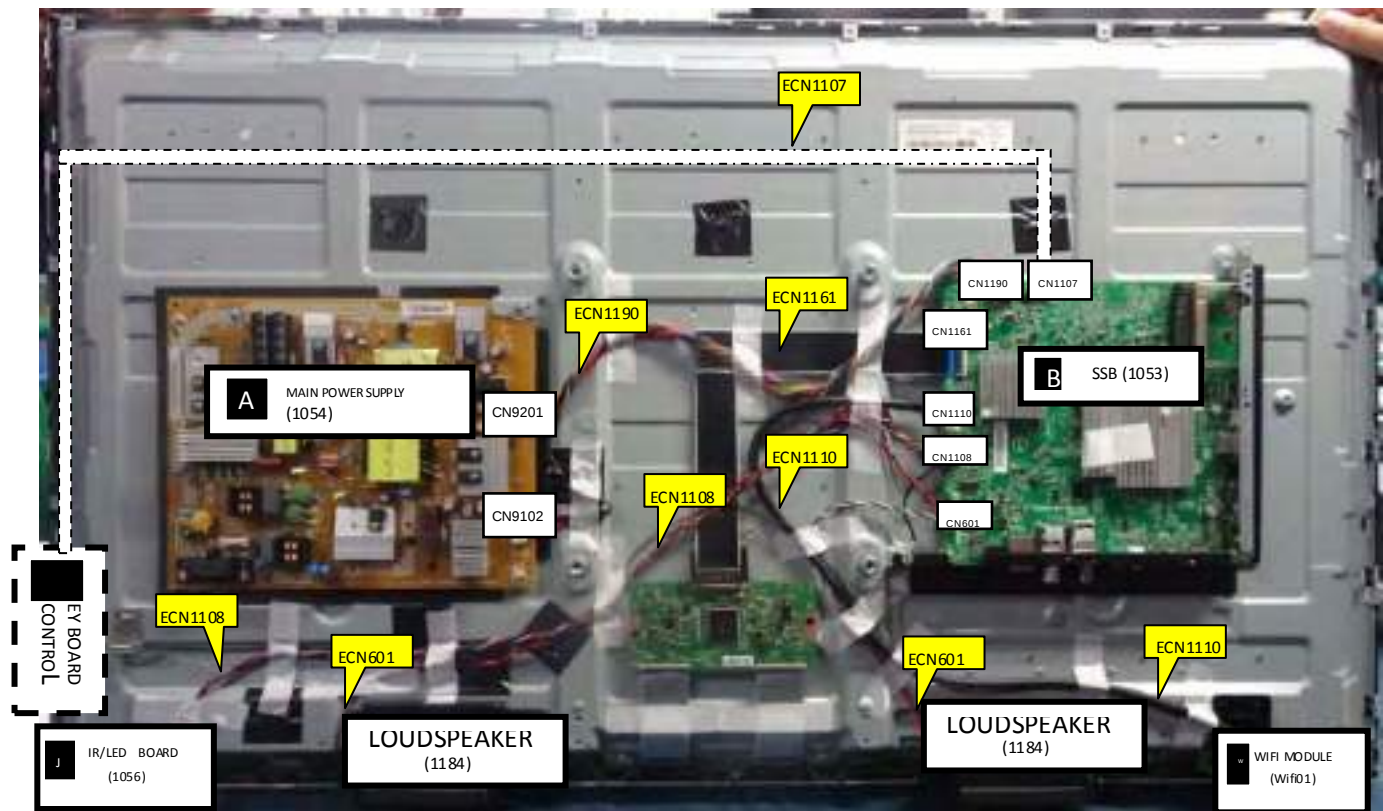
Performance may vary, depending on the capabilities of the mobile device and the software used.

2. Connections Overview

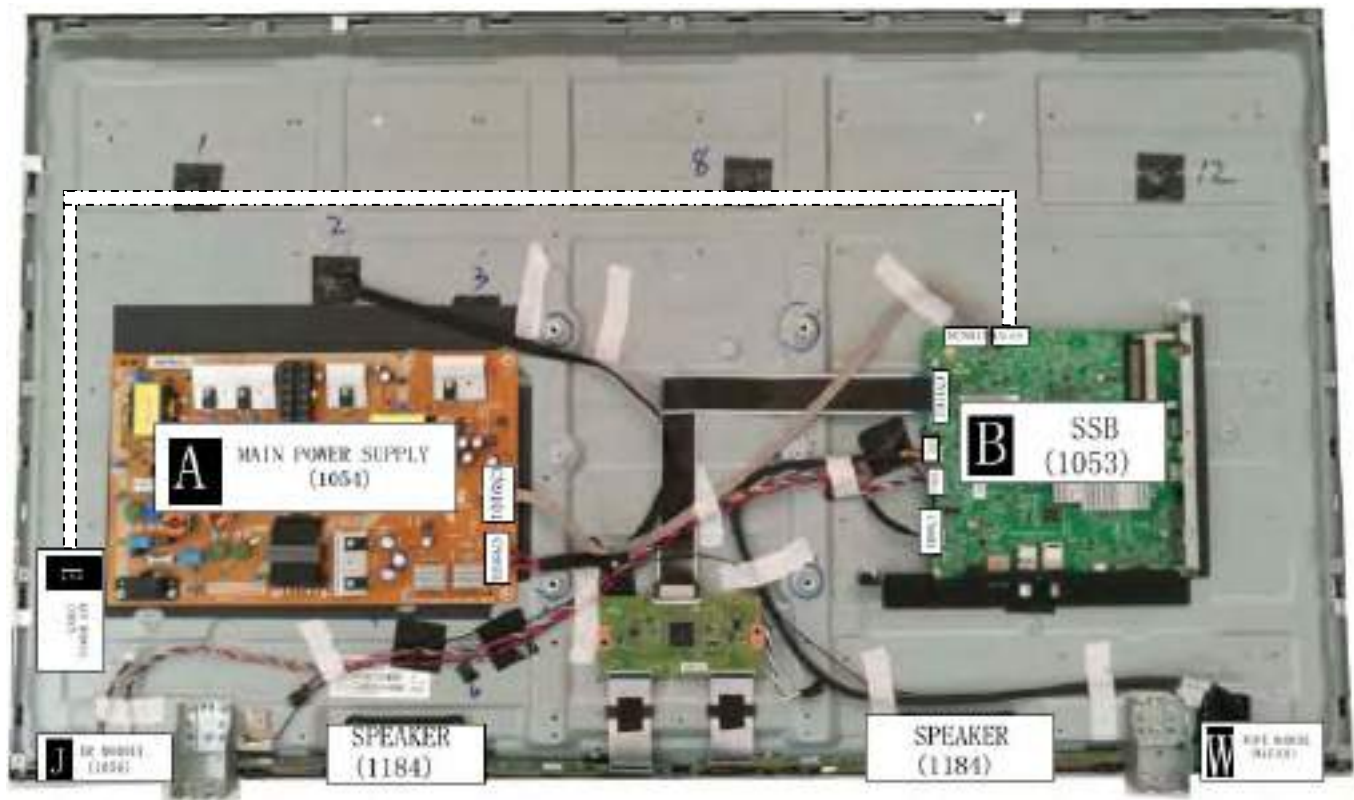


3. Mechanical Instructions

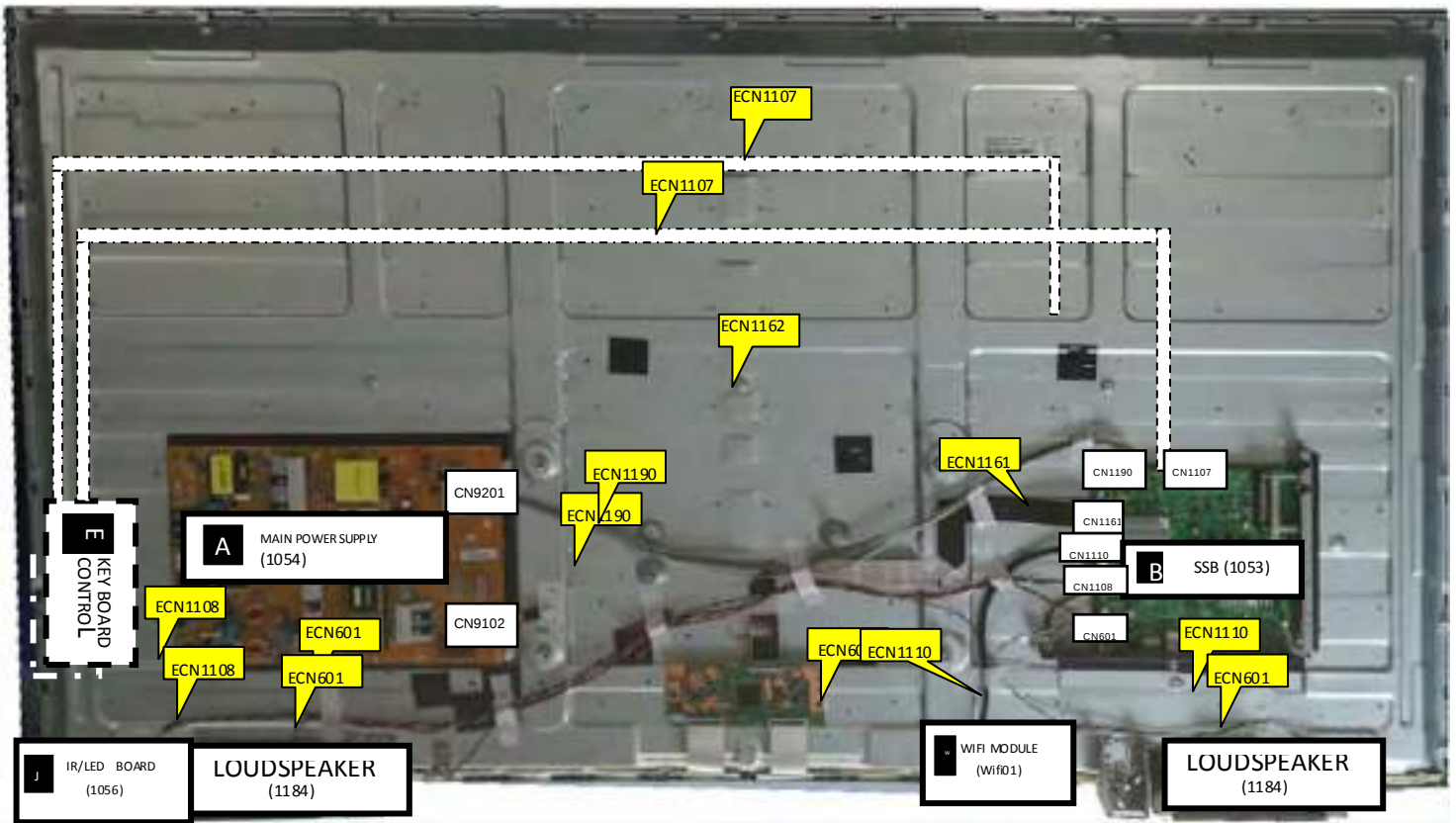
3.1 Cable Dressing



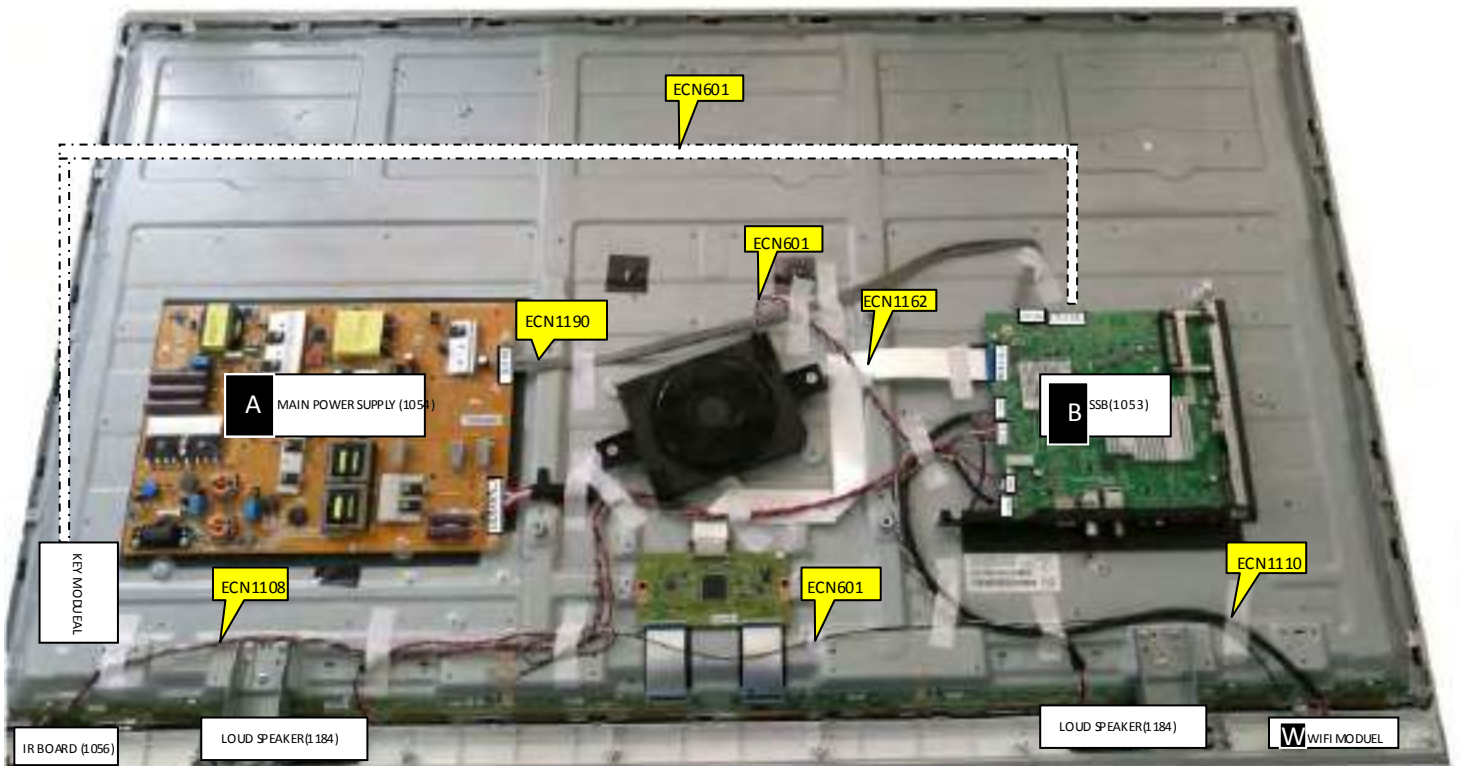
Cable dressing (43" 6412 series)



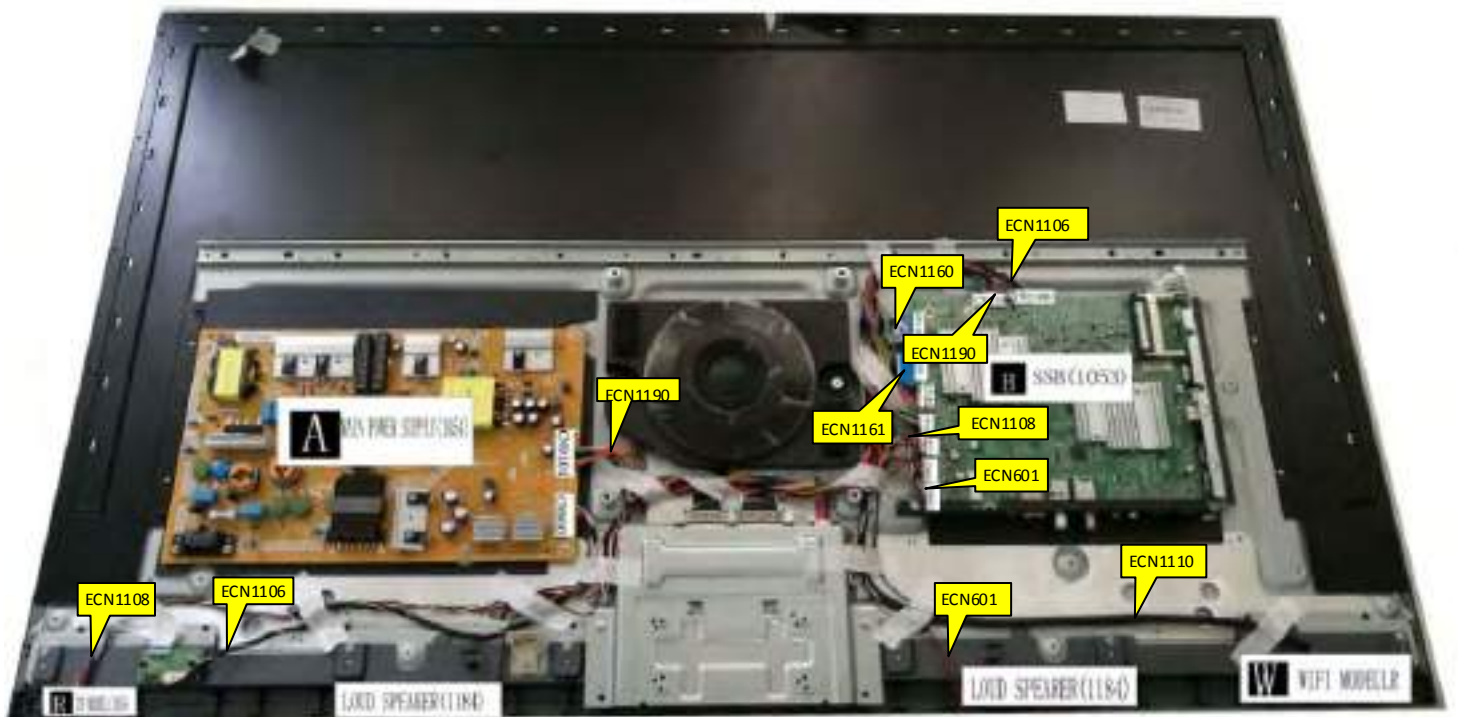
Cable dressing (49" 6412 series)



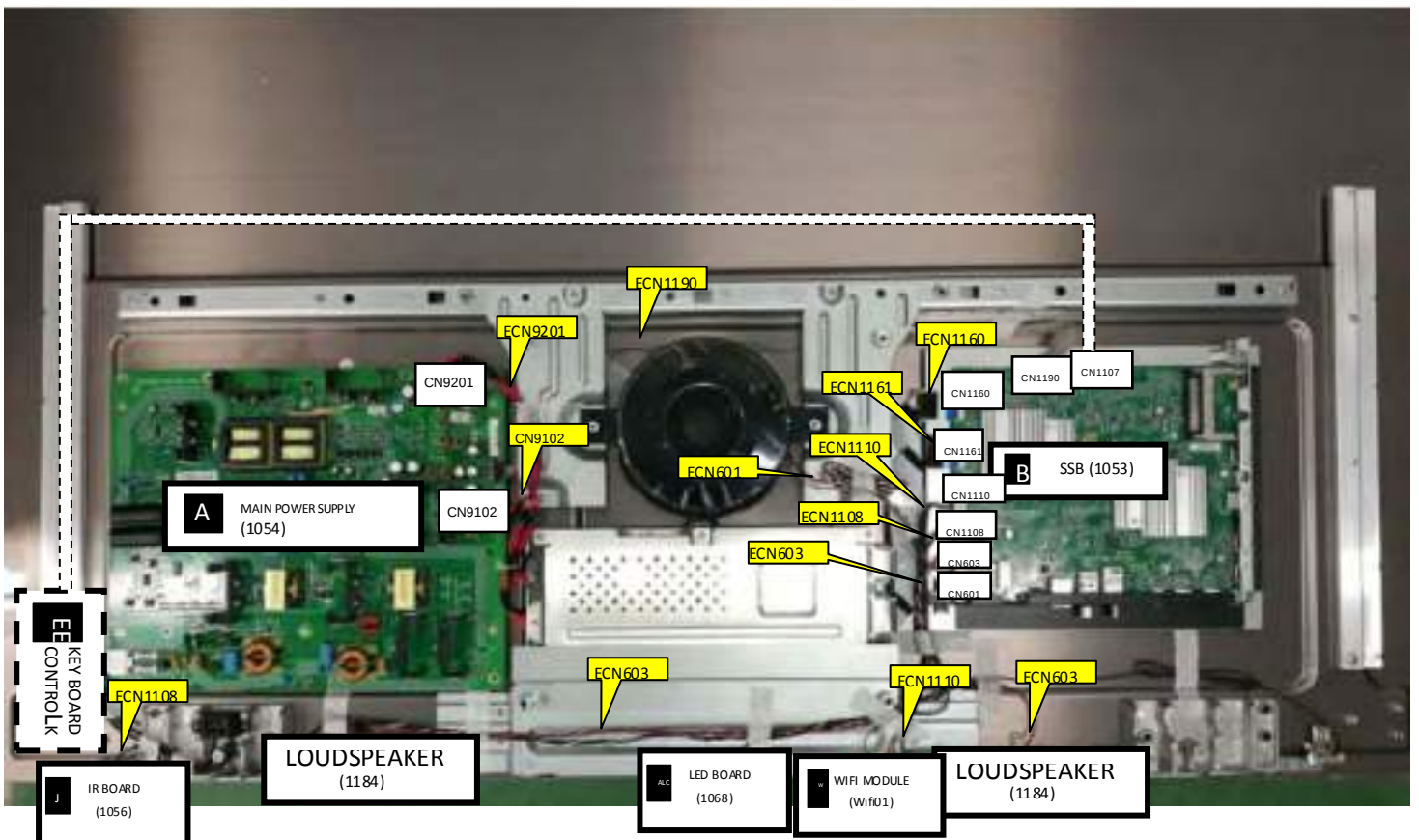
Cable dressing (65" 6412 series)



Cable dressing (49" 6482 series)



Cable dressing (49"/55"/65" 7502 series)



Cable dressing (55" 9002 series)

3.2 Assembly/Panel Removal

3.2.1 Stand removal

1. Remove the fixation screws [1] that secure the stand
2. Take the stand bracket out from the set.



3.2.2 IR board Control Unit

1. Unplug the connector from the SSB.
Caution: be careful, as these are very fragile connectors!
1. Remove all the fixation screws [1] and connector from the IR board control unit.
3. Remove the IR lens, IR board from the DECO_REAR_COVER.

When defective, replace the whole unit.



3.2.3 Rear Cover

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

1. Remove fixation screws [2] and [3] that secure the base assy..
2. Gently lift the rear cover from the TV. Make sure that wires and cables are not damaged while lifting the rear cover from the set.



(64x2 series)



(7502 series)

3.2.4 Keyboard Control Unit

1. Release the connector from the SSB Board.

Caution: be careful, the Keyboard is catch on the Back cover, please be careful to avoid damage the fragile connectors!

2. Remove all the fixation screws from the keyboard control panel [1] and take it out from the Back cover

When defective, replace the whole unit.



(49" 64x2 series)



(55" 64x2 series)



(55" 9002 series)

3.2.5 Small Signal Board (SSB)

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

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

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

2. Unplug all other connectors [2] .
3. Remove all the fixation screws from the SSB [3].
4. The SSB can now be shifted from side connector cover, then lifted and taken out of the I/O bracket.



3.2.6 Power Supply Unit (PSU)

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

1. Gently unplug all connectors from the PSU.

3. Remove all fixation screws from the PSU.
3. The PSU can be taken out of the set now.

3.2.7 Speakers

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

When defective, replace the both units.

3.2.8 WIFI module

1. Unplug the connector from the SSB..
2. Remove fixation screw that secure the WIFI module,

When defective, replace the whole unit.



3.2.9 LCD Panel

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

When defective, replace the whole unit.

4. Service Modes

4.1 Service Modes

The Service Mode feature is split into following parts:

- Service Alignment Mode (SAM).
- Factory Mode.
- Customer Service Mode (CSM). SAM and the Factory mode offer features, which can be used by the Service engineer to repair/align a TV set.

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

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

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

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

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).

4.2 Service Alignment Mode (SAM)

Purpose

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

Specifications

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

How to Activate SAM

To activate SAM, use one of the following methods:

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

After entering SAM, the following items are displayed,

with "SAM" in the upper right corner of the screen to indicate that the television is in Service Alignment Mode.

How to Navigate

- In the SAM menu, select menu items with the UP/DOWN keys on the remote control transmitter. The selected item will be indicated. When not all menu items fit on the screen, use the **UP/DOWN keys** to display the next/previous menu items.

- With the "LEFT/RIGHT" keys, it is possible to:
 - (De) activate the selected menu item.
 - (De) activate the selected sub menu.
 - Change the value of the selected menu item.
- When you press the MENU button once while in top level SAM, the set will switch to the normal user menu (with the SAM mode still active in the background).

How to Store SAM Settings

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

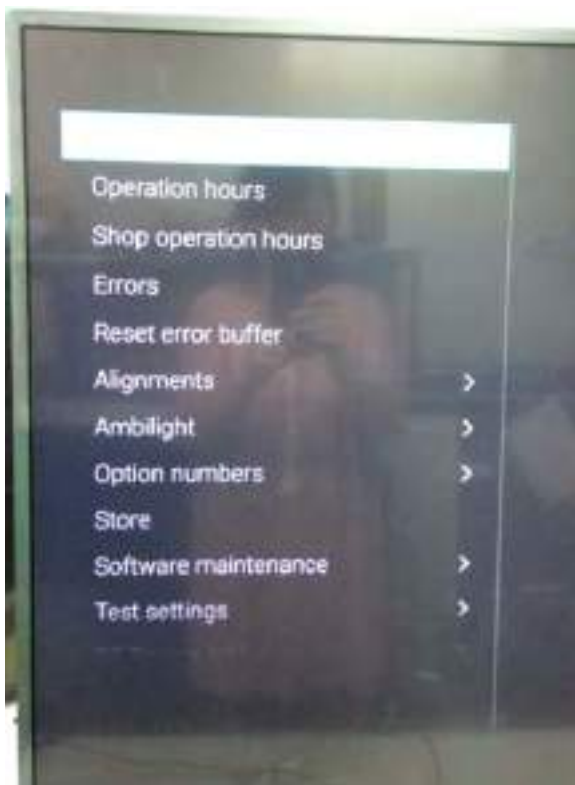
How to Exit SAM

Use one of the following methods:

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

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

SAM mode overview



4.3 Factory mode:

Purpose

- To perform extended alignments.

Specifications

- Displaying and or changing Panel ID information.
- Displaying and or changing Tuner ID information.
- Error buffer clearing.
- Various software alignment settings.
- Testpattern displaying.

- Public Broadcasting Service password Reset.
- etc.

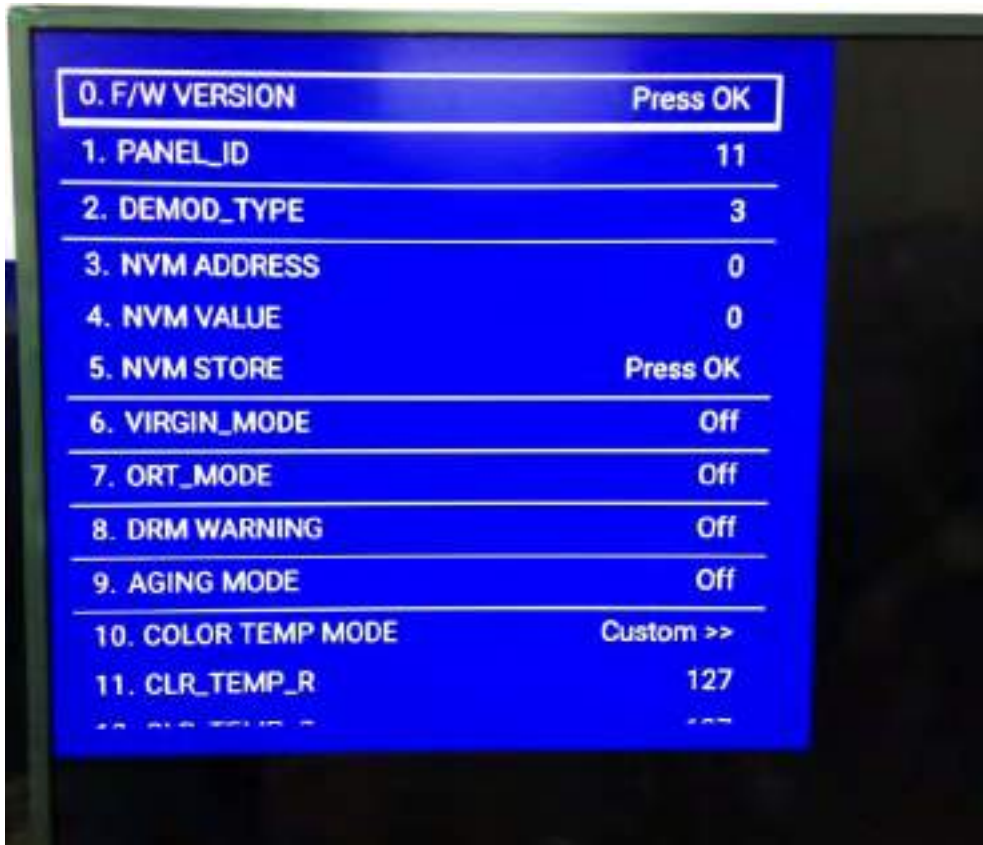
How to Activate the Factory mode

To activate the Factory mode, use the following method:

- Press the following key sequence on the remote control transmitter: from the “**menu/home**” press “**1999**”, directly followed by the “**Back/Return**” button. Do not allow the display to time out between entries while keying the sequence.

After entering the Factory mode, we can see many items displayed, use the **UP/DOWN** keys to display the next/previous menu items

Factory mode overview



How to Exit the Factory mode

Use one of the following methods:

- Select EXIT_FACTORY from the menu and press the “OK” button.

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

4.4 Customer Service Mode (CSM)

Purpose

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

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

Specifications

- Ignore “Service unfriendly modes”.

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

How to Activate CSM

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

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

CSM Overview



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. Software Upgrading, Error code and Panel Code

5.1 Software Upgrading

Step 1: Ready for F/W Upgrade

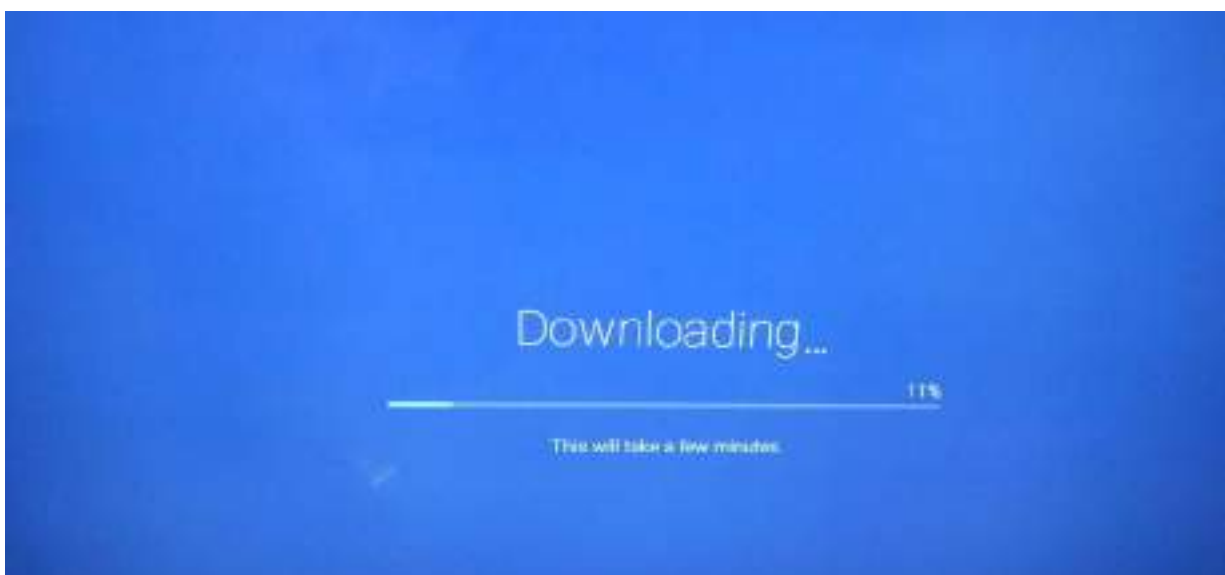
1. Rename the software as "autorun.upg"
2. Prepare a USB memory.
3. Copy the software to USB flash disk(root directory).

Note the version of this F/W before you change the software file name.

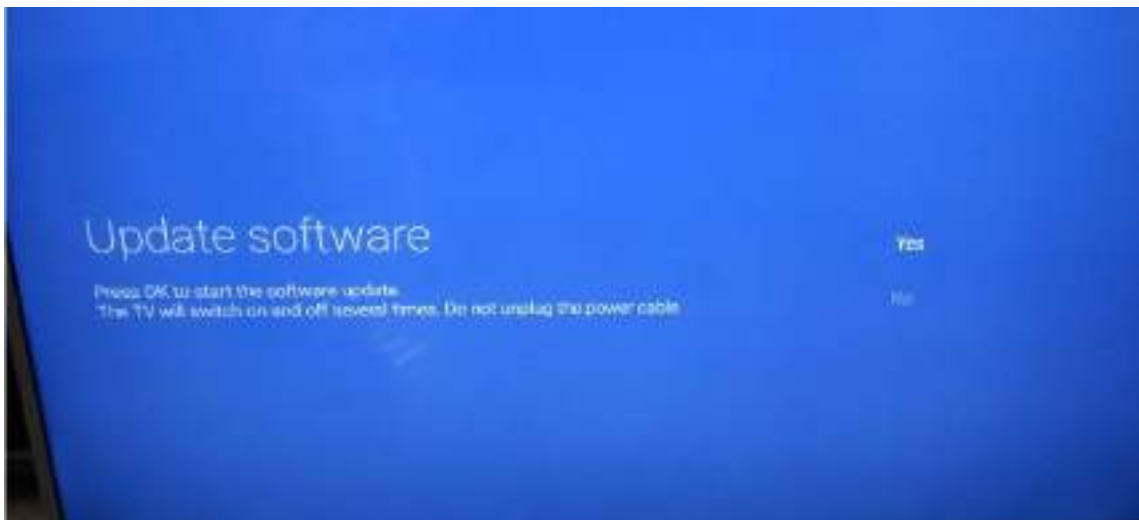


Step 2: F/W Upgrade

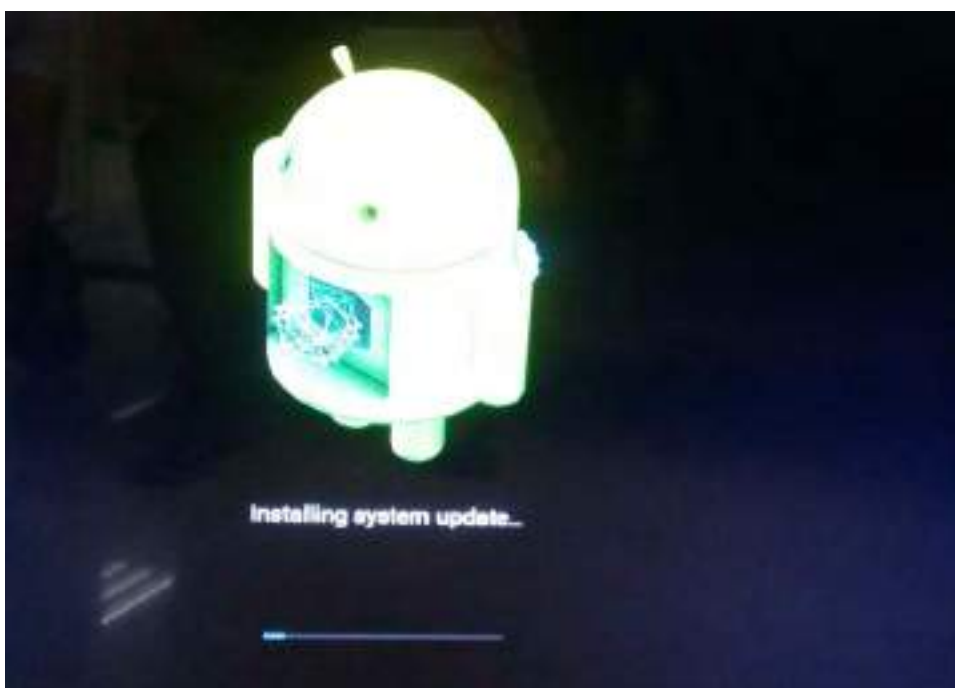
1. Plug the USB memory on the USB port on the side I/O port of TV (Please connect to USB 2.0 port, not recommend USB3.0 port)
2. AC on (Power plug)
3. TV will take a few minutes the downloading to detect the software, and then upgrade automatically as detect the software



4. Press OK to start software upgrade



5. Upgrade in progress



Step 3: Check the SW version

1. After burning software, TV will restart
2. Press "Menu+1999+back", enter Factory mode to check if the software version is correct

Caution: Please make sure that software upgrade is finished before unplug the USB and AC power!



5.2 Error Code

5.2.1 Introduction

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

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

The last five errors, stored in the NVM, are shown in the Service menu's. This is called the error buffer.

The error code buffer contains all errors detected since the last time the buffer was erased. The buffer is written from left to right. When an error occurs that is not yet in the error code buffer, it is displayed at the left side and all other errors shift one position to the right.

An error will be added to the buffer if this error differs from any error in the buffer. The last found error is displayed on the left.

An error with a designated error code never leads to a deadlock situation. It must always be diagnosable (e.g. error buffer via OSD or blinking LED).

In case a failure identified by an error code automatically results in other error codes (cause and effect), only the error code of the MAIN failure is displayed.

5.2.2 How to Read the Error Buffer

You can read the error buffer in three ways:

- On screen via the SAM/CSM (if you have a picture).

Example:

- **ERROR: 000 000 000 000 000:** No errors detected
- **ERROR: 013 000 000 000 000:** Error code 13 is the last and only detected error
- **ERROR: 034 013 000 000 000:** Error code 13 was detected first and error code 34 is the last detected (newest) error
- Via the blinking LED procedure (when you have no picture).

5.2.3 Error codes overview

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

Description	LAYER 1 error	LAYER 2 error	Monitored	Error	PC address	EB: In error buffer BL: Blinking LED	Device	Defective board
				Prot.				
PC BUSES								
DSP bus (00)	2	11	SOC	E	00	BL/EB	SSB	Audio DSP
AMP bus (01)	2	12	SOC	E	01	BL/EB	SSB	Audio DSP
SSB bus (0F)	2	13	SOC	E	0F	BL/EB	SSB	SSB
BE bus (3F)	2	14	SOC	E	3F	BL/EB	SSB	SSB
FE bus (2F)	2	17	SOC	E	2F	BL/EB	SSB	SSB
DISP bus (30)	2	18	SOC	E	30	BL/EB	SSB	Display
AMBI bus (31)	2	19	SOC	E	31	BL/EB	SSB	Proj AL
SOC doesn't boot (HW cause)	2	15	St-by µP	P	D4	BL	MT5593	SSB
Supply related								
12V	3	16	St-by µP	P		BL		Supply
SSB								
I2C switch (SSB bus)	9	24	SOC	E	E0	EB	PCA9540	Audio DSP
I2C switch (BE bus)	2	25	SOC	E	E0	EB	PCA9540	SSB
Channel dec	2	27	SOC	E	C8-CE	EB	Silab Si216x	SSB
Boston (HDMI2.2)	2	28	SOC	E	40	EB	SIL 9777	SSB
Lnb controller	2	31	SOC	E	10	EB	LNBH 25	SSB
Tuner	2	34	SOC	E	C0	EB	Si2161/AV 2019	SSB
Tuner - S2	2	35	SOC	E		EB		
Class - D 3 (DSP bus)	9	35	SOC	E	D8	EB	TAS 5760 LD	Audio DSP
Audio DSP	9	36	SOC	E	70	EB		Audio DSP
Class-D 1	2/9	37	SOC	E	D8	EB	TAS5760LD	SSB/Audio DSP
DSP EEPROM	9	38	SOC	E	A0	EB	Durango	Audio DSP
Class - D 2	2/9	39	SOC	E	DA	EB	TAS 5760 LD	SSB/Audio DSP
T ² sensor SSB	2	42	SOC	E	98	EB	LM 75	T ² sensor
Light sensor	6	43	SOC	E	52	EB	TSL2571	SET
B&O signal board	4	44	SOC	E		EB		
HDD XFS repair	8	45	SOC	E		EB		
DSP doesn't boot (SW cause)	9	52	SOC	E	70	EB	MT5593	Audio DSP
SOC doesn't boot (SW cause)	2	53	St-by µP	P	D4	BL	MT5593	SSB
FRC	2	61	SOC	E	34	EB	NT72324/72333	SSB
ASIC	2	62	SOC	E	84	EB	ASIC	SSB
Display	5	63	SOC	E	34	EB	InnoLux	Display

5.2.4 How to Clear the Error Buffer

The error code buffer is cleared in the following cases:

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

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

5.3 Panel Code

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 below tab. After resetting the Display Code, restart the set immediately.

