

X17(RU)

service manual

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Chapter One About Maintenance

1.1 Safety precautions

1.1.1 Precautions for antistatic

Movement and friction will both bring static electricity which causes serious damages to integrated IC. Though static charge is little, when a limited quantity of electric charge is added to large-scale integrated IC, as the capacitance is very small in the meantime, now the integrated IC is very much easy to be struck through by static electricity or the performance will decrease. Thus static electricity prevention is of extraordinary importance. The following are several measures to prevent static electricity:

1. Use a piece of electric conduction metal with the length of about 2 metres to insert into the earth, and Fetch the lead wire from the top of the surplus metal and connect to the required static electricity device. The length and depth of the metal embedded under the earth should be determined according to the wettability of the local soil. For humid places, it may be shorter, and longer and deeper for dry places. If possible, it can be distributed and layed in terms of “#” shape.
2. On operating table-board, the antistatic table cushion should be covered and grounded.
3. All devices and equipments should be placed on the antistatic table cushion and grounded.
4. Maintenance personnel should wear antistatic wrist ring which should be grounded.
5. Places around the operating position should also be covered with electric conduction cushion or Painted with antistatic paint.

1.1.2 About placement position

1. Audio power amplifier cannot be installed in places with high temperature and humidity.
2. Positions for placement should be stable and secure.

1.2 Maintenance method

1.2.1 Visualized method

Directly view whether abnormalities of collision, lack of element, joint welding, shedding welding, rosin joint, copper foil turning up, lead wire disconnection and elements burning up among pins of

Elements appear. Check power supply of the machine and then use hands to touch the casing of part of elements and check whether they are hot to judge the trouble spot. You should pay more attention when using this method to check in high voltage parts.

1.2.2 Electric resistance method

Set the multimeter in resistance position and test whether the numerical value of resistance of each point in the circuit has difference from the normal value to judge the trouble spot. But in the circuit the tested numerical value of resistance is not accurate, and the tested numerical value of integrated IC's pins can only be used for reference, so the elements should be broken down for test.

1.2.3 Voltage method

Voltage method is relatively convenient, quick and accurate. Set the multimeter in voltage position and test power supply voltage of the player and voltage of a certain point to judge the trouble spot according to the tested voltage variation.

1.2.4 Current method

Set the multimeter in current position and test current of the player of a certain point to judge the trouble spot. But when testing in current method, the multimeter should be series connected in the circuit, which makes this method too trivial and troublesome, so it is less frequently used in reality.

1.2.5 Cutting method

Cutting method should be combined with electric resistance method and voltage method to use. This method is mainly used in phenomena of short circuit and current leakage of the circuit. When cutting the input terminal voltage of a certain level, if voltage of the player rises again, it means that the trouble lies in this level.

1.2.6 Element substitution method

When some elements cannot be judged good or bad, substitution method may be adopted directly.

1.2.7 Comparison method

A same good PC board is usually used to test the correct voltage and waveform. Compared these data with those tested through fault PC board, the cause of troubles may be found.

Through the above maintenance method, theoretical knowledge and maintenance experience, all difficulties and troubles will be readily solved.

1.3 Required device for maintenance

- ◆ Audio Generator
- ◆ Digital oscillograph ($\geq 100\text{MHE}$)
- ◆ SMD rework station
- ◆ Multimeter
- ◆ Soldering iron
- ◆ Pointed-month pincers
- ◆ Cutting nippers
- ◆ Forceps
- ◆ Electric screw driver
- ◆ Terminals connecting cord
- ◆ Headphone
- ◆ Microphone

Chapter Two

Functions and Operation Instructions

2.1 USAGE INTRODUCTION

2.1.1 Functions and features

#Philips PNX0101 audio decode chip

Adopt famous Philips PNX0101 audio decode chip, special for Hi-Fi MP3 player, forcefully making up audio signal loss when compressing MP3 to revert audio signal better.

#Sennheiser headphone (MX400)

Build high-quality musical effect.

#Support 3D **LifeVibes™** surround stereo sound effect, 9 EQ modes

You may taste heart quaking bass and vivid surround stereo sound effect.

#Play MP3/WMA/WAV files

Support 16kbps~320kbps MP3 file and 8kbps~192kbps WMA file.

#Mobile storage function

Capable of downloading files from Windows resource manager.

#FM tuning function

Auto scanning and auto/manual memory function may listen to FM radio station programs more easily. And you may record FM program into WAV files directly.

#Voice recording function

May be used to record in class, meeting and interview.

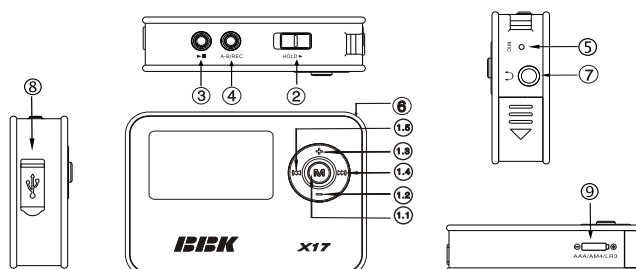
#USB 2.0 transmission (full speed)

USB2.0 full speed data transmission.

#Support firmware upgrading

Function Support upgrading function. You may add new function to the built-in program of this player conveniently.

2.1.2 Buttons and jacks illustration

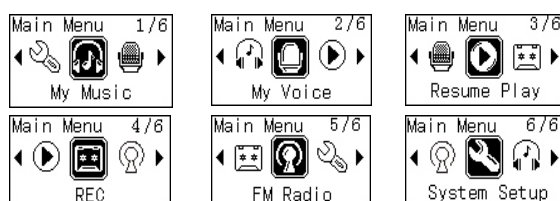


- ①.1 **M** #Press for long in any case → Enter main menu
 #Press in tuning mode → switch in PRESET and SCAN mode
 #Press in recording mode → Exit recording
 #Press in menu mode → enter the selected item or confirm the setup (the same as that of **▶** button)

- ①.2 ①.3 : #Press in Play and tune mode → adjust volume
 #Press in Menu mode → move cursor or set item
 #Press in menu mode → cancel and exit, or return to the previous menu
- ①.4 ①.5 #Press in playback mode → the next/previous track
 #Press for long in playback mode → fast forward/backward
 #Press in tuning Preset mode → select channel
 #Press in tuning SCAN mode → manual scanning
 #Press for long in tuning Preset mode → full auto scanning
 #Press for long in tuning SCAN mode → Automanual scanning
 #Menu mode → Move cursor or set item
 #Press in menu mode → cancel and exit, or return to the previous menu
- ② HOLD button: Push towards arrow to lock buttons; and push toward the opposite direction to unlock.
- ③ #Press in power-off mode → power on
 #Press for long in power-on mode → power off
 #Press in playback mode → pause playing
 #Press in recording mode → pause recording
 #Press in tuning mode → pause (mute)
 #Press in menu mode → enter the selected item or confirm the setup (the same as that of M button)
- ④ #Press for long in menu mode → enter recording mode
 #Press in playback mode → A-B repeat
 #Press for long when playing music file(non recording file) → Switch sound effect
 #Press in browsing file mode → Delete file
 #Press for long in tuning mode → Start FM recording
- ⑤ MIC: microphone
 ⑥ Hanging rope hole
 ⑦ Headphone jack
 ⑧ USB jack
 ⑨ Battery direction

Caution: In my sound effect setup mode, and are left and right cursor, and is exit button.

2.1.3 Main menu illustration



#My music

Memorize music file.

#My Voice

Memorize microphone recording file, such as meeting, classroom and interview recording, etc.

#Resume Play

Select "Resume Play" and the player begins to play from the position that music stopped playing last time.

#REC

Select "REC" to enter recording mode.

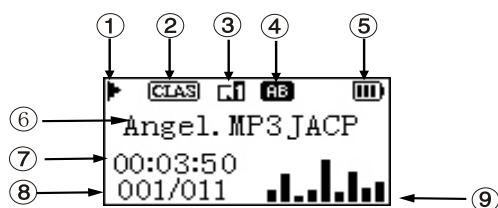
#FM Radio

Select " FM Radio"to enter radio mode.

#System Setup

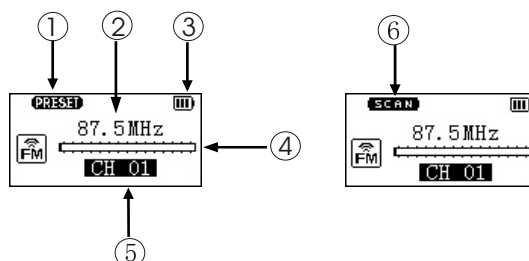
Select " System Setup" to set system items.

2.1.4 Playing interface illustration



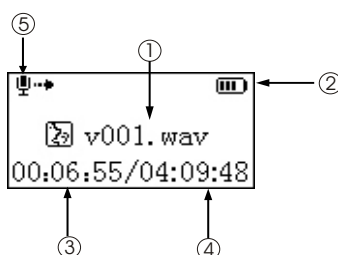
- | | |
|---------------------|-----------------------------|
| ① Play State | ⑥ Song name and Singer |
| ② Sound effect mode | ⑦ Time that has been played |
| ③ Playback mode | ⑧ Number of tracks |
| ④ Repeat state | ⑨ Spectrum display |
| ⑤ Battery capacity | |

2.1.5 Tuning interface illustration



- | | |
|--|--------------------------|
| ① PRESET mode (normal receiving) | ④ Frequency bar |
| ② Frequency of the current radio station | ⑤ PRESET channel display |
| ③ Battery capacity | ⑥ SCAN mode (scanning) |

2.1.6 Recording interface illustration



- | | |
|-------------------------------|----------------------------|
| ① Name of recorded file | ④ The left recordable time |
| ② Battery capacity | ⑤ Recording state |
| ③ Time that has been recorded | |

As for the name of recorded file "V001.WAV": 001 is serial number of the current recorded track and arranged according to sequence; WAV is file format after recording

2.2 BASIC OPERATION

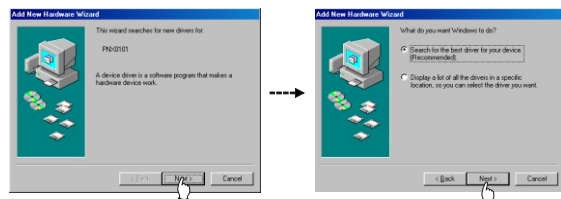
2.2.1 Install usb drive program

If your computer is Windows 98, you must install drive program if you want to use the mobile storage function of MP3 player in computer.

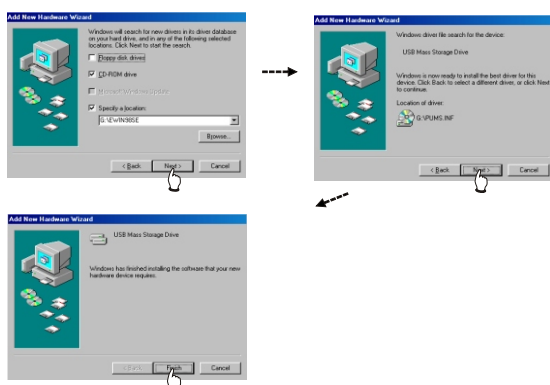
1. Place USB drive disc into CD-ROM driver of computer.
2. Connect MP3 player to computer, and the computer will automatically indicate that new firmware device has been found, and run the installation guide, shown as the following figure.

You only need to find the drive information file on disc according to prompt information to finish the installation of drive program.

3. After installation finishes, restart the computer and you may use the mobile storage function normally. Shown as the following figure:



2.2.2 Install usb drive program



2.2.3 Use mobile storage function

This player can be used as mobile storage in Windows ME/2000/XP operating system. In Windows 98SE and Mac operating system, drive program must be installed firstly and then used as mobile storage. Connect MP3 PLAYER and computer with USB transmission line. After the bottom right corner of desktop appears “ ” symbol, the mobile storage function of MP3 PLAYER may be used normally.

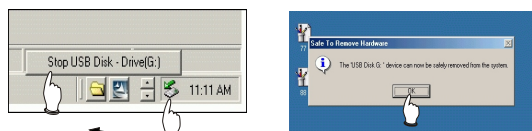
NOTE

#To avoid abnormality of the player appears, you are suggested to power off firstly before connecting MP3 PLAYER with computer, and then use USB transmission line to connect MP3 PLAYER, then connect computer.

#In Windows 98 system, there is no “ ” symbol.

2.2.4 Disconnect usb safely

After operation finishes, click “ ” symbol on bottom right corner of Windows desktop with right button of mouse, and disconnect USB safely according to the computer prompt.



2.2.5 Browse/cancel file

#Browse file

In any case, press **M** button for long to enter "Main Menu". Music file and recording file are separately saved in the first two items of main menu, "My Music" and "My Voice". Press **←** / **→** Button to select upward or downward and then press **↵** button to enter files browsing.



#Cancel file

When browsing files, press **A-B/REC** button and the cancel dialogue box will pop up.

Press **←** / **→** button to select "YES" and then press **↵** button to cancel the file. Select "NO" or press **M** button to exit.



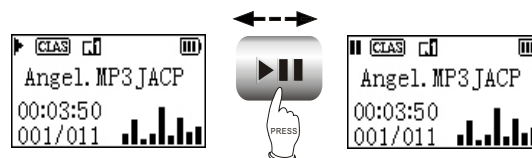
2.2.6 Play music

#Play music

press **←** / **→** button to select song In "My Music". Press **↵** button or select playback in main menu to begin playing music, meanwhile the playback interface displays.

#PAUSE PLAYING MUSIC

When playing, press **↵** button to switch to pause state. Press **↵** button again to continue playing.



#NEXT and PREV

When playing, pressing **↵** button may skip to the next track to play. If playback time of the current track is less than 5 seconds, pressing **↵** button may skip to the previous track to play, otherwise the current track will be played again if playback time is more than 5 seconds.

2.2.7 Play music

#FF and FB

When playing, pressing **↵** button for long may realize fast forward.



When playing, pressing button for long may realize fast backward.



Caution:

Fast forward and fast backward operation are only for the current track. After fast backward/forward to the beginning/ending of track, it switches into normal playback automatically.

2.2.8 Play music

#Adjust volume

When playing or tuning, pressing or button or for long may adjust volume. The display of adjusting volume in music playback interface is shown as follows:



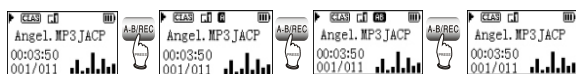
Caution:

#Music playback will be paused when browsing file.

#In some operating system (such as complex font Windows), the operation of copying lyrics/song file and changing song's name may probably lead to incorrect display. When playing WMA songs of VBR, pressing buttons may probably has slow response or has no lyrics display. When playing some non standard songs or songs with special format, noise may probably occur.

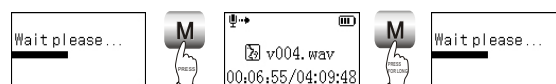
2.2.9 A-B repeat function

When playing, if you want to listen to a certain segment repeatedly, please use A-B repeat function. Press button for the first time to select the beginning point that you desire to repeat play and screen displays "A"; press it for the second time to select the ending point that you desire to repeat play and screen displays "AB", and system begins to repeat play between A-B segment. Press button for the third time to cancel repeat and continue to play.



2.2.10 Recording

When recording, press button to pause and press button for long to exit recording and then make files.



Caution:

#To avoid sudden power-off when recording, you cannot record when in low battery and when disc is fully written. If you are recording, it indicates "DISC FULL" and exits recording.
#When recording with microphone, if you press buttons and the sound of pressing may probably be recorded.

2.2.11 Tuning

#Enter tuning mode

Select "FM Radio" in main menu and press button to listen to radio.

#EXIT TUNING MODE

When listening to radio, press button for long to return to main menu.

#PRESET/SCAN MODE SWITCH

When listening to radio, press button to switch between PRESET and SCAN mode.



1. PRESET mode

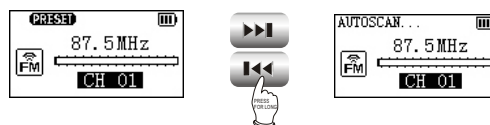
#Adjust channel

Press button to enter the next channel, and press button to enter the previous channel.

2.2.12 Tuning

#Full auto scanning

In PRESET mode, press button for long to begin full auto scanning. All scanned radio stations will be saved in PRESET channel automatically.



2. Scan mode

#Manual/automanual scanning

Press button to increase 0.1MHz each time; and press button to decrease 0.1MHz each time. Press button to save radio station. Press button for long to increase frequency continuously and stop until radio station has been searched. Press button to save radio station. Press button for long to decrease frequency continuously and stop until radio station has been searched. Press button to save radio station.

#Save radio station

Select channel in Preset mode firstly, and then switch to SCAN mode to adjust frequency (manually or automatically). After scanning desired frequency, press  button to save into the current PRESET channel.



CAUTION:

In the course of full auto/automatic scanning, press  or  /  button to stop scanning.

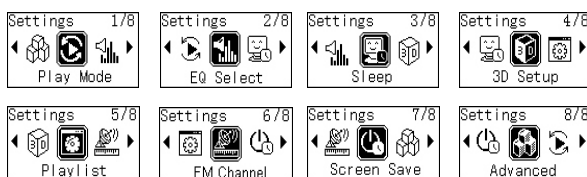
#FM RECORDING

In tuning mode, press  button for long to enter FM recording. Press  button to stop recording and make recording file .FM recording makes WAV format file.



2.3 SETTINGS

2.3.1 Settings



#Play Mode

Normal

Shuffle

Playlist

Intro

REP One

REP ALL

REP DIR

#EQ Select

Normal

3D

PURE

POP

Clas

Jazz

Rock

Dbass

Disco

My EQ

#Sleep

Disable - 120Min

#3D Setup

BassBoost

ConcertSound

#Playlist

Browse

Edit

Delete

#FM Channel

Auto

Mono

#Screen Save

Disable - 5Min

#Advanced

My EQ

REC Set

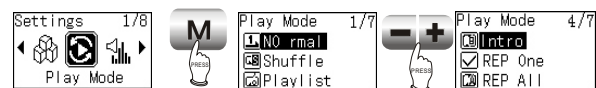
Format

Load Default

System Info

Language

2.3.2 PLAY MODE



The playback symbol displays on playback interface is shown as follows:

 : play according to track sequence.

