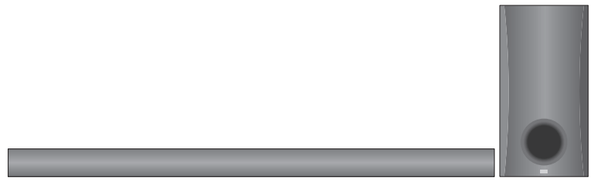
2.1 ch Sound Bar
SERVICE MANUAL

MODEL: LAS350B
(LAS350B, S35A1-W)

CAUTION
BEFORE SERVICING THE UNIT, READ THE “SAFETY PRECAUTIONS” IN THIS MANUAL.



P/NO : AFN77152011

FEBRUARY, 2015

SERVICE MANUAL

MODEL: LAS350B (LAS350B, S35A1-W)

LG

CONTENTS

SECTION 1
GENERAL

CONTENTS

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 by installed.

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

8. Minimize bodily motions when handing 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	KEYS
USB MODE ENTRY/UPDATE	Main set '-' (Volume) + Remote control 'MUTE'
EEPROM EDIT	Main set '-' (Volume) + Remote control 'OPTICAL'
EEPROM CLEAR (Initialize)	Main set '-' (Volume) + Remote control 'Treble/Bass'
VERSION CHECK	Main set '-' (Volume) + Remote control 'LG TV'
up	Sound Effect
down	NIGHT
right	F.Skip (Right)
left	B.Skip (Left)
enter	AV Sync

SERVICE INFORMATION FOR EEPROM

POWER ON

↓

OPT Status

↓

Main set '-' (Volume) + Remote control 'OPTICAL'

↓

VFD " OPT.."

↓

Use arrow key [Sound Effect, NIGHT, F.Skip (Right), B.Skip (Left)] to move to appropriate position and make changes

↓

Remote control 'AV SYNC'

↓

Display VFD "E2P CLR"

↓

Power off automatically

↓

Power cord unplug

MCS / EQ HIDDEN KEY GUIDE

1. Version & Option Check

1) Power on.
2) Press main set “-” (volume -) key and remote control "LG TV" key during 3 seconds.
3) Check MCS version.
   Ex) P1412120
4) Press remote control “F.Skip (Right)” 1 time.
   Check EQ version.
   Ex) Q1412020
5) Press remote control “F.Skip (Right)” 1 time.
   Check option.
   Ex) 10010000

2. Initialize

1) Power on.
2) Press main set “-” (volume -) key and remote control “Treble/Bass” during 3 seconds.
3) Display VFD “E2P CLR”.
4) Power off automatically.
5) Power cord unplug.

MCS / EQ PROGRAM UPDATE GUIDE

1. Preparation

- Remote control.
- Do format USB Memory to FAT32 File system.
- USB : Update file exist only in the USB Memory stick.
  Ex) LAS350B :
  MCS ⇨ E:₩LAS350B_FW_201412221.bin (if USB driver is E:₩)
  EQ ⇨ E:₩EQ_PRG_LAS350B_141219_0_4112.bin (if USB driver is E:₩)

2. Update

1) Power on.
2) Change the USB function. [Main set ‘-’ (Volume) + Remote control ‘MUTE’]
3) Insert USB.
4) Display in VFD.
   MCS : “MCS UP” ⇨ “FINISH” ⇨ Power off.
   EQ : “EQ UP” ⇨ “FINISH” ⇨ Power off.
5) Loading is shown while updating.
   Never remove USB or AC cord.
6) After update finish, show FINISH in VFD and power of automatically.
7) Power cord un-plug.

SPECIFICATIONS

• GENERAL (LAS350B)

Power requirements	120 V ~ 60 Hz
Power consumption	21 W Networked standby : 0.5 W (If all network ports are activated.)
Dimensions (W x H x D)	880 mm x 59 mm x 90 mm (34.6 inch x 2.3 inch x 3.5 inch)
Net Weight (Approx.)	1.9 kg (4.2 lb)
Operating temperature	41 °F to 95 °F (5 °C to 35 °C)
Operating humidity	5 % to 90 %

• INPUT/OUTPUT

OPT. IN	3 V (p-p), Optical jack x 1
PORT. IN	0.5 Vrms (3.5 mm stereo jack) x 1
Available Digital Input Audio	
Sampling Frequency	32 kHz, 44.1 kHz, 48 kHz, 96 kHz

• AMPLIFIER

Total	120 W
Front	25 W x 2 (6 Ω at 1 kHz)
Subwoofer	70 W (4 Ω at 100 Hz)
THD	10 %

• SUBWOOFER (S35A1-W)

Type	1 Way 1 Speaker
Impedance	4 Ω
Rated Input Power	70 W
Max. Input Power	140 W
Dimensions (W x H x D)	156 mm x 300 mm x 288 mm (6.1 inch x 11.8 inch x 11.3 inch)
Net Weight (Approx.)	2.9 kg (6.4 lb)

• BLUETOOTH

Codec	SBC

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

SECTION 2

CABINET & MAIN CHASSIS

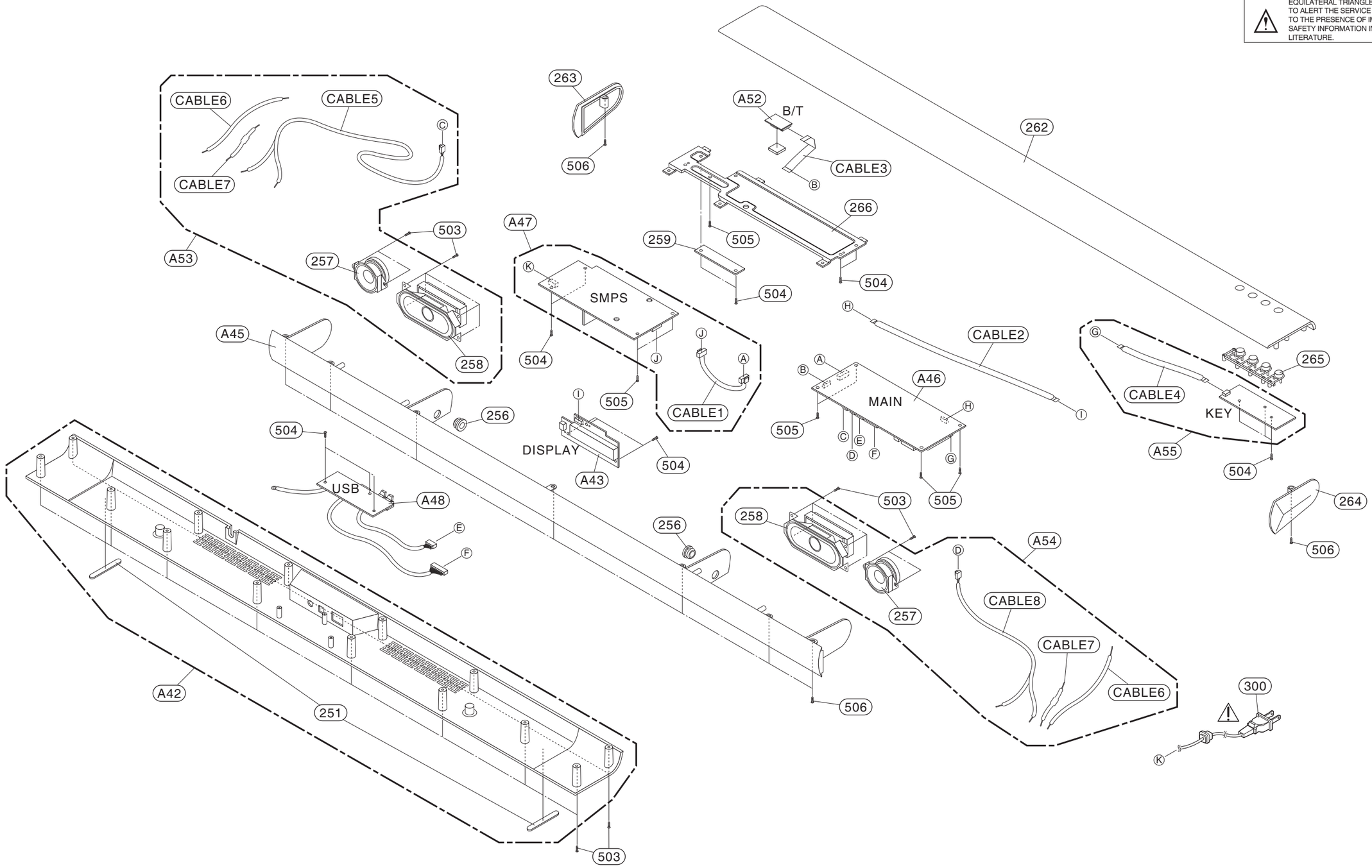
CONTENTS

MEMO

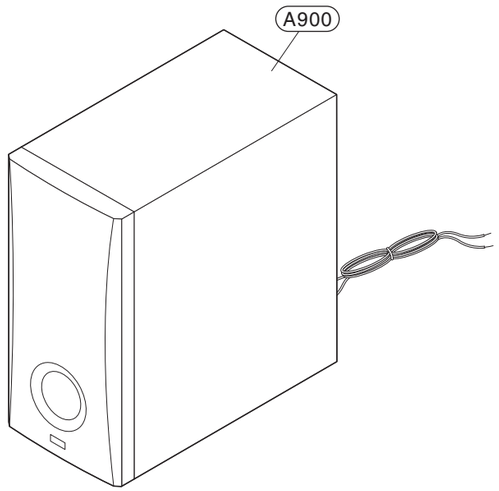
EXPLODED VIEWS

1. MAIN SET 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.

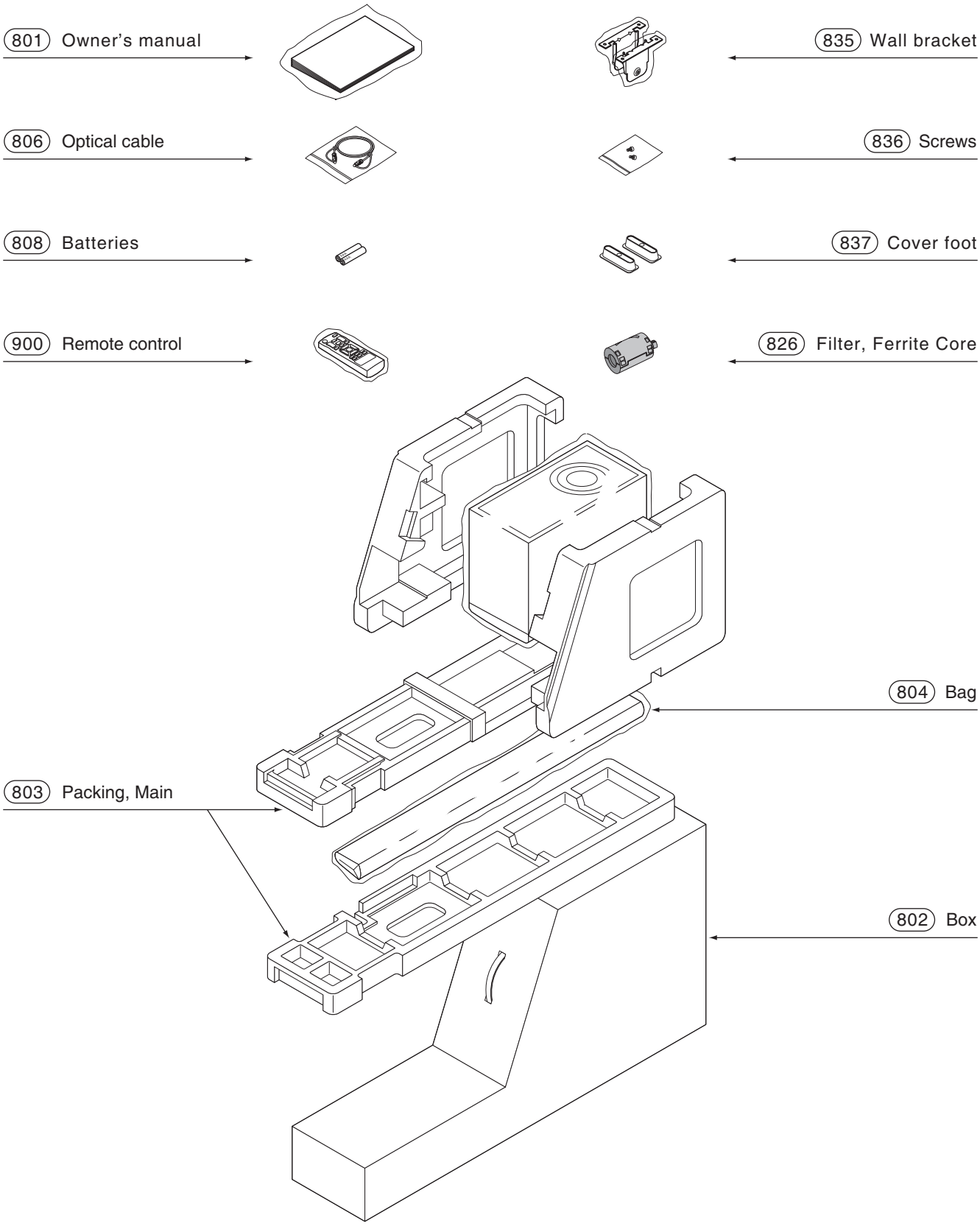


2. SUBWOOFER SECTION



MEMO

3. PACKING ACCESSORY SECTION



MEMO

SECTION 3
ELECTRICAL

CONTENTS

ONE POINT REPAIR GUIDE

1. NO POWER PROBLEM (PVDD)

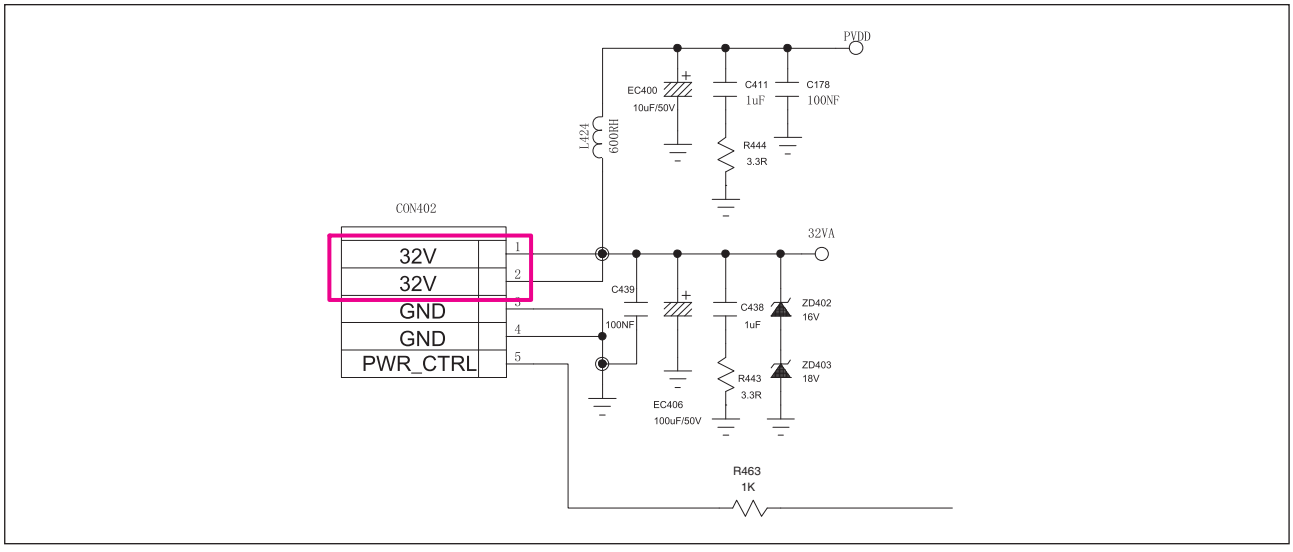
No power problem occurs when you power on the unit

1-1. Solution

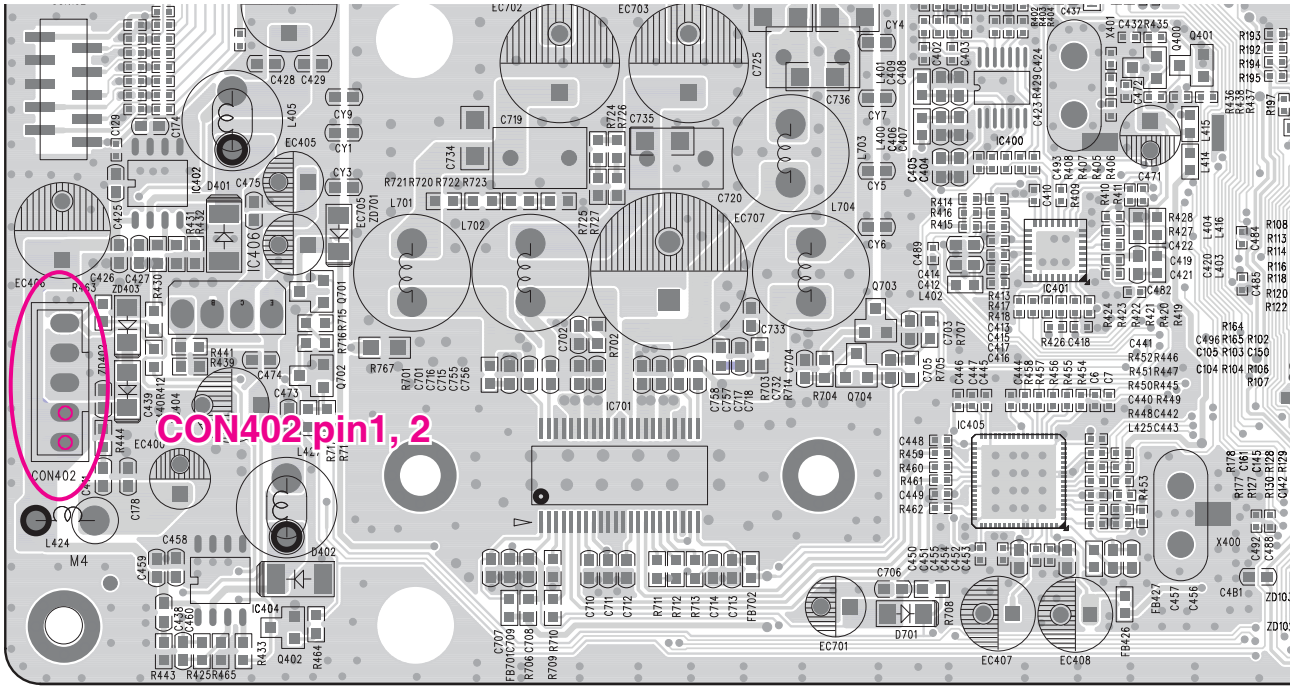
Replace SMPS board.

1-2. How to troubleshoot (Countermeasure)

1) Check the PVDD voltage 32 V at pin1, 2.
When you check the no power at this point, then replace SMPS board.



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



< MAIN board top view >

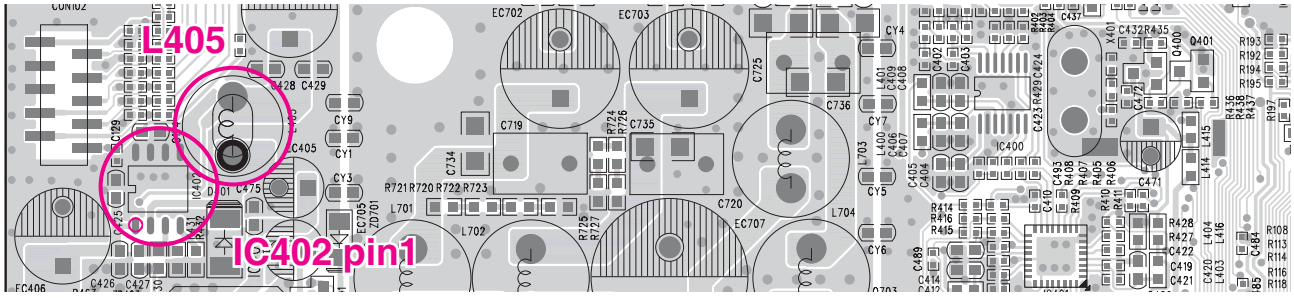
ONE POINT REPAIR GUIDE

2. POWER ON ERROR

No display or Not working.

