BBK

X5 X7
X9 X11

service manual

Circuit working principle for X5, X7 and X9 is totally the same, and only the outer appearance is different. This manual mainly introduces X5, so please refer to this one as for other models.

Catalog

Chapter One About Maintenance

1.1 Safety precautions

1.1.1 Power Safety Warning

Voltage of Portable DVD is safe low voltage, but there is 220V AC high voltage on Power Adapter, it can cause damage to body ! Maintenance personnel should take extra care.

1.1.2 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.

1.1.3 Precautions for display screen

1. Display screen is breakable article, so please protect carefully when carrying and prevent fingers or hard objects striking the screen to damage structure of the screen.

2. When cleaning screen, do not use organic chemicals. You should use cloth and use small amount of special cleaning liquid in places difficult to clean.

1.1.4 Precautions for laser head

1. Do not stare at laser head directly, for laser emission will occur when laser head is working, which will Hurt your eyes!

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

1.1.5 About placement position

1. Never place TV in positions with high temperature and humidity.

2. Avoid placing near high magnetic fields, such as loudspeaker or magnet.

3. Positions for placement should be stable and secure.

1.2 Maintenance method

1.2.1 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.

1.2.2 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.

1.2.3 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.

1.2.4 Element substitution method

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

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 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.

1.2.7 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 USAGE INTRODUCTION

2.1.1 FUNCTIONS AND FEATURES

#Philips PNX0101audio decode chip

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

#Sennheiser headphone（MX400)

Build high-quality musical effect.

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

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

#Play MP3/WMA/WAV files

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

#Mobile storage function

Capable of downloading files from Windows resource manager.

#FM tuning

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

#Voice recording function

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

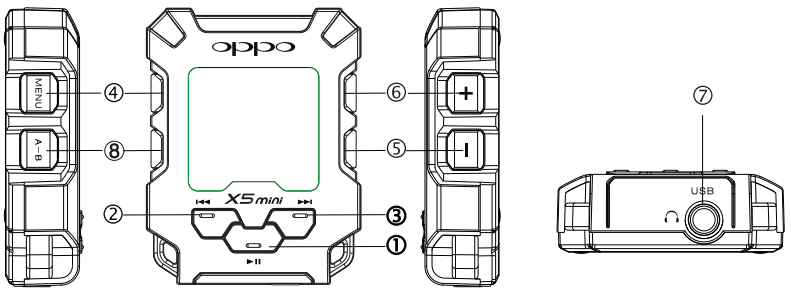
#USB 2.0 transmission (full speed)

USB2.0 full speed data transmission.

#Support firmware upgrading function

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

2.1.2 BUTTONS AND JACKS ILLUSTRATION



① #Press in power off mode → power on

#Press for long in power on mode → power off

#Press in playback interface → switch in pause/play

#Press when recording → pause recording

#press when tuning → Mute
#press in tuning SCAN mode → save radio station and switch mode to PRESET
#press when operating in menu → enter selected item or confirm setup

② ③ #Press in playback interface → the previous/next track
#Press for long in playback interface → fast backward/forward
#Press in tuning PRESET mode → select channel
#Press for long in tuning PRESET mode → full auto scanning
#Press in tuning SCAN mode → Manual scanning
#Press for long in tuning SCAN mode → automanual scanning
#When operating in menu → Move cursor or set item
#Press or for long in "My EQ" → select the frequency point you want to set

④ M : #Press for long in any mode → enter main menu
#Press when tuning → switch in PRESET and SCAN mode
#Press for long when recording → quit recording
#Press when operating in menu → not save the setup and return to the previous menu
#Press when playing → Set A-B reread

⑤ ⑥ #Press or for long in playback interface or when tuning → Adjust volume
#Press in "My EQ" → adjust dB value
#Press " -" button when browsing file → enter cancelling file dialogue box

⑦ USB/power adapter/headphone jack

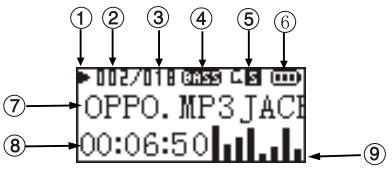
⑧ A-B :#Press in playback mode → A-B reread
#Press for long when playing musical file (non recording file) → Switch sound effect
#Press for long when listening radio → Enter FM recording
#Press A-B button when browsing file → enter cancelling file dialogue box

2.1.3 MAIN MENU ILLUSTRATION

#My music
Memorize music file.
#My Voice
Memorize microphone recording file, such as meeting, classroom and interview recording, etc.
#Resume Play
Select "Resume Play" and the player begins to play from the position that music stopped playing last time.

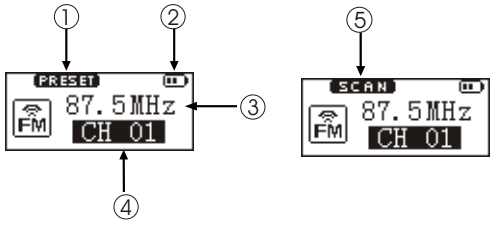
#REC
Select "REC"to enter recording mode
#FM Radio
Select " FM Radio"to enter radio setmode.
#System Setup
Select " System Setup" to set system items.

2.1.4 PLAYING INTERFACE ILLUSTRATION



❶ Playback State
❷ Serial number of the current track
❸ Number of all tracks
❹ Sound effect mode
❺ Playback mode
❻ Battery capacity
❼ ID3 information/singer/lyrics display
❽ Time that has been played of the
❾ current track

2.1.5 TUNING INTERFACE ILLUSTRATION



❶ PRESET mode (normal receiving)

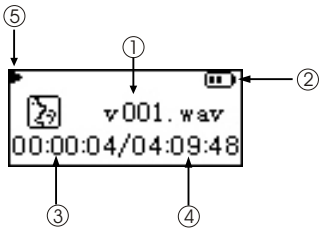
❷ Battery capacity

❸ Frequency of the current radio station

❹ PRESET channel display

❺ SCAN mode (scanning)

2.1.6 RECORDING INTERFACE ILLUSTRATION



❶ Name of recorded file

❷ Battery capacity

❸ Time that has been recorded

❹ The left recordable time

❺ Recording state

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

2.2 BASIC OPERATION

2.2.1 INSTALL USB DRIVE PROGRAM

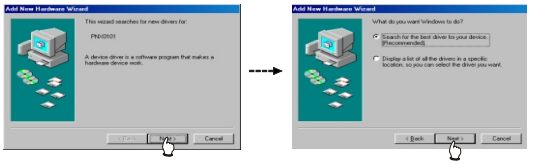
If your computer is Windows 98, you must install drive program if you want to use the mobile storage function of MP3 player in computer.

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

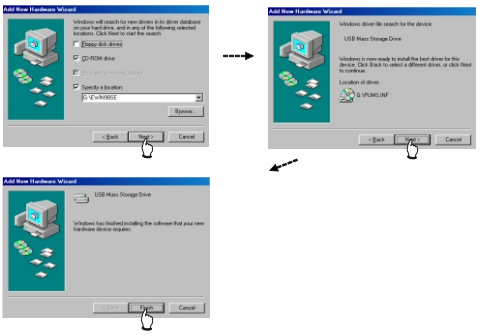
You only need to find the drive information file on disc according to prompt information to finish the installation of drive program.

3. After installation finishes, restart the computer and you may use the mobile storage function normally.

Shown as the following figure:



2.2.2 INSTALL USB DRIVE PROGRAM



2.2.3 USE MOBILE STORAGE FUNCTION

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

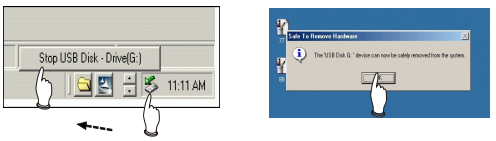
NOTE:

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

#In Windows 98 system, there is no "symbol.

2.2.4 DISCONNECT USB SAFELY

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



2.2.5 BROWSE/CANCEL FILE

#BROWSE FILE

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

#CANCEL FILE

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

2.2.6 PLAY MUSIC

#PLAY MUSIC

press ⏮/⏭ button to select song In "My Music". Press ⏯ button or select playback in main menu to begin playing music, meanwhile the playback interface displays.

#PAUSE PLAYING MUSIC

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

#NEXT and PREV

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

2.2.7 PLAY MUSIC

#FF and FB

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

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

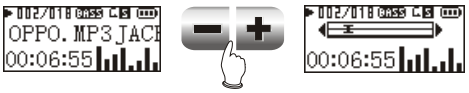
CAUTION:

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

2.2.8 PLAY MUSIC

#ADJUST VOLUME

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



CAUTION:

#Music playback will be paused when browsing file.

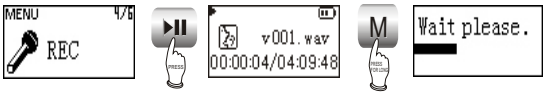
#In some operating system (such as complex font Windows), the operation of copying lyrics/song file and changing song's name may probably lead to incorrect display. When playing WMA songs of VBR , pressing buttons may probably has slow response or has no lyrics display. When playing some non standard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

2.2.9 A-B REPEAT FUNCTION

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

2.2.10 RECORDING

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



CAUTION:

#To avoid sudden power-off when recording, you cannot record when in low battery and when disc is fully written. If you are recording, it indicates “FULL DISC " and exits recording.

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

2.2.11 TUNING

#ENTER TUNING MODE

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

#EXIT TUNING MODE

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

#PRESET/SCAN MODE SWITCH

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

1. PRESET mode

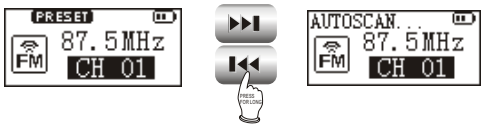
#ADJUST CHANNEL

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

2.2.12 TUNING

FULL AUTO SCANNING

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



2. SCAN MODE

#MANUAL/AUTOMANUAL SCANNING

Press button to increase 0.1MHz each time; and press button to decrease 0.1MHz each time. Press button to save radio station.

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

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

2.2.13 TUNING

SAVE RADIO STATION

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

CAUTION:

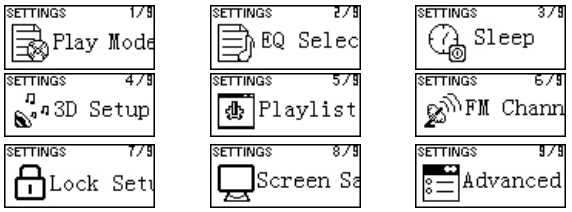
In the course of full auto/automanual scanning, press or / button to stop scanning.

#FM RECORDING

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

2.3 SETTINGS

2.3.1 SETTINGS



#Play Mode
- Normal
- Shuffle
- Playlist
- Intro
- REP One
- REP ALL

#EQ Select
- Normal
- 3D
- PURE
- POP
- Clas
- Jazz
- Rock
- Dbass
- Disco
- My EQ

#Sleep
- Disable~120Min

#3D Setup
- BassBoost
- ConcertSound

#Playlist
- Browse
- Edit
- Delete

#FM Channel
- Auto
- Mono

#Lock Setup
- Lock Disable
- Lock Enable

#Screen Save
- Disable~5Min

#Advanced
- My EQ
- REC Set
- Format
- Load Default
- System Info
- Language

2.3.2 PLAY MODE

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

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

CAUTION:

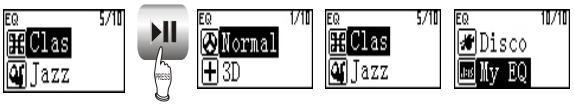
#Play mode is defaulted to "Normal" each time when power on.

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

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

2.3.3 EQ MODE

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



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

NOR NORMAL	POP POP	ROCK ROCK	USER My EQ
3D 3D	CLAS CLAS	BASS DBASS	
PURE PURE	JAZZ JAZZ	DISC DISCO	

Select "3D", and correspond with 3D that you have preset in "MAIN MENU->SYSTEM SETUP->3D SETUP. If you have not set it, it is default value.

Select "MY EQ", and correspond with the sound effect that you have preset in "MAIN MENU> SYSTEM SETUP->ADVANCED". If you have not set it, it defaults "MY EQ" to NORMAL" sound effect.

When the cursor moves to a certain sound effect mode, the sound effect mode played by MP3 player will switch to that in the cursor for the moment to facilitate you to select your desired sound effect mode. Press button to confirm this sound effect mode.

CAUTION:

When playing files in "REC", there is no "EQ MODE " item.

2.3.4 SLEEP

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

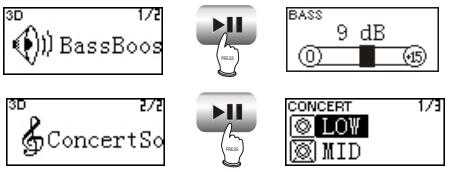
CAUTION:

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

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

2.3.5 3D

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



2.3.6 PLAYLIST

Browse

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

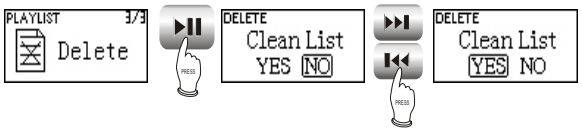
Note: Playback will be paused when in "Browse" or "Edit" list.

#Edit

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

#Delete

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



2.3.7 PLAYLIST

NOTE:

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

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

2.3.8 FM CHANNEL

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

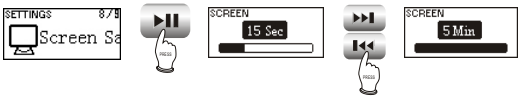
2.3.9 LOCK SETUP

Entering this menu may open or close auto buttons lock function. If “Lock Enable” is selected and not any button is operated during 30 seconds, all button functions will be locked automatically.

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

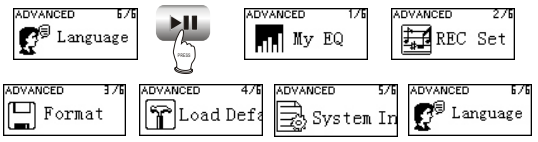
2.3.10 SCREEN SAVE

Press ⏮ or ⏭ button to adjust the screen saver time. After setup finishes, press ⏯ button to save and then exit, and press M button not to save and then exit. If the screen saver setup time is 3 minutes and no operation occurs within 3 minutes, MP3 PLAYER will enter screen saver state automatically



2.3.11 ADVANCED

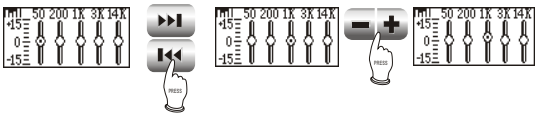
Advanced items include some other system internal setup, such as user sound effect setup, default setup and system information.



#My EQ

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

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



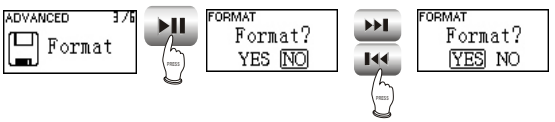
When adjusting width, take 3dB as a step and the max adjustable range is 15dB. After setup finishes, press ⏯ button to confirm and exit, and press M button to exit with the original setup not being changed.

#REC Set

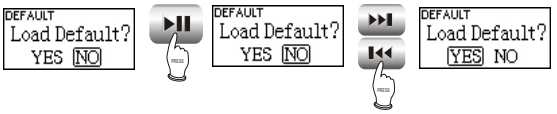
Here to set the recording quality ,The recording quality is higher, the sound quality is better and the used space is more. Three kinds of recording quality adopt IMA-ADPCM format coding.

 # Formatting

Enter this menu, and you may format hard disk. When dialogue box pops up, press ⏮ / ⏭ button to move cursor to “YES”, and then press ⏯ button to confirm to finish formatting operation.



Default



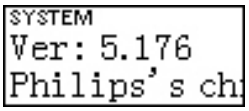
If you want to restore MP3 PLAYER to factory setup state (data and song files cannot be cancelled), you may select “Load Default”. After dialogue box pops up, select “YES” , press button to confirm and then exit to restore to default state. Select “NO” or press button to cancel.

CAUTION:

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

#System Info

You may find information of firmware version, total disc capacity and left disc capacity. In system information menu, press button to return to the previous menu.



CAUTION:

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

#Language

Russian and English are supported.

#Upgrade

Download the latest firmware upgrading file from OPPO website firstly, such as "BBK_X5miniRU.ebn" and "X5miniRU_Resource.bin", copy the two files into MP3 PLAYER at the same time, and then power on again. Find "Upgrade" item in "ADVANCED" of "SETTINGS", and pressing button may start upgrading.

After upgrading finishes, MP3 PLAYER will power on again.

NOTE:

#Only Mp3 player detects that there is upgrading file in system when this player power on, "Upgrade" menu will appear in "ADVANCED" item.

#Make sure Mp3 PLAYER has enough quantity of electric charge before upgrading.

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

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

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

2.4 SPECIFICATION

Model	X5 mini
Audio decode chip	Philips PNX0101
Lithium battery	3.7V 200mAh
Continuous playback time	The longest time is about 8 hours
Dimensions/weight	47.5mm×36.9mm×12.6mm about 20.1g
Audio SNR	≥90dB
Headphone out	9mW+9mW（32ohm impedance）
Frequency range	18Hz～20kHz
FM tuning range	87.5MHz～108MHz
Working temperature	0～40 C
Files supported	MPEG 1/2 Layer 3(16kbps～320kbps)、WMA (8kbps～192kbps)、WAV

Chapter Three Principle and Servicing

section One Principle of the Player

3.1.1 Function introduction and principle of the player

X5 Mini portable MP3 player is composed of the following functional modules:

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

#Power management module: composed of TPS79301, TPS62200 and PQ1X28 and responsible for the power supply of each part of Mp3.

#Headphone output/USB jack: headphone output jack, audio output and also USB jack and data exchange at the same time and fulfill charge function (USB jack of X7-2 headphone jack outputs individually).

#Lithium battery module: power supply of the player.

#Memory module: data storage of the player.

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

#MIC: external audio input, which fulfills recording function.

#Tuningmodle: FM tuning.

3.1.2 Block diagram

Block diagram is shown in the figure 3.2.1.1:

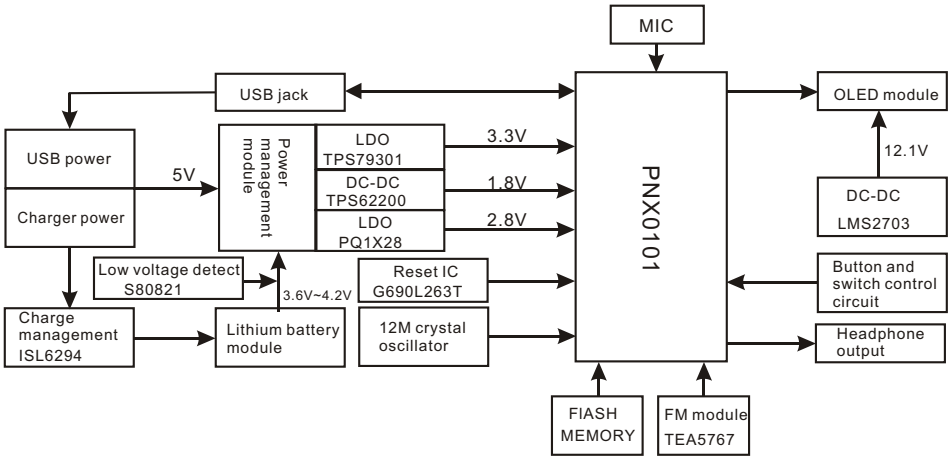


Figure 3.1.2.1 Block diagram of X5 Mini

3.1.3 Introduction to IC used by the player

Introduction to IC used by X5 Mini is shown in the following figure:

PCB board	Location	IC model	Function
Mian board	U1	TPS79301	Provide 3.3V voltage
	U2	G690L263T	System reset
	U3	TPS62200	Provide 1.8V voltage
	U4	ISL6294	Charge management
	U5	S80829	Low voltage detect
	U6	Philips PNX0101	MP3 decode
	U7	PQ1X28	Provide 2.8V voltage
	U8	TC58512FT	Flash Memory
	U9	SI912DL	Headphone mute
	U10	LM2703	Provide 12.2V voltage
Tuning board	U1	TEA5767HN	Tuning module

Section Two Unit Circuit Principle

3.2.1 FLASH circuit principle

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

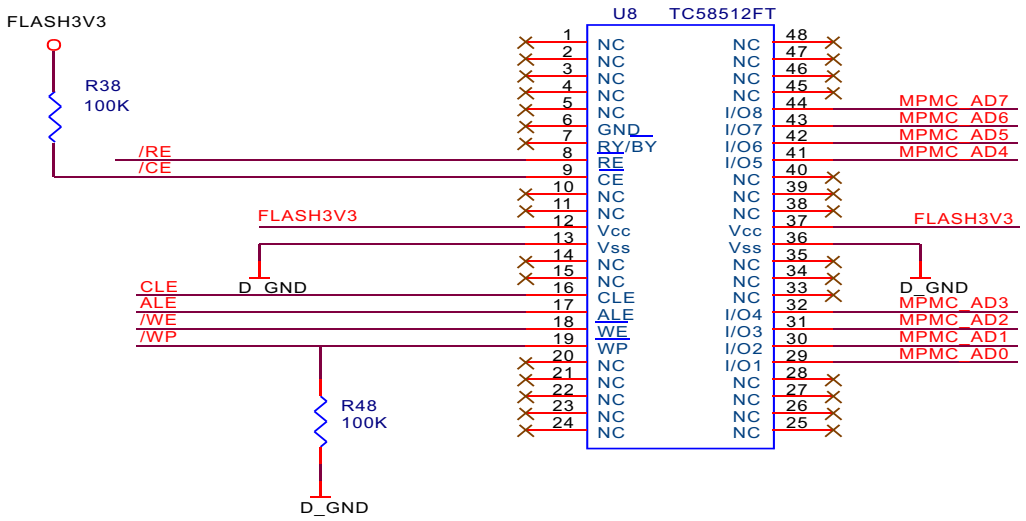


Figure 3.2.1.1 Flash circuit schematic diagram

2. Working principle: Flash Memory is the memory unit of the player. All MP3 and waveform files must be saved in FLASH. Flash module is composed of FLASH chipTC58512FT and peripheral circuit to fulfill the read, write and delete of inside files. 1.5V voltage supplies 3.3V voltage for the working of FLASH through the internal boost circuit of PNX0101. R1 is the pull-up resistor of /CE, R2 is the pull-down resistor of /WP, Vcc is the power supply pin of FLASH, /CE is chip selection signal and high level is effective. VCC33 supplies 3.3V voltage and FLASH begins to work. /RE and /WE read effective and write effective signal end to control the read and write function of FLASH. I/O1～I/O8 are 8 data lines to finish the exchange between FLASH and external data to realize the write, delete and edit function of MP3.

There is firmware of the player's working in Flash and all working is completed when CPU gives the relevant direction through the data exchange between CPU and Flash. When Mp3 player power on, 3.3V voltage supplies power for Flash through Vcc, /CE inputs 3.3V high level signal and Flash begins to work effectively. When Mp3 player is playing music, /RE is high level, Flash performs read operation. When files are being written through USB data line or recording through microphone, /WE is high level and Flash performs write operation. Read and write working should be performed through 8 data lines of I/O1～I/O8.

3.2.2 FM module circuit

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

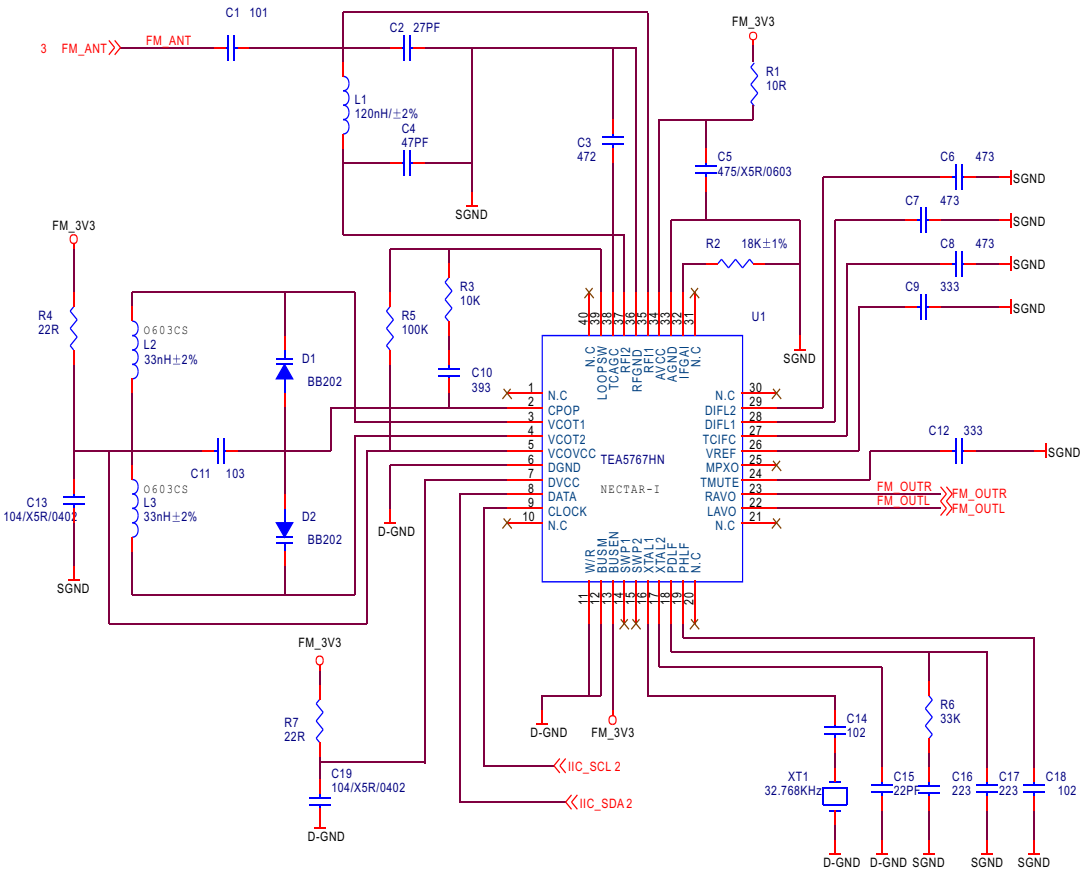


Figure 3.2.2.1 FM module circuit schematic diagram

2. Working principle: tuning circuit is composed of micro-digital tuning IC TEA5767of Philips Company and the peripheral circuit. Power supply voltage is provided by PQ1X28, which provides the pure voltage for IC with the value 2.8V. C1, C2, C3, C4, and L1 is the antenna input matching circuit of FM module; variant diode D1, D2 and winding inductor are frequency selection tuning circuit in FM module. The control of FM adopts IIC bus control means, 9, 10 of TEA5767 are data and control line. When Mp3 player switches in FM tuning state, antenna is sent to the RF band-pass filter (87.6MHz ~108MHz and 76MHz~87.5MHz) composed by LI, C2, C4 through being coupled by C1 and pin 35, 37 of TEA5767 and then is amplified by TEA5767. Pin 2, 3 4 of TEA5767 is connected with internal VCO and with variant diode D1 and D2 externally. Pin 2 is tuning voltage output and voltage changes within 1V. VCO voltage is supplied by FM 3V3 to send to pin 5 of TEA5767 through R4 limit current and C13 filtering. Built-in I2C jack is controlled through pin 8, 9 of TEA5767, CPU performs channel search and select through I2C bus. Digital power is sent to pin 7 of TEA5767 by FM 3V3 through R7 limit current and C19 filtering. Xt1 (32.768) generates basic clock of 32.768 to input to TEA5767 from pin 17 analog audio signals after being processed by TEA5767 output from pin 23 (right channel) and pin 22 (left channel) to rear stage power amplifying circuit for amplifying and then output from headphone jack.

