# BELSON

## Modelo: BSA-3750 ___ Service Manual

### Reproductor DVD-DivX

### DVD- DivX Player

- DVD-Video / Audio CD / Video CD
- Photo Viewer for JPEG Photos, Kodak Picture CD
- 5.1 Channel Audio Output
- Progressive Scan Output
- Virtual Surround Sound
- Multi-language / Subtitle / Angle
- Random Play / Program Play
- DivX 3.11~5.xx
- MPEG4  AVI Files
- Mirror front
- Remote Control

DVD VIDEO | DivX | MPEG4 | MP3 | DOLBY DIGITAL | Kodak PICTURE CD COMPATIBLE | dts DIGITAL OUT

BELSON

# Table of Contents

# 1. General Sections

## Cautions and Warnings

### Product Safety Notice

Parts marked with the symbol ⚠ in the schematic diagram have critical characteristics.

Use ONLY replacement parts recommended by the manufacturer. It is recommended that the unit be operated from a suitable DC supply or batteries during initial check out procedures.

```
┌─────────────────────────────────┐
│  ⚡    CAUTION         ⚠         │
│      RISK OF ELECTRIC SHOCK      │
│          DO NOT OPEN             │
├─────────────────────────────────┤
│ AVIS  RISQUE DE CHOC ELECTRIQUE NE│
│              PAS OUVRIR          │
├─────────────────────────────────┤
│ CAUTION:        TO REDUCE THE RISK OF │
│ ELECTRIC SHOCK,   DO NOT REMOVE  │
│ COVER (OR BACK). NO USER - SERVICEABLE│
│ PARTS INSIDE . REFER SERVICING  TO │
│ QUALIFIED SERVICE PERSONNEL.     │
│ CAUTION: (Visible) Laser Radiation When Open.│
│ DO NOT STARE INTO BEAM.          │
└─────────────────────────────────┘
```
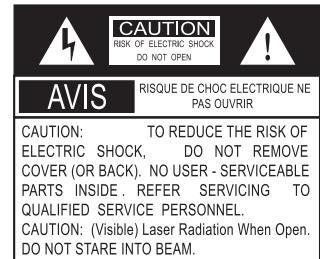
### Leakage Current Check/Resistance Check

Before returning the unit to the customer, make sure you make either (1) a leakage current check or (2) a line to chassis resistance check. If the leakage current exceeds 0.5 milliamps, or if the resistance from chassis to either side of the power cord is less than 240 K ohms, the unit is defective.

WARNING: DO NOT return the set to the customer until the problem or located is corrected.

### Protection of Eyes from Laser Beam
To protect eyes from invisible laser beam during servicing
DO NOT LOOK AT THE LASER BEAM

### Laser Caution

This Digital Video Disc Player employs  a Laser System.  To prevent direct exposure to the laser beam, do not try to open the enclosure.
Visible laser radiation emits when open and interlocks are defeated.
Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure. This CD Changer must be adjusted and repaired only by qualified service personnel.

**DO NOT STARE INTO BEAM.**

Laser symbol:
```
┌─────────────────┐
│    CLASS 1      │
│  LASER  PRODUCT │
└─────────────────┘
```
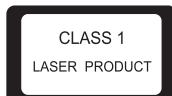
THIS IS COMPACT DISC PLAYER IS CLASSIFIED AS A CLASS 1 LASER PRODUCT.
THE LASS 1 LASER PRODUCT LABEL IS LOCATED ON THE REAR EXTERIOR.

## Precautions

### 1.  ESD Precautions in Repairing

1.1 Do not apply excessive pressure on the mechanical parts  (moving parts), including the Pickup Block, as extremely high mechanical precision or required in these parts.
1.2 When soldering the microprocessor and signal processing IC's, use a ceramic soldering iron or a soldering iron whose metal part is grounded since they are not resistant to static electricity.
1.3 When removing the solder or soldering the laser shorting lands for the Pickup Block, use a ceramic soldering iron or a soldering iron whose metal part is grounded since the laser diode or not resistant to static electricity.

### 2.  DVD Loading Unit Precautions when handling the Mechanism Block
2.1 Do not loosen any screws in the Pickup Block.

2.2 Do not adjust any screws in the Mechanism Block except for "Tilt Adjust Screws", as they are adjusted precisely at the factory.

2.3 Replacement of the Pickup Block is impossible. Always replace the Traverse Ass'y when the Pickup Block needed to be replaced. Do not touch the lens or lens holder of the Pickup Block.

2.4 The Guide Rails of the Pickup Block are greased. Take care when handing.

2.5 When you try to slide the Pickup Block, do not press or pull it directly. Always turn the dive gears with your fingers.

2.6 Be sure that the anti-slipping rubber on the turntable or clean. If there is dust or it is greasy, clean the part with the liquid that contains 50% each of alcohol and water.

When removing the Mechanism P.C.B. Ass'y, you need to short-circuit the laser diode shorting lands beforehand.

## Test Equipment / Jigs

Variable isolating transfomer, Dual channel oscilloscope, Digital multimeter

## Specification

| 1 | Chassis | | |
|---|---|---|---|
| | Laser concept | | 2 laser for DVD and VCD |
| | | | |
| 2 | Disc formats | | |
| | DVD+R | | Yes |
| | DVD-R | | Yes |
| | DVD+RW | | Yes |
| | DVD-RW | | Yes |
| | CD-R | | Yes |
| | CD-RW | | Yes |
| | | | |
| 3 | Media formats | | |
| | DVD-Video | | Yes |
| | Audio CD | | Yes |
| | Video CD | | VCD 1.0,1.1,2.0 |
| | S-Video CD | | Yes |
| | CD-ROM | | DivX,MPEG4,MP3, JPEG, Kodak Picture CD,WMA |
| | | | |
| 4 | Player features | | |
| | Parental control | | Yes, numerical lock |
| | Screen saver | | Yes |
| | Picture mode select | | Yes |
| | Video strobe | | Yes |
| | Video filter | | Yes |
| | File browser | | DivX, MP3, JPEG, Kodak Picture CD,WMA |
| | | | |
| 5 | Player functions | | |
| | Play/stop/pause | | Yes/Yes/Yes |

| | | |
|---|---|---|
| | Next/previous(skip) | Yes/Yes |
| | Fast forward/reverse | Yes/Yes (DVD,MP3,WMA : 2X / 4X / 6X / 8X , VCD,CDDA:1X / 2X / 3X / 4X, DivX: 2X / 4X / 8X / 16X ) |
| | Zoom | DVD/VCD 2X/3X/4X,JPEG 1.5X/2X/1/2/1/4 |
| | Slow motion forward /reverse | YES/YES(DVD,VCD:1/2,1/4,1/8) |
| | Perfect still picture | Yes |
| | Frame advance /reverse | Yes/Yes |
| | Repeat CD /DVD | DVD: title -chapter-A/B;VCD,CD: A/B-repeat one-repeat all |
| | Random play | CDDA, MP3,WMA |
| | Program play | CDDA,DVD,JPEG,MP3,WMA |
| | Last memory( resume) | Yes |
| | | |
| 6 | Region Code | |
| | Region code | changed by request. |
| | | |
| 7 | OSD | |
| | OSD style | standard |
| | OSD language | English, German, Dutch, French, Italian, Spanish, Portuguese |
| | Subtitle Language | English, German, Dutch, French |
| | Welcome Logo and OSD background | Provided by Customer |
| | | |
| 8 | Audio out | |
| | Digital Audio decoder | Dolby digital AC-3, MPEG 2, PCM, MP3 |
| | Digital Audio output | Dolby digital AC-3, DTS, MPEG, PCM 48/96 KHz |
| | Analog Audio output | Dolby Prologic II (down mix), Stereo; Dolby digital AC-3; 5.1CH |
| | Audio D/A converter | 24 Bit/96kHz |
| | Virtual surround Sound | Yes |
| | Digital sound process | Yes |
| | Frequency range DVD 48/96 kHz | 4 Hz-22 kHz/ 4 Hz- 44 kHz |
| | Frequency range CD 44.1 kHz | 4 Hz-20 kHz |
| | Dynamic range 1 kHz | ≥80 Db(weighted) |
| | Crosstalk | ≥80 dB(weighted) |
| | Signal noise | ≥90 dB(weighted) |
| | | |
| 9 | Video out | |
| | Video D/A converter | 10 Bit / 54 MHz |
| | Progressive Video out | PAL / NTSC |
| | PAL | Yes, 625 lines / 50Hz / 4.43 MHz |

| | | | |
|---|---|---|---|
| | NTSC | | Yes, 525 lines / 60 Hz / 3.58 MHz |
| | Norm converter ( PAL-NTSC, NTSC-PAL) | | Yes |
| | Video resolution | | 525 lines |
| | Frequency response | | 5MHz < -3 dB |
| | Signal noise rate luminance | | >60 dB (weighted) |
| | Signal noise rate chroma | | >60 dB unweighted |
| | | | |
| 10 | Connections rear | | |
| | Euro-AV | | Yes, scart |
| | Cinch Video | | Yes, 1× output |
| | Cinch Audio | | Yes, 6× output |
| | S-Video ( Y-C) | | Yes, 1× output |
| | Digital Audio out coaxial | | Yes, 1× |
| | Digital Audio out optical | | Yes, 1× |
| | progressive scan out | | Yes, 3xoutput |
| 11 | Power Supply | | |
| | Power voltage | | AC 110-240V   50/60 Hz |
| | Max. power consumption | | Approx. max. 10W |
| | Power switch | | Yes |
| | Power supply plug | | Yes |
| | | | |
| 12 | Cabinet | | |
| | Dimensions in cm (W× H ×D) net | | Approx. 43.0×4.8×25.7 |
| | Dimensions of carton in cm (W× H ×D) | | Aprrox. 47.1x10.8x36.8 |
| | | | |
| 13 | Design | | |
| | Design | | mirror-like front panel as per the sample provided by Hu-alu |
| | Cabinet keys | | POWER ,PLAY, PAUSE, STOP, OPEN/CLOSE,  PREV, NEXT |
| | Logo | |  ACCORDING TO REQUEST |
| | Label | | Model no. label and production serial number label will be sticked at rear panel |
| 14 | Remote Control | | |
| | Type | | standard |
| | Batteries | | Yes, 2×R03P AAA (no mercury) |
| | IR code | | standard |
| | | | |
| 15 | Display | | |
| | Type | | VFD |

| | | | |
|---|---|---|---|
| 16 | Packaging | | |
| | 1 set /carton | | ACCORDING TO REQUEST |
| | 54 cartons/ slip-sheet | | |
| | | | |
| 17 | Loadability | | |
| | For 20' Container | | 1296 sets |
| | For 40' Container | | 2592 sets |
| | For 40 HC Container | | 2880 sets |
| | | | |
| 18 | Supplied Accessories | | |
| | Euro-AV cable (Scart-cable) | | Yes |
| | Power cord | | Yes |
| | Remote control | | Yes |
| | Batteries | | Yes |
| | Instruction Manual | | ACCORDING TO REQUEST |
| | Warranty info | | Yes |
| | | | |
| 19 | Safely Conformity | | changed by request with payment |
| | CE | | CE report is available for Hualu's model no.:DVD4360 |

## Dissassembly Instructions
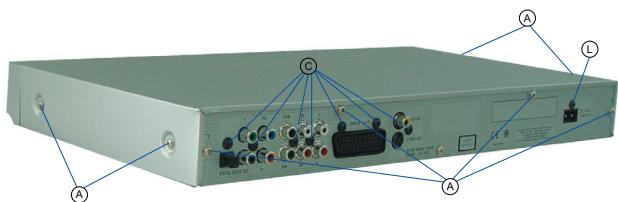


Fig. 1
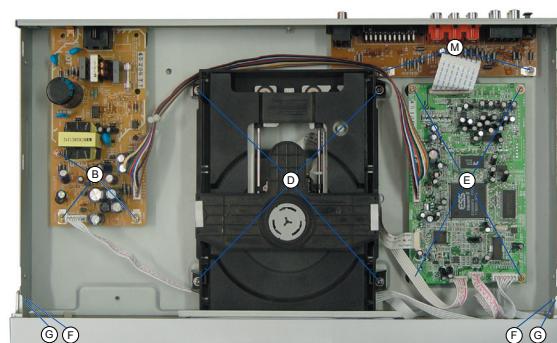


Fig. 2
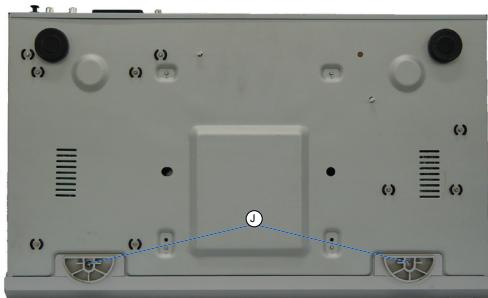
Fig.3



Fig. 4



Fig. 5

1. Cabinet Upper Part
- Undo the 8 screws A (Fig. 1)
- Bend the upper part of the cabinet from the rear side (Fig. 1) off the base plate, and then detach the cabinet upper part from the unit.

2. Front Panel
- Undo the 2 screws J (Fig. 3)
- Undo the 2 screws F (Fig. 2)
- Undo the 2 locking lugs G (Fig. 2) and then remove the front panel.
- Unplug the connectors if necessary.

3. VFD Driver and Key Control Board Units
- Remove the front panel (Point 2)
- Undo the 4 screws I (Fig. 4)
- Remove the VFD Driver and Key Control Board units.

4. Power Supply Board
- Undo the 4 screws B (Fig. 2).
- Undo the 1 screw L (Fig. 1).
- Remove the Power Supply Board from the unit.
- Unplug the connectors if necessary.

5. Main Board
- Undo the 7 screws E (Fig. 2).
- Remove the main board.
- Unplug the connectors if necessary.

6. Output Board
- Undo the 2 screws M (Fig. 2)
- Undo the 4 screws C (Fig. 1).
- Remove the output board.
- Unplug the connectors if necessary.

7. Drive Mechanism
- Undo the 4 screws D (Fig. 2)
- Lift the drive mechanism at its back part, slide it to the rear, and then remove it.
- Unplug the connectors if necessary.

8. Opening the Tray of a Defective Unit
- Turn the toothed wheel H (Fig. 5) in direction of the arrow until the tray moves then pull out the tray completely.
- Remove the DVD/CD from the defective drive unit if necessary.

# 2. Service and Special Functions

## Software Upgrade

You can download the upgrade software "bank30.rom" from Web using an Internet browser.

- Copy the "bank30.rom" on the drive of your PC.
- Create a software upgrade CD.
  - Use only a new CD-R / CD-RW (not a erased one).
  - Give the CD name of your choise (e.g. version and unit name).
  - Burn the "bank30.rom" on the CD-R / CD-RW.
- Insert the upgrade CD, the unit will be upgraded automatically.
- After upgrade, the disc tray will opened, remove the upgrade CD.

**Attention: if a failure should occur during the software upgrade, it may happen that the unit's  function  and a restart of the upgrade function are no longer possible. If this should be the case,**

- Power off the unit with pressing ON/OFF button on the front panel (do not remove the upgrade CD).
- During pressing still the NEXT button on the front panel, press down the ON/OFF button to power on the  unit, the unit will be upgraded automatically.
- After upgrade, the disc tray will opened, remove the upgrade CD.

## Initialization of the Set

You can restore all the custom settings to the basic settings.

- Press SETUP button to open the main menu.
- Select the PREFERENCES line with ▲ or ▼  and activate with OK button.
- Select the DEFAULTS line with ▲ or ▼  and press OK button to confirm.
- Select the RESET with ▶ and press OK button to reset the unit to its basic settings.
- Press SETUP to exit the menu.