CTN_ALT BOM#	Panel Type	Display Code	Setting Set Option Code
43PUS6412/05	TPT430U3-EQYSHM.G S1T	005	100
49PUS6412/05	TPT490U2-EQYSHM.G SC1T	006	101
49PUS6482/05	TPT490U2-EQYSHM.G SC1S	009	110
49PUS7502/05	TPT490U2-EQLSJA.G SC4E	011	112
55PUS7502/05	TPT550U2-EQLSKA.G S5A	012	113
55POS9002/05	LC550AQD-GJAB KR LGD	016	117
65PUS6412/05	TPT650UA-QVN06.U S300H	008	120
65PUS6412/05	TPT650U2-FN04.S SG01C	019	132
65PUS7502/05	TPT650UA-EQLSKM.G S5A	013	114

6. Circuit Descriptions

6.1 Introduction

The TPM17.3E LA is a new chassis launched in EU in 2017. The whole range is covered by MT5596UGIJ+ NT72333/NT72334 platform. The major deltas versus its predecessor support DVB-C, DVB-T, DVB-T2, DVB-S, DVB-S2 with also USB3.0, WIFI/multi-media, Video out

The TPM17.3E LA chassis comes with the following stylings:

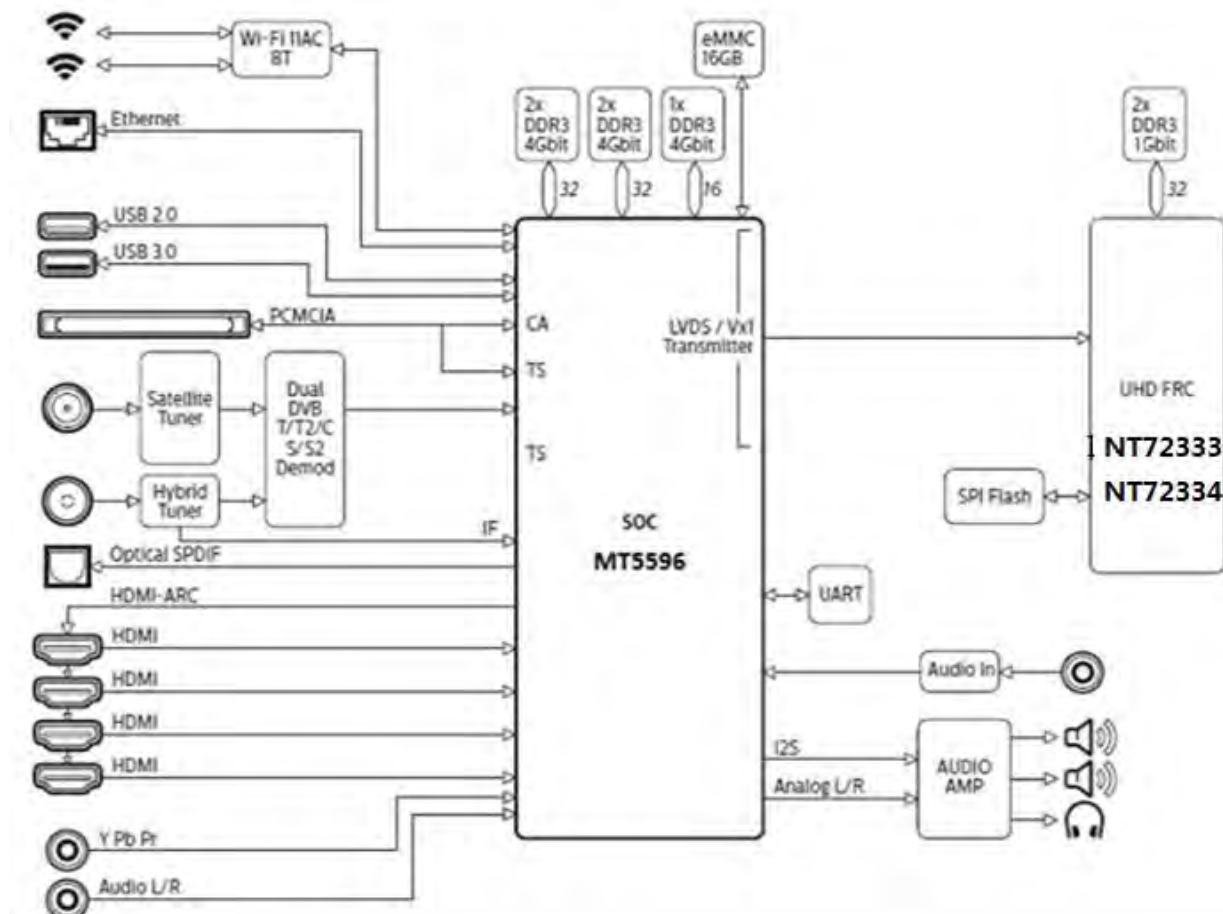
- series xxPUS64x2/xx
- series xxPUS7x02/xx
- OLED 55POS9002/12

6.1.1 Implementation

Key components of this chassis are:

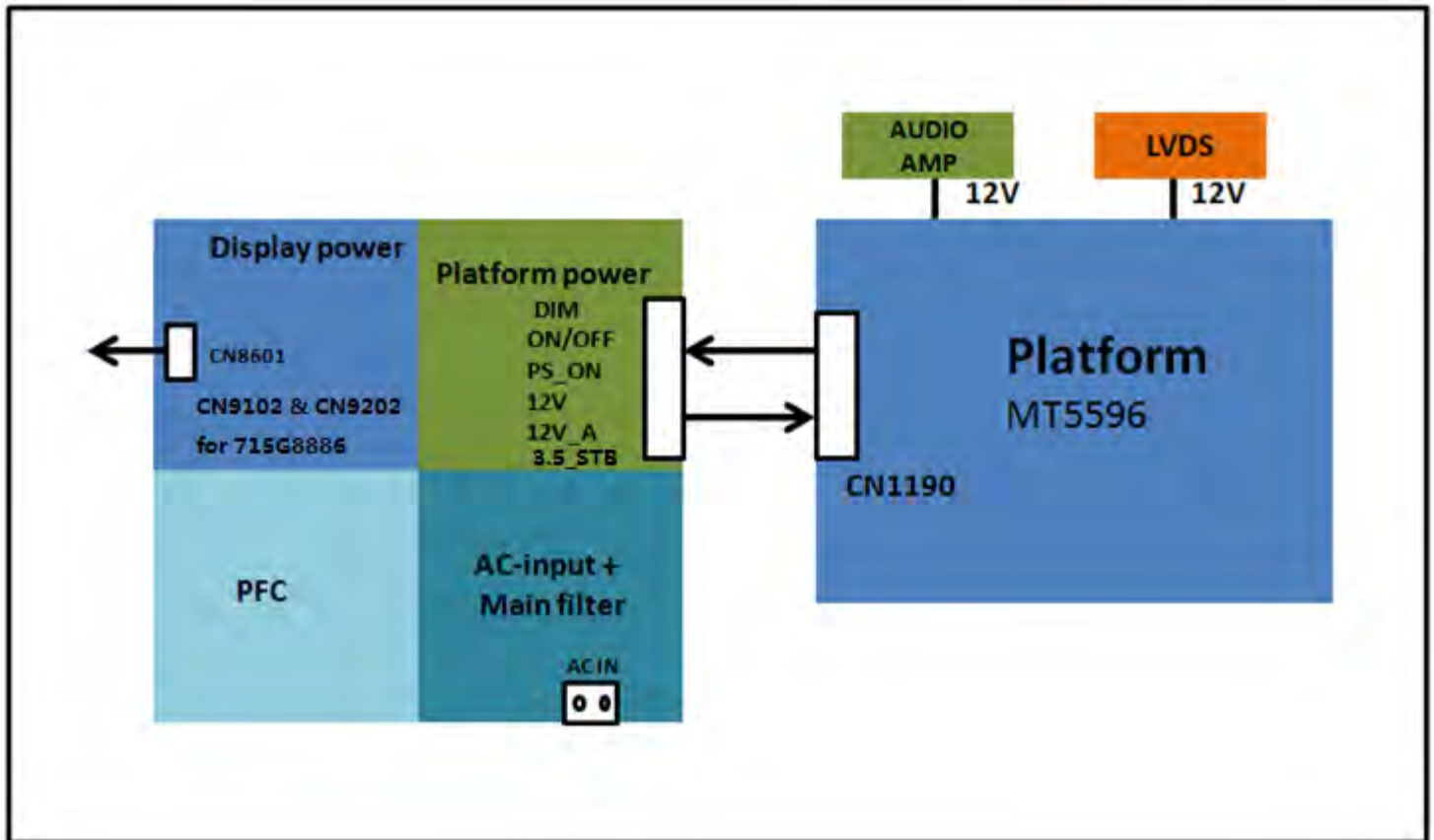
- SCALER MT5596UGIJ HSBGA-899
- SCALER NT72333TBG/BA TFBGA_484
- SCALER NT72334TBG/BA HSBGA-670
- DEMODULATOR SI2169-D60-GMR QFN-48
- FLASH MX25L1606EM2I-12G 16Mb SOP-8(200m)
- EMMC THGBMHG7C2LBAIL 16GB BGA-153
- AUDIO TAS5760LDDCAR 20W TSSOP-48
- TUNER EUROPE TDSY-G480D
- TUNER EUROPE TDQS-A701F

6.1.2 Block diagram



6.2 Power Supply

Power architecture of this platform.



6.2.1 Power Supply Unit

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

Consult the Philips Service web portal for the order codes of the boards.

Important delta's with the platform are:

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

The control signals are:

- PS-ON
- Lamp "on/off"
- DIM (PWM) (not for PSDL)

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

- +12 output (on-mode)
- +3V5_STB (on-standby)
- +12V_audio (audio AMP power)
- Output to the display; in case of
 - IPB: High voltage to the LCD panel
 - PSL and PSLS (LED-driver outputs)
 - PSDL (high frequent) AC-current.

6.2.2 Diversity

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

The following displays can be distinguished:

- CCFL/EEFL backlight: power panel is conventional IPB
- LED backlight:

- side-view LED without scanning: PSL power panel
- side-view LED with scanning: PSLS power panel
- direct-view LED without 2D-dimming: PSL power panel
- direct-view LED with 2D-dimming: PSDL power panel.

PSL stands for **P**ower **S**upply with integrated LED-drivers.

PSLS stands for a **P**ower **S**upply with integrated LED-drivers with added **S**canning functionality (added microcontroller).

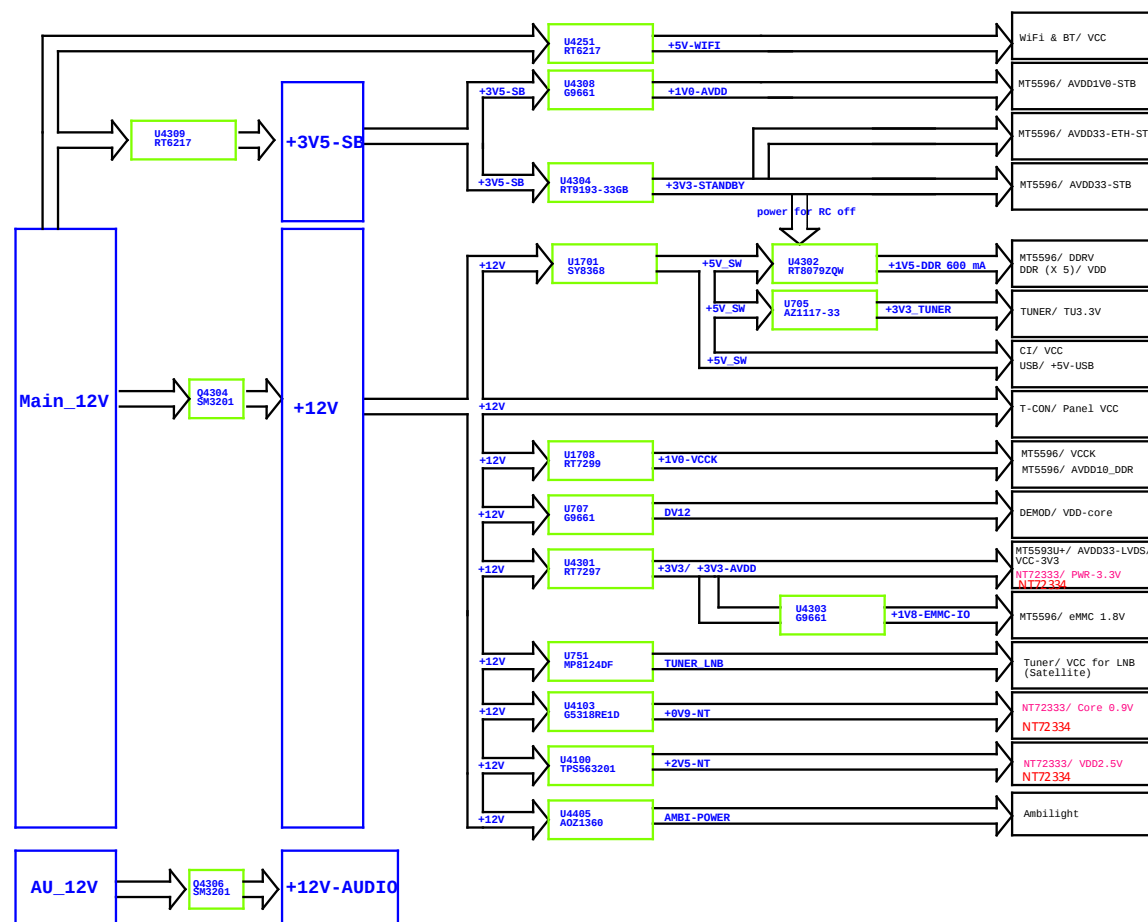
PSDL stands for a **P**ower **S**upply for **D**irect-view **L**ED backlight with 2D-dimming.

6.3 DC/DC Converters

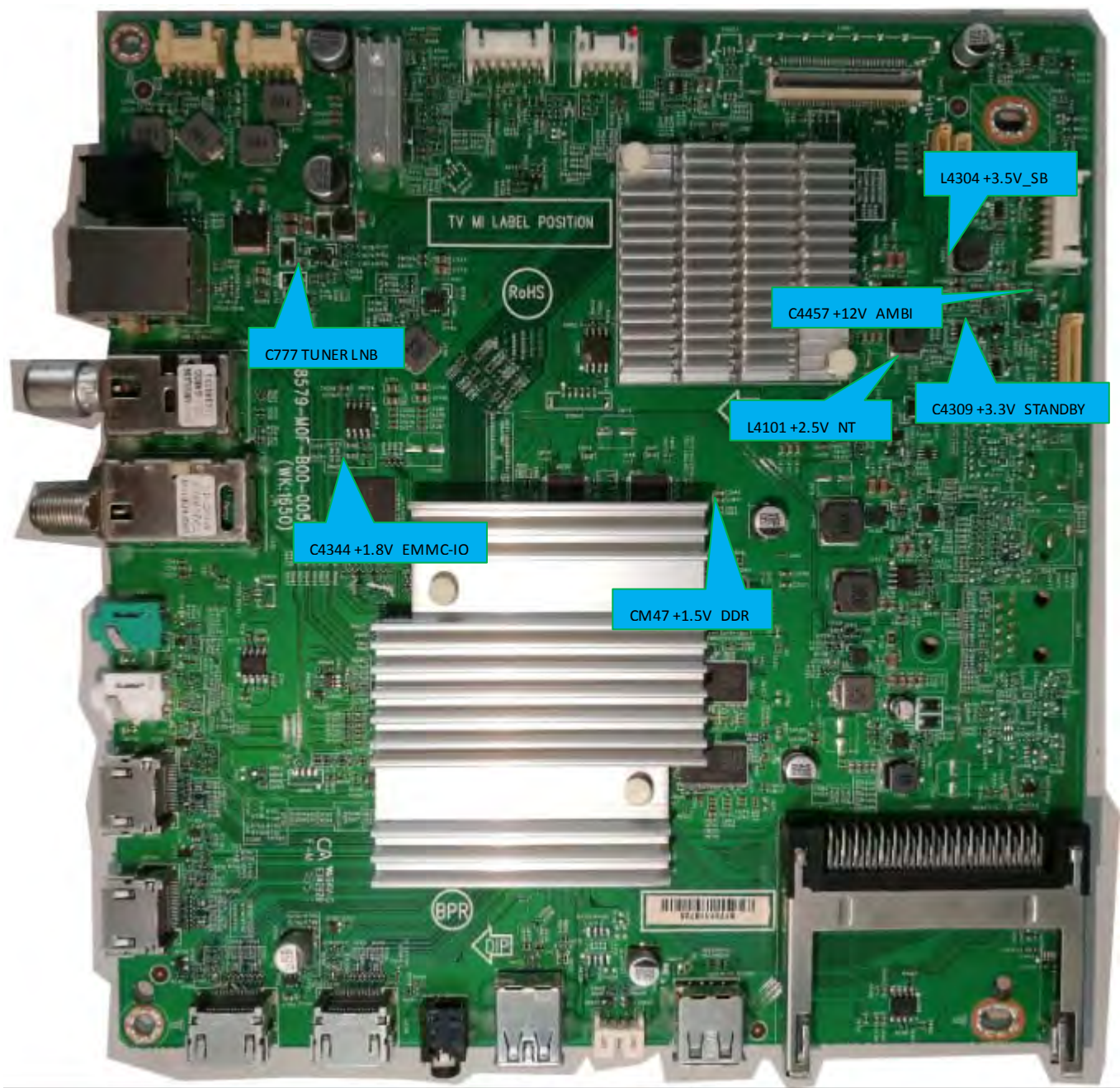
The on-board DC/DC converters deliver the following voltages(depending on set execution):

- +3V5-SB, permanent voltage for the Stand-by Power system
- +3V3-STANDBY,voltage for IR/Key board
- +12V, input from the power supply for the panel common(active mode)
- +12V, input from the power supply for LNB supply
- +3V3-EMMC, voltage for EMMC when TV on
- +1V8 -EMMC-IO, voltage for EMMC when TV on
- +1V5-DDR, voltage for DDR
- TUNER_3V3, supply voltage for tuner
- +5V-SW, input intermediate supply voltage for USB Power
- +12V-AUDIO1 for the AUDIO AMP
- +3.3VA_T2, +1.2V_T2 voltage for Demodulator IC channel decoder
- +5V-WIFI,voltage for WIFI

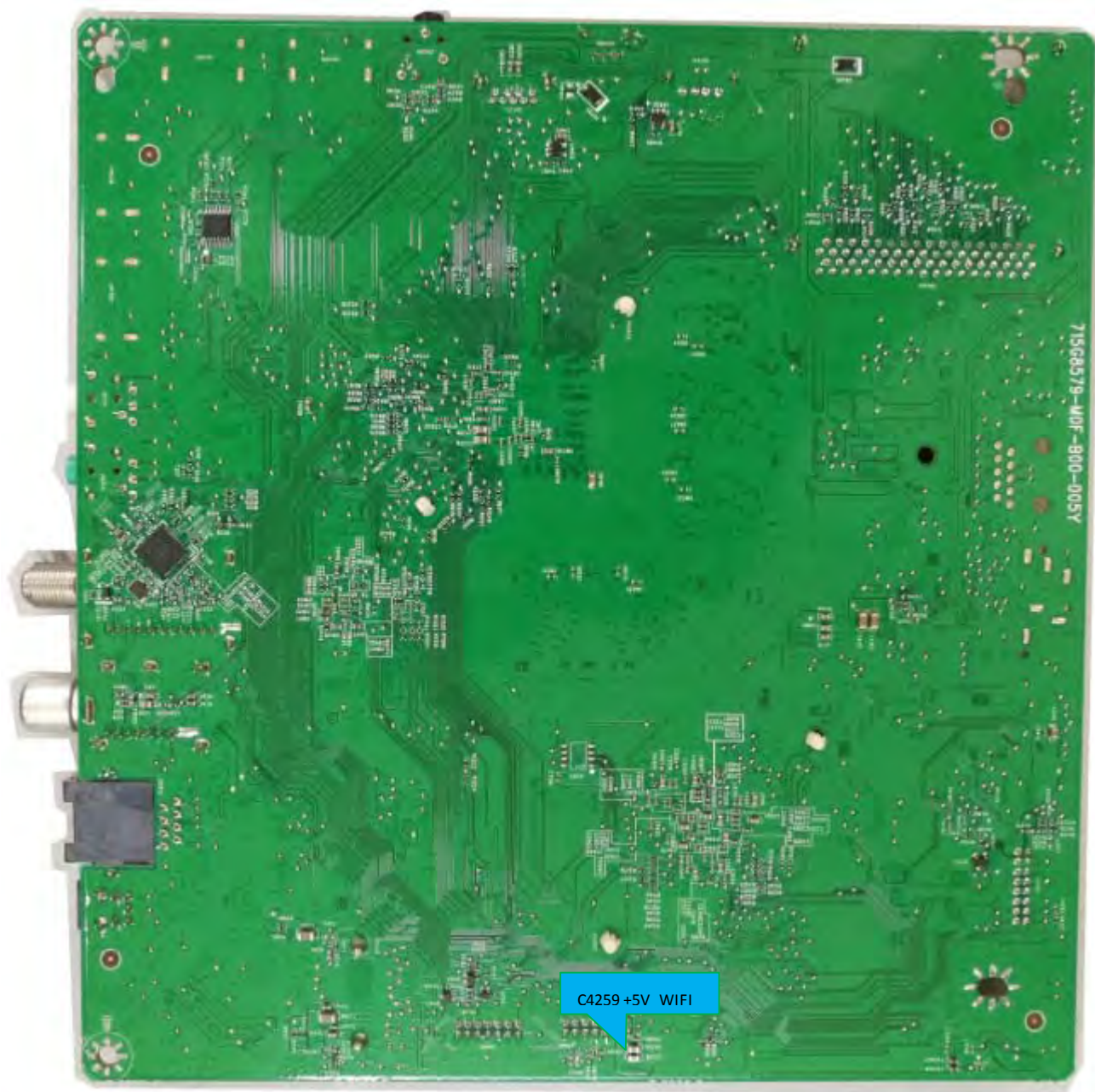
6.3.1 Power tree



6.3.2 Power layout SSB



Power SSB Top View



Power SSB Bottom View

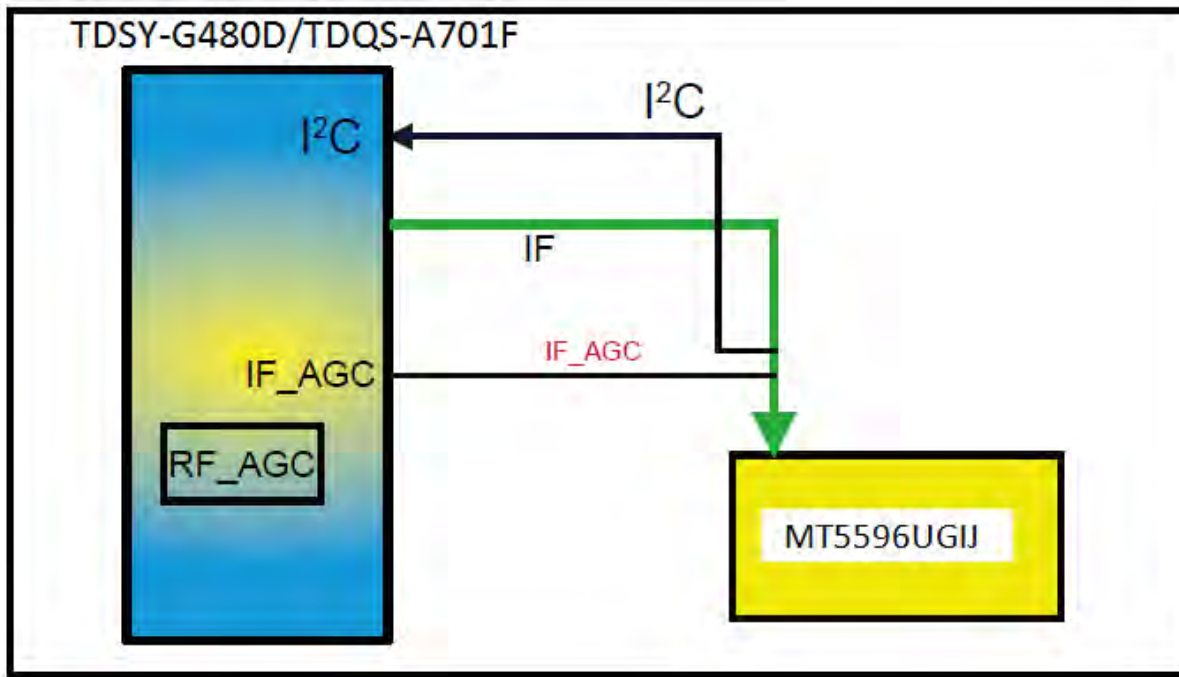
6.4 Front-End Analogue and DVB-T, DVB-C, DVB-S;ISDB-T reception

6.4.1 DVB-C part

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

- TUNER EUROPE TDSY-G480D
- TUNER EUROPE TDQS-A701F
- SCALER MT5596UGIJ HSFBSGA-899

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

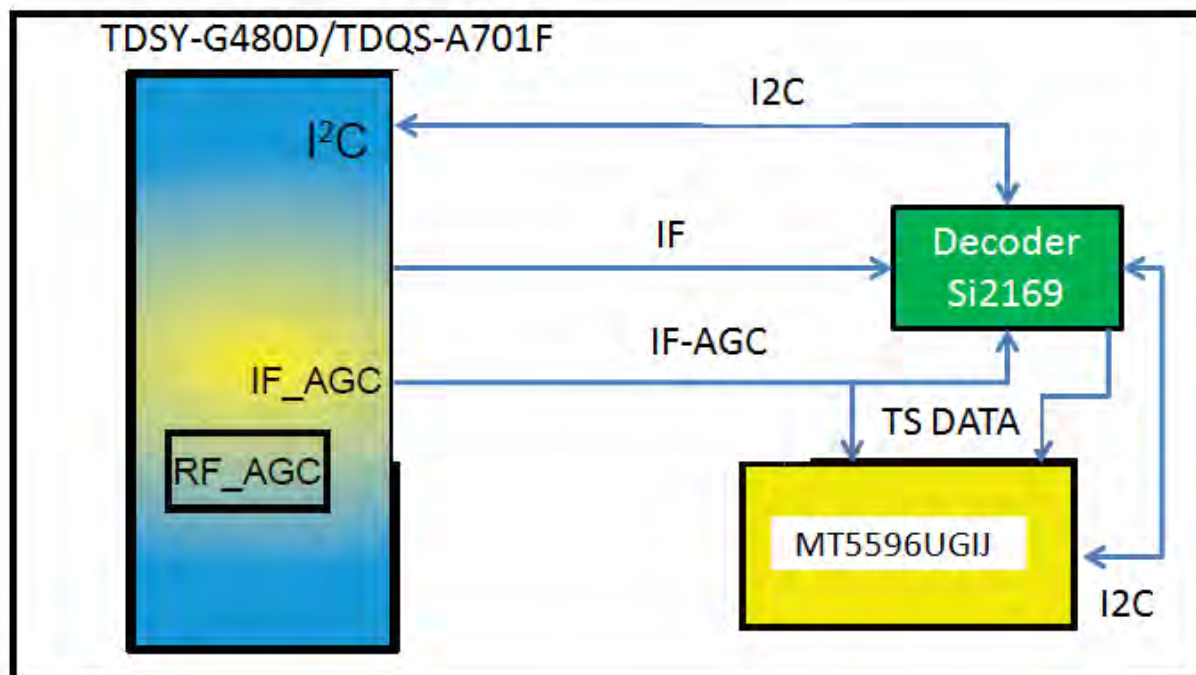


6.4.2 DTB-T/T2 part

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

- TUNER EUROPE TDSY-G480D
- TUNER EUROPE TDQS-A701F
- SCALER MT5596UGIJ HSFBSGA-899
- DEMODULATOR Si2169-C60-GMR QFN-48

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

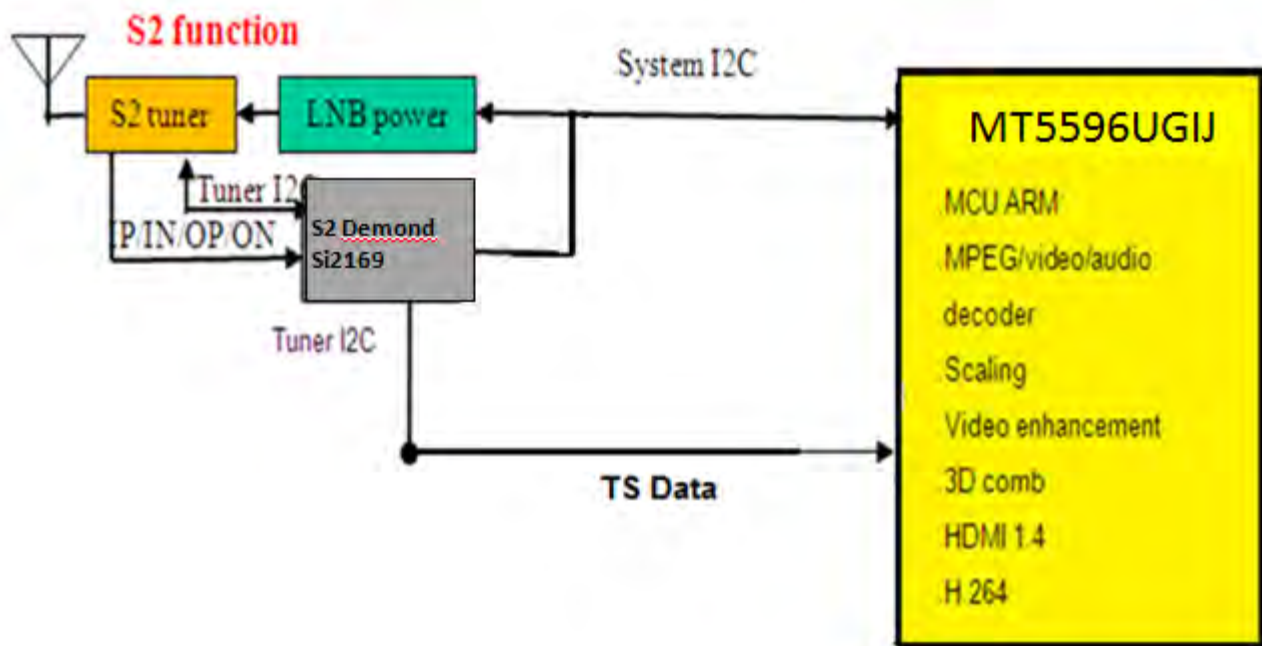


6.4.3 DTB-S2 part

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

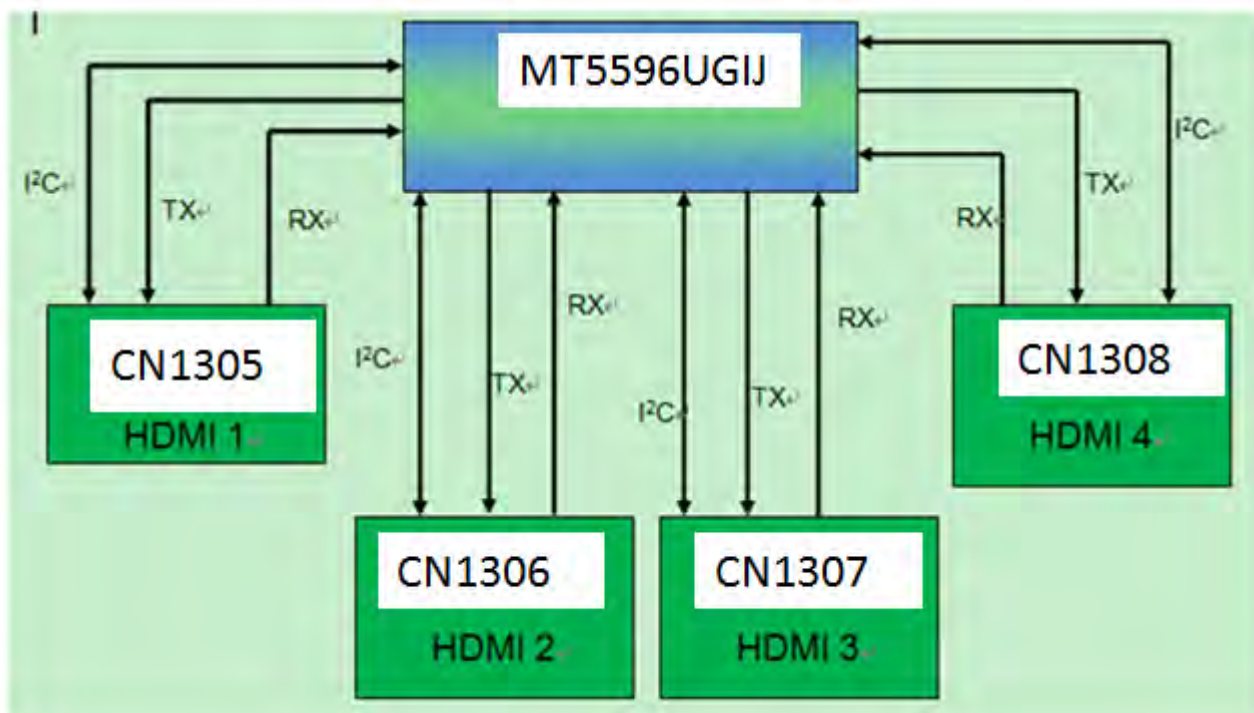
- TUNER EUROPE TDSY-G480D
- TUNER EUROPE TDQS-A701F
- SCALER MT5596UGIJ HSF BGA-899
- DEMODULATOR Si2169-C60-GMR QFN-48

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



6.5 HDMI

Refer to below for the application.



The following HDMI connector can be used:

- HDMI 1: HDMI input (TV digital interface support HDMI1.4/HDCP1.3) with digital audio/PC DVI input/ARC
- HDMI 2: HDMI input (TV digital interface support HDMI1.4/HDCP1.3) with digital audio/PC DVI input/ARC
- HDMI 3: HDMI input (TV digital interface support HDMI1.4/HDCP1.3) with digital audio/PC DVI input/ARC
- HDMI 4: HDMI input (TV digital interface support HDMI1.4/HDCP1.3) with digital audio/PC DVI input/ARC
- +5V detection mechanism
- Stable clock detection mechanism
- MHL 2.0 function only for HDMI4
- Audio return channel(ARC)
- TMDS output control
- HPD control
- CEC control

6.6 Video and Audio Processing - MT5596UGIJ

The MT5596UGIJ is the main audio and video processor (or System-on-Chip) for this platform. It has the following features:

- Worldwide multi-standard analog TV demodulator
- DVB-T/DVB-C /ISDB-T demodulators
- UHD@60Hz direct drive
- Powerful CPU core
- 3D graphic support OpenGL ES 1.1/2.0/3.0/3.1
- A transport de-multiplexer
- A multi-standard video decoder (including VP9)
- Rich format audio codec
- H.264 & VP8 encoder
- HDMI 2.0 receiver with 3D support
- MHL 3.0 & Standby Charging
- 2D/3D converter
- Ethernet MAC+PHY
- Local dimming (LED backlight)
- Two-link LVDS, V-by-one

The MediaTek MT5596UGIJ family consists of a DTV front-end demodulator, a backend decoder and a TV controller and offers high integration for advanced applications. It integrates a transport de-multiplexer, a high definition video decoder, an audio decoder, a two-link LVDS transmitter, a V-by-One transmitter, and a NTSC/PAL/SECAM TV decoder with a 3D comb filter (NTSC/PAL). The MT5596UGIJ enables consumer electronics manufacturers to build high quality, low cost and feature-rich DTV.

World-Leading Audio/Video Technology: The MT5596UGIJ supports Full-HD MPEG1/2/4/h.264/DiviX/VC1/RM/AVS/VP6/VP8 and UHD H.264/AVC, H.265/HEVC, VP9 video decoder standards, and JPEG. The MT5596UGIJ also supports MediaTek MDDiTM de-interlace solution which can reach very smooth picture quality for motions. A 3D comb filter added to the TV decoder recovers great details for still pictures. The special color processing technology provides a natural, deep colors and true studio quality video. Moreover, the MT5596UGIJ family has built-in high resolution and high-quality audio codec.

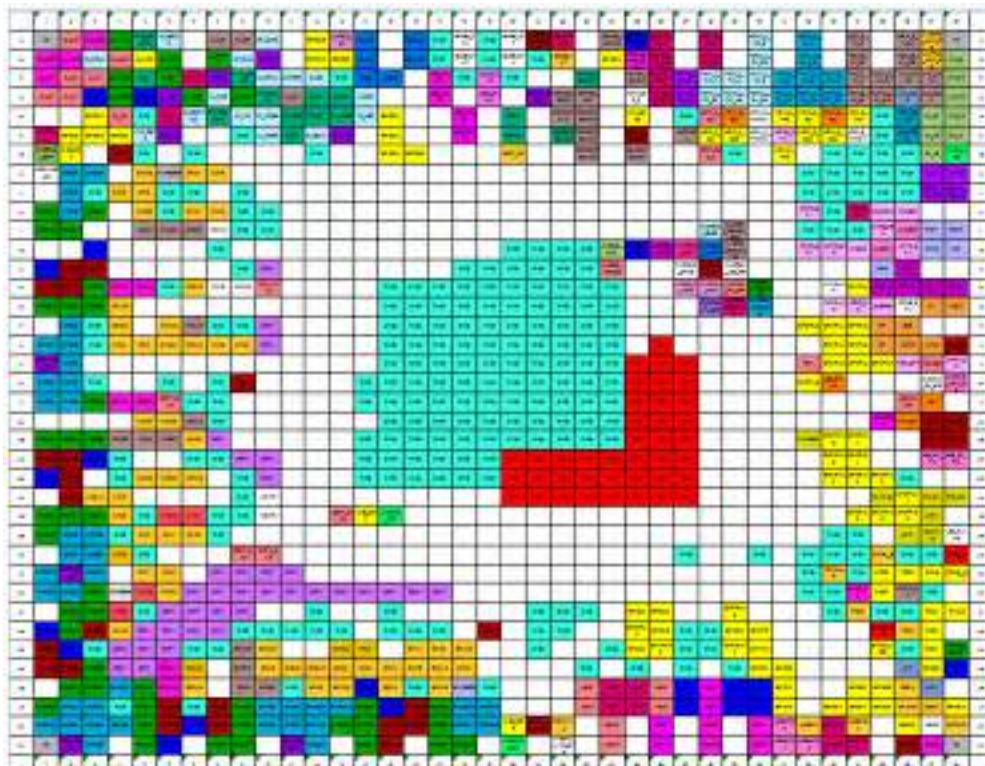
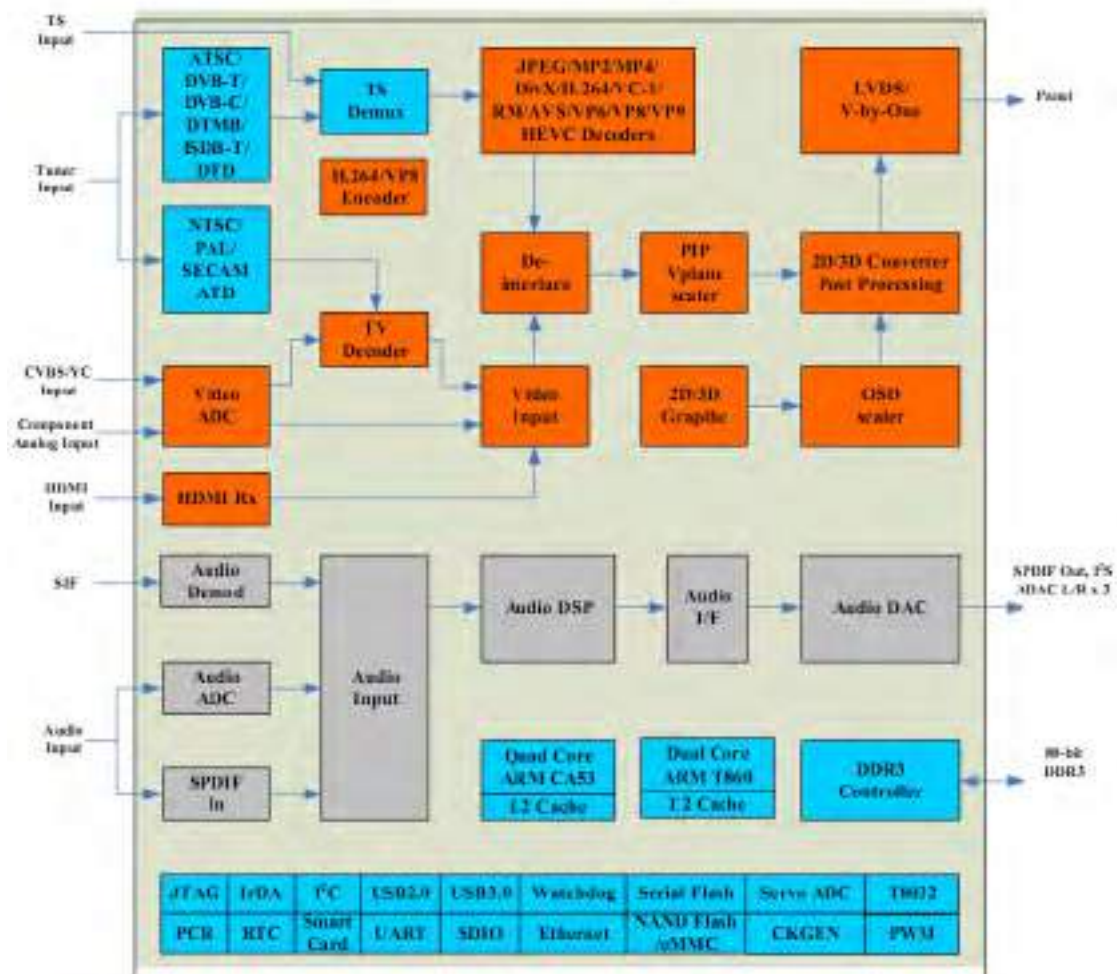
Rich Features for High Value Products: The MT5596UGIJ family enables true single-chip experience. It integrates high-quality HDMI2.0, high speed VGA ADC, two-link LVDS, V-by-One, USB2.0/3.0 receiver, Ethernet MAC+PHY, Quad core CPU and 512K bytes L2 cache, OpenGL ES 1.1/2.0/3.0/3.1, OpenCL 1/0/1.1/1.2 compliant 3D graphic engine, and DVB-T/DVB-C /ISDB-T demodulators.

All New UHD@60Hz Experience: The MT5596UGIJ family provides consumers with UHD 60Hz direct drive.

