

DV115SI

Service manual

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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.

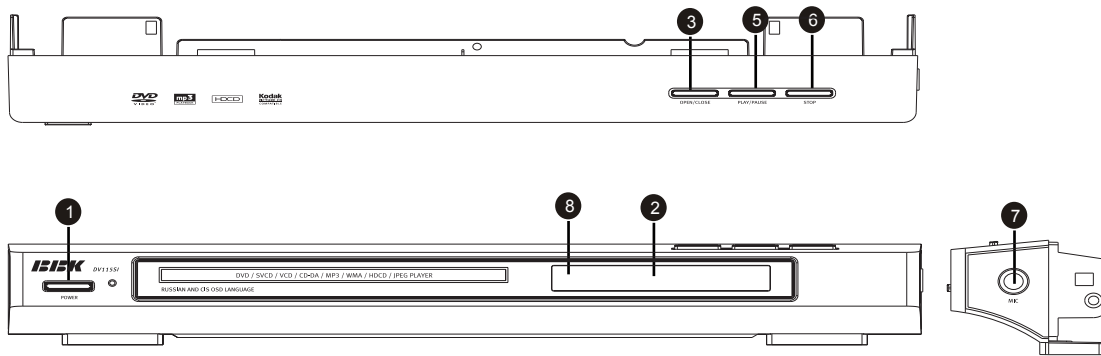
- ◆ "Memory" function enables to save the last point after stop playback.
- ◆ "Q-play" function provides direct playback and allows to skip commercial that is not possible to rewind.

- ◆ "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

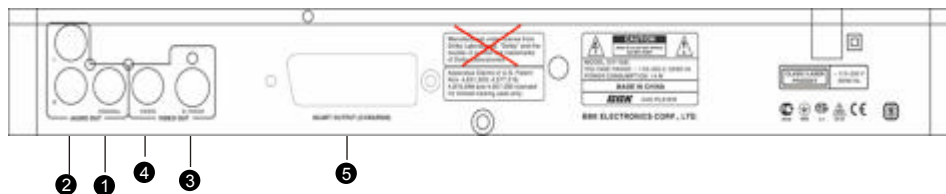
2.2.1 Front Panel Illustration



2.2.4 Remote Control Illustration

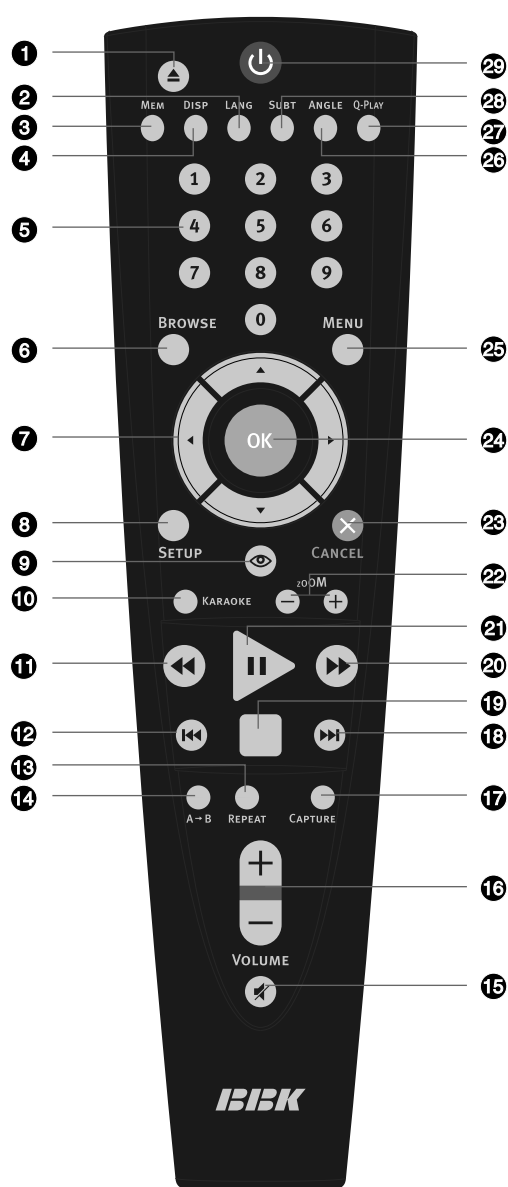
- | | | |
|---------------------|---------------------|--------------------|
| ① POWER switch | ④ Display window* | ⑦ MIC jack |
| ② Disc tray | ⑤ PLAY/PAUSE button | ⑧ IR sensor button |
| ③ OPEN/CLOSE button | ⑥ STOP button | |

2.2.2 Rear Panel Illustration



- | | |
|----------------------------------|------------------|
| ① Digital Audio Coaxial Out jack | ⑤ SCART Out jack |
| ② 2CH Audio Outjacks | 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

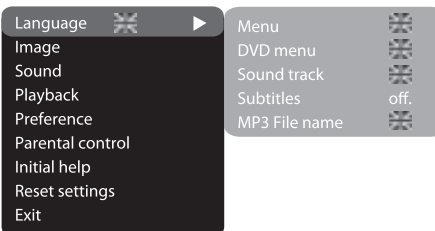
AUDIO/VIDEO CORD	1PCS
REMOTE	1PCS
AAA SIZE BATTERIES	2PCS
WARRANTY CARD	1PCS
USER MANUAL	1PCS
KARAOKE DISC	1PCS

FUNCTION SETTINGS

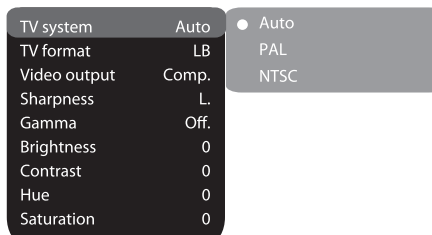
Function selection and change

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.



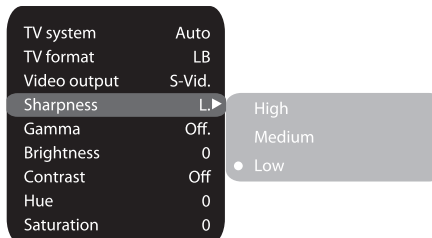
1. For example, if you wish to change the image settings, you have to select the Image item and press the OK.



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, Lithuanian, Kazakh, Romanian, Belarusian, Ukrainian, Chinese.
- Default: English.

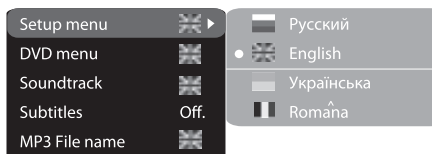
- Selection of other languages: select the OTHERS item using the UP and DOWN buttons and press OK. Enter the language code using the numeric buttons and press OK.
- If the language you selected is not recorded on the DVD disc, another available language will be used.

4. Subtitles: selection of subtitles language

- Options: Off, Russian, English, Estonian, Lithuanian, 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 disc, another available language will be displayed.

5. MP3 File name: selection of MP3 File name language

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



FUNCTION SETTINGS

Image settings menu

1. TV system: TV system selection

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

2. TV Format: image ratio settings

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

3. Video output: selection of video signal

- Options: S-Video, SCART.
- Default option: S-Video.

4. Sharpness: image sharpness adjustment

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

5. Gamma: adjustment of image color temperature

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

6. Brightness: adjustment of image brightness

7. Contrast: adjustment of image contrast

8. Hues: adjustment of image hues

9. 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	PAL
TV format	LB
Video output	S-Vid.
Sharpness	L
Gamma	Off
Brightness	0
Contrast	0
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. 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.

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

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

FUNCTION SETTINGS

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: All types.

4. Repeat: file repeat mode

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

5. Shuffle: This item is used to set on/off random playing.

- Optional setting: Off, Single, All.
- Default option: Off.

6. 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.



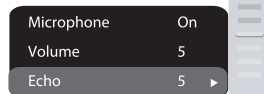
2. Volume:

- 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.



Preference settings

1. Gr. Equalizer: spectrum analyzer

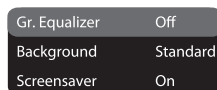
- Options: On, Off.
- Default option: Off.

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.



FUNCTION SETTINGS

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.

Allowed Any

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

Ok Cancel

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

Ok Cancel

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 help

Reset settings

Exit

MISCELLANEOUS

Specifications

Supported formats	DVD-Video, Super VCD, VCD, CD-DA, CD+G, HDCD, OGG, 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.
	Video outputs:	S-Video output, composite output, RGB/SCART output.	
Video characteristics	Signal swing of composite video output: Signal swing of S-Video output:	1.0Vp-p (75 Ω) 1.0Vp-p (75 Ω), C:0.286Vp-p (75 Ω)	
Audio characteristics	Frequency: Signal-to-noise ration: Total nonlinear distortions:	20 - 20000 Hz (±1 dB) >100 dB <0.01%	
Voltage range	~ 110 - 250 V, 50/60 Hz		
Power consumption	14 W		
Temperature requirement	5 - 35 °C		
Moisture requirement	15 - 75% (not condensate)		
Dimensions	DV111SI DV110SI, DV112SI, DV113SI DV115SI	360x210x41 mm 320x224x41 mm 350x210x41 mm	
Weight	DV111SI DV110SI, DV112SI, DV113SI, DV115SI	1.6 kg 1.7 kg	

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:

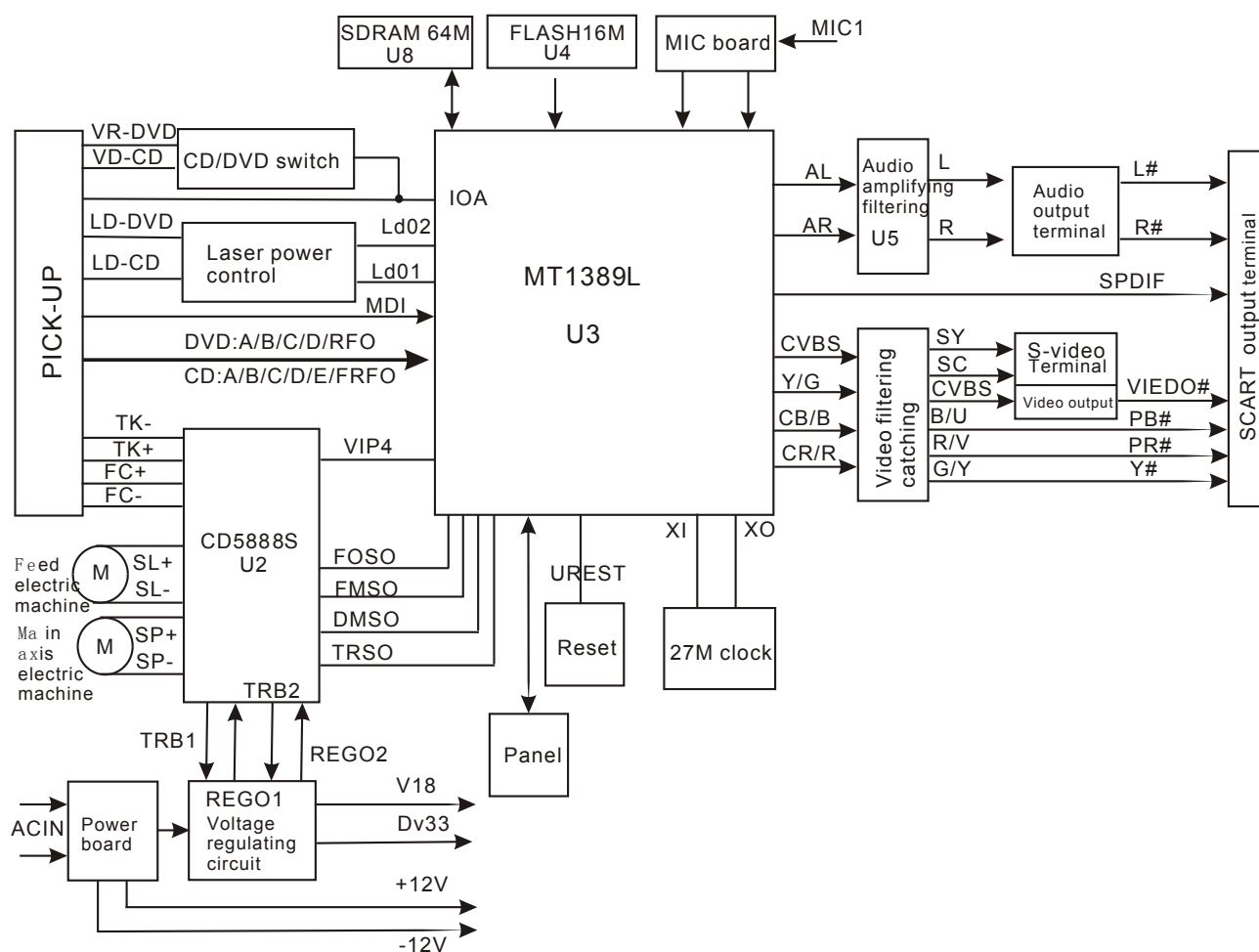


Figure 3.1.1.1 Block diagram of the player

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:

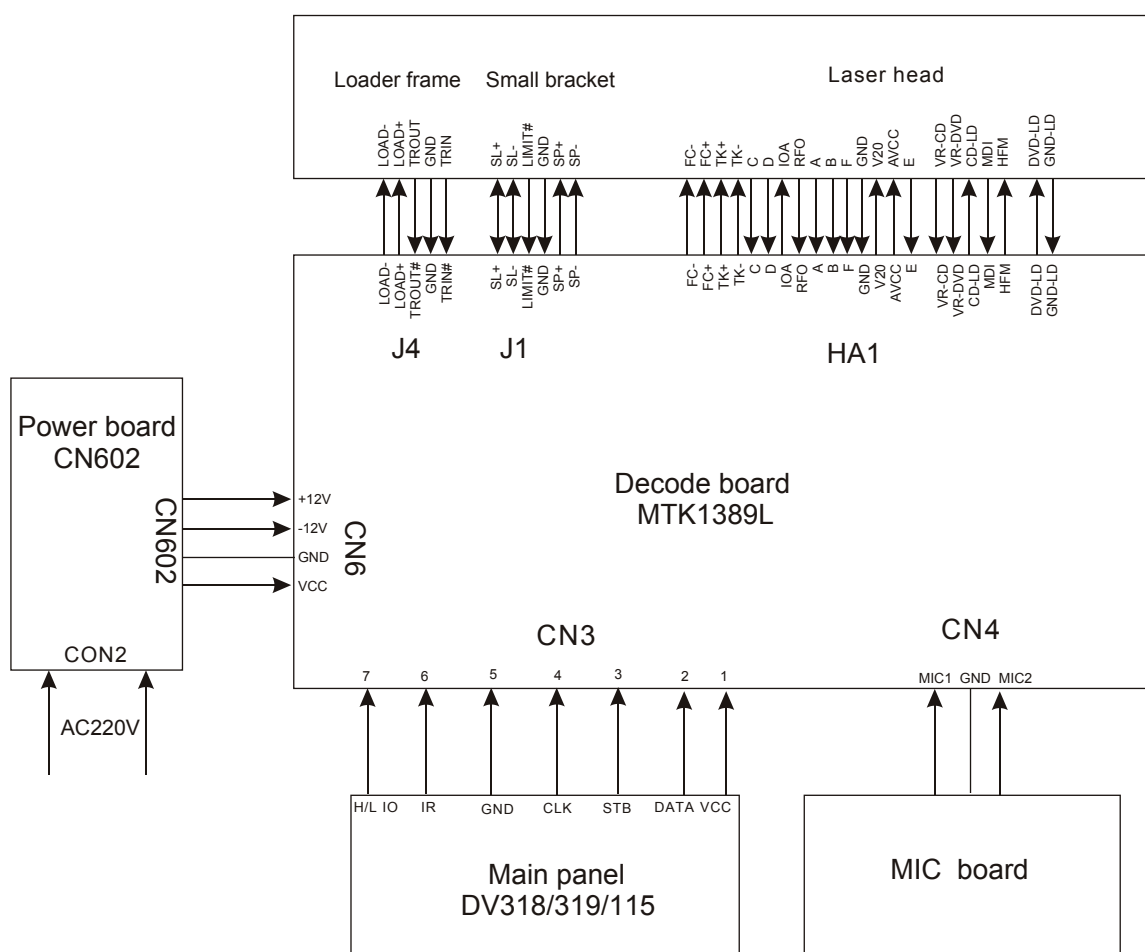


Figure 3.1.2.1 PCB board block diagram of the player

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

DV112SI IC usage instruction is shown as in the following table:

Semi-finished PCB name	IC model name	Location	Function
Power board OKI-P00807A	TL431	U603	Precise voltage regulator
	EC817	U602	Photoelectric coupler
	TN275PN	U601	Power switch IC
Main panel DV115SI	SMK838	U403	Remote control receiver
OK board DV115SI-MIC	CD4558	U13	Operational amplifier (MIC amplifying)
Decode board DV115 S-0	NJM4558	U5	Operational amplifier (audio amplifying)
	HY57V641620HGT-7	U8	SDRAM
	MT1389L version	U3	Decode chip
	CD5888S	U2	Servo drive
	25F160	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 (MT1389L+FLASH (16M) + SDRAM (64M)), and its servo circuit is mainly composed of front end signal processing, digital servo processing, digital signal processing IC MT1389L and drive circuit CD588S , in which MT1389L is also the main composed part of decode circuit. Servo circuit block diagram is shown as in the following figure 3.2.2.1:

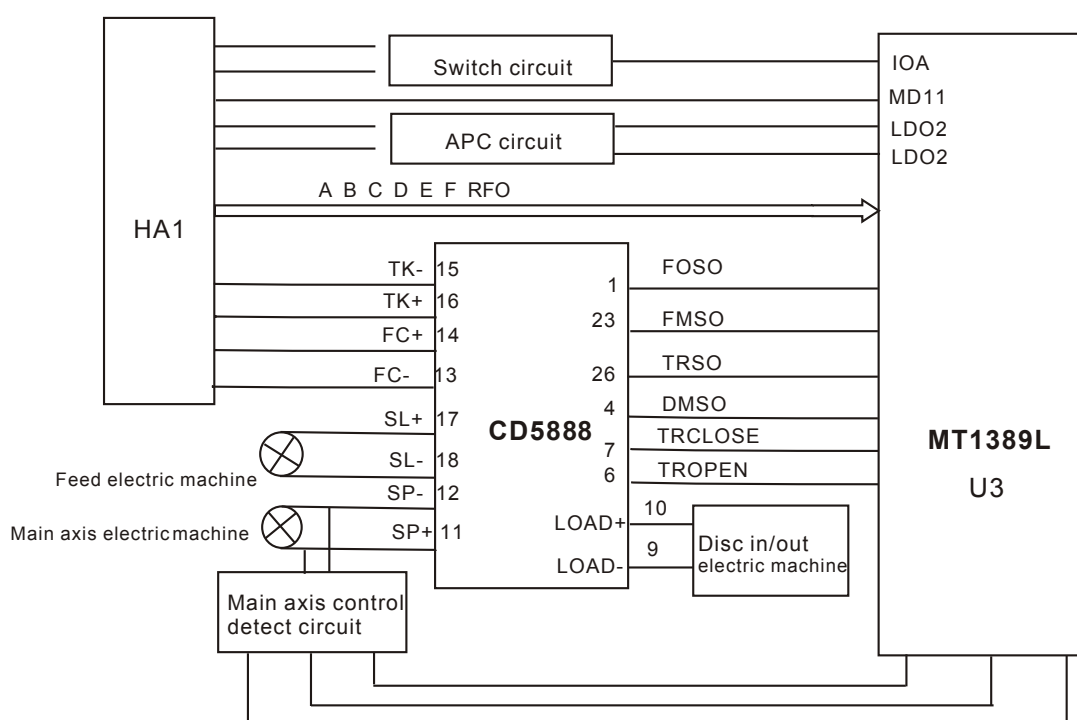


Figure 3.2.2.1 Servo circuit block diagram

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 MT1389L, MT1389L 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, MT1389L 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 MT1389L (DVD only has A, B, C, D signals) and RF signal and output from pin 1~4, 5, 6 of MT1389L respectively, after amplifying processing of pre-amplifier inside MT1389L, now signals are divided into 2 ways inside MT1389L: one part, through summation amplifying and subtraction circuit

Inside MT1389L, produces servoerror signal, after digital servo signal circuit processing, forms corresponding servo control signals, outputs FOO, TRO, DMO and FMSO servo control signal from pin 25, 24, 20 and 21 of MT1389L 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 MT1389L, 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 MT1389L, 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 MT1389L, 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:

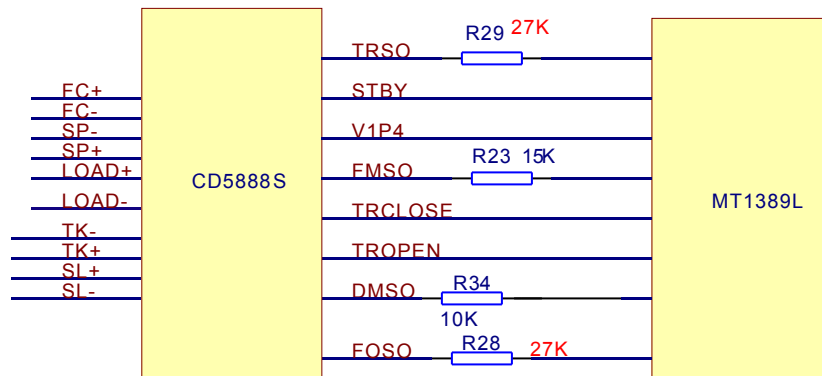


Figure 3.2.3.1 Open/close drive circuit diagram

2. Working principle: when the machine is reading discs normally, pin 6, 7, 9, 10 of CD5888S 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:

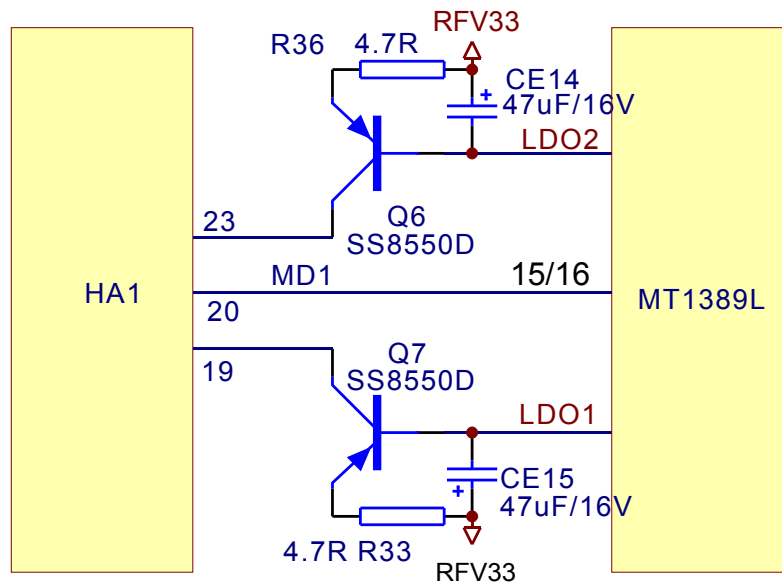


Figure 3.2.4.1 Laser power control circuit diagram

2. Working principle

Pin 15/16 of MT1389L is laser power detect signal input pin, pin 16 is DVD laser power strong/weak detect signal input pin, pin 17 is VCD laser power drive control output pin, pin 18 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 17 of MT1389 makes voltage of pin 6 of HA1 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 17 of MT1389L increase to make voltage of pin 6 of HA1 decrease to reach the purpose of reducing laser power to form an auto power control circuit.

