

SERVICE MANUAL

BBK916S



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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).

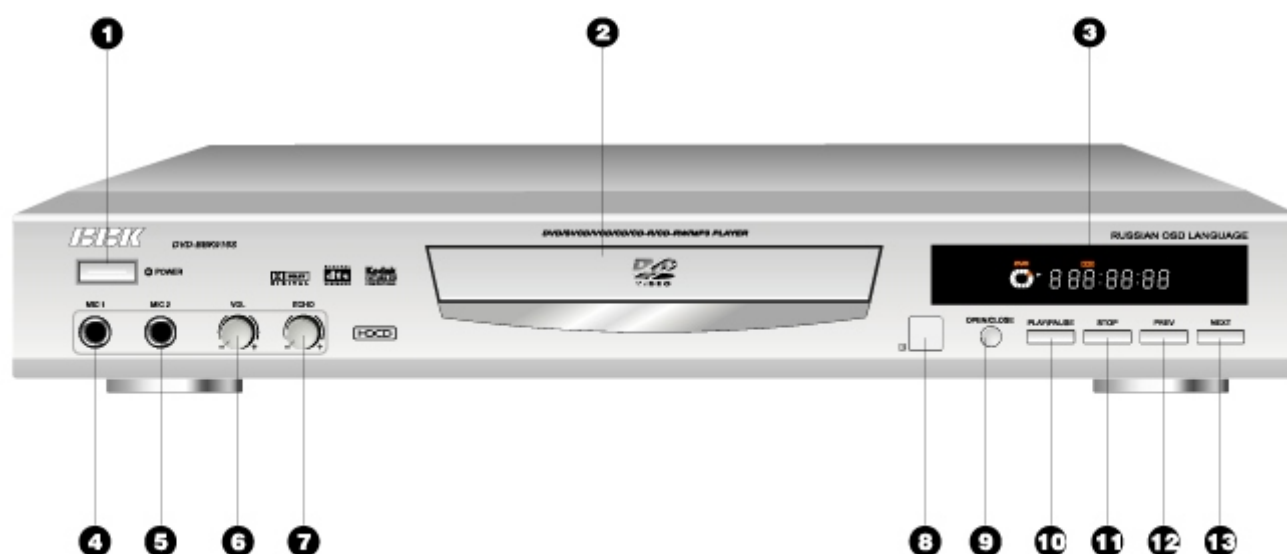
notice (1885x323x2 tiff)

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

Front Panel Illustration



❶ POWER switch

❷ Disc tray

❸ VFD display window

❹ MIC 1 jack

❺ MIC 2 jack

❻ MIC VOLUME knob

❼ ECHO adjustment knob

❽ Remote control signal sensor

❾ OPEN/CLOSE button

❿ PLAY/PAUSE button

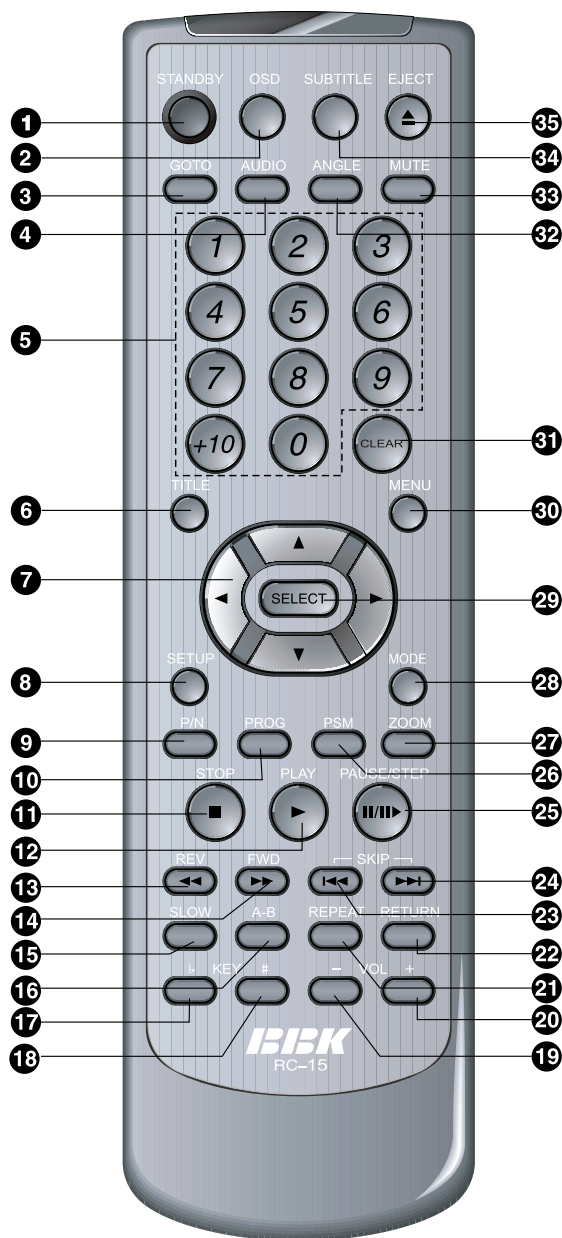
⓫ STOP button

⓬ PREV button

⓭ NEXT button

Control Button Locations and Explanations(Continued)

Remote Control Illustration



- 30 MENU Button**
Display DVD menu or open/close PBC.
- 31 CLEAR Button**
Clear error input numbers.
- 32 ANGLE Button**
Change camera angle.
- 33 MUTE Button**
Press once to mute, twice to unmute.
- 34 SUBTITLE Button**
Change subtitle language.
- 35 EJECT Button**
Open or close the disc tray.

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

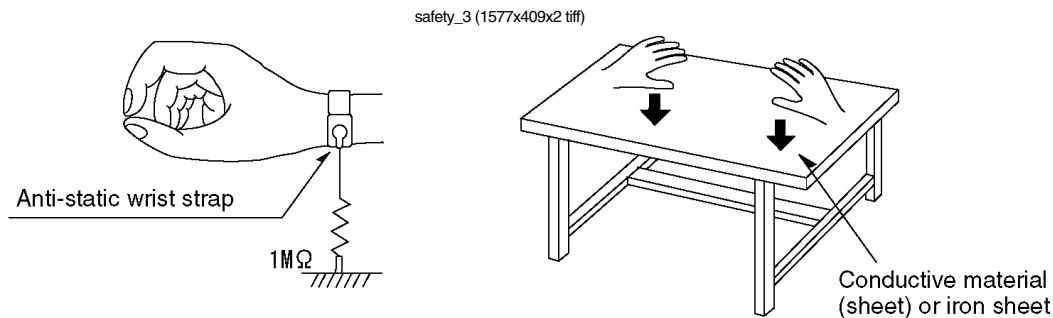
Some devices such as the DVD player use the optical pickup (laser diode) and the optical pickup will be damaged by static electricity in the working environment. Proceed servicing works under the working environment where grounding works is completed.

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

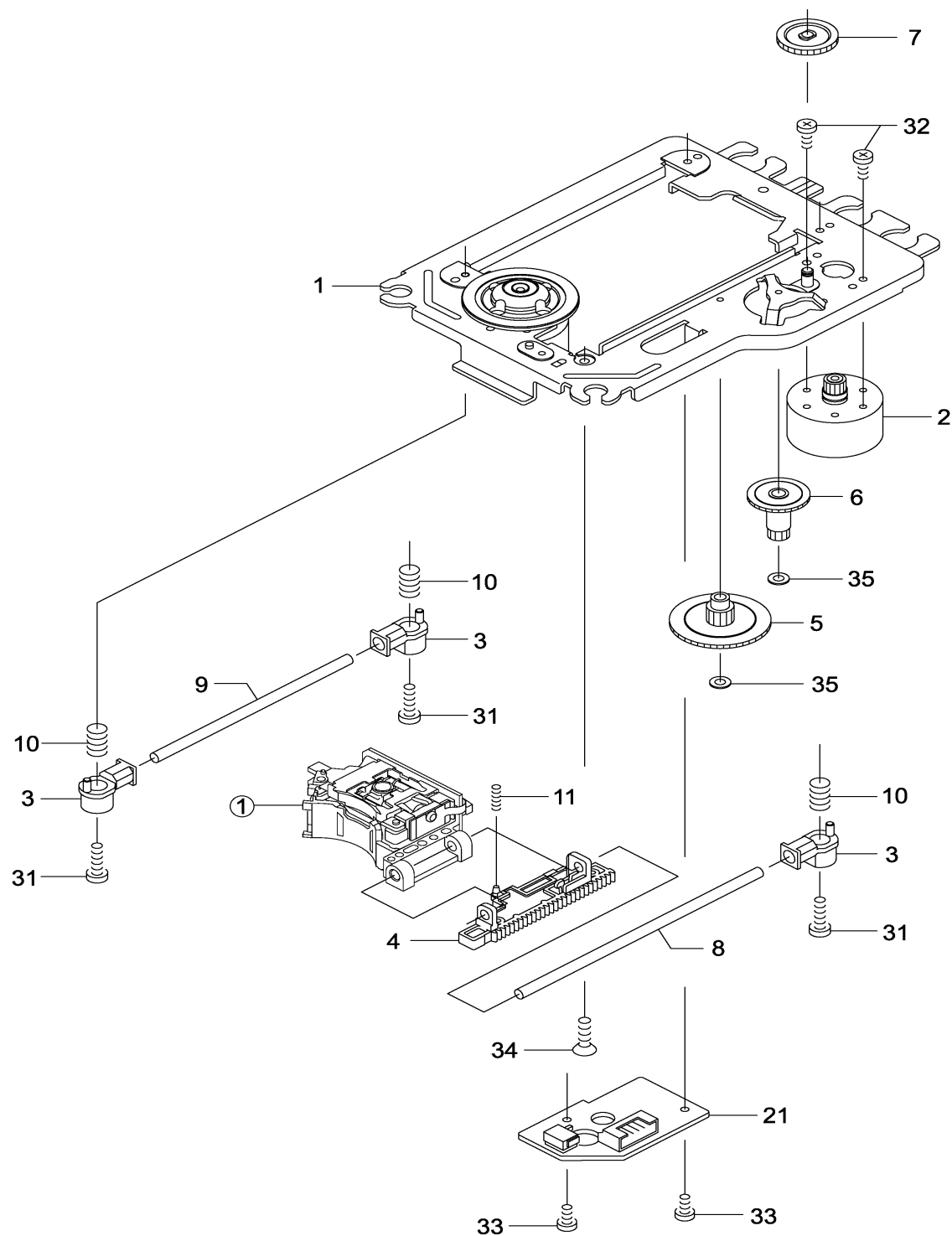
1. To keep the good quality of the optical pickup maintenance parts during transportation and before installation, the both ends of the laser diode are short-circuited. After replacing the parts with new ones, remove the short circuit according to the correct procedure. (See this Technical Guide).
2.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

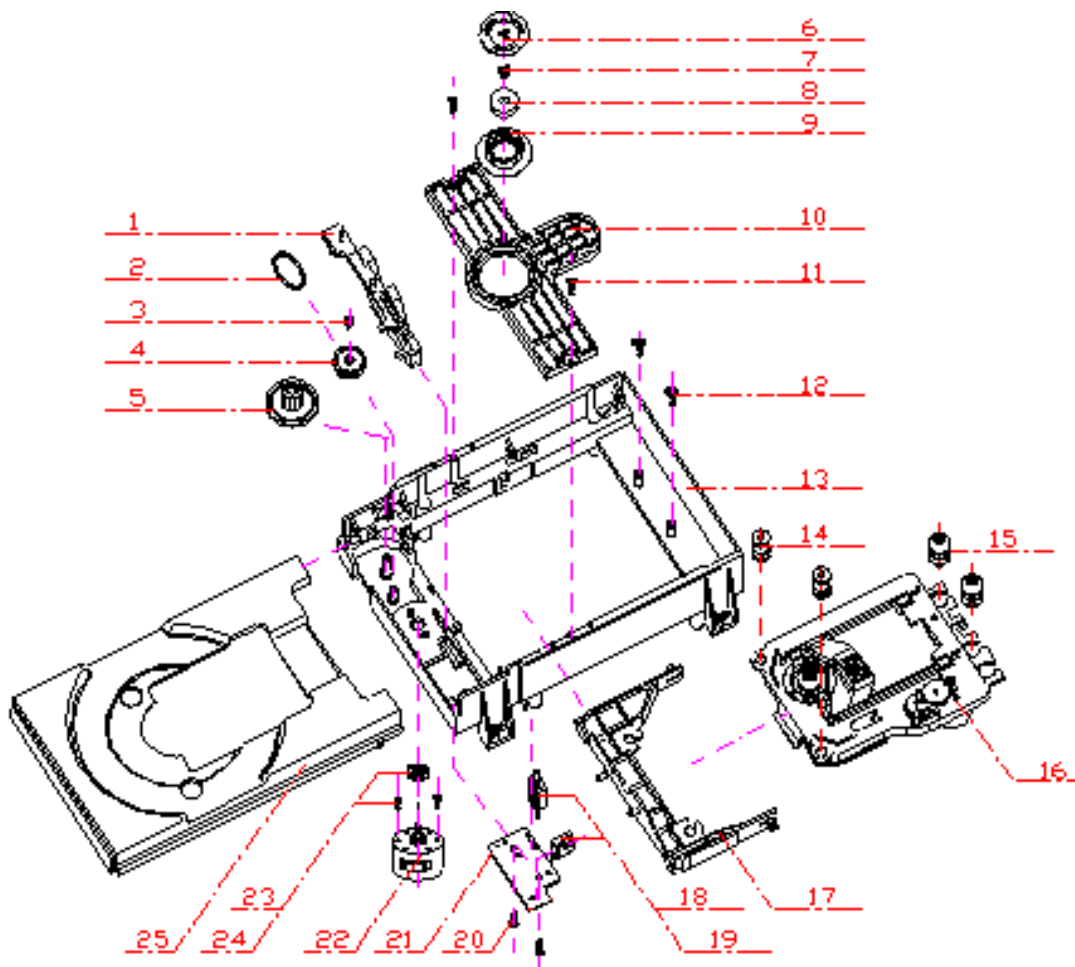
Materials to Pic (1)

