

# SERVICE MANUAL

## BBK931S



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## **1.SAFETY PRECAUTIONS**

### **1.1 GENERAL GUIDELINES**

- 1.When servicing,observe the original lead dress.if a short circuit is found,replace all parts which have been overheated or damaged by the short circuit.**
- 2.After servicing,see to it that all the protective devices such as insulation barriers,insulation papers shields are properly installed.**
- 3.After servicing,make the following leakage current checks to prevent the customer from being exposed to shock hazards.**

### **2.PREVENTION OF ELECTRO STATIC DISCHARGE(ESD) TO ELECTROSTATICALLY SENSITIVE(ES) DEVICES**

**Some semiconductor(solid state)devices can be damaged easily by static electricity.Such components commonly are called Electrostatically Sensitive(ES)Devices.Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor chip components.The following techniques should be used to help reduce the incidence of component damage caused by electro static discharge(ESD).**

- 1.Immediately before handling any semiconductor component or semiconductor-equipped assembly,drain off any ESD on your body by touching a known earth ground.Alternatively,obtain and wear a commercially available discharging ESD wrist strap,which should be removed for potential shock reasons prior to applying power to the unit under test.**
- 2.After removing an electrical assembly equipped with ES devices,place the assembly on a conductive surface such as aluminum foil,to prevent electrostatic charge buildup or exposure of the assembly.**
- 3.Use only a grounded-tip soldering iron to solder or unsolder ES devices.**
- 4.Use only an anti-static solder removal device.Some solder removal devices not classified as anti-static (ESD protected)can generate electrical charge sufficient to damage ES devices.**
- 5.Do not use freon-propelled chemicals.These can generate electrical charges sufficient to damage ES devices.**
- 6.Do not remove a replacement ES device from its protective package until immediately before you are ready to install it.(Most replacement ES devices are packaged with leads electrically shorted together by conductive foam,aluminum foil or comparable conductive material).**
- 7.Immediately before removing the protective material from the leads of a replacement ES device,touch the protective material to the chassis or circuit assembly into which the device will be installed.**

#### **Caution**

**Be sure no power is applied to the chassis or circuit,and observe all other safety precautions.**

- 8.Minimize bodily motions when handling unpackaged replacement ES devices.(Otherwise careless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity(ESD))**

notice (1885x323x2 tiff)

#### **IMPORTANT SAFETY NOTICE**

There are special components used in this equipment which are important for safety. These parts are marked by  in the schematic diagrams, Exploded Views and replacement parts list. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire, or other hazards. Do not modify the original design without permission of manufacturer.

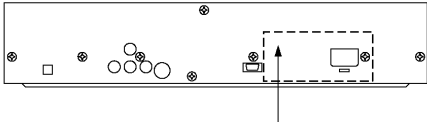
3. Precaution of L aster Diode

CAUTION:

This product utilizes a laser diode with the unit turned “on”, invisible laser radiation is emitted from the pickup lens.  
Wave length:780 nm  
Maximum output radiation power from pickup: 100 μW/VDE  
Laser radiation from the pickup lens is safety level, but be sure the followings:  
1. Do not disassemble the optical pickup unit, since radiation from exposed laser diode is dangerous.  
2. Do not adjust the variable resistor on the pickup unit. It was already adjusted.  
3. Do not look at the focus lens using optical instruments.  
4. Recommend not to look at pickup lens for a long time.

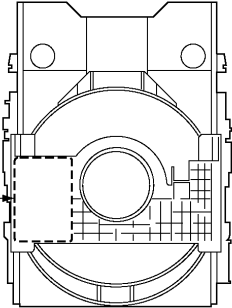
ACHTUNG:

Dieses Produkt enthält eine Laserdiode.  
Im eingeschalteten Zustand wird unsichtbare Laserstrahlung von der Lasereinheit adgestrahlt.  
Wellenlänge: 780 nm  
Maximale Strahlungsleistung der Lasereinheit: 100 μW/VDE  
Die Strahlungen der Lasereinheit ungefährlich, wenn folgende Punkte beachtet werden:  
1. Die Lasereinheit nicht zerlegen, da die Strahlung an der freigelegten Laserdiode gefährlich ist.  
2. Den werkseitig justierten Einstellregler der Lasereinheit nicht verstellen.  
3. Nicht mit optischen Instrumenten in die Fokussierlines blicken.  
4. Nicht über längere Zeit in die Fokussierlines blicken.



**Product complies with DHHS rules 21 CFR Subchapter J in effect at date of manufacture.**  
**Matsushita Electric Industrial Co., Ltd.**  
**Kadoma, Osaka, Japan**

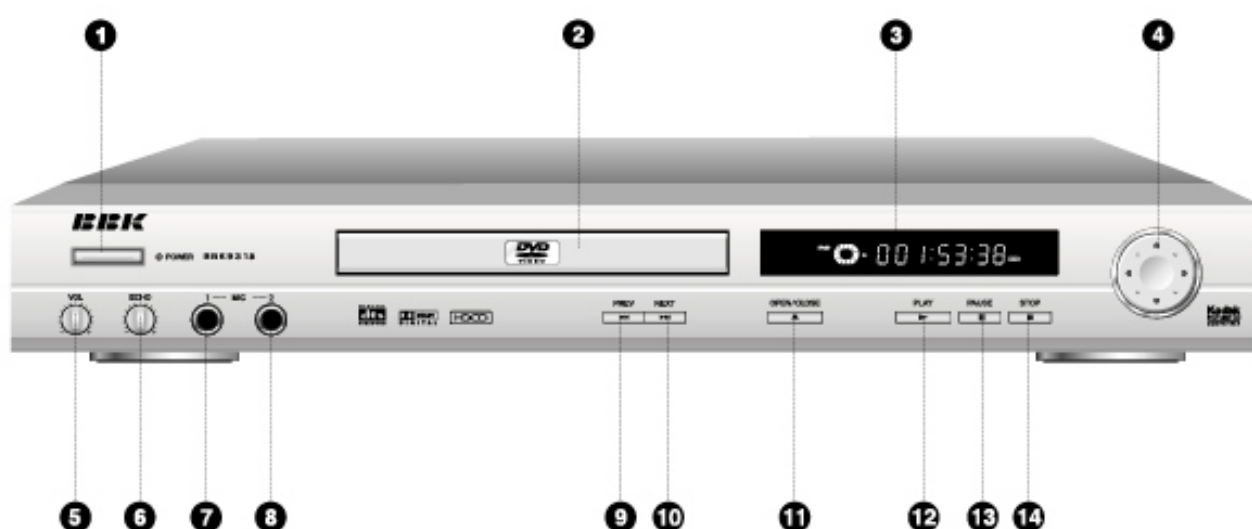
|           |                                                                                                      |
|-----------|------------------------------------------------------------------------------------------------------|
| DANGER    | - VISIBLE AND INVISIBLE LASER RADIATION WHEN OPEN.<br>AVOID DIRECT EXPOSURE TO BEAM. (FDA 21 CFR)    |
| CAUTION   | - VISIBLE AND INVISIBLE LASER RADIATION WHEN OPEN.<br>AVOID EXPOSURE TO BEAM. (IEC60825-1)           |
| ATTENTION | - RAYONNEMENT LASER VISIBLE ET INVISIBLE EN CAS D'OUVERTURE.<br>EXPOSITION DANGEREUSE AU FAISCEAU.   |
| ADVARSEL  | - SYNLIG OG USYNLIG LASERSTRÅLING VED ÅBNING.<br>UNDGÅ UDSETTELSE FOR STRÅLING.                      |
| VARO!     | - AVATTAESSA OLET ALTITAIN NÄKYVÄÄ JA NÄKYMÄTÖN<br>LASERISÄTELYLE. ÄLÄ KATSO SATEESSEEN.             |
| VARNING   | - SYNLIG OCH OSYNLIG LASERSTRÅLNING NÄR DENNA DEL<br>ÄR ÖPPNAD. BETRÄKTA EJ STRÅLEN.                 |
| ADVARSEL  | - SYNLIG OG USYNLIG LASERSTRÅLING NÄR DEKSEL ÅPNES.<br>UNNGÅ EKSPONERING FOR STRÅLEN.                |
| VORSICHT  | - SICHTBARE UND UNSICHTBARE LASERSTRAHLUNG, WENN ABDECKUNG<br>GEÖFFNET. NICHT DEN STRAHLE AUSSETZEN. |
| 注意        | - 打开时有可见及不可见激光辐射。避免激光束照射。<br>注意 - ここを開くと可視及び不可視のレーザー光が出ます。<br>ビームを直接見たり、触れはしないでください。 RQL S0223       |



CAUTION!  
THIS PRODUCT UTILIZES A LASER.  
USE OF CONTROLS OR ADJUSTMENTS OR PERFORMANCE OF PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE.

# Control Button Locations and Explanations

## Front Panel Illustration



**1** POWER switch

**2** Disc tray

**3** VFD display window

**4** CURSOR button

**5** MIC volume knob

**6** ECHO adjustment knob

**7** MIC 1 jack

**8** MIC 2 jack

**9** PREV button

**10** NEXT button

**11** OPEN/CLOSE button

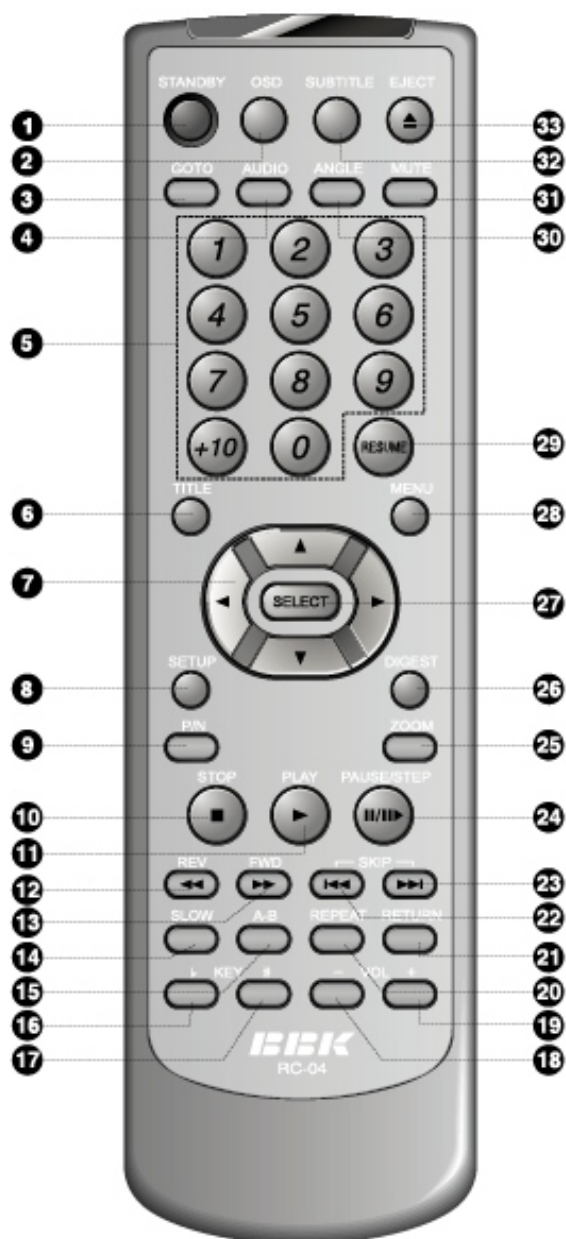
**12** PLAY button

**13** PAUSE button

**14** STOP button

# Control Button Locations and Explanations(Continued)

## Remote Control Illustration



- 28 MENU Button**  
Display DVD menu or open/close PBC.
- 29 RESUME Button**  
Resume playback from stop point.
- 30 ANGLE Button**  
Change camera angles.
- 31 MUTE Button**  
Press once to mute, twice to unmute.
- 32 SUBTITLE Button**  
Change subtitle languages.
- 33 EJECT Button**  
Open or close the disc tray.

- 1 STANDBY Button**  
Press once to stand by, Press twice to play.
- 2 OSD Button**  
Display or hide disc information.
- 3 GOTO Button**  
Play from the desired location.
- 4 AUDIO Button**  
Change the audio language or audio channel.
- 5 NUMBER Buttons**
- 6 TITLE Button**  
DVD titles.
- 7 CURSOR Buttons**
- 8 SETUP Button**  
Function setup.
- 9 P/N Button**  
Switch the TV system between PAL, NTSC and AUTO.
- 10 STOP Button**  
Stop playback.
- 11 PLAY Button**  
Normal playback.
- 12 REV Button**  
Fast backward play.
- 13 FWD Button**  
Fast forward play.
- 14 SLOW Button**  
Slow play.
- 15 A-B Button**  
Repeat the select.
- 16 KEY  $\downarrow$  Button**  
Fall tone.
- 17 KEY  $\uparrow$  Button**  
Rise tone.
- 18 VOLUME- Button**  
Decrease volume.
- 19 VOLUME+ Button**  
Increase volume.
- 20 REPEAT Button**  
Repeat play.
- 21 RETURN Button**  
Back to the previous menu.
- 22 PREV Button**  
Skip backward.
- 23 NEXT Button**  
Skip forward.
- 24 PAUSE/STEP Button**  
Pause or play frame by frame.
- 25 ZOOM Button**  
Zoom in the displayed frame.
- 26 DIGEST Button**  
9-Picture view.
- 27 SELECT Button**

## 5. PREVENTION OF STATIC ELECTRICITY DISCHARGE

The laser diode in the traverse unit (optical pickup) may break down due to static electricity of clothes or human body. Use due caution to electrostatic breakdown when servicing and handling the laser diode.

### 5.1. Grounding for electrostatic breakdown prevention

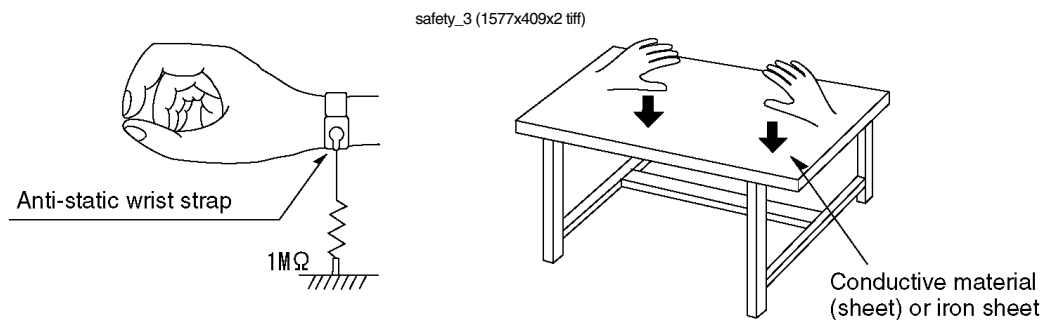
Some devices such as the DVD player use the optical pickup (laser diode) and the optical pickup will be damaged by static electricity in the working environment. Proceed servicing works under the working environment where grounding works is completed.

#### 5.1.1. Worktable grounding

1. Put a conductive material (sheet) or iron sheet on the area where the optical pickup is placed, and ground the sheet.

#### 5.1.2. Human body grounding

1 Use the anti-static wrist strap to discharge the static electricity from your body.



#### 5.1.3. Handling of optical pickup

1. To keep the good quality of the optical pickup maintenance parts during transportation and before installation, the both ends of the laser diode are short-circuited. After replacing the parts with new ones, remove the short circuit according to the correct procedure. (See this Technical Guide).

2. Do not use a tester to check the laser diode for the optical pickup. Failure to do so will damage the laser diode due to the power supply in the tester.

## 5.2. Handling precautions for Traverse Unit (Optical Pickup)

1. Do not give a considerable shock to the traverse unit (optical pickup) as it has an extremely high-precision structure.

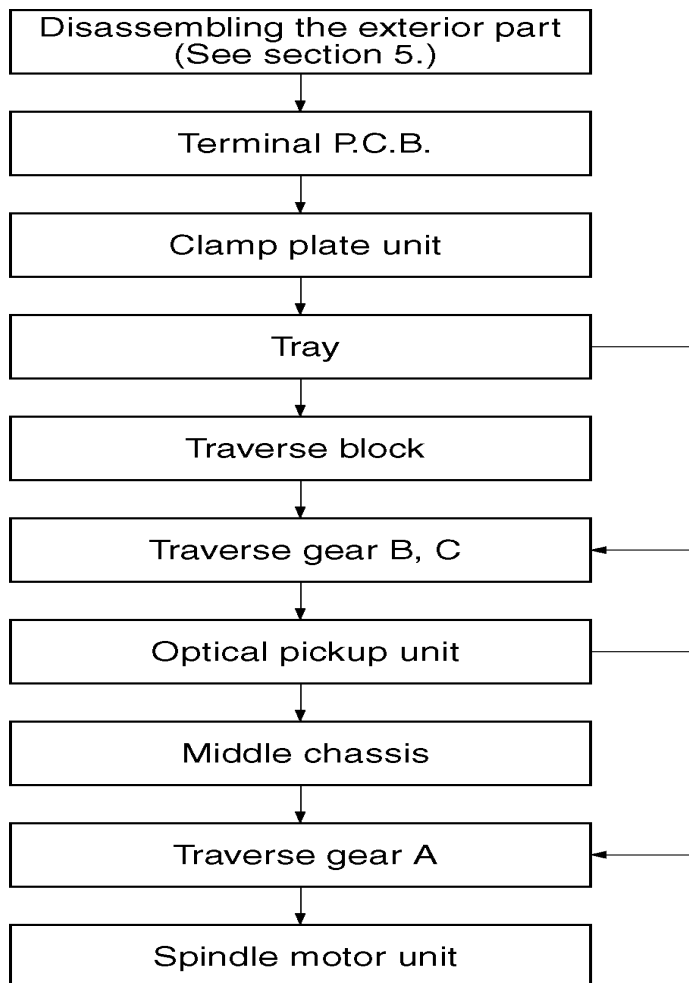
2. When replacing the optical pickup, install the flexible cable and cut its short lead with a nipper. See the optical pickup replacement procedure in this Technical Guide. Before replacing the traverse unit, remove the short pin for preventing static electricity and install a new unit. Connect the connector as short times as possible.

3. The flexible cable may be cut off if an excessive force is applied to it. Use caution when handling the cable.

4. The half-fixed resistor for laser power adjustment cannot be adjusted. Do not turn the resistor.

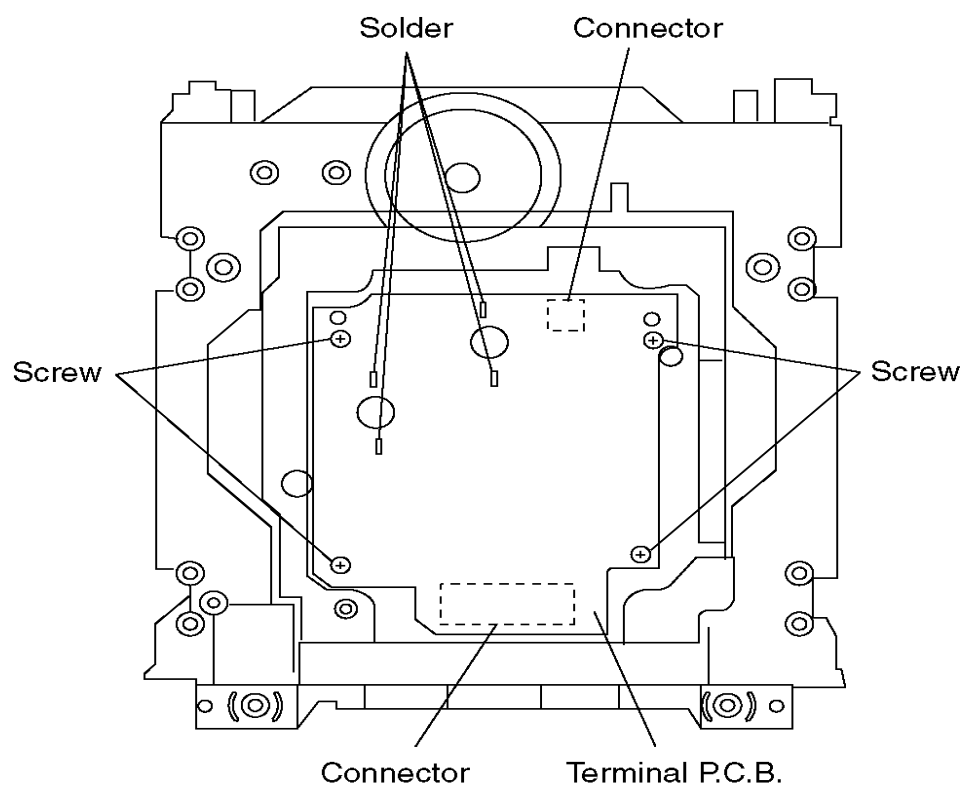
## 6.ASSEMBLING AND DISASSEMBLING THE MECHANISM UNIT

### 6.1Disassembly Procedure



### 6.2 Terminal P.C.B.

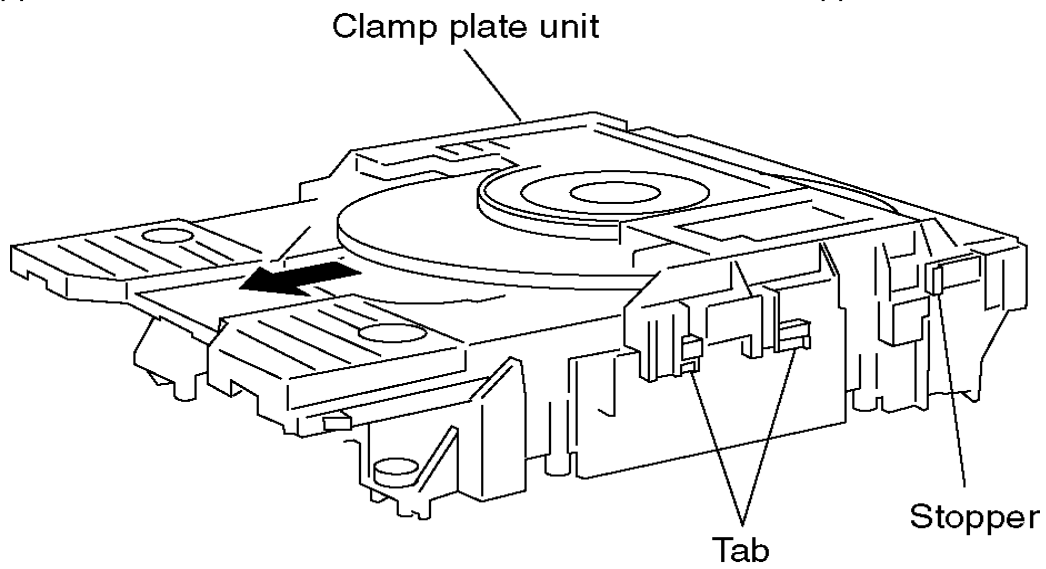
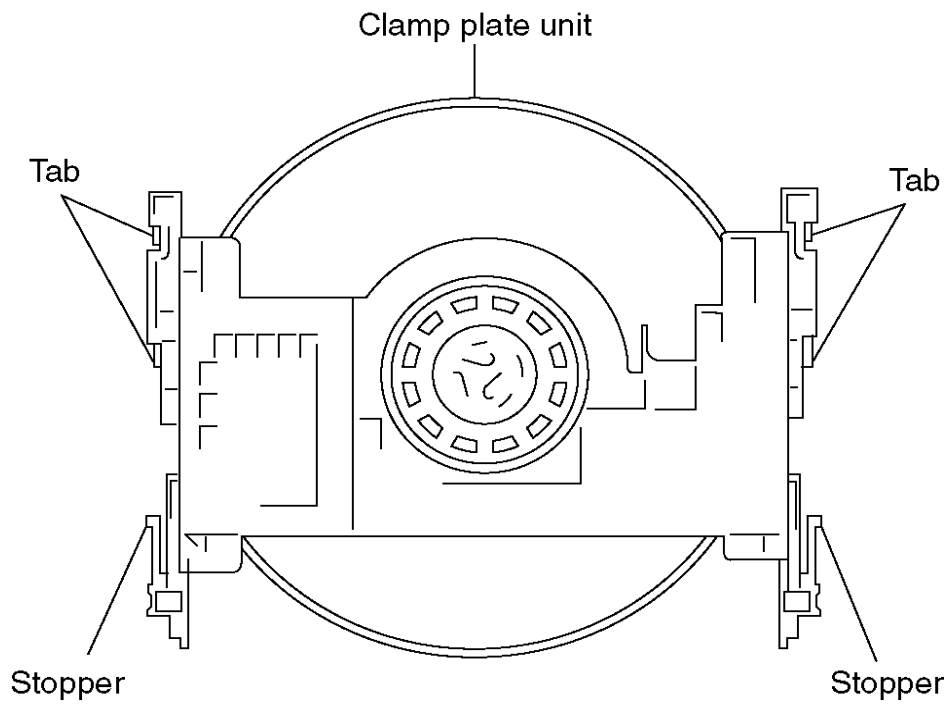
- 1.Unscrew the screws.
- 2.Remove the solders.
- 3.Remove the connectors