When reading DVD disc, pin 16 is detect signal input pin, pin 18 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
Q6_E	2.9V	3.2V	Q7_B	3.2V	2.2V
Q6_B	2.2V	3.2V	Q7_E	3.2V	2.9V
Q6_C	2.2V	0	MT1389_15	0.2V	0.2V
Q7_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:

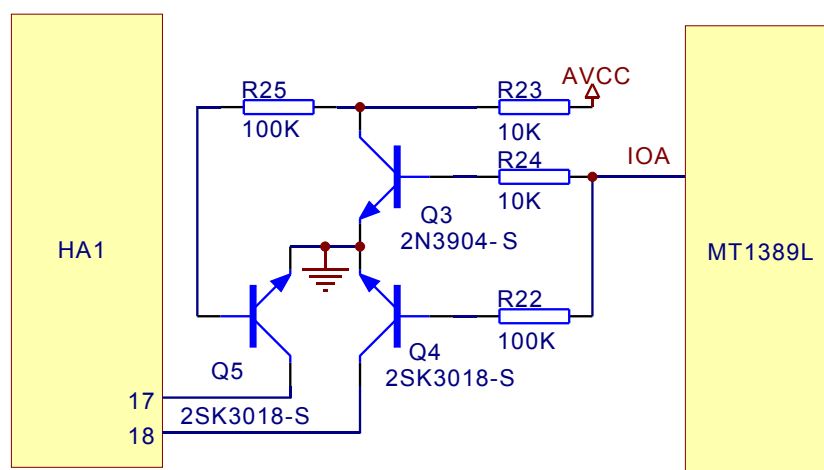


Figure 3.2.5.1 CD/DVD conversion circuit diagram

2. Working principle

After loading disc in the player, IOA port of MT1389L is defaulted high level to make Q3 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 Q3 cut off and make Q4 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: Q4 and Q5 are MOS tube

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

State	Q3			Q4			Q5			IOA
	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:

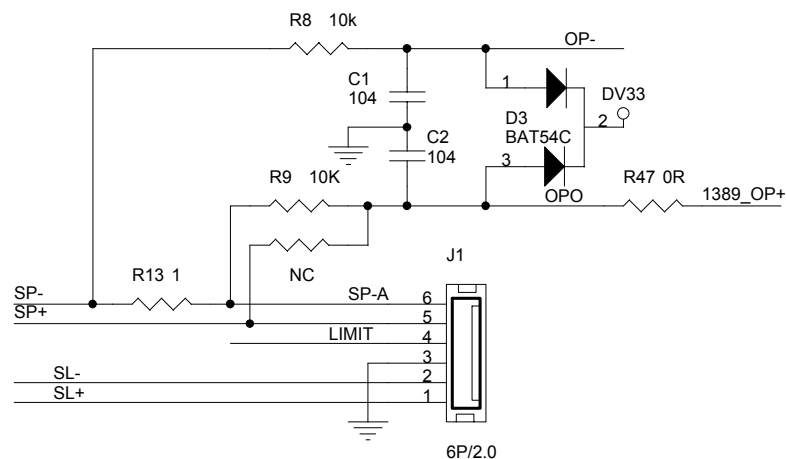


Figure 3.2.6.1 Main axis control circuit diagram

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, MT1389L 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: MT1389L 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 R8, R9 sampling to make OPO output less than 1.4V voltage and transmit to input pin of MT1389 ADIN through R47. 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 CD5888 S, pin 5 of J4	3.79	3.79→0.70→1.80
SP-	Pin 12 of CD5888 S, pin 6 of J1	1.38	1.38→3.40→1.80
OP+	Pin127of MT1389	1.38	1.38→3.10→1.80
OP-	Pin128of MT1389	1.53	1.53→3.08→1.98
OPO	Pin127of MT1389	2.44	2.44→0.40→2.50
ADIN	Pin127of MT1389	2.44	2.41→0.41→2.44
DMSO	Pin 4 of CD5888 S	1.42	1.42
VIP4	Pin 13 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

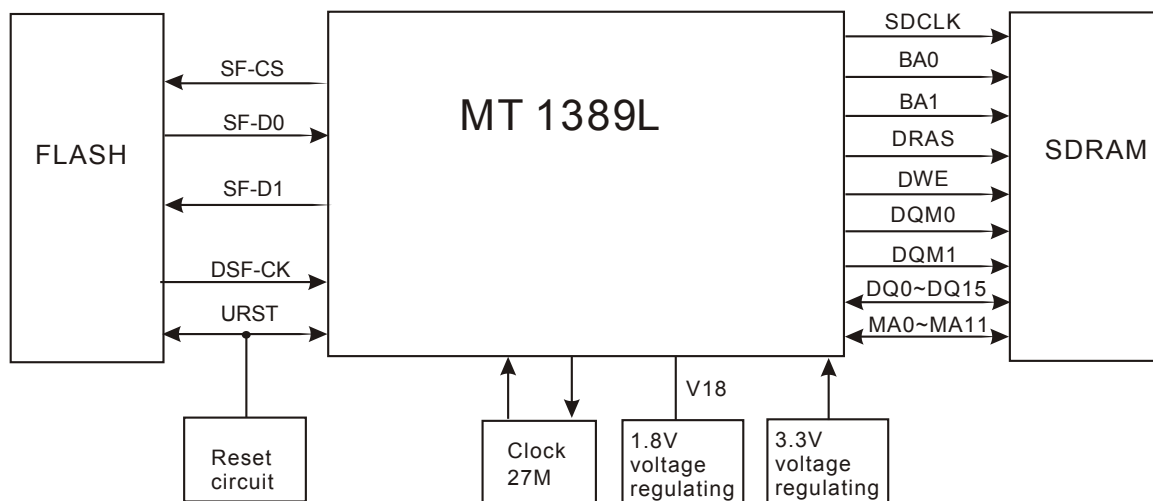


Figure 3.2.7.1 Decode circuit block diagram

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.

Audio, video output circuit: at present, MT1389L all integrates video D/A converter, MT1389L 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:

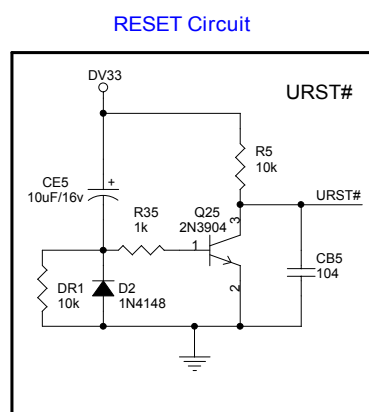


Figure 3.2.8.1 Reset circuit diagram

2. Working principle: after power on, voltage of DV33 increases to 3.3V, main chip power supply is normal. Now, voltage of CE5 to DV33 cannot change suddenly to make base electrode of Q25 has current flow in, Q25 is saturation on, URST is low level. DV33 charges CE5 in two paths through emitter junction of DR1 and Q25 make negative pole voltage of CE5 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, CE5 decreases together with DV33 voltage, D2 performs surge discharge and clamping to CE5.

3. Key point voltage (unit: V)

Q25_B is low level when in normal condition, at the moment of power on, it decreased to 0V from 3.3V gradually.

Q25_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:

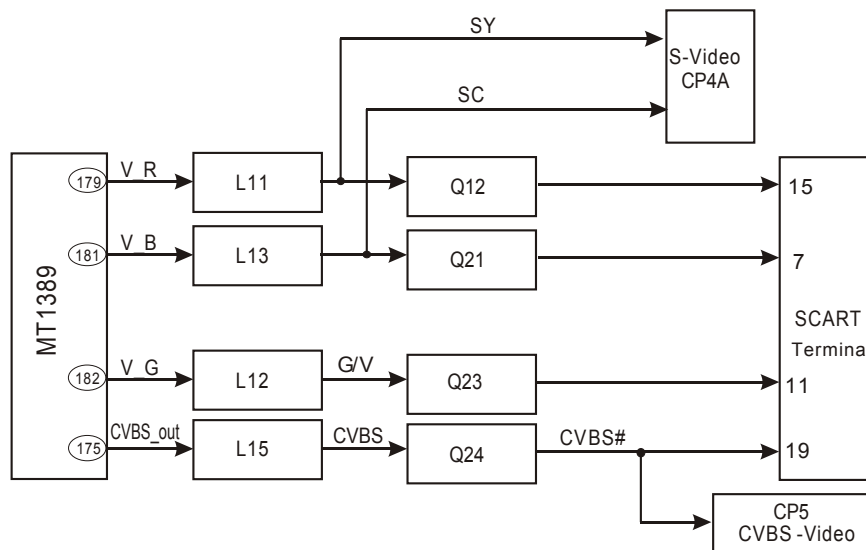


Figure 3.2.9.1 Video signal flow chart

2. Working principle: MT1389L 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 MT1389L, through video filtering clamping, output to Terminal.

Shown as in the figure 3.2.9.2, capacitor C51, C52 and inductor Q24 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.

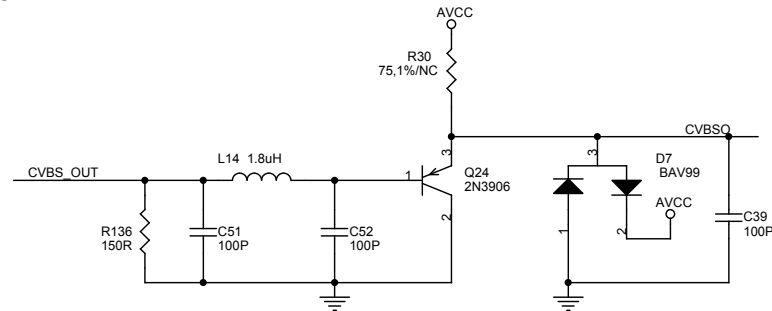


Figure 3.2.9.2 Video output circuit

3.2.10 Audio circuit

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

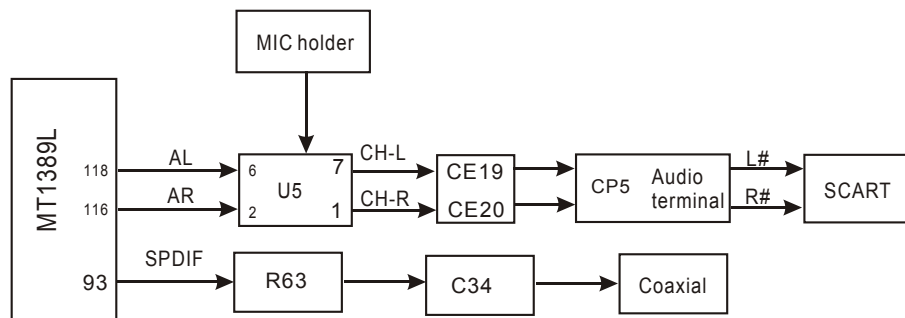


Figure 3.2.10.1 Audio signal flow chart block diagram

2. Working principle: MT1389L 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 CE19 and then the high frequency component in audio signals is filtered by the low pass filter composed of R64 C29, for signals are damped through filtering circuit, the audio signals after being filtered require the amplifying output by the amplifying circuit composed of U5A, R62 is feedback resistor, this circuit is a active filter on the whole.

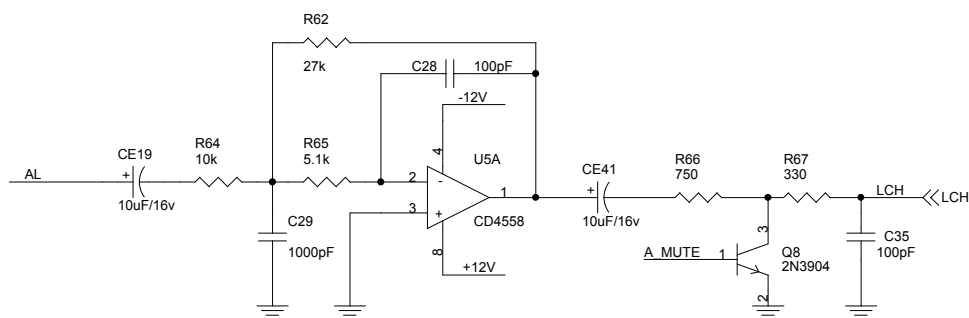


Figure 3.2.10.2 Amplifying circuit diagram

3. External Karaoke signal input and output

After being amplified, MIC signals input to pin 2, 6 of U5 separately for amplifying output.

3.2.11 Mute circuit

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

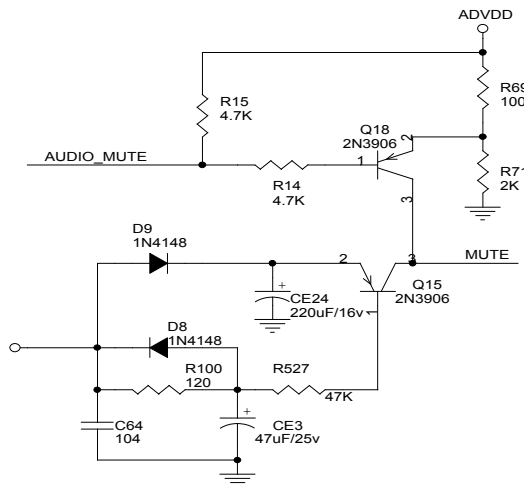


Figure 3.2.11.1 Mute circuit

2. Working principle of quieting circuit

When the player is working normally, shown in the figure 3.2.11.1, MT1389L outputs analog audio signal, and a low level signal to MUTE-DAC at the same time to make Q18 on, B electrode of Q18 is about 2.7V, collector electrode of Q18 is about 3.3V, so Q15 is also on, voltage of B electrode is about 0.7V, voltage of Q15E electrode is near to zero, 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 Q18 cut off, so Q15 cuts off, +5V power is transmitted to base electrode of switch pipe Q8~Q10 through EC electrode of Q15, 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, Q15E 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, D9 is on, +5V charges capacitor CE24 through D8, now emitter voltage of Q15 is less than base electrode voltage, Q18 cuts off. When power off, VCC disappears, Q15 base electrode changes into low level, its emitter electrode changes into high level because of discharge, now Q15 is on, Q15 collector electrode (MUTE-OUT) outputs high level to add to base electrode of switch pip Q8-Q10, 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:

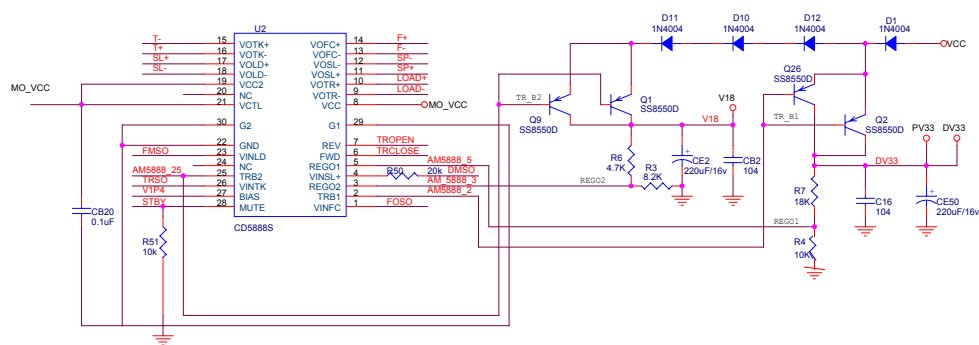


Figure 3.2.12 Decode circuit voltage regulating circuit diagram

2. Working principle:

DV33 voltage regulating process: VCC reduces voltage through D1, and supply power for rear stage circuit through E-C electrode of Q2. R7/R4 is feedback end sampling resistor.

Voltage regulating principle: DV33 voltage increases — — REGO1 voltage increases — — TR_B1 voltage increases — — Q2VCE voltage increases — — DV33 voltage decreases.

Voltage regulating principle of 1.8V is the same with that of DV33, only a diode (D11) is added to perform voltage reduction.

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

C electrode of # Q2: 3.95, B electrode: 3.35, C electrode: 2.25

C electrode of # Q1: 3.25, B electrode: 3.55, C electrode: 1.95

REGO1 REGO2 is 1.25V

3.2.13 Panel control circuit

This main panel has display screen and drive IC AP6928 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 (DV115SI-MIC) 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 C54 to pin 1 of MIC signal amplifying circuit Q1 for in-phase amplifying.

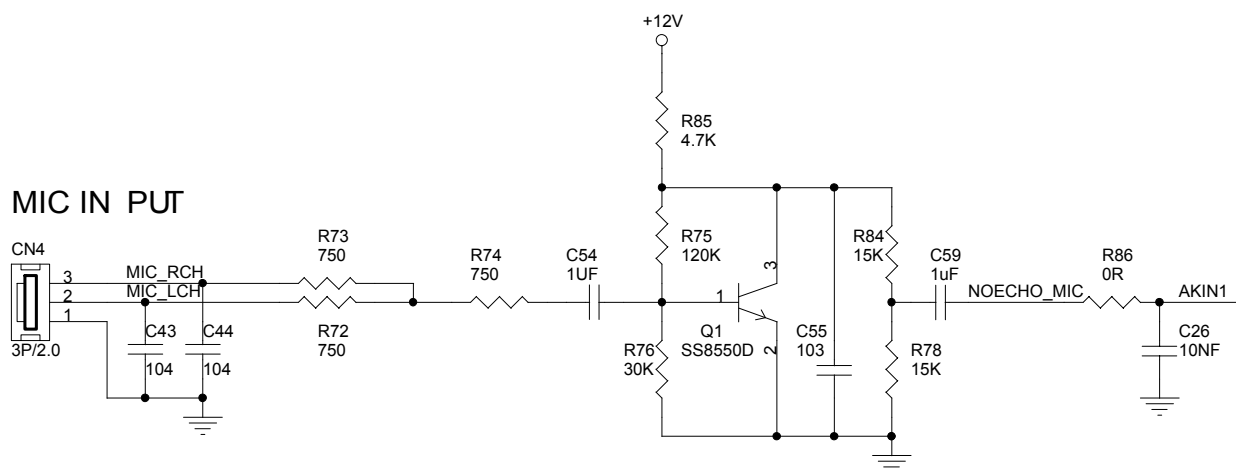


Figure 3.2.14.1 MIC circuit diagram

3.2.15 Power circuit

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

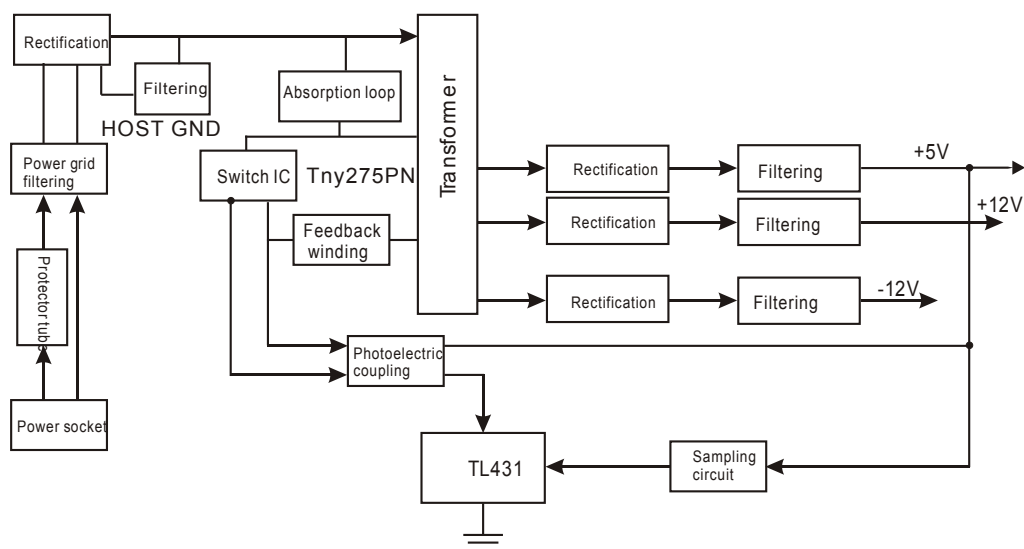


Figure 3.2.15.1 Power circuit block diagram

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 C602 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), TL431 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 Q15 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 Q18, D9 1N4148 diode has been stricken through, after changing it, trouble is removed.

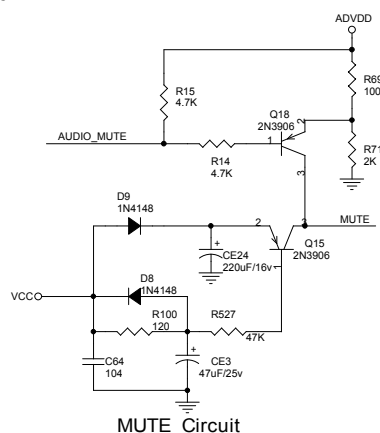


Figure 3.3.1.1 Quieting circuit diagram

【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 12V which is on low side with only two and a little, after removing load, test 12V voltage output of power board and it is normal, so we confirm that trouble lies in decode board, only U5 of decode board has +12V power supply, test the resistance to ground of pin 8 of U5 and it is 86Ω , which should be infinite in normal conditions, so we doubt that U5 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 Q25 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.

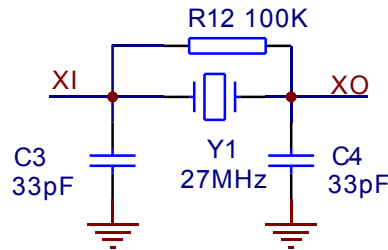


Figure 3.3.1.2 Clock circuit diagram

【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 1389L increases 20-degree, machine down and picture has mosaic, change 1389L 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 U5B Ic4558 and there is no sound output, test pin 4, 8 of 4558 and there is no -12V/+12V voltage, Check and find that CN6/CN1 has +12V/-12V voltage input.

【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

3. Pull out flat cable of decode board CN6, 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 D607 on power board and find that one end is 5V voltage and the other end has no voltage output. After changing D607, 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 100, 101 of decode chip 1389L and it is 3.3V, which is normal, use oscillograph to test audio output waveform of pin 118, 116 of 1389L and it is normal, shown in the figure 3.3.1.4, use multimeter to test voltage of C electrode of mute circuit Q18 and it is 4.6V and keeps in 4.6V when no disc in and playing discs, when testing electrode resistance of Q18 and Q15 triode, the positive/negative direction resistance of C, E electrode of Q15 is about 500Ω, after changing Q15 triode, trouble is removed.

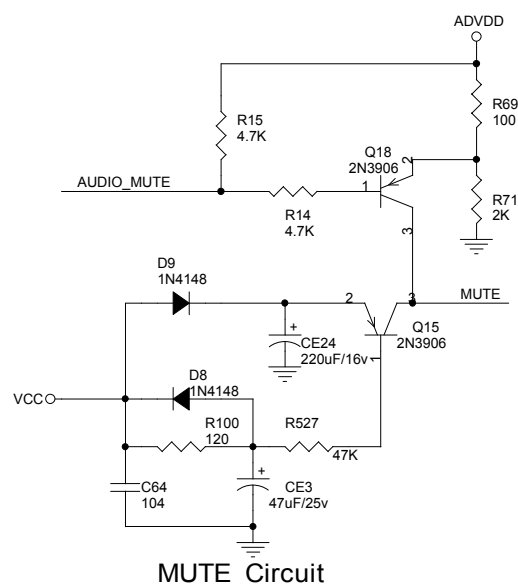


Figure 3.3.1.4 Quieting circuit diagram

【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 Q6 and it is 3.3V, which is normal, test the inductor L7 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 U5 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 1389L and it is clutter, test power supply and clock of 1389L and they are both normal, so it is judge that 1389L 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 22 of 1389L and it is high level, normal; check on state between pin 39 of 1389L and pin 6 of U2 (CD5888) 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 CD5888 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 CD5888S and it is high and low level alternative, which is normal, shown in the figure 3.3.1.5, test ADIN signal of pin127 of 1389L and it is always 0V, test voltage of OPO signal of pin127 of 1389L and it changes in 0.8~2.3V, use multimeter to test the voltage drop between , pin 127 of 1389L and it is in 0.8~2.3V, test R331 resistor and it has open circuit, after changing it, trouble is removed.

