Crystal Surround Air Track (Active Speaker System)

Model Name	HW-F450
Model Code	HW-F450/ZC

SERVICE MANUAL

Crystal Surround Air Track (Active Speaker System)

HW-F450

Contents

1. Precaution
2. Product Specification
3. Disassembly & Reassembly
4. Troubleshooting
5. PCB Diagram
6. Schematic Diagram

Refer to the service manual in the GSPN (see the rear cover) for more information.

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1. Precaution

Follow these safety instructions while servicing the ESD to prevent damage and to protect against potential hazards such as electrical shock and X-rays.

1.1. Safety Precautions

1) When reinstalling the chassis and its assemblies, be sure to restore all of the protective devices, including the control knobs and the compartment covers.

2) Make sure that there are no cabinet openings through which people (particularly children) can make contact with dangerous internal components.

3) Design Alteration Warning : Never alter or add to the mechanical or electrical design of the unit.
Example : Do not add auxiliary audio or video connectors. Such alterations might create a safety hazard. Also, any design changes or additions will void the manufacturer's warranty.

4) Leakage Current Hot Check Figure 1.1 AC Leakage Test :

WARNING

Do not use an isolation transformer during this test. Use a leakage-current tester or a metering system that complies with American National Standards Institute (ANSI C101.1, Leakage Current for Appliances), and Underwriters Laboratories (UL Publication UL1410, 59.7).

With the unit completely reassembled, plug the AC cord directly into a 120 V AC outlet. With the unit's power switched from the ON to the OFF position, measure the current between a known ground and all exposed metal parts.
Known Grounds - Earth
Known Metal parts - Screwheads, Metal Cabinets, etc.

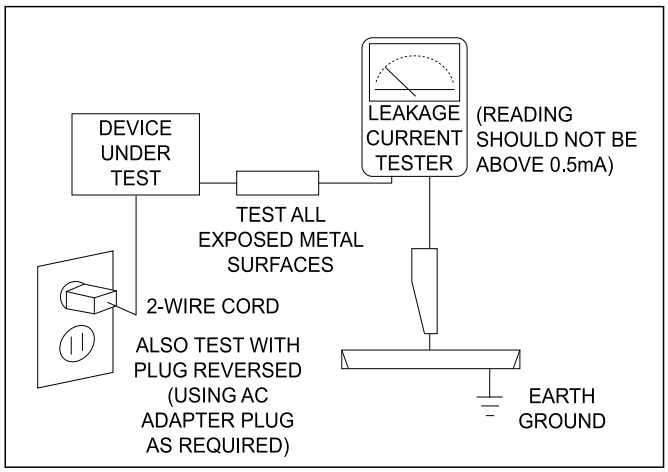

Figure 1.1 AC Leakage Test

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5) Insulation Resistance Cold Check :
(1) With the unit's AC plug disconnected from the AC source, connect an electrical jumper across the two AC prongs.
(2) Set the power switch to ON.
(3) Measure the resistance between the shorted AC plug and any exposed metallic parts.

Example : Screwheads, Metal Cabinets, Antenna Port, etc. If any of the exposed metallic parts has a return path to the chassis, the measured resistance should be between 1 and 5.2 megohms. If there is no return path, the measured resistance should be "infinite". If the resistance is outside these limits, a shock hazard might exist.
See Figure 1.2 Insulation Resistance Test

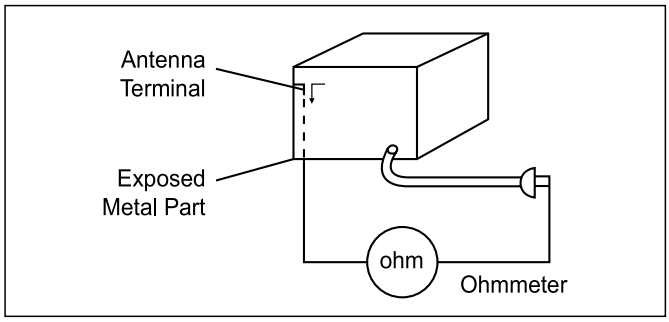

Figure 1.2 Insulation Resistance Test

6) Components, parts and wiring that appear to have overheated or that are otherwise damaged should be replaced with parts that meet the original specifications. Always determine the cause of damage or overheating, and correct any potential hazards.

7) Observe the original lead dress, especially near the following areas :
Antenna wiring, sharp edges, and especially the AC and high voltage power supplies. Always inspect for pinched, out-of-place, or frayed wiring. Do not change the spacing between components and the printed circuit board. Check the AC power cord for damage. Make sure that no wires or components touch thermally hot parts.

8) Product Safety Notice :
Some electrical and mechanical parts have special safety-related characteristics which might not be obvious from visual inspection. These safety features and the protection they give might be lost if the replacement component differs from the original–even if the replacement is rated for higher voltage, wattage, etc.

9) Components that are critical for safety are indicated in the circuit diagram by shading, ⚠ or ⚠.
Use replacement components that have the same ratings, especially for flame resistance and dielectric strength specifications. A replacement part that does not have the same safety characteristics as the original might create shock, fire or other hazards.

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1.2. Servicing Precautions

1) Servicing precautions are printed on the cabinet. Follow them.

2) Always unplug the unit's AC power cord from the AC power source before attempting to :
(a) Remove or reinstall any component or assembly, (b) Disconnect an electrical plug or connector, (c) Connect a test component in parallel with an electrolytic capacitor.

3) Some components are raised above the printed circuit board for safety. An insulation tube or tape is sometimes used. The internal wiring may be clamped to prevent contact with thermally hot components. Reinstall all such elements to their original position.

4) After servicing, always check that the screws, components and wiring have been correctly reinstalled. Make sure that the portion around the serviced part has not been damaged.

5) Check the insulation between the blades of the AC plug and accessible conductive parts (examples : metal panels, input terminals and earphone jacks).

6) Insulation Checking Procedure :
Disconnect the power cord from the AC source. Connect an insulation resistance meter (500 V) to the blades of the AC plug. The insulation resistance between each blade of the AC plug and accessible conductive parts (see above) should be greater than 1 megohm.

7) Never defeat any of the B+ voltage interlocks. Do not apply AC power to the unit (or any of its assemblies) unless all solid-state heat sinks are correctly installed.

8) Always connect a test instrument's ground lead to the instrument chassis ground before connecting the positive lead; always remove the instrument's ground lead last.

CAUTION

First read the "Safety Precautions" section of this manual. If some unforeseen circumstance creates a conflict between the servicing and safety precautions, always follow the safety precautions.

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1.3. Precautions for Electrostatically Sensitive Devices (ESDs)

Some semiconductor (“solid state”) devices are easily damaged by static electricity.
Such components are called Electrostatically Sensitive Devices (ESDs).
Examples include integrated circuits and some field-effect transistors.
The following techniques will reduce the occurrence of component damage caused by static electricity :

1) Immediately before handling any semiconductor components or assemblies, drain the electrostatic charge from your body by touching a known earth ground. Alternatively, wear a discharging wrist-strap device. (Be sure to remove it prior to applying power–this is an electric shock precaution.)

2) After removing an ESD-equipped assembly, place it on a conductive surface such as aluminum foil to prevent accumulation of electrostatic charge.

3) Do not use freon-propelled chemicals. These can generate electrical charges that damage ESDs.

4) Use only a grounded-tip soldering iron when soldering or unsoldering ESDs.

5) Use only an anti-static solder removal device. Many solder removal devices are not rated as “anti-static” (these can accumulate sufficient electrical charge to damage ESDs).

6) Do not remove a replacement ESD from its protective package until you are ready to install it.
Most replacement ESDs are packaged with leads that are electrically shorted together by conductive foam, aluminum foil or other conductive materials.

7) Immediately before removing the protective material from the leads of a replacement ESD, touch the protective material to the chassis or circuit assembly into which the device will be installed.

8) Minimize body motions when handling unpackaged replacement ESDs. Motions such as brushing clothes together, or lifting a foot from a carpeted floor can generate enough static electricity to damage an ESD.

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2. Product Specification

2.1. Product Feature

■ HW-F450

- 280 W (80 W x 2 + 120 W)
- 2.1CH, Wireless Subwoofer (active)
  - Dolby Digital, DTS 2.0
  - 1 Analog / 1 Optical
  - HDMI OUT 1 / HDMI IN 1
  - Smart Volume II
  - Virtual Surround (Music / News / Movie / Drama / Game / Sports / Pass)
  - 3D SOUND
  - 2way 3spk
  - BLUETOOTH
  - USB HOST
  - SoundShare
  - One Control

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2.2. Specifications

■ Basic Specification

General	Power supply		120 V, 60 Hz / 220 V, 50 Hz
	Standby power consumption		0.45 W
	Power consumption	Main unit	25.9 W
		Subwoofer	20 W
	USB		5 V / 0.5 A
	Weight	Main unit	4.28 Ibs
		Subwoofer	12.01 Ibs
	Dimensions (W x H x D)	Main unit	35.67 x 1.77 x 2.76 inches
		Subwoofer	6.89 x 13.78 x 11.61 inches
	Operating temperature range		+41 °F to +95 °F
	Operating humidity range		10 % to 75 %
Amplifier	Rated output power	Main unit	80 W/CH, 4 OHM, THD = 10 %, 1 kHz
		Subwoofer	120 W, 4 OHM, THD = 10 %, 70 Hz
	S/N ratio (analog input)		65 dB
	Separation (1 kHz)		65 dB

NOTE

• S/N ratio, distortion, separation and usable sensitivity are based on measurement using AES (Audio Engineering Society) guidelines.

• Samsung Electronics Co., Ltd reserves the right to change the specifications without notice.

• Weight and dimensions are approximate.

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2.3. Specifications Analysis

Model Name		HW-F450	HW-E450
Photo			
Output Power	RMS (10% THD), REF: 1ch	280 W	280 W
	Output Power (ch)	80 W x 2 + 120 W	80 W x 2 + 120 W
Compatible Media	Disc playback	N/A	N/A
	iPod Dock (selected region only)	-	-
Extra Features	Wireless Ready	-	-
	USB HOST	O	O
	Bluetooth	O	O
DVD (Video)	Progressive Scan (NT/PAL)	-	-
DSP	Virtual Surround	O	O
	3D SOUND	3D Sound Plus	3D Sound
	ASC	-	-
	Smart Volume	Smart Volume II	Smart Volume II
	Audio Up scale	-	-
	Power Bass	-	-
Audio Decoding	Dolby Digital / Plus	Dolby Digital 2.0	Dolby Digital 2.0
	Dolby True HD	N/A	N/A
	DTS / DTS-HD (HR/MA)	DTS	DTS
Video	Component out	-	-
	HDMI Out (CEC)	O	O
	HDMI Input	O	O
Audio In/Out	Mini Jack Audio In	AUX1 (3.5φ)	AUX1 (3.5φ)
	RCA Input	-	-
Optical Jack	In (Digital In)	O (1)	O (1)
Headphone	Headphone Jack (3.5Φ)	-	-
Tuner	FM	-	-
	Preset Memory	-	-

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Model Name		HW-F450	HW-E450
Photo			
Speaker	Type (Sat/Tallboy)	Internal Type (Main Frame Built-In Type) 2 way 3 spk	Internal Type (Main Frame Built-In Type) 2 way 3 spk
	Active (Powered) S/W	Wireless Active	Wireless Active

TIP

O : Feature Included

X : Not Included

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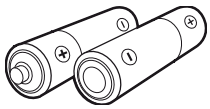
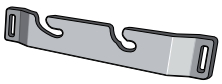
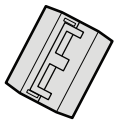
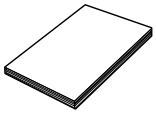
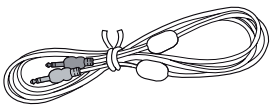
2.4. Accessories

2.4.1. Supplied Accessories

Accessories	Item	Item code	Remark
	Remote Control	AH59-02547A	Local Samsung Dealer
	Batteries (AAA size)	4301-000116	
	Bracket-Wall Mount	AH61-02952A	
	Toroidal ferrite core	3301-000144	
	USB Cable	AH39-01178A	
	User Manual	AH68-02615C	
	AUX Cable	BN39-01286A	

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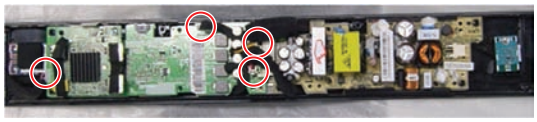
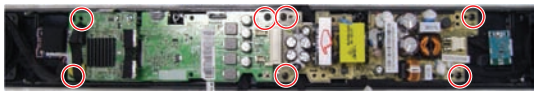
3. Disassembly & Reassembly

3.1. Overall Disassembly and Reassembly

CAUTION

- **Be careful to follow the disassembly sequence described in the manual. Otherwise, the product may be damaged.**
- **Be sure to carefully read and understand the safety instructions before performing any work as the IC chips on the PCB are vulnerable to static electricity.**
- **In order to assemble reverse the order of disassembly.**

Description	Description Photo
1. Unfasten 13 screws on the Rear. : BH,+,-,B,M3,L10,ZPC(BLK) **CAUTION** **Be careful not to make any scratches as you remove them.**	
2. Remove Cover Jack, Cover HDMI, AC Cord.	
3. Remove Cover Rear.	
4. Disconnect wire 4ea.	
5. Unfasten 1 screws on the HDMI. : BH,+,-,B,M3,L10,ZPC(BLK)BH,+,-	
6. Remove HDMI PCB and disconnect FPC wire.	
7. Unfasten 7 screws on the SMPS, MAIN-PCB. : BH,+,-,B,M3,L8,ZPC(SILVER) And remove SMPS and MAIN-PCB.	
8. Unfasten 2 screw on the COVER-FRONT. : BH,+,-,B,M3,L8,ZPC(SILVER) Remove wireless and bluetooth PCB.	

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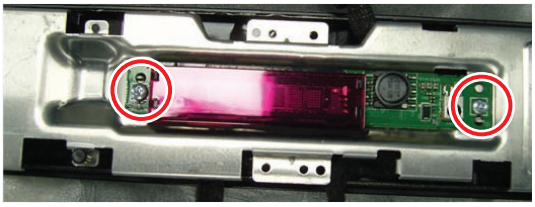
Description	Description Photo
9. Unfasten 2 screw on the SHIELD-PCB COVER-FRONT. : BH,+,-,B,M3,L8,ZPC(SILVER) Remove VFD PCB.	
10. Unfasten 14 screw on the FRONT. : BH,+,-,B,M3,L10,ZPC(BLK) Remove ASSY SPK and BUTTON-PCB.	

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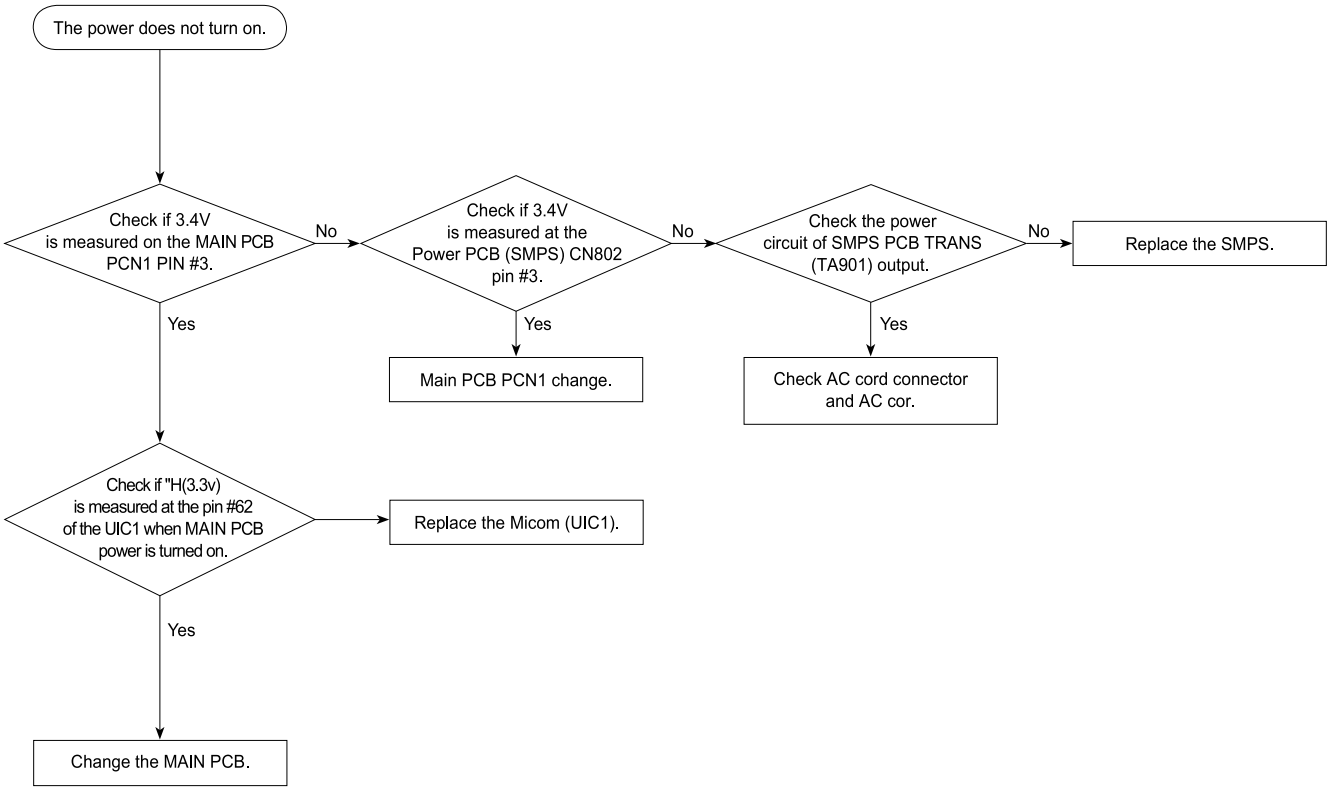
4. Troubleshooting

