BBK

X27(RU)

service manual

Catalog

Chapter One About Maintenance 1

1.1 Safety precautions 1

1.1.1 Precautions for antistatic 1

1.1.2 About placement position 1

1.2 Maintenance method 1

1.2.1 Visualized method 1

1.2.2 Electric resistance method 2

1.2.3 Voltage method 2

1.2.4 Current method 2

1.2.5 Cutting method 2

1.2.6 Element substitution method 2

1.2.7 Comparison method 2

1.3 Required device for maintenance 3

Chapter Two Functions and Operation Instructions 4

2.1 QUICK OPERATION 4

2.1.1 BUTTONS AND JACKS ILLUSTRATION 4

2.1.2 POWER ON/OFF 5

2.1.3 PLAY MUSIC 5

2.1.4 TUNING 6

2.1.5 RECORD 6

2.1.6 BATTERY CHARGE 6

2.2 USAGE INTRODUCTION 6

2.2.1 MAIN MENU ILLUSTRATION 6

2.2.2 PLAYING INTERFACE 6

2.2.3 TUNING INTERFACE T 7

2.2.4 RECORDING INTERFACE 7

2.3 BASIC OPERATION 7

2.3.1 INSTALL USB DRIVE 7

2.3.2 USE MOBILE STORAGE 7

2.3.3 DISCONNECT USB SAFELY 7
2.3.4 PLAY MUSIC 7
2.3.5 A-B REPEAT FUNCTION 8
2.3.6 RECORDING 8
2.3.7 TUNING 8
2.3.8 UPGRADE 9
2.4 SPECIFICATION 9
Chapter Three Principle and Servicing 10
Section one Principle of the player 10
3.1.1 Principle of the player 10
3.1.2 Block diagram of the player 10
3.1.3 Player uses IC collection 11
Section Two Unit Circuit Principle 12
3.2.1 FLASH circuit principle 12
3.2.2 FM module circuit 12
3.2.3 Display screen module circuit 13
3.2.4 Earphoe output/USB jack circuit 15
3.2.5 Button circuit 16
3.2.6 Charge management circuit 17
3.2.7 Low voltage detect circuit 18
3.2.8 Battery protection circuit 19
3.2.9 Power management module 19
3.2.10 Reset circuit 21
3.2.11 Power on/off control circuit 22
3.2.12 MIC circuit 23
Section Three Troubleshooting process 24
3.3.1 OSD circuit troubleshooting process 24
3.3.2 Troubleshooting process of USB jack circuit 25
3.3.3 Charge management circuit detect process 26
3.3.4 Power management circuit detect process 27
3.3.5 Detect flow of power on/off control circuit 28
3.3.6 Servicing cases 29
Section Four Waveform diagram 31
Section Five Function Introduction to IC 38
3.5.1 Function introduction to PNX0101ET 38

3.5.2 Function introduction to HY27UG088G5M 48
3.5.3 Function introduction to TPS79301 51
3.5.4 Function introduction to TCM809 51
3.5.5 Function introduction to TPS62200 52
3.5.6 Function introduction to Lm2703 53
3.5.7 Function introduction to TEA5767HN 54
3.5.8 Function introduction to PQ1X281M2ZP 56
Chapter Four Disassembly and Assembly Process 58
4.1 Disassembly process of the player 58
4.2 Assembly process of player 60
Chapter Cinque PCB board & Circuit diagram 63
Section One PCB board 63
5.1.1 Surface layer of Decode Board 63
5.1.2 Bottom layer of Decode Board 64
5.1.3 Surface layer of Button Board 65
5.1.4 Bottom layer of Button Board 66
Section TWO circuit diagram 67
5.2.1 Decode Board 67
5.2.2 Button Board 70
Chapter Six Bom List 71

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-scaleintegrated 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 de 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

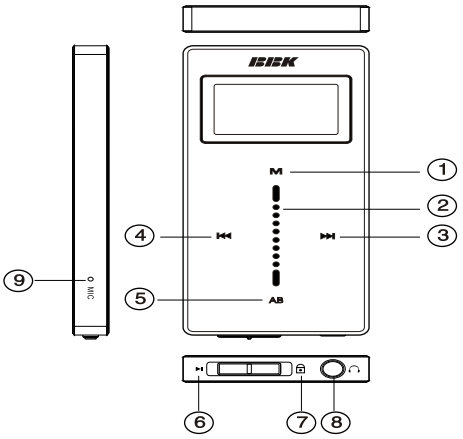
- ◆ Audio Generator
- ◆ Digital oscillograph (≥100MHE)
- ◆ SMD rework station
- ◆ Multimeter
- ◆ Soldering iron
- ◆ Pointed-month pincers
- ◆ Cutting nippers
- ◆ Forceps
- ◆ Electric screw driver
- ◆ Terminals connecting cord
- ◆ Headphone
- ◆ Microphone

Chapter Two

Functions and Operation Instructions

2.1 QUICK OPERATION

2.1.1 BUTTONS AND JACKS ILLUSTRATION



① M :
#Press in playback mode → pause playing
#Press for long in any case → enter main menu
#Press in tuning mode → switch in PRESET and SCAN mode
#Press for long in recording mode → exit recording
#Press in menu mode → enter the selected item or confirm the setup(the same as that of ⏯ button)

② + − :
#Slide when in playing and tuning interface → adjust volume
#Slide when in menu state → move cursor upwards or downwards

③ ⏭ ④ ⏮ :
#Press in playback mode → the next/previous track
#Press for long in playback mode → fast forward/backward
#Press in tuning PRESET mode → select channel
#Press in tuning SCAN mode → manual scanning
#Press for long in tuning Preset mode → full auto scanning
#Press for long in tuning SCAN mode → automanual scanning
#Menu mode → move cursor or set item
#Press ⏮ in menu mode → cancel and exit, or return to the previous menu

⑤ AB :
#Press when in playing state → A-B repeat
#Press for long when playing musical file (non recording file) → Switch sound effect
#Press for long when in menu state → enter recording
#Press when in tuning SCAN state → save radio station
#Press for long when in tuning state → enter FM recording
#Press when in file browsing interface → delete file

⑥ ▶II : #Push in power-off state → power on
#Push for long in power-on state → power off
#Push when in playing state → pause playing
#Push when in recording state → pause recording
#Push when in tuning state → mute
#Push when in menu state → enter the item or confirm the setting (the same with M button)

⑦ HOLD button: lock buttons when pushing towards direction and unlock when pushing towards the opposite direction.

⑧ Headphone jack 、 USB jack

⑨ MIC: microphone

Caution: In my sound effect setup mode,and ⏭/⏮ are left and right cursor, and ▶II is exit button.

2.1.2 POWER ON/OFF

#Power on

Push ▶II button to power on, and the power-on motion picture displays to enter My Music.

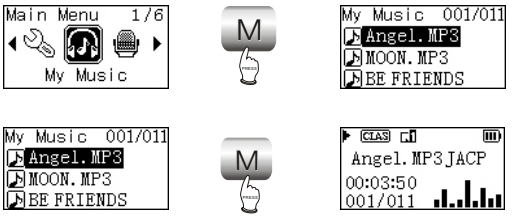
#Power off

Push ▶II button for long to power off.

CAUTION:

If functions of playing, tuning or recording are not used during a specified period, Mp3 PLAYER will power off automatically.

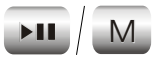
2.1.3 PLAY MUSIC



In "My Music", after selecting musical file after sliding +/− button, press M button to begin playing this song.

Select "Resume Play" in "Main Menu", and it plays from the place that the music stopped last

#PLAY/PAUSE



When playing music, pressing or pushing may switch between "Play" and "Pause".

#NEXT and PREV

When playing music, press this button to skip into the next or previous track.

#FF and FB

When playing music, press this button for long into fast forward or backward.

#Adjust volume

When playing music, sliding this button may adjust volume.

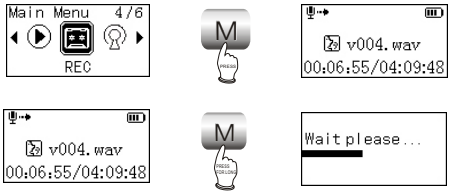
2.1.4 TUNING

In main menu, press ⏮/⏭ button to select " FM Radio" and enter tuning mode. Now insert headphone and you may listen to the radio. Press M button for long to exit tuning mode.

After entering tuning mode, press M button to switch between PRESET and SCAN modes. In PRESET mode, press ⏮/⏭ button to select channel, press ⏮/⏭ button for long to scan full automatically; in SCAN mode, press ⏮/⏭ button to adjust frequency, press ⏮/⏭ button for long to scan automanually .

2.1.5 RECORD

In main menu, select "Record" to enter record mode and pressing M button may pause recording. When recording, pressing M button for long may generate record files and then quit.

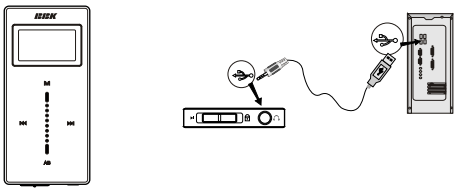


CAUTION:

#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 "Disk Full" and exits recording.

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

2.1.6 BATTERY CHARGE



This player adopts Lithium-ion battery to supply power. In any time, use USB transmission line to connect MP3 player to computer and charge will start automatically. After fully charged, charge stops automatically.

CAUTION:

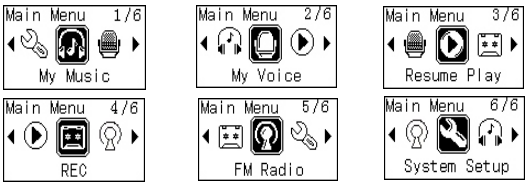
#If battery charge is too low,at the beginning of charge,the screen may probably have no display.

#It takes 3 hours to charge battery with computer and power adapter.

#Please operate safely,Before connecting USB line, please power off firstly and you'd better notconnect USB line when operating normally. Before unplugging USB line, please stop using USB memory function firstly. The player may probably be damaged if you unplug it directly.

2.2 USAGE INTRODUCTION

2.2.1 MAIN MENU ILLUSTRATION



#My music
Memorize music file.

#My Voice
Memorize Microphone recording file, such as meeting, classroom and interviewrecording, etc.

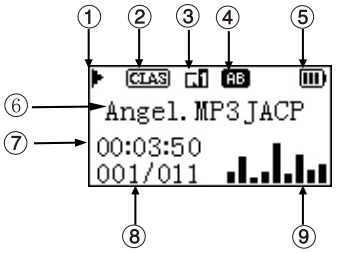
#Resume Play
Select "Resume Play" and the player beginsto play from theposition that music stopped playing last time.

 # REC
Select "REC"to enter recording mode .

#FM Radio
Select " FM Radio"to enter radio mode.

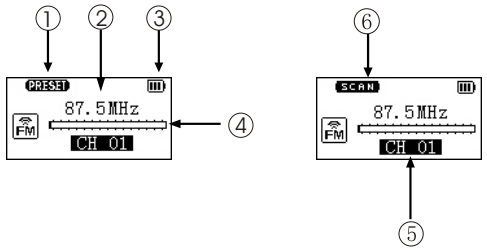
#System Setup
Select " System Setup" to set system items.

2.2.2 PLAYING INTERFACE ILLUSTRATION



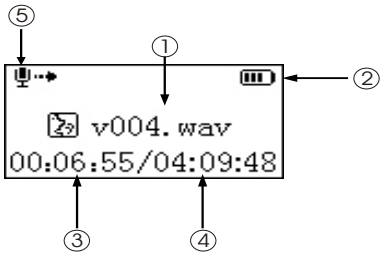
1、Play State	6、Song name and Singer
2、Sound effect mode	7、Time that has been played
3、Playback mode	8、Number of tracks
4、Repeat state	9、Spectrum display
5、Battery capacity	

2.2.3 TUNING INTERFACE ILLUSTRATION



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

2.2.4 RECORDING INTERFACE ILLUSTRATION



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

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

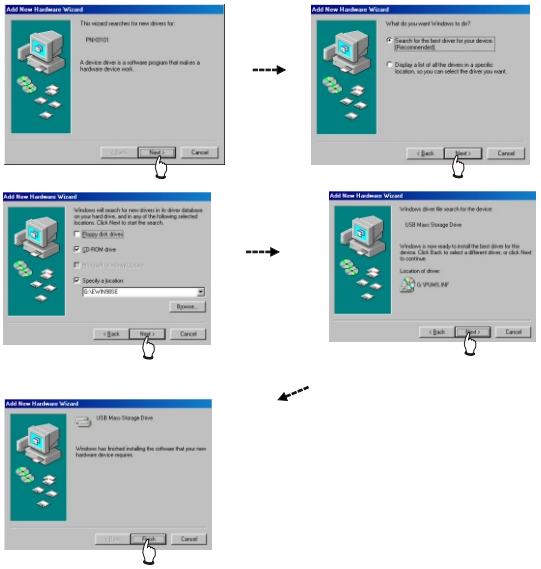
2.3 BASIC OPERATION

2.3.1 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. Download drive program from BBK website.
2. Connect MP3 player to computer, the Computer will automatically give prompt that new firmware device has been found and then run the installation guide, shown in the following figure: Users only need find the downloaded drive information file according to prompt 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:



2.3.2 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.

2.3.3 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.

2.3.4 PLAY MUSIC

#BROWSE FILE

In any case, press M button for long to enter "Main menu". Musical and record files are separately saved in the front two options of "My Music" and "My Record" in the main menu.

Slide +/- button upwards and downwards to select files to browse,
shown in the figure:

#CANCEL FILE

When browsing files, press AB button and the cancel dialogue box will pop up.
Press ⏭/⏮ button to select "YES" and then press M button to cancel the file.
Select "NO" to exit.

#PLAY MUSIC

In "My Music", slide +/- button to select songs; press M button or select "Play" in main menu to begin playing music and display playing interface at the same time.

#PAUSE PLAYING MUSIC

When playing, press M button or push ⏯ button once to switch in pause playing state; and press M button or push ⏯ 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.

#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.

#Adjust volume

When in playing and listening to radio set, sliding +/- button may adjust volume.

CAUTION:

#Music playback will be paused when browsing file.

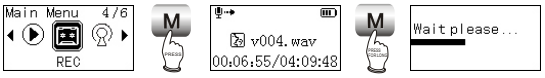
#In some operating system (such as complex font Windows), the operation of copyingl yrics/song file and changing song's name may probably lead to incorrect display.
When playing WMA songs of VBR , pressing buttons may probably has slow response or has no lyrics display. When playing some non standard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

2.3.5 A-B REPEAT FUNCTION

When playing, if you want to listen to a certain segment repeatedly, please use A-B repeat function. Press AB button for the first time to select the beginning point that you desireto 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 AB button for the third time to cancel repeat and
continue to play.

2.3.6 RECORDING

When recording, press M 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 "DISC FULL" and exits recording.

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

2.3.7 TUNING

#ENTER TUNING MODE

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

#EXIT TUNING MODE

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

#PRESET/SCAN MODE SWITCH

When listening to radio, press M 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 0.1MHz each time.Press AB button to save radio station.

Press ⏭ button for long to increase frequency continuously and stop until radio station has been searched. Press AB button to save radio station.

Press ⏮ button for long to decrease frequency continuously and stop until radio station has been searched. Press AB 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 automanually). After scanning desired frequency, press AB button to saveinto the current PRESET channel.

CAUTION:

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

FM record

In tuning state, press AB button for long to enter FM record. When in FM record, pressing M button may pause recording; and pressing M button may generate record files and then quit FM record. The record files generated from FM record are WAV format.

2.3.8 UPGRADE

#Upgrade

Download the latest firmware upgrading file from BBK website firstly, such as "BBK_X27RU.Ebn" and "X27RU_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 M button may start upgrading. After upgrading finishes, Mp3 PLAYER will power on again.

NOTE:

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

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

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

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

#After upgrading finishes the player will cancel the used upgrading file.

#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	X27 sensor
Continuous playback time	The longest time is about 8 hours
Dimensions/weight	75mm×36mm×6.9mm about30.5g
Audio SNR	≥90dB
Headphone out	9mW+9mW(32ohm impedance)/ 18mW+18mW(16ohm impedance)
Frequency range	18Hz~20kHz
FM tuning range	76MHz~108MHz
Working temperature	0℃~40℃
Files supported	MPEG 1/2/2.5 Layer 3(16kbps~320kbps)| WMA (8kbps~192kbps). WAV

Chapter Three Principle and Servicing

Section One Principle of the Player

3.1.1 Principle of the player

X27 portable MP3 player is mainly composed of following functional modules:

1. MP3 decode core chip：core chip adapts PNX0101 decode chip from Philips company,. which is professional MP3 decode IC of Philips. Its internal integrates ARM and DSP core with good timbre, low power consumption and other outstanding advantages.

2. Power management modules: composed of TPS79301, TPS62200 and PQ1X28, it is responsible for power supply of each Mp3 circuit.

3. Earphone output/USB jack：earphone output, audio output and USB jack, data exchange, charging function is finished.

4. Li-battery module：power supply of player

5.Flash module：data storage of player

6.OLED display screen module: display of working state of player

8.MIC: external audio input to finish record function

9.Tune module：FM tune

3.1.2 Block diagram of the player

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

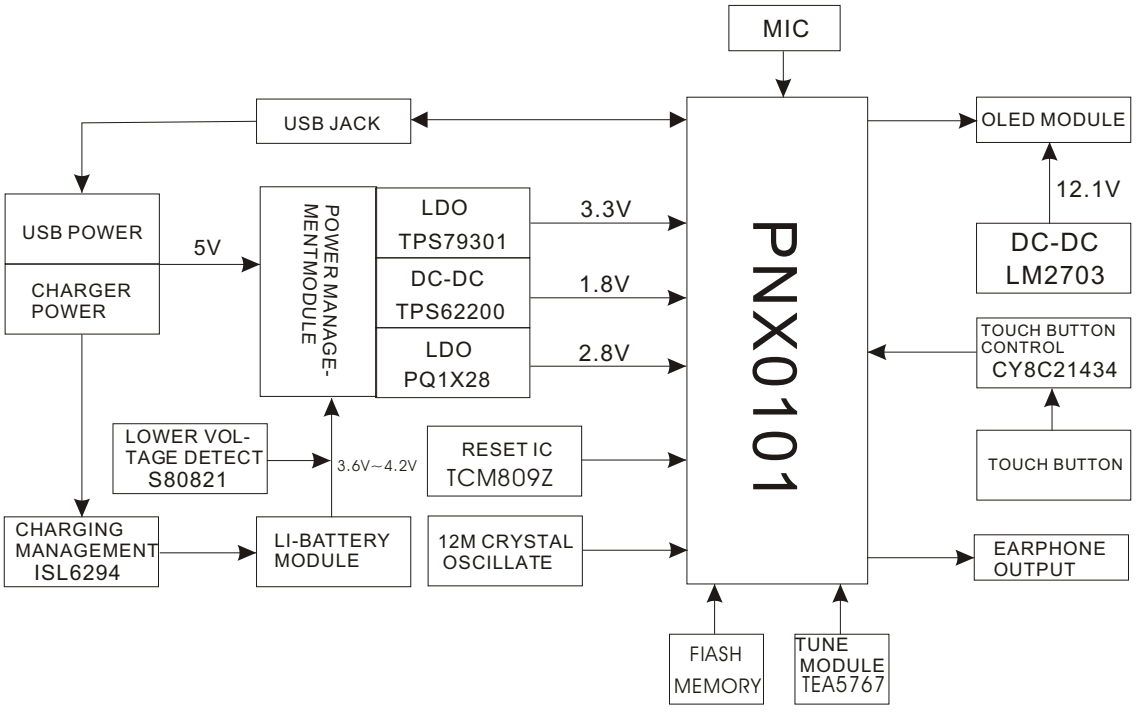


Figure3.1.2.1 block diagram of player

3.1.3 Player uses IC collection

IC used by X27 main board is shown as follows:

Location number	Chip	Function
U1	TPS79301	provide 3.3V voltage
U2	TPS62200	provide 1.8V voltage
U4	MCP73832	Charge Management
U6	PNX0101ET	MP3 decode
U7	PQ1X28M2ZP	provide 2.8V voltage
U8	HY27UG088G5M	Flash Memory
U9	TCM809Z	system reset
U10, U11	SI2305DS	Field effect tube
U12	LM2703	Provide 12.2V voltage

Chip needed by tune board is shown as follows：

Location number	Chip	Function
FU1	TEA5767HN	tune mudule

Section Two Unit Circuit Principle

3.2.1 FLASH circuit principle

1.FLASH circuit principle is shown in figure 3.2.1.1:

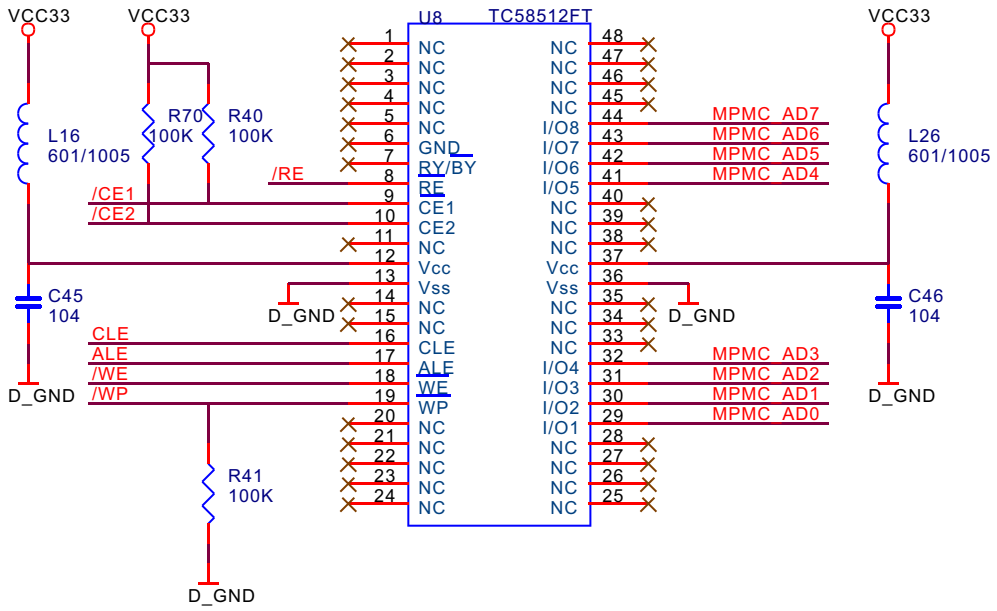


Figure 3.2.1.1 Flash circuit principle diagram

2. Working principle: Flash Memory is memory unit of whole player. All MP3 and waveform files are stored in FLASH. Flash module is composed of FLASH chip TC58512FT and peripheral circuit to finish reading, writing and delete working of internal files. TPS79301 provides 3.3V voltage for FLASH. R70、R40 are pull-up resistors of /CE1, /CE2 and R41 is pull-down resistor of /WP. Vcc is power supply pin of FLASH. /CE is signal-election, high level is efficient and VCC33 provides 3.3V voltage to start FLASH's working. /RE, /WE separately are read-efficient and write-efficient signal end to control reading and writing functions of FLASH. I/O1～I/O8 are 8 data lines to finish FLASH and external data exchange and realize write-in, delete and edit function of MP3.

