

X21(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**TM 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.

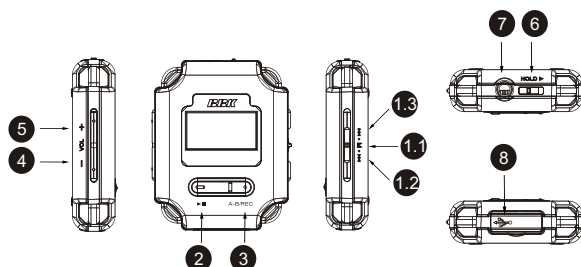
USB 2.0 transmission (full speed)

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 : # 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 when operating in menu —————> not save the setup and return to the previous menu

- 1.2 1.3 : # 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
- 2 : # 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
- 3 : # 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
 # Press in browsing file mode → delete file
- 4 5 : # Press for long in tuning mode → Start FM recording
 # Press in Play and tune mode → adjust volume
 # Press in → adjust dB value
- 6 HOLD button: Push towards arrow to lock buttons; and push toward the opposite direction to unlock.
- 7 Headphone jack
- 8 USB jack

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.

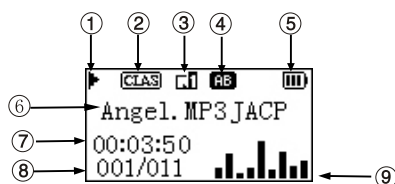
System Setup

Select "System Setup" to set system items.

System Setup

Select "System Setup" to set system items.

2.1.4 PLAYING INTERFACE ILLUSTRATION



1 Play State

2 Sound effect mode

3 Playback mode

4 Repeat state

5 Battery capacity

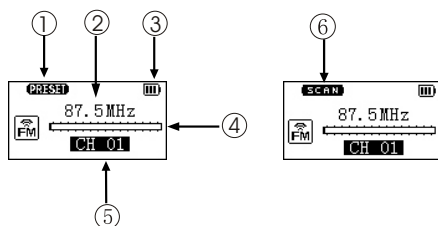
6 Song name and Singer

7 Time that has been played

8 Number of tracks

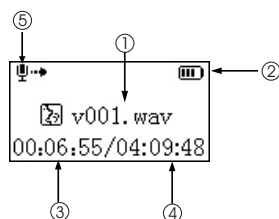
9 Spectrum display

2.1.5 TUNING INTERFACE ILLUSTRATION



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

2.1.6 RECORDING INTERFACE ILLUSTRATION



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

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

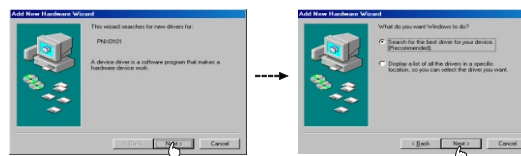
If your computer is Windows 98, you must install drive program if you want to use the mobile storage function of MP3 player in computer.

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

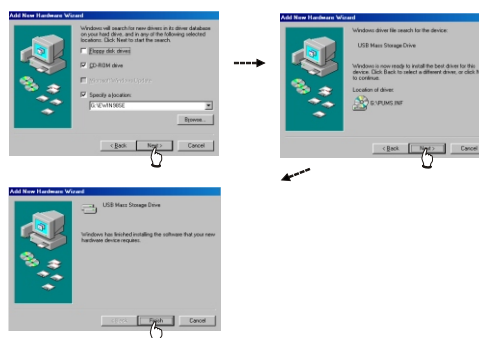
You only need to find the drive information file on disc according to prompt information to finish the installation of drive program.

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

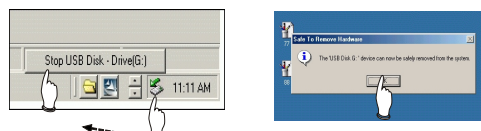
This player can be used as mobile storage in Windows ME/2000/XP operating system. In Windows 98SE and Mac operating system, drive program must be installed firstly and then used as mobile storage. Connect Mp3 PLAYER and computer with USB transmission line. After the bottom right corner of desktop appears " " 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 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

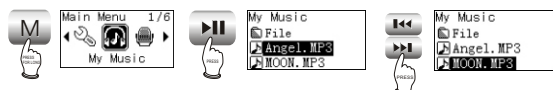
After operation finishes, click" " symbol on bottom right corner of Windows desktop with right button of mouse, and disconnect USB safely according to the computer prompt.



2.2.5 BROWSE/CANCEL FILE

BROWSE FILE

In any case, press  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  button and the cancel dialogue box will pop up. Press  button to select "YES" and then press  button to cancel the file. Select "NO" to exit.



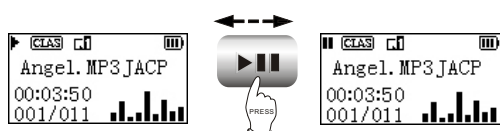
2.2.6 PLAY MUSIC

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.

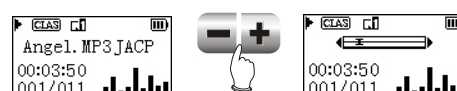


CAUTION:

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

When playing or tuning, pressing  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.

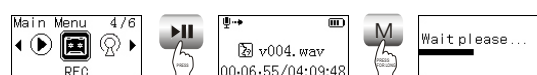
2.2.9 A-B REPEAT FUNCTION

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

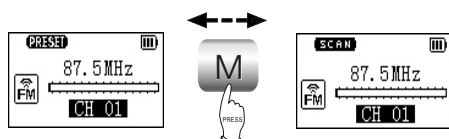
Select "FM Radio" in main menu and press button to listen to radio.

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



1. PRESET mode

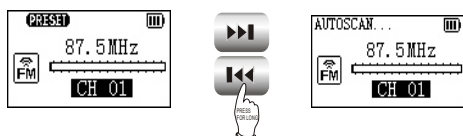
ADJUST CHANNEL

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.

2.2.13 TUNING

SAVE RADIO STATION

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

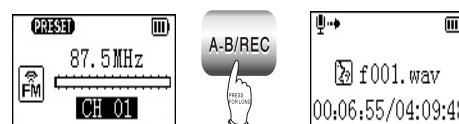


CAUTION:

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

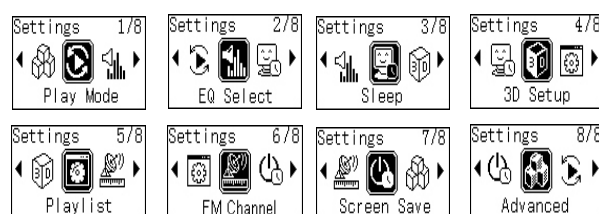
FM RECORDING

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:

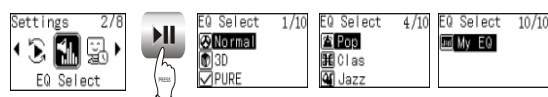
- 1. Play according to track sequence.
- random play any one track.
- play the track edited in program list.
- browse play each track for 10 seconds.
- repeat play single track.
- repeat play all tracks.
- repeat play all tracks in this Folder.

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 POP ROCK My EQ
 3D CLAS DBASS
 PURE JAZZ DISCO

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.

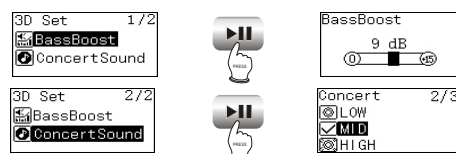


CAUTION:

- # 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 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 "□". Select a song not in the playlist and press button to add it into the list. Select a song in the playlist, and press 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 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.

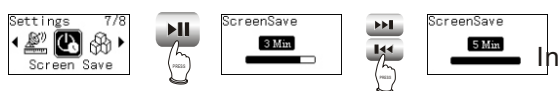
2.3.8 FM CHANNEL

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 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.

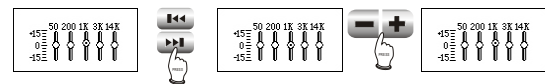


My EQ

"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.



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

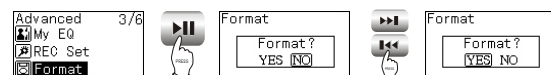
REC Set

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 coding.

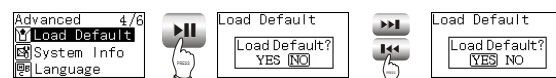


Format

Enter this menu, and you may format hard disk. When dialogue box pops up, press button to move cursor to "YES", and then press 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 button to confirm and then exit to restore to default state. Select "NO" or press button to cancel.

CAUTION:

Estore 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.

```
System Info
Ver: 6.406
Size: 235/498
Philips's chips
```

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.

```
Advanced 6/6
Load Default
System Info
Language
```



```
Language 2/2
Русский
English
```

Upgrade

Download the latest firmware upgrading file from BBK website firstly, such as "BBK X21RU.ebn" and "X21RU_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  pressing button may start upgrading.

After upgrading finishes, MP3 PLAYER will power on again.

```
Advanced 7/7
Upgrade
```



```
Upgrading...
```

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	X21
Audio dicode chip	Philips PNX0101
Continuous playback time	The longest time is about 10 hours
Dimensions/weight	57mm×45mm×14mm about 30.7g
Audio SNR	≥90dB
Headphone out	9mW+9mW(32ohm im pedance)
Frequency range	18Hz~20kHz
FM tuning rang	87.5MHz~108MHz
Working temperature	0~40℃
Files supported	MPEG 1/2 Layer 3(16kbps~320kbps),WMA(8kbps~192kbps),WAV

Chapter Three Principle and Servicing

section One Principle of the Player

3.1.1 Function introduction and principle of the player

X21 (RU) portable MP3 player is composed of the following functional modules:

MP3 main decode chip: main chip adopts PNX0101 decode chip of Philips Company, PNX0101 is the professional MP3 decode IC of Philips Company, with ARM and DSP integrated inside. The advantages are good sound quality and low power consumption.

Power management module: composed of TPS79301, TPS62200 and PQ1X28 and responsible for the power supply of each part of MP3.

USB module: USB jack, data exchange, and charge function.

Lithium battery module: power supply of the player.

Memory module: data storage of the player.

OLED module: display of the working state of the player.

Headphone output: audio output.

MIC: external audio input, which fulfills recording function.

Tuningmodule: FM tuning.

3.1.2 Block diagram

Block diagram is shown in the figure 3.2.1.1:

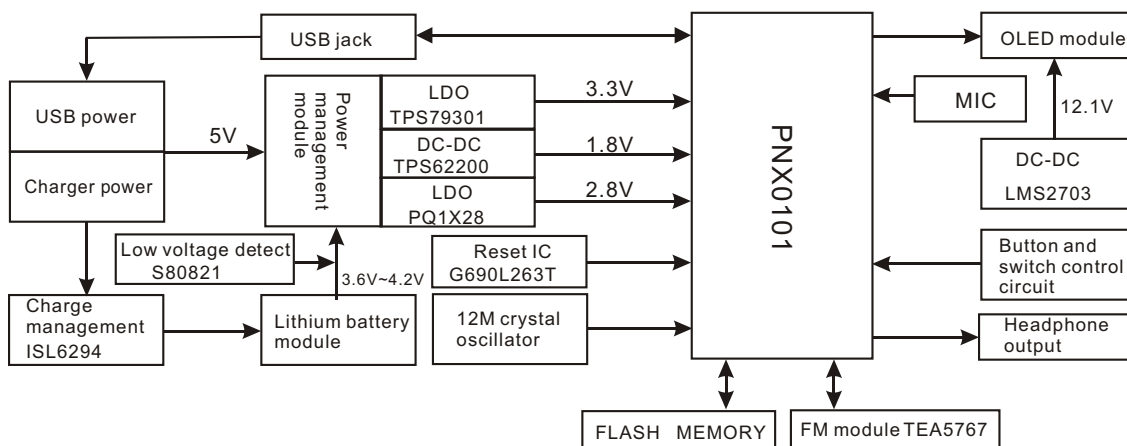


Figure 3.1.2.1 Block diagram of X21 (RU)

3.1.3 Introduction to IC used by the player

Introduction to IC used by X21 (RU) is shown in the following figure:

PCB board	Location	IC model	Function
Mian board	U1	TPS79301	Provide 3.3V voltage
	U2	G690L263T	System reset
	U3	TPS62200	Provide 1.8V voltage
	U4	ISL6294	Charge management
	U5	S80829	Low voltage detect
	U6	Philips PNX0101	MP3 decode
	U7	PQ1X28	Provide 2.8V voltage
	U8	TC58512FT	Flash Memory
	U9	SI912DL	Headphone mute
Tuning board	U1	TEA5767HN	Tuning module

Section Two Unit Circuit Principle

3.2.1 FLASH circuit principle

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

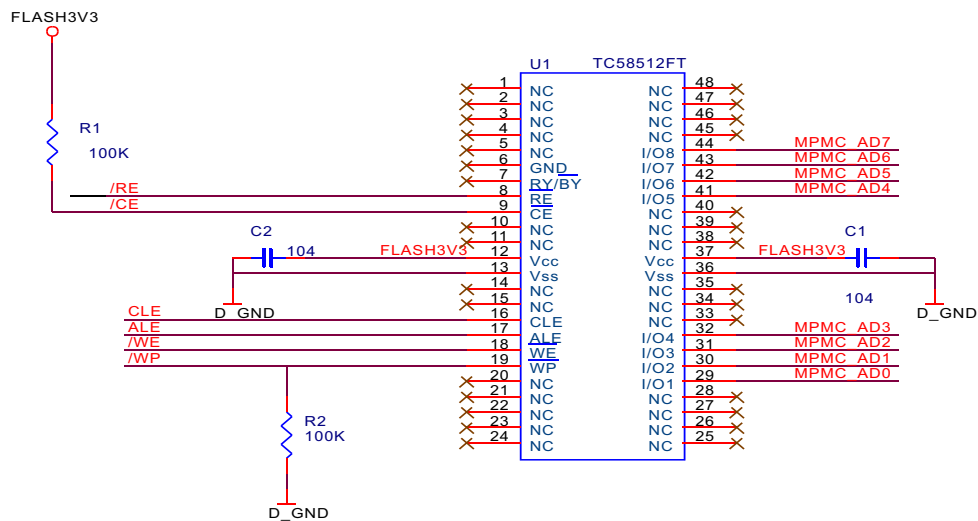


Figure 3.2.1.1 Flash circuit schematic diagram

2. Working principle: Flash Memory is the storage unit of the player and all Mp3 and waveform files must be saved in FLASH. Flash module is composed of FLASH chip TC58512FT and peripheral circuit, which fulfills the read, write and cancel working of internal files. In which, 601 magnetic L15, 104 capacitor C45 and C46 compose FLASH power filtering circuit and provide FLASH with pure 3.3V voltage. R38 is pull-up resistor of /CE, R40 is pull-down resistor of /WP, Vcc is power supply pin of FLASH, /CE is chip selection signal, VCC33 provides 3.3V voltage and FLASH begins to work. /RE, /WE are effective read and effective write signal end respectively to control read and write function of FLASH. I/O1~I/O8 is 8 data lines to fulfill the exchanges of FLASH and external data.

3.2.2 FM module circuit

1. FM module circuit schematic diagram is shown in the figure 3.2.2.1:

2. Working principle: FM module is composed of microwave digital tuning IC TEA5767HN produced by Philips Company and the peripheral circuit, in which, L17, C54, C55 is the power supply filtering circuit of FM module that provides IC with the pure voltage with typical value 2.8V. Cn1 is the socket between FM module and main board.

