

DV310SI

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
2.2.1 Front Panel Illustration	4
2.2.2 Rear Panel Illustration	5
2.2.3 Display Window Illustration	5
2.2.4 Remote Control Illustration	5
2.3 Accessories	6
2.4 FUNCTION SETUP	7
2.4.1 Function Setup	7
2.4.2 Language	7
2.4.3 Image	7
2.4.4 Sound	8
2.4.5 Playback	8

2.4.6 Preference	9
2.4.7 Parental control	9
2.4.8 Initial setup	9
2.4.9 Rest to defaults	9
2.4.10 Exit	9
2.5 Specifications	9
 Chapter Three Principle and Servicing	11
Section One Principle of the Player	11
3.1.1 Block diagram of the player	11
3.1.2 PCB board block diagram of the player	12
3.1.3 How to use IC	13
Section Two Unit Circuit Principle	14
3.2.1 Introduction to laser head	14
3.2.2 Servo circuit	16
3.2.3 Open/close drive circuit	18
3.2.4 Laser power control circuit	18
3.2.5 CD/DVD conversion circuit	19
3.2.6 Main axis control circuit	20
3.2.7 Decode circuit	21
3.2.8 Reset circuit	22
3.2.9 Video circuit	23
3.2.10 Audio circuit	24
3.2.11 Mute circuit	25
3.2.12 Decode circuit voltage regulating	26
3.2.13 Panel control circuit	27
3.2.14 MIC circuit	27
3.2.15 Power circuit	27
Section Three Servicing Cases	29
3.3.1 Servicing cases	29
3.3.2 Troubleshooting flow chart	35
Section Four Waveform diagram	47
Section Five Function Introduction to IC	53
3.5.1 function introduction to MT1389 DE-EE	53
3.5.2 function introduction to 4558	61

3.5.3 function introduction to AT24C02	62
3.5.4 function introduction to TDA1308	63
3.5.5 function introduction to TNY275PN	64
3.5.6 function introduction to AM5888S	65
3.5.7 function introduction to AP6928	67
3.5.8 Function introduction to SDRAM	68
3.5.9 Function introduction to FLASH	69
3.5.10 Function introduction to TL431	70
3.5.11 Function introduction to EL817	71
 Chapter Four Disassembly and Assembly Process	 72
 Chapter Cinque PCB board & Circuit diagram	 73
Section One PCB board	73
Section Two circuit diagram	80
 Chapter six BOM List	 87
 DV123SI Service Manual	 94
7.1.1 PCB composition figure of the player	94
7.2.1 Panel control circuit	95
7.2.2 MIC circuit	95
7.3.1 PCB board	96
7.3.2 circuit diagram	100

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

Compatible Disc Types:

- ◆ Digital video playback: DVD-Video, Super VCD, VCD Compatibility.
- ◆ Digital audio playback: CD-DA and HDCD compatibility
- ◆ Fully compatible with compressed audio files such as Mp3 and WMA.
- ◆ Digital graphic albums playback: kodak picture CD, JPEG compatibility.

Audio:

- ◆ Coaxial output for Dolby Digital/DTS/LPCM digital audio.
- ◆ Mixed audio output for amplifier or TV connection.
- ◆ Digital multi-channel decoders, providing Dolby Digital/DTS audio stream playing.
- ◆ MIC input for karaoke function.

Video:

- ◆ 108 MHz/12 bit video Digital/Analog converter.
- ◆ Composite, S-Video and RGB/SCART outputs for various types of connections.
- ◆ Capable of playing NTSC/PAL discs.
- ◆ Multiple dubbings, angles, subtitles support.
- ◆ Sharpness, gamma, brightness, contrast, hue, saturation adjustment.

Others:

- ◆ Compatible disc types: CD-R/CD-RW, DVD-R/DVD-RW, DVD+R/DVD+RW
- ◆ Russia, CIS and Baltic States adaptation interface and filenames, ID3-tags and CD-Text support

simplifies device operation.

- ◆ "Memory" function enables to save the last point after stop playback.
- ◆ "Q-play" function provides direct playback and allows to skip commercial that is not possible to rewind.

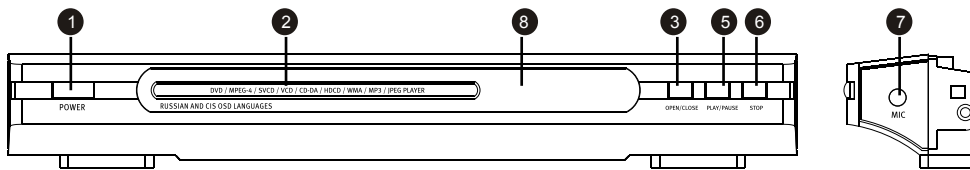
- ◆ "Captrue" function allows to save any picture as background.
- ◆ "Virtual Keyboard" function provides more convenient DVD playback control.
- ◆ "Browser" function provides easy access to playback control.
- ◆ Automatic Screenaver function.
- ◆ Parental control function to protect children from watching inappropriate discs.
- ◆ Super wide range of operating power supplies (~110-250V, 50/60Hz), automatic short circuit

protection.

2.2 Control Button Locations and Explanations

2.2.1 Front Panel Illustration

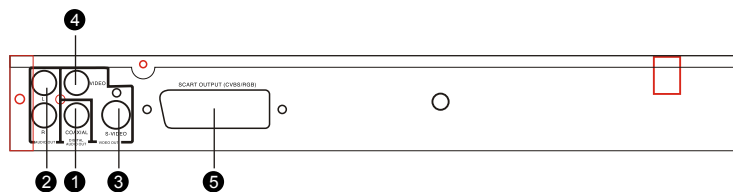
DV310SI



2.2.4 Remote Control Illustration

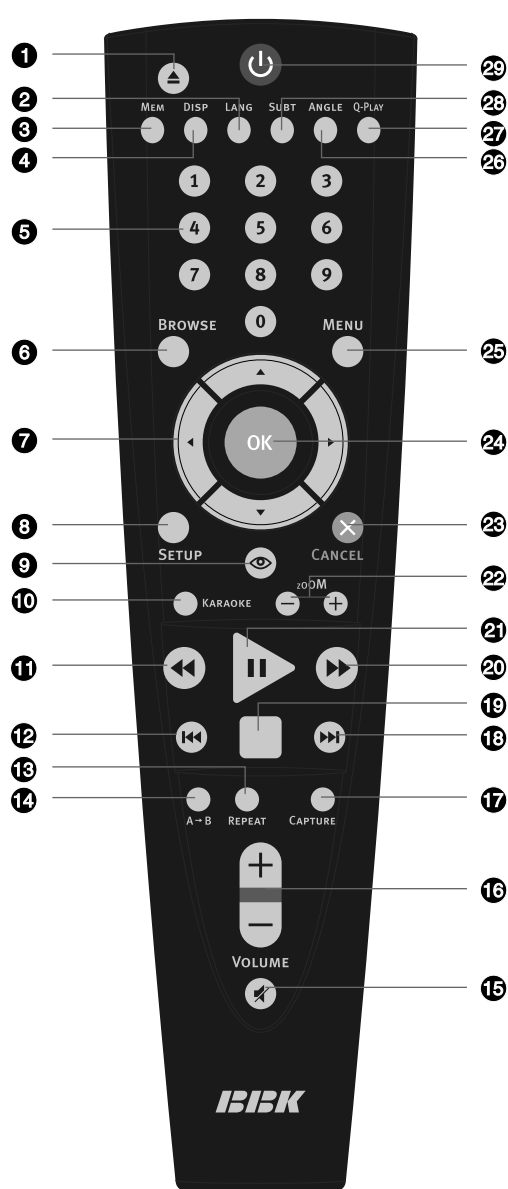
- | | | |
|---------------------|---------------------|--------------------|
| 1 POWER switch | 4 Display window* | 7 MIC jack |
| 2 Disc tray | 5 PLAY/PAUSE button | 8 IR sensor button |
| 3 OPEN/CLOSE button | 6 STOP button | |

2.2.2 Rear Panel Illustration



- | | |
|----------------------------------|------------------|
| 1 Digital Audio Coaxial Out jack | 5 SCART Out jack |
| 2 2CH Audio Out jacks | 6 Video |
| 3 S-Video | 7 Y/Cb/Cr |
| 4 Video Out jack | |

2.2.4 Remote Control Illustration



- 1 Button** Press to open/close the disc tray.
- 2 LANG button** Press to change the language.
- 3 MEM button** Press to memorize the point where playback was stopped/ playback from the previously memorized point.
- 4 DISP button** Press to display the disc information.
- 5 Numeric buttons**
- 6 BROWSE button** Press to turn on/off the browser function.
- 7 Cursor buttons (UP, DOWN, LEFT, RIGHT)**
- 8 SETUP button** Press to switch to setup mode.
- 9 Button** Press to turn on/off the "Virtual Keyboard" function.
- 10 KARAOKE button** Press to set karaoke function.
- 11 Button** Press to reverse scanning.
- 12 Button** Press to playback from the previously point.
- 13 REPEAT button** Press to repeat playback.
- 14 A-B buttons** Press to repeat the selected section.
- 15 Button** Press to turn on/off the sound.
- 16 VOLUME+/- button** Press to adjust the volume.
- 17 CAPTURE button** Press to set the played image as the power-on logo.
- 18 Button** Press to playback from the following point.
- 19 Button** Press to stop playback.
- 20 Button** Press to forward scanning.
- 21 Button** Press to play/pause the playback.
- 22 ZOOM+/- button** Press to zoom in/out the image.
- 23 CANCEL button** Press to return to the previous level/cancel current operation.
- 24 OK button**
- 25 MENU button** DVD disc menu/PBC function.
- 26 ANGLE button** Press to change camera angle/change a mode of MP3 and JPEG files reproduction.
- 27 Q-PLAY button** Press to turn the Q-Play mode on.
- 28 SUBT button** Press to change the subtitles language/JPEG mode.
- 29 Button** Press to switch the device on/into standby.

2.3 Accessories

AUDIO/VIDEO CORD	1PCS
REMOTE	1PCS
AAA SIZE BATTERIES	2PCS
WARRANTY CARD	1PCS
USER MANUAL	1PCS
KARAOKE DISC	1PCS

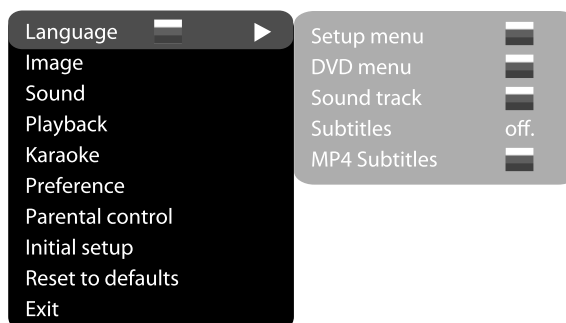
FUNCTION SETTINGS

Function selection and change

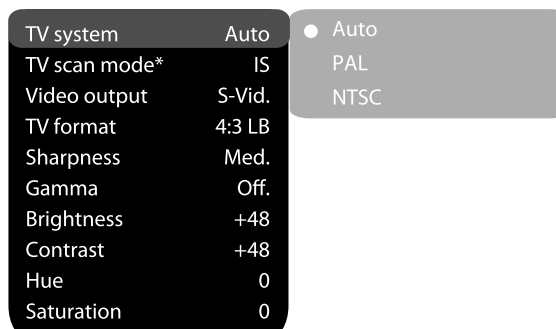
Press the SETUP key to show the setup menu. You will see the following image on the screen, as shown on the figure:

Select the desired menu item using the UP and DOWN buttons; press OK for confirmation.

1. For example, if you wish to change the image settings, you have to select the Image item and press the OK.



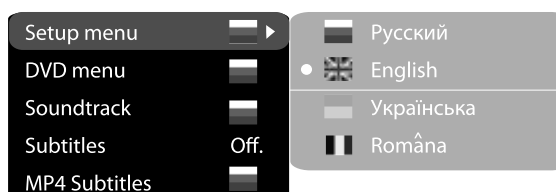
2. Using the Up and Down buttons, select the desired item and press OK.
For example, select the Sharpness item. Settings will appear on the screen. Then select the desired sharpness level and press OK for confirmation.
3. Press LEFT key of the UP and DOWN buttons for exit to previous menu level.
4. Press SETUP to exit setup menu.



Language settings

1. Menu: interface language setup

- Options: Russian, English, Ukrainian, Romanian.
- Default option: English.



2. DVD menu: selection of disc menu language

3. Soundtrack: selection of translation language

- Options: Russian, English, Estonian, Latvian, Kazakh, Romanian, Belarusian, Ukrainian, Chinese.
- Default: English.
- Selection of other languages: select the OTHERS item using the UP and DOWN buttons and press OK. Enter the language code using the numeric buttons and press OK.
- If the language you selected is not recorded on the DVD disc, another available language will be used.

4. 5. DVD/MP4 Subtitles: selection of subtitles language

- Options: Off, Russian, English, Estonian, Latvian, Kazakh, Romanian, Belarusian, Ukrainian, and Chinese.
- Default option: Off.
- Selection of other languages: select the OTHERS item using the UP and DOWN buttons and press OK. Enter the language code using numeric buttons and press OK.
- If the language you selected is not recorded on the DVD/MP4 disc, another available language will be displayed.

NOTE

- The menu image is sketchy. The real kind of the menu can differ from the image.

FUNCTION SETTINGS

Image settings menu

1. TV system: TV system selection

- Options: Auto, PAL, NTSC.
- Default option: Auto.

2. TV scan mode: scan mode selection*

- Options: progressive, interlaced.
- Default option: interlaced.
- Progressive scan is transferred only via a component video output.
- Before switching to progressive scan, make sure that your TV set supports this operation mode.

3. Video output: selection of video signal

- Options: S-Video, Comp. *, SCART.
- Default option: Comp. or S-Video.

4. TV Format: image ratio settings

- Options: 4:3 pan&scan, 4:3 letterbox and 16:9 TV.
- Default option: 4:3 pan&scan.
- Some discs are recorded with support of only one ratio. The selected ratio must comply with the TV screen.

5. Sharpness: image sharpness adjustment

- Options: High, Medium, Low.
- Default option: High.

6. Gamma: adjustment of image color temperature

- Options: High, Medium, Low, Off.
- Default option: Off.

7. Brightness: adjustment of image brightness

8. Contrast: adjustment of image contrast

9. Hues: adjustment of image hues

10. Saturation: adjustment of image saturation

Adjustment of image brightness, contrast, hues and saturation:

- Select the desired item of the image adjustment section using the Up and Down buttons. Press OK or RIGHT key to start adjusting the relevant option.
- Change the option value using the Up and Down buttons.
- Upon completion press the LEFT key of the UP and DOWN buttons to return to image setup menu.

TV system	Auto
TV scan mode*	IS
Video output	S-Vid.
TV format	4:3 LB
Sharpness	Med.
Gamma	Off.
Brightness	+48
Contrast	+48
Hue	0
Saturation	0

- Auto
- PAL
- NTSC

Sound settings menu

1. Mixer

a) Stereo mix: playback set-up while playing the disc with two independent audio channels.

- Options: L+R, L, R.
- Default options: L+R.

b) Surr. mix: set-up of surround options while playing the stereo disc.

- Options: Off, Sum. L+R, Virt. Surr.
- Default options: Off.

2. Digital audio output

a) SPDIF format: set-up of digital audio output options.

- Options: RAW, PCM.
- Default options: RAW.
- When you select the RAW option, the not decoded signal is transferred to the DVD player's digital outputs, the decoded signal is transferred to analog outputs. Decoding is performed by the built-in decoder of the DVD player. This feature is meant to ensure that signal decoding at digital outputs is performed by an external device (e.g. an amplifier).
- If you select the PCM option, a PCM coded signal will be transferred to the DVD player's digital outputs.

b) LPCM: set-up of digital audio output options to comply with different amplifiers and receivers.

- Options: 48 kHz 16 bit, 96 kHz 24 bit.
- Default option: 48 kHz 16 bit.

Mixer	Stereo mix	L+R
Digital Output	Surr. mix	Off
Tuning		

FUNCTION SETTINGS

3. Sound correction

a) Max volume: max volume limiting

- Using the Up and Down buttons, adjust the max volume level.
- Press the LEFT key of the Up and Down buttons to return to sound correction setup menu.

b) Equalizer: equalizer modes

- Options: Rock, Pop, Live, Dance, Techno, Classic, Soft, Off.
- Default option: Off.

c) Echo: echo effects

- Options: Off, Concert, Living room, Hall, Bathroom, Cave, Arena, Church.
- Default option: Off.

d) Tone balance: adjustment of tone balance level.

- Adjust the tone balance level using the Up and Down buttons.
- Press the LEFT key of the Up and Down buttons to return to sound correction setup menu.

Playback settings

1. DVD

Advertisement skip: skip the unskippable block while playing a DVD disc.

- Options: Yes, No.
- Default option: No.

2. VCD/SVCD

PBS menu: PBC menu on/off

- Options: On, Off.
- Default option: On.
- If On option is set, while reproducing discs, a menu will appear, in which you can select the order of playing the disc content. If the Off option is set, the reproducing of content is performed in the order, in which it is recorded on the disc.

3. Files: selection of reproduced files on the disc

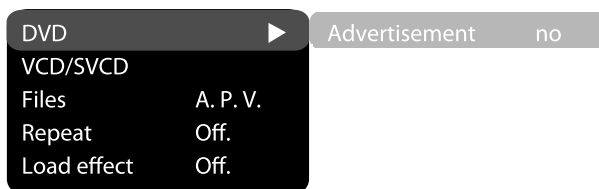
- Options: Audio, Pictures, Video.
- Default option: A.P.V.

4. Repeat: file repeat mode

- Options: Off, Single, All.
- Default option: Off.

5. Load effect: type of transition from one JPEG file to another

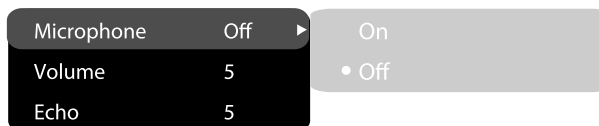
- Options: Off, from top, from bottom.
- Default option: Off.



Karaoke settings menu

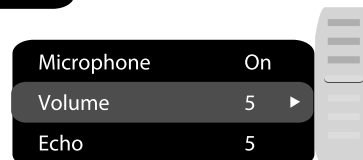
1. Microphone: microphone on/off

- Options: On, Off
- Default option: Off.



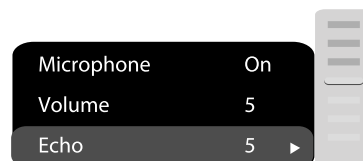
2. Volume:

- Microphone: microphone sound volume level
- Using the UP/DOWN buttons adjust the microphone volume level.
- Press LEFT key of the UP/DOWN buttons to return to karaoke settings menu.



3. Echo: echo level while playing the karaoke-disc

- Adjust the echo level Using the UP/DOWN buttons.
- Press LEFT key of the UP/DOWN buttons to return to karaoke settings menu.



FUNCTION SETTINGS

Preference settings

- 1. **Gr. Equalizer: spectrum analyzer**
 - Options: On, Off.
 - Default option: Off.
- 2. **Background: selection of an image as TV screen wallpaper**
 - Options: Standard, Saved
 - Default option: Standard.
- 3. **Screensaver: screen saver on/off**
 - Options: On, Off.
 - Default option: On..

Gr. Equalizer	Off
Background	Standard
Screensaver	Standard

Parental Control

- 1. **Category: setup of age restrictions to prevent children from seeing undesirable discs.**
 - Options: Any, Kid, G,PG, PG-13, PGR, R, NC-17.
 - Default option: Any.

AllowedAny

Set password...

- Any
- Kid
- G
- PG
- PG-13
- PGR
- R
- NC-17

- 2. **Set password: setup of a four-digit password to change the level of age restrictions.**
 - Default option: 7890.

Old password

New password

Verify

OkCancel

Initial setup menu

- Press the RIGHT key of the UP/DOWN buttons to enter the initial setup menu, then select the desired item using the buttons UP and DOWN and press OK key for confirmation.
- While being in this menu section, you cannot return to the previous level by pressing the LEFT key of the UP/DOWN buttons.

- Auto
- PAL
- NTSC

Reset to defaults

Resetting all settings and restoring default options, except age restrictions level and password.

Load factory settings

OkCancel

Exit settings menu

Select the exit item using the UP and DOWN buttons and press the OK to exit the menu.

Language

Image

Sound

Playback

Karaoke

Preference

Parental control

Initial setup

Reset to defaults

Exit

SPECIFICATION

Supported formats	DVD-Video, Super VCD, VCD, MPEG-4, CD-DA, CD+G, HDCD, MP3, WMA, Kodak Picture CD, JPEG		
Data medium	CD-R, CD-RW, DVD-R, DVD+R, DVD-RW, DVD+RW		
Inputs	Microphone input		
Outputs	Audio outputs	Analog outputs: Digital outputs:	Stereophonic output. Coaxial audio output, Optical output.*
	Video outputs:	S-Video output, composite output, component Y Cb Cr output*, progressive scanning Y Pb Pr output*, RGB/SCART output.	
	Headphone output**		
Video characteristics	Signal swing of composite video output: Signal swing of S-Video output: Signal swing of component video output:	1.0Vp-p (75 Ω) 1.0Vp-p (75 Ω), C:0.286Vp-p (75 Ω) 1.0Vp-p (75 Ω), Cb/Cr: 0.7Vp-p (75 Ω)	
Audio characteristics	Frequency: Signal-to-noise ration: Total nonlinear distortions:	20 - 20000 Hz (±1 dB) >100 dB <0.01%	
Power consumption (watt)	14		
Voltage range	~ 110 - 250 V, 50/60 Hz		
Temperature requirement	5 - 35 °C		
Moisture requirement	15 - 75% (not condensate)		

- We improve quality of our production permanently, that's why specification can change without notification.
- Some disks, was recording in different formats on different data mediums, can't playback or can playback incorrect over peculiarity of their record.

Chapter Principle and Servicing

Section One Principle of the Player

3.1.1 Block diagram of the player

DV317SI is composed by decode circuit, servo circuit, audio circuit, video circuit, MIC circuit and power circuit, the block diagram of the player is shown as in the following figure 3.1.1.1:

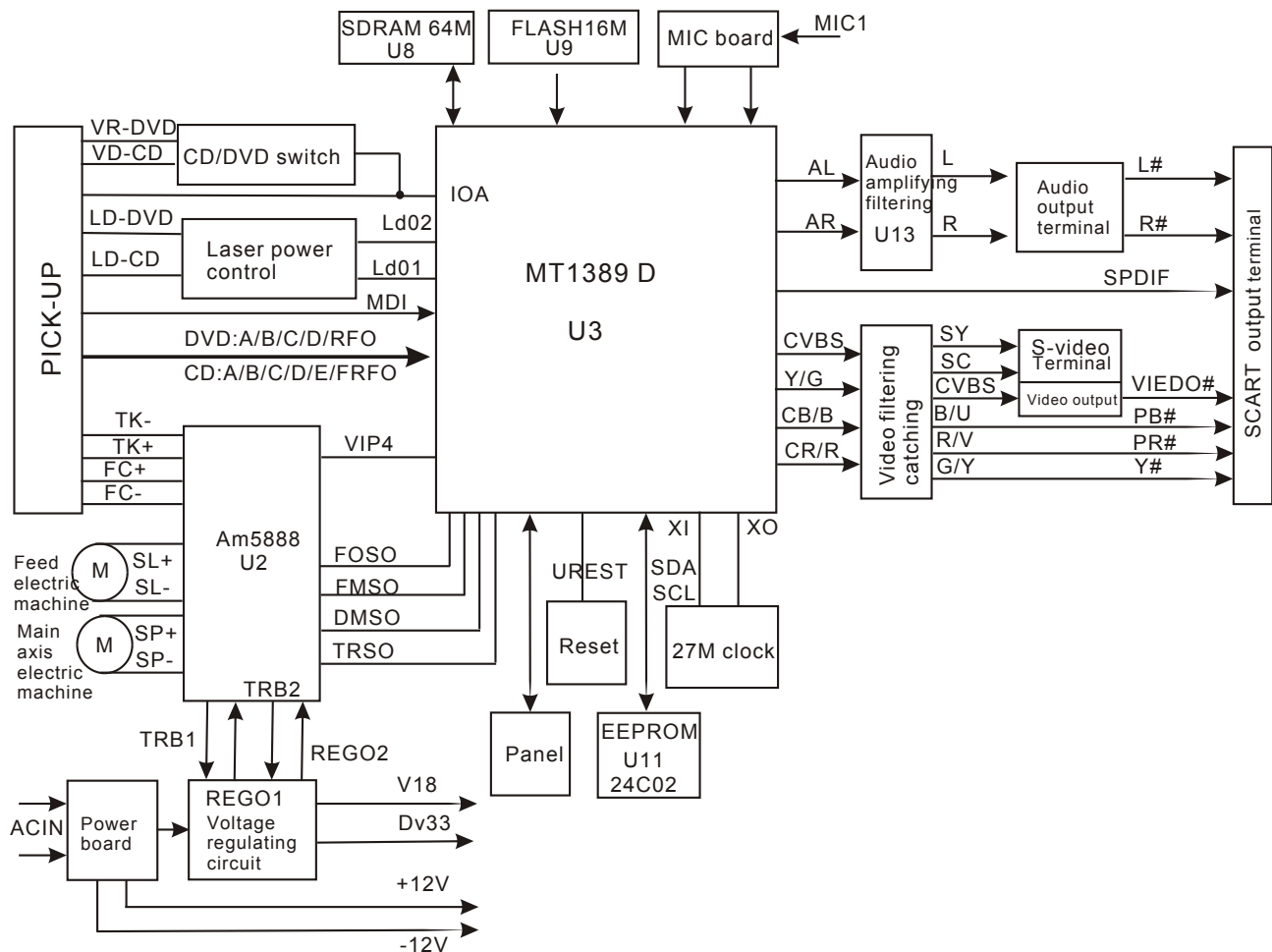


Figure 3.1.1.1 Block diagram of the player

3.1.2 PCB board block diagram of the player

PCB board block diagram of the player is show as in the following figure 3.1.2.1:

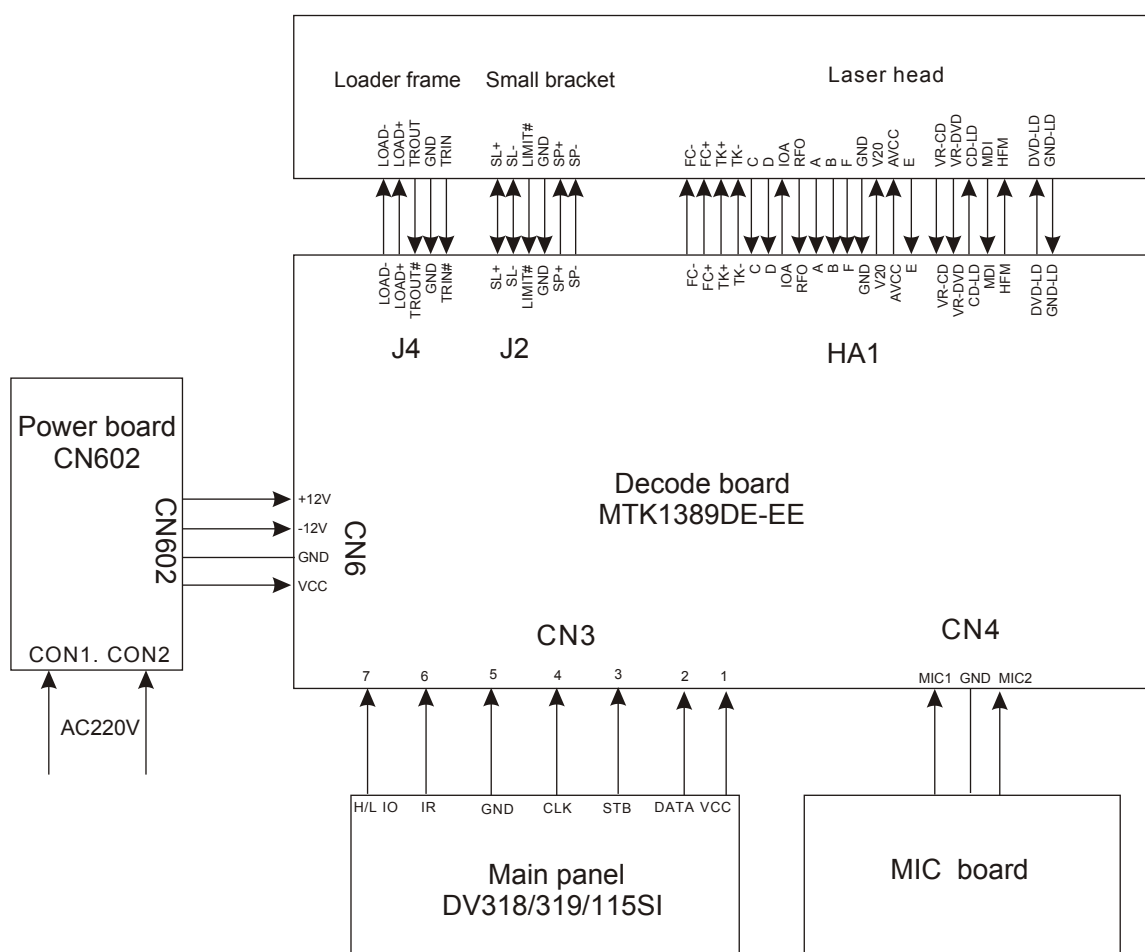


Figure 3.1.2.1 PCB board block diagram of the player

This machine is mainly composed of decode board, power board, MIC board, main panel buildup

Decode board: includes decode, servo, audio, video output circuit.

Power board: provides working voltage for each circuit, output voltage has +12V, -12 and +5V.

MIC board: with single-way microphone input, MIC signals input to decode board after being amplified.

Main panel: this panel is simple and mainly composed of remote control receiver and buttons.

Remark: in order to facilitate readers to better know the composition of machine, we have made PCB composition figure, the connecting lines in PCB composition figure are the main control line, signal line and power cord connected through flat cable, but all connected flat cable are not included.

