

# SERVICE MANUAL

## DV911S



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# 1. SAFETY PREAUTIONS

## 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 barrier, 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 availabel 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 alminum 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, alminum 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 harmless 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)

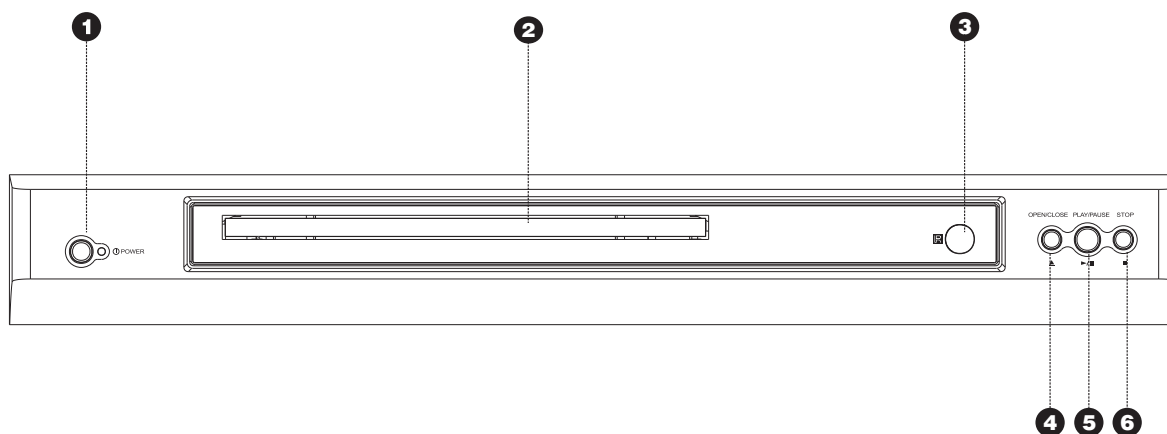
### IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are imporant for safety. These parts are marked by  $\triangle$  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.Control Button Locations and Explanations

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#### ■ Front Panel Illustration



**❶ POWER** switch

**❷ Disc** tray

**❸ IR SENSOR** button

**❹ OPEN/CLOSE** button

**❺ PLAY/PAUSE** button

**❻ STOP** button

## 4. 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.

### 4.1. Grounding for electrostatic breakdown prevention

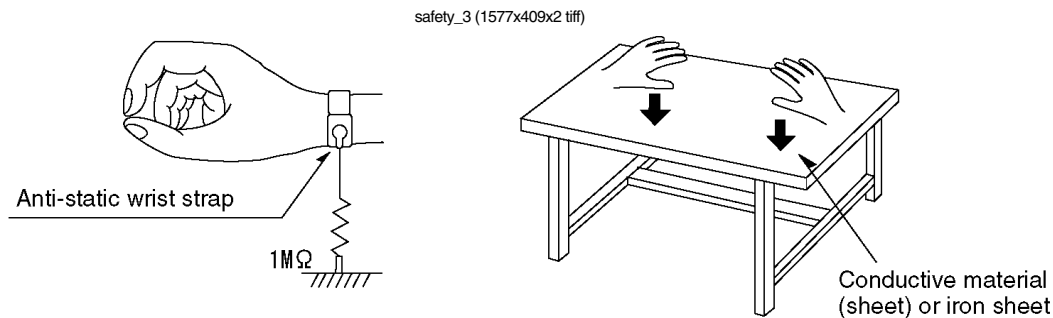
Some devices such as the DVD player use the optical pickup (laser diode) and the optical pickup will be damaged by static electricity in the working environment. Proceed servicing works under the working environment where grounding works is completed.

#### 4.1.1. Worktable grounding

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

#### 4.1.2. Human body grounding

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



#### 4.1.3. Handling of optical pickup

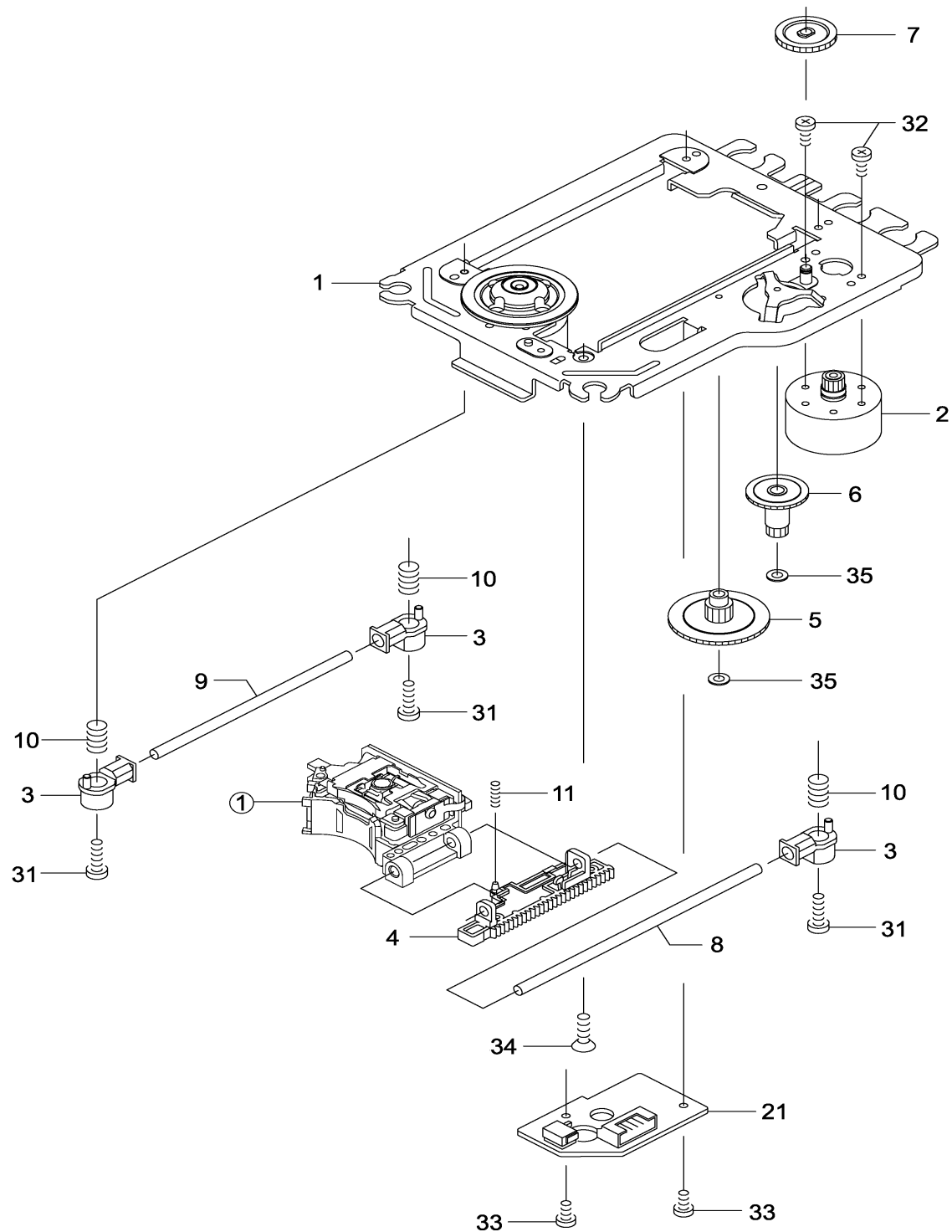
1. To keep the good quality of the optical pickup maintenance parts during transportation and before installation, the both ends of the laser diode are short-circuited. After replacing the parts with new ones, remove the short circuit according to the correct procedure. (See this Technical Guide).
2. 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.

### 4.2. 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.

## 5. Assembling and disassembling the mechanism unit

### 5.1 Optical pickup Unit Exploded View and Part List



Pic (1)

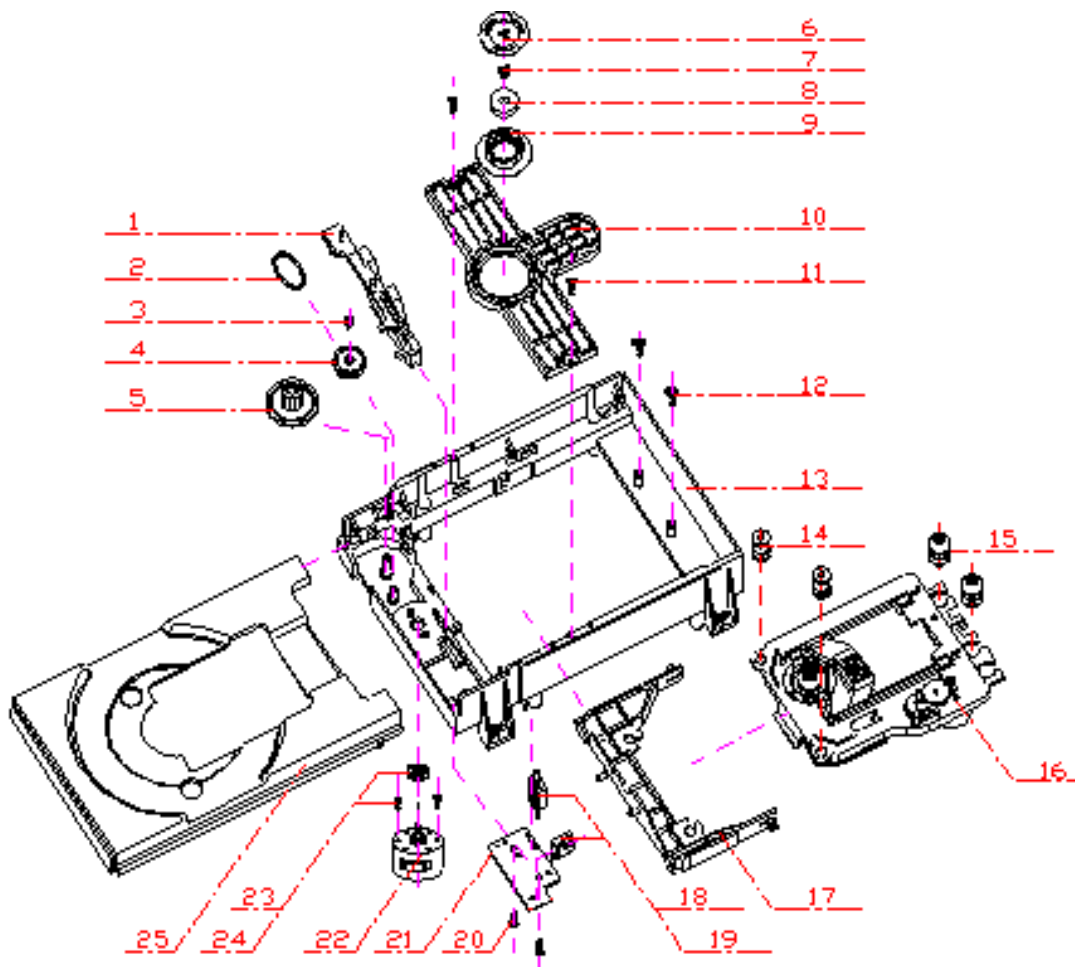
### Materials to Pic (1)

| No. | PARTS CODE    | PARTS NAME                 | Q' ty |
|-----|---------------|----------------------------|-------|
| ①   | 14692200      | SF-HD60                    | 1     |
| 1   | 1EA0311A06300 | ASSY, CHASSIS, COMPLETE    | 1     |
| 2   | 1EA0M10A15500 | ASSY, MOTOR, SLED          | 1     |
| Or  | 1EA0M10A15501 | ASSY, MOTOR, SLED          | 1     |
| 3   | 1EA2451A24700 | HOLDER, SHAFT              | 3     |
| 4   | 1EA2511A29100 | GEAR, RACK                 | 1     |
| 5   | 1EA2511A29200 | GEAR, DRIVE                | 1     |
| 6   | 1EA2511A29300 | GEAR, MIDDLE, A            | 1     |
| 7   | 1EA2511A29400 | GEAR, MIDDLE, B            | 1     |
| 8   | 1EA2744A03000 | SHAFT, SLIDE               | 1     |
| 9   | 1EA2744A03100 | SHAFT, SLIDE, SUB          | 1     |
| 10  | 1EA2812A15300 | SPRING, COMP, TYOUSEI      | 3     |
| 11  | 1EA2812A15400 | SPRING, COMP, RACK         | 1     |
|     |               |                            |       |
| 21  | 1EA0B10B20100 | ASSY, PWB                  | 1     |
| Or  | 1EA0B10B20200 | ASSY, PWB                  | 1     |
|     |               |                            |       |
| 31  | SEXEA25700--- | SPECIAL SCREW BIN+-M2X11   | 3     |
| 32  | SEXEA25900--- | SPECIAL SCREW M1.7X2.2     | 2     |
| 33  | SFBPN204R0SE- | SCR S-TPG PAN 2X4          | 2     |
| 34  | SFSFN266R0SE- | SCR S-TPG FLT 2.6X6        | 1     |
| 35  | SWXEA15400--- | SPECIAL WASHER 1.8X4 X0.25 | 2     |

[illegible]

Note : This parts list is not for service parts supply.

## 5.2 Bracket Exploded View and Part List



Pic (2)

### Materials to Pic(2)

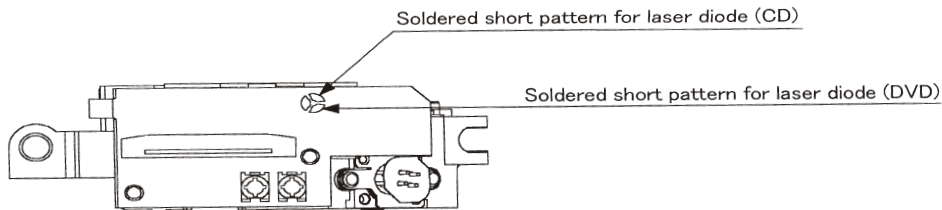
- |                                   |                          |
|-----------------------------------|--------------------------|
| 1. bracket                        | 14. front silicon rubber |
| 2. belt                           | 15. Back silicon rubber  |
| 3. screw                          | 16. Pick-up              |
| 4. belt wheel                     | 17. Pick-up              |
| 5. gearwheel                      | 18. switch               |
| 6. iron chip                      | 19. Five-pin flat plug   |
| 7. Immobility mechanism equipment | 20. screw                |
| 8. Magnet                         | 21. PCB                  |
| 9. Platen                         | 22. motor                |
| 10. Bridge bracket                | 23. Motor wheel          |
| 11. screw                         | 24. screw                |
| 12. screw                         | 25. tray                 |
| 13. Big bracket                   |                          |

**Before going process with disassembly and installation, please carefully both peruse the chart and confirm the materials.**

## 5.3 MISCELLANEOUS

### 5.3.1 Protection of the LD(Laser diode)

Short the parts of LD circuit pattern by soldering.



### 5.3.2 Cautions on assembly and adjustment

Make sure that the workbenches,jigs,tips,tips of soldering irons and measuring instruments are grounded,and that personnel wear wrist straps for ground.

Open the LD short lands quickly with a soldering iron after a circuit is connected.

Keep the power source of the pick-up protected from internal and external sources of electrical noise.

Refrain from operation and storage in atmospheres containing corrosive gases (such as  $H_2S$ ,  $SO_2$ ,  $NO_2$  and  $Cl_2$ ) or toxic gases or in locations containing substances (especially from the organic silicon, cyan, formalin and phenol groups) which emit toxic gases. It is particularly important to ensure that none of the above substances are present inside the unit. Otherwise, the motor may no longer run.

# 6.Electrical Confirmation

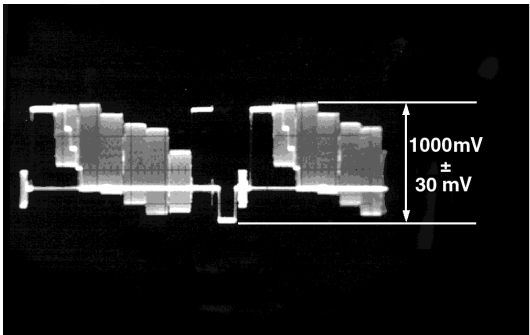
## 6.1. Video Output (Luminance Signal) Confirmation

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



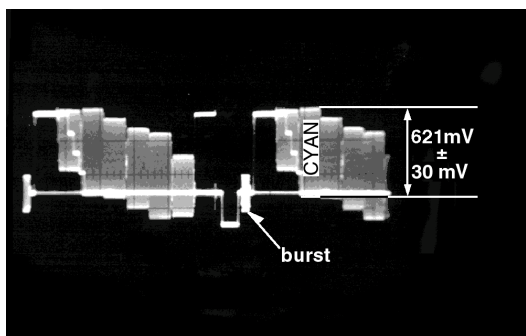
## 6.2 Video Output(Chrominance Signal) Confirmation

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                                                 |                            |

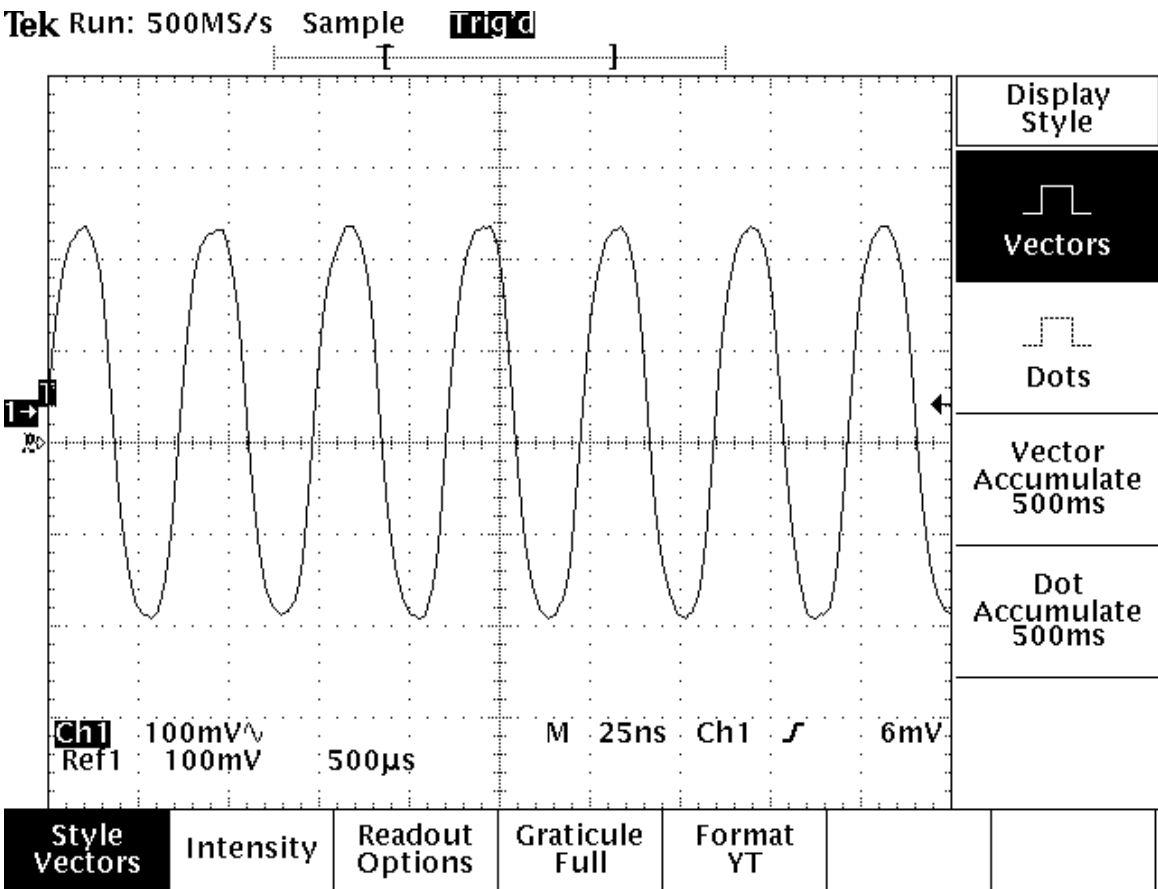
Purpose:To maintain video signal output compatibility.