2-1. IC402

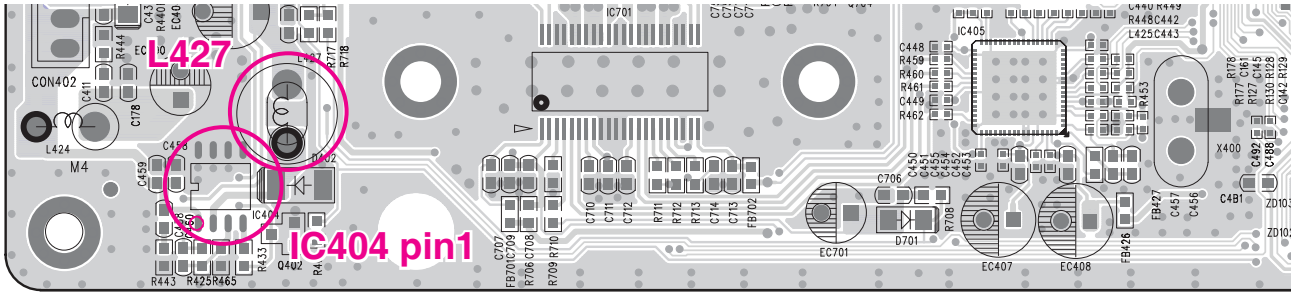
1) Check 3.3 VA at L405.
2) If 3.3 VA is not checked at the point, then find 32 V at pin1 of IC402.
3) 1), 2) is NG. ➡ Replace IC402.



< MAIN board top view >

2-2. IC404

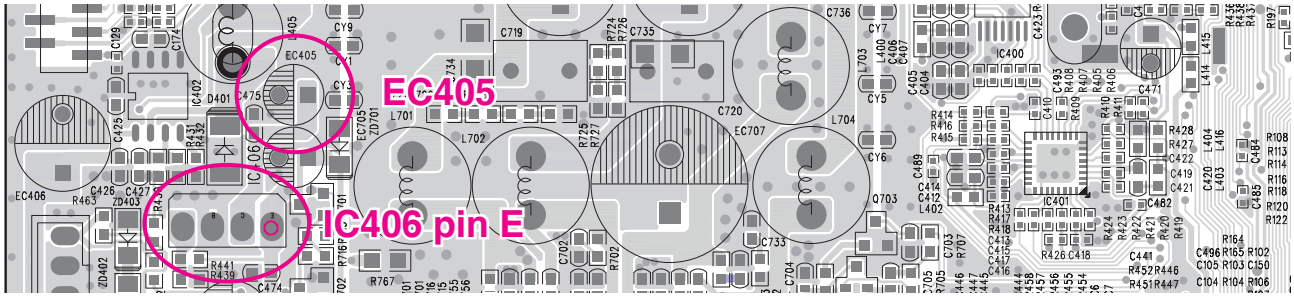
1) Check 12 VA at L427.
2) If 12 VA is not checked at the point, then find 32 V at pin1 of IC404.
3) 1), 2) is NG. ➡ Replace IC404.



< MAIN board top view >

2-3. IC406

1) Check 5 VA at EC405.
2) If 5 VA is not checked at the point, then find 12 V at pin E of IC406.
3) 1), 2) is NG. ➡ Replace IC406.



< MAIN board top view >

ONE POINT REPAIR GUIDE

3. NO SOUND (PORTABLE FUNCTION)

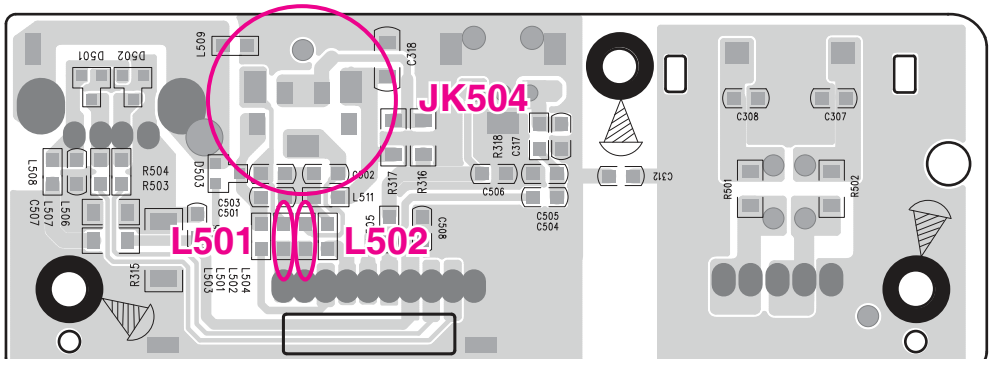
3-1. Solution

Replace IC400 or portable jack (JK504).

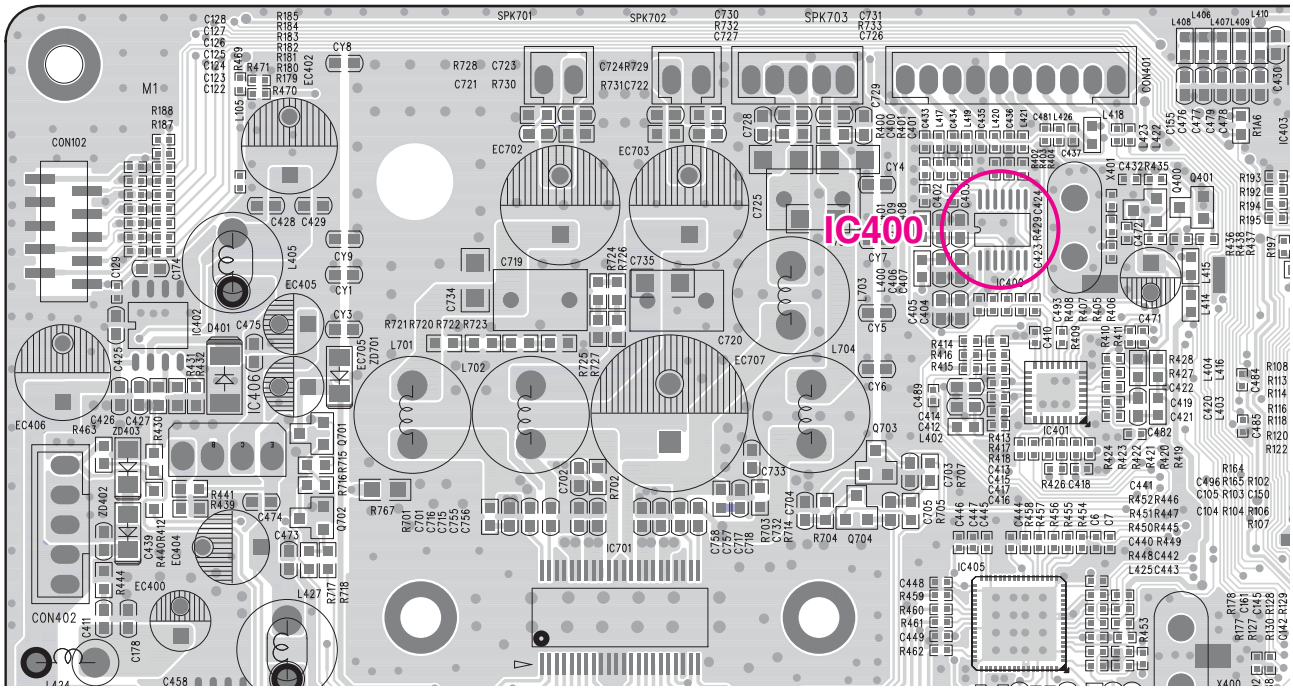
3-2. How to troubleshoot (Countermeasure)

1) Please check the soldering status of JK504
2) Please check L501, L502 (PORT_L, PORT_R signal) of portable jack (JK504).
   If you cannot find input signal, replace JK504.
3) If you can find input signal, check pin13, 14 of IC400.
4) If you can't find signal at pin13, 14 of IC400, replace IC400.

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



< USB board bottom view >



< MAIN board top view >

ONE POINT REPAIR GUIDE

4. NO BLUETOOTH

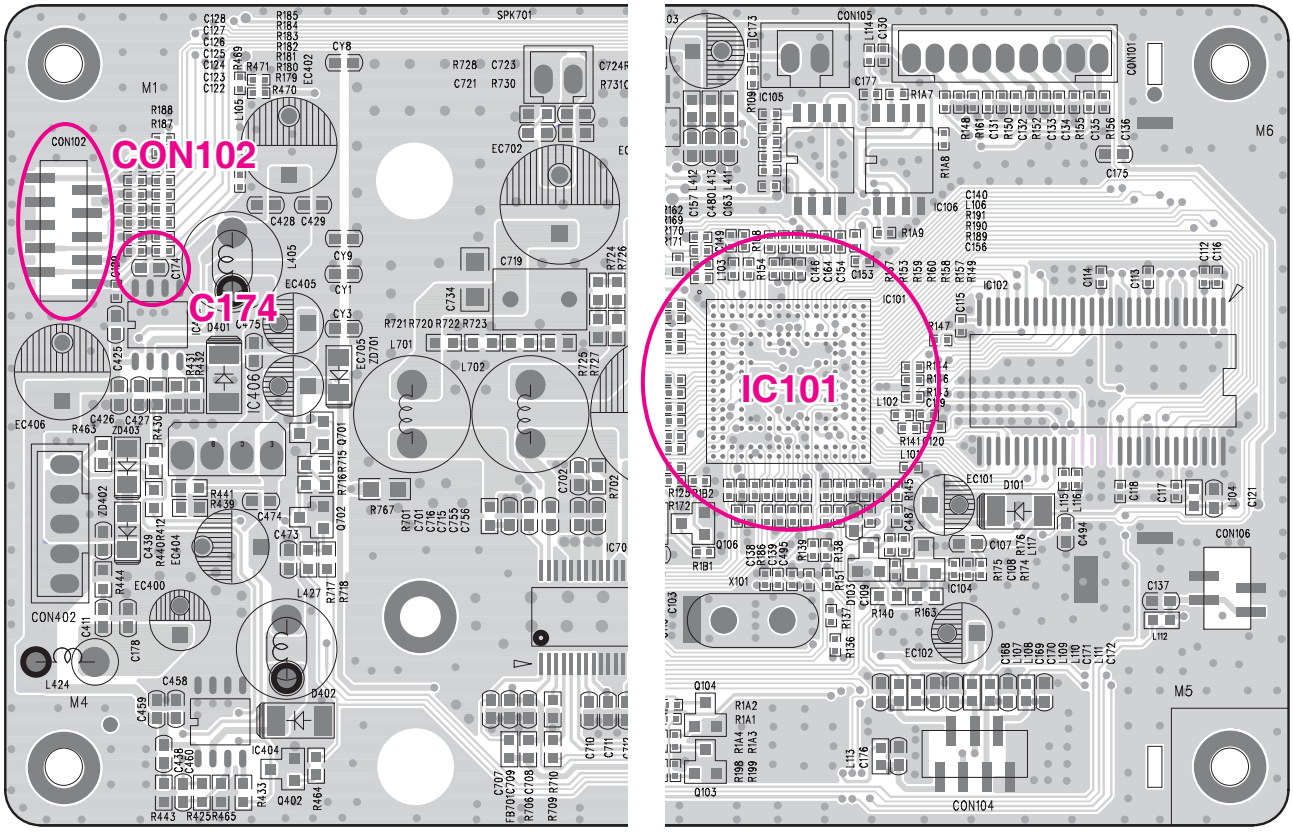
4-1. Solution

Replace IC101 on MAIN board.(No 3.3 V)

4-2. How to troubleshoot (Countermeasure)

1) Please check externally status of Bluetooth cable connection on your eyes.(at CON102 and Bluetooth module)
2) Please check 3.3 V of 3.3VA (at C174).
   If 3.3 V is OK at L509, please check BT_SDA, BT_SCL, BT_RST (pin53, 51, 25) of IC101 and BT_RX, BT_TX (pin29, 27).
   If you have no signal, please replace IC101.

4-3. Service hint (Any picture / Remark)



< MAIN board top view >

ONE POINT REPAIR GUIDE

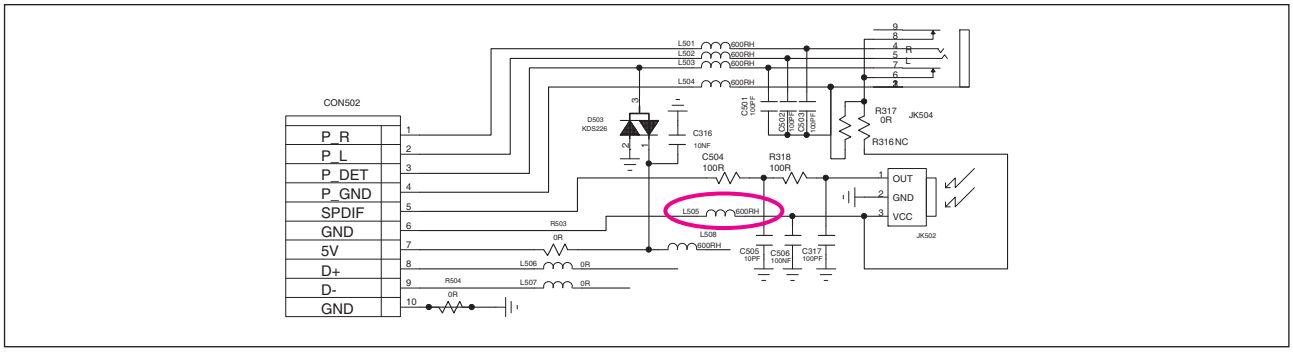
5. NO SOUND (OPTICAL)

5-1. Solution

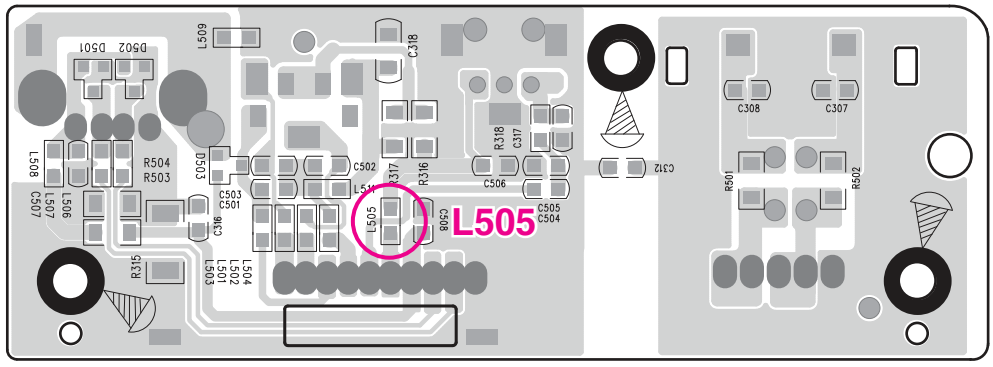
Replace IC401 on MAIN board.

5-2. How to troubleshoot (Countermeasure)

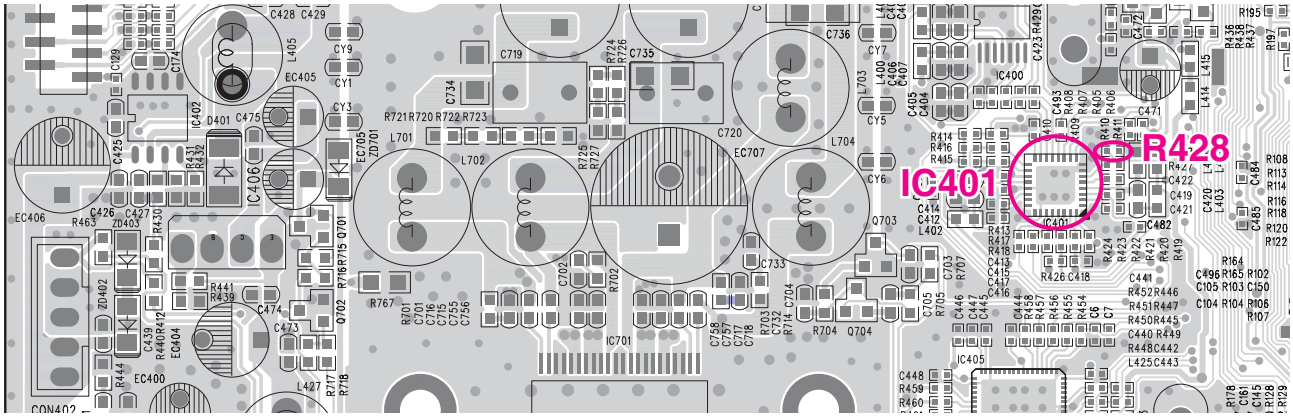
1) Please check 3.3 V of 3.3 VA at L505 in USB board
   If you can check 3.3 V, please confirm OPT_DET signal (R428) in MAIN board when optical mode.
2) In spite of process 1), set has abnormal output, then replace IC401.



