

X23(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.

#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

Full-auto, automanual and manual scanning function may listen to FM radio station program more easily.

#Voice recording function

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

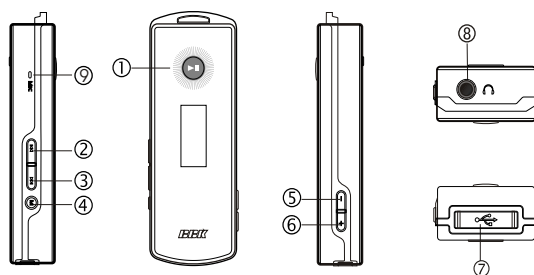
#USB 2.0 transmission (full speed)

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



- | | |
|--------------|--|
| <p>① </p> | <p>#Press in power off mode → power on</p> <p>#Press for long in power on mode → power off</p> <p>#Press in playback interface → switch in pause/play</p> <p>#Press when recording → pause recording</p> <p>#press when tuning → mute</p> <p>#press in tuning SCAN mode → save radio station and switch mode to PRESET</p> <p>#press when operating in menu → enter selected item or confirm setup</p> |
| <p>② ③ </p> | <p>#Press in playback interface → the previous/next track</p> <p>#Press for long in playback interface → fast backward/forward</p> <p>#Press in tuning PRESET mode → select channel</p> |

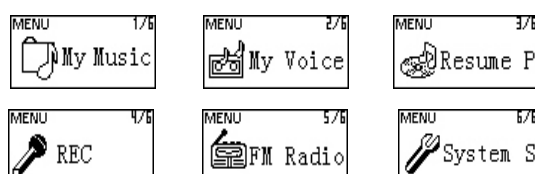
#Press for long in tuning PRESET mode → full auto scanning
 #Press in tuning SCAN mode → manual scanning
 #Press for long in tuning SCAN mode → automanual scanning
 #When operating in menu → move cursor or set item
 #Press or for long in "My EQ" → select the frequency point you want to set

④  #Press for long in any mode → enter main menu
 #Press when tuning → switch in PRESET and SCAN mode
 #Press for long when recording → quit recording
 #Press when operating in menu → not save the setup and return to the previous menu

⑤  ⑥  #Press when playing → Set A-B reread
 #Press in playback interface or when tuning → adjust volume
 #Press in "My EQ" → adjust dB value
 #Press "-" button when browsing file → enter cancelling file dialogue box
 #Press "+" button for long when tuning → enter FM recording

⑦ USB jack
 ⑧ Headphone jack
 ⑨ MIC: microphone

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 at time.

#REC

Select "REC" to enter recording mode.

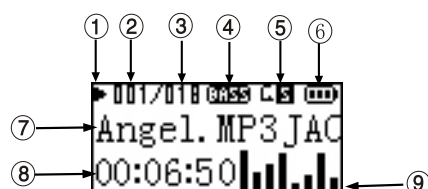
#FM Radio

Select "FM Radio" to enter radio set mode.

#System Setup

Select "System Setup" to set system items.

2.1.4 PLAYING INTERFACE ILLUSTRATION



① Playback state

② Serial number of the current track

③ Number of all tracks

④ Sound effect mode

⑤ Playback mode

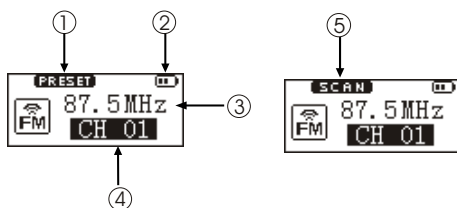
⑥ Battery capacity

⑦ ID3 information/singer/lyrics display

⑧ Time that has been played of the current track

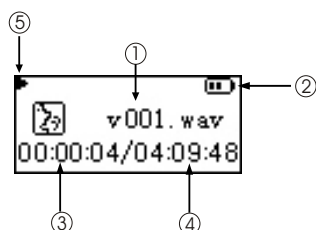
⑨ Spectrum of the current track

2.1.5 TUNING INTERFACE ILLUSTRATION



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

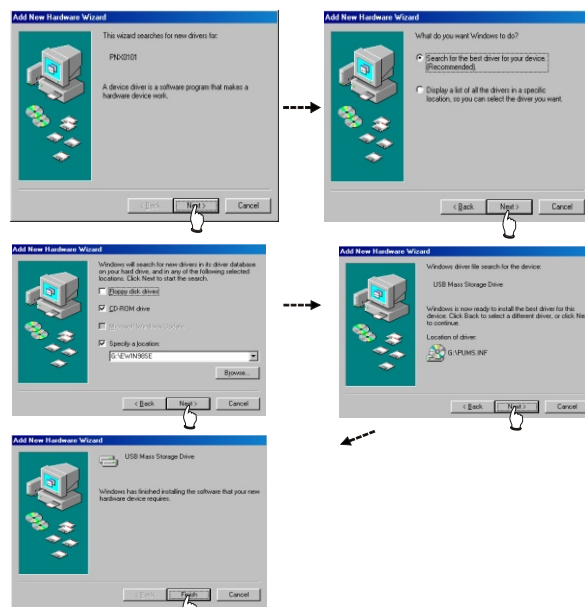
2.2.1 INSTALL USB DRIVE PROGRAM

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, 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 USE MOBILE STORAGE FUNCTION

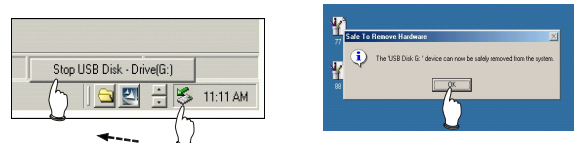
This player can be used as mobile storage in Windows ME/2000/XP operating system. In Windows 98SE and Mac operating system, drive program must be installed firstly and then used as mobile storage. Connect MP3 PLAYER and computer with USB transmission line. After the bottom right corner of desktop appears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

2.2.3 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.



2.2.4 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 **◀** 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.



2.2.5 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.

#3FF 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.

#ADJUST VOLUME

When playing or tuning or tuning, pressing **-** / **+** button or for long way 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.

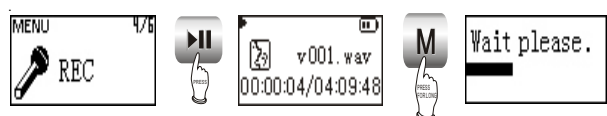
2.2.6 A-B REPEAT FUNCTION

When playing, if you want to listen to a certain segment repeatedly, please use A-B repeat function. Press **M** 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 **M** button for the third time to cancel repeat and continue to play.



2.2.7 RECORDING

When recording, press **▶▶** button to pause and press **M** 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 "FULL DISC" and exits recording.

#When recording with microphone, if you press buttons and the sound of pressing may probably be recorded.

2.2.8 TUNING

#ENTER TUNING MODE

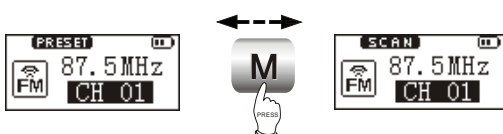
Select "FM Radio" in main menu and press  button to listen to radio.

#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.



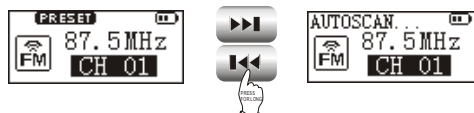
1. PRESET mode

#ADJUST CHANNEL

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

#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 0.1 Mhz 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 auto manually). 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.

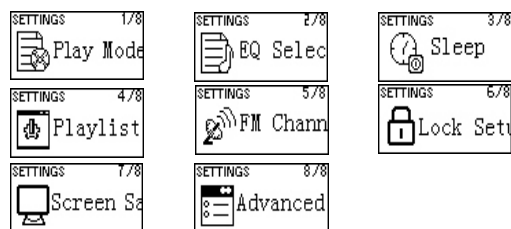
#FM RECORDING

When listening to radio, press  button for long to enter FM recording. Press  button for long to stop recording and generate into recording file. The generated file of FM recording is wav format.



2.3 SETTINGS

2.3.1 SETTINGS



#Play Mode

Normal
Shuffle
Playlist
Intro
REP One
REP ALL
REP DIR
#EQ Select
Normal
PURE
POP
Clas
Jazz
Rock
Dbass
Disco
My EQ
#Sleep
Disable~120Min

#Playlist

Browse
Edit
Delete
#FM Channel
Auto
Mono
#Lock Setup
Lock Disable
Lock Enable
#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		CLAS		DBASS
	PURE		JAZZ		DISCO
	POP		ROCK		My EQ

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 or 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 PLAYLIST

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



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

#Edit

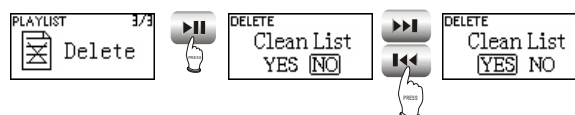


As in the above illustration, enter "Edit" and browse files. The icon before songs in the playlist is "P". Select a song not in the playlist and press button to add it into the list. Select a song in the playlist, and press button to cancel it from the playlist.

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.



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.

2.3.6 FM CHANNEL

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



2.3.7 LOCK SETUP

Entering this menu may open or close auto buttons lock function.

If "Lock Enable" is selected and not any button is operated during 30 seconds, all button functions will be locked automatically.

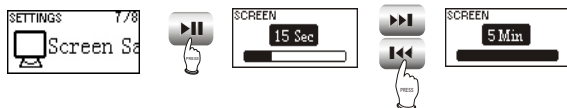


CAUTION:

Lock is only effective in playback, recording and tuning modes.

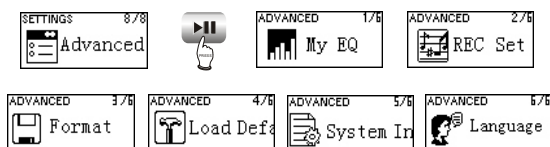
2.3.8 SCREEN SAVE

Press **▶▶** or **◀◀** button to adjust the screen saver time. After setup finishes, press **▶▶** button to save and then exit, and press **M** 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.



2.3.9 ADVANCED

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



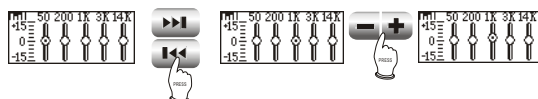
2.3.10 ADVANCED

#My EQ

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



If you want to adjust the decibel of mediant (1k HZ), 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 **M** button to exit with the original setup not being changed.

#REC Set

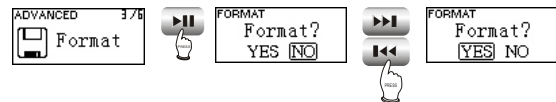
Here to set the recording quality, The recording quality is higher, the sound quality is better and the used space is more.

Three kinds of recording quality adopt IMA-ADPCM format coding.

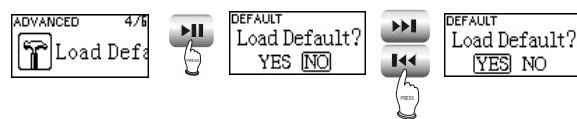


#Formatting

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.



#Default



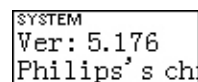
If you want to restore MP3 PLAYER to factory setup state (data and song files cannot be cancelled), you may select "Load Default". After dialogue box pops up, select "YES", press **▶▶** button to confirm and then exit to restore to default state. Select "NO" or press **M** button to cancel.

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 **M** 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.

#Languages

Russian and English are supported.



#Upgrade

Download the latest firmware upgrading file from BBK website firstly, such as "BBK_X23RU.ebn" and "X23RU_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.



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 for 10 seconds or more, please try your best not to operate other 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	X23
Audio decode chip	Philips PNX0101
Continuous playback time	The longest time is about 15 hours
Dimensions/weight	80.2mm × 28.5mm × 14.5mm about 28.5g(without battery),40g(with battery)
Audio SNR	≥90dB
Theadphone ou	9mW+9mW (32ohm impedance)
Frequency range	18Hz~20kHz
FM tuning range	87.5MHz~108MHz
Working temperature	0~40 C
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 Function introduction

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. MIC circuit: external audio input, record function finishes.

3.1.2 Block diagram of the player

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

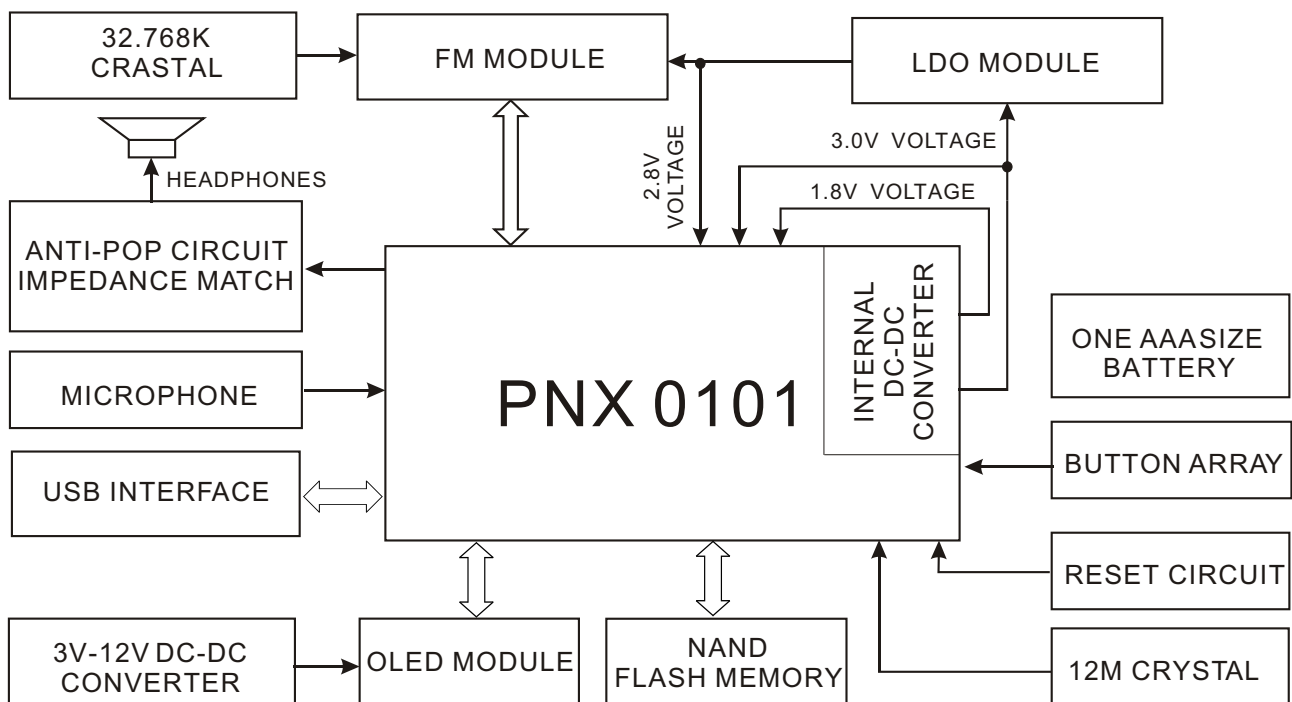


Figure 3.1.2.1 block diagram

3.1.3 Introduction to IC of the player

Introduction to IC of the player is shown as in the following table:

Location	IC model	Function
U1	PNX0101ET	MP3 decode
U2	K9F4G08UDM	Flash
U3	TCM809ZVBN713	Reset IC
U4	TPS793285DBVR	Precision voltage stabilizer
U5	SI1912	Dual MOS tube
U6	LM2703	12V boost
FU1	TEA5767HN	Tuning IC

Section Two Unit Circuit Principle

3.2.1 FLASH circuit

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

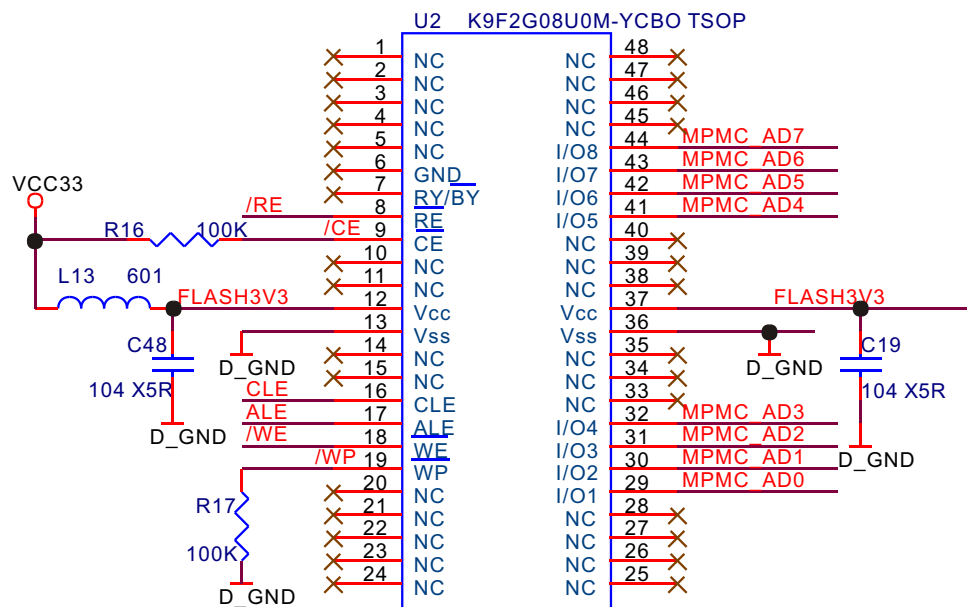


Figure 3.2.1.1 Flash circuit schematic diagram

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. R16 is pull up resistor of /CE, R17 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 o 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;