- 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

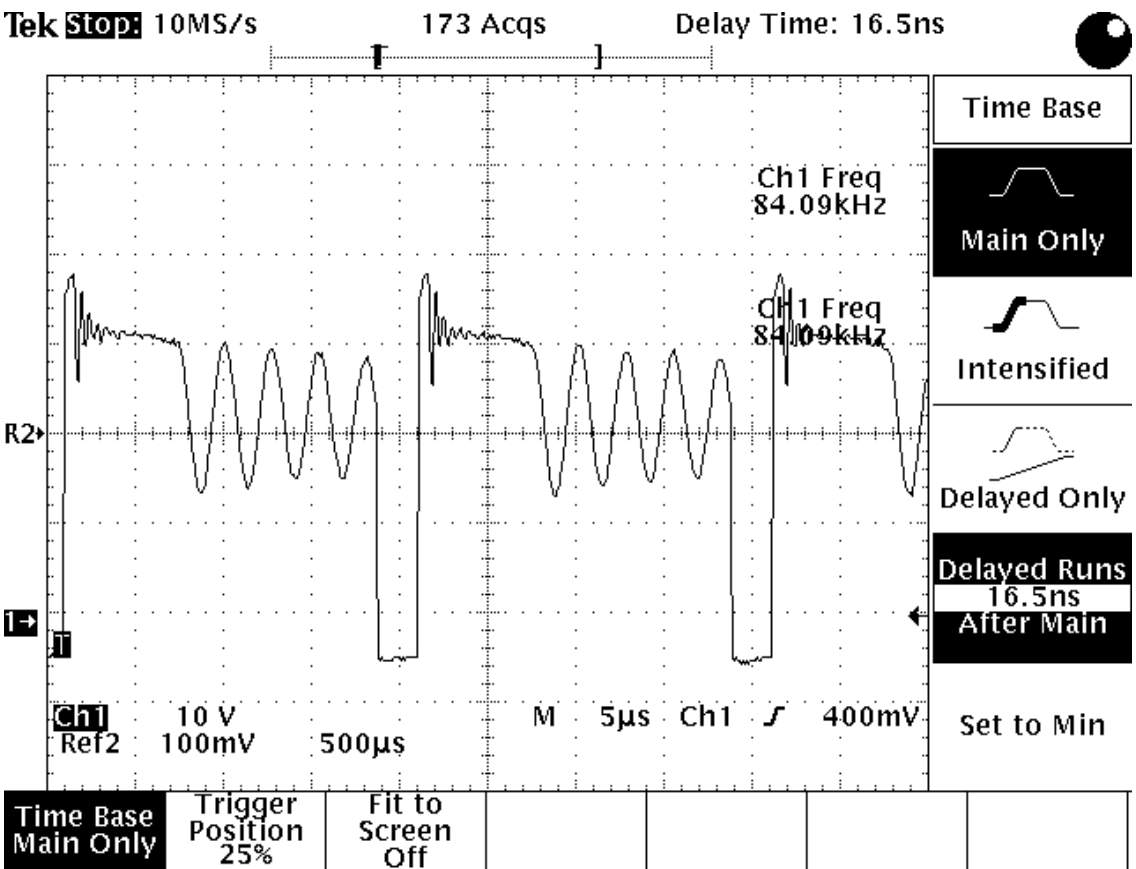


# 7.MPEG BOARD CHECK WAVEFORM

## 7.1 27MHz WAVEFORM



## 7.2 ICVIPER22 PIN.5 WAVEFORM DIAGRAM



## 8. IC BLOCK DIAGRAM & DESCRIPTION

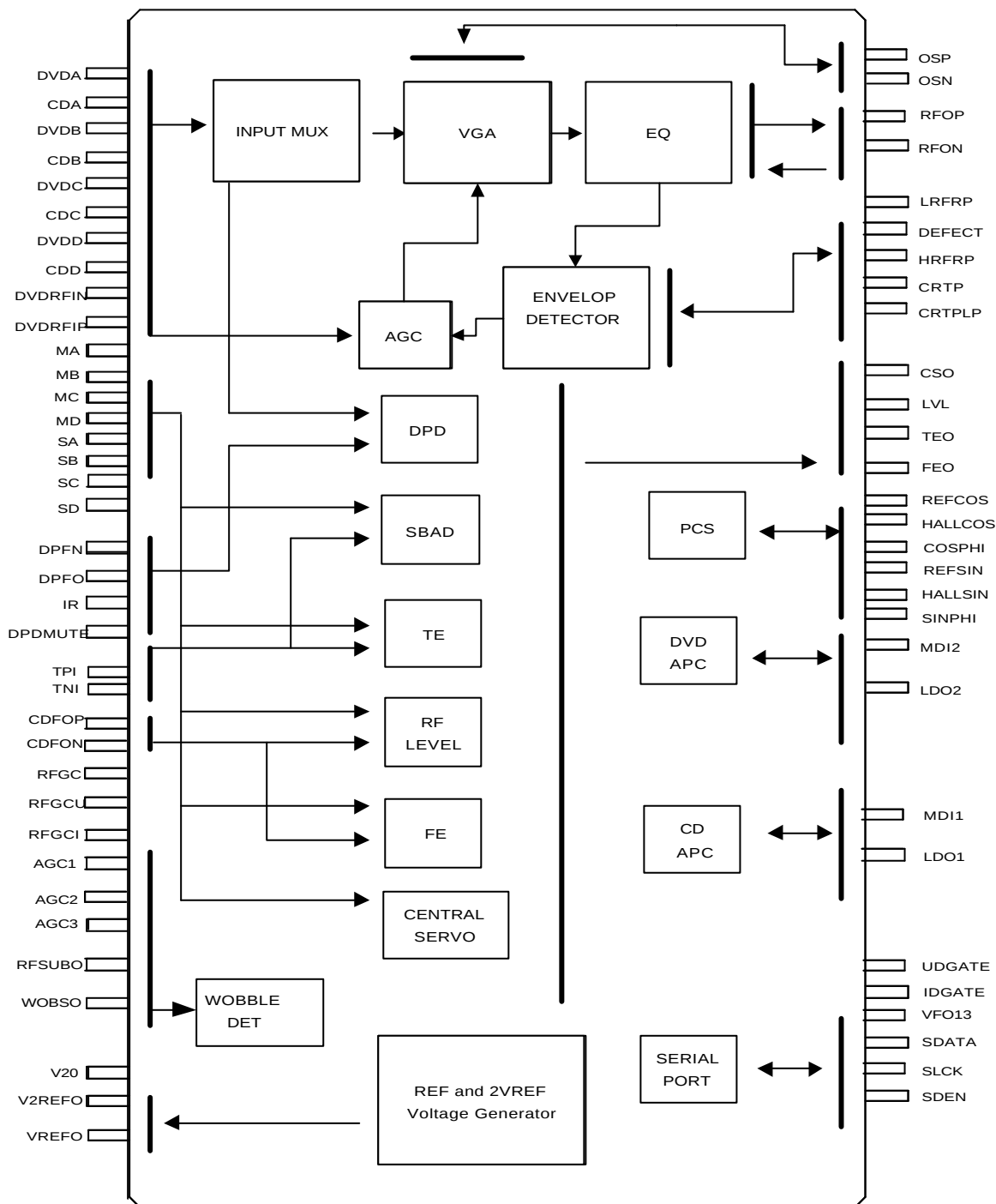
### 8.1 MT1336

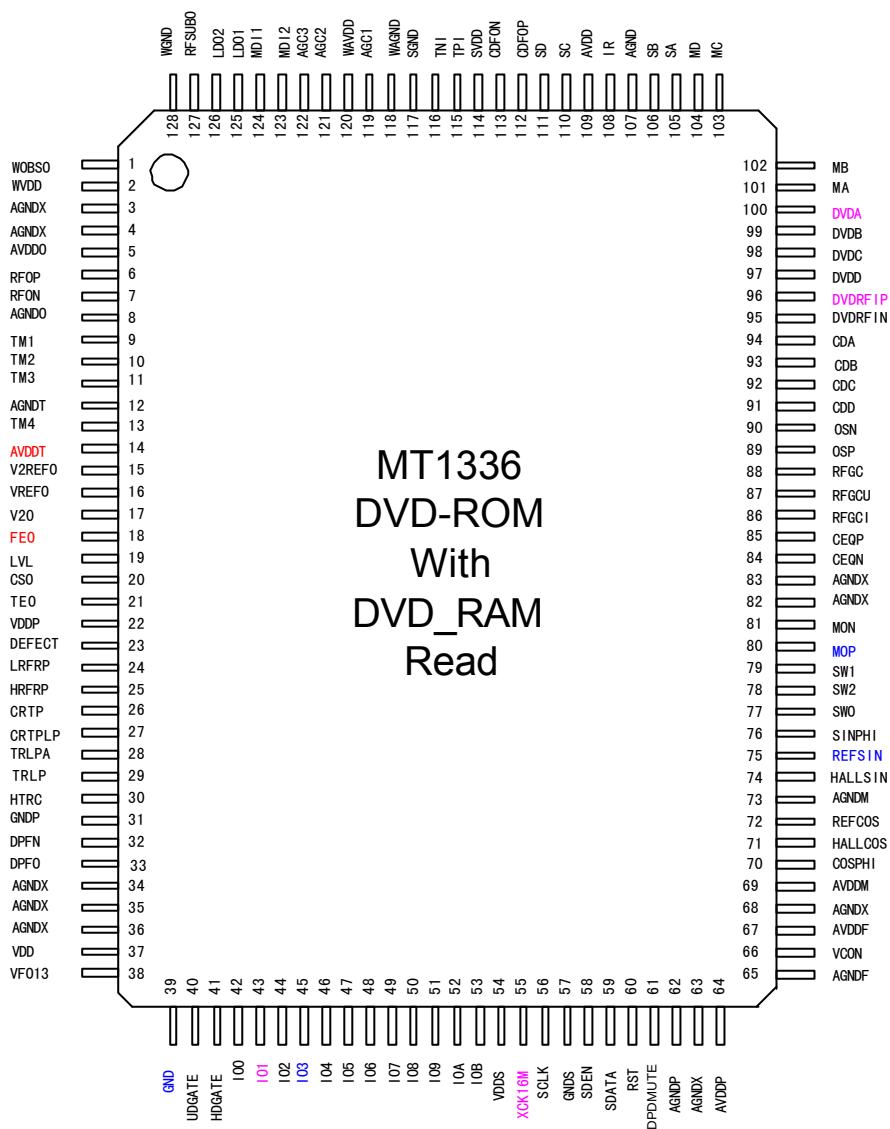
#### GENERAL DESCRIPTION

MT1336 is a high performance CMOS analog front-end IC for both CD-ROM driver up to 48XS and DVD-ROM driver up to 16XS. It also supports DVD-RAM read up to 4XS Version 2. It contains servo amplifiers to generate focusing error, 3-beam tracking error, 1 beam radial push-pull signal, RF level and SBAD for servo functions. It also includes DPD tracking error signal for DVD-ROM application. For DVD-RAM disks, there are also Differential Push-Pull (DPP) method for generating tracking signal and Differential Astigmatic Detection (DAD) for processing focusing signal. Programmable equalizer and AGC circuits are also incorporated in this chip to optimize read channel performance. In addition, this chip has dual automatic laser power control circuits for DVD-ROM (DVD-RAM) and CD-ROM separately and reference voltage generators to reduce external components. Programmable functions are implemented by the access of internal register through bi-directional serial port to configure modes selection.

#### FEATURES

- RF equalizer with programmable  $f_c$  from 3MHz to 70 MHz and programmable boost from 3dB to 13dB.
- MT1336 supports at least eight different kinds of pick-up heads with versatile input configuration for both RF input stages and servo signal blocks.
- Versatile on-line AGC.
- 3 beams tracking error signal generator for CD-ROM application.
- One beam differential phase tracking error (DPD) generator for DVD-ROM application.
- Differential push pull tracking error (DPP) generator for DVD-RAM application.
- Focusing error signal generator for CD-ROM, DVD-ROM and DVD-RAM (DAD method).
- RF level signal generator.
- Sub-beam added signal for 3 beams CD-ROM.
- One beam push-pull signal generator for central servo application.
- High speed RF envelop detection circuit with bandwidth up to 400KHz for CD-ROM.
- Defect and Blank detection circuits.
- Dual automatic laser power control circuits with programmable level of LD monitor voltage.
- Vref=1.4V voltage and V2ref=2.8V voltage generators.
- V20=2.0V voltage for pick-up head reference.
- Bi-directional serial port to access internal registers.


**MT1336 FUNCTION BLOCKS DIAGRAM**



MT1336 PIN ASSIGNMENT

**MT1336 PIN DESCRIPTIONS**

| Pin Numbers               | Symbol  | Type           | Description                                   |
|---------------------------|---------|----------------|-----------------------------------------------|
| <b>LQFP128</b>            |         |                |                                               |
| <b>RF Flag Interface</b>  |         |                |                                               |
| 23                        | DETECT  | Digital Output | Flag of bad data output status                |
| <b>RF SIO interface</b>   |         |                |                                               |
| 56                        | SCLK    | Digital Input  | RF serial clock input                         |
| 58                        | SDEN    | Digital Input  | RF serial data enable                         |
| 59                        | SDATA   | Digital IO     | RF serial data IO                             |
| 60                        | RST     | Digital input  | Reset (active high)                           |
| 55                        | XCK16M  | Digital Input  | 16.9MHz for verification                      |
| <b>RF SERVO interface</b> |         |                |                                               |
| 40                        | UDGATE  | Digital Input  | Control signal for DVD-RAM                    |
| 41                        | IDGATE  | Digital Input  | Control signal for DVD-RAM                    |
| 38                        | VFO13   | Digital Input  | DVD -RAM Header signal                        |
| <b>RF</b>                 |         |                |                                               |
| 100                       | DVDA    | Analog input   | AC coupled DVD RF signal input A              |
| 99                        | DVDB    | Analog Input   | AC coupled DVD RF signal input B              |
| 98                        | DVDC    | Analog Input   | AC coupled DVD RF signal input C              |
| 97                        | DVDD    | Analog Input   | AC coupled DVD RF signal input D              |
| 95                        | DVDRFIN | Analog Input   | AC coupled DVD RF signal input RFIN           |
| 96                        | DVDRFIP | Analog Input   | AC coupled DVD RF signal input RFIP           |
| 94                        | CDA     | Analog Input   | AC coupled CD RF signal input A               |
| 93                        | CDB     | Analog Input   | AC coupled CD RF signal input B               |
| 92                        | CDC     | Analog Input   | AC coupled CD RF signal input C               |
| 91                        | CDD     | Analog Input   | AC coupled CD RF signal input D               |
| 90                        | OSN     | Analog         | RF Offset cancellation capacitor connecting   |
| 89                        | OSP     | Analog         | RF Offset cancellation capacitor connecting   |
| 85                        | CEQP    | Analog         | RF Offset cancellation capacitor connecting   |
| 84                        | CEQN    | Analog         | RF Offset cancellation capacitor connecting   |
| 88                        | RFGC    | Analog         | RF AGC loop capacitor connecting for DVD -ROM |



|                                                                 |         |                |                                                |
|-----------------------------------------------------------------|---------|----------------|------------------------------------------------|
| 87                                                              | RFGCU   | Analog         | RF AGC loop capacitor connecting for DVD -RAM  |
| 86                                                              | RFGCI   | Analog         | RF AGC loop capacitor connecting for DVD -RAM  |
| 101                                                             | MA      | Analog Input   | DC coupled DVD-RAM main-beam RF signal input A |
| 102                                                             | MB      | Analog Input   | DC coupled DVD-RAM main-beam RF signal input B |
| 103                                                             | MC      | Analog Input   | DC coupled DVD-RAM main-beam RF signal input C |
| 104                                                             | MD      | Analog Input   | DC coupled DVD-RAM main-beam RF signal input D |
| 105                                                             | SA      | Analog Input   | DC coupled DVD-RAM sub-beam RF signal input A  |
| 106                                                             | SB      | Analog Input   | DC coupled DVD-RAM sub-beam RF signal input B  |
| 110                                                             | SC      | Analog Input   | DC coupled DVD-RAM sub-beam RF signal input C  |
| 111                                                             | SD      | Analog Input   | DC coupled DVD-RAM sub-beam RF signal input D  |
| 108                                                             | IR      | Analog         | External current bias resistor (R=20K)         |
| 119                                                             | AGC1    | Analog         | Wobble AGC loop1 capacitor                     |
| 121                                                             | AGC2    | Analog         | Wobble AGC loop2 capacitor                     |
| 122                                                             | AGC3    | Analog         | Wobble AGC loop3 capacitor                     |
| 127                                                             | RFSUBO  | Analog output  | Header push-pull RF output signal              |
| 1                                                               | WOBSO   | Digital output | Wobble signal output                           |
| 6                                                               | RFOP    | Analog output  | RF positive output                             |
| 7                                                               | RFON    | Analog output  | RF negative output                             |
| <b>TRACKING ERROR</b>                                           |         |                |                                                |
| 32                                                              | DPFN    | Analog         | DPD amplifier negative input                   |
| 33                                                              | DPFO    | Analog         | DPD amplifier output                           |
| 61                                                              | DPDMUTE | Digital input  | DPD mute control input                         |
| 116                                                             | TNI     | Analog Input   | 3 beam satellite PD signal negative input      |
| 115                                                             | TPI     | Analog Input   | 3 beam satellite PD signal positive input      |
| 21                                                              | TEO     | Analog Output  | Tracking error output                          |
| <b>FOCUSING ERROR &amp; RF LEVEL &amp; CENTRAL SERVO SIGNAL</b> |         |                |                                                |
| 112                                                             | CDFOP   | Analog Input   | CD focusing error positive input               |
| 113                                                             | CDFON   | Analog Input   | CD focusing error negative input               |
| 18                                                              | FEO     | Analog Output  | Focusing error output                          |
| 19                                                              | LVL     | Analog Output  | RF level output                                |
| 20                                                              | CSO     | Analog output  | Central servo signal output                    |
| <b>ALPC</b>                                                     |         |                |                                                |