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

□ □

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

5.2 Bracket Exploded View and Part List



Pic (2)

Materials to Pic(2)

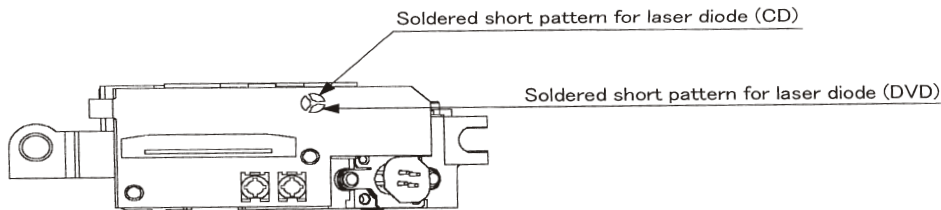
- | | |
|-----------------------------------|--------------------------|
| 1.bracket | 14. front silicon rubber |
| 2.belt | 15. Back silicon rubber |
| 3.screw | 16. Pick-up |
| 4.belt wheel | 17. Pick-up |
| 5.gearwheel | 18. switch |
| 6.iron chip | 19. Five-pin flat plug |
| 7. Immobility mechanism 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

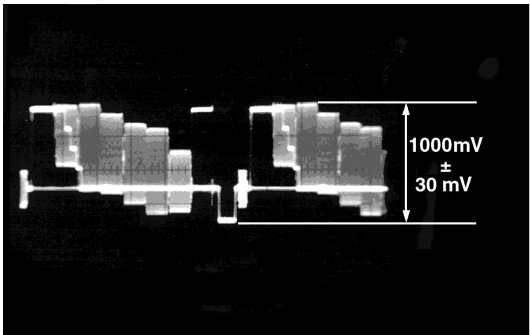
6.1. Video Output (Luminance Signal) Confirmation

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

Measurement point	Mode	Disc
Video output terminal	Color bar 75% PLAY(Title 46):DVDT-S15 PLAY(Title 12):DVDT-S01	DVDT-S15 or 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



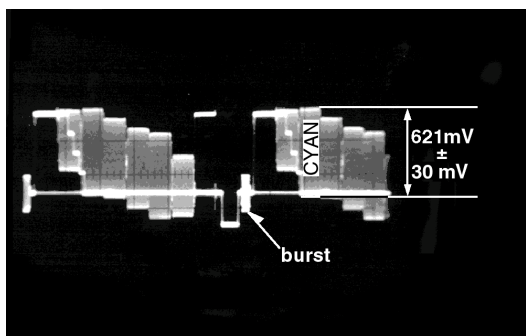
6.2 Video Output(Chrominance Signal) Confirmation

Do the confirmation after replacing P.C.B.

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

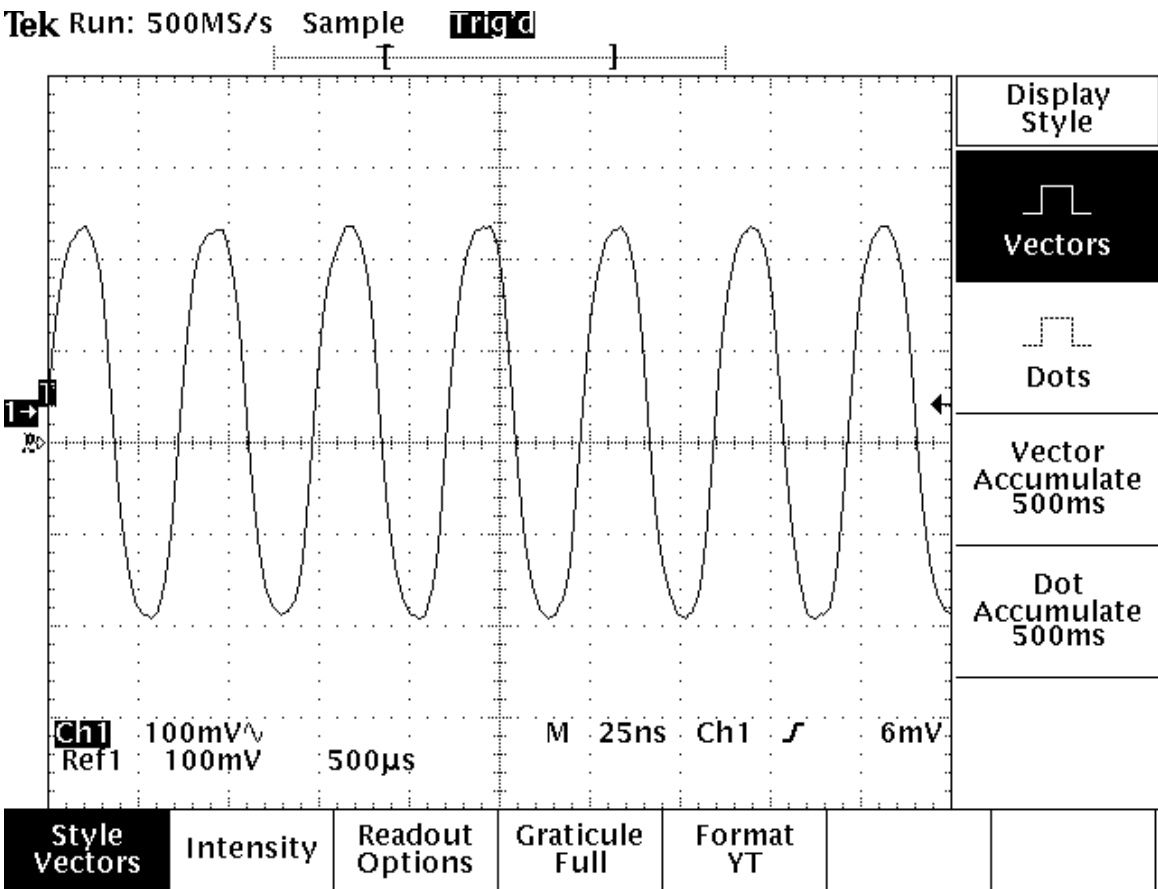
Purpose:To maintain video signal output compatibility.