3.1.3 How to use IC

DV112SIIC usage instruction is shown as in the following table:

Semi-finished PCB name	IC model name	Location	Function
Power board OKI-DV300 OKI-P00807A	TL431	U603	Precise voltage regulator
	EC817	U602	Photoelectric coupler
	TN4275PN	U601	Power switch IC
Main panel 4911S-1	HS0038B3V	U403	Remote control receiver
OK board 6112S-1	KA4558	U13	Operational amplifier (MC amplifying)
Decode board 2DV112 S-0	NJM4558	U5	Operational amplifier (audio amplifying)
	HY57V641620HGT-7	U8	SDRAM
	24C02	U11	EEPROM
	MT1389 D version	U3	Decode chip
	AM5888S	U2	Servo drive
	29LV160BE	U9	FLASH

Section Two Unit Circuit Principle

3.2.1 Introduction to laser head

Function introduction to laser head flat cable is shown as the following table:

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	hanging 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

Pin	Name	Signal flow direction	DVD disc	CD disc	No disc	Function description
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= $E-F$.

2. Working principle

(1) Laser tube: wave length of loader DVD laser diode is 650nm, wave length of CD laser diode is 790nm, the wave length which is within 370nm and 750nm is visible light, the laser in the course of reading DVD disc is visible light, and that when reading CD disc is infrared light.

(2) Principle about laser head picks up signal: laser beam projects onto disc, when laser beam focus projects onto disc vertically, laser beam will produce reflection, reach on light sensor through reflection loop and converse into electronic signal through photoelectric cell. For the reflection loop produced in non pit information area and pit information area in disc has difference and reflects into different position of light sensor, photoelectric diode in different positions on light sensor will produce different signals to process all signals on light sensor and then produce digital signals.

(3) Focus, trace coil: when laser head is reading signals normally, information side should be in the focus of laser beam, because of factors of disc error, high speed rotation and machine error, it is unavoidable that laser beam focus deviates from information face to produce phenomena of orbit boas and refocusing. Focus , trace coil is added on loader to adjust laser beam to make it correctly focus in information area.

(4) Formation of RF signal: when disc reading is normal, light sensor will have 160MV, vague and eye pattern waveform which is added on A, B, C, D respectively, and output RF signal from FRO pin after being overlapped by adder inside light sensor, the frequency when reading DVD disc is much higher than that when reading CD disc, output amplitude is about 1.4V.

3.2.2 Servo circuit

1. Servo system of this player adopts SANYO loader + MTK decode solution (MT1389D+FLASH (16M) + SDRAM (64M)), and its servo circuit is mainly composed of front end signal processing, digital servo processing, digital signal processing IC MT1389D and drive circuit AM588S , in which MT1389D is also the main composed part of decode circuit. Servo circuit block diagram is shown as in the following figure 3.2.2.1:

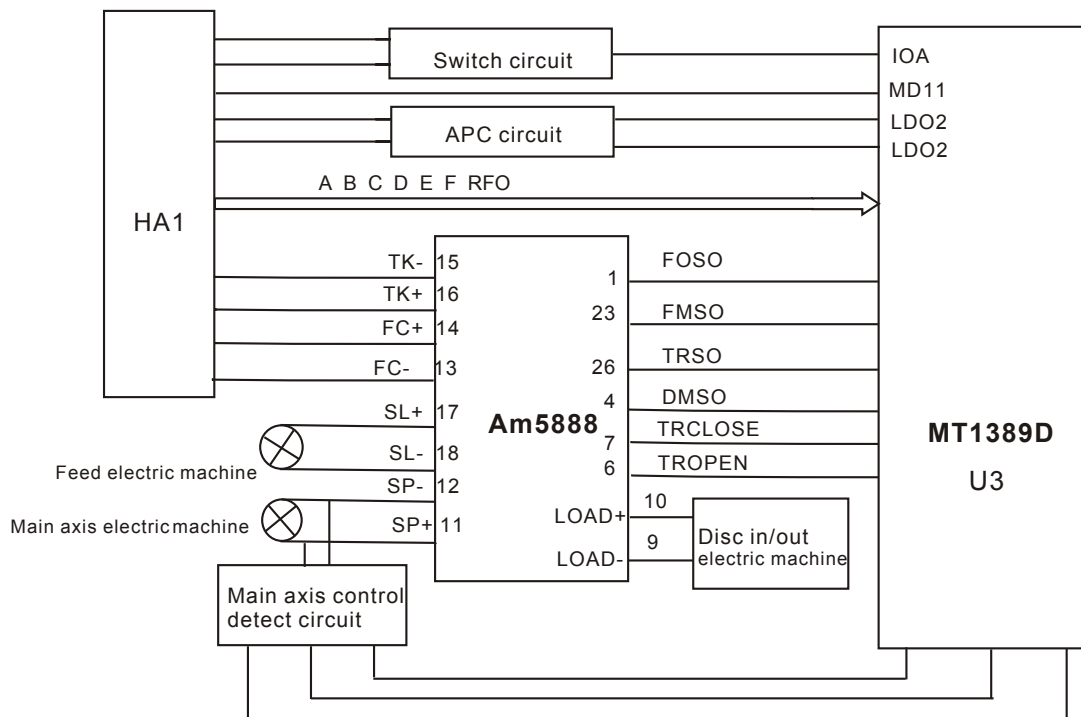


Figure 3.2.2.1 Servo circuit block diagram

2. Working principle

After power on or disc in to proper position (on loader frame for general DVD players, on PCB board below door for PDVD players), loader laser head begins reset, after laser head reaches to proper position, detect switch will give a signal to MT1389, MT1389 begins to output focus, main axis and light emission signals, disc begins to rotate, laser head begins to recognize disc information and judge whether disc is CD or DVD according to disc information to facilitate to output level from IOA pin, control disc switch circuit and laser head PD IC to make corresponding acts. At the same time, MT1389 also adjusts laser power output through laser power control circuit.

After loader reads disc information, A, B, C, D, E and F signal are formed through photoelectric conversion to MT1389 (DVD only has A, B, C, D signals) and RF signal and output from pin 2~11, 18, 19 of MT1389 respectively, after amplifying processing of pre-amplifier inside MT1389, now signals are divided into 2 ways inside MT1389: one part, through summation amplifying and subtraction circuit

Inside MT1389, produces servo error signal, after digital servo signal circuit processing, forms corresponding servo control signals, outputs FOO, TRO, DMO and FMSO servo control signal from pin 42, 41, 37 and 38 of MT1389 respectively and then send to servo drive circuit for drive amplifying through the integration circuit composed by resistor and capacitor and bring along focus coil, trace coil, main axis electric machine and feed electric machine after drive amplifying. 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 laser head 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, and then outputted to latter stage for AV decoding after finishing CIRC (Cross-Interleaved Reed-Solomon Code) error correction inside. 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. General DVD players have a disc in/out circuit to control disc tray door in/out acts to reach the purpose of making disc in and out. For PDVD, we adopt manual disc in/out means and we can judge whether disc in to proper position through detect switch.

3. Explanation to servo terms

(1) FOO: for disc make differences, and when rotating disc may probably move upwards or downwards slightly to make the focus of laser emitted by laser head cannot justly fall on data pit of disc, now focus point of objective lens is required to adjust to make focus aim at data pit exactly. The acts are mainly to make objective lens move upwards and downwards.

(2) TRO: data information is saved in disc in form of tracks. When disc is rotating, disc deviation will produce, now laser head is required to adjust. In this process, objective lens makes forward and backward movement with small moving range.

(3) FMO: similar to acts of trace, the acts of feed are larger than those of trace. Feed conducts a large scale movement firstly, and then trace moves slightly in this range. Feed moves for a while, and does not move for another while; but trace moves all the time. Feed is rough adjustment and trace is fine. And acts are obvious when power on and selecting track.

(4) DMO: it is the top that holds up disc. Its rotation speed decides that of disc. Its rotation is generated by an individual DC electric machine, in which rotation speed of DVD is twice over that of CD.

3.2.3 Open/close drive circuit

1. Open/close drive circuit is shown as in the following figure 3.2.3.1:

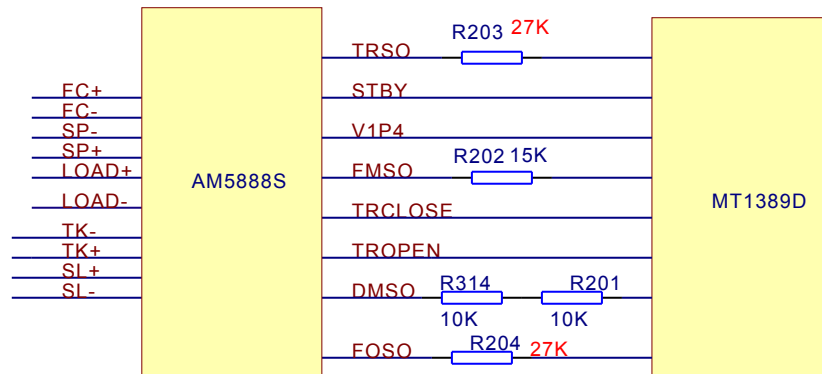


Figure 3.2.3.1 Open/close drive circuit diagram

2. Working principle: when the machine is reading discs normally, pin 6, 7, 9 10 of AM5888S are all 0V. After OPEN button is pressed, pin 6 inputs high level, pin 10 LOAD+ outputs high level, electric machine rotates to perform OPEN acts. When closing, pin 9 LOAD- outputs high level to pin 9 through electric machine to form loop, electric machine rotates reversely to perform CLOSE acts. After closing to proper position, all pins are all low level. Servo drive principle is the same with the drive of D5954 scheme, so we will not describe here.

3.2.4 Laser power control circuit

Laser power control circuit is shown as in the following figure 3.2.4.1:

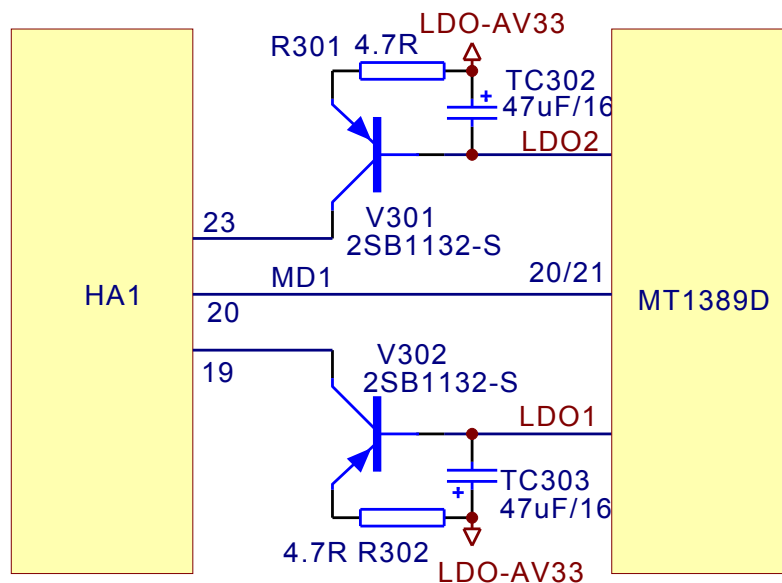


Figure 3.2.4.1 Laser power control circuit diagram

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, voltage decrease of pin 23 of MT1389 makes voltage of pin 19 of XS301 increase to reach the purpose of raising laser power. When laser power is too strong, voltage of MDII pin increases to lead to voltage of pin 23 of MT1389 increase to make voltage of pin 19 of XS301 decrease to reach the purpose of reducing laser power to form an auto power control circuit.

When reading DVD disc, pin 21 is detect signal input pin, pin 22 is drive control input pin, and the working principle is the same with that when playing VCD disc.

3. Key point voltage (unit: V) is shown as the following table:

Location number	Read DVD disc	Read VCD disc	Location number	Read DVD disc	Read VCD disc
V301_E	2.9V	3.2V	V302_B	3.2V	2.2V
V301_B	2.2V	3.2V	V302_E	3.2V	2.9V
V301_C	2.2V	0	MT1389_20	0.2V	0.2V
V302_C	0	2.2V			

3.2.5 CD/DVD conversion circuit

1. CD/DVD conversion circuit is shown as in the following figure 3.2.5.1:

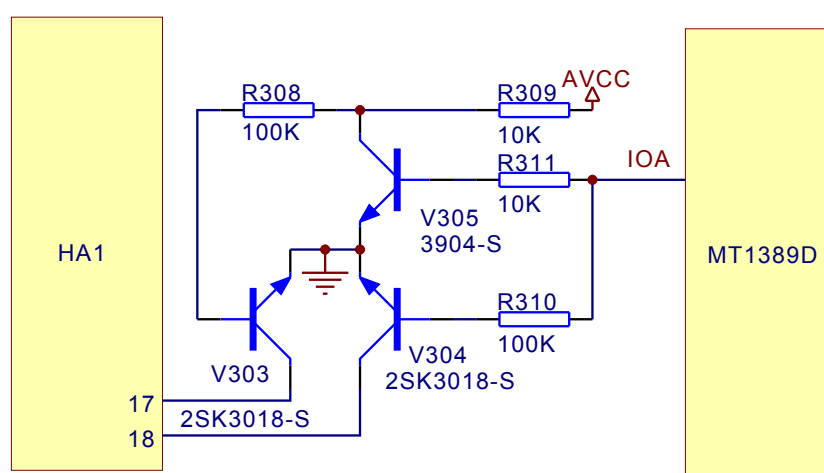


Figure 3.2.5.1 CD/DVD conversion circuit diagram

2. Working principle

After loading disc in the player, IOA port of MT1389 is defaulted high level to make V305 saturation on and form loop together with CD laser power control circuit on CD. At the same time, IOA also goes to

Loader PD IC to switch, disc begins to rotate, when servo management system recognizes that the disc in player is not CD disc, IQA pin outputs low level to make V305 cut off and make V303 on, and form loop together with DVD laser power control circuit on loader to perform disc reading acts. After disc tray door opens, IOA keeps the state before opening disc tray door. If the player cannot recognize which disc it is, IQA pin will switch continuously until reading disc or system judges that there is no disc.

Note: V303 and V304 are MOS tube

3. Key point voltage (unit: V) is shown as the following table:

State	V305			V303			V304			
	Base electrode B	Collector C	Emitter E	Grid electrode G	Drain electrode D	Source electrode S	G	D	S	
DVD disc	0	3.86	0	3.81	0.18	0	0	0	0	0
VCD disc	0.64	0.1	0	0	0	0	3.27	0.18	0	3.3

3.2.6 Main axis control circuit

1. Main axis control circuit is shown as in the following figure 3.2.6.1:

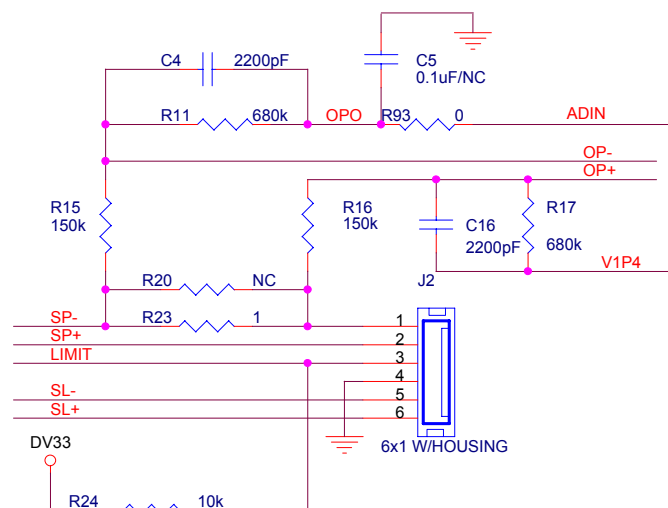


Figure 3.2.6.1 Main axis control circuit diagram

2. Function: disc is always in high speed rotation in the course of disc reading, when you need to open the door to change disc, MT1389 stops the positive direction drive signal which is given to main axis drive circuit, for the function of inertia disc is still rotating. If disc out order is performed at this time, disc will be abrasively damaged. Therefore, machine must be baking to main axis, that whether disc has stopped rotating and whether disc is reversing, decode chip of the machine cannot recognize. So a main Axis control circuit is added to make decode chip can effective monitor that whether disc has stopped rotating.

3. Working principle: MT1389 has a comparator inside composed of operational amplifier, in which OP+ is the in-phase input end of operational amplifier, OP- is reverse input end, OPO is output end,

When playing disc normally, for electric machine is positive direction rotating, voltage of OP+ is higher than that of OP-, voltage of OPO is more than 1.4V. When disc out is needed, main axis drive signal stops, for electric machine is permanent magnetic, when in rotating, induced electromotive force produces in two ends to give to decode chip through R320, R319 sampling to make OPO output less than 1.4V voltage and transmit to input pin of MT1389 ADIN through R331. When ADIN is high level, main axis drive output end has not any drive signal output, when ADIN is low level, MT1389 outputs a reversing drive signal to main axis drive circuit to make main axis electric machine speed down. Thus circular working goes on until main axis stops rotating. PDVD is manual disc out means, so after disc out, disc is still rotating, but will stop very soon.

4. Key point voltage (unit: V) is shown as the following table:

Keypoint	Position	Normal working voltage (V)	Voltage change when disc out (V)
SP+	Pin 11 of AM5888S, pin 5 of XS307	3.79	3.79→0.70→1.80
SP-	Pin 12 of AM5888S, pin 6 of XS307	1.38	1.38→3.40→1.80
OP+	Pin 36 of MT1389	1.38	1.38→3.10→1.80
OP-	Pin 35 of MT1389	1.53	1.53→3.08→1.98
OPO	Pin 34 of MT1389	2.44	2.44→0.40→2.50
ADIN	Pin 47 of MT1389	2.44	2.41→0.41→2.44
DMSO	Pin 4 of AM5888S	1.42	1.42
VIP4	Pin 30 of MT1389	1.41	1.41

3.2.7 Decode circuit

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

2. Working principle: this decode circuit is mainly composed of MT1389, SDRAM and FLASH.

Working condition of decode circuit has:

(1) Reset: refer to reset circuit working principle for details.

(2) Clock: this system adopts 27M external clock input, and produces clock signal required by system inside through internal frequency doubling circuit.

(3) Power: decode chip adopts two groups power supply of 3.3V and 1.8V, in which 1.8V mainly supply power for internal logic control circuit and we call it core voltage.

After power on, reset circuit performs reset to MT1389 built-in CPU (8032) and FLASH, decode chip outputs reset signal at the same time and performs reset to other circuit. After system reset, it firstly Sends out read signal to FLASH to read out information saved in FLASH, the machine displays power-on picture, servo system begins to work to check whether machine closes door to proper position and

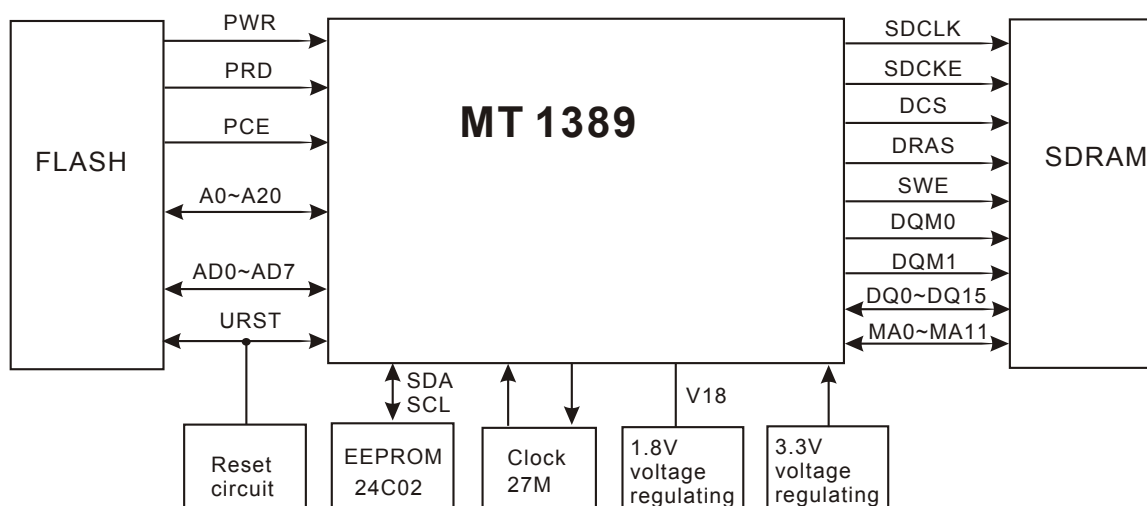


Figure 3.2.7.1 Decode circuit block diagram

Whether detect switch has been closed, if not, the door close action is performed. After detect switch of door is closed, the machine begins to perform preparations of disc reading and performs panel display at the same time of working.

Playback process: laser head picks up disc signal from disc, after servo system processing, then send to decode circuit for decoding, signal after being decoded is saved in SDRAM for the moment. When machine needs to replay signal, decode circuit calls information inside SDRAM to perform D/A conversion and then output.

User information storage: information content set by user is saved inside EEPROM, if user does not refresh or reset this information, it will saved in IC permanently.

Audio, video output circuit: at present, MT1389 all integrates video D/A converter, MT1389D inside integrates audio D/A converter, manufactures select according to their own needs. Please refer to circuit principle diagram and audio circuit explanation for details.

3.2.8 Reset circuit

1. Reset circuit is shown as in the following figure 3.2.8.1:

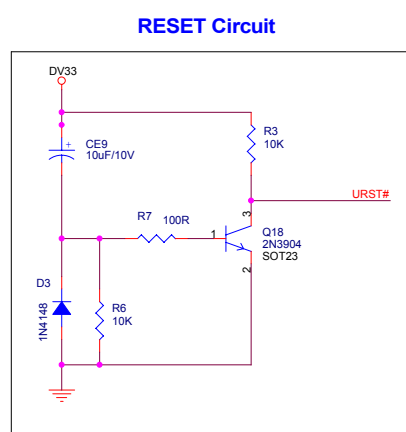


Figure 3.2.8.1 Reset circuit diagram

2. Working principle: after power on, voltage of DV33 increases to 3.3V, main chip power supply is normal. Now, voltage of CE9 to DV33 cannot change suddenly to make base electrode of Q18 has current flow in, Q18 is saturation on, URST is low level. DV33 charges CE9 in two paths through emitter junction of R6 and Q18 make negative pole voltage of CE9 decrease slowly. When this voltage decreases below 0.7V, V310 cuts off, URST changes into high level, the process for URST from low to high is called effective reset signal of low level by us. After power off, voltage of DV33 decreases, CE9 decreases together with DV33 voltage, D3 performs surge discharge and clamping to CE9.

3. Key point voltage (unit: V)

Q18_B is low level when in normal condition, at the moment of power on, it decreased to 0V from 3.3V gradually.

Q18_C is high level when in normal condition, at the moment of power on, it increases to 3.3V from 0V.

3.2.9 Video circuit

1. Video signal flow chart diagram is shown as in the following figure 3.2.9.1:

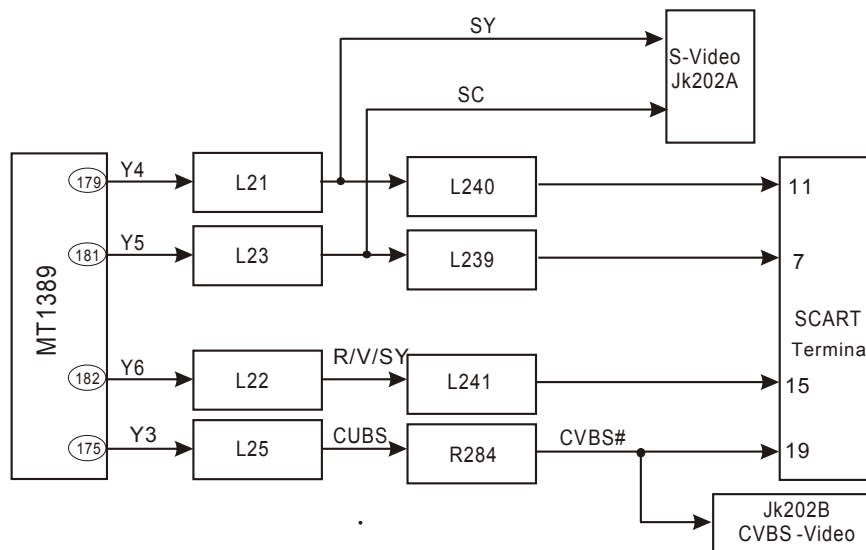


Figure 3.2.9.1 Video signal flow chart

2. Working principle: MT1389D has built-in video D/A conversion circuit, video output has R/B/G Y/Pb/Pr Y/Cb/Cr CVBS Y/C output mode, in which R/B/G Y/Pb/Pr Y/Cb/Cr Y/C cannot output at the same time and need the switch through software. CVBS is a separate output mode, 4-path video signal outputted by MT1389, through video filtering clamping, output to Terminal.

Shown as in the figure 3.2.9.2, capacitor C61, C50 and inductor L25 compose a low-pass filter to filter high frequency disturbance signal except useful signal; dual diode Q10 composes a limiter

Circuit, known from features of diode that the max amplitude of composite video signal CVBS cannot be over 5.7, and the mix cannot be less than -0.7, thus the high voltage signal from TV set can be avoided burning down the player.

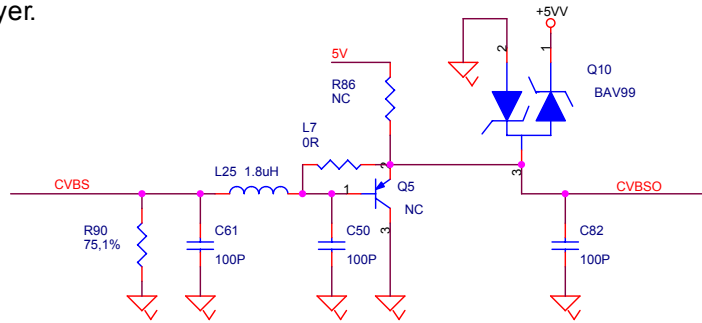


Figure 3.2.9.2 Video output circuit

3.2.10 Audio circuit

1. Audio signal flow chart block diagram is shown in the figure 3.2.10.1:

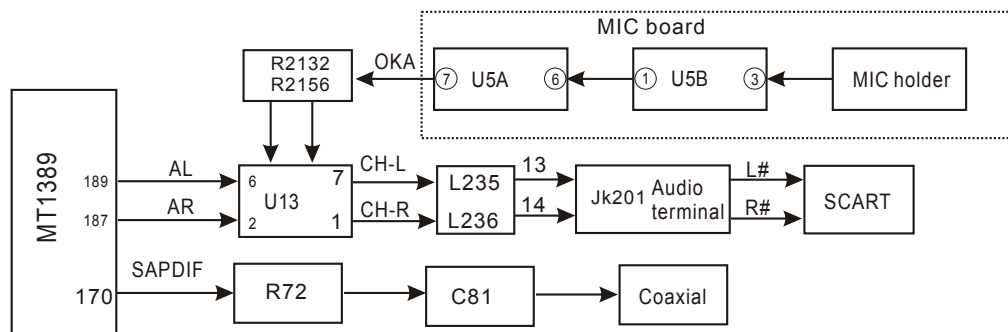


Figure 3.2.10.1 Audio signal flow chart block diagram

2. Working principle: MT1389D has built-in audio DAC conversion circuit, which stimulates signals and outputs from decode chip directly, through audio amplifying and filtering circuit, and outputs audio signals directly. Shown in the figure 3.2.10.2, the right channel analog signals outputted by decode chip are coupled by C75 and then the high frequency component in audio signals is filtered by the low pass filter composed of R97 C77, for signals are damped through filtering circuit, the audio signals after being filtered require the amplifying output by the amplifying circuit composed of U13A, R122 is feedback resistor, this circuit is a active filter on the whole.

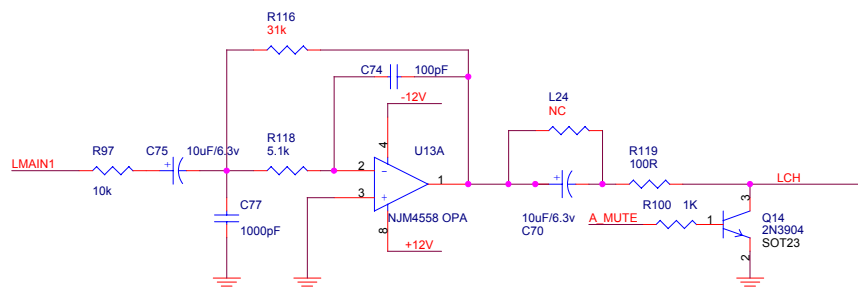


Figure 3.2.10.2 Amplifying circuit diagram

3. External Karaoke signal input and output

After being amplified, MIC signals input to pin 2, 6 of U13 separately for amplifying output.

3.2.11 Mute circuit

1. Mute circuit is shown as in the figure 3.2.11.1:

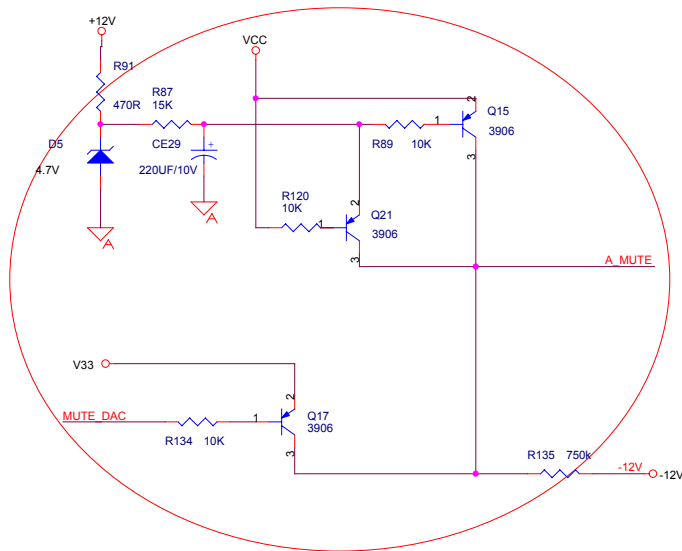


Figure 3.2.11.1 Mute circuit

2. Working principle of quieting circuit

When the player is working normally, shown in the figure 3.2.11.1, MT1389E outputs analog audio signal, and a low level signal to MUTE-DAC at the same time to make Q17 on, B electrode of Q17 is about 2.7V, collector electrode of Q17 is about 3.3V, so Q15 is also on, voltage of B electrode is about 0.7V, voltage of Q21 E electrode is near to zero, Q21 cuts off, MUTE—1 is negative voltage, which is added to base electrode of mute tube of audio output end to make mute tube cut off, and audio signal outputs after being amplified by 4558. When pressing MUTE button on remote controller, MT1389 has no audio signal that outputs to operational amplifier, so audio output end of the player has no audio signal output, but because electronic elements in circuit will produce some noise when working that transmits to output end of the player, in order to filter there noise, decode chip outputs a high level signal to MUTE-DAC to make Q21 cut off, so Q15 cuts off, +5V power is transmitted to base electrode of switch pipe Q15 through EC electrode of Q21, mute circuit is in mute state.