|                          |        |               |                                                             |
|--------------------------|--------|---------------|-------------------------------------------------------------|
| 124                      | MDI1   | Analog Input  | Laser power monitor input                                   |
| 125                      | LDO1   | Analog Output | Laser driver output                                         |
| 123                      | MDI2   | Analog Input  | Laser power monitor input                                   |
| 126                      | LDO2   | Analog Output | Laser driver output                                         |
| <b>RF RIPPLE</b>         |        |               |                                                             |
| 26                       | CRTP   | Analog        | RF top envelop filter capacitor connecting                  |
| 27                       | CRTPLP | Analog        | Defect level filter capacitor connecting                    |
| 25                       | HRFRP  | Analog output | High frequency RF ripple output or Blank detector' s output |
| 24                       | LRFRP  | Analog output | Low frequency RF ripple output                              |
| <b>POWER</b>             |        |               |                                                             |
| 67, 69                   | AVDD   | Power         | Master PLL Filter power                                     |
| 65, 73                   | AGND   | GND           | GND for Master PLL Filter                                   |
| 64                       | AVDD   | Power         | DPD Power                                                   |
| 62                       | AGND   | GND           | DPD GND                                                     |
| 109                      | AVDD   | Power         | RF path Power                                               |
| 107                      | AGND   | GND           | RF path GND                                                 |
| 114                      | SVDD   | Power         | Servo Power                                                 |
| 117                      | SGND   | GND           | Servo GND                                                   |
| 2,120                    | WAVDD  | Power         | Wobble Power                                                |
| 128,118                  | WAGND  | GND           | Wobble GND                                                  |
| 5                        | AVDDO  | Power         | Power for RF output                                         |
| 8                        | AGNDO  | GND           | GND for RF output                                           |
| 14                       | AVDDT  | Power         | Power for Trimming PAD                                      |
| 12                       | AGNDT  | GND           | GND for Trimming PAD                                        |
| 22                       | VDDP   | Power         | Peak Detection Power                                        |
| 31                       | GNDP   | GND           | Peak Detection GND                                          |
| 37,54                    | VDD    | Power         | Serial I/O Power                                            |
| 39,57                    | GND    | GND           | Serial I/O GND                                              |
| <b>REFERENCE VOLTAGE</b> |        |               |                                                             |
| 16                       | VREFO  | Analog output | Reference voltage 1.4V                                      |
| 15                       | V2REFO | Analog output | Reference voltage 2.8V                                      |
| 17                       | V20    | Analog Output | Reference voltage 2.0V                                      |

| ALPC TRIMMING             |         |                |                                                    |
|---------------------------|---------|----------------|----------------------------------------------------|
| 9                         | TM1     | Analog input   | Trimming pin for ALPC1                             |
| 10                        | TM2     | Analog input   | Trimming pin for ALPC1                             |
| 11                        | TM3     | Analog input   | Trimming pin for ALPC2                             |
| 13                        | TM4     | Analog input   | Trimming pin for ALPC2                             |
| HIGH SPEED TRACK COUNTING |         |                |                                                    |
| 29                        | TRLP    | Analog         | Low-pass filter capacitor connecting               |
| 28                        | TRLPA   | Analog         | Low-pass filter capacitor connecting               |
| 30                        | HTRC    | Digital output | High speed track counting digital output           |
| PCS                       |         |                |                                                    |
| 74                        | HALLSIN | Analog input   | Negative input of amplifier for hall sensor signal |
| 75                        | REFSIN  | Analog input   | Positive input of amplifier for hall sensor signal |
| 76                        | SINPHI  | Analog output  | Amplifier output for hall sensor signal            |
| 71                        | HALLCOS | Analog input   | Negative input of amplifier for hall sensor signal |
| 72                        | REFCOS  | Analog input   | Positive input of amplifier for hall sensor signal |
| 70                        | COSPHI  | Analog output  | Amplifier output for hall sensor signal            |
| FOR MONITOR ONLY          |         |                |                                                    |
| 81                        | MON     | Analog output  |                                                    |
| 80                        | MOP     | Analog output  |                                                    |
| 66                        | VCON    | Analog output  |                                                    |
| 77                        | SWO     | Analog output  | Output from mux of SW1 & SW2                       |
| 78                        | SW2     | Analog input   | External input for servo input select              |
| 79                        | SW1     | Analog input   | External input for servo input select              |
| FOR SERIAL I/O            |         |                |                                                    |
| 42                        | IO0     |                |                                                    |
| 43                        | IO1     |                |                                                    |
| 44                        | IO2     |                |                                                    |
| 45                        | IO3     |                |                                                    |
| 46                        | IO4     |                |                                                    |
| 47                        | IO5     |                |                                                    |

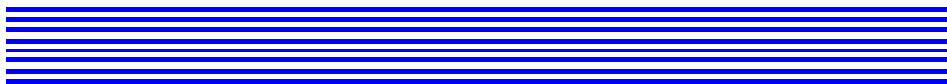


**MT1336**

PRELIMINARY, SUBJECT TO CHANGE WITHOUT NOTICE

MTK CONFIDENTIAL, NO DISCLOSURE

|    |     |  |  |
|----|-----|--|--|
| 48 | IO6 |  |  |
| 49 | IO7 |  |  |
| 50 | IO8 |  |  |
| 51 | IO9 |  |  |
| 52 | IOA |  |  |
| 53 | IOB |  |  |



**MT1379**

*Specifications are subject to change without notice*

## **Progressive Scan DVD Player Combo Chip**

### **8.2 MT1379**

- Super Integration DVD player single chip
  - Servo controller and data channel processing
  - MPEG-1/MPEG-2/JPEG video decoding
  - Dolby AC-3/DTS/DVD-Audio audio decoding
  - Unified track buffer and A/V decoding buffer
  - Video processing for scaling and video quality enhancement
  - OSD & Sub-picture decoding
  - Built-in clock generator
  - Built-in TV encoder
  - Built-in progressive video output
  - Video input port and audio/SPDIF input port
- Speed Performance on Servo and Decoding
  - DVD-ROM up to 8XS
  - CD-ROM up to 24XS
  - Built-in a frequency programmable clock to  $\mu$ P and RSPC Decoder to optimize the performance over power
- Channel Data Processor
  - Provides interface with analog front-end processor
  - Analog data slicer for small jitter capability
  - Built-in high performance data PLL for channel data demodulation
  - EFM/EFM+ data demodulation
  - Enhanced channel data frame sync protection & DVD-ROM sector sync protection
- Servo Control and Spindle Motor Control
  - Programmable frequency error gain and phase error gain of spindle PLL to control spindle motor on CLV and CAV mode
  - Provide a varipitch speed control for CLV and CAV mode
  - Built-in ADCs and DACs for digital servo control
  - Provide 2 general PWM
- Tray control can be PWM output or digital output
  - Built-in DSP for digital servo control
- Host Micro controller
  - Built-in 8032 micro controller
  - Built-in internal 373 and 8-bit programmable lower address port
  - 1024-bytes on-chip RAM
  - Up to 2M bytes FLASH-programming interface
  - Supports 5/3.3-Volt. FLASH interface
  - Supports power-down mode
  - Supports additional serial port
- DVD-ROM/CD-ROM Decoding Logic
  - Supports CD-ROM Mode 1, CD-ROM XA Mode 2 Form 1, CD-ROM XA Mode 2 Form 2, and CD-DA formats
  - High-speed ECC logic capable of correcting one error per each P-codeword or Q-codeword
  - Automatic sector Mode and Form detection
  - Automatic sector Header verification
  - 8-bit counter for decode completion check
  - Programmable descrambling and error correction schemes
  - Automatically repeated error corrections
  - 8-bit C2 Pointer counter
  - Decoder Error Notification Interrupt that signals various decoder errors
  - Provide error correction acceleration
- Buffer Memory Controller
  - Supports 16Mb/32Mb/64Mb/128Mb SDRAM
  - Supports 16-bit/32-bit SDRAM data bus interface
  - Build in a DRAM interface programmable clock to optimize the DRAM performance
  - Provide the self-refresh mode SDRAM
  - Programmable DRAM access cycle and refresh

- cycle timings
  - Block-based sector addressing
  - Programmable buffering counter for buffer status tracking
  - Maximum DRAM speed is 133MHz
  - Support 5/3.3-Volt. DRAM Interface
- Video Decode
  - Decodes MPEG1 video and MPEG2 main level, main profile video (720/480 and 720x576)
  - Maximum input bit-rate of 15Mbps/sec
  - Smooth digest view function with I, P and B picture decoding
  - Baseline, extended-sequential and progressive JPEG image decoding
  - RLE and non-RLE BMP image decoding
  - Support CD-G titles
- Video/OSD/SPU/HLI Processor
  - Arbitrary ratio vertical/horizontal scaling of video, from 0.25X to 256X
  - 65535/256/16/4/2-color bitmap format OSD,
  - 256/16 color RLC format OSD
  - Automatic scrolling of OSD image
  - Provides 4 -color/32x32-pixel hardware cursor
  - Fade-in, Fade out, and Wipe functions as specified in the DVD-Audio Specification and other slide show transition effects
  - Progressive scan output
- Audio Processing
  - Decoder format supports:
    - Dolby Digital (AC -3) decoding
    - DTS decoding
    - MLP decoding for DVD -Audio
    - MPEG-1 layer 1/layer 2 audio decoding
    - MPEG-2 layer1/layer2 2 -channel audio decoding
    - Dolby Pro Logic decoding
    - High Definition Compatible Digital (HDCD) decoding
  - Up to 6 channel linear PCM output for DVD Audio / DVD Video
- Downmix function
  - Support IEC 60958/61937 output
    - PCM / bit stream / mute mode
    - Custom IEC latency up to 2 frames
  - Pink noise and white noise generator
  - Karaoke functions
    - Microphone echo with adjustable echo level, echo -depth and delay length
    - Microphone tone control with three custom second-order IIR filter
    - Vocal mute/vocal assistant
    - Key shift up to +/- 8 keys controlled by 1/2 key
  - Channel equalizer
  - 3D surround processing include virtual surround and speaker separation
  - Power-down control
  - HDCD certified
- TV Encoder
  - Six 54MHz/12bit DA converters
  - Support NTSC, PAL-BDGHl, PAL-N, PAL-M interlace TV format and 480p, 576p progressive TV format
  - Automatically turn off unconnected channel(s).
  - Support PC monitor (VGA)
  - Support Macrovision 7.1
- Progressive Output
  - Automatic detect film or video source
  - 3:2 pull down source detection
  - Advanced Motion adaptive de-interlace
  - Minimum external memory requirement
- Audio/Video Output
  - Line-in/SPDIF-in for versatile audio processing
  - CCIR601/656 video input port
  - Support picture-in-picture for video decoding and input source
- Outline
  - 216-pin LQFP package
  - 3.3/2.5-Volt. Dual operating voltages

## PIN DEFINITIONS

| Pin Number | Symbol    | Type                      | Description                                                                                                                        |
|------------|-----------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| 1          | IREF      | Analog Input              | Current reference input. It generates reference current for data PLL.<br>Connect an external 100K resistor to this pin and PLLVSS. |
| 2          | PLLVSS    | Ground                    | Ground pin for data PLL and related analog circuitry                                                                               |
| 3          | LPIOP     | Analog Output             | Positive output of the low pass filter                                                                                             |
| 4          | LPION     | Analog Output             | Negative output of the low pass filter                                                                                             |
| 5          | LPFON     | Analog output             | Negative output of loop filter amplifier                                                                                           |
| 6          | LPFIP     | Analog Input              | Positive input of loop filter amplifier                                                                                            |
| 7          | LPFIN     | Analog Input              | Negative input of loop filter amplifier                                                                                            |
| 8          | LPFOP     | Analog Output             | Positive output of loop filter amplifier                                                                                           |
| 9          | JITFO     | Analog Output             | RF jitter meter output                                                                                                             |
| 10         | JITFN     | Analog Input              | Negative input of the operation amplifier for RF jitter meter                                                                      |
| 11         | PLLVDD3   | Power                     | 3.3V power pin for data PLL and related analog circuitry                                                                           |
| 12         | FOO       | Analog Output             | Focus servo output. PDM output of focus servo compensator                                                                          |
| 13         | TRO       | Analog Output             | Tracking servo output. PDM output of tracking servo compensator                                                                    |
| 14         | TROPENPWM | Analog Output             | Tray open output, controlled by microcontroller.<br>This is PWM output for TRWMEN27hRW2=1 or is digital output for TRWMEN27hRW2=0  |
| 15         | PWMOUT1   | Analog Output             | The 1st general PWM output                                                                                                         |
| 16         | PWMOUT2   | Analog Output             | The 2nd general PWM output                                                                                                         |
| 17         | DVDD2     | Power                     | 2.5V power pin for internal fully digital circuitry                                                                                |
| 18         | DMO       | Analog Output             | Disk motor control output. PWM output                                                                                              |
| 19         | FMO       | Analog Output             | Feed motor control. PWM output                                                                                                     |
| 20         | DVSS      | Ground                    | Ground pin for internal fully digital circuitry                                                                                    |
| 21         | FG        | Input                     | Motor Hall sensor input                                                                                                            |
| 22         | HIGHA0    | Inout<br>2~16MA, SR<br>PU | Microcontroller address 8                                                                                                          |
| 23         | HIGHA1    | Inout<br>2~16MA, SR<br>PU | Microcontroller address 9                                                                                                          |
| 24         | HIGHA2    | Inout<br>2~16MA, SR<br>PU | Microcontroller address 10                                                                                                         |
| 25         | HIGHA3    | Inout<br>2~16MA, SR<br>PU | Microcontroller address 11                                                                                                         |
| 26         | HIGHA4    | Inout<br>2~16MA, SR<br>PU | Microcontroller address 12                                                                                                         |
| 27         | HIGHA5    | Inout<br>2~16MA, SR<br>PU | Microcontroller address 13                                                                                                         |
| 28         | DVSS      | Ground                    | Ground pin for internal digital circuitry                                                                                          |

| Pin Number | Symbol | Type                      | Description                                   |
|------------|--------|---------------------------|-----------------------------------------------|
| 29         | HIGHA6 | Inout<br>2~16MA, SR<br>PU | Microcontroller address 14                    |
| 30         | HIGHA7 | Inout<br>2~16MA, SR<br>PU | Microcontroller address 15                    |
| 31         | AD7    | Inout<br>2~16MA, SR       | Microcontroller address/data 7                |
| 32         | AD6    | Inout<br>2~16MA, SR       | Microcontroller address/data 6                |
| 33         | AD5    | Inout<br>2~16MA, SR       | Microcontroller address/data 5                |
| 34         | AD4    | Inout<br>2~16MA, SR       | Microcontroller address/data 4                |
| 35         | DVDD3  | Power                     | 3.3V power pin for internal digital circuitry |
| 36         | AD3    | Inout<br>2~16MA, SR       | Microcontroller address/data 3                |
| 37         | AD2    | Inout<br>2~16MA, SR       | Microcontroller address/data 2                |
| 38         | AD1    | Inout<br>2~16MA, SR       | Microcontroller address/data 1                |
| 39         | AD0    | Inout<br>2~16MA, SR       | Microcontroller address/data 0                |
| 40         | IOA0   | Inout<br>2~16MA, SR<br>PU | Microcontroller address 0 / IO                |
| 41         | IOA1   | Inout<br>2~16MA, SR<br>PU | Microcontroller address 1 / IO                |
| 42         | DVDD2  | Power                     | 2.5V power pin for internal digital circuitry |
| 43         | IOA2   | Inout<br>2~16MA, SR<br>PU | Microcontroller address 2 / IO                |
| 44         | IOA3   | Inout<br>2~16MA, SR<br>PU | Microcontroller address 3 / IO                |
| 45         | IOA4   | Inout<br>2~16MA, SR<br>PU | Microcontroller address 4 / IO                |
| 46         | IOA5   | Inout<br>2~16MA, SR<br>PU | Microcontroller address 5 / IO                |
| 47         | IOA6   | Inout<br>2~16MA, SR<br>PU | Microcontroller address 6 / IO                |

| Pin Number | Symbol   | Type                           | Description                                      |
|------------|----------|--------------------------------|--------------------------------------------------|
| 48         | IOA7     | Inout<br>2~16MA, SR<br>PU      | Microcontroller address 7 / IO                   |
| 49         | A16      | Output<br>2~16MA, SR           | Flash address 16                                 |
| 50         | A17      | Output<br>2~16MA, SR           | Flash address 17                                 |
| 51         | IOA18    | Inout<br>2~16MA, SR<br>SMT     | Flash address 18 / IO                            |
| 52         | IOA19    | Inout<br>2~16MA, SR<br>SMT     | Flash address 19 / IO                            |
| 53         | IOA20    | Inout<br>2~16MA, SR<br>SMT     | Flash address 20 / IO<br>OR Videoin Data PortB 0 |
| 54         | APLLVSS  | Ground                         | Ground pin for audio clock circuitry             |
| 55         | APLLVDD3 | Power                          | 3.3V Power pin for audio clock circuitry         |
| 56         | ALE      | Inout<br>2~16MA, SR<br>PU, SMT | Microcontroller address latch enable             |
| 57         | IOOE#    | Inout<br>2~16MA, SR<br>SMT     | Flash output enable, active low / IO             |
| 58         | IOWR#    | Inout<br>2~16MA, SR<br>SMT     | Flash write enable, active low / IO              |
| 59         | IOCS#    | Inout<br>2~16MA, SR<br>PU, SMT | Flash chip select, active low / IO               |
| 60         | DVSS     | Ground                         | Ground pin for internal digital circuitry        |
| 61         | UP1_2    | Inout<br>4MA, SR<br>PU, SMT    | Microcontroller port 1 -2                        |
| 62         | UP1_3    | Inout<br>4MA, SR<br>PU, SMT    | Microcontroller port 1 -3                        |
| 63         | UP1_4    | Inout<br>4MA, SR<br>PU, SMT    | Microcontroller port 1 -4                        |
| 64         | UP1_5    | Inout<br>4MA, SR<br>PU, SMT    | Microcontroller port 1 -5                        |
| 65         | UP1_6    | Inout<br>4MA, SR<br>PU, SMT    | Microcontroller port 1 -6                        |
| 66         | DVDD3    | Power                          | 3.3V power pin for internal digital circuitry    |