- 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

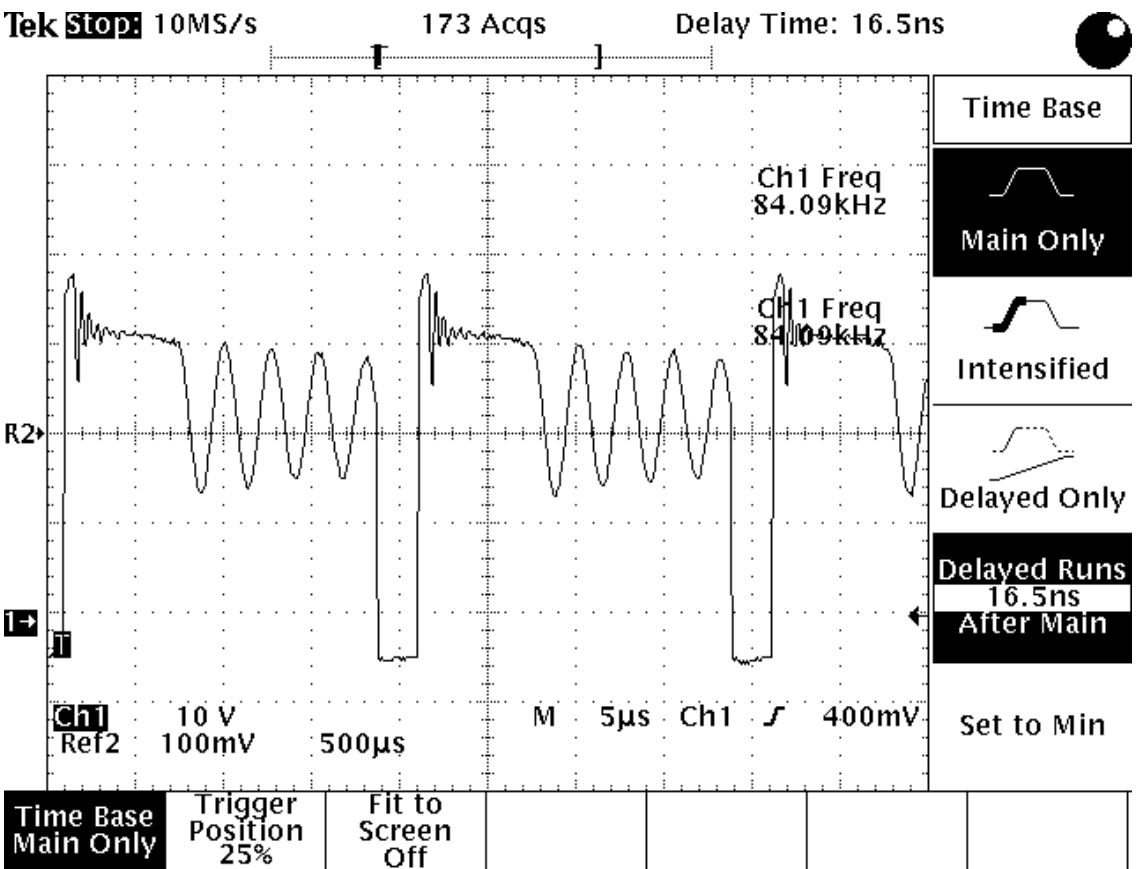


7.MPEG BOARD CHECK WAVEFORM

7.1 27MHz WAVEFORM



7.2 IC5L0380R PIN.2 WAVEFORM DIAGRAM



8. IC BLOCK DIAGRAM & DESCRIPTION

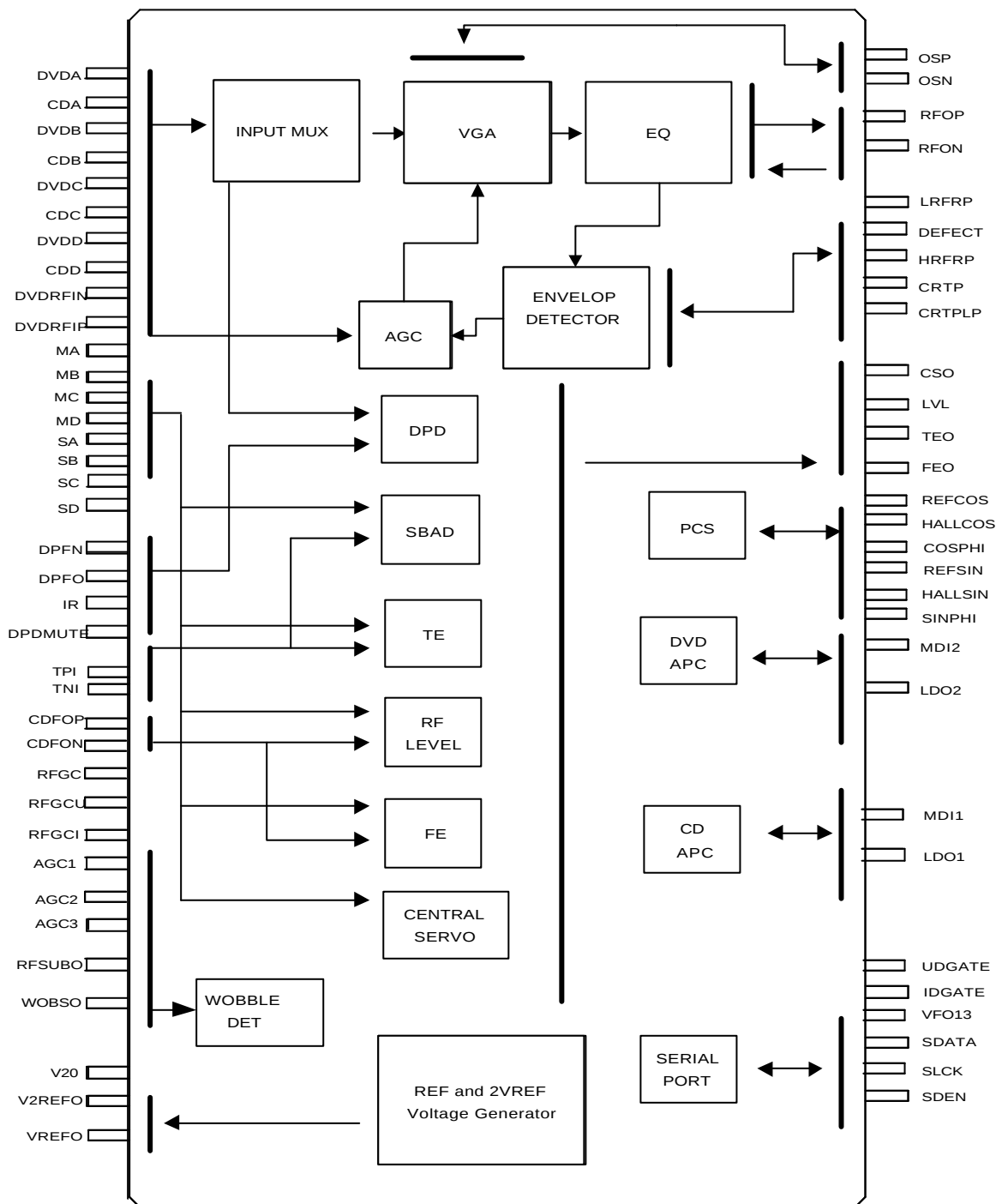
8.1 MT1336

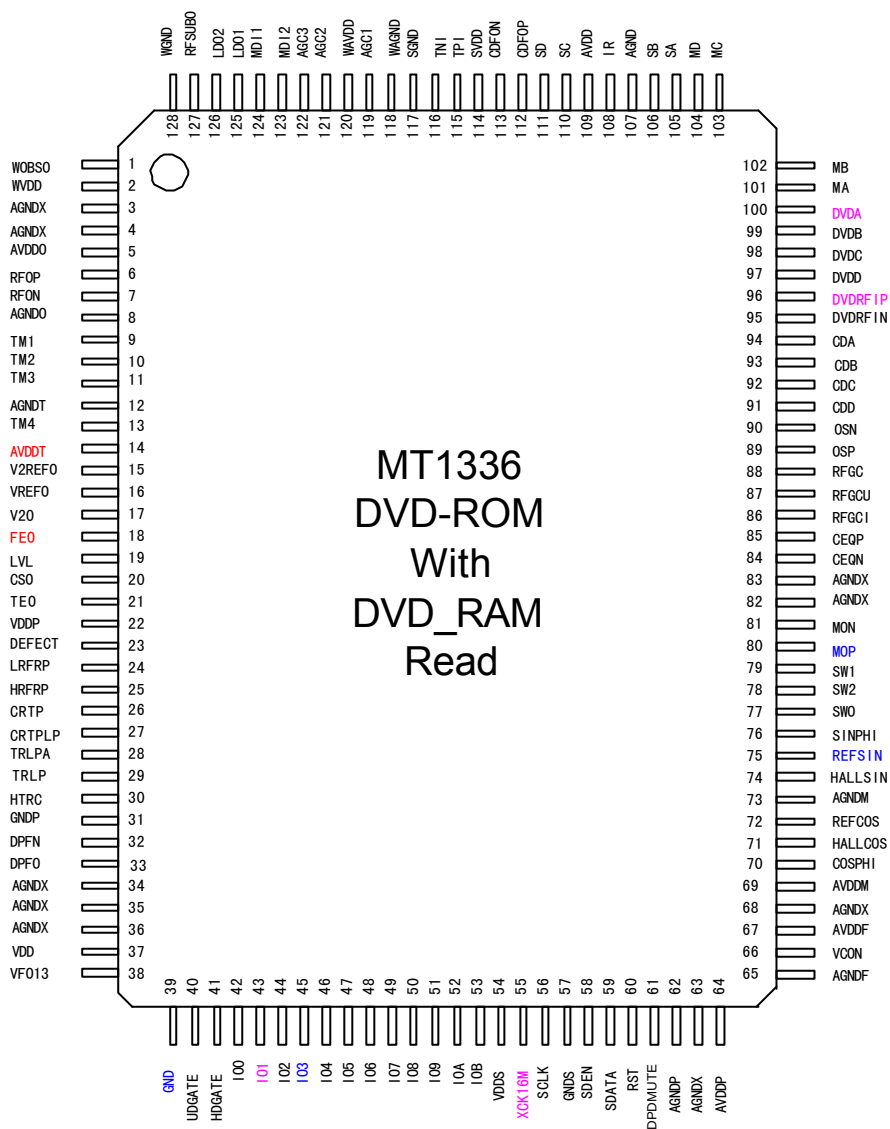
GENERAL DESCRIPTION

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
LQFP128			
RF Flag Interface			
23	DETECT	Digital Output	Flag of bad data output status
RF SIO interface			
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
RF SERVO interface			
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
RF			
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
TRACKING ERROR			
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
FOCUSING ERROR & RF LEVEL & CENTRAL SERVO SIGNAL			
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
ALPC			

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
RF RIPPLE			
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
POWER			
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
REFERENCE VOLTAGE			
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		

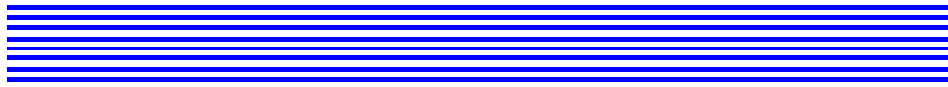


MT1336

PRELIMINARY, SUBJECT TO CHANGE WITHOUT NOTICE

MTK CONFIDENTIAL, NO DISCLOSURE

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



MT1369

Specifications are subject to change without notice

DVD Player Combo Chip

8.2 MT1369

FEATURES

- Super Integration DVD player single chip
 - Servo controller and data channel processing
 - MPEG-1/MPEG-2/JPEG video decoding
 - AC-3/DTS/DVD-Audio/MP3 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
- Speed Performance on Servo and Decoding
 - DVD-ROM up to 8XS
 - CD-ROM up to 24XS
 - Built-in a frequency programmable clock to μ 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
 - 256-bytes on-chip RAM
 - Up to 1M 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 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/SPU/HLI Processor
 - Arbitrary ratio vertical/horizontal scaling of video, from 0.25X to 256X
 - 256/16/4/2 -color bitmap format OSD,
 - 256/16 color RLC format OSD
 - Automatic scrolling of OSD image
 - Warp mode of OSD can reduce memory required
 - Dual Sub-picture decoder
 - 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
- 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
 - 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
- Outline
 - 208-pin LQFP package
 - 3.3/2.5-Volt. Dual operating voltages

PIN DEFINITIONS

Pin	Symbol	Type	Description
1	IREF	Analog Input	Current reference input. It generate reference current for data PLL. Connect an external 100K resistor to this pin and PLLVSS.
2	PLLVSS	Ground	Ground 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	PLLVD3	Power	Power 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. This is PWM output for TRWMEN _{27hRW2} =1 or is digital output for TRWMEN _{27hRW2} =0
15	PWMOUT2	Analog Output	The general PWM output
16	DVDD2	Power	2.5V power
17	DMO	Analog Output	Disk motor control output. PWM output
18	FMO	Analog Output	Feed motor control. PWM output
19	FG	Input, Pull Up	Motor Hall sensor input
20	DVSS	Ground	Ground
21	HIGHA0	Inout, Pull Up	Microcontroller address 8
22	HIGHA1	Inout, Pull Up	Microcontroller address 9
23	HIGHA2	Inout, Pull Up	Microcontroller address 10
24	HIGHA3	Inout, Pull Up	Microcontroller address 11
25	HIGHA4	Inout, Pull Up	Microcontroller address 12
26	HIGHA5	Inout, Pull Up	Microcontroller address 13
27	DVSS	Ground	Ground
28	HIGHA6	Inout, Pull Up	Microcontroller address 14
29	HIGHA7	Inout, Pull Up	Microcontroller address 15
30	AD7	Inout	Microcontroller address/data 7
31	AD6	Inout	Microcontroller address/data 6
32	AD5	Inout	Microcontroller address/data 5
33	AD4	Inout	Microcontroller address/data 4
34	DVDD3	Power	3.3V power
35	AD3	Inout	Microcontroller address/data 3
36	AD2	Inout	Microcontroller address/data 2
37	AD1	Inout	Microcontroller address/data 1
38	AD0	Inout	Microcontroller address/data 0
39	IOA0	Inout, Pull Up	Microcontroller address 0 / GPIO0
40	IOA1	Inout, Pull Up	Microcontroller address 1 / GPIO1
41	DVDD2	Power	2.5V power

Pin	Symbol	Type	Description
42	IOA2	Inout, Pull Up	Microcontroller address 2 / GPIO2
43	IOA3	Inout, Pull Up	Microcontroller address 3 / GPIO3
44	IOA4	Inout, Pull Up	Microcontroller address 4 / GPIO4
45	IOA5	Inout, Pull Up	Microcontroller address 5 / GPIO5
46	IOA6	Inout, Pull Up	Microcontroller address 6 / GPIO6
47	IOA7	Inout, Pull Up	Microcontroller address 7 / GPIO7
48	A16	Output	Flash address 16
49	A17	Output	Flash address 17
50	IOA18	Inout	Flash address 18 / GPIO10
51	IOA19	Inout	Flash address 19 / GPIO11
52	DMVSS	Ground	Ground for DRAM clock circuitry
53	DMVDD3	Power	Power for DRAM clock circuitry
54	ALE	Inout, Pull Up	Microcontroller address latch enable
55	IOOE#	Inout	Flash output enable, active low / GPIO13
56	IOWR#	Inout	Flash write enable, active low / GPIO17
57	IOCS#	Inout, Pull Up	Flash chip select, active low / GPIO18
58	DVSS	Ground	Ground
59	UP1_2	Inout, Pull Up	Microcontroller port 1-2
60	UP1_3	Inout, Pull Up	Microcontroller port 1-3
61	UP1_4	Inout, Pull Up	Microcontroller port 1-4
62	UP1_5	Inout, Pull Up	Microcontroller port 1-5
63	UP1_6	Inout, Pull Up	Microcontroller port 1-6
64	DVDD3	Power	3.3V power
65	UP1_7	Inout, Pull Up	Microcontroller port 1-7
66	UP3_0	Inout, Pull Up	Microcontroller port 3-0
67	UP3_1	Inout, Pull Up	Microcontroller port 3-1
68	INT0#	Inout, Pull Up	Microcontroller interrupt 0, active low
69	IR	Input	IR control signal input
70	DVDD2	Power	2.5V power
71	UP3_4	Inout	Microcontroller port 3-4
72	UP3_5	Inout	Microcontroller port 3-5
73	UWR#	Inout, Pull Up	Microcontroller write strobe, active low
74	URD#	Inout, Pull Up	Microcontroller read strobe, active low
75	XTALI	Input	Crystal input, 27MHz
76	XTALO	Output	Crystal output
77	DVSS	Ground	Ground
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
83	RD3	Inout	DRAM data 3
84	RD2	Inout	DRAM data 2
85	RD1	Inout	DRAM data 1
86	RD0	Inout	DRAM data 0



Pin	Symbol	Type	Description
87	RWE#	Output	DRAM write enable, active low
88	CAS#	Output	DRAM column address strobe, active low
89	RAS#	Output	DRAM row address strobe, active low
90	RCS#	Output	DRAM chip select, active low
91	BA0	Output	DRAM bank address 0
92	DVDD3	Power	3.3V power
93	RD15	Inout, Pull Up/Down	DRAM data 15
94	RD14	Inout, Pull Up/Down	DRAM data 14
95	RD13	Inout, Pull Up/Down	DRAM data 13
96	RD12	Inout, Pull Up/Down	DRAM data 12
97	DVSS	Ground	Ground
98	RD11	Inout, Pull Up/Down	DRAM data 11
99	RD10	Inout, Pull Up/Down	DRAM data 10
100	RD9	Inout, Pull Up/Down	DRAM data 9
101	RD8	Inout, Pull Up/Down	DRAM data 8
102	VPVDD3	Power	Power for varipitch VCO circuitry
103	VCOCIN	Analog Input	Connect capacitor for compensator loop filter
104	VPVSS	Ground	Ground for varipitch VCO circuitry
105	DVSS	Ground	Ground
106	CLK	Output	DRAM clock
107	CLE	Output	DRAM clock enable
108	RA11	Output	DRAM address bit 11 or audio serial data 3 (channel 7/8)
109	RA9	Output	DRAM address 9
110	RA8	Output	DRAM address 8
111	DVDD2	Power	2.5V power
112	RA7	Output	DRAM address 7
113	RA6	Output	DRAM address 6
114	RA5	Output	DRAM address 5
115	RA4	Output	DRAM address 4
116	DVSS	Ground	Ground
117	DQM1	Output	Mask for DRAM input/output byte 1
118	DQM0	Output	Mask for DRAM input/output byte 0
119	BA1	Output	DRAM bank address 0
120	RA10	Output	DRAM address10
121	DVDD2	Power	2.5V power
122	RA0	Output	DRAM address 0
123	RA1	Output	DRAM address 1
124	RA2	Output	DRAM address 2
125	RA3	Output	DRAM address 3
126	DVSS	Ground	Ground
127	RD31	Inout, Pull Up/Down	DRAM data 31
128	RD30	Inout, Pull Up/Down	DRAM data 30
129	RD29	Inout, Pull Up/Down	DRAM data 29
130	RD28	Inout, Pull Up/Down	DRAM data 28
131	DVDD3	Power	3.3V power