There is firmware of player working in Flash. All working are finished by relevant order emitted by CPU after data exchange between CPU and Flash. When MP3 play is power on, 3.3V voltage supply power for Flash through VCC. /CE inputs 3.3V high level signal，Flash is efficient and begins to work. When MP3 plays music, /RE is high level and Flash begins read-out operation. When writing in file through USB data line or recording through MIC, /WE is high level, Flash begins write-in operation. Read-out and write-in are operated through I/O1～I/O8 eight data /address lines

3.2.2 FM module circuit

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

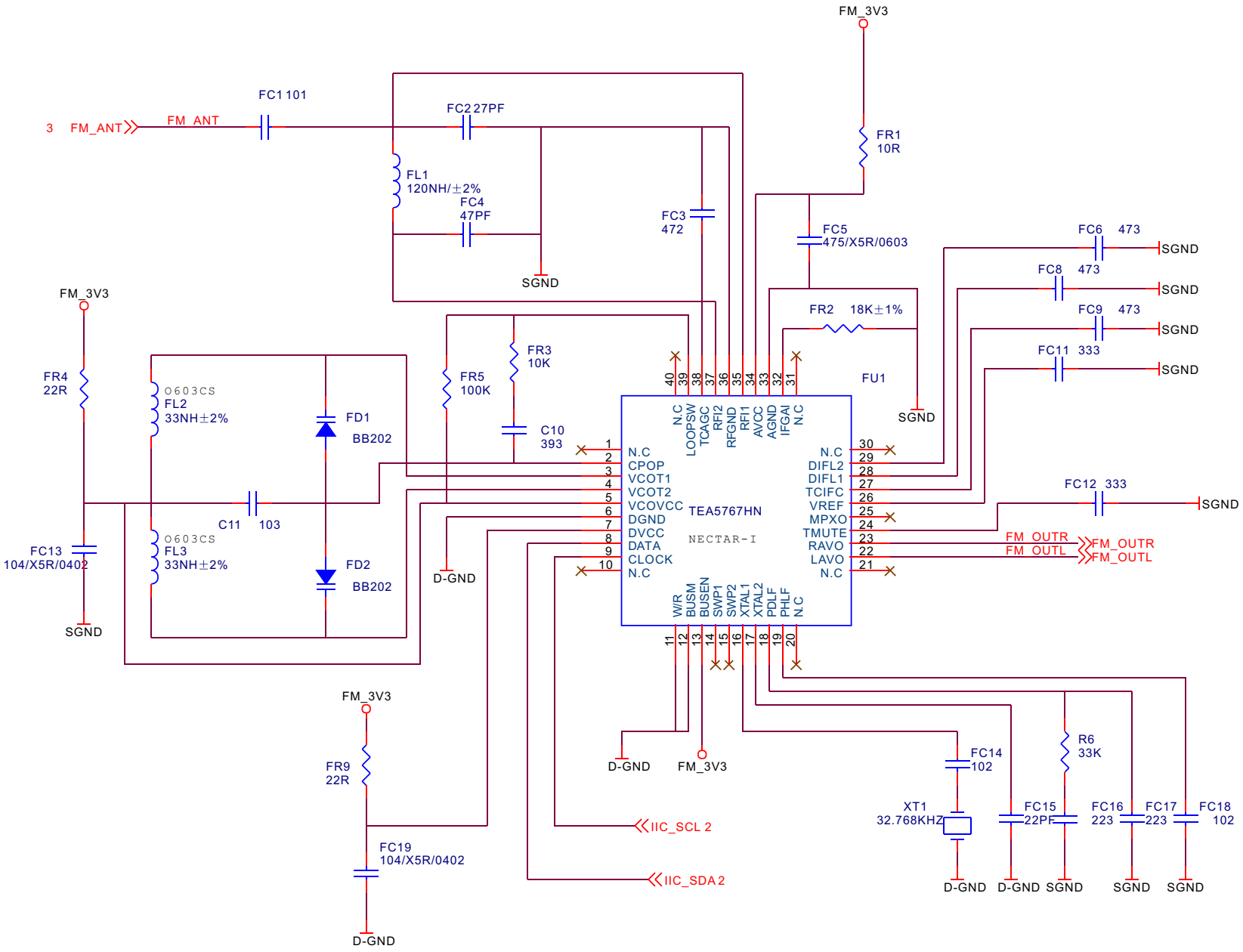


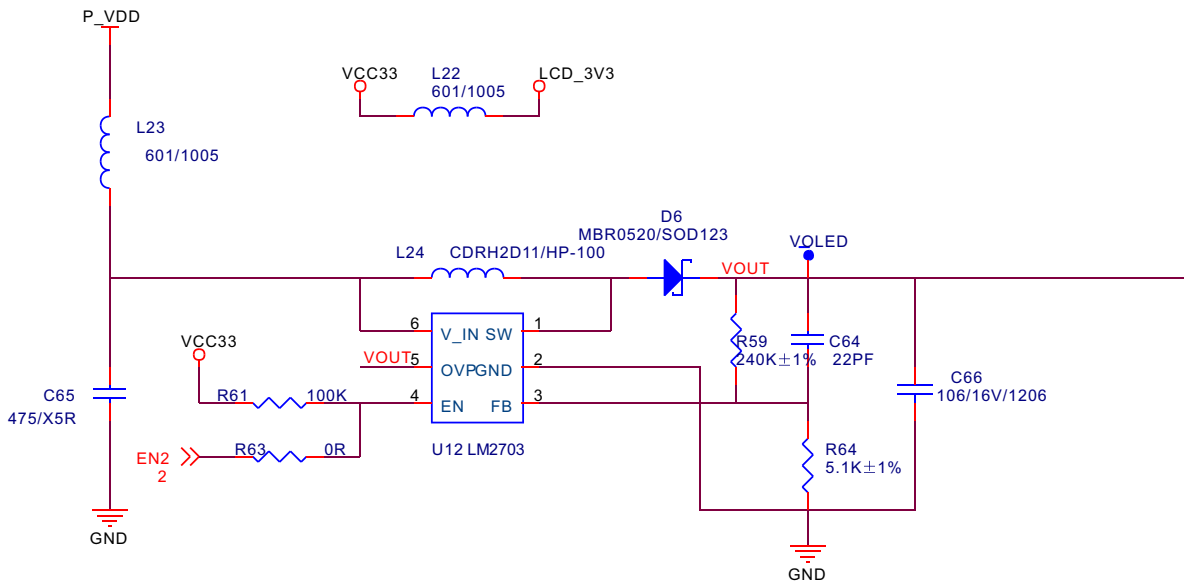
Figure 3.2.2.1 FM module circuit diagram

2. Working principle: Tune circuit is composed of micro digital tune IC TEA5767 from Philips company and its peripheral circuits. Power is supplied by PQ1X28 to provide pure 2.8V voltage for tune part . FC1、FC2、FC3、FC4、FL1 are antenna input matched circuit of FM module; Variable diode FD1, FD2 and winding line inductance are middle frequency and frequency selection tune circuits in FM module. Control of FM adopts two-wire IIC bus control and 9, 10 of TEA5767 are data and control lines.

When MP3 player switches into FM tune state, antenna is sent to RF band-pass filter（87.6MHz～108MHz and 76MHz～87.5MHz）composed by FLI, Fc2, FC4 after FC1 coupling and sent to pin 35, 37 of TEA5767 and amplified through TEA5767. Pin 2,3,4 of TEA5767 internally connect internal VCO and externally connect variable diode FD1, FD2。Pin 2 is tune voltage output, and voltage changes in 1V range during automatic searching. VCO is supplied by FM 3V3 through FR4 limit and FC13 filer and then sent to pin 5 of TEA5767. Built in I2C interface controls through pin 8,9 of TEA5767. CPU searches and selects channel through I2C bus. Digital power is sent to pin 7 of TEA5767 throuth FR9 limit , FC19 filter of FM 3V3. Basic clock of 32.768 is produced through FR9. XT1（32.768）and sent to TEA5767 through pin 17. Analog audio signals after processed by TEA5767 outputs from 23（right channel）,22（left channel）to rear electrode amplifier circuit to amplify and output from earphone jack.

3.2.3 Display screen module circuit

1.Display screen module circuit is shown in figure 3.2.3.1:



3.2.3.1 OLED circuit

2. A 12V high voltage is needed to light display screen and it should be finished by matched rise-voltage circuit, which includes two parts: rise-voltage circuit and display screen interface circuit. Rise-voltage circuit is composed of DC-DC rise-voltage chip Lm2703 and its peripheral circuits; VIN is power input pin; EN is enable end of Lm2703 ; high level is efficient; SW is high voltage output pin; FB is feedback pin. Voltage value VOLED outputted from high voltage is gained through selecting two voltage division resistors , which satisfy following relationship:

$$\frac{R59}{R64} = \frac{VOLED}{1.237} - 1$$

VOLED is about 12.2V according to above relationship. L24, C64 in circuits separately are energy storage inductance and output capacitor of rise-voltage.

When machine power on, rise-voltage inside L24 and TPS61040 begins to rise voltage and store energy. When current of L24 reached to 400MA, switches inside Lm2703 close and meanwhile supply power to rear circuit through external diode D6. R70，76 compose voltage division detect circuit and send detected voltage into pin3 of Lm2703. When voltage detected by pin 3 is lower than standard voltage1.233V（there is a 1.233 standard voltage comparator inside IC), internal switches are conducted. L24 and internal rise-voltage of Lm2703 begins to rise voltage and store energy. When current of L24 reaches to 400MA，internal switches of Lm2703 close and meanwhile supply power to rear circuit through external diode D6. Standard time of switch closing is 6μs（typical value）. Switch at least keeps 400μs (typical value) or until feedback voltage recedes lower than standard voltage. This PFM peek current control plan is operated by transformer with discontinuous conductive way (DCM) and conducting frequency depends on output current to make whole efficiency of load high. Pin 4 of chip is working enable and control level together with PNX0101 H3 pin through software to finish control of Lm2703 and realize screen saver function.

When power on, display screen carries data communicating through rear CPU and uses driving signals sent from CPU to light screen. Different signals sent by CPU cause different display of screen, so we can see different displays. Meanwhile, CPU also controls screen saver function.

3.2.4 Earphoe output/USB jack circuit

1.Earphone output jake of X27 is also USB jack. Principle chart of circuit is shown in figure 3.2.4.1:

2. Two channel left and right audio signals outputted form PNX0101 output to earphone jack circuit after 220uF capacitor coupling. Earphone jack circuit is composed of double MOS tube SI1912DL controlling sound output and earphone socket Cn1. Pin 2 and pin 5 of SI1912DL separately connect mute signal output pin PHONE_SEL of PNX0101. When it is mute, control double MOS tube breaks to cut output of earphone left and right channel. Triode Q1 in PNP circuit is used as reverse insert protection to prevent from revert insert damaging internal circuit of Mp3, D1 is diode array of TVS to protect ESD. Grounding wire of earphone is used as antenna input of FM module.

In X27 player, earphone jack is also USB jack. USB jack net is composed of USB_DM, USB_DP and GND（grounding wire). When player connects computer through USB connecting or charges, PHONE_SEL control double MOS tube SI1912DL breaks. Cut off audio output to earphone jack and USB jack circuit is conducted.

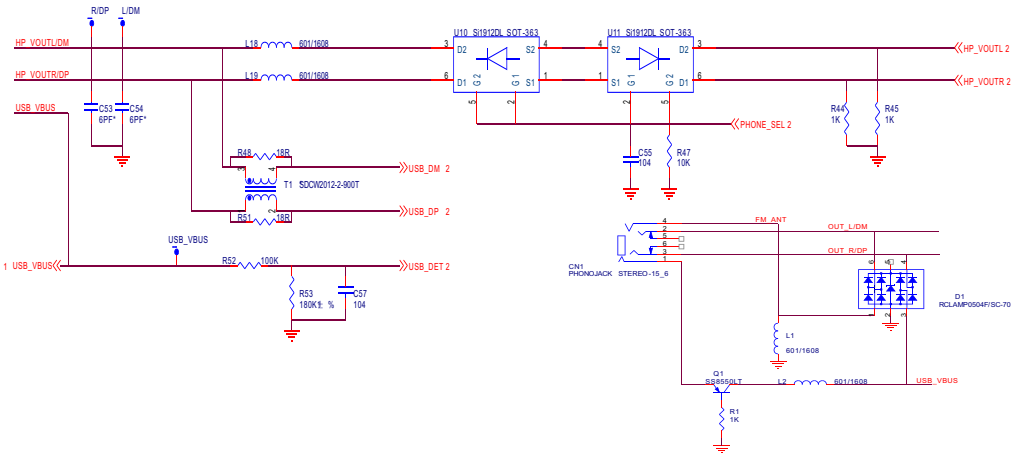


Figure 3.2.4.1 Earphone output/USB jack circuit

3.2.5 Button circuit

1.X27 adopts touch button with a CY8C21434 button control IC. CY8C21434 is internally integrated programming digital and analog system, which can configure any function modules needed by users. It is a real embedded device (SoC) which can mix signal processing ability. CY8C21434 chip belongs to capacitor touching mode which adopts I2C bus control. Button circuit diagram is shown in figure3.2.5.1:

2. Each button is actually a capacitor. When press the flat board capacitor with finger, it equals to parallel connecting two capacitor on two sides of this capacitor to enlarge capacitive value and make charge/discharge period long and make count number of record charging process larger. n count number of charge period compose an original database named rawdate. A group of new number formed by rawdate 4 baseline. Changing of rawdate and baseline is coherent in theory. When finger touches button, rawdate will enlarges quickly. When it exceeds noise valve value set by us, baseline won't change. At this time, we can judge wether there is button pressed through calculating margin between rawdate and baseline and ensure pressed button to realize button function through software.

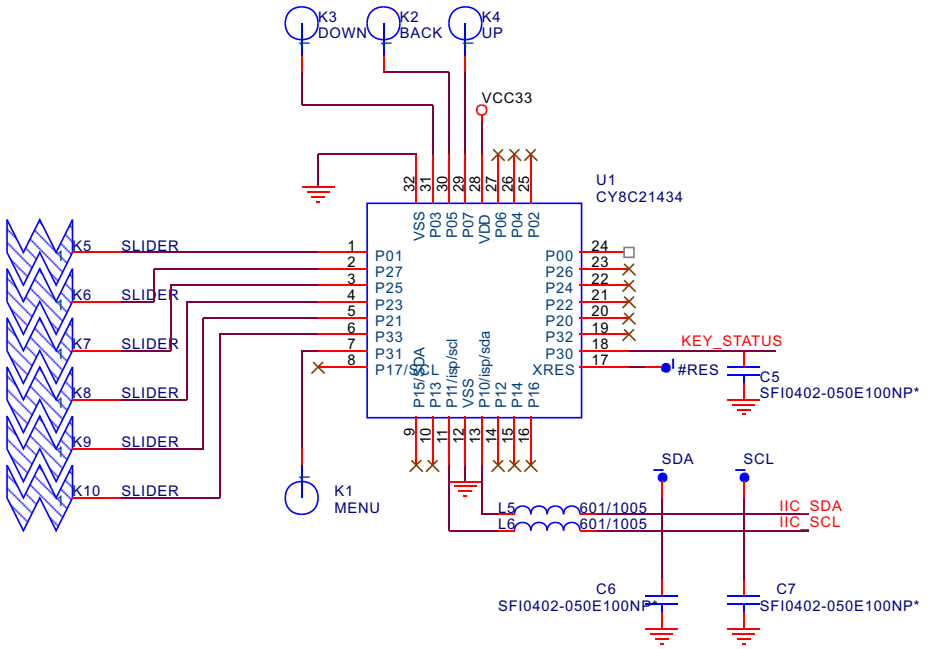


Figure 3.2.5.1button circuit diagram

3.2.6 Charge management circuit

1. Charge management circuit mainly finishes charge function to Li-battery. Its circuit diagram is shown in picture 3.2.6.1:

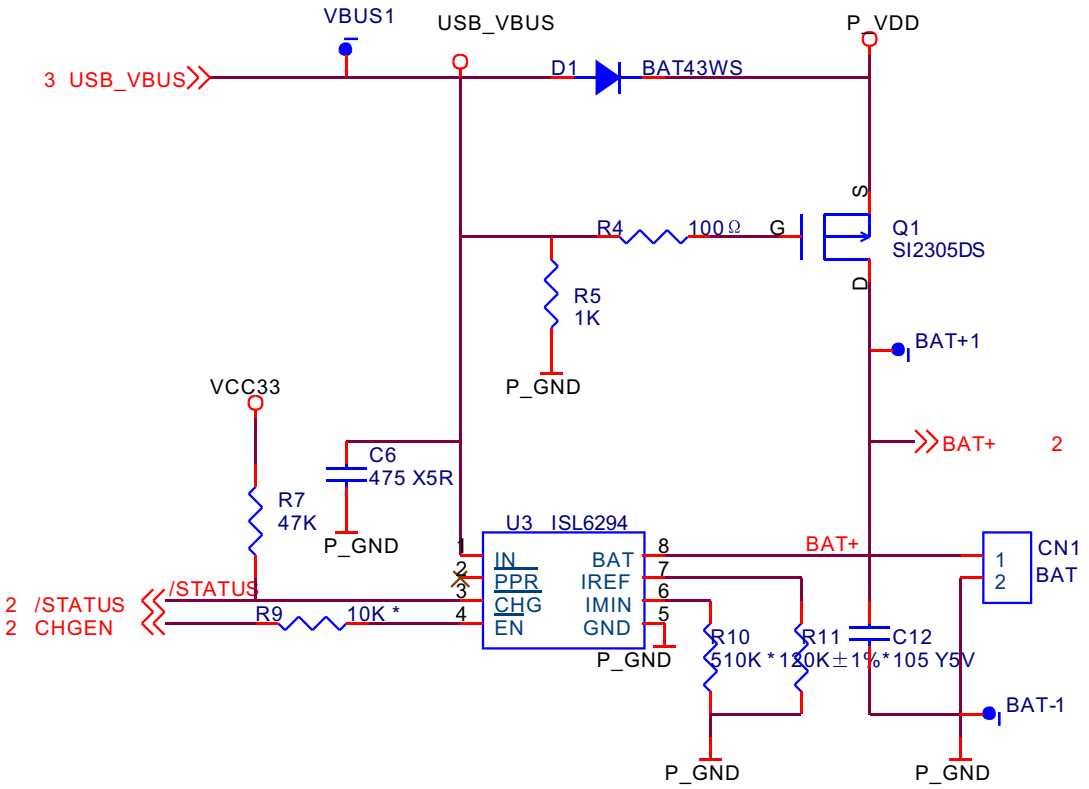


Figure 3.2.6.1Charge management circuit

2. Seen from circuit, charge circuit is mainly composed of charge control IC ISL6294 and peripheral circuit. IN pin is power input pin of ISL6294 , which is also power input pin of USB 5V. BAT is input pin of ISL6294, that is , input end of Li-ion battery; /CHG is charge state indication end, charge is in process when /CHG is low level, whereas means that charge finishes; I_{MIN} is minimum charge current setup end, which means that charge is stoped when charge current is lower than current value set by this end. Setting of minimum charge current value is realized by selecting external resistor R10. Relationship between minimum charge current I_{MIN} and R18 is shown as follows：

$$I_{MIN}=\frac{11000}{R10}(mA)$$

From above, minimum charge current is about 20mA. is setup end of charge current

I_{REF} is setup end of charge current， ISL6294 uses this reference current to charge Li-battery. Relationship between I_{REF} and peripheral resistor R11 is shown as follows：

$$I_{REF}=\frac{12089}{R11}(mA)$$

From the above , I_{REF} is about 100mA。

Whole ISL6294 charge process figure is shown in picture 3.2.6.2:

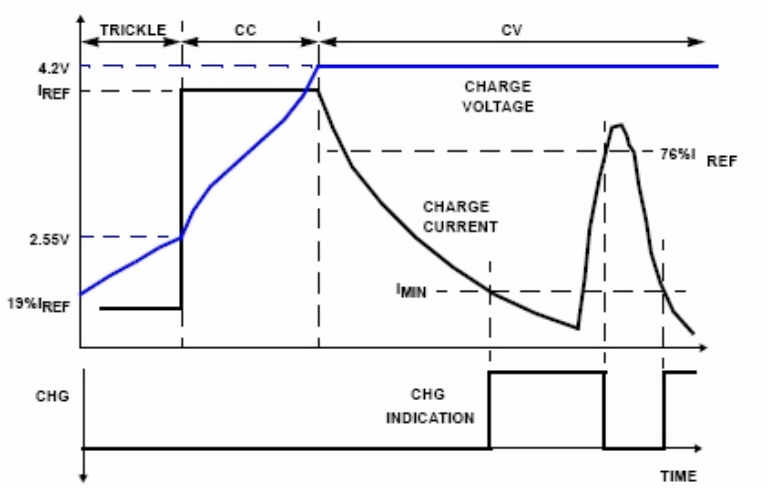


Figure 3.2.6.2 ISL6294 Charge process flow chart

3.When input voltage of VIN pin is higher than charge starting voltage（POR，typical value is 3.9V，maxsium is 4.2V）but in VOP（over voltage protection ）voltage range（4.25～6.8V），Is6294 internal MOS tube is conducted and PPR pin is low level and outputs 10mA current. When EN pin is null, internal connectting 200K resistor is in low level and is in enable state.

Internal integrated comparatorIS6294 detects battery voltage through compare to make different voltages are in different charge states. When battery voltage is lower than 2.55V，ISL6294 uses 19% discontinuous current passing external resistors to pre-charge for battery until battery voltage rises to 2.55V and ISL6294 enters to quick-charge constant current mode; When battery voltage is 4.2V，switch into constant voltage mode until charge current decreases to charge cut-off current.

3.2.7 Low voltage detect circuit

1. The function of low voltage detect circuit is to close the play when voltage inputted from player is lower than a certain voltage. Low voltage detect circuit is shown in picture3.2.7.1:

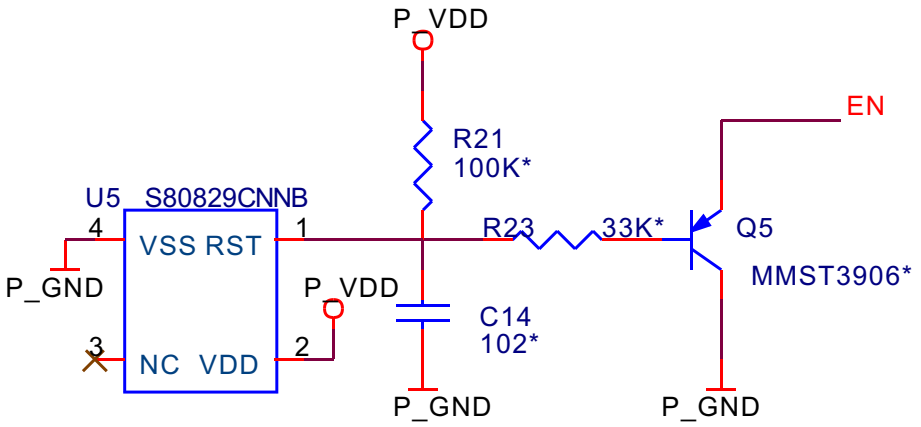


Figure 3.2.7.1 low voltage detect circuit

2. Low voltage detect circuit is mainly finished by IC S80829CNNB and PNP triode Q5. S80829CNNB is high precision voltage detect device with a 2.9V valve value and a ± 2% precision.P_VDD is input voltage of player. When P_VDD is lower than 2.9V , RST pin of IC outputs low level; triode Q5 is saturated on; control level output is low level to cut power of player to realize power off.

