

IBK

LT2002S

service manual



Catalog

Chapter One About Maintenance	1
1.1 Safety precautions	1
1.1.1 Power supply	1
1.1.2 Precautions for antistatic	1
1.1.3 Precautions for display screen	1
1.1.4 About placement position	2
1.2 Maintenance method	2
1.2.1 Visualized method	2
1.2.2 Electric resistance method	2
1.2.3 Voltage method	2
1.2.4 Current method	2
1.2.5 Cutting method	2
1.2.6 Element substitution method	3
1.2.7 Comparison method	3
1.3 Required device for maintenance	3
 Chapter Two Operation Instructions	4
2.1 LOCATION AND FUNCTION OF CONTROLS	4
2.1.1 Remote Controller	4
2.1.2 Panel Control	5
2.2 CHANGE SOURCE OPERATION	5
2.3 TV SETUP	6
2.3.1 PICTURE	6
2.3.2 SOUND	7
2.3.3 TV SETTING	7
2.3.4 SYSTEM SETTING	8
2.3.5 NICAM/BILINGUAL RECEIVING	9
2.4 VIDEO SETTING MENU	9
2.5 20.1" TV SPECIFICATION	10
2.6 CHECKING ACCESSORIES	10

Chapter Three Principle and Servicing	11
Section One Principle of the Player	11
3.1.1 Introduction to the player	11
3.1.2 Introduction to IC used by the player	11
3.1.3 Block diagram of the player	12
Section Two Unit Circuit Principle	13
3.2.1 System control circuit	13
1. System reset circuit	13
2. System clock circuit	14
3. System control principle	14
4. IIC bus control circuit	15
5. Working state indication circuit	16
3.2.2 Audio circuit	16
1. “Nicom” processing circuit	17
2. Sound source input selection circuit	18
3. Audio amplifying circuit	18
4. Mute circuit	19
3.2.3 Video circuit	20
1. Video input and A/D conversion circuit	20
2. LCD image processing circuit	20
3. Video output circuit	21
3.2.4 Input circuit	21
1. SCART	21
2. Tuner circuit	22
3.2.5 Power circuit	23
1. Power supply circuit	23
2. Main board power supply circuit	25
3. Voltage stabilizing circuit	23
4. Power control circuit	26
5. Boost control circuit	27
6. Boost circuit	27
Section Three Servicing Cases	30
3.3.1 Servicing cases	30
3.3.2 Troubleshooting flow chart	34
Section Four Waveform diagram	46

Section Five Function Introduction to IC	57
3.5. 1 function introduction to STV8216	57
3.5. 2 function introduction to MST518	60
3.5. 3 function introduction to Mp1430	66
3.5. 4 function introduction to W79E632	67
3.5. 5 function introduction to TVP5146	69
3.5. 6 function introduction to NCP1377	73
3.5. 7 function introduction to TDA7266P	74
3.5. 8 function introduction to La7952	76
3.5. 9 function introduction to Mp1048	76
 Chapter Four Disassembly and Assembly Process	 79
 Chapter Cinque PCB board & Circuit diagram	 82
Section One PCB board	82
Section Two Circuit diagram	90
 Chapter six BOM List	 97

Chapter One About Maintenance

1.1 Safety precautions

1.1.1 Power supply

When maintenance personnel are repairing DVD TV, he should pay special attention to the power with 220V 800V 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 display screen

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

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

1.1.4 About placement position

1. Never place TV in positions with high temperature and humidity.
2. Avoid placing near high magnetic fields, such as loudspeaker or magnet.
3. Positions for placement should be stable and secure.

1.2 Maintenance method

1.2.1 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.

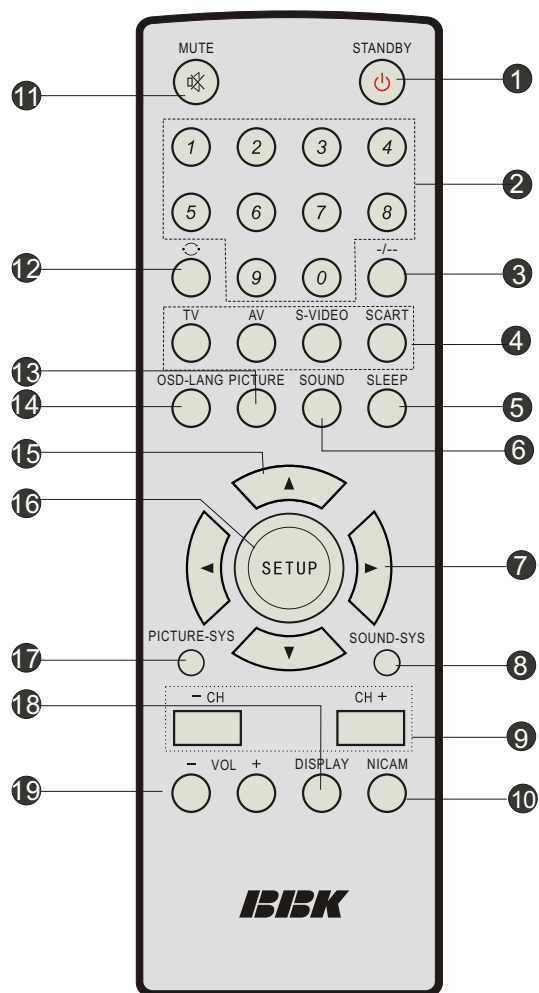
1.3 Required device for maintenance

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

Chapter Two Operation Instructions

2.1 LOCATION AND FUNCTION OF CONTROLS

2.1.1 Remote Controller

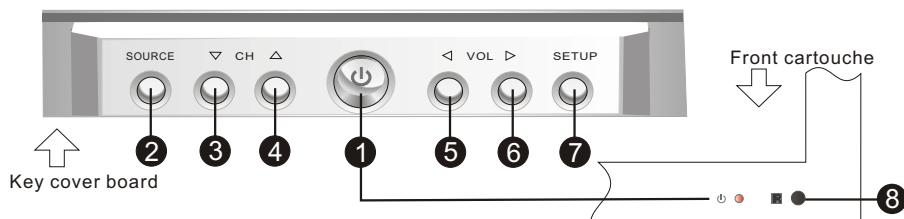


- 1 STANDBY**
To switch the unit between standby mode and power on mode.
- 2 NUMBER BUTTONS**
To directly select program number.
- 3 TWO-DIGIT NUMBER BUTTON**
To switch one or two-digit program number.
- 4 SOURCE**
Signal source select rapidly: TV, AV, S-VIDEO, SCART
- 5 SLEEP**
Setting sleep time.
- 6 SOUND BUTTON**
To adjust the sound effect. There are 4 modes for your selection in this function: User, Music, Film, News .
- 7 ◀/▶ (MENU LEFT/RIGHT)**
To adjust menu settings.
- 8 SOUND SYSTEM**
To select sound system.
- 9 CHANNEL**
To increase or decrease program number.
- 10 NICAM BUTTON**
To select the sound mode if receive NICAM or A2.
- 11 MUTE**
To turn on sound or turn off sound .
- 12 RETURN**
To return to previous selected program number.
- 13 PICTURE**
To select picture mode (User/Soft/Standard /Dynamic)
- 14 OSD-LANG**
Change OSD language between Russian and English.
- 15 ▲/▼ (MENU UP/DOWN)**
To select a menu item.
- 16 SETUP**
To enter or back to the main menu.

- 17 PICTURE SYSTEM**
To select video system.
- 18 DISPLAY**
To display current information of channel or source.
- 19 VOLUME**
To increase or decrease volume.

2.1.2 Panel Control

This TFT-LCD TV allows you to easily adjust the characteristics of the image being displayed. All of these adjustments are made by using the control buttons on the top of the TV.

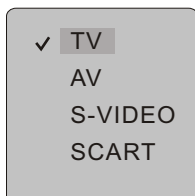


There are 7 keys for user's control including POWER, SOURCE, SETUP, CH-, CH+, VOL- and VOL+. The following descriptions are the introduction of these keys.

Item	Name	Description
1	POWER	Turn ON/OFF the LCD TV. If there is no signal input until 5 minutes, the machine will go to standby mode automatically, the indicator of the power will turn to red. If you want to power on the machine again, please press power button.
2	SOURCE	Enter or back to SOURCE menu.
3	CH-(▼)	When you watch the TV program, push the button to decrease channel number. In the main menu, push the button to select the downward menu item.
4	CH+(▲)	When you watch the TV program, push the button to increase channel number. In the main menu, push the button to select the upward menu item.
5	VOL-(◀)	Decreases /adjusts the value of the selected menu item, or decreases the level of audio volume.
6	VOL+(▶)	Increases /adjusts the value of the selected menu item, or Increases the level of audio volume.
7	SETUP	Enter or back to the main menu.
8	Remote signal sensor	

2.2 CHANGE SOURCE OPERATION

Press [SOURCE] key on the top of the TV panel to change the input source, the menu will display as follows:



The current source item is highlighted. Through pressing [▲/▼] button on the remote control or [▲/▼] key on the top of the TV may change the current source item and select source item which you want to change to. Press [◀/▶] button or [◀/▶] key to confirm your choice that change to highlighted source item.

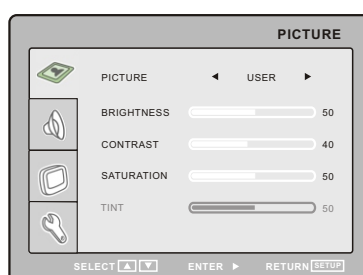
Through pressing [TV], [AV], [S-VIDEO], [SCART] button on the remote control to select signal source directly.

2.3 TV SETUP

This product can store up to 100-channel programs (0~99). You can select your favorite channel through [CH+/-] or number buttons, and you can scan and store all of the channels through manual or automatic mode.

In TV mode, press [SETUP] button on the remote control or [SETUP] key on the control panel, the menu will show as follows:

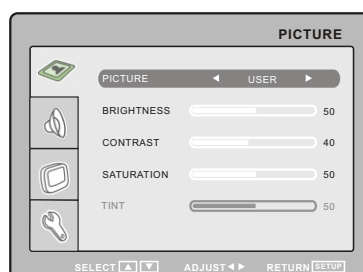
Through pressing [▲/▼] button on the remote control, you can select main menu sections(main menu sections consist of " PICTURE ", " SOUND ", " TV SETTING ", " SYSTEM SETTING "). Press [▶] button to enter this menu section.



Press [▲/▼] button on the remote control to select the item, and then press [◀/▶] button to adjust parameter value. Press [SETUP] button to return to main menu section.

2.3.1 PICTURE

Select " PICTURE " and menu will show as follows: Press [▲/▼] button to select items and [◀/▶] button to adjust.



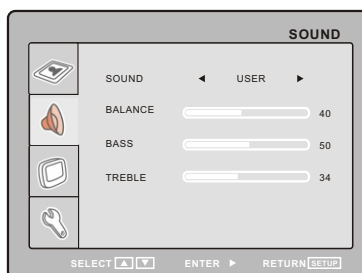
Item	Description
PICTURE	Can be change between: "USER", "STANDARD", "DYNAMIC" and "SOFT".
BRIGHTNESS	To adjust brightness.
CONTRAST	To adjust contrast.
SATURATION	To adjust color saturation.
TINT	To adjust picture tint, only valid in N 3.58/N 4.43/PAL60 and display mode with V-scanning frequency equal 59.94Hz

There are four modes in picture mode: User, Standard, Dynamic and Soft. You can press [PICTURE] button to select any one of these modes, the adjusted value is saved in User mode.



2.3.2 SOUND

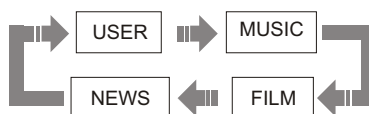
Select "  " and menu will show as follows:



Press [▲/▼] button to select item and press [◀/▶] button to adjust . The following is sound item description.

Item	Description
SOUND	Can be change between:"USER", "NEWS", "FILM"and "MUSIC".
BALANCE	To adjust balance of left and right channels.
BASS	To adjust bass.
TREBLE	To adjust treble.

There are four modes in sound mode: User, Music, Film, News. User may press [SOUND] button to select any one of these modes, the adjusted value is saved in User mode.



2.3.3 TV SETTING

Select "  " and tuning menu will show as follows:

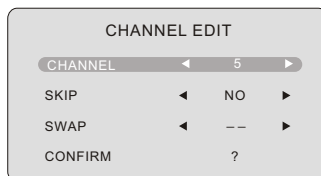


Press [▲/▼] button to select item and press [◀/▶] button to adjust or activate.

Item	Description
CHANNEL	To change the current channel number.
CHANNEL EDIT	To enter a submenu to set channel skip and channel swap. Please refer the next page.
FINE TUNE	To adjust the channel frequency accurately to make the sound and picture effect better.
MANUAL SEARCH	To search programs by manual.
AUTO SEARCH	To search programs and store all of them automatically.

NOTE

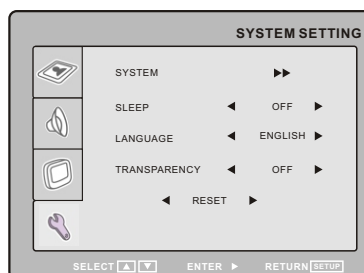
During the searching, you can press [SETUP] button to stop.



Item	Description
CHANNEL	To select current channel here.
SKIP	To select "Yes " or "No ", you can select "Yes " to make current channel inaccessible while using [CH+/-] button to browse channels.
SWAP	Select or enter the channel number directly to swap with current channel.
CONFIRM	Highlight this option and press the [◀/▶] buttons to confirm the swap function.

2.3.4 SYSTEM SETTING

You can setup some system configuration here. Press [▲/▼] to select "  " item and press [▶] button to enter the following section:



Press [▲/▼] button to select item and press [◀/▶] button to adjust or activate.

Item	Description
SYSTEM	Enter color system and sound system choosing.
SLEEP	Can change sleep time (minute) between: "OFF", "30", "60", "90", "120".
LANGUAGE	Can be changed between: "RUSSIAN", "ENGLISH".
TRANSPARENCY	To change transparency of OSD.
RESET	To reset all value to default.

NOTES

When you choose the system item, if pressing [▶] on the remote control, it will directly enter color system choosing; if you press [SOUND-SYS] button on the remote control, it will enter sound system choosing. Press [◀/▶] button to select the color or sound system.

SECAM system is only used by some European countries and districts, such as France.

If the local system is SECAM L, the color system must be selected as "SECAM" and sound system must be selected as "L".

2.3.5 NICAM/BILINGUAL RECEIVING

If you can receive Nicam/bilingual signal, you can operate as follows to enjoy that.

You can select Nicam stereo, mono channel or bilingual through NICAM button on the remote control. If stereo signal is too weak, this unit will switch into mono channel automatically.

When selecting mono channel, "MONO" will show on screen; when selecting bilingual, "DUAL1" will show on screen; when selecting bilingual II, "DUAL 2" will show on screen and when selecting stereo, "STEREO" will show on screen.

NOTE

Nicam/bilingual function is only effective in TV mode while program is coming with Nicam/bilingual.

2.4 VIDEO SETTING MENU

When in AV/ S-VIDEO/SCART input mode, there are 6 color system modes for selection: "Auto", "PAL", "N 3.58", "N 4.43", "PAL60" and "SECAM". Select the right system for your video program. If you do not know which mode your video playback devices and video media is using, you should select the Auto mode or check and confirm this with your supplier.

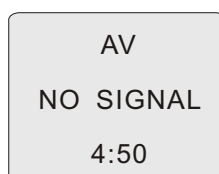
The menu setup of AV/S-VIDEO/SCART modes is much the same as that of TV mode, except the  Section is invalid and a little difference in color and sound modes. In order to make this manual pithy and concise, it is not repeated here. You can find it in preceding pages.

NOTE

If no signal input in TV, AV, S-VIDEO, SCART, the screen will show like the following figure.

This unit will go into standby mode automatically with no signal input for more than 5 minutes.

If signal input in S-VIDEO, AV/SCART CVBS signal output is not recommended.



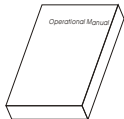
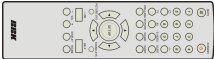
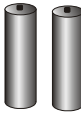
For this unit is combined by multiple functions, when inserting into SCART socket, it will not automatically switch into SCART mode. You have to select SCART channel through [SOURCE] menu or pressing [SCART] button on the remote control, that is a little different with that of other TV sets. If the input channel is SCART, this unit will automatically recognise RGB or CVBS signal of SCART; when normal RGB signal appears, this unit will automatically switch into RGB display mode.

2.5 20.1" TV SPECIFICATION

Panel	Type Class Size Display Size Pixel Pitch Viewing Angle (H) Viewing Angle (V)	TFT color II (ISO 13406-2) 20.1" 408 mm x 306 mm 0.21 mm x 0.63 mm 178° 178°
Frequency	Vertical Horizontal Display color	56 Hz – 75 Hz 30 kHz – 48 kHz 16.7 M
Inputs	Video Composite S-Video SCART Audio Stereo	1 1 1 1
Outputs	Video Composite Audio Stereo (RCA)	1 1
Color System	TV tuner Video Inputs	PAL, SECAM PAL, SECAM, NTSC 3.58, NTSC 4.43, PAL60
Sound System	TV tuner	DK, I, BG, L
Power consumption	Input	~ 100 V – 240 V, 50 Hz / 60 Hz
Power consumption	Maximum Standby	60 W < 3 W
Environmental Considerations	Operating Temperature Operating Humidity Storage Temperature Storage Humidity	+5 °C ... +35 °C 10 % – 80 % -20 °C ... +45 °C 5 % – 95 %
Dimensions	620 mm x 450 mm x 202 mm	
Net Weight	8.4 kg	

These items are depended on the TFT panel, Design and specification are subject to change without notice.

2.6 CHECKING ACCESSORIES

			
Operational Manual	Remote Controller	Batteries(AA x 2)	Power Cord

Chapter Three Principle and Servicing

Section One Principle of the Player

3.1.1 Introduction to the player

Electronic scheme of LT2002S adopts LCD components (LC201V02-SDB1 20")+inverter components (INV607)+MST518VA+TVP5146M1+STV8216+TDA7266P+tuner JS-6B2/121+CPU (W79E632A40PN), which support PAL BG/DK/I, SECAM BG/DK/L/L' RF signal modulating, PAL/NTSC/SECAM/PAL60 multi-system video signals, BG/DK/I/LL/L' accompanying system's FM, NICAM, A2 Stereo signal modulating and accompanying restore and external input SCART S-VIDEO composite video input mode. This model is composed of power, boost components, power switch board, main board, button board and remote control receiving board.

3.1.2 Introduction to IC used by the player

SN	Material code	Material name	Location	Specs	Function description	Qty
1	880504	IC	U13	24C32N SOP	Save user information (32K memorizer)	1
2	881146	IC	U4,U8	LM1117MP-1.8 SOT-223	1.8V voltage stabilizing IC	2
3	882167	IC	U2,U12	9435M SO8	MOS tube (power switch control)	2
4	882030	IC	U9	STV8216 TQFP	Multi-channel sound source selection NICAM processing	1
5	882112	IC	U1	LA7952 SIP	Video electronic switch (video output selection)	1
6	882114	IC	U6,U7,U10	AMS1117-3.3 SOT-223	3.3V voltage stabilizing IC	3
7	883149	IC	U11	TDA7266P SSO24	Audio amplifier	1
8	882376	IC	U3	TVP5146M1 PQFP	Video A/D converter	1
9	882638	IC	U5	MST518VA PQFP	LCD image processor	1
10	882945	IC	U14	MP1430DN SOP	(+)5VEXT voltage stabilizing IC	1
11	1020028	Tuner	T1	JS-6B2/121	Receiver high frequency signal and switch to AV signal	1
12	882637	IC	U15	W79E632A40PN PLCC	MCU (programmable)	1
13	883304	IC	U1	NCP1377 SOP	Power IC	1
14	8824629	IC	U3	AZ431AZ-A TO-92	3-end precision voltage stabilizer	1

3.1.3 Block diagram of the player

Block diagram of the player is shown in the figure 3.1.3.1:

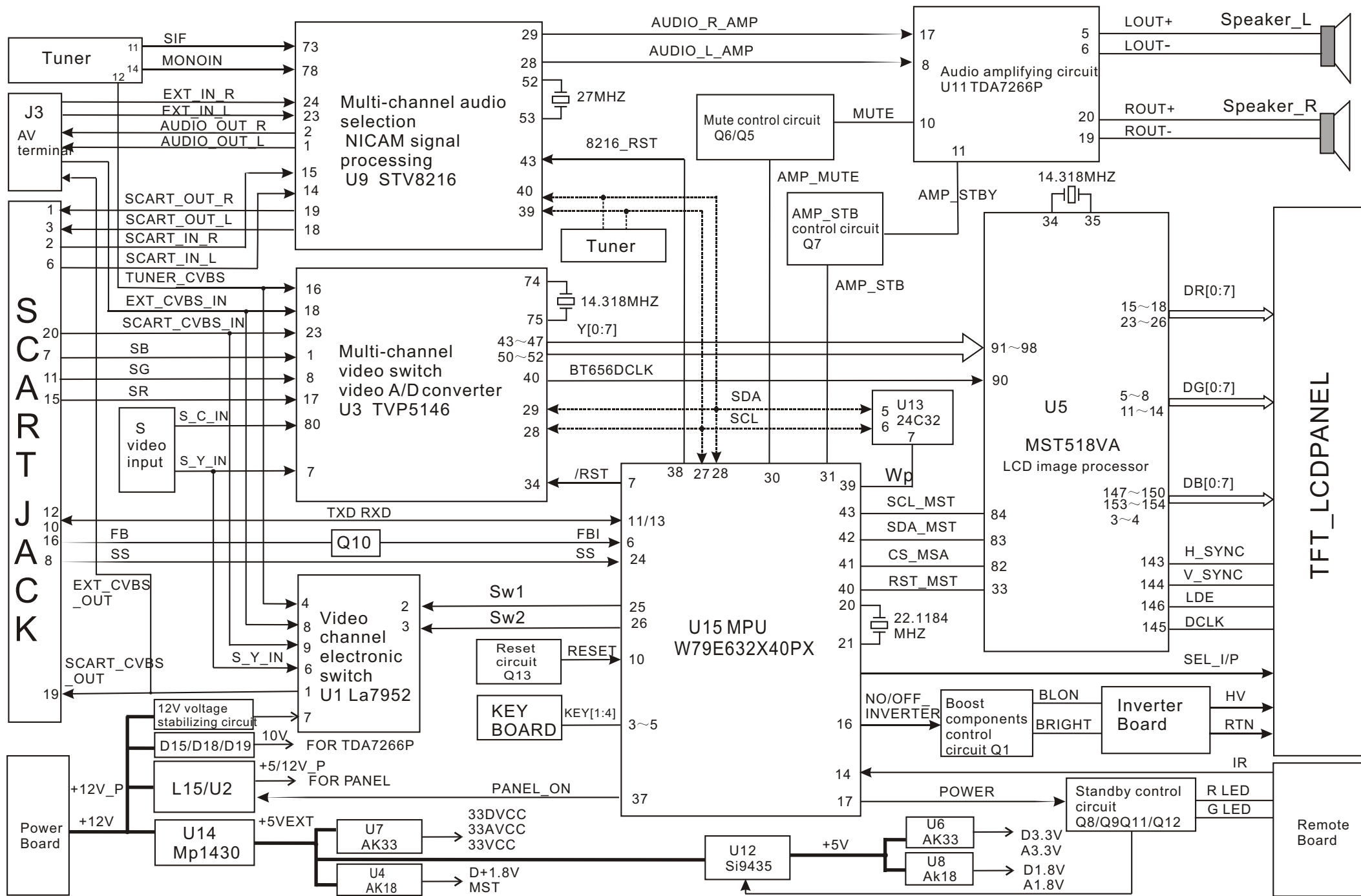


figure 3.1.3.1 Block diagram of the player

Section Two Unit Circuit Principle

3.2.1 System control circuit

System control circuit is mainly composed of reset circuit, clock circuit and W79E632. W79E632 is responsible for the control and coordination of the player's system; W79E632 is a programmable MCU processor; function of each I/O port is adjusted through software and can support the upgrading of external upgrading device. Please refer to IC function introduction for details.

1. System reset circuit

(1) system reset circuit is shown in the figure 3.2.1.1:

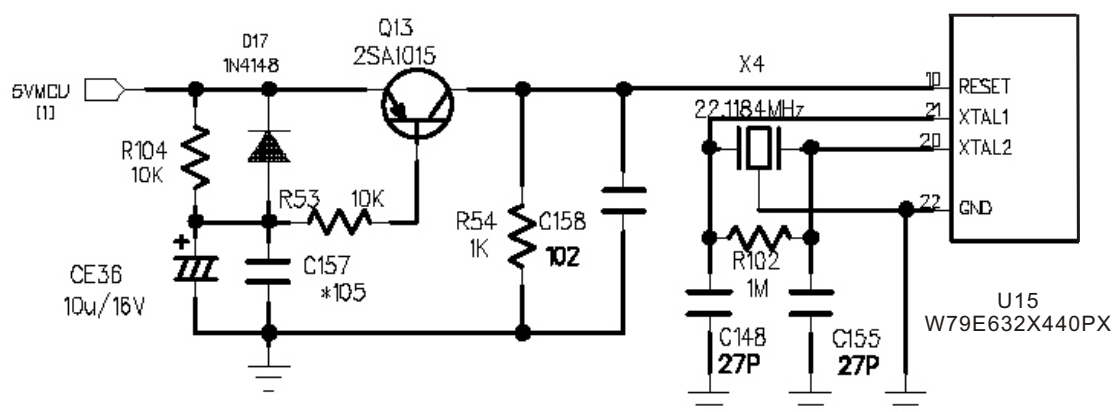


Figure 3.2.1.1 System reset circuit diagram

(2) Working principle: this circuit is a typical high level effective reset circuit. After power on, "5VMCU" changes from 0V to 5V to supply power for system control circuit, and charge CE36 through R104. Voltage of two ends of CE36 cannot change suddenly, so 5V power supplies a high level reset signal to pin 10 of U15 through C-E electrode of Q13 to reset W79E632. After capacitor CE36 is fully charged, voltage on two ends is near to 5V, now Q13 cuts off, voltage of pin 10 of W79E632 restores to low level to finish reset action. Reset time of this circuit is about 100MS, which is decided by the value of R104 and CE36. Function of D17 is to discharge CE36 quickly to ensure the reliable reset when power on for the second time. The trouble that appears in this circuit is that machine cannot enter standby state after power on, and machine fault after power on.

2. System clock circuit

(1) System clock circuit is shown in the figure 3.2.1.2:

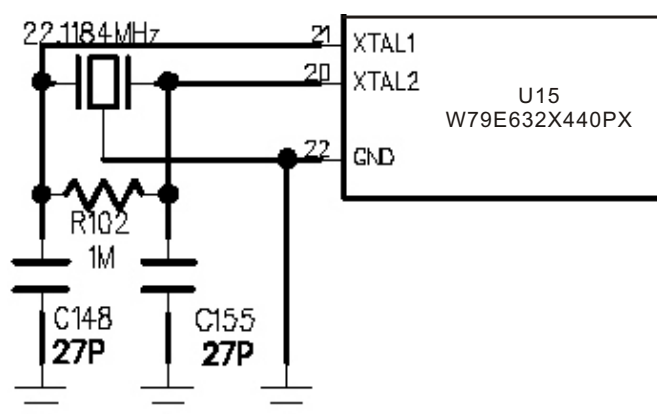


Figure 3.2.1.2 System clock circuit

(2) Working principle: this clock circuit is mainly composed of X4, C148 and C155, in which X4 is a 22.1184MHZ crystal oscillator; C148 and C155 are externally-connected resonance capacitors to produce a 22.1184MHZ clock signal to provide for W79E632 to generate clock signal required by system through internal doubling circuit to act as working clock.

3. System control principle

(1) System control schematic diagram is shown in the figure 3.2.1.3:

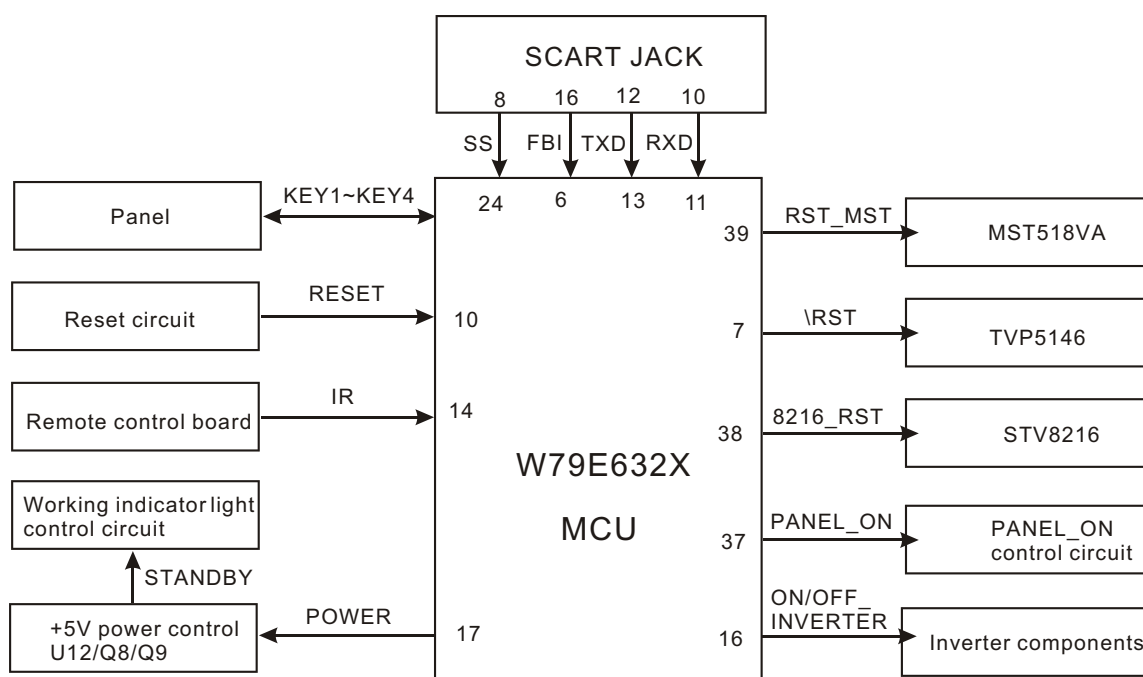


Figure 3.2.1.3 System control schematic diagram

(2) Working principle

Working process from power-on to standby: after power on, 12V power outputted by power board outputs a group of +5V power (marked as +5VEXT in schematic diagram) through being voltage stabilized by U14, during which time power supply of +5VEXT and +12V is normal. +5VEXT is mainly supplied to W79E632, MST518 and each control circuit. Reset circuit of system supplies a 120MS high level signal to reset W79E632 through pin 10 of W79E632. Pin 40 of W79E632 is connected with a 4.7K pull-up resistor externally, so high level reset signal is outputted when power on to pin 33 of MST518 to reset. After system reset, left/right of 260MS and pin 40 of W79E632 output a low level signal to make the reset of MST518 finish, now system begins to enter standby state.

Working process from standby to power-on: when W79E632 receives panel button or remote controller wake code, pin 38, 7 of W79E632 outputs a low level signal which keeps in 170MS to give TVP5146 and STV8216 for reset, meanwhile pin 17 of W79E632 (POWER) outputs a continuous low level signal to make U12 on, +5V power outputs normally and other function circuit enters working state after getting power supply. After POWER pin outputs low level, left/right of 2S and pin 37 of W79E632 (PANEL_ON) output a continuous low level signal to make Q4 cut off and make Q2, U2 (MOS tube) on. After getting power supply, display screen enters working state. Then pin 16 of W79E632 (ON/OFF_INVERTER) outputs low level signal to make boost board enter working state and output high voltage to lighten the background light of screen, picture displays normally and the machine enters normal working state. During the course of power-on, the machine will generate noise. To avoid the amplified output of noise, U15 is defaulted in low level output in standby state. After screen displays power-on picture, a high level signal outputs to make TDA7266P enter non-mute mode to prevent power-on noise effectively. Pin 13 of U15 (TXD) and pin 11 (RXD) are external upgrading input pin and the upgrading will not be normal until the machine enters upgrading mode. Pin FBI is the input mode switch pin of SCART input terminal.

4. IIC bus control circuit

(1) IIC bus control circuit block diagram is shown in the figure 3.2.1.4:

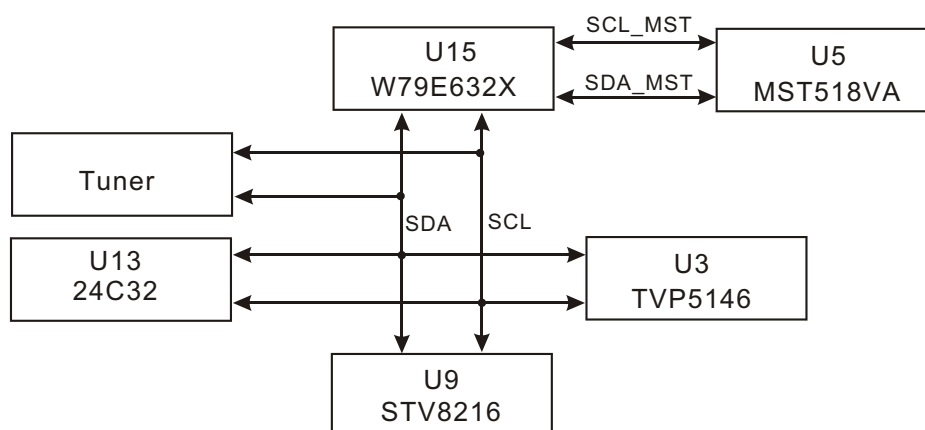


Figure 3.2.1.4 IC bus control circuit block diagram

(2) Working principle: IIC bus is a kind of simple, dual-direction and synchronous serial line developed by PHILIPS company. Only 2 lines (serial clock line and serial data line) are required to connect between components on bus to transmit information. This bus is high-performance serial bus which has function of decision and synchrony of high and low speed devices required by multi-player System with wide application range.