<Mechanism unit bottom>

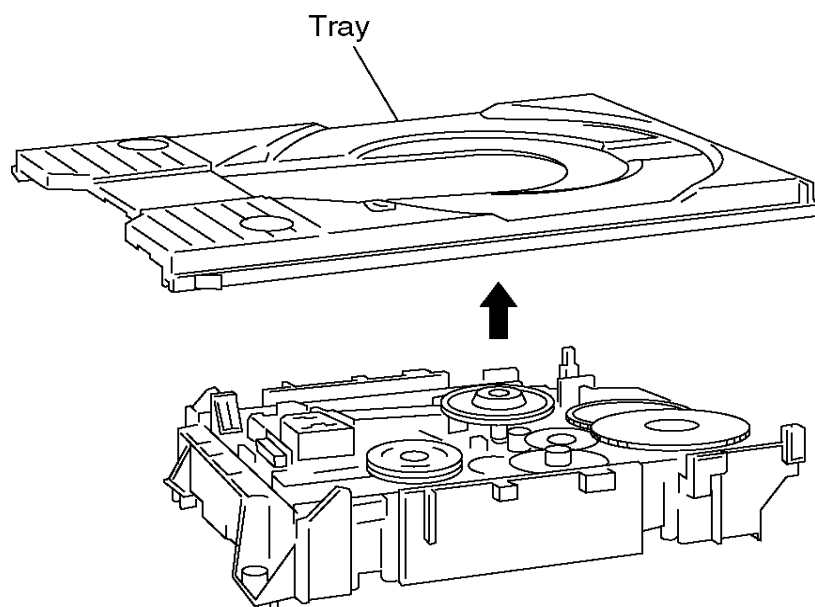
### 6.3 Clamp Plate Unit

1. Spread the stopper with hand to silde the tabs and remove the clamp plate unit.



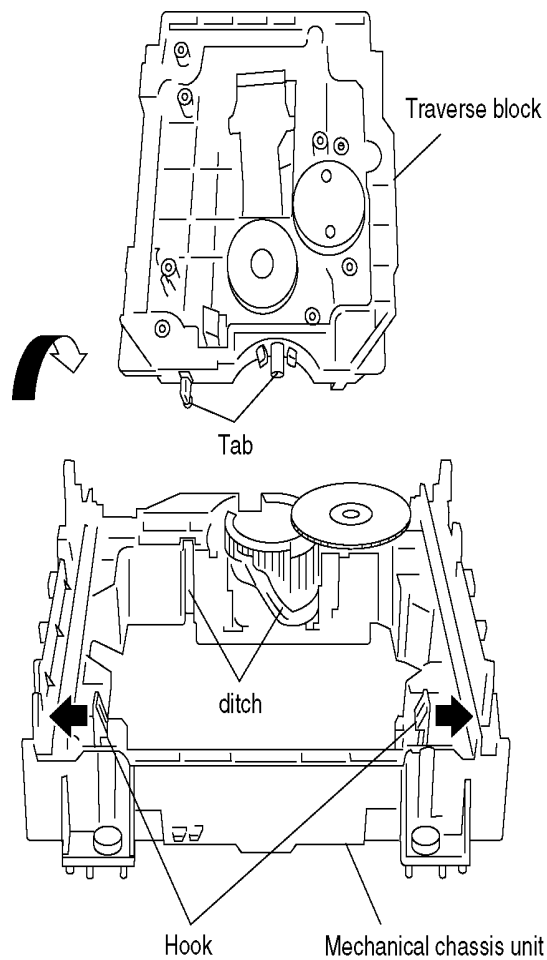
### 6.4 Tray

1. Lift the tray.



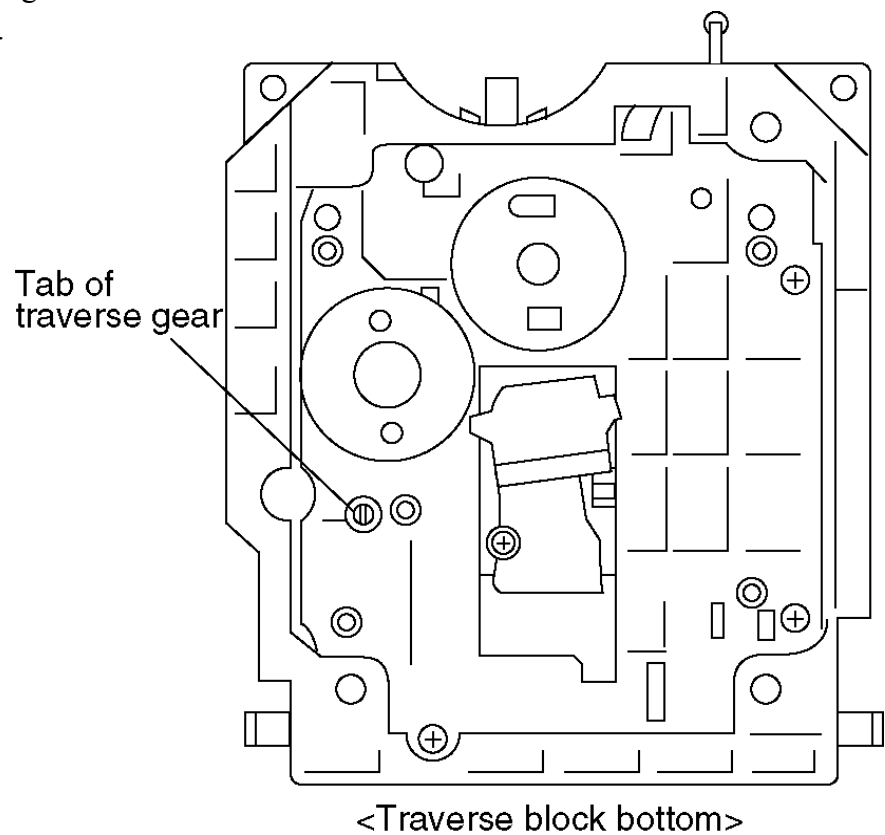
## 6.5 Traverse Block

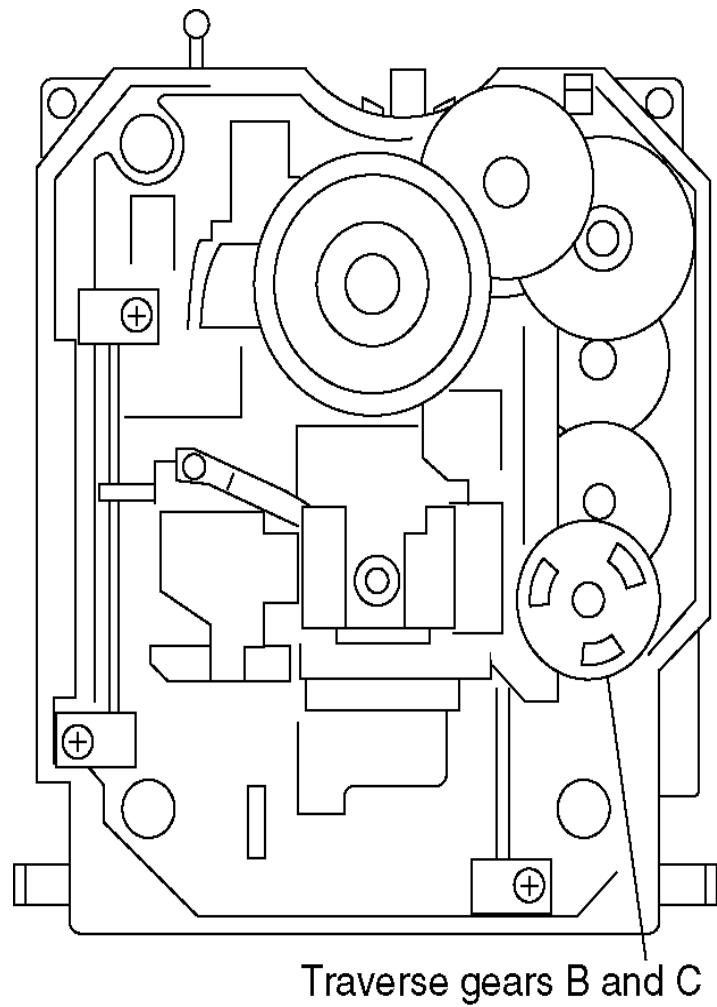
- 1.Lift the traverse block while spreading the hook of the mechanical chassis unit.
- 2.Disengage the tabs from the holes of the mechanical chassis unit.



## 6.6. Traverse Gear

- 1.Disengage the tabs from the traverse gear
- 2.Remove the traverse gears B and C.

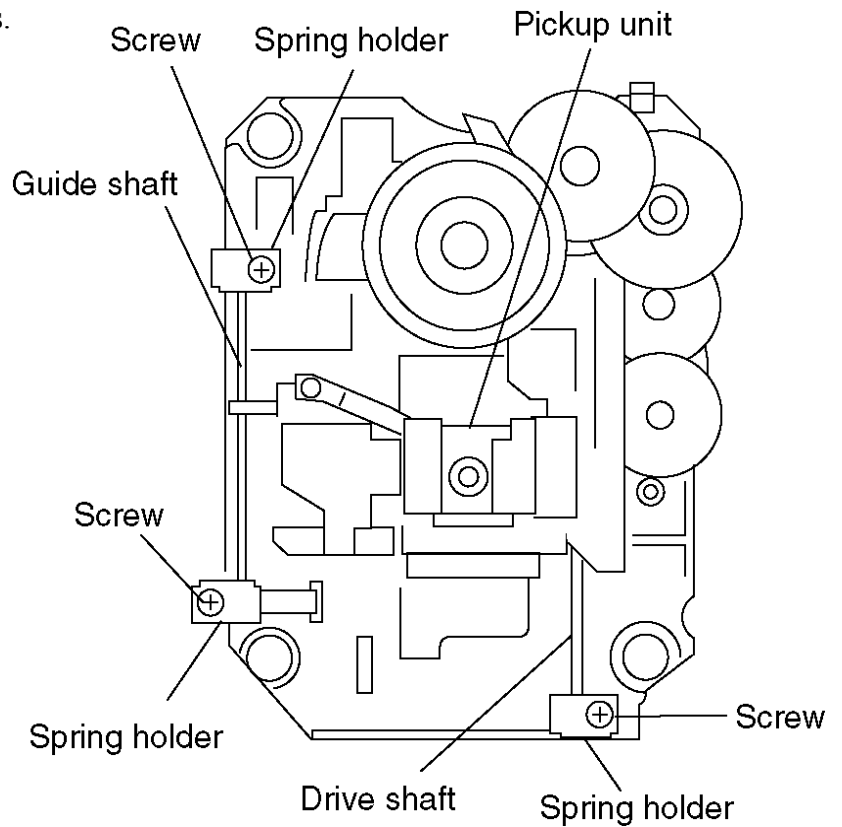




Traverse gears B and C

### 6.7. Optical Pickup Unit

1. Unscrew the screws.
2. Remove the spring holders and the springs.
3. Pull out of the drive shaft and guide shaft.



### 6.7.1. Precautions in optical pickup replacement

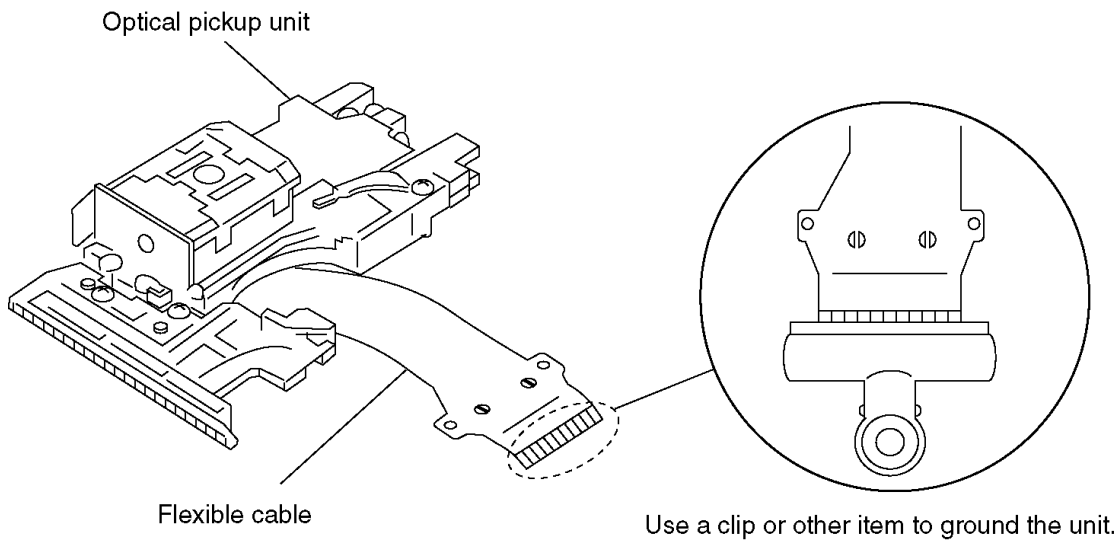
when working around the optical pickup.(Refer to the related page in this Manual about the countermeasures.

- 1.Do not touch laser diode,actuator and their peripheries.
- 2.Do not use tester to check laser diode.(Laser diode can be damaged easily.)

removing it.

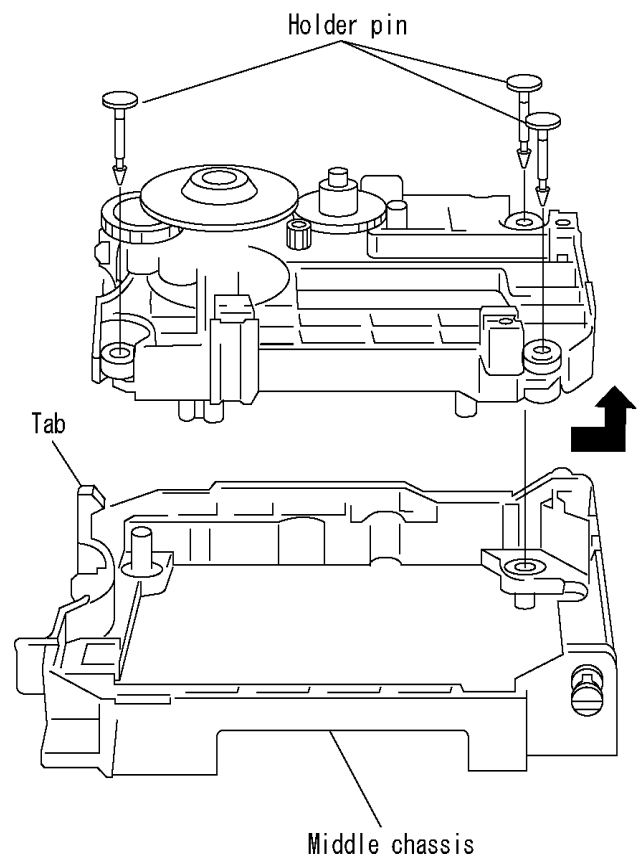
4.Solder the land on flexible cable of optical pickup unit.

- When using the soldering iron without anti-static feature,short-circuit the flexible cable terminal with a clip before short-circuiting the land.
- After intended repair is finished.remove the solder for short-circuit of laser diode in a correct way following the procedures described in this Manual.



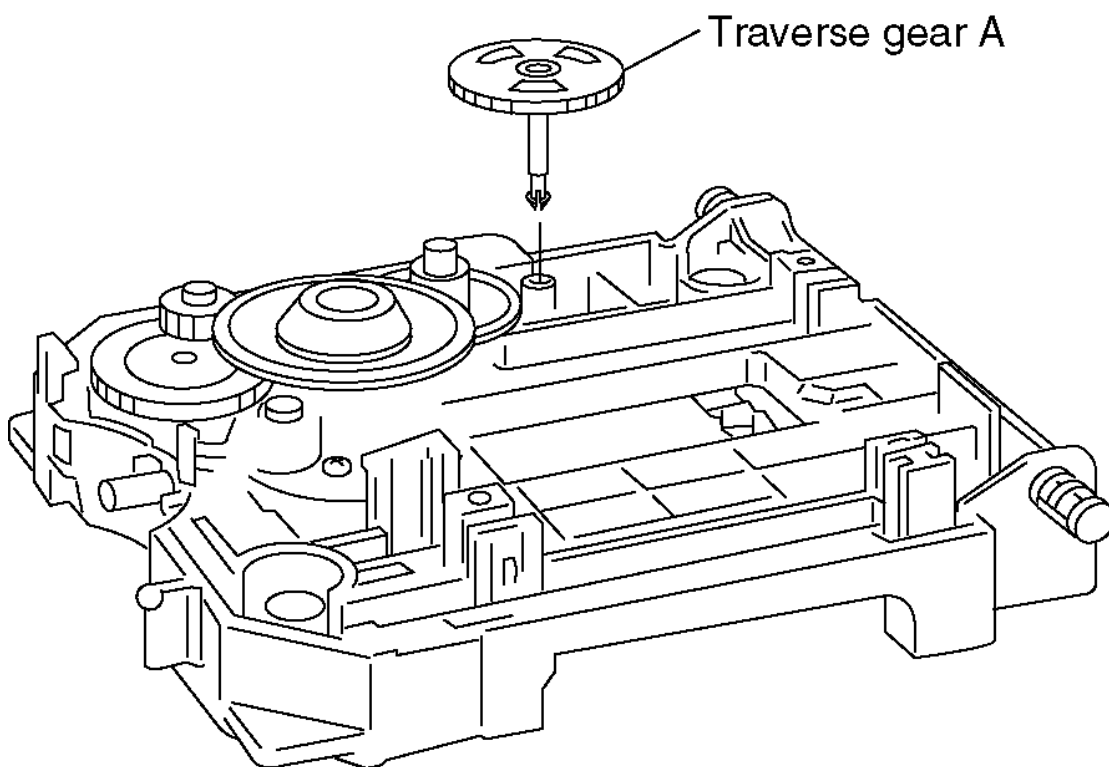
### 6.8. Disassembling the Middle Chassis

- 1.Remove the holders pins.
- 2.Remove the tab.
- 3.It lifts while pulling it in the direction of the arrow.



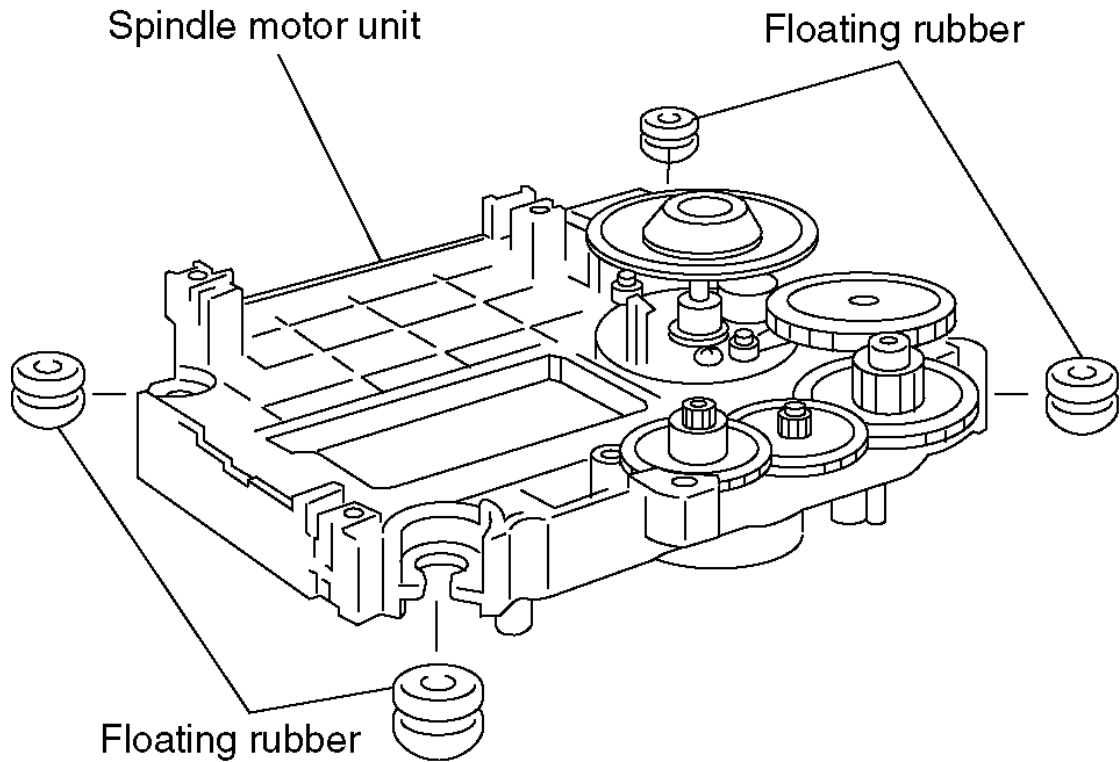
### 6.9. Disassembling the Traverse Gear A

- 1.Remove the traverse gear A.



6.10. Disassembling the Sprindle Motor Unit

1.Remove the floating rubbers.



7. Electrical Confirmation

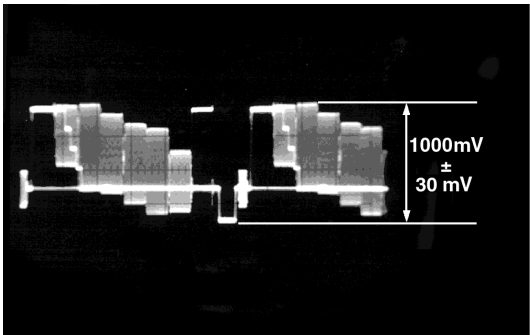
7.1. Video Output (Luminance Signal) Confirmation

DO this confirmation after replacing a P.C.B.

| Measurement point         | Mode                                                                | Disc                       |
|---------------------------|---------------------------------------------------------------------|----------------------------|
| Video output terminal     | Color bar 75%<br>PLAY(Title 46):DVDT-S15<br>PLAY(Title 12):DVDT-S01 | DVDT-S15<br>or<br>DVDT-S01 |
| Measuring equipment,tools | Confirmation value                                                  |                            |
| 200mV/dir,10 μ sec/dir    | 1000mVp-p±30mV                                                      |                            |

Purpose:To maintain video signal output compatibility.

- 1.Connect the oscilloscope to the video output terminal and terminate at 75 ohms.
- 2.Confirm that luminance signal(Y+S)level is 1000mVp-p±30mV



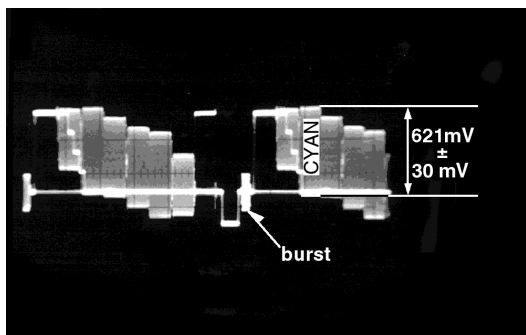
## 7.2. Video Output (Chrominance Signal) Confirmation

Do the confirmation after replacing P.C.B.

| Measurement point                                      | Mode                                                                | Disc                       |
|--------------------------------------------------------|---------------------------------------------------------------------|----------------------------|
| Video output terminal                                  | Color bar 75%<br>PLAY(Title 46):DVDT-S15<br>PLAY(Title 12):DVDT-S01 | DVDT-S15<br>or<br>DVDT-S01 |
| Measuring equipment,tools                              | Confirmation value                                                  |                            |
| Screwdriver,Oscilloscope<br>200mV/dir,10 $\mu$ sec/dir | 621mVp-p $\pm$ 30mV                                                 |                            |

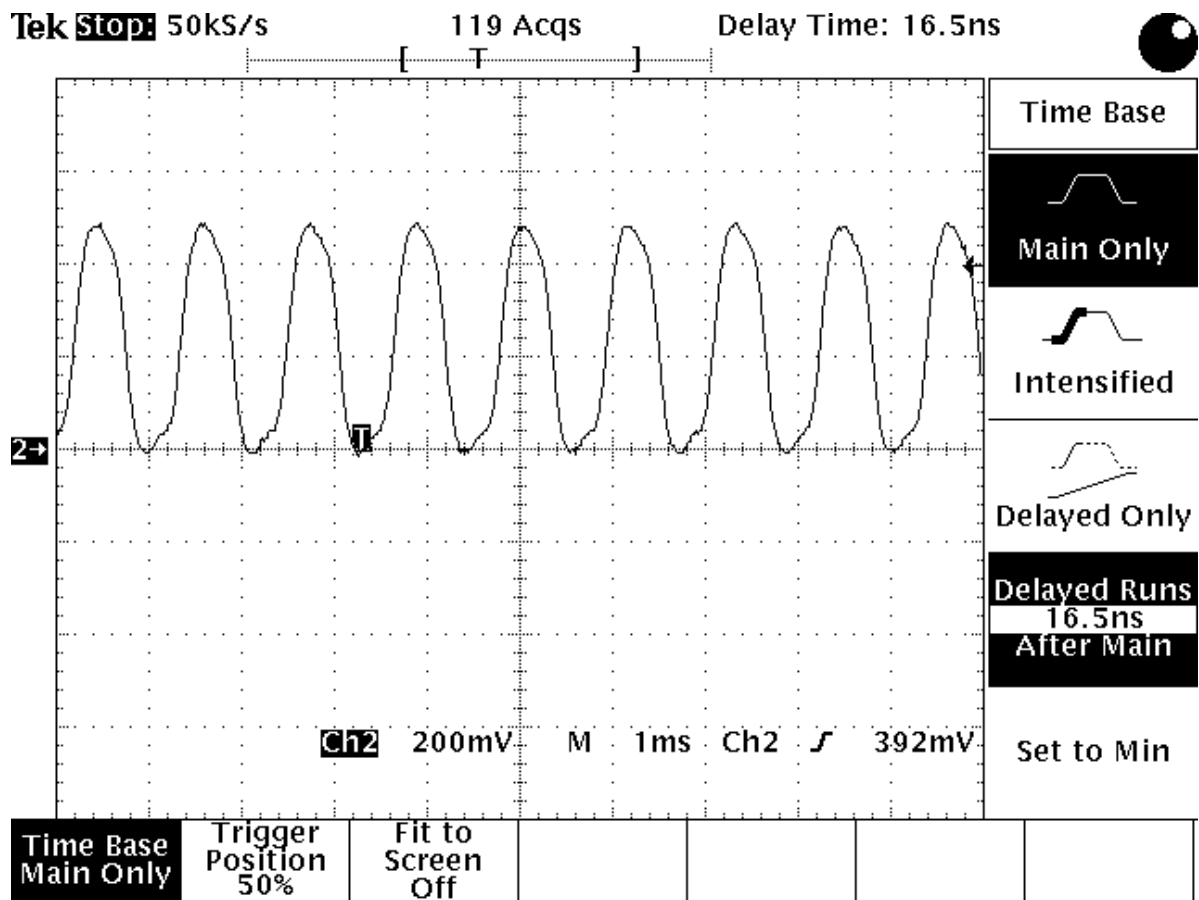
Purpose:To maintain video signal output compatibility.