Pin	Symbol	Type	Description
132	RD27	Inout, Pull Up/Down	DRAM data 27
133	RD26	Inout, Pull Up/Down	DRAM data 26
134	RD25	Inout, Pull Up/Down	DRAM data 25
135	RD24	Inout, Pull Up/Down	DRAM data 24
136	DVSS	Ground	Ground
137	DQM3	Output	Mask for DRAM input/output byte 3
138	DQM2	Output	Mask for DRAM input/output byte 2
139	RD23	Inout, Pull Up/Down	DRAM data 23
140	RD22	Inout, Pull Up/Down	DRAM data 22
141	DVDD2	Power	2.5V power
142	RD21	Inout, Pull Up/Down	DRAM data 21
143	RD20	Inout, Pull Up/Down	DRAM data 20
144	RD19	Inout, Pull Up/Down	DRAM data 19
145	RD18	Inout, Pull Up/Down	DRAM data 18
146	DVSS	Ground	Ground
147	RD17	Inout, Pull Up/Down	DRAM data 17
148	RD16	Inout, Pull Up/Down	DRAM data 16
149	ABCK	Output	Audio bit clock
150	ALRCK	Inout, Pull Down	(1) Audio left/right channel clock (2) Trap value in power-on reset. 1:use external 373, 0:use internal 373
151	DVDD3	Power	3.3V power
152	ASDATA0	Inout, Pull Down	Audio serial data 0 (left/right channel)
153	ASDATA1	Inout, Pull Down	Audio serial data 1 (surround left/surround right channel)
154	ASDATA2	Inout, Pull Down	Audio serial data 2 (center/LFE channel)
155	ACLK	Inout	Audio DAC master clock (384/256 audio sample frequency)
156	APVDD3	Power	Power for audio clock circuitry
157	APVSS	Ground	Ground for audio clock circuitry
158	SPDIF	Output	SPDIF output
159	MC_DAT	Input	Microphone serial input
160	BLANK#	Inout	Video blank area, active low / GPIO14
161	VSYN	Inout	Vertical sync / GPIO16
162	HSYN	Inout	Horizontal sync / GPIO15
163	DVSS	Ground	Ground
164	YUV0	Output	Video data output bit 0
165	YUV1	Output	Video data output bit 1
166	YUV2	Output	Video data output bit 2
167	YUV3	Output	Video data output bit 3
168	YUV4	Output	Video data output bit 4
169	DVDD2	Power	2.5V power
170	YUV5	Output	Video data output bit 5
171	YUV6	Output	Video data output bit 6
172	YUV7	Output	Video data output bit 7
173	ICE	Input, Pull Down	Microcontroller ICE mode enable
174	PRST	Input, Pull Down	Power on reset input, active high
175	DVSS	Ground	Ground

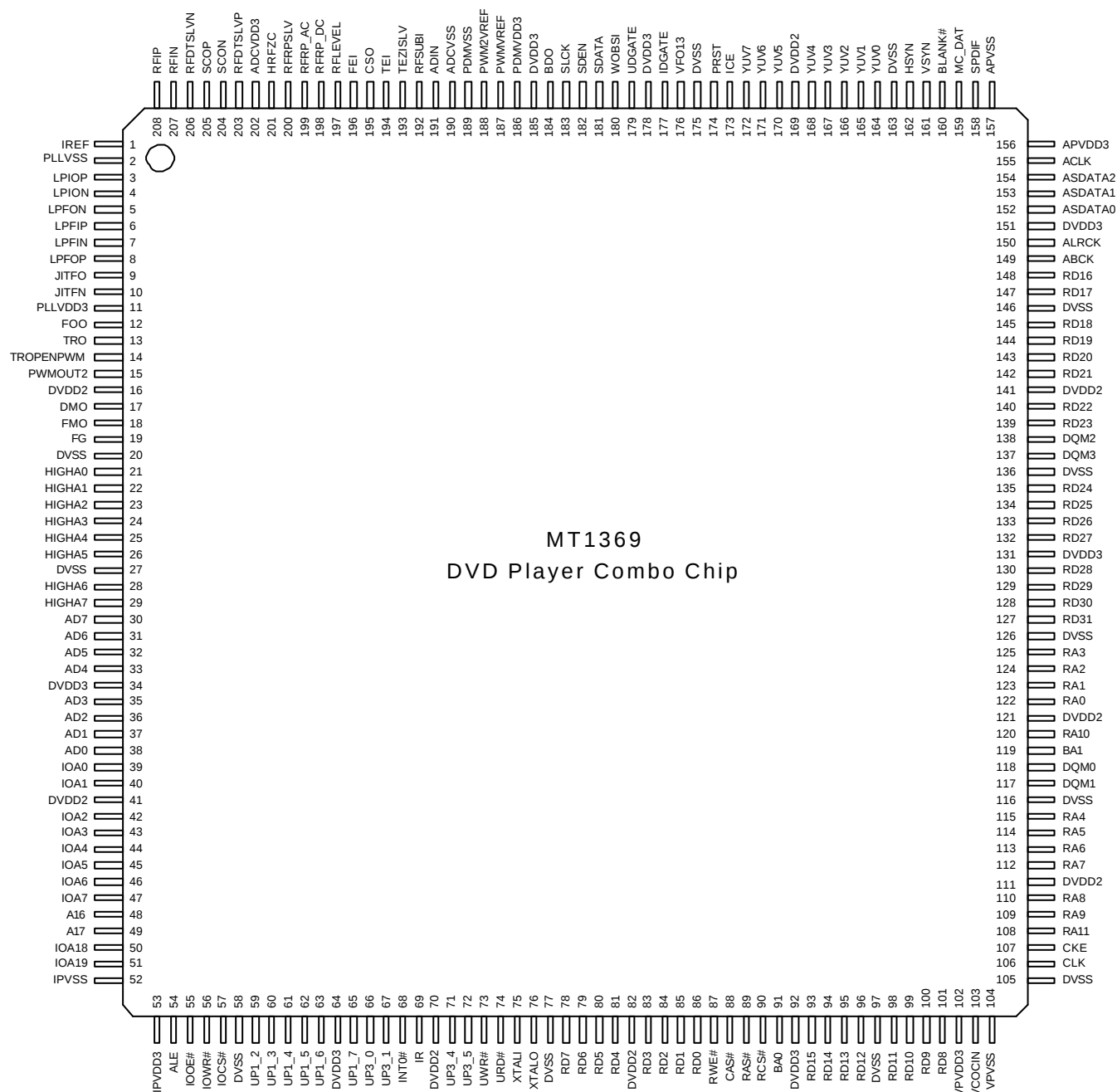
Pin	Symbol	Type	Description
176	VFO13	Output	The 1st, 3rd VFO pulse output of DVD-RAM ID header
177	IDGATE	Output	DVD-RAM ID header detect signal output
178	DVDD3	Power	3.3V power
179	UDGATE	Output	DVD-RAM recording data gate signal output
180	WOBSI	Input	Wobble signal input
181	SDATA	Output	RF serial data output
182	SDEN	Output	RF serial data latch enable
183	SLCK	Output	RF serial clock output
184	BDO	Input, Pull Down	Flag of defect data status input
185	DVDD3	Power	3.3V power
186	PDMVDD3	Power	Power for PDM circuitry
187	PWMVREF	Analog Input	A reference voltage input for PWM circuitry. A typical value of 2.8 v
188	PWM2VREF	Analog Input	A reference voltage input for PWM circuitry. A typical value of 1.4 v
189	PDMVSS	Ground	Ground for PDM circuitry
190	ADCVSS	Ground	Ground for ADC circuitry
191	ADIN	Analog Input	General A/D input
192	RFSUBI	Analog Input	RF subtraction signal input terminal
193	TEZISLV	Analog Input	Tracking error zero crossing low pass input
194	TEI	Analog Input	Tracking error input
195	CSO	Analog Input	Central servo input
196	FEI	Analog Input	Focus error input
197	RFLEVEL	Analog Input	Sub beam add input or RFRP low pass input
198	RFRP_DC	Analog Input	RF ripple detect input
199	RFRP_AC	Analog Input	RF ripple detect input (through AC coupling)
200	RFRPSLV	Analog Input	RFRP slice level input
201	HRFZC	Analog Input	High frequency RF ripple zero crossing
202	ADCVDD3	Power	Power for ADC circuitry
203	RFDTSLVP	Analog Output	Positive RF data slicer level output
204	SCON	Analog Output	Negative analog slicer current output
205	SCOP	Analog Output	Positive analog slicer current output
206	RFDTSLVN	Analog Output	Negative RF data slicer level output
207	RFIN	Analog Input	Negative input of RF differential signal
208	RFIP	Analog Input	Positive input of RF differential signal



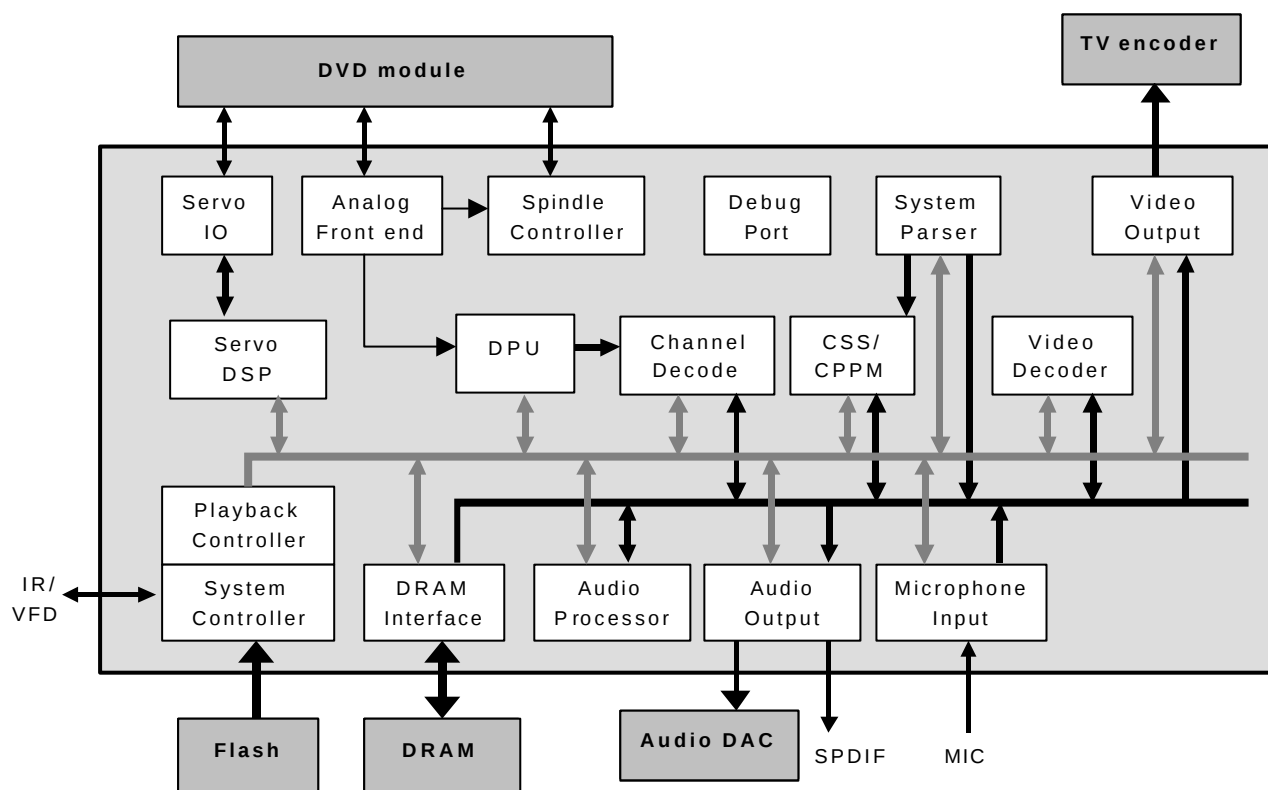
MT1369

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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 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 chip.

Analog Front End

The analog front end contains a data slicer circuit and a data PLL circuit. The RF analog signal from MT1336 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 generator generates a reference clock 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/VCDD/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 MT1369 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 are 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 MT1369 can support up to 8 channel audio outputs. The output formats can be 16, 24, or 32-bit frames. Left alignment, right alignment, or I²S formats are all supported.

