



SERVICE MANUAL

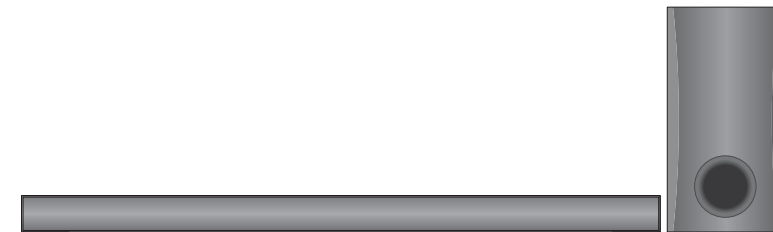
MODEL: SH2 (SH2, SPH2B-P)

2.1 ch Sound Bar **SERVICE MANUAL**

MODEL: SH2
(SH2, SPH2B-P)

CAUTION

BEFORE SERVICING THE UNIT, READ THE "SAFETY PRECAUTIONS"
IN THIS MANUAL.



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SECTION 1

GENERAL

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ESD PRECAUTIONS

Electrostatically Sensitive Devices (ESD)

Some semiconductor (solid state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive Devices (ESD). Examples of typical ESD devices are integrated circuits and some field-effect transistors and semiconductor chip components. The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed for potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ESD devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ESD devices.
4. Use only an anti-static solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ESD devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ESD devices.
6. Do not remove a replacement ESD device from its protective package until immediately before you are ready to install it. (Most replacement ESD devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive materials).
7. Immediately before removing the protective material from the leads of a replacement ESD device, touch the protective material to the chassis or circuit assembly into which the device will be installed.

CAUTION : BE SURE NO POWER IS APPLIED TO THE CHASSIS OR CIRCUIT, AND OBSERVE ALL OTHER SAFETY PRECAUTIONS.

8. Minimize bodily motions when handling unpackaged replacement ESD devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ESD device).

CAUTION. GRAPHIC SYMBOLS

	THE LIGHTNING FLASH WITH APROWHEAD SYMBOL. WITHIN AN EQUILATERAL TRIANGLE, IS INTENDED TO ALERT THE SERVICE PERSONNEL TO THE PRESENCE OF UNINSULATED "DANGEROUS VOLTAGE" THAT MAY BE OF SUFFICIENT MAGNITUDE TO CONSTITUTE A RISK OF ELECTRIC SHOCK.
	THE EXCLAMATION POINT WITHIN AN EQUILATERAL TRIANGLE IS INTENDED TO ALERT THE SERVICE PERSONNEL TO THE PRESENCE OF IMPORTANT SAFETY INFORMATION IN SERVICE LITERATURE.

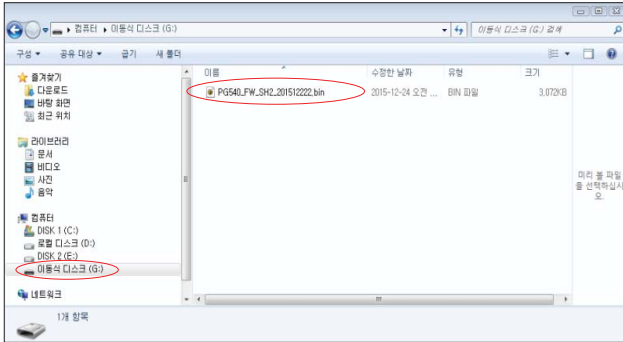
HIDDEN KEY MODE

HIDDEN MODE	ENTRANCE KEY	EXIT KEY	DISPLAY	RESULT
Version Check	Front 'Vol(-)' + Remote control 'STANDARD' for 3 seconds.	Remote control 'STANDARD', POWER OFF	NA	SW version will be output by voice through Speaker with below order. You can select each version by Volume +/- key. 1) DSP 2) CHECKSUM 3) Touch IC 4) EQ ex) 1) D1512222 2) 4A3B 3) T1507081 4) E1511261
USB SW update	Front 'Vol(-)' + Remote control 'Vol(+)' for 3 seconds.	Remote control 'F' (Function), POWER OFF	Turn on all of 4 white LED	During SW update, 4 white LED will turn on one by one and circularly.

FIRMWARE UPDATE

1. To update the Firmware

1) Copy the firmware upgrade file to a empty USB device. Make sure the USB device is empty before transferring the firmware upgrade file.



2) Hold the Volume(+) key on the remote control unit for 3 seconds, while pushing the Volume(-) button on the main unit. Then, the mode will be changed to the USB update mode. (see 3). (Do not need to change the input function on the main unit)



3) When the USB upgrade mode is ready, all the 4 function LED lamps will be on.



4) Plug the USB device into the USB port on the back side of the main unit. The update process will be started automatically. (The unit will automatically reads the file from the USB device) The progress will be displayed sequentially on 4 LED lamps on the main unit. (See the picture of 3)



5) Complete the firmware update. When the update is successfully completed, the unit goes into the standby mode after the automatic reset. When the unit goes into the standby mode, the red LED lamp will be on. (Will take about 2 minutes)



2. Urgent Firmware update description

If the function LED lamps are sequentially lighting for more than 3 minutes, unplug the power. After waiting all the lamps go off, plug the power again, and then, the Urgent firmware update function will automatically restart the update. After the process will be the same with 4 above. (The USB device should be remained on the USB port)

3. How to check the firmware version

If the main unit is on the stand-by mode, put the power on with the power button. Hold the "standard" key on the remote controller for 3 seconds while holding the Volume(-) button on the main unit. Then, the main unit mode will be changed into the version-check mode, and can listen the current version information. The new firmware version is "2015122222." If the firmware version was updated, the main unit will say D1512222. (20 is omitted, and the letter "D", meaning of DSP firmware) Push the "Standard" key once more when escaping from the version-check mode.

SPECIFICATIONS

• GENERAL

Power requirements	120 V ~ 60 Hz
Power consumption	25 W
	Networked standby : 0.5 W
	(If all network ports are activated.)
Dimensions (W x H x D)	Approx. 880 mm x 62 mm x 90 mm
	(34.6 inch x 2.4 inch x 3.5 inch)
Net Weight	Approx. 1.8 kg (3.9 lb)
Operating temperature	5 °C to 35 °C (41 °F to 95 °F)
Operating humidity	5 % to 90 %
Available Digital Input Audio Sampling Frequency	32 kHz, 44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz
Available Digital Input Audio format	Dolby Digital, PCM

• INPUTS

OPT. IN (Digital audio in)	3 V (p-p), Optical jack x 1
PORT. IN (Portable in)	2 Vrms (3.5 mm stereo jack) x 1

• AMPLIFIER (RMS OUTPUT POWER)

Total	100 W
Front	25 W x 2 (4 Ω at 1 kHz, THD 10%)
Subwoofer	50 W (4 Ω at 100 Hz, THD 10%)

• SUBWOOFER

Type	1 Way 1 Speaker
Impedance	4 Ω
Rated Input Power	50 W
Max. Input Power	100 W
Dimensions (W x H x D)	Approx. 156 mm x 300 mm x 281 mm
	(6.1 inch x 11.8 inch x 11.0 inch)
Net Weight	Approx. 2.9 kg (6.3 lb)

- Designs and specifications are subject to change without prior notice.

SECTION 2

CABINET & MAIN CHASSIS

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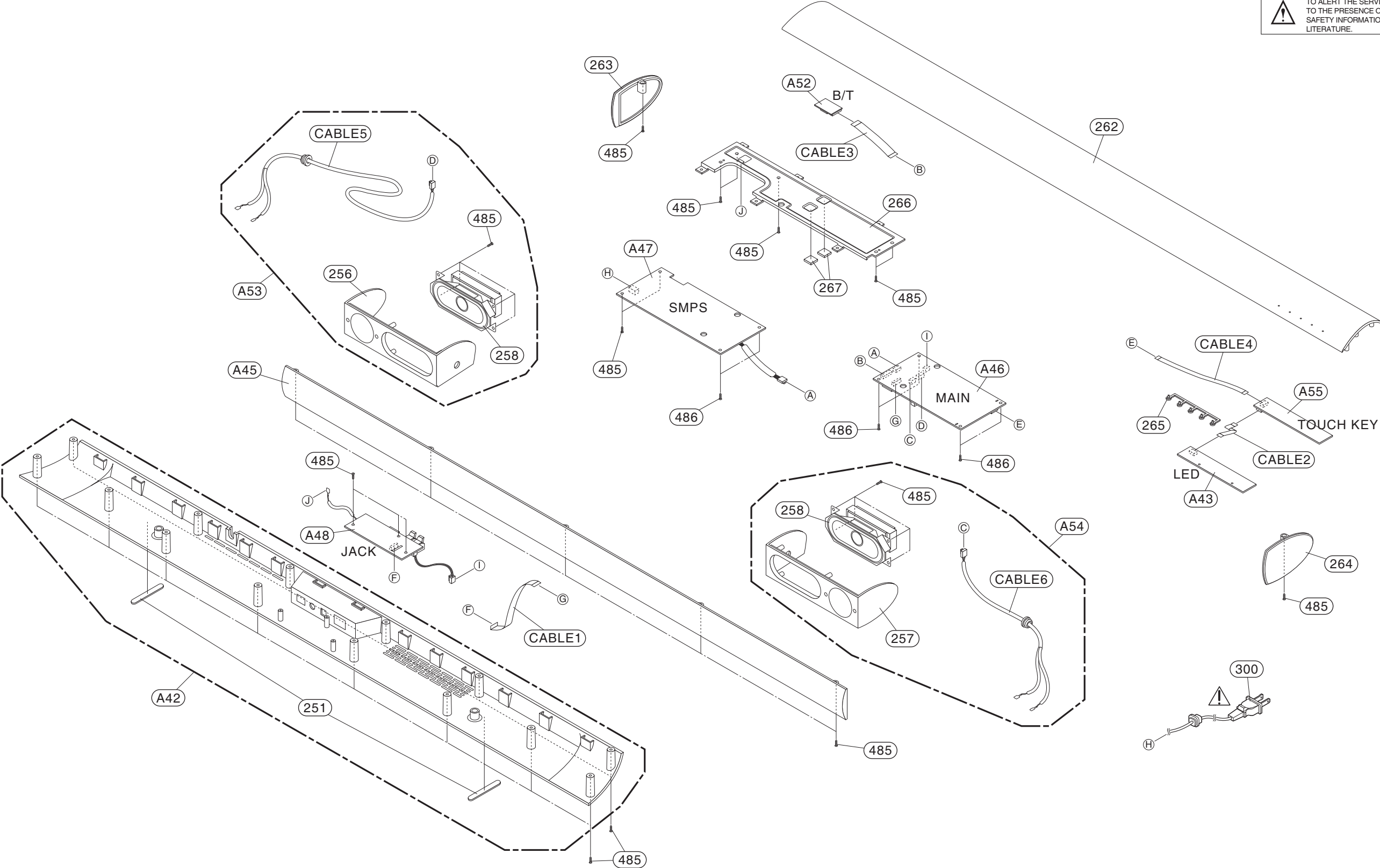
MEMO

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

EXPLODED VIEWS

1. MAIN UNIT SECTION

NOTES) THE EXCLAMATION POINT WITHIN AN EQUILATERAL TRIANGLE IS INTENDED TO ALERT THE SERVICE PERSONNEL TO THE PRESENCE OF IMPORTANT SAFETY INFORMATION IN SERVICE LITERATURE.



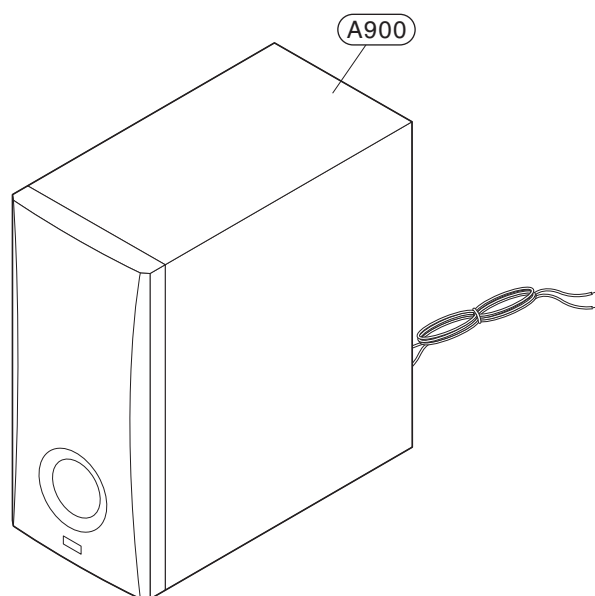
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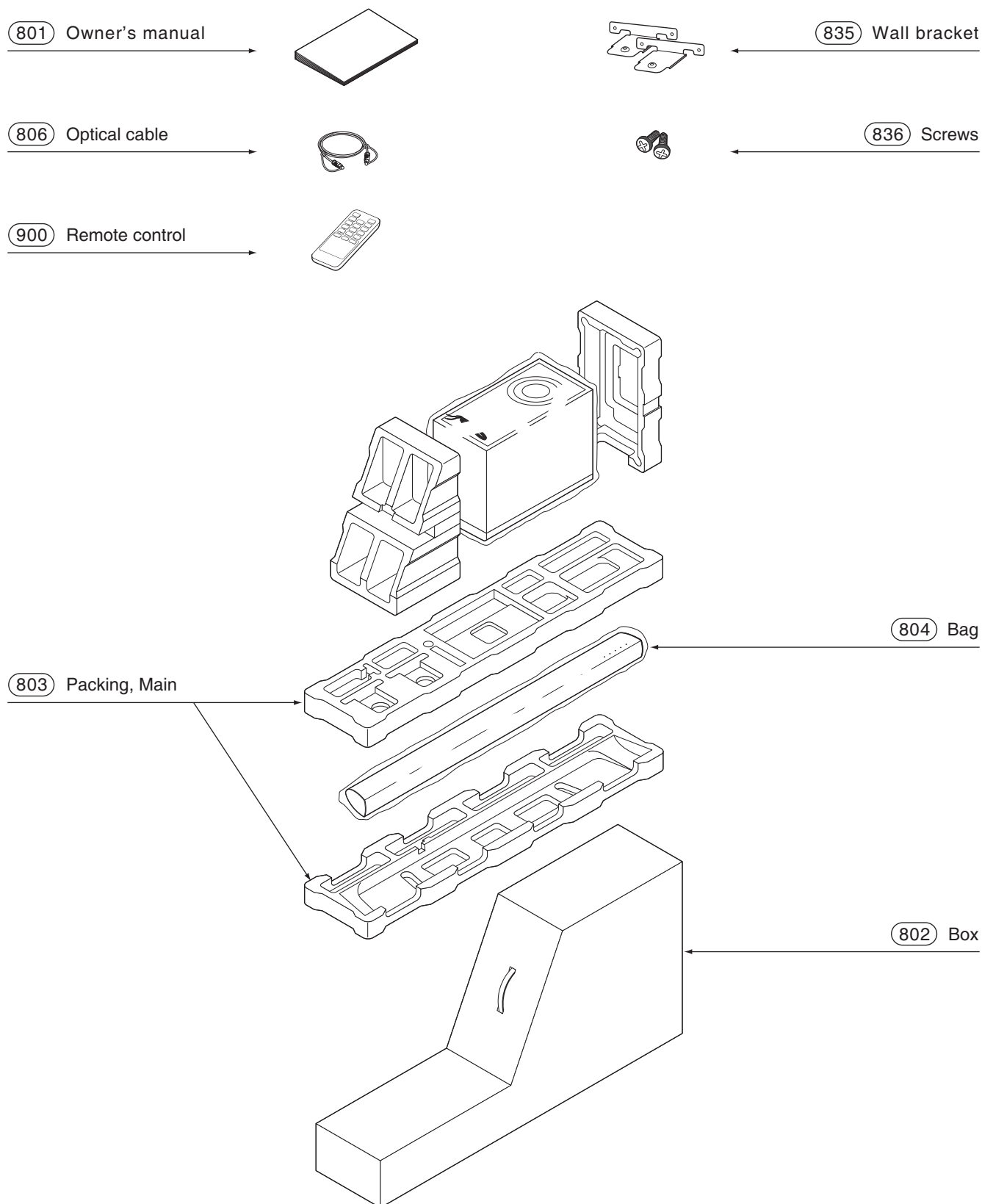
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2. SUBWOOFER SECTION



3. PACKING ACCESSORY SECTION



SECTION 3 ELECTRICAL

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ONE POINT REPAIR GUIDE

1. NO POWER PROBLEM

No power problem occurs when you power on. (No LED Sens.)