- 1.Connect the oscilloscope to the video output terminal and terminate at 75 ohme.
- 2.Confirm that the chrominance signal(C)level is 621 mVp-p $\pm$ 30mV

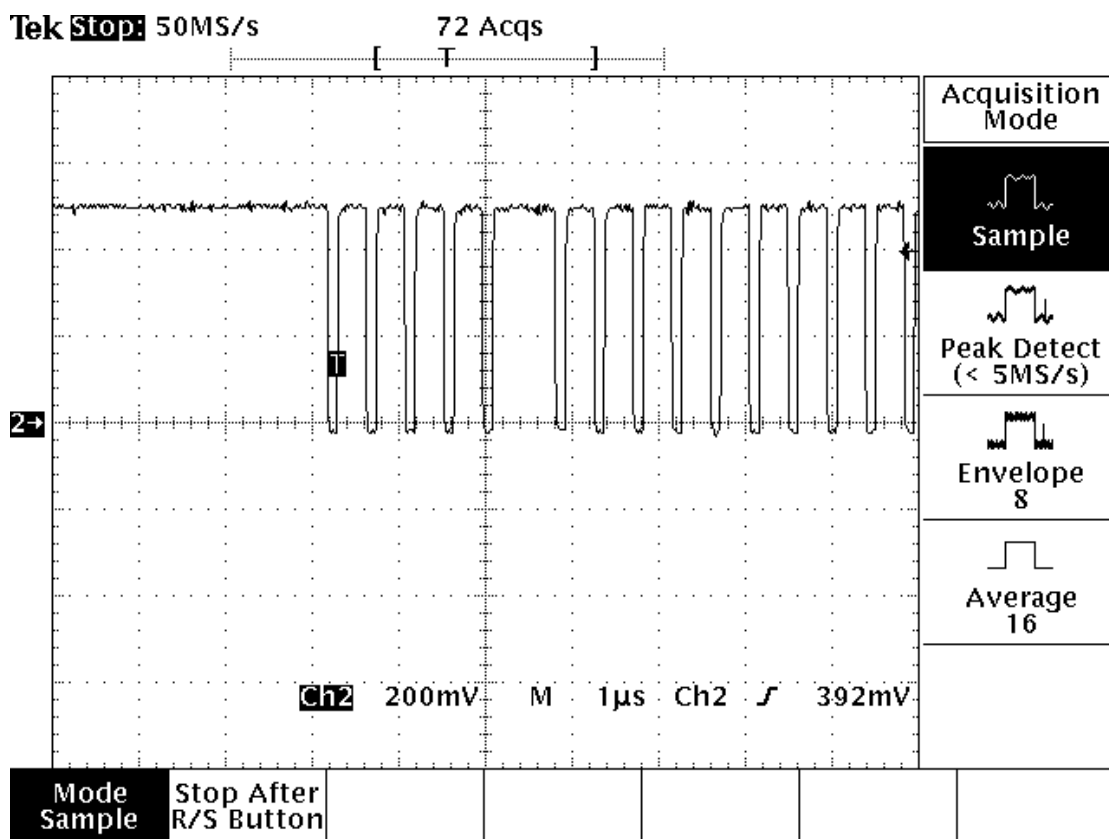


## 8. MPEG BOARD CHECK WAVEFORM

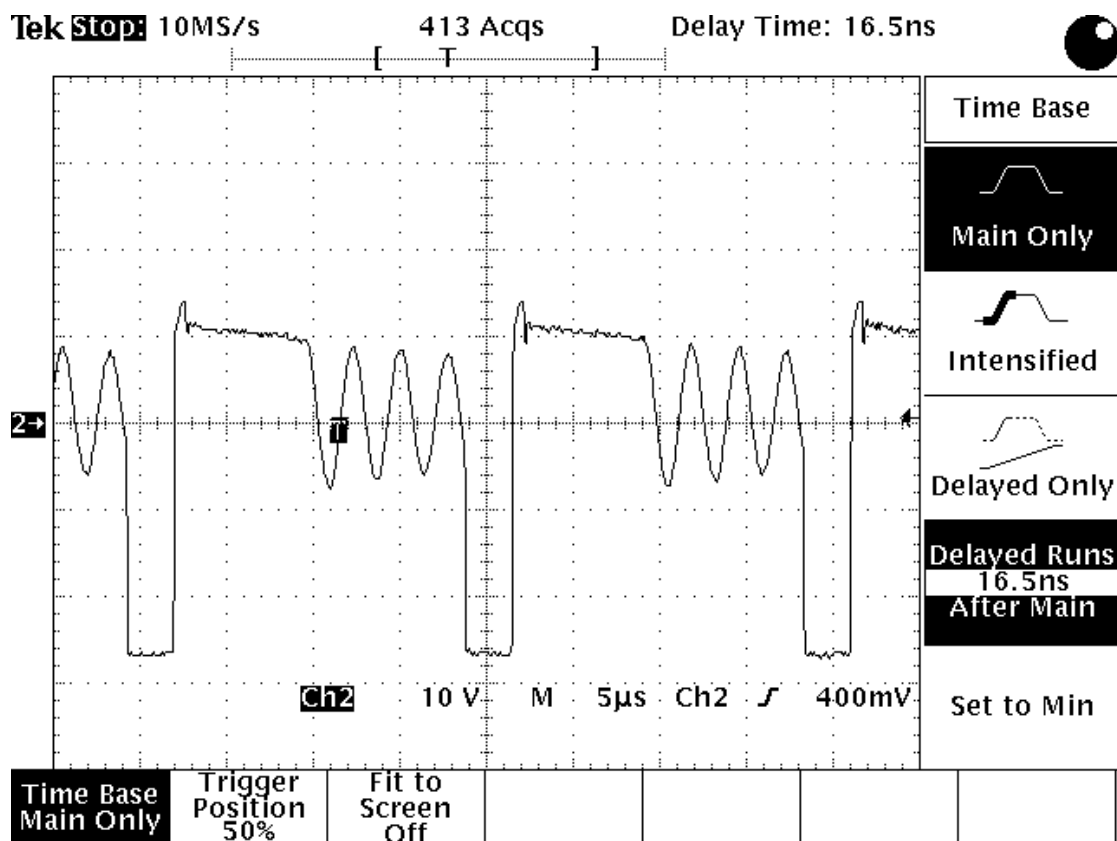
### 1.X204 WAVEFORM DIAGRAM



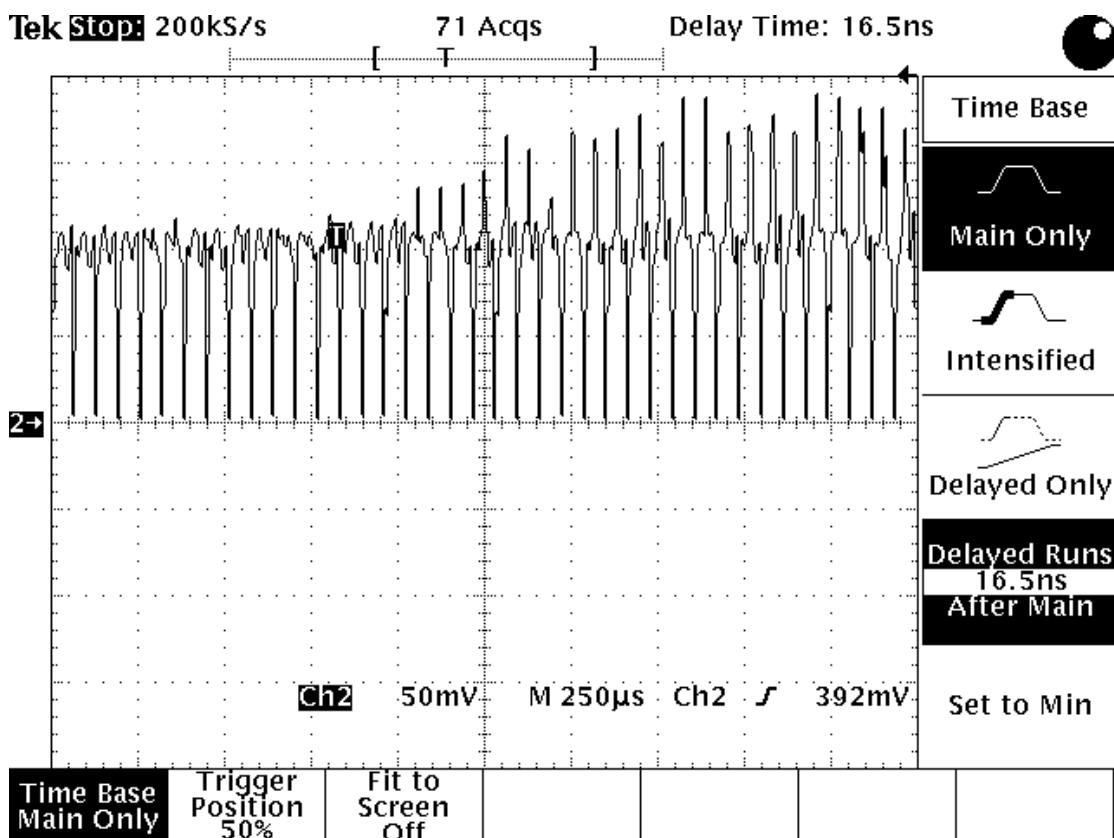
### 2.ZIVA-4.1 PIN.173/STRMCS WAVEFORM DIAGRAM



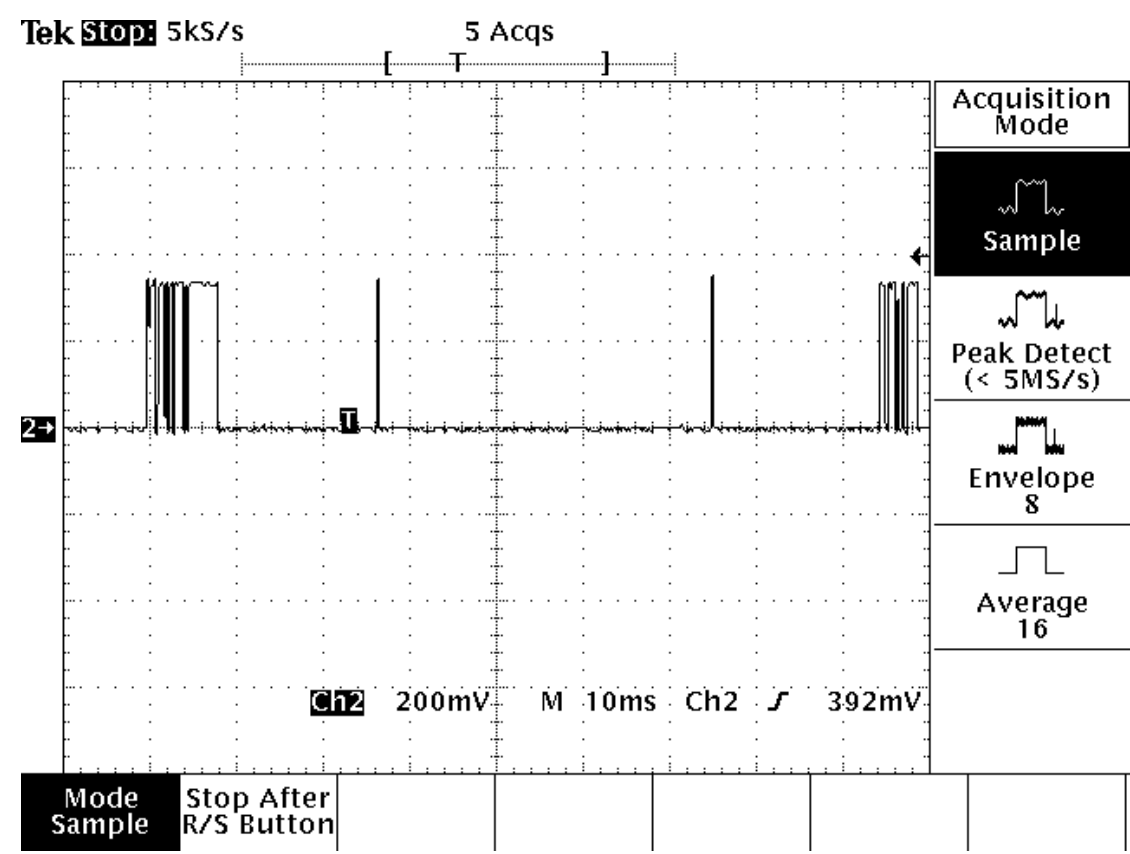
### 3.IC5L0380R PIN.2 WAVEFORM DIAGRAM



### 4.VIDEO OUPUT WAVEFORM DIAGRAM



5.ZIVA-4.1PIN.172/DVDREQ WAVEFORM DIAGRAM



# IC BLOCK DIAGRAM & DESCRIPTION

## ES4428 PINOUT

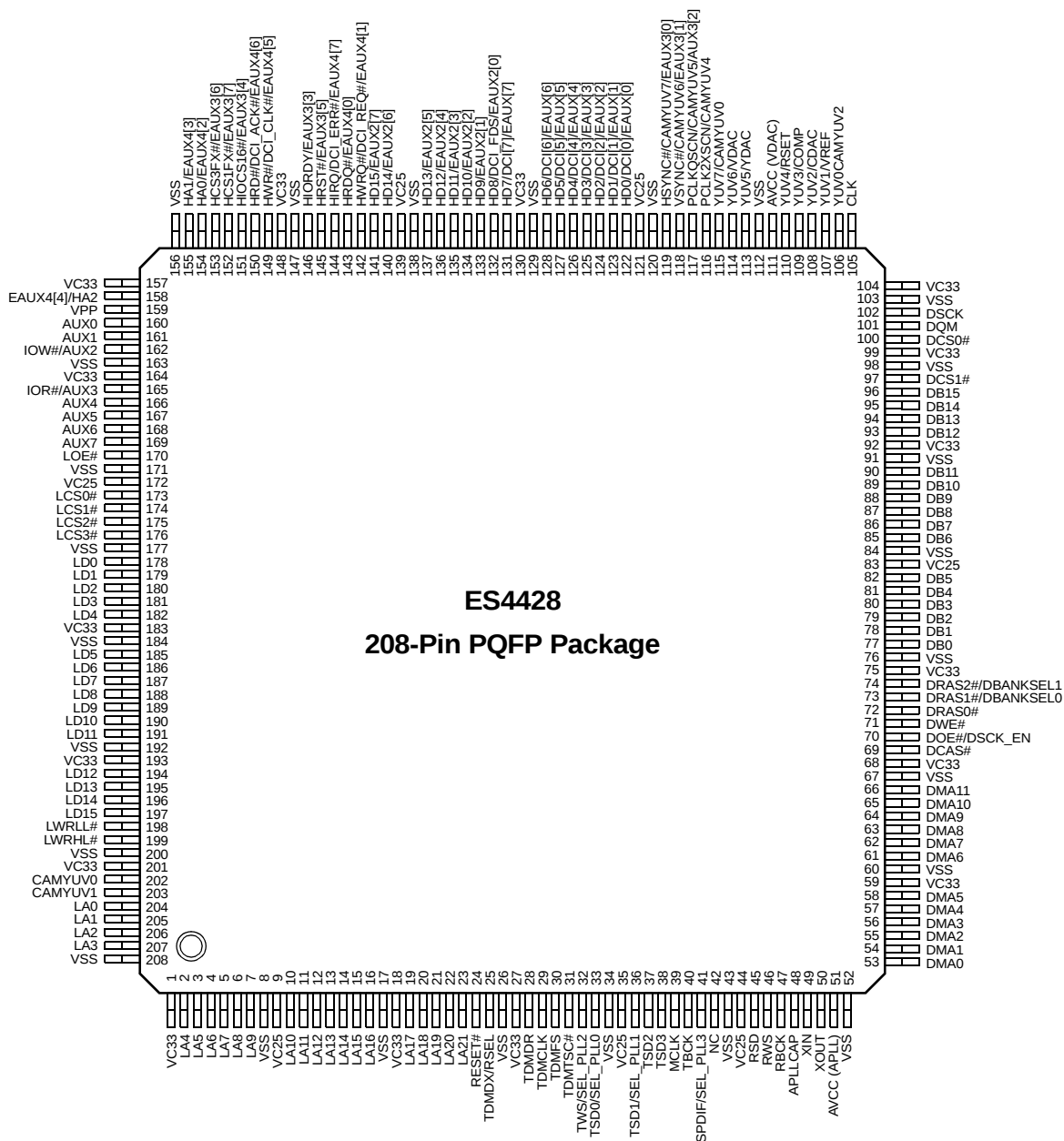


Figure 1 ES4428 Pinout

## ES4428 PIN DESCRIPTION

| Name       | Number                                                                                                     | I/O | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------|------------------------------------------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VC33       | 1, 18, 27, 59, 68, 75, 92, 99, 104, 130, 148, 157, 159, 164, 183, 193, 201                                 | P   | 3.3V digital power supply.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| VC25       | 9, 35, 44, 83, 121, 139, 172                                                                               | P   | 2.5V digital power supply.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| LA[21:0]   | 23:19, 16:10, 7 :2, 207:204                                                                                | I/O | Flash and Read-Only memory device address bus.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| VSS        | 8, 17, 26, 34, 43, 60, 67, 76, 84, 91, 98, 103, 120, 129, 138, 147, 156, 163, 171, 177, 184, 192, 200, 208 | G   | Digital ground.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| RESET#     | 24                                                                                                         | I   | Reset input (active-low).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| TDMDX      | 25                                                                                                         | O   | TDM transmit data output.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| RSEL       |                                                                                                            | I   | ROM Select<br><div> <div>RSEL</div> <div>Selection</div> <div>0</div> <div>16-bit ROM</div> <div>1</div> <div>8-bit ROM</div> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| TDMDR      | 28                                                                                                         | I   | TDM receive data input.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| TDMCLK     | 29                                                                                                         | I   | TDM clock input.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| TDMFS      | 30                                                                                                         | I   | TDM frame sync input.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| TDMTSC#    | 31                                                                                                         | O   | TDM output enable (active-low).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| TWS        | 32                                                                                                         | O   | Audio transmit frame sync output.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| SEL_PLL1   |                                                                                                            | I   | Select PLL1 input. See the table                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| TSD0       | 33                                                                                                         | O   | Audio transmit serial data output 0.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| SEL_PLL0   |                                                                                                            | I   | Select PLL0.<br><div> <div>SEL_PLL2</div> <div>SEL_PLL1</div> <div>SEL_PLL0</div> <div>Notes</div> <div>0</div> <div>0</div> <div>0</div> <div>VCO OFF</div> <div>0</div> <div>0</div> <div>1</div> <div>27.0 MHz</div> <div>0</div> <div>1</div> <div>0</div> <div>BYPASS</div> <div>0</div> <div>1</div> <div>1</div> <div>54.0 MHz</div> <div>1</div> <div>0</div> <div>0</div> <div>121.5 MHz</div> <div>1</div> <div>0</div> <div>1</div> <div>81.0 MHz</div> <div>1</div> <div>1</div> <div>0</div> <div>94.5 MHz</div> <div>1</div> <div>1</div> <div>1</div> <div>108.0 MHz</div> </div> |
| TSD1       |                                                                                                            | O   | Audio transmit serial data output 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| SEL_PLL2   |                                                                                                            | I   | Select PLL2 See the table for pin number 33.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| TSD2       |                                                                                                            | O   | Audio transmit serial data output 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| TSD3       |                                                                                                            | O   | Audio transmit serial data output 3.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| MCLK       |                                                                                                            | I/O | Audio master clock for audio DAC.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| TBCK       |                                                                                                            | I/O | Audio transmit bit clock.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| SPDIF      | 41                                                                                                         | I   | Sony/Philips Digital Interface audio input.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| SEL_PLL3   |                                                                                                            |     | SEL_PLL3 Clock Source<br><div> <div>0</div> <div>Crystal oscillator</div> <div>1</div> <div>DCLK input for test mode</div> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| RSD        | 45                                                                                                         | I   | Audio receive serial data.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| RWS        | 46                                                                                                         | I   | Audio receive frame sync.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| RBCK       | 47                                                                                                         | I   | Audio receive bit clock.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| APLLCAP    | 48                                                                                                         | I   | Analog PLL capacitor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| XIN        | 49                                                                                                         | I   | Crystal input.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| XOUT       | 50                                                                                                         | O   | Crystal output.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| AVCC (PLL) | 51                                                                                                         | P   | Audio PLL analog power supply.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Name             | Number            | I/O | Definition                                                                                                         |
|------------------|-------------------|-----|--------------------------------------------------------------------------------------------------------------------|
| AVSS (PLL)       | 52                | G   | Audio PLL analog ground.                                                                                           |
| DMA[11:0]        | 66:61,58:53       | O   | DRAM address bus.                                                                                                  |
| DCAS#            | 69                | O   | Column address strobe (active-low).                                                                                |
| DOE#/<br>DSCK_EN | 70                | O   | Output enable/clock enable (active-low).                                                                           |
| DWE#             | 71                | O   | DRAM write enable (active-low).                                                                                    |
| DRAS0#           | 72                | O   | Row address strobe 0 (active-low).                                                                                 |
| DRAS1#           | 73                | O   | Row address strobe 1 (active-low).                                                                                 |
| DBANKSEL0        |                   | O   | DRAM address bus bank select 0 output. Only active in 64Mb SDRAM mode.                                             |
| DRAS2#           | 74                | O   | Row address strobe 2 (active-low).                                                                                 |
| DBANKSEL1        |                   | O   | DRAM address bus bank select 1 output. Only active in 64Mb SDRAM mode.                                             |
| DB[15:0]         | 96:93,90:85,82:77 | I/O | DRAM data bus.                                                                                                     |
| DCS[1:0]#        | 97,100            | O   | SDRAM chip select [1:0] (active-low).                                                                              |
| DQM              | 101               | O   | Data input/output mask.                                                                                            |
| DSCK             | 102               | I   | Clock from SDRAM.                                                                                                  |
| DCLK             | 105               | I   | Clock input (bypass/test mode).                                                                                    |
| YUV[0]           | 106               | O   | YUV output data bus.                                                                                               |
| CAMYUV2          |                   |     | Video camera data bus.                                                                                             |
| YUV[1]           | 107               | O   | YUV output data bus.                                                                                               |
| VREF             |                   | I   | Internal resistor divider generates Common Mode Reference (CMR) voltage. Bypass to analog ground with 0.1 $\mu$ F. |
| YUV[2]           | 108               | O   | YUV output data bus.                                                                                               |
| CDAC             |                   | O   | Modulated chrominance output.                                                                                      |
| YUV[3]           | 109               | O   | YUV output data bus.                                                                                               |
| COMP             |                   | I   | Compensation pin.                                                                                                  |
| YUV[4]           | 110               | O   | YUV output data bus.                                                                                               |
| RSET             |                   | I   | Full scale video DAC current adjustment.                                                                           |
| AVCC (VDAC)      | 111               | P   | Video DAC analog power supply.                                                                                     |
| AVSS (VDAC)      | 112               | G   | Video DAC analog ground.                                                                                           |
| YUV[5]           | 113               | O   | YUV output data bus.                                                                                               |
| YDAC             |                   | O   | Y luminance data bus for screen video port.                                                                        |
| YUV[6]           | 114               | O   | YUV output data bus.                                                                                               |
| VDAC             |                   | O   | Composite video output.                                                                                            |
| YUV[7]           | 115               | O   | YUV output data bus.                                                                                               |
| CAMYUV3          |                   |     | Video camera data bus.                                                                                             |
| PCLK2XSCN        | 116               | I/O | 2X pixel clock.                                                                                                    |
| CAMYUV4          |                   | I   | Video camera data bus.                                                                                             |
| PCLKQSCN         | 117               | I/O | Pixel clock.                                                                                                       |
| CAMYUV5          |                   | I   | Video camera data bus.                                                                                             |
| AUX3[2]          | 118               | I/O | I/O x.                                                                                                             |
| VSYNC#           |                   | I/O | Vertical sync for screen video interface, programmable for rising or falling edge, active low.                     |
| CAMYUV6          |                   | I   | Video camera data bus.                                                                                             |
| EAUX3[1]         | 119               | I/O | I/O x.                                                                                                             |
| HSYNC#           |                   | I/O | Horizontal sync for screen video interface, programmable for rising or falling edge, active low.                   |
| CAMYUV6          |                   | I   | Video camera data bus..                                                                                            |
| EAUX3[0]         | 122               | I/O | I/O x.                                                                                                             |
| HD[0]            |                   | I/O | Host data bus I/O 0.                                                                                               |
| DCI[0]           |                   | I/O | DCI interface I/O 0.                                                                                               |
| EAUX1[0]         | 123               | I/O | I/O x.                                                                                                             |
| HD[1]            |                   | I/O | Host data bus I/O 1.                                                                                               |
| DCI[1]           |                   | I/O | DCI interface I/O 1.                                                                                               |
| EAUX1[1]         |                   | I/O | I/O x.                                                                                                             |