# 3. Layout of Circuit Diagrams and PCBs

## Main Board

## Main Board (M1)
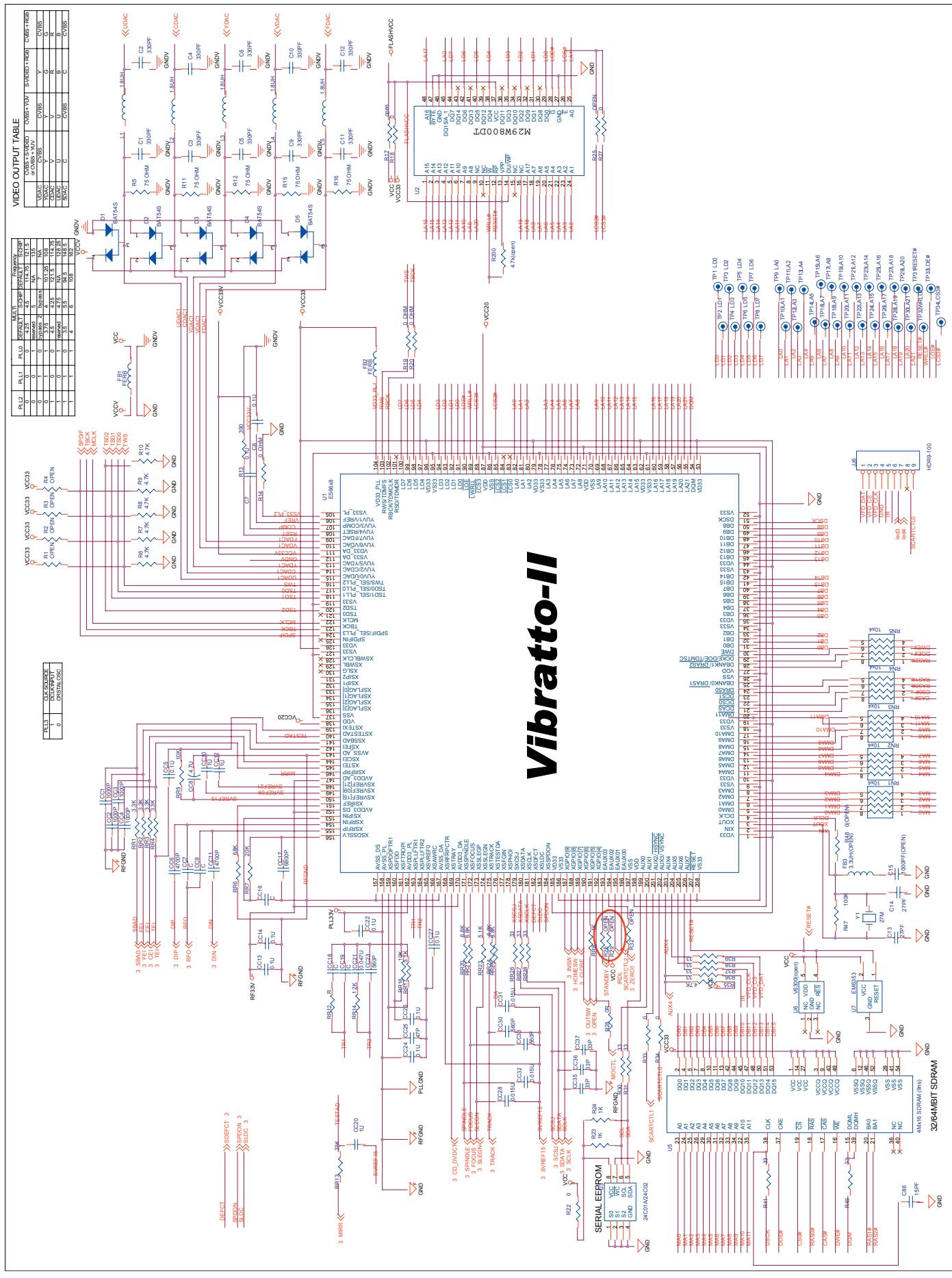
# Main Board (M2)
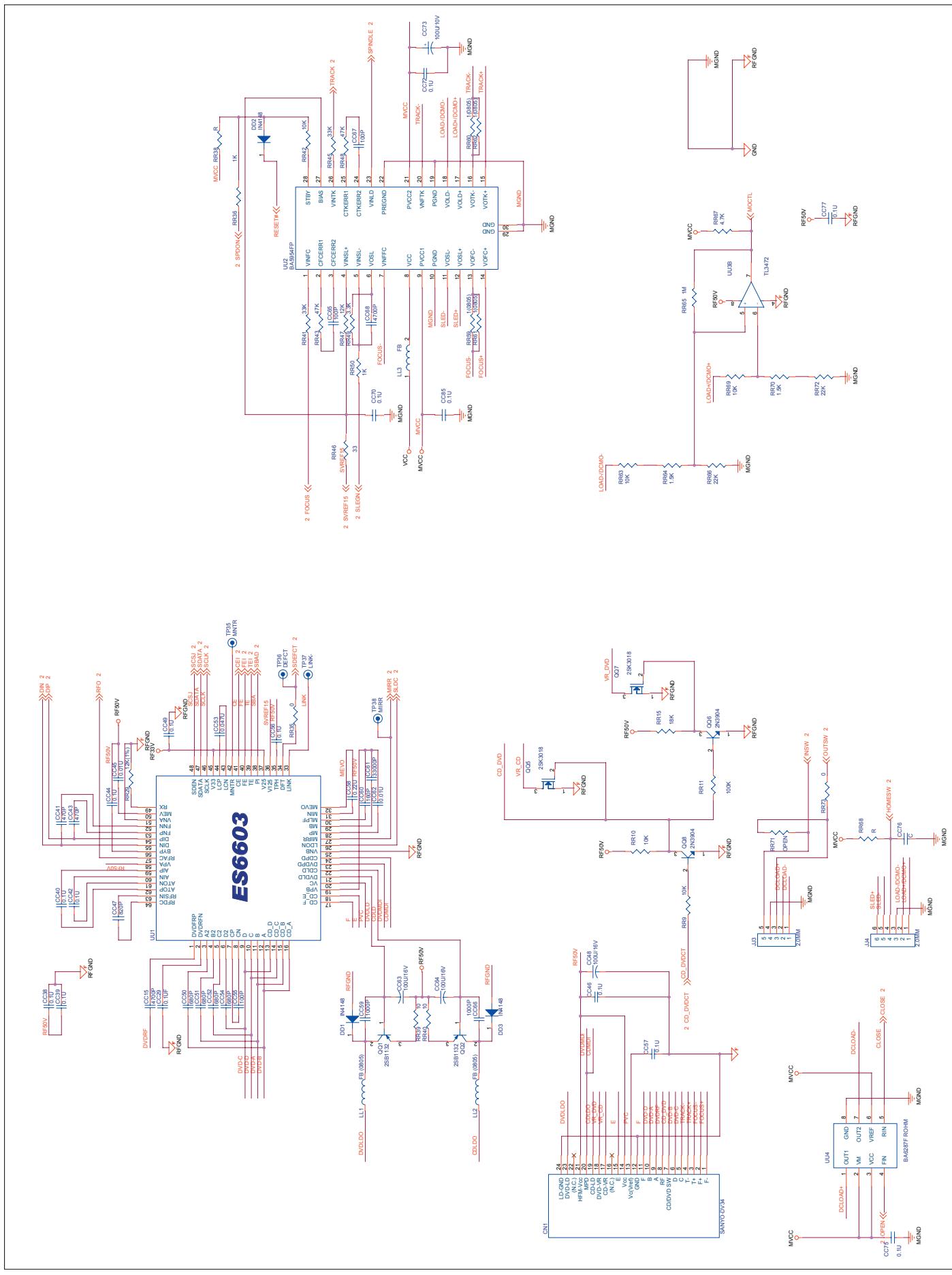
## Main Board (M3)
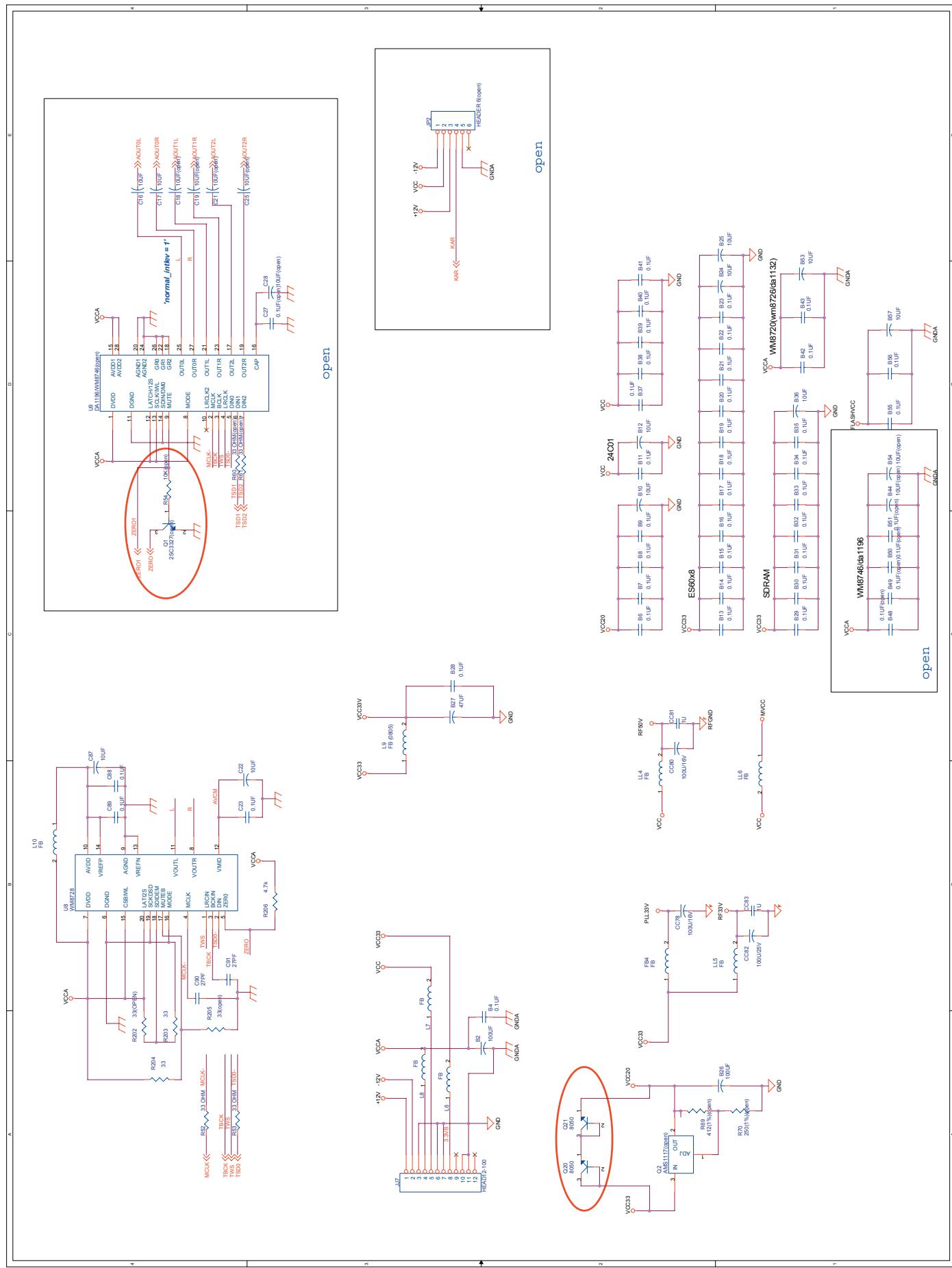
# Main Board (M4)
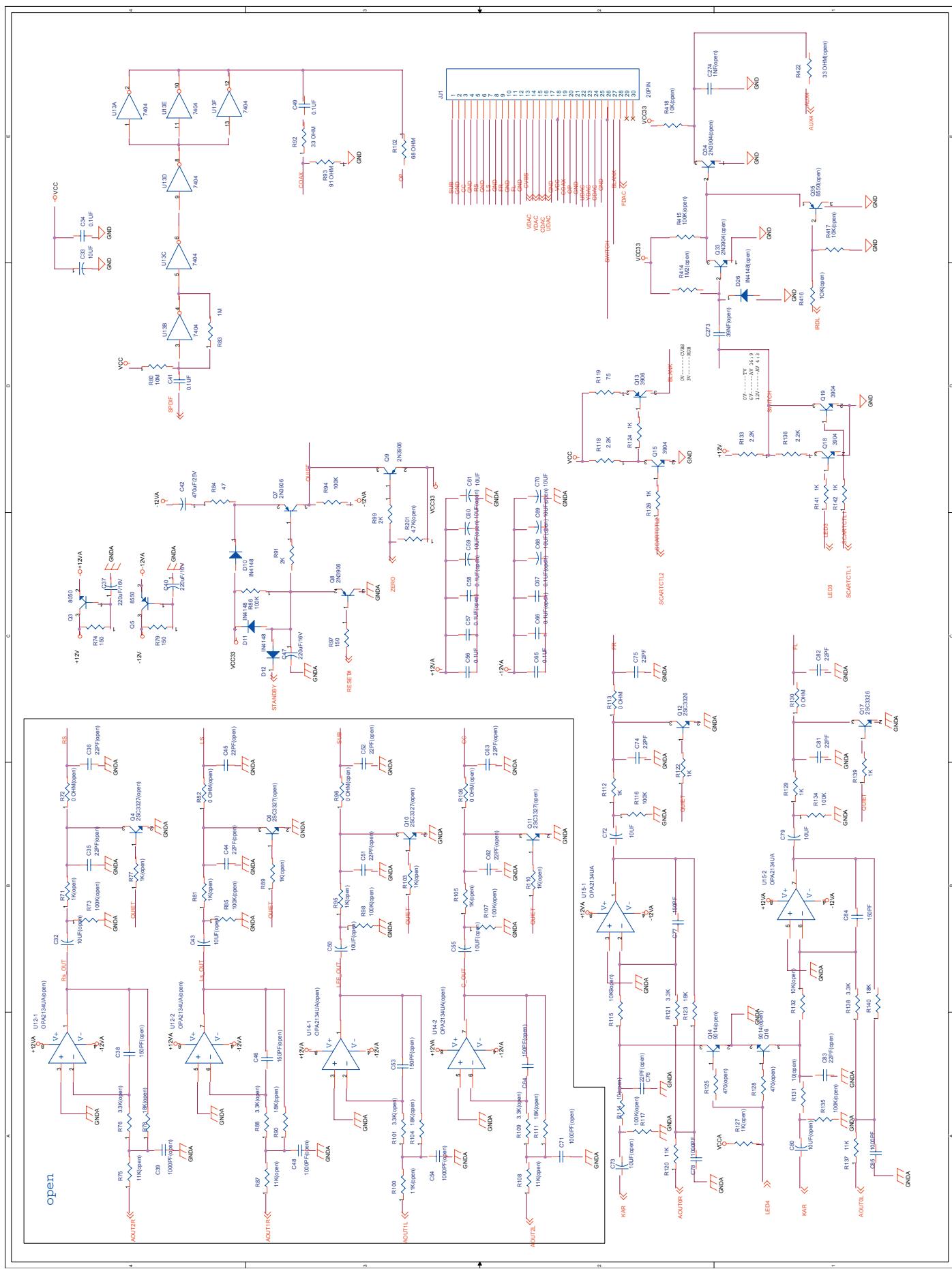
## Main Board