4.1. Checkpoints by Error Mode

Oscilloscope Setting Values	
Voltage/DIV	1 V/div
TIME/DIV	500 ms/div

4.1.1. No Power



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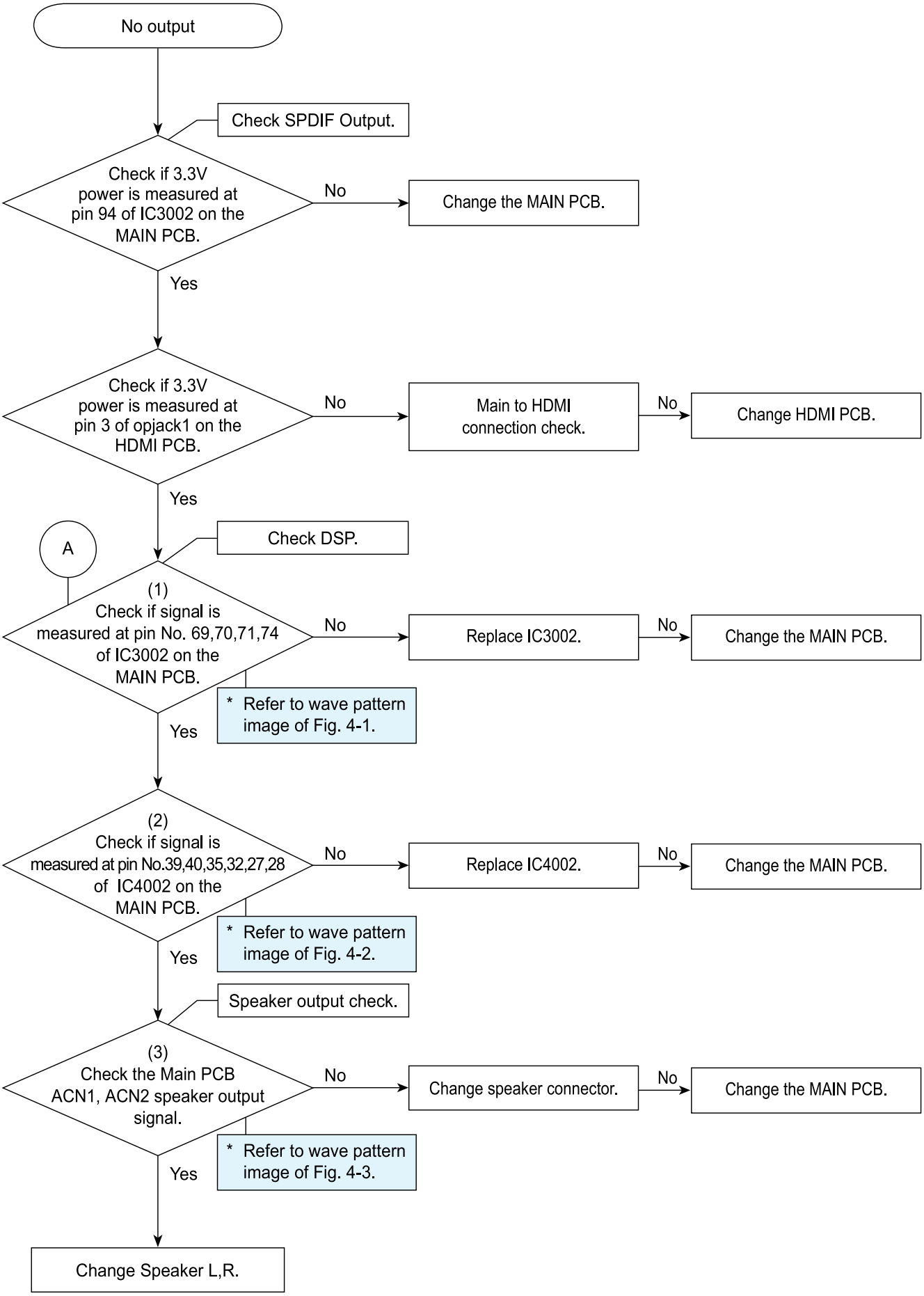
4.1.2. No Sound output (Digital)



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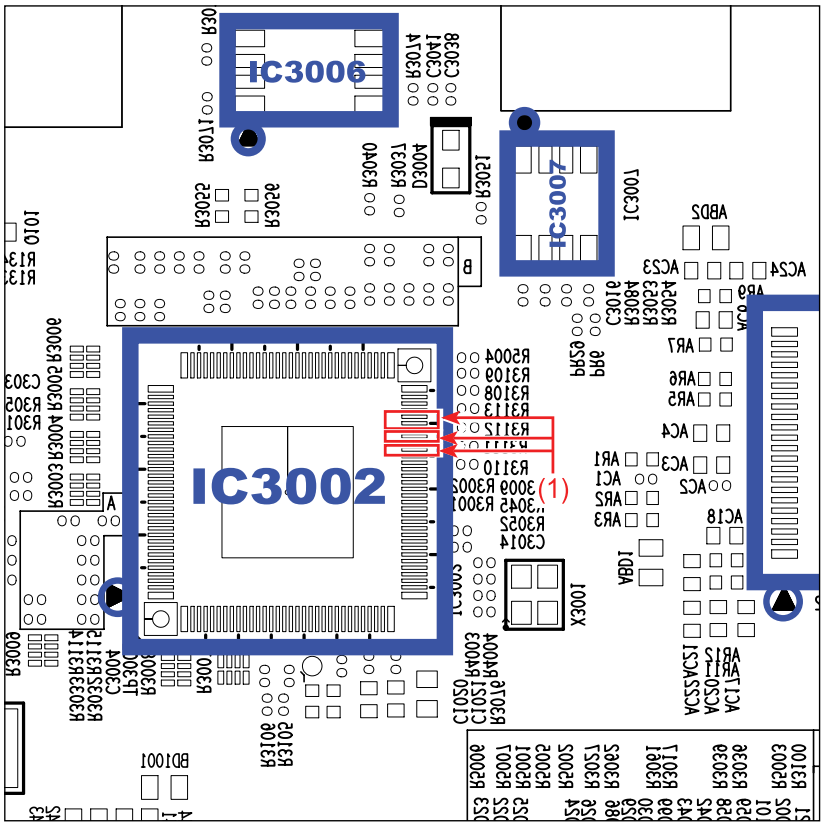
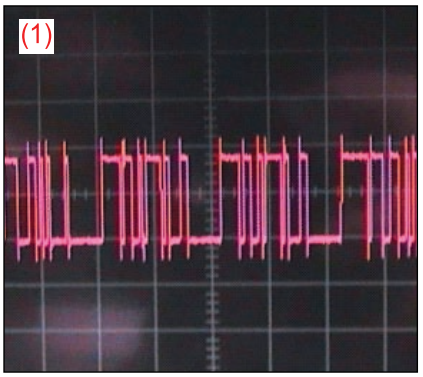
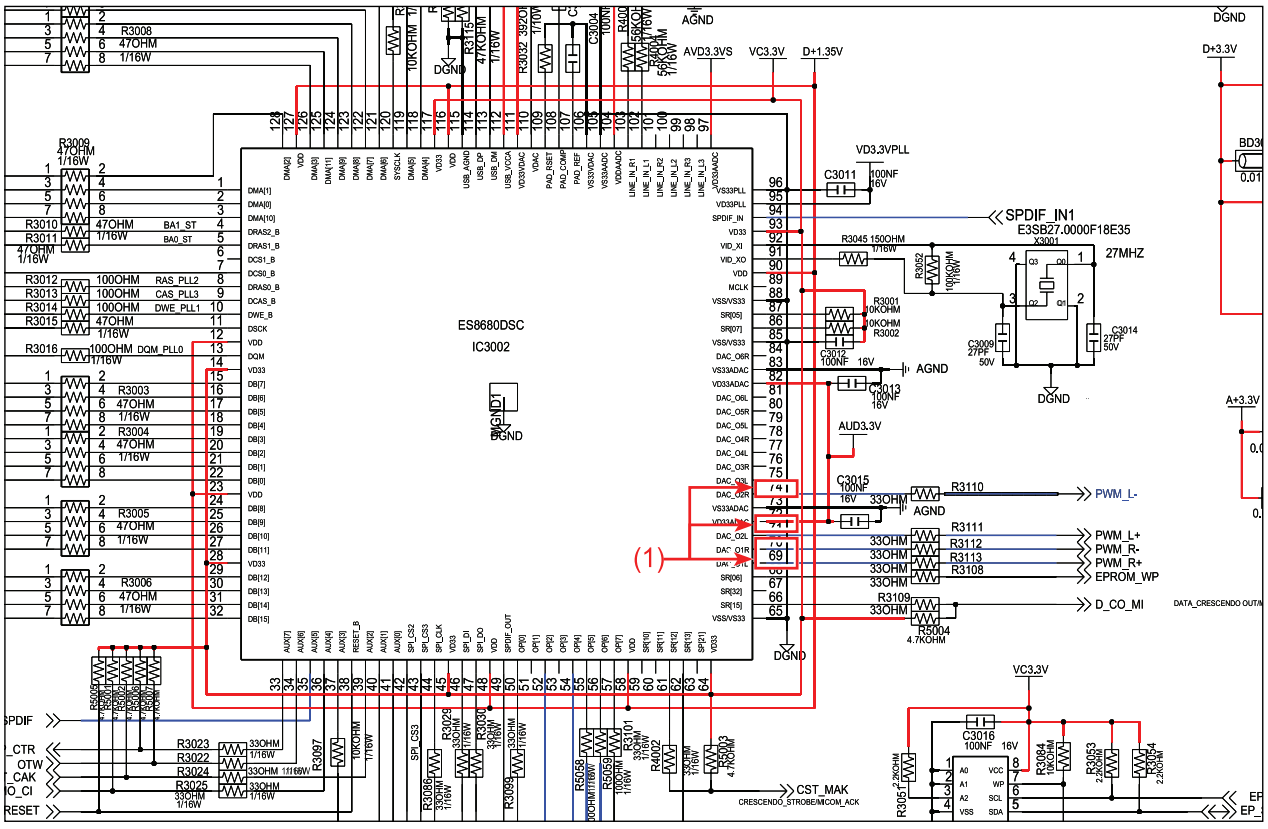




* 5.3. MAIN PCB Bottom



* 6.4. MAIN-3

<Fig. 4-1>

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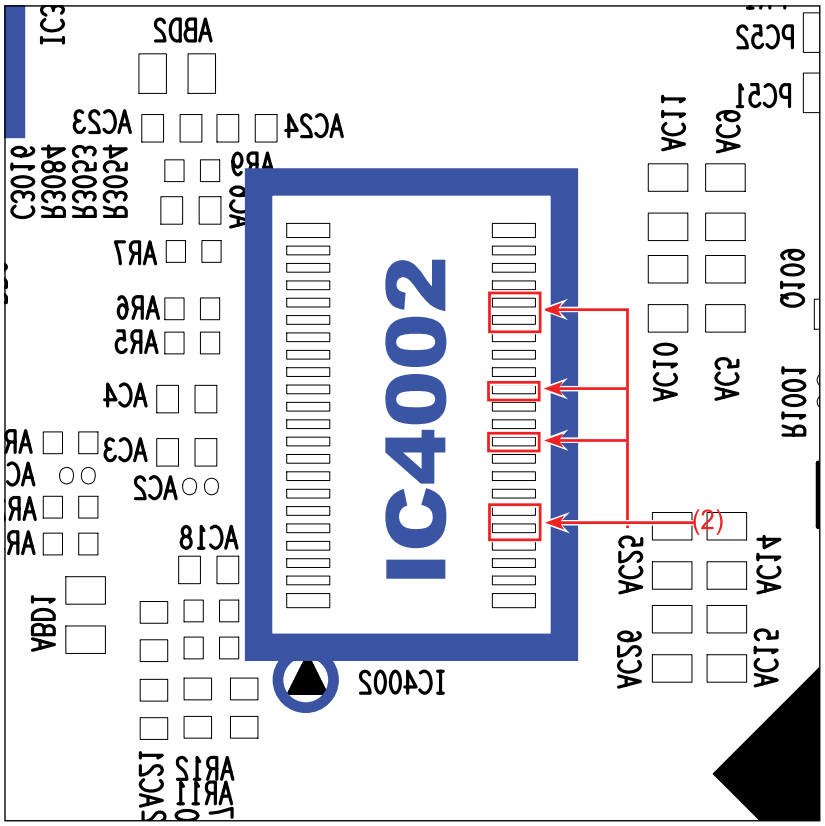
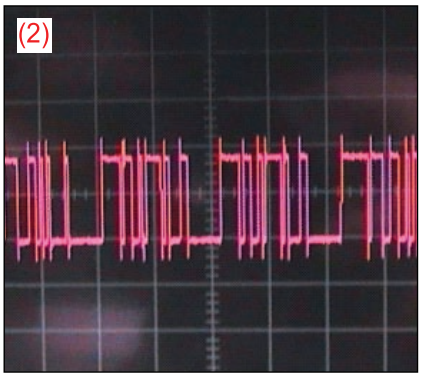
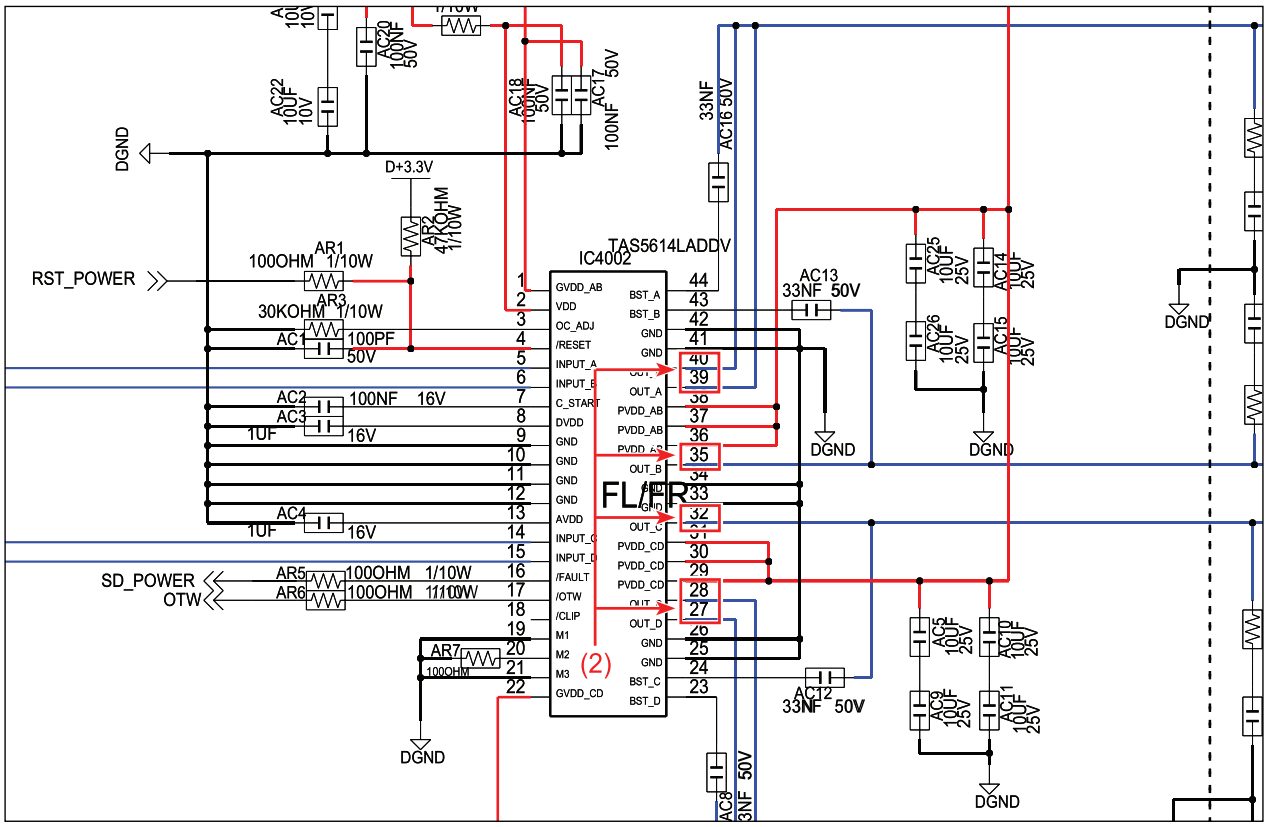




