Home Theater Soundbar HTL2160C/G/M/S/T/W/12/F7/93

Service
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Service Manual

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CLASS 1
LASER PRODUCT

GB 3141 785 38622

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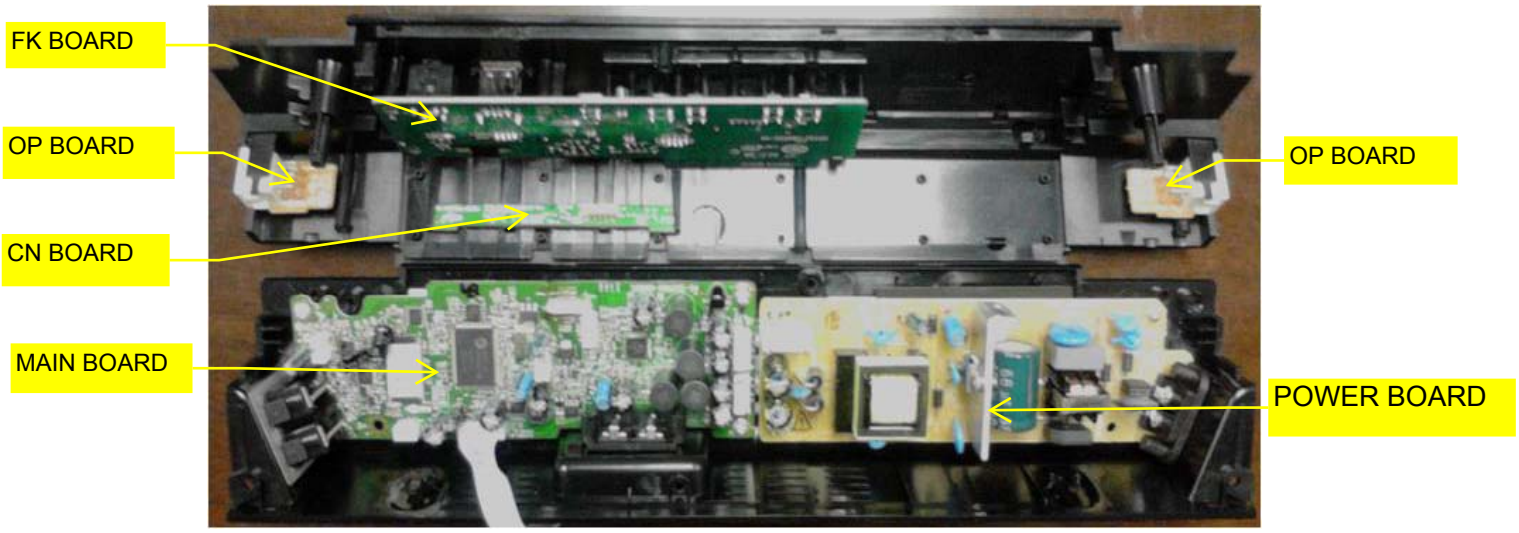
Version 1.2

PHILIPS

PCB BOARD LOCATION:



VERSION VARIATIONS

Type / Versions / Service Policy / Board in used	HTL2160		
	/12	/F7	/93
MAIN BOARD	M	M	M
FRONT BOARD	M	M	M
POWER BOARD	M	M	M
*Tips:	C -- Component Lever Repair M -- Module Lever Repair X -- Used		

HTL2160/12/F7:

Product specifications

Note

- Specifications and design are subject to change without notice.

Amplifier

- Total output power: 40W RMS (+/- 0.5 dB, 10% THD)
- Frequency response: 20 Hz-20 kHz / ±3 dB
- Signal-to-noise ratio: > 65 dB (CCIR) / (A-weighted)
- Input sensitivity:
  - AUX: 650 mV
  - AUDIO-IN: 400 mV

Audio

- S/PDIF Digital audio input:
  - Coaxial: IEC 60958-3
  - Optical: TOSLINK

Main unit

- Power supply: 110-240 V~, 50 Hz - 60 Hz
- Power consumption: 30 W
- Standby power consumption: < 0.5 W
- Speaker impedance: 6 ohm (Tweeter), 4 ohm (Woofer)
- Frequency response: 160 Hz-20 kHz
- Dimensions (WxHxD): 800 x 75.6 x 52.4 mm
- Weight: 3.84 kg

Subwoofer

- Impedance: 8 ohm
- Speaker drivers: 130 mm (5.25") woofer
- Frequency response: 20 Hz-150 Hz
- Dimensions (WxHxD): 165 x 240 x 295 mm
- Weight: 2.6 kg
- Cable length: 3 m

Remote control batteries

- 1 x CR2025

HTL2160/93:

Product specifications

Note

- Specifications and design are subject to change without notice.

Amplifier

- Total output power: 60W RMS (+/- 0.5 dB, 10% THD)
- Frequency response: 20 Hz-20 kHz / ±3 dB
- Signal-to-noise ratio: > 65 dB (CCIR) / (A-weighted)
- Input sensitivity:
  - AUX: 2 V
  - AUDIO-IN: 1V

Audio

- S/PDIF Digital audio input:
  - Coaxial: IEC 60958-3
  - Optical: TOSLINK

USB

- Compatibility: Full-Speed USB (2.0)
- Class support: USB Mass Storage Class (MSC)
- File system: FAT16 and FAT32
- Supports MP3 and WMA file formats
- Sampling frequency:
  - MP3: 8 kHz, 11 kHz, 12 kHz, 16 kHz, 22 kHz, 24 kHz, 32 kHz, 44.1 kHz, 48 kHz
  - WMA: 44.1 kHz, 48 kHz
- Constant bit rate:
  - MP3: 8 kbps-320 kbps
  - WMA: 32 kbps-192 kbps
- Version:
  - WMA: V7, V8, V9

Bluetooth

- Bluetooth profiles: A2DP
- Bluetooth version: 2.1 + EDR

Main unit

- Power supply: 220-240 V~, 50 Hz - 60 Hz
- Power consumption: 30 W
- Standby power consumption: ≤ 0.5 W
- Speaker impedance: 8 ohm (Tweeter), 4 ohm (Woofer)
- Frequency response: 160 Hz-20 kHz
- Dimensions (WxHxD): 800 x 75.6 x 52.4 mm
- Weight: 1.2 kg
- Operating temperature and humidity: 0°C to 40°C, 5% to 90% Humidity for all climates
- Storage temperature and humidity: -40 °C to 70 °C, 5% to 95%

Subwoofer

- Impedance: 8 ohm
- Speaker drivers: 130 mm (5.25") woofer
- Frequency response: 45 Hz-200 Hz
- Dimensions (WxHxD): 165 x 240 x 295 mm
- Weight: 2.6 kg
- Cable length: 3 m

Remote control batteries

- 1 x CR2025

Safety instruction, Warning & Notes

Safety instruction

1. General safety

Safety regulations require that during a repair:

. Connect the unit to the mains via an isolation transformer.

. Replace safety components indicated by the symbol ⚠, only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard.

Safety regulations require that after a repair, you must return the unit in its original condition. Pay, in particular, attention to the following points:

. Route the wires/cables correctly, and fix them with the mounted cable clamps.

. Check the insulation of the mains lead for external damage.

. Check the electrical DC resistance between the mains plug and the secondary side:

1) Unplug the mains cord, and connect a wire between the two pins of the mains plug.
2) Set the mains switch the "on" position (keep the mains cord unplug).
3) Measure the resistance value between the mains plug and the front panel, controls, and chassis bottom.
4) Repair or correct unit when the resistance measurement is less than 1MΩ.
5) Verify this, before you return the unit to the customer/user (ref. UL-standard no. 1492).
6) Switch the unit "off", and remove the wire between the two pins of the mains plug.

2.Laser safety

This unit employs a laser. Only qualified service personnel may remove the cover, or attempt to service this device (due to possible eye injury).

Laser device unit

Type : Semiconductor laser GaAlAs

Wavelength : 650nm (DVD)

: 780nm (VCD/CD)

Output power : 7mW (DVD)

: 10mW (DVD /CD)

Beam divergence: 60 degree

Note: Use of controls or adjustments or performance of procedure other than those specified herein, may result in hazardous radiation exposure. Avoid direct exposure to beam.

Warning

1.General

. All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD). Careless handing during repair can reduce life drastically. Make sure that, during repair, you are at the same potential as the mass of the set by a wristband with resistance. Keep components and tools at this same potential. Available ESD protection equipment:

1) Complete kit ESD3 (small tablemat, wristband, connection box, extension cable and earth cable) 4822 310 10671.
2) Wristband tester 4822 344 13999.

. Be careful during measurements in the live voltage section. The primary side of the power supply , including the heat sink, carries live mains voltage when you connect the player to the mains (even when the player is “off”!). It is possible to touch copper tracks and/or components in this unshielded primary area, when you service the player. Service personnel must take precautions to prevent touching this area or components in this area. A “lighting stroke” and a stripe-marked printing on the printed wiring board, indicate the primary side of the power supply.

. Never replace modules, or components, while the unit is “on”.

2. Laser

. The use of optical instruments with this product, will increase eye hazard.

. Only qualified service personnel may remove the cover or attempt to service this device, due to possible eye injury.

. Repair handing should take place as much as possible with a disc loaded inside the player.

. Text below is placed inside the unit, on the laser cover shield:

CAUTION: VISIBLE AND INVISIBLE LASER RADIATION WHEN OPEN, AVOID EXPOSURE TO BEAM.

Service Hints

CAUTION

CHARGED CAPACITORS ON THE SERVO BOARD MAY DAMAGE THE DRIVE ELECTRONICS WHEN CONNECTING A NEW DRIVE.THAT'S WHY, BESIDES THE SAFETY MEASURES LIKE

- **SWITCH OFF POWER SUPPLY**
- **ESD PROTECTION**

ADDITIONAL ACTIONS MUST BE TAKEN BY THE REPAIR TECHNICIAN.

The following steps have to be done when replacing the defective loader :

1. Dismantling of the loader to access the ESD protection point if necessary.
2. **Solder the ESD protection point*.**
3. Disconnect flexfoil cable from the defective loader.
4. Put a paper clip on the flexfoil to short-circuit the contacts (fig.1)
5. Replace the defective loader with a new loader.
6. Remove paperclip from the flexfoil and connect it to the new loader.
7. Remove solder joint on the ESD protection point.

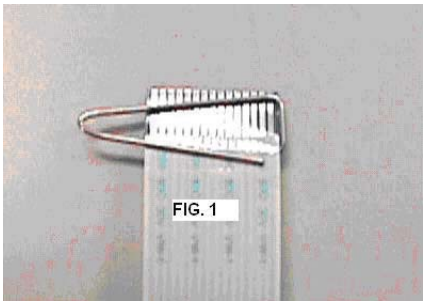
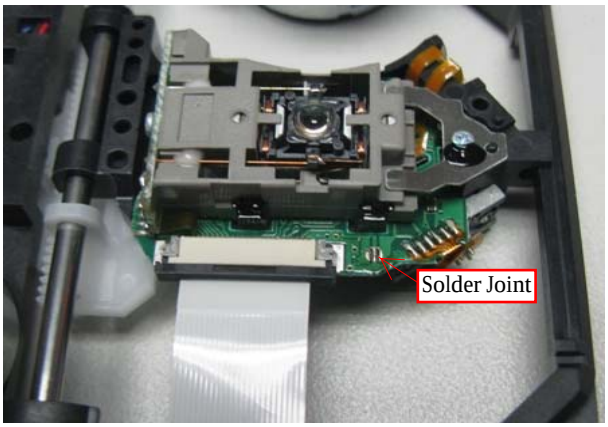


FIG. 1

ATTENTION: The laser diode of this loader is protected against ESD by a solder joint which shortcircuits the laserdiode to ground. For proper functionality of the loader this solder joint must be remove **after** connection loader to the set.



(ESD protection point is accessible from top of loader)

Only applicable for defective loader needed to be sent back to supplier for failure analysis and to support backcharging evidence.
This is also applicable for all partnership workshops.

Notes

Lead-Free requirement for service

INDENTIFICATION:

Regardless of special logo (not always indicated) 

One must treat all sets from 1.1.2005 onwards, according next rules.

Important note: In fact also products a little older can also be treated in this way as long as you avoid mixing solder-alloys (leaded/ lead-free). So best to always use SAC305 and the higher temperatures belong to this.

Due to lead-free technology some rules have to be respected by the workshop during a repair:

- Use only lead-free solder alloy Philips SAC305 with order code 0622 149 00106. If lead-free solder-paste is required, please contact the manufacturer of your solder-equipment. In general use of solder-paste within workshops should be avoided because paste is not easy to store and to handle.
- Use only adequate solder tools applicable for lead-free solder alloy. The solder tool must be able
  - To reach at least a solder-temperature of 400°C,
  - To stabilize the adjusted temperature at the solder-tip
  - To exchange solder-tips for different applications.
- Adjust your solder tool so that a temperature around 360°C – 380°C is reached and stabilized at the solder joint. Heating-time of the solder-joint should not exceed ~ 4 sec. Avoid temperatures above 400°C otherwise wear-out of tips will rise drastically and flux-fluid will be destroyed. To avoid wear-out of tips switch off un-used equipment, or reduce heat.
- Mix of lead-free solder alloy / parts with leaded solder alloy / parts is possible but PHILIPS recommends strongly to avoid mixed
  solder alloy types (leaded and lead-free). If one cannot avoid, clean carefully the
  solder-joint from old solder alloy and re-solder with new solder alloy (SAC305).
- Use only original spare-parts listed in the Service-Manuals. Not listed standard-material (commodities) has to be purchased at external companies.
- Special information for BGA-ICs:
  - always use the 12nc-recognizable soldering temperature profile of the specific BGA (for de-soldering always use highest lead-free temperature profile, in case of doubt)
  - lead free BGA-ICs will be delivered in so-called 'dry-packaging' (sealed pack including a silica gel pack) to protect the IC against moisture. After opening, dependent of MSL-level seen on indicator-label in the bag, the BGA-IC possibly still has to be baked dry. This will be communicated via AYS-website.
  Do not re-use BGAs at all.
- For sets produced before 1.1.2005, containing leaded soldering-tin and components, all needed spare-parts will be available till the end of the service-period. For repair of such sets nothing changes.
- On our website:
  www.atyourservice.ce.Philips.com

You find more information to:

BGA-de-/soldering (+ baking instructions)
Heating-profiles of BGAs and other ICs used in Philips-sets

You will find this and more technical information within the "magazine", chapter "workshop news".

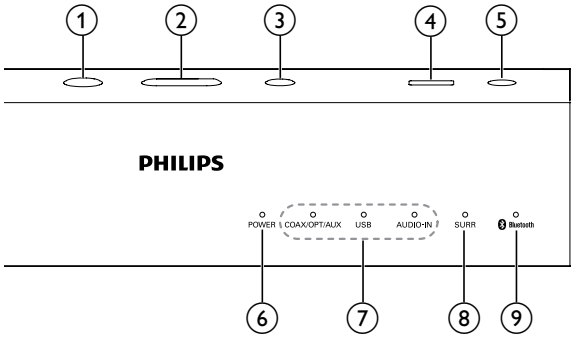
For additional questions please contact your local repair-helpdesk.

DFU Instrution

Congratulations on your purchase, and welcome to Philips! To fully benefit from the support that Philips offers, register your SoundBar at www.philips.com/welcome.