3.2.3 OLED module circuit

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

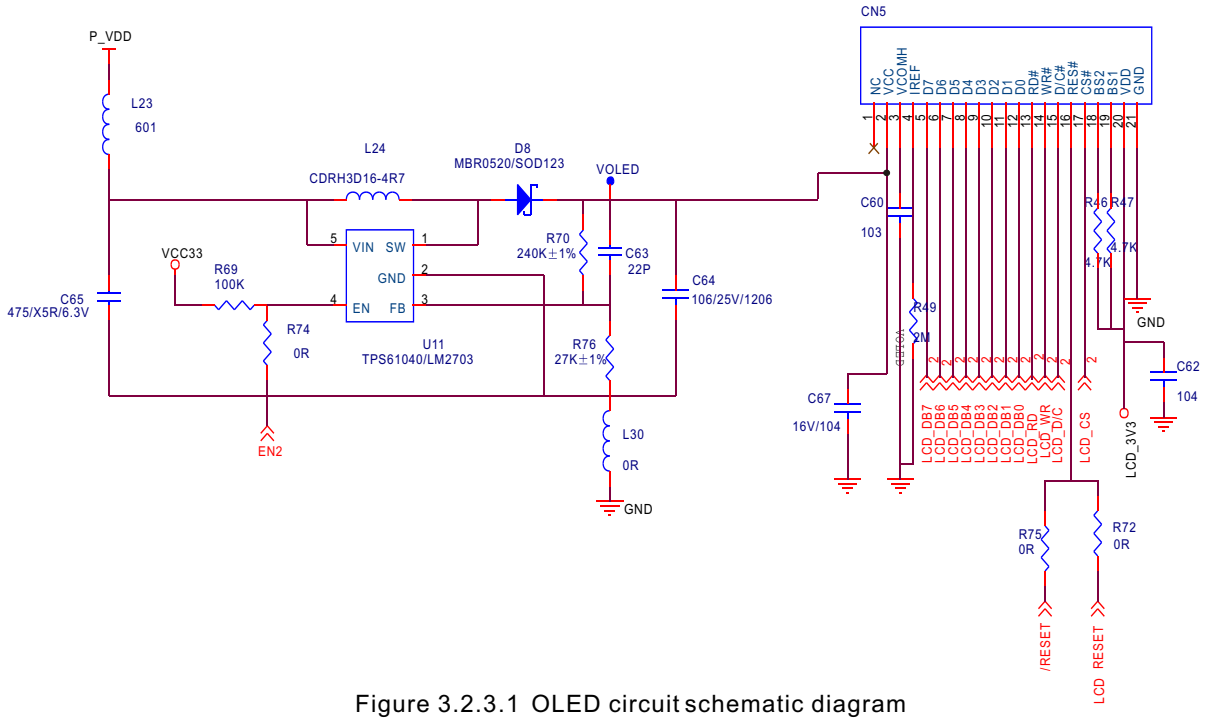


Figure 3.2.3.1 OLED circuit schematic diagram

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

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

From the above, we know that VOLED is about 12.2V. L25 and C72 in the circuit are energy saving inductor and output capacitor of boost circuit.

After power on, when the internal boost circuit of L24 and TPS61040 is on, energy saving begins. When current of L24 reaches 400MA, the internal switch of TPS61040 is off and power is supplied to the rear circuit through external diode D8 while switch is off. R70, 76 compose voltage divider detect circuit to send the detected voltage to pin 3 of TPS61040. When detect voltage of pin 3 is lower than 1.233V reference voltage (this IC has a 1.233V reference voltage comparator inside), the internal switch is on, the internal boost circuit of L24 and TPS61040 begins to increase voltage and save energy. When current of L24 reaches 400MA, the internal switch of TPS61040 cuts off and power is supplied to rear Circuit through diode D8 while switch is off. The standard time of switch off is 6 u s (classic value), switch keeps 400 u s at least or until feedback voltage decreases under reference voltage. As for this

PFM peak current control scheme operated by non continuous conduction means (DCM) , the frequency depends on output current and this makes the entire load frequency high. Ic4 pin is working enable pin together with PNX0102 H3 pin to complete the control to TPS61040 to realize screen saver function through the control of software.

When power on, display screen performs data communication through CPU to make the drive current signals lighten OLED screen, CPU sends different signal and OLED makes different display, so we may see different display, and CPU control screen saver function at the same time.

3.2.4 Headphone output/USB jack circuit

1. X5Mini Headphone output/USB jack circui schematic diagram is shown in the figure 3.2.4.1:

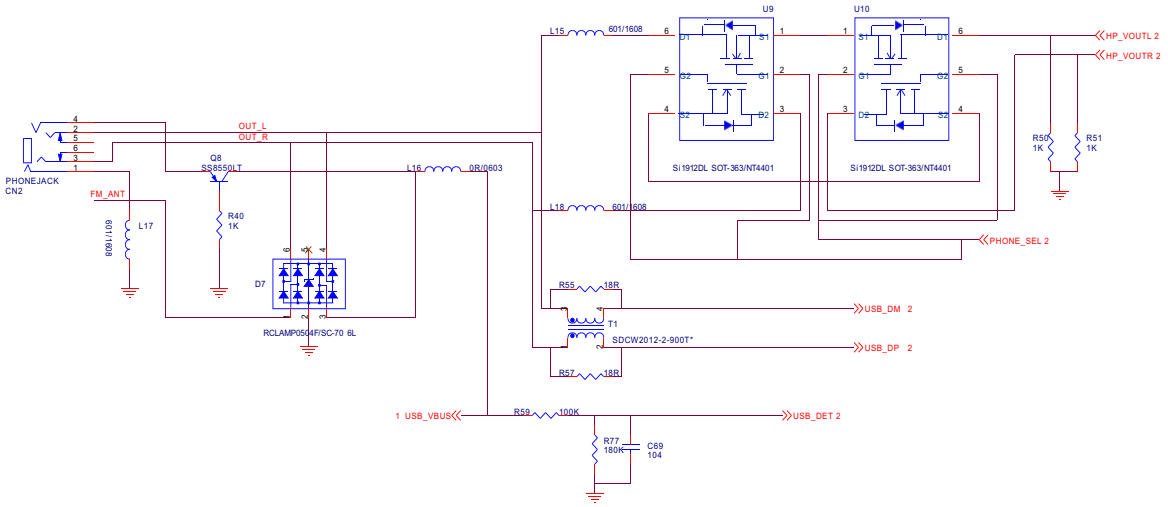


Figure 3.2.4.1 Headphone output/USB jack circuit

2. Working principle: After left and right channel audio signals outputted from PNX0101 output through being coupled by 220uF capacitor, they are sent to headphone jack circuit. Headphone jack circuit is composed of the dual MOS tube SI1912DL that controls sound output and headphone socket Cn2. Pin 2 and 5 of SI1912DL are connected with mute circuit. When pressing MUTE button, dual MOS tube is controlled to cut headphone left and right channel output. PNP triode Q8 in circuit is used as reverse insert protection, for it will damage Mp3 internal circuit, D7 is TVS diode array used for ESD protection. Ground wire of headphone is also used as antenna input of FM module.

In X5 Mini model, headphone jack is also USB jack. USB jack network is composed of USB_DM, USB_DP and GND (ground wire). When the player is connected to computer through USB line or when the player is charging, USB_CONECT control whether dual MOS tube SI1912DL cuts. Cut audio output to headphone jack and USB jack circuit is connected.

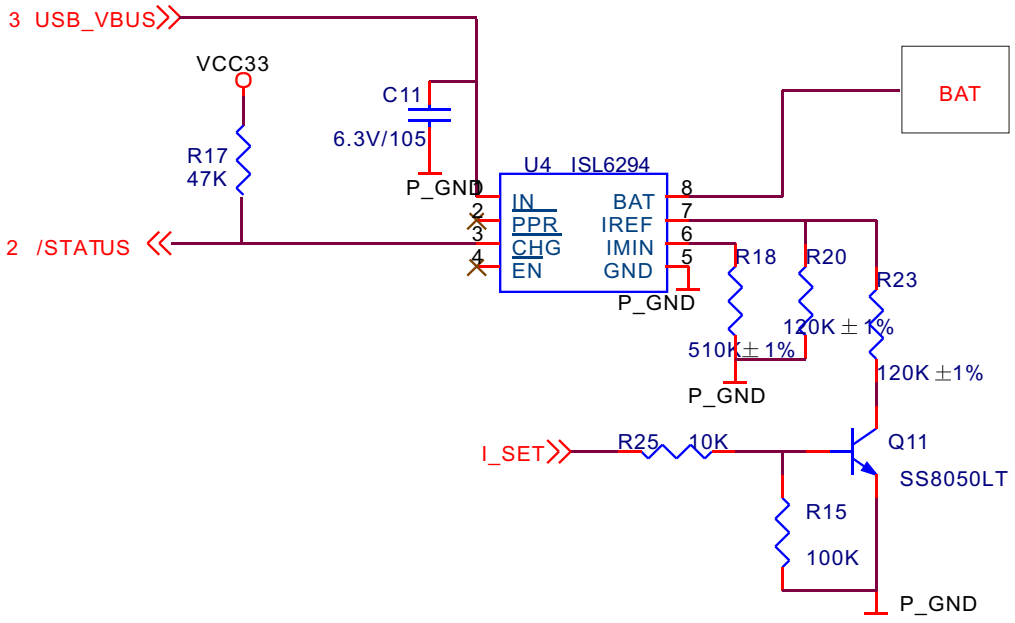
In X7-2 model, headphone output jack and USB jack are individual and working principle is similar to this.

3.2.5 Button circuit

X5 Mini button detect uses voltage divider mode, which utilizes T6 and U6 pin of ADC circuit of PNX0101 to detect the preset button voltage value to decide which button functions, and then the internal program makes the relevant response to realize function of each button. Lock button directly uses IO port of PNX0101 to detect high or low level. When high level is detected, it is locked and other buttons do not function.

3.2.6 Charge management circuit

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



3.2.6.1 Charge management circuit schematic diagram

2. Working principle: seen from the circuit, charge circuit is mainly fulfilled by charge control IC ISL6294 and peripheral circuit. IN pin is power input pin of ISL6294, that is the input end of USB 5V, BAT is output pin of ISL6294, that is the input end of lithium battery; /CHG is charge state indication end, when /CHG is in low level, it means the charge is in process, on the contrary it means the charge is finished; IMIN is minimum charge current setup end, that is, when charge current is less than the current value set by this end, charge is stopped. The setup of minimum charge current is fulfilled through selecting external resistor R18. The relationship between Minimum charge current IMIN and R18 is shown as follows:

$$I_{MIN} = \frac{11000}{R18} \text{ (MA)}$$

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

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

$$I_{REF} = \frac{12089}{R} \quad (MA)$$

Triode Q11 in circuit is used for charge current selection. When users use computer to charge battery, PNX0101 outputs I_SET, which is low level, Q11 cuts off, and R23 is connected into circuit. Seen from the above, I_{REF} is about 100 milliampere; when users use charger to charge battery, PNX0101 outputs I_SET, which is high level, Q11 is Saturated on, R20 and R23 are connected into circuit in parallel, seen from the above, I_{REF} is about 200 milliampere. The reason why we design like this is that USB jack of some computers (such as laptop computer) cannot provide large current to charge battery.

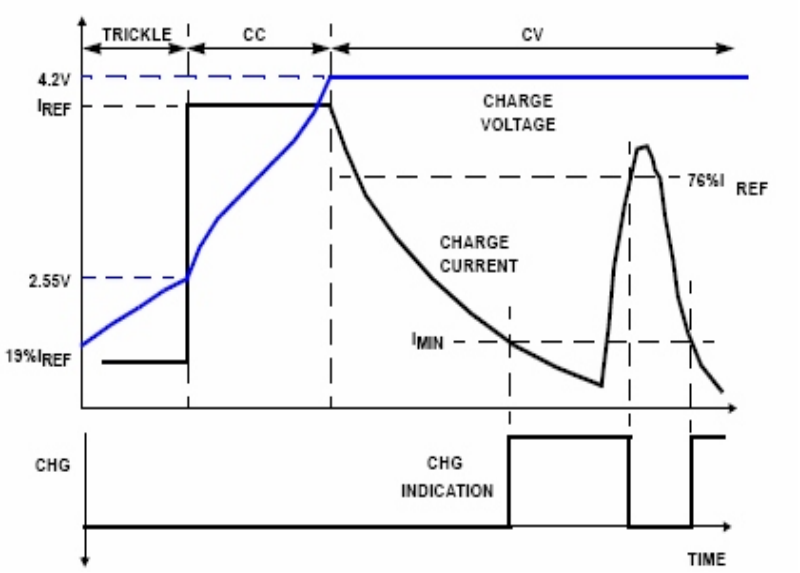


Figure 3.2.6.2 Charge progress illustration

When input voltage of VIN pin is higher than start-up voltage of charge (POR, classic value is 3.9V and max value is 4.2V) and also within VOP (over voltage protection) voltage value range (4.25~6.8V), MOS tube inside Is6294 is connected, PPR pin is low level and 10mA current outputs. When EN pin is connected with nothing, the internally connected 200K resistor is in low level and enable state.

The comparator integrated inside Is6294 detects battery voltage through comparison to make different voltage in different charge state. When battery voltage is lower than 2.55V, ISL6294 charges battery through the non continuous current of external resistor until battery voltage increases to 2.55V and ISL6294 enters quick charge constant current mode; when battery reaches 4.2V, switch in constant voltage mode until charge current decreases to charge close current.

3.2.7 Low voltage detecting circuit

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

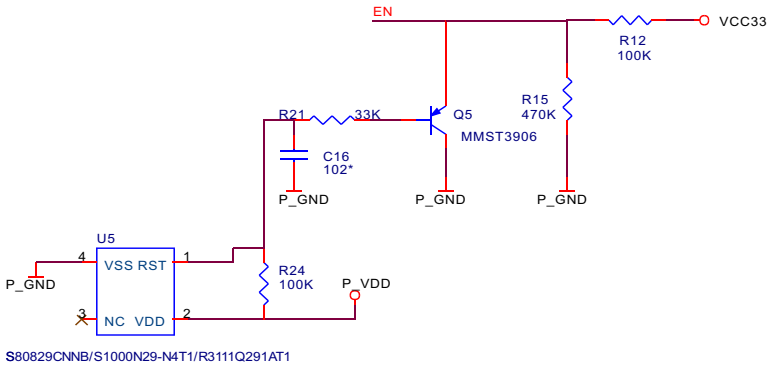


Figure 3.2.7.1 Low voltage detecting circuit schematic diagram

2. Working principle: low voltage detecting ciorcuit is fulfilled by IC S80829CNNB and PNP triode Q5. S80829CNNB is high precision voltage detector detect valve value is 2.9V and precision is 2%. P_VDD is he input voltage of the 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 which cuts off the power pf the player to power off.

3.2.8 Battery protection circuit

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

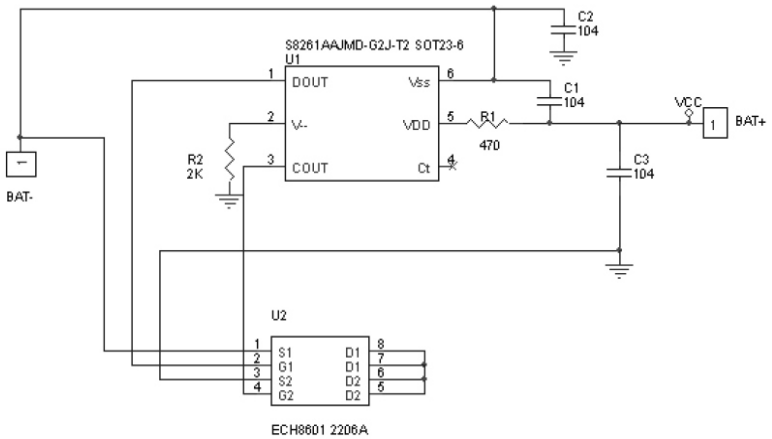


Figure 3.2.8.1 Battery protection circuit

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

3.2.9 Power management module

1. Function of power management module is to provide the player with 3.3V, 3.8V and1.8V of normal working. Circuit schematic diagram is shown in the figure 3.2.9.1, 3.2.9.2 and 3.2.9.3:

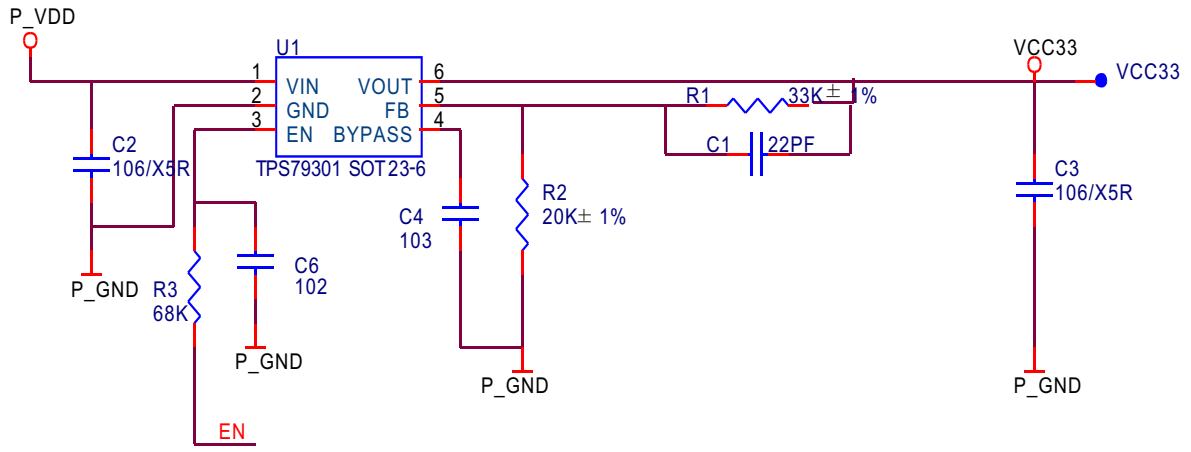


Figure 3.2.9.1 3.3V power circuit schematic diagam

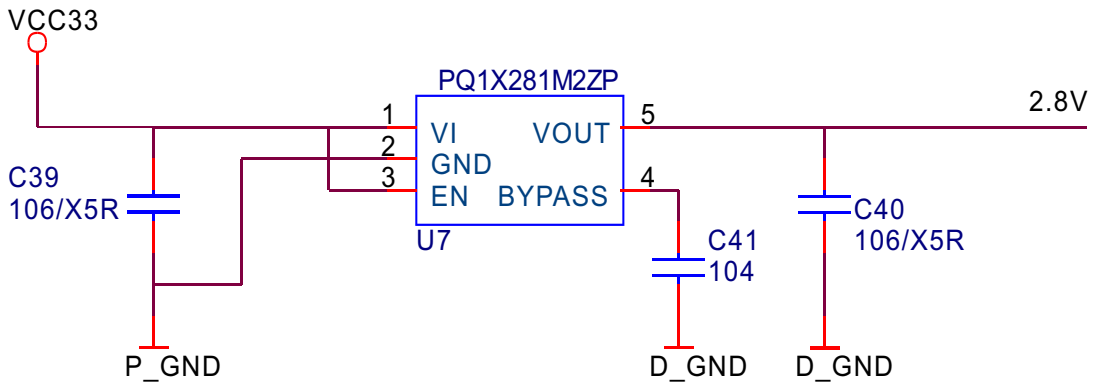


Figure 3.2.9.2 2.8V power circuit schematic diagram

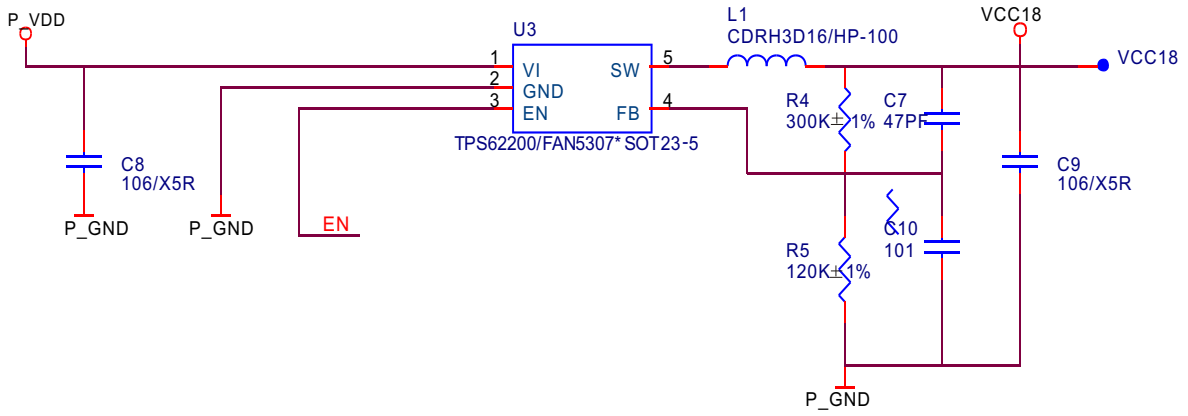


Figure 3.2.9.3 1.8V power circuit schematic diagram

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

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

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

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

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

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

To improve sound quality of Mp3 and effect of FM and microphone, we introduce 2.8V power to supply power for audio system of PNX0101 and FM and microphone, feature of this channel 2.8V power is: it is outputted by LDO PQ1X281, power is very pure with low ripple voltage. PQ1X281 may output fixed voltage 2.8V, EN is the enable end. and high level works.

3.2.10 Reset circuit

1. Reset circuit supplies rest signal to PNX0101. Reset circuit schematic diagram is shown in the figure 3.2.10.1:

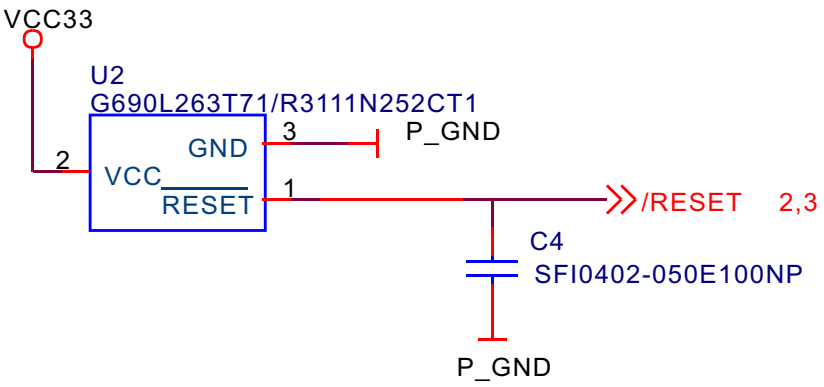


Figure 3.2.10.1 Reset circuit schematic diagram

2. Working principle: Reset adopts IC reset. G690L263T71 is one type in G690 series micro-processor reset IC produced by American GMT Company. When pin 2 Vcc voltage reaches VCC33 voltage, pin 1 outputs reset signal to reset PNX0101 (low level reset, and another reset signal outputted by G690H263T71 is high level), reset signals keeps in 140ms at least. C4 in circuit is voltage dependent resistor used for ESD protection.

3.2.11 ON/OFF control circuit

1. ON/OFF control circuit schematic diagram is shown in the figure 3.2.11.1:

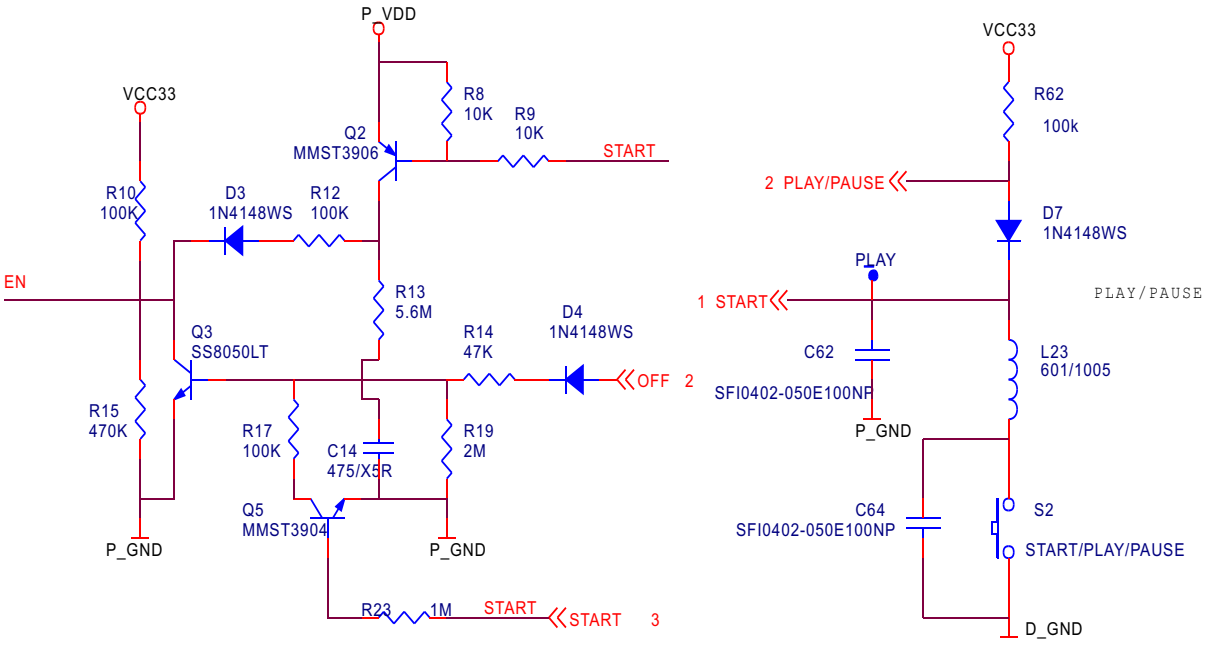


Figure 3.2.11.1 ON/OFF control circuit schematic diagram

2. Working principle:START/PLAY/PAUSE is a group of combination keys and functions are different in different working time and controlled by software.

When the player is in power off state without Connecting with USB (note: USB and power adapter

Has the same jack and function is identified by software), Q3 is in cut-off state. When pressing button S6, START is pulled down to earth, Q3 is connected, at the same time diode D4 is connected, P_VDD pulls EN up through Q3, D4, the EN enable end of U1, U3 is effective, TPS62200 and TPS79301 begin to

Enter working state, TPS62200 and TPS79301 output 1.75V and 3.3V voltage to the entire Mp3 system for power supply. System voltage VCC33, VCC18, OLED voltage (13V) begin to output, crystal oscillator X1 oscillates, U2 Generates reset signal, main chip initializes (screen display appears) and machine starts to work.

In power-on state, press START/PLAY/PAUSE button, Q3 is connected, P-VDD generates a voltage drop through CE electrode of Q3. For VCC33 voltage is normal, the circuit composed of R12 and C15 makes N electrode of D4 keeps 3.3V voltage, D4 cannot be connected and in cut-off state, EN pin is high level, TPS62200 and TPS79301 are in working state, TPS62200 and TPS79301 output 1.75V and 3.3V voltage to the entire Mp3 system for power supply; after pressing button, voltage in PLAY/PAUSE pin has variation, L3 pin of PNX0101 detects the voltage change of PLAY/PAUSE. In different operation interfaces, different functions are realized through software, including: press for short in playing interface --- switch in pause and play function; press for short when recording --- pause recording; press for short when tuning --- mute; press for short in SCAN mode when tuning --- save radio station and switch in PRESET mode; press for short when operating menu --- enter the selected item or confirm the setup.

When pressing PLAY button within 1 and 4 seconds, L3 pin of PNX0101 detects the variation of voltage, software judges that this signal is power-off signal to save the contents operated by machine. K16 pin outputs high level to make D5 on and then make Q4 on, VCC33 is grounded through CE electrode of Q4, enable end EN is low level, TPS62200 and TPS79301 close, TPS62200 and TPS79301 have no voltage output and the player realizes software power-off.

When machine down because of software trouble, press START/PLAY/PAUSE for above 4 seconds to realize hard disk power-off. The process is: after pressing button, B electrode of Q3 changes to low level, Q3 is connected, P-VDD passes through CE electrode of Q3, R16 charges C17, capacitor voltage increases gradually to make Q4 connected, VCC33 is grounded through CE electrode of Q4, enable end EN is low level, TPS62200 and TPS79301 close, TPS62200 and TPS79301 have no voltage output. When loosening button, P-VDD passes through R10, R13 makes START pin keeps high level to make Q10 connected, electricity saved in C17 discharges quickly through CE electrode of R22 and R41, Q10 to ensure the normal power-on when pressing START/PLAY/PAUSE button next time.

3.2.12 MIC circuit

1. MIC circuit schematic diagram is shown in the figure 3.2.12.1:

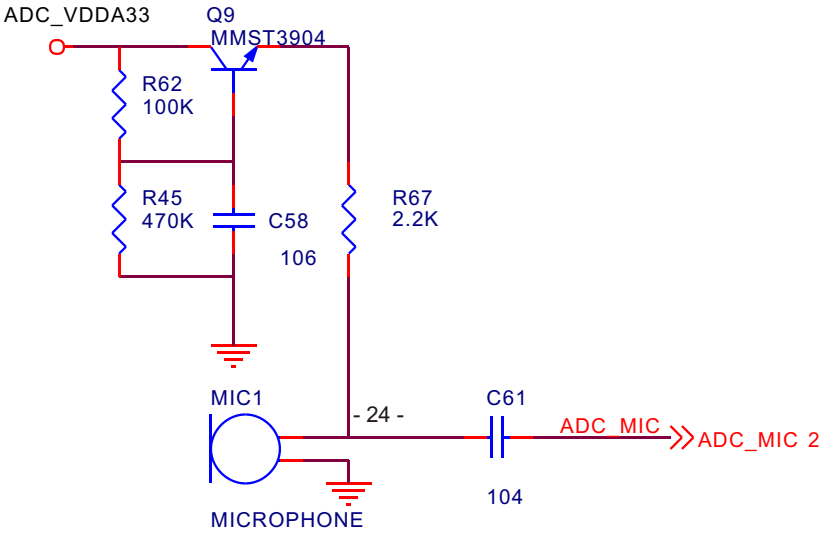


Figure 3.2.12.1 MIC circuit schematic diagram

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

In the circuit, R62, R45, Q9 and C58 are triode voltage stabilizing system, which provides stable power bias for microphone, R67 is the bias resistor of microphone.