1-1. DSP (Micom) ➡ IC101

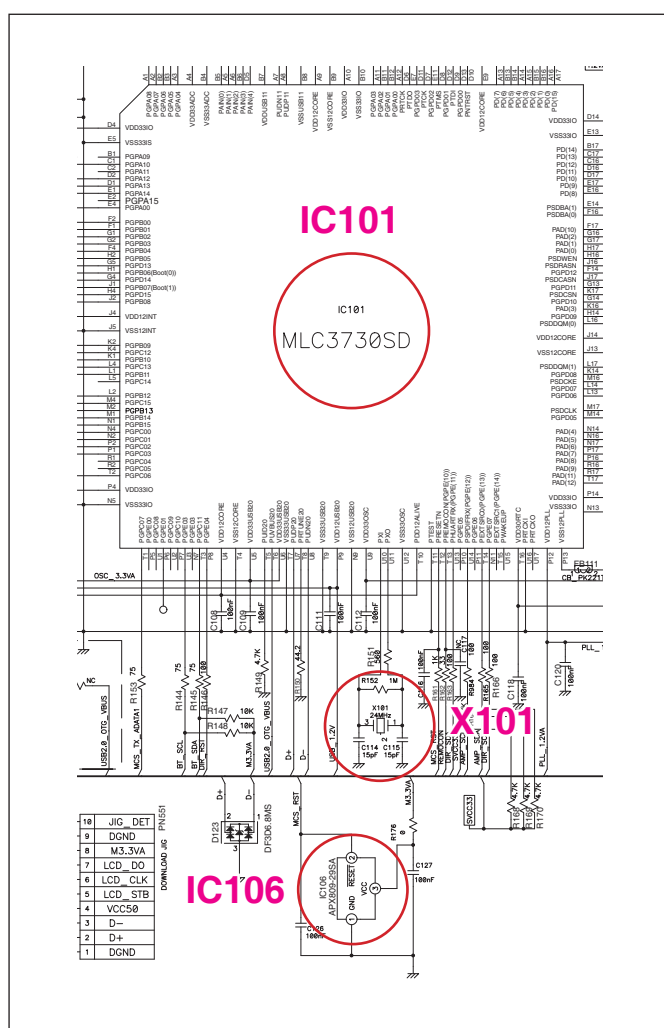
1-1-1. Solution

Replace IC101, IC105, X101 on MAIN board.

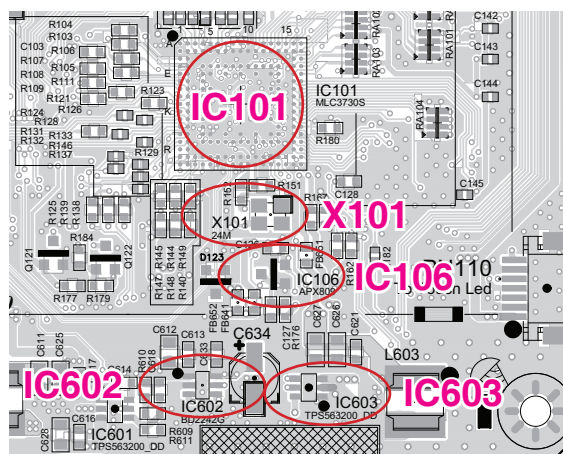
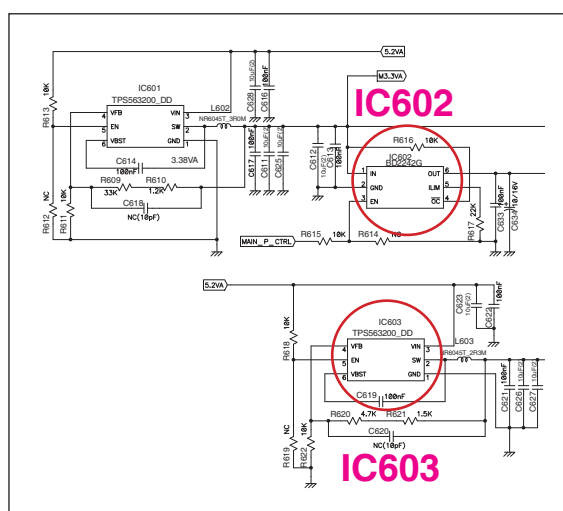
1-1-2. How to troubleshoot (Countermeasure)

- 1) Please check Vcc voltage. (pin A4, A10, D4, D14, P4, P14, U5, U6, U9 of IC101 $\Rightarrow$ 3.3 V)
If 3.3 V voltage doesn't come out, Replace IC602.
- 2) Please check Vcc voltage. (pin A9, E9, J4, J14, P9, P12, T10, U4 of IC101 $\Rightarrow$ 1.2 V)
If 1.2 V voltage doesn't come out, Replace IC603.
- 3) Please check Crystal Frequency (X101) $\Rightarrow$ 24 MHz and Replace it.
- 4) Please check RESET voltage. (pin T11 of IC101 $\Rightarrow$ 3.3 V)
If 3.3 V voltage doesn't come out, Replace IC106 and R161.
- 5) Please check P-Sens voltage. (pin A6 of IC101 $\Rightarrow$ 3.3 V)

1-1-3. Service hint (Any picture / Remark)



< Schematic point >



< MAIN board top view >

ONE POINT REPAIR GUIDE

2. SPEAKER NO SOUND

No Sound when you TURN ON the unit.

2-1. Digital AMP (IC701, IC702)

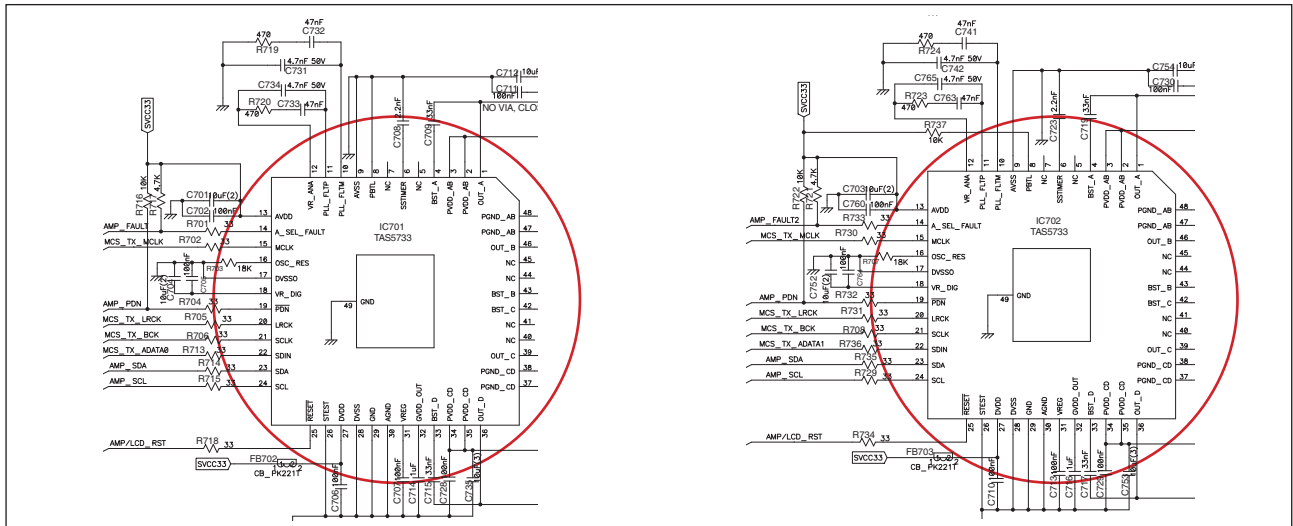
2-1-1. Solution

Replace IC701, IC702 on MAIN board.

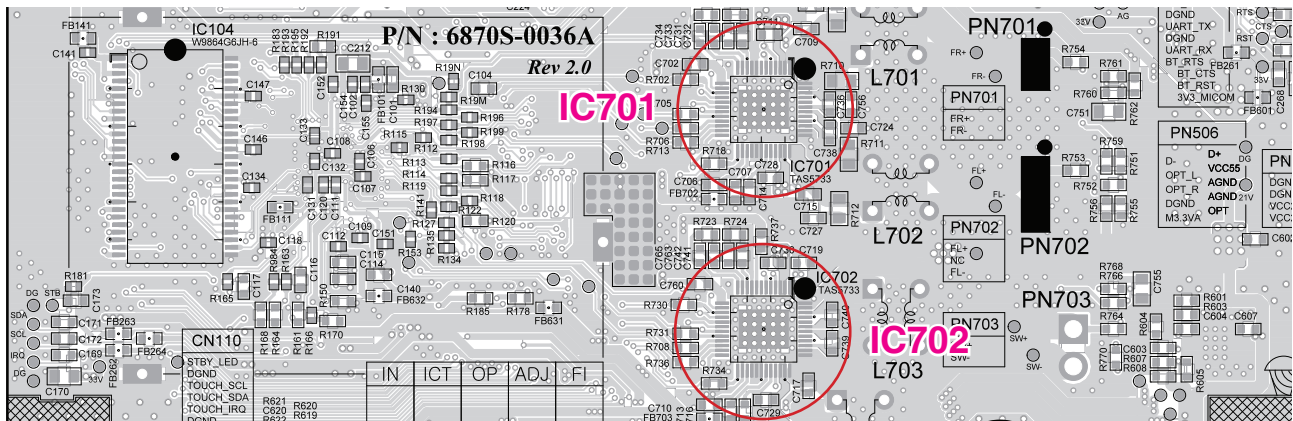
2-1-2. How to troubleshoot (Countermeasure)

- 1) Please check 3.3 V of IC701, IC702 pin13.
If 3.3 V voltage doesn't come out, Replace IC602.
- 2) Please check 15 V of IC701, IC702 pin2, 3, 34, 35.
If 15.0 V voltage doesn't come out, Replace SMPS Circuit.
- 3) Please check 3.3 V of IC701, IC702 pin14, 19, 25.
If 3.3 V voltage doesn't come out, check IC101 pin B3, D8, D9.
- 4) Please check I2S signal of IC701, IC702 pin15, 20, 21, 22 and Replace it.

2-1-3. Service hint (Any picture / Remark)



< Schematic point >



< MAIN board bottom view >

ONE POINT REPAIR GUIDE

3. PORTABLE FUNCTION DOESN'T WORK (OPTIONAL PART)

3-1. ADC (IC921)

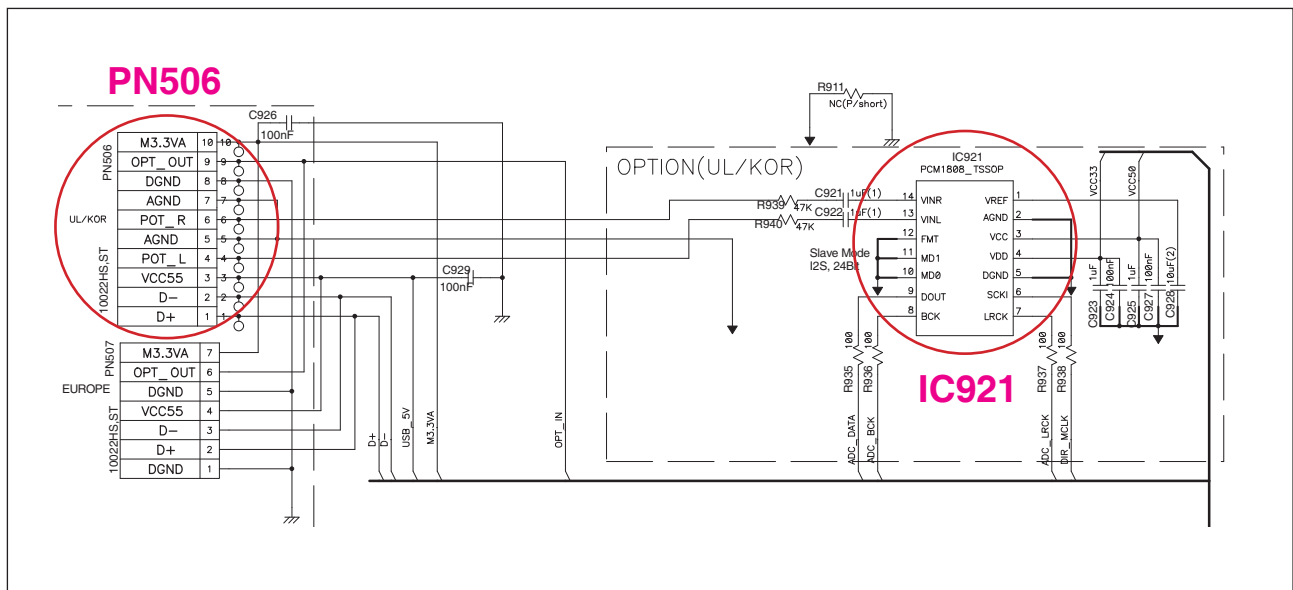
3-1-1. Solution

Replace IC921, PN506 on MAIN board.

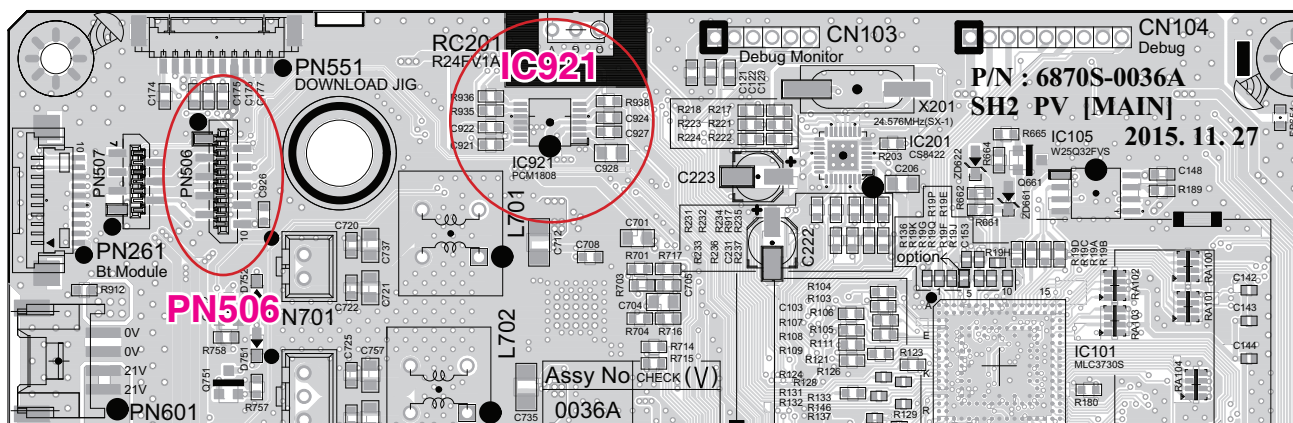
3-1-2. How to troubleshoot (Countermeasure)

- 1) Please check 5.0 V of IC921 pin3.
If 5.0 V voltage doesn't come out, Replace IC605.
- 2) Please check 3.3 V of IC921 pin4.
If 3.3 V voltage doesn't come out, Replace IC602.
- 3) Please check analog input signal of PN506 pin4, 6.
If signal doesn't come out, Replace PN506 & JK552.

