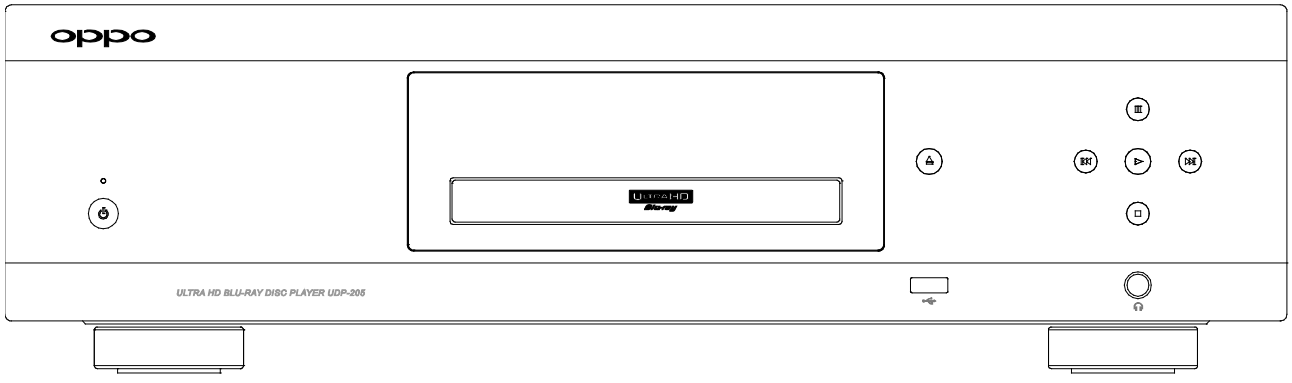
SERVICE MANUAL

ULTRA HD Blu-ray Disc Player

UDP-205



Catalog

1.1 Safety precautions 2
1.2 Precautions 2
1.3 Required device for maintenance 2
Chapter II Block diagram and version of player 3
2.1 Version of player 3
2. 1.1 UDP-205 Versions 3
2.2.1 UDP-205 Frame schematic diagram 4
2.3.1 Product serial number rules UDP-20X 6
Loader label （SONY 480&481） 7
2.3.2 UDP-205 interior image 8
Chapter III Function module schematics 9
Section 1 Loader assembly introduction 9
3.1.2 Servo circuit 10
3.1.2.1 Servo circuit overview: 10
Section 2 Partial introduction to Main board system 11
3.2.1. Block diagram of decoding circuit: 11
3.2.2 .Main board power supply circuit (UDP-205) 12
3.2.2.1 Block diagram of voltage stabilizing circuit 12
3.2.2.2 Circuit introduction: 13
3.2.2.3 MCU features 13
Section 3 Audio processing circuit 14
3.3.1 Block diagram of audio signal is shown in figure 3.3.1.1: 14
Section 4 Video processing circuit 17
3.4.1 Block diagram of video circuit I 17
Chapter 5 Other control circuits of main board 18
3.5.1 Block diagram of external input interface as shown in 3.5.1.1: 18
Section 6 Panel and button control circuits 19
3.6.1: Block diagram of panel circuit: 19
Section 7 Power supply circuit 20
3.7.1 Block diagram of power supply circuit is shown in figure 3.7.1.1: 20
Chapter IV Troubleshooting flow chart 21
4.1 Troubleshooting flow charts 21
Chapter V Install barcode 24
5.1 Install barcode 24
Chapter VI Disassembling & Assembling the Unit and Precautions 28
Chapter VII Disassembly &BOM 48
Section 1 Disassembly 48

Chapter One About Maintenance

1.1 Safety precautions

1.1.1 Power supply When maintenance personnel are repairing players ,the should pay special Attention to the power board with ~100V-240V and DC154V-300V which will cause hurt and damage to persons

1.1.2 When replacing accessories, please remove the power plug from socket to avoid any injures to human body.

1.2 Precautions

1.2.1 Precautions for laser head

1.2.1.1 Do not stare at laser head directly for laser emission will occur when laser head is working which will hurt your eyes!

1.2.1.2 Do not use wiping water or alcohol to clean laser and you may use cotton swab.

1.2.2 A bout placement position

1.2.2.1 Never place player in positions with high temperature and humidity.

1.2.2.2 Avoid placing near high magnetic fields such as loudspeaker or magnet_

1.2.2.3 Positions for placement should best able and secure.

1.2.3 Electro static precautions

1.2.3.1 Maintenance facility and working table must be earthed.

1.2.3.2 Maintenance man must wear electrostatic ring, and he can use antistatic gloves instead when electrostatic ring is unavailable or inconvenient to use.

1.2.3.3 When repairing accessories, antistatic bag is required to pack the accessory.

1.2.4 Precautions for welding

1.2.4.1 The soldering tin wire must satisfy the local environmental protection requirement.

1.2.4.2 Welding temperature must not above 350ć

1.3 Required device for maintenance

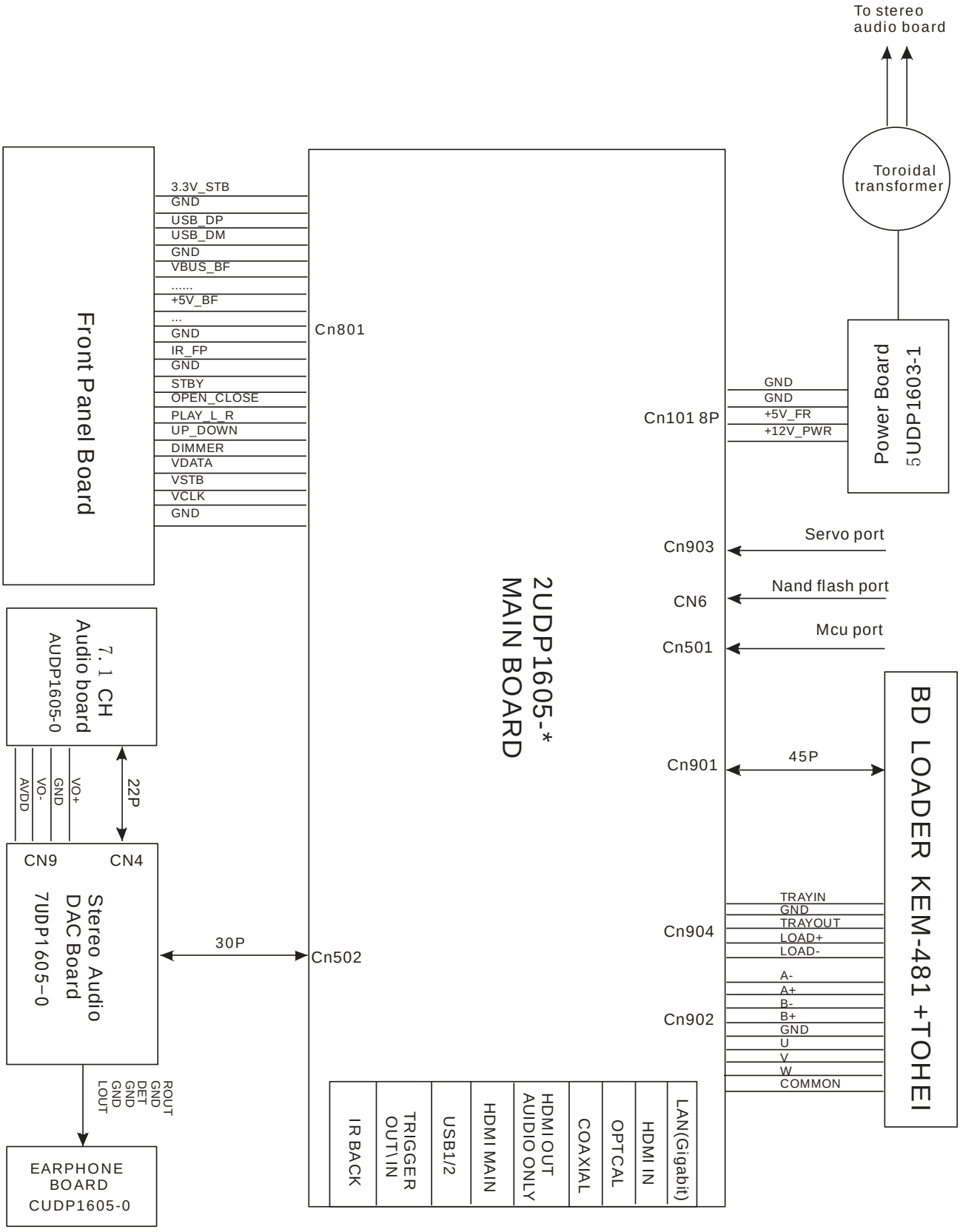
Digital oscillograph (100MHZ);TV set(1080p); receiver(support HDMI__SMD rework station; Multimeter; Soldering iron Pointed-pinchers _Cutting nippers Forceps; Electric screw driver; Terminals connecting cord; Test disc(CD/SACD/DVD/BD/4kBD) etc.

Chapter II Block diagram and version of player

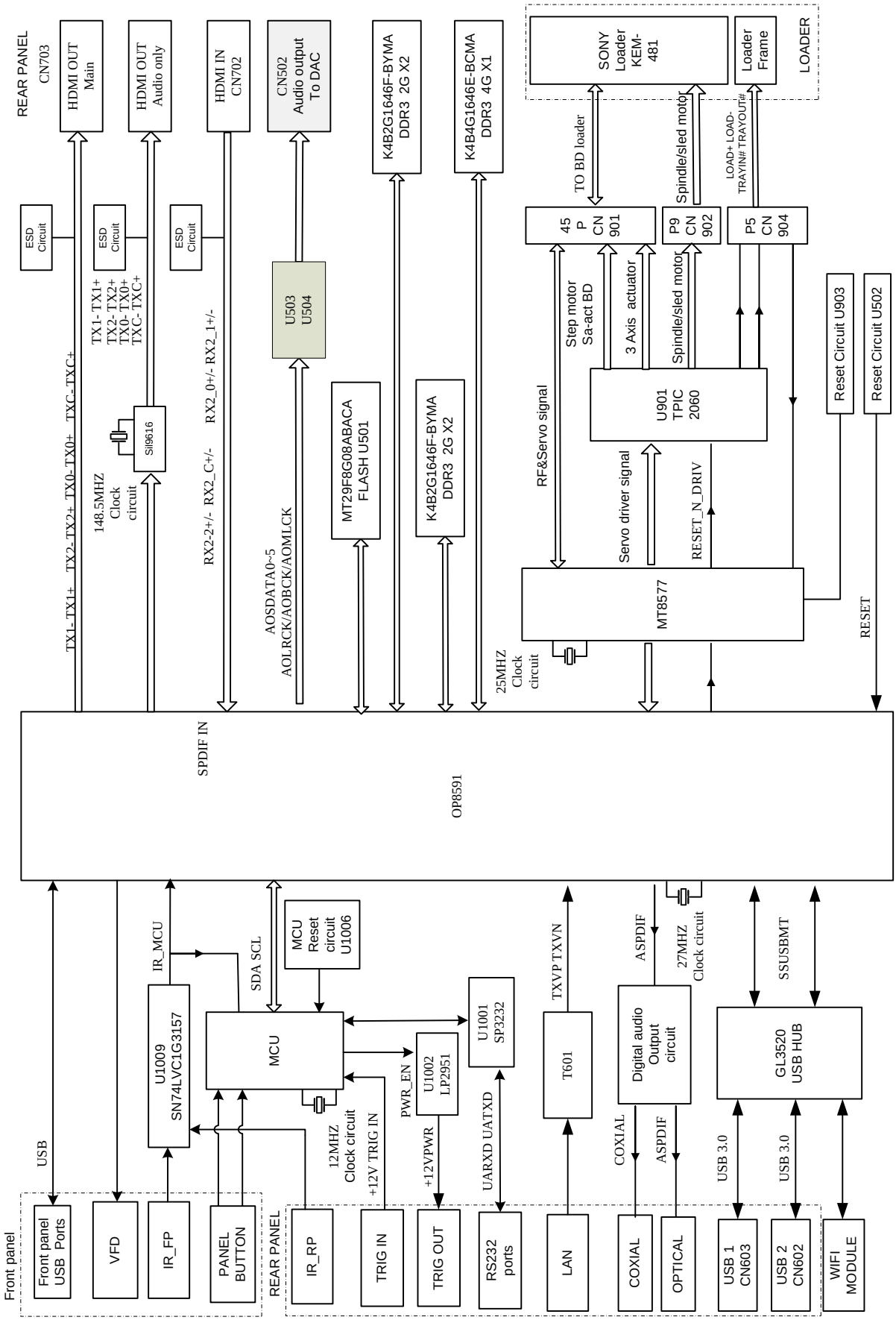
2.1 Version of player

2. 1.1 UDP-205 Versions

2.2.1 UDP-205 Frame schematic diagram



2.2.2 UDP-205 Overall block diagram



2.3.1 Product serial number rules UDP-20X

Product serial number rules:

The initial 4 digits stand for complete unit version, e.g.

B2*0，B2*0，B2*0

The 5th and 6th digits stand for sales region and model.

U8 stands for UDP-205 US (SONY 481+OP8591+MT8577);

E8 stands for UDP-205 EU (SONY 481+OP8591+MT8577).

C6 stands for UDP-205 CN (SONY 481+OP8591+MT8577)

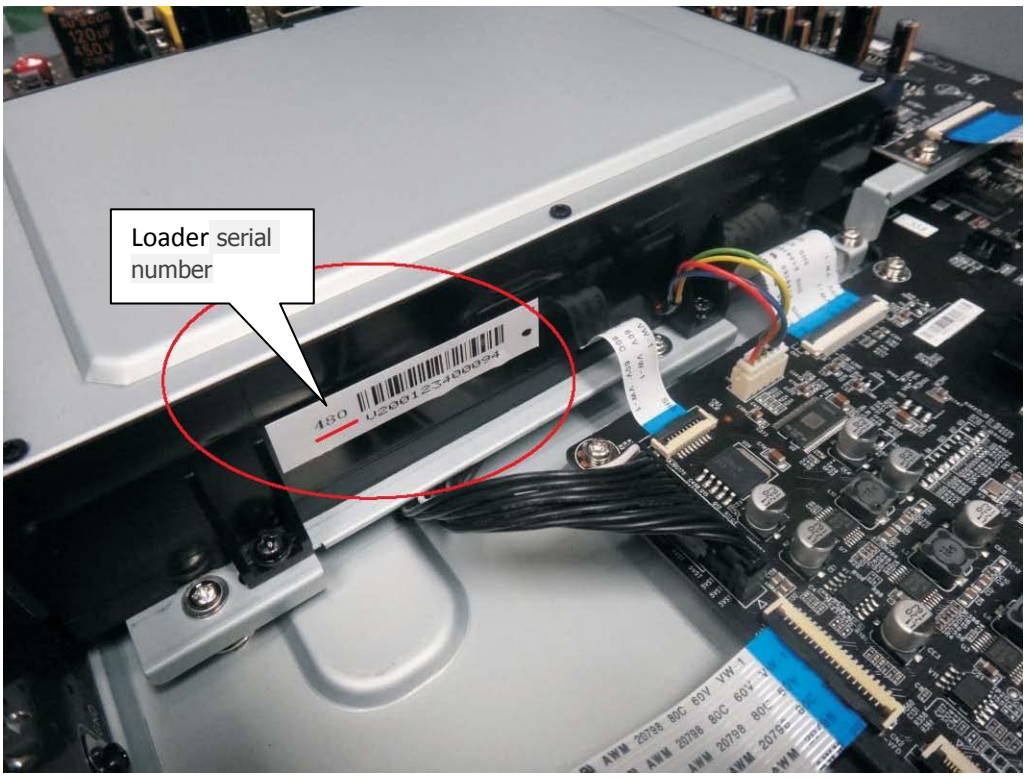
J6 stands for UDP-205 JP (SONY 481+OP8591+MT8577)

.....

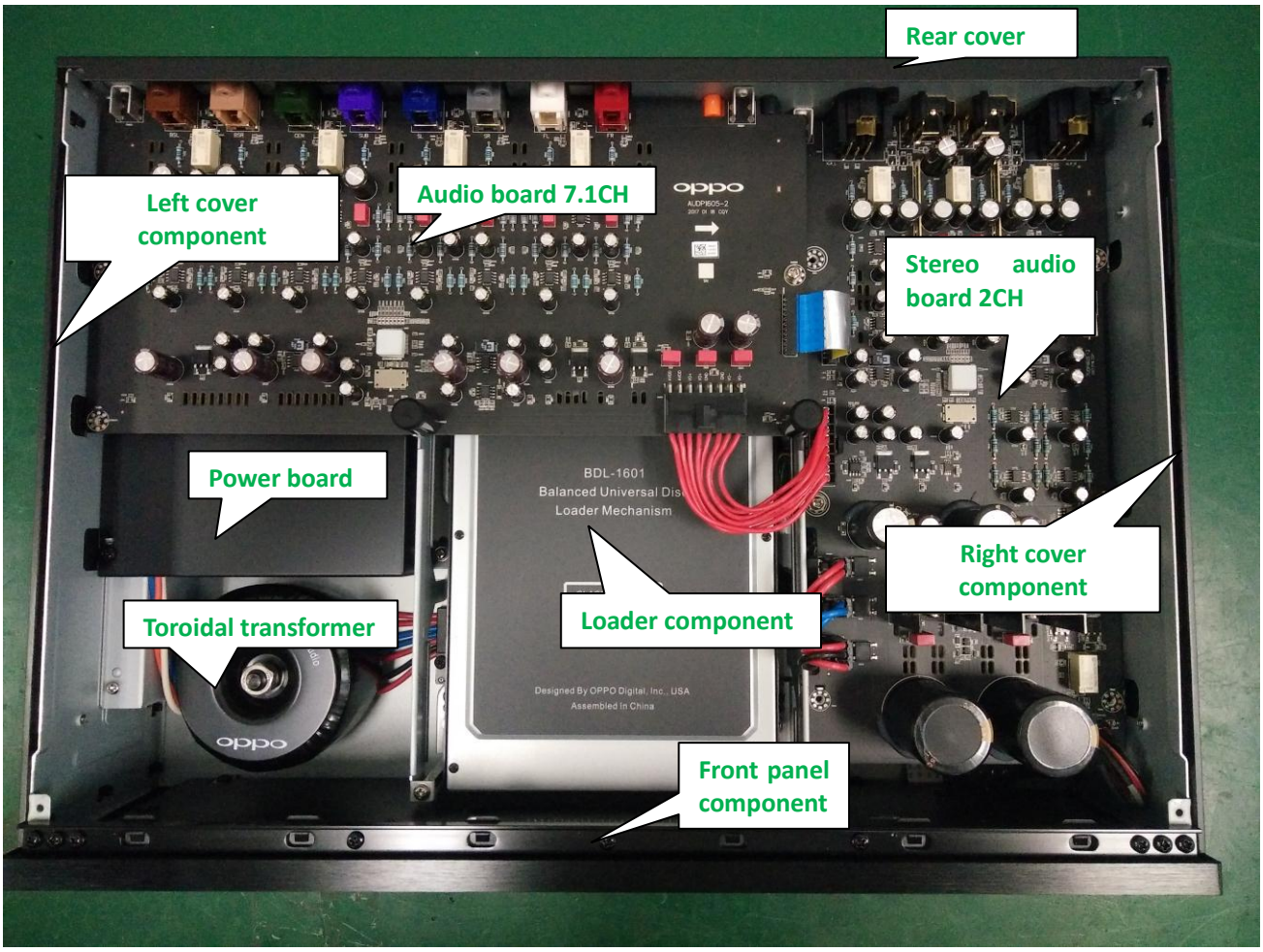
The 7th to 16th digits stand for production cycle and running number.

