

DL370D

service manual

Catalog

Chapter One About Maintenance	1
1.1 Safety precautions	1
1.1.1 Power supply	1
1.1.2 Precautions for antistatic	1
1.1.3 Precautions for laser head	1
1.1.4 About placement position	2
1.2 Maintenance method	2
1.2.1 Visualized method	2
1.2.2 Electric resistance method	2
1.2.3 Voltage method	2
1.2.4 Current method	2
1.2.5 Cutting method	2
1.2.6 Element substitution method	3
1.2.7 Comparison method	3
1.3 Required device for maintenance	3
Chapter Two Functions and Operation Instructions	4
2.1 Features	4
2.2 Control Button Locations and Explanations	4
2.3 Remote Control Illustration	6
2.4 Accessories	7
2.5 FUNCTION SETUP	7
2.5.1 Function Setup	7
2.5.2 General Settings	7
2.5.3 Audio Setup	8
2.5.4 Initial Setup	8
2.5.5 Useful notes	9
2.6 Specifications	9

Chapter Three Principle or Servicing	10
Section One Principle of the Player	10
3.1.1 Block diagram of the player	10
3.1.2 PCB composition block diagram of the player	11
3.1.3 Function introduction to IC of the player	11
Section Two Unit Circuit Principle	13
3.2.1 Servo processing circuit	13
3.2.2 CD/DVD switch circuit	15
3.2.3 Laser power control circuit	16
3.2.4 Main axis control circuit	17
3.2.5 DC-DC switch circuit	17
3.2.6 Battery voltage detecting circuit	19
3.2.7 Audio output circuit	20
3.2.8 Screen off detect control circuit	21
3.2.9 Video coding and LCD TFT drive circuit	22
3.2.10 Charge circuit and protection circuit	25
3.2.11 Control panel circuit and remote control circuit	26
3.2.12 Decode circuit	26
3.2.13 Reset circuit	28
3.2.14 Mute circuit	29
Section Servicing Cases	30
3.3.1 Servicing instances	30
3.3.2 Troubleshooting flow chart	34
Section Four Servicing Parameters	44
3.4.1 Signal waveform diagram	44
Section Five Function Introduction to IC	51
3.5.1 function introduction to MT1389E	51
3.5.2 function introduction to AM5898N	62
3.5.3 function introduction to HWD4863	62
3.5.4 function introduction to S3C9454	63
3.5.5 function introduction to T102	65
Chapter Four Disassembly and Assembly Process	70

Chapter Cinque PCB board & Circuit diagram	76
Section One PCB board	76
Section Two circuit diagram	85
Chapter six BOM List.....	94
6.1upgrade board unit	94
6.2battery board	94
6.3battery case	94
6.4battery charge board	95
6.5battery connecting board	96
6.6battery protect board	96
6.7decode board	97
6.8drive board	101
6.9main panel	102
6.10power socket board	103

Chapter One About Maintenance

1.1 Safety precautions

1.1.1 Power supply

When maintenance personnel are repairing DVD players, he should pay special attention to the power board with 220V AC and 330V DC which will cause hurt and damage to persons!

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-scale integrated IC, as the capacitance is very small in the meantime, now the integrated IC is very much easy to be struck through by static electricity or the performance will decrease. Thus static electricity prevention is of extraordinary importance. The following are several measures to prevent static electricity:

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

1.1.3 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.

1.1.4 About placement position

1. Never place DVD player 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 Visualized method

Directly view whether abnormalities of collision, lack of element, joint welding, shedding welding, rosin joint, copper foil turning up, lead wire disconnection and elements burning up among pins of elements appear. Check power supply of the machine and then use hands to touch the casing of part of elements and check whether they are hot to judge the trouble spot. You should pay more attention when using this method to check in high voltage parts.

1.2.2 Electric resistance method

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

1.2.3 Voltage method

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

1.2.4 Current method

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

1.2.5 Cutting method

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

1.2.6 Element substitution method

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

1.2.7 Comparison method

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

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

1.3 Required device for maintenance

- ◆ Digital oscillograph ($\geq 100\text{MHz}$)
- ◆ TV set
- ◆ SMD rework station
- ◆ Multimeter
- ◆ Soldering iron
- ◆ Pointed-nose pincers
- ◆ Cutting nippers
- ◆ Forceps
- ◆ Electric screw driver
- ◆ Terminal connecting cord
- ◆ Headphone
- ◆ Microphone

Chapter Two

Functions and Operation Instructions

2.1 Features

This player utilizes color TFT LCD and new generation DVD decoding chip with built-in Dolby Digital decoders which can bring you to a brand-new AV entertainment world. The 2-laser super error correction mechanism supports CD-R

Brand-new AV Effects.

1. 7" color TFT LCD.
2. Compatible with MPEG4 discs to produce wonderful pictures.
3. Built-in Dolby Digital decoder.
4. Built-in stereo speakers.
5. Hi-Fi stereo headphone output.

High Quality Digital Audio

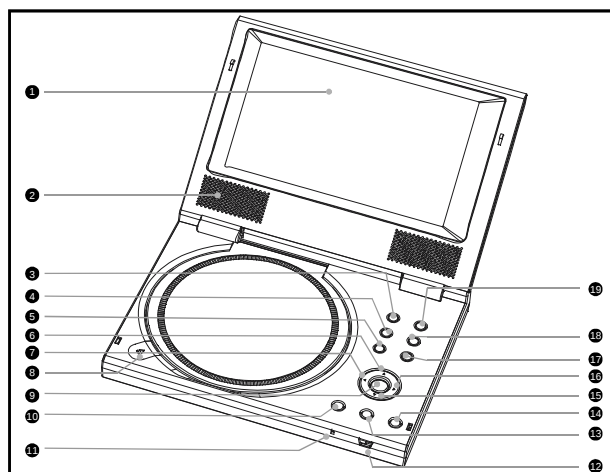
1. Built-in Dolby Digital and DTS digital surround decoder

Numerous Convenient Functions

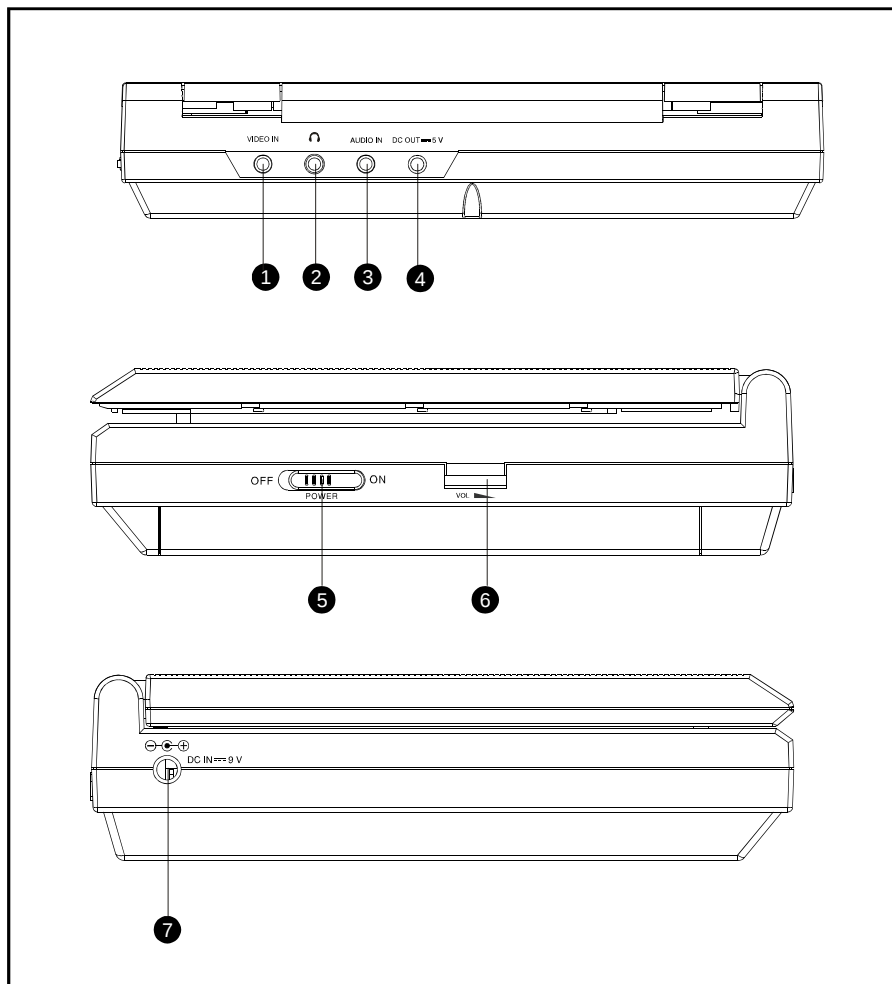
1. Screen saver function cautiously protects your LCD and TV.
 2. Large capacity solid Li-Ion battery, electronic anti-shock circuits, convenient for you to watch movies outdoors.
 3. Easy-to-use brand-new GUI and virtual keyboard.
 4. Multi-angle playback function makes it possible for you to view a scene from different camera angles.
 5. Direct entry to desired scenes (title/chapter/time/track search).
 6. Multiple aspect ratios to fit various TV sets.
 7. Parental control function to protect children from watching inappropriate discs.
 8. Multiple dubbing languages and subtitle languages keep you in the best entertaining status anytime.
- Supports SVCD, VCD, CD, MP3, HDCD, KODAK PICTURE CD, DVD-R/RW.

NOTE: Some discs labelled with MPEG4 on the market actually are *.rm/*.ram/*.rmm/*.ra and others which are incompatible. Please take care when buying discs.

2.2 Control Button Locations and Explanations

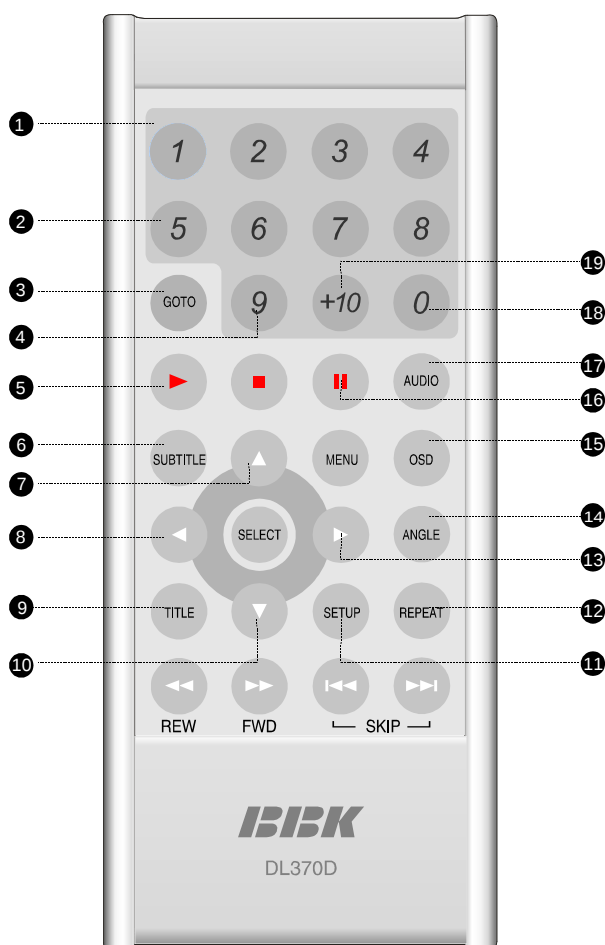


- | | |
|---------------------------------|-----------------------------------|
| ① Color TFT LCD | ⑪ Power indicator |
| ② Speakers | ⑫ IR sensor |
| ③ PICTURE Button | ⑬ STOP Button |
| ④ DVD/AUX IN Button | ⑭ Keyboard/SWITCH Button |
| ⑤ SETUP Button | ⑮ REW Button/DOWN direction arrow |
| ⑥ FWD Button/UP direction arrow | ⑯ NEXT/RIGHT Button |
| ⑦ PREV/LEFT Button | ⑰ MENU Button |
| ⑧ OPEN/CLOSE Button | ⑱ TITLE Button |
| ⑨ PLAY / SELECT button | ⑲ Q-PLAY Button |
| ⑩ PAUSE button | |



- | | |
|-------------------|-----------------------|
| ① Video In jack | ⑤ Power switch |
| ② HeadPhones jack | ⑥ Speaker volume knob |
| ③ Audio In jack | ⑦ DC 9V In |
| ④ DC 5V Out | |

2.3 Remote Control Illustration



- ❶ NUMBER Buttons
- ❷ GOTO button
Play from the desired location.
- ❸ PLAY Button
Normal playback.
- ❹ STOP Button
Stop playback.
- ❺ SUBTITLE Button
Change subtitle languages/Switch JPEG display modes.
- ❻ CURSOR Buttons
- ❼ SELECT Button
- ❽ TITLE button
DVD titles.
- ❾ REW Button
Fast backward play.
- ❿ FWD Button
Fast forward play.
- ⓫ PREV Button
Skip backward.
- ⓬ NEXT Button
Skip forward.
- ⓭ SETUP Button
Function setup.
- ⓮ REPEAT Button
Repeat play.
- ⓯ ANGLE Button
Change camera angles, MP3/JPEG playback modes switch.
- ⓰ MENU Button
Display DVD menu or open/close PBC.
- ⓱ OSD Button
Display or hide disc information.
- ⓲ AUDIO Button
Change the audio language or audio channel.

- ⓳ PAUSE Button
Pause frame by frame.

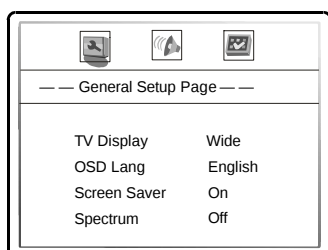
2.4 Accessories

AV Cords	1PCS
Remote Control	1PCS
AAA Size Batteries	2PCS
Instruction Manual	1PCS
Battery Pack	1PCS
Power Adapter	1PCS
Warranty Card	1PCS

2.5 FUNCTION SETUP

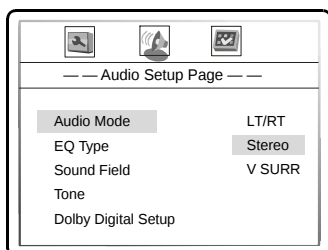
2.5.1 Function Setup

1. Press **SETUP** button, The TV set screen displays:

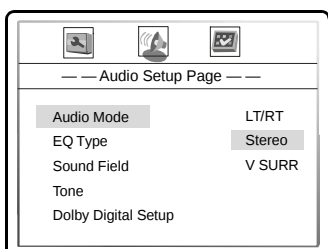


2. Press **LEFT/RIGHT** arrow to select the desired channel to be changed.

For example, if you want to set this player's Audio, please press **LEFT/RIGHT** arrows to select **AUDIO SETUP PAGE**. Press **SELECT** for verification. The audio setup page displays On the screen.

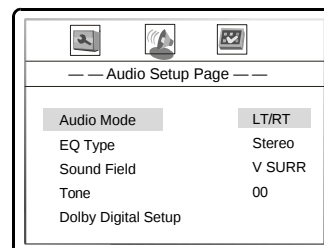


3. Press **UP/DOWN** arrow to select the desired item you want to set and press **SELECT**. For example, press **UP/DOWN** arrows to select **AUDIO MODE** and press **SELECT**. The **AUDIO MODE** appears on the screen.

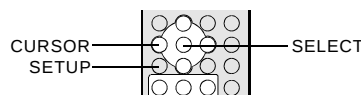


4. Press **UP/DOWN** arrow to select the desired value. Press **SELECT** to confirm it.

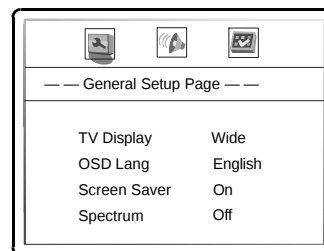
For example: Press **UP/DOWN** arrow to select "**LT/RT**", than press **SELECT**, the TV screen Display:



5. Press **SETUP** to exit the setup menu.



2.5.2 General Settings



1. **TV Display:** To set the aspect ratio of this player's output image.

Optional settings: **NORMAL/PANSCAN**, **NORAM/LETTER BOX**, **WIDE**.

Default: **WIDE**.

NOTES

The playing effects are contingent upon the disc's recording aspect ratio. Some discs may not be played according to your selected aspect ratio.

16:9 is only applicable to the 16:9 TV.

Please select the aspect ration in accordance with that of your TV.

The LCD screen is utilizing 16 by 9 aspect ratio only.

2. **OSD Lang:** This item is used to set the prompts language on the screen.

Optional settings: **English**, **Russian**.

Default: **English**.

3. **Screen saver:** Open or close the screen saver Function.

Optional settings: **OFF**, **ON**

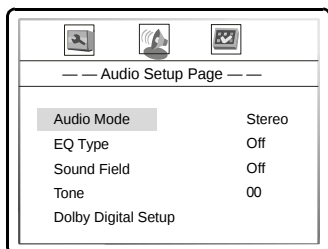
Default: ON

4. Spectrum: This item is used to set whether the Dynamic Spectrum is allowed.

Selectable value: ON, OFF.

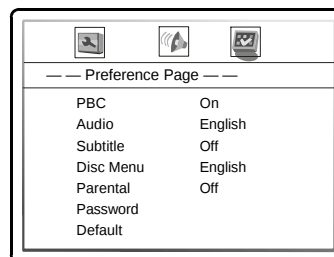
Default: OFF

2.5.3 Audio Setup



1. Audio output mode: To set the audio output mode to make the multi-channel audio into two-channel outputs.
Optional settings: LT/RT, STEREO, V SURR.
Default: STEREO
2. EQ type: To set EQ modes.
Optional settings: Off, ROCK, Pop, Live, Dance, Techno, Classic, Soft.
Default: Off
3. Sound Field: To set different sound field effects.
Optional settings: Off, Concert, Living room, Hall, Bathroom, Cave, Arena, Church.
Default: Off.
4. TONE control: This item is used to set the tone level to match your diapason when you are singing.
Method to adjust tone:
 - A. Press UP/DOWN cursor button to select TONE item in AUDIO SETUP PAGE, and then press SELECT button to enter the adjust menu
 - B. Press LEFT/RIGHT cursor button to adjust the setting value.
 - C. Press SELECT button to return to AUDIO SETUP PAGE after adjustment are well done.
5. Dolby Digital setup:
 - A. L+R: To set the output means of the left or right audio when playing a Dolby disc with separate two-channel audio
Optional settings: Stereo, L-Mono, R-Mono, Mix-Mono.
Default: Stereo.
 - B. Dynamic compression: To set the linear compression ratio to get different compression result.
Optional settings: OFF, 1/8, 1/4, 3/8, 1/2, 5/8, 3/4, 7/8, FULL.
Default: OFF.

2.5.4 Initial Setup



1. PBC: To set the PBC status.
When playing SVCD or VCD2.0 discs, if the PBC is ON, the menu image displays on the screen and this player enter the PBC mode; if the PBC is OFF, this player plays the disc by its sequence.
Optional settings: On, Off.
Default: On.
2. AUDIO: To set the preference audio language when playing.
3. SUBTITLE: To set the preference subtitle language when playing.
Optional subtitle languages: English, French, Spanish, Chinese, Japanese, Korean, Russian, Thai, others, Off.
subtitle language default: Off
4. DISC MENU LANGUAGE: To set the preference disc menu language when playing.
Optional audio/disc menu languages: English, French, Spanish, Chinese, Japanese, Korean, Russian, Thai, others.
Audio/disc menu language default: English.

NOTES

Audio/subtitle/disc menu languages are effective to DVD only.

If the disc does not record your desired language, the player will select the disc-specified languages to play.

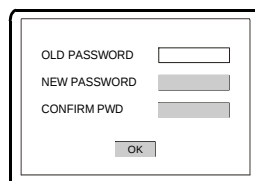
Selecting other languages: Press UP/DOWN ARROW to move the cursor to OTHER item, press SELECT. Press NUMBER buttons to enter your desired language codes, then press SELECT.

5. Parental : To set the parental control ratings to prevent children from watching the restricted contents. (In case the disc supports this function.)
Optional settings: KID, G, PG, PG-13, PGR, R, NC17, ADULT, OFF.
Default: OFF.

NOTE

When changing the parental control ratings, a password is needed. Refer to the following password item for detailed settings.

6. PASSWORD: To set a four digit password to enable you to change the parental control ratings.
Default: 7890.



7. DEFAULT: To restore all settings to the default value except for the parental control and password settings.

2.5.5 Useful notes

In order to prolong the service life of your player, it is recommended to wait at least 30 seconds before you turn it on again after switching it off.

Turn off power after operation.

Only use the power supply of the nominal voltage, otherwise the player will not be operational or even be damaged.

Some functions of the player may not be applicable to some discs.

In case of occasional player halt, please turn it off and turn it on again.

This player cannot play some SVCD discs with the CVD format.

When to use the Audio Output of this unit, please minimize the phone volume first.

2.6 Specifications

Disc Types	DVD VIDEO SVCD,MPEG4 VCD1.0,1.1,2.0 CD-DA MP3	
Output	Analog audio output Video Output	Stereo output, Headphone output
Video Characteristics	Video Amplitude	1.0Vp-p(75Ω)
Audio Characteristics	Frequency Signal-to-noise Ratio Total harmonic distortion	20Hz~20kHz(±1dB) >90dB <0.01%
General Specifications	Power Supply DC 9V 2A Power Consumption 12W Dimensions 205mmX149mmX39.5mm Mass 735g	
Operating Temperature	5 ~35	
Operating Humidity	15%~75%(no condensation)	

Specifications are subject to change without notice.

We do not guarantee that all discs can be played smoothly due to the disc quality,disc recording quality and recording format.

Chapter Three Principle or Servicing

Section One Principle of the Player

3.1.1 Block diagram of the player

DL370D is composed of decode circuit, servo circuit, audio circuit, video circuit and power circuit. The block diagram of the player is shown as in the following figure 3.1.1.1:

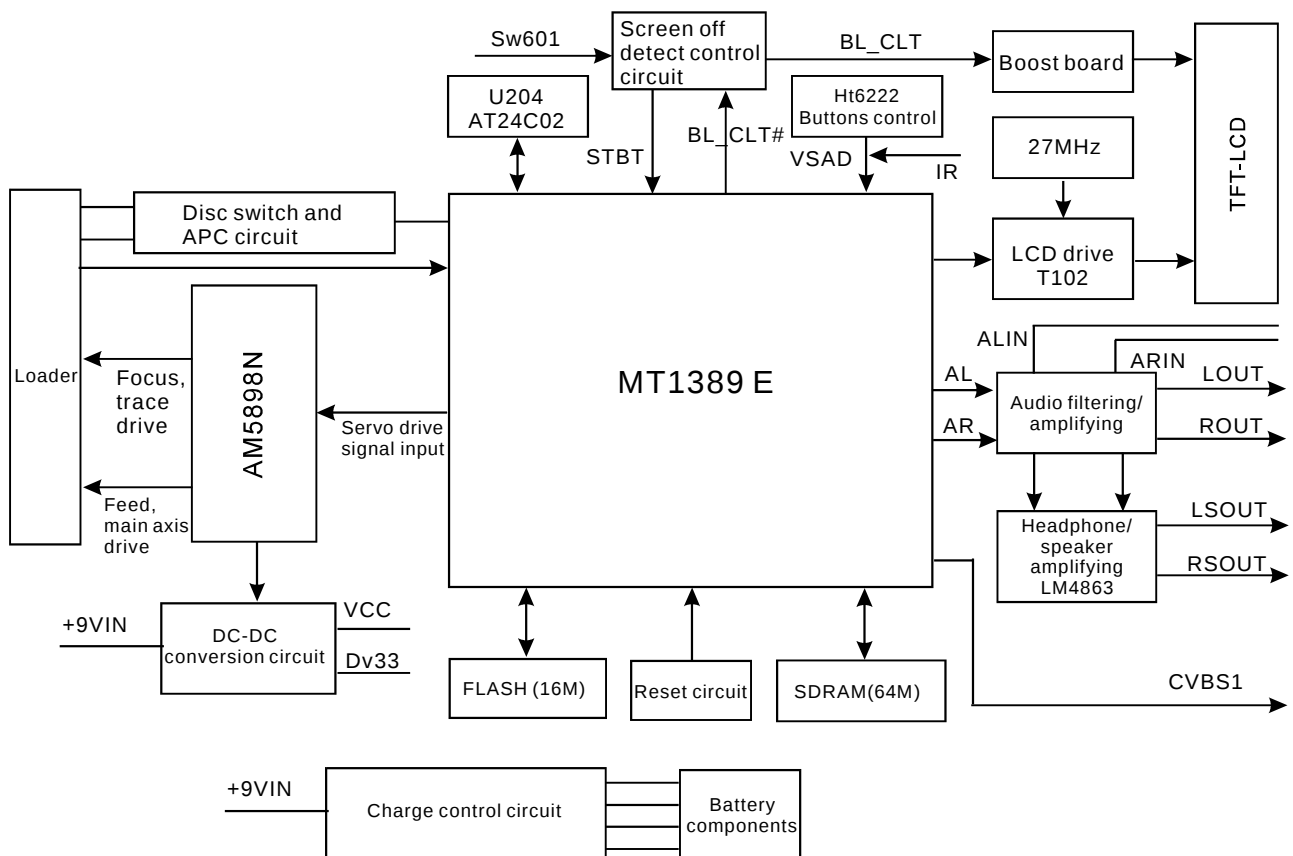


Figure 3.1.1.1 Block diagram of the player

3.1.2 PCB composition block diagram of the player

PCB composition diagram of the player is shown as in the following figure 3.1.2.1:

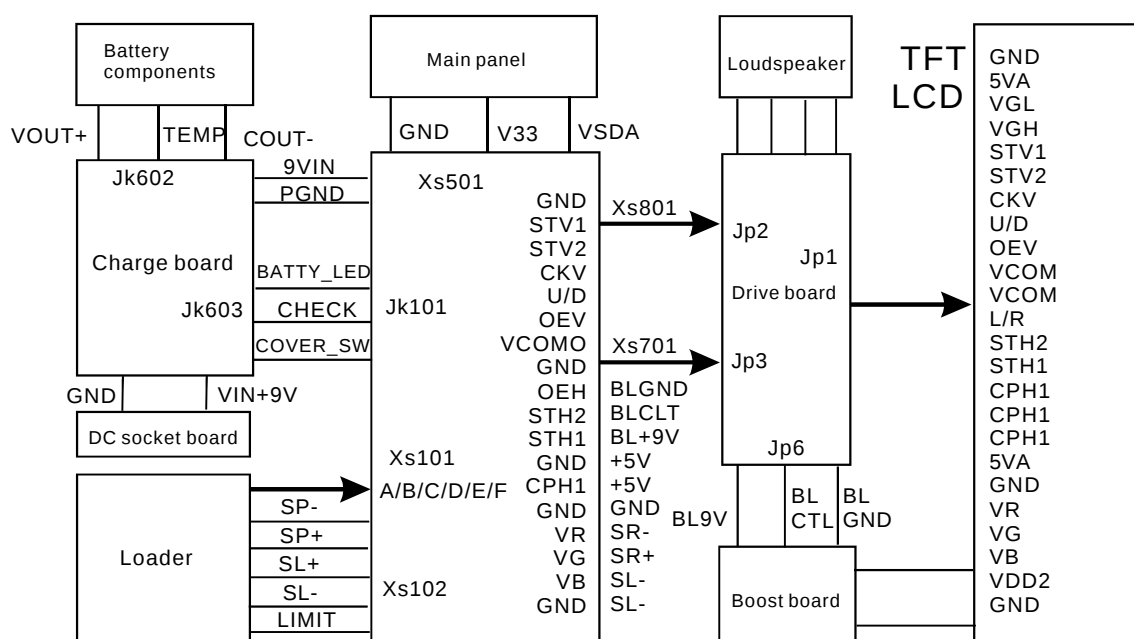


Figure 3.1.2.1 PCB composition figure of the player

3.1.3 Function introduction to IC of the player

Function introduction to IC of the player is shown as in the following figure:

PCB board	Location	IC model	Function
Main panel	U401	PT2222A	Buttons coding control
Drive board	U1	NJM3414AM	VCOM signal amplifying
	U2	G5105TBU	DC-DC conversion
Protection board	QB1	S8232	Battery charge protection
Charge board	U601	S3F9454	8-bit single chip, charge control
	U602	TL431	Three-end adjustable distributary reference source
	U603	LM358	Operational amplifier
Boost board	IC1	MP1026	Boost control
Decode board	U301	C4558	Audio amplifying (operational amplifier)
	U803	AZ1117	Voltage regulating IC
	U202	HY57V641620ET	64M SDRAM
	U801	T102	Video coding, LCD drive

Decode board	U204	24C02	EEPROM
	U201	MT1389FE/E	Decode chip
	U901	AM5898	Servo drive, DC-DC control
	U502	LM393	Battery electrical charge detect (operational amplifier)
	U701	HWD4863	Headphone amplifying
	U206,U802	LM1117H	Voltage regulating IC (U206 1.8V/U802 2.5V)
	U501	HS0038B3V	Receiver
	U203	29LV160BE	16M FLASH

Section Two Unit Circuit Principle

3.2.1 Servo processing circuit

1. DL370D adopts SANYO 62 loader and MTK decode solution (MT1389E+FLASH (16M)+SDRAM (64M)). The servo circuit is composed of front end signal processing, digital signal processing IC MT1389E and drive circuit Am5898, in which MT1389E is also the main composition of decode circuit.