3-1-3. Service hint (Any picture / Remark)



< Schematic point >



< MAIN board top view >

ONE POINT REPAIR GUIDE

5. OPTICAL FUNCTION DOESN'T WORK

5-1. DIR (IC201)

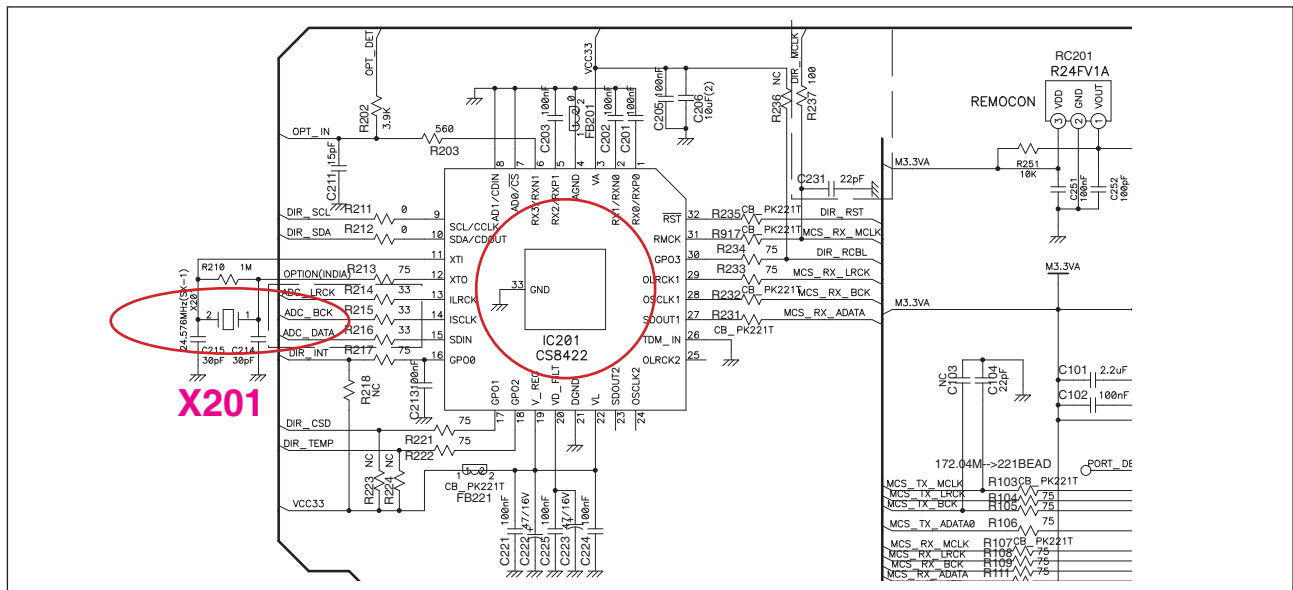
5-1-1. Solution

Replace IC201 on MAIN board & JK551 on JACK board.

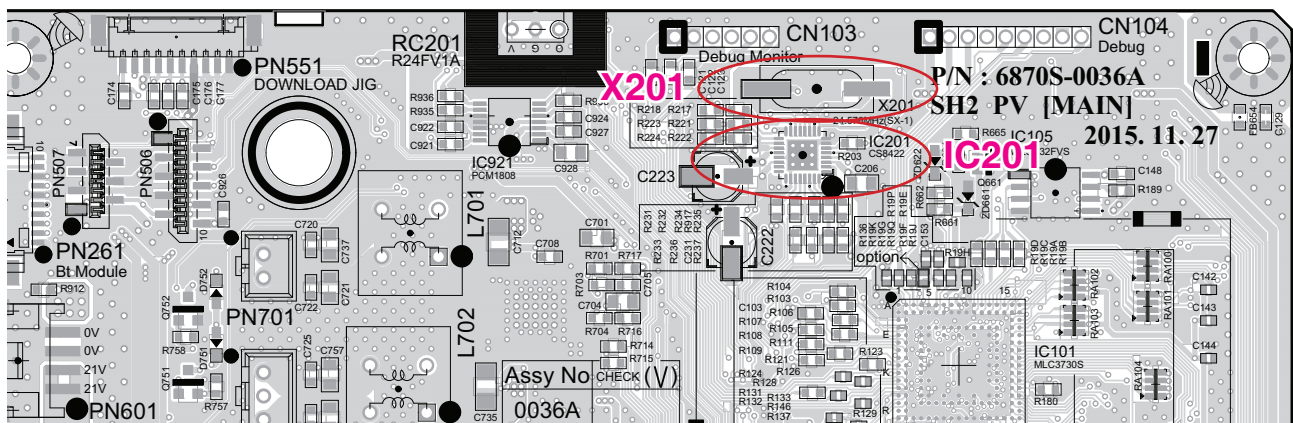
5-1-2. How to troubleshoot (Countermeasure)

- 1) Please voltage check 3.3 V of JK551 pin3.
If 3.3 V voltage doesn't come out, Replace IC601.
- 2) Please voltage check 3.3 V of IC201 pin3, 19, 22.
If signal doesn't come out, Replace IC602.
- 3) Please check Crystal Frequency (X201) $\Rightarrow$ 24.576 MHz and Replace it.
- 4) Please check SPDIF Signal of IC201 pin6 and Replace it.

5-1-3. Service hint (Any picture / Remark)



< Schematic point >



< MAIN board top view >

ONE POINT REPAIR GUIDE

6. PROTECTION

6-1. Protection-1

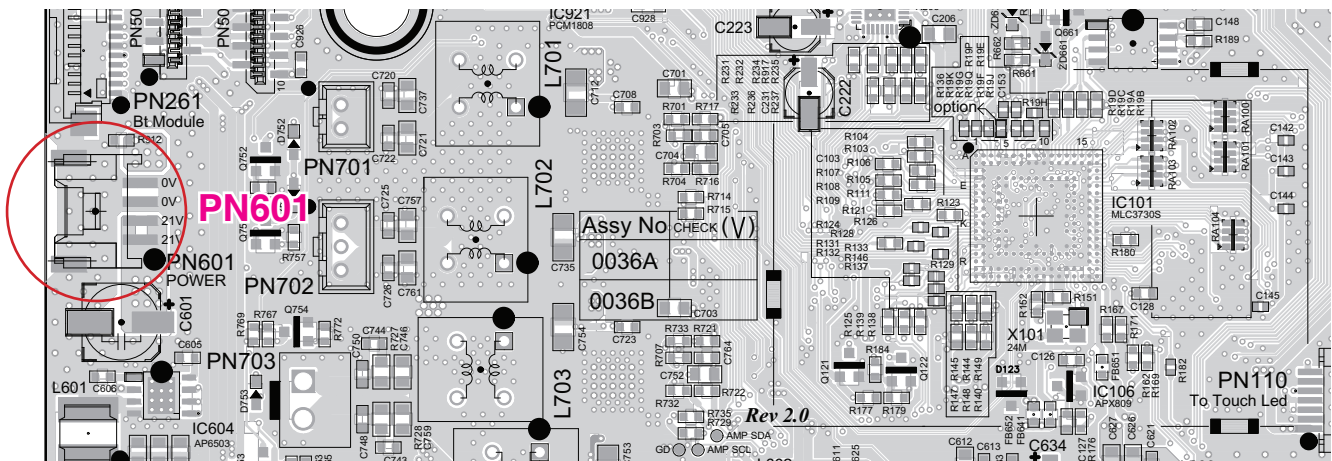
6-1-1. Solution

Replace IC701, IC702 (AMP IC) on MAIN board.

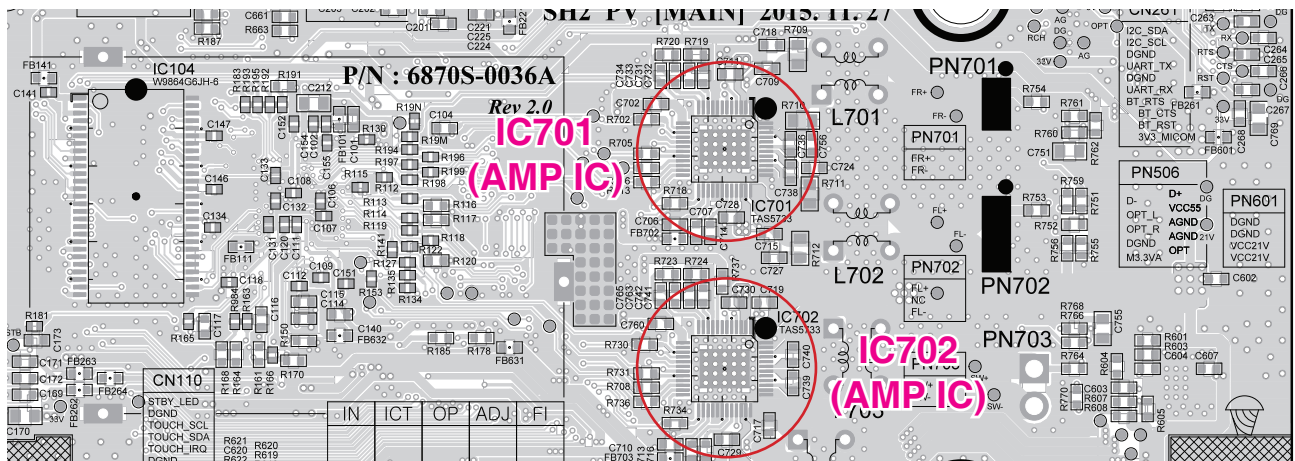
6-1-2. How to troubleshoot (Countermeasure)

- 1) After MAIN SET power off, check Red LED blink at intervals of 1 sec.
- 2) Turn MAIN SET power on again.
- 3) Check PVDD voltage (21 V) of PN601 pin1, 2.
 - If PVDD voltage has 6.0 V under, refer to SMPS board repair guide.
- 4) Check SVCC33 voltage (3.3 V) of IC701, IC702 pin13, 27.
 - If SVCC33 voltage has 2.7 V under, refer to 3.3 V no power repair guide.
- 5) Check impedance (4 Ω) of speaker unit.
 - If impedance of speaker unit has 2 Ω under, replace speaker unit.
- 6) If check point 3), 4), 5) is OK, replace IC701, IC702 (AMP IC) on MAIN bottom board.

6-1-3. Service hint (Any picture / Remark)



< MAIN board top view >



< MAIN board bottom view >

ONE POINT REPAIR GUIDE

PROTECTION

6-2. Protection-2

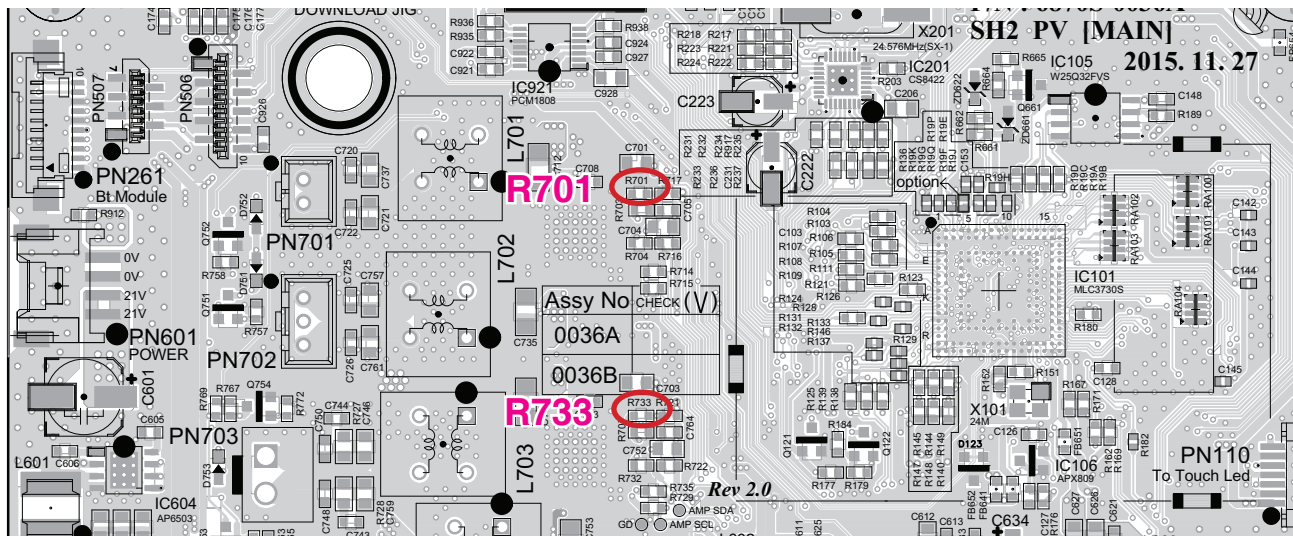
6-2-1. Solution

Replace IC701, IC702 (AMP IC) on MAIN board.

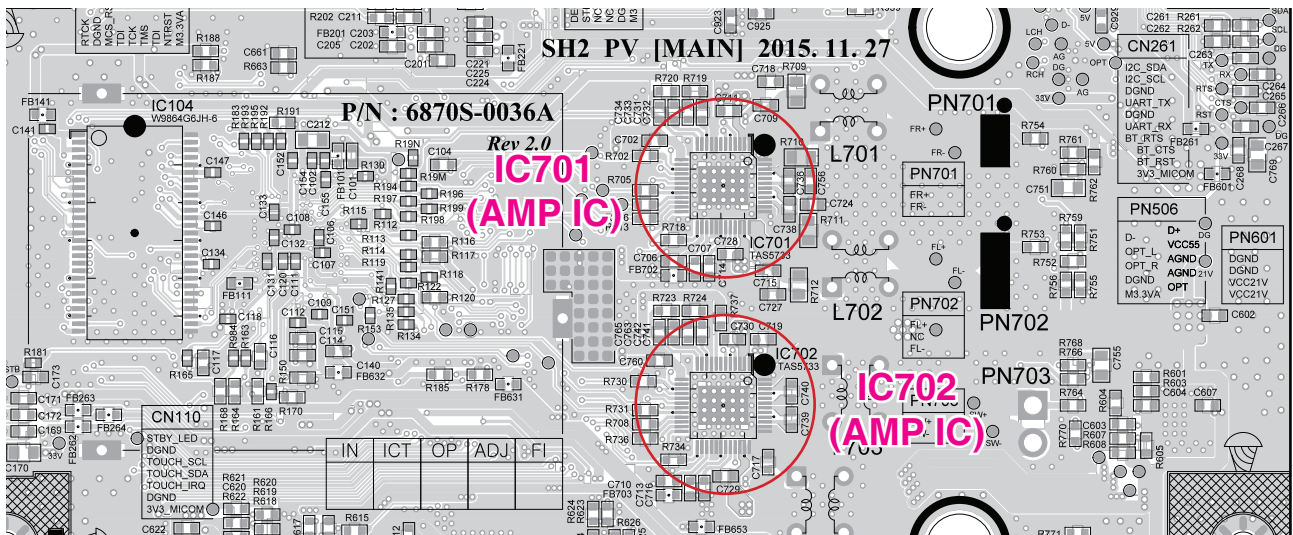
6-2-2. How to troubleshoot (Countermeasure)

- 1) After MAIN SET power off, check Red LED blink at intervals of 1 sec.
- 2) Turn MAIN SET power on again.
- 3) Check voltage 3.3 V of AMP_FAULT signal (pin14 of IC701, IC702).
- 4) If pin14 of IC701, IC702 is low (0 V), Replace IC701, IC702 (AMP IC) on MAIN bottom board.