When player is not playing disc or stops playing, MT1389D outputs a high level signal to MUTE-DAC to make audio circuit enter mute state.

After microphone is inserted into the machine, DET pin outputs low level, Q21E electrode is low level, now no matter the former circuit outputs mute circuit, rear mute circuit does not work, and sound outputs normally.

3. Power-off quieting working principle

As shown in the figure 3.2.11.1, when the player is working normally, VD206 is on, +5V charges capacitor TC235 through D20, now emitter voltage of Q219 is less than base electrode voltage, Q219 cuts off. When power off, VCC disappears, Q219 base electrode changes into low level, its emitter electrode changes into high level because of discharge, now Q219 is on, Q219 collector electrode (MUTE-OUT) outputs high level to add to base electrode of switch pip Q205-Q206, switch pipe is saturated, noise produces in the course of power off is bypassed to ground, and power-off quieting function is realized.

3.2.12 Decode circuit voltage regulating

Decode circuit voltage regulating is shown as in the following figure 3.2.12:

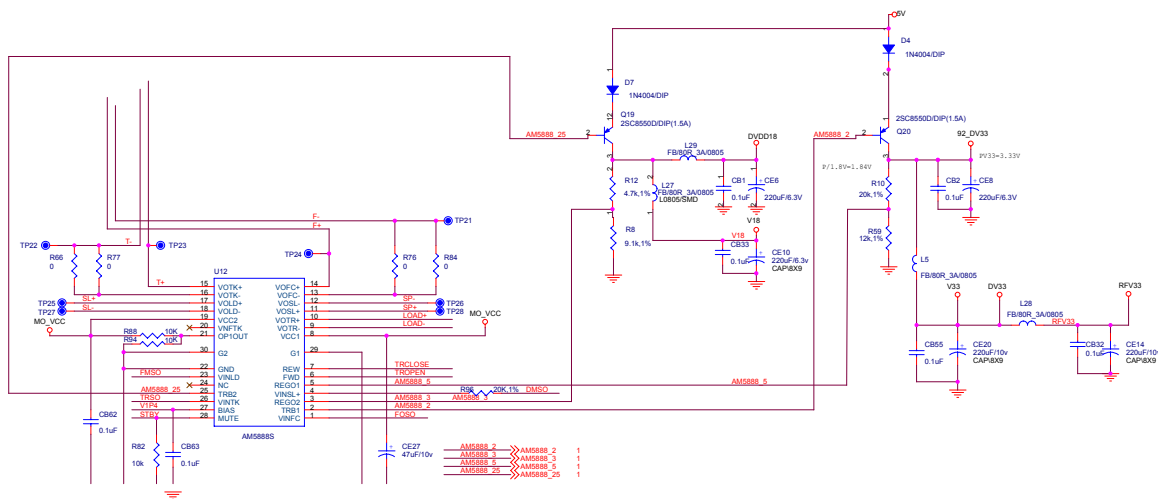


Figure 3.2.12 Decode circuit voltage regulating circuit diagram

2. Working principle:

DV33 voltage regulating process: VCC reduces voltage through D4, and supply power for rear stage circuit through E-C electrode of Q20. R326/R327 is feedback end sampling resistor.

Voltage regulating principle: Dv33 voltage increases— — —REGO1 voltage increases— — —TR_B1 voltage increases— — —Q20VCE voltage increases — — —DV33 voltage decreases.

Voltage regulating principle of 1.8V is the same with that of DV33, only a diode (D7) is added to perform voltage reduction.

3. Key point voltage (unit: V) is shown as follows:

C electrode of # Q20: 3.95, B electrode: 3.35, C electrode: 2.25

C electrode of #Q19: 3.25, B electrode: 3.55, C electrode: 1.95

```
# REGO1 REGO2 is 1.25V
```

3.2.13 Panel control circuit

This main panel (4) has no display screen and drive IC. PT6961 is mainly composed of panel button and remote control receiver, the coding of button function is completed by decode chip.

3.2.14 MIC circuit

MIC board (6112S-1) mainly fulfills the amplifying and output of MIC signal, shown in the figure 3.2.14.1, after microphone is inserted into the machine, MIC signals, after being filtered, are sent by TC601 to pin 3 of MIC signal amplifying circuit U601 for in-phase amplifying, and then output from pin 1 of U5, through volume adjustment by potentiometer VR602, input to pin 6 of U5 for reverse amplifying, then output from pin 7 of U5 to decode board and audio amplifying circuit for mixed amplifying.

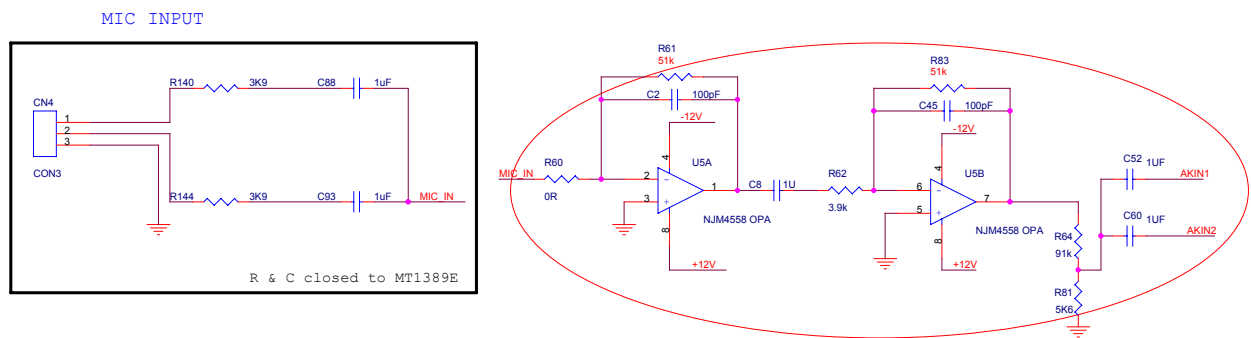


Figure 3.2.14.1 MIC circuit diagram

3.2.15 Power circuit

1. Power circuit block diagram is shown as in the following figure 3.2.15.1:

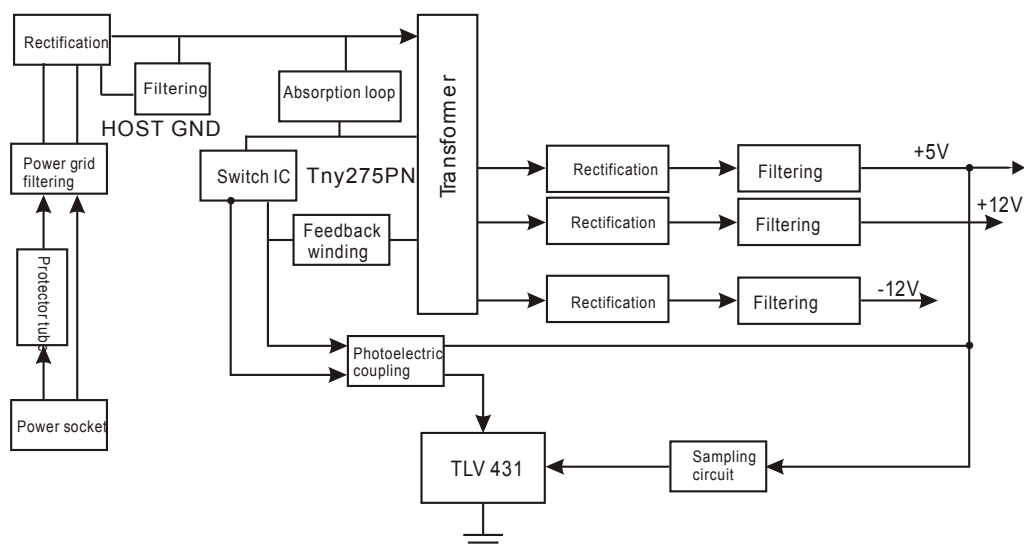


Figure 3.2.15.1 Power circuit block diagram

2. Working principle

(1) Power grid filtering circuit: various electromagnetic radiation exists in surroundings, so it will produce interference to the inputted AC power, and the function of power grid filtering circuit is to filter these interference to make those that enter bridge rectification circuit are pure 220V AC power.

(2) Bridge rectification and filtering circuit: the function of this circuit is to converse electric supply into DC power, the voltage after being rectified and filtered is 1.414 times of input power, so the DC voltage at the two ends of C601 is about equal to 300V.

(3) Absorption loop: for power is always working in on/off state and will produce very high peak voltage, in order to well protect switch IC, a peak absorption loop is added.

(4) Filtering circuit: the function is to produce a stable and slamm-wave DC voltage. In filtering circuit, "II" type filter is mostly adopted. The feature of capacitor filtering is high load resistance, when current is small, filtering is obvious, but inductor filtering is small load resistance, when current is large, filtering is obvious. To compose capacitor into "II" type filter can make better filtering effect.

(5) Feedback loop: the time length of "on" and "off" within the same cycle inside switch module FSDH321 is decided by feedback loop. Feedback loop performs sampling to +5V output stage voltage, when output stage voltage is too high, the sampled voltage is on high side, through feedback loop, to change the duty ratio of pin 3 signal of TNY275PN and reduce on time, and output voltage begins to reduce. When output voltage is too low, the sampled voltage is on low side, through feedback loop, to make duty ratio of FSDH321 increase, output voltage increases, through the function of feedback loop, power board is made to output stable voltage. The used TL431 in this power is a 2.5V comparator, sampling voltage is compare with this 2.5V voltage, when sampling voltage is more than 2.5V (means that output voltage is on high side), TL43 is on, light emitting diode in photoelectric diode begins to emit light to make the other end of photoelectric coupler begin to be on, light emitting diode is stronger, the on degree bigger, the on time of switch module TNY275PN decreases, output voltage begins to decrease. When sampling voltage is less than 2.5V (means output stage voltage is on low side), TL431 is cut off, on time of TNY275PN increases, output voltage increases. Thus through auto control function of feedback loop, power board is made to output stable voltage.

Section Three Servicing Cases

3.3.1 Servicing cases

【Example 1】 Symptom: noise appears when power off

Description: at the moment of power off, audio output has noise; TV loudspeaker gives a bump sound.

Analysis and troubleshooting: when this type of trouble appears, trouble always appears in power-off noise removing circuit; firstly, test the MUTE-1 voltage of Q219 C electrode at the moment of power off, shown in the figure 3.3.1.1, voltage of this point changes from -7.8V to 0.5V gradually at the moment of power off, use multimeter to test elements around Q214, VD206 1N4148 diode has been stricken through, after changing it, trouble is removed.

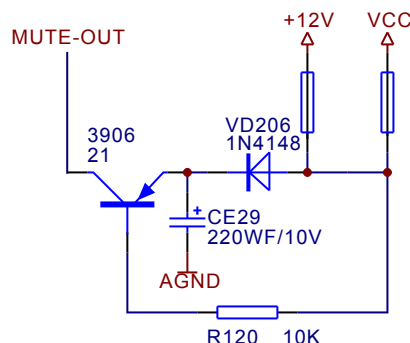


Figure 3.3.1.1 Quieting circuit diagram

【Example 2】 Symptom: no sound

Description: picture output is normal

Analysis and troubleshooting: test sound output, pin 1, 7 of circuit operational amplifier and there is no signal output, test power supply voltage of operational amplifier and it is 9V which is on low side with only two and a little, after removing load, test 9V voltage output of power board and it is normal, so we confirm that trouble lies in decode board, only U219 of decode board has +9V power supply, test the resistance to ground of pin 8 of U219 and it is 86Ω , which should be infinite in normal conditions, so we doubt that U219 has trouble, change it and trouble is removed.

【Example 3】 Symptom: power not on

Description: no picture, no sound and no screen display

Analysis and troubleshooting: shown in the figure 3.3.1.2, after power on, use voltage level (20V) of multimeter to test the power supply from power board to decode board ($\pm 12V$, +5, 3.3V) and it is normal, check reset circuit D4 working and it is normal, check clock and there is no 27MHz oscillation frequency, so it is doubted that the fault of crystal oscillator Y1 caused the trouble, after changing it, disc reading and output are normal and trouble is removed.

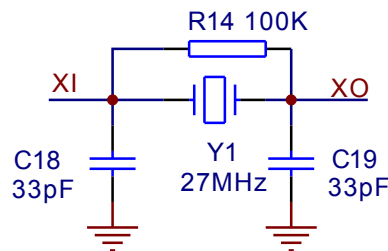


Figure 3.3.1.2 Clock circuit diagram

【Example 4】 Symptom: picture mosaic when reading disc

Description: power on and read disc, after displaying DVD format, machine down and picture has mosaic, power on again, picture still has mosaic but not read disc. Put the machine aside for 20 minutes and trouble disappears.

Analysis and troubleshooting: firstly test voltage of each spot +5V, +3V and core voltage 1.86V and they are all normal, so we doubt that it is affected by temperature. Use electric hair drier to heat each IC of decode board and find that when temperature of decode IC 1389D increases 20-degree, machine down and picture has mosaic, change 1389D chip and trouble is removed.

【Example 5】 Symptom: no sound

Description: disc reading is normal and there is sound output

Analysis and troubleshooting: use remote controller to restore to default settings firstly, then connect with audio terminal and check whether there is sound output; check pin 1, 7 of operational amplifier U13 Ic4558 and there is no sound output, test pin 4, 8 of 4558 and there is no +12V voltage, Check and find that CN6/CN1 has +12V voltage input, test and find that one end of L220 has 9V voltage and the other end has no voltage output, change L210 and trouble disappears.

【Example 6】 Symptom: power not on

Description: no picture, no sound and no screen display

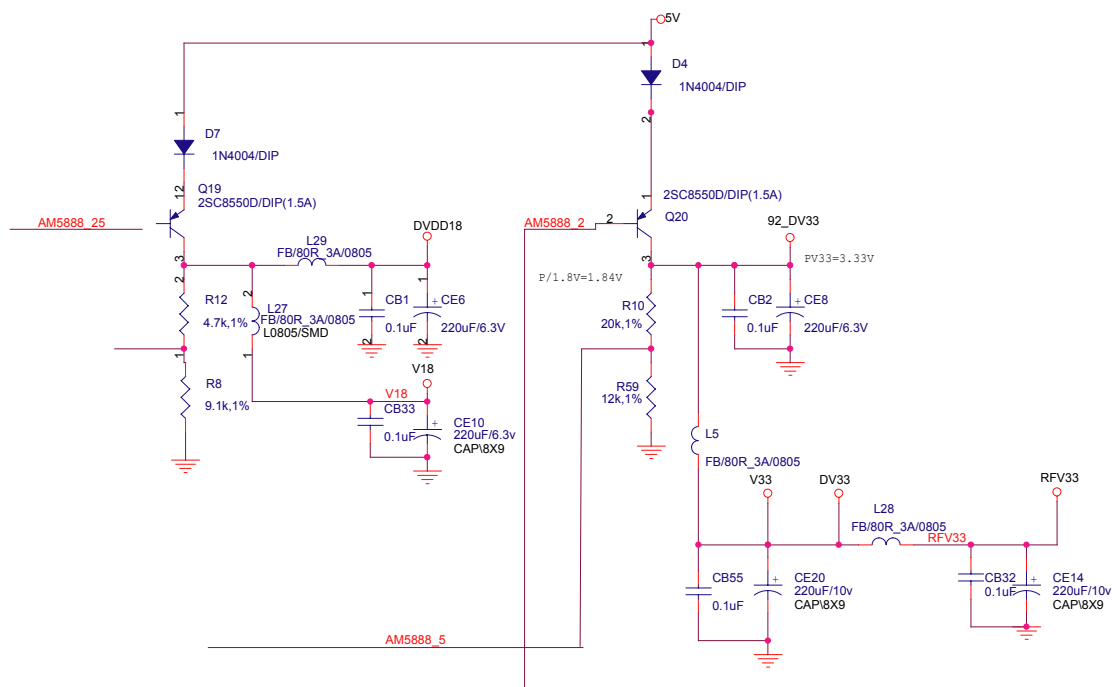
Analysis and troubleshooting: check power board and find that voltage of each channel has no output, check and find that 220V voltage input is normal, test bridge rectification circuit and there is no voltage output, use multimeter to test protector tube and it has open circuit, change protector tube and

trouble is not removed, test anode of TL431 and there is still no voltage output, protector tube is burnt out again, check 4 diode of bridge rectification circuit and they are all normal, TL431 has no abnormalities of liquid leakage and stricken through, test U601 (switch IC) and pin 1, 8 are short-circuited to ground, so it is judged that IC has been stricken through, change IC and trouble is removed.

【Example 7】 Symptom: power not on

Description: no screen display and no output

Analysis and troubleshooting: check +5V voltage output of power board and it is normal; check voltage of pin 4 of CN6 and it is also +5V, which is normal; after power of for a period, use hand to touch 1389 and find that 1389 does not work (feel the temperature here. If 1389 has began to work, the temperature will be high), so firstly consider the power supply of 1389; shown in the figure 3.3.1.3, test anode of Tc307 and there is no +1.8V voltage (output voltage of Q20, Q10 emitter electrode supplies +3.3V power for 1389), test voltage of pin 8, 19, 21 of AM5888 and they are all 5V, which is normal, so we judge that AM5888 has trouble; change it and trouble is removed.



3. Pull out flat cable of decode board XCN6, test each input voltage again and there is still no +5V voltage;

4. Check whether two ends of +5V on power supply flat cable from power board CN602 to decode board, and result is normal;

5. Test voltage of two ends of C606, +5V has no output; after power off, use 200 ohm level of multimeter to test two ends of C606 and find that resistance is close to zero, so we doubt that capacitor TC506 has electricity leakage; take down C606, test anode welding point of C606 and find that +5V output is normal, but there is still no 3.3V output;

6. Test two ends of diode D510 on power board and find that one end is 5V voltage and the other end has no voltage output. After changing D510, 3.3V output is normal, and machine works normally.

【Example 9】 Symptom: sound has no output

Description: after power on, each audio channel has no sound output when playing discs, when switching MUTE function; output has no change, no sound output.

Analysis and troubleshooting: we know from trouble symptom, the common channel of sound output has abnormality, firstly test operational amplifier IC 4558 +12V and -12V power supply voltage and it is normal, use multimeter to test voltage of pin 186, 183 of decode chip 1389D and it is 3.3V, which is normal, use oscillograph to test audio output waveform of pin 189, 187 of 1389D and it is normal, shown in the figure 3.3.1.4, use multimeter to test voltage of C electrode of mute circuit Q21 and it is 4.6V and keeps in 4.6V when no disc in and playing discs, when testing electrode resistance of Q21 and Q15 triode, the positive/negative direction resistance of C, E electrode of Q15 is about 500Ω, after changing Q15 triode, trouble is removed.

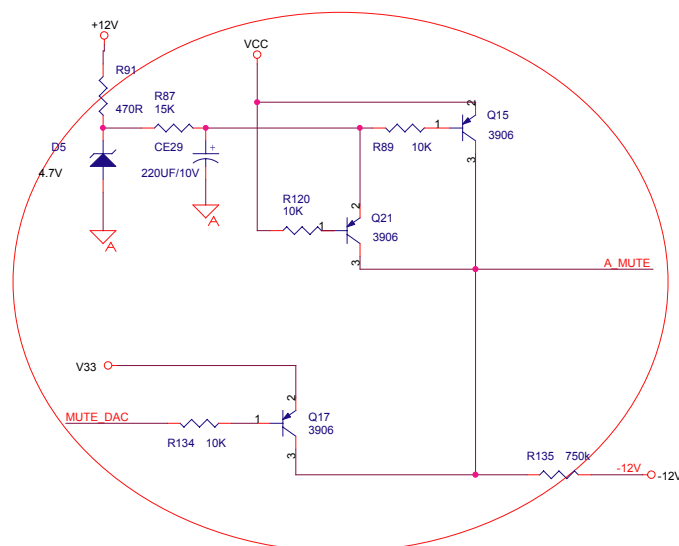


Figure 3.3.1.4 Quieting circuit diagram

【Example 10】 Symptom: not read DVD

Description: laser head, focus, feed, main axis and trace are all normal, but no light emission.

Analysis and troubleshooting: check emitter electrode voltage of Q17 and it is 3.3V, which is normal, test the inductor L303 between collector electrode and pin 23 of HA1 and find that inductor has open circuit; after changing inductor, trouble is removed.

【Example 11】 Symptom: less screen display

Description: when reading disc, display screen does not emit light for a period.

Analysis and troubleshooting: beat machine and test, screen less display always exists; use diode level of multimeter, red pen connected with any pin of screen and black pen tested pin of screen tube, test each screen pin one by one and check light emission segment of screen and a segment of screen does not emit light, so we may judge that screen is damaged; after changing screen, trouble is removed.

【Example 12】 Symptom: clutter

Description: disc reading of machine is normal, picture output is normal, sound output has noise

Analysis and troubleshooting: power on and read disc (test disc), use oscillograph to test the output waveform of pin 1, 7 of decode board operational amplifier U13 IC4558 and it is clutter, test output waveform of pin n2, 6 of operational amplifier and it is clutter, test AL, AR output waveform of pin 189, 187 of 1389D and it is clutter, test power supply and clock of 1389 and they are both normal, so it is judge that 1389D has trouble, after changing it, trouble is removed.

【Example 13】 Symptom: not read disc

Description: not read any disc, laser head, light emission, feed, main axis and trace are all normal, but there is no focus acts.

Analysis and troubleshooting: use multimeter to test pin 13, 14 of U2 (5888) and voltage is normal (about 1.4V), test pin 1, 2 of HA1 and voltage is normal, check nerve flat cable and the contact is good, so we judge that laser head focus coil is burnt out; after changing loader, trouble is removed. Pins have 10 ohm resistance (0 ohm resistance in normal conditions), so we judge that light touch has trouble; after changing light touch switch, trouble is removed.

【Example 14】 Symptom: door not open

Analysis and troubleshooting: press OPEN button, check pin 39 of 1389 and it is high level, normal; check on state between pin 39 of 1389 and pin 6 of U2 (AM5888) and it is good; check pin 9, 10 of U301 and there is no voltage output (pin 9 is low, pin 10 is high), so we doubt that AM5888 has trouble, after changing it, trouble is removed (AM5888 integrates open/close circuit).

【Example 15】 Symptom: disc rotation speed too fast when door opens

Description: when playing normally, open disc, disc tray cannot come out immediately, after disc tray out, disc will rotate on the tray for a while and then stop.

Analysis and troubleshooting: if this kind of trouble appears, the problem will appear in main axis servo drive circuit, when opening door, test voltage change of pin 11, 12 of U2 AM5888S and it is high and low level alternative, which is normal, shown in the figure 3.3.1.5, test ADIN signal of pin 43 of 1389 and it is always 0V, test voltage of OPO signal of pin 34 of 1389 and it changes in 0.8~2.3V, use multimeter to test the voltage drop between pin 34 and pin 43 of 1389 and it is in 0.8~2.3V, test R331 resistor and it has open circuit, after changing it, trouble is removed.

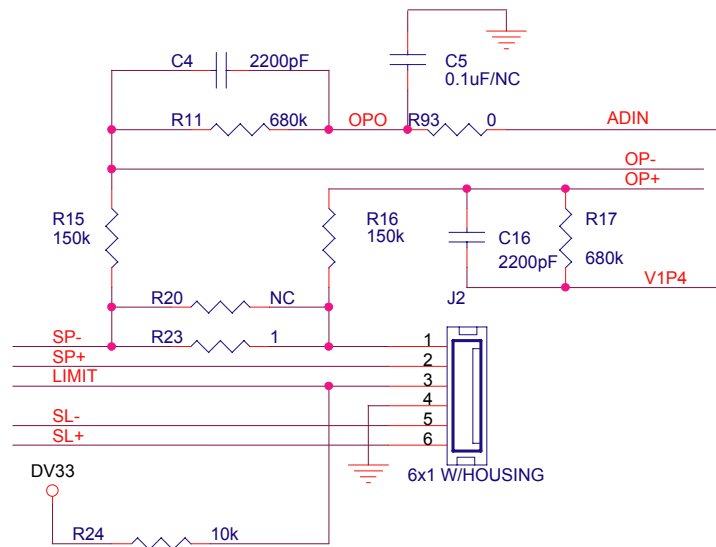
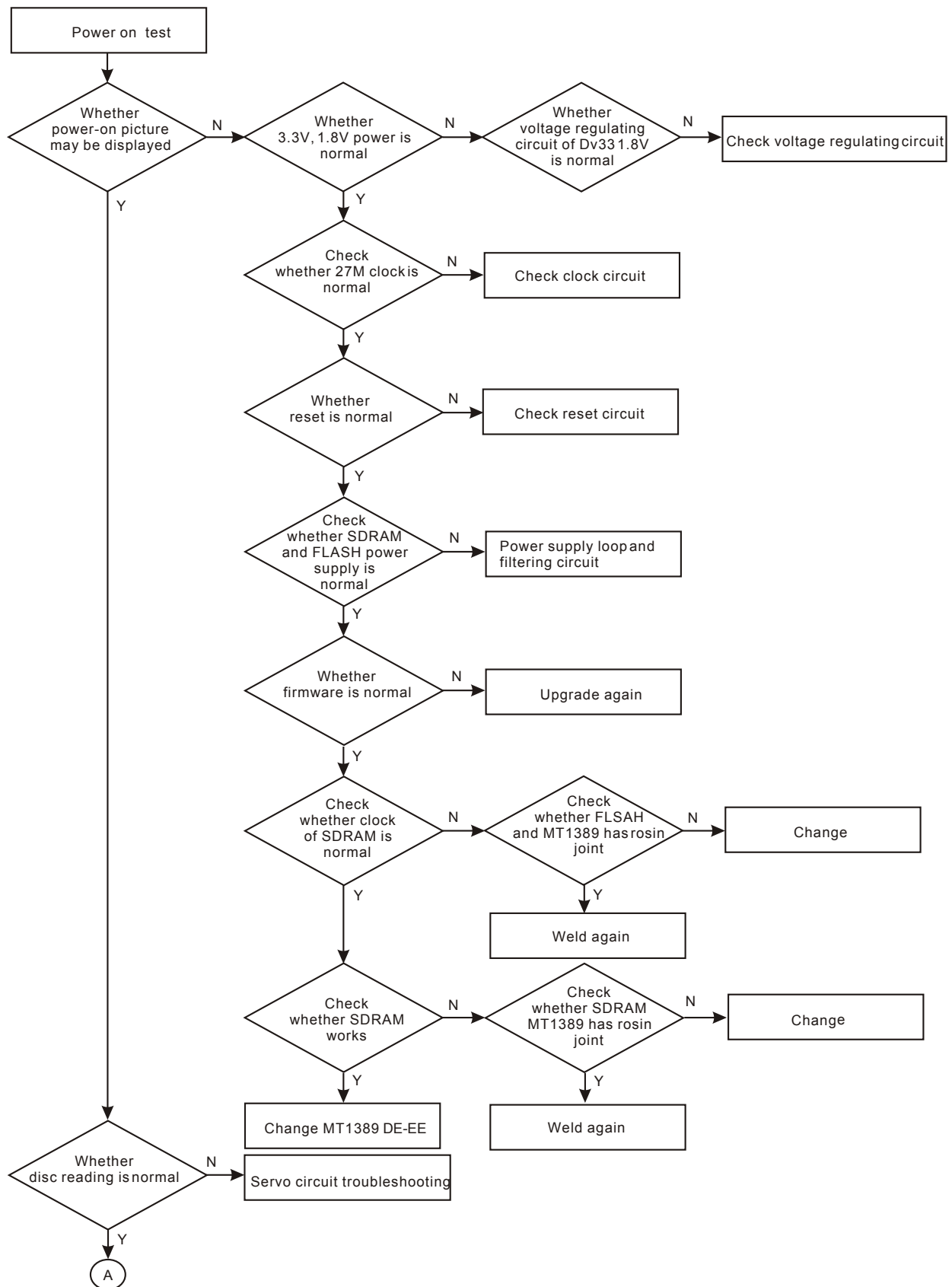


Figure 3.3.1.5 Servocircuit diagram

3.3.2 Troubleshooting flow chart

1. Troubleshooting process for “Power on (insert “power plug” and turn on “power switch”) is shown in the following figure 3.3.2.1:



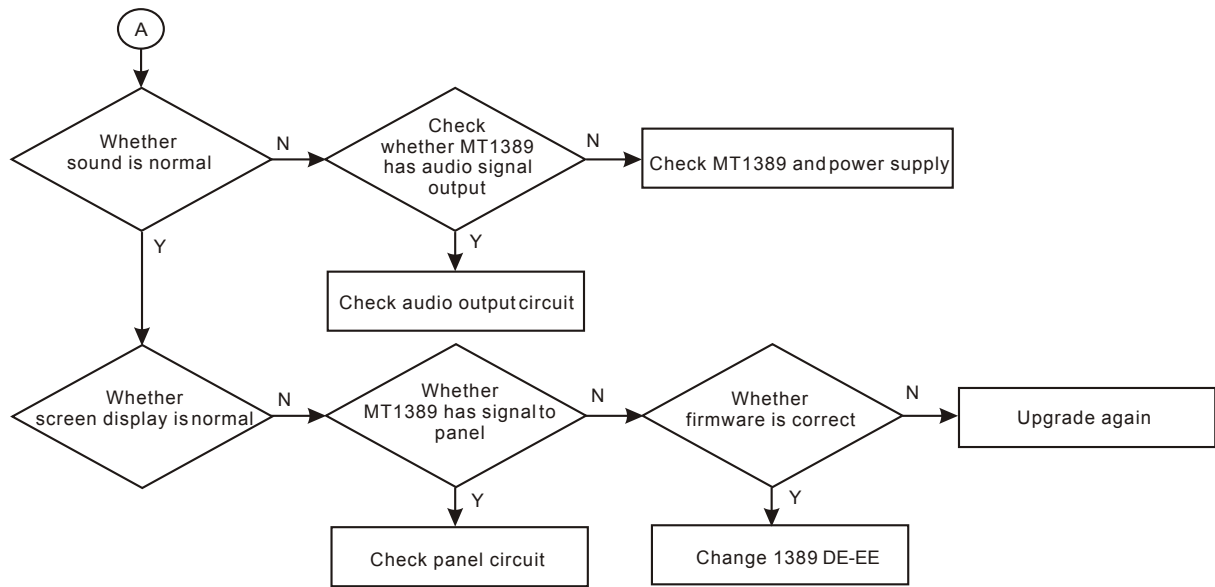
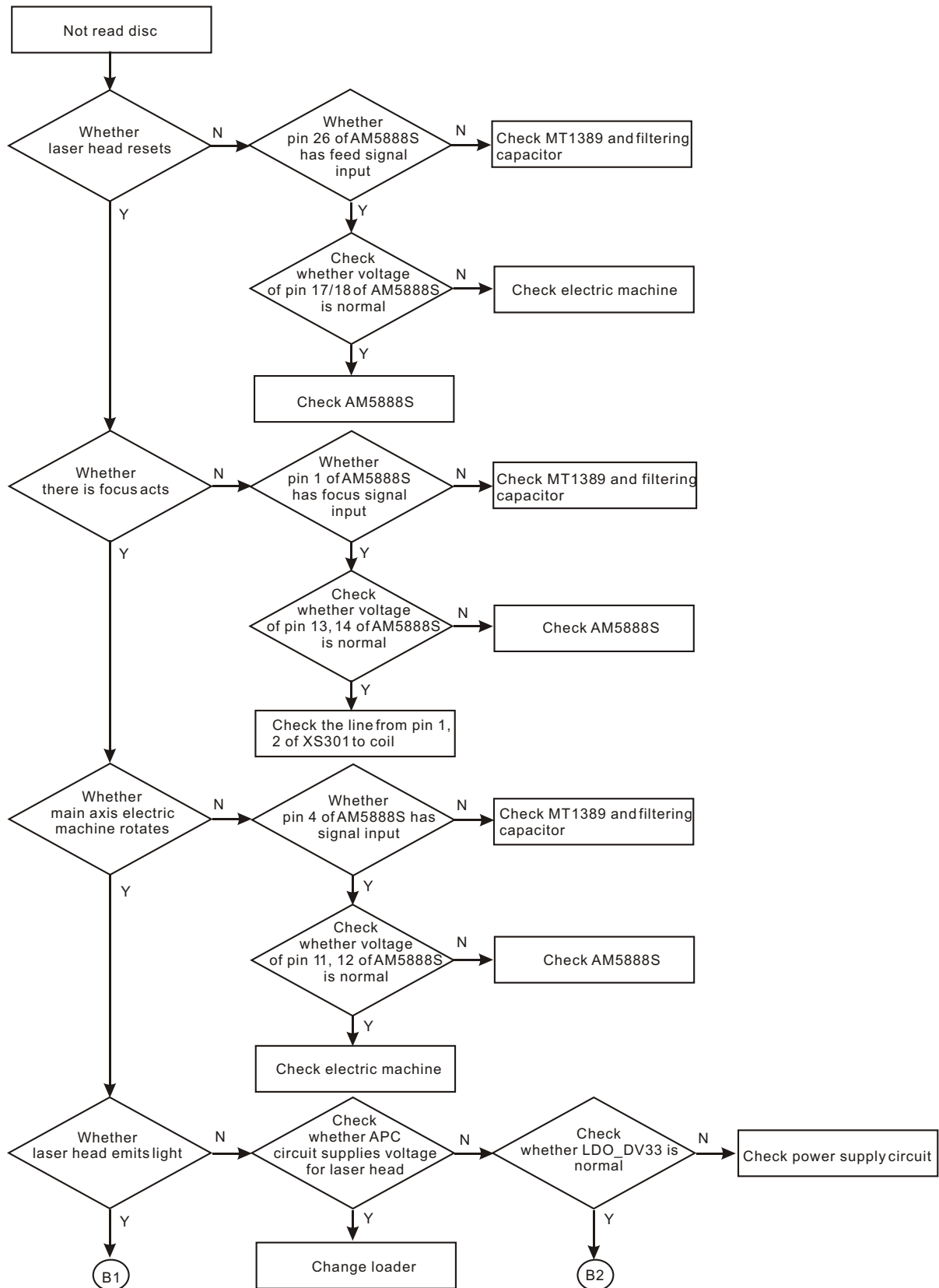


Figure 3.3.2.1 Troubleshooting flow chart for “Power on”

2. Troubleshooting process for “Not read disc” is shown in the following figure 3.3.2.2:



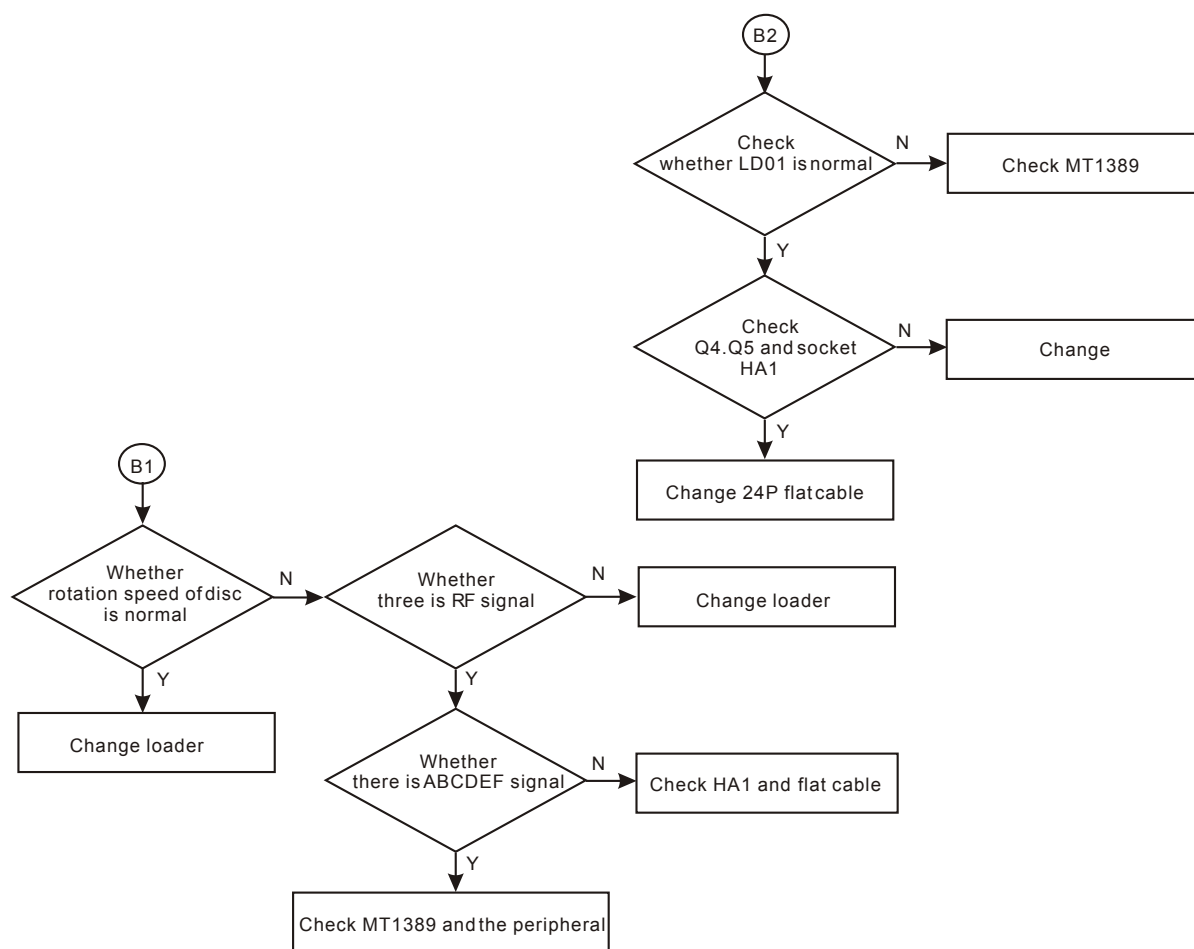


Figure 3.3.2.2 Troubleshooting flow chart for “Not read disc”

3. Troubleshooting process for “Video has no output” is shown in the following figure 3.3.2.3:

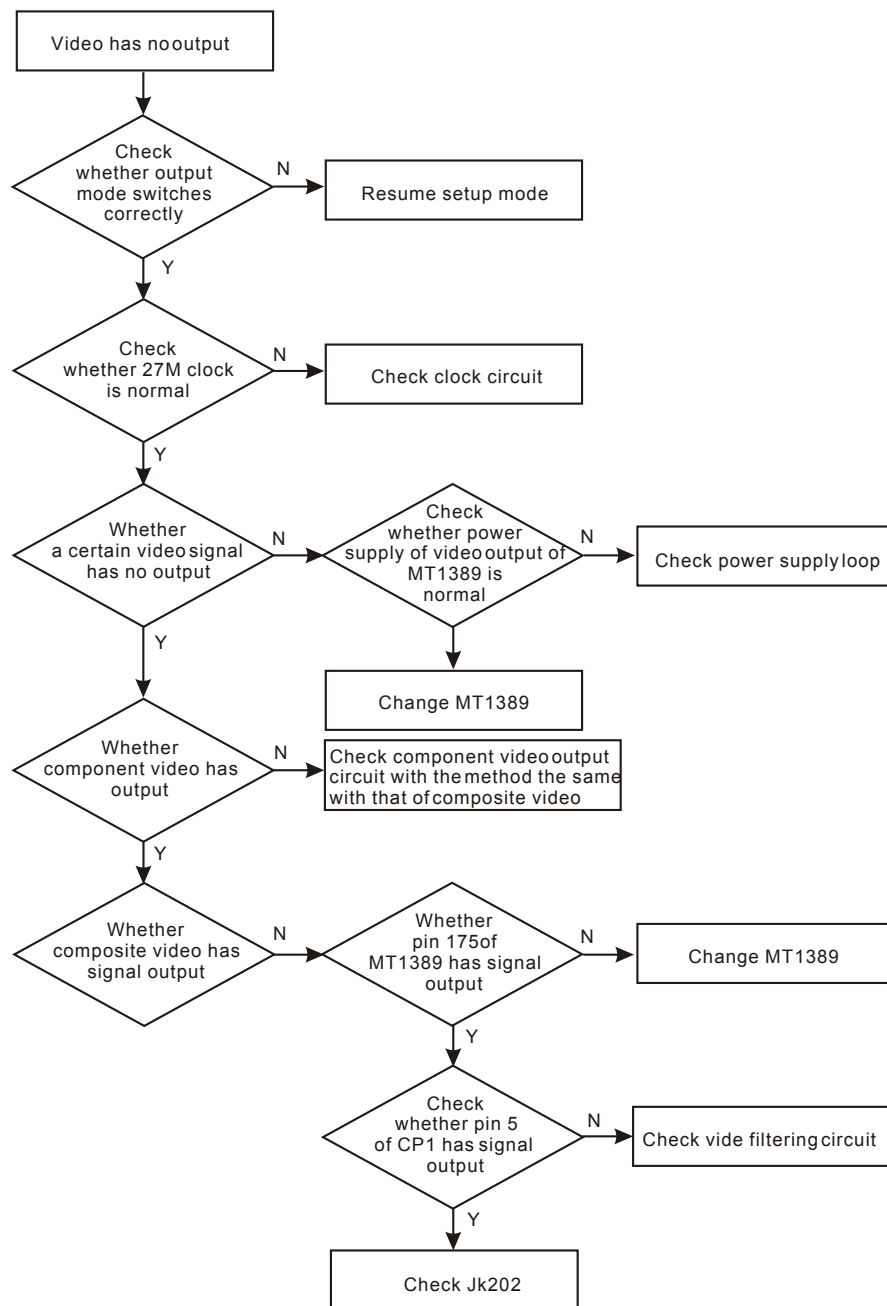


Figure 3.3.2.3 Troubleshooting flow chart for “Video has no output”

4. Troubleshooting process for “Left channel has no sound” is shown in the following figure 3.3.2.4:

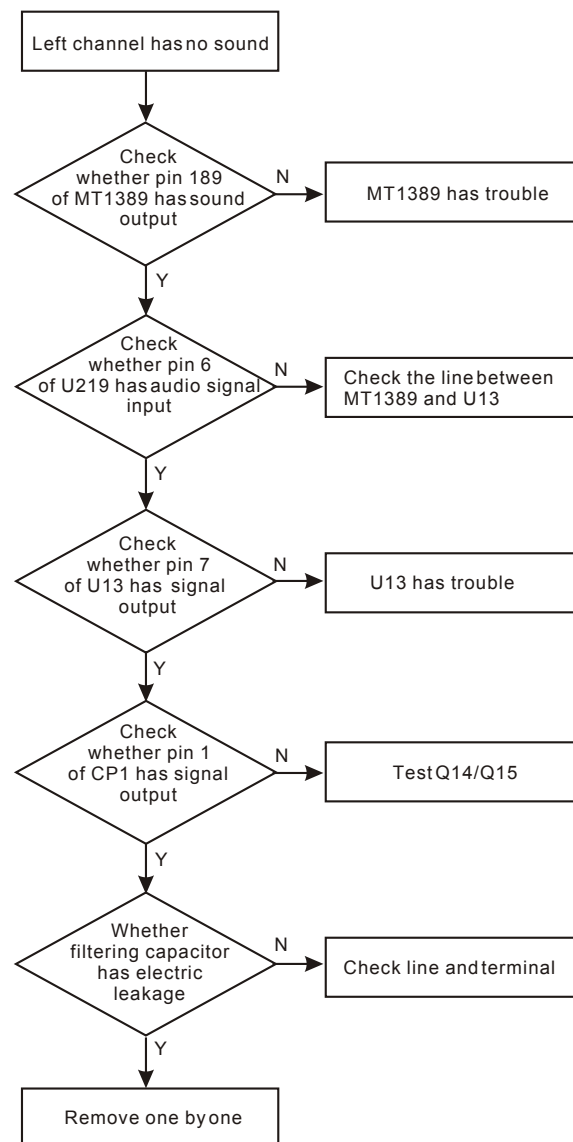


Figure 3.3.2.4 Troubleshooting flow chart for “Left channel has no sound”

5. Troubleshooting process for “MIC has no sound output” is shown in the figure 3.3.2.5:

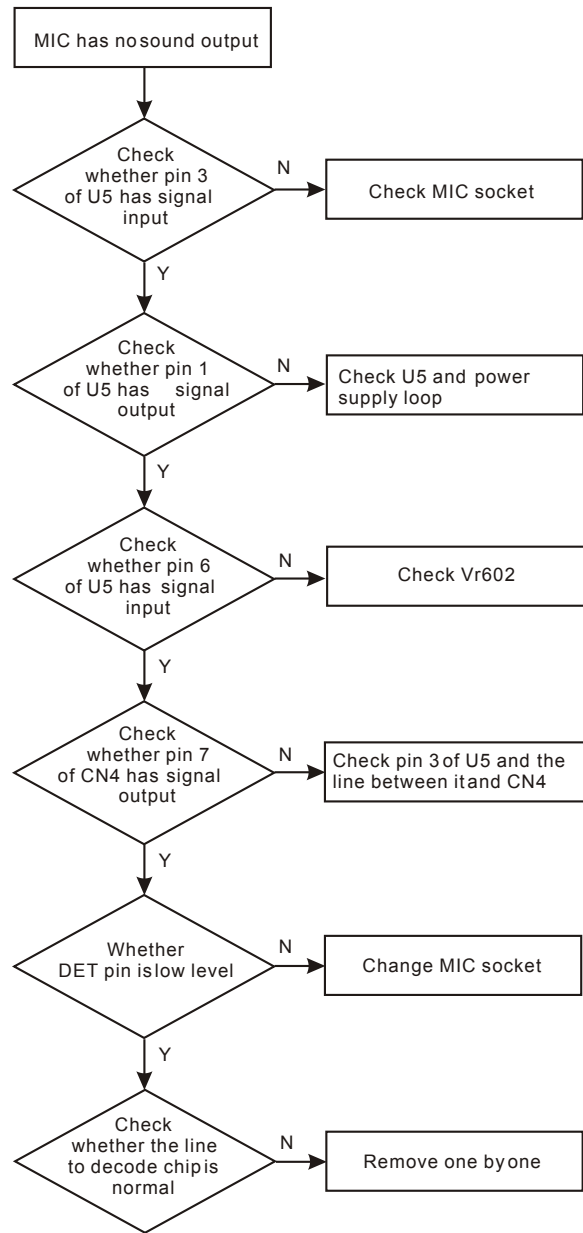


Figure 3.3.2.5 Troubleshooting flow chart for “MIC has no sound output”

6. Troubleshooting process for "No +5V voltage (power board 5317SI-1)" is shown in the following figure 3.3.2.6:

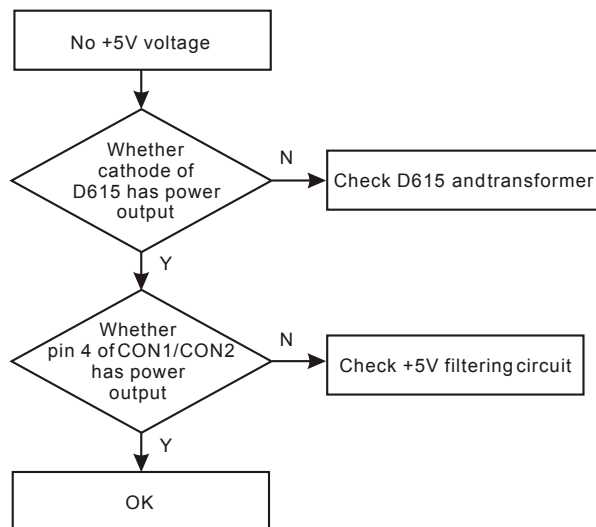


Figure 3.3.2.6 Troubleshooting process for "No +5V voltage"

7. Troubleshooting process for "Voltage output is unstable (power board OKI-DV300/OKI-P00807A)" is shown in the following figure 3.3.2.7:

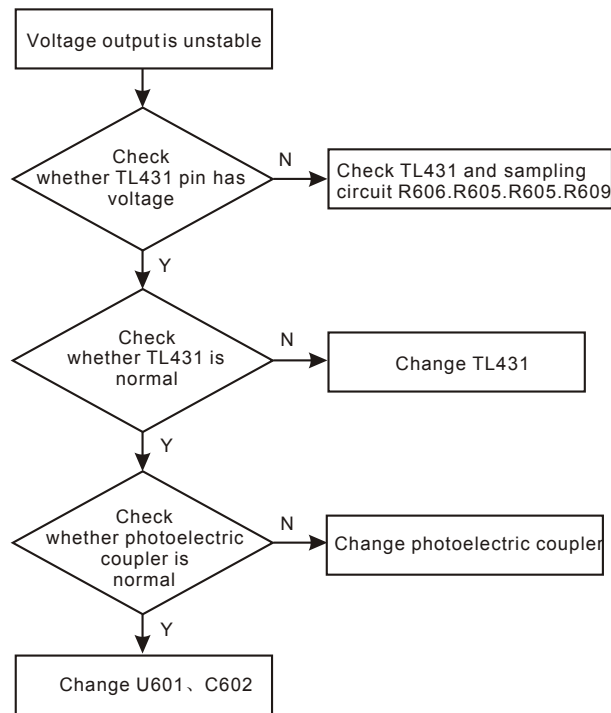


Figure 3.3.2.7 Troubleshooting flow chart for "Voltage output is unstable"

8. Troubleshooting process for “No +12V voltage (power board OKI-DV300/OKI-P00807A)” is shown in the following figure 3.3.2.8:

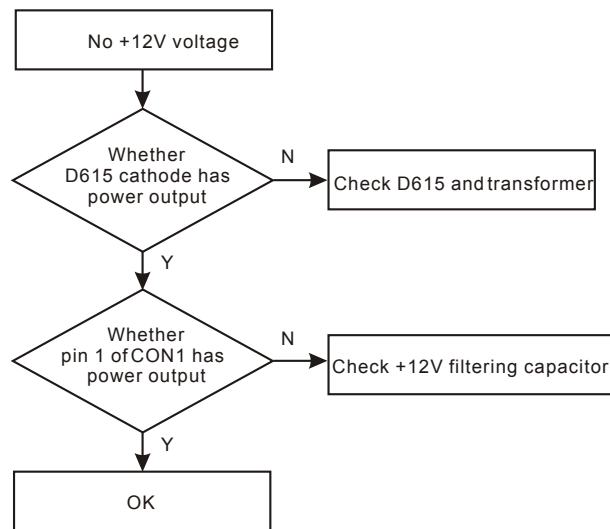


Figure 3.3.2.8 Troubleshooting flow chart for “No +12V voltage”

9. Troubleshooting process for “No +12V voltage (power board OKI-DV300/OKI-P00807A)” is shown in the following figure 3.3.2.9:

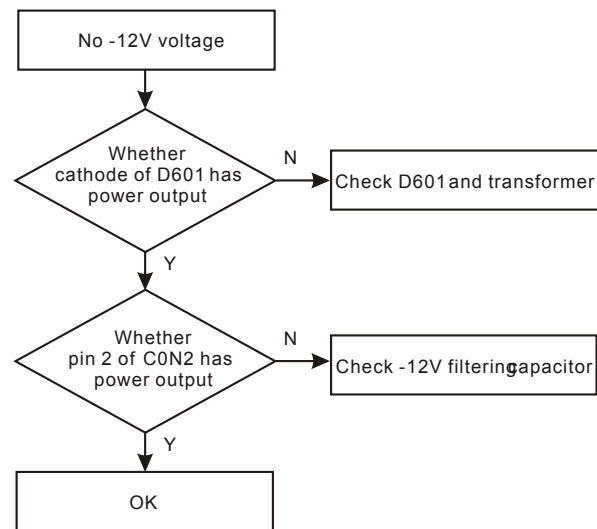


Figure 3.3.2.9 Troubleshooting process for “No -12V voltage”

10. Troubleshooting process for “No voltage output (power board OKI-DV300/OKI-P00807A)” is shown in the following figure 3.3.2.10:

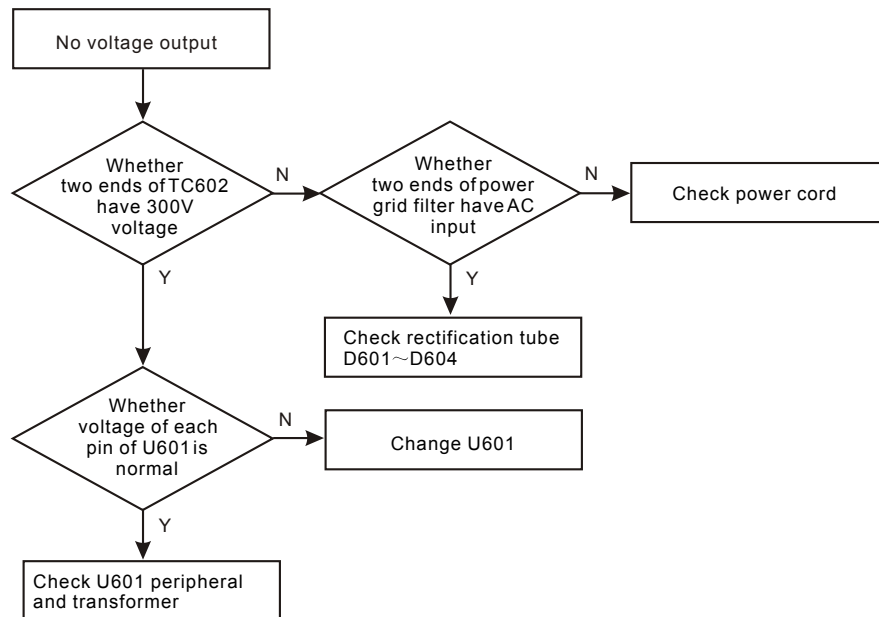
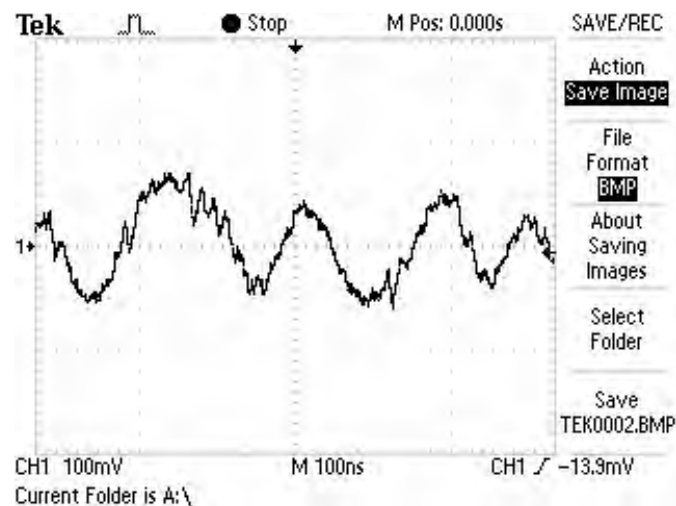


Figure 3.3.2.10 Troubleshooting flow chart for “No voltage output”

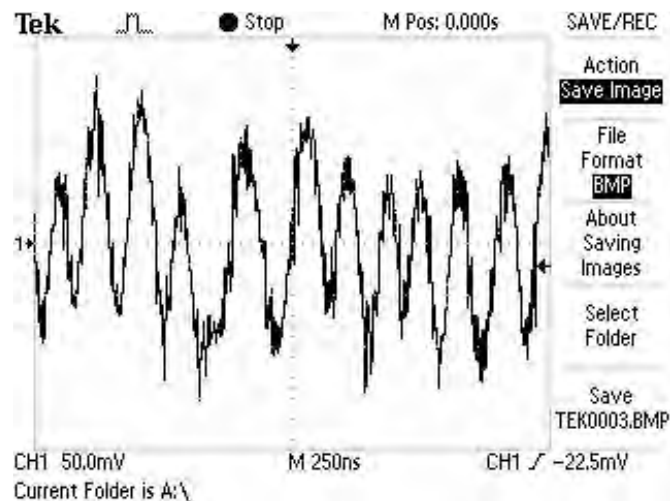
Section Four Waveform diagram

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

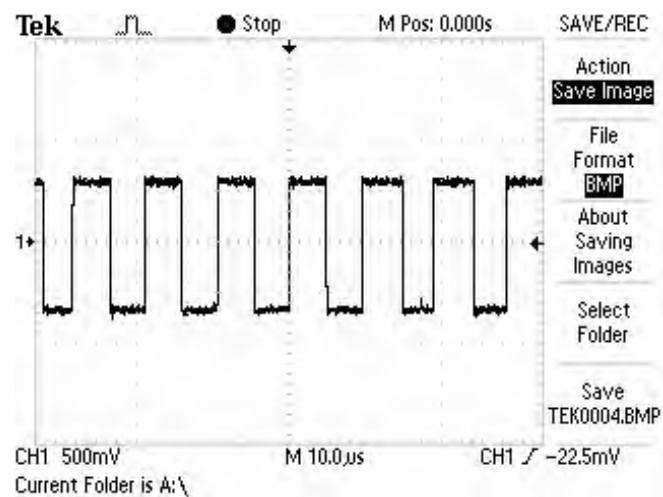
1. RFO signal waveform diagram of pin 8 of HA1



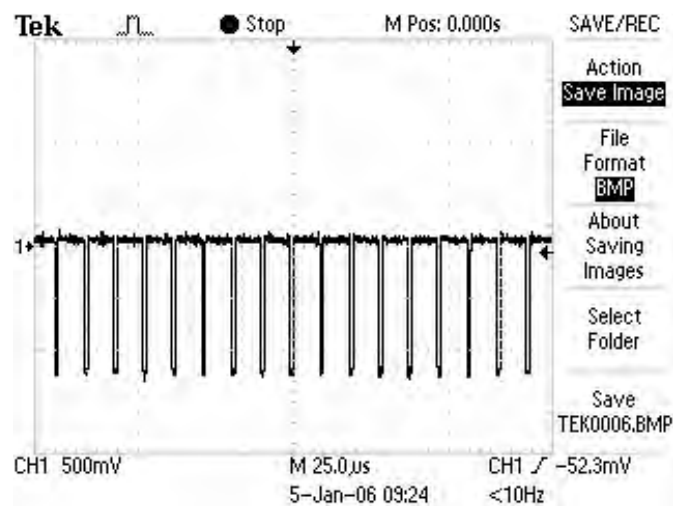
2. A signal waveform diagram of pin 9 of HA1 (B 、C、 D、 E、 F)



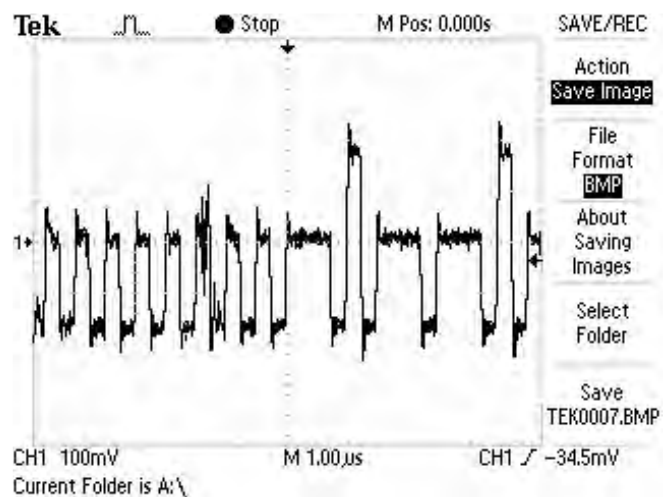
3. DMO signal (when there is main axis rotation) waveform diagram of pin 37 of U2 (MT1389)