- 15 -

3.2.3 OLED module circuit

1. OLED module circuit schematic diagram is shown in the figure 3.2.3.1:

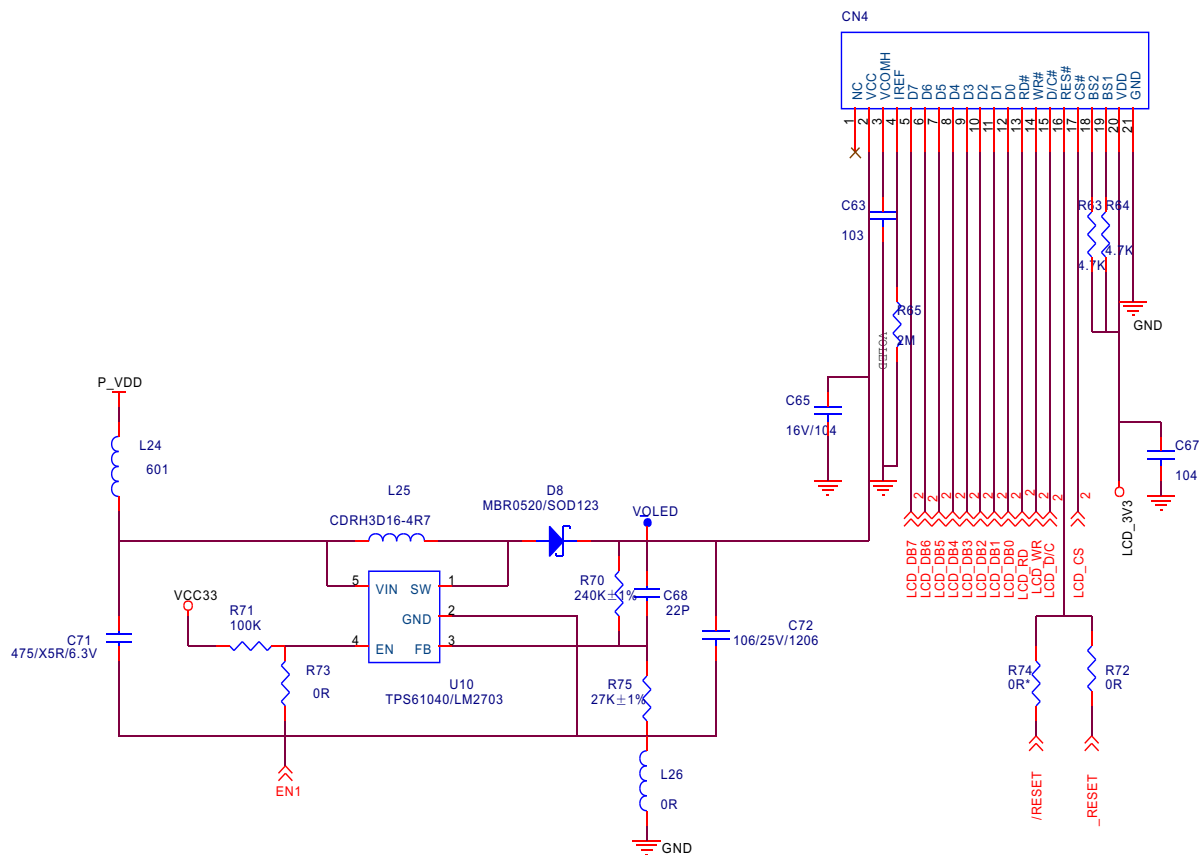


Figure 3.2.3.1 OLED circuit schematic diagram

2. Working principle: for 12V high voltage is required to lighten OLED, boosted circuit must be used together to fulfill it and the circuit includes two parts: boosted circuit and OLED jack circuit. In which, boosted circuit is composed of boosted DC-DC LM2703 and peripheral circuit, VIN is power input, EN is the enable end of LM2703, high level is effective, SW is high voltage output pin, FB is feedback pin, the voltage value VOLED outputted by high voltage is achieved through selection the two divider resistance and they satisfy the following relationship:

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

Seen from the above, VOLED is about, 12.2V. L25, C72 in circuit are energy storage inductor and output capacitor of boosted circuit.

OLED jack circuit is connected with OLED jack of PNX0101 directly, the internal program of PNX0101 controls the characters display of OLED, working state information of the player is displayed through OLED to fulfill man-machine communication.

3.2.4 USB jack circuit

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

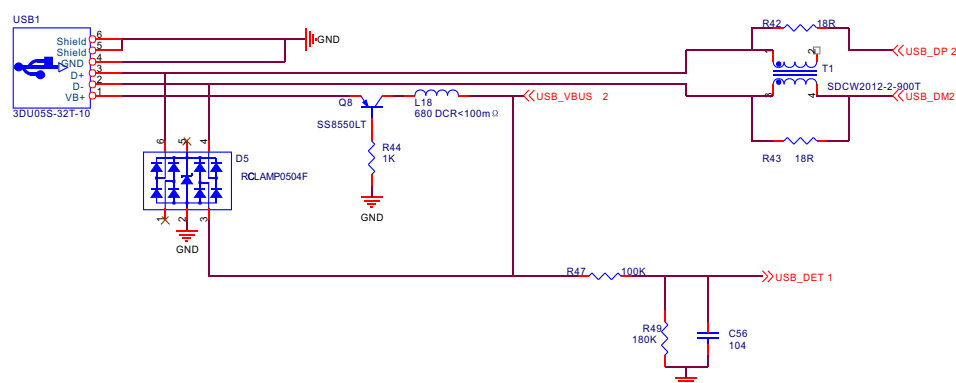


Figure 3.2.4.1 USBjack circuit schematic diagram

2. Working principle: USB jack network is composed of VB+ (USB 5V power), D+ (anode data line), D- (cathode data line) and GND (ground line). In the circuit, PNP triode Q8 is reverse insert protection function to prevent the damage of Mp3 internal circuit because of reverse insert; D5 is TVS diode array used for anti-static.

3.2.5 Button circuit

1. Button circuit schematic diagram is shown in the figure 3.2.5.1:

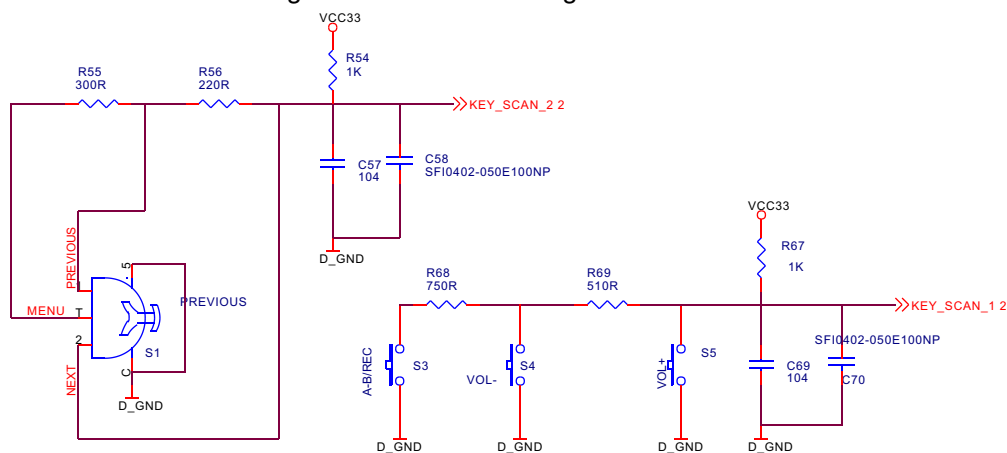


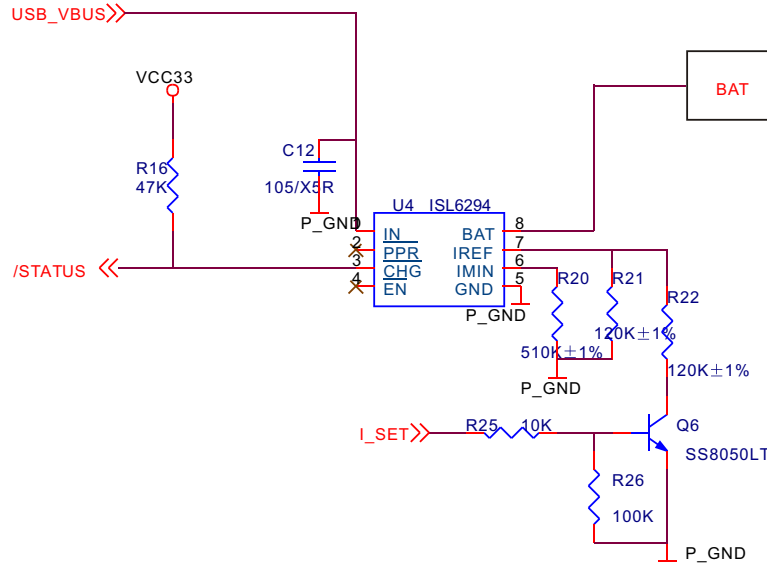
Figure 3.2.5.1 Button circuit schematic diagram

2. Working principle: buttons of X21 (RU) include a 3-direction button, a HOLD switch and 4 single buttons (in which one is ON/OFF and PLAY button and will be introduced in ON/OFF circuit). Button detection uses partial voltage mode, which utilizes ADC circuit of PNX0101 to check voltage value of the preset button to determine which button functions, then make the corresponding reaction by internal program to fulfill function of each button.

To lock button, directly use a IO port of PNX0101 to detect high and low level. When high level is detected, lock is determined, other buttons do not function. C58, C70 and C73 are voltage dependent resistor to prevent ESD.

3.2.6 Charge management circuit

1. Charge management circuit mainly charges lithium-ion battery and the circuit schematic diagram is shown in the figure 3.2.6.1:



3.2.6.1 Charge management circuit schematic diagram

2. Working principle: seen from the circuit, charge circuit is mainly fulfilled by charge control IC ISL6294 and peripheral circuit. IN pin is power input pin of ISL6294, that is the input end of USB 5V, BAT is output pin of ISL6294, that is the input end of lithium battery; /CHG is charge state indication end, when /CHG is in low level, it means the charge is in process, on the contrary it means the charge is finished; IMIN is minimum charge current setup end, that is, when charge current is less than the current value set by this end, charge is stopped. The setup of minimum charge current is fulfilled through selecting external resistor R20. The relationship between Minimum charge current IMIN and R20 is shown as follows:

$$I_{MIN} = \frac{11000}{R20} \text{ (MA)}$$

Seen from the above, minimum charge current is about 20 milliampere.

IREF is setup end of charge current, ISL6294 uses this reference current to charge lithium battery. The relationship between charge current I_{REF} and resistor connected externally:

$$I_{REF} = \frac{12089}{R}$$

Triode Q6 in circuit is used for charge current selection. When users use computer to charge battery, PNX0101 outputs I_SET, which is low level, Q6 cuts off, and R21 is connected into circuit. Seen from the above, I_{EFR} is about 100 milliampere; when users use charger to charge battery, PNX0101 outputs I_SET, which is high level, Q6 is Saturated on, R21 and R22 are connected into circuit in parallel, seen from the

Above, I_{REF} is about 200 milliamper. The reason why we design like this is that USB jack of some computers (such as laptop computer) cannot provide large current to charge battery.

3.2.7 Low voltage detecting circuit

1. Function of low voltage detecting circuit is that when input voltage of the player is detected to be lower than a certain voltage value, the player turns off. Low voltage detecting circuit schematic diagram is shown in the figure 3.2.7.1:

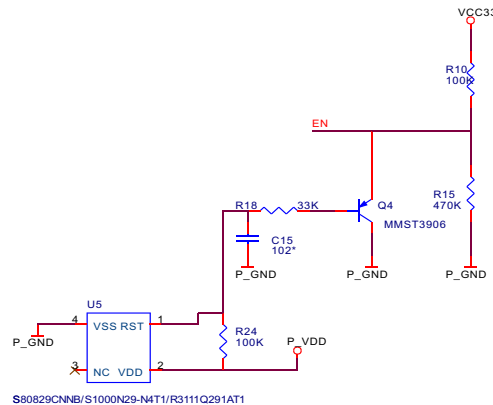


Figure 3.2.7.1 Low voltage detecting circuit schematic diagram

2. Working principle: low voltage detecting circuit is fulfilled by IC S80829CNNB and PNP triode Q4. S80829CNNB is high precision voltage detector detect value is 2.9V and precision is +2%. P_VDD is the input voltage of the player, when P_VDD is lower than 2.9V, RST pin of IC outputs low level, pin triode Q4 is saturated on, control level output is low level which cuts off the power of the player to power off.

3.2.8 Battery protection circuit

1. Battery protection board is installed on lithium battery and used to protect lithium battery from being damaged by short circuit, over discharge and over charge. Lithium battery and battery protection board are all lithium battery core components by us. Circuit schematic diagram of battery protection board is shown in the figure 3.2.8.1:

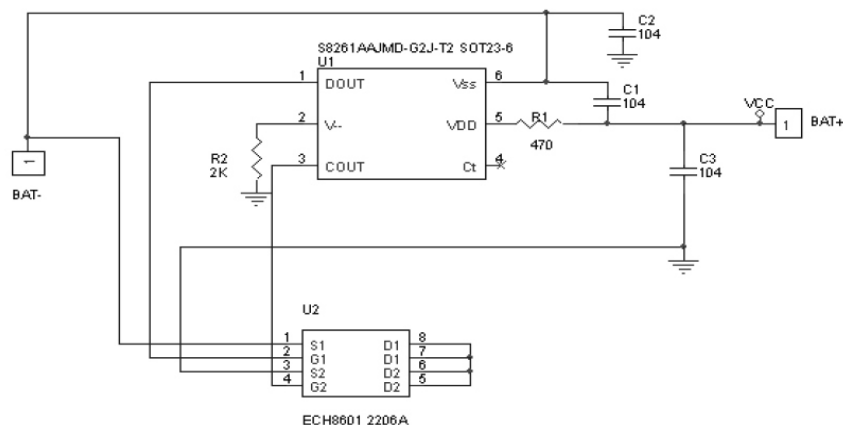


figure 3.2.8.1 Battery protection circuit diagram

Battery protection circuit equivalent circuit diagram is shown in he figure 3.2.8.2:

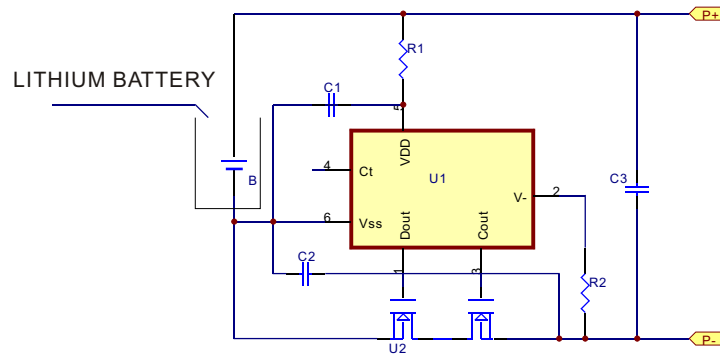


Figure 3.2.8.2 Battery protection circuit equivalent circuit schematic diagram

2. Working principle: battery protection circuit is mainly composed of battery protection IC S8261 and built-in dual N groove MOSFET ECH8601. S8261 is lithium-ion polymer of built-in high precision voltage detect circuit and delay circuit, which may be served as protection IC of battery. DOUT and COUT pin are over-discharge (when lithium battery voltage is lower than 2.4V, it is called over discharge) protection output end and over-charge (when lithium battery voltage is higher than 4.2V, it is called over charge) protection output end. When in normal condition, these two pins are high level, MOSFET switches on, lithium battery voltage outputs to the player through protection board; when in protection, these two pins output low level to control MOSFET and turn off power. Over-current detection (short-circuit protection) is fulfilled through detecting short corcuit state by V- pin to control DOUT and COUT output. When battery has short circuit, voltage on V- externally connected resistor has a sudden change, V- detects that voltage on R2 increases instantly to control DOUT and COUT to output low level at the same time and control MOS tube to cut off from battery to protect battery.

3.2.9 Power management module

1. Function of power management module is to provide the player with 3.3V, 3.8V and 1.8V of normal working. Circuit schematic diagram is shown in the figure 3.2.9.1, 3.2.9.2 and 3.2.9.3:

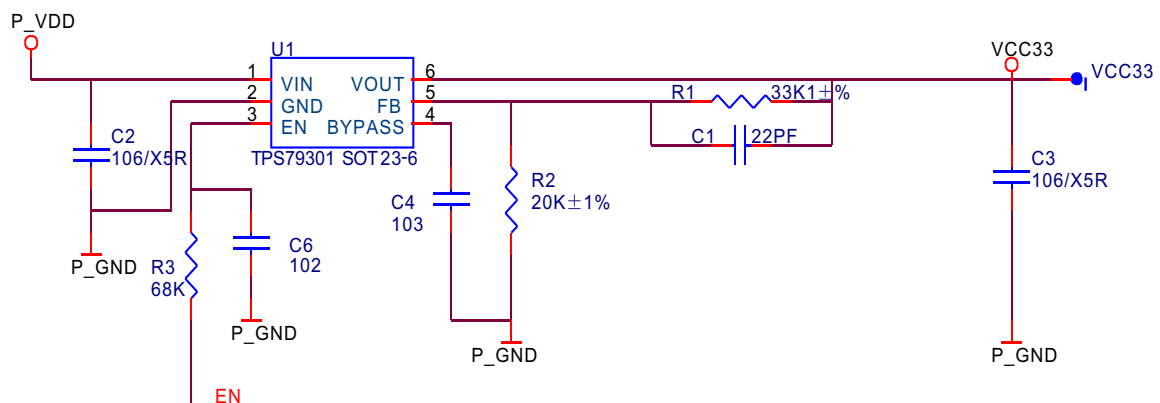


Figure 3.2.9.1 3.3V power circuit schematic diagram

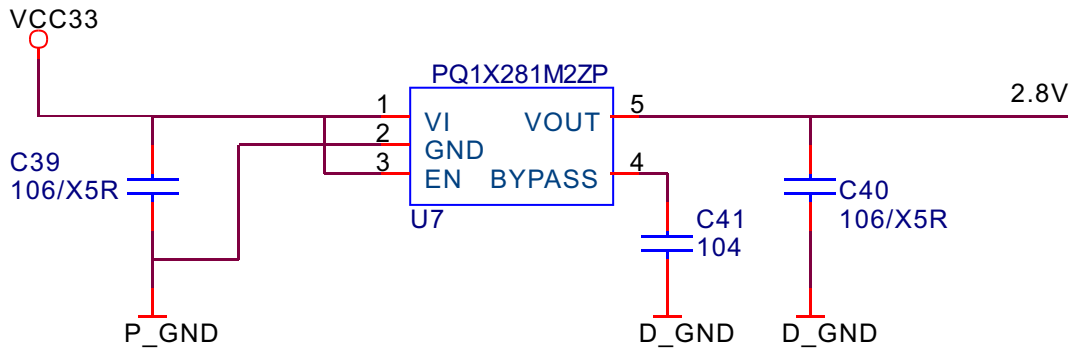


Figure 3.2.9.2 2.8V power circuit schematic diagram

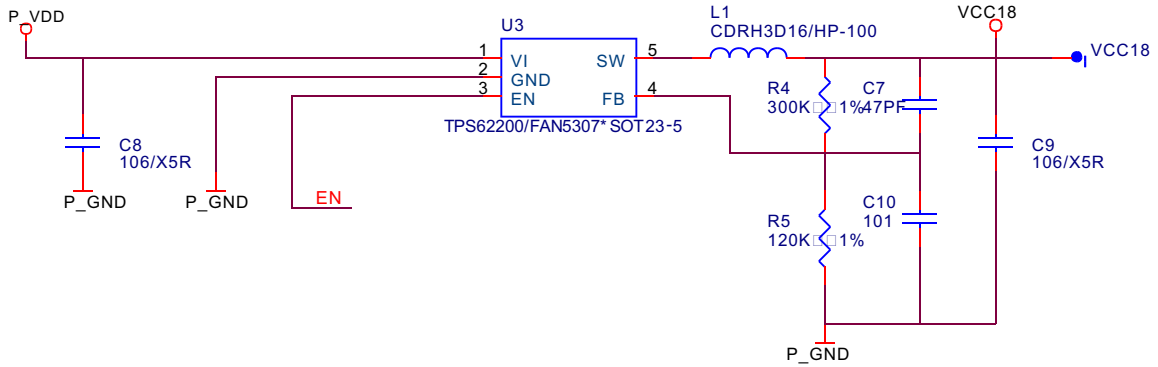


Figure 3.2.9.3 1.8V power circuit schematic diagram

2. Working principle: seen from the figure 3.2.9.1, 3.3V power is supplied by IC TPS79301 and peripheral circuit. TPS79301 is a linear voltage stabilizing module (LDO also called), EN pin is the enable pin that controls normal working, high level is effective; BYPASS has a resistor inside that can compose low pass filter together with external 103 capacitor C4 to decrease output noise; the setup of TPS79301 output voltage is decided by the resistance value of the two externally-connected resistors of FB pin and the relationship is shown as follows:

$$VOUT = 1.2246 \times \left(1 + \frac{R_1}{R_2} \right)$$

Seen from the above, $VOUT$ is about 3.2V.