1650(cycle)　900001（Homework serial number）

Loader label （SONY 480&481）



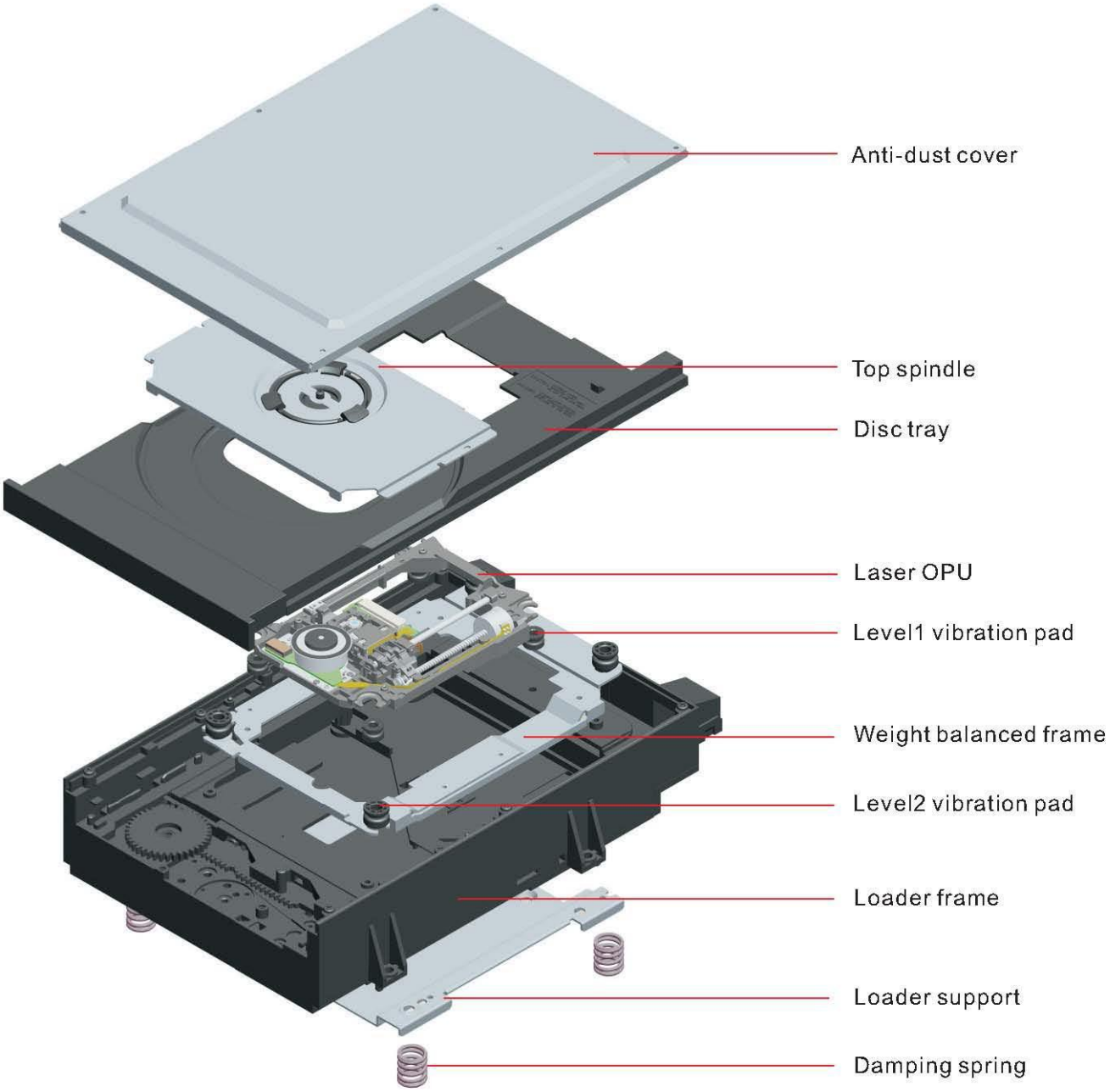
2.3.2 UDP-205 interior image



Chapter III Function module schematics

Section 1 Loader assembly introduction

3.1.1 Exploded view of the loader (481 same 480)



3.1.1 Exploded view of the loader(480&481)；

3.1.2 Servo circuit

3.1.2.1 Servo circuit overview:

UDP-205 player adopts SONY 481 loader and MT8577&OP8591 decoding scheme. And its servo circuit is mainly composed of decoding chip Mt8577, driver IC tpic2060 and other components.

Please refer to Figure 3.1.1.1 below:

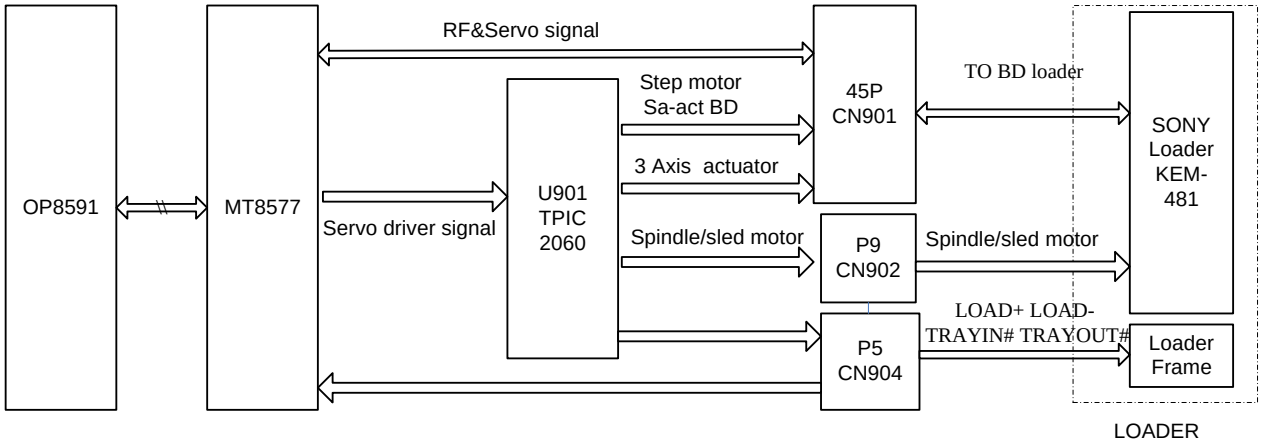


Figure 3.1.2.1 Block diagram of servo circuit

3.1.2.2 Operating principle of servo circuit: :

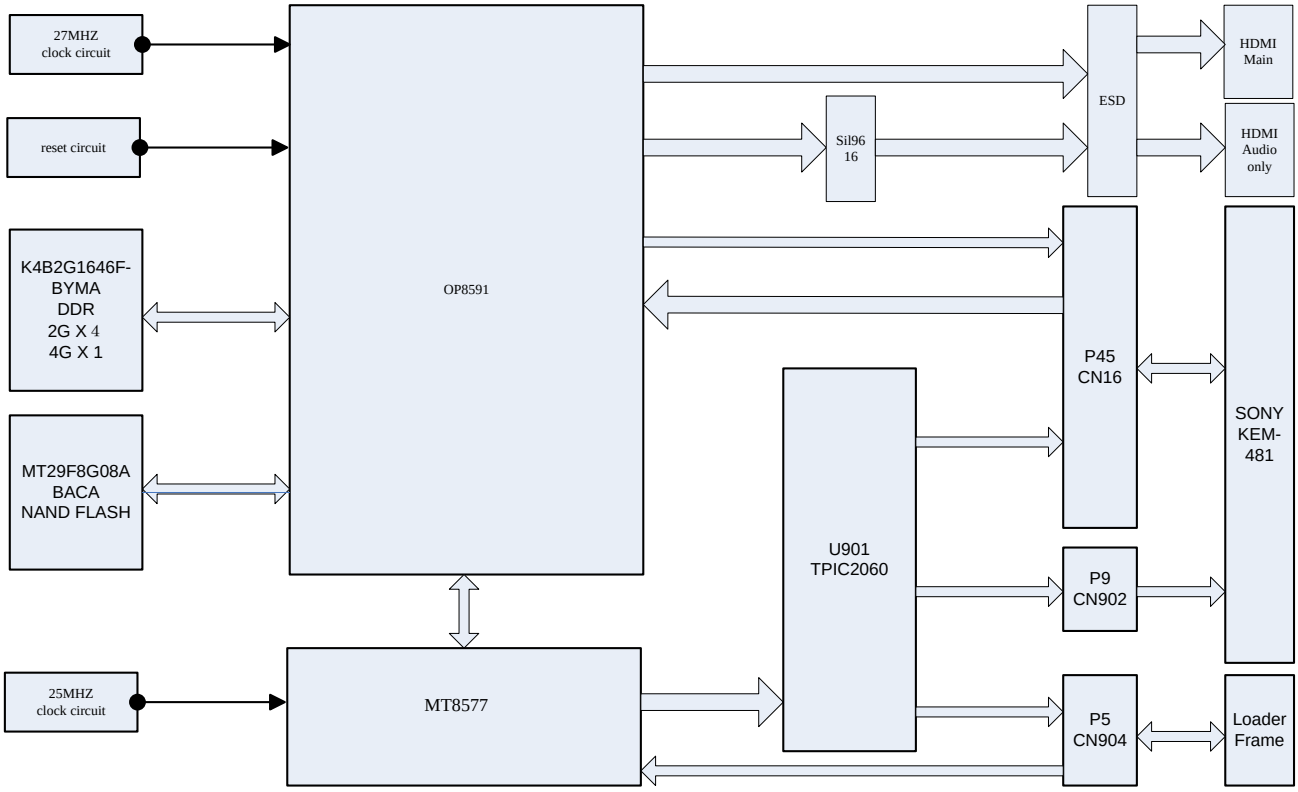
Servo circuit is mainly composed of pick up interface, servo drive, system control and signal processing circuits and servo software (built in NAND FLASH) and other modules.
Servo drive circuit: servo drive circuit has one drive group. This group is composed of U 901(TPIC2060) and peripheral circuit which are used to drive spindle motor, focus coil, tracking coil and feed motor. TPIC2060 has servo control circuit and drive circuit built in.

Common servo circuit troubles:

- Fail to open/close tray door.
- Fail to load discs for loader driver error.
- Keep displaying “loading”, “No disc” or “Unknown disc”.
- Fail to view servo software version in setup menu, loader malfunction.
- Fail to load disc for poor contact of flat cable that connects the loader.

Section 2 Partial introduction to Main board system

3.2.1. Block diagram of decoding circuit:



3.2.1.1 Block diagram of decode and peripheral circuit

Decoding chip: This player adopts OP8591 as main chip, which includes video decoding, audio processing, memory controller, HDMI 2.0 transmitter, external interface and other modules. It supports H.264 VC-1 MPEG1 MPEG2 MPEG4　HEVC video decoding, Audio processing AC-3 Dolby digital Plus Digital True HD DTS DTS-HD , Dual HDMI outputs, HDMI inputs and USB 3.0/2.0 high speed ports,

Supported disc formats include BD（4K）BDMV, BDLIVE, SACD, DVD-AUDIO, CD, etc. For detailed features,

Please refer to IC specifications.

GENERAL DESCRIPTION

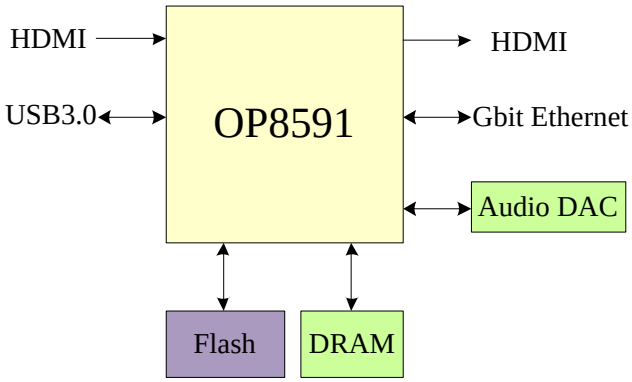
OP8591 is a highly integrated multi-media system-on-chip for UHD(4K) stream player. While integratd with MT8577A, it is worldwide first fully support Ultra HD 4K Blu-Ray Player system.

OP8591 with MT8577A can support Blu-Ray, DVD and CD playback, including the latest BD-ROM format, such as BD-Live and BonusView. It feature with HEVC, H.264 and VP9 4K 60p video decoder for coming 4K (3840x2160) video content and also with MPEG-2, VP8 and VC-1 2K 60p video decoder for legacy 2K (1920x1080 video content. And for audio decoding, it has capability for AAC, Dolby Digital, Dolby Digital Plus, Dolby TrueHD, DTS, and DTSHD MA by multi-format decoder that can support high quality audio stream.

OP8591 is fabricated with advanced silicon process and offers higher CPU performance and proper DRAM bandwidth. This SoC also includes a powerful graphics engine and a variety of peripherals, like USB 2.0/3.0 port. To support popular network applications, OP8591 also implements 10/100/1000 Ethernet interface and support WLAN connection thru its USB port.

Besides the connectivity features, audio and video output quality and flexibility is another focus of state-of-the-art Ultra HD 4K Blu-Ray device. OP8591 embeds an HDMI 2.0 compliant transmitter for video output. And OP8591 also embeds an HDMI 2.0 Receiver for video input. Its audio output via I^2S, SPDIF and HDMI can be configured independently. Moreover, OP8591 also supports audio bit stream input from HDMI and SPDIF.

With the advanced technology and abundant features, OP8591 is well positioned to be the core of Ultra HD 4K Blu-Ray players.



Key Features

- HEVC, H.264 and VP9 4K video decode
- MPEG2, VP8 2K video decode
- Dual-channel multi-format audio decode
- Motion-Adaptive, Edge-Preserving De-interlace
- Quad cores Cortex-A53
- Mail-860 MP2
- HDMI 2.0 tramsimitter
- HDMI 2.0 Receiver
- Gbit Ethernet
- USB 2.0 and 3.0
- SATA for front-end SOC.
- HDR Support

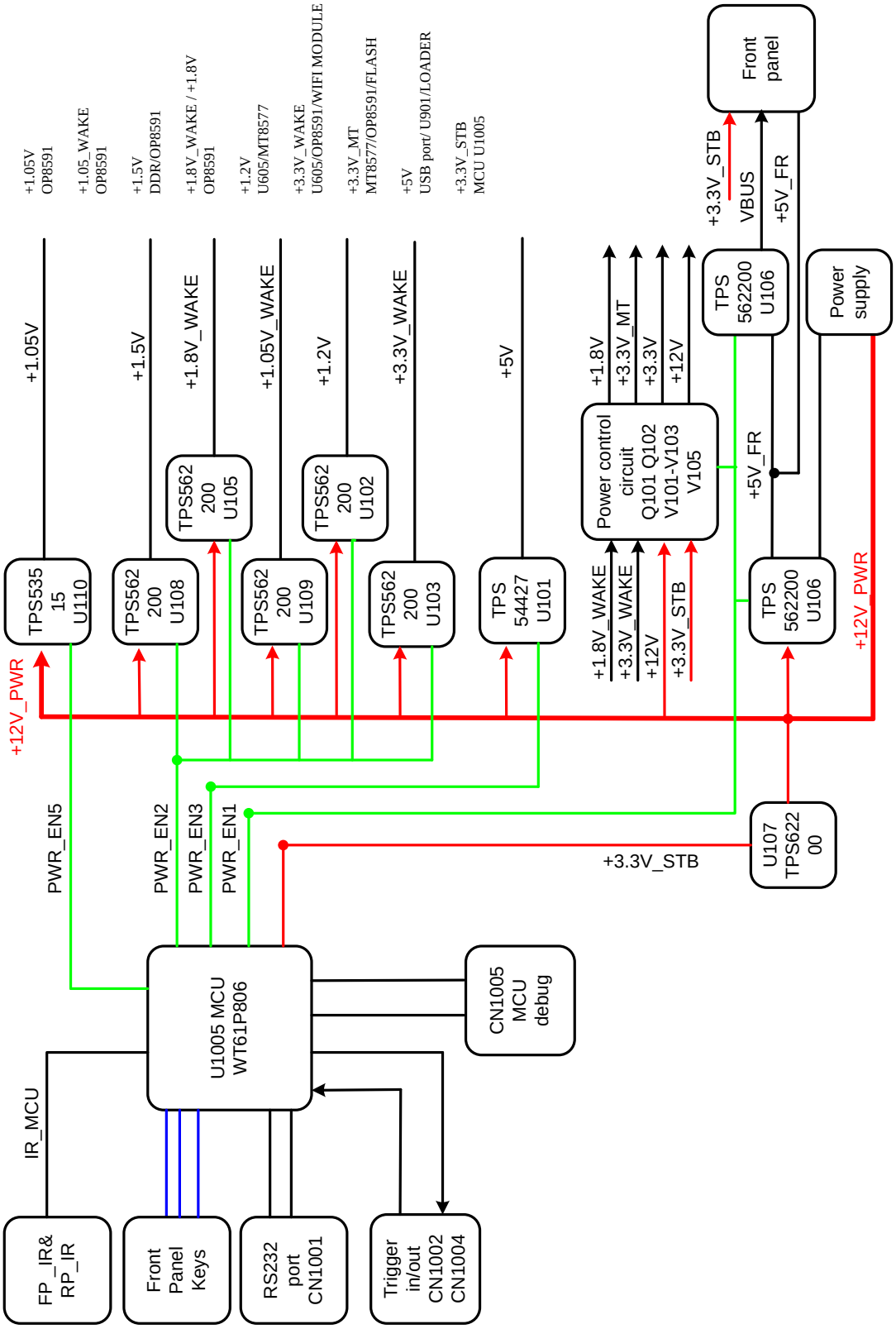
■Blu-ray Disc player

- HEVC Main 10 profile@L5.1 video decode
- H.264/AVC, VC1, MPEG-2 MP@HL video decode
- MPEG-1/MPEG-2 MP@ML/JPEG video
- MPEG-4 ASP and DivX video
- Dolby Digital, Dolby Digital+, Dolby Lossless
- DTS Digital Surround, DTS-HD
- Embedded ARM Cortex-A53 quad core with NEON Media Processing,L2 cache and VFPv4 Floating Point Unit.
- Data transport demux
- 1DES/3DES/AES/AACS/BD+/CSS/CPRM/DTCP copy protection
- Graphics engine
- HDMI 2.0 MAC and PHY with HDCP 2.2
- USB 3.0x1, USB 2.0 x 2
- Built-in 10/100/1000 Ethernet-MAC/PHY

Decoding chip:

3.2.2 .Main board power supply circuit (UDP-205)

3.2.2.1 Block diagram of voltage stabilizing circuit



3.2.2.2 Circuit introduction: UDP-205

When device powered on， the power circuit outputs +12V voltage to supply power via CN101 for the main board. The power supply circuit of the decoding board consists of switch control, DC-DC step-down regulator circuit, MCU and other sub-circuits.

True standby: When device in standby mode, the +12V power output via U107 regulator supplies power （3.3V_STB） for MCU, front panel buttons, remote sensor circuit and other circuits that requires standby power. When U101~U110 etc； circuits start running, the +12V power is input to each DC-DC circuit, and then transmitted through regulator circuit to provide power supply for subsequent circuits. The enable control of each DC-DC power is conducted by MCU according to system demands.

3.2.2.3 MCU features

The device employs WT61P8 with standby control, DC-DC control, button function, CEC and other features. The WT61P8 is a microcontroller for flat panel display control and power management with 1) Turbo 8052CPU, 2) 64K bytes flash memory, 3) 1K+256 bytes SRAM, 4) 8 8-bit PWMs, 5) DPMS detector(2 H/V inputs, Support H+V input) , 6) 4 timers and 2 UART Ports, 7) 2 DDC/CI interface, 8) Slave I2C interface, 9)8 channel 8-bit A/D converter, 10) Real Time Clock, 11) Watch-dog timer, 12) Embedded ISP function, 13)Power down mode, 14) Embedded ICE mode. and15) H/W CEC. It‘s peripheral circuit include power -on reset circuit and 12M clock circuit. The MCU supports firmware upgrade via USB and serial ports.