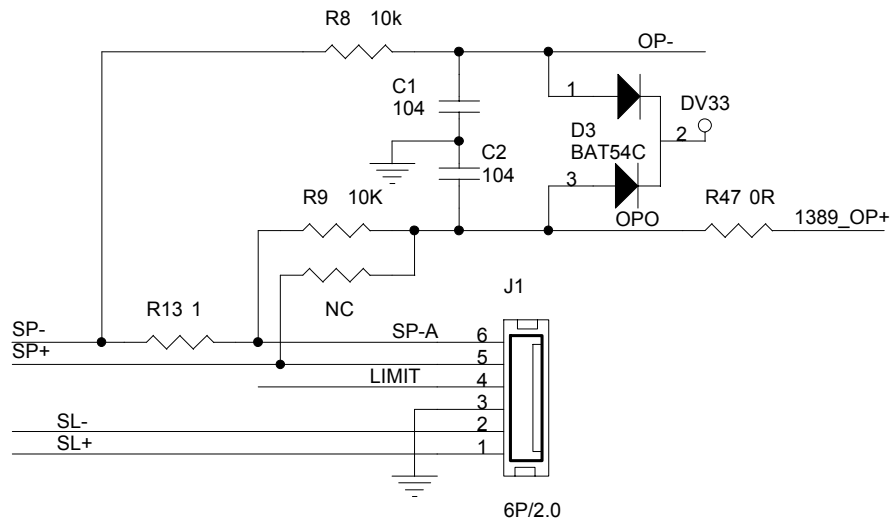
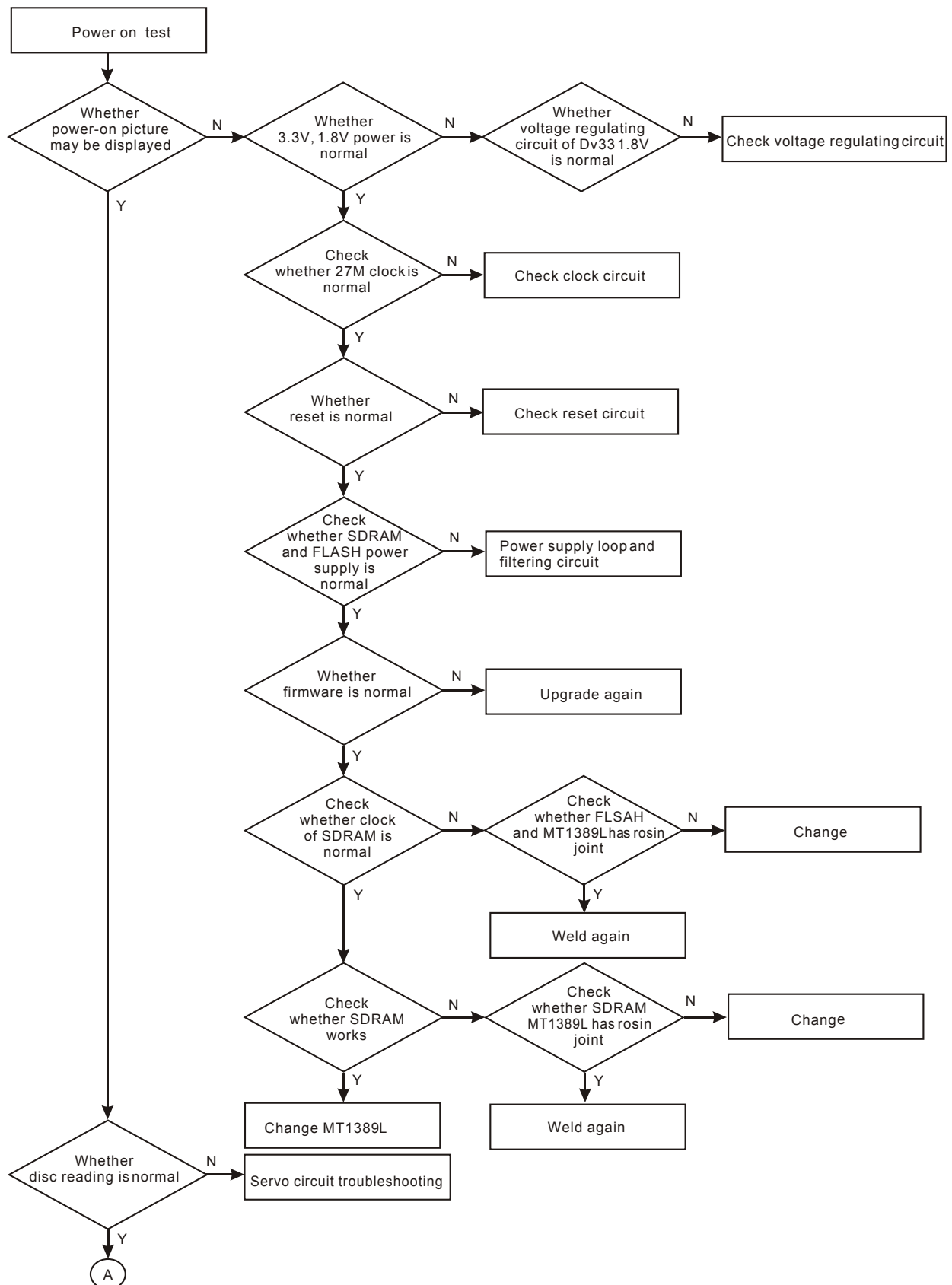


Figure 3.3.1.5 Servo circuit diagram

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:



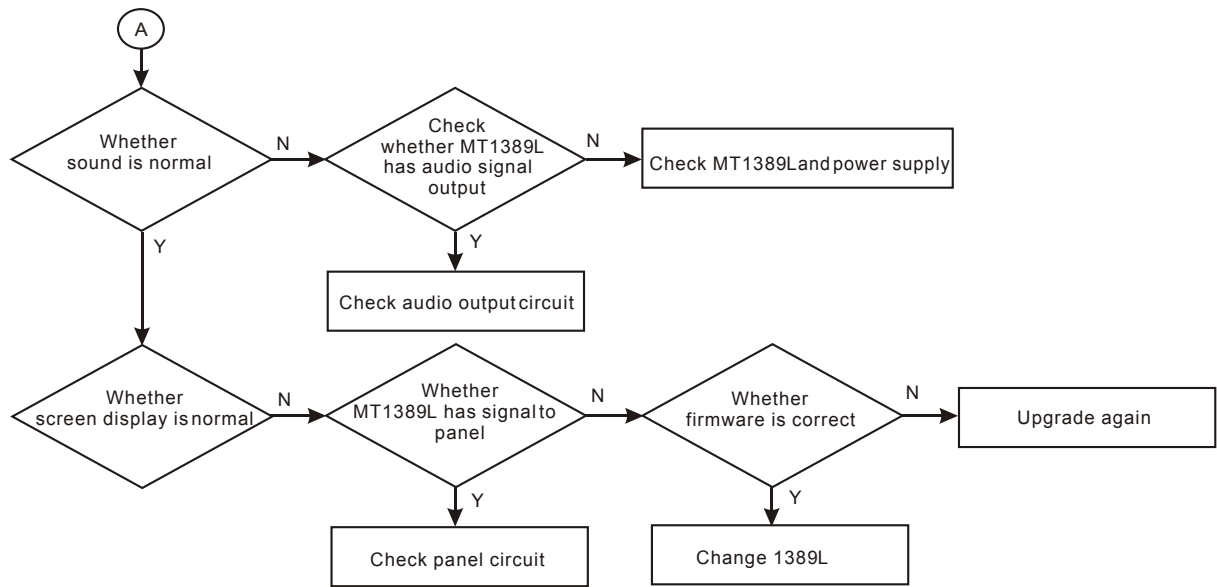
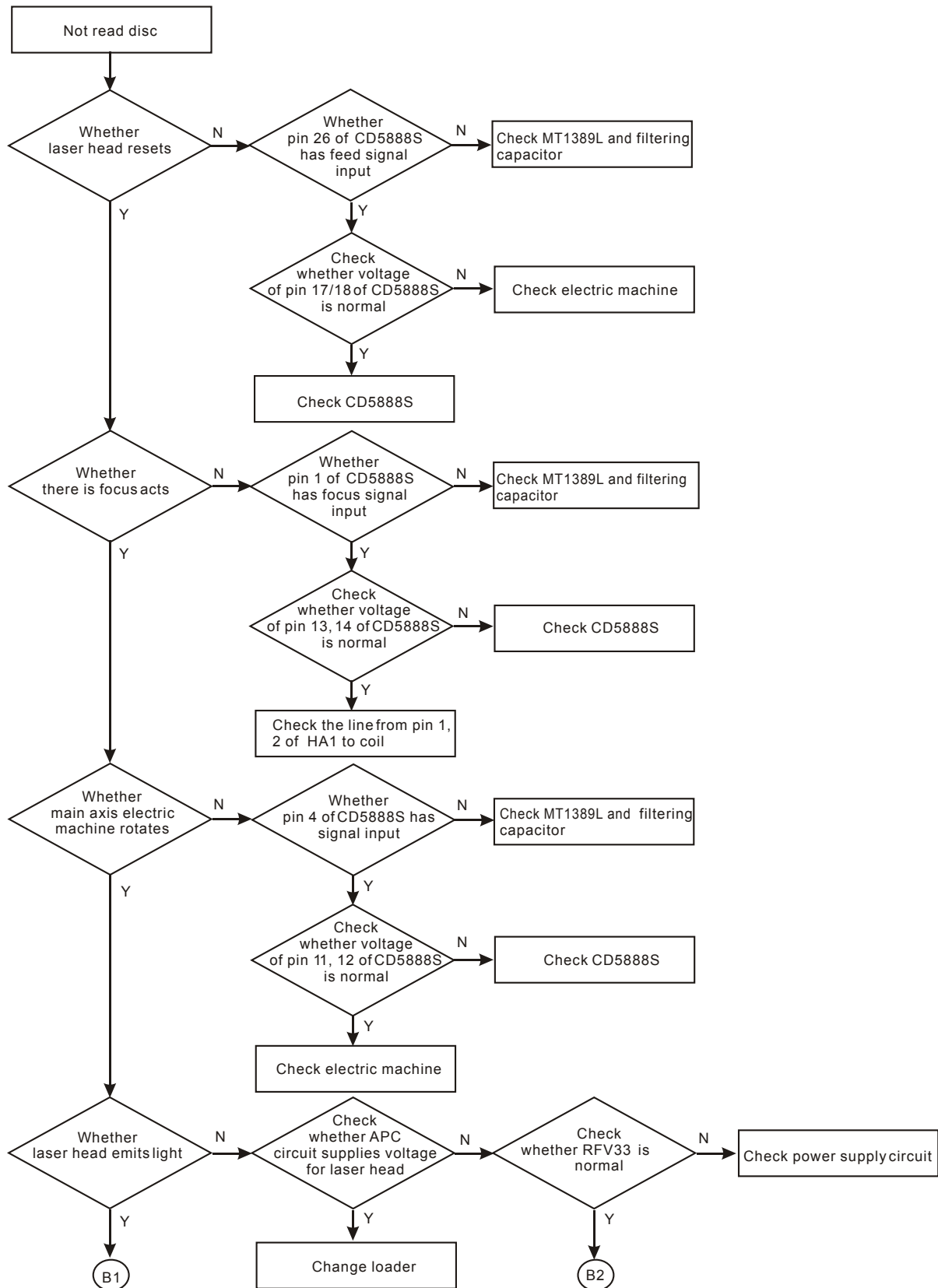


Figure 3.3.2.1 Troubleshooting flow chart for “Power on”

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



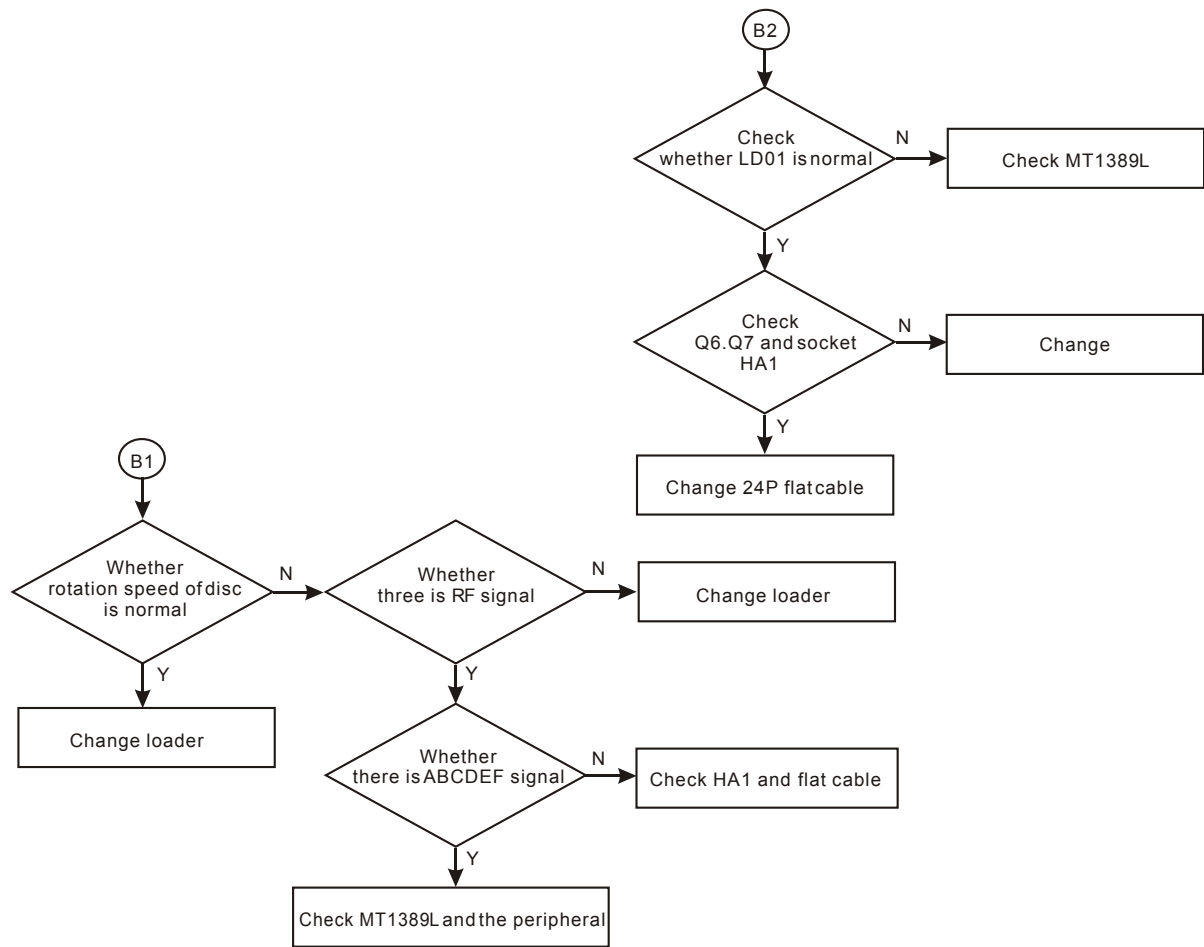


Figure 3.3.2.2 Troubleshooting flow chart for “Not read disc”

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

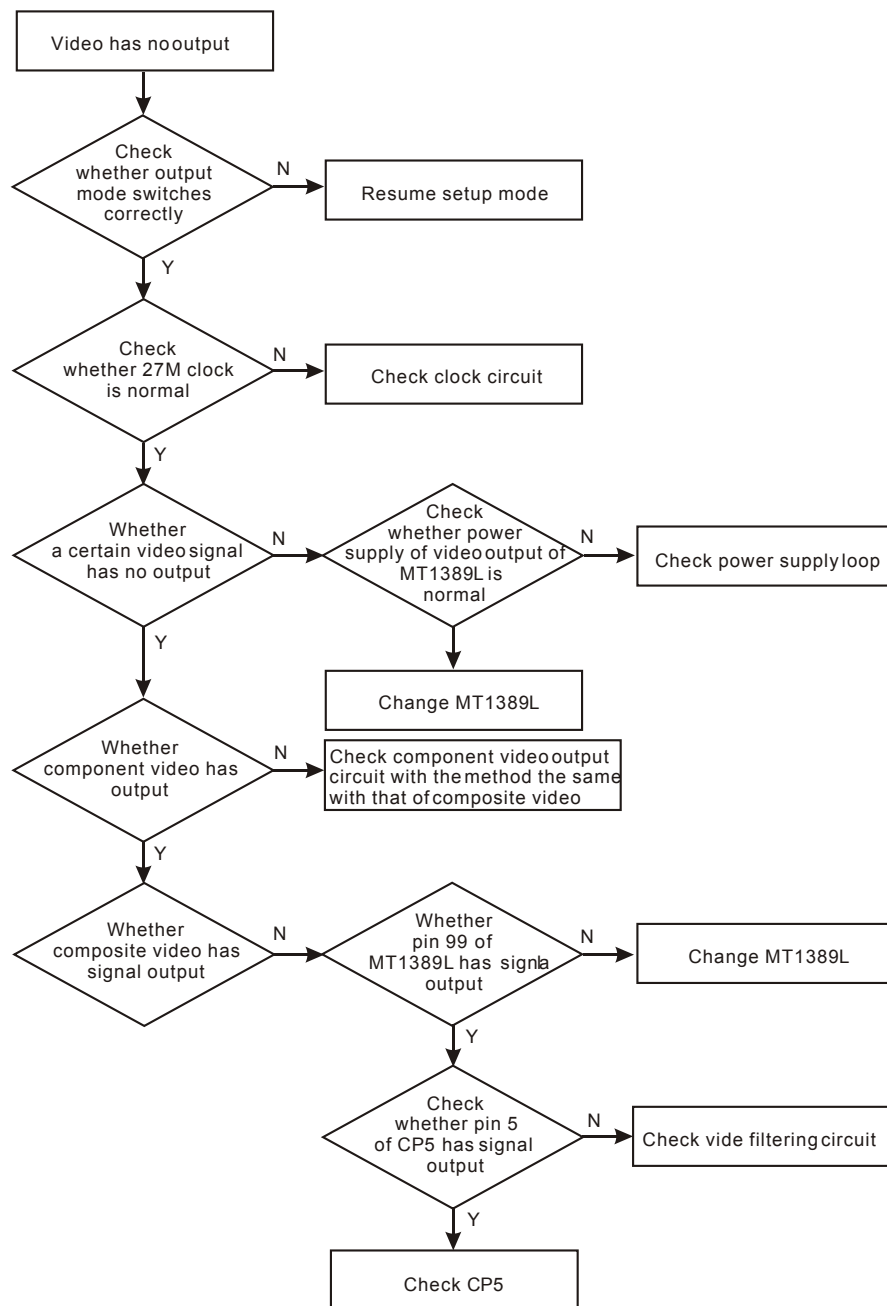


Figure 3.3.2.3 Troubleshooting flow chart for “Video has no output”

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

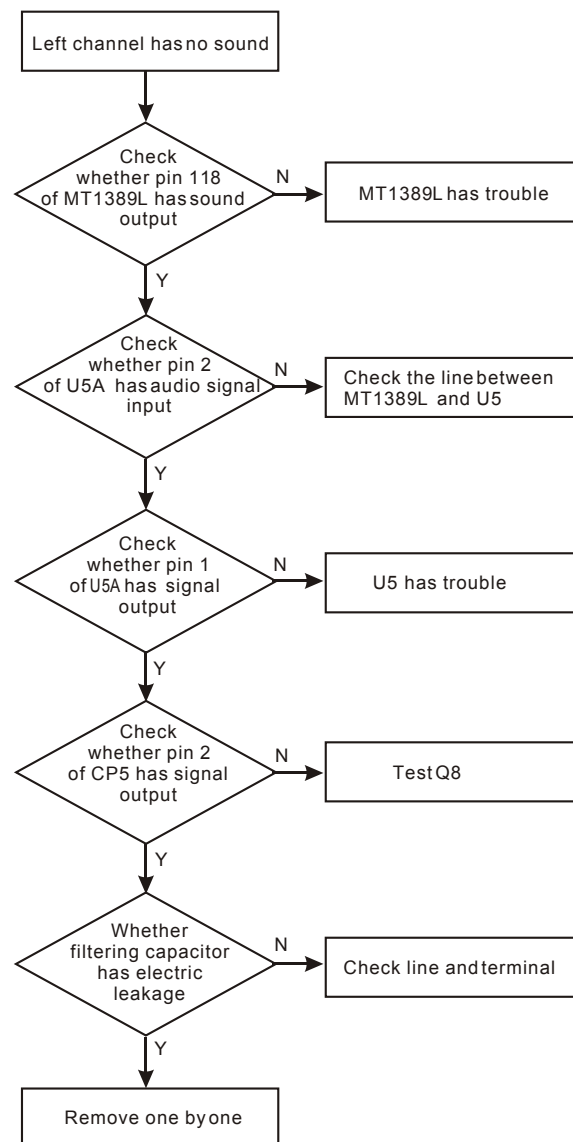


Figure 3.3.2.4 Troubleshooting flow chart for “Left channel has no sound”

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

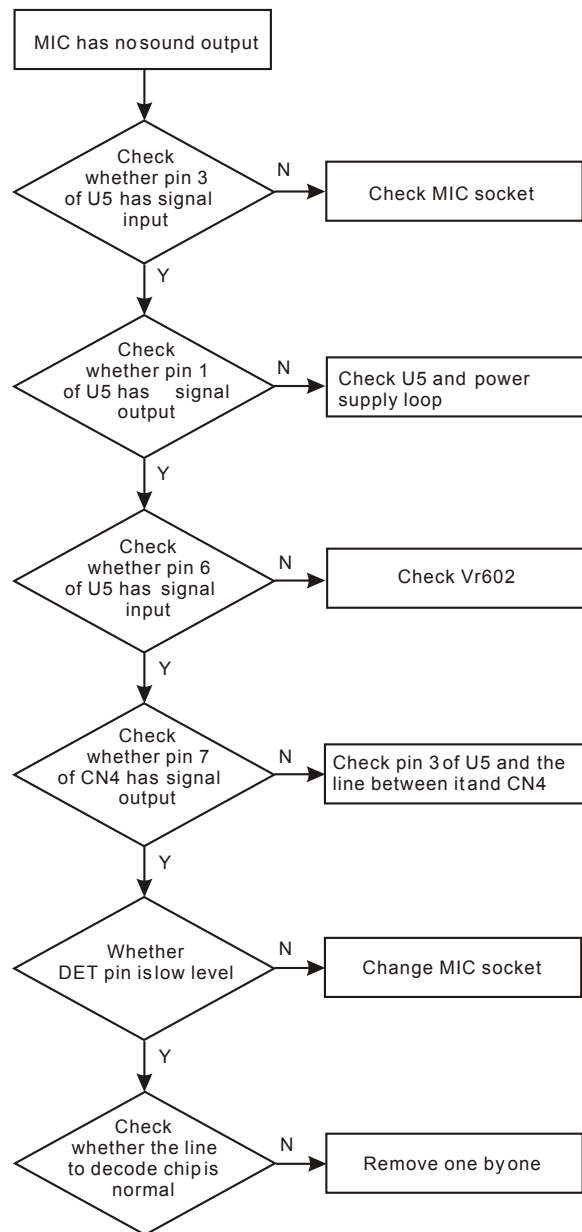


Figure 3.3.2.5 Troubleshooting flow chart for “MIC has no sound output”