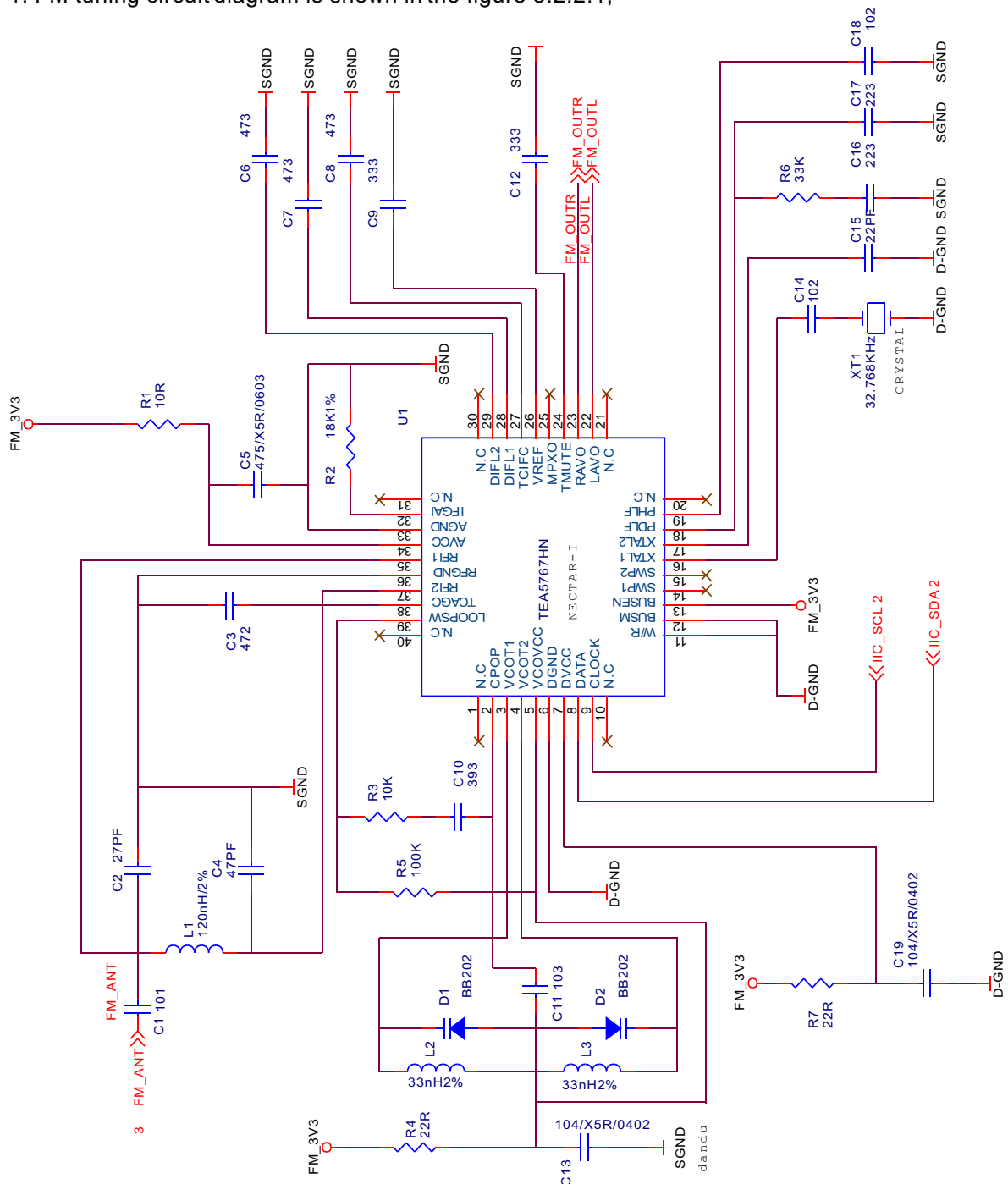


Figure 3.2.2.1 FM tuning circuit diagram

2. Working principle: tuning circuit is composed of micro digital tuning IC TEA5767HN of Philips company and peripheral circuit. Power supply voltage is supplied by PQ1X28 to provide pure voltage with value 2.8V for IC. FC1, FC2, FC3, FC4 and FI1 are antenna input matched circuit of FM module; variable diode Fd1, Fd2 and winding inductor is tuning circuit in FM module. Control of FM adopts IIC bus control means, 8,9 of TEA5767 are data line and control line.

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 nature, through antenna input matching circuit, input TEA5767HN, PNX0101 via RF11 and RF12 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.

3.2.3 OLED module circuit

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

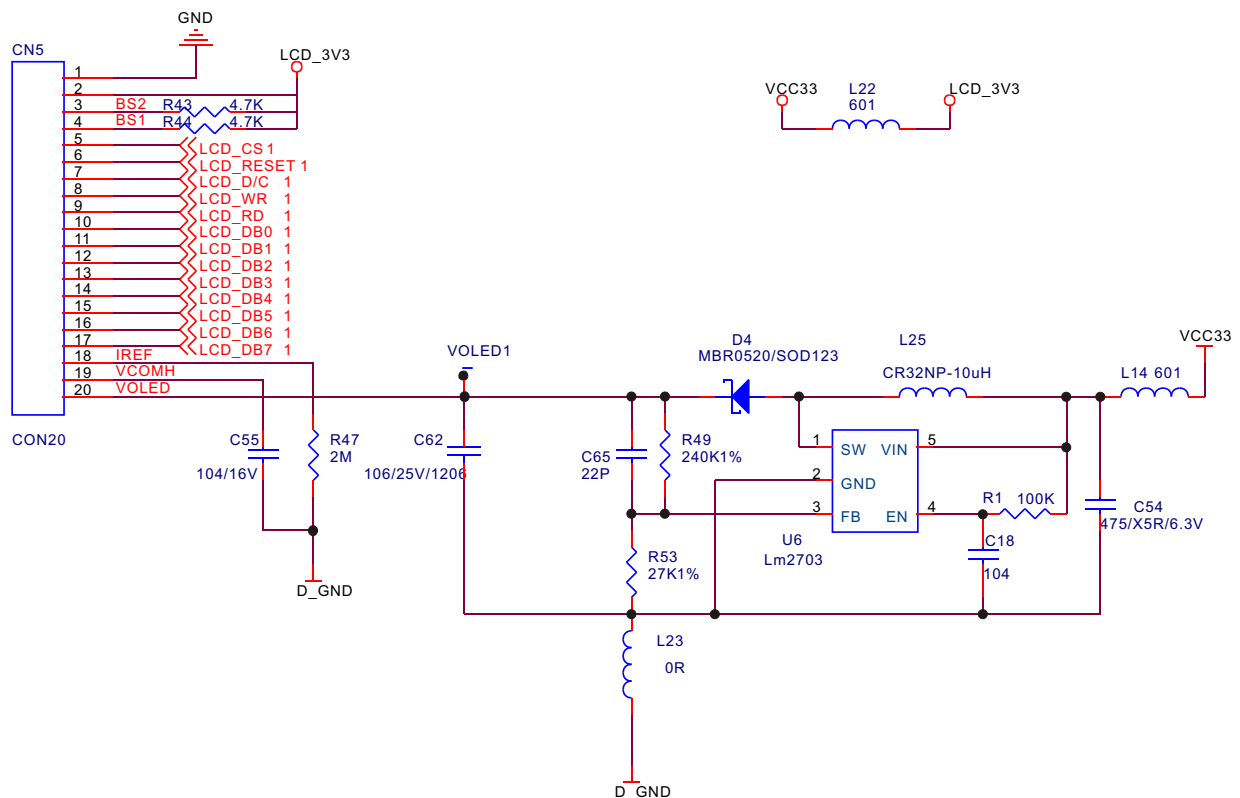


Figure 3.2.3.1 OLED circuit schematic diagram

2. Working principle: 12V high voltage is required to lighten OLED and matching circuit must be matched to finish. The circuit includes two parts: boosted circuit and OLED jack circuit, in which boosted circuit is constituted by boosted DC-DC LM2703 and peripheral circuit, VIN is power input, EN is Lm2703 enable end, high level is effective, SW is high voltage output pin, FB is feedback pin, voltage

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 R1 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 PNX0101 directly, through data exchange of LED_DB0~LED_DB7 and PNX0101, character display is controlled by internal program of PNX0101.

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:

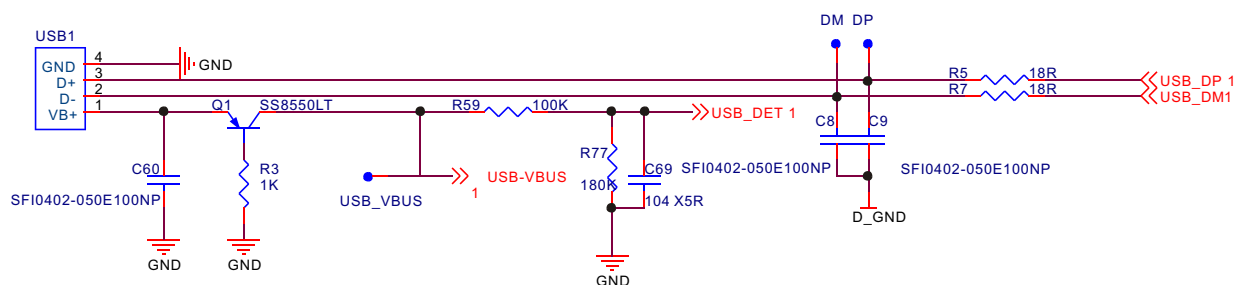


Figure 3.2.4.1 USB jack circuit schematic diagram

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.

D with USB control module of PNX0101 directly. When Mp3 is connected with computer, VB+ high level of computer USB jack inputs to USB_DET of PNX0101, USB jack is effective, USB jack connects with PNX0101 through D+ (USB_DP) and D- (USB_DM), then connected with Flash by PNX 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:

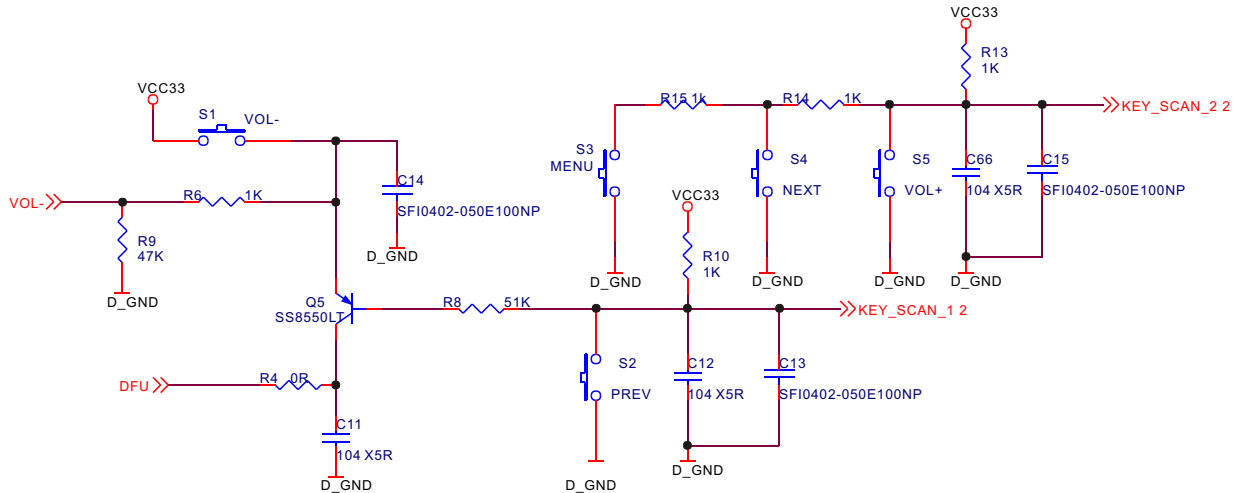


Figure 3.2.5.1 Buttons circuit schematic diagram

2. Working principle: buttons of X23 (RU) are composed of 6 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 PNX0101 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 PNX0101, then the internal program makes the relevant response to realize function of each button. To lock button.

3.2.6 Headphone jack circuit

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

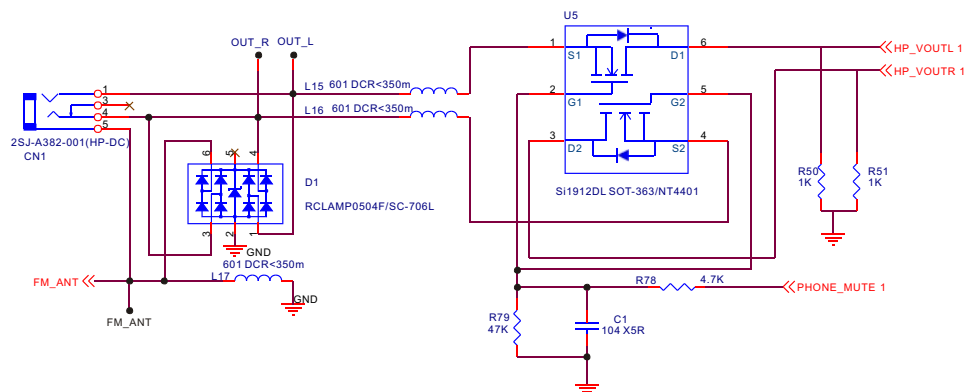


Figure 3.2.6.1 Headphone jack circuit schematic diagram

2. Working principle: left and right channels audio signals outputted from PNX0101, 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 Power on/off control circuit

1. Power on/off control circuit of X17 (RU) is shown in the figure 3.2.7.1:

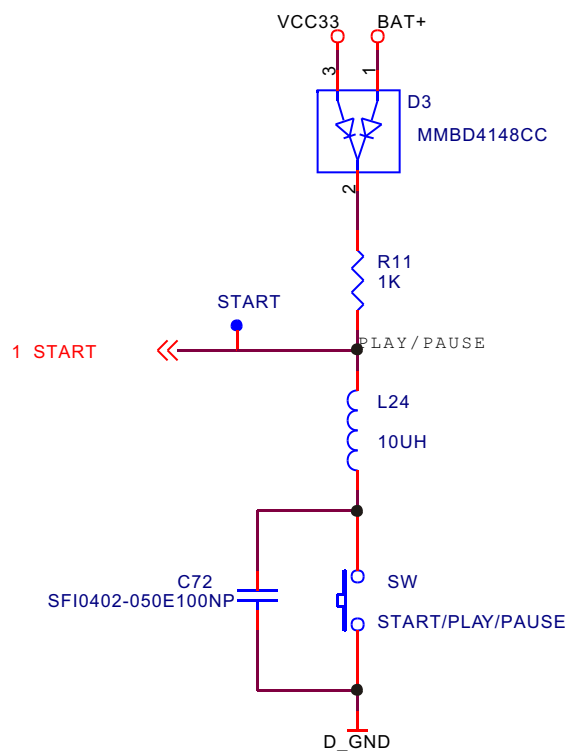


Figure 3.2.7.1 Power on control circuit schematic diagram

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 X23 (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.

3.2.8 Reset circuit

1. Reset circuit is to provide power on reset level for PNX0101. Reset circuit is shown in the figure 3.2.8.1:

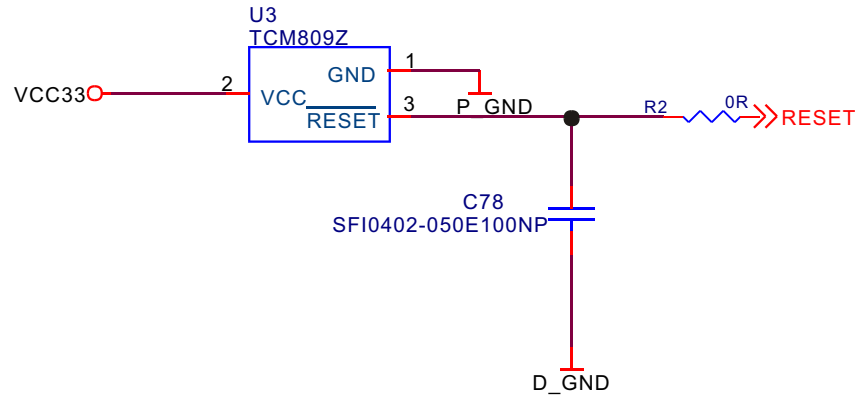


Figure 3.2.8.1 Reset circuit schematic diagram

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 PNX0101 to reset the player. After reset finishes, high level is maintained, C11 in circuit is voltage dependent resistor and used for anti-static.