### View of Component Side
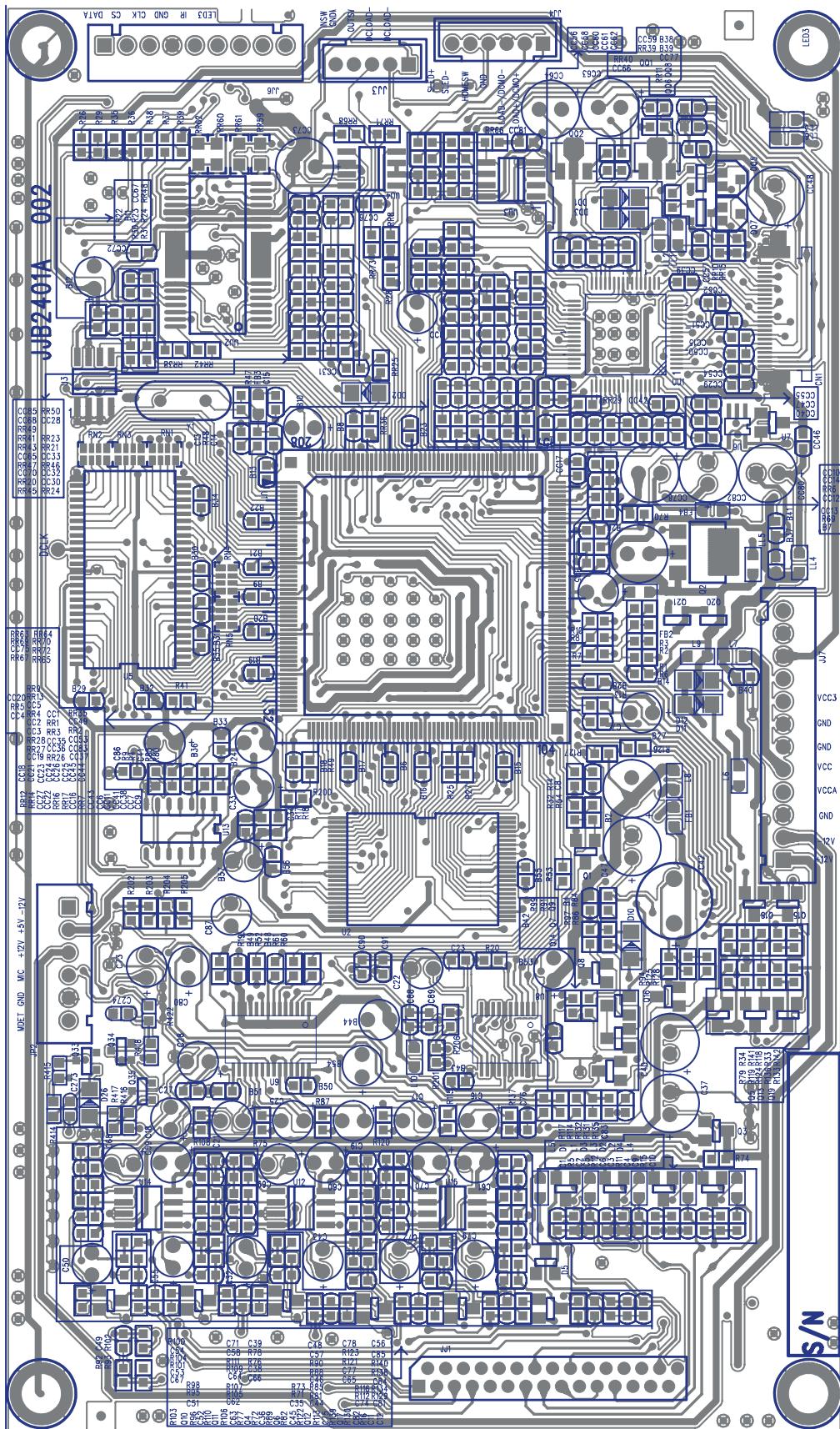
## Power Supply Board
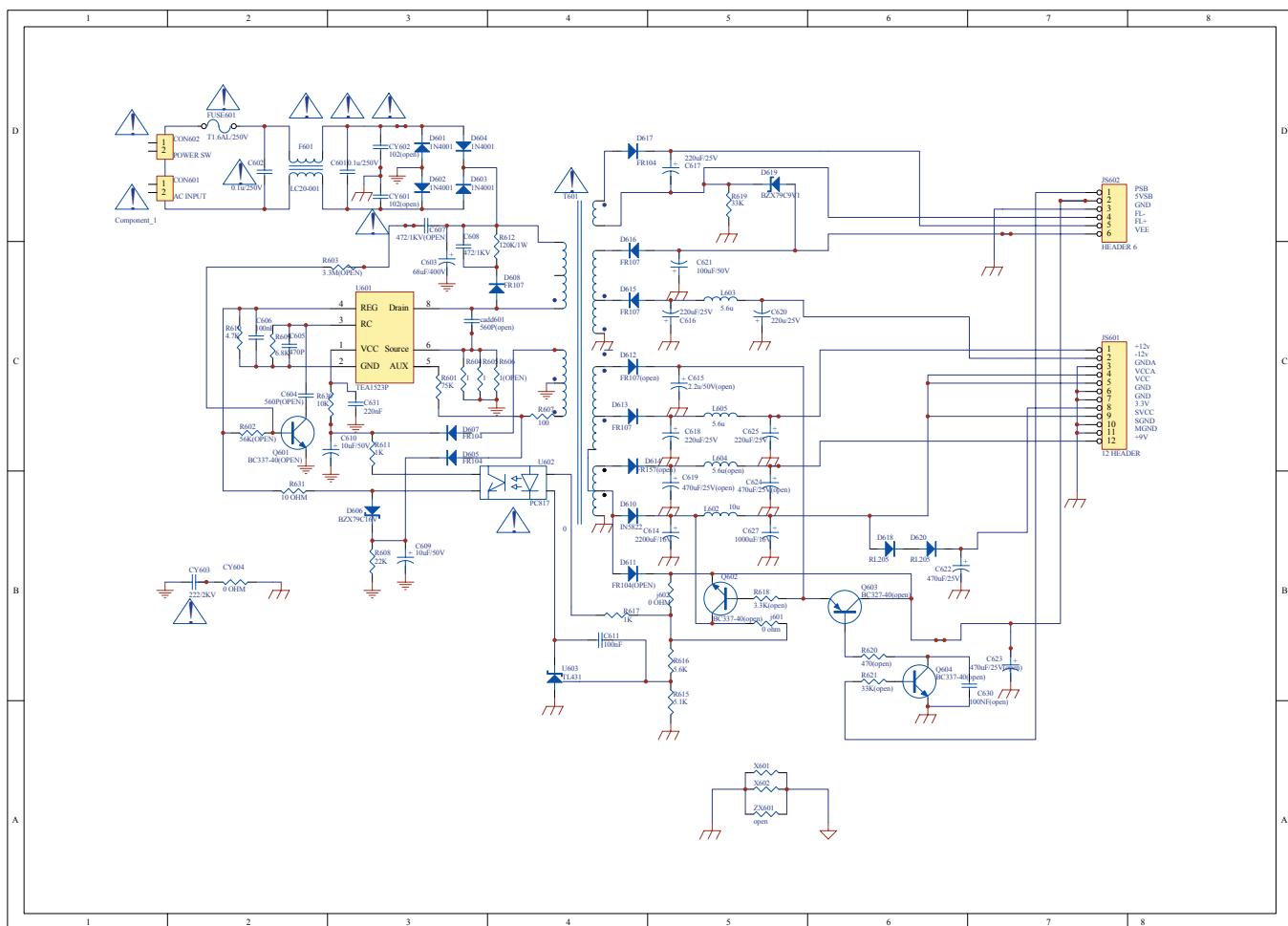


## Power Supply Board

### View of component Side
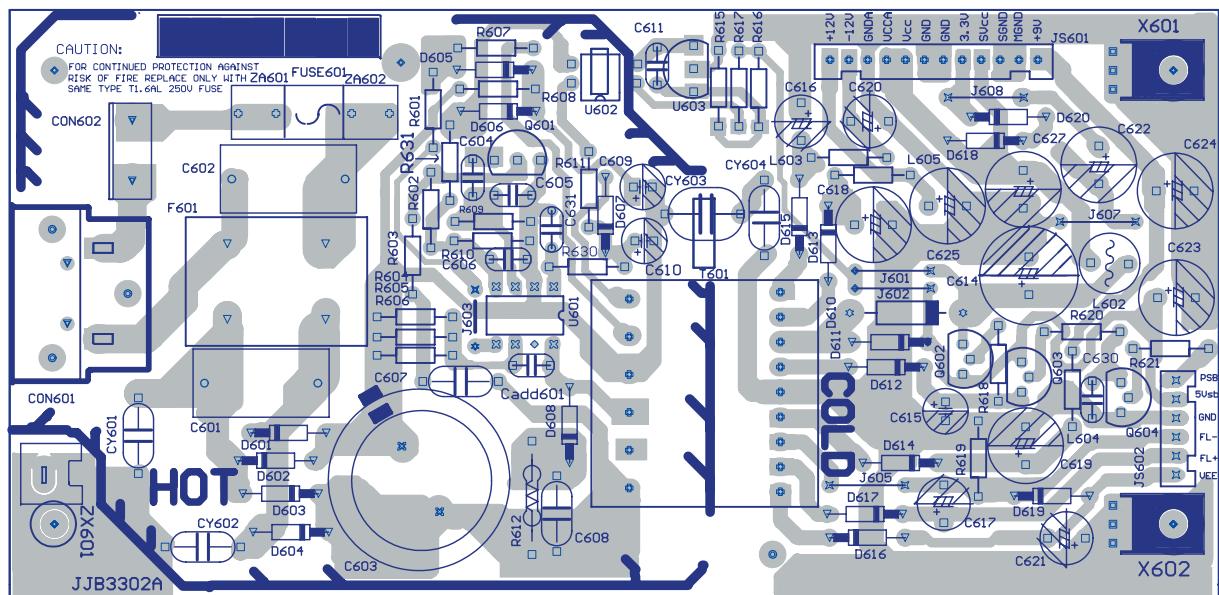
## Output Board
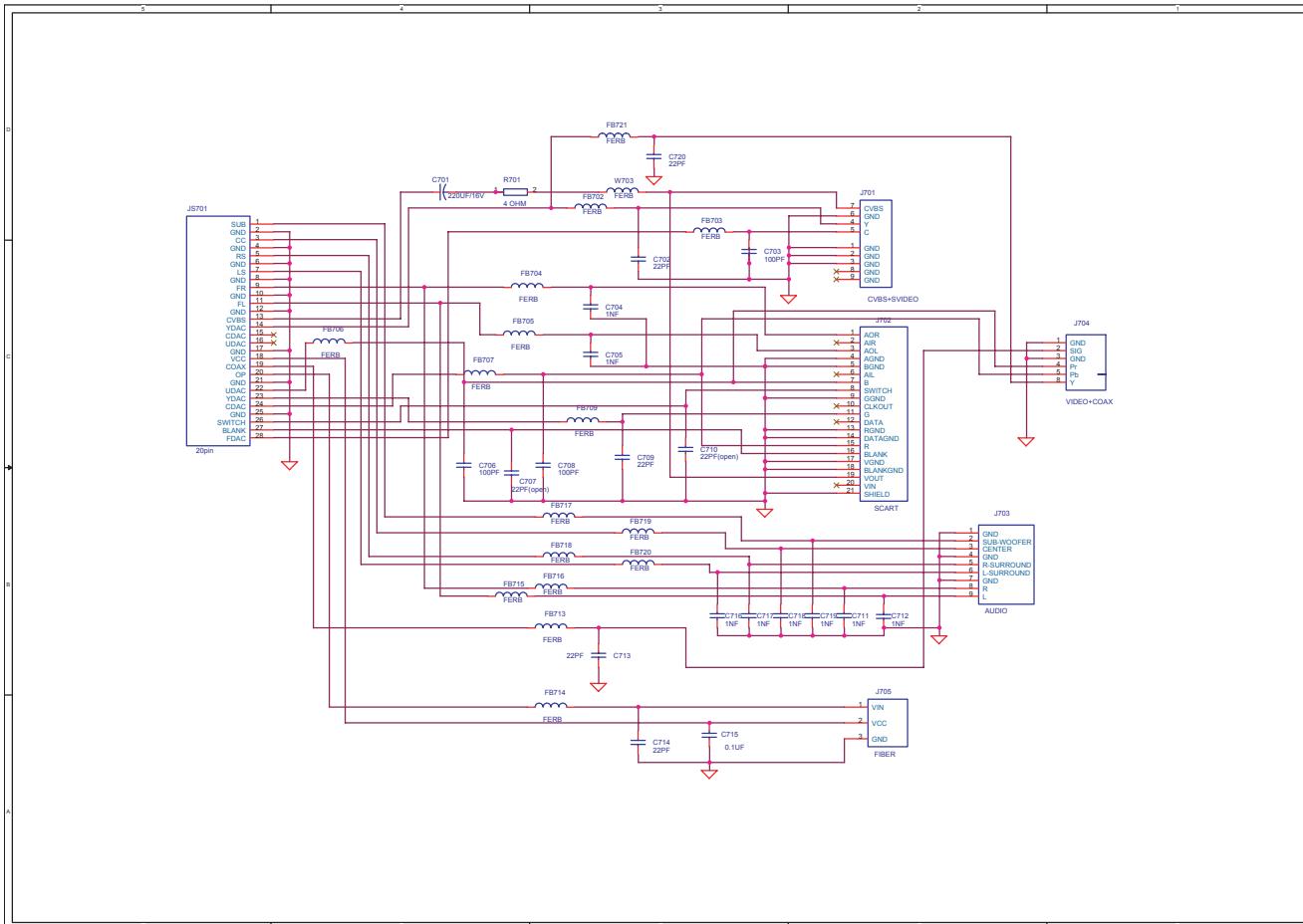


## Output Board

**View of Component Side**
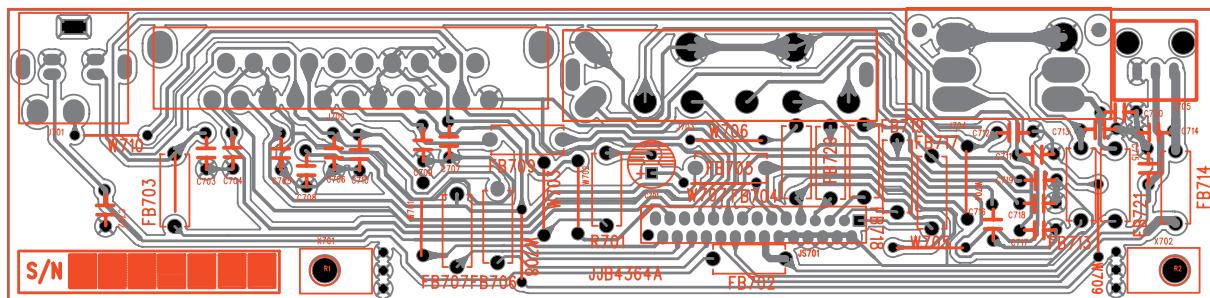
# Key Control and VFD Driver Board
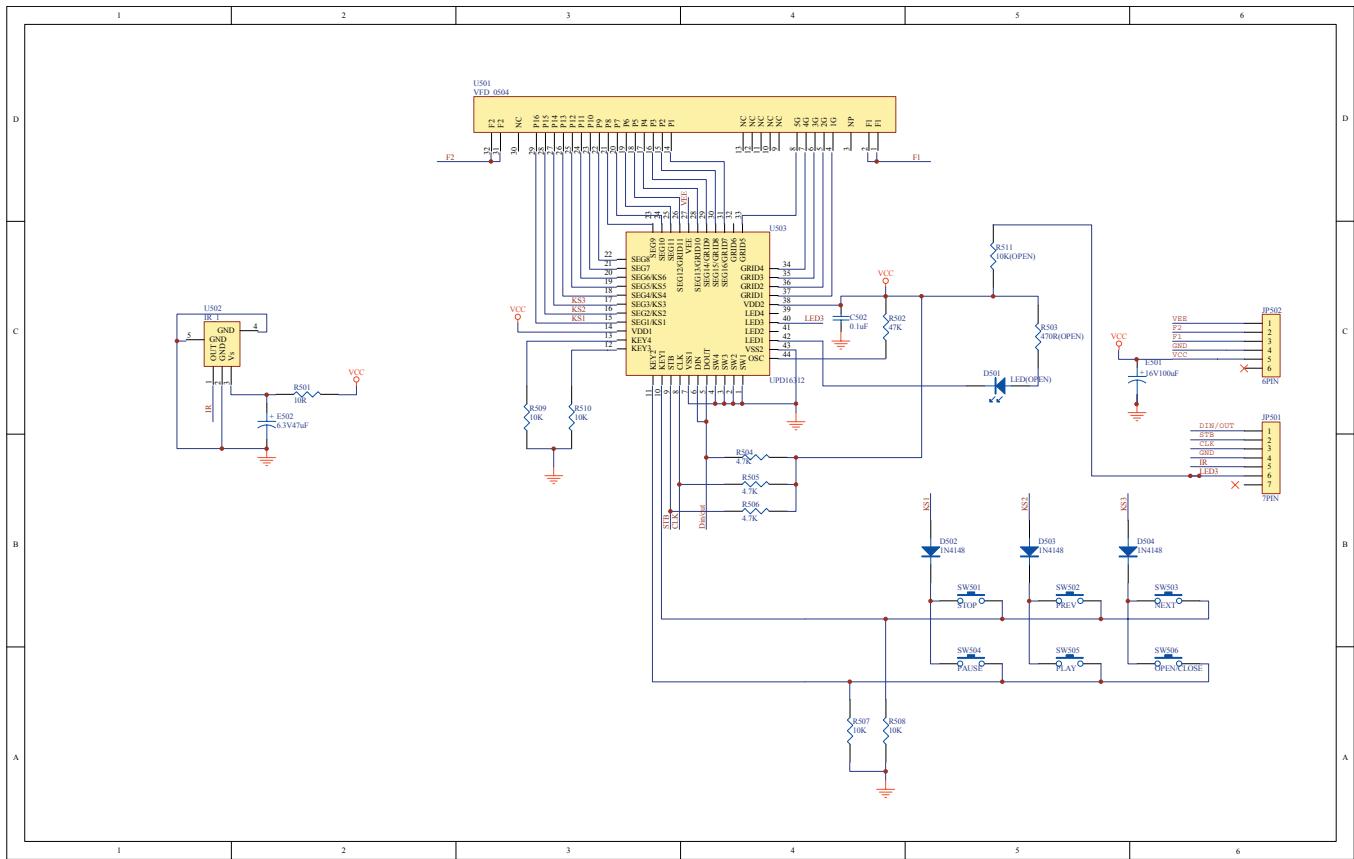