3.2.8 Battery protection circuit

1. Battery protection board is installed on Li-battery to protect Li-battery from damaging by short circuit, over discharge and over charge. Li-battery and battery board are called Li-battery core component. Principle chart of battery protection board is shown in figure3.2.8.1:

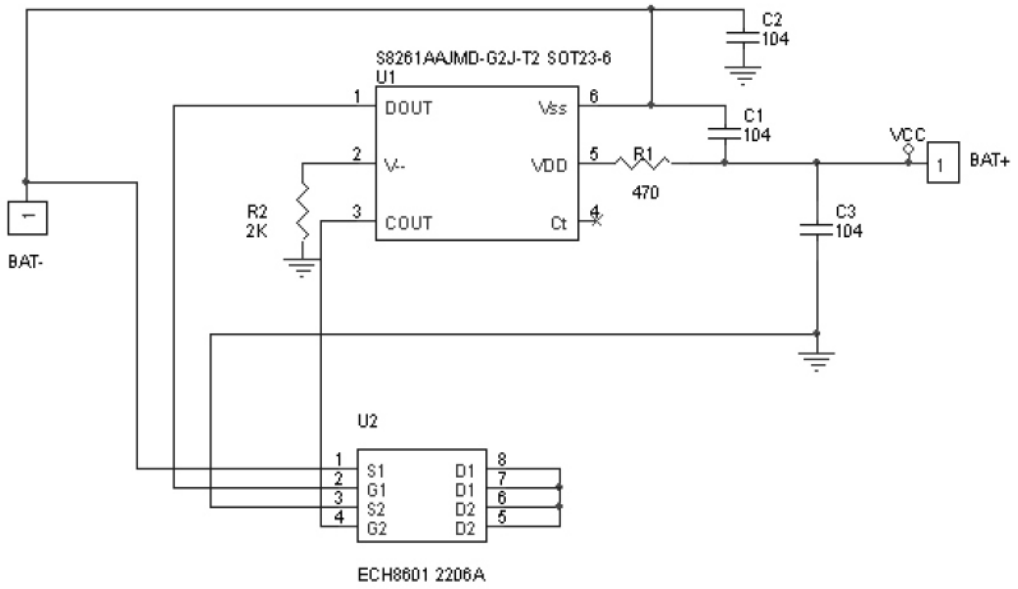


Figure3.2.8.1 Battery protection circuit

2. Battery protection circuit is mainly composed of battery protection IC S8261 and built-in dual N channel MOSFET ECH8601. S8261 is built-in high precision voltage detect circuit , which protects IC together with lithium ion polymer of delaying circuit. Its DOUT and COUT pin are separately over discharge（voltege of Li-battery lower than 2.4V is over discharge)preotting output end and overcharge（voltage of Li-battery higher than 4.2V is over charge）protectting output end. The two pins are high level in normal working; MOSFET opens ; Li-battery voltage outputs to player through protection board. When it protects, the two pins outputs low level to control MOSFET and cut off power. Pass current detect（short circuti protection）is finished through V-pin detect circuit state controlling DOUT and COUT output.

3.2.9 Power management module

1. Function of power management module is to provide 3.3V, 2.8V and 1.8V three channel voltage for player's normal working. Circuits' diagrams are shown in picture3.2.9.1、3.2.9.2、3.2.9.3:

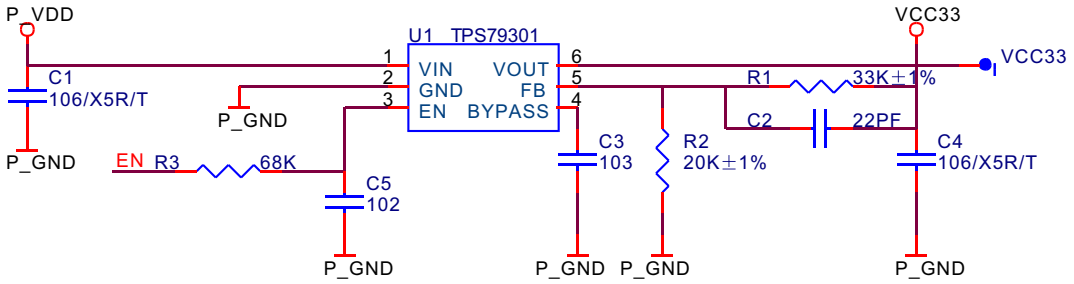


Figure 3.2.9.1 3.3V power circuit

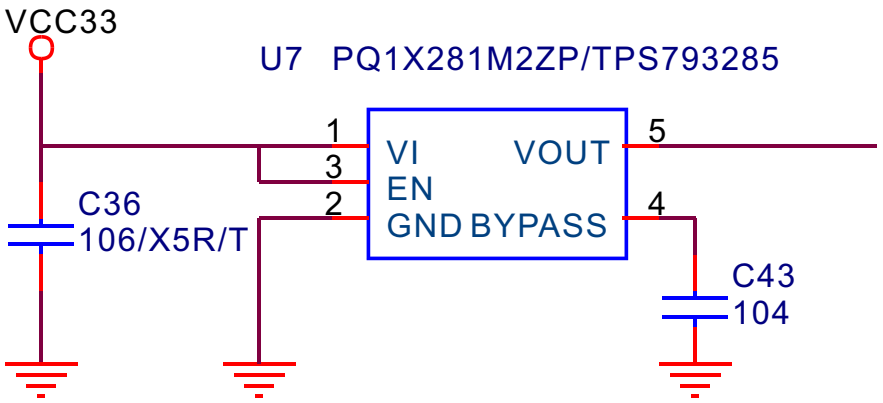


Figure 3.2.9.2 2.8V power circuit

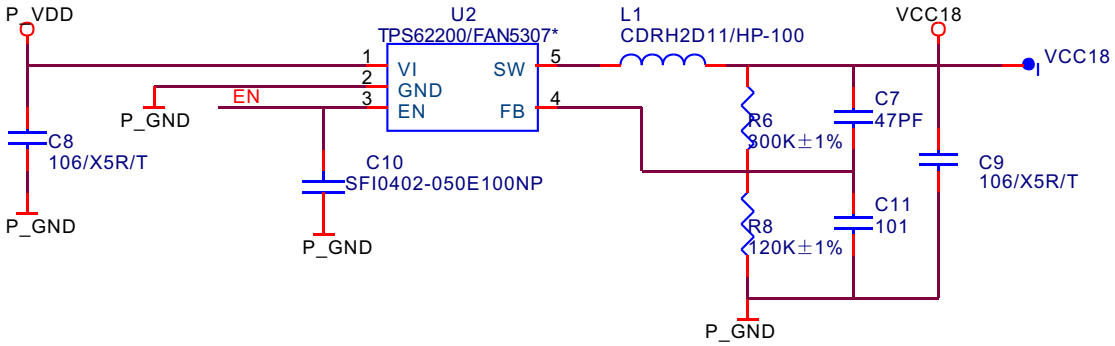


Figure 3.2.9.3 1.8V power circuit

2. Seen from circuit, 3.3V voltage is supplied by IC TPS79301 and peripheral circuit. TPS79301 is a linear voltage stabilize module（also called LDO). Its EN pin is enable pin to control normal working and high level is effective. Inside BYPASS pin, there is a resistor than can from a lowpass filter with peripheral 103 capacitor C3 to reduce output noise; Setup of TPS79301 output voltage is determined by two external connecting resistor value of FB pin and its relationship is shown as follows：

$$VOUT=1.2246\times\left(1+\frac{R1}{R2}\right)$$

From above, VOUT is about 3.2V。

Player's working power 1.8V is supplied by IC TPS62200 and its peripheral circuits. TPS62200 is high efficient voltage-decrease DC-DC convertor. EN pin is enable pin and high level is efficient. Relationship between output voltage of TPS62200 and FB pin feedback resistor is shown as follows：

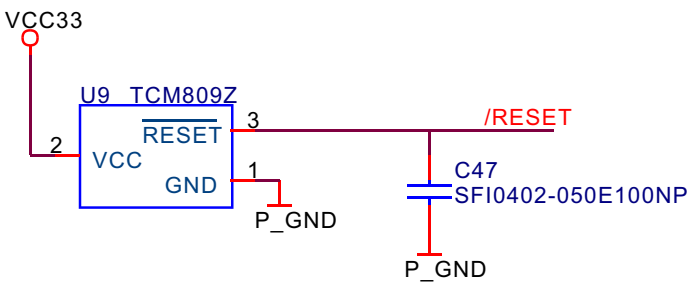
$$VOUT=0.5\times\left(1+\frac{R6}{R8}\right)$$

From above, output voltage is about 1.75V。

To strength effect of Mp3 timbre, FM and MIC，we brought in 2.8V power to specially supply power for PNX0101 audio system, FM and MIC . Features of this channel 2.8V power are：it is outputted by LDO PQ1X281 with a clean power and low ripple voltage. PQ1X281 can output stable voltage 2.8V，EN pin is its enable end and high level is efficient.

3.2.10 Reset circuit

1. Reset circuit provides reset signal for PNX0101 and its diagram is shown in figure 3.2.10.1:



3.2.10.1 Reset circuit

2. Reset adopts IC reset. When pin 2 Vcc voltage of TCM809Z achieves VCC33 voltage to reset PNX0101 and reset signal at least keeps 140ms. C47 is voltage dependent resistor to protect ESD.

3.2.11 Power on/off control circuit

1. Power on/off control circuit is shown in picture3.2.11.1, 3.2.11.2:

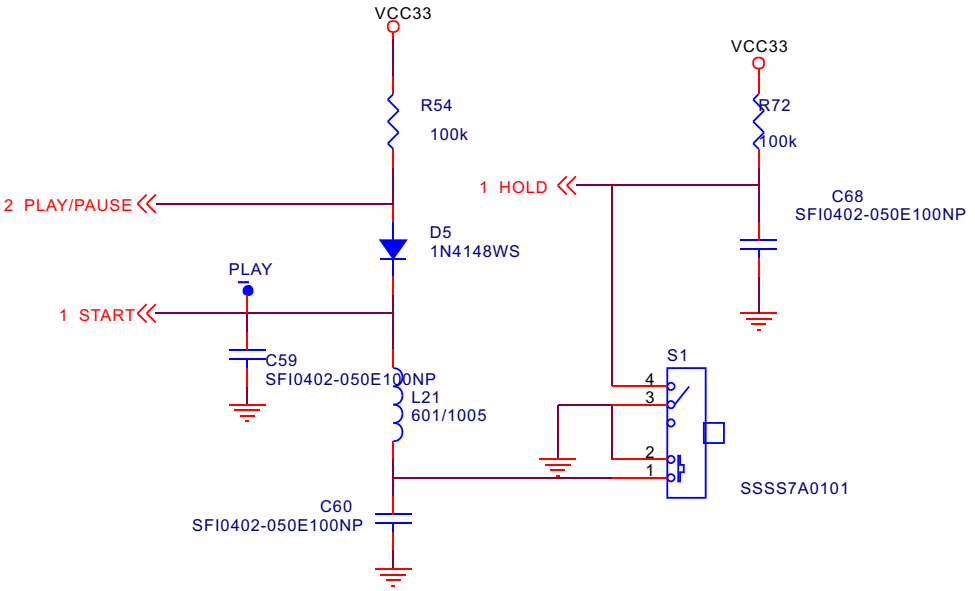


Figure 3.2.11.1 Power on/off control circuit

2. START/PLAY/PAUSE is a combination press button with different functions in different time, which is depend on software. When player is in power off and unconnected with USB state（remark：USB and power adapter use jack in common with software identify function），START is high level and Q2 is cut off. When press button S1 switches to power on，START is pulled to ground and outputs low level; Q2 is conducted; diode D2 is conducted ;P_VDD pulls EN high through Q2、D2; EN enable end of U1、U3 is effective; TPS62200 and TPS79301 begin to enter working state; TPS62200 and TPS79301 separately output 1.8V and 3.3V voltage to provide power for system. System voltage VCC33、VCC18、OLED voltage（13V）begin to output, crystal oscillator X1 oscillates; U9 produces reset signal; core chip initialize（display appears）and machine begins to work.

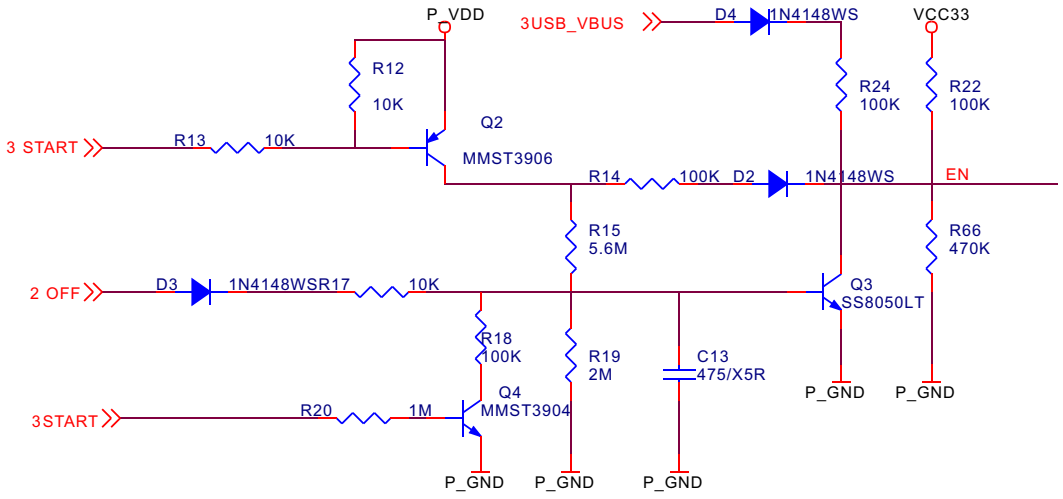


Figure 3.2.11.2 Power off control circuit

3. In power on state, short press START/PLAY/PAUSE，Q2 is saturated on，EN pin is high level and player works normally. After pressing button, voltage of PLAY/PAUSE pin changes, and PLAY/PAUSE voltage of PNX0101 L3 pin is detected to have PLAY/PAUSE voltage change. Different functions are realized in different interface, which includes: in playing interface, short press is pause/play switch; in recording interface, short press is record pause; in tuning interface, short press is mute; short press in tuning SCAN mode is to save radio station and change mode into PRESET mode; short press in operation menu is to enter selection or affirm setting.

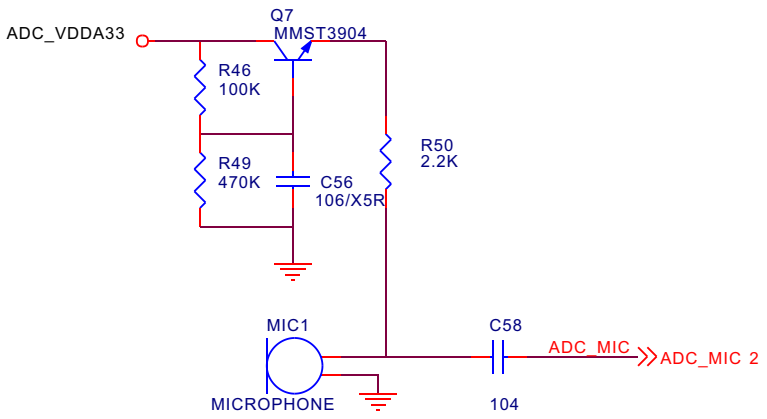
When PLAY button pressing time is more than 1 second or less than 4 seconds，L3 pin of PNX0101 is detected to have voltage change. Judged by software, this signal is power off signal. Save machine operating contents. Pin K16 outputs high level to make D3 conduct. So that Q3 is conducted. VCC33 is grounding through CE electrode of Q3 to make enable end EN low level. TPS62200 and TPS79301 close; TPS62200 and TPS79301 has no voltage output and player realize software power off.

when play machine down because of software problem, long press START/PLAY/PAUSE button more than 4 seconds to realize firmware power off. The process is that：after pressing button, B electrode START of Q2 changes into low level; Q2 is conducted; P-VDD passes through CE electrode of Q2, R15 charges C13, and voltage on capacitor increases gradually to make Q3 conduct. VCC33 is grounding through CE electrode of Q3, EN changes into low level，TPS62200 and TPS79301 stops working, and there is no voltage output, player is power off. When button is loose, P-VDD keeps START pin a high level through R12，R13 and make Q4 conduct. Power saved by C13 discharges quickly through CE electrode of R18, R19 and Q4 to make sure that power on is normal when press START/PLAY/PAUSE button next time.

3.2.12 MIC circuit

1. MIC circuit is shown in figure 3.2.12.1:

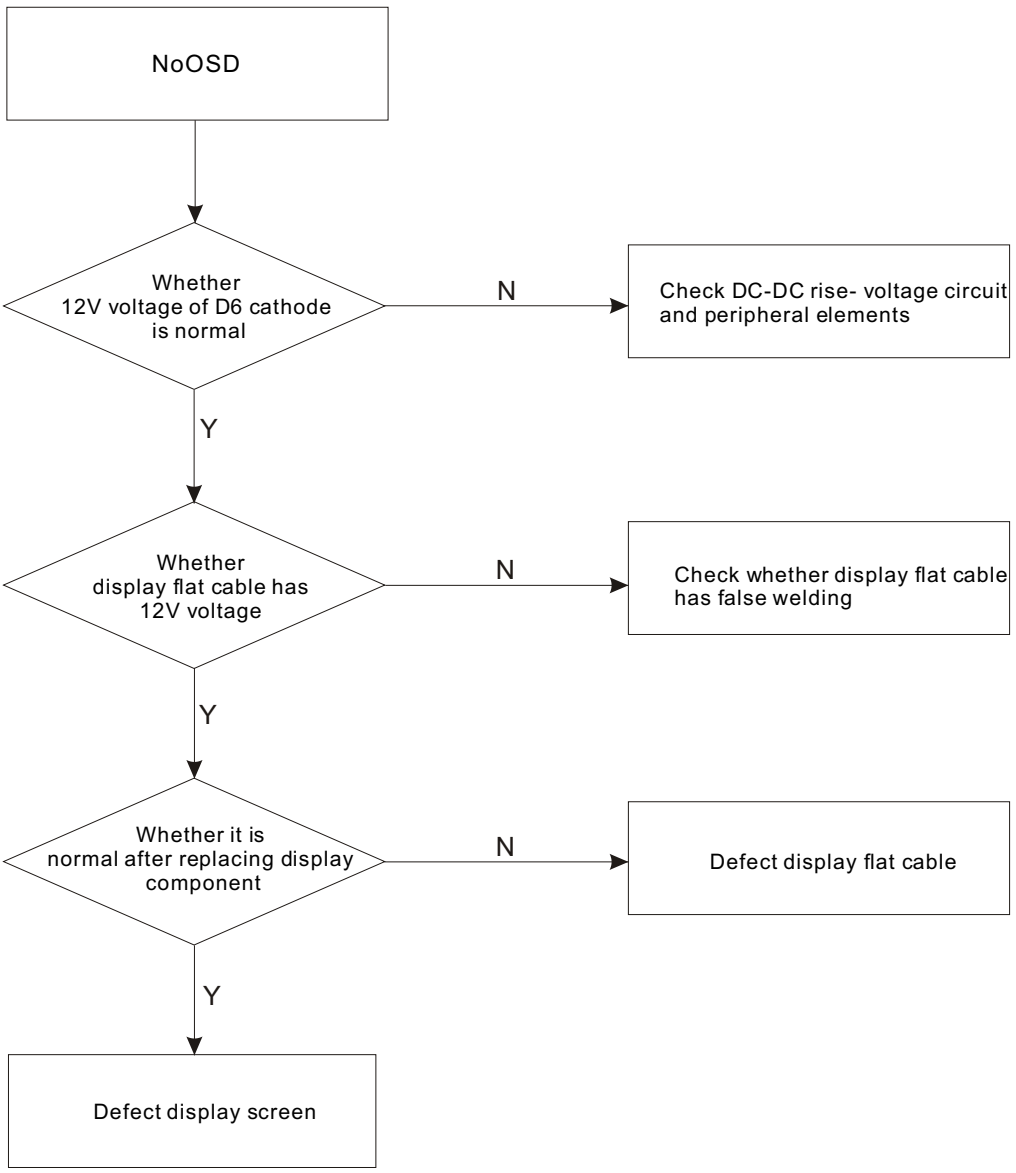
2. MIC circuit is mainly composed of MIC and MIC power biased circuit. MIC MIC1 changes external recorded audio signal into electric signal and outputs to ADC circuit of PNX0101 after C58 coupling and changes analog electric signal into digital signal and forms WAV file to save in FLASH after software decode. R46、R49、Q7 and C56 in circuit are triode voltage stabilization system to provide stable power biase for MIC and R50 is biased resistor of MIC.