Section Three Servicing Cases

3.3.1 Servicing cases

[Example 1] Symptom: power not on

Description: no screen display and no output

Analysis and troubleshooting: connect with power adapter and check whether charge is available and whether screen has display and result is that there is no display; take down machine and check power supply 3.3V and 1.8V, we find that 3.3V decreases to 0.6V,1.8v; use power adapter to suppl power, input 5V is normal, charge enable end is high level and it is also normal; observe carefully and find that pin 2 of U1 (TPS79301) has false welding; after weld again, trouble is removed.

[Example 2] Symptom: machine cannot be switched on

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

Analysis and troubleshooting: firstly make sure whether machine cannot be switched on or power not on; connect with power adapter or computer and check whether screen displays normally; connect with power adapter and charge can display, which means that power and rear stage circuit working is normal; power on/off circuit, through a light touch switch S6, forms loop after closing; give power an enable end signal to control whether the whole circuit works; test S6 switch, press SHUT and check whether it is on; when testing, we find that S6 has false welding; after welding again, trouble is removed.

[Example 3] Symptom: cannot connect with computer

Description: no response and no OSD after connecting with computer

Analysis and troubleshooting: firstly make sure whether charge and power on are normal and the result is normal; use diode level of multimeter to test the resistance to ground of USB-DM, USB-DP data signals in USB terminal position and it should be close to several hundred ohm, but we find that USB-DM resistance value is normal, USB-DP resistance value is infinite and USB terminal has false welding; after welding again, trouble is removed.

[Example 4] Symptom: noise appears when tuning

Description: noise appears when tuning.

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

State, search radio station automatically, tuning is normal, which means power supply, data and clock are normal; we remote external interference, receive the nearest local radio station and check whether it is clear, and the result shows noise still exists; circuit that causes noise is high frequency tuning and mixed frequency part; carefully check and find that pin 37 of tuning U1(TEA5767HN)is false welding; weld again and trouble is removed.

[Example 5] Symptom: noise appear when playing

Description: headphone output noise when playing

Analysis and troubleshooting: if there is noise when playing, it is BGA that has trouble, for playback and other functions are all normal, only there is noise, so it is necessary to analyse whether decode [art or rear stage causes this trouble, when playing 1KHZ standard signal, there should be sine wave signals and not any noise; test P3, N3 waveform close to BGA, so we judge that it is BGA that has trouble; after changing it, trouble is removed.

[Example 6] Symptom: no OSD

Description: screen has no display

Analysis and troubleshooting: firstly confirm whether trouble lies in power or screen itself; power on and listen to the sound and sound s normal, so it is preliminarily judged that power supply 3.3V and 1.8V are both basically normal. Firstly test voltage on two ends of L24 and it is about 4.3V, which is basically normal; then test voltage on two ends of D8 and find that anode has no 13V voltage, take down display screen and there is still no; check input end voltage and enable voltage and they are basically normal, then check FB end voltage of feedback pin and it is obviously low, EN enable end has false welding, after welding again, trouble is removed.

[Example 7] Symptom: screen has mosaic

Description: display screen has mosaic and display has disorder

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

[Example 8] Symptom: Noise when playing recording files

Description: Noise when playing recording files

Analysis and troubleshooting: schematic diagram of record circuit is shown in the figure, it is mainly composed of microphone and microphone power bias circuit, MIC switches the external voice signals recorded into electric signals, through being coupled by C61, output to ADC circuit of PNX0102 and form

WMA files through software coding to save in Flash. When repairing this kind of machine, firstly play files and check whether there is noise and there is no; check recording circuit and power supply is normal; when recording, use oscillograph to test C71 and there is noise interference, after changing MIC, trouble is removed.

[Example 9] Symptom: cannot connect with computer

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

Analysis and troubleshooting: if software program is incorrect or lost, machine may probably not be switched on or machine failure will happen; when this trouble appears, please fresh the software firstly; firstly check whether software upgrading is available and then down load software program; after upgrading software, trouble is removed.

[Example 10] Symptom: cannot charge

Description: charge mode can display but in fact charge function is not available

Analysis and troubleshooting: charge mode and charge can both display but the player cannot be fully charged; after 3 hours, unplug power adapter and power on, low battery charge displays and then power off automatically; you may enter charge mode and there is charge indication, which means there is power input, BAT and CHG are normal, so we should consider charge control pin, check IMIN current control end, when current of this pin is very small, charge stops; R18 has false welding; after welding again, trouble is removed.

3.3.2 Troubleshooting flow chart

1. Troubleshooting process for " screen display circuit" is shown in the figure 3.3.2.1:

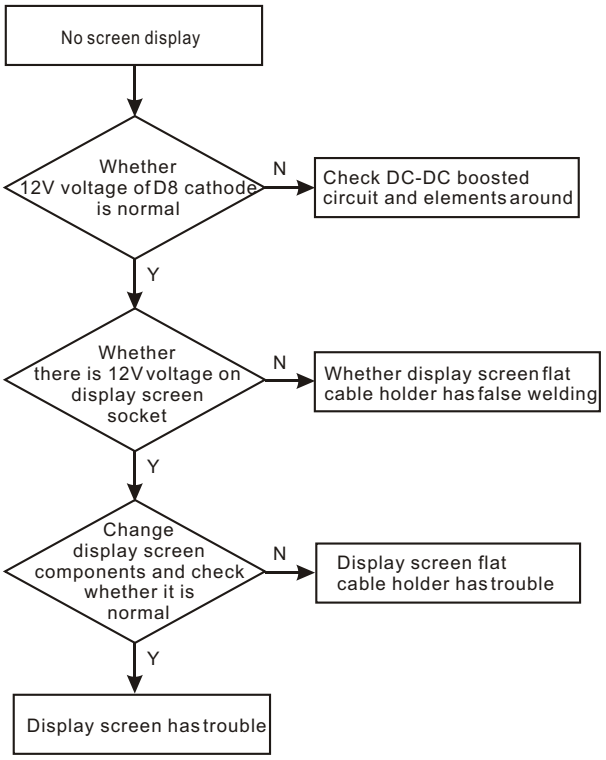


Figure 3.3.2.1 Screen display circuit troubleshooting figure

2. Troubleshooting process for “USB jack circuit” is shown in the figure .3.3.2.2:

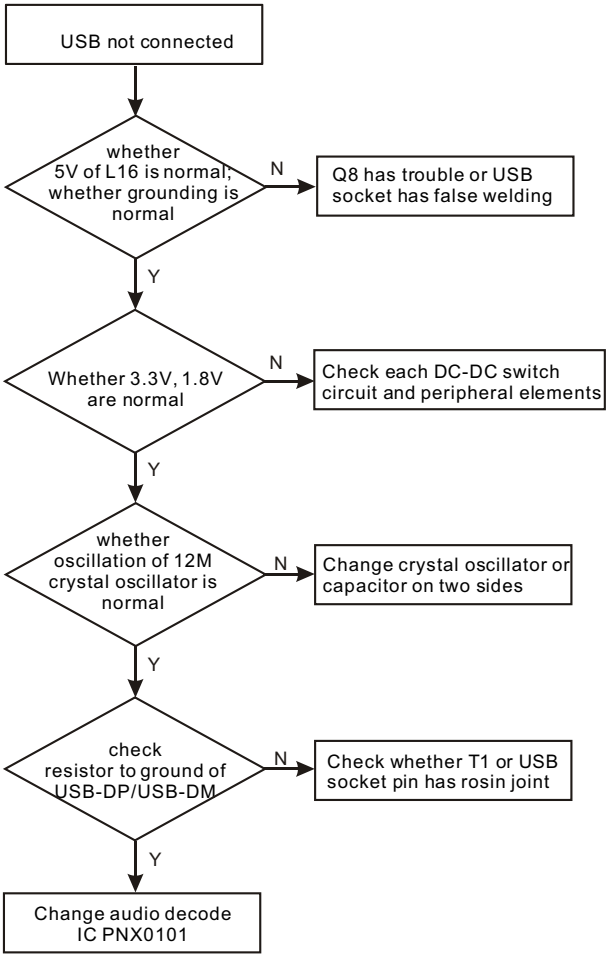


Figure 3.3.2.2 USB jack troubleshooting flow chart

3. Troubleshooting process for “Button circuit” is shown in the figure 3.3.2.3:

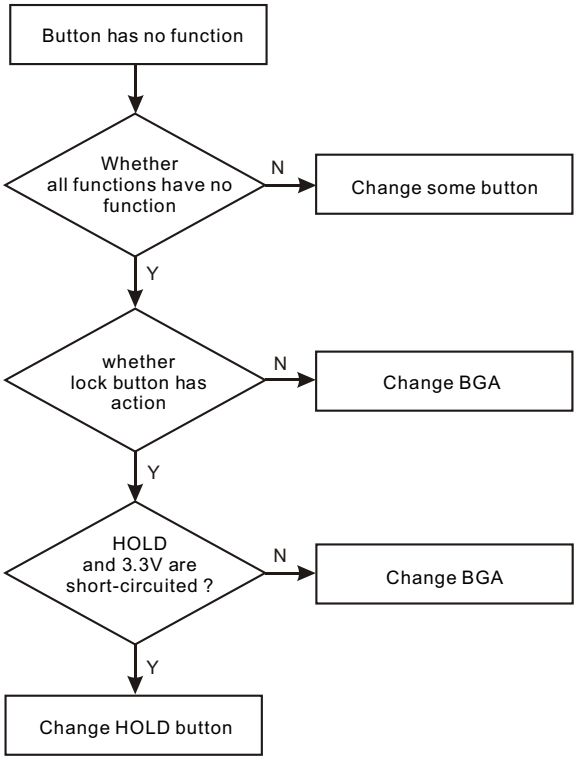


Figure 3.3.2.3 Button circuit troubleshooting flow chart

. 4. Troubleshooting process for “Charge management circuit ”is shown in the figure 3.3.2.4:

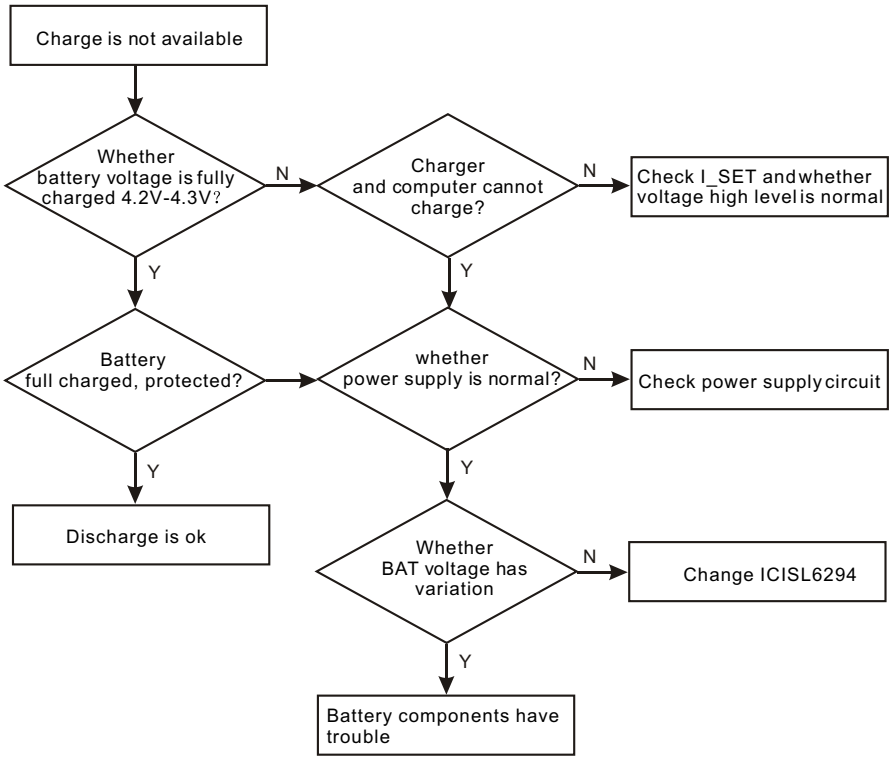


Figure 3.3.2.4 Charge management circuit troubleshooting flow chart

5. Troubleshooting process for “Power management circuit” is shown in the figure 3.3.2.5:

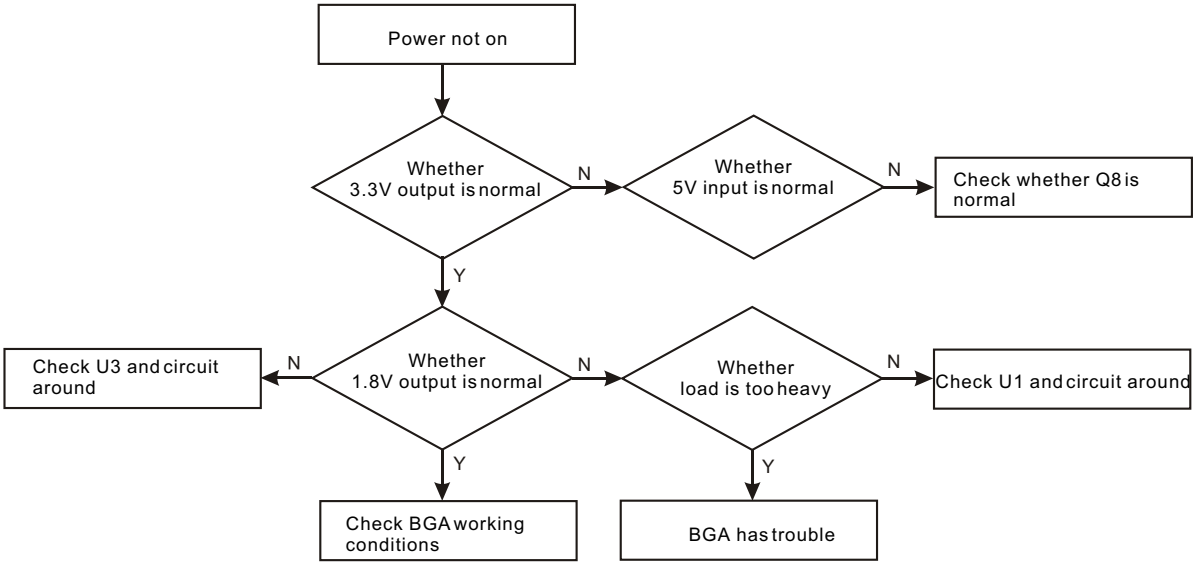


Figure 3.3.2.5 Power management circuit troubleshooting flow chart

6. Troubleshooting process for “ ON/OFF control circuit” is sown in the figure 3.3.2.6:

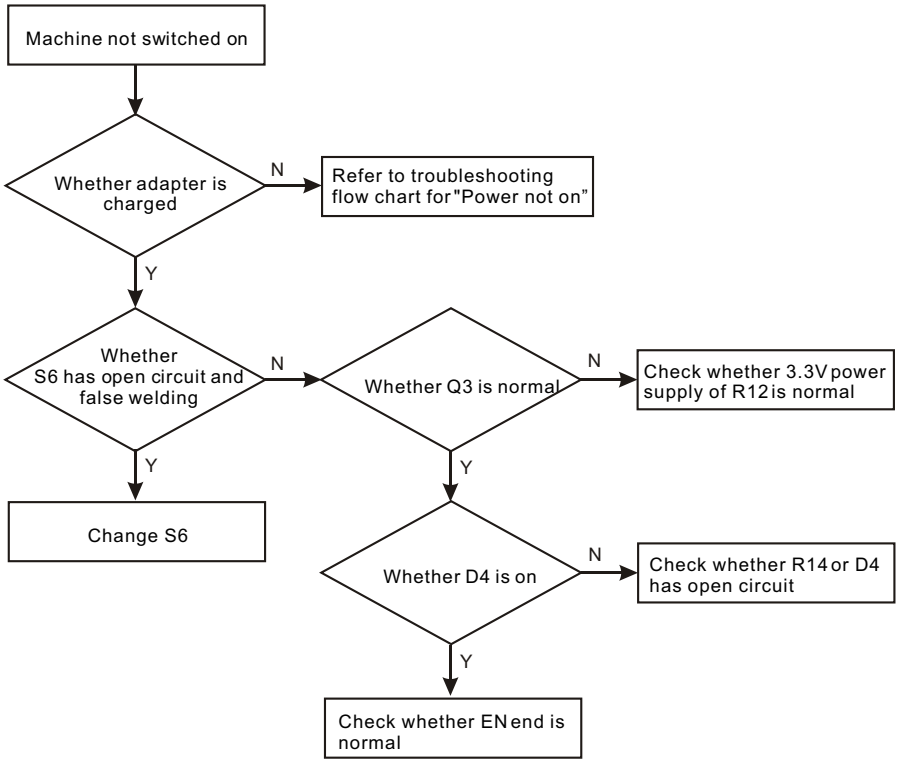


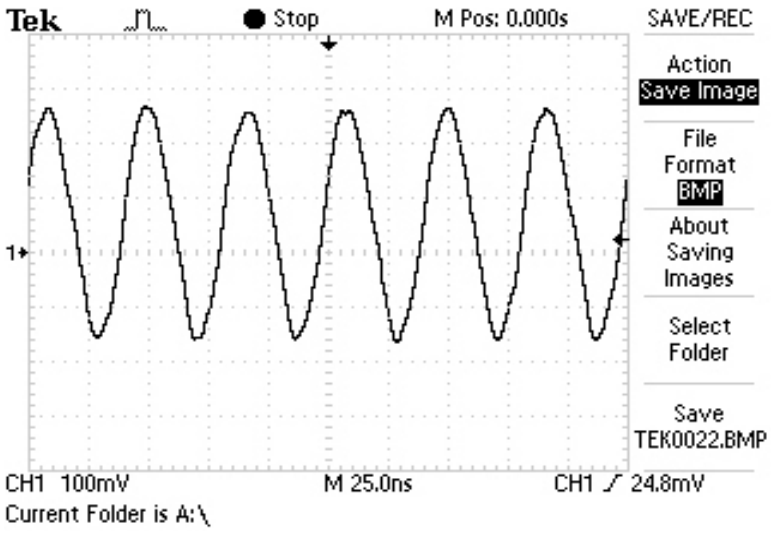
Figure 3.3.2.6 ON/OFF control circuit troubleshooting flow chart

Section Four Servicing Parameters

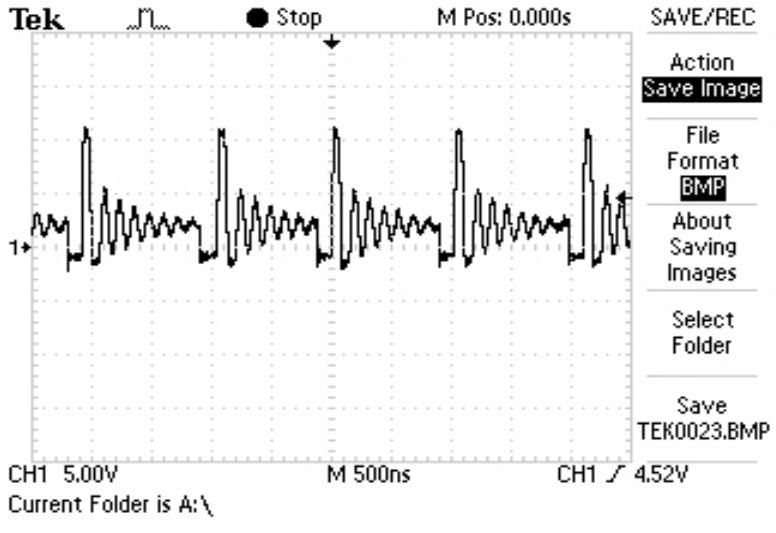
3.4.1 Key point waveform diagram

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

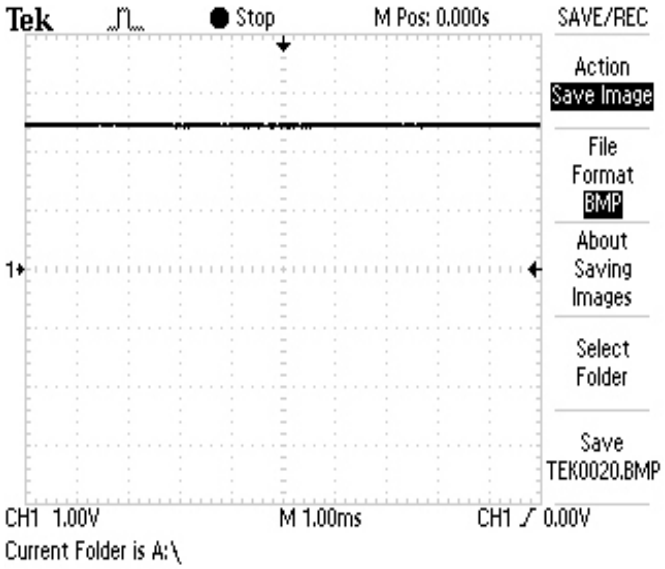
1.12M crystal oscillator oscillation waveform diagram



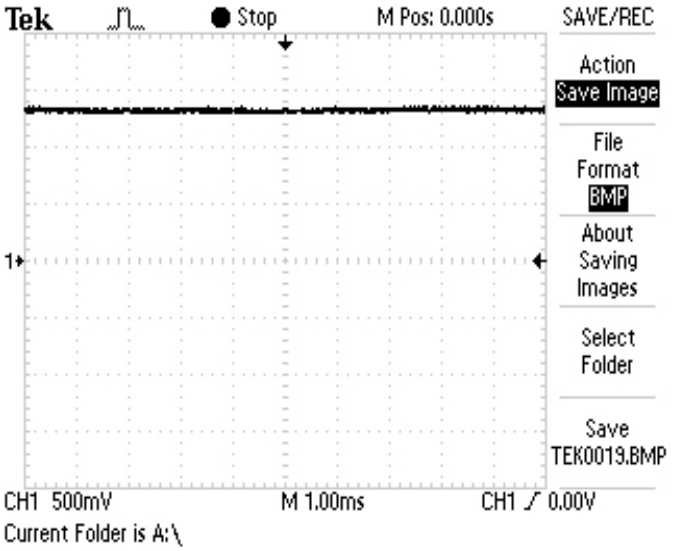
2. L24 boosted energy storage waveform diagram



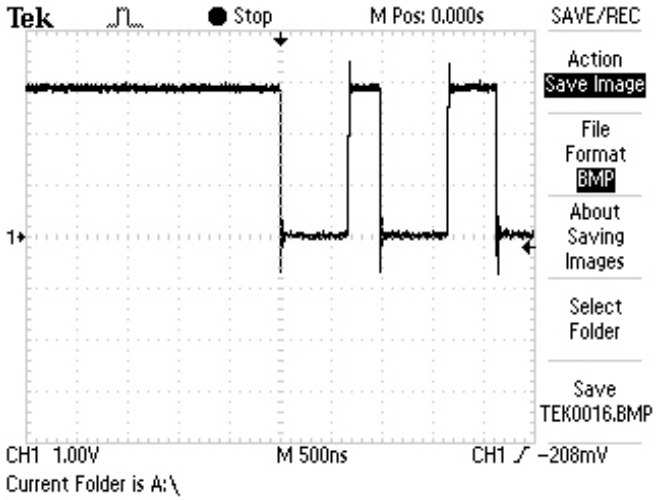
3. Software power supply 3V3 waveform diagram.



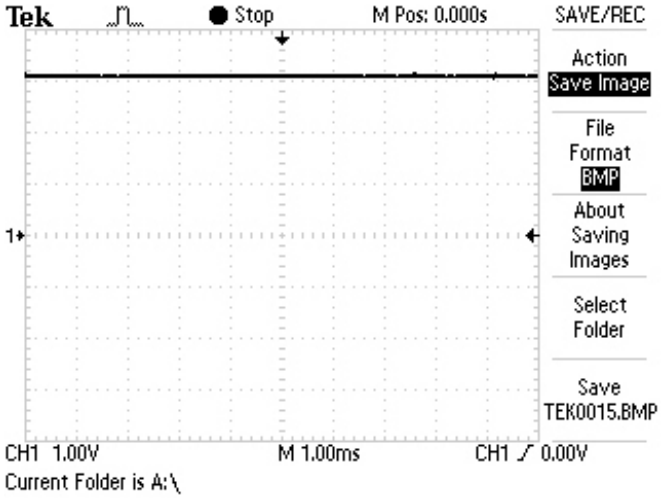
4. LCD_3V3 waveform diagram.



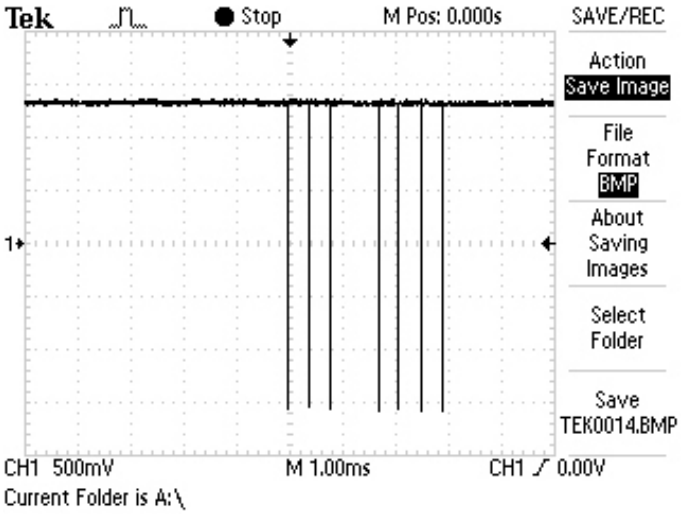
5. LCD_CS waveform diagram.