# Key Control and VFD Driver Board

## View of Component Side
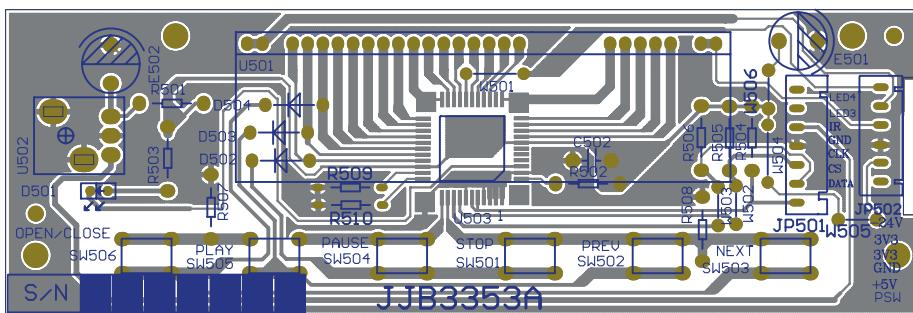
# 4. IC Block Diagrams

**ES6603**

ES6603 PINOUT
The figure below depicts the ES6603 device pinout. The pound symbol(#) indicates an active-low signal.

| | | |
|---|---|---|
| RX | 49 | 32 MEVO |
| MEV | 50 | 31 MIN |
| VNA | 51 | 30 MLPF |
| FNN | 52 | 29 MB |
| FNP | 53 | 28 MP |
| DIP | 54 | 27 MIRR |
| DIN | 55 | 26 LDON |
| BYP | 56 | 25 VNB |
| RFAC | 57 | 24 CDPD |
| VPA | 58 | 23 DVDPD |
| AIP | 59 | 22 CDLD |
| AIN | 60 | 21 DVDLD |
| ATON | 61 | 20 VC |
| ATOP | 62 | 19 VPB |
| RFSIN | 63 | 18 CD_E |
| RFDC | 64 | 17 CD_F |

**ES6603S**

Top pins (48–33): SDEN, SDATA, SCLK, V33, LCP, LCN, MNTR, CE, FE, TE, PI, V25, V125, TPH, DFT, LINK

Bottom pins (1–16): DVDRFP, DVDRFN, A2, B2, C2, D2, CP, CN, D, C, B, A, CD_D, CD_C, CD_B, CD_A
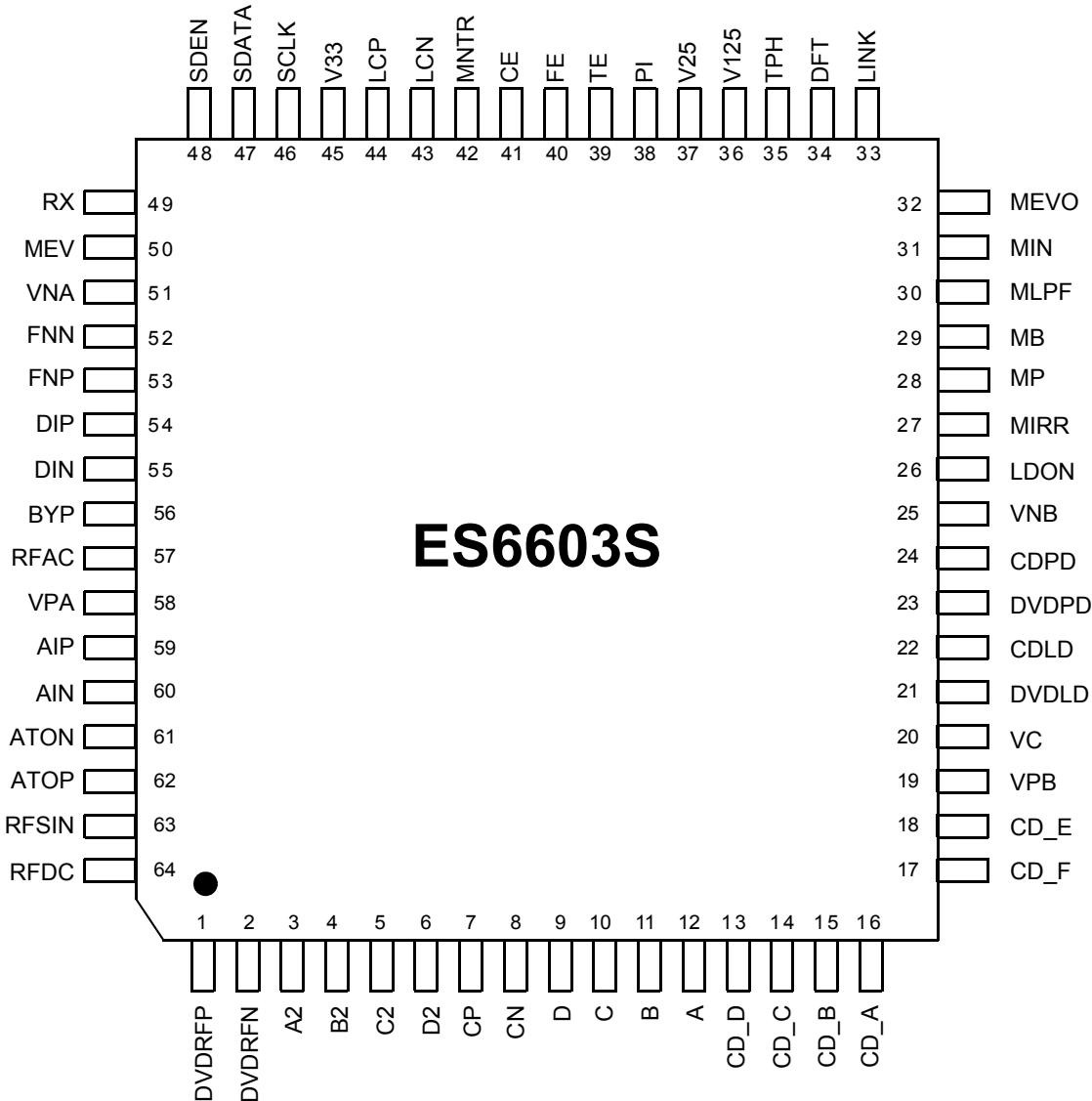
ES6603 Device Pinout

## ES6603 PIN DESCRIPTION

The table below lists the pin descriptions for the ES6603. The poundsymbol (#) indicates an active-low signal.

ES6603 Pin Descriptions List

| Name | Pin Numbers | I/O | Definition |
|---|---|---|---|
| DVDRFP, DVDRFN | 1, 2 | I | Differential RF signal attenuator inputs. |
| A2, B2, C2, D2 | 3:6 | I | AC coupled photo detector interface inputs for the differential phase detector (DPD) from the main beam photo matrix. |
| CP, CN | 7, 8 | ó | Differential phase tracking low-pass filter pins. Connect CP to CN via capacitors. |
| D, C, B, A | 9:12 | I | Photo detector interface inputs from the main beam photo matrix. |
| CD_D, CD_C, CD_B, CD_A | 13:16 | I | CD photo detector interface inputs from the main beam photo matrix. |
| CD_F, CD_E | 17, 18 | I | CD photo detector interface inputs from the CD side beam photo detector; used for CD tracking detection. |
| VPB | 19 | P | Servo block power supply. |
| VC | 20 | O | Reference voltage out (VPB/2). Output impedance is less than 50 . |
| DVDLD | 21 | O | DVD APC output; controls laser power for DVD. |
| CDLD | 22 | O | CD APC output; controls laser power for CD. |
| DVDPD | 23 | I | DVD APC input. |
| CDPD | 24 | I | CD APC input. |
| VNB | 25 | G | Servo block ground. |
| LDON | 26 | I | APC On/Off control. A high level activates LD output. (open is low) |
| MIRR | 27 | O | Mirror detect output. |
| MP, MB | 28, 29 | I | Mirror top and bottom hold pins.Connected to VPB pin 19 via capacitors. |
| MLPF | 30 | I | Mirror low-pass filter pins. Connected to VPB pin 19 via a capacitor. |
| MIN | 31 | I | RF input signal for mirror. AC coupled inputs for the mirror detection circuit from MEVO pin 32. |
| MEVO | 32 | O | RFDC bottom envelope out. Pull-In or bottom clamped RF envelope signal output for mirror detection. |
| LINK | 33 | I,O | Linking Signal In/Mirror Monitor Out. In the linking area, the mirror and tracking error outputs are disabled when this pin goes high. When the monitor output signal is selected by the Control H register, mirror-related signals can be observed. |
| DFT | 34 | O | Defect output. When the Pull-In signal level is below the detection level, or when the RF signal level is below the detection level, the DFT output goes high. The defect output is selected by the serial port. |
| TPH | 35 | I | Pull-In top hold. Connected to VPB pin 19 via a capacitor. |
| V125 | 36 | O | 1.25V servo block reference voltage output. |
| V25 | 37 | P | 2.5V servo output reference power supply. |
| PI | 38 | O | Pull-In signal out. The summing signal output of A, B, C, D, or CD_A, CD_B, CD_C, or CD_D. Reference to V25/3. |
| TE | 39 | O | Tracking error output reference to V125 pin 36. |
| FE | 40 | O | Focusing error output reference to V125 pin 36. |

ES6603 PIN DESCRIPTION

ES6603 Pin Descriptions List (Continued)

| Name | Pin Numbers | I/O | Definition |
|---|---|---|---|
| CE | 41 | O | Center error output reference to V125 pin 36. |
| MNTR | 42 | O | Monitor out signal. Output is selectable by register settings. |
| LCN, LCP | 43, 44 | I | Lens shift offset cancellation low-pass filter pins. Connect LCN to LCP via a capacitor. |
| V33 | 45 | P | 3.3V output buffers power supply. |
| SCLK | 46 | I | Serial clock from ES66x8. |
| SDATA | 47 | I/O | Serial data I/O. |
| SDEN | 48 | I | Serial data enable. Enabled by an active-high signal. |
| RX | 49 | I | Reference resistor. Connected to ground via a 12.0k , 1% resistor.. |
| MEV | 50 | I | RFDC bottom envelope. Connected to VPA pin 58 via a capacitor. |
| VNA | 51 | G | RF block and serial port ground. |
| FNN, FNP | 52, 53 | O | Differential outputs of equalizer/filter. |
| DIP, DIN | 54, 55 | I | Differential analog inputs to the RF single-end output buffer and full wave rectifier. |
| BYP | 56 | I | AGC amplifier gain bypass. Tied to VPA via a capacitor. |
| RFAC | 57 | O | Single-ended RF output. |
| VPA | 58 | P | RF block and serial port power supply. |
| AIP, AIN | 59, 60 | I | Differential AGC amplifier inputs. |
| ATON, ATOP | 61, 62 | O | Differential attenuator outputs. |
| RFSIN | 63 | I | Single-ended RF signal attenuator input. |
| RFDC | 64 | O | Single-ended RF summing output. |

**20**

## ES6603 DEVICE INTERFACES
The table below lists the device interfaces for the ES6603.

ES6603 Device Interfaces

| Name | Pin Numbers | I/O | Definition |
|---|---|---|---|
| AGC Interface | 59, 60 | I | Differential AGC amplifier inputs [AIP] and [AIN]. |
| Automatic Laser Power Control (APC) Interface | 21 | O | APC laser power control for DVD [DVDLD]. |
| | 22 | O | APC laser power control for CD [CDLD]. |
| | 23 | I | APC photo diode in for DVD [DVDPD]. |
| | 24 | I | APC photo diode in for CD [CDPD]. |
| | 26 | I | APC input on/off control [LDON]. |
| CD/DVD Photo Detector Interface | 3:6 | | DVD differential phase detector matrix inputs [A2], [B2], [C2], and [D2]. |
| | 9:12 | I | DVD single-ended phase detector matrix inputs [A], [B], [C], and [D]. |
| | 13:16 | I | CD photo detector interface inputs [CD_A], [CD_B], [CD_C] and [CD_D]. |
| | 17, 18 | I | CD side beam photo detector tracking outputs [CD_E] and [CD_F]. |
| Embedded Servo DSP Interface | 26 | I | APC input on/off control [LDON] from embedded servo DSP. |
| | 33 | I/O | Linking signal and mirror monitor control I/O [LINK]. |
| | 34 | O | Defect output [DFT] to embedded servo DSP. |
| | 38 | O | Pull-In signal [PI] to embedded servo DSP. |
| | 39 | O | Tracking error [TE] to embedded servo DSP. |
| | 40 | O | Focusing error [FE] to embedded servo DSP. |
| | 41 | O | Center error [CE] to embedded servo DSP.. |
| | 46 | I | Serial clock [SCLK] from embedded servo DSP. |
| | 47 | I/O | Serial data I/O [SDATA] for embedded servo DSP. |
| | 48 | I | Serial data enable [SDEN] from embedded servo DSP. |
| Filtering and Reference Voltage | 7, 8 | I | Differential phase tracking low-pass filters [CP] and [CN]. |
| | 20 | O | DC bias reference voltage [VC]. |
| | 30 | I | Mirror low-pass filter [MLPF]. |
| | 36 | O | Servo block reference voltage [V125]. |
| | 43, 44 | I | Lens shift offset cancellation low-pass filters [LCP] and [LCN]. |
| | 64 | O | Single-ended RF summing output reference [RFDC]. |
| Power and Ground | 19 | P | Servo block port power supply [VPB]. |
| | 25 | G | Servo block ground [VNB]. |
| | 37 | P | 2.5V reference voltage servo output power supply [V25]. |
| | 45 | P | 3.3V output buffers power supply [V33]. |
| | 51 | G | RF block and serial port ground [VNA]. |
| | 58 | P | RF block and serial port power supply [VPA]. |
| AGC and Filter Interface | 1,2 | I | Differential RF signal attenuator inputs [DVDRFP] and [DVDRFN]. |
| | 52, 53 | O | Differential normal filter outputs [FNP] and [FNN]. |
| | 54, 55 | I | Differential analog RF buffer inputs [DIP] and [DIN]. |
| | 57 | O | Single-ended RF output [RFAC]. |
| | 63 | I | Single-ended RF signal attenuator input [RFSIN]. |
| | 61, 62 | O | Differential attenuator outputs [ATOP] and ATON]. |
| Serial Port Interface | 46 | I | Serial clock from ES66x8 [SCLK]. |
| | 47 | I/O | Serial data I/O [SDATA]. |
| | 48 | I | Serial data enable [SDEN]. |