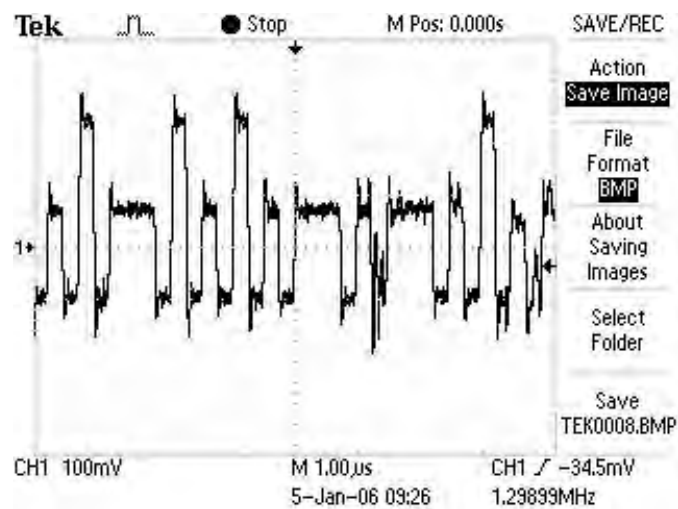
4. FMO signal (when there is feed) waveform diagram of pin 38 of U2 (MT1389)



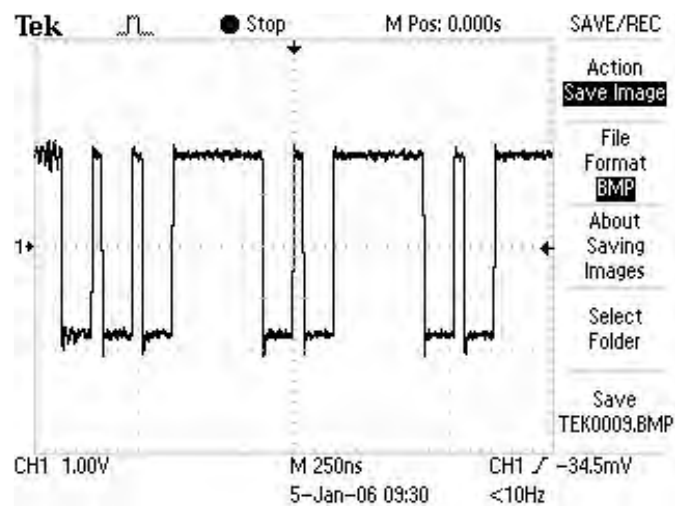
5. TRO signal (when there is trace) waveform diagram of pin 41 of U2 (MT1389)



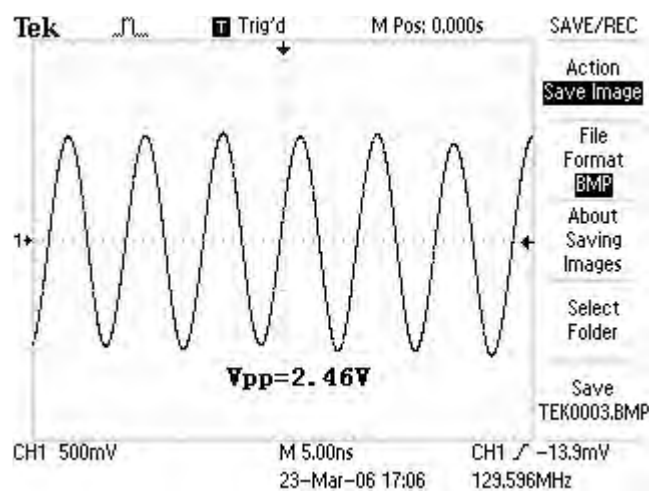
6. FOO signal (when there is focus) waveform diagram of pin 42 of U2 (MT1389)



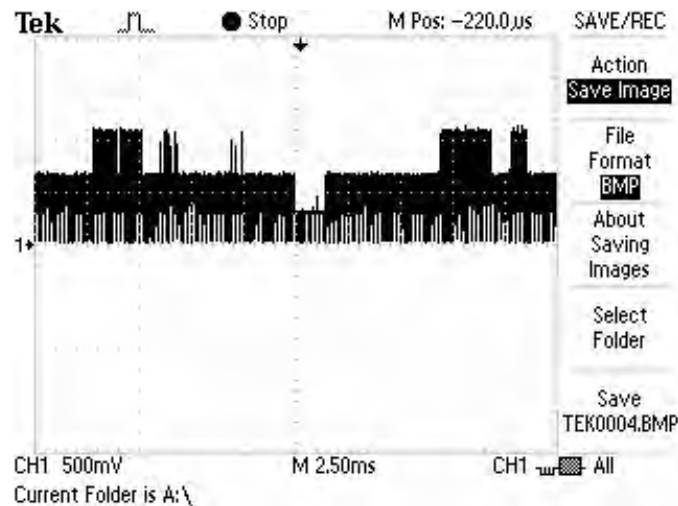
7. Waveform diagram of pin 29 (when no disc in) of U9 (FLASH)



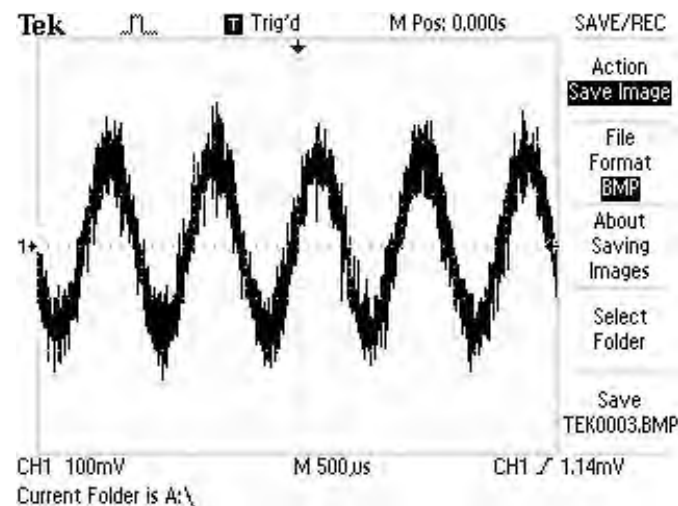
8. Waveform diagram of pin 38 of U8 (SDRAM)



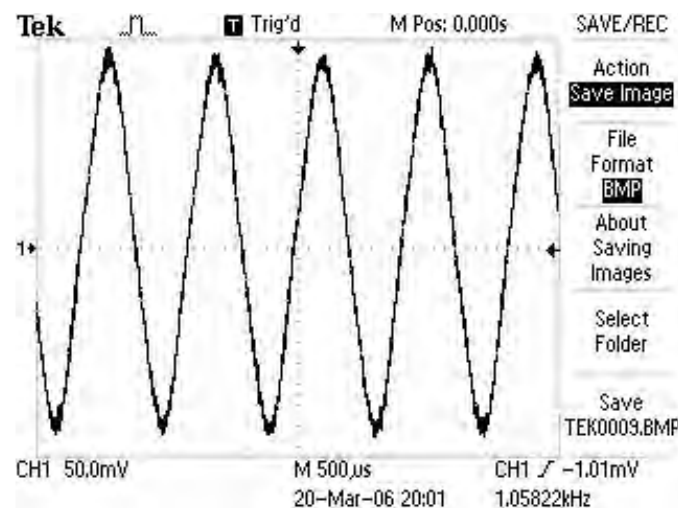
9. Video signal waveform diagram



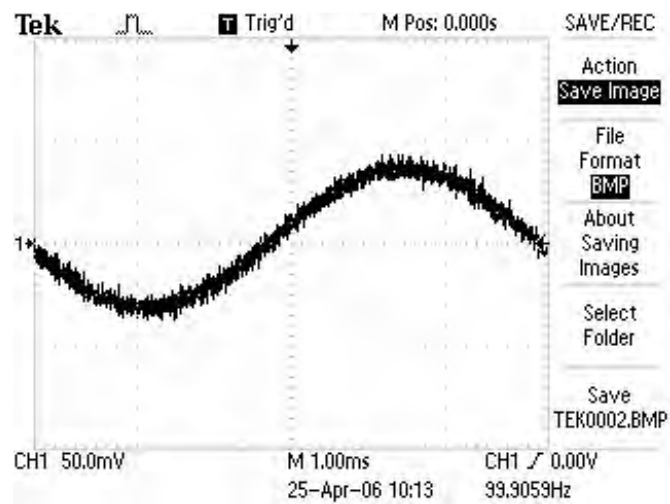
10. Waveform diagram of audio signals without being filtered and amplified (test point: audio signal amplifying input end C75/C79)



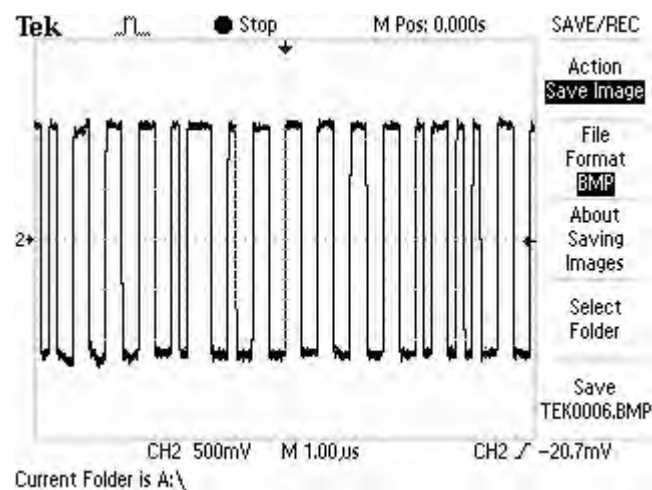
11. 1KHZ signal waveform diagram. It is suggested to use test disc, if not, the tested waveform will change at any time to affect judgment.



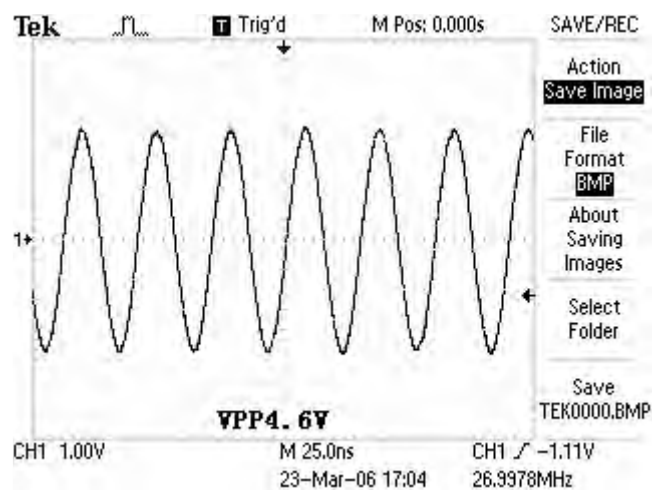
12. LEF#: waveform diagram for subwoofer channel analog signal



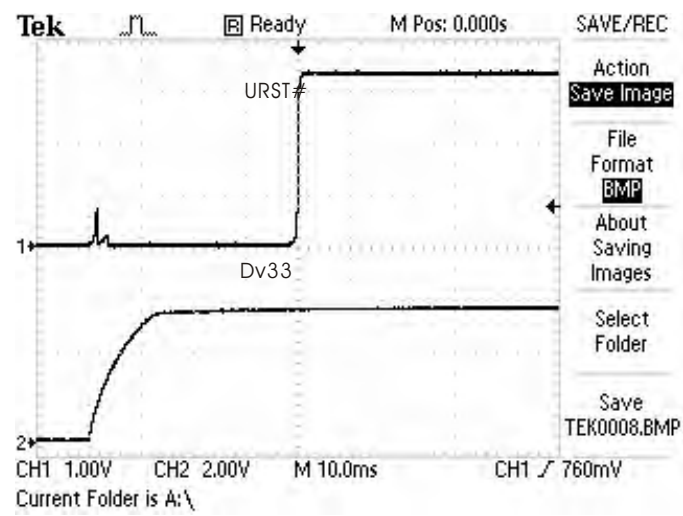
13. SPDIF: waveform diagram for optical/coaxial digital audio signal



14. 27M clock signal waveform diagram



15. Reset signal waveform diagram



Section Five Function Introduction to IC

3.5.1 function introduction to MT1389 DE-EE

MT1389DE adopts LQFP 256 pinsealing packaging, 3.3V/1.8V dual voltage working mode, a good-performance large-scale CD-ROM, DVD-ROM front-stage processing CMOS integrated circuit, and special chip for CD/VCD/DVD player. It includes focus servo error amplifying and trace servo error amplifying, and RF horizontal output servo control. The main functions include:

The main function of RF small signal front stage processing is to perform the relevant processing and amplifying to RF signals conveyed by laser head part, and automatically adjusts laser output power.

Digital servo processing may produce focus, trace, feed and main axis servo control signals; digital signal processing fulfills EFM/EFM + modulating of RF signal.

MPEG-1/MPEG-2/MPEG4/JPEG Video decode: this chip can not only fulfill decoding to VCD, DVD, but also read JPEG picture to realize digital album playback function.

In audio aspect, AC-3/DTS dual decoding can be realized. This chip has built-in audio D/A converter to make peripheral circuit simpler and has built-in 108MHZ video coder.

Pin	Main	Type	Description
RF Interface (26)			
191	RFGND18	Ground	Analog ground
192	RFVDD18	Power	Analog power 1.8V
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 3.3V
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
ALPC (4)			
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
Reference Voltage (3)			
28	V2REFO	Analog output	Reference voltage 2.8V
29	V20	Analog output	Reference voltage 2.0V
30	VREFO	Analog output	Reference voltage 1.4V
Analog Monitor Output (7)			
24	SVDD3	Power Analog	power 3.3V
25	CSO	Analog output	1) Central servo 2) Positive main beam summing output
26	RFLVL	Analog output	1) RFRP low pass, or 2) Negative main beam summing output
27	SGND	Ground	Analog ground
31	FEO	Analog output	Focus error monitor output

32	TEO	Analog output	Tracking error monitor output
33	TEZISLV	Analog output	TE Slicing Level
Analog Servo Interface (8)			
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 ACcoupling)
209	HRFZC	Analog Input	High frequency RF ripple zero crossing
210	CRTPLP	Analog output	Defect level filter capacitor connecting
211	RFGND	Ground	Analog Power
RF Data PLL Interface (9)			
195	JITFO	Analog output	The output terminal of RF jitter meter.
196	JITFN	Analog Input	The input terminal of RF jitter meter.
197	PLLSS	Ground	Ground pin for data PLL and related analog circuitry.
198	IDACEXLP	Analog output	Data PLL DAC Low -pass filter
199	PLLVD3	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
Motor and Actuator Driver Interface (10)			
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	TROPENPW M	Analog Output	Tray PWM output / Tray open output.
40	PWMOUT1 ADIN0	Analog Output	1) 1st General PWM output, or 2) AD input 0
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 (Digital pin)	LVTTL 3.3V Input, Schmitt Input, pull up , with analog input path for ADIN1	1) Motor Hall sensor input, or 2) AD input 1, or 3) GPIO
General Power/Ground (27)			
48,84,103, 133,156	DVDD18	Power	1.8V power pin for internal digital circuitry
71,93,120, 143	DVSS	Ground	1.8V Ground pin for internal digital circuitry
58,61,87, 108,123,13 8,151,168	DVDD3	Power	3.3V power pin for internal digital circuitry
56,74,97, 115,130,145 ,160	DVSS	Ground	3.3V Ground pin for internal digital circuitry
184	APLLCAP	Analog Inout	APLL External Capacitance connection
185	APLLVSS	Ground	Ground pin for audio clock circuitry
183	APLLVDD3	Power	3.3V Power pin for audio clock circuitry
Micro Controller and Flash Interface (48)			
54	HIGHA0	Inout 4~16MA, SR PU	Microcontroller address 8
68	HIGHA1	Inout 4~16MA, SR PU	Microcontroller address 9
67	HIGHA2	Inout 4~16MA, SR PU	Microcontroller address 10
66	HIGHA3	Inout 4~16MA, SR PU	Microcontroller address 11
65	HIGHA4	Inout 4~16MA, SR PU	Microcontroller address 12
64	HIGHA5	Inout 4~16MA, SR PU	Microcontroller address 13
63	HIGHA6	Inout 4~16MA, SR PU	Microcontroller address 14
62	HIGHA7	Inout 4~16MA, SR PU	Microcontroller address 15
85	AD7	Inout 4~16MA, SR	Microcontroller address/data 7
81	AD6	Inout 4~16MA, SR	Microcontroller address/data 6
80	AD5	Inout 4~16MA, SR	Microcontroller address/data 5
79	AD4	Inout 4~16MA, SR	Microcontroller address/data 4
78	AD3	Inout 4~16MA, SR	Microcontroller address/data 3
77	AD2	Inout 4~16MA, SR	Microcontroller address/data 2

76	AD1	Inout 4~16MA, SR	Microcontroller address/data 1
75	AD0	Inout 4~16MA, SR	Microcontroller address/data 0
88	IOA0	Inout 4~16MA, SR PU	Microcontroller address 0 / IO
72	IOA1	Inout 4~16MA, SR PU	Microcontroller address 1 / IO
47	IOA2	Inout 4~16MA, SR PU	Microcontroller address 2 / IO
49	IOA3	Inout 4~16MA, SR PU	Microcontroller address 3 / IO
50	IOA4	Inout 4~16MA, SR PU	Microcontroller address 4 / IO
51	IOA5	Inout 4~16MA, SR PU	Microcontroller address 5 / IO
52	IOA6	Inout 4~16MA, SR PU	Microcontroller address 6 / IO
53	IOA7	Inout 4~16MA, SR PU	Microcontroller address 7 / IO
60	A16	Output 4~16MA, SR PU	Flash address 16
86	A17	Output 4~16MA, SR PU	Flash address 17
55	IOA18	Inout 4~16MA, SR PD, SMT	Flash address 18 / IO
57	IOA19	Inout 4~16MA, SR PD, SMT	Flash address 19 / IO
69	IOA20	Inout 4~16MA, SR PD, SMT	Flash address 20 / IO
82	IOA21	Inout 4~16MA, SR PD, SMT	1) Flash address 21 / IO 2) While External FLASH size <= 2MB: GPIO
83	ALE	Inout 4~16MA, SR PU, SMT	Microcontroller address latch enable
73	IOOE#	Inout 4~16MA, SR SMT	Flash output enable, active low / IO
59	IOWR#	Inout 4~16MA, SR PU, SMT	Flash write enable, active low / IO
70	IOCS#	Inout 4~16MA, SR SMT	Flash chip select, active low / IO
89	UWR#	Inout 4~16MA, SR PU, SMT	SMT Microcontroller write strobe, active low
90	URD#	Inout 4~16MA, SR PU, SMT	Microcontroller read strobe, active low
91	UP1_2	Inout 4MA, SR PU, SMT	Microcontroller port 1-2
92	UP1_3	Inout 4MA, SR PU, SMT	Microcontroller port 1-3
94	UP1_4	Inout 4MA, SR PU, SMT	Microcontroller port 1-4
95	UP1_5	Inout 4MA, SR PU, SMT	Microcontroller port 1-5
96	UP1_6	Inout 4MA, SR PU, SMT	1) Microcontroller port 1-6 2) I2C clock pin
98	UP1_7	Inout 4MA, SR PU, SMT	1) Microcontroller port 1-7 2) I2C data pin
99	UP3_0	Inout 4MA, SR PU, SMT	1) Microcontroller port 3-0 2) 8032 RS232 RXD

100	UP3_1	Inout 4MA, SR PU, SMT	1) Microcontroller port 3-1 2) 8032 RS232 TXD
101	UP3_4	Inout 4MA, SR PU, SMT	1) Microcontroller port 3-4 2) Hardwired RD232 RXD 3) I2C clock pin
102	UP3_5	Inout 4MA, SR PU, SMT	1) Microcontroller port 3-5 2) Hardwired RD232 TXD 3) I2C data pin
106	IR	IR Input SMT	IR control signal input
107	INT0#	Inout 4~16MA, SR PU, SMT	Microcontroller external interrupt 0, active low
Audio interface (14)			
163	ALRCK	Inout 4MA,PD,SMT	1) Audio left/right channel clock 2) Trap value in power-on reset: I) 1 : use external 373 II) 0: use internal 373 3) While internal AUDIO DAC used: GPO
161	ABCK	Inout 4MA	1) Audio bit clock 2) While internal AUDIO DAC used: GPIO
162	ACLK	Inout 4MA SMT	1) Audio DAC master clock 2) While internal AUDIO DAC used: GPIO
164	ASDATA0	Inout 4MA PD SMT	1) Audio serial data 0 (Front-Left/Front-Right) 2) Trap value in power-on reset : I) 1 : manufactory test mode II) 0 : normal operation 3) While internal AUDIO DAC used: GPO
165	ASDATA1	Inout 4MA PD SMT	1) Audio serial data 1 (Left-Surround/Right-Surround) 2) Trap value in power-on reset : I) 1 : manufactory test mode II) 0 : normal operation 3) While only 2 channels output: GPO
166	ASDATA2	Inout 4MA PD SMT	1) Audio serial data 2 (Center/LFE) 2) Trap value in power-on reset : I) 1 : manufactory test mode II) 0 : normal operation 3) While only 2 channels output: GPO

167	ASDATA3	Inout 4MA PD SMT	1) Audio serial data 3 (Center-back/ Center-left-back/Center-right-back, in 6.1 or 7.1 mode) 2) While only 2 channels output: GPIO
169	MC_DATA	Inout 2MA	1) Microphone serial input 2) While not support Microphone: I) Microcontroller external interrupt 2 II) GPIO
170	SPDIF	Output 4~16MA, SR : ON/OFF	SPDIF output
186	ADACVDD3	Power	3.3V power pin for AUDIO DAC circuitry
187	AR	Output	1) AUDIO DAC right channel output 2) While internal AUDIO DAC not used: GPO
188	VCM	Analog	AUDIO DAC reference voltage
189	AL	Output	1) AUDIO DAC left channel output 2) While internal AUDIO DAC not used: GPO
190	ADACGND	Ground	Ground pin for AUDIO DAC circuitry
Video Interface (12)			
171	DACVDDC	Power	3.3V power pin for VIDEO DAC circuitry
172	VREF	Analog	Bandgap reference voltage
173	FS	Analog	Full scale adjustment
174	DACVSSC	Ground	Ground pin for VIDEO DAC circuitry
175	CVBS	Output 4MA, SR	Analog composite output
176	DACVddb	Power	3.3V power pin for VIDEO DAC circuitry
177	DACVSSB	Ground	Ground pin for VIDEO DAC circuitry
178	DACVDDA	Power	3.3V power pin for VIDEO DAC circuitry
179	Y/G	Output 4MA, SR	Green or Y or SY or CVBS
180	DACVSSA	Ground	Ground pin for VIDEO DAC circuitry
181	B/CB/PB	Output 4MA, SR	Blue or CB/PB or SC
182	R/CR/PR	Output 4MA, SR	Red or CR/PR or CVBS or SY
MISC (10)			
105	PRST#	Input PU, SMT	Power on reset input, active low
104	ICE	Input PD, SMT	Microcontroller ICE mode enable
193	XTALO	Output	27M crystal out
194	XTALI	Input	27M crystal in

44	GPIO0	Inout 4MA, SR SMT	General purpose IO 0
45	GPIO1	Inout 4MA, SR SMT	1) General purpose IO 1 2) Microcontroller external interrupt 4
46	GPIO2	Inout 2MA	General purpose IO 2
157	GPIO3	Inout 2MA	1) General purpose IO 3 2) Microcontroller external interrupt 1
158	GPIO4	Inout 2MA	General purpose IO 4
159	GPIO5	Inout 2MA	1) General purpose IO 5 2) Microcontroller external interrupt 3
Dram Interface (38) (Sorted by position)			
155	RA4	Inout	DRAM address 4
154	RA5	Inout	DRAM address 5
153	RA6	Inout	DRAM address 6
152	RA7	Inout	DRAM address 7
150	RA8	Inout	DRAM address 8
149	RA9	Inout	DRAM address 9
148	RA11	Inout Pull-Down	DRAM address bit 11
147	CKE	output	DRAM clock enable
146	RCLK	Inout	Dram clock
144	RA3	Inout	DRAM address 3
142	RA2	Inout	DRAM address 2
141	RA1	Inout	DRAM address 1
140	RA0	Inout	DRAM address 0
139	RA10	Inout	DRAM address 10
137	BA1	Inout	DRAM bank address 1
136	BA0	Inout	DRAM bank address 0
135	RCS#	output	DRAM chip select, active low
134	RAS#	output	DRAM row address strobe, active low
132	CAS#	output	DRAM column address strobe, active low
131	RWE#	output	DRAM Write enable, active low
129	DQM1	Inout	Data mask 1
128	RD8	Inout	DRAM data 8

127	RD9	Inout	DRAM data 9
126	RD10	Inout	DRAM data 10
125	RD11	Inout	DRAM data 11
124	RD12	Inout	DRAM data 12
122	RD13	Inout	DRAM data 13
121	RD14	Inout	DRAM data 14
119	RD15	Inout	DRAM data 15
118	RD0	Inout	DRAM data 0
117	RD1	Inout	DRAM data 1
116	RD2	Inout	DRAM data 2
114	RD3	Inout	DRAM data 3
113	RD4	Inout	DRAM data 4
112	RD5	Inout	DRAM data 5
111	RD6	Inout	DRAM data 6
110	RD7	Inout	DRAM data 7
109	DQM0	Inout	Data mask 0

3.5.2 function introduction to 4558

1. Description

The RC4558 and NJM4558 devices are dual general-purpose operational amplifiers with each half electrically similar to the μ A741 except that offset null capability is not provided.

The high common-mode input voltage range and the absence of latch-up make these amplifiers ideal for voltage-follower applications. The devices are short-circuit protected and the internal frequency compensation ensures stability without external components.

The RC4558 is characterized for operation from 0°C to 70°C, and the RM4558 is characterized for operation over the full military temperature range of –55°C to 125°C.

2. FEATURES

- ◆ Continuous-Short-Circuit Protection
- ◆ Wide Common-Mode and Differential
- ◆ Voltage Ranges
- ◆ No Frequency Compensation Required
- ◆ Low Power Consumption

No Latch-Up

Unity-Gain Bandwidth . . . 3 MHz Typ

Gain and Phase Match Between Amplifiers

Low Noise . . . 8 nV/√Hz Typ at 1 kHz

Designed To Be Interchangeable With

Raytheon RC4558 and RM4558 Devices

3. PIN CONFIGURATION

PIN No	Symbol	I/O	Description
1	1OUT	O	Output 1
2	1IN–	I	Inverting Input Pin 1
3	1IN+	I	Non-Inverting Input Pin 1
PIN No.	Symbol	I/O	Description
PIN No.	Symbol	I/O	Description
4	VCC–	I	Negative Power Supply
5	2IN+	I	Non-Inverting Input Pin 2
6	2IN–	I	Inverting Input Pin 2
7	2OUT	O	Output 2
8	VCC+	I	Positive Power Supply

3.5.3 function introduction to AT24C02

1. Description

The AT24C02 provides 2048 bits of serial electrically erasable and programmable read-only memory (EEPROM) organized as 256 words of 8 bits each. The device is optimized for use in many industrial and commercial applications where low-power and low-voltage operation are essential. The AT24C02 is available in space-saving 8-lead PDIP,

8-lead MAP, 8 lead TSSOP and 8-ball dBGA2 packages and is accessed via a 2-wire serial interface. In addition, the entire family is available in 2.7V (2.7V to 5.5V) and 1.8V (1.8V to 5.5V) versions.

2. Features

Low-voltage and Standard-voltage Operation

– 2.7 (VCC = 2.7V to 5.5V)

– 1.8 (VCC = 1.8V to 5.5V)

Internally Organized, 256 x 8 (2K),

2-wire Serial Interface

- ### 3. PIN DESCRIPTION

PIN No.	Symbol	I/O	Description
1	A0	I	To Ground
2	A1	I	To Ground
3	A2	I	To Ground
4	VSS	I	To Ground
5	SDA	I/O	Serial Data input
6	SCL	I/O	Serial SCL input
7	TEST	I/O	Test port
8	VDD	I	Positive Power Supply

Lowest System Cost with Enhanced Flexibility

- Simple ON/OFF control, no loop compensation needed
- Selectable current limit through BP/M capacitor value
 - Higher current limit extends peak power or, in open frame applications, maximum continuous power
 - Lower current limit improves efficiency in enclosed adapters/chargers
 - Allows optimum *TinySwitch-III* choice by swapping devices with no other circuit redesign
- Tight I²f parameter tolerance reduces system cost
 - Maximizes MOSFET and magnetics power delivery

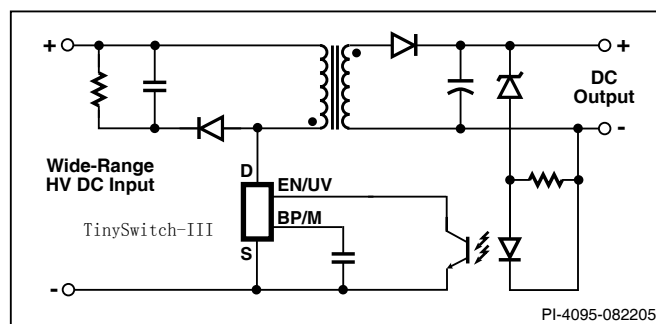


Figure 1. Typical Standby Application.

- Minimizes max overload power, reducing cost of transformer, primary clamp & secondary components
- ON-time extension – extends low line regulation range/hold-up time to reduce input bulk capacitance
- Self-biased: no bias winding or bias components
- Frequency jittering reduces EMI filter costs
- Pin-out simplifies heatsinking to the PCB
- SOURCE pins are electrically quiet for low EMI

Enhanced Safety and Reliability Features

- Accurate hysteretic thermal shutdown protection with automatic recovery eliminates need for manual reset
- Improved auto-restart delivers <3% of maximum power in short circuit and open loop fault conditions
- Output overvoltage shutdown with optional Zener
- Line under-voltage detect threshold set using a single optional resistor
- Very low component count enhances reliability and enables single-sided printed circuit board layout
- High bandwidth provides fast turn on with no overshoot and excellent transient load response
- Extended creepage between DRAIN and all other pins improves field reliability

EcoSmart[®] – Extremely Energy Efficient

- Easily meets all global energy efficiency regulations
- No-load <150 mW at 265 VAC without bias winding, <50 mW with bias winding
- ON/OFF control provides constant efficiency down to very light loads – ideal for mandatory CEC regulations and 1 W PC standby requirements

Applications

- Chargers/adapters for cell/cordless phones, PDAs, digital cameras, MP3/portable audio, shavers, etc.