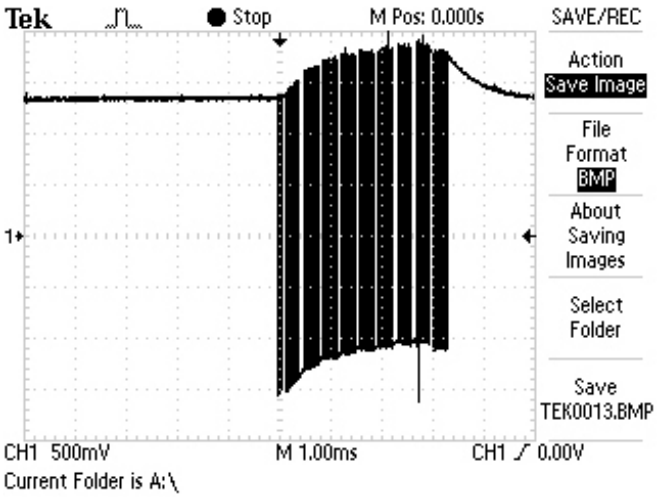
6. LCD_RESET waveform diagram



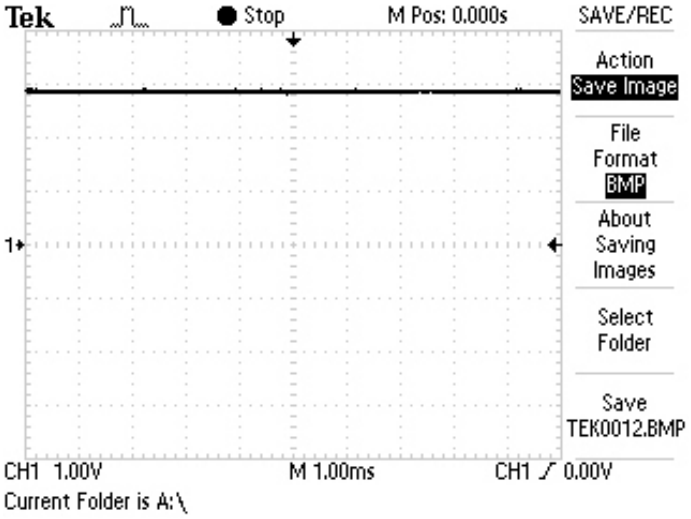
7. LCD_D/C waveform diagram



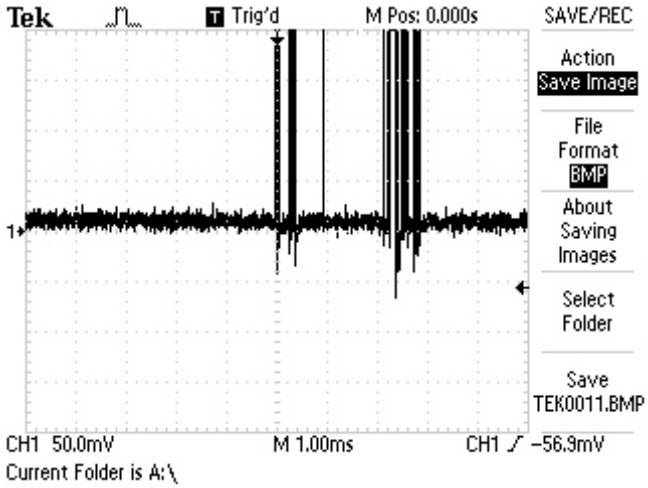
8. LCD_WR waveform diagram



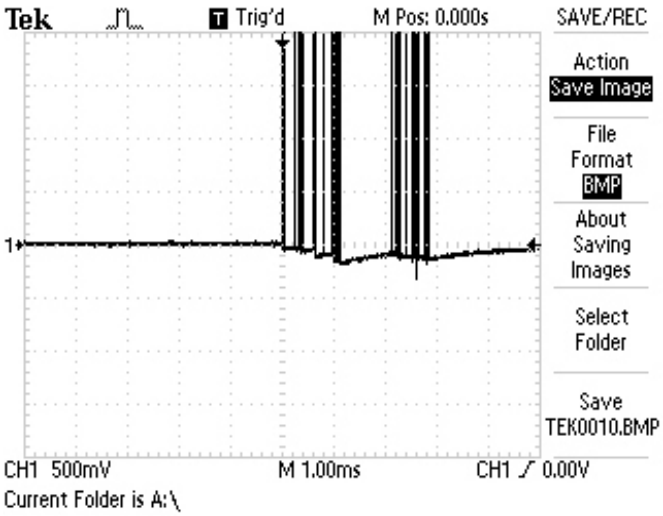
9. LCD_RD waveform diagram



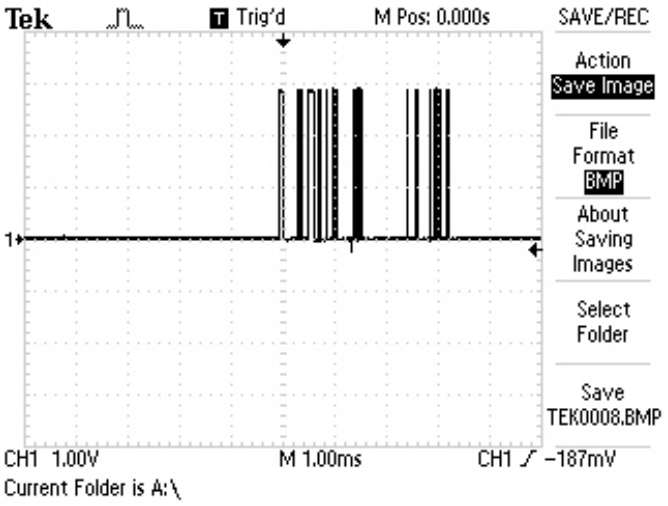
10. LCD_DB0 waveform diagram



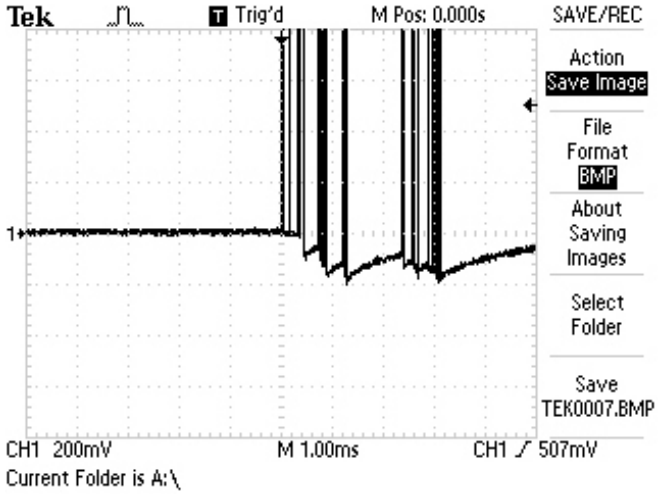
11. LCD_DB1 waveform diagram



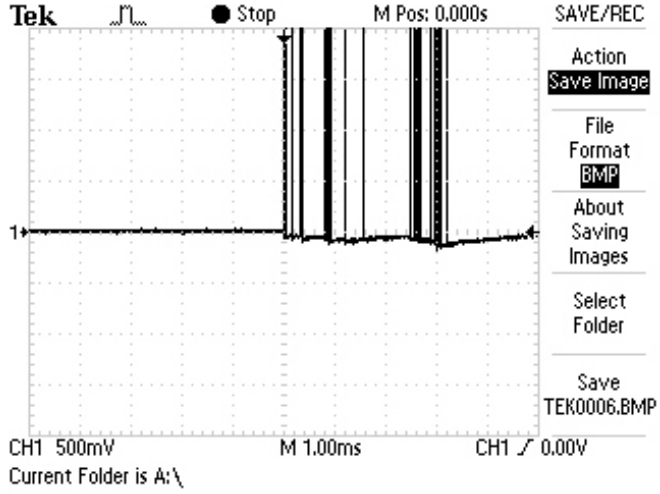
12. LCD_DB2 waveform diagram



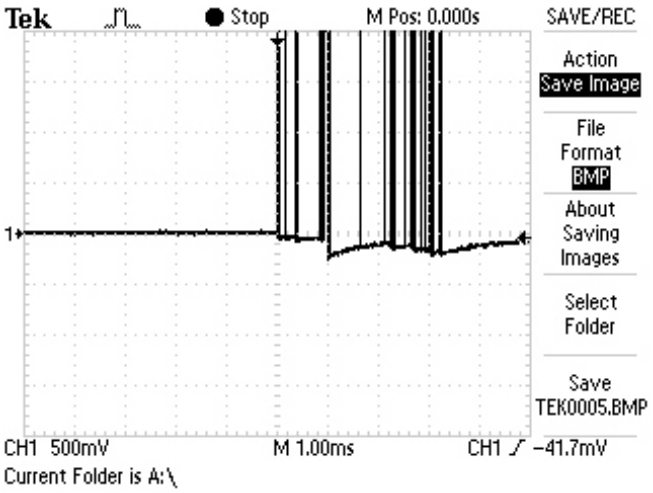
13. LCD_DB3 waveform diagram



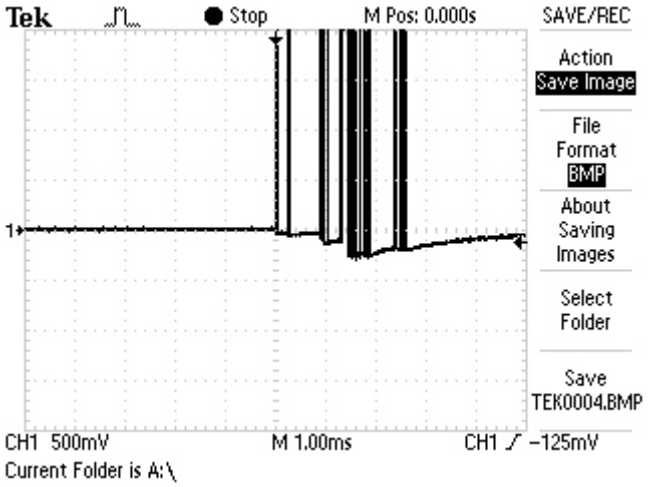
14. LCD_DB4 waveform diagram



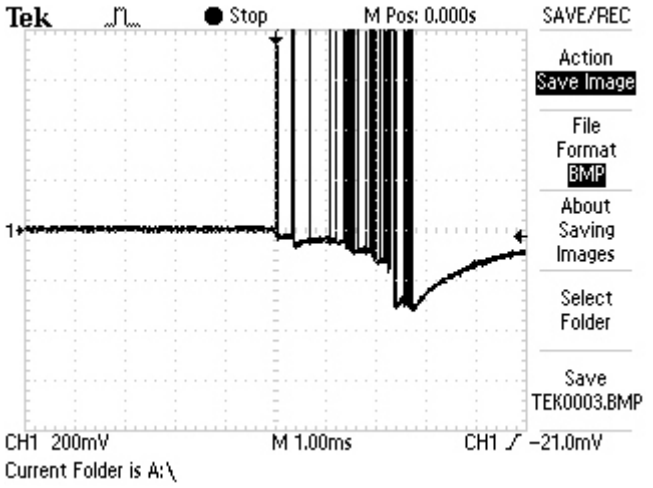
15. LCD_DB5 waveform diagram



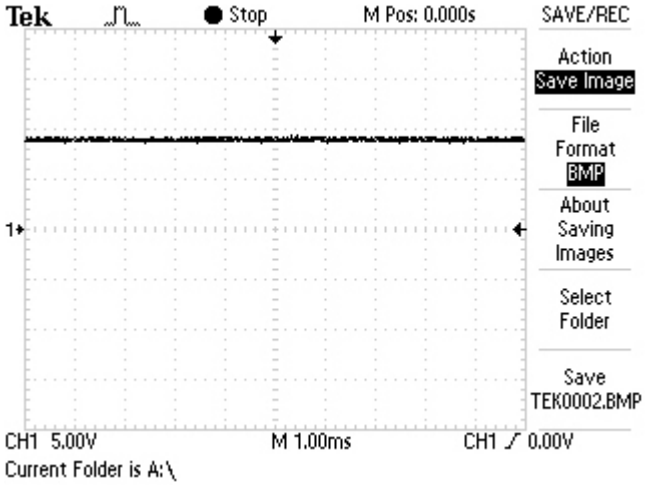
16. LCD_DB6 waveform diagram



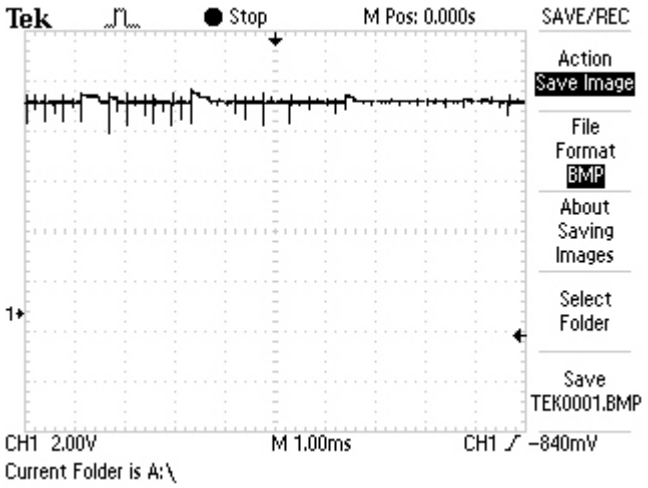
17. LCD_DB7 waveform diagram



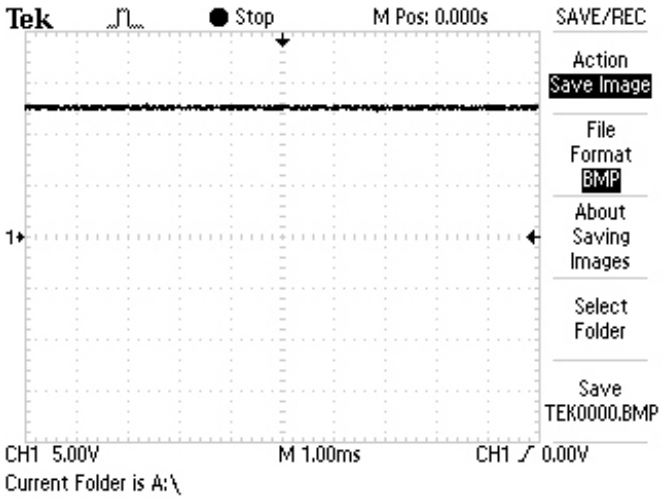
18. IREF waveform diagram



19. VCOMH waveform diagram



20. VOLED waveform diagram



3.4.2 Key point voltage list

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

Section Five Function Introduction to IC

3.5.1 Function introduction to 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	I/O	output	bpts10tht	Data input 3/Data output 3

GPIO_LCD_5		VDC tolerant			5v	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 tolerant	I/O	input	bpts10tht 5v	Data input/Data output
GPIO_MCI_4						General Purpose IO pin
MCI_DAT_1	J2	0-5 VDC tolerant	I/O	input	bpts10tht 5v	Data input/Data output
GPIO_MCI_3						General Purpose IO pin

MCI_DAT_0	H3	0-5 VDC tolerant	I/O	input	bpts10tht 5v	Data input/Data output
GPIO_MCI_2						General Purpose IO pin
MCI_CLK	G3	0-5 VDC tolerant	I/O	output	bpts10tht 5v	MCI clock output
GPIO_MCI_1						General Purpose IO pin
MCI_CMD	H2	0-5 VDC tolerant	I/O	input	bpts10tht 5v	Command input/Command output
GPIO_MCI_0						General Purpose IO pin
USB Interface (fixed: 4 pins + (8 pins reserved for future use))						
USB_CONNECT_N	T15	0-5 VDC tolerant	I/O	output	bpts10tht 5v	Soft connect output USB 2.0 FS
GPIO_USB_1						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 tolerant	I/O	input	bpts10tht 5v	USB Supply detection line USB 2.0 FS & USB 2.0 HS
GPIO_USB_0						General Purpose IO pin
USB_RREF	P16		I/O		bpts10tht 5v	
USB_GNDA	R17				vssco	Reserved for USB 2.0 HS
USB_VSSA_REF	R16				vccso	Reserved for USB 2.0 HS
USB_VSSA_TERM	T16				vssco	Reserved for USB 2.0 HS
USB_VDDA18_PLL	U15				vddco	Reserved for USB 2.0 HS
USB_VDDA18_BG	U16				vddco	Reserved for USB 2.0 HS
USB_VDDA33	U18				vddco	Reserved for USB 2.0 HS
USB_VDDA33_DRV	V18				vddco	Reserved for USB 2.0 HS
DAI Interface (fixed: 3 pins)						

DAI_BCK	H17	0-5 VDC tolerant	I/O	input	bpts10tht 5v	DAI Bitclock
GPIO_DAI_2						General Purpose IO pin
DAI_WS	G17	0-5 VDC tolerant	I/O	input	bpts10tht 5v	DAI Wordselect
GPIO_DAI_1						General Purpose IO pin
DAI_DATA	G16	0-5 VDC tolerant	I/O	input	bpts10tht 5v	DAI Serial data input
GPIO_DAI_0						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	I	input	ipthut5v	JTAG Clock Input (pull-up)

		tolerant				
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	iic400kt5v	Serial clock IIC Slave
IIC_SDA	J17	0-5 VDC tolerant	I/O	input	iic400kt5v	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	bpts10thd t5v	Start up mode pin 2 (pull down) General Purpose IO pin
GPIO_2	K18	0-5 VDC tolerant	I/O	input	bpts10thd t5v	Start up mode pin 1 (pull down) General Purpose IO pin
GPIO (fixed: 2 pins)						

GPIO_1	K17	0-5 VDC toleran t	I/O	input output (Test Mode))	bpts10tht 5v	General Purpose IO pin Toggled (Test Mode)
GPIO_0	K16	0-5 VDC toleran t	I/O	input	bpts10tht 5v	General Purpose IO pin (stop)
Reset input pin (fixed: 1 pin)						
RSTIN_N	T14	0-5 VDC toleran t	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 G690L263T71

1. Description

The G690/G691 are microprocessor (µP) supervisory circuits used to monitor the power supplies in µP and digital systems. They provide excellent circuit reliability and low cost by eliminating external components and adjustments when used with +5V, +3.3V, +3.0V- powered circuits.

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

The G691L has an open-drain output stage, while the G690 have push-pull outputs. The G691L's open-drain RESET output requires a pull-up resistor that can be connected to a voltage higher than VCC. The G690L have an active-low RESET output, while the G690H has an active-high RESET output. The reset comparator is designed to ignore fast transients on VCC, and the outputs are guaranteed to be in the correct logic state for VCC down to 1V.

Low supply current makes the G690/G691 ideal for use in portable equipment. The G690/G691 are available in 3-pin SOT-23 packages.

2. Features

- ◆ Precision Monitoring of +3V, +3.3V, and +5V Power-Supply Voltages
- ◆ Fully Specified Over Temperature
- ◆ Available in Three Output Configurations Push-Pull RESET Output (G690L)
- ◆ 140ms min Power-On Reset Pulse Width
- ◆ 10μA Supply Current
- ◆ Guaranteed Reset Valid to VCC = +1V
- ◆ Power Supply Transient Immunity
- ◆ No External Components
- ◆ 3-Pin SOT-23 Packages

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

3.5.8 Function introduction to ISL6294IRZ

1. Description

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

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

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

2. Features

- ◆ Complete Charger for Single-Cell Li-ion/Polymer Batteries
- ◆ Integrated Pass Element and Current Sensor
- ◆ No External Blocking Diode Required
- ◆ Low Component Count and Cost
- ◆ 1% Voltage Accuracy
- ◆ Programmable Charge Current
- ◆ Programmable End-of-Charge Current
- ◆ Charge Current Thermal Foldback for Thermal Protection
- ◆ Trickle Charge for Fully Discharged Batteries
- ◆ 28V Maximum Voltage for the Power Input
- ◆ Power Presence and Charge Indications
- ◆ Less Than 1μA Leakage Current off the Battery When No Input Power Attached or Charger Disabled
- ◆ Ambient Temperature Range: -40°C to 85°C

3. PIN Description

PIN No.	Symbol	I/O	Description
1	VIN	P	Power input
2	PPR	I	Open-drain power presence indication
3	CHG	I	Open-drain charge indication pin
4	EN	I	Enable input
5	BAT	O	Charger output pin
6	IREF	I	Charge-current program and monitoring pin
7	IMIN	I	End-of-charge (EOC) current program pin
8	GND		System ground

3.5.9 Function introduction to PQ1X281M2ZP

1. Description

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

2. Features

- ◆ Compact surface mount package (2.9✕1.6✕1.1mm)
- ◆ Low power-loss (Dropout voltage: TYP. 0.11 V/MAX. 0.26V at IO=60mA)
- ◆ Also compatible ceramic capacitors because of suppressing oscillation level

◆ High ripple rejection (TYP. 70dB)

◆ Low dissipation current (Dissipation current at no load: TYP. 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

3.5.10 Function introduction to SI1912

1. Description

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

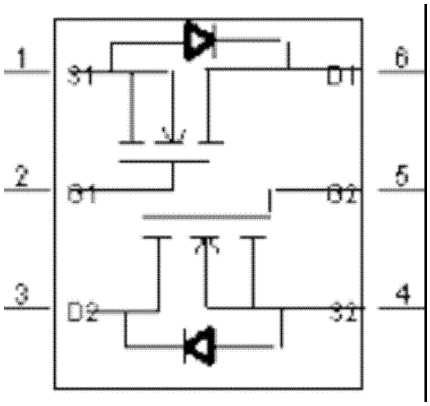
2. Features

◆ TrenchFET Power MOSFETS: 1.8-V Rated

◆ ESD Protected: 2000 V

◆ Thermally Enhanced SC-70 Package

3. PIN Description



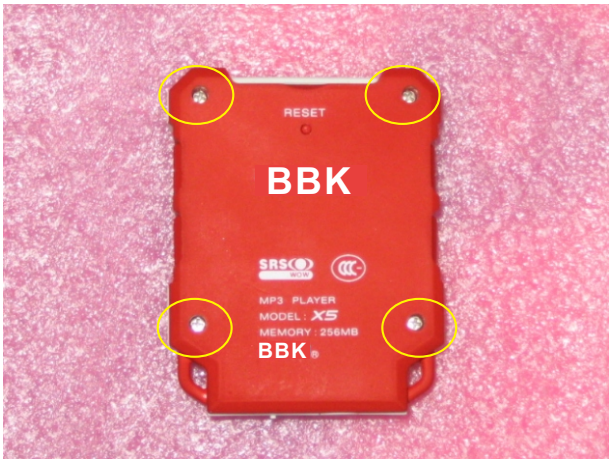
Chapter Four

Disassembly and Assembly Process

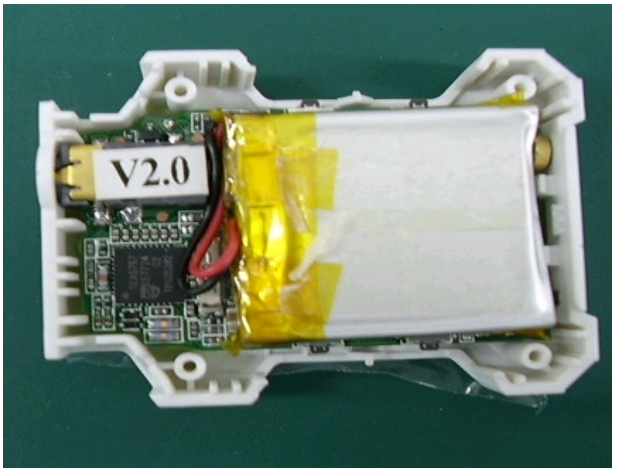
In order to know structure of X5Mini (RU) more easily, directly and conveniently, now pictures are adopted to present each link of the process of disassembly and assembly of the player before users to prevent them operating incorrectly to damage elements. This player comprises the whole set, PLED display screen, battery and tuning board. You are supposed to operate according to the illustrations strictly.

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

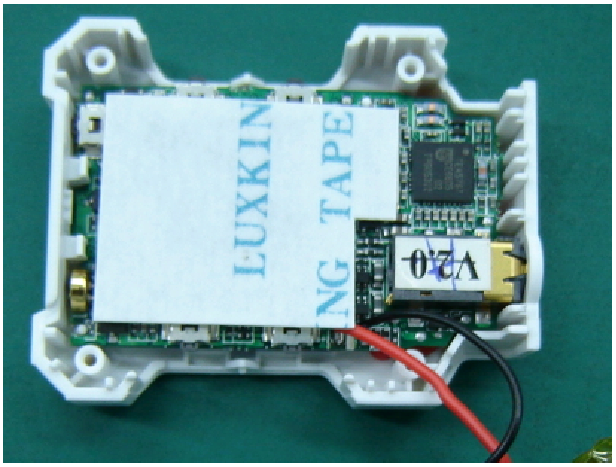
4.1 Disassembly process of the player



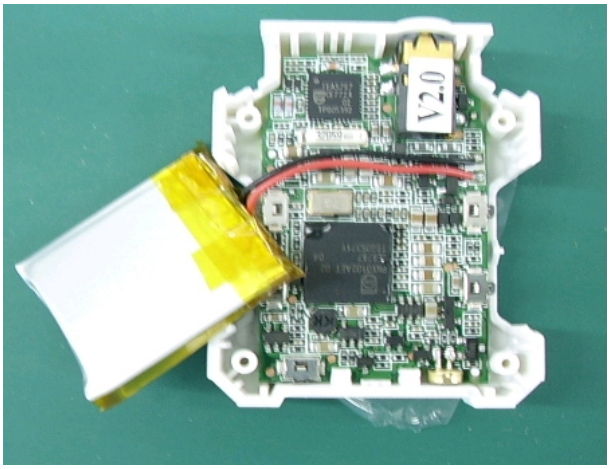
1. Use electric screwdriver or "+"-shaped screwdriver to Remove the 4 screws shown in the picture.



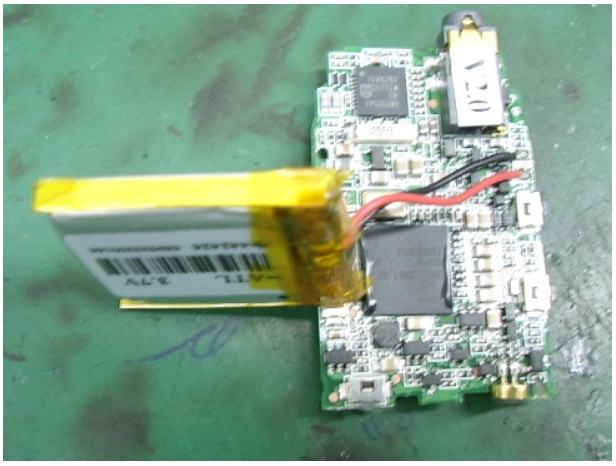
2. Use nails to take down bottom casing from the middle Slot.



3. Take down battery and make the PVC plate stuck on Main board show out.



4. Take down the PVC plate and sponge stuck on main Board.



5. Take out main board from its edge.

4.2 Assembly process of the player

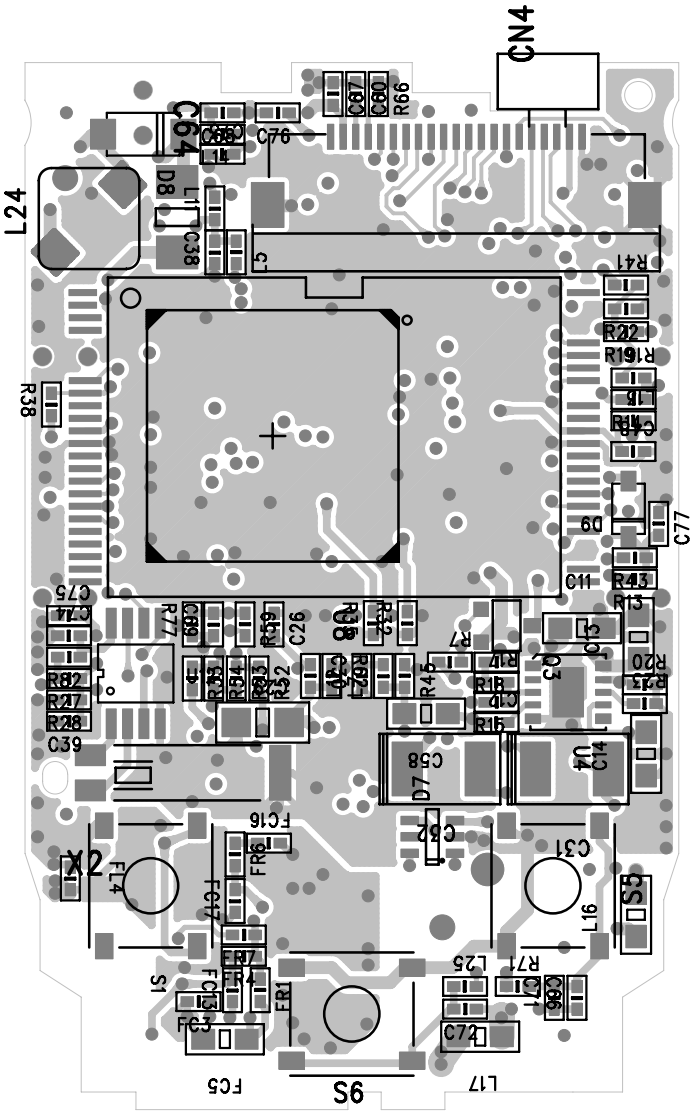
Assembly process of the player is similar to the disassembly process, only the sequence is reverse.