| Name      | Number                   | I/O | Definition                                               |
|-----------|--------------------------|-----|----------------------------------------------------------|
| HD[2]     | 124                      | I/O | Host data bus I/O 2.                                     |
| DCI[2]    |                          | I/O | DCI interface I/O 2.                                     |
| EAUX1[2]  |                          | I/O | I/O x.                                                   |
| HD[3]     | 125                      | I/O | Host data bus I/O 3.                                     |
| DCI[3]    |                          | I/O | DCI interface I/O 3.                                     |
| EAUX1[3]  |                          | I/O | I/O x.                                                   |
| HD[4]     | 126                      | I/O | Host data bus I/O 4.                                     |
| DCI[4]    |                          | I/O | DCI interface I/O 4.                                     |
| EAUX1[4]  |                          | I/O | I/O x.                                                   |
| HD[5]     | 127                      | I/O | Host data bus I/O 5.                                     |
| DCI[5]    |                          | I/O | DCI interface I/O 5.                                     |
| EAUX1[5]  |                          | I/O | I/O x.                                                   |
| HD[6]     | 128                      | I/O | Host data bus I/O 6.                                     |
| DCI[6]    |                          | I/O | DCI interface I/O 6.                                     |
| EAUX1[6]  |                          | I/O | I/O x.                                                   |
| HD[7]     | 131                      | I/O | Host data bus I/O 7.                                     |
| DCI[7]    |                          | I/O | DCI interface I/O 7.                                     |
| EAUX1[7]  |                          | I/O | I/O x.                                                   |
| HD[8]     | 132                      | I/O | Host data bus I/O 8.                                     |
| DCI_FDS#  |                          | I/O | DCI full duplex select.                                  |
| EAUX2[0]  |                          | I/O | I/O x.                                                   |
| HD[9]     | 133                      | I/O | Host data bus I/O 9.                                     |
| EAUX2[1]  |                          | I/O | I/O x.                                                   |
| HD[10]    | 134                      | I/O | Host data bus I/O 10.                                    |
| EAUX2[2]  |                          | I/O | I/O x.                                                   |
| HD[11]    | 135                      | I/O | Host data bus I/O 11.                                    |
| EAUX2[3]  |                          | I/O | I/O x.                                                   |
| HD[12]    | 136                      | I/O | Host data bus I/O 12.                                    |
| EAUX2[4]  |                          | I/O | I/O x.                                                   |
| HD[13]    | 137                      | I/O | Host data bus I/O 13.                                    |
| EAUX2[5]  |                          | I/O | I/O x.                                                   |
| HD[14]    | 140                      | I/O | Host data bus I/O 14.                                    |
| EAUX2[6]  |                          | I/O | I/O x.                                                   |
| HD[15]    | 141                      | I/O | Host data bus I/O 15.                                    |
| EAUX2[7]  |                          | I/O | I/O x.                                                   |
| AUX[1:0]  | 160, 161                 | I/O | Auxiliary ports.                                         |
| AUX[2]    | 162                      | I/O | Auxiliary port.                                          |
| IOR#      |                          | O   | Read strobe (active-low).                                |
| AUX[3]    |                          | I/O | Auxiliary port.                                          |
| IOW#      | 165                      | O   | Write strobe (active-low).                               |
| AUX[7:4]  |                          | I/O | Auxiliary ports.                                         |
| LOE#      |                          | O   | Flash memory device output enable (active-low).          |
| LCS[1]#   | 174                      | O   | Read-only memory chip select 1 (active-low).             |
| LCS[3:2]# | 175,176                  | O   | Flash memory chip select [3:2] (active-low).             |
| LD[15:0]  | 197:194,191:185,182:178  | I/O | Flash and read-only memory device data bus.              |
| LWRLL#    | 198                      | O   | Flash memory device write low byte enable (active-low).  |
| LWRHL#    | 199                      | O   | Flash memory device write high byte enable (active-low). |
| NC        | 42,146:142, 173, 203:202 |     | No Connect pins. Leave open.                             |

## ES4427 PINOUT

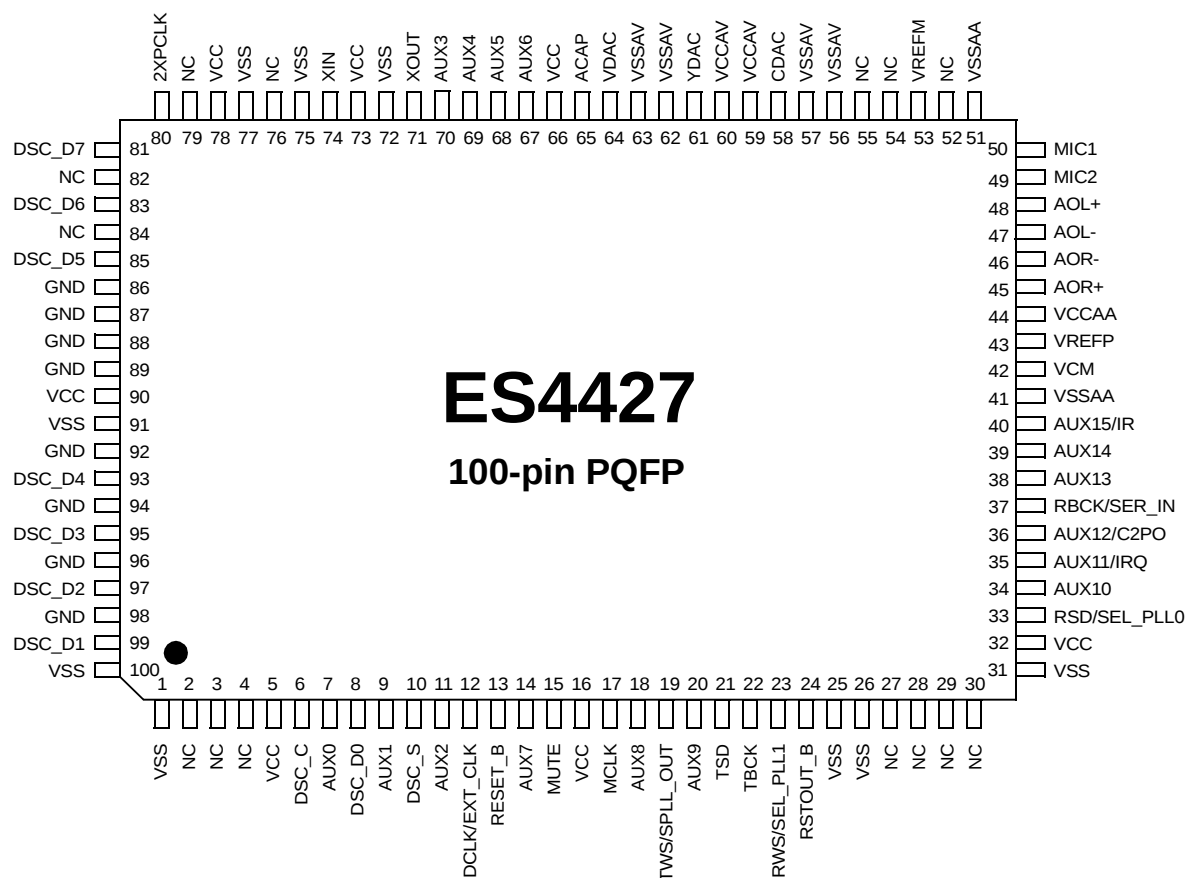


Figure 2 ES4427 Pinout

## ES4427 PIN DESCRIPTION

| Name       | Number                                        | I/O | Definition                                           |
|------------|-----------------------------------------------|-----|------------------------------------------------------|
| VSS        | 1, 25, 26, 31, 72, 75, 77, 91, 100            | --  | Ground.                                              |
| NC         | 2:4,27:30, 54, 55, 58, 61, 64, 76, 79, 82, 84 |     | No connect. Do not connect to these pins.            |
| VCC        | 5,16,32,66,73,78,90                           | I   | Voltage supply, 5 V.                                 |
| GND        | 52, 54, 55, 86:89, 92, 94, 96, 98             | --  | Analog ground.                                       |
| DSC_C      | 6                                             | I   | Clock for programming to access internal registers.  |
| AUX0[0]    | 7                                             | I/O | Auxiliary bus 0.                                     |
| DSC_D[7:0] | 8, 81, 83, 85, 93, 95, 97, 99                 | I/O | Data for programming to access internal registers.   |
| AUX0[1]    | 9                                             | I/O | Auxiliary bus 0.                                     |
| DSC_S      | 10                                            | I   | Strobe for programming to access internal registers. |
| AUX0[2]    | 11                                            | I/O | Auxiliary bus 0.                                     |
| DCLK       | 12                                            | O   | DCLK clock input for test mode.                      |
| RST#       | 13                                            | I   | Input from reset circuit.                            |
| AUX0[6]    | 14                                            | I/O | Auxiliary bus 0.                                     |

| Name       | Number         | I/O                    | Definition                                                                                                                                                                                                                                                                                                                                                                                                                   |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
|------------|----------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|------|---|---|-------------------------|----------|----------|-------------------------------------|---|---|------------------------|---|---|------------------------|
| MUTE       | 15             | O                      | Audio mute output.                                                                                                                                                                                                                                                                                                                                                                                                           |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| MCLK       | 17             | I                      | Audio master clock input.                                                                                                                                                                                                                                                                                                                                                                                                    |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| AUX0[7]    | 18             | I/O                    | Auxiliary bus 0.                                                                                                                                                                                                                                                                                                                                                                                                             |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| TWS        | 19             | I                      | Dual-purpose pin TWS is the transmit audio frame sync input from ES4428.                                                                                                                                                                                                                                                                                                                                                     |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| SPLL_OUT   |                | O                      | SPLL_OUT is the select PLL output.                                                                                                                                                                                                                                                                                                                                                                                           |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| AUX1[0]    | 20             | I/O                    | Auxiliary bus 1.                                                                                                                                                                                                                                                                                                                                                                                                             |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| TSD        | 21             | I                      | Transmit audio data output from ES4428.                                                                                                                                                                                                                                                                                                                                                                                      |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| TBCK       | 22             | I                      | Transmit audio bit clock output from ES4428.                                                                                                                                                                                                                                                                                                                                                                                 |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| RWS        | 23             | O                      | Dual-purpose pin RWS is the receive audio frame sync input to ES4428.                                                                                                                                                                                                                                                                                                                                                        |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| SEL_PLL1   |                | I                      | Pins SEL_PLL[1:0] select the PLL clock frequency for the DCLK output.<br><table><tr><th>SEL_PLL1</th><th>SEL_PLL0</th><th>DCLK</th></tr><tr><td>0</td><td>0</td><td>Bypass PLL (input mode)</td></tr><tr><td><b>0</b></td><td><b>1</b></td><td><b>27 MHz (output mode) Default</b></td></tr><tr><td>1</td><td>0</td><td>32.4 MHz (output mode)</td></tr><tr><td>1</td><td>1</td><td>40.5 MHz (output mode)</td></tr></table> | SEL_PLL1 | SEL_PLL0 | DCLK | 0 | 0 | Bypass PLL (input mode) | <b>0</b> | <b>1</b> | <b>27 MHz (output mode) Default</b> | 1 | 0 | 32.4 MHz (output mode) | 1 | 1 | 40.5 MHz (output mode) |
| SEL_PLL1   |                | SEL_PLL0               | DCLK                                                                                                                                                                                                                                                                                                                                                                                                                         |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| 0          |                | 0                      | Bypass PLL (input mode)                                                                                                                                                                                                                                                                                                                                                                                                      |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| <b>0</b>   |                | <b>1</b>               | <b>27 MHz (output mode) Default</b>                                                                                                                                                                                                                                                                                                                                                                                          |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| 1          | 0              | 32.4 MHz (output mode) |                                                                                                                                                                                                                                                                                                                                                                                                                              |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| 1          | 1              | 40.5 MHz (output mode) |                                                                                                                                                                                                                                                                                                                                                                                                                              |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| RSTOUT#    | 24             | O                      | Reset output (active-low) to ES4428.                                                                                                                                                                                                                                                                                                                                                                                         |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| RSD        | 33             | O                      | Dual-purpose pin. RSD is the receive audio data input to ES4428.                                                                                                                                                                                                                                                                                                                                                             |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| SEL_PLL0   |                | I                      | SEL_PLL0 along with SEL_PLL1 select the PLL clock frequency for the DCLK output. See the table for pin number 23.                                                                                                                                                                                                                                                                                                            |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| AUX1[2]    | 34             | I/O                    | Auxiliary bus 1.                                                                                                                                                                                                                                                                                                                                                                                                             |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| AUX1[3]    | 35             | I/O                    | Auxiliary bus 1. Interrupt output to ES4428                                                                                                                                                                                                                                                                                                                                                                                  |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| AUX1[4]    | 36             | I/O                    | Auxiliary bus 1.                                                                                                                                                                                                                                                                                                                                                                                                             |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| RBCK       | 37             | O                      | Dual-purpose pin. RBCK is the receive audio bit clock input to ES4428.                                                                                                                                                                                                                                                                                                                                                       |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| SER_IN     |                | I                      | SER_IN is the serial input DSC mode.<br>0 - Parallel DSC mode.<br>1 - Serial DSC mode.                                                                                                                                                                                                                                                                                                                                       |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| AUX1[5]    | 38             | I/O                    | Auxiliary bus 1.                                                                                                                                                                                                                                                                                                                                                                                                             |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| AUX1[6]    | 39             | I/O                    | Interrupt input to modem subsystem.                                                                                                                                                                                                                                                                                                                                                                                          |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| AUX1[7]    | 40             | I/O                    | Auxiliary bus 1.                                                                                                                                                                                                                                                                                                                                                                                                             |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| IR         |                | I                      | IR interrupt input.                                                                                                                                                                                                                                                                                                                                                                                                          |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| VSSAA      | 41, 51         | I                      | Audio Analog Ground.                                                                                                                                                                                                                                                                                                                                                                                                         |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| VCM        | 42             | I                      | ADC Common Mode Reference (CMR) buffer output. CMR is approximately 2.25 V. Bypass to analog ground with 47 μF electrolytic in parallel with 0.1 μF.                                                                                                                                                                                                                                                                         |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| VREFP      | 43             | I                      | DAC and ADC maximum reference. Bypass to VCMR with 10 μF in parallel with 0.1 μF.                                                                                                                                                                                                                                                                                                                                            |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| VCCAA      | 44             | I                      | Analog VCC, 5 V.                                                                                                                                                                                                                                                                                                                                                                                                             |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| AOR+, AOR- | 45, 46         | O                      | Right channel output. Differential output.                                                                                                                                                                                                                                                                                                                                                                                   |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| AOL-, AOL+ | 47, 48         | O                      | Left channel output. Differential output.                                                                                                                                                                                                                                                                                                                                                                                    |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| MIC2       | 49             | I                      | Microphone input 2.                                                                                                                                                                                                                                                                                                                                                                                                          |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| MIC1       | 50             | I                      | Microphone input 1.                                                                                                                                                                                                                                                                                                                                                                                                          |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| VREFM      | 53             | I                      | DAC and ADC minimum reference. Bypass to VCMR with 10 μF in parallel with 0.1 μF.                                                                                                                                                                                                                                                                                                                                            |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| VSSAV      | 56, 57, 62, 63 | I                      | Video Analog Ground                                                                                                                                                                                                                                                                                                                                                                                                          |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| VCCAV      | 59, 60         | I                      | Video VCC, 5 V                                                                                                                                                                                                                                                                                                                                                                                                               |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| ACAP       | 65             | I                      | Audio CAP                                                                                                                                                                                                                                                                                                                                                                                                                    |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| AUX[0]6    | 67             | I/O                    | General purpose I/O.                                                                                                                                                                                                                                                                                                                                                                                                         |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| AUX[0]5    | 68             | I/O                    | General purpose I/O.                                                                                                                                                                                                                                                                                                                                                                                                         |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| AUX[0]4    | 69             | I/O                    | Modem DSP reset.                                                                                                                                                                                                                                                                                                                                                                                                             |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| AUX[0]3    | 70             | I/O                    | CD loader reset.                                                                                                                                                                                                                                                                                                                                                                                                             |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| XOUT       | 71             | O                      | 27 MHz crystal output.                                                                                                                                                                                                                                                                                                                                                                                                       |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| XIN        | 74             | I                      | 27 MHz crystal input.                                                                                                                                                                                                                                                                                                                                                                                                        |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |
| PCLKX2     | 80             | I                      | Pixel clock input from host processor, ES4428 PLL and pixel clock synthesizers and from external video encoder.                                                                                                                                                                                                                                                                                                              |          |          |      |   |   |                         |          |          |                                     |   |   |                        |   |   |                        |

**ES4428 DEVICE INTERFACES**

| Name                      | Number                      | I/O | Definition                                                              |
|---------------------------|-----------------------------|-----|-------------------------------------------------------------------------|
| Audio Interface           | 32                          | O   | Audio transmit frame sync [TWS].                                        |
|                           | 33                          | O   | Audio transmit serial data [TSD].                                       |
|                           | 39                          | I/O | Audio master clock for audio DAC [MCLK].                                |
|                           | 40                          | I/O | Audio transmit bit clock [TBCK].                                        |
|                           | 45                          | I   | Audio receive serial data input [RSD].                                  |
|                           | 46                          | I   | Audio receive frame sync input [RWS].                                   |
| Clock Interface           | 29                          | I   | TDM clock input [TDMCLK].                                               |
|                           | 39                          | I   | Audio master clock input [MCLK].                                        |
|                           | 40                          | I/O | Audio transmit bit clock [TBCK].                                        |
|                           | 47                          | I   | Audio receive bit clock [RBCK].                                         |
|                           | 70                          | O   | DRAM serial clock output enable [DSCLK], when selected.                 |
|                           | 102                         | I/O | SDRAM controller clock output [DSCK].                                   |
|                           | 105                         | I   | Data clock input [DCLK] for bypass and test mode.                       |
|                           | 116                         | I/O | 2 X pixel clock I/O [PCLK2XSCN].                                        |
| DCI (DVD) Interface       | 117                         | I/O | Pixel clock I/O [PCLKQSCN].                                             |
|                           | 122:128, 131                | I/O | DCI interface data I/Os [DCI_D[7:0], when selected.                     |
|                           | 132                         | I/O | DCI interface full duplex I/O [DCI_FDS#], when selected.                |
|                           | 142                         | O   | DCI interface request output [DCI_REQ#], when selected.                 |
|                           | 144                         | O   | DCI interface parity error output [DCI_ERR#], when selected.            |
|                           | 149                         | I   | DCI interface acknowledge input [DCI_ACK#] (active-low), when selected. |
| DRAM Interface            | 150                         | O   | DCI interface clock output [DCI_CLK], when selected.                    |
|                           | 53:58, 61:66                | I/O | DRAM address bus [DMA11:0].                                             |
|                           | 69                          | O   | Column address strobe [DCAS0#].                                         |
|                           | 70                          | O   | DRAM output enable [DOE#].                                              |
|                           | 71                          | O   | DRAM write enable [DWE#].                                               |
|                           | 72                          | O   | DRAM row address strobe 0 [DRAS0#].                                     |
|                           | 73                          | O   | DRAM row address strobe 1 [DRAS1#].                                     |
|                           |                             | O   | DRAM bank select 1 [DBANKSEL1#].                                        |
|                           | 74                          | O   | DRAM row address strobe 2 [DRAS2#].                                     |
|                           |                             | O   | DRAM bank select 0 [DBANKSEL0].                                         |
|                           | 77:82, 86:90, 93:96         | I/O | DRAM data bus [DB15:0].                                                 |
| Flash/ROM/ SRAM Interface | 97, 100                     | O   | SDRAM chip select [DCS1:0#].                                            |
|                           | 23:19, 16:10, 7 :2, 207:204 | I/O | Flash, ROM and SRAM device address bus [LA21:0].                        |
| Host Interface            | 197:194, 191:185, 182:178   | I/O | Flash, ROM and SRAM device data bus [LD15:0].                           |
|                           | 122:128, 131:137, 140, 141  | I/O | Host data bus [HD15:0]                                                  |
|                           | 142                         | O   | Host write request [HWRQ#].                                             |
|                           | 143                         | O   | Host read request [HRDQ#].                                              |
|                           | 144                         | O   | Host interrupt request [HIRQ].                                          |
|                           | 145                         | O   | Host reset output [HRST#].                                              |
|                           | 146                         | I/O | Host I/O ready [HIORDY].                                                |
|                           | 149                         | O   | Host/DVD drive read output [HRD#].                                      |
|                           | 150                         | O   | Host/DVD drive write output [HWR#].                                     |
|                           | 152                         | O   | Host select 1 [HCS1FX#].                                                |
|                           | 153                         | O   | Host select 3 [HCS3FX#].                                                |

| Name | Number | I/O | Definition |
|------|--------|-----|------------|
|------|--------|-----|------------|

|                     |                             |     |                                                       |
|---------------------|-----------------------------|-----|-------------------------------------------------------|
| Processor Interface | 23:19, 16:10, 7 :2, 207:204 | I/O | Flash, ROM and SRAM device address bus [LA21:0].      |
|                     | 197:194, 191:185, 182:178   | I/O | Flash, ROM and SRAM device data bus [LD15:0].         |
|                     | 170                         | O   | Flash memory device output enable [LOE#].             |
|                     | 174                         | O   | Read-only memory chip select 1 [LCS1#].               |
|                     | 175, 176                    | O   | Flash memory chip select [3:2] [LCS3:2#].             |
|                     | 198                         | O   | Flash memory device write low byte enable [LWRL#].    |
|                     | 199                         | O   | Flash memory device write high byte enable [LWRHL#].. |
| SPDIF Interface     | 41                          | I   | S/PDIF audio input.                                   |
| TDM Interface       | 25                          | O   | TDM transmit data output [TDMDX].                     |
|                     | 28                          | I   | TDM receive data input [TDMDR].                       |
|                     | 29                          | I   | TDM clock input [TDMCLK].                             |
|                     | 30                          | I   | TDM frame sync [TDMFS].                               |
|                     | 31                          | O   | TDM output enable [TDMTSC#].                          |
| Video Interface     |                             | O   | YUV[0] output.                                        |
|                     | 106                         | O   | Camera YUV[2] output.                                 |
|                     | 107                         | O   | YUV[1] output.                                        |
|                     | 108                         | O   | YUV[2] output.                                        |
|                     |                             | O   | Modulated chrominance output [CDAC].                  |
|                     | 109                         | O   | YUV[3] output.                                        |
|                     | 110                         | O   | YUV[4] output.                                        |
|                     |                             | I   | Full scale video DAC current adjustment [RSET].       |
|                     | 113                         | O   | YUV[5] output.                                        |
|                     |                             | O   | Y luminance output [YDAC].                            |
|                     | 114                         | O   | YUV[6] output.                                        |
|                     |                             | O   | Composite video output [VDAC].                        |
|                     | 115                         | O   | YUV[7] output.                                        |
|                     |                             | O   | Camera YUV[7] output [CAMYUV7].                       |
|                     | 116                         | I/O | 2X pixel clock [PCLK2XSCN].                           |
|                     |                             | I   | Camera YUV[4] output [CAMYUV4].                       |
|                     | 117                         | I/O | Pixel clock [PCLKQSCN].                               |
|                     |                             | I   | Camera YUV[5] output [CAMYUV5].                       |
|                     | 118                         | I/O | Vertical sync[VSYNC#].                                |
|                     |                             | I   | Camera YUV[6] output [CAMYUV6].                       |
|                     | 119                         | I/O | Horizontal sync [HSYNC#].                             |
|                     |                             | I   | Camera YUV[7] output [CAMYUV7].                       |

# IC BLOCK DIAGRAM & DESCRIPTION

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IC U214 Am29F002B/Am29F002NB

## 2 Megabit (256 K x 8-Bit)

## CMOS 5.0 Volt-only Boot Sector Flash Memory

### DISTINCTIVE CHARACTERISTICS

#### ■ Single power supply operation

- 5.0 Volt-only operation for read, erase, and program operations
- Minimizes system level requirements

#### ■ Manufactured on 0.32 $\mu$ m process technology

- Compatible with 0.5  $\mu$ m Am29F002 device

#### ■ High performance

- Access times as fast as 55 ns

#### ■ Low power consumption (typical values at 5 MHz)

- 1  $\mu$ A standby mode current
- 20 mA read current
- 30 mA program/erase current

#### ■ Flexible sector architecture

- One 16 Kbyte, two 8 Kbyte, one 32 Kbyte, and three 64 Kbyte sectors
- Supports full chip erase
- Sector Protection features:

A hardware method of locking a sector to prevent any program or erase operations within that sector