| Pin Number | Symbol | Type                              | Description                                   |
|------------|--------|-----------------------------------|-----------------------------------------------|
| 67         | UP1_7  | Inout<br>4MA, SR<br>PU, SMT       | Microcontroller port 1 -7                     |
| 68         | UP3_0  | Inout<br>4MA, SR<br>PU, SMT       | Microcontroller port 3 -0                     |
| 69         | UP3_1  | Inout<br>4MA, SR<br>PU, SMT       | Microcontroller port 3 -1                     |
| 70         | INT0#  | Inout<br>2~16MA, SR<br>PU, SMT    | Microcontroller interrupt 0, active low       |
| 71         | IR     | Input<br>SMT                      | IR control signal input                       |
| 72         | DVDD2  | Power                             | 2.5V power pin for internal digital circuitry |
| 73         | UP3_4  | Inout                             | Microcontroller port 3 -4                     |
| 74         | UP3_5  | Inout                             | Microcontroller port 3 -5                     |
| 75         | UWR#   | Inout<br>2~16MA, SR<br>PU, SMT    | Microcontroller write strobe, active low      |
| 76         | URD#   | Inout<br>2~16MA, SR<br>PU, SMT    | Microcontroller read strobe, active low       |
| 77         | DVSS   | Ground                            | Ground pin for internal digital circuitry     |
| 78         | RD7    | Inout                             | DRAM data 7                                   |
| 79         | RD6    | Inout                             | DRAM data 6                                   |
| 80         | RD5    | Inout                             | DRAM data 5                                   |
| 81         | RD4    | Inout                             | DRAM data 4                                   |
| 82         | DVDD2  | Power                             | 2.5V power pin for internal digital circuitry |
| 83         | RD3    | Inout                             | DRAM data 3                                   |
| 84         | RD2    | Inout                             | DRAM data 2                                   |
| 85         | RD1    | Inout                             | DRAM data 1                                   |
| 86         | RD0    | Inout                             | DRAM data 0                                   |
| 87         | RWE#   | Output<br>2~16MA, SR              | DRAM Write enable, active low                 |
| 88         | CAS#   | Output<br>2~16MA, SR              | DRAM columnaddress strobe, active low         |
| 89         | RAS#   | Output<br>2~16MA, SR              | DRAM row address strobe, active low           |
| 90         | RCS#   | Output<br>2~16MA, SR              | DRAM chip select, active low                  |
| 91         | BA0    | Output<br>2~16MA, SR              | DRAM bank address 0                           |
| 92         | DVSS   | Ground                            | Ground pin for internal digital circuitry     |
| 93         | RD15   | Inout<br>2~16MA, SR<br>PU/PD, SMT | DRAM data 15                                  |

| Pin Number | Symbol | Type                              | Description                                              |
|------------|--------|-----------------------------------|----------------------------------------------------------|
| 94         | RD14   | Inout<br>2~16MA, SR<br>PU/PD, SMT | DRAM data 14                                             |
| 95         | RD13   | Inout<br>2~16MA, SR<br>PU/PD, SMT | DRAM data 13                                             |
| 96         | RD12   | Inout<br>2~16MA, SR<br>PU/PD, SMT | DRAM data 12                                             |
| 97         | DVDD3  | Power                             | 3.3V power pin for internal digital circuitry            |
| 98         | RD11   | Inout<br>2~16MA, SR<br>PU/PD, SMT | DRAM data 11                                             |
| 99         | RD10   | Inout<br>2~16MA, SR<br>PU/PD, SMT | DRAM data 10                                             |
| 100        | RD9    | Inout<br>2~16MA, SR<br>PU/PD, SMT | DRAM data 9                                              |
| 101        | RD8    | Inout<br>2~16MA, SR<br>PU/PD, SMT | DRAM data 8                                              |
| 102        | DVSS   | Ground                            | Ground pin for internal digital circuitry                |
| 103        | CLK    | Output<br>2~16MA, SR              | DRAM clock                                               |
| 104        | CLE    | Output<br>2~16MA, SR              | DRAM clock enable                                        |
| 105        | RA11   | Output<br>2~16MA, SR              | DRAM address bit 11 or audio serial data 3 (channel 7/8) |
| 106        | RA9    | Output<br>2~16MA, SR              | DRAM address 9                                           |
| 107        | RA8    | Output<br>2~16MA, SR              | DRAM address 8                                           |
| 108        | DMVDD3 | Power                             | 3.3V Power pin for DRAM clock circuitry                  |
| 109        | DMVSS  | Ground                            | Ground pin for DRAM clock circuitry                      |
| 110        | RA7    | Output<br>2~16MA, SR              | DRAM address 7                                           |
| 111        | DVDD3  | Power                             | 3.3V power pin for internal digital circuitry            |
| 112        | RA6    | Output<br>2~16MA, SR              | DRAM address 6                                           |
| 113        | RA5    | Output<br>2~16MA, SR              | DRAM address 5                                           |
| 114        | RA4    | Output<br>2~16MA, SR              | DRAM address 4                                           |
| 115        | DVSS   | Ground                            | Ground pin for internal digital circuitry                |
| 116        | DQM1   | Output<br>2~16MA, SR              | Mask for DRAM input/output byte 1                        |

| Pin Number | Symbol | Type                              | Description                                   |
|------------|--------|-----------------------------------|-----------------------------------------------|
| 117        | DQM0   | Output<br>2~16MA, SR              | Mask for DRAM input/output byte 0             |
| 118        | BA1    | Output<br>2~16MA, SR              | DRAM bank address 0                           |
| 119        | RA10   | Output<br>2~16MA, SR              | DRAM address10                                |
| 120        | DVDD2  | Power                             | 2.5V power pin for internal digital circuitry |
| 121        | RA0    | Output<br>2~16MA, SR              | DRAM address 0                                |
| 122        | RA1    | Output<br>2~16MA, SR              | DRAM address 1                                |
| 123        | RA2    | Output<br>2~16MA, SR              | DRAM address 2                                |
| 124        | RA3    | Output<br>2~16MA, SR              | DRAM address 3                                |
| 125        | DVSS   | Ground                            | Ground pin for internal digital circuitry     |
| 126        | RD31   | Inout<br>2~16MA, SR<br>PU/PD, SMT | DRAM data 31                                  |
| 127        | RD30   | Inout<br>2~16MA, SR<br>PU/PD, SMT | DRAM data 30                                  |
| 128        | RD29   | Inout<br>2~16MA, SR<br>PU/PD, SMT | DRAM data 29                                  |
| 129        | RD28   | Inout<br>2~16MA, SR<br>PU/PD, SMT | DRAM data 28                                  |
| 130        | DVDD3  | Power                             | 3.3V power pin for internal digital circuitry |
| 131        | RD27   | Inout<br>2~16MA, SR<br>PU/PD, SMT | DRAM data 27                                  |
| 132        | RD26   | Inout<br>2~16MA, SR<br>PU/PD, SMT | DRAM data 26                                  |
| 133        | RD25   | Inout<br>2~16MA, SR<br>PU/PD, SMT | DRAM data 25                                  |
| 134        | RD24   | Inout<br>2~16MA, SR<br>PU/PD, SMT | DRAM data 24                                  |
| 135        | DVSS   | Ground                            | Ground pin for internal digital circuitry     |
| 136        | DQM3   | Output<br>2~16MA, SR              | Mask for DRAM input/output byte 3             |
| 137        | DQM2   | Output<br>2~16MA, SR              | Mask for DRAM input/output byte 2             |

| Pin Number | Symbol  | Type                              | Description                                                                                                                                            |
|------------|---------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| 138        | RD23    | Inout<br>2~16MA, SR<br>PU/PD, SMT | DRAM data 23 /<br>Videoin Data PortA 7                                                                                                                 |
| 139        | RD22    | Inout<br>2~16MA, SR<br>PU/PD, SMT | DRAM data 22 /<br>Videoin Data PortA 6                                                                                                                 |
| 140        | DVDD2   | Power                             | 2.5V power pin for internal digital circuitry                                                                                                          |
| 141        | RD21    | Inout<br>2~16MA, SR<br>PU/PD, SMT | DRAM data 21 /<br>Videoin Data PortA 5                                                                                                                 |
| 142        | RD20    | Inout<br>2~16MA, SR<br>PU/PD, SMT | DRAM data 20 /<br>Videoin Data PortA 4                                                                                                                 |
| 143        | RD19    | Inout<br>2~16MA, SR<br>PU/PD, SMT | DRAM data 19 /<br>Videoin Data PortA 3                                                                                                                 |
| 144        | RD18    | Inout<br>2~16MA, SR<br>PU/PD, SMT | DRAM data 18 /<br>Videoin Data PortA 2                                                                                                                 |
| 145        | DVSS    | Ground                            | Ground pin for internal digital circuitry                                                                                                              |
| 146        | RD17    | Inout<br>2~16MA, SR<br>PU/PD, SMT | DRAM data 17 /<br>Videoin Data PortA 1                                                                                                                 |
| 147        | RD16    | Inout<br>2~16MA, SR<br>PU/PD, SMT | DRAM data 16 /<br>Videoin Data PortA 0                                                                                                                 |
| 148        | ABCK    | Output<br>4MA                     | Audio bit clock                                                                                                                                        |
| 149        | ALRCK   | Inout<br>4MA,<br>PD, SMT          | (1) Audio left/right channel clock<br>(2) Trap value in power-on reset :<br>1 : use external 373 0: use internal 373                                   |
| 150        | DVDD3   | Power                             | 3.3V power pin for internal digital circuitry                                                                                                          |
| 151        | ACLK    | Inout<br>4MA                      | Audio DAC master clock (384/256 audio sample frequency)                                                                                                |
| 152        | MC_DATA | Input                             | Microphone serial input                                                                                                                                |
| 153        | SPDIF   | Output<br>2~16MA,<br>SR : ON/OFF  | SPDIF output                                                                                                                                           |
| 154        | ASDATA0 | Inout<br>4MA<br>PD SMT            | (1) Audio serial data 0 (left/right channel)<br>(2) Trap value in power-on reset :<br>1 : manufactory test mode 0 : normal operation                   |
| 155        | ASDATA1 | Inout<br>4MA<br>PD SMT            | (1) Audio serial data 1 (surround left/surround right channel)<br>(2) Trap value in power-on reset :<br>1 : manufactory test mode 0 : normal operation |
| 156        | ASDATA2 | Inout<br>4MA<br>PD SMT            | (1) Audio serial data 2 (center/left channel)<br>(2) Trap value in power-on reset :<br>1 : manufactory test mode 0 : normal operation                  |

| Pin Number | Symbol    | Type                    | Description                                                                                                                                                                       |
|------------|-----------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 157        | ASDATA3   | Inout<br>4MA<br>PD SMT  | (1) Audio serial data 3 (surround left/surround right channel)<br>(2) Trap value in power-on reset :<br>1 : manufactory test mode 0 : normal operation<br>OR Videoin Data PortB 1 |
| 158        | ASDATA4   | Inout<br>4MA<br>PD SMT  | (1) Audio serial data 4 (center/left channel)<br>(2) Trap value in power-on reset :<br>1 : manufactory test mode 0 : normal operation<br>OR Videoin Data PortB 2                  |
| 159        | DACVDDC   | Power                   | 3.3V power pin for VIDEO DAC circuitry                                                                                                                                            |
| 160        | VREF      | Analog input            | Bandgap reference voltage                                                                                                                                                         |
| 161        | FS        | Analog output           | Full scale adjustment                                                                                                                                                             |
| 162        | YUV0/CIN  | Output<br>4MA, SR       | Video data output bit 0 /<br>Compensation capacitor                                                                                                                               |
| 163        | DACVSSC   | Ground                  | Ground pin for VIDEO DAC circuitry                                                                                                                                                |
| 164        | YUV1/C    | Output<br>4MA, SR       | Video data output bit 1 /<br>Analog chroma output                                                                                                                                 |
| 165        | DACVddb   | Power                   | 3.3V power pin for VIDEO DAC circuitry                                                                                                                                            |
| 166        | YUV2/Y    | Output<br>4MA, SR       | Video data output bit 2 /<br>Analog Y output                                                                                                                                      |
| 167        | DACVSSB   | Ground                  | Ground pin for VIDEO DAC circuitry                                                                                                                                                |
| 168        | YUV3/CVBS | Output<br>4MA, SR       | Video data output bit 3 /<br>Analog composite output                                                                                                                              |
| 169        | DACVDDA   | Power                   | 3.3V power pin for VIDEO DAC circuitry                                                                                                                                            |
| 170        | YUV4/G    | Output<br>4MA, SR       | Video data output bit 4 /<br>Green or Y                                                                                                                                           |
| 171        | DACVSSA   | Ground                  | Ground pin for VIDEO DAC circuitry                                                                                                                                                |
| 172        | YUV5/B    | Output<br>4MA, SR       | Video data output bit 5 /<br>Blue or CB                                                                                                                                           |
| 173        | YUV6/R    | Output<br>4MA, SR       | Video data output bit 6 /<br>Red or CR                                                                                                                                            |
| 174        | ICE       | Input<br>PD, SMT        | Microcontroller ICE mode enable                                                                                                                                                   |
| 175        | BLANK#    | Inout<br>4MA, SR<br>SMT | Video blank area, active low /<br>Videoin Field_601                                                                                                                               |
| 176        | VSYN      | Inout<br>4MA, SR<br>SMT | Vertical sync /<br>Videoin Vsync_601                                                                                                                                              |
| 177        | YUV7      | Inout<br>4MA, SR<br>SMT | Video data output bit 7 /<br>Videoin Data PortB 3                                                                                                                                 |
| 178        | DVSS      | Ground                  | Ground pin for internal digital circuitry                                                                                                                                         |
| 179        | HSYN      | Inout<br>4MA, SR<br>SMT | Horizontal sync /<br>Videoin Hsync_601                                                                                                                                            |
| 180        | SPMCLK    | Input                   | Audio DAC master clock of SPDIF input /<br>Videoin Data PortB 4                                                                                                                   |

| Pin Number | Symbol   | Type             | Description                                                             |
|------------|----------|------------------|-------------------------------------------------------------------------|
| 181        | SPDATA   | Input            | Audio data of SPDIF input /<br>Videoin Data PortB 5                     |
| 182        | DVDD2    | Power            | 2.5V power pin for internal digital circuitry                           |
| 183        | SPLRCK   | Input            | Audio left/right channel clock of SPDIF input /<br>Videoin Data PortB 6 |
| 184        | SPBCK    | Input            | Audio bit clock of SPDIF input /<br>Videoin Data PortB 7                |
| 185        | DVDD3    | Power            | 3.3V power pin for internal digital circuitry                           |
| 186        | XTALO    | Output           | Crystal output                                                          |
| 187        | XTALI    | Input            | Crystal input                                                           |
| 188        | PRST     | Input<br>PD, SMT | Power on reset input, active high                                       |
| 189        | DVSS     | Ground           | Ground pin for internal digital circuitry                               |
| 190        | VFO13    | Output           | The 1st, 3rd header VFO pulse output                                    |
| 191        | IDGATE   | Output           | Header detect signal output                                             |
| 192        | DVDD3    | Power            | 3.3V power pin for internal digital circuitry                           |
| 193        | UDGATE   | Output           | DVD_RAM recording data gate signal output                               |
| 194        | WOBSI    | Input            | Wobble signal input                                                     |
| 195        | SDATA    | Output           | RF serial data output                                                   |
| 196        | SDEN     | Output           | RF serial data latch enable                                             |
| 197        | SLCK     | Output           | RF serial clock output                                                  |
| 198        | BDO      | Input            | Flag of defect data input status                                        |
| 199        | ADCVSS   | Ground           | Ground pin for ADC circuitry                                            |
| 200        | ADIN     | Analog Input     | General A/D input                                                       |
| 201        | RFSUBI   | Analog Input     | RF subtraction signal input terminal                                    |
| 202        | TEZISLV  | Analog Input     | Tracking error zero crossing low pass input                             |
| 203        | TEI      | Analog Input     | Tracking error input                                                    |
| 204        | CSO      | Analog Input     | Central servo input                                                     |
| 205        | FEI      | Analog Input     | Focus error input                                                       |
| 206        | RFLEVEL  | Analog Input     | Sub beam add input or RFRP low pass input                               |
| 207        | RFRP_DC  | A Input          | RF ripple detect input                                                  |
| 208        | RFRP_AC  | Analog Input     | RF ripple detect input (through AC coupling)                            |
| 209        | HRFZC    | Analog Input     | High frequency RF ripple zero crossing                                  |
| 210        | PWMVREF  | A Input          | A reference voltage input for PWM circuitry. A typical value of 4.0 v   |
| 211        | PWM2VREF | A Input          | A reference voltage input for PWM circuitry. A typical value of 2.0 v   |
| 212        | ADCVDD3  | Power            | 3.3V power pin for ADC circuitry                                        |
| 213        | RFDTSLVP | Analog Output    | Positive RF data slicer level output                                    |
| 214        | RFDTSLVN | Analog Output    | Negative RF data slicer level output                                    |
| 215        | RFIN     | Analog Input     | Negative input of RF differential signal                                |
| 216        | RFIP     | Analog Input     | Positive input of RF differential signal                                |