1.8V power of the working of the player is provided by IC TPS62200 and peripheral circuit. TPS62200 is high efficiency voltage drop DC-DC converter. EN is enable pin and high level is effective. The relationship between TPS62200 output voltage and FB pin feedback resistor is shown as follows:

$$VOUT = 0.5 \times \left(1 + \frac{R_4}{R_5} \right)$$

Seen from the above, the output voltage is about 1.75V.

To improve sound quality of Mp3 and effect of FM and microphone, we introduce 2.8V power to supply power for audio system of PN0101 and FM and microphone, feature of this channel 2.8V power is: it is outputted by LDO PQ1X281, power is very pure with low ripple voltage. PQ1X281 may output fixed voltage 2.8V, EN is the enable end.

3.2.10 Headphone jack circuit

1. Headphone jack circuit schematic diagram is shown in the figure 3.2.10.1:

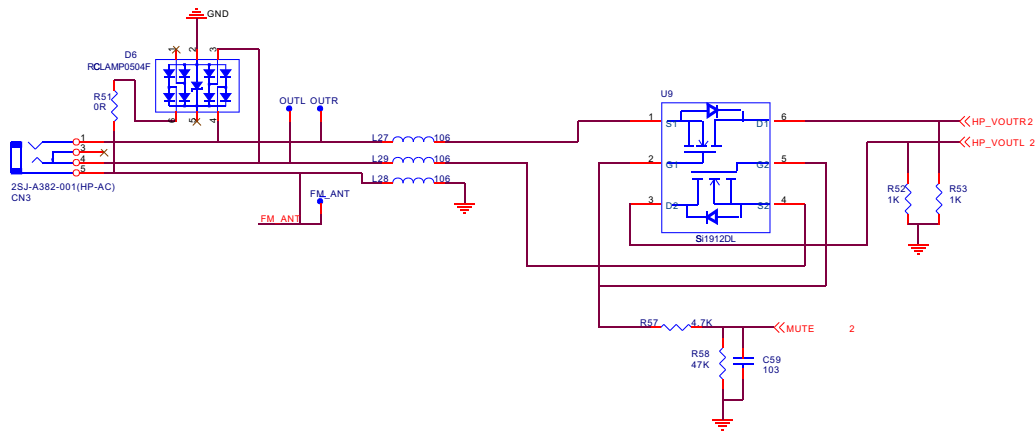


Figure 3.2.10.1 Headphonejack circuit schematic diagram

2. Working principle: left and right channel audio signals outputted from PNx0101 output through being coupled by 220uF capacitor to headphone jack circuit. Headphone jack circuit is composed by dual MOS tube SI1912DL that controls sound output and headphone socket CN3, pin 2 and pin 5 of SI1912DL are connected to mute circuit, after pressing MUTE button the control dual MOS tube is cracked to cut off the output of headphone left and right channels. D6 is circuit is TVS diode array and used to protect ESD. Ground wire of headphone is also served as the antenna input of FM module.

3.2.11 Reset circuit

1. Reset circuit supplies rest signal to PNx0101. Reset circuit schematic diagram is shown in the figure 3.2.11.1:

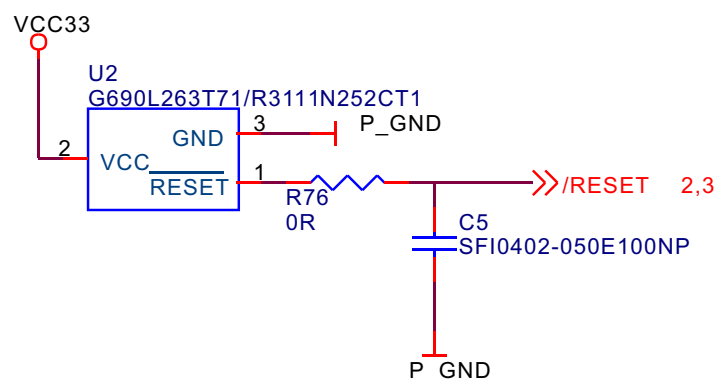


Figure 3.2.11.1 Reset circuitschematic diagram

2. Working principle: reset circuit is composed by reset IC G690L263 . G690L263 may output a low level reset pulse signal with 140 millisecond pulse width to reset the player. C5 in the circuit is voltage dependent resistor and used to protec ESD.

3.2.12 ON/OFF control circuit

1. ON/OFF control circuit schematic diagram of X21 (RU) is shown in the figure 3.2.12.1:

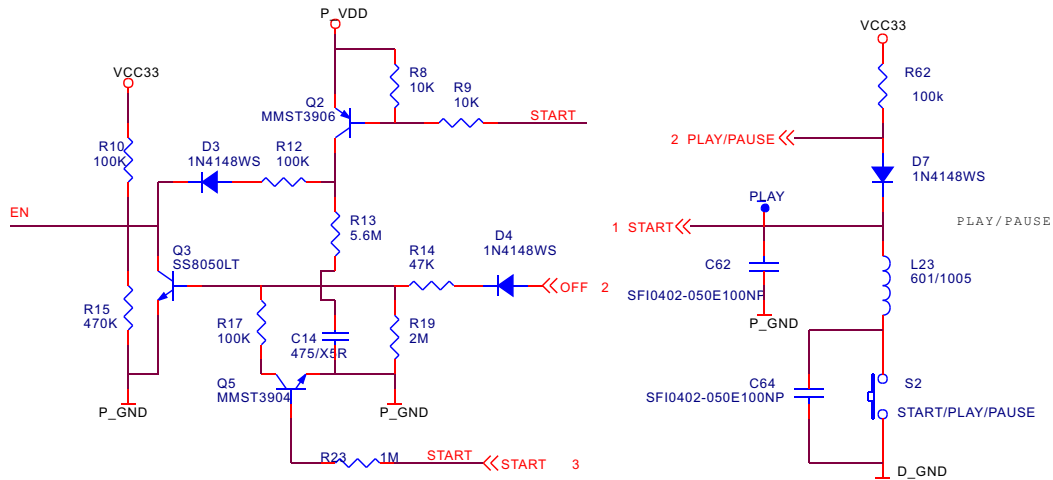


Figure 3.2.12.1 ON/OFF control circuit schematic diagram

2. Working principle: ON/OFF control is fulfilled through operating ON/OFF button S2 by users. When press S2 to power on, S2 is connected, START sends out low level signal, Q2 is saturated on, battery voltage P_VDD makes EN high level through Q2, R12 and D3 to make power management module work, power system of the player starts and machine power on; when power off normally (for instance, press ON/ONN button for a long time or battery electric charge is too low), PNX0101 sends out OFF high level to make Q3 saturated on to pull EN down to ground, power management module stops working and machine power off; when accidents happens, system fails, PNX0101 has not any reaction to any operation, now press S2 and Q2 is saturated on all the time, battery voltage P_VDD charges C14 through Q2, R13 and R19, when C14 is charged higher than 0.5V, Q3 is on, EN is low level and the player power off. PN knot of R17 and Q5 is the figure is the discharge loop of C14.

3.2.13 MIC circuit

1. MIC circuit schematic diagram is shown in the figure 3.2.13.1:

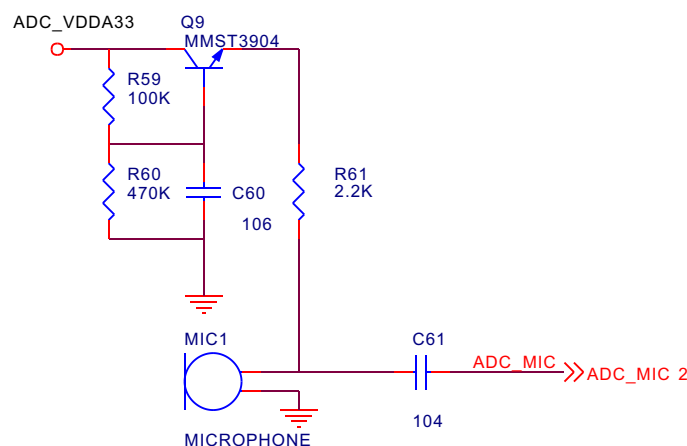


Figure 3.2.13.1 MIC circuit schematic diagram

2. Working principle: MIC circuit is mainly composed of microphone and microphone power biasing circuit. MIC1 switches the recorded external voice signals to electrical signal, through C61 coupling, output to ADC circuit of PNX0101 to converse analog electric signal to digital electric signal and form WAV files after encoding of software to save in FLASH.

In the circuit, R59, R60, Q9 and C60 are triode voltage stabilizing system, which provides stable power bias for microphone, R61 is the bias resistor of microphone.

Section Three Servicing Cases

3.3.1 Servicing cases

【Example 1】 Symptom: power not on

Description: no screen display and no output

Analysis and troubleshooting: firstly check whether this trouble is caused by battery or by power circuit, connect to power adapter and check whether charge is available and whether screen has display. Power on and there is no display, check power supply 3.3V and 1.8V and find that 3.3V lowers to 0.6V, and voltage in normal working condition should be 1.8V, 3.3VDC-DC switch circuit is shown in the figure 3.3.1.1, use power adapter to supply power, 5V input is normal, charge enable end is high level, which is also normal, observe carefully and find that pin 6 of Ic9301 has false welding, after welding again trouble is removed.

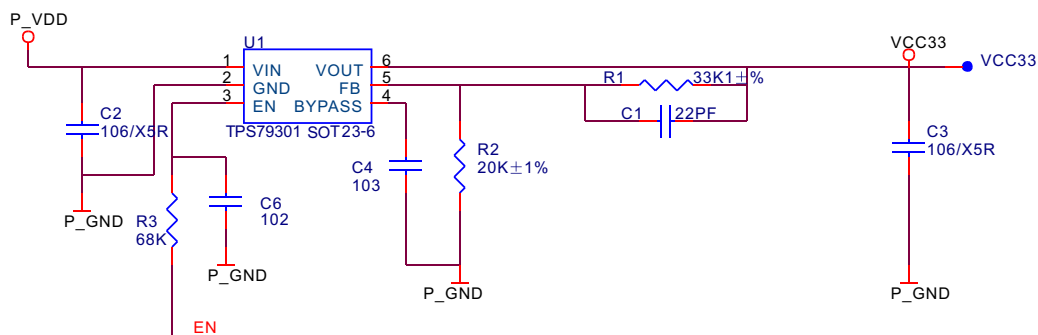


Figure 3.3.1.1 3.3VDC-DC switch circuit schematic diagram

【Example 2】 Symptom: machine not switched on

Description: no screen display, no response after pressing ON/OFF button

Analysis and troubleshooting: firstly confirm whether it is machine not switched on or it is power not on, connect to adapter or computer and check whether display on screen is normal, connect to adapter and charge can display, which means that power and rear stage circuit working are basically normal, ON/OFF circuit is shown in the figure 3.3.1.2, the working principle is that after a light touch switch S2 closes, a loop appears and a signal Start produces, triode Q2 is on and gives an enable signal to power control, test S2 switch, press down and check whether it is on, during test we find that S2 has false welding. After welding again, trouble is removed.

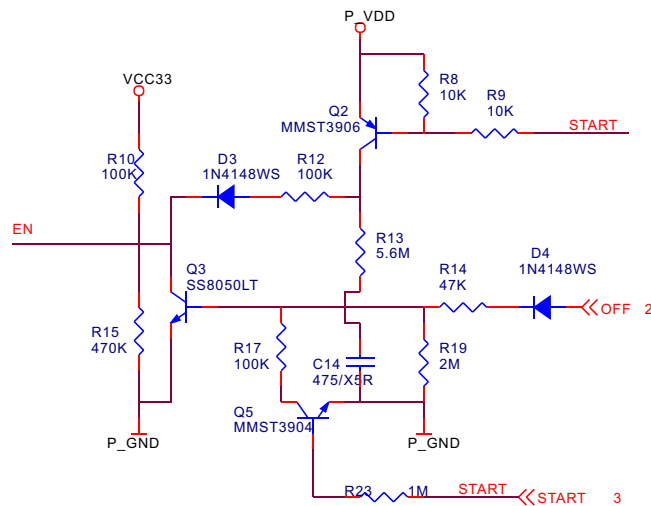


Figure 3.3.1.2 ON/OFF circuit schematic diagram

【Example 3】 Symptom: computer not connected

Description: when connecting to computer, no reaction and o screen display

Analysis and troubleshooting: firstly confirm whether charge and power on are available, and the result is normal. Use diode position of multimeter and anode of pen to ground, test whether the resistance value to ground of D+, D- data signals in the position of USB terminal is close to several hundred omh, short-circuit could not appear between D+ and D-, when testing we find that D+ is normal, D- resistance value is infinite, USB terminal has false welding. After welding again, trouble is removed.

【Example 4】 Symptom: only one side of headphone has output

Description: only one side of headphone has output and the other has not.

Analysis and troubleshooting: firstly decide the trouble lies in tuning components or in common part, whether only one side has sound when listening and result is normal. Tuning circuit is shown in the figure 3.3.1.3, tuning part components reaches the main board through a flat cable holder, radio station program can be received and this shows that power supply, data and clock are all normal, use oscillograph to test left and right channel output of FM directly and find that FM-OUTL has no waveform output, then check tuning board output part and waveform is normal, circuit at back is connected through a flat cable holder, press the flat cable holder and it is ok, after losing, trouble appears again, so we decide that flat cable holder has trouble, after changing it trouble is removed.

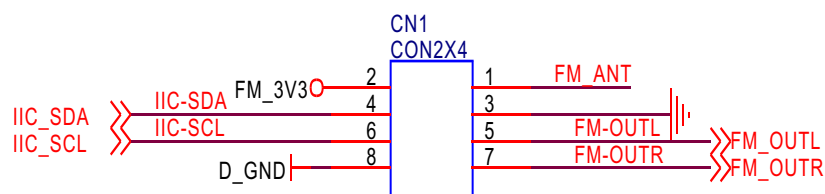


Figure 3.3.1.3 Tuning circuit schematic diagram

【Example 5】 Symptom: noise when playing

Description: headphone output has noise when playing music

Analysis and troubleshooting: if noise appears when playing, it is generally the condition that BGA has trouble, functions, such as playing are all normal and only noise appears, so we need to analyse the trouble is caused by decode part or rear stage. Headphone output part circuit is shown in the figure 3.3.1.4. When playing 1KHZ standard signal, it should be sine wave signal, and not any clutter exists. Firstly test C32 and waveform in C33, and there exists clutter, so we decide that BGA has trouble, after changing it trouble is removed.

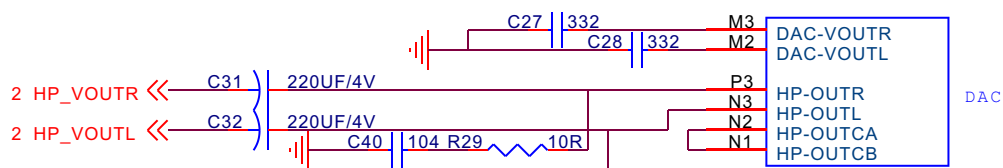


Figure 3.3.1.4 Decodepart circuit schematic diagram

【Example 6】 Symptom: charge is not available

Description: connect to charger, charge displays, but low electric charge displays when power on after charge finishes.