Sectors can be locked via programming equipment

Temporary Sector Unprotect feature allows code changes in previously locked sectors

#### ■ Top or bottom boot block configurations available

#### ■ Embedded Algorithms

- Embedded Erase algorithm automatically preprograms and erases the entire chip or any combination of designated sectors
- Embedded Program algorithm automatically writes and verifies data at specified addresses

#### ■ Minimum 1,000,000 write cycle guarantee per sector

#### ■ 20-year data retention at 125°C

- Reliable operation for the life of the system

#### ■ Package option

- 32-pin PDIP
- 32-pin TSOP
- 32-pin PLCC

#### ■ Compatibility with JEDEC standards

- Pinout and software compatible with single-power supply Flash
- Superior inadvertent write protection

#### ■ Data# Polling and toggle bits

- Provides a software method of detecting program or erase operation completion

#### ■ Erase Suspend/Erase Resume

- Suspends an erase operation to read data from, or program data to, a sector that is not being erased, then resumes the erase operation

#### ■ Hardware reset pin (RESET#)

- Hardware method to reset the device to reading array data (not available on Am29F002NB)

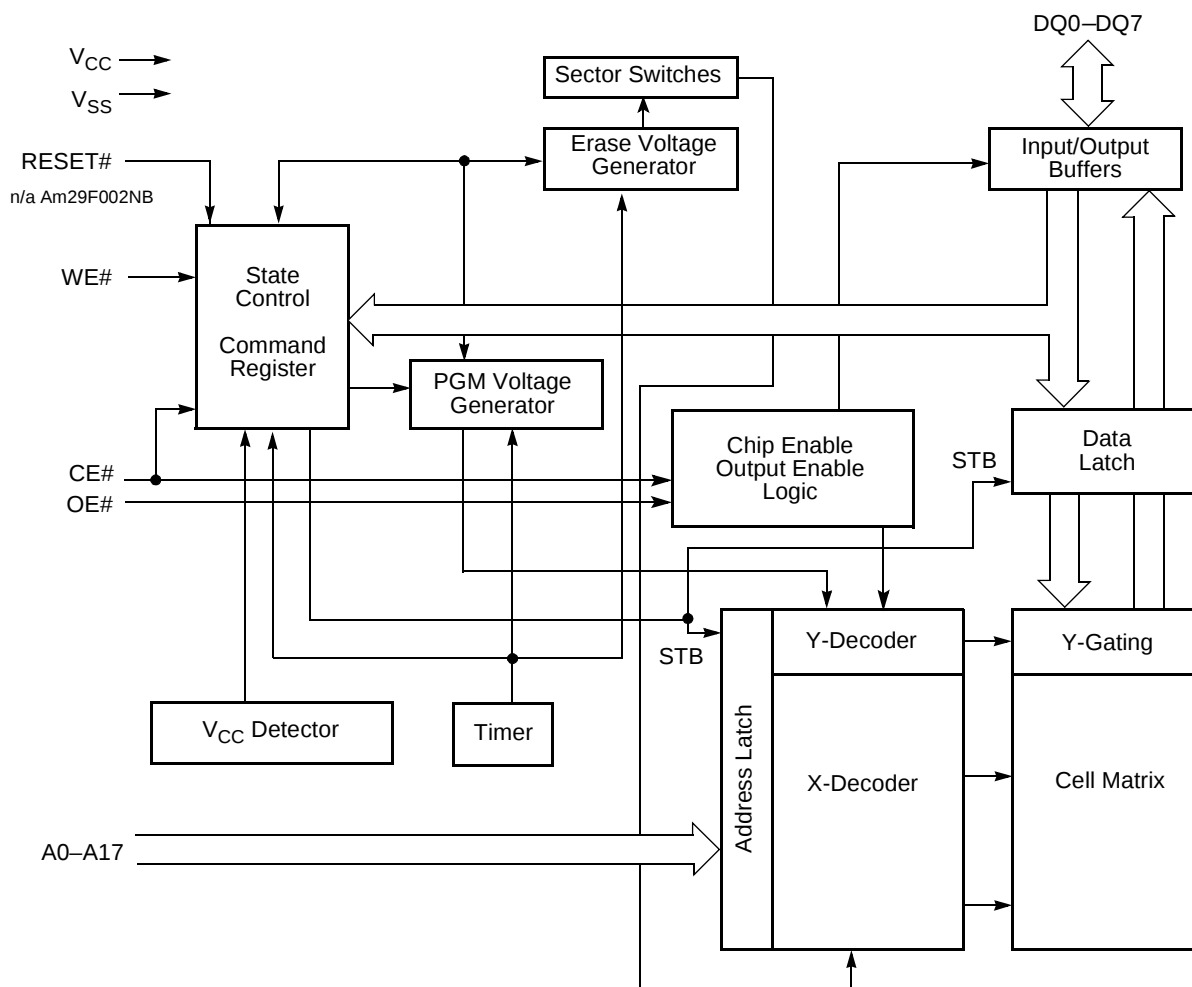
# IC BLOCK DIAGRAM & DESCRIPTION

## PRODUCT SELECTOR GUIDE

| Family Part Number                   |                                   | Am29F002B/Am29F002NB |     |     |      |
|--------------------------------------|-----------------------------------|----------------------|-----|-----|------|
| Speed Option                         | $V_{CC} = 5.0 \text{ V} \pm 5\%$  | -55                  |     |     |      |
|                                      | $V_{CC} = 5.0 \text{ V} \pm 10\%$ |                      | -70 | -90 | -120 |
| Max access time, ns ( $t_{ACC}$ )    |                                   | 55                   | 70  | 90  | 120  |
| Max CE# access time, ns ( $t_{CE}$ ) |                                   | 55                   | 70  | 90  | 120  |
| Max OE# access time, ns ( $t_{OE}$ ) |                                   | 30                   | 30  | 35  | 50   |

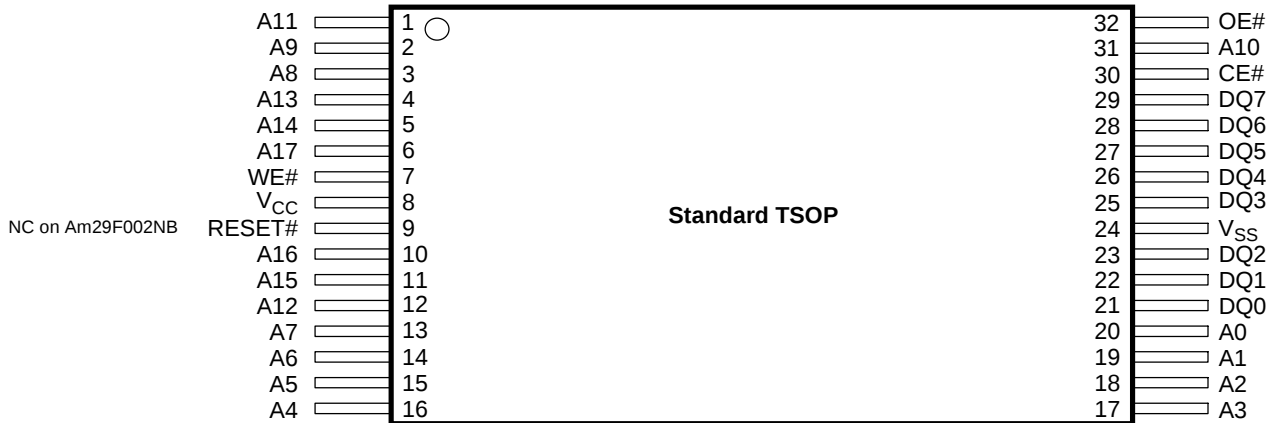
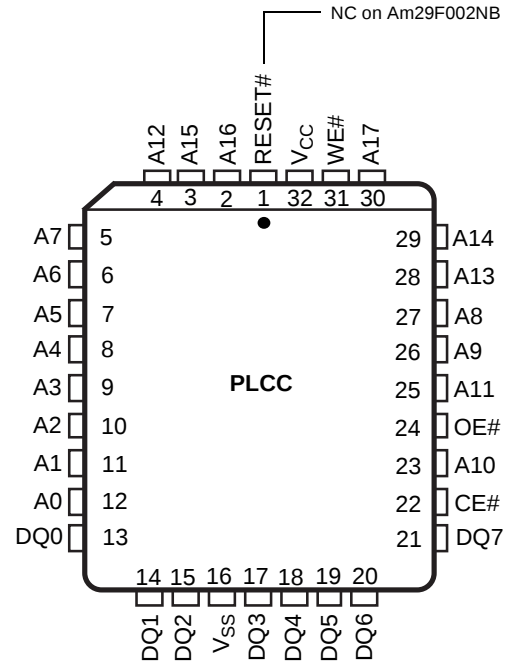
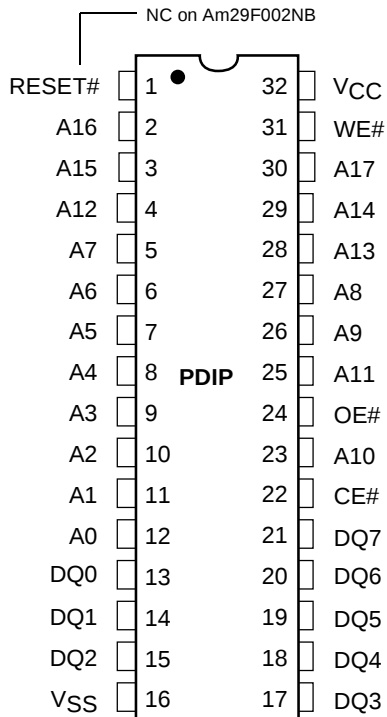
**Note:** See "AC Characteristics" for full specifications.

## BLOCK DIAGRAM



# IC BLOCK DIAGRAM & DESCRIPTION

## CONNECTION DIAGRAMS



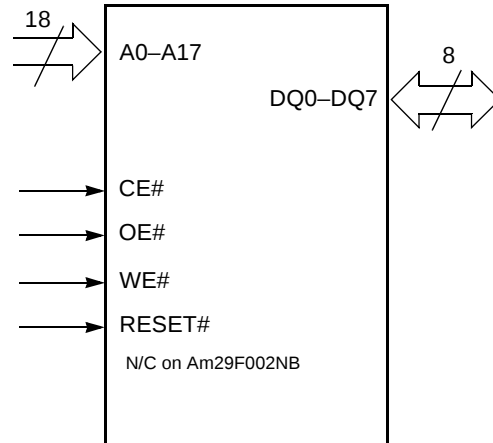
# IC BLOCK DIAGRAM & DESCRIPTION

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## PIN CONFIGURATION

|                 |   |                                                                                                                         |
|-----------------|---|-------------------------------------------------------------------------------------------------------------------------|
| A0–A17          | = | 18 addresses                                                                                                            |
| DQ0–DQ7         | = | 8 data inputs/outputs                                                                                                   |
| CE#             | = | Chip enable                                                                                                             |
| OE#             | = | Output enable                                                                                                           |
| WE#             | = | Write enable                                                                                                            |
| RESET#          | = | Hardware reset pin, active low<br>(not available on Am29F002NB)                                                         |
| V <sub>CC</sub> | = | +5.0 V single power supply<br>(see Product Selector Guide for<br>device speed ratings and voltage<br>supply tolerances) |
| V <sub>SS</sub> | = | Device ground                                                                                                           |
| NC              | = | Pin not connected internally                                                                                            |

## LOGIC SYMBOL



# IC BLOCK DIAGRAM & DESCRIPTION

## IC U206 SDRAM-HY57V65162B

### **4 Banks x 1M x 16Bit Synchronous DRAM**

#### **DESCRIPTION**

The Hyundai HY57V651620B is a 67,108,864-bit CMOS Synchronous DRAM, ideally suited for the Mobile applications which require low power consumption and extended temperature range. HY57V651620B is organized as 4banks of 1,048,576x16.

HY57V651620B is offering fully synchronous operation referenced to a positive edge of the clock. All inputs and outputs are synchronized with the rising edge of the clock input. The data paths are internally pipelined to achieve very high bandwidth. All input and output voltage levels are compatible with LVTTTL.

Programmable options include the length of pipeline (Read latency of 2 or 3), the number of consecutive read or write cycles initiated by a single control command (Burst length of 1,2,4,8 or Full page), and the burst count sequence(sequential or interleave). A burst of read or write cycles in progress can be terminated by a burst terminate command or can be interrupted and replaced by a new burst read or write command on any cycle. (This pipelined design is not restricted by a `2N` rule.)

#### **FEATURES**

- Single 3.3V  $\pm$  10% power supply
- All device pins are compatible with LVTTTL interface
- JEDEC standard 400mil 54pin TSOP-II with 0.8mm of pin pitch
- All inputs and outputs referenced to positive edge of system clock
- Data mask function by UDQM or LDQM
- Internal four banks operation
- Auto refresh and self refresh
- 4096 refresh cycles / 64ms
- Programmable Burst Length and Burst Type
  - 1, 2, 4, 8 or Full page for Sequential Burst
  - 1, 2, 4 or 8 for Interleave Burst
- Programmable  $\overline{\text{CAS}}$  Latency ; 2, 3 Clocks

#### **ORDERING INFORMATION**

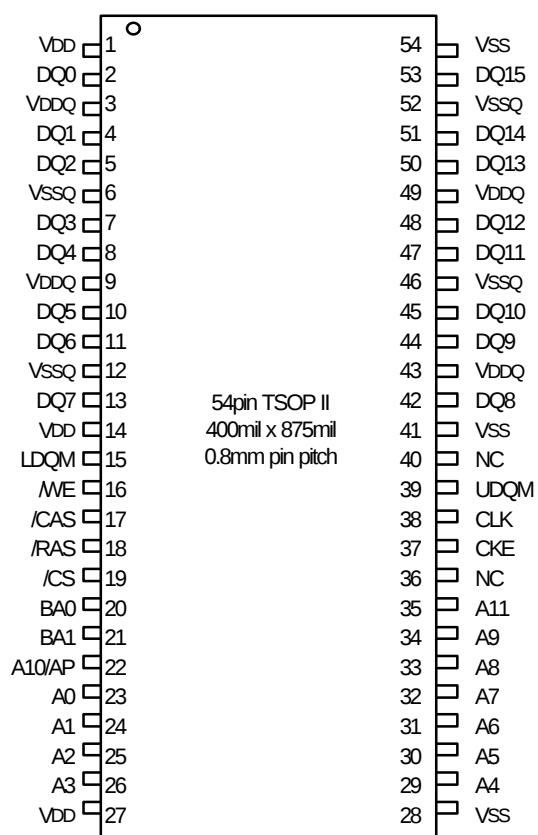
| Part No.             | Clock Frequency | Power        | Organization           | Interface | Package              |
|----------------------|-----------------|--------------|------------------------|-----------|----------------------|
| HY57V651620BTC-7I    | 143MHz          | Normal power | 4Banks x 1Mbits<br>x16 | LVTTTL    | 400mil 54pin TSOP II |
| HY57V651620BTC-75I   | 133MHz          |              |                        |           |                      |
| HY57V651620BTC-10SI  | 100MHz          |              |                        |           |                      |
| HY57V651620BLTC-7I   | 143MHz          | Lower Power  |                        |           |                      |
| HY57V651620BLTC-75I  | 133MHz          |              |                        |           |                      |
| HY57V651620BLTC-10SI | 100Mhz          |              |                        |           |                      |

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Rev. 0.4/Nov.00

# IC BLOCK DIAGRAM & DESCRIPTION

## PIN CONFIGURATION



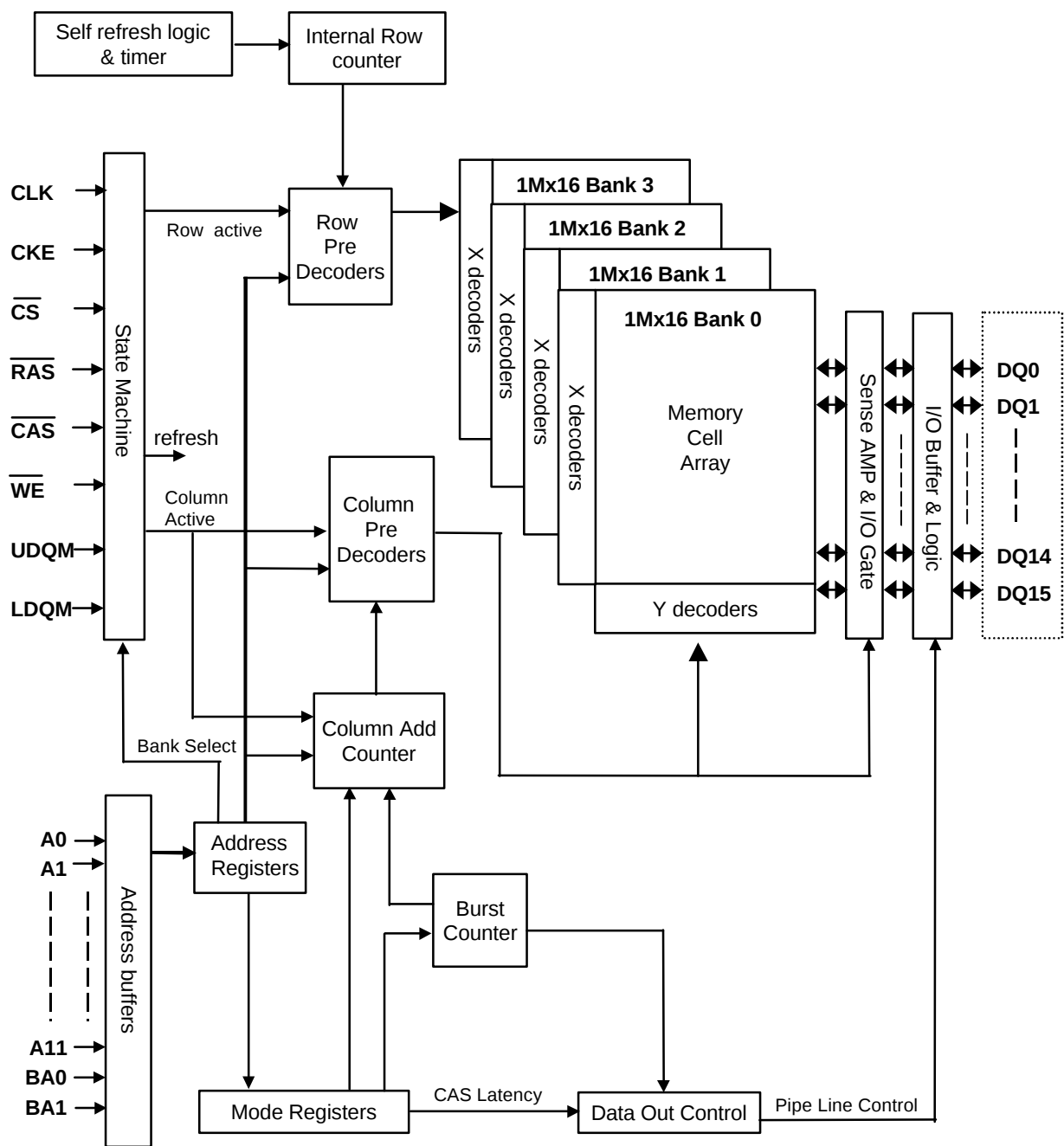
## PIN DESCRIPTION

| PIN                                                   | PIN NAME                                                      | DESCRIPTION                                                                                                                        |
|-------------------------------------------------------|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| CLK                                                   | Clock                                                         | The system clock input. All other inputs are registered to the SDRAM on the rising edge of CLK                                     |
| CKE                                                   | Clock Enable                                                  | Controls internal clock signal and when deactivated, the SDRAM will be one of the states among power down, suspend or self refresh |
| $\overline{CS}$                                       | Chip Select                                                   | Enables or disables all inputs except CLK, CKE and DQM                                                                             |
| BA0,BA1                                               | Bank Address                                                  | Selects bank to be activated during $\overline{RAS}$ activity<br>Selects bank to be read/written during CAS activity               |
| A0 ~ A11                                              | Address                                                       | Row Address : RA0 ~ RA11, Column Address : CA0 ~ CA7<br>Auto-precharge flag : A10                                                  |
| $\overline{RAS}$ , $\overline{CAS}$ , $\overline{WE}$ | Row Address Strobe,<br>Column Address Strobe,<br>Write Enable | $\overline{RAS}$ , $\overline{CAS}$ and $\overline{WE}$ define the operation<br>Refer function truth table for details             |
| LDQM, UDQM                                            | Data Input/Output Mask                                        | Controls output buffers in read mode and masks input data in write mode                                                            |
| DQ0 ~ DQ15                                            | Data Input/Output                                             | Multiplexed data input / output pin                                                                                                |
| VDD/VSS                                               | Power Supply/Ground                                           | Power supply for internal circuits and input buffers                                                                               |
| VDDQ/VSSQ                                             | Data Output Power/Ground                                      | Power supply for output buffers                                                                                                    |
| NC                                                    | No Connection                                                 | No connection                                                                                                                      |

# IC BLOCK DIAGRAM & DESCRIPTION

## FUNCTIONAL BLOCK DIAGRAM

1Mbit x 4banks x 16 I/O Synchronous DRAM



# IC BLOCK DIAGRAM & DESCRIPTION

## ABSOLUTE MAXIMUM RATINGS

| Parameter                          | Symbol    | Rating     | Unit     |
|------------------------------------|-----------|------------|----------|
| Ambient Temperature                | TA        | -40 ~ 85   | °C       |
| Storage Temperature                | TSTG      | -55 ~ 125  | °C       |
| Voltage on Any Pin relative to VSS | VIN, VOUT | -1.0 ~ 4.6 | V        |
| Voltage on VDD relative to VSS     | VDD, VDDQ | -1.0 ~ 4.6 | V        |
| Short Circuit Output Current       | IOS       | 50         | mA       |
| Power Dissipation                  | PD        | 1          | W        |
| Soldering Temperature · Time       | TSOLDER   | 260 · 10   | °C · Sec |

**Note :** Operation at above absolute maximum rating can adversely affect device reliability

## DC OPERATING CONDITION (TA= -40 to 85°C)

| Parameter            | Symbol    | Min        | Typ. | Max        | Unit | Note |
|----------------------|-----------|------------|------|------------|------|------|
| Power Supply Voltage | VDD, VDDQ | 3.0        | 3.3  | 3.6        | V    | 1    |
| Input High Voltage   | VIH       | 2.0        | 3.0  | VDDQ + 2.0 | V    | 1,2  |
| Input Low Voltage    | VIL       | VSSQ - 2.0 | 0    | 0.8        | V    | 1,3  |

**Note :**

- 1.All voltages are referenced to VSS = 0V
- 2.VIH (max) is acceptable 4.7V AC pulse width with ≤3ns of duration
- 3.VIL (min) is acceptable -2.0V AC pulse width with ≤3ns of duration

## AC OPERATING CONDITION (TA= -40 to 85°C, VDD=3.3V ± 0.3V, VSS=0V)

| Parameter                                           | Symbol    | Value   | Unit | Note |
|-----------------------------------------------------|-----------|---------|------|------|
| AC Input High / Low Level Voltage                   | VIH / VIL | 2.4/0.4 | V    |      |
| Input Timing Measurement Reference Level Voltage    | Vtrip     | 1.4     | V    |      |
| Input Rise / Fall Time                              | tR / tF   | 1       | ns   |      |
| Output Timing Measurement Reference Level           | Voutref   | 1.4     | V    |      |
| Output Load Capacitance for Access Time Measurement | CL        | 50      | pF   | 1    |

**Note :**

1. Output load to measure access time is equivalent to two TTL gates and one capacitor (50pF)  
For details, refer to AC/DC output circuit

# IC BLOCK DIAGRAM & DESCRIPTION

## IC WS7805

## POSITIVE-VOLTAGE REGULATORS

- 3-Terminal Regulators
- Output Current Up to 1.5 A
- No External Components
- Internal Thermal Overload Protection
- High Power Dissipation Capability
- Internal Shot-Circuit Current Limiting
- Output Transistor Safe-Area

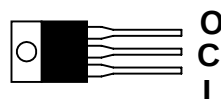
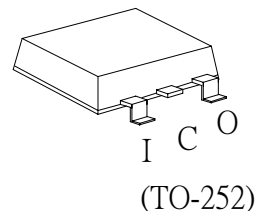
### Compensation

## DESCRIPTION

This series of fixed-voltage monolithic integrated-circuit voltage regulators designed for a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. Each of these regulators can deliver up to 1.5 amperes of output current. The internal current limiting and thermal shutdown features of these regulators make them essentially immune to overload.