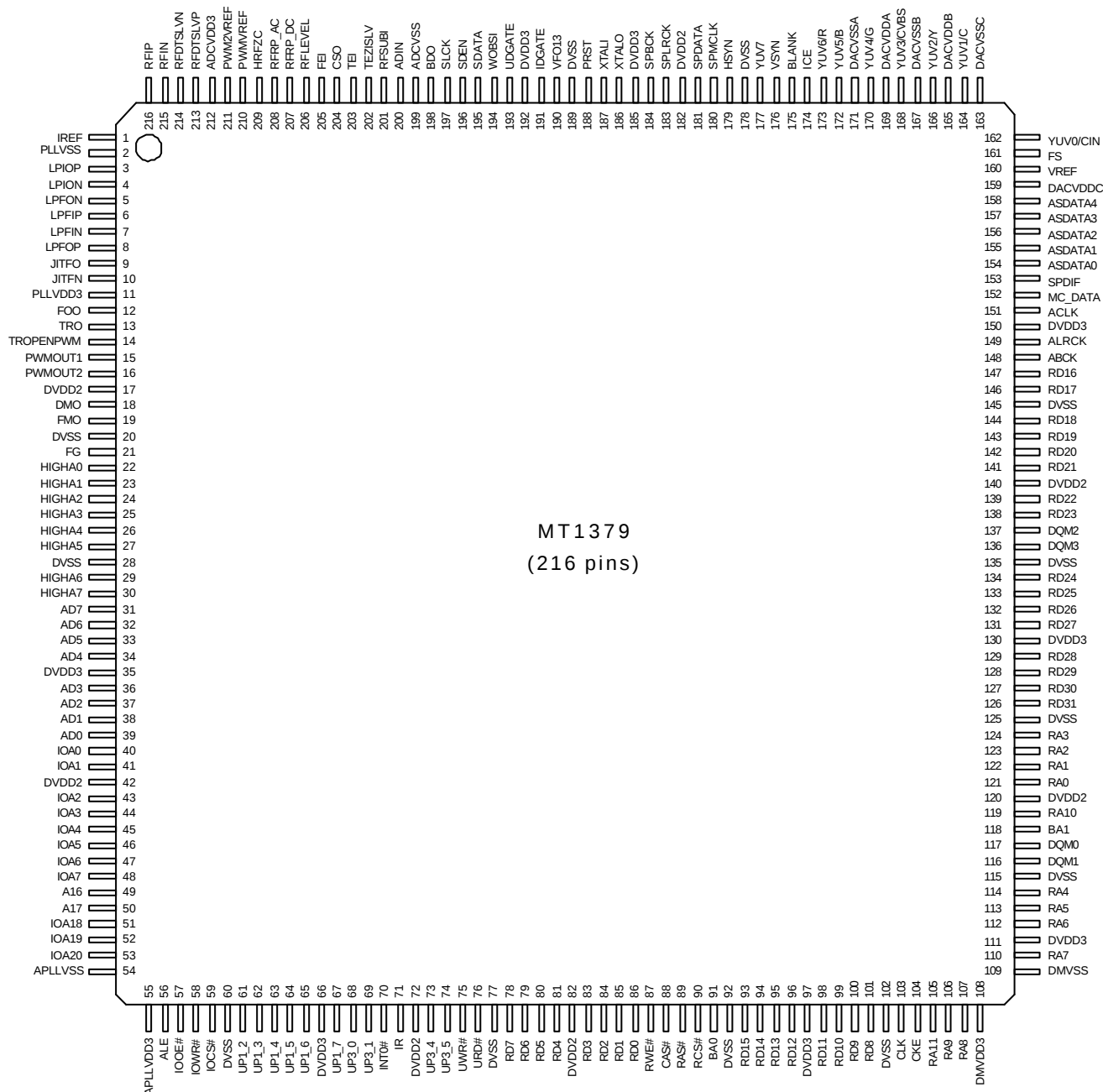
# MT1379

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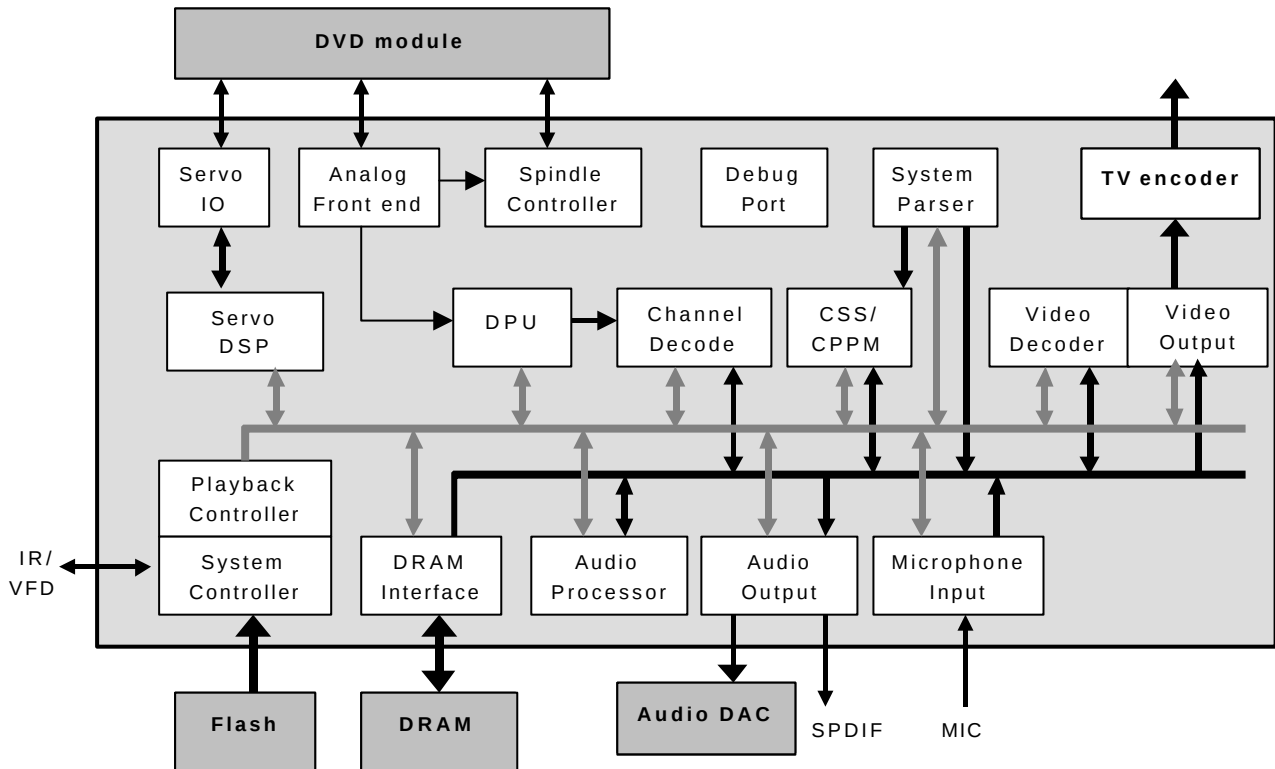
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26 Jul, 2002

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## FUNCTIONAL BLOCK



## Servo Controller

The servo control is accomplished through the servo DSP (Servo Digital Signal Processor) and its accessory I/O circuits. This servo DSP is capable of performing complex operations and also provides a friendly interface for the system controller. By issuing type 1 and type 2 commands from the system controller, the servo DSP can accomplish various complicated servo control functions, such as tracking, seeking and MT1336/MT1376 chip register programming. As for the servo I/O circuits, it provides interface between the input servo signals and the Servo DSP. It has built-in ADCs to digitize the servo control signal and DACs to provide signals for the actuator and sledge motor. It also has a serial interface to communicate with the MT1336/MT1376 chip.

## Analog Front End

The analog front end contains a data slicer circuit and a data PLL circuit. The RF analog signal from MT1336/MT1376 is quantized by the data slicer to form the EFM/EFM+ bit stream, from which the channel bit clock is extracted by the data PLL. The EFM/EFM+bit stream and bit clock are then output to DPU for channel bit processing.

DPU

Data path unit (DPU) provides protection on data with lost synchronization patterns and demodulates EFM/EFM+ bit stream into the channel raw data that will be corrected by the decoder. The synchronization protection makes data after the synchronization pattern to be extracted even if the synchronization pattern is not found.

## Spindle Controller

The spindle controller is used to control disc spindle motor. It includes a varipitch CLV clock generator, a CLV/CAV controller, and a PWM generator. The varipitch CLV clock enerator generates a reference colck for the speed of operation. The CLV/CAV

controller changes the mode and speed of operation according to servo register setting. The PWM generator generates pulse-width-modulated signal to drive disc spindle motor driver.

### CSS/CPPM

The CSS/CPPM module provides functions necessary for decoding discs conforming to CSS/CPPM specification.

### System Parser

The system parser is used to help the system controller to decode DVD/SVCD/VCD bitstream just after the channel decoder performing error correction. Acting as a DMA master, it moves bitstream data from RSPC buffer to video, audio, or sub-picture buffer according to system controller request. It also decrypts the scramble data of the CSS/CPPM sectors. Another function of system parser is providing system controller/DSP a DRAM memory copy controller to enhance system controller/DSP performance.

### Video Decoder

The primary function of MT1379 is to support MPEG1 and MPEG2 video decoding. The video decode engine comprises of variable length decoder (VLD), inverse transformer (IT), motion compensator (MC), and block reconstructor (BR). The video decode engine decodes the variable length encoded symbols in MPEG bitstream and performs inverse scan, inverse quantization, mismatch control and inverse discrete cosine transform onto the variable length decoded data. The motion compensator fetches prediction data from reference picture buffer according to motion vectors and motion prediction mode for P and B pictures. Finally, the block reconstructor combines both the results of inverse transformer and motion compensator to derive the reconstructed image macroblock and write back to picture buffer.

The video decode engine can also support JPEG and BMP file decoding by common image compression hardware kernels.

### Video Output

The Video Output unit contains Video Processor, SPU, OSD, Cursor, TV encoder units, it performs

- Reading decoded video from DRAM buffer
- Scaling the image
- Gamma/Brightness/Hue/Saturation adjustment and edge enhancement
- Reading and decoding SPU and OSD data from DRAM buffer
- Generating hardware cursor image
- Merging the video data, SPU, OSD and cursor

#### Video Processor

The Video Processor unit controls the transfer of video data stored in the DRAM to an internal or external TV encoder. It uses FIFOs to buffer outgoing luminance and chrominance data, and performs YUV420 to YUV422 conversion and arbitrary vertical/horizontal decimation/interpolation, from 1/4x to 256x. With this arbitrary ratio scaling capability, the Video Processor can perform arbitrary image conversion, such as PAL to NTSC, NTSC to PAL, MPEG1 to MPEG2, Letterbox, Pan-Scan conversion or zoom in, zoom out. It is also capable of interlace to progressive conversion.

The Video Processor unit performs the following functions:

- Requests and receives the decoded picture data from the picture buffer in external DRAM for display
- Resample vertical data to create 4:2:2 sample format
- Optionally performs vertical/horizontal resampling of both luminance and chrominance data
- Performs optional Gamma correction, luminance/chrominance adjustment, and edge enhancement

The Video Processor unit contains two 2-tap vertical filters for luminance and chrominance. These filters are used to interpolate and reposition luminance and chrominance line to improve picture quality. These filters are capable of generating up to eight, unique subline value between two consecutive scan lines. The generation of lines depends on the ratio between the height of the source image and the target image. In applications where DRAM bandwidth are critical the filters can be configured as simple line-repeating to reduce the DRAM bandwidth required.

The Video Processor unit integrates two separate horizontal postprocessing filter, a simple 2-tap linear horizontal filter and an 8-tap programmable filter. These filters are provided for scaling images horizontally along the scan line. These two filters is capable of generating up to eight, unique subpixel values between two consecutive pixels on a scan line. The generation of pixels depends on the ratio between the width of the source image and the target image.

#### SPU

This is a hardware sub-picture decoder. It decodes the compressed SPU image bitstream and CHG\_COLCON commands according to SPU header information previously decoded by system controller. The SPU module also allows two SPU objects to be displayed at the same time. SPU image is blended with main video stream.

#### OSD

The OSD module can operate with 2/4/16/256-color bitmap format (1/2/4/8 bits), and 16/256 color RLC format, all have 16 levels of transparency. In addition, it accepts an special WARP mode, which inserts one programmable RLC code in the bitmap to reduce the image size stored in DRAM. It also features automatic shadow/outline generation in 2-color mode, 2 Highlight areas, 1 ChangeColor area and 1 OSDVoid area. One OSD area can occupy the full or a partial screen, or multiple OSDs can occur in a screen at the same time, only if they don't occupy the same horizontal line. The output image is blended with the video-SPU mixed stream.

#### Cursor

A hardware cursor generator is integrated in Video Output Unit. The cursor image is a 32x32 4-color bitmap image, each colors are programmable. Cursor can be enlarged by 2 in both vertical and horizontal directions. Cursor image is multiplexed with video-SPU-OSD mixed stream.

### Audio Interface

Audio interface consists of Audio Output Interface and Microphone Input Interface.

#### Audio Output Interface

The MT1379 can support up to 8 channel audio outputs. The output formats can be 16, 24, or 32-bit frames. Left alignment, right alignment, or I<sup>2</sup>S formats are all supported.

With built-in PLL, MT1379 can provide the audio clock (ACLK) for external audio DAC at 384Fs, where Fs is usually 32KHz, 44.1KHz, 48KHz, 96KHz, or 192KHz. ACLK can also be programmed to be from outside MT1379. When ACLK is input to MT1379, the frequency could be 128\*n Fs, where n is from 1 to 7.

Audio raw (encoded) data or cooked (decoded) data can be output on a single line using S/PDIF interface. The output slew rate and driving force of this pad are programmable.

#### Microphone Input Interface

The MT1379 provides a microphone input interface. Two independent microphones' data could be input to the MT1379. There are two independent digital volume control for these two input channels. The input data formats can also be left alignment, right alignment, or I<sup>2</sup>S formats.

### System Controller

MT1379 uses an embedded Turbo-8032 as System Controller and provide ICE interface to increase the feasibility of F/W development. Also, MT1379 includes an build-in internal 373 to latch lower byte address from 8032 Port 0 and provide a glue-logic free solution. MT1379 supports up to 1M X 16 bits Flash ROM to store 8032 code, H/W related data, User data, etc. F/W upgrade can be achieved either by debug interface or by disk.

## ELECTRICAL CHARACTERISTICS

### Absolute Maximum Rating

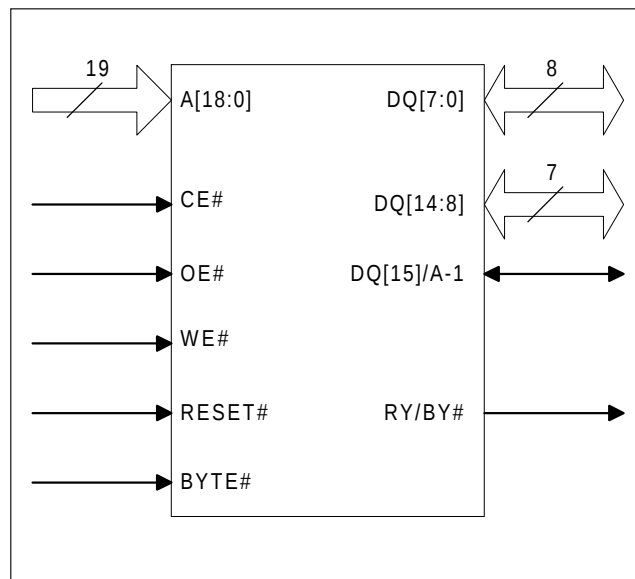
| Symbol           | Parameters            | Value            | Unit |
|------------------|-----------------------|------------------|------|
| VDD3             | 3.3V Supply voltage   | -0.3 to 3.6      | V    |
| VDD2             | 2.5V Supply voltage   | -0.3 to 3.0      | V    |
| VDDA             | Analog Supply voltage | -0.3 to 3.6      | V    |
| V <sub>IN</sub>  | Input Voltage         | -0.3 to 5.5      | V    |
| V <sub>OUT</sub> | Output Voltage        | -0.3 to VDD3+0.3 | V    |
| T <sub>a</sub>   | Ambient Temperature   | 0 to 70          | °C   |

### DC Characteristics

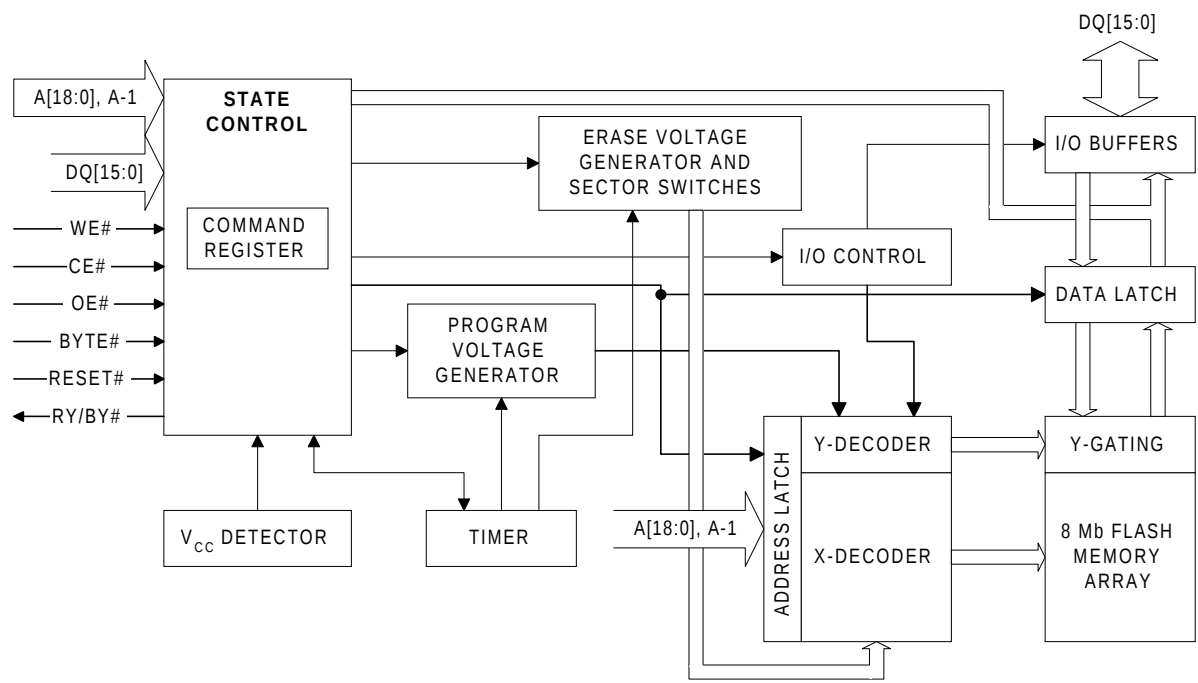
| Symbol            | Parameters               | Min | Typ | Max  | Unit |
|-------------------|--------------------------|-----|-----|------|------|
| V <sub>IH</sub>   | Input voltage high       | 2.4 | -   | 3.6  | V    |
| V <sub>IL</sub>   | Input voltage low        | -   | -   | 0.8  | V    |
| V <sub>OH</sub>   | Output voltage high      | 3.0 | -   | VDD3 | V    |
| V <sub>OL</sub>   | Output voltage low       | -   | -   | 0.5  | V    |
| I <sub>IH</sub>   | High level input current |     |     | 10   | uA   |
| I <sub>IL</sub>   | Low level input current  | -10 |     |      | uA   |
| P <sub>D</sub>    | Power dissipation        |     | 1.0 |      | W    |
| P <sub>Down</sub> | Power down mode          |     |     | 0.1  | W    |