3.2.9 MIC circuit

1. MIC circuit is shown in the figure 3.2.9.1:

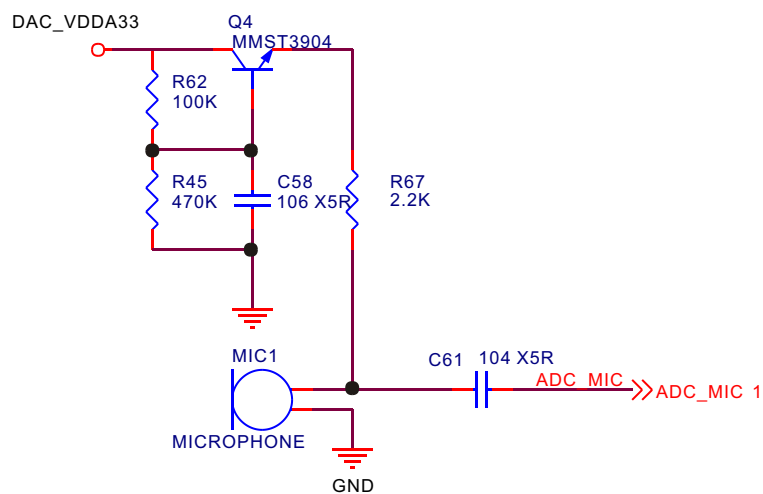


Figure 3.2.9.1 MIC circuit schematic diagram

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.

3.2.10 Low voltage detecting circuit

X23(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.

Section Three Servicing Cases

3.3.1 Servicing cases

[Example 1] 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 2] Symptom: not connect with computer

Description: connect with computer, no response and no OSD.

Analysis and troubleshooting: firstly confirm whether power-on is available and the result is normal; then check USB circuit, check whether 4 pin flat cable from USB socket to main board has open circuit (please note 4 Pin welding position of this model player is easy to break, so you cannot test flat cable directly and you must test from USB socket Pin to USB terminal Pin). Use diode level of multimeter to ground, test the resistance 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 is not allowed (test 2 pins in the middle of USB terminal); test and find that D+ resistance value is normal, D- resistance value is infinite, R5 is false welding; after welding again, trouble is removed.

[Example 3] Symptom: noise appears when tuning

Description: noise appears when tuning.

Analysis and troubleshooting: firstly judge whether tuning components or common part has trouble, whether one side of headphone has sound when listening, and the result is normal; then switch to tuning

State, search radio station automatically, tuning is normal, which means power supply, data and clock are normal; we remote external interference, receive the nearest local radio station and check whether it is clear, and the result shows noise still exists; circuit that causes noise is high frequency tuning and mixed frequency part; carefully check and find that pin 37 of tuning IC is false welding; weld again and trouble is removed.

[Example 4] 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; test C31, C32 waveform close to BGA, so we judge that it is BGA that has trouble; after changing it, trouble is removed.

[Example 5] 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.

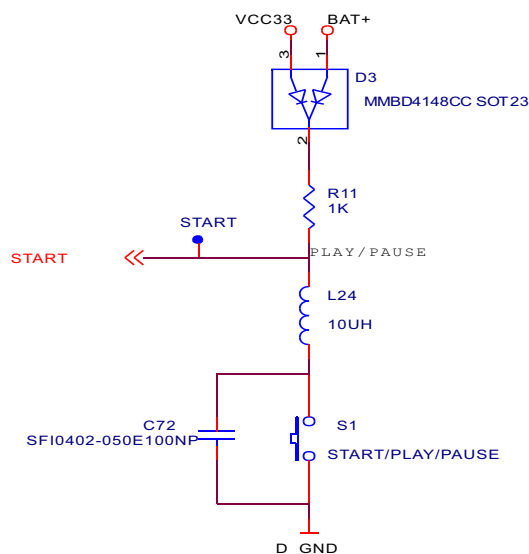


Figure 3.3.1.1 ON/OFF circuit schematic diagram

[Example 6] 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 7] 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 3.3.1.2. 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.

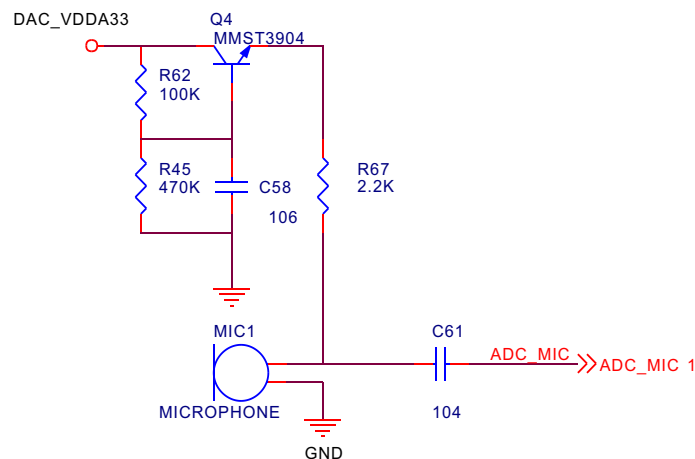


Figure 3.3.1.2 MIC circuit schematic diagram

[Example 8] Symptom: no OSD

Description: screen has no display

Analysis and troubleshooting: firstly confirm whether trouble lies in power or screen itself; power on and listen to the sound and sound is normal, so it is preliminarily judged that power supply 3.3V and 1.8V are both basically normal. 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 D4 and find that anode has no 12.5V 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 IC U6 has trouble, after changing it, trouble is removed.

[Example 9] 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 3.3.1.3, 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.

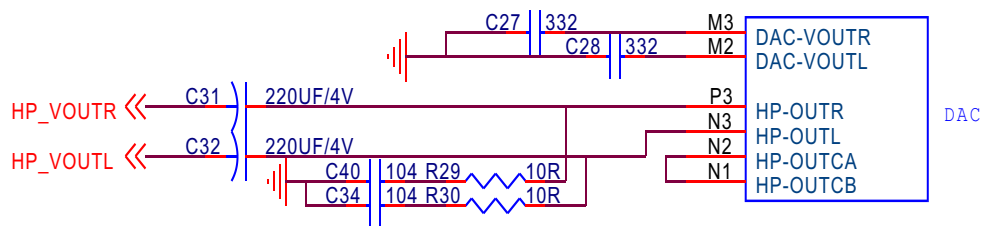


Figure 3.3.1.3 DAC circuit diagram

[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 3.3.1.4, 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 U4 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.

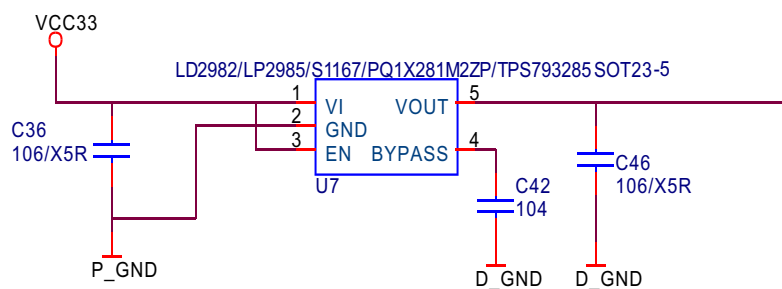


Figure 3.3.1.4 2.8V power switch circuit schematic diagram

3.3.2 Troubleshooting flow chart

1. Troubleshooting process for “No screen display”.

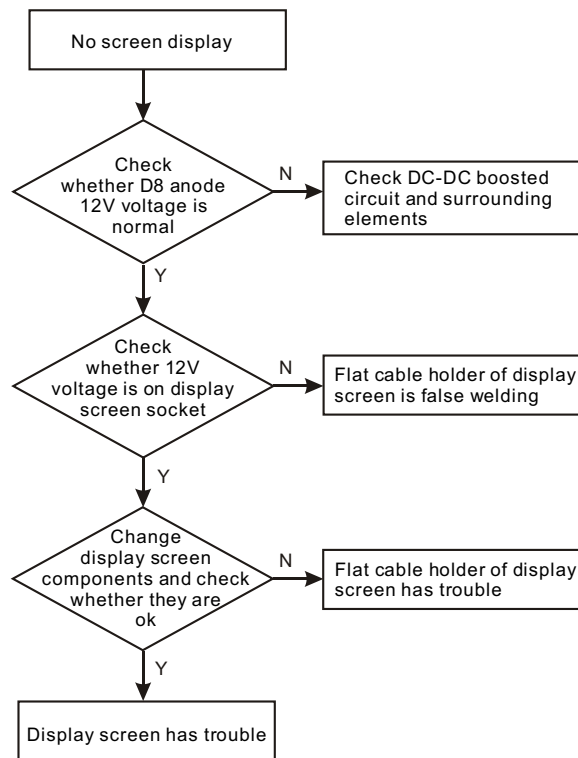


Figure 3.3.2.1 Trouble shooting flow chart for “No screen display”

2. Troubleshooting process for “USB not connected”.

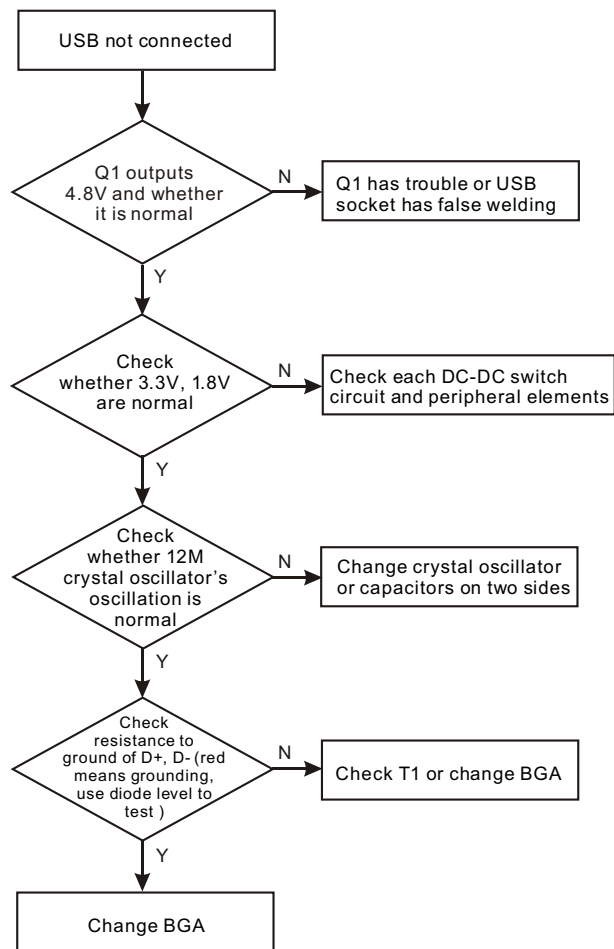


Figure 3.3.2.2 Troubleshooting plow chart for “USB not connected”

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

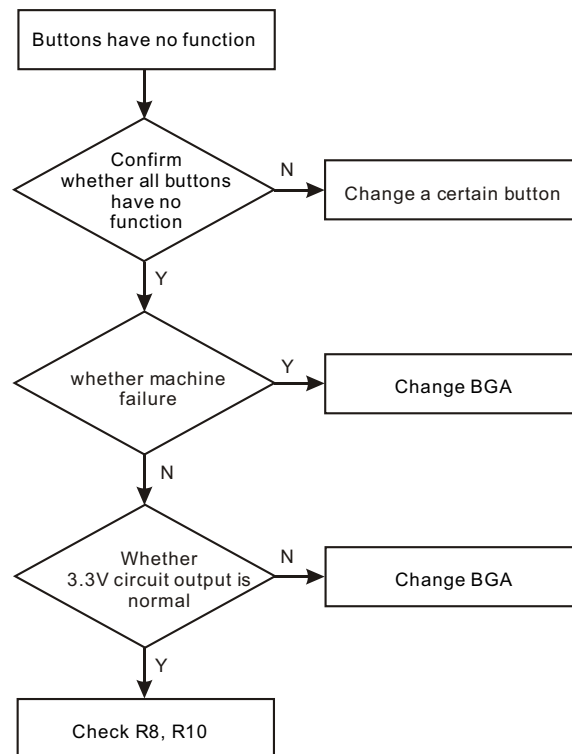


Figure 3.3.2.3 Troubleshooting flow chart for “Buttons have no function”

4 Troubleshooting process for “No tuning function”

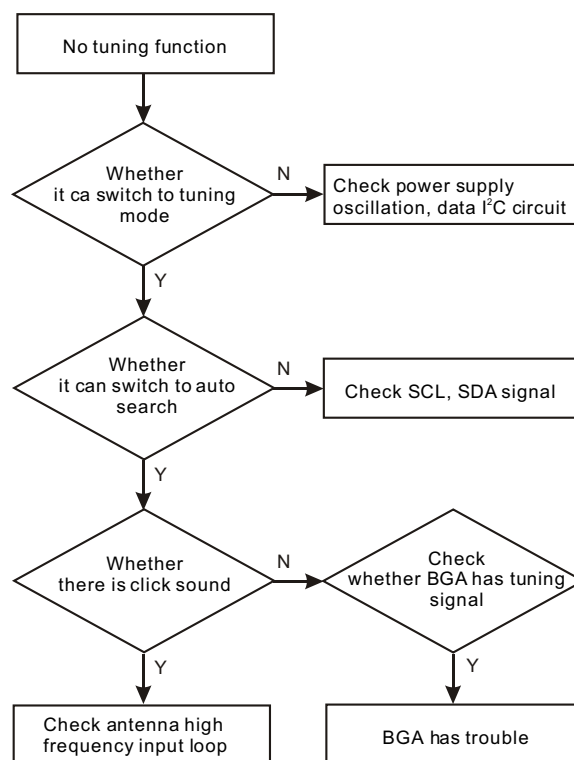


Figure 3.3.2.4 Troubleshooting flow chart for “No tuning function”

5.Troubleshooting process for "Power not on"

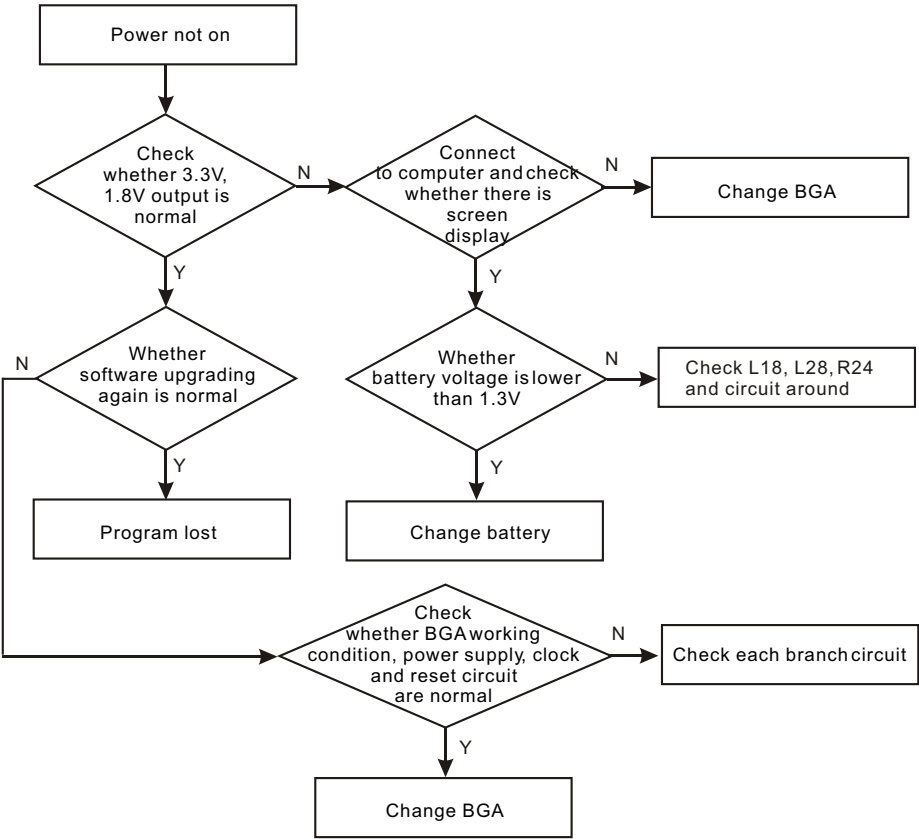
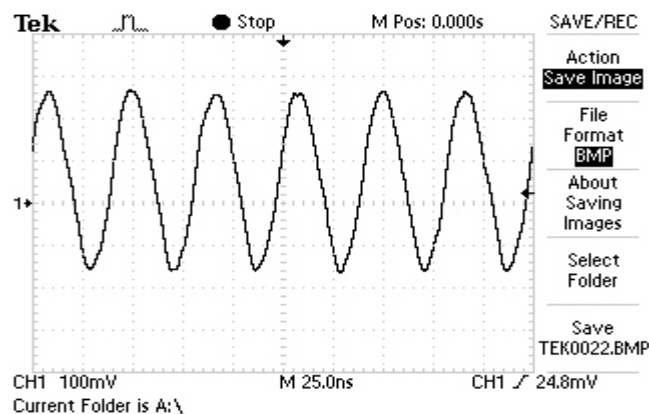


Figure 3.3.2.5 Troubleshooting flow chart for "Power not on"

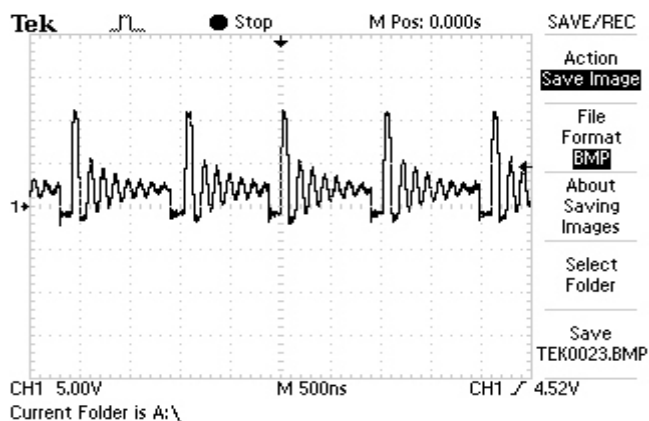
Section Four Waveform diagram

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.