 : random play any one track.

 : play the track edited in program list.

 : browse play each track for 10 seconds.

 : repeat play single track.

 : repeat play all tracks.

 : repeat play all tracks in this Folder.

Caution:

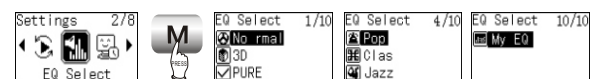
#Play mode is defaulted to "Normal" each time when power on.

#Files in "My Voice" only support sequence playback.

#When playing files in "My Voice", there is no "Play mode" item.

2.3.3 Eq select

Press  button to enter "EQ SELECT", and then use  /  to move cursor, shown as follows:



The corresponding icons of each EQ mode in playback mode are shown as follows:

 NORMAL

 JAZZ

 3D

 ROCK

 PURE

 DBASS

 POP

 DISCO

 CLAS

 My EQ

Select "3D", and correspond with 3D that you have preset in "MAIN MENU->SYSTEM SETUP->3D SETUP. If you have not set it, it is default value. Select "MY EQ", and correspond with the sound effect that you have preset in "MAIN MENU->SYSTEM SETUP->ADVANCED". If you have not set it, it defaults "MY EQ" to "NORMAL" sound effect. When the cursor moves to a certain sound effect mode, the sound effect mode played by MP3 player will switch to that in the cursor for the moment to facilitate you to select your desired sound effect mode. Press  Button to confirm this sound effect mode.

CAUTION: When playing files in "REC", there is no "EQ Select" item.

2.3.4 Sleep

Press **-** / **+** button to adjust the timing power-off time. After setup finishes, press **▶▶** button to save and then exit, and press **◀◀** button not to save and then exit. If timing power off time is 15 minutes, after 15 minutes, MP3 PLAYER will power off automatically.



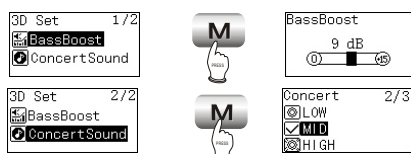
Caution:

#It is defaulted to be invalid each time when power on.

#Timing power-on time is a rough time, and may have difference.

2.3.5 3D

In this menu, "3D" may be adjusted. BassBoost can strengthen bass effect; and concert can build classical sound field effect. At the same time of confirming clearness, strengthen hearing feeling. Through adjustment, you may feel live and vivid sound field effect no matter where you are.



2.3.6 Playlist

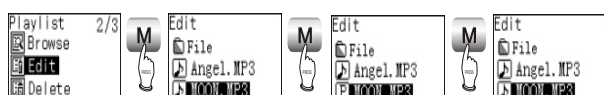
#Browse

Select "Browse", and you may check how many songs have been program-med into playlist. When browsing playlist. Pressing **M** button may begin playing.



Note: Playback will be paused when in "Browse" or "Edit" list.

#Edit



As in the above illustration, enter "Edit" and browse files. The icon before songs in the playlist is "P". Select a song not in the playlist and press **M** button to add it into the list. Select a song in the playlist, and press **M** button to cancel it from the playlist. You can add 15 songs into the playlist at most.

#Delete



Select "Delete". After dialogue box pops up, select "YES", and press **M** button to confirm and the playlist is cleared.

2.3.7 Playlist

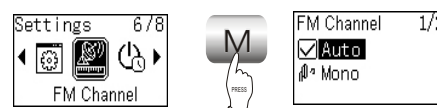
NOTE

#If the operation of adding or cancelling music files is detected, MP3 PLAYER will clear the playlist automatically.

#You cannot enter "Edit list" and "Clear list" when in program playback.

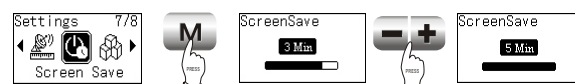
2.3.8 Fm channel

You can select the FM channel in settings. When select Auto, it changes the channel automatically when in tuning mode. When select Mono, it tunes at Mono channel all the time.



2.3.9 Screen save

Press **-** / **+** button to adjust the screen saver time. After setup finishes, press **M** button to save and then exit, and press **◀◀** button not to save and then exit. If the screen saver setup time is 3 minutes and no operation occurs within 3 minutes, Mp3 PLAYER will enter screen saver state automatically.



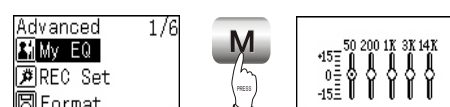
2.3.10 Advanced

Advanced items include some other system internal setup, such as user sound effect setup, default setup and system information.



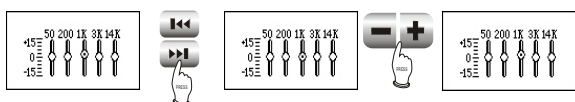
#My EQ

In "My EQ" interface, you may see the decibel (dB) of each frequency.



If you want to adjust the decibel of mediant (1kHz), operate according to the below illustration.

2.3.11 Advanced



When adjusting width, take 3dB as a step and the max adjustable range is 15dB. After setup finishes, press **M** button to confirm and exit, and press **⏮** button to exit with the original setup not being changed.

#REC Set

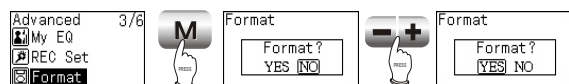
Here to set the recording quality, The recording quality is higher, the sound quality is better and the used space is more. Three kinds of recording quality adopt IMA-ADPCM format



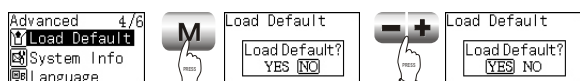
2.3.12 Advanced

#Format

Enter this menu, and you may format hard disk. When dialogue box pops up, press **←** / **→** button to move cursor to "YES", and then press **M** button to confirm to finish formatting operation.



#Load Default



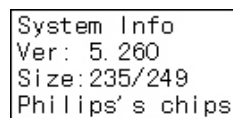
If you want to restore MP3 PLAYER to factory setup state (data and song files cannot be cancelled), you may select "Load Default". After dialogue box pops up, select "YES", press **M** button to confirm and then exit to restore to default state. Select "NO" or press **⏮** button to cancel.

CAUTION: Restore to "Default" state is effective only when power on again.

#System Info

You may find information of firmware version, total disc capacity and left disc capacity. In system information menu.

press **⏮** button to return to the previous menu.

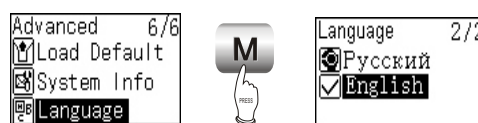


Caution:

Because firmware will use some space, the displayed content capacity may probably be different from the actual capacity.

#Language

Russian and English are supported.



#Upgrade

Download the latest firmware upgrading file from BBK website firstly, such as "BBK_X17RU.ebn" and "X17RU_Resource.bin", copy the two files into MP3 PLAYER at the same time, and then power on again. Find "Upgrade" item in "ADVANCED" of "SETTINGS", and **M** pressing button may start upgrading.

After upgrading finishes, MP3 PLAYER will power on again.



NOTE:

#Only MP3 player detects that there is upgrading file in system when this player power on, "Upgrade" menu will appear in "ADVANCED" item.

#Make sure MP3 PLAYER has enough quantity of electric charge before upgrading.

#To ensure successful firmware upgrading, do not power off during the course of upgrading.

#Upgrading will last about 10 seconds or more, please try your best not to operate any buttons during this course.

#After firmware upgrading finishes, some function or interface may probably be different from user manual, so please take real object as standard.

2.4 SPECIFICATION

Model	X17
Audio decode chip	Philips PNX0101

Continuous playback time	The longest time is about 11 hours
Dimensions/weight	53mm×38.5mm×13.8mm about 25.5g(without battery),37.5g(with battery)
Audio SNR	≥90dB
Headphone out	9mW+9mW (32ohm impedance)
Frequency range	18Hz~20kHz
FM tuning range	87.5MHz~108MHz
Working temperature	0~40℃
Files supported	MPEG 1/2 Layer 3(16kbps~320kbps)、WMA (8kbps~192kbps)、WAV

Chapter Three Servicing and Principle

Section One Principle of the Player

3.1.1 Principle of the player

1. Mp3 main decode chip, which adopts professional MP3 decode chip PNX0101 of Philips company, with integrated ARM and DSP core inside. Sound quality is good and power consumption is low.
2. USB jack circuit: USB jack, data exchange.
3. Flash circuit: data storage of the player.
4. OLED circuit: display of working state of the player.
5. Output circuit: audio output.
6. MIC circuit: external audio input, record function finishes.
7. FM tuning circuit: professional FM tuning chip TEA5767HN of Philips company is adopted to realize FM tuning.

3.1.2 Block diagram of the player

Block diagram of the player is shown in the figure 3.1.2.1:

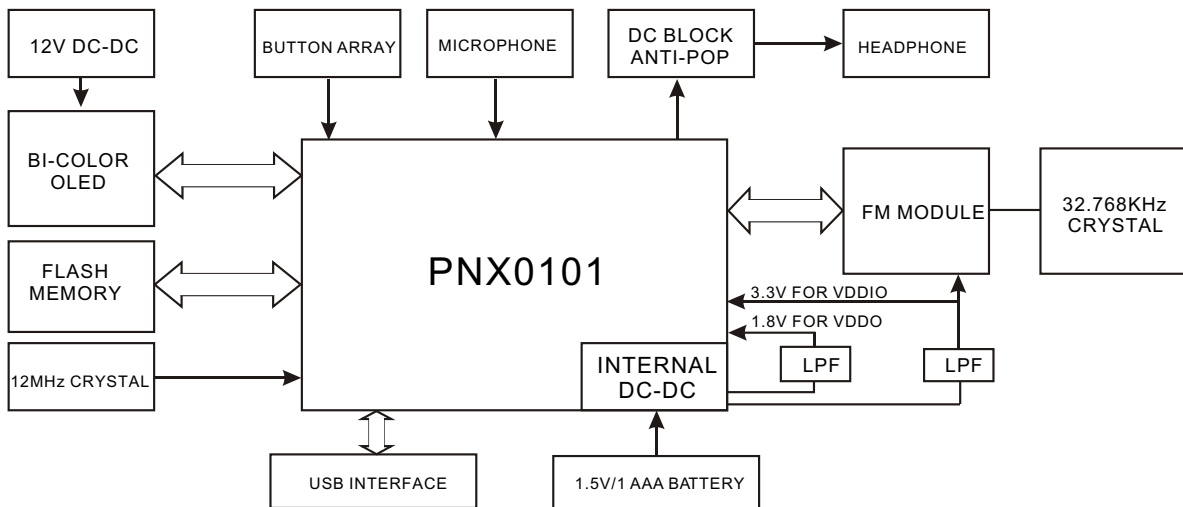


Figure 3.1.2.1 X17 (RU) block diagram

3.1.3 Function introduction to IC used by the player

Function introduction to IC used by X17 (RU) is shown in the following table:

PCB board	Location	IC model	Function
Main board	U1	TC58512FT	Flash Memory
	U4	LM2703	Supply 12.2V voltage
	U6	Philips PNX0101	MP3 decode
	U7	PQ1X28	Supply 2.8V voltage
	U9	G690L263T	System reset
	U10	SI912DL	Headphone mute
Tuning board	U1	TEA5767HN	Tuning module

Section Two Unit Circuit Principle

3.2.1 FLASH circuit

1. FLASH circuit schematic diagram is shown in the figure 3.2.1.1:

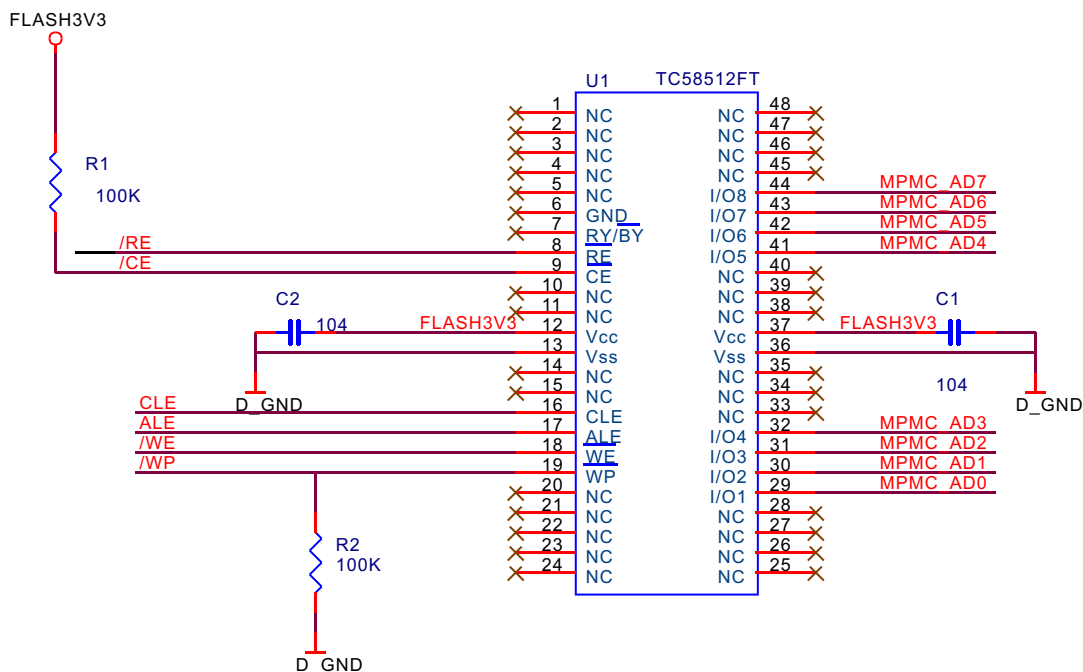


Figure 3.2.1.1 Flash circuit schematic diagram

2. Working principle: Flash Memory is the storage unit of the player, all Mp3 and waveform files should be stored in FLASH. Flash module is composed of FLASH chip TC58512FT and peripheral circuit to finish internal files's working of read, write and delete. 1.5V battery voltage, through PNX0101 internal boosted circuit, provides 3.3V voltage for working of FLASH. R1 is pull up resistor of /CE, R2 is the pull down resistor of /WP, Vcc is power supply pin of FLASH, /CE is chip selection signal, high level is effective, VCC33 provides 3.3V voltage and FLASH begins to work. /RE, /WE are read effective and write effective signal end respectively to control read and write function of FLASH. I/O1 - I/O8 are 8 data lines to complete the exchange of FLASH and external data to realize functions of write, delete and edit of Mp3.

When Mp3 is powered on, 3.3V voltage supplies power for Flash through Vcc, /CE inputs 3.3V high level signal and Flash begins to work effectively. When Mp3 laying music, /RE is high level, Flash performs read operation. When writing files in through data line or recording through microphone, /WE is high level, Flash performs write in operation. Working of read out and write in are performed through I/O1~I/O8 8 data/address lines.

3.2.2 FM tuning circuit

1. FM tuning circuit diagram is shown in the figure 3.2.2.1;

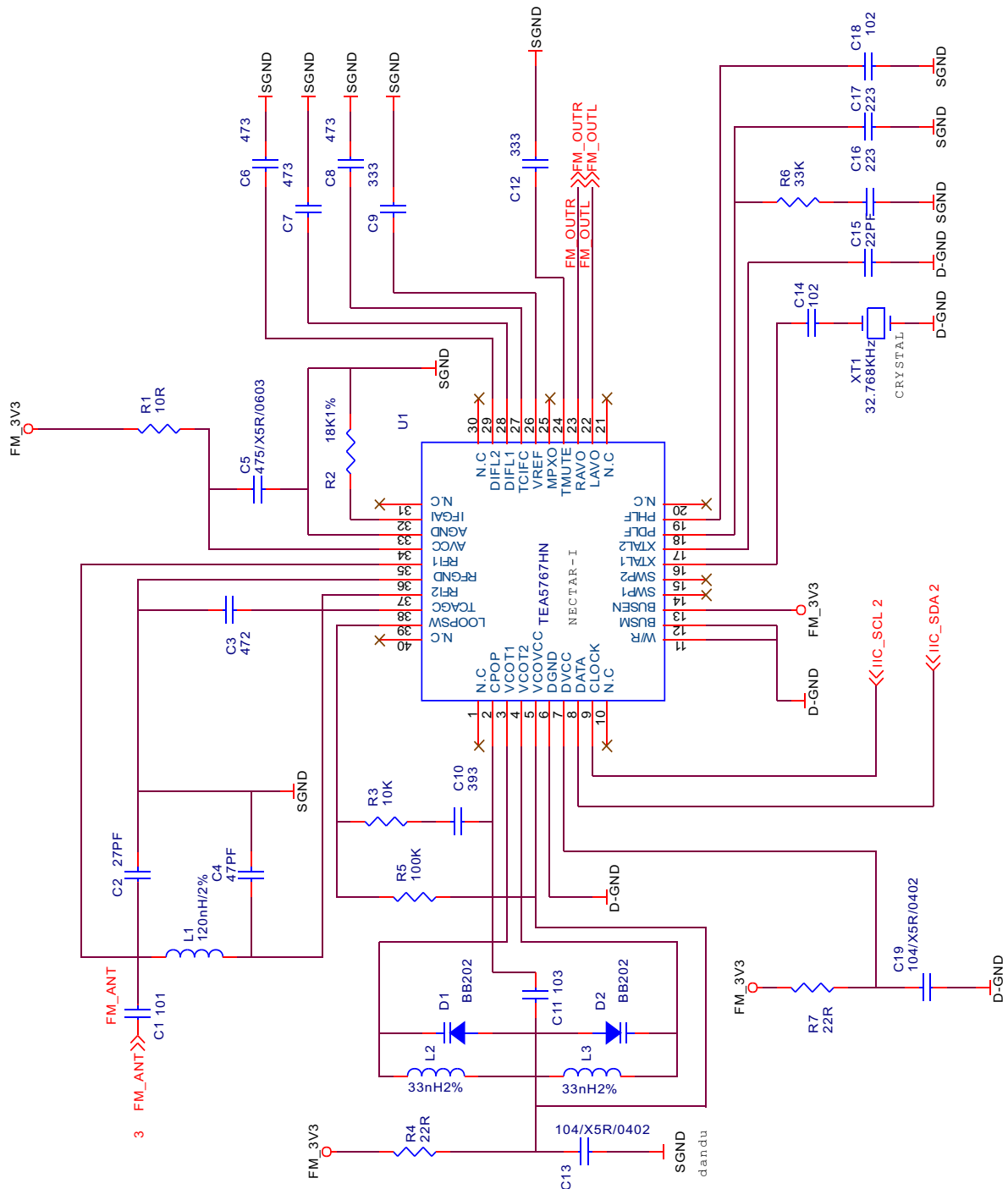


Figure 3.2.2.1 FM tuning circuit diagram

When MP3 player switches to FM tuning state, pin 13 BUSEN of TEA5767HN receives high level signal, bus control mode is gated, IC begins to work. As antenna, headphone receives FM signals from radio, through antenna input matching circuit, input TEA5767HN, PNX0101 via RFI1 and RFI2 to control TEA5767HN to perform intermediate frequency and selected frequency control through IIC_SCL and IIC_SDA to transform FM signals to sound simulating signals and then is outputted by FM_OUTR and FM_OUTL to ADC circuit of PNX0101 and then output through headphone after DAC processing.