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



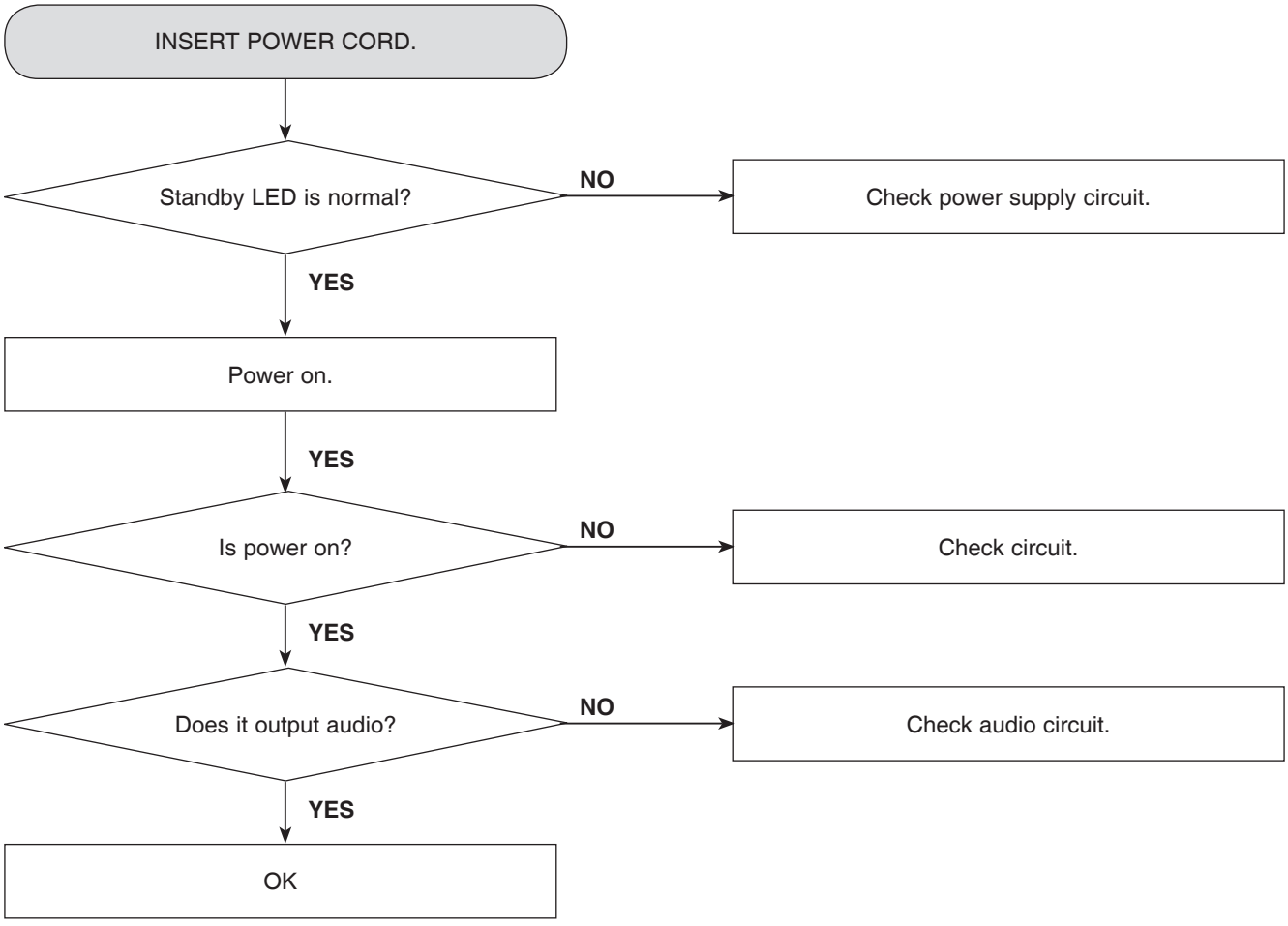
< USB board bottom view >



< MAIN board top view >

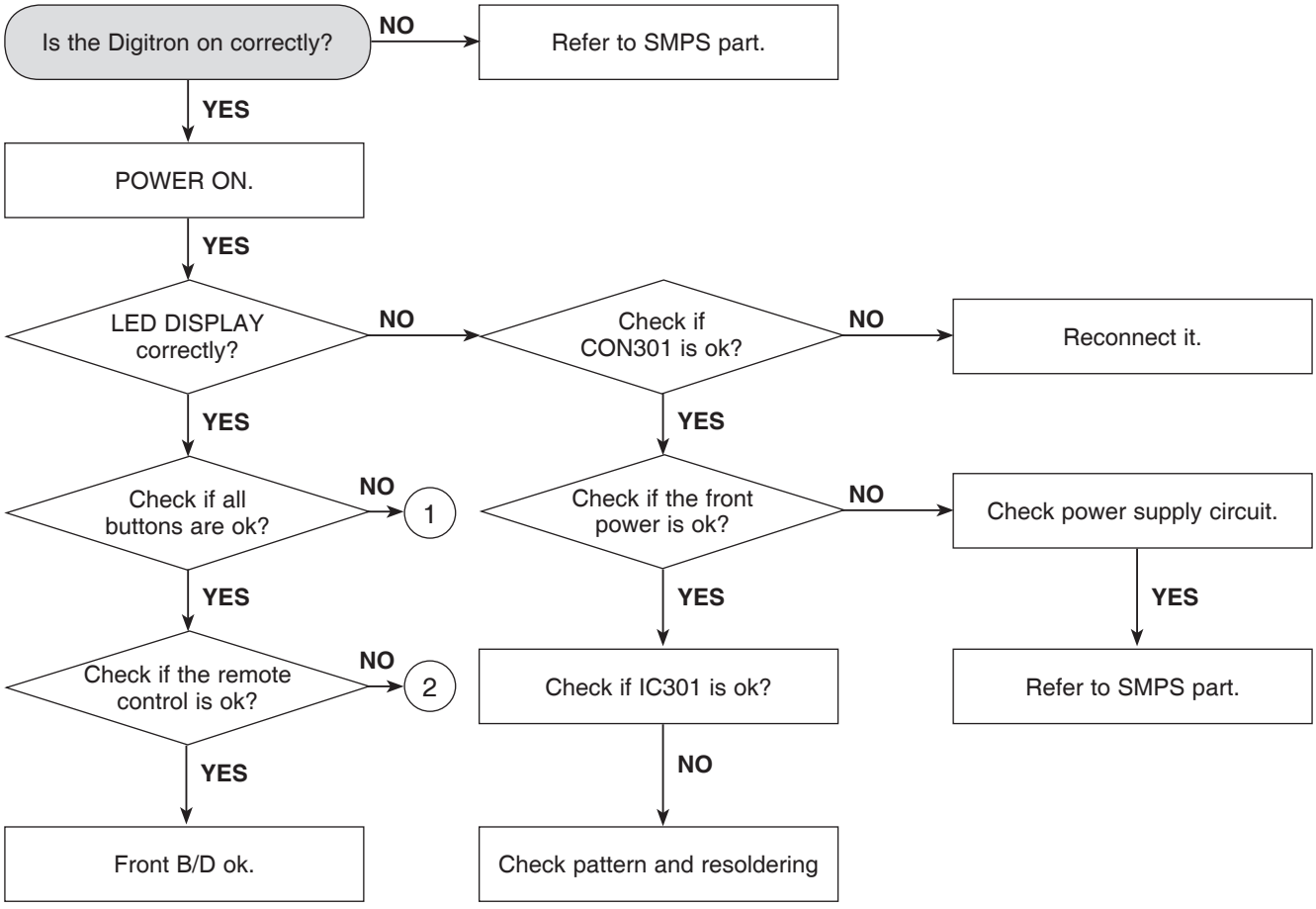
ELECTRICAL TROUBLESHOOTING GUIDE

1. POWER SUPPLY CIRCUIT



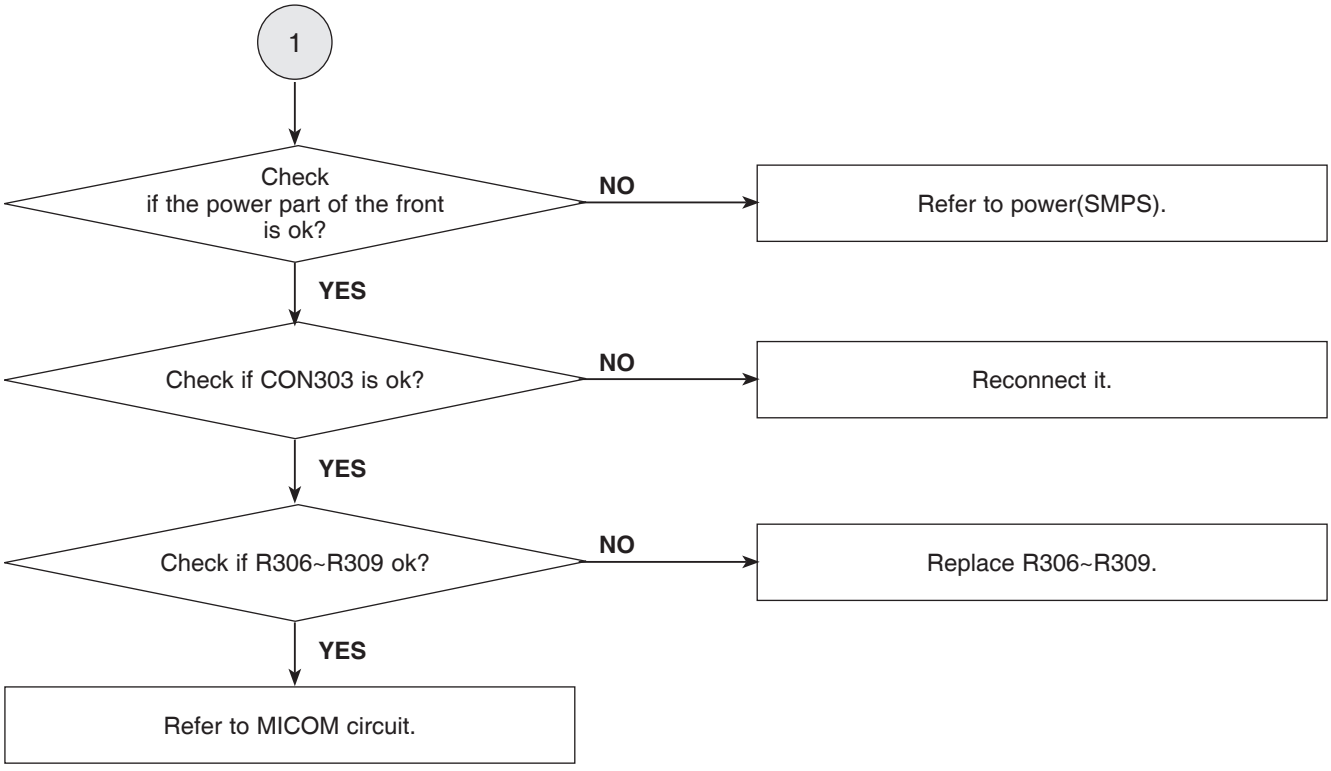
ELECTRICAL TROUBLESHOOTING GUIDE

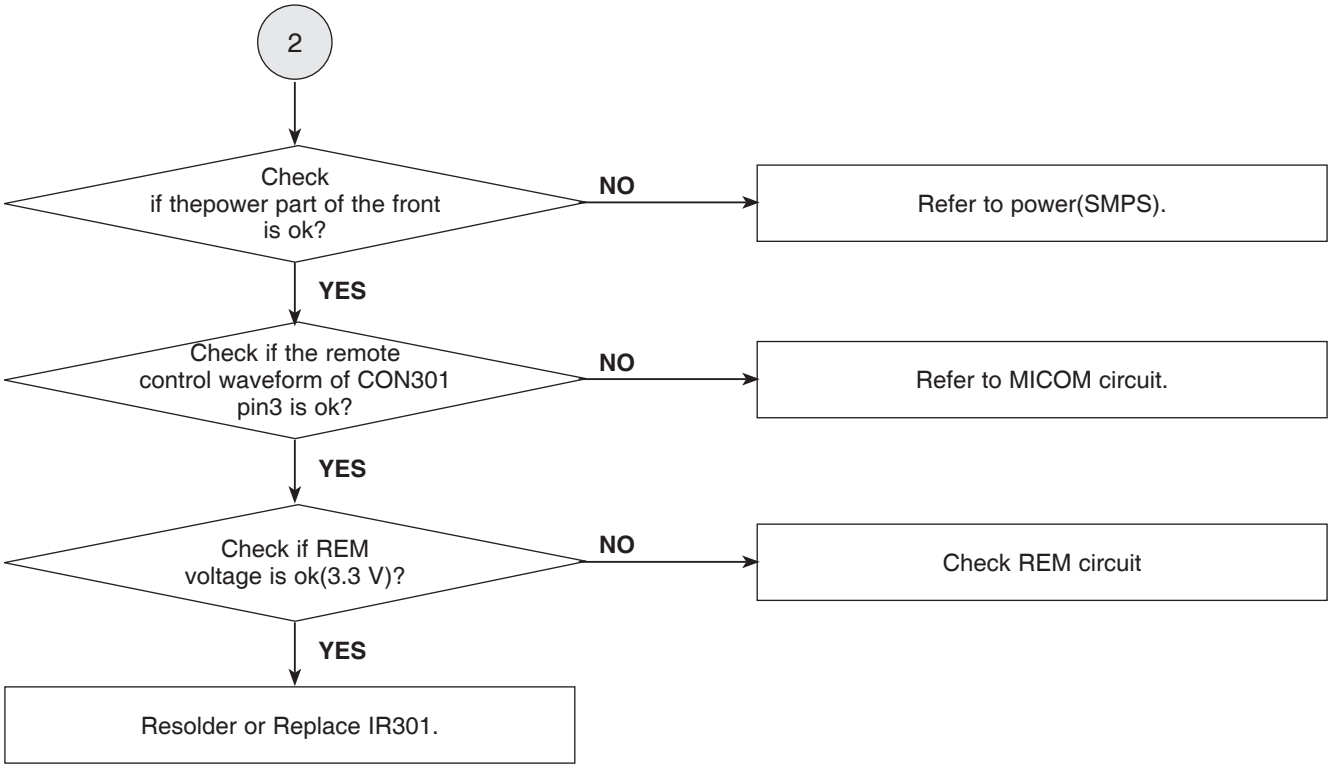
2. FRONT CIRCUIT



ELECTRICAL TROUBLESHOOTING GUIDE

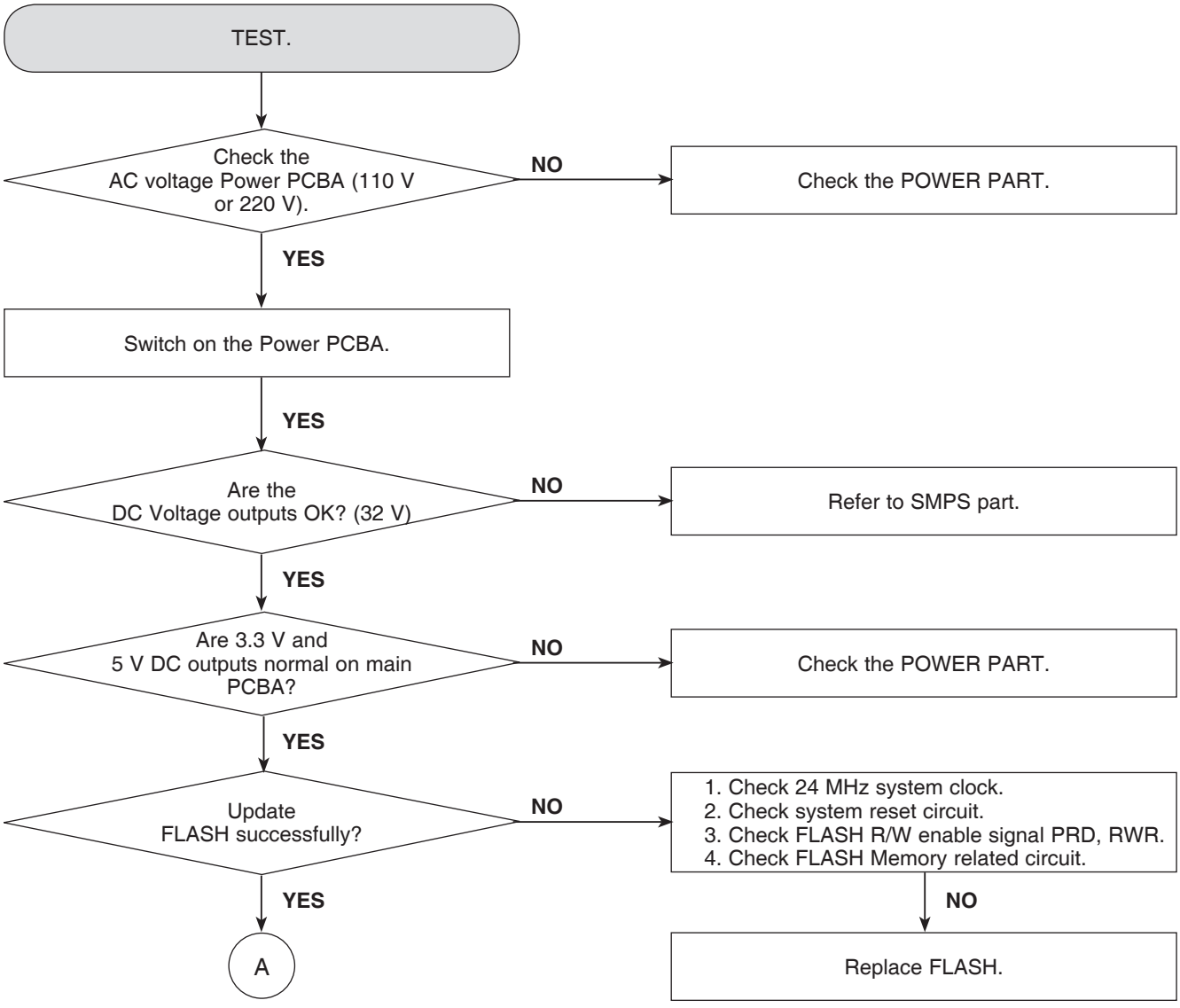
FRONT CIRCUIT



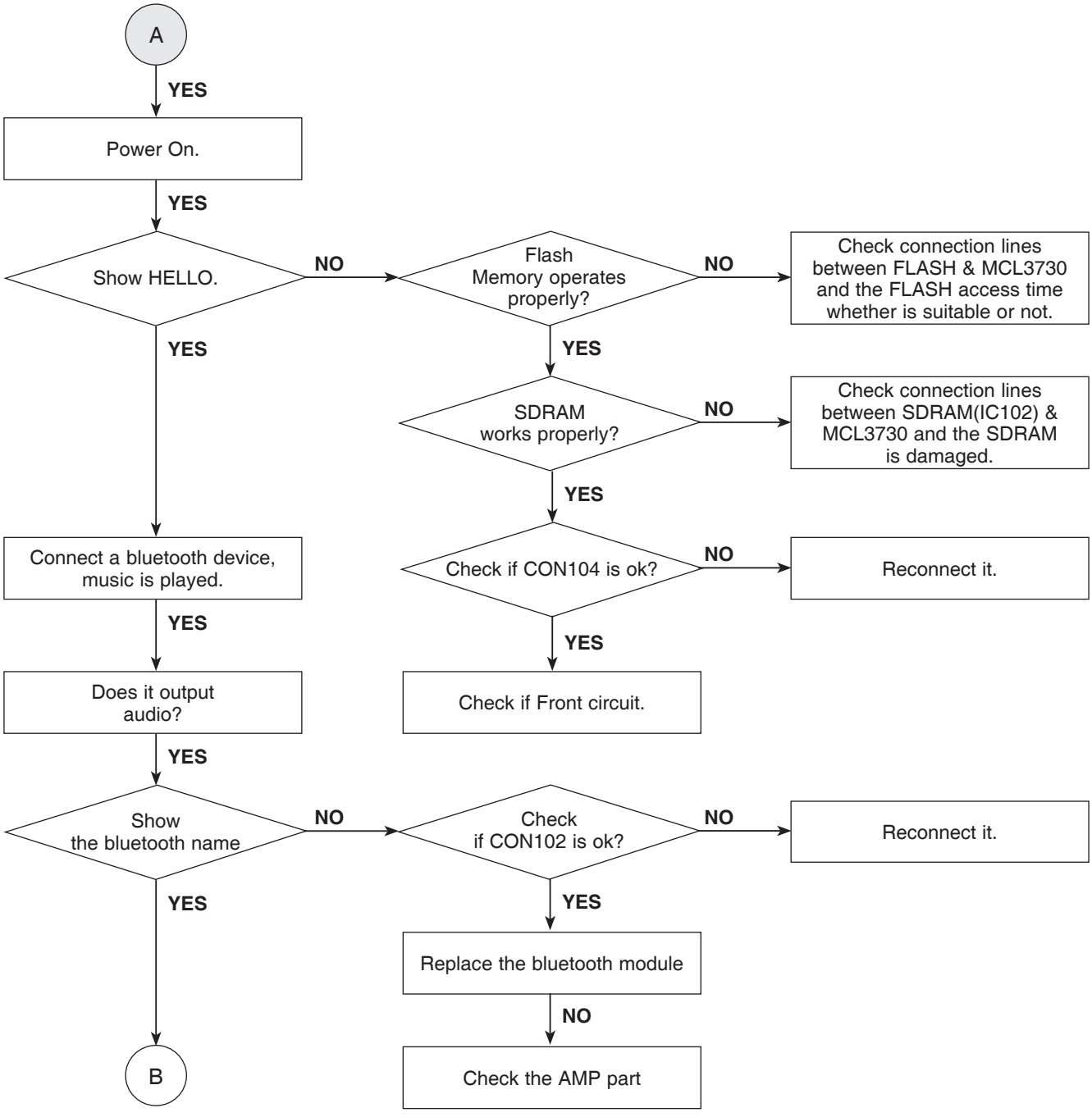


ELECTRICAL TROUBLESHOOTING GUIDE

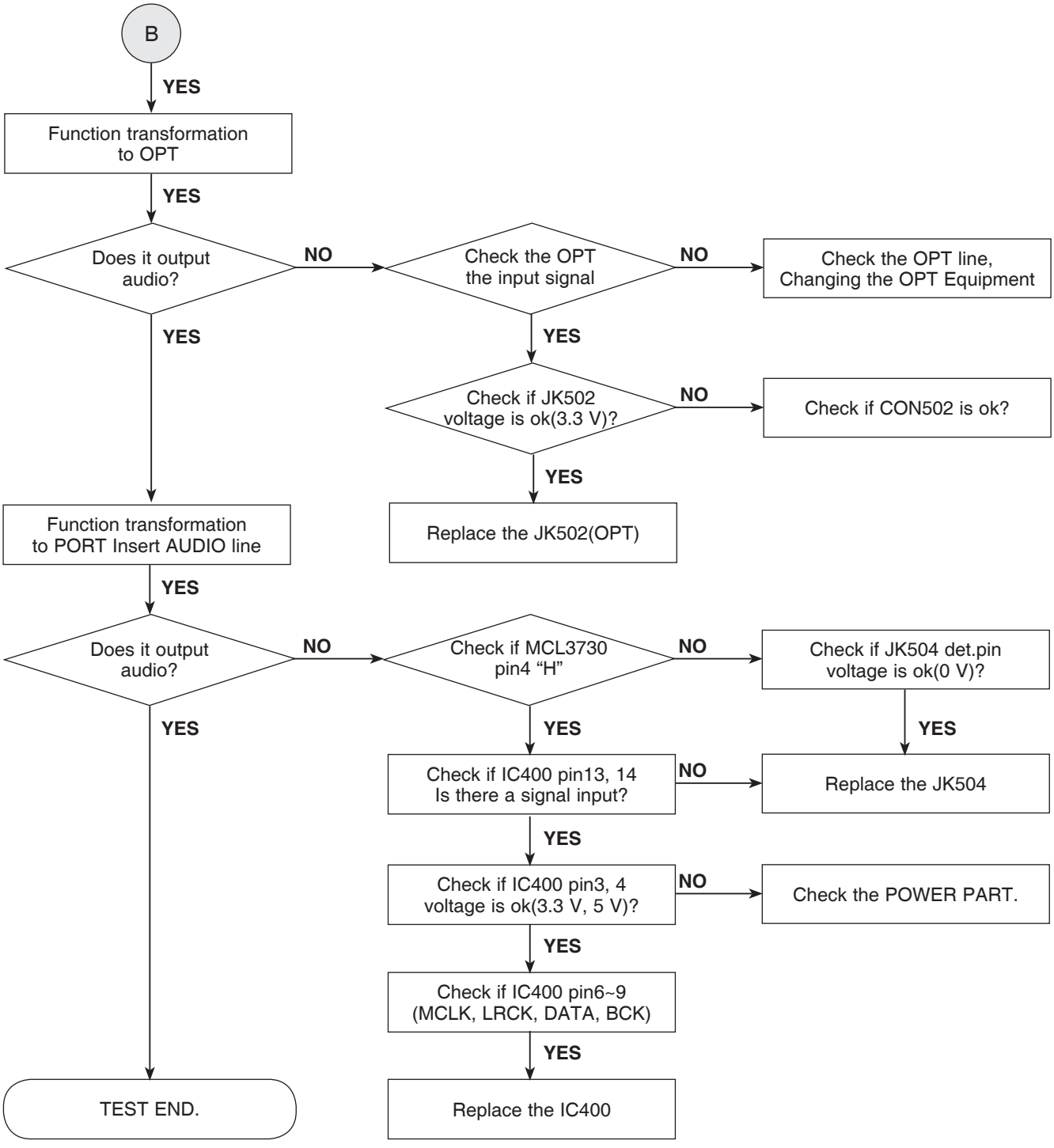
3. TEST & DEBUG FLOW



ELECTRICAL TROUBLESHOOTING GUIDE

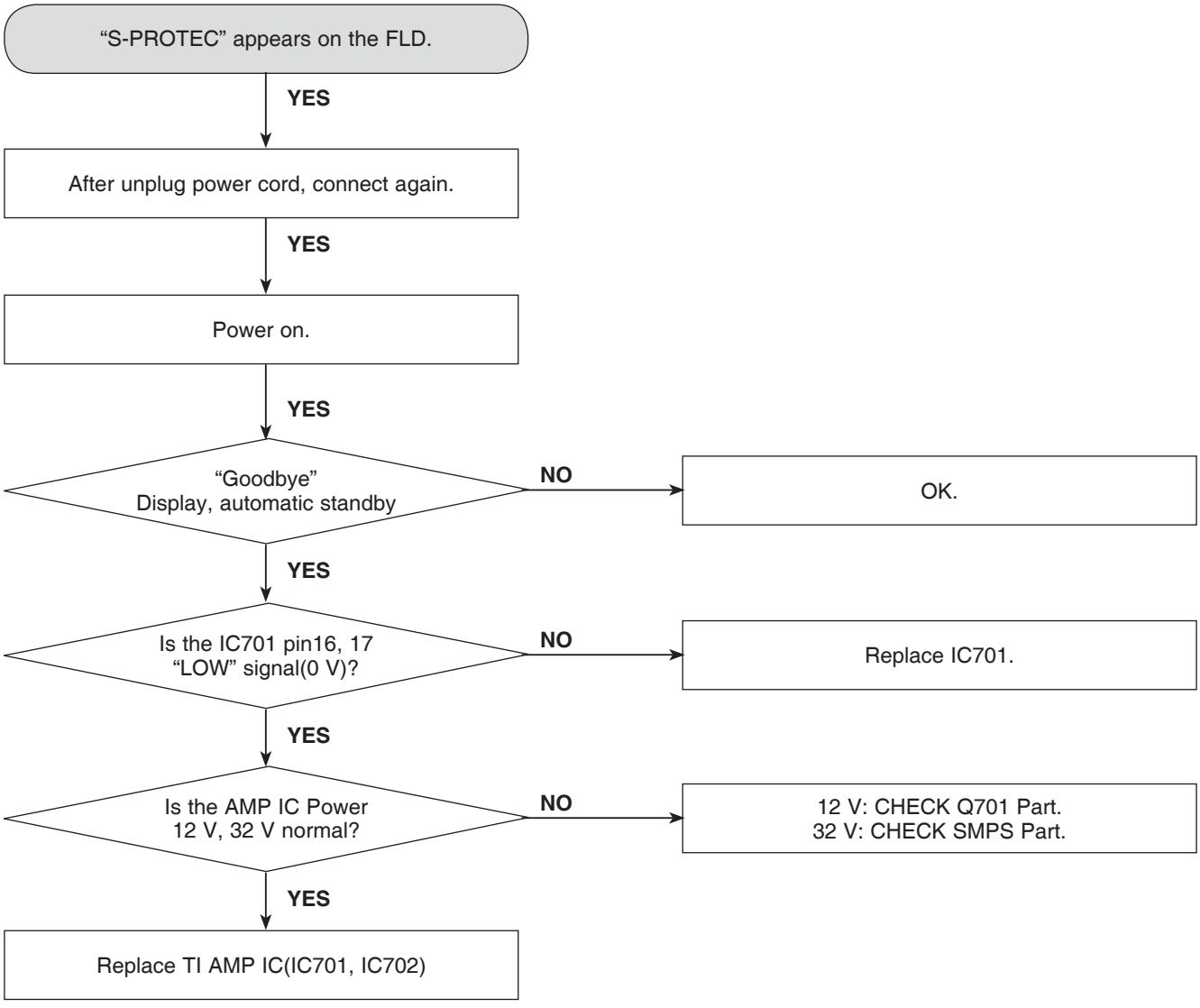


ELECTRICAL TROUBLESHOOTING GUIDE