Section 3 Audio processing circuit

3.3.1 Block diagram of audio signal is shown in figure 3.3.1.1:

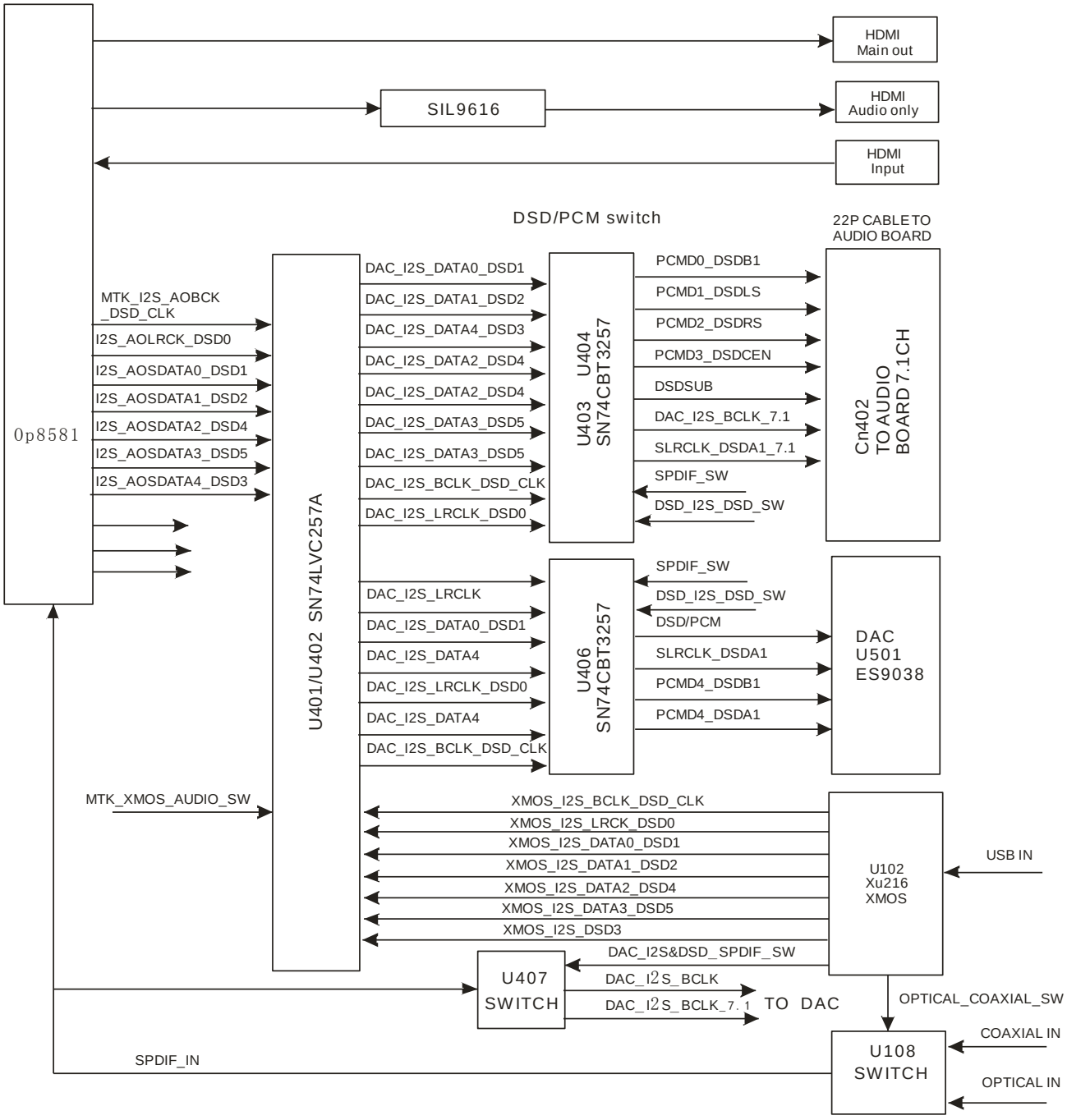


Figure 3.3.1.1 Block diagram of audio signal

Processing flow of audio signal

When the UDP-205 play discs or Media files from USB, or process signal from HDMI in, audio signal will be sent out in digital audio format after being processed by decoding circuits.

1) HDMI main output: Signal sent to HDMI after being processed by OP8591 (AV outputted at the same time)

2) HDMI Audio only， signal sent to sil9616 after being processed by OP8591, then sent to HDMI in audio format. sil9616 can provide an external clock signal for the audio circuits.

3) SPDIF: audio signals sent to AVR via SPDIF, supports only up to normal 5.1CH, or 2CH(high bit rate, 192Khz)

4) I2S format output： audio signal will be converted to I2S format by OP8591, then sent to electronic switch that comprised by U401 & U402(exterior input and local playback), then sent to the DSD/PCM electronic switch that comprised by U403 & U404 & U406, then will be finally sent to the rear DAC for D/A conversion.

5) USB DAC input：Audio signals sent from USB DAC IN will be sent to U401&U402 after being processed by XMOS chip, then will be sent to the rear DAC for D/A conversion finally via DSD/PCM electronic switch that comprised by U403 & U404 & U406.

6) Signal sent from SPDIF will be outputted in two channles after pass through U108, the source signals sent from exterior input will be sent to OP8591 for processing, and the PCM signals will be sent to ES9038.

Analog audio output

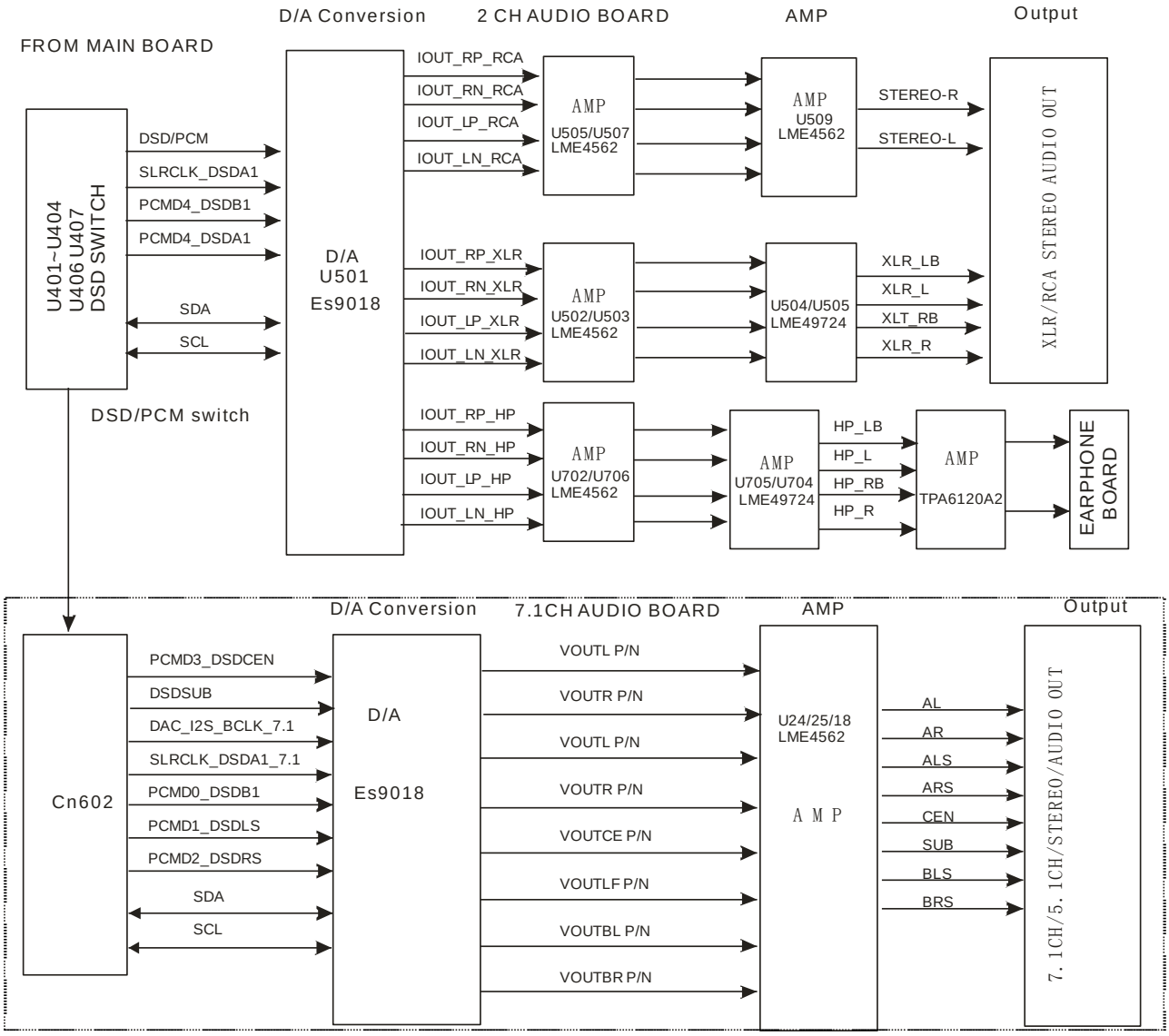


Figure 3.3.1.1 Block diagram of audio signal

Analog audio output circuit

Analog audio output employs dedicated audio board for isolated processing, capable of D/A conversion of DSD and PCM signal. Audio processing board mainly consists of buffer circuit, DSD/PCM selection switch and audo D/A conversion, amplification, filter, muting and power supply circuits.

Operating principle

The first group of digital audio (I2S)output signals output from OP9591 are transferred through socket CN502 to audio DAC board. The I2S-formatted audio signals from OP9591 and input to electronic switch U1/U2. (when the device set to DSD output,) while outputting DSD signal, OP9591 also output a low level DSD/PCM switch signal for U1/U2 to select DSD output channel. (When DSD_PCM is on high level, the PCM output channel is selected.) I2S audio signal is input to the audio DAC circuit for AK4458 to perform D/A conversion and output analog audio signal, which is transmitted to the audio amplification and filter circuit consisting of 5532 and other components for amplification and filtering, and output to external device via RCA connectors.

Section 4 Video processing circuit

3.4.1 Block diagram of video circuit I

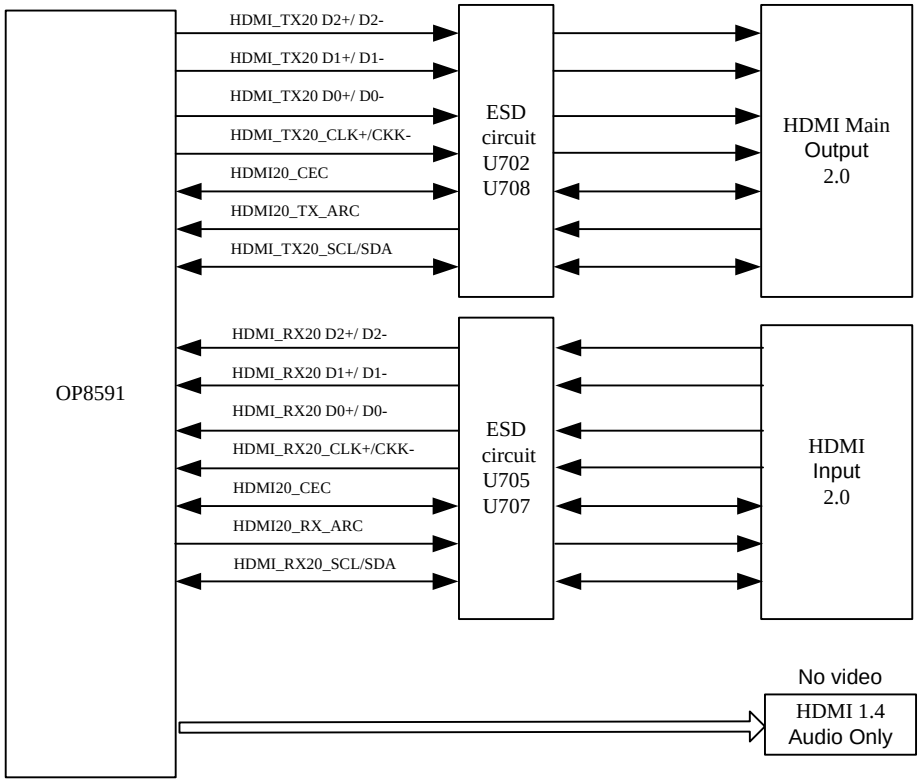


Figure 3.4.2.1 Block diagram of video circuit

3.4.1.2 Video output Circuit

- **HDMI output:** The digital video interface of OP8591 transmits digital video signal to HDMI output （Main）Encoded into TMDS signal, and in the meantime digital audio signal output from Mt8530 is also encoded Into TMDS. OP8591 also has HDCP 2.2 encrypted built in. The TMDS signal output from OP8591 is transmitted to HDMI （Main）for output. For protection of HDMI 1 port, the circuit also has anti-ESD IC included.
- Video output circuit issues mainly include no video output and output video signal distortion.

2.4.1.3 HDMI 2.0 input circuit

- OP8591 incorporates one sets of HDMI input; HDMI input port locates on the rear panel and goes directly into OP8591's HDMI input port.

Chapter 5 Other control circuits of main board

3.5.1 Block diagram of external input interface as shown in 3.5.1.1:

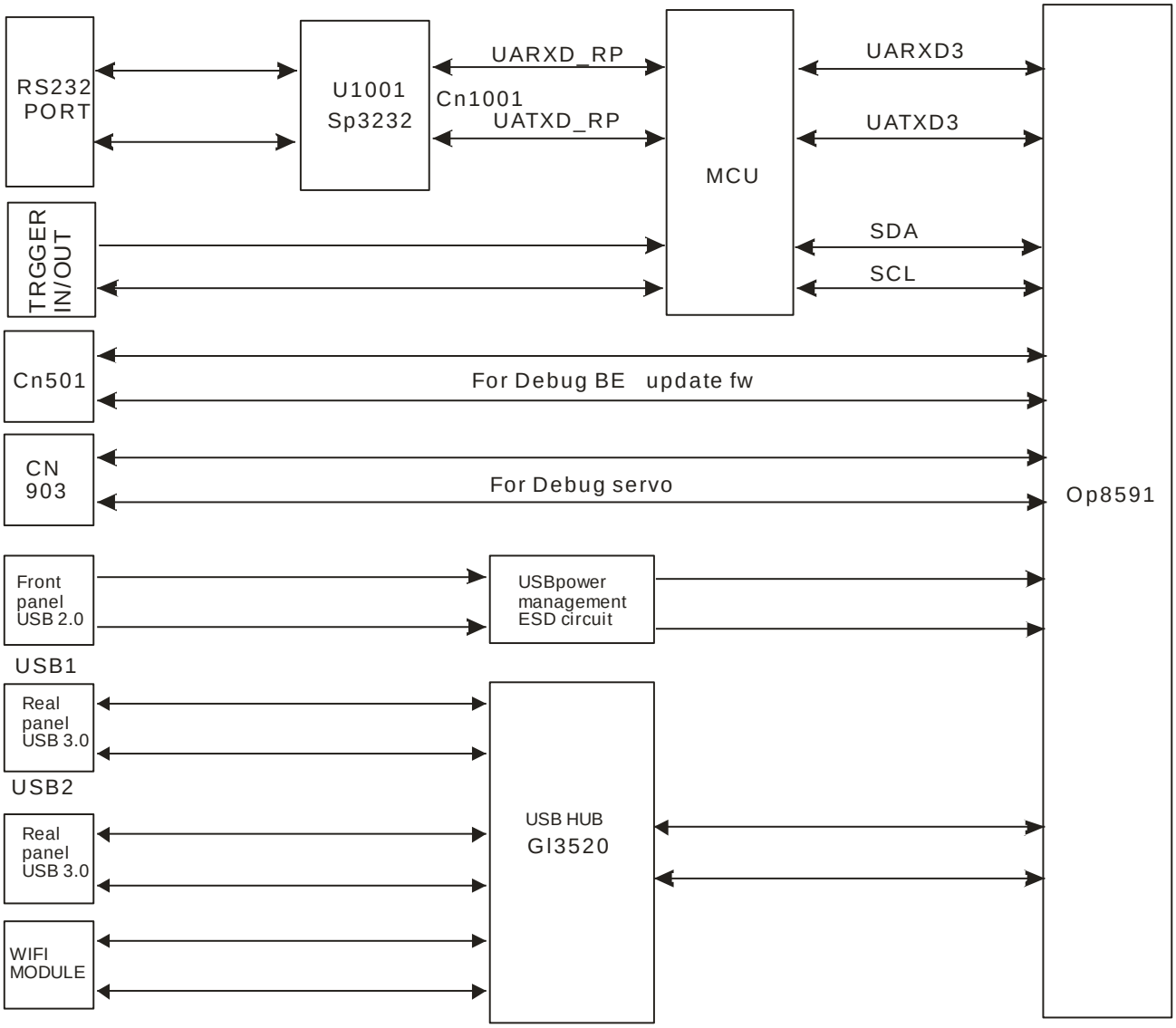


Figure 3.5.1.1 Block diagram of external input interface

RS232 On the player, RS232 is mainly used for remote control circuit, allowing external control system to control the player via RS232 port.

CN501 NAND FLASH Debug port

CN903 Servo software Debug port, barcode input port

USB 3 sets of USB interfaces for external USB devices, USB1 USB2 (Rear panel) is USB3.0

Section 6 Panel and button control circuits

3.6.1: Block diagram of panel circuit:

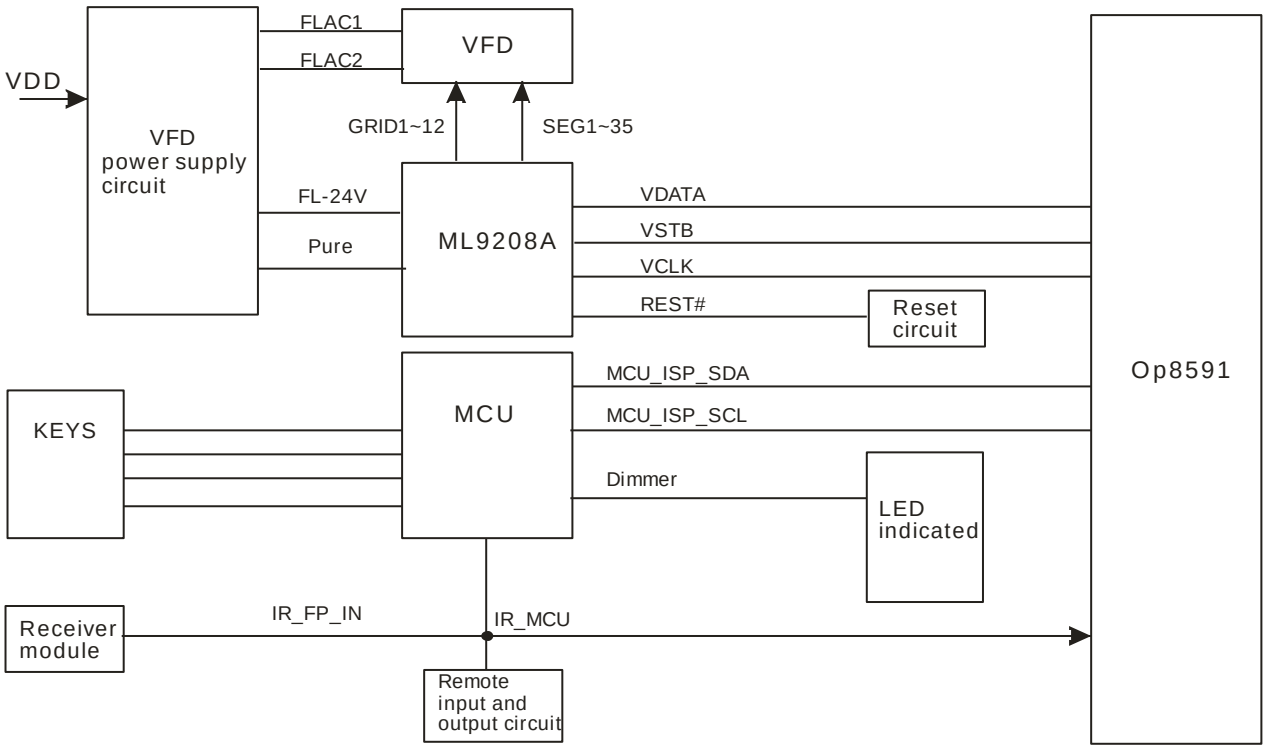


Figure 3.6.1.1 Block diagram of panel

Section 7 Power supply circuit

3.7.1 Block diagram of power supply circuit is shown in figure 3.7.1.1:

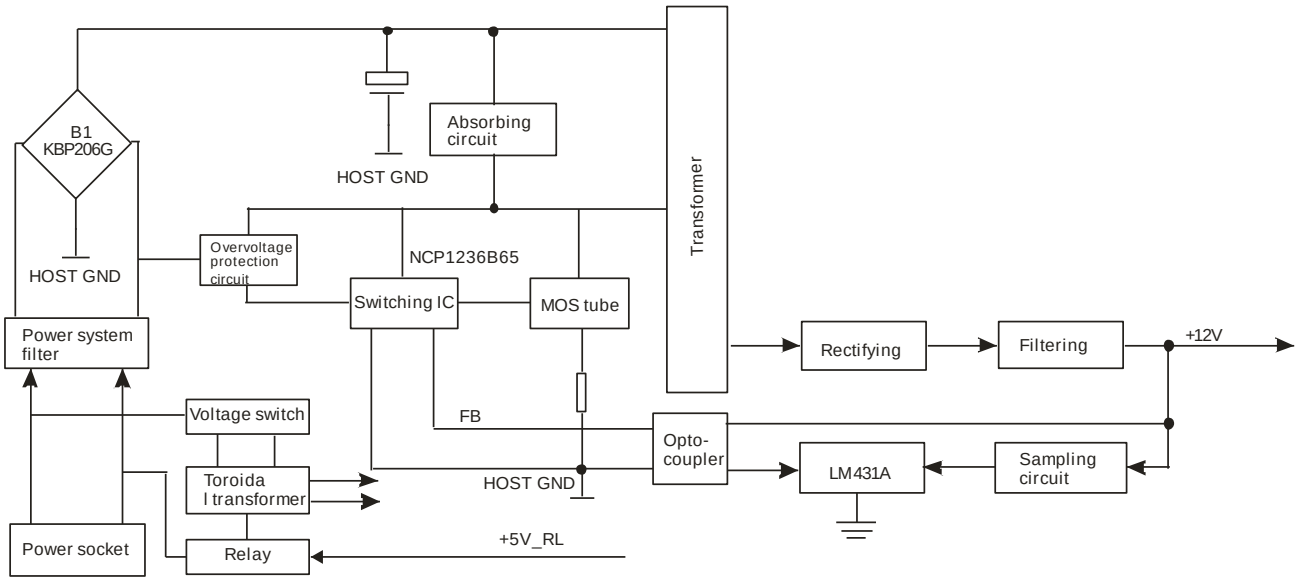
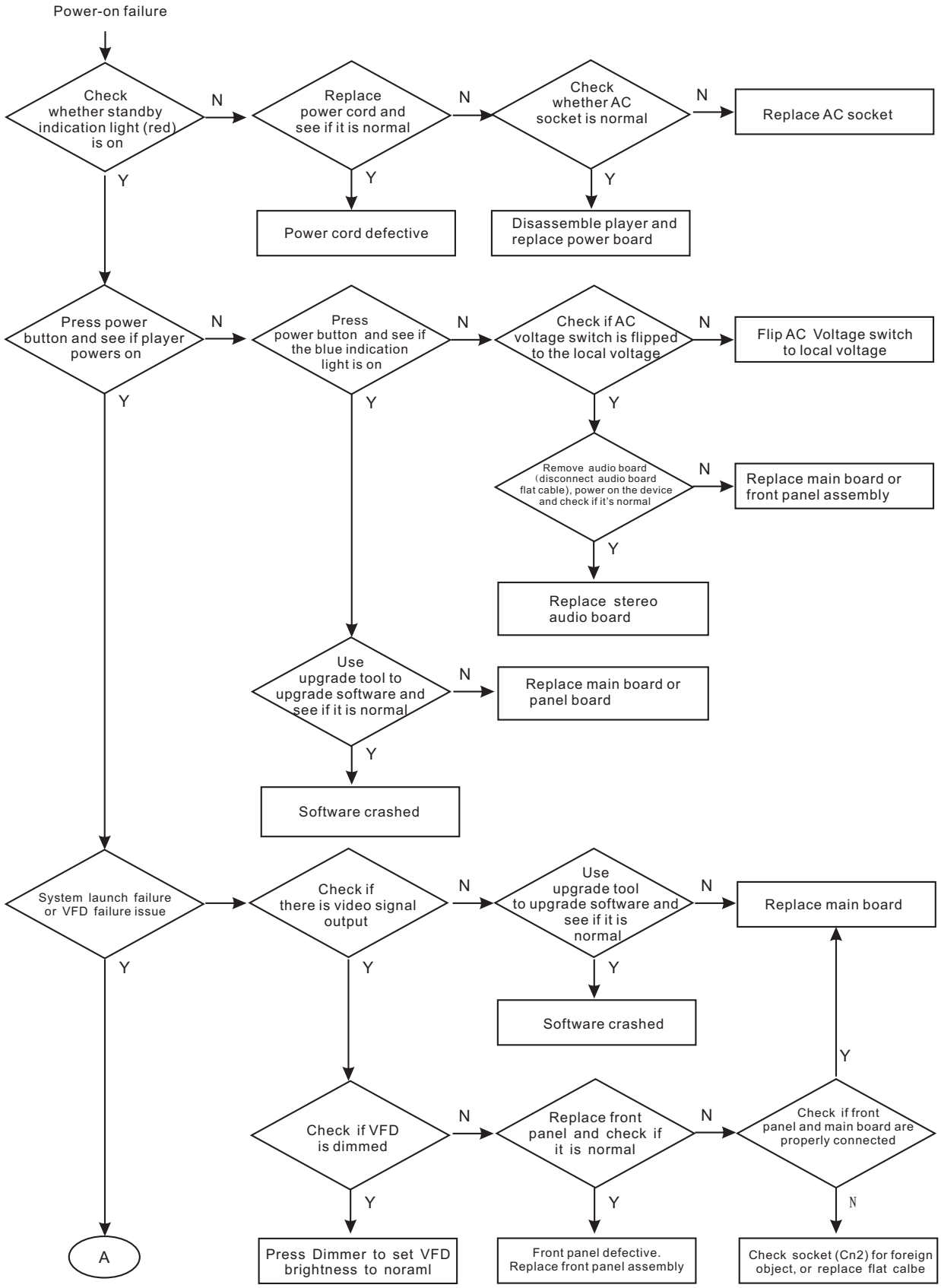


Figure 3.7.1.1 Block diagram of power circuit

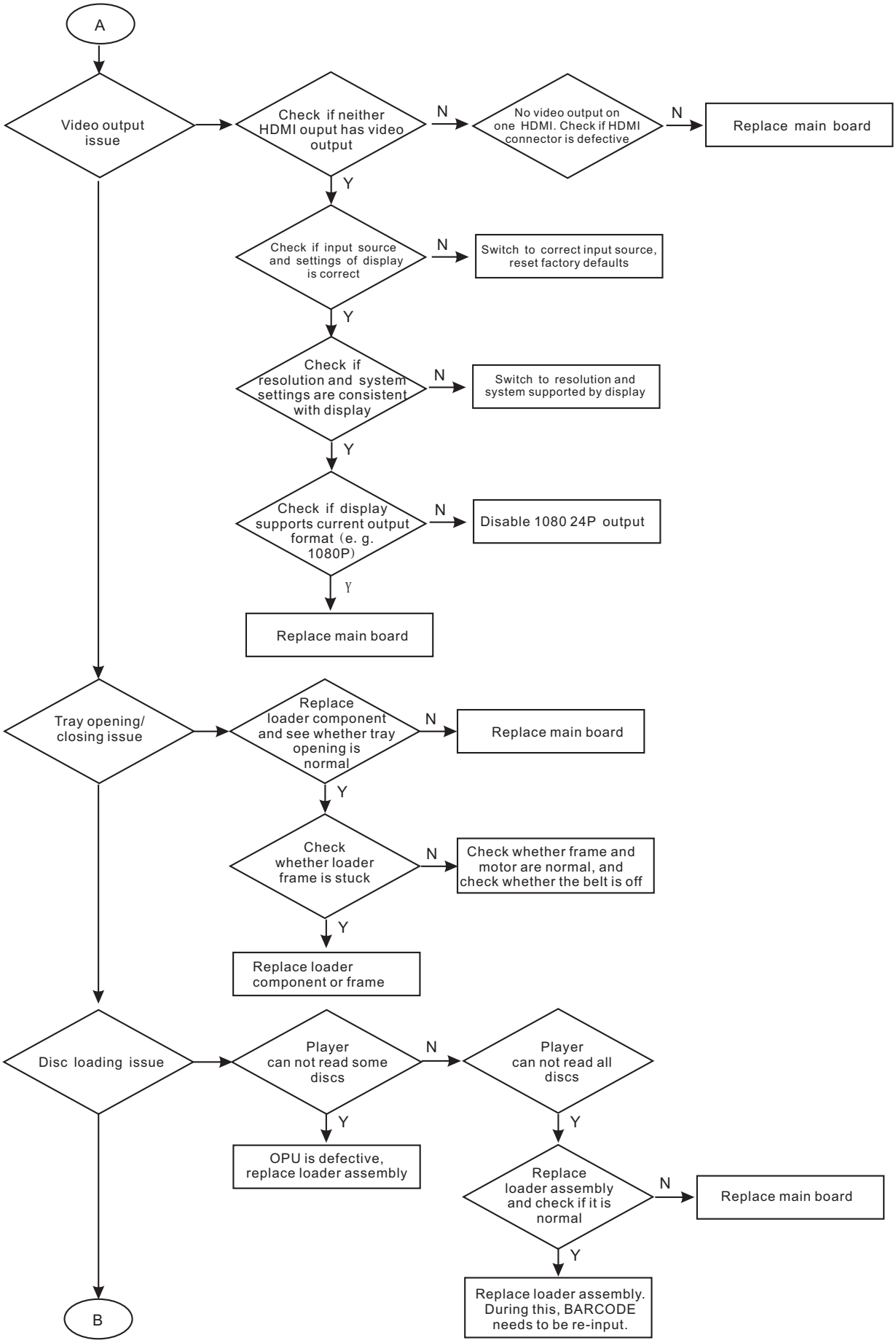
+5v_RL is a relay control signal that given by the MCU on the main board, MCU will output high level signals to disconnect the relay in order to protect the circuits while short-circuit, overvoltage, overcurrent occurs.

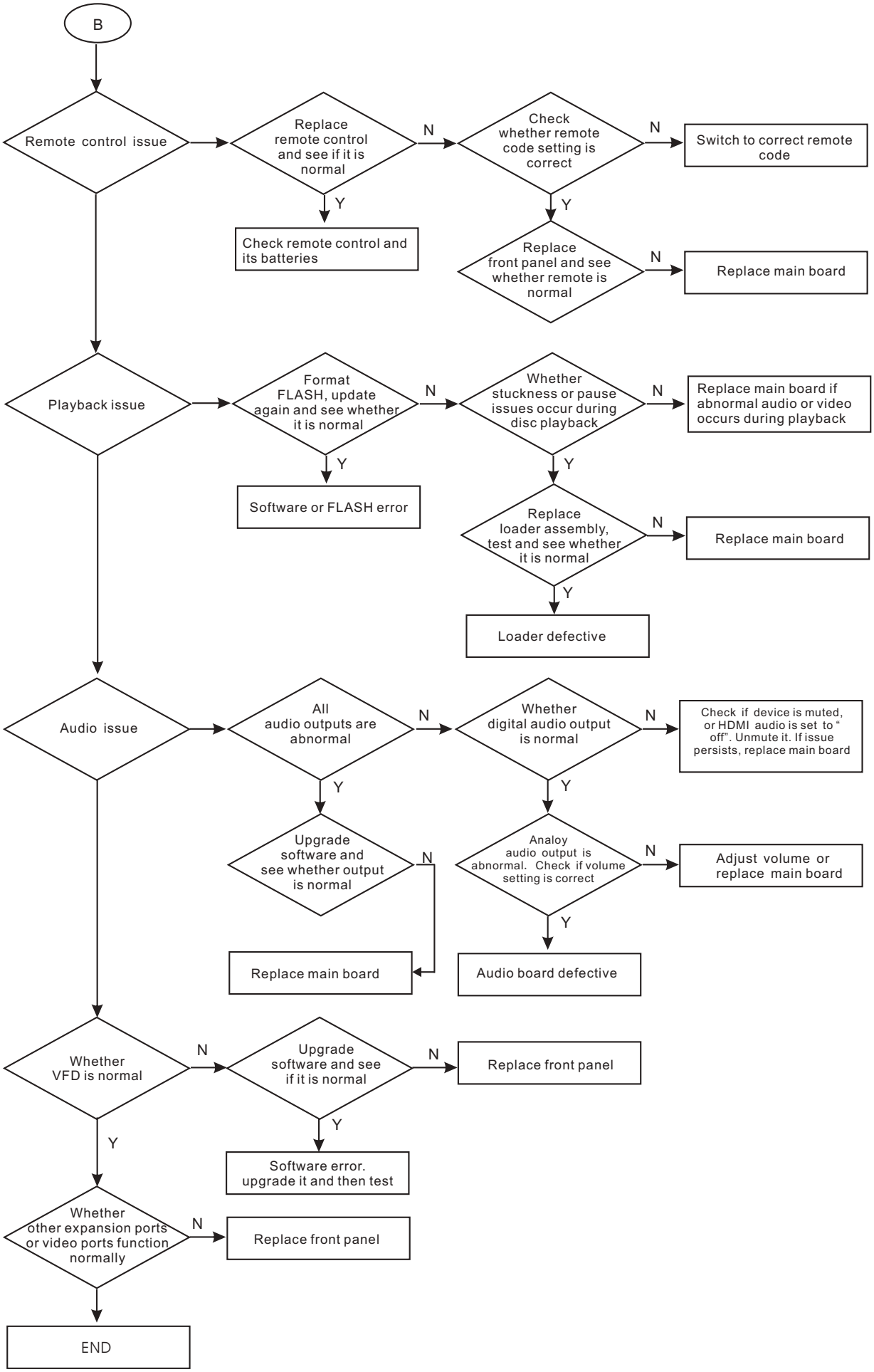
Chapter IV Troubleshooting flow chart

4.1 Troubleshooting flow charts



Troubleshooting flow for tray opening/closing, disc loading, playback and remote control issues

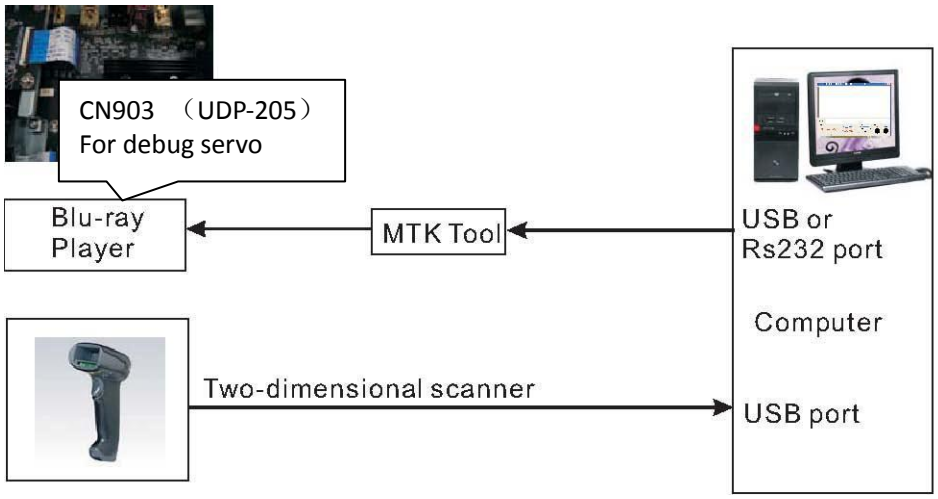



B
Remote control issue
Replace remote control and see if it is normal
N
Check whether remote code setting is correct
N
Switch to correct remote code
Y
Check remote control and its batteries
Y
Replace front panel and see whether remote is normal
N
Replace main board
Playback issue
Format FLASH, update again and see whether it is normal
N
Whether stuckness or pause issues occur during disc playback
N
Replace main board if abnormal audio or video occurs during playback
Y
Software or FLASH error
Y
Replace loader assembly, test and see whether it is normal
N
Replace main board
Y
Loader defective
Audio issue
All audio outputs are abnormal
N
Whether digital audio output is normal
N
Check if device is muted, or HDMI audio is set to " off". Unmute it. If issue persists, replace main board
Y
Upgrade software and see whether output is normal
N
Y
Analoy audio output is abnormal. Check if volume setting is correct
N
Adjust volume or replace main board
Replace main board
Y
Audio board defective
Whether VFD is normal
N
Upgrade software and see if it is normal
N
Replace front panel
Y
Y
Software error. upgrade it and then test
Whether other expansion ports or video ports function normally
N
Replace front panel
END