Value VOLED outputted by high voltage is achieved through selecting two voltage partial resistor on two ends of FB, and the following relation is met:

$$\frac{R_1}{R_2} = \frac{VOLED}{1.237} - 1$$

Seen from the above, VOLED is about 12.2V. L25, C62 in circuit are energy storage inductor and output capacitor of boosted circuit.

3.3V voltage inputs LM2703 through Vin, EN receives the high level through current limit by R55 to make LM2703 effective, 3.3V voltage is outputted by SW pin through LM2703 voltage rise, output to pin 20 of OLED through voltage stabilizing pipe D4 to provide lighting voltage for OLED. During the course of working, FB feedback to LM2703 through detecting energy storage capacitor C65, output voltage may be controlled through adjusting resistor R49 and R53.

OLED jack circuit is connected with OLED of PN0101 directly, through data exchange of LED_DB0~LED_DB7 and PN0101, character display is controlled by internal program of PN0101.

Pin 6 of OLED is reset signal and controlled by one MPMC jack of PNx0101. When power on, high level outputs and OLED resets.

3.2.4 USB jack circuit

1. USB jack circuit is shown in the figure 3.2.4.1:

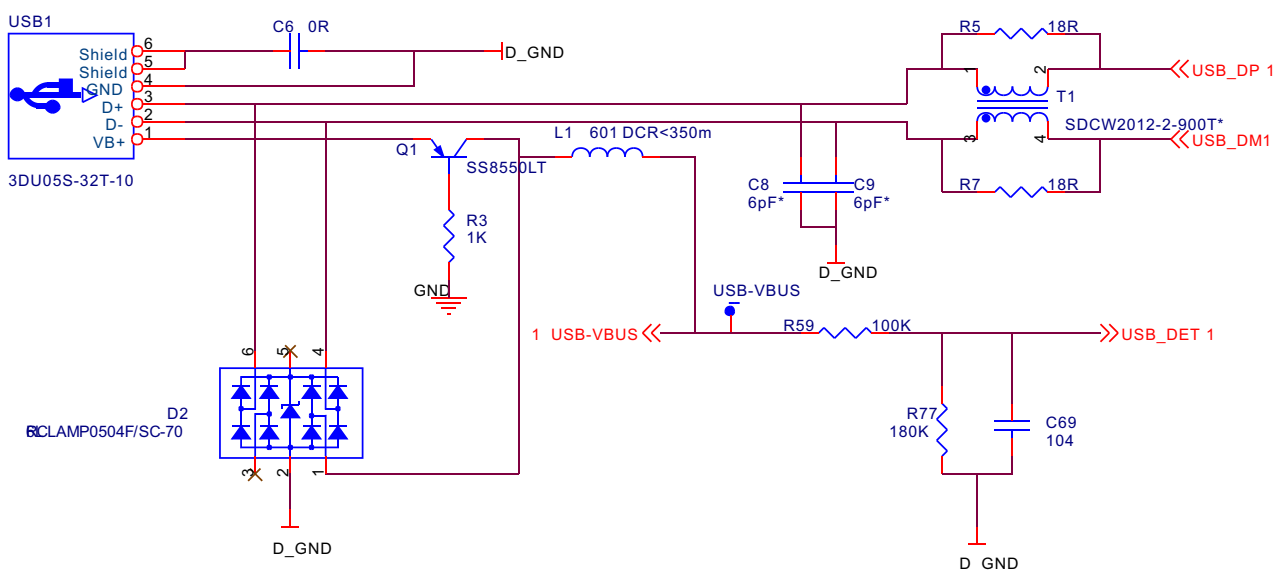


Figure 3.2.4.1 USBjack circuit schematic diagram

2. Working principle: USB jack network is composed of VB+ (USB 5V power), D+ (positive data line), D- (negative data line) and GND (ground line), in which PNP triode Q1 is used for inverse insert protection to prevent damaging Mp3 internal circuit because of inverse insert; D2 is TVS diode array and used for static-proof.

D with USB control module of PN0101 directly. When Mp3 is connected with computer, VB+ high level of computer USB jack inputs to USB_DET of PN0101, USB jack is effective, USB jack connects with PN0101 through D+ (USB_DP) and D- (USB_DM), then connected with Flash by PN0101 to realize information exchange of Flash internal data and computer internal data.

3.2.5 Buttons circuit

1. Buttons circuit is shown in the figure 3.2.5.1:

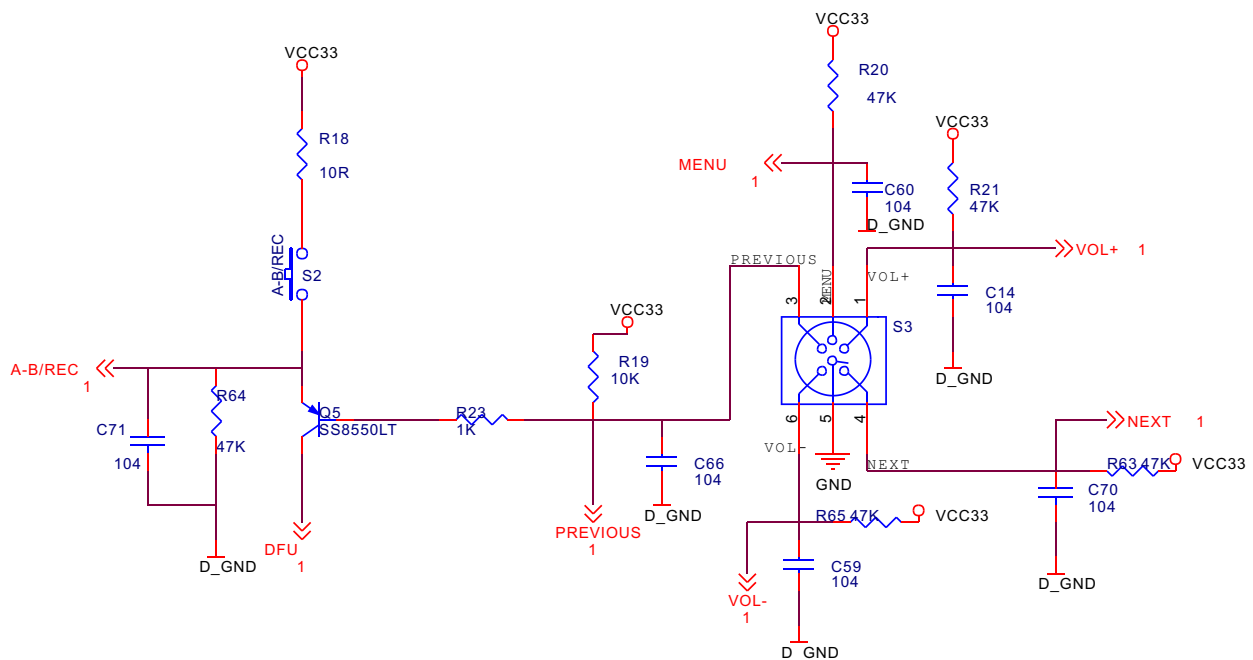


Figure 3.2.5.1 Buttons circuit schematic diagram

2. Working principle: buttons of X17 (RU) include one 4-direction button, one HOLD switch and two single buttons (one is OPEN/CLOSE and PLAY button, which will be introduced in power on/off circuit). Button detect is to use partial voltage mode to utilize ADC circuit of PN0101 to check preset button voltage value to decide which button functions. When the relevant button is pressed, voltage value of preset point corresponding to this button will have change, voltage inputs ADC circuit of PN0101, then the internal program makes the relevant response to realize function of each button. To lock button, directly utilize one I/O port of PN0101 to check high/low level; when high level is detected, it is locked and other buttons have no function.

3.2.6 Headphone jack circuit

1. Headphone jack circuit is shown in the figure 3.2.6.1:

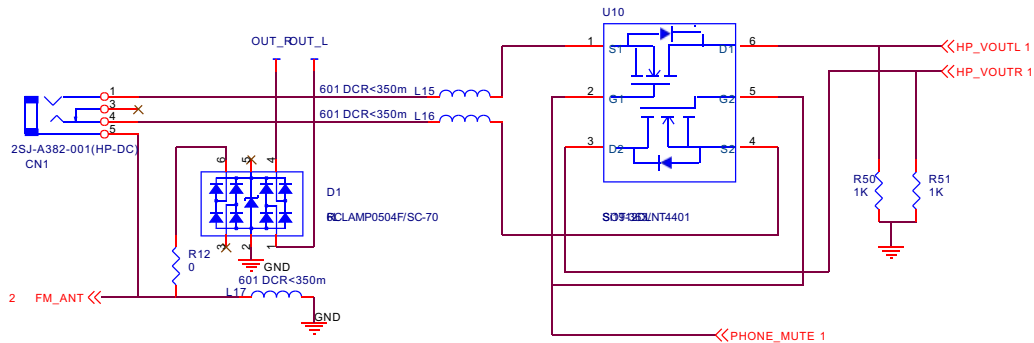


Figure 3.2.6.1 Headphone jack circuit schematic diagram

2. Working principle: left and right channels audio signals outputted from PN0101, through 220uF capacitor coupling output, are sent to headphone jack circuit. Headphone jack circuit is composed of the dual MOS tube SI1912DL and headphone socket CN1 that control sound output. Pin 2 and 5 of SI1912DL are connected to mute circuit. When MUTE button is pressed, control dual MOS tube is disconnected to cut the output of left and right channels of headphone. D1 in circuit is TVS diode array, used to protect ESD to prevent external static from damaging internal circuit through headphone jack. Ground wire of headphone is also used as antenna input of FM tuning.

3.2.7 Reset circuit

1. Reset circuit is to provide power on reset level for PN0101. Reset circuit is shown in the figure 3.2.7.1:

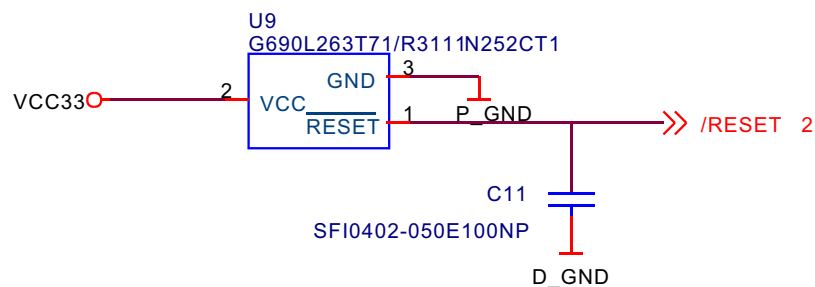


Figure 3.2.7.1 Reset circuit schematic diagram

2. Working principle: reset circuit is composed of reset IC G690L263 (U2) and peripheral circuit. At the moment of power of the player, level of pin 2 of G690L263 changes from 0V to 3.3V, pin 1 outputs a low level reset pulse signal with pulse width 140 millisecond and inputs to pin T14 of PN0101 to reset the player. After reset finishes, high level is maintained, C11 in circuit is voltage dependent resistor and used for anti-static.

3.2.8 Power on/off control circuit

1. Power on/off control circuit of X17 (RU) is shown in the figure 3.2.8.1:

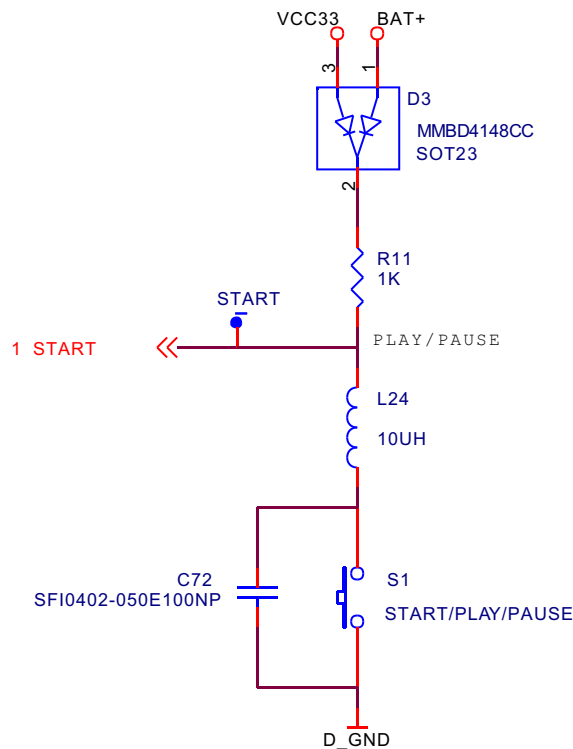


Figure 3.2.8.1 Power on control circuit schematic diagram

2. Working principle: power on/off is completed through operating ON/OFF button S1. When pressing S1 to power on, S1 is connected, high voltage of STAET point is pulled down to ground, START sends out low level signal, L17 of PNX0101 is connected to START signal DC-DC to begin to work and provide 3.3V and 1.8V voltage, D17 pin of PNX0101 is connected to START signal at the same time and system power on.

Power off of X17 (RU) is realized through software. During the course of working, press S1 for a long time, PNC0101 detects START signal through D17, low level sends out this power-off signal to make the player stop working; if low level is short time, it is PLAY or PAUSE.

3.2.9 Low voltage detecting circuit

X17 (RU) has no special low voltage detecting circuit. Battery voltage detecting is controlled through PNX0101 internal software, M17 pin of PNX0101 is connected to anode of battery, internal program sets the lowest voltage of power off, when M17 pin of PNX0101 detects that battery anode voltage is lower than this value, power off signal sends out to realize system power off.

3.2.10 MIC circuit

1. MIC circuit is shown in the figure 3.2.10.1:

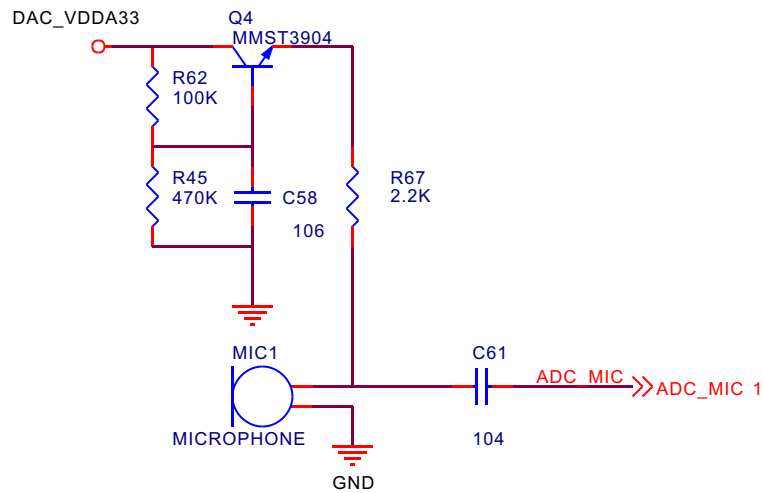


Figure 3.2.10.1 MIC circuit schematic diagram

2. Working principle: MIC circuit is composed of microphone and microphone power bias circuit. MIC1 switches the external voice signals recorded to electric signals, through C61 coupling, and outputs ADC circuit of PNX0101 to switch analog electric signals to digital signals to form WAV file through software encoding to save in FLASH. R62, R45, Q4 and C56为 in circuit is triode voltage stabilizing system, which provides stable power bias for microphone, R67 is bias resistor of microphone.

Section Three Servicing Cases

3.3.1 Servicing cases

【Example 1】 Symptom: player not switched on

Description: after pressing ON button, screen has no display and headphone has no output.

Analysis and troubleshooting: firstly conform whether the trouble is player not switched on or power supply not connected; connect with computer and check whether display of screen is normal; connect to adapter, if display of charge can be displayed, it means that power and rear stage circuit work normally; power on/off circuit is shown in the figure 3.3.1.1, power on/off circuit, through a light touch switch S1, shuts and then forms loop to generate a Start signal to enter chip detect and then power on; firstly test S2 switch, press CLOSE and check whether it is on and find that S2 is false welding when testing; after welding again, trouble is removed.