6-2-3. Service hint (Any picture / Remark)



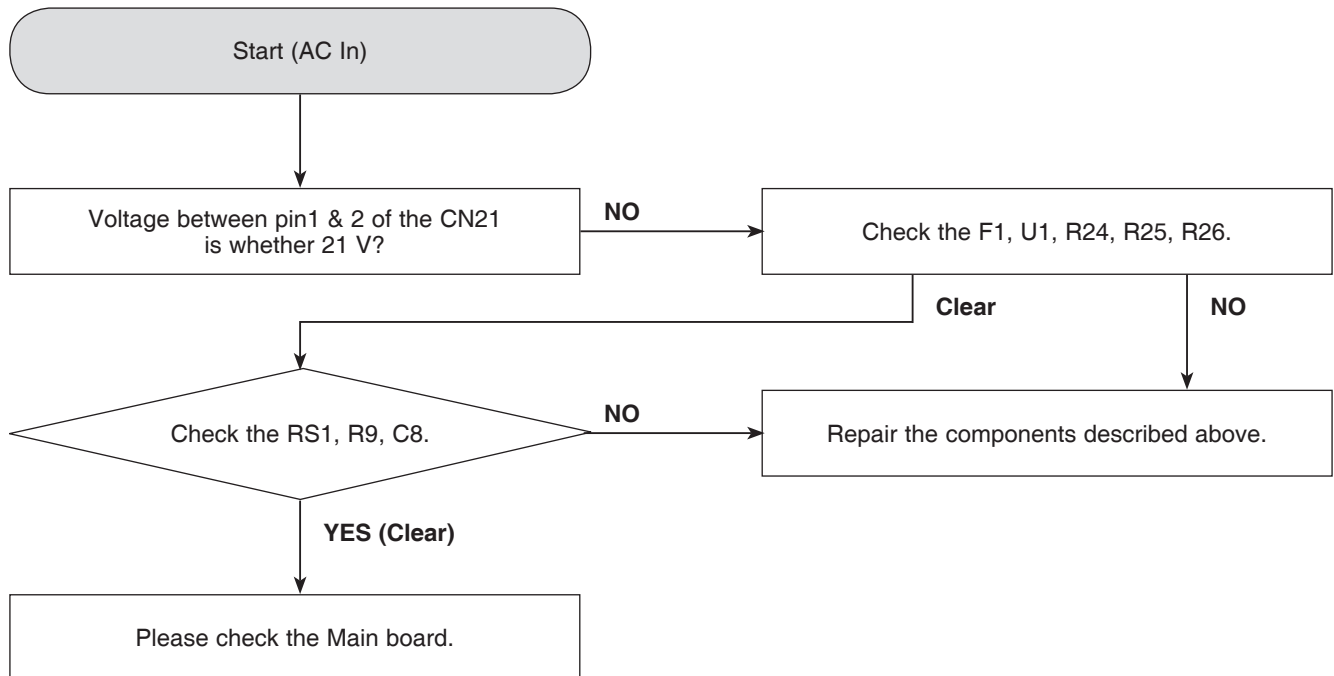
< MAIN board top view >



< MAIN board bottom view >

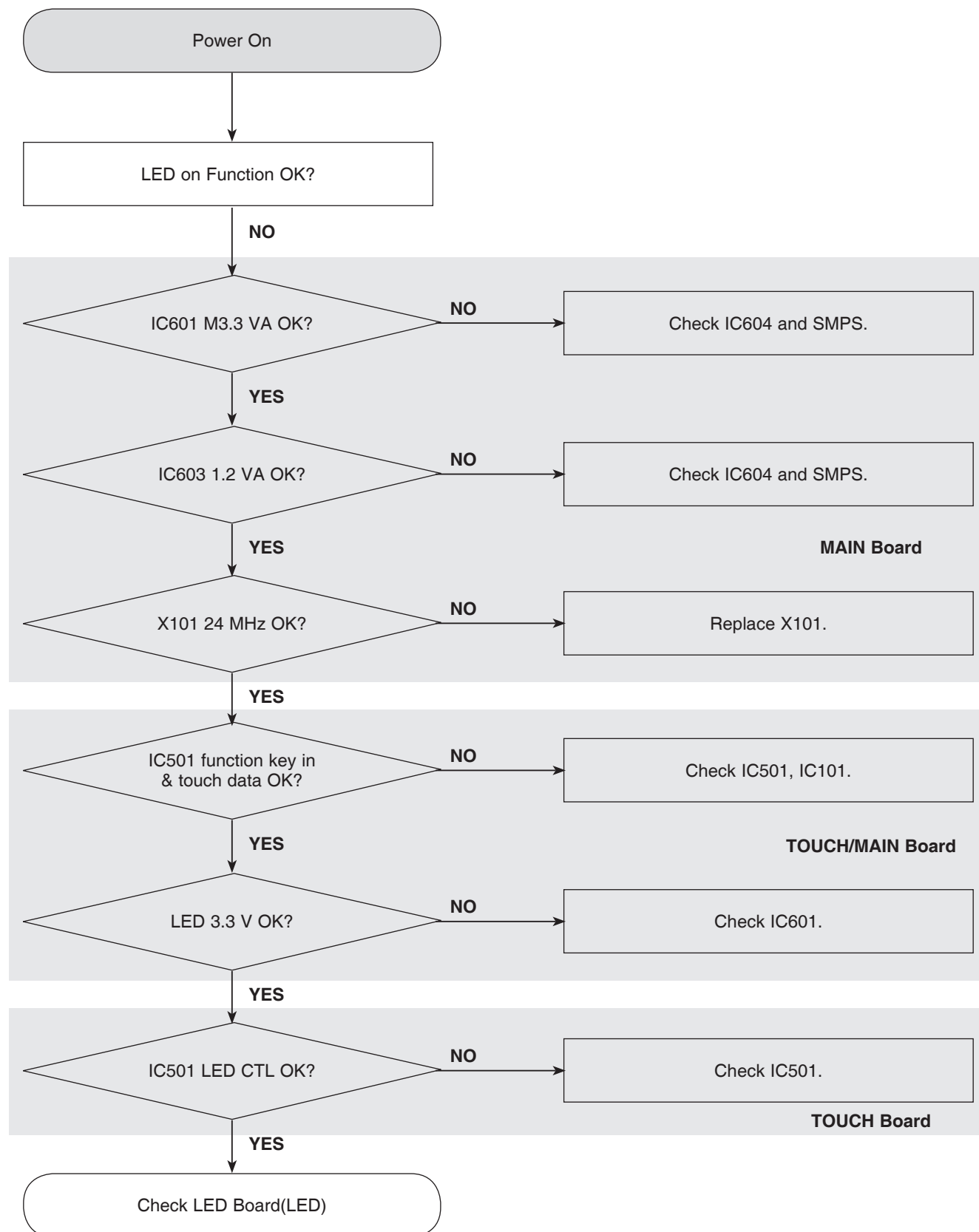
ELECTRICAL TROUBLESHOOTING GUIDE

1. SMPS PART (POWER ON)



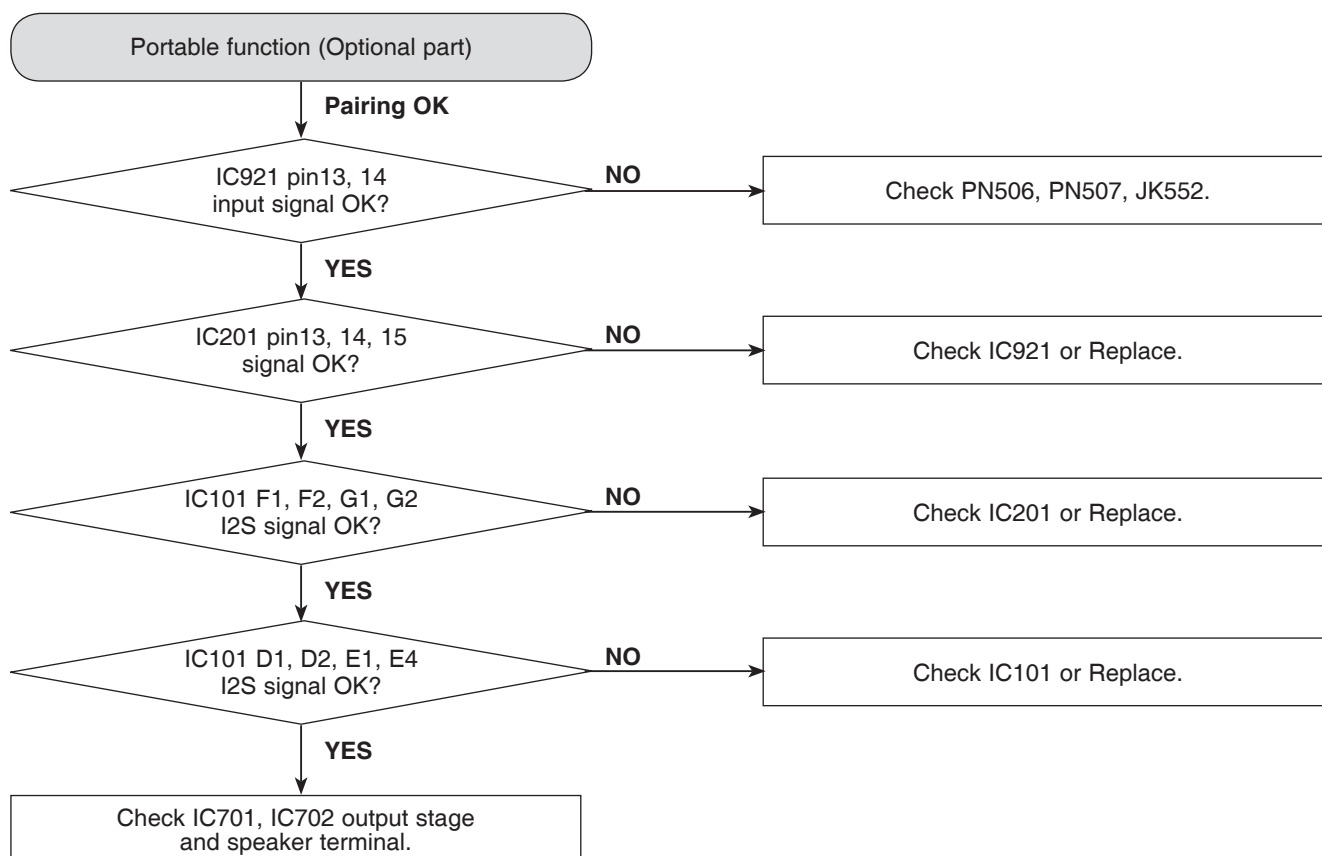
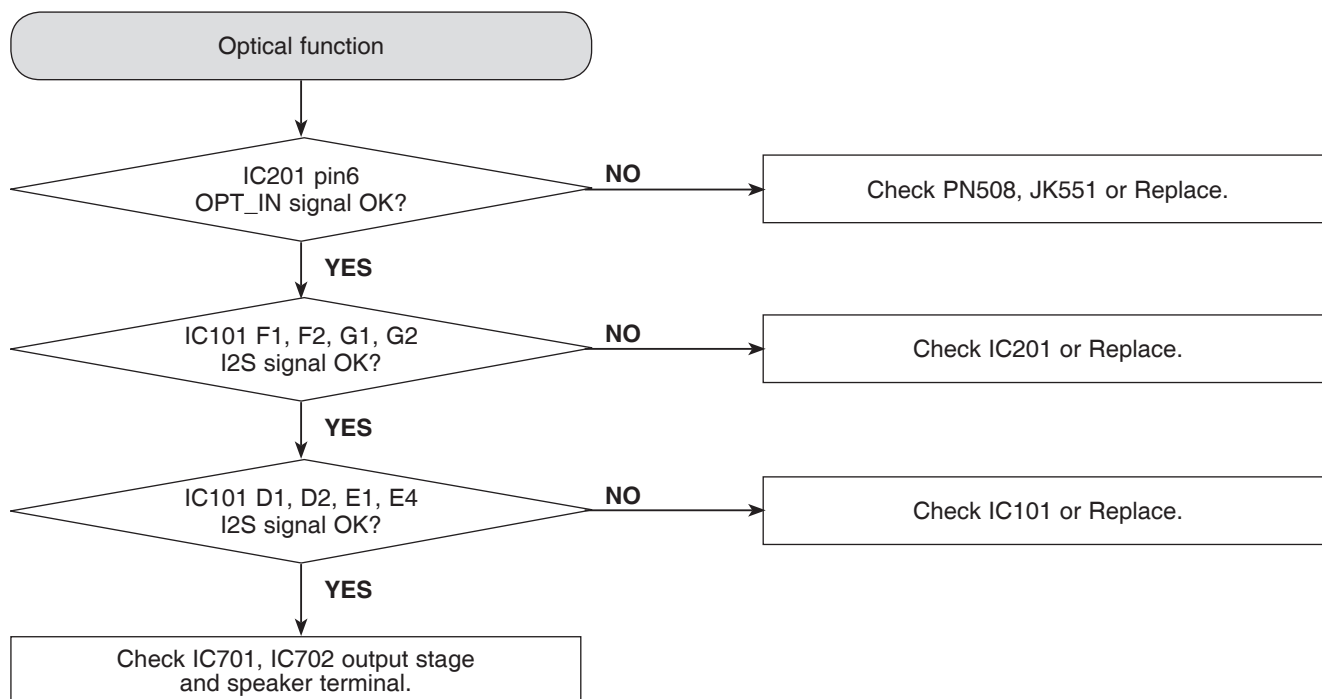
ELECTRICAL TROUBLESHOOTING GUIDE