5. Working state indication circuit

(1) Working state indication circuit is shown in the figure 3.2.1.5:

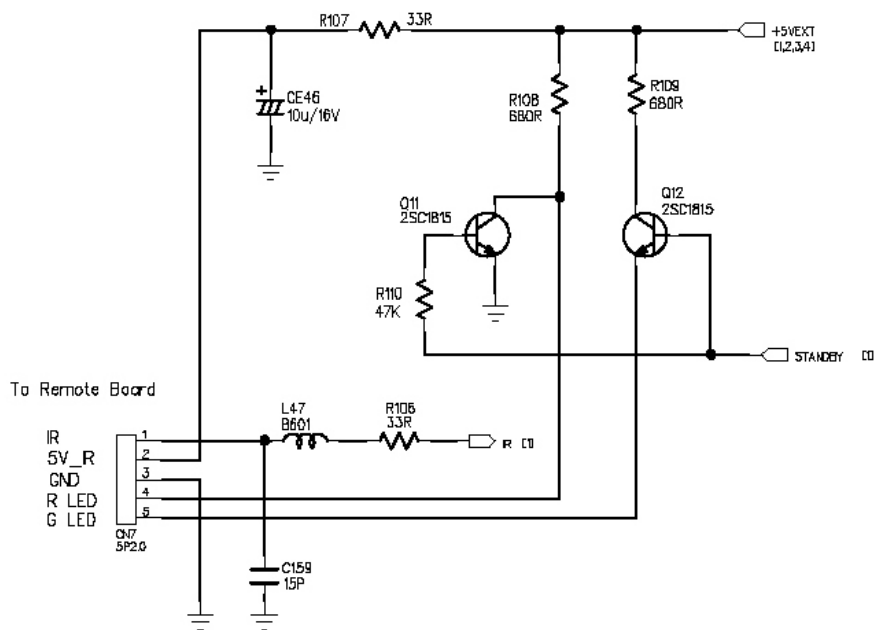


Figure 3.2.1.5 Working state indication circuit diagram

(2) Working principle: after power on and entering standby state, pin 17 of W79E63 (POWER) is high level, now Q9 is saturated on, STANDBY is low level and makes Q8/Q11/Q12 cut off in circuit. Now U12 also cuts off and +5V power has no output. +5VEXT power is supplied for the dual-color light on Remote Control board through R108 and the red light gets power supply. If the red light is on, it means that the machine enters standby state. After power on, pin 17 of W79E632 (POWER) is low level, Q9 cuts off, STANDBY is high level, Q8/Q11/Q12 is saturated on and now U12 is also on and +5V power outputs. +5VEXT power is supplied for the dual-color light on remote control board through R109/Q12, the green light gets power supply and it means that machine enters working state.

3.2.2 Audio circuit

Audio processing circuit is mainly responsible for the switch, amplifying and restore of audio and composed of audio source input selection and NICAM processing circuit, audio amplifying circuit and mute control circuit. Audio processing circuit block diagram is shown in the figure 3.2.2.1:

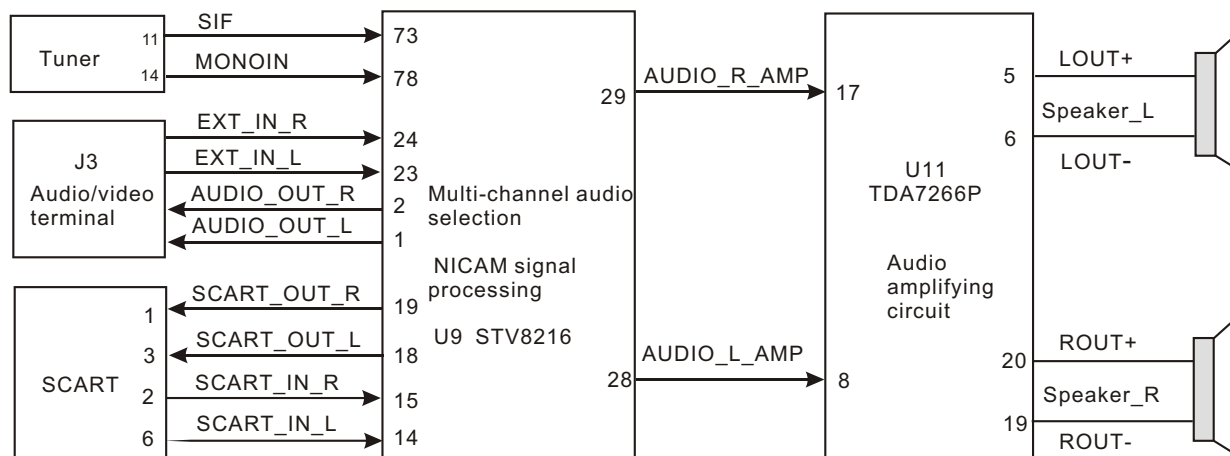


Figure 3.2.2.1 Audio processing circuit block diagram

1. “Nicam” processing circuit

(1) NICAM: the core technology of “NICAM” is the NICAM728 technology developed by BBC. Besides transmitting TV image and simulating mono-channel signal, NICAM TV broadcasting system also transmits dual-channel digital coding sound signal. NICAM is famous for clear treble and deep bass with the sound quality close to listening to CD disk directly. In the aspect of SNR, dynamic range and channel separation index, NICAM is far better than the current FM accompany. As TV accompany, NICAM applies 3 kinds of working mode currently: 1) Bilingual mode: NICAM transmits dual-channel digital sound relevant or irrelevant to the current program and transmits 3-channel sound signal together with the original FM analog accompany, which are suitable for multi-language areas; 2) Stereo mode: two digital channels of NICAM transmit left and right channel sound signals of stereo separately, and the original FM analog accompany only transmits mixed sound signals of 2 channels to be compatible with TV set without NICAM function; 3) Mon0-channel mode: two channels of NICAM transmit one channel sound signals and one channel data signal, which is equal to providing 3-channel signals together with the original TV analog accompany.

(2) NICAM processing circuit block diagram is shown in the figure 3.2.2.2:

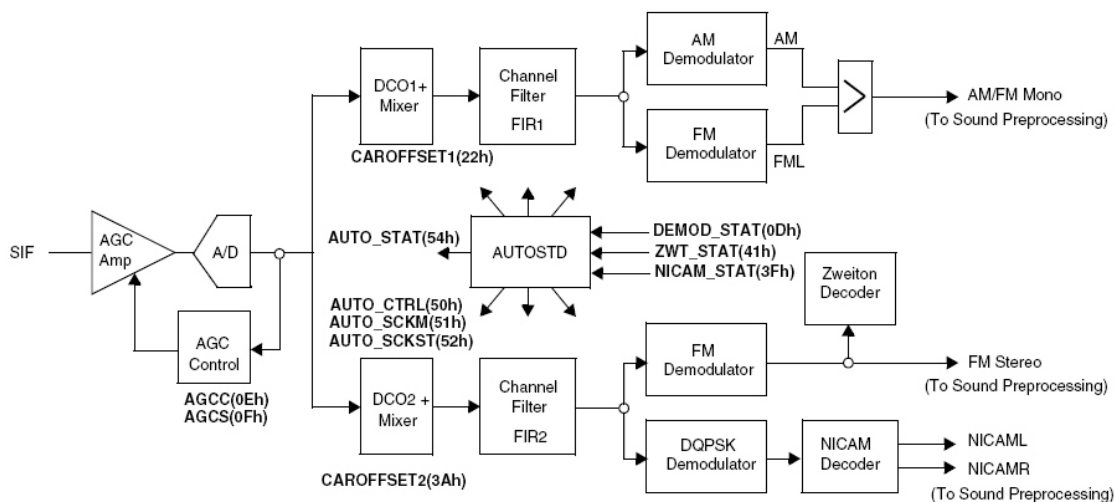


Figure 3.2.2.2 NICAM processing circuit block diagram

(3) Working principle: when tuner receives NICAM signal, it outputs from pin 11 of tuner (SIF), and inputs into pin 73 of STV8216 through the filtering circuit composed of C99, C98 and L24 components and then restores to audio signal through being modulated by internal circuit of STV8216 and sends to audio amplifying circuit through pin 28, 29 of STV8216.

2. Sound source input selection circuit

Besides NICAM processing circuit, STV8216 also includes multi-channel sound source selection function. After the machine enters from standby to power-on, systems sends a low level effective reset signal to pin 43 of STV8216 to reset STV8216. IIC bus means is adopted between STV8216 and W79E632 for communication. When working state of system is in SCART input state, STV8216 switches to SCART_IN signal under the control of W79E632 for processing, now pin 28, 29 of STV8216 output the audio signals inputted by SCART_IN and also output two groups of audio signals as external output signal through pin 1, 2, 18, 19. Working principle of other groups' sound source input is the same, so we will not introduce here.

3. Audio amplifying circuit

(1) Audio amplifying circuit is shown in the figure 3.2.2.3:

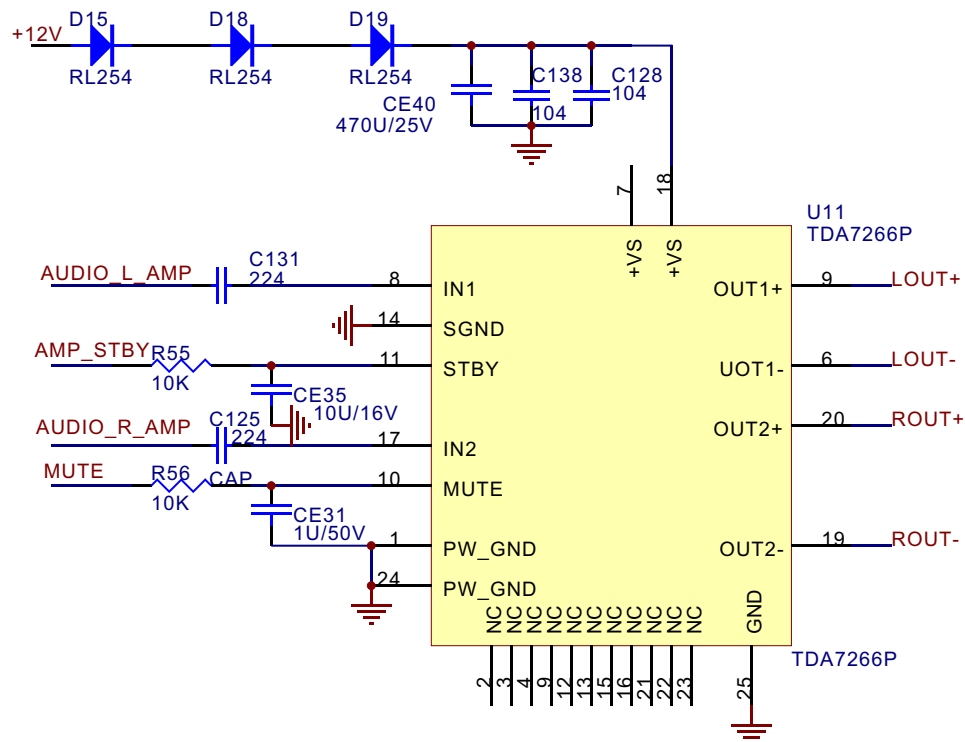


Figure 3.2.2.3 Audio amplifying circuit diagram

(2) Working principle: TDA7266P is a 3W+3W dual-bridge audio amplifying. Audio signals input through pin 8, 17 of TDA7266P and then output from pin 5, 6, 19, 20 of TDA7266P after being amplified

By internal dual-bridge audio amplifier to drive loudspeaker to make sounds. This IC adopts +10V power supply, D15/D18/D19 is drop diode and pin 11 is standby control pin. After machine enters power-on state, pin 30 of W79E632 (AMP_STB) outputs high level and this IC enters working mode.

4. Mute circuit

(1) Mute circuit is shown in the figure 3.2.2.4:

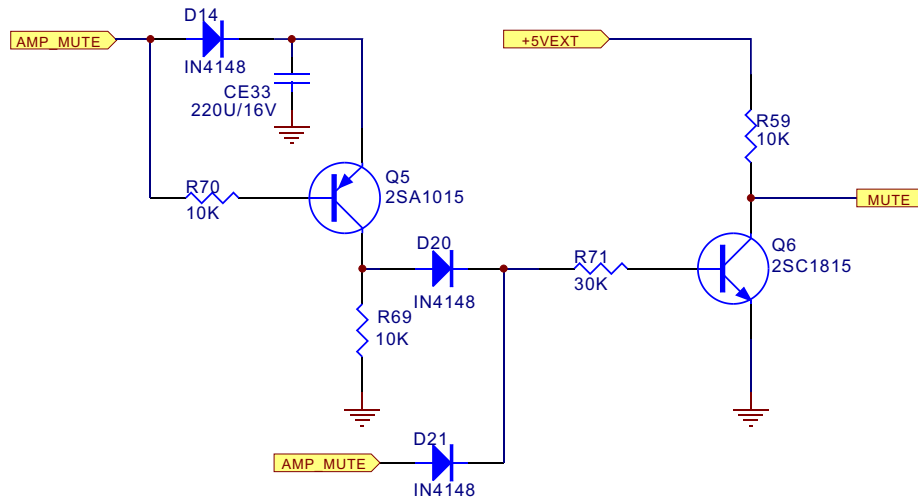


Figure 3.2.2.4 Mute circuit diagram

(2) Working principle

Power-on mute: after power on, pin AMP_STB of MCU outputs low level signals, pin 11 of TDA7266P is low level, IC enters standby mode, and pin AMP_MUTE of MCU outputs a high level to make Q6 saturated on through D21; because Q6 is saturated on, pin MUTE is low level signal and TDA7266P is in mute state to realize power on mute function.

Power-on mute: when machine enters power-on mode from standby, AMP_STB outputs a high level signal firstly to make TDA7266P enter working state, now pin AMP_MUTE outputs high level signals and then outputs a low level signal until other circuit of the machine enter working state to make Q6 cutoff, pin 10 of TDA7266P is high level, TDA7266P enter non-mute mode and the player has sound output to realize power-on mute function.

Power-off mute: when machine enters standby mode from working mode, pin AMP_MUTE outputs high level, pin MUTE is level signals and TDA7266P enters mute state.

Power-off mute: when power is switched off, for CE33 has been fully charged when power on, after power off, CE33 discharges through Q5/D20 to make Q6 on and now pin 10 of TDA7266P is low level to realize power-off mute function.

3.2.3 Video circuit

Video circuit is mainly responsible for the input of external video signals, the processing of video signals send from tuner, and the drive processing of LCD screen, including video input selection, video A/D conversion circuit, LCD picture processing circuit and video output circuit. Video circuit block diagram is shown in the figure 3.2.3.1:

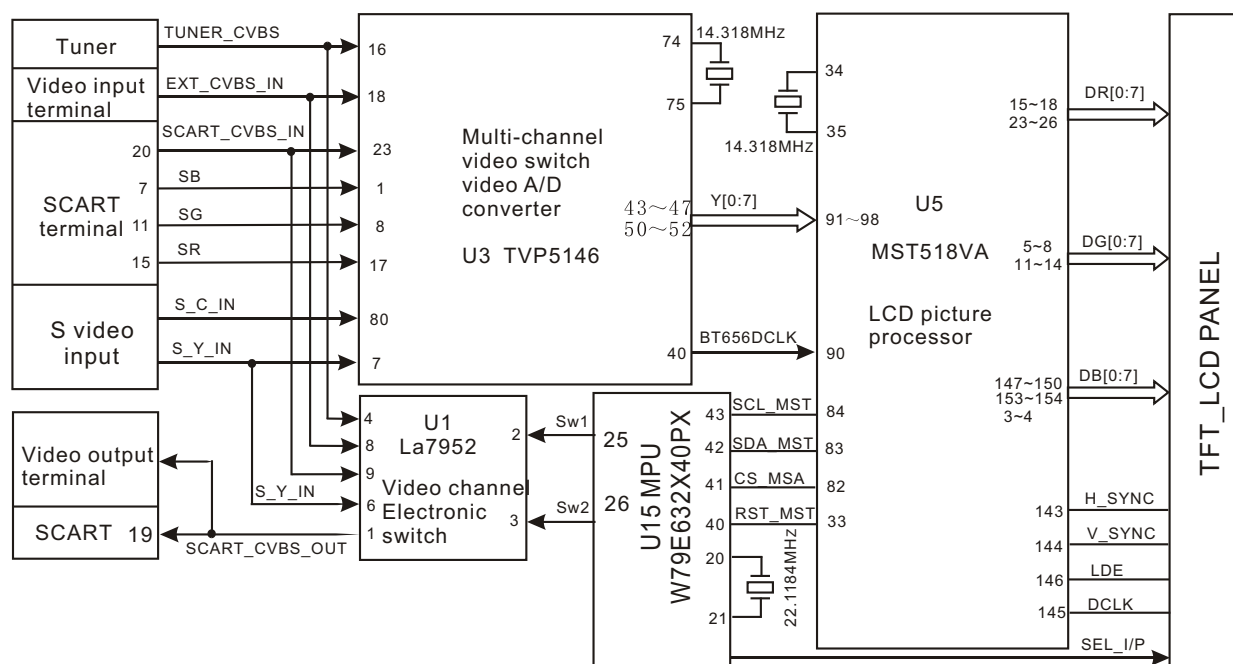


Figure 3.2.3.1 Video circuit block diagram

1. Video input and A/D conversion circuit

This circuit is mainly composed of TVP5146 and peripheral elements. TVP5146 supports NTSC, PAL and SECAM video signals and the supportable video signal format has RGB, YPbPr, CVBS or S-video video. The built-in A/D converter can realize multi-format's conversion function. Video signals inputted externally in this player have S-VIDEO, SCART-RGB, SCART-CVBS, EXT-CVBS and TUNER-CVBS. When machine is set in S-VIDEO input, S_C_IN and S_Y_IN signals input from pin 80, 7 and switch to digital video signals through internal processing and then output from pin 43~47, 50~52 of TVP5146 to LCD picture processing chip MST518VA..

2. LCD image processing circuit

LCD image processing circuit is composed of MST518VA and peripheral elements, responsible for switching the inputted digital video signals or analog video signals into signals required by LCD drive. MST518 is a high-performance and high integration picture processing chip designed for LCD, which can support SXGA format (1280*1024). It integrates a group of high-performance ADC, high quality

Format change system, OSD generator, output clock producer and multi-format output display jack (support TTL, LVDS, RSDS). This player adopts digital signal input, which inputs from pin 91~98 of MST518VA, meanwhile TVP5146 also provides a 27MHZ clock signal to MST518VA. W79E632 performs data exchange and control to MST518VA through bus. MST518VA has multi-format output display jack. TTL output means is adopted in this player and the output means can be adjusted through software according to screen's drive means. MST518VA outputs DR0~DR7/DG0~DG7/DB0~DB7 to drive display screen, and also outputs clock, enable and synchronous signals to supply for the working of screen (145 OCLK clock output, 146 LDE enable signal, 144 LVSYNC filed synchronous output and 143 LHSYNC line synchronous output).

3. Video output circuit

(1) Video output circuit is shown in the figure 3.2.3.2:

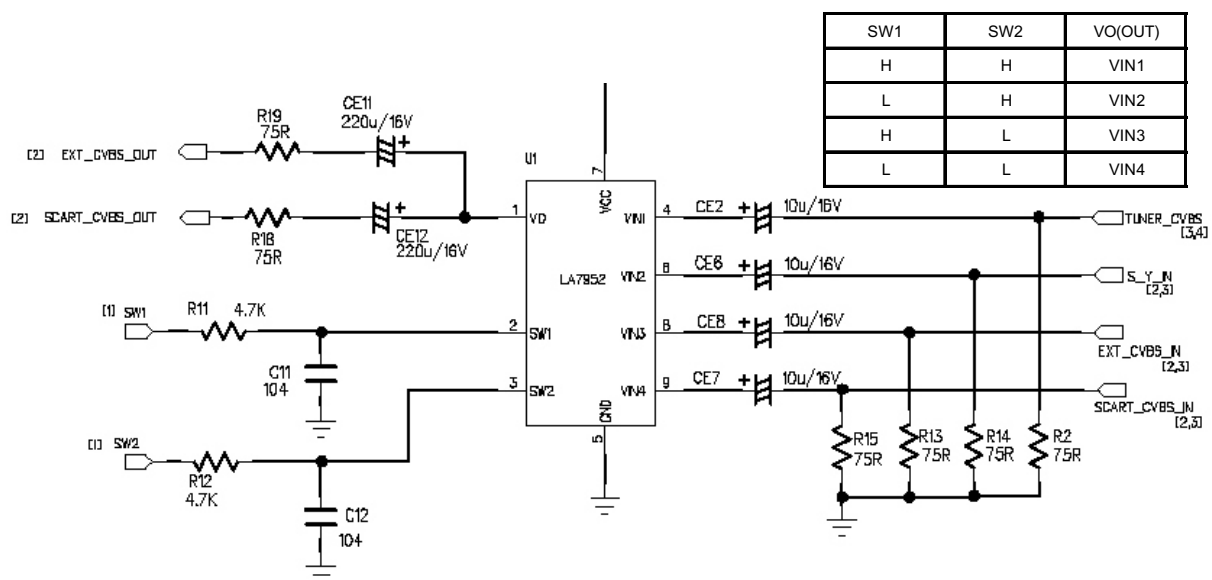


Figure 3.2.3.2 Video output circuit diagram

(2) Working principle: video output circuit is composed of LA7952 which is a 1-in-4 video electronic switch with a built-in 6DB video amplifier used as video output in this player. When there is external input signal, the machine can output one channel to external video port to supply for other video devices.

3.2.4 Input circuit

External input means of TV has SCART, S-VIDEO and CVBS, and also composite video and stereo audio output function.

1. SCART terminal is a standard input port in Europe. In this jack circuit, many dual-direction diodes are adopted and act as protection function to prevent the instability of externally-connected device or damage of the machine due to static. SCART pin function is shown in the following table:

Pin	Name	Signal direction	Function description	Pin	Name	Signal direction	Function description
1	A(B)OUT	I	Audio right channel input	12	NC		Network communication data line 2
2	A(B)IN	O	Audio right channel output	13	RETURN		Pr signal ground
3	A(A)OUT	I	Audio left channel input	14	RETURN		Blanking signal ground
4	A-COM		Audio signal ground	15	RED I/O	I/O	Pr signal I/O port
5	RETURN		Pb signal ground	16	BLK I/O	I/O	Blanking signal I/O port ★
6	A(A)IN	O	Audio left channel output	17	RETURN		Blanking signal ground
7	BLUE I/O	I/O	Pb signal I/O port	18	TRTURN		Composite video signal ground
8	FUNCSW	I	Function selection jack	19	V-OUT	I	Composite video signal input
9	RETURN		Y1 signal ground	20	V-IN	O	Composite video signal output
10	CONT	I/O	Network communication data line 2	21	GND		Common
11	GREEN I/O	I/O	Y1 signal I/O port				

2. Tuner circuit

(1) Tuner circuit is shown in the figure 3.2.4.1:

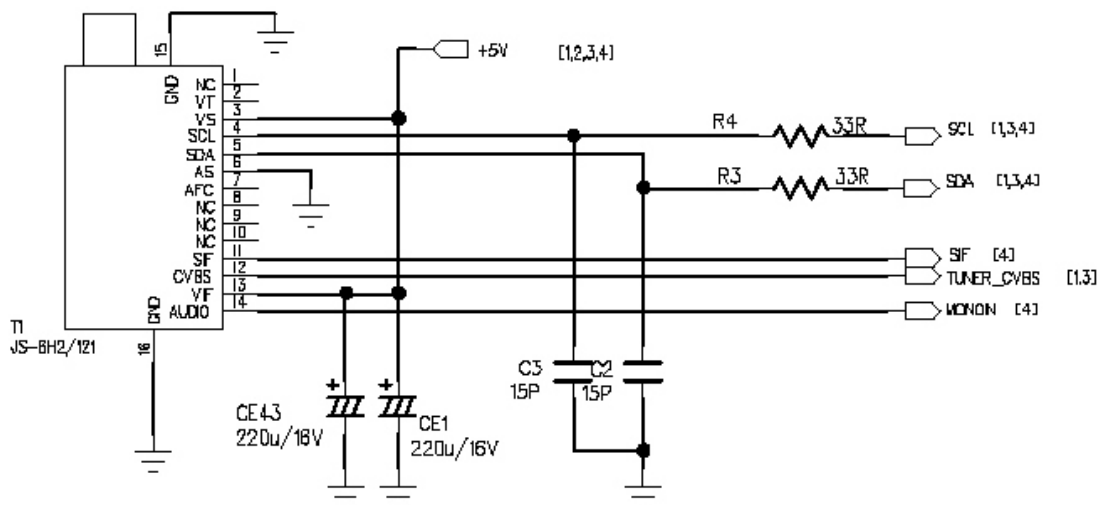


Figure 3.2.4.1 Tuner circuit diagram

(2) Working principle: this tuner includes middle frequency amplifying circuit, which adopts IIC bus means to perform function control (such as select channel and search channel) through W79E632. After high frequency signals are modulated, video signals and audio signals are separated through being filtered by internal filter of tuner. Audio and video signals output from pin 12, 14 and then send to audio and video processing circuit. When tuner receives NICAM signal, NICAM signals output from pin 11 of tuner to STV8216 for modulating.

(3) Tuner pin function is shown in the following table:

Pin	Name	Function	Pin	Name	Function
1	NC	NC	8	NC	NC
2	VT	NC	9	NC	NC
3	VS	(+)5V power supply pin	10	NC	NC
4	SCL	SCL is connected with MCU	11	SIF	NICAM jack
5	SDA	SDA is connected with MCU	12	TUNER_CVBS	Video output
6	AS	GND	13	VIF	5V power is connected externally
7	AFC	NC	14	AUDIO	Audio output

3.2.5 Power circuit

Power circuit provides each function module with stable working voltage to ensure the normal working of each module circuit. The following is the working principle of each circuit.

1. Power supply circuit

(1) Power supply block diagram is shown in the figure 3.2.5.1:

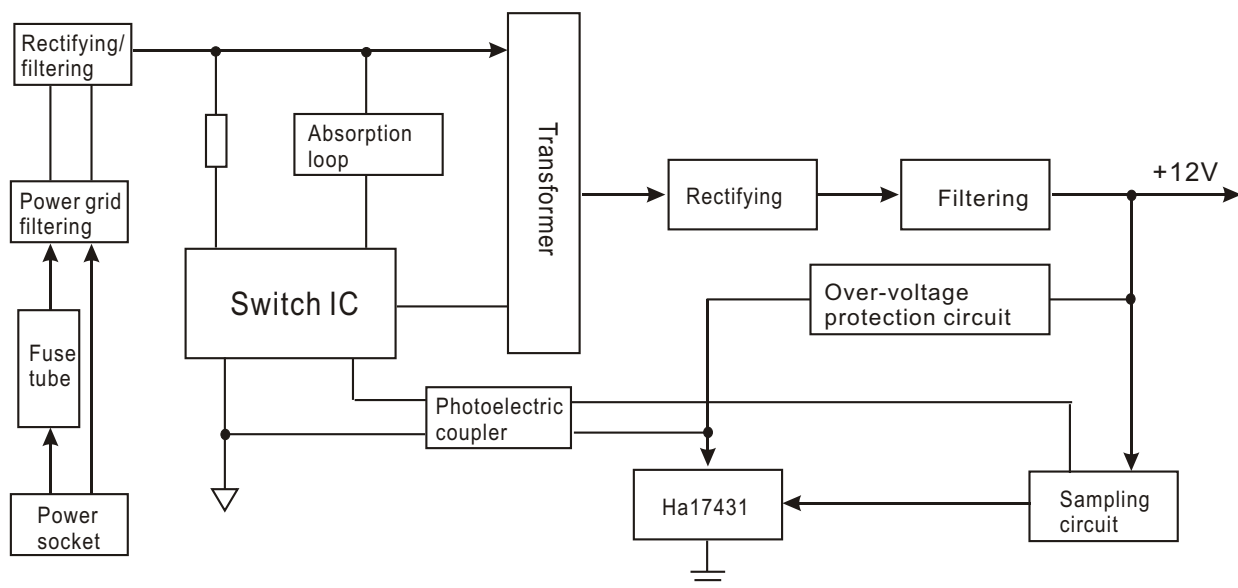


Figure 3.2.15.1 Power circuit block diagram

(2) Working principle: after electric supply inputs, through protection circuit and power grid filtering circuit, it enters B1 rectification directly, in which protection circuit has over-voltage, over-current and temperature protection circuit. After being rectified, electric power switches to DC power (its effective

Value is 1.4 times of electric power, equal to 300V). For C1 performs filtering, 300V power is divided into two paths: one path is provided for switch module (U1_2/U1_3) through dropping voltage by R3~R7; and the other path reaches power pin of switch module (U1_7) through the winding of transformer to make transformer perform the storage and discharge of energy through the internal switch pipe. For the reverse peak voltage will produce when discharging energy, in order to avoid damaging MOS tube in switch module, the absorption loop (D1/C3/R17) protects MOS tube. 5-6 winding is sampling winding; when preliminary winding of transformer is discharging energy, inductance current forms between secondary winding and sampling winding and inductance voltage forms on two ends of secondary winding, which provides each circuit of the machine with the required DC power through being rectified by secondary rectifying diode. For power fluctuation is large, in order to supply stable DC output, sampling is performed on the output end of 12V (fulfilled by U3 and sampling circuit composed by peripheral). When output voltage is high, U3A K is on to make the internal light emission diode of U2 emit light to control the photosensitive triode CE inside U2 on to change TH/TL of switch pipe control end to make output voltage decrease, or else the output voltage is high. ZD1/Q1 in the figure composes over-voltage protection circuit.

(3) Power supply circuit analyse

Power supply circuit is mainly composed of full bridge circuit, transformer boost circuit, resonance circuit, feedback control circuit and protection circuit.

1) Full bridge circuit: full bridge drive circuit is driven directly by mps1048 and composed of 4 Nmos pipes (Q1A, Q1B Q2A, Q2B). NMOS has features of small resistance and waste, but the upper arm circuit of full bridge must be added with bootstrap capacitor. Through the alternate connection of Q1B Q2A (take two as a group) and Q2B Q1A (take two as a group), the primary winding of inverter transformer is made pass through the alternating current with the opposite direction to drive boost transformer.

2) Turns ratio of boost transformer is 27:1860, which can boost 12V input voltage to 800-volt or more.

3) Resonance circuit: resonance circuit is composed of boost transformer secondary leakage inductance and input capacitor 3000V/10pF. Secondary transformer inductance is 200mH and it comprises series resonance loop together with output capacitor to rectify the square wave outputted preliminarily to sine wave; because Q value gain of parallel resonance loop is in direct ratio to its load resistance, when lightening, for the impedance of CCFL is too large about 100M-ohm), the parallel resonance loop can get large gain, large output voltage can be achieved (about 2KV), which may lighten CCFL. After lightening, resistance of CCFL drops (about 100K-ohm), so Q value of resonance decreases, output voltage drops to keep the normal working voltage of lamp.

4) Feedback circuit: inverter is constant output. Through sampling lamp tube current, 1K resistor (R27~R32) is used to fulfill current sampling together with lamp tube. The sampled AC current switches

To voltage inputted to the feedback pin L1 of mp1048; AC circuit inputted by LI, through being sampled by circuit inside IC, switches to RMS voltage value and inputs to the reverse input end of internal amplifier to control the TH/TL of PWM signal.

5) Protection circuit: over-voltage/open-circuit protection is to fulfil the control of voltage feedback loop through sampling output voltage, connected in series by high voltage capacitor of 3KV/10PF and capacitor of 103/25V, composing voltage division circuit to switch output high voltage to voltage sampling and send into the voltage feedback pin LV of IC. When sampled voltage is more than 1.2V, IC enters protection state to turn off drive pulse.

6) Short-circuit protection circuit: because inverter adopts constant control, even though short-circuit happens, output current less than 7mA can also be achieved. Through drive pulse is not shut off, IC still works, but voltage now is pulled down.