## SYSTEM BLOCK DIAGRAM
A sample system block diagram featuring the ES6603 and
the ES66x8 Vibratto-II DVD processor with embedded
servo DSP is depicted in the figure below.
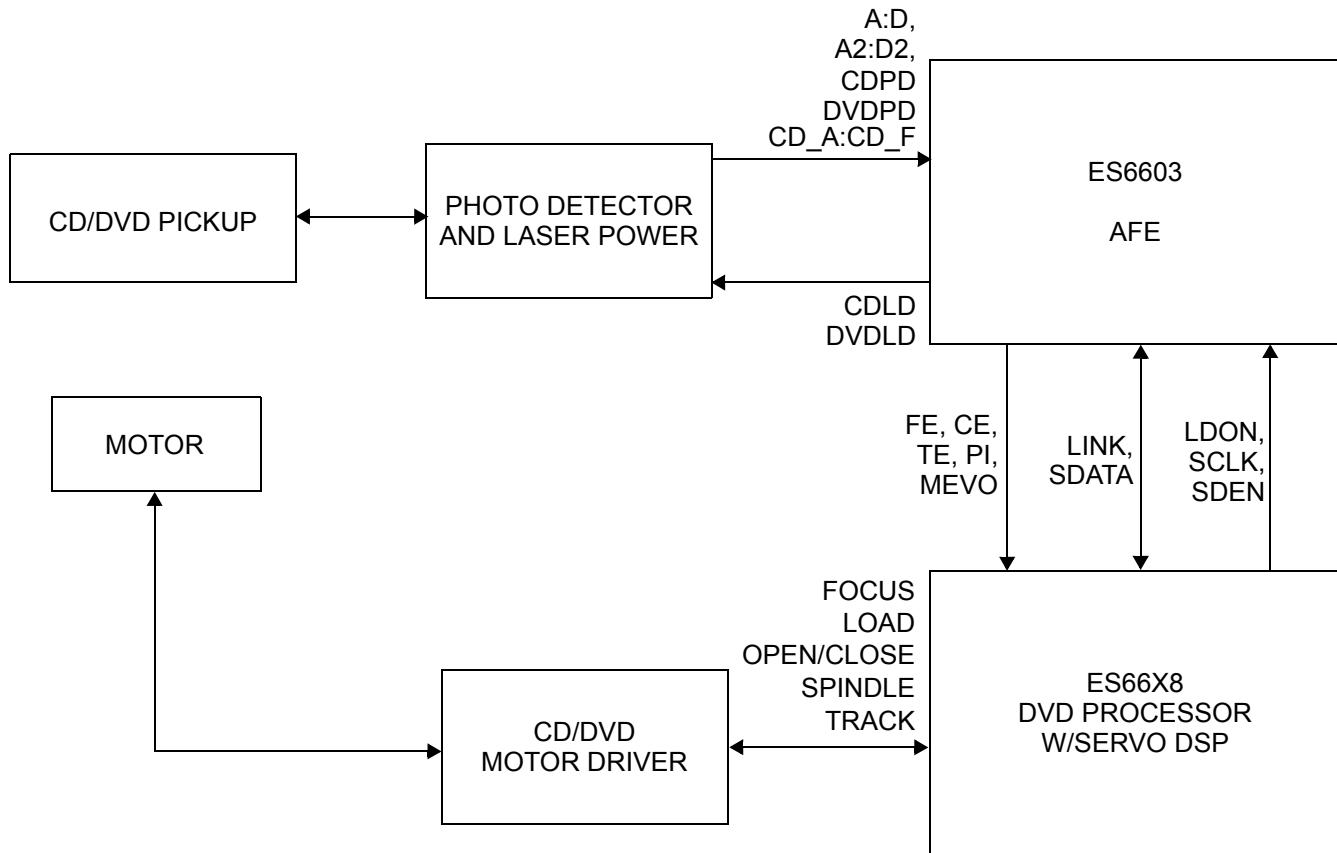
ES6603/ES66x8 Block Diagram

# BLOCK DIAGRAM

The major subsystem of the ES6603 are shown in the figure below.
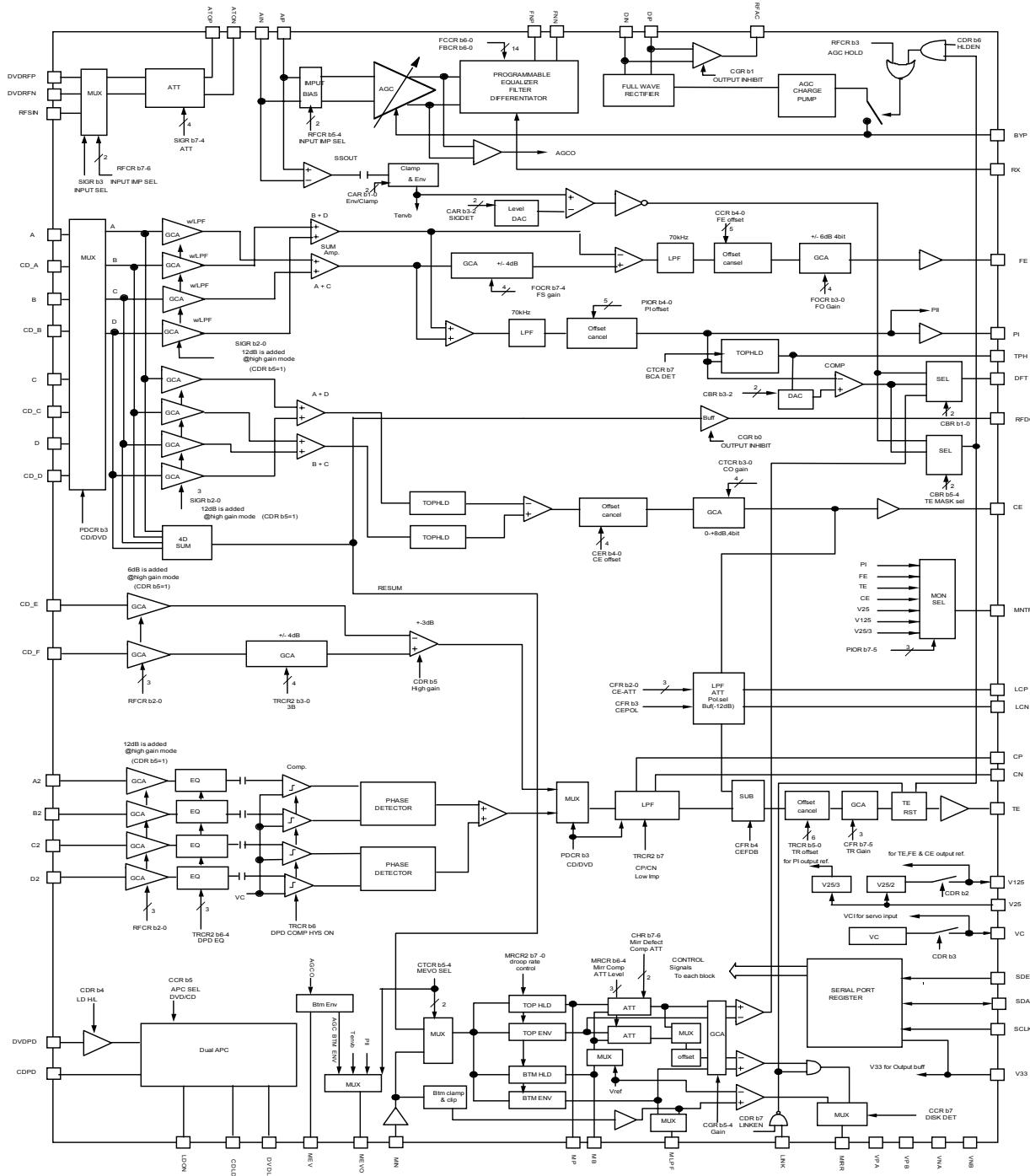


ES6603 Block Diagram

## ES6688/6698

The figure below depicts the ES6688/98 device pinout.
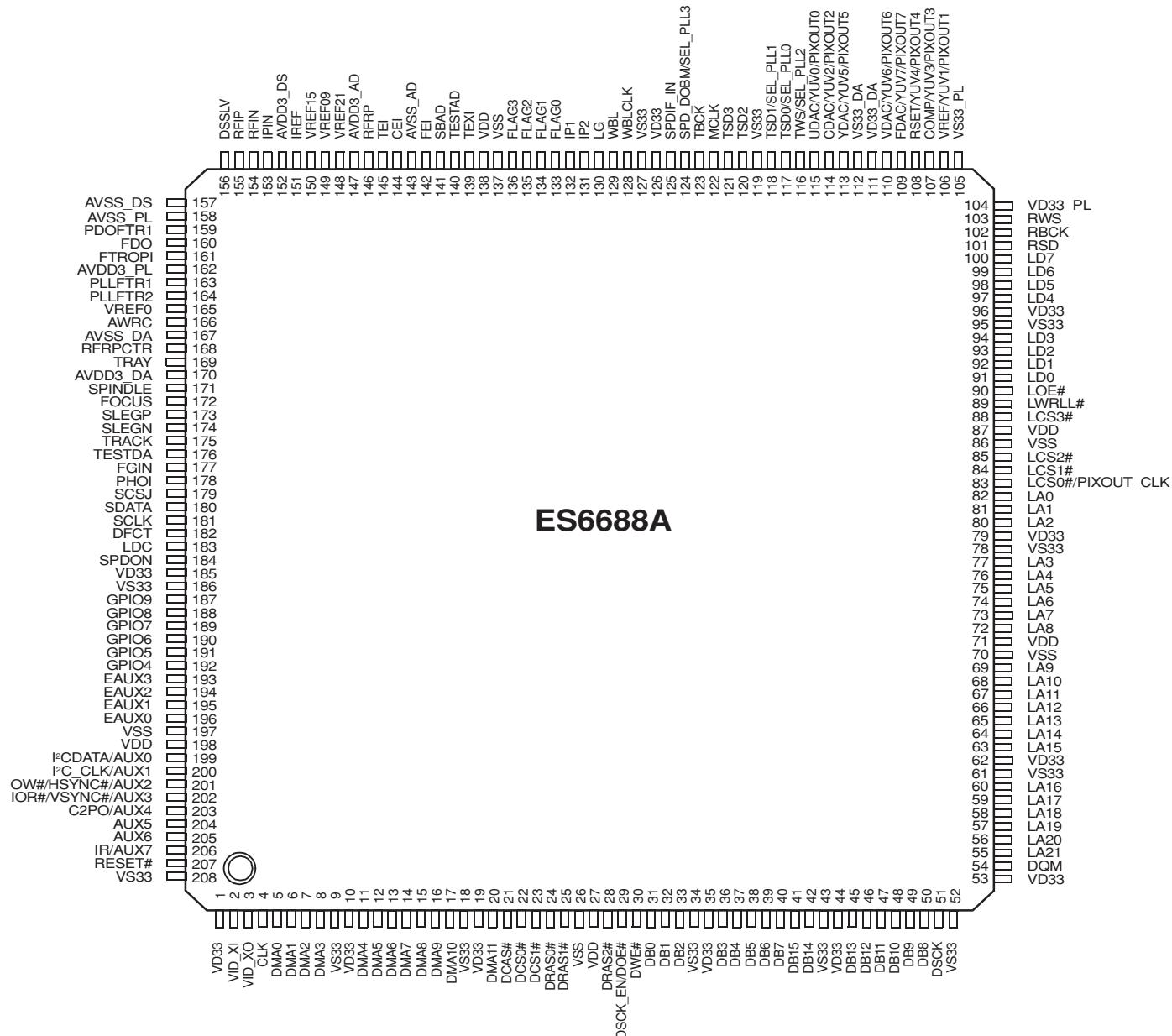
# ES6688/98 DEVICE INTERFACES
The table below lists the device interfaces for the ES6688/98.

ES6688A Pin Description

| Names | Pin Numbers | I/O | Definitions |
|---|---|---|---|
| VD33 | 1, 10, 19, 35, 44, 53, 62, 79, 96, 126, 185 | P | I/O power supply. |
| VID_XI | 2 | I | Crystal input. |
| VID_XO | 3 | O | Crystal output. |
| CLK | 4 | I | System clock. |
| DMA[11:0] | 5:8 11:17, 20 | O | DRAM address bus. |
| VS33 | 9, 18, 34, 43, 52, 61, 78, 95, 119, 127, 186, 208 | G | Ground for I/O power supply. |
| DCAS# | 21 | O | DRAM column address strobe (active-low). |
| DCS[1:0]# | 22, 23 | O | DRAM chip select (active-low). |
| DRAS[2:0]# | 24, 25, 28 | O | DRAM row address strobe (active-low). |
| VSS | 26, 70, 86, 137, 197 | G | Ground for core power supply. |
| VDD | 27, 71, 87, 138, 198 | P | Core power supply. |
| DSCK_EN | 29 | O | DRAM clock enable output. |
| DOE# | | O | DRAM output enable (active-low). |
| DWE# | 30 | O | DRAM write enable (active-low). |
| DB[15:0] | 31:33, 36:42, 45:50 | I/O | DRAM data bus. |
| DSCK | 51 | O | Output clock to DRAM. |
| DQM | 54 | O | Data input/output mask. |
| LA[21:0] | 55:60, 63:69, 72:77, 80:82 | O | RISC port address bus. |
| LCS0# | 83 | O | RISC port chip select (active-low). |
| PIXOUT_CLK | | O | CCIR656 output pixel clock. |
| LCS[3:1]# | 84, 85, 88 | O | RISC port chip select (active-low). |
| LWRLL# | 89 | O | RISC port low-byte write enable (active-low). |
| LOE# | 90 | O | RISC port output enable (active-low). |
| LD[7:0] | 91:94, 97:100 | I/O | RISC port data bus; (5V tolerant input). |
| RSD | 101 | I | Audio receive serial data; (5V tolerant input). |
| RBCK | 102 | I | Audio receive bit clock; (5V tolerant input). |
| RWS | 103 | I | Audio receive frame sync; (5V tolerant input). |
| VD33_PL | 104 | P | Power for PLL blocks. |
| VS33_PL | 105 | G | Ground for PLL blocks. |

ES6688A Pin Description (Continued)

| Names | Pin Numbers | I/O | Definitions |
|-------|-------------|-----|-------------|
| VREF | | I | Internal voltage reference to video DAC. |
| YUV1 | 106 | O | YUV pixel 1 output data. |
| PIXOUT1 | | O | CCIR656 output pixel 1. |
| COMP | | I | Compensation input. |
| YUV3 | 107 | O | YUV pixel 3 output data. |
| PIXOUT3 | | O | CCIR656 output pixel 3. |
| RSET | | I | DAC current adjustment resistor input. |
| YUV4 | 108 | O | YUV pixel 4 output data. |
| PIXOUT4 | | O | CCIR656 output pixel 4. |
| FDAC | | O | Video DAC output. Refer to description and matrix for UDAC pin 115. |
| YUV7 | 109 | O | YUV pixel 7 output data. |
| PIXOUT7 | | O | CCIR656 output pixel 7. |
| VDAC | | O | Video DAC output. Refer to description and matrix for UDAC pin 115. |
| YUV6 | 110 | O | YUV pixel 6 output data. |
| PIXOUT6 | | O | CCIR656 output pixel 6. |
| VD33_DA | 111 | P | Power for I/O power supply for VDAC. |
| VS33_DA | 112 | G | Ground for I/O power supply for VDAC. |
| YDAC | | O | Video DAC output. Refer to description and matrix for UDAC pin 115. |
| YUV5 | 113 | O | YUV pixel 5 output data. |
| PIXOUT5 | | O | CCIR656 output pixel 5. |
| CDAC | | O | Video DAC output. Refer to description and matrix for UDAC pin 115. |
| YUV2 | 114 | O | YUV pixel 2 output data. |
| PIXOUT2 | | O | CCIR656 output pixel 2. |

ES6688A Pin Description (Continued)

| Names | Pin Numbers | I/O | Definitions |
|---|---|---|---|
| UDAC | 115 | O | Video DAC output. |
| YUV0 | | O | YUV pixel 0 output data. |
| PIXOUT0 | | O | CCIR656 output pixel 0. |
| TWS | | O | Audio transmit frame sync output. |
| SEL_PLL2 | 116 | I | System and DSCK output clock frequency selection is made at the rising edge of RESET#. The matrix below lists the available clock frequencies and their respective PLL bit settings. Strapped to VCC or ground via 4.7-k&!resistor; read-only during reset. |

Within the UDAC Definitions cell:

| Value | F DAC (pin 109) | V DAC (pin 110) | Y DAC (pin 1130) | C DAC (pin 114) | U DAC (pin 115) |
|---|---|---|---|---|---|
| 0 | CVBS/Chroma | CVBS1 | Y | C | N/A |
| 1 | CVBS/Chroma | CVBS1 | Y | C | CVBS2 |
| 2 | CVBS/Chroma | N/A | Y | C | N/A |
| 3 | CVBS/Chroma | CVBS1 | N/A | N/A | CVBS2 |
| 4 | CVBS/Chroma | CVBS1 | N/A | N/A | N/A |
| 5 | CVBS/Chroma | CVBS1 | Y | Pb | Pr |
| 6 | CVBS/Chroma | N/A | Y | Pb | Pr |
| 7 | N/A | SYNC | G | B | R |
| 8 | CVBS/Chroma | Chroma | Y | Pb | Pr |
| 9 | CVBS | CVBS1 | G | B | R |
| 10 | CVBS | CVBS1 | G | R | B |
| 11 | N/A | SYNC | G | R | B |
| 12 | CVBS/Chroma | N/A | Y | Pr | Pb |
| 13 | CVBS/Chroma | CVBS1 | Y | Pr | Pb |
| 14 | Chroma | Y | G | R | B |

F: CVBS/chroma signal for simultaneous mode.
Y: Luma component for YUV and Y/C processing.
C: Chrominance signal for Y/C processing.
U: Chrominance component signal for YUV mode.
V: Chrominance component signal for YUV mode.