Main unit

This section includes an overview of the main unit.



① ⏻
Switch the SoundBar on or to standby.

② VOLUME +-
Increase or decrease volume.

③ SOURCE
Select an audio source for the SoundBar.

④ •⇠
Connect a USB flash drive.

⑤ AUDIO IN
Audio input jack (3.5mm) for an external audio device.

⑥ Power
Lights up when you switch on the SoundBar.

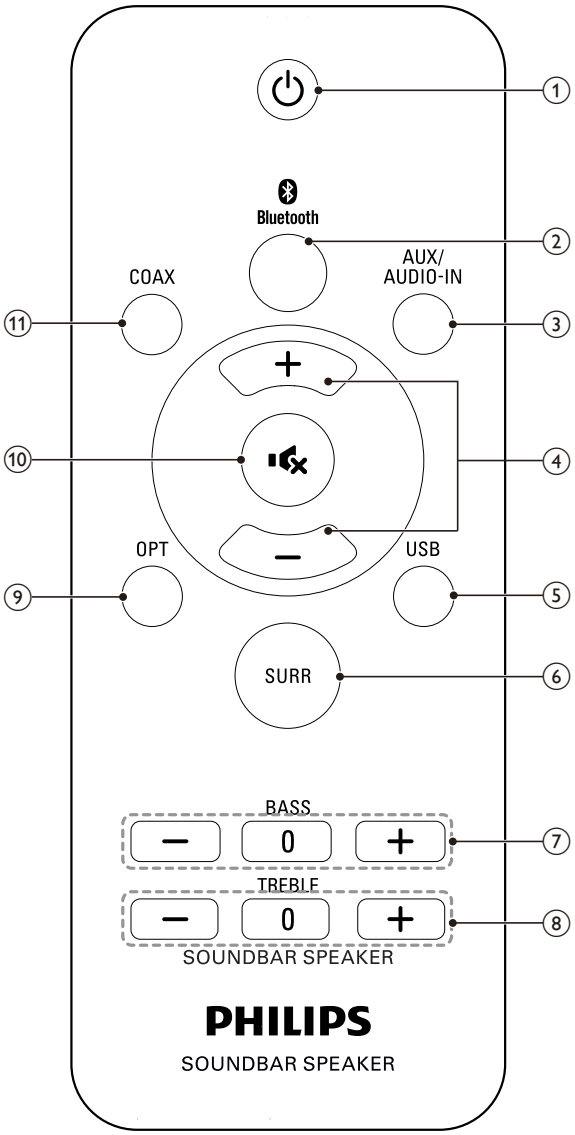
⑦ Source indicators
- COAX/OPT/AUX: Lights up when you switch to coaxial, optical or analog audio input source.
- USB: Lights up when you switch to the USB source.
- AUDIO-IN: Lights up when you switch to the audio input source.

⑧ SURR
Lights up when you select Virtual Surround sound.

⑨ Bluetooth
Lights up when you switch to the Bluetooth mode.

Remote control

This section includes an overview of the remote control.



① ⏻ (Standby-On)
Switch the SoundBar on or to standby.

② COAXIAL
Switch your audio source to the coaxial connection.

③ USB
Switches to USB storage device.

④ OPTICAL
Switch your audio source to the optical connection.

⑤ Bluetooth
Switch to Bluetooth mode.

⑥ TREBLE +/-
Increase or decrease treble.

⑦ SURR
Toggle between stereo and virtual surround sound.

⑧ 🔇
Mute or restore volume.

⑨ BASS +/-
Increase or decrease bass.

⑩ +/-
Increase or decrease volume.

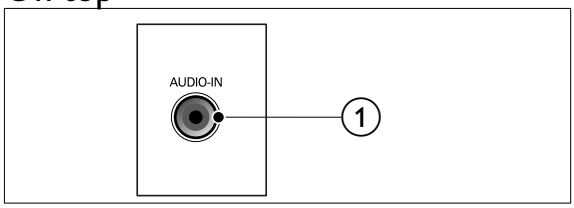
⑪ AUDIO-IN
Switch your audio source to audio in connection.

⑫ AUX
Switch your audio source to the AUX connection.

Connectors

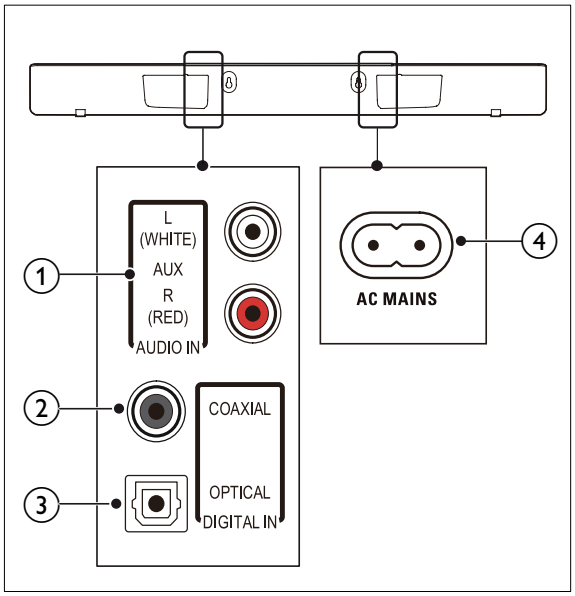
This section includes an overview of the connectors available on your SoundBar.

On top



① AUDIO-IN
Audio input from an MP3 player.

Rear connectors



① AUDIO IN-AUX
Connect to an analog audio output on the TV or an analog device.

② DIGITAL IN-COAXIAL
Connect to a coaxial audio output on the TV or a digital device.

③ DIGITAL IN-OPTICAL
Connect to an optical audio output on the TV or a digital device.

④ AC MAINS~
Connect to the power supply.

Connect

This section helps you connect your SoundBar to a TV and other devices.
For information about the basic connections of your SoundBar and accessories, see the quick start guide.

Note

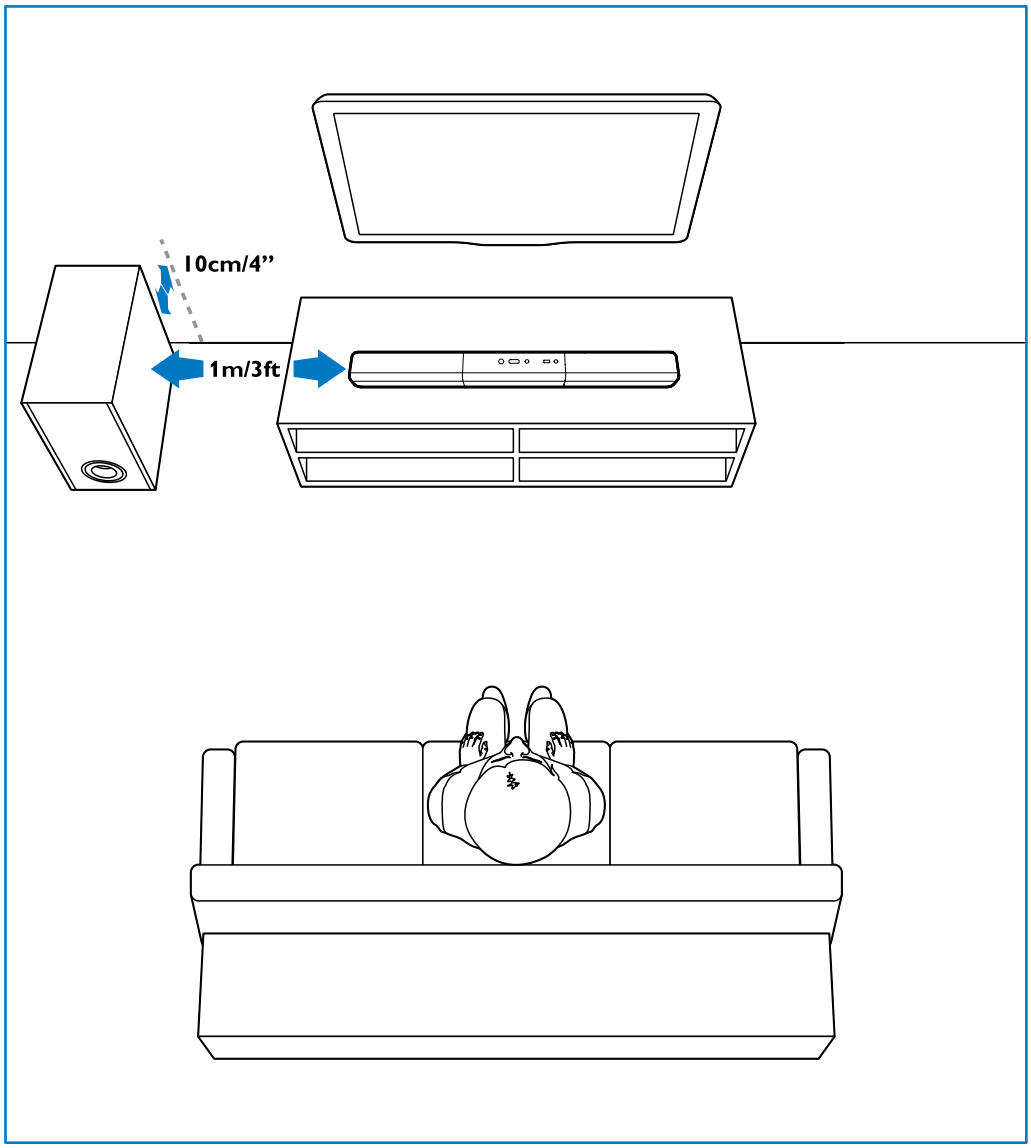
- For identification and supply ratings, refer to the type plate at the back or bottom of the product.
- Before you make or change any connections, make sure that all devices are disconnected from the power outlet.

Subwoofer

Follow the steps below to position and connect your subwoofer.

Position

Place the subwoofer at least one meter (three feet) away from either to the left or right of your SoundBar, and ten centimeter away from the wall.
For best results, place your subwoofer as shown below.



Connect

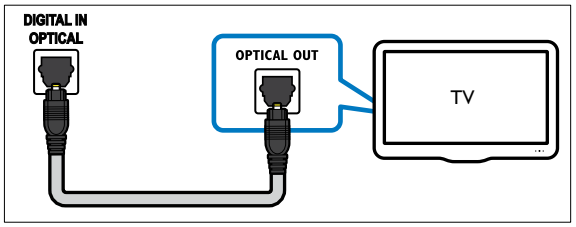
Connect your subwoofer to your SoundBar as described in the quick start guide.

Connect audio from TV and other devices

Play audio from TV or other devices through your Soundbar speakers.
Use the best quality connection available on your TV, Soundbar, and other devices.

Option 1: Connect audio through a digital optical cable

Best quality audio



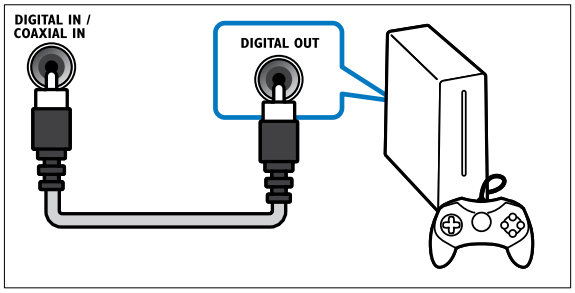
1 Using an optical cable, connect the **OPTICAL** connector on your SoundBar to

the **OPTICAL OUT** connector on the TV or other device.

- The digital optical connector might be labeled **SPDIF** or **SPDIF OUT**.

Option 2: Connect audio through a digital coaxial cable

Best quality audio



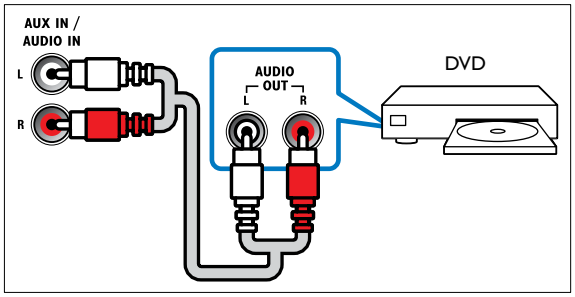
1 Using a coaxial cable, connect the **COAXIAL** connector on your SoundBar to the **COAXIAL/DIGITAL OUT** connector on the TV or other device.

- The digital coaxial connector might be labeled **DIGITAL AUDIO OUT**.

Option 3: Connect audio through analog audio cables

Basic quality audio

1 Using an analog cable, connect the **AUX** connectors on your SoundBar to the **AUDIO OUT** connectors on the TV or other device.



Mechanical and Dismantling Instructions

Dismantling Instruction

Detailed information please refer to the model set.

The following guidelines show how to dismantle the player.

Step1: Dismantle the Right Speaker and Left Speaker. Remove 4 screws on the Bottom Cover. Then pull out the speakers.(Figure 1)

(Figure 1)

Step2: Open the Top Cover.Remove 6 screws on the Bottom Cover. Then open the Top Cover and Bottom Cover. (Figure 2)

Disconnect connectors(XP3,XP4,XP5,XP8,XP9)(FIgure 3)

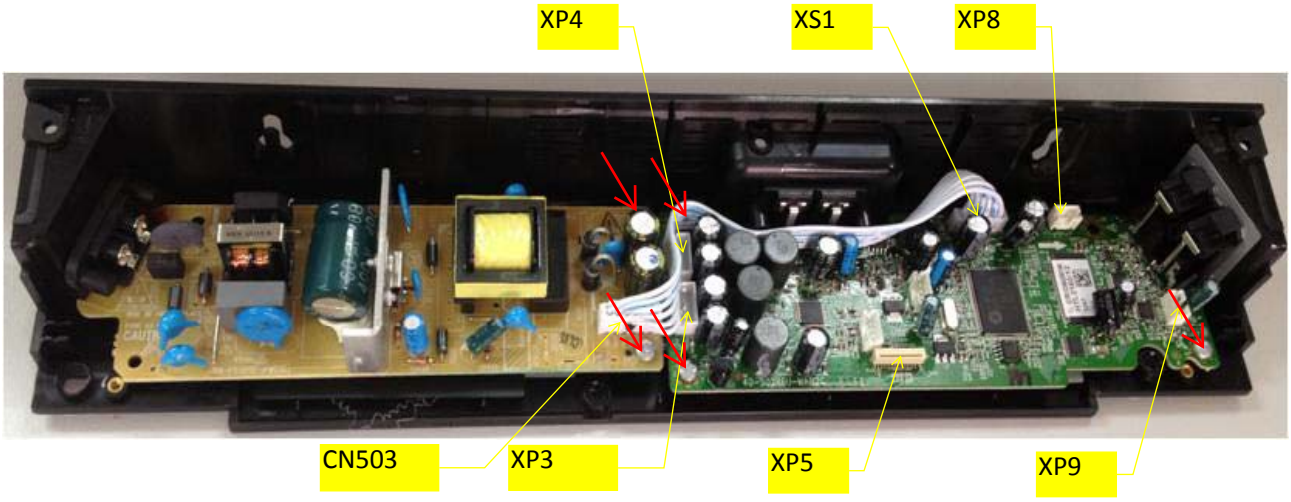
(Figure 2)

Mechanical and Dismantling Instructions

Dismantling Instruction

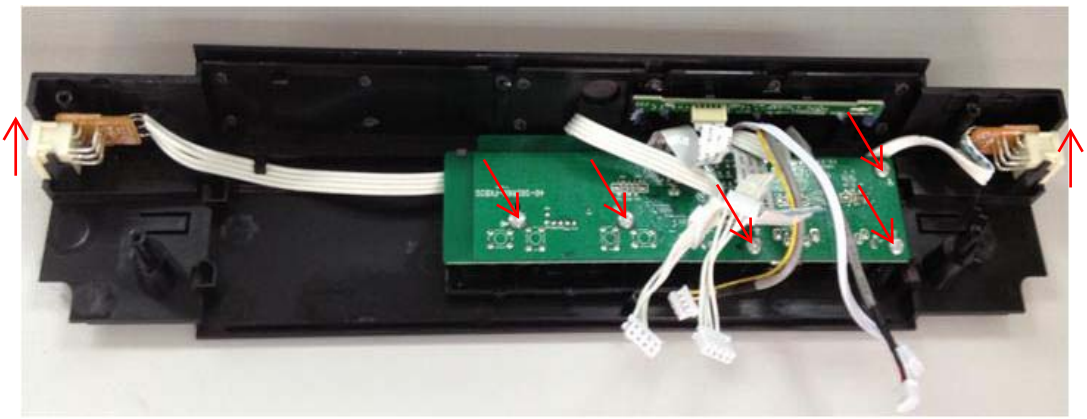
Detailed information please refer to the model set.