### KEY FEATURES

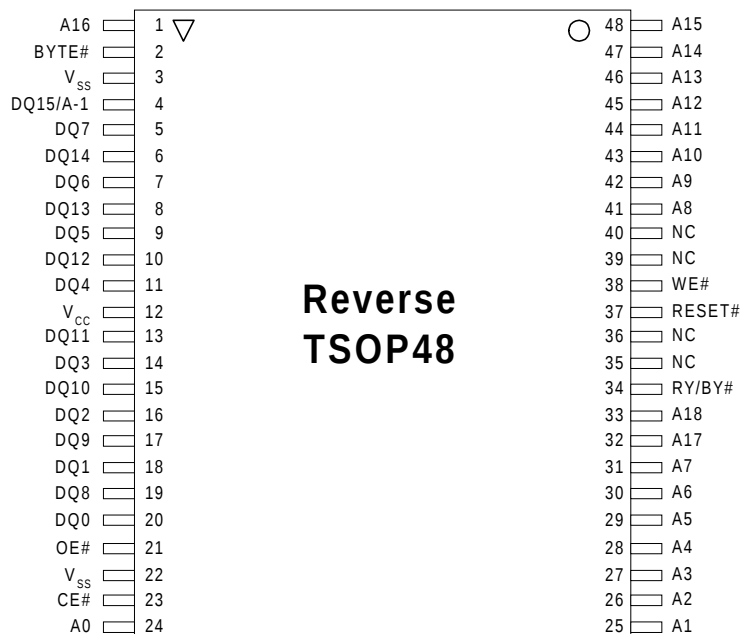
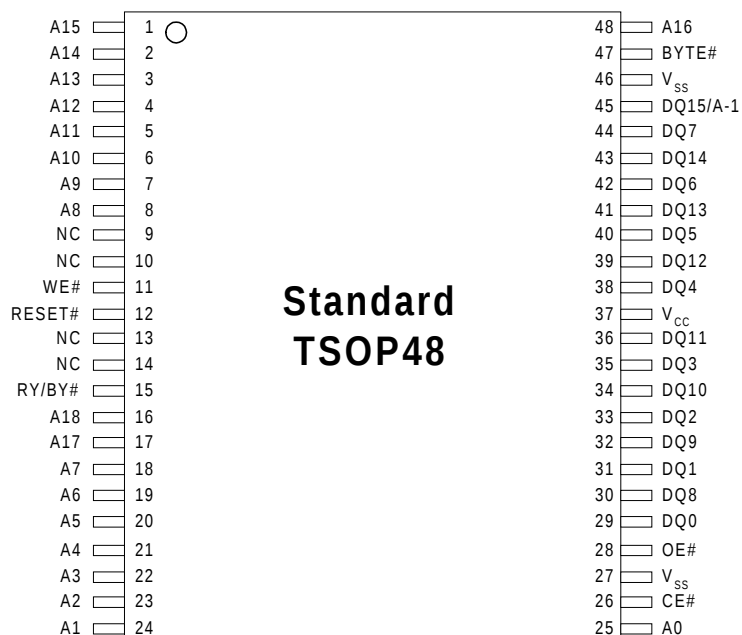
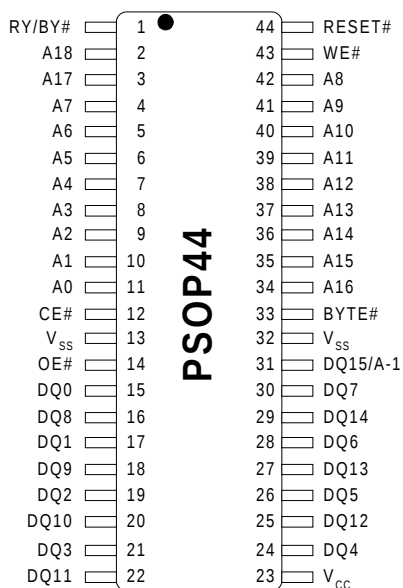
- **5 Volt Read, Program, and Erase**
  - Minimizes system-level power requirements
- **High Performance**
  - Access times as fast as 55 ns
- **Low Power Consumption**
  - 20 mA typical active read current in byte mode, 28 mA typical in word mode
  - 35 mA typical program/erase current
  - 5  $\mu$ A maximum CMOS standby current
- **Compatible with JEDEC Standards**
  - Package, pinout and command-set compatible with the single-supply Flash device standard
  - Provides superior inadvertent write protection
- **Sector Erase Architecture**
  - Boot sector architecture with top and bottom boot block options available
  - One 16 Kbyte, two 8 Kbyte, one 32 Kbyte and fifteen 64 Kbyte sectors in byte mode
  - One 8 Kword, two 4 Kword, one 16 Kword and fifteen 32 Kword sectors in word mode
  - A command can erase any combination of sectors
  - Supports full chip erase
- **Erase Suspend/Resume**
  - Temporarily suspends a sector erase operation to allow data to be read from, or programmed into, any sector not being erased
- **Sector Protection**
  - Any combination of sectors may be locked to prevent program or erase operations within those sectors
- **Temporary Sector Unprotect**
  - Allows changes in locked sectors (requires high voltage on RESET# pin)
- **Internal Erase Algorithm**
  - Automatically erases a sector, any combination of sectors, or the entire chip
- **Internal Programming Algorithm**
  - Automatically programs and verifies data at a specified address
- **Fast Program and Erase Times**
  - Byte programming time: 7  $\mu$ s typical
  - Sector erase time: 1.0 sec typical
  - Chip erase time: 19 sec typical
- **Data# Polling and Toggle Status Bits**
  - Provide software confirmation of completion of program or erase operations
- **Ready/Busy# Output (RY/BY#)**
  - Provides hardware confirmation of completion of program and erase operations
- **Minimum 100,000 Program/Erase Cycles**
- **Space Efficient Packaging**
  - Available in industry-standard 44-pin PSOP and 48-pin TSOP and reverse TSOP packages



**BLOCK DIAGRAM**



## PIN CONFIGURATIONS



## 8.4 U203 SDRAM-HY57V1610D

### DESCRIPTION

THE Hynix HY57V161610D is a 16,777,216-bits CMOS Synchronous DRAM, ideally suited for the Mobile applications which require low power consumption and industrial temperature range. HY57V161610D is organized as 2banks of 524,288x16.

HY57V161610D is offering fully synchronous operation referenced to a positive edge 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 LVTTL.

Programmable options include the length of pipeline (Read latency of 1,2 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 pipeline design is not restricted by a `2N` rule.)

### FEATURES

- Single 3.0V to 3.6V power supply <sup>Note1)</sup>
- All device pins are compatible with LVTTL interface
- JEDEC standard 400mil 50pin TSOP-II with 0.8mm of pin pitch
- All inputs and outputs referenced to positive edge of system clock
- Data mask function by UDQM/LDQM
- Internal two banks operation
- Auto refresh and self refresh
- 4096 refresh cycles / 64ms
- Programmable Burst Length and Burst Type
  - 1, 2, 4, 8 and Full Page for Sequence Burst
  - 1, 2, 4 and 8 for Interleave Burst
- Programmable CAS Latency ; 1, 2, 3 Clocks

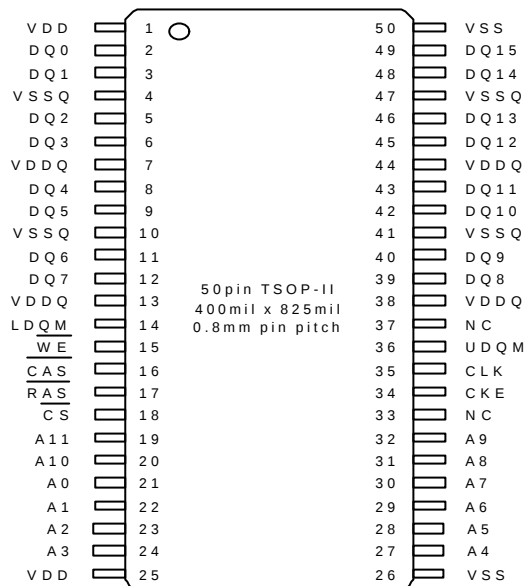
### ORDERING INFORMATION

| Part No.           | Clock Frequency | Organization           | Interface | Package                 |
|--------------------|-----------------|------------------------|-----------|-------------------------|
| HY57V161610DTC-55I | 183MHz          | 2Banks x 512Kbits x 16 | LVTTL     | 400mil<br>50pin TSOP II |
| HY57V161610DTC-6I  | 166MHz          |                        |           |                         |
| HY57V161610DTC-7I  | 143MHz          |                        |           |                         |
| HY57V161610DTC-10I | 100MHz          |                        |           |                         |

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Rev. 0.2/Aug.01

## PIN CONFIGURATION

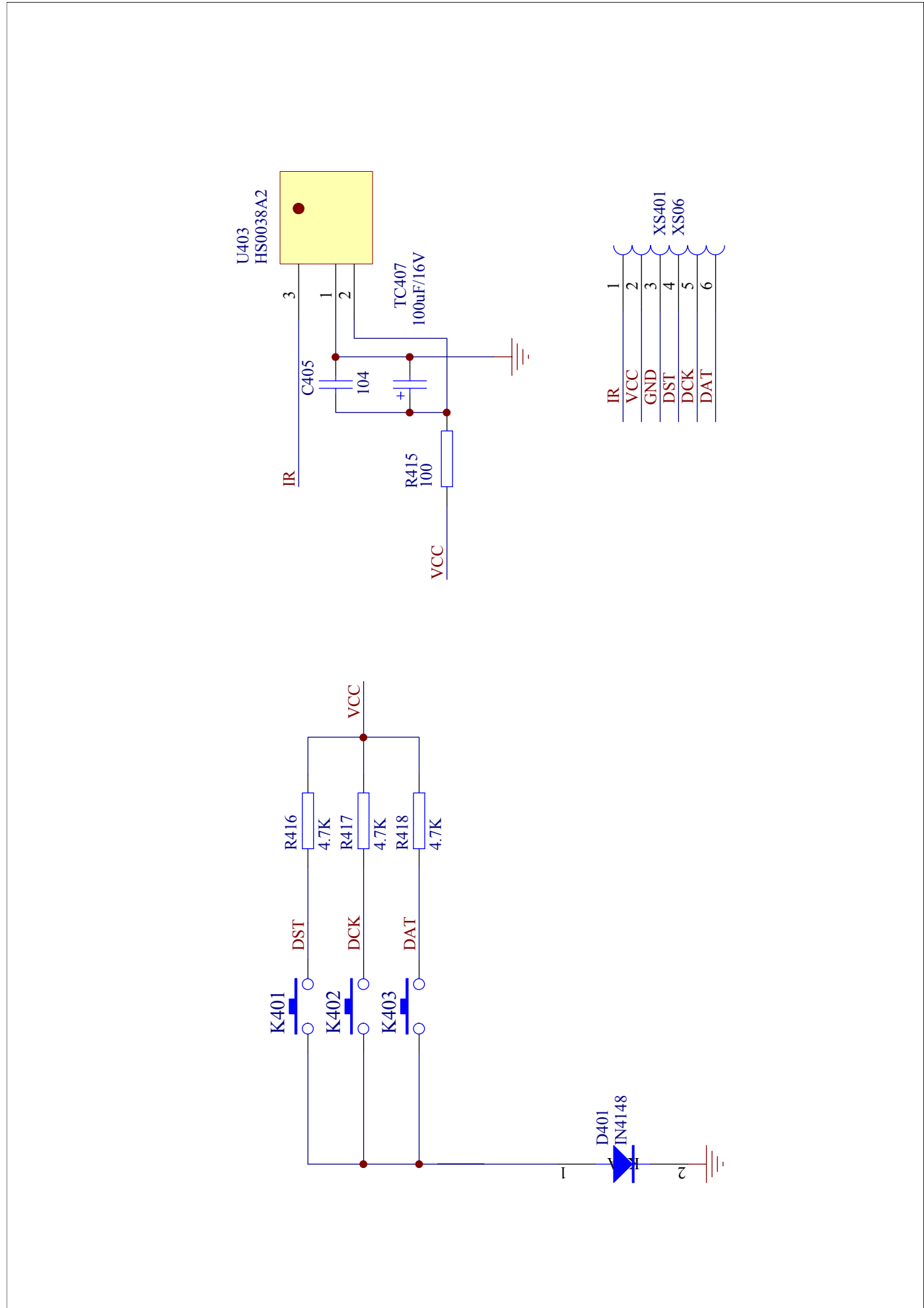


## PIN DESCRIPTION

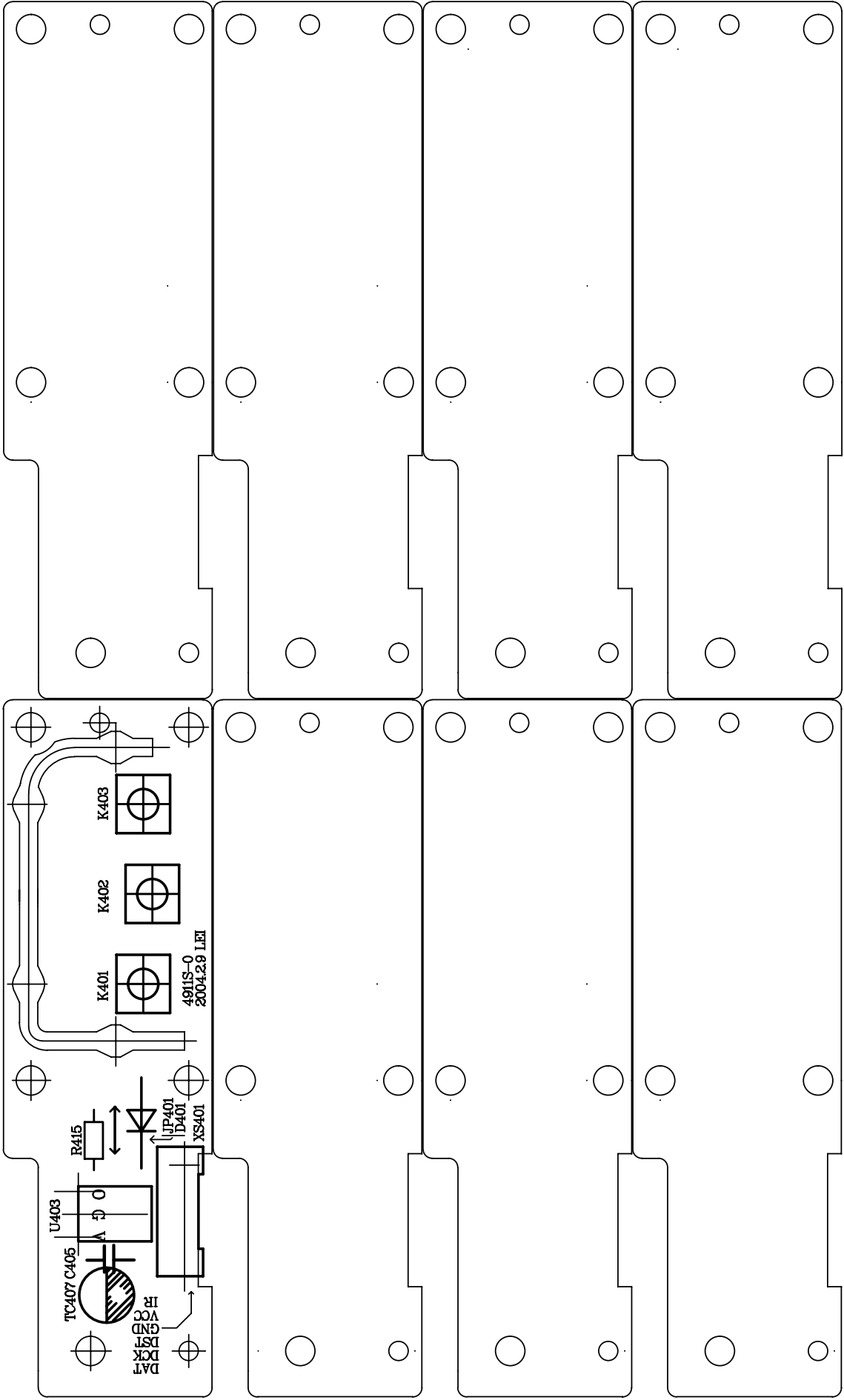
| PIN                                                   | PIN NAME                                                      | DESCRIPTION                                                                                                                         |
|-------------------------------------------------------|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| CLK                                                   | Clock                                                         | The system clock input. All other inputs are referenced 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                                                   | Command input enable or mask except CLK, CKE and DQM                                                                                |
| BA                                                    | Bank Address                                                  | Select either one of banks during both $\overline{RAS}$ and $\overline{CAS}$ activity.                                              |
| A0 ~ A10                                              | Address                                                       | Row Address : RA0 ~ RA10, 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                                        | DQM control output buffer in read mode and mask input data in write mode                                                            |
| DQ0 ~ DQ15                                            | Data Input/Output                                             | Multiplexed data input / output pin                                                                                                 |
| VDD/VSS                                               | Power Supply/Ground                                           | Power supply for internal circuit and input buffer                                                                                  |
| VDDQ/VSSQ                                             | Data Output Power/Ground                                      | Power supply for DQ                                                                                                                 |
| NC                                                    | No Connection                                                 | No connection                                                                                                                       |