6. Troubleshooting process for "No +5V voltage (power board OKI-P00803A)" is shown in the following figure 3.3.2.6:

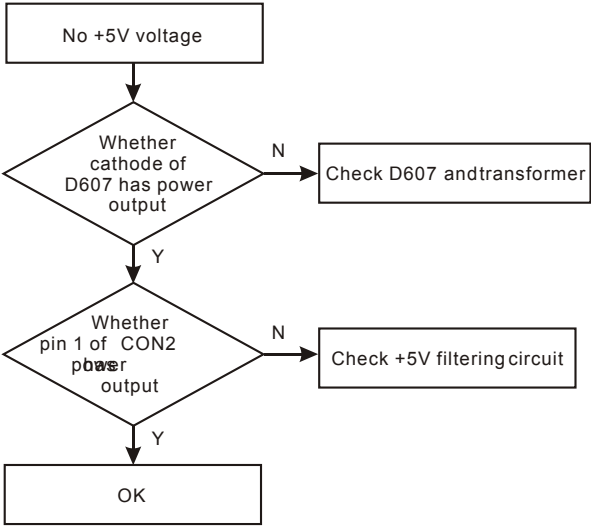


Figure 3.3.2.6 Troubleshooting process for "No +5V voltage"

7. Troubleshooting process for "Voltage output is unstable (power board OKI-P00803A)" is shown in the following figure 3.3.2.7:

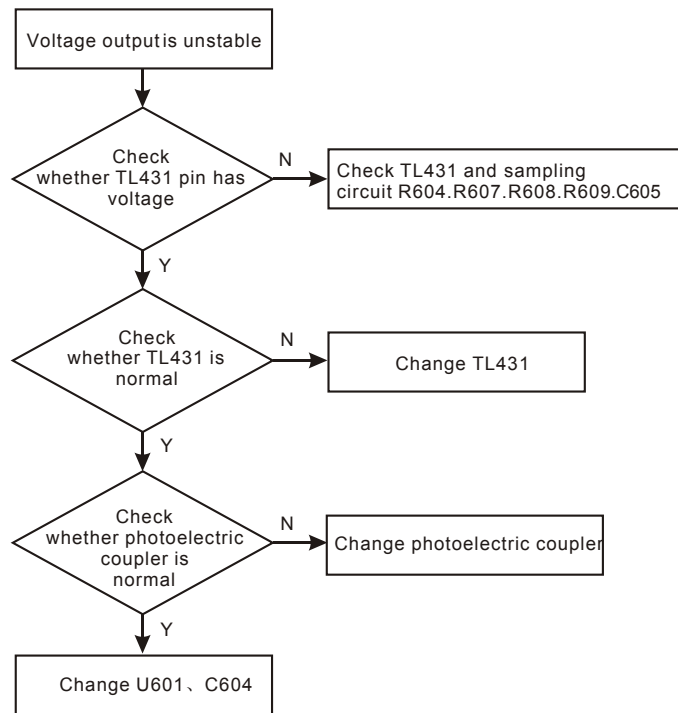


Figure 3.3.2.7 Troubleshooting flow chart for "Voltage output is unstable"

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

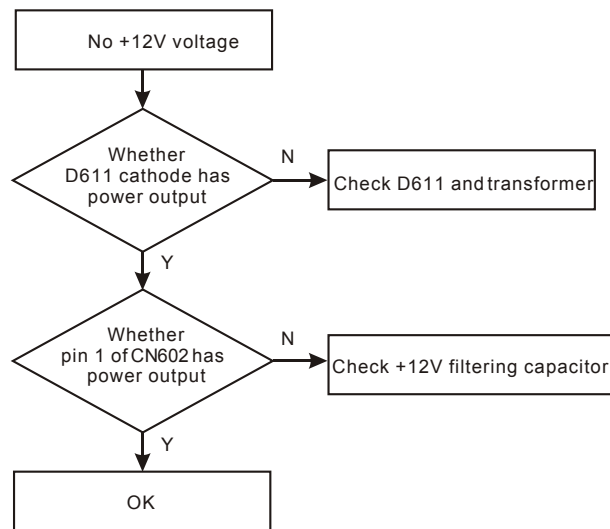


Figure 3.3.2.8 Troubleshooting flow chart for “No +12V voltage”

9. Troubleshooting process for “No +12V voltage (power board OKI -P008073A)” is shown in the following figure 3.3.2.9:

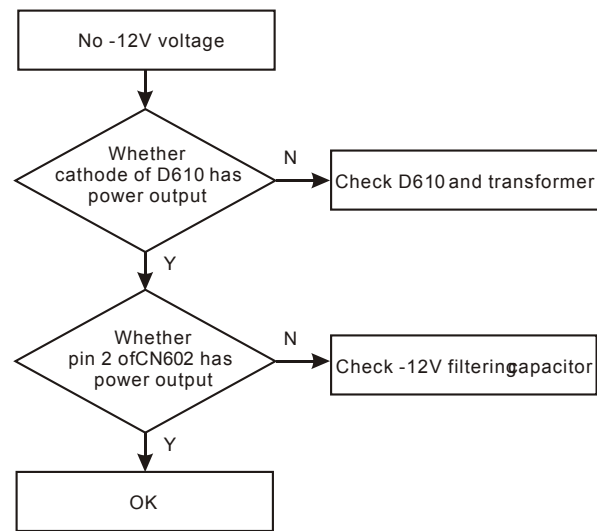


Figure 3.3.2.9 Troubleshooting process for “No -12V voltage”

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

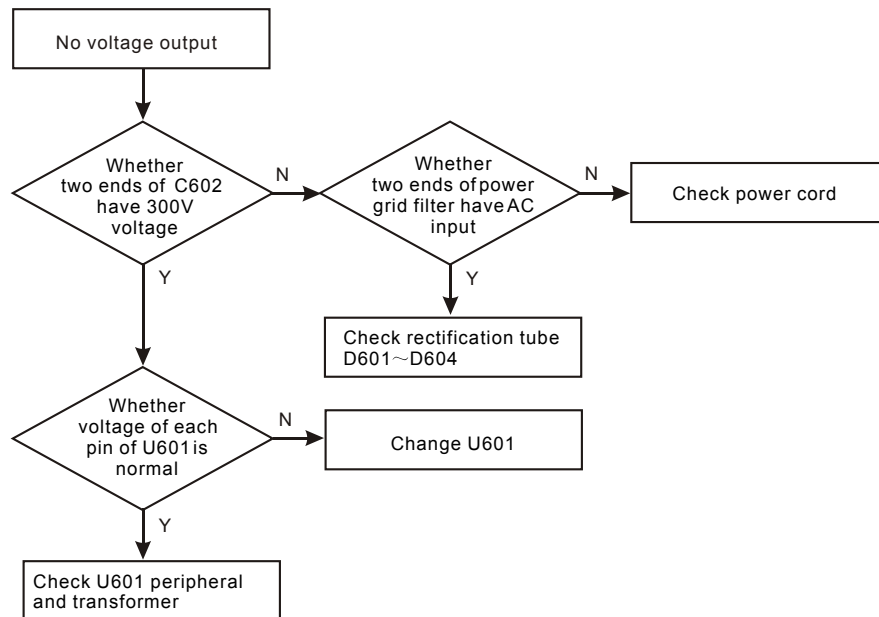
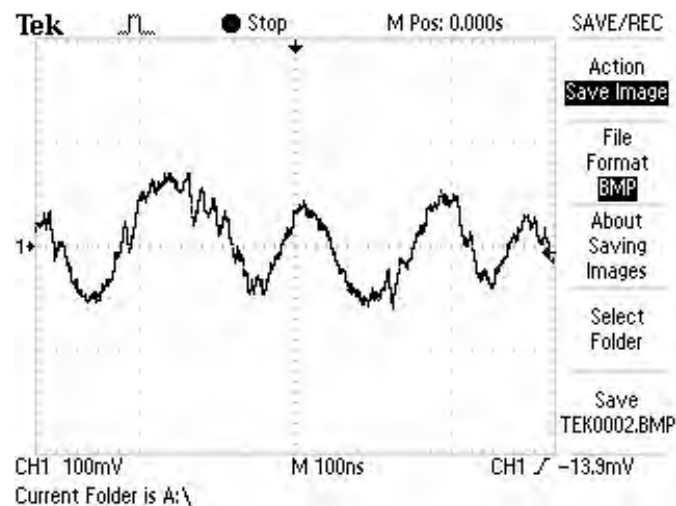


Figure 3.3.2.10 Troubleshooting flow chart for “No voltage output”

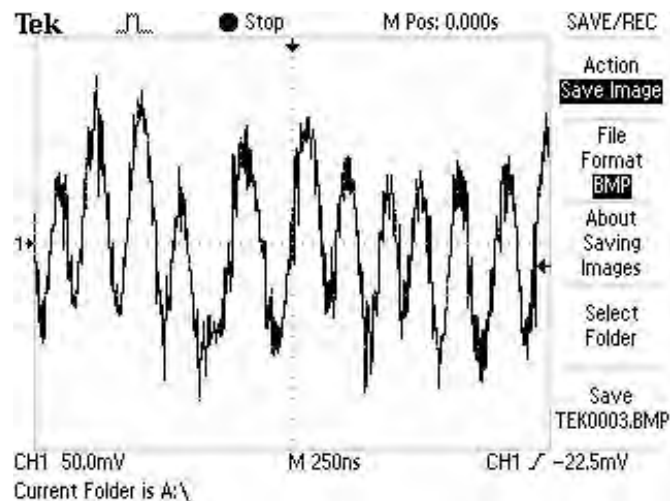
Section Four Waveform diagram

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.

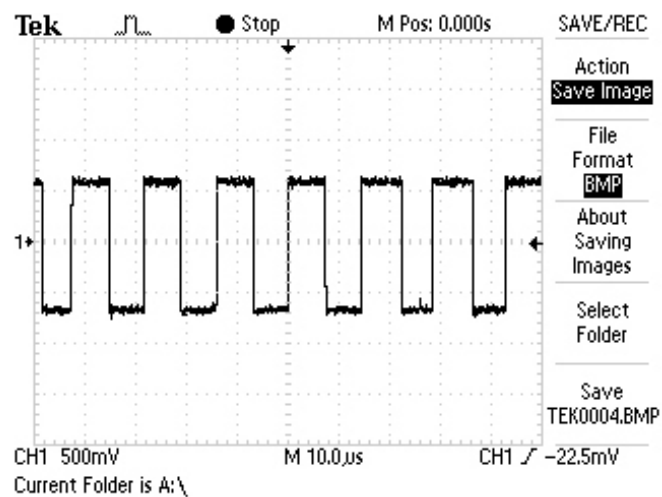
1. RFO signal waveform diagram of pin 8 of HA1



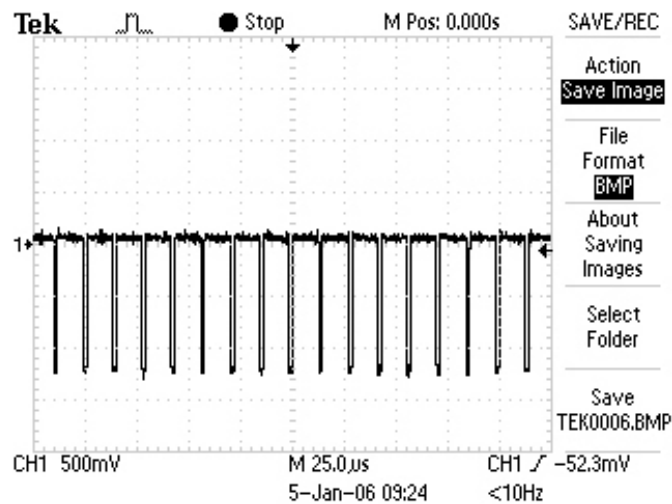
2. A signal waveform diagram of pin 9 of HA1 (B 、C、D、E、F)



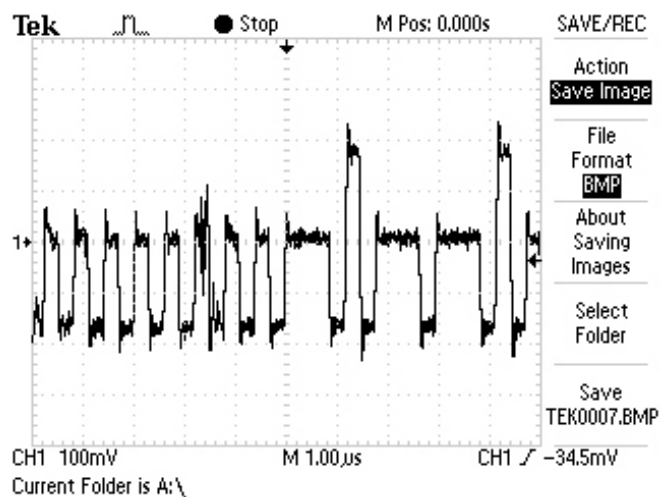
3. DMO signal (when there is main axis rotation) waveform diagram of pin 20 of U3 (MT1389L)



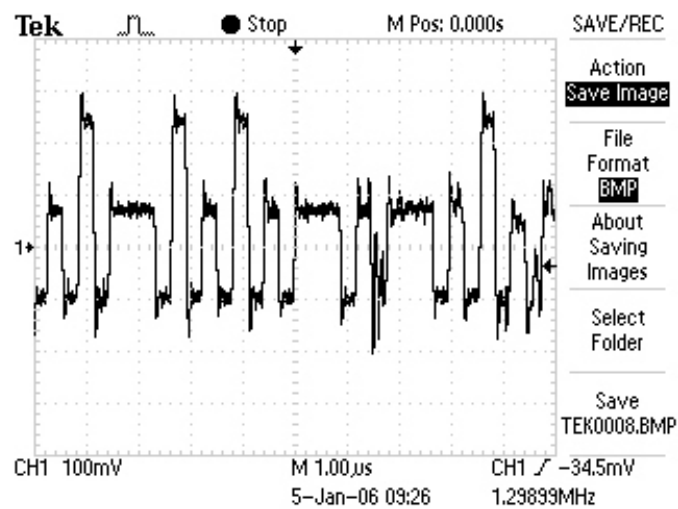
4. FMO signal (when there is feed) waveform diagram of pin 21 of U3 (MT1389L)



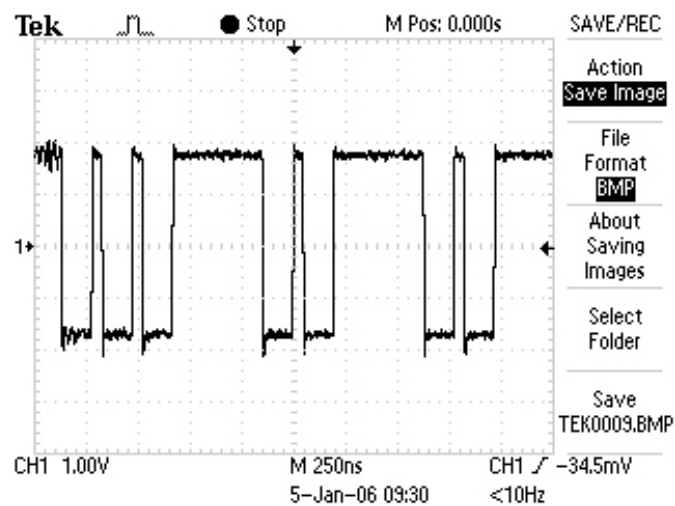
5. TRO signal (when there is trace) waveform diagram of pin 24 of U3 (MT1389L)



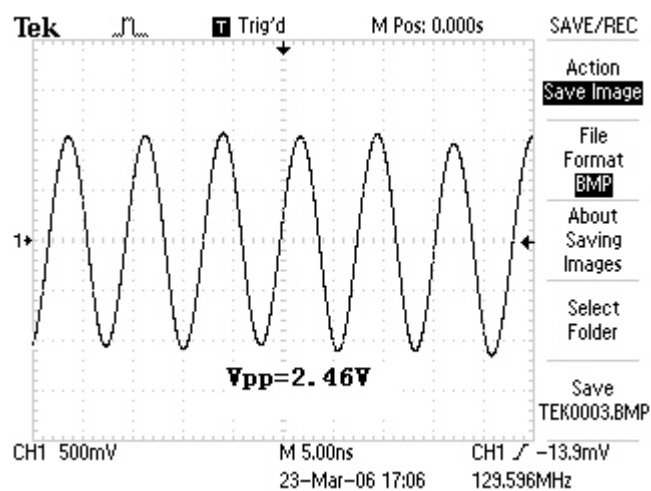
6. FOO signal (when there is focus) waveform diagram of pin 25 of U2 (MT1389L)



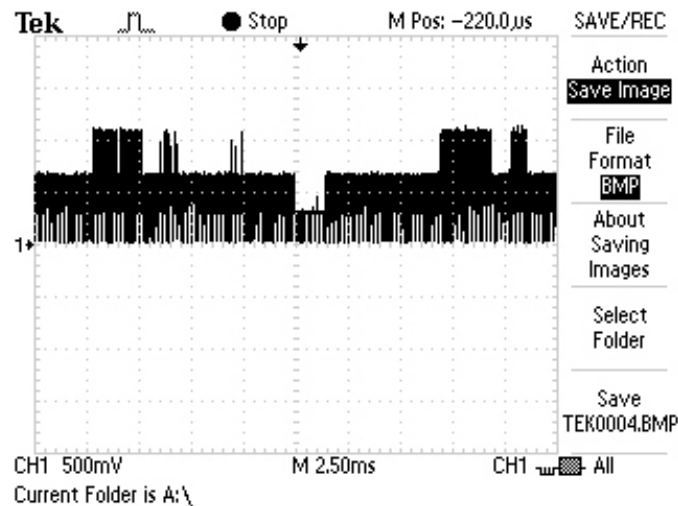
7. Waveform diagram of pin 2 (when no disc in) of U4 (FLASH)



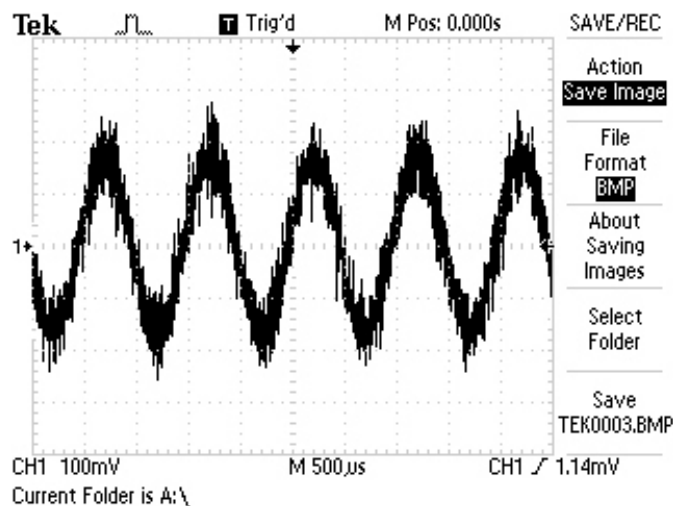
8. Waveform diagram of pin 43 of U8 (SDRAM)



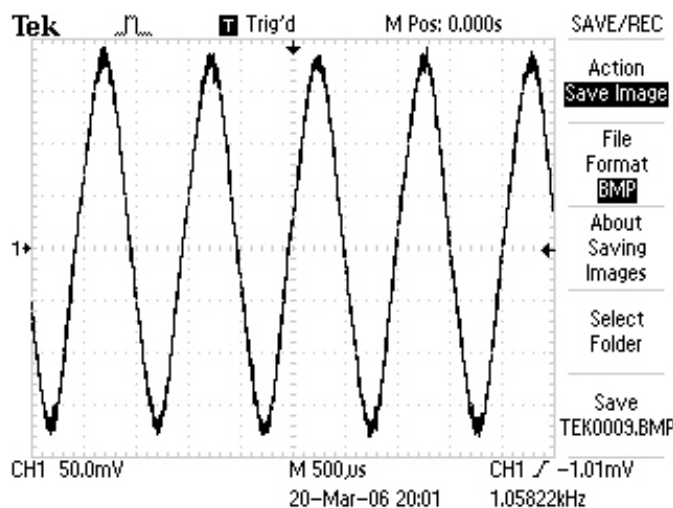
9. Video signal waveform diagram



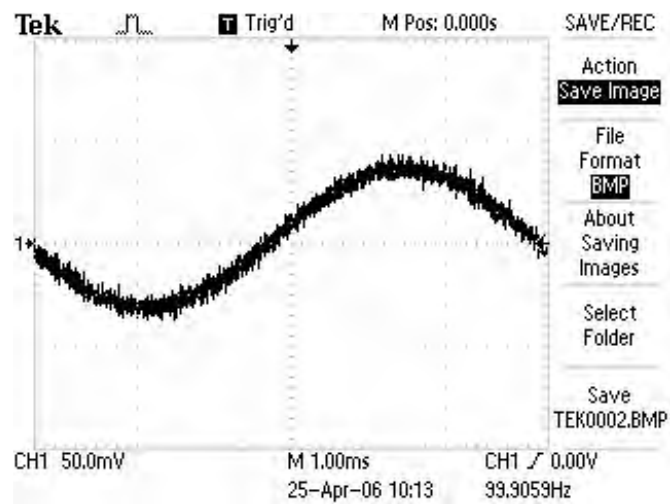
10. Waveform diagram of audio signals without being filtered and amplified (test point: audio signal amplifying input end CE41)



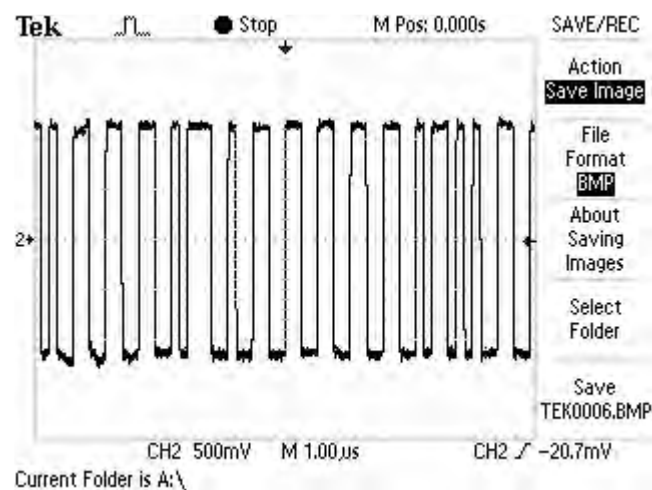
11. 1KHZ signal waveform diagram. It is suggested to use test disc, if not, the tested waveform will change at any time to affect judgment.