ELECTRICAL TROUBLESHOOTING GUIDE

4. AMP PROTECTION



WAVEFORMS OF MAJOR CHECK POINT

1. CRYSTAL

1

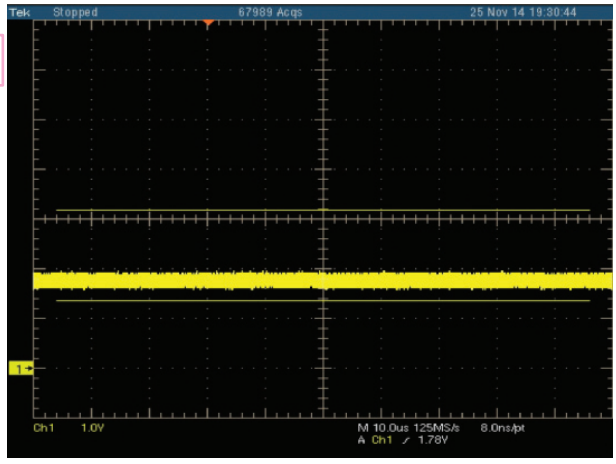


FIG 1-1. X101 (24 MHz)

2

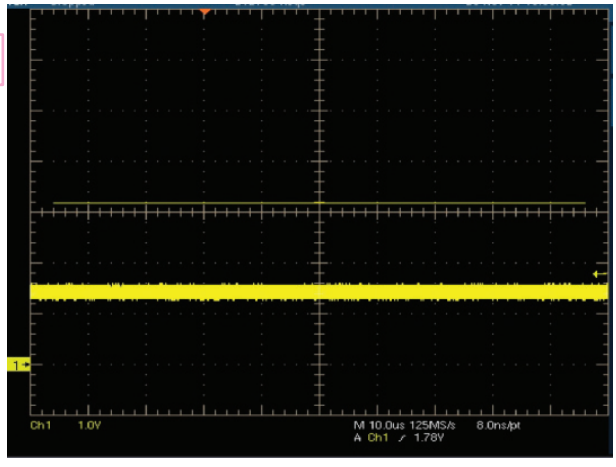
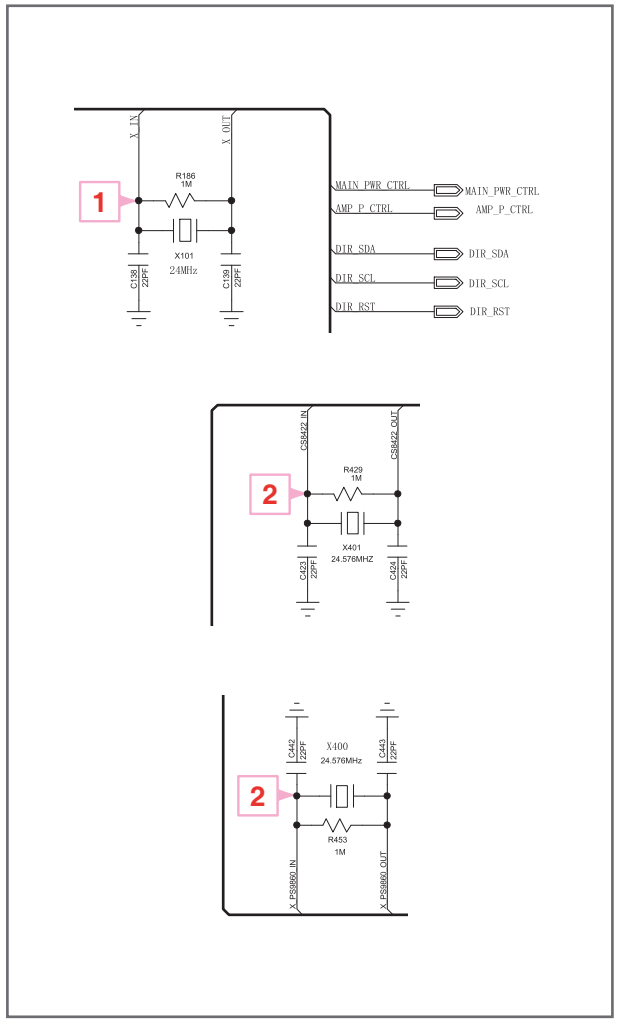
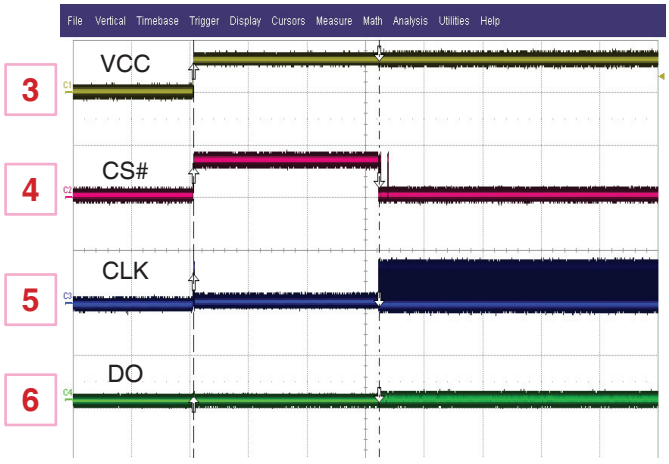


FIG 1-2. X400, X401 (24.576 MHz)



2. FLASH MEMORY



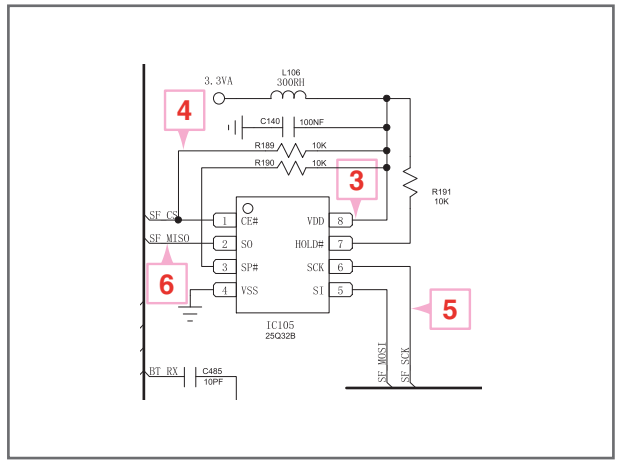


FIG 2. VCC, CS#, CLK, DO

3. TACT KEY

7

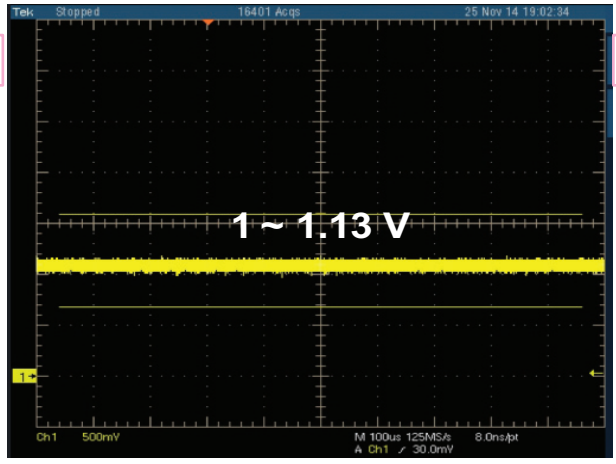


FIG 3-1. Press VOL +

8

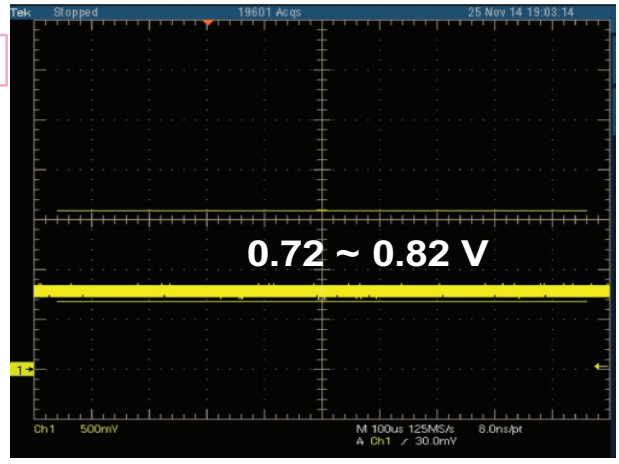


FIG 3-2. Press VOL -

9

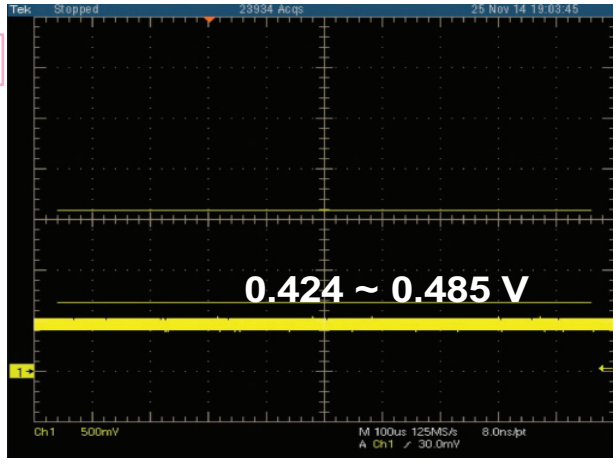


FIG 3-3. Press FUN.KEY

10

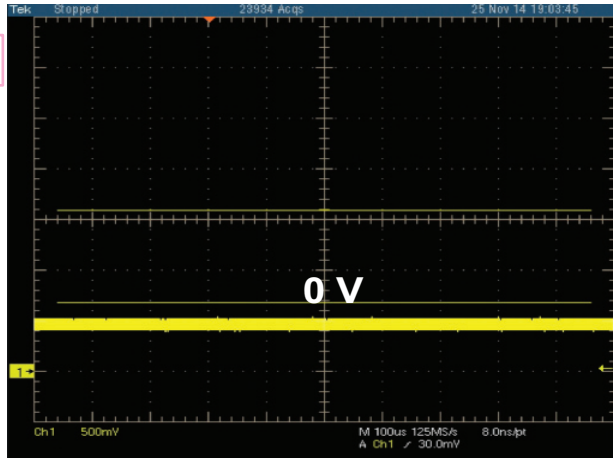
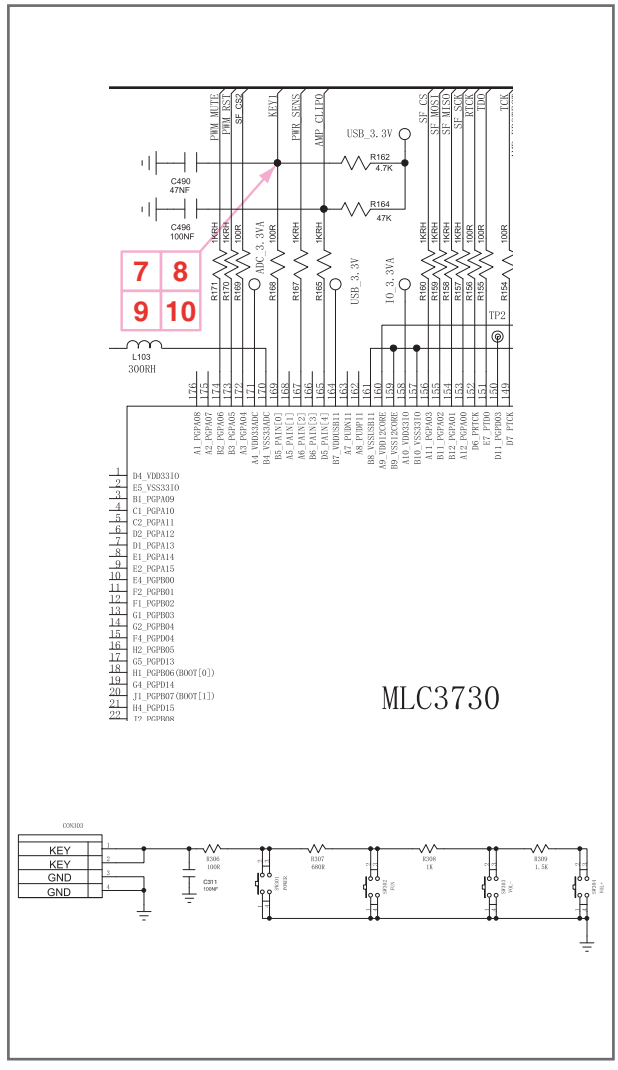