Analysis and troubleshooting: as for this trouble, charge mode displays, charge also displays, but full charge is not available, machine cannot power on after charging for 3 hours, power on after unplugging charge line and low electric charge displays and machine power off automatically. Charge management circuit diagram is shown in the figure 3.3.1.5, machine can enter charge mode and there is charge indication, which means that there is power input, BAT and CHG are normal, so you should consider charge control pin, check IMIN current control end mainly, when current of this pin is small, charge stops, when checking this end, we find that R20 is false welding; after welding again, trouble is removed.

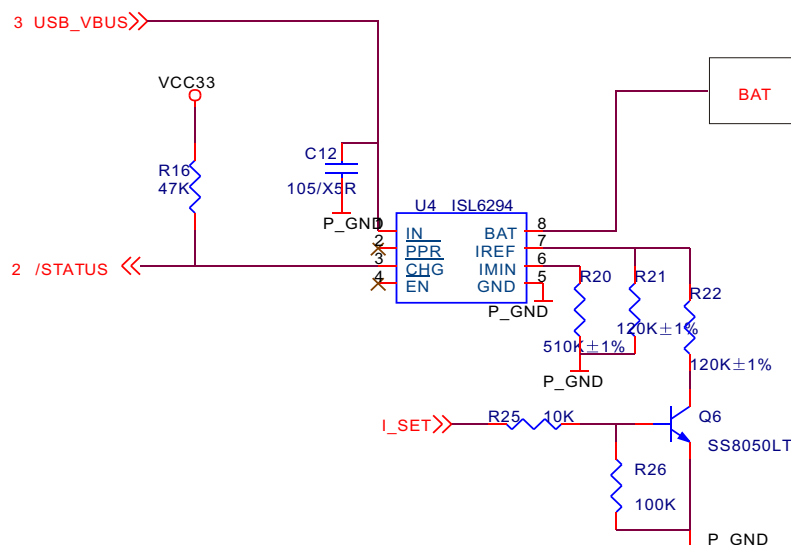
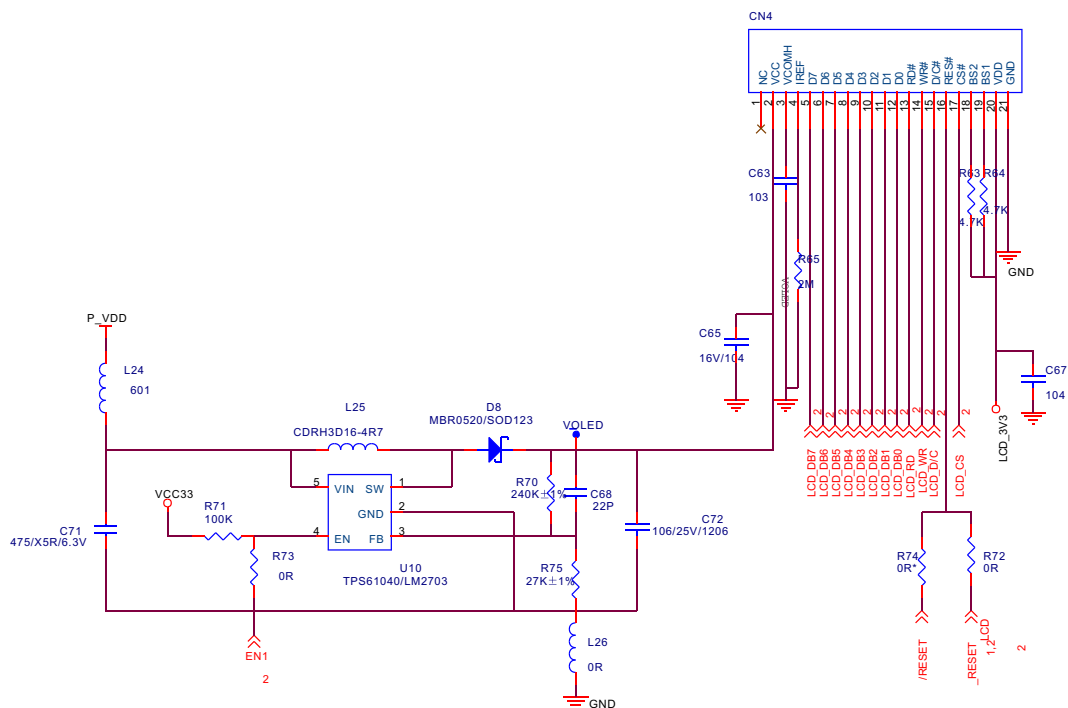


Figure 3.3.1.5 Chargeboard circuit schematic diagram

【Example 7】 Symptom: no screen display

Description: screen is not on and there is no display

Analysis and troubleshooting: firstly confirm the trouble appears in power supply and screen itself, after power and listen, the sound is normal, so we preliminarily decide that power supply 3.3V, 1.8V are basically normal. Screen display control circuit is shown in the figure 3.3.1.6. Test voltage on two ends of L25 and it is about, which is normal, then test voltage on two ends of D8 and find that anode has no 13V, remove screen and there is still no 13V. Check input end voltage and enable end is basically normal, then check feedback pin FB voltage and it is on low side obviously, and capacitor C68 also has trouble. After changing it, trouble is removed.



MIC switches the recorded external voice signal to electric signal, through C61 coupling, output to ADC circuit of Pn0101 and form WMV files after being coded by software to save in Flash. Firstly lay sound file and check whether there is noise, and there is no, check recording circuit, power supply is normal, when recording, use oscillograph to test C61 and there is clutter interference. After changing MIC, trouble is removed.

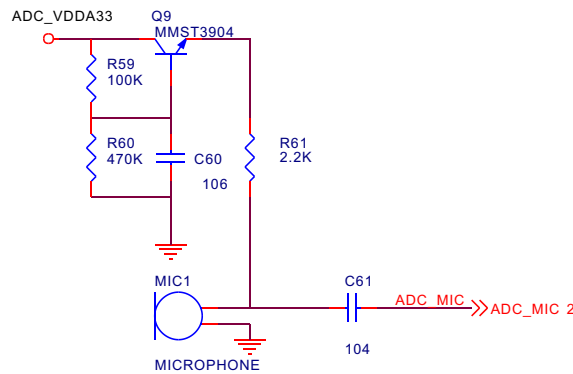


Figure 3.3.1.7 Recording circuit schematic diagram

【Example 10】Symptom: computer cannot be connected

Description: after connecting to computer, hardware cannot be found

Analysis and troubleshooting: movable disc of computer cannot be found, when this trouble appears, check whether you may upgrade software and download program to upgrade. Open DFU program, download firmware again and it is ok. Note: firmware of Mp3 need to be upgraded always. When meets this trouble, trouble is removed.