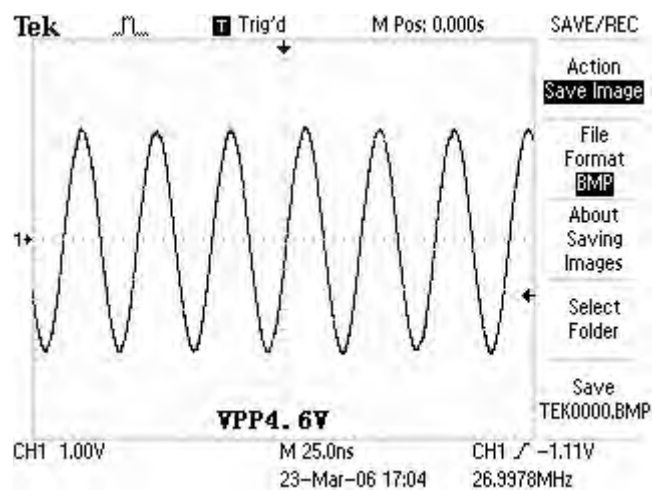
12. LEF#: waveform diagram for subwoofer channel analog signal



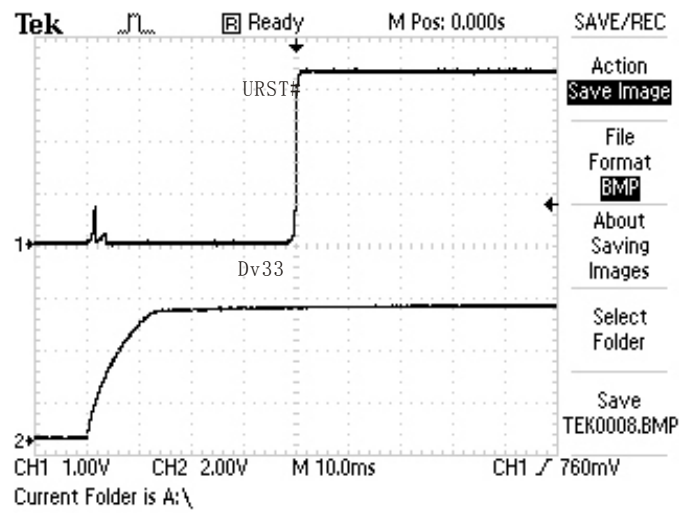
13. SPDIF: waveform diagram for optical/coaxial digital audio signal



14. 27M clock signal waveform diagram



15. Reset signal waveform diagram



Section Five Function Introduction to IC

MT1389L

Desktop DVD Player SOC

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MTK CONFIDENTIAL, NO DISCLOSURE

5 Function

5-1 General Description

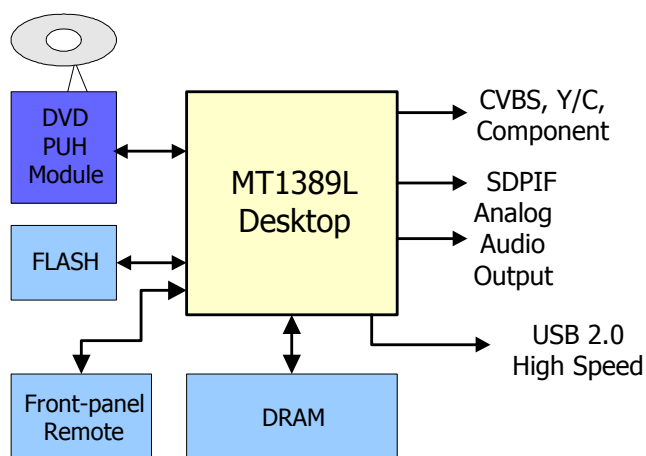
MediaTek MT1389L is a cost-effective DVD system-on-chip (SOC) which incorporates advanced features like MPEG-4 video decoder, high quality TV encoder and state-of-art de-interlace processing. The MT1389L enables consumer electronics manufacturers to build high quality, USB2.0, MS/SD/MMC reader, feature-rich DVD players, portable DVD players or any other home entertainment audio/video devices.

World-Leading Technology: Based on MediaTek's world-leading DVD player SOC architecture, the MT1389L is the New generation of the DVD player SOC. It integrates the MediaTek 3rd generation front-end digital RF amplifier and the Servo/MPEG AV decoder.

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

Incredible Audio/Video Quality: The progressive scan of the MT1389L utilized advanced motion-adaptive de-interlace algorithm to achieve the best movie/video playback. It also supports a 3:2 pull down algorithm to give the best film effect. The 108MHz/12-bit video DAC provides users a whole new viewing experience. Built-in 6ch audio DACs and 2ch audio ADCs could give the variable function solutions.

High Performance Memory Storage Device: As the core of Portable DVD players need more capability to support current multimedia contents. The MT1389L provides the interface for the 3-in-1 card reader, which supports Memory-Stick, Secure Digital Memory Card, and MultiMediaCard, to connect with the mainstream digital camera FLASH cards. For the USB application, we adopt **USB2.0 High speed** specification to reach rich-contents transference. **USB 2.0 High speed** will support for high-speed devices. **USB 2.0 High Speed** is suitable for high-performance devices such as high-density storage devices. In addition, **USB 2.0 High Speed** supports old USB 1.0/1.1 software and peripherals, offering impressive and even better compatibility to customers



DVD Player System Diagram Using MT1389L

Key Features

- RF/Servo/MPEG Integration
- DivX Home Theater Level MPEG4 ASP Video decoder
- Support Nero-Digital
- Support DivX Ultra
- High Performance Audio Processor
- Progressive Scan
- 108MHz/12-bit, 4 CH TV Encoder
- Internal 6CH Audio DAC
- Internal 2CH Audio ADC
- USB2.0 High Speed (Host/Device)
- 3-in-1 MS/SD/MMC reader

Applications

Standard DVD Players

¹ DivX is a trademark of DivXNetworks

² **USB High Speed** : 480Mbit/sec. USB Full Speed : 12Mbit/sec.

Pin	Main	Alt.	Type	Description
Analog Interface (66)				
125	RFIP		Analog Input	AC coupled DVD RF signal input RFIP
126	RFIN	OPOUT	Analog Input	AC coupled DVD RF signal input RFIN
127	RFG	OPINP	Analog Input	Main beam, RF AC input path
128	RFH	OPINN	Analog Input	Main beam, RF AC input path
1	RFA		Analog Input	RF main beam input A
2	RFB		Analog Input	RF main beam input B
3	RFC		Analog Input	RF main beam input C
4	RFD		Analog Input	RF main beam input D
5	RFE		Analog Input	RF sub beam input E
6	RFF		Analog Input	RF sub beam input E
7	AVDD18_2		Analog power	Analog 1.8V power
8	AVDD33_1		Analog Power	Analog 3.3V power
9	XTALI		Input	27MHz crystal input
10	XTALO		Output	27MHz crystal output
11	AGND33		Analog Ground	Analog Ground
12	V20		Analog output	Reference voltage 2.0V
13	V14		Analog output	Reference voltage 1.4V
14	REXT		Analog Input	Current reference input. It generates reference current for RF path. Connect an external 15K resistor to this pin and AVSS
15	MDI1		Analog Input	Laser power monitor input

Pin	Main	Alt.	Type	Description
16	MDI2		Analog Input	Laser power monitor input
17	LDO1		Analog Output	Laser driver output
18	LDO2		Analog Output	Laser driver output
19	AVDD33_2		Analog Power	Analog 3.3V power
20	DMO		Analog Output	Disk motor control output. PWM output
21	FMO		Analog Output	Feed motor control. PWM output
22	TRAY_OPEN		Analog Output	Tray PWM output/Tray open output
23	TRAY_CLOSE		Analog Output	Tray PWM output/Tray close output
24	TRO		Analog Output	Tracking servo output. PDM output of tracking servo compensator
25	FOO		Analog Output	Focus servo output. PDM output of focus servo compensator
26	FG	GPIO2	Analog	1) Motor Hall sensor input 2) GPIO
27	USB_DP		Analog Inout	USB port DPLUS analog pin
28	USB_DM		Analog Inout	USB port DMINUS analog pin
29	VDD33_USB		USB Power	USB Power pin 3.3V
30	VSS33_USB		USB Ground	USB ground pin
31	PAD_VRT		Analog Inout	USB generating reference current
32	VDD18_USB		USB Power	USB Power pin 1.8V
95	DACVDDC		Power	3.3V power pin for video DAC circuitry
96	VREF		Analog	Bandgap reference voltage
97	FS		Analog	Full scale adjustment (suggest to use 560 ohm)
98	DACVSSC		Ground	Ground pin for video DAC circuitry
99	CVBS		Analog	Analog composite output
100	DACVDDB		Power	3.3V power pin for video DAC circuitry
101	DACVDDA		Power	3.3V power pin for video DAC circuitry
102	Y/G		Analog	Green, Y, SY, or CVBS
103	B/CB/PB		Analog	Blue, CB/PB, or SC

Pin	Main	Alt.	Type	Description
104	R/CR/PR		Analog	Red, CR/PR, CVBS, or SY
105	AADVSS		Ground	Ground pin for 2ch audio ADC circuitry
106	AKIN2		Analog	1) Audio ADC input 2 2) MS_CLK set B 3) MCDATA 4) Audio Mute 5) HSYN/VSYN output 6) C5 7) GPIO
107	ADVCM		Analog	1) 2ch audio ADC reference voltageC 2) C6 3) GPIO
108	AKIN1		Analog	1) Audio ADC input 1 2) MS_D0 set B 3) Audio Mute 4) HSYN/VSYN output 5) C7 6) GPIO
109	AADVDD		Power	3.3V power pin for 2ch audio ADC circuitry
110	APLLVDD3		Power	3.3V Power pin for audio clock circuitry
111	APLLCAP		Analog InOut	APLL external capacitance connection
112	ADACVSS2		Ground	Ground pin for audio DAC circuitry
113	ADACVSS1		Ground	Ground pin for audio DAC circuitry
114	ARF / LFE	GPIO	Analog Output	1) Audio DAC sub-woofer channel output 2) While internal audio DAC not used: a. ACLK b. GPIO
115	ARS	GPIO	Analog Output	1) Audio DAC right Surround channel output 2) While internal audio DAC not used: a. ABCK b. GPIO

Pin	Main	Alt.	Type	Description
116	AR	GPIO	Analog Output	1) Audio DAC right channel output 2) While internal audio DAC not used: a. SDATA2 b. GPIO c. RXD2
117	AVCM		Analog	Audio DAC reference voltage
118	AL	GPIO	Analog Output	1) Audio DAC left channel output 2) While internal audio DAC not used: a. SDATA1 b. GPIO c. RXD1
119	ALS	GPIO	Analog Output	1) Audio DAC left Surround channel output 2) While internal audio DAC not used: a. ALRCK b. GPIO
120	ALF /CENTER	GPIO	Analog Output	1) Audio DAC center channel output 2) While internal audio DAC not used: a. ASDATA0 b. GPIO
121	ADACVDD1		Analog Power	3.3V power pin for audio DAC circuitry
122	ADACVDD2		Analog Power	3.3V power pin for audio DAC circuitry
123	AVDD18_1		Analog Power	Analog 1.8V power
124	AGND18		Analog Ground	Analog Ground
General Power/Ground (7)				
54, 90	DVDD18		Power	1.8V power pin for internal digital circuitry
79	DVSS18		Ground	1.8V Ground pin for internal digital circuitry
50, 68,84	DVDD33		Power	3.3V power pin for internal digital circuitry
60	DVSS		Ground	3.3V Ground pin for internal digital circuitry
Micro Controller , Flash Interface and GPIO(12)				
33	GPIO3	INT#	InOut 8mA, SR PD, SMT	1) General purpose IO 3 2) Microcontroller external interrupt 1
34	GPIO4		InOut 4mA, PD	General purpose IO 4

Pin	Main	Alt.	Type	Description
35	GPIO6		InOut 4mA, PD	General purpose IO 6
36	SF_CS_		InOut 8mA, SR PU, SMT	Serial Flash Chip Select
37	SF_DO		InOut 8mA, SR PD, SMT	Serial Flash Dout
38	SF_DI		InOut 8mA, SR PU, SMT	Serial Flash Din
39	SF_CK		InOut 8mA, SR PD, SMT	Serial Flash Clock
40	UP1_6	SCL	InOut 4mA, SR PU, SMT	1) Microcontroller port 1-6 2) I ² C clock pin
41	UP1_7	SDA	InOut 4mA, SR PU, SMT	1) Microcontroller port 1-7 2) I ² C data pin
42	ICE		Input PD, SMT	Microcontroller ICE mode enable
43	PRST#		Input PU, SMT	Power on reset input, active low
44	IR		Input SMT	IR control signal input
Dram Interface (37) (Sorted by position)				
45	RD0		InOut, 4mA	DRAM data 0

Pin	Main	Alt.	Type	Description
46	RD1		InOut 4mA	DRAM data 1
47	RD2		InOut 4mA	DRAM data 2
48	RD3		InOut 4mA	DRAM data 3
49	RD4		InOut 4mA	DRAM data 4
51	RD5		InOut 4mA	DRAM data 5
52	RD6		InOut 4mA	DRAM data 6
53	RD7		InOut 4mA	DRAM data 7
55	DQM0		InOut 4mA, PD	Data mask 0
56	RD15		InOut 4mA	DRAM data 15
57	RD14		InOut 4mA	DRAM data 14
58	RD13		InOut 4mA	DRAM data 13
59	RD12		InOut 4mA	DRAM data 12
61	RD11		InOut 4mA	DRAM data 11
62	RD10		InOut 4mA	DRAM data 10
63	RD9		InOut 4mA	DRAM data 9
64	RD8		InOut 4mA	DRAM data 8

Pin	Main	Alt.	Type	Description
65	DQM1		InOut 4mA, PD	Data mask 1
66	RCLK		InOut 4mA, PD	Dram clock
67	RA11		InOut 4mA, PD	DRAM address bit 11
69	RA9		InOut 4mA, PD	DRAM address 9
70	RA8		InOut 4mA, PD	DRAM address 8
71	RA7		InOut 4mA, PD	DRAM address 7
72	RA6		InOut 4mA, PD	DRAM address 6
73	RA5		InOut 4mA, PD	DRAM address 5
74	RA4		InOut 4mA, PD	DRAM address 4
75	RWE#		Output 4mA, PD	DRAM Write enable, active low
76	CAS#		Output 4mA, PD	DRAM column address strobe, active low
77	RAS#		Output 4mA, PD	DRAM row address strobe, active low
78	BA0		InOut 4mA, PD	DRAM bank address 0
80	BA1		InOut 4mA, PD	DRAM bank address 1
81	RA10		InOut 4mA, PD	DRAM address 10

Pin	Main	Alt.	Type	Description
82	RA0		InOut 4mA, PD	DRAM address 0
83	RA1		InOut 4mA, PD	DRAM address 1
85	RA2		InOut 4mA, PD	DRAM address 2
86	RA3		InOut 4mA, PD	DRAM address 3
87	GPIO7	CKE	InOut 4mA, PD	1) GPIO 7 2) Dram Clock Enable 3) MS_CLK set A 4) Audio Mute 5) HSYN/VSYN input 6) C0
GPIO (6)				
88	GPIO8		InOut 4mA, PD	1) GPIO8 2) MS_BS set A 3) SD_CLK set A 4) ASDATA2 5) ACLK 6) Audio Mute 7) HSYN/VSYN input 8) C1
89	GPIO9		InOut 4mA, PU	1) GPIO9 2) MS_D0 set A 3) SD_CMD set A 4) ASDATA1 5) ABCK 6) C2 7) RXD1

Pin	Main	Alt.	Type	Description
91	GPIO10		InOut 4mA, PD	1) GPIO10 2) SD_CLK set B 3) SD_D0 set A 4) ASDATA0 5) ALRCK 6) HSYN/VSYN output 7) C3 8) TXD1
92	GPIO11		InOut 4mA, PD	1) GPIO11 2) SD_CMD set B 3) MS_BS set B 4) Audio Mute 5) HSYN/VSYN output 6) C4
93	SPDIF	GPIO12	InOut 2mA, PD	1) SPDIF output 2) GPIO12
94	GPIO13		InOut 4mA, PD	1) GPIO13 2) SD_D0 set B 3) ALRCK 4) Audio Mute 5) YUVCLK

3.5.2 function introduction to CD4558

1. Description

The CD4558 and NJM4558 devices are dual general-purpose operational amplifiers with each half electrically similar to the 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 CD4558 is characterized for operation from 0 °C to 70 °C , and the CD4558 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 TNY275PN

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 I_{pf} parameter tolerance reduces system cost
 - Maximizes MOSFET and magnetics power delivery

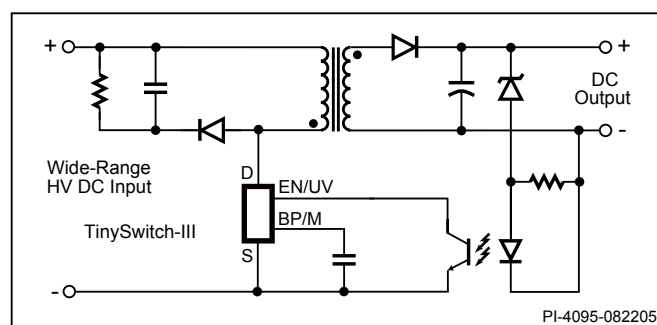


Figure 1. Typical Standby Application.

- 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.

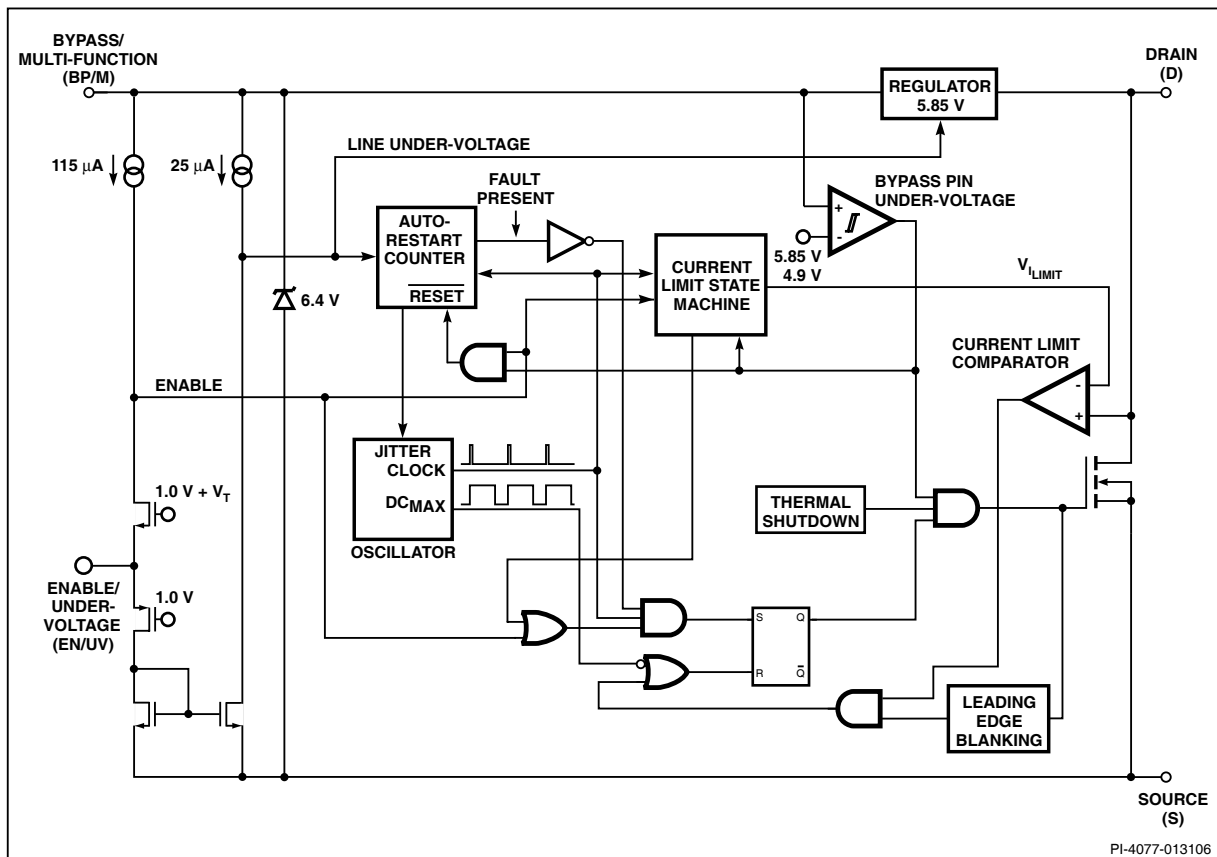


Figure 2. Functional Block Diagram.

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 μ F capacitor results in the standard current limit value. Use of a 1 μ F capacitor results in the current limit being reduced to that of the next smaller device size. Use of a 10 μ F 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

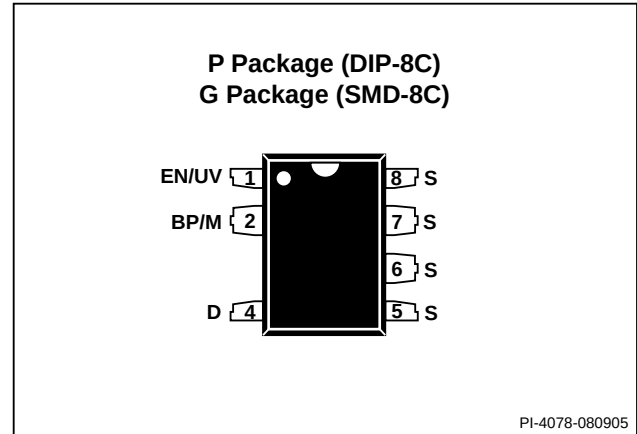


Figure 3. Pin Configuration.

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

3.5.4 function introduction to CD5888 S

1. Description

The CD5888S 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 $V_{cc1} = V_{cc2} = 12V$, 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

3.5.5 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.

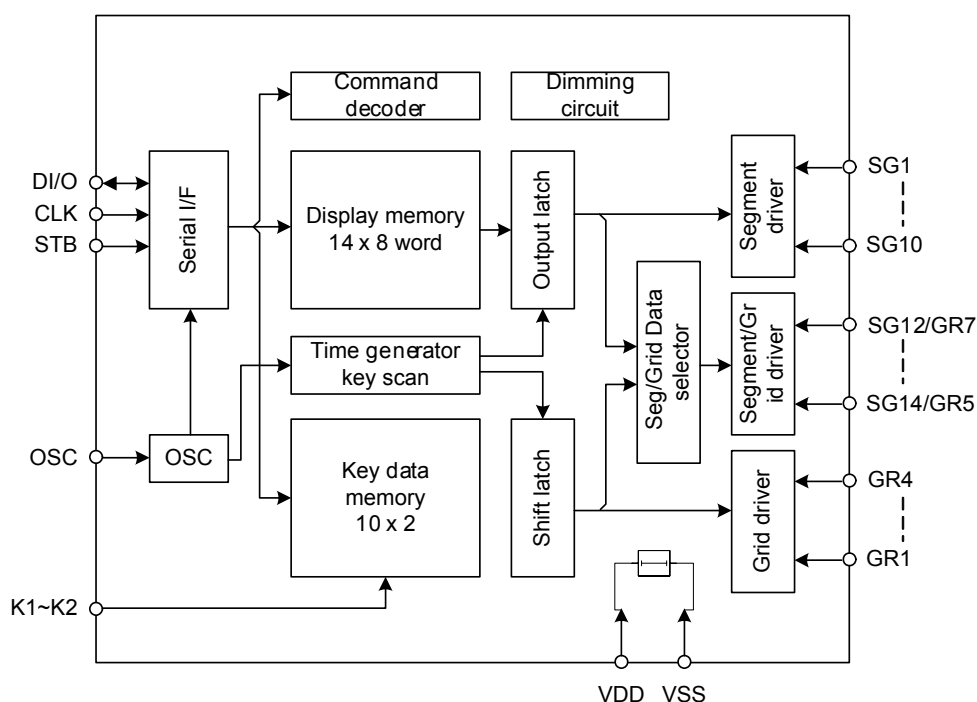
FEATURES

- 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.