Chapter Cinque

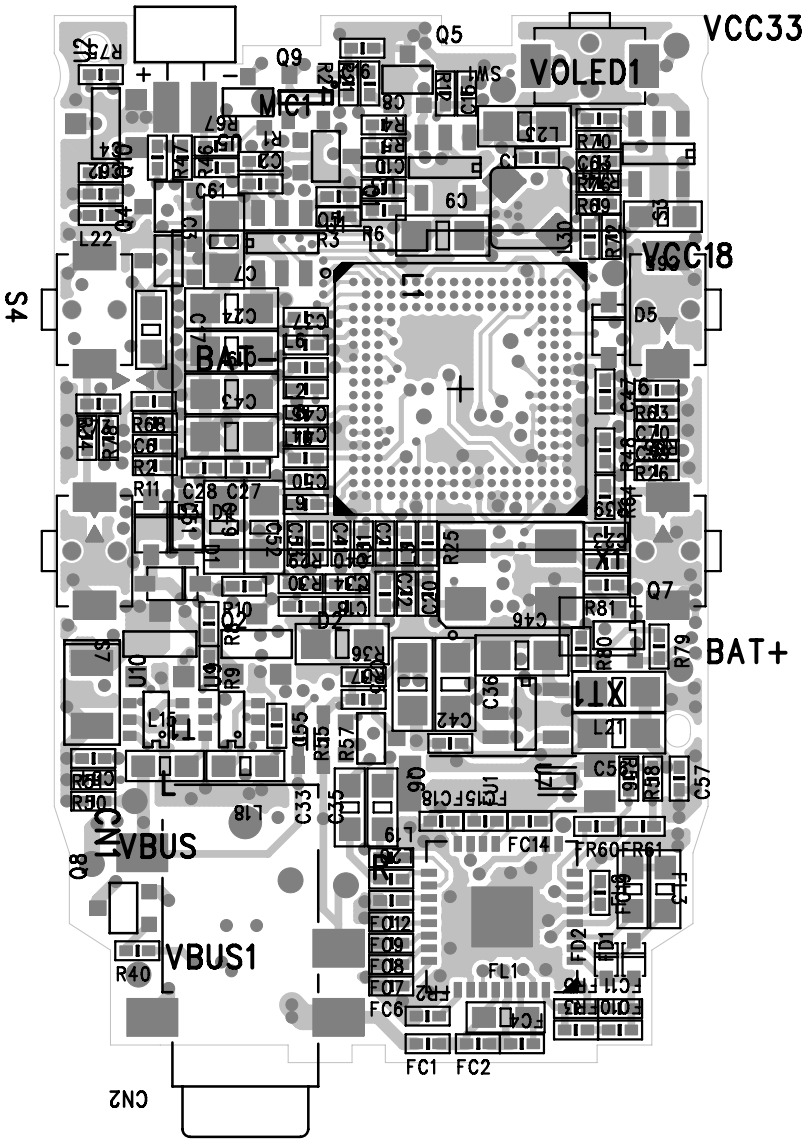
PCB board & Circuit diagram

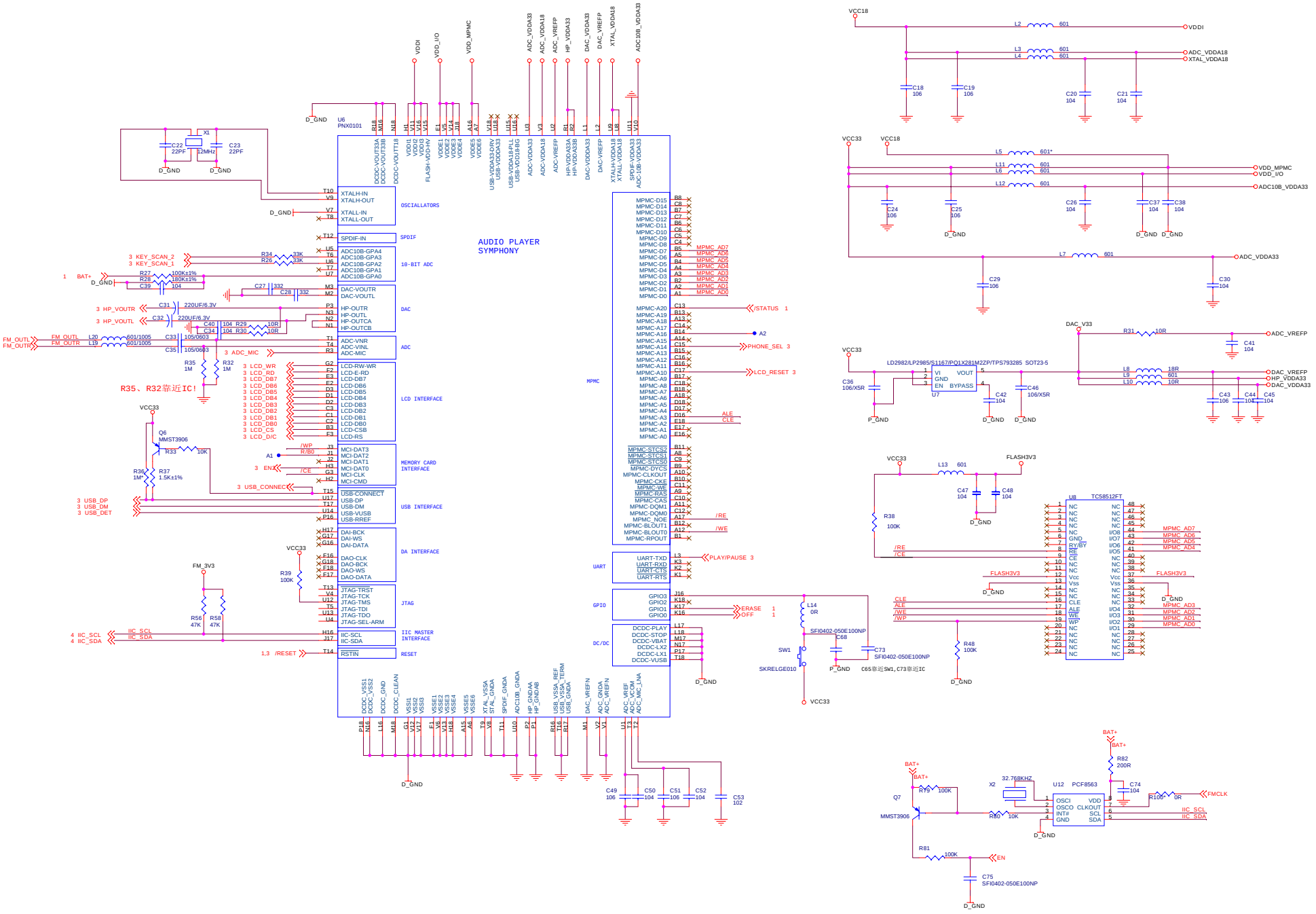
Section One PCB board

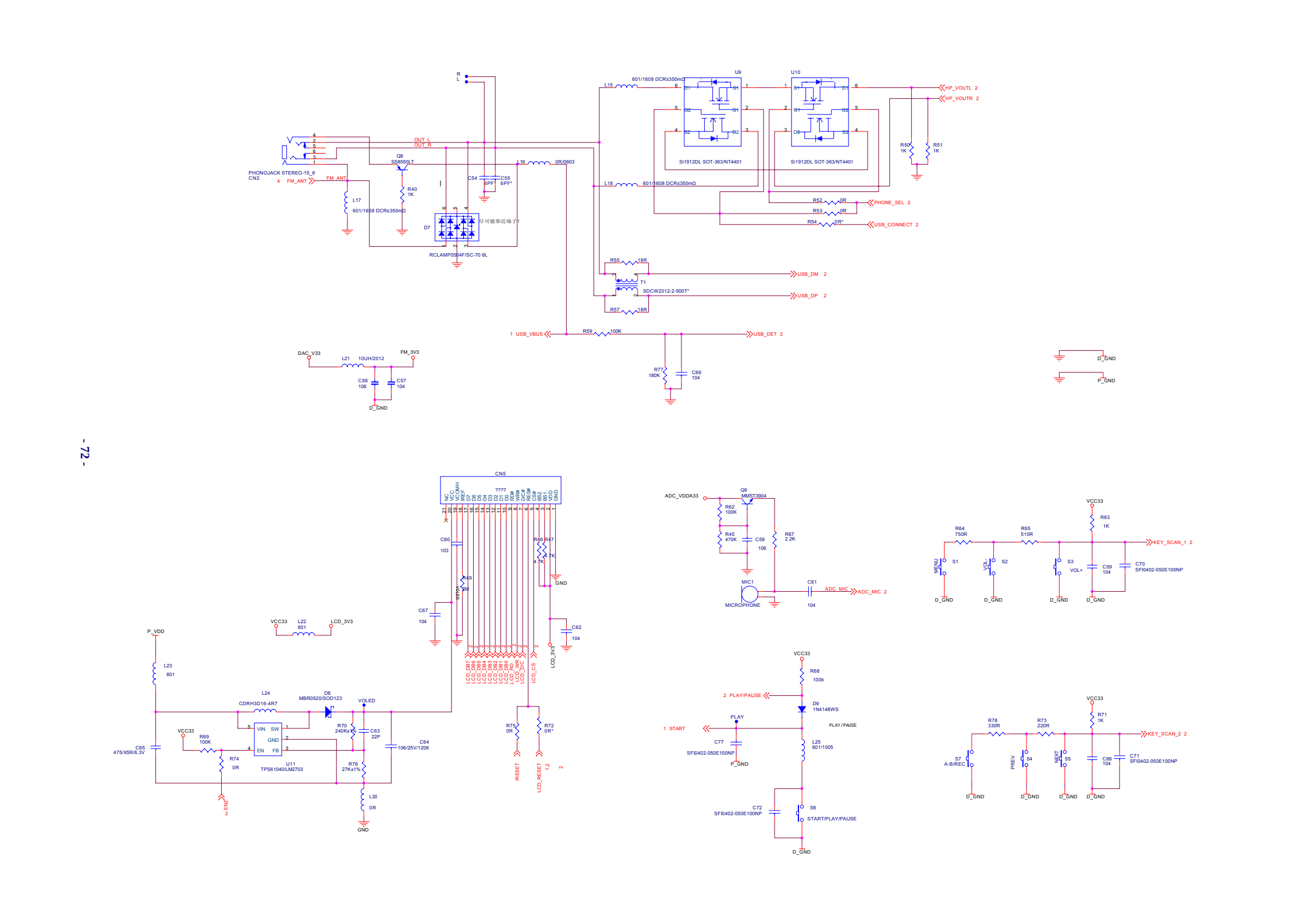
Surface layer of main Board

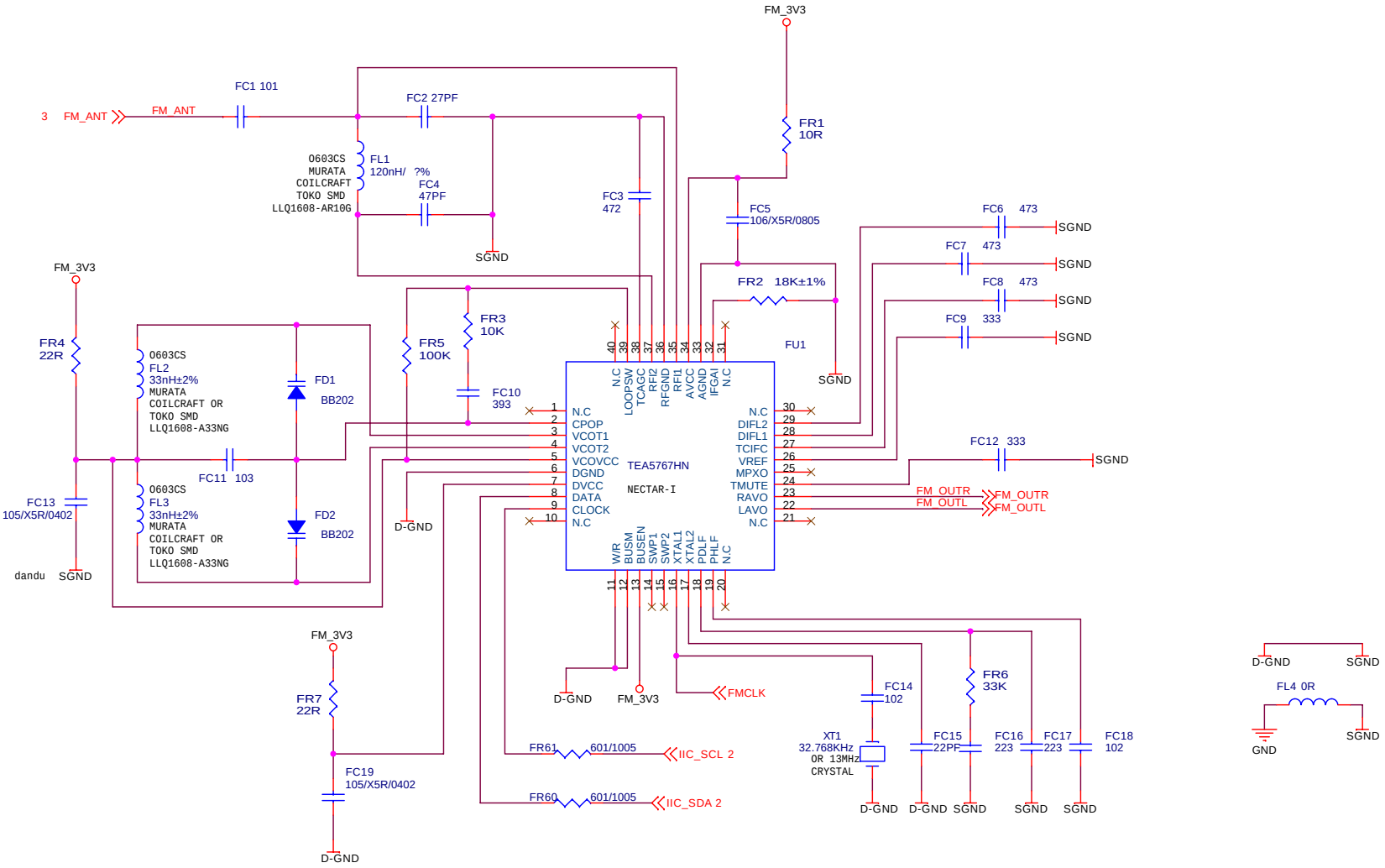


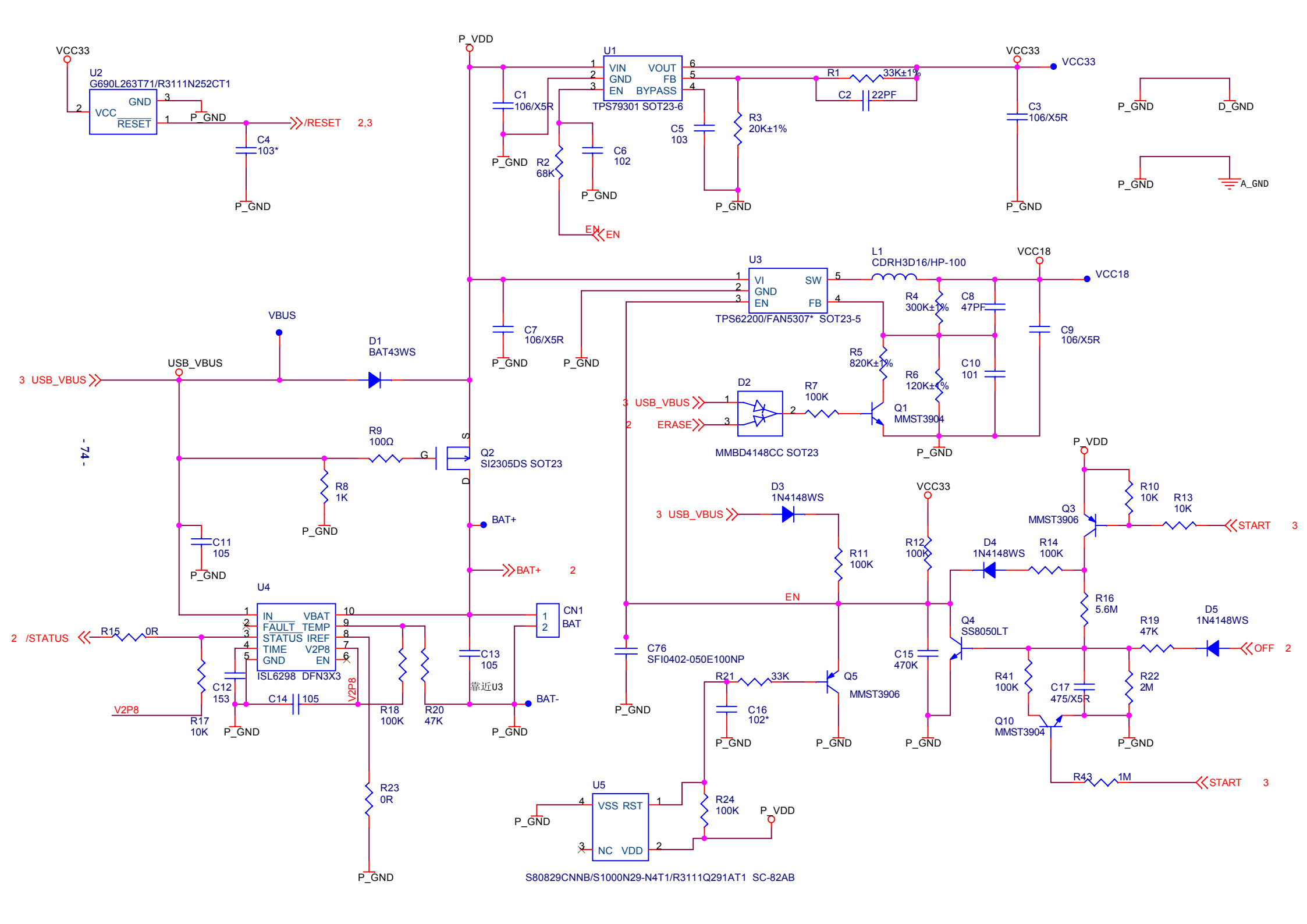
Bottom layer of main Board




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!
U7
LD2982/LP2985/S1167/PQ1X281M2ZP/TPS793285 SOT23-5
U8
TC58512FT
U12
PCF8563
X1
12MHz
X2
32.768KHZ
Q6
MMST3906
Q7
MMST3906
SW1
SKRELGE010
FM_3V3
VCC33
VCC18
VDDI
VDD_I/O
VDD_MPMC
ADC_VDDA18
ADC_VREFP
HP_VDDA33
DAC_VDDA33
DAC_VREFP
XTAL_VDDA18
ADC10B_VDDA33
D_GND
P_GND
DAC_V33
FLASH3V3
BAT+
FMCLK
EN
C65靠近SW1,C73靠近IC


R
L
U9
U10
L15
601/1608 DCRs350mΩ
HP_VOUTL 2
HP_VOUTR 2
Si1912DL SOT-363/NT4401
Si1912DL SOT-363/NT4401
R50 1K
R51 1K
OUT_L
OUT_R
PHONOJACK STEREO-15_6
CN2
FM_ANT
Q8
SS8550LT
L16
0R/0603
C54 6PF
C55 6PF*
R40 1K
L17
601/1608 DCRs350mΩ
D7
RCLAMP0504F/SC-70 6L
L18
601/1608 DCRs350mΩ
R52 0R
R53 0R
R54 0R*
PHONE_SEL 2
USB_CONNECT 2
R55 18R
T1
SDCW2012-2-900T*
R57 18R
USB_DM 2
USB_DP 2
USB_VBUS
R59 100K
USB_DET 2
R77 180K
C69 104
DAC_V33
L21 10UH/2012
FM_3V3
C56 106
C57 104
D_GND
P_GND
CN5
C60 103
R46 4.7K
R47 4.7K
R49 2M
C67 104
C62 104
GND
LCD_3V3
LCD_CS
LCD_RST
LCD_SCL
LCD_SDA
LCD_SDO
LCD_WR
LCD_D/C
VCC33
L22 601
LCD_3V3
P_VDD
L23 601
L24
CDRH3D16-4R7
D8
MBR0520/SOD123
VOLED
C65 475/X5R/6.3V
R69 100K
R74 0R
U11
TPS61040/LM2703
R70 240K±1%
C63 22P
C64 106/25V/1206
R76 27K±1%
L30 0R
R75 0R
R72 0R*
/RESET
LCD_RESET
ADC_VDDA33
Q9
MMST3904
R62 100K
R45 470K
C58 106
R67 2.2K
MIC1
MICROPHONE
C61 104
ADC_MIC
ADC_MIC 2
VCC33
R63 1K
R64 750R
R65 510R
KEY_SCAN_1 2
MENU
S1
VOL-
S2
S3
VOL+
C59 104
C70 SFI0402-050E100NP
R68 100k
2 PLAY/PAUSE
D9
1N4148WS
PLAY
PLAY/PAUSE
1 START
C77 SFI0402-050E100NP
L25 601/1005
C72 SFI0402-050E100NP
S6
START/PLAY/PAUSE
R78 330R
R73 220R
R71 1K
KEY_SCAN_2 2
S7
A-B/REC
PREV
S4
NEXT
S5
C66 104
C71 SFI0402-050E100NP


FM_3V3
3
FM_ANT
FM_ANT
FC1 101
FC2 27PF
FR1
10R
0603CS
MURATA
COILCRAFT
TOKO SMD
LLQ1608-AR10G
FL1
120nH/ ?%
FC4
47PF
SGND
FC3
472
FC5
106/X5R/0805
FC6 473
FC7 473
FC8 473
FC9 333
SGND
FR2 18K±1%
FU1
FR3
10K
FR5
100K
FC10
393
FR4
22R
0603CS
FL2
33nH±2%
MURATA
COILCRAFT OR
TOKO SMD
LLQ1608-A33NG
FD1
BB202
FC11 103
FC13
105/X5R/0402
dandu
0603CS
FL3
33nH±2%
MURATA
COILCRAFT OR
TOKO SMD
LLQ1608-A33NG
FD2
BB202
D-GND
TEA5767HN
NECTAR-I
N.C
CPOP
VCOT1
VCOT2
VCOVCC
DGND
DVCC
DATA
CLOCK
LOOPSW
TCAGC
RFI2
RFGND
RFI1
AVCC
AGND
IFGAI
DIFL2
DIFL1
TCIFC
VREF
MPXO
TMUTE
RAVO
LAVO
W/R
BUSM
BUSEN
SWP1
SWP2
XTAL1
XTAL2
PDLF
PHLF
FC12 333
FM_OUTR
FM_OUTL
FMCLK
FC14
102
FR6
33K
XT1
32.768KHz
OR 13MHz
CRYSTAL
FC15
22PF
FC16
223
FC17
223
FC18
102
FR7
22R
FC19
105/X5R/0402
FR61
601/1005
IIC_SCL 2
FR60
601/1005
IIC_SDA 2
FL4 0R
GND


VCC33
U2
G690L263T71/R3111N252CT1
GND
VCC
RESET
P_GND
/RESET 2,3
C4
103*
P_GND
P_VDD
U1
VIN VOUT
GND FB
EN BYPASS
TPS79301 SOT23-6
C1
106/X5R
P_GND
R2
68K
C6
102
P_GND
EN
EN
C5
103
R3
20K±1%
P_GND
R1
33K±1%
C2
22PF
VCC33
C3
106/X5R
P_GND
VCC33
P_GND
D_GND
P_GND
A_GND
U3
VI SW
GND
EN FB
TPS62200/FAN5307* SOT23-5
L1
CDRH3D16/HP-100
VCC18
VCC18
R4
300K±1%
C8
47PF
C9
106/X5R
R5
820K±1%
R6
120K±1%
C10
101
C7
106/X5R
P_GND
P_GND
VBUS
D1
BAT43WS
USB_VBUS
3 USB_VBUS
D2
R7
100K
3 USB_VBUS
2 ERASE
MMBD4148CC SOT23
Q1
MMST3904
P_GND
R9
100Ω
G
S
D
Q2
SI2305DS SOT23
R8
1K
P_GND
BAT+
BAT+ 2
C11
105
P_GND
U4
IN VBAT
FAULT TEMP
STATUS IREF
TIME V2P8
GND EN
ISL6298 DFN3X3
CN1
BAT
2 /STATUS
R15
0R
C12
153
C14
105
V2P8
V2P8
R17
10K
P_GND
R18
100K
R20
47K
C13
105
靠近U3
BAT-
P_GND
C76
SFI0402-050E100NP
P_GND
D3
1N4148WS
3 USB_VBUS
R11
100K
EN
R21
33K
Q5
MMST3906
C16
102*
P_GND
P_GND
VCC33
R12
100K
C15
470K
P_GND
P_VDD
Q3
MMST3906
R10
10K
R13
10K
START 3
D4
1N4148WS
R14
100K
R16
5.6M
Q4
SS8050LT
R19
47K
D5
1N4148WS
OFF 2
R41
100K
C17
475/X5R
R22
2M
Q10
MMST3904
P_GND
R43
1M
START 3
U5
VSS RST
NC VDD
P_GND
R24
100K
P_VDD
R23
0R
P_GND
S80829CNNB/S1000N29-N4T1/R3111Q291AT1 SC-82AB
- 74 -

Chapter six BOM List

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
X5 MINI(RU)BR(256M) RED BLACK			
BATTERY PROTECT BOARD 5446654			
0090223	SMD RESISTOR	1/16W 2K±5%	R2
0090011	SMD RESISTOR	1/16W 470Ω±5% 0603	R1
0310207	SMD CAPACITOR	50V 104 ±20% 7R 0603	C1,C2,C3 ①
0310543	SMD CAPACITOR	50V 104±10% 7R 0603	C1,C2,C3 ①
0882570	IC	S-8261AANMG22 SO23-6	U1
0790065	SMD FIELD EFFECT TRANSISTOR	ECH8601 TSSOP	U2 ②
0790090	SMD FIELD EFFECT TRANSISTOR	ECH8601R TSSOP	U2 ②
1632263	PCB	E9-0	
X5 MINI(RU)BR(256M) RED BLACK			
MAINBOARD 5447795			
0090324	SMD RESISTOR	1/16W 0Ω±5% 0402	FL4,L30,R52,R53,R74,R72
0090326	SMD RESISTOR	1/16W 10Ω±5% 0402	FR1,L10,R29,R30,R31
0090644	SMD RESISTOR	1/16W 18Ω±5% 0402	R55,R57,L8
0090447	SMD RESISTOR	1/16W 22Ω±5% 0402	FR7,FR4
0090339	SMD RESISTOR	1/16W 100Ω±5% 0402	R9
0090346	SMD RESISTOR	1/16W 220Ω±5% 0402	R73
0090349	SMD RESISTOR	1/16W 300Ω±5% 0402	R78
0090355	SMD RESISTOR	1/16W 510Ω±5% 0402	R65
0090359	SMD RESISTOR	1/16W 750Ω±5% 0402	R64
0090362	SMD RESISTOR	1/16W 1K±5% 0402	R8,R40,R50,R51,R63,R71
0090369	SMD RESISTOR	1/16W 2.2K±5% 0402	R67
0090377	SMD RESISTOR	1/16W 4.7K±5% 0402	R46,R47
0090385	SMD RESISTOR	1/16W 10K±5% 0402	FR3,R10,R13,R25,R56,R58,L14,R33
0090390	SMD RESISTOR	1/16W 18K±5% 0402	FR2
0090396	SMD RESISTOR	1/16W 33K±5% 0402	FR6,R21,R26,R34
0090400	SMD RESISTOR	1/16W 47K±5% 0402	R19,R17
0090408	SMD RESISTOR	1/16W 100K±5% 0402	FR5,R11,R12,R14,R15,R24,R38,R39,R41,R48,R59,R62,R68,R69

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
0090404	SMD RESISTOR	1/16W 68K±5% 0402	R2
0090425	SMD RESISTOR	1/16W 470K±5% 0402	C15,R45
0090433	SMD RESISTOR	1/16W 1MΩ±5% 0402	R35,R32,R43
0090436	SMD RESISTOR	1/16W 2MΩ±5% 0402	R22,R66
0090443	SMD RESISTOR	1/16W 5.6MΩ±5% 0402	R16
0090639	PRECISION SMD RESISTOR	1/16W 1.5K±1% 0402	R37
0090672	PRECISION SMD RESISTOR	1/16W 20K±1% 0402	R3
0090671	PRECISION SMD RESISTOR	1/16W 33K±1% 0402	R1
0090485	PRECISION SMD RESISTOR	1/16W 27K±1% 0402	R76
0090509	PRECISION SMD RESISTOR	1/16W 100K±1% 0402	R27
0090681	PRECISION SMD RESISTOR	1/16W 120K±1% 0402	R6,R20,R23
0090645	PRECISION SMD RESISTOR	1/16W 180K±1% 0402	R28,R77
0090682	PRECISION SMD RESISTOR	1/16W 300K±1% 0402	R4
0090687	PRECISION SMD RESISTOR	1/16W 240K±1% 0402	R70
0090667	PRECISION SMD RESISTOR	1/16W 510K±1% 0402	R18
1030029	SMD PRESS SENSITIVITY RESISTOR	SFI0402-050E100NP	C4,C68,C70,C71,C72,C73,C76,C77,C79
0310416	SMD CAPACITOR	50V 22P±5% NPO 0402	C2,C22,C23,C63,FC15
0310418	SMD CAPACITOR	50V 27P±5% NPO 0402	FC2
0310424	SMD CAPACITOR	50V 47P±5% NPO 0402	C8,FC4
0310432	SMD CAPACITOR	50V 101±5% NPO 0402	C10,FC1
0310704	SMD CAPACITOR	25V 102±10% 7R 0402	C6,C53,FC14,FC18
0310705	SMD CAPACITOR	25V 332±10% 7R 0402	C27,C28
0310706	SMD CAPACITOR	25V 472±10% 7R 0402	FC3
0310453	SMD CAPACITOR	25V 103±10% 7R 0402	C5,C60,FC11
0310455	SMD CAPACITOR	16V 223±10% 7R 0402	FC16,FC17
0310710	SMD CAPACITOR	16V 333±10% 5R 0402	FC12,FC9
0310711	SMD CAPACITOR	10V 393±10% 5R 0402	FC10
0310712	SMD CAPACITOR	10V 473±10% 5R 0402	FC6,FC7,FC8
0310480	SMD CAPACITOR	10V 104±10% 5R 0402	C20,C21,C26,C30,C34,C37,C38,C39,C40,C41,C42,C44,C45,C47,C48,C50,C52,C57,C59,C62,C66,C61,C69,FC13,FC19
0310753	SMD CAPACITOR	16V 104±20% 5R 0402	C67
0310703	SMD CAPACITOR	10V 105±20% Y5V 0603	C11,C13,C33,C35