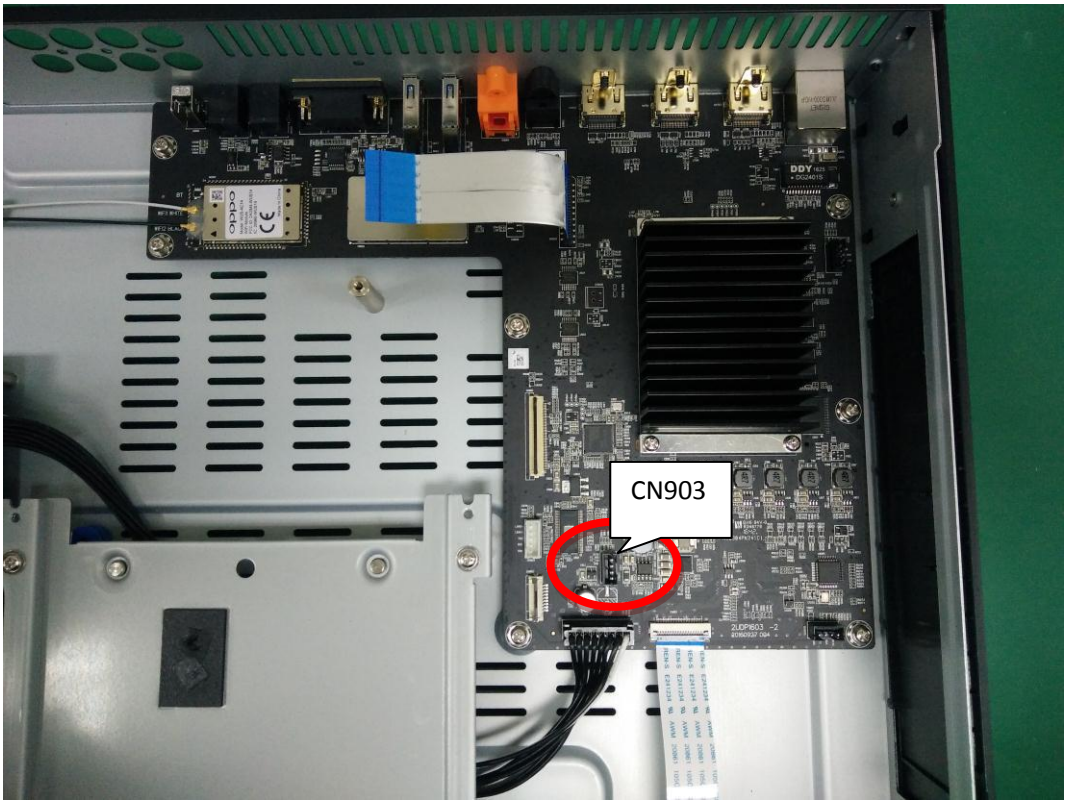
Chapter V Install barcode

5.1 Install barcode

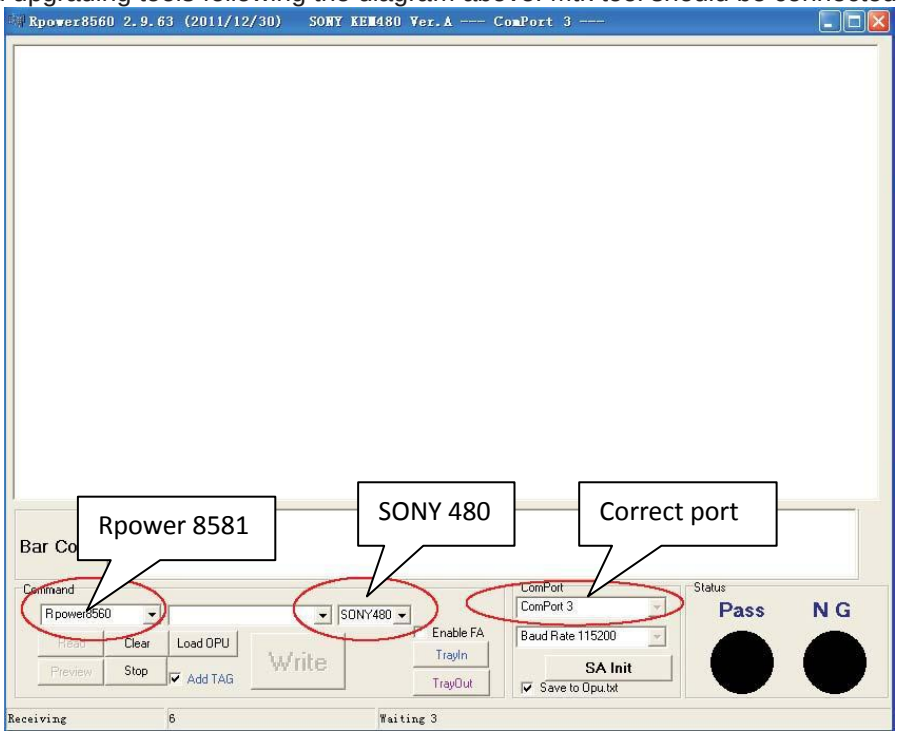
Device connection （same BDP-20X）



Block diagram of barcode entry device connection



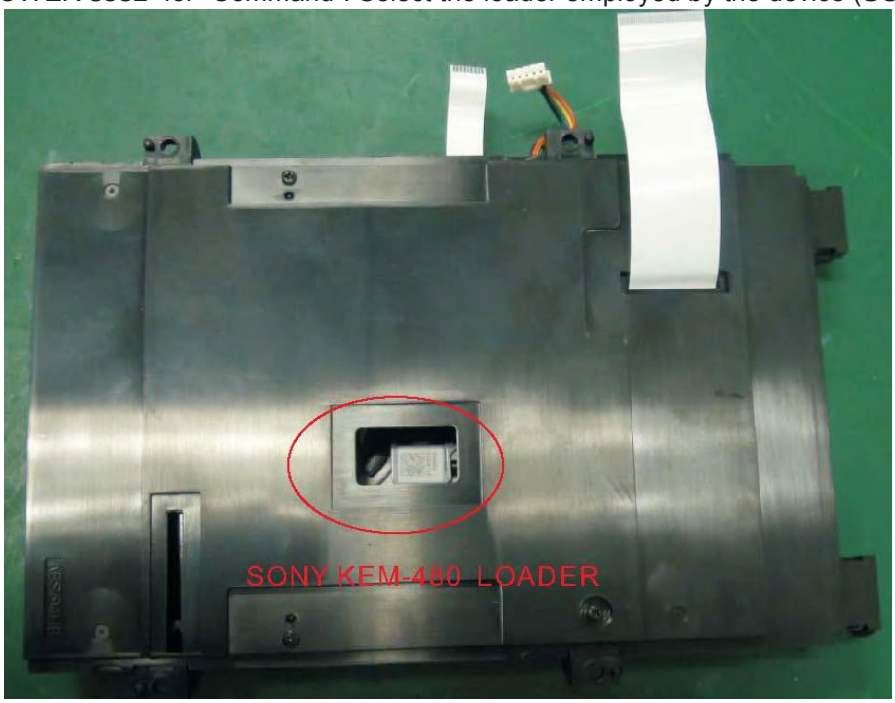
Step 1. After replacing main board or loader assembly, it is required to re-input barcode. Before the barcode is input, the main board and the loader should not be connected. Connect the player, PC, two-dimensional scanner and upgrading tools following the diagram above. Mtk tool should be connected to **CN903**.



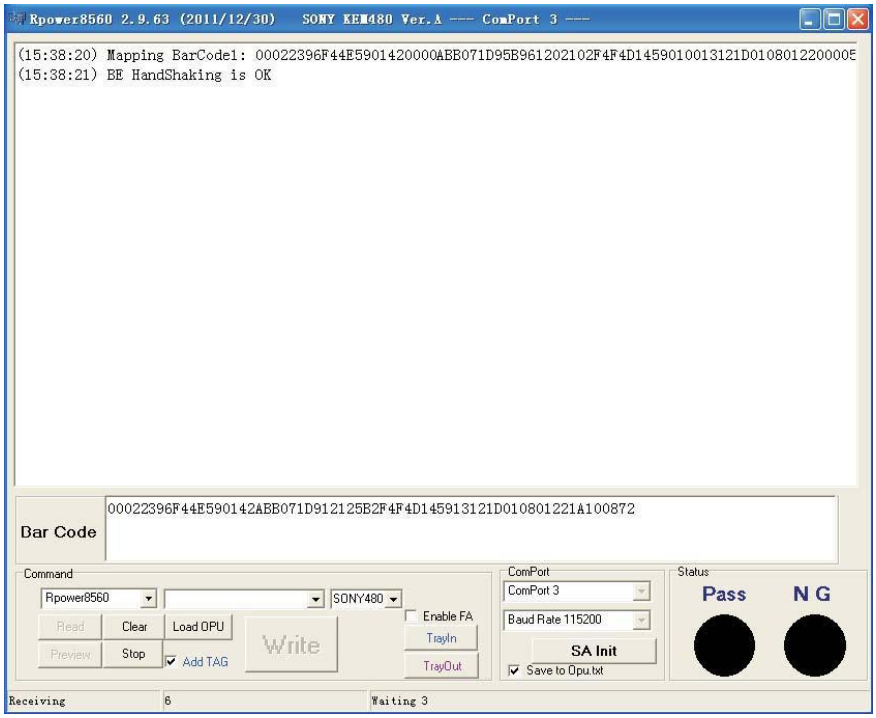
Step 2. Activate the predetermined Rpower_2.9.82(**KEM480**) software on PC. Set up the software according to device model.

1) Select the appropriate COM port according to the connecting port of the MTK tool.

2) Select “RPOWER **8581**” for “Command”. Select the loader employed by the device (**SONY 480**).

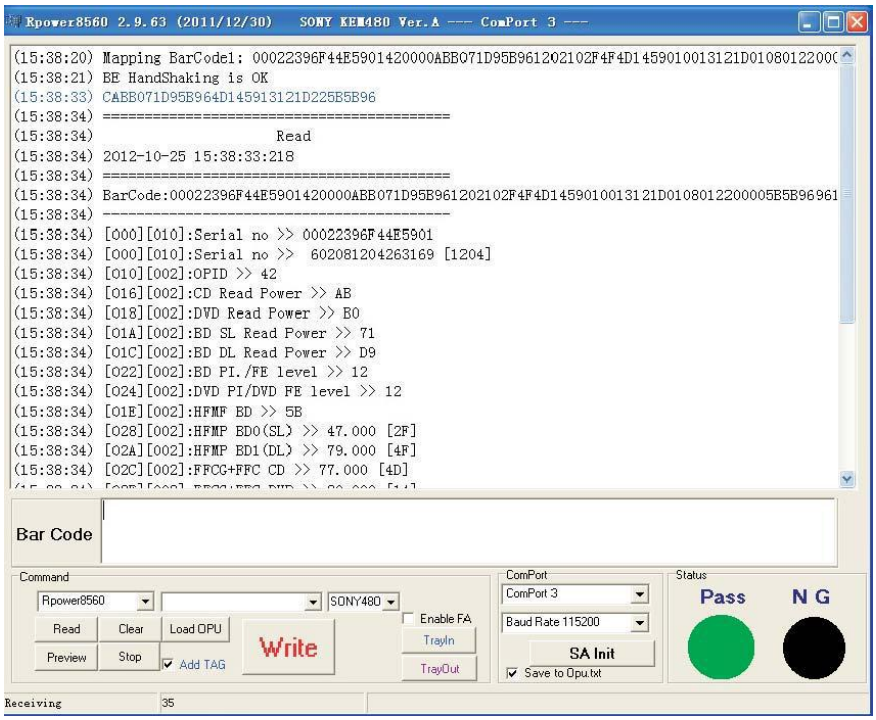


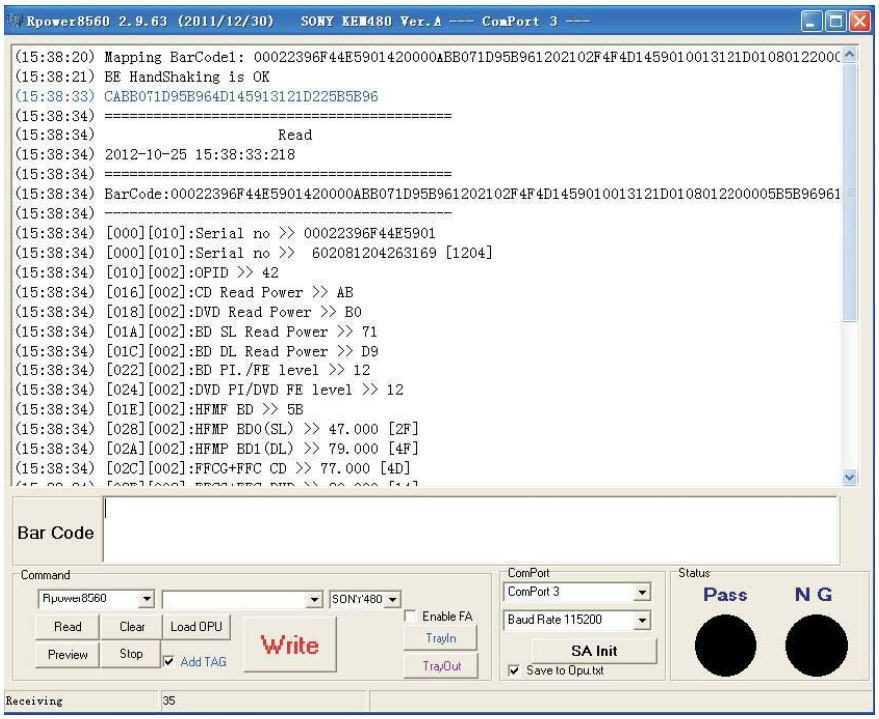
Step 3. Use the scanning gun to scan the two-dimensional barcode. (Find the reserved scanning window in the bottom of the loader) Note: If the barcode label cannot be seen from the window, connect the loader cable to the main board and power the device on, then the OPU will automatically reset to the initial position and reveal the barcode label.



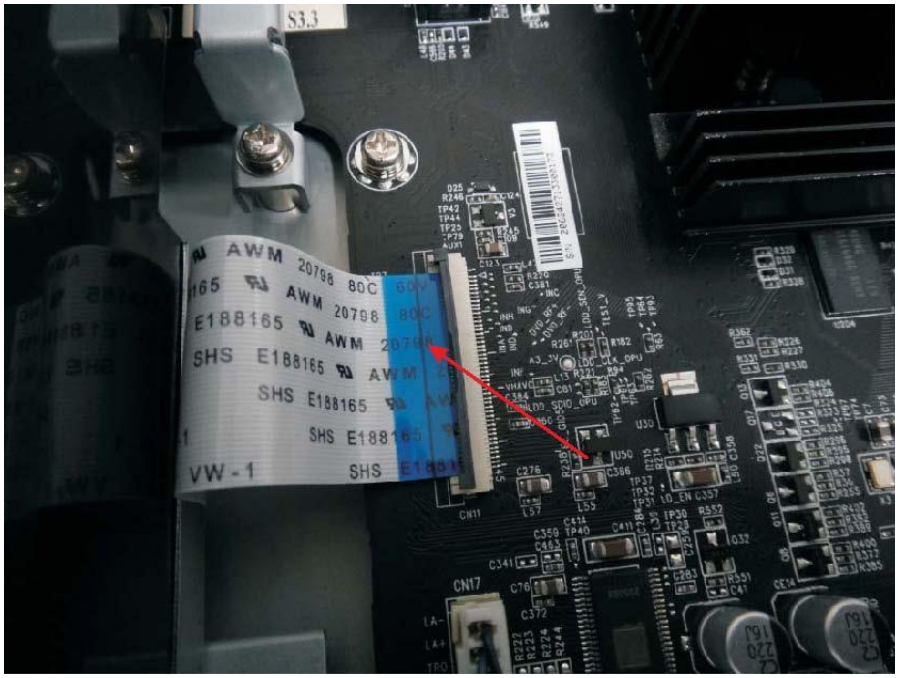
Step 4. The Barcode will be displayed on the PC software interface after successfully scanned. The barcode consists of 64 digits and alphabets.

Step 5. After the barcode input is successfully completed, the PASS light will turn green and last for a few seconds and logs will be displayed.





Step 6. The PASS light will go black again after the few seconds, indicating the process is completed.



Step 7. Reinstall the flat cable of the loader properly, power the device on and test it. Input the barcode again, If the FA test menu appears, you can skip this test by pressing the Stop key.

Note:

- Please check the device connections if NG or FALL happens during upgrading.
- The device should remain on during upgrading, and powering off and standby should be avoided.
- Do not connect the loader or conduct reading test before barcode input is successfully done.
- FA test might be reminded after barcode input is finished. After-sales service staff can skip this test

Chapter VI Disassembling & Assembling the Unit and Precautions

Some components can not be disassembled directly due to product physical design.

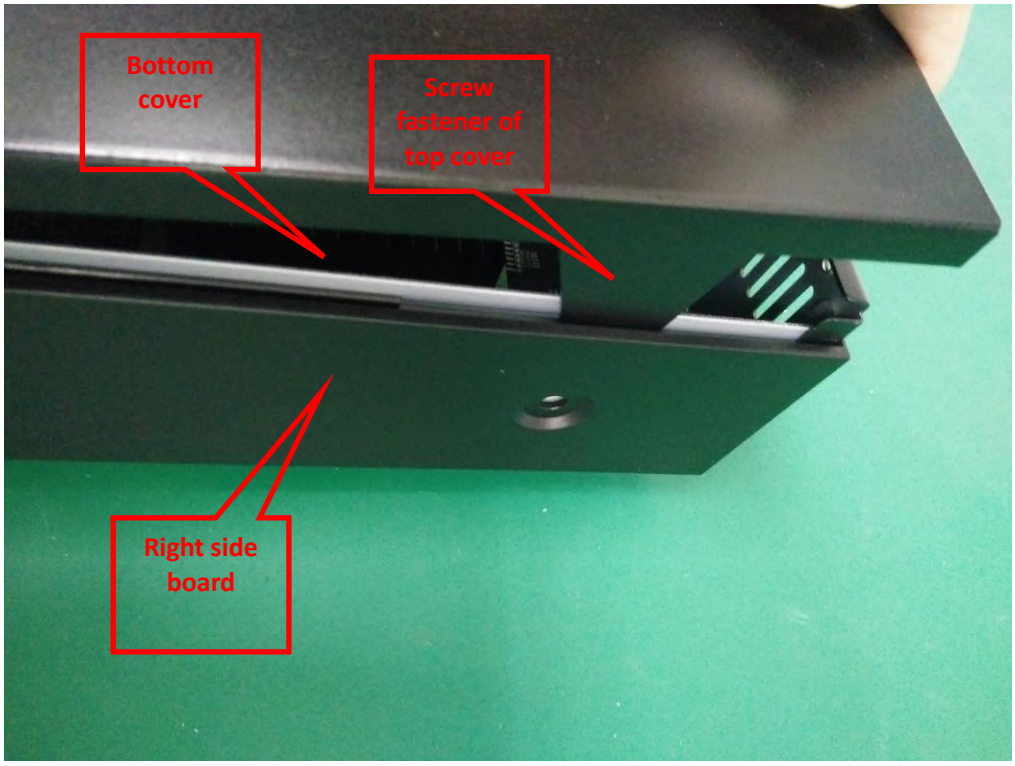
1. Replacing the mainboard
   Disassembling: top cover--tray door--7.1CH audio board—stereo audio board--audio board holder (right) -- loader component –-main board(in sequence)
   Assembling: main board-–loader component--install loader Barcode--tray door--disc reading test-- audio board holder-- stereo audio board --7.1CH audio board -- top cover(in sequence)
   Caution: please use the glue to fix the wifi antenna in order to prevent wifi antenna become less crowded
2. Replacing the power board :
   Disassembling: top cover--7.1CH audio board--audio board holder(left)--shielding case for power board--power board (in sequence)
   Assembling: power board--shielding case for power board—audio board holder (left) --7.1CH audio board (in sequence)
3. Replacing the loader component
   Disassembling: take out the tray door -–top cover--7.1Ch audio board--stereo audio board—audio board holder(left)--unplug the cables--remove the screws that fix the loader--take out the loader component.
   Assembling: install the loader component on the loader holder –install loader Barcode-- plug in the cables-- Power on the player then open the tray door-- adjust the tray door as appropriate---install the screws--audio board holder--stereo audio board--7.1CH audio board—top cover
4. Replacing the left cover
   Disassembling: top cover--7.1Ch audio board—stereo audio board—audio board holder--shielding case for power board—remove the wifi antenna that fixed on the main board—Remove the conductive foam on the antenna shielding case--take out the left cover
   Assembling: antenna--conductive foam--left cover-- shielding case for power board –-audio board holder-- 7.1CH audio board--top cover
5. Replacing the front component
   Disassembling: take out the tray door—disassemble the audio board-- disassemble the front panel component
   Assembling: install the front panel component --install the tray door--adjust the tray door as appropriate--audio board

1、 Remark **: please re-install the barcode file after replacing the loader or main board, refer to** **Chapter V Install barcode**

Replacing the top cover

1.1、Place the player on the working bench as above, remove the 5x screws that fix the top cover and the rear cover

1.2、Remove the 4x screws that fix the side covers and the bottom cove.



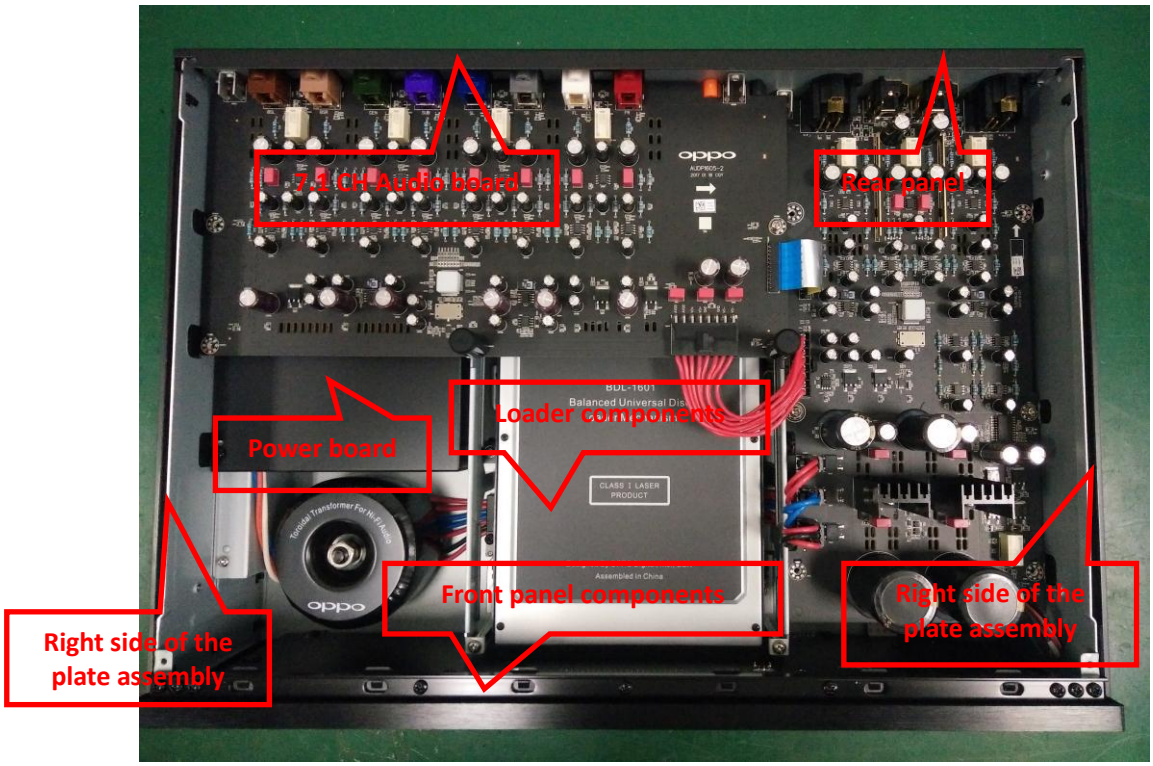
1.3、Take out the top cover starting from the rear cover(If difficult to take it out, please check if any screws have not been removed)

Assembling: perform the disassembling procedure in the reverse order

Cautions：

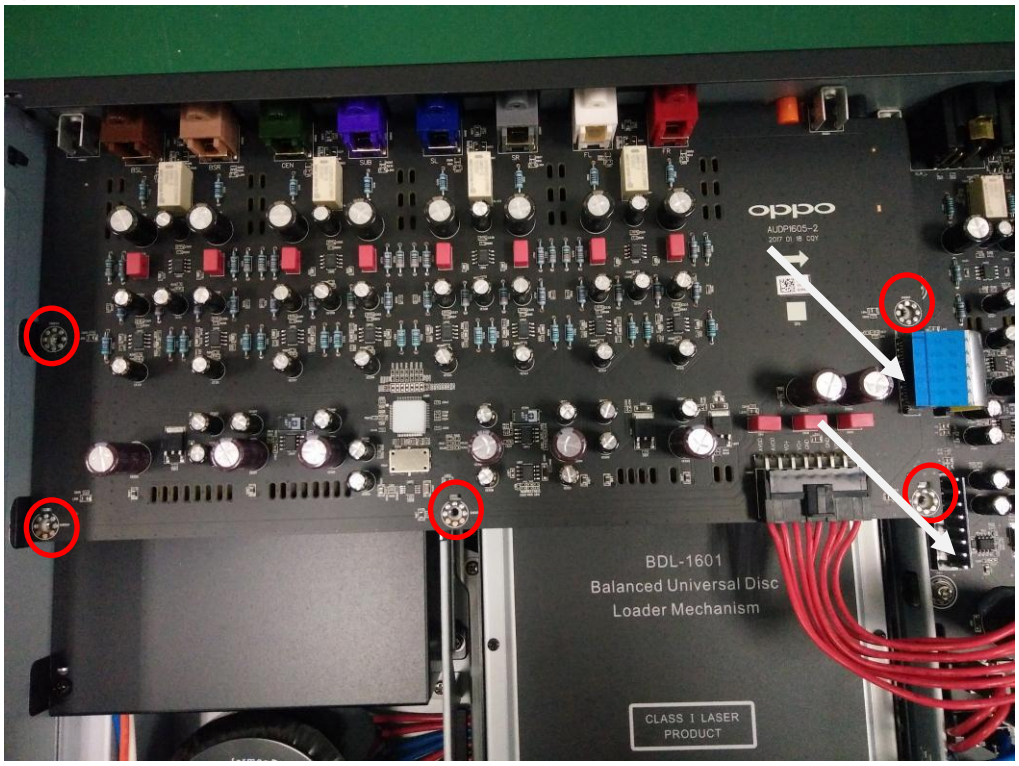
1、 Screw fastener of top cover must be installed between the left/right cover and the side panel of bottom cover.