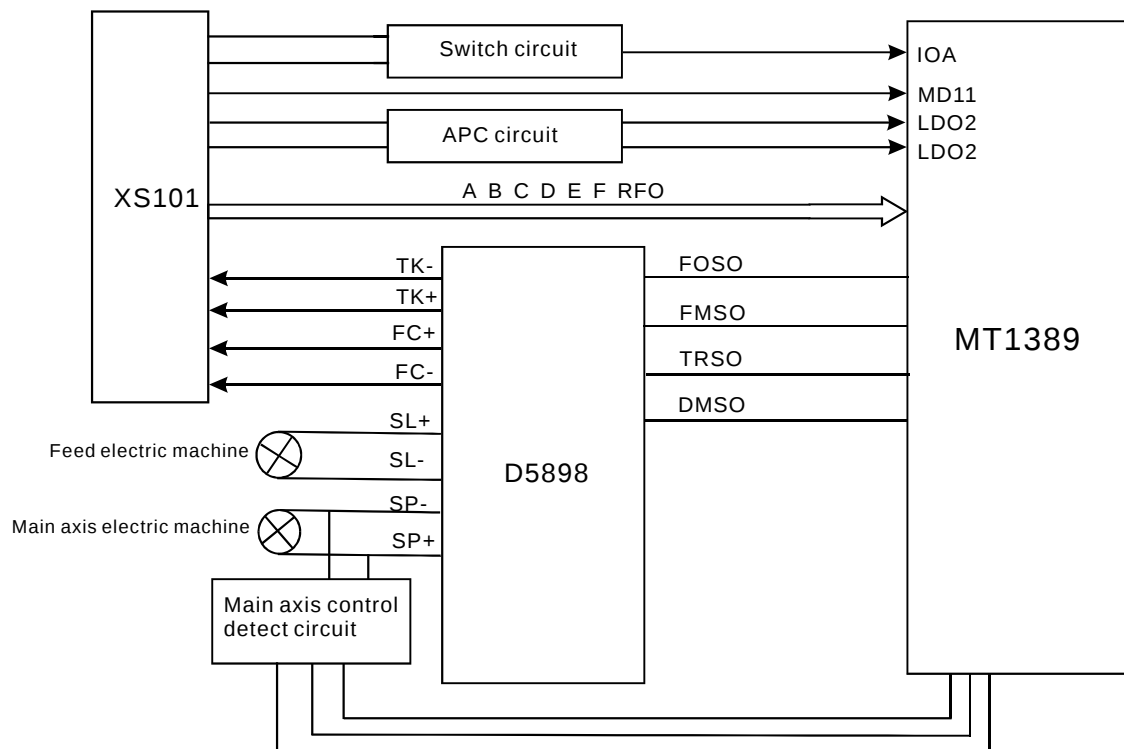


Figure 3.2.2.1 Servo processing circuit block diagram

2. Working principle: after power on or turning off door (door detect switch SW601/SW602 on charge board shouts off), loader laser head begins to reset, focus and main axis begin to rotate, laser head begins to identify disc information to judge the disc is CD or DVD to facilitate to make the corresponding acts. At the same time, Mt1389 also adjusts laser output power through laser power control circuit. When loader reads disc information, after photoelectric conversion, A, B, C, D, E, F signals are formed to give to Mt1389 (DVD has A, B, C, D signals only) and Therefore signal and the input from pin 2~11, 18, 19 of MT1389. After MT1389 internal pre-amplifying processing, now signal are divided into two parts inside MT1389:

After being processed by digital servo signal circuit inside MT1389, one part of signal form corresponding servo control signals and output FOO, TRO, DMO, FMO digital servo control signals from pin 42, pin 41, pin 37, pin 38 of Mt1389 respectively, then change into analog servo control signal FOSO, TRSO, DMSO, FMSO through integration circuit composed by resistor capacitor, and send to driver circuit BA5954 for amplification to bring along focus coil, trace coil, main axis electric machine and feed electric machine after drive amplification. Among these, focus and trace servo are used to correct objective position accurately; feed servo is used to bring along laser head to make radial large-scale move which belongs to the preliminary adjustment to pick-up position; and main axis servo is used to control main axis electric machine to make it read signals in means of constant linear velocity and bring along disc to rotate. After processing of amplification by VGA voltage control amplifier and equalization frequency compensation inside MT1389, another part of signals are changed into digital signals through internal A/D converter. When loader is reading CD/VCD signals, these signals are conducted EFM demodulation inside MT1389, after CIRC (Cross-Interleaved Reed-Solomon Code) error correction is finished inside, it outputs to rear state for audio/video decoding; when loader is reading DVD signals, these signals are conducted ESM demodulation inside MT1389, and then sent to latter stage for decoding after finishing RSPC error correction inside. Compared with general DVD players, this machine has no disc in/out circuit and manual opening method is adopted. When pin 148 of MT1389E is high level, system recognises that the door has been opened, when it is low level, the machine recognizes that the door has been closed.

3. Loader signals introduction is shown as follows:

Pin	Name	Signal flow direction	DVD disc	CD disc	No disc	Function description
1	F-	Input loader	2.52	2.34	0.46	Focus error signal is added to two sides of pick-up focus coil
2	F+	Input loader	2.49	2.49	0.93	
3	T+	Input loader	2.53	2.51	0.94	Trace error signal is added to two sides of pick-up trace coil
4	T-	Input loader	2.58	2.51	0.93	
5	C	Input MT1389	2.2	2.25	2.04	Disc data signal
6	D	Input MT1389	2.2	3.2	2.04	Disc data signal
7	IOA	Input MT1389	0.01	3.2	3.21	Disc identification signal, CD is 3.3V, DVD is 0V
8	RF	Input MT1389	2.21	2.53	1.28	The sum of disc data signal
9	A	Input MT1389	2.17	2.22	2.04	Disc data signal
10	B	Input MT1389	2.19	2.27	2.04	Disc data signal
11	F	Input MT1389	2.07	2.44	2.03	Supplementary signal used in trace
12	GND	Ground	0.01	0.01	0	Grounding
13	V20	Input loader	2.04	2.06	2.03	Reference voltage

14	Vcc	Input loader	5.04	5.04	5.02	Supply voltage for loader
15	E	Input MT1389	2.06	2.45	2.03	Disc data signal
16	Blanking	haning in air	0.01	0	0	unused
17	VR-CD	Input loader	0.21	0.01	0	Through the handling inside loader, make sure MD11 is 180mV when reading CD
18	VR-DVD	Input loader	0.01	0.2	0	Through the handling inside loader, make sure MD11 is 180mV when reading DVD
19	LD-CD	Input loader	0.09	2.1	0	CD laser power control signal
20	MDII	Input MT1389	0.21	0.2	0	CD and DVD laser power monitoring signal
21	HFM	Input loader	5.04	5.04	5.02	High frequency overlapping signal produces laser with different wave length inside loader
22	Blanking	unused	0.01	0.1	0	
23	LD-DVD	Input loader	2.21	0.1	0	DVD laser power control signal
24	GND	unused	0.01	0.01	0	Grounding

Note: 1. When reading DVD, there are only A, B, C, D signals.

2. When reading CD, there are A, B, C, D, E, F signals.

3. $RFO=A+B+C+D$.

4. Focus error signal= $(A+C)-(B+D)$ Trace error signal= $E-F$.

3.2.2 CD/DVD switch circuit

1. CD/DVD switch circuit is shown as in the following figure 3.2.2.1:

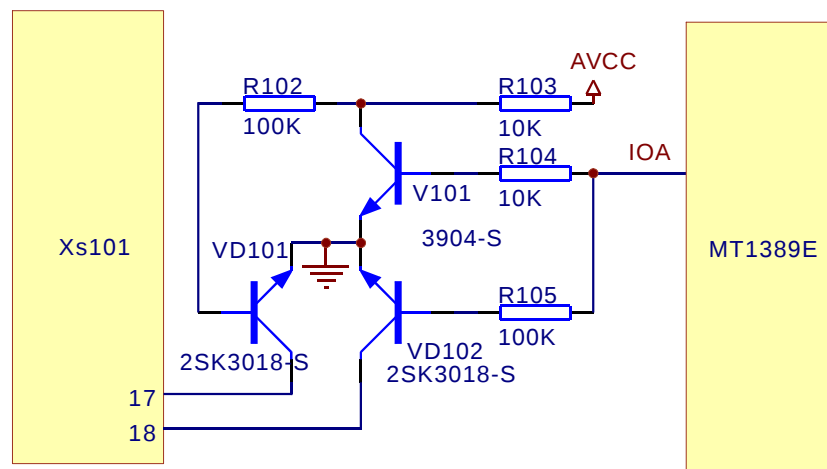


Figure 3.2.2.1 CD/DVD switch circuit

2. Working principle: after disc is loaded in machine, IOA port is defaulted high level to make Vd102 saturation on and form loop with CD laser power control circuit on loader, at the same time IOA also reaches loader PD IC for switch, disc begins to rotate; when servo processing system recognises that the disc inside machine is not CD, IQA pin outputs low level to make Vd102 cut off, Vd101 on and form loop with DVD laser power control circuit on loader to carry out the action of reading DVD disc. After door is opened, IOA still keeps the state before door is opened. If machine cannot recognise which the disc is, IQA pin will switch always until no disc is read out or judged by system.

Note: V303, V304 are MOS pipes (pressure drop is small when saturation on).

3.2.3 Laser power control circuit

1. Laser power control circuit is shown as in the following figure 3.2.3.1:

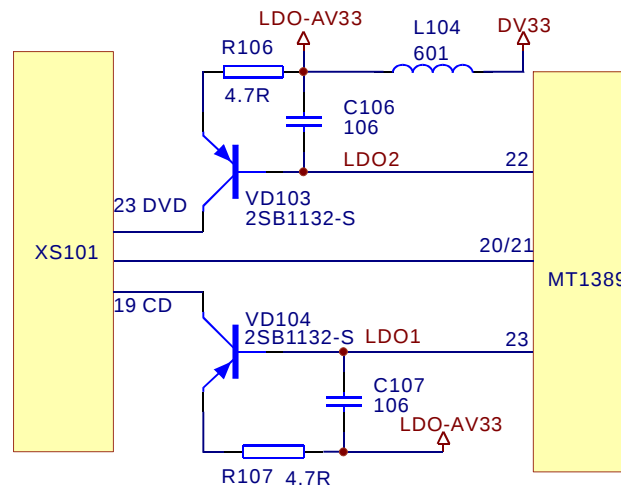


Figure 3.2.3.1 Laser power control circuit diagram

2. Working principle: pin 20/21 of MT1389 is laser power detect signal input pin, pin 21 is DVD laser power strong/weak detect signal input pin, pin 23 is VCD laser power drive control output pin, pin 22 is DVD laser power drive control output pin.

When reading VCD disc, laser power becomes weak, voltage of MDII pin decreases; when voltage of MT1389 decreases, voltage of pin 19 of XS101 increases to reach the function of boost laser power; when laser power is too strong, voltage of MDI pin increases to make voltage of MT1389 increase and voltage of pin 19 of XS101 decrease to reach the purpose of lowering laser power to form a automatic power control circuit. When reading DVD disc, pin 21 is detect signal input pin, pin 22 is drive control output pin and the working principle is the same with that when playing VCD disc.

3.2.4 Main axis control circuit

1. Main axis control circuit is shown as in the following figure 3.2.4.1:

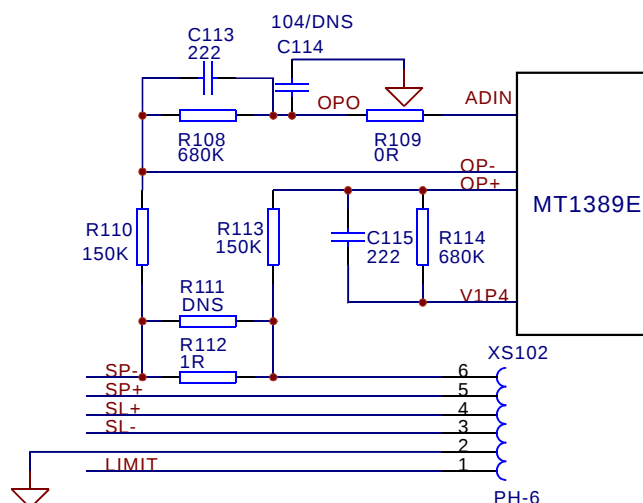


Figure 3.2.4.1 Main axis control circuit diagram

2. Working principle: MT1389E has a comparator composed of operational amplifier inside. When door is opened, disc is always rotating, so a braking signal is required to make main axis electric machine stop rotating immediately to realize the purpose that disc can stop rotating during a short period after door is opened. In the course of playing, if “OPEN” button is pressed, main axis drive signal disappears, but main axis electric machine is still in rotating state because of inertia function. The induced voltage achieved by induced electromotive force produced by electric machine running on sampling resistor R321, R340, after sampling through resistor R112/R110/R113, input to pin 35, 36 of MT1389, and output from pin 34 after Mt1389 amplifying processing inside, after D/A conversion and relevant processing inside Mt1389, an instant electric machine reverse braking signal is outputted to make main axis electric machine speed down. This machine is manual open/close means, so disc is still rotating after door is opened but it will stop very soon.

3.2.5 DC-DC switch circuit

1. DC-DC switch circuit is shown as in the following figure 3.2.5.1:

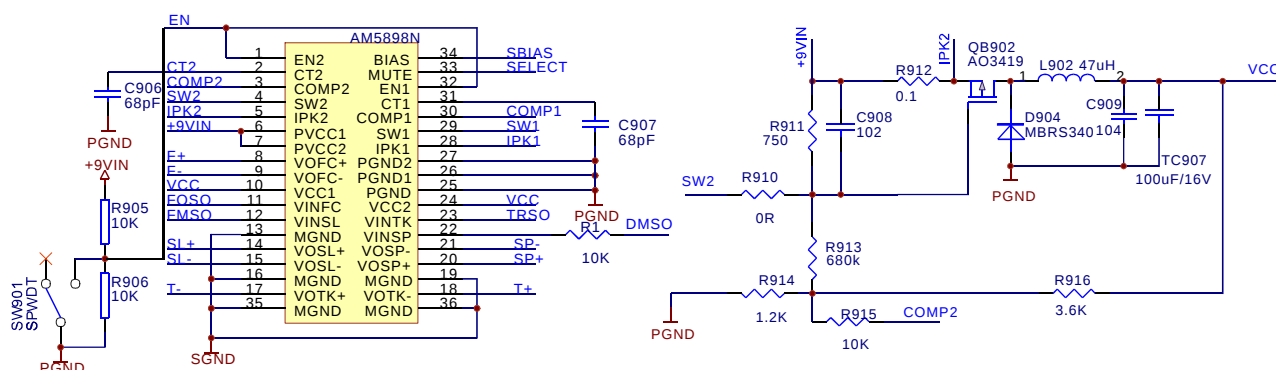


Figure 3.2.5.1 DC-DC switch circuit diagram

2. Working principle: when switch is closed, EN1 EN2 of AM5898 is low level, DC-DC circuit has no function, machine is in power off state, but after Sw901 is disconnected, EN end is high level, DC-DC circuit begins to work. Take VCC for instance, we give explanation to voltage regulating of circuit:

DC-DC circuit begins to oscillate, its working frequency is in 240khz, Sw pin outputs on/off signal. When grid electrode of QB902 is high level, MOS pipe is on, +9V power reaches L902 TC907 through MOS pipe to save energy for inductor and charge capacitor, D904 freewheeling diode, when MOS pipe is cut off, L discharges energy and its induced electromotive force makes diode on, at the same time TC907 discharges the load with current direction unchanged to form a series connection switch voltage regulating circuit. When output voltage is on high side, it has the following changes: VCC increases — COMP2 increases SW2 on/off frequency turns low —VCC decreases. When voltage is on low side, the course is opposite to that of increase. R912 is over-current protection circuit sampling resistor. (DV3.3 circuit principle is the same with that of VCC)

As shown in the figure 3.2.5.2, when machine is in DVD, SELECT pin of decode chip outputs a high level to make servo drive circuit enter working state and reach Vd1 saturation on at the same time, VD901 is cut off, Qb904 is cut off, DC OUT has no power output. When machine is switched to external input, SELECT pin of decode chip outputs a low level to make servo driver circuit not work, VD1 is cut off, VD901 is saturated, QB904 is saturated, DC OUT outputs VCC to provide for TV box. (CON3 is DC output socket)

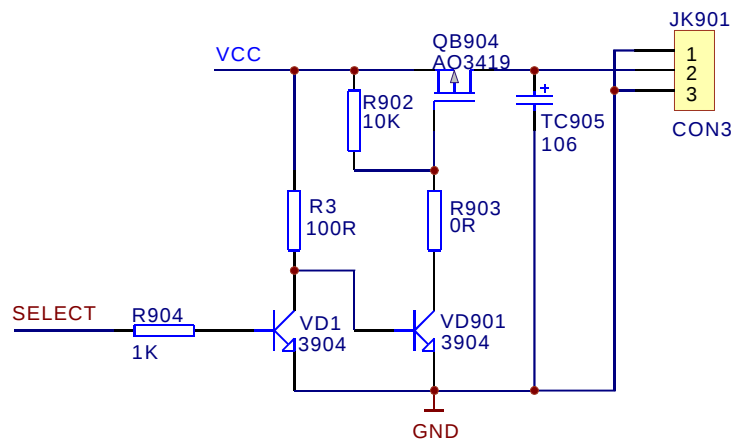


Figure 3.2.5.2 DC OUT control circuit

3. Relationship of each control pin of AM5898

AM5898 has built-in DC - DC power manager and collaborate with peripheral circuit to provide load with the required voltage. This circuit is with over-voltage protection, over-current protection and stability protection function, in which AM5898 is also with servo drive function, which has been introduced in servo circuit section. The relationship of each pin of AM5898 is shown as in the following table:

Truth table (○ : active × : inactive - : don ' t care)

MUTE	EN1	EN2	MOTOR CHANNEL	DC-DCCTRL1	DC-DCCTRL2
H	—	—	○	—	—
—	H	—	—	○	—
—	—	H	—	—	○
L	L	L	×	×	×

3.2.6 Battery voltage detecting circuit

1. Battery voltage detecting circuit is shown as in the following figure 3.2.6.1:

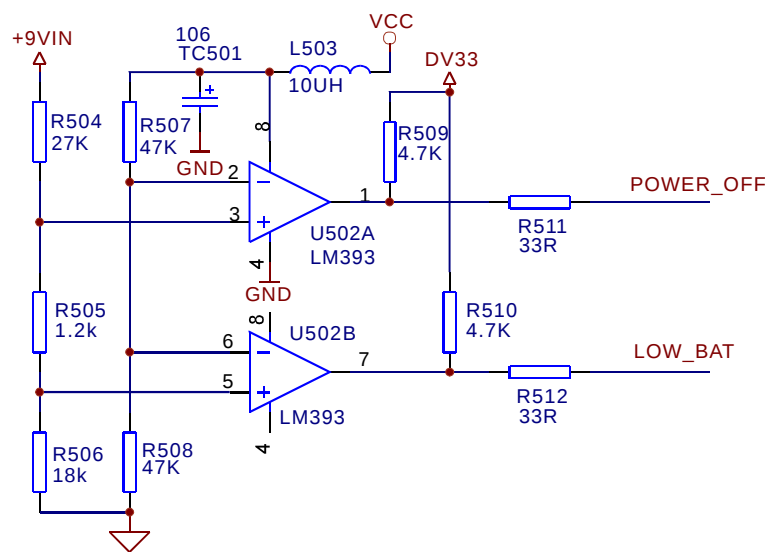


Figure 3.2.6.1 Battery voltage detecting circuit

2. Working principle: U502 is an operational amplifier and used as a comparator in circuit. Reverse input terminal inputs a VCC5V, through two resistors partial pressure, the reference voltage (2.5V) is achieved; through partial pressure by R504 R505 R506 of +9VIN, two groups of voltage are achieved to supply for the in-phase input end of operational amplifier; when voltage of in-phase input end is less than 2.5V, the output pin of operational amplifier outputs a low level to decode chip to perform the corresponding acts. In this machine, after calculation, we conclude that when input voltage is less than 6.5V, pin 7 of operational amplifier outputs low level and machine screen displays low battery; when input voltage is less than 6.1V, pin 1 of operational amplifier outputs low level and machines carries out power-off action.

3.2.7 Audio output circuit

1. Audio output circuit block diagram is shown as in the following figure 3.2.7.1:

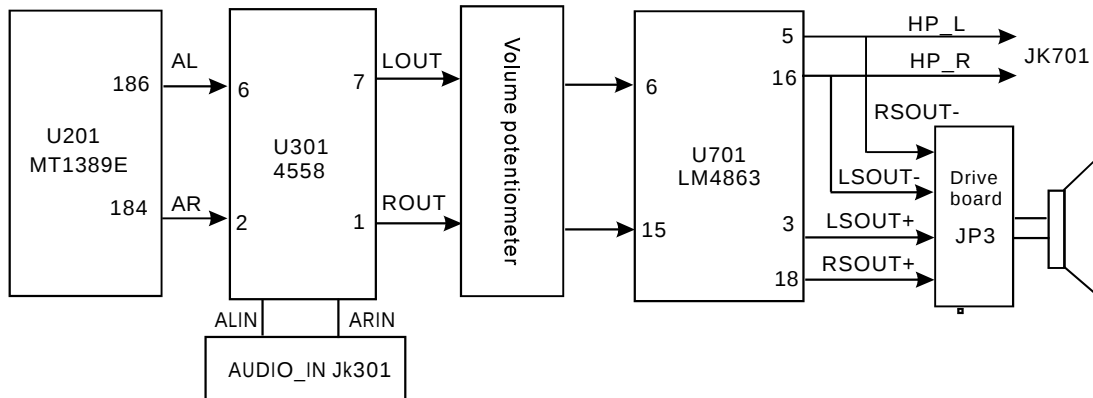


Figure 3.2.7.1 Audio output circuit block diagram

2. Working principle: signal read out by disc, through audio and video decoding, converse audio signal in MT1389E built-in DAC circuit to analog audio signal and output left and right channel analog signals from pin 186, 184 of MT1389E, through Tc301, Tc302, coupled to pin 6, 2 of U301 and then output from pin 1, 7 of U301 through being filtering and amplifying by the active filter composed of U301 and send to audio output terminal and headphone amplifying output circuit.

(1) Headphone amplifying output circuit

As shown in the figure 3.2.7.2, after volume adjustment of the audio signals outputted from U301 through VR701, input from pin 6, 15 of U701 respectively; audio signals after being amplified output from pin 5, 16 of U701 to headphone socket for perform converse between headphone and speaker.

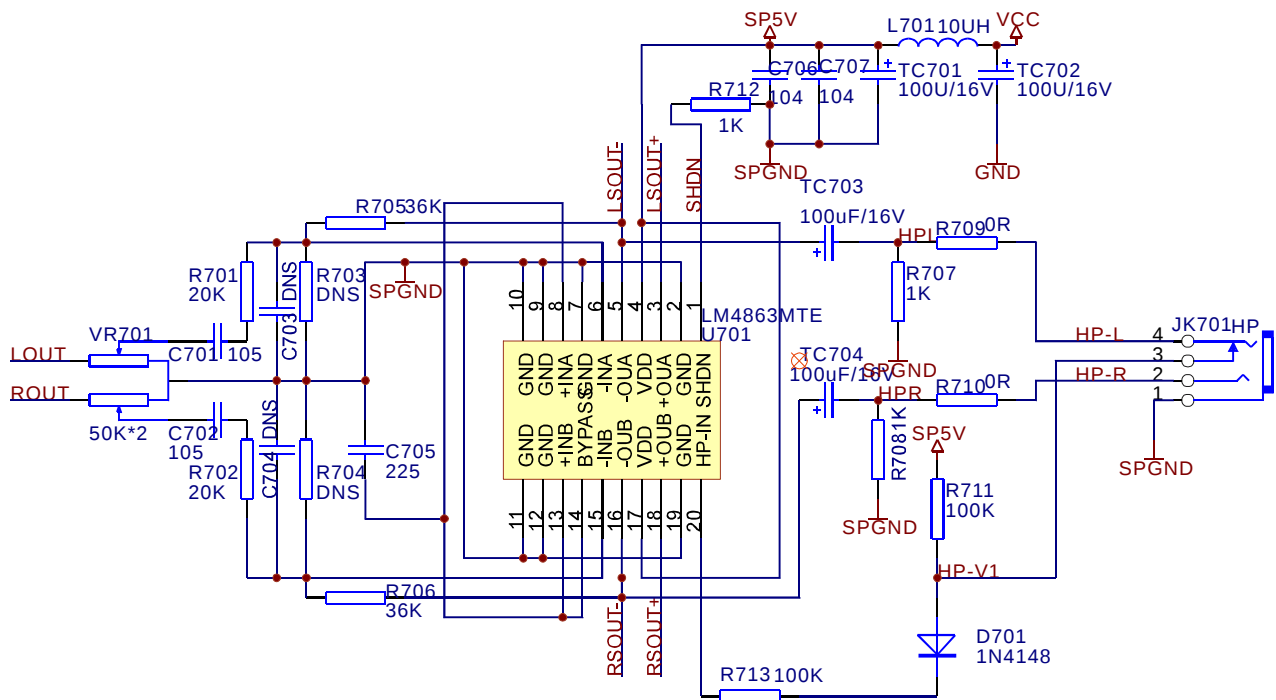


Figure 3.2.7.2 Headphone amplifying output circuit diagram

(2) Output mode switch in headphone and speaker

LM4863 drive speaker adopts bridge connection. That drives headphone is single ending working mode and its switch between them is fulfilled by HP-IN pin. As shown in the figure 3.2.7.2, when headphone is inserted into a jack, a 4V~VDD voltage is added to HP-IN, which may cut off internal operational amplifying module Amp2A and Amp2B to make the load connected by bridge invalid. Now IC lies in single ending working mode and speaker has no sound output. When no headphone is connected to jack, partial pressure resistance of R711, R707 makes the voltage supplied to pin HP-IN (pin 16) close to 50mV, drive Amp2A and Amp2B are in working state to make 4863 work in bridge mode and transmit to speaker through drive board to make speaker has sound output.

3.2.8 Screen off detect control circuit

1. Screen off detect control circuit is shown as in the following figure 3.2.8.1:

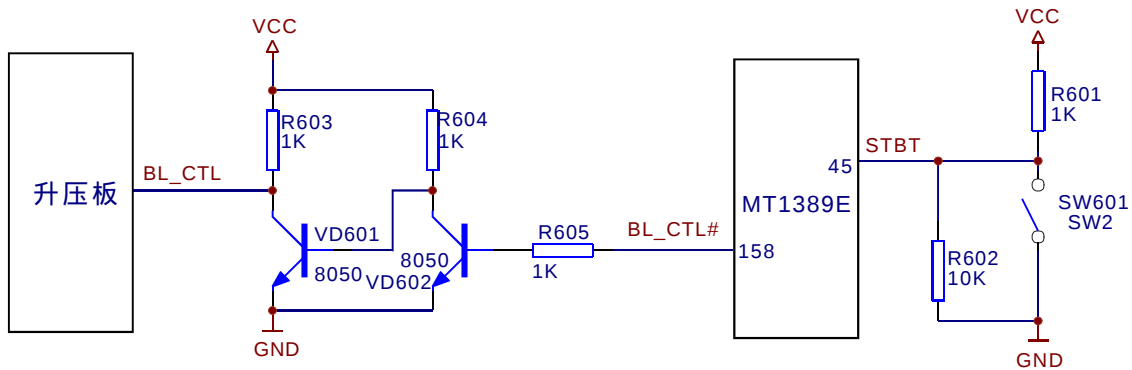


Figure 3.2.8.1 Screen off detect control circuit

2. Working principle: when switch is off, pin 45 of MT1389 detects level, pin 158 outputs low level to make BL_CTL low level, boost board stops working; when switch is disconnected, STBT is high level, pin 158 of MT1389 outputs high level to make BL_CTL high level, boost board begins to work and lighten back light board (when switch is in panel position, screen close is off, screen open is disconnected).

3.2.9 Video coding and LCD - TFT drive circuit

1. Video coding and LCD - TFT drive circuit block diagram is shown as in the following figure 3.2.9.1:

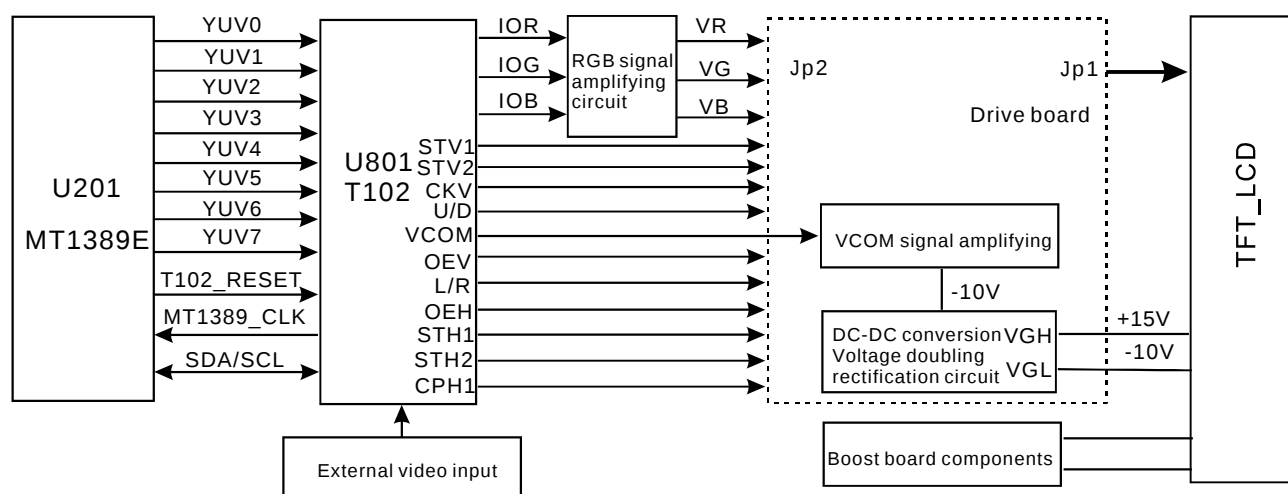


Figure 3.2.9.1 Video coding and LCD - TFT drive circuit block diagram

2. Working principle: decode chip outputs digital video signal and directly inputs to T102 for coding in the means of data in parallel (8 bit), and restore digital signal to 3 base colour signal through internal DAC circuit and are outputted by pin 62, 65, 68 and sent to a amplifying circuit composed of single triode. Shown as in the figure 3.2.9.2, converse small current signal of RGB into voltage output means to drive LCD screen to display.

VCOM signal amplifying circuit: VCOM, after U1 (NJM2414) amplifying, outputs from pin 6, 7 to display screen and is used as the colourful filtering plate of display screen.

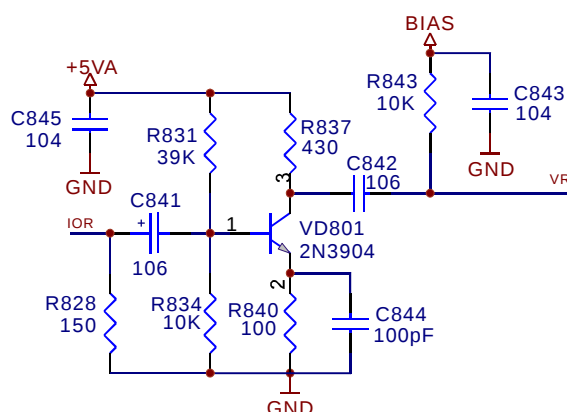


Figure 3.2.9.2 Amplifying circuit

3. Voltage doubling circuit

Working of display drive circuit requires high voltage, so +5V voltage is voltage doubled, shown as in the following figure 3.2.9.3:

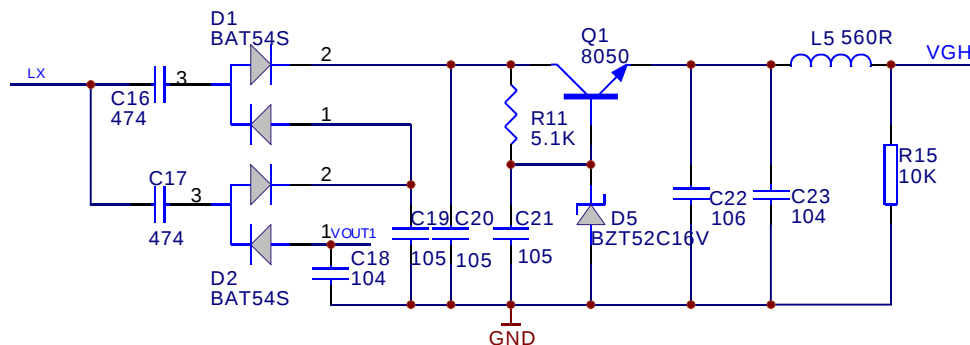


Figure 3.2.9.3 Voltage doubling rectification circuit

+5V power, through DC-DC conversion conducted by U2, is transmitted to the two groups of voltage doubling rectification circuit composed of D1-D4 to perform rectification to power sent from pin 1 of U2. When LX input is negative half circle, about -14V voltage is formed in collector electrode of Q2, -10 VGL voltage outputted after D6 voltage regulating is provided to VCOM signal amplifying circuit and display screen. When LX input is positive half circle, the voltage doubling rectification circuit composed by D1, D2, C19 cannot be up to voltage required by VG, so 7V DC current achieved after D7 rectification is overlapped in pin 1 of to voltage regulating circuit Q1, D5 for voltage regulating and then output +15V DC power to provide for display screen. +15V is outputted by JP1 to display screen through socket JP2 to drive board. In which JP3 on drive board mainly transmit the signal and power required by loudspeaker and boost board.