FIG 3-4. Press POWER KEY



4. USB

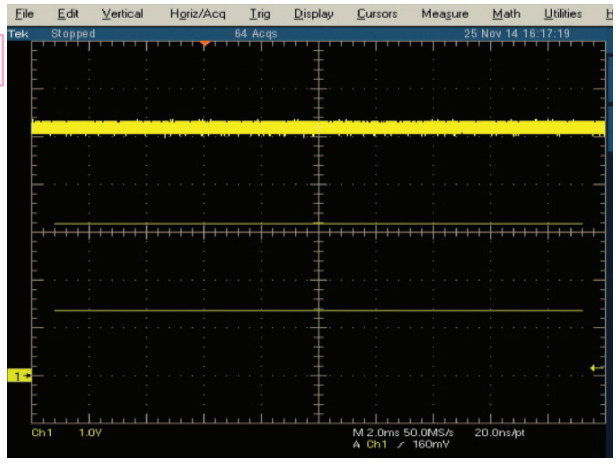


FIG 4-1. USB_5V

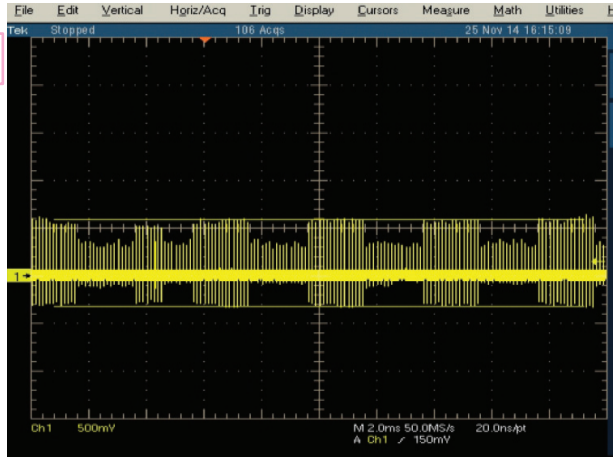


FIG 4-2. USB D+

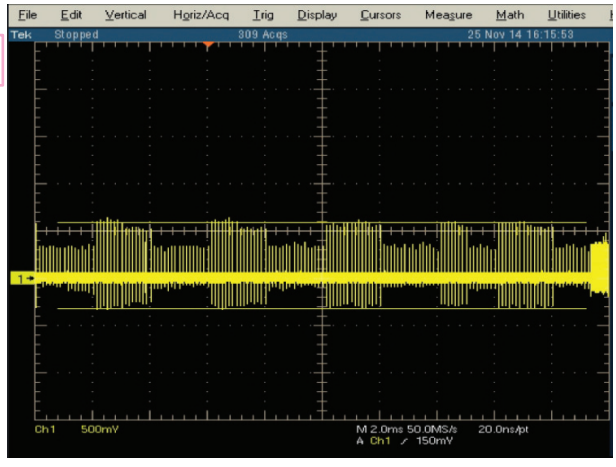
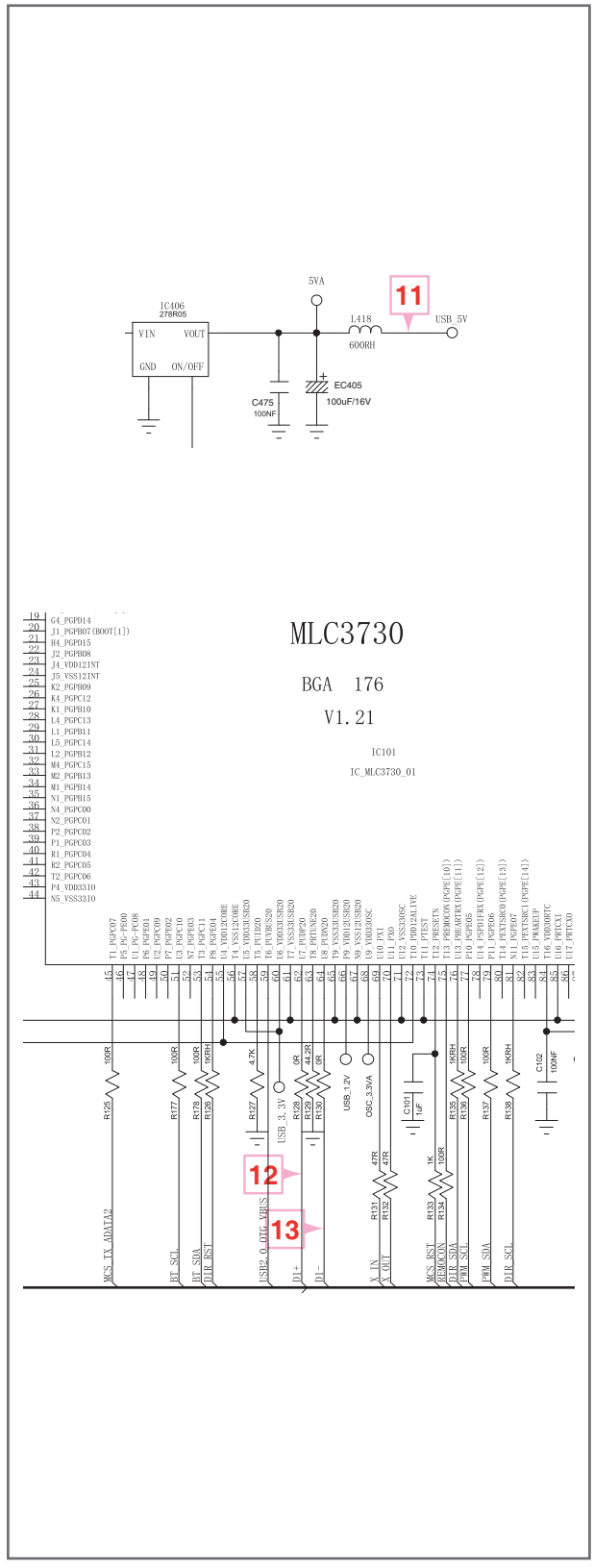


FIG 4-3. USB D-



5. REMOTE CONTROL

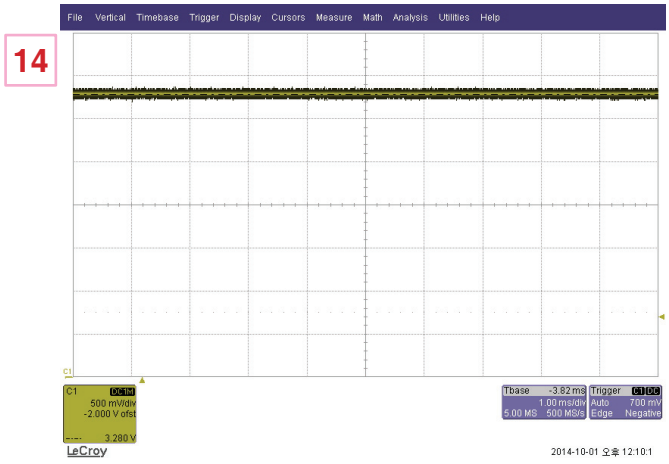


FIG 5-1. Input Voltage

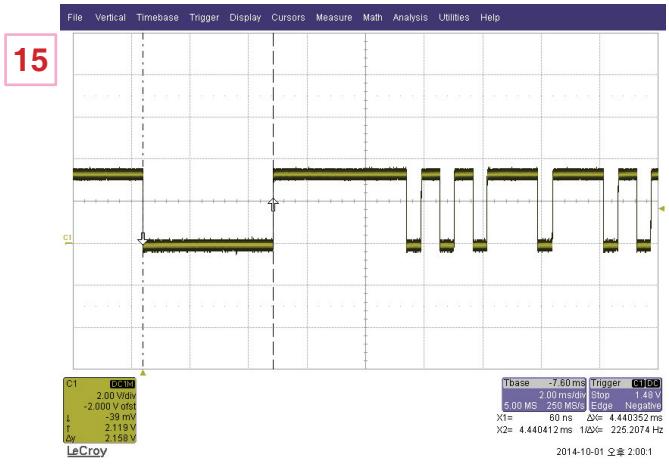


FIG 5-2. Low Timing

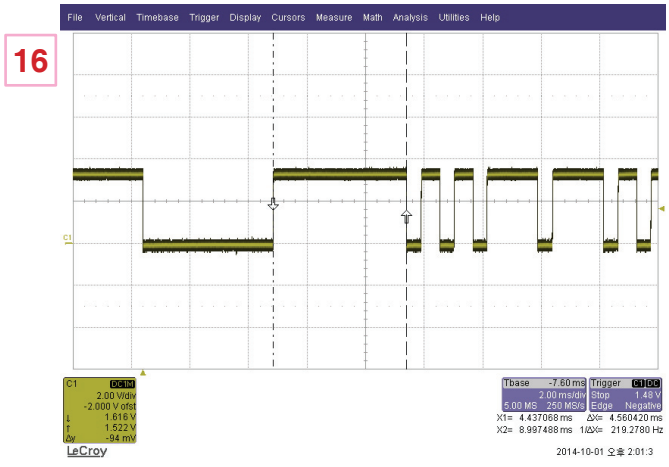
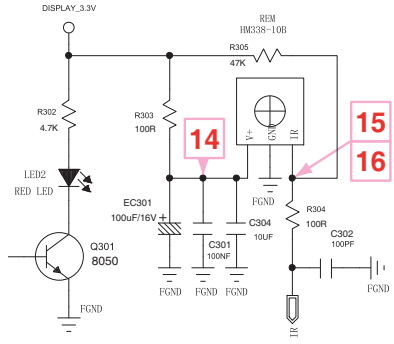


FIG 5-3. High Timing



Item	Measured	Spec.
Input Level	3.3 V	IR Receiver Spec: 2.7 ~ 5.5 V
“ Low” Timing	4.4 ms	3.6 ms ~ 5.04 ms
“ High” Timing	4.48 ms	4.08 ms ~ 5.04 ms

6. OPTICAL

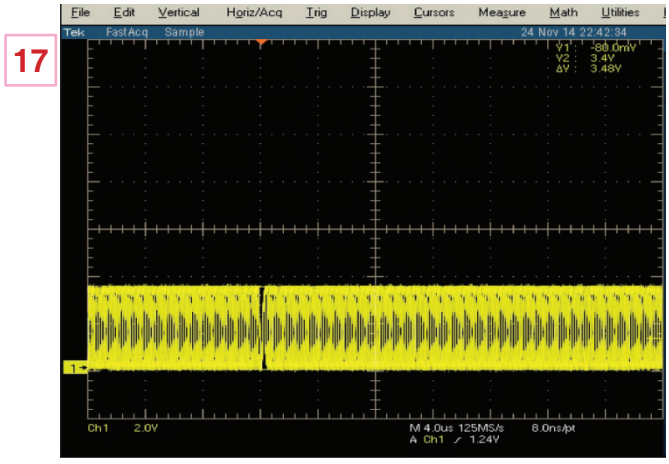


FIG 6-1. OPT_IN

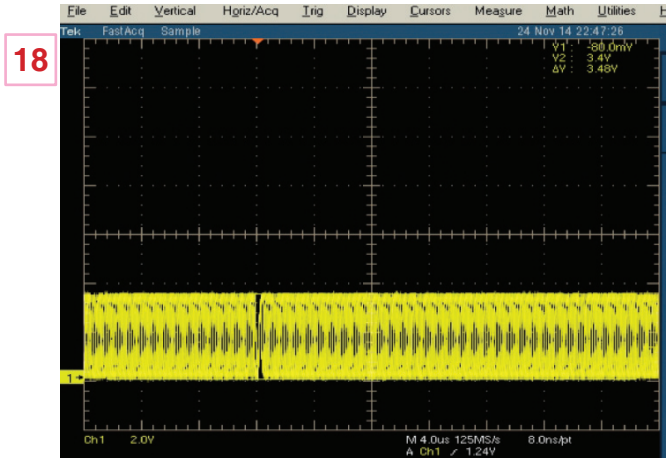
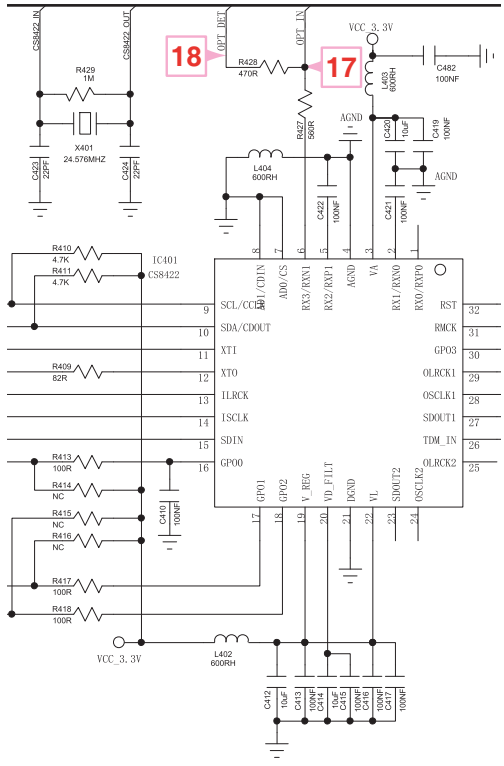


FIG 6-2. OPT_DET



7. PORTABLE

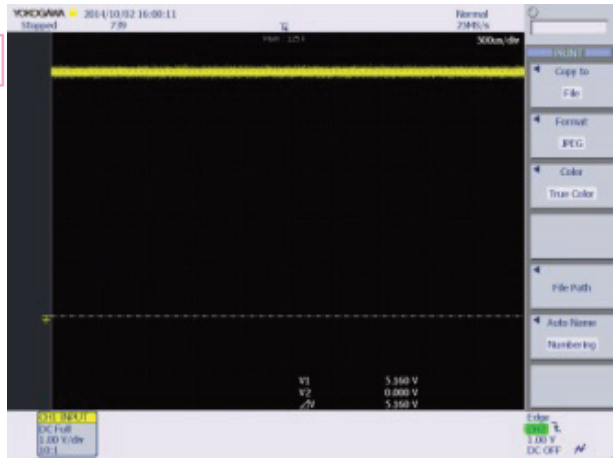


FIG 7-1. ADC IC 5 V

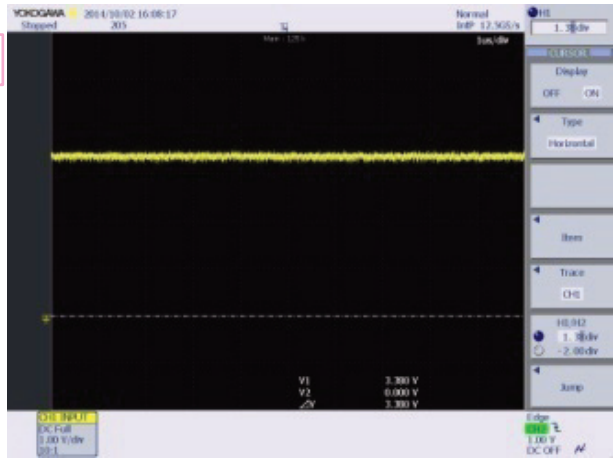


FIG 7-2. ADC IC 3.3 V

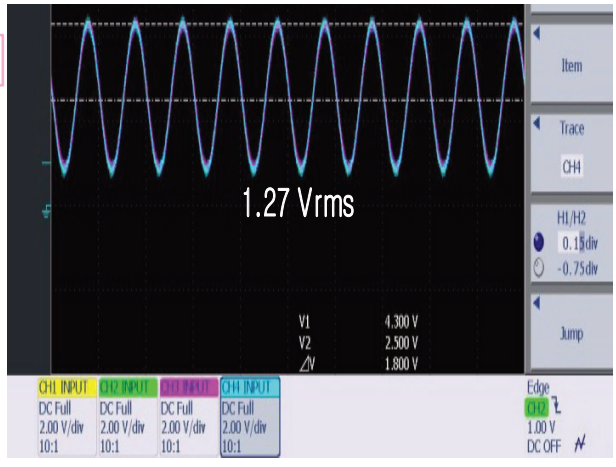
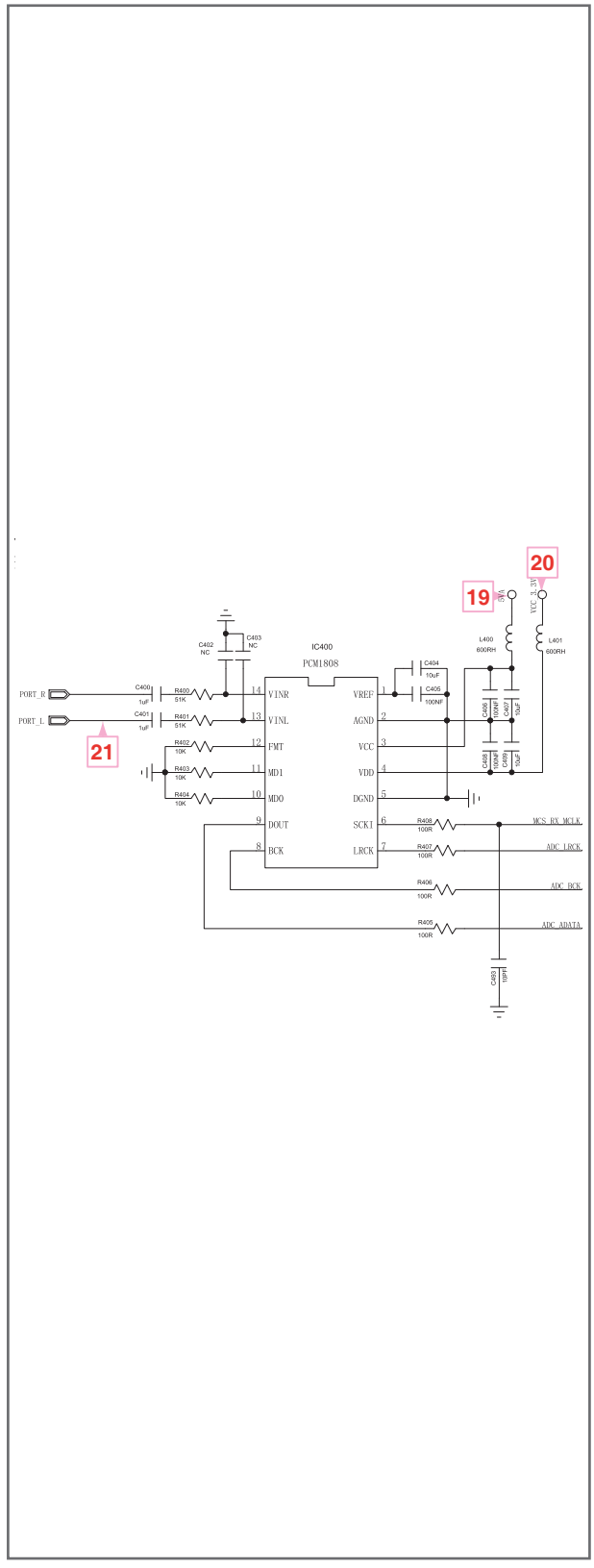