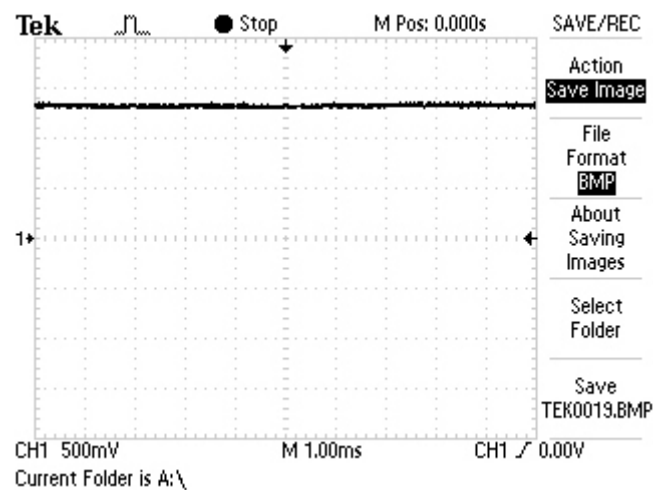
1. 12M crystal oscillator oscillation waveform diagram



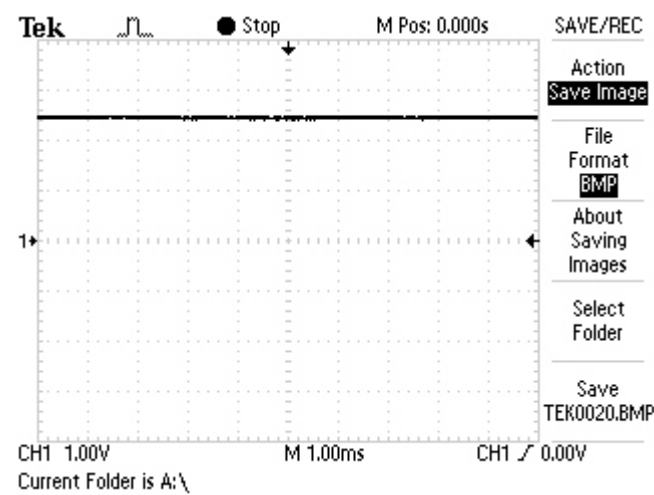
2. L25 boosted energy storage waveform diagram



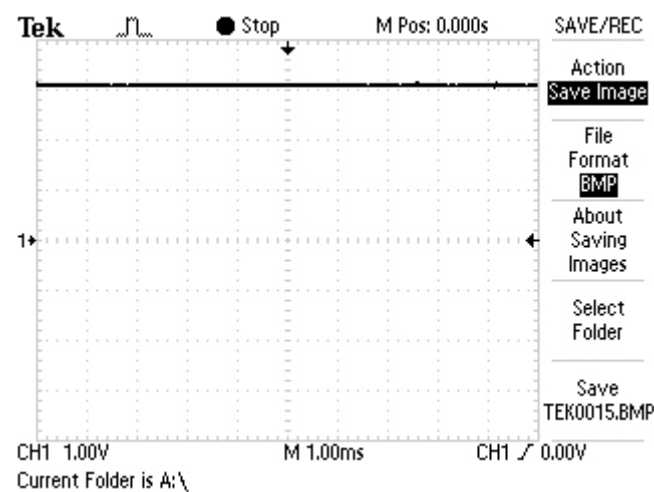
3. LCD_3V3 waveform diagram



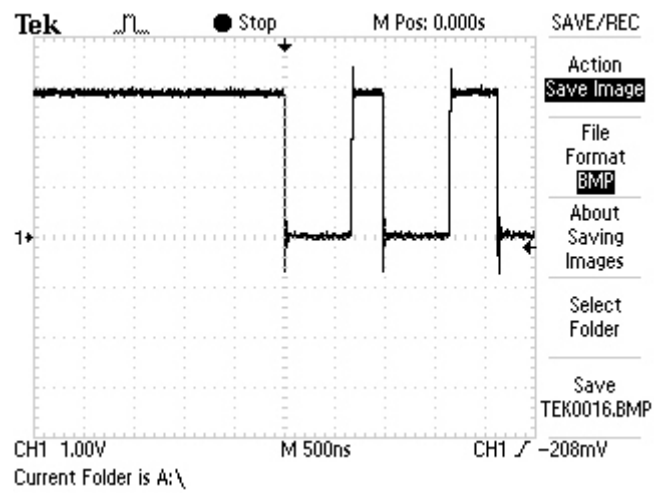
4. Software power supply 3V3 waveform diagram