Step3: Dismantle the Power Board and Main Board.remove 5 screws on the boards and 3 screws on the Bottom Cover. Disconnect connector CN503. Pull out the Main Board,then pull out the Power Board.(Figure 3)



(Figure 3)

Step4: Dismantle the Front and key board. Pull up 2 OP boards, remove 5 screws on the board. Then pick up the board.(Figure 4)



(Figure 4)

Software Upgrade

Step1: Main board software Update procedure:

1. Rename upgrade file to mpeg2160_XX.bin (XX means different area code).

   Copy mpeg2160_XX.bin to root directly of USB disk.

2. Plug USB in ,then Switch source to USB

   It will be auto upgrade software and all LEDs will turn on while upgrading,

   Strongly suggest do not operate it when upgrading.

3. The source will switch to AUX after upgrade successful.

Step 2: LED board software Update procedure:

1. Rename upgrade file to mcu_2160.bin Copy mcu_2160.bin to root directory of USB disk.

2. Plug USB in ,then switch source to USB

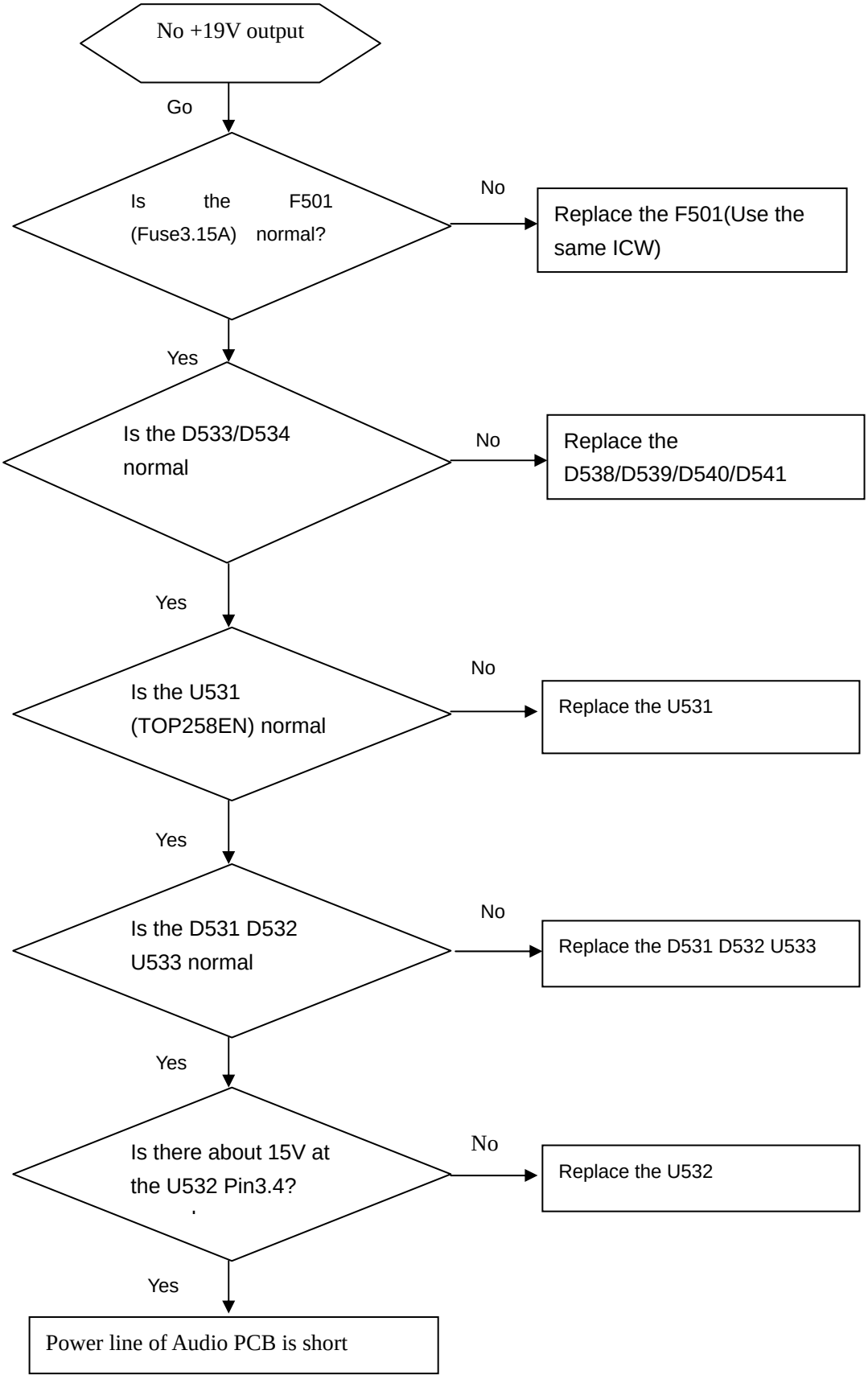
   It will be auto upgrade software and all LEDs will turn on while upgrading,

   Strongly suggest do not operate it when upgrading.

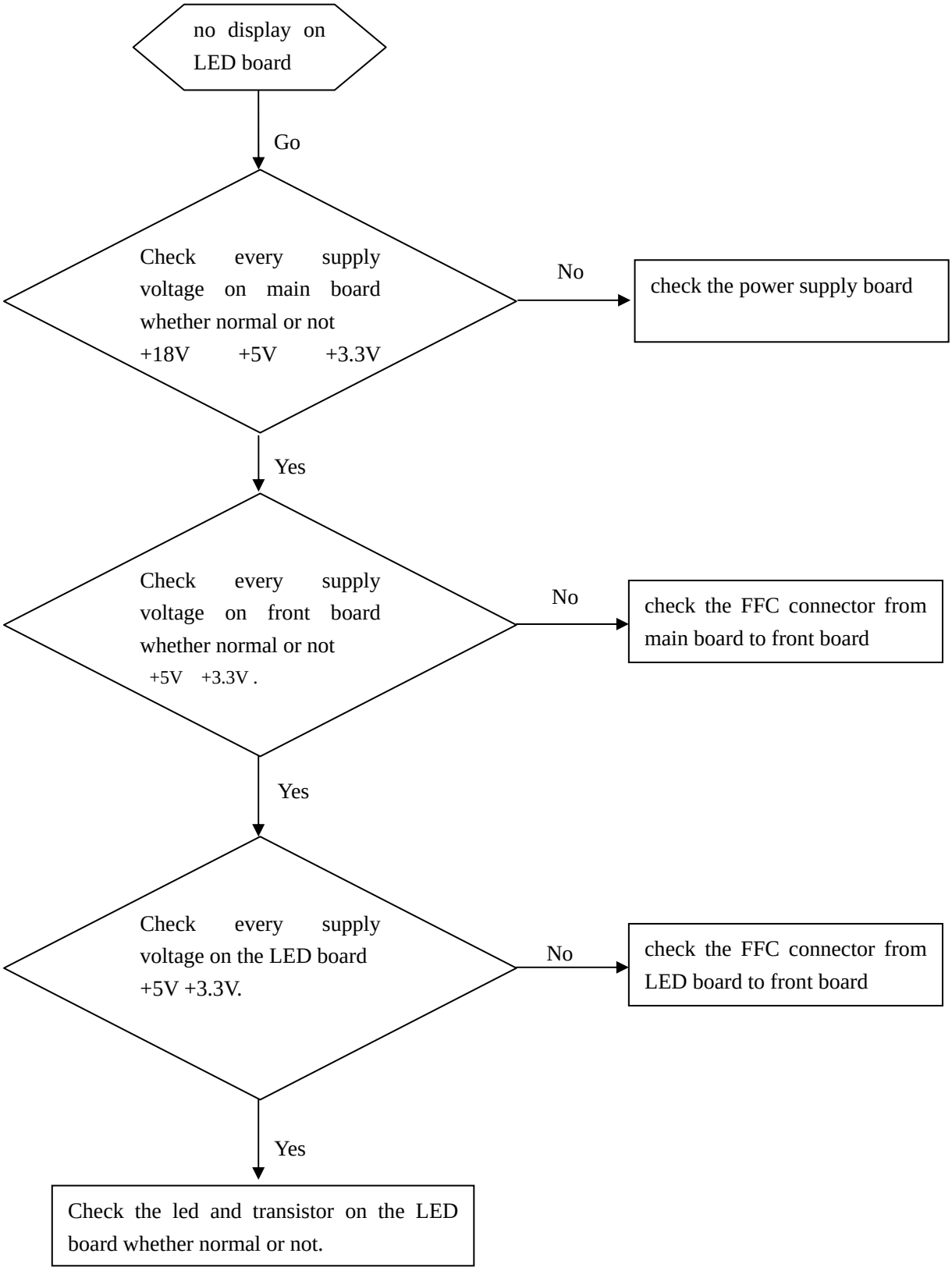
3. All LEDs will blink two times after upgrade successful. Then machine will reboot.

Warning: never copy mpeg2160_XX.bin and mcu_2160.bin to root directory of USB at the same time.