FIG 7-3. Analog Input Voltage



8. AUDIO PWM(1/2)

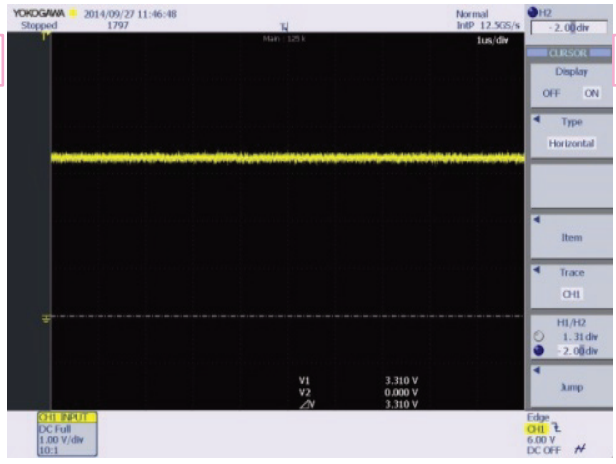


FIG 8-1. PWM IC 3.3 V

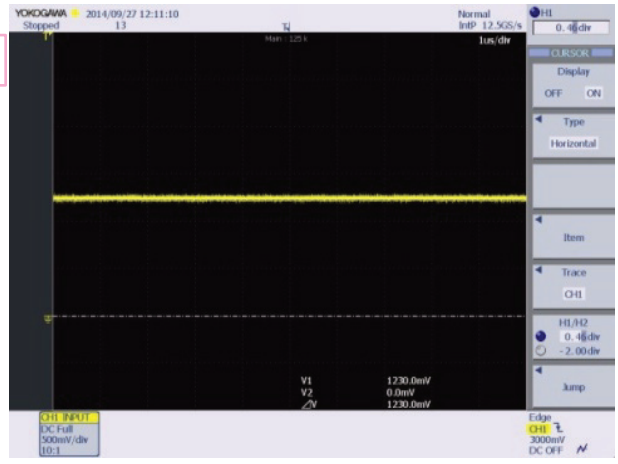


FIG 8-2. PWM IC 1.2 V

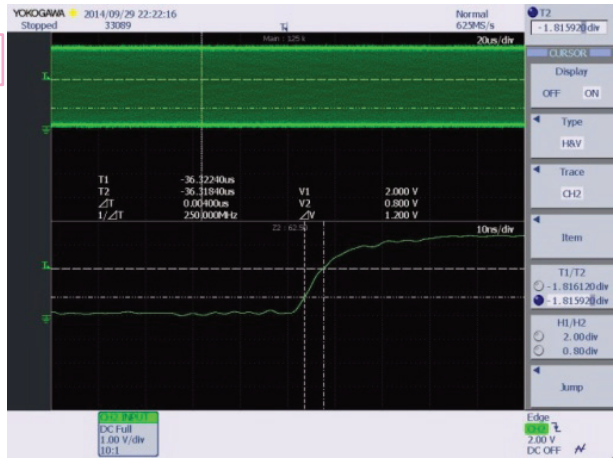
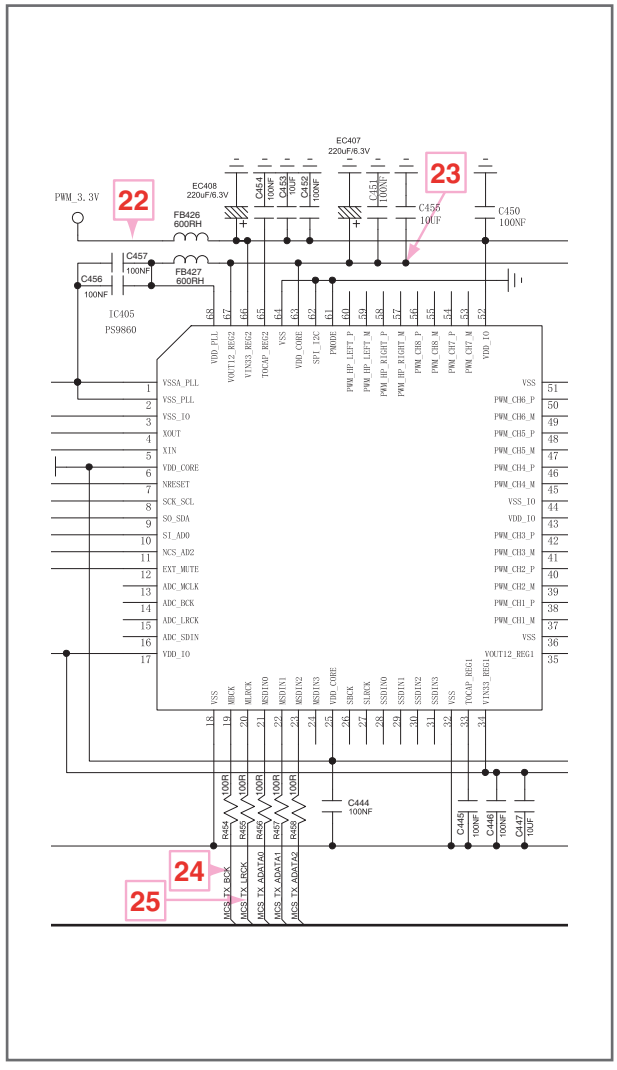


FIG 8-3. BCK

FIG 8-4. LRCK



AUDIO PWM(2/2)

FIG 8-5. Front L/R

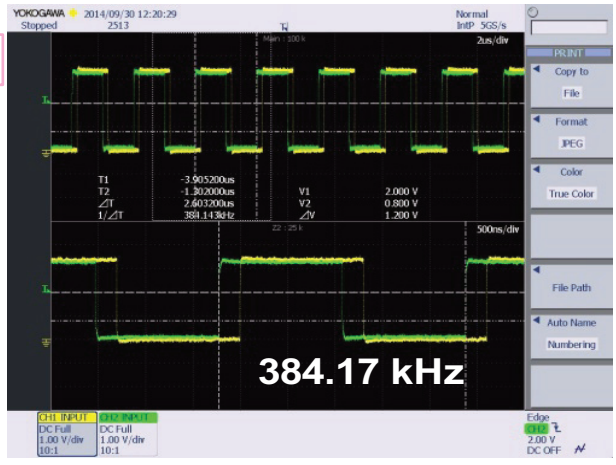
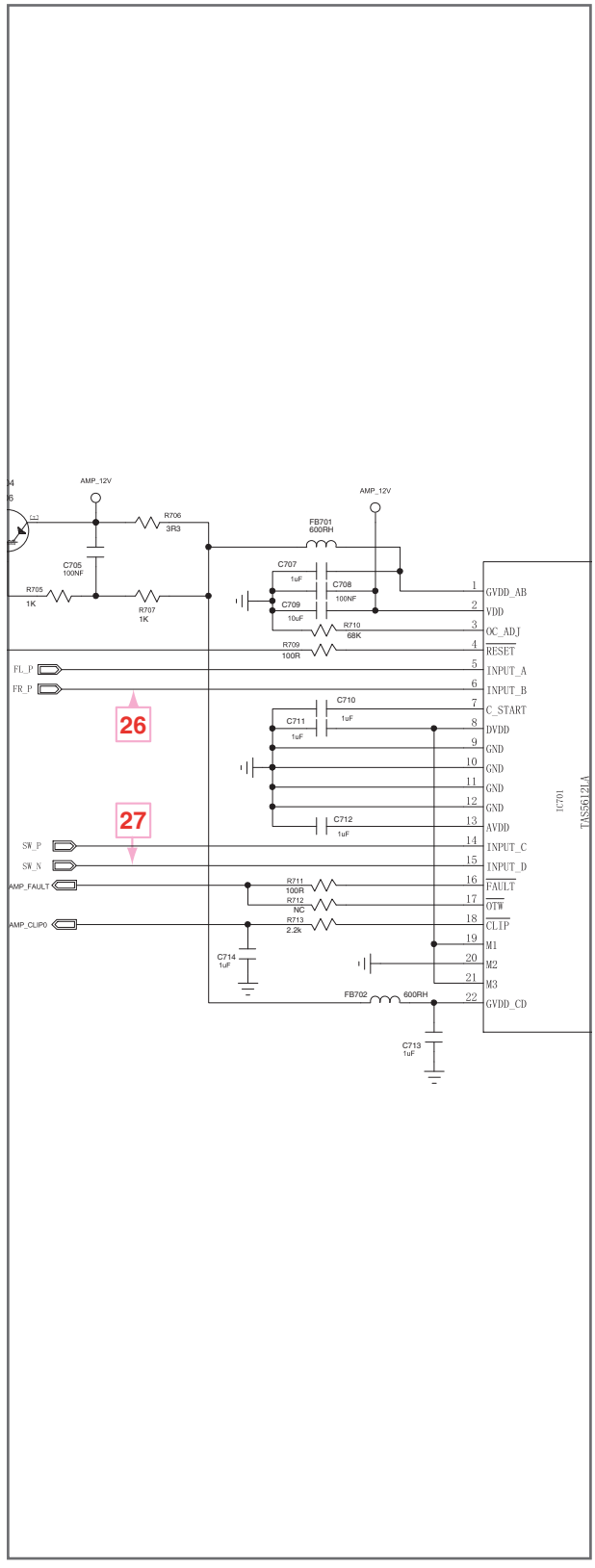


FIG 8-6. Subwoofer



9. AUDIO AMP

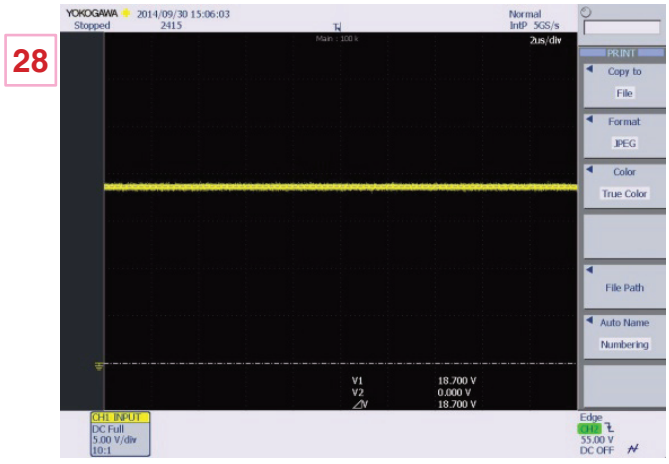


FIG 9-1. AMP IC PVDD: 32 V

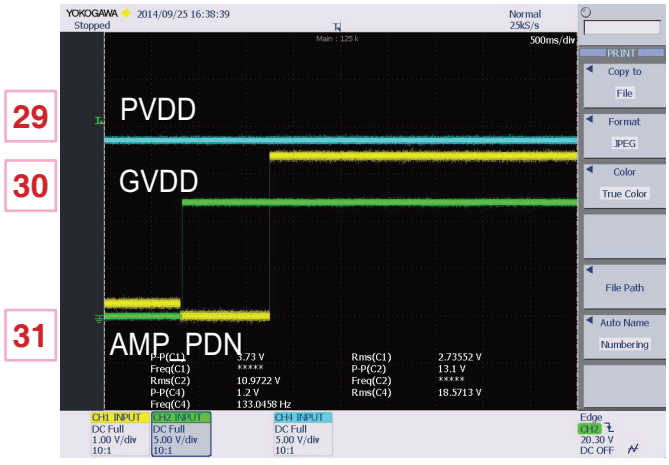
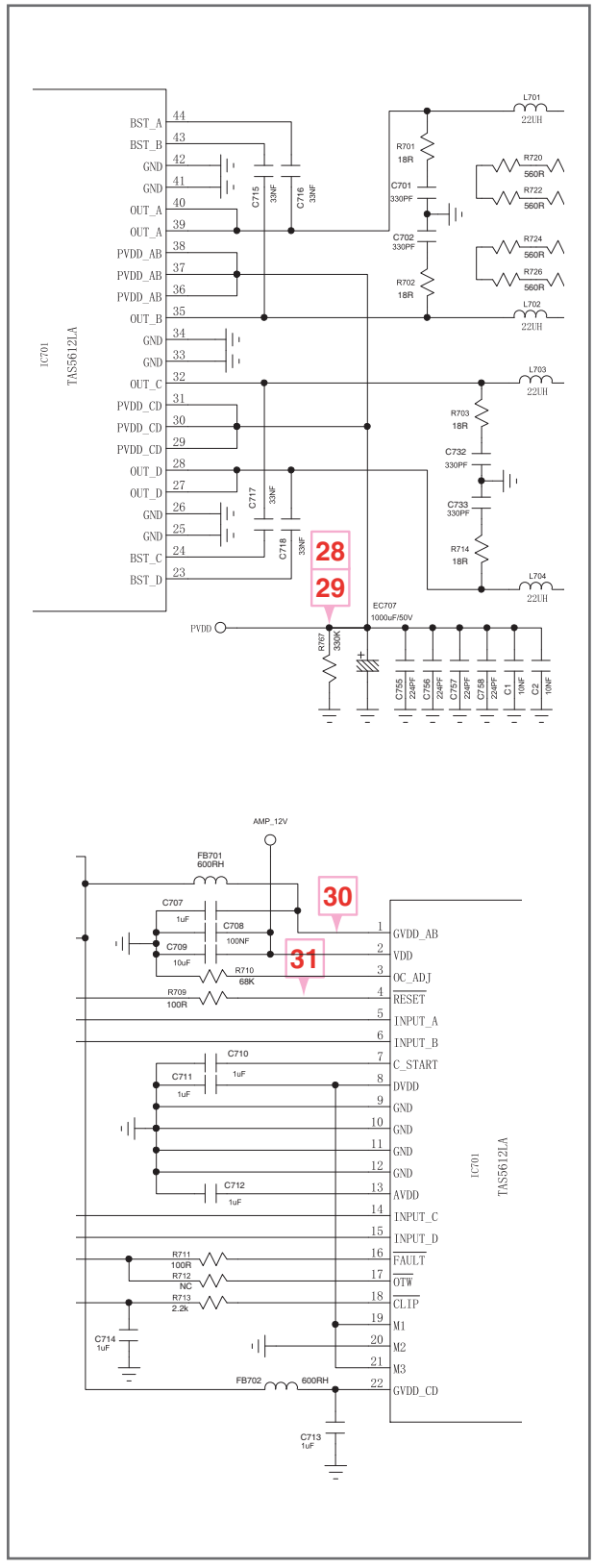
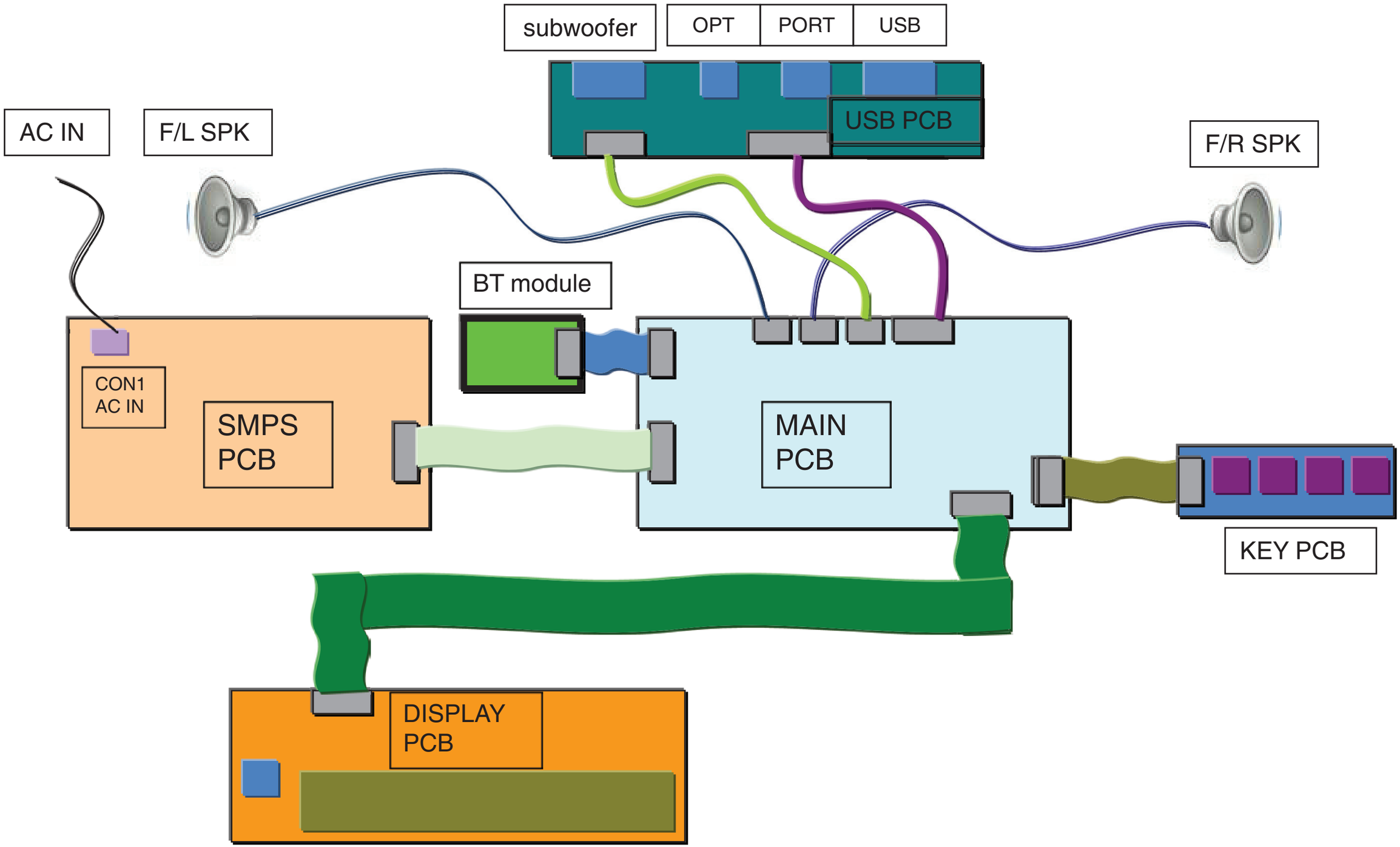


FIG 9-2.