2. Main board power supply circuit

Main board power supply circuit block diagram is shown in the figure 3.2.5.2:

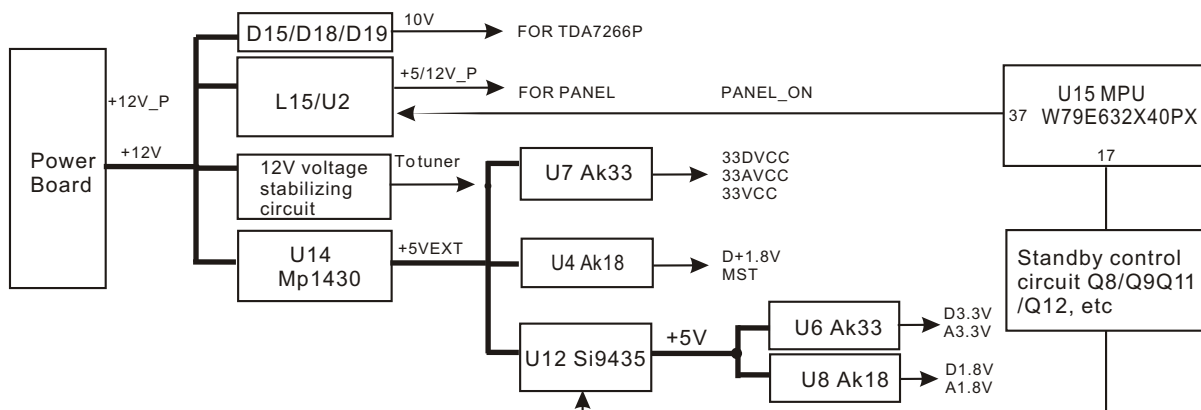


Figure 3.2.5.2 Main board power supply circuit block diagram

3. Voltage stabilizing circuit

(1) Voltage stabilizing circuit is shown in the figure 3.2.5.3:

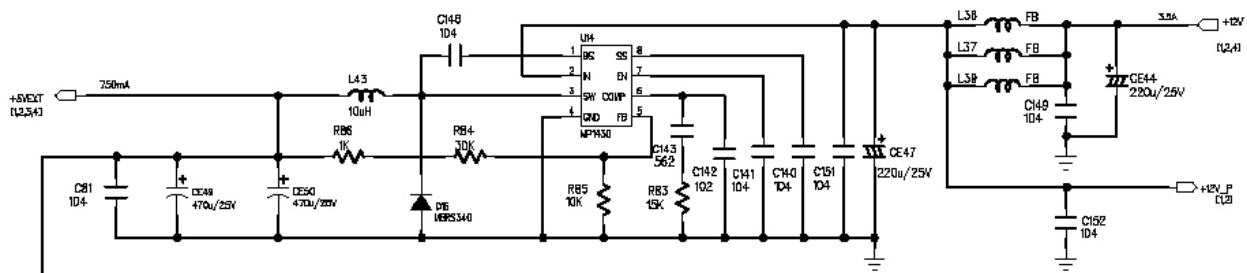


Figure 3.2.5.3 Voltage stabilizing circuit diagram

(2) Working principle: Mp1430 is a voltage-drop style voltage stabilizing circuit. 12V power inputted by power supply circuit, through being voltage stabilized by Mp1430, outputs 5VEXT power directly supplied to load circuit, in which pin 5 of Ma1430 is feedback input pin and its reference voltage is 1.22V. When 5V power becomes high for certain reason, voltage of feedback end pin 5 also becomes high and control circuit inside Mp1430 will make output voltage of pin 3 of Mp1430 becomes low. When 5V power becomes low for certain reason, voltage of feedback end pin 5 also becomes low and control circuit inside Mp1430 will make output voltage of pin 3 of Mp1430 becomes high, until pin3 of Mp1430 outputs stable 5V power.

4. Power control circuit

(1) Power control circuit is shown in the figure 3.2.5.4:

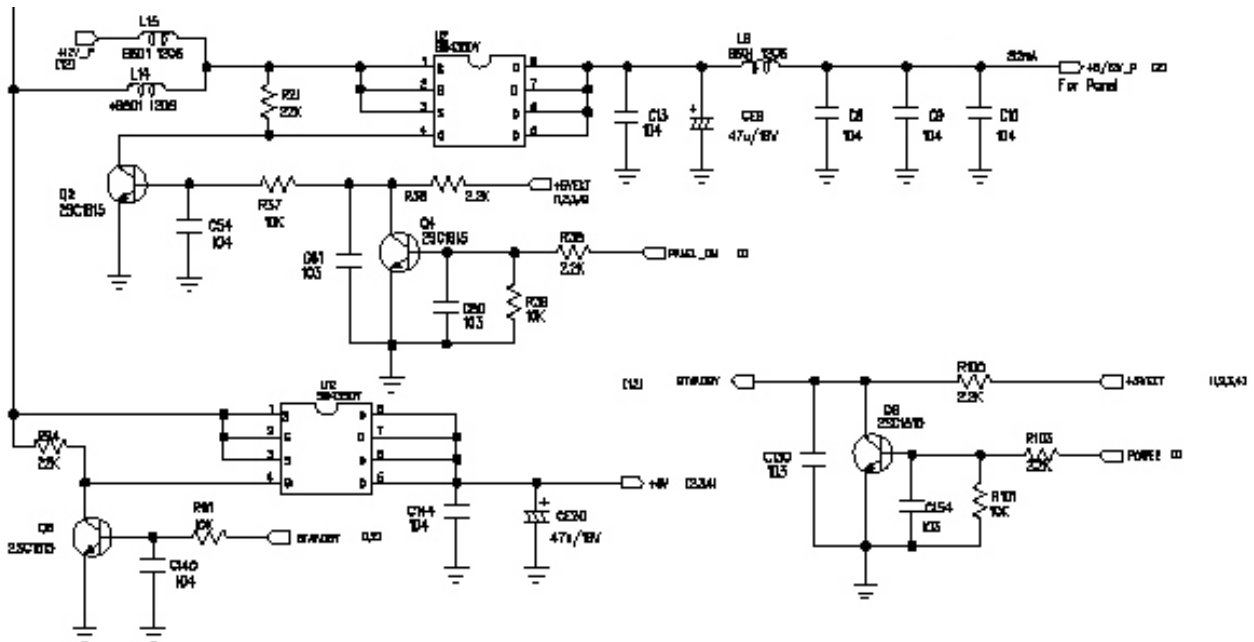


Figure 3.2.5.4 Power control circuit diagram

(2) Working principle: 5V power outputted by Ma1430 is supplied to MOS tube U12 (U12 IS a P-Channel MOSFET) and its connection state is controlled by pin 17 of W79E632 (POWER). When in standby, control end of U12 is high level, U12 cuts off; when in power-on, control end of U12 is low level, U12 is saturated on and power supplies power for rear stage through U12. U2 is also a MOS tube to control PANEL power whose voltage is decided by specification of "screen". +5V and +12V are used in our company currently. +12V is used in this player and the control process is that after power on, PANEL_ON pin of W79E632 outputs low level to make Q4 cut off, which makes Q2 saturated on, U2 is also connected and display screen power supply is normal. When machine enters standby state, PANEL_ON pin of W79E632 outputs high level to make Q4 connected and make Q2 cut off, control end of U12 is high level and +5v/12v_p has no voltage output.

5. Boost control circuit

(1) Boost control circuit diagram is shown in the figure 3.2.5.5:

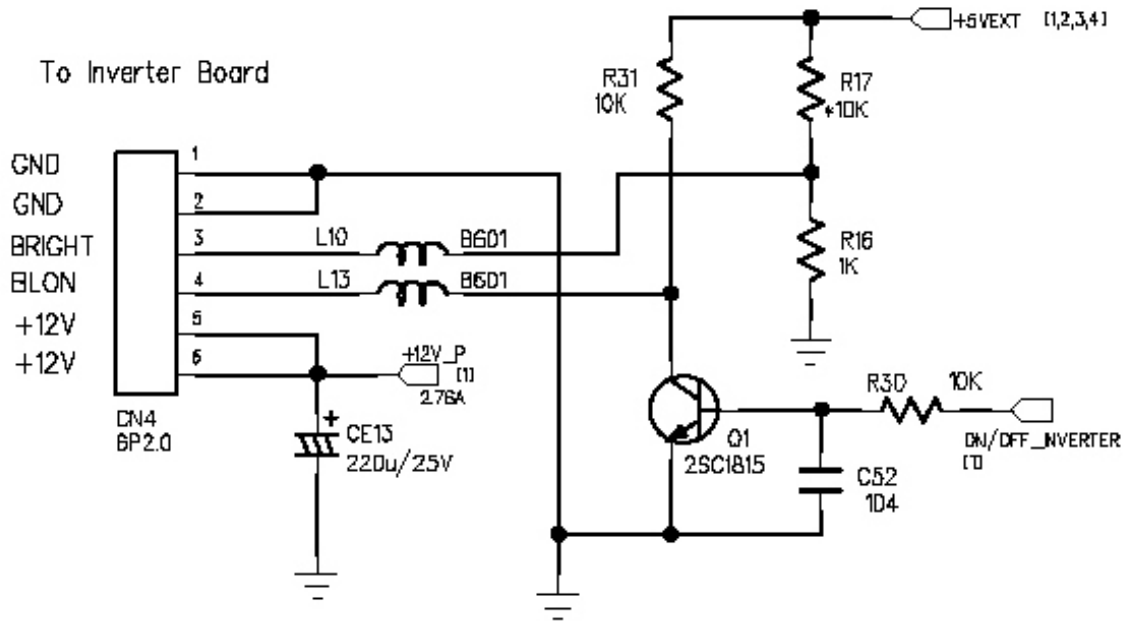


Figure 3.2.5.5 Boost board control circuit

(2) Working principle: after power on, +12V power is normal, machine is in standby state, ON/OFF_INVERTER pin of MCU outputs high level, Q1 is saturated on, pin 4 of CN4 is low level and boost circuit stops working. After machine enters power on from standby state, ON/OFF_INVERTER pin of MCU outputs low level, Q1 cuts off, pin 4 of CN4 is high level and boost circuit enters working state. Pin 3 of Cn4 (BRIGHT) is brightness level adjustment pin, which can be used to adjust the entire brightness of screen.

6. Boost circuit

(1) CCFL background light source introduction

This player adopts CCFL background light source. When CCFL background light source cools (during a period without operation), to activate CCFL background light source, 1600V high voltage electricity is required, which is three times of that when running (now average voltage is 500-800V). CCFL background light source is positive resistor at the beginning and then switches to negative resistor (above 1mA), which means that it has high output impedance (current source), can restrain negative load resistor effect and can limit current when activating CCFL background light source. Background light source can limit current. To supply high voltage power for CCFL background light source, it should pass through full bridge circuit, transformer boost circuit, resonance circuit and feedback control circuit.

(2) Boost circuit block diagram is shown in the figure 3.2.5.6:

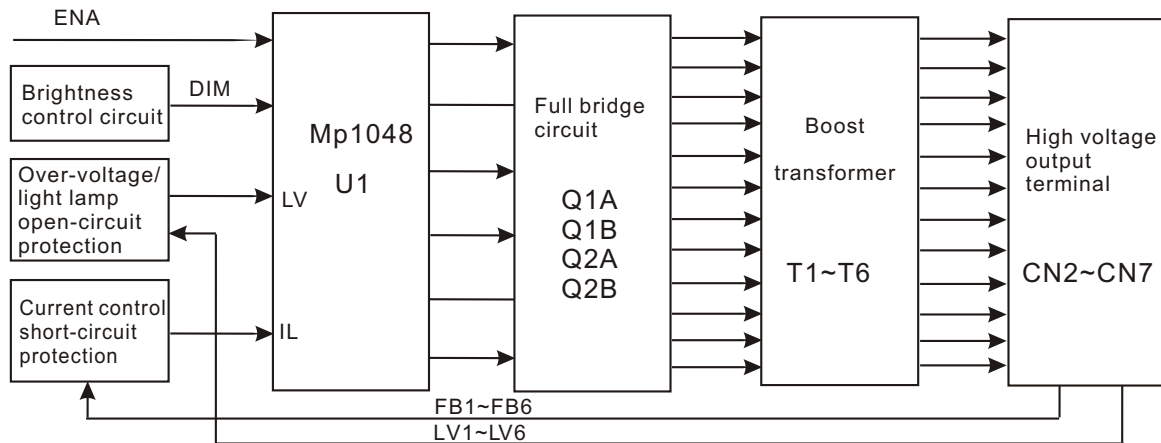


Figure 3.2.5.6 Boost circuit block diagram

(3) Working principle

1) Full bridge circuit: full bridge drive circuit is driven by mps1048 directly and full bridge is composed by 4 Nmos tubes (Q1A, Q1B, Q2A, Q2B). MOS tube's connected resistance is small and consumption is small, in which Q1B and Q2A are one group, Q2B and Q1A are one group, which are connected circularly under MPS1048 to produce AC current opposite to pass direction in primary winding of transformer and boost through transformer (turns ratio of transformer is 27:1860, which can increase 12V input voltage to 800V).

2) Resonance circuit: it is composed of secondary leakage inductance of transformer and capacitor (C26 3000V/10Pf). Leakage inductance of secondary transformer is 200mH and composes resonance loop together with output capacitor to rectify the square wave outputted preliminarily to sine wave. For the Q value gain of resonance loop is in direct ratio to its load resistor, when lightening, resonance loop may achieve large gain for impedance of CCFL is large (about 100M-ohm), therefore large output voltage can be achieved (about 2KV), and CCFL may be on. After CCFL is on, resistance of CCFL drops (about 100K0ohm), so Q-value of resonance circuit drops and output voltage drops to keep normal working voltage of light lamp.

3)Feedback circuit: inverter is constant output. Through sampling light lamp current, 1K resistor (R27~R32) is used to fulfill current sampling together with light lamp in series to switch sampled current To voltage and input to feedback pin L1 of mp1048. AC voltage inputted by LI, through being sampled by IC internal circuit, switches to RMS voltage value and input to reverse input end of internal amplifier to control TH/TL of PWM signal.

4) Protection circuit: the control of voltage feedback loop for over-voltage protection/open-circuit protection is fulfilled through sampling output voltage. High voltage capacitor of 3KV/10PF is connected with capacitor of 103/25V in series to compose voltage division circuit to switch output high voltage to

Voltage sampling, through being rectified by D2~D4, sent to voltage feedback pin LV of IC. When voltage sampled is over 1.2V, IC enters protection state to turn off pulse drive.

5) Other control circuit: pin 13 of MP1048 is the enable control end of this IC. When this pin is high level, IC enters working state. This IC in this player is controlled by CPU, pin 12/13 of MP1048 is brightness control pin. Adjusting this pin voltage may adjust light lamp current to adjust brightness of the player.

Section Three Servicing Cases

3.3.1 Servicing cases

[Example 1] Symptom: black screen when power-on (background light of screen is not on)

Description: from standby to power-on, screen is black all the time and panel indicator light can display normally.

Analysis and troubleshooting: according to servicing experience, if screen is black when power-on, firstly place the head of oscillograph near high voltage of boost board and find that oscillograph has no inductive waveform, so we can make sure that boost board has not outputted high voltage. Shown in the figure 3.3.1.1, use multi-meter to test +12V power supply voltage of CN4 and it is normal. Test pin 4 voltage and it is 0V all the time. Use multi-meter to test ON/OFF-INVERTER end and it is high level when in standby and low level in power-on in normal conditions, so we doubt that triode Q1 has trouble; use multi-meter diode level to test Q1 and triode Q1 has been stricken through. Change Q1 and trouble is removed.

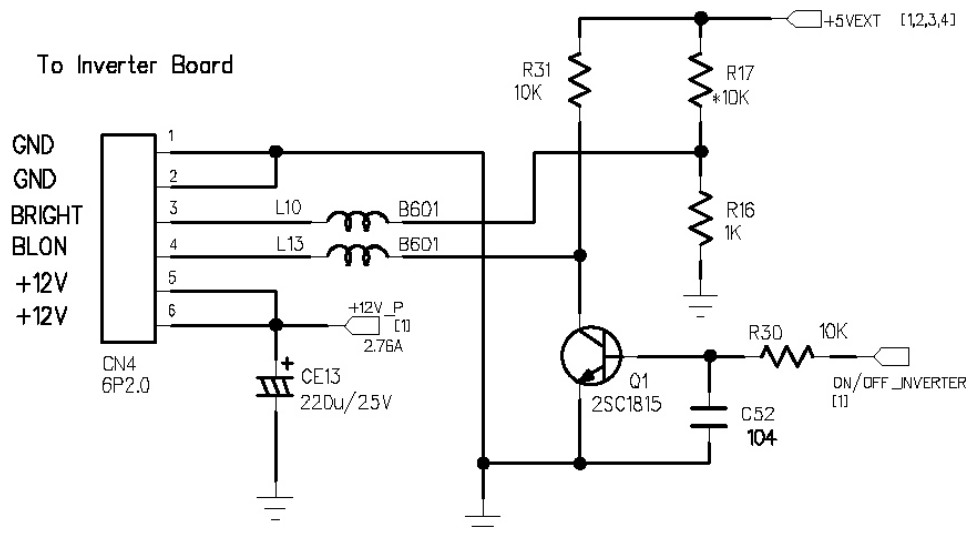


Figure 3.3.1.1 Boost control circuit diagram

[Example 2] Symptom: power not on

Description: after inserting power cord, indicator light is not on. Press POWER button and player cannot be switched on.

Analysis and troubleshooting: when this kind of trouble appears, firstly check whether power board has +12V voltage output. Test Cn6 flat cable holder and find that there is +12 voltage to video main board, which means that power circuit is ok; then check power control circuit and check whether pin 2 of U14 has input voltage and whether pin 3 has +5V voltage and result is normal. Test output pin voltage of U12 and find that there is no +5V voltage output and pin 4 of U12 is low level at the same time, so we doubt U12 has trouble. Change U12 and U12 pin has +5V voltage output after inserting power cord. Power on and test functions of the player and they are all normal, so trouble is removed.

[Example 3] Symptom: speaker has no sound

Description: in any external input mode, there is no sound output.

Analysis and troubleshooting: set signal source in “AV” state, turn on DVD Player demonstration disc and use oscillograph to test left/right speaker and find that there is no signal waveform output, so we confirm trouble should appear in precious stage circuit. Shown in the figure 3.3.1.2, test pin 8, 17 input pin of U11 (TDA7226) and find that there is waveform input, but pin 9, 20 have no waveform output. Then test power supply loop and +12V voltage changes to 10V after voltage drops, which is normal. Observe whether pin around has rosin joint or false welding. Weld again and trouble exists, so it may be chip internal processing circuit that has trouble. After changing U11, trouble disappears.

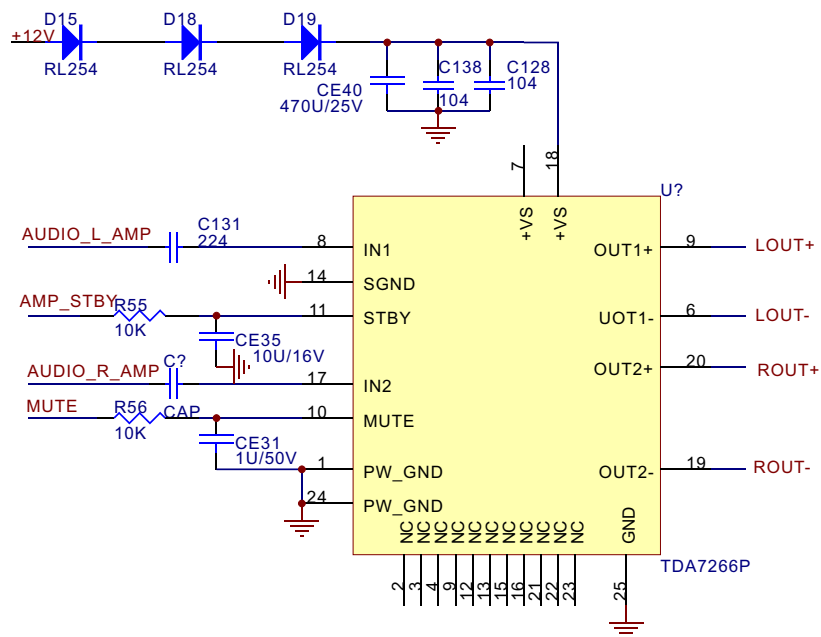


Figure 3.3.1.2 Audio amplifying circuit

[Example 4] Symptom: standby indicator light is not on

Description: after power on, red standby light of the player is not on, but when pressing POWER button, the player may enter power-on state.

Analysis and troubleshooting: after power on, indicator light is not on no matter in standby or in power-on, but if you press POWER button, system can power on. According to the symptom, trouble

should be in indicator light control circuit. In standby, test emitter electrode of Q9 and it is high level and that of Q11 is low level, so we doubt that triode Q11 is not on. After changing it, trouble is removed.

[Example 5] Symptom: noise appears when power on

Description: press POWER button on remote control or control board to power on and off on each input mode and you may hear “pop” noise during the courses.

Analysis and troubleshooting: according to servicing experience, firstly check mute circuit when this kind of trouble appears. Shown in the figure 3.3.1.3, when power on, AMP-MUTE signal changes from low level to high level and then adds to base electrode of triode Q6 through diode D21 and R71 to make triode Q6 saturated on, now MUTE end is low level to realize power-on mute effect. When power on, voltage on two ends of CE33 cannot change suddenly, high level should be kept to make triode Q5 connected; voltage is added to base electrode of triode Q6 through diode D20, R71 to make it saturated on, now MUTE end is low level and power-off mute effect is realized at the same time. Now noise exists when both in power on and power off, so their common loop has trouble. After checking, we find that triode Q6 has been stricken through. Change the corresponding model, trouble disappears.

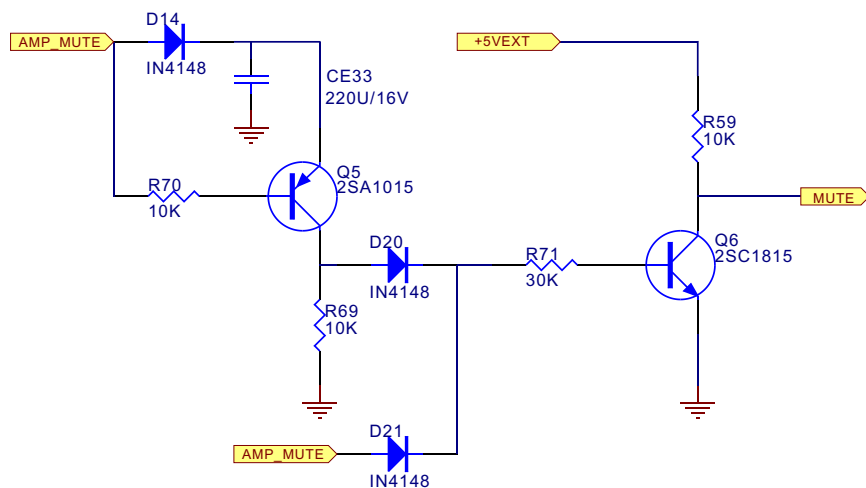


Figure 3.3.1.3 Mute circuit diagram

[Example 6] Symptom: no sound

Description: insert antenna, TV can search channels but speaker has no sound output.

Analysis and troubleshooting: TV audio signal are received from tuner which can output analog TV image and mono signal and digital coding signal (NICAM signal). Before this kind of trouble appears, please do not repair in a hurry. Firstly confirm whether there is sound output in SCART and AV input mode. After confirming, there is sound output in other mode now, which means that U11 and speakers are good. Use oscillograph to test pin 14 of tuner and check whether there is audio waveform output. After testing, we find that this pin has waveform output and this signal enters chip U8 (STV8216) through the RC filtering composed by resistor R1 and capacitor CE5. Test pin 8, 17 of U11 and find that there is no

Audio signal input. Check carefully and find that pin 28, 29 of U9 may probably have rosin joint. Use iron and tin to process and trouble disappears after power on again.

[Example 7] Symptom: remote control has no function

Description: when pressing buttons on remote control, TV screen has no response.

Analysis and troubleshooting: test voltage of 5V-IR pin of Cn7 and it is +4.96, which is normal. When power is not on, test elements of L47, R106, C159 between pin 1 of Cn7 and chip U15 and they are all normal. After power on, test voltage of pin 1 of Cn7 and it is +4.98V, which is also normal. Press buttons on remote control and find that pin 1 voltage of Cn7 has no change. Under normal conditions, when pressing remote control, voltage changes from +4.98 to 3V plus several, which means remote control information has been received, so trouble should be in remote control receiver. After changing, trouble disappears.

[Example 8] Symptom: AV input has no image

Description: set signal source in "AV" state, turn on DVD Player demonstration disc and screen has no image. SCART is used to output signal to external TV set and there is still no image display.

Analysis and troubleshooting: use oscillograph to test waveform on two ends of L45 near J3 and it is normal. Video signals inputted by AV, through L45, are sent to pin 18 of TVP5146 and then switch into digital video signals after internal processing and output from pin 43~47, 50~52 of TVP5146 to LCD image processing chip of MST518 to drive LCD screen; the other way is sent to pin 8 of La7952 and output outside. Test and find that two ends of C53 have waveform but output pin 43~47, 50~52 have no waveform. Observe carefully and find that pin 18 has rosin joint and screen has display after welding again, but external video signal still has no input. Test input pin 8 and output pin 1 of U1 (La7952) and find that there is input waveform but no output. Test pin 7 power supply voltage of U1 and it is normal, so we doubt U1 has trouble. After changing U1, trouble is removed.

[Example 9] Symptom: NICAM has no function

Description: press NICAN button on remote control and bilingual mode, stereo mode and mono mode cannot be changed each other.

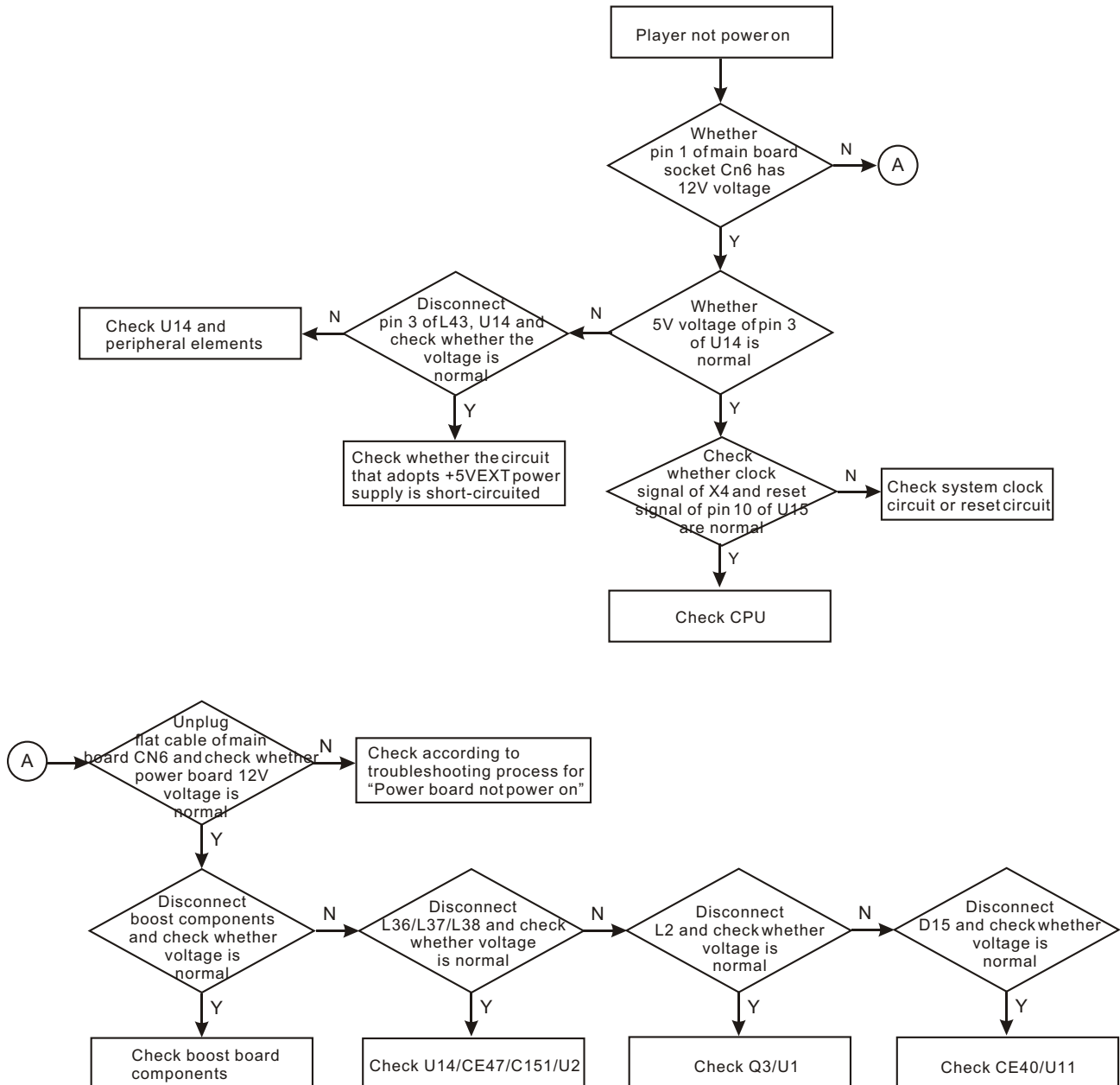
Analysis and troubleshooting: after receiving "NICAM" signal from tuner, NICAM outputs from pin 11, through the filtering circuit composed by C99, C98, L24, enters pin 73 of STV8216, and then restores To audio signal through internal processing and then outputs to audio amplifying circuit from pin 28, 29, so firstly use oscillograph to test whether waveform of pin 11 (SIF) is normal.

Then test pin 78 signal of U9 after filtering and find that waveform is normal and there is input but no output, so we can make sure U9 has trouble; test each power supply voltage and they are all normal. Use oscillograph to test crystal oscillation circuit and find that 14.318MHZ of X3 has no oscillation. After changing X3, crystal oscillator has oscillation and trouble is removed.

3.3.2 Troubleshooting flow chart

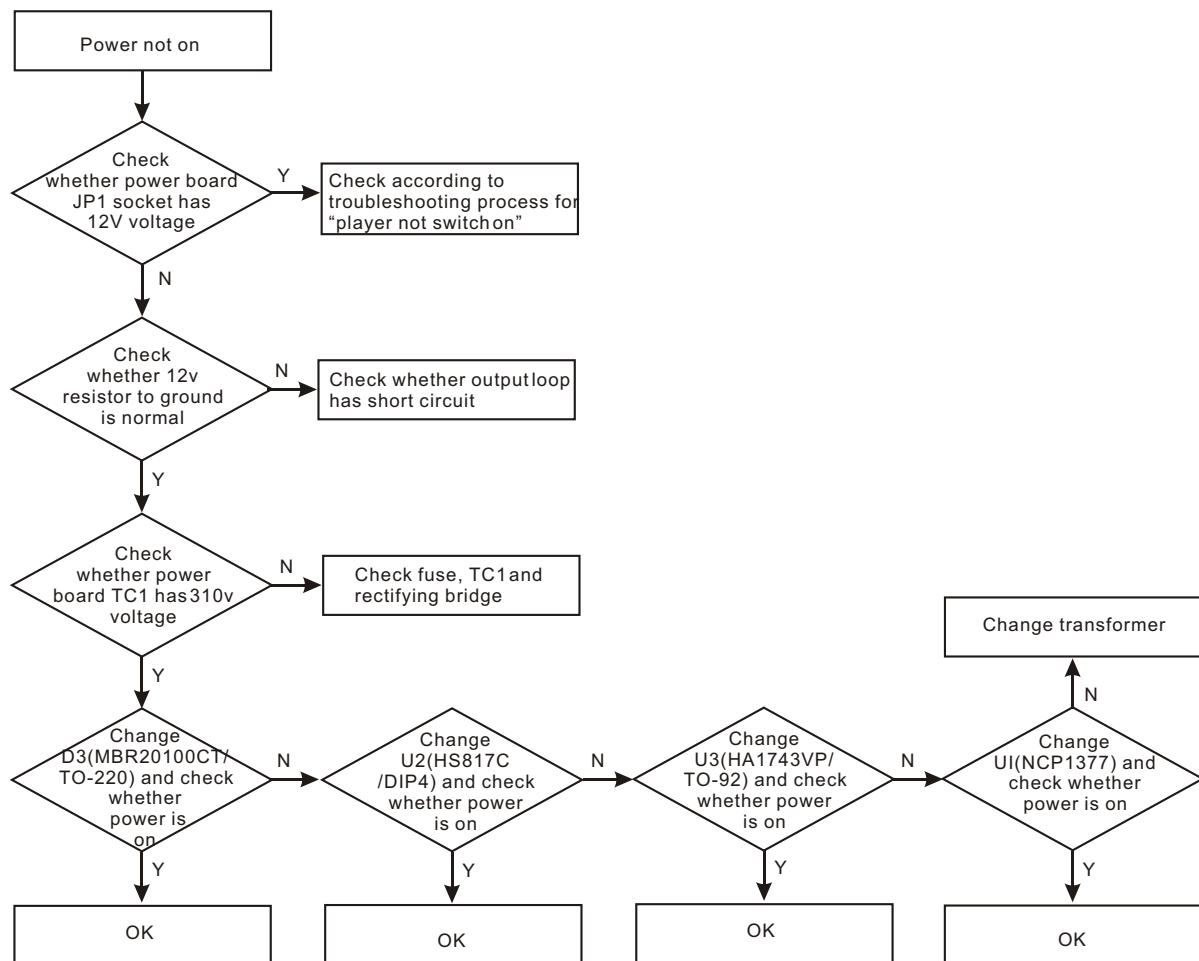
[Flow chart 1] Symptom: player not power on

Description: switch on power, indicator light is not on and buttons have no function.