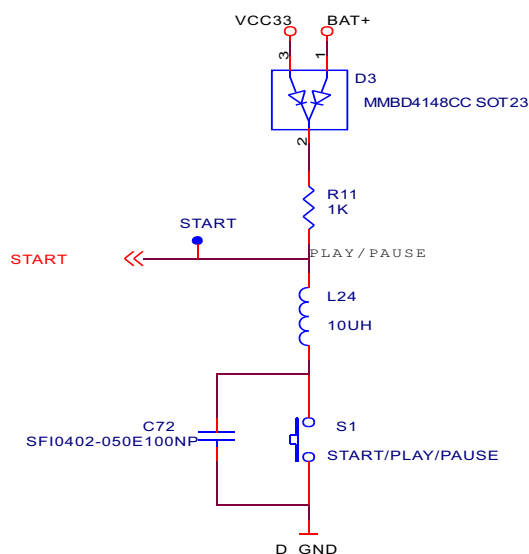


Figure 3.3.1.1 ON/OFF circuit schematic diagram

【Example 2】 Symptom: only one side has sound output when tuning

Description: only one side of headphone has output when tuning

Analysis and troubleshooting: firstly judge whether tuning component have trouble or common [part has trouble, whether only one side has output when listening and the result is that both sides are normal; through a flat cable holder, the tuning components reach main board; for radio stations can be searched when tuning, it means that power supply, data and clock are basically normal; directly use oscillograph to test left and right channel output of FM and find that FM-OUTL has no waveform output, then check output part of tuning board and waveform is normal, flat cable holder pin is shown in the figure 3.3.1.2, use hand to press flat cable holder and it is OK, but it has trouble after loosing, so we judge that flat cable holder contact is not good, after changing it, trouble is removed.

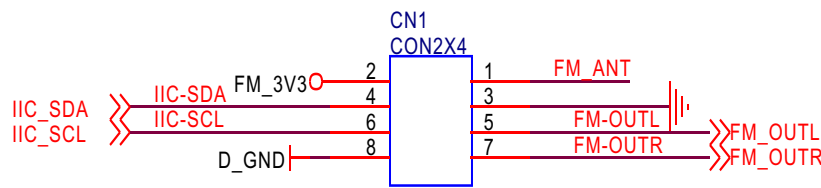


Figure 3.3.1.2 Flat cable holder pin circuit diagram

【Example 3】 Symptom: noise appear when playing

Description: headphone output noise when playing

Analysis and troubleshooting: if there is noise when playing, it is BGA that has trouble, for playback and other functions are all normal, only there is noise, so it is necessary to analyse whether decode [art or rear stage causes this trouble, when playing 1KHZ standard signal, there should be sine wave signals and not any noise, schematic diagram of DAV part of PNX0101 is shown in the figure 3.3.1.3, test waveform in C32, C33 and find that there is noise, so we judge that it is BGA that has trouble; after changing it, trouble is removed.

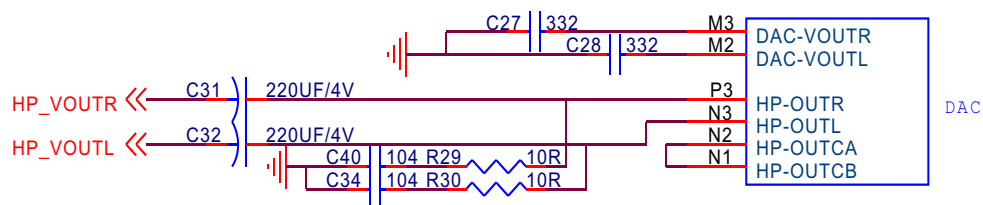


Figure 3.3.1.3 DAV part circuit diagram

【Example 4】 Symptom: no screen display

Description: when playing, screen has no display and playback is normal.

Analysis and troubleshooting: power on and playing music and sound is normal, so it is preliminarily judged that power supply 3.3V and 1.8V are both basically normal. Screen display control circuit is shown in the figure 3.3.1.4, firstly test voltage on two ends of L25 and it is about 4.3V, which is

Basically normal; then test voltage on two ends of D8 and find that anode has no 13V voltage, take down display screen and there is still no; check input end voltage and enable voltage and they are basically normal, then check FB end voltage of feedback pin and it is obviously low, check and find that capacitor C68 has trouble, after changing it, trouble is removed.

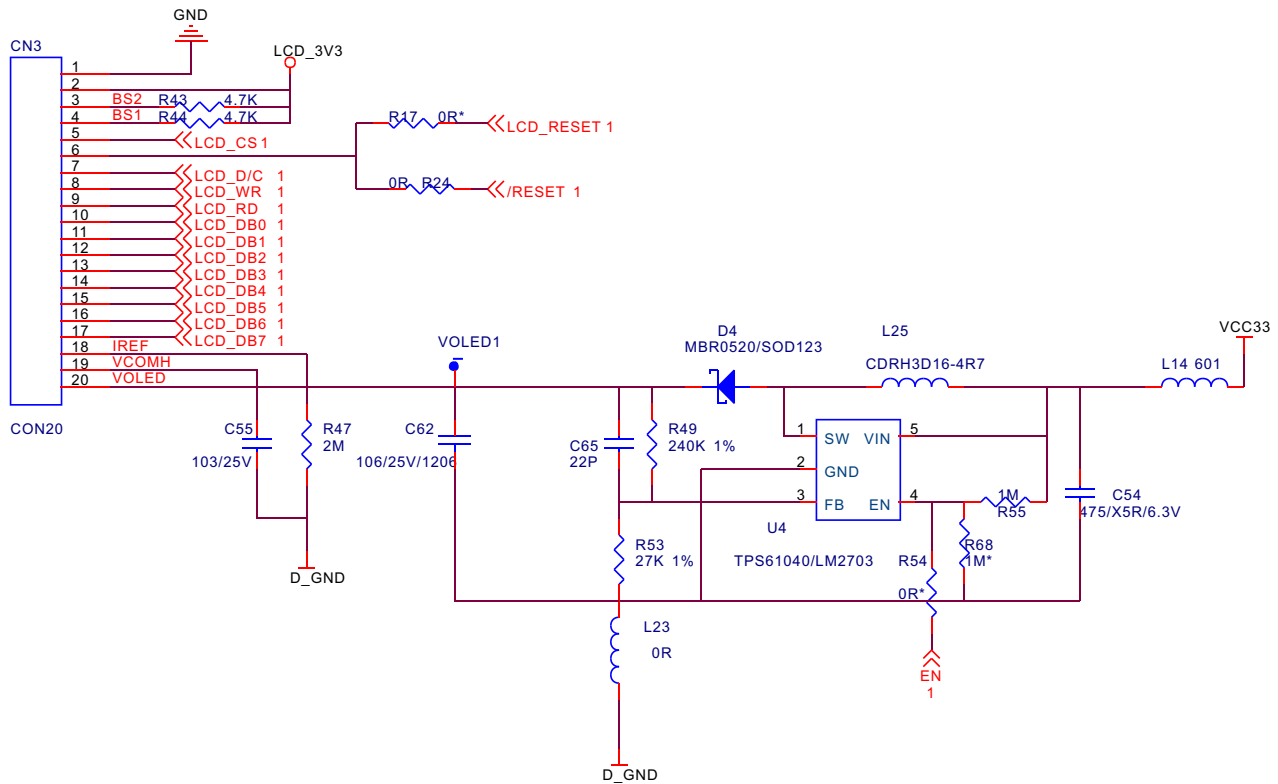


Figure 3.3.1.4 Screen display control circuit diagram

【Example 5】Symptom: screen has mosaic

Description: display screen has mosaic and display has disorder

Analysis and troubleshooting: this troubleshooting is the same with that of no screen display, with the difference is that power supply is normal; firstly confirm whether the screen itself has trouble or circuit has trouble, change display screen and trouble still exists, then use oscillograph to test the 8-digit number of OLED screen and find that flat cable holder of display screen has false welding, after welding again, trouble is removed.

【Example 6】Symptom: noise when recording

Description: there is noise when playing record files

Analysis and troubleshooting: schematic diagram of record circuit is shown in the figure, it is mainly composed of microphone and microphone power bias circuit, MIC circuit schematic diagram is shown in the figure 3.3.1.5. MIC switches the external voice signals recorded into electric signals, through being coupled by C61, output to ADC circuit of PNX0101 and form WMA files through software coding to save in Flash.

When repairing this kind of machine, firstly play files and check whether there is noise and there is no; check recording circuit and power supply is normal; when recording, use oscillograph to test C61 and there is noise interference, after changing MIC, trouble is removed.

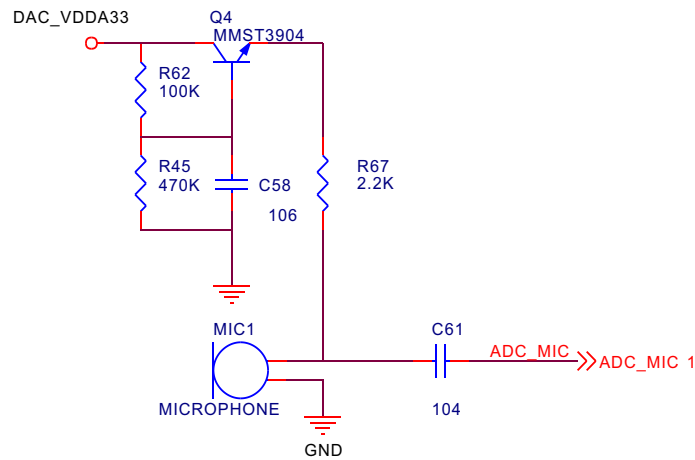


Figure 3.3.1.5 MIC circuit schematic diagram

【Example 7】 Symptom: only one side has sound output

Description: only one side of headphone has output when playing.

Analysis and troubleshooting: because only one side has normal sound output, it means that other circuits are normal, secondary output DAC circuit is shown in the figure 3.3.1.6, firstly check whether headphone terminal has false welding, test waveform on two ends of headphone terminal and find that left channel has no waveform, then test capacitor C32 and there is still no wave, then test C28 and reference level is obviously low comparing with right channel, test resistor to ground and it is only dozens of ohm, take down BGA and test and find that resistance to ground is infinite, after changing BGA, trouble is removed.

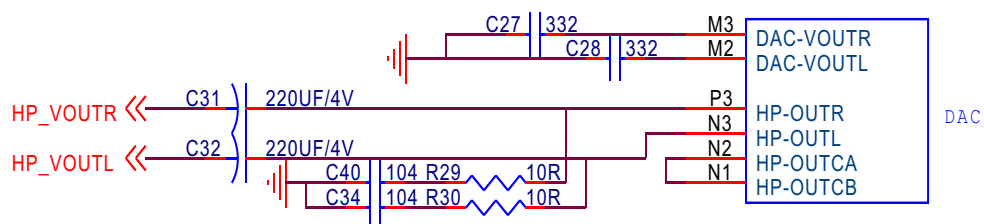


Figure 3.3.1.6 DAC circuit diagram

【Example 8】 Symptom: power not on

Description: no OSD, no output

Analysis and troubleshooting: firstly analyse whether it is caused by battery or by power circuit. If power not on, firstly connect with computer and check whether screen has display. Power on, connect and there is no display, so take machine apart and check it. Firstly check power battery voltage and it

Cannot be lower than 1.3V, then check VCC 3.3V and 1.8V outputted through BGA and find that 3.3V is low, which is normal and 1.8V is normal; after pressing ON button and the player is working normally, VCC 1.8V should be pulled down to about 1.4V, VCC3.3V should be lower to 3.1~3.2V when working normally; then test crystal oscillator, oscillation is normal, frequency is 24MHZ and reset is also normal, so we analyse that it is chip that is not working; working conditions are normal, so we analyse that it is drive program that has problem; upgrade DFU again and trouble is removed.

【Example 9】 Symptom: computer cannot be connected

Description: after connecting with computer, no response and no screen display.

Analysis and troubleshooting: firstly check whether charge and power on is available and the result is normal. Use diode level of multilevel to test the resistance value to ground of D+, D- data signals in USB terminal position and it should be close to several hundred ohm, then test between D+ and D- and short-circuit cannot be allowed; when testing, we find that resistance value of D+ is normal and that of D- is infinite, check and find that USB terminal has false welding; after welding again, trouble is removed.

【Example 10】 Symptom: no sound when playing

Description: headphone has no output when playing

Analysis and troubleshooting: firstly adjust volume to maximum and play 1KHZ standard signals, 2.8V power switch circuit is shown in the figure 3.3.1.7, check whether two ends of output end C31, C32 have waveform and there is no, then test resistance to ground of reference level end C27, C28 and it is normal, then test audio power supply IC U7 and pin 1 of input end is 3.3V, which is normal, when testing Pin 5 of output end and voltage is 0.6V, which should be 2.8V when in normal conditions, so it is on low side obviously, after changing IC, trouble is removed.

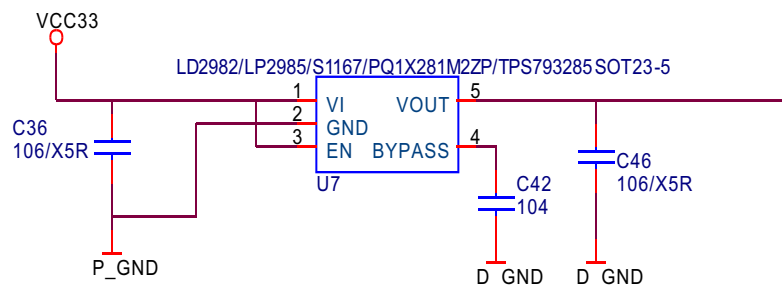


Figure 3.3.1.7 2.8V power switch circuit schematic diagram

3.3.2 Troubleshooting flow chart

1.Troubleshooting process for “No screen display”.

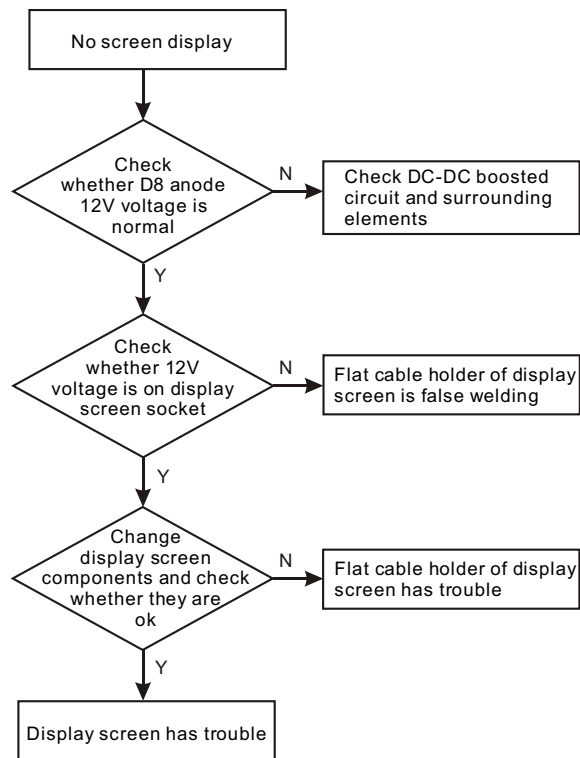


Figure 3.3.2.1 Trouble shooting flow chart for “No screen display”

2. Troubleshooting process for “USB not connected”.

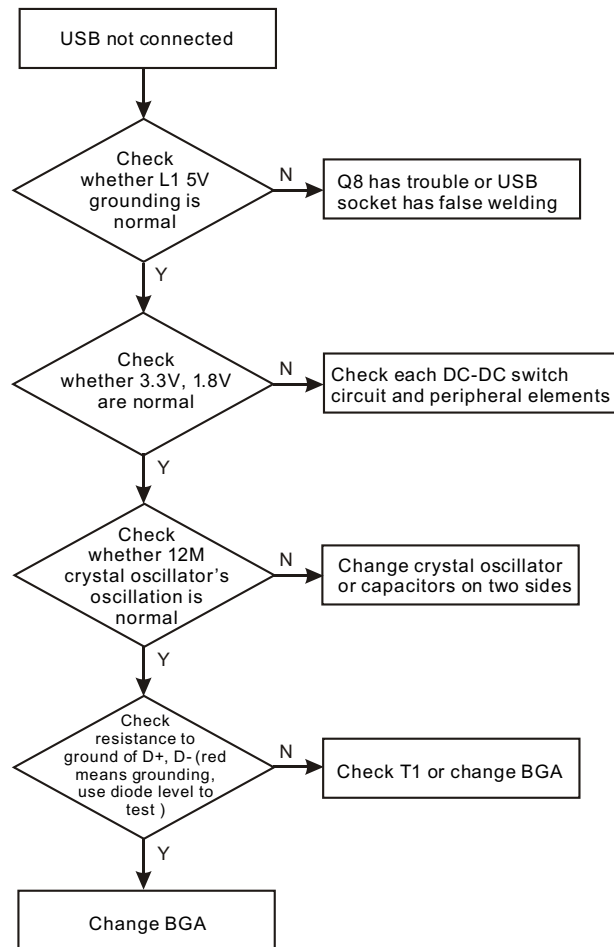


Figure 3.3.2.2 Troubleshooting plow chart for “USB not connected”

3.Troubleshooting process for“Buttons have no function”.