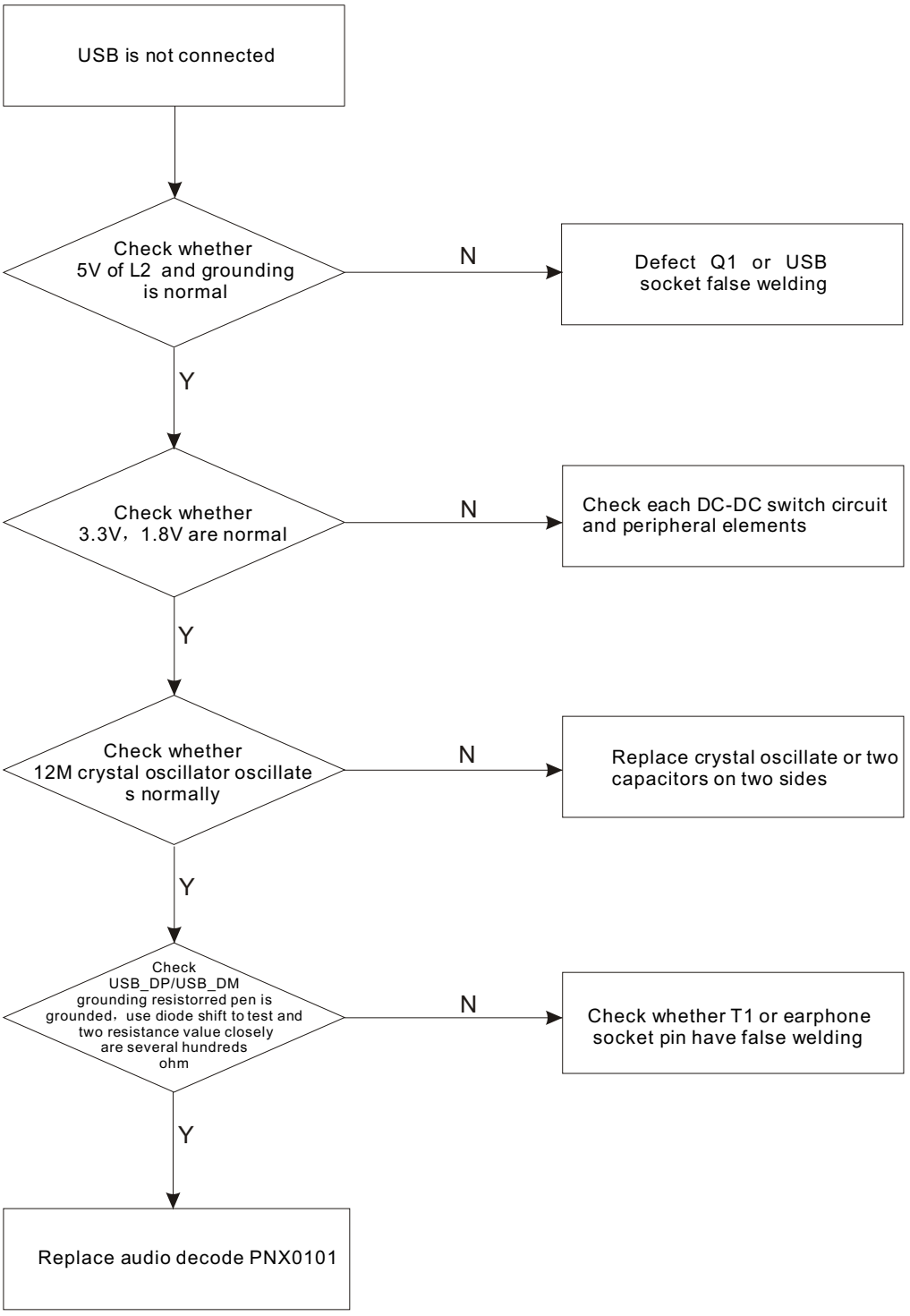
3.2.12.1 MIC circuit

Section Three Troubleshooting process

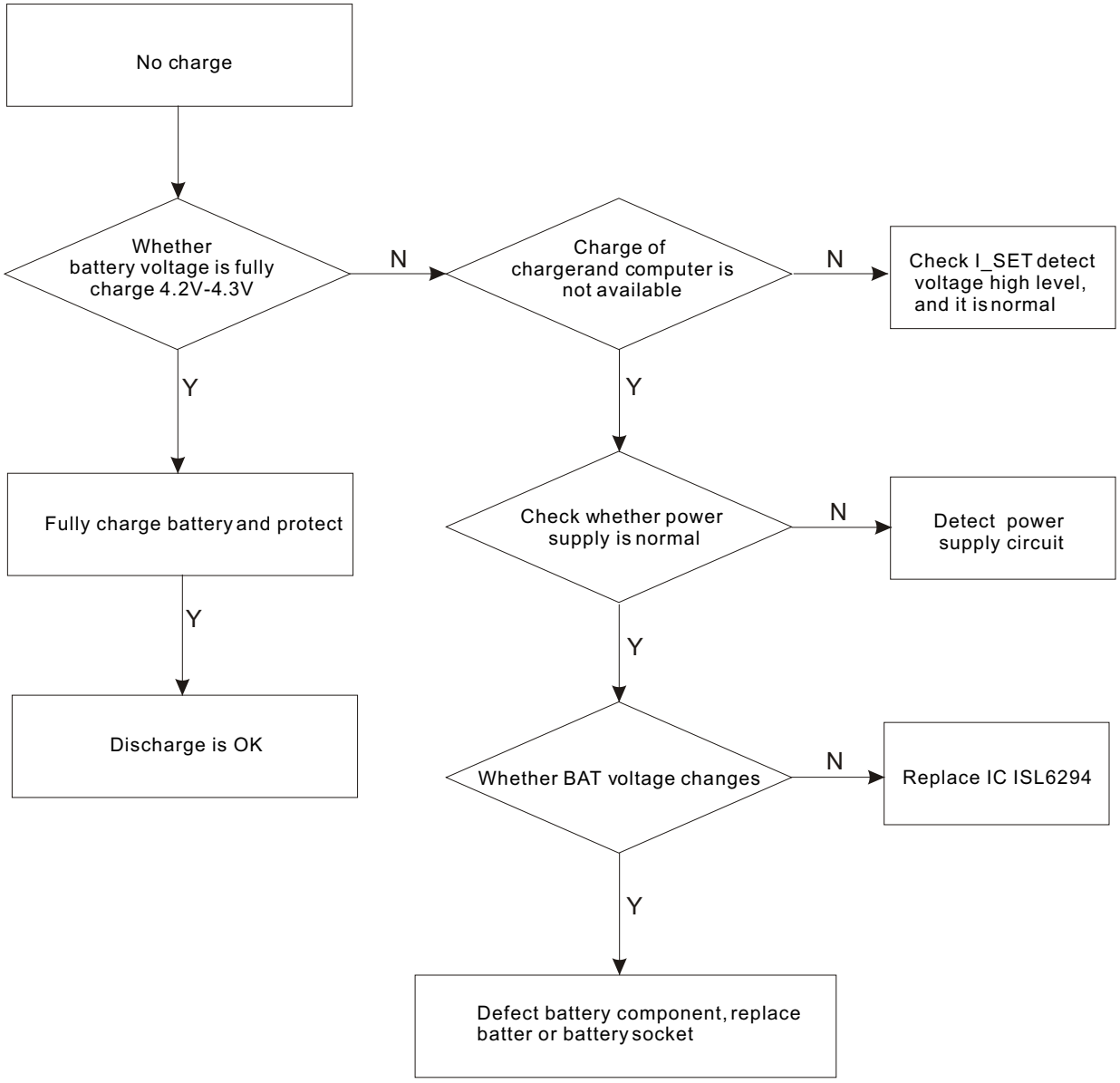
3.3.1 OSD circuit troubleshooting process



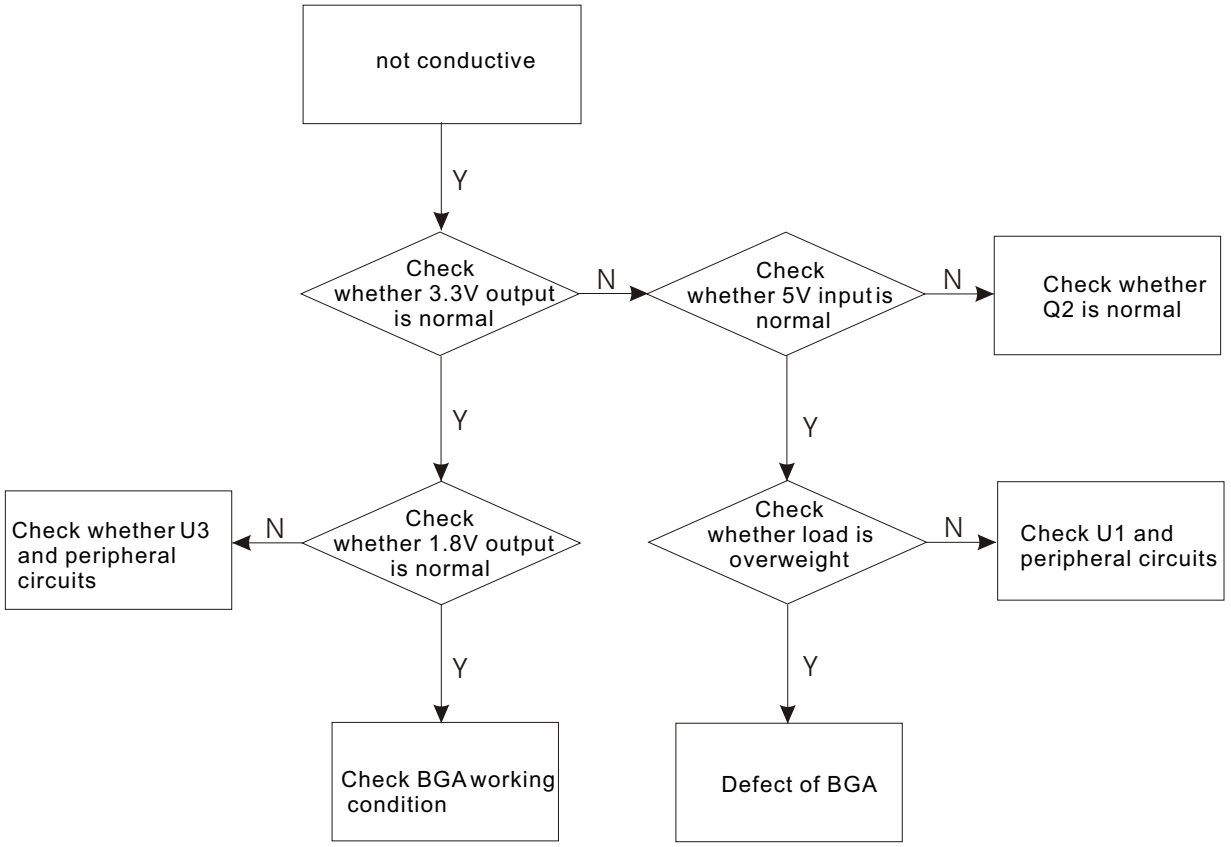
3.3.2 Troubleshooting process of USB jack circuit



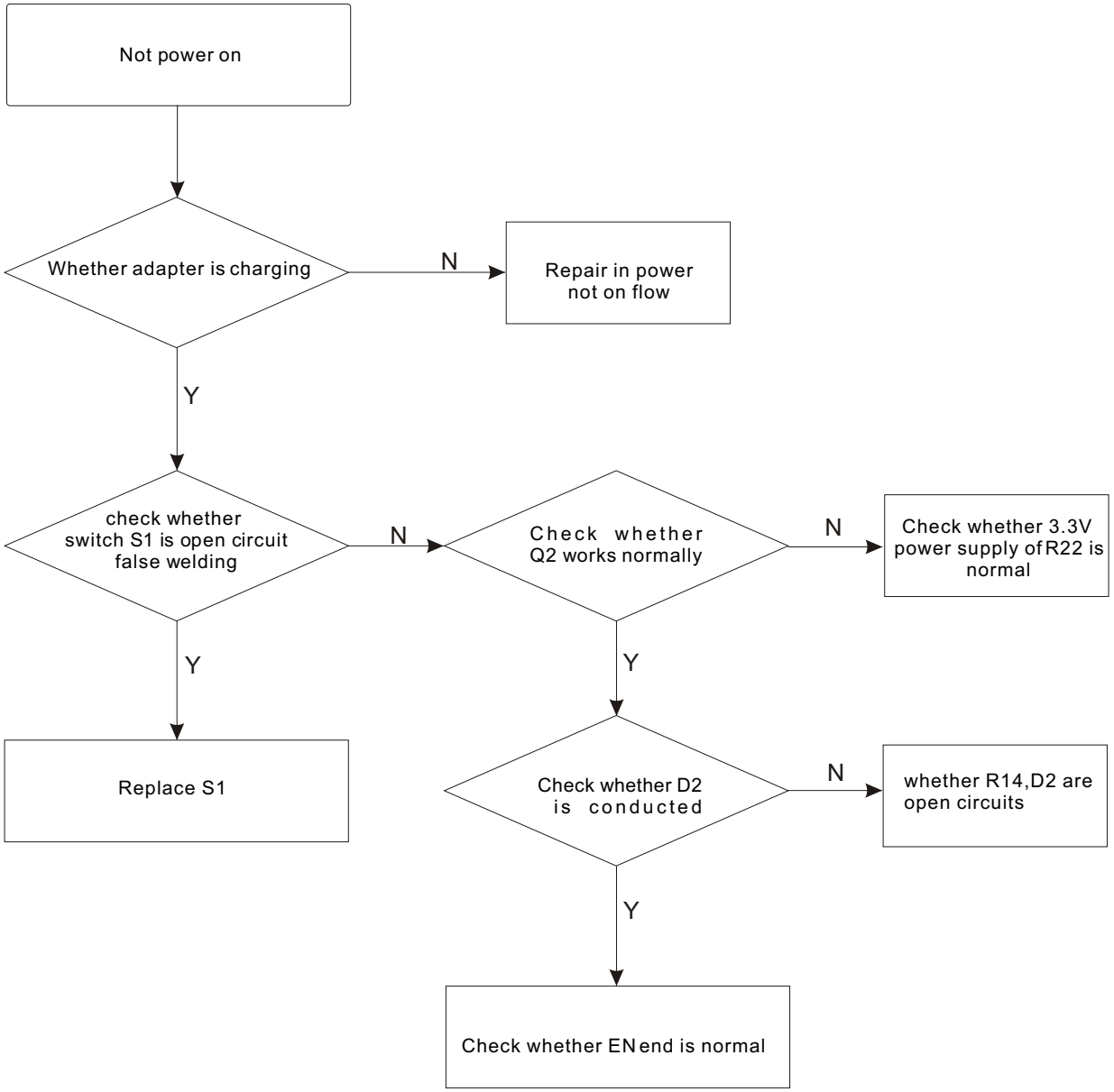
3.3.3 Charge management circuit detect process



3.3.4 Power management circuit detect process



3.3.5 Detect flow of power on/off control circuit



3.3.6 Servicing cases

[Example 1] Symptom: power not on.

Description: no OSD and no output.

Analysis and troubleshooting: Connect adapter, see whether it can charge and whether there is display on screen, and there is no display after it conducted. Take the player apart and check. Test power supply 3.3V and 1.8V and it is found that 3.3V is low to 0.6V and 1.8V is normal. Use adapter to supply power; input 5V and it is normal; enable end of charge is also high level and it is normal. Detect carefully, it is found that pin 2 of U1 (TPS79301) is false welding . After repair welding , trouble is moved.

[Example 2] Symptom: power not on.

Description: No OSD after pressing power-on button and earphone has no output.

Analysis and troubleshooting: Firstly confirm that whether it is power not on or no conduction. Connect adapter or computer and see whether display of screen is normal. Connect adapter and charge can be displayed, which means that power and rear circuit is normal working. Power on/off circuit is that it closes to form a loop through a core-start switch S1 to give power control an enable end signal to control whole circuit normal working. Detect S1 switch, then press close and see whether it is conducted. During detect, it is found that, S1 is false welding. Trouble is removed after repair welding.

[Example 3] Symptom: No connecting with computer.

Description: No response after connecting with computer and no OSD.

Analysis and troubleshooting: Firstly confirm whether it can charge. Power on and it is normal. Use multimeter diode shift to test grounding resist of two data signals USB_DM，USB_DP on USB terminal and it should approach several hundreds ohm. In the test, resistance value of USB_DM is normal; USB_DP resistace value is infinite . It is found that USB terminal is false welding and trouble is removed after repair welding.

[Example 4] Symptom: noise when tuning.

Description: radio station has noise when tuning.

Analysis and troubleshooting: firstly judge whether the tuning components or common part has trouble. Listen to radio station by using headphone and check whether only one side of headphone has sound and the result is normal. Then switch in tuning state to search radio station automatically and the result is normal, which means power supply, data and clock are normal. To remove interferences from outside, we receiver the nearest radio station to listen and check whether it is clear, and it has noise in result. The circuit that causes noise is mainly high frequency tuning and mixed frequency part. Check carefully and find that pin 37 of FU1(TEA5767HN) has false welding. After welding again, trouble is removed.

[Example 5] Symptom: noise in playing.

Description: there is noise when playing.

Analysis and troubleshooting: noise in playing is mostly caused by defect BGA. Because all other functions are normal in playing except that there is noise. It should be confirmed that whether it caused by decode part or rear electrode. Play 1KHZ standard signal. sine signal should be outputted and there is no mixed wave. First detect P3.N3 wave of BGA and mixed wave is found. We confirm that BGA is defect, replace it and trouble is removed.

[Example 6] Example: no OSD.

Description: screen has no display.

Analysis and troubleshooting: firstly confirm whether power or display screen itself has trouble. Power on, listen to playing sound and it is normal, so we preliminarily decide power supply 3.3V and 1.8V are normally basically. Test voltage on two ends of L24, and it is about 4.3V, which is normal. Then test voltage on two ends of D6 and find the anode does not form 13V. Take out display screen and there is still no 13V. Check input end voltage and EN enable end is normal. Then check feedback pin FB end voltage and it is low obviously and EN enable end has false welding. After welding again, trouble is removed.

[Example 7] Symptom: Visuasl artifacts.

Description: display visual artifacts and mess codes.

Analysis and troubleshooting: troubleshooting way is similar with that of no ODS. Normal power supply is the difference. Firstly we should confirm that whether screen or circuit has problem. Replace display screen, and trouble also exists. Then use oscillograph to test 8 digit of OLED screen. It is found that extension socket has false welding. Trouble is removed after weld again.

[Example8] Symptom: external recording noise

Description: there is noise when playing external recording file.

Analysis and troubleshooting: recording circuit is composed of MIC and MIC power biased circuit. MIC changes recorded external sound signal into electric signal and outputs to ADC circuit of PNX0101 after C58 coupling. Then it forms to wave file after software decode and store in Flash. To repaire this kind of machine, first play playback file and see whether there is noise, and there is no noise. Detect record circuit and power supply is normal. Use oscillograph to detect C58 and there is mixed wave interference. Replace MIC and trouble is removed.

[Example 9] Symptom: computer cannot be connected.

Description: after connecting with computer, no display and disk cannot be found.

Analysis and troubleshooting: Defect or lost of software programme will cause power not on or machine down problems. Refresh software when this kind of problem happens. Firstly, try whether software can be upgraded and download programme again. Trouble is removed after software upgrading.

[Example10] Symptom: Charge is not available

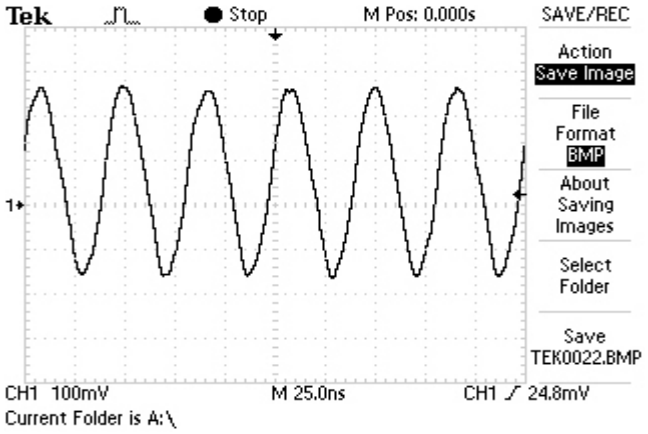
Description: display charge mode but actually charge is not available.

Analysis and troubleshooting: Display charge mode is available ,but it can not be fully charged. Pull out adapter and power on after 3 hours. Low power is displayed and power off automatically. Charge mode can be entered and there is charge indication, which means that power inputs. Battery BAT and CHG is normal. Charge control pin should be considered firstly. Detect IMIN current control end and stop charging if current of this pin is too low. R10 is found to have false welding. Trouble is removed after weld again.

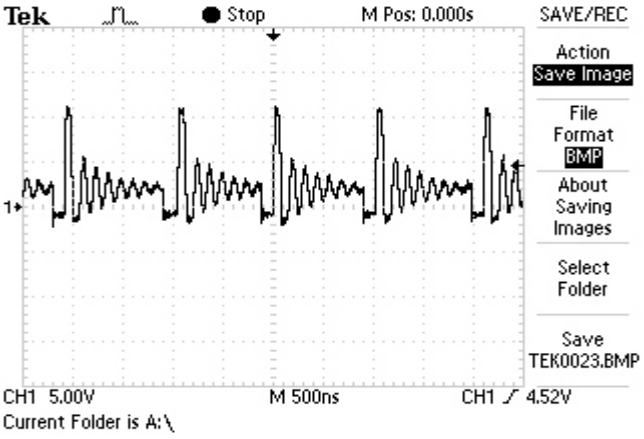
Section Four Waveform diagram

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.

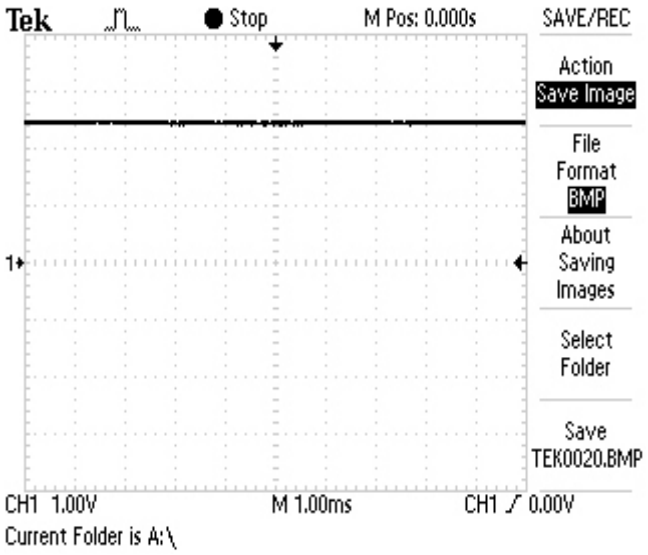
1. 12M crystal oscillator oscillation waveform diagram



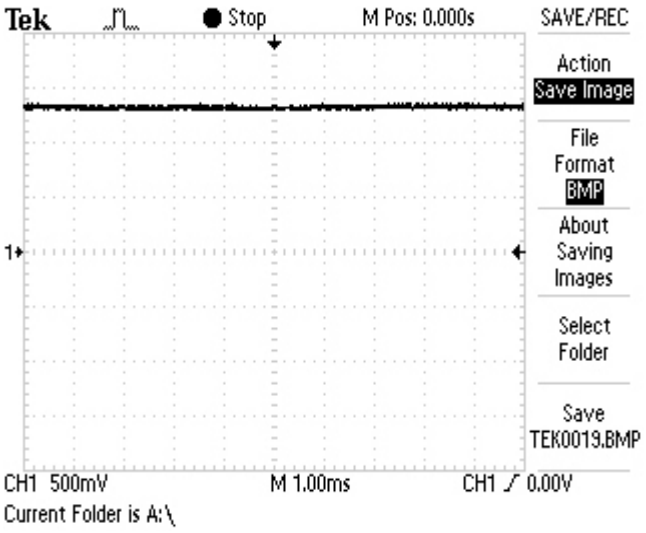
2.L24 boosted energy storage waveform diagram



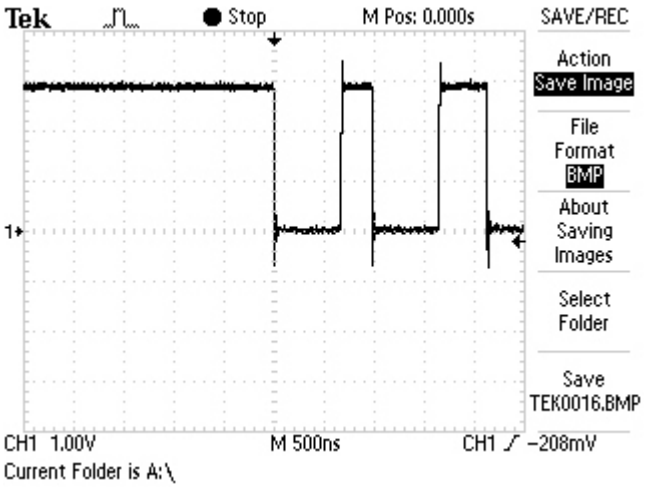
3. Flash power supply 3V3 waveform.