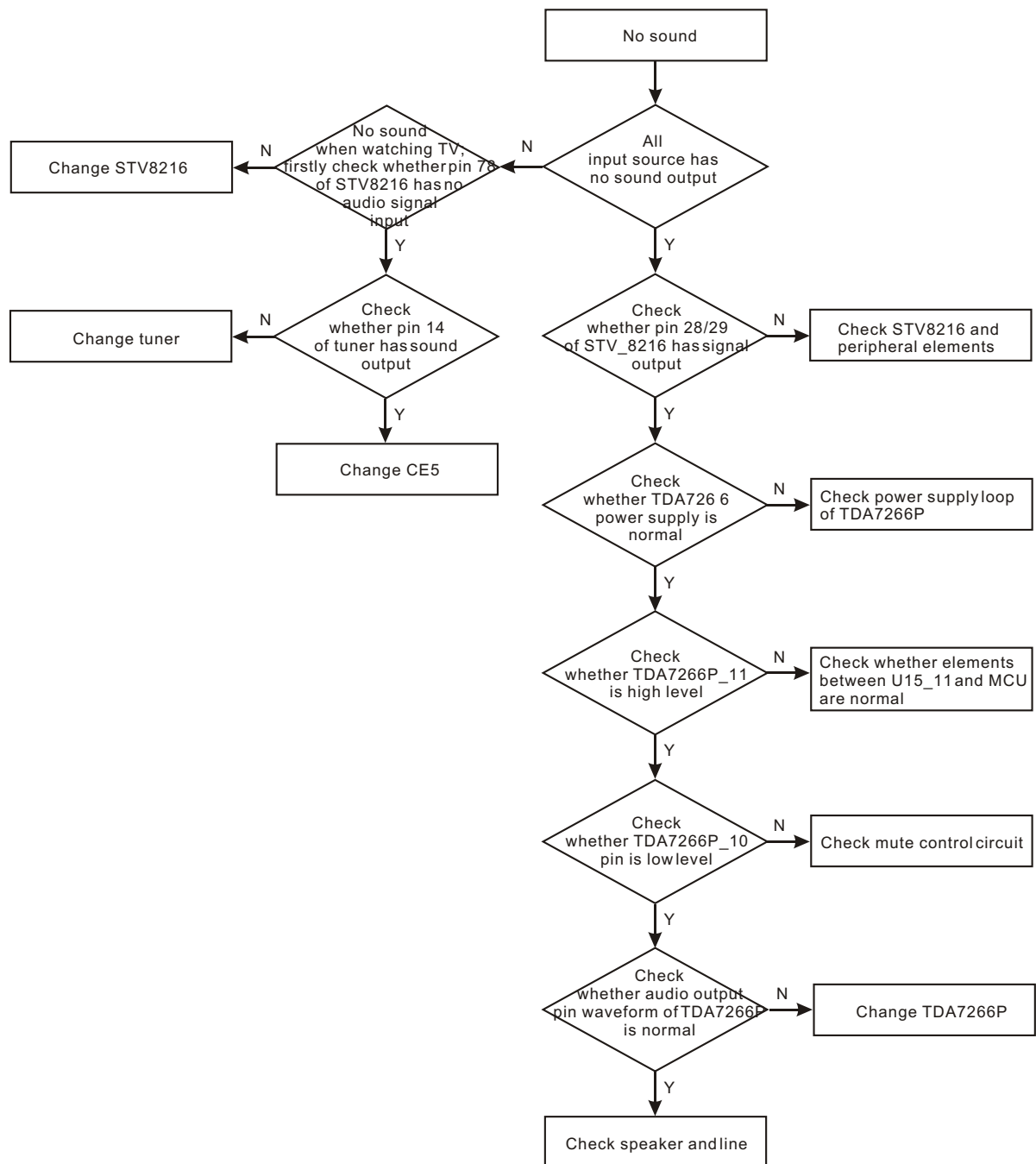
[Flow chart 2] Symptom: power not on

Description: no response after switching on player



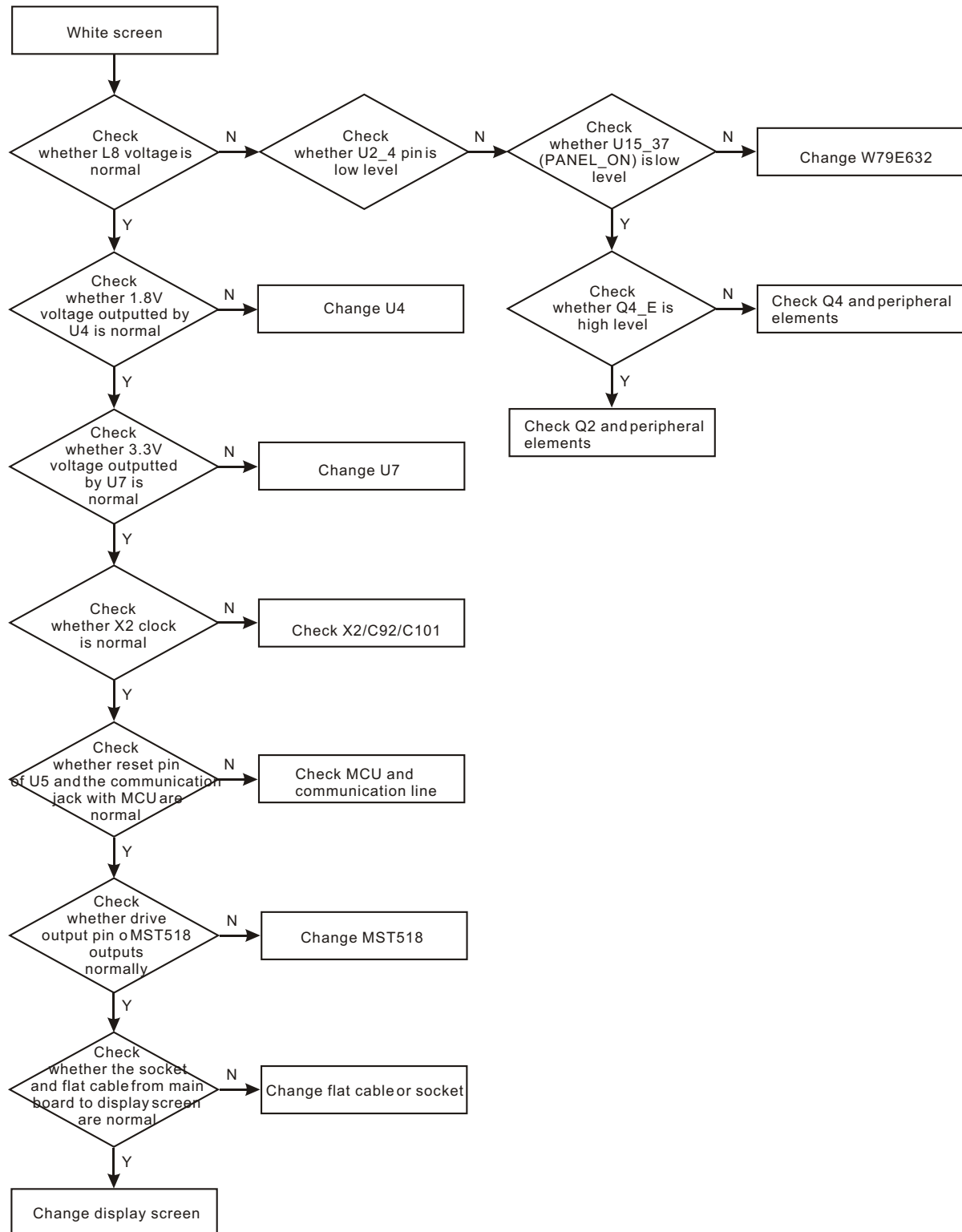
[Flow chart 3] Symptom: no sound

Description: there is image, but no audio output



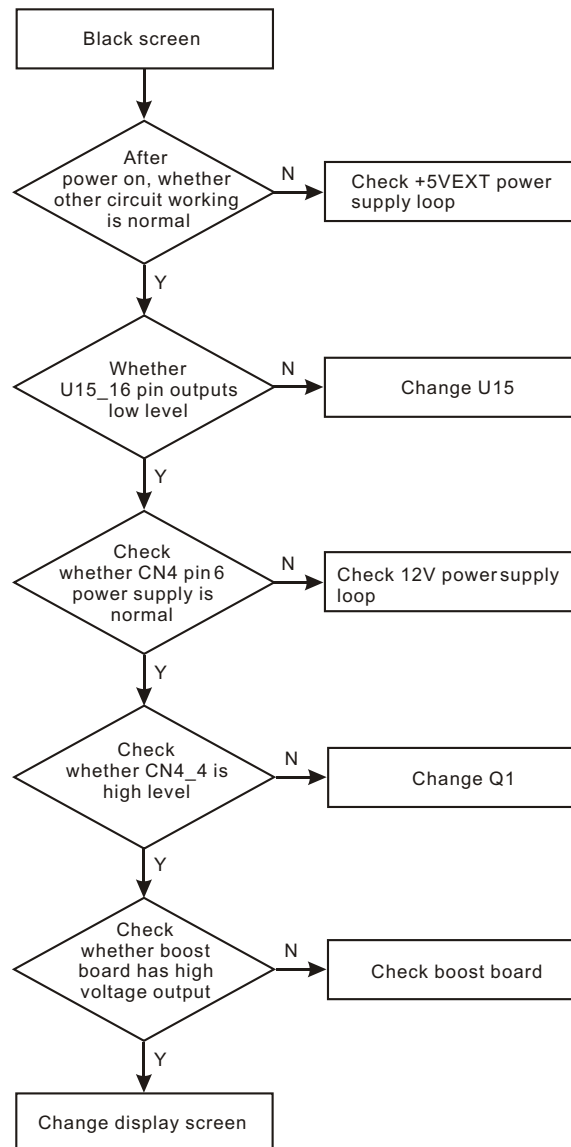
[Flow chart 4] Symptom: white screen

Description: screen is white and indicator on



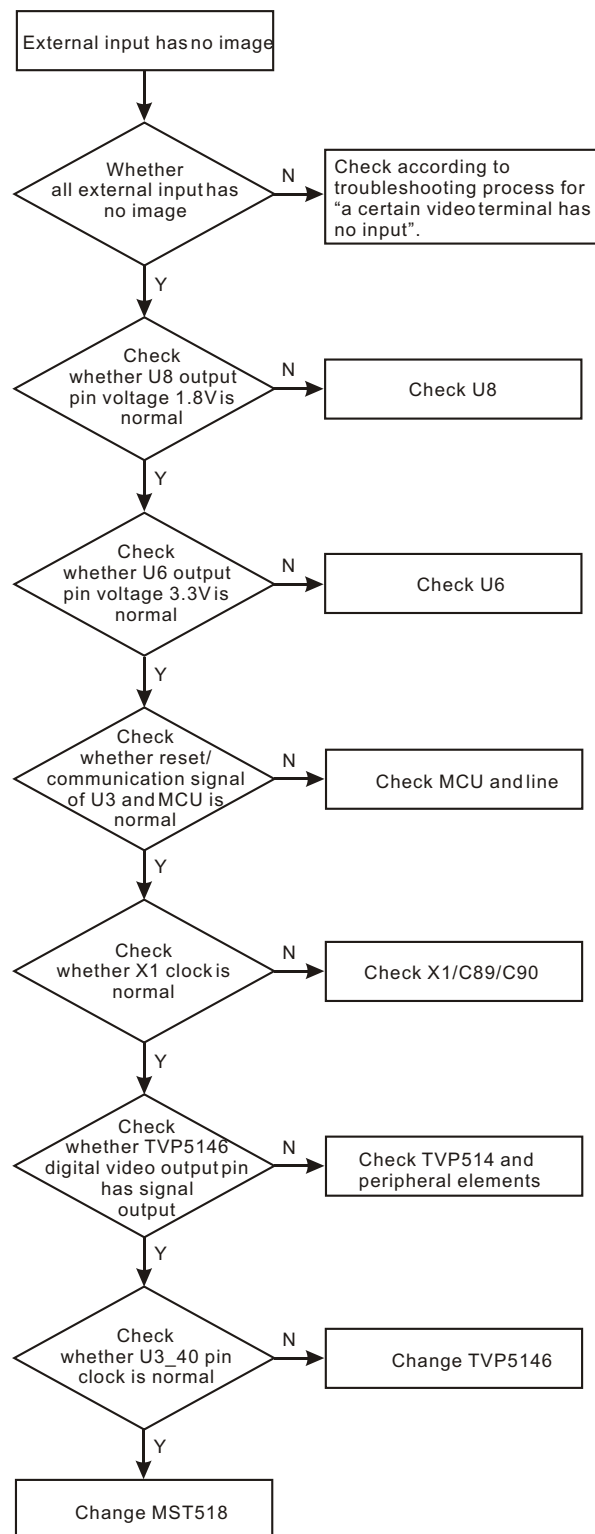
[Flow chart 5] Symptom: black screen

Description: screen is black and indicator light is on.



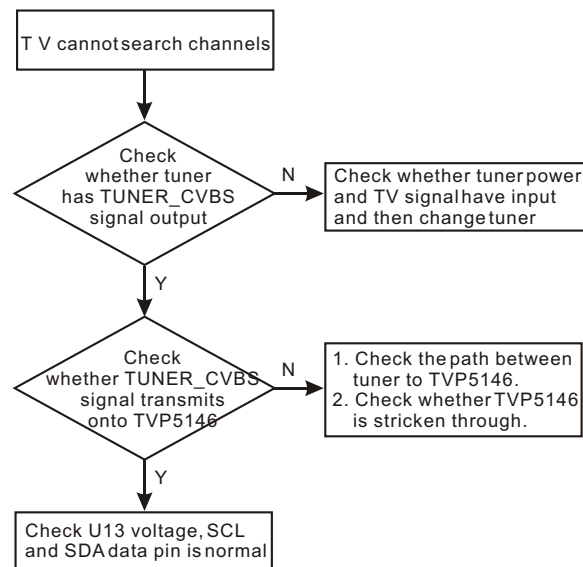
[Flow chart 6] Symptom: external input has no image

Description: external input has no image but has sound.



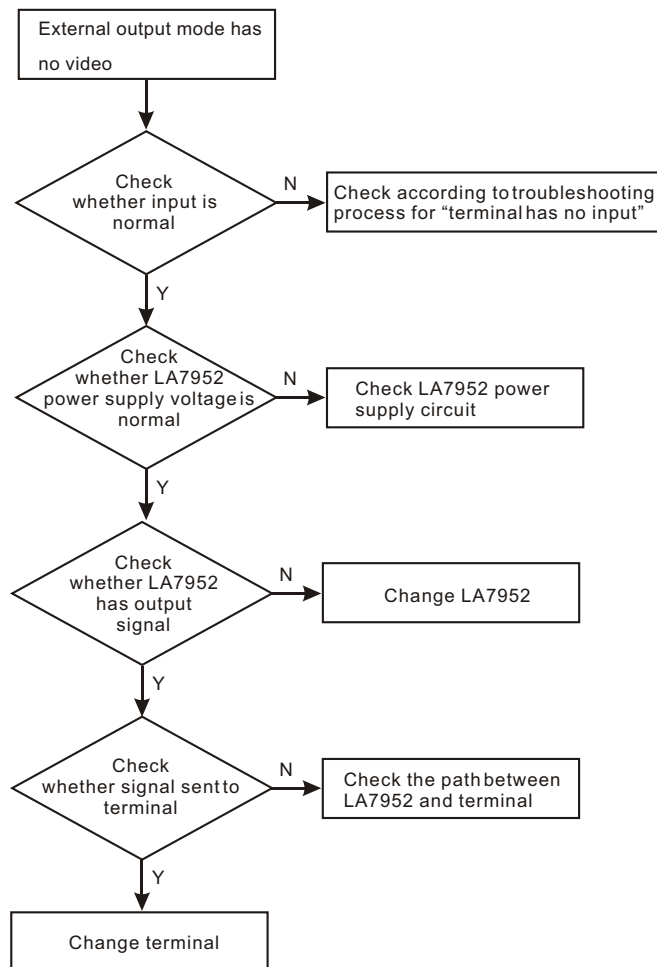
[Flow chart 7] Symptom: TV cannot search channels

Description: channel cannot be searched



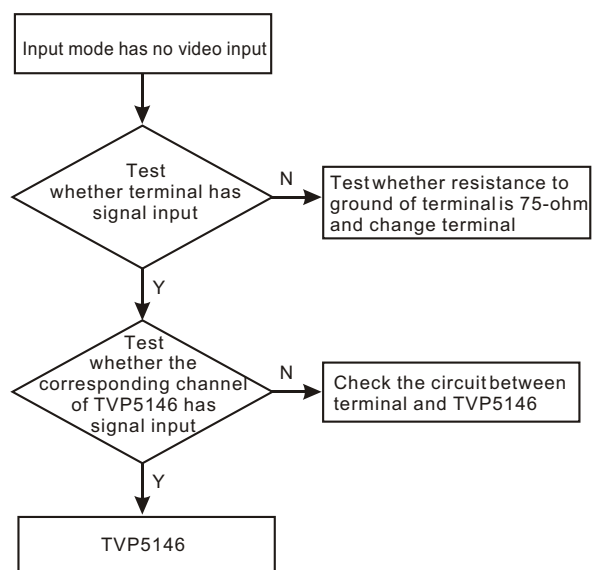
[Flow chart 8] Symptom: external output mode has no video

Description: external output mode has no video but has audio.



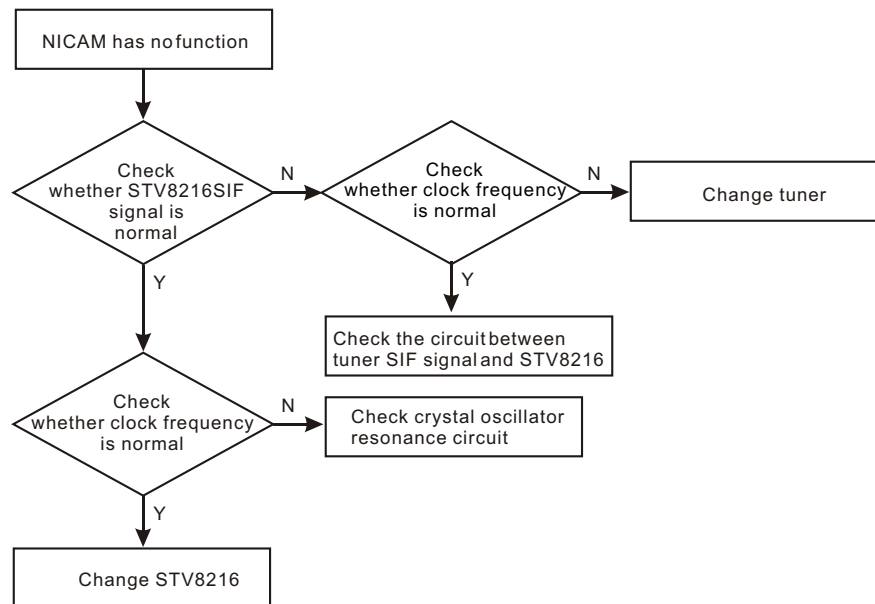
[Flow chart 9] Symptom: input mode has no video input

Description: input mode has no video input but has audio input.



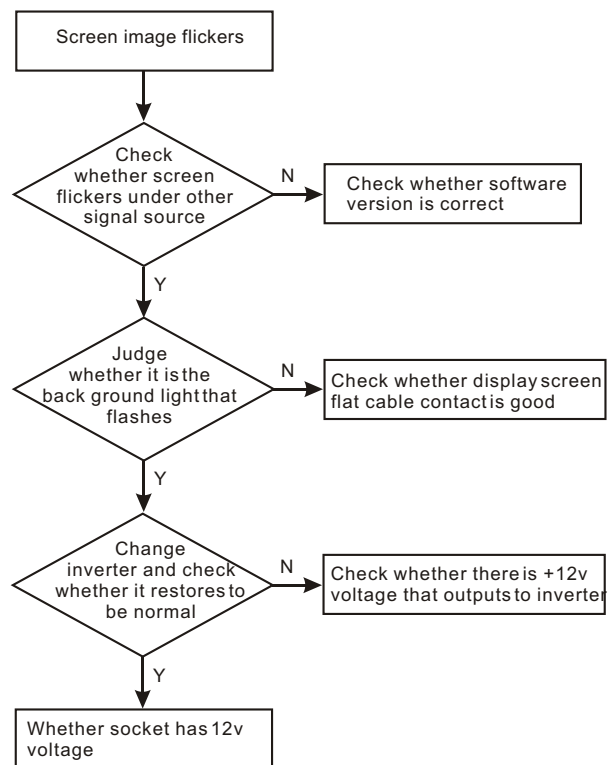
[Flow chart 10] symptom: NICAM has no function

Description: NICAM has no function and cannot be realized



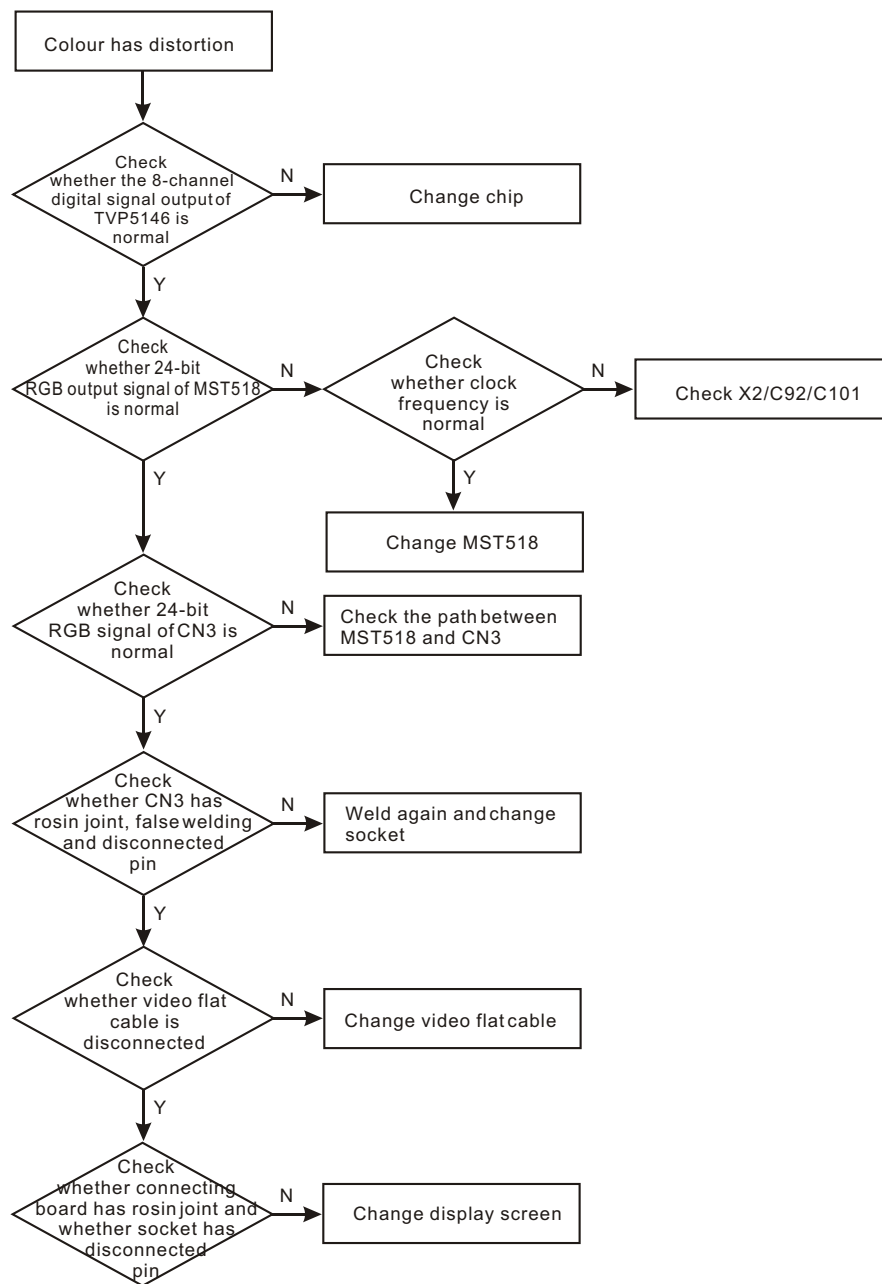
[Flow chart 11] Symptom: screen image flickers

Description: screen image flickers and sound is normal



[Flow chart 12] Symptom: colour has distortion

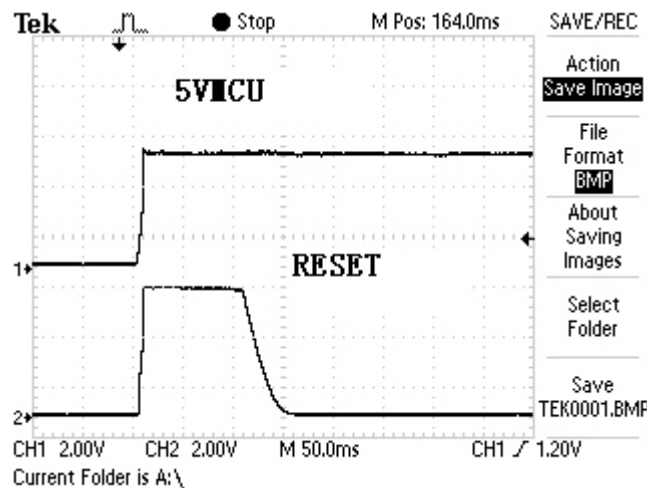
Description: picture colour has distortion



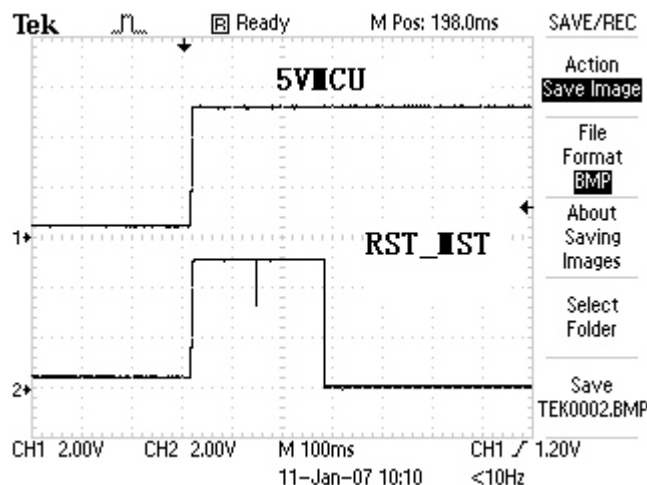
Section Four Waveform diagram

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.

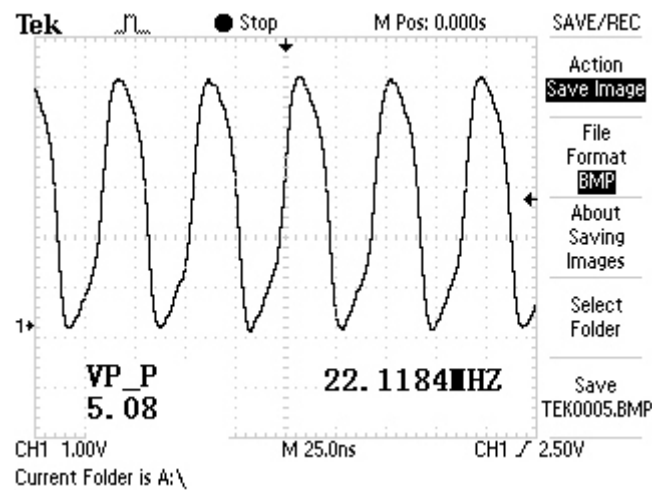
1. Reset VCC: waveform comparison diagram of 5VMCU and system reset pin during the course of power on



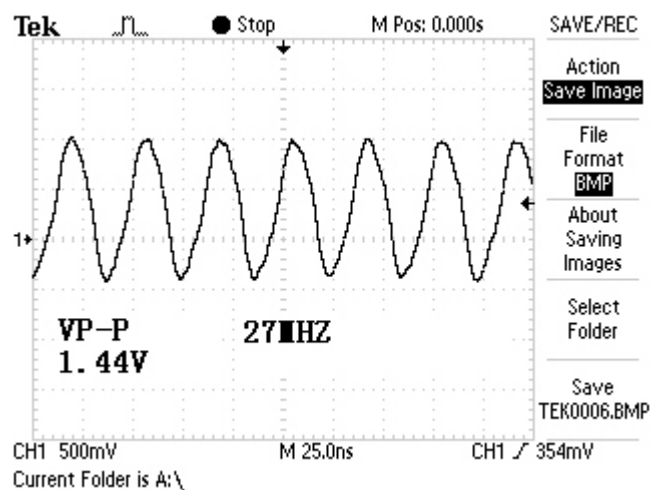
2. Reset MST: waveform comparison diagram of 5VMCU and MST518 reset pin during the course of power on



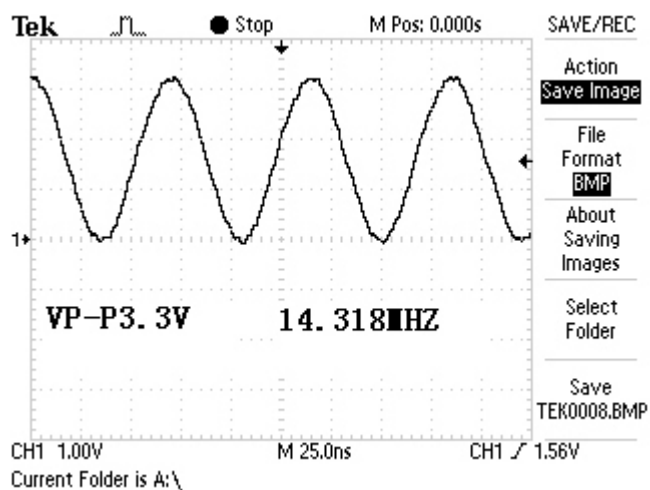
3. X4-5.08V: waveform diagram when X4 is in standby (frequency 22.1184MHZ)



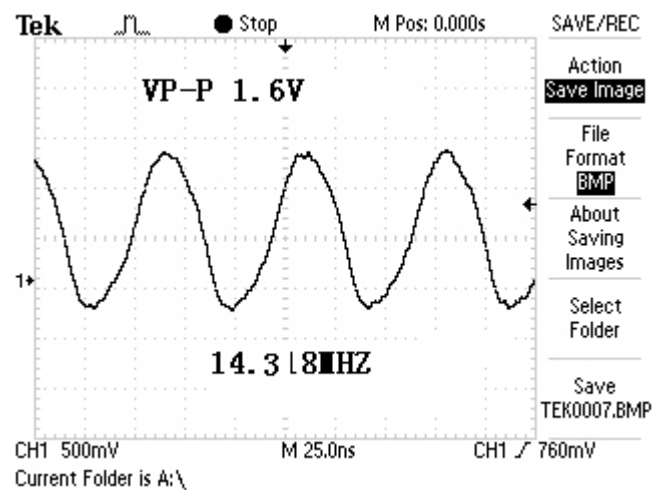
4. X3-3.44V: waveform diagram when X3 is working (frequency 27MHZ)



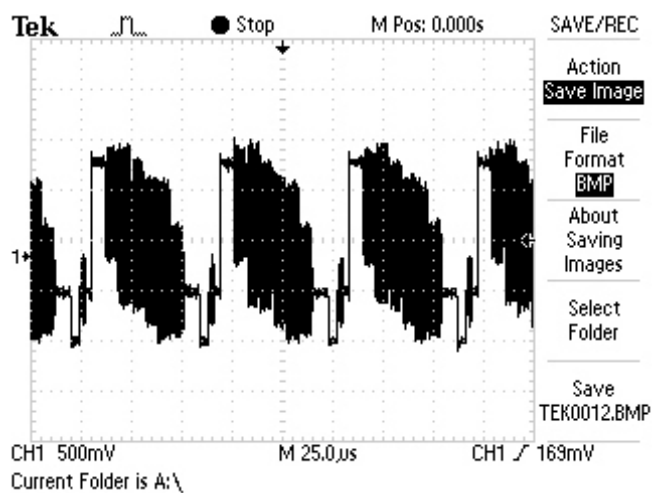
5. X2-3.3V: waveform diagram when X2 is working (frequency 14.318MHz)



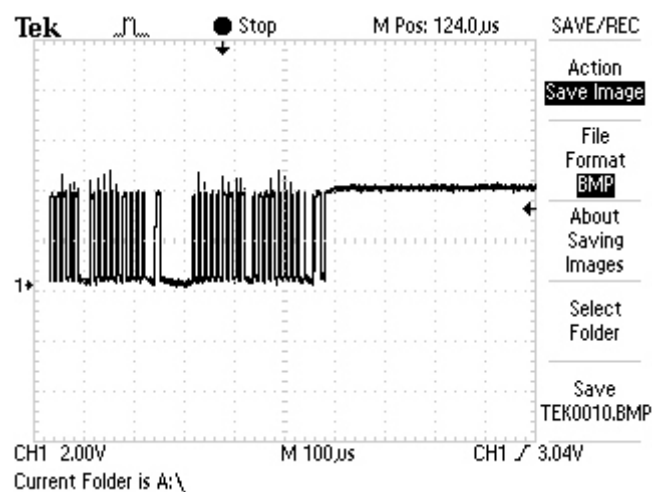
6. X1-1.6V: waveform diagram when X1 is working (frequency 14.318MHZ)



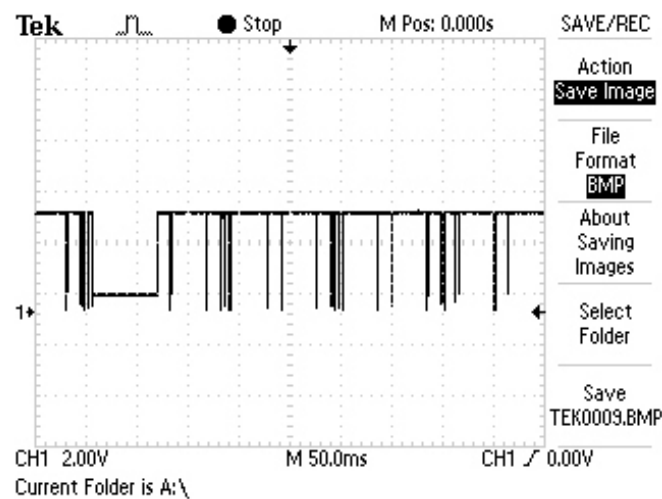
7. U3_16: video signal waveform diagram of U3_16 pin when machine is receiving standard signal source in TV state.