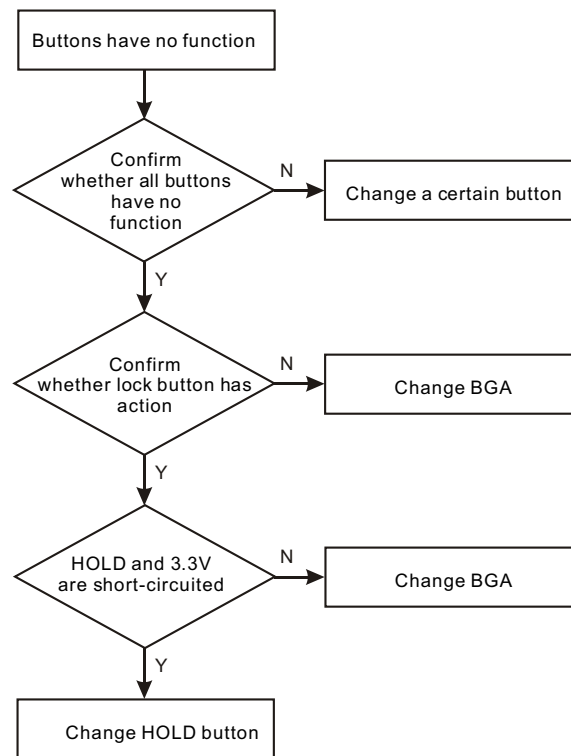


Figure 3.3.2.3 Troubleshootingflow chart for “Buttons have no function”

4 Troubleshooting process for “No tuning function”

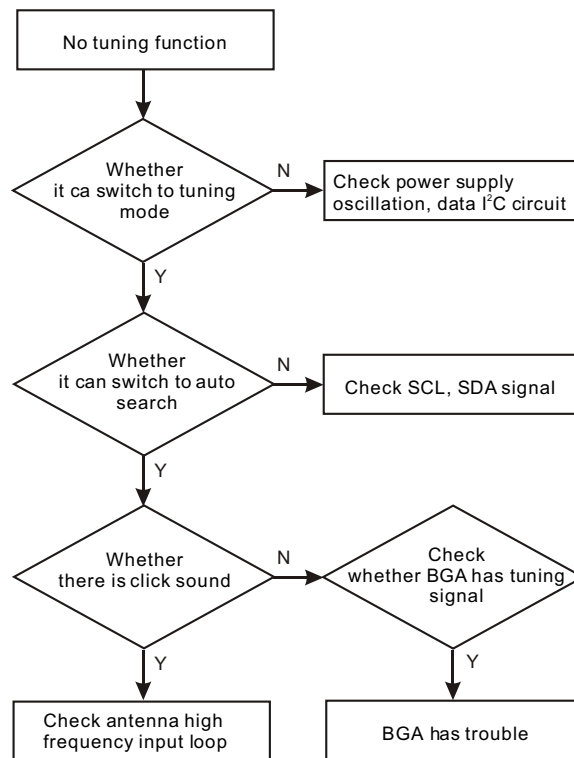


Figure 3.3.2.4 Troubleshooting flow chart for “No tuning function”

5. Troubleshooting process for "Power not on"

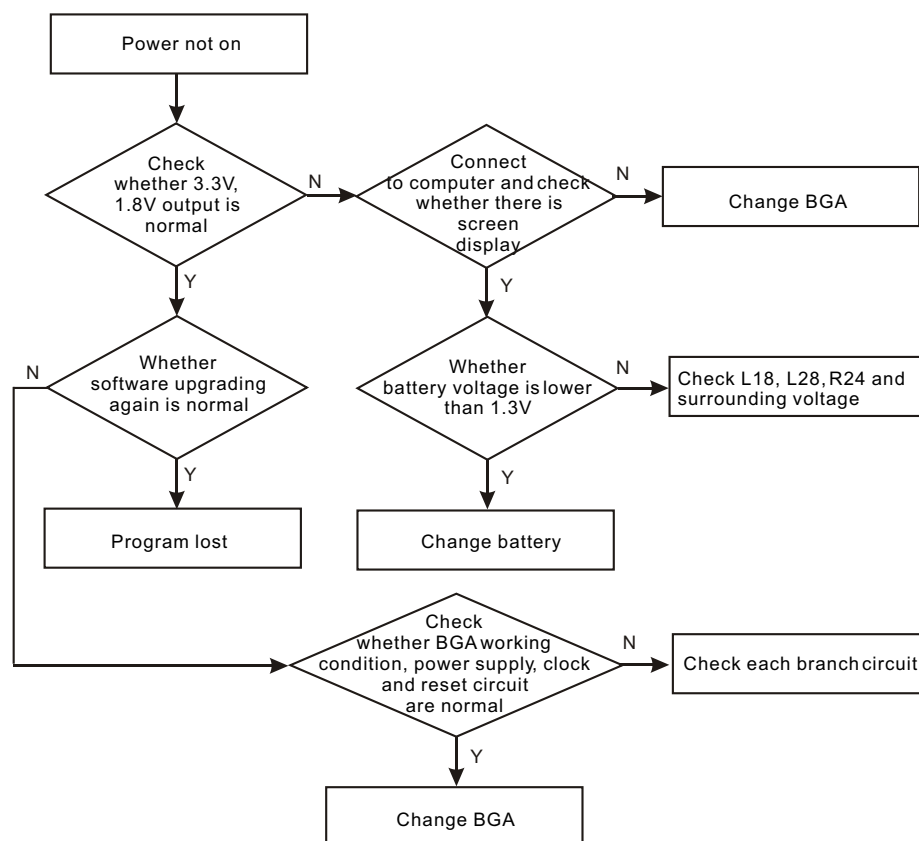
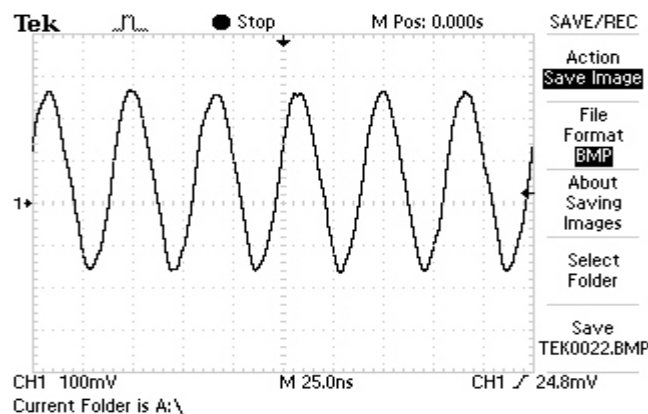


Figure 3.3.2.5 Troubleshooting flow chart for "Power not on"

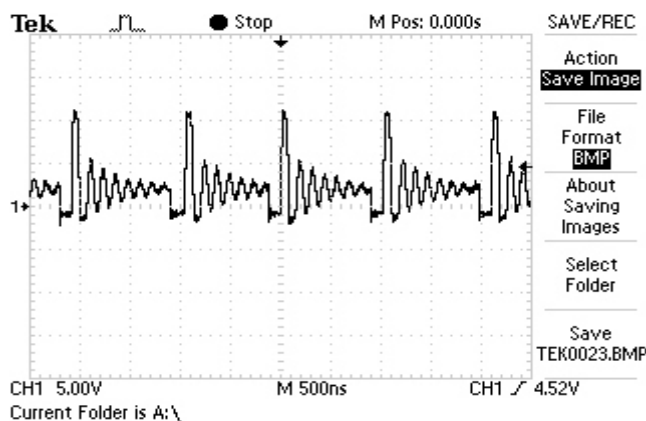
Section Four Servicing Parameters

This section collects signal waveform diagram of audio, video and each unit circuit with the purpose to help servicing personnel to judge where trouble lies in accurately and quickly to improve servicing skills. For the difference of oscillograph's type, model and tuner, a certain difference may exist, so the servicing personnel are expected to pay more attention to check in daily operation.

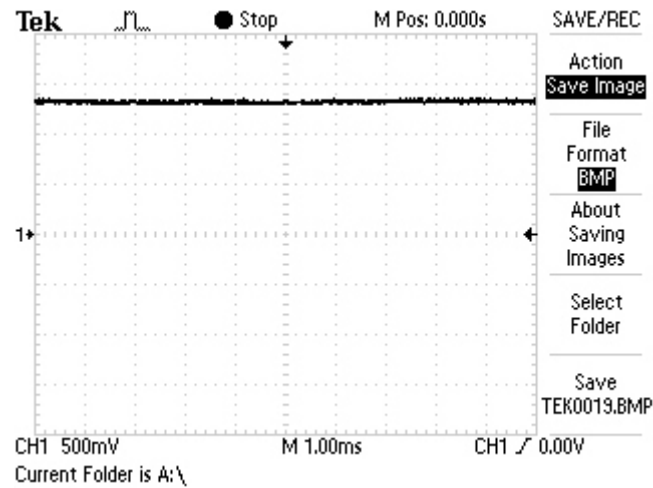
1. 12M crystal oscillator oscillation waveform diagram



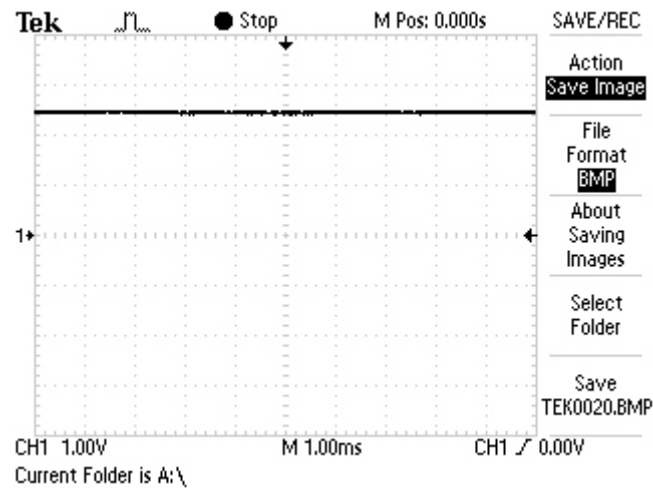
2. L25 boosted energy storage waveform diagram



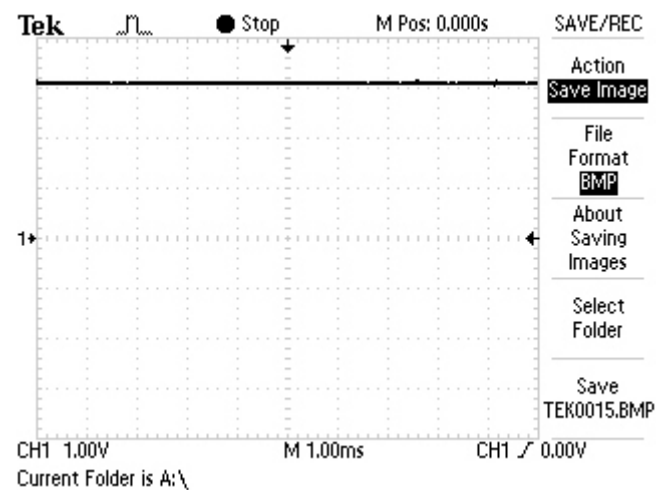
3. LCD_3V3 waveform diagram



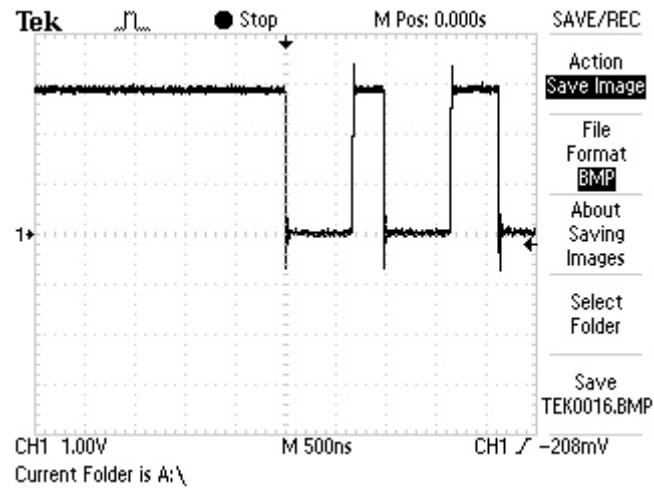
4. Software power supply 3V3 waveform diagram