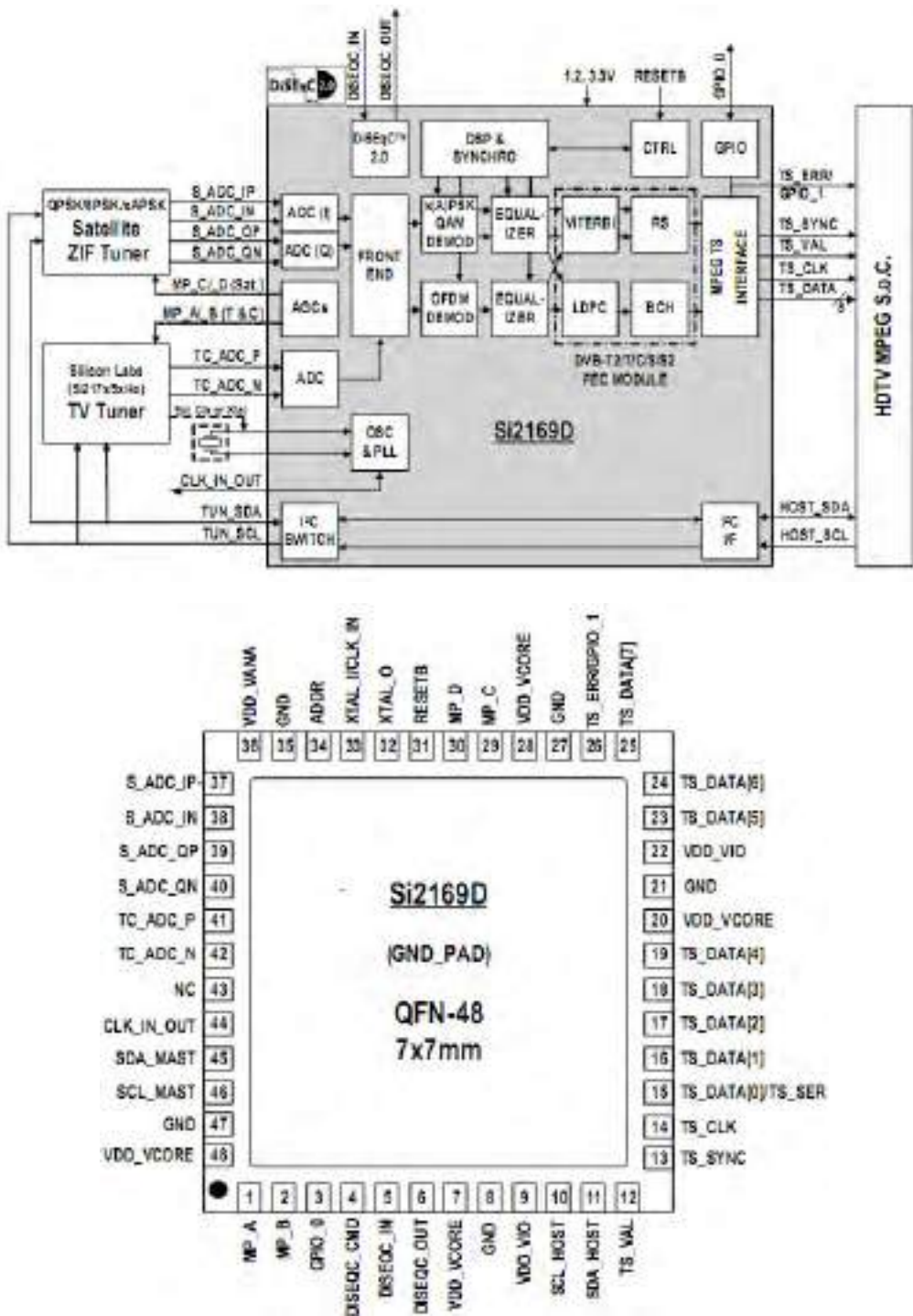
VW Common Platform Capability: The MT5596UGIJ family supports, DVB-T, DVB-C, and ISDB-T demodulation functions. It reserves transport stream inputs for external demodulators for other countries or areas. TV maker can easily port the same UI to worldwide TV models. First-class adjacent and co-channel rejection capability grants excellent reception. Professional error-concealment provides stable, smooth and mosaic-free video quality.

7.1 MT5596UGIJ (IC U9400)

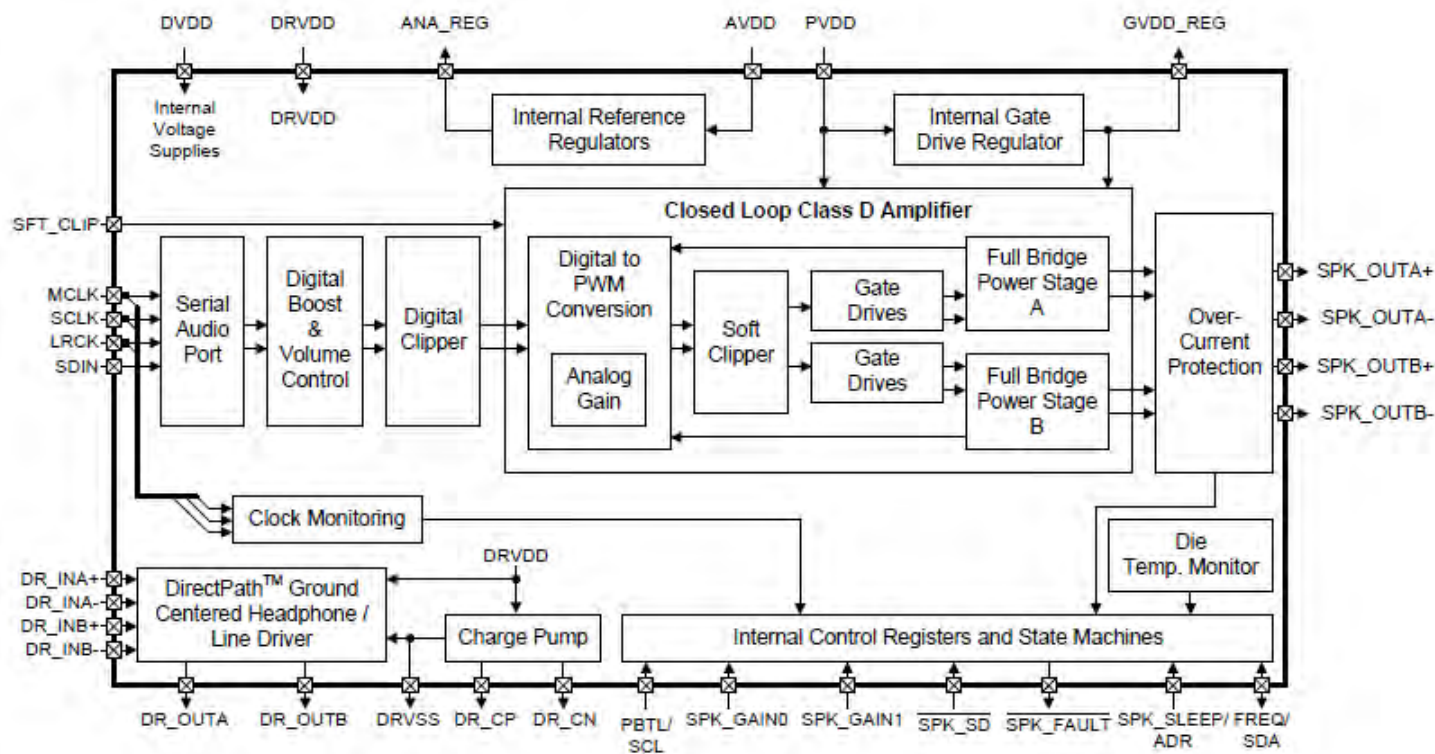
7.1 MT5596UGIJ (IC U9400)



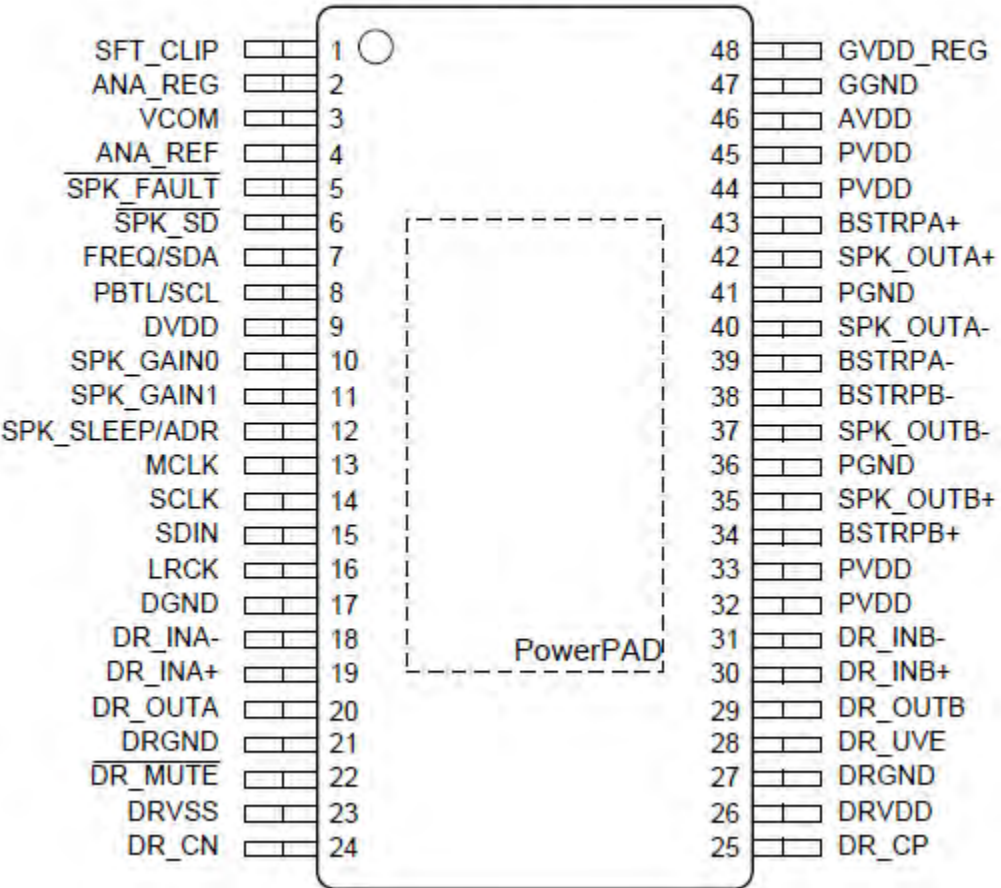
7.2 NT72333TBG/BA (IC U3100)



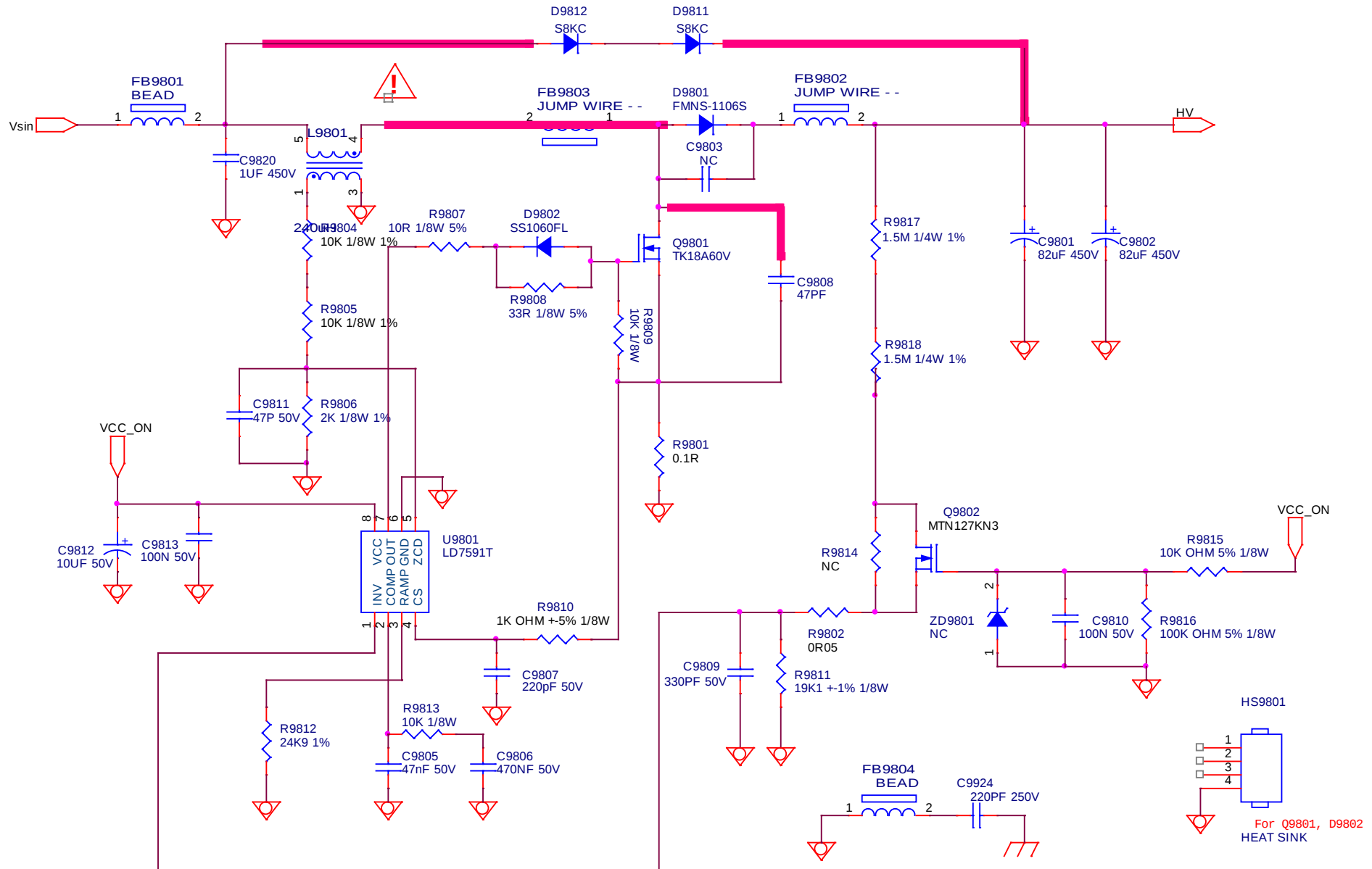
7.3 TAS5760LDDCAR (IC U5100)



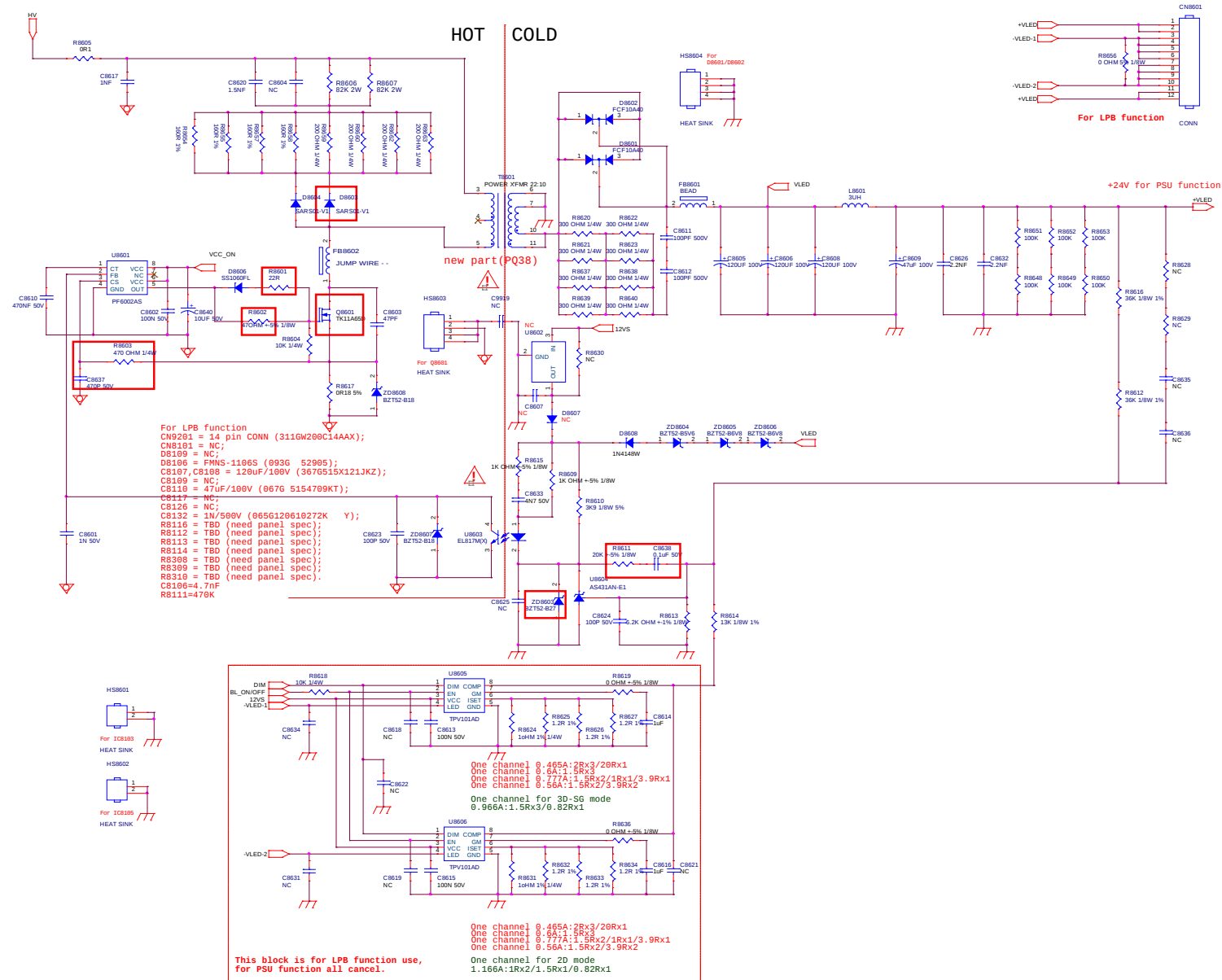
TSSOP PACKAGE
DCA-48
(TOP VIEW)



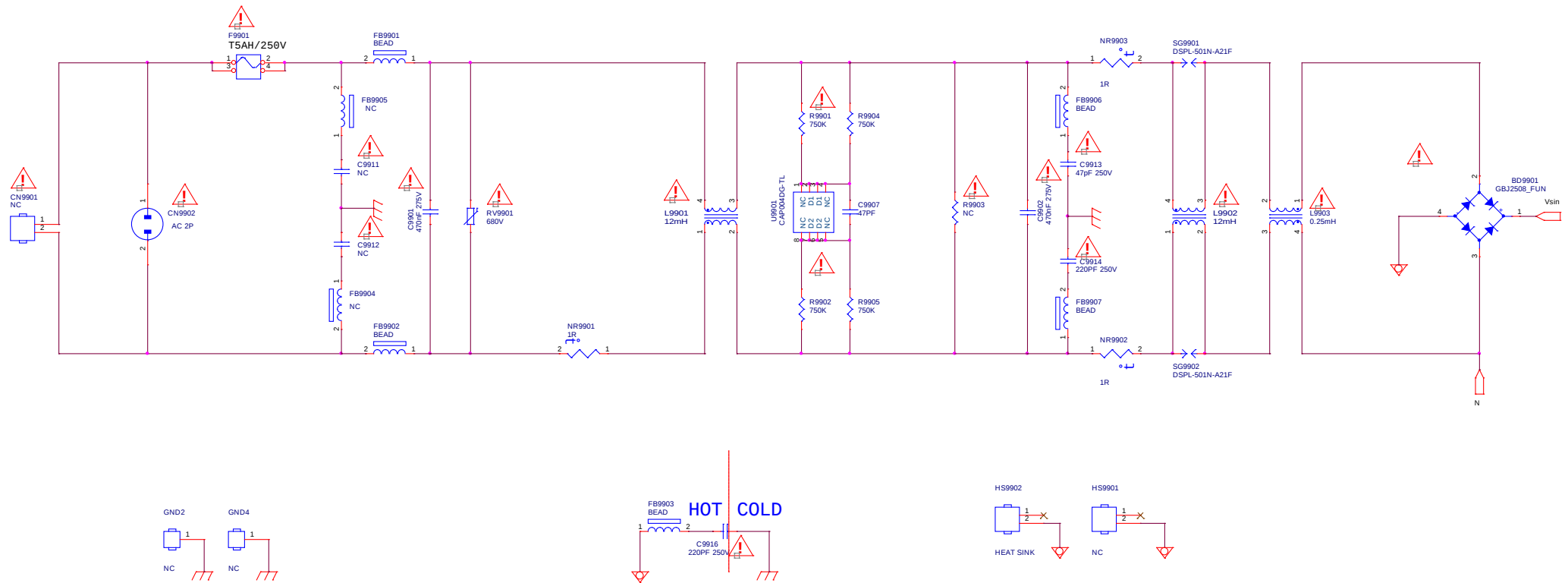
8-1-2 PFC



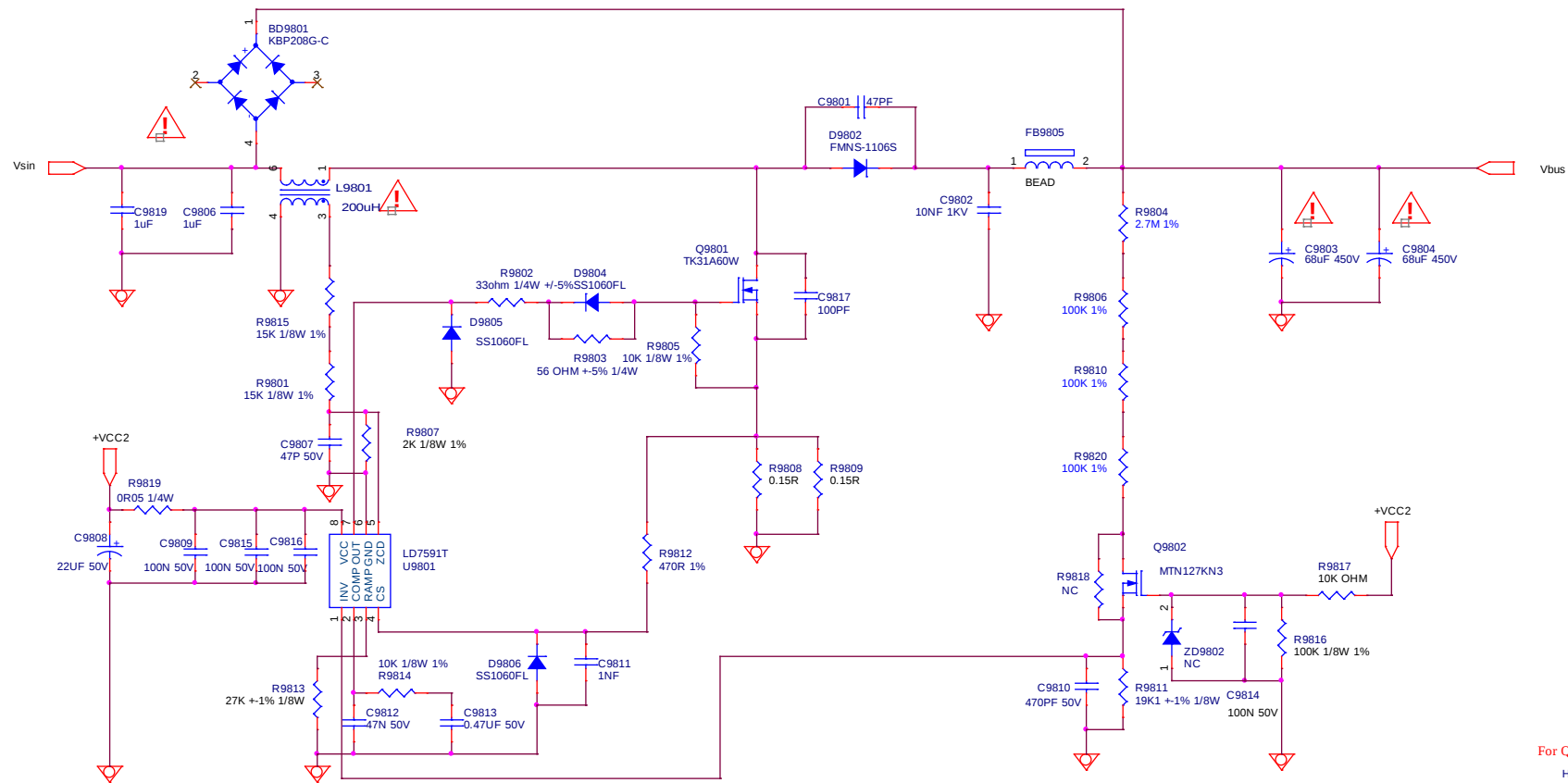
8-1-4 LED



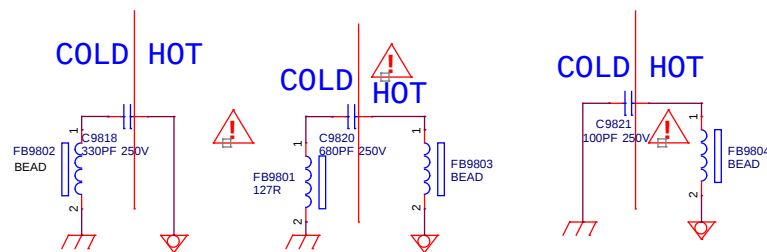
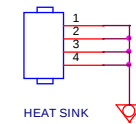
8-2-1 AC Input