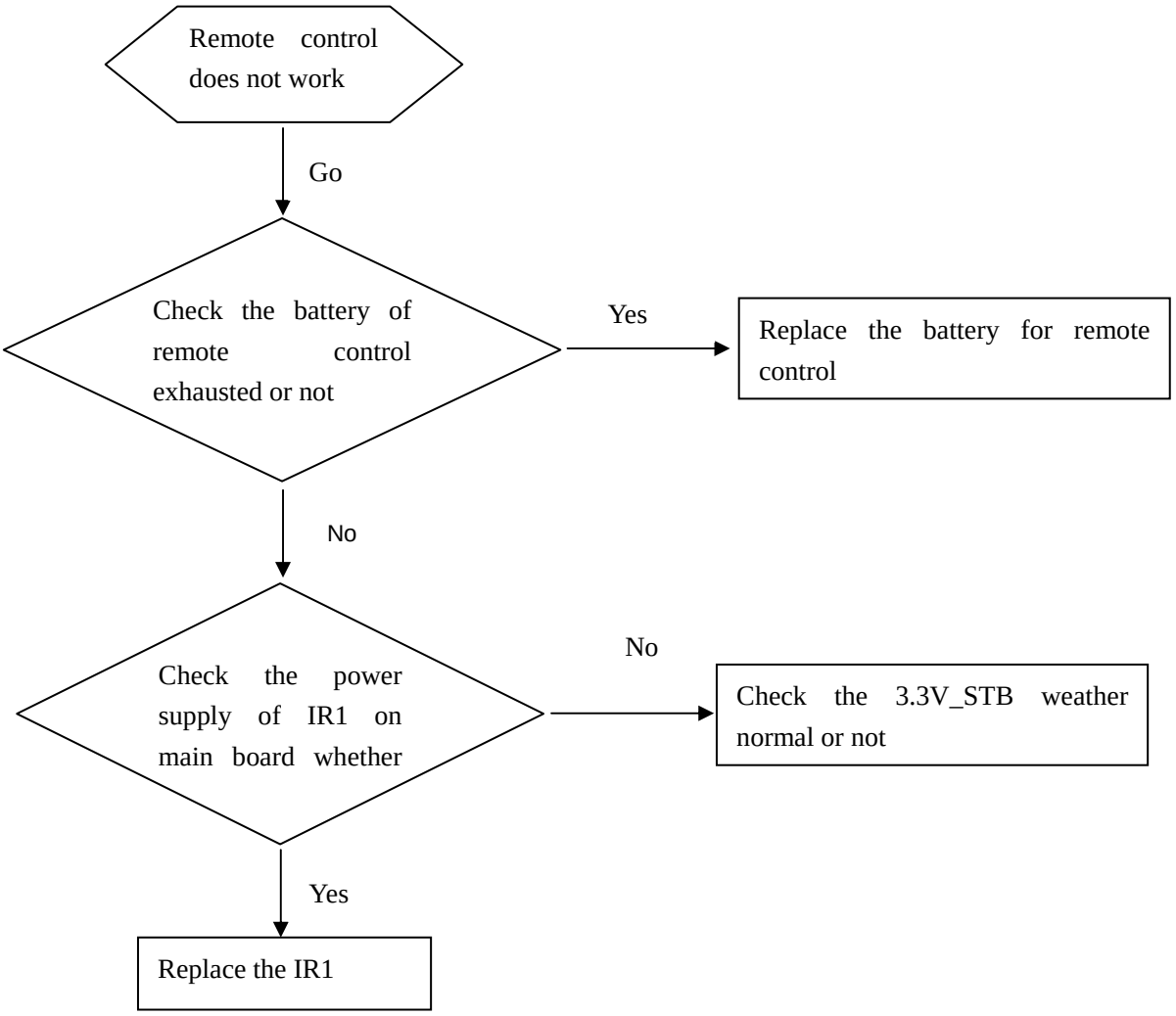
No +19V output



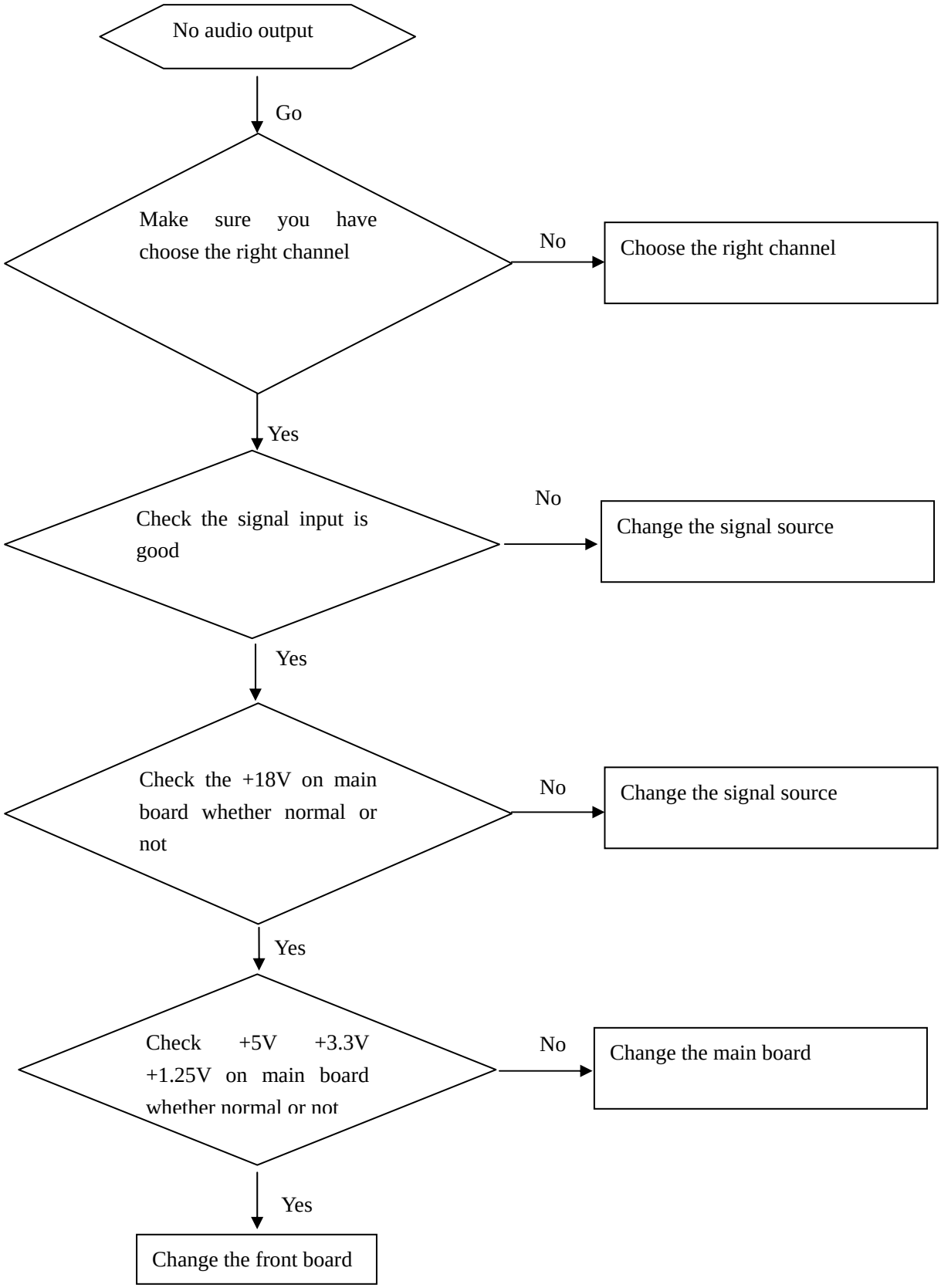
LED no display on LED board



Remote control does not work

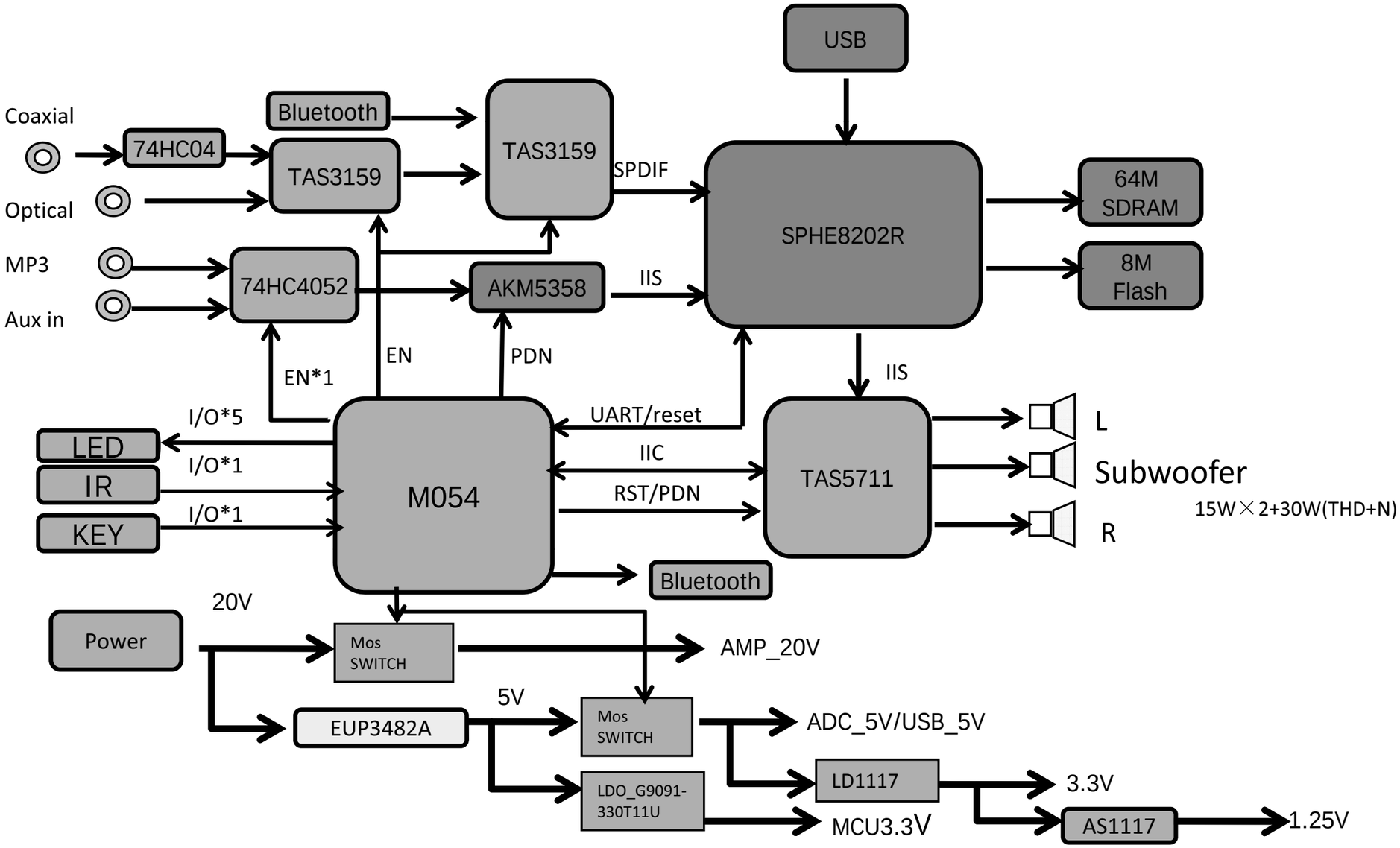


No audio output



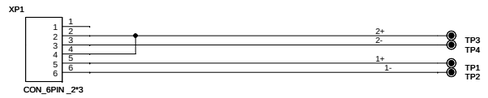
6-1

Block Diagram for HTL2160:



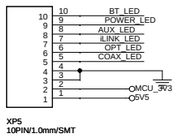
7-1

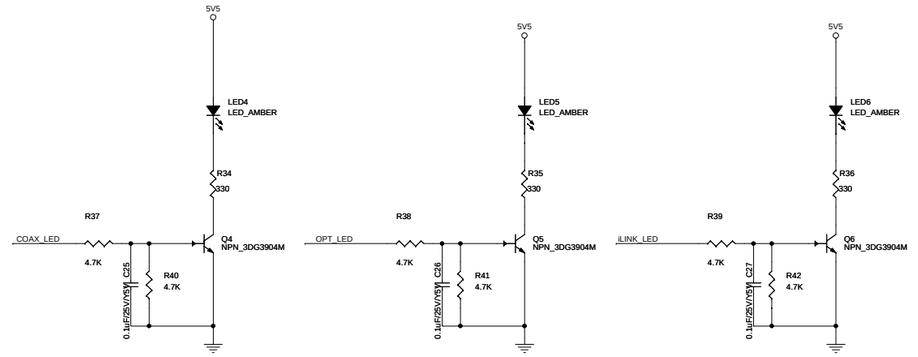
OP Board Circuit Diagram for HTL2160/12/F7/93:

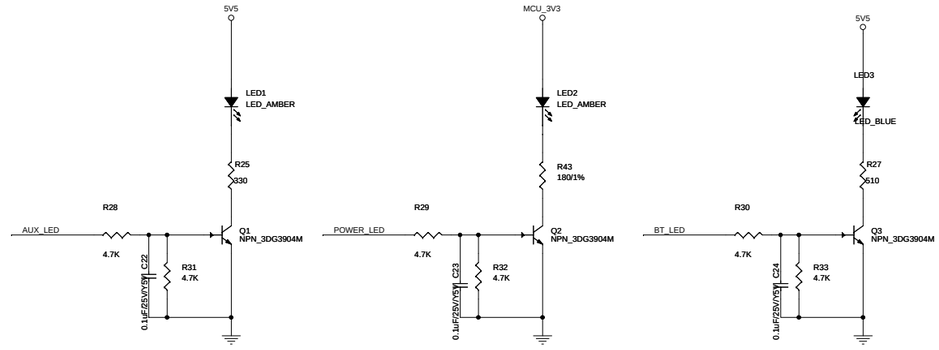


7-2

CN Board Circuit Diagram for HTL2160/12/F7/93:

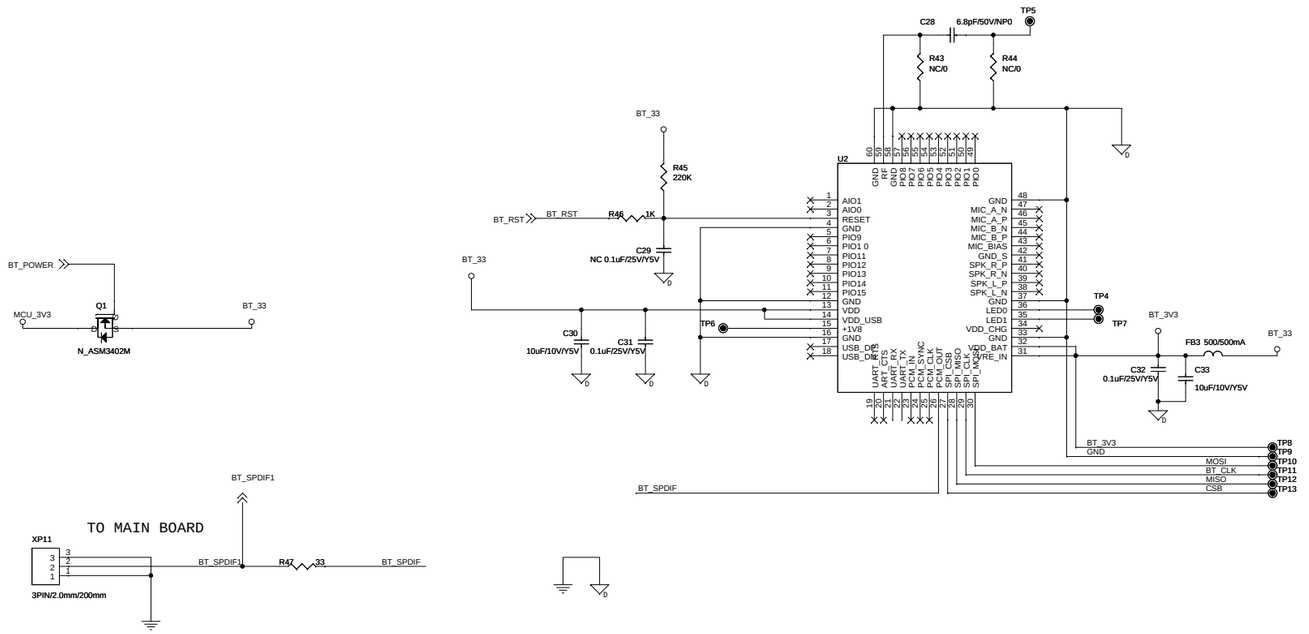






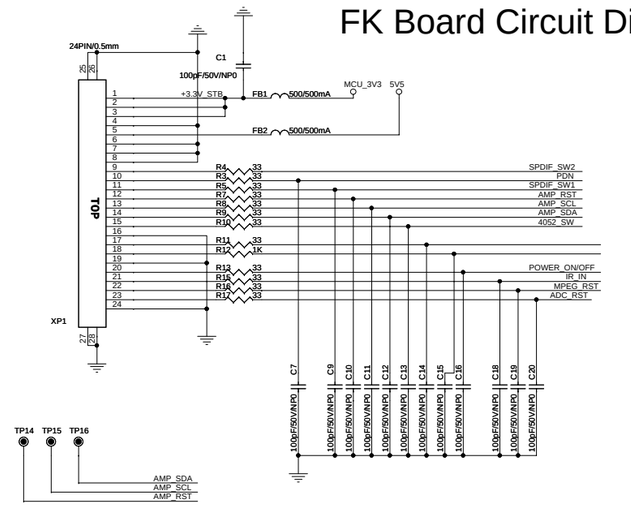
7-3

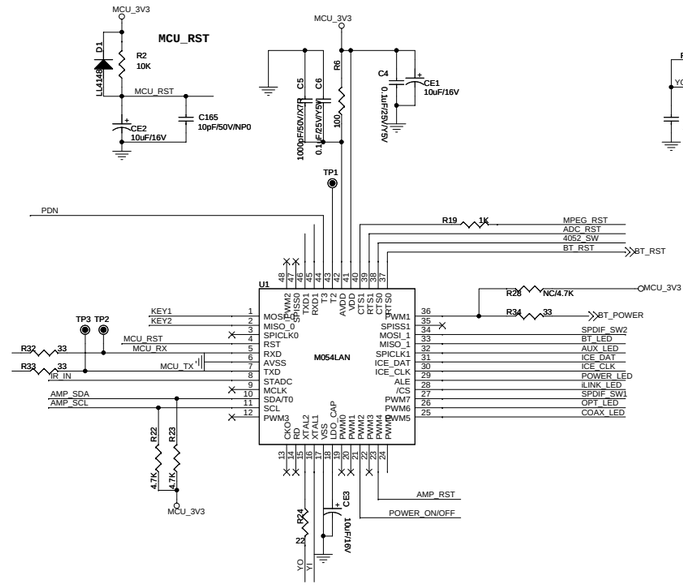
FK Board Circuit Diagram for HTL2160/12/F7/93:

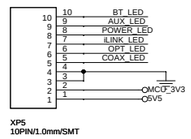


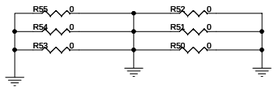
7-4

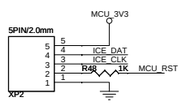
FK Board Circuit Diagram for HTL2160/12/F7/93:

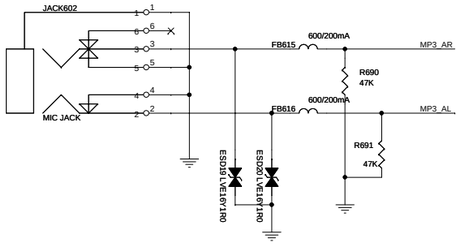


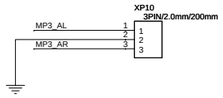


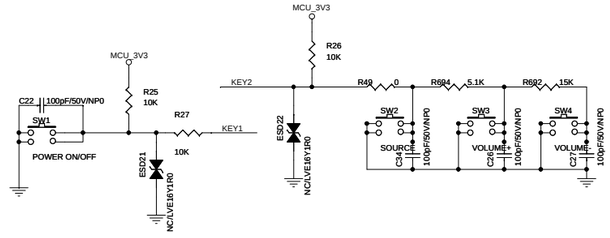


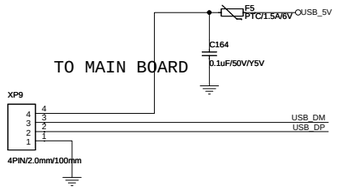


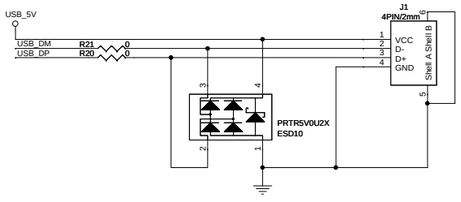






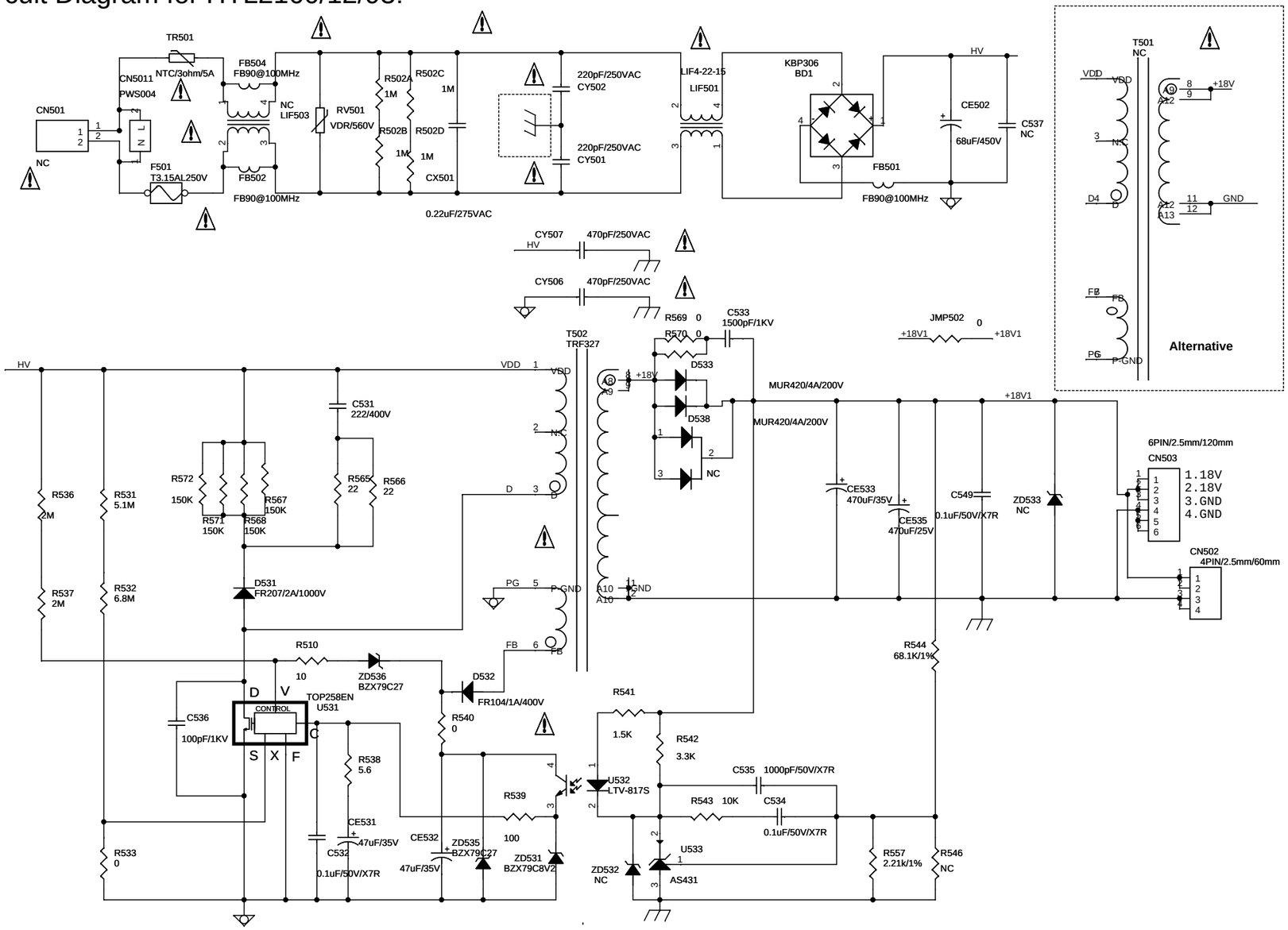






7-5

Power Board Circuit Diagram for HTL2160/12/93:



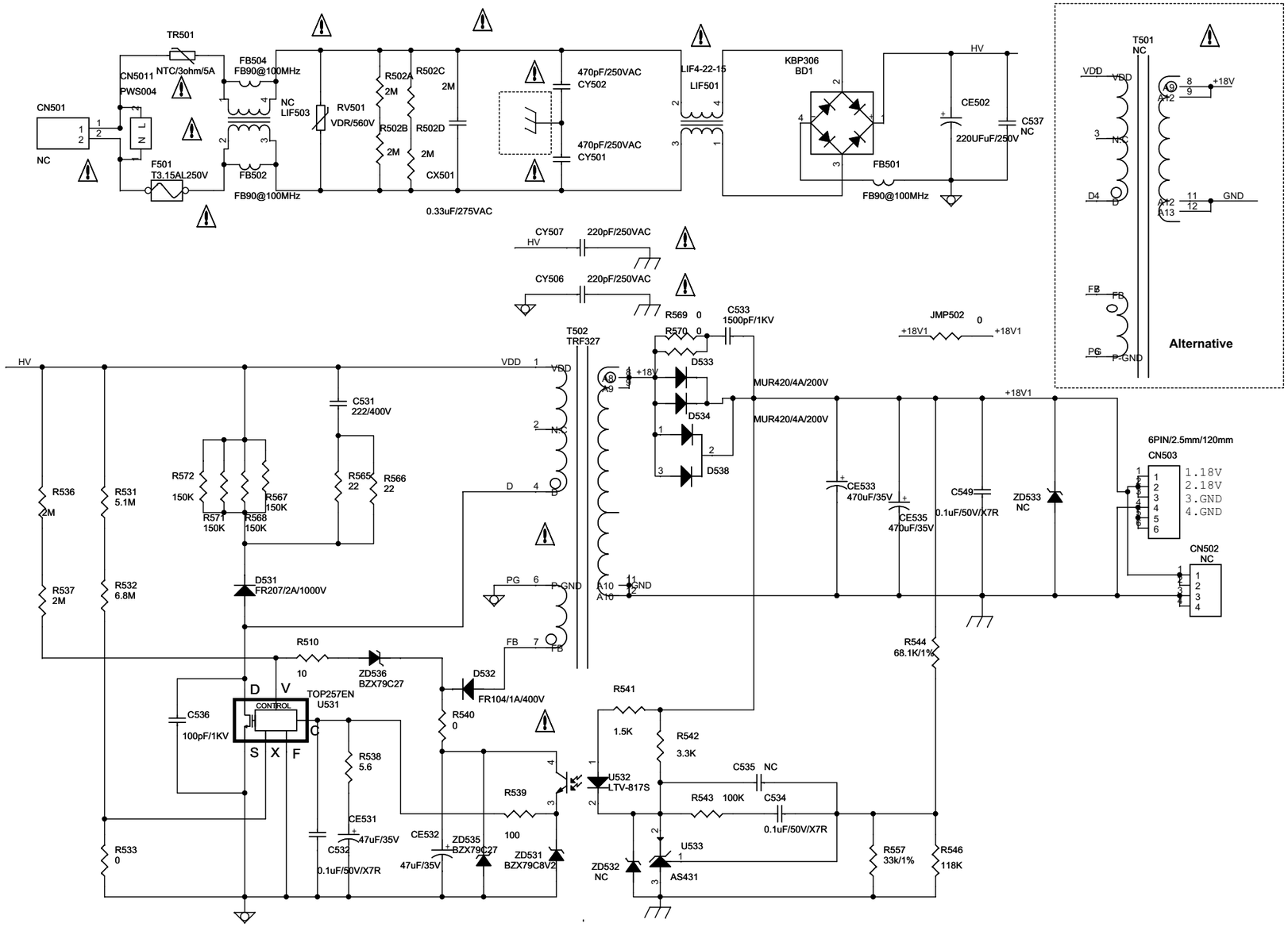
*** CAUTION :**

THE PARTS MARKED WITH ⚠ ARE IMPORTANT PARTS ON THE SAFETY.

PLEASE USE THE PARTS HAVING THE DESIGNATED PARTS NUMBER WITHOUT FAIL.

7-6

Power Board Circuit Diagram for HTL2160/F7:



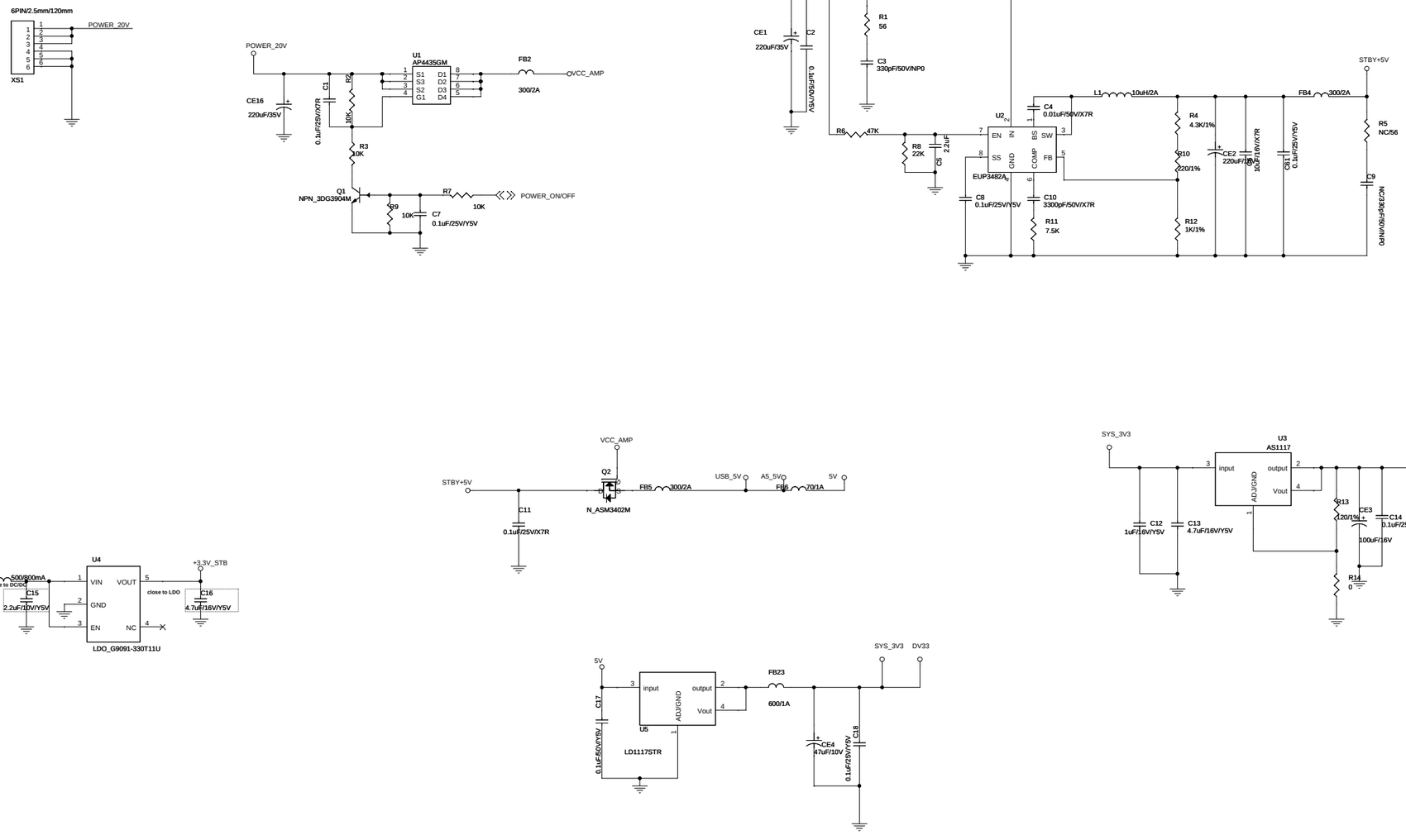
*** CAUTION :**

THE PARTS MARKED WITH ⚠ ARE IMPORTANT PARTS ON THE SAFETY.

PLEASE USE THE PARTS HAVING THE DESIGNATED PARTS NUMBER WITHOUT FAIL.

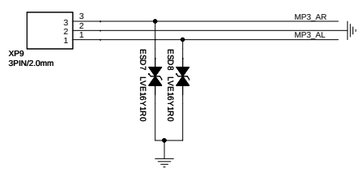
7-7

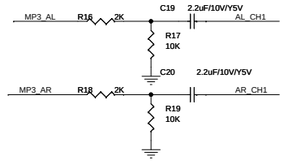
Main Board Circuit Diagram for HTL2160/12/F7/93:Power

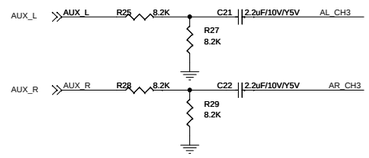


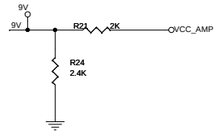
7-8

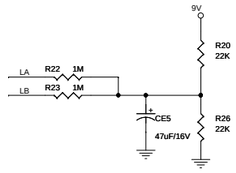
Main Board Circuit Diagram for HTL2160/12/F7/93:MP3 & AUX