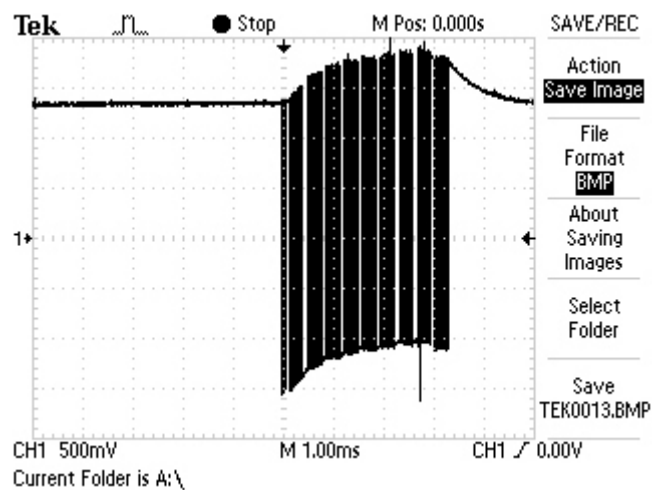
5. LCD_RESET waveform diagram



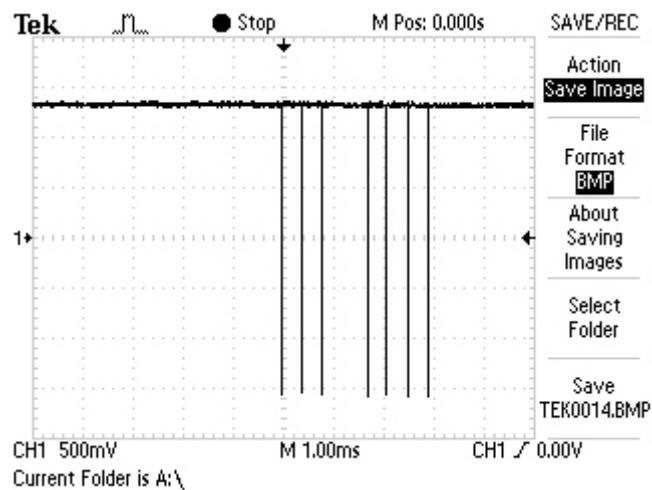
6. LCD_CS waveform diagram



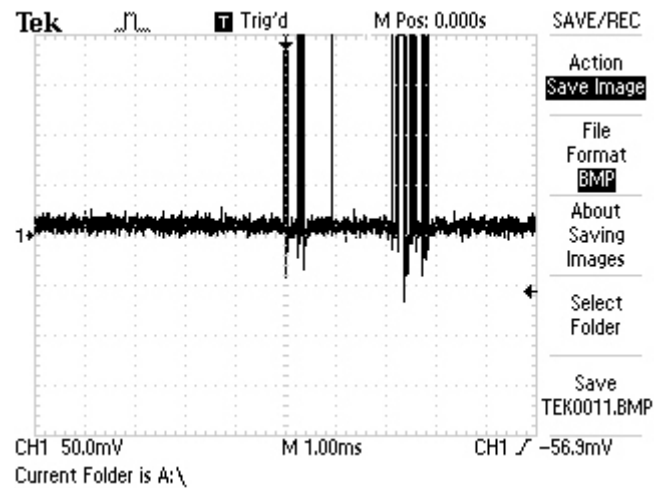
7. LCD_WR waveform diagram



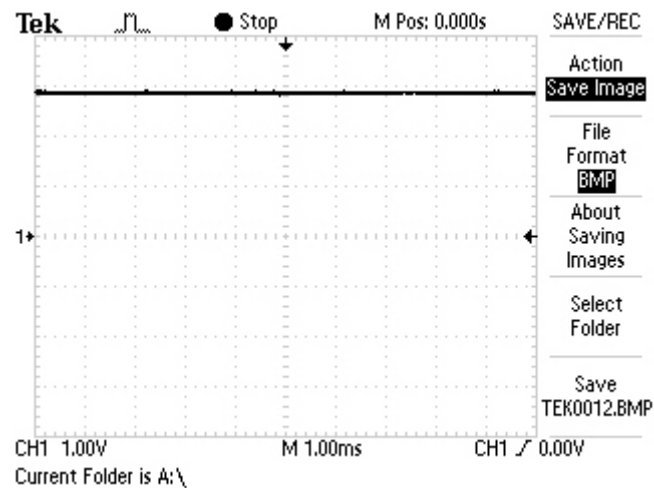
8. LCD_D/C waveform diagram



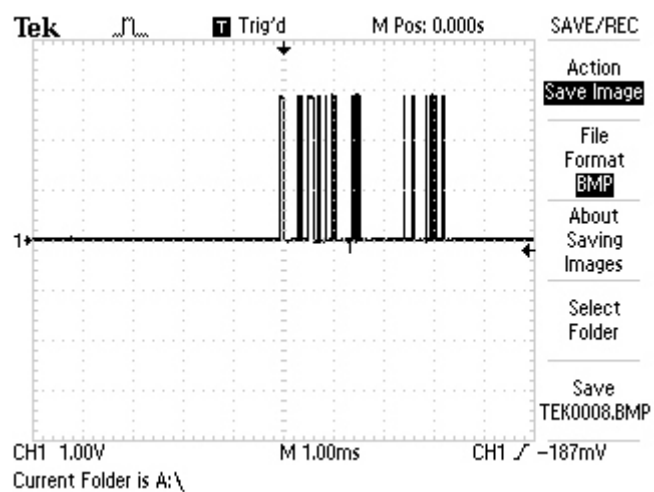
9. LCD_DB0 waveform diagram



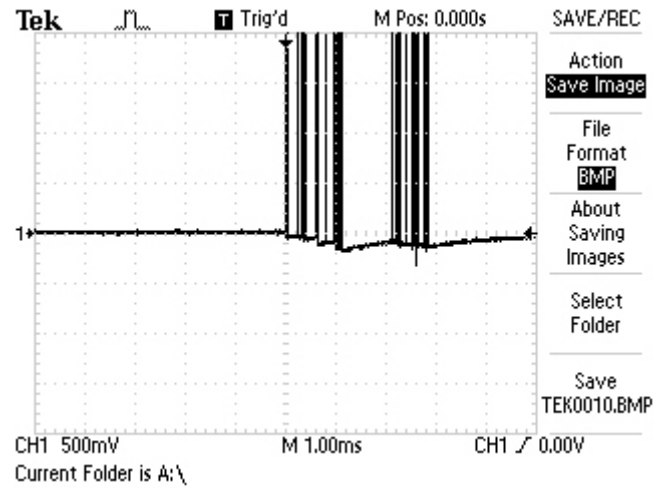
10. LCD_RD waveform diagram



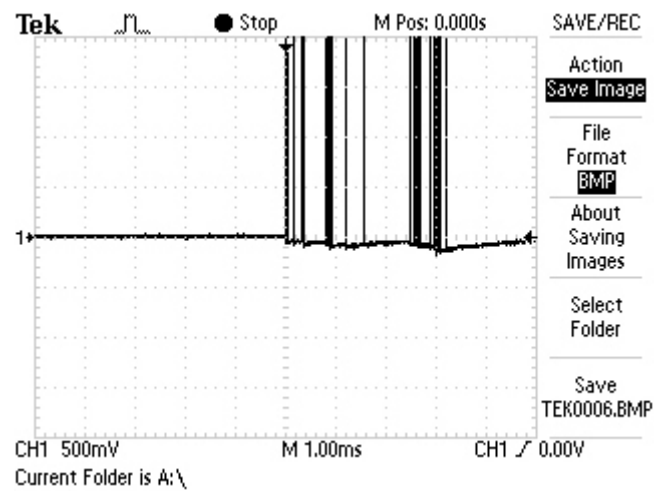
11. LCD_DB2 waveform diagram



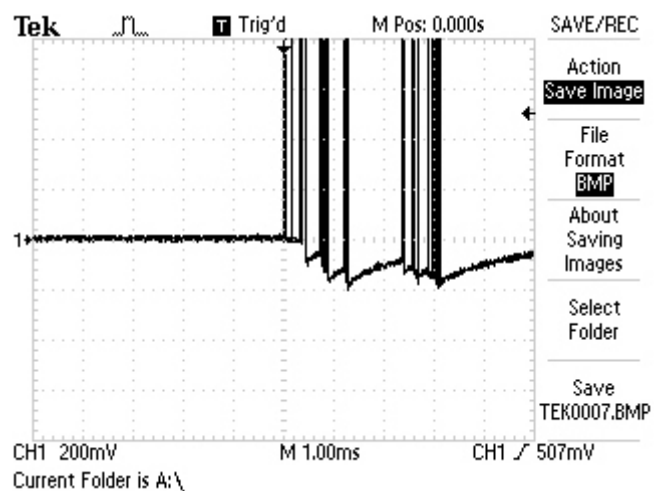
12. LCD_DB1 waveform diagram



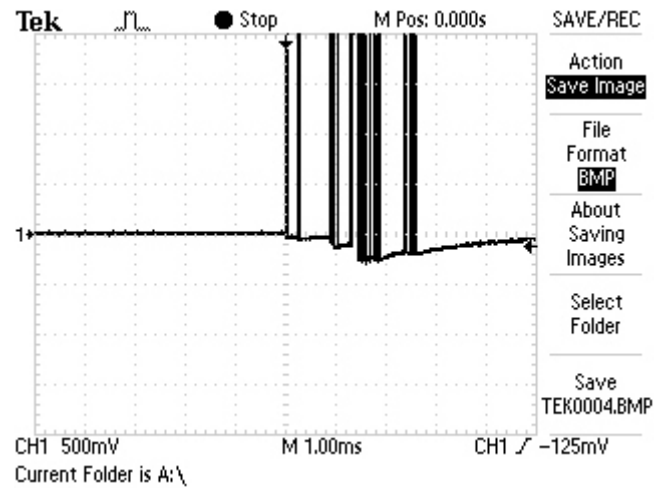
13. LCD_DB4 waveform diagram



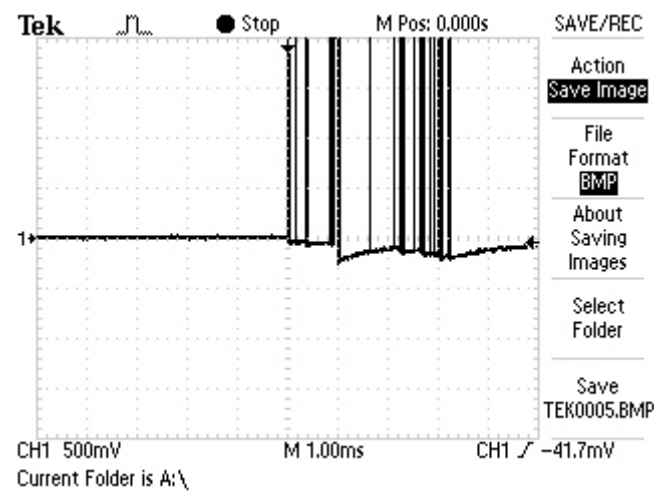
14. LCD_DB3 waveform diagram



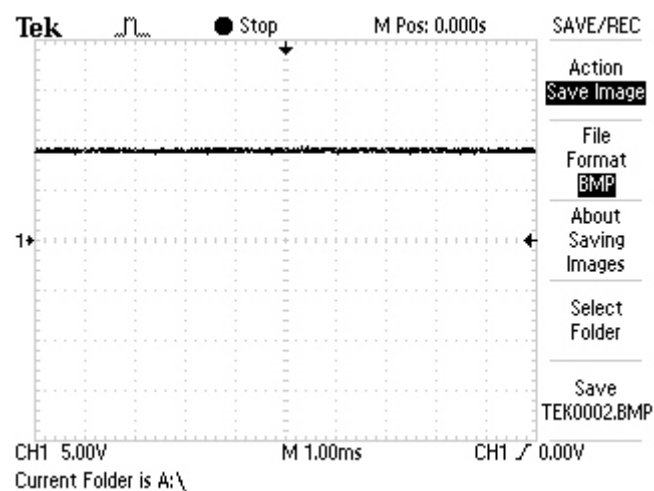
15. LCD_DB6 waveform diagram



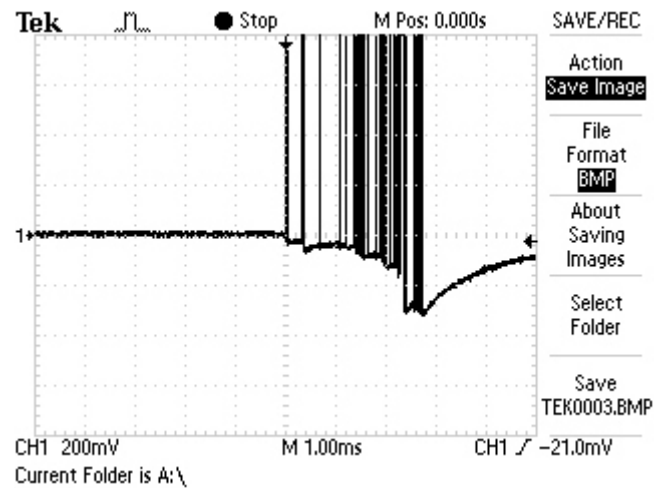
16. LCD_DB5 waveform diagram



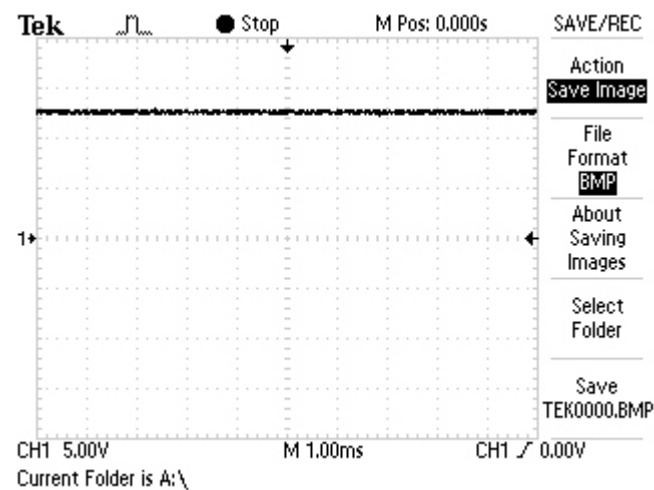
17. IREF waveform diagram



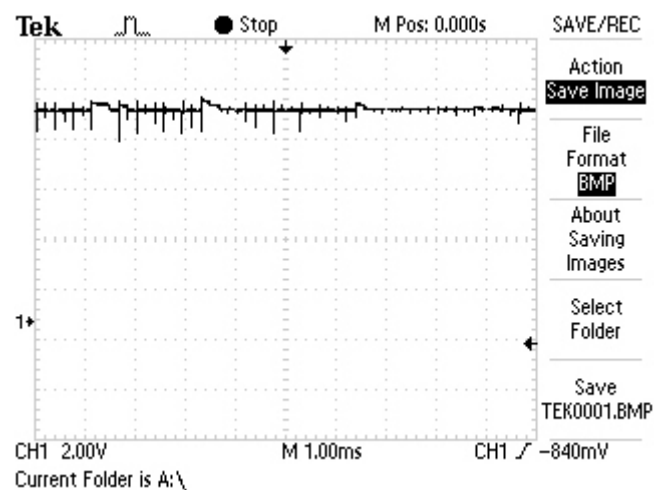
18. LCD_DB7 waveform diagram



19. VOLED waveform diagram



20. VCOMH waveform diagram



Section Five Function Introduction to IC

3.5.1 Function introduction to PNX0101

The PNX0101 (ARM-based Solid State Audio IC) is an IC based on an embedded RISC processor. The device is designed for hand-held Solid State Audio applications like portable MP3 players. The high level of integration, low power consumption and high processor performances make the PNX0101 very suitable for portable hand-held devices.

The PNX0101 is based on the powerful ARM7TDMI CPU core, which is a full 32-bit RISC processor with 8 k byte dedicated cache.

2. Pin function of PNX0101 is shown as the following table:

PIN	Main	Description
T10	XTALH_IN	12M clock in
V9	XTALH_OUT	12M clock out
U9	XTALH_VDDA18	Crystal oscillator analog power supply
T9	XTALH_VSSA	Crystal oscillator analog ground
V7	XTALH_IN	Digital ground
T8	XTALH_OUT	unused
U8	XTALH_VDDA18	Crystal oscillator analog power supply
V9	XTALH_GNDA	Crystal oscillator analog ground
T12	SPDIF_IN	unused
U11	SPDIF_VDDA18	Grounding
T11	SPDIF_GNDA	Grounding
U5	ADC10B_GPA4	unused
T6	ADC10B_GPA3	unused
U6	ADC10B_GPA2	unused
T7	ADC10B_GPA1	unused

U7	ADC10B_GPA0	Analog general pin (battery +)
V10	ADC10B_VDDA33	10bitADC power supply
U10	ADC10B_GNDA	10bitADC grounding
M3	DAC_VOUTR	AC grounding
M2	DAC_VOUTL	AC grounding
L1	DAC_VDDA33	DACanalog power supply
L2	DAC_VREFP	
M1	DAC_VREFN	Grounding
P3	HP_OUTR	Headphone output (right)
N3	HP_OUTL	Headphone output (left)
N2	HP_OUTCA	Connect to N1
N1	HP_OUTCB	Connect to N2
R1	HP_VDDA33A	Headphone analog power supply
R2	HP_VDDA33B	Headphone analog power supply
P2	HP_GNDAA	Headphone analog ground
P1	HP_GNDAB	Headphone analog ground
T3	ADC_VCOM	AC grounding
U2	ADC_VREFP	Positive reference voltage
V1	ADC_VREFN	Grounding
V3	ADC_VDDA18	Analog 1.8V power supply
U3	ADC_VDDA33	Analog 3.3V power supply
V2	ADC_GNDA	Grounding
U1	ADC_VREF	AC grounding
T1	ADC_VINR	Analog input (right) — tuning right
T4	ADC_VINL	Analog input (left) — tuning left
R3	ADC_MIC	Analog input—MIC input
T2	ADC_MIC_LNA	
G2	LCD_RW_WR	LCD read/write gating
F2	LCD_E_RD	
E3,E2,D3,D1, D2,C3,C1,C2	LCD_DB_7~0	LCD data line
B3	LCD_CSB	Chip selection

F3	LCD_RS	Data/direction gating
J3	MCI_DAT_3	Card read gating
J1	MCI_DAT_2	
J2	MCI_DAT_1	unused
H3	MCI_DAT_0	Power off level
G3	MCI_CLK	Card read chip selection clock
H2	MCI_CMD	unused
T15	USB_CONNECT_N	USB2.0 soft output
U17	USB_DP	USB data line
T17	USB_DM	USB data line
U14	USB_VBUS	USB power supply
P16	USB_RREF	unused
R17	USB_GNDA	Analog ground
R16	USB_VSSA_REF	Analog ground
T16	USB_VSSA_TERM	Analog ground
U15	USB_VDDA18_PLL	unused
U16	USB_VDDA18_BG	unused
U18	USB_VDDA33	unused
V18	USB_VDDA33_DRV	unused
H17	DAI_BCK	unused
G17	DAI_WS	unused
G16	DAI_DATA	unused
F16	DAO_CLK	unused
G18	DAO_BCK	unused
F18	FAO_WS	unused
F17	DAO_DATA	unused
T13	JTAG_TRST_N	J1
V4	JTAG_TCK	J2
U12	JTAG_TMS	3.3V
T5	JTAG_TDI	J3
U13	JTAG_TDO	J4
U4	JTAG_SEL_ARM	J5

H16	IIC_SCL	Serial clock IIC control
J17	IIC_SDA	Serial data IIC control
B8,C8,B7,C7 B6,C6,C5,C4 B5,A5,B4,A4 A3,B2,A2,A1	MPMC_D_15~ 0	MPMC data input/output (use 7~0 as address line)
C13,B13,A3,C14 B14,A14,C15,B15 C16,B16,C17,B17 C18,B18,A18,D18 D17,D16,E18,E17 E16	MPMC_A_20~ 0	MPMC address line
B11	MPMC_STCS_2	unused
A8	MPMC_STCS_1	unused
C9	MPMC_STCS_0	unused
B9	MPMC_DYCS	unused
A10	MPMC_CLKOUT	unused
B10	MPMC_CKE	unused
C11	MPMC_WE	unused
A9	MPMC_RAS	unused
C10	MPMC_CAS	unused
A11	MPMC_DQM_1	unused
C12	MPMC_DQM_0	unused
A17	MPMC_NOE	Read gating
B12	MPMC_BLOUT_1	unused
A12	MPMC_BLOUT_0	Write gating
B1	MPMC_RPOUT	unused
L3	UART_TXD	unused
K3	UART_RXD	unused
K2	UART_NCTS	unused
K1	UART_NRTS	unused
J16	GPIO_3	DFO
K18	GPIO_2	G2

K17	GPIO_1	G2
K16	GPIO_0	P_GND
T14	RSTIN_N	System reset
V15	FLASH_VDD_HV	
H1	VDDI1	Mermcore power supply
V11	VDDI2	Core power supply
V16	VDDI3	Flash core power supply
G1	VSSI1	Mermcore grounding
V12	VSSI2	Core grounding
V17	VSSI3	Flash core
E1	VDDE1	3.3V power supply
V5	VDDE2	3.3V power supply
V14	VDDE3	3.3V power supply
J18	VDDE4	3.3V power supply
A16	VDDE5	1.8V~3.3V power supply
A7	VDDE6	1.8V~3.3V power supply
F1	VSSE1	Grounding
V6	VSSE2	Grounding
V13	VSSE3	Grounding
H18	VSSE4	Grounding
A15	VSSE5	Grounding
A6	VSSE6	Grounding
L17	DCDC_PLAY	Power on signal
L18	DCDC_STOP	P_GND
N17	DCDC_LX2	DC-DC input
P17	DCDC_LX1	DC-D input
T18	DCDC_VUSB	USB voltage input
M17	DCDC_VBAT	Battery power supply
R18	DCDC_VOUT33A	DC/DC 3.3V output
M16	DCDC_VOUT33B	DC/DC 3.3V input
N18	DCDC_VOUT18	DC/DC 1.8V output
P18	DCDC_VSS1	DC/DC grounding

N16	DCDC_VSS2	DC/DC grounding
L16	DCDC_GND	Core grounding
M18	DCDC_CLEAN	Reference circuit grounding

3.5.2 Function introduction to G60L263T

1. The G690 are microprocessor supervisory circuits used to monitor the power supplies in and digital systems. They provide excellent circuit reliability and low cost by eliminating external components and adjustments when used with +5V, +3.3V, +3.0V- powered circuits.

These circuits perform a single function: they assert a reset signal whenever the VCC supply voltage declines below a preset threshold, keeping it asserted for at least 140ms after VCC has risen above the reset threshold. Reset thresholds suitable for operation with a variety of supply voltages are available.

2. Pin function is shown as the following figure:

Pin	Contiguous signal name	Function description
1	/RESET	Output reset low level
2	VCC	IC power supply
3	GND	Grounding

3.5.3 Function introduction to TC58512FT

1. Offered in 512M×8bit, the K9K4G08U0M is 4G bit with spare 128M bit capacity. Its NAND cell provides the most cost-effective solution for the solid state mass storage market. A program operation can be performed in typical 200μs on the 2112-byte page and an erase operation can be performed in typical 2ms on a 128K-byte block. Data in the data page can be read out at 30ns cycle time per byte. The I/O pins serve as the ports for address and data input/output as well as command input. The on-chip write controller automates all program and erase functions including pulse repetition, where required, and internal verification and margining of date Even the write-intensive systems can take advantage of the K9K4G08U0M ' s extended reliability of 100K program/erase cycles by providing ECC(Error Correcting Code) with real time mapping-out algorithm. The K9K4G08U0M is an optimum solution for large nonvolatile storage applications such as solid state file storage and other portable applications requiring non-volatility. An ultra high density solution having two 4Gb stacked with two chip selects is also available in standard TSOP package.