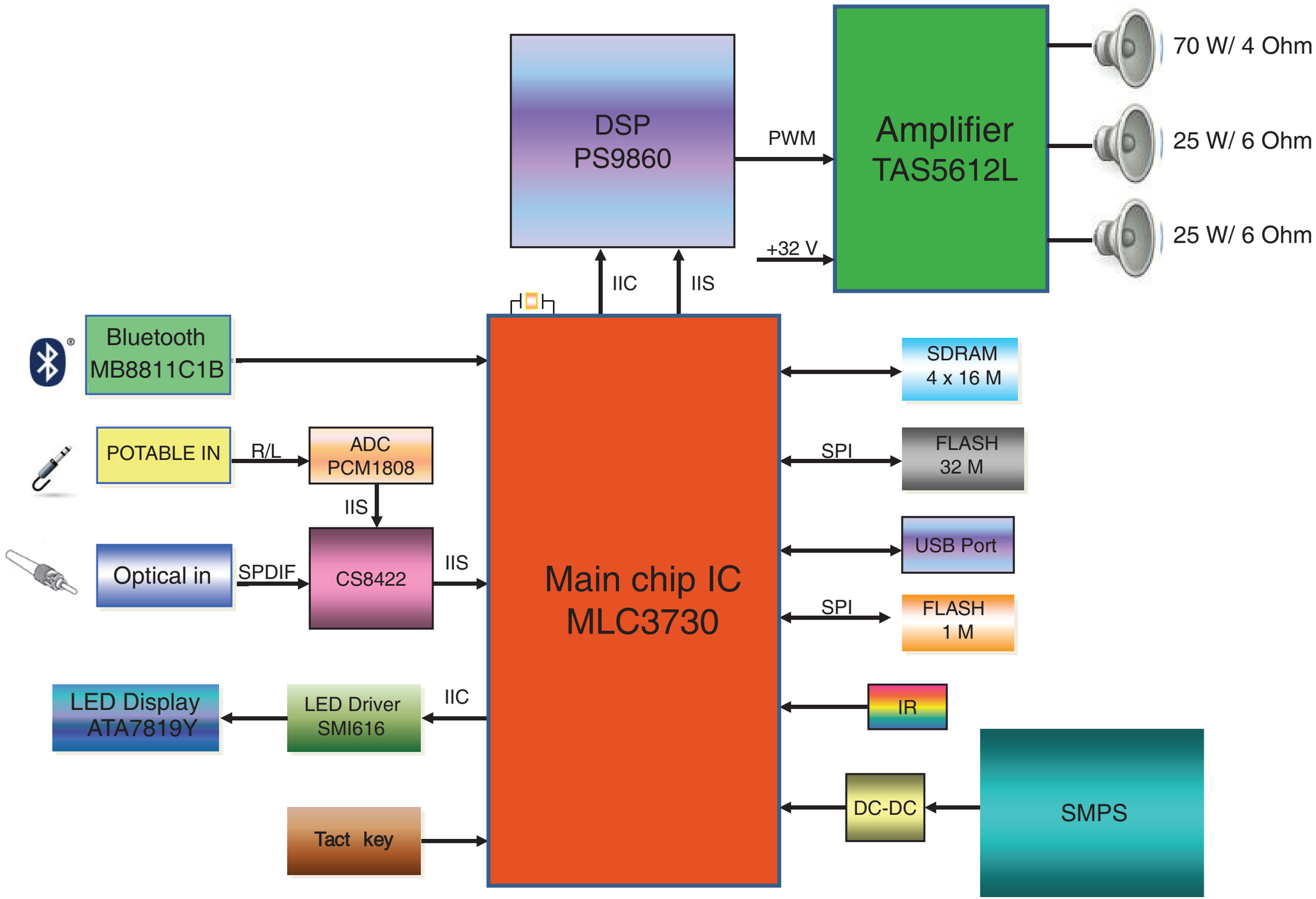


MEMO

WIRING DIAGRAM

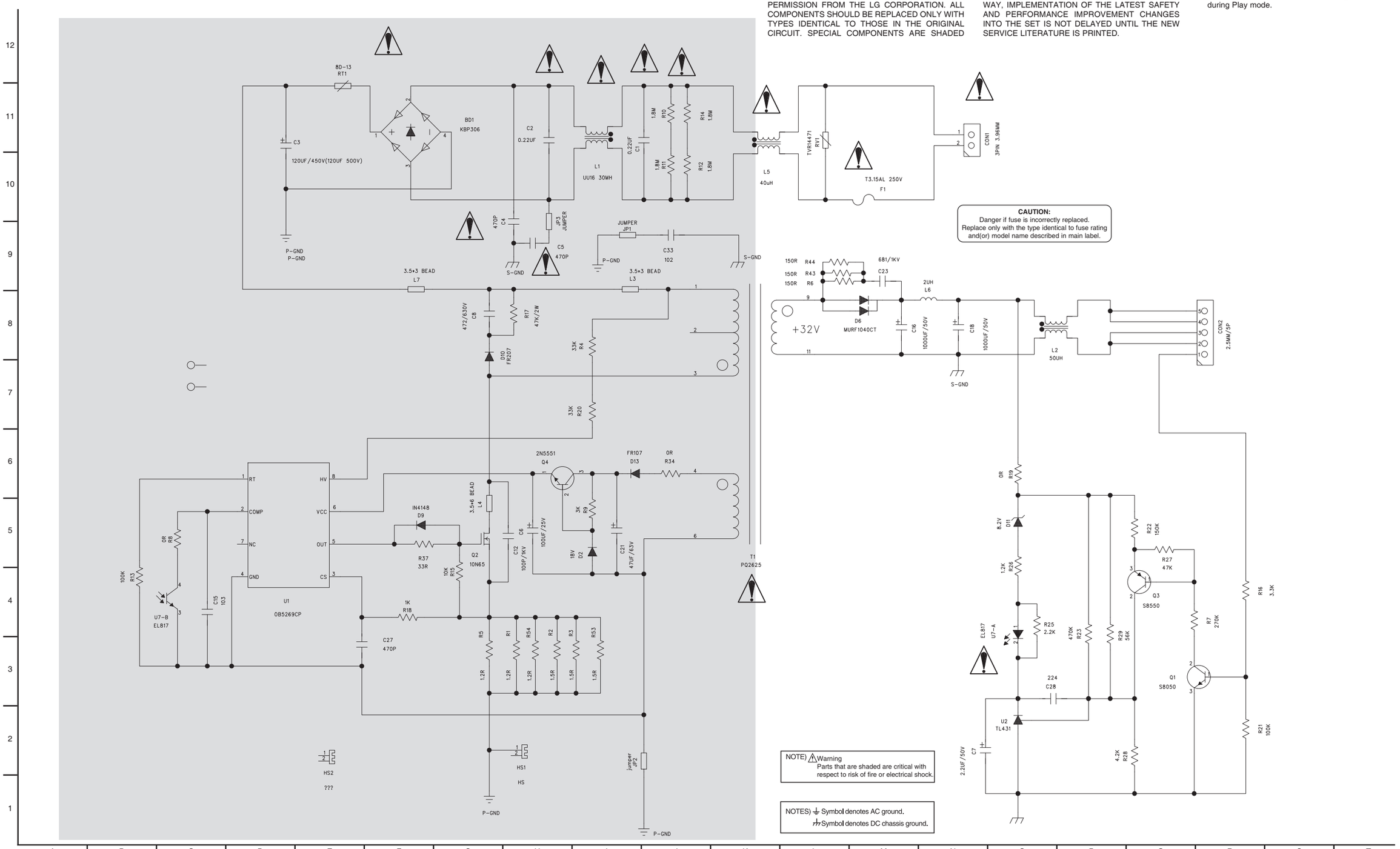


BLOCK DIAGRAM



CIRCUIT DIAGRAMS

1. SMPS CIRCUIT DIAGRAM



IMPORTANT SAFETY

WHEN SERVICING THIS CHASSIS, UNDER NO CIRCUMSTANCES SHOULD THE ORIGINAL DESIGN BE MODIFIED OR ALTERED WITHOUT PERMISSION FROM THE LG CORPORATION. ALL COMPONENTS SHOULD BE REPLACED ONLY WITH TYPES IDENTICAL TO THOSE IN THE ORIGINAL CIRCUIT. SPECIAL COMPONENTS ARE SHADED ON THE SCHEMATIC FOR EASY IDENTIFICATION. THIS CIRCUIT DIAGRAM MAY OCCASIONALLY DIFFER FROM THE ACTUAL CIRCUIT USED. THIS WAY, IMPLEMENTATION OF THE LATEST SAFETY AND PERFORMANCE IMPROVEMENT CHANGES INTO THE SET IS NOT DELAYED UNTIL THE NEW SERVICE LITERATURE IS PRINTED.

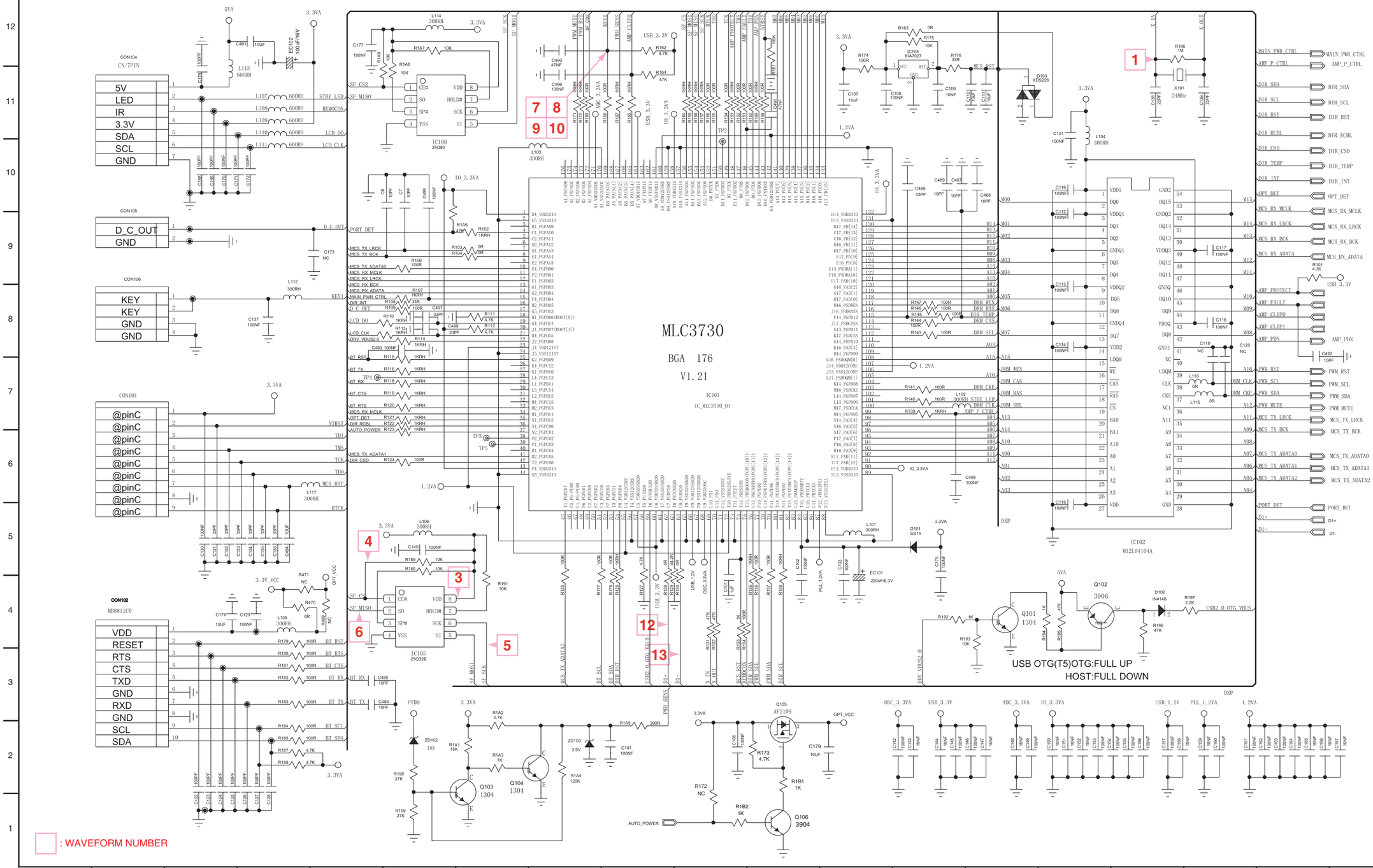
NOTE :

1. Shaded(▨) parts are critical for safety. Replace only with specified part number.
2. Voltages are DC-measured with a digital voltmeter during Play mode.

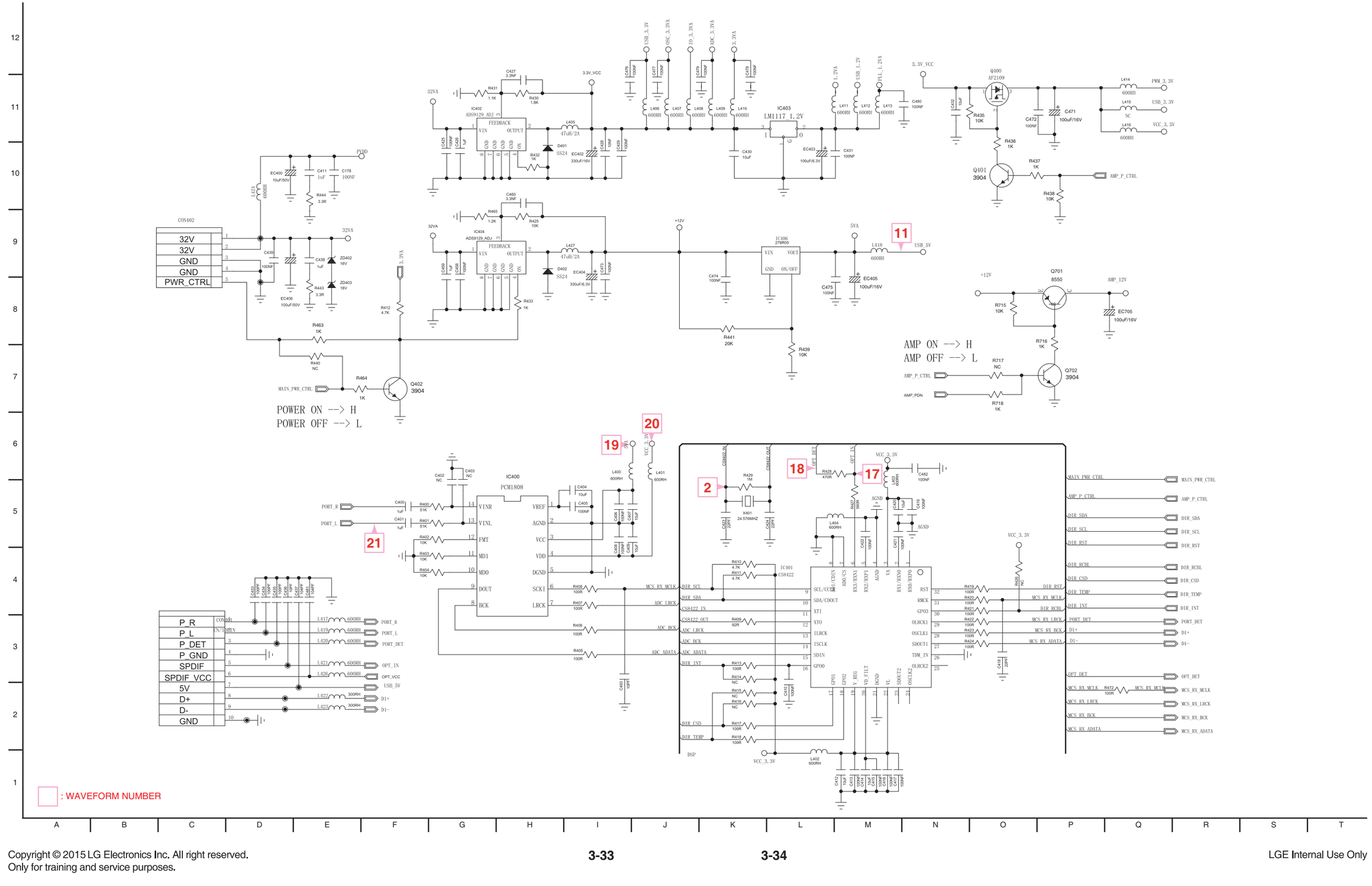
NOTE) ⚠Warning
Parts that are shaded are critical with respect to risk of fire or electrical shock.

NOTES) ⏚ Symbol denotes AC ground.
⏚ Symbol denotes DC chassis ground.