* 5.3. MAIN PCB Bottom



* 6.5. MAIN-4

<Fig. 4-2>

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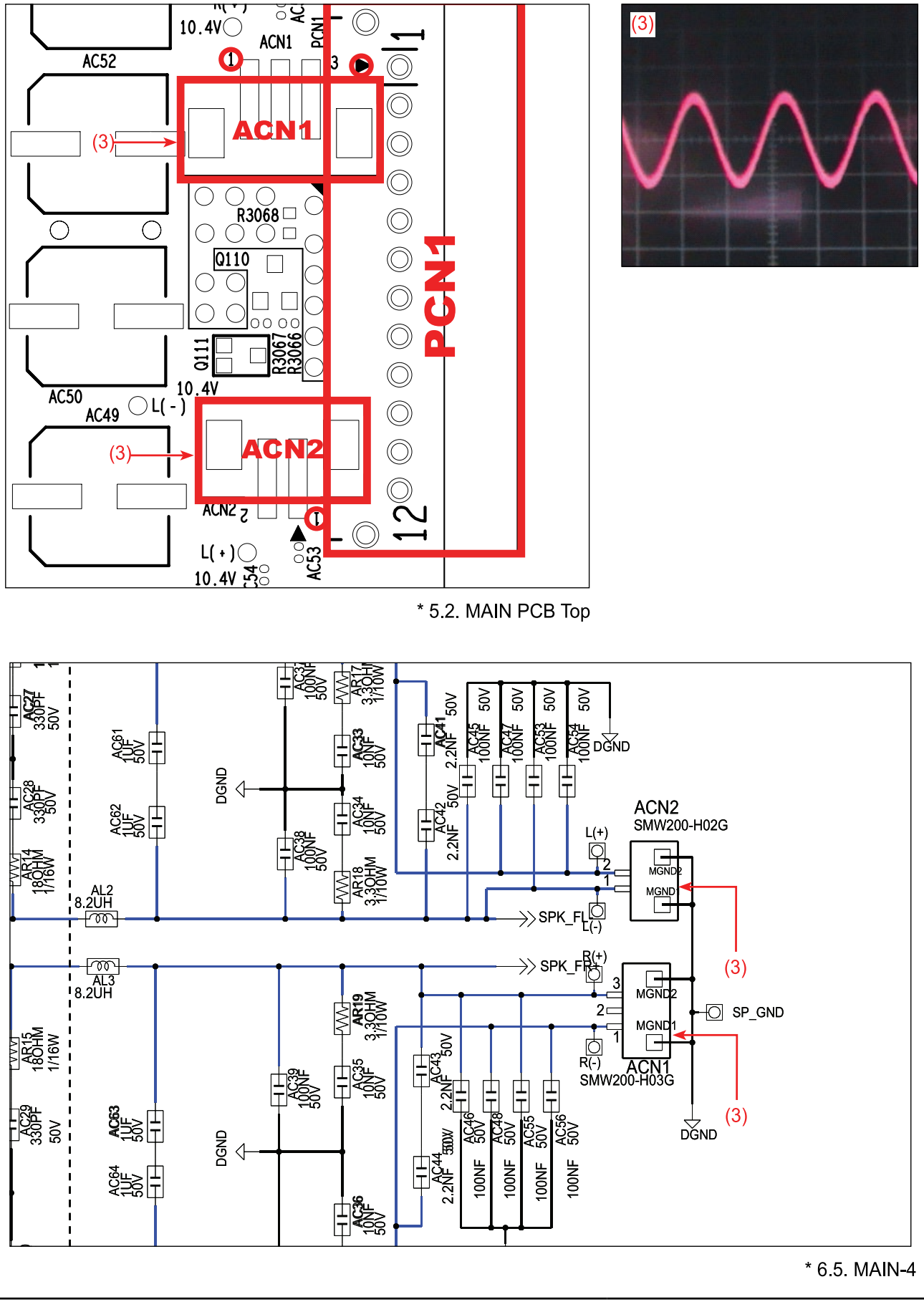

<Fig. 4-3>

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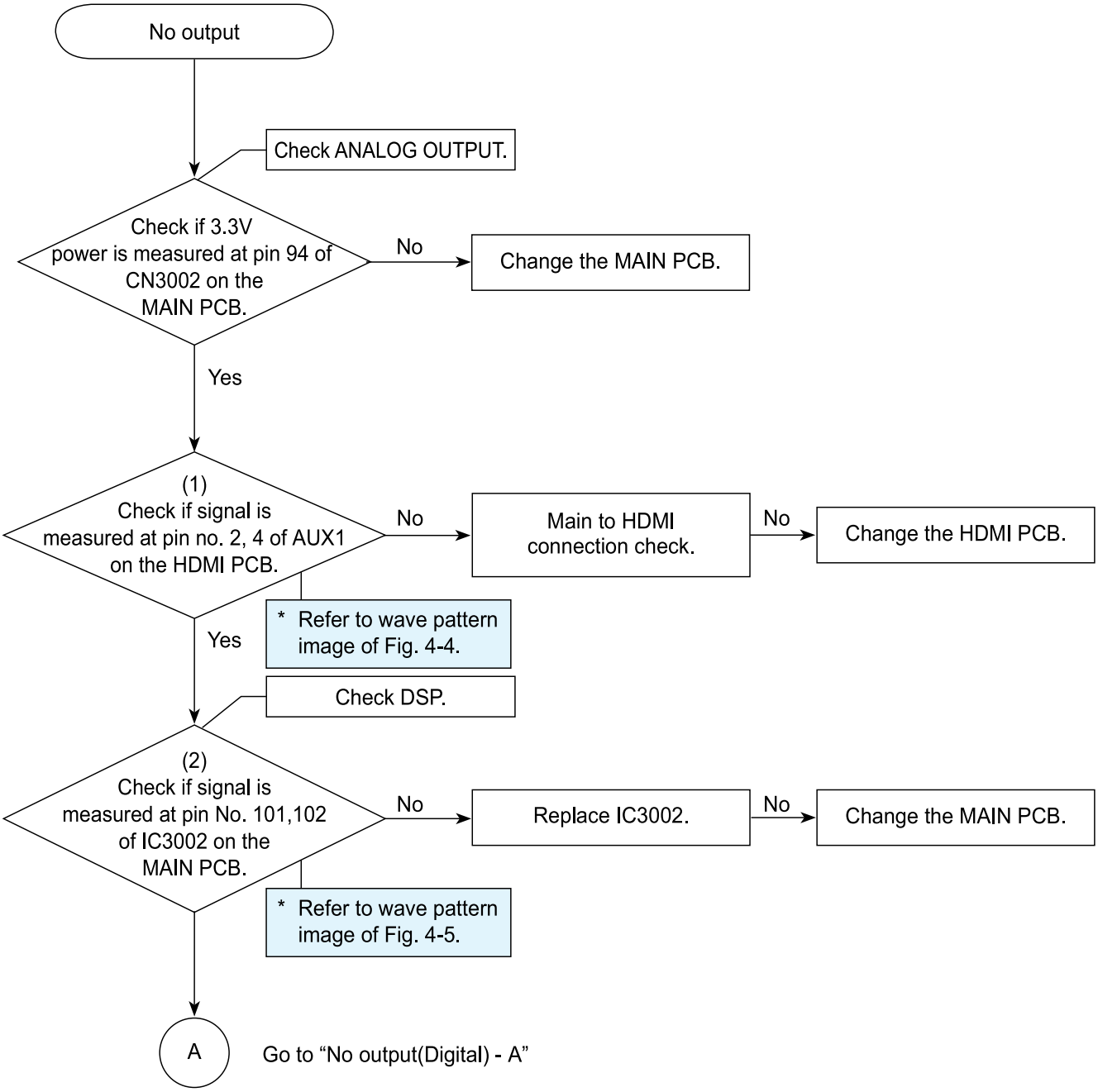
4.1.3. No Sound output (Analog)



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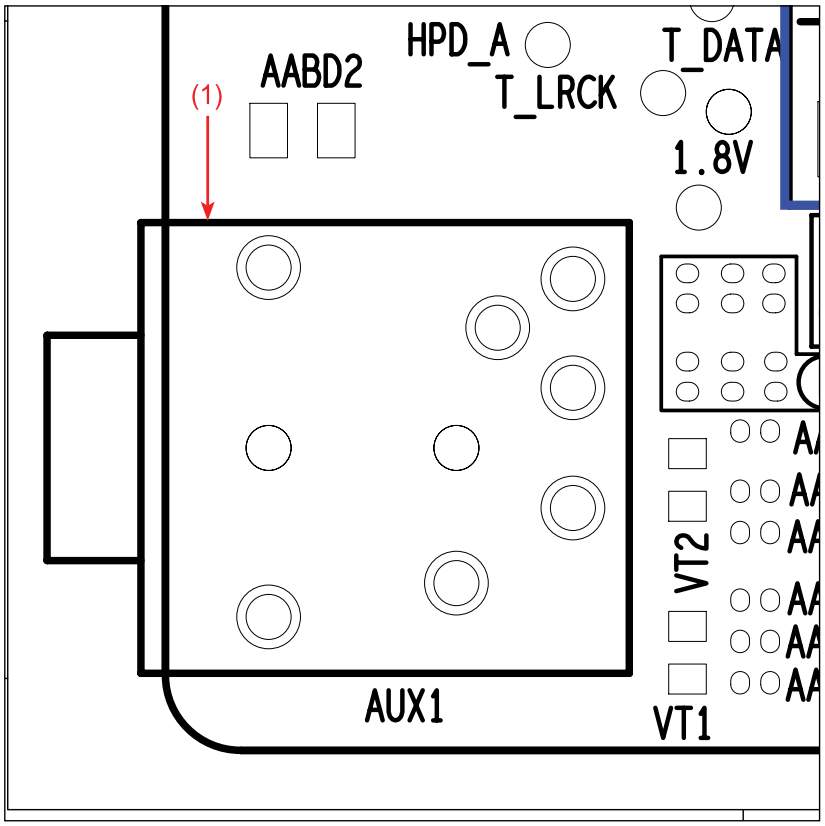
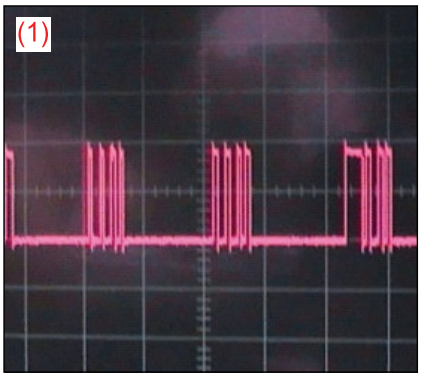
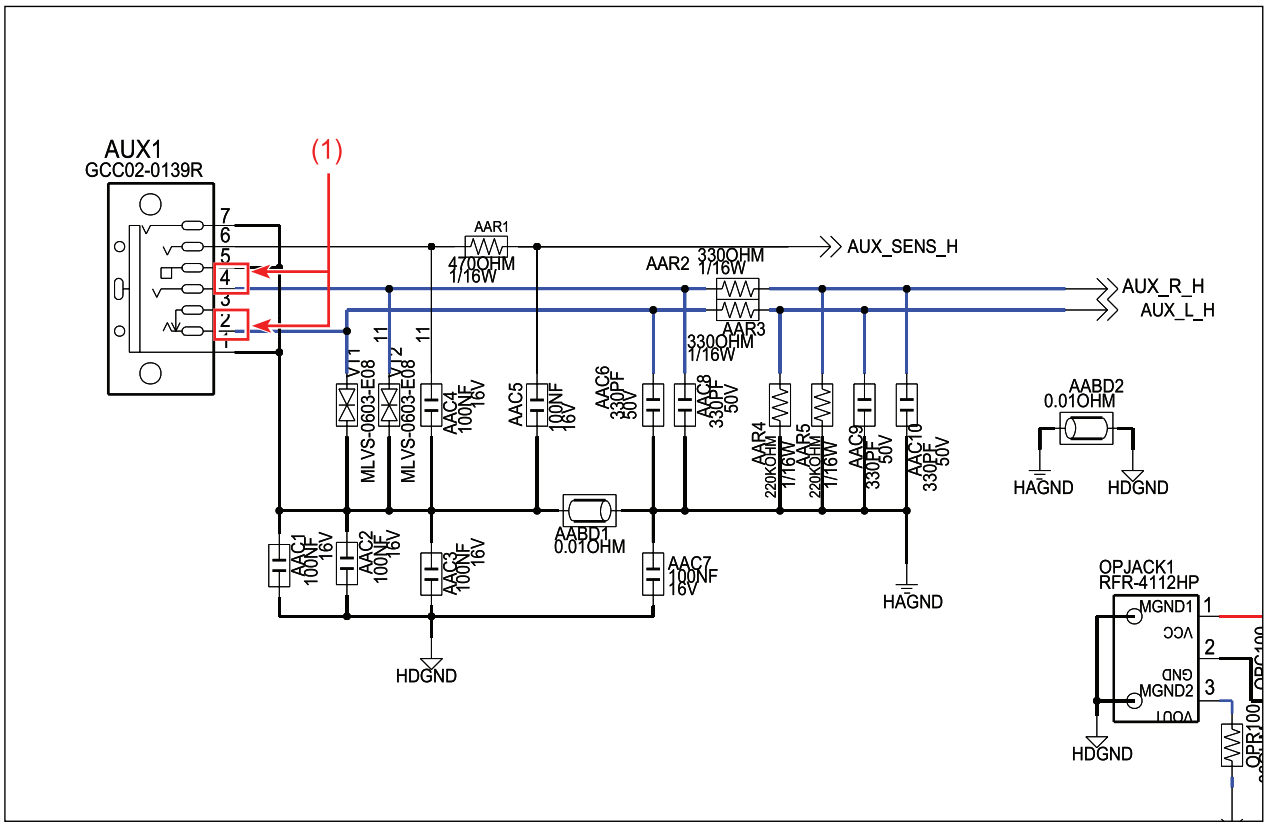




* 5.4. HDMI PCB Top



* 6.6. HDMI

<Fig. 4-4>

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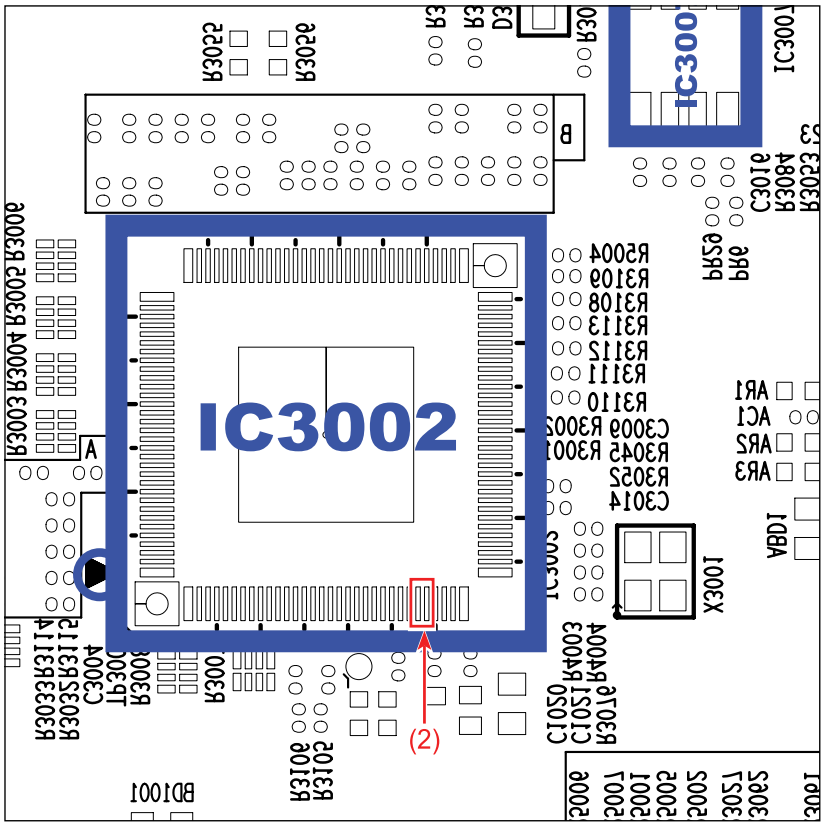
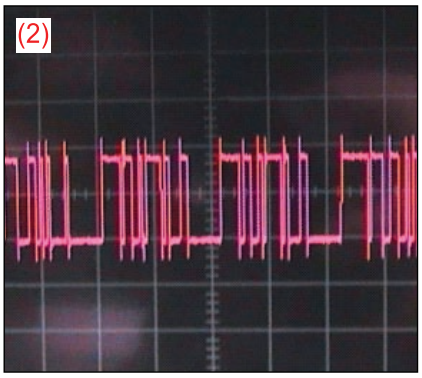
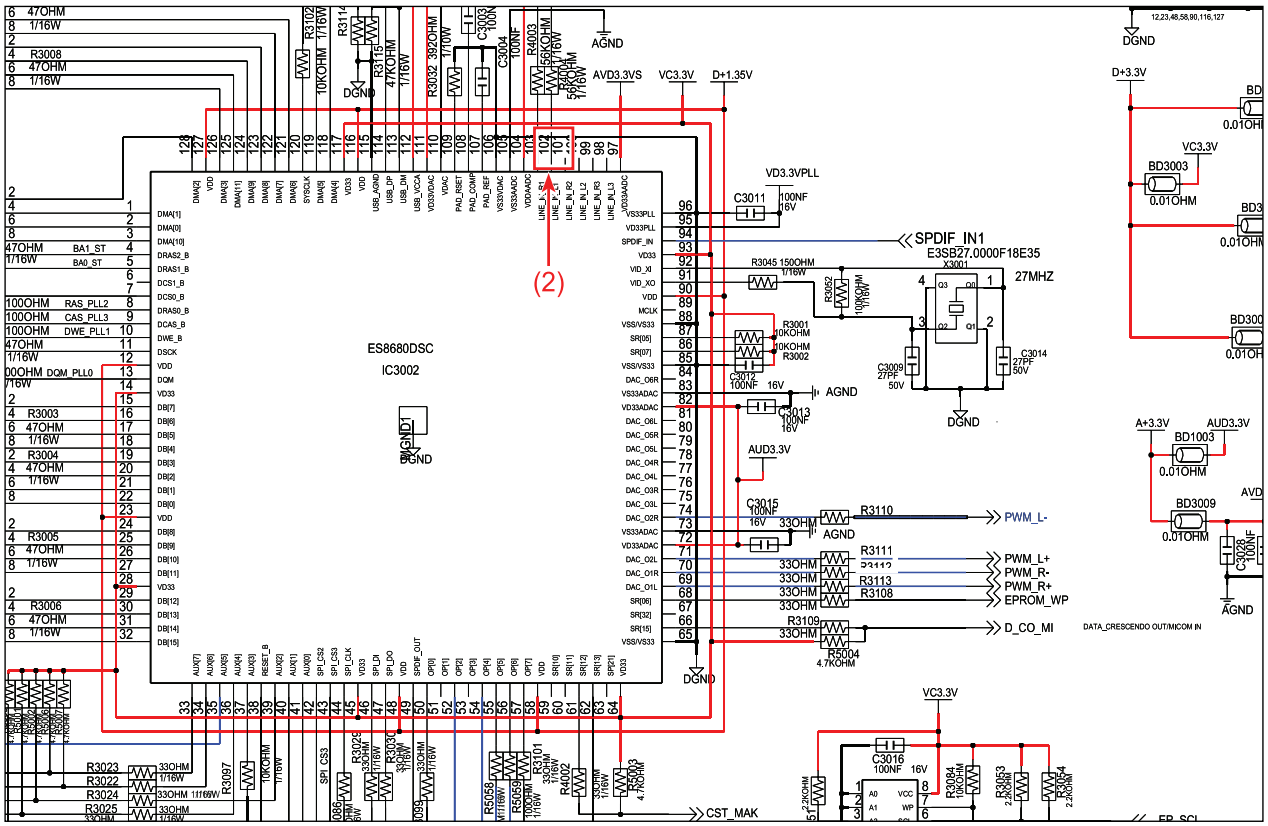




* 5.3. MAIN PCB Bottom



* 6.4. MAIN-3

<Fig. 4-5>

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4.2. Measures to be taken when the Protection Circuit operates

4.2.1. Operation of Power Block Protection Circuit

- Protection Circuit operates when power problem occurs in the SMPS.