Within the SEL_PLL2 Definitions cell:

| SEL_PLL2 | SEL_PLL1 | SEL_PLL0 | Clock Type (MHz) |
|---|---|---|---|
| 0 | 0 | 0 | CLK · 4.5 |
| 0 | 0 | 1 | CLK · 5.0 |
| 0 | 1 | 0 | Bypass |
| 0 | 1 | 1 | CLK · 4.0 |
| 1 | 0 | 0 | CLK · 4.25 |
| 1 | 0 | 1 | CLK · 4.75 |
| 1 | 1 | 0 | CLK · 5.5 |
| 1 | 1 | 1 | CLK · 6.0 |

ES6688A Pin Description (Continued)

| Names | Pin Numbers | I/O | Definitions |
|---|---|---|---|
| TSD0 | 117 | O | Audio transmit serial data port 0. |
| SEL_PLL0 | | I | Refer to the description and matrix for SEL_PLL2, pin 116. |
| TSD1 | 118 | O | Audio transmit serial data port 1. |
| SEL_PLL1 | | I | Refer to the description and matrix for SEL_PLL2, pin 116. |
| TSD2, 3 | 120, 121 | O | Audio transmit serial data ports 2 and 3. |
| MCLK | 122 | I/O | Audio master clock for audio DAC. |
| TBCK | 123 | O | Audio transmit bit clock. |
| SPD_DOBM | 124 | O | S/PDIF output. |
| SEL_PLL3 | | I | Clock source select. Strapped to VCC or ground via 4.7-k&!resistor; read only during reset.<br><br>| **SEL_PLL3** | **Clock Source** |<br>|---|---|<br>| 0 | Crystal oscillator |<br>| 1 | CLK input | |
| SPDIF_IN | 125 | I | S/PDIF input; (5V tolerant input). |
| WBLCLK | 128 | O | DVD-RAM wobble detector circuit clock source to preamp. |
| WBL | 129 | O | DVD-RAM wobble output. |
| LG | 130 | O | DVD-RAM land/groove flag. |
| IP2 | 131 | I | DVD-RAM header position index 2. |
| IP1 | 132 | I | DVD-RAM header position index 1. |
| FLAG[3:0] | 133:136 | O | To monitor servo status. |
| TEXI | 139 | I | High-speed tracking error input. |
| TESTAD | 140 | I | Test AD input. |
| SBAD | 141 | I | Sub-beam addition input signal. |
| FEI | 142 | I | Focus input error signal. |
| AVSS_AD | 143 | G | Analog ground for ADC block. |
| CEI | 144 | I | Center error input signal. |
| TEI | 145 | I | Tracking error input signal. |
| RFRP | 146 | I | RF ripple/envelope input signal. |
| AVDD3_AD | 147 | P | Analog power supply for ADC block. |
| VREF21 | 148 | O | 2.1V reference voltage. |
| VREF09 | 149 | O | 0.9V reference voltage. |
| VREF15 | 150 | O | 1.5V reference voltage. |
| IREF | 151 | I | Servo data PLL interface reference current generator. Connect a resistor between this pin and ground to set reference current. |
| AVDD3_DS | 152 | P | Analog power supply for data slicer block. |

ES6688A Pin Description (Continued)

| Names | Pin Numbers | I/O | Definitions |
|---|---|---|---|
| IPIN | 153 | I | Inverting input of data slicer. |
| RFIN | 154 | I | Analog RF signal input after passing through equalizer (minus). |
| RFIP | 155 | I | Analog RF signal input after passing through equalizer (plus). |
| DSSLV | 156 | O | Data slicer level output. |
| AVSS_DS | 157 | G | Analog ground for data slicer block. |
| AVSS_PL | 158 | G | Analog ground for data PLL block. |
| PDOFTR1 | 159 | O | Servo data PLL phase detector filter pin number 1. |
| FDO | 160 | O | Servo data PLL output node of frequency detector charge pump. |
| FTROPI | 161 | I | Servo data PLL input node of loop filter OP circuit. |
| AVDD3_PL | 162 | P | Analog power supply for data PLL block. |
| PLLFTR1 | 163 | I | Servo data PLL loop filter pin number 1. |
| PLLFTR2 | 164 | I | Servo data PLL loop filter pin number 2. |
| VREF0 | 165 | O | Servo data PLL reference voltage output. |
| AWRC | 166 | I/O | Auto wide range control VCO signal from/to AWRC DAC. |
| AVSS_DA | 167 | G | Analog ground for DAC part. |
| RFRPCTR | 168 | I/O | Central level of RFRP. |
| TRAY | 169 | O | Output voltage level for tray buffer IC. |
| AVDD3_DA | 170 | P | Analog power supply for DAC part. |
| SPINDLE | 171 | O | Output voltage level for spindle buffer IC. |
| FOCUS | 172 | O | Output voltage level for focus buffer IC. |
| SLEGP | 173 | O | Output voltage level for Sledge buffer IC (plus). |
| SLEGN | 174 | O | Output voltage level for Sledge buffer IC (minus). |
| TRACK | 175 | O | Output voltage level for tracking buffer IC. |
| TESTDA | 176 | O | Test DA output. |
| FGIN | 177 | I | Spindle hall sensor input. |
| PHOI | 178 | I | Sledge photo interrupt signal input. |
| SCSJ | 179 | O | Chip selection signal to RF chip (serial data enable). |
| SDATA | 180 | I/O | Data signal from/to RF chip. |
| SCLK | 181 | O | Serial clock source to RF chip. |
| DFCT | 182 | I | Defect flag input signal. |
| LDC | 183 | O | Laser diode on/off control output. |
| SPDON | 184 | O | Spindle power driver on/off control output. |
| GPIO9-7, 5 | 187-189, 191 | O | General-purpose open-collector output used for servo control; Pull up to VCC via a 4.7-k&!resistor. |
| GPIO6, 4 | 190, 192 | I/O | General-purpose input/output used for servo control; (5V tolerant input). |

ES6688A Pin Description (Continued)

| Names | Pin Numbers | I/O | Definitions |
|---|---|---|---|
| EAUX3 | 193 | O | Extended auxilliary port with open-collector output used for servo control; Pull up to VCC via a 4.7-k&!resistor. |
| EAUX2-0 | 194-196 | I/O | Extended auxilliary ports; (5V tolerant input). |
| I²CDATA | 199 | I/O | I²C data I/O; (5V tolerant input). |
| AUX0 | | I/O | Auxiliary port (open collector); (5V tolerant input). |
| I²C_CLK | 200 | I/O | I²C clock I/O; (5V tolerant input). |
| AUX1 | | I/O | Auxiliary port (open collector); (5V tolerant input). |
| IOW# | 201 | O | I/O Write strobe (LCS1) (active-low). |
| HSYNC# | | I/O | Horizontal sync (active-low); (5V tolerant input). |
| AUX2 | | I/O | Auxiliary port; (5V tolerant input). |
| IOR# | 202 | O | I/O Read strobe (LCS1) (active-low). |
| VSYNC# | | I/O | Vertical sync (active-low); (5V tolerant input). |
| AUX3 | | I/O | Auxiliary port; (5V tolerant input). |
| C2PO | 203 | I | Error correction flag from CD; (5V tolerant input). |
| AUX4 | | I/O | Auxiliary port; (5V tolerant input). |
| AUX5, 6 | 204, 205 | I/O | Auxiliary ports; (5V tolerant input). |
| IR | 206 | I | Infrared remote control input; (5V tolerant input). |
| AUX7 | | I/O | Auxiliary port; (5V tolerant input). |
| RESET# | 207 | I | Reset input (active-low); (5V tolerant input). |

ES6688A Device Interfaces

| Name | Pin Numbers | I/O | Definition |
|---|---|---|---|
| Audio Port Interface | 101 | I | Audio receive serial data input (RSD); (5V tolerant input). |
| | 102 | I | Audio receive bit clock input (RBCK); (5V tolerant input). |
| | 103 | I | Audio receive frame sync input (RWS); (5V tolerant input). |
| | 116 | O | Audio transmit frame sync output (TWS). |
| | 117, 118, 120, 121 | O | Audio transmit serial data outputs (TSD[3:0]). |
| | 122 | I/O | Audio DAC master clock (MCLK). |
| | 123 | O | Audio transmit bit clock output (TBCK). |
| | 124 | O | Sony/Philips Digital Interface audio output (SPD_DOBM). |
| | 125 | I | Sony/Philips Digital Interface audio input (SPDIF_IN); (5V tolerant input). |
| Auxiliary Port Interface | 193 | O | Extended auxilliary ports (EAUX3). |
| | 194-196 | I/O | Extended auxilliary ports (EAUX2-0); (5V tolerant input). |
| | 199, 200 | I/O | Open collector auxilliary ports (AUX1, 0); (5V tolerant input). |
| | 201-206 | I/O | Primary auxiliary port I/Os (AUX7-2); (5V tolerant input). |
| Clock Interface and Reset | 2 | I | 27-MHz crystal clock input (VID_XI). |
| | 3 | O | 27-MHz crystal clock output (VID_XO). |
| | 4 | I | System clock (CLK). |
| | 29 | O | DRAM clock enable output (DSCK_EN). |
| | 51 | O | Output clock (DSCK) to video memory (DRAM). |
| | 116:118 | I | Clock frequency select PLL outputs (SEL_PLL[2:0]). |
| | 207 | I | Reset input (active-low) (RESET#); (5V tolerant input). |
| Display Interface | 106:110, 113:115 | O | Pixel data outputs (YUV[7:0]). |
| | 201 | I/O | Horizontal sync (HSYNC#); (5V tolerant input). |
| | 202 | I/O | Vertical sync (VSYNC#); (5V tolerant input). |
| CCIR656 Output Port Interface | 106:110, 113:115 | O | CCIR656 output pixels [7:0]; [PIXOUT[7:0]]. |
| | 83 | O | CCIR656 output pixel clock [PIXOUT_CLK]. |
| EPROM/Flash ROM and RISC Port Interface | 55:60, 63:69, 72:77, 80:82 | O | RISC port address bus (LA[21:0]) to EPROM or Flash memory. |
| | 83:85 | O | RISC port chip select outputs (LCS[2:0]#) to EPROM or Flash memory. |
| | 89 | O | RISC port low-byte write enable output (LWRLL#) to EPROM or Flash memory. |
| | 90 | O | RISC port output enable (LOE#) to EPROM and Flash memory. |
| | 91:94, 97:100 | I/O | RISC port data bus (LD[7:0]) to EPROM or Flash memory; (5V tolerant input). |

ES6688A Device Interfaces (Continued)

| Name | Pin Numbers | I/O | Definition |
|---|---|---|---|
| Filter and Reference Voltage Interface | 106 | I | Video DAC reference voltage input (VREF). |
| | 107 | I | Compensation input (COMP). |
| Front Panel Display Interface | 206 | I | Infrared remote control input (IR); (5V tolerant input). |
| General-Purpose | 187-189, 191 | O | General-purpose open collector output (GPIO9-7, 5); Pull up to VCC using a 4.7-k&!resistor. |
| | 190, 192 | I/O | General-purpose I/O (GPIO6, 4); (5V tolerant input). |
| I2C Bus Interface | 199 | I/O | I2C data I/O (I2C_DATA); (5V tolerant input). |
| | 200 | I/O | I2C clock I/O (I2C_CLK); (5V tolerant input). |
| Power and Ground | 1, 10, 19, 35, 44, 53, 62, 79, 96, 126, 185 | P | I/O power supply (VD33). |
| | 9, 18, 34, 43, 52, 61, 78, 95, 119, 127, 186, 208 | G | I/O ground (VS33). |
| | 26, 70, 86, 137, 197 | G | Ground for core power (VSS). |
| | 27, 71, 87, 138, 198 | P | Core power supply (VDD). |
| | 104 | P | Power supply for PLL block (VD33_PL). |
| | 105 | G | Ground for PLL block (VS33_PL). |
| | 111 | P | Power supply for video DAC (VD33_DA). |
| | 112 | G | Ground for video DAC (VS33_DA). |
| | 143 | G | Analog ground for ADC (AVSS_AD). |
| | 147 | P | Analog power supply for ADC (AVDD3_AD). |
| | 152 | P | Analog power supply for data slicer (AVDD3_DS). |
| | 157 | G | Analog ground for data slicer (AVSS_DS). |
| | 158 | G | Analog ground for data PLL (AVSS_PL). |
| | 162 | P | Analog power supply for data PLL (AVDD3_PL). |
| | 167 | G | Analog ground for DAC (AVSS_DA). |
| | 170 | P | Analog power supply for DAC (AVDD3_DA). |
| Serial Port Interface | 203 | I | C2PO error correction flag from CD (C2PO); (5V tolerant input). |
| Servo Data Slicer Interface | 153 | I | Inverting input of data slicer (IPIN). |
| | 154 | I | Analog RF signal input after passing through equalizer (minus) (RFIN). |
| | 155 | I | Analog RF signal input after passing through equalizer (plus) (RFIP). |
| | 156 | O | Data slicer level output (DSSLV). |

ES6688A Device Interfaces (Continued)

| Name | Pin Numbers | I/O | Definition |
|---|---|---|---|
| Servo DAC Interface | 166 | I/O | Auto wide range control VCO signal from/to AWRC DAC (AWRC). |
| | 168 | I/O | Central level of RFRP (RFRPCTR). |
| | 169 | O | Output voltage level for tray buffer IC (TRAY). |
| | 171 | O | Output voltage level for spindle buffer IC (SPINDLE). |
| | 172 | O | Output voltage level for focus buffer IC (FOCUS). |
| | 173 | O | Output voltage level for Sledge buffer IC (plus) (SLEGP). |
| | 174 | O | Output voltage level for Sledge buffer IC (minus) (SLEGN). |
| | 175 | O | Output voltage level for tracking buffer IC (TRACK). |
| | 176 | O | Test DA output (TESTDA). |
| Servo Comparator Interface | 139 | I | High-speed tracking error input (TEXI). |
| Servo ADC Interface | 140 | I | Test AD input (TESTAD). |
| | 141 | I | Sub-beam addition input signal (SBAD). |
| | 142 | I | Focus input error signal (FEI). |
| | 144 | I | Center error input signal (CEI). |
| | 145 | I | Tracking error input signal (TEI). |
| | 146 | I | RF ripple/envelope input signal (RFRP). |
| | 148 | O | 2.1V reference voltage (VREF21). |
| | 149 | O | 0.9V reference voltage (VREF09). |
| | 150 | I | 1.5V reference voltage (VREF15). |
| Servo PLL Interface | 151 | I | Servo data PLL interface reference current generator. Connect a resistor between this pin and ground to set reference current (IREF). |
| | 159 | O | Servo data PLL phase detector filter pin number 1 (PDOFTR1). |
| | 160 | O | Servo data PLL output node of frequency detector charge pump (FDO). |
| | 161 | I | Servo data PLL input node of loop filter OP circuit (FTROPI). |
| | 163 | I | Servo data PLL loop filter pin number 1 (PLLFTR1). |
| | 164 | I | Servo data PLL loop filter pin number 2 (PLLFTR2). |
| | 165 | O | Servo data PLL reference voltage output (VREF0). |