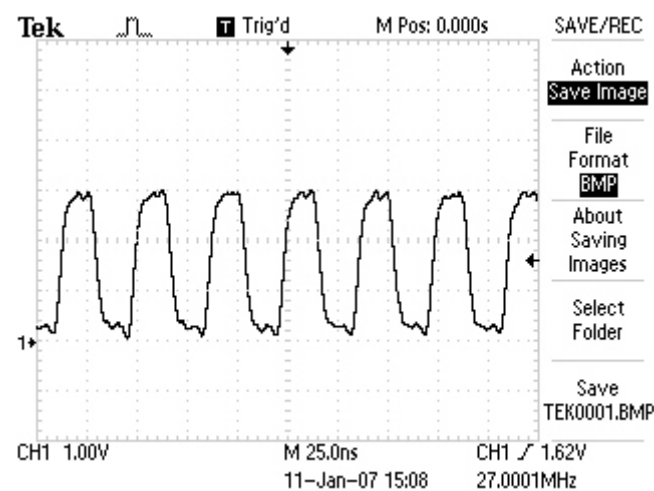
8. U13_6: waveform diagram of SCL in IIC bus



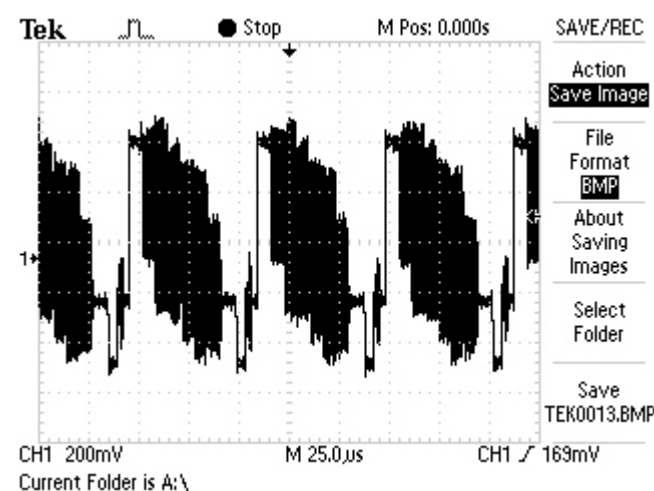
9. U13_5: waveform diagram of SDA in IIC bus



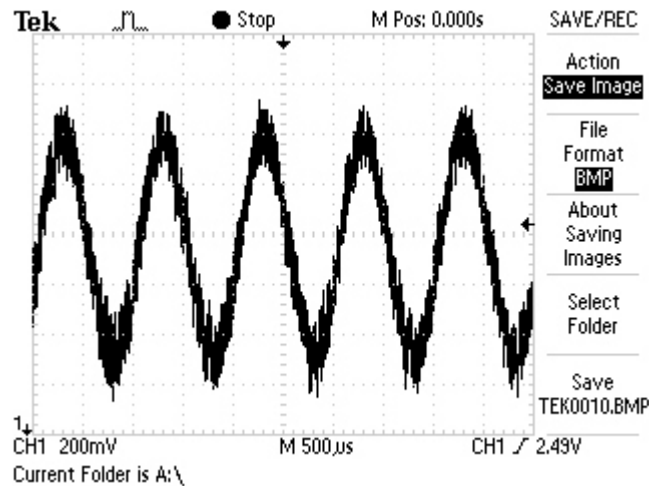
10. TVP5146_40: waveform diagram of TVP5146_40 pin outputting clock signal to MST518 (frequency 27MHZ)



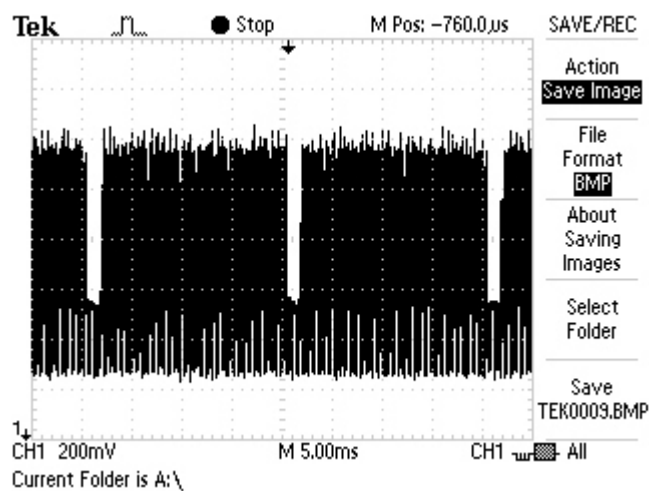
11. TEK0013: waveform diagram of video signal outputted by U1_1 pin when machine is receiving standard signal source in TV state



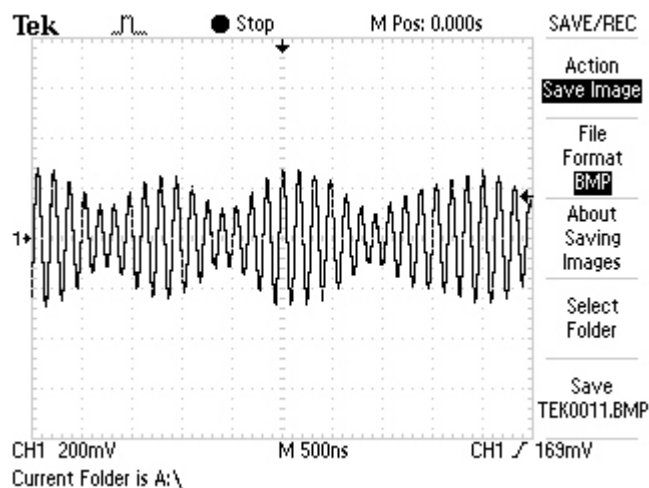
12. T1_14: waveform diagram of audio output pin of tuner when machine is receiving standard signal source in TV state.



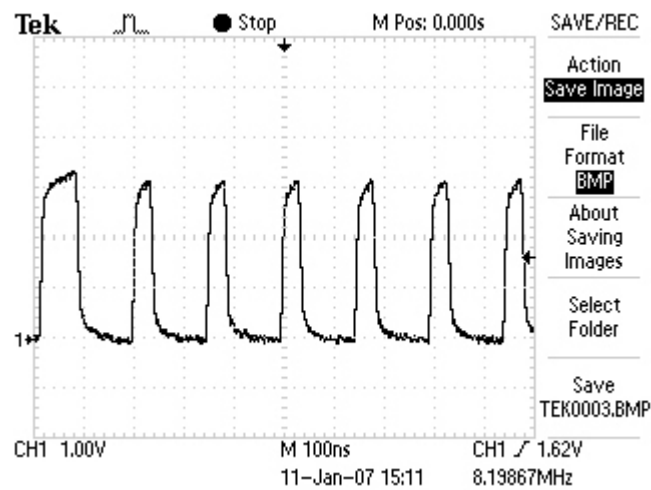
13. T1_12: waveform diagram of video signal outputted by pin 12 of tuner when machine is receiving TV signal in TV state



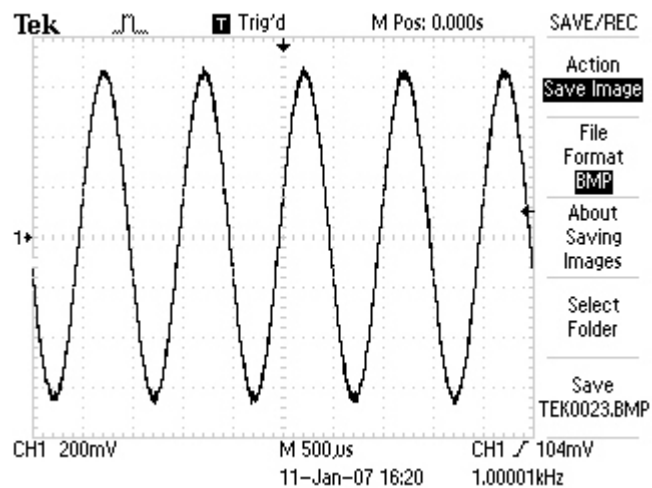
14. T1_11: output waveform of NICAM output pin



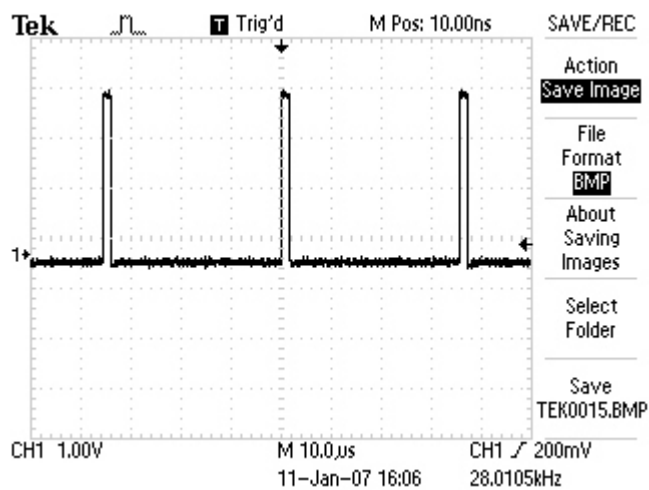
15. RP5: waveform diagram of digital video signal outputted by TVP5146 (test point RP5)



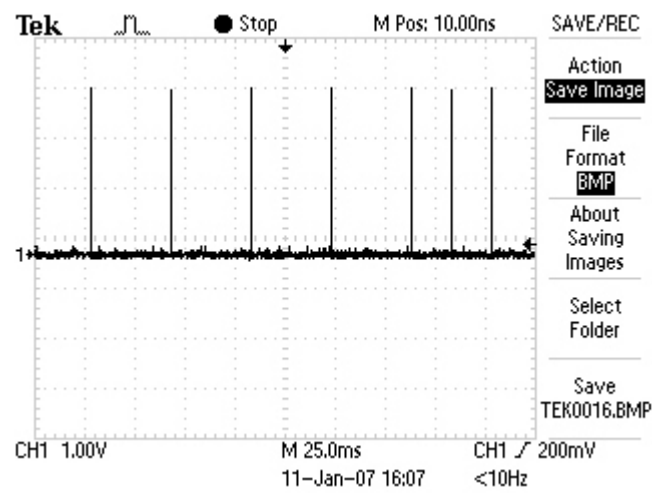
16. ROUT: audio output waveform diagram (test point CN5)



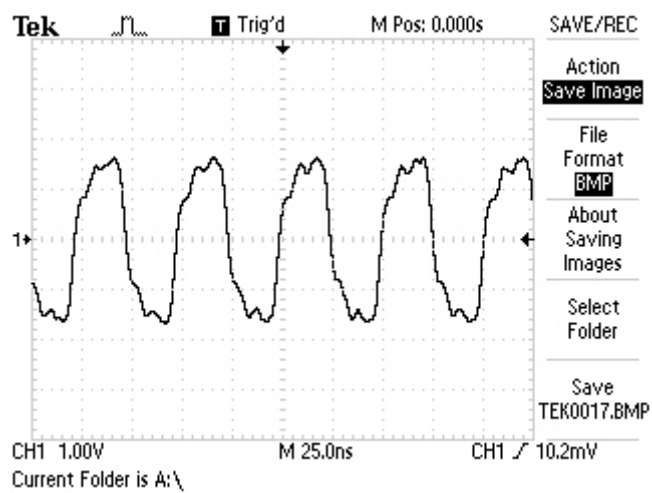
17. R25: waveform diagram of H_SYNC signal outputted by MST518 (test point R25)



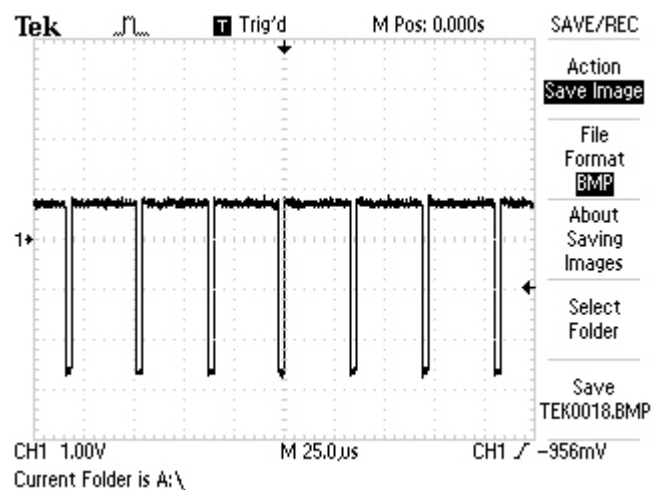
18. R24: waveform diagram of Y_SYNC signal outputted by MST518 (test point R24)



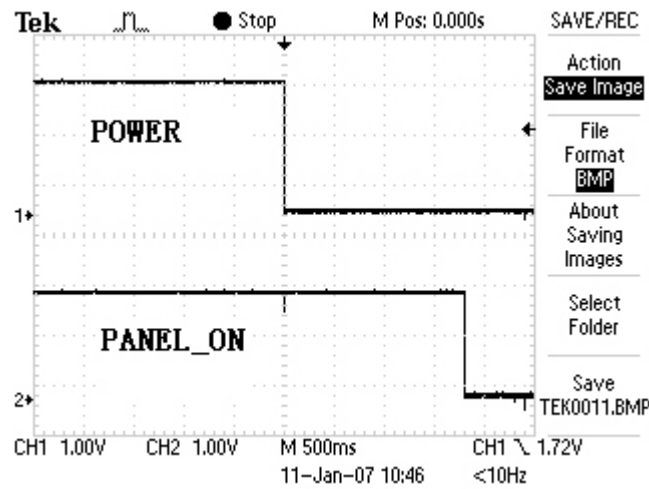
19. R23: waveform diagram of DCLK signal outputted by MST518 (test point R23)



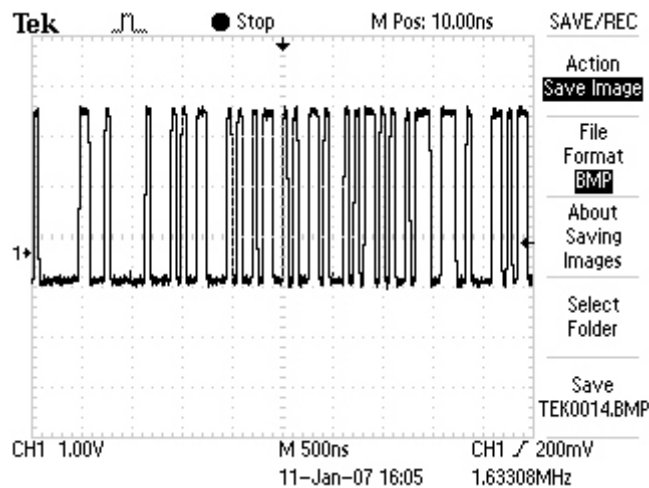
20. R22: waveform diagram of LDE signal outputted by MST518 (test point R22)



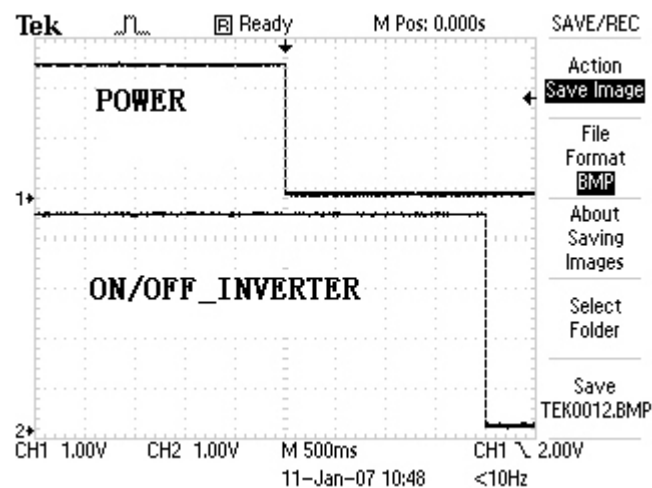
21. PANEL_ON: waveform comparison diagram of POWER and PANEL_ON signal when machine enters power-on from standby



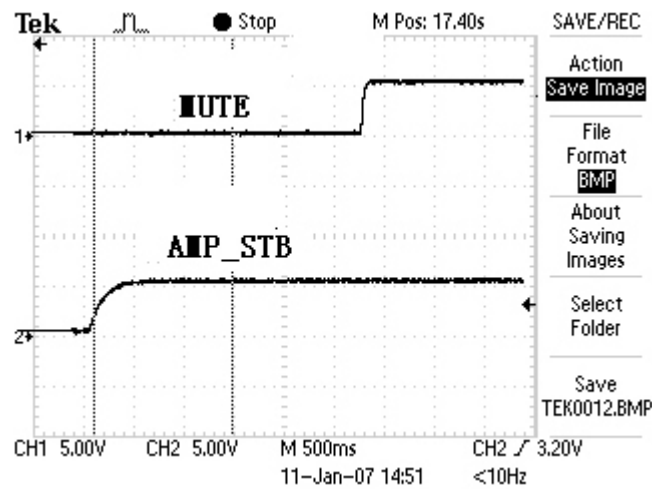
22. MST518_RP1: waveform diagram of drive signal outputted by MST518



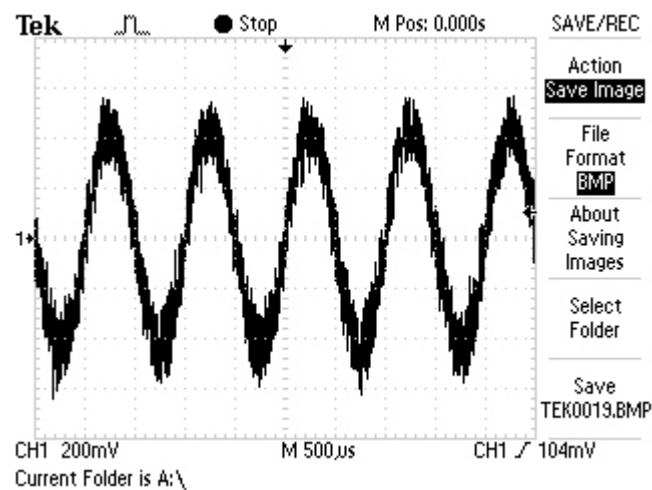
23. INVERTER: waveform comparison diagram of POWER and ON/OFF_INVERTER signal when machine enters power-on from standby



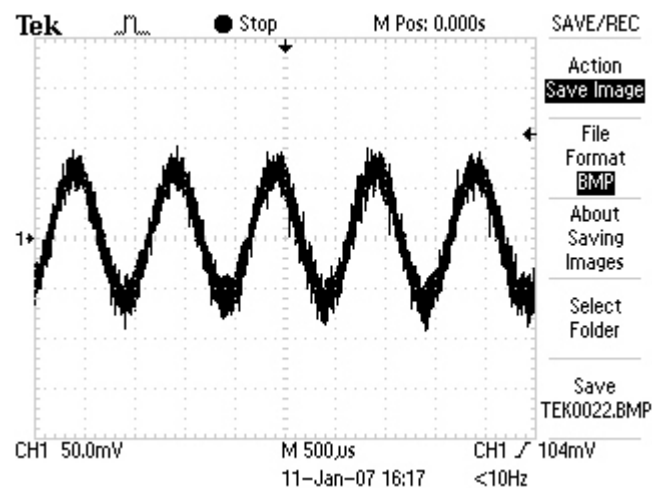
24. AMP_STB: waveform comparison diagram of AMP_STB and MUTE signal when machine enters power-on from standby



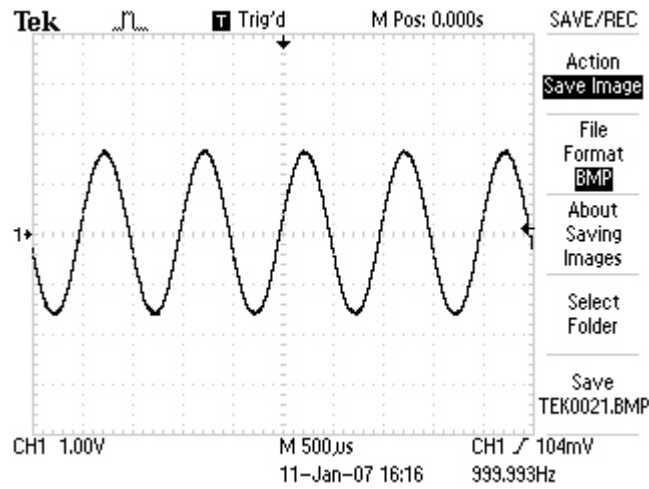
25. 8216_78: waveform diagram of audio signal from tuner when machine is receiving standard signal source in TV state (test point STV8216_78)



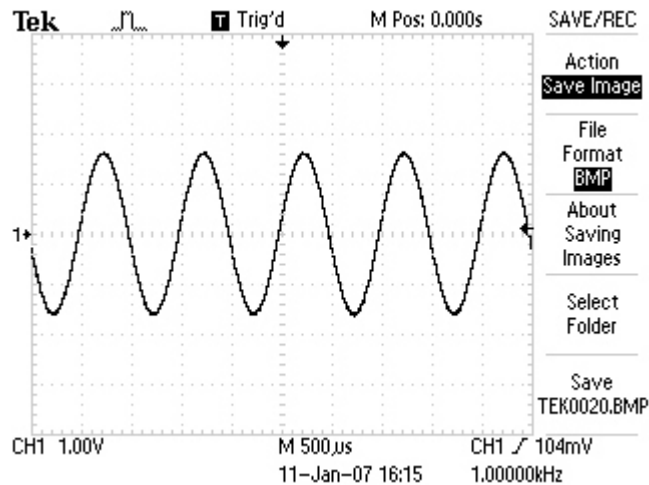
26. 8216_28: waveform diagram of audio signals from tuner that output from pin 28/29 after being processed by STV8216 when machine is receiving standard signal source in TV state



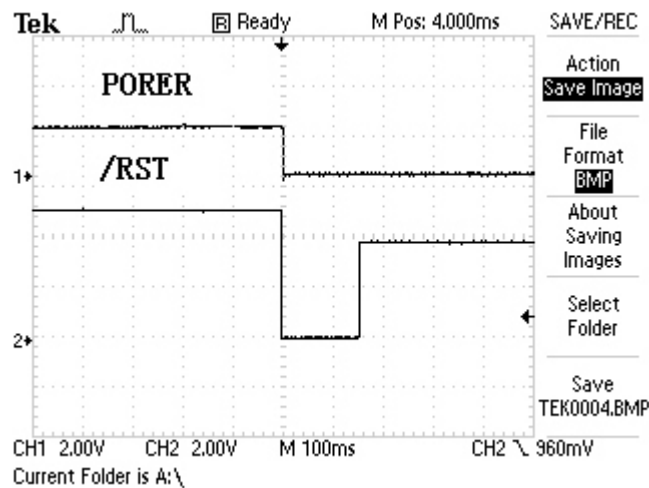
27. 8216_18: waveform diagram of audio signals from tuner that output from pin 18/19 after being processed by STV8216 when machine is receiving standard signal source in TV state



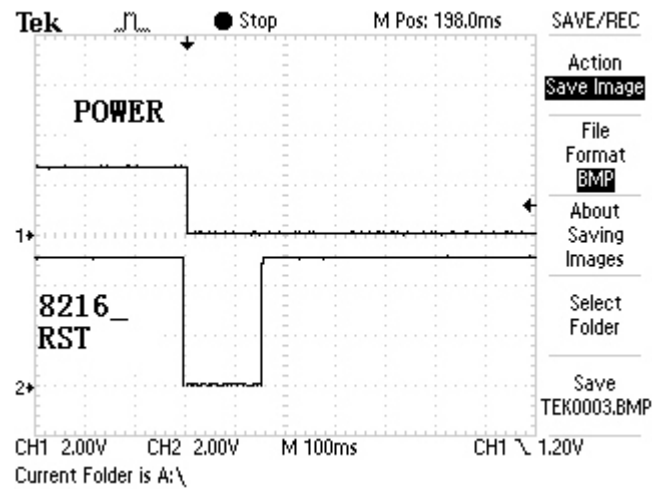
28. 8216_1: waveform diagram of audio signals from tuner that output from pin 1/2 after being processed by STV8216 when machine is receiving standard signal source in TV state



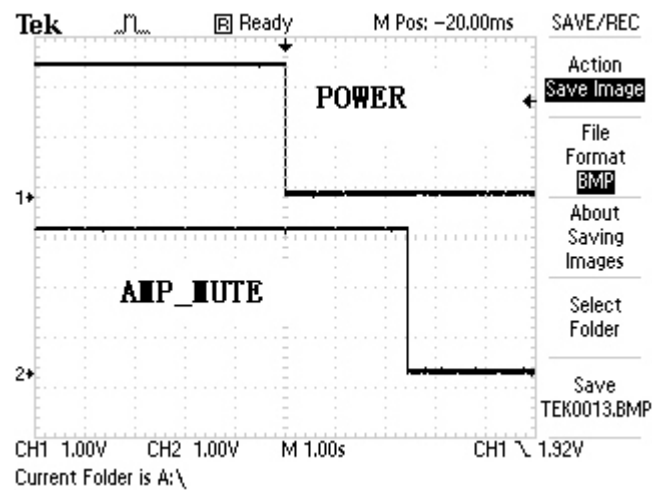
29. Pin 7 RST: waveform comparison diagram of reset signal outputted by pin 7 of W79E632 (/RST) and POWER pin



30. Pin 38 RST: waveform comparison diagram of reset signal outputted by pin 38 of W79E632 (8216_RST) and POWER pin



31. Pin 30 MUTE: waveform comparison diagram of audio signal outputted by pin 30 of W79E632 (MUTE) and POWER pin



Section Five Function Introduction to IC

3.5.1 function introduction to STV8216

1. Description

TV Sound Demodulator: provides all the necessary circuitry for the demodulation of audio transmissions of European and Asian terrestrial TV broadcasts. The various transmission standards are automatically detected and demodulated without user intervention.

Audio Processor: based on DSP technology, independently controls loudspeaker, subwoofer and headphone signals. It offers basic and advanced features, such as a ST WideSurround, Equalizer, Automatic Loudness and Smart Volume Control for television viewer comfort. The STV8226/36 versions can perform additionally the SRS 3D Surround for stereo and mono signals.

Audio Matrix: 3 stereo and 1 mono external analog audio inputs to loudspeakers and headphone, with 2 stereo external analog audio outputs (SCART compatible).

2. Feature

- # NICAM, AM, FM Mono and FM 2 Carrier Stereo Demodulators for all sound carriers between 4.5 and 7 MHz
- # Spatial Sound Effects (ST Wide Surround and Pseudo-Stereo)
- # Mono input provided for optimum AM Demodulation performances
- # Subwoofer output with Volume Control and Programmable Bandwidth
- # Demodulation controlled by Automatic Standard Recognition System
- # Loudspeaker and Headphone outputs with Volume/Balance Controls and Beeper
- # Sound IF AGC with wide range
- # Overmodulation and Carrier Offset recovery
- # Smart Volume Control
- # 5-band Equalizer & Bass/Treble Control
- # SRS® 3D Surround
- # 3-to-2 Analog Stereo Audio I/Os (SCART compatible) with Audio Matrix
- # Low-noise Audio Mutes and Switches
- # I²S Output to interface with Dolby® ProLogic® Decoder
- # Automatic Loudness Control
- # I²C Bus-controlled

Single and standard 27 MHz Crystal Oscillator

Embedded 3.3 V Regulators

Power supplies: 3.3 V Digital, 5 V or 8 V Analog

I = Input

O = Output

OD = Open Drain

B = Bidirectional

A = Analog

AP = Analog Power Supply

DP = Digital Power Supply

3. Pin Definitions

PIN	Name	Type	Function
1	AO1L	A	Left SCART1 Audio Output
2	AO1R	A	Right SCART1 Audio Output
3	NC		Not Used
4	NC		Not Used
5	NC		Not Used
6	NC		Not Used
7	VDDC	AP	3.3 V Power Supply for Audio DAC/ADC
8	GNDC	AP	0 V Power Supply for DAC/ADC
9	AI1L	A	Left SCART1 Audio Input
10	AI1R	A	Right SCART1 Audio Input
11	VMC1	A	Switched VREF Decoupling Pin for Audio Converters (VMCP)
13	VMC2	A	VREF Decoupling Pin for Audio Converters (VMC)
14	AI2L	A	Left SCART2 Audio Input
15	AI2R	A	Right SCART2 Audio Input
16	VDDA	AP	3.3 V Power Supply for Audio Buffers, Matrix & Bias
17	GNDAH	AP	0 V Power Supply for Audio Buffers & SCART
18	AO2L	A	Left SCART2 Audio Output
19	AO2R	A	Right SCART2 Audio Output
20	VDDH	AP	8 V / 5 V Power Supply for SCART & Audio Buffers
21	NC		Not Used
22	VREFA	A	Voltage Reference for Audio Buffers

23	AI3L	A	Left SCART3 Audio Input
24	AI3R	A	Right SCART3 Audio Input
25	N/C		Not Used
26	BGAP	A	Bandgap Voltage Source Decoupling
27	N/C		Not Used
28	LSL	A	Left Loudspeaker Output
29	LSR	A	Right Loudspeaker Output
30	SW	A	Subwoofer Output
31	HPL	A	Left Headphone Output
32	HPR	A	Right Headphone Output
33	GNDSA	AP	Substrate Analog/Digital Shield
34	N/C		Not Used
35	HPD	B	Headphone Detection Input (Active Low)
36	ADR	I	Hardware I ² C Chip Address Control
37	N/C		Not Used
38	N/C		Not Used
39	SCL	OD	I ² C Serial Clock
40	SDA	OD	I ² C Serial Data
41	N/C		Not Used
42	REG	A	5 V Power Regulator Control
43	RESET	I	Hardware Reset (Active Low)
44	SYSCK	B	System Clock Output
45	MCK	B	I ² S Master Clock Output
46	VDD1	DP	3.3V Power Supply for Digital Core & IO Cells
47	GND1	DP	0V Power Supply for Digital Core & IO Cells
48	N/C		Not Used
49	GNDSP	AP	Substrate Analog/Digital Shield for Clock-PLL
50	N/C		Not Used
51	N/C		Not Used
52	XTI	I	Crystal Oscillator Input
53	XTO	O	Crystal Oscillator Output
54	VDDP	AP	3.3 V Power Supply for Analog PLL Clock
55	GNDP	AP	0 V Power Supply for Analog PLL Clock

56	GND2	DP	0 V Power Supply for Digital Core, DSPs & IO Cells
57	VDD2	DP	3.3 V Power Supply for Digital Core, DSPs & IO Cells
58	CKTST	I	Must be Connected to 0 V
59	N/C		Not Used
60	N/C		Not Used
61	SDO	B	I ² S Bus Data Output
62	ST/SDI	B	Stereo Detection Output / I ² S Bus Data Input
63	WS	B	I ² S Bus Word Select Output
64	SCK	B	I ² S Bus Clock Output
65	BUS1	B	I ² C Bus Expander Output 1
66	N/C		Not Used
67	N/C		Not Used
68	BUS0	B	I ² C Bus Expander Output 2
69	IRQ	B	I ² C Status Read Request
70	N/C		Not Used
71	N/C		Not Used
72	N/C		Not Used
73	SIF	A	Sound IF Input
74	VTOP	A	ADC VTOP Decoupling Pin
75	VREFIF	A	AGC Voltage Reference Decoupling Pin
76	VDDIF	AP	3.3 V Power Supply for IF AGC & ADC
77	GNDIF	AP	0 V Power Supply for IF AGC & ADC
78	MONOIN	A	Mono Input
79	NC		Not Used
80	NC		Not Used

3.5.2 function introduction to MST518

1. Description

The MST518V is a high performance, and fully integrated graphics processing IC solution for LCD monitors with resolutions up to SXGA. It is configured with an integrated triple-ADC/PLL, a high quality scaling engine, an on-screen display controller, a built-in output clock generator, and a multi-purpose output display interface.

To further reduce system costs, the MST518V also integrates intelligent power management control

capability for green-mode requirements and spread-spectrum support for EMI management.