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
0310674	SMD CAPACITOR	6.3V 475±10% 5R 0603	C17
0310717	SMD CAPACITOR	6.3V 475±20% 5R 0603	C65,FC5
0310486	SMD CAPACITOR	6.3V 106±20% 5R 0805	C1,C3,C7,C9,C36,C46
0310701	SMD CAPACITOR	10V 106±20% Y5V 0805	C18,C19,C24,C25,C29,C43,C49,C51,C56,C58 ③
0310389	SMD CAPACITOR	10V 106 +80%-20% Y5V 0805	C18,C19,C24,C25,C29,C43,C49,C51,C56,C58 ③
0310752	SMD CAPACITOR	25V 106±10% 5R 1206	C64
0310736	SMD TANTALUMCAPACITOR	4V 220uF±20% 3528(B)	C31,C32
0390142	SMD MAGNETIC BEADS	FC1608-60102	L15,L17,L18
0090001	SMD RESISTOR	1/16W 0Ω±5% 0603	L16
0390388	SMD MAGNETIC BEADS	600Ω/100MHZ±25% 1005	L2,L3,L4,L6,L7,L9,L11,L12,L13,L22,L23,L19,L20, L25,FR60,FR61
0390044	SMD INDUCTOR	10UH±10% 2012	L21
0390397	SMD CORES INDUCTOR	10uH±20% CDRH2D11/HP	L1
0390221	SMD COIL THREAD INDUCTOR	33nH±2% 1608	FL2,FL3
0390398	SMD COIL THREAD INDUCTOR	120nH±2% 1608	FL1
0390384	SMD CORES INDUCTOR	4.7uH±20% CDRH3D16-4R7	L24 ④
0390387	SMD CORES INDUCTOR	4.7uH±30% CDRH3D16/HP	L24 ④
1090080	ESD ELEMENT	RCL0504 SC70-6L	D7
0700154	SMD TRIODE	14148WS SO323	D3,D4,D5,D9
0680077	SMD SCHOTTKY DIODE	MBR0520 SOD123	D8
0680074	SMD SCHOTTKY DIODE	B43WS SO323	D1
0700115	SMD TRANSFIGURATION DIODE	BB202	FD1,FD2
0780298	SMD TRIODE	MMS3904 SO323	Q9,Q10
0780299	SMD TRIODE	SS8050LT SO323	Q4,Q11
0780293	SMD TRIODE	MMS3906 SO323	Q3,Q5,Q6
0780300	SMD TRIODE	SS8550LT SO323	Q8
0790041	SMD FIELD EFFECT TRANSISTOR	SI2305DS SO23	Q2
0790068	SMD FIELD EFFECT TRANSISTOR	SI1912 SO363	U9,U10 ⑤
0790070	SMD FIELD EFFECT TRANSISTOR	NTJD4401N SO363	U9,U10 ⑤
0882475	IC	79301 SO23-6	U1 ⑥
0882668	IC	79333DBVR SO23-5	U1 ⑥
0882388	IC	TE5767HN HVQFN	FU1

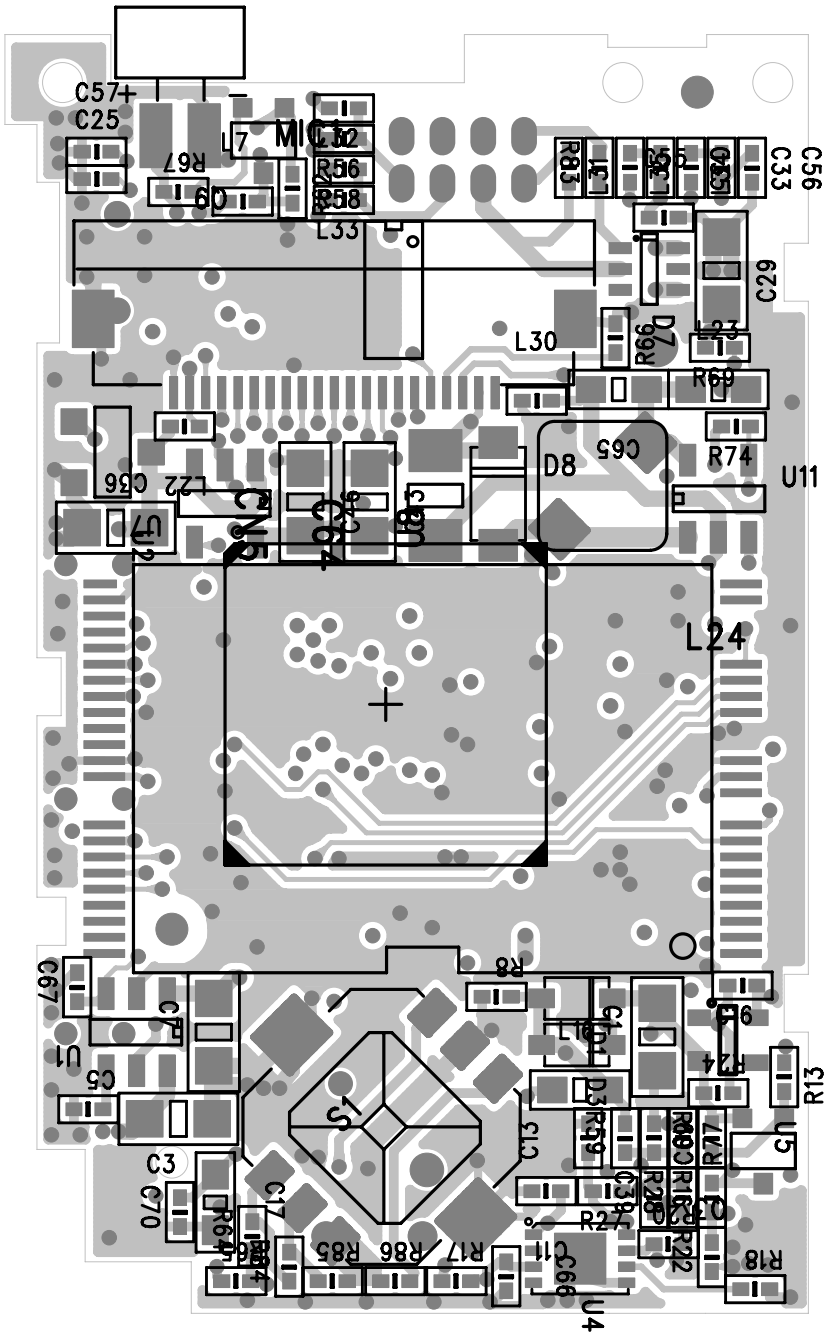
MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
0882481	IC	G690L26371 SO23-3	U2
0882476	IC	TP62200 SO23-5	U3
0882851	IC	ISL6294IRZ DFN	U4
0882524	IC	S80829CNNB SC-82	U5
0882403	IC	PNX0101ET/302 TFBGA	U6
0882480	IC	PQ12812ZP SO23-5	U7 ⑦
0882629	IC	793285DBVR SO23-5	U7 ⑦
0882324	IC	92G08U0YCBO TSOP	U8 ⑧
0882576	IC	92G08U0PIB0 TSOP	U8 ⑧
0882565	IC	L2703 SO23-5	U11
1340099	SMD LIGHT TOUCH SWITCH	SKRELGE010	SW1,S2,S3,S4,S7
1340128	LIGHT TOUCH SWITCH	TS-1186	S1,S5,S6
1140082	MICROPHONE	44dB±3dB 4×1.2 WITH NEEDLE	MIC1
1980074	SMDEARPHONE SOCKET	2S0386-001	CN2
1940282	CABLE SOCKET	21P 0.5mm SMD,SUBMIT MEET WITH CLASP	CN5
1632822	PCB	2MINI51	
0960279	SMD CRYSTAL OSCILLATOR	32.768KHz±20ppm SS6 12.5P	XT1
0960284	SMD CRYSTAL OSCILLATOR	12MHz±30ppm 5032/4 20P	X1

Chapter seven

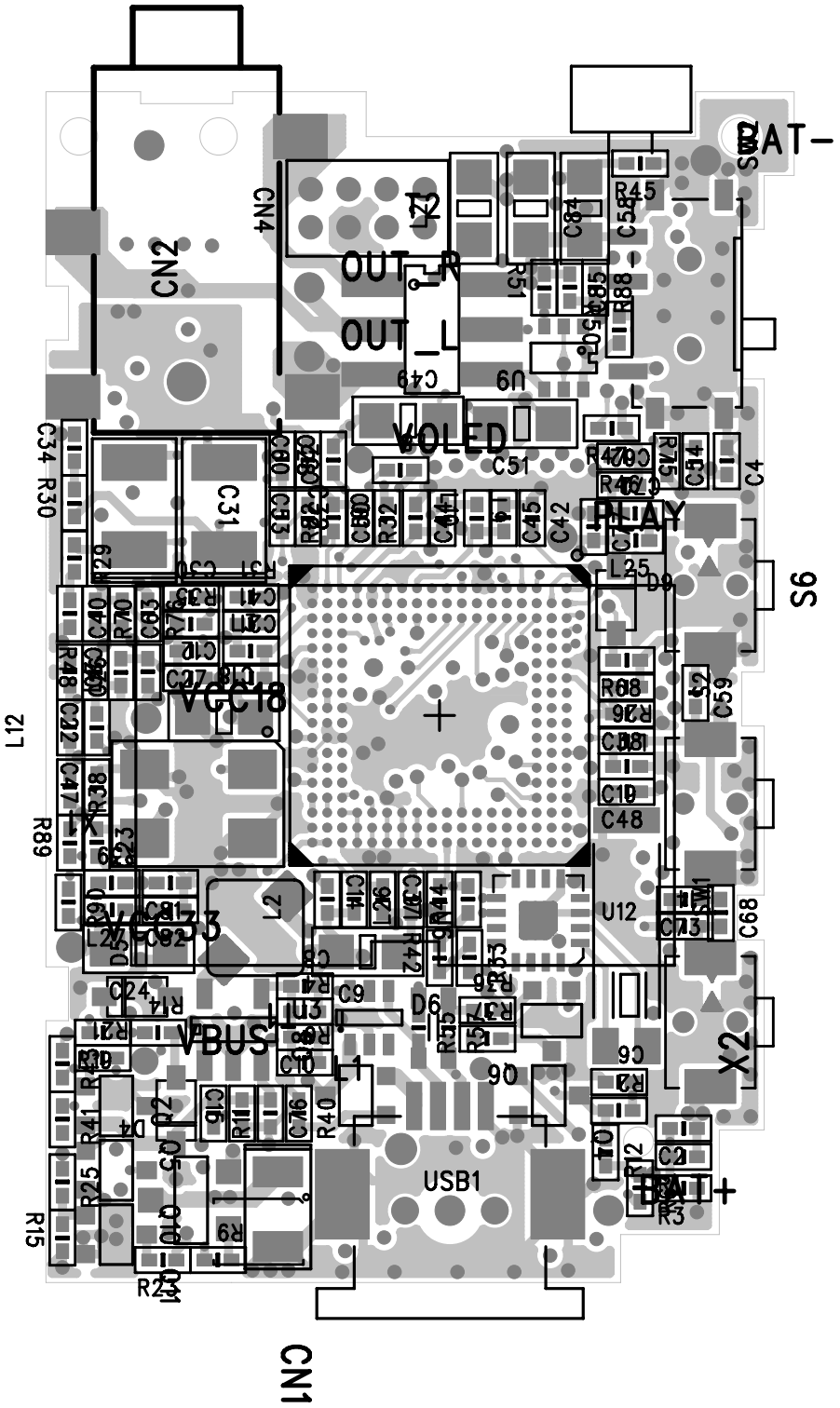
X7 PCB board & Circuit diagram

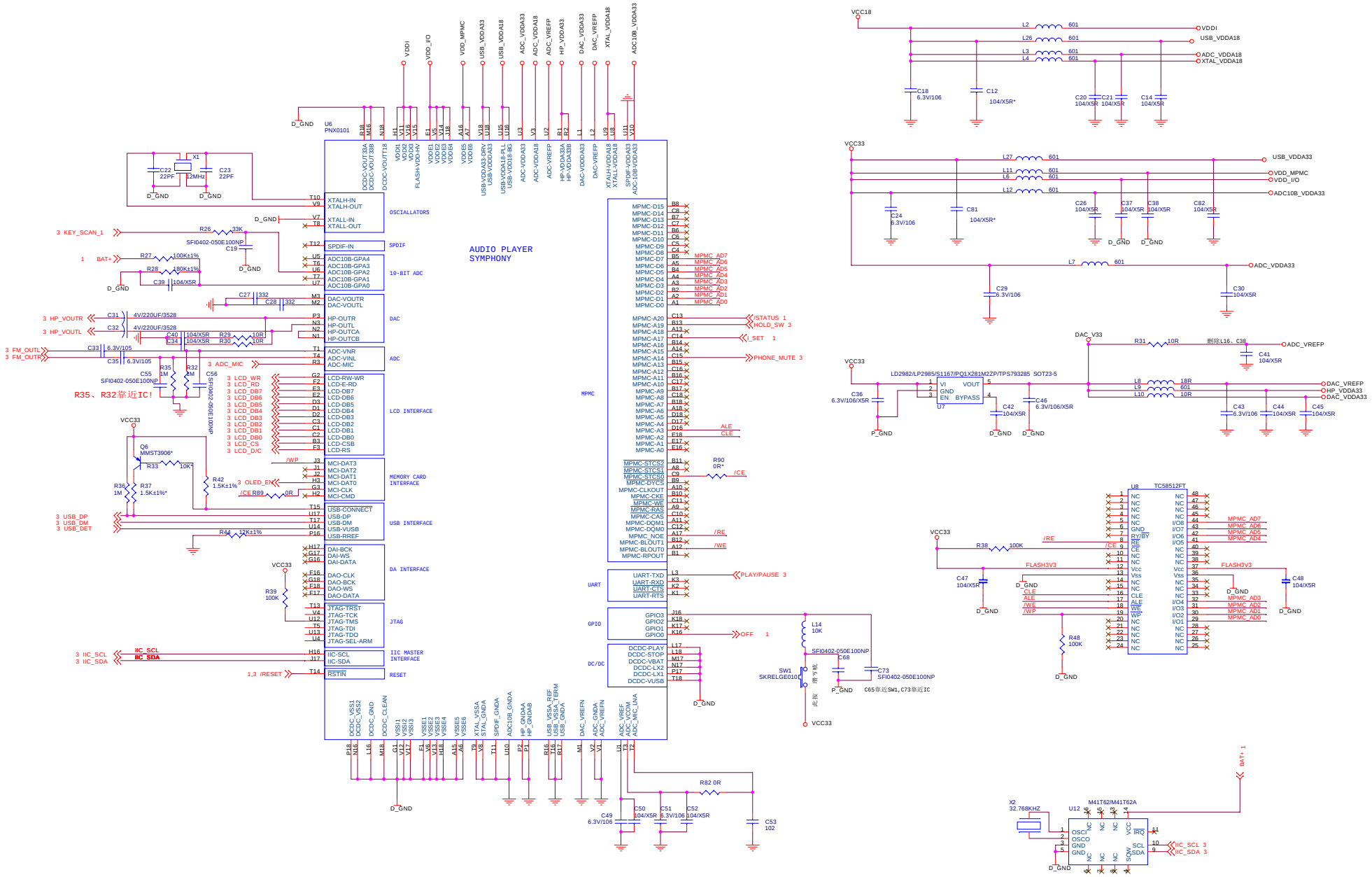
Section One PCB board

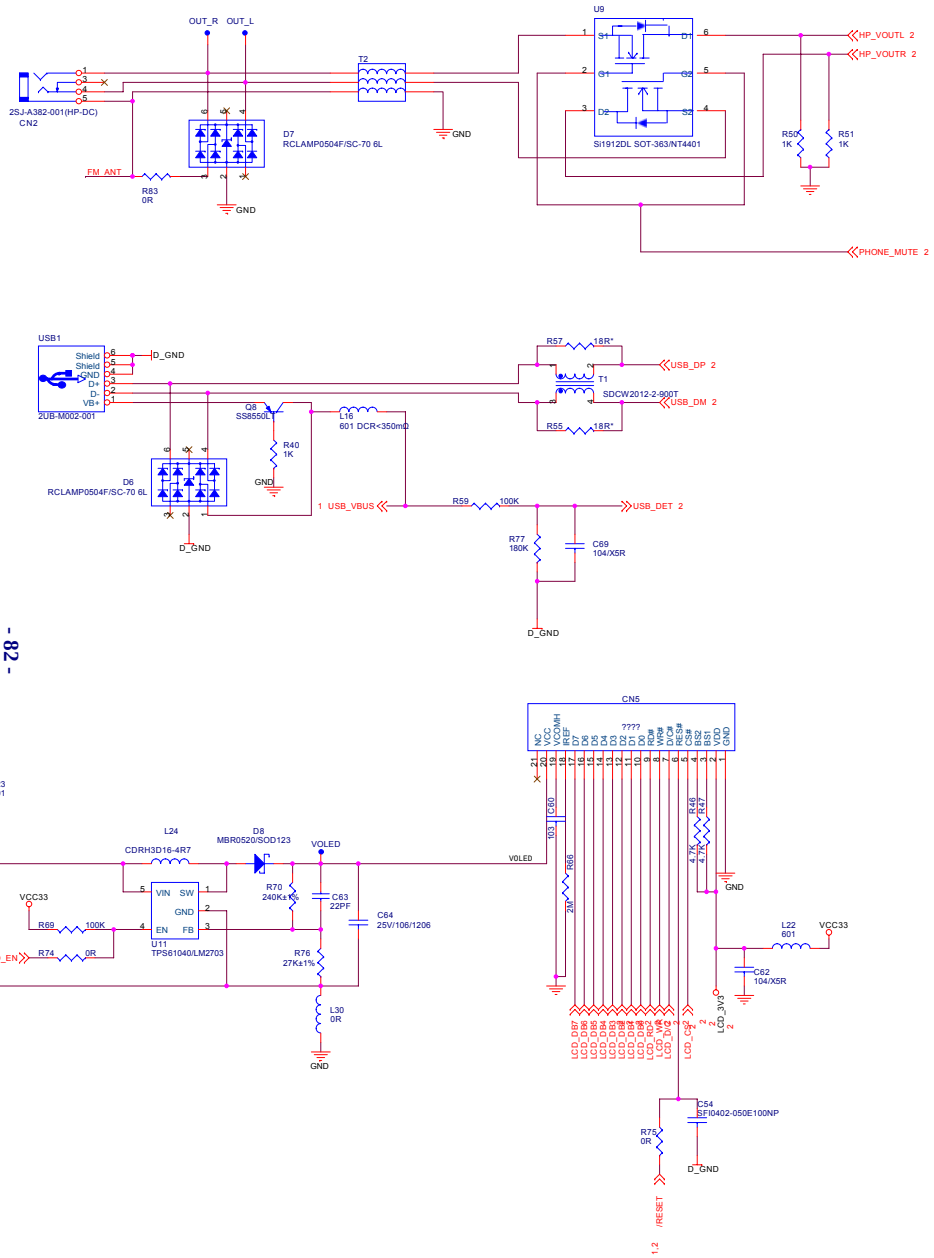
Surface layer of main Board

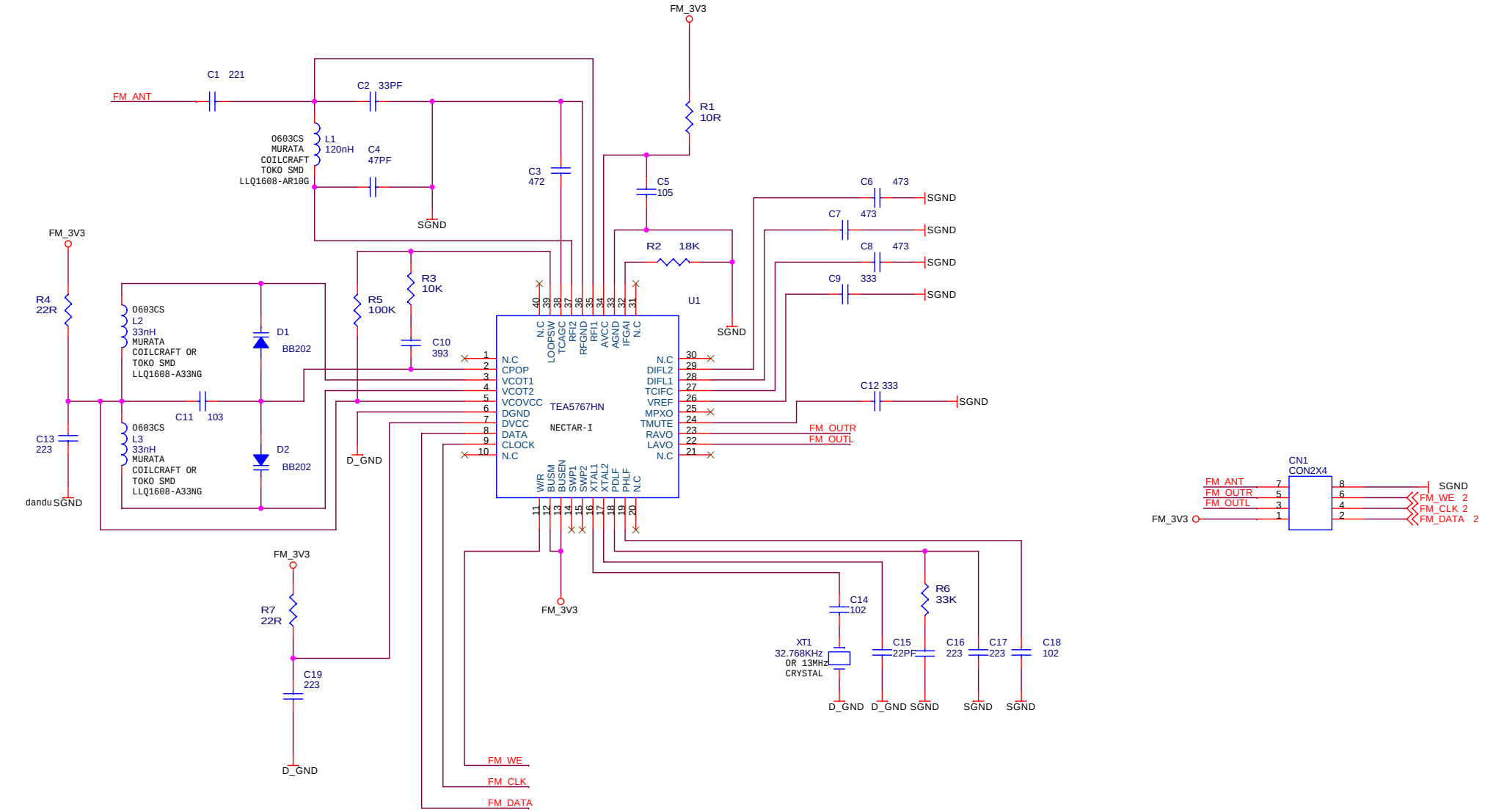


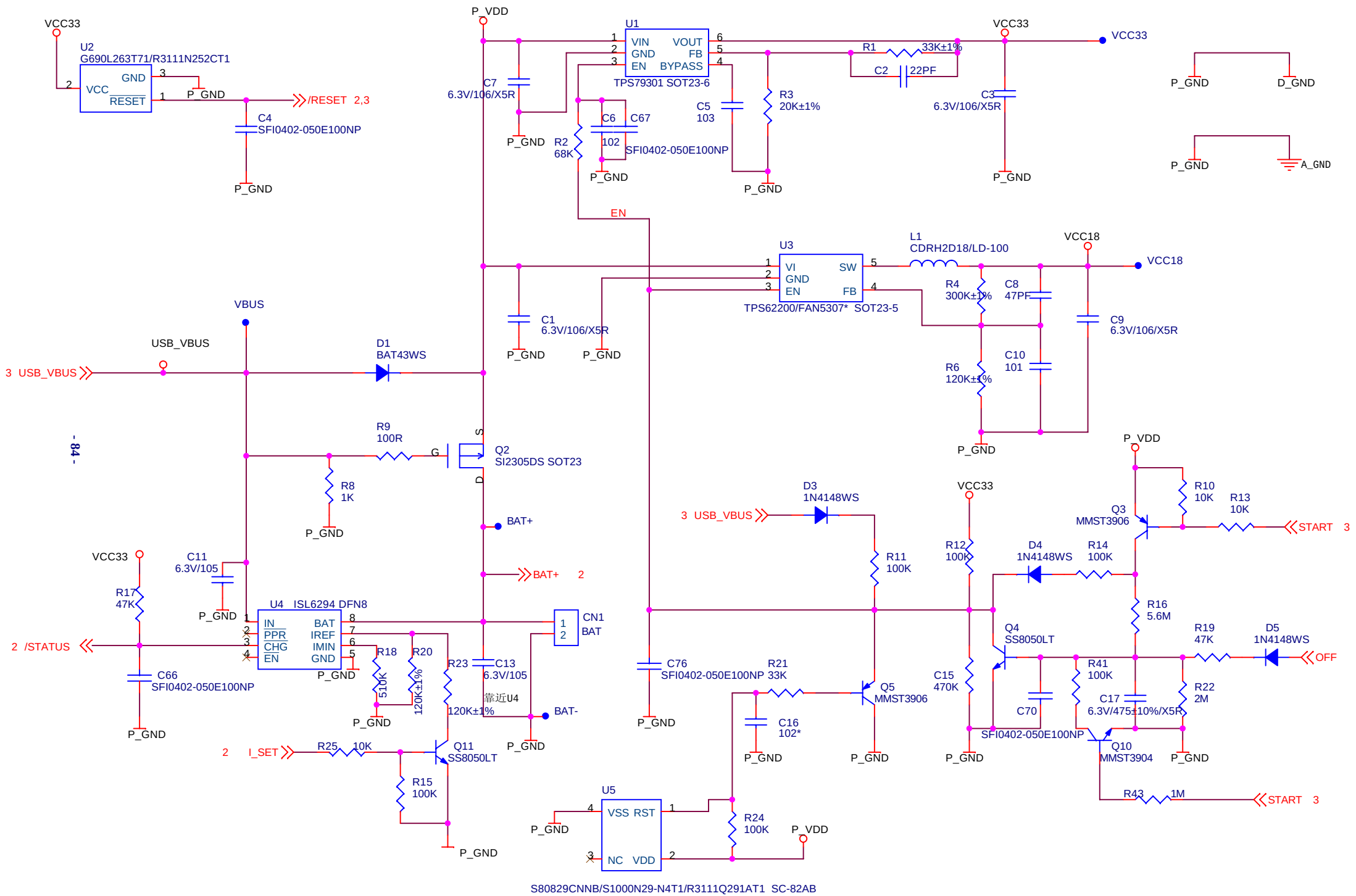
Bottom layer of main Board




AUDIO PLAYER
SYMPHONY
U6
PNX0101
OSCIALLATORS
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!
SW1 SKRELGE010
U8 TC58512FT
U12 M41T62/M41T62A
X2 32.768KHZ


OUT_R
OUT_L
2SJ-A382-001(HP-DC)
CN2
T2
D7
RCLAMP0504F/SC-70 6L
FM_ANT
R83
0R
GND
U9
SI1912DL SOT-363/NT4401
HP_VOUTL 2
HP_VOUTR 2
R50
1K
R51
1K
PHONE_MUTE 2
USB1
2UB-M002-001
D_GND
Q8
SS8550L
L16
601 DCR<350mΩ
R40
1K
D6
RCLAMP0504F/SC-70 6L
R57
18R*
R55
18R*
T1
SDCW2012-2-900T
USB_DP 2
USB_DM 2
1 USB_VBUS
R59
100K
USB_DET 2
R77
180K
C69
104/X5R
P_VDD
L23
601
L24
CDRH3D16-4R7
D8
MBR0520/SOD123
VOLED
C65
6.3V/475/X5R
VCC33
R69
100K
2 OLED_EN
R74
0R
U11
TPS61040/LM2703
R70
240K±1%
C63
22PF
C64
25V/106/1206
R76
27K±1%
L30
0R
CN5
R66
2M
R48
4.7K
R47
4.7K
C60
L22
601
C62
104/X5R
LCD_3V3
C54
SFI0402-050E100NP
R75
0R
/RESET
1,2
ADC_VDDA33
Q9
MMST3904
R62
100K
R45
470K
C58
5.3V/106
R67
2.2K
MIC1
MICROPHONE
C61
104/X5R
ADC_MIC
ADC_MIC 2
H:HOLD
SW2
SK??
R88
10K
HOLD_SW 2
C85
104/X5R
FM_3V3
R56 R58
10K 10K
DAC_VDDA33
L21
10UH/2012
C84
106
2 IIC_SDA
2 IIC_SCL
L32
L33
601
601
CN4
CON2X4
L34
L35
FM_OUTL 2
FM_OUTR 2
FM_ANT
C25
SFI0402-050E100NP
C57
SFI0402-050E100NP
SGND
L37
0R
R86
3K
R85
1K
R84
510R
R64
300R
R65
220R
R63
1K
KEY_SCAN_1 2
S1
S2
A-B REC
C59
104/X5R
R68
100k
2 PLAY/PAUSE
D9
1N4148WS
PLAY
PLAY/PAUSE
1 START
C77
SFI0402-050E100NP
L25
601/1005
P_GND
C72
SFI0402-050E100NP
S6
START/PLAY/PAUSE