SMPS	Part Location	Pin No.	Protection Circuit Operation		Remark
			Open	Short	
	CN802	PS+3.6V	○	○	
		PVDD+25.5V	○	○	

4.2.2. Power Protection

The Condition of Power Protection Active.

1) Voltage of SMPS's PVDD(+25.5V) is higher than standards.

2) Normal Condition Voltage Range : PVDD(+25V): about +25V

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4.2.3. AMP Pre-Inspection relating to Power Protection

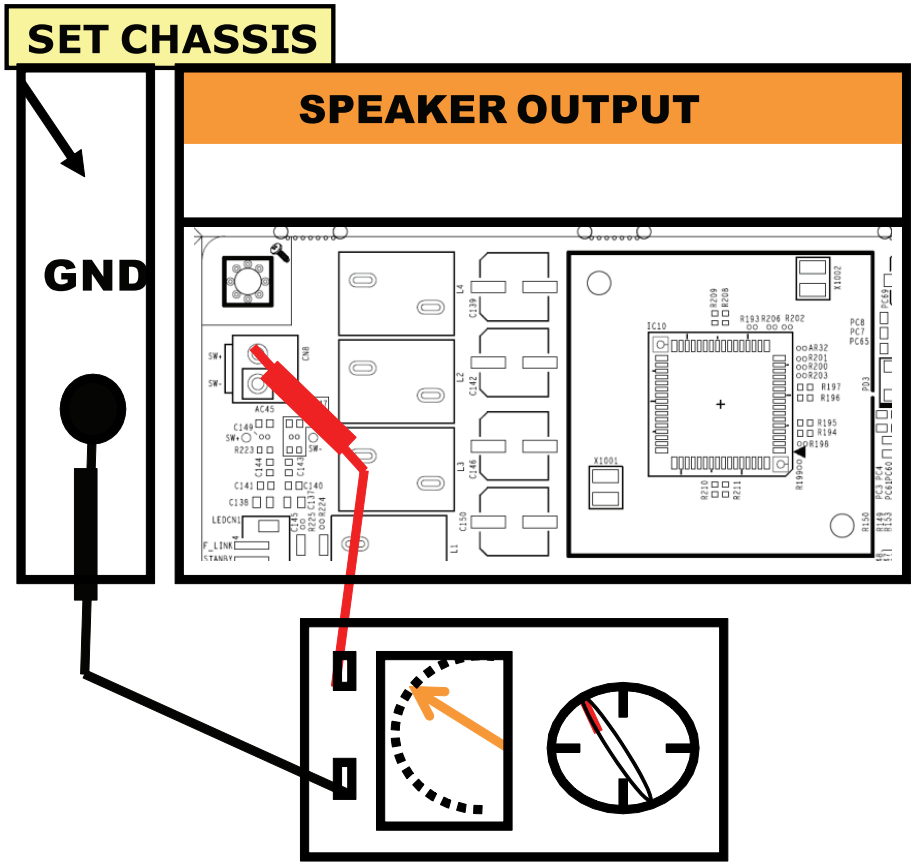
If you think there are problems at the AMP PCB, you can check the PCB without disassembling the set by following the test below.

CAUTION

Do not connect the power cord during the test!

Resistance using Tester	
F/R CH	200Kohm

- If there is a large difference than the value listed above then the AMP PCB has a problem.



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4.3. Initialization & Update

4.3.1. How to check the Firmware version

1) Turn the power off.
2) Press the “DRC” button on the remote control.
3) After 5 seconds, the version will be displayed on the LED.

4.3.2. How to initialize

Using the remote control

1) Turn the power off.
2) Press the "MUTE" button on the remote control for 5 seconds.
3) "ID SET" will be displayer on the LED.

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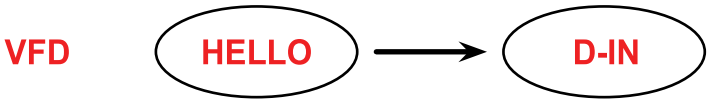
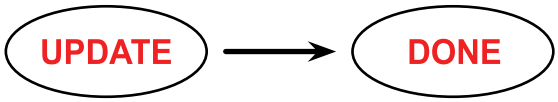
4.3.3. USB Update procedure

1) Step 1 : Power on the device. You can see the following VFD display.



2) Step 2 : Prepare the USB disk with update files then plug-in to the USB port. You can see the following VFD display.



3) Step 3 : Progressing update.

In case Micom, DSP, HDMI and Wireless update, you can see the following VFD display.

Case 1 : Micom Update.

Case 2 : DSP Update.

Case 3 : Wireless Update.

Case 4 : HDMI Update

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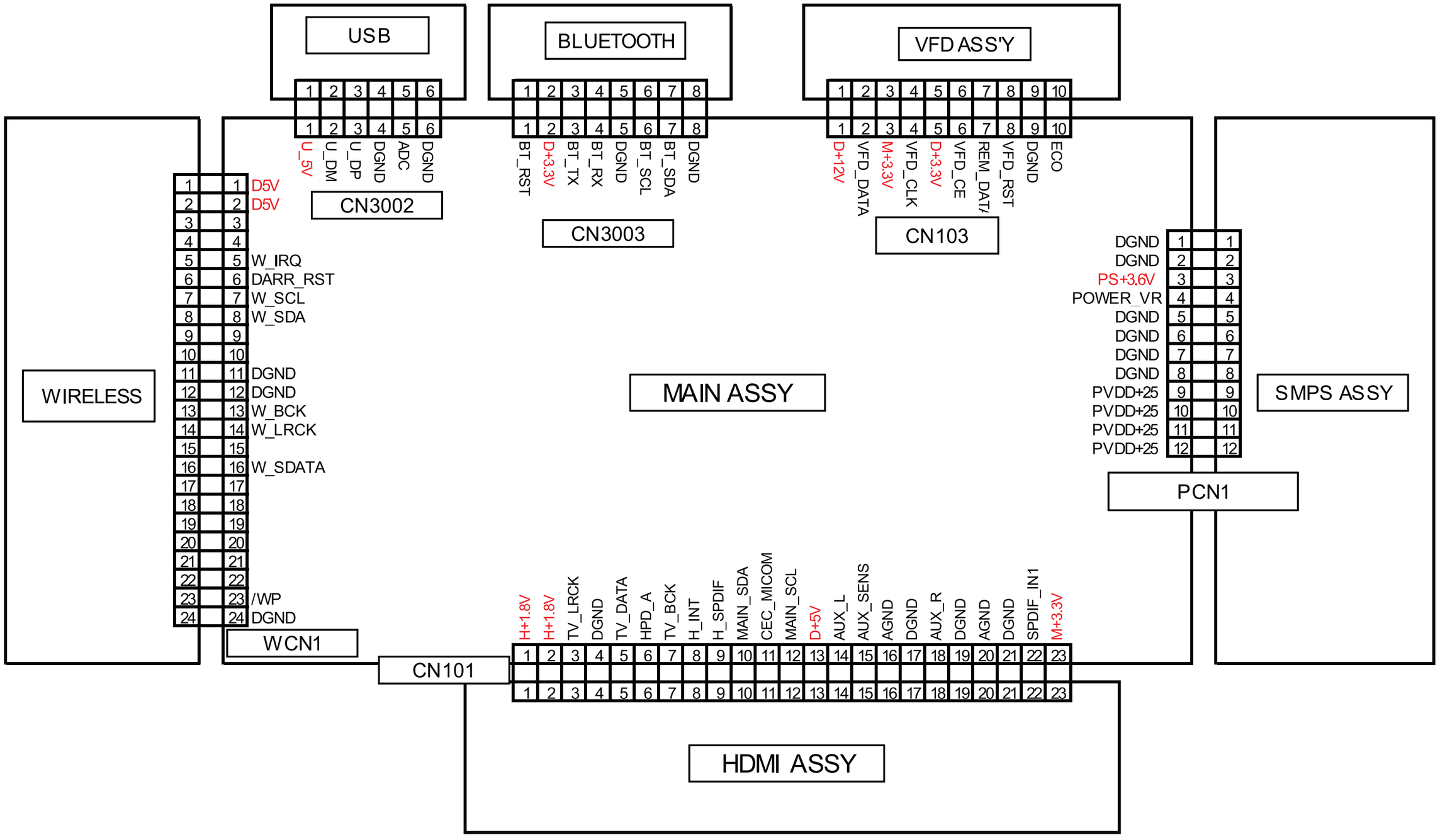
5. PCB Diagram

5.1. Wiring Diagram



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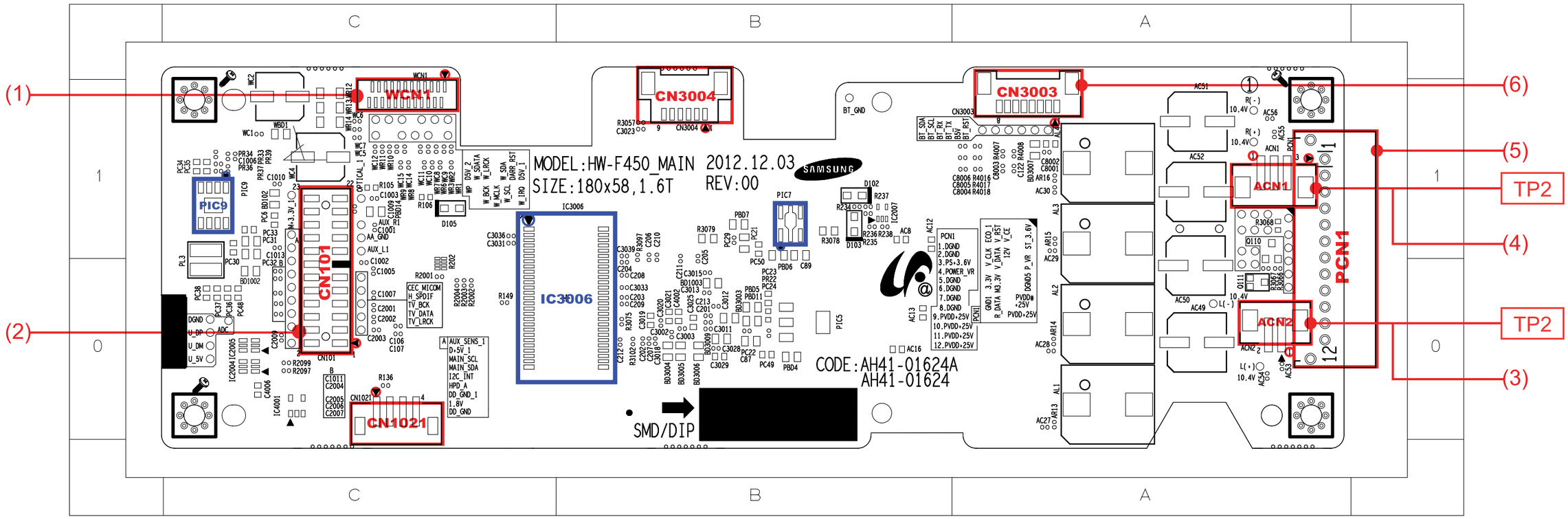
5.2. MAIN PCB Top



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5.2.1. Pin Connection

1) WCN1

WIRELESS CONTROL

Pin No.	Signal
1	D+5V
2	D+5V
3	
4	
5	W_IRQ
6	DARR_RST
7	W_SCL
8	W_SDA
9	
10	
11	W_MCLK
12	DGND
13	W_BCK
14	W_LRCK
15	
16	W_SDATA
17	
18	
19	
20	
21	
22	
23	/WP
24	DGND

2) CN101

HDMI CONTROL

Pin No.	Signal
1	H+1.8V
2	H+1.8V
3	TV_LRCK
4	DGND
5	TV_DATA
6	HPD_A
7	TV_BCK
8	H_INT
9	H_SPDIF
10	MAIN_SDA
11	CEC_MICOM
12	MAIN_SCL
13	D+5V
14	AUX_L
15	AUX_SENS
16	AGND
17	DGND
18	AUX_R
19	DGND
20	AGND
21	DGND
22	SPDIF_IN1
23	M+3.3V

3) ACN2

FRONT L-CH OUTPUT

Pin No.	Signal
1	L-
2	L+

4) ACN1

FRONT R-CH OUTPUT

Pin No.	Signal
1	R-
2	
2	R+

5) PCN1

POWER SIGNAL CONNECTOR

Pin No.	Signal
1	DGND
2	DGND
3	PS+3.6V
4	POWER_VR
5	DGND
6	DGND
7	DGND
8	DGND
9	PVDD+25
10	PVDD+25
11	PVDD+25
12	PVDD+25

6) CN3003

BLUETOOTH CONTROL

Pin No.	Signal
1	BT_RST
2	D+3.3V
3	BT_TX
4	BT_RX
5	DGND
6	BT_SCL
7	BT_SDA
8	DGND

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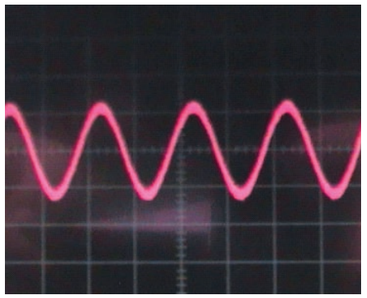
5.2.2. Test Point Wave Form

TP2


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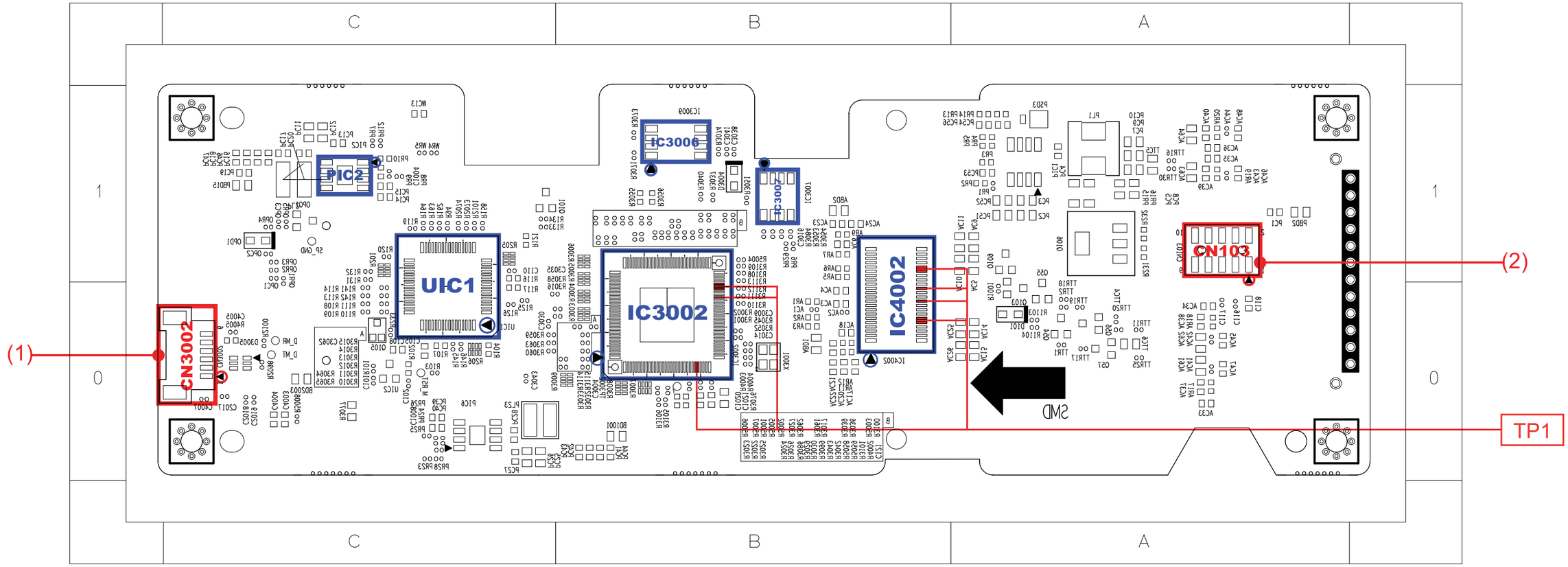
5.3. MAIN PCB Bottom