3.3.2 Troubleshooting flow chart

1. Troubleshooting process for “No screen display” is shown in the figure 3.3.2.1:

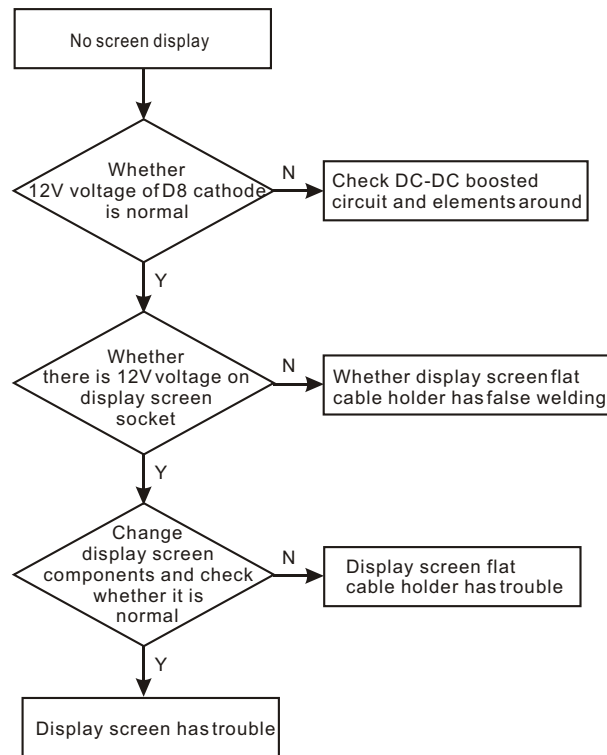


Figure 3.3.2.1 Screen display circuit troubleshooting figure

2. Troubleshooting process for “USB not connected” is shown in the figure .3.3.2.2:

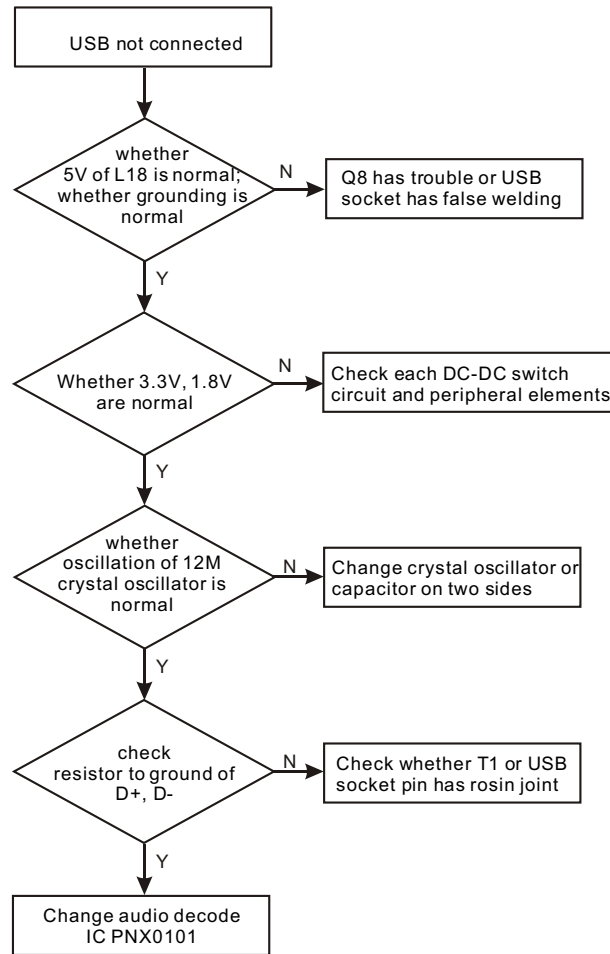


Figure 3.3.2.2 USBjack troubleshooting flow chart

3. Troubleshooting process for “Button has no function” is shown in the figure 3.3.2.3:

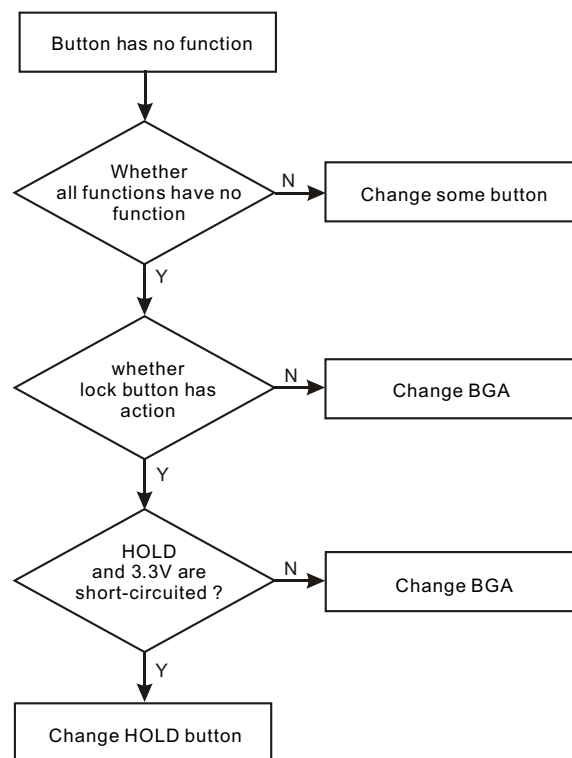


Figure 3.3.2.3 Button circuit troubleshooting flow chart

4. Troubleshooting process for “Charge is not available” is shown in the figure 3.3.2.4:

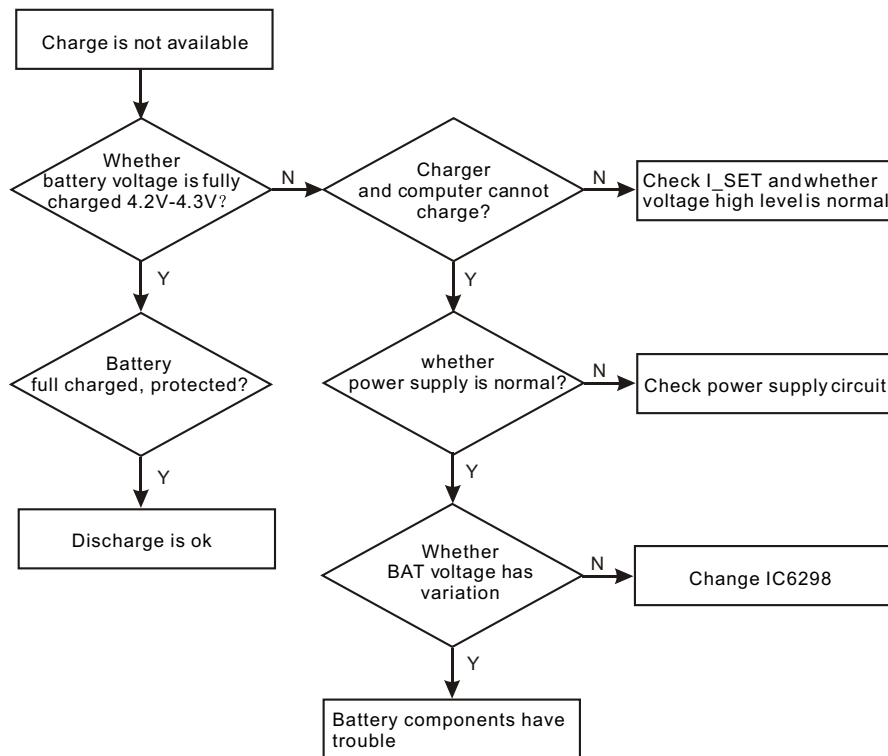


Figure 3.3.2.4 Charge management circuit troubleshooting flow chart

5. Troubleshooting process for “Power not on” is shown in the figure 3.3.2.5:

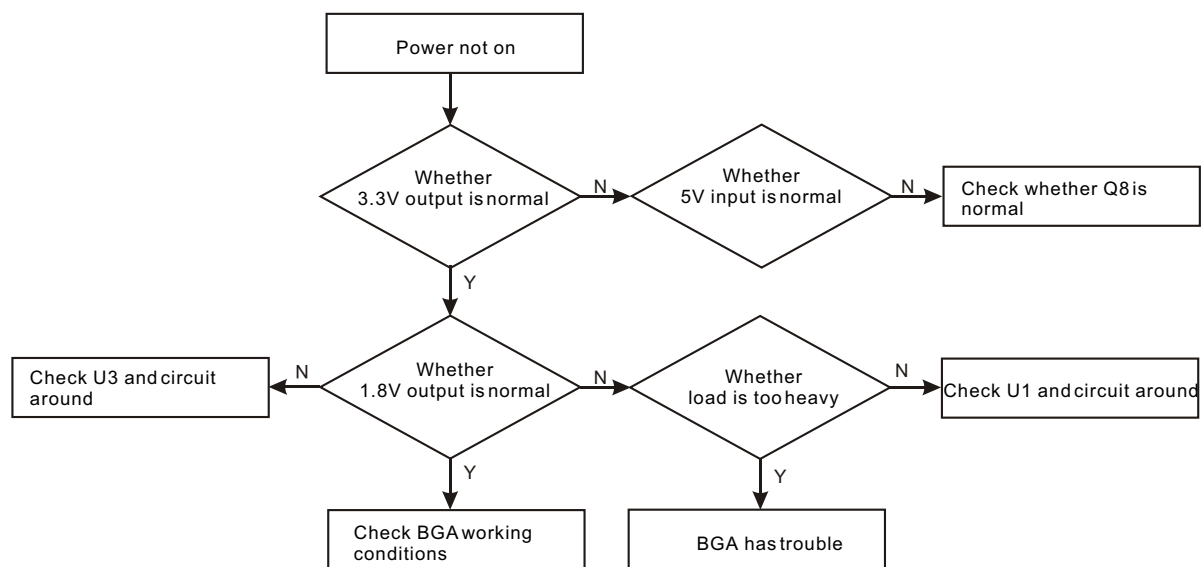


Figure 3.3.2.5 Power management circuit troubleshooting flow chart

6. Troubleshooting process for “Machine not switched on” is shown in the figure 3.3.2.6:

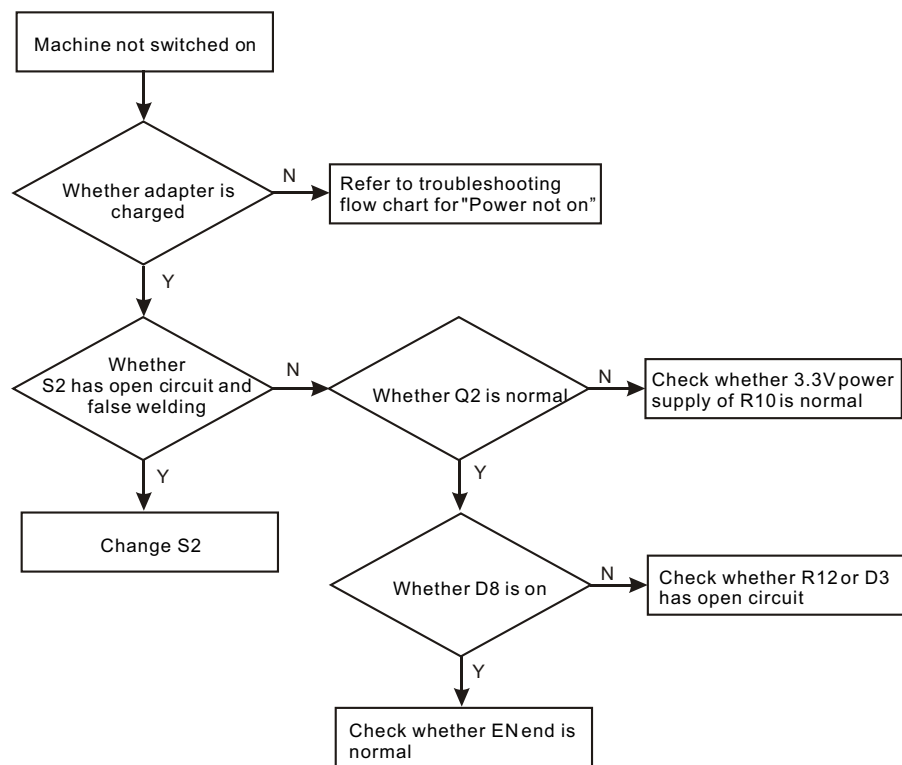


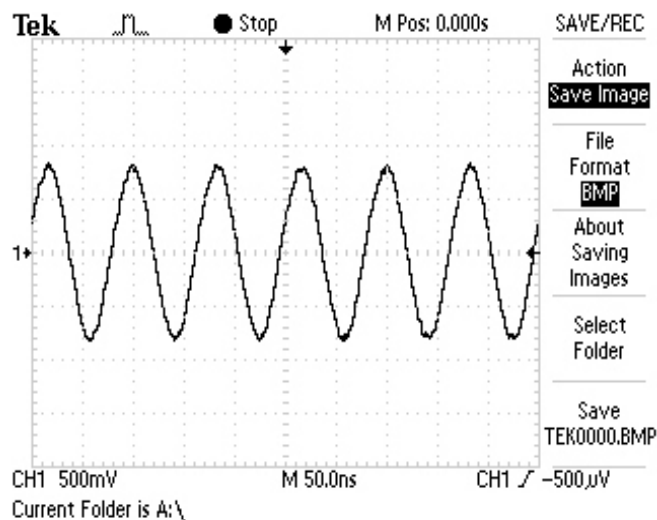
Figure 3.3.2.6 ON/OFF control circuit troubleshooting flow chart

Section Four Servicing Parameters

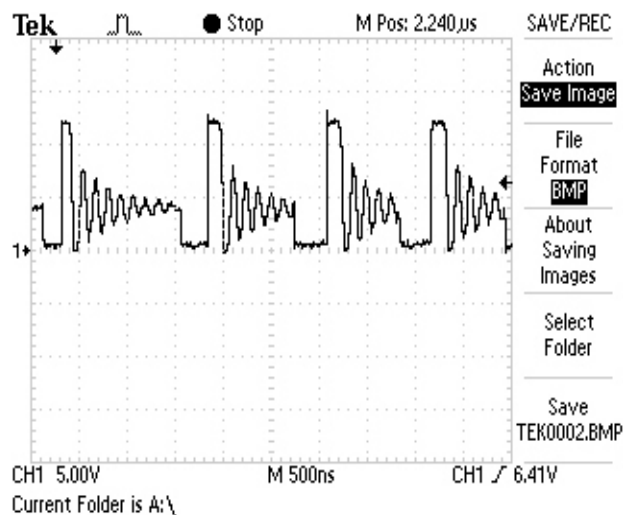
3.4.1 Key point waveform diagram

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.

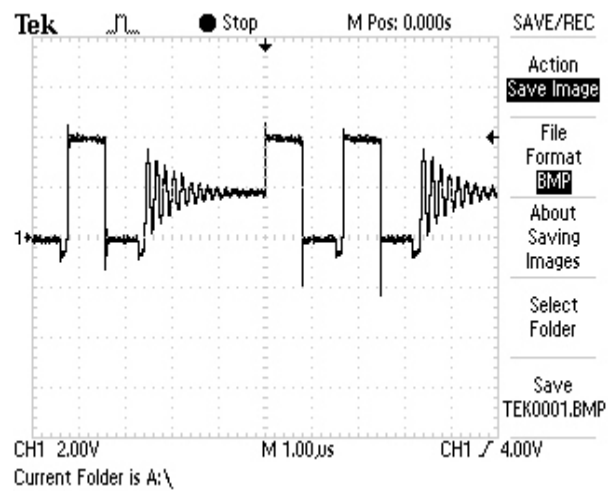
1. 12M crystal oscillator oscillation waveform diagram



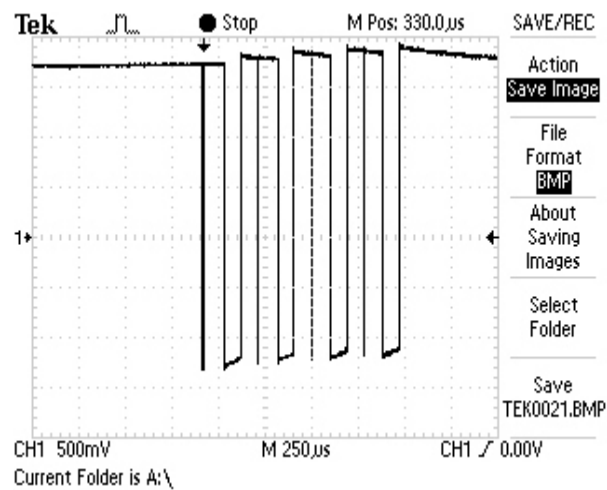
2. L25 boosted energy storage waveform diagram



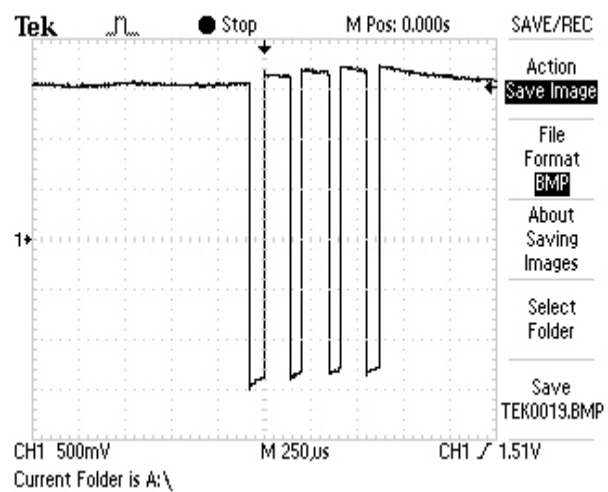
3. L1 1.8V energy storage waveform diagram