FM_3V3
C1 221
FM_ANT
C2 33PF
0603CS
MURATA
COILCRAFT
TOKO SMD
LLQ1608-AR10G
L1
120nH
C4
47PF
SGND
C3
472
R1
10R
C5
105
C6 473
C7 473
C8 473
C9 333
C12 333
R2 18K
SGND
R3
10K
R5
100K
C10
393
U1
TEA5767HN
NECTAR-I
N.C
CPOP
VCOT1
VCOT2
VCOVCC
DGND
DVCC
DATA
CLOCK
LOOPSW
TCAGC
RFI2
RFGND
RFI1
AVCC
AGND
IFGAI
DIFL2
DIFL1
TCIFC
VREF
MPXO
TMUTE
RAVO
LAVO
WR
BUSM
BUSEN
SWP1
SWP2
XTAL1
XTAL2
PDLF
PHLF
FM_OUTR
FM_OUTL
R4
22R
C13
223
dandu
SGND
0603CS
L2
33nH
MURATA
COILCRAFT OR
TOKO SMD
LLQ1608-A33NG
D1
BB202
C11 103
0603CS
L3
33nH
MURATA
COILCRAFT OR
TOKO SMD
LLQ1608-A33NG
D2
BB202
D_GND
R7
22R
C19
223
D_GND
FM_WE
FM_CLK
FM_DATA
C14
102
R6
33K
XT1
32.768KHz
OR 13MHz
CRYSTAL
C15
22PF
C16
223
C17
223
C18
102
D_GND
D_GND
SGND
SGND
SGND
CN1
CON2X4
FM_ANT
FM_OUTR
FM_OUTL
FM_3V3
SGND
FM_WE 2
FM_CLK 2
FM_DATA 2

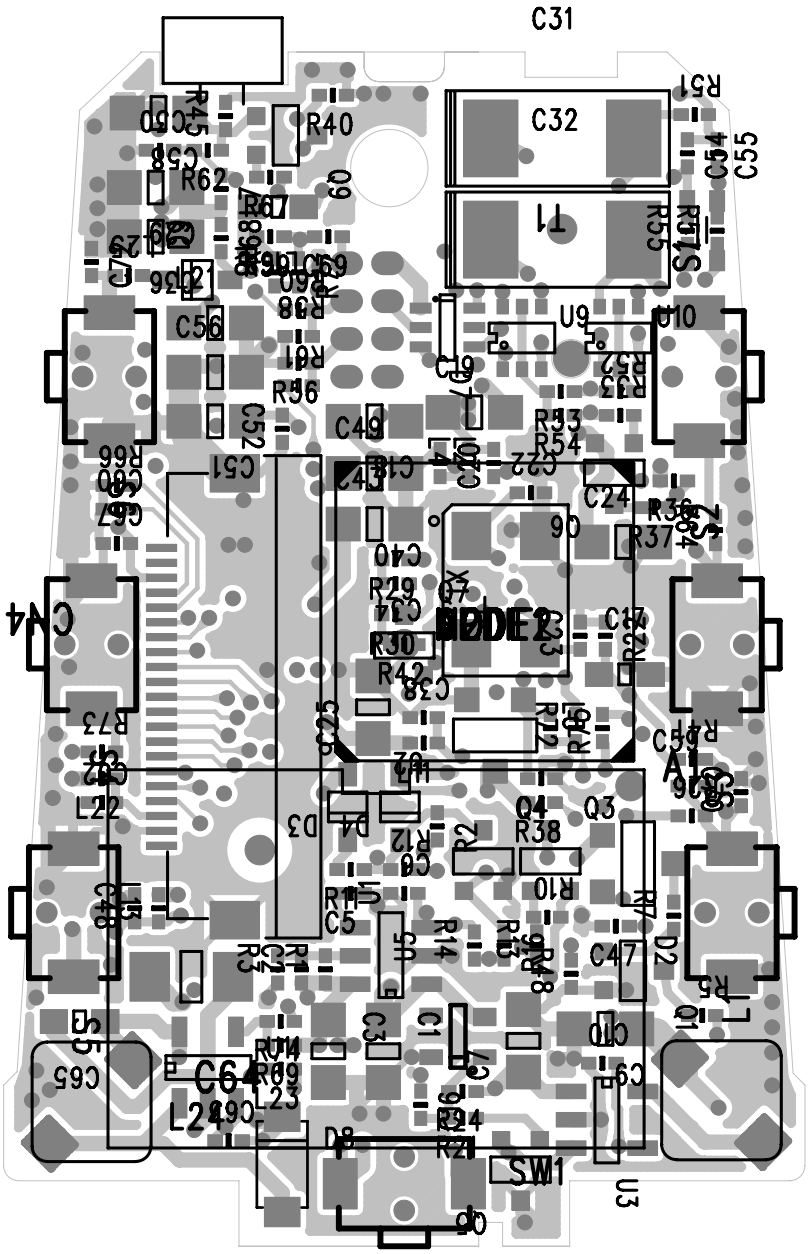

VCC33
U2
G690L263T71/R3111N252CT1
GND
VCC
RESET
P_GND
/RESET 2,3
C4
SFI0402-050E100NP
P_VDD
U1
VIN
GND
EN
VOUT
FB
BYPASS
TPS79301 SOT23-6
C7
6.3V/106/X5R
C5
103
C6
102
C67
SFI0402-050E100NP
R2
68K
R3
20K±1%
R1
33K±1%
C2
22PF
C3
6.3V/106/X5R
VCC33
P_GND
D_GND
A_GND
EN
U3
VI
GND
EN
SW
FB
TPS62200/FAN5307* SOT23-5
L1
CDRH2D18/LD-100
VCC18
R4
300K±1%
C8
47PF
C9
6.3V/106/X5R
R6
120K±1%
C10
101
C1
6.3V/106/X5R
VBUS
USB_VBUS
3 USB_VBUS
D1
BAT43WS
R9
100R
Q2
SI2305DS SOT23
R8
1K
BAT+
BAT+ 2
- 84 -
D3
1N4148WS
R11
100K
R12
100K
Q3
MMST3906
R10
10K
R13
10K
START 3
D4
1N4148WS
R14
100K
R16
5.6M
Q4
SS8050LT
R19
47K
D5
1N4148WS
OFF 2
R41
100K
C17
6.3V/475±10%/X5R
R22
2M
C70
SFI0402-050E100NP
Q10
MMST3904
R43
1M
START 3
C15
470K
C11
6.3V/105
R17
47K
2 /STATUS
U4 ISL6294 DFN8
IN
PPR
CHG
EN
BAT
IREF
IMIN
GND
C66
SFI0402-050E100NP
R18
510K
R20
120K±1%
R23
120K±1%
C13
6.3V/105
CN1
BAT
BAT-
靠近U4
C76
SFI0402-050E100NP
R21
33K
Q5
MMST3906
C16
102*
2 I_SET
R25
10K
Q11
SS8050LT
R15
100K
U5
VSS
RST
NC
VDD
R24
100K
S80829CNNB/S1000N29-N4T1/R3111Q291AT1 SC-82AB

Chapter eight

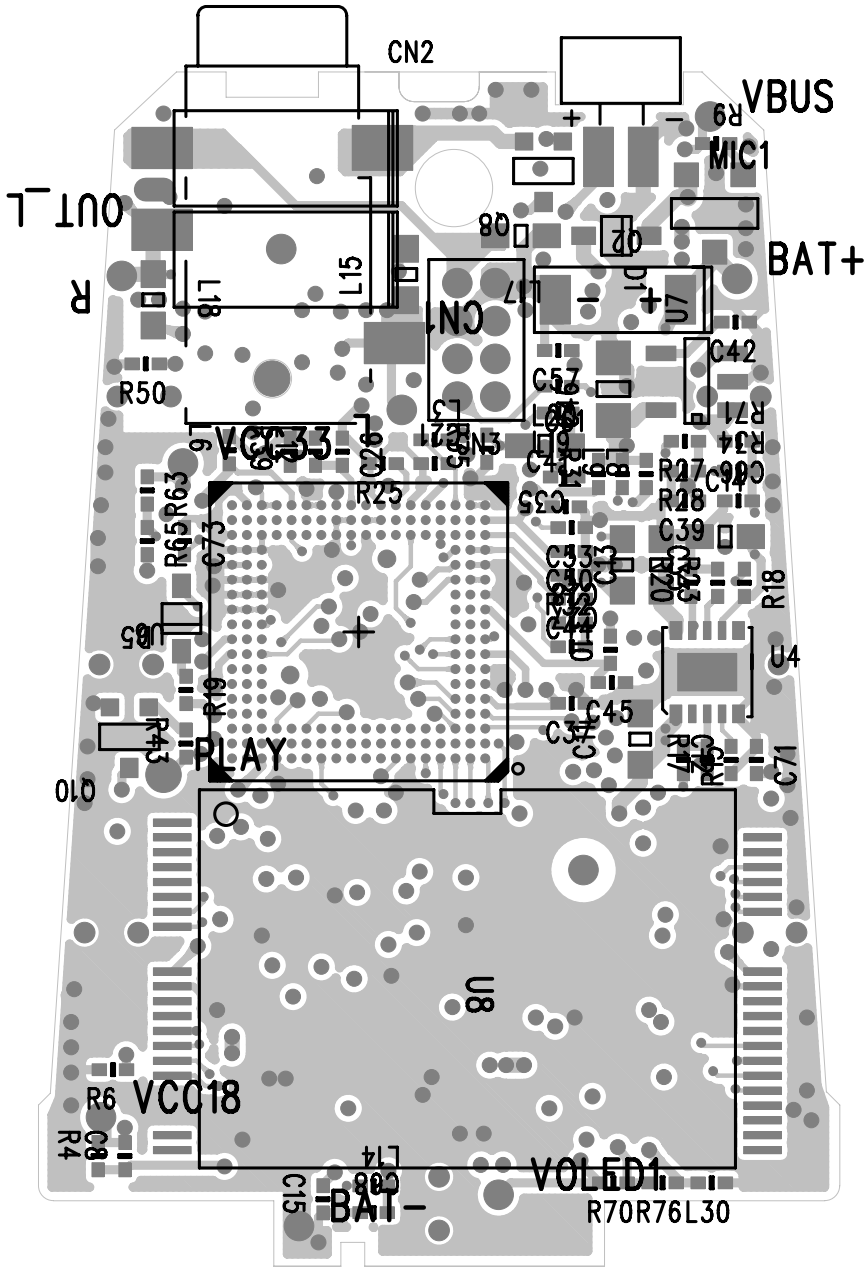
X9 PCB board & Circuit diagram

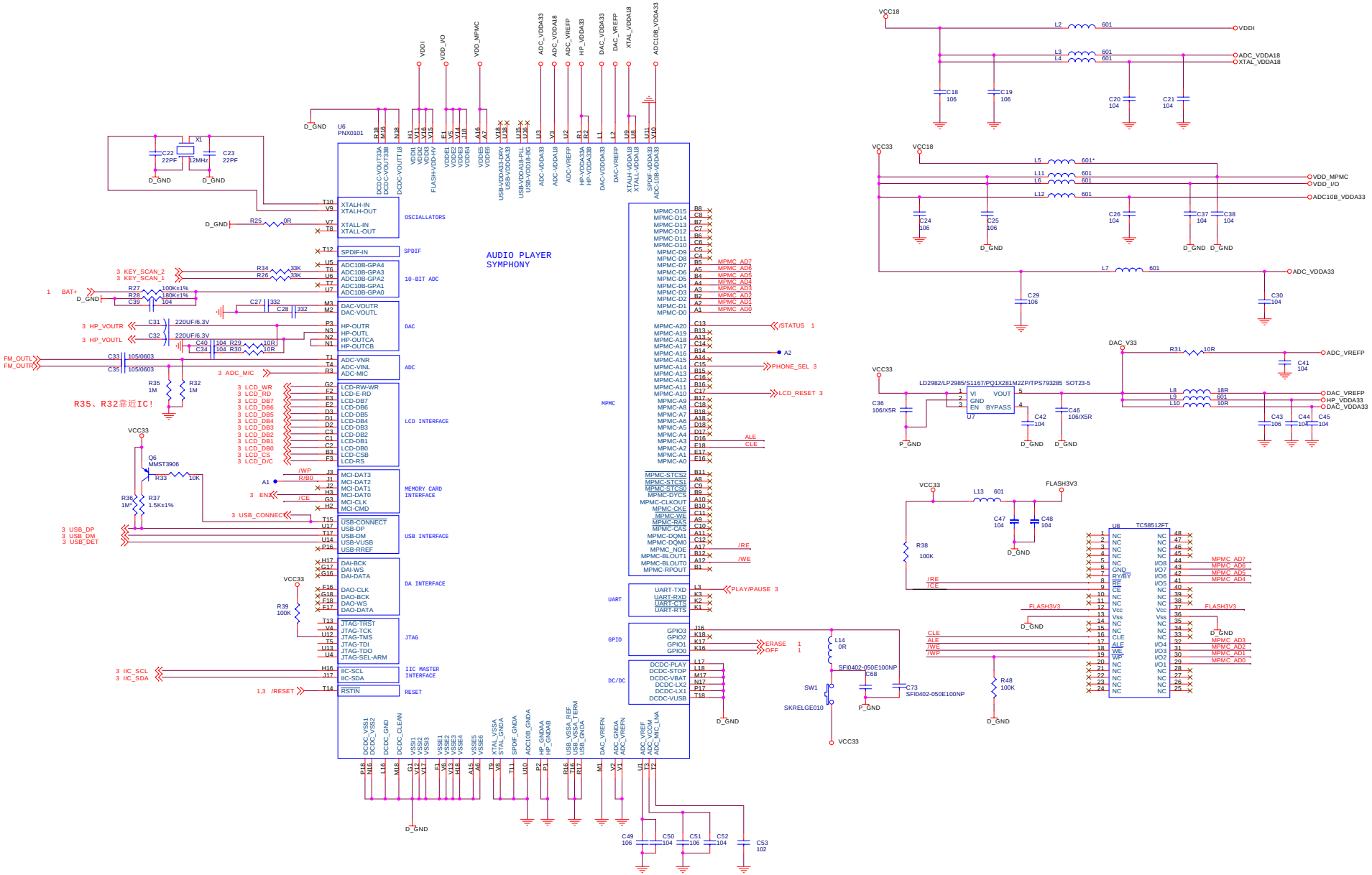
Section One PCB board

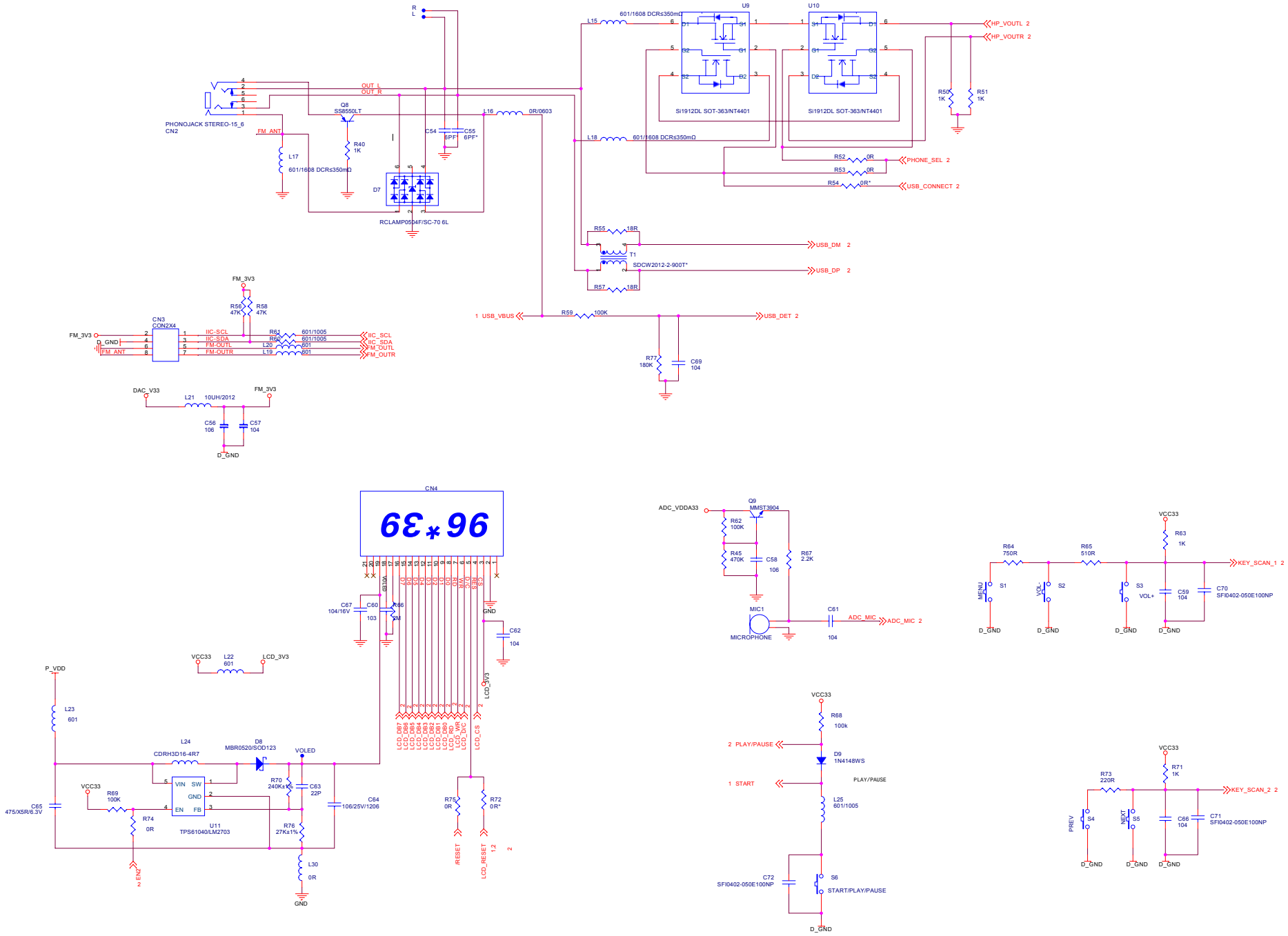
Surface layer of main Board

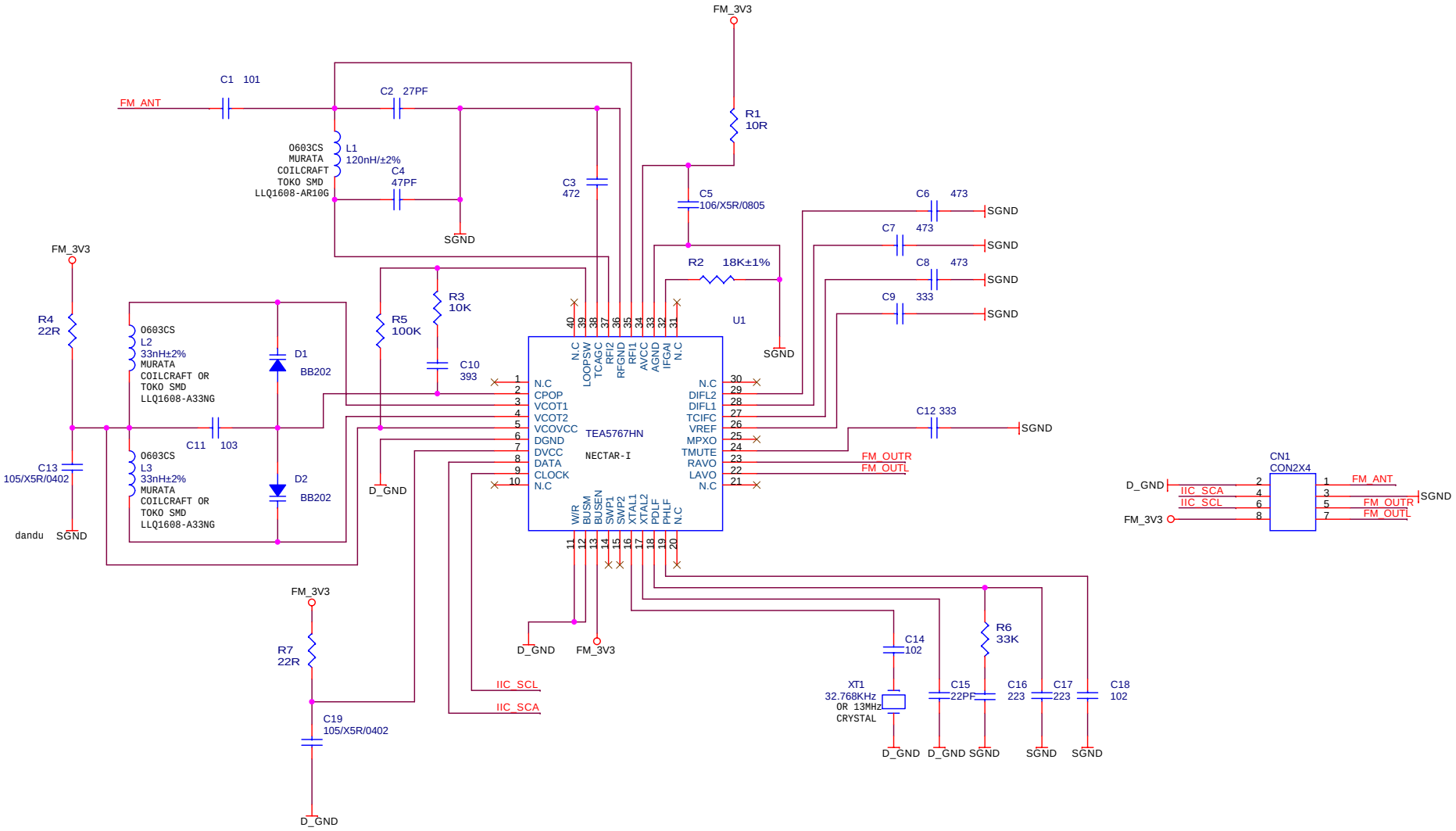


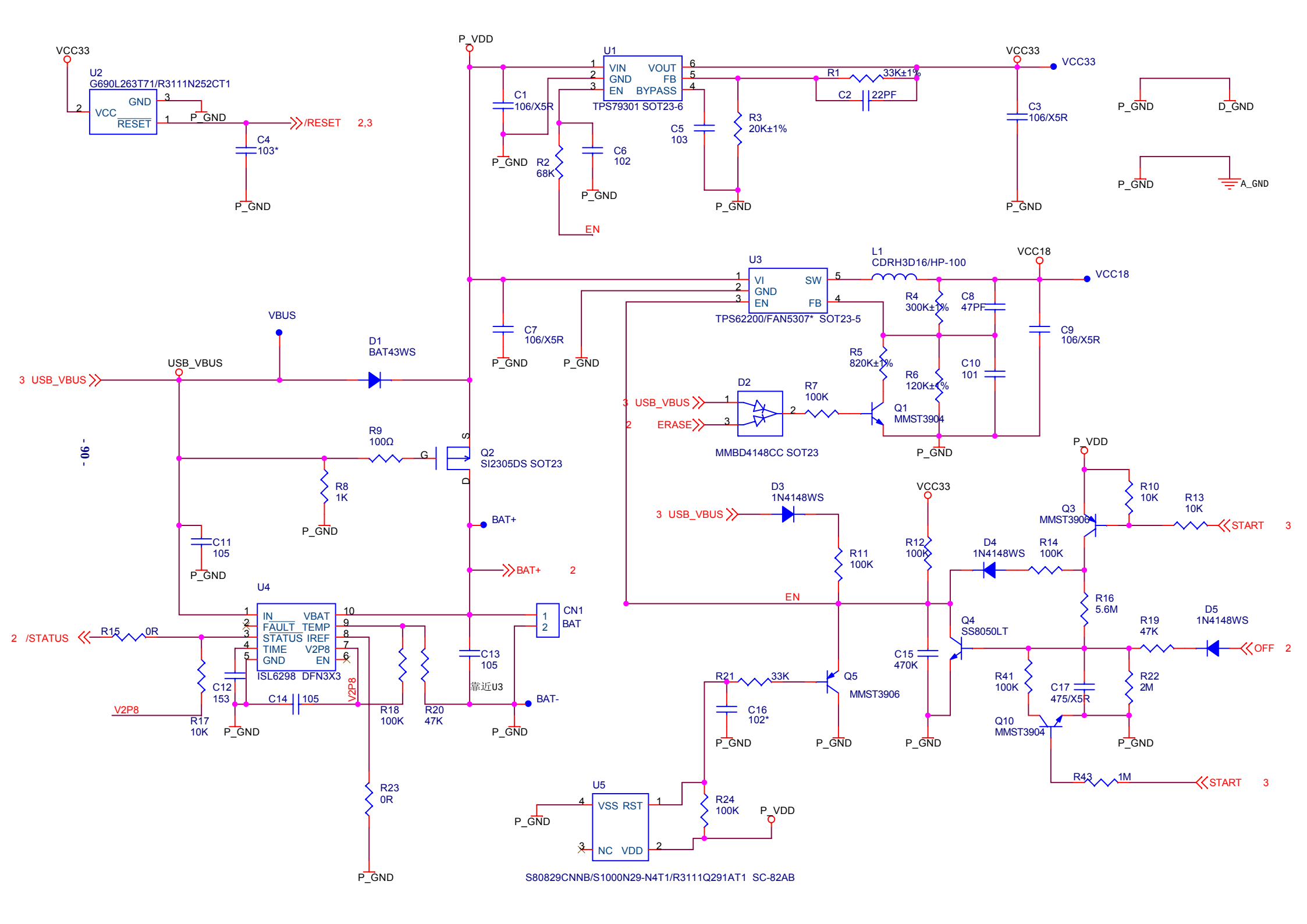
Bottom layer of main Board




AUDIO PLAYER
SYMPHONY
U6
PNX0101
OSCIALLATORS
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!
LD2982/LP2985/S1167/PQ1X281M2ZP/TPS793285 SOT23-5
TC58512FT
SKRELGE010
SFI0402-050E100NP


PHONOJACK STEREO-15_6
CN2
Q8
SS8550LT
R40
1K
L17
601/1608 DCR≤350mΩ
FM_ANT
OUT_L
OUT_R
C54
6PF
C55
6PF*
L16
0R/0603
D7
RCLAMP0504F/SC-70 6L
U9
U10
Si1912DL SOT-363/NT4401
L15
L18
601/1608 DCR≤350mΩ
HP_VOUTL 2
HP_VOUTR 2
R50
1K
R51
1K
R52
0R
R53
0R
R54
0R*
PHONE_SEL 2
USB_CONNECT 2
R55
18R
R57
18R
T1
SDCW2012-2-900T*
USB_DM 2
USB_DP 2
1 USB_VBUS
R59
100K
USB_DET 2
R77
180K
C69
104
FM_3V3
R56
47K
R58
47K
CN3
CON2X4
D_GND
FM_ANT
IIC-SCL
IIC-SDA
FM-OUTL
FM-OUTR
R62
601/1005
R60
601/1005
L20
601
L19
601
IIC_SCL
IIC_SDA
FM_OUTL
FM_OUTR
DAC_V33
L21
10UH/2012
C56
106
C57
104
CN4
C67
104/16V
C60
103
R66
2M
GND
C62
104
VCC33
L22
601
LCD_3V3
P_VDD
L23
601
L24
CDRH3D16-4R7
D8
MBR0520/SOD123
VOLED
C65
475/X5R/6.3V
R69
100K
R74
0R
U11
TPS61040/LM2703
VIN
SW
GND
EN
FB
R70
240K±1%
C63
22P
C64
106/25V/1206
R76
27K±1%
L30
0R
R75
0R
R72
0R*
/RESET
LCD_RESET
LCD_CS
LCD_WR
LCD_D/C
LCD_RD
LCD_DB0
LCD_DB1
LCD_DB2
LCD_DB3
LCD_DB4
LCD_DB5
LCD_DB6
LCD_DB7
ADC_VDDA33
Q9
MMST3904
R62
100K
R45
470K
C58
106
R67
2.2K
MIC1
MICROPHONE
C61
104
ADC_MIC
ADC_MIC 2
VCC33
R63
1K
R64
750R
R65
510R
KEY_SCAN_1 2
MENU
VOL-
VOL+
S1
S2
S3
C59
104
C70
SFI0402-050E100NP
D_GND
R68
100k
2 PLAY/PAUSE
1 START
D9
1N4148WS
PLAY/PAUSE
L25
601/1005
C72
SFI0402-050E100NP
S6
START/PLAY/PAUSE
R71
1K
R73
220R
KEY_SCAN_2 2
PREV
NEXT
S4
S5
C66
104
C71
SFI0402-050E100NP


FM_3V3
C1 101
FM_ANT
C2 27PF
0603CS
MURATA
COILCRAFT
TOKO SMD
LLQ1608-AR10G
L1
120nH/±2%
C4
47PF
SGND
C3
472
R1
10R
C5
106/X5R/0805
C6 473
C7 473
C8 473
C9 333
SGND
R2 18K±1%
R3
10K
R4
22R
R5
100K
0603CS
L2
33nH±2%
MURATA
COILCRAFT OR
TOKO SMD
LLQ1608-A33NG
D1
BB202
D2
BB202
C10
393
C11 103
C12 333
C13
105/X5R/0402
dandu
U1
TEA5767HN
NECTAR-I
N.C
CPOP
VCOT1
VCOT2
VCOVCC
DGND
DVCC
DATA
CLOCK
LOOPSW
TCAGC
RFI2
RFGND
RFI1
AVCC
AGND
IFGAI
DIFL2
DIFL1
TCIFC
VREF
MPXO
TMUTE
RAVO
LAVO
W/R
BUSM
BUSEN
SWP1
SWP2
XTAL1
XTAL2
PDLF
PHLF
FM_OUTR
FM_OUTL
D_GND
IIC_SCA
IIC_SCL
R7
22R
C19
105/X5R/0402
C14
102
XT1
32.768KHz
OR 13MHz
CRYSTAL
C15
22PF
R6
33K
C16
223
C17
223
C18
102
CN1
CON2X4
FM_ANT
FM_OUTR
FM_OUTL