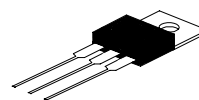
### TO-252

#### WS7805DP



### TO-220

#### WS7805CV



## ABSOLUTE MAXIMUM RATINGS OVER OPERATING TEMPERATURE RANGE (UNLESS OTHERWISE NOTE)

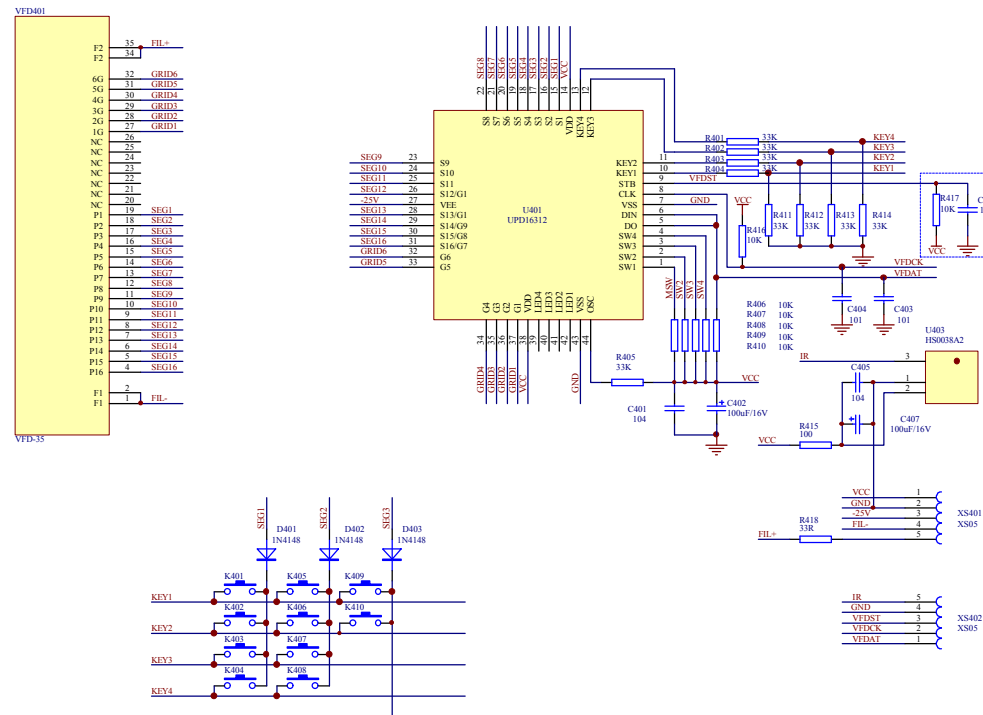
| WS7805                                                    | PARAMETER  | UNIT |
|-----------------------------------------------------------|------------|------|
| Input voltage, $V_i$                                      | 35         | V    |
| Continuous total dissipation at 25°C free-air temperature | 2          | W    |
| Lead temperature 1.6mm (1/16 inch) from case 10 seconds   | 260        | °C   |
| Storage temperature range, $T_{stg}$                      | -65 to 150 | °C   |

## RECOMMENDED OPERATING CONDITIONS

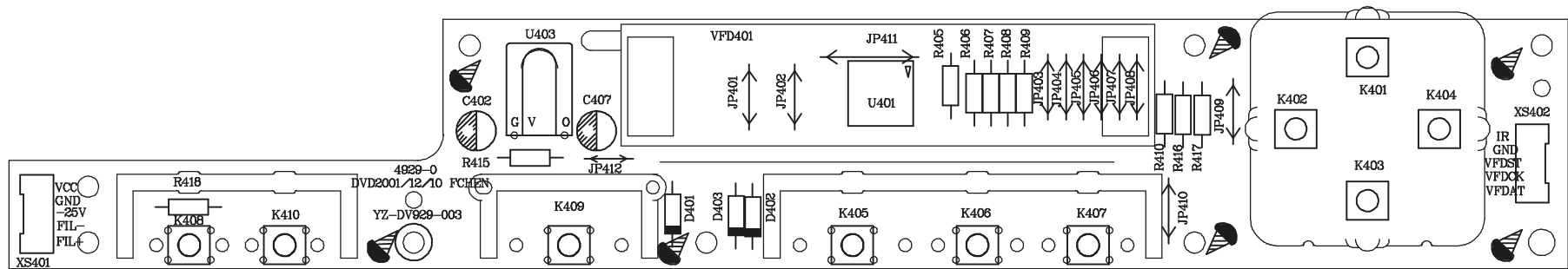
|                                               | MIN | MAX | UNIT |
|-----------------------------------------------|-----|-----|------|
| Input voltage, $V_i$                          | 7   | 25  | V    |
| Output current, $I_o$                         |     | 1.5 | A    |
| Operating virtual junction temperature, $T_j$ | 0   | 70  | °C   |

# SCHEMATIC & P.C.B WIRING DIAGRAM

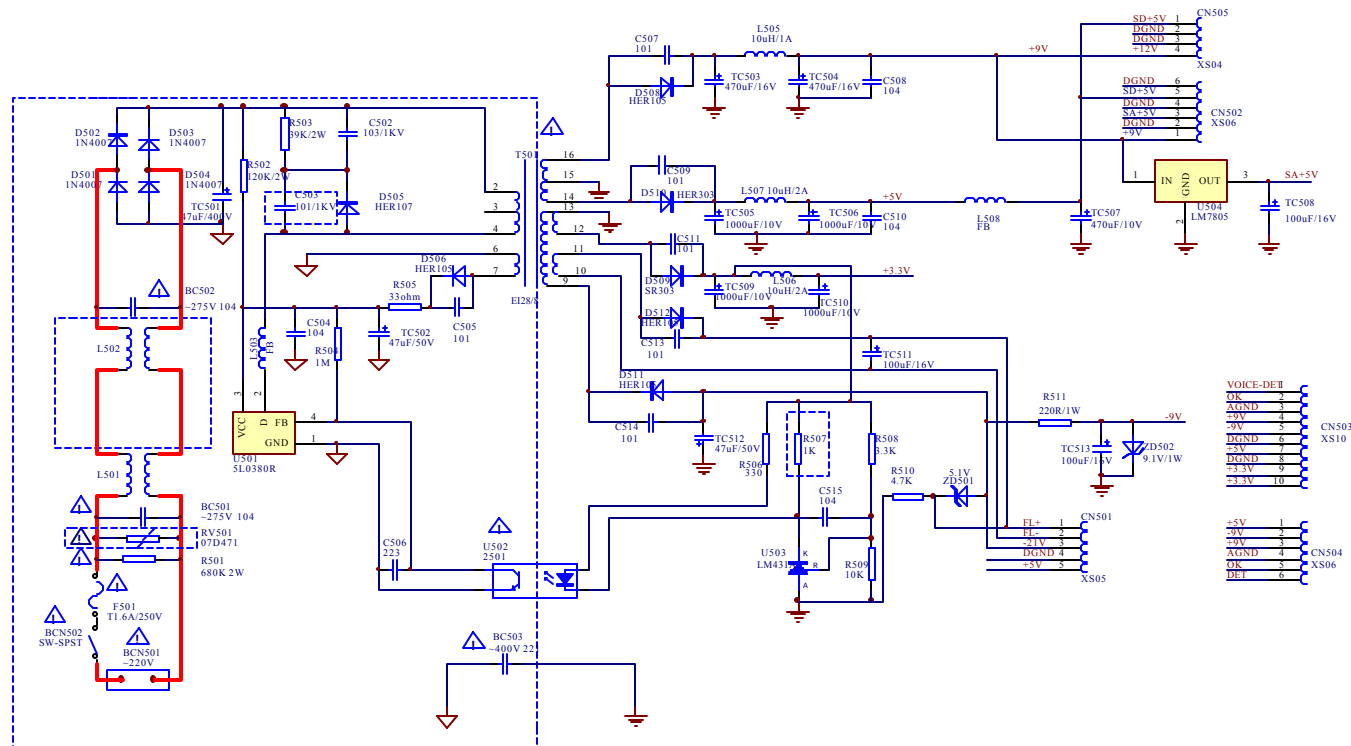
## FRONT SCHEMATIC DIAGRAM



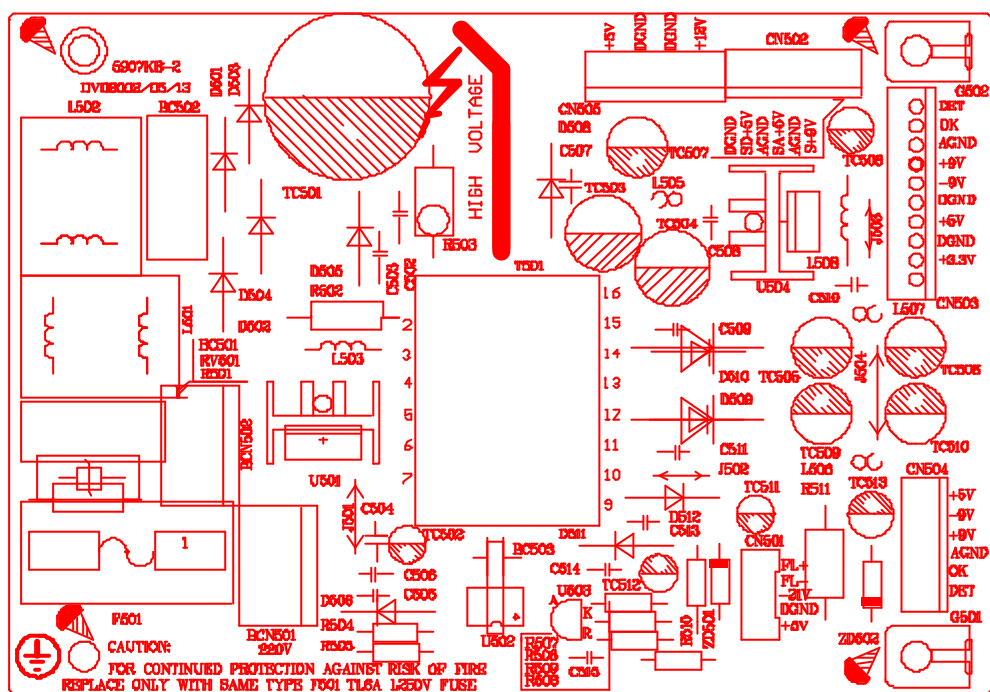
# FRONT SCHEMATIC DIAGRAM



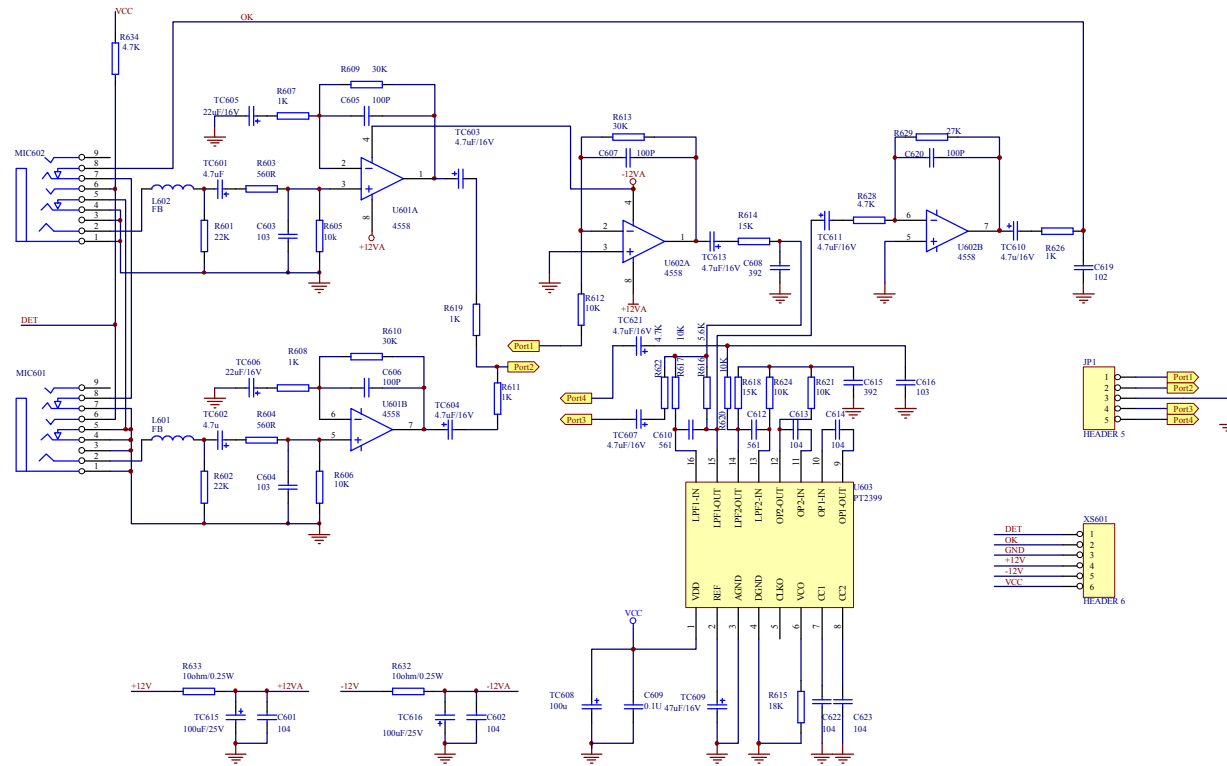
# POWER BOARD SCHEMATIC DIAGRAM



## POWER BOARD SCHEMATIC DIAGRAM



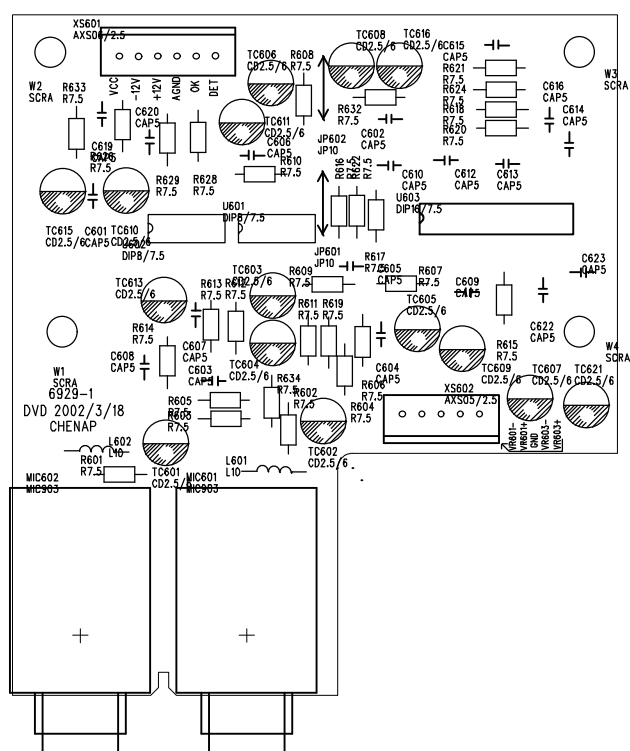
## OK SCHEMATIC DIAGRAM

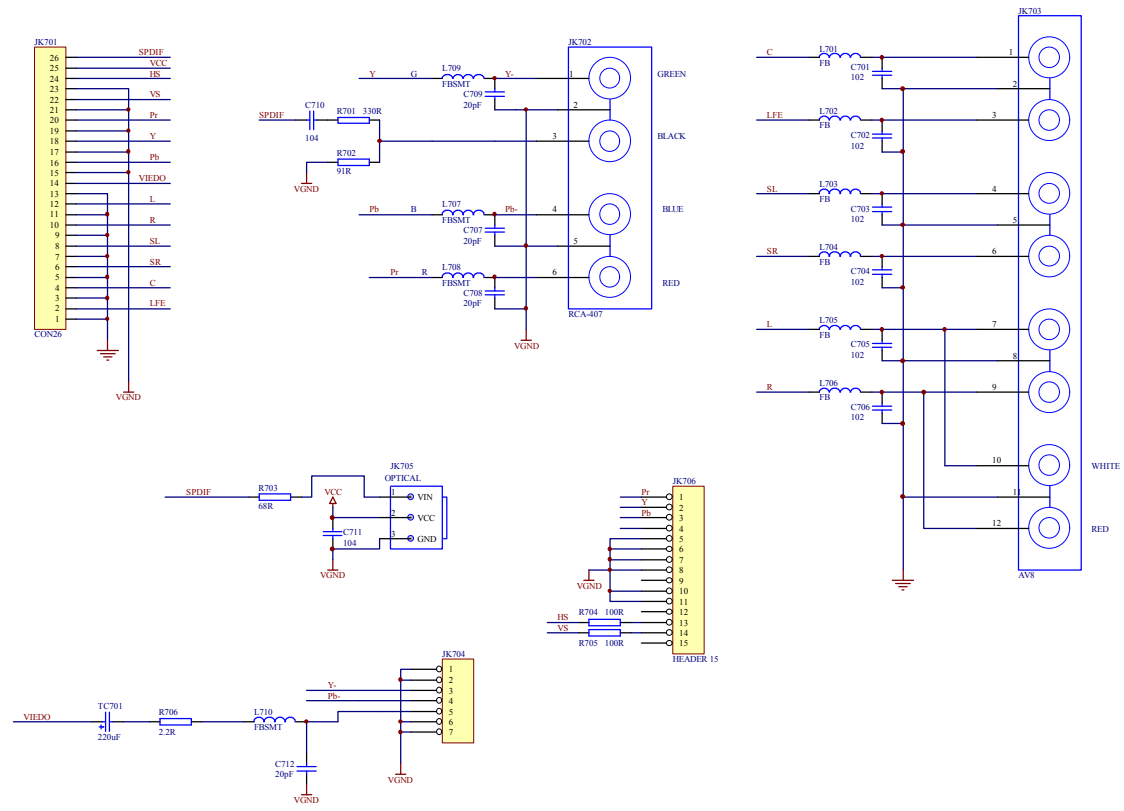


OK. SCHEMATIC DIAGRAM

NO: 6929-1.PCB

**silk top**

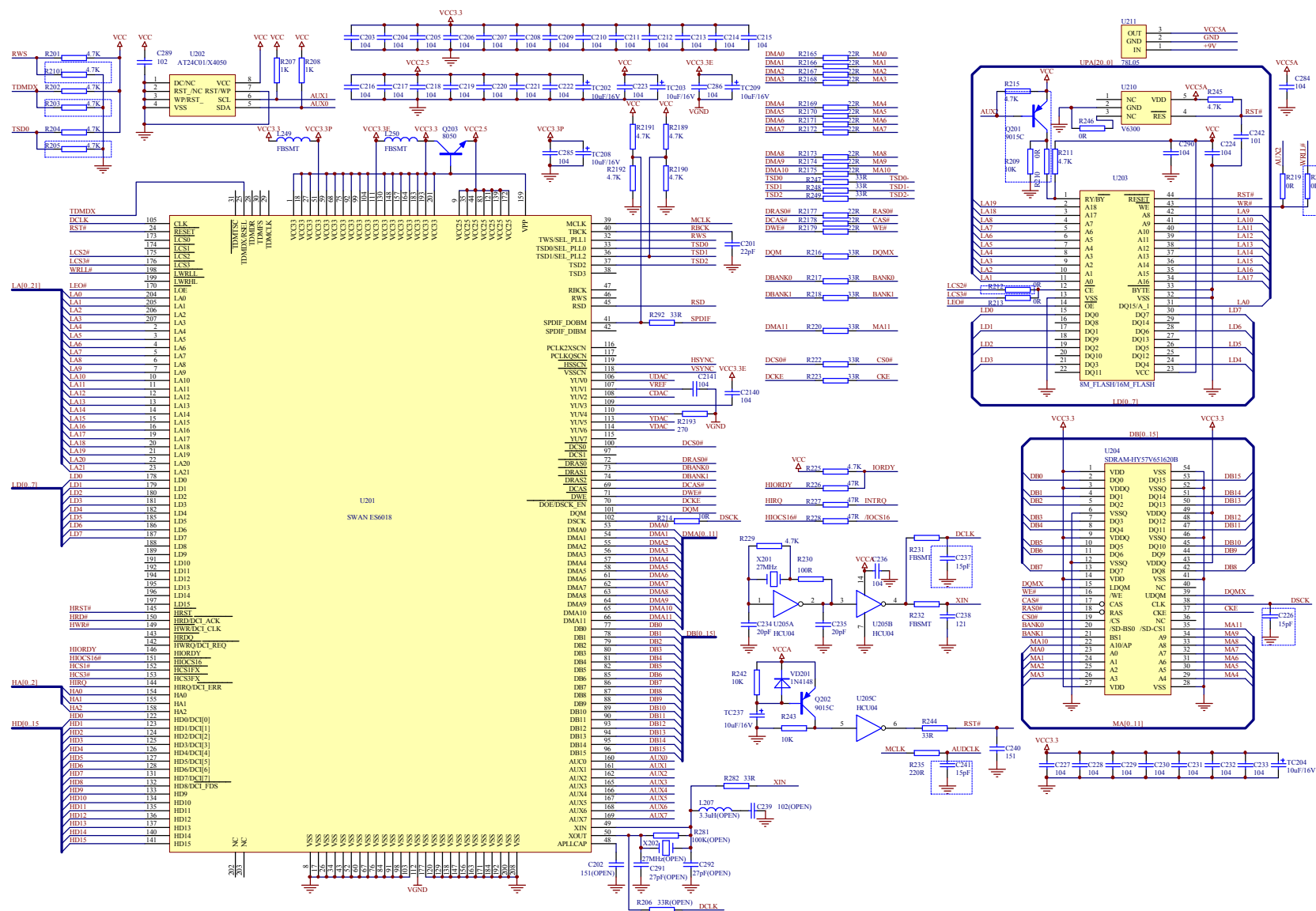




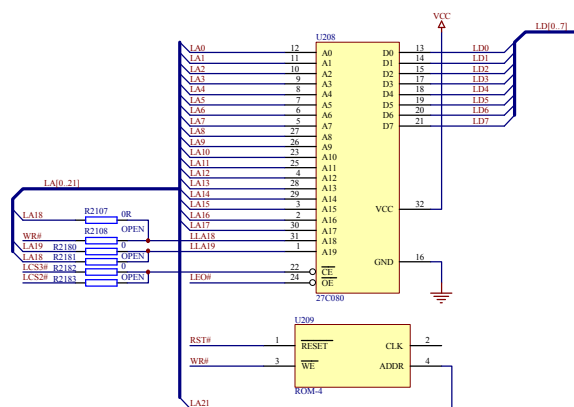
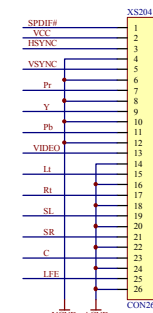
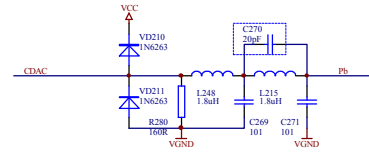
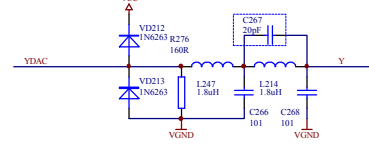
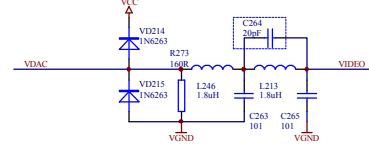
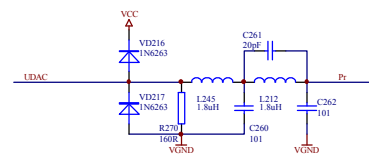
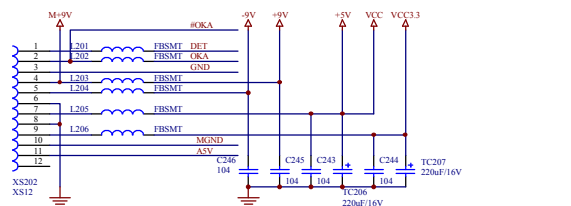
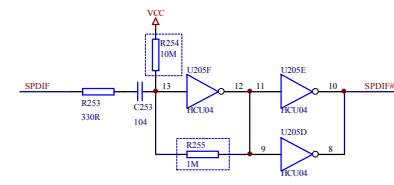
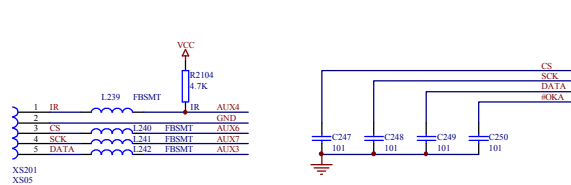
**silk top**