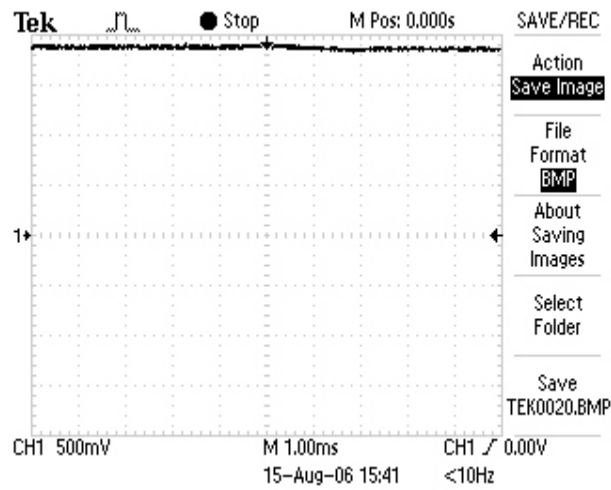
4. LCD_CS waveform



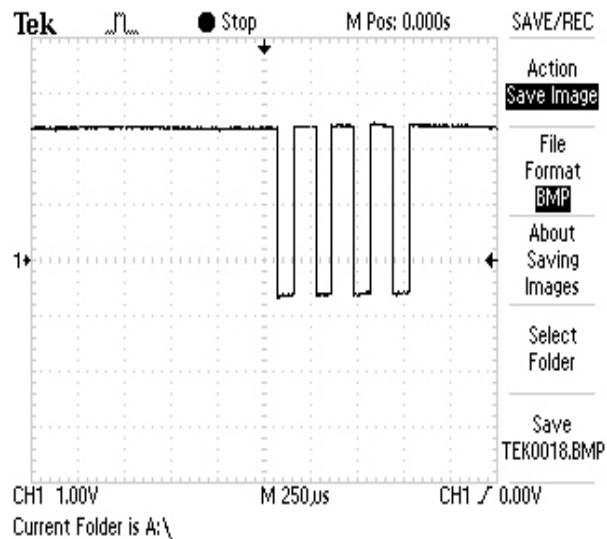
5. LCD_D/C waveform diagram



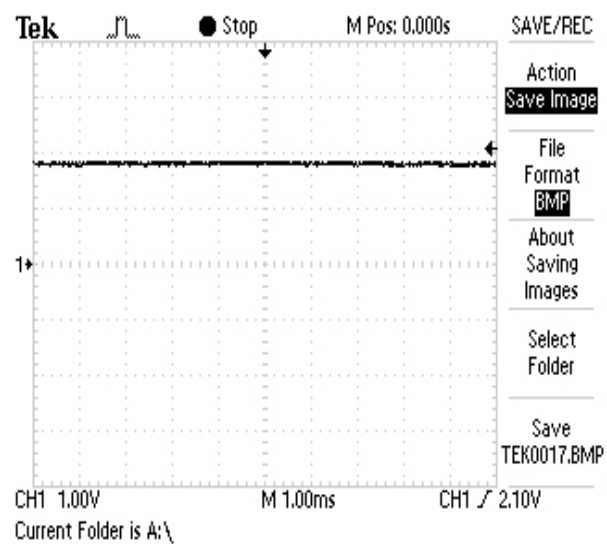
6. LCD_RESET



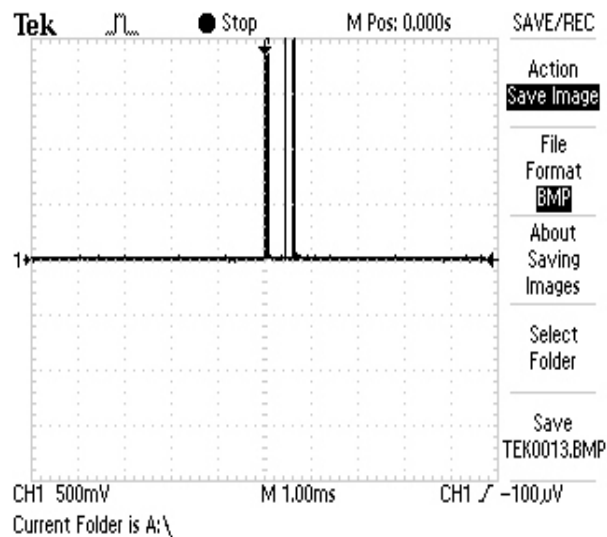
7. LCD_WR waveform diagram



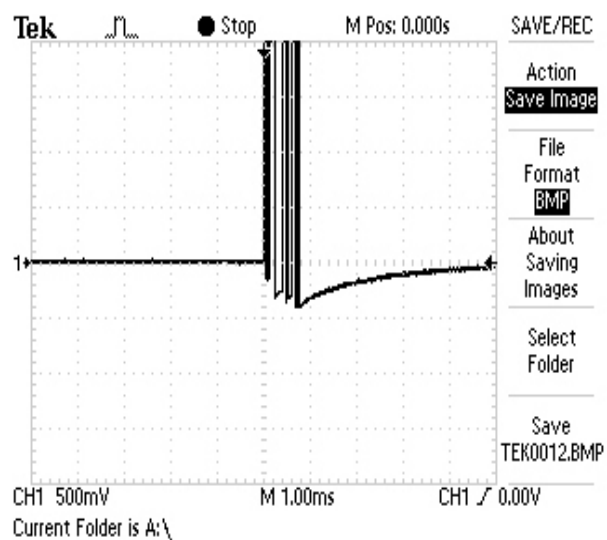
8. LCD_RD waveform diagram



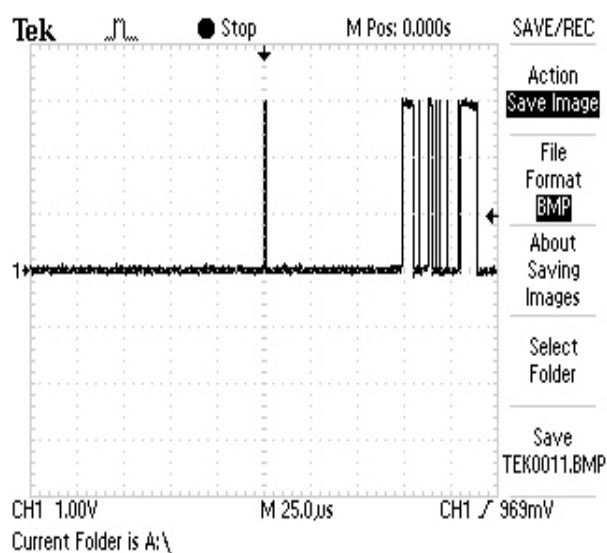
9. LCD_DB0 waveform diagram



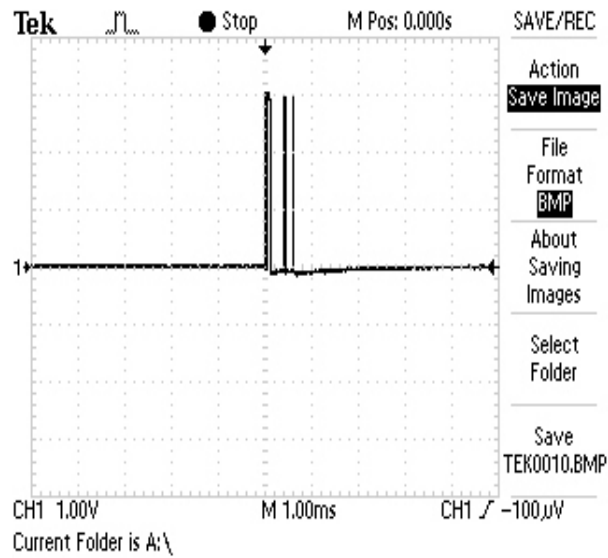
10. LCD_DB1 waveform diagram



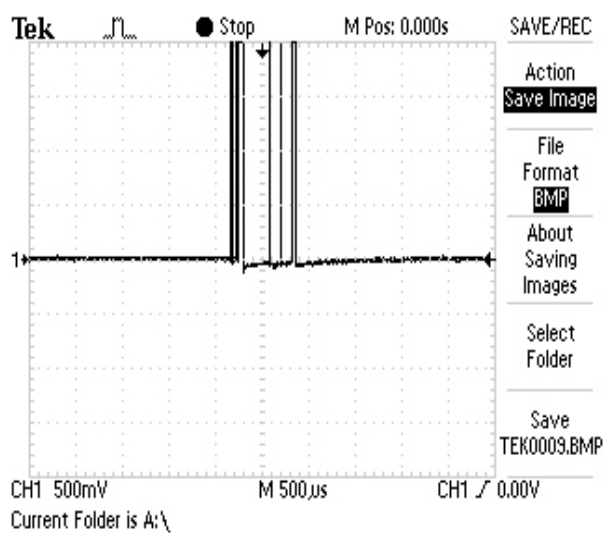
11. LCD_DB2 waveform diagram



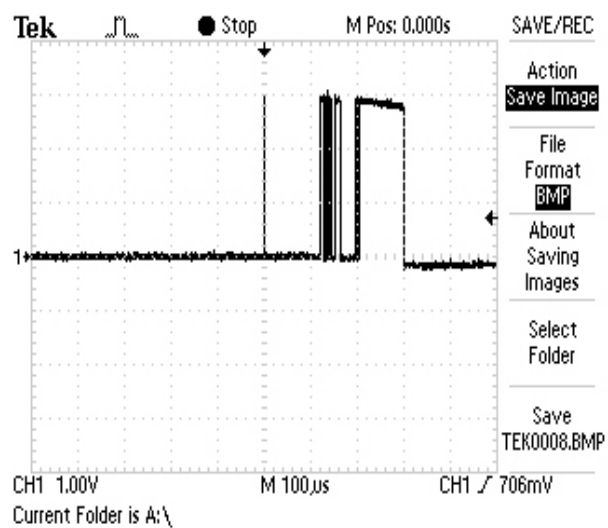
12. LCD_DB3 waveform diagram



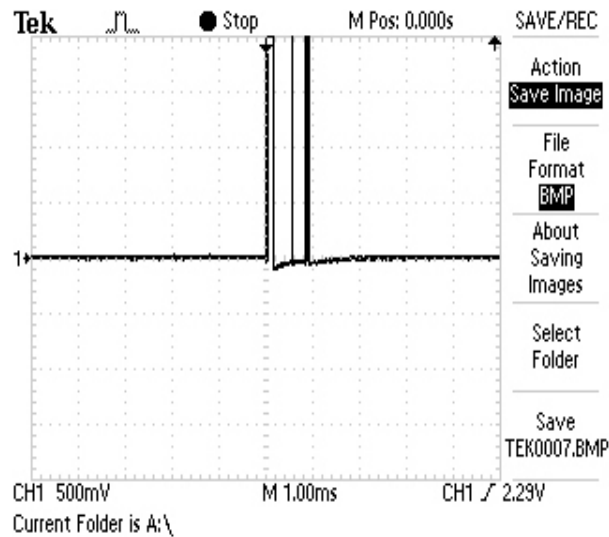
13. LCD_DB4 waveform diagram



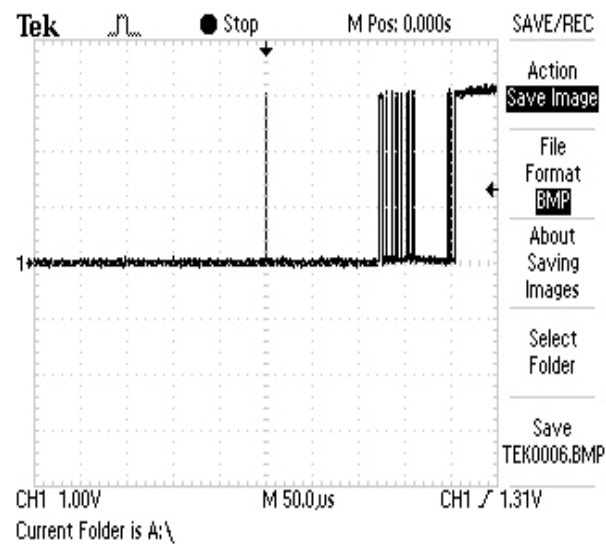
14. LCD_DB5 waveform diagram



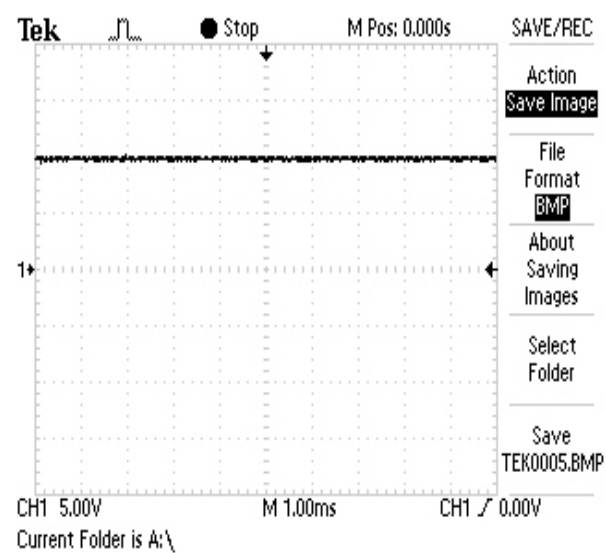
15. LCD_DB6 waveform diagram



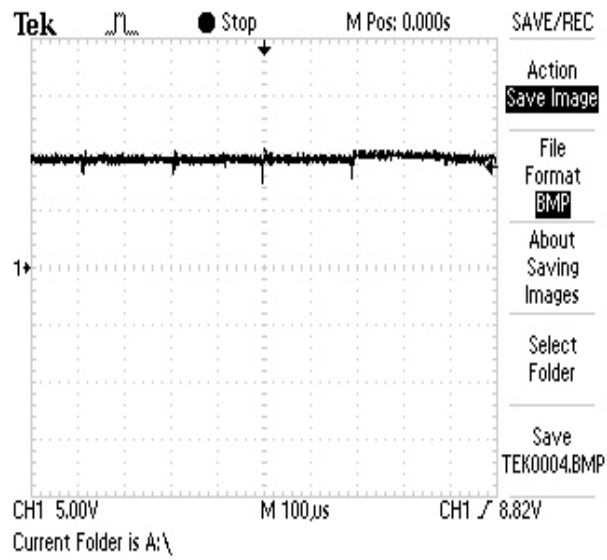
16. LCD_DB7 waveform diagram



17. IREF waveform diagram



18. VCOMH waveform diagram



3.4.2 Key point voltage list

Test point	Working voltage (V)
FM3V3 (CN1_4)	2.82
CN4_2	12.36
CN4_3 (screen bright)	9.58
CN4_4	9.46
CN4_20	3.31
VCC33 (one end of R62)	3.31
U8_9	3.28
U8_12	3.31
U8_19	3.31
Q9_C	3.31
Q9_B	2.65
Q9_E	2.06
MIC_+	1.71
KEYSCAN_1_S3	1.09
KEYSCAN_1_S4	1.12
KEYSCAN_1_S5	0

Section Five Function Introduction to IC

3.5.1 Function introduction to PN0101

The PN0101 (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 PN0101 very suitable for portable hand-held devices.

The PN0101 is based on the powerful ARM7TDMI CPU core, which is a full 32-bit RISC processor with 8 k byte dedicated cache.

Pin function of PN0101 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_GPA 4	Unused
T6	ADC10B_GPA3	Unused
U6	ADC10B_GPA2	Unused
T7	ADC10B_GPA1	Unused
U7	ADC10B_GPA0	Analog common 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	DAC analog power supply
L2	DAC_VREFP	
M1	DAC_VREFN	Grounding
P3	HP_OUTR	Headphone output (right)
N3	HP_OUTL	Headphone output (left)
N2	HP_OUTCA	N1 connected
N1	HP_OUTCB	N2 connected
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	Voltage reference
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/instruction 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 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
R16	USB_VSSA_REF	Analog
T16	USB_VSSA_TERM	Analog
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	MPMC_D_15~ 0	MPMC data in/out (use 7~0 as data line)
C5,C4,B5,A5,B4,A4 A3,B2,A2,A1	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	Merm core power supply
V11	VDDI2	Core power supply
V16	VDDI3	Flash core power supply
G1	VSSI1	Merm core grounding
V12	VSSI2	Core grounding
V17	VSSI3	Flash core grounding
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 in
P17	DCDC_LX1	DC-DC in
T18	DCDC_VUSB	USB voltage input
M17	DCDC_VBAT	Battery power supply
R18	DCDC_VOUT33A	DC/DC 3.3V out
M16	DCDC_VOUT33B	DC/DC 3.3V in
N18	DCDC_VOUT18	DC/DC 1.8V in
P18	DCDC_VSS1	DC/DC grounding
N16	DCDC_VSS2	DC/DC grounding
L16	DCDC_GND	Core grounding
M18	DCDC_CLEAN	Datum circuit grounding

3.5.2 Function introduction to G690

The G690 are microprocessor (UP) 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.

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	rounding

3.5.3 Function introduction to PQ1X281

PQ1X281 may output fixed voltage 2.8V, EN pin is enable end, high level works. The feature of the 2.8V voltage outputted by this IC is small ripple and pure voltage, which is used to supply power for audio system, FM and microphone.

Pin function is shown as the following figure: :

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

3.5.4 Function introduction to TC58512FT

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.

Pin function is shown as the following figure :

Pin	Contiguous signal name	Function description
9	/CE	Chip selection
8	/RE	Read gating
18	/WE	Write gating
19	/WP	Write protection
7	RY/BY	Busy/idle judgment
12、37	VCC	Power supply

3.5.5 Function introduction to SI1912DL

SI1912DL integrates 2 MOS tubes insides and is used to control on/off of two circuits. In X17 (RU),it is served as control IC of secondary output.

Pin function is shown as the following figure :

Pin	Contiguous signal name	Function description
1	S1	S electrode of MOS tube 1
2	D1	D electrode of MOS tube 1
3	G2	G electrode of MOS tube 2
4	S2	S electrode of MO tube 2
5	G2	G electrode of MOS tube 2
6	D1	D electrode MO tube 1

3.5.6 Function introduction to LM2703

The LM2703 is a micropower step-up DC/DC in a small 5-lead 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.

Pin function is shown as the following figure :

Pin	Contiguous signal name	Function description
1	SW	Voltage output end
2	GND	Grounding
3	FB	Output feedback
4	EN	Enable end

3.5.7 TPS79301

The TPS793xx family of low-dropout (LDO) low-power linear voltage regulators features high power supply rejection ratio (PSRR), ultralow noise, fast start-up, and excellent line and load transient responses in NanoStar wafer chip scale and SOT23 packages. NanoStar packaging gives an ultrasmall footprint as well as an ultralow profile and package weight, making it ideal for portable applications such as handsets and PDAs. Each device in the family is stable, with a small 2.2- μ F ceramic capacitor on the output. The TPS793xx family uses an advanced, proprietary BiCMOS fabrication process to yield extremely low dropout voltages (e.g., 112 mV at 200mA, TPS79330). Each device achieves fast start-up times (approximately 50 μ s with a 0.001- μ F bypass capacitor) while consuming very low quiescent current (170 μ A typical). Moreover, when the device is placed in standby mode, the supply current is reduced to less than 1 μ A.

Pin function is shown as the following figure :

Pin	Contiguous signal name	Function description
1	VIN	Voltage input
2	GND	Grounding
3	EN	IC enable pin
4	BYPASS	Internal resistor and external compose filtering circuit
5	FB	Feedback
6	VOUT	Voltage output

3.5.8 Function introduction to TPS62200

The TPS6220x devices are a family of high-efficiency synchronous step-down converters ideally suited for portable systems powered by 1-cell Li-Ion or 3-cell NiMH/NiCd batteries. The devices are also suitable to operate from a standard 3.3-V or 5-V voltage rail. With an output voltage range of 6.0 V down to 0.7 V and up to 300 mA output current, the devices are ideal to power low voltage DSPs and processors used in PDAs, pocket PCs, and smart phones. Under nominal load current, the devices operate with a fixed switching

frequency of typically 1 MHz. At light load currents, the part enters the power save mode operation; the switching frequency is reduced and the quiescent current is typically only 15 μ A; therefore it achieves the highest efficiency over the entire load current range. The TPS6220x needs only three small external components. Together with the tiny SOT23 package, a minimum system solution size can be achieved. An advanced fast response voltage mode control scheme achieves superior line and load regulation with small ceramic input and output capacitors.

Pin function is shown as the following figure :

Pin	Contiguous signal name	Function description
1	VIN	Voltage input
2	GND	Grounding
3	EN	IC enable pin
4	FB	Output feedback
5	SW	External device pin, voltage output

3.5.9 Function introduction to ISL6294

The ISL6294 is a cost-effective, fully integrated high input voltage single-cell Li-ion battery charger. The charger uses a CC/CV charge profile required by Li-ion batteries. The charger accepts an input voltage up to 28V but is disabled when the input voltage exceeds the OVP threshold, typically 6.8V, to prevent excessive power dissipation. The 28V rating eliminates the over-voltage protection circuit required in a low input voltage charger.

The charge current and the end-of-charge (EOC) current are programmable with external resistors. When the battery voltage is lower than typically 2.55V, the charger preconditions the battery with typically 20% of the programmed charge current. When the charge current reduces to the programmable EOC current level during the CV charge phase, an EOC indication is provided by the CHG pin, which is an open-drain output. An internal thermal foldback function protects the charger from any thermal failure.

Two indication pins (PPR and CHG) allow simple interface to a microprocessor or LEDs. When no adapter is attached or when disabled, the charger draws less than 1 μ A leakage current from the battery.

Pin function is shown as the following figure :

Pin	Contiguous signal name	Function description
1	IN	Power input
2	/PPR	Charge voltage limit end
3	/CHG	Charge state indication

4	/EN	IC enable pin
5	GND	System grounding
6	IMIN	Minimum current setup
7	IREF	Charge current setup

3.5.10 Function introduction to S80829

The S-808xxC series is a series of high-precision voltage detectors developed using CMOS process. The detection voltage is fixed internally with an accuracy of $\pm 2.0\%$. Two output forms, Nch open-drain and CMOS output, are available. Ultra-low current consumption and miniature package lineup can meet demand from the portable device applications.

Pin	Contiguous signal name	Function description
1	RST	Control signal voltage output pin
2	VDD	Voltage input pin
3	NC	Unused
4	VSS	Grounding

3.5.11 Function introduction to TEA5767HN

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.

Pin function is shown as the following figure :

Pin	Contiguous signal name	Function description
1	NC	Unused
2	CPOP	
3	VCOT1	Tuning output voltage oscillator 1
4	VCOT2	Tuning output voltage oscillator 2
5	VCOVCC	Tuning 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 oscillator input 1
17	XTAL2	Crystal oscillator 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	Voltage reference
27	TCIFC	IF adjusts time constant
28	DIFL1	Decouple IF limiter 1
29	DIFL2	Decouple IF limiter 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	Phase-locked loop filter output gating
40	NC	Unused

Chapter Four

Disassembly and Assembly Process

In order to know structure of X21 (RU) more easily, directly and conveniently, now pictures are adopted to present each link of the process of disassembly and assembly of the player before users to prevent them operating incorrectly to damage elements. This player comprises the whole set, PLED display screen, battery and tuning board. You are supposed to operate according to the illustrations strictly.

Note: all operations must be with strict anti-static measures, operators must wear anti-static hand wrist or gloves, electric screwdriver must be grounded effectively and articles of screwdriver and nippers must be removed static electricity before use.

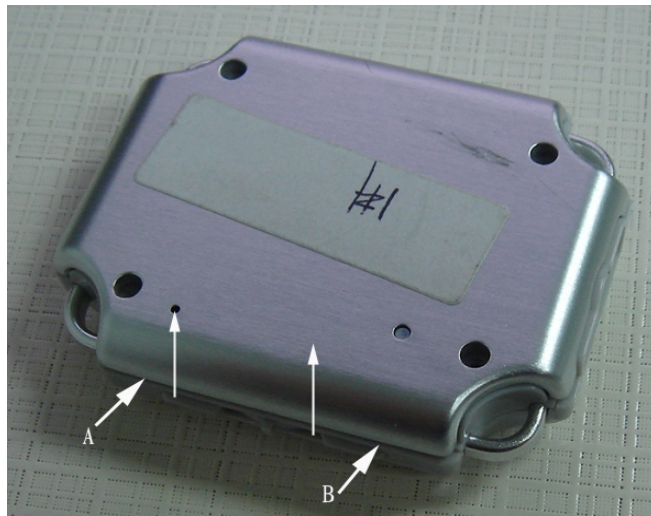
4.1 Whole set

4.1.1 Disassembly process of the whole set

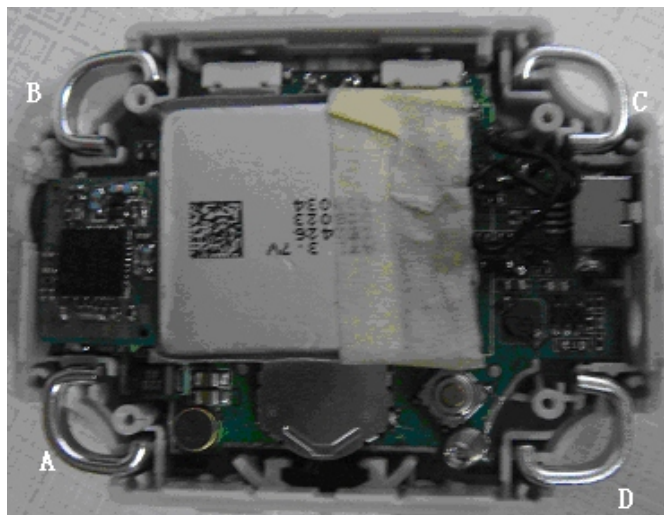
1. Use electric screwdriver or “+” shaped screwdriver to unfix the 4 screws (A, B, C, D) in the joint place of front casing and rear casing.



2.Exert strength with nails towards the upward arrow direction from the joint place of rear casing aluminum alloy and middle casing (A, B) and take down rear casing.



3. Take down 4 rings (A, B, C, D)



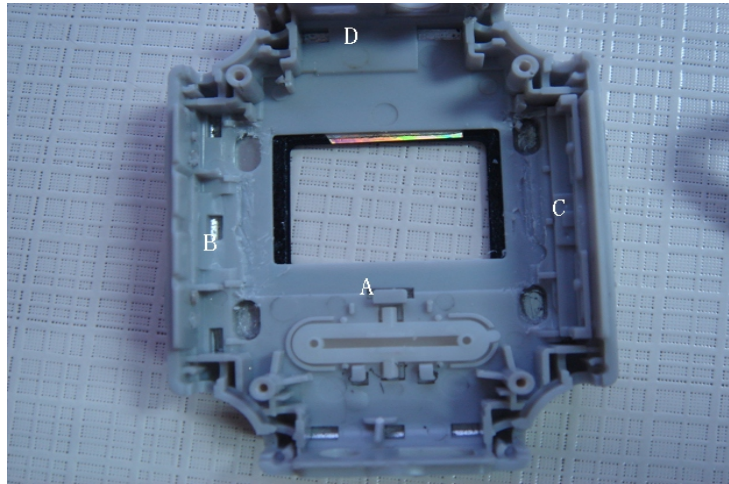
4. Pull the middle casing (A) of USB jack outwards to take down main board.