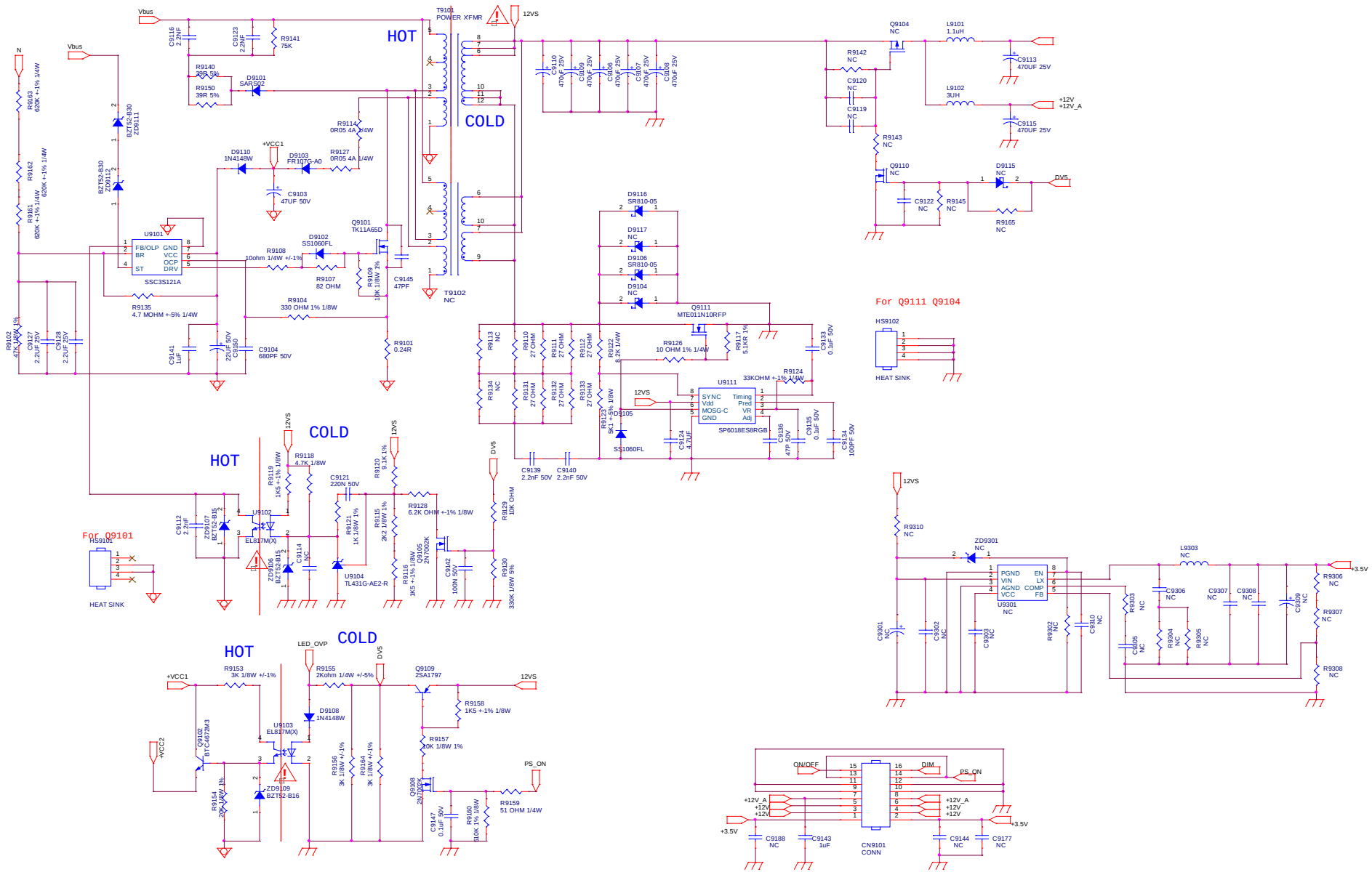
8-2-2 PFC LD7591T



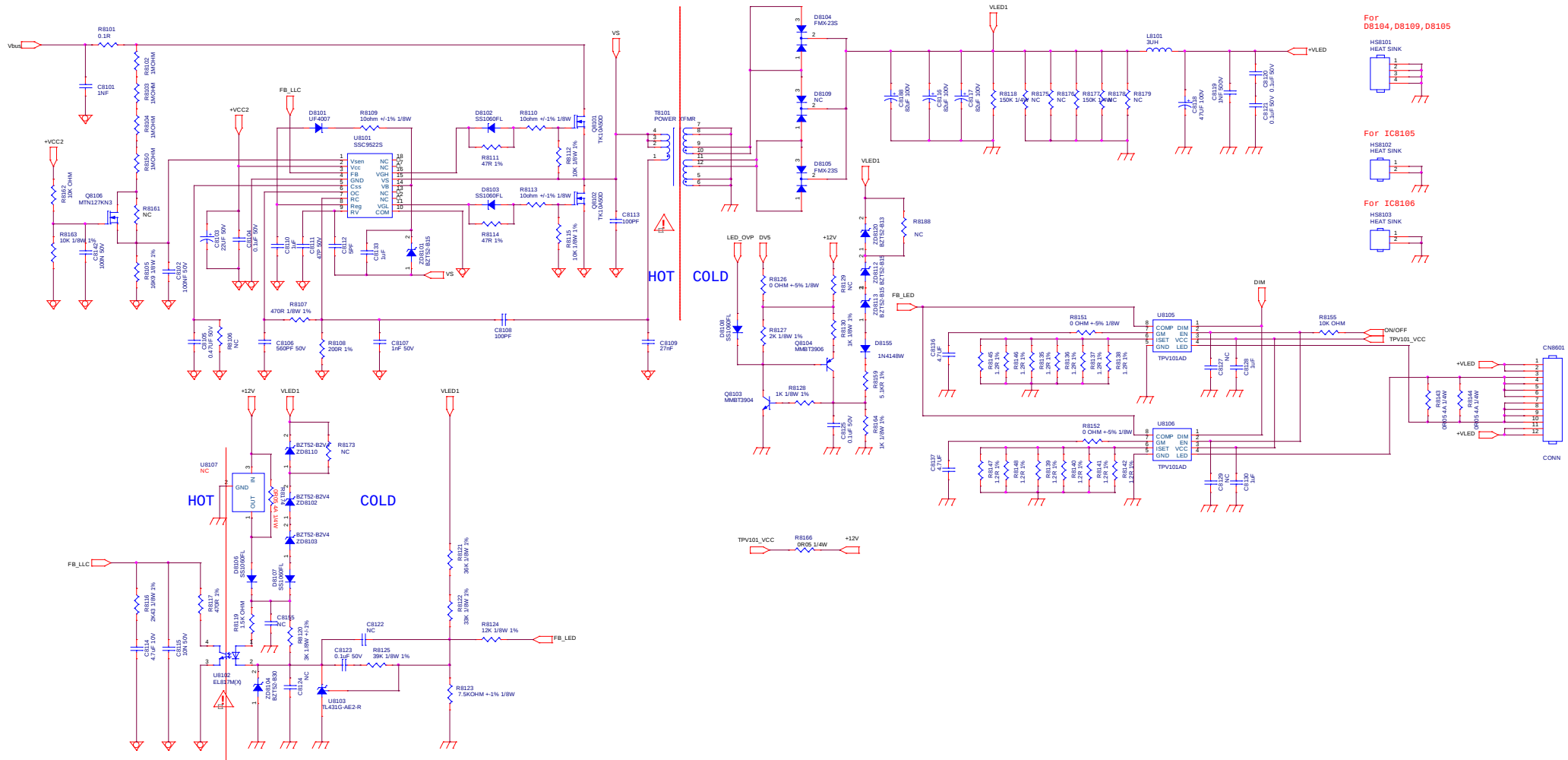
For Q9801/D9802
HS9801



8-2-3 Main power SSC3S121A

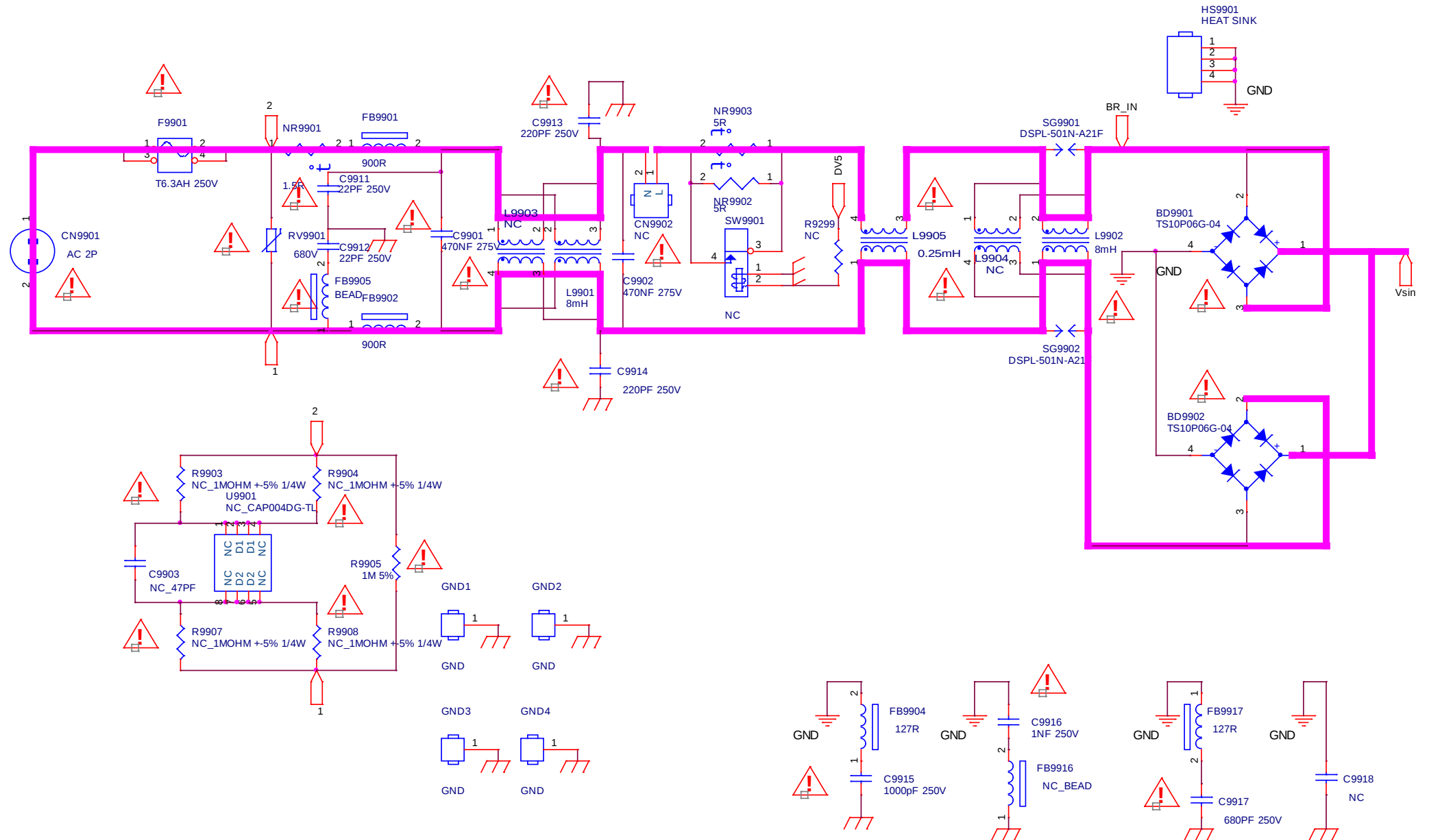


8-2-4 LED Driver SSC9522S

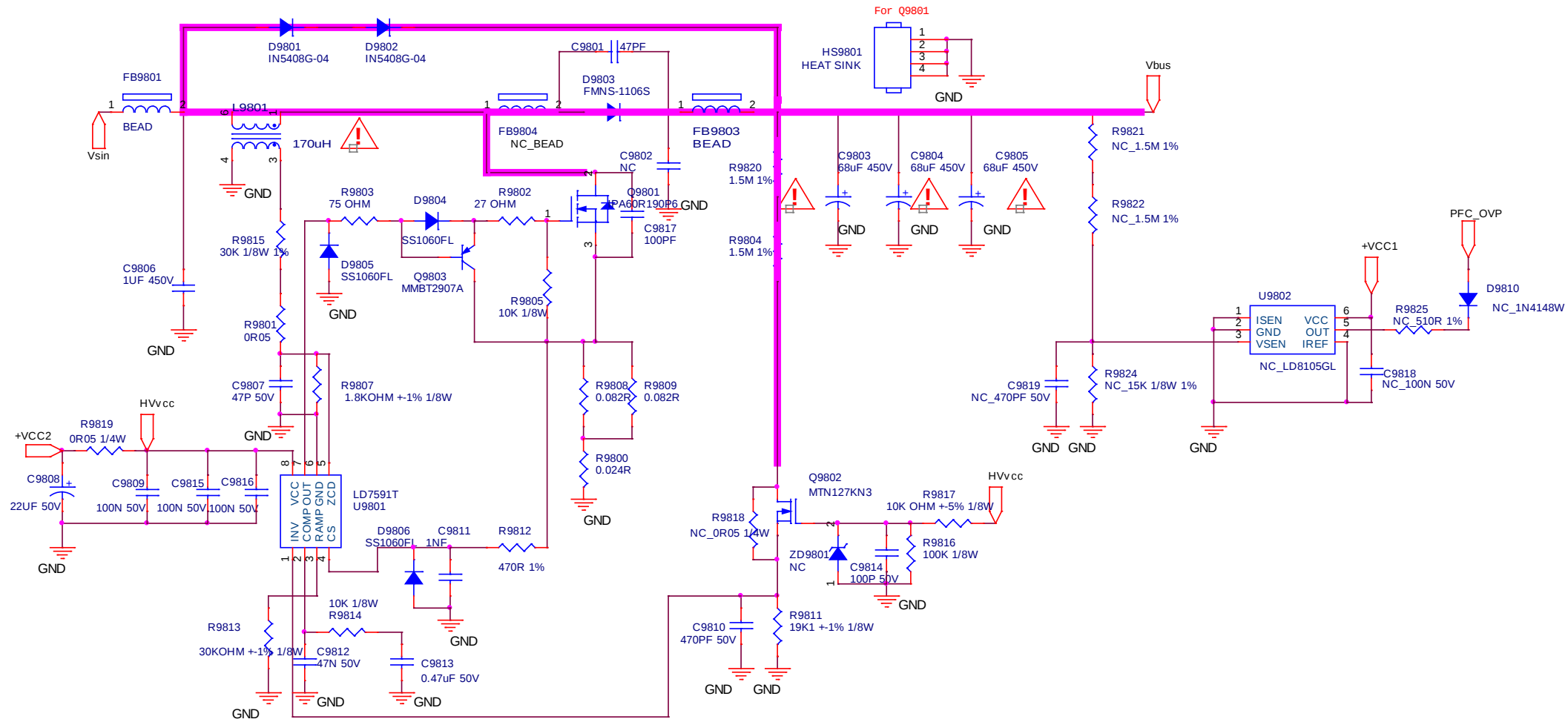


8.3 A 715G8682 PSU(For 65" 6412/ 7502 Series)

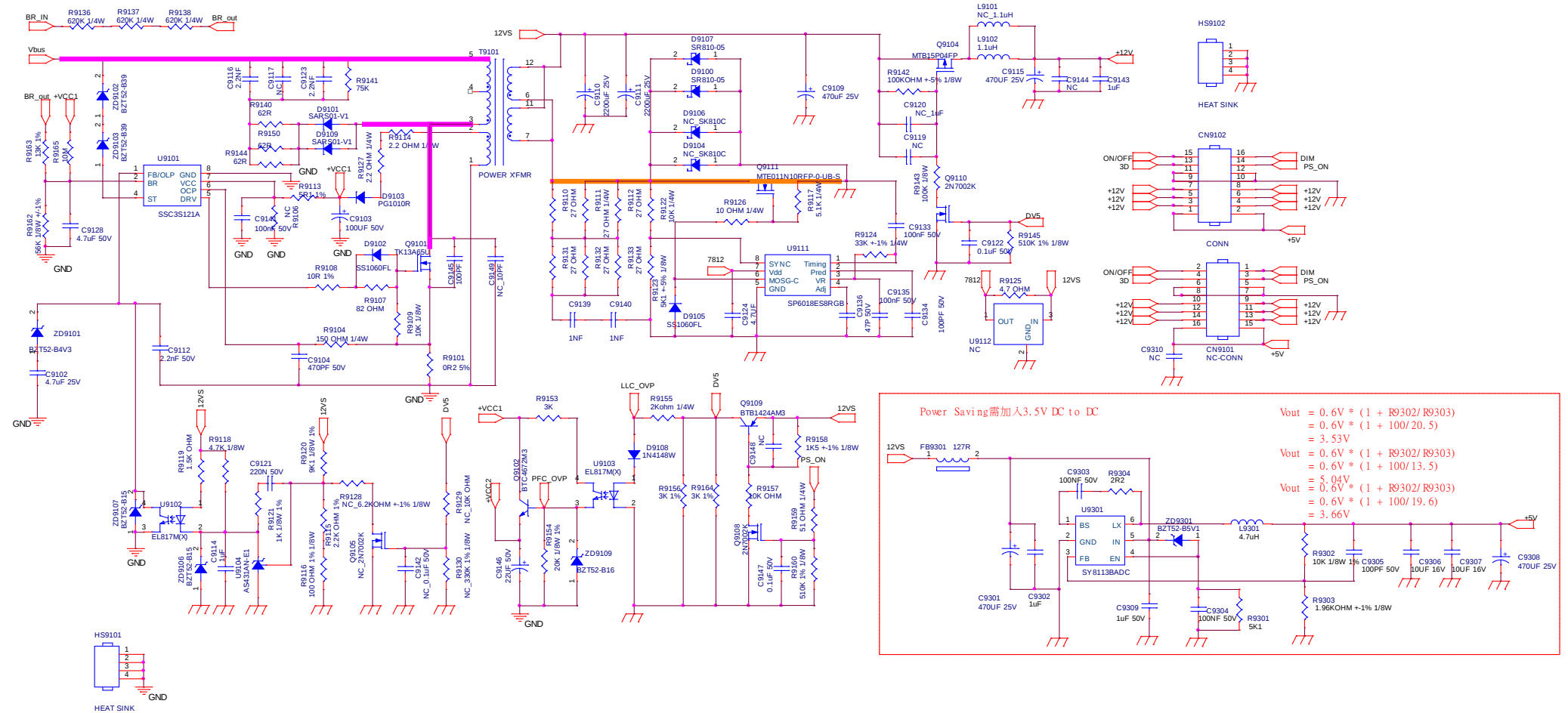
8-3-1 AC Input



8-3-2 PFC

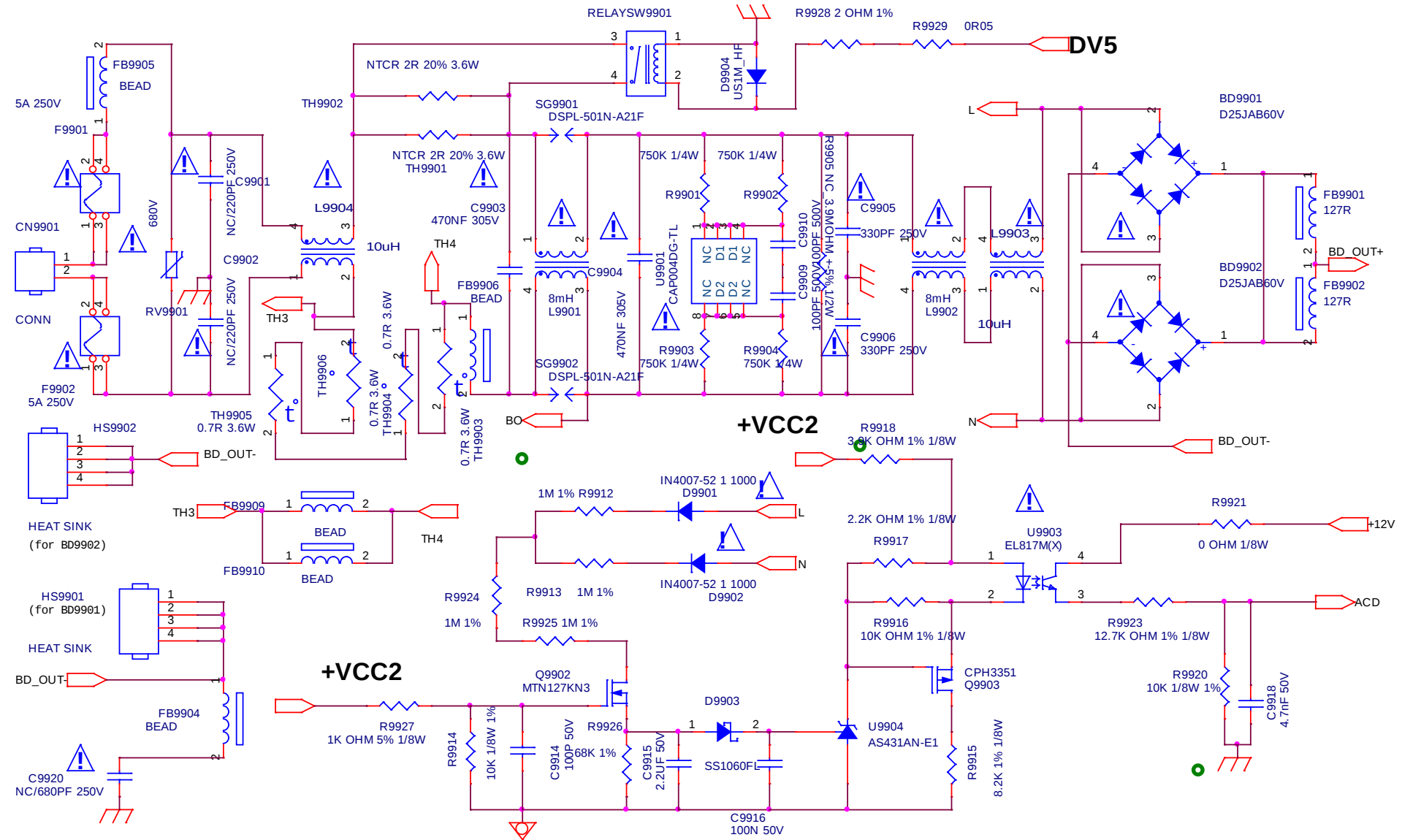


8-3-3 Main Power

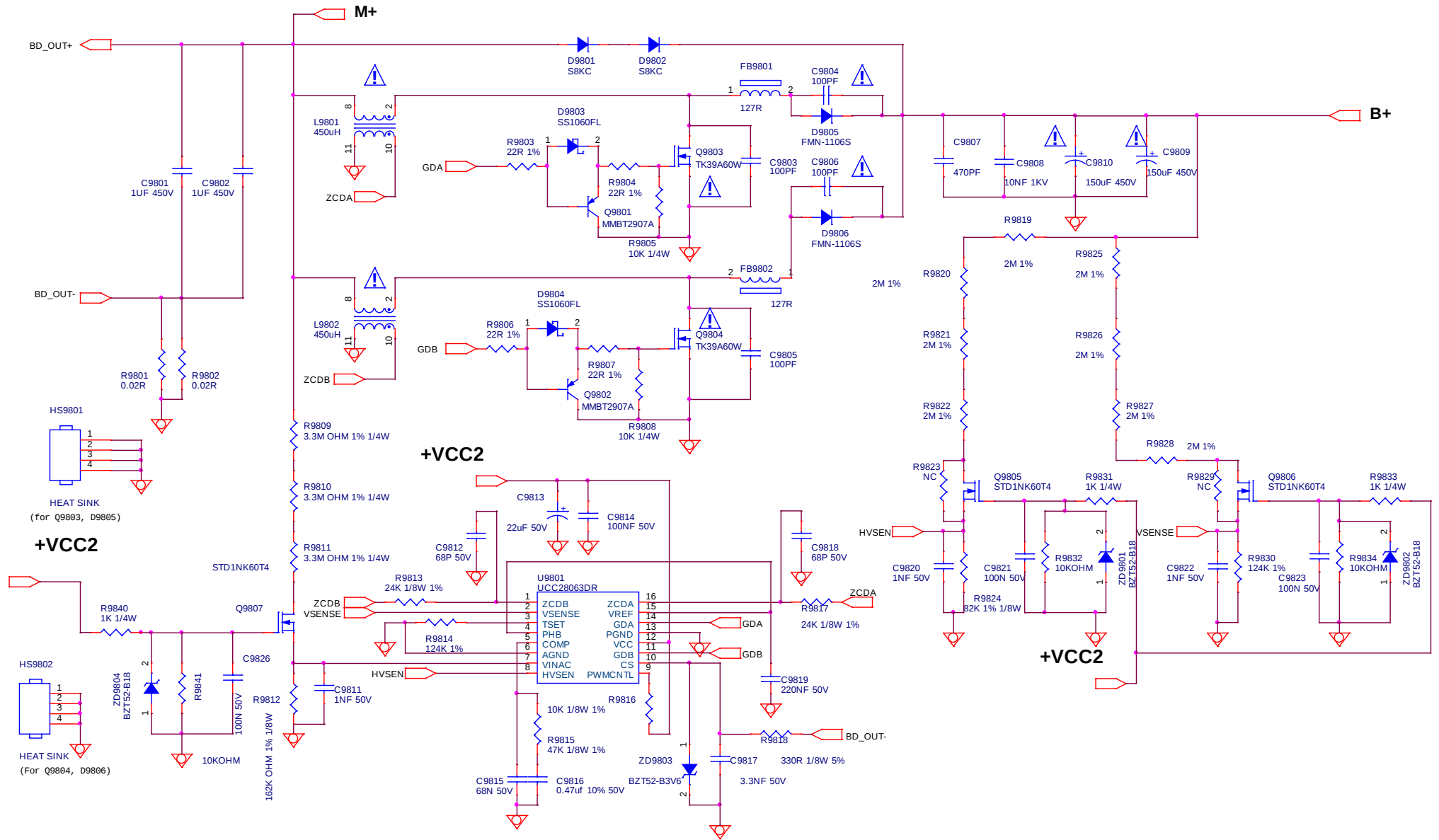


8.4 A 715G8886 PSU(For 55" 9002 Series)

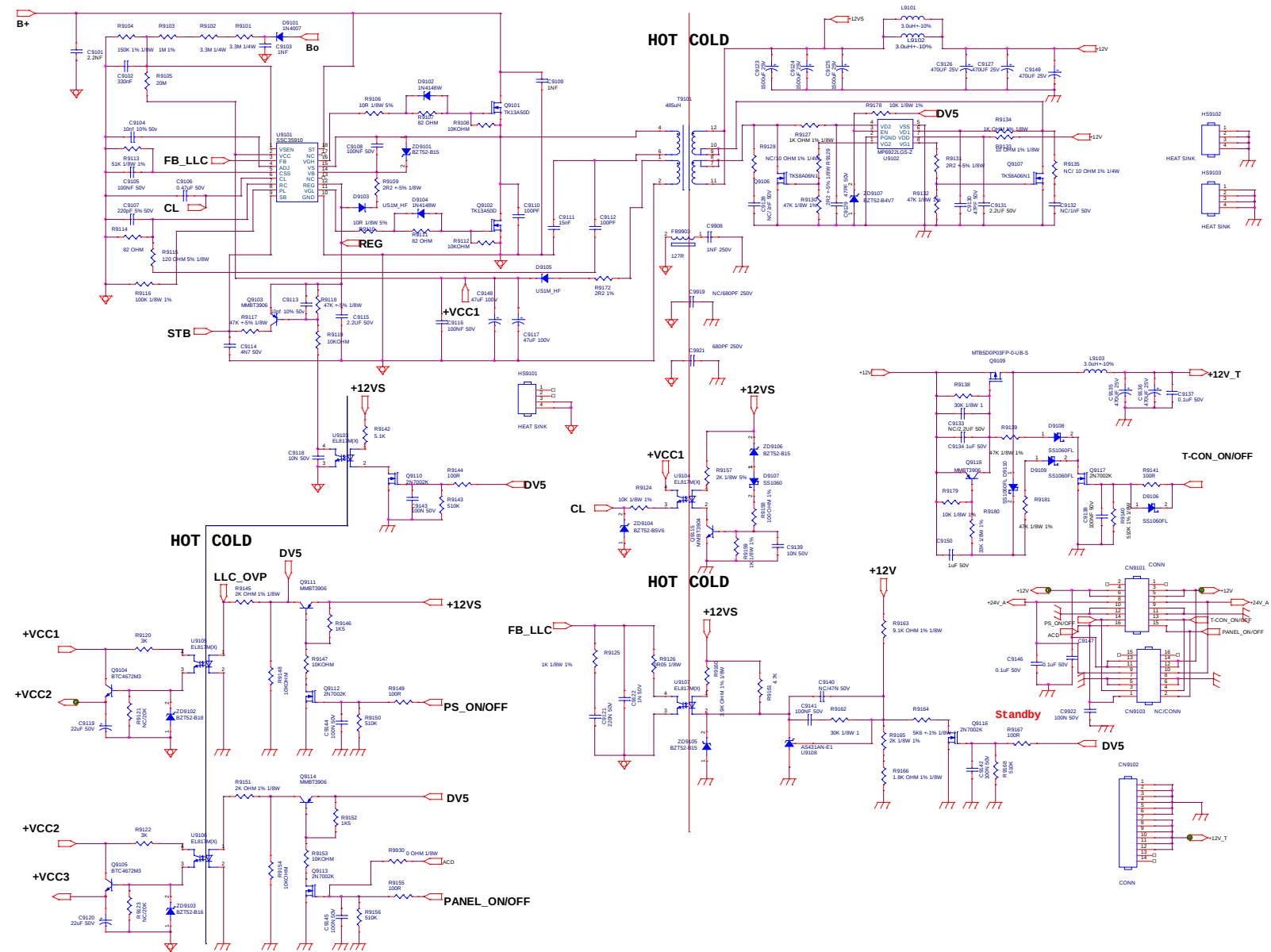
8-4-1 Input stage



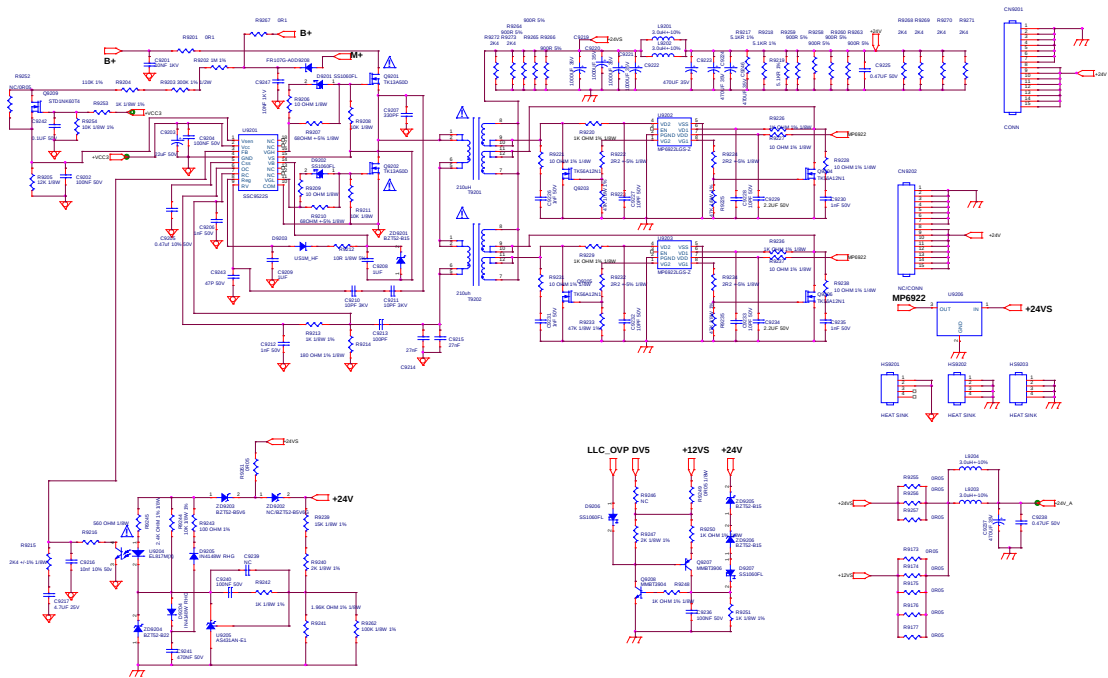
8-4-2 PFC stage



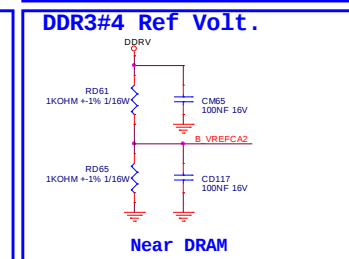
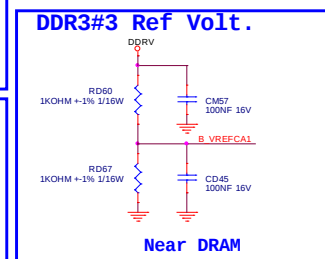
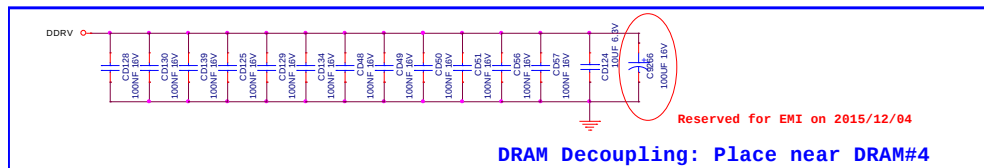
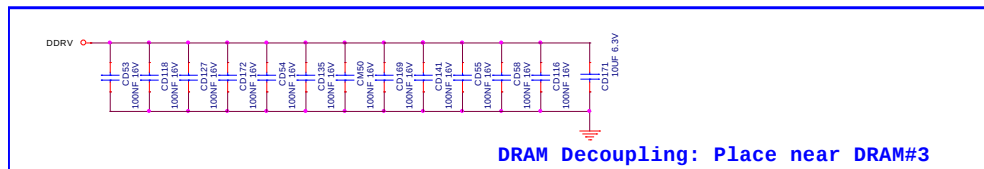
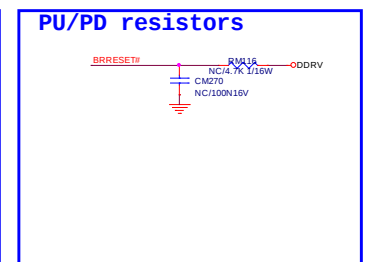
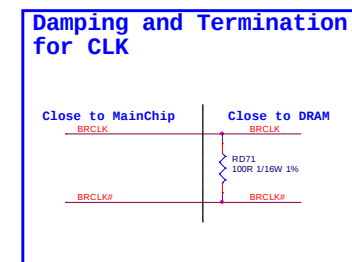
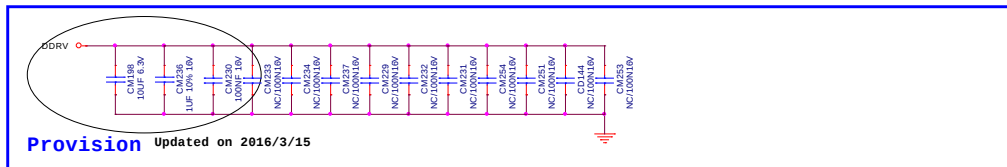
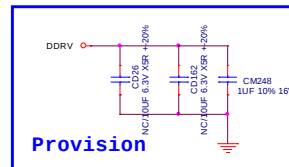
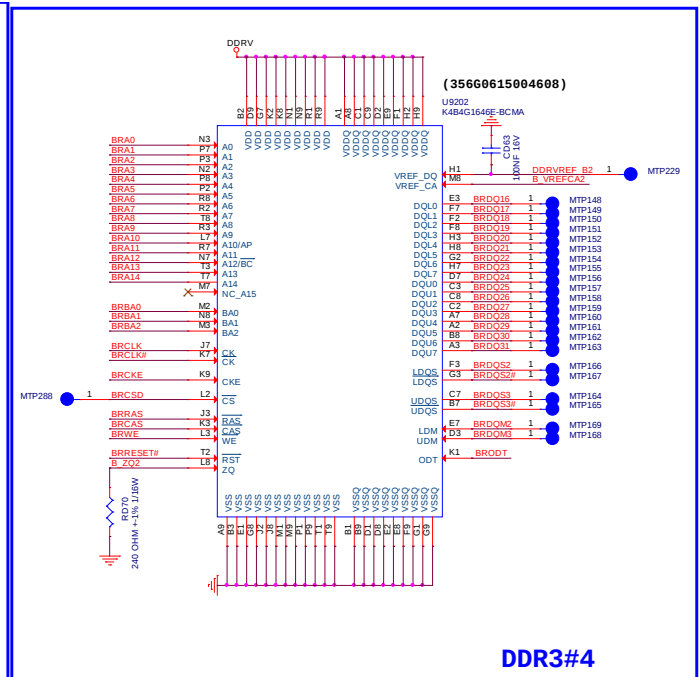
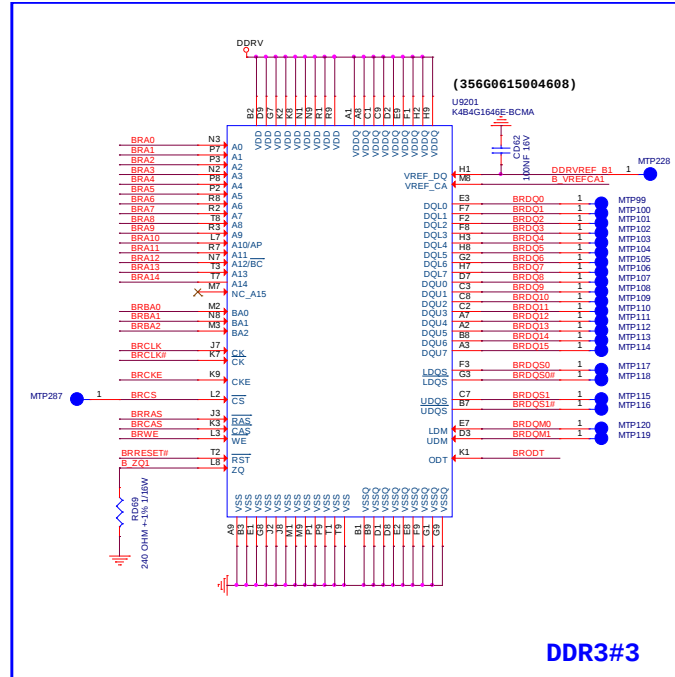
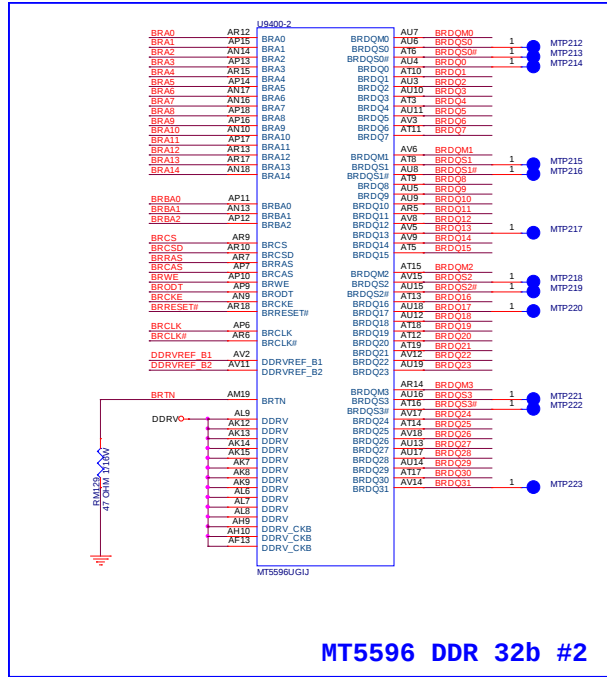
8-4-3 12V power stage



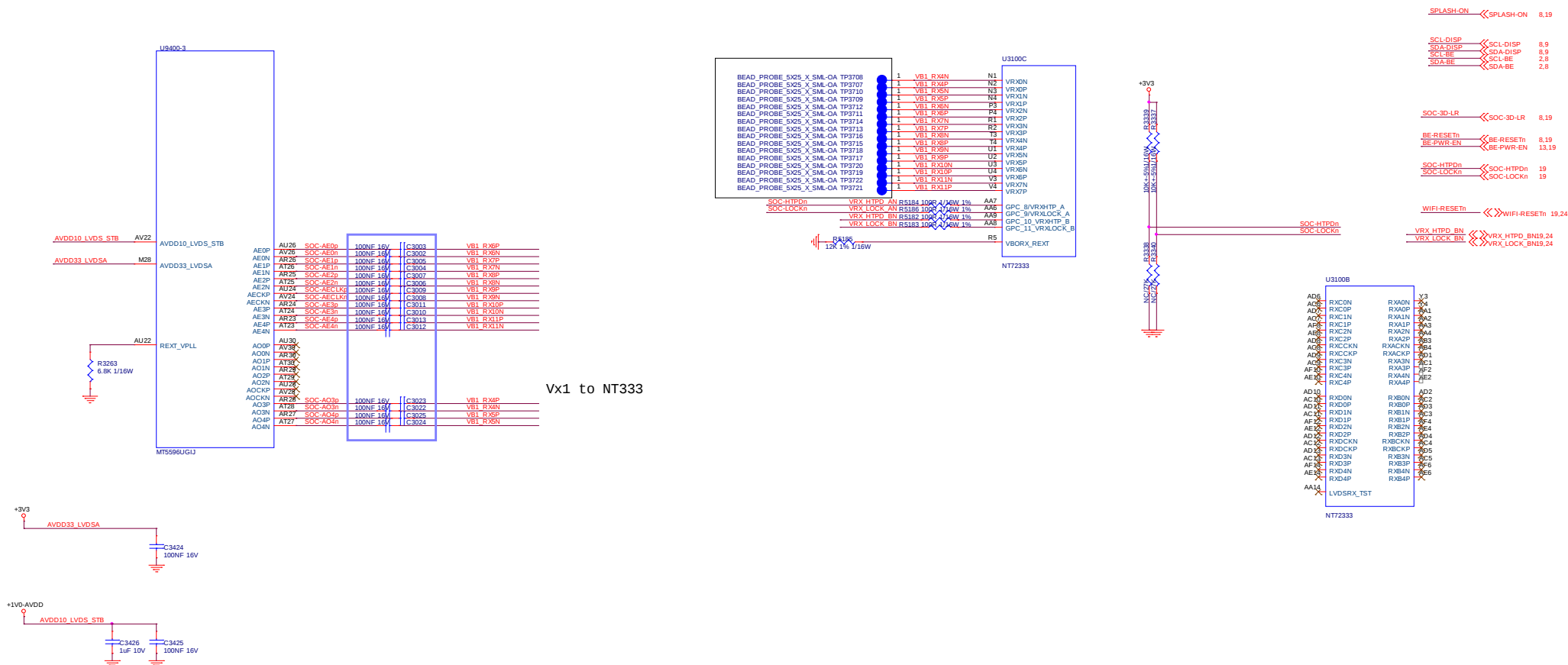
8-4-3 24V power stage



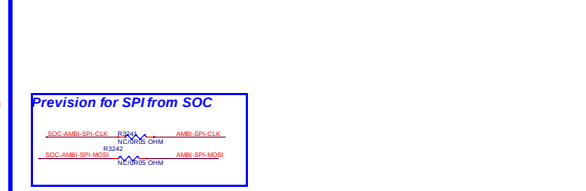
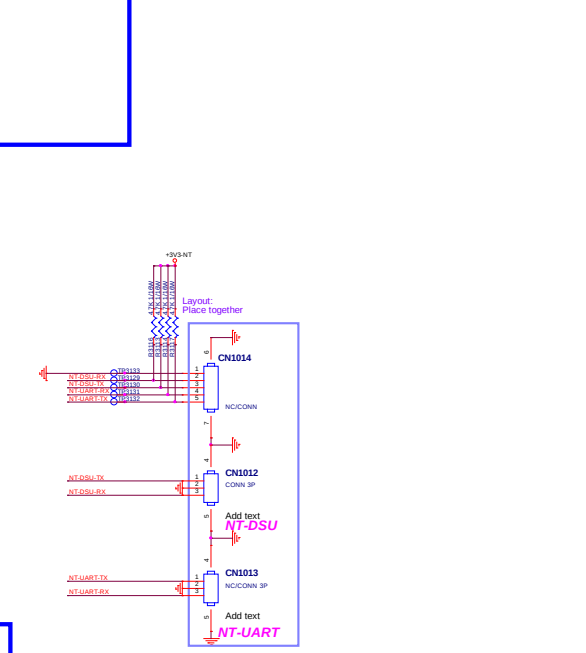
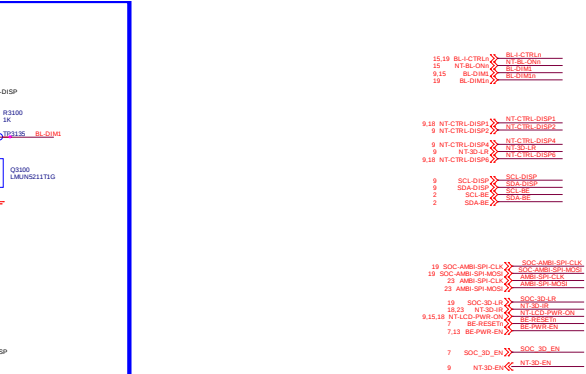
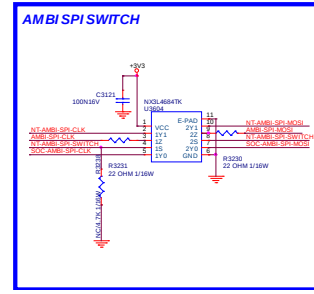
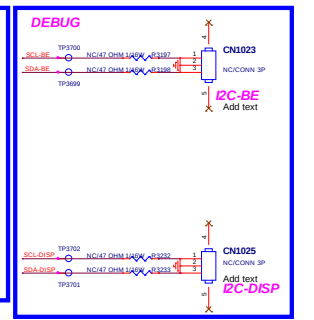
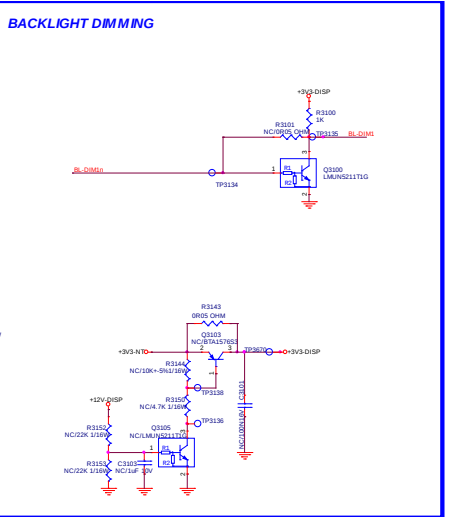
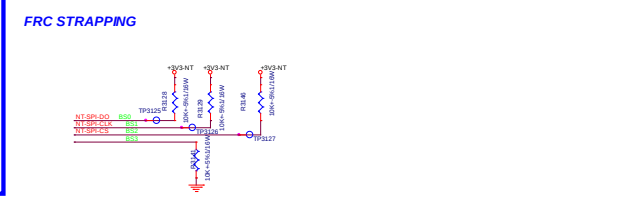
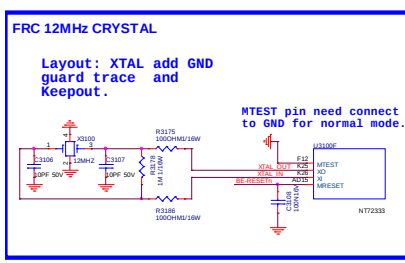
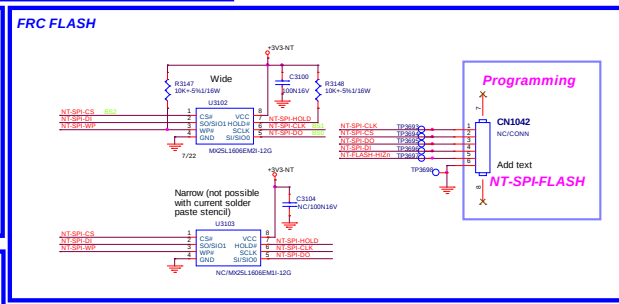
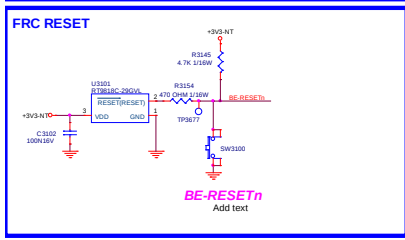
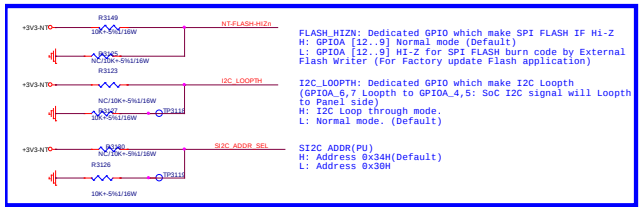
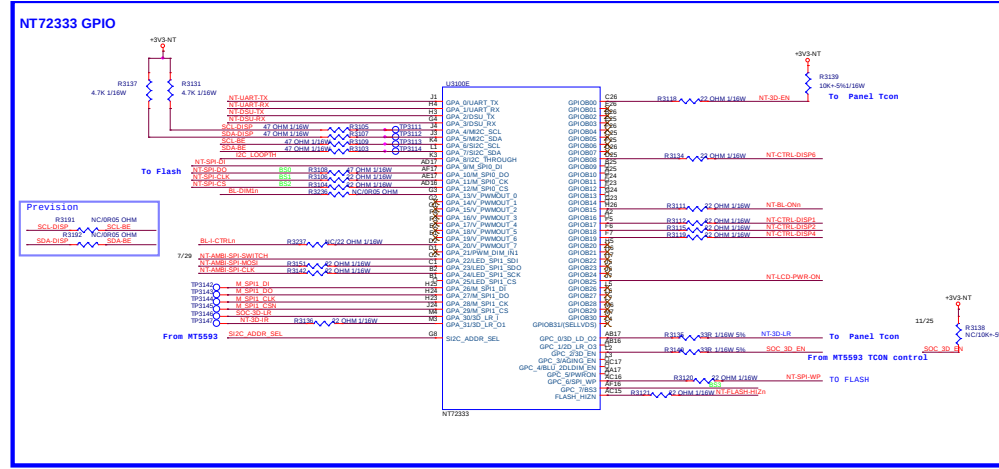
8-5-3 SOC-DDR3-3-4



8-5-6 BE-NT72333a-Vx1-INPUT

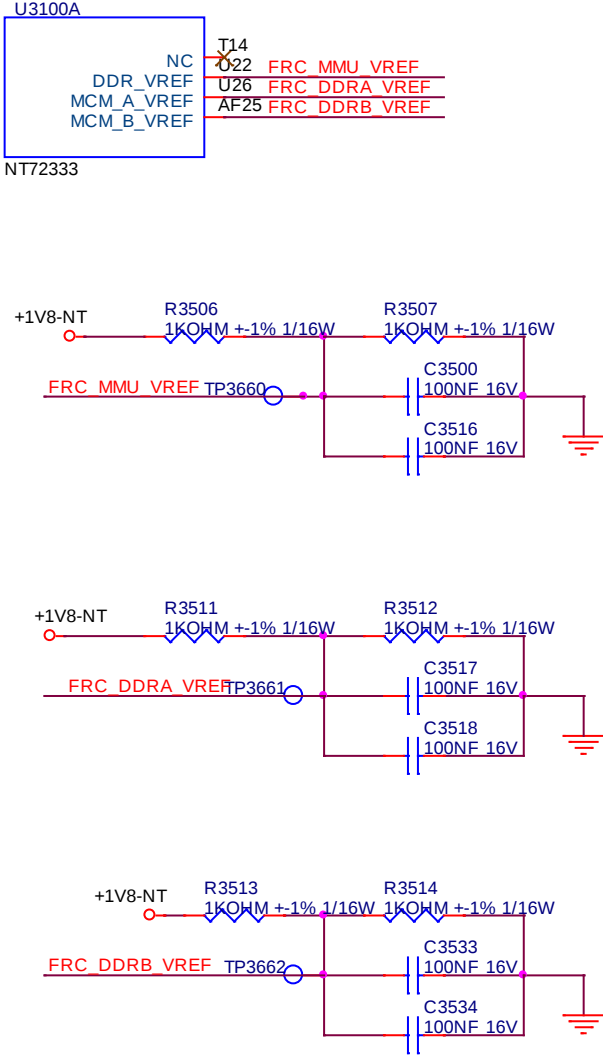


8-5-7 BE-NT72333b-GPIO



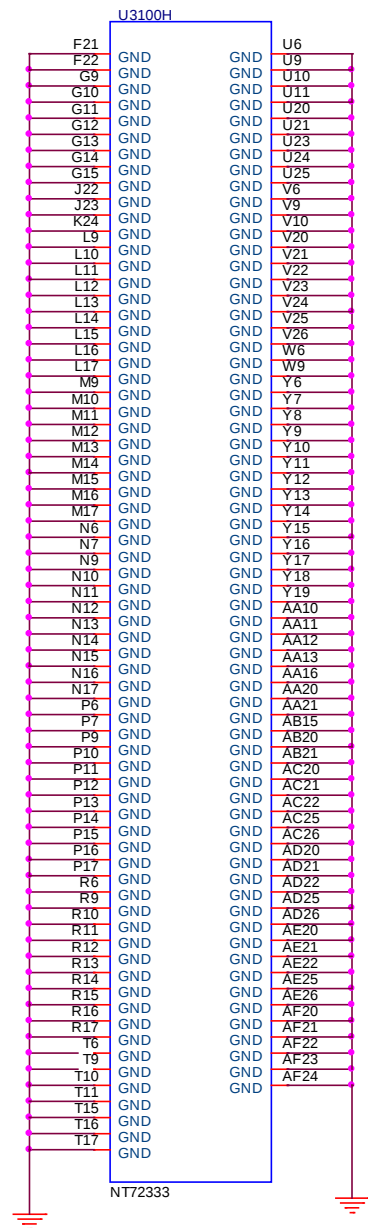
15.19	BL-CTRL	BL-CTRL
15	BL-CTRL	BL-CTRL
9.15	BL-DIM	BL-DIM
19	BL-DIM	BL-DIM
9.18	NT-CTRL-DISP	NT-CTRL-DISP
9	NT-CTRL-DISP	NT-CTRL-DISP
9	NT-CTRL-DISP	NT-CTRL-DISP
9.18	NT-CTRL-DISP	NT-CTRL-DISP
9	SCL-DISP	SCL-DISP
9	SCL-DISP	SCL-DISP
2	SCL-DISP	SCL-DISP
19	SOC-AMBI-SPI-CLK	SOC-AMBI-SPI-CLK
19	SOC-AMBI-SPI-MOSI	SOC-AMBI-SPI-MOSI
23	AMBI-SPI-MOSI	AMBI-SPI-MOSI
19	SOC-AMBI-SPI-MISO	SOC-AMBI-SPI-MISO
18.25	NT-SD-EN	NT-SD-EN
9.15.18	NT-SD-EN	NT-SD-EN
7.13	BE-RESET	BE-RESET
7	SOC-SD-EN	SOC-SD-EN
9	NT-SD-EN	NT-SD-EN

NT72333 DDR

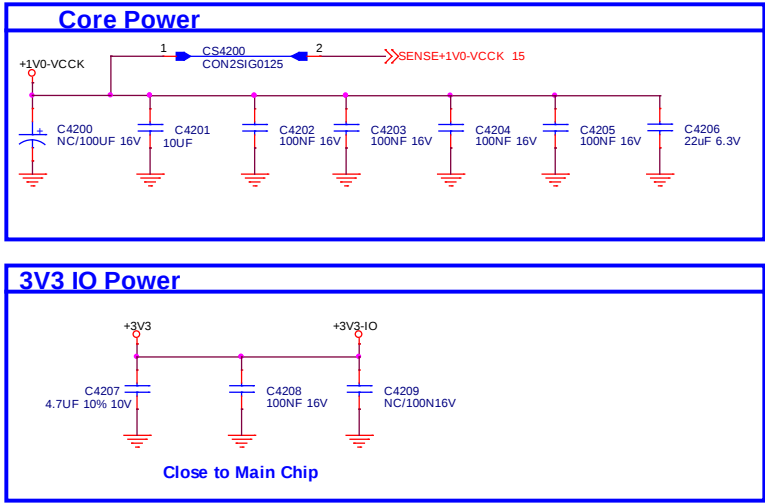
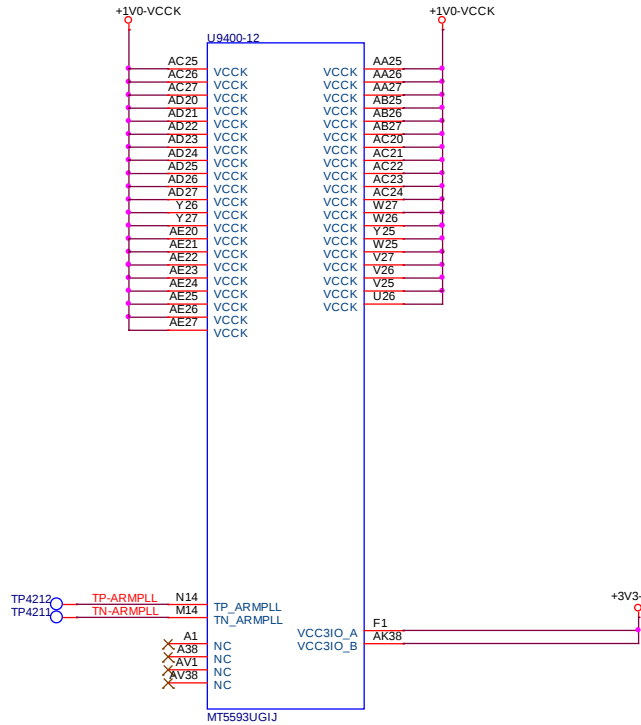
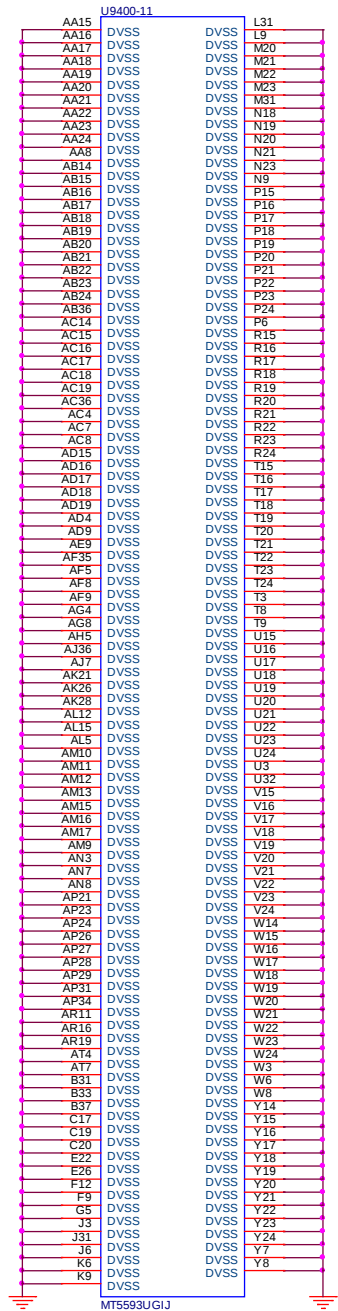