9. SCHEMATIC & PCB WIRING DIAGRAM

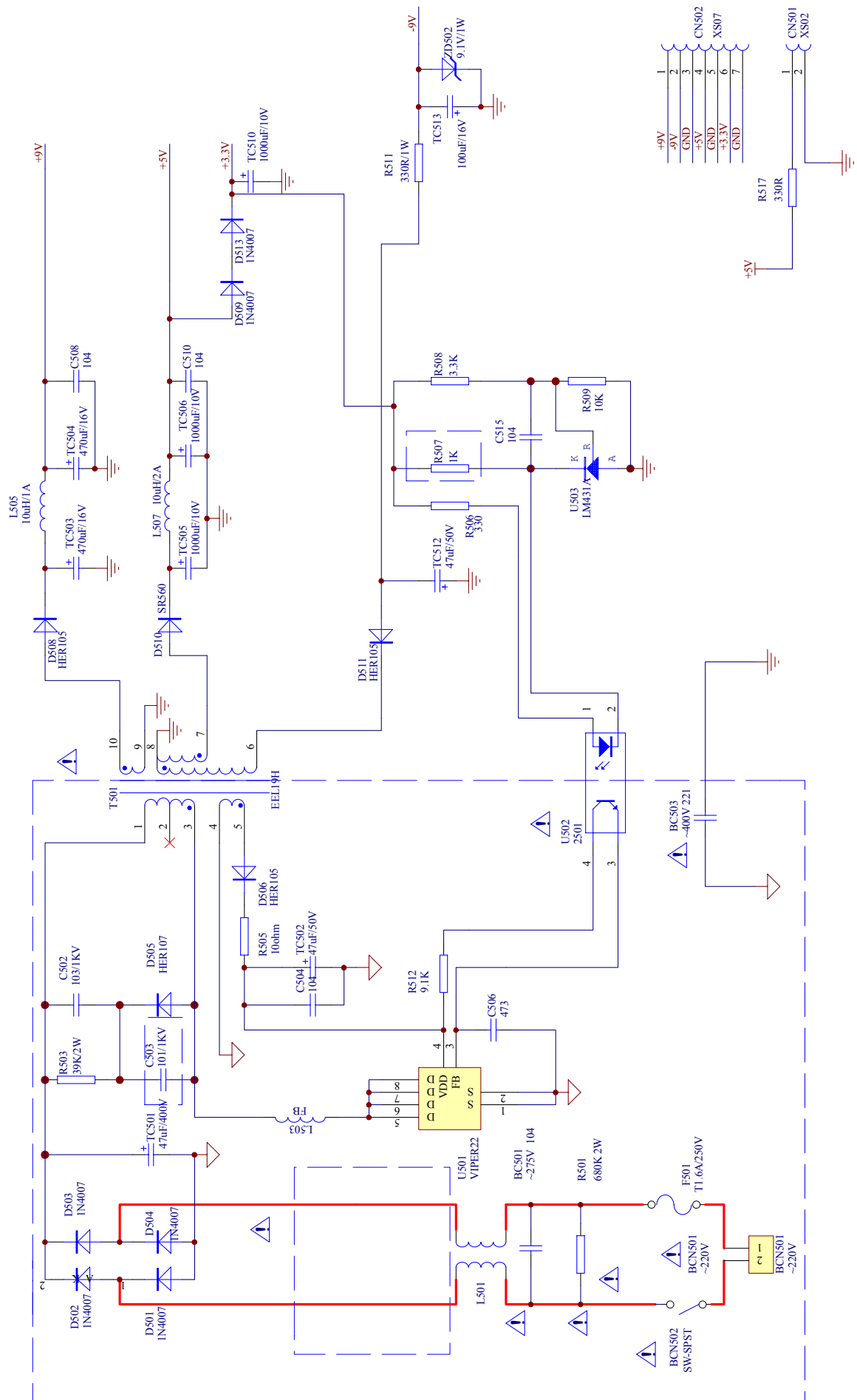
FRONT SCHEMATIC DIAGRAM



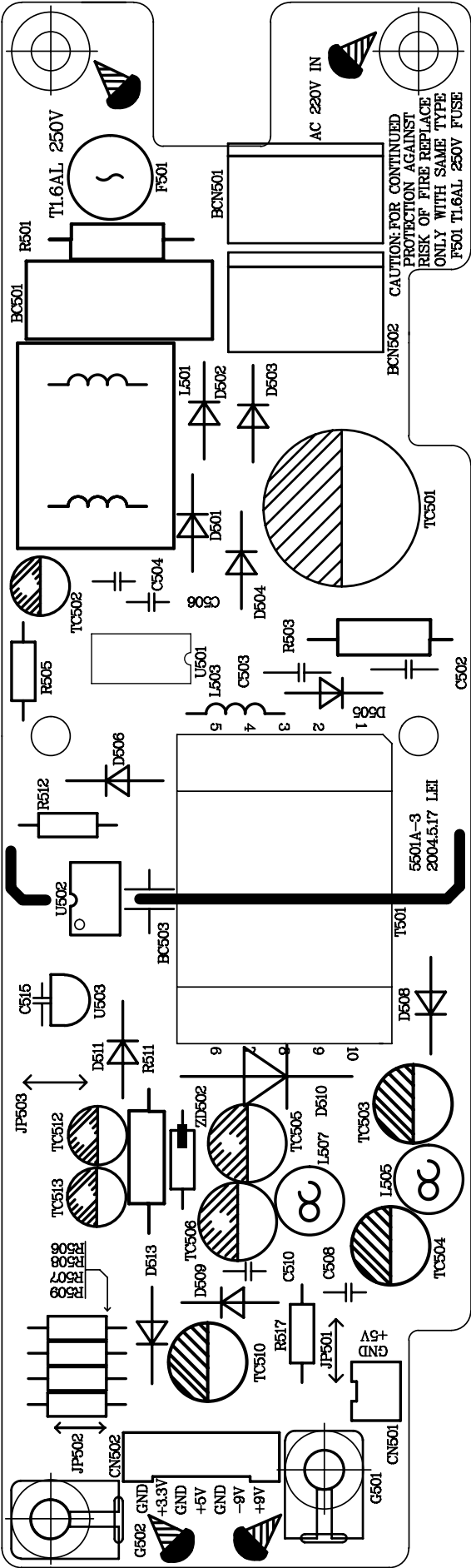
FRONT SCHEMATIC DIAGRAM



## POWER BOARD SCHEMATIC DIAGRAM

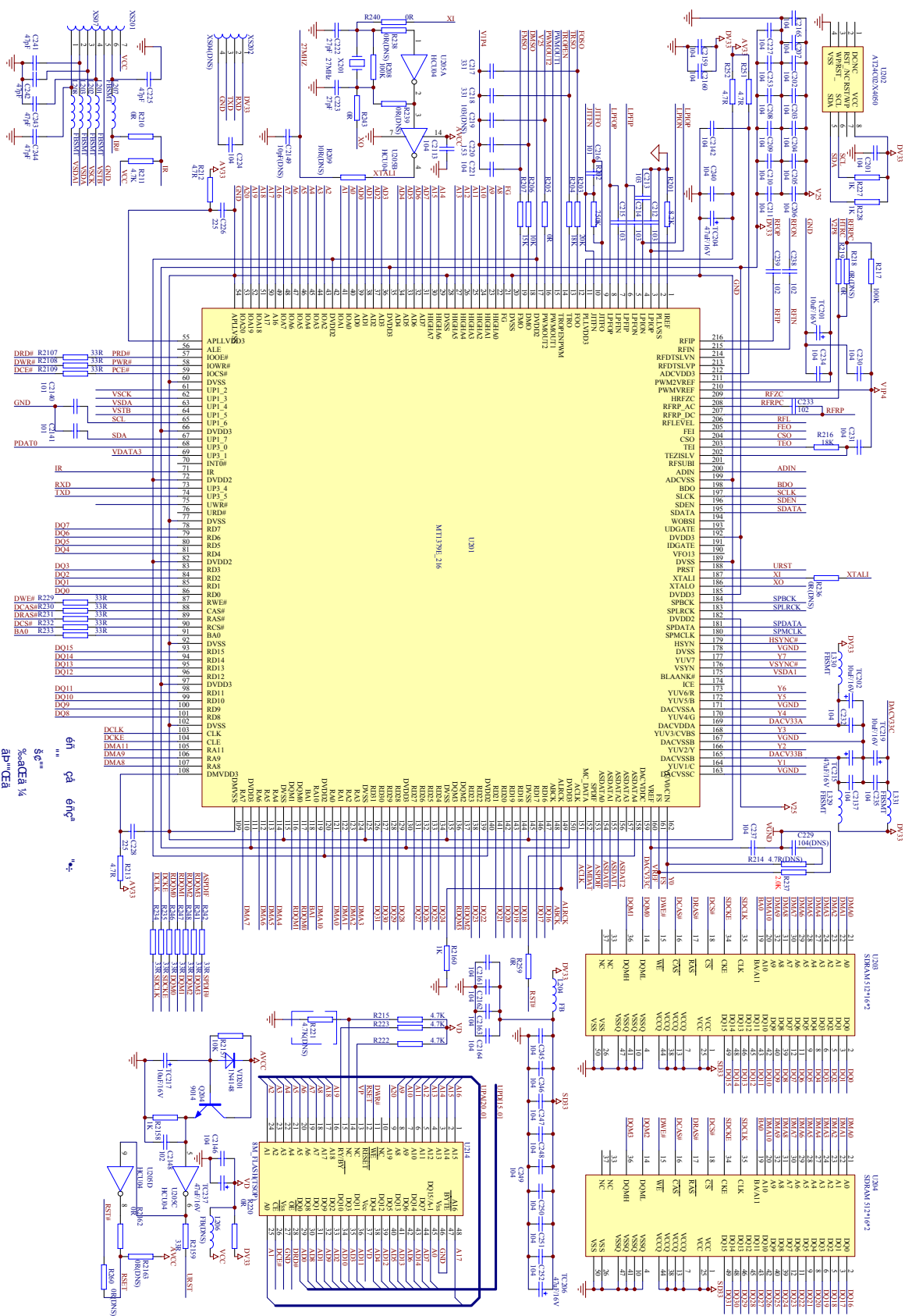


POWER BOARD SCHEMATIC DIAGRAM





MIAN SCHEMATIC DIAGRAM

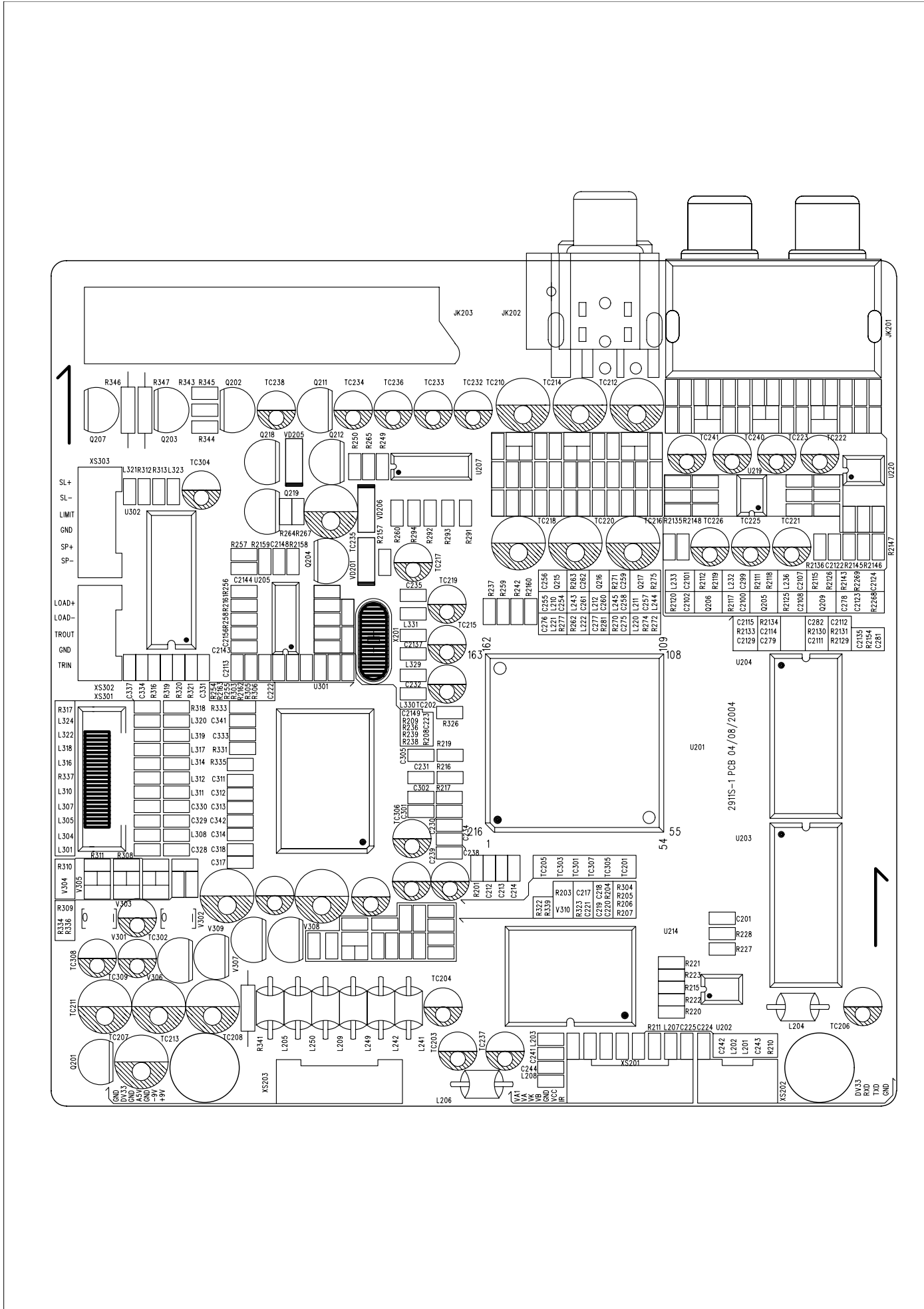


The schematic diagram illustrates a video amplifier circuit. It features a multi-stage transistor amplifier with various components including resistors, capacitors, and inductors. The circuit is divided into several sections:

- Power Supply Section:** Includes a transformer with primary windings X500, X501, X502, X503, X504, X505, X506, X507, X508, X509, X510, X511, X512, X513, X514, X515, X516, X517, X518, X519, X520, X521, X522, X523, X524, X525, X526, X527, X528, X529, X530, X531, X532, X533, X534, X535, X536, X537, X538, X539, X540, X541, X542, X543, X544, X545, X546, X547, X548, X549, X550, X551, X552, X553, X554, X555, X556, X557, X558, X559, X560, X561, X562, X563, X564, X565, X566, X567, X568, X569, X570, X571, X572, X573, X574, X575, X576, X577, X578, X579, X580, X581, X582, X583, X584, X585, X586, X587, X588, X589, X590, X591, X592, X593, X594, X595, X596, X597, X598, X599, X600, X601, X602, X603, X604, X605, X606, X607, X608, X609, X610, X611, X612, X613, X614, X615, X616, X617, X618, X619, X620, X621, X622, X623, X624, X625, X626, X627, X628, X629, X630, X631, X632, X633, X634, X635, X636, X637, X638, X639, X640, X641, X642, X643, X644, X645, X646, X647, X648, X649, X650, X651, X652, X653, X654, X655, X656, X657, X658, X659, X660, X661, X662, X663, X664, X665, X666, X667, X668, X669, X670, X671, X672, X673, X674, X675, X676, X677, X678, X679, X680, X681, X682, X683, X684, X685, X686, X687, X688, X689, X690, X691, X692, X693, X694, X695, X696, X697, X698, X699, X700, X701, X702, X703, X704, X705, X706, X707, X708, X709, X710, X711, X712, X713, X714, X715, X716, X717, X718, X719, X720, X721, X722, X723, X724, X725, X726, X727, X728, X729, X730, X731, X732, X733, X734, X735, X736, X737, X738, X739, X740, X741, X742, X743, X744, X745, X746, X747, X748, X749, X750, X751, X752, X753, X754, X755, X756, X757, X758, X759, X760, X761, X762, X763, X764, X765, X766, X767, X768, X769, X770, X771, X772, X773, X774, X775, X776, X777, X778, X779, X780, X781, X782, X783, X784, X785, X786, X787, X788, X789, X790, X791, X792, X793, X794, X795, X796, X797, X798, X799, X800, X801, X802, X803, X804, X805, X806, X807, X808, X809, X810, X811, X812, X813, X814, X815, X816, X817, X818, X819, X820, X821, X822, X823, X824, X825, X826, X827, X828, X829, X830, X831, X832, X833, X834, X835, X836, X837, X838, X839, X840, X841, X842, X843, X844, X845, X846, X847, X848, X849, X850, X851, X852, X853, X854, X855, X856, X857, X858, X859, X860, X861, X862, X863, X864, X865, X866, X867, X868, X869, X870, X871, X872, X873, X874, X875, X876, X877, X878, X879, X880, X881, X882, X883, X884, X885, X886, X887, X888, X889, X890, X891, X892, X893, X894, X895, X896, X897, X898, X899, X900, X901, X902, X903, X904, X905, X906, X907, X908, X909, X910, X911, X912, X913, X914, X915, X916, X917, X918, X919, X920, X921, X922, X923, X924, X925, X926, X927, X928, X929, X930, X931, X932, X933, X934, X935, X936, X937, X938, X939, X940, X941, X942, X943, X944, X945, X946, X947, X948, X949, X950, X951, X952, X953, X954, X955, X956, X957, X958, X959, X960, X961, X962, X963, X964, X965, X966, X967, X968, X969, X970, X971, X972, X973, X974, X975, X976, X977, X978, X979, X980, X981, X982, X983, X984, X985, X986, X987, X988, X989, X990, X991, X992, X993, X994, X995, X996, X997, X998, X999, X1000, X1001, X1002, X1003, X1004, X1005, X1006, X1007, X1008, X1009, X1010, X1011, X1012, X1013, X1014, X1015, X1016, X1017, X1018, X1019, X1020, X1021, X1022, X1023, X1024, X1025, X1026, X1027, X1028, X1029, X1030, X1031, X1032, X1033, X1034, X1035, X1036, X1037, X1038, X1039, X1040, X1041, X1042, X1043, X1044, X1045, X1046, X1047, X1048, X1049, X1050, X1051, X1052, X1053, X1054, X1055, X1056, X1057, X1058, X1059, X1060, X1061, X1062, X1063, X1064, X1065, X1066, X1067, X1068, X1069, X1070, X1071, X1072, X1073, X1074, X1075, X1076, X1077, X1078, X1079, X1080, X1081, X1082, X1083, X1084, X1085, X1086, X1087, X1088, X1089, X1090, X1091, X1092, X1093, X1094, X1095, X1096, X1097, X1098, X1099, X1100, X1101, X1102, X1103, X1104, X1105, X1106, X1107, X1108, X1109, X1110, X1111, X1112, X1113, X1114, X1115, X1116, X1117, X1118, X1119, X1120, X1121, X1122, X1123, X1124, X1125, X1126, X1127, X1128, X1129, X1130, X1131, X1132, X1133, X1134, X1135, X1136, X1137, X1138, X1139, X1140, X1141, X1142, X1143, X1144, X1145, X1146, X1147, X1148, X1149, X1150, X1151, X1152, X1153, X1154, X1155, X1156, X1157, X1158, X1159, X1160, X1161, X1162, X1163, X1164, X1165, X1166, X1167, X1168, X1169, X1170, X1171, X1172, X1173, X1174, X1175, X1176, X1177, X1178, X1179, X1180, X1181, X1182, X1183, X1184, X1185, X1186, X1187, X1188, X1189, X1190, X1191, X1192, X1193, X1194, X1195, X1196, X1197, X1198, X1199, X1200, X1201, X1202, X1203, X1204, X1205, X1206, X1207, X1208, X1209, X1210, X1211, X1212, X1213, X1214, X1215, X1216, X1217, X1218, X1219, X1220, X1221, X1222, X1223, X1224, X1225, X1226, X1227, X1228, X1229, X1230, X1231, X1232, X1233, X1234, X1235, X1236, X1237, X1238, X1239, X1240, X1241, X1242, X1243, X1244, X1245, X1246, X1247, X124



MIAN SCHEMATIC DIAGRAM



# 10. SPARE PARTS LIST DV911S-2 MATERIAL LIST

## 1. POWER BOARD

| MATERIAL CODE | MATERIAL NAME               | SPECIFICATIONS             | UNIT | QUANTITY | LOCATION            |
|---------------|-----------------------------|----------------------------|------|----------|---------------------|
| 294           | CARBON FILM RESISTOR        | 1/4W10K±5% SHAPED 10       | PCS  | 1        | R507                |
| 0010101       | METAL FILM RESISTOR         | 1/4W12K±1% SHAPED 10       | PCS  | 1        | R509                |
| 0000461       | CARBON FILM RESISTOR        | 1/4W9.1K±5% SHAPED 10      | PCS  | 1        | R512                |
| 0010063       | METAL FILM RESISTOR         | 1/4W4.7K±1% SHAPED 10      | PCS  | 1        | R508                |
| 0000431       | CARBON FILM RESISTOR        | 1/4W75Ω±5% SHAPED 10       | PCS  | 1        | R505                |
| 0010135       | METAL OXIDE FILM RESISTOR   | 2W39K±5% SHAPED FLAT 15×9  | PCS  | 1        | R503                |
| 0000278       | CARBON FILM RESISTOR        | 1/4W330Ω±5% SHAPED 10      | PCS  | 1        | R517                |
| 0000380       | CARBON FILM RESISTOR        | 1/4W510Ω±5% SHAPED 10      | PCS  | 1        | R506                |
| 0070001       | HIGH VOLTAGE RESISTOR       | 1/2W680K±5%                | PCS  | 1        | R501                |
| 0580054       | VOLTAGE REGULATOR DIODE     | 9.1V 1W                    | PCS  | 1        | ZD502               |
| 0010250       | METAL OXIDE FILM RESISTOR   | 1W22Ω±5%SHAPED R 15×8      | PCS  | 1        | R511                |
| 0570005       | DIODE                       | 1N4007                     | PCS  | 4        | D501~D504           |
| 0570011       | DIODE                       | RL202                      | PCS  | 2        | D509,D513           |
| 0200138       | PORCELAIN CAPACITOR         | 50V 104 ±20% 5mm           | PCS  | 4        | C504,C508,C510,C515 |
| 0200224       | PORCELAIN CAPACITOR         | 1000V 103 +80%-20% 7.5mm   | PCS  | 1        | C502                |
| 0200223       | PORCELAIN CAPACITOR         | 1000V 101 +80%-20% 7.5mm   | PCS  | 1        | C503                |
| 0200228       | PORCELAIN CAPACITOR         | 1000V 101 ±10% 7.5mm       | PCS  | 1        | C503                |
| 0210191       | TERYLENE CAPACITOR          | 50V 222 ±10% 5mm           | PCS  | 1        | C506                |
| 0260559       | CD                          | CD11T 50V47U±20%6×12 2.5   | PCS  | 2        | TC502,TC512         |
| 0260563       | CD                          | KM 400V47U±20%18×20 7.5    | PCS  | 1        | TC501               |
| 0260557       | CD                          | CD11T 16V100U±20%6×12 2.5  | PCS  | 1        | TC513               |
| 0260594       | CD                          | CD11T 25V220U±20%8×12 3.5  | PCS  | 2        | TC503,TC504         |
| 0260560       | CD                          | CD11T 10V1000U±20%8×16 3.5 | PCS  | 3        | TC505,TC506,TC510   |
| 0390057       | MAGNETIC BEADS INDUCTOR     | RH354708                   | PCS  | 1        | L503                |
| 0410010       | CHOKE COIL                  | VERTICAL 10UH 1A 5mm       | PCS  | 1        | L505                |
| 0410011       | CHOKE COIL                  | VERTICAL 10UH 2A 5mm       | PCS  | 1        | L507                |
| 1080011       | PHOTOELECTRIC COUPLER       | HS817                      | PCS  | 1        | U502                |
| 0570013       | DIODE                       | HER105                     | PCS  | 3        | D506,D508,D511      |
| 0570014       | DIODE                       | HER107                     | PCS  | 1        | D505                |
| 0680010       | SCHOTTKY DIODE              | SR560 DO-27                | PCS  | 1        | D510                |
| 0880553       | IC                          | LM431ACZ TO-92             | PCS  | 1        | U503                |
| 0880581       | IC                          | TL431C TO-226AA(LP)        | PCS  | 1        | U503                |
| 0880800       | IC                          | 431L TO-92                 | PCS  | 1        | U503                |
| 0210066       | TERYLENE CAPACITOR          | 275V 104 ±20% 15mm         | PCS  | 1        | BC501               |
| 0210070       | TERYLENE CAPACITOR          | 275V 104 ±10% 15mm         | PCS  | 1        | BC501               |
| 0200267       | CERAMIC CAPACITOR           | CT81 250VAC221±20% 10mm    | PCS  | 1        | BC503               |
| 0200268       | TERYLENE CAPACITOR          | CT81 250VAC221±10% 10mm    | PCS  | 1        | BC503               |
| 0460394       | SWITCHING POWER TRANSFORMER | BCK-19-0179                | PCS  | 1        | T501                |
| 1000004       | POWER GRID FILTER           | UT-20 40mH ±20% 10×13      | PCS  | 1        | L501                |