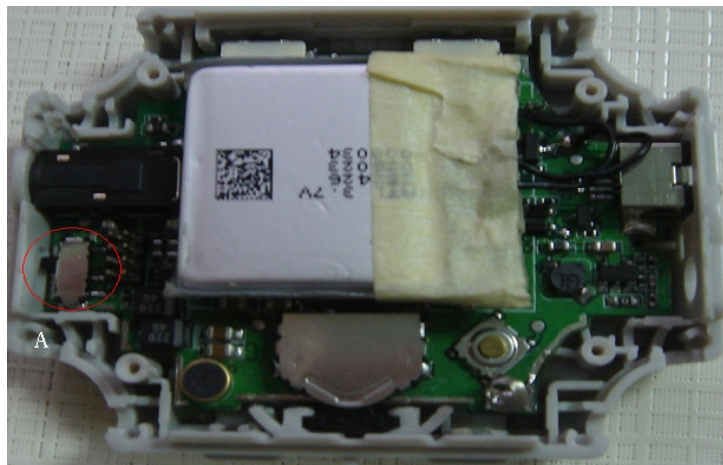
4.1.2 Assembly process of the whole set

1. Install ON/OFF button (A), 3-direction button (B), volume control button (C) and lock button (D).

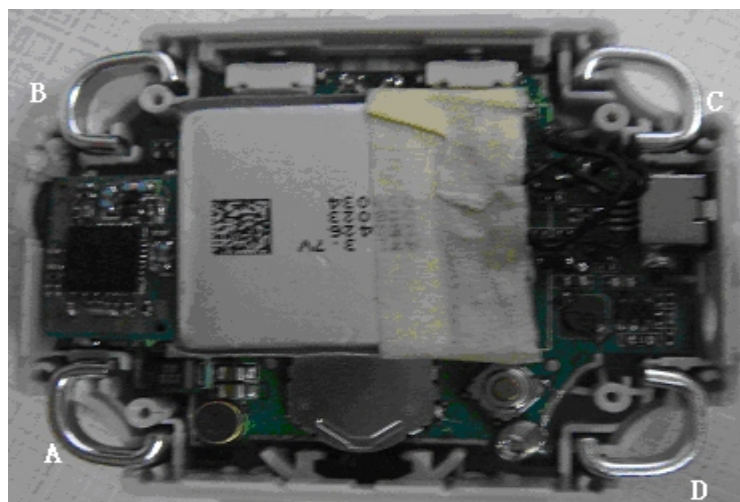
In order to prevent them from falling off in the course of assembly, you may use adhesive tape outside the front casing to fasten when necessary.



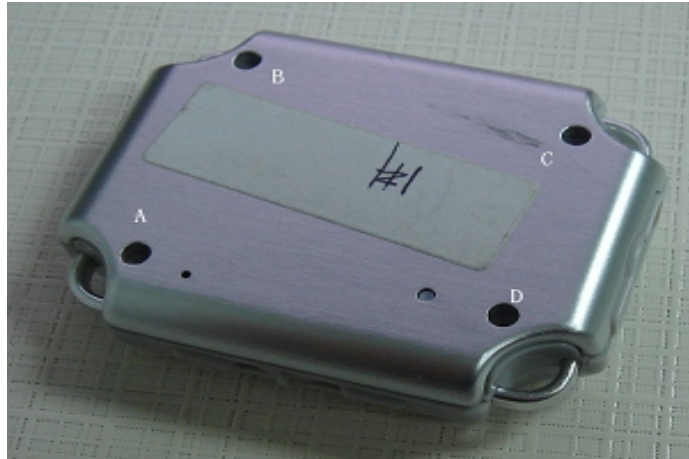
2. Install main board into front casing. Pay attention to install one end of headphone jack firstly and LOCK button (A) on main board must be aimed at the lock button cap on front casing.



3. Install 4 rings (A, B, C, D)



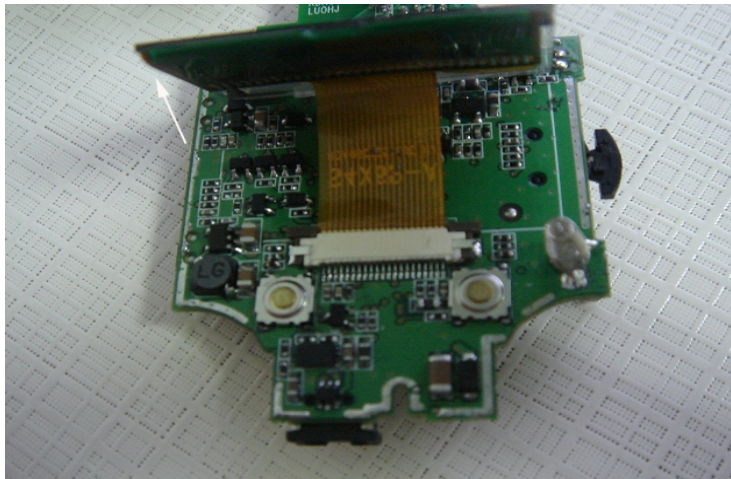
4. Install into rear casing and use electric screwdriver to fix 4 screws (A, B, C, D).



4.2 OLED display screen

4.2.1 OLED disassembly process

1. Take down main board and pull up display screen according to the direction shown in the illustration.



2. Push away the 2 clasps according to the direction shown in the illustration, pull up display screen data line and take down OLED screen.



4.2.2 OLED assembly process

Assemble according to the direction of disassembly process of OLED display screen.

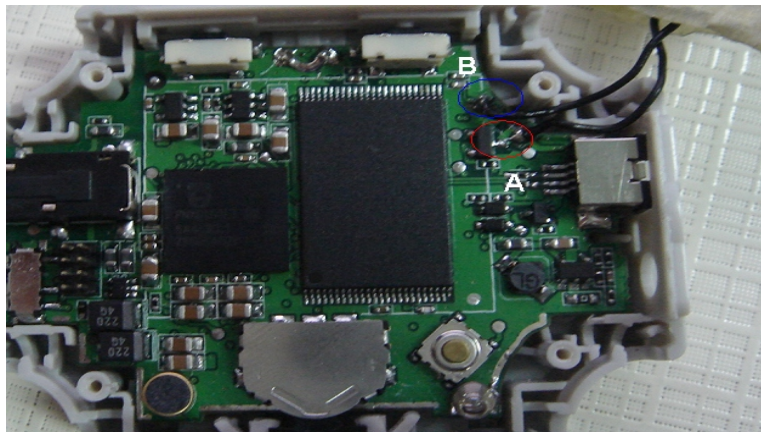
4.3 Li battery

4.3.1 Li battery disassembly process

1. Take down rear casing, and take down battery according to arrow direction.

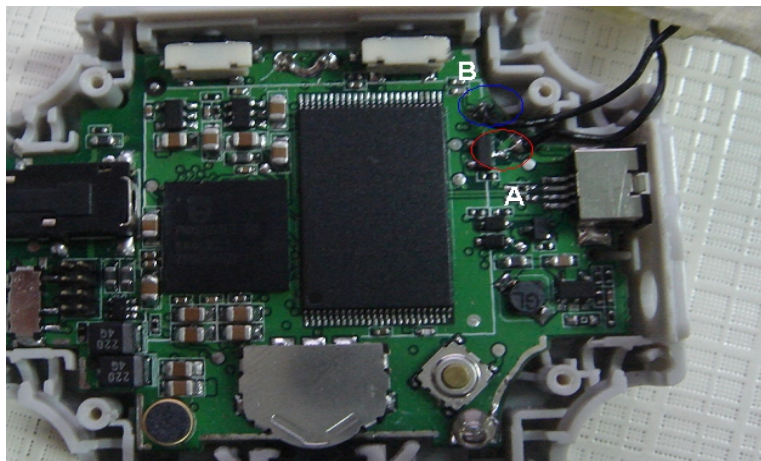


2. Use brand iron to weld out point A and B and take down battery



4.3.2 Li battery assembly process

1. Use brand iron to well weld point A and B and pay attention that point A is connected to anode of Li battery and point B the cathode.



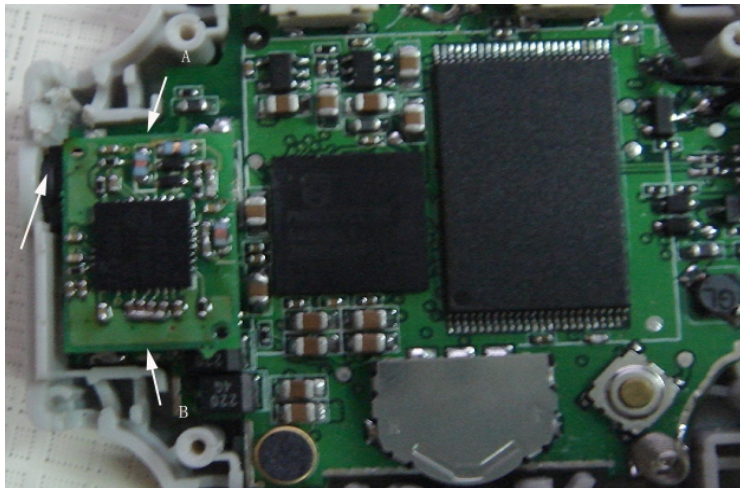
2. Fix the battery onto the sponge of main board battery location.



4.4 FM tuning board

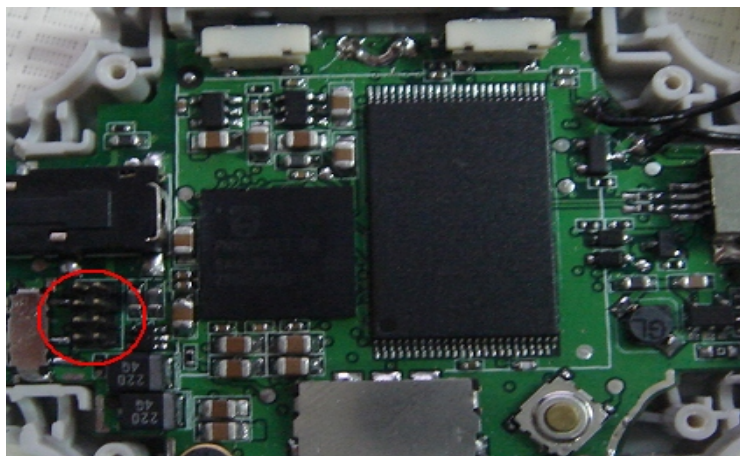
4.4.1 FM tuning board disassembly process

Exert strength according to upward arrow direction from , B position with fingers and take down FM board.



4.4.2 FM tuning board assembly process

Aim the FM tuning board at the 8pin socket on main board and insert FM tuning board. Pay attention to the direction.

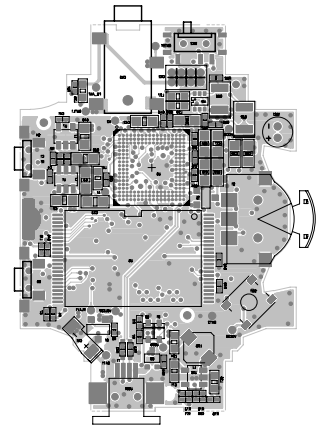
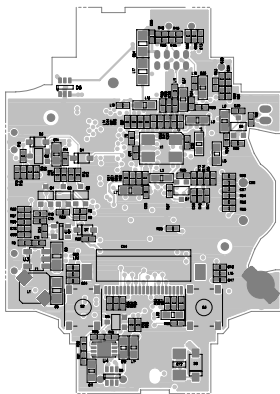