VREF voltage divider

NT72333 GND

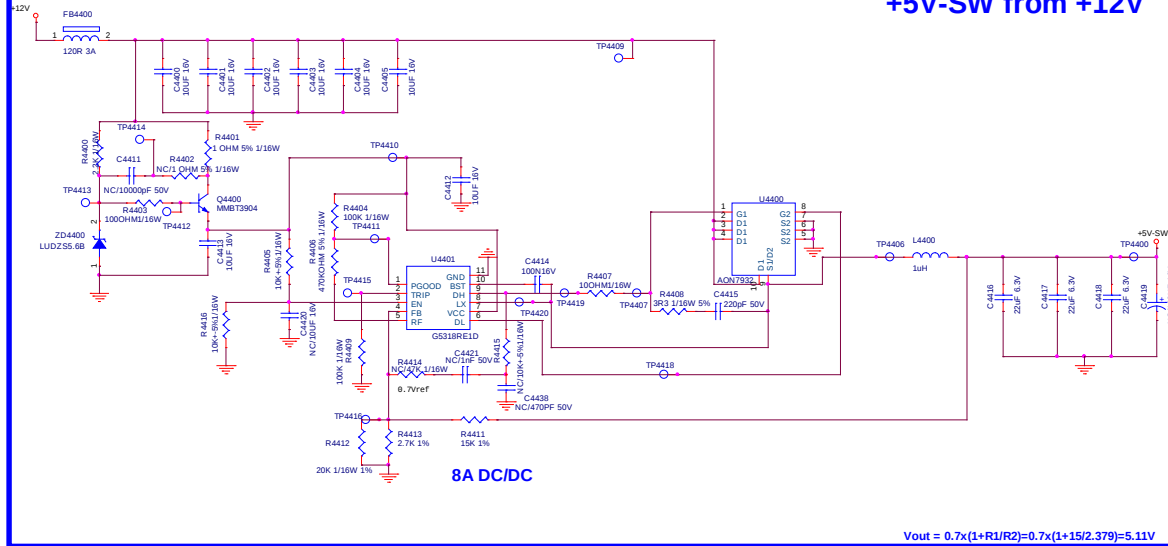


8-5-13 DCDC-SOC-VCKK-DVSS



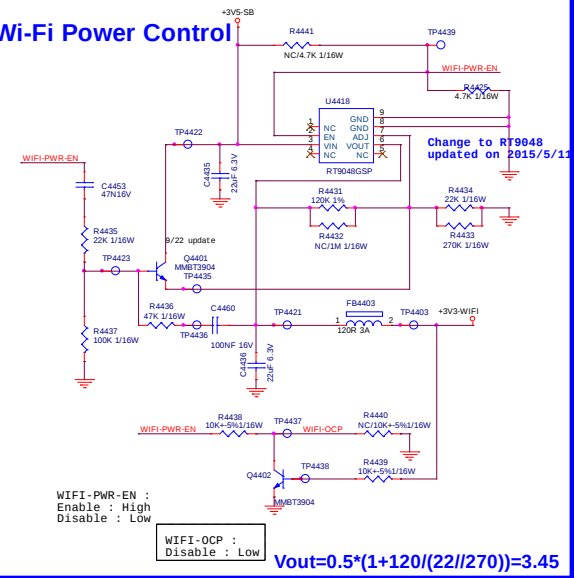
8-5-15 VCCK & DVSS

+5V-SW from +12V



$$V_{out} = 0.7 \times (1 + R1/R2) = 0.7 \times (1 + 15/2.379) = 5.11V$$

Wi-Fi Power Control



WIFI-PWR-EN :
Enable : High
Disable : Low

WIFI-OCPP :
Disable : Low

$$V_{out} = 0.5 \times (1 + 120 / (22 / 270)) = 3.45$$

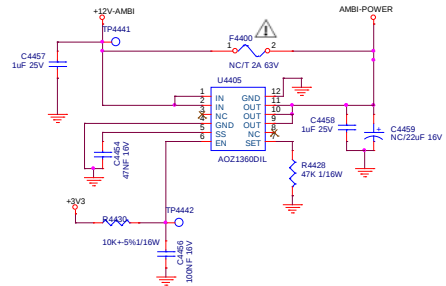
LNB POWER Control

6	LNB_EN	LNB_EN
9	LNB_LINEDROP	LNB_LINEDROP
6	13V/18V_SW	13V/18V_SW
6	TUNER_LNB	TUNER_LNB
6	DISEQC_OUT	DISEQC_OUT
19	TUN_LNB	TUN_LNB

WIFI POWER Control

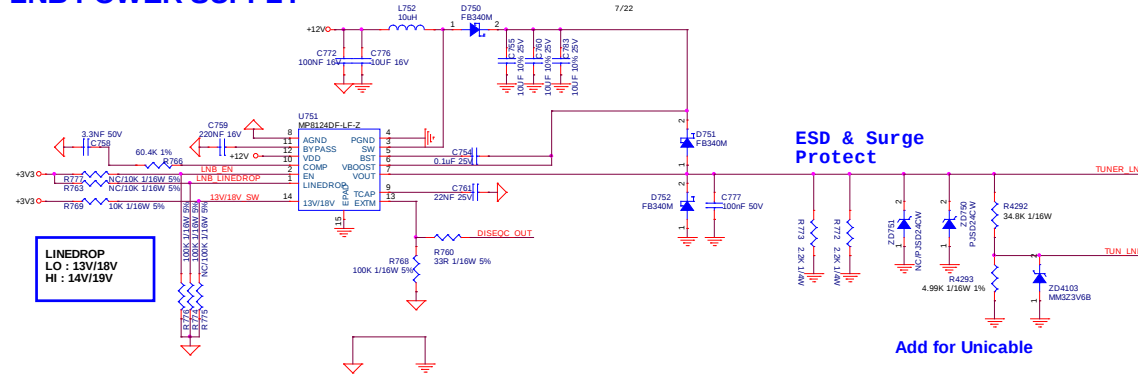
7	WIFI-OCPP	WIFI-OCPP
19	WIFI-PWR-EN	WIFI-PWR-EN

AMBILIGHT PROTECTION



F4400	X	NA
C4401	X	X
C4402	X	X
C4403	X	X
C4404	NA	X
C4405	NA	X
C4406	NA	X
C4407	NA	X
C4408	NA	X
C4409	NA	NA
C4410	NA	NA
C4411	NA	NA
C4412	NA	NA

LNB POWER SUPPLY

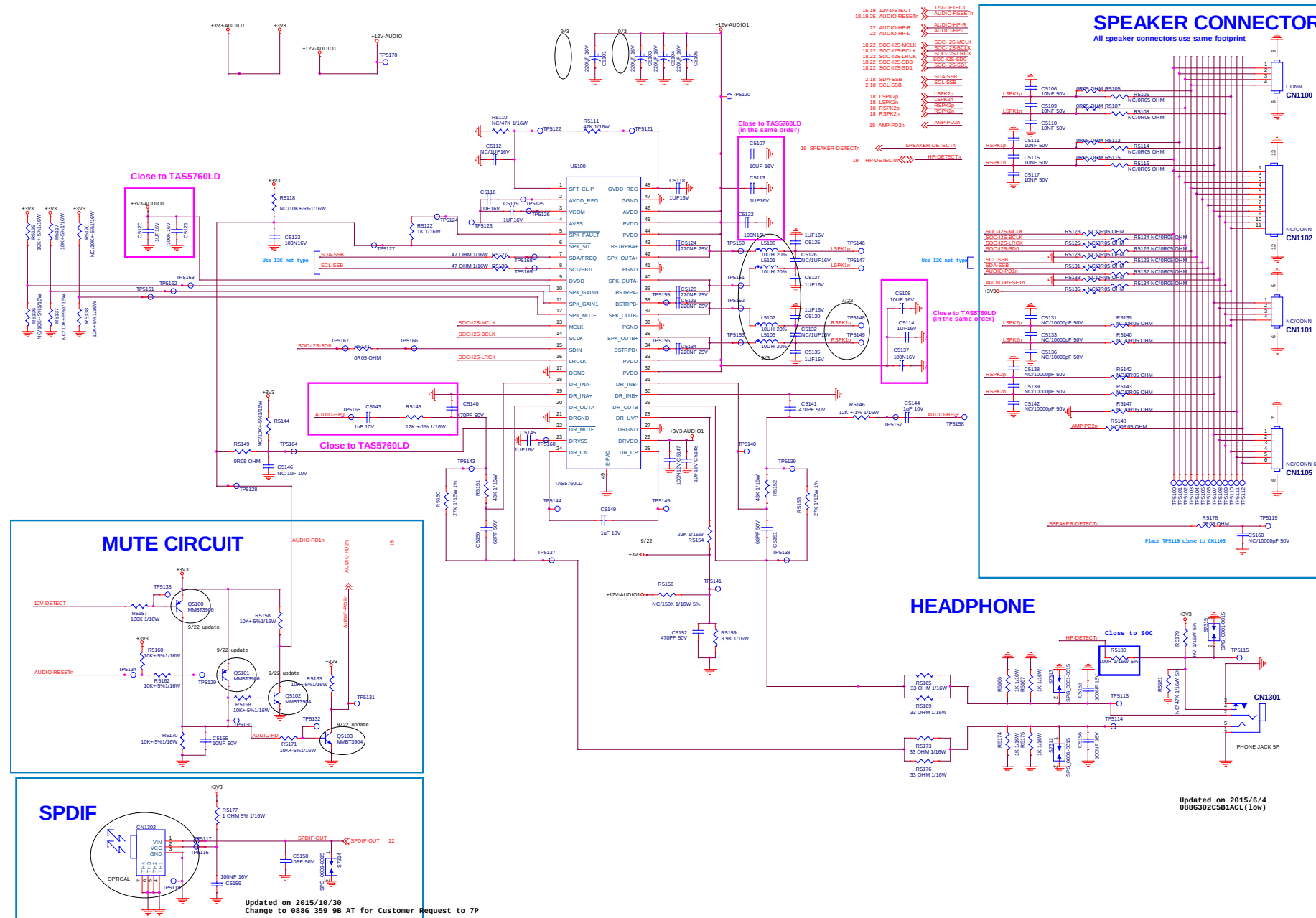


NC for PUT6401 models

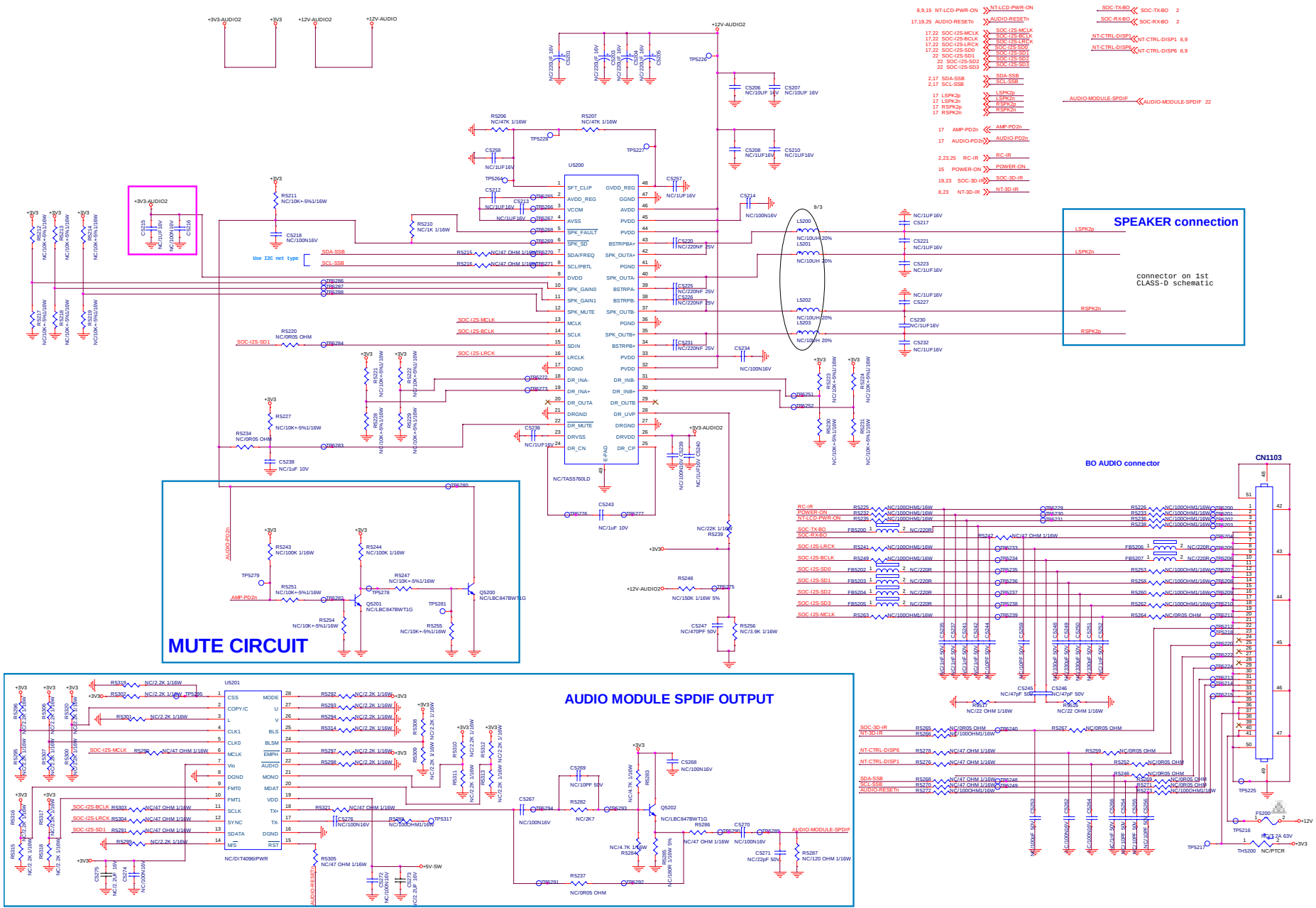
ESD & Surge Protect

Add for Unicable

8-5-16 AUDIO-1st-CLASS-D-AMP

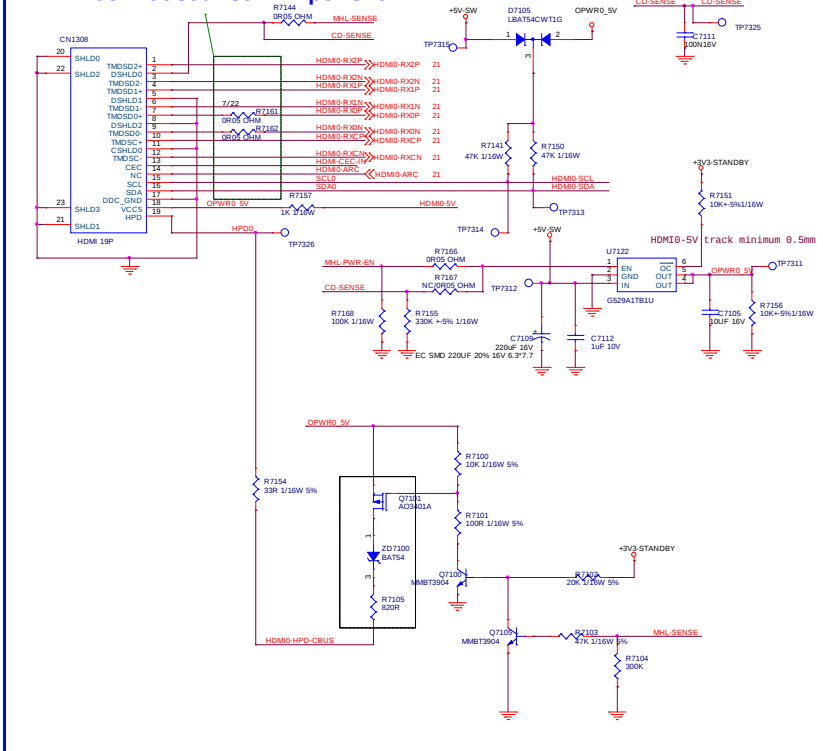


8-5-17 AUDIO-2nd-CLASS-D-AMP



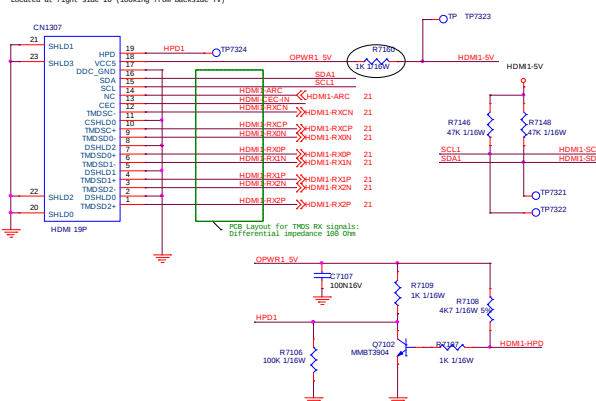
8-5-19 HDMI-INPUTS

HDMI4 Connected to RX port 0

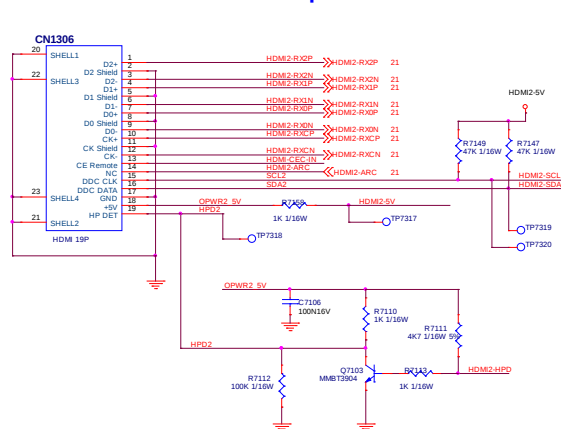


HDMI3 Connected to RX port 1

Located at right side IO (looking from backside TV)

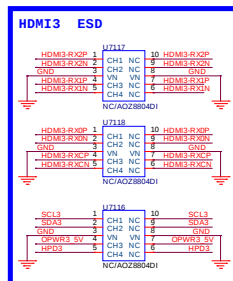
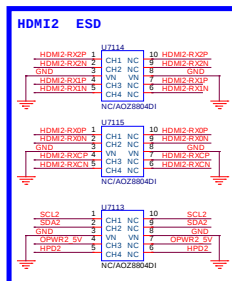
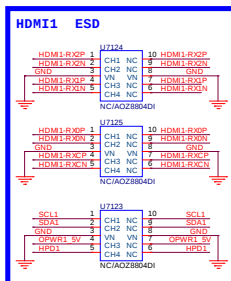
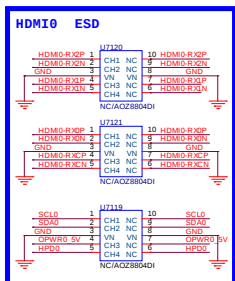
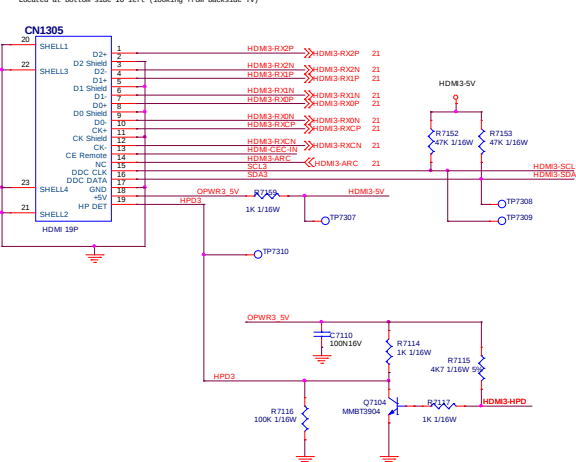


HDMI2 Connected to RX port 2

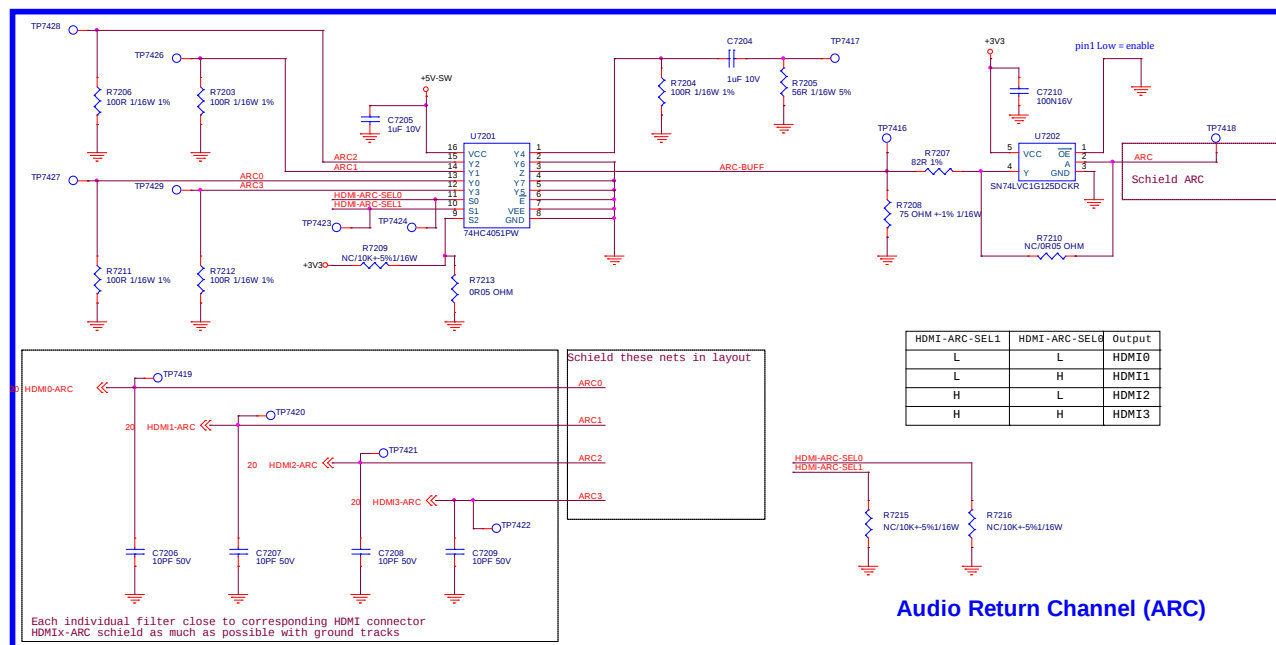
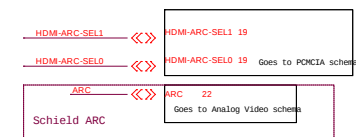
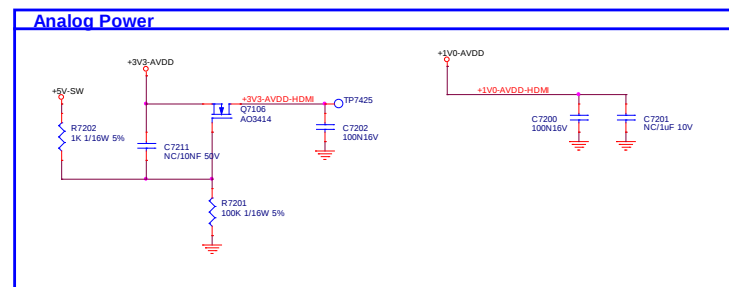
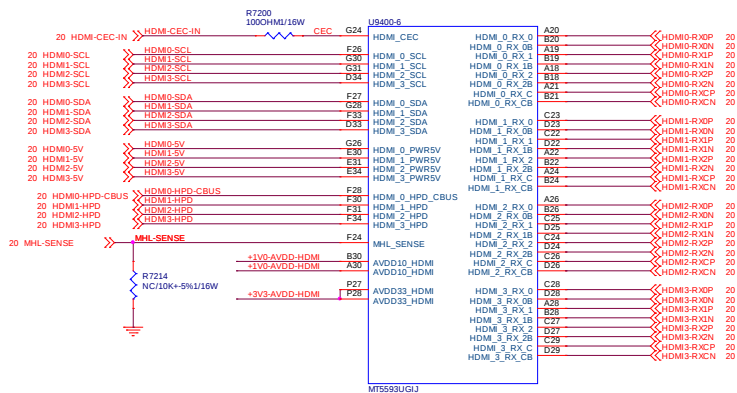


HDMI1 Connected to RX port 3

Located at bottom side IO left (looking from backside TV)

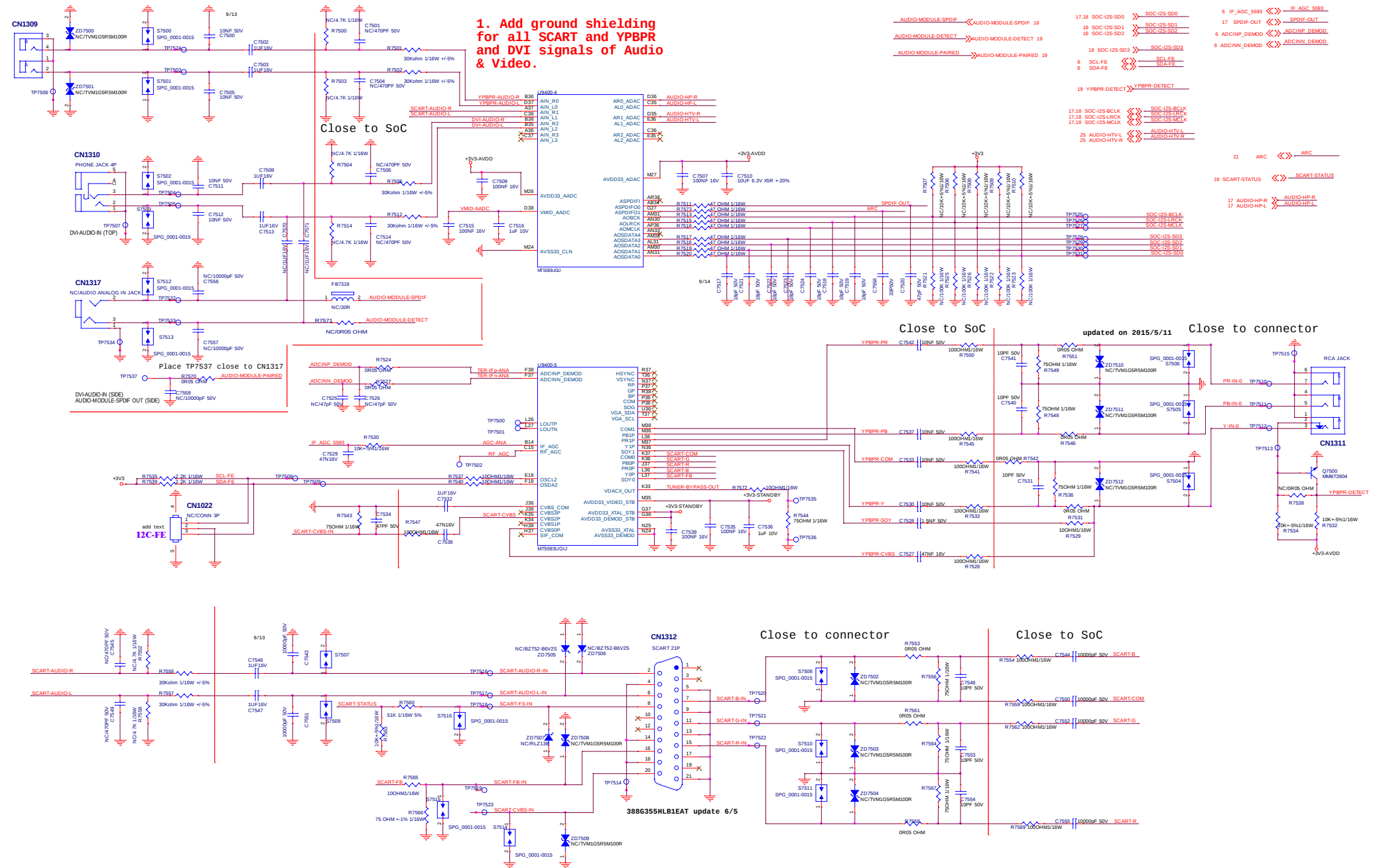


8-5-20 HDMI-SOC-ARC

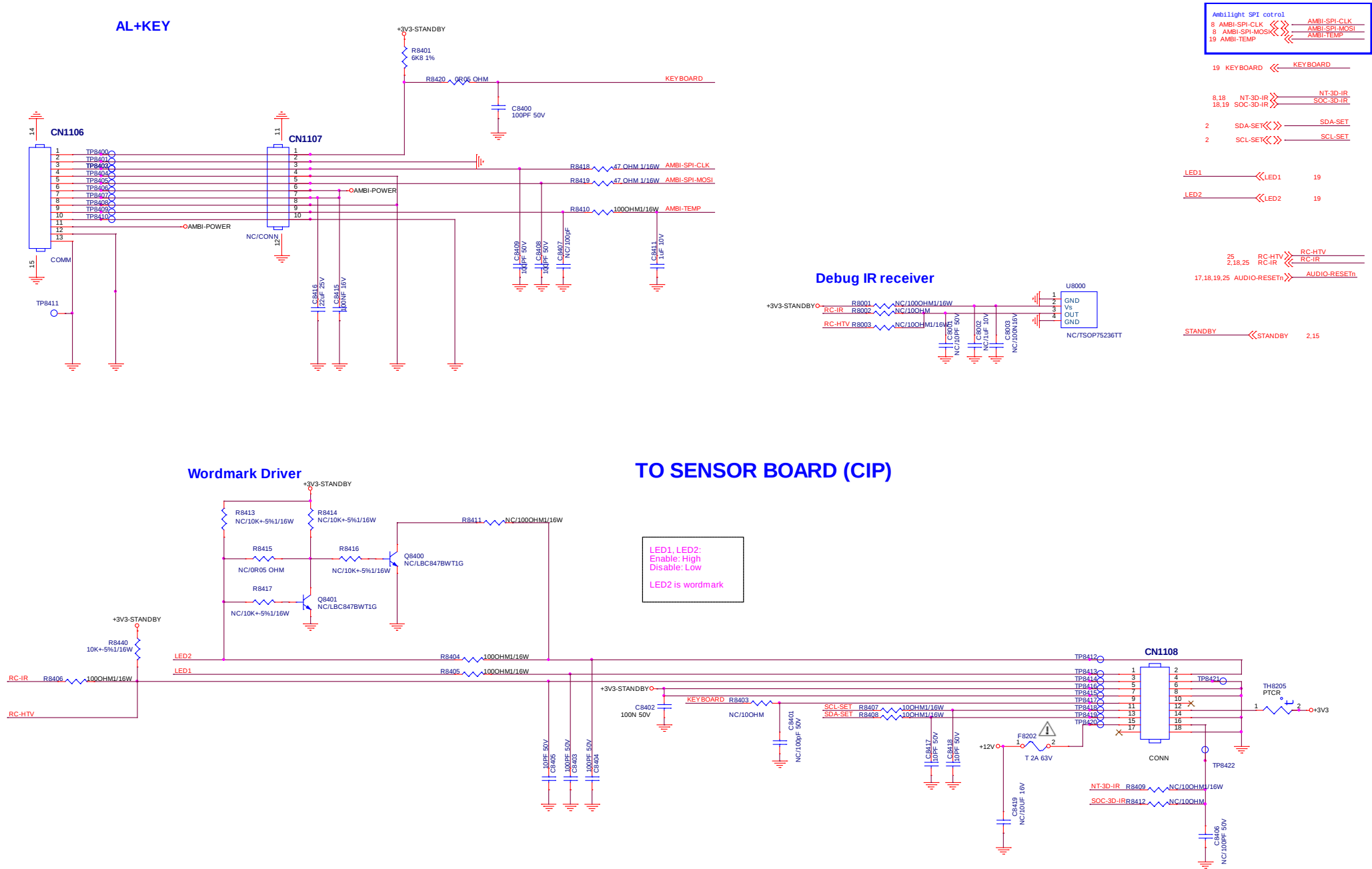


HDMI-ARC-SEL1	HDMI-ARC-SEL0	Output
L	L	HDMI0
L	H	HDMI1
H	L	HDMI2
H	H	HDMI3

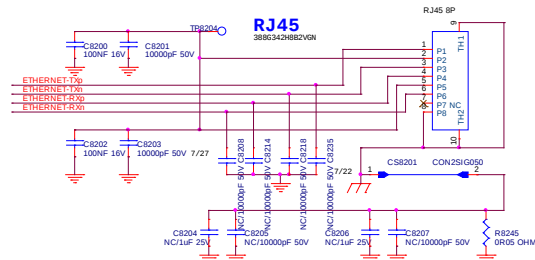
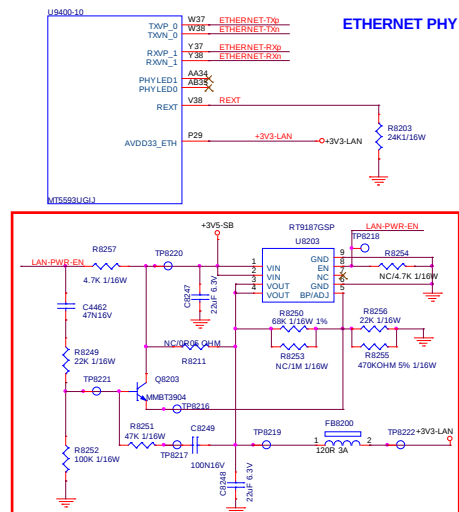
8-5-21 SCART-YPbPr-CVBS



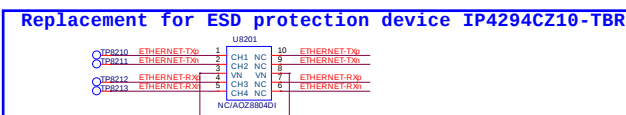
8-5-22 CTRL-CONNECTORS



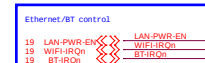
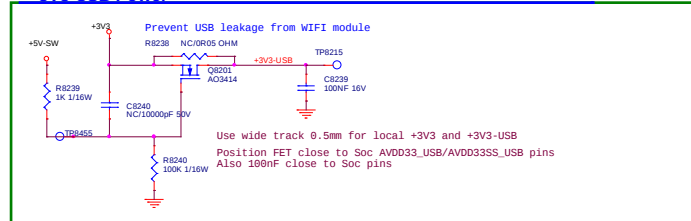
8-5-23 CTRL-ETHERNET-PHY



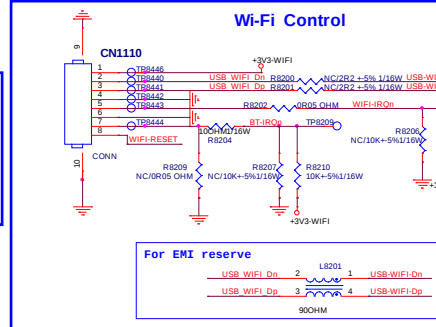
SEPARATE GROUND



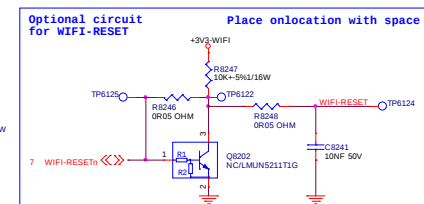
+3V3-USB Power



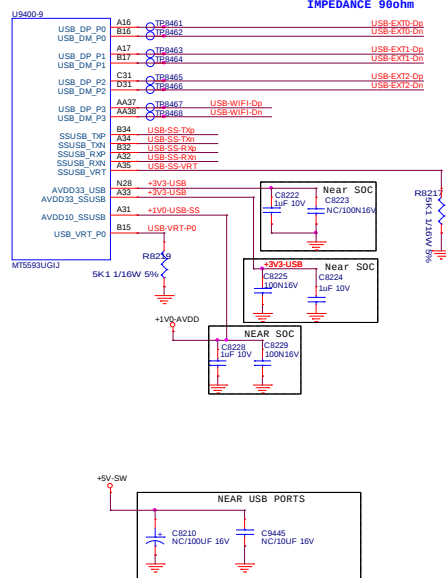
Wi-Fi Control



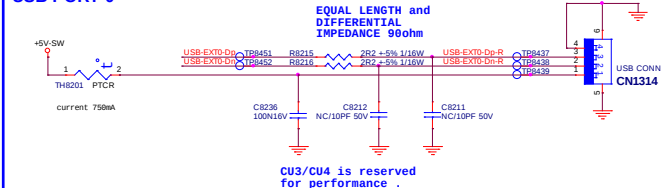
Optional circuit
for WIFI-RESET



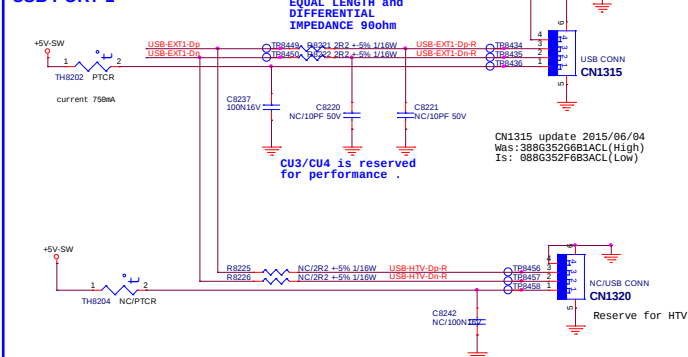
USB



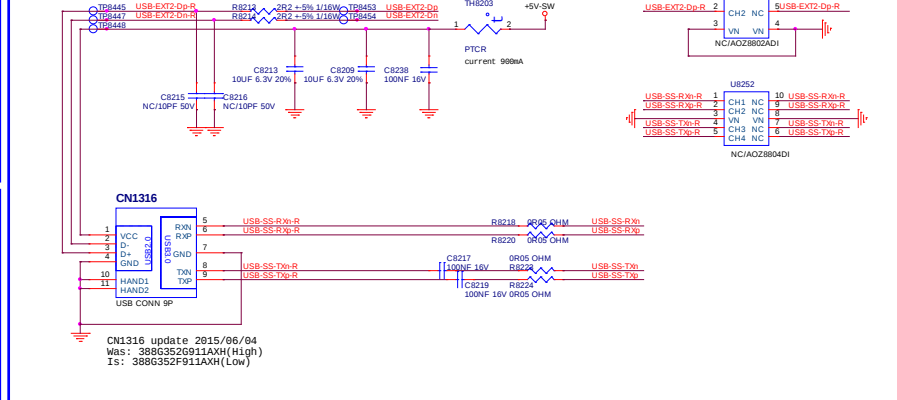
USB PORT 0



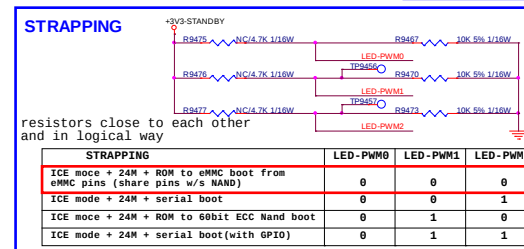
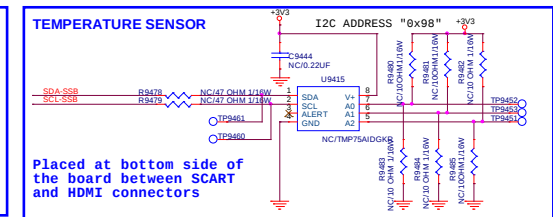
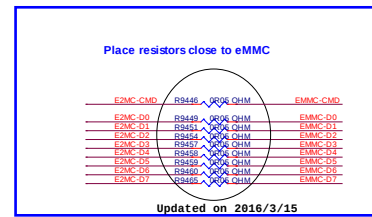
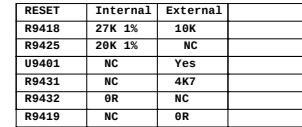
USB PORT 1



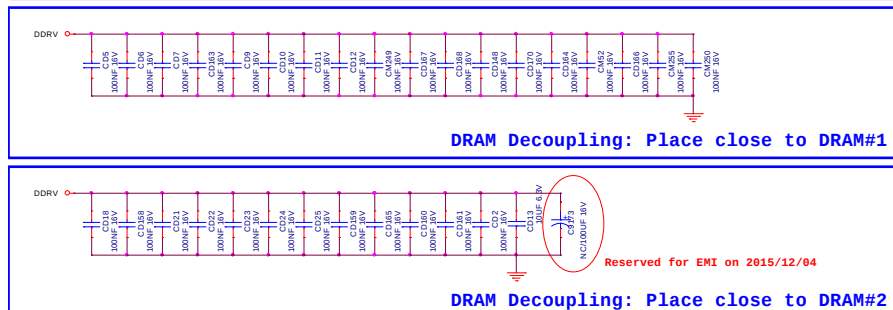
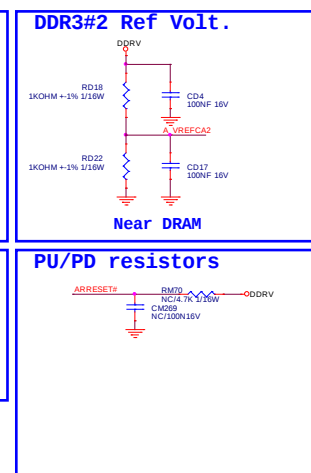
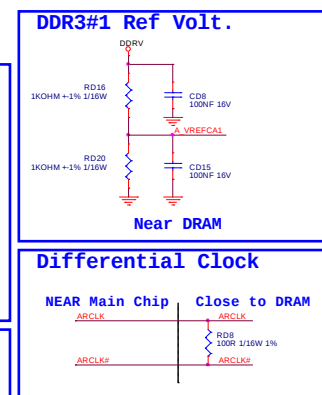
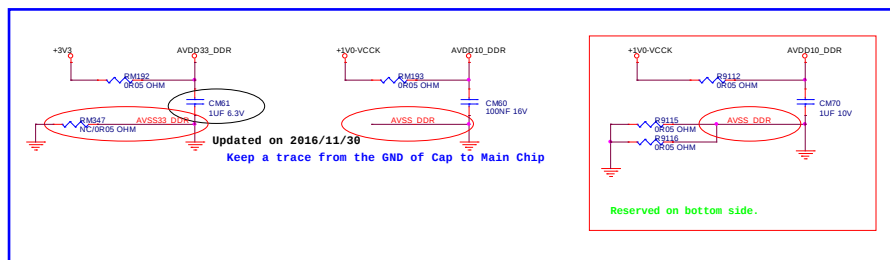
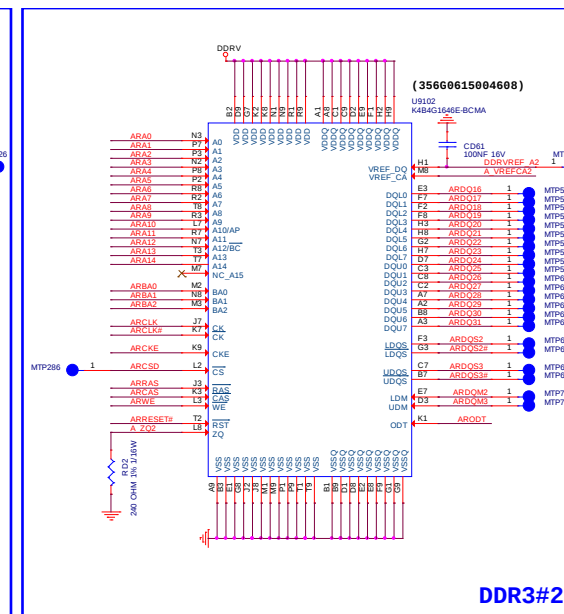
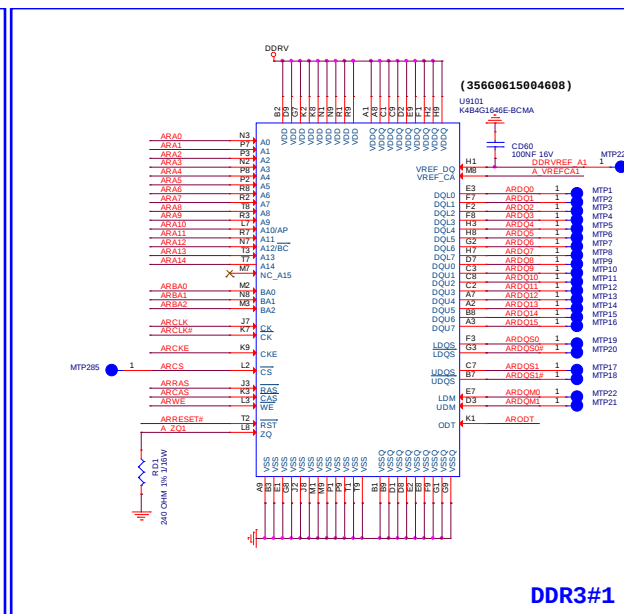
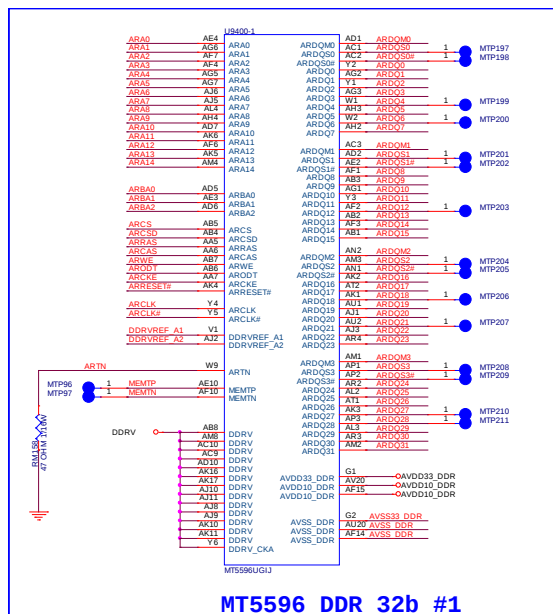
USB PORT 2
USB3.0