ES6688A Device Interfaces (Continued)

| Name | Pin Numbers | I/O | Definition |
|---|---|---|---|
| Servo Control and Data Interface | 133:136 | O | To monitor servo status (FLAG[3:0]). |
| | 177 | I | Spindle hall sensor input (FGIN). |
| | 178 | I | Sledge photo interrupt signal input (PHOI). |
| | 179 | O | Chip selection signal to RF chip (serial data enable) (SCSJ). |
| | 180 | I/O | Data signal from/to RF chip (SDATA). |
| | 181 | O | Serial clock source to RF chip (SCLK). |
| | 182 | I | Defect flag input signal (DFCT). |
| | 183 | O | Laser diode on/off control output (LDC). |
| | 184 | O | Spindle power driver on/off control output (SPDON). |
| | 187-189, 191 | O | General-purpose open collector output used for servo control (GPIO9-7, 5); Pull up to VCC using a 4.7-k&!resistor. |
| | 190, 192 | I/O | General-purpose input/output used for servo control (GPIO6, 4); (5V tolerant input). |
| Servo DVD-RAM Interface | 128 | O | DVD-RAM wobble detector circuit clock source to preamp (WBLCLK). |
| | 129 | O | DVD-RAM wobble output (WBL). |
| | 130 | O | DVD-RAM land/groove flag (LG). |
| | 131 | I | DVD-RAM header position index 2 (IP2). |
| | 132 | I | DVD-RAM header position index 1 (IP1). |
| System Memory Interface | 5:8, 11:17, 20 | O | DRAM address bus (DMA[11:0]). |
| | 21 | O | Memory column address strobe output (DCAS#). |
| | 22, 23 | O | DRAM chip select outputs (DCS[1:0]#). |
| | 24, 25, 28 | O | Memory row address strobe output (DRAS[2:0]#). |
| | 29 | O | Memory output enable (DOE#). |
| | 30 | O | Memory write enable output (DWE#). |
| | 31:33, 36:42, 45:50 | I/O | Memory data bus (DB[15:0]). |
| | 51 | O | Output clock to DRAM (DSCK). |
| | 54 | O | Memory data I/O mask output (DQM). |
| Video DAC Interface | 109 | O | CVBS/chroma signal (FDAC) for simultaneous mode. |
| | 110 | O | Composite component signal (VDAC) for YUV mode. |
| | 113 | O | Luma component signal (YDAC) for YUV mode and Y/C processing. |
| | 114 | O | Chrominance component signal (CDAC) for Y/C processing. |
| | 115 | O | Chrominance component signal (UDAC) for YUV mode. |

## SYSTEM BLOCK DIAGRAM

A sample system block diagram for the ES66x8 Vibratto-II DVD player board design
is show in the figure below.
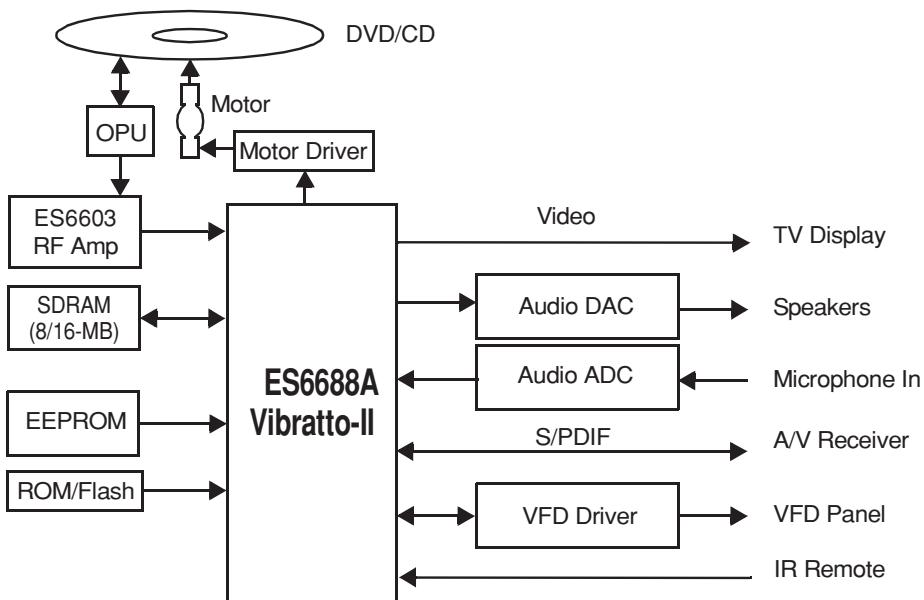


Figure 2  ES6688A Vibratto-II System Block Diagram

# 5. Exploded View and Spare Parts Lists

## Exploded View
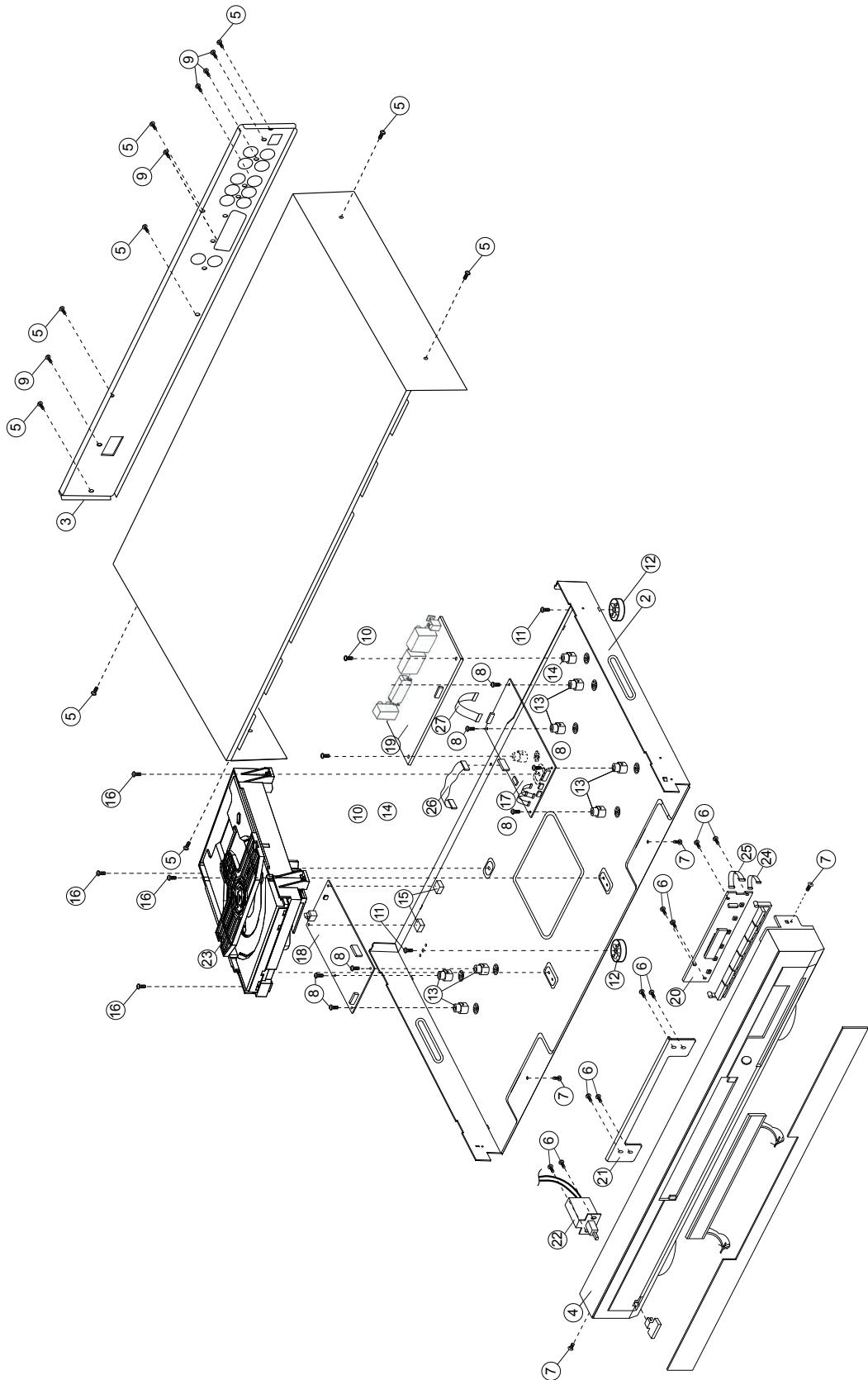
## Spare Parts Lists

Structure Parts List

Note:  1. When replacing any of components, be sure to use only manufactures specified parts shown in the parts list.
  2. Important safety notice: Components identified by " ! " mark have special characteristics important for safety.

| Ref. No. | PART NUMBER | Part Name & Description | Pcs | Remarks |
|---|---|---|---|---|
| 1 | JKM3350-1 | Top Cover | 1 | |
| 2 | JMZ0001A | Thermoplastic tube | 2 | ⚠ |
| 3 | JMZ0001B | Thermoplastic tube | 1 | ⚠ |
| 4 | JSB0002 | POWER Switch | 1 | ⚠ |
| 5 | JWV0005 | Power wire ( 2P) | 1 | ⚠ |
| 6 | JGR4360 | Rear side panel | 1 | |
| 7 | JMK4350-2 | Chassis | 1 | |
| 8 | JKA2302 | Foot | 2 | |
| 9 | JMN0002 | Clip | 3 | |
| 10 | JMN2301 | Stanchion | 7 | |
| 11 | JMN2302 | Stanchion | 2 | |
| 12 | JGM2301 | Power board Rubber | 2 | |
| 13 | JWV12P2.5A | Connecting wire (12pin) | 1 | |
| 14 | JWJ30P1.0T80 | Flexible flat cable(30P) | 1 | |
| 15 | JYP3350P-2 | Front Panel | 1 | |
| 16 | JGK4350-BSA | Logo nameplate | 1 | |
| 17 | JMN3350 | Bracket | 1 | |
| 18 | JWV7P2.5A | Connecting wire (7pin) | 1 | |
| 19 | JWV6P2.5B | Connecting wire (6pin) | 1 | |
| 20 | JMG3350 | Foot rubber mat | 2 | |
| 21 | JQL0011D | adhesive tape (double side) | 1 | |
| 22 | DV34 | Optical pickup unit | 1 | ⚠ |
| 23 | KZG-D01 | Holder of mechanism | 1 | |
| 24 | JWJ24P0.5T190 | Flexible flat cable(24P) | 1 | |
| 25 | JWV6P2.0Y160 | Connecting wire (6 pin, pitch=2.0mm, L=160mm) | 1 | |
| 26 | JWV5P2.0T140 | Connecting wire (5 pin, pitch=2.0mm, L=140mm) | 1 | |
| 27 | JMG1313 | Board Rubber | 2 | |
| 28 | JMR0002 | Mechanism mat | 2 | |
| 29 | BA2.6×8 | Screw | 2 | |
| 30 | FM3×6 | Screw | 4 | |
| 31 | PA3×8 | Screw | 10 | |
| 32 | PWB3×8 | Screw | 2 | |
| 33 | PWB3×8-B | Screw | 8 | |
| 34 | PWM3×6 | Screw | 9 | |
| 35 | PWM3×8 | Screw | 4 | |
| 36 | PWM3×11 | Screw | 2 | |
| 37 | PWM3×15 | Screw | 7 | |

Electric Parts List

Note:
1. When replacing any of components, be sure to use only manufactures specified parts shown in the parts list.
2. Important safety notice: Components identified by "!" mark have special characteristics important for safety.
3. This product uses a laser diode. Refer to caution statements.
4. Capacity valuse are in microfarads (μF) unless specified otherwise, P=Pico-farads (pF), F=Farads (F); Resistance values are in ohms, unless specified otherwise, 1K=1,000(OHM),1M=1,000K(OHM).

| POS.    NO | PART NUMBER | DESCRIPTION | Pcs | Remarks |
|---|---|---|---|---|
| | JEP4364A | Output Board Module | 1 | |
| | JEP3353A | Operate Board Module | 1 | |
| | JEP4360P | Power Board Module | 1 | ⚠ |
| | JEP4361A | Decode Board Module | 1 | |
| | | | | |
| | JEP4364A | Output Board Module | 1 | |
| | JJB4364A-1 | PCB | 1 | |
| C701 | ECA1CHG221 | Aluminum electrolytic capacitor 220uF | 1 | |
| C702,C709,C714,C713,C720 | HLT1HC220K05F3D | Capacitor,ceramic 22pF | 5 | |
| C703,C706,C708 | HLT1HS101K05F3D | Capacitor,ceramic 100pF | 3 | |
| C715 | HLS1HF104Z07F3D | Capacitor,ceramic 100nF | 1 | |
| C711,C712,C704,C705,C716, C717,C718,C719 | HLK1HB102K05F3D | Capacitor,ceramic 1000pF | 8 | |
| FB702,FB703,FB704,FB705, FB706,FB707,FB709,FB713 ,FB714,FB721,W703,W704, W705,FB717,FB718,FB719, FB720 | EN9589 | Ferrite bead | 17 | |
| JS701 | JJS30P1.0S | Connector 30P  1.0mm | 1 | |
| X701,X702 | VJR0978 | Earthing strip | 2 | |
| J701 | ASW-03 | Terminal (CVBS+S-VIDEO) | 1 | |
| J702 | CS-106 | Terminal (SCART) | 1 | |
| J703 | AV6-8.4-13/PB | Terminal (5.1 channel  Audio) | 1 | |
| J704 | AV4-8403A | Terminal (Coaxial + YPbPr) | 1 | |
| J705 | TPK-TX178A | Terminal (Optical) | 1 | |
| W701,W702,W706,W707, W708,W709,W710 | Z-W6NL-H10 | Jumper  10mm | 7 | |
| R701 | ERD25TJ3R9B | Resistor  1/4W 3.9Ω ±5% | 1 | |
| | JEP3353A | Operate Board Module | 1 | |
| | JJB3353A | PCB | 1 | |
| E501,E502 | ECEA1AKA101-H5 | Aluminum electrolytic capacitor 100uF | 2 | |
| C502 | HLS1HF104Z07F3D | Capacitor,ceramic 100nF | 1 | |
| JP502 | JJU6P2.5A | Connector 6P  2.5mm | 1 | |
| JP501 | JJU7P2.5A | Connector 7P  2.5mm | 1 | |
| D502,D503,D504 | 1N4148 | Diode | 3 | |
| U502 | AT136BT-12DW | 36KHz IR Receiver | 1 | |
| R501 | ERD25TJ100D | Resistor  10Ω ±5% | 1 | |