2、 Use the correct screws.

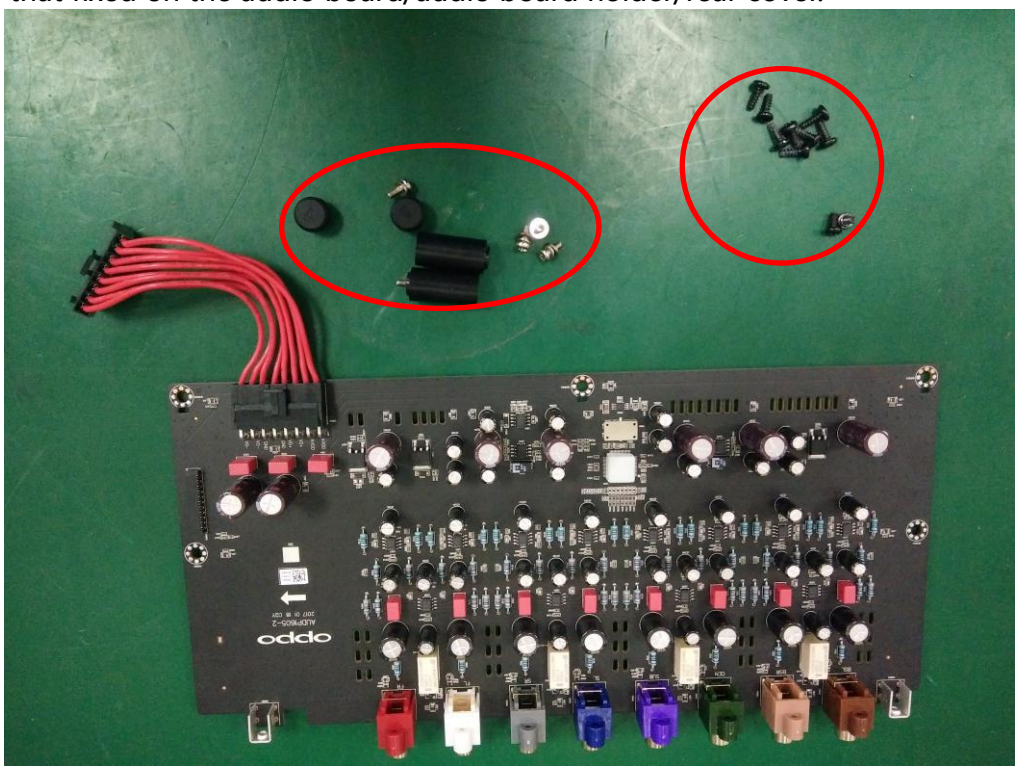


You will see the interior structure after take out the top cover: front panel component, loader component, power board, stereo audio board,7.1CH audio board, rear cover, left pane;, right cover and bottom cover

2、Replacing audio boards



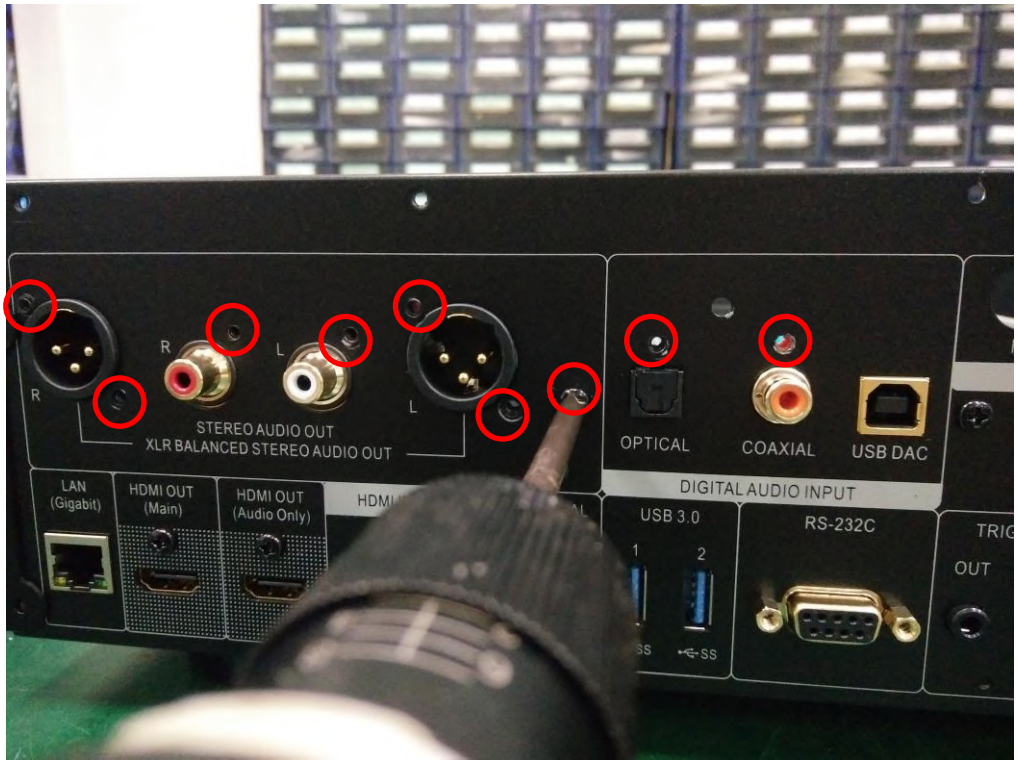
2.1.1、Disconnect the cables connecting the 7.1CH audio board and stereo audio board, remove the screws that fixed on the audio board/audio board holder/rear cover.



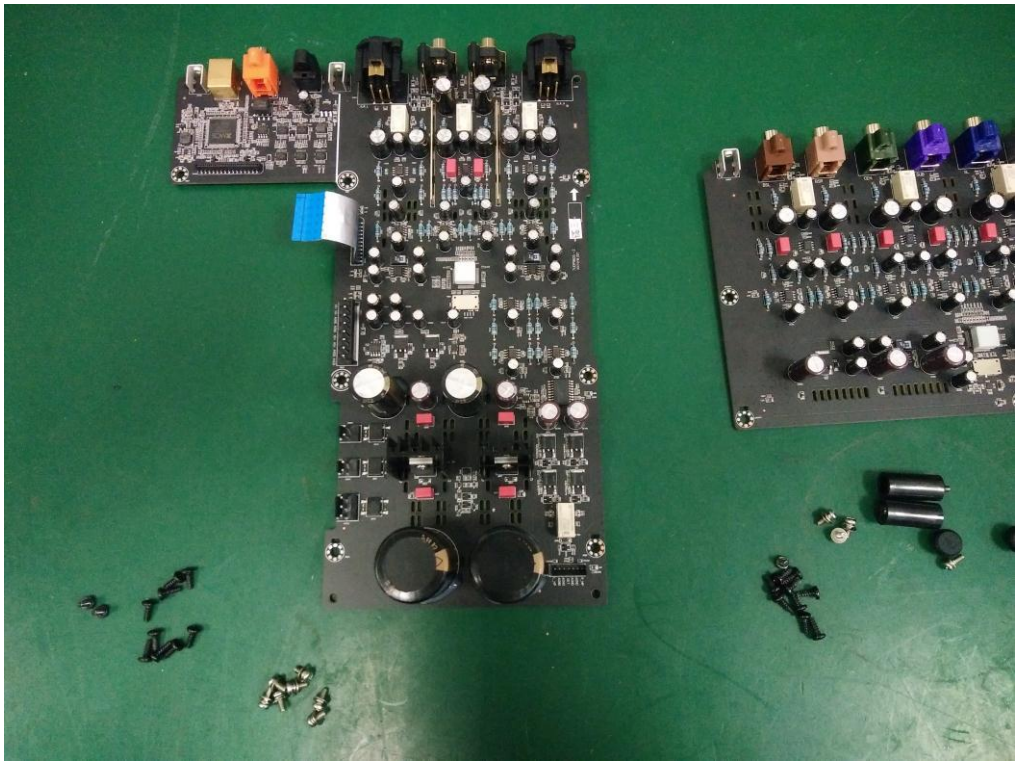
2.1.2 Remove the screws that fixed between the audio board and the rear cover then take out the audio board.

2.2 Disassemble the stereo audio board

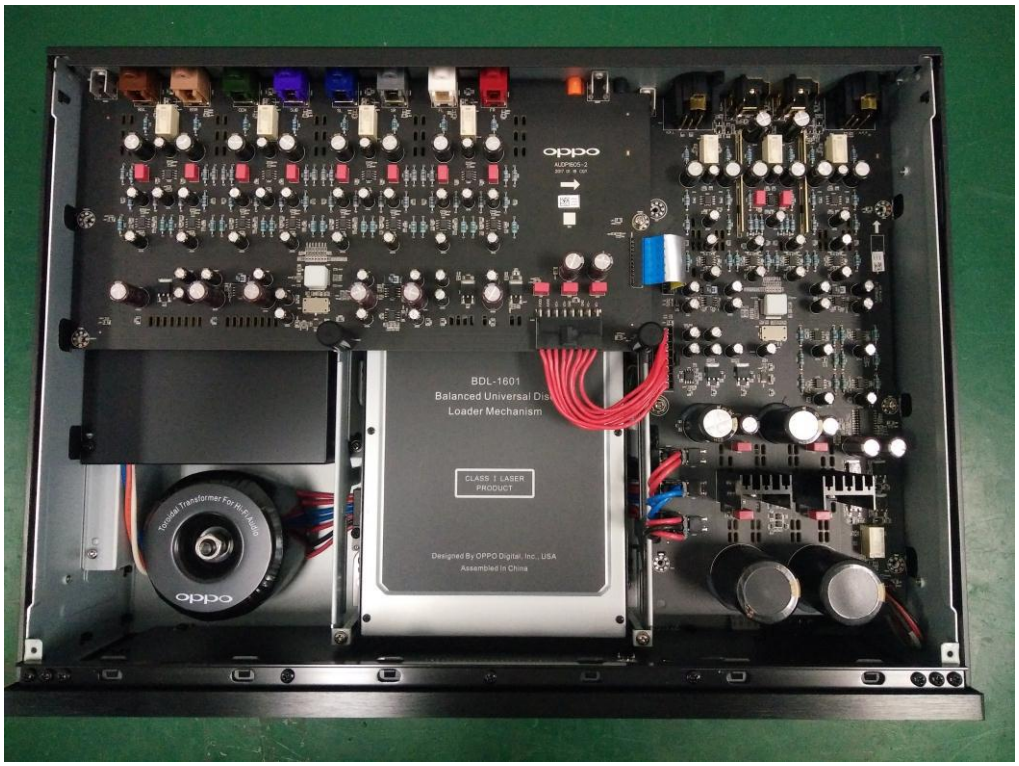
2.2.1Disconnect the cables that connected to the stereo audio board.



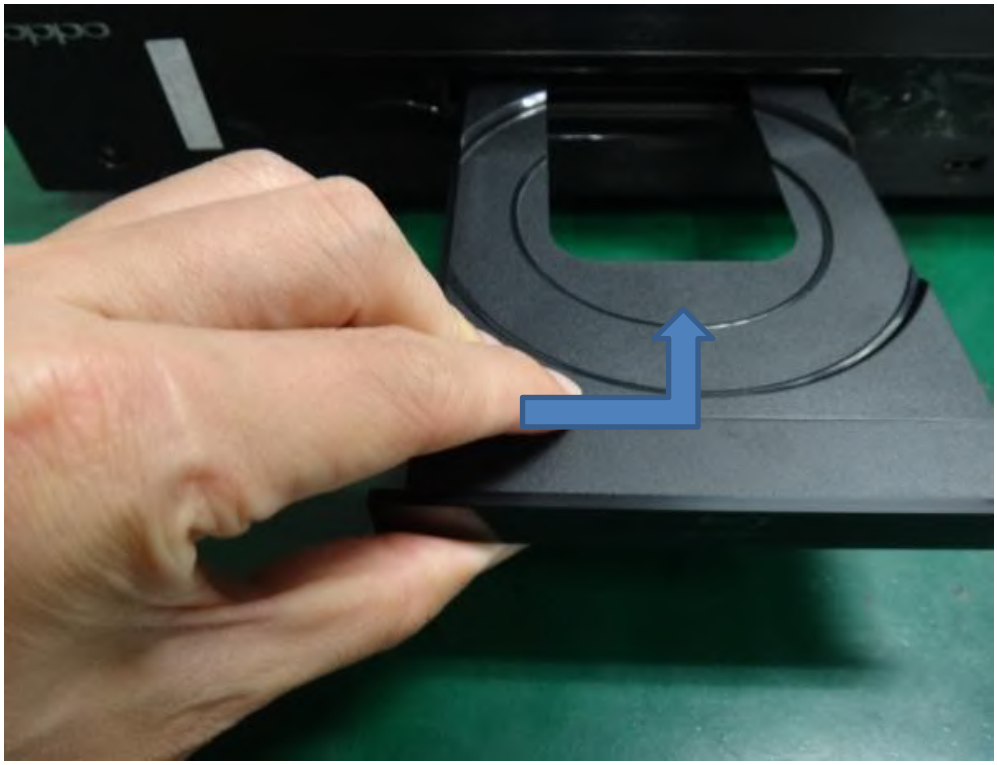
2.2.2 Remove the screws that fix the rear cover and the audio board.



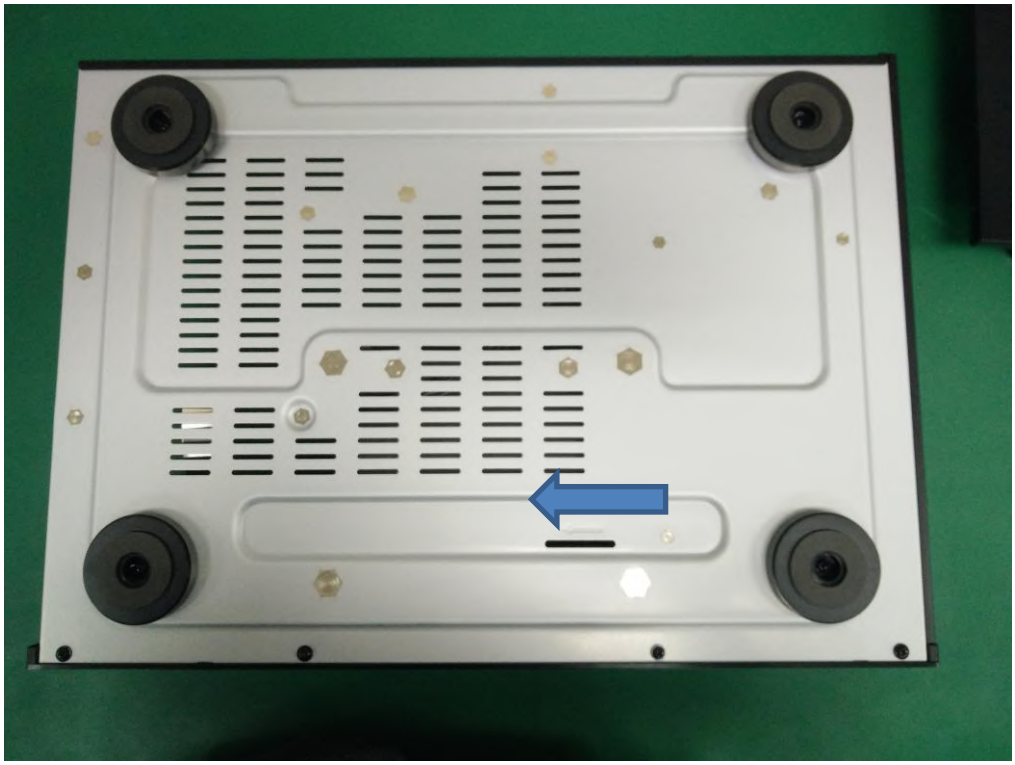
2.3. **Assembling:** perform the disassembling procedure in the reverse order



3、Replacing the loader component



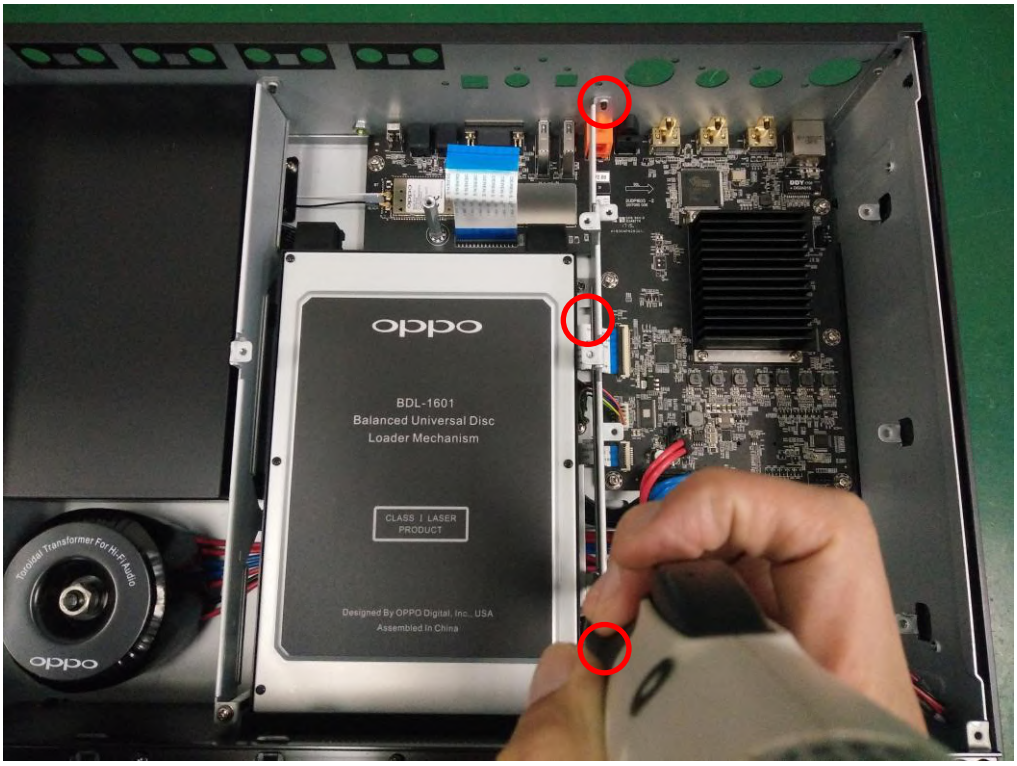
3.1、Power on the player then open the tray door, push the tray door upwards



3.1.1、When the player fails to be turned on or the tray door can not be opened, use a tweezer to open the tray door by hand in the direction as above picture shown, and take out the tray door.