2. Feature

- # High-quality zoom and shrink scaling engine (Compatible with VGA thru SXGA)
- # Integrated 8-bit triple-ADC/PLL
- # On-screen display controller (OSD)
- # Supports dual-RGB inputs
- # Supports sRGB
- # Supports composite sync and SOG separator
- # Programmable 10-bit gamma correction
- # Integrated brightness & contrast control adjustment
- # Supports peaking function for video sharpness enhancement
- # Supports coring function for low level noise reduction
- # Supports multi-purpose output display interface driver
- # Supports copy protection
- # Supports PWM backlight intensity control
- # Green PC and low EMI features
- # Low standby power mode (< 16mA)
- # Supports 8-bit video decoder input (ITU 656)

3. Pin Definitions

PIN	Pin Name	Pin Type	Function
33	HWRESET	Schmitt Trigger Input w/ 5V-tolerant	Hardware reset; active high
82	CS	Input w/ 5V-tolerant	3 Wire Serial Bus Chip Select; active high
83	SDA	I/O w/ 5V-tolerant	3 Wire Serial Bus Data; 4mA driving strength
84	SCL	Input w/ 5V-tolerant	3 Wire Serial Bus Clock
Analog Interface			
38	HSYNC0	Schmitt Trigger Input w/ 5V-tolerant	Analog HSYNC Input from Channel 0
39	VSYNC0	Schmitt Trigger Input w/ 5V-tolerant	Analog VSYNC Input from Channel 0
40	HSYNC1	Schmitt Trigger Input w/ 5V-tolerant	Analog HSYNC Input from Channel 1
41	VSYNC1	Schmitt Trigger Input w/ 5V-tolerant	Analog VSYNC Input from Channel 1

55	REXT		External resistor 390 ohm to AVDD
60	BIN1	Analog Input	Analog Blue Input from Channel 1
61	BIN1M	Analog Input	Reference Ground for Analog Blue Input from Channel 1
62	SOGIN1	Analog Input	Sync-On-Green Input from Channel 1
63	GIN1	Analog Input	Analog Green Input from Channel 1
64	GIN1M	Analog Input	Reference Ground for Analog Green Input from Channel 1
65	RIN1	Analog Input	Analog Red Input from Channel 1
66	RIN1M	Analog Input	Reference Ground for Analog Red Input from Channel 1
69	BIN0M	Analog Input	Reference Ground for Analog Blue Input from Channel 0
70	BIN0	Analog Input	Analog Blue Input from Channel 0
71	GIN0M	Analog Input	Reference Ground for Analog Green Input from Channel 0
72	GIN0	Analog Input	Analog Green Input from Channel 0
73	SOGIN0	Analog Input	Sync-On-Green Input from Channel 0
74	RIN0M	Analog Input	Reference Ground for Analog Red Input from Channel 0
75	RIN0	Analog Input	Analog Red Input from Channel 0
78	RMID		Mid-Scale Voltage Bypass
79	REFP		Internal ADC Top De-coupling Pin
80	REFM		Internal ADC Bottom De-coupling Pin
Video Interface			
90	VCLK	Input w/ 5V-tolerant	Video Decoder Clock
98-91	VD[7:0]	Input w/ 5V-tolerant	Video Decoder Data[7:0]
LCD Interface			
143	LHSYNC	Output w/ Pull-down Resistor	LCD HSYNC; 4~12mA driving strength programmable
144	LVSYNC	Output w/ Pull-down Resistor	LCD VSYNC; 4~12mA driving strength programmable
145	OCLK	Output w/ Pull-down Resistor	LCD Output Clock; 4~12mA driving strength programmable
146	LDE	Output w/ Pull-down Resistor	LCD Display Enable; 4~12mA driving strength programmable
138-131	RA[7:0]	Output w/ Pull-down Resistor	Port A Red Channel Bit[7:0]; 4~12mA driving strength programmable
128, 127, 120-115	GA[7:0]	Output w/ Pull-down Resistor	Port A Green Channel Bit[7:0]; 4~12mA driving strength programmable
110-103	BA[7:0]	Output w/ Pull-down Resistor	Port A Blue Channel Bit[7:0]; 4~12mA driving strength programmable
26-23, 18-15	RB[7:0]	I/O w/ Pull-down Resistor	Port B Red Channel Bit[7:0]; 4~12mA driving strength programmable
14-11, 8-5	GB[7:0]	I/O w/ Pull-down Resistor	Port B Green Channel Bit[7:0]; 4~12mA driving strength programmable
4, 3, 154,	BB[7:0]	I/O w/ Pull-down Resistor	Port B Blue Channel Bit[7:0]; 4~12mA driving strength programmable

153, 150-147			
126, 155-160	GPO[6:0]	Output w/ Pull-down Resistor	TCON GPO[6:0]; 4~12mA driving strength programmable
124	OINV	Output w/ Pull-down Resistor	TCON "Odd" Channel Inversion; 4~12mA driving strength programmable
123	EINV	Output w/ Pull-down Resistor	TCON "Even" Channel Inversion; 4~12mA driving strength programmable
122	OSP	Output w/ Pull-down Resistor	TCON "Odd" Channel Start Pulse; 4~12mA driving strength programmable
121	ESP	Output w/ Pull-down Resistor	TCON "Even" Channel Start Pulse; 4~12mA driving strength programmable
LVDS Interface			
138	LVA0M	Output	A-Link Negative LVDS Differential Data Output
137	LVA0P	Output	A-Link Positive LVDS Differential Data Output
136	LVA1M	Output	A-Link Negative LVDS Differential Data Output
135	LVA1P	Output	A-Link Positive LVDS Differential Data Output
134	LVA2M	Output	A-Link Negative LVDS Differential Data Output
133	LVA2P	Output	A-Link Positive LVDS Differential Data Output
128	LVA3M	Output	A-Link Negative LVDS Differential Data Output
127	LVA3P	Output	A-Link Positive LVDS Differential Data Output
132	LVACKM	Output	A-Link Negative LVDS Differential Clock Output
131	LVACKP	Output	A-Link Positive LVDS Differential Clock Output
154	LVB0M	Output	B-Link Negative LVDS Differential Data Output
153	LVB0P	Output	B-Link Positive LVDS Differential Data Output
150	LVB1M	Output	B-Link Negative LVDS Differential Data Output
149	LVB1P	Output	B-Link Positive LVDS Differential Data Output
148	LVB2M	Output	B-Link Negative LVDS Differential Data Output
147	LVB2P	Output	B-Link Positive LVDS Differential Data Output
144	LVB3M	Output	B-Link Negative LVDS Differential Data Output
143	LVB3P	Output	B-Link Positive LVDS Differential Data Output
146	LVBCKM	Output	B-Link Negative LVDS Differential Clock Output
145	LVBCKP	Output	B-Link Positive LVDS Differential Clock Output
RSDS Interface			
143	CLKAP	Output	A-Link Positive RSDS Differential Clock Output from

			"Odd" Channel
144	CLKAN	Output	A-Link Negative RSDS Differential Clock Output from "Odd" Channel
145	CLKBP	Output	B-Link Positive RSDS Differential Clock Output from "Even" Channel
146	CLKBN	Output	B-Link Negative RSDS Differential Clock Output from "Even" Channel
109, 107, 105, 103	BA[3:0]P	Output	A-Link Positive RSDS Differential Data Output from "Odd" Channel
110, 108, 106, 104	BA[3:0]N	Output	A-Link Negative RSDS Differential Data Output from "Odd" Channel
127, 119, 117, 115	GA[3:0]P	Output	A-Link Positive RSDS Differential Data Output from "Odd" Channel
128, 120, 118, 116	GA[3:0]N	Output	A-Link Negative RSDS Differential Data Output from "Odd" Channel
137, 135, 133, 131	RA[3:0]P	Output	A-Link Positive RSDS Differential Data Output from "Odd" Channel
138, 136, 134, 132	RA[3:0]N	Output	A-Link Negative RSDS Differential Data Output from "Odd" Channel
3, 153, 149, 147	BB[3:0]P	Output	B-Link Positive RSDS Differential Data Output from "Even" Channel
4 154, 150, 148	BB[3:0]N	Output	B-Link Negative RSDS Differential Data Output from "Even" Channel
13, 11, 7, 5	GB[3:0]P	Output	B-Link Positive RSDS Differential Data Output from "Even" Channel
14, 12, 8, 6	GB[3:0]N	Output	B-Link Negative RSDS Differential Data Output from "Even" Channel
25, 23, 17, 15	RB[3:0]P	Output	B-Link Positive RSDS Differential Data Output from "Even" Channel
26, 24, 18, 16	RB[3:0]N	Output	B-Link Negative RSDS Differential Data Output from "Even" Channel
126, 155-160	GPO[6:0]	Output w/ Pull-down Resistor	TCON GPO[6:0]; 4~12mA driving strength programmable
122	OSP	Output w/ Pull-down Resistor	TCON "Odd" Channel Start Pulse; 4~12mA driving strength programmable
121	ESP	Output w/ Pull-down Resistor	TCON "Even" Channel Start Pulse; 4~12mA driving strength programmable
GPIO Interface			
87	GOUT1/PWM1	Output	GOUT1/PWM1; 4mA driving strength

86	GOUT1/PWM0	Output	GOUT0/PWM0; 4mA driving strength
Misc. Interface			
2	BYPASS		For External Bypass Capacitor
29	DDC_DAT	I/O w/ 5V-tolerant	DDC Data for Analog Interface; 4mA driving strength
30	DDC_CLK	Input w/ 5V-Tolerant	DDC Clock for Analog Interface
31	DDCROM_CLK	Input w/ 5V-Tolerant	DDC ROM Clock
32	DDCROM_DAT	I/O w/ 5V-tolerant	DDC ROM Data; 4mA driving strength
34	XIN	Crystal Oscillator Input	Xin
35	XOUT	Crystal Oscillator Output	Xout
Power Pins			
48, 54, 58, 77	AVDD	3.3V Power	ADC Power
56	AVDD_PLL	3.3V Power	PLL Power
36	AVDD_MPLL	3.3V Power	MPLL Power
10, 22, 88, 99, 111, 129, 139, 151	VDDP	3.3V Power	Digital Output Power
19, 102, 114, 142	VDDC	2.5V Power	Digital Core Power
1, 9, 20, 21, 37, 42, 45, 51, 57, 59, 76, 81, 89, 100, 101, 112, 113, 125, 130, 140, 141, 152	GND	Ground	Digital Core Ground
27, 28, 43, 44, 46, 47, 49, 50, 52, 53, 67, 68, 90	NC		No Connect. Leave These Pins Floating.

3.5.3 function introduction to MP1430

1. Description

The MP1430 is a step-down regulator with an internal Power MOSFET. It achieves 3A continuous output current over a wide input supply range with excellent load and line regulation.

Current mode operation provides fast transient response and eases loop stabilization.

Fault condition protection includes cycle-by-cycle current limiting and thermal shutdown. Adjustable soft-start reduces the stress on the input source at turn-on. In shutdown mode the regulator draws 20 μ A of supply current.

The MP1430 requires a minimum number of readily available external components to complete a 3A step down DC to DC converter solution.

2. Feature

- # 3A Output Current
- # Programmable Soft-Start
- # 110m Ω Internal Power MOSFET Switch
- # Stable with Low ESR Output Ceramic Capacitors
- # Up to 95% Efficiency
- # 20 μ A Shutdown Mode
- # Fixed 385KHz Frequency
- # Thermal Shutdown
- # Cycle-by-Cycle Over Current Protection
- # Wide 6V to 28V Operating Input Range
- # Output Adjustable from 1.22V
- # Under Voltage Lockout
- # Available in 8-Pin SOIC Package

3. Pin Definitions

Pin	Pin Name	Function
1	BS	High-Side Gate Drive Boost Input. BS supplies the drive for the high-side N-Channel MOSFET switch. Connect a 10nF or greater capacitor from SW to BS to power the high side switch.
2	IN	Power Input. IN supplies the power to the IC, as well as the step-down converter switches. Drive IN with a 6V to 28V power source. Bypass IN to GND with a suitably large capacitor to eliminate noise on the input to the IC. See Input Capacitor section.
3	SW	Power Switching Output. SW is the switching node that supplies power to the output. Connect the output LC filter from SW to the output load. Note that a capacitor is required from SW to BS to power the high-side switch.
4	GND	Ground. (Note: Connect the exposed pad on backside to Pin 4).

5	FB	Feedback Input. FB senses the output voltage to regulate that voltage. Drive FB with a resistive voltage divider from the output voltage. The feedback threshold is 1.222V. See Setting the Output Voltage section.
6	COMP	Compensation Node. COMP is used to compensate the regulation control loop. Connect a series RC network from COMP to GND to compensate the regulation control loop. In some cases, an additional capacitor from COMP to GND is required. See Compensation section.
7	EN	Enable Input. EN is a digital input that turns the regulator on or off. Drive EN high to turn on the regulator, drive EN low to turn it off. An Under Voltage Lockout (UVLO) function can be implemented by the addition of a resistor divider from VIN to GND. For complete low current shutdown its needs to be less than 0.7V. For automatic startup, leave EN unconnected.
8	SS	Soft-Start Control Input. SS controls the soft-start period. Connect a capacitor from SS to GND to set the soft-start period. A 0.1 μ F capacitor sets the soft-start period to 10ms. To disable the soft-start feature, leave SS unconnected.

3.5.4 function introduction to W79E632

1. Description

The W79E632 is a fast 8051 compatible microcontroller with a redesigned processor core without wasted clock and memory cycles. As a result, it executes every 8051 instruction faster than the original 8051 for the same crystal speed. Typically, the instruction executing time of W79E632 is 1.5 to 3 times faster than that of traditional 8051, depending on the type of instruction. In general, the overall performance is about 2.5 times better than the original for the same crystal speed. Giving the same throughput with lower clock speed, power consumption has been improved. Consequently, the W79E632 is a fully static CMOS design; it can also be operated at a lower crystal clock. The W79E632 contains In-System Programmable (ISP) 128 KB bank-addressed Flash EPROM; 4KB auxiliary Flash EPROM for loader program; on-chip 1 KB MOVX SRAM; power saving modes.

2. Feature

- # 8-bit CMOS microcontroller
- # High speed architecture of 4 clocks/machine cycle runs up to 40 MHz
- # Pin compatible with standard 80C52
- # Instruction-set compatible with MCS-51
- # Four 8-bit I/O Ports
- # One extra 4-bit I/O port, chip select
- # Three 16-bit Timers
- # 7 interrupt sources with two levels of priority
- # On-chip oscillator and clock circuitry
- # One enhanced full duplex serial port

Dual 64KB In-System Programmable Flash EPROM banks (APFlash0 and APFlash1)

4KB Auxiliary Flash EPROM for loader program (LDFlash)

256 bytes scratch-pad RAM

1 KB on-chip SRAM for MOVX instruction

Programmable Watchdog Timer

6 channels of 8 bit PWM

Software Reset

Software programmable access cycle to external RAM/peripherals

Code protection

3. Pin Definitions

PIN	PIN NAME	Function
1	NC	
2	KEY1	panel key1
3	KEY2	panel key2
4	KEY3	panel key3
5	KEY4	panel key4
6	FBI	CVBS/RGB switch
7	/RST	TVP5146 out Reset
8	NC	
9	NC	
10	RST	RESET: A high on this pin for two machine cycles while the oscillator is running resets the device.
11	RXD	upgrade port
12	KEY2	panel key2
13	TXD	upgrade port
14	IR	remote input
15	NC	
16	ON/OFF_INVERTER	Higher voltage switch
17	POWER	power control
18	NC	
19	NC	
20	XTAL2	CRYSTAL2: This is the crystal oscillator output. It is the inversion of XTAL1.
21	XTAL1	CRYSTAL1: This is the crystal oscillator input. This pin may be driven by an external clock.
22	GND	GROUND: Ground potential

23	NC	
24	SS	Screen proportion switch
25	SW1	Video Output Switch1
26	SW2	Video Output Switch2
27	SCL	IIC clock
28	SDA	IIC data
29	SEL_I/P	Progressive/Interlaced Scanning Switch
30	AMP_MUTE	Audio Amplifier Mute
31	AMP_STB	Audio Amplifier Standby
32	PSEN	PROGRAM STORE ENABLE: PSEN enables the external ROM data onto the Port 0 address/data bus during fetch and MOVC operations. When internal ROM access is performed, no PSEN strobe signal outputs from this pin.
33	ALE	ADDRESS LATCH ENABLE: ALE is used to enable the address latch that separates the address from the data on Port 0.
35	EA	EXTERNAL ACCESS ENABLE: This pin forces the processor to execute out of external ROM. It should be kept high to access internal ROM. The ROM address and data will not be present on the bus if EA pin is high and the program counter is within 128 KB area. Otherwise they will be present on the bus.
34	NC	
36	NC	
37	PANEL_ON	Screen power switch
38	8216_RST	STV8216 Reset output
39	WP	Protect 24C32
40	RST_MST	MST518 Reset
41	CS_MST	MST518 Chip Enable
42	SDA_MST	IIC Clock to CPU
43	SCL_MST	IIC Data to CPU
44	VDD	POWER SUPPLY: Supply voltage for operation.

3.5.5 function introduction to TVP5146

1. Description

TVP5146 is a high quality, single-chip digital video decoder that digitizes and decodes all popular base-band analog video formats into digital component video. TVP5146 supports the A/D conversion of component RGB and YPbPr signals, as well as the A/D conversion and decoding of NTSC, PAL and SECAM

composite and S-Video into component YCbCr. This chip includes four 10-bit 30-MSPS A/D converters. Prior to each A/D converter, each analog channel contains an analog circuit, which clamps the input to a reference voltage and applies a programmable gain and offset. A total of 10 video input terminals can be configured to any combination of RGB, YPbPr, CVBS, S-Video video inputs.

Component, Composite or S-Video signals are sampled at 2x the square-pixel or ITU-R BT.601 clock frequency (27 MHz), line-locked for correct pixel alignment, and are then decimated to the 1x pixel rate. CVBS decoding utilizes 2-dimensional complementary 5-line adaptive comb filtering for both the luma and chroma data paths, to reduce both cross-luma and cross-chroma artifacts. A chroma trap filter is also available. On CVBS and Y/C inputs, the user can control video characteristics such as contrast, brightness, saturation and hue via an I2C host port interface. Furthermore, luma peaking with programmable gain is included, as well as a patented chroma transient improvement (CTI) circuit.

2. Feature

- # Four 30-MSPS, 10-bit A/D Channels with programmable clamp and gain control
- # Supports NTSC (J, M, 4.43), PAL (B, D, G, H, I, M, N, Nc, 60) and SECAM (B, D, G, K, K1, L) CVBS, S-video
- # Supports analog component YPbPr /RGB video formats with embedded sync
- # 10 analog video input terminals for multi-source connection
- # User-programmable video output formats
- # HSYNC/VSXNC outputs with programmable position, polarity and width and FID (Field ID) output
- # Component video processing
- # Vertical Blank Interval Data Processor
- # I²C host port interface #
- # Reduced power consumption: 1.8V digital core, 3.3V and 1.8V analog core with power-save and power-down modes
- # Embedded RAM to allow user-downloadable configuration micro code (feature upgrade)
- # 80-pin TQFP PowerPAD™ package

3. Pin Definitions

Name	No.	I/O	Description
Analog Video			
VI_1_A	80	I	VI_1_x: Analog video input for CVBS/Pb/B/C
VI_1_B	1		VI_2_x: Analog video input for CVBS/Y/G
VI_1_C	2		VI_3_x: Analog video input for CVBS/Pr/R/C
VI_2_A	7		VI_4_A: Analog video input for CVBS/Y
VI_2_B	8		Up to ten composite, 4 S-video and two composite or three component video

VI_2_C	9		inputs (or a combination thereof) can be supported. The inputs must be AC coupled. The recommended coupling capacitor is 0.1 μF. The possible input configurations are listed in the input select register 00h.
VI_3_A	16		
VI_3_B	17		
VI_3_C	18		
VI_4_A	23		
Clock Signals			
XTAL1	74	I	External clock reference input.
XTAL2	75	O	External clock reference output.
DATACLK	40	O	Line-locked data output clock.
Digital Video			
Y[9:0]	43-47,50-54	O	Digital video output of Y/YCbCr, Y[9] is MSB and Y[0] is LSB.
C[9:0]/GPIO[9:0]	57-60,63-66,69,70	I/O	Digital video output of CbCr, C[9] is MSB and C[0] is LSB. Unused outputs can be left unconnected. Also these terminals can be programmable general purpose I/O. Fast-Switch Overlay between Digital RGB and component RGB/YPbPr Digital BLUE input from Closed Caption decoder (Overlay device) Digital GREEN input from Closed Caption decoder (Overlay device) Digital RED input from Closed Caption decoder (Overlay device)
FSO	57	I	Fast-Switch Overlay between Digital RGB and component RGB/YPbPr
D_BLUE	58	I	Digital BLUE input from Closed Caption decoder (Overlay device)
D_GREEN	59	I	Digital GREEN input from Closed Caption decoder (Overlay device)
D_RED	60	I	Digital RED input from Closed Caption decoder (Overlay device)
Miscellaneous Signals			
RESETB	34	I	Reset input, active low.
PWDN	33	I	Power down input. 1: Power down 0: Normal mode
GLCO/I2CA	37	I/O	Genlock Control Output (GLCO). Two Genlock data formats are available: TI formats and Real Time Control (RTC) format. During reset, this terminal is an input, used to program the I2C address LSB.
FSS/GPIO	35	I/O	Fast-switch (Blanking) input. Switching signal between synchronous component video (YPbPr/RGB) and composite video input. Programmable general purpose I/O
TMS	27	I	This terminal should be connected to a ground.
INTREQ	30	O	Interrupt request.

Host Interface			
SDA	29	I/O	I2C Data bus.
SCL	28	I	I2C Clock input.
Power Supplies			
NSUB	26	I	Substrate ground. Connect to analog ground.
CH1_A33GND CH2_A33GND CH3_A33GND CH4_A33GND	3 6 19 22	I	Analog 3.3V return.
CH1_A33VDD CH2_A33VDD CH3_A33VDD CH4_A33VDD	4 5 20 21	I	Analog power. Connect to 3.3V.
CH1_A18GND CH2_A18GND CH3_A18GND CH4_A18GND	79 10 15 24	I	Analog 1.8V return.
CH1_A18VDD CH2_A18VDD CH3_A18VDD CH4_A18VDD	78 11 14 25	I	Analog power. Connect to 1.8V.
A18GND_REF	13	I	Analog 1.8V return.
A18VDD_REF	12	I	Analog power for reference 1.8V.
PLL_A18GND	77	I	Analog power return.
PLL_A18VDD	76	I	Analog power. Connect to 1.8V.
DGND	32,42,56,68	I	Digital return.
DVDD	31,41,55,67	I	Digital power. Connect to 1.8V.
IOGND	39,49,62	I	Digital power return.
IOVDD	38,48,61	I	Digital power. Connect to 3.3V or less for reduced noise.
Sync Signals			
HS/CS/GPIO	72	I/O	Horizontal sync output or digital composite sync output Programmable general purpose I/O
VS/VBLK/GPIO	73	I/O	Vertical sync output. (for modes with dedicated VSYNC) or VBLK output Programmable general purpose I/O
FID/GPIO	71	I/O	Odd/even field indicator output Programmable general purpose I/O

AVID/GPIO	36	I/O	Active Video indicator output Programmable general purpose I/O
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3.5.6 function introduction to NCP1377

1. Description

The NCP1377 combines a true current mode modulator and a demagnetization detector which ensures full borderline/critical Conduction Mode in any load/line conditions together with minimum drain voltage switching (Quasi- Resonant operation). Due to its inherent skip cycle capability, the controller enters burst mode as soon as the power demand falls below a predetermined level. As this happens at low peak current, no audible noise can be heard. For NCP1377, an internal 8.0 μ s timer prevents the free- run frequency to exceed the 150 kHz CISPR- 22 EMI starting limit while the skip adjustment capability lets the user select the frequency at which the burst foldback takes place. For NCP1377B, the internal timer duration is reduced to 3.0 μ s to allow operation at higher frequencies.

The transformer core reset detection is done through an auxiliary winding which, brought via a dedicated pin, also enables fast Over Voltage Protection (OVP). Once an OVP has been detected, the IC permanently latches- off. The 1377 features a sampling time of 4.5 μ s whereas it is 1.5 μ s for the B version.

The NCP1377 also features an efficient protective circuitries which, in presence of an overcurrent condition, disables the output pulses and enters a safe burst mode, trying to restart. Once the default has gone, the device auto- recovers. Finally an internal 1.0 ms soft- start eliminates the traditional startup stress.

2. Feature

- # Free- Running Borderline/Critical Mode Quasi- Resonant Operation
- # Latched Over Voltage Protection
- # Auto- Recovery Short- Circuit Protection Via UVLO Crossover
- # External Latch Triggering, e.g. Via Overtemperature Signal
- # Current- Mode with Adjustable Skip- Cycle Capability
- # Internal 1.0 ms Soft- Start
- # Internal Temperature Shutdown
- # Internal Leading Edge Blanking
- # 500 mA Peak Current Source/Sink Capability
- # Under Voltage Lockout Level of 12.5 V (On) and 7.5 V (Min)
- # Direct Optocoupler Connection
- # SPICE Models Available for TRANSient Analysis
- # Internal Minimum TOFF

3. Pin Definitions

Pin	Symbol	Function	Description
1	Demag	Core reset detection and OVP	The auxiliary FLYBACK signal ensures discontinuous operation and offers a fixed over voltage detection level of 7.2 V.
2	FB	Sets the peak current setpoint	By connecting an optocoupler to this pin, the peak current setpoint is adjusted accordingly to the output power demand. By bringing this pin below the internal skip level, you shut off the device.
3	CS	Current sense input and skip cycle level selection	This pin senses the primary current and routes it to the internal comparator via an L.E.B. By inserting a resistor in series with the pin, you control the level at which the skip operation takes place.
4	Gnd	The IC ground	-
5	Drv	Driving pulses	The driver's output to an external MOSFET.
6	VCC	Supplies the IC	This pin is connected to an external bulk capacitor of typically 10 µF.
7	NC	-	This unconnected pin ensures adequate creepage distance.
8	HV	High- voltage pin	Connected to the high- voltage rail, this pin injects a constant current into the VCC bulk capacitor and ensures a clean lossless startup sequence.

3.5.7 function introduction to TDA7266P

1. Description

The TDA7266P is a dual bridge amplifier specially designed for LCD TV/Monitor, PC Motherboard, TV and Portable Audio applications.

2. Feature

TECHNOLOGY BI20II

WIDE SUPPLY VOLTAGE RANGE (3.5 - 12V)

OUTPUT POWER:

- 3+3W @THD = 10%, RL = 8Ω, VCC = 7.5V
- 4+4W Music Power @THD = 10%, RL = 8Ω, VCC = 8.5V

SINGLE SUPPLY

MINIMUM EXTERNAL COMPONENTS:

- NO SVR CAPACITOR
- NO BOOTSTRAP
- NO BOUCHEROT CELLS
- INTERNALLY FIXED GAIN

STAND-BY & MUTE FUNCTIONS

SHORT CIRCUIT PROTECTION

THERMAL OVERLOAD PROTECTION

3. Pin Definitions

PIN	Pin Name	Pin Type	Function
1	PW_GND	GND	GND
2	NC		NC
3	NC		NC
4	NC		NC
5	OUT1+	Output	LOUT+ OUTPUT
6	OUT1-	Output	LOUT- OUTPUT
7	+VS	10V POWER	Power
8	IN1	AUDIO INPUT	AUDIO_L_INPUT
9	NC		NC
10	MUTE	MUTE	MUTE I
11	STBY	AMP_STBY	IC
12	NC		NC
13	NC		NC
14	SGND	GND	GND
15	NC		NC
16	NC		NC
17	IN2	AUDIO INPUT	AUDIO_R_INPUT
18	+VS	10V POWER	Power
19	OUT2+	Output	ROUT+ OUTPUT
20	OUT2-	Output	ROUT- OUTPUT
21	NC		NC
22	NC		NC
23	NC		NC
24	PW_GND	GND	GND

3.5.8 function introduction to LA7952

1. Feature

- # On-chip driver with 4 inputs, 1 output, 75W termination.
- # On-chip 6dB amplifier.
- # Excellent crosstalk characteristic.
- # Wide band.
- # Input with DC restoration circuit.

2. Pin Definitions

Pin	Pin Name	Pin Type	Function
1	VIDEO OUT	OUTPUT	VIDEO OUTPUT
2	A		SWITCH
3	B		SWITCH
4	VIN1	INPUT	VIDEO INPUT
5	GND	GND	GND
6	VIN2	INPUT	VIDEO INPUT
7	VCC	POWER	12V
8	VIN3	INPUT	VIDEO INPUT
9	VIN4	INPUT	VIDEO INPUT

3.5.9 function introduction to MP1048

1. Description

The MP1048 is a fixed operating frequency inverter controller that controls four external N-Channel power MOSFETs in a full-bridge configuration. The inverter is designed to power up to 6 cold cathode fluorescent lamps (CCFLs) to backlight liquid crystal displays. Its full-bridge architecture converts unregulated DC input voltages to the nearly pure sine waves required to ignite and operate CCFLs.

2. General Feature lists

- # Capable of Driving up to 6 Lamps
- # Controls Four External, Low Cost, N-Channel MOSFETs
- # Fixed Operating Frequency
- # Input Voltage Range of 10V to 22V
- # Lamp Current and Voltage Regulation
- # Full-Wave Sense Amp
- # Analog and Burst Mode Dimming Control

Integrated Burst Mode Oscillator and Modulator

Soft-On and Soft-Off Burst Envelope

Open Lamp Protection

Secondary Over-Current Protection

Dual-Mode Fault Timer

Available in TSSOP28 and SOIC28 Packages

3. Pin Definitions

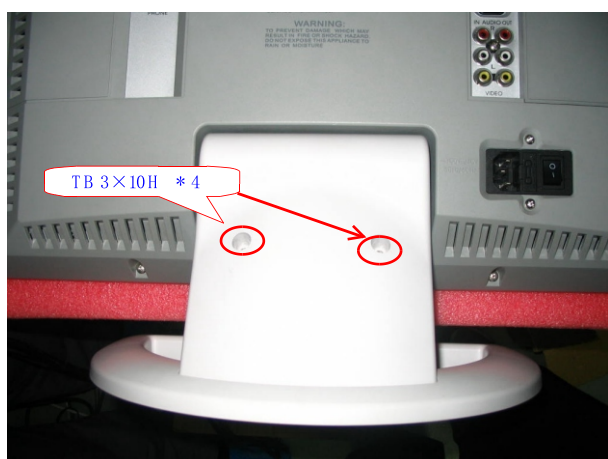
Pin	Name	Description
1	SI	Secondary Current Feedback Input. Connect a current sense resistor from the cold end of the secondary winding to ground. Connect this pin to the junction of the resistor and the secondary winding. If the voltage at SI exceeds +1.2V, a pulse of current will pull down on the COMP pin in an attempt to regulate the secondary current and the Fault Timer will be started.
2	LI	Lamp Current Feedback Input. Connect this pin to the cold end of the lamp and shunt a sense resistor to ground. The sense amplifier will sink a current from the COMP pin that is proportional to the absolute value of the voltage at this pin. (In regulation the average of the absolute value of the voltage at this pin is determined by the voltage at the ABRT pin).
3	LV	Lamp Voltage Feedback Input. Connect a capacitive voltage divider from the hot end of the lamp to ground. Connect this pin to the tap on the divider and shunt a bias resistor to ground. If the voltage at LV exceeds +1.2V, a pulse of current will pull down on the COMP pin to attempt to regulate the lamp voltage and the Fault Timer will be started.
4	COMP	Feed back Compensation Node. Connect a compensation capacitor from this pin to ground.
5	AG	Analog Ground.
6	FT	Fault Timing. Connect a timing capacitor from this pin to AG to set the fault timeout period.
7	LCS	Lamp operating Clock Set. Connect a resistor from this pin to AG. This resistor sets the operating frequency of the MP1048.
8	LCC	Lamp Clock Control. LCC provides compensation when the operating clock is swept in order to strike the lamp. Connect a resistor in series with a capacitor from LCC to AG. Connect a smaller capacitor directly from LCC to AG. Connect only a single capacitor to AG, if some sweeping of the operating clock can be tolerated during open lamp conditions. Connect LCC to AG to force the operating clock to the selected value at all times.
9	BRC	Burst Repetition Rate Control. Connect BRC to AG.
10	BRS	Burst Repetition Rate Setting. If the burst repetition rate is to be synchronized to an external clock, connect a capacitor from BRS to AG. If the burst rate generator is free-run and will not be synchronized with an external clock, connect a resistor in parallel with a capacitor from BRS to AG. If the burst is to be controlled by an external logic signal, connect BRS to VCC and apply the logic signal to the DBRT pin.
11	DBRT	Burst-Mode (Digital) Brightness Control Input. The voltage range of 0V to 1.2V at DBRT linearly sets the burst-mode duty cycle from minimum 10% to 100%. If burst dimming is not used, tie DBRT to VCC.

12	ABRT	Analog Brightness Control Input. The voltage range of 0V to 1.2V at ABRT sets the 3:1 dimming range for the lamp current. If analog dimming is not used, tie ABRT to VCC.
13	EN	Enable Input. Pull EN high to turn on the MP1048; low to turn it off.
14	NC	No Connect.
15	PRR	Input Power Rail, Right-Side. Connect PRR directly to the drain of the high-side, right-side, external power MOSFET.
16	BTR	Output Bootstrap, Right-Side. BTR provides gate bias for the right-side high-side MOSFET. Connect a capacitor from BTR to OUTR.
17	UGR	High-Side MOSFET Gate Output, Right-Side. Connect UGR to the gate of the high-side, right-side, external power MOSFET.
18	OUTR	Bridge Output, Right-Side. Connect OUTR to the source of the right-side, high-side MOSFET and the drain of the low-side, right-side MOSFET.
19	VCCR	Voltage Rail Output, Right-Side. VCCR allows bypassing the bias supply for the control circuitry. Bypass VCCR with a 0.47 μ F capacitor. Connect to VCCL
20	LGR	Low-Side MOSFET Gate Output, Right-Side. Connect LGR to the gate of the low-side, right-side MOSFET.
21	PGR	Power Ground, Right-Side. Connect PGR to the source of the low-side, right-side MOSFET.
22	PRL	Input Power Rail, Left-Side. Connect PRL directly to the drain of the high-side, left-side, external power MOSFET.
23	BTL	Output Bootstrap, Left-Side. BTL provides gate bias for the left-side high-side MOSFET. Connect a capacitor from BTL to OUTL.
24	UGL	High-Side MOSFET Gate Output, Left-Side. Connect UGL to the gate of the high-side, left-side, external power MOSFET.
25	OUTL	Bridge Output, Left-Side. Connect OUTL to the source of the left-side, high-side MOSFET and the drain of the left-side, low-side MOSFET.
26	VCCL	Voltage Rail Output, Left-Side. VCCL allows bypassing the bias supply for the control circuitry. Bypass VCCL with a 0.47 μ F capacitor. Connect to VCCR.
27	LGL	Low-Side MOSFET Gate Output, Left-Side. Connect LGL to the gate of the low-side, left-side MOSFET.
28	PGL	Power Ground, Left-Side. Connect PGL to the source of the low-side, left-side MOSFET.