|         |                            |                   |     |   |               |
|---------|----------------------------|-------------------|-----|---|---------------|
| 1563407 | PCB                        | 5501A-4           | PCS | 1 |               |
| 2100003 | CONNECTION CORDS           | Φ0.6 SHAPED 7.5mm | PCS | 2 | JP501,JP503   |
| 2100010 | CONNECTION CORDS           | Φ0.6 SHAPED 5mm   | PCS | 1 | JP502         |
| 2300021 | FUSE                       | T1.6AL 250V       | PCS | 1 | F501          |
| 1940045 | SOCKET                     | 2P 8.0mm 2#       | PCS | 2 | BCN501,BCN502 |
| 1940023 | SOCKET                     | 7P 2.0mm          | PCS | 1 | CN502         |
| 1940027 | SOCKET                     | 2P 2.0mm          | PCS | 1 | CN501         |
| 0881933 | IC                         | VIPER22A DIP8     | PCS | 1 | U501          |
| 3870115 | GROUND CHIP OF POWER BOARD | AB903             | PCS | 2 | G501,G502     |
|         |                            |                   |     |   |               |

## 2. MAIN BOARD

| MATERIAL CODE | MATERIAL NAME              | SPECIFICATIONS                                       | UNIT | QUANTITY | LOCATION          |
|---------------|----------------------------|------------------------------------------------------|------|----------|-------------------|
| 5232805       | SOFT SPONGE SPACER         | 6×6×2.5 DOUBLE-FACED, HARD                           | PCS  | 1        | IPC FOR IR SENSOR |
| 0000009       | CARBON FILM RESISTOR       | 1/6W100Ω±5%                                          | PCS  | 1        | R415              |
| 0090023       | SMD RESISTOR               | 1/16W 10K ±5%                                        | PCS  | 3        | R416,R417,R418    |
| 0570006       | DIODE                      | 1N4148                                               | PCS  | 1        | D401              |
| 1340003       | LIGHT TOUCH RESTORE SWITCH | HORIZONTAL 6×6×1                                     | PCS  | 3        | K401~K403         |
| 0200139       | PORCELAIN CAPACITOR        | 50V 104 +80%-20% 5mm                                 | PCS  | 1        | C405              |
| 0260206       | CD                         | CD11C 10V100U±20%5×7 2                               | PCS  | 1        | TC407             |
| 2360002       | IR SENSOR                  | HS0038B                                              | PCS  | 1        | U403              |
| 2100010       | CONNECTION CORDS           | Φ0.6 SHAPED 5mm                                      | PCS  | 1        | JP401             |
| 2121660       | FLAT CABLE                 | 6P200 2.0 2 SOCKET WITH L NEEDLE, THE SAME DIRECTION | PCS  | 1        | XS401             |
| 1563482       | PCB                        | 4911S-1                                              | PCS  | 1        |                   |
|               |                            |                                                      |      |          |                   |
|               |                            |                                                      |      |          |                   |

## 3. MAIN PANEL

| MATERIAL CODE | MATERIAL NAME | SPECIFICATIONS        | UNIT | QUANTITY | LOCATION                                                                     |
|---------------|---------------|-----------------------|------|----------|------------------------------------------------------------------------------|
| 0090001       | SMD RESISTOR  | 1/16W 0Ω ±5%          | PCS  | 19       | R205,R220,R219,R236,R238,R239,R258,R259,R332,R337,R2162,L243~L248,C2143,R348 |
| 0090272       | SMD RESISTOR  | 1/16W1Ω±5%            | PCS  | 5        | R312,R313,R317,R318,R336                                                     |
| 0090106       | SMD RESISTOR  | 1/16W 4.7Ω ±5%        | PCS  | 4        | R212,R213,R251,R252                                                          |
| 0090179       | SMD RESISTOR  | 1/16W 15Ω ±5%         | PCS  | 2        | R314,R315                                                                    |
| 0090005       | SMD RESISTOR  | 1/16W 33Ω ±5%         | PCS  | 20       | R229~R235,R241,R242,R246~R248,R291~R294,R2107,R2108,R2109,R2159              |
| 0000375       | SMD RESISTOR  | 1/4W2.2Ω±5%           | PCS  | 1        | R341                                                                         |
| 0000273       | SMD RESISTOR  | 1/4W33Ω±5% SHAPED 10  | PCS  | 1        | R346                                                                         |
| 0000278       | SMD RESISTOR  | 1/4W330Ω±5% SHAPED 10 | PCS  | 1        | R347                                                                         |
| 0090006       | SMD RESISTOR  | 1/16W 75Ω ±5%         | PCS  | 1        | R344                                                                         |
| 0090003       | SMD RESISTOR  | 1/16W 10Ω ±5%         | PCS  | 1        | R210                                                                         |
| 0090232       | SMD RESISTOR  | 1/16W 150Ω ±5%        | PCS  | 13       | R262~R264,R270~R277,R281,R280                                                |
| 0090009       | SMD RESISTOR  | 1/16W 330Ω ±5%        | PCS  | 2        | R249,R256                                                                    |
| 0090014       | SMD RESISTOR  | 1/16W 1K ±5%          | PCS  | 13       | R227,R228,R266,R267,R2105,R2106,R2117~R2120,R2158,R2160,R349                 |
| 0090017       | SMD RESISTOR  | 1/16W 2.2K ±5%        | PCS  | 2        | R345,R350                                                                    |

|         |                        |                          |     |    |                                                                                                                                                                                                                                                |
|---------|------------------------|--------------------------|-----|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0090019 | SMD RESISTOR           | 1/16W 4.7K ±5%           | PCS | 8  | R211,R222,R223,R2130,R2131,R2134,R2135,R343                                                                                                                                                                                                    |
| 0090021 | SMD RESISTOR           | 1/16W 6.8K ±5%           | PCS | 2  | R2136,R2148                                                                                                                                                                                                                                    |
| 0090022 | SMD RESISTOR           | 1/16W 8.2K ±5%           | PCS | 1  | R201                                                                                                                                                                                                                                           |
| 0090016 | SMD RESISTOR           | 1/16W 1.5K ±5%           | PCS | 2  | R338,R342                                                                                                                                                                                                                                      |
| 0090223 | SMD RESISTOR           | 1/16W 2K ±5%             | PCS | 1  | R237                                                                                                                                                                                                                                           |
| 0090011 | SMD RESISTOR           | 1/16W 470Ω ±5%           | PCS | 2  | R322,R323                                                                                                                                                                                                                                      |
| 0090023 | SMD RESISTOR           | 1/16W 10K ±5%            | PCS | 12 | R206,R250,R265,R303~R306,R309,R311,R319,R339,R2157                                                                                                                                                                                             |
| 0090024 | SMD RESISTOR           | 1/16W 15K ±5%            | PCS | 2  | R207,R307                                                                                                                                                                                                                                      |
| 0090025 | SMD RESISTOR           | 1/16W 20K ±5%            | PCS | 6  | R203,R316,R320,R321,R2129,R2133                                                                                                                                                                                                                |
| 0090188 | SMD RESISTOR           | 1/16W 18K ±5%            | PCS | 2  | R204,R216                                                                                                                                                                                                                                      |
| 0090229 | PRECISION SMD RESISTOR | 1/16W 330K ±1%           | PCS | 2  | R333,R334                                                                                                                                                                                                                                      |
| 0090319 | PRECISION SMD RESISTOR | 1/16W 750K ±1%           | PCS | 3  | R202,R331,R335                                                                                                                                                                                                                                 |
| 0090034 | SMD RESISTOR           | 1/16W 100K ±5%           | PCS | 6  | R208,R217,R308,R310,R2111,R2112                                                                                                                                                                                                                |
| 0090244 | SMD RESISTOR           | 1/16W 91Ω ±5%            | PCS | 1  | R257                                                                                                                                                                                                                                           |
| 0260019 | CD                     | CD11 16V10U±20%5×11 2    | PCS | 14 | TC201,TC202,TC203,TC217,TC219,TC225,TC226,TC232,TC233,TC236,TC240,TC241,TC306,TC307                                                                                                                                                            |
| 0260028 | CD                     | CD11 16V220U±20%6×12 2.5 | PCS | 13 | TC205,TC207,TC208,TC210~TC214,TC216,TC218,TC220,TC235,TC301                                                                                                                                                                                    |
| 0260200 | CD                     | CD11C 16V47U±20%5×7 2    | PCS | 11 | TC204,TC206,TC215,TC234,TC237,TC302~TC305,TC308,TC309                                                                                                                                                                                          |
| 0310190 | SMD CAPACITOR          | 50V 27P ±5% NPO 0603     | PCS | 3  | C222,C223,C333                                                                                                                                                                                                                                 |
| 0310045 | SMD CAPACITOR          | 50V 47P ±5% NPO 0603     | PCS | 14 | C225,C241,C242,C243,C254,C256,C257,C259,C260,C262,C266,C268,C269,C271                                                                                                                                                                          |
| 0310047 | SMD CAPACITOR          | 50V 101 ±5% NPO 0603     | PCS | 5  | C216,C2111,C2114,C2140,C2141                                                                                                                                                                                                                   |
| 0310051 | SMD CAPACITOR          | 50V 331 ±5% NPO 0603     | PCS | 2  | C217,C218                                                                                                                                                                                                                                      |
| 0310048 | SMD CAPACITOR          | 50V 151 ±5% NPO 0603     | PCS | 2  | C334,C331                                                                                                                                                                                                                                      |
| 0310364 | SMD CAPACITOR          | 10V 225 +80%-20% 0805    | PCS | 2  | C226,C228                                                                                                                                                                                                                                      |
| 0310064 | SMD CAPACITOR          | 50V 391 ±10% 0603        | PCS | 1  | C304                                                                                                                                                                                                                                           |
| 0310046 | SMD CAPACITOR          | 50V 82P ±5% NPO 0603     | PCS | 1  | C305                                                                                                                                                                                                                                           |
| 0310196 | SMD CAPACITOR          | 50V 471 ±10% 0603        | PCS | 1  | C311                                                                                                                                                                                                                                           |
| 0310084 | SMD CAPACITOR          | 50V 104 +80%-20% 0603    | PCS | 82 | C201~C211,C221,C224,C227,C230,C231,C232,C234,C235,C237,C240,C245~C253,C279,C282,C289~C291,C294~C297,C301~C303,C312~C313,C320~C330,C332,C335~C339,C341,C2113,C2137,C2142,C2144,C2146,C2150~C2154,C2157,C2158,C2165,C2159,C2160,C2161~C2164,C280 |

|         |                    |                       |     |    |                                                                                                                                                                                                                                                |
|---------|--------------------|-----------------------|-----|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0310058 | SMD CAPACITOR      | 25V 104 +80%-20% 0603 | PCS | 82 | C201~C211,C221,C224,C227,C230,C231,C232,C234,C235,C237,C240,C245~C253,C279,C282,C289~C291,C294~C297,C301~C303,C312~C313,C320~C330,C332,C335~C339,C341,C2113,C2137,C2142,C2144,C2146,C2150~C2154,C2157,C2158,C2165,C2159,C2160,C2161~C2164,C280 |
| 0310234 | SMD CAPACITOR      | 16V 105 +80%-20% 0603 | PCS | 4  | C315~C318                                                                                                                                                                                                                                      |
| 0310066 | SMD CAPACITOR      | 50V 102 ±10% 0603     | PCS | 8  | C233,C238,C239,C2112,C2115,C2148,,C299,C2101                                                                                                                                                                                                   |
| 0310231 | SMD CAPACITOR      | 50V 122 ±10% 0603     | PCS | 2  | C2122,C2129                                                                                                                                                                                                                                    |
| 0310072 | SMD CAPACITOR      | 50V 103 ±10% 0603     | PCS | 4  | C212~C215                                                                                                                                                                                                                                      |
| 0310201 | SMD CAPACITOR      | 50V 153 ±10% 0603     | PCS | 3  | C220,C308,C319                                                                                                                                                                                                                                 |
| 0310055 | SMD CAPACITOR      | 16V 333 ±10% 0603     | PCS | 1  | C306                                                                                                                                                                                                                                           |
| 0310044 | SMD CAPACITOR      | 50V 33P ±5% NPO 0603  | PCS | 1  |                                                                                                                                                                                                                                                |
| 0390044 | SMD INDUCTOR       | 10UH ±10% 2012        | PCS | 2  | L303,L306                                                                                                                                                                                                                                      |
| 0390096 | SMD INDUCTOR       | 1.8UH ±10% 1608       | PCS | 6  | L210~L215                                                                                                                                                                                                                                      |
| 0390057 | MAGNETIC INDUCTOR  | RH354708              | PCS | 7  | L204,L205,L209,L241,L242,L249,L250                                                                                                                                                                                                             |
| 0390095 | SMD MAGNETIC BEADS | FCM1608K-221T05       | PCS | 33 | L201~L203,L207,L216,L217,L219~L222,L232,L233,L301,L304,L305,L307,L308,L310~L312,L314,L316~L324,L329~L331                                                                                                                                       |
| 0700007 | SMD DIODE          | 1N4148                | PCS | 4  | VD201,VD205~VD207                                                                                                                                                                                                                              |
| 0700001 | SMD DIODE          | LS4148                | PCS | 4  | VD201,VD205~VD207                                                                                                                                                                                                                              |
| 0700002 | SMD DIODE          | LL4148                | PCS | 4  | VD201,VD205~VD207                                                                                                                                                                                                                              |
| 0780032 | TRIODE             | 9014C                 | PCS | 1  | Q204                                                                                                                                                                                                                                           |
| 0780030 | TRIODE             | 8550C                 | PCS | 2  | V306,V309                                                                                                                                                                                                                                      |
| 0780029 | TRIODE             | C8050                 | PCS | 6  | V307,V308,Q201,Q202,Q203,Q207                                                                                                                                                                                                                  |
| 0780197 | SMD TRIODE         | C1815                 | PCS | 2  | Q205,Q206                                                                                                                                                                                                                                      |
| 0780020 | TRIODE             | C1815Y                | PCS | 1  | Q212                                                                                                                                                                                                                                           |
| 0780043 | TRIODE             | 2SA1015               | PCS | 3  | Q211,Q218,Q219                                                                                                                                                                                                                                 |
| 0780062 | SMD TRIODE         | 9014C                 | PCS | 1  | V310                                                                                                                                                                                                                                           |
| 0780041 | SMD TRIODE         | 3906                  | PCS | 6  | Q213~Q217,Q220                                                                                                                                                                                                                                 |
| 0780040 | SMD TRIODE         | 3904                  | PCS | 1  | V305                                                                                                                                                                                                                                           |
| 0780193 | SMD TRIODE         | 2SK3018               | PCS | 2  | V303,V304                                                                                                                                                                                                                                      |
| 0780115 | SMD TRIODE         | 2SB1132               | PCS | 2  | V301,V302                                                                                                                                                                                                                                      |
| 0880185 | IC                 | NJM4558M SOP          | PCS | 1  | U219                                                                                                                                                                                                                                           |
| 0880513 | IC                 | HCU04 SOP             | PCS | 1  | U205                                                                                                                                                                                                                                           |
| 0880498 | IC                 | HY57V161610DTC-8 SOP  | PCS | 2  | U203,U204                                                                                                                                                                                                                                      |
| 0881124 | IC                 | CS4340-KS SOP         | PCS | 1  | U207                                                                                                                                                                                                                                           |
| 0881031 | IC                 | 24C02N SOP            | PCS | 1  | U202                                                                                                                                                                                                                                           |
| 0881690 | IC                 | MT1336E-C QFP         | PCS | 1  | U301                                                                                                                                                                                                                                           |
| 0881689 | IC                 | MT1379EE-C QFP        | PCS | 1  | U201                                                                                                                                                                                                                                           |
| 0881378 | IC                 | BA5954FP HSOP         | PCS | 1  | U302                                                                                                                                                                                                                                           |
| 1860029 | SCART SOCKET       | SCART-01              | PCS | 1  | JK203                                                                                                                                                                                                                                          |
| 0960020 | CRYSTAL OSCILLATOR | 27.00MHz 49-S         | PCS | 1  | X201                                                                                                                                                                                                                                           |
| 1910140 | TERMINAL SOCKET    | AV4-8.4-5G-5 BLACK    | PCS | 1  | JK201                                                                                                                                                                                                                                          |

|         |                 |                                                |     |   |             |
|---------|-----------------|------------------------------------------------|-----|---|-------------|
| 1910129 | TERMINAL SOCKET | SA-001-012 BLACK IRON SHEET<br>SCREEN-SHIELDED | PCS | 1 | JK202       |
| 1940024 | SOCKET          | 5P 2.0mm                                       | PCS | 1 | XS302       |
| 1940005 | SOCKET          | 6P 2.0mm                                       | PCS | 2 | XS201,XS303 |
| 1940023 | SOCKET          | 7P 2.0mm                                       | PCS | 1 | XS203       |
| 1631550 | PCB             | 2911S-1                                        | PCS | 1 |             |
| 1940094 | CABLE SOCKET    | 24P 0.5mm SMD WITH CLASP                       | PCS | 1 | XS301       |
|         |                 |                                                |     |   |             |