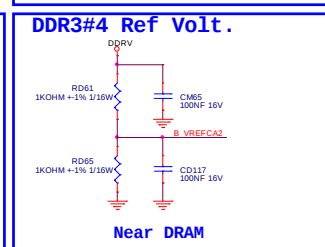
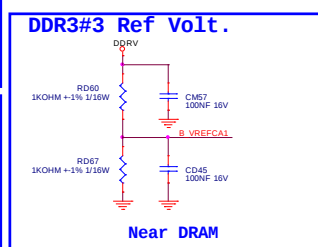
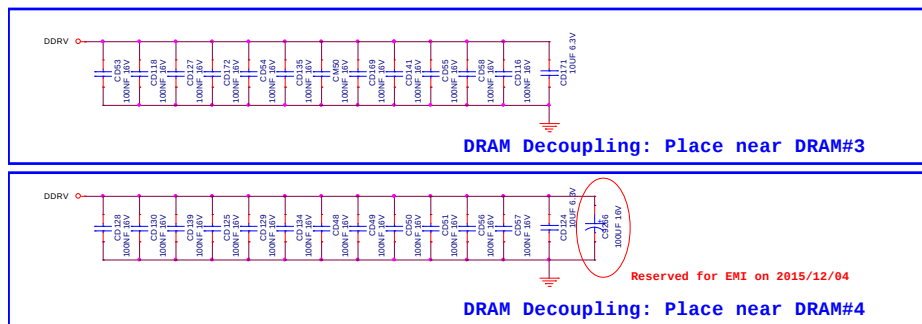
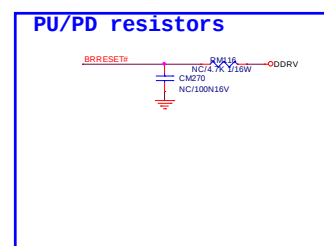
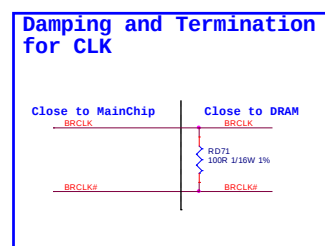
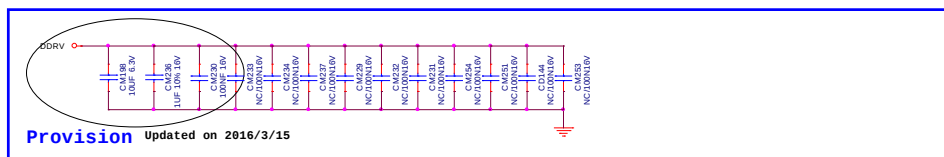
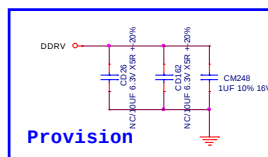
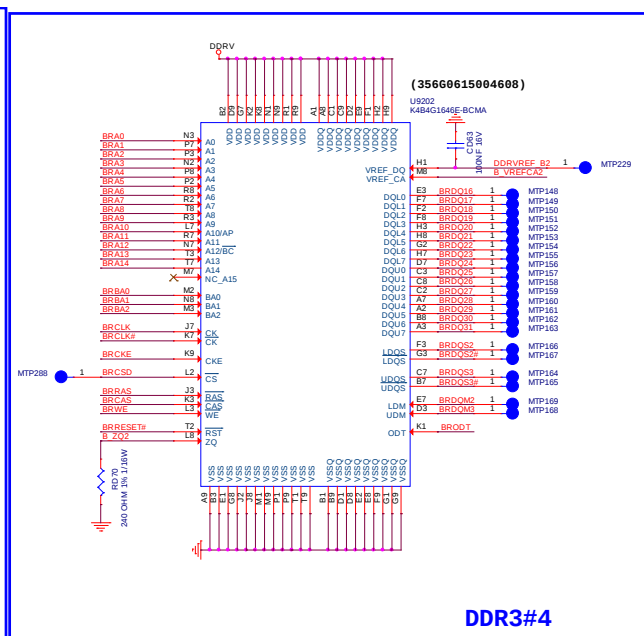
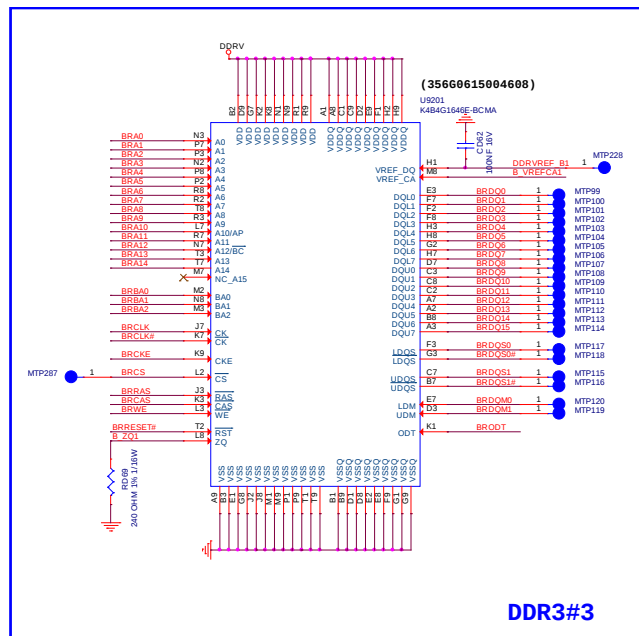
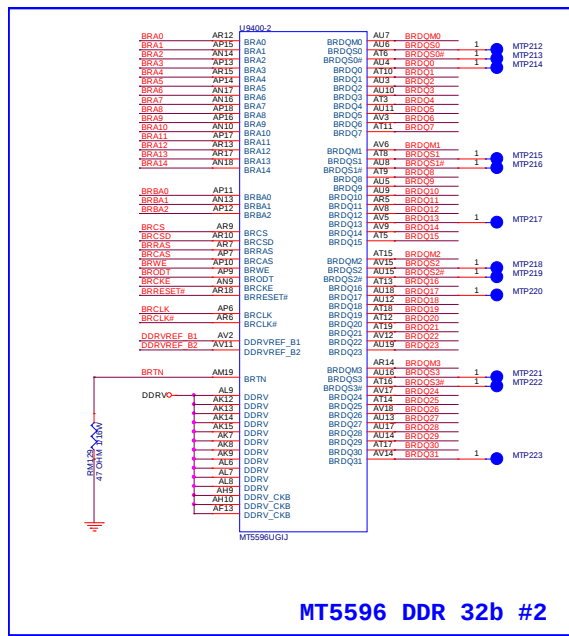
8-6-1 SOC-EMMC

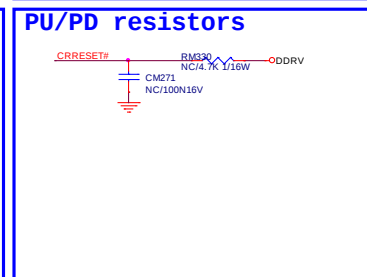
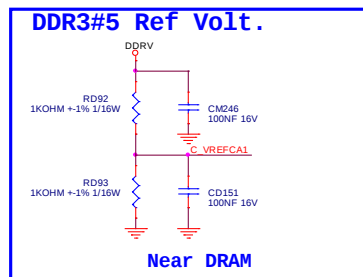
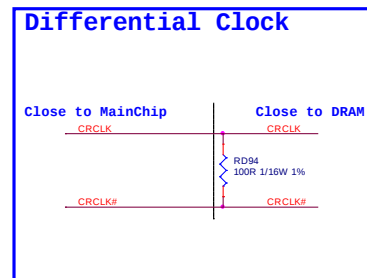
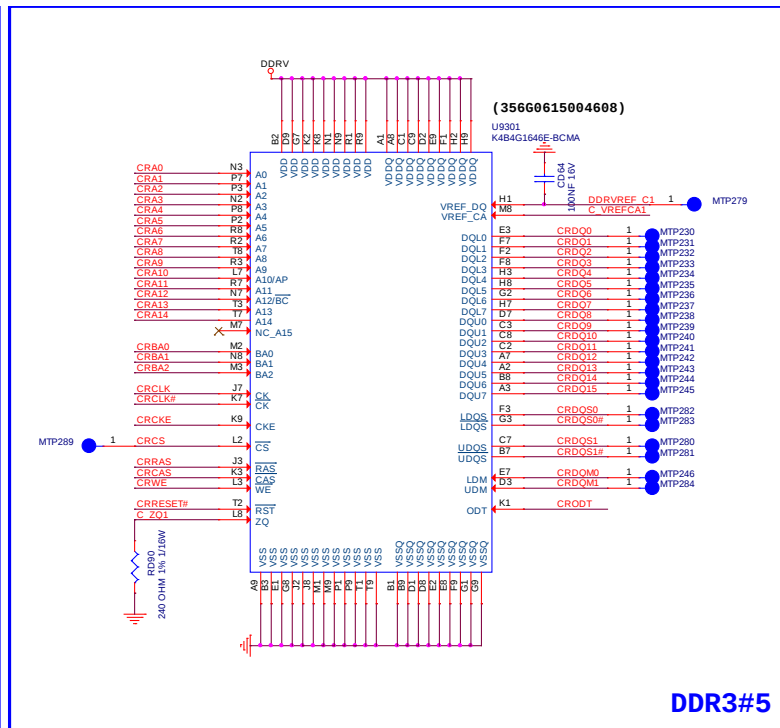


8-6-2 SOC-DDR3-1-2

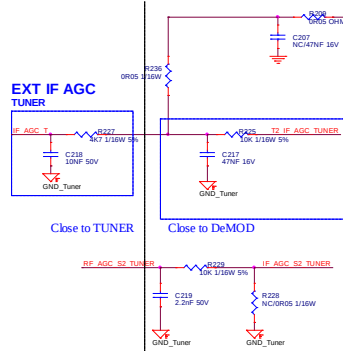
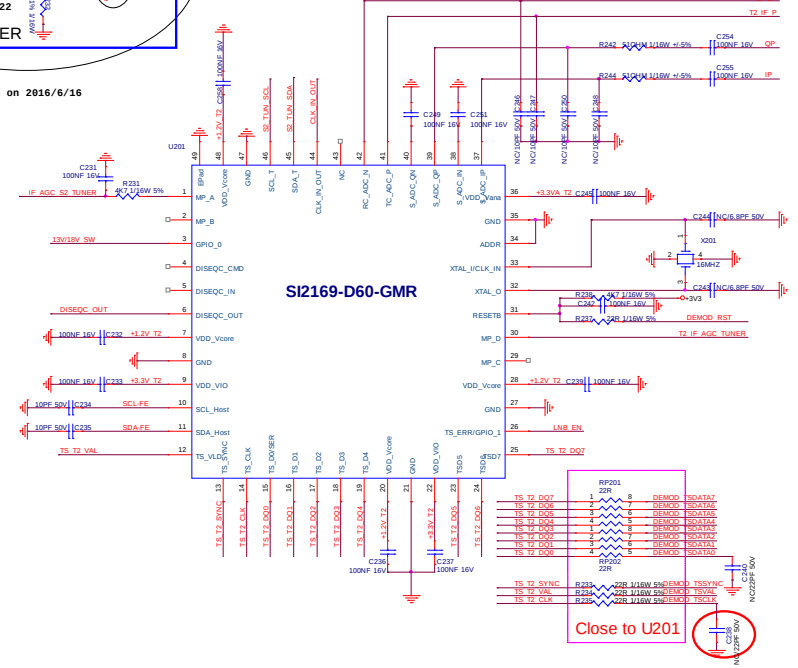
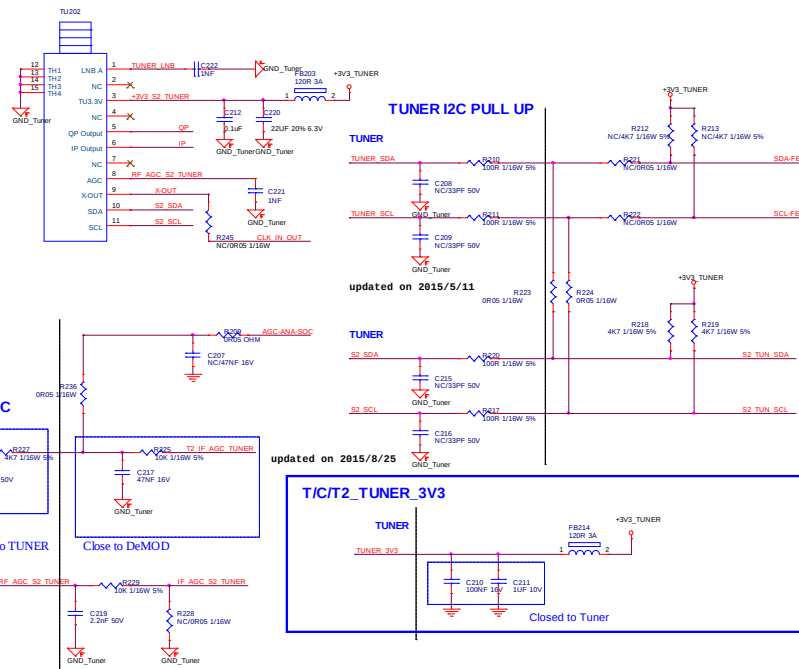
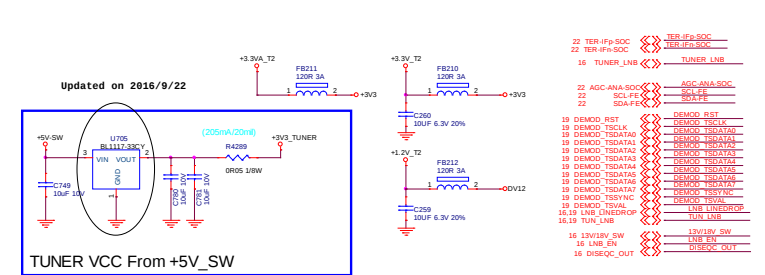
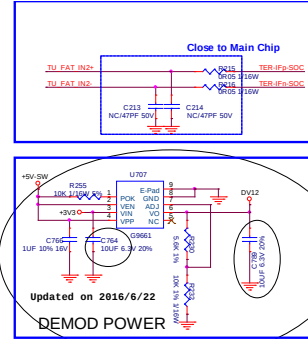
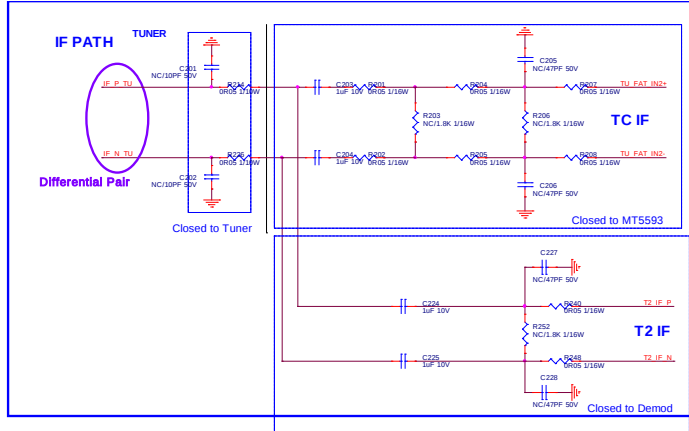
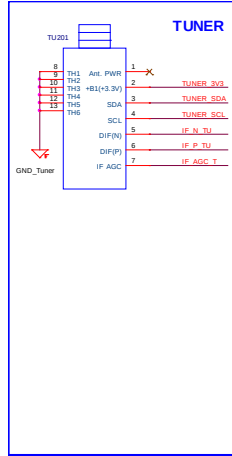


8-6-3 SOC-DDR3-3-4

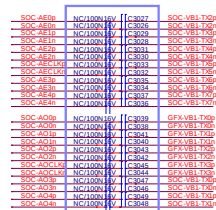
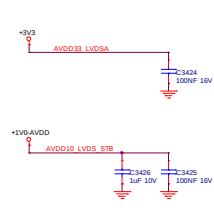


[illegible]

8-6-5 FE-TUNER-DEMOD-TPV

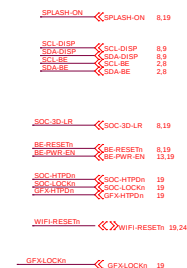
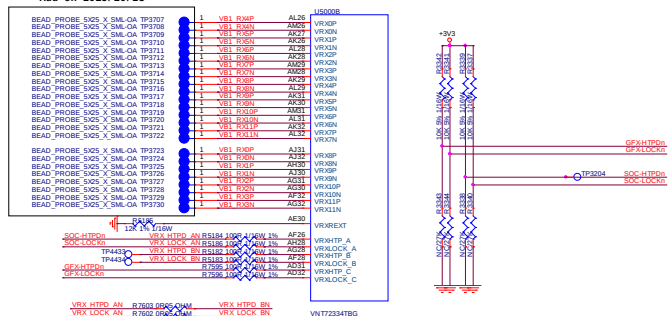


MT5596 Vx1 OUTPUT

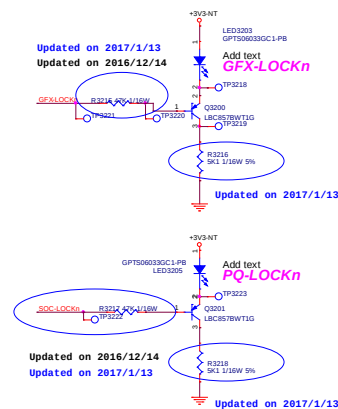


Add on 2016/6/24 for Debug

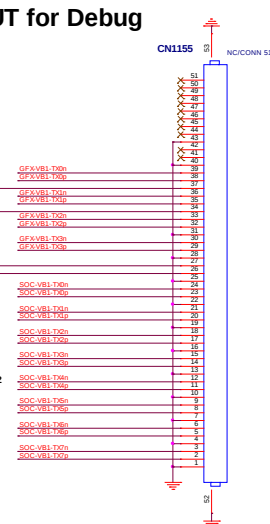
Add on 2015/10/23



MT5596 Vx1 OUTPUT for Debug

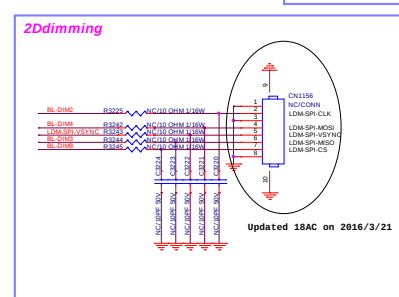
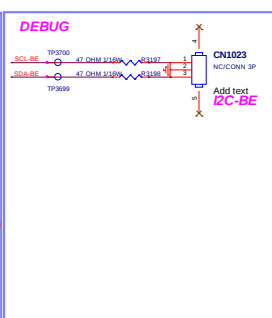
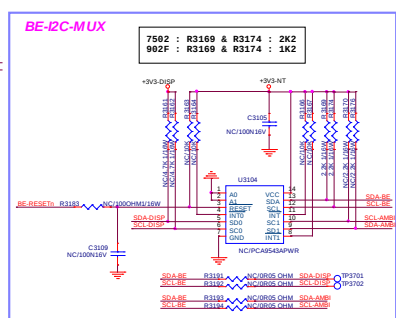
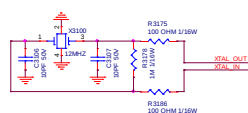
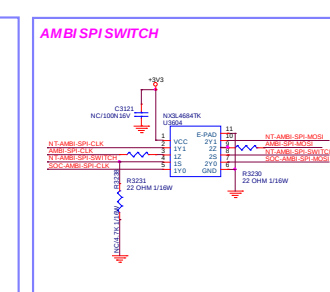
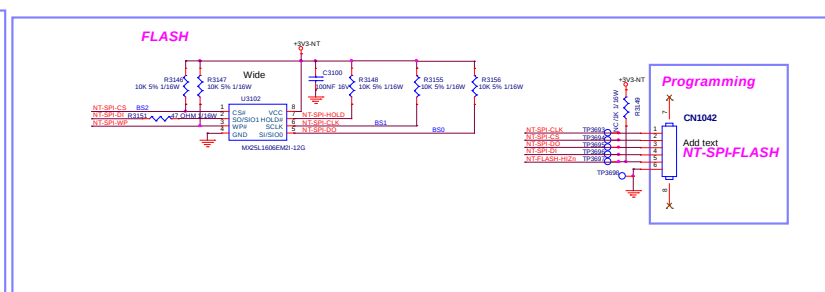
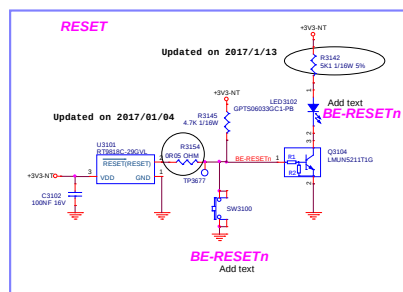
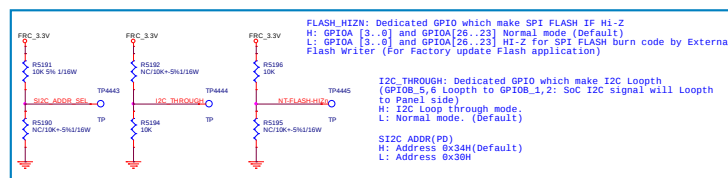
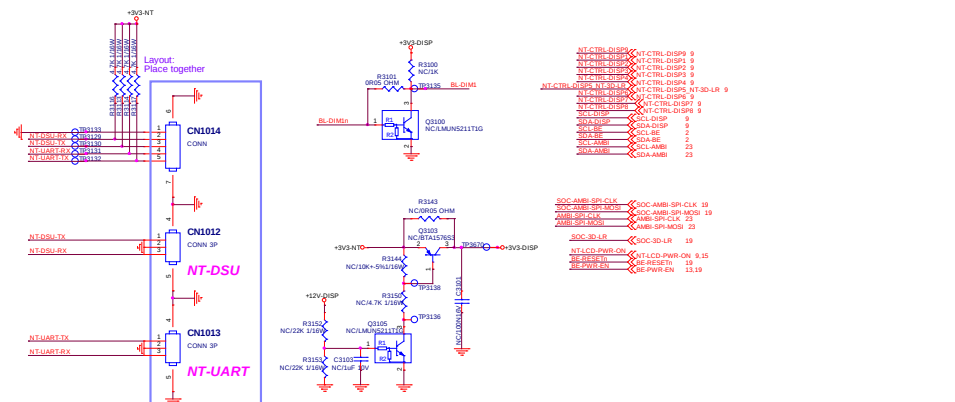
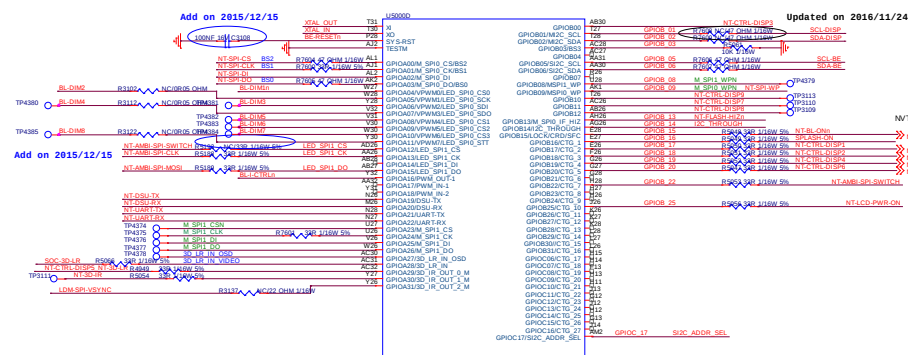


Add on 2016/6/27
Updated 18AC on 2016/9/12

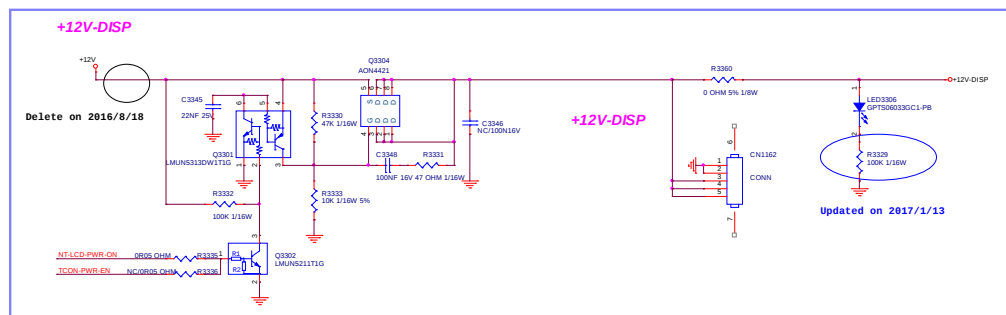


8-6-7 BE-NT7234b-GPIO

NT334 CONTROL

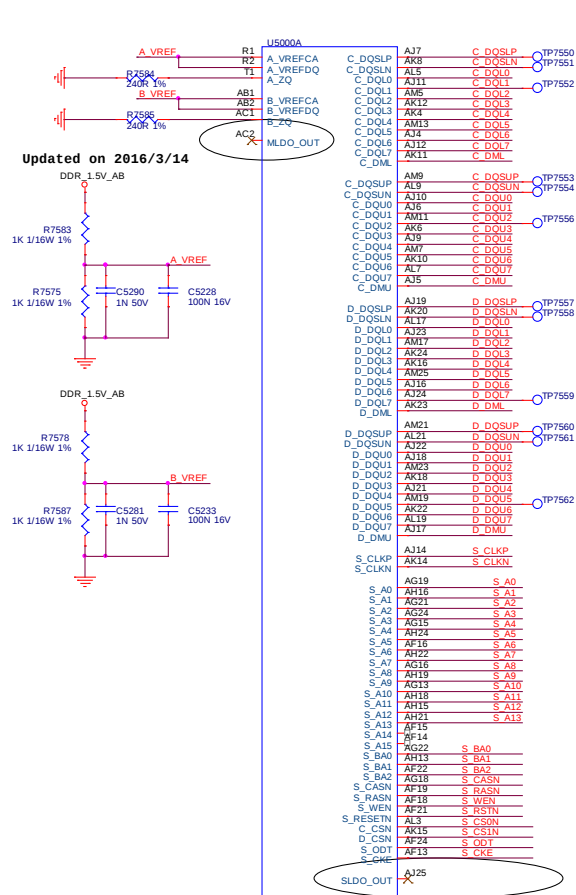


NT334 V-BY-1 OUTPUT



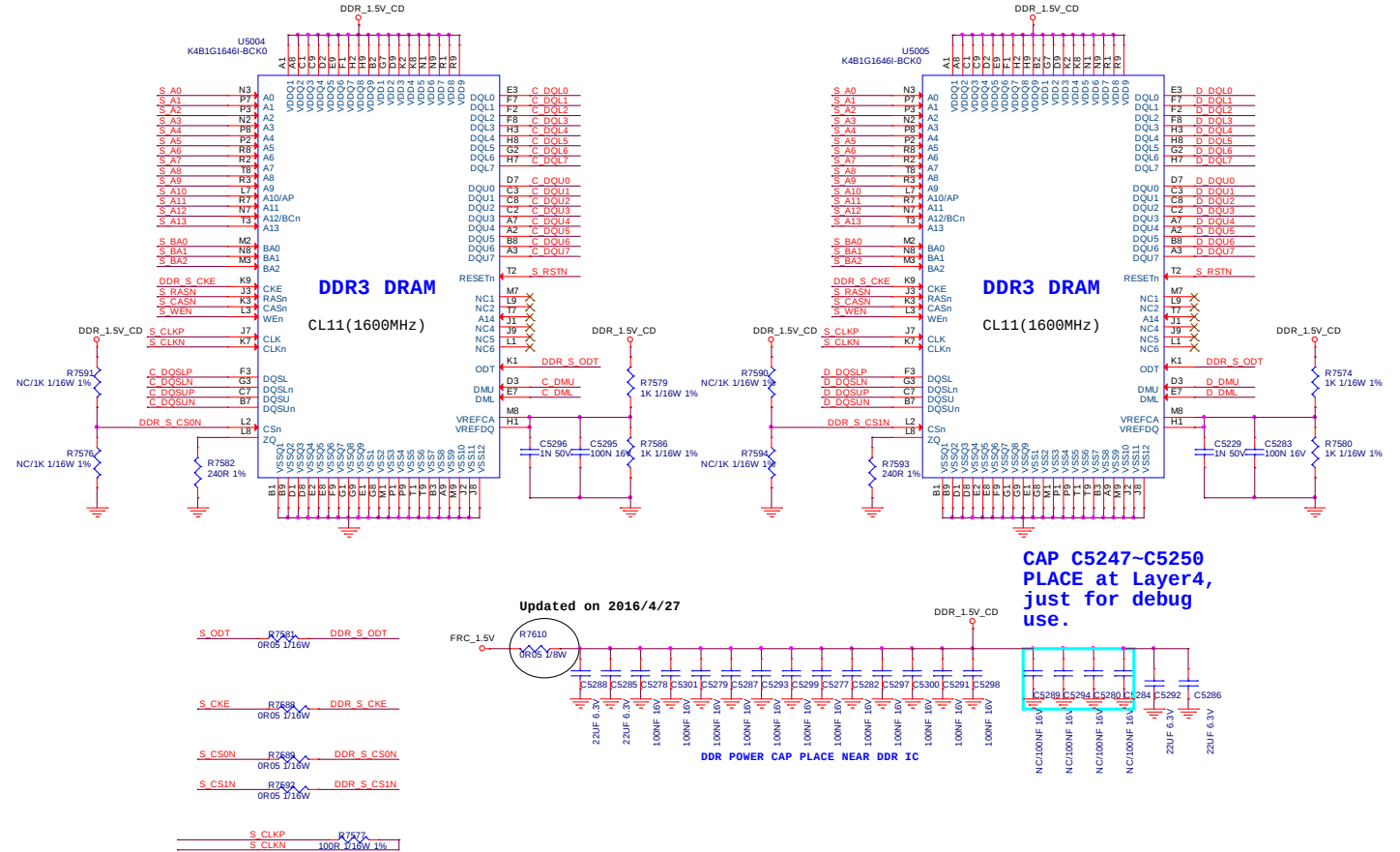
8-6-10 BE-NT7234e-DDR

NT334 DDR A-B



VNT72334TBG

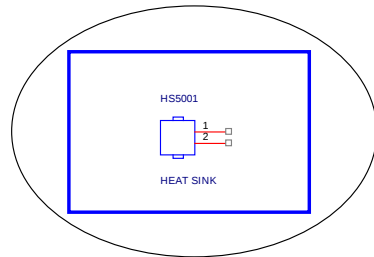
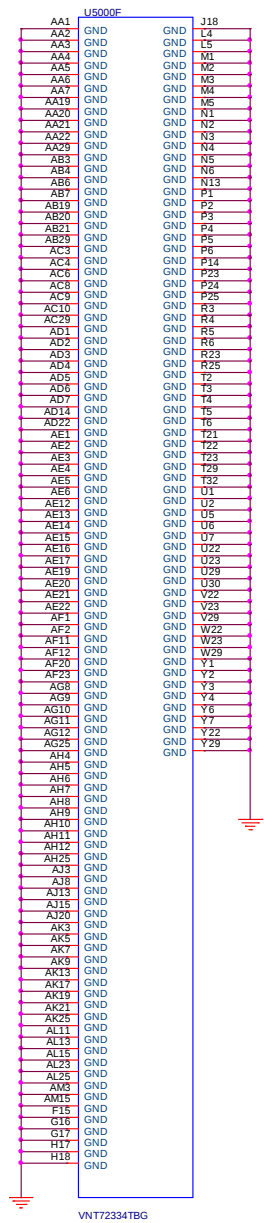
Updated on 2016/3/14



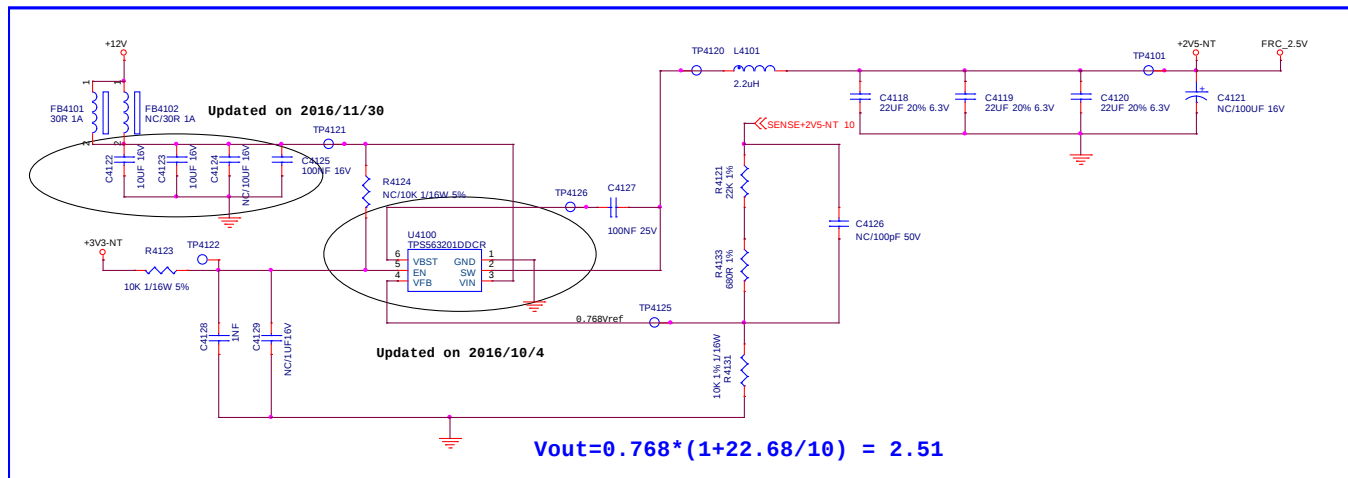
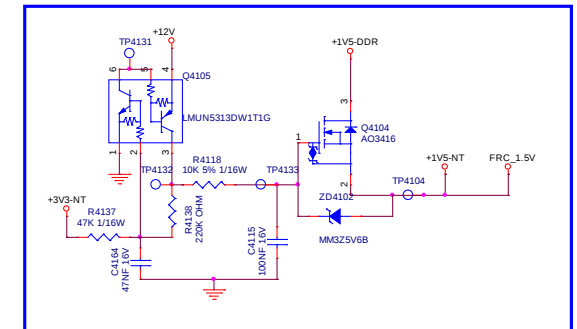
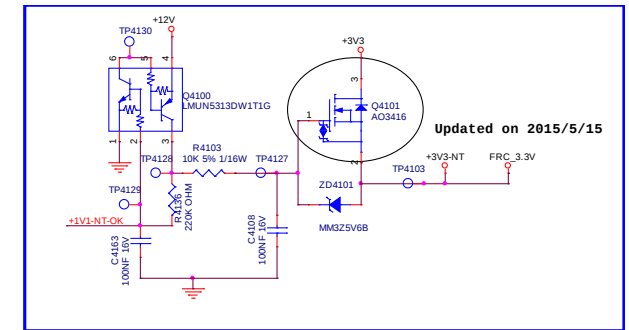
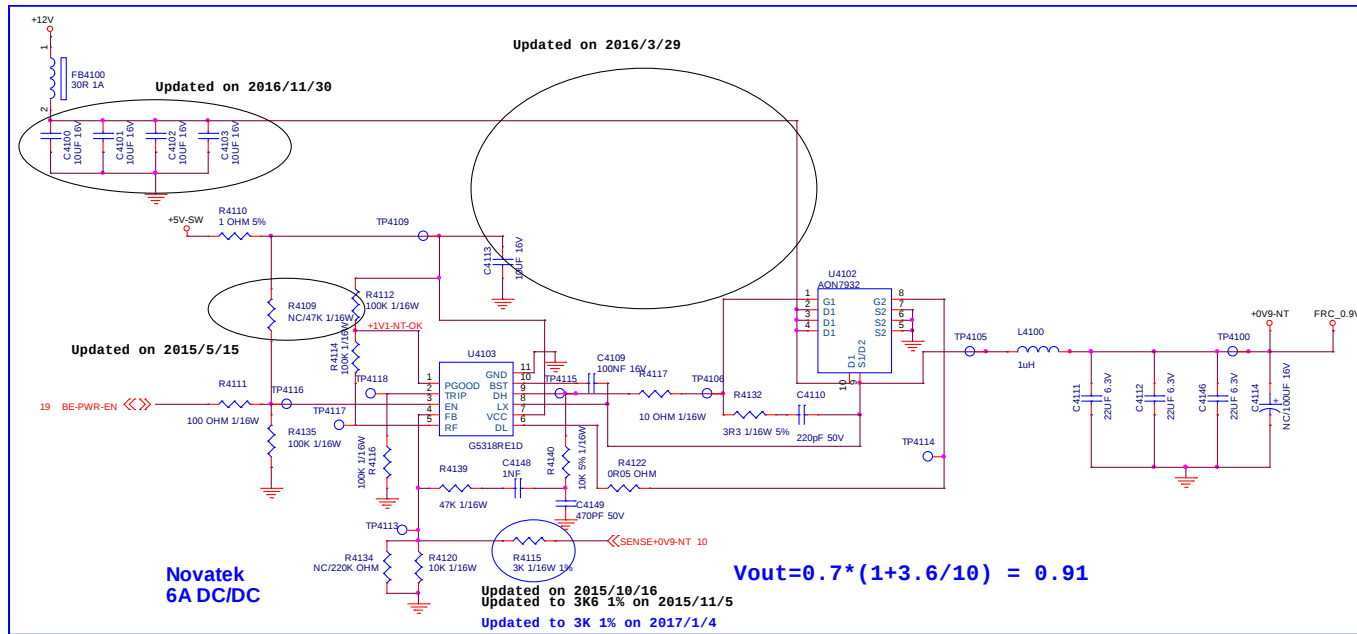
CAP C5247-C5250
PLACE at Layer4,
just for debug
use.