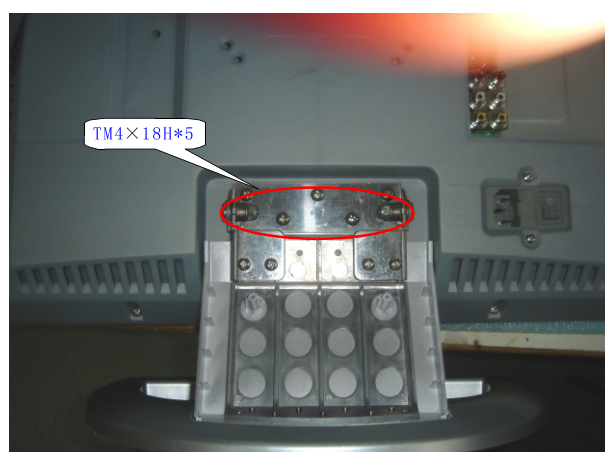
Chapter Four

Disassembly and Assembly Process

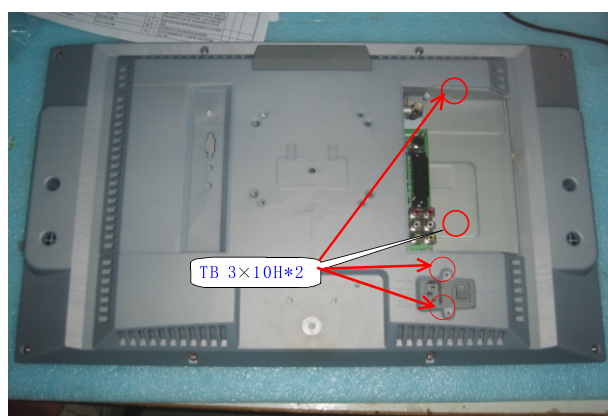
In order to know structure of TV set LT2002S easily, directly and quickly, pictures are adopted here to present each link of assembly and disassembly process of the player to avoid operating blindly to damage elements. Structure design of this TV set is reasonable, so please avoid striking with hard objects in actual operation to ensure each parts is not damaged.



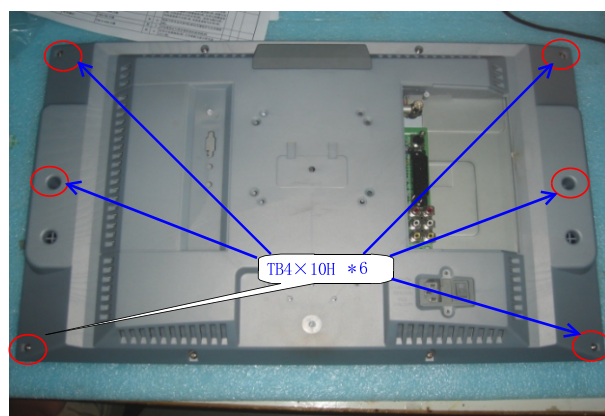
1. Remove 2 TB3*10H*4 screws and vertical pole rear casing.



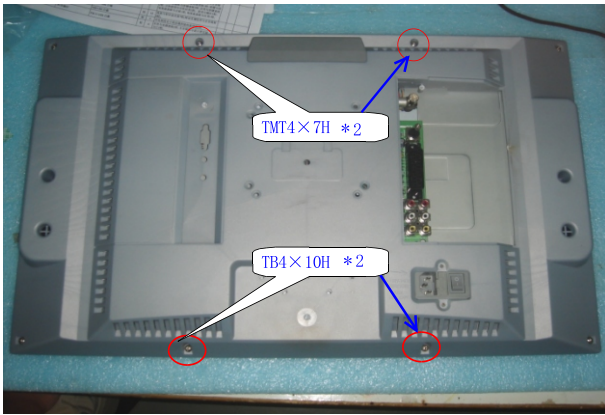
2. Place the machine on table flatly, take down 5 TM4×18H white nickel screws and then remove base components.



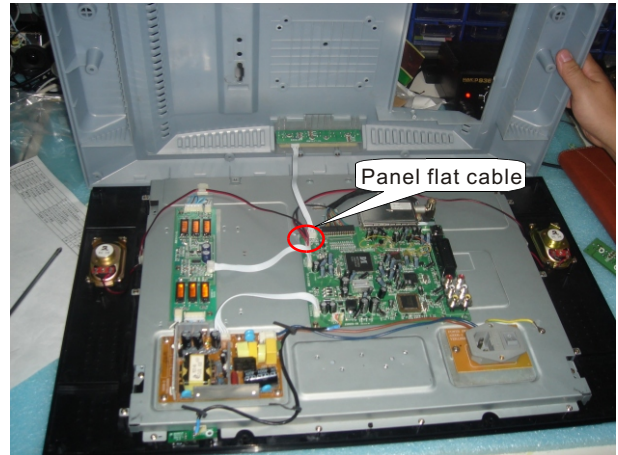
3. Take down 4 TB 3×10H white nickel screws marked in the picture and TV box cover board.



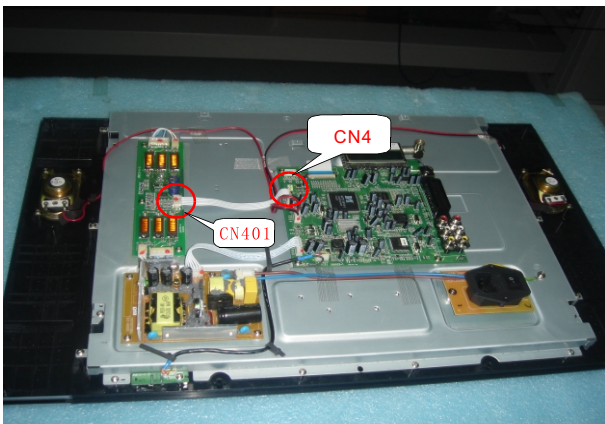
4. Take down 6 screws that fix rear casing.



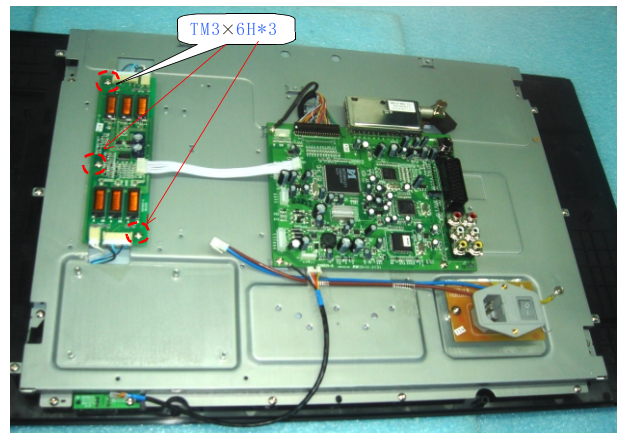
5. Take 2 TB4x10H white nickel screws and TMT4x7H white nickel screw.



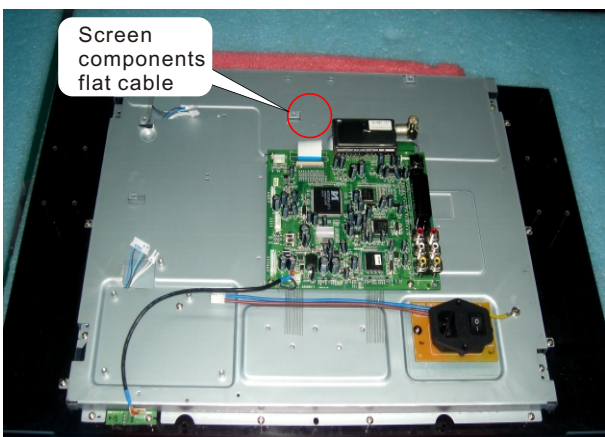
6. Take down rear casing components, unplug button board flat cable and put rear casing components aside (do not scratch them).



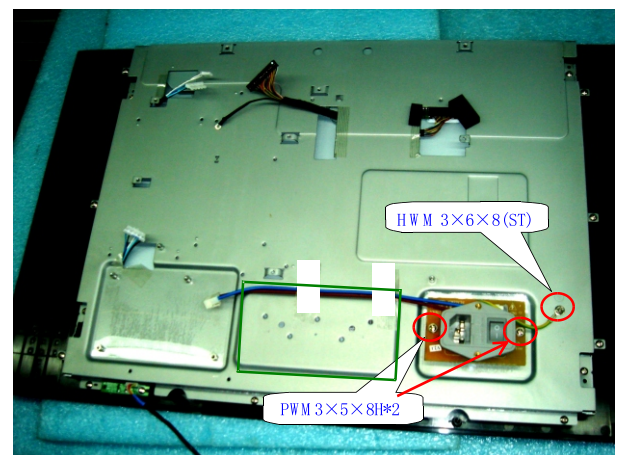
7. Remove display screen: unplug flat cable firstly and then take down power board.



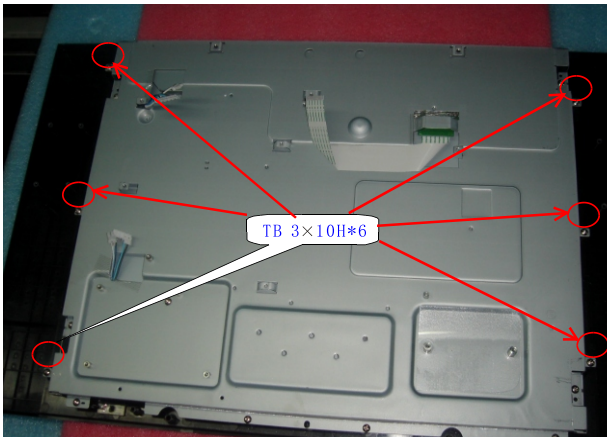
8. Take down TM3*6H screw and boost board components.



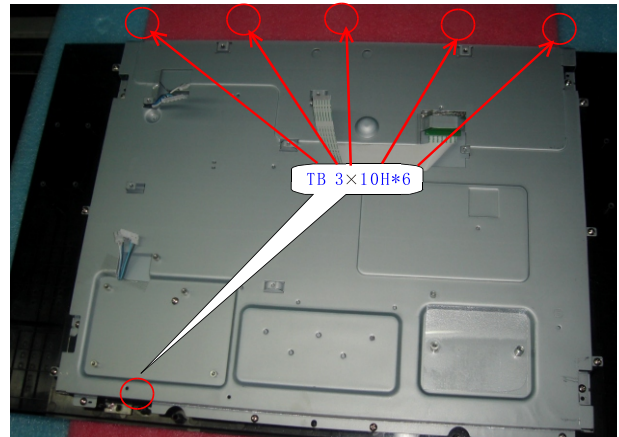
9. Unplug the flat cable that inserts in display screen components.



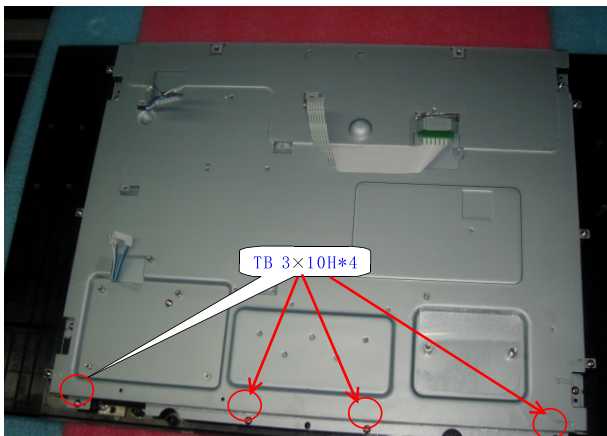
10. Take down screw and switch components.



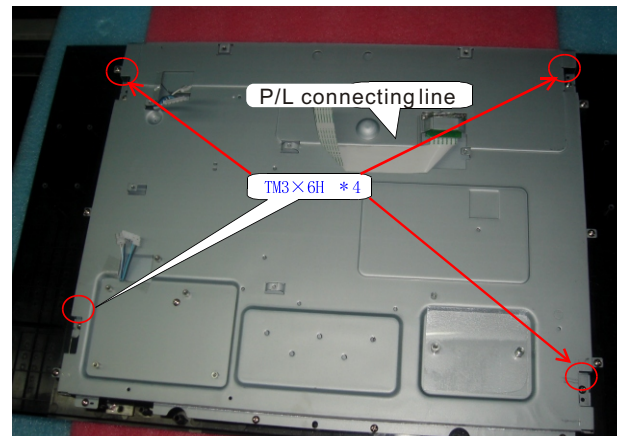
11. Remove 6TB 3×10H white nickel screws.



12. Remove 6 TB 3×10H white nickel screws.



13. Remove 4 TB 3×10H white nickel screws.



14. Remove 4 TM3×6H white nickel screws and then take P/L connecting line slightly (please note back side of flat cable has double-sided adhesive tape).



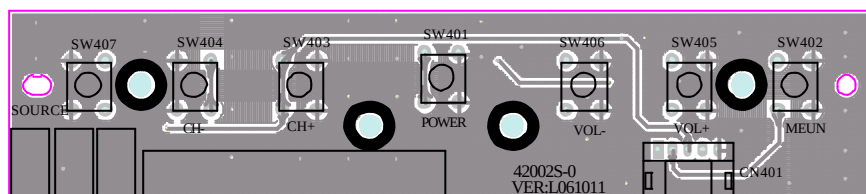
15. Take out display screen components and the assembly process is the reverse.

Chapter Cinque

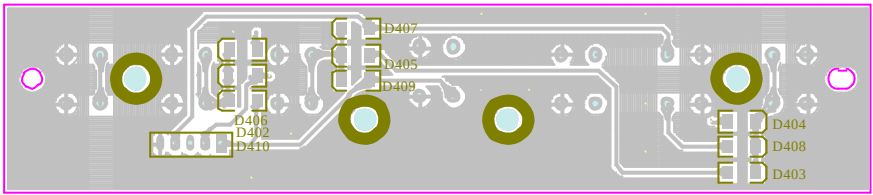
PCB board & Circuit diagram

Section One PCB board

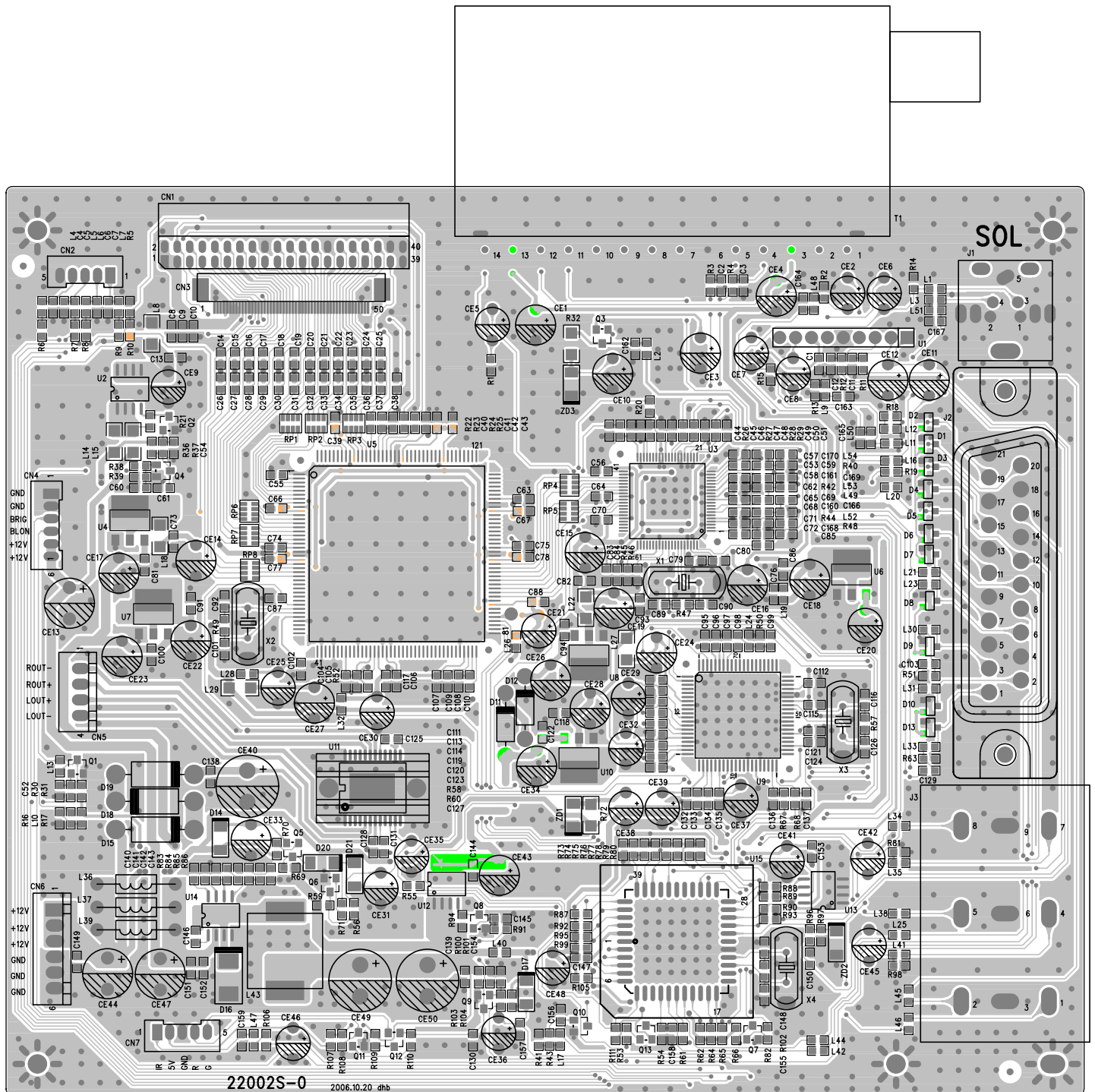
5.1.1 Surface layer of Button Board



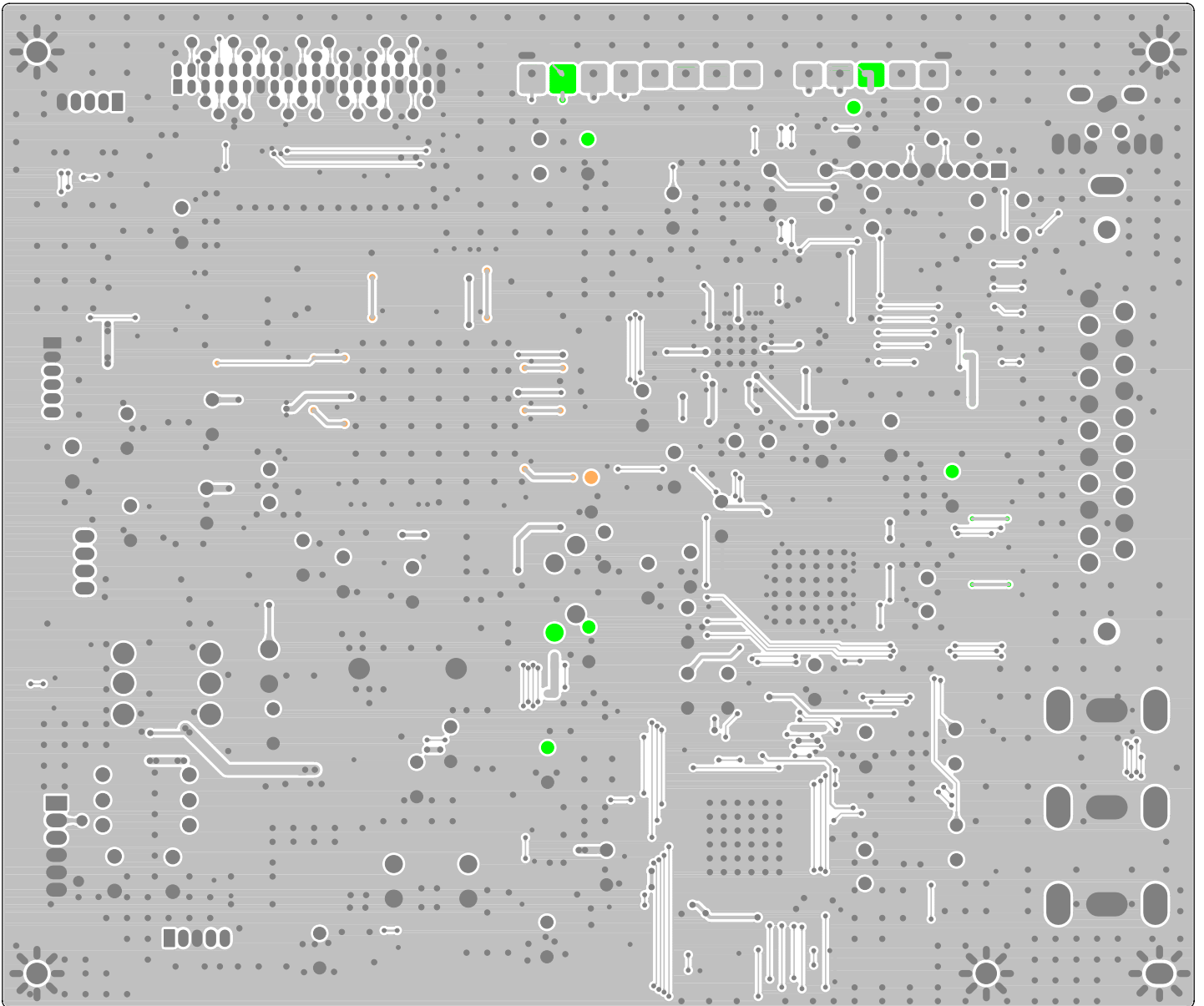
5.1.2 Bottom layer of Button Board



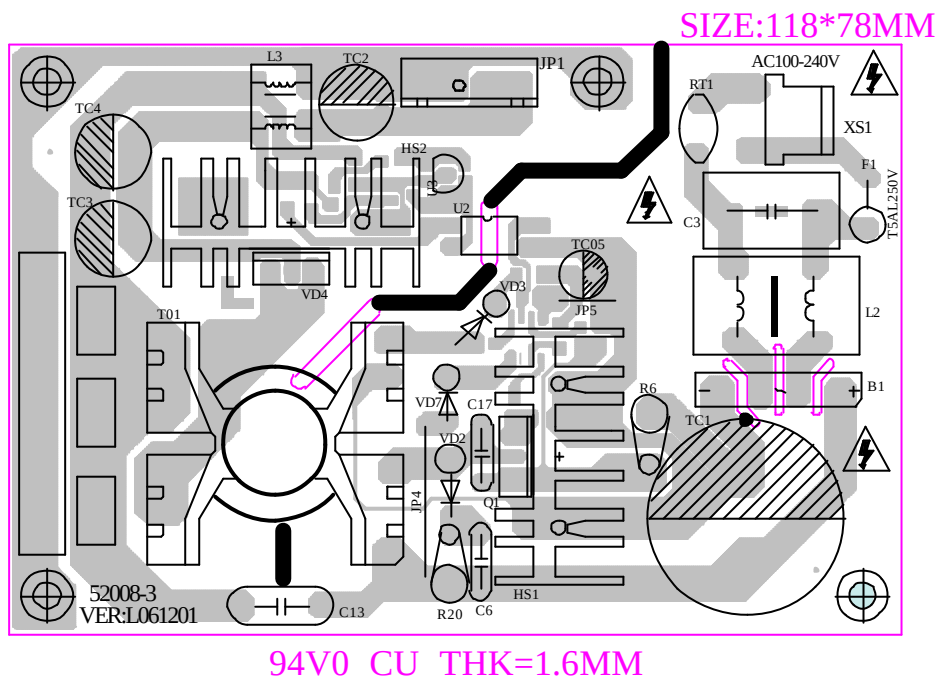
5.1.3 Surface layer of Main Board



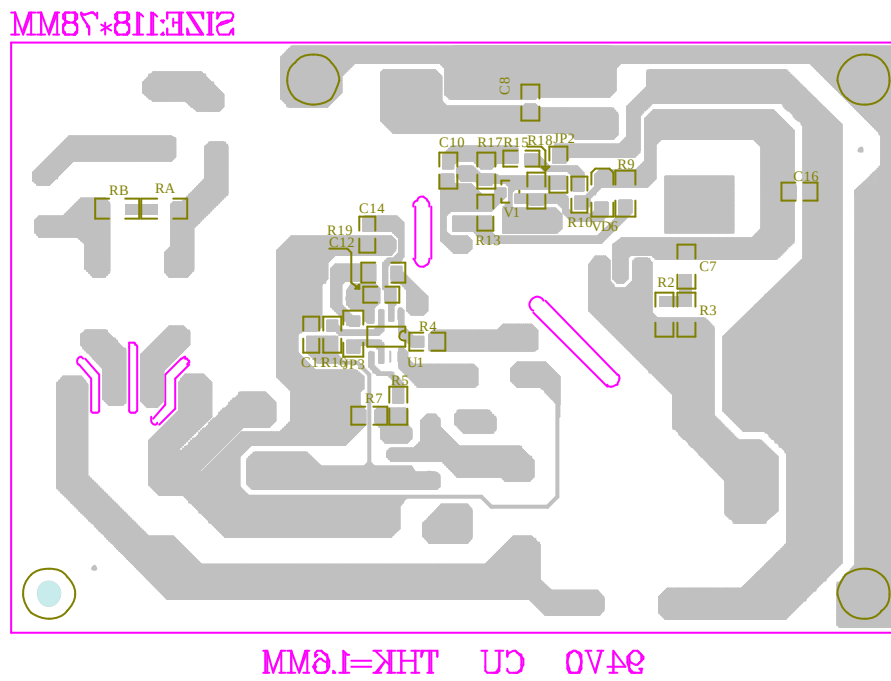
5.1.4 Bottom layer of Main Board



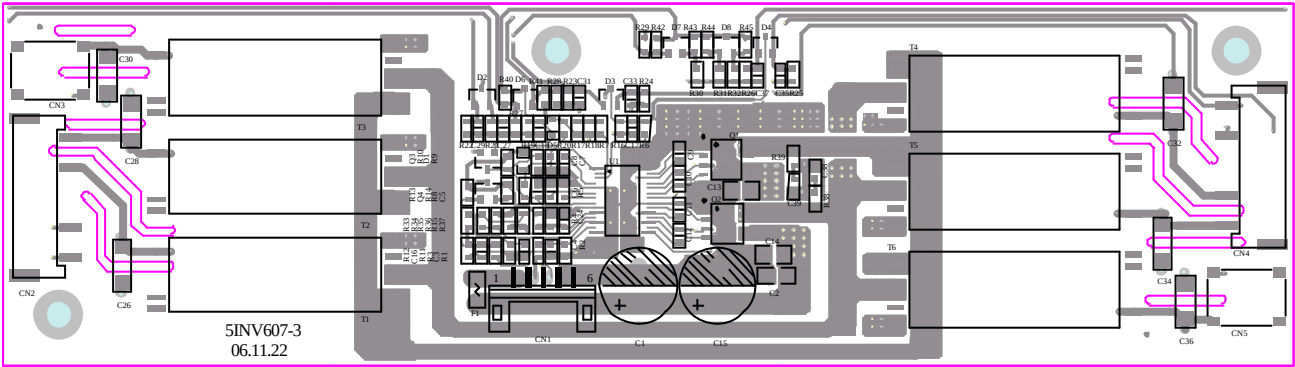
5.1.5 Surface layer of power Board



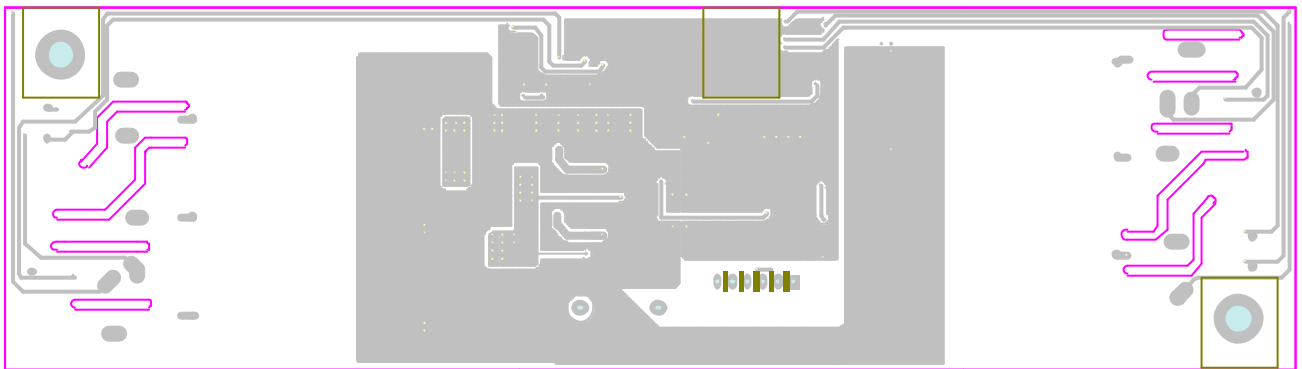
5.1.6 Bottom layer of power Board



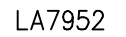
5.1.7 Surface layer of Boost Board



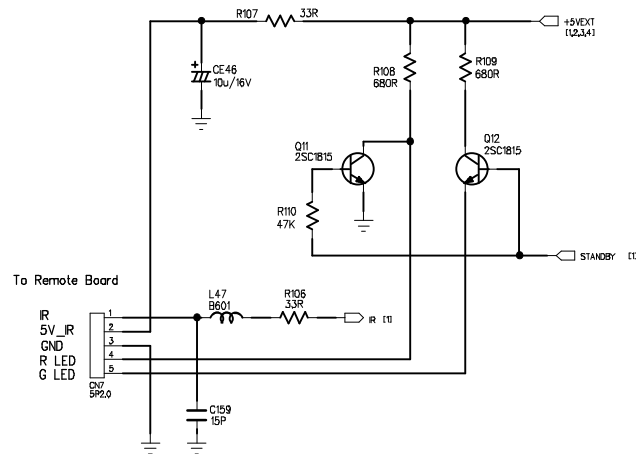
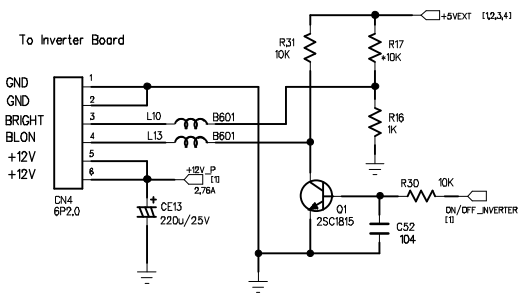
5.1.8 Bottom layer of Boost Board