4. Boost board (if this PCB board is damaged, it will not be serviced but change it directly): how to judge the boost board: 1) Make detecting head of oscillograph close to high voltage output line (pay attention not to touch the line), a sine wave with about 60K will be viewed from oscillograph, which means that boost board has AC output. The main fault of boost board is that there is no back light or back light is dark.

5. Function introduction to display screen pin is shown as in the following table:

Pin	Symbol	I/O	description
1	GND	-	Ground
2	VCC	P	Power line for logic
3	VGL	P	Gate driver negative voltage
4	VGH	P	Gate driver positive voltage
5	STV1	I/O	Gate driver START PULSE 1
6	STV2	I/O	Gate driver START PULSE 2

7	CKV	I	Gate driver scanning clock
8	U/D	I	Up/Down scanning change
9	OEV	I	Gate driver output enable
10	Vcom	I	HORIZONTAL SYNCHRONIZATION SIGNAL(Voltage applied to color filter substrate)
11	Vcom	I	Voltage applied to color filter substrate
12	L/R	I	Right / Left scanning change
13	MOD	I	Sampling mode change (H: Simultaneous, L: Sequential)
14	OEH	I	LATCH PULSE FOR COLUMN DRIVER
15	STH2	I/O	Source scanning start signal 2
16	STH1	I/O	Source scanning start signal 1
17	CPH1	I	INPUT DATA CLOCK
18	CPH1	I	INPUT DATA CLOCK
19	CPH1	I	INPUT DATA CLOCK
20	Vcc	P	Power line for logic
21	GND	P	Ground
22	VR	I	Red video signal
23	VG	I	Green video signal
24	VB	I	Blue video signal
25	AVdd	P	Power
26	AVss	P	Ground

6. Scanning mode selection is shown as in the following table:

Scan control input setup		Start up pulse I/O state				Scan mode
U/D	L/R	STVR	STVL	STHR	STHL	
GND	Vcc	O	I	O	I	Up → down Left → right
Vcc	GND	I	O	I	O	Down → up Right → left
GND	GND	O	I	I	O	Up → down Right → left
Vcc	Vcc	I	O	O	I	Up → down Left → right

3.2.10 Charge circuit and protection circuit

1. Battery: Lithium-ion polymer chargeable battery always follows the method of constant current firstly and then constant voltage, and then charge in constant voltage state.

2. Lithium battery protection part (this PCB board will not be serviced inside battery components) is divided into three types: A) Over-voltage protection, that is charge protection; B) Under voltage protection, that is discharge protection; C) Current protection (short circuit protection included). The protection delay and delay time of the above 3 items are different, from 1 second to 0.1 second and to 10ms with delay adjustable. Two lithium batteries protection, no matter over voltage protection or under voltage protection, they are the relationship of “or”. Only one of the two cores has the condition, the protection is available, which requires that the two cores of a group of battery are balanced on the whole, or else the whole capacity will be severely damaged (when in over voltage protection, the core of high voltage causes over voltage protection firstly; when in under voltage protection, the core of low voltage causes protection firstly).

3. Charge part (charge board is a individual PCB inside main unit): core of charge part is single chip that adopts A/D conversion with 10-bit. 8-bit single chip (S3F9454) of PWM (12bits) SAMSUNG company has the following features:

(1) Single chip is with 10-bit A/D conversion itself, the precision of A/D conversion is 1/1024, the negative voltage of general NI-MH is 3-6mv ($6\text{mv}/1500\text{mv}=1/250$), which can meet the demands greatly.

The precision of lithium battery may be up to 5mv. Considering the test error, it may be up to $\pm 20\text{mv}$, that is $4.2\text{V}\pm 0.02\text{v}$. The high precision and strong point are obvious.

(2) Use PWM (pulse width modulator) of single chip itself to directly control DC/DC conversion. The control method is provided by software to achieve different constant current and constant voltage curve (different charge means may be designed according to clients' requirements), so the whole line is simple, with low cost, high reliability, high efficiency power conversion and less heat radiation.

(3) May charge NI-MH, NI-CD, LI-ION battery well. How to judge whether it is fully charged: A) max voltage; B) max temperature increase; C) negative voltage; D) longest charge time. It can be tested quickly after battery is fully charged and loaded again (within 15 minutes) and stop charging (this point is very important to NIMH and NICD, which can prevent over charge to damage battery), when battery voltage is low, use small current to charge to resume the damaged battery.

4. Working principle: when external power adapter is adopted to supply power, power arrives at VIN pin through socket board and is divided into two ways: A) arrive at decode board (VOUT+) directly through VD602; B) provided for charge circuit. After voltage regulating, the voltage regulating circuit composed by V601, U602 provides working voltage for U601. U601 is charge management control single chip.

Power supply of CPU adopts TI431 and an NPN triode. There are many elements, but precision is high, easy to correct and up to 1%, and test work is less. The power supply circuit is composed of U602 and V601, etc.

V605, V604, V603, QB602 compose switch DC/DC circuit; V603 and V604 compose standard push pull circuit to drive QB602 to make QB602 has good switch waveform to decrease heat radiation.

QB602, L601, TC603 and VD601 compose classic STEP DOWN circuit. When QB602 is on, current supplies power for battery on one hand and save energy for inductor on the other hand. When is QB1 cut off, the electric energy in inductor discharges through VD601 to charge battery.

LM358 is classic in-phase amplifying circuit. The reason of adding amplifying circuit is to decrease resistance test and heat radiation.

The function of QB603 is the external power supply control end. When VIN is low level, QB603 is on, battery supplies power for load; when VIN is high level, adapter supplies power for load.

QB601 and V602 compose protection circuit. When charge circuit or battery has trouble, MOS_SW outputs high level, QB601 cuts off, 9V stops supplying power for battery.

3.2.11 Control panel circuit and remote control circuit

Panel control circuit adopts HT6222 control circuit to control and its working power is 3.3V. After we input buttons information, serial data signal are achieved through HT6222 internal processing and sent to decode board through VSDA pin and to IR pin (102) of decode chip through a separation diode Vd201. The function of separation diode is to prevent the mutual interference of buttons function and remote control function and incorrect order being carried out.

3.2.12 Decode circuit

1. Decode circuit block diagram is shown as in the following figure 3.2.12.1:

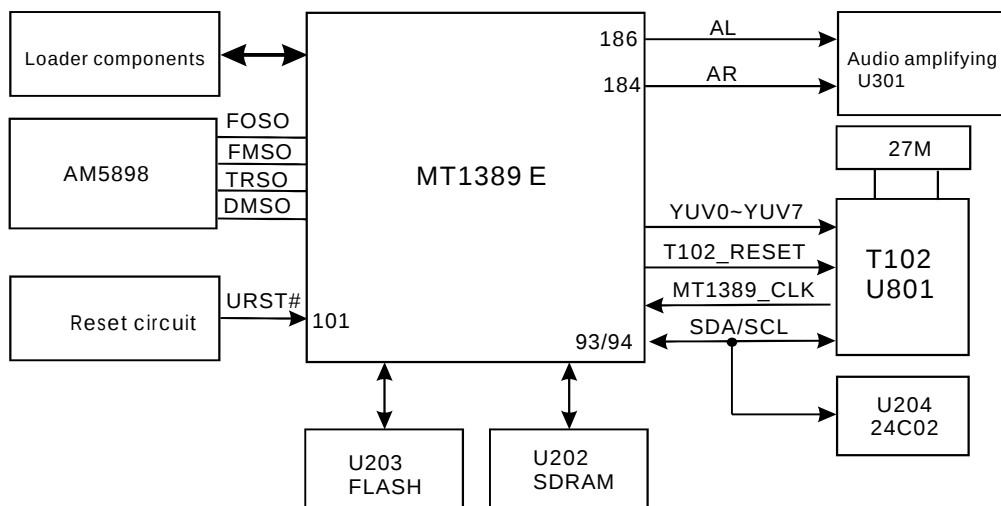


Figure 3.2.12.1 Decode circuit block diagram

2. Working principle:

(1) Power: MT1389 is with two groups of power supply: one group achieves 1.8V voltage after LM1117MP-1.8(U216) voltage regulating to supply for the logic circuit inside IC; the other group achieves 3.3V voltage after DC-DC conversion and QB903 voltage regulating. At the same time, FLASH and SDRAM must also meet the requirements of power.

(2) System clock: clock signal is an important factor of machine's working, that whether there is clock signal or whether it is normal will affect the normal working of the player. This machine adopts external clock (27M) that inputs to pin 194 of MT1389, clock is produced by T102 and its peripheral circuit.

(3) Data communication

1) Communication of Mt1389 and SDRAM: the communication of MT1389 and SDRAM is mainly to temporarily save the large quantities of data after MT1389 decoding to prepare for saving at any time. Shown as in the figure, DMA0DMA10 is address signal, DQ0DQ15 is data signal, DCLK is synchronous clock, DCKE is enabled end, CS is chip selection signal, WE is write enabled signal, RAS and CAS are row and line gating signals.

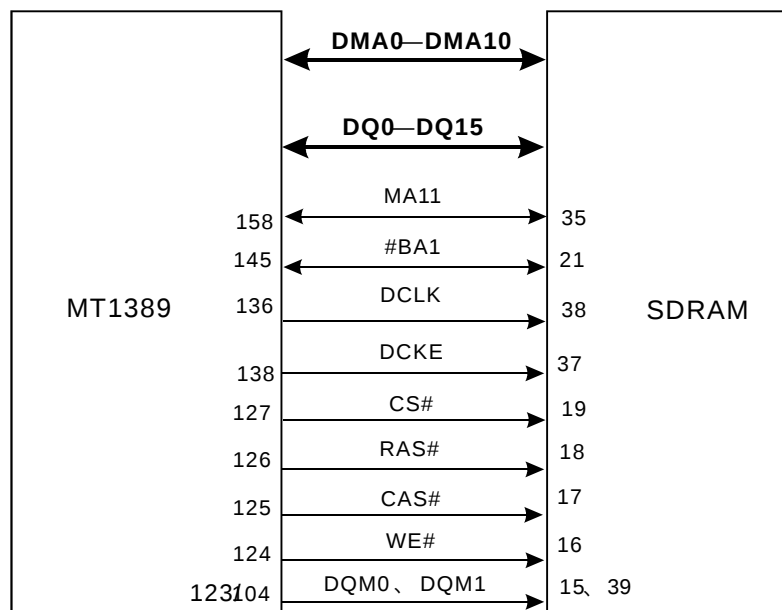


Figure 3.2.12.2 Communication block diagram of MT1389 and SDRAM

2) Communication of MT1389 and FLASH

The communication of Mt1389 and FLASH is mainly to call the program and working directions saved inside FLASH when power on. Shown as in the figure, A0A19 is address line, A20 and 21 are address line, AD0AD14 is data line, DWR# is read-write control, DCE# is chip selection and DRD# is red operation.

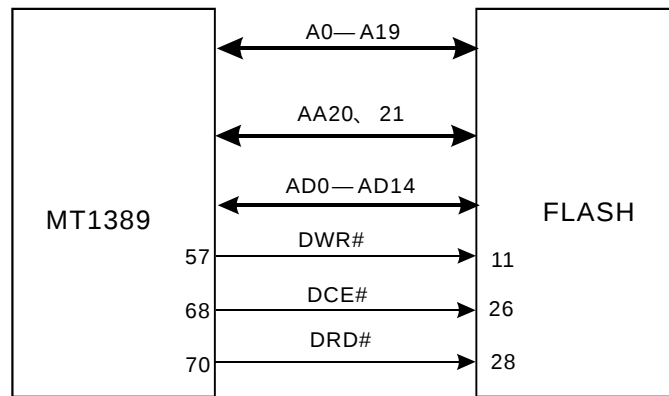


Figure 3.2.12.3 Communication block diagram of Mt1389 and FLASH

3. Audio, video output

(1) Video: MT1389 integrates video encoder inside, so analog video signals can output from Mt1389 inside directly; but DL370D only need to output digital signal, and its digital signal output is as follows:

Pin 152~157 and pin 79/99 of MT1389E output MYUV0~MYUV7 8-bit digital video signal separately.

(2) Audio: Mt1389 integrates D/A conversion inside, so analog audio signal output from MT1389 inside directly, and digital signal may also output directly and be conversed by the externally connected D/A conversion IC, which is also with optical output function. DL370D adopts analog audio output and the output signals are as follows:

P187: ASL

P186: AL

P184: AR

P183: ASR

P182: ASUBW

P188: ACENTER

P159: DPDIF#

This machine only uses two channels of AL and AR and no other channels.

3.2.13 Reset circuit

1. Reset circuit is shown as in the following figure 3.2.13.1:

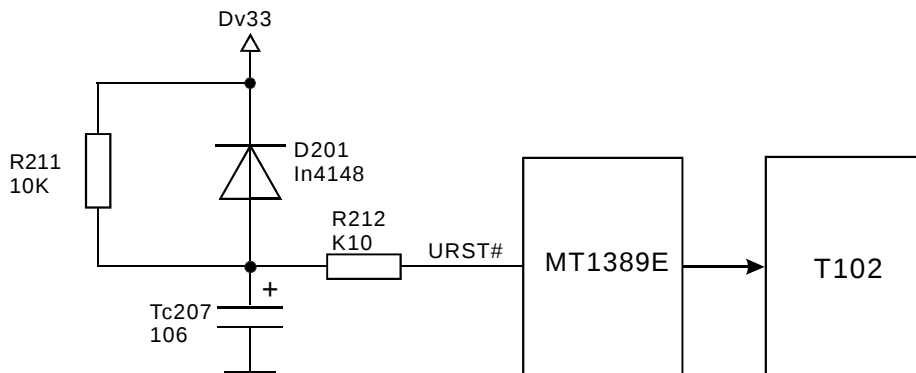


Figure 3.2.13.1 Reset circuit diagram

2. Working principle: after power on, DV33 charges TC207 through R211. Voltage on two ends of capacitor cannot change suddenly, so positive voltage of TC207 increases gradually and its increase time is related with R211/TC207. When machine is working normally, this voltage is the same with power voltage on the whole. After this circuit performs reset to decode chip, pin 95 of decode chip outputs a reset signal to pin 28 of T102 to perform reset to T102. After machine power off, the electric charge saved in TC207 discharges through D201 to ensure the reliable reset after power on next time.

3.2.14 Mute circuit

1. Mute circuit is shown as in the following figure 3.2.14.1:

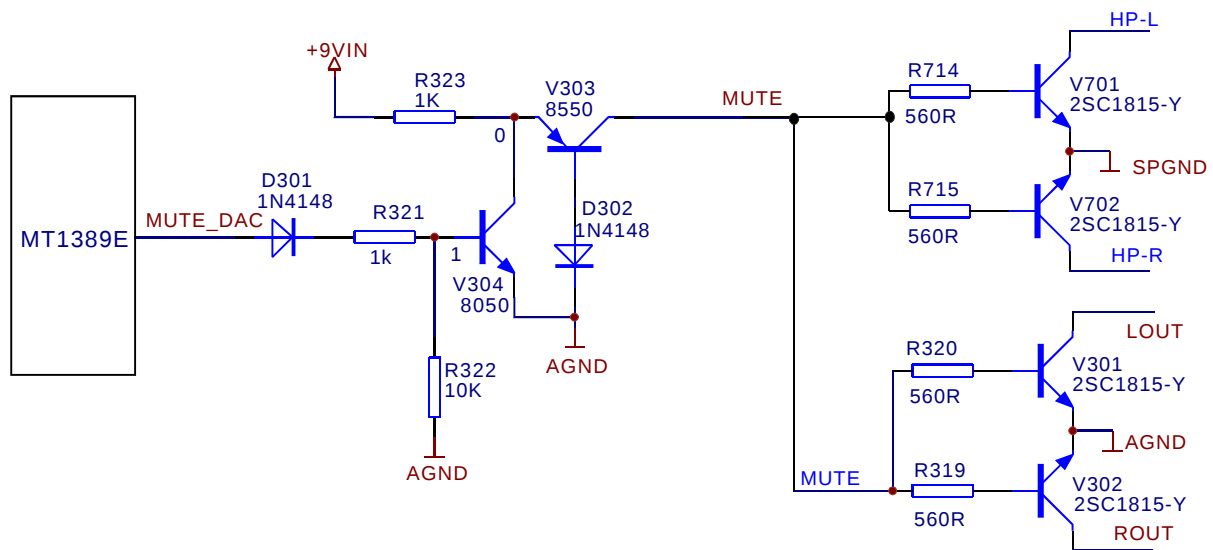


Figure 3.2.14.1 Mute circuit diagram

2. Working principle: after power on, +9V arrives at the base electrode of V301, V302, V701, V702 through CE of V303 to make triode saturated on, audio signal output and headphone output are short circuited to ground to remove noise that produces when power on. After machine resets and begins to read disc, pin 151 of Mt1389 outputs a high level to make pin MUTE change from high level to low level, V301, V302, V701, V702 are cut off because the base electrode is low level, audio signal can output normally.

Section Servicing Cases

3.3.1 Servicing instances

[Example1] Symptom: not read disc

Description: not read any disc

Analysis and troubleshooting: firstly, press down detect switch of door and check whether loader laser head can restore to the most inner circle and it is normal after observing. Then check whether laser head has infrared light radiation, the intensity of light radiation (pay attention not to stare at laser light with eyes vertically, which is harmful to eyes, and look at it at a certain angle) is basically normal, then load disc and observe the rotation speed of disc, the beginning of rotation is basically normal, and finally rotation speeds up obviously and the laser head also moves all the way, which means that it cannot find the disc information, firstly you may consider that laser head focus has trouble and cannot find the beginning information, change loader components and trouble is removed.

[Example 2] Symptom: no OSD

Description: machine cannot read disc, there is no image

Analysis and troubleshooting: firstly check power supply of each channel, 9V, 3.3V, 1.8V, 5V which are all normal, check 5V of control line BL_CTL of boost board and back light voltage 9V of boost board and boost board output, which are normal; check whether detect switch is stuck or whether detect switch is invalid, which are normal; check CVBS0 signal on L801 and find that there is no; check power supply of MT1389, U202 (SDRAM), U203 (FLASH), U204 (EEPROM), which is normal; check pin 1, 24, 25, 48 of FLASH address line (FLASH pin is dense, this 4 pins are at the edge, so it is easy to measure) and find that there are two pins without waveform, another two pins have waveform but it is incorrect; after changing FLASH, trouble is removed.

[Example 3] Symptom: colour distortion

Description: colour loss leads to the distortion of played picture

Analysis and troubleshooting: play colourful bar signal and find that green signal is missing; colour loss is not display screen trouble generally, so firstly check display drive circuit, directly check amplifying circuit of R, G, B, there is IOG signal but there is no output signal VG; check triode Vd802 and find that R835 is missed stuck, after sticking it again and trouble is removed.

[Example 4] Symptom: white screen

Description: disc reading is normal, sound is normal, display screen cannot display image and white screen appears.

Analysis and troubleshooting: white screen means that boost board working is normal, so it is preliminarily judged that display drive has trouble, check voltage of 3.3V, 2.5V of U801 and they are both normal; check input/output signal CVBS0, SDL, SCL, YUV, STH, VCOM0 and find that there is no VCOM0 signal; after changing U801, the trouble is removed.

[Example 5] Symptom: headphone has no output

Description: loudspeaker and headphone both have no output.

Analysis and troubleshooting: use oscillograph to test whether there is sound signal that outputs to headphone terminal, and there is no; test whether left and right of TC703, TC704 electrolytic capacitor have waveform output and there is no; check whether mute circuit is normal, MUTE signal is low level, normal; check pin 15, 16 of U701 (LM4863 headphone/loudspeaker drive), and there is sound signal input; after changing U701, trouble is removed.

[Example 6] Symptom: power not on

Description: machine has no response after power on

Analysis and troubleshooting: check whether 9V voltage comes through charge board and it is normal; check QB902, QB903, and there is 5V, 3.3V conversion, which is normal; check power supply of each channel and find that L216 has no 1.8V output, so it is doubted that U206 has trouble; after changing U206, trouble is removed.

[Example 7] Symptom: after installing battery, unplug power adapter, screen will be dark for 1-2S and then become normal.

Description: use battery to supply power, unplug power adapter, screen will be dark for 1-2S and then become normal.

Analysis and troubleshooting: firstly compare defective machine with good one, good one will flash once, but it flashes slightly and shortly, and you will not be aware if you do not observe carefully; because the brightness and darkness of screen has closely relation to boost board, firstly check boost board; according to experiences, if the R9 rosin joint on boost board will lead to dark screen, use multimeter to test and there is no rosin joint, use oscillograph to touch HV, LV signal, and unplug power adapter at the same time, trouble does not appear again, use man-made simulating method to insert and unplug quickly and trouble appears again, sine wave on oscillograph disappears for 1-2s, check BL_9V power supply and find that during trouble period BL_9V voltage will have distortion (it is a little similar to distortion sine wave, but much more complicated), take down IC and distortion still exists, which means that it is not IC fault, check element connected with BL_9V, when testing to pin 11 of IC, we find that during the fault period of 9V voltage, there is distortion waveform, after changing C7, trouble is removed.

[Example 8] Symptom: not read disc

Description: not read any disc

Analysis and troubleshooting: firstly press down open detecting switch and observe laser head focus and heat radiation, which are normal; after changing laser head, trouble still exists; load disc and

Read it, when laser head begins to focus, laser head cannot be searched and slides back and forth, use oscillograph to check focus and trace signal and they are all noisy wave, check the digital signal at front end of integration, it is still noisy wave; check A, B, C, D, Therefore signal and they are also noisy wave, check the path between them and there is no problem, each capacitor has no rosin joint and joint welding; when checking whether flat cable holder XS101 has rosin joint, tin seems to be connected between pin 8, 9; use multimeter to test and there is actually short circuit, after removing welding tin, trouble is removed.

[Example 9] Symptom: noise exists when playing

Description: there is noise when playing not any discs, loudspeaker and headphone both have noise.

Analysis and troubleshooting: firstly make clear that it is loudspeaker trouble or other circuit trouble, use headphone to listen to Jk701 and check whether it has noise, if it has, it is confirmed that circuit has trouble, then play 1KHZ standard signal disc, it is easy to test waveform, use oscillograph to check pin 3 and 18 waveform of U701, it should be sine wave, but there is noisy wave to appear consequently, then check pin 5 and 15 of U701, input pin of left/right channel, and there is still noisy wave to appear, go on checking to the front stage, check C701, C702 waveform and there is still noisy wave to appear; directly test pin 1 and 7 of U301, and there is still noisy wave, then check pin 2 and 6 of U301, and waveform is normal consequently, test power supply of U301, it is also normal; after changing U301, trouble is removed.

[Example 10] Symptom: black screen

Description: screen of machine has no display after power on

Analysis and troubleshooting: firstly check whether power indicator light emits light to judge whether power starts up; if indicator light is normal, load disc and check whether disc reading can continue and whether disc reading is normal; listen loudspeaker and check whether its sound is normal, if it is normal, the power is judged to be normal preliminarily. Then press screen display detect switch to check whether screen display has light flashing, if there is no, check 5V of detect signal control line BL_CTL of boost board and back light voltage 9V of boost board and boost board output and they are all normal; then test whether high voltage has output. Use detecting head of oscillograph to close up high voltage line of input display screen and there should be sine wave. Finally change display screen and trouble is removed.

[Example 11] Symptom: no output

Description: machine screen has no display after power on, cannot read disc.

Analysis and troubleshooting: firstly test 3.3V, 1.8V voltage after DC-DC conversion, voltage output is normal, then test whether crystal oscillator Y801 has oscillation, and it is normal, and frequency 27.00MHZ is also normal, then test URST# reset voltage 3.0V and it is also normal basically, then test software data 128M and it also normal, then test U202 DCLK,DCKE and it has response, and only address line has no response, so we begin to doubt that SDRAM has trouble, change it and there is still

No output, finally we doubt that chip Mt1389 has trouble; after changing MT1389, trouble is removed.

[Example 12] Symptom: noise appears when playing CD

Description: it is normal when playing other discs, but noise appears when playing CD disc

Analysis and troubleshooting: firstly make clear whether other discs have noise, play Dvd disc and test that there is no noise, then listen to headphone and check whether it has noise to confirm whether it is loudspeaker trouble or headphone trouble, and they both have noise consequently; now we analyse that DVD is normal, which means that DAC audio decode and operational amplifier are basically normal, then process audio decode and data has trouble, which is mainly caused by SDRAM and decode chip, change SDRAM and it is invalid, then change decode chip MT1389 and trouble is removed.

[Example 13] Symptom: not read CD disc

Description: DVD disc reading is normal, Cd and VCD disc reading are not available

Analysis and troubleshooting: DVD disc reading is normal, so it is judged that focus and trace is normal basically; firstly we doubt whether detecting has error, test IOA voltage of pin 44 of MT1389, and the voltage at that time is about 3.1 which is obviously incorrect, when reading DVD disc, it is high level, now VCD disc is being read and it is also high level, triode V102 will not be on at all, of course loader laser head CD laser pipe will not be lightened; directly change MT1389 and trouble is removed.

[Example 14] Symptom: not read disc

Description: not read any disc

Analysis and troubleshooting: laser head is in middle and cannot return to the most inner circle after power on, firstly measure T+, T- voltage and it is about 2.5V, which is basically normal, then test feed inner resistance on loader components, it is about 8 ohm, which is also normal, finally carefully observe Xs102 flat cable holder and find that there is one flat cable of the 6 loader flat cable that falls off, after pressing tightly, trouble is removed (this loader always has this trouble, which shows that main axis electric machine does not rotate sometimes and also pay attention to observe this plug).

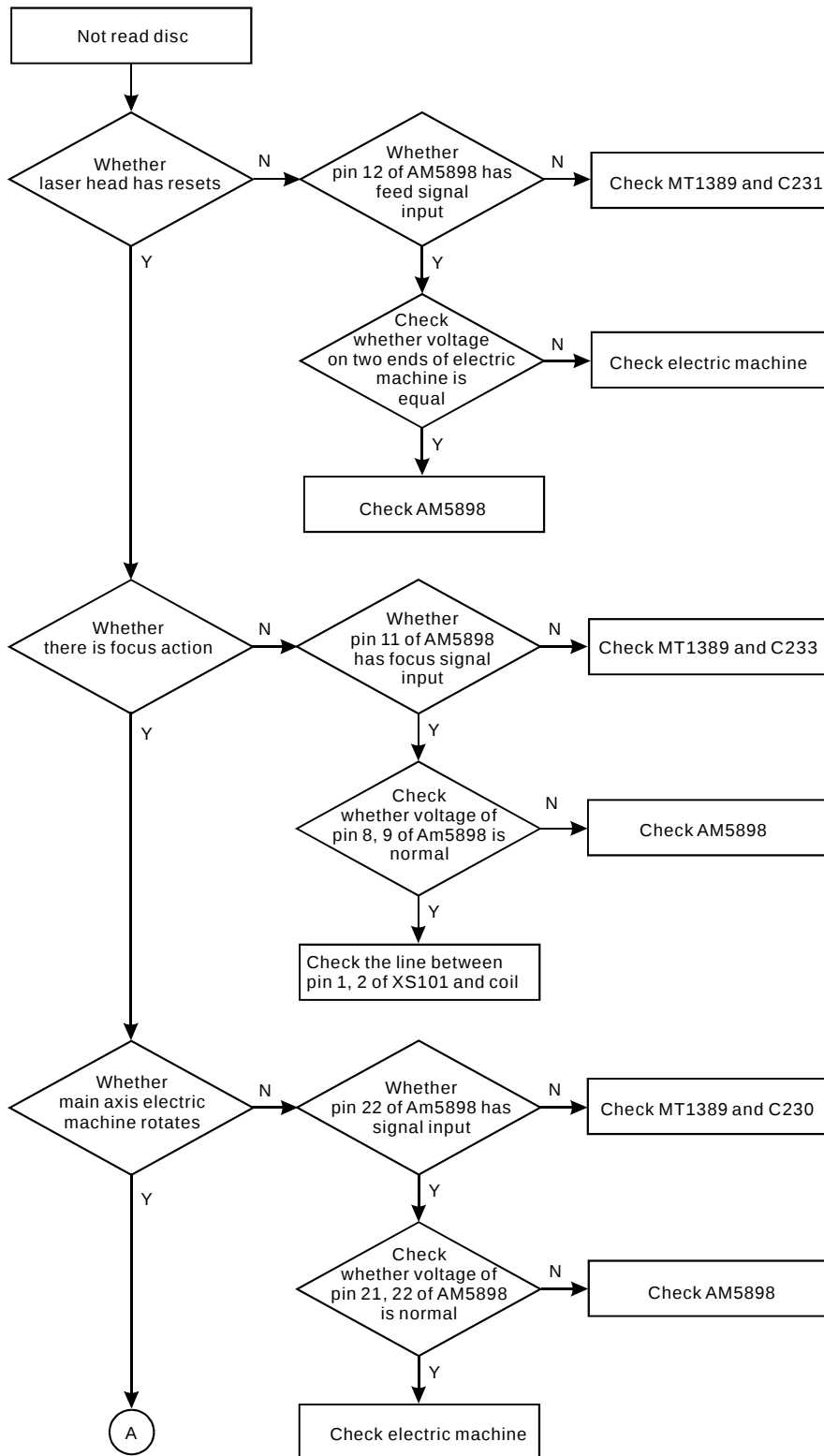
[Example 15] Symptom: white screen

Description: TFT screen appears white screen, no normal image output

Analysis and troubleshooting: boost board is normal and it is preliminarily judged that display drive part has trouble, check each voltage 3.3V, 2.5V of U801 and they are both normal; test oscillation of Y801 and it is normal; test tricolour and it is normal; test 8-bit data and it is normal, which means that U801 working is normal, change display screen and trouble still exists. Then we doubt that it is the display screen flat cable holder that has trouble, observe carefully and find that 3.3V power supply pin of flat cable holder DV33 3.3V has false welding; after welding again and trouble is removed.