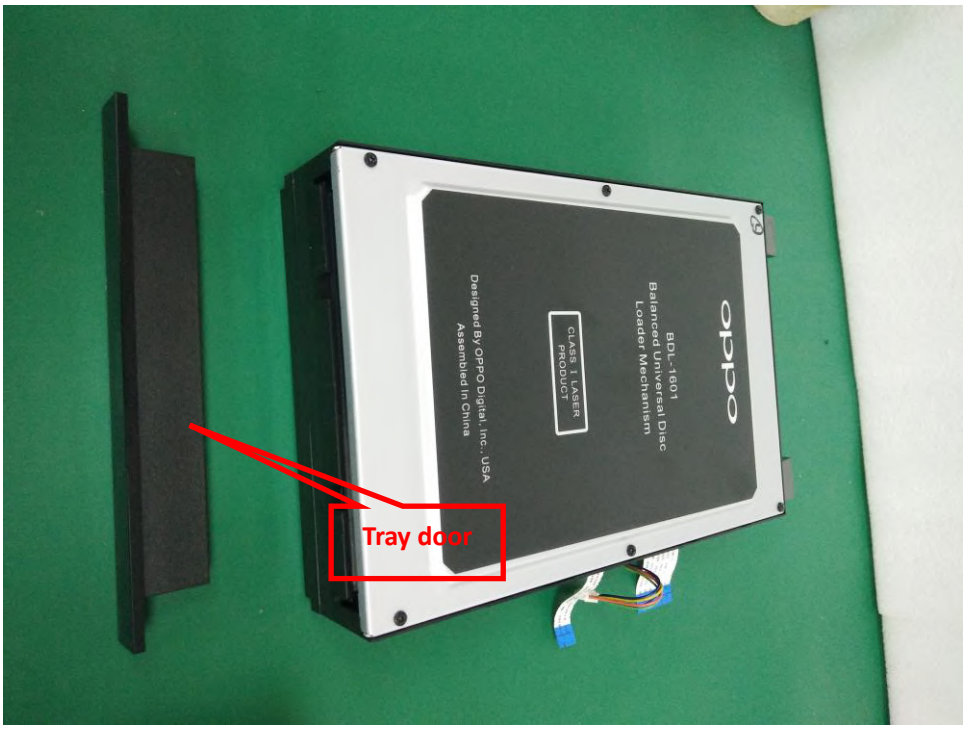
3.2 Disassemble the audio boards according to the disassembling process of audio boards.

3.3 Remove the audio board holder(right) and the loader component.

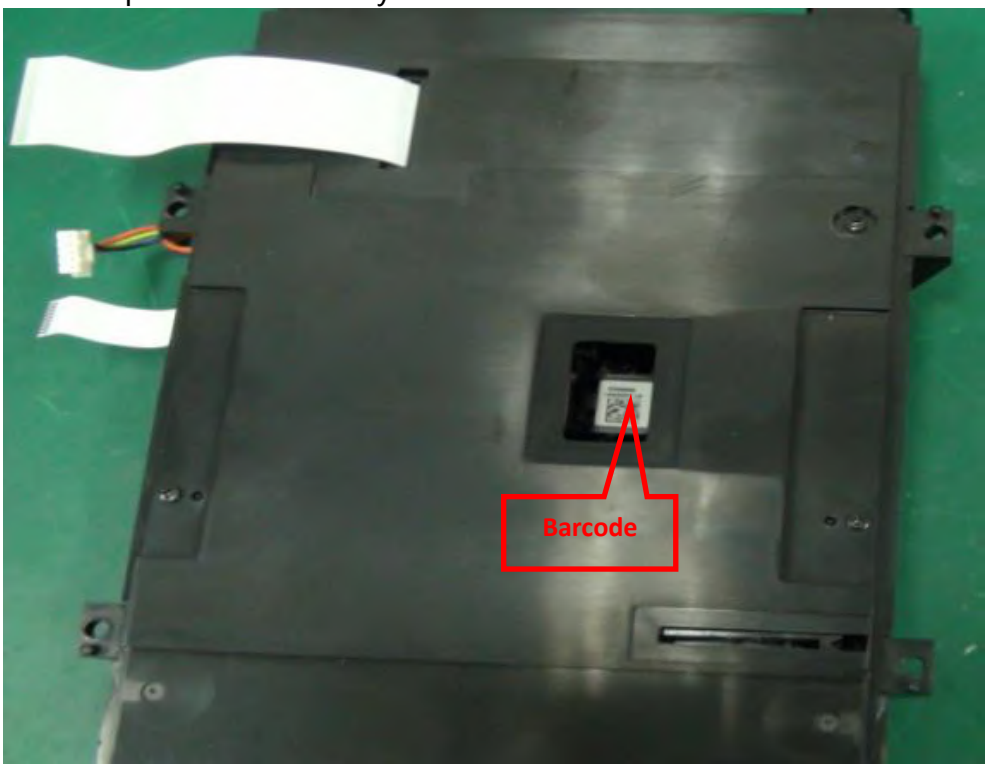


3.3.1 Disconnect the 3x cables between the main board and the loader component. Note that the flat cable cannot be unplugged directly. Need to tun over the flap on the socket by 90° and then take out the cable.

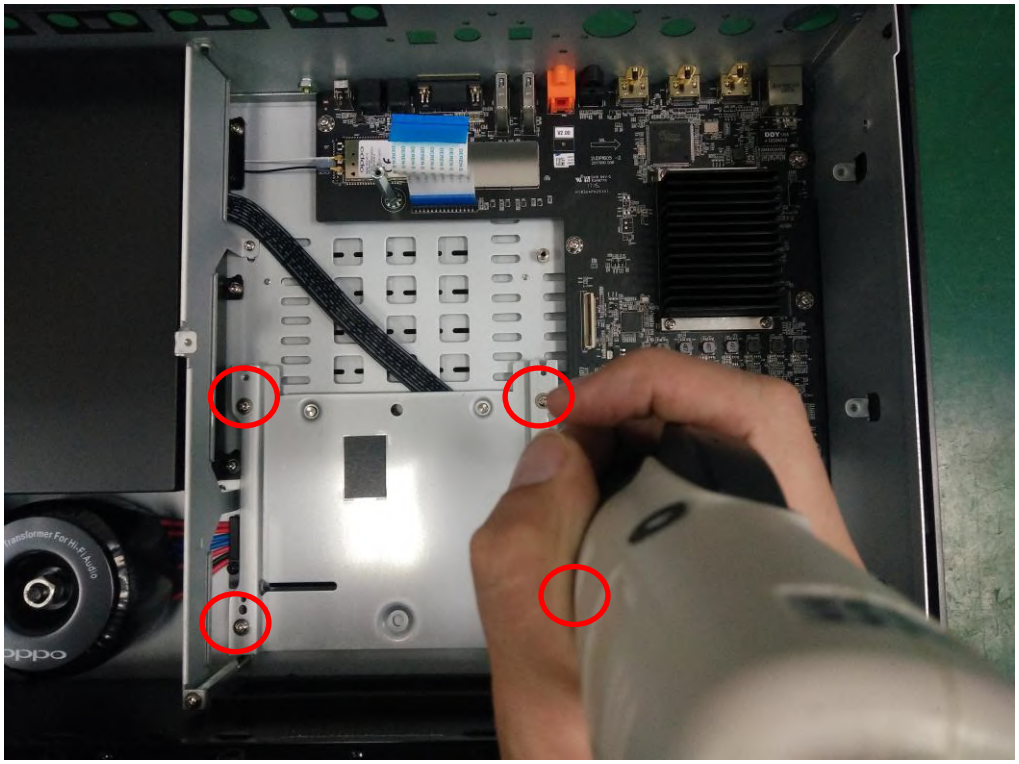
3.3.2 、Remove the 4x screws between the loader and the loader holder then take out the loader component



3.3.3 The loader component and the tray door that taken out



Assembling for the loader component：install the barcode--fix the loader component to the loader holder –connect the cables to the main board--power on the player--install the tray door --adjust the position of tray door --install the screws that fix the loader –install audio board holder, audio board and top cover--installation finished--test.



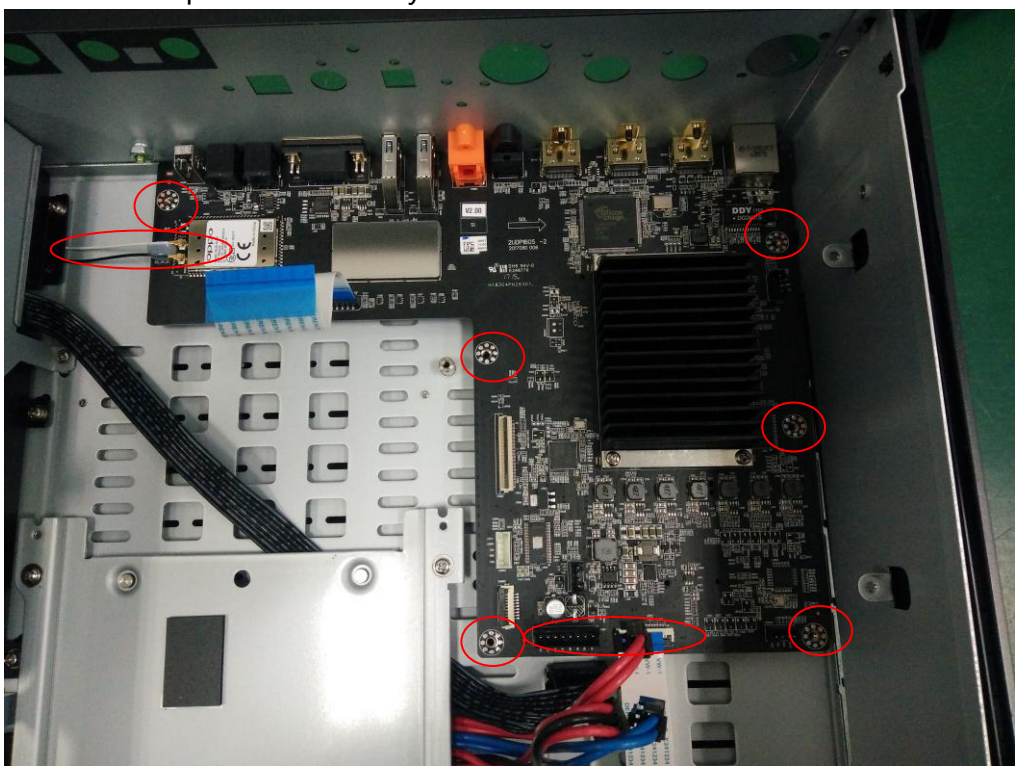
3.4.1 You could adjust the height of the loader component by adjust the screws as shown in the above picture.

Please mind the gap between the tray door and the front panel component, otherwise the cosmetics facade would be affected.

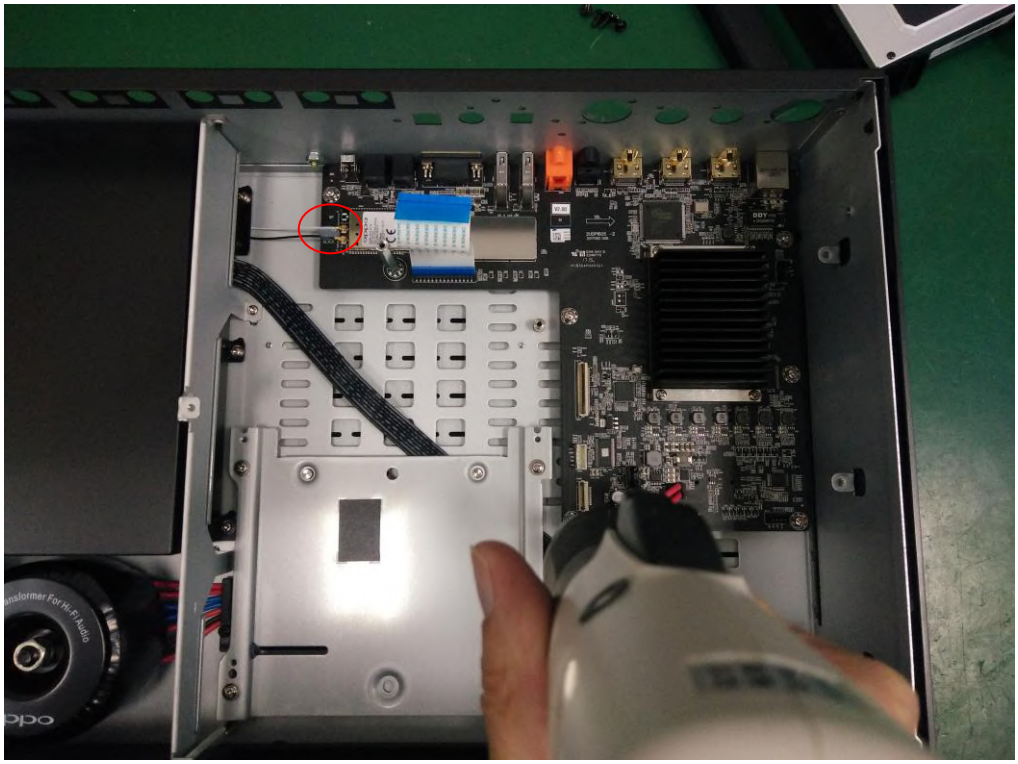
4. Replacing the main board

4.1 Remove the audio boards and loader component in sequence

4.2 Unplug all of cables that connected to the main board, with regard to the flat cable, you need to tun over the flap on the socket by 90° and then take out the cable.

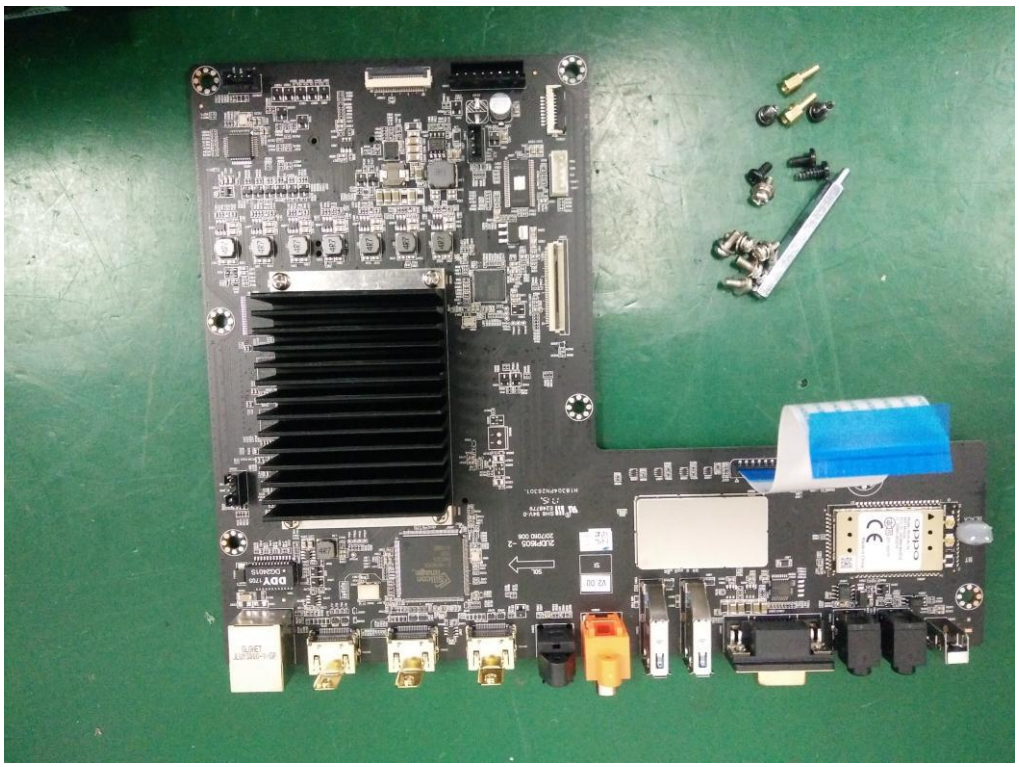


4.3 Remove the 6x screws that fixing the main board and the bottom cover.



4.4 Take out the main board

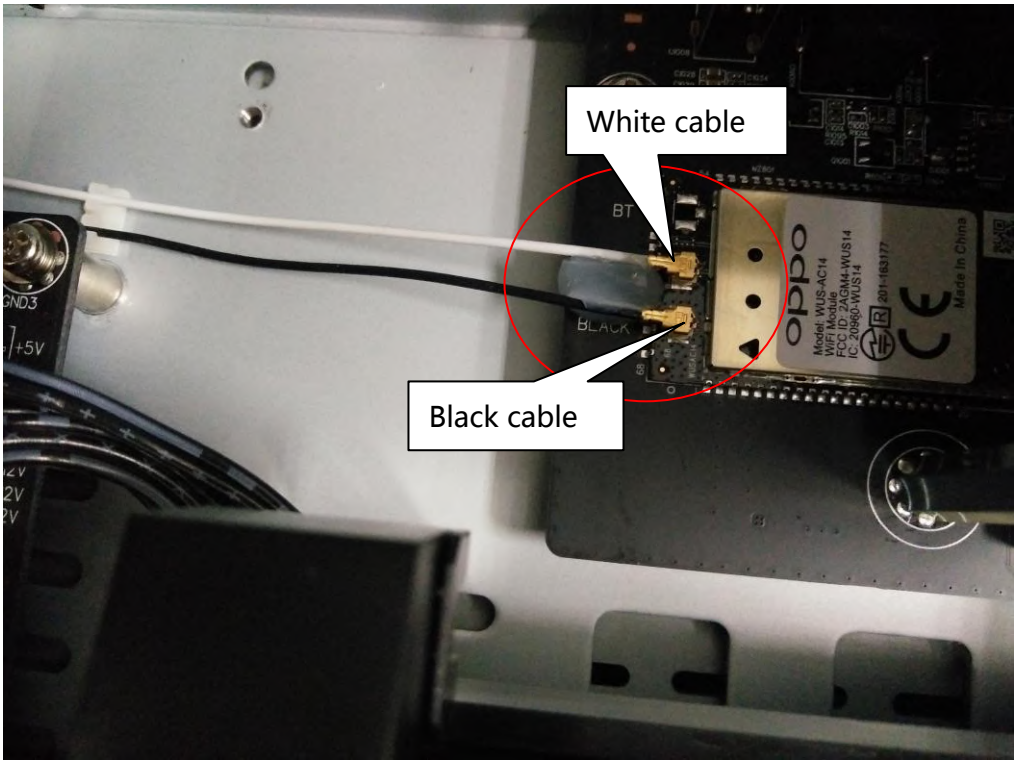
4.5 Install the new main board



4.6 Installing the main board

Take out the main board then replace a new one (need to install the barcode)