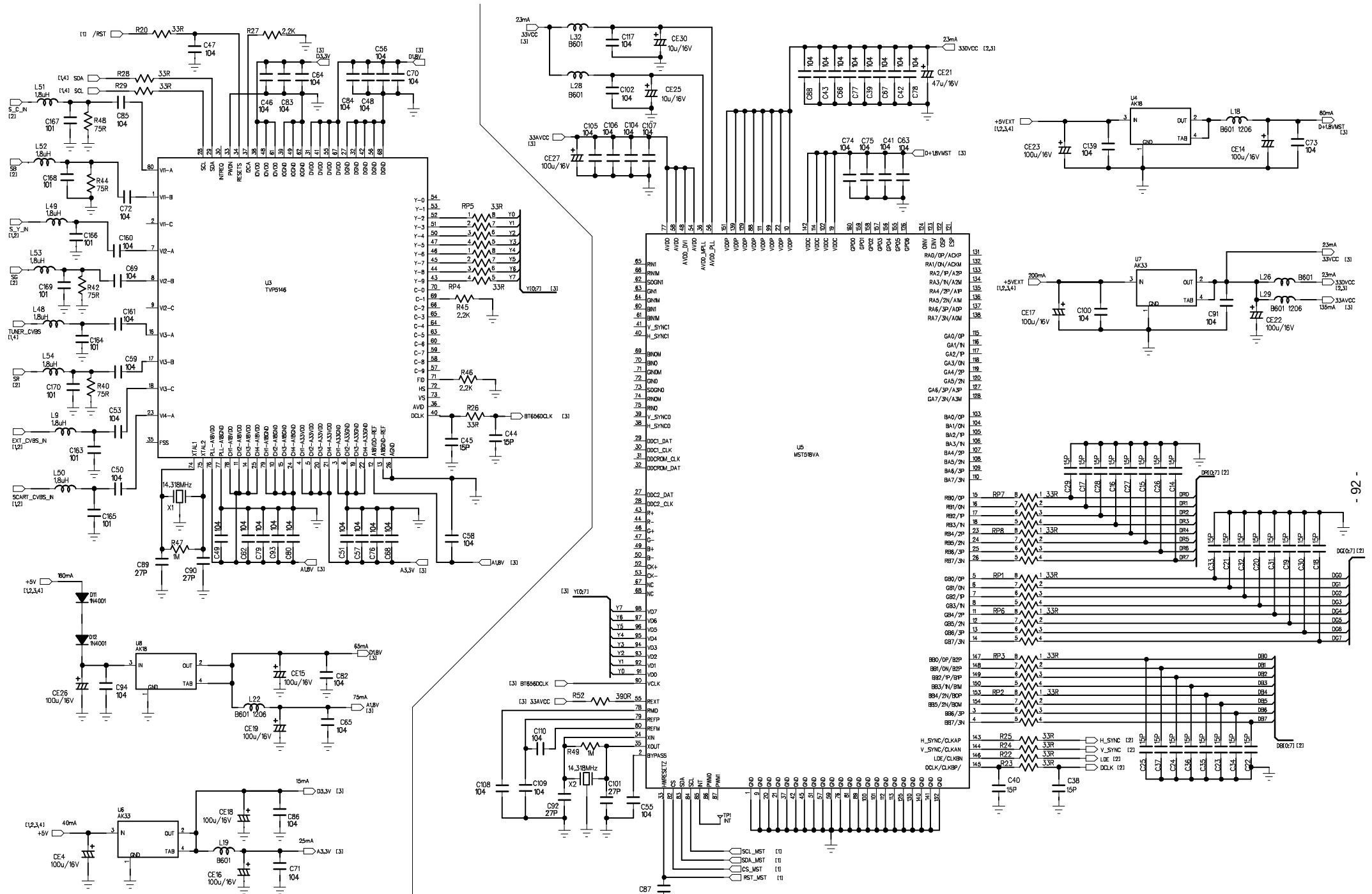


5.2.1 Main Board



SW1	SW2	V0(OUT)
H	H	VIN1
L	H	VIN2
H	L	VIN3
L	L	VIN4

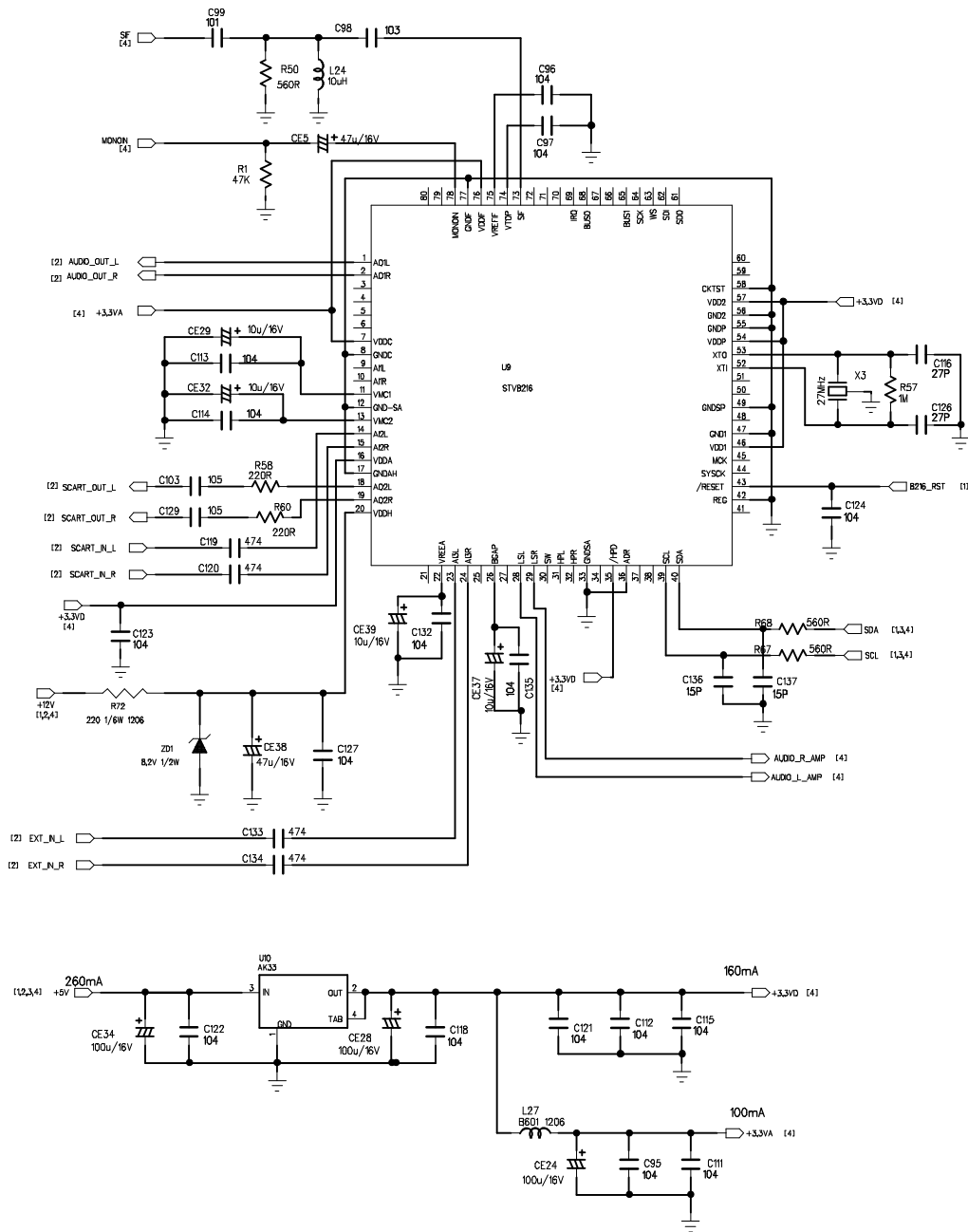




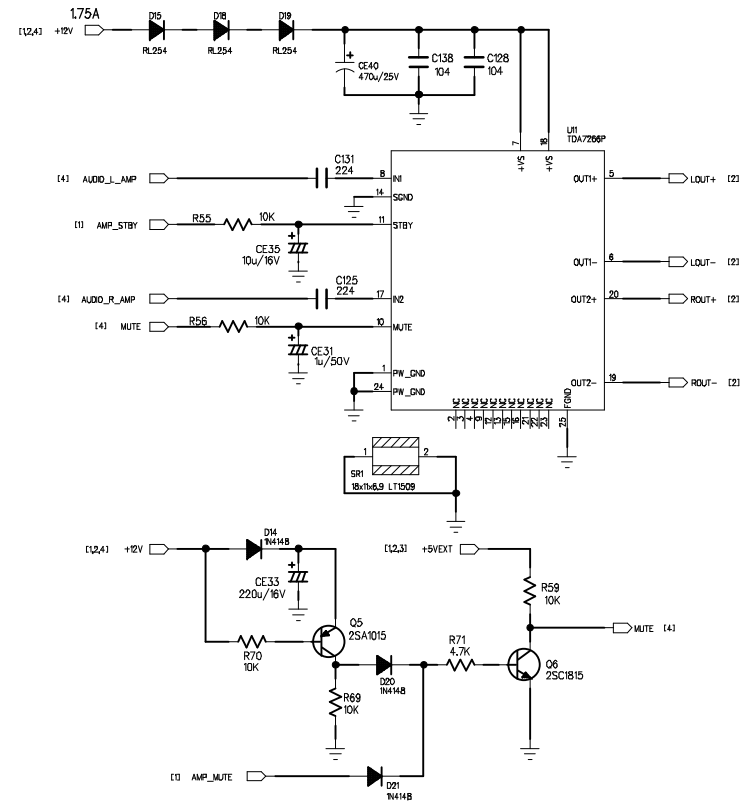
TVP5146

MST518

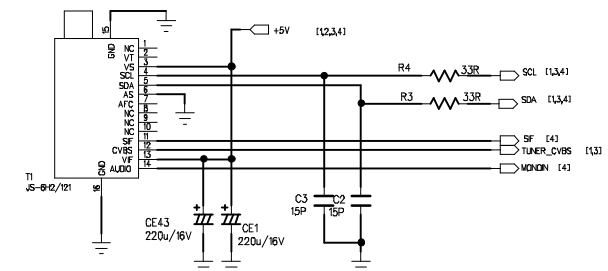
STV8216



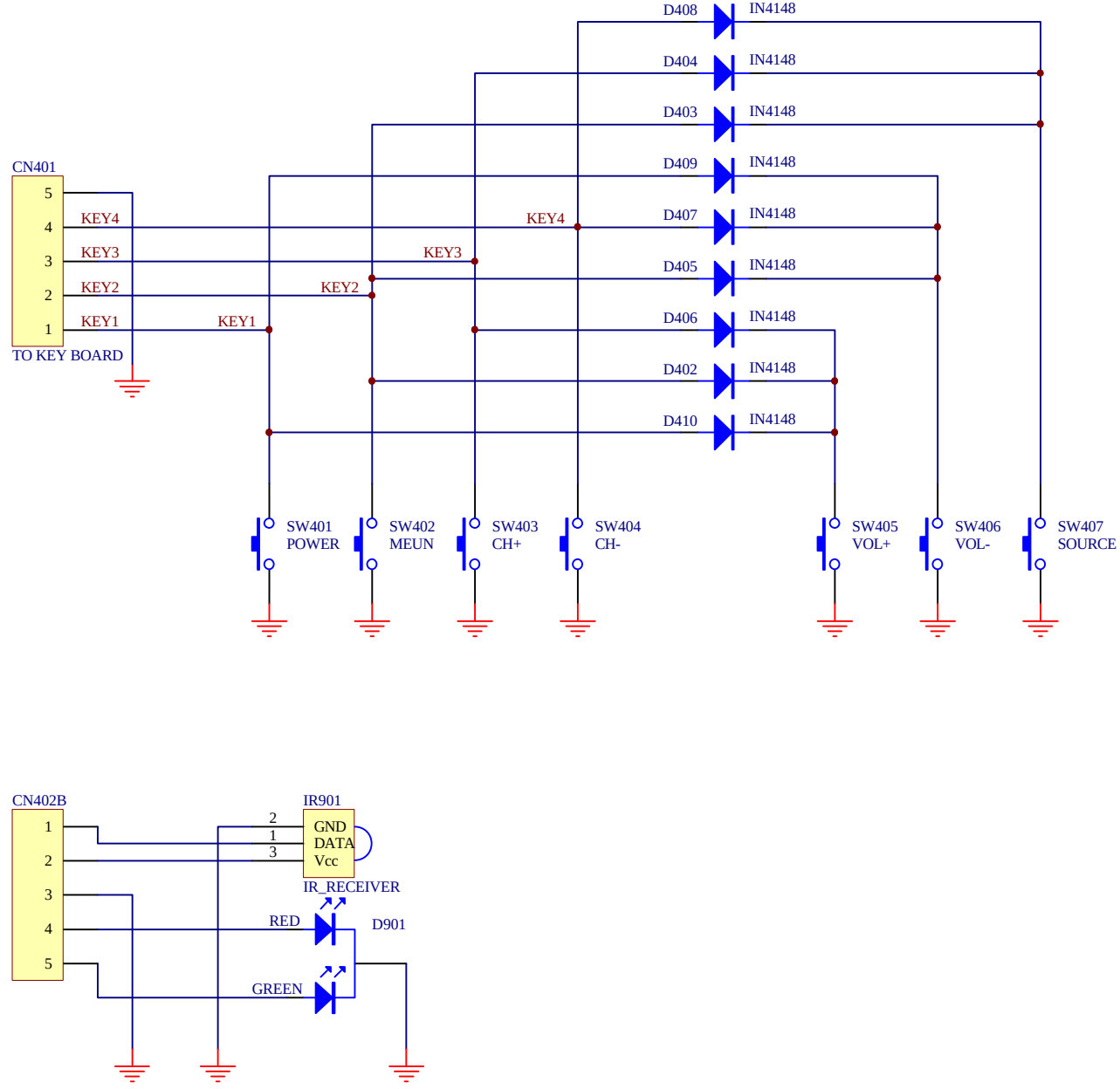
AMP



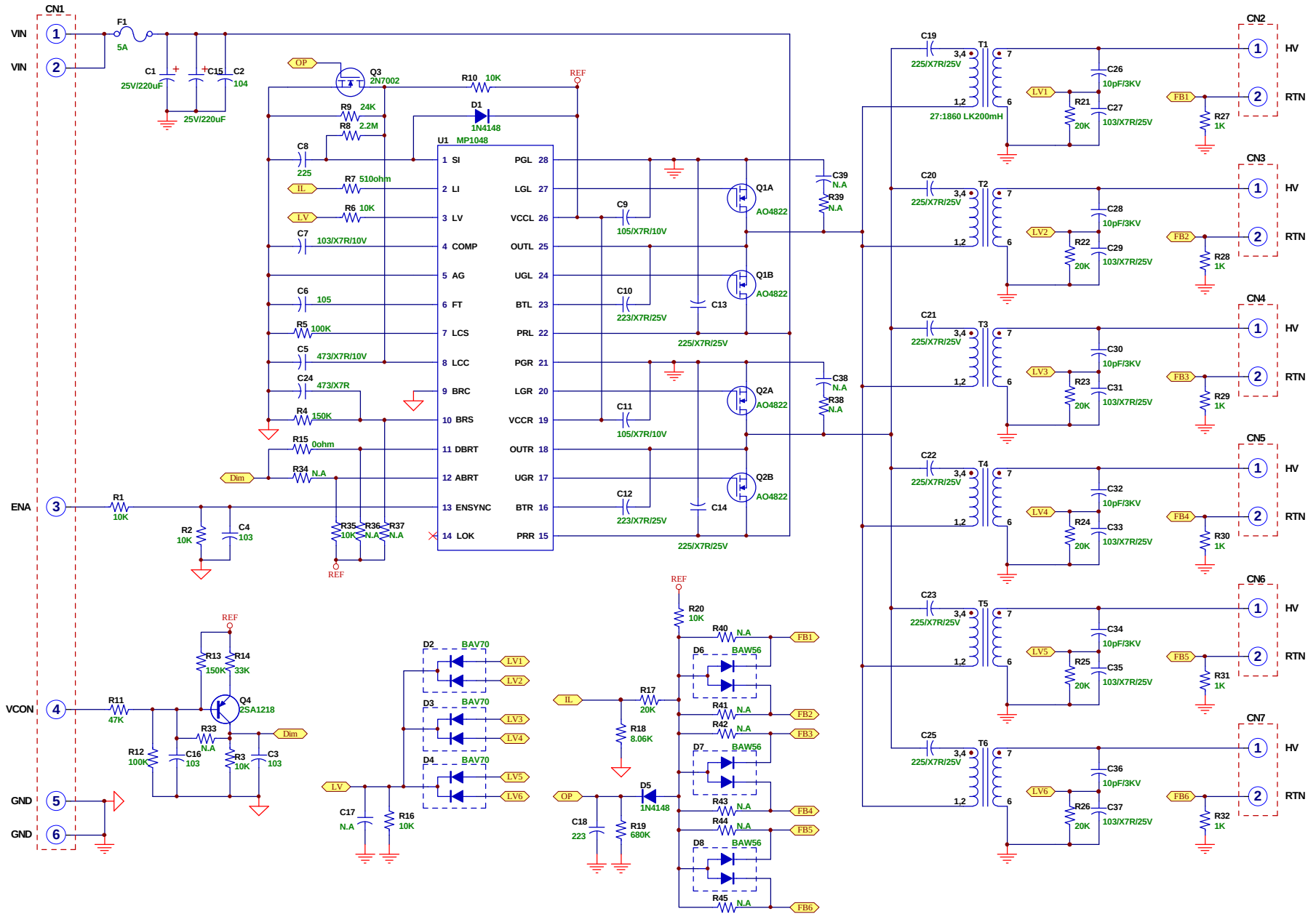
TUNER



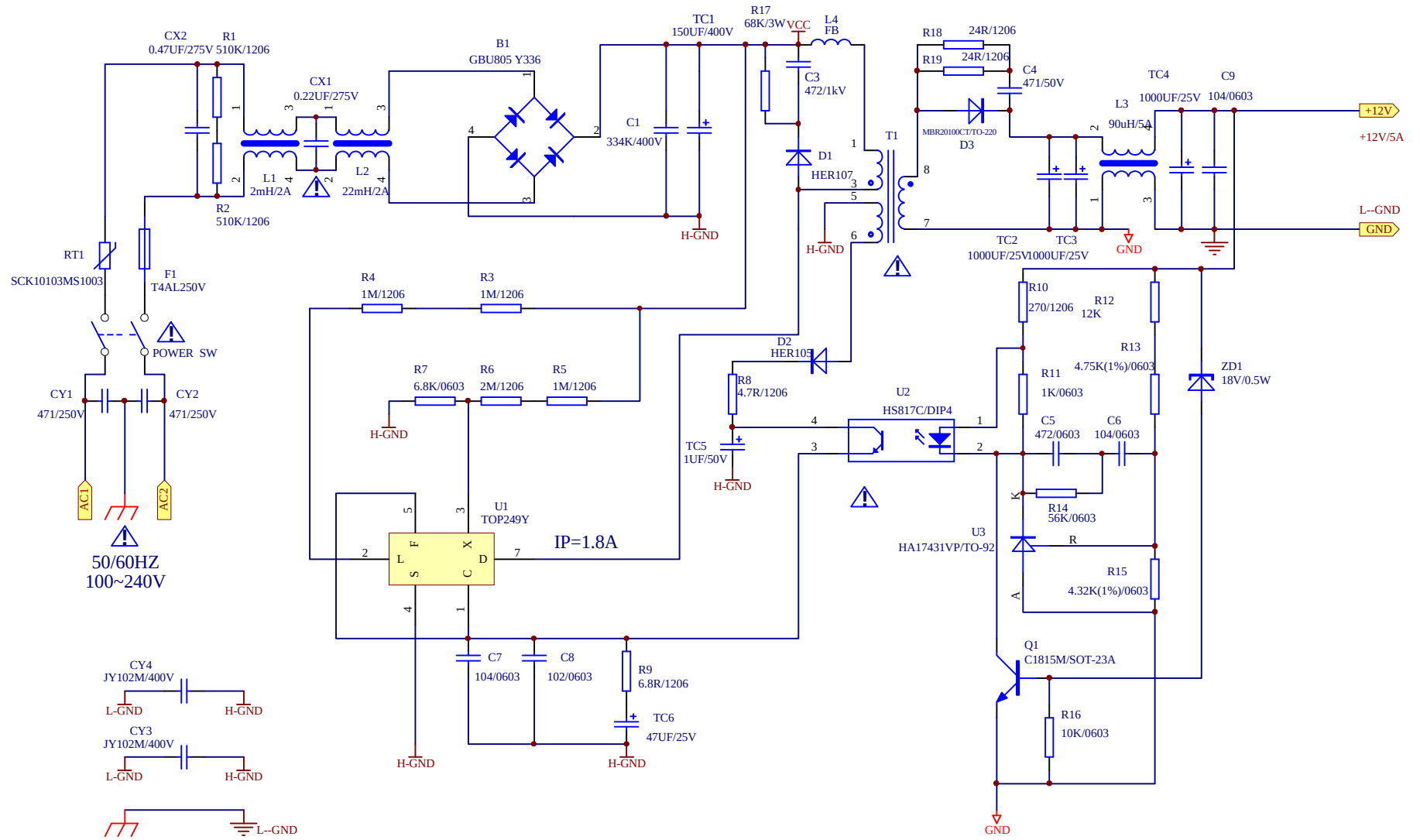
5.2.2 Button Board and IR receiving board



5.2.3 Boost Board



5.2.4 power Board



Chapter six BOM List

MATERIAL L CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
LT2002S(RU) BLACK			
POWER BOARD 5449797			
0090114	SMD RESISTOR	1/8W 00±5% 1206	JP2,JP3
0090521	SMD RESISTOR	1/8W 510K±5% 1206	RA,RB
0090057	SMD RESISTOR	1/10W 4.7K±5% 0805	R7
0090072	SMD RESISTOR	1/10W 39K±5% 0805	R4
0090661	SMD RESISTOR	1/4W 4.70±5% 1206	R2,R3
0090646	SMD RESISTOR	1/8W 330±5% 1206	R19
0390044	SMD INDUCTOR	10UH±10% 2012	R5
0090050	SMD RESISTOR	1/10W 1K±5% 0805	R13,R18
0090718	PRECISION SMD RESISTOR	1/10W 4.32K±1% 0805	R17
0090719	PRECISION SMD RESISTOR	1/10W 12K±1% 0805	R10
0090720	PRECISION SMD RESISTOR	1/10W 4.75K±1% 0805	R15
0090122	SMD RESISTOR	1/10W 2700±5% 0805	R16
0090654	SMD RESISTOR	1/8W 2700±5% 1206	R9
1050010	HEAT SENSITIVITY RESISTOR	NTC 30(5A)±20% 10D 5	RT1
0310144	SMD CAPACITOR	50V 104±10% 7R 0805	C16,C10,C8
0310029	SMD CAPACITOR	50V 102±10% 7R 0805	C14
0310101	SMD CAPACITOR	50V 101±5% NPO 0805	C11,C12
0200166	PORCELAIN CAPACITOR	500V 103±20% 5mm	C6
0310781	SMD CAPACITOR	100V 102±10% 7R 1206	C7
0200299	PORCELAIN CAPACITOR	1000V 471 +80%-20% SHAPED 7.5mm	C17
0200373	CERAMIC CAPACITOR	@C81 250VAC 102M 10 VDE	C13
0010286	METAL OXIDE FILM RESISTOR	3W 47K±5%	R20
0010365	RY	3W 0.330±5%	R6
0210211	ANTI-JAMMING CAPACITOR	@MPX 2 275VAC 33415 VDE	C3
0260767	CD	KM 400V68U±20%18×25 C10	TC1
0260769	CD	25V1000U±20% 10×20 5	TC2,TC3,TC4
0260672	CD	CD288H 50V47U±20%6.3×11 2.5	TC05
0410211	COMMON MODE CHOKE	VERTICAL 22mH2AF 18×F 10×8 10	L2

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
0410160	COMMON MODE CHOKE	VERTICAL 90UH 5A F 9×F 5×4	L3
0460648	SWITCH POWER TRANSFORMER	@PQ32-082 SJ	T01
0700123	SMD VOLTAGE REGULATOR DIODE	15V±5% 1/2W	VD6
0780197	SMD TRIODE	C1815	V1
0570050	DIODE	HER105 SHAPED 7.5mm	VD3,VD2,VD7
0680104	SCHOTTKY DIODE	MBRF20100CT TO-220	VD4
0670018	SILICON BRIDGE	GBU405 Y336	B1
0883304	IC	NCP1377 SOP	U1
1080011	PHOTOELECTRIC COUPLER	HS817	U2
08824629	IC	AZ431AZ-A TO-92 BELT	U3
1564690	PCB	@52008-3 UL	
0790114	FIELD EFFECT TRANSISTOR	S1260Z PLASTIC SEALED,TO-220	Q1
1940142	SOCKET	2P 8.0mm STRAIGHT FLEX	XS1
1940006	SOCKET	6P 2.5mm	JP1
2300071	FUSE	@3.15AL 250V WITH CANNULA,CQC	F1
3580251	HEAT RADIATION PIECE	LT2002S(RU)	HS1,HS2
5120635	WHITE GLUE	607	
5120749	GREEN GLUE	LOCTITE638	
5120014	SILICONE GREASE HEAT CONDUCT OIL	LYCAL304	
2100003	LEAD	F 0.6 SHAPED 7.5mm	JP5
2100017	LEAD	F 0.6 SHAPED 20mm	JP4
4210151	MACHINE-TAPPING SCREW	B3×6H WHITE NICKEL	VD4,Q1
LT2002S(RU) BLACK			
KEY-PRESS BOARD		5449336	
0700001	SMD DIODE	LS4148	D402~D408,D410,D409
1340145	LIGHT TOUCH RESTORE SWITCH	VERTICAL TSAC-2	SW401~SW407
1940160	SOCKET	5P 2.0mm STRAIGHT FLEX	CN401
1633584	PCB	42002S-0	
LT2002S(RU) BLACK			
POWER SUPPLY SWITCH BOARD		5449491	
1870074	POWER SUPPLY SOCKET	@0717-1 WITH OOFF/FUSE BLACK VDE	SW1
2121646	FLAT CABLE	3P 230 3.96 2 PIN,TOGETHER DIRECTION,2 CORD 18# CORD	CN1 AND POWER BOARD XS1

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
2110485	LEAD	18# 70mm YELLOW GREEN,WITH WELD PIECE,HOLEF 4.3	GROUNDING WIRE
1940142	SOCKET	2P 8.0mm STRAIGHT FLEX	CN1
2300006	FUSE	4AL 250V	
1563786	PCB	A2008-1	
LT2002S(RU) BLACK			
RECEIVING BOARD OF REMOTE CONTROL		5449365	
0620086	DUAL COLOR RADIATION DIODE	2.5RG59HW-A×5 RED GREEN	D901
2360002	IR SENSOR	HS0038B	IR901
2150214	FLAT CABLE	5P 250 2.0 1 5PSHIELD WITH WELD PIECE 28# CORD	MAIN BOARD CN7 TO REMOTE CONTROL RECEIVING BOARD CN402B
5233923	SOFT SPONGE SPACER	7×6×4 DOUBLE-FACED,HARD	REMOTE CONTROLLER
1633662	PCB	92002S-1	
LT2002S(RU) BLACK			
REMOTE CONTROL :		5471875	
0310048	SMD CAPACITOR	50V 151±5% NPO 0603	C802,C803
0090147	SMD RESISTOR	1/10W 10±5% 0805	R801
0630009	EMISSION PIPE	TSAL4400	LED801 ①
0630010	EMISSION PIPE	LTE-4206	LED801 ①
0700001	SMD DIODE	LS4148	D801~D803
0780130	SMD TRIODE	STC3265	Q801 ②
0780150	SMD TRIODE	UTC 8050S (D9-D)	Q801 ②
0780085	SMD TRIODE	8050D	Q801 ②
0880186	IC	6222 SOP	U801 ③
0880220	IC	P2222 SOP	U801 ③
0970003	CERAMIC RESONATOR	455E	X801
1631960	PCB	81703SRU-0	
3031118	SURFACE CASING OF REMOTE CONTROL	019-01 GREY	
3040813	REMOTE CONTROL BOTTOM CASING	019-01 GREY	
3050701	BATTERY CASE DOOR OF REMOTE CONTROL	019-01 GREY	
5156974	SURFACE STICKER O REMOTE CONTROL	2002S(RU)SILVER	
3850063	ANODE SPRING	019-01 3#	

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
3850064	CATHODE SPRING	019-01 3#	
3850065	ANODECATHODE SPRING	019-01 3#	
4631127	CONDUCT GLUE O REMOTE CONTROL	2002S(RU)	
5070558	PLASTIC BAG	210×70×0.05 PE	PACK REMOTE CONTROLLER
LT2002S(RU) BLACK			
TRANSFER BOARD 5449490			
1940403	BTB SOCKET	21/20P 1.0mm HRS/D9-41S-1V	CN1
1940211	CABLE SOCKET	50P 0.5mm SMD,NEXT MEET WITH CLASP	CN2
1633663	PCB	G2002S-0	
LT2002S(RU) BLACK			
VIDEO FREQUENCY BOARD 22002S-2			
0090005	SMD RESISTOR	1/16W 330±5% 0603	R3,R4,R6~R9,R20,R22~R26,R28,R29, R61,R74,R88,R89,R106,R107
0090006	SMD RESISTOR	1/16W 750±5% 0603	R13~R15,R18,R19,R40,R42,R44,R48
0090008	SMD RESISTOR	1/16W 2200±5% 0603	R58,R60,R96
0090012	SMD RESISTOR	1/16W 5600±5% 0603	R50,R67,R68
0090013	SMD RESISTOR	1/16W 6800±5% 0603	R109
0090014	SMD RESISTOR	1/16W 1K±5% 0603	R5,R16,R41,R54,R86,R97,R108
0090017	SMD RESISTOR	1/16W 2.2K±5% 0603	R27,R36,R38,R43,R45,R46,R100, R103
0090019	SMD RESISTOR	1/16W 4.7K±5% 0603	R11,R12,R62,R64~R65,R75~R77,R79,R80,R87,R90,R92,R93, R95,R99,R105,R111,R113,R114,R115,R116,R117
0090538	SMD RESISTOR	1/4W 1200±5% 1206	R32
0090023	SMD RESISTOR	1/16W 10K±5% 0603	R30,R31,R37,R39,R53,R55,R56,R59, R69,R70,R78,R85,R91,R101,R104,R66
0090024	SMD RESISTOR	1/16W 15K±5% 0603	R83
0090026	SMD RESISTOR	1/16W 22K±5% 0603	R21,R94
0090029	SMD RESISTOR	1/16W 47K±5% 0603	R1,R51,R63,R81,R98,R110
0090109	SMD RESISTOR	1/16W 1MO±5% 0603	R47,R49,R57,R102
0090189	SMD RESISTOR	1/16W 30K±5% 0603	R84,R71,R82
0090234	SMD RESISTOR	1/16W 3900±5% 0603	R52
0090628	SMD RESISTOR	1/8W 2200±5% 1206	R72
0090181	SMD RESISTOR	1/16W 1000±5% 0603	R2

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
0090001	SMD RESISTOR	1/16W 00±5% 0603	L9,L48~L54
0100019	SMD RESISTOR NETWORKS	1/16W 330±5% 8P	RP1~RP8
0310042	SMD CAPACITOR	50V 15P±5% NPO 0603	C2~C7,C14~C38,C40,C44,C45,C136,C137,C159
0310047	SMD CAPACITOR	50V 101±5% NPO 0603	C99
0310066	SMD CAPACITOR	50V 102±10% 7R 0603	C142,C158
0310072	SMD CAPACITOR	50V 103±10% 7R 0603	C60,C61,C98,C130,C154
0310190	SMD CAPACITOR	50V 27P±5% NPO 0603	C89,C90,C92,C101,C116,C126,C148,C155
0310199	SMD CAPACITOR	50V 562±10% 7R 0603	C143
0310222	SMD CAPACITOR	25V 104±20% 7R 0603	C1,C8~C13,C39,C41~C43,C46~C52,C54~C59,C62~C88,C91,C93~C97,C100,C102,C104~C115,C117,C118,C121~C124,C127,C128,C132,C135,C138~C141,C144~C147,C149~C153,C156,C162,C53,C160,C161
0310505	SMD CAPACITOR	25V 224 +80%-20% 0603	C125,C131
0310542	SMD CAPACITOR	16V 474±10% 0603	C119,C120,C133,C134 ④
0310593	SMD CAPACITOR	10V 474±10% 5R 0603	C119,C120,C133,C134 ④
0310643	SMD CAPACITOR	16V 105±20% Y5V 0603	C103,C129
0390052	MAGNETIC BEADS INDUCTOR	FB	L36,L37,L39
0390095	SMD MAGNETIC BEADS	FC160822105	L1,L3,L11,L12,L16,L20,L21,L45,L46
0390170	SMD INDUCTOR	10UH±10% 1608	L24
0390300	SMD MAGNETIC BEADS	6000/100MHZ±25% 1608	L2,L4~L7,L10,L13,L17,L19,L23,L25,L26,L28,L30~L35,L38,L40~L42,L44,L47
0390301	SMD MAGNETIC BEADS	6000/100MHZ±25% 3216	L8,L15,L18,L22,L27,L29
0390424	SMD CORES INDUCTOR	10uH±20% 5.4A CDRH127	L43
0570003	DIODE	1N4001	D11,D12
0570019	DIODE	0000254	D15,D18,D19
0680028	SMD SCHOTTKY DIODE	MBRS340	D16
0700001	SMD DIODE	LS4148	D14,D17,D20,D21
0700004	SMD VOLTAGE REGULATOR DIODE	5.1V±5% 1/2W	ZD2
0700064	SMD TRIODE	B991 SO23	D1~D7,D23,D24,D29,D30
0700147	SMD VOLTAGE REGULATOR DIODE	8.2V±5% 1/2W	ZD1
0780197	SMD TRIODE	C1815	Q1~Q2,Q4,Q6~Q12
0780085	SMD TRIODE	8050D	Q3

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
0700137	SMD VOLTAGE REGULATOR DIODE	11V±5% 1/2W MINIMELF	ZD3
0780198	SMD TRIODE	2S1015	Q5,Q13
0880504	IC	24C32N SOP	U13
02607649	CD	C11T 50V1U±20%5×11 2 BELT	CE31
02607359	CD	C11T 16V47U±20%5×11 C5 BELT	CE5,CE9,CE20,CE21,CE38,CE41,CE52
02606869	CD	C11T 25V220U±20%8×12 C5 BELT	CE13,CE44,CE47,CE3,CE10
02606859	CD	C11T 16V100u±20%6×12 C5 BELT	CE4,CE14~CE19,CE22~CE24,CE26~CE28,CE34,CE48
02607159	CD	C11T 25V10U±10%5×11 C5 BELT	CE2,CE6~CE8,CE25,CE29,CE30,CE32,CE35~CE37,CE39,CE42,CE45,CE46
02606629	CD	CD288H 25V470U±20%10×16 C5 BELT	CE40,CE49,CE50
02607139	CD	C11T 16V220U±20%6×12 C5 BELT	CE1,CE11,CE12,CE33,CE43
0881146	IC	L11171.8 SO223	U4,U8 ⑤
0883069	IC	AZ11171.8 SO223	U4,U8 ⑤
0882167	IC	9435M SO8	U2,U12 ⑥
0881867	IC	FDS9435A SOP	U2,U12 ⑥
0882084	IC	SI9435 SO8	U2,U12 ⑥
0882030	IC	S8216 TQFP	U9
0882112	IC	L7952 SIP	U1
0882114	IC	AMS1117-3.3 SO223	U6,U7,U10 ⑦
0882485	IC	AZ11173.3 SO223	U6,U7,U10 ⑦
0883149	IC	7266P SSO24	U11
0882376	IC	TVP51461 PQFP	U3
0882638	IC	MS518VA PQFP	U5
0882945	IC	1430DN SOP	U14
0960020	CMETAL OXIDE FILM RESISTORSTAL OSCILLATOR	27.00MHZ 49-S	X3
0960229	CMETAL OXIDE FILM RESISTORSTAL OSCILLATOR	14.31818MHZ 49-S	X1,X2
0960299	CMETAL OXIDE FILM RESISTORSTAL OSCILLATOR	22.1184MHZ±30PPM 49-S 20P	X4
1020028	TUNER	JS-6B2/121	T1
1633705	PCB	22002S-2	
1860060	SCART SOCKET	102 STRAIGHT INSERT	J2
1940211	CABLE SOCKET	50P 0.5mm SMD,NEXT MEET WITH CLASP	CN3
1910160	TERMINAL SOCKET	S TERMINAL,STRAIGHT INSERT,WITH SHIELD	J1

MATERIAL CODE	MATERIAL NAME	SPECIFICATIONS	LOCATION
1910274	TERMINAL SOCKET	6-8.3-3 STRINGHT INSERT,WITH SHIELD	J3
1940005	SOCKET	6P 2.0mm	CN4
1940006	SOCKET	6P 2.5mm	CN6
1940003	SOCKET	4P 2.5mm	CN5
1940024	SOCKET	5P 2.0mm	CN2,CN7
3580236	HEAT RADIATION PIECE	18×11×6.9 1509	FOR U11
LT2002S(RU)BLACK			
PRODUCT CODE 5840114 PROGRAM FLASH ROMLT2002S-0A(128K) 0911865			
0882637	IC	79E63240PN PLCC	U15