DDR POWER CAP PLACE NEAR DDR IC

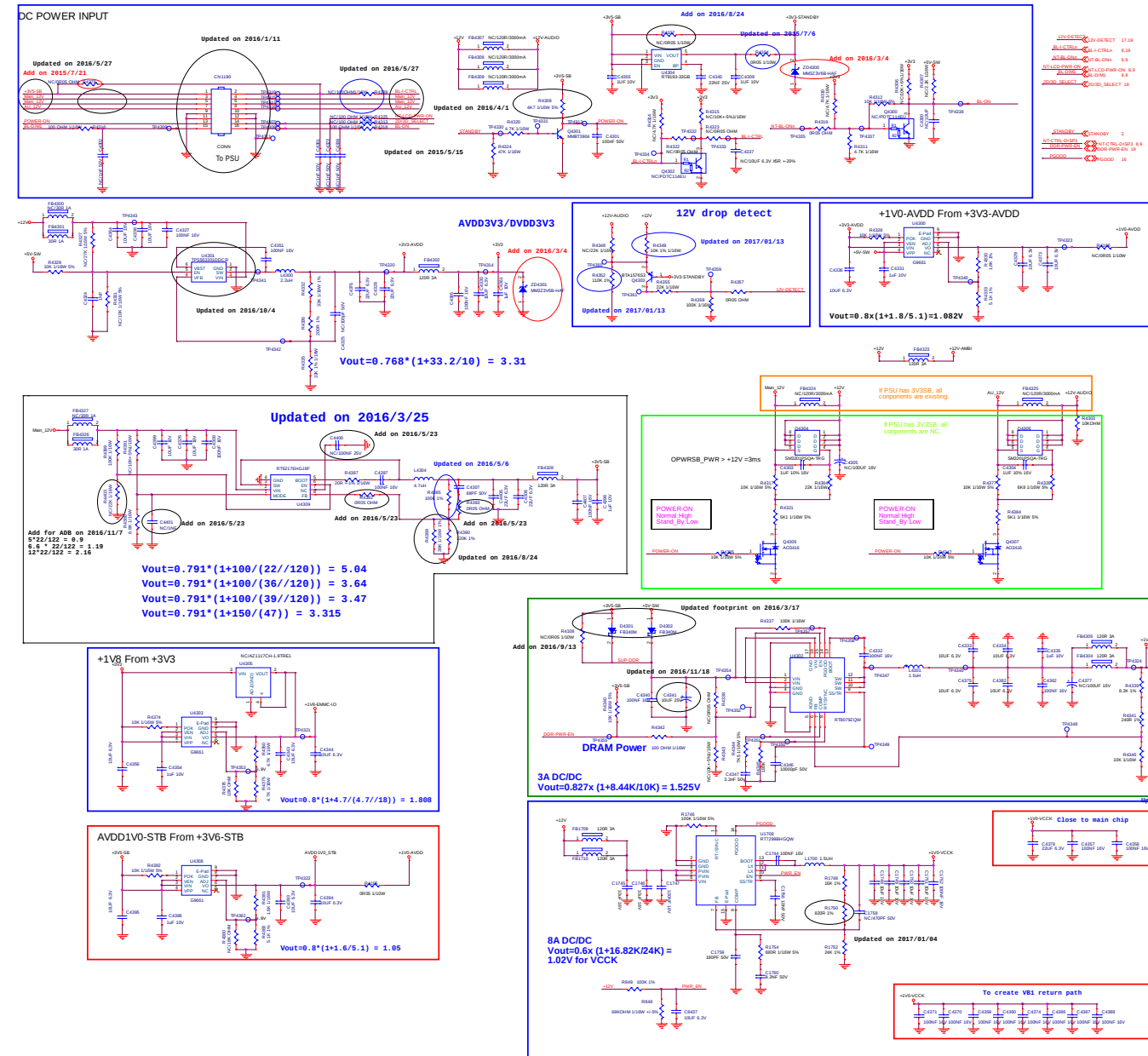
NT334 GROUND



8-6-12 DCDC-Novatek-POWER

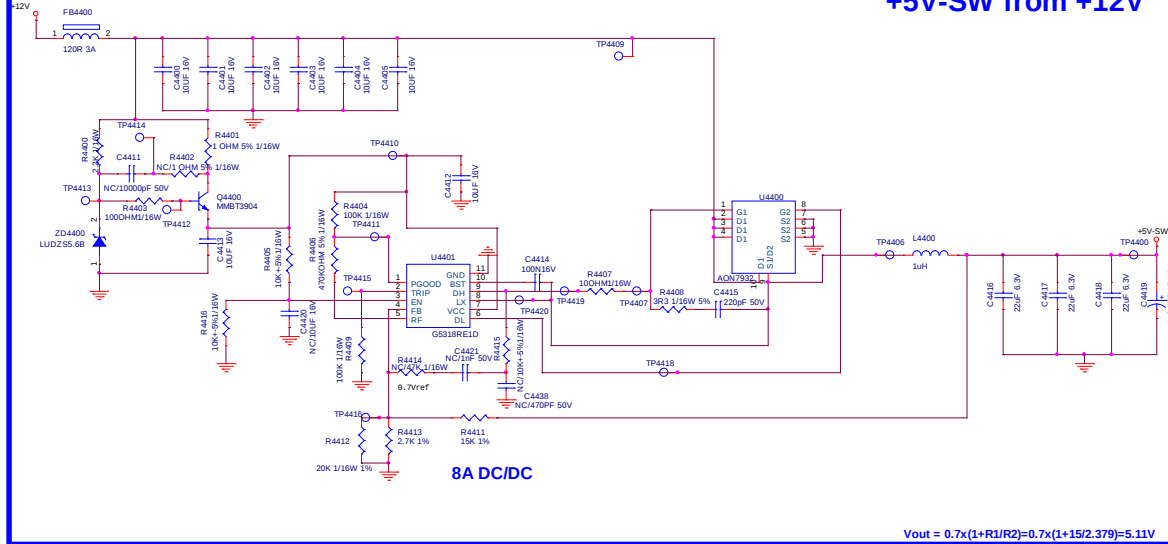


8-6-14 DCDC-SYSTEM-POWER1

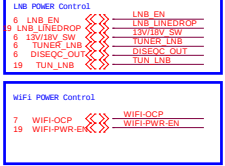
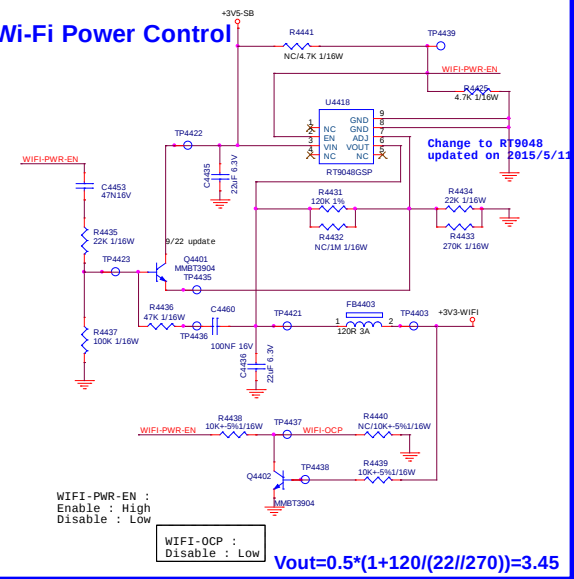


8-6-15 VCCK & DVSS

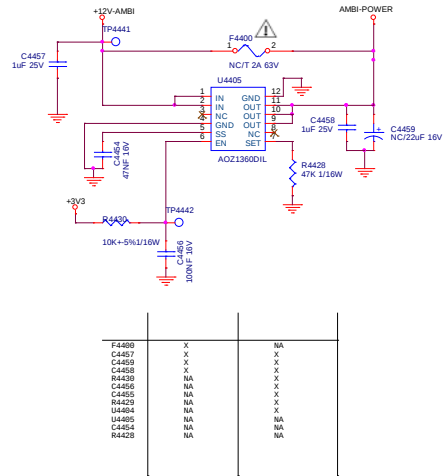
+5V-SW from +12V



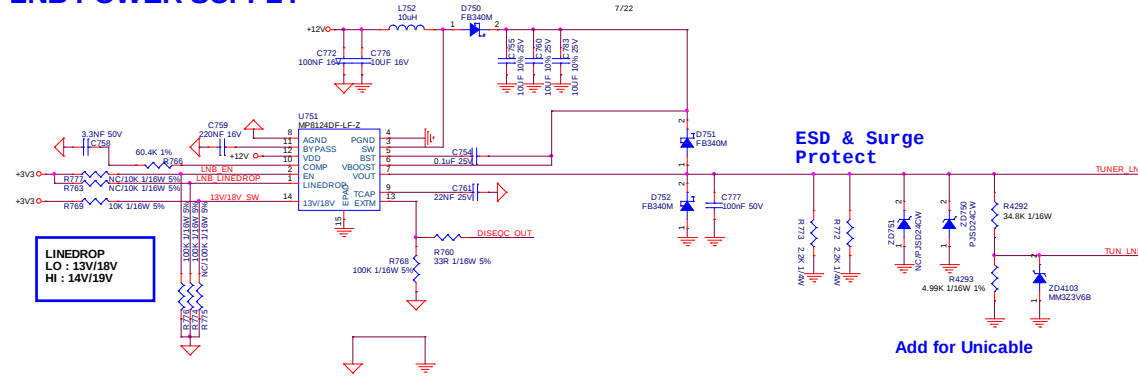
Wi-Fi Power Control



AMBILIGHT PROTECTION

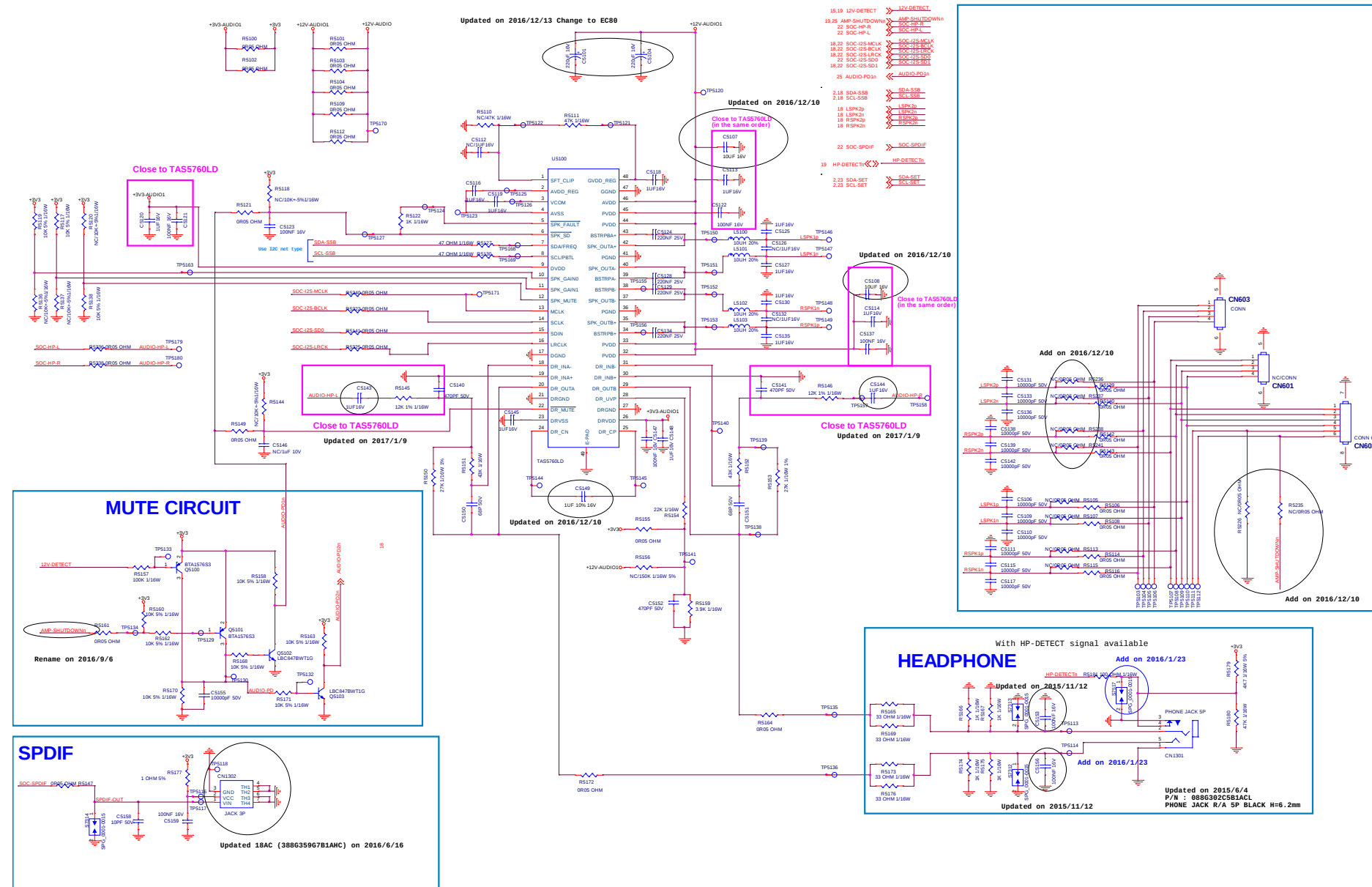


LNB POWER SUPPLY

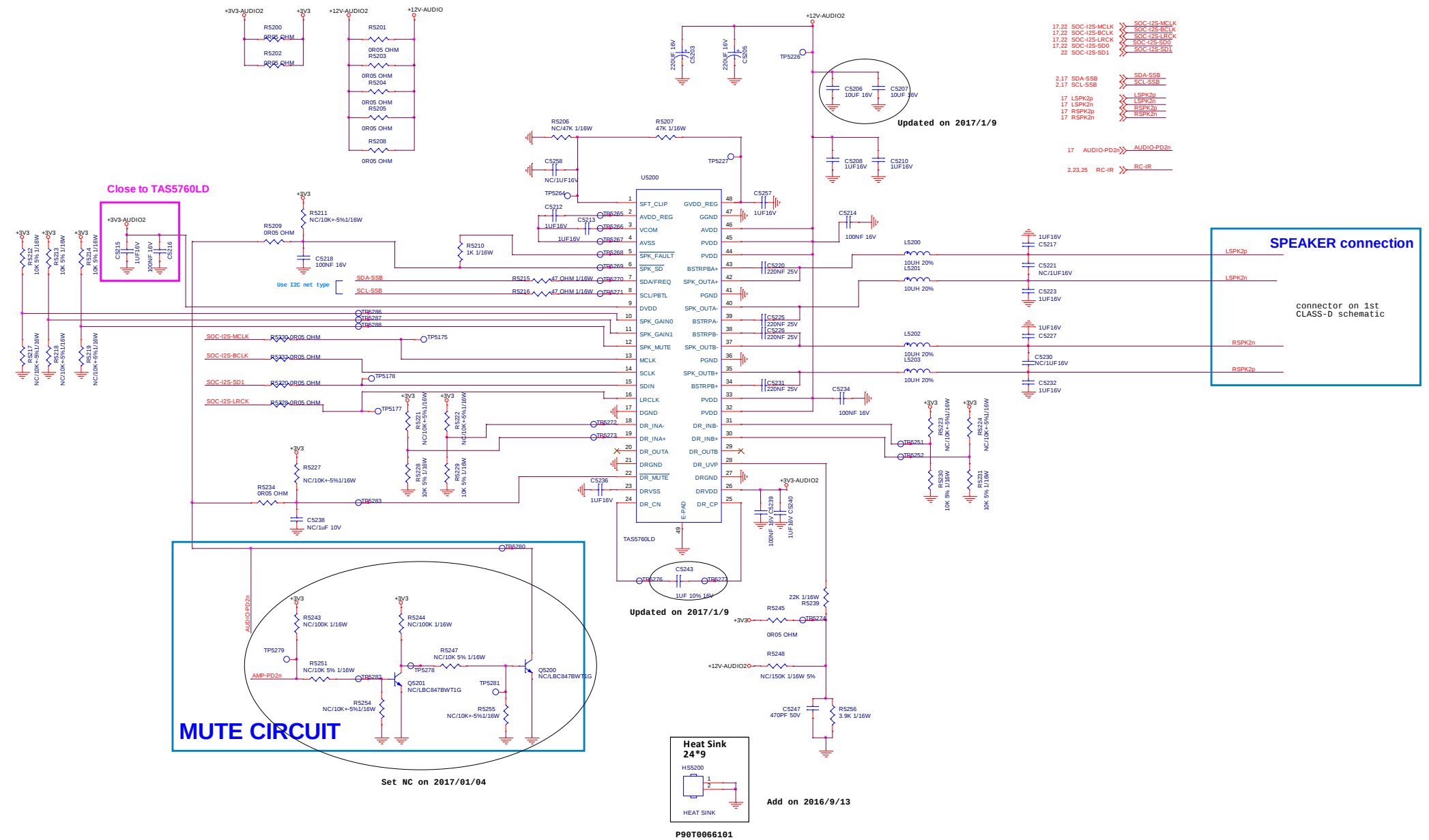


NC for PUT6401 models

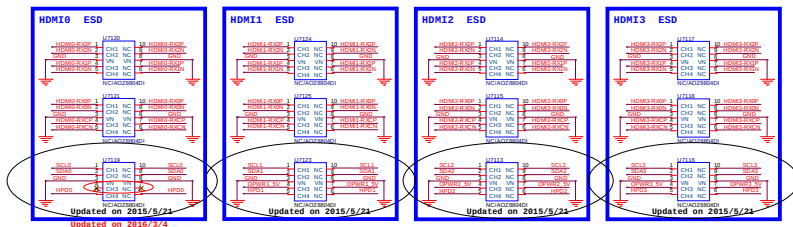
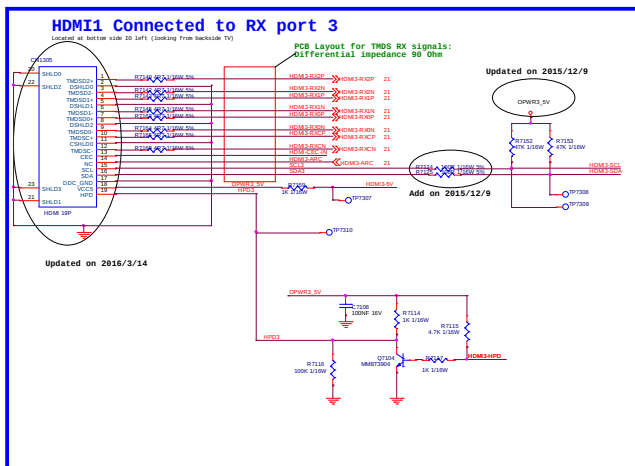
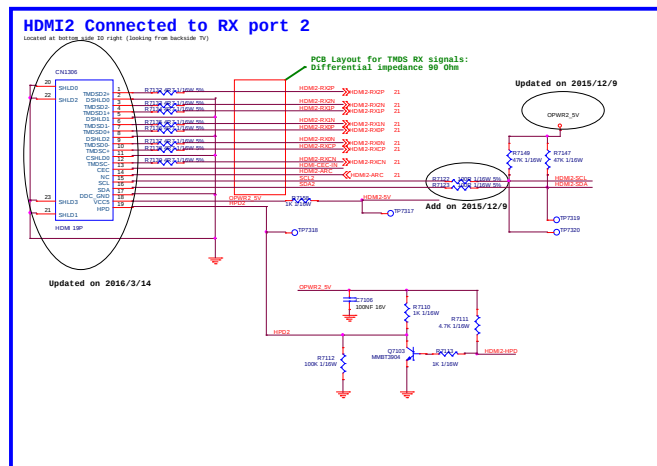
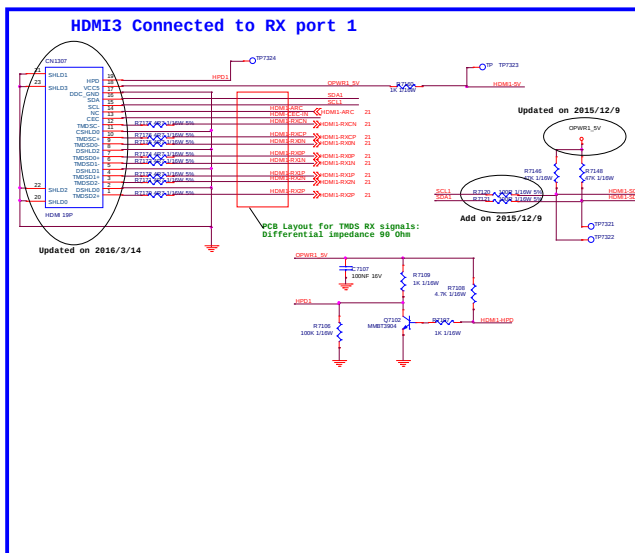
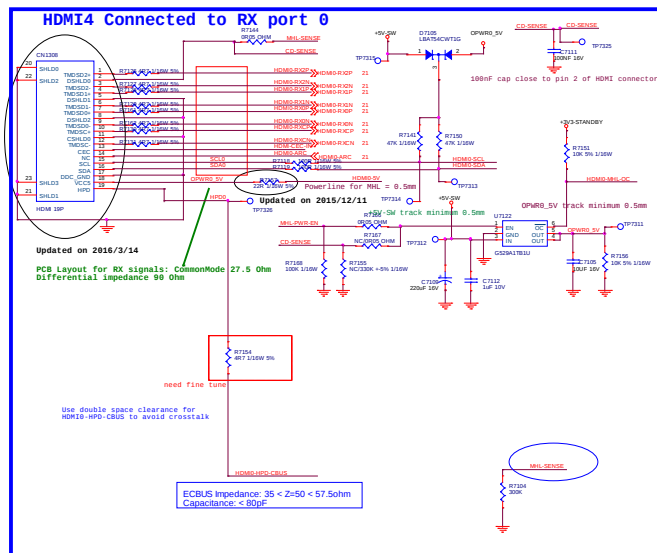
8-6-17 AUDIO-1st-CLASS-D-AMP



8-6-18 AUDIO-2nd-CLASS-D-AMP

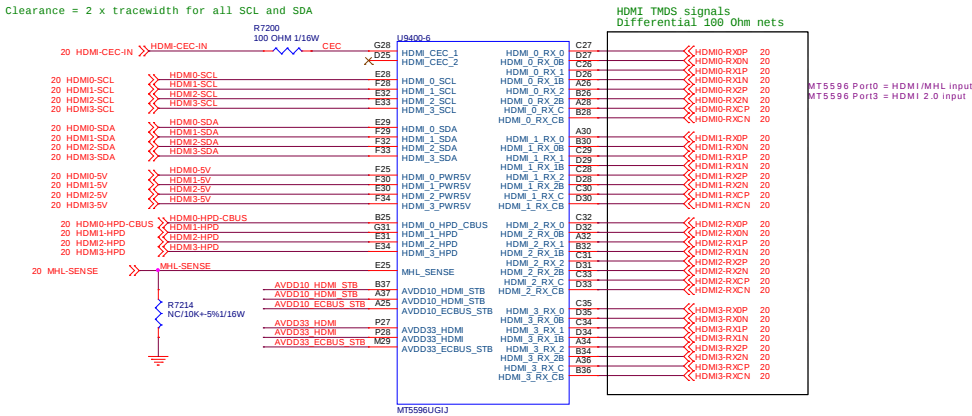


8-6-20 HDMI-INPUTS

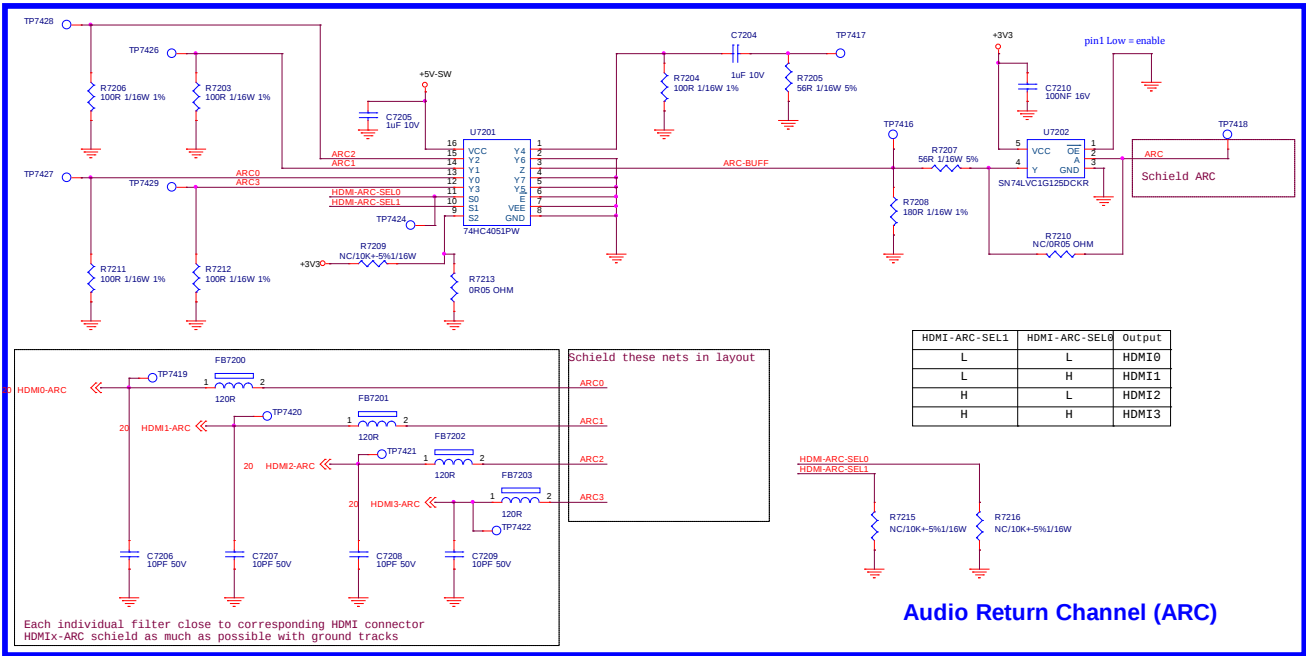
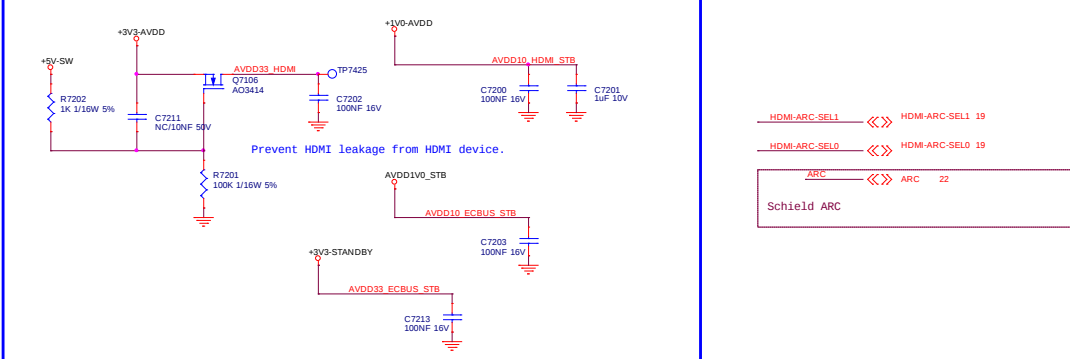


8-6-21 HDMI-SOC-ARC

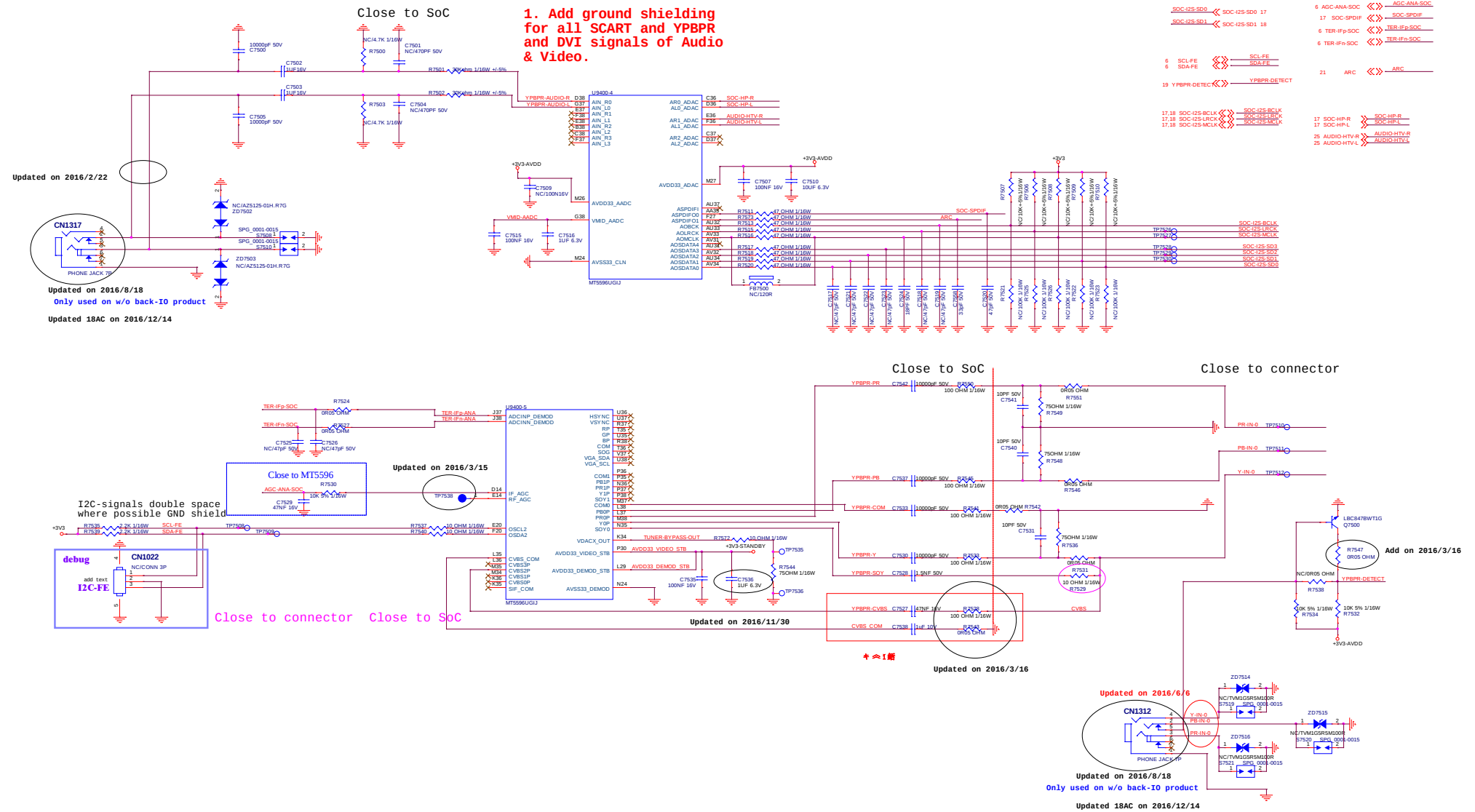
Clearance = 2 x tracewidth for all SCL and SDA



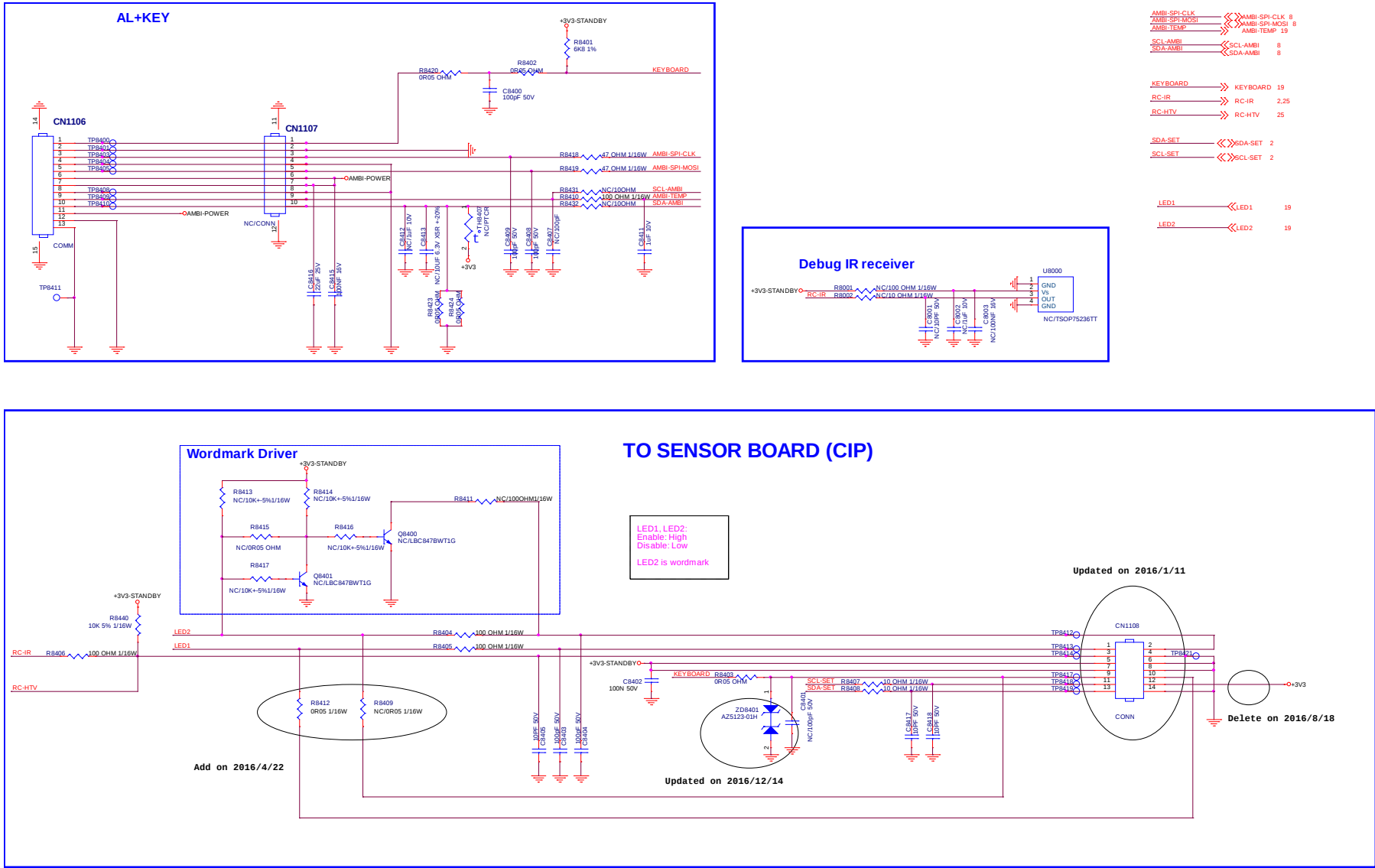
Analog Power



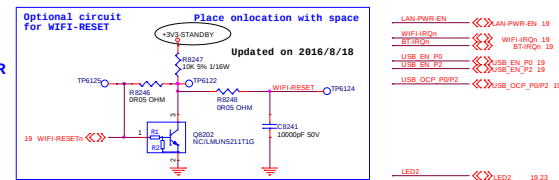
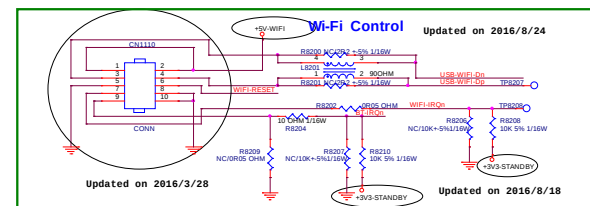
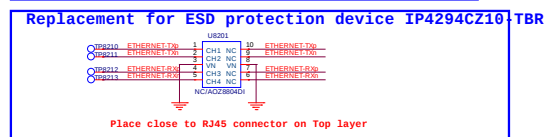
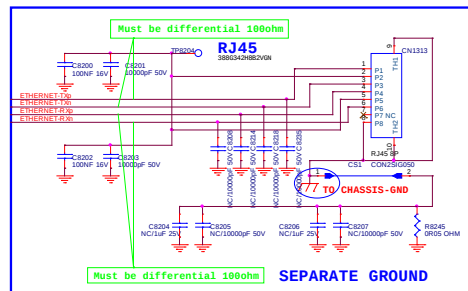
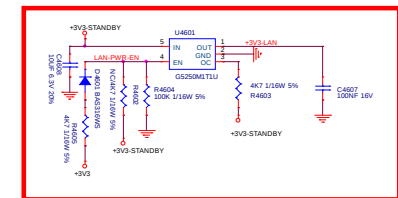
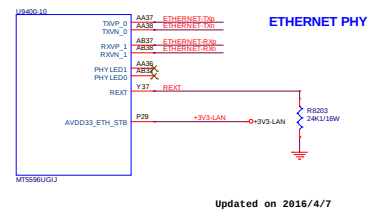
8-6-22 SCART-YPbPr-CVBS



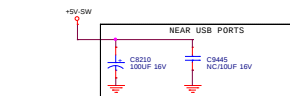
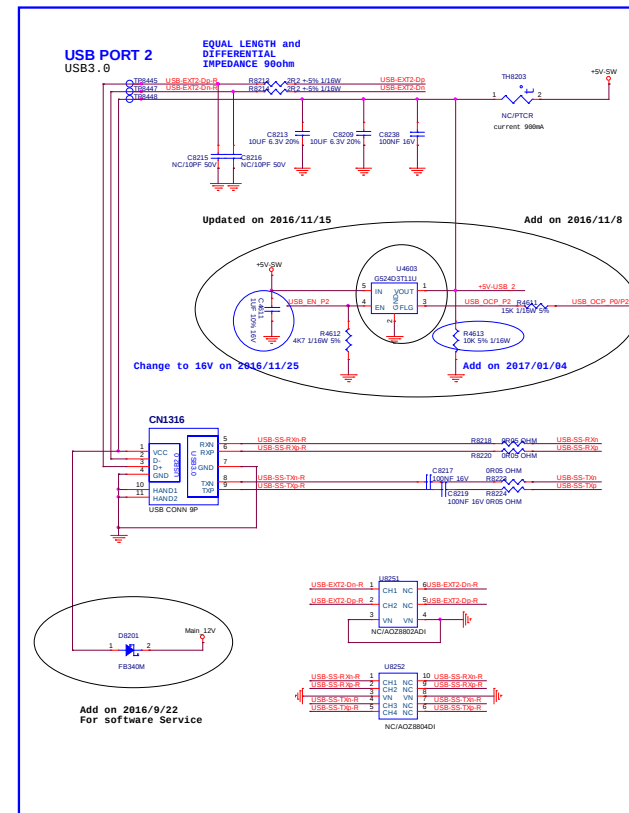
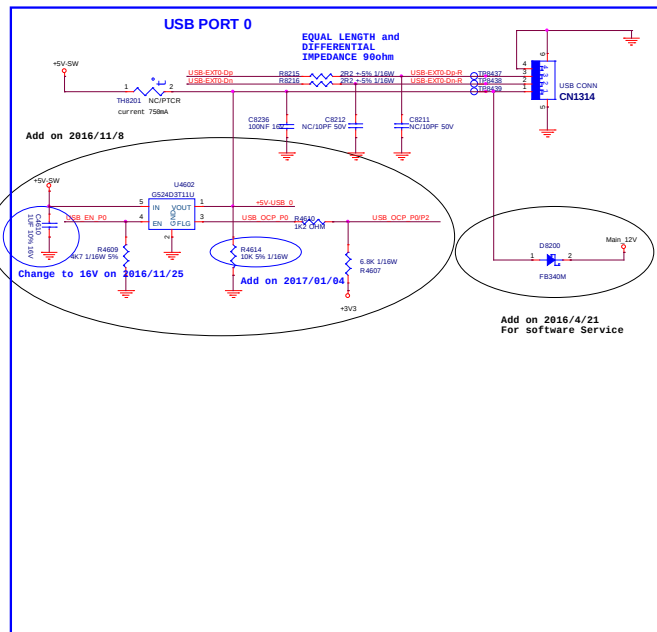
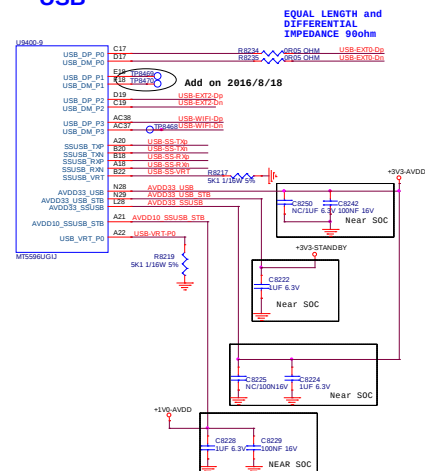
8-6-23 CTRL-CONNECTORS



8-6-24 CTRL-ETHERNET-PHY

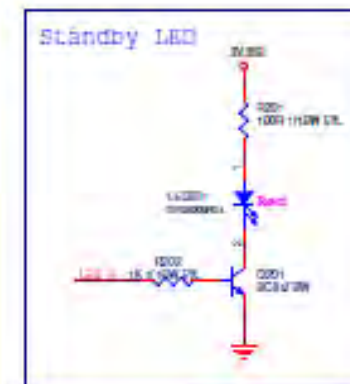
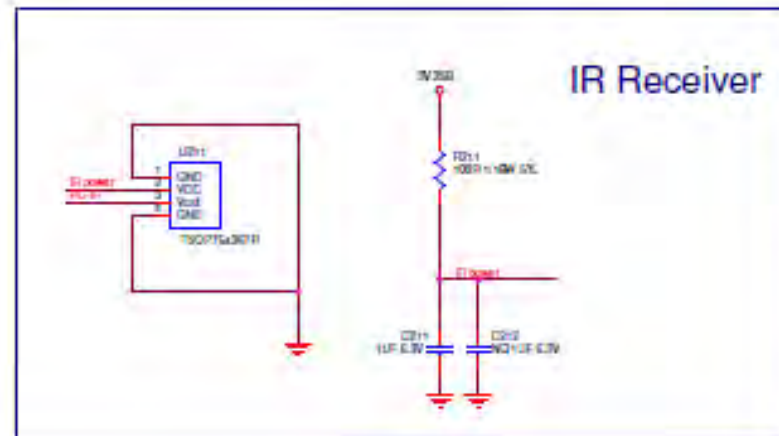
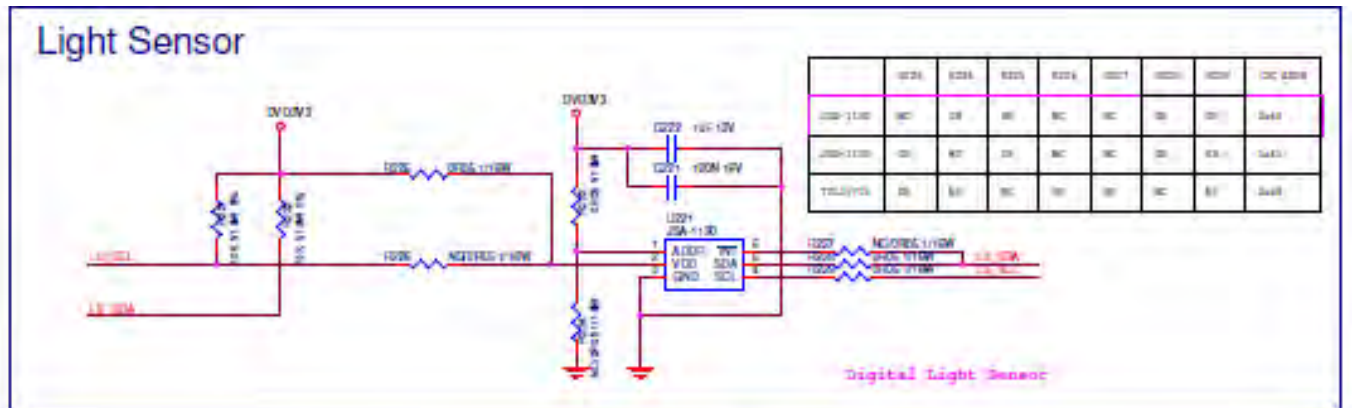
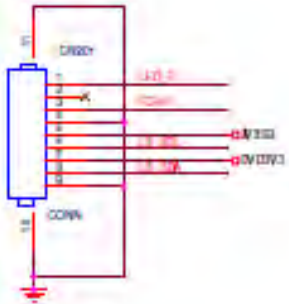