3.5.6 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	

3.5.7 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:

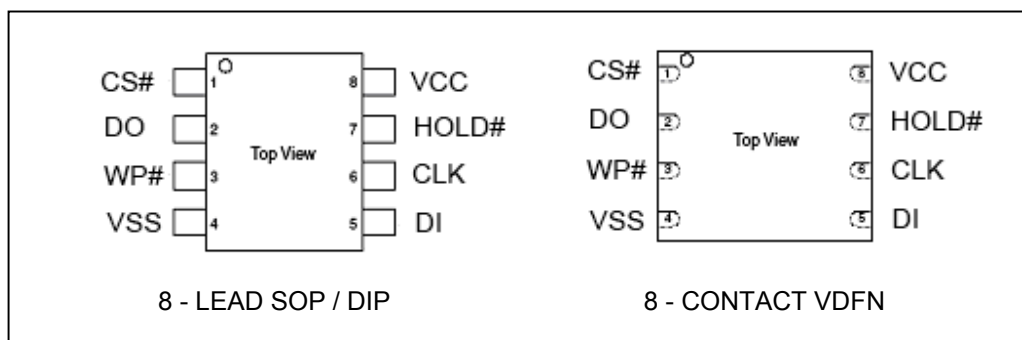


Table 1. PIN Names

Symbol	Pin Name
CLK	Serial Clock Input
DI	Serial Data Input
DO	Serial Data Output
CS#	Chip Enable
WP#	Write Protect
HOLD#	Hold Input
Vcc	Supply Voltage (2.7-3.6V)
Vss	Ground

3.5.8 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.

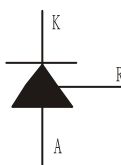


Figure 3.4.12.1 TL431 outside drawing

3.5.9 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.

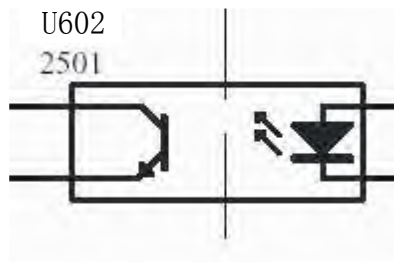


Figure 3.4.13.1 2501 outside drawing

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: DV318SI,DV319SI,DV115SI only have difference in the front panel,so we only use the pictures of DV319SI here.

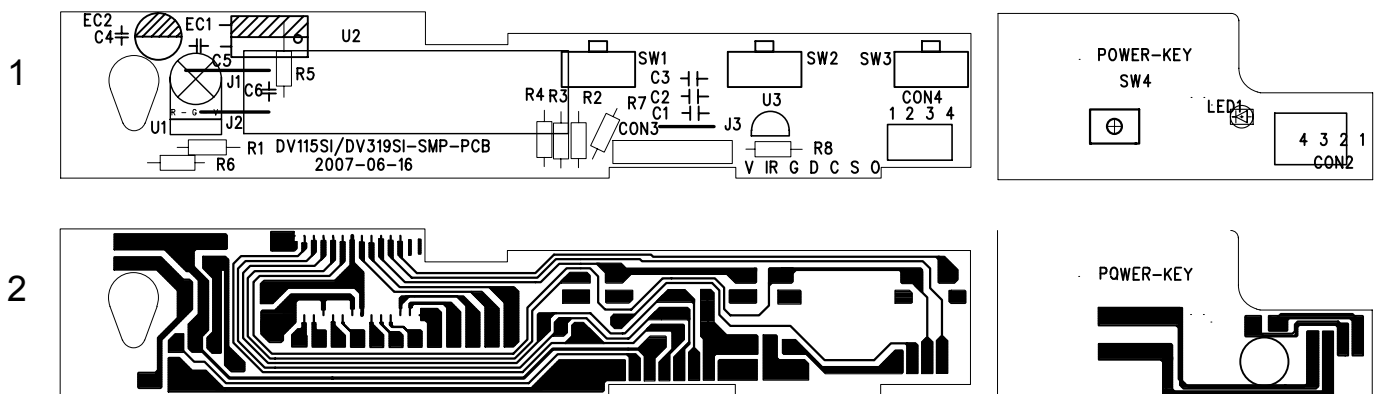
Chapter Cinque

PCB board & Circuit diagram

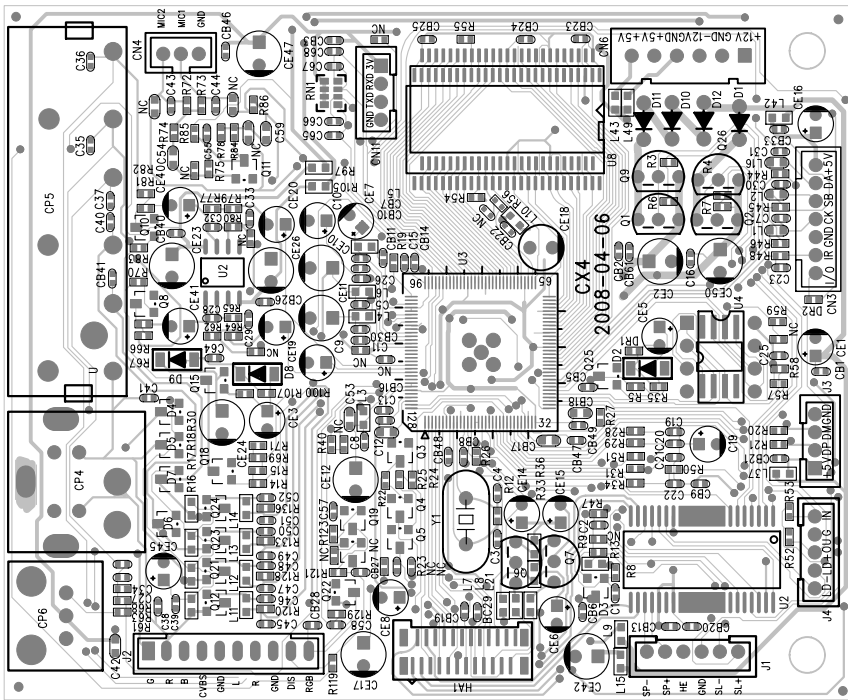
Section One PCB board

5.1.1 Surface layer of KEY SCAN Board

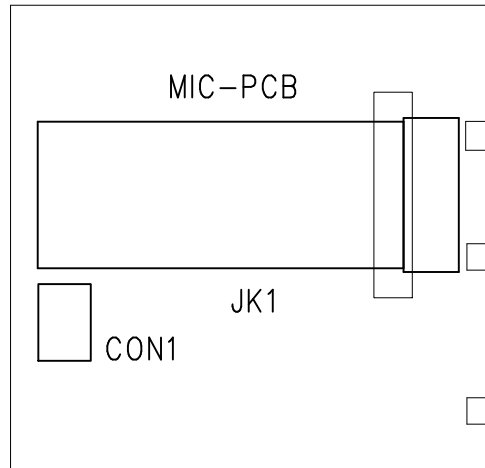
5.1.2 Bottom layer of KEY SCAN Board



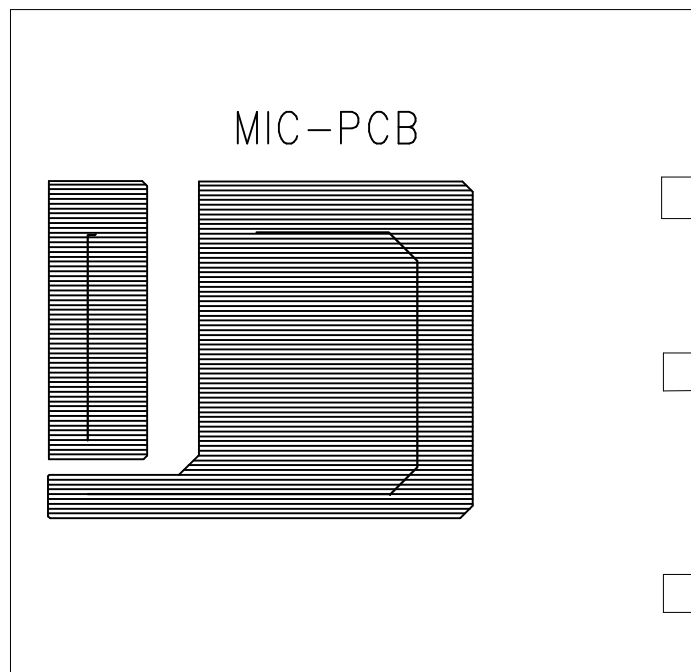
5.1.3 Surface layer of DECODE&SERVO Board (CX4)



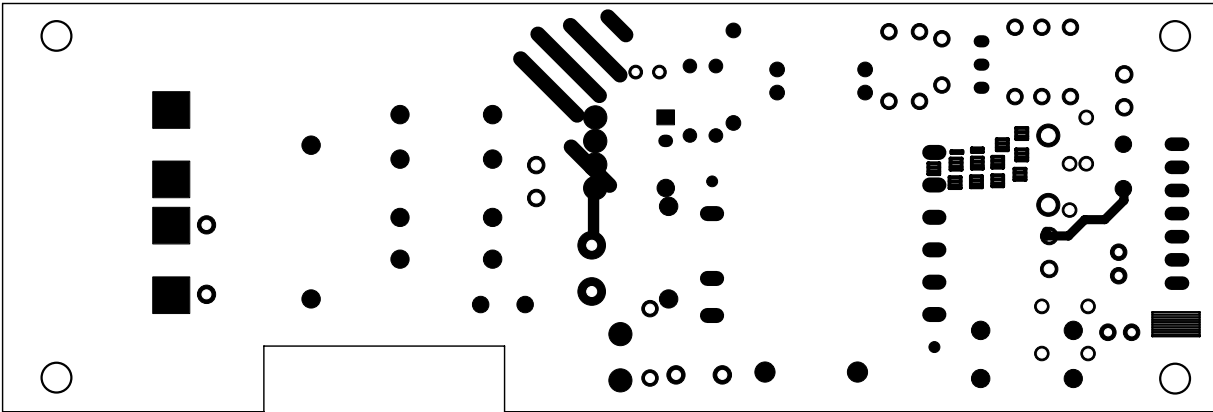
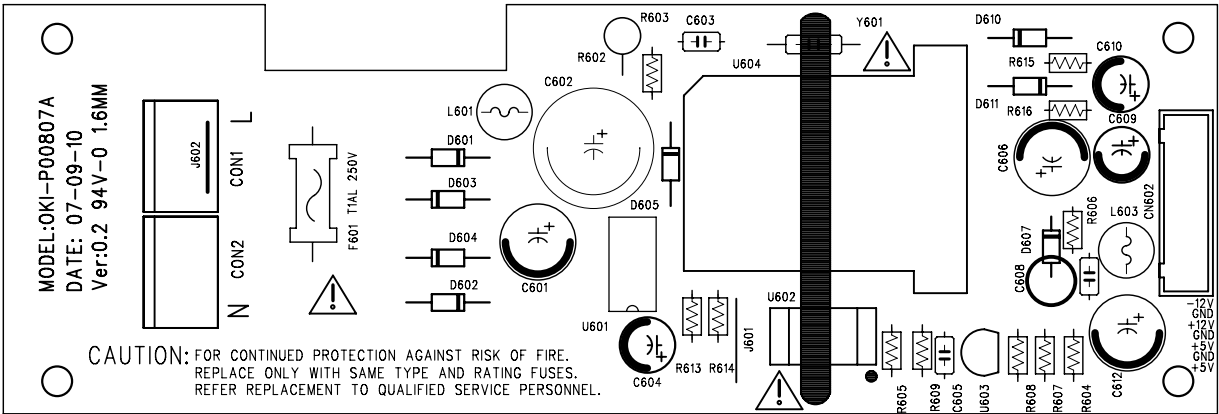
5.1.5 Surface layer of MIC Board



5.1.6 Bottom layer of MIC Board

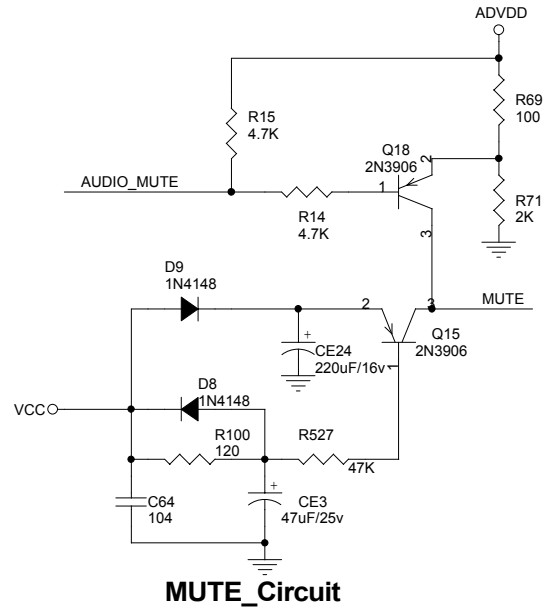
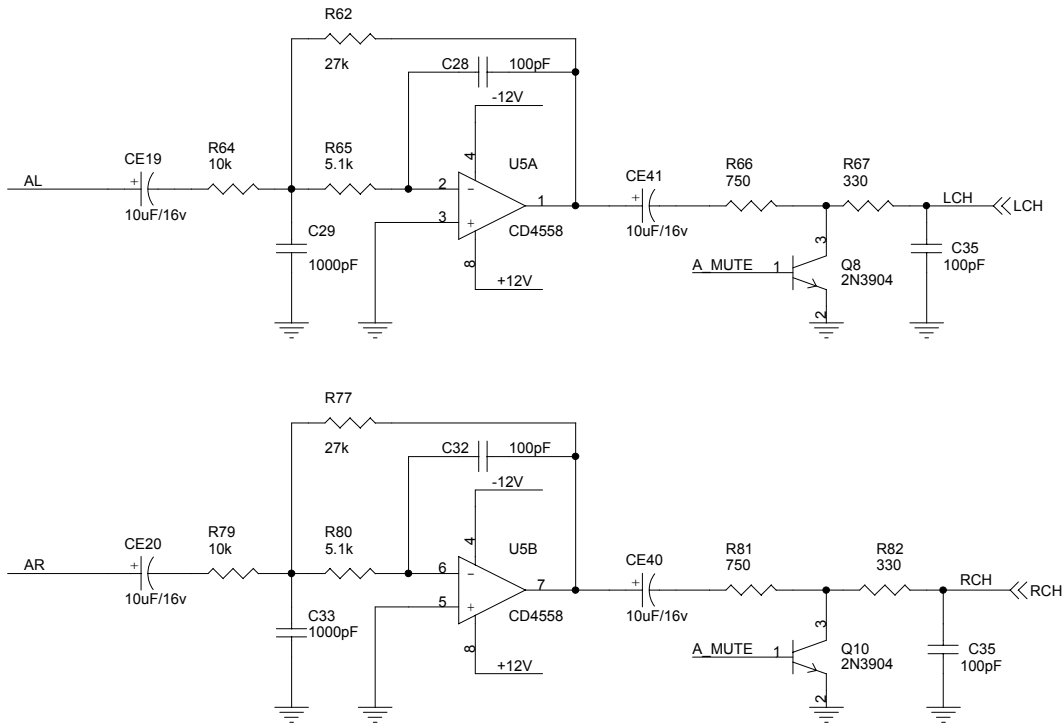


5.1.7 POWER Board

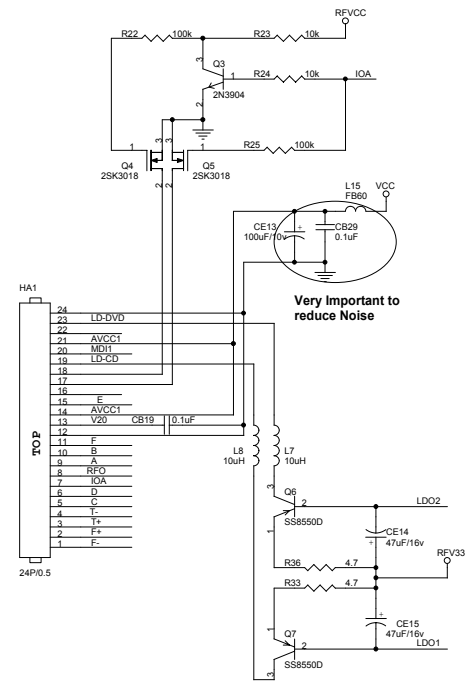
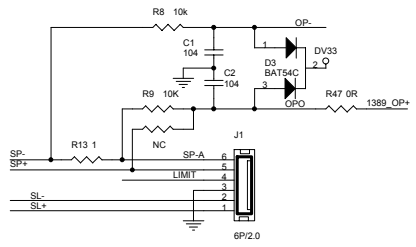
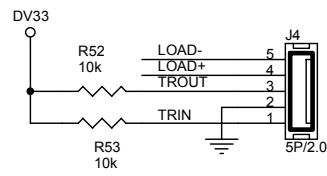
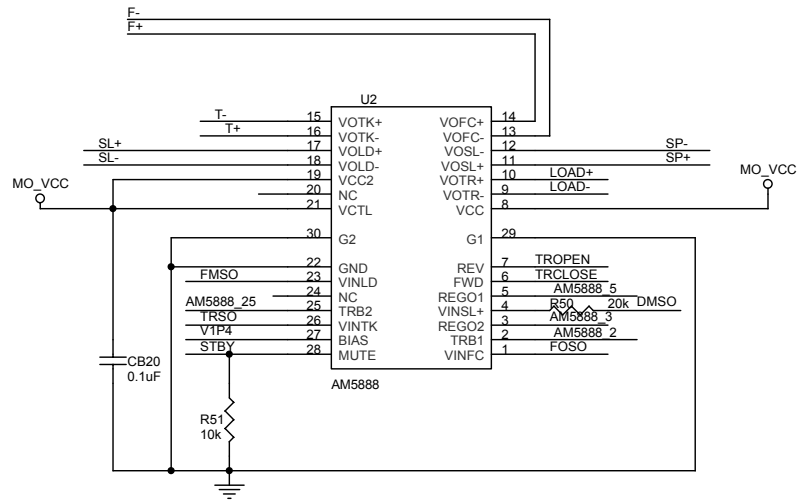


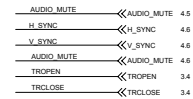
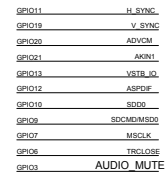
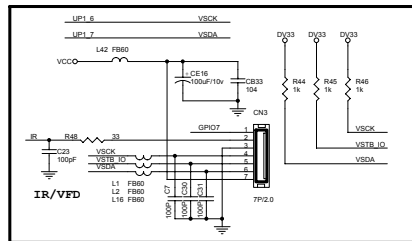
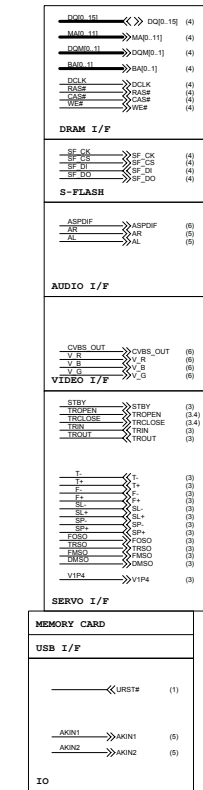
Section Two circuit diagram

5.2.1 DECODE&SERVO Board 1

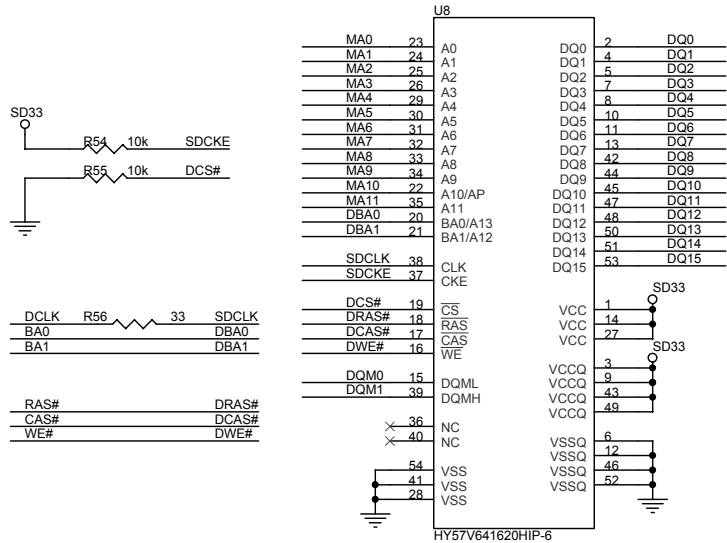


5.2.2 DECODE&SERVO Board 2

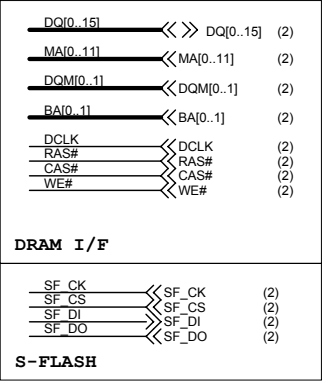
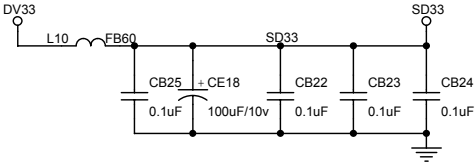
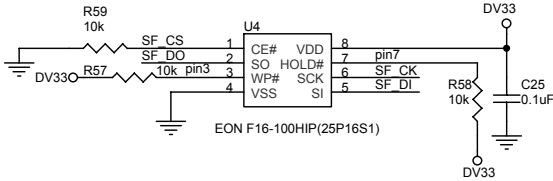