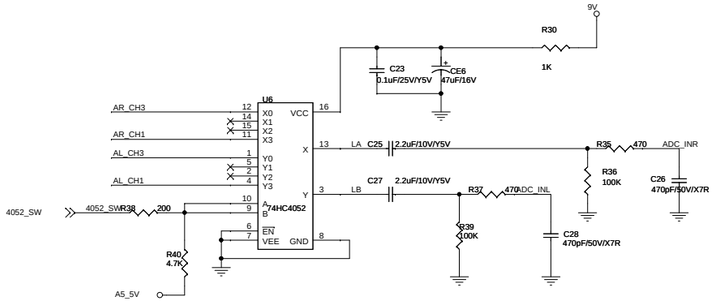


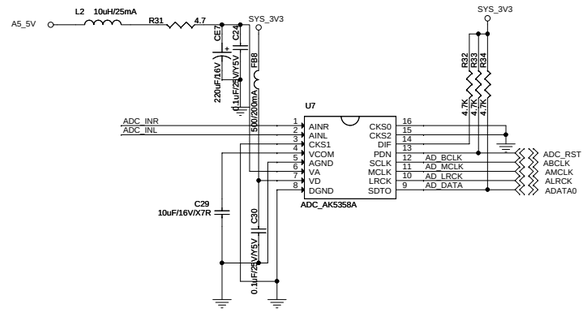






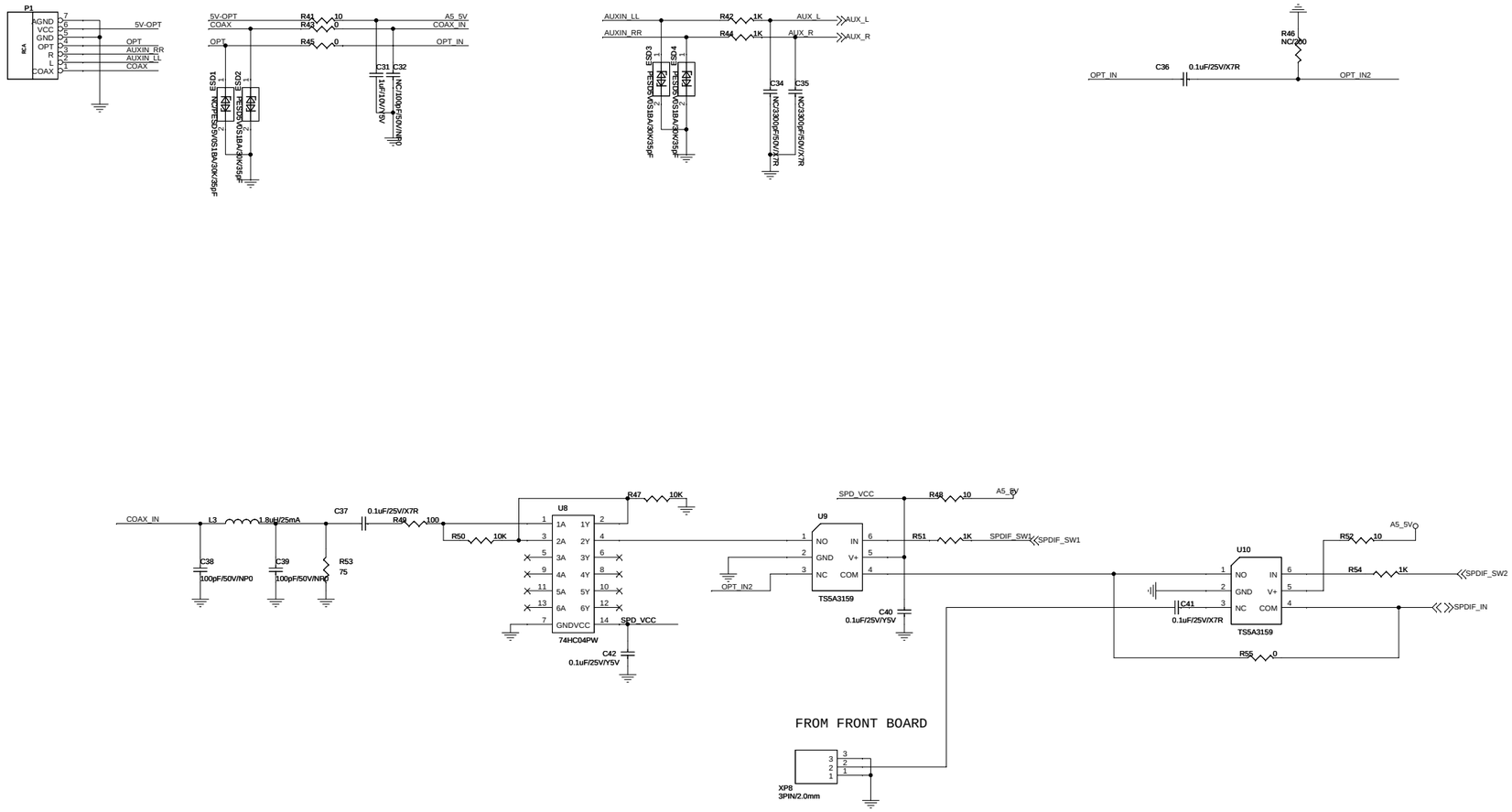






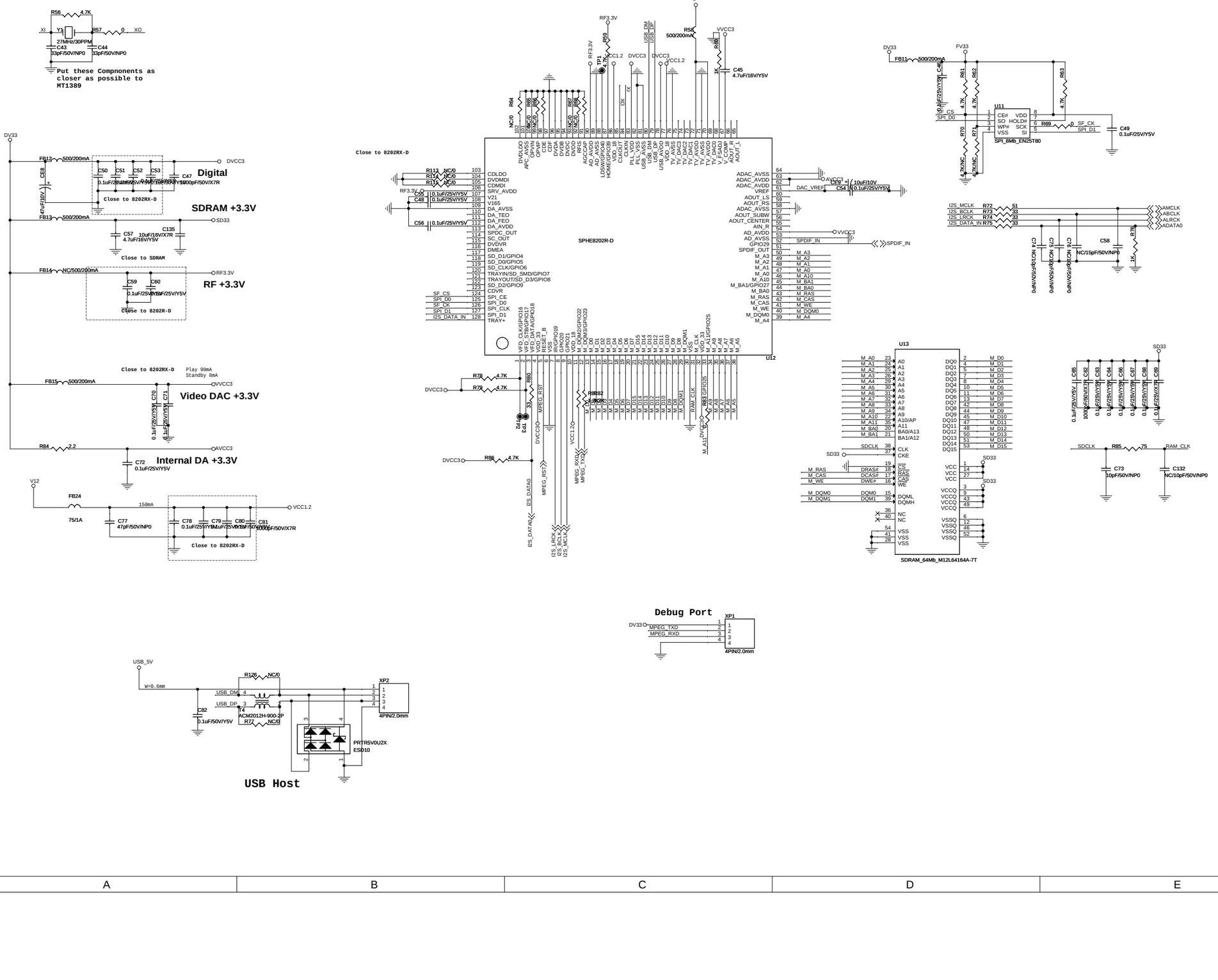
7-9

Main Board Circuit Diagram for HTL2160/12/F7/93:COAX & OPT & BT



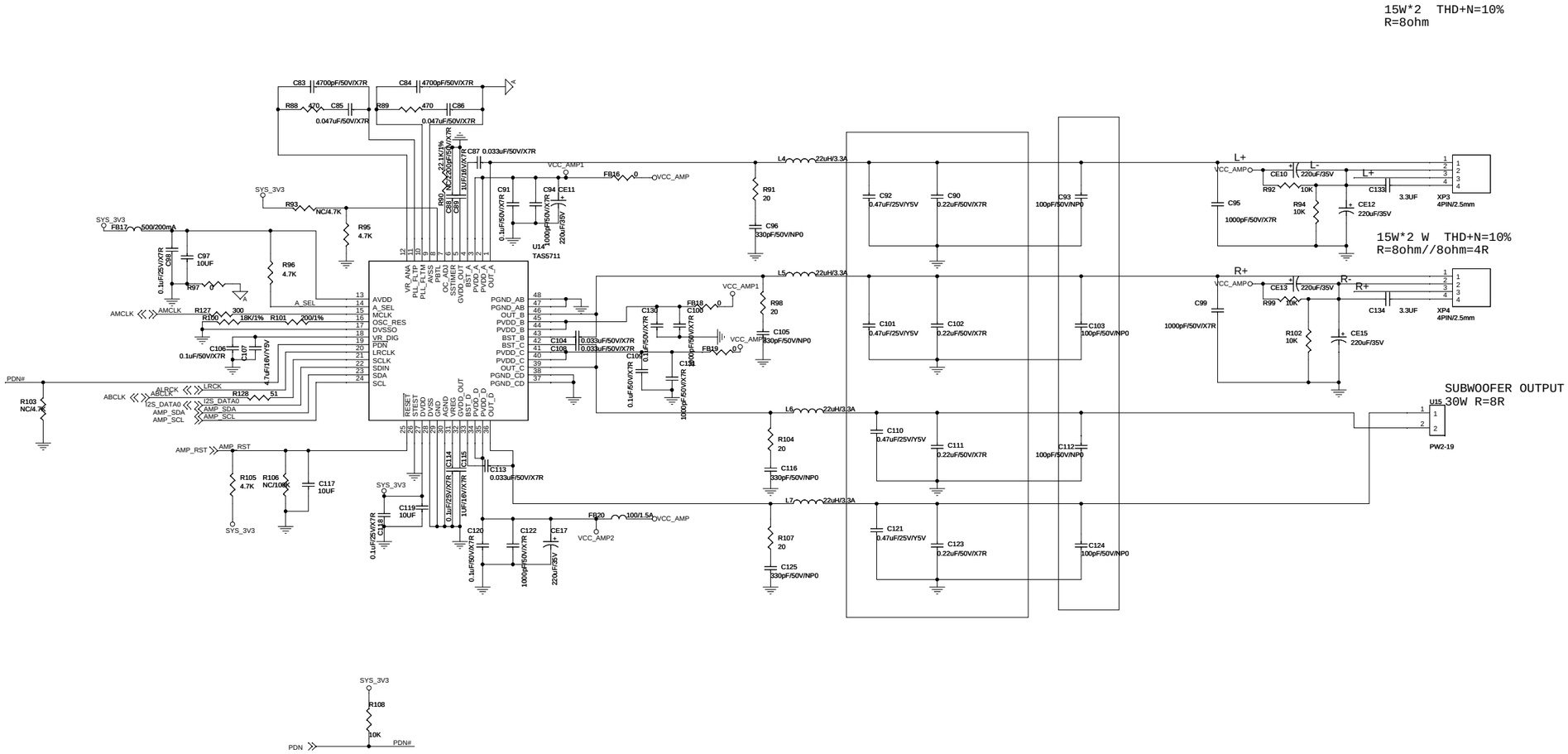
7-10

Main Board Circuit Diagram for HTL2160/12/F7/93:SP8202



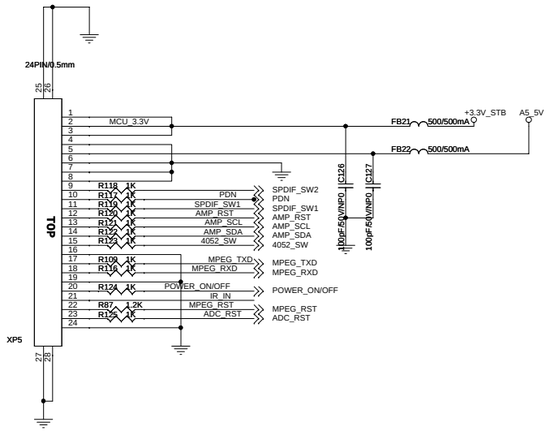
7-11

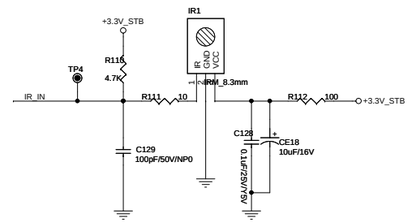
Main Board Circuit Diagram for HTL2160/12/F7/93:TAS5711



7-12

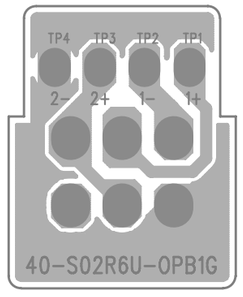
Main Board Circuit Diagram for HTL2160/12/F7/93:IR





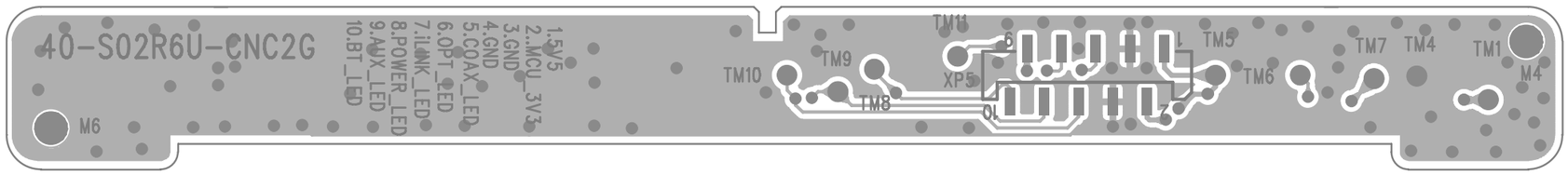
7-13

OP Board Print-layout(Bottom side):



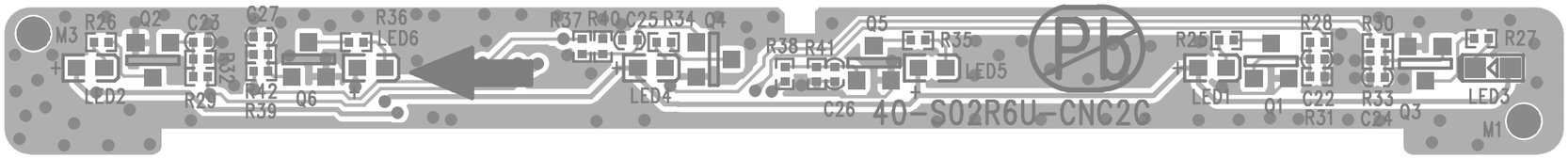
7-14

CN Board Print-layout(Bottom side):