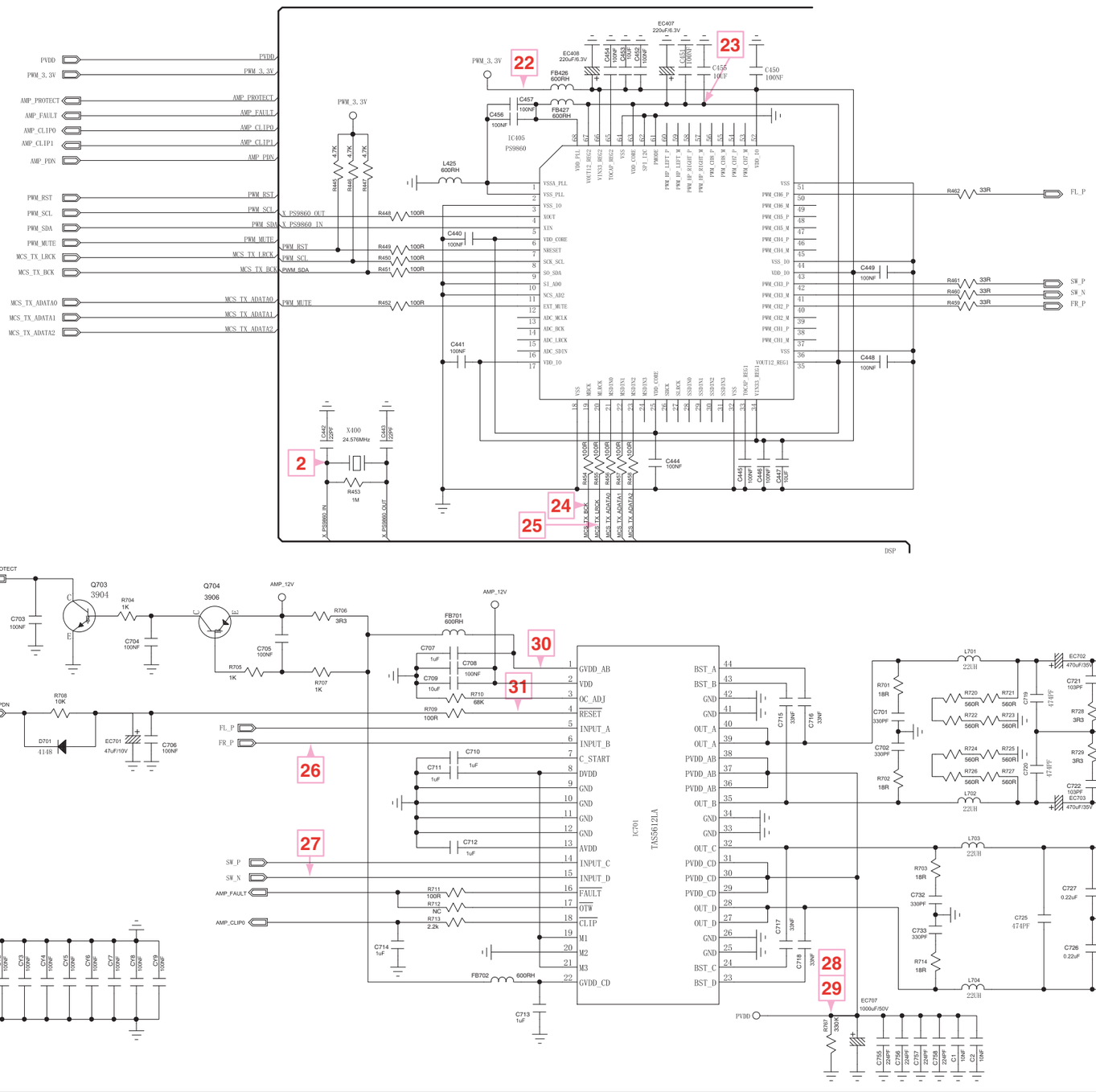
2. MAIN - DSP CIRCUIT DIAGRAM



3. MAIN - POWER CIRCUIT DIAGRAM

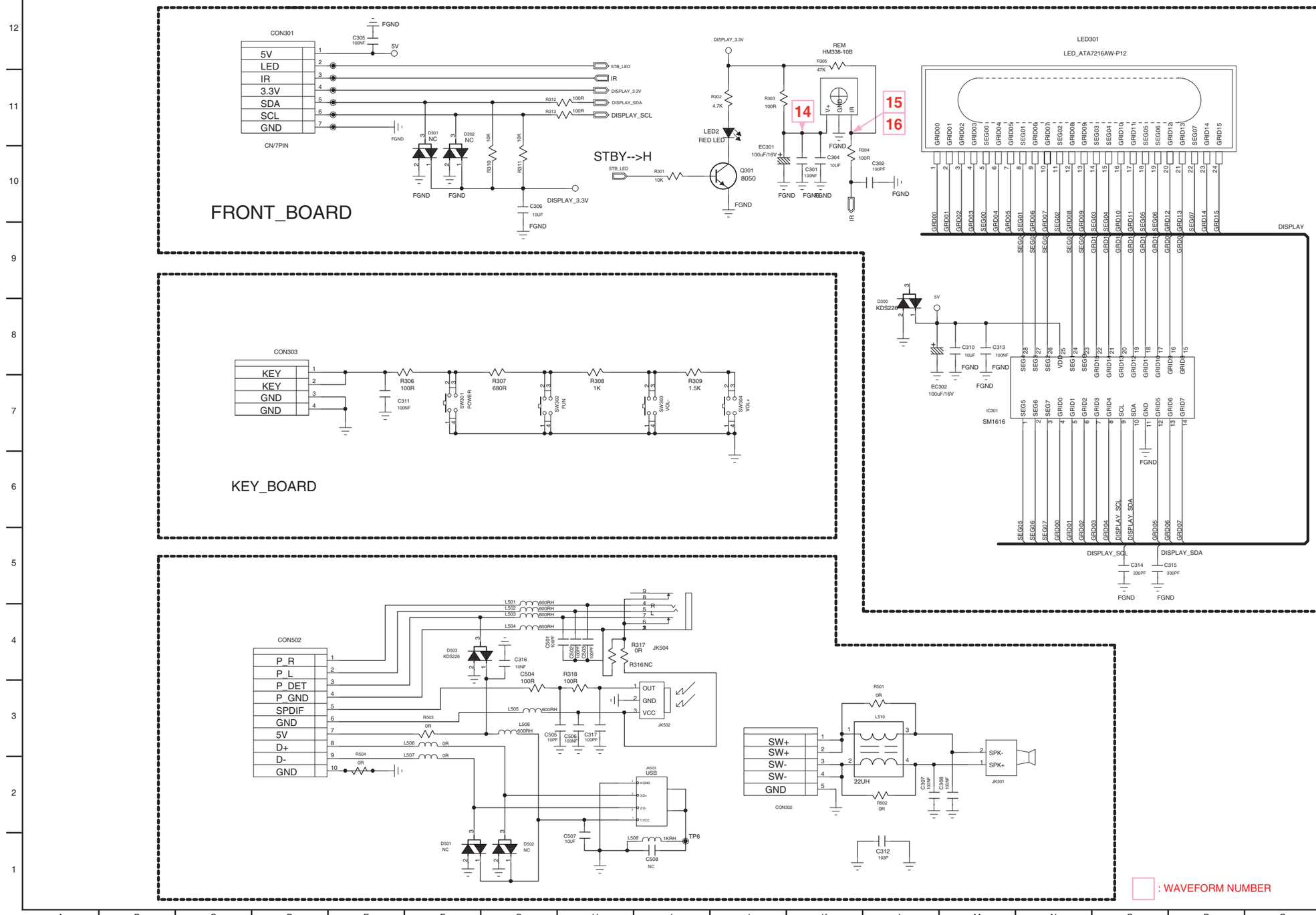


4. MAIN - PWM & AMP CIRCUIT DIAGRAM



: WAVEFORM NUMBER

5. DISPLAY/ KEY/ USB CIRCUIT DIAGRAM



CIRCUIT VOLTAGE CHART

Designator	Description	Pin	Voltage Spec	Measured Voltage
IC101	Digital Signal Processors	1, 43, 90, 132, 158	3.0~3.6 V	3.28 V
		23, 55, 72, 107, 142, 160	1.1~1.3 V	1.19 V
		57, 60, 164(USB_VCC)	3.0~3.6 V	3.28 V
		66(USB_VCC)	1.1~1.3 V	1.19 V
		68(OSC_VCC)	3.0~3.6 V	3.28 V
		87(PLL_VCC)	1.1~1.3 V	1.19 V
IC102	SDRAM	1, 3, 9, 14, 27, 43, 49	3.0~3.6 V	3.28 V
IC105	FLASH	8	3.0~3.6 V	3.28 V
IC106	FLASH	8	3.0~3.6 V	3.28 V
IC400	ADC IC	3	4.75~5.25 V	4.98 V
		4	3.0~3.6 V	3.28 V
IC401	Digital Audio Function	19, 22	3.0~3.6 V	3.28 V
IC402	DC TO DC	1	31~33 V	32 V
		2	3.0~3.6 V	3.28 V
IC404	DC TO DC	1	31~33 V	32 V
		2	11~13 V	11.8 V
IC405	DSP IC	17, 34, 43, 52, 66	3.0~3.6 V	3.28 V
		6, 25, 35, 63, 67	1.1~1.3 V	1.2 V
IC406	LDO IC	1	11~13 V	11.8 V
		2	4.75~5.25 V	4.98 V
IC701	AMP IC	1, 2, 22	11~13 V	11.8 V
		29, 30, 31, 36, 37, 38	31~33 V	32 V

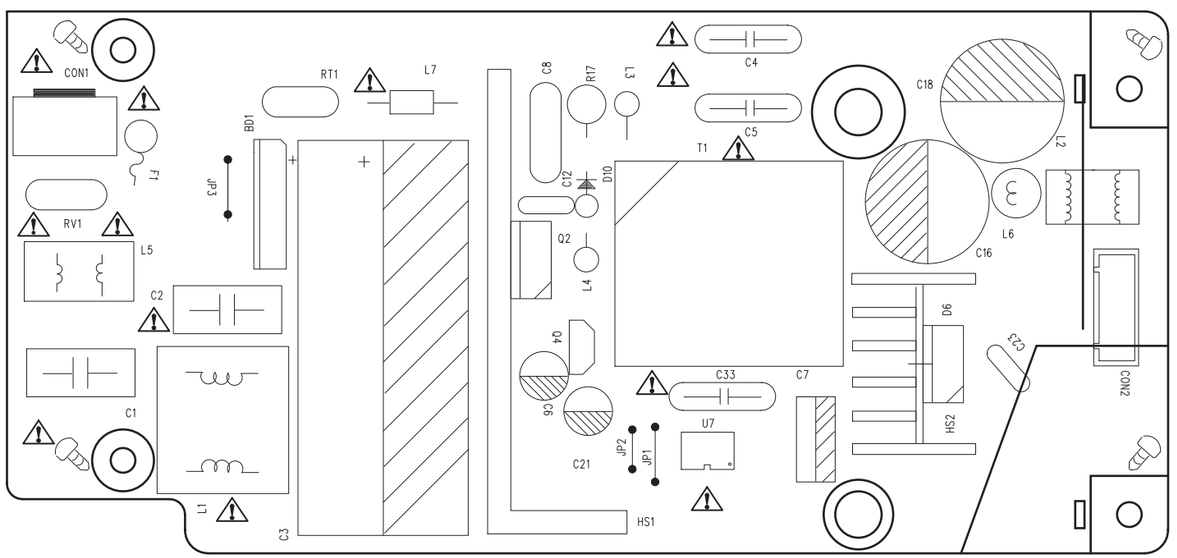
MEMO

PRINTED CIRCUIT BOARD DIAGRAMS

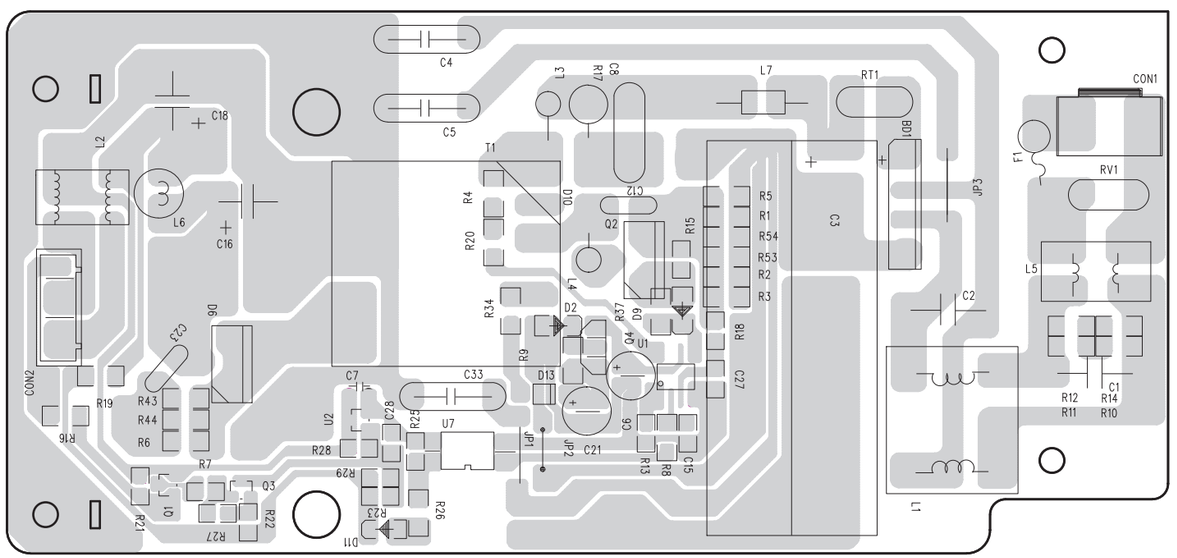
1. SMPS P. C. BOARD DIAGRAM

(TOP VIEW)

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

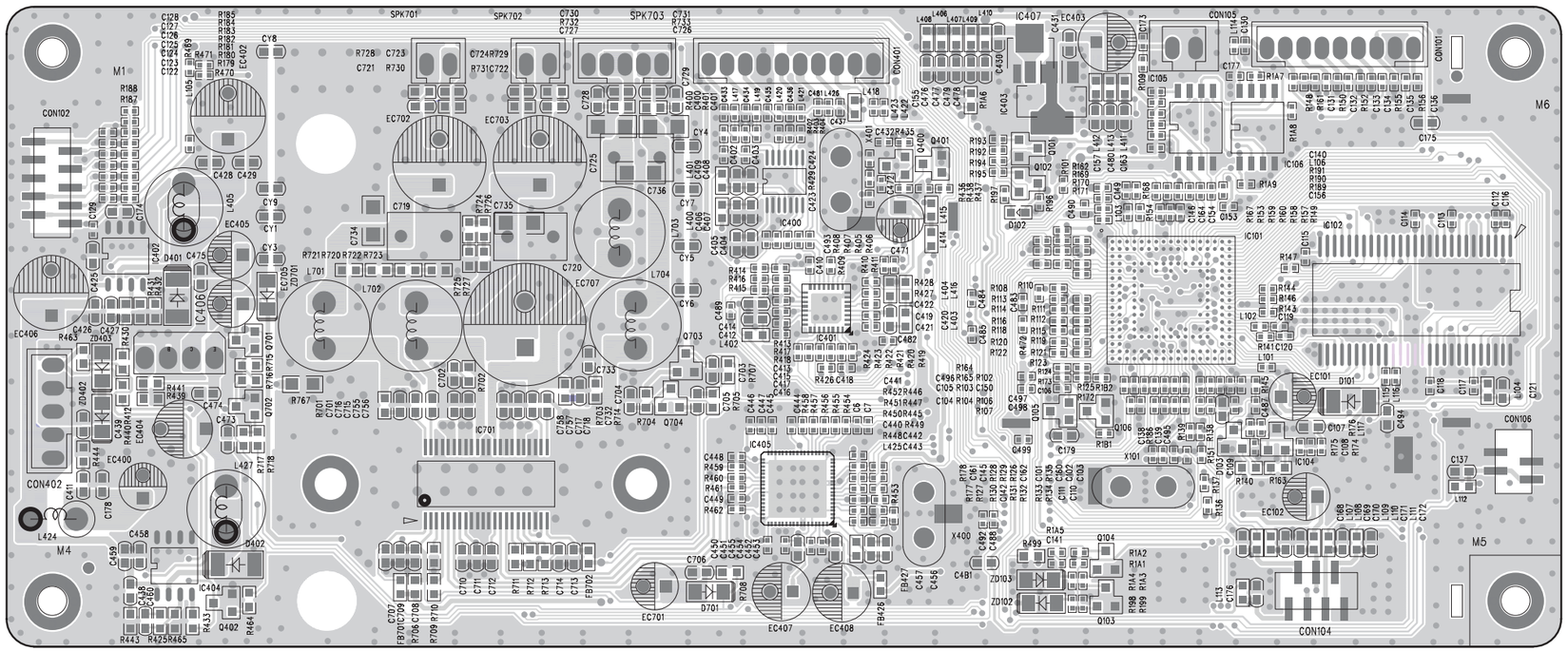


(BOTTOM VIEW)

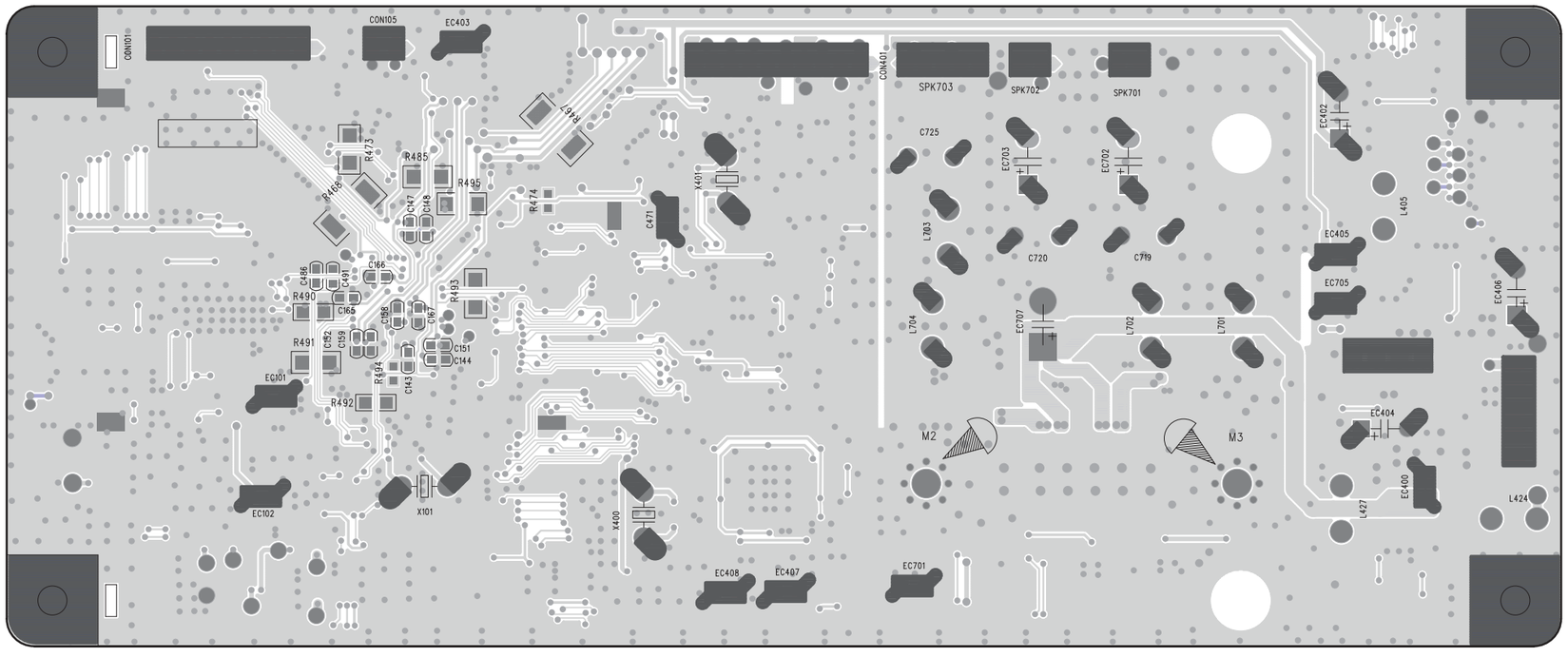


2. MAIN P. C. BOARD DIAGRAM

(TOP VIEW)

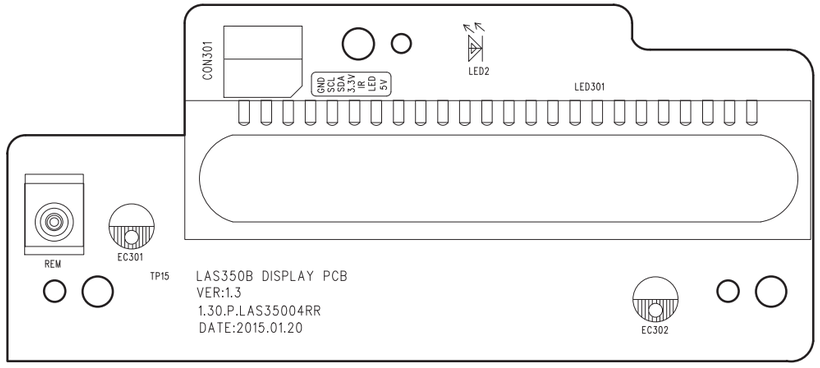


(BOTTOM VIEW)

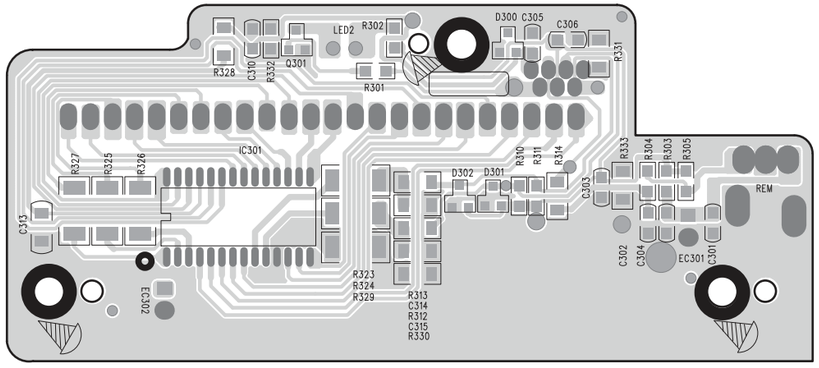


3. DISPLAY P. C. BOARD DIAGRAM

(TOP VIEW)

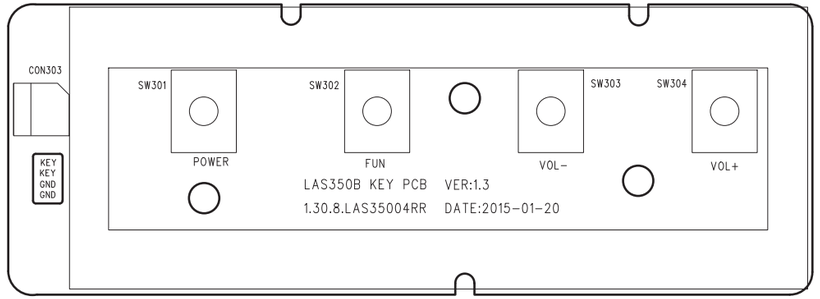


(BOTTOM VIEW)

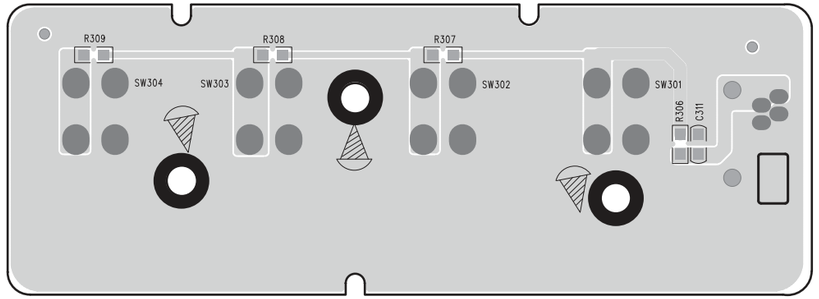


4. KEY P. C. BOARD DIAGRAM

(TOP VIEW)

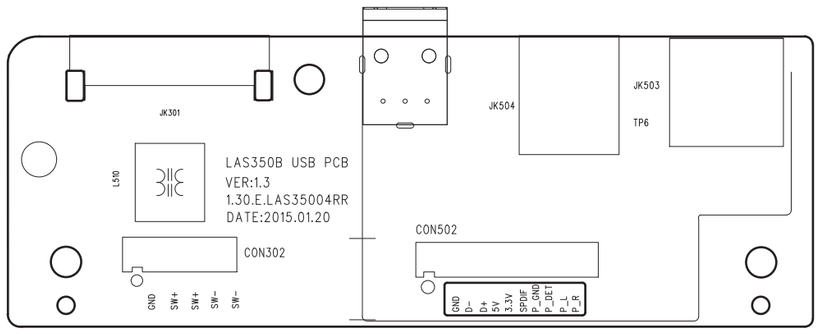


(BOTTOM VIEW)

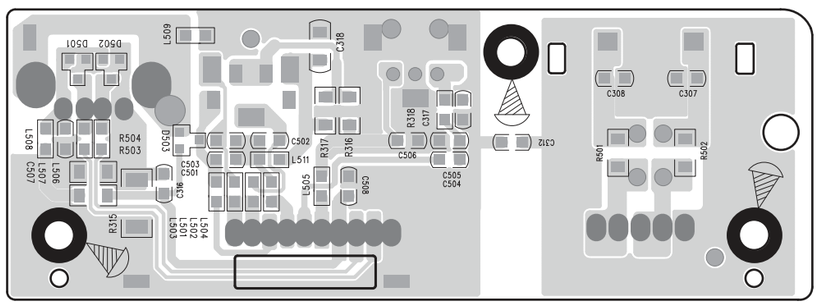


5. USB P. C. BOARD DIAGRAM

(TOP VIEW)



(BOTTOM VIEW)



MEMO

MEMO