OUTPUT POWER TABLE				
PRODUCT ³	230 VAC $\pm 15\%$		85-265 VAC	
	Adapter ¹	Peak or Open Frame ²	Adapter ¹	Peak or Open Frame ²
TNY274 P or G	6 W	11 W	5 W	8.5 W
TNY275 P or G	8.5 W	15 W	6 W	11.5 W
TNY276 P or G	10 W	19 W	7 W	15 W
TNY277 P or G	13 W	23.5 W	8 W	18 W
TNY278 P or G	16 W	28 W	10 W	21.5 W
TNY279 P or G	18 W	32 W	12 W	25 W
TNY280 P or G	20 W	36.5 W	14 W	28.5 W

Table 1. Notes: **1.** Minimum continuous power in a typical non-ventilated enclosed adapter measured at 50 °C ambient. Use of an external heatsink will increase power capability **2.** Minimum peak power capability in any design or minimum continuous power in an open frame design (see Key Application Considerations). **3.** Packages: P: DIP-8C, G: SMD-8C. See Part Ordering Information.

- PC Standby and other auxiliary supplies
- DVD/PVR and other low power set top decoders
- Supplies for appliances, industrial systems, metering, etc.

Description

TinySwitch-III incorporates a 700 V power MOSFET, oscillator, high voltage switched current source, current limit (user selectable) and thermal shutdown circuitry. The IC family uses an ON/OFF control scheme and offers a design flexible solution with a low system cost and extended power capability.

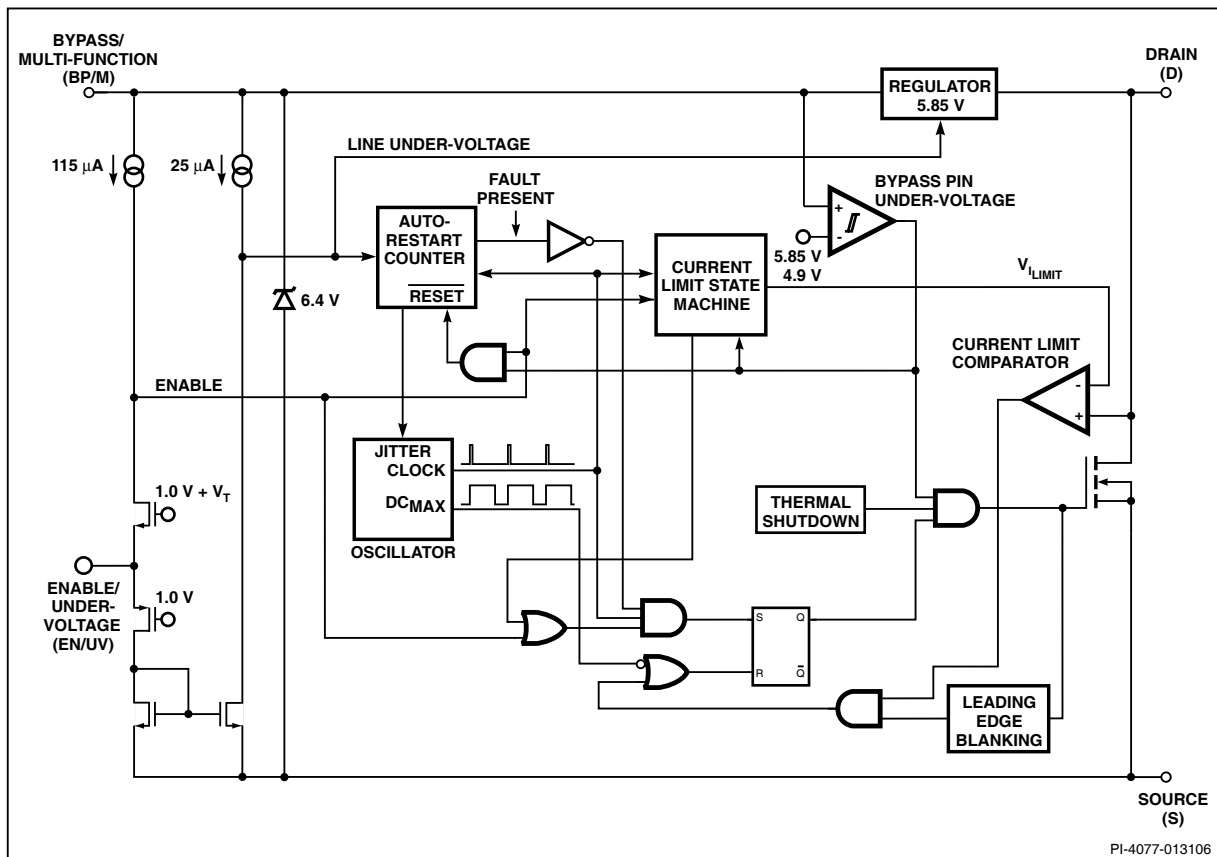


Figure 2. Functional Block Diagram.

Pin Functional Description

DRAIN (D) Pin:

This pin is the power MOSFET drain connection. It provides internal operating current for both start-up and steady-state operation.

BYPASS/MULTI-FUNCTION (BP/M) Pin:

This pin has multiple functions:

1. It is the connection point for an external bypass capacitor for the internally generated 5.85 V supply.
2. It is a mode selector for the current limit value, depending on the value of the capacitance added. Use of a 0.1 μF capacitor results in the standard current limit value. Use of a 1 μF capacitor results in the current limit being reduced to that of the next smaller device size. Use of a 10 μF capacitor results in the current limit being increased to that of the next larger device size for TNY275-280.
3. It provides a shutdown function. When the current into the bypass pin exceeds 5.5 mA, the device latches off until the BP/M voltage drops below 4.9 V, during a power down. This can be used to provide an output overvoltage function

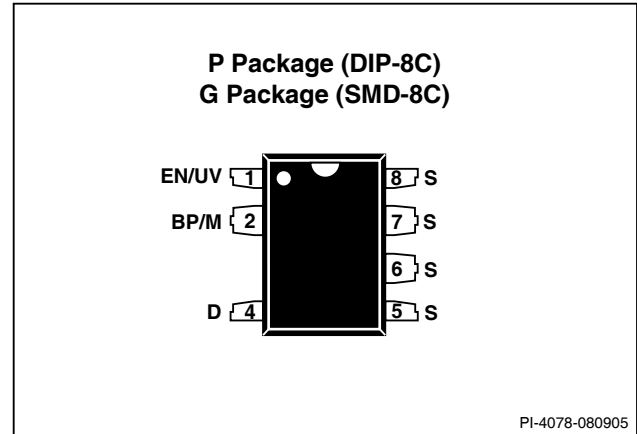


Figure 3. Pin Configuration.

with a Zener connected from the BP/M pin to a bias winding supply.

ENABLE/UNDER-VOLTAGE (EN/UV) Pin:

This pin has dual functions: enable input and line under-voltage sense. During normal operation, switching of the power

3.5.5 function introduction to AM5888S

1. Description

The AM5888S is a five-channel BTL driver IC for driving the motors and actuators such as used in DVD player and consists of two independent precision voltage regulators with adjustable range from 1.5V to 4 V. It supports a variety of applications. Also, Pb free package is selectable (Please refer to Marking Identification).

2. Fetures

1) Two channels are voltage-type BTL drivers for actuators of tracking and focus. Two channels are voltage-type BTL driver for sled and spindle motors. It is also built-in one channel bi-direction DC motor driver for tray.

2) Wide dynamic range [9.0V (*typ.*) when $V_{cc1} = V_{cc2} = 12\text{V}$, at $R_L = 20\Omega$, load].

3) Separating power of V_{cc1} and V_{cc2} is to improve power efficiency by a low supply voltage for tracking, focus, and spindle.

4) Level shift circuit built-in.

5) Thermal shut down circuit built-in.

6) Mute mode built-in.

7) Dual actuator drivers:

A general purpose input OP provides differential input for signal addition. The output structure is two power OPAMPS in bridge configuration.

8) Sled motor driver: A general purpose input OP provides differential input for signal addition. The output structure is one power OPAMP in bridge configuration.

9) Spindle driver: Single input linear BTL driver. The output structure are two power OPAMPS in bridge configuration.

10) Tray in-out driver: The DC motor driver supports forward/reverse control for tray motor.

11) 2 Built-in regulator controllers: Adjustable range 1.5V ~ 4V

3. PIN DESCRIPTION

PIN	Symbol	I/O	Description
1	VINFC	I	Input for focus drive
2	TRB_1	O	Connect to external transistor base
3	REGO2	O	Regulator voltage output, connect to external transistor collector
4	VINSL	I	Input for the sled driver
5	REGO1	O	Regulator voltage output, connect to external transistor collector
6	FWD	I	Tray driver forward input
7	REV	I	Tray driver reverse input
8	VCC1	I	Vcc for pre-drive block and power block of sled and tray
9	VOTR-	O	Tray driver output (-)
10	VOTR+	O	Tray driver output (+)
11	VOSL+	O	Sled driver output (+)
12	VOSL-	O	Sled driver output (-)
13	VOFC-	O	Focus driver output (-)
14	VOFC+	O	Focus driver output (+)
15	VOTK+	O	Tracking driver output (+)
16	VOTK-	O	Tracking driver output (-)
17	VOLD+	O	Spindle driver output (+)
18	VOLD-	O	Spindle driver output (-)
19	VCC2	I	Vcc for power block of spindle, tracking and focus
20	NC		No Connection
21	VCTL	I	Speed control input of tray driver
22	GND	I	Ground
23	VINLD	I	Input for spindle driver

24	NC		No Connection
25	TRB_2	O	Connect to external transistor base
26	VINTK	I	Input for tracking driver
27	BIAS	I	Input for reference voltage
28	MUTE	I	Input for mute control

3.5.6 function introduction to AP6928

DESCRIPTION

AP6928 is an LED (light-emitting diode) Controller driven on a 1/4 to 1/7 duty factor. One display memory, control circuit, key scan circuit are all incorporated into a single chip to build a highly reliable peripheral device for a single chip microcomputer.

It is applicable for the LED display driving of VHS, DVD PLAYER and Home Theatre etc.

We used unique technique to steady the LED driving and key-scan.

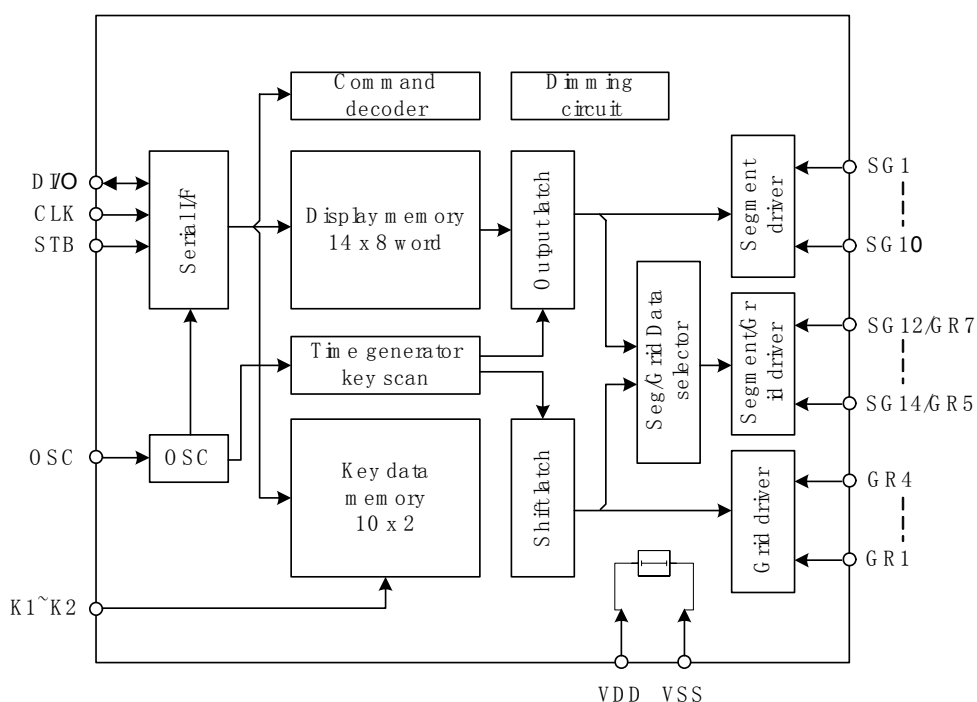
FEATURES

- Built reset circuit to resist disturber from power
- Deep sub-micrometer CMOS Technology
- Low Power Consumption design
- Multiple Display Modes (13-Segment & 4-Grid to 10-Segment & 7-Grid)
- Key Scanning (10 x 2 Matrices)
- 8-Step Dimming Circuitry
- Serial Interface for CLK, DI/O, Strobe pins
- Available in 28-pin, SOP Package

APPLICATIONS

- VHS, DVD PLAYER
- Display of Industry use

BLOCK DIAGRAM



PIN DESCRIPTION

Pin No.	Symbol	Pin Name	Description
2	DI/O	Data input/output	Input serial data at the rising edge of the shift clock, starting from the low order bit. Output serial data at the falling edge of the shift clock, starting from low order bit. This is an NMOS open-drain output pin.
4	STB	Strobe	Initializes serial interface at the rising or falling edge of the AP6928. Then it waits to receive a command. Data input after STB has fallen is processed as a command. While command data is processed, current processing is stopped, and the serial interface is initialized. While STB is high, CLK is ignored.
3	CLK	Clock input	Reads serial data at the rising edge, and outputs data at the falling edge.
1	OSC	Oscillator pin	Connected an external pull-low resistor to this pin or an RC oscillator circuit.
5 ~ 6	K1 to K2	Key data input	Key scan data input to these pins is latched at the end of display cycle.
8 ~ 17	SG1/KS1 to SG10/KS10	High level output (segment)	Segment or key source output pins (dual function). This is PMOS open-drain output.
27 ~ 26	GR1 to GR2	Low level output (grid)	Grid driver output pins (Grid only). This is NMOS open-drain output.
24 ~ 23	GR3 to GR4	Low level output (grid)	Grid driver output pins (Grid only). This is NMOS open-drain output.
18 ~ 20	SG12/GR7 to SG14/GR5	High level output (segment)/Low level output (grid)	These pins are selectable for segment or grid output. This is PMOS open-drain(as Segment) or NMOS open-drain(as Grid) output.
7,21	VDD	Logic power	Positive power supply.
22,25,28	VSS	Logic ground	Power supply, ground.

3.5.7 Function introduction to SDRAM

64M 16-bit memorizer SDRAM with the player and the working clock frequency is 166/143MHZ. The function of 16SDRAM in DVD players is to memorizer the program of AML3298 taken out from FLASH and information of image and sound taken out from disc to form buffer, add the stability of information output and add anti-shaking effect of player. Pin function introduction is shown as the following table:

Pin	Name	Function	Signal flow	Pin	Name	Function	Signal flow
1	VDD	3.3V power supply		28	VSS	Ground	
2	DQ0	Data bus	I/O	29	MA4	Address bus	I

3	VDDQ	3.3V power supply	I/O	30	MA5	Address bus	I
4	DQ1	Data bus	I/O	31	MA6	Address bus	I
5	DQ2	Data bus	I/O	32	MA7	Address bus	I
6	VSSQ	Ground		33	MA8	Address bus	I
7	DQ3	Data bus	I/O	34	MA9	Address bus	I
8	DQ4	Data bus	I/O	35	MA11	Address bus	I
9	VDDQ	3.3V power supply		36	NC	Blank	
10	DQ5	Data bus	I/O	37	CKE	Clock enable signal	I
11	DQ6	Data bus	I/O	38	CLK	System clock input	I
12	VSSQ	Ground		39	UDQM	Data input/output screen-shielded signal	I
13	DQ7	Data bus	I/O	40	NC	Blank	
14	VDD	3.3V power supply		41	VSS	Ground	
15	LDQM	Data input/output screen-shielded signal	I	42	DQ8	Data bus	I/O
16	WE	Write control signal	I	43	VDDQ	3.3V power supply	
17	CAS	Line address gating signal	I	44	DQ9	Data bus	I/O
18	RAS	Row address gating signal	I	45	DQ10	Data bus	I/O
19	CS	Chip selection signal	I	46	VSSQ	Ground	
20	SD-BS0	Segment address 0 gating signal	I	47	DQ11	Data bus	I/O
21	SD-BS1	Segment address 1 gating signal	I	48	DQ12	Data bus	I/O
22	MA10	Address bus	I	49	VDDQ	3.3V power supply	
23	MA0	Address bus	I	50	DQ13	Data bus	I/O
24	MA1	Address bus	I	51	DQ14	Data bus	I/O
25	MA2	Address bus	I	52	VSSQ	Ground	
26	MA3	Address bus	I	53	DQ15	Data bus	I/O
27	VDD	3.3V power supply		54	VSS	Ground	

3.5.9 Function introduction to FLASH

FLASH (U8) is a 16Mbit FLASH memory, and the damage of U8 may cause troubles, such as power not on, no disc reading and power on picture mosaic. Pin function is shown as the following table:

Pin	Name	Function	Voltage (when no disc)	Data direction
1-9、16-25、48	AO-A19	20 bit address bus		I
11	WE	Write enable signal, low level is effective	3.23V	I
12	RESET	Reset, low level is effective	3.23V	I
10、13、14	NC	Blank pin		
15	RY/BY	Ready/system busy	3.23V	O
26	CE	Chip enable, low level effective	0V	I
27、46	VSS	Ground		
28	OE	Output enable signal , low level is effective	0V	I
29-3、6、38-44	DQ0-DQ14	15 bit data bus		O
37	VCC	5V power supply	+5V	
45	DQ15/A-1	Take word extend mode as data line, and bit extend mode as address line		I/O
47	BYTE	Select 8-bit or 16-bit output mode. High level is 16-bit output and low level is 8-bit output		I

3.5.10 Function introduction to TL431

U603 (LM431A) is a 2.5V comparator, shown as the figure 3.4.12.1. Compared the inputted voltage of R end with 2.5V, when voltage of R end is more than 2.5V, KA end is on and photoelectric coupler starts to send out photocurrent; when voltage of R end is less than 2.5V, KA end is cutoff and photoelectric coupler does not send out photocurrent. CPU+3.3V in power board circuit must be kept in 3.3V, for the function of comparator. No matter more than or less than 3.3V, through on and off status of comparator, it will control the on state of the output end of photoelectric coupler TL431 to adjust the output space occupation ratio of switch module to control the output voltage of transformer and masthead the power.

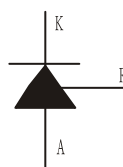


Figure 3.4.12.1 TL431 outside drawing

3.5.11 Function introduction to EL817

U602 (2501) is a photoelectric coupler, shown as the figure 3.4.13.1. The right side is a light emitting diode, which sends out light of different intensity according to the strength of voltage inputted from the right side, generates photocurrent of different intensity on the left side according to light of different intensity, and outputs from position D. The higher of the voltage inputted from the right side, the stronger of the light emitted from light emitting diode and the larger of the photocurrent produced from position D. The lower of the voltage inputted from the right side of photoelectric coupler, the weaker of the light emitted from light emitting diode and the weaker of the current outputted from position D.

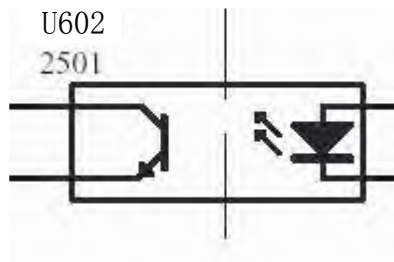


Figure 3.4.13.1 2501 outside drawing

Chapter Four

Disassembly and Assembly Process

DVD players manufactured in BBK are largely identical but with minor differences and are mainly composed of loader components, control panel components, decode and servo board components, power board components, power amplifier board components, MIC board components and AV board components. In order to speed up the compilation of “Service Manual”, we shall not give repeat explanation to model with minor differences in chapter four “Disassembly and Assembly Process” for the later compiled service manuals. For disassembly and assembly process in this chapter, please refer to chapter 4 of “DK1005S Service Manual” or “DK1020S Service” .

The pictures of this model are shown as follows:



Noted: DV310SI,DV312SI,DV110SI only have difference in the front panel,so we only use the pictures of DV110SI here.

Chapter Cinque

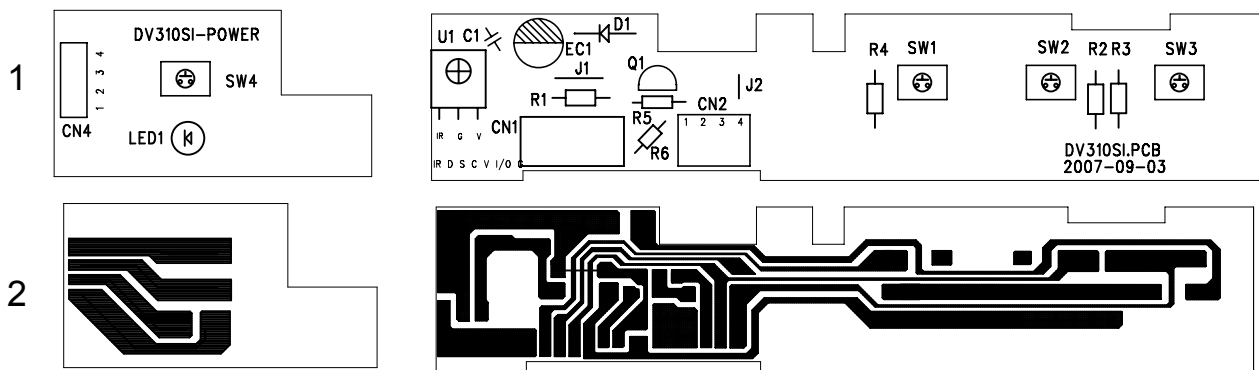
PCB board & Circuit diagram

Section One PCB board

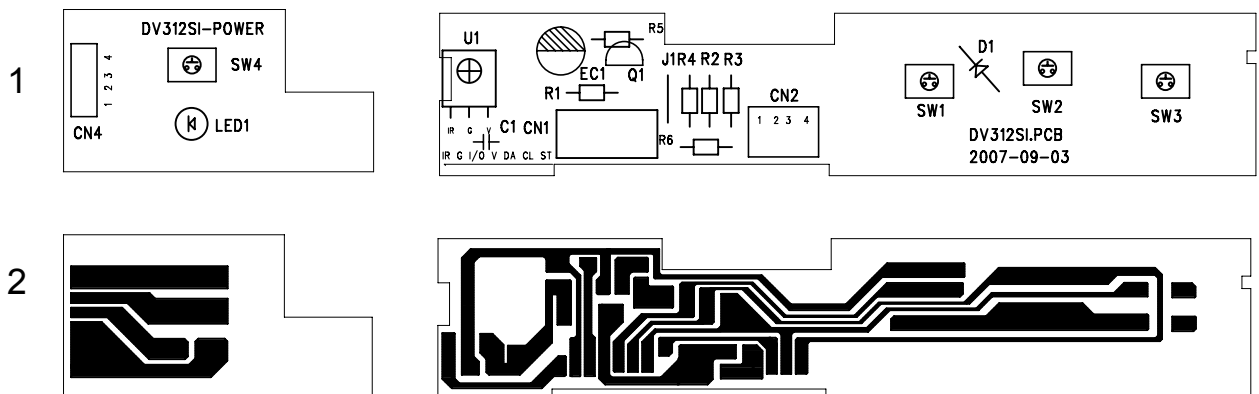
5.1.1 Surface layer of KEY SCAN Board

5.1.2 Bottom layer of KEY SCAN Board

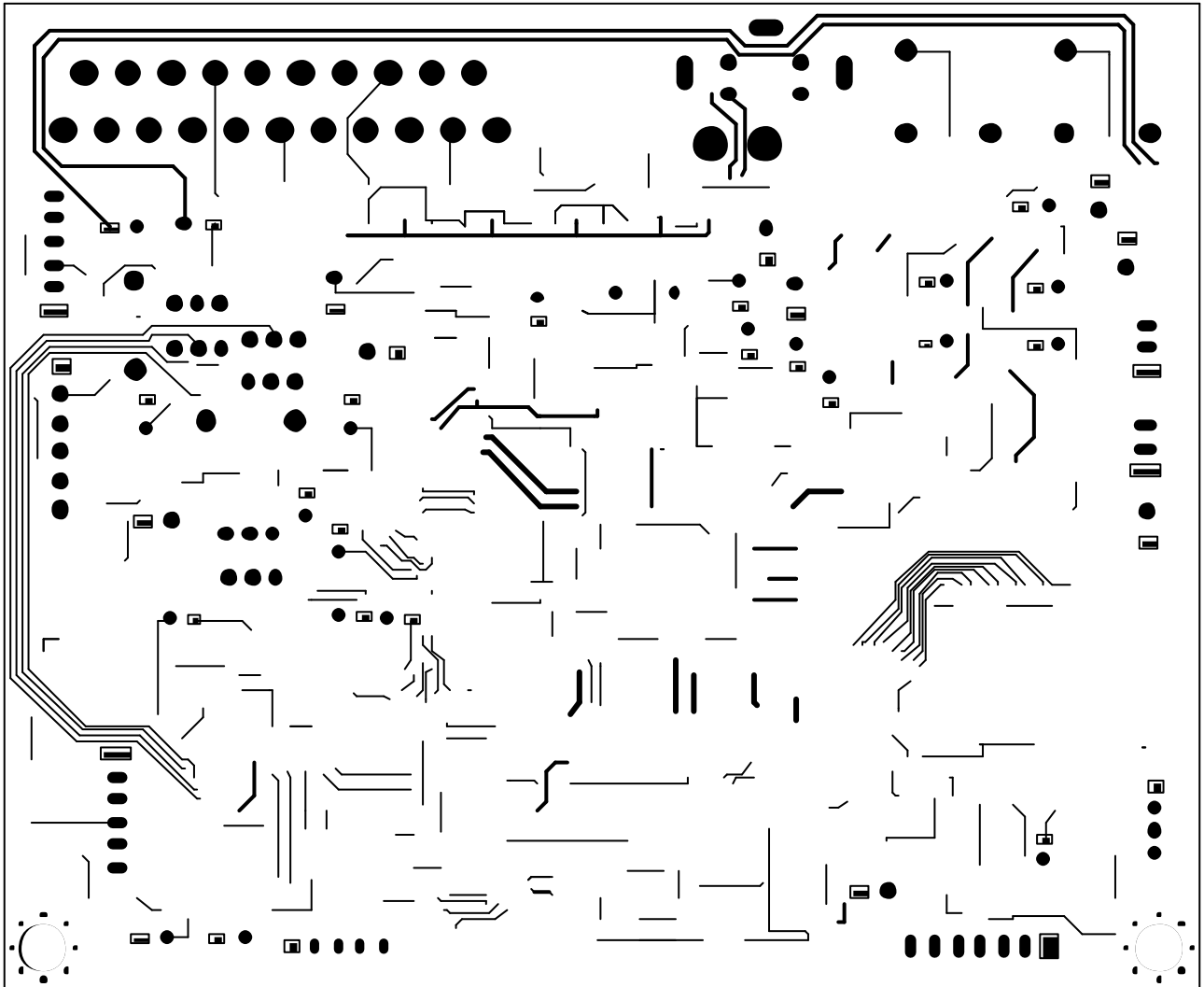
DV310SI



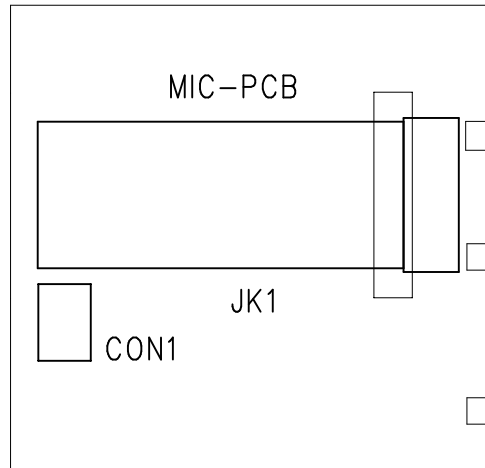
DV312SI



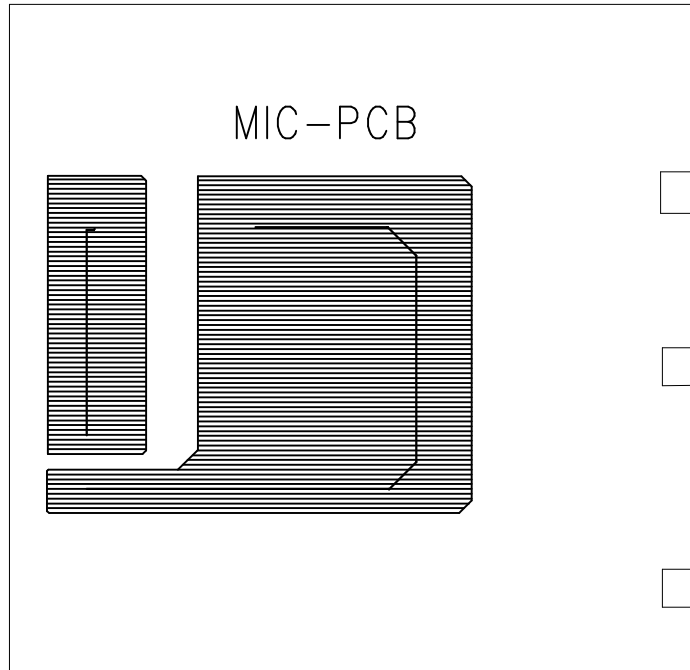
5.1.4 Bottom layer of DECODE&SERVO Board (CX2)