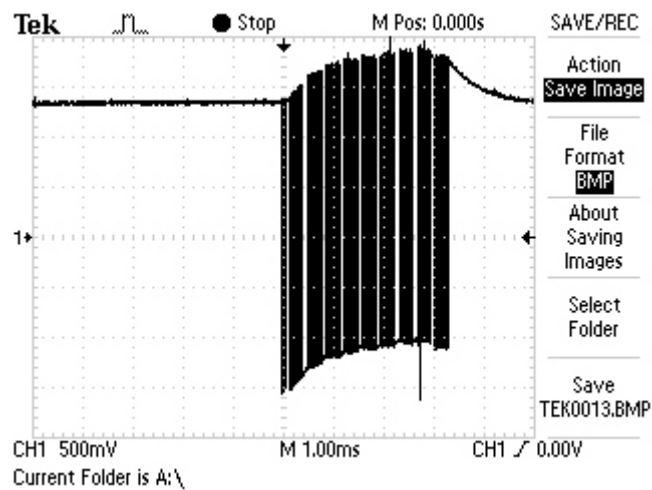
5. LCD_RESET waveform diagram



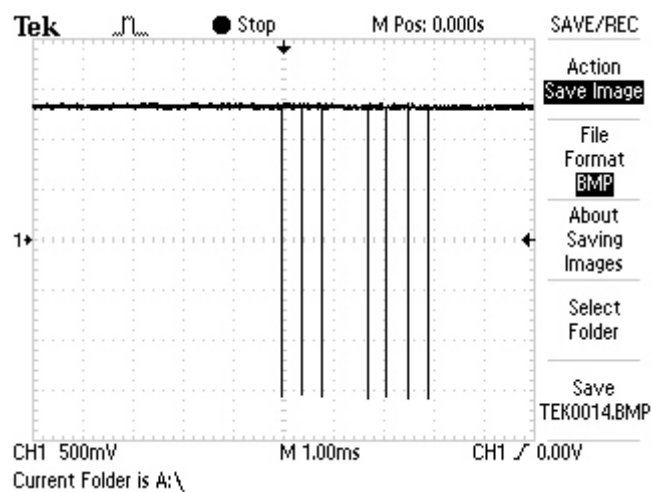
6. LCD_CS waveform diagram



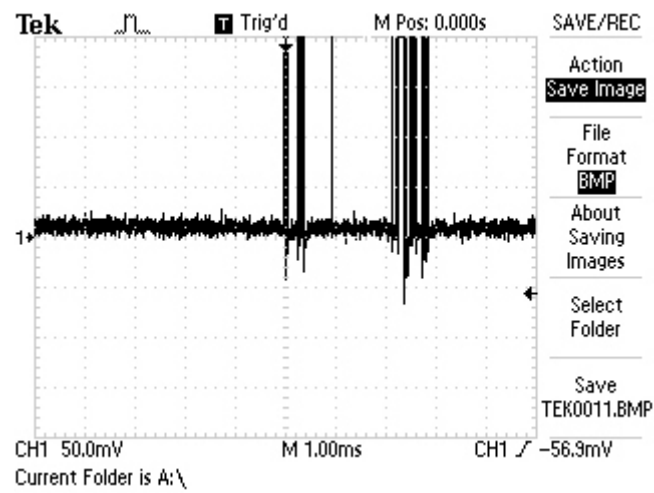
7. LCD_WR waveform diagram



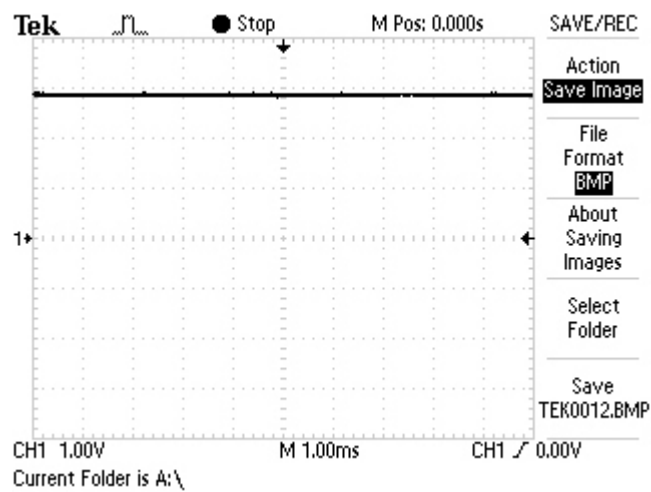
8. LCD_D/C waveform diagram



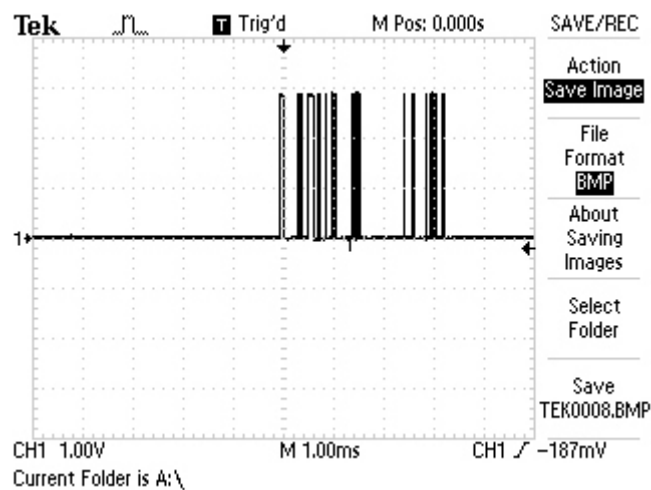
9. LCD_DB0 waveform diagram



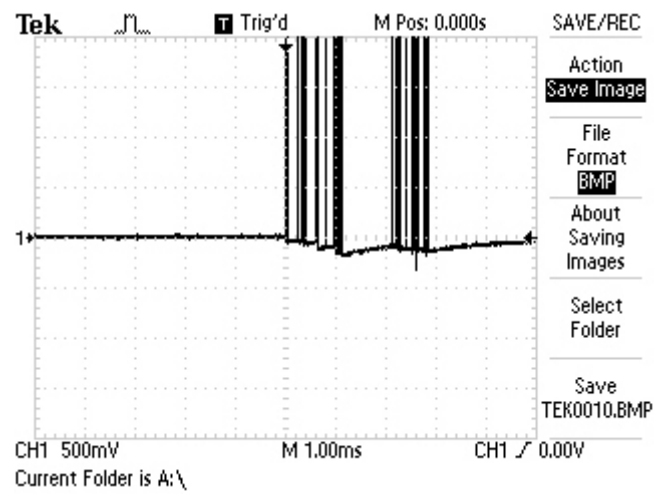
10. LCD_RD waveform diagram



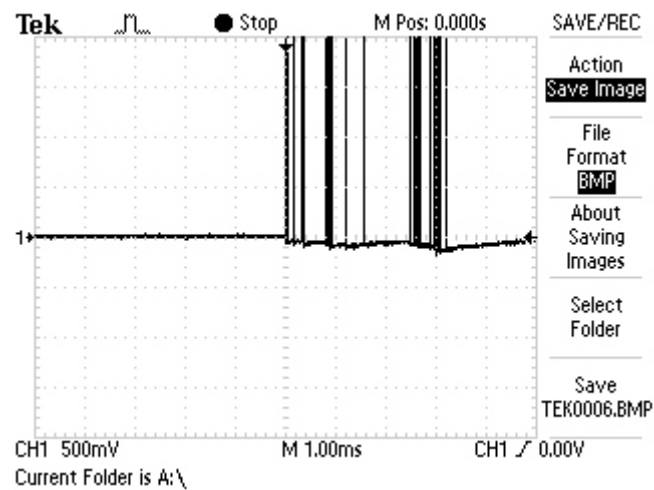
11. LCD_DB2 waveform diagram



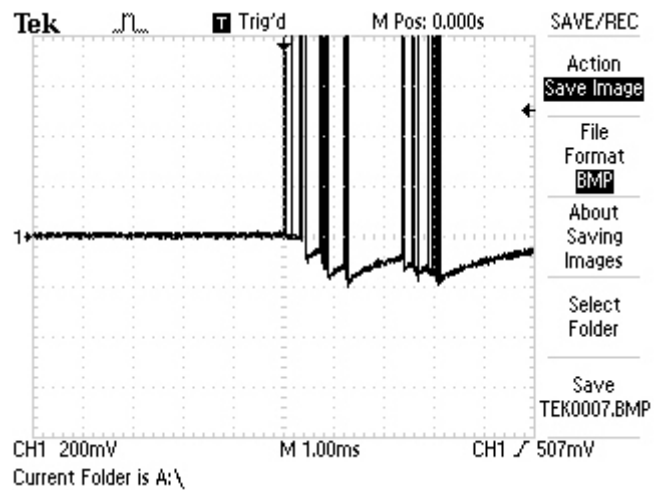
12. LCD_DB1 waveform diagram



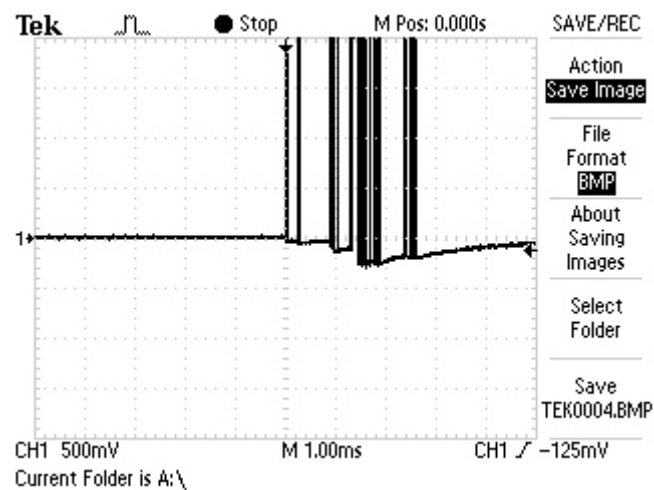
13. LCD_DB4 waveform diagram



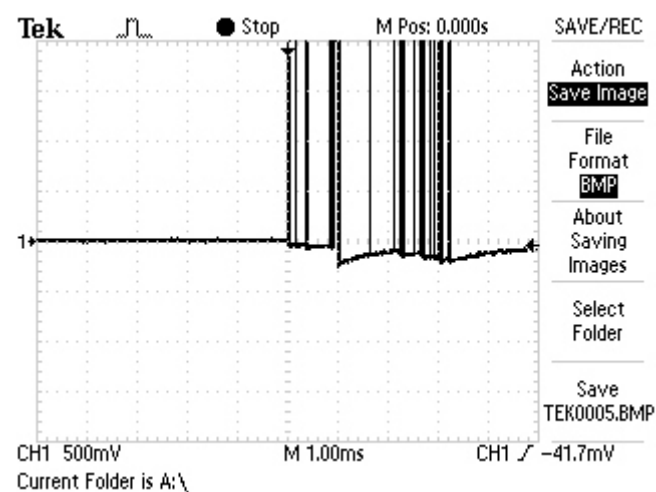
14. LCD_DB3 waveform diagram



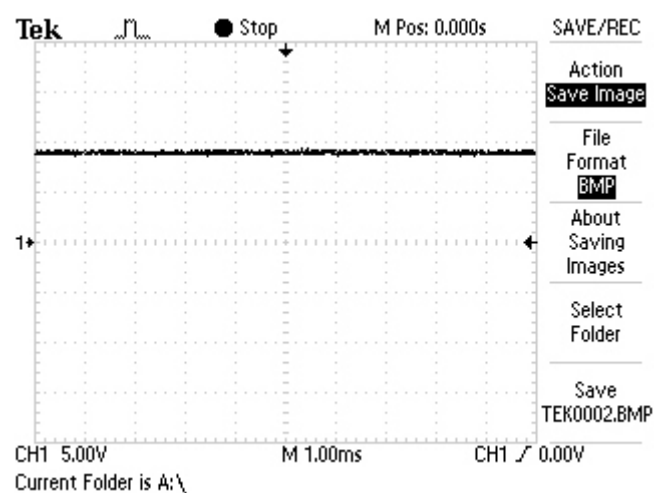
15. LCD_DB6 waveform diagram



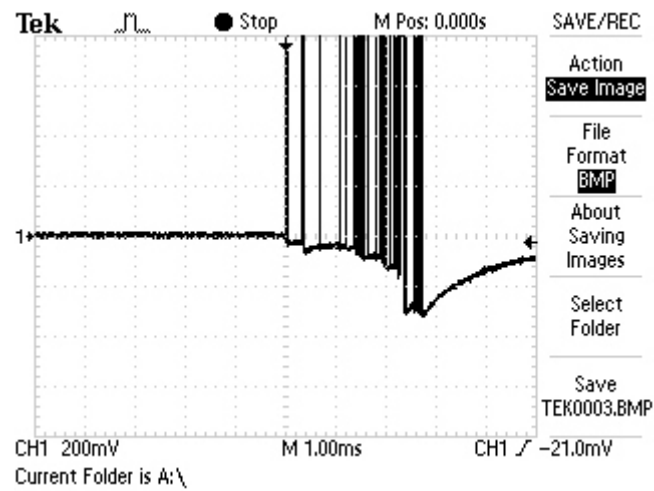
16. LCD_DB5 waveform diagram



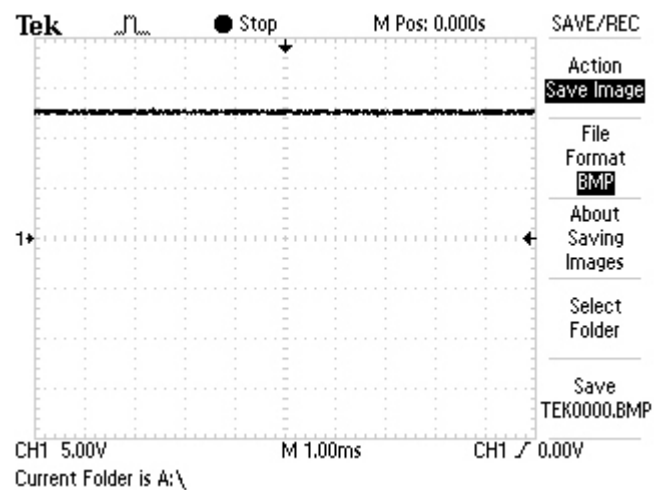
17. IREF waveform diagram



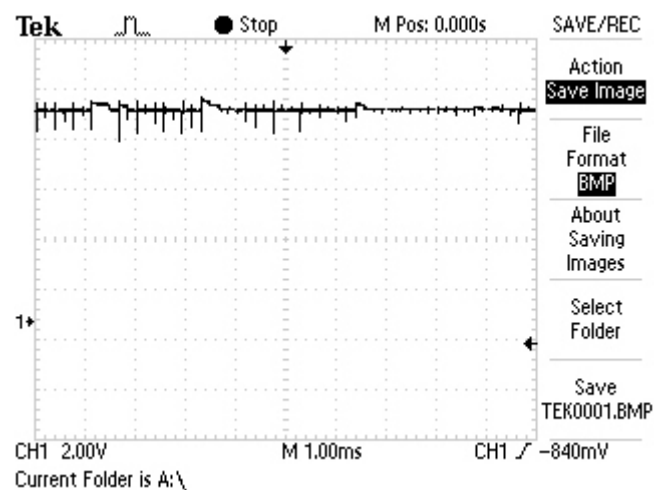
18. LCD_DB7 waveform diagram



19. VOLED waveform diagram



20. VCOMH waveform diagram



Section Five Function Introduction to IC

3.5.1 Function introduction to PNX0101ET

1. Description

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 kbyte dedicated cache.

2. Features

2.1 General Features

- ◆ One chip solution for compressed audio players using flash memory
- ◆ Programmable architecture enables flexible support of “up-coming” digital music formats
 - This hold for running the decoder on the ARM
 - The decoders on the low-power DSP, are running from mask ROM
- ◆ FM Radio input and control support
- ◆ Embedded program flash for easy upgrading and increased program security
- ◆ Support for Philips LifeVibes™ audio enhancement algorithms
- ◆ Small footprint package TBGA180 10x10mm 0.5pitch

2.2 Hardware Features

- ◆ ARM7TDMI + 8kByte cache
- ◆ Embedded 64kByte RAM and 32 kByte ROM
- ◆ Integrated embedded program Flash (4M bit)
- ◆ Ultra low power Audio DSP for support of Philips LifeVibes™ audio enhancement algorithms (storede in teh DSP's ROM).
- ◆ External memory support: Nand Flash/Compact flash/MMC/SMC/SRAM/ROM/SDRAM
- ◆ Integrated MCI interface
- ◆ Integrated USB 2.0 FS compliant slave interface (for firmware upgrade, data support from/to PC, streaming audio)

- ◆ Intelligent Configuration Power Management
- ◆ Single battery operated embedded DC/DC converter
- ◆ Integrated 6800/8080 compatible LCD interface
- ◆ General-Purpose IO pins (nearly all pins can be configured as GPIO pins)
- ◆ Integrated Master/Slave IIC interface
- ◆ Integrated ADC with line input and voice input (with recording possibility)
- ◆ Built-in ADC for level measurement & control (5-inputs)
- ◆ Integrated DAC with line output, headphone output with short-circuit protection
- ◆ Integrated IIS input and output interface
- ◆ Integrated SPDIF receiver
- ◆ Integrated UART + IRDA
- ◆ Integrated Real Time Clock with alarm
- ◆ Boundary scan

2.3 Possible software features

- ◆ MP3 encoding/decoding (*) => Support for MPEG 1 layer 3 and MPEG 2 layer 2.5 and layer 3 audio

decoding (MP3)

- ◆ WMA decoding (*)
- ◆ AAC decoding (*)
- ◆ Ogg Vorbis decoding (*)
- ◆ Voice recording using ADPCM
- ◆ Intelligent power management software
- ◆ USB Mass Storage Class
- ◆ USB Device Firmware Upgrade
- ◆ Philips LifeVibes™ sound enhancement software including bass/treble/volume control.

(*) Audio decoders/encoders do need appropriate licenses.

3. PIN Description

SYMBOL	BGA BALL	DIGITAL I/O LEVEL	APPL. FUNC	PIN STATE AFTER RESET	CELL TYPE	DESCRIPTION
12 MHz oscillator (fixed: 4 pins)						
XTALH_IN	T10		A	input	apio (ZI)	12 MHz clock input
XTALH_OUT	V9		A	output	apio (IO)	12 MHz clock output
XTALH_VDDA18	U9				vddco	Analog supply Oscillator
XTALH_VSSA	T9				vssco	Analog ground Oscillators
32.768 kHz oscillator (fixed: 4 pins)						

XTALL_IN	V7		A	input	apio (ZI)	32.768 kHz clock input
XTALL_OUT	T8		A	output	apio (ZI)	32.768 kHz clock output
XTALL_VDDA18	U8				vddco	Analog supply Oscillators/PLL's
XTALL_GNDA	V8				vssco	Analog ground Oscillators/PLL's
bitslicer/SPDIF (fixed: 3pins)						
SPDIF_IN	T12		A	input	apio (IO)	SPDIF input
SPDIF_VDDA33	U11				vddco	Analog supply SPDIF input
SPDIF_GNDA	T11				vssco	Analog ground SPDIF input
10-bit ADC (fixed: 7 pins)						
ADC10B_GPA4	U5		A	input	apio (ZI)	Analog General Purpose pins
ADC10B_GPA3	T6		A	input	apio (ZI)	Analog General Purpose pins
ADC10B_GPA2	U6		A	input	apio (ZI)	Analog General Purpose pins
ADC10B_GPA1	T7		A	input	apio (ZI)	Analog General Purpose pins
ADC10B_GPA0	U7		A	input	apio (ZI)	Analog General Purpose pins
ADC10B_VDDA33	V10				vddco	Analog supply 10-bit ADC
ADC10B_GNDA	U10				vssco	Analog ground 10-bit ADC
DAC (fixed: 13 pins)						
DAC_VOUTR	M3		A	output	apio (IO)	SDAC Right Analog Output
DAC_VOUTL	M2		A	output	apio (IO)	SDAC Left Analog Output
DAC_VDDA33	L1				vddco	SDAC Positive Voltage
DAC_VREFP	L2		A	input	apio (IO)	SDAC Positive Reference Voltage
DAC_VREFN	M1		A	input	apio (IO)	SDAC Negative Reference Voltage
HP_OUTR	P3		A	output	apio (IO)	SDAC Right Headphone Output
HP_OUTL	N3		A	output	apio (IO)	SDAC Left Headphone Output
HP_OUTCA	N2		A	output	apio (IO)	Headphone common output reference
HP_OUTCB	N1		A	output	apio (IO)	Headphone common output reference
HP_VDDA33A	R1				vddco	Headphone analog supply
HP_VDDA33B	R2				vddco	Headphone analog supply
HP_GNDAA	P2				vssco	Headphone analog ground
HP_GNDAB	P1				vssco	Headphone analog ground
ADC (fixed: 11 pins)						
ADC_VCOM	T3		A	input	apio (IO)	ADC Common Reference Voltage
ADC_VREFP	U2		A	input	apio (IO)	ADC Positive Reference Voltage

ADC_VREFN	V1		A	input	apio (IO)	ADC Negative Reference Voltage
ADC_VDDA18	V3				vddco	Analog supply ADC
ADC_VDDA33	U3				vddco	Analog supply ADC
ADC_GNDA	V2				vssco	Analog ground ADC
ADC_VREF	U1		A	input	apio (IO)	ADC Reference Voltage
ADC_VINR	T1		A	input	apio (IO)	SADC Right Analog Input
ADC_VINL	T4		A	input	apio (IO)	SADC Left Analog Input
ADC_MIC	R3		A	input	apio (IO)	Microphone input
ADC_MIC_LNA	T2		A	output	apio (IO)	Output of LNA of Microphone input
HP_VCOM				input		HP Common Reference Voltage
LCD Interface (fixed: 12 pins)						
LCD_RW_WR	G2	0-5 VDC tolerant	I/O	output	bpts10tht 5v	6800 read/write select 8080 active 'high' write enable
GPIO_LCD_11						General Purpose IO pin
LCD_E_RD	F2	0-5 VDC tolerant	I/O	output	bpts10tht 5v	6800 enable 8080 active 'high' read enable
GPIO_LCD_10						General Purpose IO pin
LCD_DB_7	E3	0-5 VDC tolerant	I/O	output	bpts10tht 5v	Data input 7/Data output 7/Serial data output/4-bit data 3
GPIO_LCD_9						General Purpos IO pin
LCD_DB_6	E2	0-5 VDC tolerant	I/O	output	bpts10tht 5v	Data input 6/Data output 6/Serial data input/4-bit data 2
GPIO_LCD_8						General Purpose IO pin
LCD_DB_5	D3	0-5 VDC tolerant	I/O	output	bpts10tht 5v	Data input 5/Data output 5/Serial clock output/4-bit data 1
GPIO_LCD_7						General Purpos IO pin
LCD_DB_4	D1	0-5 VDC tolerant	I/O	output	bpts10tht 5v	Data input 4/Data output 4/4-bit data 0
GPIO_LCD_6						General Purpose IO pin
LCD_DB_3	D2	0-5 VDC tolerant	I/O	output	bpts10tht 5v	Data input 3/Data output 3
GPIO_LCD_5						General Purpose IO pin
LCD_DB_2	C3	0-5 VDC tolerant	I/O	output	bpts10tht 5v	Data input 2/Data output 2
GPIO_LCD_4						General Purpose IO pin
LCD_DB_1	C1	0-5 VDC tolerant	I/O	output	bpts10tht 5v	Data input 1/Data output 1
GPIO_LCD_3						General Purpose IO pin

LCD_DB_0	C2	0-5 VDC	I/O	output	bpts10tht	Data input 0/Data output 0
GPIO_LCD_2		tolerant			5v	General Purpose IO pin
LCD_CSB	B3	0-5 VDC	I/O	output	bpts10tht	Chip Select
GPIO_LCD_1		tolerant			5v	General Purpose IO pin
LCD_RS	F3	0-5 VDC	I/O	output	bpts10tht	'high' Data register select 'low' instruction
GPIO_LCD_0		tolerant			5v	register select General Purpose IO pin
Memory Card Interface (fixed: 6 pins)						
MCI_DAT_3	J3	0-5 VDC	I/O	input	bpts10tht	Data input/Data output
GPIO_MCI_5		tolerant			5v	General Purpose IO pin
MCI_DAT_2	J1	0-5 VDC	I/O	input	bpts10tht	Data input/Data output
GPIO_MCI_4		tolerant			5v	General Purpose IO pin
MCI_DAT_1	J2	0-5 VDC	I/O	input	bpts10tht	Data input/Data output
GPIO_MCI_3		tolerant			5v	General Purpose IO pin
MCI_DAT_0	H3	0-5 VDC	I/O	input	bpts10tht	Data input/Data output
GPIO_MCI_2		tolerant			5v	General Purpose IO pin
MCI_CLK	G3	0-5 VDC	I/O	output	bpts10tht	MCI clock output
GPIO_MCI_1		tolerant			5v	General Purpose IO pin
MCI_CMD	H2	0-5 VDC	I/O	input	bpts10tht	Command input/Command output
GPIO_MCI_0		tolerant			5v	General Purpose IO pin
USB Interface (fixed: 4 pins + (8 pins reserved for future use))						
USB_CONNECT_N	T15	0-5 VDC	I/O	output	bpts10tht	Soft connect output USB 2.0 FS
GPIO_USB_1		tolerant			5v	General Purpose IO pin
USB_RPU					A	apio (IO)
USB_DP	U17		A	input	usb11	Positive USB data line USB 2.0 FS
USB_DP					apio	Positive USB data line USB 2.0 HS
USB_DM	T17		A	input	usb11	Negative USB data line USB 2.0 FS
USB_DM					apio	Negative USB data line USB 2.0 HS
USB_VBUS	U14	0-5 VDC	I/O	input	bpts10tht	USB Supply detection line USB 2.0 FS &
GPIO_USB_0		tolerant			5v	USB 2.0 HS General Purpose IO pin
USB_RREF	P16		I/O		bpts10tht 5v	

USB_GNDA	R17				vssco	Reserved for USB 2.0 HS
USB_VSSA_REF	R16				vccso	Reserved for USB 2.0 HS
USB_VSSA_TERM	T16				vssco	Reserved for USB 2.0 HS
USB_VDDA18_PLL	U15				vddco	Reserved for USB 2.0 HS
USB_VDDA18_BG	U16				vddco	Reserved for USB 2.0 HS
USB_VDDA33	U18				vddco	Reserved for USB 2.0 HS
USB_VDDA33_DRV	V18				vddco	Reserved for USB 2.0 HS
DAI Interface (fixed: 3 pins)						
DAI_BCK	H17	0-5 VDC tolerant	I/O	input	bpts10tht	DAI Bitclock
GPIO_DAI_2					5v	General Purpose IO pin
DAI_WS	G17	0-5 VDC tolerant	I/O	input	bpts10tht	DAI Wordselect
GPIO_DAI_1					5v	General Purpose IO pin
DAI_DATA	G16	0-5 VDC tolerant	I/O	input	bpts10tht	DAI Serial data input
GPIO_DAI_0					5v	General Purpose IO pin
DAO Interface (fixed: 4 pins)						
DAO_CLK	F16	0-5 VDC tolerant	I/O	output	bpts10tht 5v	256 fs clock output
DAO_BCK	G18	0-5 VDC tolerant	I/O	output	bpts10tht	DAO Bitclock
GPIO_DAO_2					5v	General Purpose IO pin
DAO_WS	F18	0-5 VDC tolerant	I/O	output	bpts10tht 5v	DAO Wordselect
DAO_DATA	F17	0-5 VDC tolerant	I/O	output	bpts10tht	DAO Serial data output
GPIO_DAO_0					5v	General Purpose IO pin
JTAG (fixed: 6 pins)						
JTAG_TRST_N	T13	0-5 VDC tolerant	I	input	ipthdt5v	JTAG Reset Input (pull-down)
JTAG_TCK	V4	0-5 VDC tolerant	I	input	ipthut5v	JTAG Clock Input (pull-up)
JTAG_TMS	U12	0-5 VDC tolerant	I	input	ipthut5v	JTAG Mode Select Input (external pull-up)
JTAG_TDI	T5	0-5 VDC tolerant	I	input	ipthut5v	JTAG Data Input (pull-up)
JTAG_TDO	U13	0-5 VDC tolerant	I/O	output	bpts10tht 5v	JTAG Data output