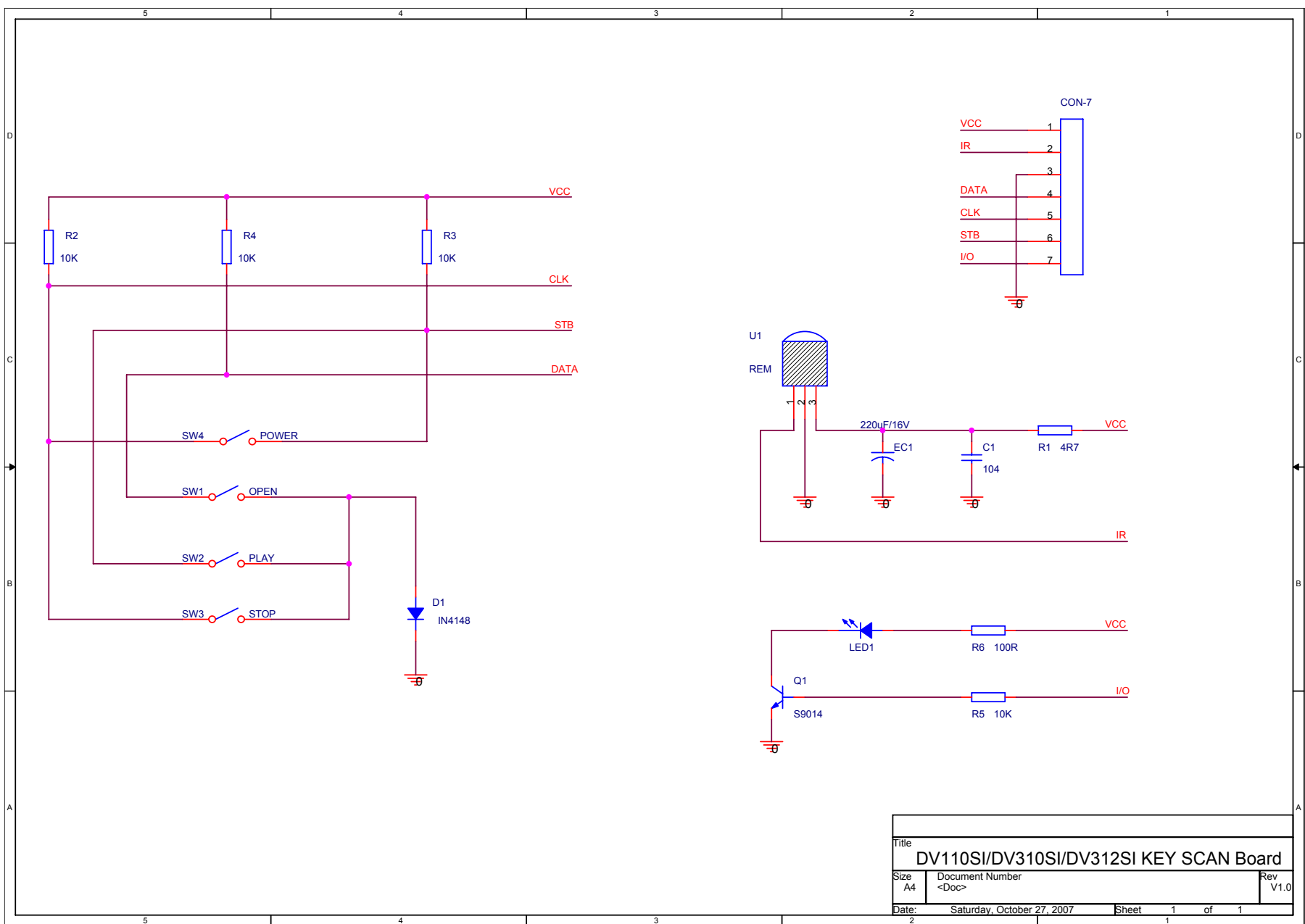
SDRAM



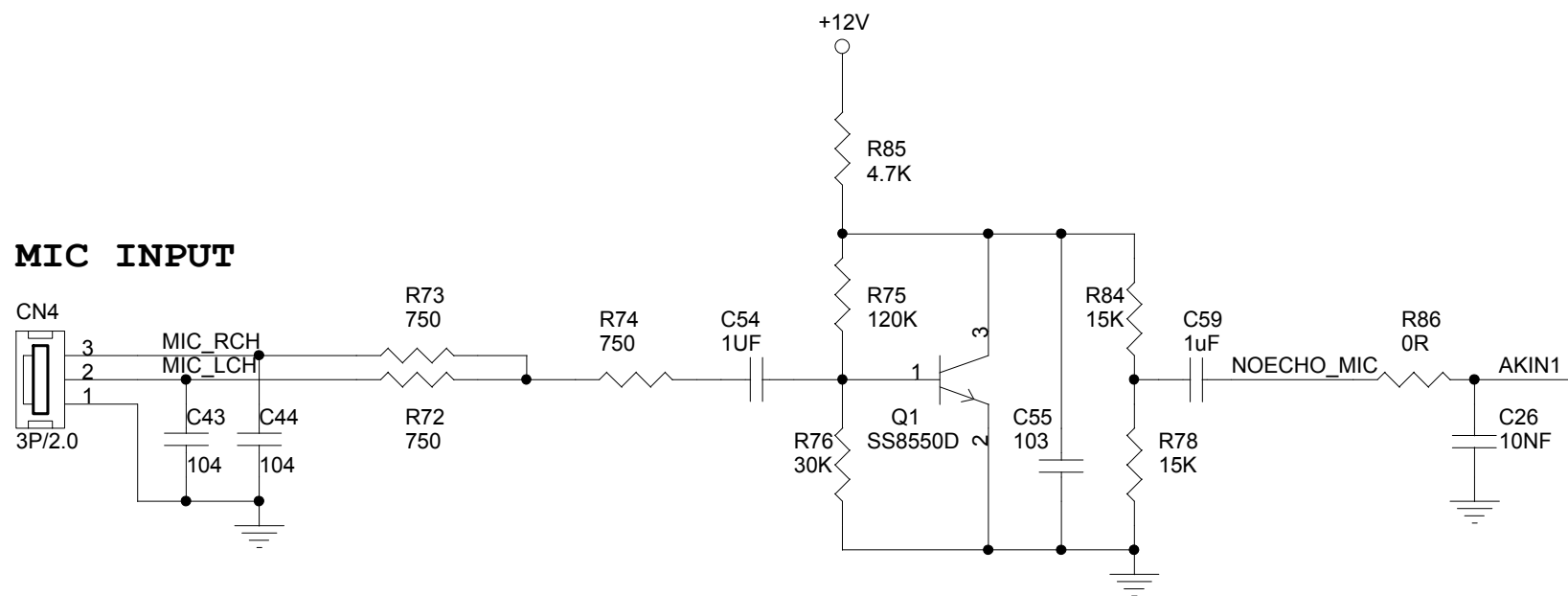
S-FLASH



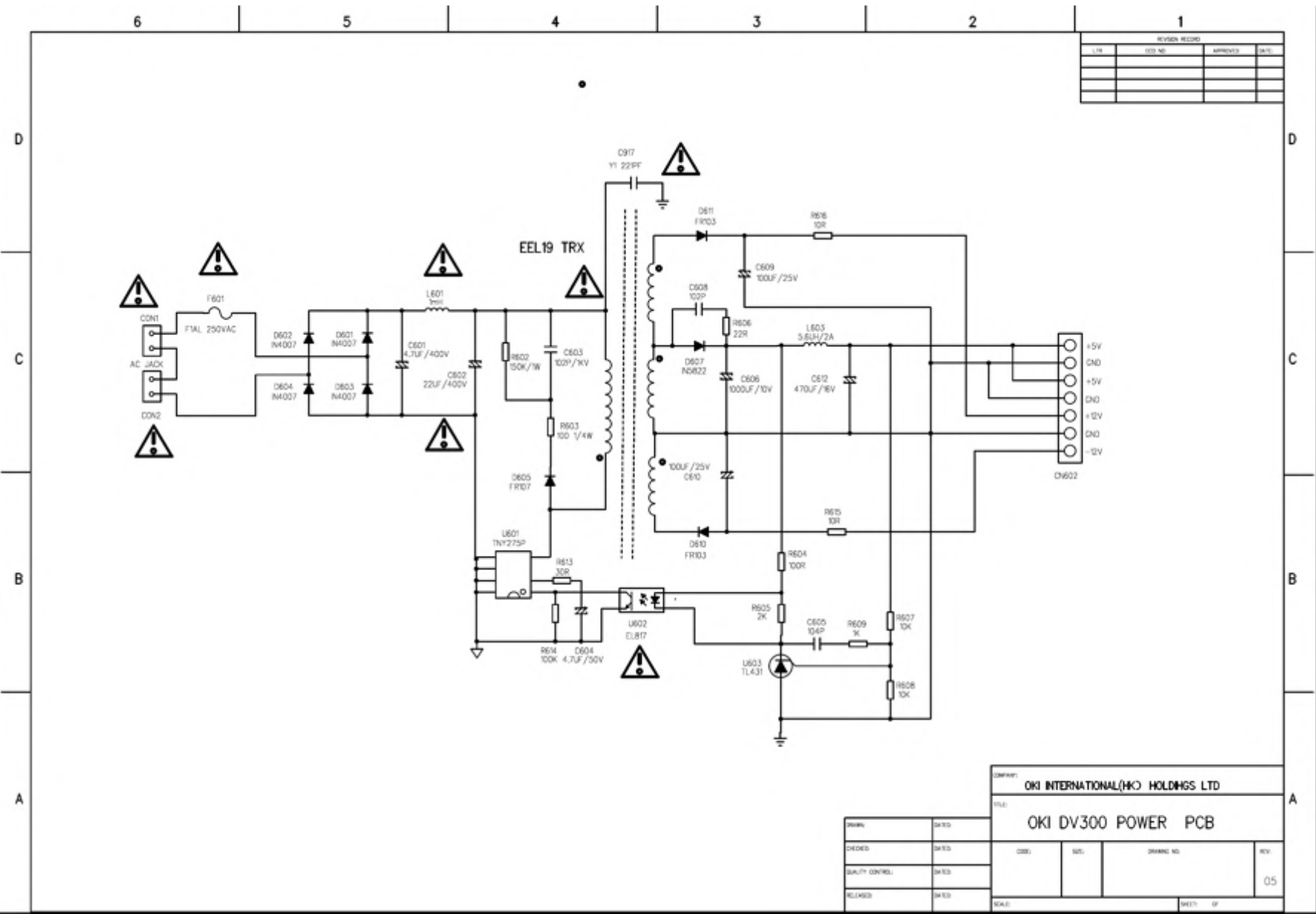
5.2.5 KEY SCAN Board



5.2.6 MIC Board



5.2.7 POWER Board



Chapter Six BOM List

DVD PLAYER DV115SI (RU MTK1389DE-L(VIDEO+S_VIDEO+COAXIAL+2.0CH+SCART))

SERIAL NUMBER	MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	UNIT	QUANTITY	LOCATION
1	803-115S01-0	PANELS COMPONENTS		PCS	1	
2	803-115S03-0	PLASTIC COMPONENTS OF FRONT PANEL		PCS	1	
3	803-115S02-2	FLAT CABLE COMPONENTS		PCS	1	
4	804-115S01-0	HARDWARE COMPONENTS		PCS	1	
4.1	821-051213-0	DECODER BOARD		PCS	1	
4.2	820-010401-01	DVD LOADER COMPONENTS		PCS	1	
4.3	832-807A10-1	POWER BOARD		PCS	1	
5	805-115S01-0	PACKAGE MATERIAL		SETS	1	
6	803-SCAR01-5	SCART BOARD		PCS	1	

BOM LIST VERSION NO.: SI07.08.1

1.DV115SI PANELS COMPONENTS			803-115S01-0			
SERIAL NUMBER	MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	UNIT	QUANTITY	LOCATION
1.1	190-115S07-10	PCB	DV319SI-SMP LED	PCS	1	
1.2	190-0MIC16-40	PCB	DV319SI-MIC.PCB	PCS	1	
1.3	033-AP6928-0	IC	AP6928 SOP28 VDD4.5-5.5V	PCS	1	U2
1.4	135-600099-2	LED DISPLAY	ORANGE 42.1*11*7.75mm -25	PCS	1	
1.5	136-600838-0	RECEIVING HEAD	SMK838	PCS	1	U1
1.6	113-479401-62	CARBON FILM RESISTOR	1/4W 4.7Ω±1%	PCS	1	R1
1.7	113-100405-12	CARBON FILM RESISTOR	1/4W 10Ω±5%	PCS	1	R6
1.8	113-221405-12	CARBON FILM RESISTOR	1/4W 220Ω±5%	PCS	1	R7
1.9	113-103805-12	CARBON FILM RESISTOR	1/8W 10KΩ±5%	PCS	4	R2,R3,R4,R8
1.10	113-513805-12	CARBON FILM RESISTOR	1/8W 51KΩ±5%	PCS	1	R5
1.11	127-107042-0	ELECTROLYTIC CAPACITOR	16V/100uf ±20% 5*7mm	PCS	1	EC2
1.12	127-227042-0	ELECTROLYTIC CAPACITOR	16V/220uf ±20% 6.3*7mm	PCS	1	EC1
1.13	123-101350-1	PORCELAIN CAPACITOR	50V/100pf ±10% Z5U	PCS	3	C1,C2,C3
1.14	123-104370-1	PORCELAIN CAPACITOR	50V/0.1uf +80%-20% Y5V	PCS	3	C4,C5,C6
1.15	147-001100-C	LIGHT TOUCH RESTORE SWITCH	6*6*5mm 180g	PCS	1	SW4
1.16	147-001110-A	LIGHT TOUCH RESTORE SWITCH	KFC-WA3.85 6*6*5mm 180g	PCS	3	SW1,SW2,SW3
1.17	130-00S9014-0	TRANSISTOR	S9014	PCS	1	U3
1.18	130-053007-5	LIGHT EMITTING DIODE	ROUND SHAPE, RED LIGHT	PCS	1	LED1
1.19	172-000070-00	EXTENSIO	L=7.0mm	PCS	1	J3
1.20	172-000090-00	EXTENSIO	L=9.0mm	PCS	1	J2
1.21	172-000110-00	EXTENSIO	L=11.0mm	PCS	1	J1
1.22	501-080806-21	SPONGE	8*8*2mm 8*8DOUBLE PLASTA	PCS	1	LED DISPLAY
1.23	161-3650B2-3	MIC-3P	JS CK6.35-18	PCS	1	MIC1/MIC2
1.24	190-115S22-00	PCB	DV115SI POWER KEY	PCS	1	
1.25	214-0SKY03-0	INDICATOR LIGHT PILLAR	φ4*3.5mm	PCS	1	

2.DV115SI PLASTIC COMPONENTS OF FRONT PANEL					803-115S03-0	
SERIAL NUMBER	MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	UNIT	QUANTITY	LOCATION
2.1	200-115S00-11	FRONT PANEL	DV115SI SILVER	PCS	1	FRONT PANEL
2.2	230-115S00-01	POWER KEY	DV115SI SILVER	PCS	1	FRONT PANEL
2.3	234-115S00-01	PLAY/STOP/OPEN/CLOSE	DV115SI SILVER	PCS	1	FRONT PANEL
2.4	206-115S00-11	CD DOOR	DV115SI SILVER	PCS	1	FRONT PANEL
2.5	254-115S00-11	REFLATIVE MIRROR	DV115SI SILVER	PCS	1	FRONT PANEL

3.DV115SI CABLES COMPONENTS					803-115S02-2	
SERIAL NUMBER	MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	UNIT	QUANTITY	LOCATION
3.1	191-078170-2G	FLAT CABLE	A/7PIN B/8PIN 2.0mm L=160mm	PCS	1	FRONT PANEL TO DECODER BOARD
3.2	191-048300-21	FLAT CABLE	4PIN 2.0mm L=320mm	PCS	1	FRONT PANEL
3.3	191-036200-51	FLAT CABLE	A/3PIN B/2PIN A2.0mm/B2.54mm	PCS	1	MIC BOARD TO DECODER BOARD
3.4	191-053150-24	FLAT CABLE	5PIN 2.0mm L=150mm	PCS	1	DVD LOADER TO DECODER BOARD
3.5	191-063130-20	FLAT CABLE	6PIN 2.0mm L=130mm	PCS	1	DVD LOADER TO DECODER BOARD
3.6	197-242501-0	FLAT CABLE	24PIN 0.55mm L=250mm	PCS	1	DVD LOADER TO DECODER BOARD
3.7	191-073400-3D	FLAT CABLE	A/7PIN B/6PIN 2.54mm L=400mm	PCS	1	POWER BOARD/CN602 TO DECODER BOARD
3.8	191-123080-5D	FLAT CABLE	A/12PIN B/10PIN, A/2.54mm B/2.0mm	PCS	1	SCART OUT TO DECODER BOARD
3.9	171-431120-4	POWER CABLE	(H03VVH2-F): L=1200MM+60MM	PCS	1	POWER SWITCH TO POWER BOARD

4.DV115SI HARDWARE COMPONENTS					804-115S01-0	
SERIAL NUMBER	MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	UNIT	QUANTITY	LOCATION
4.4	303-115S03-10	BOTTOM COVER	DV115SI 360*38*195mm SFCC S	PCS	1	
4.5	301-115S03-10	BACK PANEL	DV115SI 360*38mm SFCC SILVER	PCS	1	
4.6	302-115S03-02	TOP COVER	DV115SI 360*38*195mm SFCC S	PCS	1	
4.7	315-115S24-0	METAL FRAME OF PANEL	DV115SI-FRONT PANEL	PCS	1	FRONT PANEL
4.8	315-115S12-0	PILLAR	N TYPE	PCS	1	
4.9	368-301706-2	SELF-TAPPING SCREW	7PWB3*6	PCS	1	BOTTOM COVER/FRONT PANEL
4.10	358-300106-2	SELF-TAPPING SCREW	6BB3*6	PCS	6	TOP COVER
4.11	358-300106-2	SELF-TAPPING SCREW	6BB3*6	PCS	1	BACK COVER/BOTTOM COVER
4.12	367-301506-2	SELF-TAPPING SCREW	5KB3*6	PCS	2	TWO SIDES OF FRONT PANEL
4.13	368-301708-2	SELF-TAPPING SCREW	7PWB3*8	PCS	4	LOADER
4.14	358-300113-2	SELF-TAPPING SCREW	BB3*13	PCS	4	POWER BOARD
4.15	358-300113-2	SELF-TAPPING SCREW	BB3*13	PCS	2	DECODER BOARD
4.16	361-200006-0	SELF-TAPPING SCREW	PA2*6	PCS	2	BUTTONS
4.17	364-300606-1	SELF-TAPPING SCREW	PB3*6	PCS	5	PCB BOARD OF FRONT PANEL
4.18	364-300606-1	SELF-TAPPING SCREW	PB3*6	PCS	2	MIC SOCKET
4.19	364-300606-1	SELF-TAPPING SCREW	PB3*6	PCS	2	METAL FRAME OF FRONT PANEL
4.20	368-301704-2	SELF-TAPPING SCREW	7PWB3*4	PCS	4	METAL FRAME OF FRONT PANEL
4.21	358-300108-1	SELF-TAPPING SCREW	6BB3*8	PCS	2	SCART BOARD
4.22	358-300108-1	SELF-TAPPING SCREW	6BB3*8	PCS	4	DECODER BOARD SOCKET
4.23	283-331108-0	PILLAR	D3.3*11*8 H=8MM	PCS	4	POWER BOARD
4.24	283-331108-0	PILLAR	D3.3*11*8 H=8MM	PCS	2	DECODER BOARD
4.24	530-318S00-0	INSULATION PAPER	PVC , 90*75*0.3	PCS	1	POWER BOARD
4.25	530-318S00-1	INSULATION PAPER	PVC,100*60*0.25	PCS	1	TOP COVER
4.26	281-088801-0	PLASTIC TIE	L=125MM , WIDTH=10MM	PCS	1	BACK COVER
4.27	280-100102-0	PLASTIC TIE	L=100MM , WIDTH=2MM	PCS	2	INSIDE CABLES
4.28	511-350402-12	RUBBER MAT	35*4*2.5MM	PCS	2	TOP SIDE OF LOADER FRAME
4.29	502-140040-11	SPRRONG CUSHION	EVA90 14*4MM	PCS	2	BOTTOM COVER
4.30	501-181206-11	SPRRONG CUSHION	EVA90 18*12*6MM	PCS	2	BOTTOM COVER
4.31	551-318S01-0	DOUBLE SIDE YELLOW PAPER		PCS	2	INSIDE CABLES

4.1 DV115SI MTK1389DE-L DECODER BOARD COMPONENTS

821-051213-0

SERIAL NUMBER	MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	UNIT	QUANTITY	LOCATION
4.1	821-051213-0	DECODER BOARD	MTK1389DE-L(CX4 2008-04-06)	PCS		
4.1.1	013-000005-00	CHIP RESISTOR	0Ω 0402 1/16W ±5% "SMD"	PCS	4	R47,R40,R86,DR2
4.1.2	013-109005-10	CHIP RESISTOR	1Ω 0603 1/10W ±5% "SMD"	PCS	1	R13
4.1.3	013-479005-10	CHIP RESISTOR	4.7Ω 0603 1/10W ±5% "SMD"	PCS	2	R33,R36
4.1.4	013-330005-00	CHIP RESISTOR	33Ω 0402 1/16W ±5% "SMD"	PCS	2	R56,R48
4.1.5	013-330005-10	CHIP RESISTOR	33Ω 0603 1/10W ±5% "SMD"	PCS	2	R97,R105
4.1.6	013-680005-00	CHIP RESISTOR	68Ω 0402 1/16W ±5% "SMD"	PCS	1	R61
4.1.7	013-750001-10	CHIP RESISTOR	75Ω 0603 1/10W ±1% "SMD"	PCS	4	R16,R17,R18,R30
4.1.8	013-910005-00	CHIP RESISTOR	91Ω 0402 1/16W ±5% "SMD"	PCS	1	R68
4.1.9	013-121005-00	CHIP RESISTOR	120Ω 0402 1/16W ±5%	PCS	1	R100
4.1.10	013-101001-00	CHIP RESISTOR	100Ω 0402 1/16W ±1%	PCS	1	R69
4.1.11	013-151005-00	CHIP RESISTOR	150Ω 0402 1/16W ±5%	PCS	5	R63,R136,R133,R128,R120
4.1.12	013-331005-00	CHIP RESISTOR	330Ω 0402 1/16W ±5%	PCS	2	R82,R67
4.1.13	013-751005-00	CHIP RESISTOR	750Ω 0402 1/16W ±5%	PCS	7	R81,R83,R70,R66,R72,R73,R74
4.1.14	013-102005-00	CHIP RESISTOR	1K 0402 1/16W ±5% "SMD"	PCS	6	R44,R45,R46,R119,R121,R35
4.1.15	013-202005-00	CHIP RESISTOR	2K 0402 1/16W ±5% "SMD"	PCS	3	R71,R107,R19,
4.1.16	013-472005-00	CHIP RESISTOR	4.7K 0402 1/16W ±5%	PCS	4	R14,R15,R85,R6
4.1.17	013-512005-00	CHIP RESISTOR	5.1K 0402 1/16W ±5%	PCS	3	R27,R65,R80
4.1.18	013-822005-00	CHIP RESISTOR	8.2K 0402 1/16W ±5%	PCS	1	R3
4.1.19	013-103005-00	CHIP RESISTOR	10K 0402 1/16W ±5% "SMD"	PCS	20	R55,R4,R54,R79,R57,R58,R59,DR1,R5,R52,R53,R34,R51,R8,R9,R23,R24,R123,R129,R64
4.1.20	013-153005-00	CHIP RESISTOR	15K 0402 1/16W ±5% "SMD"	PCS	6	R78,R84,R20,R21,R31,R26
4.1.21	013-183005-00	CHIP RESISTOR	18K 0402 1/16W ±5% "SMD"	PCS	1	R7
4.1.22	013-203005-00	CHIP RESISTOR	20K 0402 1/16W ±5% "SMD"	PCS	1	R50
4.1.23	013-273005-00	CHIP RESISTOR	27K 0402 1/16W ±5% "SMD"	PCS	4	R28,R29,R62,R77
4.1.24	013-104005-00	CHIP RESISTOR	100K 0402 1/16W ±5% "SMD"	PCS	3	R25,R22,R12
4.1.25	013-124005-00	CHIP RESISTOR	120K 0402 1/16W ±5% "SMD"	PCS	1	R75
4.1.26	017-472115-10	CHIP RESISTOR AR	4.7K*4 0603 1/10W ±5%	PCS	1	RN1
4.1.27	023-270040-00	CHIP CAPACITOR	27PF 16V ±5% 0402	PCS	2	C3,C4
4.1.28	023-221040-00	CHIP CAPACITOR	220PF 16V ±5% 0402	PCS	1	C13
4.1.29	023-101040-00	CHIP CAPACITOR	100PF 16V ±5% 0402	PCS	31	C66,C67,C68,C35,C36,C37,C23,C7,C30,C31,C32,C28,C65,CB27,C58,C45,C46,C47,C48,C49,C50,C51,C52,C38,C41,C39,C40,C25,C57,CB41,C27
4.1.30	023-331041-00	CHIP CAPACITOR	330PF 16V ±10% 0402	PCS	2	C19,C20
4.1.31	023-102041-00	CHIP CAPACITOR	1000PF 16V ±10% 0402	PCS	2	C33,C29
4.1.32	023-152041-00	CHIP CAPACITOR	1500PF 16V ±10% 0402	PCS	1	C11
4.1.33	023-682041-00	CHIP CAPACITOR	6800PF 16V ±10% 0402	PCS	1	C5
4.1.34	023-103041-00	CHIP CAPACITOR	10nF 16V ±10% 0402	PCS	2	C55,C26
4.1.35	023-153041-00	CHIP CAPACITOR	15nF 16V ±10% 0402	PCS	1	C22