| | | | | |
|---|---|---|---|---|
| R502 | ERD25TJ473D | Resistor 47K ±5% | 1 | |
| R504,R505,R506,R507,R508, R509,R510 | ERD25TJ103D | Resistor 10K ±5% | 7 | |
| SW501,SW502,SW503, SW504,SW505,SW506 | EVQPAE05R | Light Touch Button | 6 | |
| U501 | HNV05SS32 | VFD | 1 | |
| | JMG2302 | VFD rubber mat | 2 | |
| W502,W503,W505,W506 | Z-W6NL-H5 | Jumper 5mm | 4 | |
| W501,W504 | Z-W6NL-H7.5 | Jumper 7.5mm | 2 | |
| U503 | D16312 | IC | 1 | |
| | JEP4360P | Power Board Module | 1 | ⚠ |
| | JJB3302A | PCB | 1 | ⚠ |
| C609 C610 | ECA1HHG100 | Aluminum electrolytic capacitor 10uF | 2 | |
| C627 | ECA1CHG102 | Aluminum electrolytic capacitor 1000uF | 1 | |
| C614 | ECA1CHG222 | Aluminum electrolytic capacitor 2200uF | 1 | |
| C616 C618 C620 C625 C617 | ECA1EHG221 | Aluminum electrolytic capacitor 220uF | 5 | |
| C622 | ECA1EHG471 | Aluminum electrolytic capacitor 470uF | 1 | |
| C621 | ECA1HHG101 | Aluminum electrolytic capacitor 100uF | 1 | |
| C603 | HPW680M2GN30 | Aluminum electrolytic capacitor 68uF | 1 | |
| C601 C602 | AC275V-104K | Capacitor, 275V104 | 2 | ⚠ |
| C605 | HLK1HB471K05F3D | Capacitor,ceramic 470pF | 1 | |
| C606 | HLS1HF104Z07F3D | Capacitor,ceramic 100nF | 1 | |
| C631 C611 | HCM08051HY5V224ZB3 | Capacitor,ceramic 220nF | 2 | |
| C608 | ECKA3A472MBP | Capacitor,ceramic 4.7nF | 1 | |
| CY603 | HJE222M12H3 | Capacitor,ceramic 2.2nF | 1 | ⚠ |
| CON602 | JJS0002 | AC Connector 2P pitch=7.92mm | 1 | ⚠ |
| CON601 | K2AA2B000004 | AC inlet | 1 | ⚠ |
| D601 D602 D603 D604 | 1N4007-H02-1 | Diode | 4 | |
| D605 D607 D617 | FR104-H02-1 | Diode | 3 | |
| D606 | BZX55C16V | Zener diode | 1 | |
| D608 D613 D615 D616 | FR107-H02-1 | Diode | 4 | |
| D610 | 1N5822-M26 | Diode | 1 | |
| D618 D620 | RL205-H14 | Diode | 2 | |
| D619 | BZX55C9V1 | Zener diode | 1 | |
| F601 | JLF0001 | Choke | 1 | ⚠ |
| J603 | Z-W6NL-H7.5 | Jumper 7.5mm | 1 | |
| J601 J602 J605 J607 J608, CY604 | Z-W6NL-H10 | Jumper 10mm | 6 | |
| JS601 | JJU12P2.5A | Connector 12P 2.5mm | 1 | |
| JS602 | JJU6P2.5A | Connector 6P 2.5mm | 1 | |
| L602 | ELC10D100E | Inductor 10uH | 1 | |
| L603 L605 | ELEAA5R6JA | Inductor 5.6uH | 2 | |
| R601 | ERD25TJ753B | Resistor 75K ±5% | 1 | |
| R604 R605 | ERD25TF1R0B | Resistor 1Ω±5% | 2 | |

| | | | | |
|---|---|---|---|---|
| R607 | ERD25TJ101B | Resistor 100Ω±5% | 1 | |
| R608 | ERD25TJ223B | Resistor 22K ±5% | 1 | |
| R609 | ERD25TJ682B | Resistor 6.8K ±5% | 1 | |
| R631 | ERD25TJ100B | Resistor 10Ω±5% | 1 | |
| R610 | ERD25TJ472B | Resistor 4.7K ±5% | 1 | |
| R615 | ERD25TF512B | Resistor 5.1K ±1% | 1 | |
| R616 | ERD25TF532B | Resistor 5.3K ±1% | 1 | |
| R611 R617 | ERD25TJ102B | Resistor 1K ±5% | 2 | |
| R612 | ERX2SJ563H | Resistor 56K ±5% | 1 | |
| R619 | ERD25TJ333B | Resistor 33K ±5% 0.25W | 1 | |
| R630 | ERD25TJ103B | Resistor 10K ±5% 0.25W | 1 | |
| T601 | JTP2301 | Transformer | 1 | ⚠ |
| U601 | TEA1523P | IC | 1 | |
| U602 | H11A817C300 | IC | 1 | ⚠ |
| U603 | AZ431BZ-A | IC | 1 | |
| X601 X602 | VJR0978 | Earthing Strip | 2 | |
| ZA601 ZA602 | EYF52BC | Fuse socket | 2 | |
| FUSE601 | JSF0002 | Fuse | 1 | ⚠ |
| CY601,CY602 | HJE102M09H3 | Capacitor, 1nF/400V | 2 | ⚠ |
| ZX601 | RMCC001-1 | Earthing Strip | 1 | |
| | JEP4361A | **Decode Board Module** | | |
| U3 | 24C01 | IC | 1 | |
| QQ2,QQ1 | 2SB1115-T | SMT transistor | 2 | |
| UU2 | BA5954 | IC | 1 | |
| UU4 | BA6287F | IC | 1 | |
| D1,D2,D3,D4,D5 | BAT54RSLT1 | SMT diode | 5 | |
| B2,B26,CC73 | ECA1AM101 | Aluminum electrolytic capacitor 100uF | 3 | |
| B27 | ECA1AM470 | Aluminum electrolytic capacitor 47uF | 1 | |
| CC48,CC63,CC64,CC78,CC80 | ECA1CM101 | Aluminum electrolytic capacitor 47uF | 5 | |
| C37,C40,C47 | ECA1CM221 | Aluminum electrolytic capacitor 220uF | 3 | |
| B10,B12,C16,C17,B24,B25, C33,B36,B57,C61,C70,C72, C79,C18,C19,C21,C25,C28, B44,B54,C59,C60,C68,C69, C32,C43,C50,C55 | ECA1EM100 | Aluminum electrolytic capacitor 10uF | 28 | |
| CC82 | ECA1EM101 | Aluminum electrolytic capacitor 100uF | 1 | |
| C42 | ECA1EM471 | Aluminum electrolytic capacitor 470uF | 1 | |
| CC8 | ECA1EM4R7 | Aluminum electrolytic capacitor 4.7uF | 1 | |
| CC55,CC65,CC67 | ECJ1VB1C101K | SMT capacitor 100pF | 3 | |
| CC45,CC62 | ECJ1VB1C103K | SMT capacitor 0.01uF | 2 | |
| CC10,CC12,CC20,CC81,CC83 | ECJ1VB1C105Z | SMT capacitor 1uF | 5 | |
| C86 | ECJ1VB1C150Z | SMT capacitor 15pF | 1 | |
| C77,C84,C38,C46,C53,C64 | ECJ1VB1C151Z | SMT capacitor 150pF | 6 | |

| | | | | |
|---|---|---|---|---|
| CC28,CC31,CC32 | ECJ1VB1C153K | SMT capacitor 0.015uF | 3 | |
| CC60 | ECJ1VB1C161K | SMT capacitor 160pF | 1 | |
| CC58 | ECJ1VB1C224K | SMT capacitor 0.022uF | 1 | |
| C1,C2,C3,C4,C5,C6,C9,C10,C11,C12, | ECJ1VB1C331Z | SMT capacitor 330pF | 10 | |
| CC61 | ECJ1VB1C333K | SMT capacitor 0.033uF | 1 | |
| CC6,CC11,CC15,CC68 | ECJ1VB1C472K | SMT capacitor 470pF | 4 | |
| CC53,CC21 | ECJ1VB1C473K | SMT capacitor 0.047uF | 2 | |
| CC17 | ECJ1VB1C682K | SMT capacitor 680pF | 1 | |
| CC47 | ECJ1VB1C821Z | SMT capacitor 820pF | 1 | |
| CC41,CC43 | ECJ1VB1H471K | SMT capacitor 470pF | 2 | |
| CC23,CC30,CC33 | ECJ1VB1H561K | SMT capacitor 560pF | 3 | |
| CC50,CC51,CC52,CC54 | ECJ1VB1H681K | SMT capacitor 680pF | 4 | |
| C74,C75,C81,C82,C36,C35,C44,C45,C52,C51,C62,C63 | ECJ1VC1H220J | SMT capacitor 22pF | 12 | |
| C14,C13 | ECJ1VC1H240G | SMT capacitor 24pF | 2 | |
| CC35,CC36,CC37 | ECJ1VC1H330J | SMT capacitor 33pF | 3 | |
| CC25 | ECJ1VC1H470J | SMT capacitor 47pF | 1 | |
| B4,B6,B7,B8,B9,B11,B13,B14,B15,B16,B17,B18,B19,B20,B21,B22,B23,B28,CC29,B29,B30,B31,B32,B33,C34,B34, B35,B37,B38,B39,B40,C41,B41,C49,B55,C56,B56,C65,CC5,C7,C8,CC13,CC14,CC22,CC24,CC26,CC27,CC38,CC39,CC40,CC42,CC44,CC46,CC49,CC56,CC57,CC70,CC72,CC75,CC77,CC85,c27,B48,B49,B50,B51,C57,C58,C66,C67 | ECJ1VF1C104Z | SMT capacitor 0.1uF | 70 | |
| CC1,CC2,CC3,CC4,CC59,CC66,C78,C85,C39,C48,C54,C71 | ECUV1H102JCV | SMT capacitor 1000pF | 12 | |
| L1,L2,L3,L4,L5 | ELJEA1R8KF | SMT inductor 1.8uH | 5 | |
| U7 | EM6353BX1SP3B-4.4 | IC | 1 | |
| RR29,RR47 | ERJ3EKF1202V | SMT resistor 12K 0.1W ±1% | 2 | |
| ,R123,R140,R78,R90,R104,R111 | ERJ3EKF1802V | SMT resistor 18K 0.1W ±1% | 6 | |
| R121,R138,R76,R88,R101,R109 | ERJ3EKF3301V | SMT resistor 3.3K 0.1W ±1% | 6 | |
| R137,R120,R75,R87,R100,R108 | ERJ3EKF9101V | SMT resistor 9.1K 0.1W ±1% | 6 | |
| R22,R27,R34,RR35,RR73,R14,R19,R20,R28,R130,R113,R72,R82,R96,R106 | ERJ3GEY0R00V | SMT resistor 0Ω 0.1W | 15 | |
| RR40,RR39,R18 | ERJ3GEYJ100V | SMT resistor 10Ω 0.1W ±5% | 3 | |

| | | | | |
|---|---|---|---|---|
| RR8,R23,R24,RR36,RR50,R112,R122,R124,R126,R129,R139,R141,R142,R71,R77,R81,R89,R103,R95,R105,R110 | ERJ3GEYJ102V | SMT resistor 1K 0.1W ±5% | 21 | |
| RR5,RR9,RR10,RR16,RR42,RR63,RR69, R54 | ERJ3GEYJ103V | SMT resistor 10K 0.1W ±5% | 8 | |
| RR11,R47,R86,R94,R116,R134,R73,R85,R98,R107 | ERJ3GEYJ104V | SMT resistor 100K 0.1W ±5% | 10 | |
| R83,RR65 | ERJ3GEYJ105V | SMT resistor 1MΩ 0.1W ±5% | 2 | |
| R80 | ERJ3GEYJ106V | SMT resistor 10MΩ 0.1W ±5% | 1 | |
| RR14 | ERJ3GEYJ122V | SMT resistor 1.2K 0.1W ±5% | 1 | |
| R74,R79,R97 | ERJ3GEYJ151V | SMT resistor 150Ω 0.1W ±5% | 3 | |
| RR70,RR64 | ERJ3GEYJ152V | SMT resistor 1.5K 0.1W ±5% | 2 | |
| RR15 | ERJ3GEYJ183V | SMT resistor 18K 0.1W ±5% | 1 | |
| R91,R99 | ERJ3GEYJ202V | SMT resistor 2K 0.1W ±5% | 2 | |
| RR7 | ERJ3GEYJ203V | SMT resistor 20K 0.1W ±5% | 1 | |
| R118,R133,R136 | ERJ3GEYJ222V | SMT resistor 2.2K 0.1W ±5% | 3 | |
| RR72,RR66,RR41,RR45 | ERJ3GEYJ223V | SMT resistor 22K 0.1W ±5% | 4 | |
| RR26,RR27,RR28,R30,R31,R36,R37,R38,R39,R41,RR46,R49,R52,R53,R92,R60,R61 | ERJ3GEYJ330V | SMT resistor 33Ω 0.1W ±5% | 17 | |
| RR1,RR2,RR3,RR4,RR49, | ERJ3GEYJ332V | SMT resistor 3.3K 0.1W ±5% | 5 | |
| RR13 | ERJ3GEYJ333V | SMT resistor 33K 0.1W ±5% | 1 | |
| R13 | ERJ3GEYJ391V | SMT resistor 390Ω 0.1W ±5% | 1 | |
| R84 | ERJ3GEYJ470V | SMT resistor 47Ω 0.1W ±5% | 1 | |
| R6,R7,R8,R9,R10,R35,RR67 | ERJ3GEYJ472V | SMT resistor 4.7K 0.1W ±5% | 7 | |
| RR43,RR48 | ERJ3GEYJ473V | SMT resistor 47K 0.1W ±5% | 2 | |
| RR17,RR23 | ERJ3GEYJ512V | SMT resistor 5.1K 0.1W ±5% | 2 | |
| R102 | ERJ3GEYJ680V | SMT resistor 68Ω 0.1W ±5% | 1 | |
| RR20,RR21,RR24,RR25 | ERJ3GEYJ682V | SMT resistor 6.8K 0.1W ±5% | 4 | |
| RR6 | ERJ3GEYJ683V | SMT resistor 68K 0.1W ±5% | 1 | |
| R5,R11,R12,R15,R16,R119 | ERJ3GEYJ750V | SMT resistor 75Ω 0.1W ±5% | 6 | |
| R93 | ERJ3GEYJ910V | SMT resistor 91Ω 0.1W ±5% | 1 | |
| RR59,RR60,RR61,RR62 | ERJ6GEYJ1R0V | SMT resistor 1Ω 0.125W ±5% | 4 | |
| UU1 | ES6603S | IC | 1 | |
| U1 | ES6688FA | IC | 1 | |
| RN1,RN2,RN3,RN4,RN5 | EXB38V100JV | SMT Resistor Array 10Ω ×4 | 5 | |
| Y1 | HC49S27.000M | Crystal Oscillator | 1 | |
| U5 | IS42S16400A-7T | SDRAM | 1 | |
| | JJB2401A-003 | PCB | 1 | |
| CN1 | JJS24P0.5AL | Connector 24P 0.5mm | 1 | |
| JJ1 | JJS30P1.0S | Connector 30P 1.0mm | 1 | |
| JJ7 | JJU12P2.5A | Connector 12P 2.5mm | 1 | |
| JJ3 | JJU5P2.0A | Connector 5P 2.0mm | 1 | |

| JJ4 | JJU6P2.0A | Connector 6P  2.0mm | 1 | |
|---|---|---|---|---|
| JJ6 | JJU7P2.5A | Connector 7P  2.5mm | 1 | |
| FB1,FB2,FB4,LL1,LL2,L9,LL3,LL4,LL5,LL6,L6,L7,L8 | JLB0004 | SMT ferrite bead | 13 | 43 |
| QQ6,QQ8,Q15,Q18,Q19 | KST3904-MTF | SMT transistor | 5 | |
| DD1,DD2,DD3,D10,D11,D12 | LL4148-13 | SMT transistor | 6 | |
| U2 | M29W800DT-70N1 | FLASH | 1 | |
| U15,U12,U14 | OPA 4558 | IC | 3 | |
| U13 | PC74HCTO4T | IC | 1 | |
| Q7,Q8,Q9,Q13 | SMD-2N3906 | SMT transistor | 4 | |
| Q17,Q12,Q1,Q4,Q6,Q10,Q11 | SMD-2SC3326 | SMT transistor | 7 | |
| QQ7,QQ5 | SMD-2SK3018 | SMT transistor | 2 | |
| Q3,Q20,Q21 | SMD-8050 | SMT transistor | 3 | |
| Q5 | SMD-8550 | SMT transistor | 1 | |
| UU3 | TL3472 | IC | 1 | |
| U9 | WM8746 | IC | 1 | |

ACCESSORY PARTS LIST

Note:
1. When replacing any of components, be sure to use only manufactures specified parts shown in the parts list.
2. Important safety notice: Components identified by " ! " mark have special characteristics important for safety.

| Ref. No. | PART NUMBER | Part Name & Description | Pcs | Remarks |
|---|---|---|---|---|
| 1 | R03P-AAA | Battery | 2 | |
| 2 | JAK4360-BSA-1 | Remote control | 1 | |
| 3 | JFX0003 | Scart cable | 1 | |
| 4 | RJA0055-1K | Power cable | 1 | ⚠ |
| 5 | JPF0001 | Accessory bag | 1 | |
| 6 | JQC4360-BSA | Guarantee | 1 | |
| 7 | JQT4360-BSA-1 | User Manual | 1 | |
| 8 | JQL0010P | Adhesive Tape | 0.15 | |
| 9 | CZT1002-J | Adhesive Tape | 1.4 | |
| 10 | JPF0002-1 | Set  bag | 1 | |
| 11 | JPG4360B-BSA | Packing  case | 1/3 | |
| 12 | JPN3350A | Cushion (left) | 1 | |
| 13 | JPN3350B | Cushion (right) | 1 | |
| 14 | PRNC0020 | Cushion (front) | 1 | |