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5.3.1. Pin Connection

1) CN3002

USB CONTROL

Pin No.	Signal
1	D5V
2	USB_CON_DM
3	USC_CON_DP
4	DGND
5	SW_ADC
6	DGND

2) CN103

VFD CONTROL

Pin No.	Signal
1	D+12V
2	VFD_DATA
3	M+3.3V
4	VFD_CLK
5	D+3.3V
6	VFD_CE
7	REM_DATA
8	VFD_RST
9	DGND
10	ECO

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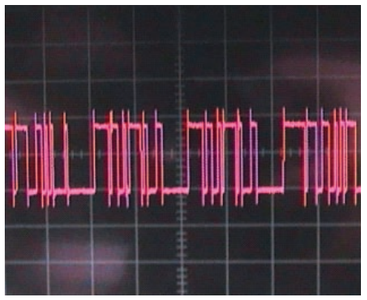
5.3.2. Test Point Wave Form

TP1


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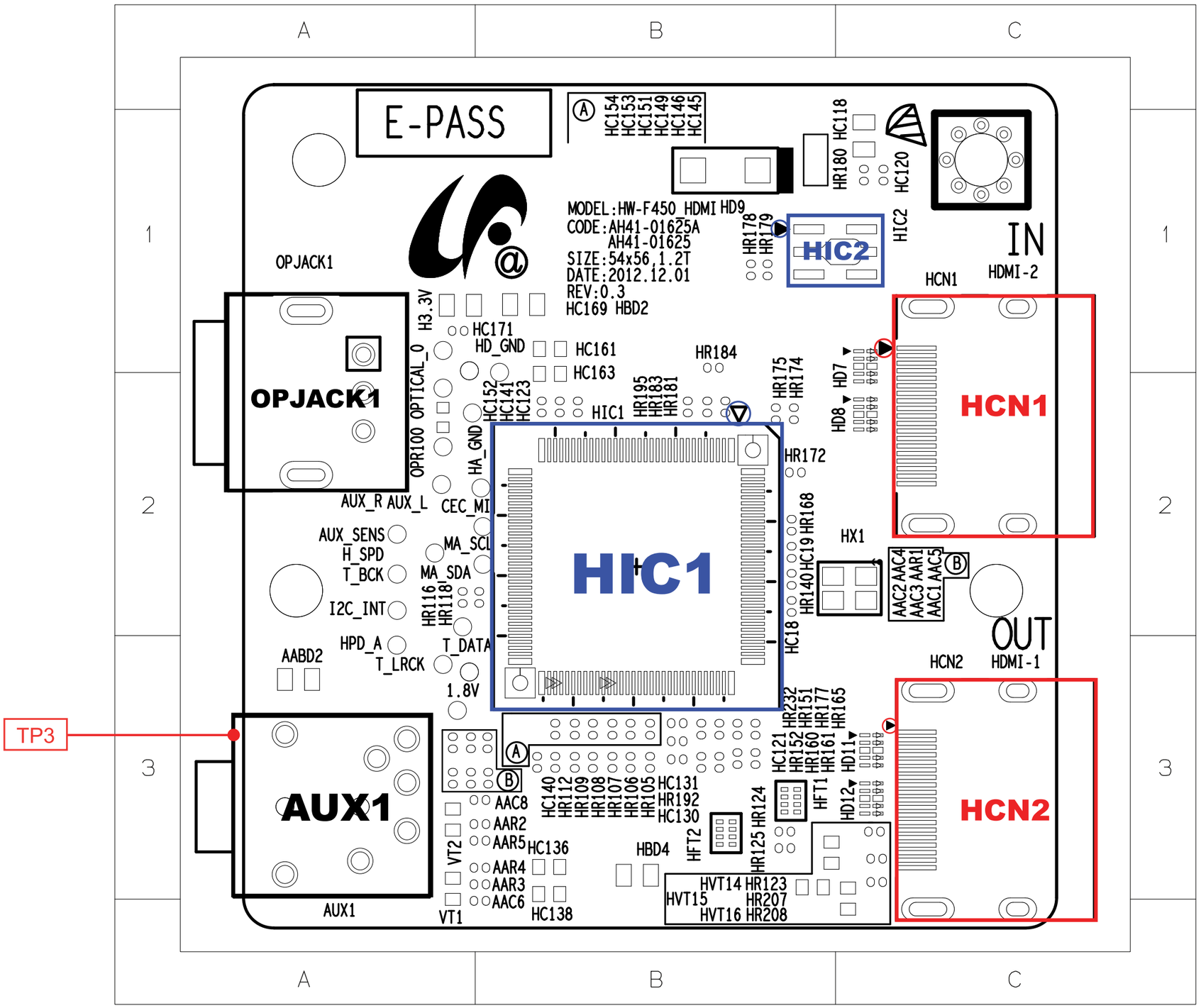
5.4. HDMI PCB Top



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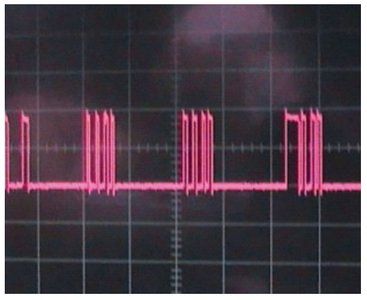
5.4.1. Test Point Wave Form

TP3


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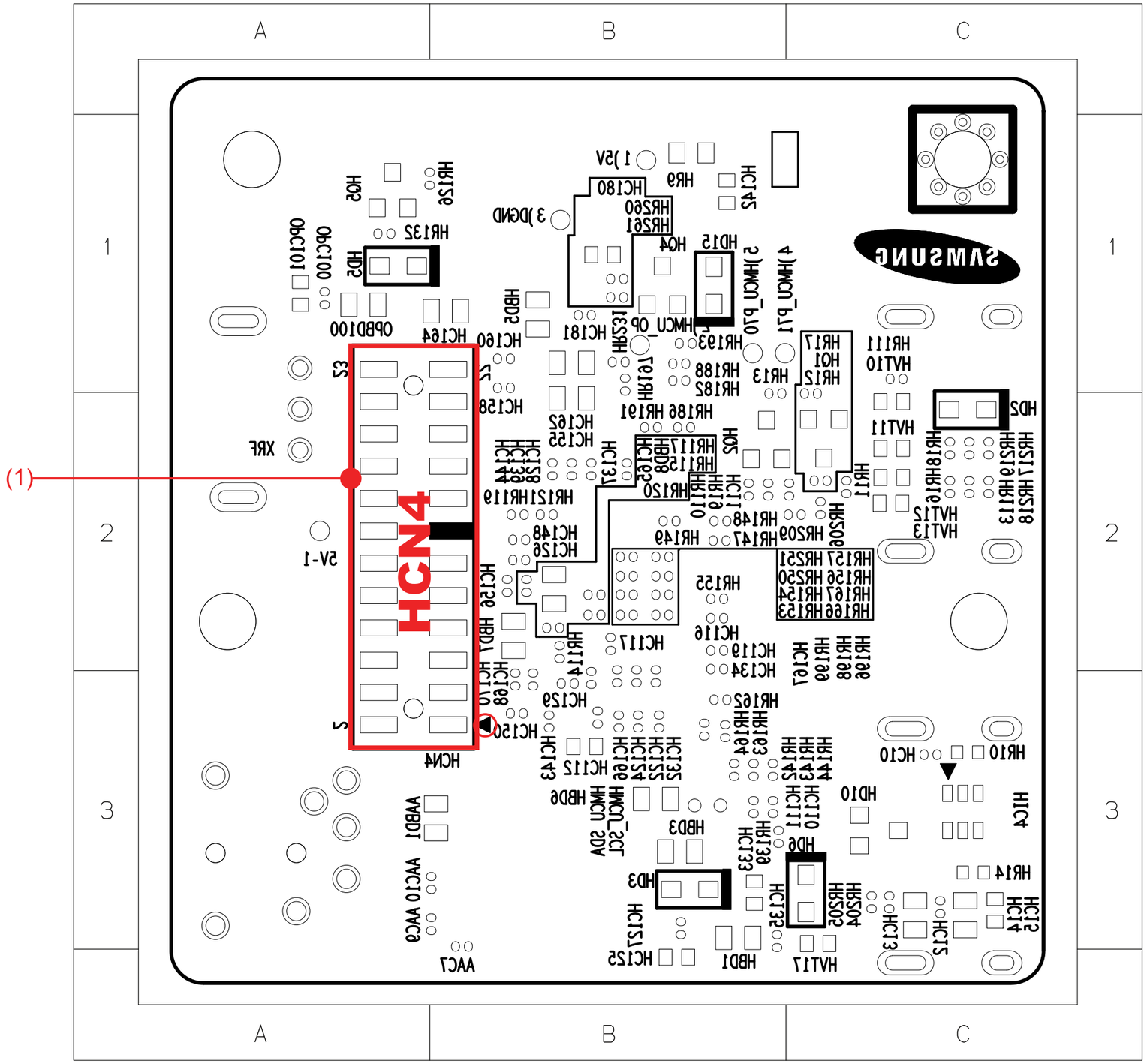
5.5. HDMI PCB Bottom



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5.5.1. Pin Connection

1) HCN4

HDMI CONTROL

Pin No.	Signal
1	EP1.8V
2	EP1.8V
3	TV_LRCK_H
4	HDGND
5	TV_DATA_H
6	HPD_A_H
7	TV_BCK_H
8	I2C_INT_H
9	H_SPDIF_H
10	MAIN_SDA_H
11	CEC_MICOM_H
12	MAIN_SCL_H
13	H5V
14	AUX_L_H
15	AUX_SENS_H
16	HAGND
17	HDGND
18	AUX_R_H
19	HDGND
20	HAGND
21	HDGND
22	OPTICAL_0_H
23	HM3.3V

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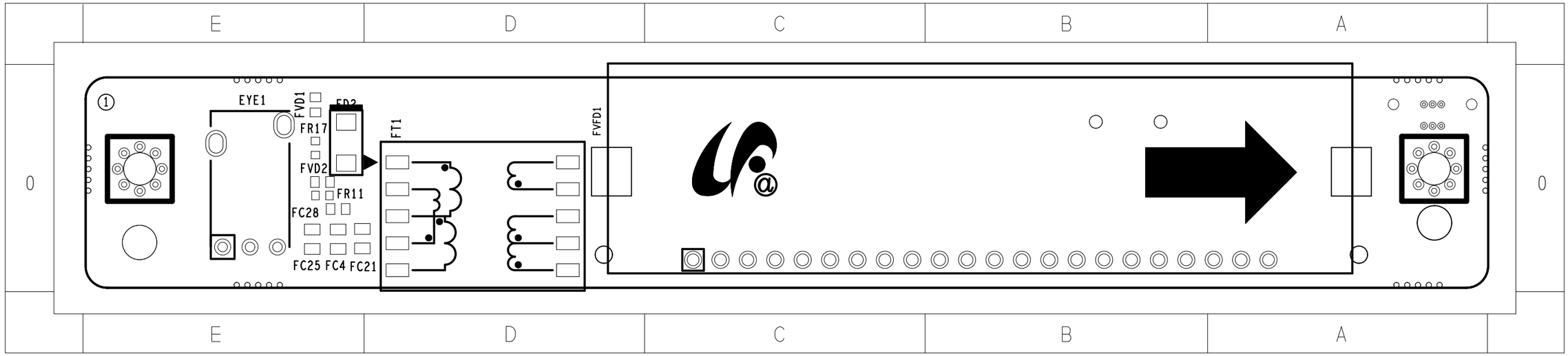
5.6. VFD PCB Top



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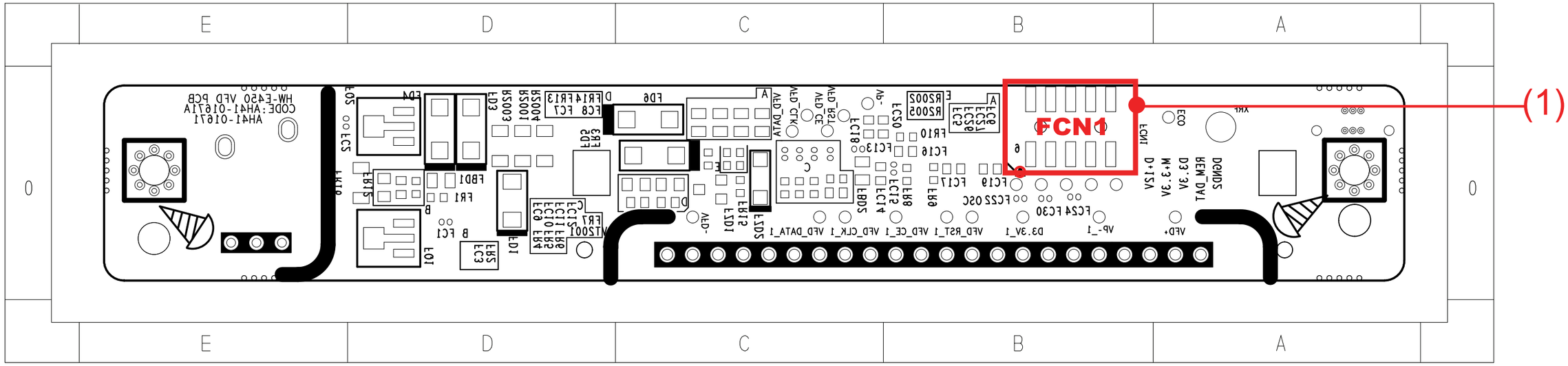
5.7. VFD PCB Bottom



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5.7.1. Pin Connection

1) FCN1

VFD CONTROL

Pin No.	Signal
1	D+12VV
2	VFD_DATA_V
3	M+3.3VV
4	VFD_CLK_V
5	D3.3VV
6	VFD_CE_V
7	REM_DATA1
8	VFD_RST_V
9	V_DGND
10	ECO_V

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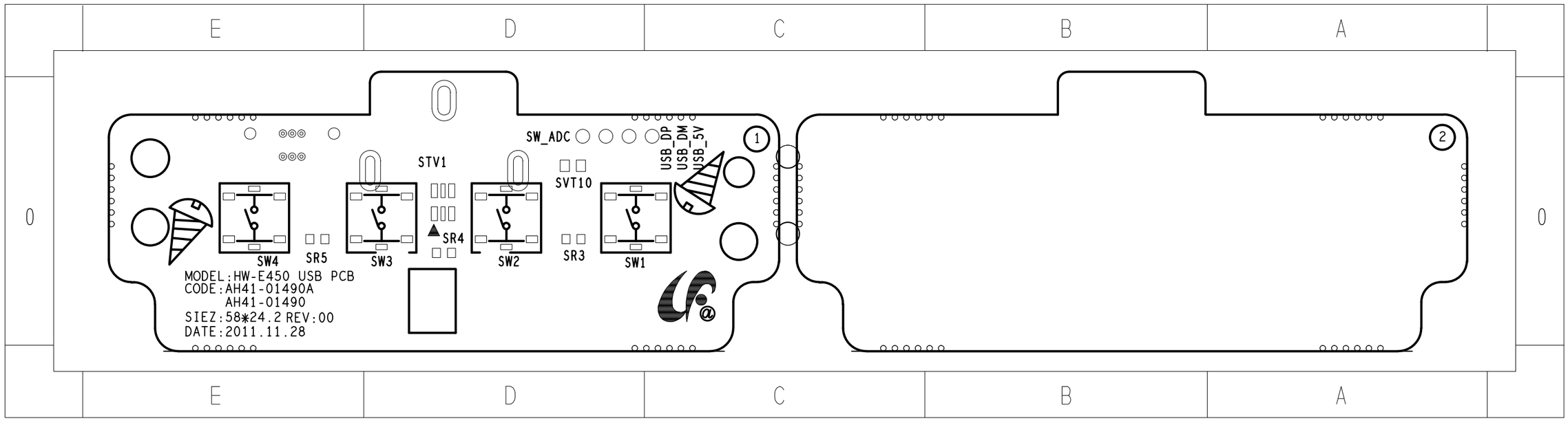
5.8. USB PCB Top



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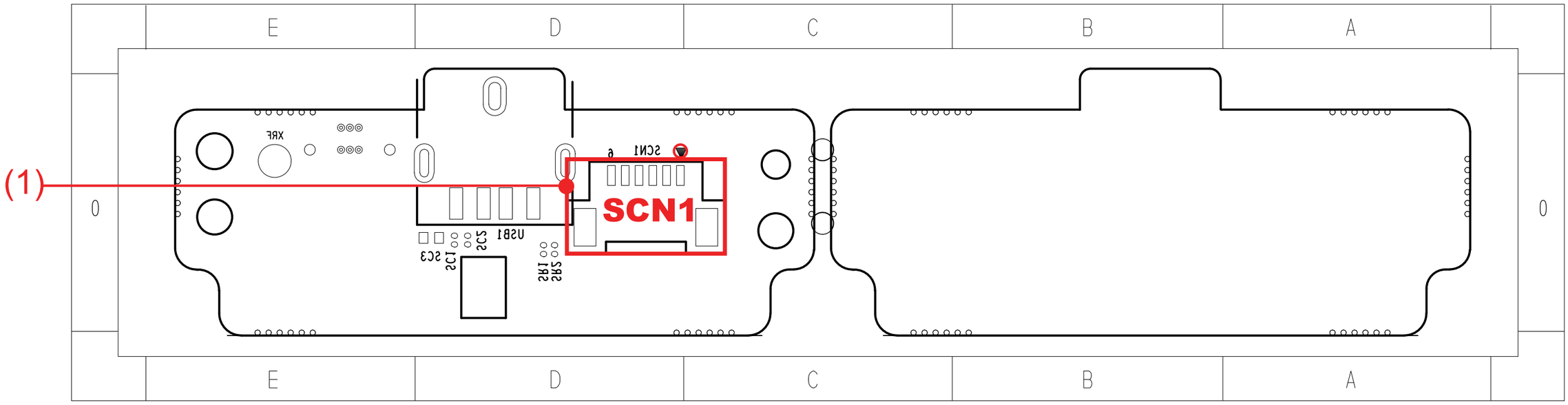
5.9. USB PCB Bottom