2. SYSTEM PART



ELECTRICAL TROUBLESHOOTING GUIDE

3. NO AUDIO OUTPUT



WAVEFORMS OF MAJOR CHECK POINT

1. SYSTEM PART-1 (X-TAL)

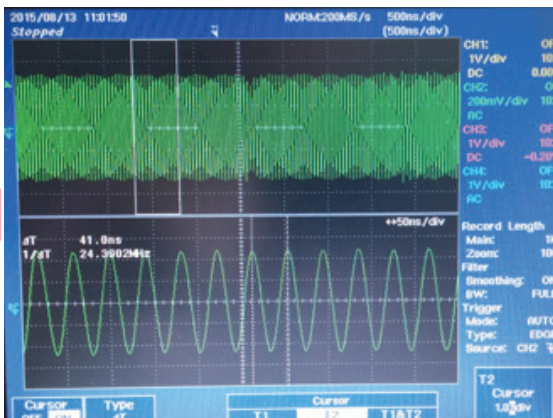


FIG 1-1. DIR (IC201) - CS8422

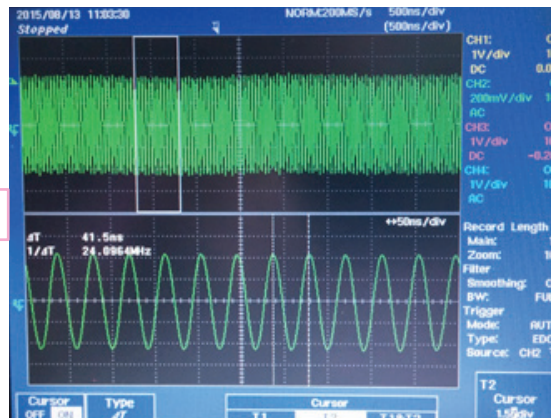
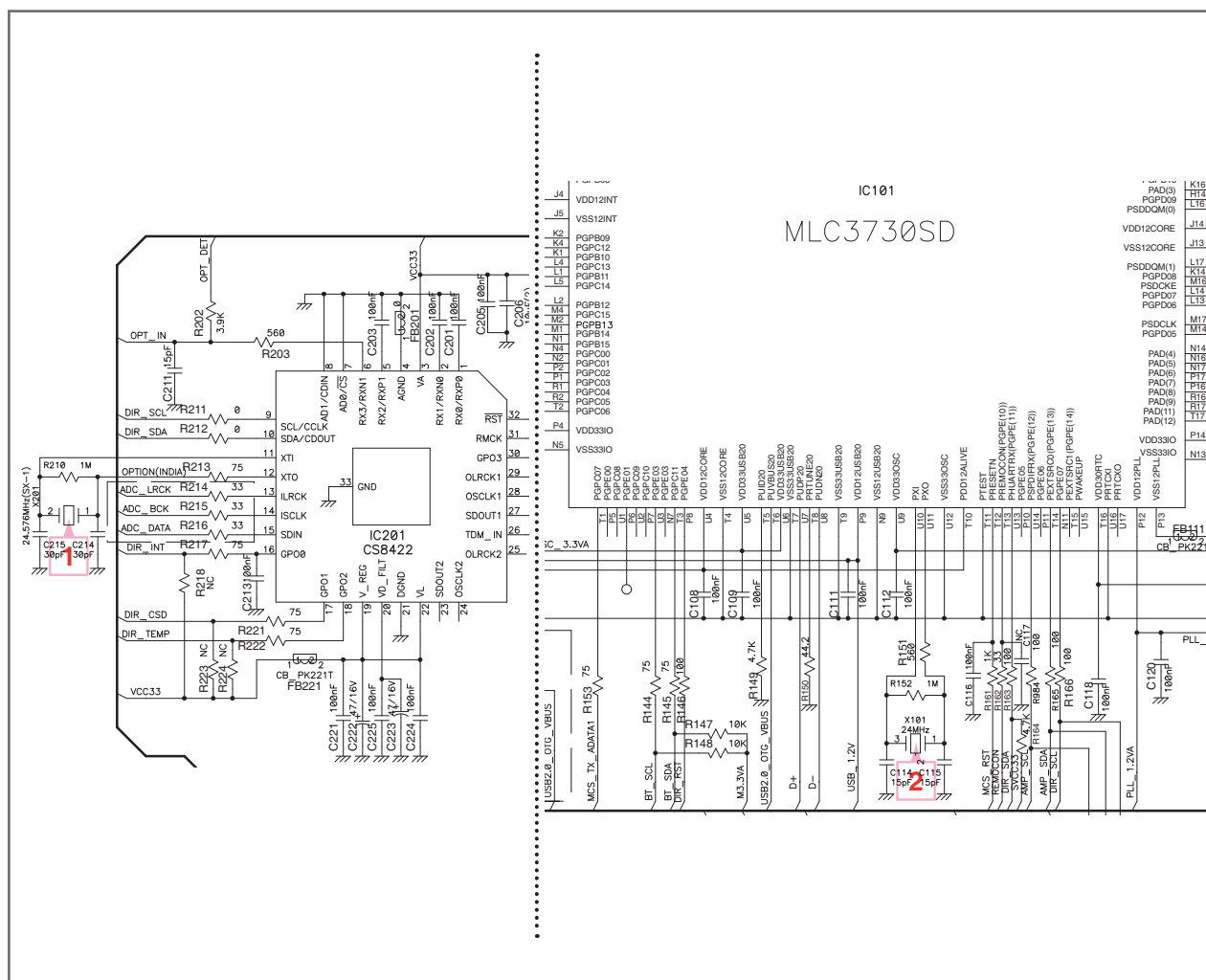


FIG 1-2. DSP (IC101) - MLC3730SD



2. SYSTEM PART-2 (I2S SIGNAL)

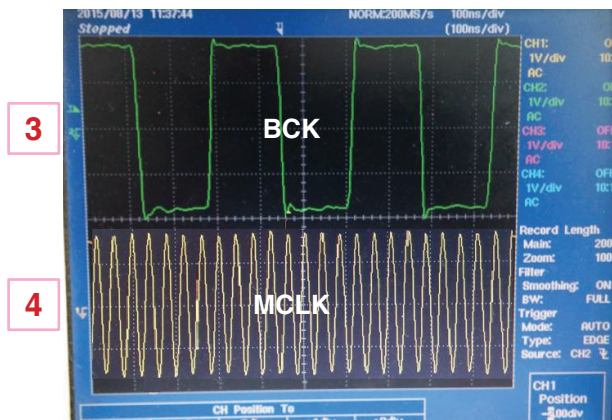


FIG 2-1. AMP (IC701, IC702) - TAS5733

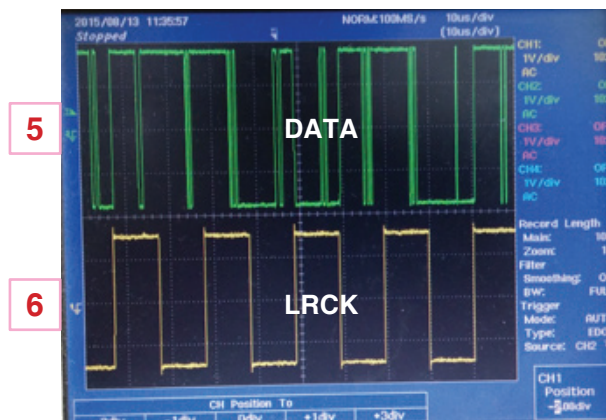
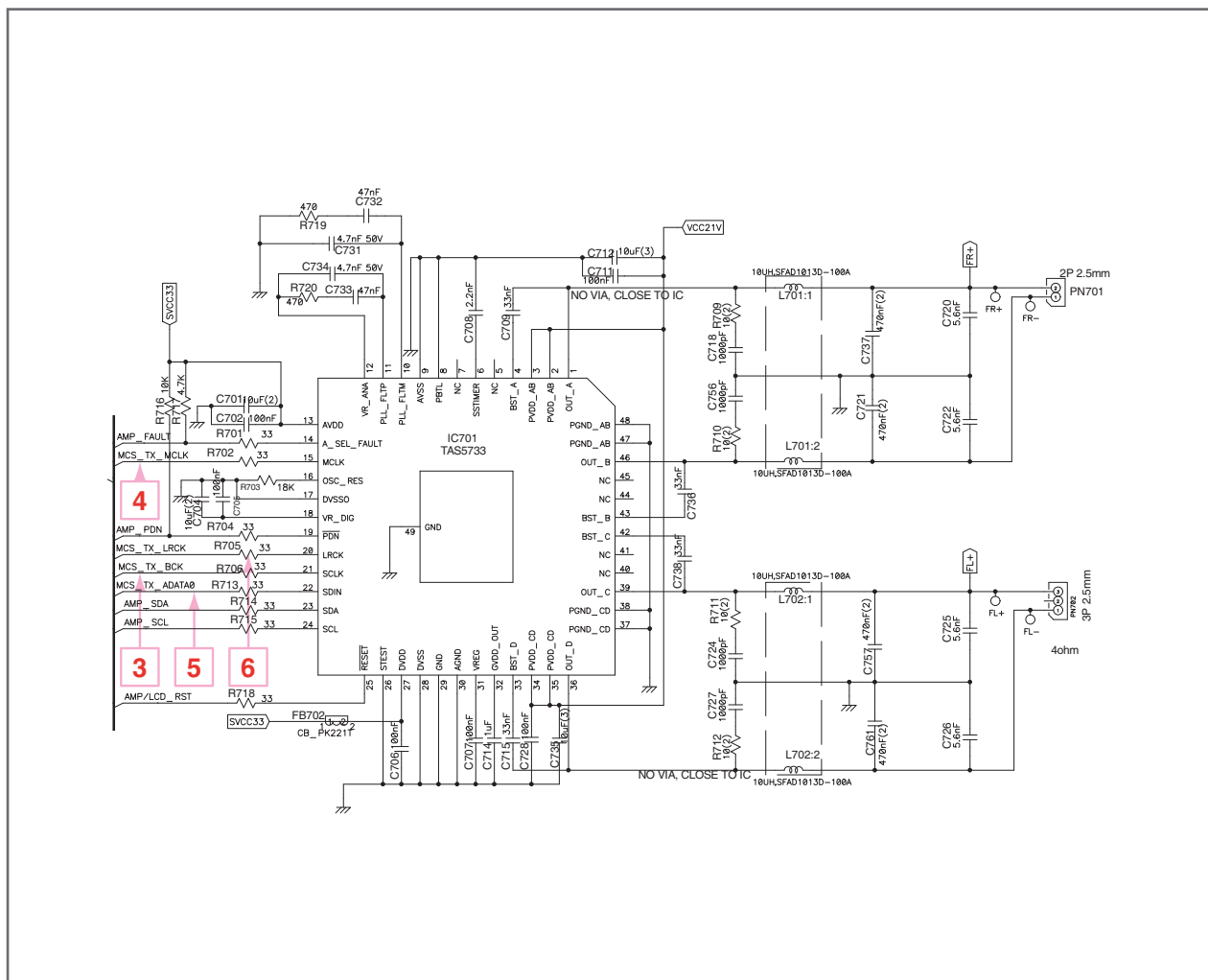


FIG 2-2. AMP (IC701, IC702) - TAS5733



3. SYSTEM PART-3 (I2C SIGNAL)



FIG 3-1. DIR (IC201) - CS8422

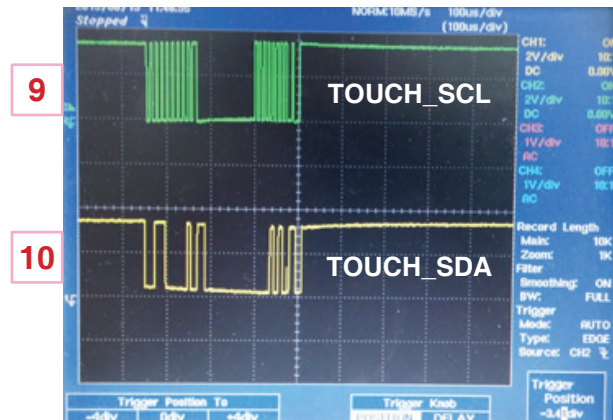
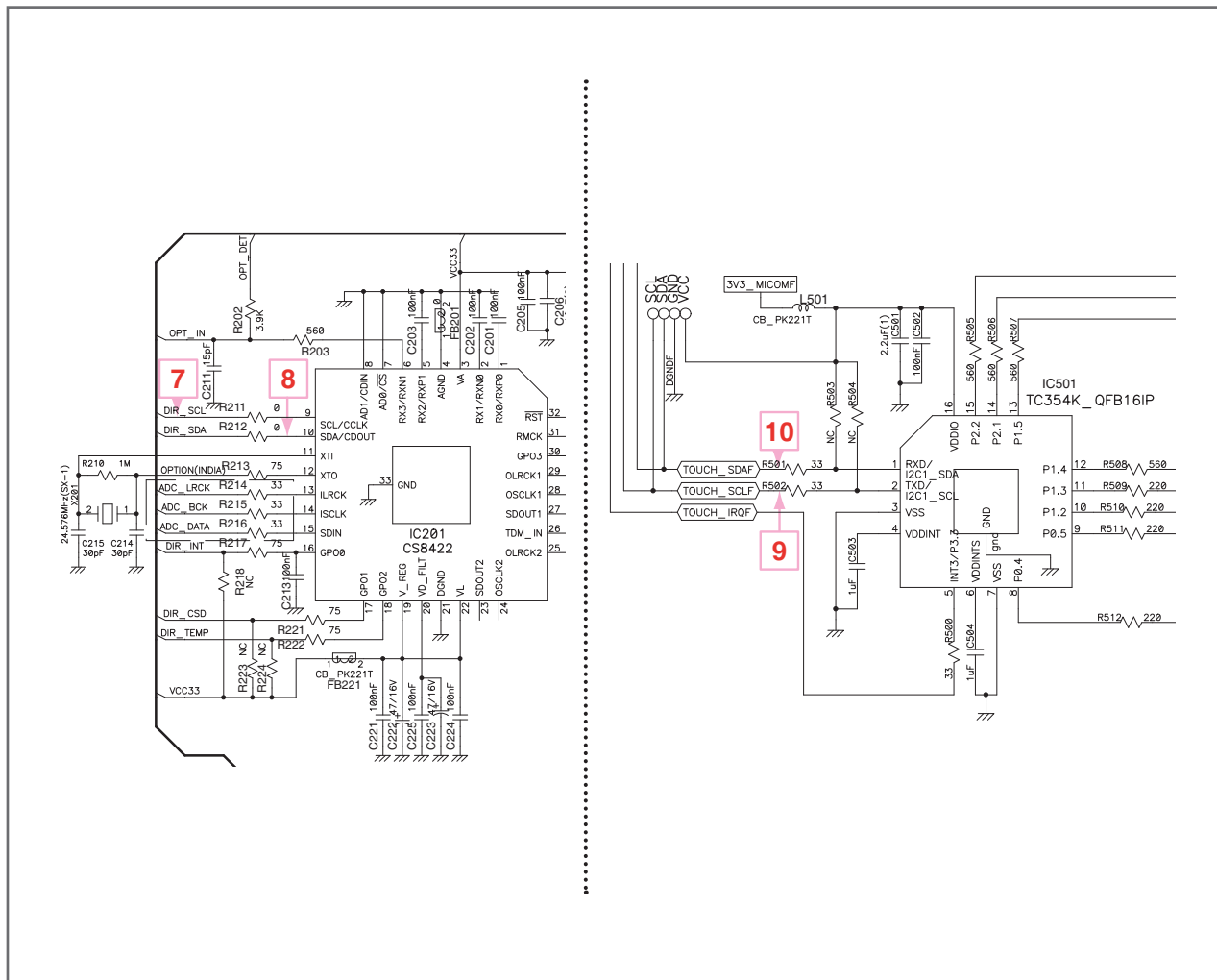
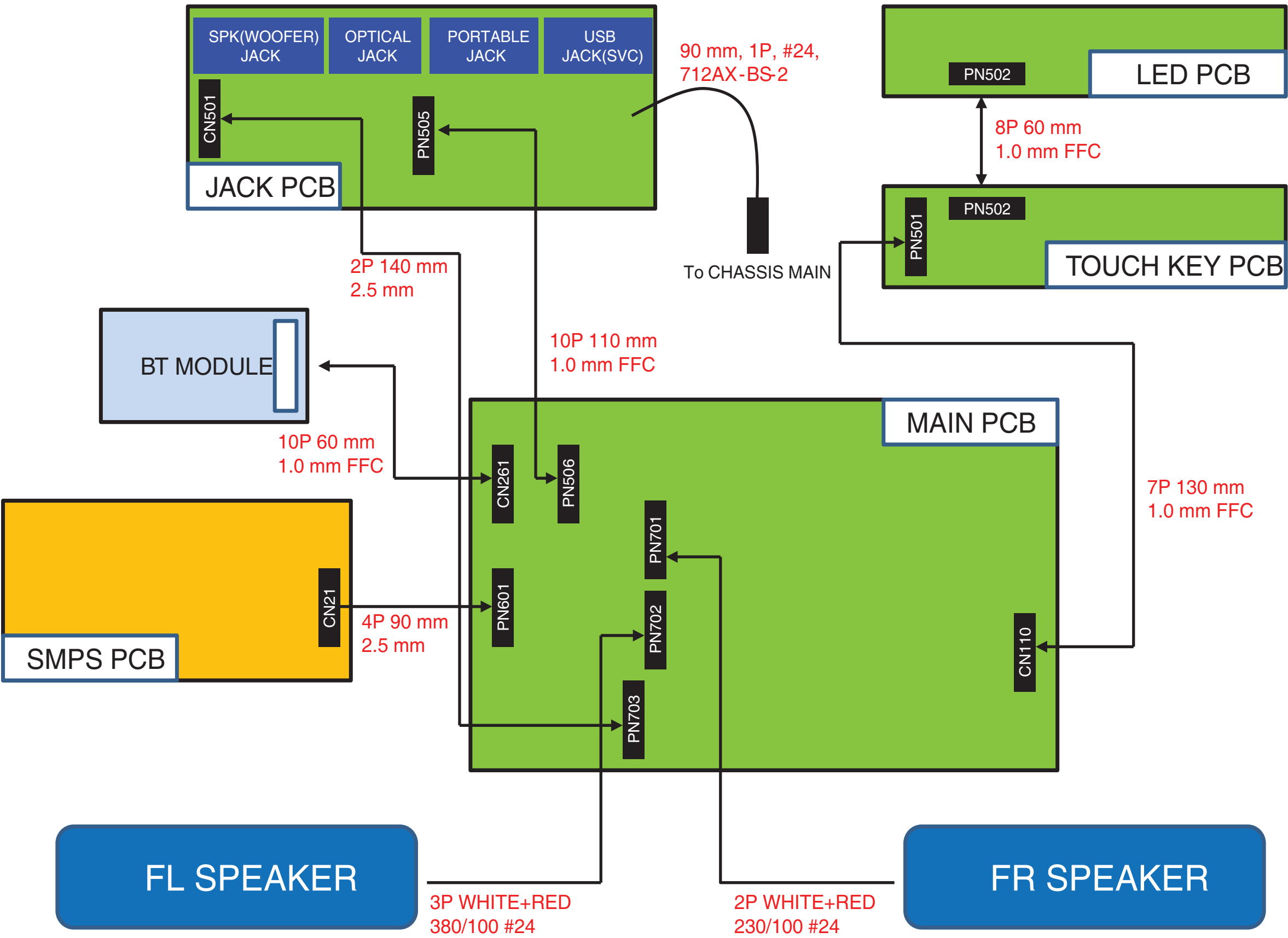