3.3.2 Troubleshooting flow chart

1. Troubleshooting flow chart for “Not read disc” is shown as in the following figure 3.3.2.1:



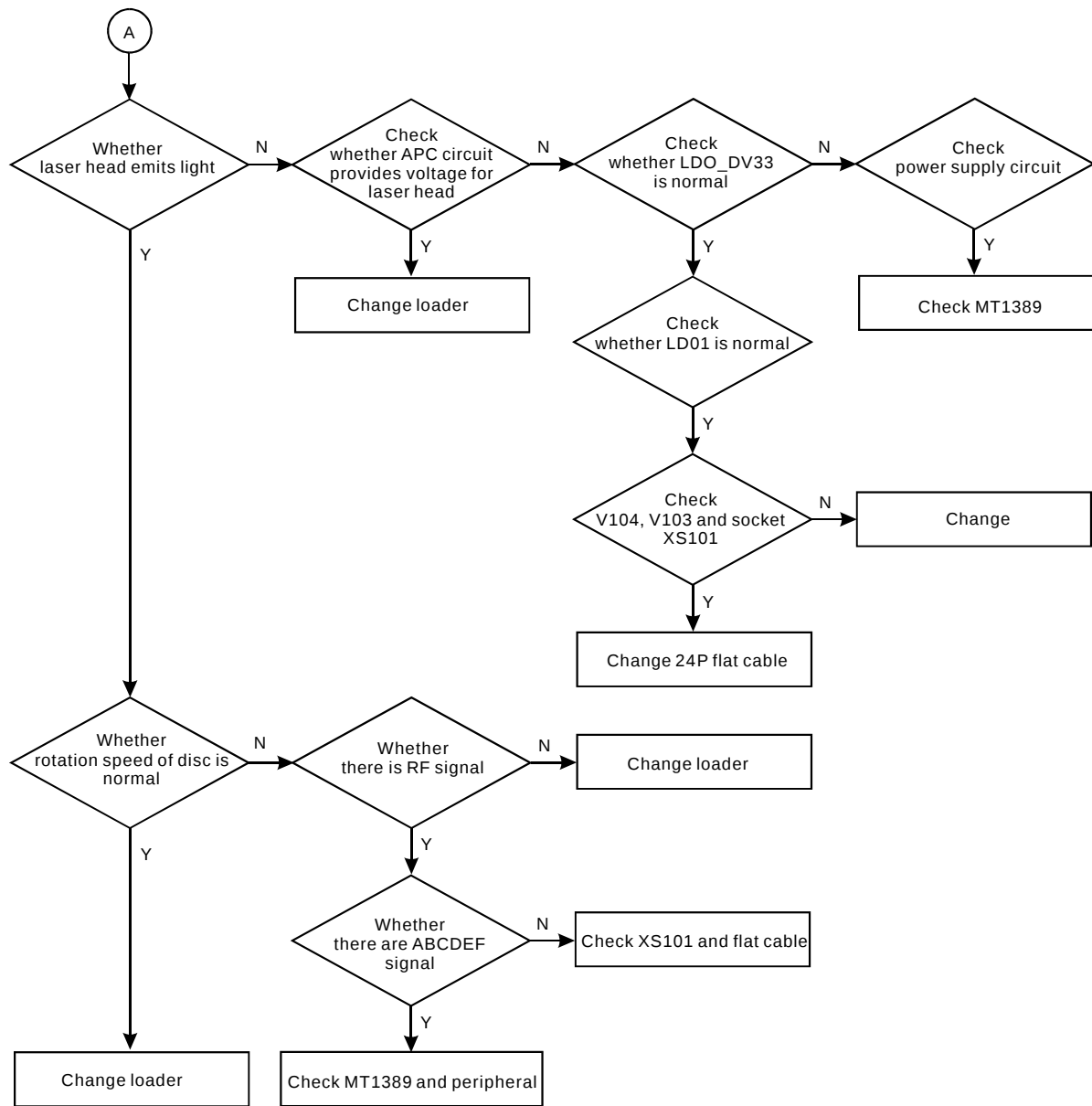
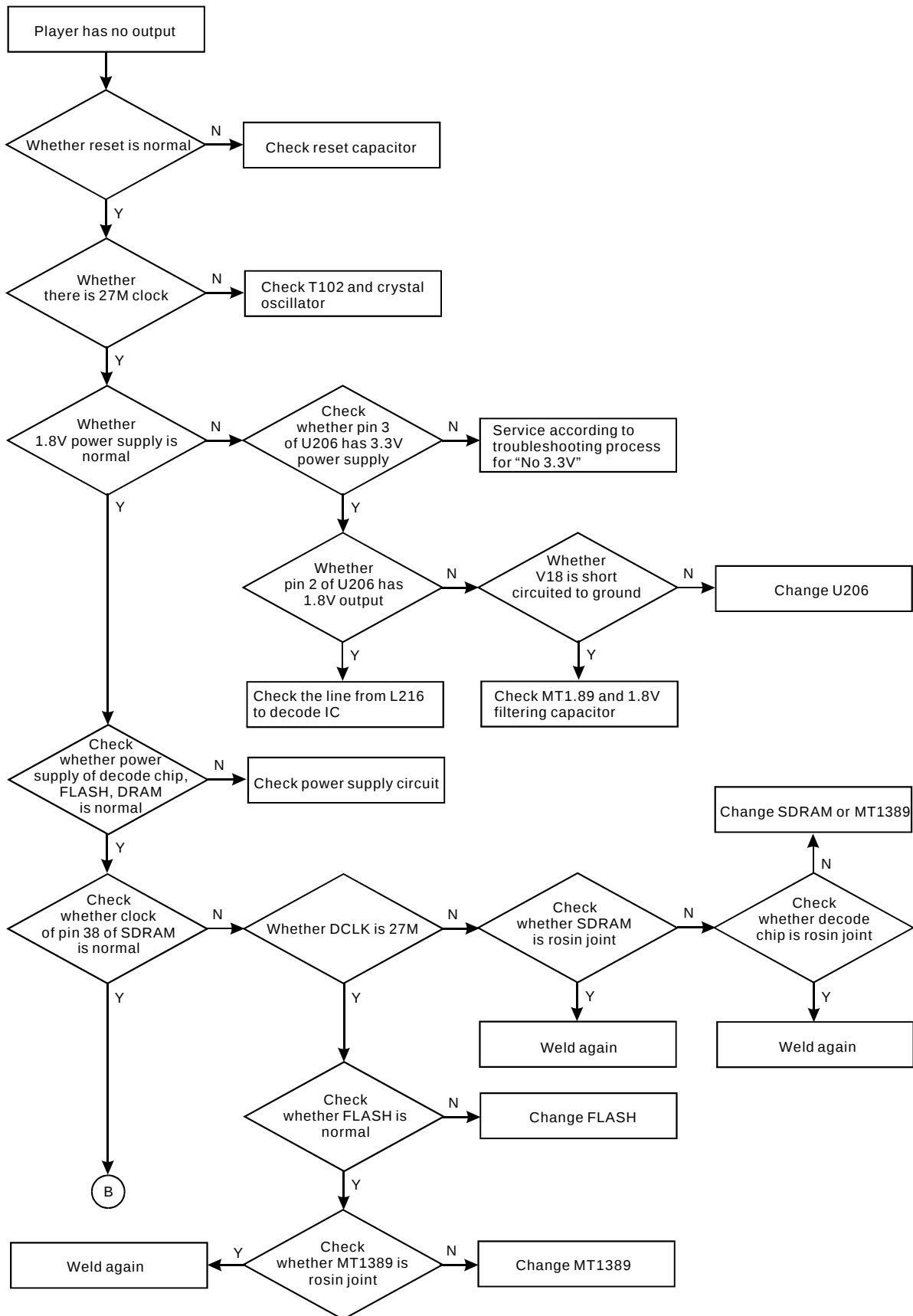


Figure 3.3.2.1 Troubleshooting flow chart for “Not read disc”

2. Troubleshooting flow chart for “Player has no output” is shown as in the following figure 3.3.2.2:



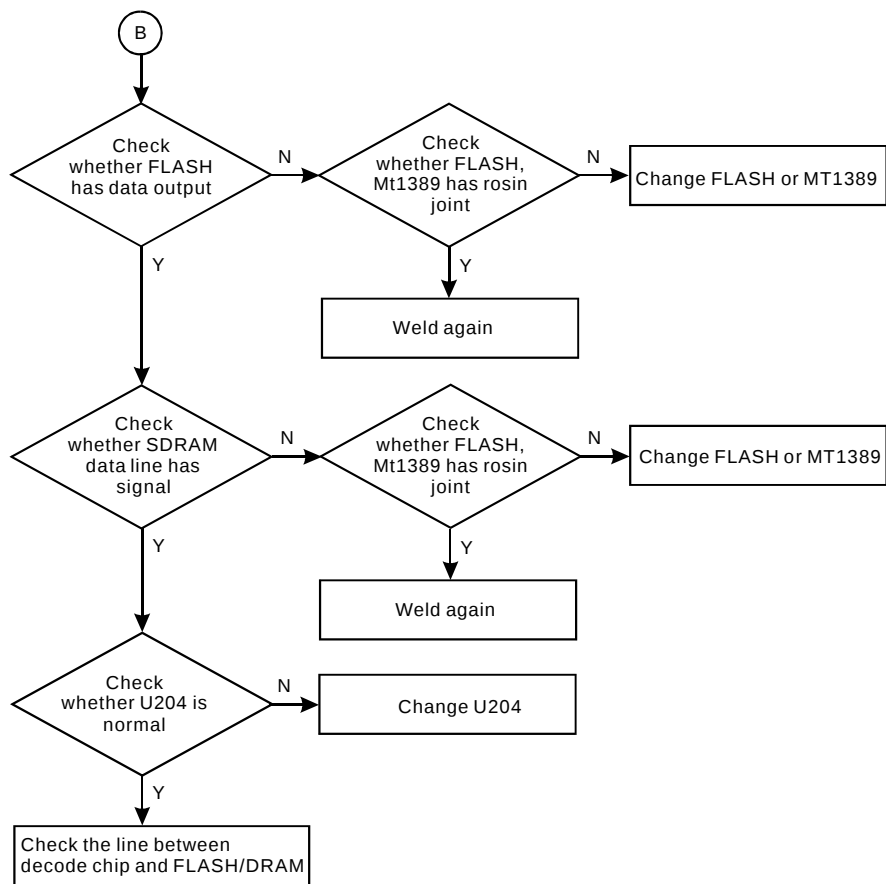


Figure 3.3.2.2 Troubleshooting flow chart for “Player has no output”

3. Troubleshooting flow chart for “No VCC voltage” is shown as in the following figure 3.3.2.3:

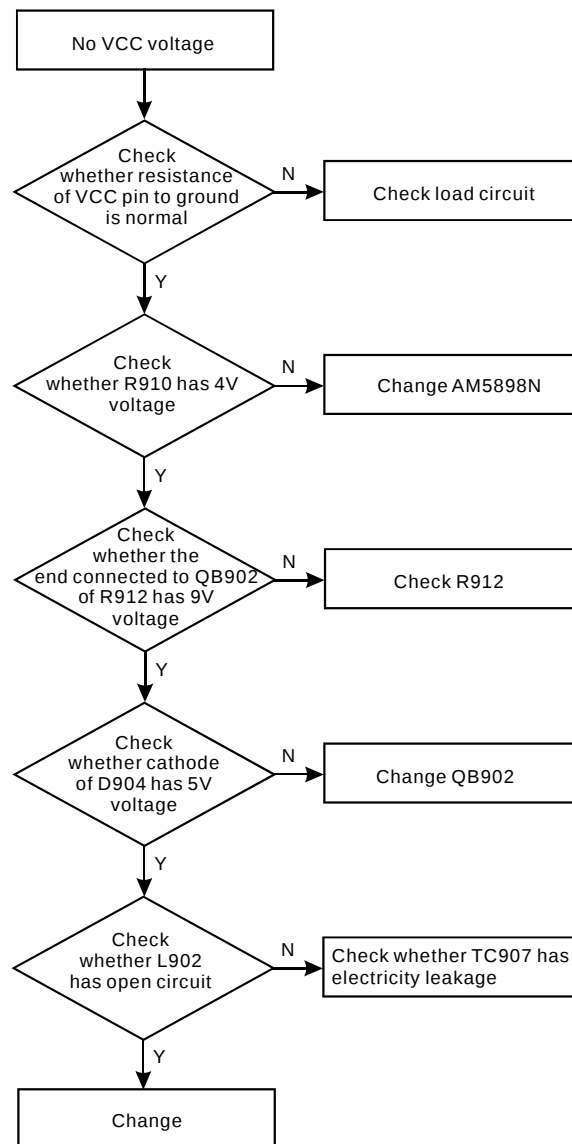


Figure 3.3.2.3 Troubleshooting flow chart for “No VCC voltage”

4. Troubleshooting flow chart for “No DV33V voltage” is shown as in the following figure 3.3.2.4:

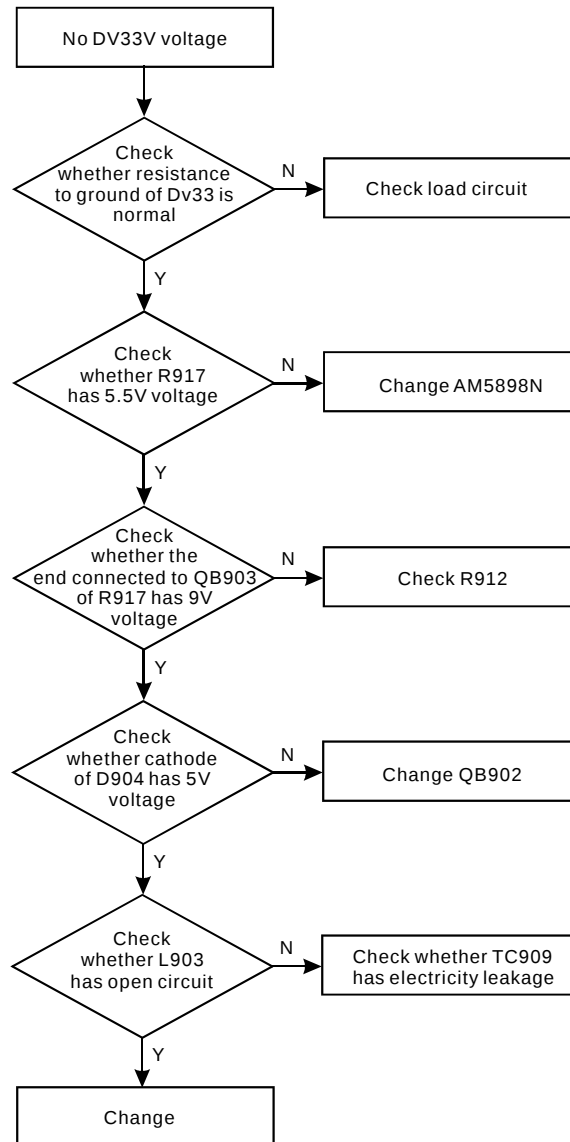


Figure 3.3.2.4 Troubleshooting flow chart for “No DV33V voltage”

5. Troubleshooting flow chart for “No VCC, DV33V voltage” is shown as in the following figure 3.3.2.5:

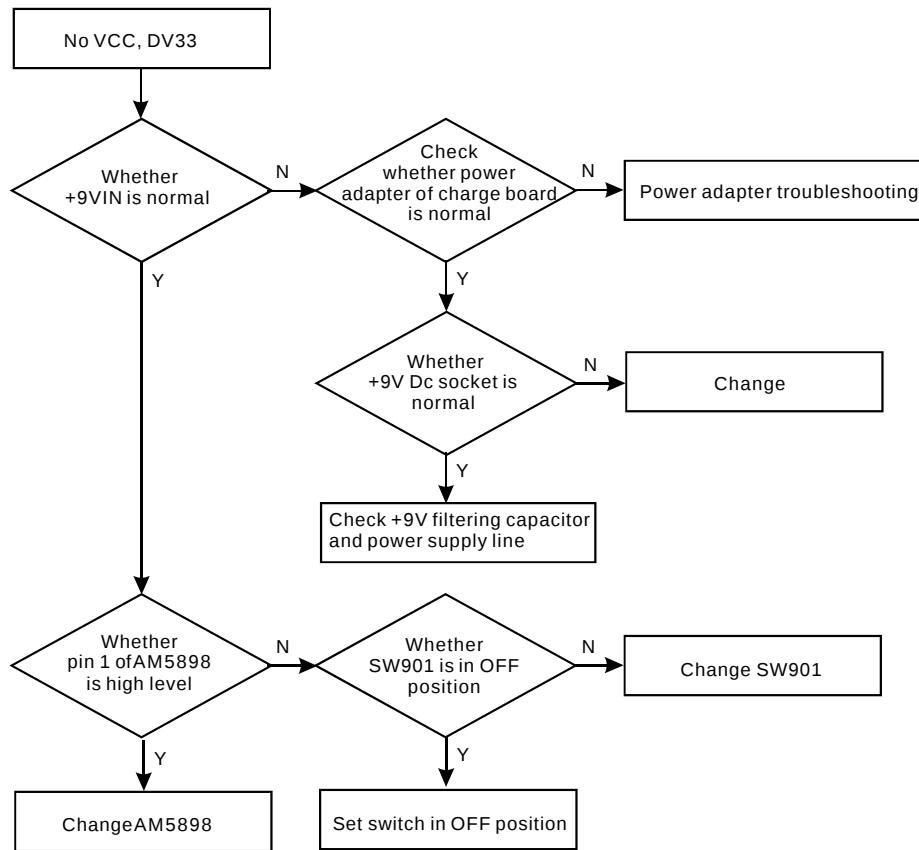


Figure 3.3.2.5 Troubleshooting flow chart for “No VCC, DV33V voltage”

6. Troubleshooting flow chart for “Audio has no output” is shown as in the following figure 3.3.2.6:

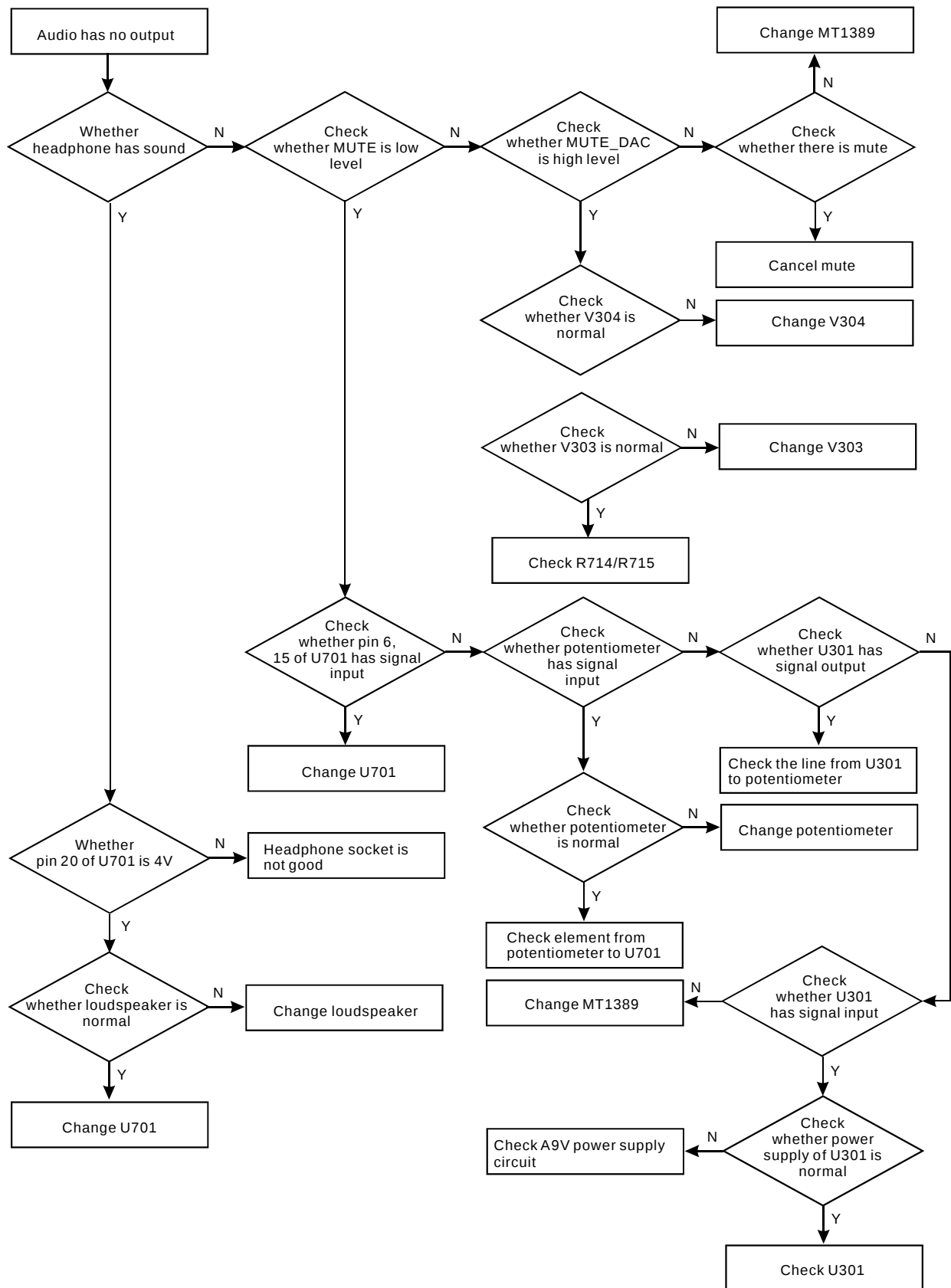
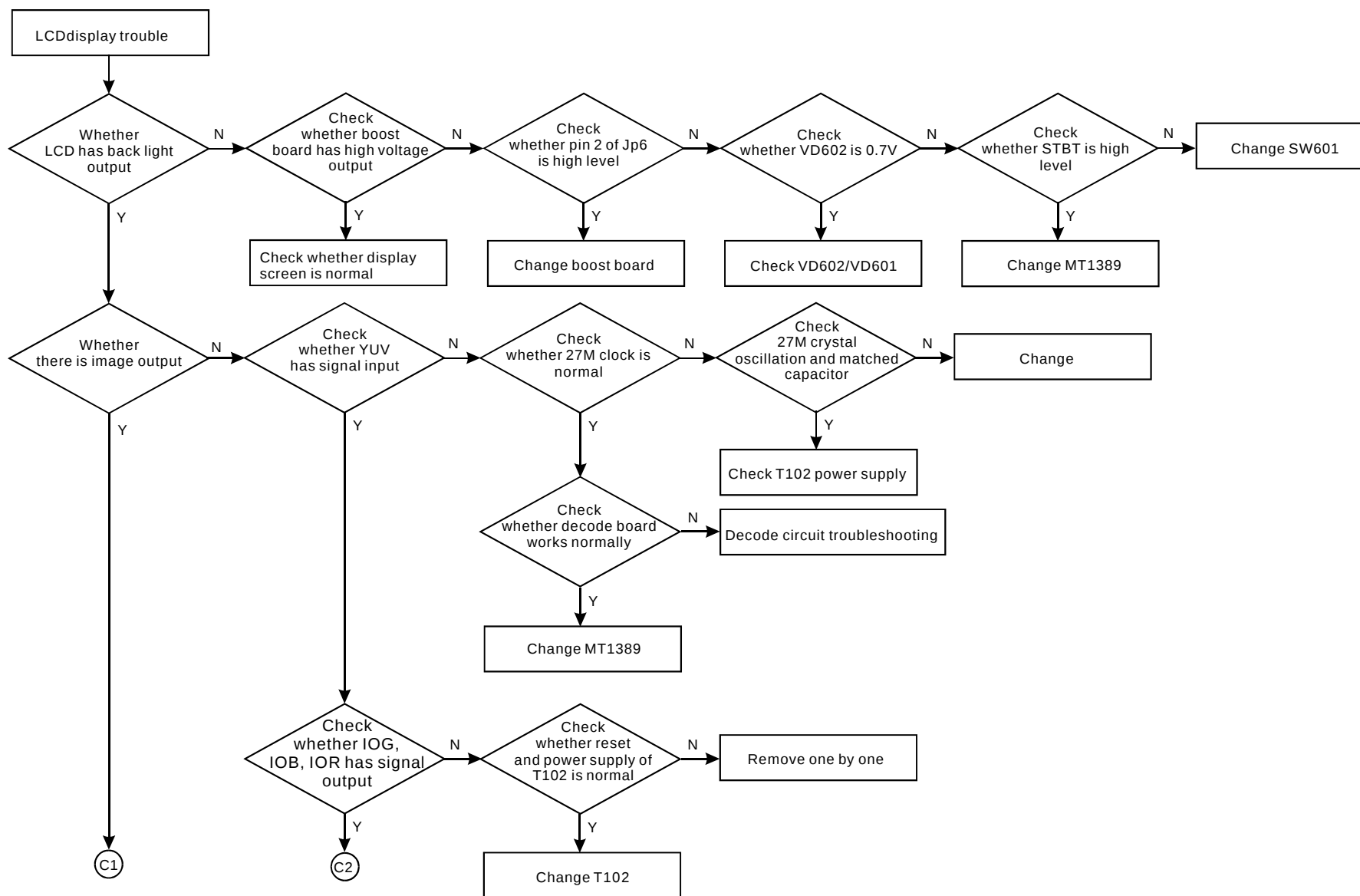


Figure 3.3.2.6 Troubleshooting flow chart for “No audio output”

7. Troubleshooting flow chart for “LCD display trouble” is shown as in the following figure 3.3.2.7:



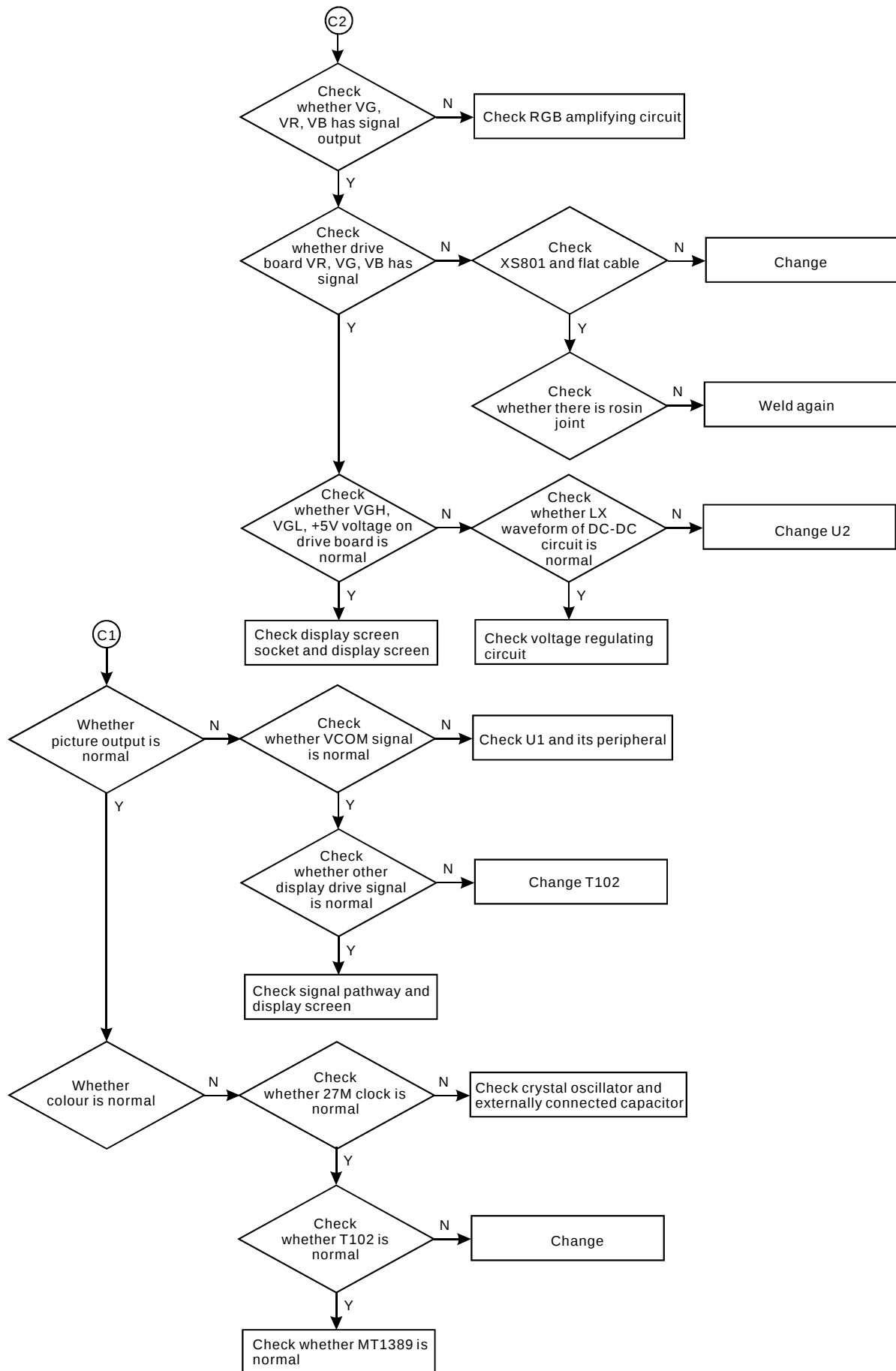


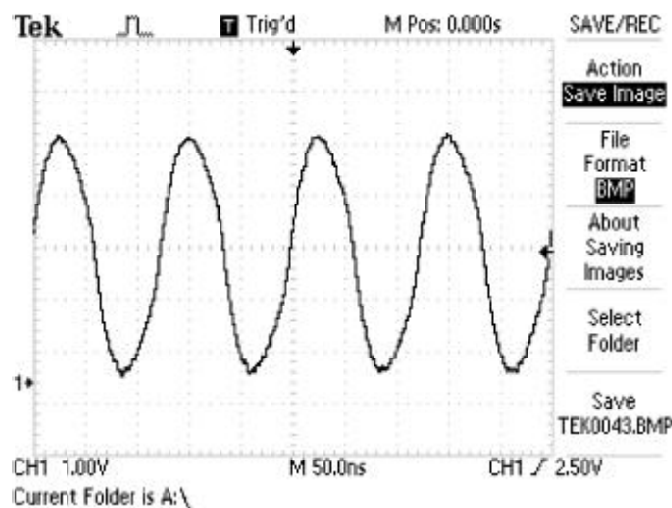
Figure 3.3.2.7 Troubleshooting flow chart for “LCD display trouble”

Section Four Servicing Parameters

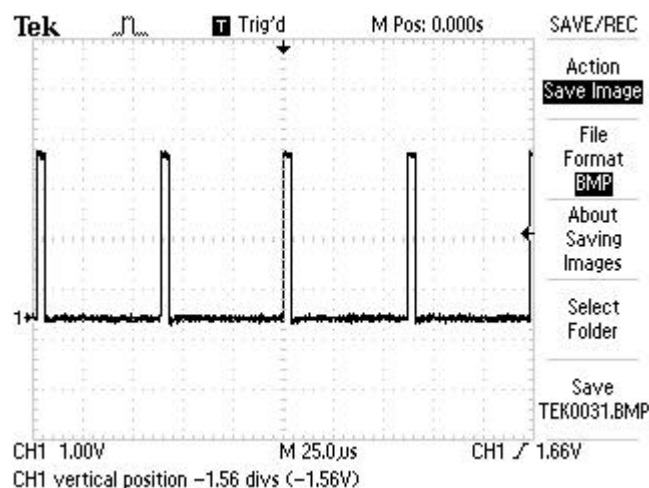
3.4.1 Signal waveform diagram

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.