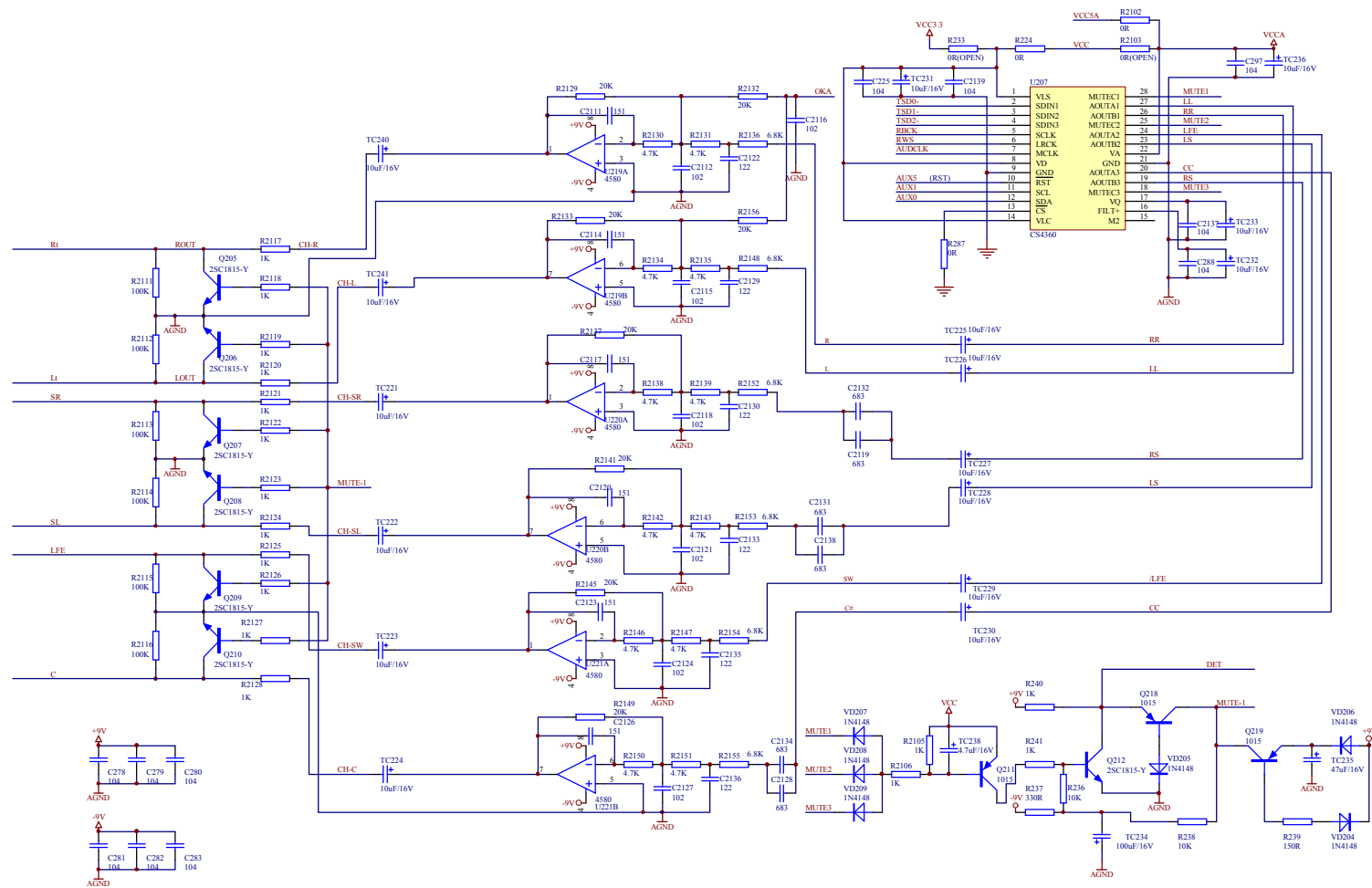
### MIAN SCHEMATIC DIAGRAM



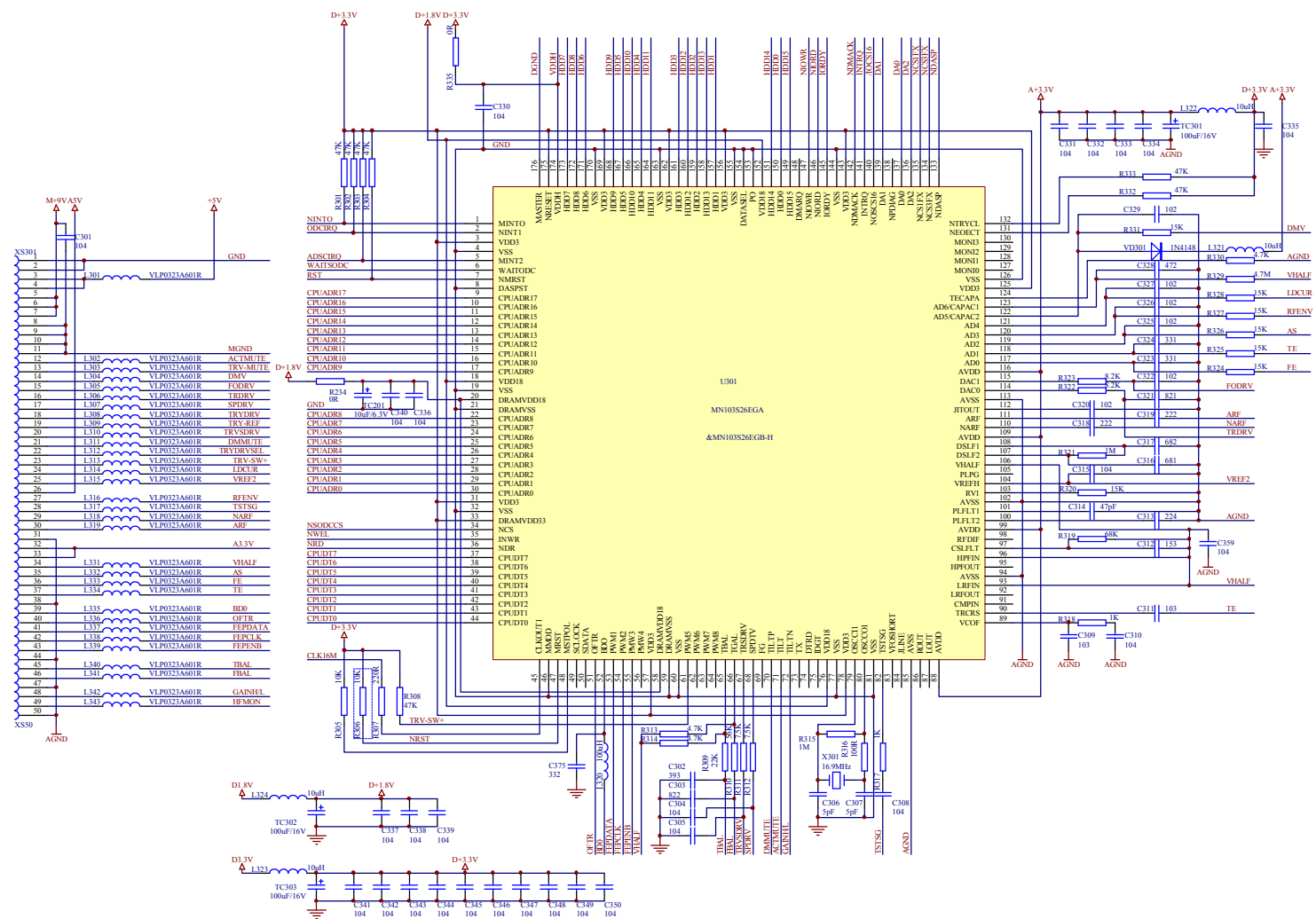
# MIAN SCHEMATIC DIAGRAM



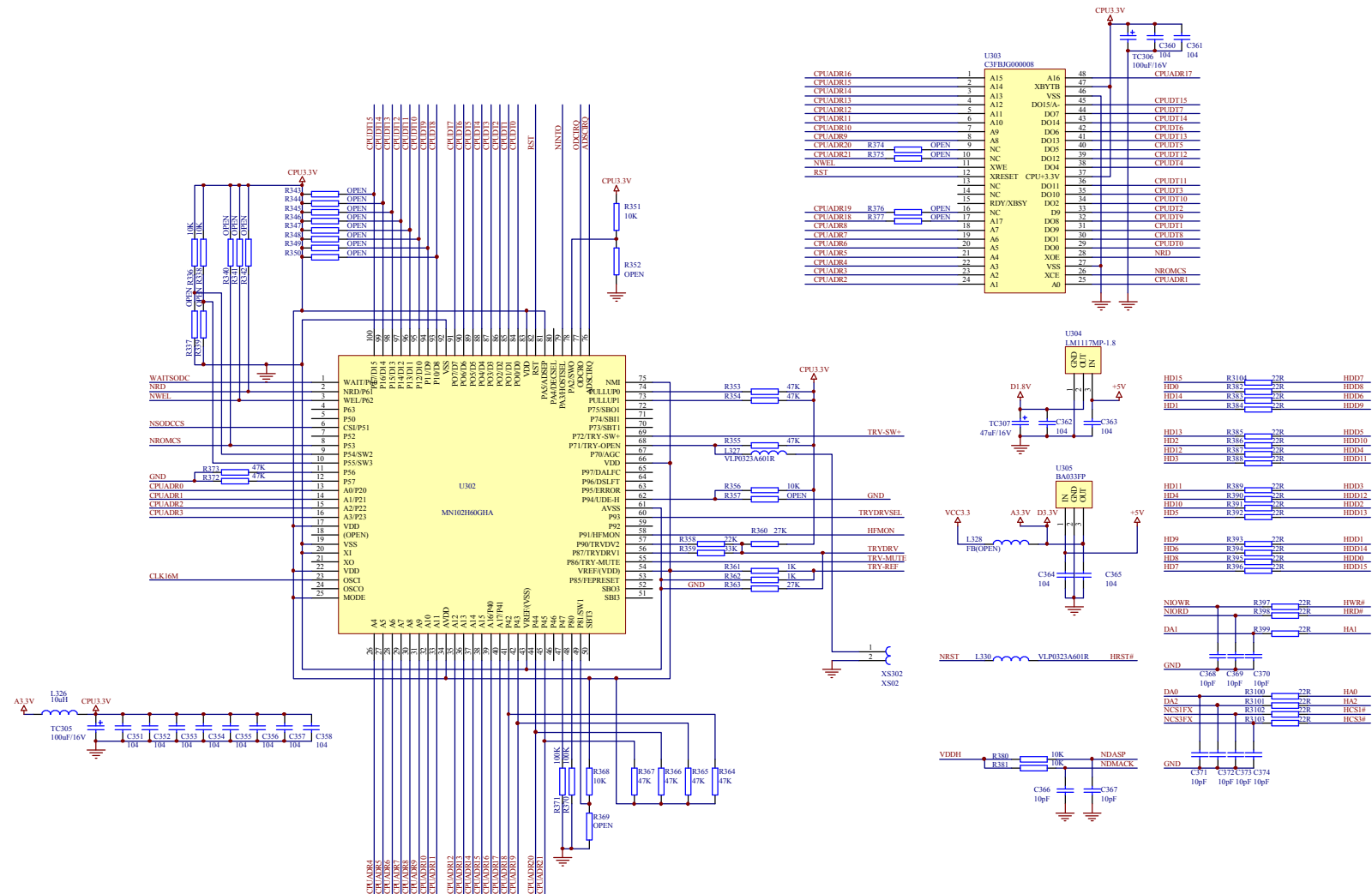
# MIAN SCHEMATIC DIAGRAM

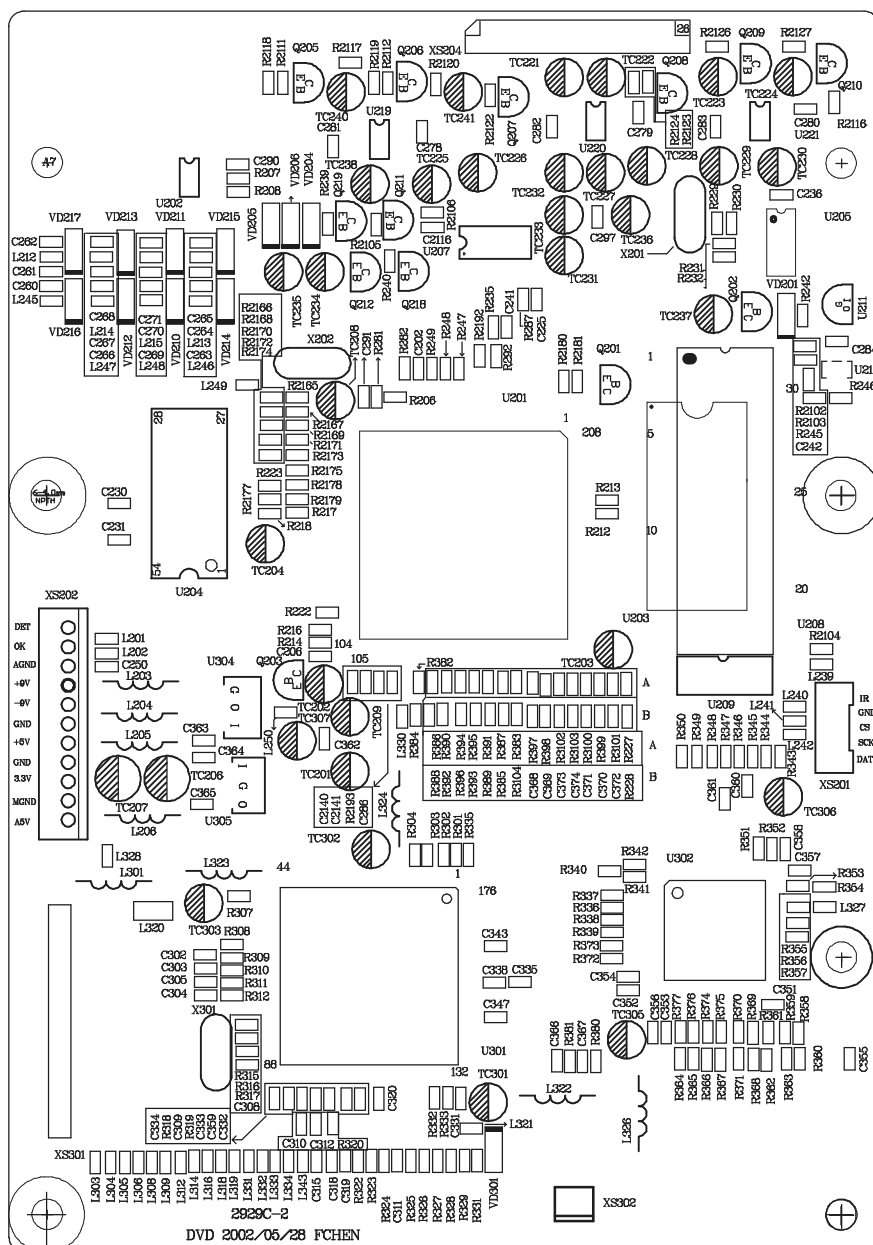


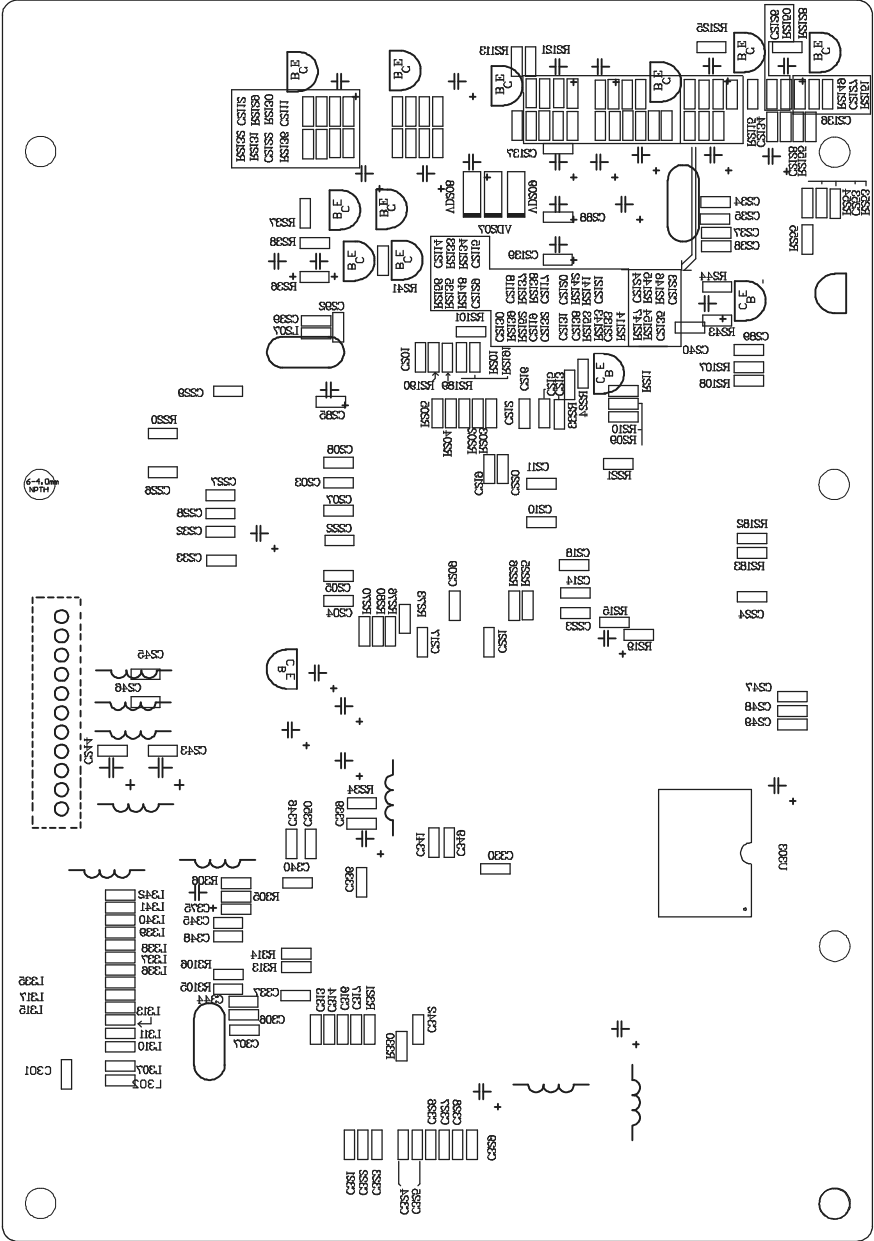
### MIAN SCHEMATIC DIAGRAM



# MIAN SCHEMATIC DIAGRAM







**BBK931S(RU) MATERIAL LIST**
**1. DECODE BOARD**

| NO |  | MATERIAL      | SPECIFICATIONS | quantity | location specification                                                                                                                 |
|----|--|---------------|----------------|----------|----------------------------------------------------------------------------------------------------------------------------------------|
| 1  |  | CHIP RESISTOR | 1/16W 0Ω ±5%   | 19       | R213,R219,R287,R335,R2102,R2107,R2180,R2182,C2119,C2128,C2131,L245,L246,L247,L248,L320,VD204,R224,R234                                 |
| 2  |  | CHIP RESISTOR | 1/16W 10Ω ±5%  | 1        | R214                                                                                                                                   |
| 3  |  | CHIP RESISTOR | 1/16W 22Ω ±5%  | 37       | R382~R399,R2165~R2175,R2177~R2179,R3100~R3104                                                                                          |
| 4  |  | CHIP RESISTOR | 1/16W 33Ω ±5%  | 10       | R216~R218,R220,R222,R223,R247~R249,R292                                                                                                |
| 5  |  | CHIP RESISTOR | 1/16W 47Ω ±5%  | 3        | R226,R227,R228                                                                                                                         |
| 6  |  | CHIP RESISTOR | 1/16W 75Ω ±5%  | 4        | R270,R273,R276,R280                                                                                                                    |
| 7  |  | CHIP RESISTOR | 1/16W 100Ω ±5% | 1        | R316                                                                                                                                   |
| 8  |  | CHIP RESISTOR | 1/16W 150Ω ±5% | 1        | R239                                                                                                                                   |
| 9  |  | CHIP RESISTOR | 1/16W 220Ω ±5% | 2        | R235,R307                                                                                                                              |
| 10 |  | CHIP RESISTOR | 1/16W 270Ω ±5% | 1        | R2193                                                                                                                                  |
| 11 |  | CHIP RESISTOR | 1/16W 330Ω ±5% | 2        | R237,R253                                                                                                                              |
| 12 |  | CHIP RESISTOR | 1/16W 1K ±5%   | 22       | R207,R208,R240,R241,R317,R318,R361,R362,R2105,R2106,R2117~R2128                                                                        |
| 13 |  | CHIP RESISTOR | 1/16W 4.7K ±5% | 24       | R201,R202,R204,R211,R215,R225,R313,R314,R330,R2104,R2130,R2131,R2134,R2135,R2138,R2139,R2142,R2143,R2146,R2147,R2150,R2151,R2189,R2192 |
| 14 |  | CHIP RESISTOR | 1/16W 6.8K ±5% | 6        | R2136,R2148,R2152,R2153,R2154,R2155                                                                                                    |
| 15 |  | CHIP RESISTOR | 1/16W 7.5K ±5% | 2        | R311,R312                                                                                                                              |
| 16 |  | CHIP RESISTOR | 1/16W 8.2K ±5% | 2        | R322,R323                                                                                                                              |
| 17 |  | CHIP RESISTOR | 1/16W 10K ±5%  | 11       | R236,R238,R305,R306,R336,R338,R351,R357,R368,R380,R381                                                                                 |
| 18 |  | CHIP RESISTOR | 1/16W 15K ±5%  | 7        | R320,R324~R328,R331                                                                                                                    |
| 19 |  | CHIP RESISTOR | 1/16W 20K ±5%  | 8        | R2129,R2132,R2133,R2137,R2141,R2145,R2149,R2156                                                                                        |
| 20 |  | CHIP RESISTOR | 1/16W 22K ±5%  | 2        | R309,R358                                                                                                                              |
| 21 |  | CHIP RESISTOR | 1/16W 27K ±5%  | 2        | R360,R363                                                                                                                              |
| 22 |  | CHIP RESISTOR | 1/16W 33K ±5%  | 1        | R359                                                                                                                                   |
| 23 |  | CHIP RESISTOR | 1/16W 47K ±5%  | 16       | R301~R304,R308,R332,R333,R353~R355,R364~R367,R372,R373                                                                                 |
| 24 |  | CHIP RESISTOR | 1/16W 56K ±5%  | 1        | R310                                                                                                                                   |
| 25 |  | CHIP RESISTOR | 1/16W 68K ±5%  | 1        | R319                                                                                                                                   |
| 26 |  | CHIP RESISTOR | 1/16W 100K ±5% | 9        | R281,R370,R371,R2111~R2116                                                                                                             |
| 27 |  | CHIP RESISTOR | 1/16W 1MΩ ±5%  | 2        | R315,R321                                                                                                                              |

|    |      |                |                                         |    |                                                                                                                                  |
|----|------|----------------|-----------------------------------------|----|----------------------------------------------------------------------------------------------------------------------------------|
| 28 |      | CHIP RESISTOR  | 1/16W 4.7M $\Omega$ $\pm$ 5%            | 1  | R329                                                                                                                             |
| 29 |      | CD             | CD11 50V2.2U $\pm$ 20%5 $\times$ 11 2   | 2  | TC232,TC233                                                                                                                      |
| 30 |      | CD             | CD11 16V10U $\pm$ 20%5 $\times$ 11 2    | 15 | TC208,TC209,TC221~TC230,TC240,TC241,TC201                                                                                        |
| 31 |      | CD             | CD11C 16V47U $\pm$ 20%5 $\times$ 7 2    | 13 | TC202~TC204,TC231,TC234~TC236,TC301~TC303,TC305~TC307                                                                            |
| 32 |      | CD             | CD11 16V220U $\pm$ 20%6 $\times$ 12 2.5 | 2  | TC206,TC207                                                                                                                      |
| 33 |      | CHIP CAPACITOR | 50V 10P $\pm$ 5% NPO 0603               | 9  | C366~C374                                                                                                                        |
| 34 |      | CHIP CAPACITOR | 50V 22P $\pm$ 5% NPO 0603               | 1  | C201                                                                                                                             |
| 35 |      | CHIP CAPACITOR | 50V 27P $\pm$ 5% NPO 0603               | 3  | C292,C306,C307                                                                                                                   |
| 36 |      | CHIP CAPACITOR | 50V 47P $\pm$ 5% NPO 0603               | 2  | C291,C314                                                                                                                        |
| 37 |      | CHIP CAPACITOR | 50V 101 $\pm$ 5% NPO 0603               | 14 | C260,C262,C263,C265,C266,C268,C269,C271,C2111,C2114,C2117,C2120,C2123,C2126                                                      |
| 38 |      | CHIP CAPACITOR | 50V 331 $\pm$ 5% NPO 0603               | 2  | C323,C324                                                                                                                        |
| 39 |      | CHIP CAPACITOR | 50V 681 $\pm$ 5% NPO 0603               | 1  | C316                                                                                                                             |
|    | 39.1 | CHIP CAPACITOR | 50V 681 $\pm$ 10% 0603                  | 1  | C316                                                                                                                             |
| 40 |      | CHIP CAPACITOR | 50V 821 $\pm$ 10% 0603                  | 1  | C321                                                                                                                             |
| 41 |      | CHIP CAPACITOR | 50V 102 $\pm$ 10% 0603                  | 14 | C239,C320,C322,C325,C326,C327,C329,C2112,C2115,C2116,C2118,C2121,C2124,C2127                                                     |
| 42 |      | CHIP CAPACITOR | 50V 122 $\pm$ 10% 0603                  | 6  | C2122,C2129,C2130,C2133,C2135,C2136                                                                                              |
| 43 |      | CHIP CAPACITOR | 50V 222 $\pm$ 10% 0603                  | 2  | C318,C319                                                                                                                        |
| 44 |      | CHIP CAPACITOR | 50V 332 $\pm$ 10% 0603                  | 1  | C375                                                                                                                             |
| 45 |      | CHIP CAPACITOR | 50V 472 $\pm$ 10% 0603                  | 1  | C328                                                                                                                             |
| 46 |      | CHIP CAPACITOR | 50V 682 $\pm$ 10% 0603                  | 1  | C317                                                                                                                             |
| 47 |      | CHIP CAPACITOR | 50V 822 $\pm$ 10% 0603                  | 1  | C303                                                                                                                             |
| 48 |      | CHIP CAPACITOR | 50V 103 $\pm$ 10% 0603                  | 2  | C309,C311                                                                                                                        |
| 49 |      | CHIP CAPACITOR | 50V 153 $\pm$ 10% 0603                  | 1  | C312                                                                                                                             |
| 50 |      | CHIP CAPACITOR | 16V 393 $\pm$ 10% 0603                  | 1  | C302                                                                                                                             |
| 51 |      | CHIP CAPACITOR | 50V 104 +80%-20% 0603                   | 95 | C203~C225,C227~C233,C236,C243~C246,C253,C278~C286,C288~C290,C297,C301,C304,C305,C308,C310,C315,C330~C365,C2137,C2139,C2140,C2141 |
|    | 51.1 | CHIP CAPACITOR | 25V 104 +80%-20% 0603                   | 95 | C203~C225,C227~C233,C236,C243~C246,C253,C278~C286,C288~C290,C297,C301,C304,C305,C308,C310,C315,C330~C365,C2137,C2139,C2140,C2141 |
| 52 |      | CHIP CAPACITOR | 16V 224 +80%-20% 0603                   | 1  | C313                                                                                                                             |
| 53 |      | INDUCTANC      | 1.8UH $\pm$ 10% 1608                    | 4  | L212~L215                                                                                                                        |
| 54 |      | INDUCTANC      | 3.3uH $\pm$ 10% 1608                    | 1  | L207                                                                                                                             |
| 55 |      | INDUCTANC      | RH354708                                | 9  | L203~L206,L301,L322~L324,L326                                                                                                    |