4.1.36	023-105041-10	CHIP CAPACITOR	1UF 16V ±10% 0603	PCS	7	C54,C59,CB17,CB18,C42,C12,C53
4.1.37	023-104042-00	CHIP CAPACITOR	100nF 16V ±20% 0402	PCS	40	CB33,CB24,CB23,C44,CB2,C16,CB22,CB25,CB26,C64,CB30,CB7,C15,CB61,CB21,CB9,CB20,C1,C2,CB29,CB19,CB8,C8,C43,C34,CB3,CB5,CB10,CB11,CB13,CB14,CB16,CB28,CB49,CB1,CB6,C21,CB47,CB
4.1.38	127-106058-0	CAPACITOR	10uF/25V +80% -20% 4*7mm	PCS	7	CE20,CE19,CE41,C9,CE3,CE7,CE5
4.1.39	127-476048-0	CAPACITOR	47uF/16V +80% -20% 4*7mm	PCS	8	CE46,C10,CE9,CE6,CE15,CE14,CE8,CE45
4.1.40	127-107038-0	CAPACITOR	100uF/10V +80% -20% 5*8mm	PCS	4	CE16,CE18,CE11,CE1
4.1.41	127-227048-0	CAPACITOR	220uF/16V +80/-20% 6.3*8mm	PCS	10	CE2,CE50,CE23,CE10,CE26,CE24,CE17,CE42,CE12,CE47
4.1.42	005-189100-0	INDUCTANCE	1.8uH 0603 ±10%	PCS	4	L11,L12,L13,L14
4.1.43	085-600R25-1	CHIP BEAD	FB600/0603 (60Ω)	PCS	15	L42,L43,L49,L1,L2,L3,L37,L10,L4,L6,L5,L9,L15,L21,L16
4.1.44	005-100100-0	INDUCTANCE	10uH 0603 ±10%	PCS	2	L7,L8
4.1.45	030-004148-1	DIODE	1N4148, LL-34	PCS	3	D2,D8,D9
4.1.46	030-06T54C-0	DIODE ARRAYS	BAT54C/SOT23 P(NN)P	PCS	1	D3
4.1.47	130-004004-0	DIODE	1N4004 1/2W	PCS	4	D1,D10,D12,D11
4.1.48	031-2N3904-0	TRIODE	2N3904 (SOT-23) 1W PNP SMD	PCS	6	Q8,Q10,Q11,Q25,Q3,Q19
4.1.49	031-2N3906-0	TRIODE	2N3906(SOT-23) 1W PNP SMD	PCS	7	Q12,Q21,Q23,Q24,Q15,Q22,Q18
4.1.50	030-06AV99-0	DIODE ARRAYS	BAV99/SOT23 1W P(NP)N	PCS	4	D4,D5,D6,D7
4.1.51	131-S8550D-0	TRIODE	SS8550D IW (DIP EBC)	PCS	6	Q1,Q2,Q9,Q26,Q6,Q7
4.1.52	030-003018-0	DIODE	2SK3018 SOT-23	PCS	2	Q4,Q5
4.1.53	060-124051-0	FPC SOCKET	24PIN 0.5MM	PCS	1	HA1
4.1.54	161-134154-0	RCA SOCKET	AV-6-803A φ3.4MM	PCS	1	CP5
4.1.55	161-500002-0	S-VIDEO	7PIN	PCS	1	CP4
4.1.56	160-010200-0	PIN SOCKET	PH-10A 10PIN 2.0MM	PCS	1	J1
4.1.57	160-005200-0	PIN SOCKET	PH-5A 5PIN 2.0MM	PCS	1	J4
4.1.58	160-003200-0	PIN SOCKET	PH-3A 3PIN 2.0MM	PCS	1	CN4
4.1.59	160-006300-0	PIN SOCKET	XH-6A 6PIN 2.5MM	PCS	1	CN6
4.1.60	160-006200-0	PIN SOCKET	PH-6A 6PIN 2.0MM	PCS	1	J2
4.1.61	160-004200-0	PIN SOCKET	PH-4A 4PIN 2.0MM	PCS	1	J3
4.1.62	160-007200-0	PIN SOCKET	PH-7A 7PIN 2.0MM	PCS	1	CN3
4.1.63	033-1389DE-1	IC	MT1389DE-L/SMD LQFP-128	PCS	1	U3
4.1.64	033-641620-2	IC	HY57V641620ETP	PCS	1	U8
4.1.65	033-CD5888-0	IC	IC: CD5888CB	PCS	1	U2
4.1.66	033-CD4558-0	IC	CD4558 / SOP-8	PCS	1	U5
4.1.67	033-000F16-0	IC	EON F16-100HIP(25P16SI)	PCS	1	U4
4.1.68	137-270000-30	CRYSTAL OSCILLATOR	27MHZ	PCS	1	Y1
4.1.69	190-138902-42	PCB	CX4 2008-4-06 77*95MM H=1.2MM	PCS	1	

4.2 DV115SI LOADER COMPONENTS				820-010401-01		
SERIAL NUMBER	MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	UNIT	QUANTITY	LOCATION
4.2	820-010401-01	DVD LOADER	SANYO SF-HD85	SET	1	
4.2.1	830-040003-3	DVD LENS(Optical eye only)	SANYO SF-HD85	PCS	1	LOADER
4.2.2	829-810601-2	METAL FRAME OF LOADER	DM34	PCS	1	LOADER
4.2.3	829-810601-1	PLASTIC FRAME OF LOADER	ASA-8106-B01	PCS	1	LOADER
4.2.4	150-300FA6-0	SP MOTOR	RF-300F-12350W D/V5.9	PCS	1	LOADER
4.2.5	150-300EA6-0	SL MOTOR	RF-300EA-1D390 D/V5.9	PCS	1	LOADER
4.2.6	150-0300C5-0	O/C MOTOR	RF-300F-11440Z D/V5.9	PCS	1	LOADER

4.3 DV115SI POWER BOARD COMPONENTS

832-807A10-1

SERIAL NUMBER	MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	UNIT	QUANTITY	LOCATION
4.3	832-807A10-1	POWER BOARD	OKI-P00807A 07-12-17 VER:0.3	SET	1	
4.3.1	133-0EL817-0	IC	EL817B	PCS	1	U602
4.3.2	133-TL431A-0	IC	TL431A TO-92	PCS	1	U603
4.3.3	133-00275P-0	IC	PWM IC PI TNY275PN	PCS	4	U601
4.3.4	130-004007-0	DIODE	1N4007 VRRM=1000V IF=1.0A	PCS	2	D601,D602,D603,D604
4.3.5	130-000104-0	DIODE	FR104 VRRM=400V IF=1.0A	PCS	1	D610,D611
4.3.6	130-000107-0	DIODE	FR104 VRRM=1000V IF=1.0A	PCS	1	D605
4.3.7	130-005822-0	DIODE	IN5822 VRRM=40V IF=3.0A	PCS	1	D607
4.3.8	182-321000-2	FUSE	32S 250V 1A UL Φ3.6*10mm	PCS	1	F601
4.3.9	123-102150-0	PORCELAIN CAPACITOR	100V/1000pF ±10%	PCS	1	C608
4.3.10	123-104370-0	PORCELAIN CAPACITOR	50V/0.1UF +80%-20%	PCS	1	C605
4.3.11	123-102660-0	PORCELAIN CAPACITOR	1000V/1000pF	PCS	1	C603
4.3.12	123-221451-0	Y CAPACITOR	400V/220pF	PCS	1	Y601
4.3.13	127-477042-0	ELECTROLYTIC CAPACITO	16V/470uF ±20% 105℃ (8*12)	PCS	1	C612
4.3.14	127-107052-1	ELECTROLYTIC CAPACITO	25V/100uF ±20% 105℃ (6*12)	PCS	2	C609,C610
4.3.15	127-106052-1	ELECTROLYTIC CAPACITO	25V/10uF ±20% 105℃ (5*11)	PCS	1	C604
4.3.16	127-226402-3	ELECTROLYTIC CAPACITO	400V/22uF ±20% 105℃ (13*22)	PCS	4	C602
4.3.17	127-475402-0	ELECTROLYTIC CAPACITO	400V/4.7uF ±20% 105℃ (8*12)	PCS	1	C601
4.3.18	127-108032-3	ELECTROLYTIC CAPACITO	10V/1000uF ±20% 105℃ (8*14)	PCS	1	C606
4.3.19	113-101405-12	CARBON FILM RESISTOR	1/4W 100 ±5	PCS	2	R603
4.3.20	113-220405-12	CARBON FILM RESISTOR	1/4W 22 ±5	PCS	2	R606
4.3.21	113-102805-12	CARBON FILM RESISTOR	1/8W 1k ±5	PCS	1	R609
4.3.22	113-202805-12	CARBON FILM RESISTOR	1/8W 2k ±5	PCS	1	R605
4.3.23	113-101805-12	CARBON FILM RESISTOR	1/8W 100 ±5	PCS	1	R604
4.3.24	113-154A05-12	CARBON FILM RESISTOR	1W 150k ±5	PCS	1	R602
4.3.25	113-300805-12	CARBON FILM RESISTOR	1/8W 30 ±5	PCS	1	R613
4.3.26	113-104805-12	CARBON FILM RESISTOR	1/8W 100k ±1	PCS	1	R614
4.3.27	113-103801-62	Metal FILM RESISTOR	1/8W 10k ±5	PCS	2	R607,R608
4.3.28	113-100405-12	CARBON FILM RESISTOR	1/4W 10 ±5	PCS	1	R615
4.3.29	172-000050-00	METAL PIN	5mm*0.5mm	PCS	1	R616
4.3.30	105-102101-1	INDUCER	1mH/1A ±10%(6*8)	PCS	1	L601
4.3.31	105-569101-1	INDUCER	5.6uH/2A ±10%(6*8)	PCS	1	L603
4.3.32	101-19EL19-09	TRANSFORMER	OKI-P00807A EEL19 (HC2791-	PCS	2	T601
4.3.33	160-007300-0	SOCKET	7PIN PH=2.5mm (XH-7P 180°)	PCS	1	CN602
4.3.34	160-103420-1	SOCKET	2PIN PH=7.5mm (3.96-3P 180°)	PCS	1	CON2
4.3.35	552-600001-0	YELLOW SILICA GEL		g/pcs		
4.3.36	190-807A01-10	PCB	OKI-P00807A 131*45*1.6MM	PCS	1	
4.3.37	333-0PCB01-0	METAL FILM	4*8mm	PCS	1	
4.3.38	172-000100-00	METAL PIN	10*0.3mm	PCS	1	J601

6.DV115SI PACKAGE MATERIAL				805-115S01-0		
SERIAL NUMBER	MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	UNIT	QUANTITY	LOCATION
5.0	619-566110-3	RCA LINE	YELLOW/RED/WHITE L=1000m	SETS	1	VIDEO/AUDIO R/L OUT
5.1	828-390101-0	REMOTE CONTROL	RC026-01R	PCS	1	
5.2	617-3R0315-3	BATTERY	Zn/Mn02 GP03R 1.5V AAA	PCS	2	REMOTE CONTROL
5.3	630-0RBK01-00	MANUAL	DV319SI	PCS	1	
5.4	631-0RBK49-00	WARRANTY CARD	DV319SI	PCS	1	
5.5	643-111013-08	SERIAL NO. STICKERS	50*10mm	PCS	1	GIFT BOX
5.6	643-211013-08	SERIAL NO. STICKERS	32*10mm	PCS	1	BACK PANEL
5.7	643-411013-08	SERIAL NO. STICKERS	50*10mm	PCS	1	SHIPPING BOX
5.8	643-311013-08	SERIAL NO. STICKERS	24*5mm	PCS	4	WARRANTY
5.9	643-511013-08	SERIAL NO. STICKERS	25*8mm	PCS	1	DVD LOADER FRAME
5.10	650-0RBK02-0	MIC_HEADPHONE PAPER		PCS	1	
5.11	650-0RBK03-0	ADVERTISEMENT PAPER		PCS	1	
5.12	650-0RBK01-0	ADVERTISEMENT PAPER		PCS	1	
5.13	633-0RBK02-0	CIS SERVICE		PCS	1	
5.14	648-115S28-1	UNIT VER. NO. STICKER	15*6mm SI07.08.1	PCS	2	GIFT BOX/BACK PANEL
5.15	648-MPEG28-5	DECODER BOARD VER. NO.	10*6mm V4.7	PCS	1	DECODER BOARD
5.16	648-LEAR02-6	ANTI-OPENNING STICKER	25*10mm	PCS	1	UPPER COVER AND BACK PANEL
5.17	648-LEAR02-B	ANTI-OPENNING STICKER		PCS	0.33333	SHIPPING BOX
5.18	600-100101-00	POLYFOAM-L	DV318SI-L	PCS	1	
5.19	600-100102-00	POLYFOAM-R	DV318SI-R	PCS	1	
5.20	600-100104-00	POLYFOAM-MIDDLE	DV318SI-MIDDLE	PCS	1	
5.21	607-0BOX01-0	GIFT BOX HANDEL	DV318SI	SETS	1	GIFT BOX
5.22	602-115S04-08	GIFT BOX	DV318SI 402*105*295mm	PCS	1	
5.23	604-115S04-08	SHIPPING BOX	DV318SI 658*415*315mm	PCS	0.17	
5.24	601-0RBK01-00	PE BAG	430*400mm 0.04mm	PCS	1	DVD UNIT
5.25	601-0RBK02-00	PE BAG	185*278mm 0.04mm	PCS	1	MANUAL
5.26	601-082740-01	PE BAG	80*270*0.04mm	PCS	1	REMOTE CONTROL
5.27	601-072240-01	PE BAG	70*220*0.04mm	PCS	3	AUDIO/VIDEO CABLE
5.28	648-0RBK12-0	COLOR STICKER	Φ5mm SILVER	PCS	0.33333	SHIPPING BOX

6.DV115SI SCART BOARD				803-SCAR01-5		
SERIAL NUMBER	MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	UNIT	QUANTITY	LOCATION
6	190-SCAR12-80	PCB	SCART V1.0	PCS	1	
6.1	162-052120-0	21PIN SCART JACK	21PIN 105	PCS	1	

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:

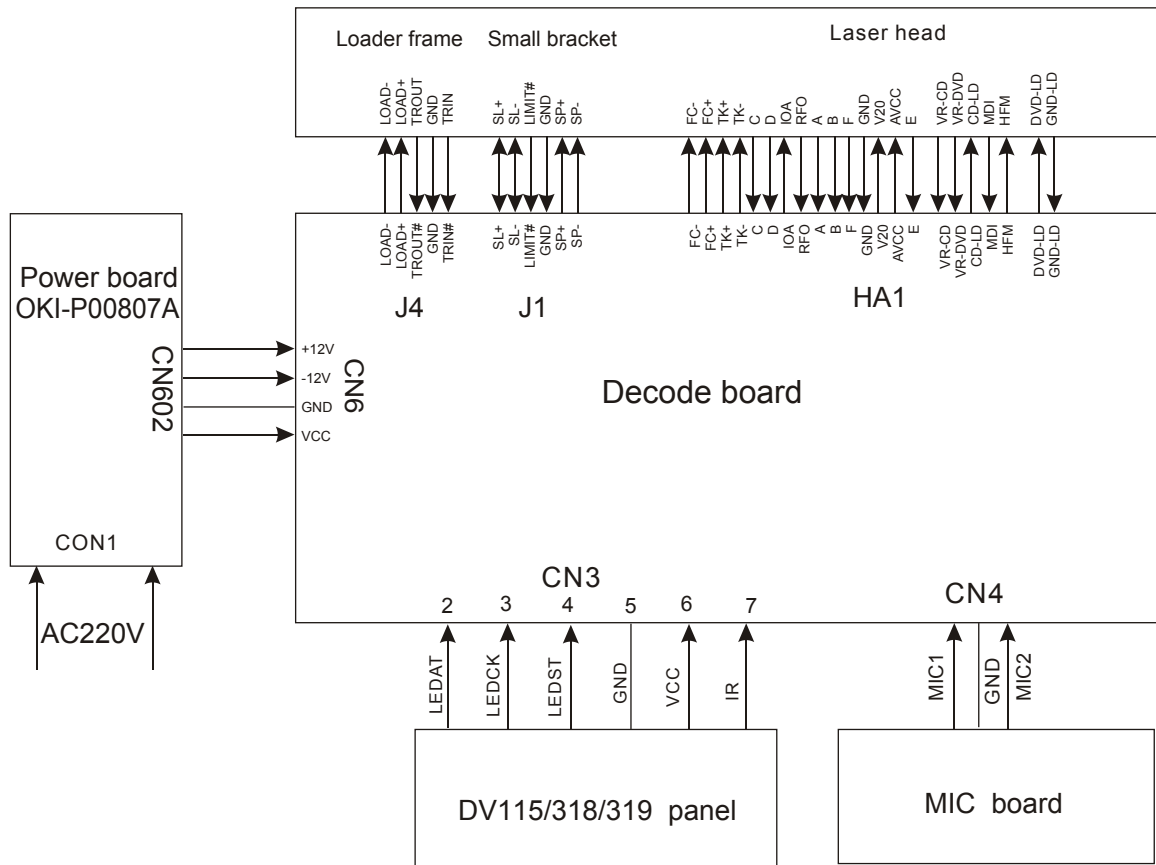
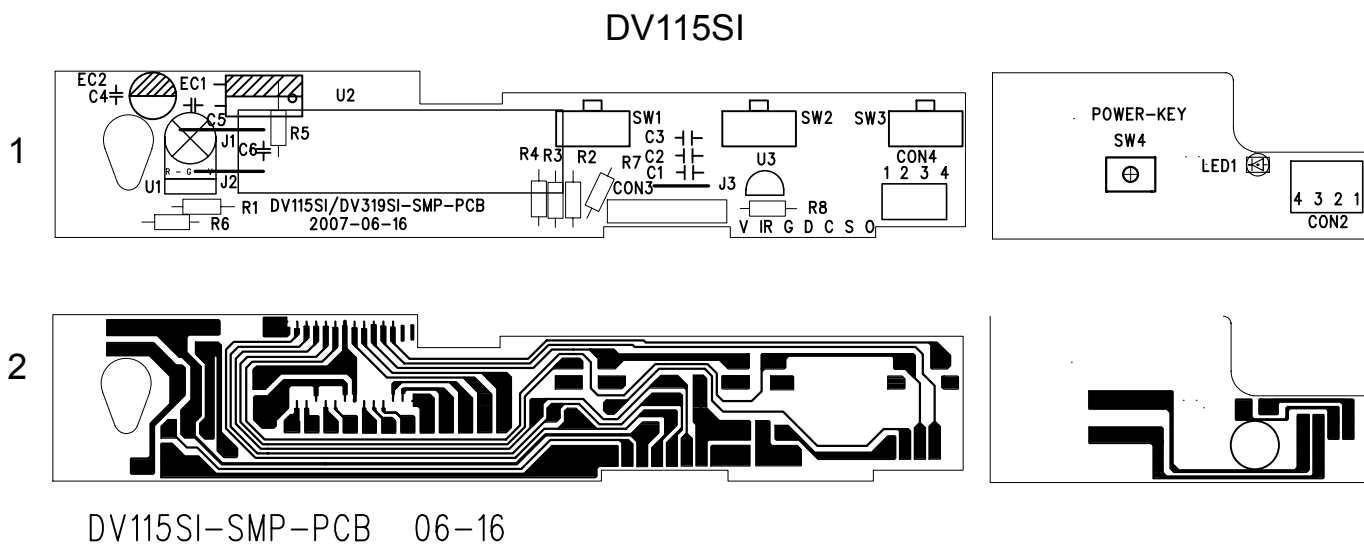


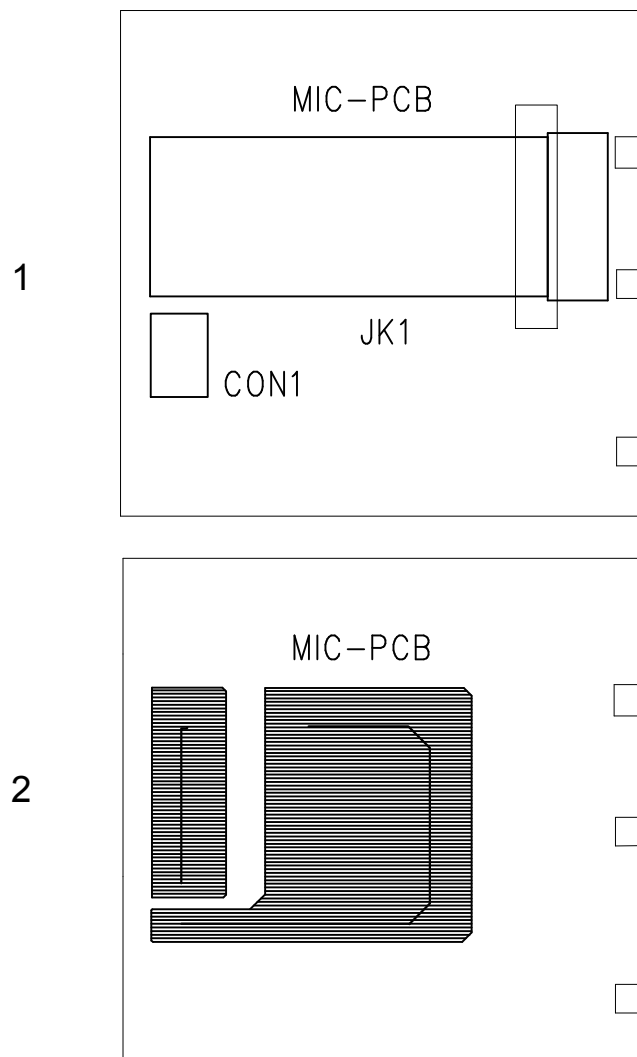
Figure 7.1.1.1 PCB board block diagram of the player

7.3.1 PCB board

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



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



7.3.2 circuit diagram

1.KEY SCAN Board