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5.9.1. Pin Connection

1) SCN1

USB CONTROL

Pin No.	Signal
1	USB_5V
2	USB_DM
3	USB_DP
4	DGND
5	SW_ADC
6	DGND

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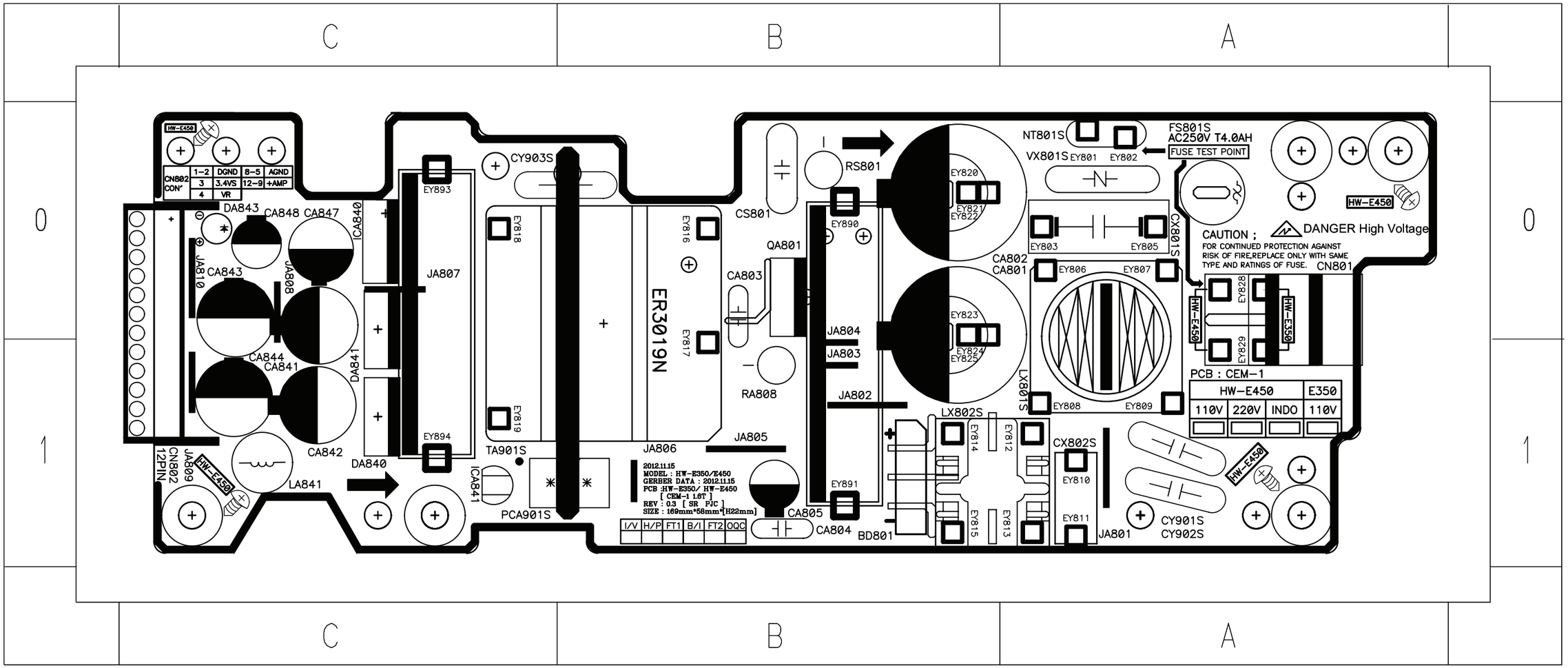
5.10. SMPS PCB Top



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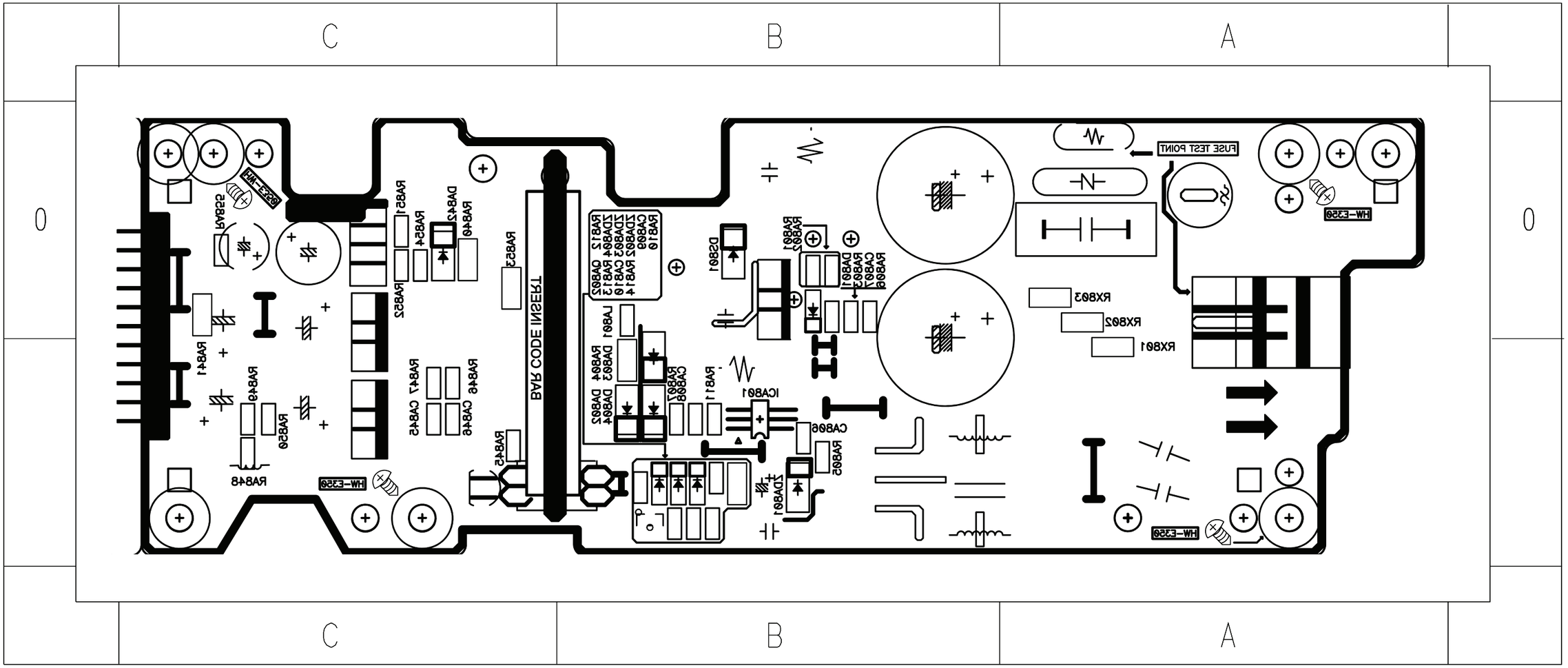
5.11. SMPS PCB Bottom



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6. Schematic Diagram

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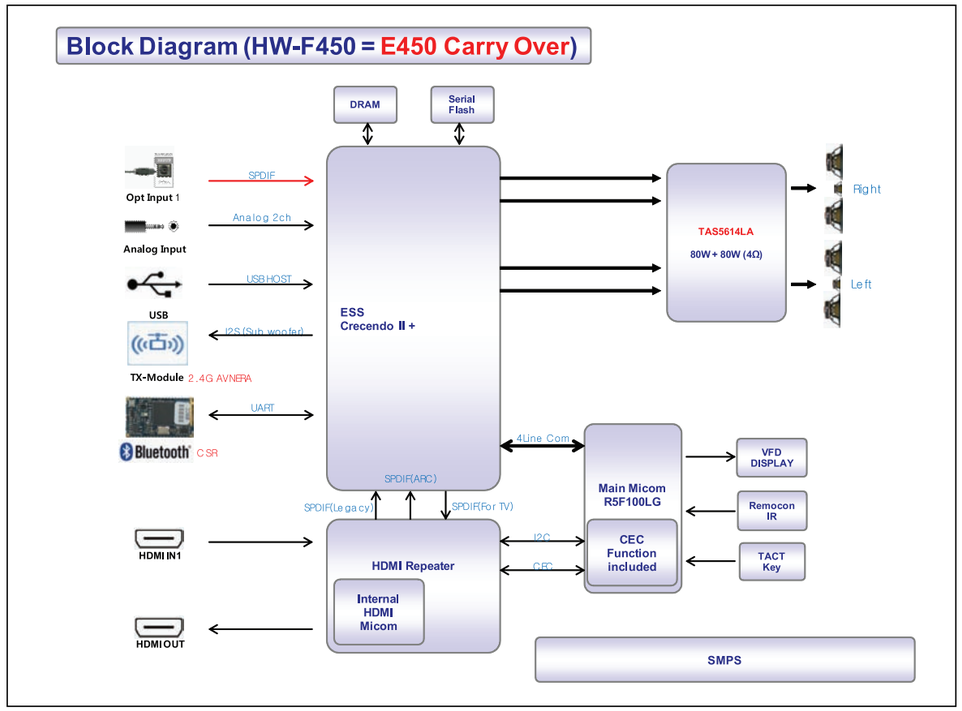
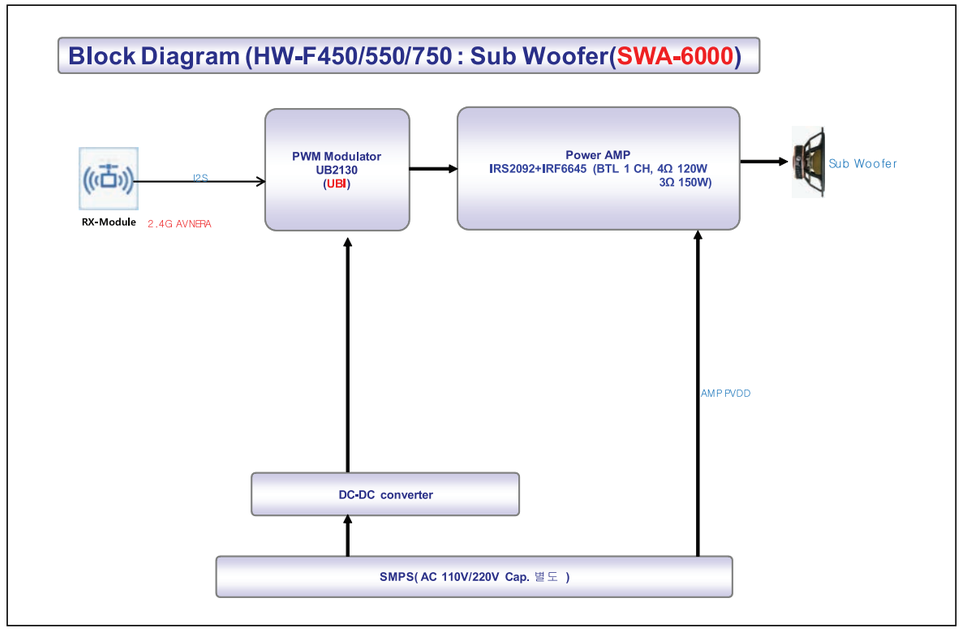
6.1. Overall Block Diagram



- Main System uses Digital Signal Processor which is ESS Crescendo2+ (ESCD8680)
- The Crescendo2+ include DIR, ADC, DAC, PWM IC.
- All displays is registered by VFD.
- Serial Interface between I2S is operated with various protocol over the whole system.
- DSP (ESD8680) implement DSP AUDIO DECODING function by 12s.
- Power, proper for each part, will be generated by SMPS.
- Power On/Off by Micom port is possible.
- Function and sound field can be controlled by remote controller and keys.
- HDMI repeater IC includes internal HDMI Micom.
- The active subwoofer operate with wireless system.



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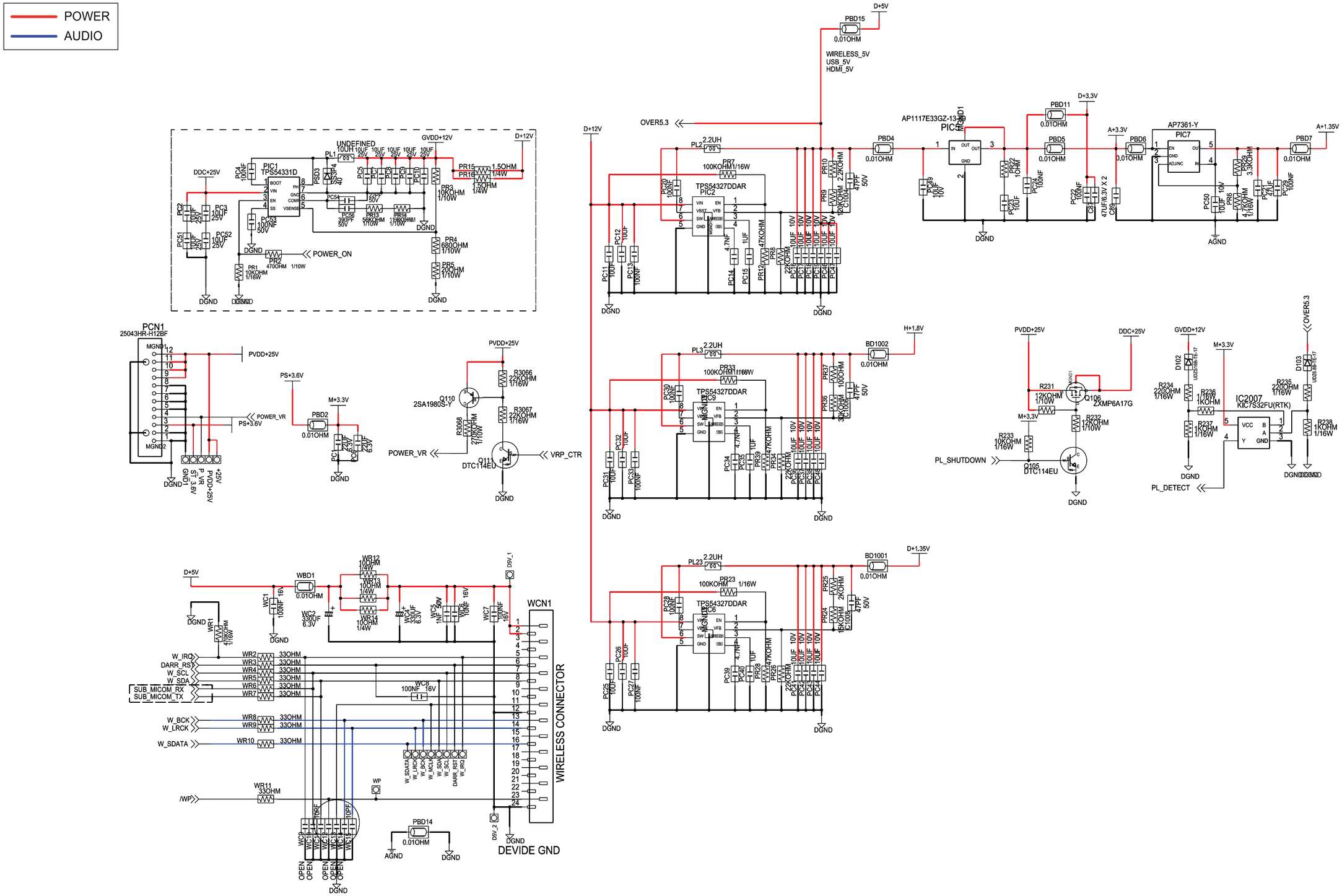
6.2. MAIN-1