JTAG_SEL_ARM	U4	0-5 VDC tolerant	I	input	ipthdt5v	JTAG selection (pull-down)
IIC master/slave Interface (fixed: 2 pins)						
IIC_SCL	H16	0-5 VDC tolerant	I/O	input	iic400kt5 v	Serial clock IIC Slave
IIC_SDA	J17	0-5 VDC tolerant	I/O	input	iic400kt5 v	Serial data IIC Slave
MPMC (fixed: 52 pins)						
MPMC_D_15	B8		I/O	input	bpts10th	MPMC data input/output 15
GPIO_MPMC_50						General Purpose IO pin
MPMC_D_14	C8		I/O	input	bpts10th	MPMC data input/output 14
GPIO_MPMC_49						General Purpose IO pin
MPMC_D_13	B7		I/O	input	bpts10th	MPMC data input/output 13
GPIO_MPMC_48						General Purpose IO pin
MPMC_D_12	C7		I/O	input	bpts10th	MPMC data input/output 12
GPIO_MPMC_47						General Purpose IO pin
MPMC_D_11	B6		I/O	input	bpts10th	MPMC data input/output 11
GPIO_MPMC_46						General Purpose IO pin
MPMC_D_10	C6		I/O	input	bpts10th	MPMC data input/output 10
GPIO_MPMC_45						General Purpose IO pin
MPMC_D_9	C5		I/O	input	bpts10th	MPMC data input/output 9
GPIO_MPMC_44						General Purpose IO pin
MPMC_D_8	C4		I/O	input	bpts10th	MPMC data input/output 8
GPIO_MPMC_43						General Purpose IO pin
MPMC_D_7	B5		I/O	input	bpts10th	MPMC data input/output 7
GPIO_MPMC_42						General Purpose IO pin
MPMC_D_6	A5		I/O	input	bpts10th	MPMC data input/output 6
GPIO_MPMC_41						General Purpose IO pin
MPMC_D_5	B4		I/O	input	bpts10th	MPMC data input/output 5
GPIO_MPMC_40						General Purpose IO pin
MPMC_D_4	A4		I/O	input	bpts10th	MPMC data input/output 4
GPIO_MPMC_39						General Purpose IO pin
MPMC_D_3	A3		I/O	input	bpts10th	MPMC data input/output 3
GPIO_MPMC_38						General Purpose IO pin

MPMC_D_2	B2		I/O	input	bpts10th	MPMC data input/output 2
GPIO_MPMC_37						General Purpose IO pin
MPMC_D_1	A2		I/O	input	bpts10th	MPMC data input/output 1
GPIO_MPMC_36						General Purpose IO pin
MPMC_D_0	A1		I/O	input	bpts10th	MPMC data input/output 0
GPIO_MPMC_35						General Purpose IO pin
MPMC_A_20	C13		I/O	output	bpts10th	MPMC address 20
GPIO_MPMC_34						General Purpose IO pin
MPMC_A_19	B13		I/O	output	bpts10th	MPMC address 19
GPIO_MPMC_33						General Purpose IO pin
MPMC_A_18	A13		I/O	output	bpts10th	MPMC address 18
GPIO_MPMC_32						General Purpose IO pin
MPMC_A_17	C14		I/O	output	bpts10th	MPMC address 17
GPIO_MPMC_31						General Purpose IO pin
MPMC_A_16	B14		I/O	output	bpts10th	MPMC address 16
GPIO_MPMC_30						General Purpose IO pin
MPMC_A_15	A14		I/O	output	bpts10th	MPMC address 15
GPIO_MPMC_29						General Purpose IO pin
MPMC_A_14	C15		I/O	output	bpts10th	MPMC address 14
GPIO_MPMC_28						General Purpose IO pin
MPMC_A_13	B15		I/O	output	bpts10th	MPMC address 13
GPIO_MPMC_27						General Purpose IO pin
MPMC_A_12	C16		I/O	output	bpts10th	MPMC address 12
GPIO_MPMC_26						General Purpose IO pin
MPMC_A_11	B16		I/O	output	bpts10th	MPMC address 11
GPIO_MPMC_25						General Purpose IO pin
MPMC_A_10	C17		I/O	output	bpts10th	MPMC address 10
GPIO_MPMC_24						General Purpose IO pin
MPMC_A_9	B17		I/O	output	bpts10th	MPMC address 9
GPIO_MPMC_23						General Purpose IO pin
MPMC_A_8	C18		I/O	output	bpts10th	MPMC address 8
GPIO_MPMC_22						General Purpose IO pin
MPMC_A_7	B18		I/O	output	bpts10th	MPMC address 7

GPIO_MPMC_21						General Purpose IO pin
MPMC_A_6	A18		I/O	output	bpts10th	MPMC address 6
GPIO_MPMC_20						General Purpose IO pin
MPMC_A_5	D18		I/O	output	bpts10th	MPMC address 5
GPIO_MPMC_19						General Purpose IO pin
MPMC_A_4	D17		I/O	output	bpts10th	MPMC address 4
GPIO_MPMC_18						General Purpose IO pin
MPMC_A_3	D16		I/O	output	bpts10th	MPMC address 3
GPIO_MPMC_17						General Purpose IO pin
MPMC_A_2	E18		I/O	output	bpts10th	MPMC address 2
GPIO_MPMC_16						General Purpose IO pin
MPMC_A_1	E17		I/O	output	bpts10th	MPMC address 1
GPIO_MPMC_15						General Purpose IO pin
MPMC_A_0	E16		I/O	output	bpts10th	MPMC address 0
GPIO_MPMC_14						General Purpose IO pin
MPMC_NSTCS_2	B11		I/O	output	bpts10th	Static memory chip select 2. Default active LOW (reprogrammable).
GPIO_MPMC_13						General Purpose IO pin
MPMC_NSTCS_1	A8		I/O	output	bpts10th	Static memory chip select 1. Default active LOW (reprogrammable).
GPIO_MPMC_12						General Purpose IO pin
MPMC_NSTCS_0	C9		I/O	output	bpts10th	Static memory chip select 0. Default active LOW (reprogrammable).
GPIO_MPMC_11						General Purpose IO pin
MPMC_NDYCS	B9		I/O	output	bpts10th	SDRAM chip select. Active LOW.
GPIO_MPMC_10						General Purpose IO pin
MPMC_CLKOUT	A10		O	output	bpt4mt	Memory clock output. Connect to the clock input of SDRAM and SyncFlash devices.
MPMC_CKE	B10		I/O	output	bpts10th	SDRAM clock enable. Active HIGH.
GPIO_MPMC_9						General Purpose IO pin
MPMC_NWE	C11		I/O	output	bpts10th	Write enable for SDRAM. Active LOW.
GPIO_MPMC_8						General Purpose IO pin

MPMC_NRAS	A9		I/O	output	bpts10th	Row address strobe for SDRAM and SyncFlash devices. Active LOW.
GPIO_MPMC_7						General Purpose IO pin
MPMC_NCAS	C10		I/O	output	bpts10th	Column address strobe for SDRAM and SyncFlash devices. Active LOW.
GPIO_MPMC_6						General Purpose IO pin
MPMC_DQM_1	A11		I/O	output	bpts10th	Data mask output to SDRAM. Active HIGH. The signal MPMCDQMOUT[1] mask byte [15:8] on the data bus. Used for SDRAM devices.
GPIO_MPMC_5						General Purpose IO pin
MPMC_DQM_0	C12		I/O	output	bpts10th	Data mask output to SDRAM. Active HIGH. The signal MPMCDQMOUT[0] mask byte [7:0] on the data bus. Used for SDRAM devices.
GPIO_MPMC_4						General Purpose IO pin
MPMC_NOE	A17		I/O	output	bpts10th	Output enable for static memories. Active LOW. Used for static memory devices.
GPIO_MPMC_3						General Purpose IO pin
MPMC_BLOUT1	B12		I/O	output	bpts10th	The signal nMPMCBLSOUT[1] selects byte lane [15:8] on the data bus. Used for static memory devices.
GPIO_MPMC_2						General Purpose IO pin
MPMC_BLOUT0	A12		I/O	output	bpts10th	The signal nMPMCBLSOUT[0] selects byte lane [7:0] on the data bus. Used for static memory devices.
GPIO_MPMC_1						General Purpose IO pin
MPMC_RPOUT	B1		I/O	output	bpts10th	Reset power down to SyncFlash memory. Active LOW. Used for static memory devices.
GPIO_MPMC_0						General Purpose IO pin
UART (fixed: 4 pins)						
UART_TXD	L3	0-5 VDC tolerant	I/O	output	bpts10tht	Serial output
GPIO_UART_3					5v	General Purpose IO pin
UART_RXD	K3	0-5 VDC	I/O	input	bpts10tht	Serial input

GPIO_UART_2		tolerant			5v	General Purpose IO pin
UART_NCTS	K2	0-5 VDC	I/O	input	bpts10tht	Clear to send (active low)
GPIO_UART_1		tolerant			5v	General Purpose IO pin
UART_NRTS	K1	0-5 VDC	I/O	output	bpts10tht	Ready to send
GPIO_UART_0		tolerant			5v	General Purpose IO pin
Mode selection pins (fixed: 2 pins)						
GPIO_3	J16	0-5 VDC tolerant	I/O	input	bpts10th dt5v	Start up mode pin 2 (pull down) General Purpose IO pin
GPIO_2	K18	0-5 VDC tolerant	I/O	input	bpts10th dt5v	Start up mode pin 1 (pull down) General Purpose IO pin
GPIO (fixed: 2 pins)						
GPIO_1	K17	0-5 VDC tolerant	I/O	input output (Test Mode))	bpts10tht 5v	General Purpose IO pin Toggled (Test Mode)
GPIO_0	K16	0-5 VDC tolerant	I/O	input	bpts10tht 5v	General Purpose IO pin (stop)
Reset input pin (fixed: 1 pin)						
RSTIN_N	T14	0-5 VDC tolerant	I	input	ipthut5v	System Reset input (active low)
Flash pins (fixed: 1 pins)						
FLASH_VDD_HV	V15				vddco	
Digital supplies (fixed: 6 pins)						
VDDI1	H1				vddco	Core supply (Mem)
VDDI2	V11				vddco	Core supply (Core)
VDDI3	V16				vddi	Core supply (Flash)
VSSI1	G1				vssco	Core ground (Mem)
VSSI2	V12				vssco	Core ground (Core)
VSSI3	V17				vssis	Core ground (Flash)
Peripheral supplies (fixed: 12 pins)						
VDDE1	E1				vdde3v3	Peripherel (I/O) supply (3.3V)
VDDE2	V5				vdde3v3	Peripheral (I/O) supply (3.3V)
VDDE3	V14				vdde3v3	Peripheral (I/O) supply (3.3V)
VDDE4	J18				vdde3v3	Peripheral (I/O) supply (3.3V)
VSSE1	F1				vsse3v3	Peripheral (I/O) ground

VSSE2	V6				vsse3v3	Peripheral (I/O) ground
VSSE3	V13				vsse3v3	Peripheral (I/O) ground
VSSE4	H18				vsse3v3	Peripheral (I/O) ground
VDDE5	A16				vdde3v3	MPMC Peripheral (I/O) supply (1.8V .. 3.3V)
VDDE6	A7				vdde3v3	MPMC Peripheral (I/O) supply (1.8V .. 3.3V)
VSSE5	A15				vsse3v3	MPMC Peripheral (I/O) ground
VSSE6	A6				vsse3v3	MPMC Peripheral (I/O) ground
DC/DC pins (fixed: 13 pins)						
DCDC_PLAY	L17		A		apio	Play button input
DCDC_STOP	L18		A		apio	Stop signal input
DCDC_LX2	N17		A		apio	DC/DC connection to external coil 2
DCDC_LX1	P17		A		apio	DC/DC connection to external coil 1
DCDC_VUSB	T18		A		apio	USB supply voltage
DCDC_VBAT	M17				vddco	Battery supply voltage
DCDC_VOUT33A	R18				vddco	DC/DC 3.3V output voltage
DCDC_VOUT33B	M16				vddco	DC/DC 3.3V input voltage
DCDC_VOUT18	N18				vddco	DC/DC 1.8V output voltage
DCDC_VSS1	P18				vssco	DC/DC ground to N-switch 1
DCDC_VSS2	N16				vssco	DC/DC ground to N-switch 2
DCDC_GND	L16				vssco	Core ground and substrate
DCDC_CLEAN	M18				vssco	Reference circuit ground, not connected to substrate

3.5.2 Function introduction to K9F2G08U0M

1. Description

Offered in 512M × 8bit, the K9F2G08U0M 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 200 μs 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 data. 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 TSOPi package.

2. Features

- ◆ Voltage Supply
 - 2.7 V ~3.6 V
- ◆ Organization
 - Memory Cell Array
 - (512M + 16,384K)bit x 8bit
 - Data Register
 - (2K + 64)bit x8bit
 - Cache Register
 - (2K + 64)bit x8bit
- ◆ Automatic Program and Erase
 - Page Program
 - (2K + 64)Byte
 - Block Erase
 - (128K + 4K)Byte
- ◆ Page Read Operation
 - Page Size
 - 2K-Byte
 - Random Read : 25 μ s(Max.)
 - Serial Access : 30ns(Min.)
- ◆ Fast Write Cycle Time
 - Program time : 200 μ s(Typ.)
 - Block Erase Time : 2ms(Typ.)
- ◆ Command/Address/Data Multiplexed I/O Port
- ◆ Hardware Data Protection
 - Program/Erase Lockout During Power Transitions
- ◆ Reliable CMOS Floating-Gate Technology
 - Endurance : 100K Program/Erase Cycles
 - Data Retention : 10 Years
- ◆ Command Register Operation
- ◆ Cache Program Operation for High Performance Program
- ◆ Power-On Auto-Read Operation

- ◆ Intelligent Copy-Back Operation
- ◆ Unique ID for Copyright Protection
- ◆ Package :
 - K9K4G08U0M-YCB0/YIB0
48-Pin TSOP I (12 x 20 / 0.5 mm pitch)
 - K9W8G08U1M-YCB0/YIB0 : Two K9K4G08U0M stacked.
48-Pin TSOP I (12 x 20 / 0.5 mm pitch)
 - K9K4G08U0M-PCB0/PIB0 : Pb-FREE PACKAGE
48-Pin TSOP I (12 x 20 / 0.5 mm pitch)
 - K9W8G08U1M-PCB0/PIB0 : Two K9K4G08U0M stacked.
48-Pin TSOP I (12 x 20 / 0.5 mm pitch)

3. PIN Description

PIN No.	Symbol	I/O	Description
29~32, 41~44	I/O0 ~ I/O7	I/O	DATA INPUTS/OUTPUTS
16	CLE	I	COMMAND LATCH ENABLE
17	ALE	I	ADDRESS LATCH ENABLE
9	/CE	I	CHIP ENABLE
8	/RE	I	READ ENABLE
18	/WE	I	WRITE ENABLE
19	/WP	I	WRITE PROTECT
7	R/B	I	READY/BUSY OUTPUT
38	PRE	I	POWER-ON READ ENABLE
37	Vcc	P	POWER
36	Vss	P	GROUND
1~6, 9, 10, 14, 15, 20~24, 25~28, 33~35, 39, 40, 45~48	N.C	N	NO CONNECTION

3.5.3 Function introduction to TCM809ZVBN713

1. Description

The TCM809 is cost-effective system supervisor circuits designed to monitor VDD in digital systems; providing a reset signal to the host processor, when necessary. No external components are required.

The RESET output is typically driven active within 65 μ sec of VDD falling through the reset voltage threshold. RESET is maintained active for a minimum of 140 msec after VDD rises above the reset threshold. The TCM809 has an active-low RESET output. The output of the TCM809 is valid down to VDD = 1V. Both devices are available in 3-Pin SC-70 and SOT-23B packages.

2. Features

- ◆ Precision VDD Monitor for 2.5V, 3.0V, 3.3V, 5.0V Nominal System Voltage Supplies
- ◆ 140 msec Minimum RESET Time-Out Period
- ◆ RESET Output to VDD = 1.0V (TCM809)
- ◆ Low Supply Current, 9 μ A (typ.)
- ◆ VDD Transient Immunity
- ◆ Small 3-Pin SC-70 and SOT-23B Packages
- ◆ No External Components
- ◆ Push-Pull RESET Output
- ◆ Temperature Ranges:
 - Extended: SOT-23, SC-70 (V): -40 ° C to +125 ° C

3. PIN Description

PIN No.	Symbol	I/O	Description
1	GND		Ground
2	Vcc	P	Supply voltage
3	/RESET	O	/RESET push-pull output

3.5.4 Function introduction to PQ1X281M2ZP

1. Description

The PQ1Xxx1M2ZP Series are Low Output Current, Compact Surface Mount Type Low Power-Loss Voltage Regulators.

2. Features

- ◆ Compact surface mount package (2.9×1.6×1.1mm)
- ◆ Low power-loss (Dropout voltage: TYP. 0.11 V/MAX. 0.26V at IO=60mA)
- ◆ Also compatible ceramic capacitors because of suppressing oscillation level
- ◆ High ripple rejection (TYP. 70dB)
- ◆ Low dissipation current (Dissipation current at no load: TYP. 150 μ A)
- ◆ Built-in ON/OFF control function (Dissipation current at OFF-state: MAX. 1 μ A)
- ◆ Built-in overcurrent and overheat protection functions

*It is available for every 0.1V of output voltage (1.3V to 5.0V)

3. PIN Description

PIN No.	Symbol	I/O	Description
---------	--------	-----	-------------

1	V _{in}	I	DC input
2	GND		Ground
3	V _c	I	ON/OFF control terminal
4	Nr	I	Noise reduction
5	V _o	O	DC Output

3.5.5 Function introduction to SI1912

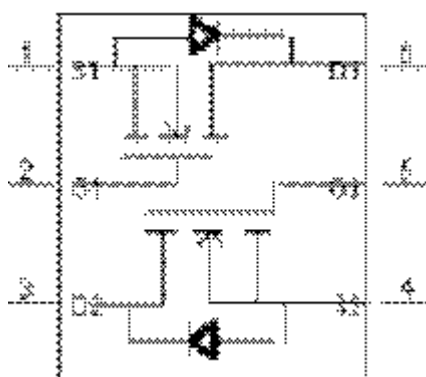
1. Description

The SI1912 is a Dual N-Channel 20-V (D-S) MOSFET.