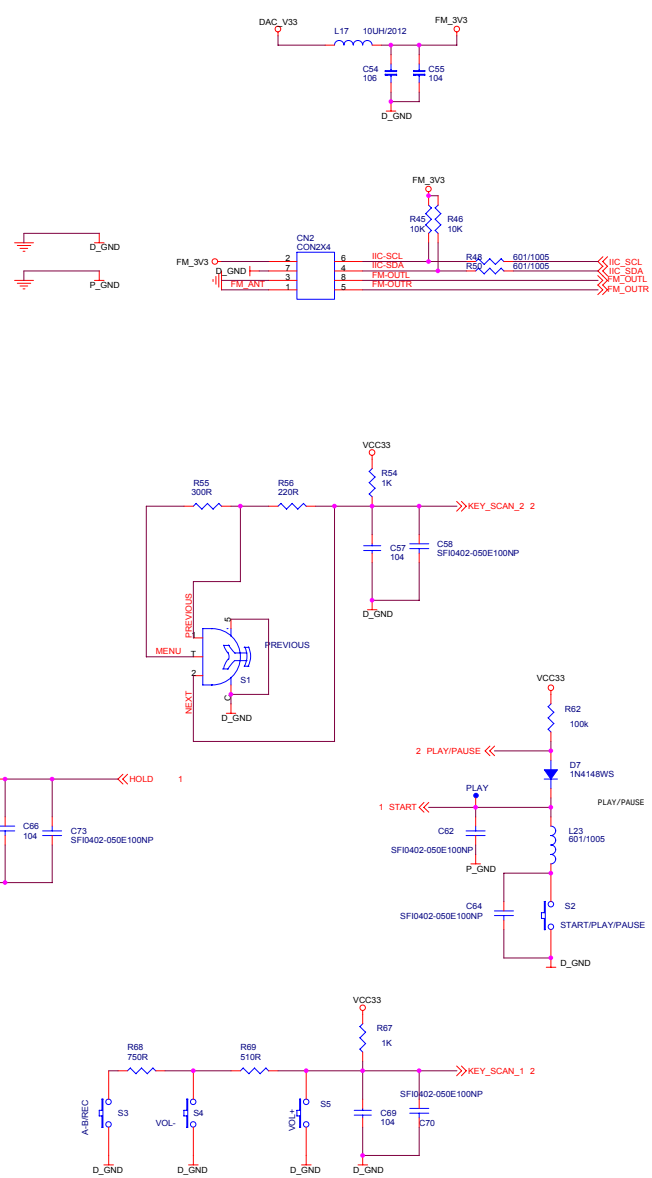
Chapter Cinque

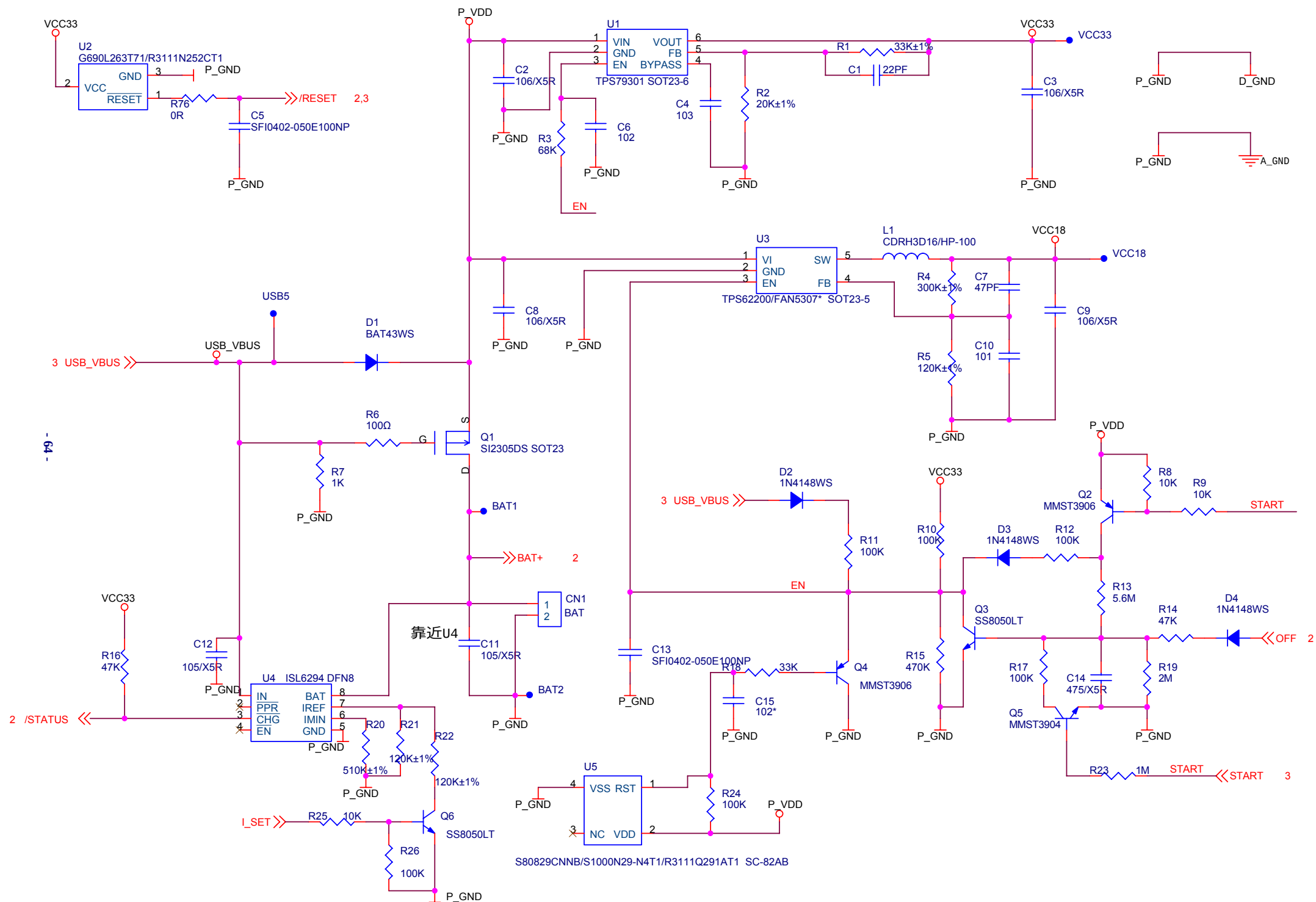
PCB board & Circuit diagram

Section One PCB board

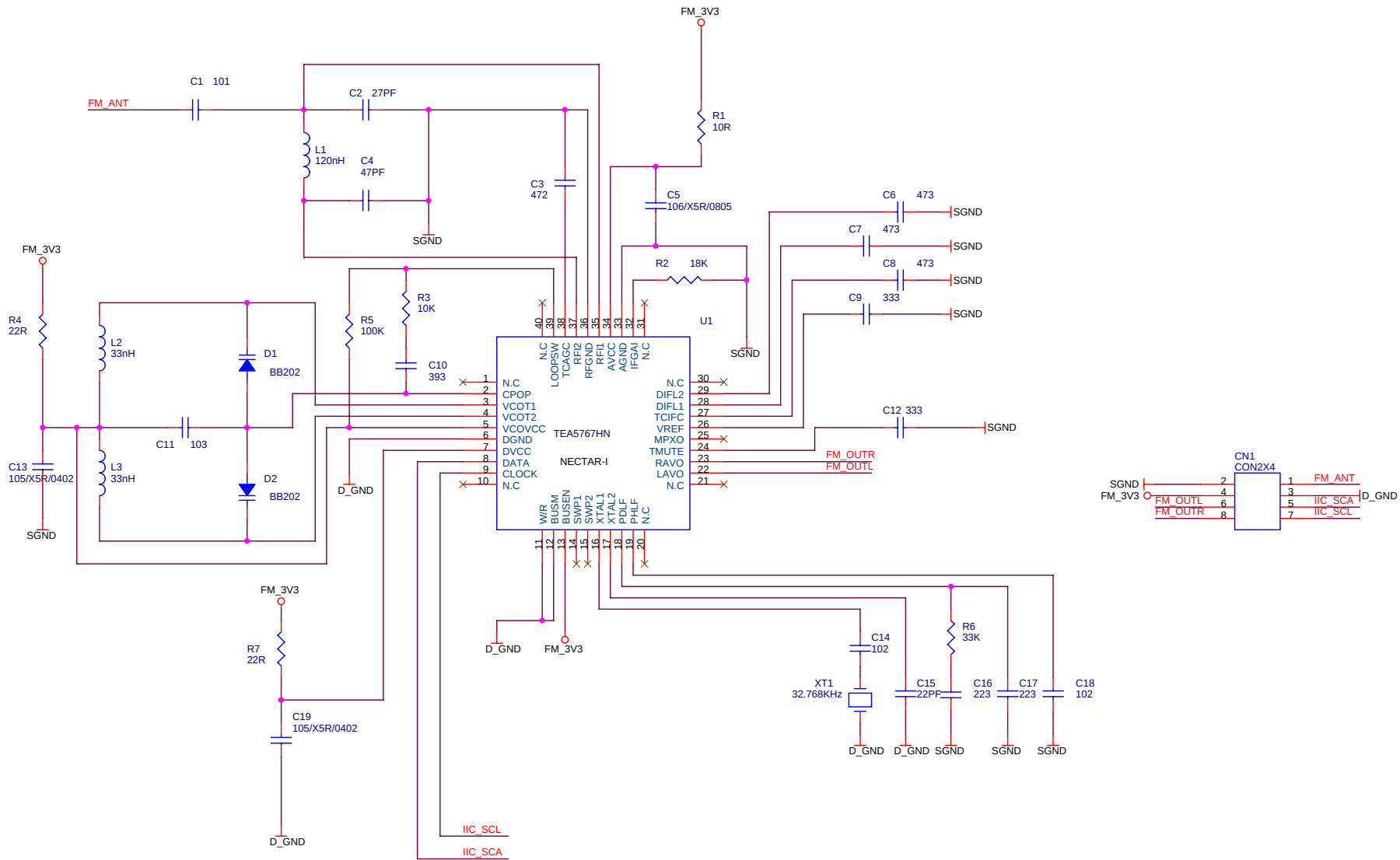
X21 PCB Board







5.2.2 FM Board



Chapter six BOM List

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
X21L (RU) SILVER WHITE (1G)			
MAIN BOARD		5448402	
0090324	SMD RESISTOR	1/16W 00±5% 0402	R51,R72,R73,R76
0090001	SMD RESISTOR	1/16W 00±5% 0603	L26
0090326	SMD RESISTOR	1/16W 100±5% 0402	L14,R31,R32,R33
0090644	SMD RESISTOR	1/16W 180±5% 0402	L12,R42,R43
0090339	SMD RESISTOR	1/16W 1000±5% 0402	R6
0090346	SMD RESISTOR	1/16W 2200±5% 0402	R56
0090349	SMD RESISTOR	1/16W 3000±5% 0402	R55
0090355	SMD RESISTOR	1/16W 5100±5% 0402	R69
0090362	SMD RESISTOR	1/16W 1K±5% 0402	R7,R44,R52,R53,R54,R67
0090369	SMD RESISTOR	1/16W 2.2K±5% 0402	R61
0090375	SMD RESISTOR	1/16W 3.9K±5% 0402	R77,R78
0090359	SMD RESISTOR	1/16W 7500±5% 0402	R68
0090377	SMD RESISTOR	1/16W 4.7K±5% 0402	R57,R63,R64
0090385	SMD RESISTOR	1/16W 10K±5% 0402	R8,R9,R25,R36,R45,R46,L16
0090396	SMD RESISTOR	1/16W 33K±5% 0402	R18,R28,R30
0090400	SMD RESISTOR	1/16W 47K±5% 0402	R14,R16,R58,R66
0090404	SMD RESISTOR	1/16W 68K±5% 0402	R3
0090408	SMD RESISTOR	1/16W 100K±5% 0402	R10,R11,R12,R17,R24,R26,R38,R39,R40,R47,R59,R62,R71
0090425	SMD RESISTOR	1/16W 470K±5% 0402	R15,R60
0090433	SMD RESISTOR	1/16W 1MO±5% 0402	R23,R34,R35
0090436	SMD RESISTOR	1/16W 2MO±5% 0402	R19,R65
0090443	SMD RESISTOR	1/16W 5.6MO±5% 0402	R13
0090639	PRECISION SMD RESISTOR	1/16W 1.5K±1% 0402	R37
0090672	PRECISION SMD RESISTOR	1/16W 20K±1% 0402	R2
0090485	PRECISION SMD RESISTOR	1/16W 27K±1% 0402	R75
0090671	PRECISION SMD RESISTOR	1/16W 33K±1% 0402	R1
0090509	PRECISION SMD RESISTOR	1/16W 100K±1% 0402	R27
0090681	PRECISION SMD RESISTOR	1/16W 120K±1% 0402	R5,R21,R22

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
0090645	PRECISION SMD RESISTOR	1/16W 180K±1% 0402	R29,R49
0090687	PRECISION SMD RESISTOR	1/16W 240K±1% 0402	R70
0090682	PRECISION SMD RESISTOR	1/16W 300K±1% 0402	R4
0090667	PRECISION SMD RESISTOR	1/16W 510K±1% 0402	R20
1030029	SMD PRESS SENSITIVITY RESISTOR	SFI0402-050E100NP	C5,C13,C47,C48,C58,C62,C64,C70,C73 ①
1030033	SMD PRESS SENSITIVITY RESISTOR	SDV1005H180C100GPT 0402	C5,C13,C47,C48,C58,C62,C64,C70,C73 ①
0310416	SMD CAPACITOR	50V 22P±5% NPO 0402	C1,C20,C21,C68
0310424	SMD CAPACITOR	50V 47P±5% NPO 0402	C7
0310432	SMD CAPACITOR	50V 101±5% NPO 0402	C10
0310704	SMD CAPACITOR	25V 102±10% X7R 0402	C6,C53
0310705	SMD CAPACITOR	25V 332±10% X7R 0402	C31,C28
0310453	SMD CAPACITOR	25V 103±10% X7R 0402	C4,C59,C63
0310480	SMD CAPACITOR	10V 104±10% X5R 0402	C18,C19,C24,C25,C26,C27,C30,C34,C35,C38,C41,C43,C44,C45,C46,C50,C52,C55,C56,C57,C61,C66,C67,C69 ②
0310790	SMD CAPACITOR	10V 104±20% X5R 0402	C18,C19,C24,C25,C26,C27,C30,C34,C35,C38,C41,C43,C44,C45,C46,C50,C52,C55,C56,C57,C61,C66,C67,C69 ②
0310483	SMD CAPACITOR	10V 105±10% X5R 0603	C11,C12
0310674	SMD CAPACITOR	6.3V 475±10% X5R 0603	C14,C71
0310717	SMD CAPACITOR	6.3V 475±20% X5R 0603	C36,C37
0310486	SMD CAPACITOR	6.3V 106±20% X5R 0805	C2,C3,C8,C9,C39,C40
0310389	SMD CAPACITOR	10V 106 +80%-20% Y5V 0805	C16,C17,C22,C23,C29,C42,C49,C51,C54,C60
0310753	SMD CAPACITOR	16V 104±20% X5R 0402	C65
0310752	SMD CAPACITOR	25V 106±10% X5R 1206	C72
0310736	SMD TANTALUMCAPACITOR	4V 220uF±20% 3528(B)	C33,C32
0390142	SMD MAGNETIC BEADS	FCM1608-601T02	L2,L3,L4,L6,L7,L8,L9,L13,L18,L22,L24,L27,L28,L29
0390388	SMD MAGNETIC BEADS	600O/100MHZ±25% 1005	L10,L11,L15,L23,R48,R50
0390044	SMD INDUCTOR	10UH±10% 2012	L17
0390386	SMD CORES INDUCTOR	10uH±20% CDRH3D16/HP	L1
0390384	SMD CORES INDUCTOR	4.7uH±20% CDRH3D16-4R7	L25 ③
0390387	SMD CORES INDUCTOR	4.7uH±30% CDRH3D16/HP	L25 ③
1090080	ESD ELEMENT	RCLAMP0504F SC70-6L	D6,D5 ④
1090084	ESD ELEMENT	PLR0504F-P SC70-6L	D6,D5 ④

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
0700154	SMD TRIODE	1N4148WS SOD-323	D2,D3,D4,D7
0680074	SMD SCHOTTKY DIODE	BAT43WS SOD-323	D1
0680077	SMD SCHOTTKY DIODE	MBR0520 SOD123	D8
0780298	SMD TRIODE	MMST3904 SOD-323	Q9,Q5
0780299	SMD TRIODE	SS8050LT SOD-323	Q3,Q6
0780293	SMD TRIODE	MMST3906 SOD-323	Q2,Q4,Q7
0780300	SMD TRIODE	SS8550LT SOD-323	Q8
0790041	SMD FIELD EFFECT TRANSISTOR	SI2305DS SOT-23	Q1
0790068	SMD FIELD EFFECT TRANSISTOR	SI1912 SOT363	U9 ⑤
0790070	SMD FIELD EFFECT TRANSISTOR	NTJD4401N SOT363	U9 ⑤
0882475	IC	TPS79301 SOT23-6	U1 ⑥
0882668	IC	TPS79333DBVR SOT23-5	U1 ⑥
0882481	IC	G690L263T71 SOT23-3	U2
0882476	IC	TPS62200 SOT23-5	U3
0882851	IC	ISL6294IRZ DFN	U4
0882524	IC	S80829CNNB SC-82	U5
0882403	IC	PNX0101ET/N302 TFBGA	U6
0882480	IC	PQ1X281M2ZP SOT23-5	U7 ⑦
0882629	IC	TPS793285DBVR SOT23-5	U7 ⑦
0882875	IC	K9K8G08U0M-PCB0 TSOP	U8 ⑧
0883145	IC	K9K8G08U0A-PCB0 TSOP	U8 ⑧
0882565	IC	LM2703 SOT-23-5	U10 ⑨
0882999	IC	FAN5331 SOT23-5	U10 ⑨
0882675	IC	K9K4G08U0M-PCBO TSOP	⑩
0882619	IC	K9K4G08U0M-YCBO TSOP	⑩
0883070	IC	K9F4G08U0A-YCBO TSOP	⑩
0883101	IC	K9K4G08U0A-YCBO TSOP	⑩
1310057	SMD STIR SWITCH	SSSS811101	SW2
1340127	SMD LIGHT TOUCH SWITCH(THREE DIRECTION)	SLLB310300	S1
1340128	LIGHT TOUCH SWITCH	TS-1186	SW1,S2,S3
1340141	SMD LIGHT TOUCH SWITCH	TS-1112E-2(180 GRAM PUISSANCE)	S4,S5
3810092	GROUNDING SPRING	F 3.2×8.5 F 0.2 PLATING NICKEL	P7,P8

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
1140070	MICROPHONE	44dB±3dB 4×1.5 WITH NEEDLE	MIC1
1980050	EARPHONE SOCKET	2SJ-A382-001	CN3
1860085	USB SOCKET	2UB-M002-001	USB1
1940282	CABLE SOCKET	21P 0.5mm SMD,SUBMIT MEET WITH CLASP	CN4
1970094	DULE FLAT NEEDLE	2×4 5mm1.27mm STRINGHT INSERT MOLD HIGH 1.5mm	CN2
0960284	SMD CMETAL OXIDE FILM RESISTORSTAL OSCILLATOR	12MHz±30ppm 5032/4 20P	X1
1633235	PCB	2X21RUP-1	
X21L (RU) SILVER WHITE (1G)			
BATTERY BOARD		5446654	
0090223	SMD RESISTOR	1/16W 2K±5%	R2
0090011	SMD RESISTOR	1/16W 4700±5% 0603	R1
0310207	SMD CAPACITOR	50V 104 ±20% X7R 0603	C1,C2,C3 (11)
0310543	SMD CAPACITOR	50V 104±10% X7R 0603	C1,C2,C3 (11)
0882570	IC	S-8261AANMD-G2N-T2 SOT23-6	U1
0790065	SMD FIELD EFFECT TRANSISTOR	ECH8601 TSSOP	U2 (12)
0790090	SMD FIELD EFFECT TRANSISTOR	ECH8601R TSSOP	U2 (12)
1632263	PCB	EX9-0	
X21L (RU) SILVER WHITE (1G)			
FM MODULE		5448339	
0310432	SMD CAPACITOR	50V 101±5% NPO 0402	C1
0310418	SMD CAPACITOR	50V 27P±5% NPO 0402	C2
0310706	SMD CAPACITOR	25V 472±10% X7R 0402	C3
0310424	SMD CAPACITOR	50V 47P±5% NPO 0402	C4
0310486	SMD CAPACITOR	6.3V 106±20% X5R 0805	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
0310480	SMD CAPACITOR	10V 104±10% X5R 0402	C13,C19 (13)
0310790	SMD CAPACITOR	10V 104±20% X5R 0402	C13,C19 (13)
0310704	SMD CAPACITOR	25V 102±10% X7R 0402	C14,C18
0310416	SMD CAPACITOR	50V 22P±5% NPO 0402	C15

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
0310455	SMD CAPACITOR	16V 223±10% X7R 0402	C16,C17
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
1632993	PCB	FX21RUP-0	
X21L (RU) SILVER WHITE (1G)			
BATTERY BOARD		5446654	
0090223	SMD RESISTOR	1/16W 2K±5%	R2
0090011	SMD RESISTOR	1/16W 4700±5% 0603	R1
0310207	SMD CAPACITOR	50V 104 ±20% X7R 0603	C1,C2,C3 (14)
0310543	SMD CAPACITOR	50V 104±10% X7R 0603	C1,C2,C3 (14)
0882570	IC	S-8261AANMD-G2N-T2 SOT23-6	U1
0790065	SMD FIELD EFFECT TRANSISTOR	ECH8601 TSSOP	U2 (15)
0790090	SMD FIELD EFFECT TRANSISTOR	ECH8601R TSSOP	U2 (15)
1632263	PCB	EX9-0	
X21L (RU) SILVER WHITE (1G)			
FM MODULE FX21RUP-0		5448339	1.1/
0310432	SMD CAPACITOR	50V 101±5% NPO 0402	C1
0310418	SMD CAPACITOR	50V 27P±5% NPO 0402	C2
0310706	SMD CAPACITOR	25V 472±10% X7R 0402	C3
0310424	SMD CAPACITOR	50V 47P±5% NPO 0402	C4
0310486	SMD CAPACITOR	6.3V 106±20% X5R 0805	C5
0310712	SMD CAPACITOR	10V 473±10% X5R 0402	C6,C7,C8

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
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
0310480	SMD CAPACITOR	10V 104±10% X5R 0402	C13,C19 (16)
0310790	SMD CAPACITOR	10V 104±20% X5R 0402	C13,C19 (16)
0310704	SMD CAPACITOR	25V 102±10% X7R 0402	C14,C18
0310416	SMD CAPACITOR	50V 22P±5% NPO 0402	C15
0310455	SMD CAPACITOR	16V 223±10% X7R 0402	C16,C17
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