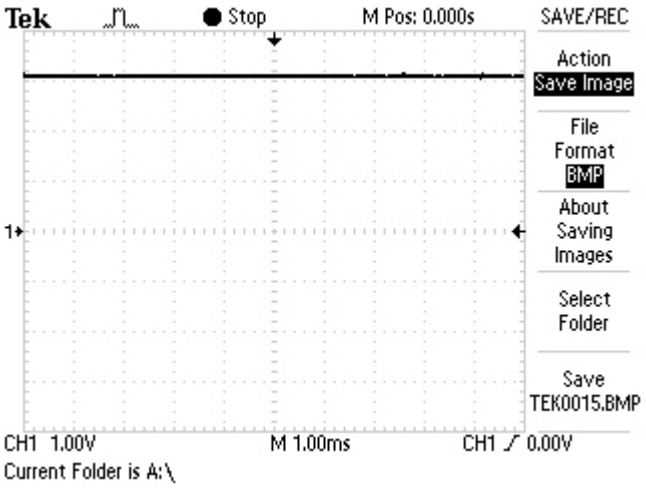
4.LCD_3V3 waveform



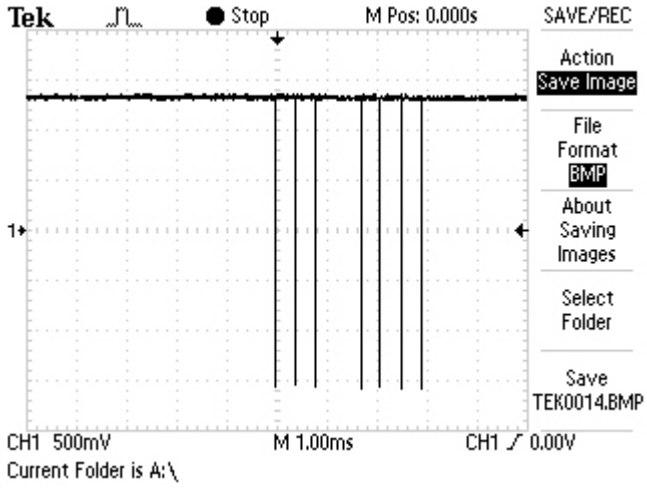
5.LCD_CS wave form



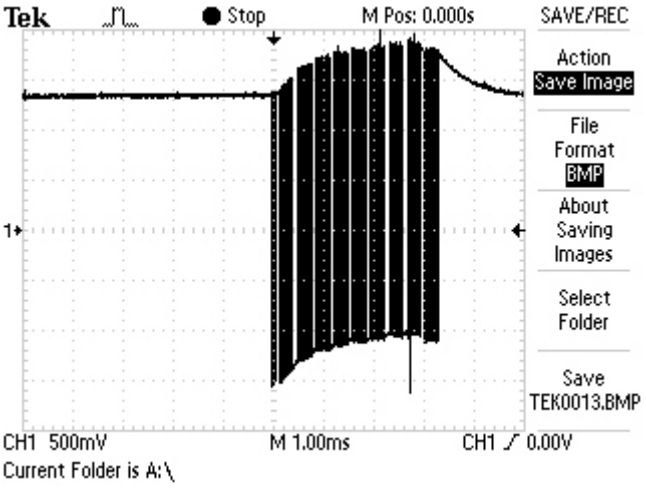
6、LCD_RESET waveform



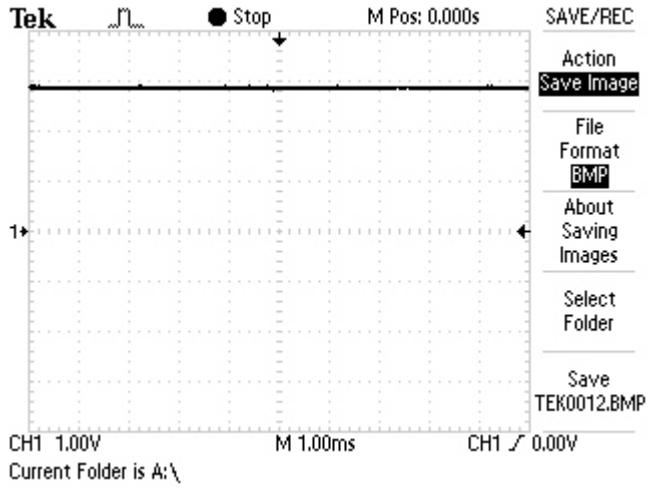
7.LCD_D/C wave form



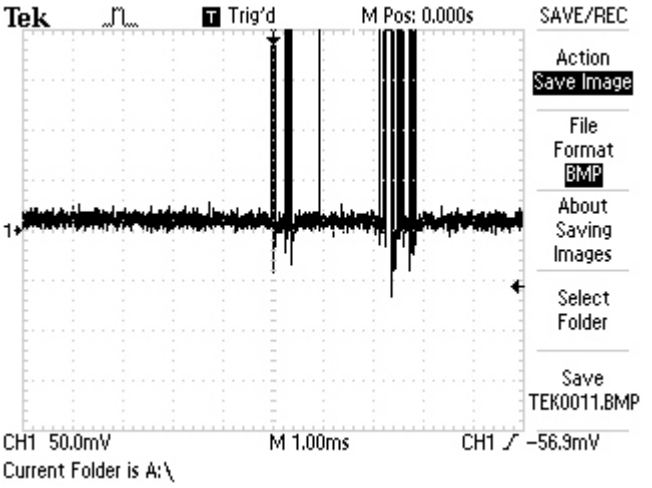
8.LCD_WR waveform



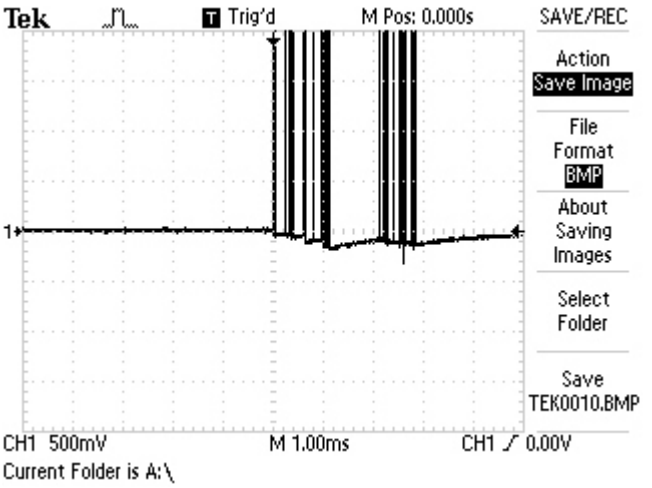
9.LCD_RD waveform



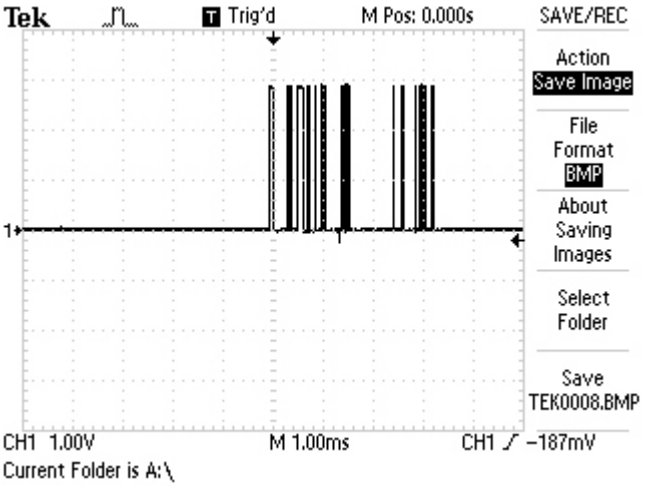
10.LCD_DB0 waveform



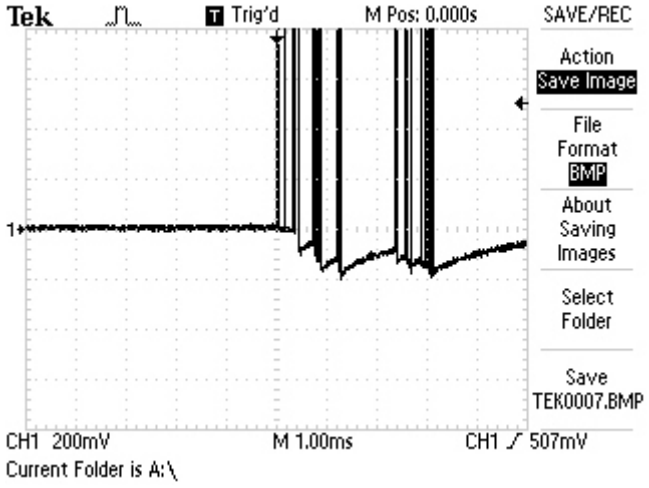
11.LCD_DB1 waveform



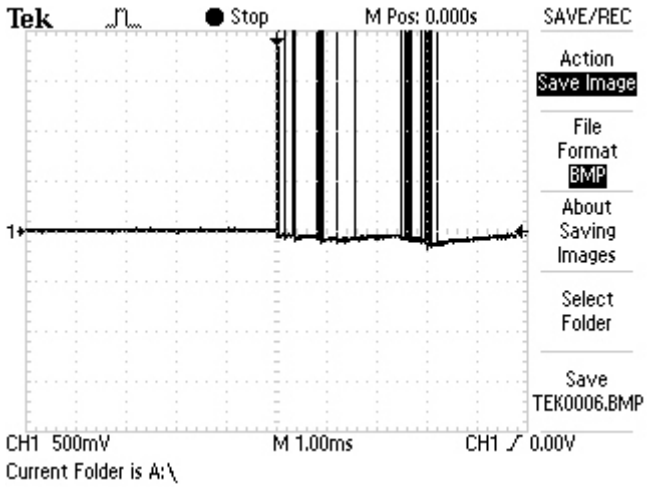
12.LCD_DB2 waveform



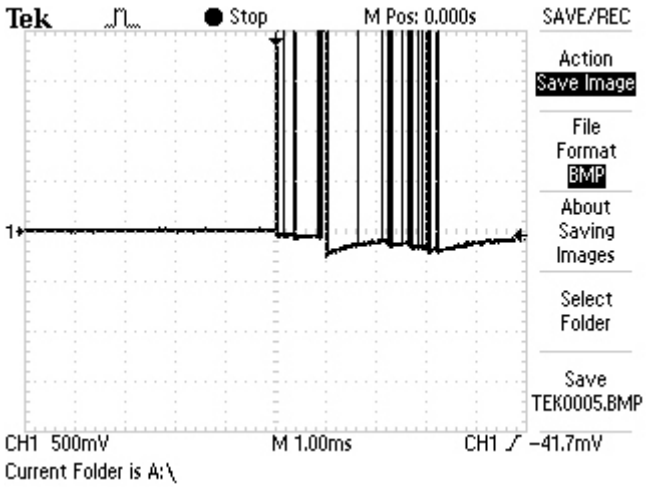
13.LCD_DB3 waveform



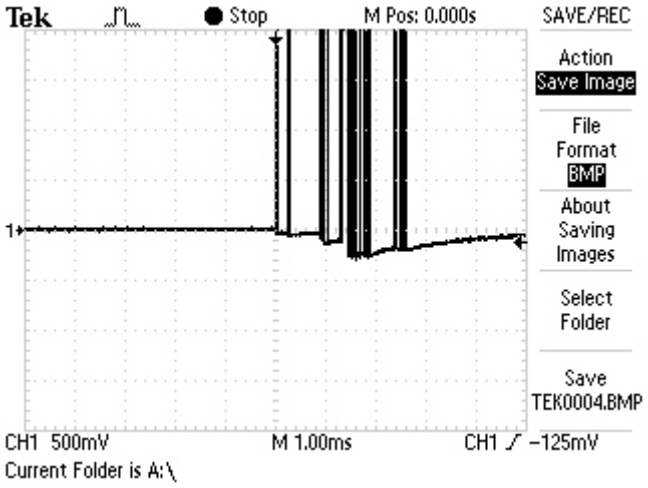
14.LCD_DB4 waveform



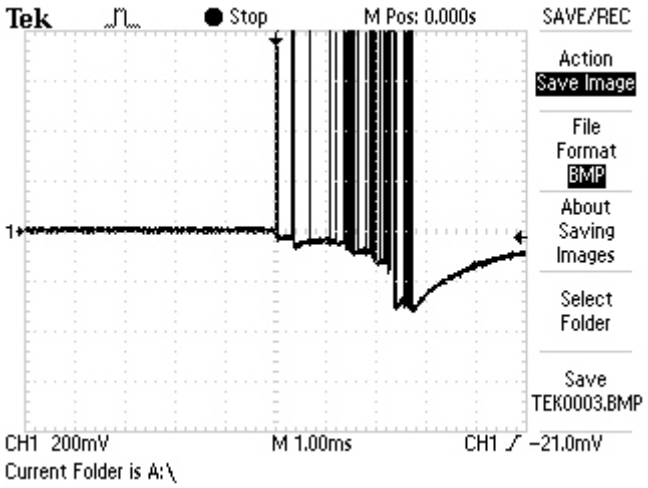
15.LCD_DB5 waveform



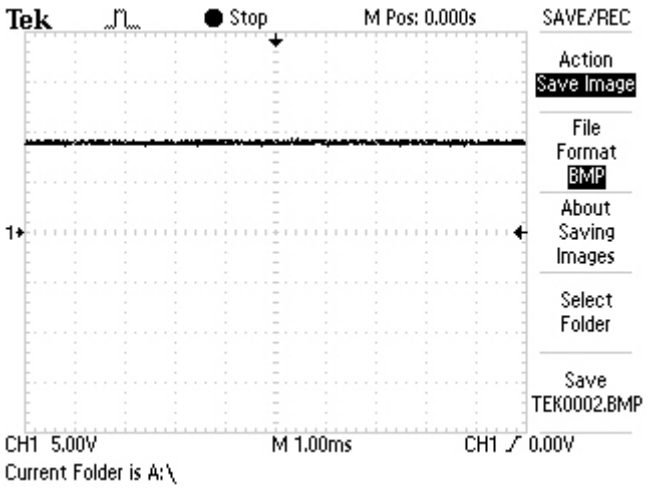
16.LCD_DB6 waveform



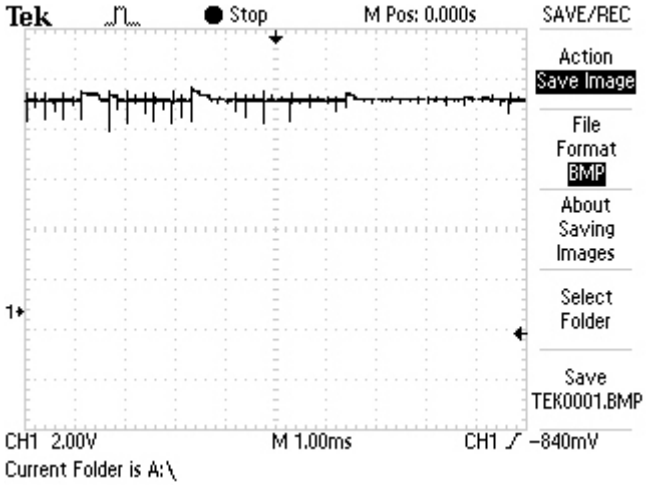
17.LCD_DB7 waveform



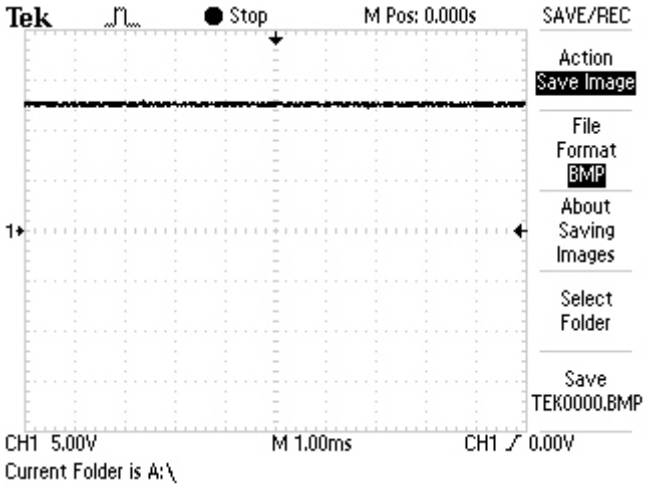
18.IREF waveform



19.VCOMH waveform



20.VOLED waveform



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^{TM} 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 LifeVibesTM 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 LifeVibesTM 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 tolerant	I/O	output	bpts10tht 5v	Data input 0/Data output 0
GPIO_LCD_2						General Purpose IO pin
LCD_CSB	B3	0-5 VDC tolerant	I/O	output	bpts10tht 5v	Chip Select
GPIO_LCD_1						General Purpose IO pin
LCD_RS	F3	0-5 VDC tolerant	I/O	output	bpts10tht 5v	'high' Data register select 'low' instruction register select
GPIO_LCD_0						General Purpose IO pin
Memory Card Interface (fixed: 6 pins)						
MCI_DAT_3	J3	0-5 VDC tolerant	I/O	input	bpts10tht 5v	Data input/Data output
GPIO_MCI_5						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)	Reserved for USB 2.0 HS
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 & USB 2.0 HS
GPIO_USB_0		tolerant			5v	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	I/O	input	bpts10tht	DAI Bitclock
GPIO_DAI_2		tolerant			5v	General Purpose IO pin
DAI_WS	G17	0-5 VDC	I/O	input	bpts10tht	DAI Wordselect
GPIO_DAI_1		tolerant			5v	General Purpose IO pin
DAI_DATA	G16	0-5 VDC	I/O	input	bpts10tht	DAI Serial data input

GPIO_DAI_0		tolerant			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 5v	DAO Bitclock
GPIO_DAO_2						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 5v	DAO Serial data output
GPIO_DAO_0						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 5v	Serial output
GPIO_UART_3						General Purpose IO pin
UART_RXD	K3	0-5 VDC tolerant	I/O	input	bpts10tht 5v	Serial input
GPIO_UART_2						General Purpose IO pin
UART_NCTS	K2	0-5 VDC tolerant	I/O	input	bpts10tht 5v	Clear to send (active low)
GPIO_UART_1						General Purpose IO pin
UART_NRTS	K1	0-5 VDC tolerant	I/O	output	bpts10tht 5v	Ready to send
GPIO_UART_0						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 HY27UG088G5M

1. Description

Offered in 512Mx8bit, the HY27UG088G5M 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 data. Even the write-intensive systems can take advantage of the HY27UG088G5M′ 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 : 25μs(Max.)
  - – Serial Access : 30ns(Min.)
- ◆ Fast Write Cycle Time
  - – Program time : 200μs(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, 10	/CE1, /CE2	I	CHIP ENABLE
8	/RE	I	READ ENABLE
18	/WE	I	WRITE ENABLE
19	/WP	I	WRITE PROTECT
6, 7	R/B1, R/B2	I	READY/BUSY OUTPUT
38	PRE	I	POWER-ON READ ENABLE
37	Vcc	P	POWER
36	Vss	P	GROUND
1~5, 14, 15, 20~24, 25~28, 33~35, 39, 40, 45~48	N.C	N	NO CONNECTION

3.5.3 Function introduction to TPS79301

1. Description

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 2.2-μF 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 star-up times (approximately 50μs with a 0.001-μF capacitor) while consuming very low quiescent current (170 μA typical). Moreover, when the device is placed in standby mode, the supply current is reduced to less than 1 μA. The TPS79328 exhibits approximately 32 μVRMS of output voltage noise with a 0.1-μF bypass capacitor. Applications with analog components that are noise sensitive, such as portable RF electronics, benefit from the high PSRR and low-noise features as well as the fast response time.

2. Features

- 200-mA RF Low-Dropout Regulator With Enable
- Available in 1.8-V, 2.5-V, 2.8-V, 2.85-V, 3-V, 3.3-V, 4.75-V, and Adj (1.22 V to 5.5 V)
- High PSRR (70 dB at 10 kHz)
- Ultralow Noise (32 μV)
- Fast Start-Up Time (50 μs)
- Stable With a 2.2-μF Ceramic Capacitor
- Excellent Load/Line Transient Response
- Very Low Dropout Voltage (112 mV at Full exLoad, TPS79330)
- 5-Pin SOT23 (DBV) and NanoStar Wafer Chip Scale (YEQ) Packages

3. PIN Description

PIN No.	Symbol	I/O	Description
1	IN	I	Unregulated input to the device
2	GND	I	Regulator ground
3	EN	I	Enables or shuts down the device
4	BYPASS	O	further reduce regulator noise
5	FB	O	feedback input voltage for the adjustable device
6	OUT	O	Output of the regulator

3.5.4 Function introduction to TCM809

1. Description

The TCM809 and TCM810 are 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 m sec after VDD rises above the reset threshold.

The TCM810 has an active-high RESET output, while the TCM809 has an active-low /RESET output. The output of the TCM809/TCM810 is valid down to VDD = 1V. Both devices are available in 3-Pin SC-70 and SOT-23B packages.

The TCM809/TCM810 are optimized to reject fast transient glitches on the VDD line. A low supply current of 9 μA (typ., VDD = 3.3V) make these devices suitable for battery-powered applications..

2. Features

- ◆ Precision V_{DD} Monitor for 2.5V, 3.0V, 3.3V, 5.0V Nominal System Voltage Supplies
- ◆ 140 msec Minimum RESET Time-Out Period
- ◆ /RESET Output to V_{DD} = 1.0V (**TCM809**)
- ◆ Low Supply Current, 9 μA (typ.)
- ◆ V_{DD} Transient Immunity
- ◆ Small 3-Pin SC-70 and SOT-23B Packages
- ◆ No External Components
- ◆ Push-Pull RESET Output
- ◆ Temperature Ranges:
  - Industrial: SC-70 (E): -40°C to +85°C
  - Extended: SOT-23, SC-70 (V): -40°C to +125°C

3. PIN Description

PIN No.	Symbol	I/O	Description
1	/RESET	O	RESET Signal Output
2	GND	I	Ground
3	VCC	P	Power

3.5.5 Function introduction to TPS62200

1. Description

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 μA; 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.