2. Features

- ◆ TrenchFET Power MOSFETS: 1.8-V Rated
- ◆ ESD Protected: 2000 V
- ◆ Thermally Enhanced SC-70 Package

3. PIN Description



3.5.6 Function introduction to LM2713

1. Description

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.

2. Features

- ◆ 350mA, 0.7W, internal switch
- ◆ Uses small surface mount components
- ◆ Adjustable output voltage up to 20V
- ◆ 2.2V to 7V input range
- ◆ Input undervoltage lockout
- ◆ 0.01μA shutdown current
- ◆ Small 5-Lead SOT-23 package

3. PIN Description

PIN No.	Symbol	I/O	Description
1	SW	P	Power Switch input.
2	GND		Ground.
3	FB	O	Output voltage feedback input.
4	SHDN	I	Shutdown control input, active low.
5	VIN	I	Analog and Power input.

3.5.7 Function introduction to TEA5767HN

1. Description

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. Features

- ◆ High sensitivity due to integrated low-noise RF input amplifier
- ◆ FM mixer for conversion to IF of the US/Europe (87.5 to 108 MHz) and Japanese (76 to 91MHz) FM band
- ◆ Preset tuning to receive Japanese TV audio up to 108 MHz
- ◆ RF Automatic Gain Control (AGC) circuit
- ◆ LC tuner oscillator operating with low cost fixed chip inductors
- ◆ FM IF selectivity performed internally
- ◆ No external discriminator needed due to fully integrated FM demodulator
- ◆ Crystal reference frequency oscillator; the oscillator operates with a 32.768 kHz clock crystal or with a 13 MHz crystal and with an externally applied 6.5 MHz reference frequency

- ◆ PLL synthesizer tuning system
- ◆ I2C-bus and 3-wire bus, selectable via pin BUSMODE
- ◆ 7-bit IF counter output via the bus
- ◆ 4-bit level information output via the bus
- ◆ Soft mute
- ◆ Signal dependent mono to stereo blend [Stereo Noise Cancelling (SNC)]
- ◆ Signal dependent High Cut Control (HCC)
- ◆ Soft mute, SNC and HCC can be switched off via the bus
- ◆ Adjustment-free stereo decoder
- ◆ Autonomous search tuning function
- ◆ Standby mode
- ◆ Two software programmable ports
- ◆ Bus enable line to switch the bus input and output lines into 3-state mode
- ◆ Automotive temperature range (at VCCA, VCC(VCO) and VCCD = 5 V).

3. PIN Description

PIN No.	Symbol	I/O	Description
1	n.c.		not connected
2	CPOUT	O	charge pump output of synthesizer PLL
3	VCOTANK1	O	voltage controlled oscillator tuned circuit output 1
4	VCOTANK2	O	voltage controlled oscillator tuned circuit output 2
5	VCC(VCO)	P	voltage controlled oscillator supply voltage
6	DGND		digital ground
7	VCCD	P	digital supply voltage
8	DATA	I/O	bus data line input/output
9	CLOCK	I	bus clock line input
10	n.c.		not connected
11	WRITE/READ	I	write/read control input for the 3-wire bus
12	BUSMODE	I	bus mode select input
13	BUSENABLE	I	bus enable input
14	SWPORT1		software programmable port 1
15	SWPORT2		software programmable port 2
16	XTAL1	I	crystal oscillator input 1
17	XTAL2	I	crystal oscillator input 2
18	PHASEFIL		phase detector loop filter

19	PILFIL		pilot detector low-pass filter
20	n.c.		not connected
21	n.c.		not connected
22	VAFL	O	left audio frequency output voltage
23	VAFR	O	right audio frequency output voltage
24	TMUTE	I	time constant for soft mute
25	MPXO	O	FM demodulator MPX signal output
26	Vref	P	reference voltage
27	TIFC	I	time constant for IF centre adjust
28	LIMDEC1	I	decoupling IF limiter 1
29	LIMDEC2	I	decoupling IF limiter 2
30	n.c.		not connected
31	n.c.		not connected
32	Igain	I	gain control current for IF filter
33	AGND		analog ground
34	VCCA	P	analog supply voltage
35	RFI1	I	RF input 1
36	RFGND		RF ground
37	RFI2	I	RF input 2
38	TAGC		time constant RF AGC
39	LOOPSW		switch output of synthesizer PLL loop filter
40	n.c.		not connected

Chapter Four

Assembly and Disassembly Process

In order to get to know the structure of X23 (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



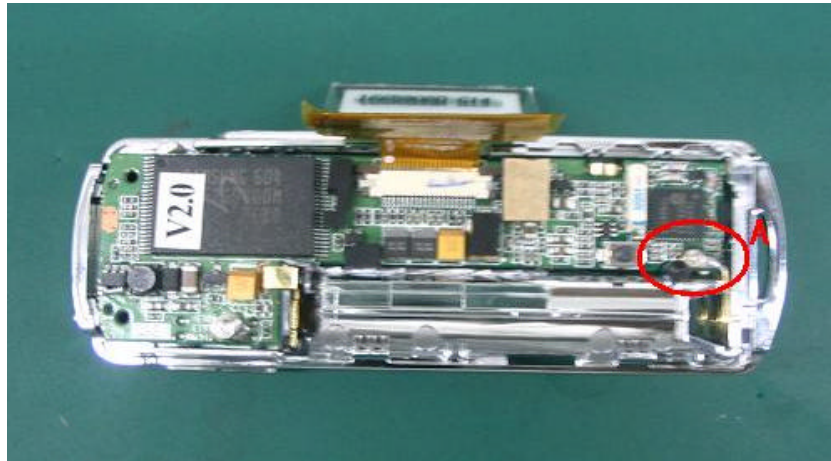
1. Press down in position A shown in the figure, take down rear casing and take out battery.



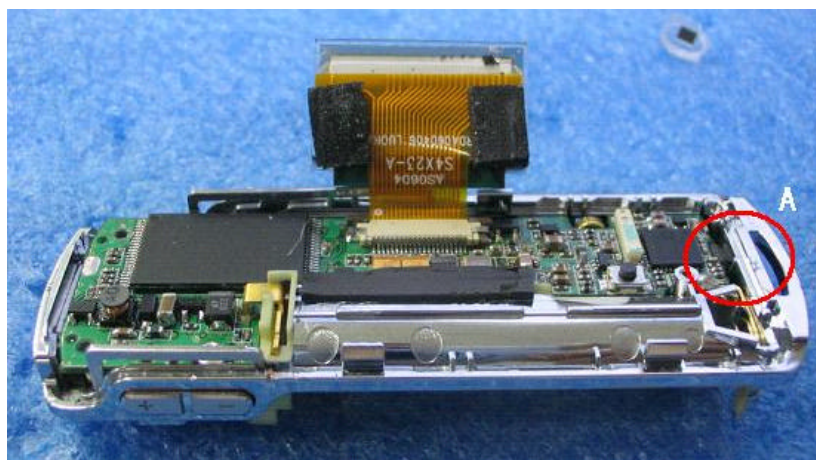
2. Use knife blade to take down front casing mirror from A, B position shown in the figure.



3. Use electric screwdriver or manual screwdriver to take down 3 screw (A, B, C) of front casing.



4. Take down front casing and use electric screwdriver or manual screwdriver to take down main board screw (A).

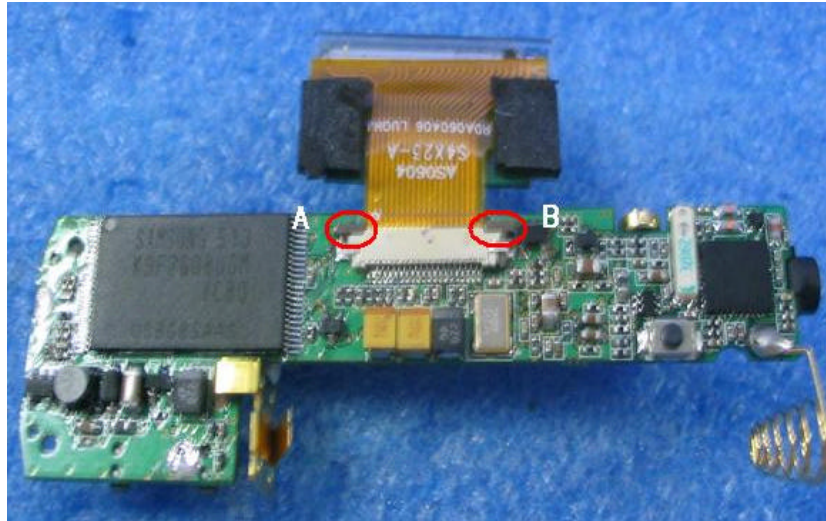


5. Take down main board and pay attention to headphone jack in position A.

4.2 Assembly process of the player

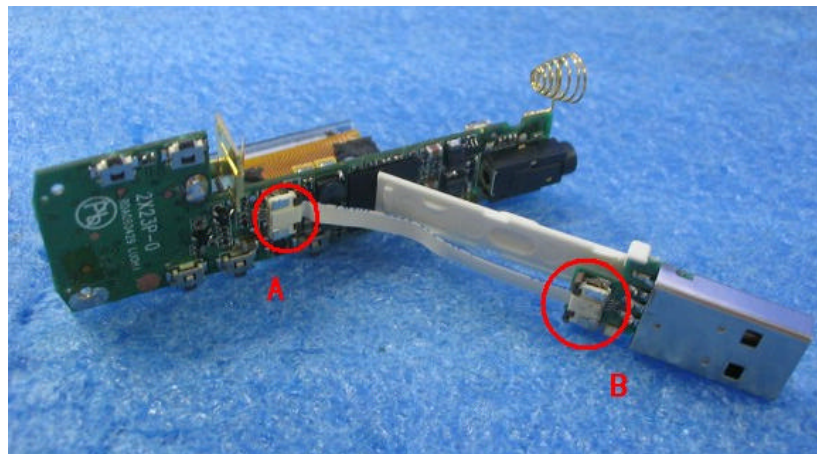
Assembly process of the layer is the same with disassembly process, only the sequence is reverse.

4.3 Disassembly and assembly process for OLED screen



Push away button in position A and B, take down connecting line and display screen. The installation method is the same.

4.4 Disassembly and assembly process for USB jack



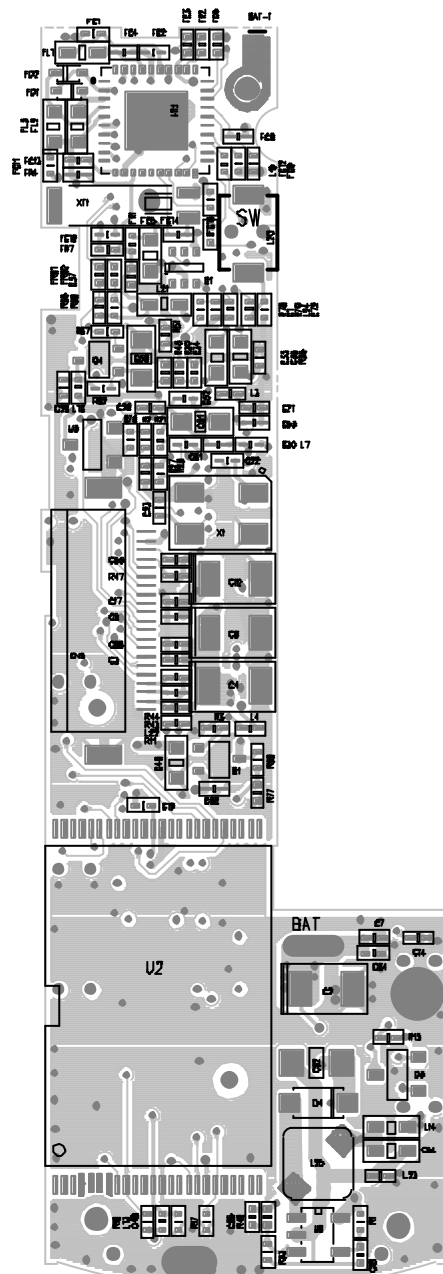
Open button in position A and B, take down connecting line and USB jack. The installation method is the same.

Chapter Cinque

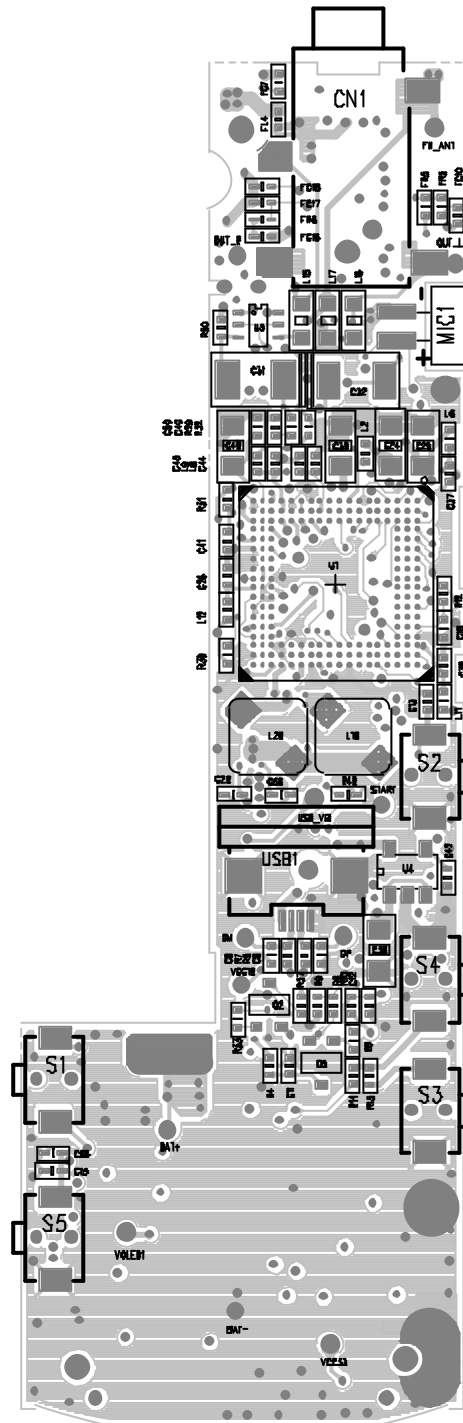
PCB board & Circuit diagram

Section One PCB board

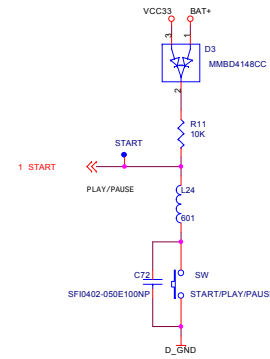
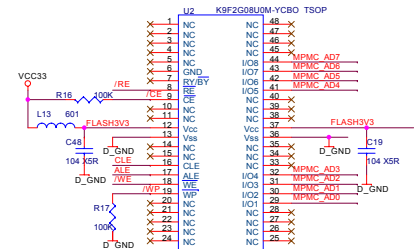
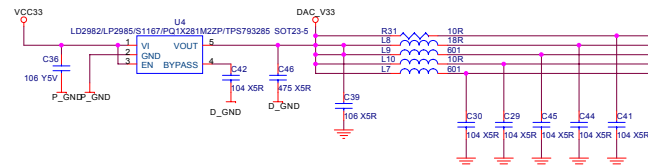
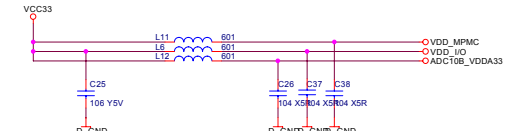
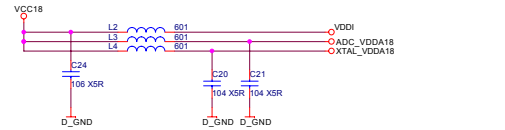
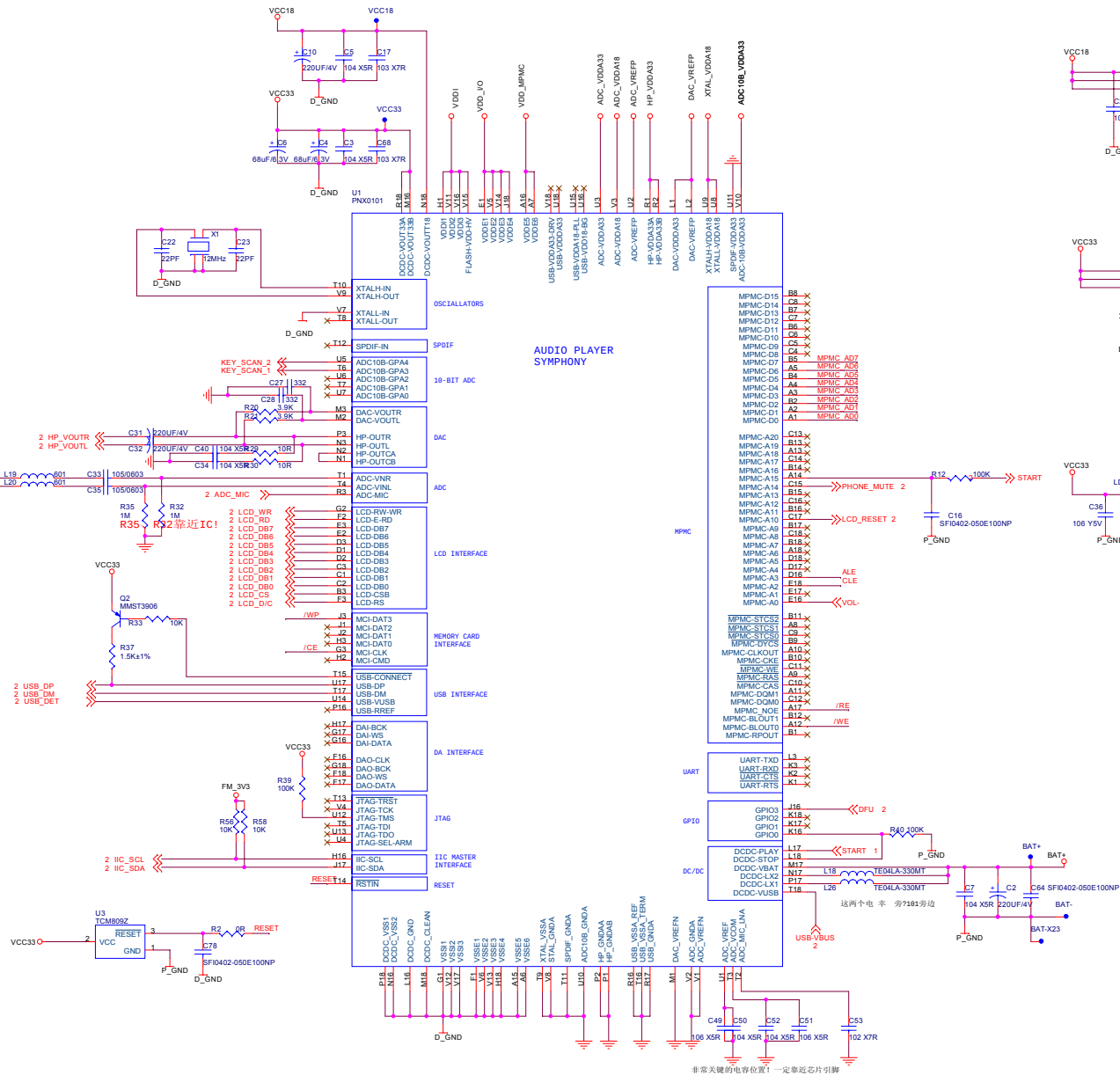
Surface layer of main Board