2. Pin function is shown as the following figure:

Pin	Name	Function
29~32,41~44	I/O ₀ ~I/O ₇	Data input/output line
16	CLE	Order lock latched gating
17	ALE	Address lock latched gating
9	/CE	Chip selection
8	/RE	Read gating
18	/WE	Write gating
19	/WP	Write protection
7	RY/BY	Busy/free judge
12、37	VCC	Power supply
13、36	VSS	Grounding
1~7,10,11,20~28,33~35,38~40,45~48	NC	Unused

3.5.4 Function introduction to SI1912DL

SI1912DL integrates 2 MOS pipes inside, which is used to control the on/off of 2-channel circuit and used as control IC of secondary output of 在 X17 (RU) and the pin function is shown in the table:

Pin	Name	Function
1	S1	S electrode of MOS tube
2	D1	D electrode of MOS tube 1
3	G2	G electrode of MOS tube 2
4	S2	S electrode of MOS tube 2
5	G2	G electrode of MOS tube 2
6	D1	D electrode of MOS tube 1

3.5.5 Function introduction to LM2703

1. The LM2703 is a micro-power step-up DC/DC in a small 5lead SOT-23 package. A current limited, fixed off-time control scheme conserves operating current resulting in high efficiency over a wide range of load conditions. The 21V switch allows for output voltages as high as 20V. The low 400ns off-time permits the use of tiny, low profile inductors and capacitors to minimize footprint and cost in space-conscious portable applications. The LM2703 is ideal for LCD panels requiring low current and high efficiency as well as white

LED applications for cellular phone back-lighting. The LM2703 can drive up to 4 white LEDs from a single Li-Ion battery.

2. Pin function is shown as the following figure:

Pin	Name	Data direction
1	SW	Voltage output end
2	GND	Grounding
3	FB	Output feedback
4	EN	Enable end
5	VIN	Voltage input

3.5.6 Function introduction to TEA5767HN

1. The TEA5767HN is a single-chip electronically tuned FM stereo radio for low-voltage application with fully integrated IF selectivity and demodulation. The radio is completely adjustment-free and only requires a minimum of small and low cost external components. The radio can be tuned to the European, US and Japanese FM bands.

2. Pin function is shown as the following figure:

Pin	Name	Data direction
1	NC	unused
2	CPOP	
3	VCOT1	Tuning output voltage oscillator 1
4	VCOT2	Tuning output voltage oscillator 2
5	VCOVCC	Tuning output voltage oscillator power supply
6	DGND	Digital ground
7	DVCC	Digital power supply
8	DATA	Data pin (IIC serial data control)
9	CLOCK	Clock pin (IIC serial clock control)
10	NC	unused
11	W/R	Read/write control
12	BUSM	Bus mode input
13	BUSEN	Bus mode gating
14	SWP1	Software program port 1

15	SWP2	Software program port 2
16	XTAL1	Crystal input 1
17	XTAL2	Crystal input 2
18	PDLE	
19	PHLE	
20	NC	unused
21	NC	unused
22	LAVO	Left channel audio voltage output
23	RAVO	Right channel audio voltage output
24	TMUTE	Software mute time constant
25	MPXO	FM tuner MPX signal output
26	VREF	Reference voltage
27	TCIFC	IF adjust time constant
28	DIFL1	Decoupling IF clamper 1
29	DIFL2	Decoupling IF clamper 2
30	NC	unused
31	NC	unused
32	IFGAI	IF gain control
33	AGND	Analog ground
34	AVCC	Analog power supply
35	RFI1	F input 1
36	RFGND	RF ground
37	RFI2	RF input 2
38	TCAGC	RF auto gain control time constant
39	LOOPSW	Lock latched loop filter output gating
40	NC	unused

3.5.7 Function introduction to PQ1X28

PQ1X281 may output fixed voltage 2.8V, EN pin is the enable end. The feature of 2.8V voltage outputted by this IC is that ripple is very small and voltage is very pure, which are used to supply power for audio system, FM and microphone. pin function is shown in the following table:

Pin	Contiguous signal name	Function description
1	VIN	DC power input
2	GND	Grounding
3	EN	Enable end
4	BYPASS	Form filtering circuit with external resistor
5	VOUT	Voltage output

Chapter Four

Assembly and Disassembly Process

In order to get to know the structure of X17 (RU) more easily and directly, now we use pictures to present each key point of disassembly and assembly process before all users to prevent users from operating blindly and to damage elements, so we hope you can operate according to the instructions strictly.

Note: all operations must be with strict anti-static measures. Operators must wear anti-static gloves or wrist ring; electric screwdriver must be grounded effectively and articles, such as nippers must be removed static before using!

4.1 Disassembly process of the player

1. Use nails to take down front casing mirror from the gap of glass and front casing (arrow position in the following figure).



2. Take down the 4-direction button from the front casing.



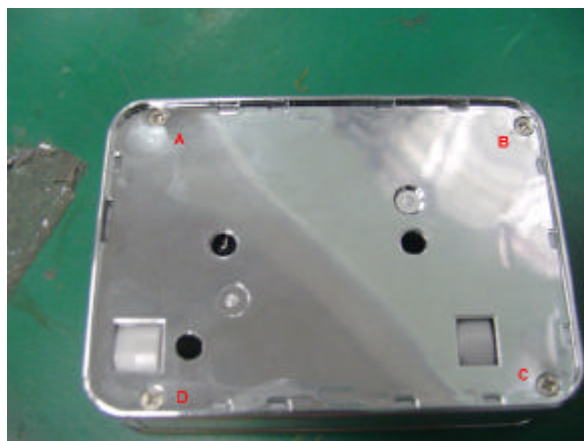
3. Use electric screwdriver or “+”-shaped screwdriver to take down 4 screws (A, B, C, D) from the front casing.



4. Take down bottom casing mirror (method is the same with that of taking down front casing mirror)



5. Use electric screwdriver or “+”-shaped screwdriver to take down 4 screws (A, B, C, D) from the bottom casing.



6. Use nippers or screwdriver to take down two welding points of A and B and then remove the front casing.



7. Use electric screwdriver or “+”-shaped screwdriver to take down 2 screws of main board (A, B).



8. Exert strength from the end of USB jack (arrow direction) to take down the main board.



4.2 Assembly process of the player

1. Install the LOCK button into the middle casing.



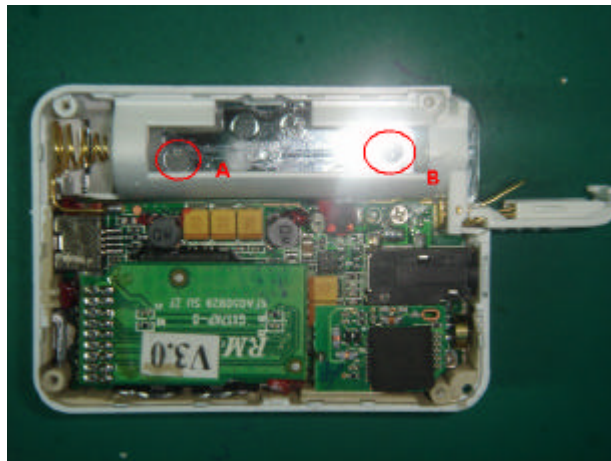
2. Install the main board and pay attention to install one end of headphone jack firstly and aim the button (A) of main board at the button cap hole of front casing.



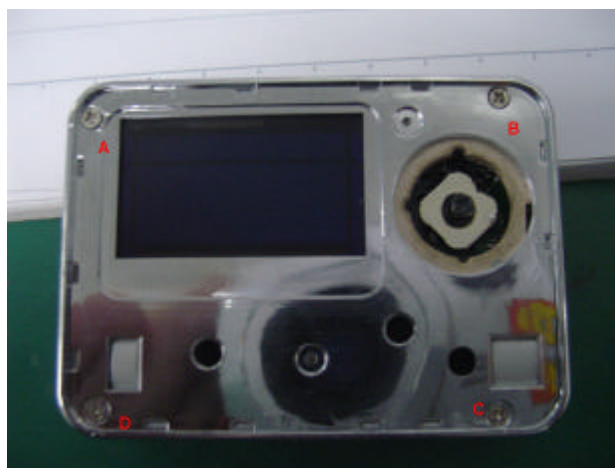
3. Use electric screwdriver or "+"-shaped screwdriver to tightly fix 2 screws (A, B) of main board.



4. Install front casing and use brand iron to weld A and B point.



5. Use electric screwdriver or "+"-shaped screwdriver to tightly fix 4 screws (A, B, C, D) of front casing.



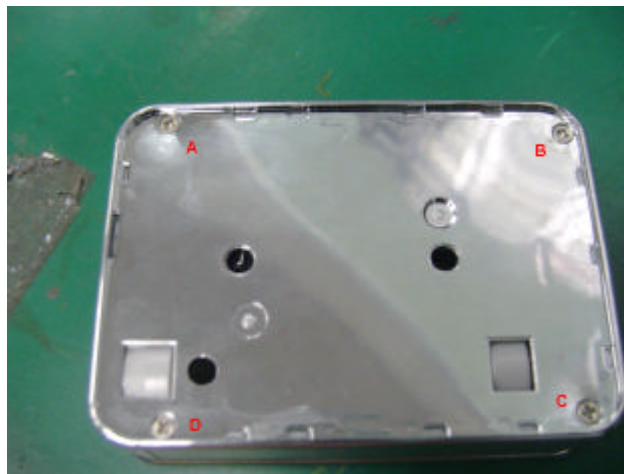
6. Install LOCK button.



7. Install front casing mirror.



8. Install bottom casing and use electric screwdriver or manual screwdriver to tightly fix 4 screws (A, B, C, D) of bottom casing.