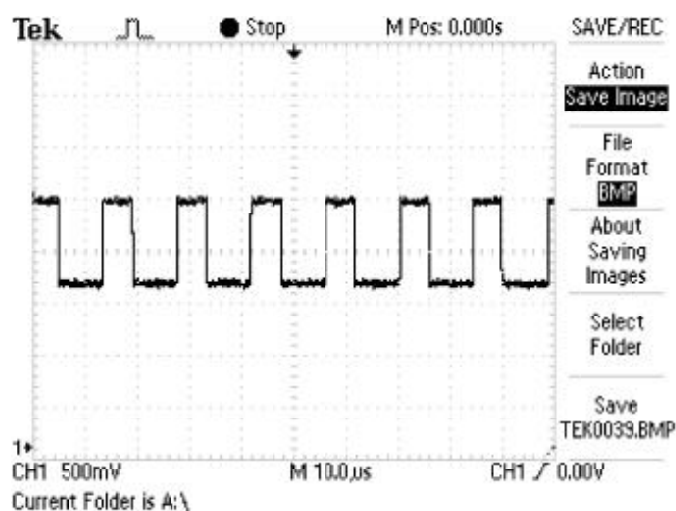
1. Waveform diagram of pin 2 8M of charge board U601



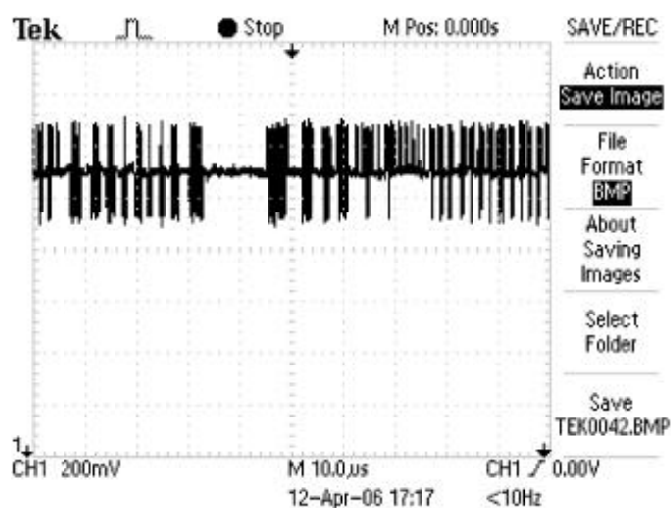
2. Waveform diagram of pin 4 CKV of JP2



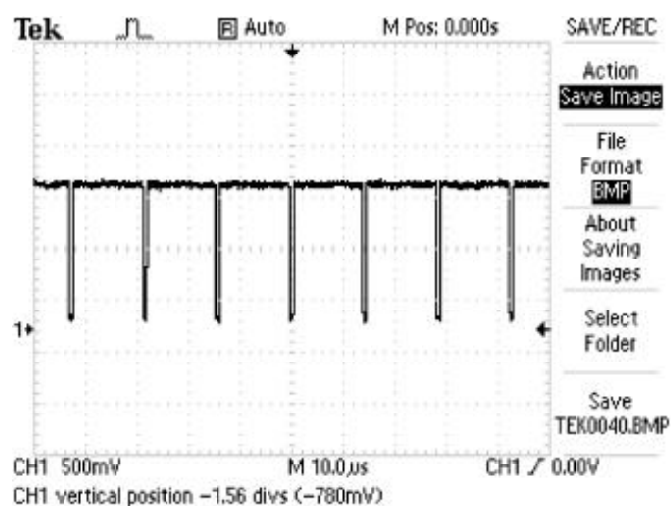
3. Waveform diagram of main axis drive DMO outputted by decode chip



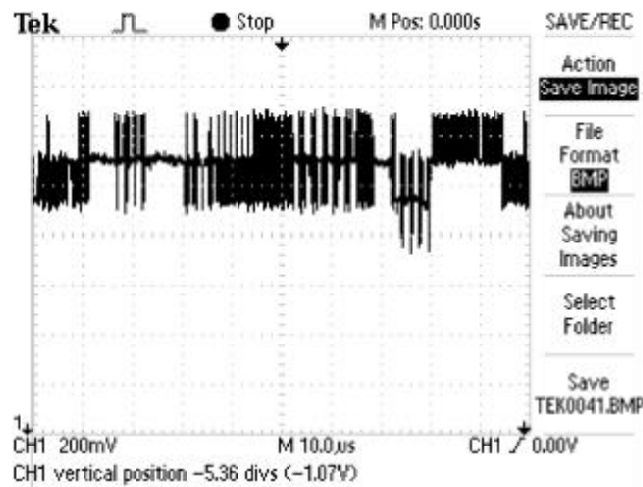
4. Waveform diagram of FO outputted by decode chip



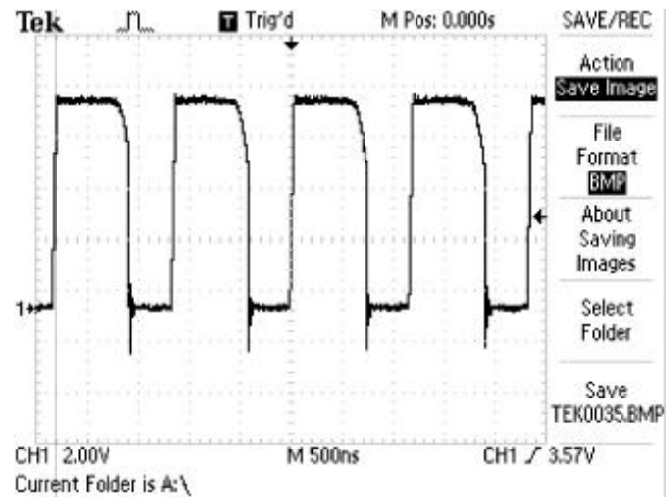
5. Waveform diagram of FM outputted by decode chip



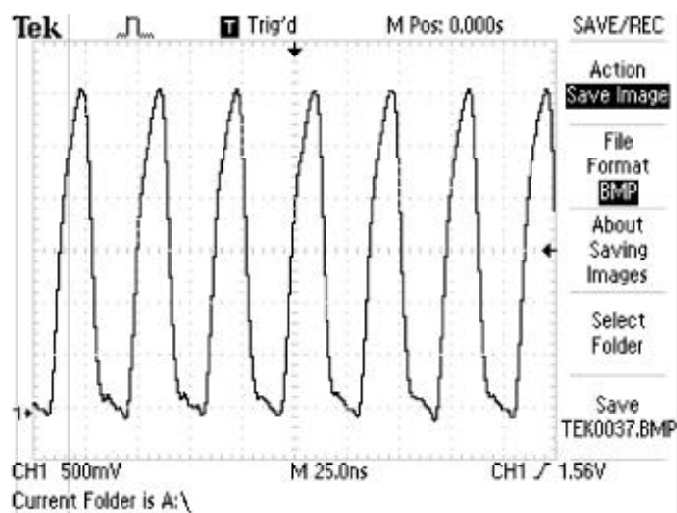
6. Waveform diagram of TR outputted by decode chip



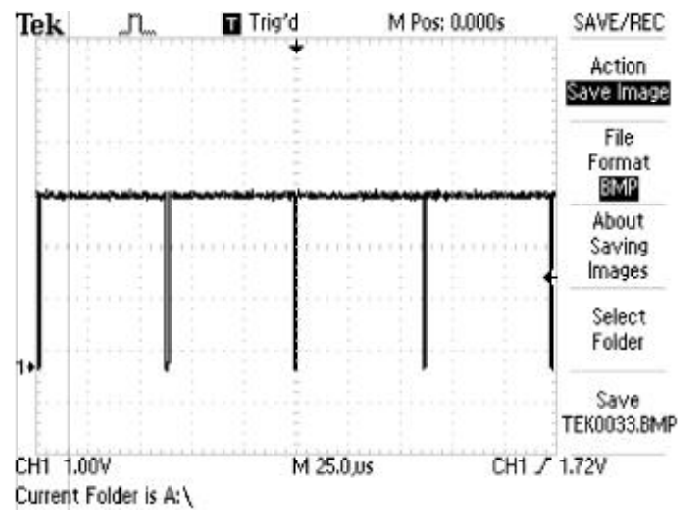
7. Waveform diagram of LX signal of pin 1 of G5105



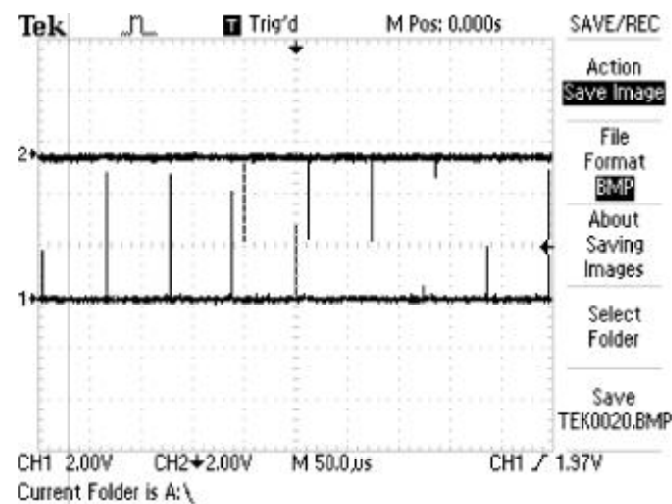
8. Waveform diagram of CLK of pin 194 of MT1389



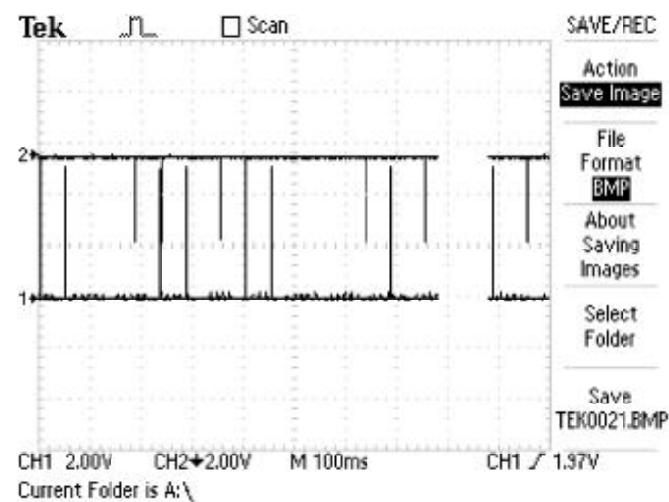
9. Waveform diagram of OEH of pin 11 of JP2



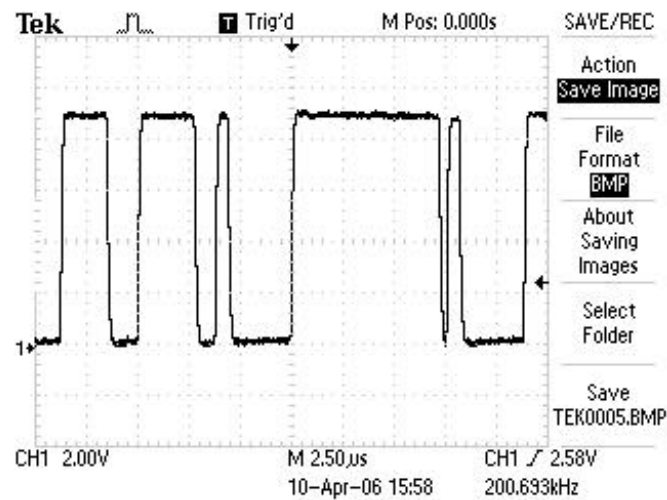
10. Waveform diagram of STH1, STH2 of pin 12, 13 of JP2



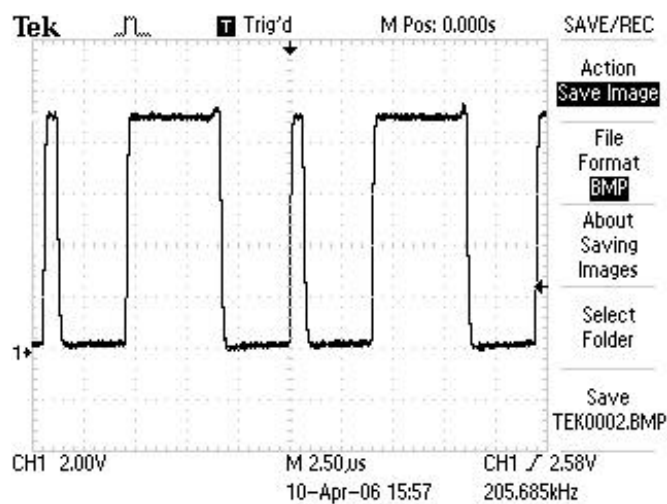
11. Waveform diagram of pin 5, 6 STV1, STV2 of JP2



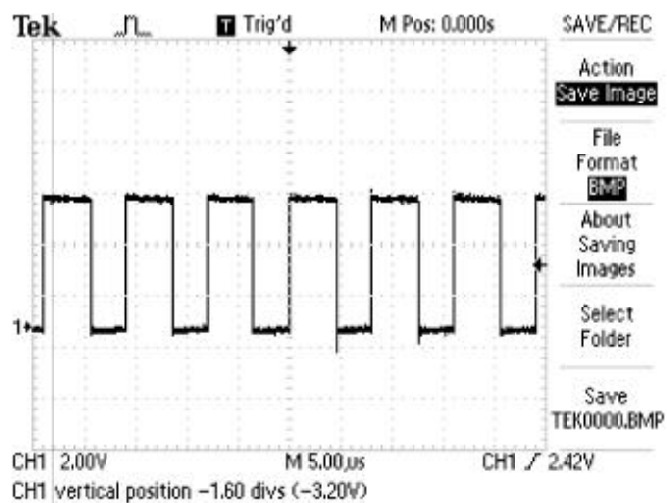
12. Waveform diagram of pin 29 SW1 of AM5898



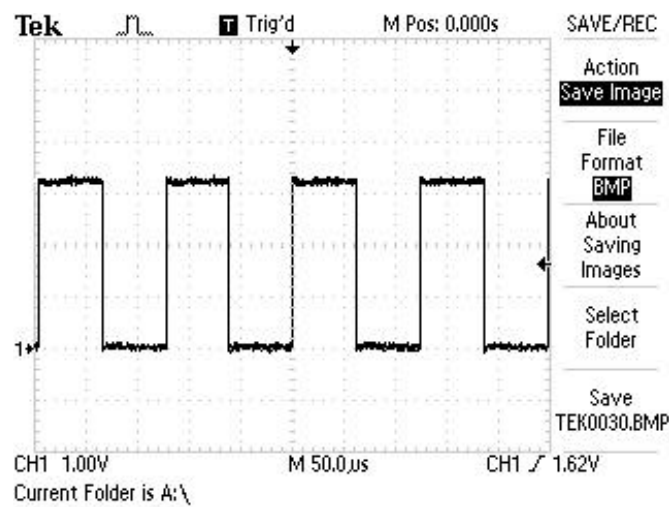
13. Waveform diagram of pin 4 SW2 of AM5898



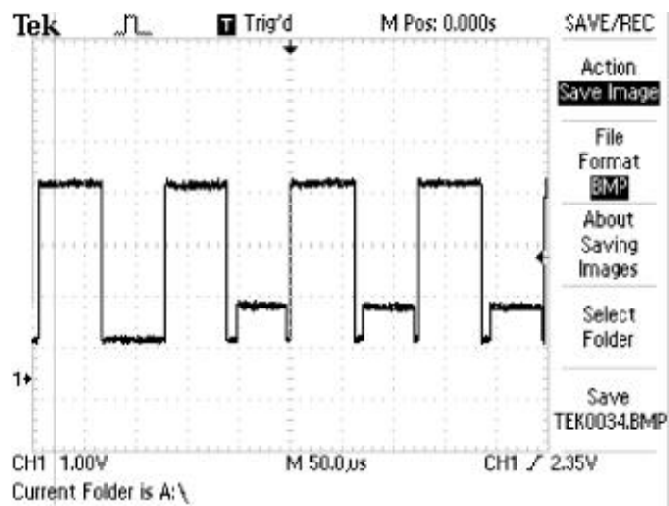
14. Waveform diagram of pin 13 of U601



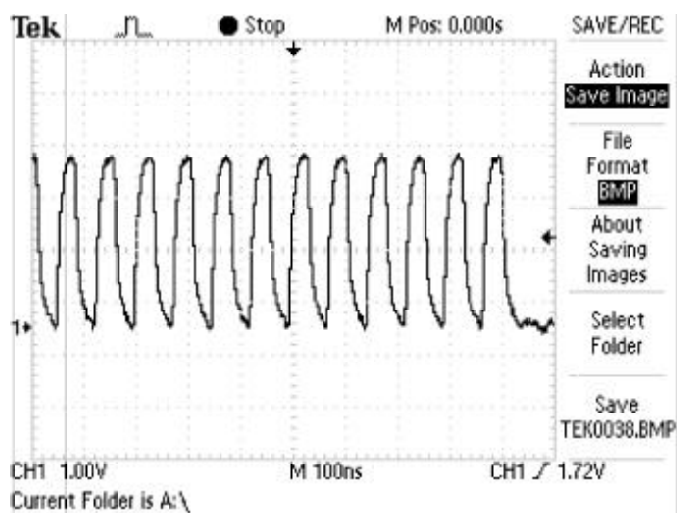
15. Waveform diagram of pin 7 VCOMO of JP2



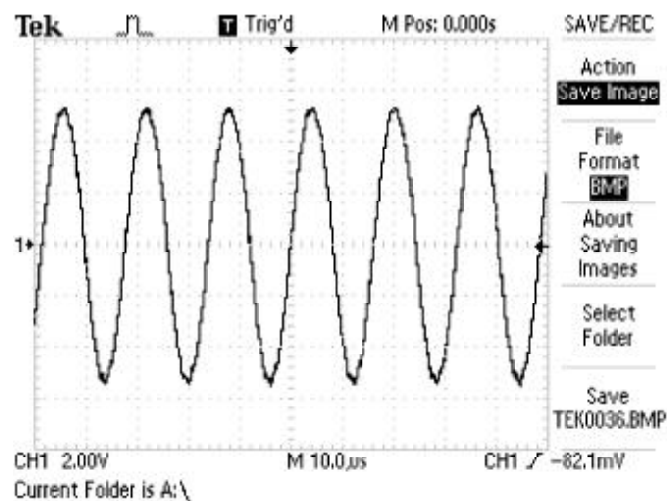
16. Waveform diagram of pin 17 VR of JP2



17. Waveform diagram of pin 81~88 YUV of T102

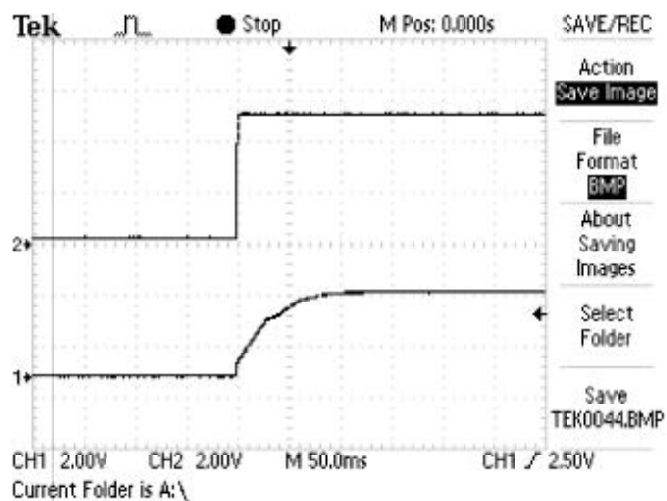


18. Waveform diagram of black light drive voltage

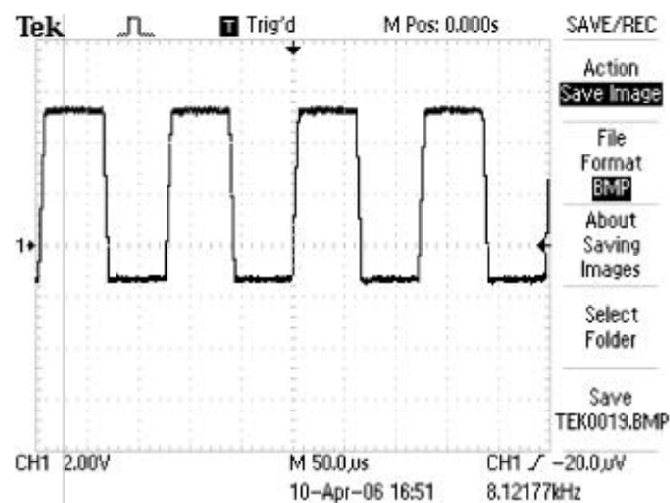


Note: back light drive voltage is high, when testing, detecting head of oscillograph cannot be contacted with output terminal directly, only close to output terminal and waveform can be tested.

19. URST waveform diagram



20. Waveform diagram of pin 6 U1 VCOM



Section Five Function Introduction to IC

3.5.1 function introduction to MT1389E

1. DESCRIPTION

MT1389E is a cost-effective DVD system-on-chip (SOC) which incorporates advanced features like MPEG-4 video decoder, high quality TV encoder and state-of-art de-interlace processing.

Based on MediaTek's world-leading DVD player SOC architecture, the MT1389E is the 3rd generation of the DVD player SOC. It integrates the MediaTek 2nd generation front-end analog RF amplifier and the Servo/MPEG AV decoder.

To enrich the feature of DVD player, the MT1389 equips a simplified MPEG-4 advanced simple profile (ASP) video decoder to fully support the DivX1 Home Theater profile. It makes the MT1389-based DVD player be capable of playback MPEG-4 content which become more and more popular.

The progressive scan of the MT1389E utilized advanced motion-adaptive de-interlace algorithm to achieve the best movie/video playback. It also supports a 3:2 pull down algorithm to give the best film effect. The 108MHz/12-bit video DAC provides users a whole new viewing experience.

2. Key Features

RF/Servo/MPEG Integration

Embedded 6ch Audio DAC

Embedded 2ch Audio ADC for Karaoke

High Performance Audio Processor

High Performance Progressive Video Processor

Support Nero-Digital

High Quality 108MHz/12-bit, 4 CH TV Encoder

3. General Feature lists

(1)Integration DVD player single chip

High performance analog RF amplifier

Servo controller and data channel processing

MPEG-1/MPEG-2/JPEG video

Dolby AC-3/DTS Decoder

Unified memory architecture

Versatile video scaling & quality enhancement

OSD & Sub-picture

Built-in clock generator

Built-in high quality TV encoder

Built-in progressive video processor

Audio effect post-processor

Built-in 5.1-ch Audio DAC

Built-in 2-ch Audio ADC for Karaoke

(2)High Performance Analog RF Amplifier

Programmable fc

Dual automatic laser power control

Defect and blank detection

RF level signal generator

(3)Speed Performance on Servo/Channel Decoding

DVD-ROM up to 4XS

CD-ROM up to 24XS

(4)Channel Data Processor

Digital data slicer for small jitter capability

Built-in high performance data PLL for channel data demodulation

EFM/EFM+ data demodulation

Enhanced channel data frame sync protection & DVD-ROM sector sync protection

(5)Servo Control and Spindle Motor Control

Programmable frequency error gain and phase error gain of spindle PLL to control spindle motor on CLV and CAV mode

Built-in ADCs and DACs for digital servo control

Provide 2 general PWM

Tray control can be PWM output or digital output

(6)Embedded Micro controller

Built-in 8032 micro controller

Built-in internal 373 and 8-bit programmable lower address port

1024-bytes on-chip RAM

Up to 2M bytes FLASH-programming interface

Supports 5/3.3-Volt. FLASH interface

Supports power-down mode

Supports additional serial port

(7)DVD-ROM/CD-ROM Decoding Logic

High-speed ECC logic capable of correcting one error per each P-codeword or Q-codeword

Automatic sector Mode and Form detection

Automatic sector Header verification

Decoder Error Notification Interrupt that signals various decoder errors

Provide error correction acceleration

(8)Buffer Memory Controller

Supports 16Mb/32Mb/64Mb SDRAM

Supports 16-bit SDRAM data bus

Provides the self-refresh mode SDRAM

Block-based sector addressing

(9)Video Decode

Decodes MPEG1 video and MPEG2 main level, main profile video (720/480 and 720x576)

Decodes MPEG-4 Advanced Simple Profile

Support DivX 3.11/4.x/5.x Home Theater Profile

Support Nero-Digital

Smooth digest view function with I, P and B picture decoding

Baseline, extended-sequential and progressive JPEG image decoding

Support CD-G titles

(10)Video/OSD/SPU/HLI Processor

Arbitrary ratio vertical/horizontal scaling of video, from 0.25X to 256X

65535/256/16/4/2-color bitmap format OSD,

256/16 color RLC format OSD

Automatic scrolling of OSD image

(11)Audio Effect Processing

Dolby Digital (AC-3)/EX decoding

DTS/DTS-ES decoding

MPEG-1 layer 1/layer 2 audio decoding

MPEG-2 layer1/layer2 2-channel audio

High Definition Compatible Digital (HDCD)
Windows Media Audio (WMA)
Dolby ProLogic II
Concurrent multi-channel and downmix out
IEC 60958/61937 output
PCM / bit stream / mute mode
Custom IEC latency up to 2 frames
Pink noise and white noise generator
Karaoke functions
Microphone echo
Microphone tone control
Vocal mute/vocal assistant
Key shift up to +/- 8 keys
Chorus/Flanger/Harmony/Reverb
Channel equalizer
3D surround processing include virtual surround and speaker separation

(12)TV Encoder

Four 108MHz/12bit DACs
Support NTSC, PAL-BDGHINM, PAL-60
Support 525p, 625p progressive TV format
Automatically turn off unconnected channels
Support PC monitor (VGA)
Support Macrovision 7.1 L1, Macrovision 525P and 625P
CGMS-A/WSS
Closed Caption

(13)Progressive Scan Video

Automatic detect film or video source
3:2 pull down source detection
Advanced Motion adaptive de-interlace
Minimum external memory requirement

(14)Outline

216-pin LQFP package
3.3/1.8-Volt. Dual operating voltages

4. PIN DESCRIPTION

S.N.	Pin Name	Definition	Description
1	AGND	Ground	Analog ground
2	DVDA	Analog Input	AC coupled input path A
3	DVDB	Analog Input	AC coupled input path B
4	DVDC	Analog Input	AC coupled input path C
5	DVDD	Analog Input	AC coupled input path D
6	DVDRFIP	Analog Input	AC coupled DVD RF signal input RFIP
7	DVDRFIN	Analog Input	AC coupled DVD RF signal input RFIN
8	MA	Analog Input	DC coupled main-beam RF signal input A
9	MB	Analog Input	DC coupled main-beam RF signal input B
10	MC	Analog Input	DC coupled main-beam RF signal input C
11	MD	Analog Input	DC coupled main-beam RF signal input D
12	SA	Analog Input	DC coupled sub-beam RF signal input A
13	SB	Analog Input	DC coupled sub-beam RF signal input B
14	SC	Analog Input	DC coupled sub-beam RF signal input C
15	SD	Analog Input	DC coupled sub-beam RF signal input D
16	CDFON	Analog Input	CD focusing error negative input
17	CDFOP	Analog Input	CD focusing error positive input
18	TNI	Analog Input	3 beam satellite PD signal negative input
19	TPI	Analog Input	3 beam satellite PD signal positive input
20	MDI1	Analog Input	Laser power monitor input
21	MDI2	Analog Input	Laser power monitor input
22	LDO2	Analog Output	Laser driver output
23	LDO1	Analog Output	Laser driver output
24	SVDD3	RFSVDD	Analog power 3.3V
25	CSO/RFOP	Analog output	1) Central servo 2) Positive main beam summing output
26	RFLVL/RFON	Analog output	1) RFRP low pass, or 2) Negative main beam summing output
27	SGND	Ground	Analog ground
28	V2REFO	Analog output	Reference voltage 2.8V

29	V20	Analog output	Reference voltage 2.0V
30	VREFO	Analog output	Reference voltage 1.4V
31	FEO	Analog output	Focus error monitor output
32	TEO	Analog output	Tracking error monitor output
33	TEZISLV	Analog output	TE Slicing Level
34	OP_OUT	Analog output	Op amp output.
35	OP_INN	Analog input	Op amp negative input
36	OP_INP	Analog input	Op amp positive input
37	DMO	Analog Output	Disk motor control output. PWM output.
38	FMO	Analog Output	Feed motor control. PWM output.
39	TROPENPWM	NC	Tray PWM output / Tray open output.
40	PWMOUT1	NC	1) 1st General PWM output, or
41	TRO	Analog Output	Tracking servo output. PDM output of tracking servo compensator.
42	FOO	Analog Output	Focus servo output. PDM output of focus servo compensator
43	FG/ADIN	INPUT	1) Motor Hall sensor input
44	IOA	OUTPUT	Control CD/DVD switch circuit
45	STBT	INPUT	Screen off detect
46	STBY	NC	Unused
47	A2	INOUT	Flash address
48	DVDD18	INPUT	1.8V power
49	A3	INOUT	Flash address
50	A4	INOUT	Flash address
51	A5	INOUT	Flash address
52	A6	INOUT	Flash address
53	A7	INOUT	Flash address
54	A8	INOUT	Flash address
55	A18	INOUT	Flash address
56	A19	INOUT	Flash address
57	PWR#	INOUT	FLASH read/write control
58	A16	INOUT	Flash address
59	A15	INOUT	Flash address
60	DVDD3	DV33INPUT	3.3V power

61	A14	INOUT	Flash address
62	A13	INOUT	Flash address
63	A12	INOUT	Flash address
64	A11	INOUT	Flash address
65	A10	INOUT	Flash address
66	A9	INOUT	Flash address
67	A20	INOUT	Flash address
68	PCE#	INOUT	Chip selection
69	A1	INOUT	Flash address
70	PRD#	INOUT	Read operation control
71	AD0	INOUT	FLASH DATA
72	AD1	INOUT	FLASH DATA
73	AD2	INOUT	FLASH DATA
74	DVSS	Ground	Ground
75	AD3	INOUT	FLASH DATA
76	AD4	INOUT	FLASH DATA
77	AD5	INOUT	FLASH DATA
78	AD6	INOUT	FLASH DATA
79	MYUV7	OUTPUT	YUV signal digital output
80	ALE	NC	NC
81	AD7	INOUT	FLASH DATA
82	A17	INOUT	Flash address
83	A0	INOUT	Flash address
84	DVDD18	Power	1.8V power
85	UWR#	Output	NC
86	URD#	Output	NC
87	DVDD3	Power	3.3V power
88	UP1_2	NC	
89	NOUSE	NC	NC
90	YUV_CLK	INPUT	YUV signal clock
91	LOW_BAT	INPUT	Lower battery detect pin
92	POWER_OFF	INPUT	Lower battery power-off detect pin