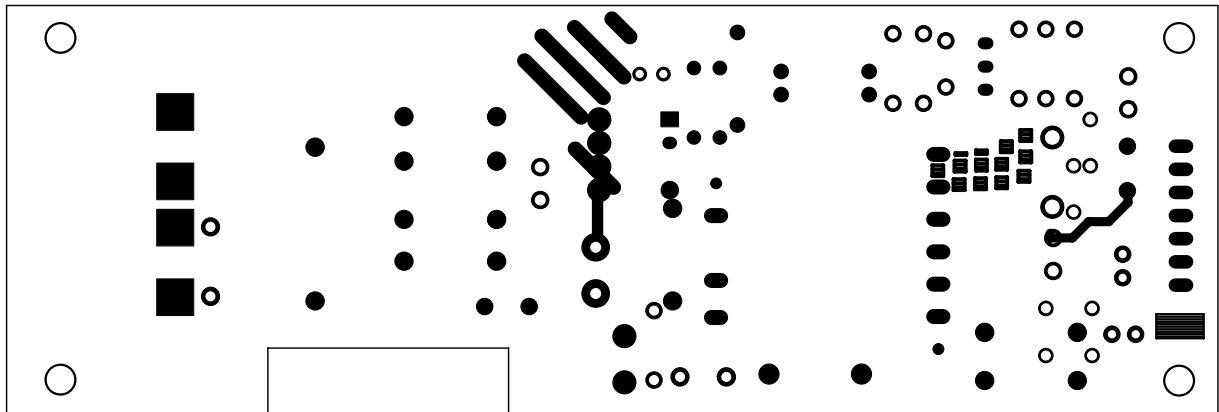
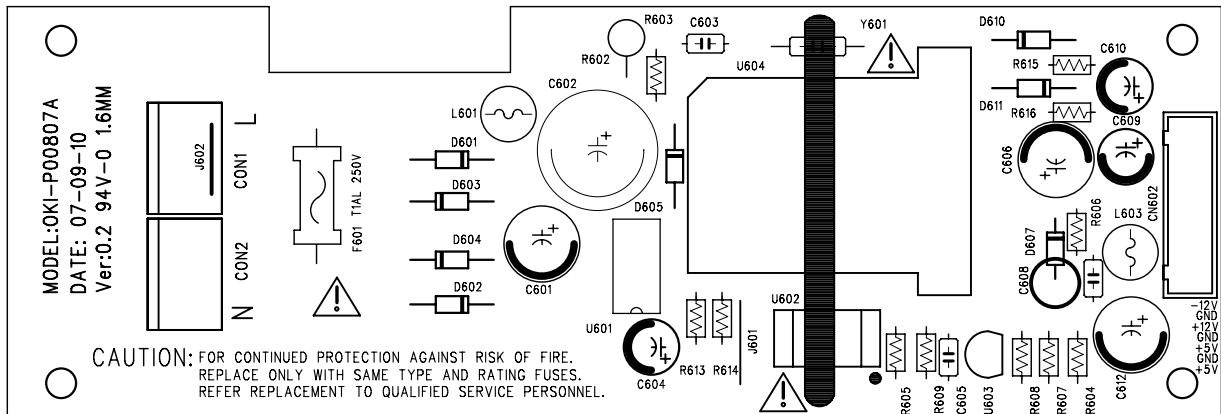
5.1.5 Surface layer of MIC Board



5.1.6 Bottom layer of MIC Board

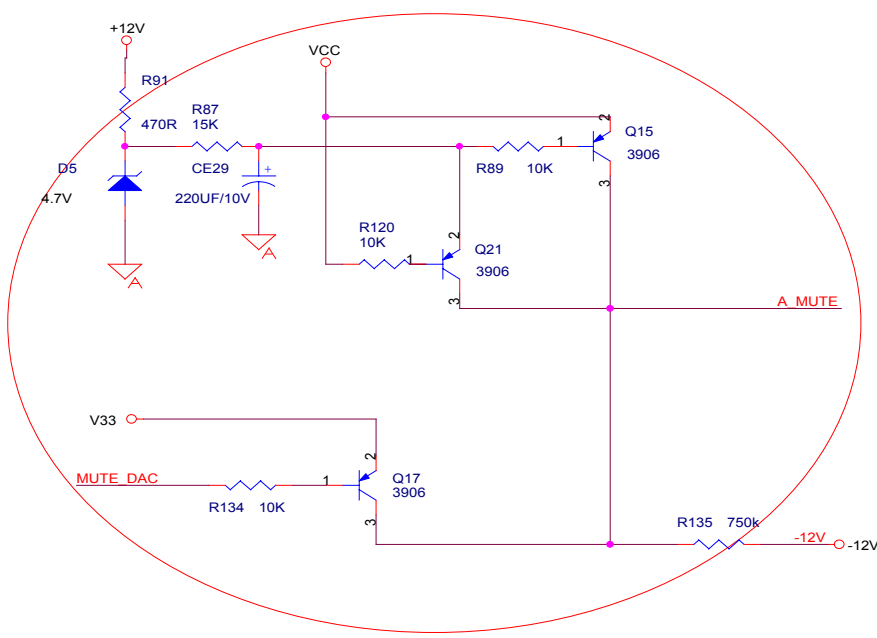
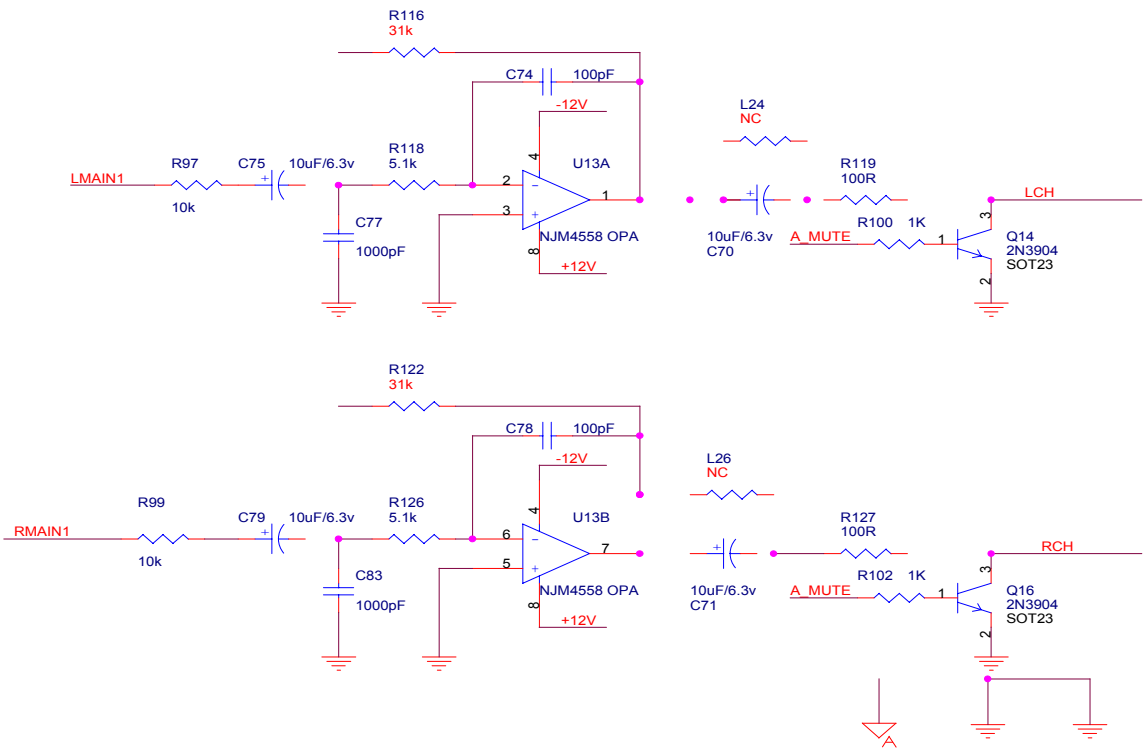


5.1.7 POWER Board

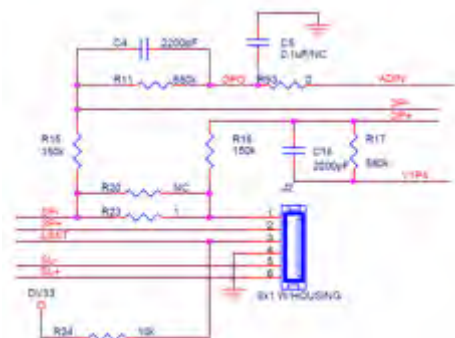
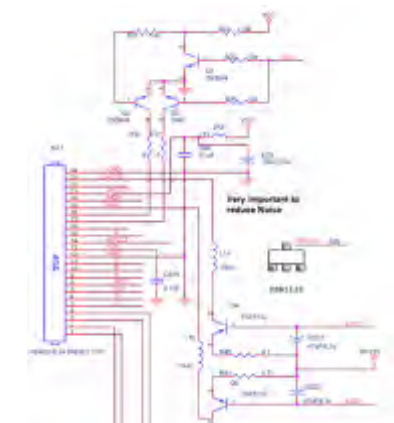
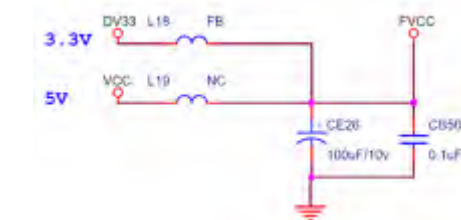
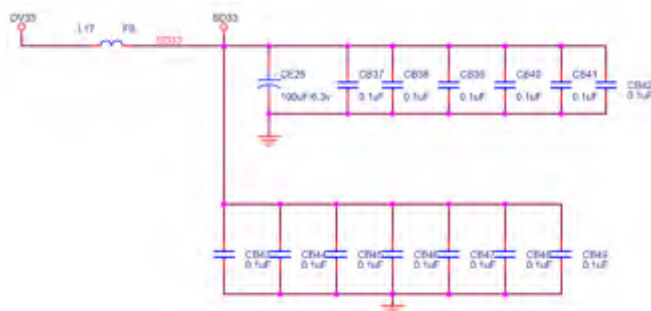
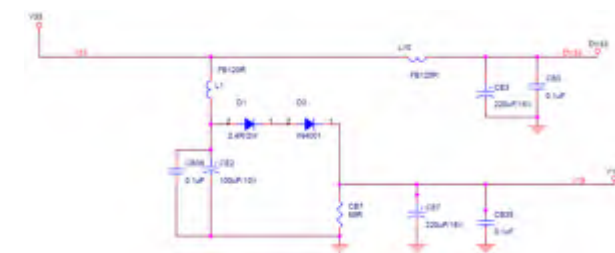
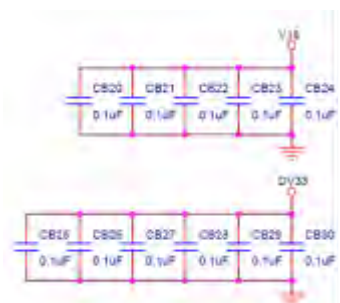
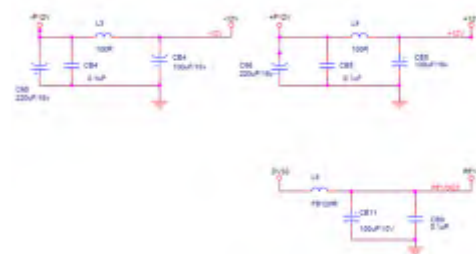
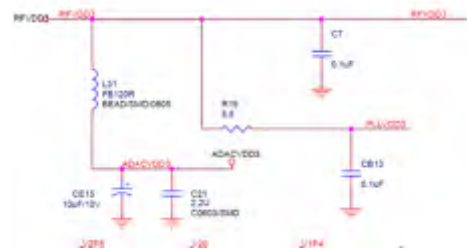
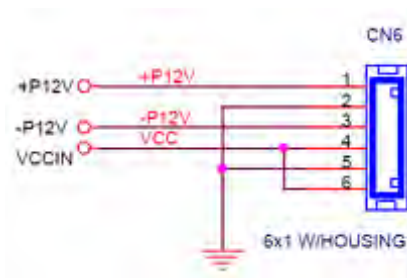
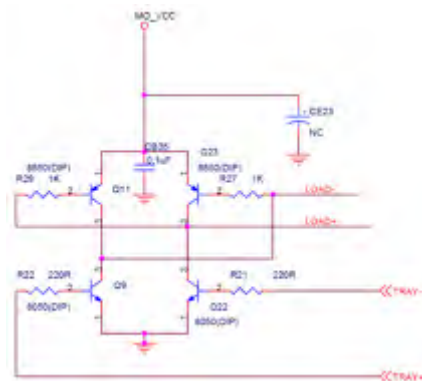


Section Two circuit diagram

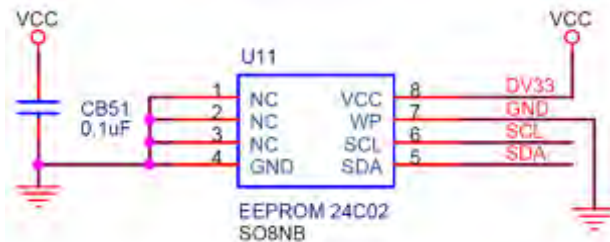
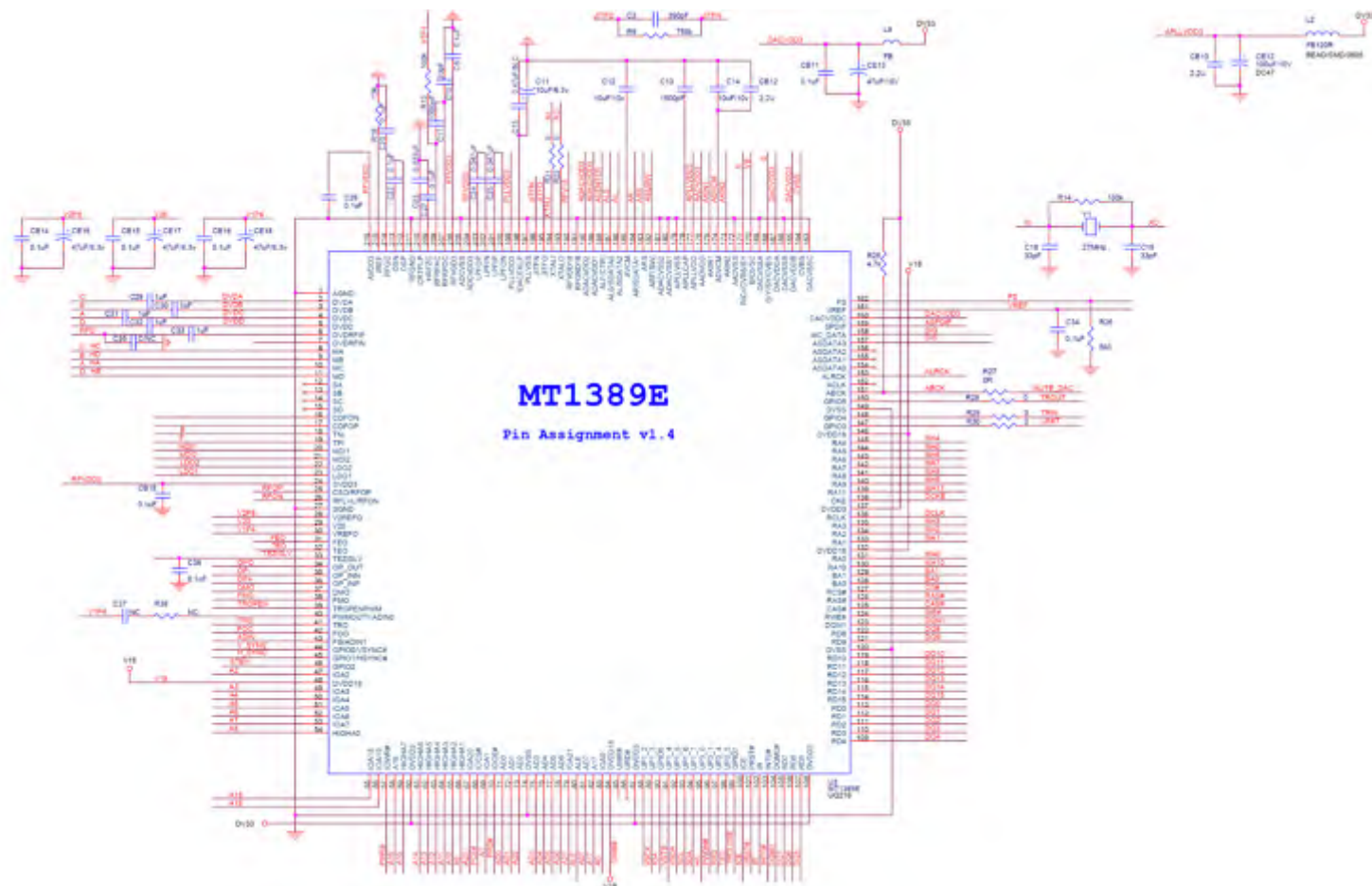
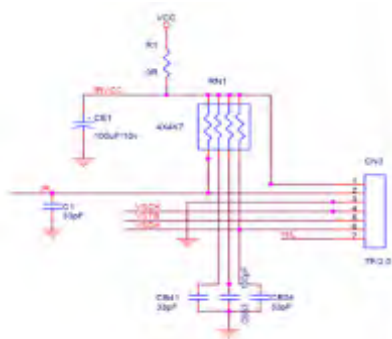
5.2.1 DECODE&SERVO Board 1



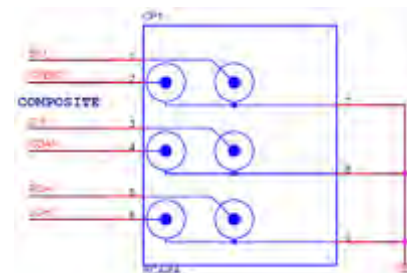
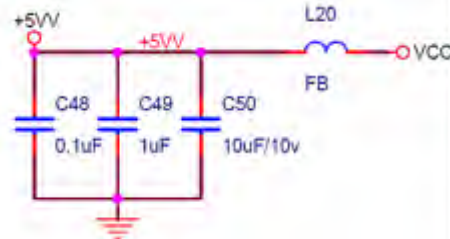
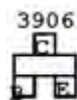
5.2.2 DECODE&SERVO Board 2



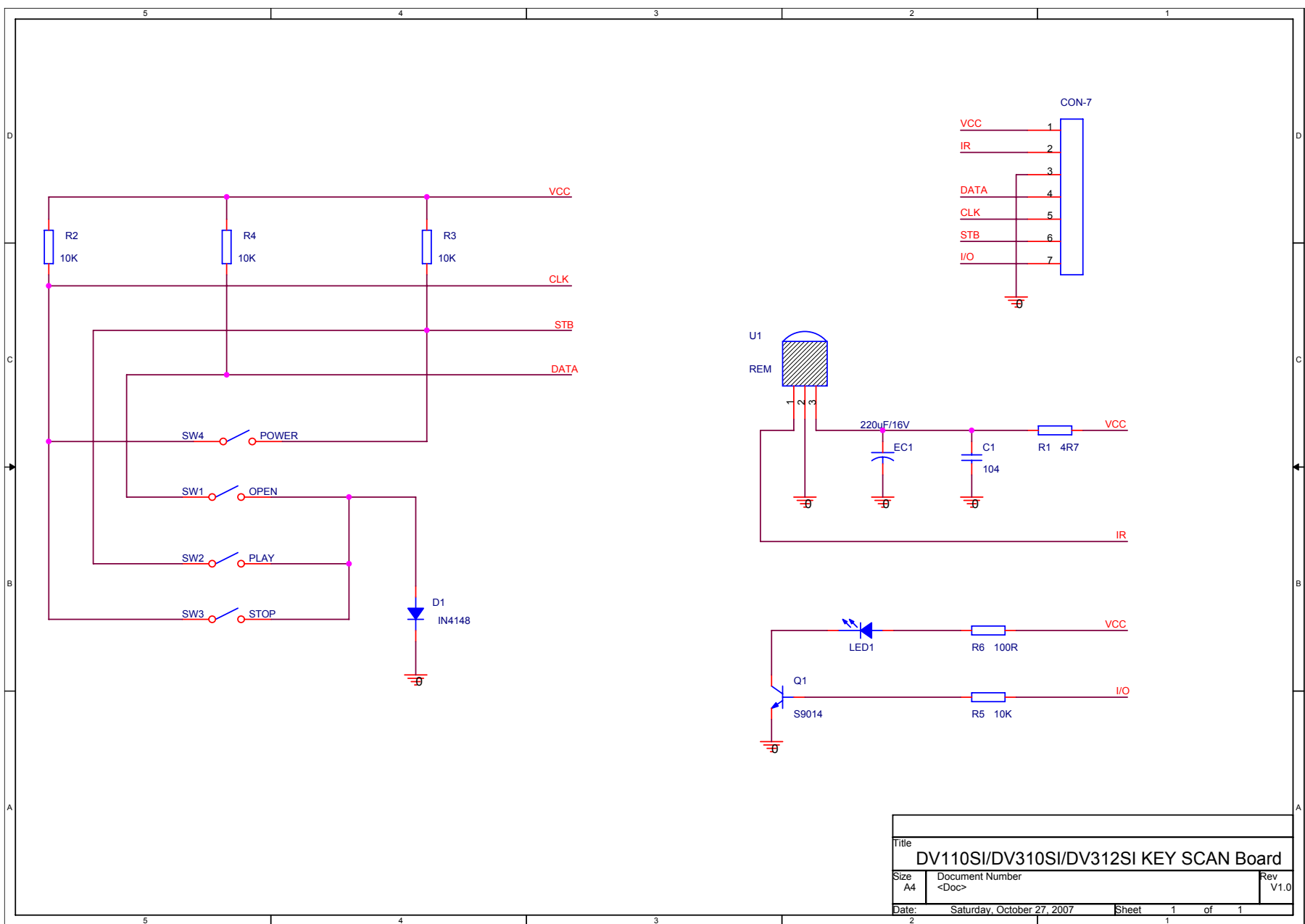
5.2.3 DECODE&SERVO Board 3



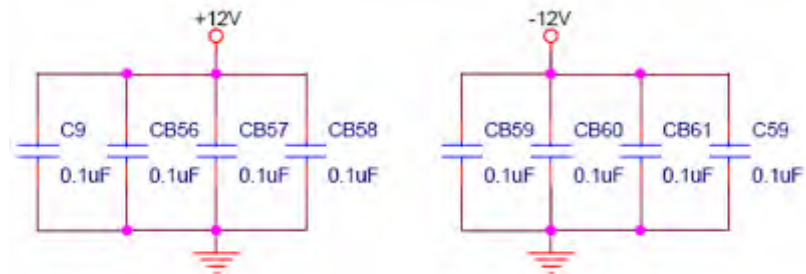
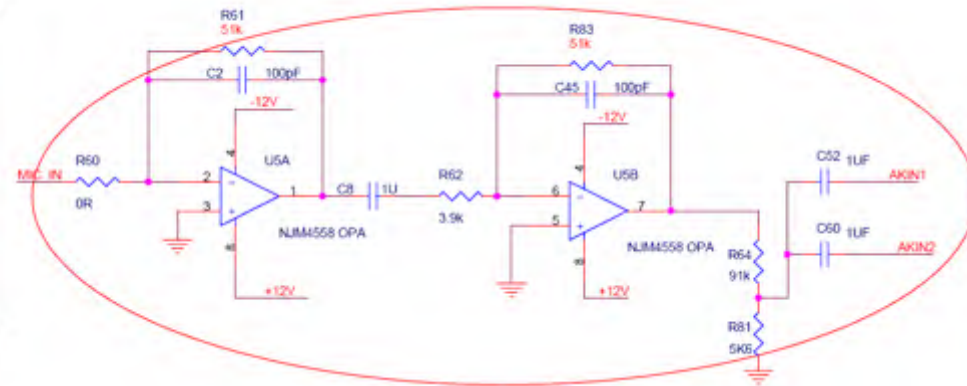
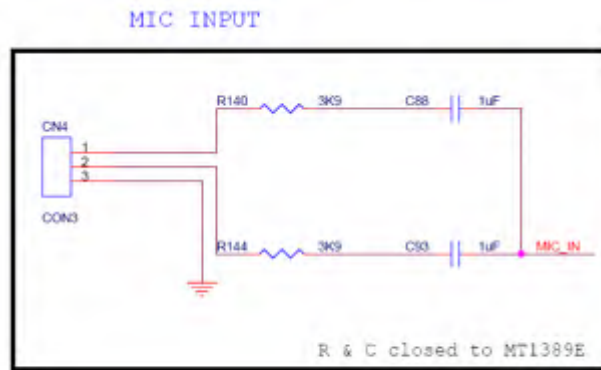
5.2.4 DECODE&SERVO Board 4



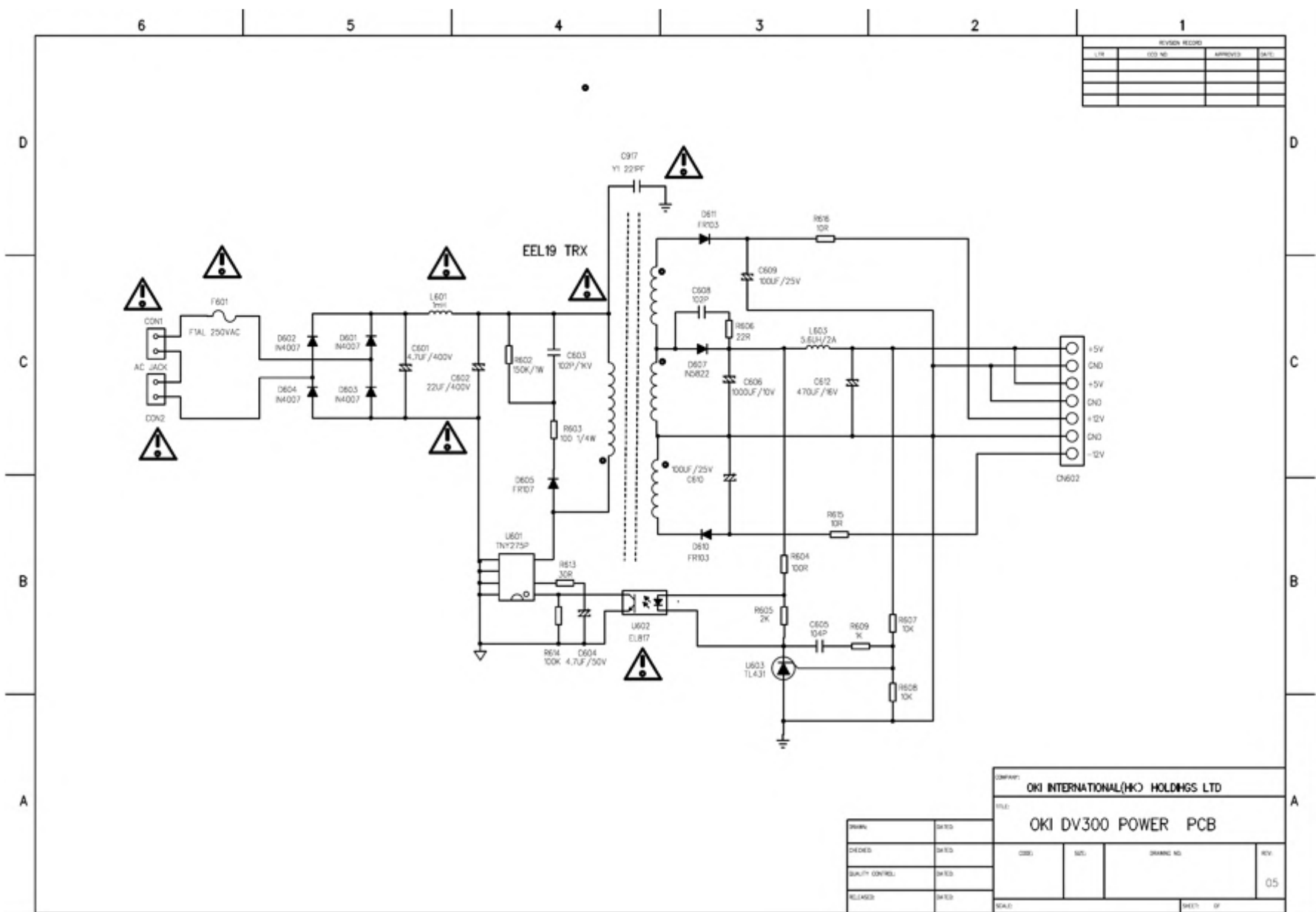
5.2.5 KEY SCAN Board



5.2.6 MIC Board



5.2.7 POWER Board



Chapter Six BOM List

1.DV310SI PANEL COMPONENTS

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
190-310S07-00	PCB	DV310SI-SMP LED	
190-0MIC16-70	PCB	DV310SI-MIC.PCB	
136-603386-1	RECEIVING HEAD	SM3386T	U1
130-004148-0	DIODE	1N4148(DIP)	D1
113-479405-12	CARBON FILM RESISTOR	1/4W 4.7Ω±5%	R1
113-221405-12	CARBON FILM RESISTOR	1/4W 220Ω±5%	R6
113-103805-12	CARBON FILM RESISTOR	1/8W 10KΩ±5%	R2,R3,R4,R5
127-227042-0	ELECTROLYTIC CAPACITOR	16V/220uf ±20% 6.3*7mm	EC1
123-104370-1	PORCELAIN CAPACITOR	50V/0.1uf +80/-20% Y5V	C1
147-001100-C	LIGHT TOUCH RESTORE SWITCH	6*6*5mm 180g	SW1,SW2,SW3,SW4
131-0S9014-0	TRANSISTOR	S9014	Q1
130-053007-3	LIGHT EMITTING DIODE	ROUND SHAPE, RED LIGHT	LED1
172-000040-00	EXTENSIO	L=4.0mm	J2
172-000060-00	EXTENSIO	L=6.0mm	J1
501-080802-21	SPONGE	8*8*2mm 8*8DOUBLE PLASTAIC	UNDER RECEIVER
161-3650B2-3	MIC-3P	JS CK6.35-18	JK1

2.DV310SI PLASTIC COMPONENTS OF FRONT PANEL

[illegible]