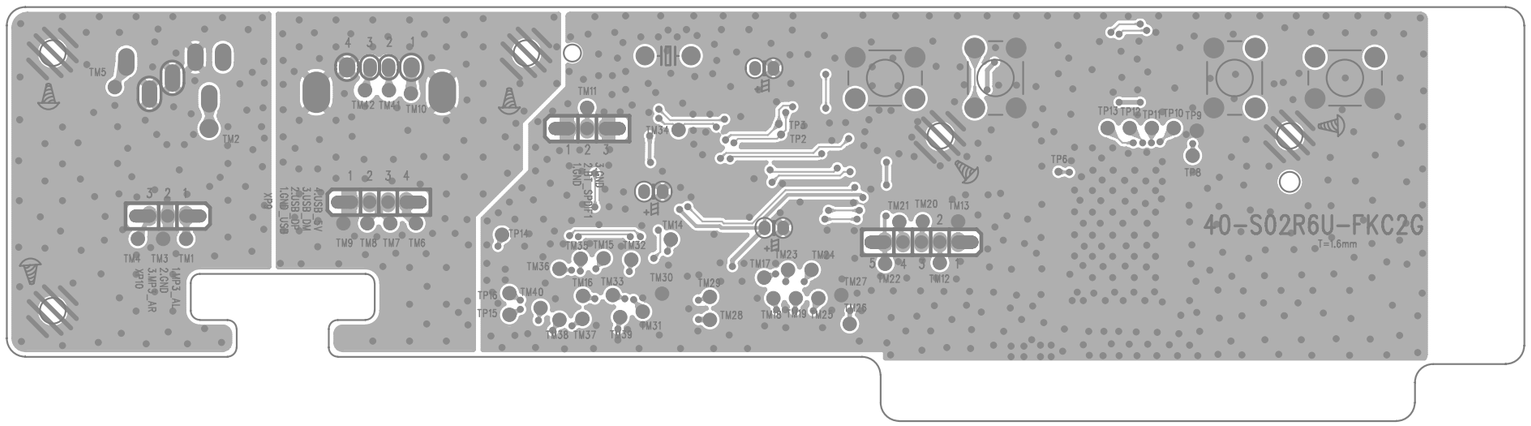
7-15

CN Board Print-layout(Top side):



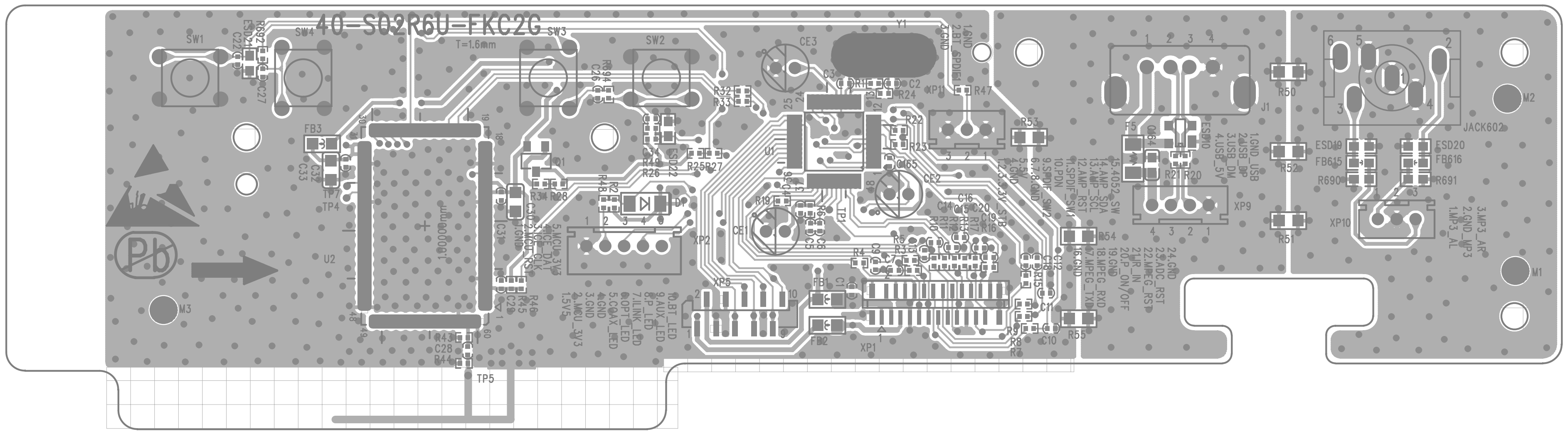
7-16

FK Board Print-layout(Bottom side):



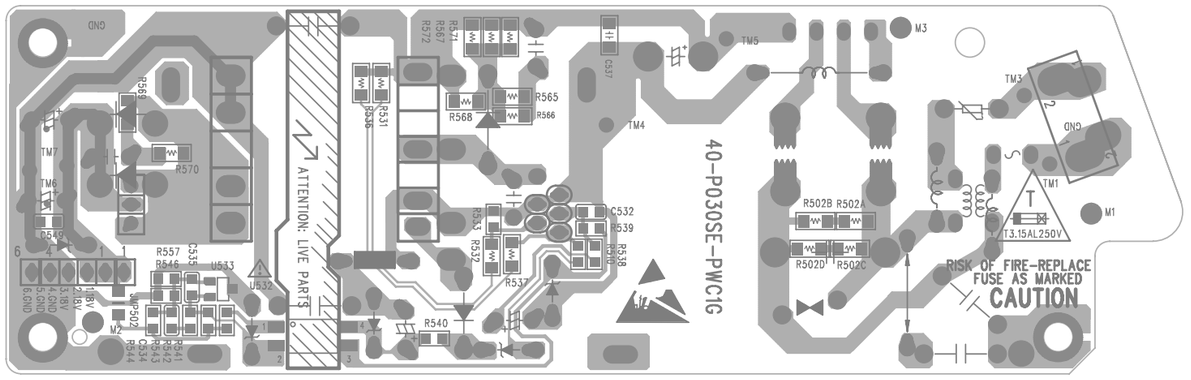
7-17

FK Board Print-layout(Top side):



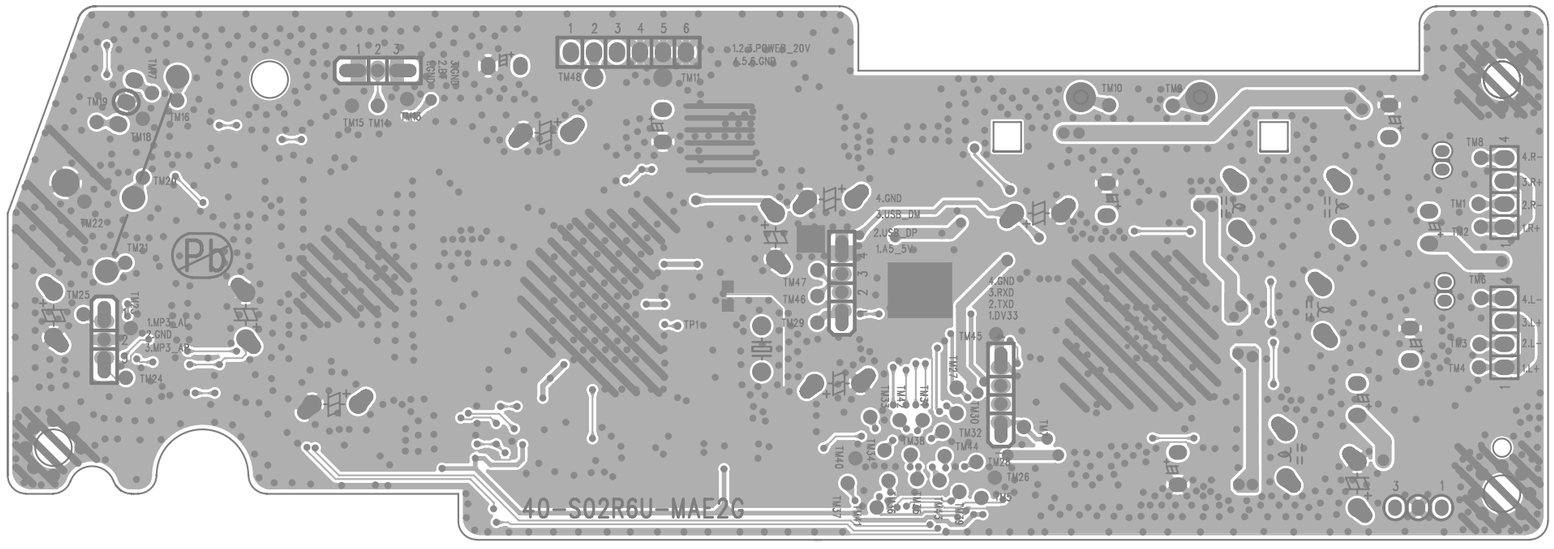
7-18

Power Board Print-layout(Bottom side):



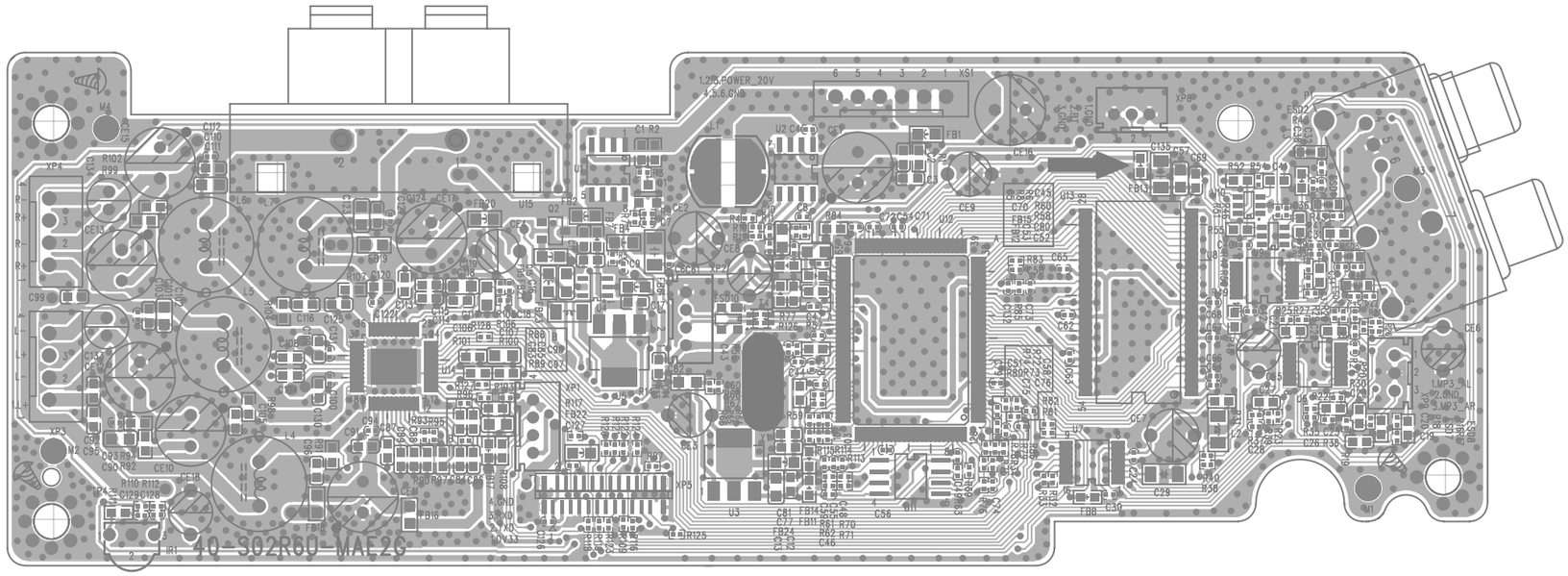
7-19

Main Board Print-layout(Bottom side):



7-20

Main Board Print-layout(Top side):



Voltages for per connection pin

XS1 from power supply board connect to main board

Pin NO.	Pin Assin	Remarks
1	19V	18-20V
2		
3		
4	GND	
5		
6		

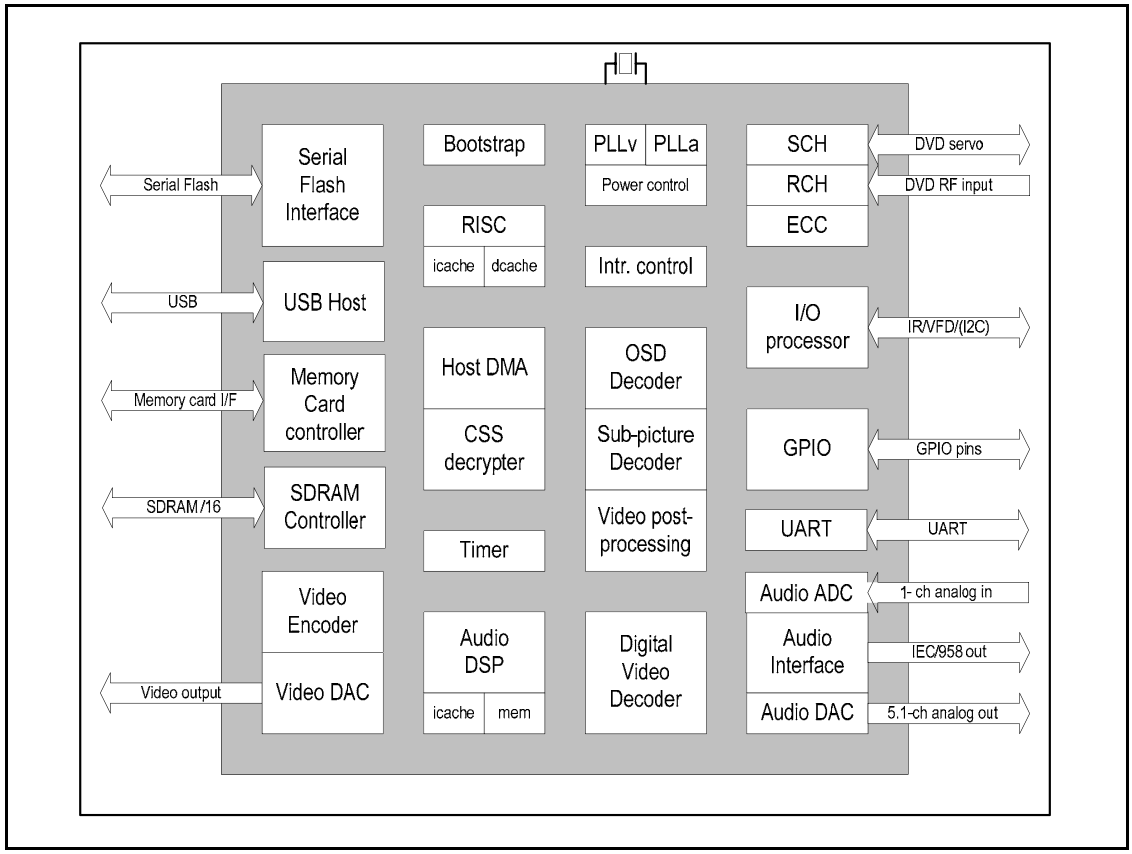
XP5 from main board connect to front board

Pin NO.	Pin Assin	Remarks
1	MCU_3.3v	3.2V-3.4V
2		
3		
4	GND	
5	A5_5V	4.75-5.25V
6	GND	
7		
8		
9	SPDIF_SW2	
10	PND	
11	SPDIF_SW1	
12	AMP_RST	
13	AMP_SCL	
14	AMP_SDA	
15	4052_SW	
16	GND	
17		
18		
19	GND	
20	POWER_OM/OFF	
21	IR_IN	
22	MPEG_RST	
23	ADC_RST	
24	GND	