93	SCL	INOUT	I2C clock pin
94	SDA	INOUT	I2C data pin
95	Reset output	OUTPUT	T102_RESET
96	KEY2	NC	NC
97	RXD	INOUT	8032 RS232 RXD
98	TXD	INOUT	8032 RS232 TXD
99	MYUV3	OUTOUT	YUV signal digital output
100	ICE	Input	unused
101	PRST#	INPUT	Power on reset input, active low
102	IR	INPUT	IR control signal input
103	INTO#	INPUT	NC
104	DQMO	Inout	Data mask 0
105	RD7	Inout	DRAM data 7
106	RD6	Inout	DRAM data 6
107	RD5	Inout	DRAM data 5
108	DVDD3	DV33INPUT	3.3V power
109	RD4	Inout	DRAM data 4
110	RD3	Inout	DRAM data 3
111	RD2	Inout	DRAM data 2
112	RD1	Inout	DRAM data 1
113	RD0	Inout	DRAM data 0
114	RD15	Inout	DRAM data 15
115	RD14	Inout	DRAM data 14
116	RD13	Inout	DRAM data 13
117	RD12	Inout	DRAM data 12
118	RD11	Inout	DRAM data 11
119	RD10	Inout	DRAM data 10
120	DVSS	IN	3.3V power
121	RD9	Inout	DRAM data 9
122	RD8	Inout	DRAM data 8
123	DQM1	Inout	Data mask 1
124	WE#	output	DRAM Write enable, active low

125	CAS#	output	DRAM column address strobe, active low
126	RAS#	output	DRAM row address strobe, active low
127	CS#	output	DRAM chip select, active low
128	BA0	Inout	DRAM bank address 0
129	BA1	Inout	DRAM bank address 1
129	DMA10	Inout	DRAM address 10
131	DMA0	Inout	DRAM address 0
132	DVDD18	INPUT	1.8V power
133	DMA1	Inout	DRAM address 1
134	DMA2	Inout	DRAM address 2
135	DMA3	Inout	DRAM address 3
136	DCLK	Inout	Dram clock
137	DV33	INPUT	3.3V power
138	DCKE	output	DRAM clock enable
139	DMA11	Inout Pull-Down	DRAM address bit 11
140	DMA9	Inout	DRAM address 9
141	DMA8	Inout	DRAM address 8
142	DMA7	Inout	DRAM address 7
143	DMA6	Inout	DRAM address 6
144	DMA5	Inout	DRAM address 5
145	DMA4	Inout	DRAM address 4
146	DVDD18	INPUT	1.8V power
147	LIMIT	Input	Feed electric machine to position detect
148	cover_sw	Input	Door detect switch signal input
149	GND		GND
150	SELECT	OUTPUT	Drive IC control pin (high level when reading disc, low level when in external input)
151	MUTE_DAC	OUTPUT	Mute signal output, low level when power on, high level when reading disc
152	MYUV0	OUTPUT	YUV signal digital output
153	MYUV1	OUTPUT	YUV signal digital output
154	MYUV2	OUTPUT	YUV signal digital output

155	MYUV4	OUTPUT	YUV signal digital output
156	MYUV5	OUTPUT	YUV signal digital output
157	MYUV6	OUTPUT	YUV signal digital output
158	BL_CTL#	OUTPUT	Screen off control output
159	SPDIF	OUTPUT	unused
160	DACVDDC	Power	3.3V power pin for VIDEO DAC circuitry
161	VREF	Analog	Bandgap reference voltage
162	FS	Analog	Full scale adjustment
163	DACVSSC	Ground	Ground pin for VIDEO DAC circuitry
164	CVBS	Output	Analog composite output (unused)
165	DACVDDC	Power	3.3V power pin for VIDEO DAC circuitry
166	DACVSSC	Ground	Ground pin for VIDEO DAC circuitry
167	DACVDDC	Power	3.3V power pin for VIDEO DAC circuitry
168	CVBS2	Output	Analog composite output (unused)
169	DACVSSC	Ground	Ground pin for VIDEO DAC circuitry
170	S/C	Output	Chroma signal output
171	S/Y	Output	Brightness signal output
172	DACVSSC	Ground	Ground pin for VIDEO DAC circuitry
173	AKIN2	INPUT	Karaoke input 2
174	ADVCM		AUDIO ADC reference voltage
175	AKIN1	INPUT	Karaoke input 1
176	AADVDD3	Power	AD conversion 3.3V power input
177	APLLVDD3	Power	PLL power input
178	APLLCAP		Externally connected capacitor
179	DACVSSC	Ground	Ground pin for DAC circuitry
180	DACVSSA	Ground	Ground pin for DAC circuitry
181	DACVSSC	Ground	Ground pin for DAC circuitry
182	SW	Output	ASUBW OUTPUT
183	ARS	Output	Surround right output
184	AR	Output	AUDIO DAC right channel output
185	AVCM		AUDIO DAC reference voltage
186	AL	Output	AUDIO DAC left channel output

187	ALS	Output	Surround left output
188	ACENTER	Output	Center output
189	ADCCVDD1	POWER	ADC power input
190	ADCCVDD1	POWER	ADC power input
191	RFGND18	Ground	Analog ground
192	RFVDD18	Power	Analog power 1.8V
193	XTALO	Output	27M crystal out
194	XTALI	Input	27M crystal in
195	JITFO	Analog output	The output terminal of RF jitter meter.
196	JITFN	Analog Input	The input terminal of RF jitter meter.
197	PLLVS	Ground	Ground pin for data PLL and related analog circuitry.
198	IDACEXLP	Analog output	Data PLL DAC Low-pass filter
199	PLLVDD3	Power	Power pin for data PLL and related analog circuitry.
200	LPFON	Analog Output	The negative output of loop filter amplifier
201	LPFIP	Analog Input	The positive input terminal of loop filter amplifier.
202	LPFIN	Analog Input	The negative input terminal of loop filter amplifier.
203	LPFOP	Analog Output	The positive output of loop filter amplifier
204	ADCVDD3	Power	Analog 3.3V Power for ADC
205	ADCVSS	Ground	Analog ground for ADC
206	RFVDD3	Power	Analog Power
207	RFRPDC	Analog output	RF ripple detect output
208	RFRPAC	Analog Input	RF ripple detect input(through AC-coupling)
209	HRFZC	Analog Input	High frequency RF ripple zero crossing
210	CRTPLP	Analog output	Defect level filter capacitor connecting
211	RFGND	Ground	Analog Power
212	OSP	Analog output	RF Offset cancellation capacitor connecting
213	OSN	Analog output	RF Offset cancellation capacitor connecting
214	RFGC	Analog output	RF AGC loop capacitor connecting for DVD-ROM
215	IREF	Analog Input	Current reference input. It generates reference current for RF path. Connect an external 15K resistor to this pin and AVSS.
216	AVDD3	Power	Analog Power

3.5.2 function introduction to AM5898N

1. DESCRIPTION

The AM5898N is a 4-channel BTL driver IC for driving the motors and actuators such as used in DVD player and consists of two DC-DC Step Down Converters. It is pretty fit for portable DVD player application. Package material is Pb Free for environmental protection.

2. PIN DESCRIPTION

PIN No	Pin Name	Function	PIN No	Pin Name	Function
1	EN2	Enable pin for buck converter 2	18	VOTK-	Tracking driver output (-)
2	CT2	Timing capacitor input 2	19	MGND	Ground for motor driver
3	COMP2	Comparator inverting input 2	20	VOSP+	Spindle driver output (+)
4	SW2	Switching output 2	21	VOSP-	Spindle driver output (-)
5	IPK2	Current sense 2	22	VINSP	Input for spindle driver
6	PVcc1	Vcc for step down converter 1	23	VINTK	Input for tracking driver
7	PVcc2	Vcc for step down converter 2	24	Vcc2	Vcc for power block of spindle , tracking and focus
8	VOFC+	Focus driver output (+)	25	PGND	Ground for analog ground
9	VOFC-	Focus driver output (-)	26	PGND1	Ground for step down converter 1
10	Vcc1	Vcc for power block of sled	27	PGND2	Ground for step down converter 2
11	VINFC	Input for focus driver	28	IPK1	Current sense 1
12	VINSL+	Input for the sled driver	29	SW1	Switching output 1
13	MGND	Ground for motor driver	30	COMP1	Comparator inverting input 1
14	VOSL+	Sled driver output (+)	31	CT1	Timing capacitor input 1
15	VOSL-	Sled driver output (-)	32	EN1	Enable pin for buck converter 1
16	MGND	Ground for motor driver	33	MUTE	Input for mute control
17	VOTK+	Tracking driver output (+)	34	BIAS	Input for reference voltage

3.5.3 function introduction to HWD4863

1. DESCRIPTION

HWD4863 is a dual-bridge connecting audio power amplifier, which uses 5V voltage source and can transmit 2.2W even continuous power to a 4 Ω load (note1) or transmit 2.5W to a 3 Ω load (note 2), THD+N is less than 1.0%. In addition, when headphone plug is connected to jack, audio power amplifier is in signal final end working mode to drive stereo headphone.

HWD4863 audio power amplifier is designed to provide high quality power output. It adopts surface casing technology with minimum external components. To simplify audio system design, 4863 bridge connecting speaker amplifying mode and single final end stereo headphone amplifying mode can be realized by the same chip.

4863 adopts externally controlled low power cut off mode, stereo headphone amplifying mode and internal thermal cut protection system, also utilizes features of circuit to decrease noise (click sound and crepitating sound) and distortion degree.

2. PIN DESCRIPTION

Pin	Name	Type	Explanation
1	SHUTDOWN	INPUT	Cut off port
2	GND	POWER	Ground wire
3	+OUTA	OUTPUT	Positive direction output end A
4	VDD	POWER	Power
5	- OUTA	OUTPUT	Reverse output end A
6	-INA	INPUT	Reverse input end A
7	GND	POWER	Ground wire
8	+ INA	INPUT	Positive direction input end A
9	NC		Ground wire
10	NC		Ground wire
11	NC		Ground wire
12	NC		Ground wire
13	+ INB	INPUT	Positive direction input end B
14	BYPASS	INPUT	
15	- INB	INPUT	Reverse input end B
16	- OUTB	OUTPUT	Reverse output end B
17	VDD	POWER	Power
18	+ OUTB	OUTPUT	Positive direction output end B
19	GND	POWER	Ground wire
20	HP-IN	INPUT	Headphone/stereo mode selection

3.5.4 function introduction to S3C9454

1. DESCRIPTION

S3C9454 is core part of charge part and a single chip. This single chip adopts 10-bit A/D conversion,

PWM (12bits). Scheme of single chip (S3F9454)) has the following features:

(1) Single chip is with 10-bit A/D conversion with the precision 1/1024, the general negative voltage of NI-MH is 3-6mv (6mv/1500mv=1/250) which can satisfy your requirements. Lithium battery precision may be up to 5mv, and may be up to +/-20mv, that is 4.2V+/-0.02v when demodulation error is considered, and high precision degree is obvious.

(2) Utilize PWM (Pulse width demodulator) of single chip itself to directly control DC/DC conversion. Control method is provided by software to get different constant current and constant voltage curve (different charge means may be designed according to client's requirements), so the whole line is simple with low cost and high security, power conversion efficiency is high and heat radiation is less.

(3) May well charge NI-MH, NI-CD, LI-ION battery. The way to judge whether it is fully charged: a. Max voltage; b. max temperature increase; c. Negative voltage; d. Longest charge time. After battery is fully charged and put again (within 15 minutes), it can be tested very quickly and stop charging (this is very important to NIMH and NICD, which can prevent over charging and battery damage), may also use small current to charge to recover the damaged battery when voltage is very low.

2. PIN DESCRIPTION

Pin	Description	Function	Working voltage
1	VSS	Ground wire	0
2	XIN	Oscillation input pin	2.5
3	XOUT	Oscillation output pin	2.5
4	REST	Reset	5
5	I/O	Discharge output pin, it is low when in normal condition and high when in discharge	0
6	I/O	Unused	5
7	I/O	Bad battery or trouble control pin; when externally connected battery has trouble or in short circuit, output high level control QB601, V602 make QB601 cut off, charge stops.	5
8	I/O	Unused	0
9	I/O	Unused	0
10	I/O	Charge indication	0, 5 change
11	A/D	Unused	5
12	A/D	Check	5
13	A/D	Pulse modulating output pin (PWM), this pin outputs wav with different pulse width to control power-amplifying circuit to achieve different charge voltage current.	3

14	A/D	A/D input pin, which may be used as judge pin of battery category.	5
15	A/D	Battery voltage input pin, which may input through proper resistor partial pressure.	4.5
16	A/D	Temperature protection	2.4
17	A/D	Charge current input pin, which input through externally connected detect resistor (such as 0.5 ohm) and low pass filtering.	0.33
18	A/D	Charge battery category input pin, when VDD is pulled up, NIMH, NICD is charged; when VSS is connected, Lithium battery is charged.	0
19	A/D	Test mode input pin, which is connected to VDD when in normal conditions.	5
20	VDD	Power	5

3.5.5 function introduction to T102

1. DESCRIPTION

The T102 is a highly integrated All-in-one Visual Processor that provides major cost saving solution for the portable applications. T102 has built-in Double high performance ADCs, TCON, Triple DACs, Scaling Machine with sophisticated upscaling and downscaling algorithms. The Innovative integrated "Frame-Buffer0Less" De-interlacer can significantly reduce system cost. The T102 also integrates On Screen Display engine with 1K-word of SRAM. The device can interface to an external micro-controller through 2-wire serial bus interface.

2. FEATURES

Cost Effective Integrated Double ADC OSD + ITU656/01 Decoder +2D Video Decoder +OSD + Scaler + TCON + DAC

- Integrates 9-bit Double Analog to Digital Converters (ADC)& Phase Locked Loop (PLL)
- Scaler supports 2-D adaptive intra-field de-interlace and non-linear 16:9 aspect ratio.
- Requires no external Frame Buffer Memory for deinterlacer
- ITU656/601 Decoder with digital input ports for standard ITU656/601 input data
- Advanced On Screen Display (OSD) function
- Programmable Timing Controller (Tcon) for Car TV applications
- Multi-standard color decoder with 2D adaptive comb filter
- Innovative and flexible design to reduce total system cost
- # Double 9-bit Analog to digital Converters (ADC)
- # 80MSPS Conversion Rate

- built-in Pre-amp, mid-level & ground clamp circuit
- Automatic Clamp Control for CVBS, Y and C
- Programmable Static Gain Control or Automatic Gain Control for CVBS or Y/C
- Max input configuration up to 6xCVBS, 3xS-video
- # Digital Video Enhancement
- # Chroma Enhancer
- C supports DCTI, Saturation and Hue adjustment.
- # Advanced Scaling Engine
- # FIR Based Scaler
- Coefficient based sharpness filters
- independent vertical and horizontal scaling ratio
- 16:9 Non-linear Aspect ratio
- # LCD Interface
- Provides Gamma correction for panel compensation
- Supports image pan functions
- Programmable Timing Controller
- RGB Triple output
- # Color Management
- RGB Gamma Correction
- # Built-in On Screen Display Engine
- 1k-word OSD SRAM memory
- Supports text or bitmap modes
- Supports character blinking and overlay functions
- Fully programmable character mapping
- Supports alpha blending & Zoom-in/Zoom-out function
- Optional fonts can be stored in off-chip serial EEPROM
- # Crystal Oscillator Circuit
- Direct interface to a (27.0MHz) Crystal
- Also provide a buffered clock output for external Micro-controller
- # Digital Test Pattern Generator
- Programmable standard & special panel burn-in test patterns
- Supports special border frame blocking mode
- # Independent Display Phase Lock Loop
- Generates pixel clock output to panel
- Supports free run OSD mode
- # Serial Bus Interface
- Supports 2-wire (normal speed) or 4-wire (high speed) mode

Pulse Width Modulation Outputs

General Purpose Input Output (GPIO)

Design For Testability

-Scan chain insertion

-Separated analog & digital test modes

Power Supply: +2.5V & +3.3V

Package: 100-pin LQFP

3. PIN DESCRIPTION

symbol	Pin#	Type	Description
Power Supplies			
VDD25	27,46,57,78,89,96	PWR	+2.5V digital core power supply
VD33	26,35,47,56,80,91	PWR	+3.3V digital output power supply
AVDDB	1,7	PWR	+3.3V analog power supply for ADC channel 2
AVDDG	9,15	PWR	+3.3V analog power supply for ADC channel 1
GND	25,37,48,51,55,58,79,94,95	GND	Digital ground
AGNDB	2,8	GND	Analog ground for ADC channel 2
AGNDG	10,16	GND	Analog ground for ADC channel 1
AVD33R	69	PWR	+3.3V analog power supply for DAC channel R
AVD33G	66	PWR	+3.3V analog power supply for DAC channel G
AVD33B	63	PWR	+3.3V analog power supply for DAC channel B
AVDD	75	PWR	+2.5V Analog Power Supply for DAC
DVDD	60	PWR	+2.5V Digital Power Supply for DAC
AVD33D	77	PWR	+3.3V Analog Power Supply for DAC I/O pads
AVSS3R	70	GND	Analog ground for DAC channel R
AVSS3G	67	GND	Analog ground for DAC channel G
AVSS3B	64	GND	Analog ground for DAC channel B
AVSS	76	GND	Analog ground for DAC
DVSS	61	GND	Digital ground for DAC
AVSSD	59	GND	Analog Ground for DAC I/O pads
Output Interface Signals			
IOR	68	AO	Channel R current output
IOG	65	AO	Channel G current output

IOB	62	AO	Channel B current output
LLCK1	52	DO	Output Data Clock
LLCK2	53	DO	Output Data Clock
LLCK3	54	DO	Output Data Clock
VSO	49	DO	Vertical Synchronization Output Control Signal
HSO	45	DO	Horizontal Synchronization Output Control Signal
Timing Controller Interface Signals			
STH2	50	DO	Source Driver start pulse
LP	44	DO	Latch pulse for column driver
GCLK	43	DO	Gate driver clock
GOE	42	DO	Gate driver output enable
STV1	40	DO	Gate Driver start pulse
STV2	40	DO	Gate Driver start pulse
UD	39	DO	Panel UP/DOWN Control
PL	38	DO	Panel Right/Left Control
P1H	32	DO	Panel Polarity Control
2-wire serial bus Interface Signals			
SCL	30	DI	2-wire serial bus clock.Power down does not affect SCL
SDA	29	I/O	2-wire serial bus data.Power Down does not affect SDA
Configuration interface Signals			
CPUINT	31	I/O	Internal Interrupt
RSTB	28	DI	Field flag
Test Pins			
F1B1	99	AO	ADC test pin
FILED	33	DO	Field flag
ADC Interface			
ACB2	4	AI	Analog input 2 of channel 2
ACB1	5	AI	Analog input 1 of channel 2
ACB0	6	AI	Analog input 0 of channel 2
AY2	12	AI	Analog input 2 of channel 1
AY1	13	AI	Analog input 1 of channel 1
AY0	14	AI	Analog input 0 of channel 1

Video-In Interface			
VCLK	90	DI/O	ITU-656 video clock
VDTO	81	DI/O	ITU-656 video port
VDT1	82	DI/O	ITU-656 video port
VDT2	83	DI/O	ITU-656 video port
VDT3	84	DI/O	ITU-656 video port
VDT4	85	DI/O	ITU-656 video port
VDT5	86	DI/O	ITU-656 video port
VDT6	87	DI/O	ITU-656 video port
VDT7	88	DI/O	ITU-656 video port
LHREF	97	DI	ITU-601 video port
LODD	98	DI	ITU-601 video port
PLL Reference Clock			
XTALI	92	DI	Output PLL reference clock input
XTALO	93	DO	Output PLL reference clock output
XCLK2MC	36	DO	Buffered XTALI for external microprocessor
Power Management Interface Signals			
PWM	34	DO	Pulse Width Modulation for backlight control
General Purpose Input Output Signals			
GPIO0	81	DI/O	GPIO port 0
GPIO1	82	DI/O	GPIO port 1
GPIO2	83	DI/O	GPIO port 2
GPIO3	84	DI/O	GPIO port 3

Chapter Four Disassembly and Assembly Process

In order to know the structure of DVD player DK1005S easily, visibly and quickly, now each key link of the disassembly and assembly process of the player is presented in means of pictures to prevent users from incorrect operating and damaging elements. This player is divided into: the unit, loader, loader components, control panel components, decode control components, power board components, AV board components, MIC board components and remote controller. You are suggested to operate according to illustrations strictly.

The assembly and disassembly process is as follows:



1. Open battery case cover and use electric screwdriver to take out screws.



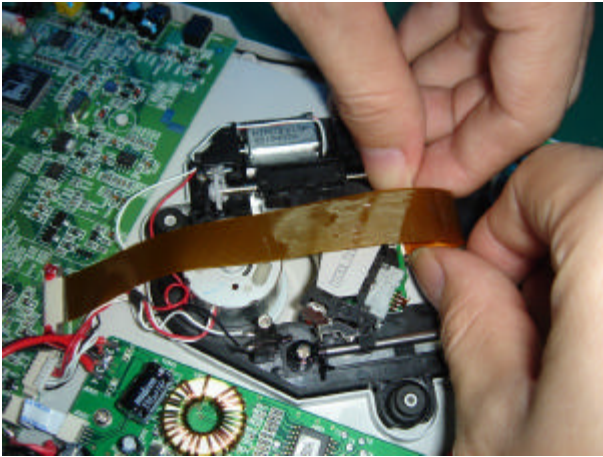
2. Take out all screws.



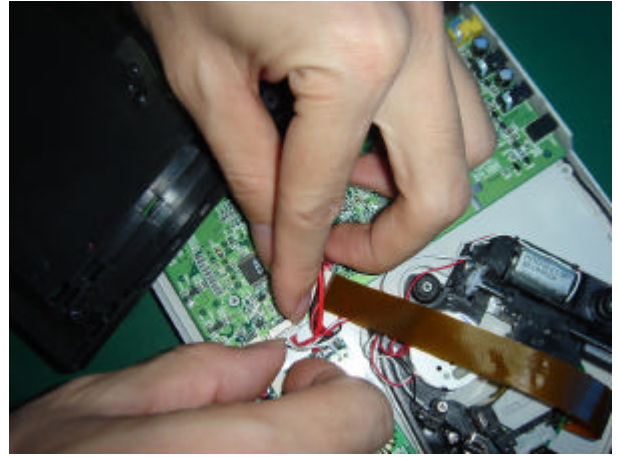
3. Take apart bottom board: loader flat cable is stuck on bottom board, so when taking apart bottom board, you should separate loader flat cable from bottom board and then you may take the bottom board (pay attention not to pull flat cable by force).



4. Take apart bottom cover.



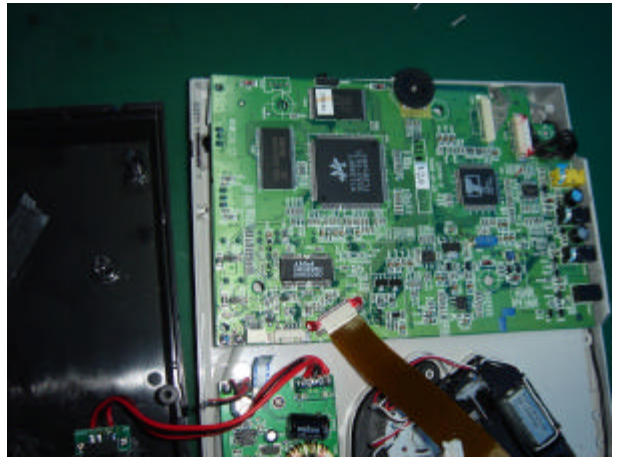
5. Change loader: take out 24P loader flat cable and pay attention to the clasp on flat cable socket.



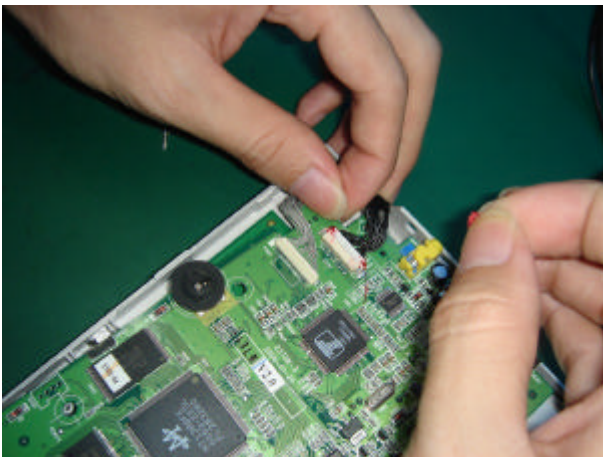
6. Remove the red glue on socket and take out feed electric machine flat cable.



7. Take out loader and change new loader. The assembly process is opposite to disassembly process. After assembly is ok, open the protection point on laser head.



8. Take down decode board: pull out the flat cable connected charge board and decode board. Use electric screwdriver to unfix screws of decode board.



9. Remove the red glue from drive board to decode board and pull out flat cable (when removing display screen components, this two flat cable may not be removed).



10. Take out panel flat cable and then you may take out decode board.



11. Take down display screen components: firstly take down decode board with the method the same as above. The two flat cable of drive board may not be removed, but should be loosed. Take out PVC plate.



12. Panel servicing: you may take down panel directly for servicing.



13. Take down display components: open the display screen.



14. Take out rotary axis bracket.



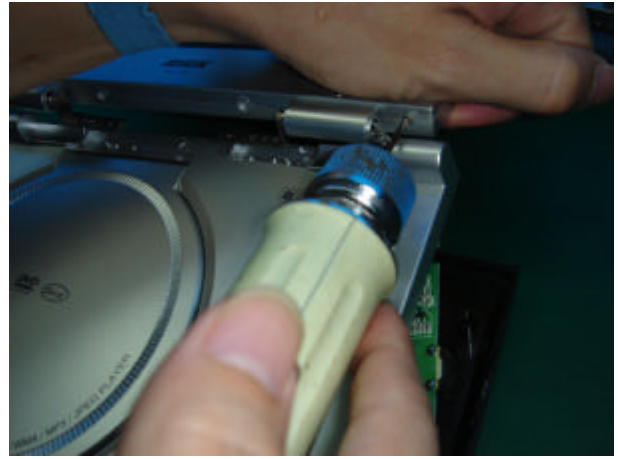
15. Take out screws in rotary axis.



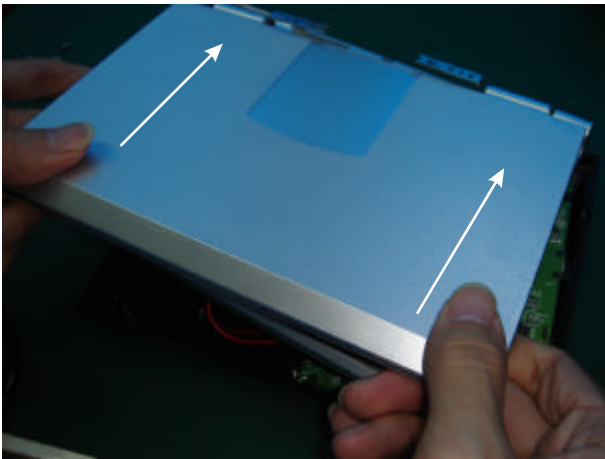
16. Separate display screen components from machine.



17. Use electric screwdriver to unfix screws at the powerpart of display screen components.



18. Take out screws.



19. Exert strength on upper display cover backwards and take out the upper display cover.



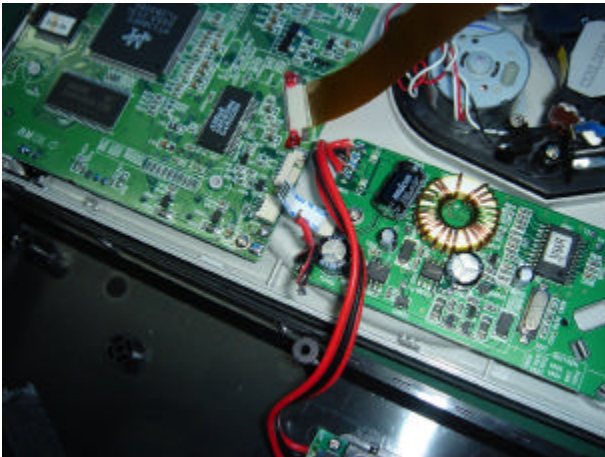
20. The assembly process of display screen components is adverse to that of disassembly process.



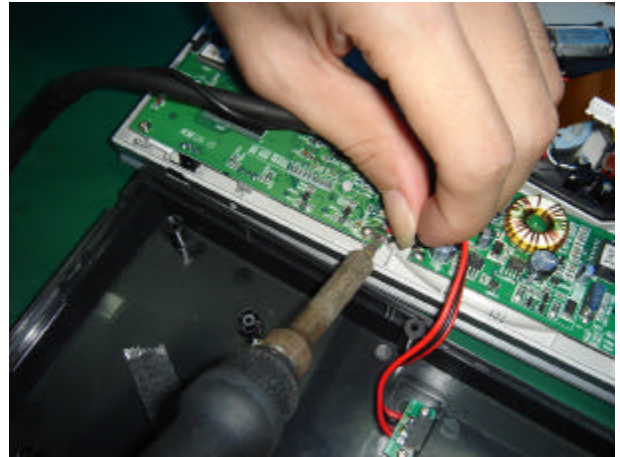
21. PVC plate must be added to decode board assembly to prevent short circuit of the decode board.



22. Insert panel flat cable. Pay attention that the switch is pointed to the position and forcible assembly is avoided.



23. Fix decode board screws.



24. Well weld flat cable to prevent the misplaced welding.



25. Well arrange flat cable inside machine to prevent them locking the loader.



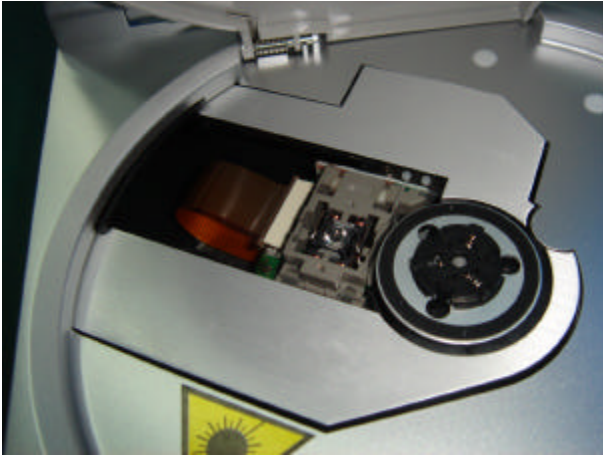
26. Assemble power switch and cover the bottom cover. Pay attention that the bottom cover must be well assorted with panel.



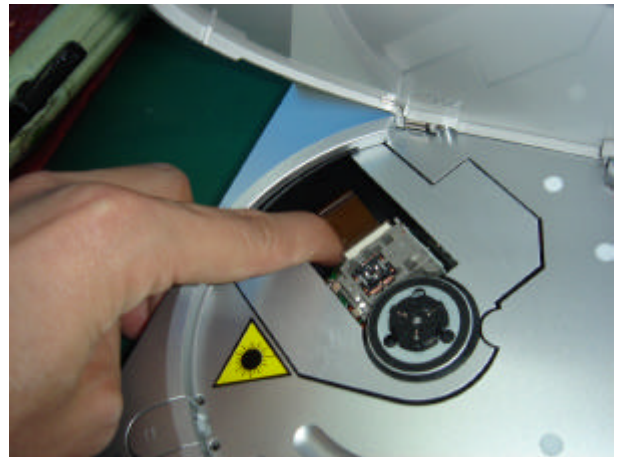
27. Use electric screwdriver to fix screws. Pay attention the length of screws before fixing.