3.DV310SI CABLES COMPONENTS			
MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
191-078180-2A	FLAT CABLE	7PIN 2.0mm L=180mm	FRONT PANEL TO DECODER BOARD
191-048280-24	FLAT CABLE	4PIN 2.0mm L=280mm	FRONT PANEL
191-036200-51	FLAT CABLE	A/3PIN B/2PIN A2.0mm/B2.54mm L=120mm	MIC BOARD TO DECODER BOARD
191-053150-2E	FLAT CABLE	5PIN 2.0mm L=150mm	DVD LOADER TO DECODER BOARD
191-063130-21	FLAT CABLE	6PIN 2.0mm L=130mm	DVD LOADER TO DECODER BOARD
197-242000-0	FLAT CABLE	24PIN 0.55mm L=200mm	DVD LOADER TO DECODER BOARD
191-073400-3D	FLAT CABLE	A/7PIN B/6PIN 2.54mm L=400mm	POWER BOARD/CN602 TO DECODER BOARD
171-431120-4	POWER CABLE	(H03VVH2-F): L=1200MM+60MM	POWER SWITCH TO POWER BOARD
4.DV310SI HARDWARE COMPONENTS			
MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
303-310S03-00	BOTTOM COVER	DV310SI 320*43*200mm SFCC SILVER	
301-310S03-00	BACK PANEL	DV310SI 320*43mm SFCC SILVER	
302-310S03-00	TOP COVER	DV310SI 320*43*200mm SFCC SILVER	
315-310S24-0	METAL FRAME OF PANEL	DV310SI-FRONT PANEL	FRONT PANEL
368-301706-2	SELF-TAPPING SCREW	7PWB3*6	BOTTOM COVER/FRONT PANEL
358-300106-2	SELF-TAPPING SCREW	6BB3*6	TOP COVER
358-300106-2	SELF-TAPPING SCREW	6BB3*6	BACK COVER/BOTTOM COVER
367-301506-2	SELF-TAPPING SCREW	5KB3*6	TWO SIDES OF FRONT PANEL
358-300107-2	SELF-TAPPING SCREW	6BB3*7	LOADER
358-300113-2	SELF-TAPPING SCREW	BB3*13	POWER BOARD
358-300113-2	SELF-TAPPING SCREW	BB3*13	DECODER BOARD
364-300606-1	SELF-TAPPING SCREW	PB3*6	PCB BOARD OF FRONT PANEL
364-300606-1	SELF-TAPPING SCREW	PB3*6	MIC SOCKET
364-300606-1	SELF-TAPPING SCREW	PB3*6	METAL FRAME OF FRONT PANEL
368-301704-2	SELF-TAPPING SCREW	7PWB3*4	METAL FRAME OF FRONT PANEL
358-300108-1	SELF-TAPPING SCREW	6BB3*8	SCART BOARD
358-300108-1	SELF-TAPPING SCREW	6BB3*8	DECODER BOARD SOCKET
283-331108-0	PILLAR	D3.3*11*8 H=8MM	POWER BOARD
283-331108-0	PILLAR	D3.3*11*8 H=8MM	DECODER BOARD
530-110S00-0	INSULATION PAPER	PVC , 90*75*0.3	POWER BOARD
530-318S00-1	INSULATION PAPER	PVC,100*60*0.25	TOP COVER
281-088801-0	PLASTIC TIE	L=125MM , WIDTH=10MM	BACK COVER
280-100102-0	PLASTIC TIE	L=100MM , WIDTH=2MM	INSIDE CABLES
511-350402-12	RUBBER MAT	35*4*2.5MM	TOP SIDE OF LOADER FRAME
502-140040-11	SPRRONG CUSHION	EVA90 14*4MM	BOTTOM COVER
501-181106-11	SPRRONG CUSHION	EVA90 18*12*6MM	BOTTOM COVER
551-318S01-0	DOUBLE SIDE YELLOW PAPER		INSIDE CABLES

5. DV310SI MTK1389DE-EE DECODER BOARD COMPONENTS

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
821-051209-0	DECODER BOARD	HL MTK1389DE-EE	
013-000005-00	CHIP RESISTOR	1/16W 0Ω±5% 0402	R36,R37,R39,R60,R93,L18,R145
013-000005-10	CHIP RESISTOR	1/10W 0Ω±5% 0603	L5
013-000005-20	CHIP RESISTOR	1/8W 0Ω±5% 0805	R1
013-109005-10	CHIP RESISTOR	1/10W 1Ω±5% 0603	R23,L13
013-479005-10	CHIP RESISTOR	1/10W 4.7Ω±5% 0603	R40,R41.
013-689005-10	CHIP RESISTOR	1/10W 6.8Ω±5% 0603	R19
013-330005-00	CHIP RESISTOR	1/16W 33Ω±5% 0402	R8,R10,R63,
013-680005-00	CHIP RESISTOR	1/16W 68Ω±5% 0402	R73
013-750001-10	CHIP RESISTOR	1/10W 75Ω±1% 0603	R78,R79,R85,R90
013-910005-00	CHIP RESISTOR	1/16W 91Ω±5% 0402	R72
013-101005-00	CHIP RESISTOR	1/16W 100Ω±5% 0402	R7,R71,R119,R127
013-101005-10	CHIP RESISTOR	1/10W 100Ω±5% 0603	L3,L4
013-471005-00	CHIP RESISTOR	1/16W 470Ω±5% 0402	R30,R56,R91
013-561001-10	CHIP RESISTOR	1/10W 560Ω±1% 0603	R26
013-102005-00	CHIP RESISTOR	1/16W 1KΩ±5% 0402	R34,R65,R67,R100,R102
013-392005-00	CHIP RESISTOR	1/16W 3.9KΩ±5% 0402	R62 ,R140,R144
013-472005-00	CHIP RESISTOR	1/16W 4.7KΩ±5% 0402	R24,R50,R54
013-512005-00	CHIP RESISTOR	1/16W 5.1KΩ±5% 0402	R118,R126
013-562005-00	CHIP RESISTOR	1/16W 5.6KΩ±5% 0402	R4,R81
013-103005-00	CHIP RESISTOR	1/16W 10KΩ±5% 0402	R3,R6,R28,R31,R32,R33,R35,R49, R57,R58,R68,R70,R89,R120,R134 R53
013-113005-00	CHIP RESISTOR	1/16W 11KΩ±5% 0402	R97,R99
013-123005-00	CHIP RESISTOR	1/16W 12KΩ±5% 0402	R2
013-133005-00	CHIP RESISTOR	1/16W 13KΩ±5% 0402	R5
013-153005-00	CHIP RESISTOR	1/16W 15KΩ±5% 0402	R18,R48,R87
013-203005-00	CHIP RESISTOR	1/16W 20KΩ±5% 0402	R20,
013-273005-00	CHIP RESISTOR	1/16W 27KΩ±5% 0402	R46 R47
013-303005-00	CHIP RESISTOR	1/16W 30KΩ±5% 0402	R116,R122
013-513005-00	CHIP RESISTOR	1/16W 51KΩ±5% 0402	R61,R83
013-913005-00	CHIP RESISTOR	1/16W 91KΩ±5% 0402	R64
013-104005-00	CHIP RESISTOR	1/16W 100KΩ±5% 0402	R13,R14
013-154005-00	CHIP RESISTOR	1/16W 150KΩ±5% 0402	R15,R16
013-684005-00	CHIP RESISTOR	1/16W 680KΩ±5% 0402	R11,R17
013-754005-00	CHIP RESISTOR	1/16W 750KΩ±5% 0402	R9,R135
017-472115-10	CHIP RESISTOR	1/10W 4*4.7KΩ±5% 0603	RN1
023-200041-00	CHIP CAPACITOR	16V 20pF±10% 0402	C10
023-330041-00	CHIP CAPACITOR	16V 33pF±10% 0402	C18,C19
023-101041-00	CHIP CAPACITOR	16V 100pF±10% 0402	C1,C2,C45,C48,C49,C50,C53,C54, C55,C56,C57,CB58,C61,C67,C68,C B72,C73,C74,C76,C78,CB80,C81,C 82,C84,C85,C86,CB41,CB53,CB54, C120
023-331041-00	CHIP CAPACITOR	16V 330pF±10% 0402	C39.C40.
023-391041-00	CHIP CAPACITOR	16V 390pF±10% 0402	C3
023-102041-00	CHIP CAPACITOR	16V 1000pF±10% 0402	C17,C77,C83
023-152041-00	CHIP CAPACITOR	16V 1500pF±10% 0402	C13
023-222041-00	CHIP CAPACITOR	16V 2200pF±10% 0402	C4,C16
023-153041-00	CHIP CAPACITOR	16V 15nF±10% 0402	C42
023-333041-00	CHIP CAPACITOR	16V 33nF±10% 0402	C23
023-473041-00	CHIP CAPACITOR	16V 47nF±10% 0402	C24,C25

[illegible]

6. DV310SI LOADER COMPONENTS

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
820-010401-00	DVD LOADER	SANYO SF-HD65	
	DVD LOADER FRAME	ASA-8106-B01	
	SP MOTOR	RF-300F-12350W D/V5.9	
	SL MOTOR	RF-300EA-1D390 D/V5.9	
	O/C MOTOR	RF-300F-11440Z D/V5.9	

7. DV310SI POWER BOARD COMPONENTS

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
832-803A10-0	POWER BOARD	OKI-P00803A(H1)	
133-00817B-0	IC	EL817B	U602
133-0AZ431-0	IC	TL431A TO-92	U603
133-0275PN-0	IC	PWM IC PI TNY275PN	U601
130-004007-0	DIODE	1N4007 VRRM=1000V IF=1.0A	D601,D602,D603,D604
130-000104-0	DIODE	FR104 VRRM=400V IF=1.0A	D610,D611
130-000107-0	DIODE	FR104 VRRM=1000V IF=1.0A	D605
130-005822-0	DIODE	IN5822 VRRM=40V IF=3.0A	D607
182-321000-1	FUSE	32S 250V 1A UL Φ3.6*10mm	F601
123-102150-0	PORCELAIN CAPACITOR	100V/1000pF ±10%	C608
123-104370-0	PORCELAIN CAPACITOR	50V/0.1UF +80%-20%	C605
123-102660-0	PORCELAIN CAPACITOR	1000V/1000pF	C603
123-221451-0	Y CAPACITOR	400V/220pF	Y601
127-477042-0	ELECTROLYTIC CAPACITOR	16V/470uF ±20% 105°C (8*12)	C612
127-107052-1	ELECTROLYTIC CAPACITOR	25V/100uF ±20% 105°C (6*12)	C609,C610
127-106052-1	ELECTROLYTIC CAPACITOR	25V/10uF ±20% 105°C (5*11)	C604
127-226402-1	ELECTROLYTIC CAPACITOR	400V/22uF ±20% 105°C (13*22)	C602
127-475402-0	ELECTROLYTIC CAPACITOR	400V/4.7uF ±20% 105°C (8*12)	C601
127-108032-1	ELECTROLYTIC CAPACITOR	10V/1000uF ±20% 105°C (8*14)	C606
113-101405-10	CARBON FILM RESISTOR	1/4W 100 ±5	R603
113-220405-10	CARBON FILM RESISTOR	1/4W 22 ±5	R606
113-102805-10	CARBON FILM RESISTOR	1/8W 1k ±5	R609
113-202805-10	CARBON FILM RESISTOR	1/8W 2k ±5	R605
113-101805-10	CARBON FILM RESISTOR	1/8W 100 ±5	R604
113-154A05-10	CARBON FILM RESISTOR	1W 150k ±5	R602
113-300805-10	CARBON FILM RESISTOR	1/8W 30 ±5	R613
113-104805-10	CARBON FILM RESISTOR	1/8W 10k ±1	R614
113-103801-10	Metal FILM RESISTOR	1/8W 100k ±5	R607,R608
113-100405-10	CARBON FILM RESISTOR	1/4W 10 ±5	R615
172-000050-00	METAL PIN	5mm*0.5mm	R616
105-102101-1	INDUCER	1mH/1A ±10%(6*8)	L601
105-569101-1	INDUCER	5.6uH/2A ±10%(6*8)	L603
101-19EL19-11	TRANSFORMER	OKI-P00803A EEL19 (HC2791-298)	T601
160-007300-0	SOCKET	7PIN PH=2.5mm (XH-7P 180°)	CN602
160-103420-1	SOCKET	2PIN PH=7.5mm (3.96-3P 180°)	CON2
172-010075-00	METAL PIN	7.5*0.6mm	CON1
190-803A01-01	PCB	OKI-P00803A 131*45*1.6MM	
333-0PCB01-0	METAL FILM	4*8mm	J601
172-010070-00	METAL PIN	7*0.6mm	J601
172-000050-00	METAL PIN	10*0.3mm	
R516-204030-0	HEAT-SHRINKING TUBE	30*4mm (UL:E214175 K-2(+))	F601

8. DV310SI PACKAGE MATERIAL			
MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
802-310S01-0	PACKAGE MATERIAL	DV310SI	
554-2BBKOK-0	DVD KARAOKE DISC	BBK DVD KARAOKE	
619-566112-1	RCA LINE	YELLOW L=1200mm	VEDIO OUT
619-566112-2	RCA LINE	RED/WHITE L=1200mm	AUDIO R/L OUT
828-390018-0	REMOTE CONTROL	RC026-01R	
617-3R0315-3	BATTERY	Zn/Mn02 GP03R 1.5V AAA	REMOTE CONTROL
630-310S01-07	MANUAL	DV318SI	
631-310S49-00	WARRANTY	DV318SI	
643-110877-07	SERIAL NO. STICKERS	50*10mm	GIFT BOX
643-210877-07	SERIAL NO. STICKERS	32*10mm	BACK PANEL
643-410877-07	SERIAL NO. STICKERS	50*10mm	SHOPPING BOX
643-310877-07	SERIAL NO. STICKERS	24*5mm	WARRANTY
643-510877-07	SERIAL NO. STICKERS	25*8mm	DVD LOADER FRAME
650-310S01-0	MIC_HEADPHONE PAPER	DV318SI	
648-310S07-0	STICKER_RIGHT	DV318SI	UPPER COVER
648-310S27-0	MPEG_4 STICKERS	DV318SI	FRONT BOARD
633-310S02-0	CIS SERVICE	DV318SI	
648-310S28-0	UNIT VERSION No.	15*6mm SI07.02	GIFT BOX/BACK PANEL
648-807A28-0	POWER BOARD VERSION No.	10*6mm V6.0	POWER BOARD
648-MPEG28-4	DECODER BOARD VERSION No.	10*6mm V4.1	DECODER BOARD
648-FRON28-6	FRONT BOARD VERSION No.	10*6mm V5.1	FRONT BOARD
648-0MIC28-4	MIC BOARD VERSION No.	10*6mm V3.1	MIC BOARD
648-LEAR02-6	OPEN-PREVENTATION STICKER	25*10mm	UPPER COVER AND BACK PANEL
600-100101-00	POLYFOAM-L	DV318SI-L	
600-100102-00	POLYFOAM-R	DV318SI-R	
600-100104-00	POLYFOAM-MIDDLE	DV318SI-MIDDLE	
607-0BOX01-0	GIFT BOX HANDEL	DV318SI	GIFT BOX
602-310S01-07	GIFT BOX	DV318SI 375*105*297mm	
604-310S01-07	SHIPPING BOX	DV318SI 860*385*312mm	
601-310S01-07	PE BAG	400*400mm 0.004mm	DVD UNIT
601-310S02-07	PE BAG	185*278mm 0.004mm	MANUAL
601-082740-01	PE BAG	80*270*0.004mm	REMOTE CONTROL
601-072240-01	PE BAG	70*220*0.004mm	AUDIO/VIDEO CABLE

7.1.1 PCB composition figure of the player

PCB board block diagram of the player is show as in the following figure 7.1.1.1:

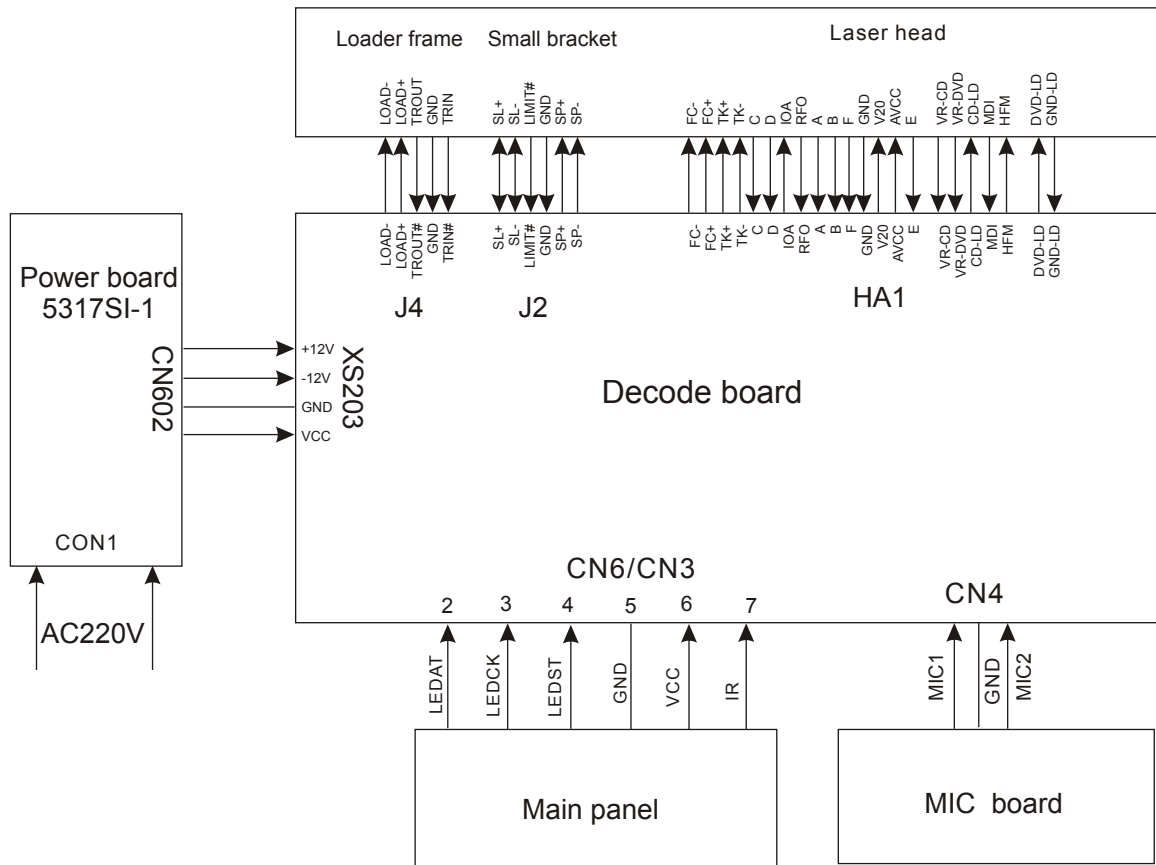


Figure 7.1.1.1 PCB board block diagram of the player

7.2.1 Panel control circuit

Panel control circuit block diagram is shown in the figure 7.2.1.1:

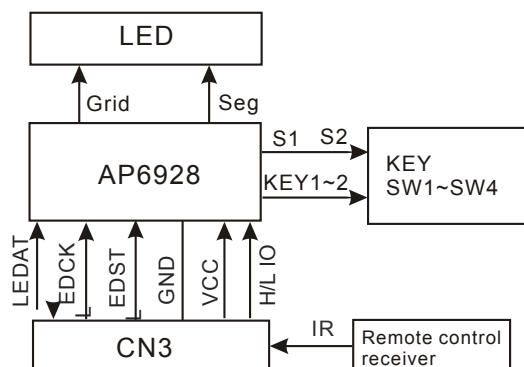


Figure 7.2.1.1 Control panel circuit block diagram

2. Working principle

Button function realization: when users are operating the machine, button matrix circuit will produce a button function code that transmits to the main CPU inside decode chip, CPU performs the corresponding switch to the function module inside system, and a signal produces at the same time to control OSD and panel display and makes the relevant display.

Panel display drive: when serial data signals sent from decode chip is transmitting to panel IC (PT6961), IC performs LED drive according to information sent from decode, and displays the corresponding content (controlled by software).

3. Definition and function of main jacks of panel

XS401 is connected to decode board, and the jack that communicates with decode system, in which IR is remote control signal output pin, +5V is panel power supply.

LEDAT is data transmission pin (dual direction) and controlled through LEDST, LEDCK is working clock signal input displayed by panel.

Main trouble of panel: button has no function, function disorder, LED display is abnormal, no remote control, etc.

7.2.2 MIC circuit

MIC (6DV123SI-0) circuit block diagram is shown in the figure 7.2.2.1:

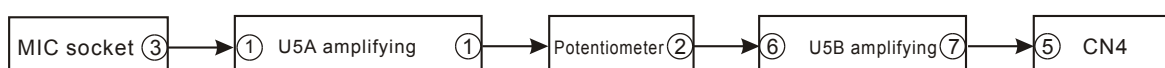
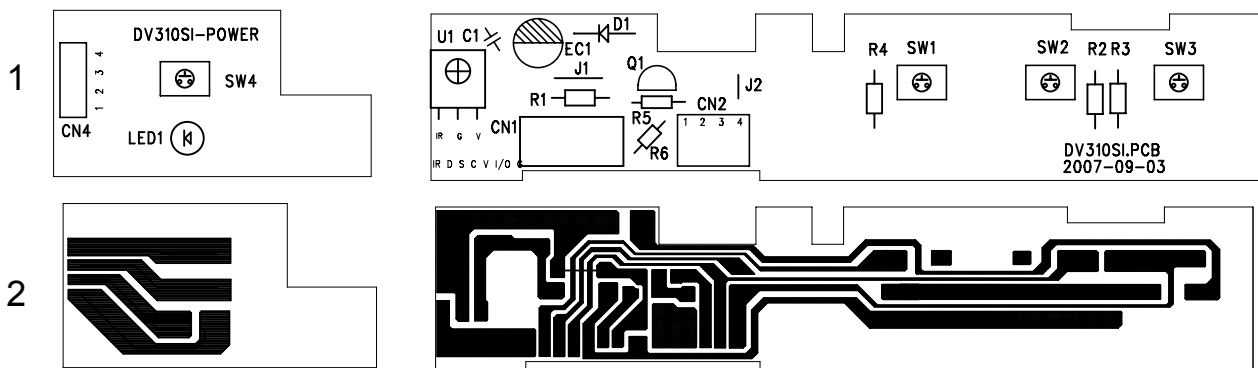


Figure 7.2.2.1 MIC circuit block diagram

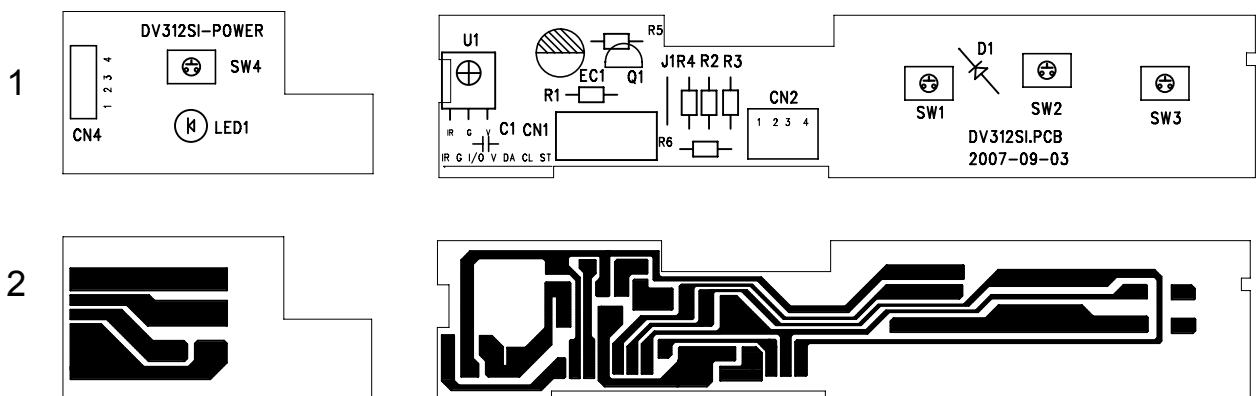
7.3.1 PCB board

1. Surface layer of KEY SCAN Board
2. Bottom layer of KEY SCAN Board

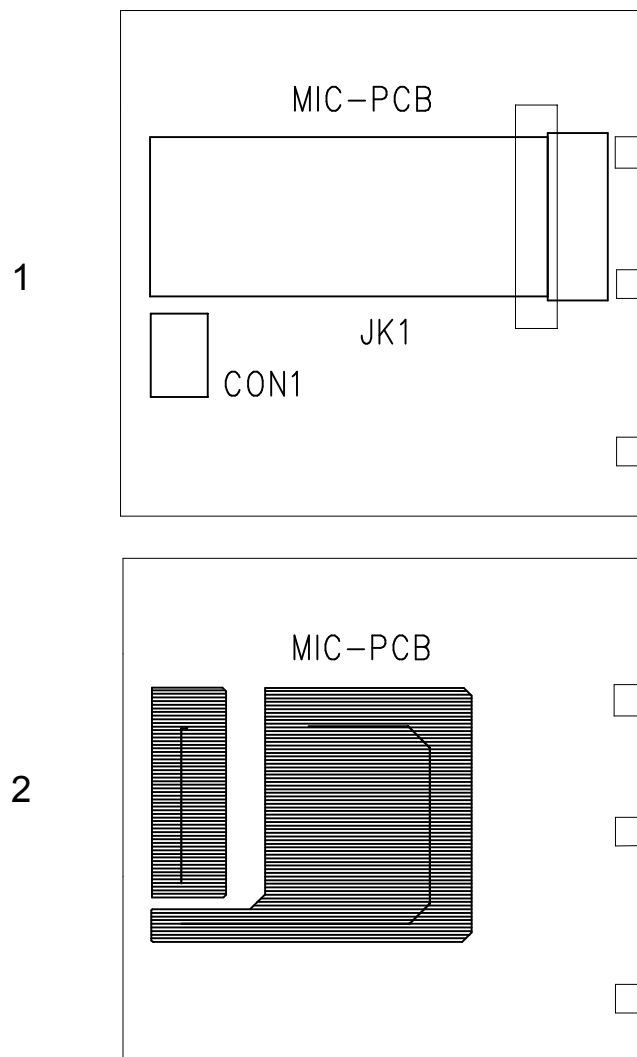
DV310SI



DV312SI

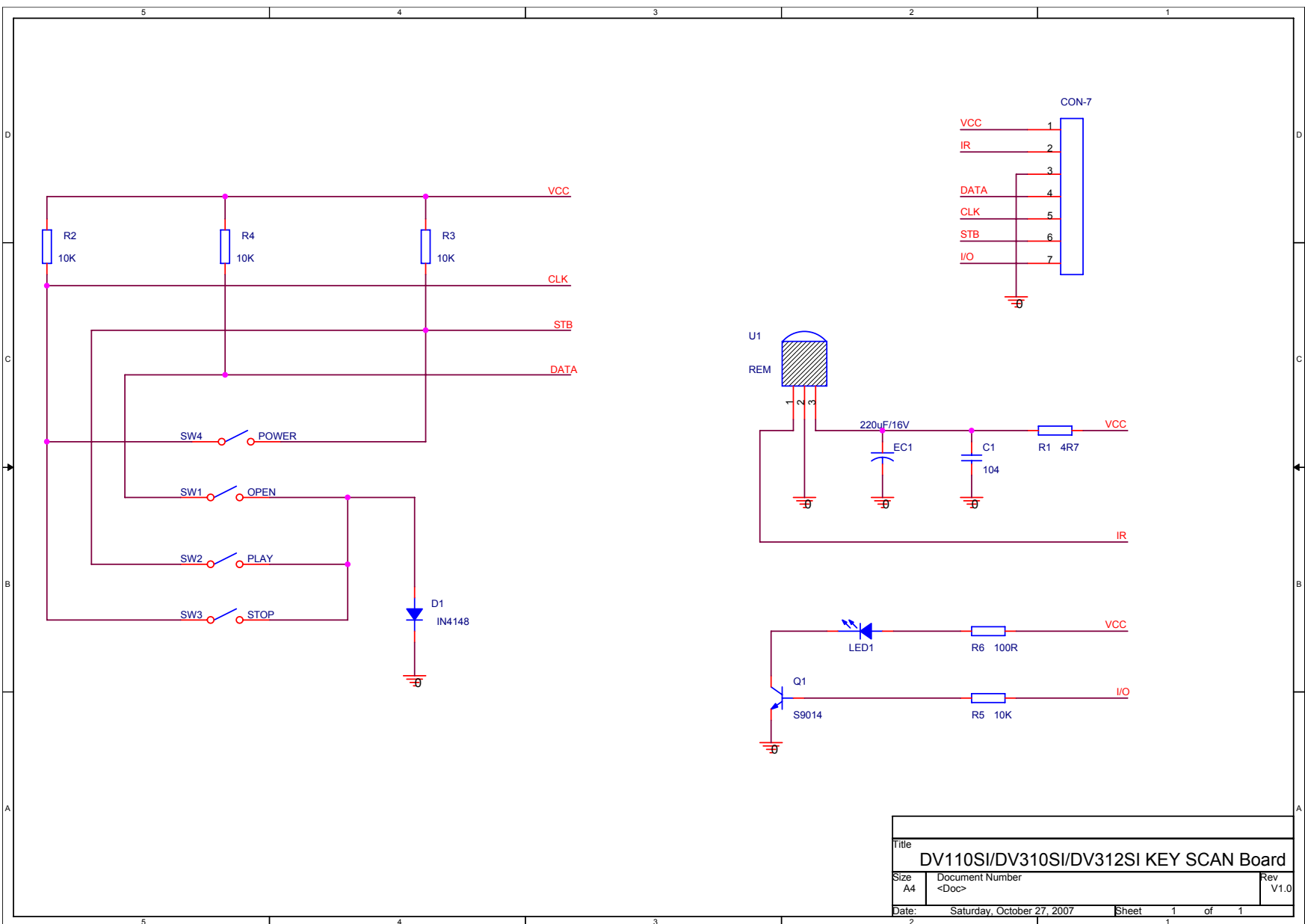


1. Surface layer of KEY MIC Board
2. Bottom layer of KEY MIC Board



7.3.2 circuit diagram

1.KEY SCAN Board



MIC INPUT