2. Features

- ◆ High Efficiency Synchronous Step-Down Converter With up to 95% Efficiency
- ◆ 2.5 V to 6.0 V Input Voltage Range
- ◆ Adjustable Output Voltage Range From 0.7 V to VI
- ◆ Fixed Output Voltage Options Available
- ◆ Up to 300 mA Output Current
- ◆ 1 MHz Fixed Frequency PWM Operation
- ◆ Highest Efficiency Over Wide Load Current Range Due to Power Save Mode
- ◆ 15-μA Typical Quiescent Current
- ◆ Soft Start
- ◆ 100% Duty Cycle Low-Dropout Operation
- ◆ Dynamic Output-Voltage Positioning
- ◆ Available in a Tiny 5-Pin SOT23 Package

3. PIN Description

PIN No.	Symbol	I/O	Description
1	VI	I	Supply voltage pin
2	GND		Ground
3	EN	I	The enable pin of the device
4	FB	I	The feedback pin of the device
5	SW	I/O	The switch pin

3.5.6 Function introduction to LM2703

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

3.5.8Function 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. 150μA)
- ◆ Built-in ON/OFF control function (Dissipation current at OFF-state: MAX. 1μA)
- ◆ 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	Vin	I	DC input
2	GND		Ground

3	Vc	I	ON/OFF control terminal
4	Nr	I	Noise reduction
5	Vo	O	DC Output

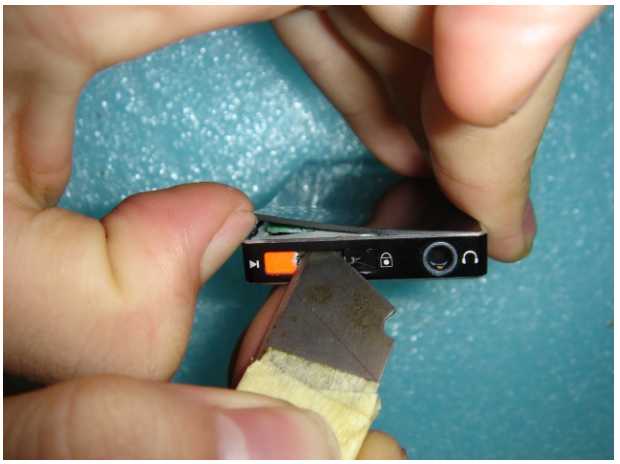
Chapter Four Disassembly and Assembly Process

In order to know structure of X27 more easily, directly and fast, we use pictures to present the readers each key process of disassemble and assemble player to avoid reader's blind motion to damage elements. Readers should strictly follow instructions to operate!

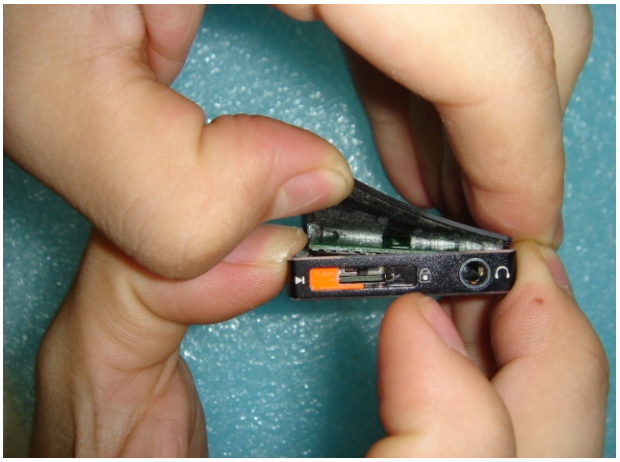
Notice：All operations should have anti-static measure and operators should wear anti-static golve or wrist ring; electric screwdriver must be grounded effectively and articles, such as nippers must be removed static before using!

4.1 Disassembly process of the player

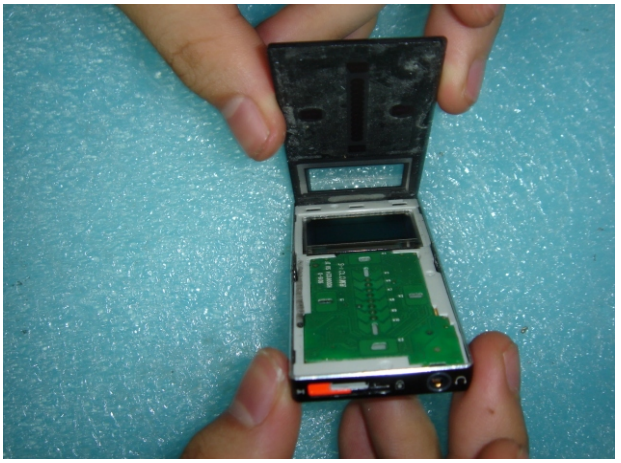
1. Use forceps to take out power on/off core-start switch;



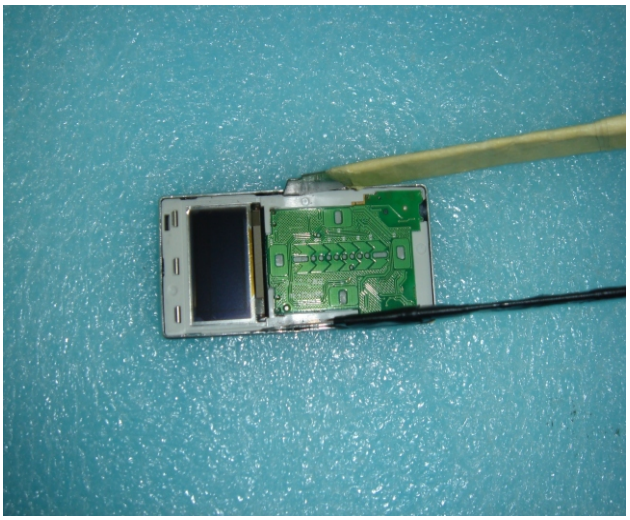
2. Use sharp blade gently from button hole to prize glass of front casing;



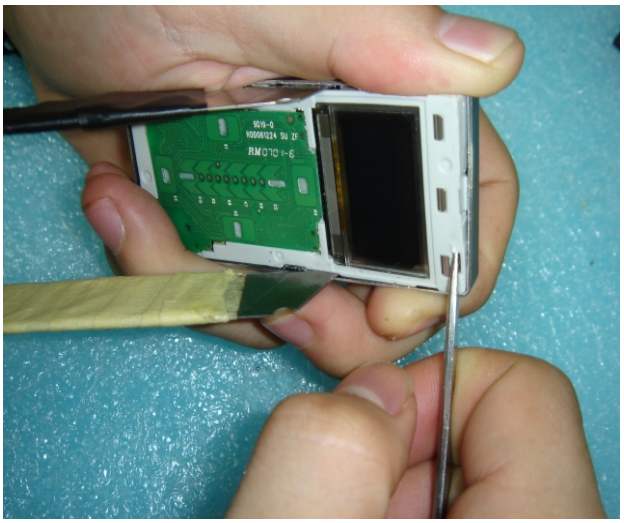
3. Use nail to peel off glass of front casing;



4. Peel off front casing glass from middle casing to reveal decode board;



5. Insert two tools into two positions in picture to resist two clasp of middle casing;

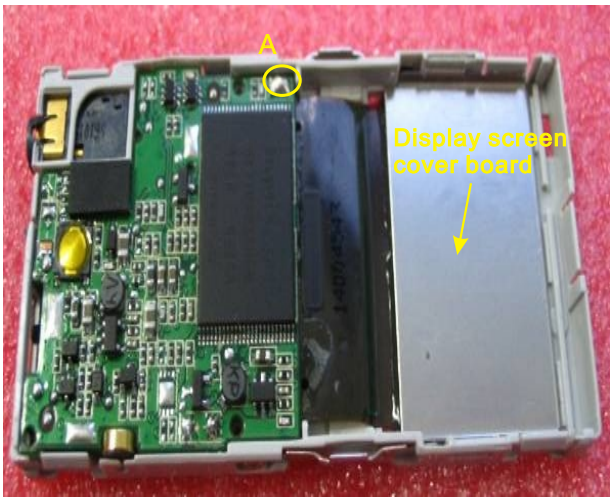


6. Use special hook toll, shown in picture, to remove middle casing and main board component;

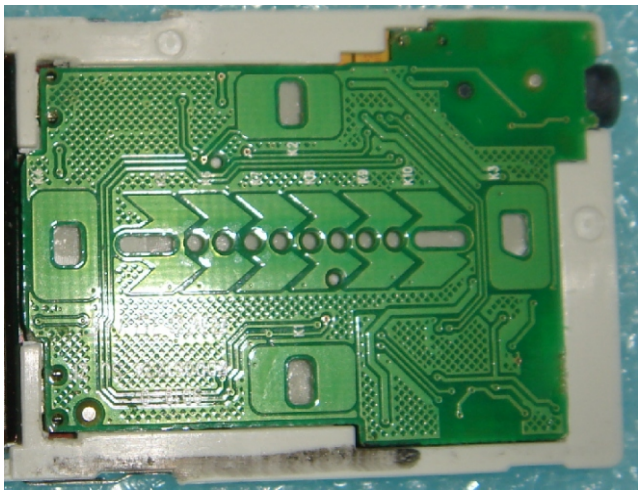
7. Take out middle casing and main board component from bottom casing;

8. Use iron weld to separate two welding points , shown in A point in picture, to take out Li-battery component;

9. Use electric screwdriver or “ + ” shaped screwdriver to take out three main board screws in picture;

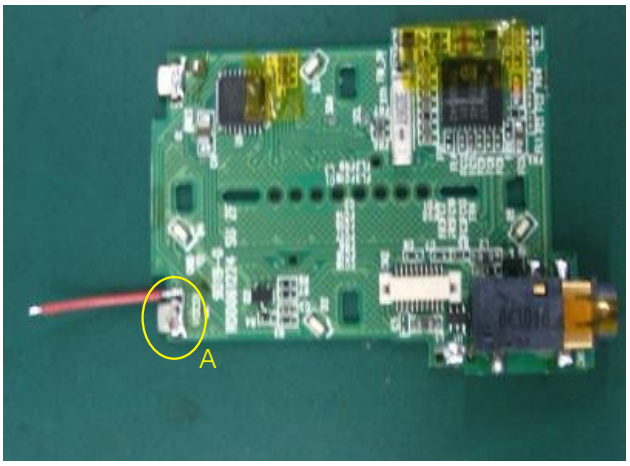


10. Use iron weld to open A point in picture, take out main board and display screen component from middle casing;

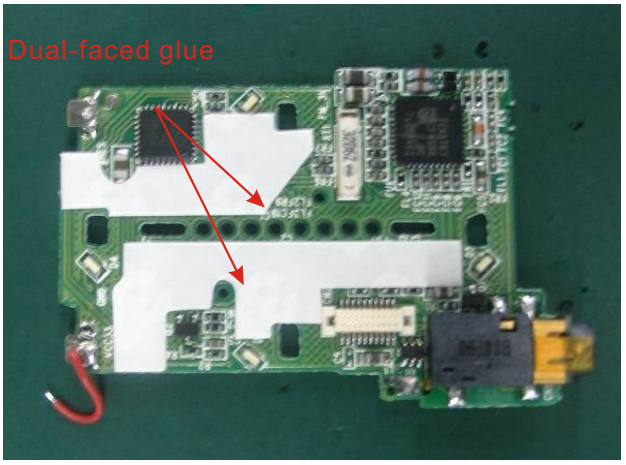


11. Take out button board from middle casing to finish disassembly process of player.

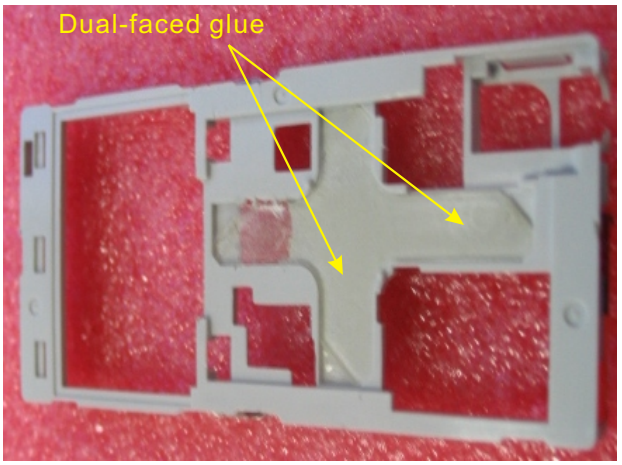
4.2 Assembly process of player



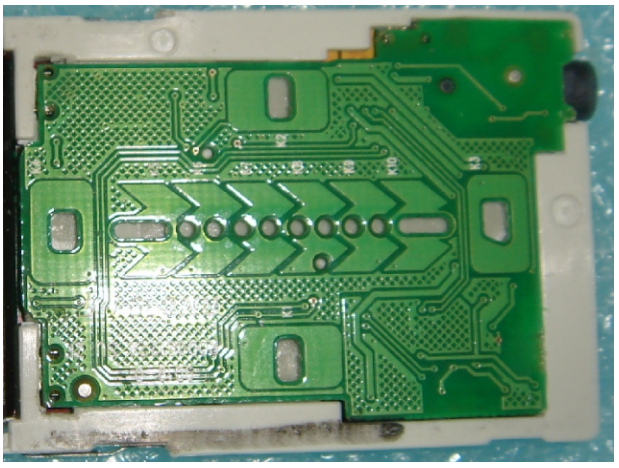
1. Use iron to weld button board lead to A point in picture.



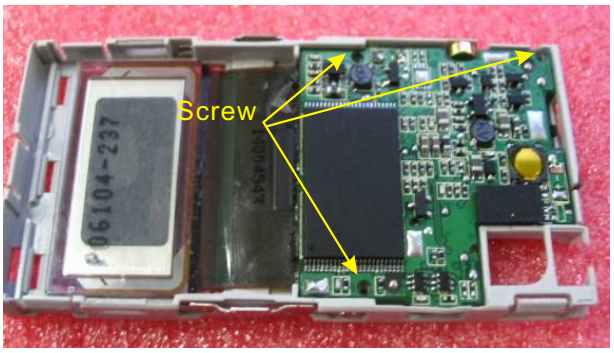
2. As shown in picture, stick dual-faced glue on PCB appointed blank area on terminal side of earphone and tear protection layer of dual-faced glue;



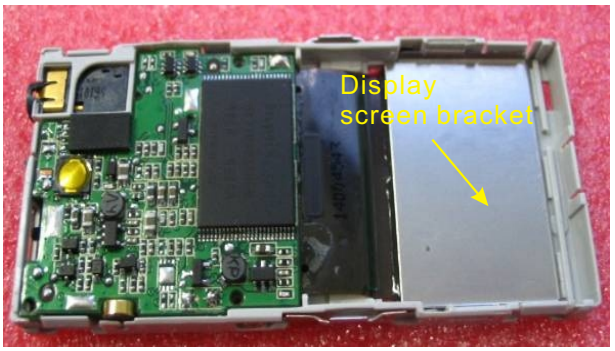
3. As shown in picture, stick on dual-faced glue on appointed position of middle casing and tear off protection layer of dual-faced glue;



4. Make jointing lead on button board pass through relevant position of surface casing, put electrode piece of lead into surface casing. Stick whole button board onto surface casing and press to the just position by hand;



5. Put main board and display screen component into middle casing and put three main board screws, shown in picture, to fix;



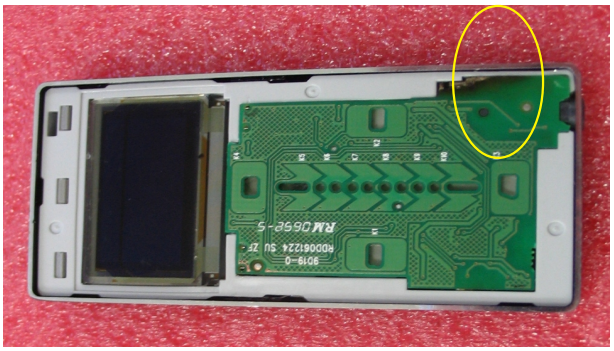
6. Stick a 1cm long dual-faced glue on both sides of bracket, put bracket into main board and ensure that each clasp in the just position;

7. Tear off protection layer of dual-faced glue on display screen bracket and fix display screen onto bracket;

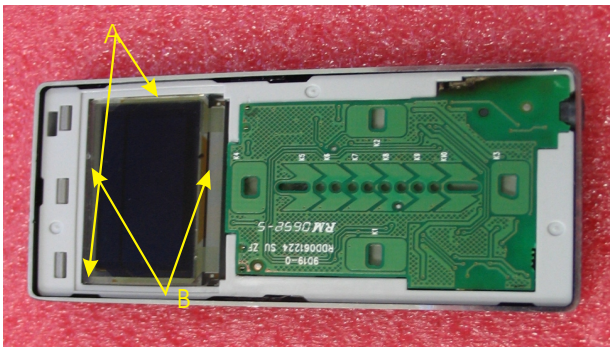
8. Weld tin on A point on main board and weld button board lead onto A point of main board;

9. Weld tin onto A point of main board, firstly weld cathode lead (black) onto PCB "—" point on main board, then weld anode lead (red) onto "+" point of main board PCB;

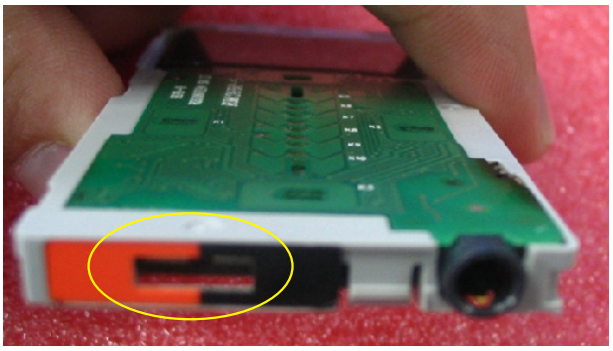
10. Tear off protection layer of dual-faced glue on display screen bracket and stick battery onto display screen bracket;



11. Use proper amount of 402 glue on joint of button board and surface casing;



12. Stick one spacer with 21×1.5×0.3 sigle-faced glue in rear side on left and right side of display screen, stick one spacer with 28×1.5×0.3sigle-faced glue on upper and lower sides of display screen



13. Install 3-direction button into appointed position of middle casing;

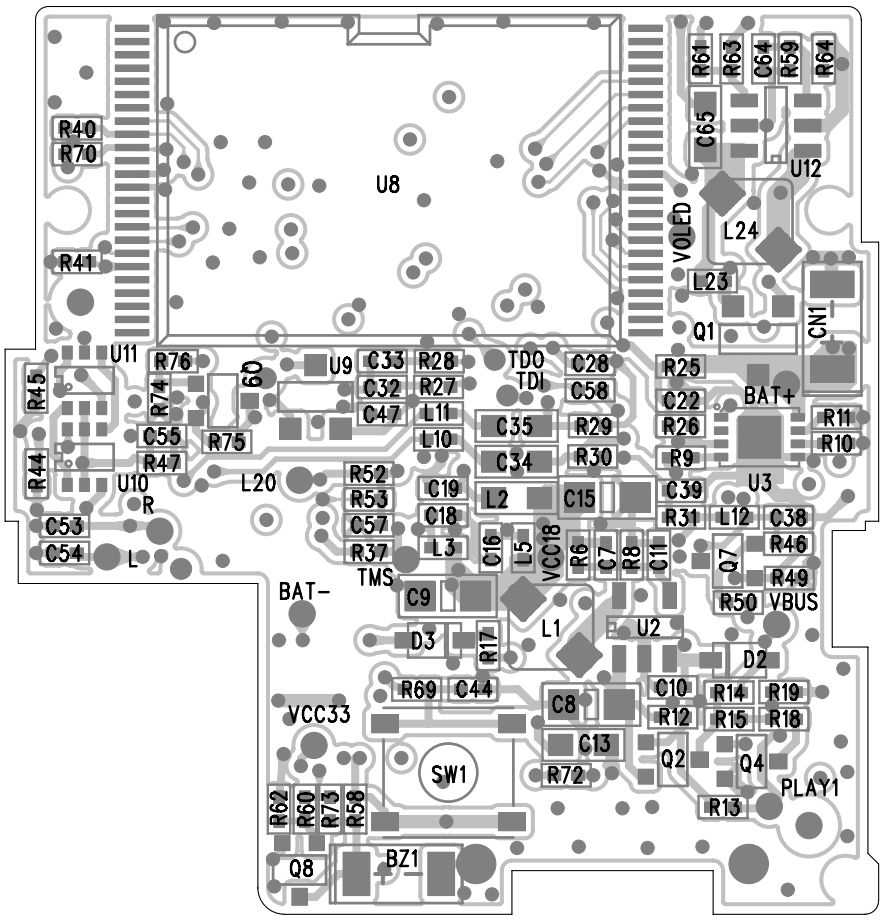
14. Tear off protection layer of glue in rear side, put glass onto display screen, press glass tightly to the just position by hand to finish assembly process;