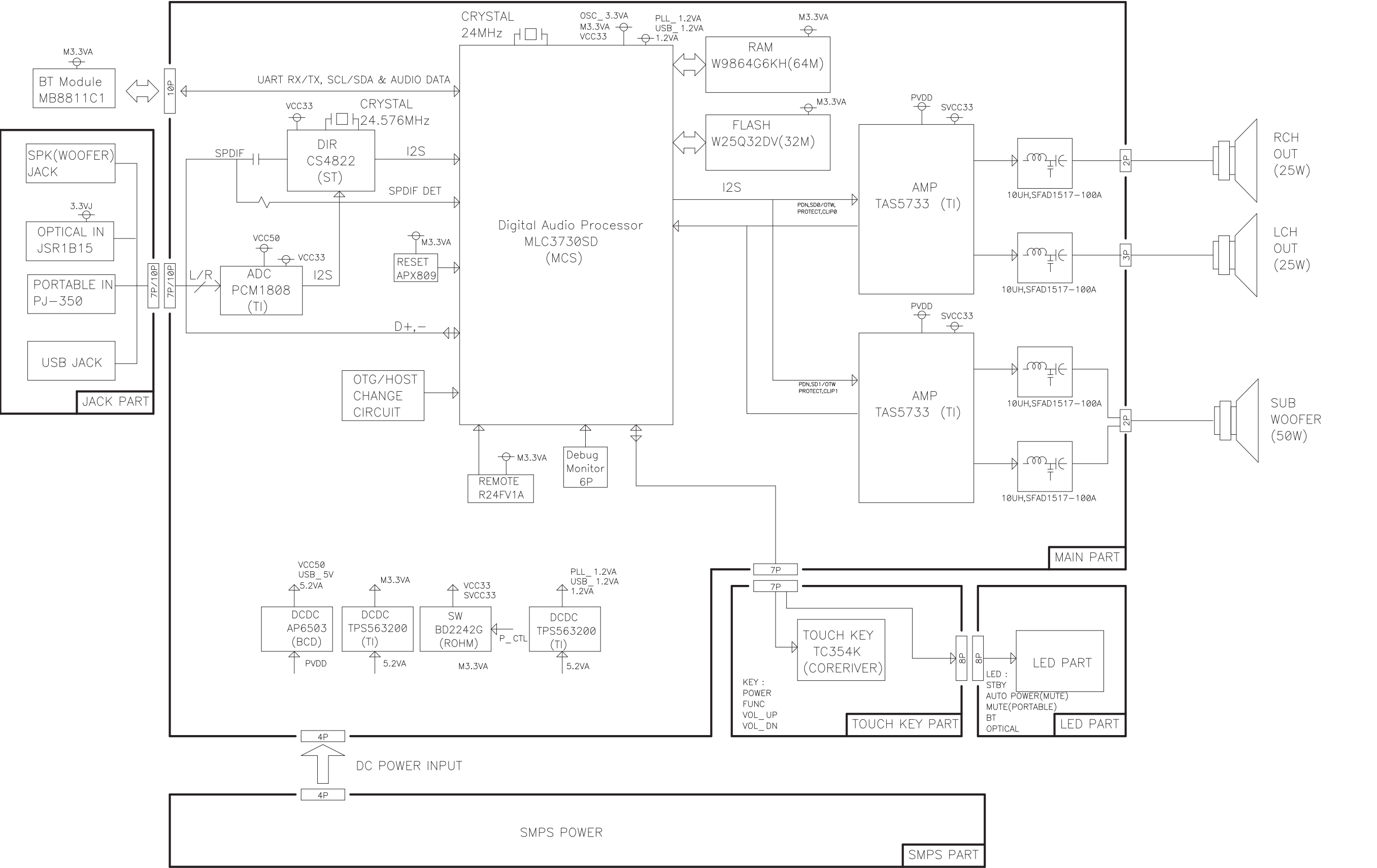
FIG 3-2. TOUCH (IC501) - TC354K



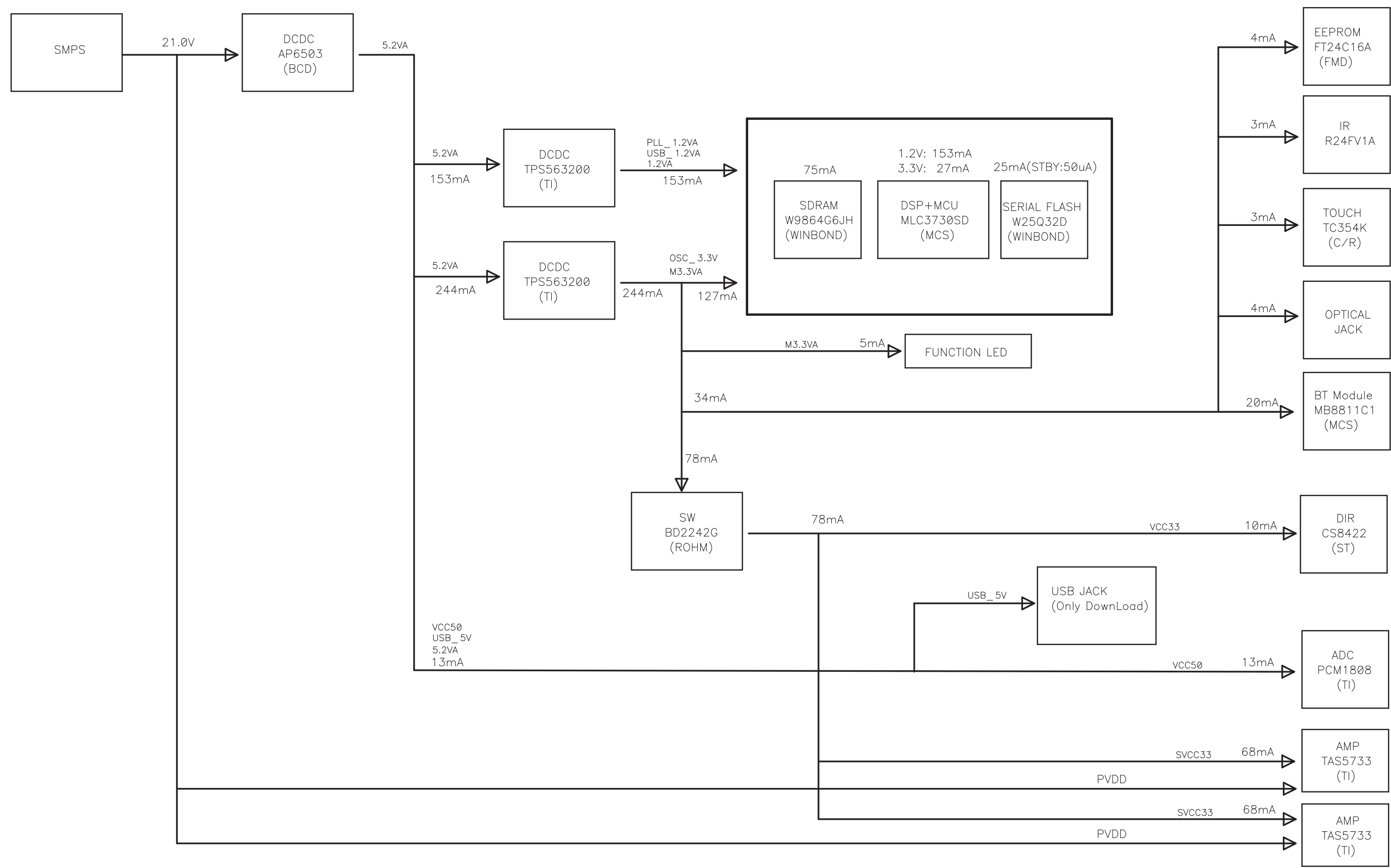
WIRING DIAGRAM



BLOCK DIAGRAMS
1. SYSTEM BLOCK DIAGRAM

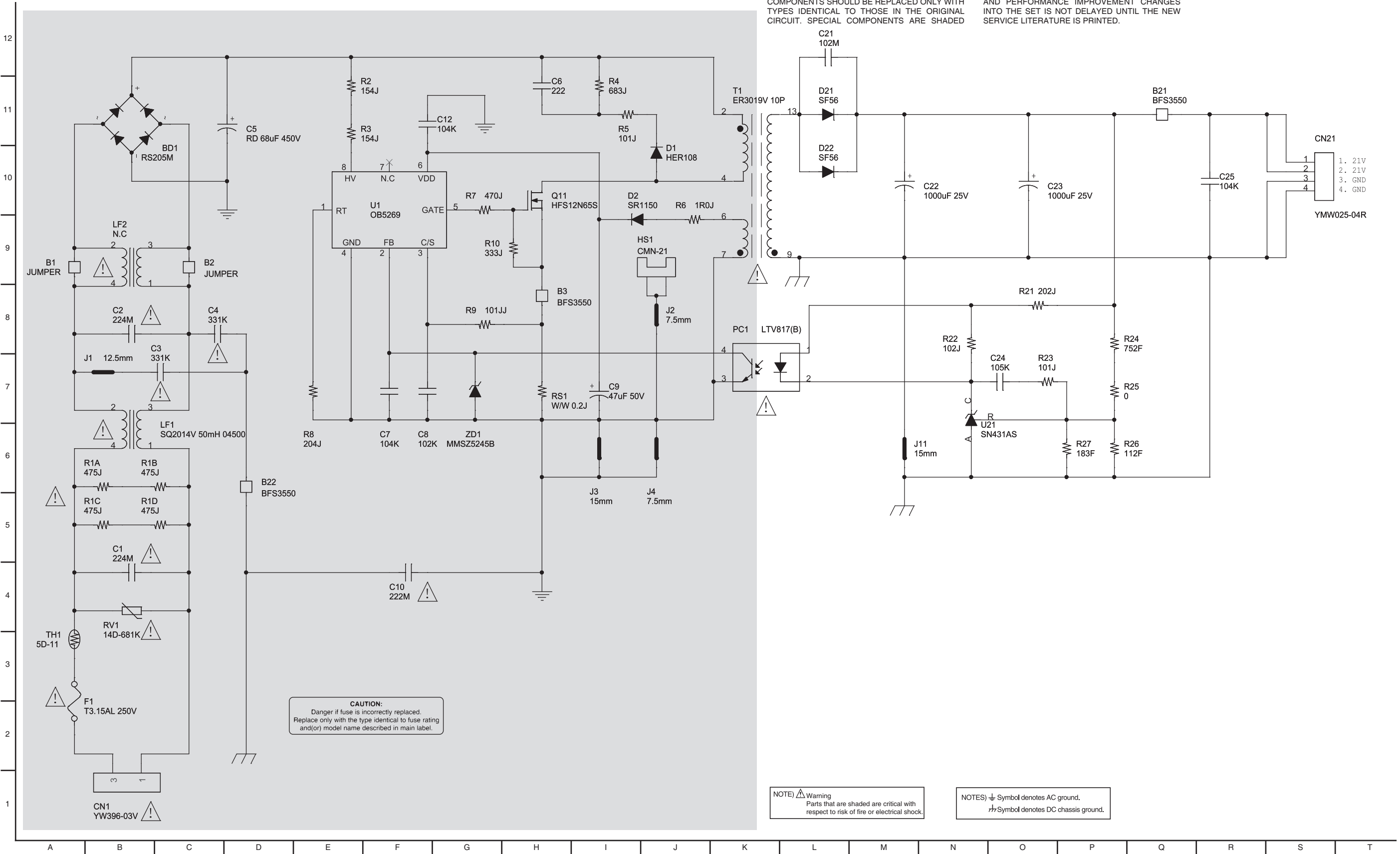


2. POWER BLOCK DIAGRAM

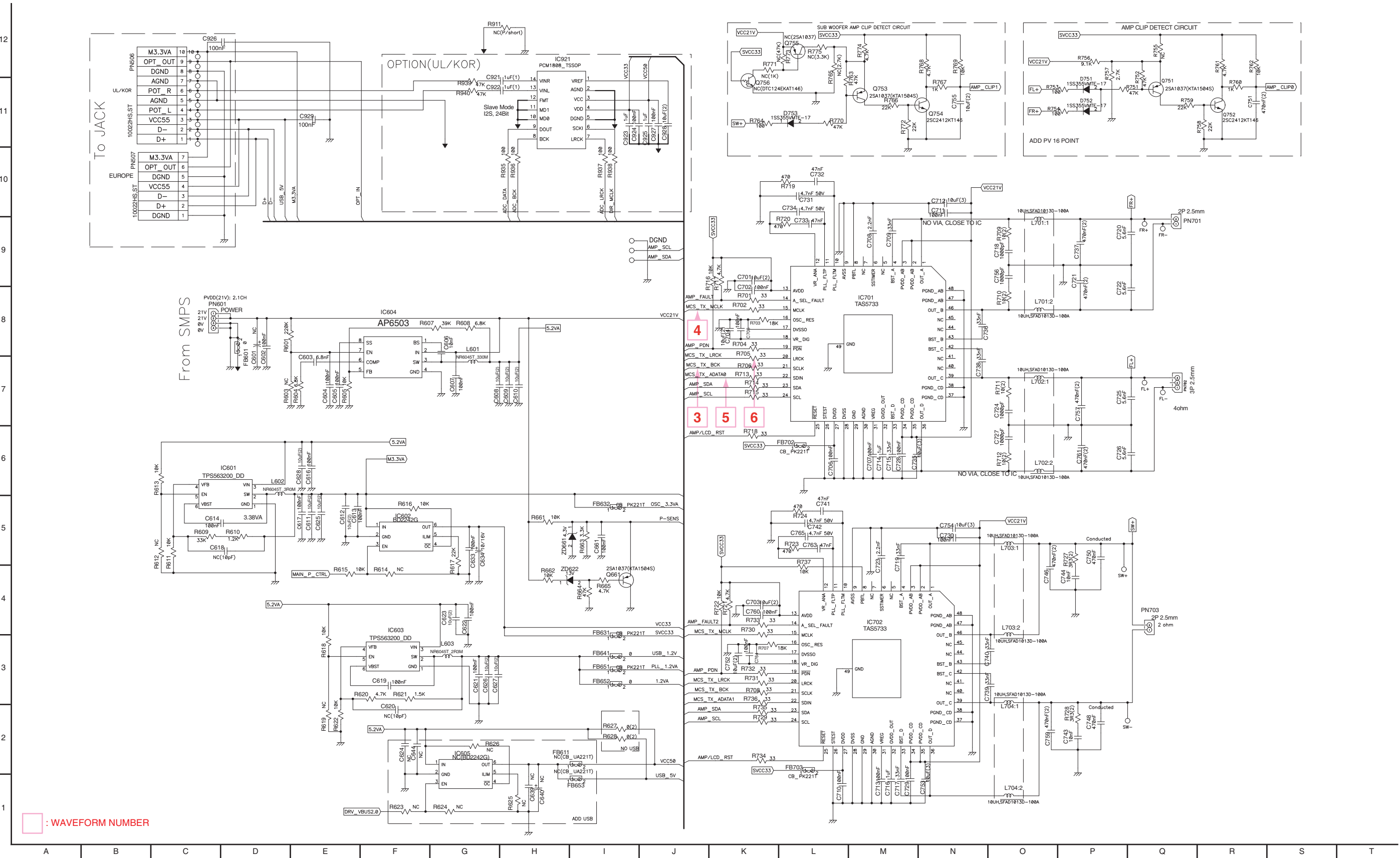


CIRCUIT DIAGRAMS

1. SMPS CIRCUIT DIAGRAM



2. MAIN - AMP & POWER CIRCUIT DIAGRAM



OPTION(UL/KOR)