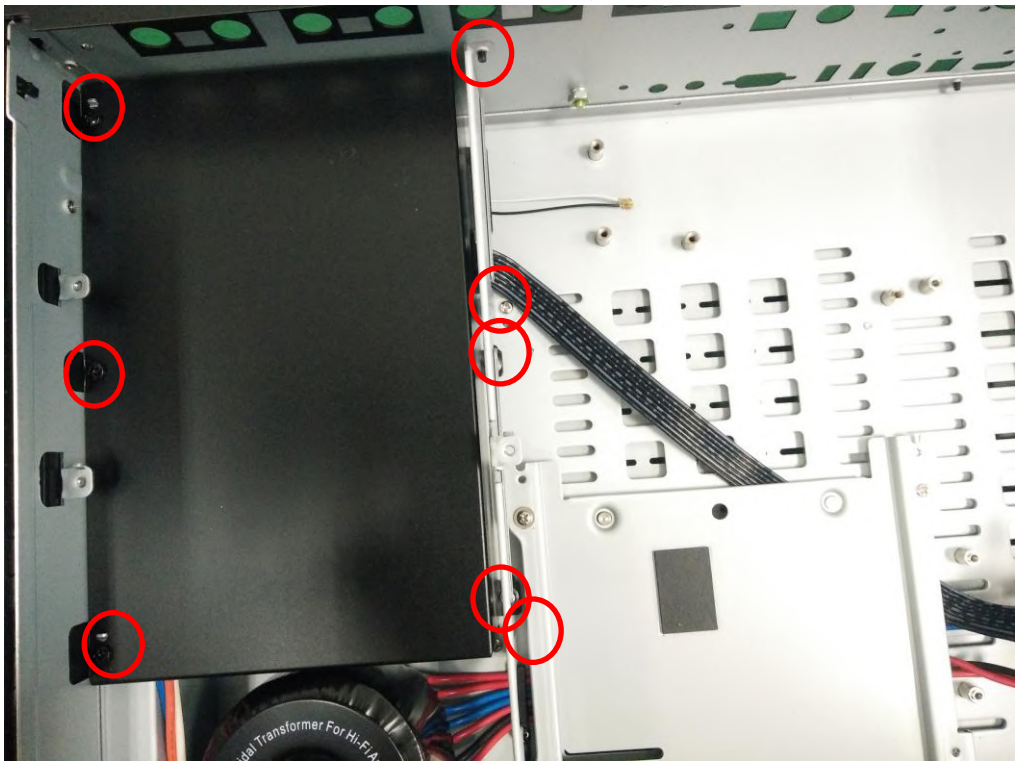
Assembling：place the main board in the right place -----assemble the screws that fixing the main board and the bottom cover -----assemble the screws between the main board and the rear cover ----assemble the cables **(WiFi antenna needs to be fixed by glue) -**----install the barcode-----install the latest firmware------test



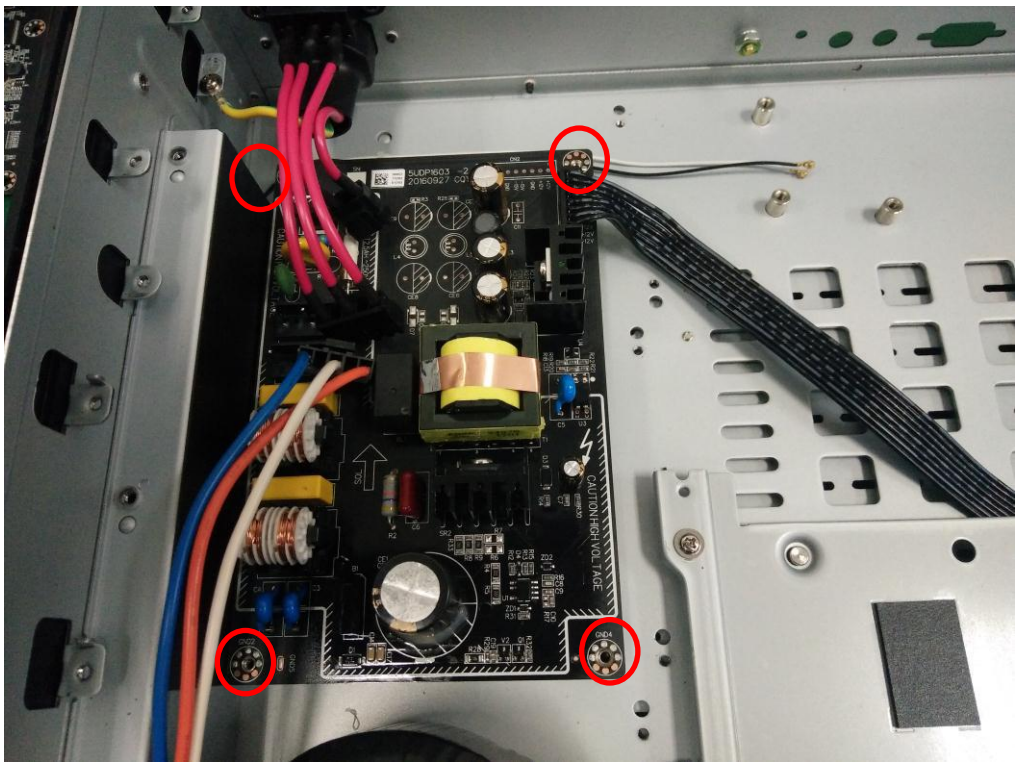
5. Replacing the power board

5.1 Disassemble the 7.1CH audio board

5.2 Remove the audio board holder(left) and the shielding case for power board.



5.3 Disconnect the 3X cables that connected on the power board and remove the 4X screws that fixed on the power board.



Assembling: perform the disassembling procedure in the reverse order. Make sure that you have i*nserted the cable into its place.*

6.1 Replacing the left cover component

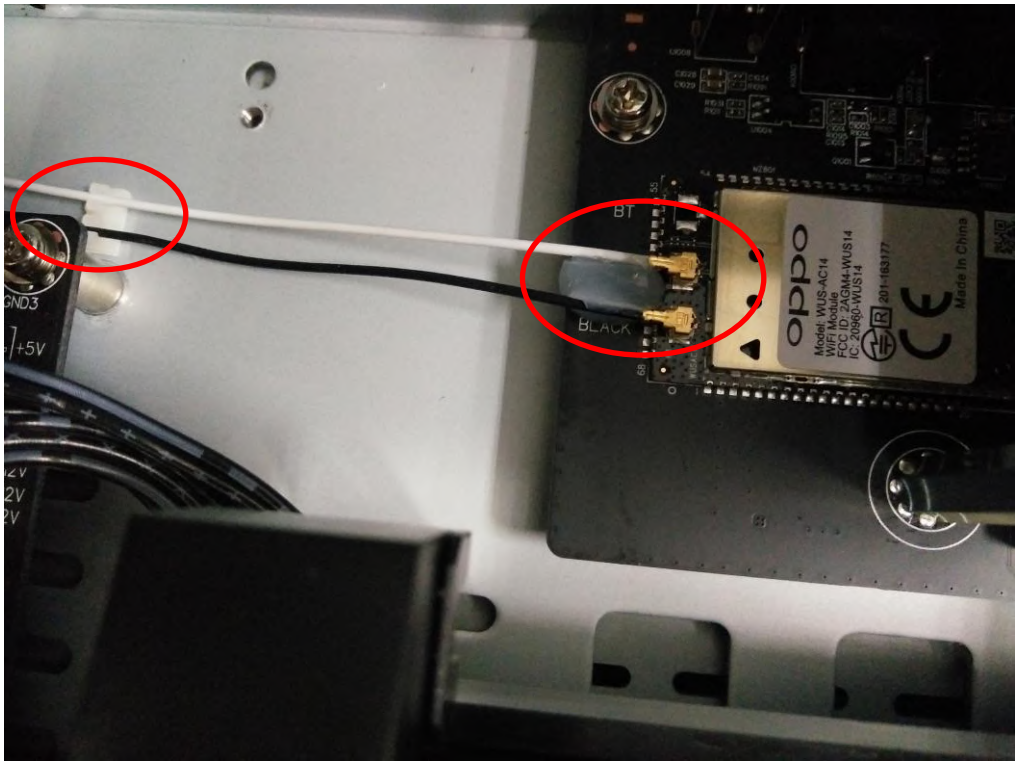
6.1.1 Remove the 7.1ch audio board

6.1.2 Remove the audio board holder(left) and the shielding case for power board.

6.1.3 Remove the 2X screws that fixed between the left cover and the rear cover.

6.1.4 Remove the WiFi antenna that fixed on the main board and the bottom cover.

Cautions : a fastener on the both side of left/right cover component, please take out the wifi antenna gently from the fastener.WiFi antenna needs to be fixed by glue

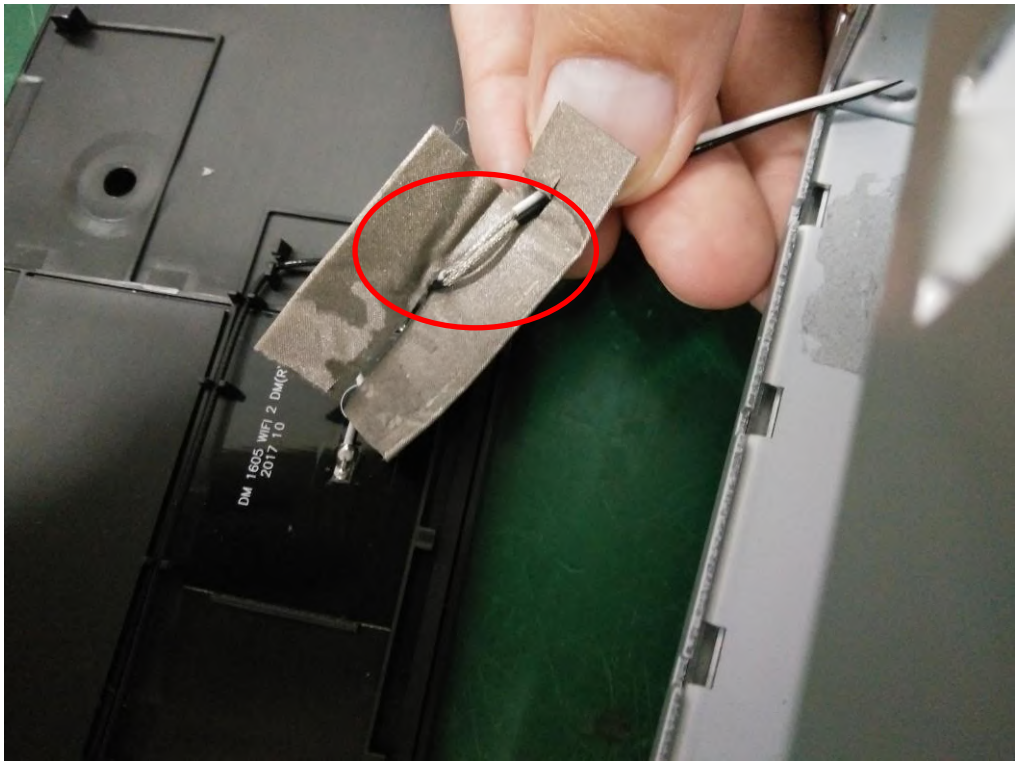


6.1.5 Remove the conductive foam that fixed on the side of bottom cover, and take out the WiFi antenna section from the left cover.

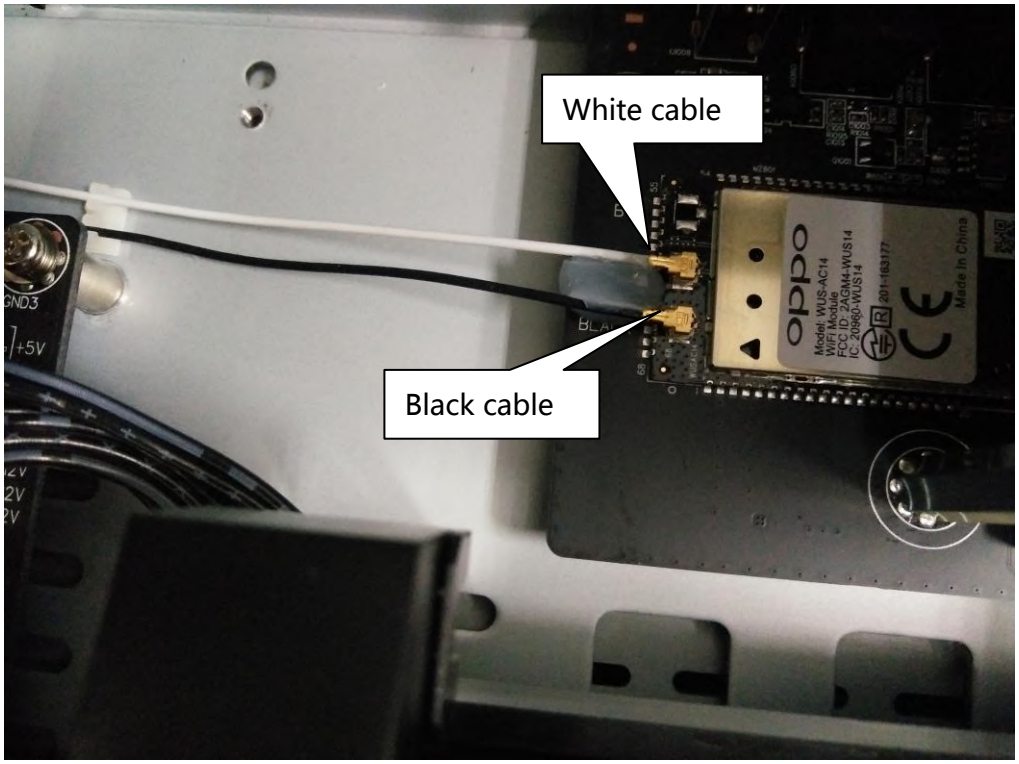
Assembling: perform the disassembling procedure in the reverse order.

Cautions: the shielding section of WiFi antenna should be wrapped totally by the conductive foam once you replace a new WiFi module.

Please see the picture below:



2) Insert the cable into its place.

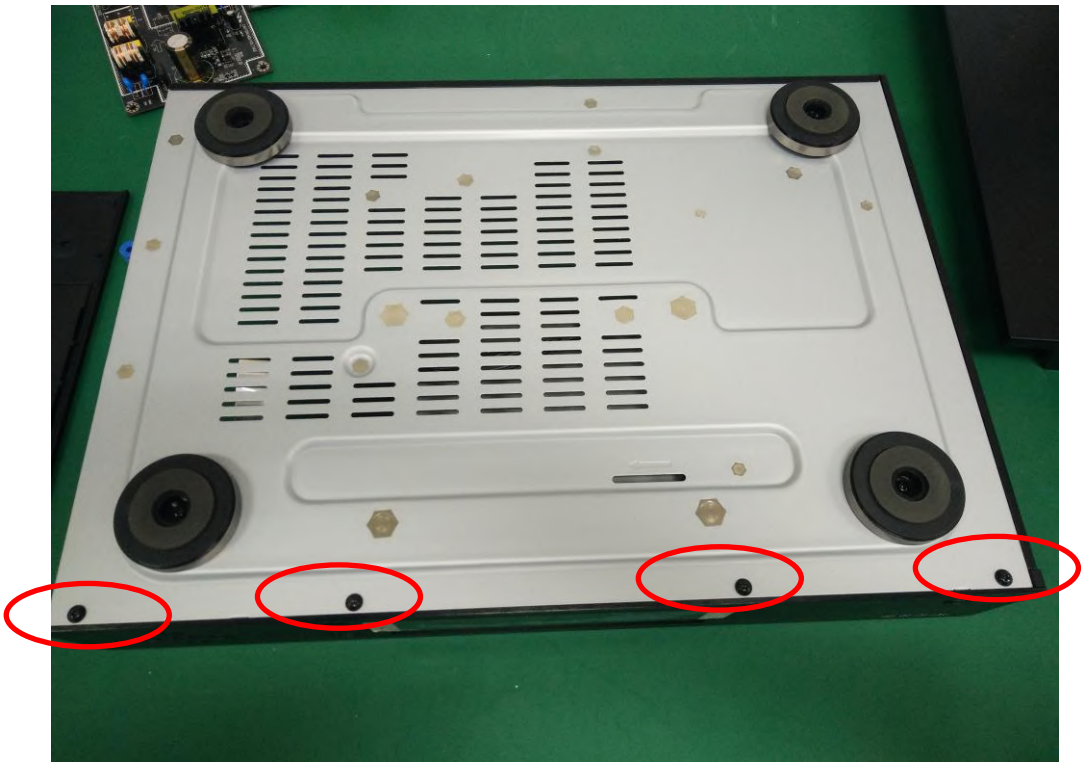


3) The WiFi antenna is a sensitive and flimsy device, don’ t yank it or bend it. *WiFi antenna needs to be fixed by glue after installation*

4) Install the left cover component, the position os conductive foam as above

7、Replacing the front panel

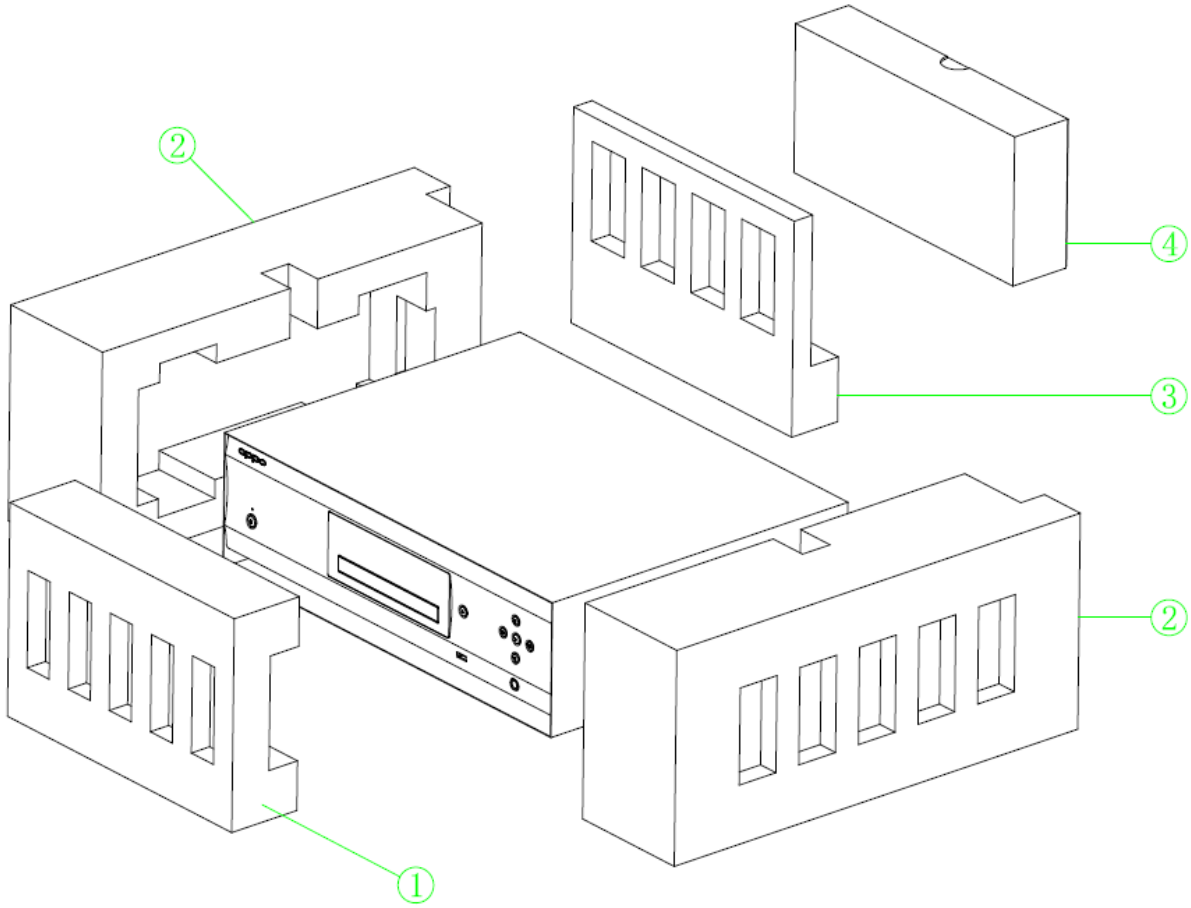
7.1、Remove the cable between the front panel component and main board then take out the tray door, remove the screws that fixed between the top of the front panel componet and the bottom cover.



7.2、Remove those 4x screws that fixed between the bottom cover and the bottom of front panel component.

Chapter VII Disassembly &BOM

Section 1 Disassembly



Product model：UDP-205

NO	Material Code	Material name	Specification	quantity	Remark
0		Carton box	UDP-205	1	
2	50420198	Foam bracket for left/right side	BDP0903$	2	Foam bracket for left/right side
1	50420178	Foam bracket for front panel	BDP0903 2#$	1	
0		User manual	UDP-205	1	
3	50420188	Foam bracket for real panel	29×13.8×2CM3 black$	1	Foam board between rear cover and accessory box
4	50174318	Accessory box	290×58×138$	1	For HDMI cord Remote controller power cord et