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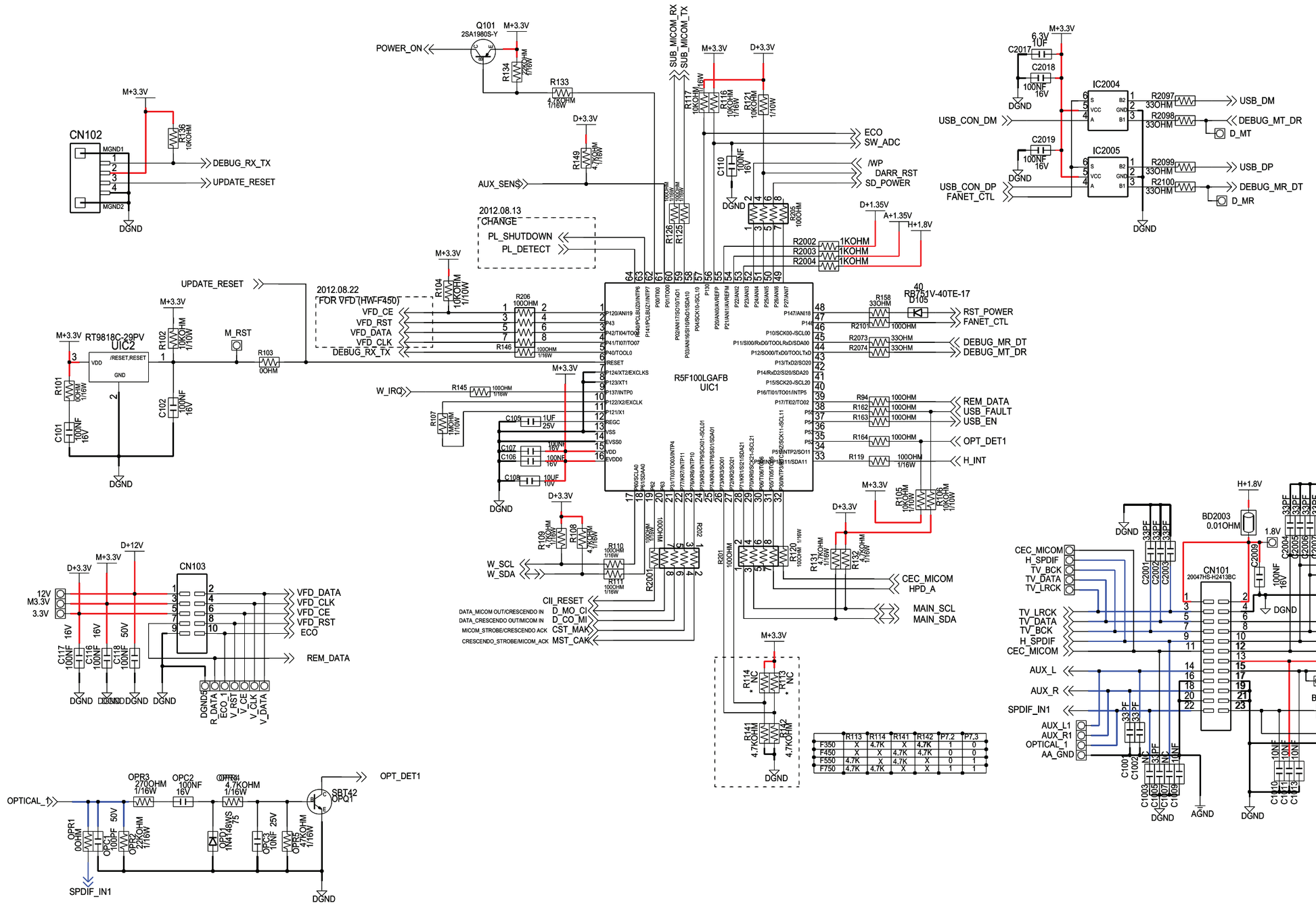
6.3. MAIN-2

POWER
AUDIO

NEC_64P MICOM



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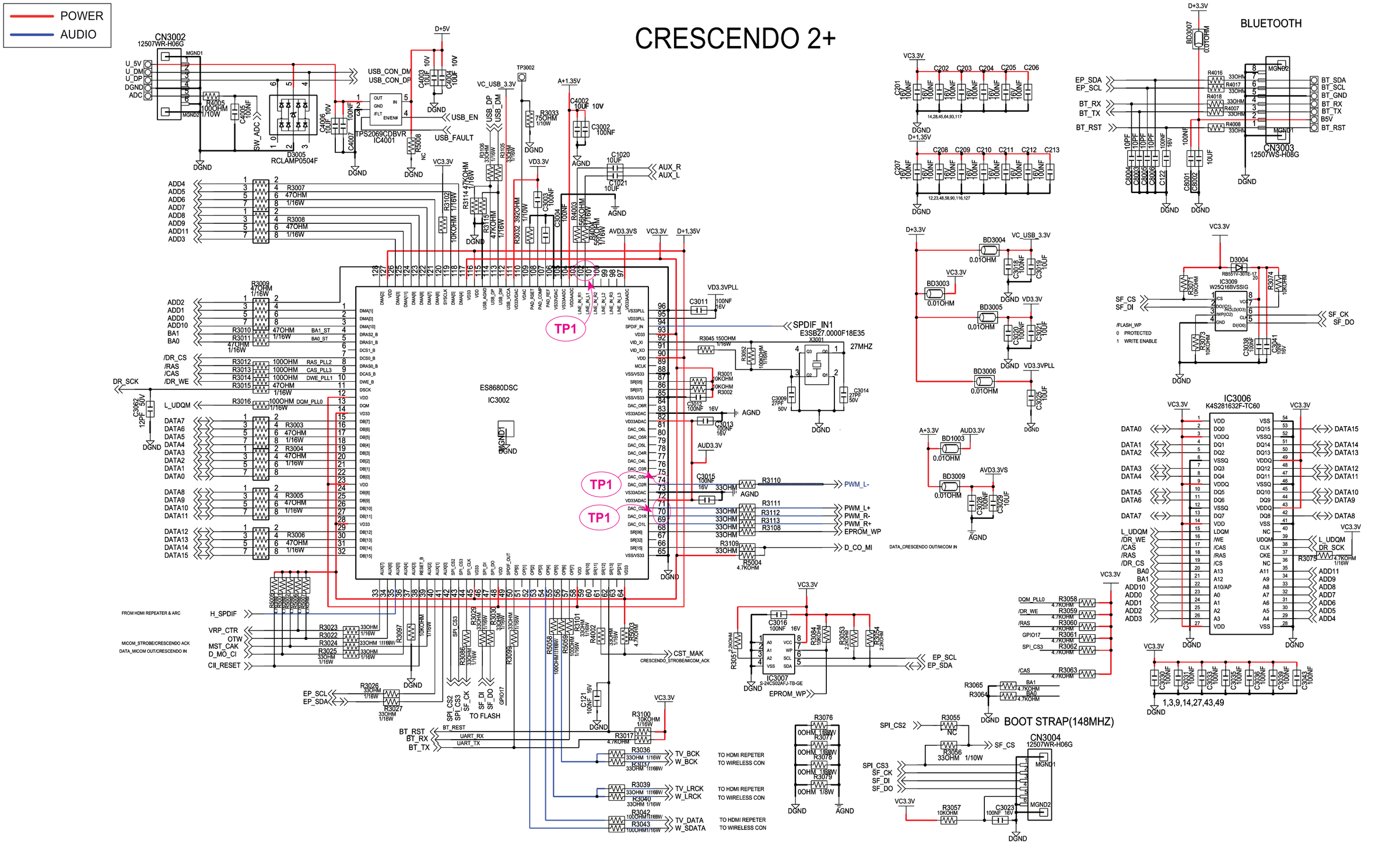
6.4. MAIN-3



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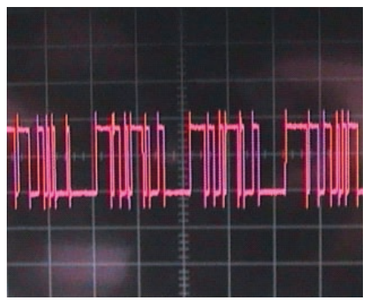
6.4.1. Test Point Wave Form

TP1


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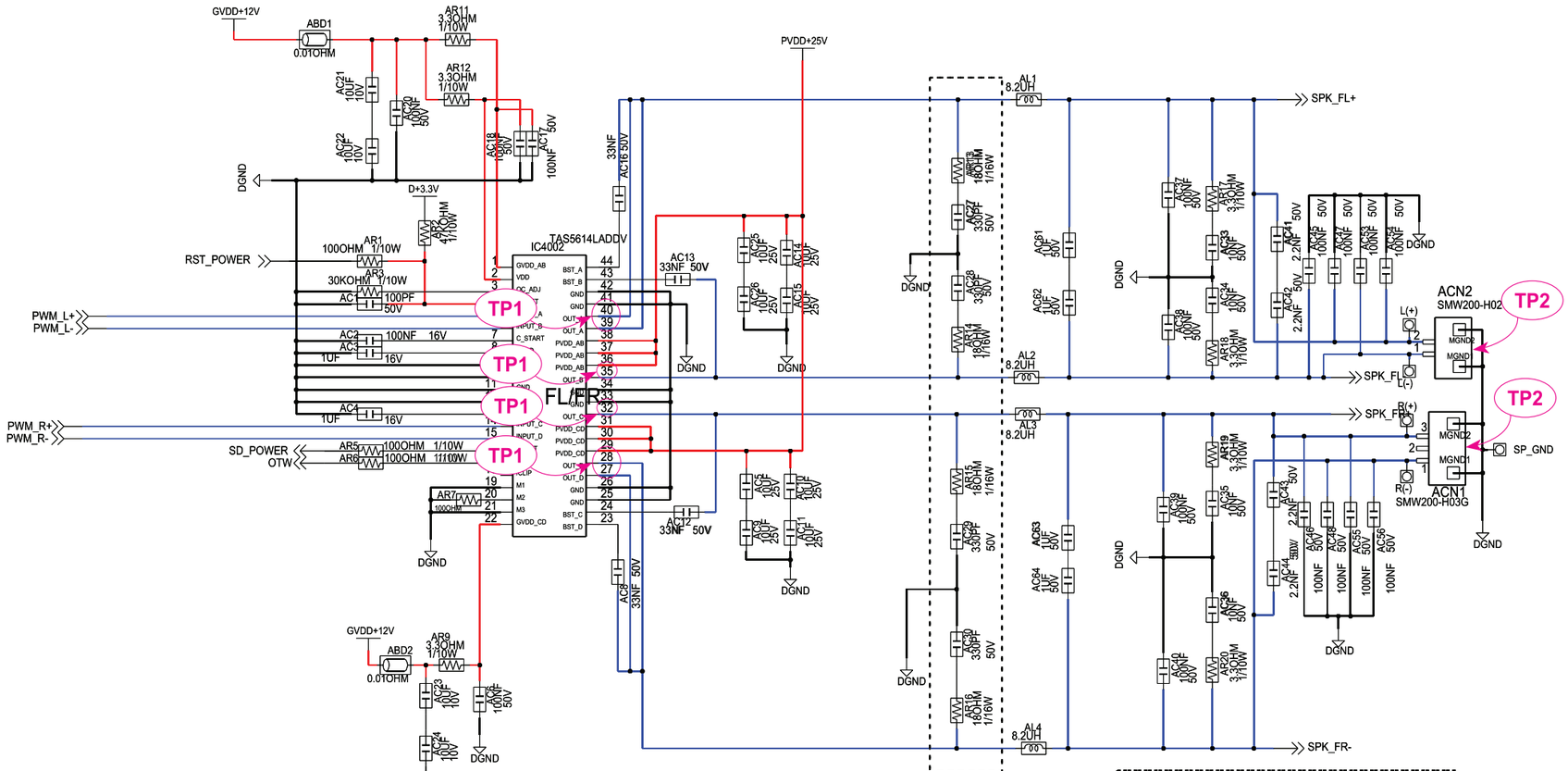
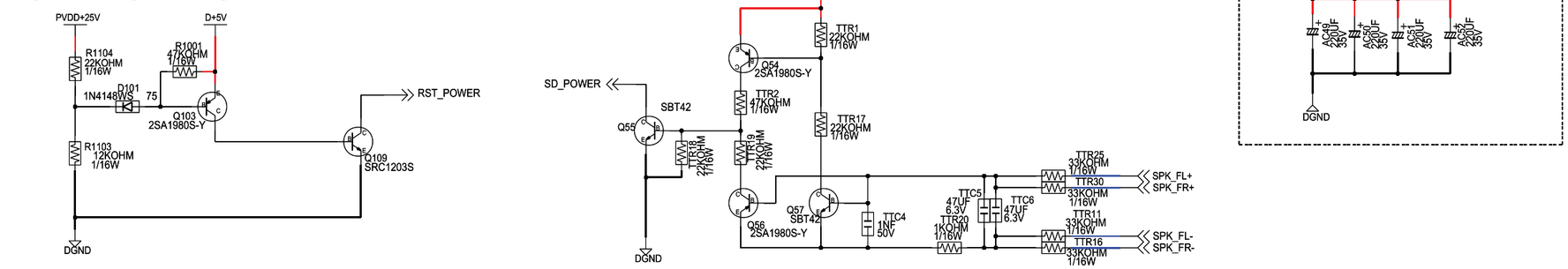
6.5. MAIN-4

POWER
AUDIO

2CH_TI TAS5614LA AMP



POWER OFF MUTE



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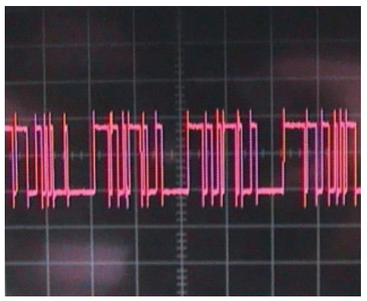
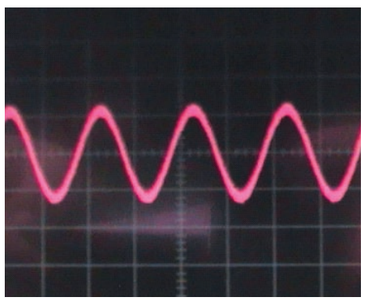
6.5.1. Test Point Wave Form

TP1



TP2



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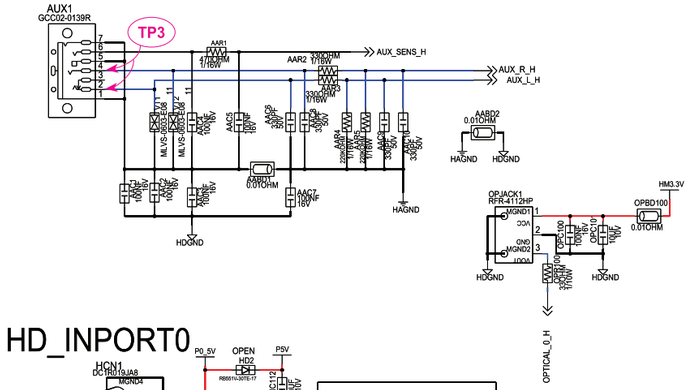
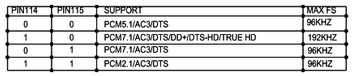
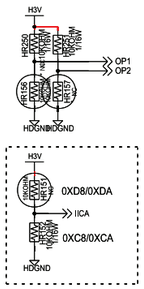
6.6. HDMI

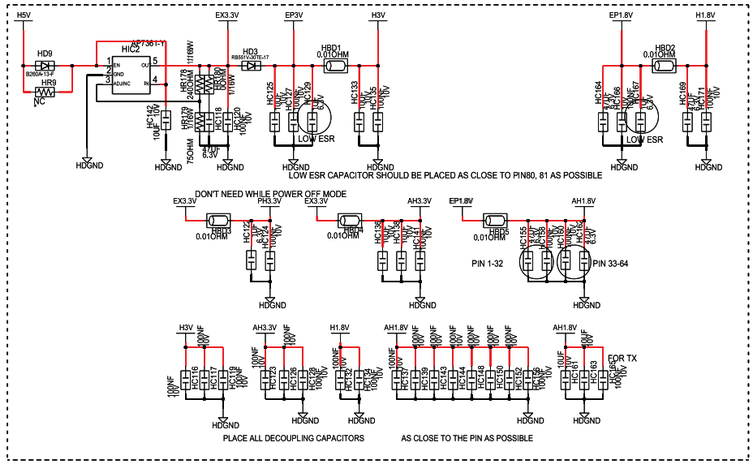
POWER
AUDIO



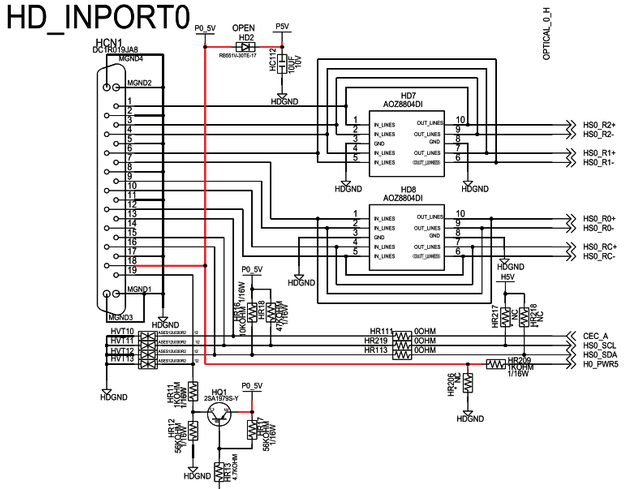


PIN114	PIN115	SUPPORT	MAX FS
0	0	PCM5.1/AC3/DTS	96KHZ
1	0	PCM7.1/AC3/DTS/DD+/DTS-HD/TRUE HD	192KHZ
0	1	PCM7.1/AC3/DTS	96KHZ
1	1	PCM2.1/AC3/DTS	96KHZ