With built-in PLL, MT1369 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 MT1369. When ACLK is input to MT1369, 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 MT1369 provides a microphone input interface. Two independent microphones' data could be input to the MT1369. There are two independent digital volume control for these two input channels. The input data formats can also be left alignment, right alignment, or I²S formats.

System Controller

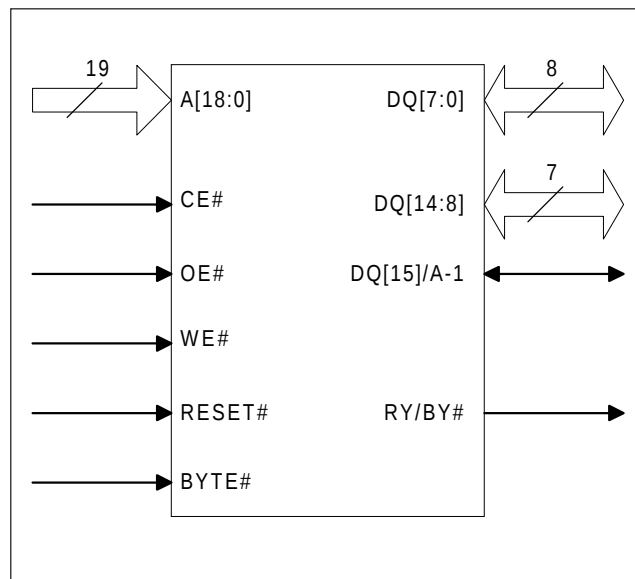
MT1369 uses an embedded Turbo-8032 as System Controller and provide ICE interface to increase the feasibility of F/W development. Also, MT1369 includes an build-in internal 373 to latch lower byte address from 8032 Port 0 and provide a glue-logic free solution. MT1369 supports up to 1M X 8 bits Flash 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.

IC BLOCK DIAGRAM & DESCRIPTION

8.3 U214 HY29F800

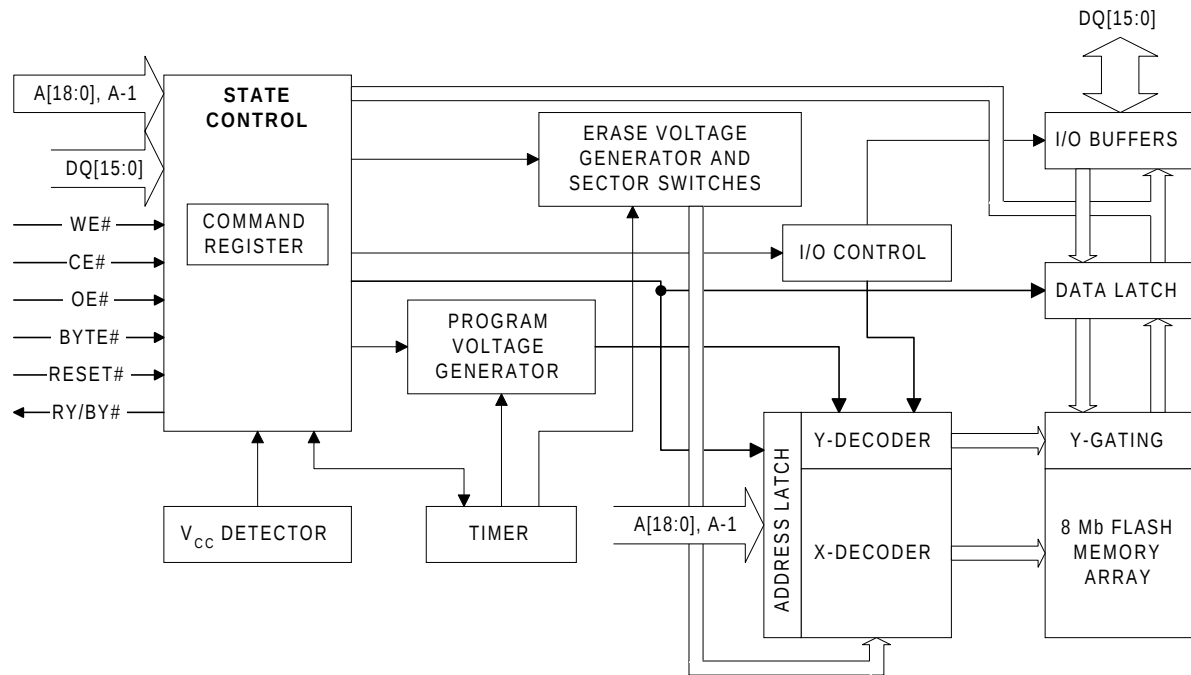
KEY FEATURES

- **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 μ 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 μ 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



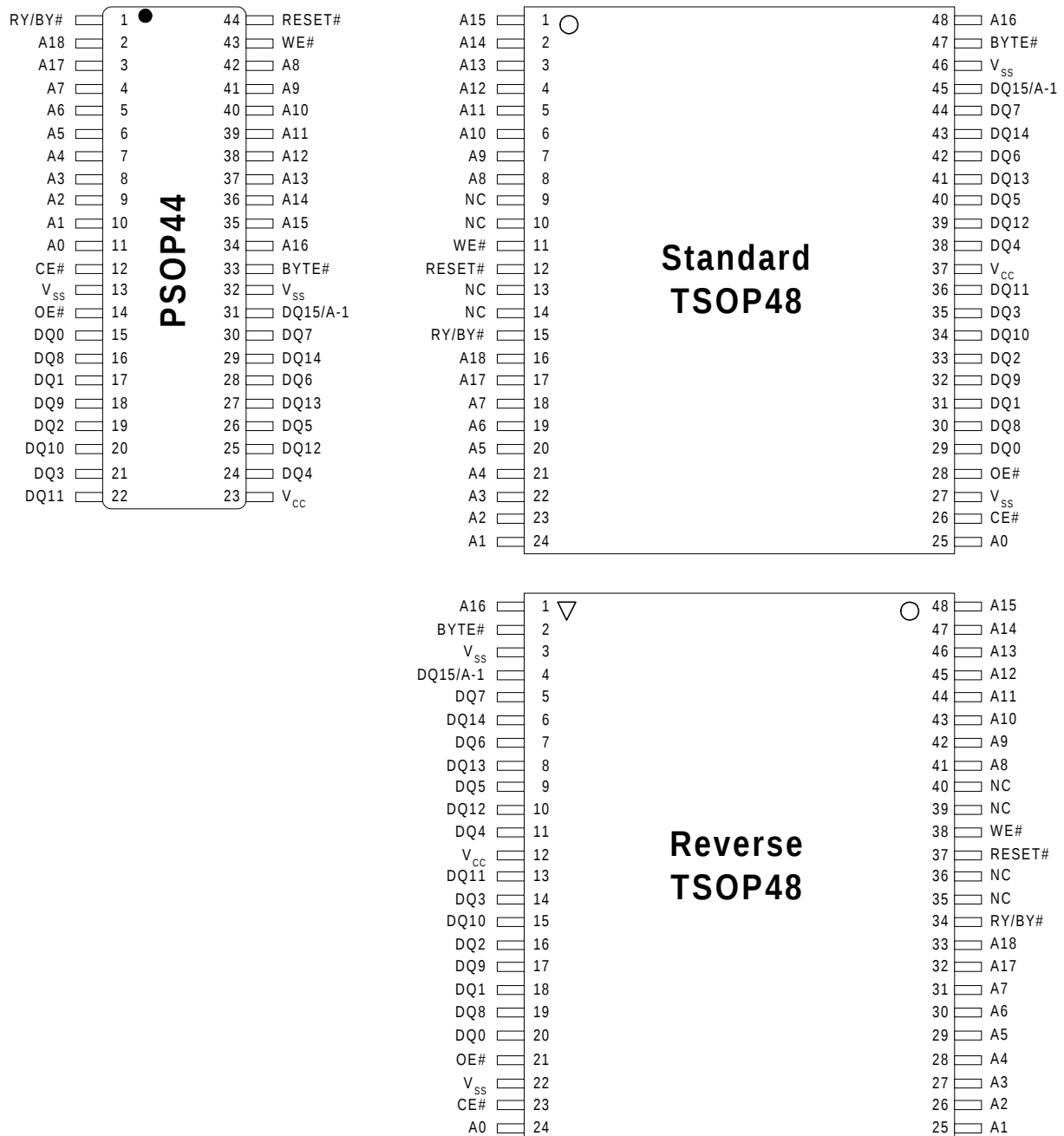
IC BLOCK DIAGRAM & DESCRIPTION

BLOCK DIAGRAM



IC BLOCK DIAGRAM & DESCRIPTION

PIN CONFIGURATIONS



IC BLOCK DIAGRAM & DESCRIPTION

8.4 U203 SDRAM-HY57V1610D

2 Banks x 512k x 16 Bit Synchronous DRAM

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 LVTTTL.

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 ^{Note1)}
- All device pins are compatible with LVTTTL 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

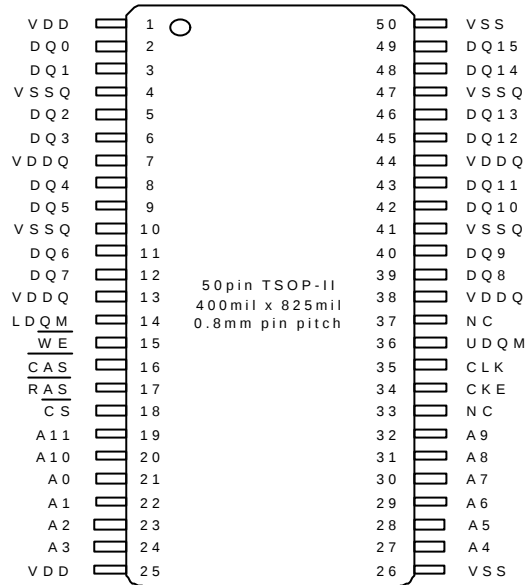
Part No.	Clock Frequency	Organization	Interface	Package
HY57V161610DTC-55I	183MHz	2Banks x 512Kbits x 16	LVTTTL	400mil 50pin TSOP II
HY57V161610DTC-6I	166MHz			
HY57V161610DTC-7I	143MHz			
HY57V161610DTC-10I	100MHz			

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Rev. 0.2/Aug.01

IC BLOCK DIAGRAM & DESCRIPTION

PIN CONFIGURATION



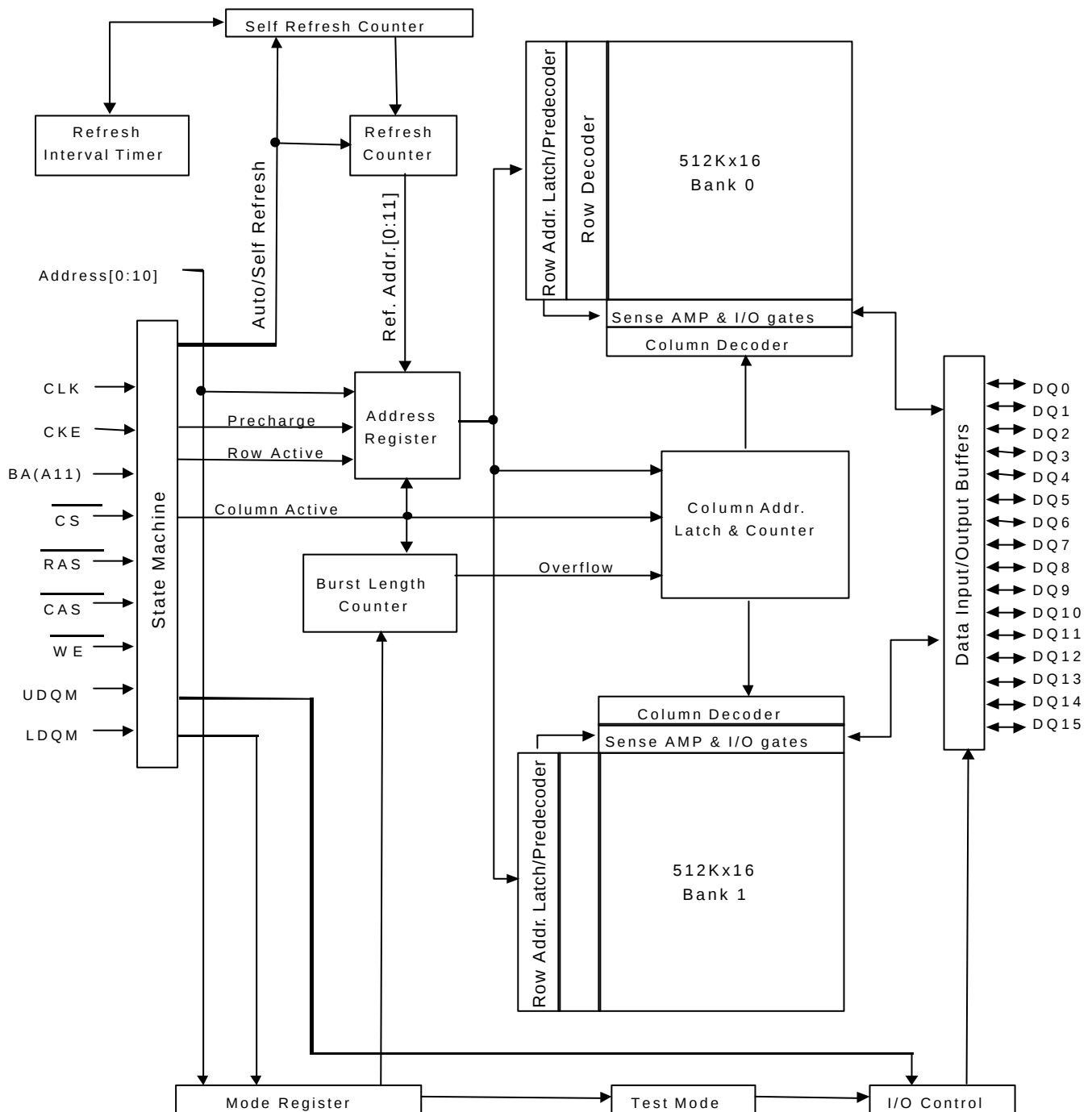
PIN DESCRIPTION

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.
$\overline{\text{CS}}$	Chip Select	Command input enable or mask except CLK, CKE and DQM
BA	Bank Address	Select either one of banks during both $\overline{\text{RAS}}$ and $\overline{\text{CAS}}$ activity.
A0 ~ A10	Address	Row Address : RA0 ~ RA10, Column Address : CA0 ~ CA7 Auto-precharge flag : A10
$\overline{\text{RAS}}$, $\overline{\text{CAS}}$, $\overline{\text{WE}}$	Row Address Strobe, Column Address Strobe, Write Enable	$\overline{\text{RAS}}$, $\overline{\text{CAS}}$ and $\overline{\text{WE}}$ define the operation. 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