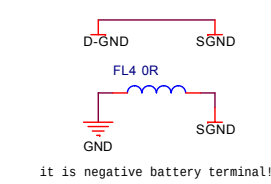
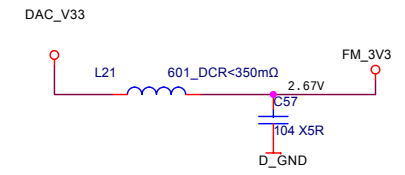
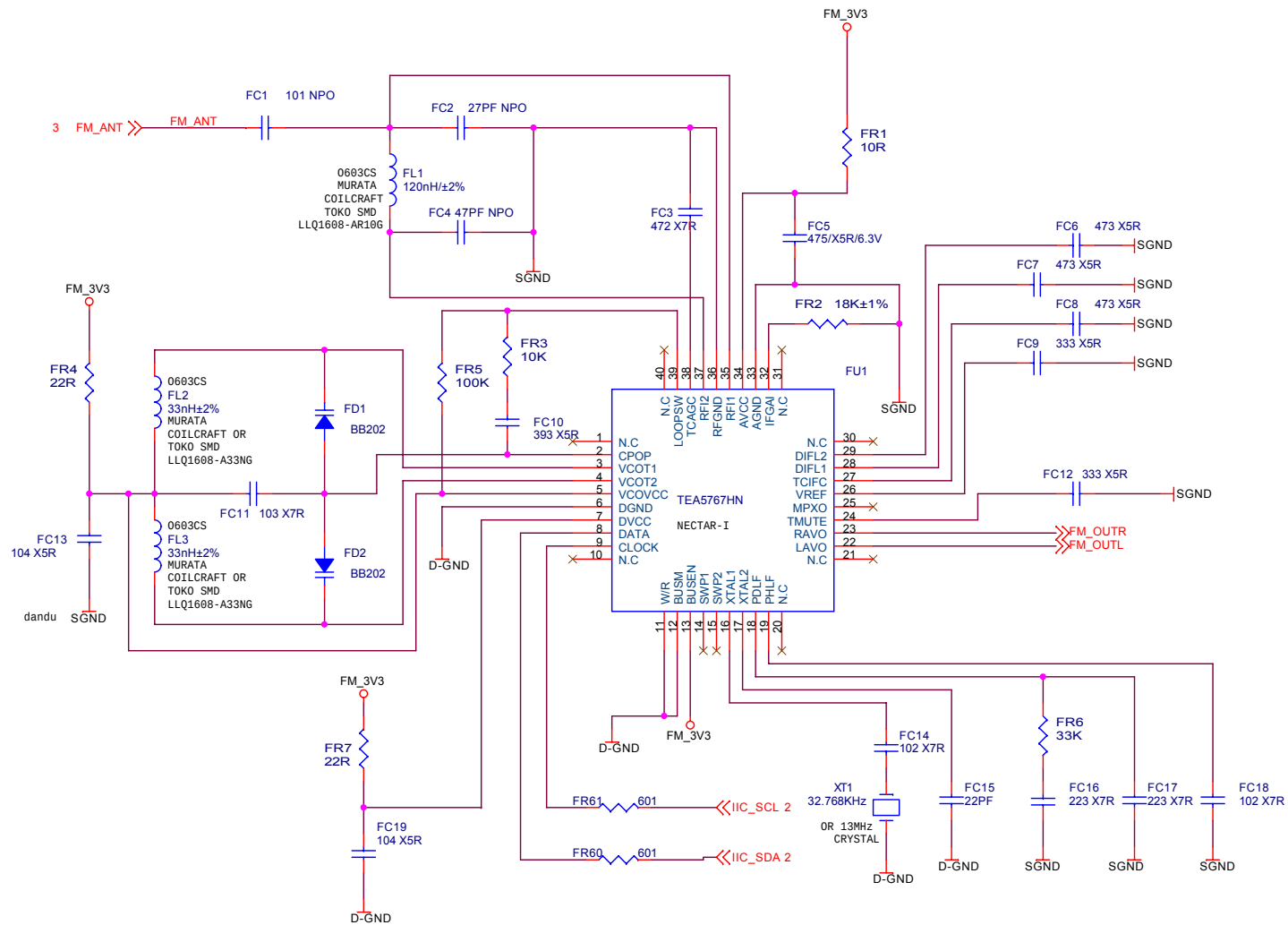


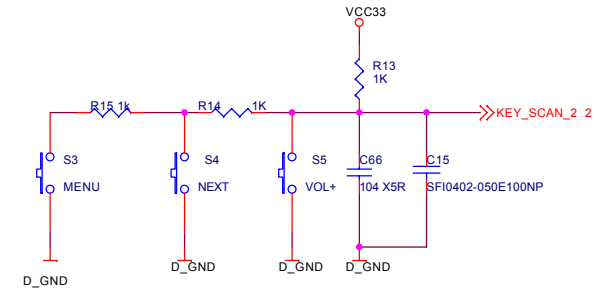
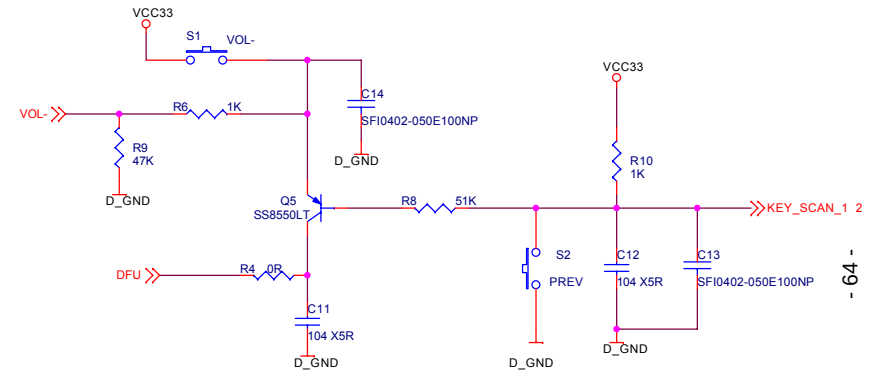
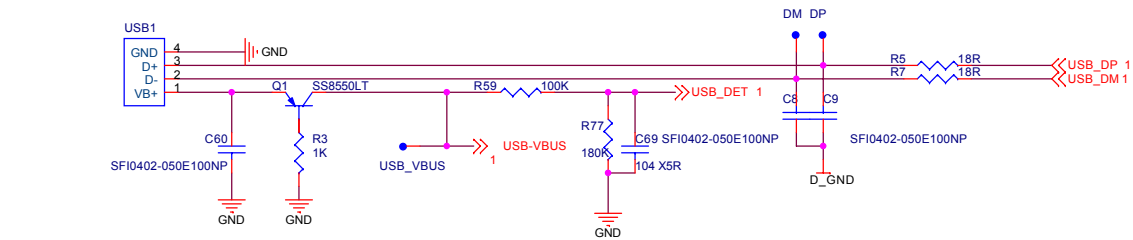
Bottom layer of main Board



Section Two Circuit diagram







Chapter six BOM List

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
X23L(RU)(1G) BLACK			
MAIN BOARD		5448998	
0090324	SMD RESISTOR	1/16W 00±5% 0402	R2,R4,FL4,L23
0090326	SMD RESISTOR	1/16W 100±5% 0402	FR1,L10,R29,R30,R31
0090644	SMD RESISTOR	1/16W 180±5% 0402	R5,R7,L8
0090447	SMD RESISTOR	1/16W 220±5% 0402	FR7,FR4
0090362	SMD RESISTOR	1/16W 1K±5% 0402	R3,R6,R10,R13,R14,R15,R50,R51
0090369	SMD RESISTOR	1/16W 2.2K±5% 0402	R67
0090375	SMD RESISTOR	1/16W 3.9K±5% 0402	R20,R21
0090377	SMD RESISTOR	1/16W 4.7K±5% 0402	R43,R44,R78
0090385	SMD RESISTOR	1/16W 10K±5% 0402	FR3,R11,R33,R56,R58
0090390	SMD RESISTOR	1/16W 18K±5% 0402	FR2
0090396	SMD RESISTOR	1/16W 33K±5% 0402	FR6
0090400	SMD RESISTOR	1/16W 47K±5% 0402	R9,R79
0090401	SMD RESISTOR	1/16W 51K±5% 0402	R8
0090408	SMD RESISTOR	1/16W 100K±5% 0402	FR5,R12,R16,R17,R39,R40,R59,R62,R1
0090425	SMD RESISTOR	1/16W 470K±5% 0402	R45
0090433	SMD RESISTOR	1/16W 1M0±5% 0402	R35,R32
0090436	SMD RESISTOR	1/16W 2M0±5% 0402	R47
0090639	PRECISION SMD RESISTOR	1/16W 1.5K±1% 0402	R37
0090485	PRECISION SMD RESISTOR	1/16W 27K±1% 0402	R53
0090645	PRECISION SMD RESISTOR	1/16W 180K±1% 0402	R77
0090687	PRECISION SMD RESISTOR	1/16W 240K±1% 0402	R49
1030029	SMD PRESS SENSITIVITY RESISTOR	SFI0402-050E100NP	C8,C9,C13,C14,C15,C16,C60,C64,C72,C78
0310416	SMD CAPACITOR	50V 22P±5% NPO 0402	C22,C23,C65,FC15
0310418	SMD CAPACITOR	50V 27P±5% NPO 0402	FC2
0310424	SMD CAPACITOR	50V 47P±5% NPO 0402	FC4
0310432	SMD CAPACITOR	50V 101±5% NPO 0402	FC1
0310704	SMD CAPACITOR	25V 102±10% X7R 0402	FC14,FC18,C53
0310705	SMD CAPACITOR	25V 332±10% X7R 0402	C27,C28

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
0310706	SMD CAPACITOR	25V 472±10% X7R 0402	FC3
0310453	SMD CAPACITOR	25V 103±10% X7R 0402	C17,C68,FC11
0310455	SMD CAPACITOR	16V 223±10% X7R 0402	FC16,FC17
0310710	SMD CAPACITOR	16V 333±10% X5R 0402	FC12,FC9
0310711	SMD CAPACITOR	10V 393±10% X5R 0402	FC10
0310712	SMD CAPACITOR	10V 473±10% X5R 0402	FC6,FC7,FC8
0310480	SMD CAPACITOR	10V 104±10% X5R 0402	C1,C3,C5,C7,C11,C12,C19,C20,C21,C26,C29,C30,C34,C37,C38,C40,C41,C42,C44,C45,C48,C50,C52,C57,C61,C66,C69,FC13,FC19,C18 ①
0310790	SMD CAPACITOR	10V 104±20% X5R 0402	C1,C3,C5,C7,C11,C12,C19,C20,C21,C26,C29,C30,C34,C37,C38,C40,C41,C42,C44,C45,C48,C50,C52,C57,C61,C66,C69,FC13,FC19,C18 ①
0310753	SMD CAPACITOR	16V 104±20% X5R 0402	C55
0310216	SMD CAPACITOR	10V 105 +80%-20% 0603	C33,C35
0310717	SMD CAPACITOR	6.3V 475±20% X5R 0603	C54,FC5,C46
0310486	SMD CAPACITOR	6.3V 106±20% X5R 0805	C24,C39,C49,C51,C58
0310389	SMD CAPACITOR	10V 106 +80%-20% Y5V 0805	C25,C36
0310752	SMD CAPACITOR	25V 106±10% X5R 1206	C62
0310838	SMD TANTALUM CAPACITOR	6.3V 68UF±20% 3528 T≤2.1	C6,C4
0310736	SMD TANTALUMCAPACITOR	4V 220uF±20% 3528(B)	C2,C10,C31,C32
0390142	SMD MAGNETIC BEADS	FCM1608-601T02	L14,L15,L16,L17,L21
0390388	SMD MAGNETIC BEADS	6000/100MHZ±25% 1005	L2,L3,L4,L6,L7,L9,L11,L12,L13,L19,L20,L22,L24,FR60,FR61
0390463	SMD CORES INDUCTOR	10uH±10% CR32NP	L25
0390221	SMD COIL THREAD INDUCTOR	33nH±2% 1608	FL2,FL3
0390398	SMD COIL THREAD INDUCTOR	120nH±2% 1608	FL1
0390426	SMD CORES INDUCTOR	33uH±20% CDRH3D16/HP	L18,L26
1090080	ESD ELEMENT	RCLAMP0504F SC70-6L	D1 ②
1090084	ESD ELEMENT	PLR0504F-P SC70-6L	D1 ②
0700057	SMD DUAL DIODE	MMBD4148CC SOT-23	D3
0680077	SMD SCHOTTKY DIODE	MBR0520 SOD123	D4
0700115	SMD TRANSFIGURATION DIODE	BB202	FD1,FD2
0780298	SMD TRIODE	MMST3904 SOD-323	Q4
0780293	SMD TRIODE	MMST3906 SOD-323	Q2
0780300	SMD TRIODE	SS8550LT SOD-323	Q1,Q5

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
0790068	SMD FIELD EFFECT TRANSISTOR	SI1912 SOT363	U5 ③
0790070	SMD FIELD EFFECT TRANSISTOR	NTJD4401N SOT363	U5 ③
0882388	IC	TEA5767HN HVQFN	FU1
0883141	IC	TCM809ZVNB713 SOT-23B	U3
0882403	IC	PNX0101ET/N302 TFBGA	U1
0882480	IC	PQ1X281M2ZP SOT23-5	U4 ④
0882629	IC	TPS793285DBVR SOT23-5	U4 ④
0882875	IC	K9K8G08U0M-PCB0 TSOP	U2 ⑤
0883145	IC	K9K8G08U0A-PCB0 TSOP	U2 ⑤
0882565	IC	LM2703 SOT-23-5	U6 ⑥
0882999	IC	FAN5331 SOT23-5	U6 ⑥
1340201	SMD LIGHT TOUCH SWITCH	TS-1410ESH2	SW
1340099	SMD LIGHT TOUCH SWITCH	SKRELGE010	S1,S2,S3,S4,S5
1980050	EARPHONE SOCKET	2SJ-A382-001	CN1
1940282	CABLE SOCKET	21P 0.5mm SMD,SUBMIT MEET WITH CLASP	CN5
1633280	PCB	2X23P-1	
1940363	CABLE SOCKET	4P 0.5mm SMD SUBMIT MEET WITH CLASP	USB1
0960279	SMD CMETAL OXIDE FILM RESISTORSTAL OSCILLATOR	32.768KHz±20ppm SSPT6 12.5P	XT1
0960284	SMD CMETAL OXIDE FILM RESISTORSTAL OSCILLATOR	12MHz±30ppm 5032/4 20P	X1
X23L(RU)(1G) BLACK			
USB PIN UNIT		5462407	
1633422	PCB	USBX23-3	