REMOCON

IC101

MLC3730SD

IC105

W25Q32FVSSIG

IC104

W9864G6JH-6

IC106

APX809-29SA

IC107

APX809-29SA

IC108

APX809-29SA

IC109

APX809-29SA

IC110

APX809-29SA

IC111

APX809-29SA

IC112

APX809-29SA

IC113

APX809-29SA

IC114

APX809-29SA

IC115

APX809-29SA

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IC148

APX809-29SA

IC149

APX809-29SA

IC150

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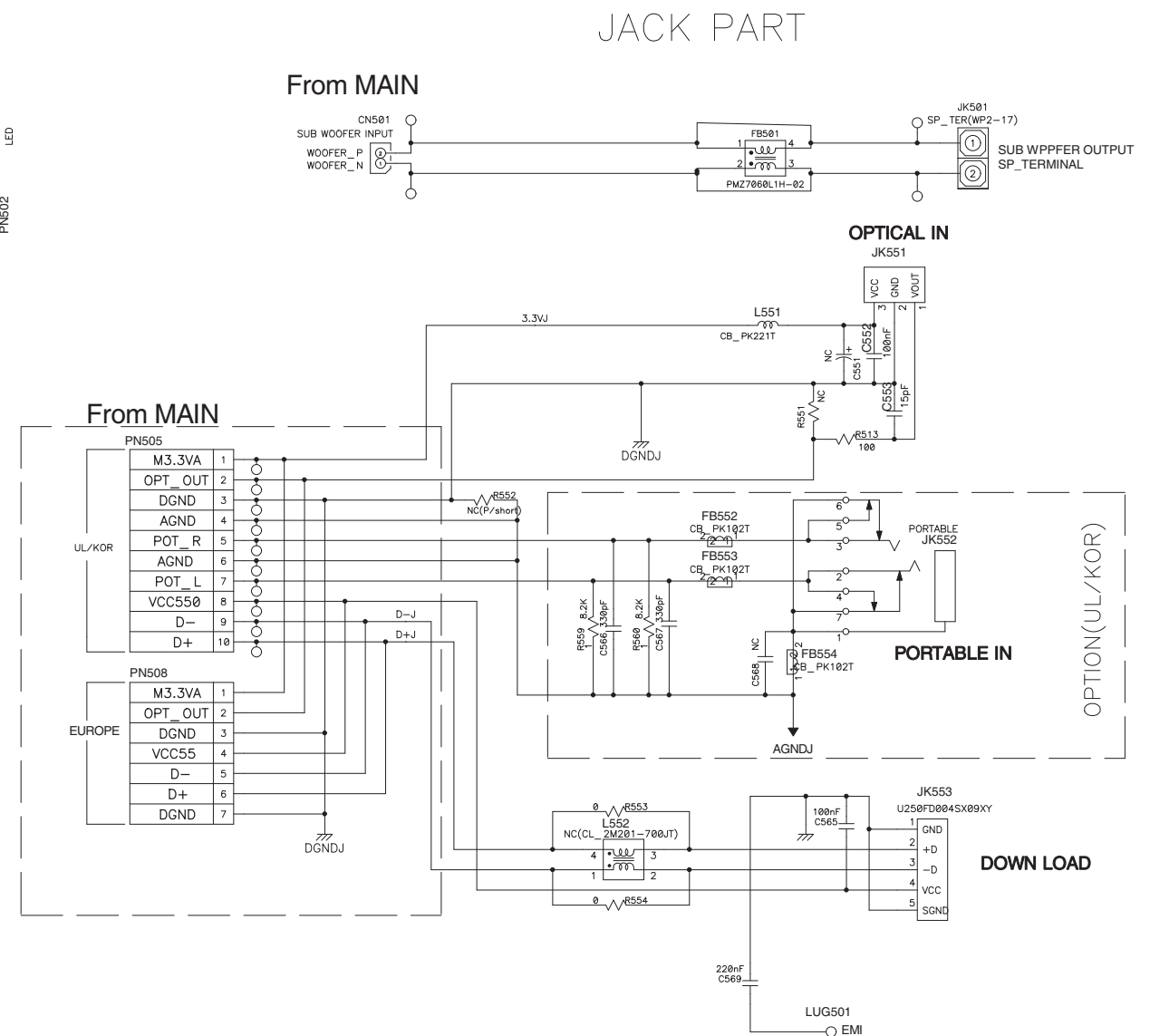
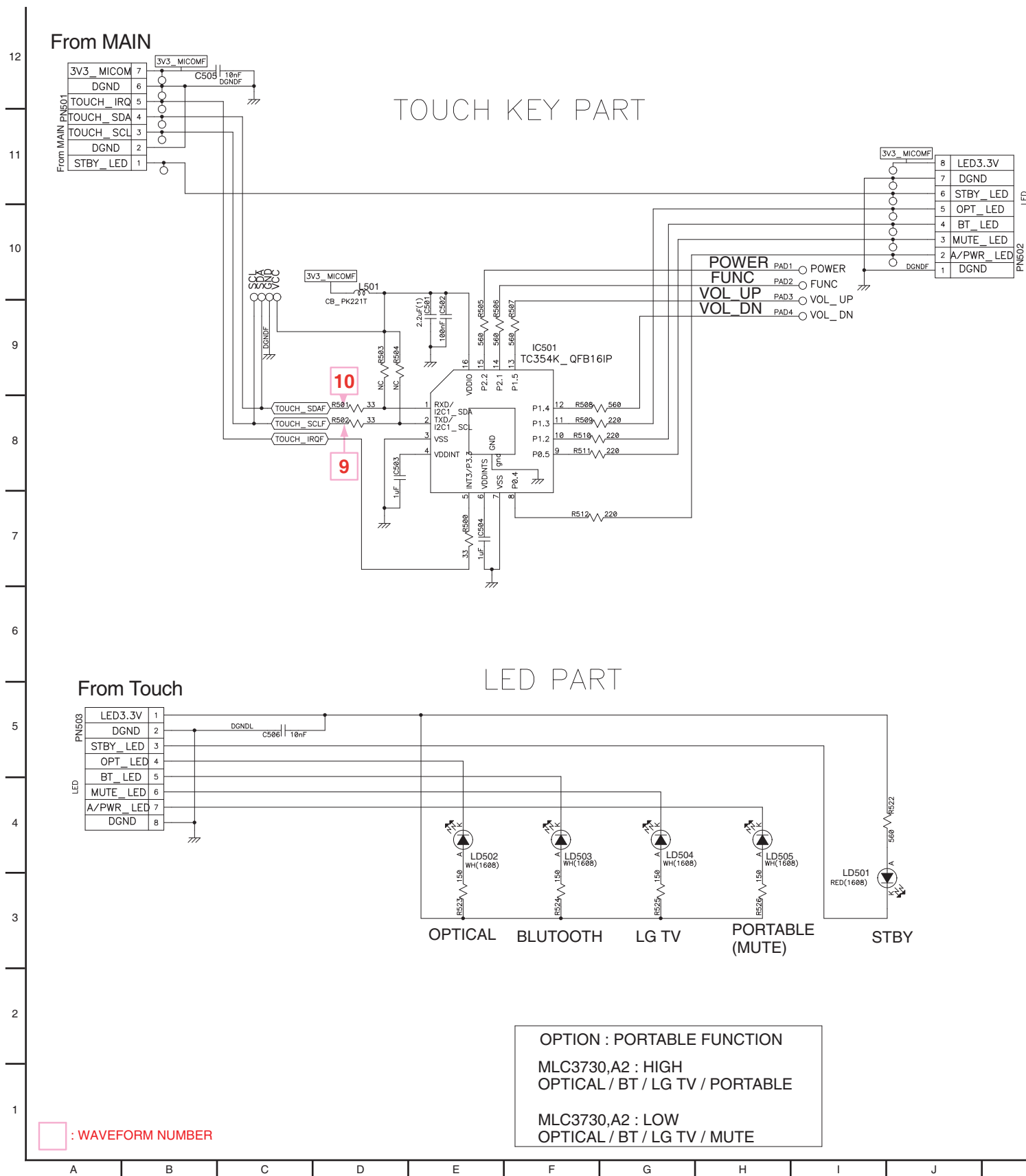
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4. JACK/ LED/ TOUCH KEY CIRCUIT DIAGRAM



CIRCUIT VOLTAGE CHART

1. ICs

Location No	Description	Source	Spec Range[V]	Measure [V]
IC101	MLC3730D	M3.3VA	3.135~ 3.465	3.32
		OSC_3.3VA	3.135~ 3.465	3.32
		1.2VA	1.08 ~1.32	1.22
		USB_1.2V	1.08 ~1.32	1.22
		PLL_1.2VA	1.08 ~1.32	1.22
IC104	W9864G6KH-6	M3.3VA	3.0 ~ 3.6	3.32
IC105	W25Q32	M3.3VA	3.0 ~ 3.6	3.32
IC201	CS8422	VL(VCC33)	1.71~ 5.25	3.29
		VA(VCC33)	3.125 ~ 3.465	3.3
		V_REG(VCC33)	3.125 ~ 3.465	3.29
IC501	TC354K	3.3_MICOMF	1.8 ~ 3.6	3.32
IC601	TPS563200	5.2VA	4.5 ~ 17	5.13
IC602	BD2242G	M3.3VA	2.8 ~ 5.5	3.32
IC603	TPS563200	5.2VA	4.5 ~ 17	5.13
IC604	AP6503	PVDD	4.75 ~ 23	20.5
IC701	TAS5733	PVDD	-0.3 ~ 30	20.5
		SVCC33	-0.3 ~ 3.6	3.29
IC702	TAS5733	PVDD	-0.3 ~ 30	20.5
		SVCC33	-0.3 ~ 3.6	3.29
IC921	PCM1808	VCC50	45 ~ 5.5	5.14
		VCC33	2.7 ~ 3.6	3.3
PC1	LTV817	VCE	35	1.17
Q1	HFS12N65S	VDS	650 Vpp	482 Vpp
U1	OB5269	VDD	12 ~ 30	13.33
U21	SN431AS	VKA	36	17.04

2. DIODES

Location No	Description	Specification	Anode	Cathode
BD1	RS205M	600V /2A	335	
D1	HER108	1000V/1A	418 Vpp	
D2	SR1150	150V/1A	86 Vpp	
D21, D22	SF56	400V/5A	168 Vpp	
D753	1SS355	40 V/100 mA	0.15	0.52
ZD1	MM1Z5245B	15V/0.5W	1.147	
ZD622	UDZVTE-17 13B	Vbk37 V/0.2 W	0	17.95
ZD661	UDZVTE-17 4.3B	Vbk37 V/0.2 W	0	3.46

3. CAPACITORS

Location No	Value (uF)	Voltage_Spec	Measure	Margin
C3, C4	330 pF	400	119	281
C5	68	450	335	115
C6 (Peak to Peak)	2200 pF	400	82	318
C7	0.1	50	1.17	48.83
C8	1000 pF	50	0.008	49.992
C9	47	50	13.59	36.41
C10 (Peak to Peak)	2200 pF	400	22	378
C12	0.1	50	13.33	36.67
C21 (Peak to Peak)	1000 pF	400	168	232
C22	1000	25	21	4
C24	1	50	14.4	35.6
C25	0.1	50	21	29
C101	2.2	16	3.32	12.68
C102, C107, C111, C112, C118, C131, C133, C143, C144, C145, C146, C147, C152, C154, C155	0.1	16	3.32	12.68
C120, C132, C151, C153, C126, C108, C109	0.1	16	1.23	14.77
C222	47	16	3.29	12.71
C223	47	16	2.48	13.52
C612, C623, C170, C206, C608, C609, C610, C611, C625, C626, C627, C928	10	10	3.32	6.68
C634	10	16	3.31	12.69
C712, C735, C753, C754	10	25	20.5	4.5
C714, C716	1	25	7.17	17.83
C721, C737, C757, C761	0.47	25	20.5	4.5
C921, C922, C923	1	25	3.3	21.7

MEMO

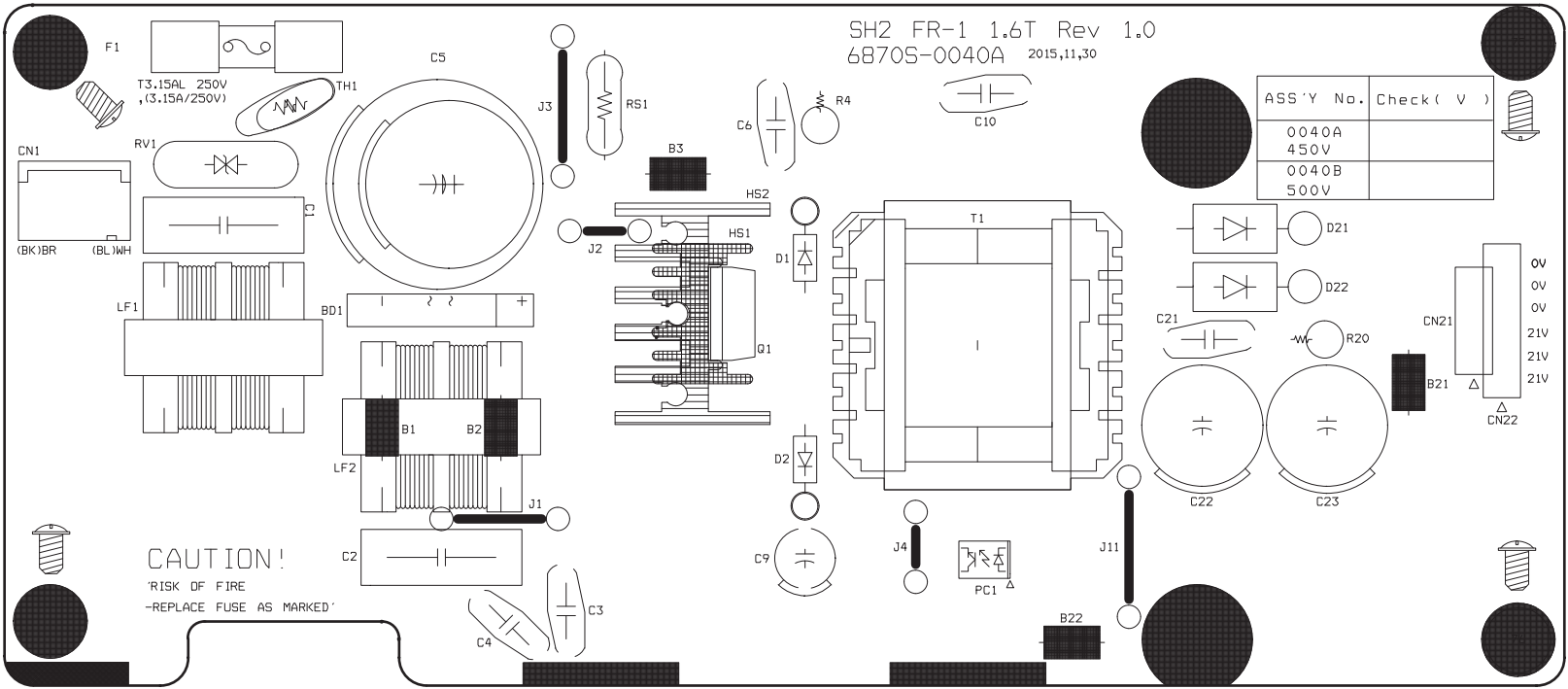
4. CONNECTORS

Connector No.	PIN	SOURCE	SPEC(V)	Value(V)
SMPS Board				
PN601 CN21 (SMPS)	1	PVDD	19.5 ~ 21.5	20.5
	2	PVDD	19.5 ~ 21.5	20.5
	3	DGND	0	0
	4	DGND	0	0
MAIN Board				
JK553	1	VCC55	4.65 ~ 5.35	5.14
	2	D-	-	-
	3	D+	-	-
	4	DGND	0	0
PN110 PN501	1	3V3_MICOM	3.14~3.47	3.32
	2	DGND	0	0
	3	TOUCH_IRQ	2.3~3.47	3.32
	4	TOUCH_SDA	2.3~3.47	3.32
	5	TOUCH_SCL	2.3~3.47	3.32
	6	DGND	0	0
	7	STBT_LED	2.3~3.47	3.31
PN506	1	3V3_MICOM	3.14~3.47	3.32
	2	OPT_OUT	2.3~3.47	3.31
	3	DGND	0	0
	4	AGND	0	0
	5	POT_R	-	-
	6	AGND	0	0
	7	POT_L	-	-
	8	VCC55	4.65 ~ 5.35	5.14
	9	D-	-	-
	10	D+	-	-
PN701	1	FR+	0	0
	2	FR-	0	0
PN702	1	FL-	0	0
	2	NC	-	-
	3	FL+	0	0
PN703	1	Woofer+	0	0
	2	Woofer-	0	0