IC BLOCK DIAGRAM & DESCRIPTION

FUNCTIONAL BLOCK DIAGRAM

1Mx16 Synchronous DRAM



IC BLOCK DIAGRAM & DESCRIPTION

ABSOLUTE MAXIMUM RATINGS

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

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

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

Parameter	Symbol	Min	Typ.	Max	Unit	Note
Power Supply Voltage	VDD, VDDQ	3.0	3.3	3.6	V	1, 2
Input high voltage	VIH	2.0	3.0	VDD + 0.3	V	1, 4
Input low voltage	VIL	-0.5	0	0.8	V	1, 5

Note :

- 1.All voltages are referenced to VSS = 0V.
- 2.VDD(min) is 3.15V when HY57V161610DTC-7I operates at CAS latency=2
- 3.VIH(max) is acceptable 4.6V AC pulse width with ≤ 10 ns of duration.
- 4.VIL(min) is acceptable -1.5V AC pulse width with ≤ 10 ns of duration.

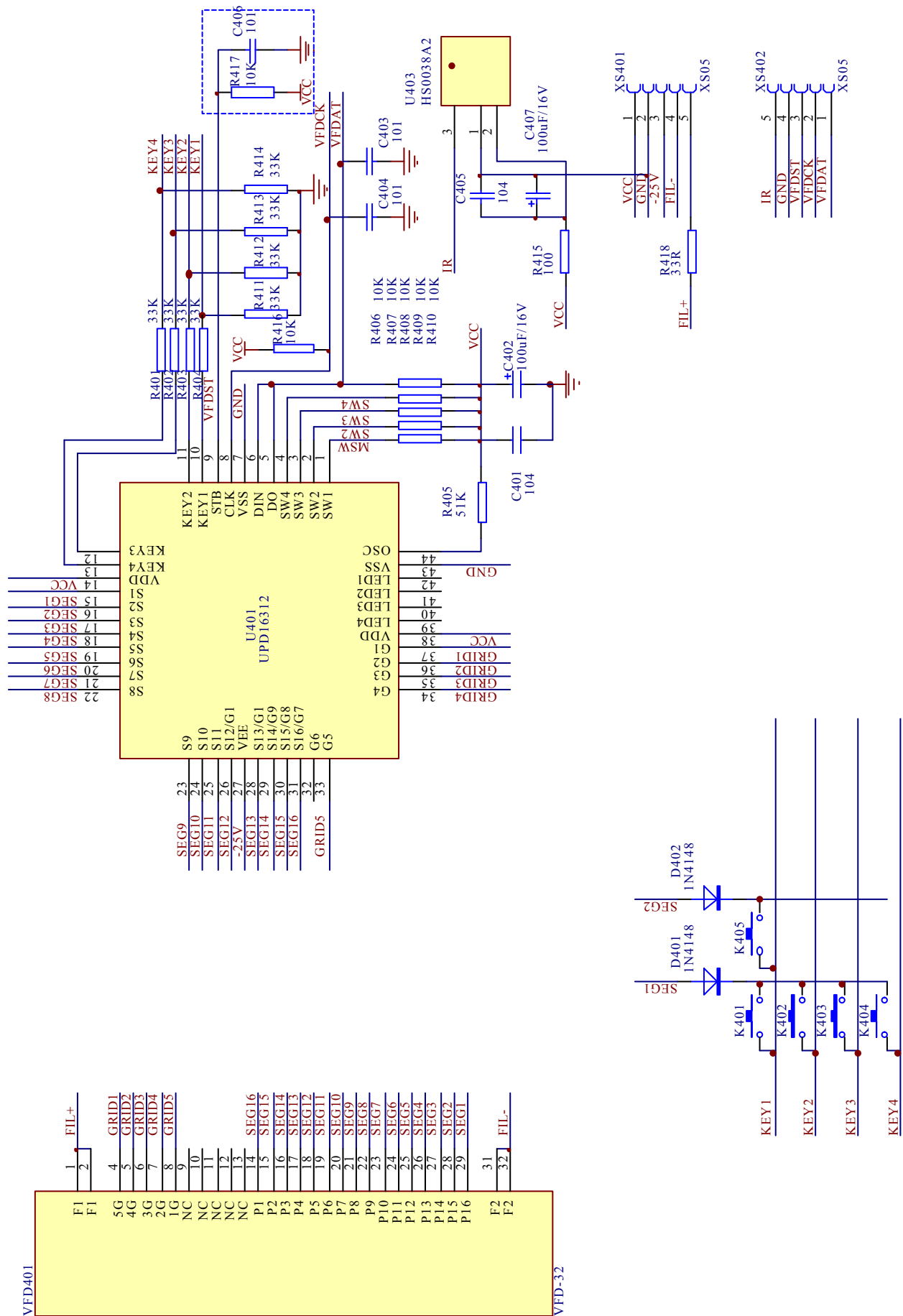
AC OPERATING CONDITION (TA= - 40°C to 85°C, VDD=3.0V to 3.6V, VSS=0V)

Parameter	Symbol	Value	Unit	Note
AC input high / low level voltage	VIH / VIL	2.4/0.4	V	
Input timing measurement reference level voltage	Vtrip	1.4	V	
Input rise / fall time	tR / tF	1	ns	
Output timing measurement reference level	Voutref	1.4	V	
Output load capacitance for access time measurement	CL	30	pF	1

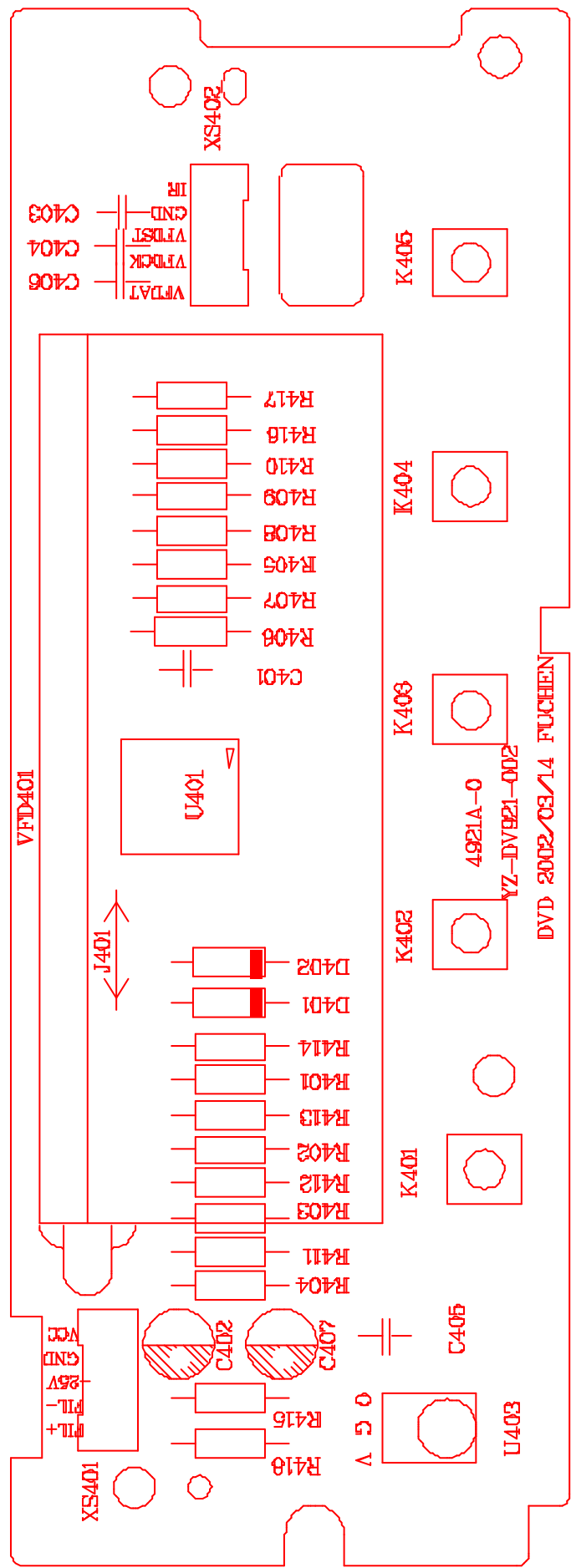
Note :

1. Output load to measure access times is equivalent to two TTL gates and one capacitance(30pF).
For details, refer to AC/DC output load circuit.
2. VDD(min) is 3.15V when HY57V161610DTC-7I operates at CAS latency=2 and tCK2=8.9ns

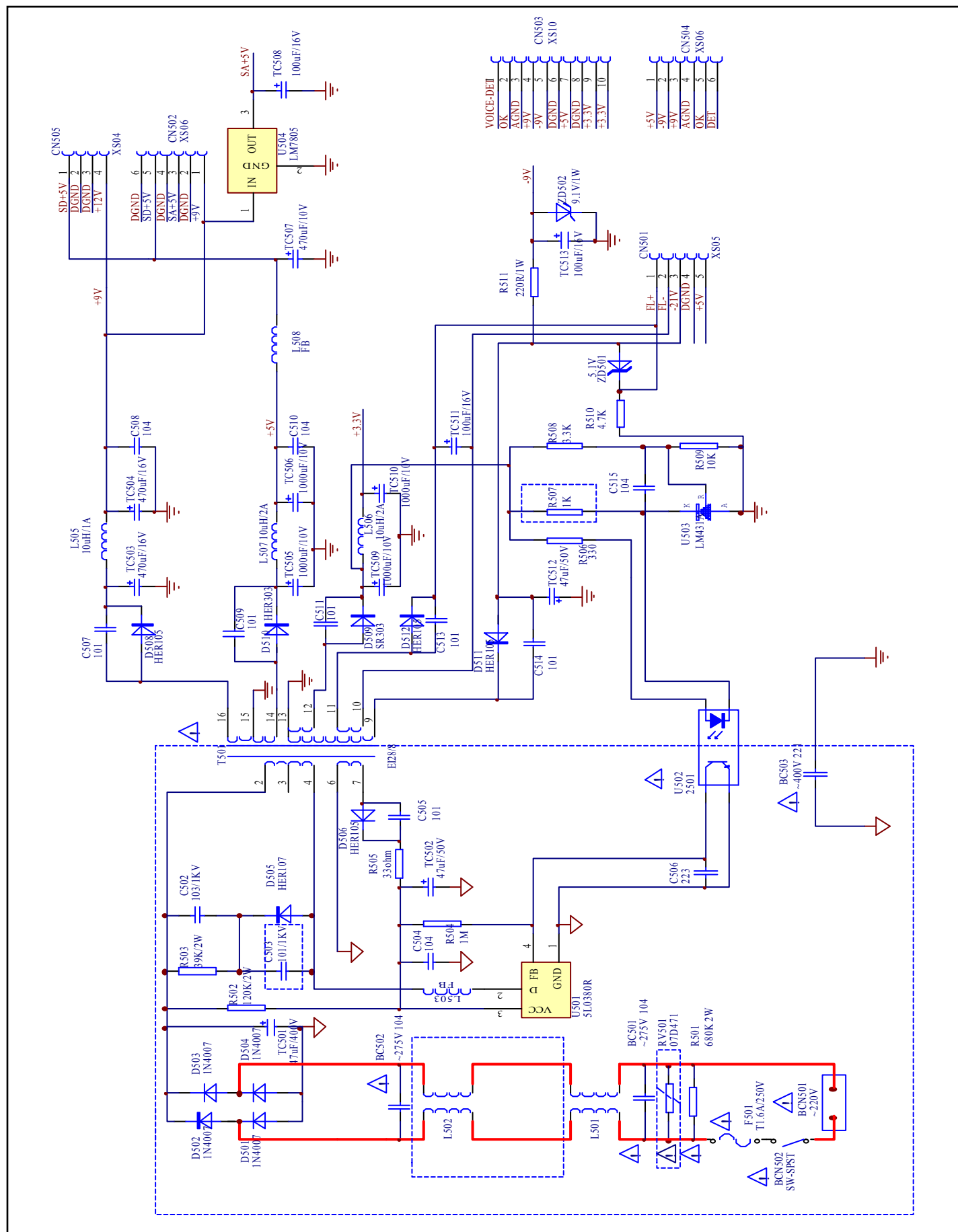
9.SCHEMATIC & P.C.B WIRING DIAGRAM FRONT SCHEMATIC DIAGRAM