9. Install bottom casing mirror.

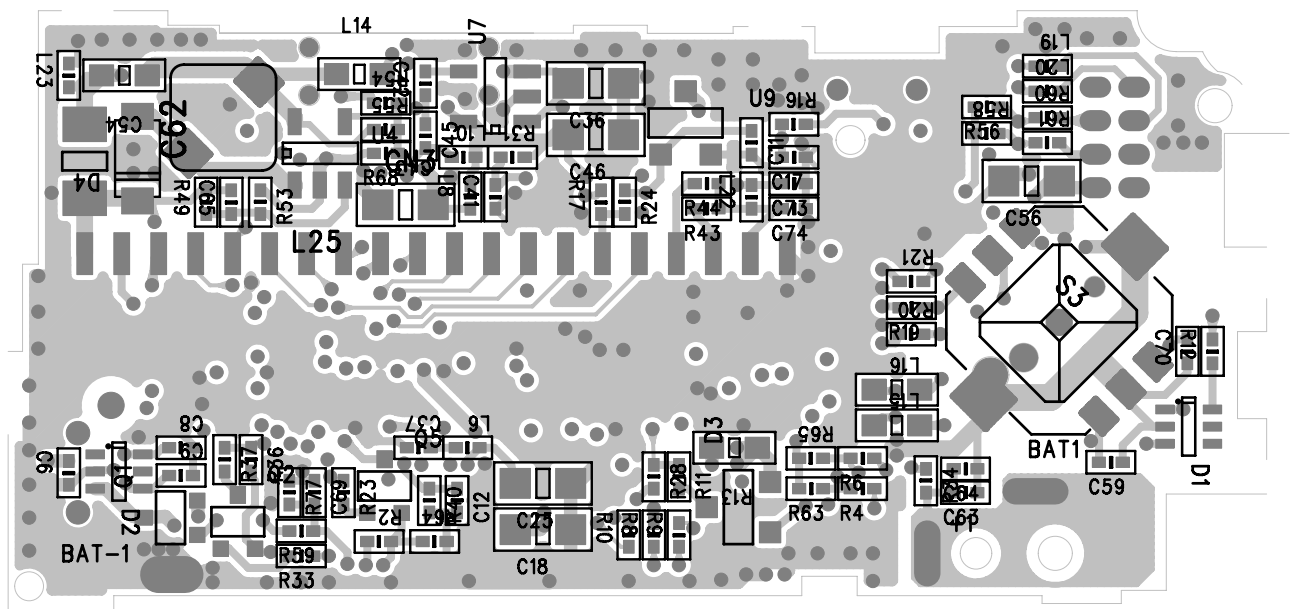


Chapter Cinque

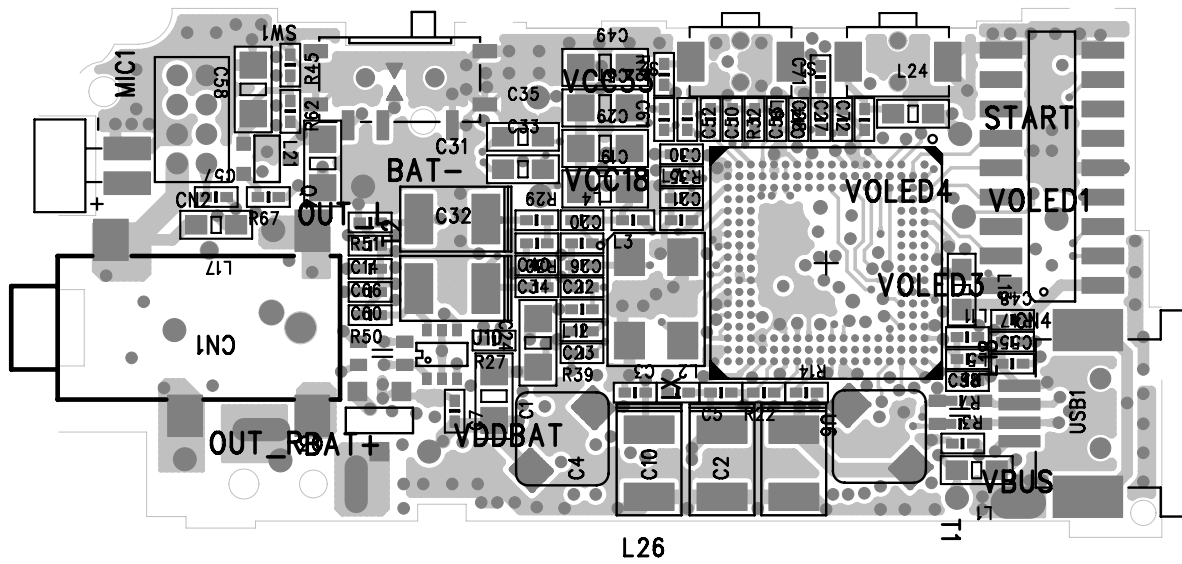
PCB board & Circuit diagram

Section One PCB board

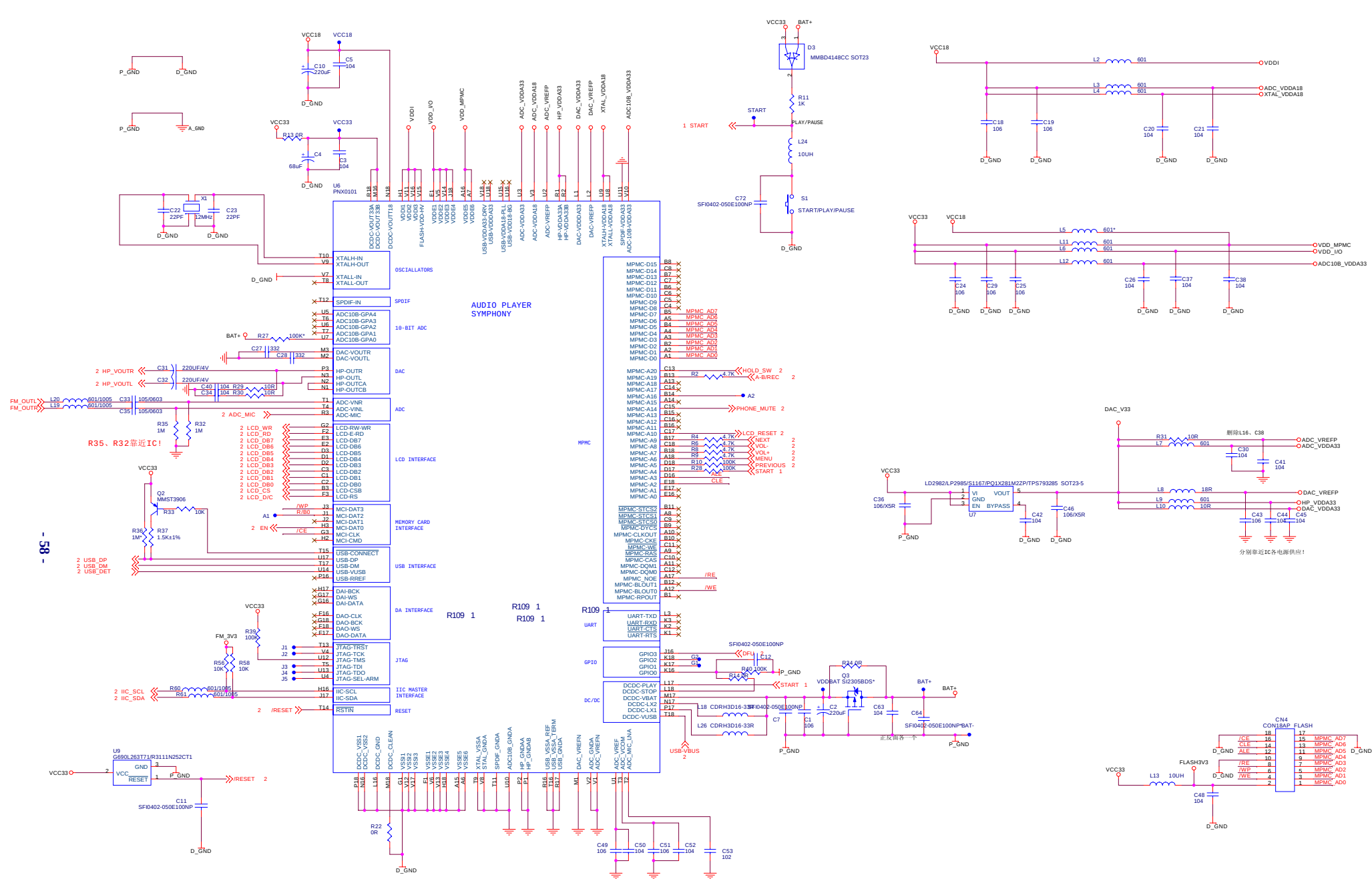
X21 Surface layer of PCB Board

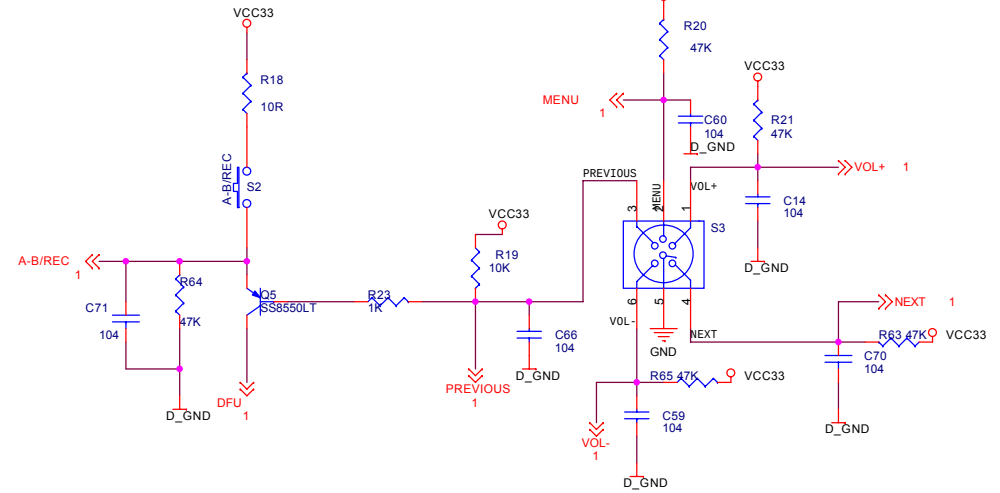
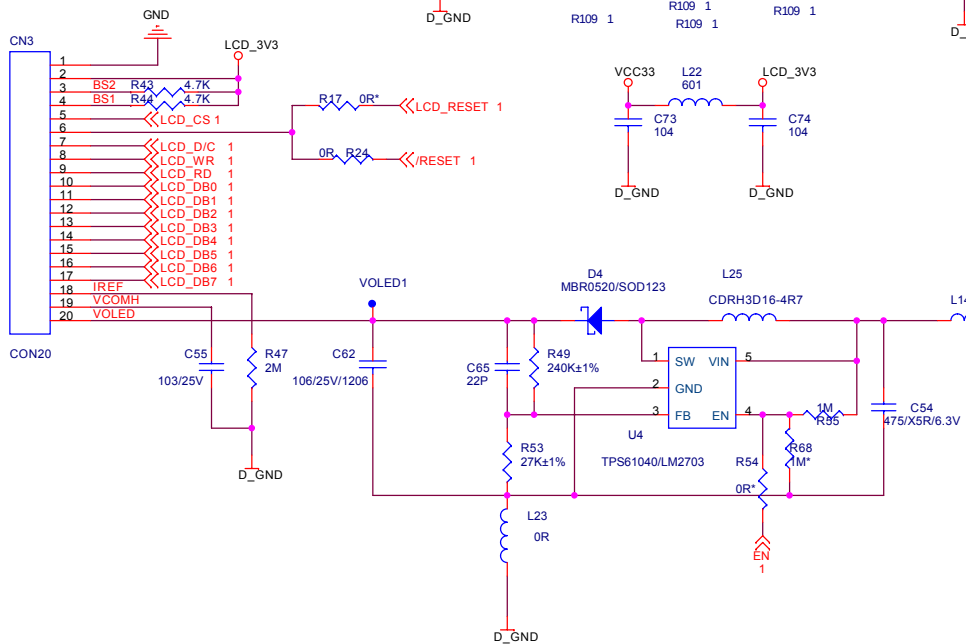
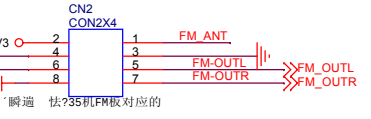
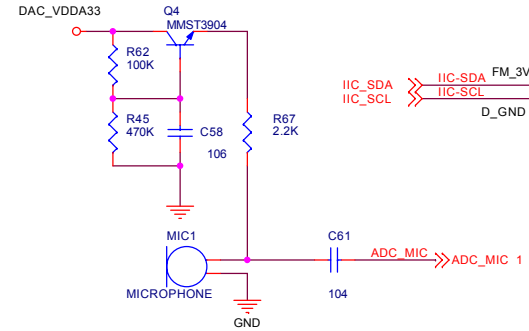
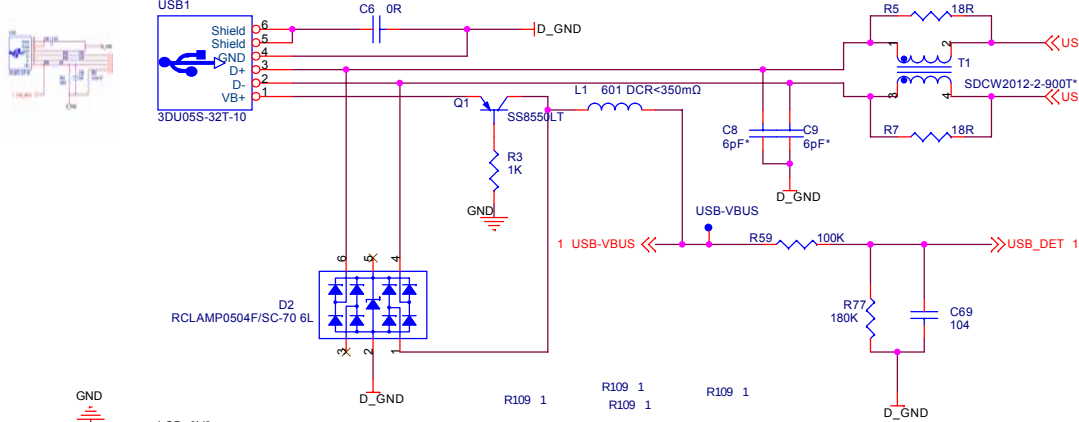
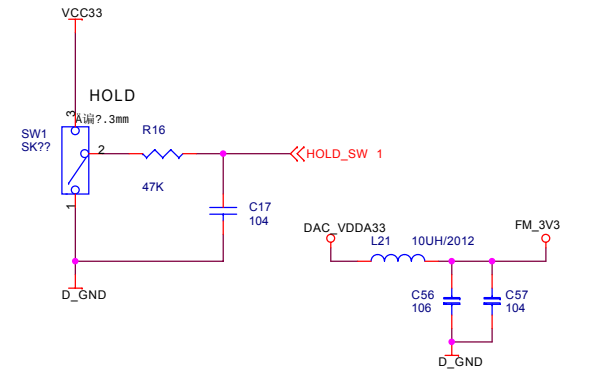
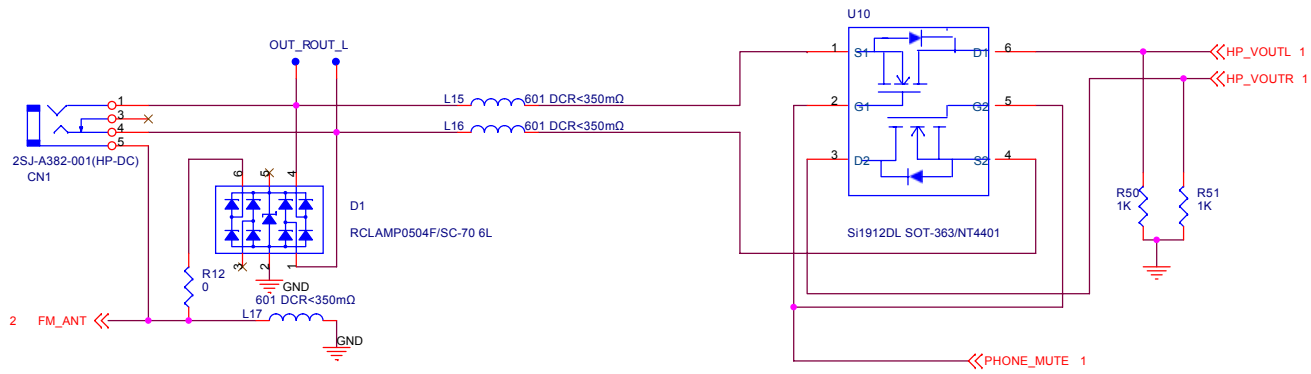


X21 Bottom layer of PCB Board



Section Two circuit diagram





Chapter six BOM List

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
MAIN BOARD 5448802			
0090324	SMD RESISTOR	1/16W 00± 5% 0402	R12,R14,L23,R22,R17,C6,R34
0090001	SMD RESISTOR	1/16W 00± 5% 0603	R13
0090326	SMD RESISTOR	1/16W 100± 5% 0402	L10,R18,R29,R30,R31
0090644	SMD RESISTOR	1/16W 180± 5% 0402	R5,R7,L8
0090362	SMD RESISTOR	1/16W 1K± 5% 0402	R3,R11,R23,R50,R51
0090369	SMD RESISTOR	1/16W 2.2K± 5% 0402	R67
0090639	PRECISION SMD RESISTOR	1/16W 1.5K± 1% 0402	R37
0090377	SMD RESISTOR	1/16W 4.7K± 5% 0402	R2,R4,R6,R8,R9,R43,R44
0090385	SMD RESISTOR	1/16W 10K± 5% 0402	R33,R56,R58,R19
0090400	SMD RESISTOR	1/16W 47K± 5% 0402	R16,R20,R21,R63,R64,R65
0090485	PRECISION SMD RESISTOR	1/16W 27K± 1% 0402	R53
0090408	SMD RESISTOR	1/16W 100K± 5% 0402	R28,R39,R40,R59,R62,R10
0090687	PRECISION SMD RESISTOR	1/16W 240K± 1% 0402	R49
0090645	PRECISION SMD RESISTOR	1/16W 180K± 1% 0402	R77
0090425	SMD RESISTOR	1/16W 470K± 5% 0402	R45
0090433	SMD RESISTOR	1/16W 1MO± 5% 0402	R32,R35,R55
0090436	SMD RESISTOR	1/16W 2MO± 5% 0402	R47
1030033	SMD PRESS SENSITIVITY RESISTOR	SDV1005H180C100GPT 0402	C7,C11,C12,C64,C72 ①
1030029	SMD PRESS SENSITIVITY RESISTOR	SFI0402-050E100NP	C7,C11,C12,C64,C72 ①
0310416	SMD CAPACITOR	50V 22P± 5% NPO 0402	C22,C23,C65
0310704	SMD CAPACITOR	25V 102± 10% X7R 0402	C53
0310453	SMD CAPACITOR	25V 103± 10% X7R 0402	C55
0310705	SMD CAPACITOR	25V 332± 10% X7R 0402	C27,C28
0310480	SMD CAPACITOR	10V 104± 10% X5R 0402	C3,C5,C14,C17,C20,C21,C26,C30,C34,C37,C38,C40,C41,C42,C44,C45,C48,C50,C52,C57,C59,C60,C61,C63,C66,C69,C70,C73,C74 ②
0310790	SMD CAPACITOR	10V 104± 20% X5R 0402	C3,C5,C14,C17,C20,C21,C26,C30,C34,C37,C38,C40,C41,C42,C44,C45,C48,C50,C52,C57,C59,C60,C61,C63,C66,C69,C70,C73,C74 ②
0310216	SMD CAPACITOR	10V 105 +80%-20% 0603	C33,C35
0310717	SMD CAPACITOR	6.3V 475± 20% X5R 0603	C54
0310389	SMD CAPACITOR	10V 106 +80%-20% Y5V 0805	C1,C18,C19,C24,C25,C29,C36,C43,C46,C49,C51,C56,C58

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
0310752	SMD CAPACITOR	25V 106± 10% X5R 1206	C62
0310675	SMD TANTALUMCAPACITOR	6.3V 68uF± 20% 3528 (B)	C4 ③
0310838	SMD TANTALUMCAPACITOR	6.3V 68UF± 20% 3528 T≤2.1	C4 ③
0310736	SMD TANTALUMCAPACITOR	4V 220uF± 20% 3528(B)	C31,C32,C2,C10
0700057	SMD DUAL DIODE	MMBD4148CC SOT-23	D3
0680077	SMD SCHOTTKY DIODE	MBR0520 SOD123	D4
1090080	ESD ELEMENT	RCLAMP0504F SC70-6L	D1 ④
1090084	ESD ELEMENT	PLR0504F-P SC70-6L	D1 ④
0390142	SMD MAGNETIC BEADS	FCM1608-601T02	L1,L13,L14,L15,L16,L17,L24
0390388	SMD MAGNETIC BEADS	6000/100MHZ± 25% 1005	L2,L3,L4,L6,L7,L9,L11,L12,L19,L20,L22,R60,R61
0390387	SMD CORES INDUCTOR	4.7uH± 30% CDRH3D16/HP	L25
0390426	SMD CORES INDUCTOR	33uH± 20% CDRH3D16/HP	L18,L26
0390044	SMD INDUCTOR	10UH± 10% 2012	L21
0780293	SMD TRIODE	MMST3906 SOD-323	Q2
0780298	SMD TRIODE	MMST3904 SOD-323	Q4
0780300	SMD TRIODE	SS8550LT SOD-323	Q1,Q5
0882403	IC	PNX0101ET/N302 TFBGA	U6
0882481	IC	G690L263T71 SOT23-3	U9
0882480	IC	PQ1X281M2ZP SOT23-5	U7 ⑤
0882629	IC	TPS793285DBVR SOT23-5	U7 ⑤
0882565	IC	LM2703 SOT-23-5	U4 ⑥
0882438	IC	TPS61041 SOT-23	U4 ⑥
0882999	IC	FAN5331 SOT23-5	U4 ⑥
0790068	SMD FIELD EFFECT TRANSISTOR	SI1912 SOT363	U10 ⑦
0790070	SMD FIELD EFFECT TRANSISTOR	NTJD4401N SOT363	U10 ⑦
1140070	MICROPHONE	44dB± 3dB 4×1.5 WITH NEEDLE	MIC1
0960284	SMD CMETAL OXIDE FILM RESISTORSTAL OSCILLATOR	12MHz± 30ppm 5032/4 20P	X1
1980050	EARPHONE SOCKET	2SJ-A382-001	CN1
1970081	DUAL FLAT NEEDLE	2×4 4.5mm 1.27mm STRAIGHT INSERT,MOLD HIGH:1mm	CN2
1970091	DUAL FLAT NEEDLE	2×9 11.4mm 1.27mm STRINGHT INSERT MOLD HIGH 2.0	CN4
1860085	USB SOCKET	2UB-M002-001	USB1
1310057	SMD STIR SWITCH	SSSS811101	SW1
1340099	SMD LIGHT TOUCH SWITCH	SKRELGE010	S1,S2

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
1632837	PCB	4X17S-2	CN3
1340119	SMD LIGHT TOUCH SWITCH	SKRHABE010	S3
1632820	PCB	2X17KP-1	
FM MODULE 5447448			
0310416	SMD CAPACITOR	50V 22P± 5% NPO 0402	C15
0310418	SMD CAPACITOR	50V 27P± 5% NPO 0402	C2
0310424	SMD CAPACITOR	50V 47P± 5% NPO 0402	C4
0310432	SMD CAPACITOR	50V 101± 5% NPO 0402	C1
0310706	SMD CAPACITOR	25V 472± 10% X7R 0402	C3
0310717	SMD CAPACITOR	6.3V 475± 20% X5R 0603	C5
0310712	SMD CAPACITOR	10V 473± 10% X5R 0402	C6,C7,C8
0310710	SMD CAPACITOR	16V 333± 10% X5R 0402	C12,C9
0310711	SMD CAPACITOR	10V 393± 10% X5R 0402	C10
0310453	SMD CAPACITOR	25V 103± 10% X7R 0402	C11
0310704	SMD CAPACITOR	25V 102± 10% X7R 0402	C14,C18
0310455	SMD CAPACITOR	16V 223± 10% X7R 0402	C16,C17
0310480	SMD CAPACITOR	10V 104± 10% X5R 0402	C13,C19 ⑧
0310790	SMD CAPACITOR	10V 104± 20% X5R 0402	C13,C19 ⑧
0090326	SMD RESISTOR	1/16W 100± 5% 0402	R1
0090390	SMD RESISTOR	1/16W 18K± 5% 0402	R2
0090385	SMD RESISTOR	1/16W 10K± 5% 0402	R3
0090447	SMD RESISTOR	1/16W 220± 5% 0402	R7,R4
0090408	SMD RESISTOR	1/16W 100K± 5% 0402	R5
0090396	SMD RESISTOR	1/16W 33K± 5% 0402	R6
0700115	SMD TRANSFIGURATION DIODE	BB202	D1,D2
0390112	SMD COIL THREAD INDUCTOR	33nH± 5% 1608	L2,L3
0390326	SMD COIL THREAD INDUCTOR	120nH± 5% 1608	L1
0882388	IC	TEA5767HN HVQFN	U1
0960279	SMD CMETAL OXIDE FILM RESISTORSTAL OSCILLATOR	32.768KHz± 20ppm SSPT6 12.5P	XT1
1860088	FLAT FEMALE	4p 1.27mm DUAL RANK,SMD,MOLD HIGH 2.1mm	CN1
1632821	PCB	FX17KP-1	
FLASH MODULE 5448791			
0310480	SMD CAPACITOR	10V 104± 10% X5R 0402	C1,C2 ⑨
0310790	SMD CAPACITOR	10V 104± 20% X5R 0402	C1,C2 ⑨

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
0090408	SMD RESISTOR	1/16W 100K± 5% 0402	R1,R2
0882875	IC	K9K8G08U0M-PCB0 TSOP	U1 ⑩
0883145	IC	K9K8G08U0A-PCB0 TSOP	U1 ⑩
1632730	PCB	GX17KP-0	
0882882	IC	K9F4G08U0M-PCB0 TSOP	U1 (11)
0882675	IC	K9K4G08U0M-PCB0 TSOP	U1 (11)
0882619	IC	K9K4G08U0M-YCB0 TSOP	U1 (11)
0883070	IC	K9F4G08U0A-YCB0 TSOP	U1 (11)
0883101	IC	K9K4G08U0A-YCB0 TSOP	U1 (11)