PRINTED CIRCUIT BOARD DIAGRAMS

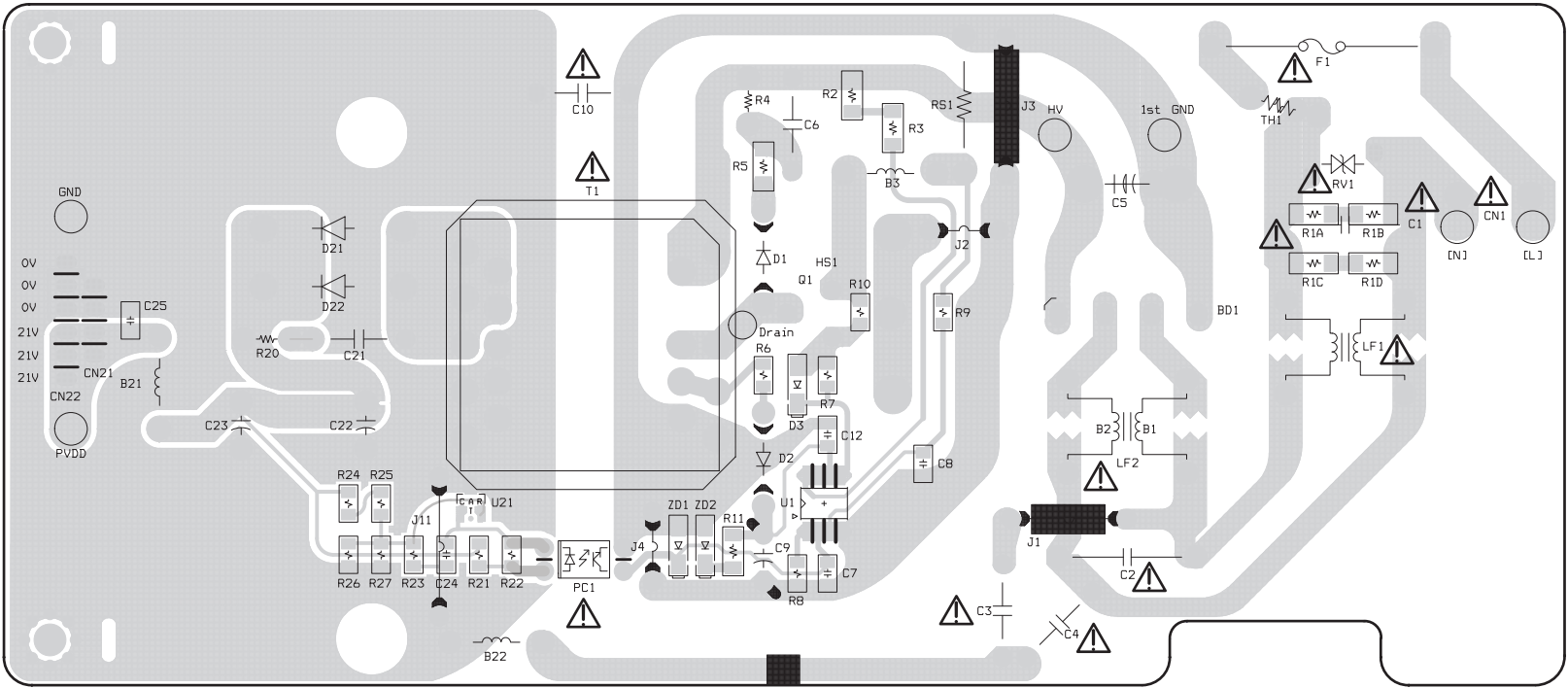
1. SMPS P. C. BOARD DIAGRAM

(TOP VIEW)

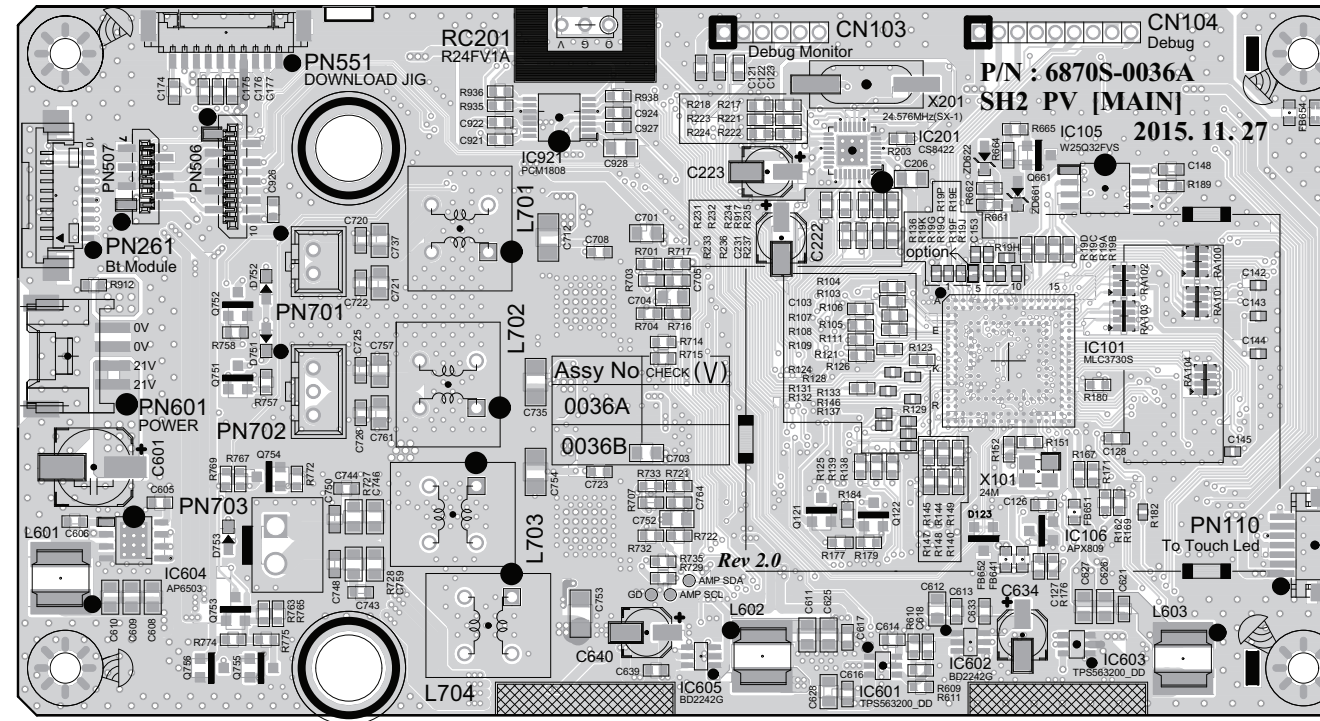


NOTE) Warning
Parts that are critical with respect to risk of fire or electrical shock.

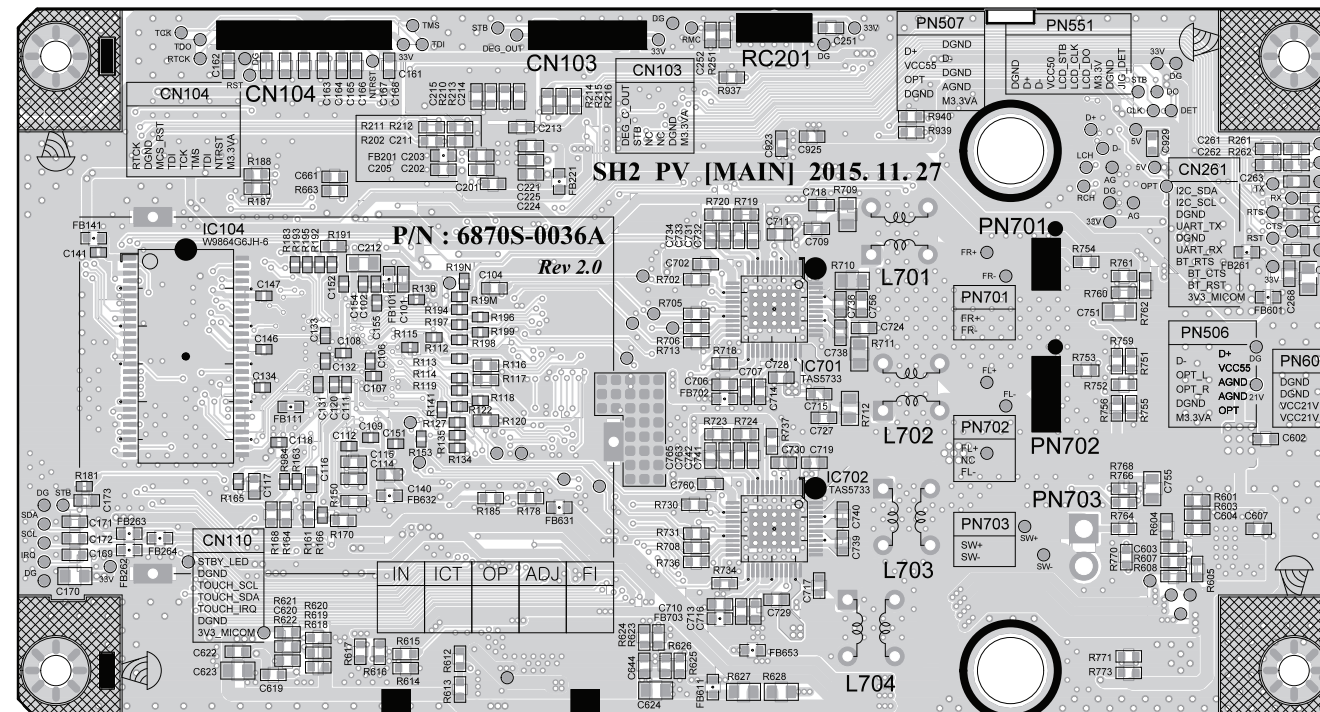
(BOTTOM VIEW)



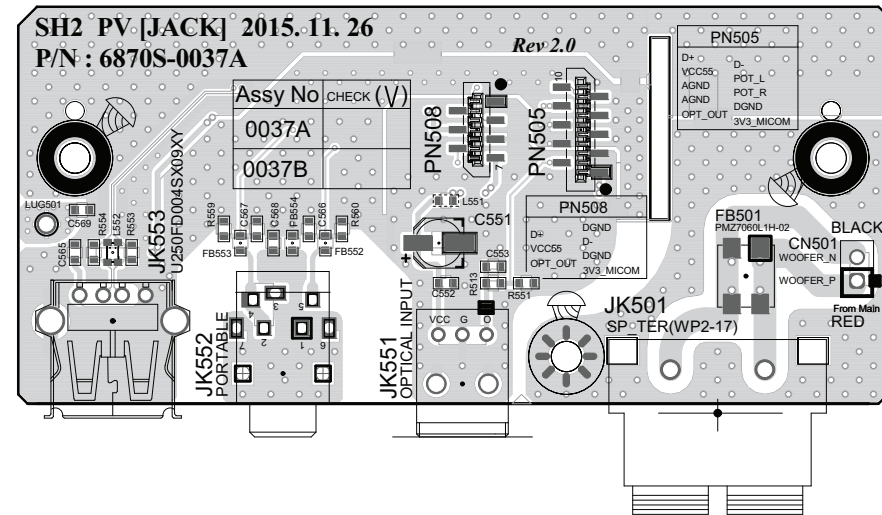
2. MAIN P. C. BOARD DIAGRAM (TOP VIEW)



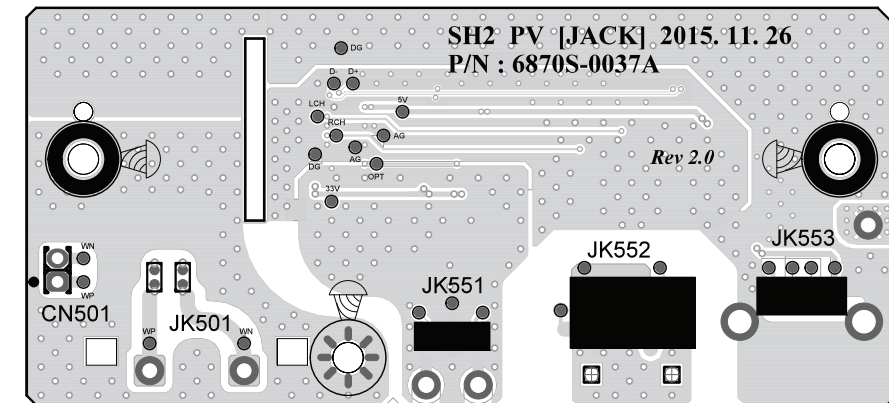
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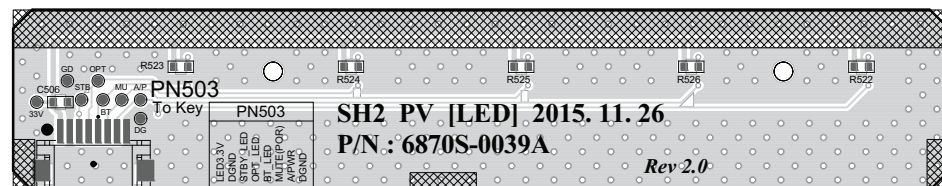
3. JACK P. C. BOARD DIAGRAM (TOP VIEW)



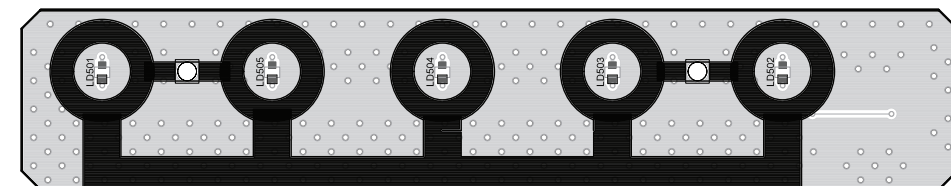
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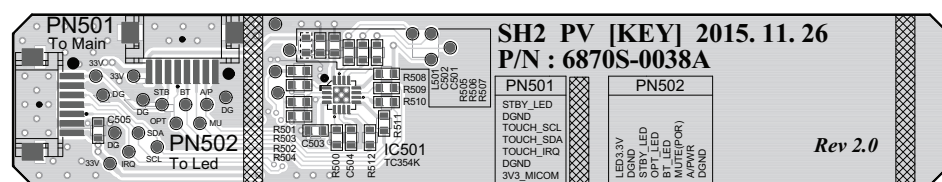
4. LED P. C. BOARD DIAGRAM (TOP VIEW)



(BOTTOM VIEW)



5. TOUCH KEY P. C. BOARD DIAGRAM (TOP VIEW)



(BOTTOM VIEW)