|    |      |                           |                                        |    |                                                                      |
|----|------|---------------------------|----------------------------------------|----|----------------------------------------------------------------------|
| 56 |      | CHIP<br>MAGNETIC<br>BEADS | FCM1608K-221T05                        | 43 | L201,L202,L239~L242,L249,L250,L302~L319,L321,L327,<br>L330~L343,R206 |
| 57 |      | CHIP DIODE                | 1N4148                                 | 14 | VD205~VD217,VD301                                                    |
|    | 57.1 | CHIP DIODE                | LS4148                                 | 14 | VD205~VD217,VD301                                                    |
|    | 57.2 | CHIP DIODE                | LL4148                                 | 14 | VD205~VD217,VD301                                                    |
| 58 |      | TRIODE                    | S8050D                                 | 1  | Q203                                                                 |
| 59 |      | TRIODE                    | C1815Y                                 | 7  | Q205~Q210,Q212                                                       |
| 60 |      | TRIODE                    | 2SA1015                                | 3  | Q211,Q218,Q219                                                       |
| 61 |      | IC                        | HA178L05PA TO-92M                      | 1  | U211                                                                 |
| 62 |      | IC                        | NJM4558M SOP                           | 3  | U219,U220,U221                                                       |
|    | 62.1 | IC                        | 4580 SOP                               | 3  | U219,U220,U221                                                       |
|    | 62.2 | IC                        | 4558 SOP                               | 3  | U219,U220,U221                                                       |
| 63 |      | IC                        | MM74HCU04M SOP                         | 1  | U205                                                                 |
|    | 63.1 | IC                        | HCU04 SOP                              | 1  | U205                                                                 |
| 64 |      | IC                        | MT48LC4M16A2-75C SOP                   | 1  | U204                                                                 |
|    | 64.1 | IC                        | D4564163G5-A80 SOP                     | 1  | U204                                                                 |
|    | 64.2 | IC                        | HY57V641620HGT-H TSOP                  | 1  | U204                                                                 |
| 65 |      | IC                        | CS4360 SSOP                            | 1  | U207                                                                 |
| 66 |      | IC                        | AT24C01A SOP                           | 1  | U202                                                                 |
| 67 |      | IC                        | ES6018F QFP                            | 1  | U201                                                                 |
| 68 |      | IC                        | MN102H60GHC LQFP                       | 1  | U302                                                                 |
| 69 |      | IC                        | MN103S26EGA LQFP                       | 1  | U301                                                                 |
| 70 |      | IC                        | BA033FP TO252-3                        | 1  | U305                                                                 |
| 71 |      | IC                        | LM1117MP-1.8 SOT-223                   | 1  | U304                                                                 |
| 72 |      | IC                        | V6300F SOT-23 5L                       | 1  | U210                                                                 |
| 73 |      | SOFTWARE<br>FLASH         | ROM931S-0A(8M)                         | 1  |                                                                      |
| 74 |      | SOFTWARE<br>FLASH         | 220 (2M)                               | 1  |                                                                      |
| 75 |      | CRYSTAL<br>OSCILLATO      | 16.9344MHZ 49-U                        | 1  | X301                                                                 |
| 76 |      | CRYSTAL<br>OSCILLATO      | 27.00MHz 49-U                          | 1  | X202                                                                 |
| 77 |      | PCB                       | 2929C-2                                | 1  |                                                                      |
| 78 |      | SOCKET                    | 5 2.0mm                                | 1  | XS201                                                                |
| 79 |      | SOCKET                    | 2 2.0mm                                | 1  | XS302                                                                |
| 80 |      | SOCKET                    | 11 2.5mm                               | 1  | XS202                                                                |
| 81 |      | CABLE<br>SOCKET           | 13 PINS 1.0mm DOUBLE<br>LINES STRAIGHT | 1  | XS204                                                                |
| 82 |      | CABLE<br>SOCKET           | 50 PINS 0.5mm CHIP<br>WITHOUT BUCKLE   | 1  | XS301                                                                |

## 2. POWER BOARD

| NO | MATERIAL                    | SPECIFICATIONS        | quantity | location specification |
|----|-----------------------------|-----------------------|----------|------------------------|
| 1  | CARBON-<br>FILM<br>RESISTOR | 1/4W33Ω±5% SHAPED 10  | 1        | R505                   |
| 2  | CARBON-<br>FILM<br>RESISTOR | 1/4W330Ω±5% SHAPED 10 | 1        | R506                   |
| 3  | CARBON-<br>FILM<br>RESISTOR | 1/4W10K±5% SHAPED 10  | 1        | R507                   |
| 4  | CARBON-<br>FILM<br>RESISTOR | 1/4W4.7K±5% SHAPED 10 | 1        | R510                   |

|    |      |                           |                                                |   |                               |
|----|------|---------------------------|------------------------------------------------|---|-------------------------------|
| 5  |      | CARBON-FILM RESISTOR      | 1/4W1M $\Omega$ $\pm$ 5% SHAPED 10             | 1 | R504                          |
| 6  |      | METAL FILM RESISTOR       | 1/4W4.7K $\pm$ 1%                              | 1 | R508                          |
| 7  |      | METAL FILM RESISTOR       | 1/4W12K $\pm$ 1% SHAPED 10                     | 1 | R509                          |
| 8  |      | METAL OXIDE FILM RESISTOR | 1W330 $\Omega$ $\pm$ 5% R-SHAPED 15 $\times$ 8 | 1 | R511                          |
| 9  |      | METAL OXIDE FILM RESISTOR | 2W39K $\pm$ 5% SHAPED 15 $\times$ 9            | 1 | R503                          |
| 10 |      | METAL OXIDE FILM RESISTOR | 2W120K $\pm$ 5% SHAPED 15                      | 1 | R502                          |
| 11 |      | HIGH VOLTAGE RESISTOR     | 1/2W680K $\pm$ 5%                              | 1 | R501                          |
| 12 |      | PORCELAIN CAPACITOR       | 50V 100P $\pm$ 10% 5mm                         | 6 | C505,C507,C509,C511,C513,C514 |
| 13 |      | PORCELAIN CAPACITOR       | 50V 104 $\pm$ 20% 5mm                          | 4 | C504,C508,C510,C515           |
| 14 |      | PORCELAIN CAPACITOR       | 1000V 101 +80%-20% 7.5mm                       | 1 | C503                          |
|    | 14.1 | PORCELAIN CAPACITOR       | 1000V 101 $\pm$ 10% 7.5mm                      | 1 | C503                          |
| 15 |      | PORCELAIN CAPACITOR       | 1000V 103 +80%-20% 7.5mm                       | 1 | C502                          |
| 16 |      | CERAMIC CAPACITOR         | CT81 400V 221 $\pm$ 20% 10mm                   | 1 | BC503                         |
|    | 16.1 | CERAMIC CAPACITOR         | CT81 400V221 $\pm$ 10% 10mm                    | 1 | BC503                         |
| 17 |      | TERYLENE CAPACITOR        | 100V 223 $\pm$ 10% 5mm                         | 1 | C506                          |
| 18 |      | TERYLENE CAPACITOR        | 275V 104 $\pm$ 20% 15mm                        | 1 | BC501                         |
|    | 18.1 | TERYLENE CAPACITOR        | 275V 104 $\pm$ 10% 15mm                        | 1 | BC501                         |
| 19 |      | CD                        | GZ16V100U $\pm$ 20%6 $\times$ 12 2.5           | 3 | TC508,TC511,TC513             |
|    | 19.1 | CD                        | CD11 16V100U $\pm$ 20%6 $\times$ 12 2.5        | 3 | TC508,TC511,TC513             |
|    | 19.2 | CD                        | CD110 16V100U $\pm$ 20%6 $\times$ 12 2.5       | 3 | TC508,TC511,TC513             |
|    | 19.3 | CD                        | CD11C 16V100U+20%-15%6 $\times$ 7 2.5          | 3 | TC508,TC511,TC513             |
|    | 19.4 | CD                        | CD11C 16V100U $\pm$ 20%6 $\times$ 7 2.5        | 3 | TC508,TC511,TC513             |
| 20 |      | CD                        | CD11 16V470U $\pm$ 20%8 $\times$ 123.5         | 2 | TC503,TC504                   |
| 21 |      | CD                        | CD11 50V47U $\pm$ 20%6 $\times$ 12 2.5         | 2 | TC502,TC512                   |
| 22 |      | CD                        | CD11 10V1000U $\pm$ 20%8 $\times$ 16 3.5       | 4 | TC505,TC506,TC509,TC510       |
|    | 22.1 | CD                        | CD11 10V1000U $\pm$ 20%8 $\times$ 14 3.5       | 4 | TC505,TC506,TC509,TC510       |
|    | 22.2 | CD                        | GS 10V1000U $\pm$ 20%8 $\times$ 16 3.5         | 4 | TC505,TC506,TC509,TC510       |
|    | 22.3 | CD                        | GS 10V1000U $\pm$ 20%8 $\times$ 14 3.5         | 4 | TC505,TC506,TC509,TC510       |
| 23 |      | CD                        | LP3 400V47U $\pm$ 20%22 $\times$ 28 10         | 1 | TC501                         |
|    | 23.1 | CD                        | LS 400V47U $\pm$ 20%22 $\times$ 25 10          | 1 | TC501                         |
| 24 |      | MAGNETIC BEAD INDUCTANCE  | RH354708                                       | 1 | L503                          |

|    |      |                                    |                           |   |                              |
|----|------|------------------------------------|---------------------------|---|------------------------------|
| 25 |      | CHOKE COIL                         | 10UH 1A 5mm               | 1 | L505                         |
| 26 |      | CHOKE COIL                         | 10UH 2A 5mm               | 2 | L506,L507                    |
| 27 |      | SWITCH<br>MAINS<br>TRANSFORM<br>ER | BCK-4025B-2876            | 1 | T501                         |
| 28 |      | DIODE                              | HER105                    | 4 | D506,D508,D511,D512          |
| 29 |      | DIODE                              | HER306                    | 1 | D510                         |
| 30 |      | SCHOTTKY<br>DIODE                  | SR360                     | 1 | D509                         |
| 31 |      | DIODE                              | HER107                    | 1 | D505                         |
| 32 |      | VOLTAGE<br>REGULATOR<br>DIODE      | 5.1V 1/2W                 | 1 | ZD501                        |
| 33 |      | VOLTAGE<br>REGULATOR<br>DIODE      | 9.1V 1W                   | 1 | ZD502                        |
| 34 |      | DIODE                              | 1N4007                    | 4 | D501~D504                    |
| 35 |      | IC                                 | 5L0380R YDTU              | 1 | U501                         |
| 36 |      | IC                                 | LM431ACZ TO-92            | 1 | U503                         |
|    | 36.1 | IC                                 | TL431C TO-226AA(LP)       | 1 | U503                         |
|    | 36.2 | IC                                 | 431L TO-92                | 1 | U503                         |
|    | 36.3 | IC                                 | KA431AZ TO-92             | 1 | U503                         |
| 37 |      | POWER<br>GRID FILTER               | UT-20 40mH ±20% 10×13     | 1 | L502                         |
| 38 |      | PHOTO-<br>ELECTRIC<br>COUPLER      | NEC2561                   | 1 | U502                         |
|    | 38.1 | PHOTO-<br>ELECTRIC<br>COUPLER      | PC817                     | 1 | U502                         |
|    | 38.2 | PHOTO-<br>ELECTRIC<br>COUPLER      | NEC2501                   | 1 | U502                         |
|    | 38.3 | PHOTO-<br>ELECTRIC<br>COUPLER      | HS817                     | 1 | U502                         |
|    | 38.4 | PHOTO-<br>ELECTRIC<br>COUPLER      | 817D                      | 1 | U502                         |
| 39 |      | IC                                 | LM7805 GOLD SEALED TO-220 | 1 | U504                         |
| 40 |      | PCB                                | 5907KB-2                  | 1 |                              |
| 41 |      | SOCKET                             | 5 PINS 2.0mm              | 1 | CN501                        |
| 42 |      | SOCKET                             | 9 PINS 2.5mm              | 1 | CN503                        |
| 43 |      | SOCKET                             | 2 PINS 2.5mm              | 1 | CN502                        |
| 44 |      | SOCKET                             | 6 PINS 2.5mm              | 1 | CN504                        |
| 45 |      | SOCKET                             | 2 PINS 8.0mm 2#           | 2 | BCN501,BCN502                |
| 46 |      | CONNECTIO<br>N CORDS               | Φ0.6 SHAPED 7.5mm         | 2 | J502,J503                    |
| 47 |      | CONNECTIO<br>N CORDS               | Φ0.6 SHAPED 10mm          | 3 | L501,J501                    |
| 48 |      | CONNECTIO<br>N CORDS               | Φ0.6 SHAPED 12.5mm        | 1 | J504                         |
| 49 |      | FUSE TUBE                          | T1.6AL 250V               | 1 | F501                         |
| 50 |      | FUSE<br>SOCKET                     | BLX-2                     | 1 | FOR F501                     |
| 51 |      | RADIATION<br>BOARD                 | 11×15×25 AB009K           | 2 | U501,U504 FOR HEAT RADIATION |

|    |      |                                |                      |   |                              |
|----|------|--------------------------------|----------------------|---|------------------------------|
|    | 51.1 | RADIATION BOARD                | 11×15×25 WHITE AB905 | 2 | U501,U504 FOR HEAT RADIATION |
| 52 |      | GROUND CHIP OF THE POWER BOARD | AB903                | 2 | G501~G502                    |
| 53 |      | TAPPING SCREW                  | BT 3×8 BLACK         | 2 | FIXED HEAT RADIATION BOARD   |

### 3. OUTPUT BOARD

| NO |      | MATERIAL                       | SPECIFICATIONS                      | quantity | location specification |
|----|------|--------------------------------|-------------------------------------|----------|------------------------|
| 1  |      | CARBON-FILM RESISTOR           | 1/6W68Ω±5%                          | 1        | R703                   |
| 2  |      | CARBON-FILM RESISTOR           | 1/6W91Ω±5%                          | 1        | R702                   |
| 3  |      | CARBON-FILM RESISTOR           | 1/6W330Ω±5%                         | 1        | R701                   |
| 4  |      | CARBON-FILM RESISTOR           | 1/6W2.2Ω±5% SHAPED 7.5              | 1        | R706                   |
| 5  |      | PORCELAIN CAPACITOR            | 50V 20P ±10% NPO 5mm                | 4        | C707,C708,C709,C712    |
| 6  |      | PORCELAIN CAPACITOR            | 50V 102 ±20% 5mm                    | 6        | C701~C706              |
| 7  |      | PORCELAIN CAPACITOR            | 50V 104 ±20% 5mm                    | 2        | C710,C711              |
|    | 7.1  | PORCELAIN CAPACITOR            | 50V 104 +80%-20% 5mm                | 2        | C710,C711              |
| 8  |      | CD                             | CD11 16V220U±20%6×12 2.5            | 1        | TC701                  |
| 9  |      | MAGNETIC BEAD INDUCTANCE       | RH354708                            | 10       | L701~L710              |
| 10 |      | PHOTO-ELECTRIC CONVERTER       | GP1F32T                             | 1        | JK705                  |
|    | 10.1 | PHOTO-ELECTRIC CONVERTER       | TX178A                              | 1        | JK705                  |
| 11 |      | CONNECTION CORDS               | Φ0.6 SHAPED 10mm                    | 2        | JP701,JP702            |
| 12 |      | END SOCKET                     | CS-09                               | 1        | JK704                  |
| 13 |      | END SOCKET                     | AV8-8.4-6G-3                        | 1        | JK703                  |
| 14 |      | GROUND CHIP OF THE POWER BOARD | AB903                               | 1        | G701                   |
| 15 |      | CABLE SOCKET                   | 13 PINS 1.0mm DOUBLE LINES STRAIGHT | 1        | JK701                  |
| 16 |      | END SOCKET                     | AV4-8.4-6G-3                        | 1        | JK702                  |
| 17 |      | PCB                            | 7929-2                              | 1        |                        |

### 4. OK BOARD

| NO |  | MATERIAL              | SPECIFICATIONS         | quantity | location specification |
|----|--|-----------------------|------------------------|----------|------------------------|
| 1  |  | CARBON-FILM CAPACITOR | 1/6W560Ω±5% SHAPED 7.5 | 2        | R603,R604              |

|      |  |                       |                                         |   |                                           |
|------|--|-----------------------|-----------------------------------------|---|-------------------------------------------|
| 2    |  | CARBON-FILM CAPACITOR | 1/6W1K±5% SHAPED 7.5                    | 5 | R607,R608,R611,R619,R626                  |
| 3    |  | CARBON-FILM CAPACITOR | 1/6W4.7K±5% SHAPED 7.5                  | 3 | R622,R628,R634                            |
| 4    |  | CARBON-FILM CAPACITOR | 1/6W5.1K±5% SHAPED 7.5                  | 1 | R616                                      |
| 5    |  | CARBON-FILM CAPACITOR | 1/6W10K±5% SHAPED 7.5                   | 7 | R605,R606,R612,R617,R620,R621,R624        |
| 6    |  | CARBON-FILM CAPACITOR | 1/6W22K±5% SHAPED 7.5                   | 2 | R601,R602                                 |
| 7    |  | CARBON-FILM CAPACITOR | 1/6W10Ω±5% SHAPED 7.5                   | 2 | R632,R633                                 |
| 8    |  | CARBON-FILM CAPACITOR | 1/6W15K±5% SHAPED 7.5                   | 2 | R614,R618                                 |
| 9    |  | CARBON-FILM CAPACITOR | 1/6W18K±5% SHAPED 7.5                   | 1 | R615                                      |
| 10   |  | CARBON-FILM CAPACITOR | 1/6W27K±5% SHAPED 7.5                   | 1 | R629                                      |
| 11   |  | CARBON-FILM CAPACITOR | 1/6W30K±5% SHAPED 7.5                   | 3 | R613,R609,R610                            |
| 12   |  | PORCELAIN CAPACITOR   | 50V 100P ±10% 5mm                       | 4 | C607,C620,C605,C606                       |
| 13   |  | PORCELAIN CAPACITOR   | 50V 561 ±10% 5mm                        | 2 | C610,C612                                 |
| 14   |  | PORCELAIN CAPACITOR   | 50V 103 ±10% 5mm                        | 4 | C603,C604,C616,C619                       |
| 15   |  | PORCELAIN CAPACITOR   | 50V 104 ±20% 5mm                        | 7 | C601,C602,C609,C622,C623,C613,C614        |
| 16   |  | PORCELAIN CAPACITOR   | 50V 392 ±10% 5mm                        | 2 | C608,C615                                 |
| 17   |  | CD                    | CD11 16V22U±20%5×11 2                   | 2 | TC605,TC606                               |
| 18   |  | CD                    | CD11 10V47U±20%5×7 2                    | 1 | TC609                                     |
| 18.1 |  | CD                    | CD11C 16V47U±20%5×7 2                   | 1 | TC609                                     |
| 19   |  | CD                    | CD11 25V100U±20%6×12 2.5                | 3 | TC615,TC616,TC608                         |
| 20   |  | CD                    | CD11 16V4.7U±20%5×11 2                  | 9 | TC601~TC604,TC610,TC611,TC613,TC621,TC607 |
| 21   |  | MAGNETIC INDUCTANCE   | RH354708                                | 2 | L601,L602                                 |
| 22   |  | IC                    | NJM4558D DIP                            | 2 | U601,U602                                 |
| 23   |  | IC                    | PT2399 DIP                              | 1 | U603                                      |
| 24   |  | PCB                   | 6929-1                                  | 1 |                                           |
| 25   |  | RAFT CORDS            | 6P90 2.5 2 PLUG WITH L NEEDLE, REVERSED | 1 | XS601                                     |
| 26   |  | SOCKET                | 5 PINS 2.5mm                            | 1 | XS602                                     |
| 27   |  | MIC SOCKET            | CK3-6.35-106                            | 2 | MIC601,MIC602                             |
| 28   |  | CONNECTION CORDS      | Φ0.6 SHAPED 10mm                        | 2 | JP601,JP602                               |

#### 5. OK BOARD

| NO | MATERIAL | SPECIFICATIONS | quantity | location specification |
|----|----------|----------------|----------|------------------------|
|----|----------|----------------|----------|------------------------|

|   |  |                        |                                   |   |       |
|---|--|------------------------|-----------------------------------|---|-------|
| 1 |  | ROTATING POTENTIOMETER | WH09-2L-B10K-F25 ±20%             | 1 | VR601 |
| 2 |  | ROTATING POTENTIOMETER | WH09-2L-B50K-F25±20%              | 1 | VR602 |
| 3 |  | PCB                    | A929-0                            | 1 |       |
| 4 |  | RAFT CORDS             | 5P70 2.0/2.5 2 PLUG WITH L NEEDLE | 1 | XS602 |

#### 6. MAIN FRONT PANEL (1)

| NO |     | MATERIAL                   | SPECIFICATIONS                            | quantity | location specification                  |
|----|-----|----------------------------|-------------------------------------------|----------|-----------------------------------------|
| 1  |     | SOFT SPONGE PAD            | 15×4×3.5 DOUBLE SIDE ADHESIVE TAPE (SOFT) | 4        | CONNECT VFD AND THE FRONT PANEL'S PCB   |
| 2  |     | SOFT SPONGE PAD            | 12×10×8 DOUBLE SIDE ADHESIVE TAPE (HARD)  | 1        | CONNECT THE INFRARED SENSOR AND THE PCB |
| 3  |     | CARBON-FILM RESISTOR       | 1/4W10Ω±5% SHAPED 10                      | 1        | R418                                    |
|    | 3.1 | CARBON-FILM RESISTOR       | 1/4W10Ω±5%                                | 1        | R418                                    |
| 4  |     | CARBON-FILM RESISTOR       | 1/4W100Ω±5%                               | 1        | R415                                    |
|    | 4.1 | CARBON-FILM RESISTOR       | 1/4W100Ω±5% SHAPED 10                     | 1        | R415                                    |
| 5  |     | CARBON-FILM RESISTOR       | 1/4W10K±5%                                | 7        | R406~R410,R416,R417                     |
|    | 5.1 | CARBON-FILM RESISTOR       | 1/4W10K±5% SHAPED 10                      | 7        | R406~R410,R416,R417                     |
| 6  |     | CARBON-FILM RESISTOR       | 1/4W51K±5%                                | 1        | R405                                    |
| 7  |     | CD                         | CD11C 10V100U±20%5×7 2                    | 2        | C402,C407                               |
| 8  |     | DIODE                      | 1N4148                                    | 3        | D401~D403                               |
| 9  |     | IC                         | D16312GB QFP                              | 1        | U401                                    |
|    | 9.1 | IC                         | PT6312LQ QFP                              | 1        | U401                                    |
| 10 |     | VFD                        | HNV 06SS91                                | 1        | U402                                    |
| 11 |     | LIGHT TOUCH RESTORE SWITCH | HORIZONTAL 6×6×1                          | 10       | K401~K410                               |
| 12 |     | CONNECTION CORDS           | Φ0.6 SHAPED 10mm                          | 10       | JP401~JP410                             |
| 13 |     | CONNECTION CORDS           | Φ0.6 SHAPED 15mm                          | 1        | JP411                                   |
| 14 |     | RAFT CORDS                 | Φ0.6 SHAPED 7.5mm                         | 1        | JP412                                   |
| 15 |     | RAFT CORDS                 | 5P150 2.0 2 PLUG WITH L NEEDLE, REVERSED  | 1        | XS402                                   |
| 16 |     | RAFT CORDS                 | 5P240 2.0 2 PLUG WITH L NEEDLE, REVERSED  | 1        | XS401                                   |
| 17 |     | INFRARED SENSOR            | HS0038A2                                  | 1        | U403                                    |
| 18 |     | SEMI-FINISHED PCB          | 4929-0- CHIP DV929-2                      | 1        |                                         |

7. MAIN FRONT PANEL (2)

| NO |  | MATERIAL       | SPECIFICATIONS       | quantity | location specification |
|----|--|----------------|----------------------|----------|------------------------|
| 1  |  | CHIP RESISTOR  | 1/16W 33K ±5%        | 8        | R401~R404,R411~R414    |
| 2  |  | CHIP CAPACITOR | 50V 101 ±5% NPO 0603 | 3        | C403,C404,C406         |
| 3  |  | CHIP CAPACITOR | 50V 103 ±10% 0603    | 2        | C401,C405              |
| 4  |  | PCB            | 4929-0               | 1        |                        |