XP2 from main board connect to front board for USB

Pin NO.	Pin Assin	Remarks
1	USB_5V	4.75-5.25V
2	USB_DM	
3	USB_DP	
4	GND	

Main IC-SP8202_RDB Functional Block Diagram



Main IC-SP8202_RDB PIN Description

Symbol	Pin #	I/O	Description
VFD_CLK/GPIO	1	I/O	1. CLK of VFD 2. General-purpose I/O
VFD_STB/GPIO	2	I/O	1. Strobe of VFD 2. General-purpose I/O
VFD_DATA/GPIO	3	I/O	1. DATA of VFD 2. General-purpose I/O
VDD33	4	P	I/O power supply
RST_B	5	I	System Reset
VSS_0	6	G	Ground
IR_I/GPIO	7	I/O	IR input or general-purpose I/O
SCART_SEL/GPIO	8	I/O	SCART select or general-purpose I/O
SCART_DIS/GPIO	9	I/O	SCART display or general-purpose I/O
VDD_0	10	P	1.8V Kernel logic power supply (For 8202R/Rx –D, 1.25V is used)
HSYNC/GPIO	11	I/O	1. General-purpose I/O 2. SD_HWORD_LDQM : SDRAM High Word LDQM 3. SD_CS0_B : SDRAM Chip Select 0 4. UA0_RXD : UART RX Port 0 5. HSYNC_PC : HSYNC signal of TV Interface
VSYNC/GPIO	12	I/O	1. General-purpose I/O 2. SD_HWORD_UDQM : SDRAM High Word UDQM 3. SD_CKE : SDRAM Clock Enable 4. UA0_TXD : UART TX Port 0 5. VSYNC_PC : VSYNC signal of TV Interface
SDRAM Interface			
M_D0	13	I/O	SDRAM data bus bit 0
M_D1	14	I/O	SDRAM data bus bit 1
M_D2	15	I/O	SDRAM data bus bit 2
M_D3	16	I/O	SDRAM data bus bit 3
M_D4	17	I/O	SDRAM data bus bit 4
M_D5	18	I/O	SDRAM data bus bit 5
M_D6	19	I/O	SDRAM data bus bit 6
M_D7	20	I/O	SDRAM data bus bit 7
M_D15	21	I/O	SDRAM data bus bit 15
M_D14	22	I/O	SDRAM data bus bit 14
M_D13	23	I/O	SDRAM data bus bit 13
M_D12	24	I/O	SDRAM data bus bit 12
M_D11	25	I/O	SDRAM data bus bit 11
M_D10	26	I/O	SDRAM data bus bit 10
M_D9	27	I/O	SDRAM data bus bit 9
M_D8	28	I/O	SDRAM data bus bit 8
M_DQM1/GPIO	29	I/O	1. SDRAM data input/output mask for M DD[15:8] 2. General-purpose I/O
VSS_1	30	G	Ground

Main IC-SP8202_RDB PIN Description

Symbol	Pin #	I/O	Description
M_CLKO	31	O	SDRAM CLK
VDD33	32	P	I/O power supply
M_A11/GPIO	33	I/O	1. SDRAM address bus 11 2. General-purpose I/O 3. UA0_RXD : UART RX Port 1 4. HSYNC_PC : HSYNC signal of TV Interface
M_A9	34	I/O	SDRAM address bus 9
M_A8	35	I/O	SDRAM address bus 8
M_A7	36	I/O	SDRAM address bus 7
M_A6	37	I/O	SDRAM address bus 6
M_A5	38	I/O	SDRAM address bus 5
M_A4	39	I/O	SDRAM address bus 4
M_DQM0/GPIO	40	I/O	1. SDRAM data input/output mask for M DD[7:0] 2. General-purpose I/O
M_WE_B	41	I/O	SDRAM write enable / row pre-charge
M_CAS_B	42	I/O	SDRAM column address strobe
M_RAS_B	43	I/O	SDRAM row address strobe / pre-charge
M_BA0	44	I/O	1. SDRAM bank select address 0 2. SDRAM bank select address 1
M_BA1/GPIO	45	I/O	1. SDRAM bank select address 1 2. SDRAM bank select address 0 3. General-purpose I/O 4. UA0_TXD : UART TX Port 1
M_A10	46	I/O	SDRAM address bus 10
M_A0	47	I/O	SDRAM address bus 0
M_A1	48	I/O	SDRAM address bus 1
M_A2	49	I/O	SDRAM address bus 2
M_A3	50	I/O	SDRAM address bus 3
Audio SPDIF Output Interface			
AUD_IEC_TX/GPIO	51	I/O	1. Audio SPDIF Output 2. General-purpose I/O
SCART_SIG/GPIO	52	I/O	1. SCART SIG signal 2. General-purpose I/O
Audio Codec Interface			
AVSS33_AD	53	G	Ground pin for Audio ADC
AVDD33_AD	54	P	3.3V power for Audio ADC
AIN_R	55	A	ADC right channel analog input
AOUT_CENTER	56	A	DAC Center channel analog output
AOUT_SW	57	A	DAC Sub-woof channel analog output
VSS_ADAC_0	64	G	Ground pin for Audio DAC #0
AOUT_RS	59	A	DAC Surround Right channel analog output
AOUT_LS	60	A	DAC Surround Left channel analog output
VM	61	A	Reference voltage for Audio DAC
VDD_ADAC _0	62	P	3.3V power for Audio DAC #0
VDD_ADAC _1	63	P	3.3V power for Audio DAC #1

Main IC-SP8202_RDB PIN Description

Symbol	Pin #	I/O	Description
VSS_ADAC_1	64	G	Ground pin for Audio DAC #1
AOUT_FL	65	A	DAC Front Left channel analog output
AOUT_FR	66	A	DAC Front Right channel analog output
Video DAC Interface			
V_COMP	67	A	Video DAC Bias Voltage
V_FSADJ	68	A	Full-Scale adjust control pin (EXT resistor) (1.2 K ohm to ground)
TV_DAC0	69	A	Video DAC channel 0 output
VDD_TVA0	70	P	3.3V power for Video DAC channel 0
VSS_TVA0	71	G	Ground pin for Video DAC channel 0
VDD_TVA1	72	P	3.3V power for Video DAC channel 1~3
TV_DAC1	73	A	Video DAC channel 1 output
TV_DAC2	74	A	Video DAC channel 2 output
TV_DAC3	75	A	Video DAC channel 3 output
VSS_TVA1	76	G	Ground pin for Video DAC channel 1~3
Kernel Power of Top Side			
VDD_1	77	P	1.8V Kernel logic power supply (For 8202R/Rx –D, 1.25V is used)
USB Interface			
AVDD_USB	78	P	3.3V power for USB PLL and USB transceiver
USB_DP	79	A	USB bus D+
USB_DM	80	A	USB bus D-
AVSS_USB	81	G	Ground pin for USB PLL and USB transceiver
PLL Interface			
VSS_PLL	82	G	Ground pin for PLLTV, PLLA, PLLAFE, SSPLL, and Crystal PAD
VDD_PLL	83	P	3.3V power for PLLTV, PLLA, PLLAFE, SSPLL, and Crystal PAD
CLKIN	84	I	Crystal PAD input
CLKOUT	85	O	Crystal PAD output
VDD18	86	P	1.8V power supply (For 8202R/Rx –D, 1.25V is used)
Servo Interface			
HOME/GPIO	87	I/O	1. Servo signal: HOME 2. General-purpose I/O
LDSW/GPIO	88	I/O	1. Servo signal: LDSW 2. General-purpose I/O
AD_AVSS	89	G	Servo ADC ground pin
AD_AVDD	90	P	3.3V power for Servo ADC
AGCCAP	91	A	External AGC capacitor connected to ground. (0.1u)
RFIS	92	I	Single-ended RF equalizer input.
DVDD	93	I	DVD RF input D, from the main beam photo detector
DVDC	94	I	DVD RF input C, from the main beam photo detector
DVDB	95	I	DVD RF input B, from the main beam photo detector
DVDA	96	I	DVD RF input A, from the main beam photo detector
CDF	97	I	CD tracking error input F, from the sub-beam photo detector
CDE	98	I	CD tracking error input E, from the sub-beam photo detector
OPVIP	99	I	Op-amp 1 positive input

Main IC-SP8202_RDB PIN Description

Symbol	Pin #	I/O	Description
OPVIN	100	I	Op-amp 1 negative input
RF_APC_AVSS	101	G	Ground pin for RF and APC
DVDLDO	102	O	DVD APC output
CDLDO	103	O	CD APC output
DVDMDI	104	I	DVD APC input from monitor photo diode
CDMDI	105	I	CD APC input from monitor photo diode
SRV_AVDD	106	P	3.3V power for SERVO
V21	107	A	Reference DC bias voltage
V165	108	A	Reference DC bias voltage
DA_AVSS	109	G	Ground pin for DAC
DATEO	110	A	4-bit DAC output for motor drive TE
DAFEO	111	A	4-bit DAC output for motor drive FE
DA_AVDD	112	P	3.3V power for DAC
SPDC_OUT/GPIO	113	I/O	1. Servo SPDC OUT 2. General-purpose I/O
SC_OUT/GPIO	114	I/O	1. Servo SC_OUT 2. General-purpose I/O
TRAY_OUT/GPIO	115	I/O	1. Servo TRAY_OUT 2. General-purpose I/O
DMEA/GPIO	116	I/O	1. Servo DMEA 2. General-purpose I/O
SD_D1/CARD_SENSE/GPIO	117	I/O	1. Servo SC1_OUT 2. SD Data bit 1 3. Card Sense pin 4. General-purpose I/O
SD_D0/STEP_OUT/GPIO	118	I/O	1. Servo STEP_OUT 2. SD Data bit 0 3. General-purpose I/O
SD_CLK/GPIO	119	I/O	1. Servo FGIN 2. General-purpose I/O 3. I2C_DATA : Data pin of I2C Interface 4. SD clock pin
SD_CMD/GPIO	120	I/O	1. HW_CFG_SRC[0] : Hardware Configure bit 0 2. General-purpose I/O 3. Servo TRAY_IN 4. I2C_CLK : CLK of I2C Interface 5. SD Command pin
SD_D3/TRAY_OUT/GPIO	121	I/O	1. HW_CFG_SRC[1] : Hardware Configure bit 1 2. General-purpose I/O 3. SD Data bit 3 4. Servo TRAY_OUT
SD_D2/TRAY_IN/GPIO	122	I/O	1. HW_CFG_SRC[2] : Hardware Configure bit 2 2. General-purpose I/O 3. SD Data bit 2 4. Servo TRAY_IN

Main IC-SP8202_RDB PIN Description

Symbol	Pin #	I/O	Description
CDVR/GPIO	123	I/O	1. HW_CFG_SRC[3] : Hardware Configure bit 3 2. General-purpose I/O 3. Servo CDVR
SPI_CSB/GPIO	124	I/O	1. Chip Select of SPI Interface 2. General-purpose I/O
SPI_D0/GPIO	125	I/O	1. Data bit 0 of SPI Interface 2. General-purpose I/O
SPI_CLK/GPIO	126	I/O	1. CLK output of SPI Interface 2. General-purpose I/O
SPI_D1/GPIO	127	I/O	1. Data bit 1 of SPI Interface 2. General-purpose I/O
TRAY+/GPIO	128	I/O	Servo TRAY+ or general-purpose I/O

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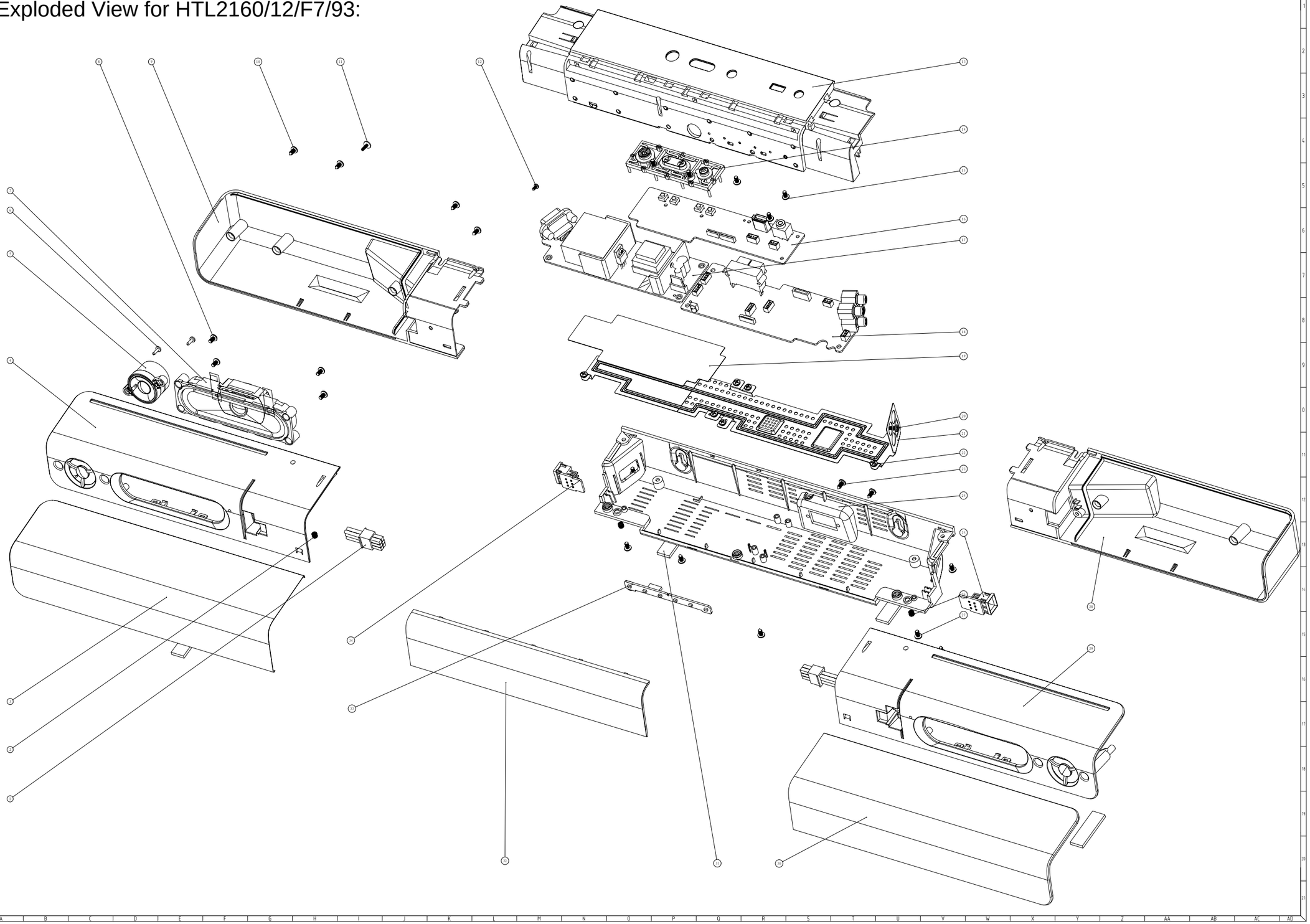
Exploded View for HTL2160/12/F7/93:



REVISION LIST

Version 1.0

* Initial release for HTL2160/12/F7

Version 1.1

* Add the color version for /12 on cover.

Version 1.2

* Initial release for HTL2160/93.