28. Check whether the machine is fully and properly assembled with all elements.



29. Open the door of the machine and you may see the double-faced adhesive tape. Use hand to press the flat cable on bottom board to prevent it falling off.



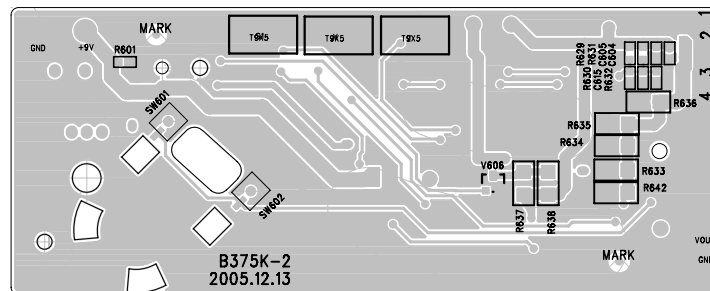
30. Power on, test and assembly finishes.

Chapter Cinque

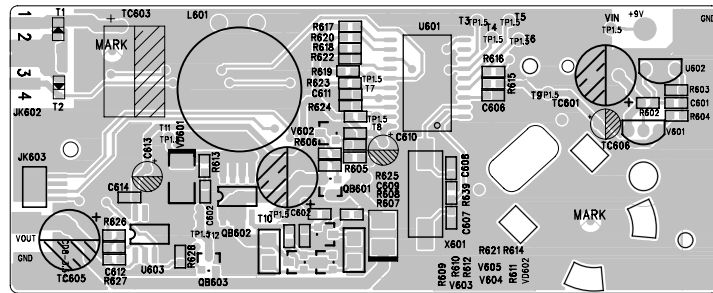
PCB board & Circuit diagram

Section One PCB board

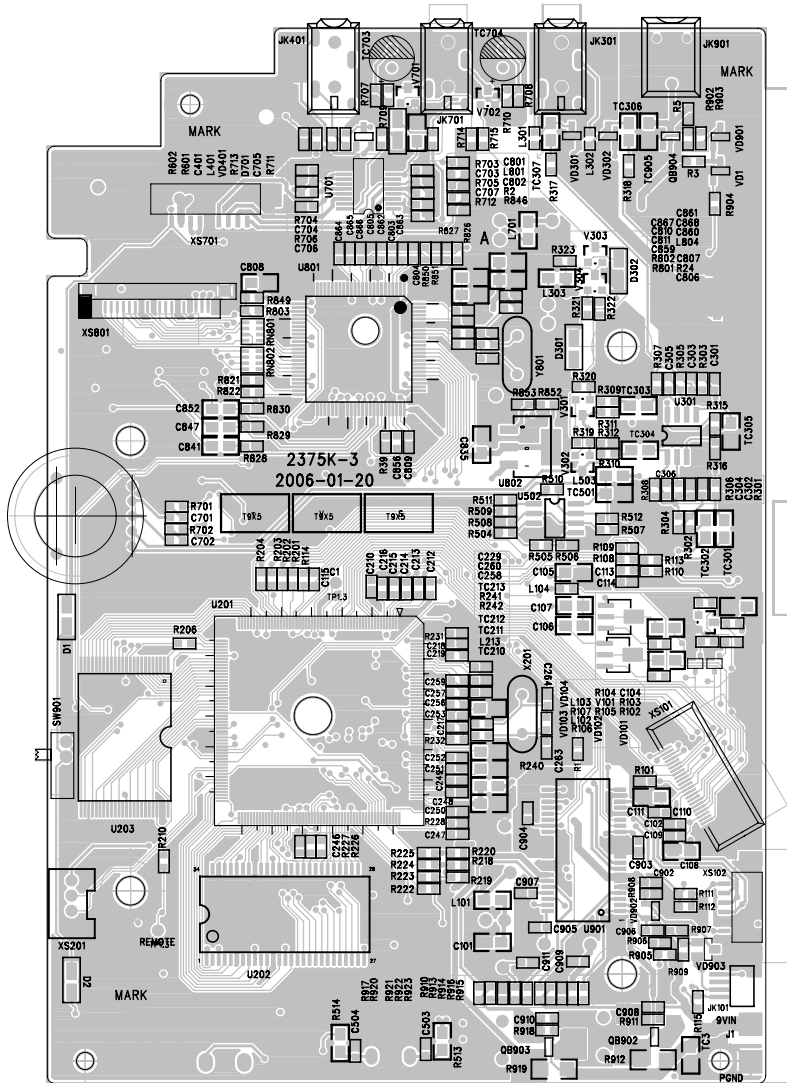
5.1.1 Bottom layer of Battery charge Board



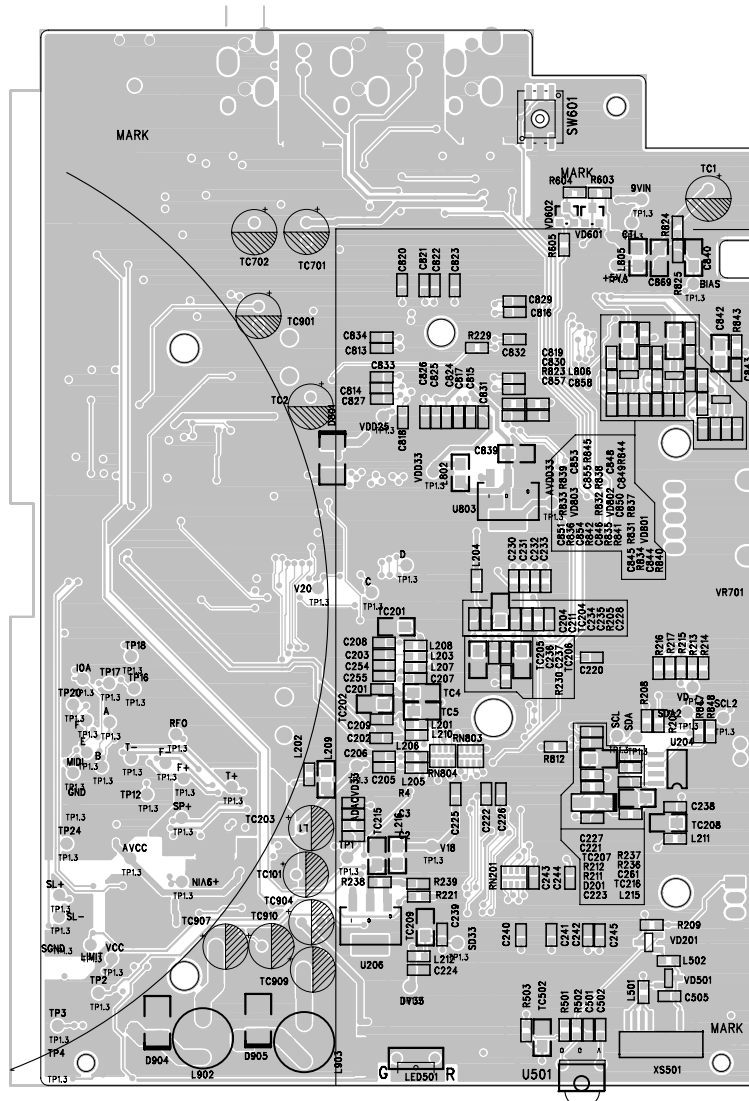
5.1.2 Surface layer of Battery charge Board



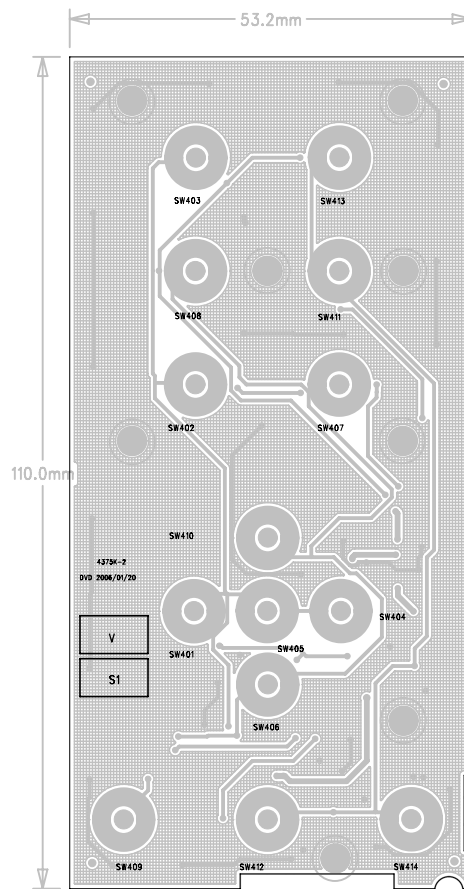
5.1.3 Surface layer of DECODE Board



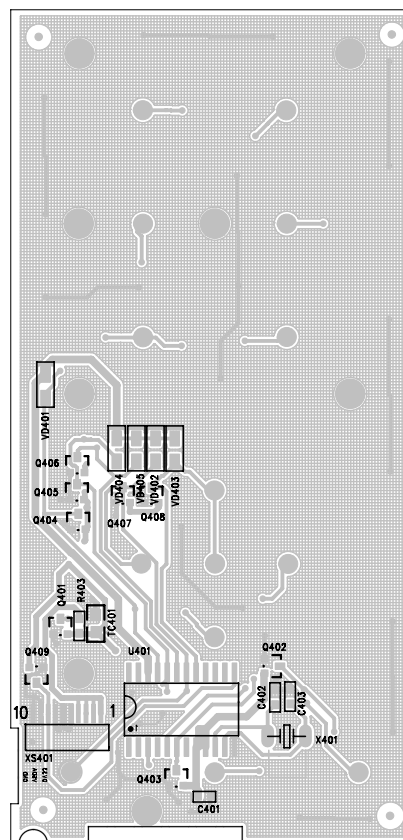
5.1.4 Bottom layer of DECODE Board



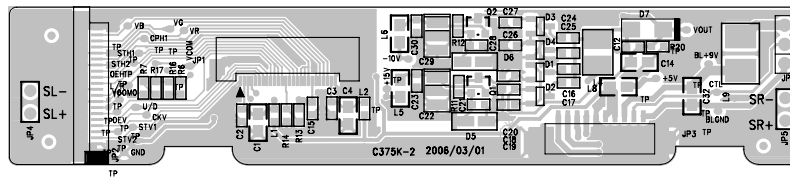
5.1.5 Surface layer of KEY SCAN Board



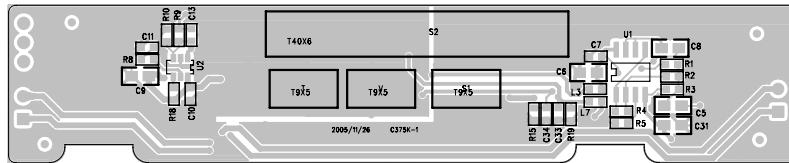
5.1.6 Bottom layer of KEY SCAN Board



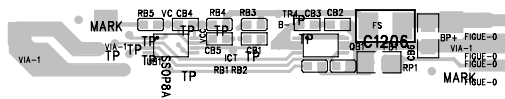
5.1.7 Surface layer of Drive Board



5.1.8 Bottom layer of Drive Board

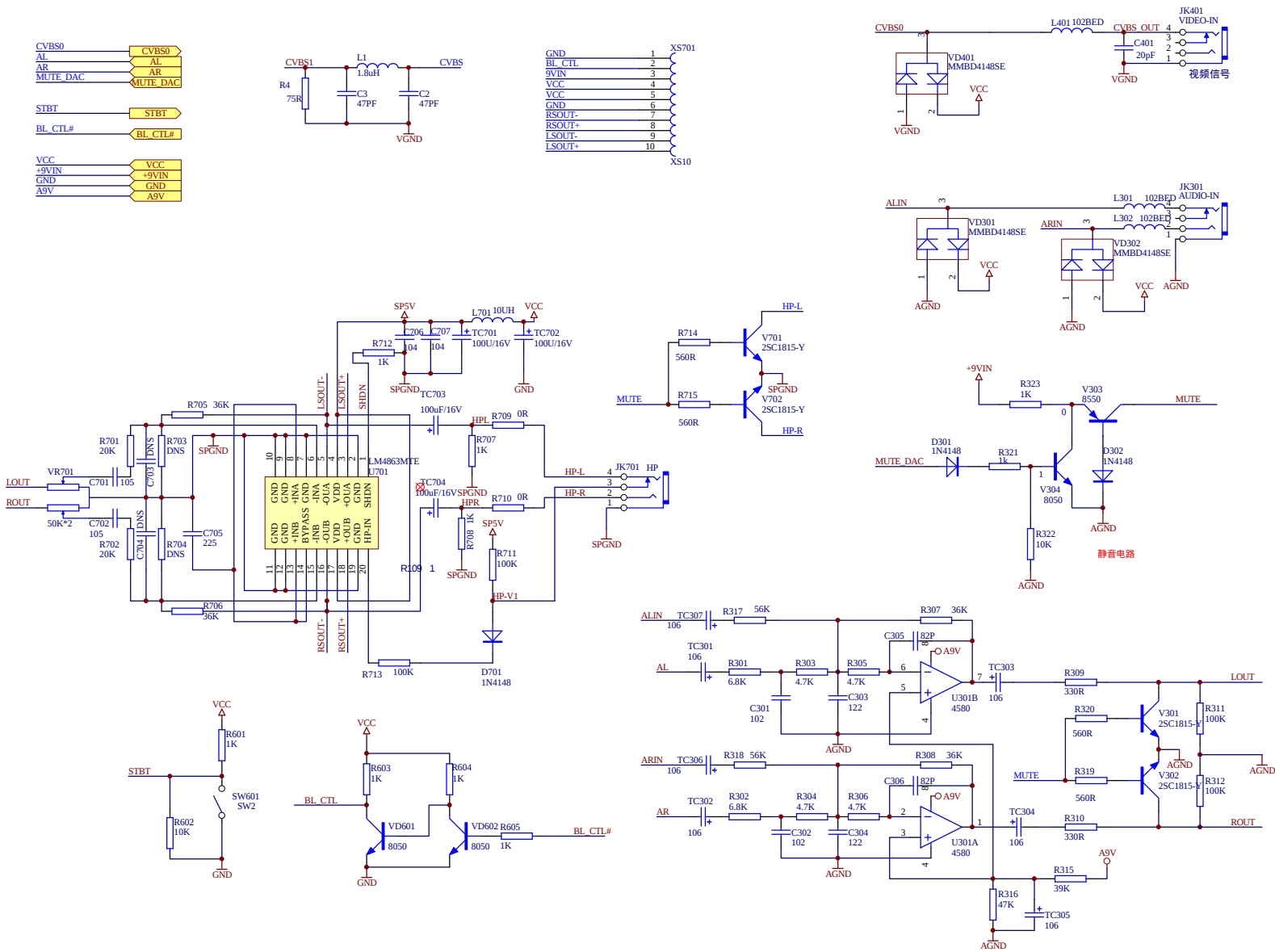


5.1.9 Battery protection Board

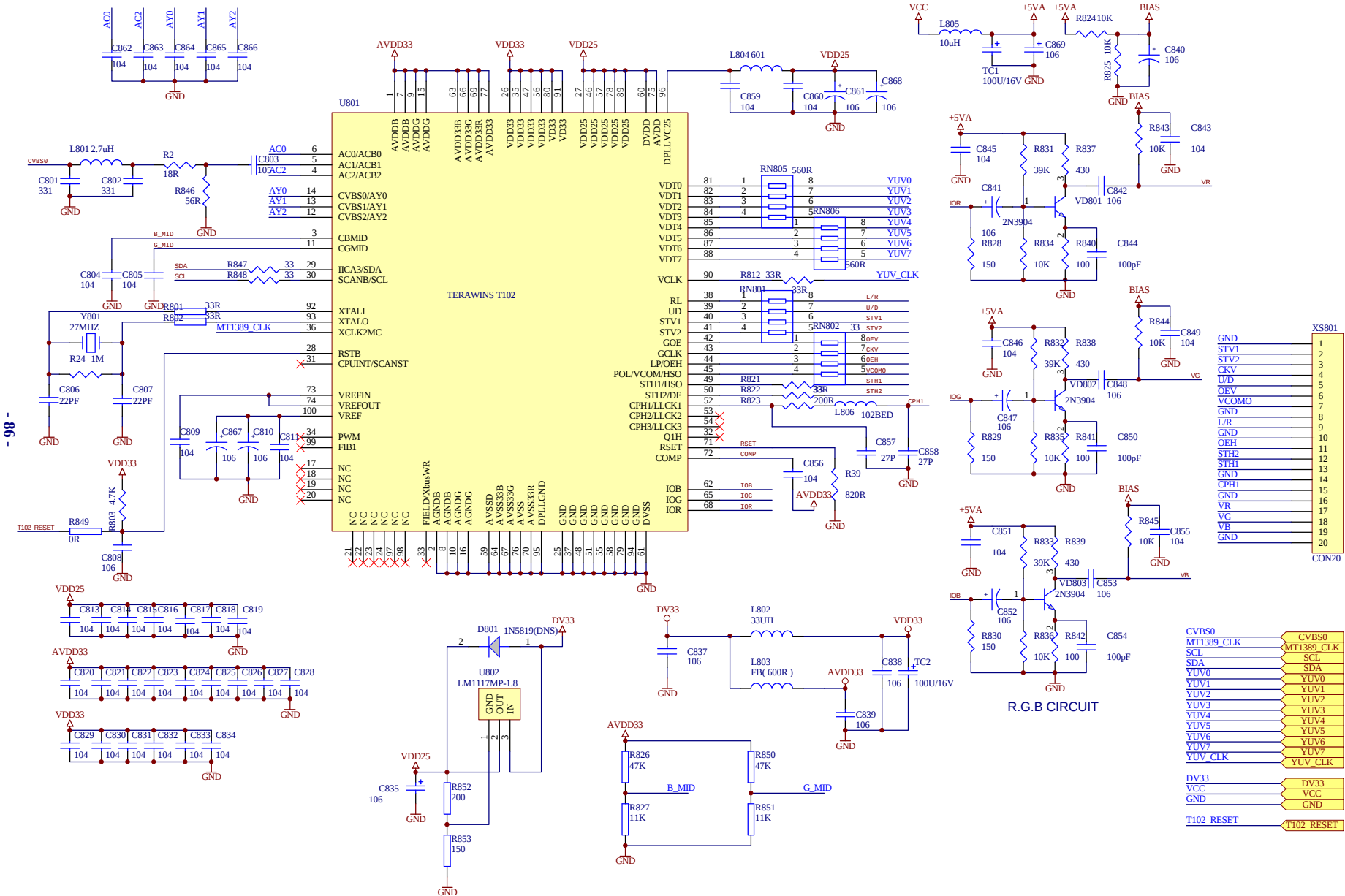


Section Two circuit diagram

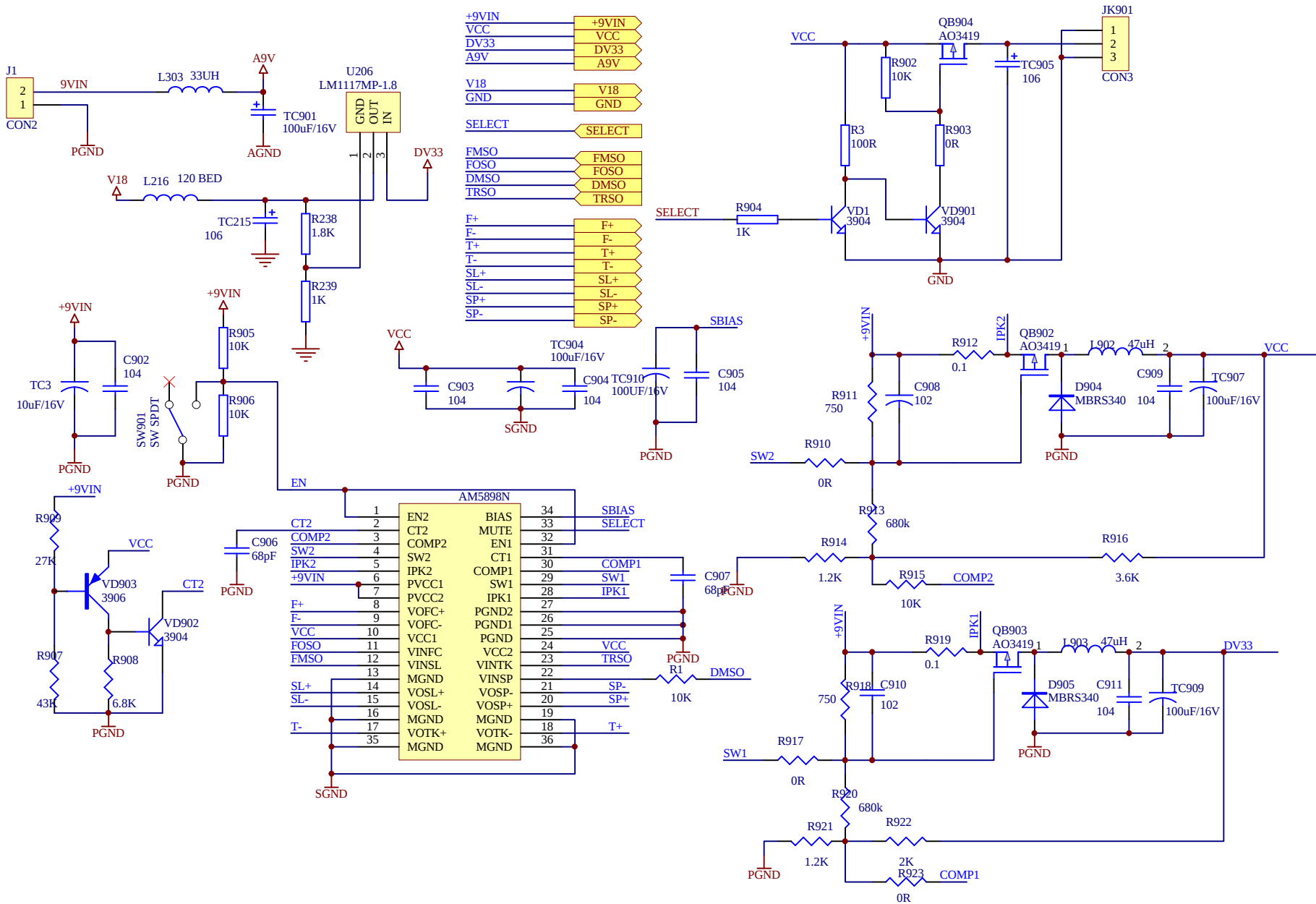
5.2.1 DECODE Board 1



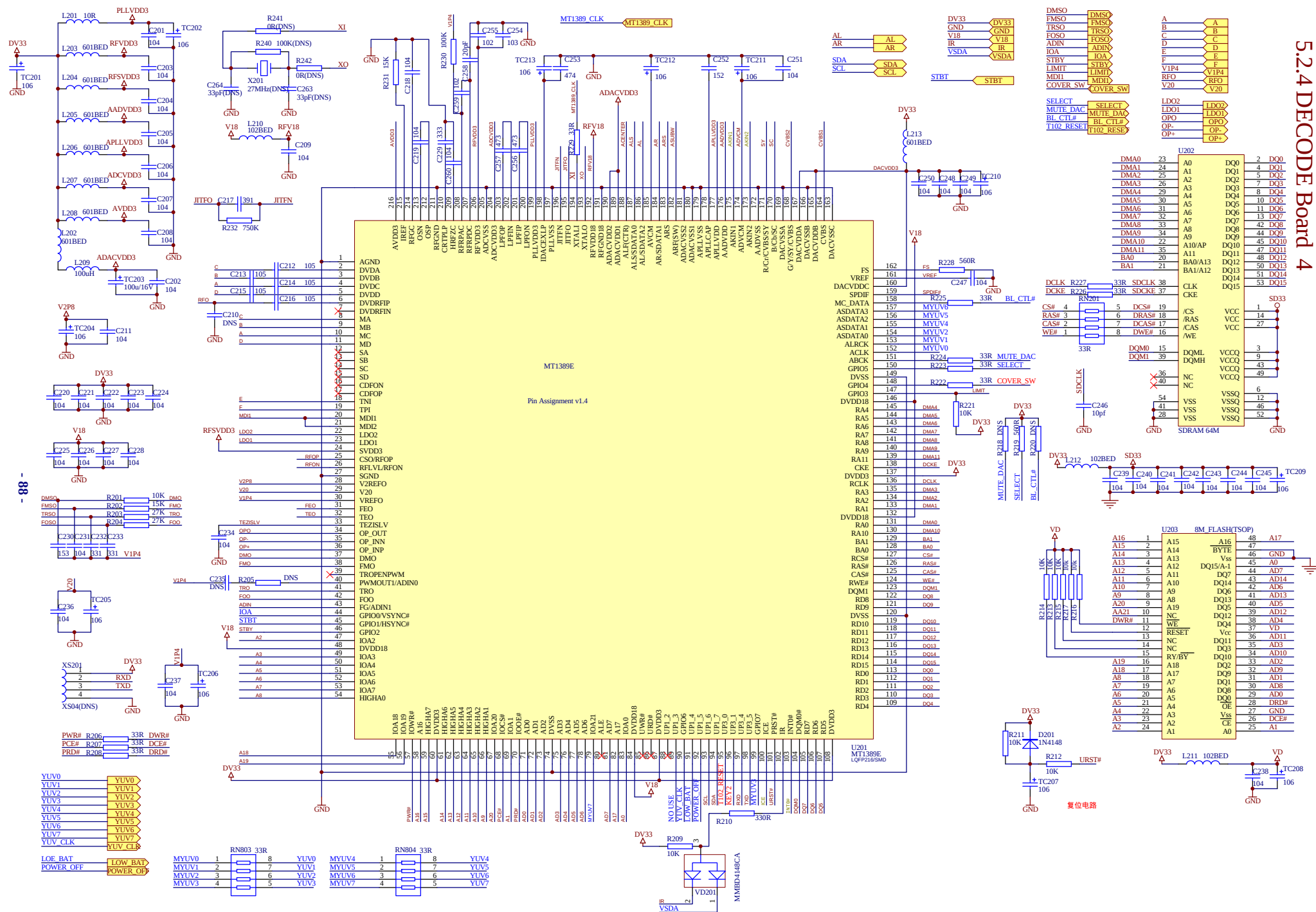
5.2.2 DECODE Board 2



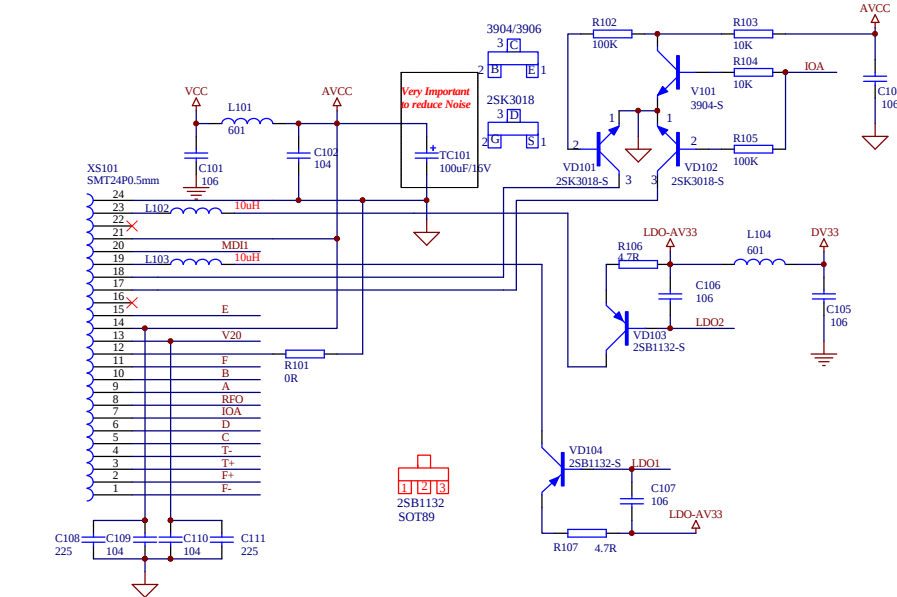
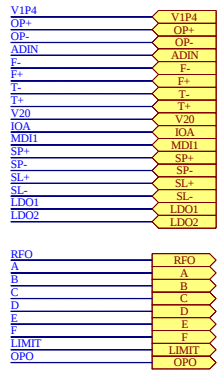
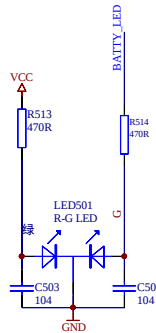
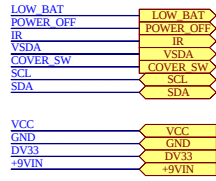
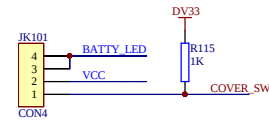
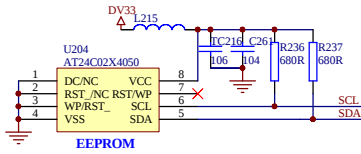
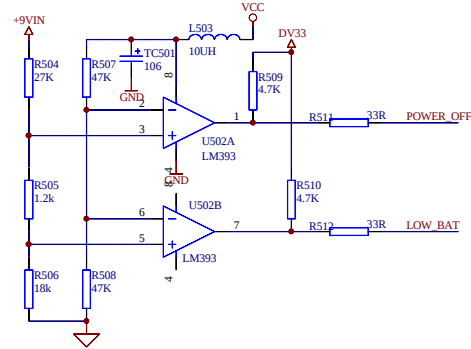
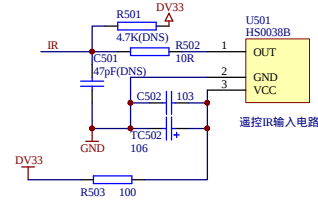
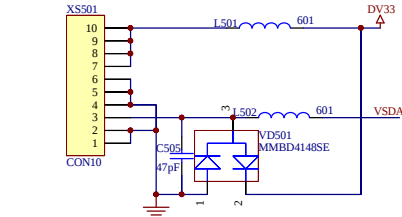
5.2.3 DECODE Board 3