USB



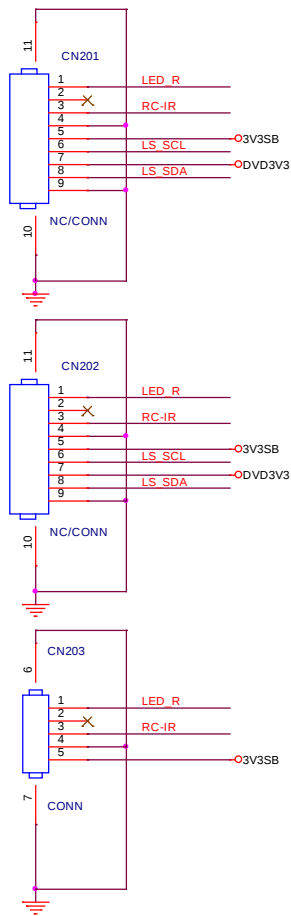
8.7J 715G8694 IR/LED Panel

8-7-1 LED&IR&Light sensor

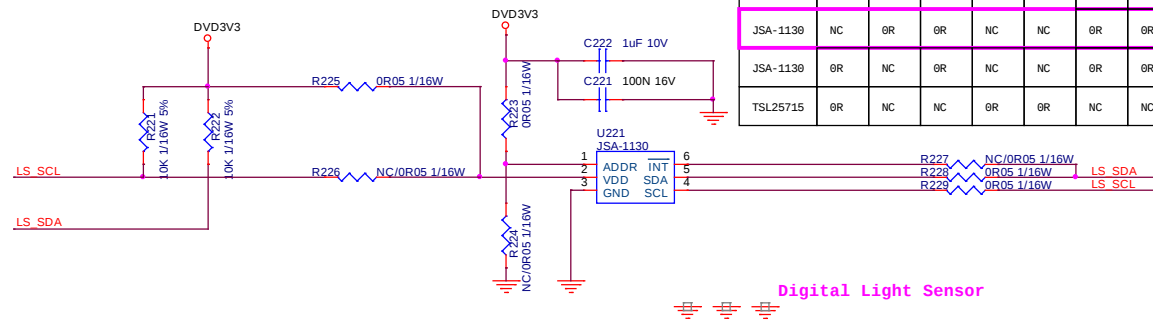


8.8 J 715G8623 IR/LED Panel

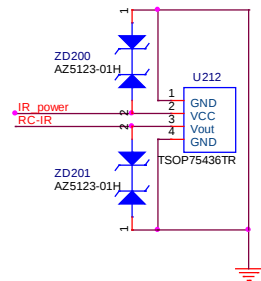
8-8-1 IR



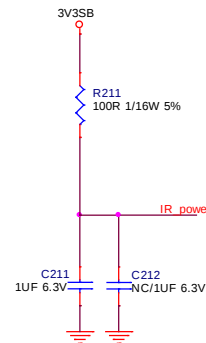
Light Sensor



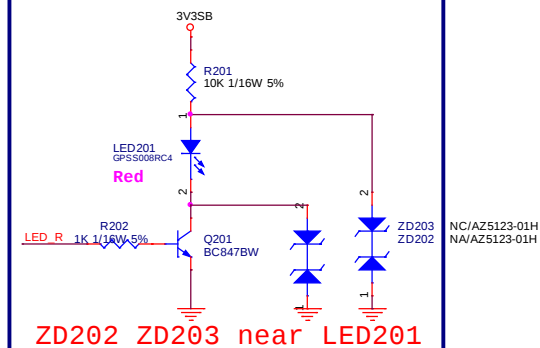
ZD200 ZD201 near U212 pin



IR Receiver

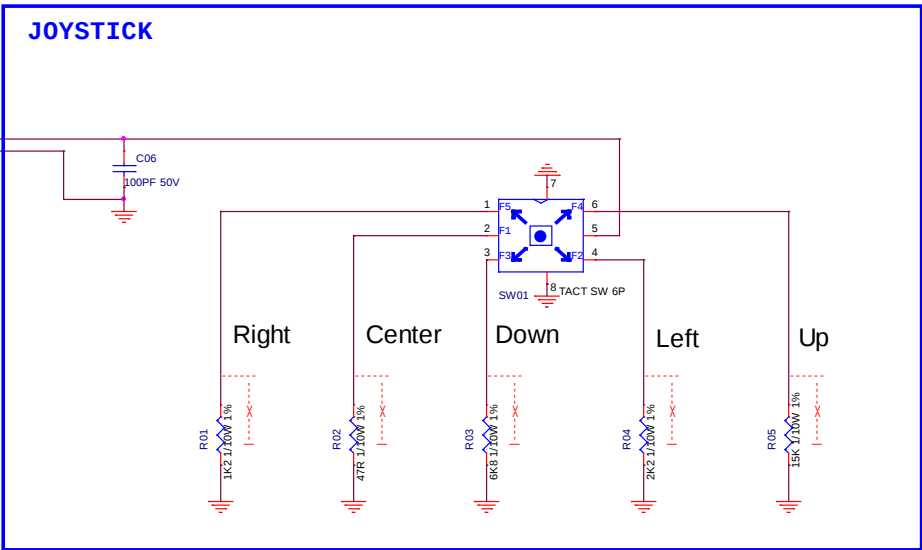
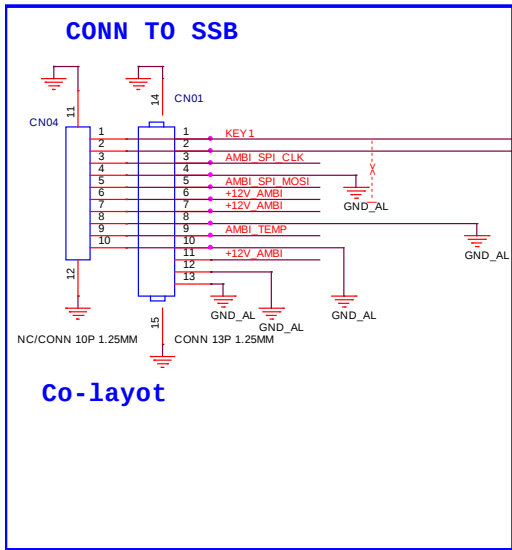


Standby LED



8.9 E 715G8555 Keyboard control panel

8-9-1 Key



Joystick key define

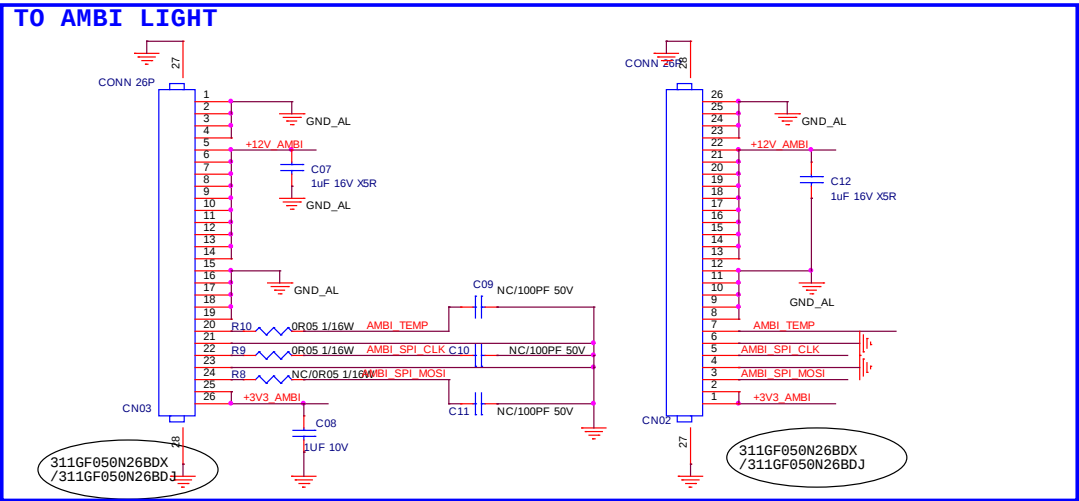
Direction	switch	Key function	Resistance	Voltage	Range
Center	2-5 short	Menu	0R	0V	0.0 to 0.22 V
Right	1-5 short	CH+	1K2	0.5V	0.39 to 0.60 V
Left	4-5 short	CH-	2K2	0.81V	0.67 to 0.95 V
Down	3-5 short	VOL-	6K8	1.65V	1.41 to 1.87 V
Up	6-5 short	VOL+	15K	2.27V	1.93 to 2.58 V
NA	NA	No function	NA	3.3V	3.135 to 3.465V

Joystick circuit diagram

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

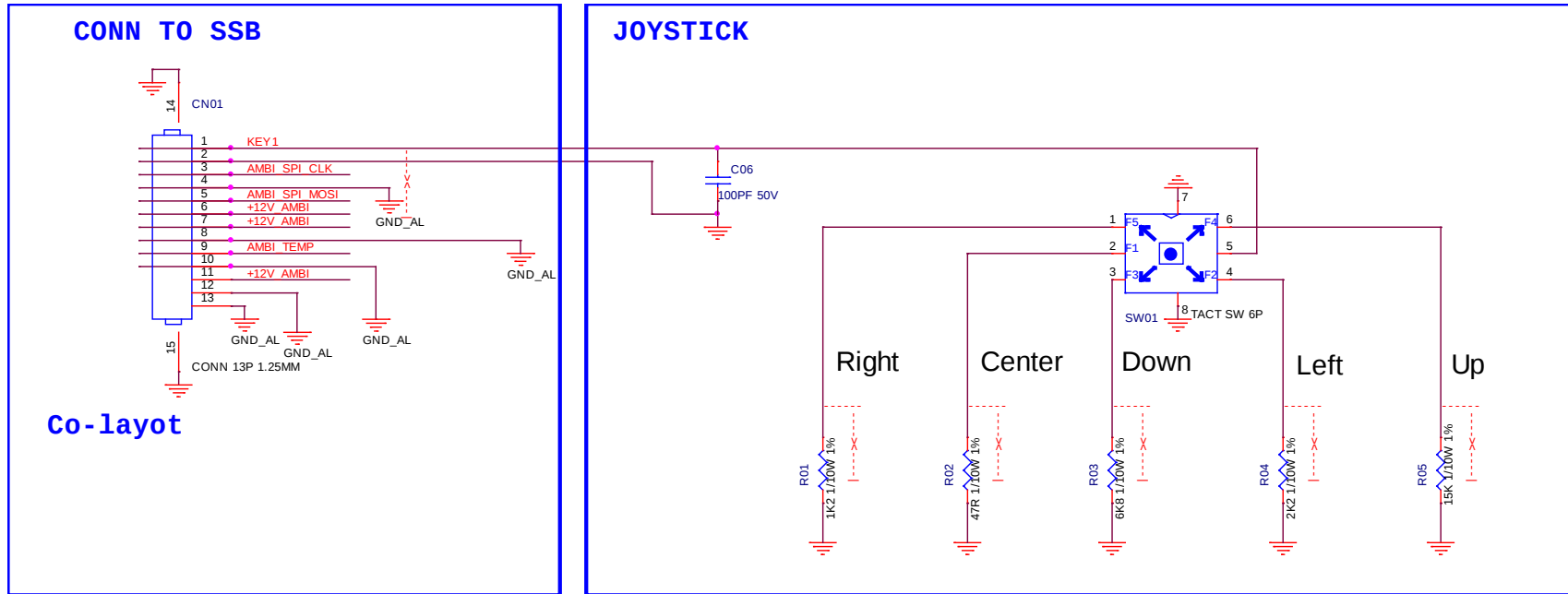
Joystick diversity for AL

	CN03	C07	R9	R10
AL2	N	N	N	N
AL3/AL4	Y	Y	Y	Y

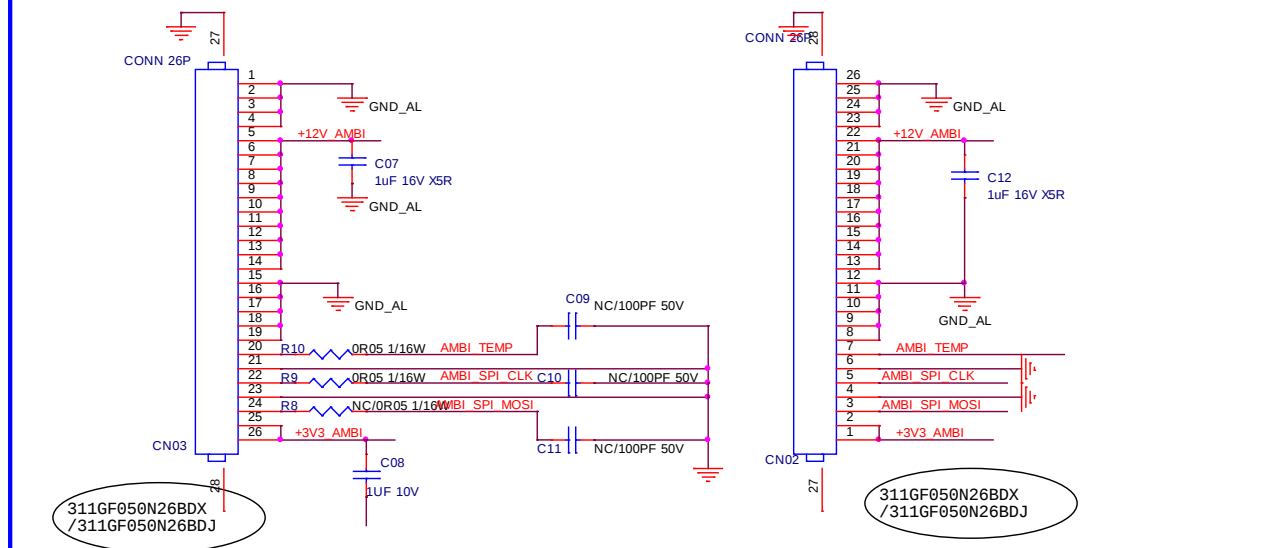


8.10 E 715G7088 Keyboard control panel

8-10-1 Key

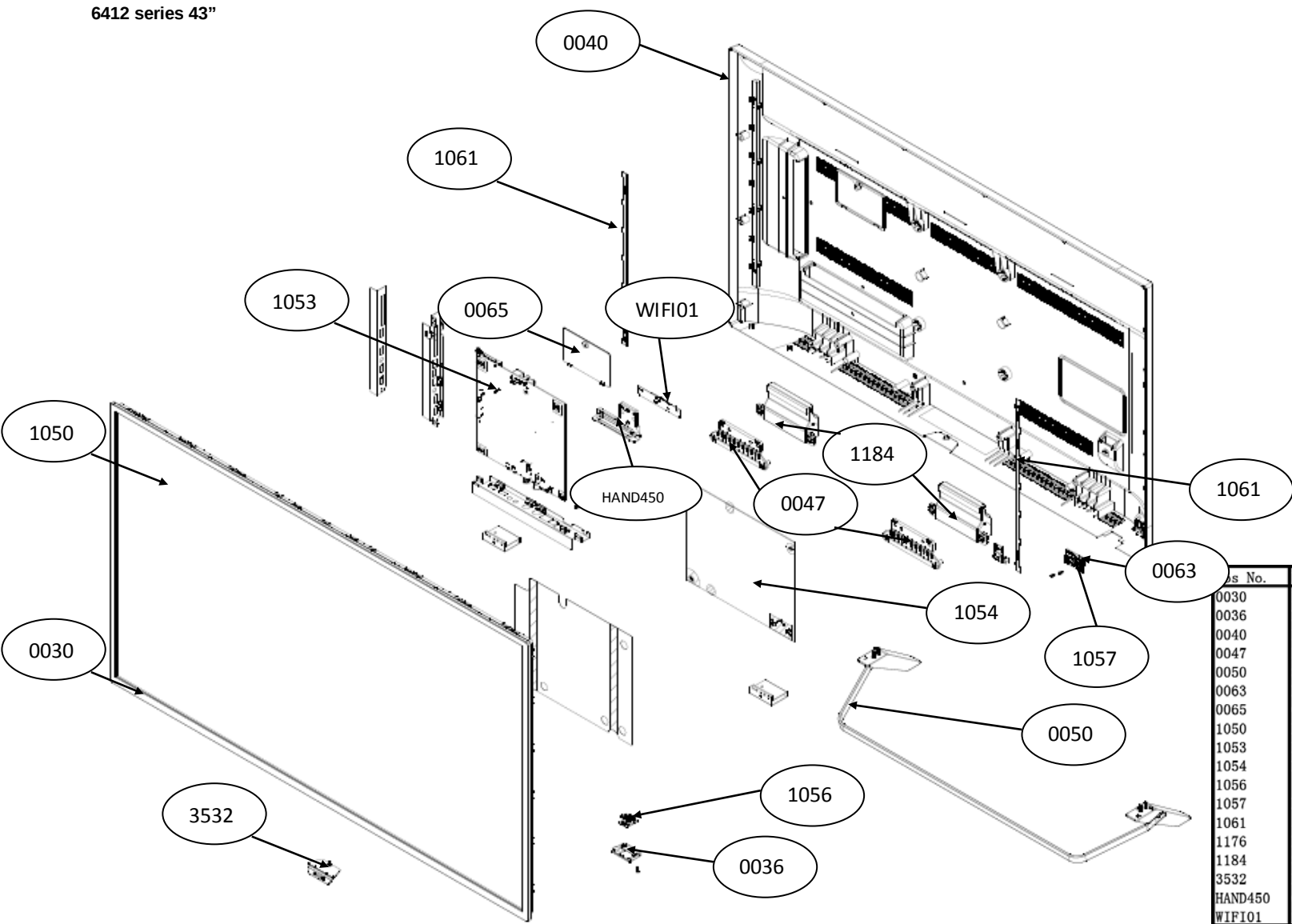


TO AMBI LIGHT

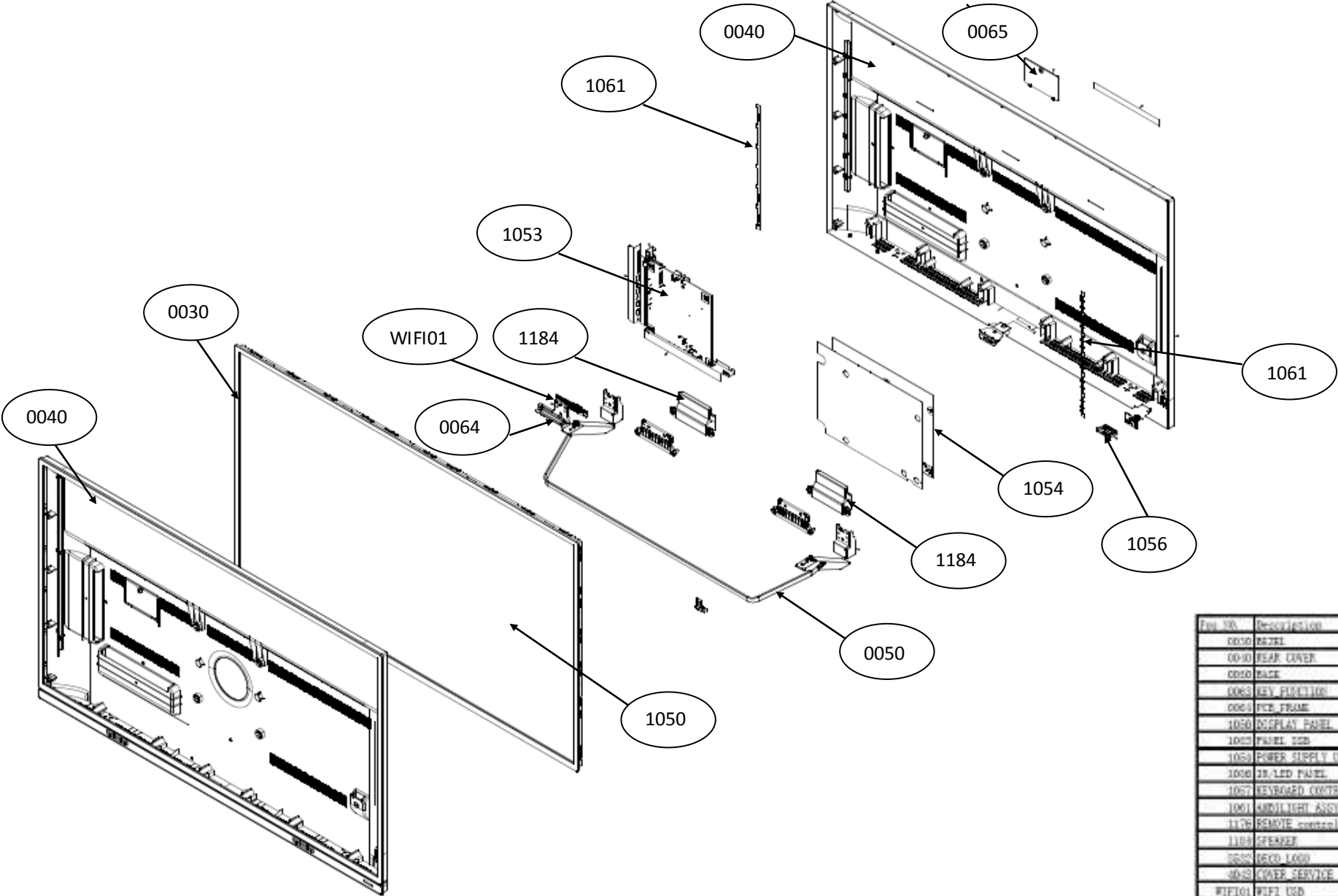


9. Styling Sheets

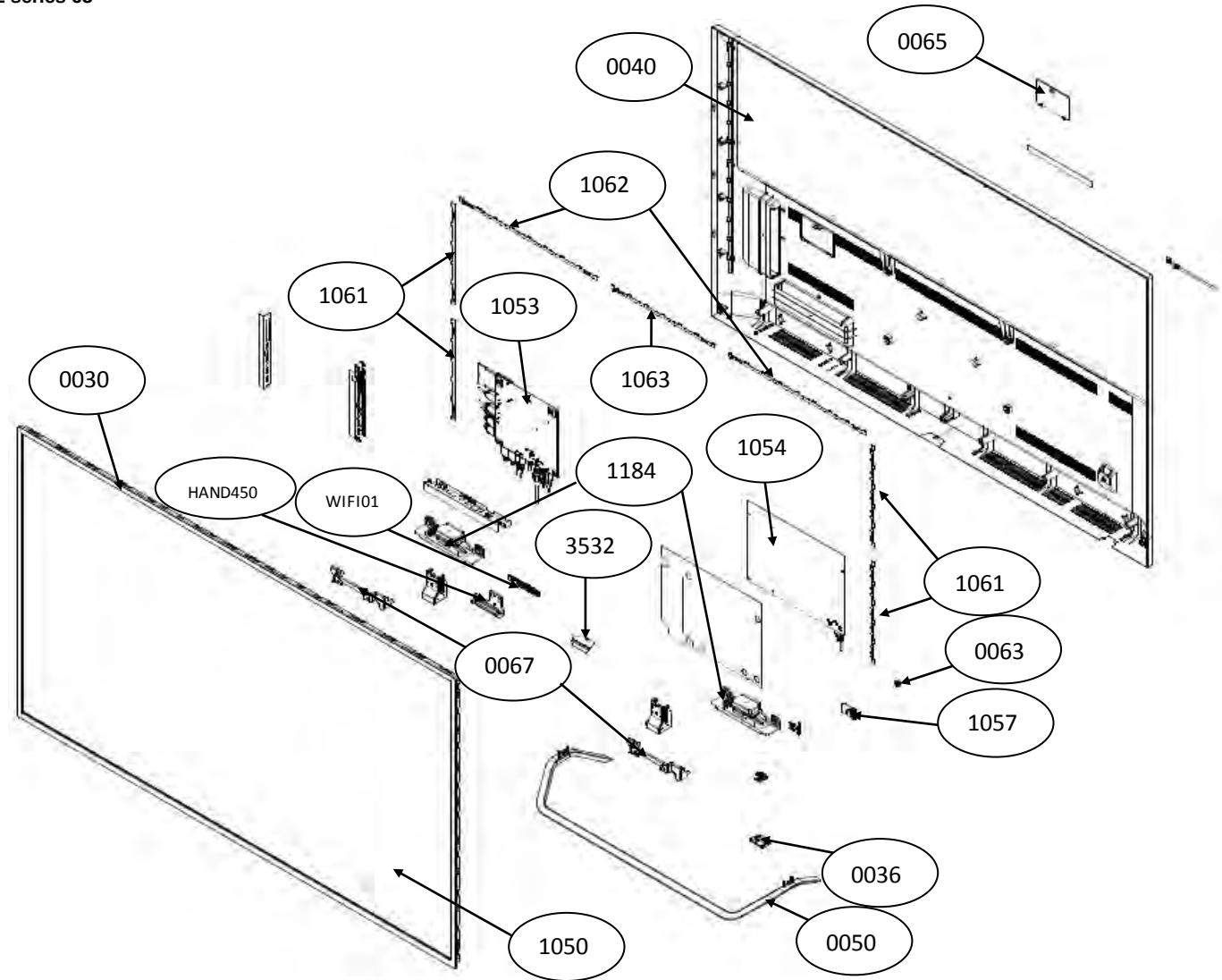
6412 series 43"



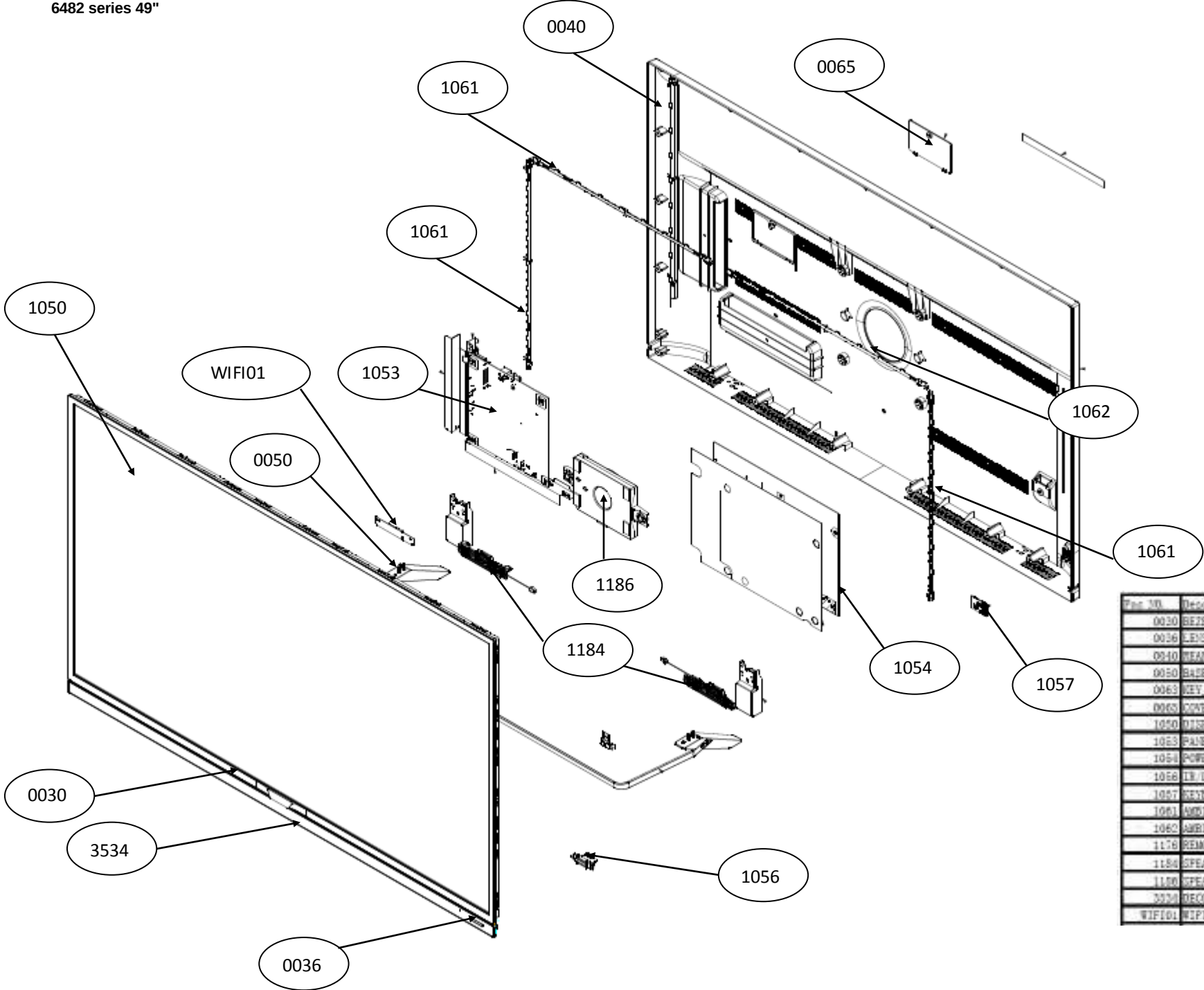
Parts No.	Description	Remarks
0030	Bezel	
0036	LENS	
0040	Rear cover	
0047	HDD Holder	
0050	Stand	
0063	KEY_FUNCTION	
0065	COVER_CLOCK_REAR	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1057	KEY BOARD ASSY	
1061	AMBILIGHT ASSY	
1176	Remote control	Not displayed
1184	Speakers	
3532	DECO_LOGO	
HAND450	Case_holder	
WIFI01	WIFI/BT USB	



Part No.	Description	Remark
0030	BEZEL	
0040	BEZEL COVER	
0050	PANEL	
0065	KEY FUNCTION	
0066	PCE FRAME	
1050	DISPLAY PANEL	
1053	PANEL I/O	
1054	POWER SUPPLY UNIT	
1056	IR LED PANEL	
1061	KEYBOARD CONTROL PANEL	
1061	AUXILIARY ASSISTANT UI	
1176	REMOTE control	Not displayed
1184	SPEAKER	
0050	DECO LOGO	
0040	COVER SERVICE	
WIFI01	WIFI I/O	

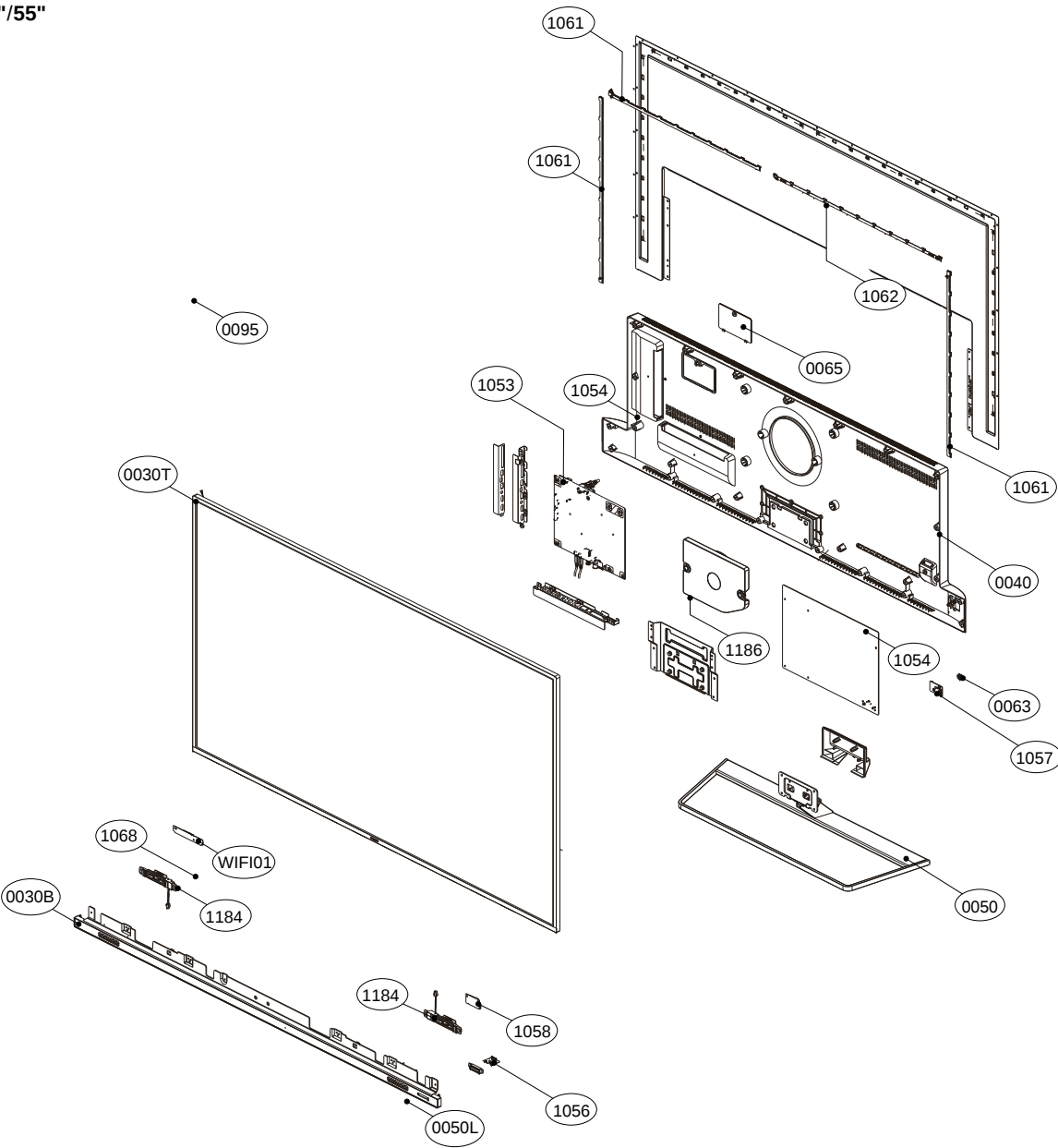


Pos No.	Description	Remarks
0030	Bezel	Not displayed
0036	LENS	
0040	Rear cover	
0050	Stand	
0063	KEY_FUNCTION	
0065	COVER_CLOCK_REAR	
0067	COVER_SPK	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1057	KEY BOARD ASSY	
1061	AMBILIGHT ASSY	
1062	AMBILIGHT ASSY	
1063	AMBILIGHT ASSY	
1176	Remote control	
1184	Speakers	
3532	DECO_LOGO	
HAND450	Case_holder	
WIFI01	WIFI/BT USB	



Part No.	Description	Remark
0030	BEZEL	
0036	LENS_IR	
0040	REAR COVER	
0050	BASE	
0065	KEY_FUNCTION	
0066	CLOCK BACK	
1050	DISPLAY PANEL	
1053	PANEL PCB	
1054	POWER SUPPLY UNIT	
1056	IR/LED PANEL	
1057	KEYBOARD CONTROL PANEL	
1061	AMBI LIGHT ASSY(LED #1)	
1062	AMBI LIGHT ASSY(LED #2)	
1178	REMOTE control	Not displayed
1184	SPEAKER	
1186	SPEAKER	
3534	DECO SHEET	
WIFI01	WIFI USB	

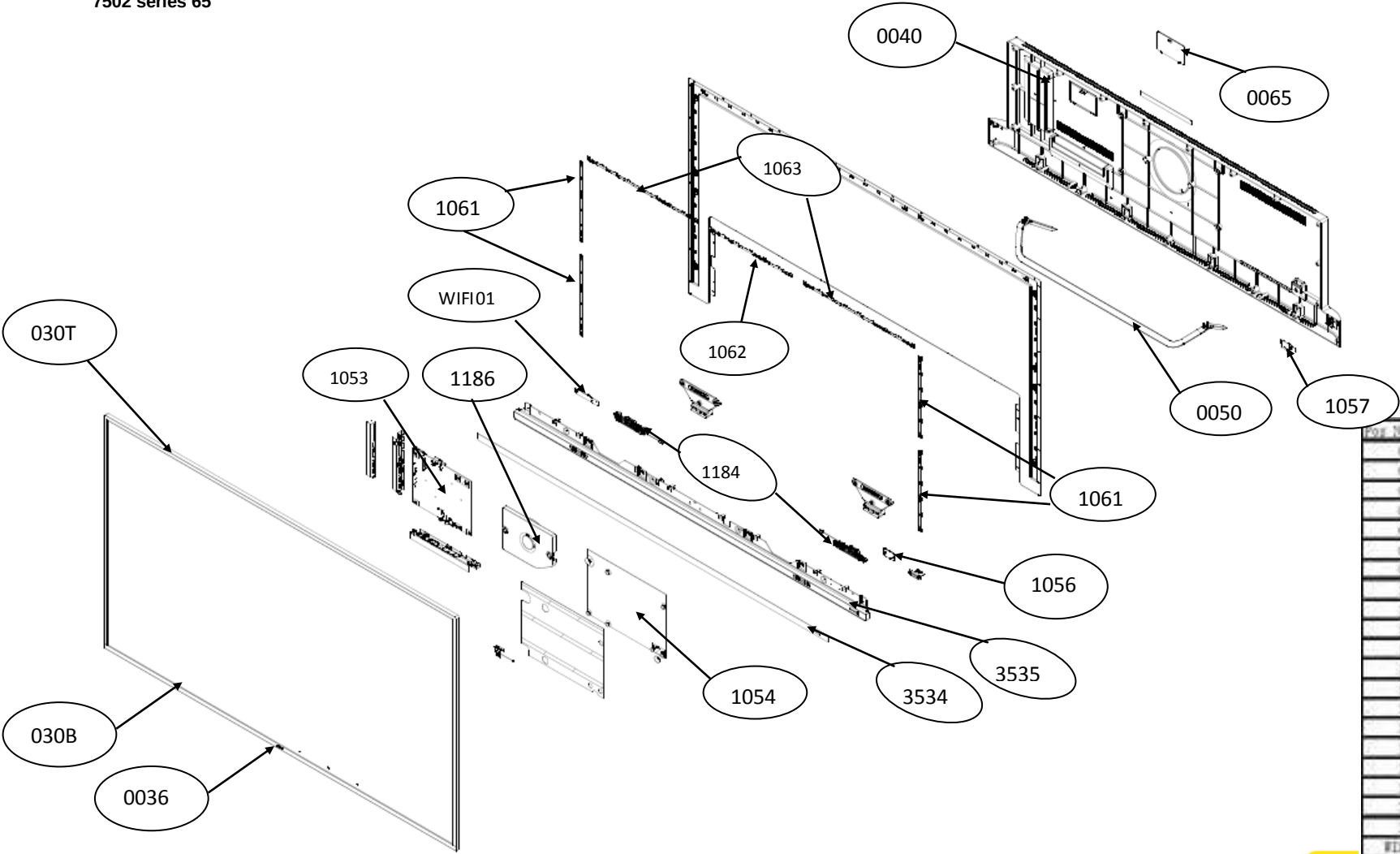
7502 series 49"/55"



Pos No.	Description	Remarks
0030T	Bezel-TOP	Not displayed
0030B	Bezel-BOTTOM	
0040	Rear cover	
0050	BASE	
0063	KEY_FUNCTION	
0065	COVER_CLOCK_REAR	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1057	Keyboard control panel	
1068	Option Board	
1061	LED Modules	
1062	LED Module	
1176	Remote control	
1184	Speakers	
1186	Speaker	
WIFI01	WiFi_USB	

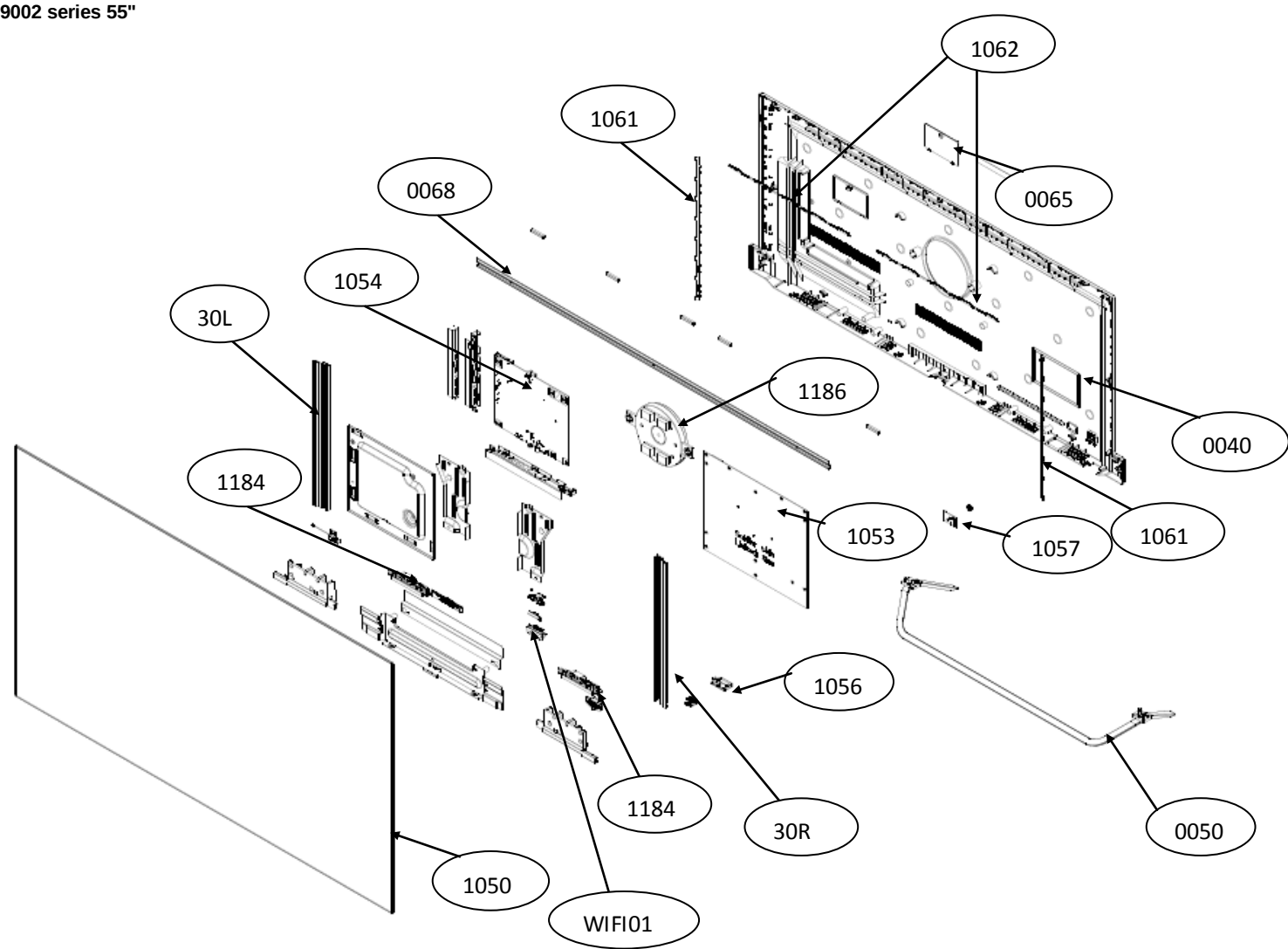
FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

7502 series 65"



Part No.	Description	Remark
030T	BEZEL-TOP	
030B	BEZEL-BOTTOM	
0036	LENS IR	
0040	REAR COVER	
0065	BASE	
0050	KEY FUNCTION	
0056	COVER CLOCK REAR	
1061	DISPLAY PANEL	
1062	PANEL SSD	
1063	POWER SUPPLY UNIT	
1064	IR/LED PANEL	
1065	KEYBOARD CONTROL PANEL	
1066	AMBI LIGHT ASSY	
1067	AMBI LIGHT ASSY	
1068	AMBI LIGHT ASSY	
1186	REMOTE control	Not displayed
1188	SPEAKER	
1189	SPEAKER	
3534	DECO SHEET	
3535	DECO BEZEL	
WIFI01	WIFI USB	

9002 series 55"



Pos NO.	Description	Remark
40	REAR COVER	
50	BASE ASSY	
65	COVER_CLOCK_REAR	
68	LIGHT_GUIDE	
1050	LCD LC550AQD-GJAB KR LGD	
1053	MB ASSY	
1054	POWER BOARD ASSY	
1055	OPTION BOARD ASSY	
1056	IR BOARD ASSY	
1057	KEY BOARD ASSY	
1061	Ambilight ASSY(2)	
1062	Ambilight ASSY(2)	
1176	REMOTE Control	No displayed
1184	SPEAKER	
1186	SPEAKER WOOFER	
30L	Bezel_Plastic Front L	
30R	Bezel_Plastic Front R	
WIFI01	WIFI/BT USB	