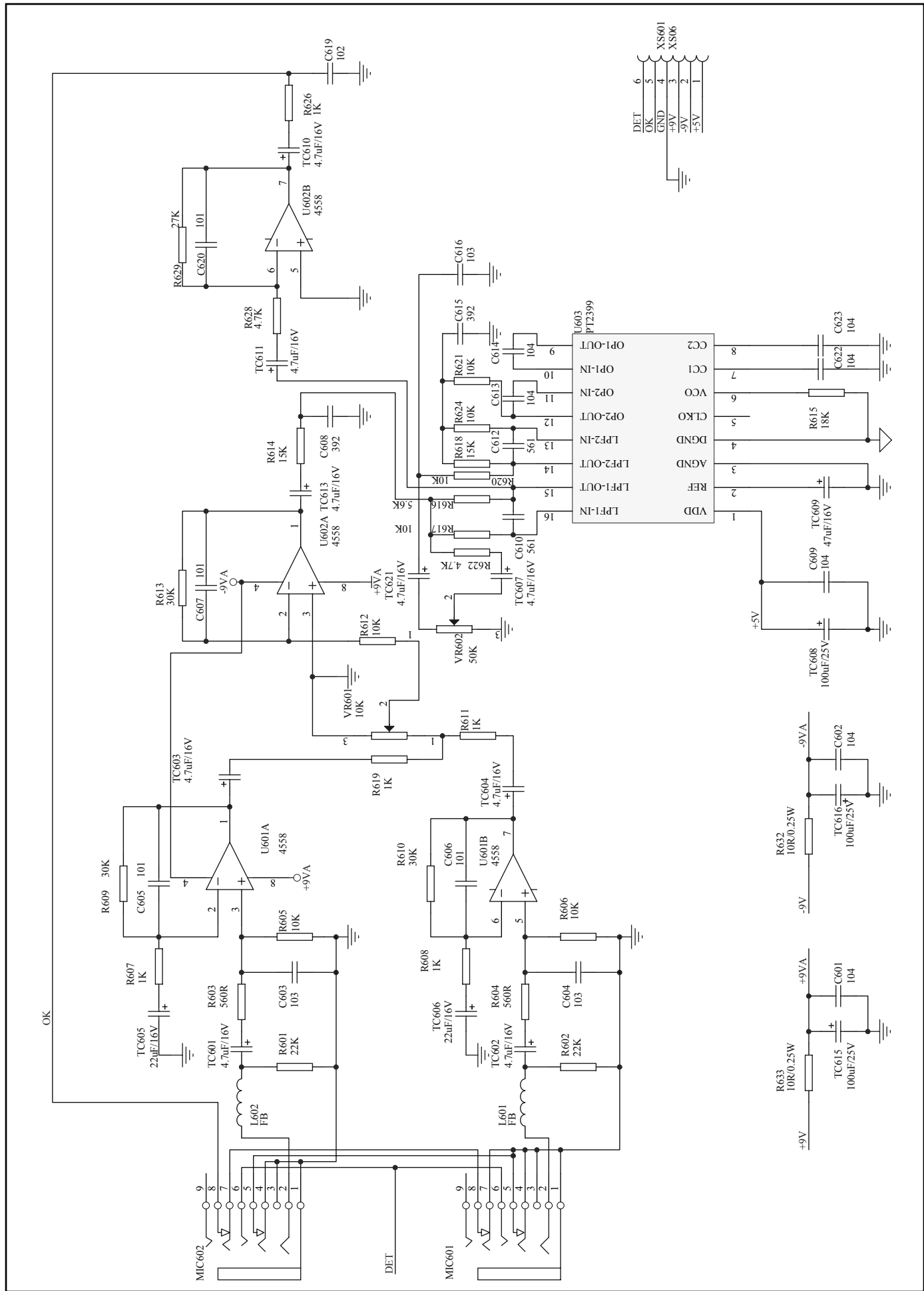
FRONT SCHEMATIC DIAGRAM



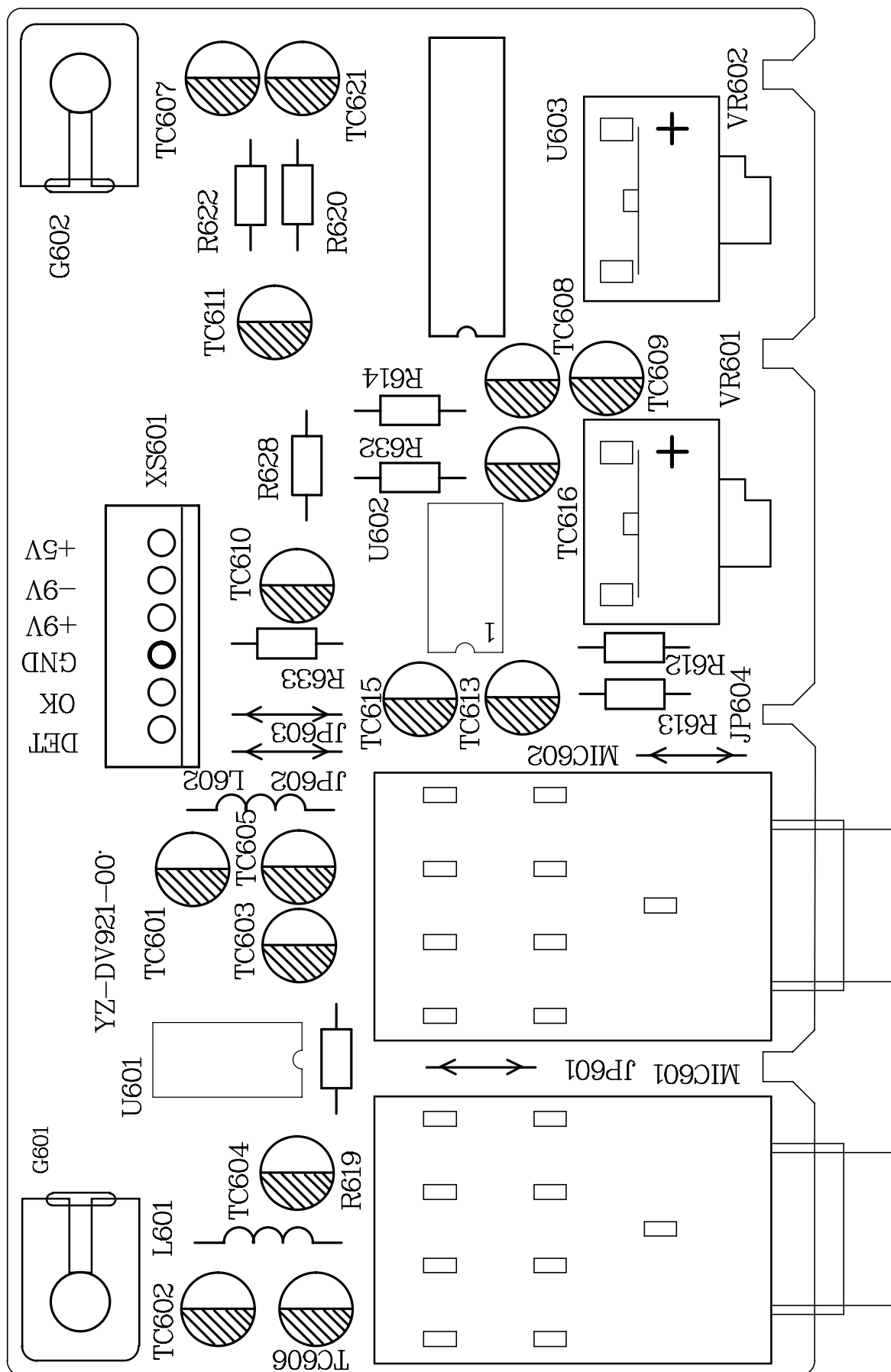
POWER BOARD SCHEMATIC DIAGRAM



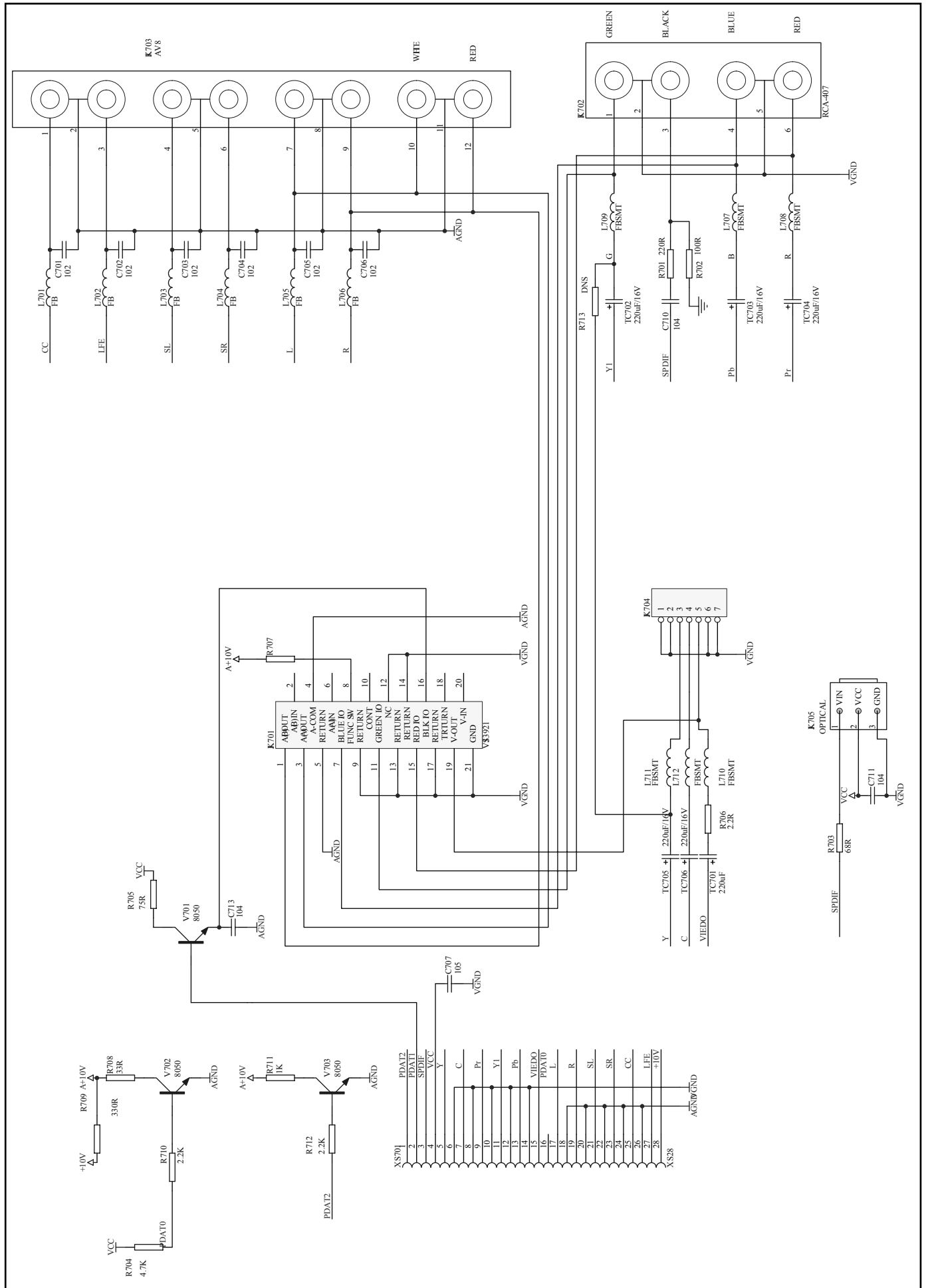
OK SCHEMATIC DIAGRAM



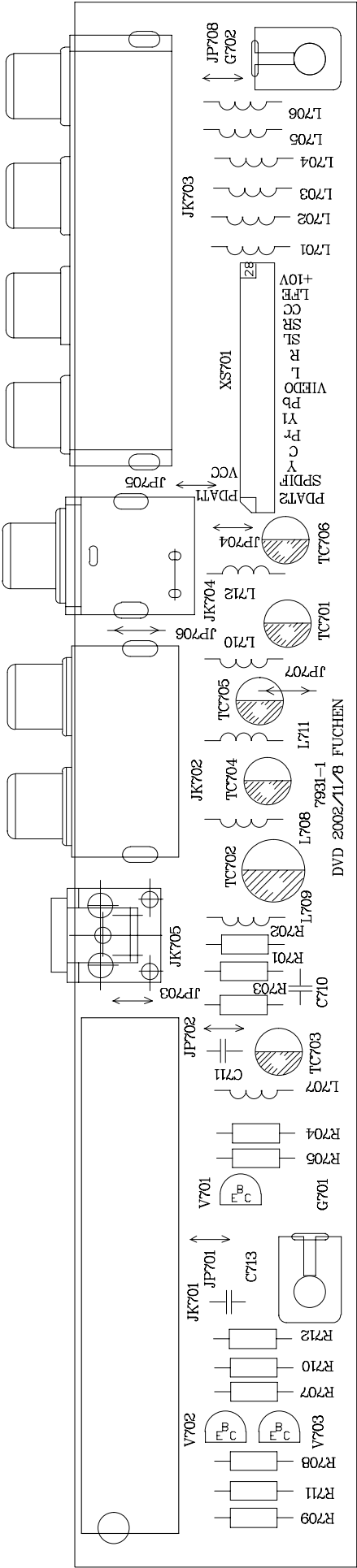