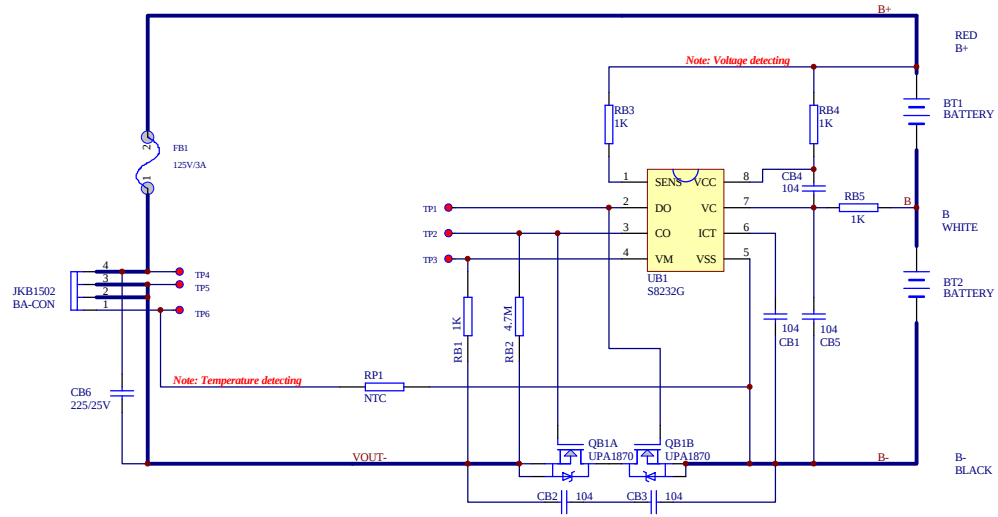
5.2.4 DECODE Board 4



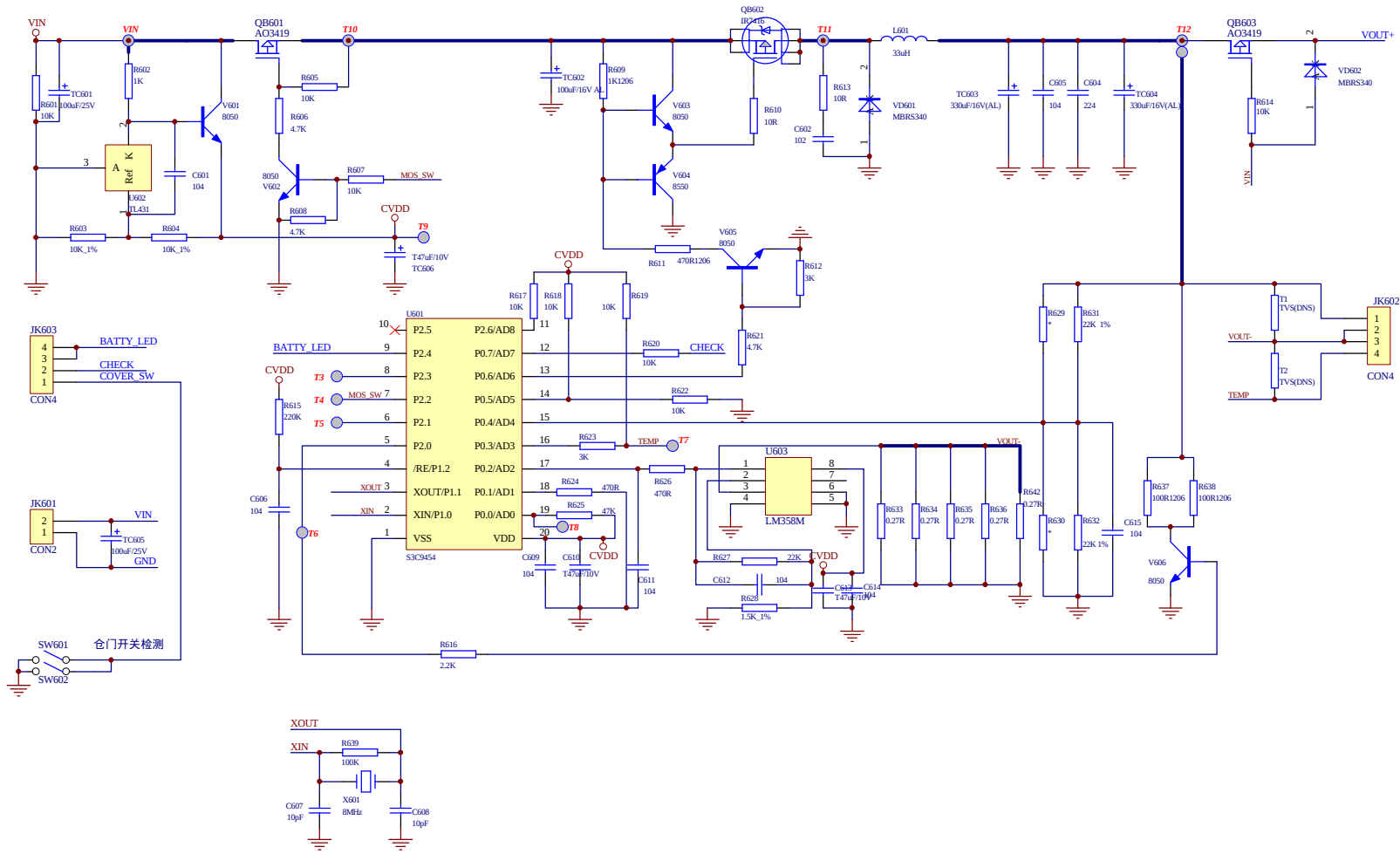
5.2.5 DECODE Board 5



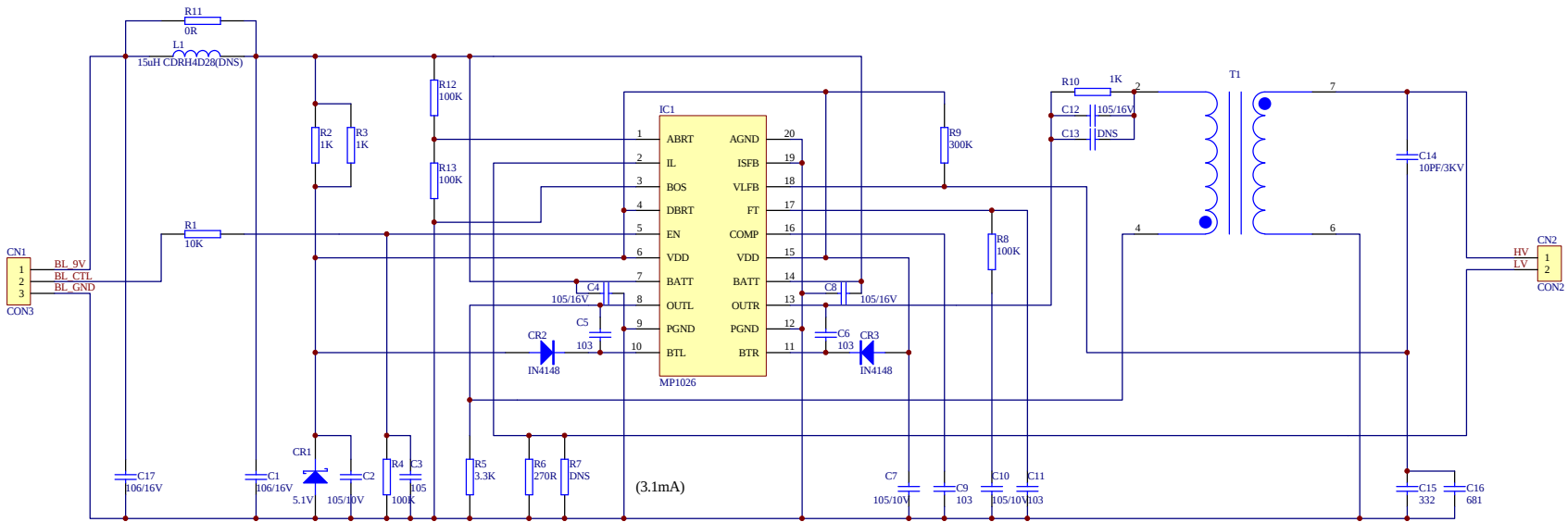
5.2.6 Battery protection Board



5.2.8 Battery charge Board



5.2.9 Boost Board



Chapter six BOM List

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
DL370D (RU) SUKVER[1389E]			
UPGRADE BOARD UNIT		5462199	
0090001	SMD RESISTOR	1/16W 00±5% 0603	R11
0090014	SMD RESISTOR	1/16W 1K±5% 0603	R2,R3,R10
0090018	SMD RESISTOR	1/16W 3.3K±5% 0603	R5
0090227	SMD RESISTOR	1/16W 2700±5%	R6
0090023	SMD RESISTOR	1/16W 10K±5% 0603	R1
0090034	SMD RESISTOR	1/16W 100K±5% 0603	R4,R8,R12,R13
0090204	SMD RESISTOR	1/16W 300K±5% 0603	R9
0310070	SMD CAPACITOR	50V 332±10% X7R 0603	C15
0310065	SMD CAPACITOR	50V 681±10% X7R 0603	C16
0310072	SMD CAPACITOR	50V 103±10% 0603	C5,C6,C9,C11
0310658	SMD CAPACITOR	25V 105±10% X7R 0805	C4,C8,C12
0310483	SMD CAPACITOR	10V 105±10% X5R 0603	C3,C2,C7,C10
0310549	SMD CERAMICCAPACITOR	25V 106+80%-20% 1210	C1,C17
0310778	SMD CERAMICCAPACITOR	3000V 10P±5% NPO 1808	C14
1940227	SOCKET	3P 1.25mm SMD	CN1
1940280	SOCKET	SM02B-BHSS-1-TB	CN2
0700154	SMD TRIODE	1N4148WS SOD-323	CR2,CR3
0700163	SMD VOLTAGE REGULATOR DIODE	5.1V±5% 0.2W SOD-323	CR1
0882914	IC	MP1026EF TSSOP	IC1
0460571	SWITCH POWERTRANSFORMER	002P502	T1
1632843	PCB	A375K-0	
DL370D (RU) SUKVER[1389E]			
BATTERY BOARD PCB SEMI-FINISHED PRODUCT		5446634	
1632077	PCB	E371-3	
3630280	BATTEMETAL OXIDE FILM RESISTOR POLARITY LABELL	DL371 GILD	
DL370D (RU) SUKVER[1389E]			
BATTERY CASE		5471684	
5233441	INSULATION PLATISC BAND	PZ-281 LENGTH:60m WIDTH:23mm DEEP YELLOW	

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
3072235	TOP COVER OF BATTERYCASE	DL370D(RU) DEEP GREY	
3070167	BOTTOM COVER OF BATTEMETAL OXIDE FILM RESISTORCASE	DL371 DEEP GREY	
5142620	SN LABELL	PORFABLE DVD BATTEMETAL OXIDE FILM RESISTOR WITH BAR CODE NUMBER	
1510201	RECHARGEABLE BATTERY	2750MAH 7.2V LITHIUM 102×68×4.6	
5446634	PCB SEMI-FINISHED PRODUCT	E371-3 DL371D(RU)	
5448114	PCB SEMI-FINISHED PRODUCT	D375K-2 DL370D(RU)	
DL370D (RU) SUKVER[1389E]			
BATTERY CHARGE BOARD PCB SEMI-FINISHED PRODUCT		5448113	
0090536	SMD RESISTOR	1/8W 0.27O±5% 1206	R633,R634,R635,R636,R642
0090003	SMD RESISTOR	1/16W 10O±5% 0603	R610,R613
0090171	SMD RESISTOR	1/8W 1K±5% 1206	R609
0090135	SMD RESISTOR	1/8W 100O±5% 1206	R637,R638
0090011	SMD RESISTOR	1/16W 470O±5% 0603	R624,R626
0090488	SMD RESISTOR	1/8W 470O±5% 1206	R611
0090014	SMD RESISTOR	1/16W 1K±5% 0603	R602
0090016	SMD RESISTOR	1/16W 1.5K±5% 0603	R628
0090017	SMD RESISTOR	1/16W 2.2K±5% 0603	R616
0090549	PRECISION SMD RESISTOR	1/16W 3k±1% 0603	R612,R623
0090304	PRECISION SMD RESISTOR	1/16W 10K±1% 0603	R601,R603,R604,R605,R607,R614,R617~R620,R622
0090019	SMD RESISTOR	1/16W 4.7K±5% 0603	R606,R608,R621
0090029	SMD RESISTOR	1/16W 47K±5% 0603	R625
0090490	PRECISION SMD RESISTOR	1/16W 22K±1% 0603	R627,R631,R632
0090201	SMD RESISTOR	1/16W 220K±5% 0603	R615
0090034	SMD RESISTOR	1/16W 100K±5% 0603	R639
0310066	SMD CAPACITOR	50V 102 ±10% 0603	C602
0310207	SMD CAPACITOR	50V104 ±20% 0603	C601,C605,C606,C609,C611,C612,C614,C615
0310112	SMD CAPACITOR	16V 224 ±10% 0603	C604
0260008	CD	CD11C 10V47U±20%4×7 1.5	TC606,C610,C613
0260451	CD	CD11C 25V100U±20% 8×7 3.5	TC601,TC602,TC605
0260214	CD	CD11 16V330U±20%8×12 3.5	TC603

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
0780085	SMD TRIODE	8050D	V602,V603,V605,V606
0780138	TRIODE	8050D	V601
0780129	SMD TRIODE	8550D	V604
0680028	SMD SCHOTTKY DIODE	MBRS340	VD601,VD602
0790097	FIELD EFFECT TRANSISTOR	AO4419 SO8	QB602
0790095	SMD FIELD EFFECT TRANSISTOR	AO3409 SOT-23	QB601, QB603
0882887	IC	S3F9454 SOP(375KR)	U601
0880176	IC	LM358M SOP	U603
0882089	IC	TL431 TO-92	U602
0960245	SMD CRYSTAL OSCILLATOR	8.00MHz ±20ppm 49-S	X601
0310188	SMD CAPACITOR	50V 10P ±5% NPO 0603	C607,C608
0410139	CHOKE COIL	VERTICAL 30UH 3A 15mm	L601
1940295	CABLE SOCKET	4P 1.0mm DUAL RANK TOUCH POINT,SMD,HORIZONTAL	JK603
1350053	TESTING SWITCH	SPVE110600	SW601,SW602
1632919	PCB	B375K-2	
DL370D (RU) SUKVER[1389E]			
BATTERY CONNECTING BOARD PCB SEMI-FINISHED PRODUCT			5445368
1860063	BATTEMETAL OXIDE FILM RESISTOR LINKER	4p 2.5mm DC-001-040-100	CN1
2121557	FLAT CABLE	4P 120mm 22# CORD RED BLACK BLACK RED	
1631736	PCB	G371-0	
1030028	SMD PRESS SENSITIVITY RESISTOR	V1608A18NR (18V) 0603	PARALLEL CONNECTION TO GROUND OF BATTERY POWER OUTPUT PORT
DL370D (RU) SUKVER[1389E]			
BATTERY PROTECT BOARD PCB SEMI-FINISHED PRODUCT			5448114
0090014	SMD RESISTOR	1/16W 1K±5% 0603	RB1,RB3,RB4,RB5
0090233	SMD RESISTOR	1/16W 4.7MO±5% 0603	RB2
0310594	SMD CAPACITOR	25V 104 ±10% 0603	CB1,CB2,CB3,CB4,CB5
0310219	SMD CAPACITOR	16V 106 +80%-20% 1206	CB6
0790040	FIELD EFFECT TRANSISTOR	UPA1870 SSOP	QB1
0881941	IC	S8232AUFT TSSOP	QB1
0881535	IC	S8232 SOP	UB1
2300023	SMD FUSE	T3AL 125V	FB1

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
1632920	PCB	D375K-2	
DL370D (RU) SUKVER[1389E]			
DECODE BOARD PCB SEMI-FINISHED PRODUCT		2375K-3	
0090001	SMD RESISTOR	1/16W 00±5% 0603	R101,R109,R903,R849,R910,R917,R923,R1,R812
0090735	SMD RESISTOR	1/4W 0.1O±5% 1206	R912,R919
0090272	SMD RESISTOR	1/16W 1O±5% 0603	R112
0090106	SMD RESISTOR	1/16W 4.7O±5% 0603	R106,R107
0090003	SMD RESISTOR	1/16W 10O±5% 0603	L201,R502
0090296	SMD RESISTOR	1/16W 18O±5% 0603	R2
0090005	SMD RESISTOR	1/16W 33O±5% 0603	R206~R208,R222~R227,R511,R512,R801,R802,R821,R822,R847,R848
0090291	SMD RESISTOR	1/16W 56O±5% 0603	R846
0090232	SMD RESISTOR	1/16W 150O±5% 0603	R828,R829,R830,R709,R710,R853
0090181	SMD RESISTOR	1/16W 100O±5% 0603	R503,R840,R841,R842,R3
0090239	SMD RESISTOR	1/16W 200O±5% 0603	R823,R852
0090009	SMD RESISTOR	1/16W 330O±5% 0603	R210,R309,R310
0090248	SMD RESISTOR	1/16W 430O±5% 0603	R837,R838,R839
0090011	SMD RESISTOR	1/16W 470O±5% 0603	R513,R514
0090012	SMD RESISTOR	1/16W 560O±5% 0603	R219,R228,R319,R320,R714,R715
0780197	SMD TRIODE	C1815	V301,V302,V701,V702
0090013	SMD RESISTOR	1/16W 680O±5% 0603	R236,R237
0090182	SMD RESISTOR	1/16W 750O±5% 0603	R911,R918
0090014	SMD RESISTOR	1/16W 1K±5% 0603	R239,R601,R603,R604,R605,R707,R708,R712,R904,R115
0090235	SMD RESISTOR	1/16W 820O±5% 0603	R39
0090015	SMD RESISTOR	1/16W 1.2K±5% 0603	R505,R921
0090541	PRECISION SMD RESISTOR	1/16W 2.2K±1% 0603	R914
0090236	SMD RESISTOR	1/16W 1.8K±5% 0603	R238
0090223	SMD RESISTOR	1/16W 2K±5%	R922
0090526	PRECISION SMD RESISTOR	1/16W 6.8K±1% 0603	R916
0090019	SMD RESISTOR	1/16W 4.7K±5% 0603	R303,R304,R305,R306,R509,R510,R803
0090021	SMD RESISTOR	1/16W 6.8K±5% 0603	R301,R302,R908

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
0090023	SMD RESISTOR	1/16W 10K±5% 0603	R103,R104,R209,R211~R217,R221,R602,R824,R825,R834,R835,R836,R843,R844,R845,R902,R905,R906,R915,R5,R322,R323
0090502	PRECISION SMD RESISTOR	1/16W 11K±1% 0603	R827,R851
0090024	SMD RESISTOR	1/16W 15K±5% 0603	R231
0090028	SMD RESISTOR	1/16W 33K±5% 0603	R202
0090017	SMD RESISTOR	1/16W 2.2K±5% 0603	R201
0090188	SMD RESISTOR	1/16W 18K±5% 0603	R506
0090025	SMD RESISTOR	1/16W 20K±5% 0603	R701,R702,R321
0090027	SMD RESISTOR	1/16W 27K±5% 0603	R203,R204,R504,R909,R317,R318
0090190	SMD RESISTOR	1/16W 36K±5% 0603	R307,R308
0090255	SMD RESISTOR	1/16W 24K±5% 0603	R705,R706
0090191	SMD RESISTOR	1/16W 39K±5% 0603	R315,R831~R833
0090029	SMD RESISTOR	1/16W 47K±5% 0603	R316,R507,R508,R826,R850
0090030	SMD RESISTOR	1/16W 56K±5% 0603	R907
0090006	SMD RESISTOR	1/16W 75O±5% 0603	R4,R229
0090034	SMD RESISTOR	1/16W 100K±5% 0603	R102,R105,R230,R311,R312,R711,R713
0090197	SMD RESISTOR	1/16W 150K±5% 0603	R110,R113
0090211	SMD RESISTOR	1/16W 680K±5% 0603	R108,R114,R913,R920
0090212	SMD RESISTOR	1/16W 750K±5% 0603	R232
0090109	SMD RESISTOR	1/16W 1MO±5% 0603	R24
0100019	SMD RESISTOR NETWORKS	1/16W 33O±5% 8P	RN201,RN801,RN802
0090623	SMD RESISTOR NETWORK	1/16W 75O±5% 0603×4 8P	RN803,RN804
0160157	ROTATED POTENTIOMETER	WHE101GB-2A-B50K-16	VR701
0260455	CD	CD11E 6.3V220U±20% 6.3×5 2.5	TC2
0260568	CD	CD11E 16V100U±20%6.3×5 2.5	TC1,TC101,TC203,TC701~TC704,TC901,TC904,TC907,TC909,TC910
0310389	SMD CAPACITOR	10V 106 +80%-20% Y5V 0805	C101,C104~C107,C808,C810,C835,C839,C840,C841,C842,C847,C848,C852,C853,C861,C867,C868,C869,TC201,TC202,TC204~TC213,TC215,TC216,TC301~TC307,TC501,TC502,TC905,TC3~TC5
0310188	SMD CAPACITOR	50V 10P ±5% NPO 0603	C246
0310647	SMD CAPACITOR	25V 20P ±5% NPO 0603	C258,C401

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
0310043	SMD CAPACITOR	50V 22P ±5% NPO 0603	C806,C807
0310190	SMD CAPACITOR	50V 27P ±5% NPO 0603	C857,C858
0310045	SMD CAPACITOR	50V 47P ±5% NPO 0603	C505,C2,C3
0390096	SMD INDUCTOR	1.8UH ±10% 1608	L1
0310193	SMD CAPACITOR	50V 68P ±5% NPO 0603	C906,C907
0310046	SMD CAPACITOR	50V 82P ±5% NPO 0603	C305,C306
0310047	SMD CAPACITOR	50V 101 ±5% NPO 0603	C844,C850,C854
0310051	SMD CAPACITOR	50V 331 ±5% NPO 0603	C232,C233,C801,C802
0310064	SMD CAPACITOR	50V 391 ±10% 0603	C217
0310066	SMD CAPACITOR	50V 102 ±10% 0603	C255,C259,C301,C302,C908,C910
0310231	SMD CAPACITOR	50V 122 ±10% 0603	C303,C304
0310067	SMD CAPACITOR	50V 152 ±10% 0603	C252
0310117	SMD CAPACITOR	50V 222 ±5% X7R 0603	C113,C115
0310072	SMD CAPACITOR	50V 103 ±10% 0603	C254,C502
0310324	SMD CAPACITOR	16V 393 ±10% X7R 0603	C230
0310055	SMD CAPACITOR	16V 333 ±10% 0603	C229
0310056	SMD CAPACITOR	16V 473 ±10% 0603	C256,C257
0310594	SMD CAPACITOR	25V 104 ±10% 0603	C102,C109,C110,C201~C209,C211,C218~C228,C234,C236~C245,C247~C251,C260,C261,C503,C504,C706,C707,C804,C805,C809,C811,C813~C827,C829~C834,C843,C845,C846,C849,C851,C855,C856,C859,C860,C862~C866,C902~C905,C909,C911
0310257	SMD CAPACITOR	16V 683 ±10% X7R 0603	C231
0310542	SMD CAPACITOR	16V 474±10% 0603	C253
0310234	SMD CAPACITOR	16V 105 +80%-20% 0603	C212~C216,C701,C702,C803
0310672	SMD CAPACITOR	25V 225 +80%-20% Y5V 0805	C108,C111,C705
0390189	SMD INDUCTOR	2.7UH ±10% 1608	L801
0390044	SMD INDUCTOR	10UH ±10% 2012	L102,L103,L503,L701
0390215	SMD RESISTOR	33uH±10% 3225	L303,L802
0390433	VERTICAL INDUCTOR	47uH±10% 8×5 5mm	L902,L903
0390279	SMD COIL THREAD INDUCTOR	100uH ±10% 3225	L209,L805
0390302	SMDMAGNETIC BEADS	MGHB1608S102	L210,L211,L212,L301,L302,L401,L806
0390259	SMDMAGNETIC BEADS	FCM2012-120T2A	L216

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
0390142	SMDMAGNETIC BEADS	FCM1608-601T02	L104,L202~L208,L215,L501,L502,L804
0390025	SMDMAGNETIC BEADS	BGH2012B601L	L101,L213
0700007	SMD DIODE	1N4148	D201,D701,D1,D2,D301,D302
0700001	SMD DIODE	LS4148	D201,D701,D1,D2,D301,D302
0700002	SMD DIODE	LL4148	D201,D701,D1,D2,D301,D302
0700056	SMD DOUBLE DIODE	MMBD4148SE SOT-23	VD301,VD302,VD401,VD501
0700063	SMD DUAL DIODE	MMBD4148CA SOT-23	VD201
0680050	SMD SCHOTTKY DIODE	MBRS140	D904,D905
0620086	2RG59PC RED AND GREEN 2 x4.5x4	2.5RG59HW-Ax5 RED AND GREEN	LED501
0780085	SMD TRIODE	8050D	V304,VD601,VD602,VD1
0780129	SMD TRIODE	8550D	V303
0780193	SMD TRIODE	2SK3018	VD101,VD102
0780115	SMD TRIODE	2SB1132	VD103,VD104
0780040	SMD TRIODE	3904(100-300) SOT-23	V101,VD801~VD803,VD901,VD902
0780041	SMD TRIODE	3906(100-300) SOT-23	VD903
0790095	SMDFIELD EFFECT TRANSISTOR	AO3409 SOT-23	QB902~QB904
0880768	IC	C4558 SOP	U301
0882485	IC	AZ1117H-3.3 SOT-223	U803
0882262	IC	K4S641632H-TC60 TSOP	U202
0882559	IC	HY57V641620ET-7 TSOP	U202
0882892	IC	T102 LQFP	U801
0882150	IC	24CC02A SOP	U204
0881947	IC	A21SC SOP	U204
0882749	IC	FM24C02 SOP	U204
0882643	IC	MT1389FE/E(E) QFP	U201
0882886	IC	AM5898N HSOP	U901
0882105	IC	LM393 SO8	U502
0882942	IC	HWD4863MTE TSSOP	U701
0882461	IC	AZ1117H-ADJ SOT-223	U206,U802
0881182	IC	LM1117MP-ADJ SOT-223	U206,U802
2360016	IR SENSOR	HS0038B3V	U501

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
0960020	CRYSTAL OSCILLATOR	27.00MHz 49-S	Y801
1940294	CABLE SOCKET	10P 1.0mm DUAL RANK TOUCH POINT,SMD,HORIZONTAL	XS501
1940295	CABLE SOCKET	4P 1.0mm DUAL RANK TOUCH POINT,SMD,HORIZONTAL	JK101
1940237	SOCKET	20P 0.8mm SMD	XS801
1940220	SOCKET	6P 1.25mm SMD	XS102
1940322	SOCKET	10P 1.25mm SMD HORIZONTAL	XS701
1940094	CABLE SOCKET	24P 0.5mm SMD WITH CLASP	XS101
1350065	TESTING SWITCH	SPVE0010	SW601
1310083	STIR SWITCH	SK-12D06-D2	SW901
1870024	POWER SUPPLY SOCKET	DS-341-113	JK901
1910101	AV SOCKET	PJ-327 BLACK	JK301,JK701
1910104	AV SOCKET	PJ-327 YELLOW	JK401
1632988	PCB	2375K-3	
DL370D (RU) SUKVER[1389E]			
DRIVE BOARD PCB SEMI-FINISHED PRODUCT		5448111	
0090001	SMD RESISTOR	1/16W 00±5% 0603	R13,R6
0090018	SMD RESISTOR	1/16W 3.3K±5% 0603	R8
0090014	SMD RESISTOR	1/16W 1K±5% 0603	R11,R12
0090023	SMD RESISTOR	1/16W 10K±5% 0603	R1,R15,R2,R5,R20,R7
0090192	SMD RESISTOR	1/16W 51K±5% 0603	R4
0090189	SMD RESISTOR	1/16W 30K±5% 0603	R16
0390044	SMD INDUCTOR	10UH ±10% 2012	L5,L6
0090024	SMD RESISTOR	1/16W 15K±5% 0603	R3
0090254	SMD RESISTOR	1/16W 9.1K±5% 0603	R17
0090030	SMD RESISTOR	1/16W 56K±5% 0603	R10
0090193	SMD RESISTOR	1/16W 82K±5% 0603	R19
0090034	SMD RESISTOR	1/16W 100K±5% 0603	R18
0090203	SMD RESISTOR	1/16W 270K±5% 0603	R9
0310389	SMD CAPACITOR	10V 106 +80%-20% Y5V 0805	C1,C4,C5,C6,C8,C9,C14,C31,C32
0310701	SMD CAPACITOR	10V 106±20% Y5V 0805	C1,C4,C5,C6,C8,C9,C14,C31,C32
0310654	SMD CERAMICCAPACITOR	25V 106 +80%-20% Y5V 1206	C22,C29

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
0310066	SMD CAPACITOR	50V 102 ±10% 0603	C12
0310072	SMD CAPACITOR	50V 103 ±10% 0603	C11
0310594	SMD CAPACITOR	25V 104 ±10% 0603	C10,C15,C18,C2,C23,C3,C30,C33,C34,C7
0310542	SMD CAPACITOR	16V 474±10% 0603	C16,C17,C24,C25
0310658	SMD CAPACITOR	25V 105 ±10% X7R 0805	C19,C20,C21,C26,C27,C28
0390435	SMD INDUCTOR	10uH ±20% 4532	L9,L4
0390142	SMDMAGNETIC BEADS	FCM1608-601T02	L1,L2,L3,L7
0390025	SMDMAGNETIC BEADS	BGH2012B601L	L8
0680042	SMD SCHOTTKY DIODE	BAT54S SOT-23	D1,D2,D3,D4
0700136	SMD VOLTAGE REGULATOR DIODE	16V ±5% 1/2W MINIMELF	D5
0700137	SMD VOLTAGE REGULATOR DIODE	11V ±5% 1/2W MINIMELF	D6
0680050	SMD SCHOTTKY DIODE	MBRS140	D7
0780085	SMD TRIODE	8050D	Q1
0780129	SMD TRIODE	8550D	Q2
0881539	IC	NJM3414AM SOP	U1
0882891	IC	G5105TBU SOT-23	U2
1940194	CABLE SOCKET	26P 0.5mm SMD,SUBMIT MEET WITH CLASP	JP1
1940237	SOCKET	20P 0.8mm SMD	JP2
1940322	SOCKET	10P 1.25mm SMD HORIZONTAL	JP3
1633048	PCB	C375K-2	
DL370D (RU) SUKVER[1389E]			
MAIN PANEL PCB SEMI-FINISHED PRODUCT		5448110	
0090003	SMD RESISTOR	1/16W 100±5% 0603	R403
0310048	SMD CAPACITOR	50V 151 ±5% NPO 0603	C402,C403
0310389	SMD CAPACITOR	10V 106 +80%-20% Y5V 0805	TC401
0700002	SMD DIODE	LL4148	VD401,VD402,VD403
0700001	SMD DIODE	LS4148	VD401,VD402,VD403
0700007	SMD DIODE	1N4148	VD401,VD402,VD403
0970003	CERAMIC RESONATOR	455E	X401
0881587	IC	PT2222A SOP	U401
1940294	CABLE SOCKET	10P 1.0mm DUAL RANK TOUCH POINT,SMD,HORIZONTAL	XS401

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
0700056	SMD DOUBLE DIODE	MMBD4148SE SOT-23	Q401-Q409
0310207	SMD CAPACITOR	50V104 ±20% 0603	C401
0310543	SMD CAPACITOR	50V 104 ±10% X7R 0603	C401
1632989	PCB	4375K-2	
DL370D (RU) SUKVER[1389E]			
POWER SOCKET BOARD PCB SEMI-FINISHED PRODUCT		5448112	
1870021	POWER SUPPLY SOCKET	DC-023	JK102
1570158	PCB	F375K-0	
DL370D (RU) SUKVER[1389E]			
PROGRAM FLASH			
0881650	IC	29LV160BE-70PFTN TSOP	U203