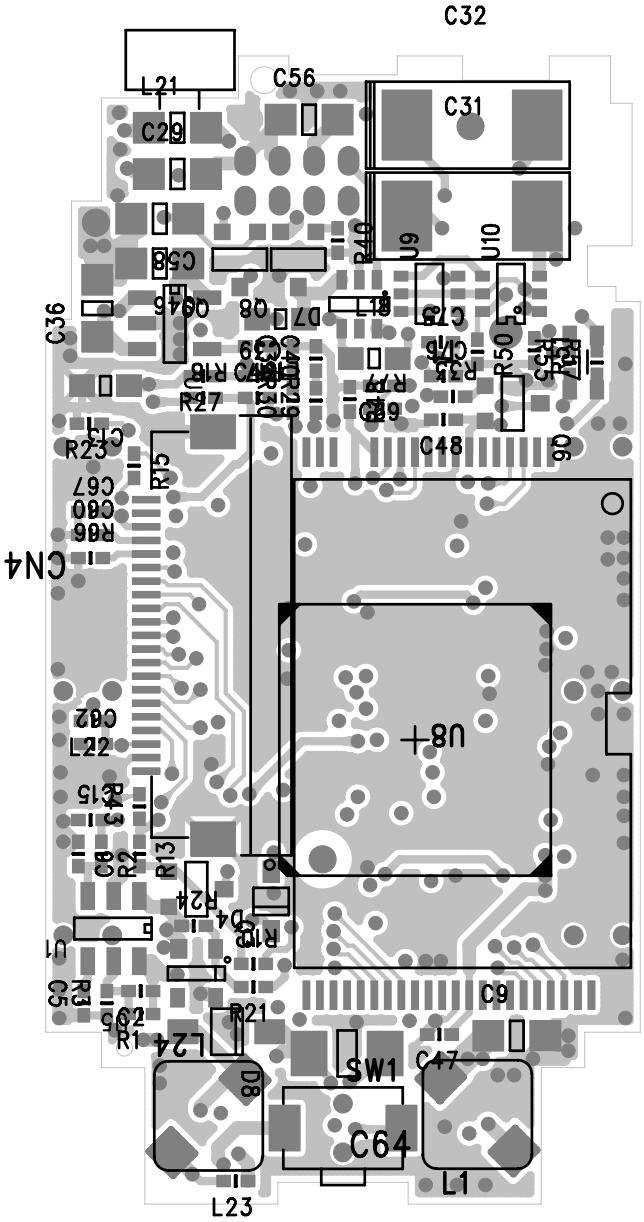

VCC33
U2
G690L263T71/R3111N252CT1
GND
VCC
RESET
P_GND
/RESET 2,3
C4
103*
P_GND
P_VDD
U1
VIN VOUT
GND FB
EN BYPASS
TPS79301 SOT23-6
C1
106/X5R
P_GND
R2
68K
C6
102
P_GND
EN
C5
103
R3
20K±1%
P_GND
R1
33K±1%
C2
22PF
VCC33
C3
106/X5R
P_GND
VCC33
P_GND
D_GND
P_GND
A_GND
U3
VI SW
GND
EN FB
TPS62200/FAN5307* SOT23-5
L1
CDRH3D16/HP-100
VCC18
R4
300K±1%
C8
47PF
C9
106/X5R
VCC18
R5
820K±1%
R6
120K±1%
C10
101
C7
106/X5R
P_GND
P_GND
VBUS
D1
BAT43WS
USB_VBUS
3 USB_VBUS
D2
3 USB_VBUS
2 ERASE
R7
100K
Q1
MMST3904
MMBD4148CC SOT23
P_GND
R9
100Ω
G
S
D
Q2
SI2305DS SOT23
R8
1K
P_GND
BAT+
BAT+ 2
C11
105
P_GND
U4
IN VBAT
FAULT TEMP
STATUS IREF
TIME V2P8
GND EN
ISL6298 DFN3X3
2 /STATUS
R15 0R
C12
153
C14 105
V2P8
R17
10K
P_GND
R18
100K
R20
47K
C13
105
靠近U3
CN1
BAT
BAT-
P_GND
R23
0R
P_GND
D3
1N4148WS
3 USB_VBUS
R11
100K
EN
VCC33
R12
100K
P_VDD
Q3
MMST3906
R10
10K
R13
10K
START 3
D4
1N4148WS
R14
100K
R16
5.6M
Q4
SS8050LT
R19
47K
D5
1N4148WS
OFF 2
C15
470K
R21
33K
Q5
MMST3906
C16
102*
P_GND
P_GND
P_GND
R41
100K
C17
475/X5R
R22
2M
Q10
MMST3904
P_GND
R43
1M
START 3
U5
VSS RST
NC VDD
P_GND
R24
100K
P_VDD
S80829CNNB/S1000N29-N4T1/R3111Q291AT1 SC-82AB
- 90 -

Chapter nine

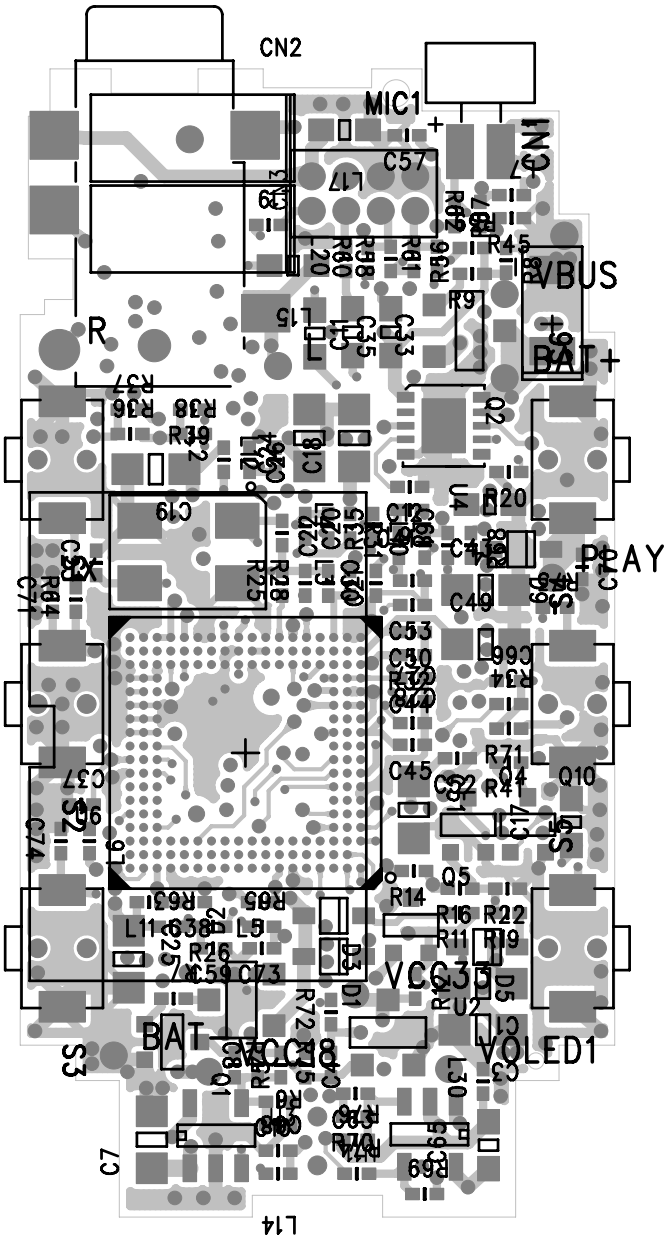
X11 PCB board & Circuit diagram

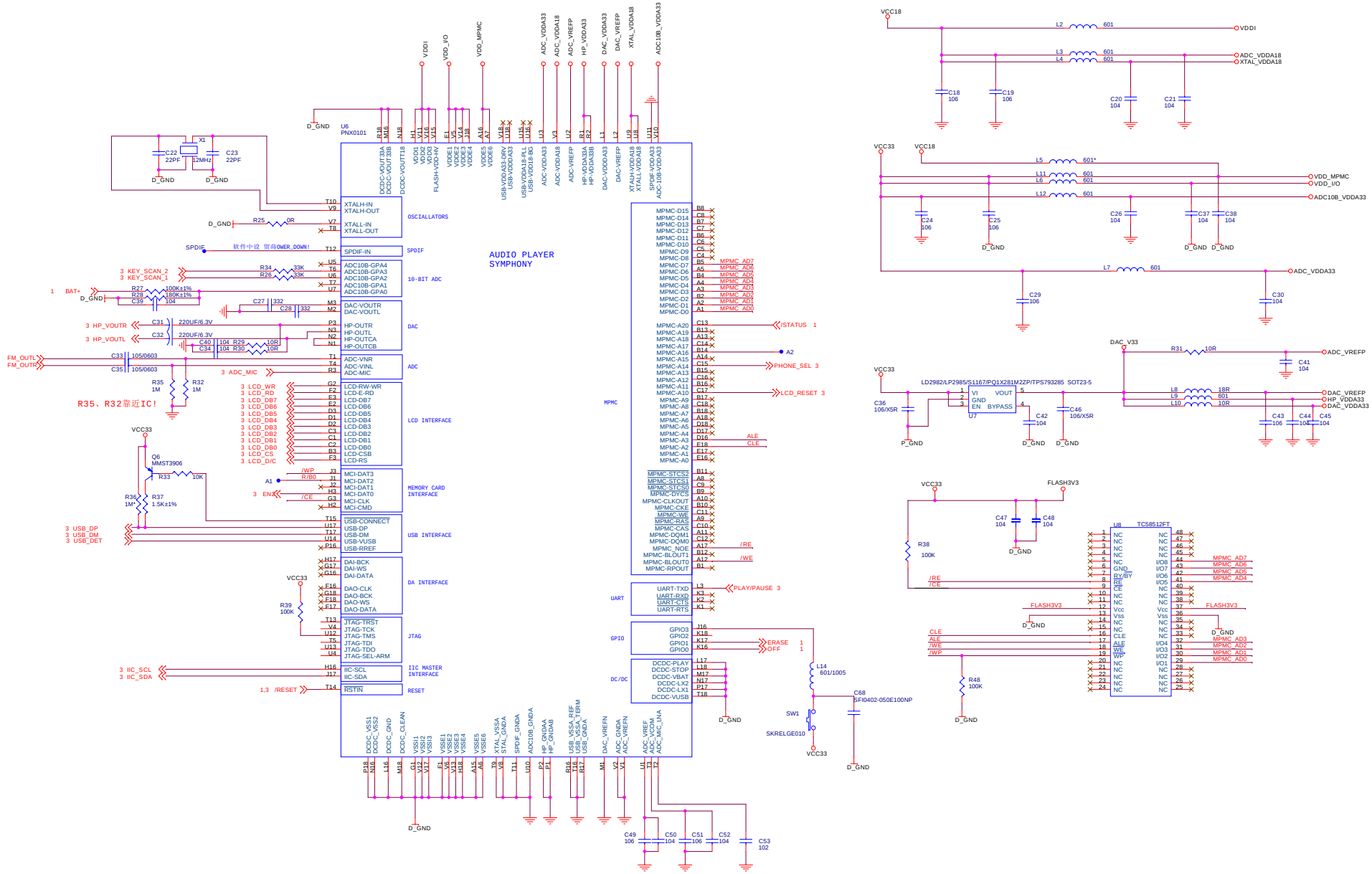
Section One PCB board

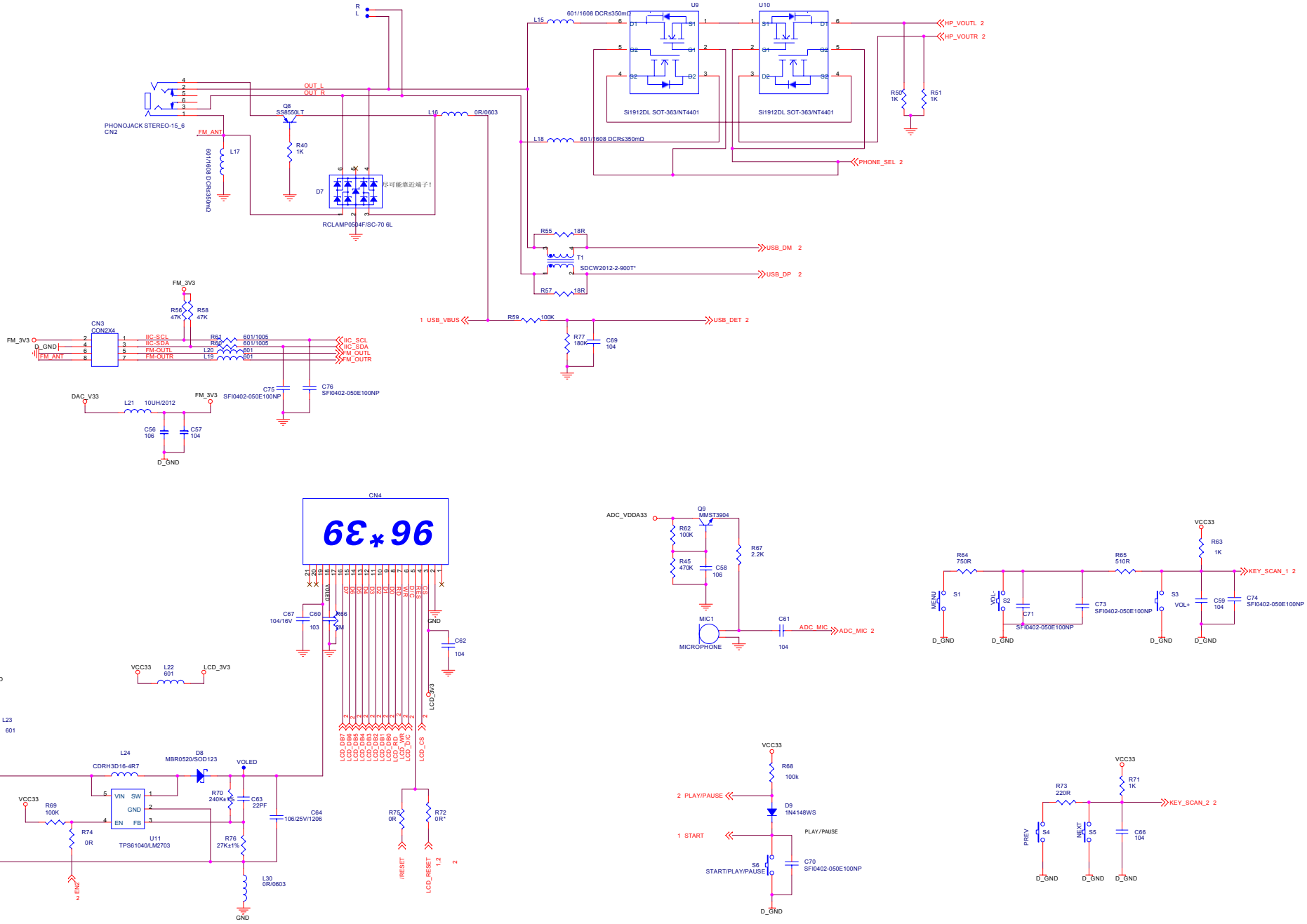
Surface layer of main Board

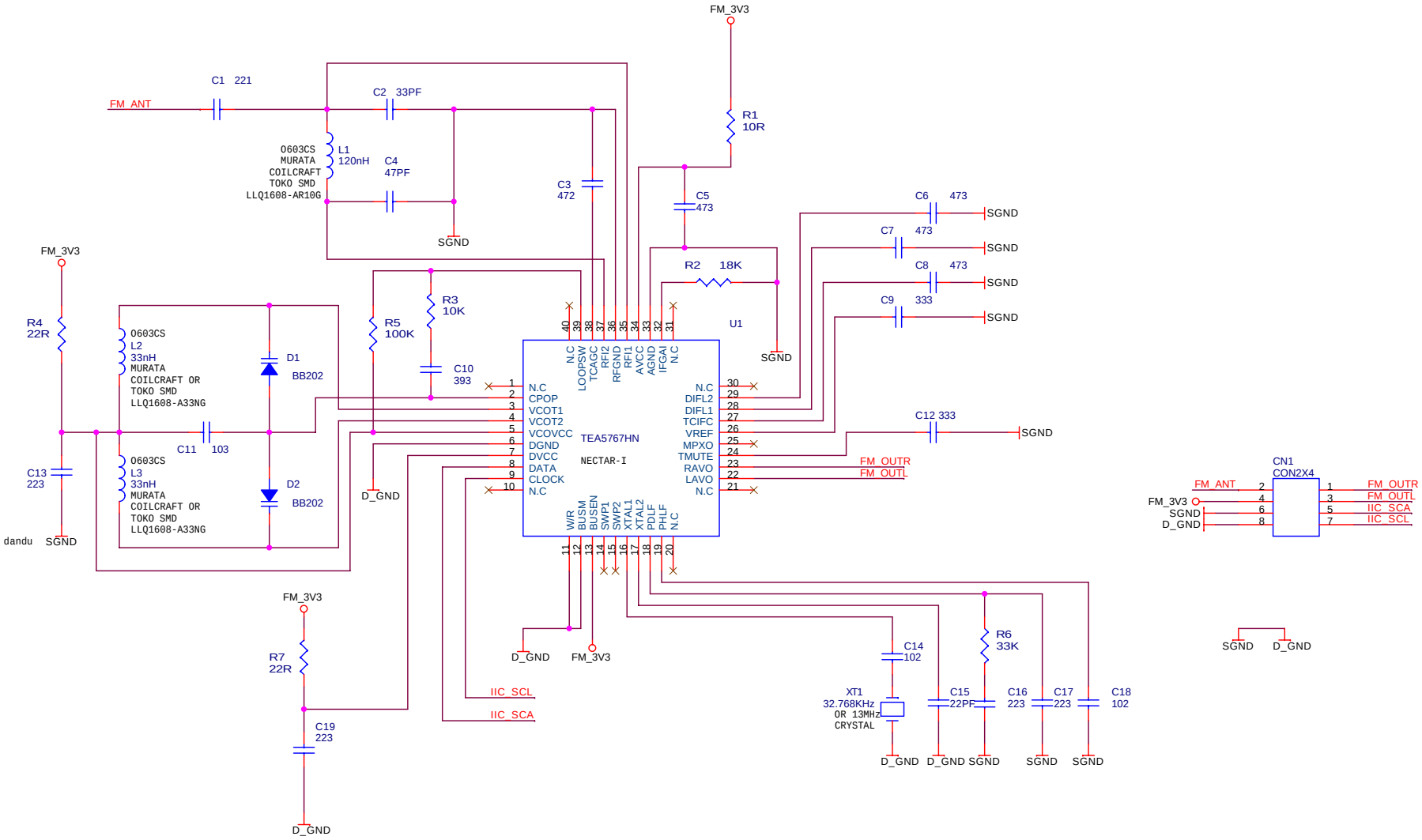


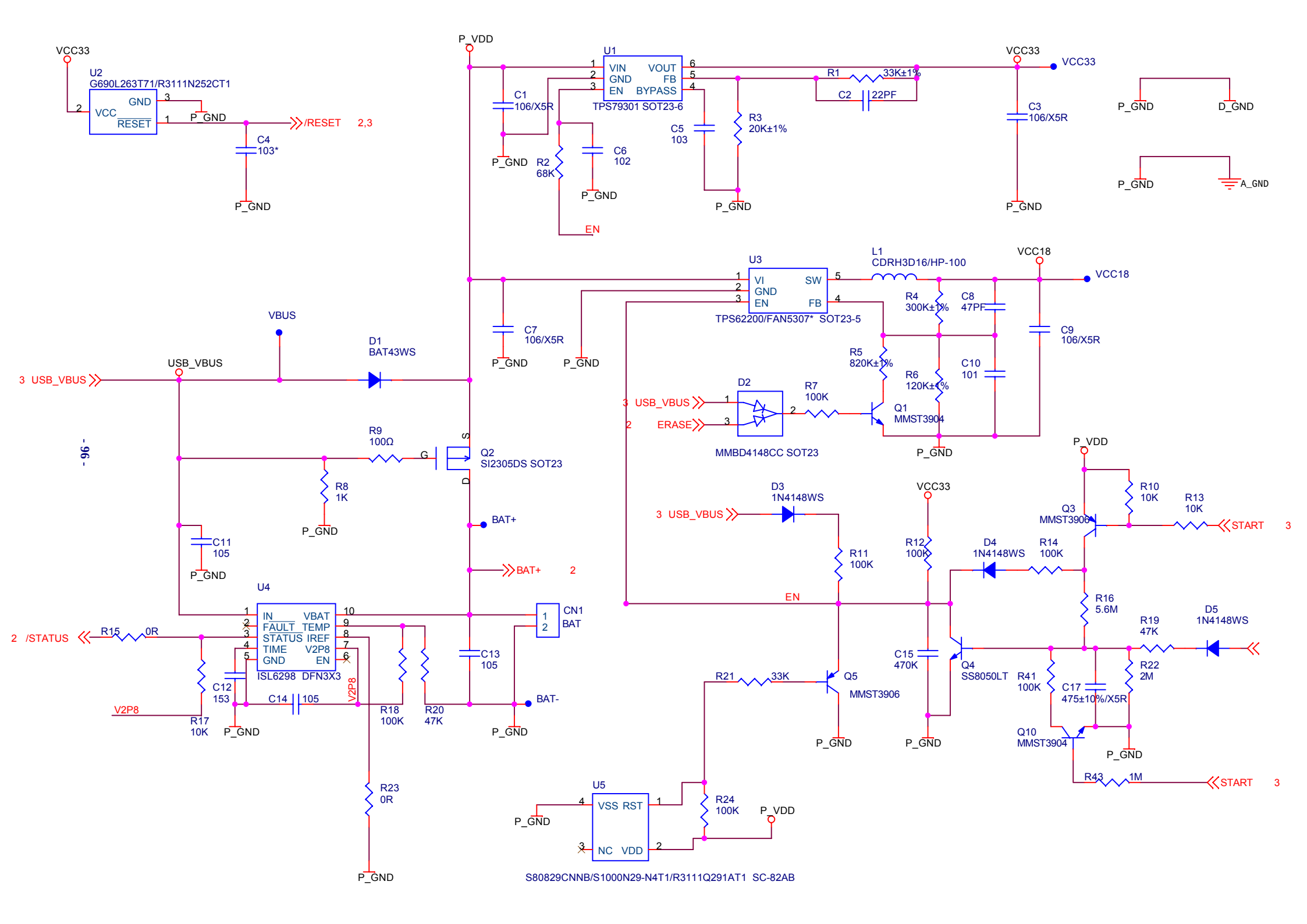
Bottom layer of main Board




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!
U7
U8
TC58512FT
FLASH3V3
VCC33
VCC18
D_GND
P_GND


PHONOJACK STEREO-15_6
CN2
FM_ANT
601/1608 DCRs350mΩ
L17
R40
1K
Q8
SS8550LT
OUT_L
OUT_R
L16
0R/0603
D7
RCLAMP0504F/SC-70 6L
尽可能靠近端子!
L15
601/1608 DCRs350mΩ
L18
601/1608 DCRs350mΩ
U9
U10
Si1912DL SOT-363/NT4401
Si1912DL SOT-363/NT4401
HP_VOUTL 2
HP_VOUTR 2
R50
1K
R51
1K
PHONE_SEL 2
R55
18R
R57
18R
T1
SDCW2012-2-900T*
USB_DM 2
USB_DP 2
1 USB_VBUS
R59
100K
USB_DET 2
R77
180K
C69
104
FM_3V3
R56
47K
R58
47K
CN3
CON2X4
FM_3V3
D_GND
FM_ANT
IIC_SCL
IIC_SDA
FM_OUTL
FM_OUTR
R64
601/1005
R66
601/1005
L20
601
L19
601
IIC_SCL
IIC_SDA
FM_OUTL
FM_OUTR
C75
SFI0402-050E100NP
C76
SFI0402-050E100NP
DAC_V33
L21
10UH/2012
FM_3V3
C56
106
C57
104
D_GND
CN4
6E*96
C67
104/16V
C60
103
R66
2M
GND
C62
104
LCD_3V3
VCC33
L22
601
P_VDD
L23
601
L24
CDRH3D16-4R7
D8
MBR0520/SOD123
VOLED
VCC33
R69
100K
R74
0R
U11
TPS61040/LMZ703
VIN
SW
GND
EN
FB
R70
240K±1%
C63
22PF
R76
27K±1%
C64
106/25V/1206
C65
475/X5R/6.3V
L30
0R/0603
GND
EN
2
LCD_D7
LCD_D6
LCD_D5
LCD_D4
LCD_D3
LCD_D2
LCD_D1
LCD_D0
LCD_WR
LCD_DC
LCD_CS
LCD_3V3
R75
0R
R72
0R*
/RESET
LCD_RESET
ADC_VDDA33
Q9
MMST3904
R62
100K
R45
470K
C58
106
R67
2.2K
MIC1
MICROPHONE
C61
104
ADC_MIC
ADC_MIC 2
VCC33
R64
750R
R65
510R
R63
1K
KEY_SCAN_1 2
MENU
S1
VOL-
S2
C71
SFI0402-050E100NP
C73
SFI0402-050E100NP
S3
VOL+
C59
104
C74
SFI0402-050E100NP
D_GND
D_GND
D_GND
D_GND
VCC33
R68
100k
2 PLAY/PAUSE
D9
1N4148WS
1 START
PLAY/PAUSE
S6
START/PLAY/PAUSE
C70
SFI0402-050E100NP
D_GND
VCC33
R71
1K
R73
220R
KEY_SCAN_2 2
PREV
S4
NEXT
S5
C66
104
D_GND
D_GND
D_GND


FM_3V3
FM_ANT
C1 221
C2 33PF
R1 10R
0603CS MURATA COILCRAFT TOKO SMD LLQ1608-AR10G
L1 120nH
C4 47PF
C3 472
C5 473
SGND
C6 473
C7 473
C8 473
C9 333
R2 18K
U1
R3 10K
R4 22R
R5 100K
0603CS L2 33nH MURATA COILCRAFT OR TOKO SMD LLQ1608-A33NG
D1 BB202
C10 393
C11 103
0603CS L3 33nH MURATA COILCRAFT OR TOKO SMD LLQ1608-A33NG
D2 BB202
C13 223
dandu
D_GND
TEA5767HN
NECTAR-I
N.C
CPOP
VCOT1
VCOT2
VCOVCC
DGND
DVCC
DATA
CLOCK
LOOPSW
TCAGC
RFI2
RFGND
RFI1
AVCC
AGND
IFGAI
DIFL2
DIFL1
TCIFC
VREF
MPXO
TMUTE
RAVO
LAVO
W/R
BUSM
BUSEN
SWP1
SWP2
XTAL1
XTAL2
PDLF
PHLF
C12 333
FM_OUTR
FM_OUTL
IIC_SCL
IIC_SCA
R7 22R
C19 223
C14 102
R6 33K
XT1 32.768KHz OR 13MHz CRYSTAL
C15 22PF
C16 223
C17 223
C18 102
CN1 CON2X4
IIC_SCA
IIC_SCL


VCC33
U2
G690L263T71/R3111N252CT1
GND
VCC
RESET
P_GND
/RESET 2,3
C4
103*
P_VDD
U1
VIN VOUT
GND FB
EN BYPASS
TPS79301 SOT23-6
C1
106/X5R
R1
33K±1%
C2
22PF
C3
106/X5R
C5
103
R3
20K±1%
R2
68K
C6
102
EN
D_GND
A_GND
U3
VI SW
GND
EN FB
TPS62200/FAN5307* SOT23-5
L1
CDRH3D16/HP-100
VCC18
R4
300K±1%
C8
47PF
C9
106/X5R
R5
820K±1%
R6
120K±1%
C10
101
C7
106/X5R
VBUS
USB_VBUS
D1
BAT43WS
3 USB_VBUS
D2
MMBD4148CC SOT23
R7
100K
Q1
MMST3904
ERASE
R9
100Ω
Q2
SI2305DS SOT23
R8
1K
C11
105
BAT+
U4
IN VBAT
FAULT TEMP
STATUS IREF
TIME V2P8
GND EN
ISL6298 DFN3X3
CN1
BAT
2 /STATUS
R15
0R
C12
153
C14
105
C13
105
R17
10K
R18
100K
R20
47K
BAT-
R23
0R
D3
1N4148WS
R11
100K
R12
100K
D4
1N4148WS
R14
100K
Q3
MMST3906
R10
10K
R13
10K
START 3
R16
5.6M
R19
47K
D5
1N4148WS
R21
33K
Q5
MMST3906
C15
470K
Q4
SS8050LT
R41
100K
C17
475±10%/X5R
R22
2M
Q10
MMST3904
R43
1M
U5
VSS RST
NC VDD
R24
100K
S80829CNNB/S1000N29-N4T1/R3111Q291AT1 SC-82AB
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