Chapter Cinque

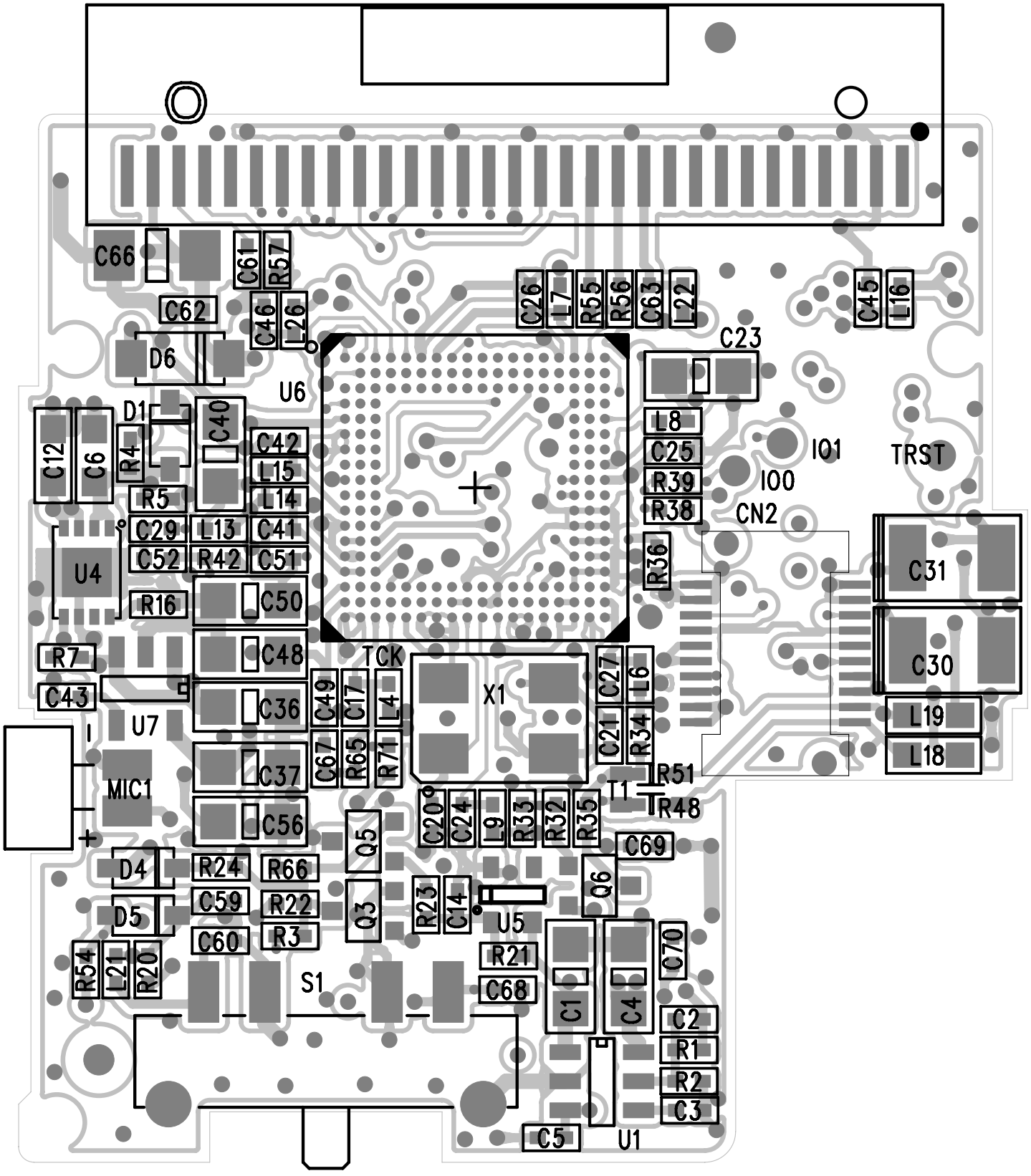
PCB board & Circuit diagram

Section One PCB board

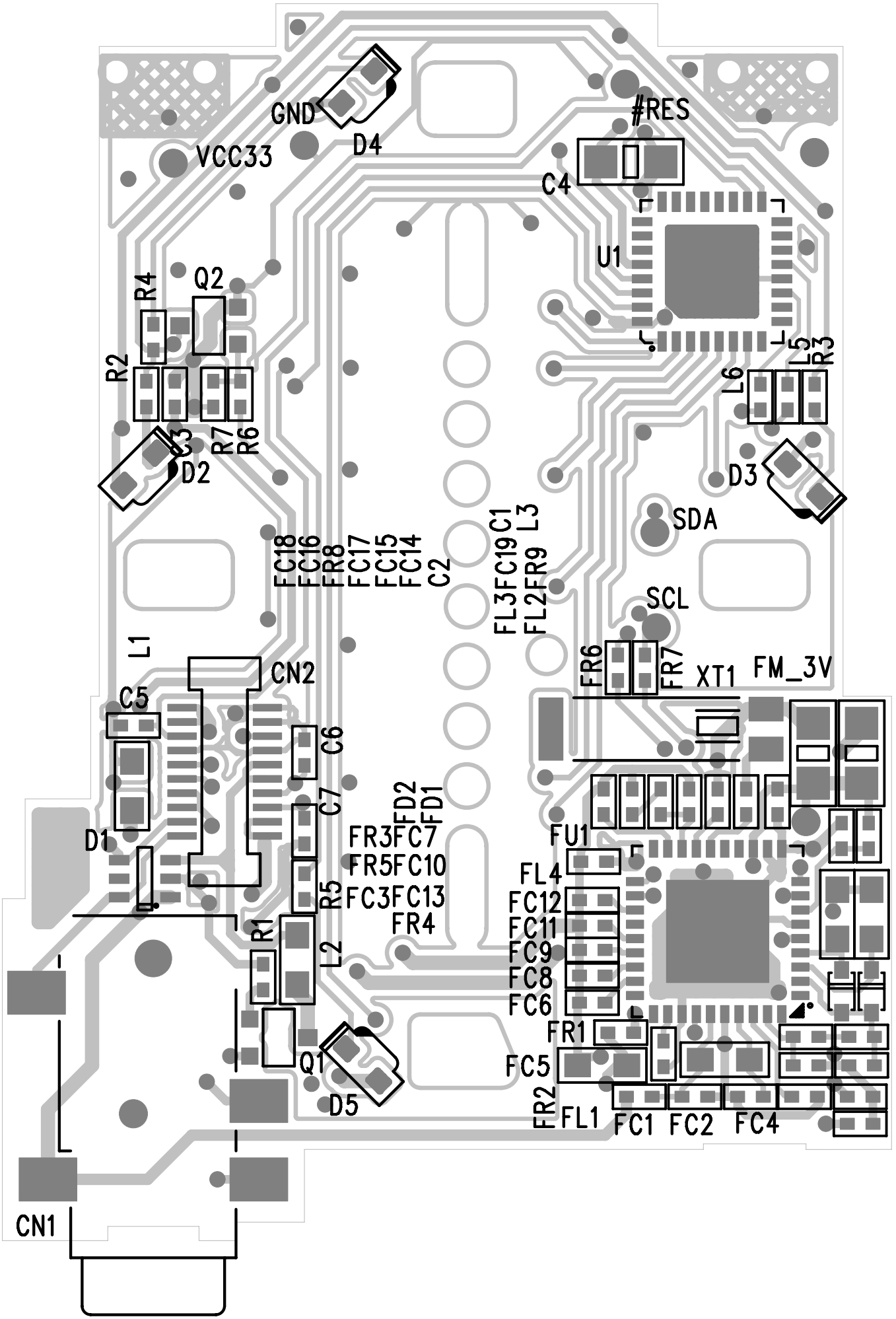
5.1.1 Surface layer of Decode Board



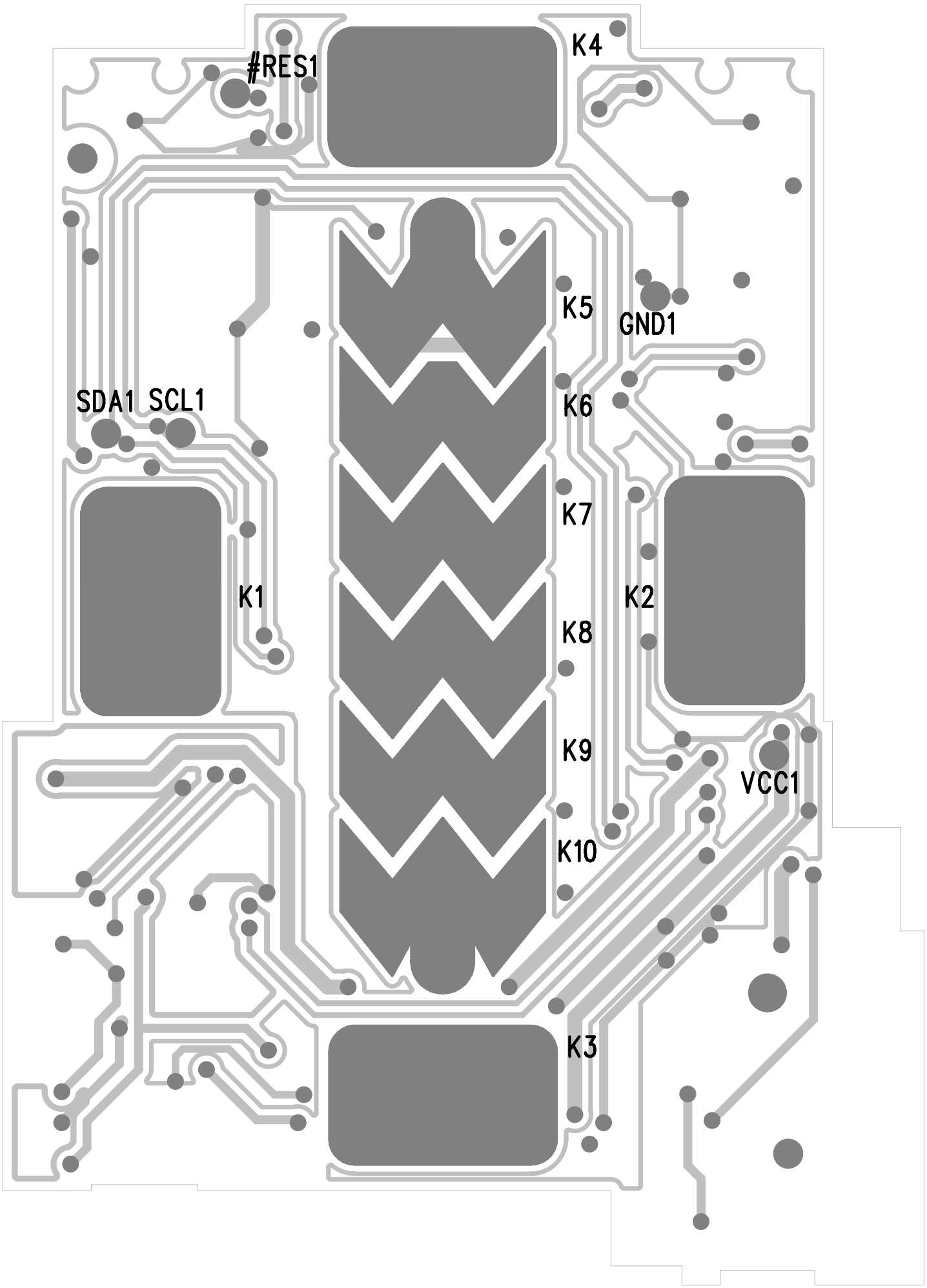
5.1.2 Bottom layer of Decode Board



5.1.3 Surface layer of Button Board

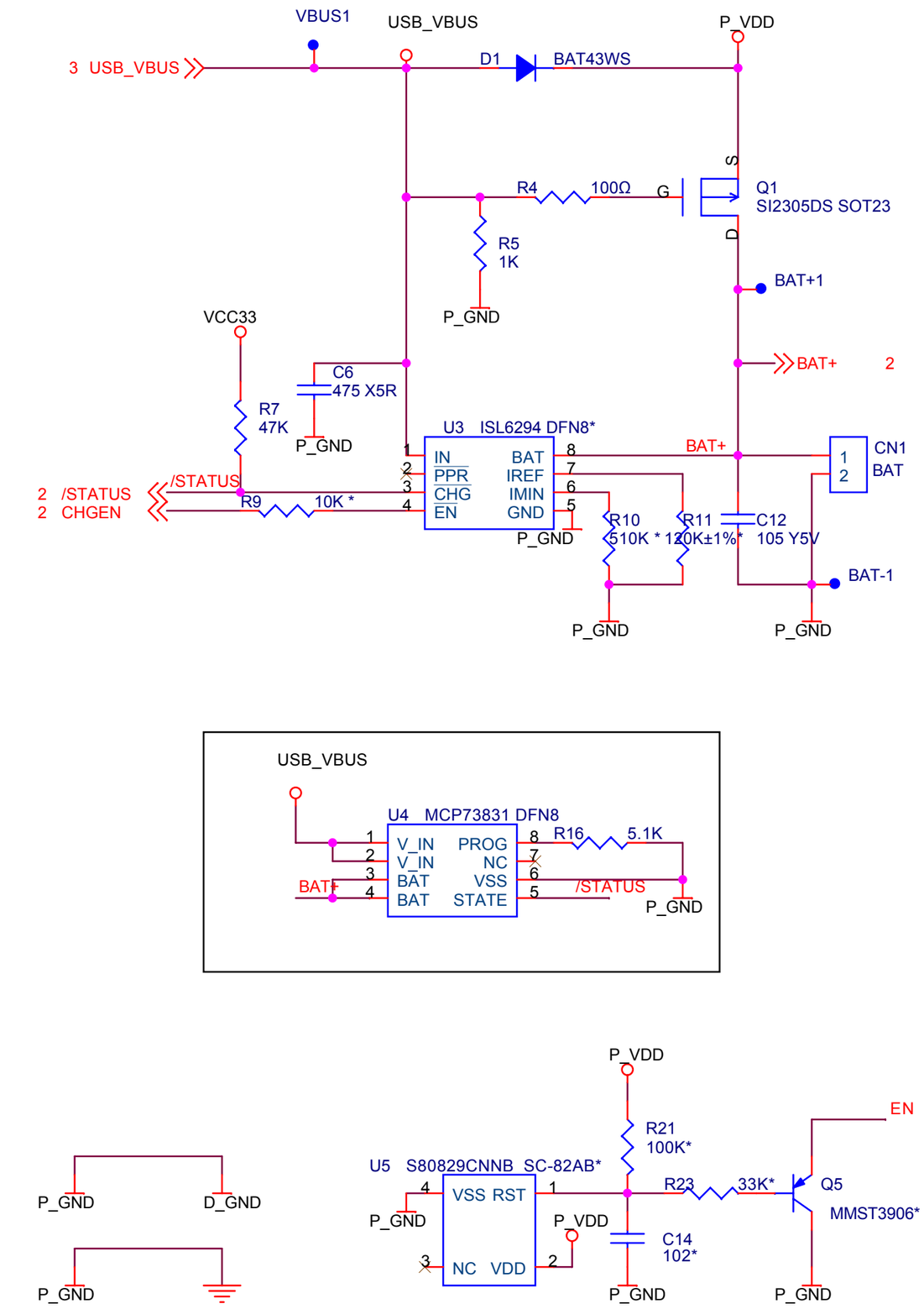


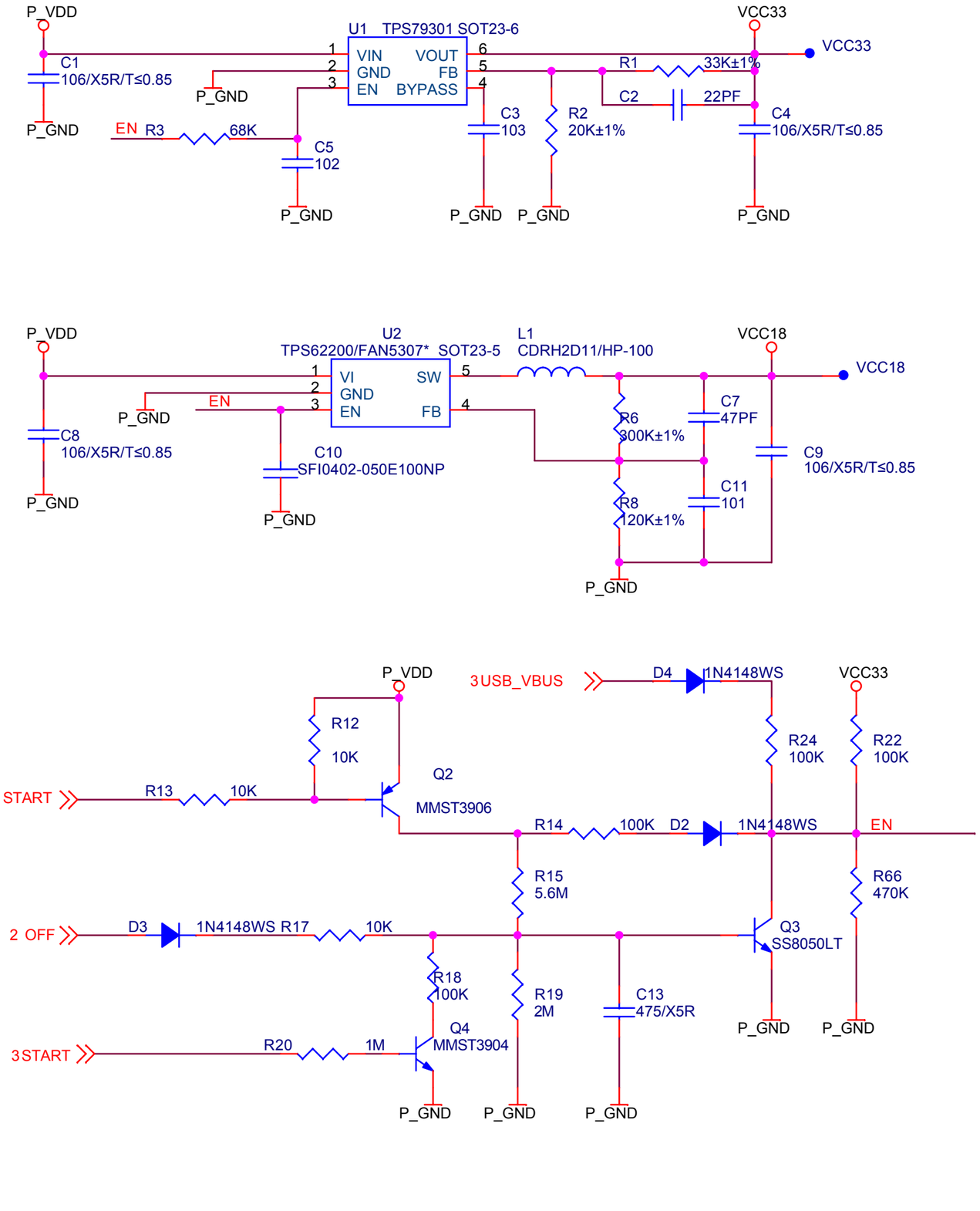
5.1.4 Bottom layer of Button Board

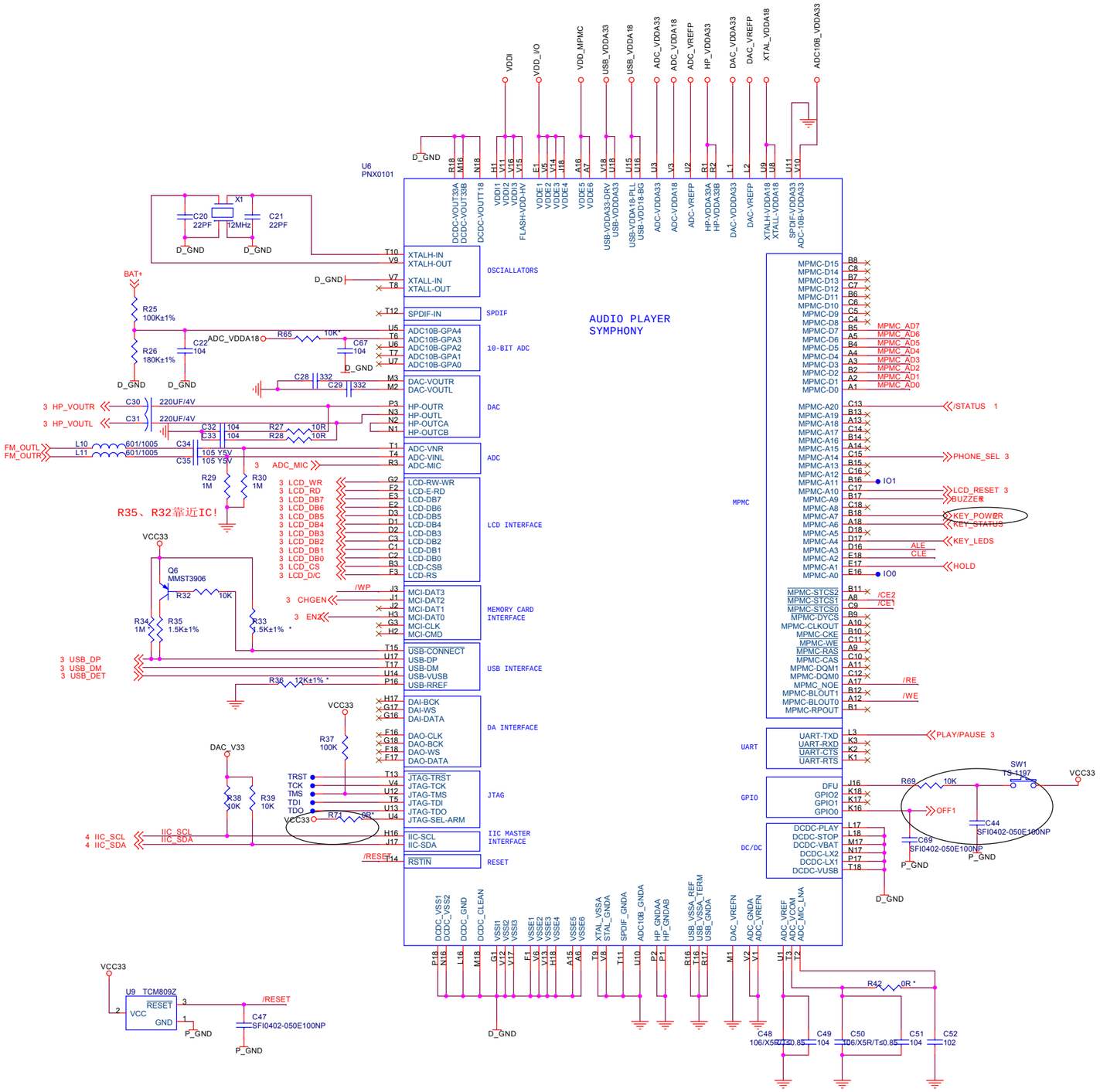


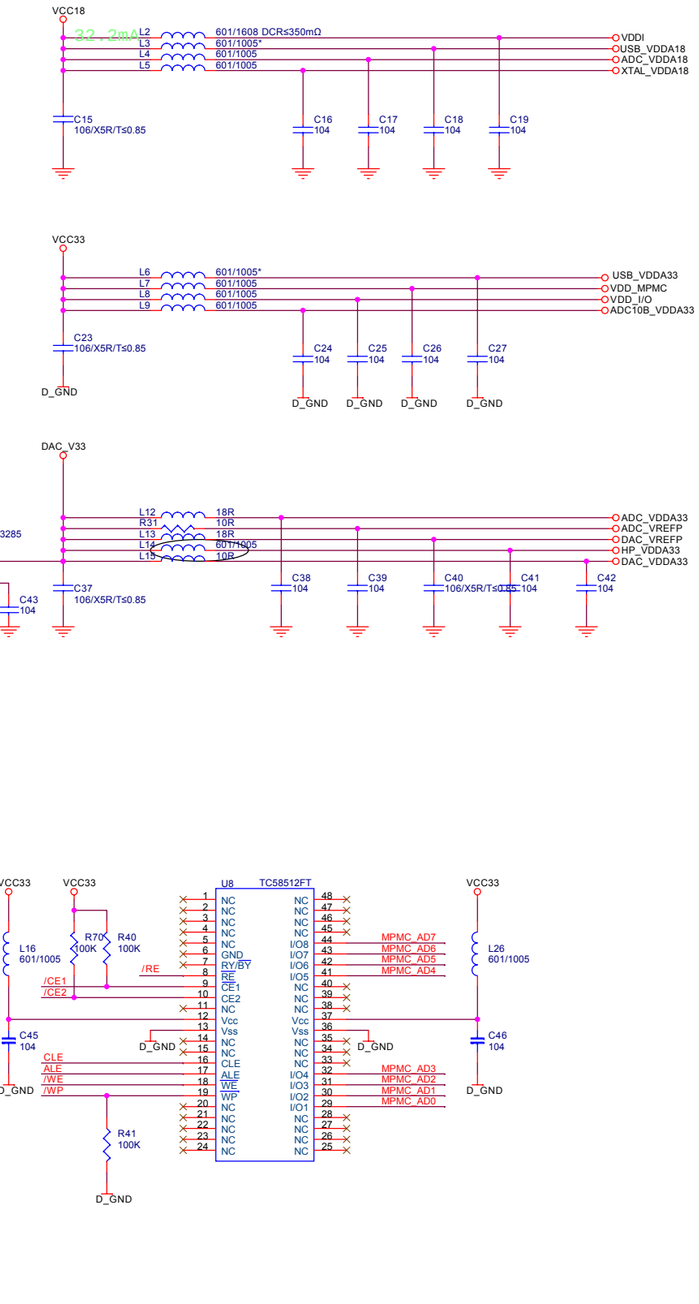
Section TWO circuit diagram

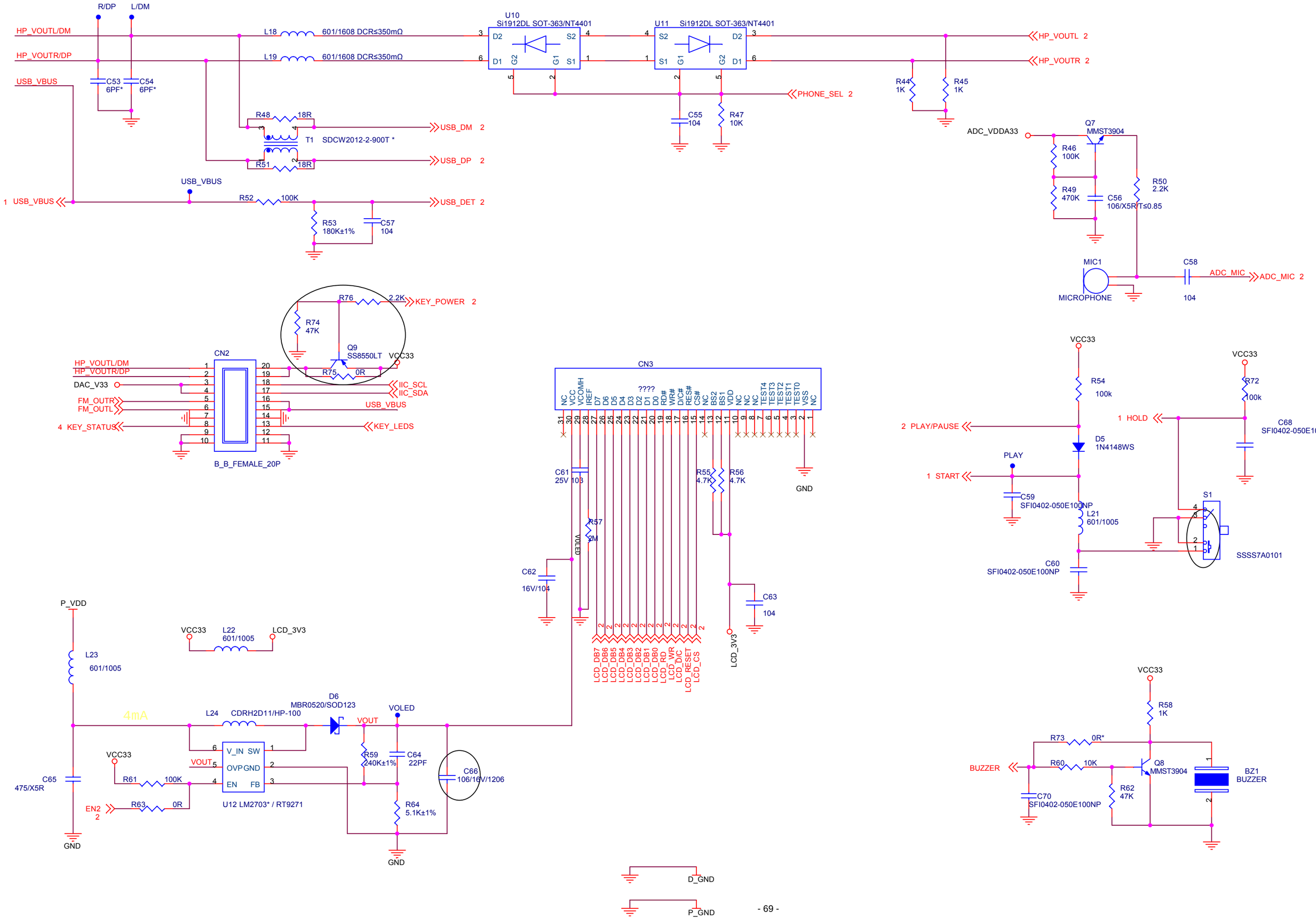
5.2.1 Decode Board



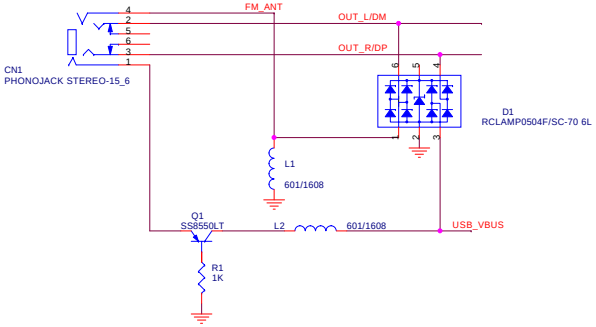


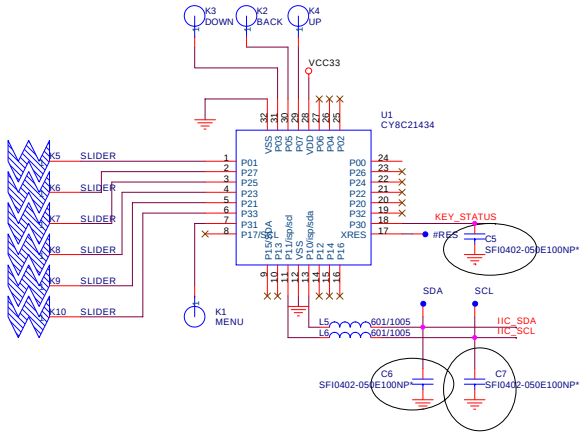

U6
PNX0101
AUDIO PLAYER
SYMPHONY
OSCILLATORS
SPDIF
10-BIT ADC
DAC
ADC
LCD INTERFACE
MEMORY CARD INTERFACE
USB INTERFACE
DA INTERFACE
JTAG
IIC MASTER INTERFACE
RESET
MPMC
UART
GPIO
DC/DC
R35、R32靠近IC!
Q6
MMST3906
U9 TCM809Z

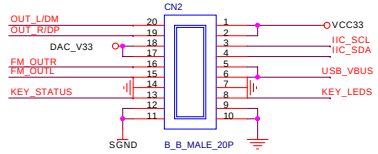

U7 PQ1X281M2ZP/TPS793285
U8 TC58512FT
SW1
TS-1187

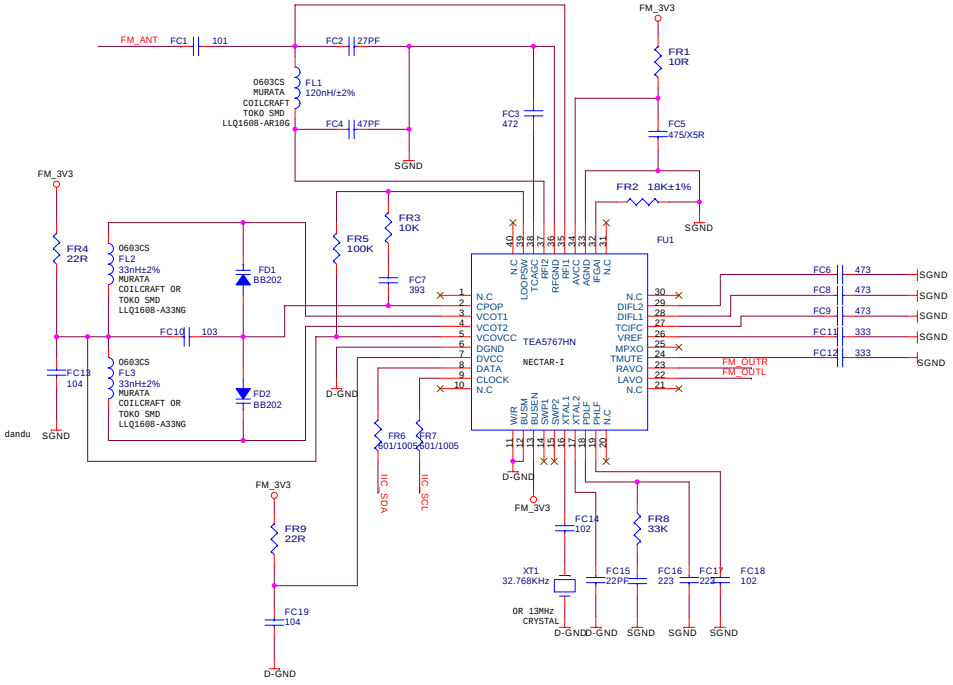

R/DP
L/DM
HP_VOUTL/DM
HP_VOUTR/DP
USB_VBUS
L18 601/1608 DCR≤350mΩ
L19 601/1608 DCR≤350mΩ
C53 6PF*
C54 6PF*
U10 Si1912DL SOT-363/NT4401
U11 Si1912DL SOT-363/NT4401
D2
D1
G2
G1
S2
S1
C55 104
R47 10K
PHONE_SEL 2
R44 1K
R45 1K
HP_VOUTL 2
HP_VOUTR 2
R48 18R
R51 18R
T1 SDCW2012-2-900T *
USB_DM 2
USB_DP 2
USB_VBUS
1 USB_VBUS
R52 100K
R53 180K±1%
C57 104
USB_DET 2
ADC_VDDA33
Q7 MMST3904
R46 100K
R49 470K
C56 106/X5R/T≤0.85
R50 2.2K
MIC1
MICROPHONE
C58 104
ADC_MIC
ADC_MIC 2
R76 2.2K
KEY_POWER 2
R74 47K
Q9 SS8550LT
VCC33
R75 0R
CN2
HP_VOUTL/DM
HP_VOUTR/DP
DAC_V33
FM_OUTR
FM_OUTL
4 KEY_STATUS
IIC_SCL
IIC_SDA
USB_VBUS
KEY_LEDS
B_B_FEMALE_20P
CN3
NC VCC VCOMH IREF D7 D6 D5 D4 D3 D2 D1 D0 RD# WR# D/C# RES# CS# NC BS2 BS1 VDD NC NC NC NC TEST4 TEST3 TEST2 TEST1 TEST0 VSS NC
????
C61 25V 103
R55 4.7K
R56 4.7K
GND
R57 2M
VOLED
C62 16V/104
C63 104
LCD_3V3
LCD_DB7 LCD_DB6 LCD_DB5 LCD_DB4 LCD_DB3 LCD_DB2 LCD_DB1 LCD_DB0 LCD_RD LCD_WR LCD_D/C LCD_RESET LCD_CS
VCC33
R54 100k
2 PLAY/PAUSE
D5 1N4148WS
PLAY
1 START
C59 SFI0402-050E100NP
L21 601/1005
C60 SFI0402-050E100NP
1 HOLD
R72 100k
C68 SFI0402-050E100NP
S1
SSSS7A0101
P_VDD
L23 601/1005
VCC33
L22 601/1005
LCD_3V3
4mA
L24 CDRH2D11/HP-100
D6 MBR0520/SOD123
VOLED
VOUT
C65 475/X5R
VCC33
R61 100K
EN2 2
R63 0R
V_IN SW
OVP GND
EN FB
U12 LM2703* / RT9271
R59 240K±1%
C64 22PF
C66 106/16V/1206
R64 5.1K±1%
GND
D_GND
P_GND
VCC33
R58 1K
R73 0R*
BUZZER
R60 10K
Q8 MMST3904
R62 47K
C70 SFI0402-050E100NP
BZ1 BUZZER

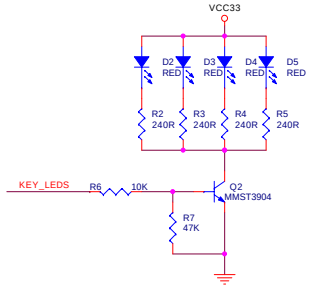
5.2.2 Button Board

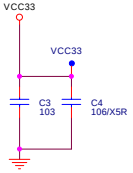


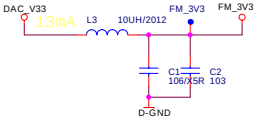


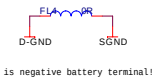












Chapter Six Bom List

MATERIAL CODI	MATERIAL NAME	SPECIFICATIONS	LOCATION
BATTERY PROTECT BOARD 4940138			
0090011	SMD RESISTOR	1/16W 470Ω±5% 0603	R1
0090223	SMD RESISTOR	1/16W 2K±5%	R2
0310084	SMD CAPACITOR	50V 104 +80%-20% 0603	C1,C2,C3 ①
0310207	SMD CAPACITOR	50V 104 ±20% 7R 0603	C1,C2,C3 ①
0790065	SMD FIELD EFFECT TRANSISTOR	ECH8601 TSSOP	U2 ②
0790090	SMD FIELD EFFECT TRANSISTOR	ECH8601R TSSOP	U2 ②
0882570	IC	S-8261AANMG22 SO23-6	U1
1633824	PCB	ED19-0	
X27L sensor(RU)B BLACK(0101)			
KEY-PRESS BOARD 4940137			
MATERIAL CODI	MATERIAL NAME	SPECIFICATIONS	LOCATION
0090324	SMD RESISTOR	1/16W 0Ω±5% 0402	FL4
0090326	SMD RESISTOR	1/16W 10Ω±5% 0402	FR1
0090447	SMD RESISTOR	1/16W 22Ω±5% 0402	FR9,FR4
0090809	PRECISION SMD RESISTOR	1/16W240Ω±1% 0402	R2,R3,R4,R5
0090362	SMD RESISTOR	1/16W 1K±5% 0402	R1
0090385	SMD RESISTOR	1/16W 10K±5% 0402	R6,FR3
0090390	SMD RESISTOR	1/16W 18K±5% 0402	FR2
0090396	SMD RESISTOR	1/16W 33K±5% 0402	FR8
0090400	SMD RESISTOR	1/16W 47K±5% 0402	R7
0090408	SMD RESISTOR	1/16W 100K±5% 0402	FR5
0310416	SMD CAPACITOR	50V 22P±5% NPO 0402	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% 7R 0402	FC14,FC18
0310706	SMD CAPACITOR	25V 472±10% 7R 0402	FC3
0310453	SMD CAPACITOR	25V 103±10% 7R 0402	C2,C3,FC10
0310455	SMD CAPACITOR	16V 223±10% 7R 0402	FC17,FC16
0310710	SMD CAPACITOR	16V 333±10% 5R 0402	FC12,FC11
0310711	SMD CAPACITOR	10V 393±10% 5R 0402	FC7
0310712	SMD CAPACITOR	10V 473±10% 5R 0402	FC6,FC8,FC9
0310480	SMD CAPACITOR	10V 104±10% 5R 0402	FC13,FC19 ③
0310790	SMD CAPACITOR	10V 104±20% 5R 0402	FC13,FC19 ③
0310717	SMD CAPACITOR	6.3V 475±20% 5R 0603	FC5
0310831	SMD CAPACITOR	6.3V106±10%5R 0805 T≤0.85	C4,C1
0390142	SMD MAGNETIC BEADS	FC1608-60102	L2,L1

0390388	SMD MAGNETIC BEADS	600Ω/100MHZ±25% 1005	L5,L6,FR6,FR7
0390044	SMD INDUCTOR	10UH±10% 2012	L3
0390221	SMD COIL THREAD INDUCTOR	33nH±2% 1608	FL2,FL3
0390398	SMD COIL THREAD INDUCTOR	120nH±2% 1608	FL1
1090080	ESD ELEMENT	RCL0504 SC70-6L	D1 ④