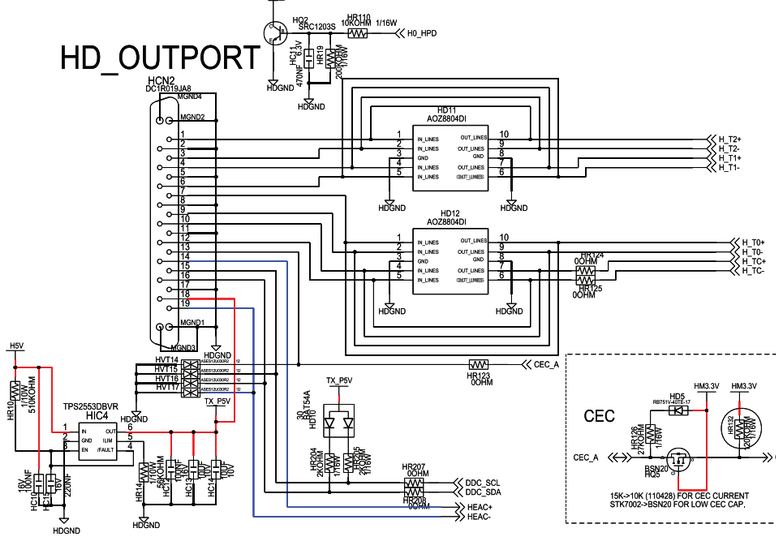


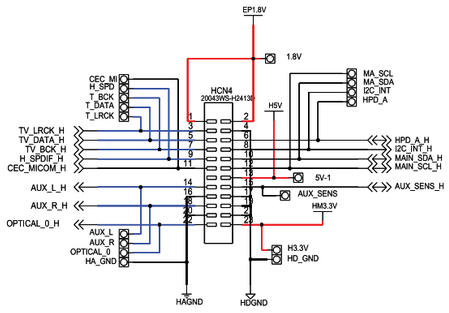


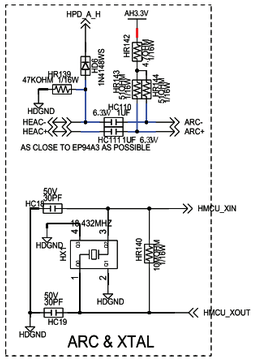
HD_INPORT0

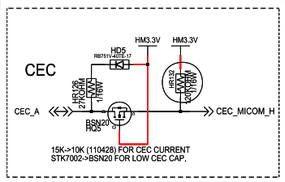


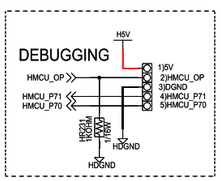
HD_OUTPORT

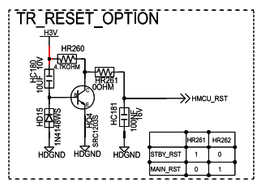


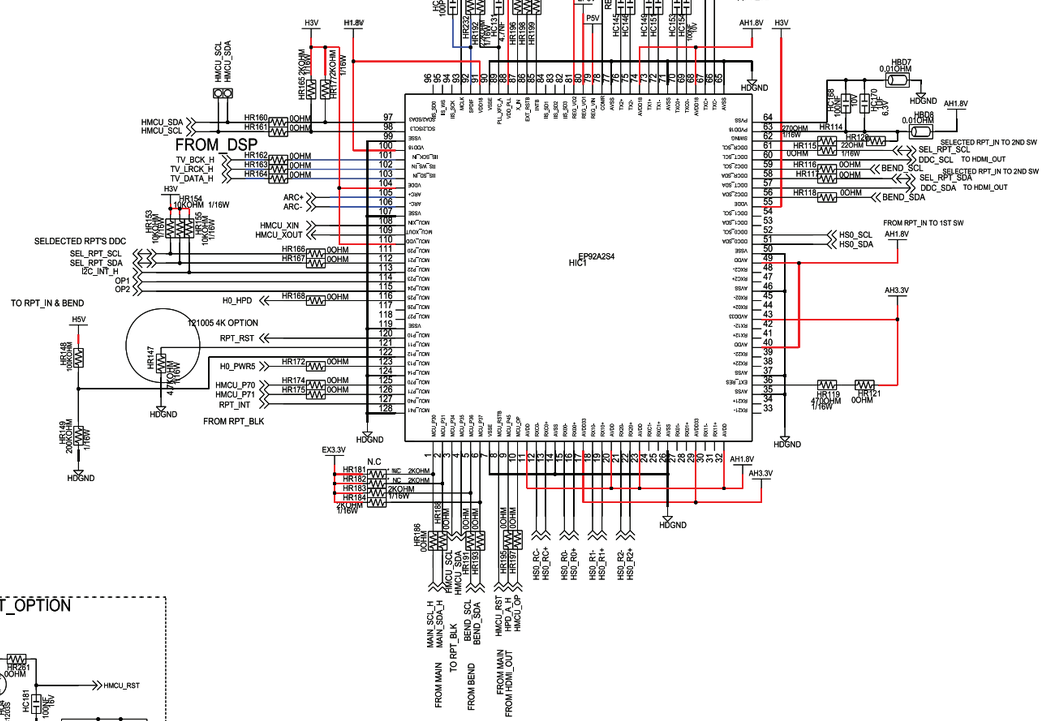












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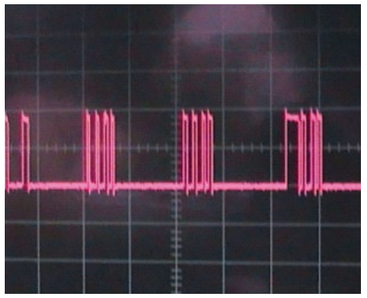
6.6.1. Test Point Wave Form

TP3


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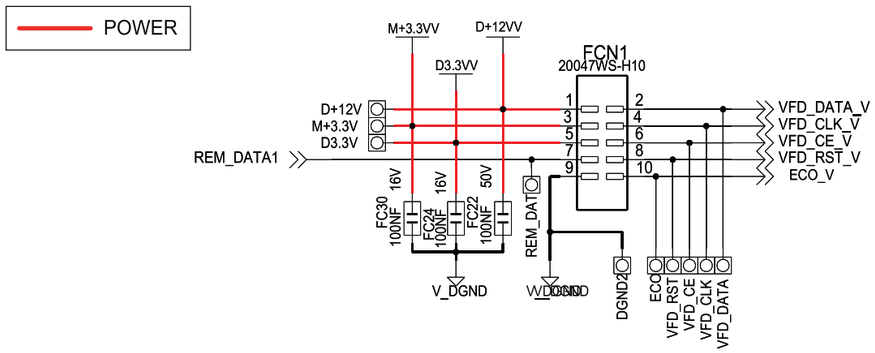
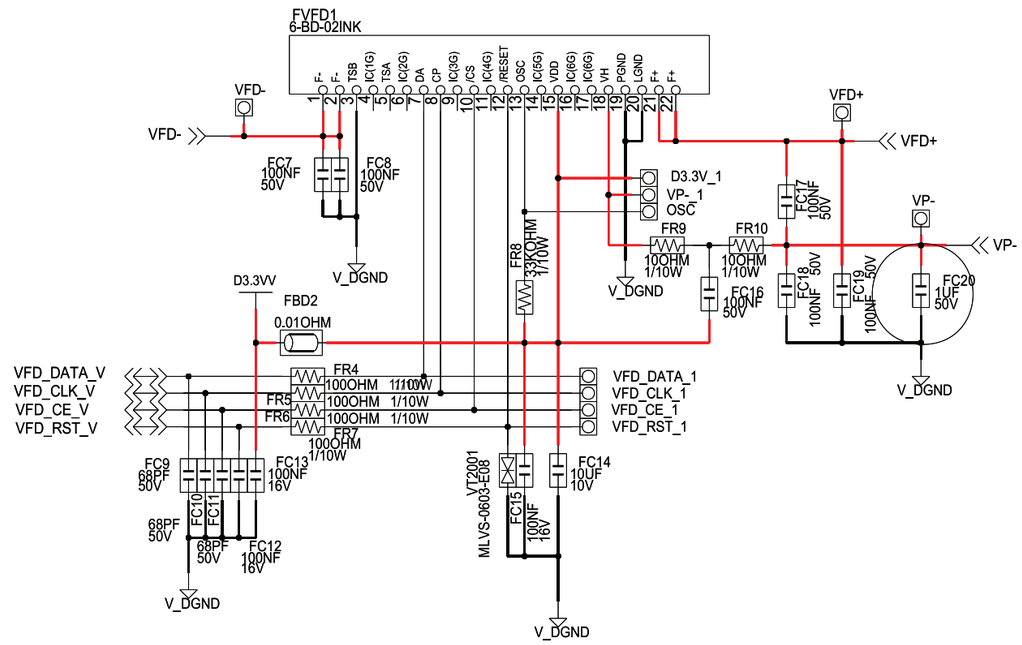
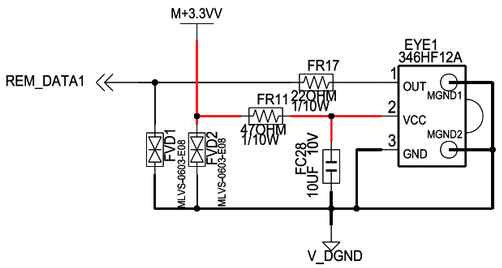
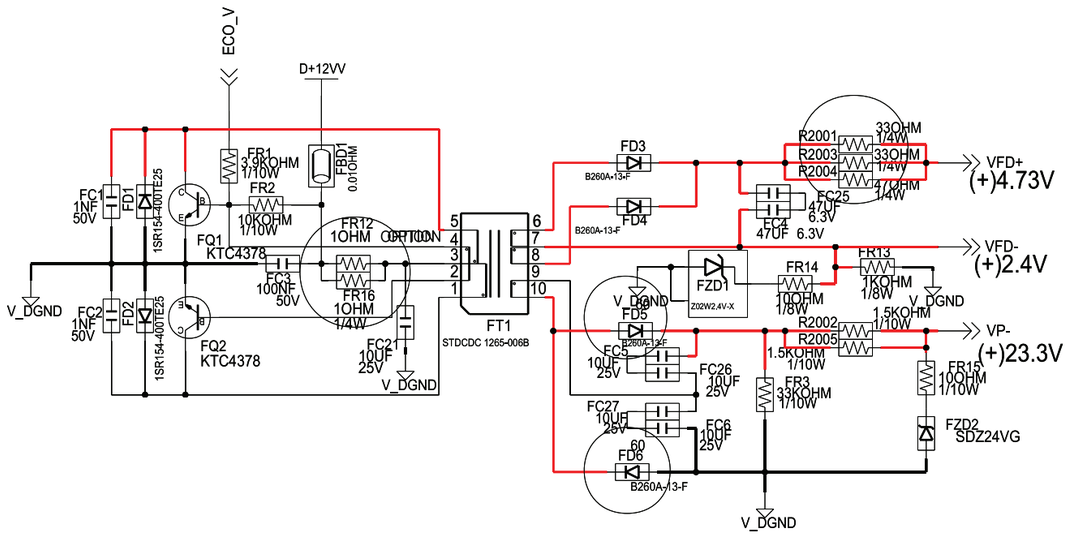
6.7. VFD









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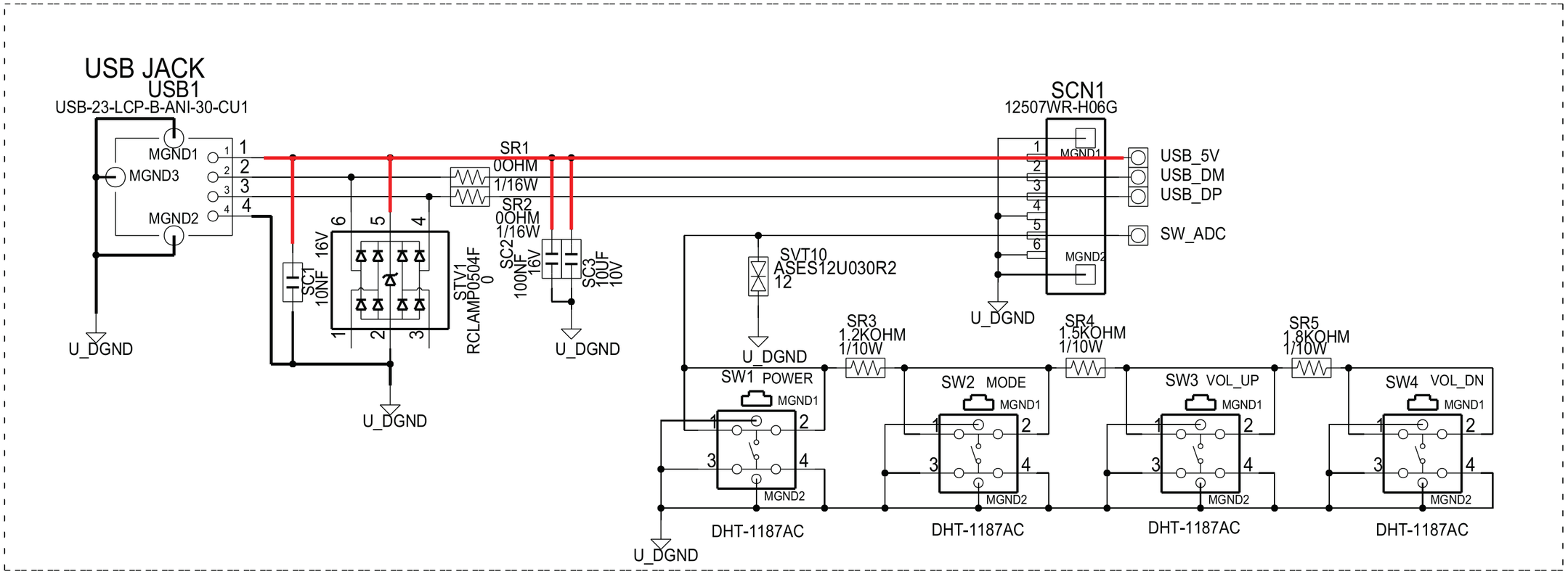
6.8. USB

POWER

USB & TACT SW



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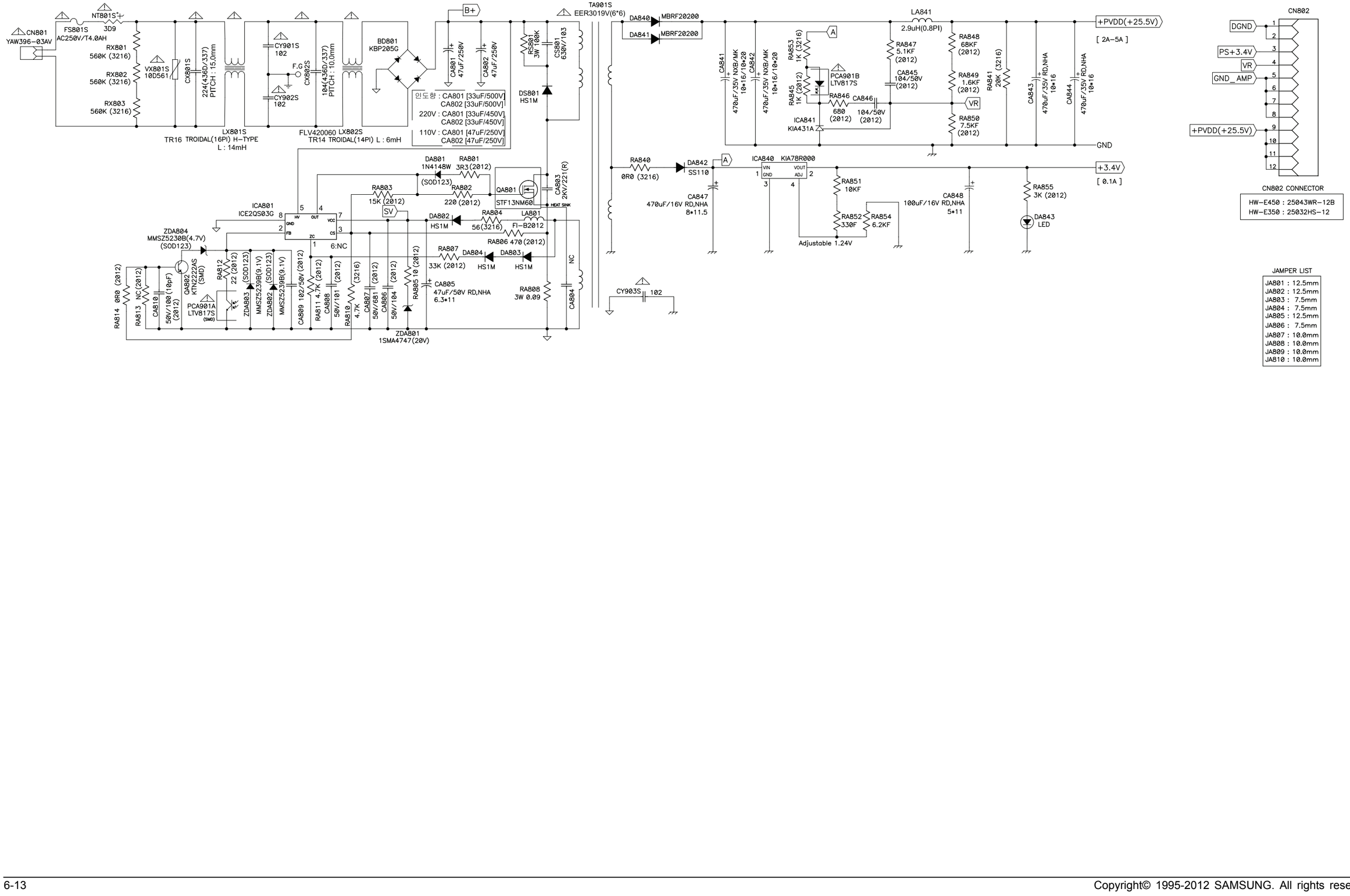
6.9. SMPS



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GSPN (GLOBAL SERVICE PARTNER NETWORK)

Area	Web Site
Europe, MENA, CIS, Africa	https://gspn1.samsungcsportal.com
E.Asia, W.Asia, China, Japan	https://gspn2.samsungcsportal.com
N.America, S.America	https://gspn3.samsungcsportal.com

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