1090084	ESD ELEMENT	PLR0504P SC70-6L	D1 ④
0700186	SMD RADIATION DIODE	1SB0602V22D0CA01	D2,D3,D4,D5 ⑤
0700187	SMD RADIATION DIODE	LTST-S270KRKT RED	D2,D3,D4,D5 ⑤
0700115	SMD TRANSFIGURATION DIODE	BB202	FD1,FD2
0780298	SMD TRIODE	MMS3904 SO323	Q2
0780300	SMD TRIODE	SS8550LT SO323	Q1
0883368	IC	CY8C21434 MLF	U1
0882388	IC	TE5767HN HVQFN	FU1
1980074	SMDEARPHONE SOCKET	2S0386-001	CN1 ⑥
1980086	SMDEARPHONE SOCKET	S0226S00-041-102	CN1 ⑥
1770015	BTB PIN	10P 0.5mm 69120252	CN2 ⑦
1770017	BTB PIN	10P 0.5mm AXK6F20545YJ	CN2 ⑦
1633851	PCB	9 D19-2	
0960279	SMD CRYSTAL OSCILLATOR	32.768KHz±20ppm SS6 12.5P	XT1
3872274	LOCATED BAFFLE PLATE	19L STAINLESS STEEL	BUTTON PCB
X27L sensor(RU)B BLACK(0101)			
MAINBOARD	4940136		
MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
0090324	SMD RESISTOR	1/16W 0Ω±5% 0402	R63
0090326	SMD RESISTOR	1/16W 10Ω±5% 0402	L15,R27,R28,R31
0090644	SMD RESISTOR	1/16W 18Ω±5% 0402	L12,L13,R48,R51
0090339	SMD RESISTOR	1/16W 100Ω±5% 0402	R4
0090362	SMD RESISTOR	1/16W 1K±5% 0402	R5,R44,R45
0090369	SMD RESISTOR	1/16W 2.2K±5% 0402	R50,R76
0090377	SMD RESISTOR	1/16W 4.7K±5% 0402	R55,R56,R38,R39
0090378	SMD RESISTOR	1/16W 5.1K±5% 0402	R16
0090385	SMD RESISTOR	1/16W 10K±5% 0402	R12,R13,R17,R32,R47,R69,R65
0090400	SMD RESISTOR	1/16W 47K±5% 0402	R7,R74
0090404	SMD RESISTOR	1/16W 68K±5% 0402	R3
0090408	SMD RESISTOR	1/16W 100K±5% 0402	R14,R18,R22,R24,R37,R40,R41,R46,R52,R54,R61,R70,R72
0090425	SMD RESISTOR	1/16W 470K±5% 0402	R66,R49
0090433	SMD RESISTOR	1/16W 1MΩ±5% 0402	R20,R29,R30
0090436	SMD RESISTOR	1/16W 2MΩ±5% 0402	R19,R57
0090443	SMD RESISTOR	1/16W 5.6MΩ±5% 0402	R15
0090639	PRECISION SMD RESISTOR	1/16W 1.5K±1% 0402	R35

0090485	PRECISION SMD RESISTOR	1/16W 27K±1% 0402	R64
0090672	PRECISION SMD RESISTOR	1/16W 20K±1% 0402	R2
0090671	PRECISION SMD RESISTOR	1/16W 33K±1% 0402	R1
0090509	PRECISION SMD RESISTOR	1/16W 100K±1% 0402	R25
0090681	PRECISION SMD RESISTOR	1/16W 120K±1% 0402	R8
0090645	PRECISION SMD RESISTOR	1/16W 180K±1% 0402	R26,R53
0090682	PRECISION SMD RESISTOR	1/16W 300K±1% 0402	R6
0090687	PRECISION SMD RESISTOR	1/16W 240K±1% 0402	R59
1030029	MD PRESS SENSITIVITY RESISTO	SFI0402-050E100NP	C10,C44,C47,C59,C60,C68,C69,C70 ⑧
1030033	MD PRESS SENSITIVITY RESISTO	S1005H180C100GPT 0402	C10,C44,C47,C59,C60,C68,C69,C70 ⑧
0310416	SMD CAPACITOR	50V 22P±5% NPO 0402	C2,C20,C21,C64
0310424	SMD CAPACITOR	50V 47P±5% NPO 0402	C7
0310432	SMD CAPACITOR	50V 101±5% NPO 0402	C11
0310704	SMD CAPACITOR	25V 102±10% 7R 0402	C5,C52
0310705	SMD CAPACITOR	25V 332±10% 7R 0402	C28,C29
0310453	SMD CAPACITOR	25V 103±10% 7R 0402	C3,C61
0310480	SMD CAPACITOR	10V 104±10% 5R 0402	C16,C17,C18,C19,C22,C24,C25,C26,C27,C32,C33,C38,C39,C41,C42,C43,C45,C46,C49,C51,C55,C57,C58,C63,C67 ⑨
0310790	SMD CAPACITOR	10V 104±20％ 5R 0402	C16,C17,C18,C19,C22,C24,C25,C26,C27,C32,C33,C38,C39,C41,C42,C43,C45,C46,C49,C51,C55,C57,C58,C63,C67 ⑨
0310753	SMD CAPACITOR	16V 104±20% 5R 0402	C62
0310216	SMD CAPACITOR	10V 105 +80%-20% 0603	C12,C34,C35
0310717	SMD CAPACITOR	6.3V 475±20% 5R 0603	C13,C65,C6
0310831	SMD CAPACITOR	6.3V106±10%5R 0805 T≤0.85	C1.C4.C8.C9.C15.C23.C36.C37.C40.C48.C50.C5
0310839	SMD CAPACITOR	16V 106±10% 5R 1206	C66
0310736	SMD TANTALUMCAPACITOR	4V 220uF±20% 3528(B)	C30,C31
0390142	SMD MAGNETIC BEADS	FC1608-60102	L2,L18,L19
0390388	SMD MAGNETIC BEADS	600Ω/100MHZ±25% 1005	L4,L5,L7,L8,L9,L10,L11,L14,L16,L21,L22,L23,L26
0390397	SMD CORES INDUCTOR	10uH±20% CDRH2D11/HP	L1,L24
0700154	SMD TRIODE	14148WS SO323	D2,D3,D4,D5
0680077	SMD SCHOTTKY DIODE	MBR0520 SOD123	D6
0680074	SMD SCHOTTKY DIODE	B43WS SO323	D1
0780298	SMD TRIODE	MMS3904 SO323	Q4,Q7
0780299	SMD TRIODE	SS8050LT SO323	Q3
0780300	SMD TRIODE	SS8550LT SO323	Q9
0780293	SMD TRIODE	MMS3906 SO323	Q2,Q6
0790041	SMD FIELD EFFECT TRANSISTOR	SI2305DS SO23	Q1
0790068	SMD FIELD EFFECT TRANSISTOR	SI1912 SO363	U11,U10 ⑩
0790070	SMD FIELD EFFECT TRANSISTOR	NTJD4401N SO363	U11,U10 ⑩

0882475	IC	79301 SO23-6	U1 (11)
0882668	IC	79333DBVR SO23-5	U1 (11)
0883141	IC	TC809ZVNB713 SO23B	U9
0882476	IC	TP62200 SO23-5	U2
0883370	IC	MCP73832 DFN	U4
0882403	IC	PNX0101ET/302 TFBGA	U6
0882480	IC	PQ12812ZP SO23-5	U7 (12)
0882629	IC	793285DBVR SO23-5	U7 (12)
0883307	IC	HY27UG088G5TPCB TSOP	U8
0882565	IC	L2703 SO23-5	U12
1310096	SMD STIR SWITCH	SSSS70101	S1 (13)
1310095	SMD STIR SWITCH	1370R	S1 (13)
1340117	SMD FILM SWITCH	TS-11973	SW1
1940406	BTB SOCKET	10P 0.5mm 69020252	CN2 (14)
1940410	BTB SOCKET	10P 0.5mm AXK5F20545YJ	CN2 (14)
1140082	MICROPHONE	44dB±3dB 4×1.2 WITH NEEDLE	MIC1 (15)
1140105	MICROPHONE	42dB±2dB 4×1.5 WITH NEEDLE	MIC1 (15)
1140115	MICROPHONE	42dB ±2dB 4×3 WITH NEEDLE	MIC1 (15)
1633823	PCB	2 19-1	
0960284	SMD CRYSTAL OSCILLATOR	12MHz±30ppm 5032/4 20P	X1