OK SCHEMATIC DIAGRAM



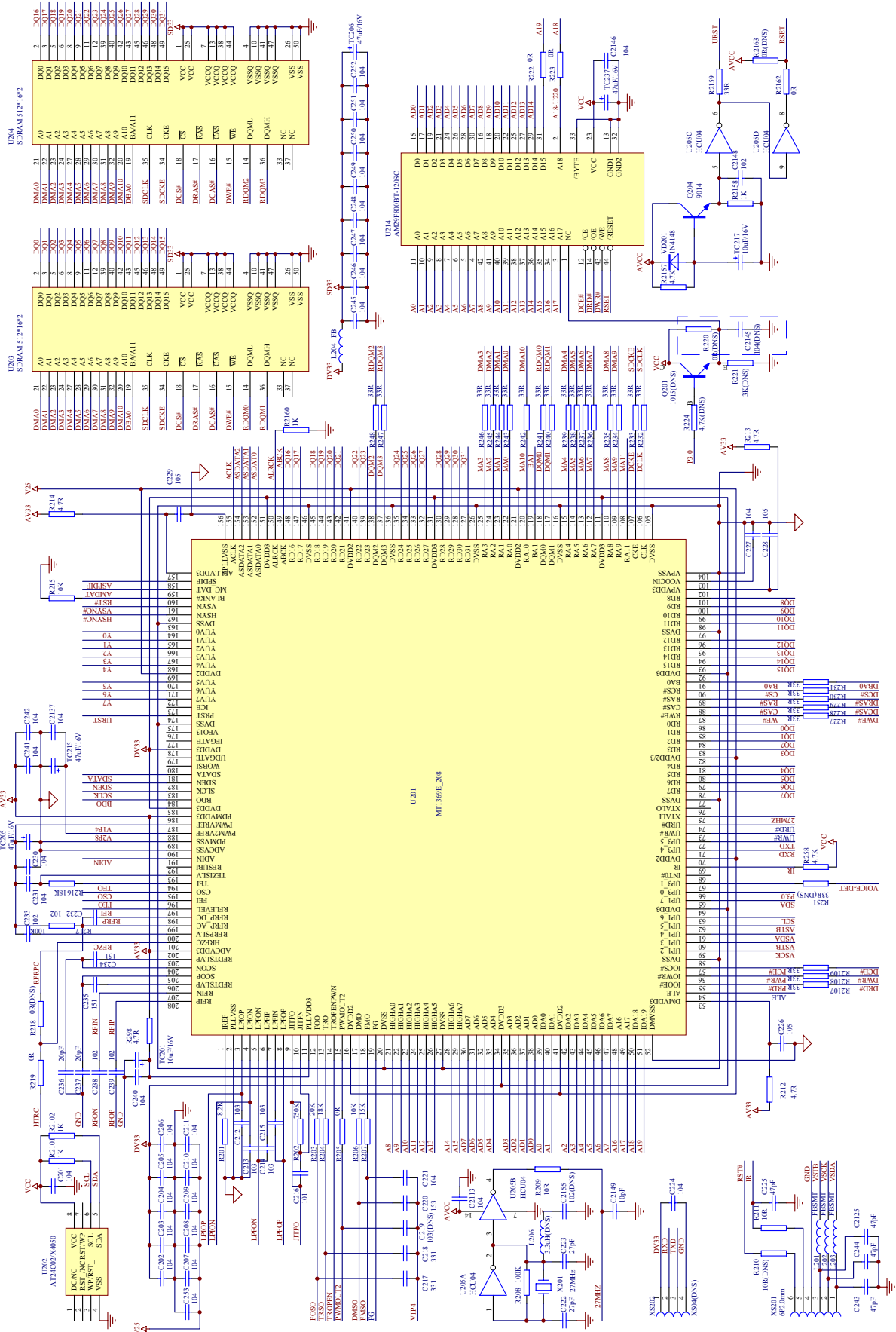
OUTPUT BOARD SCHEMATIC DIAGRAM



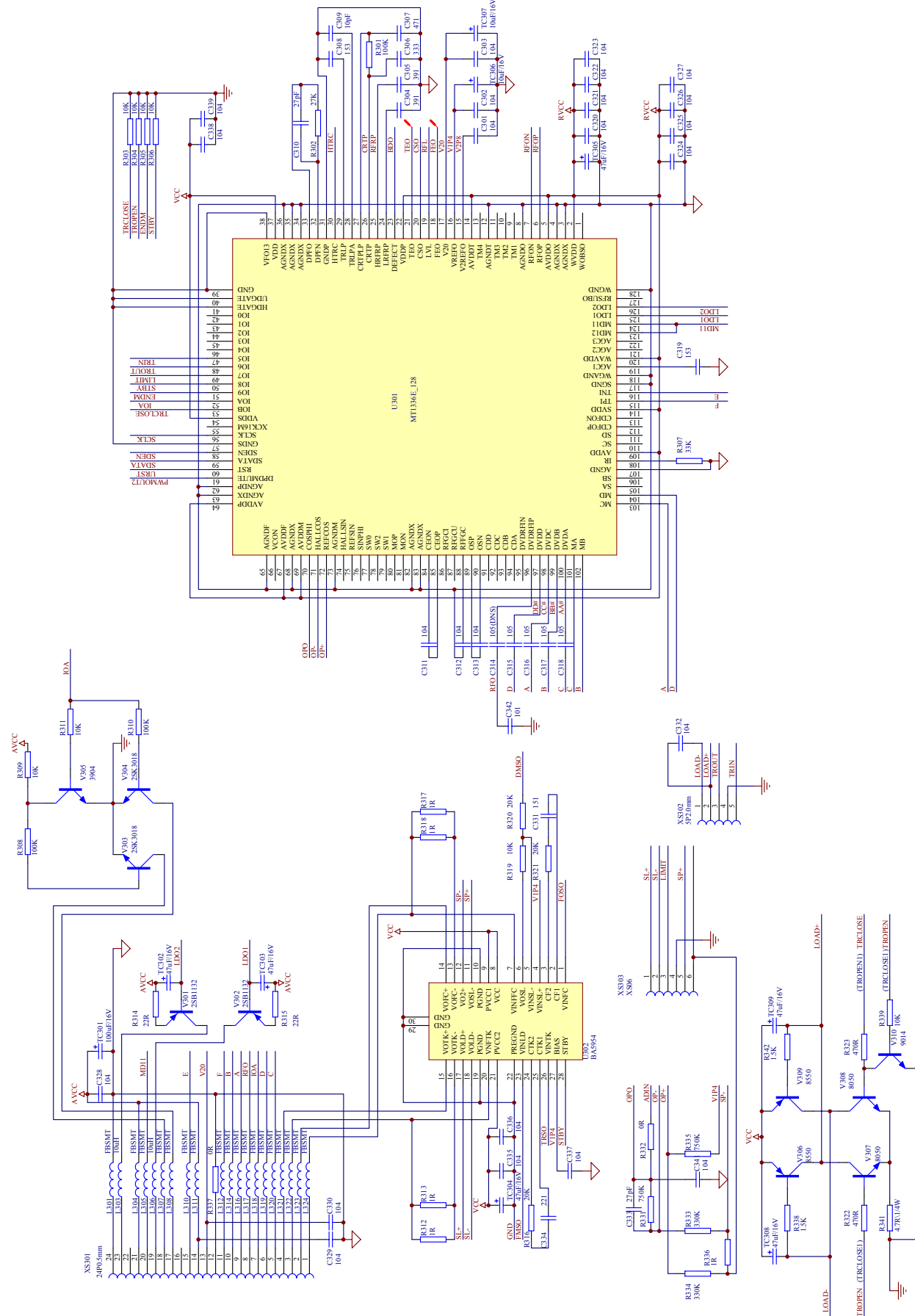
OUTPUT BOARD SCHEMATIC DIAGRAM



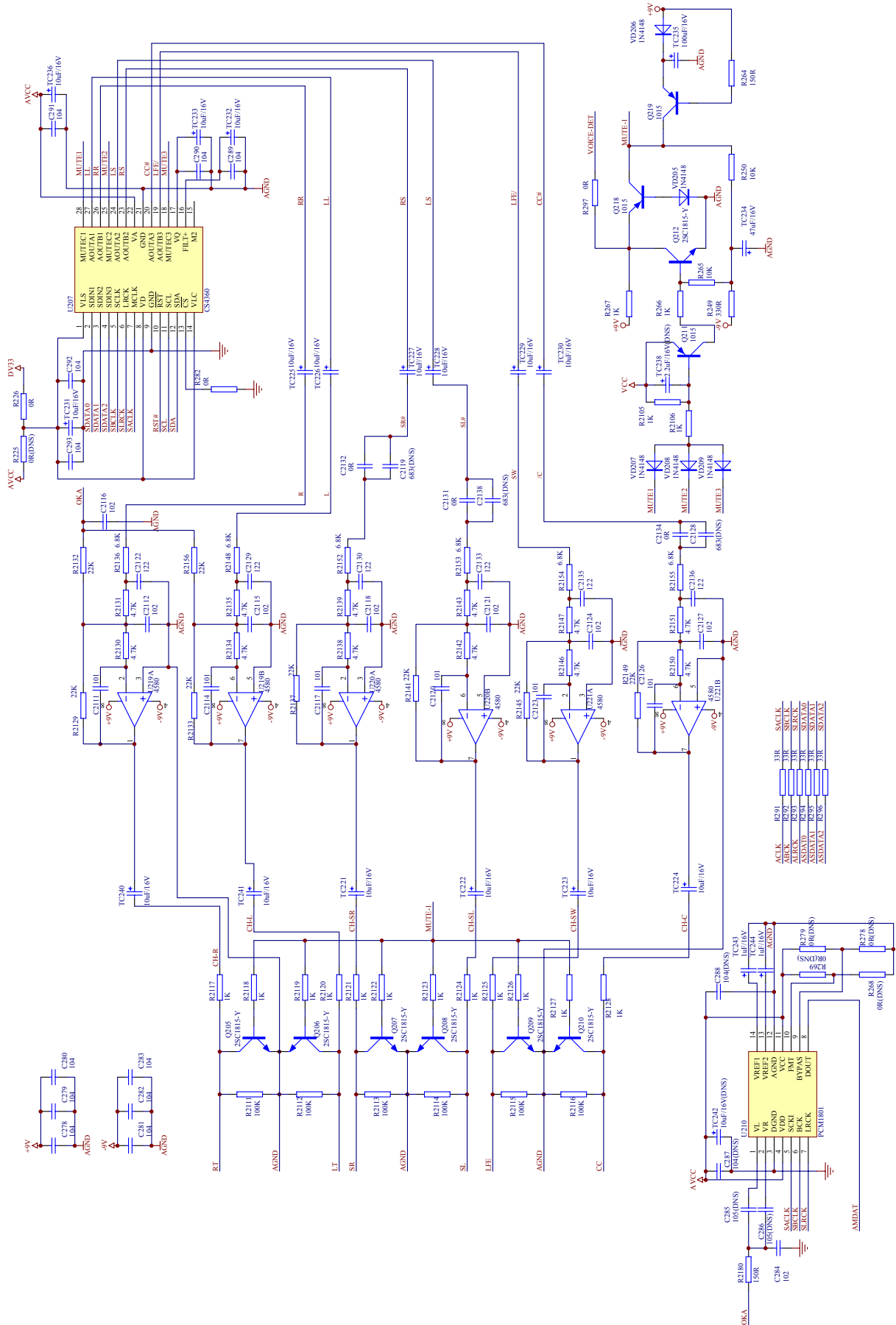
MIAN SCHEMATIC DIAGRAM

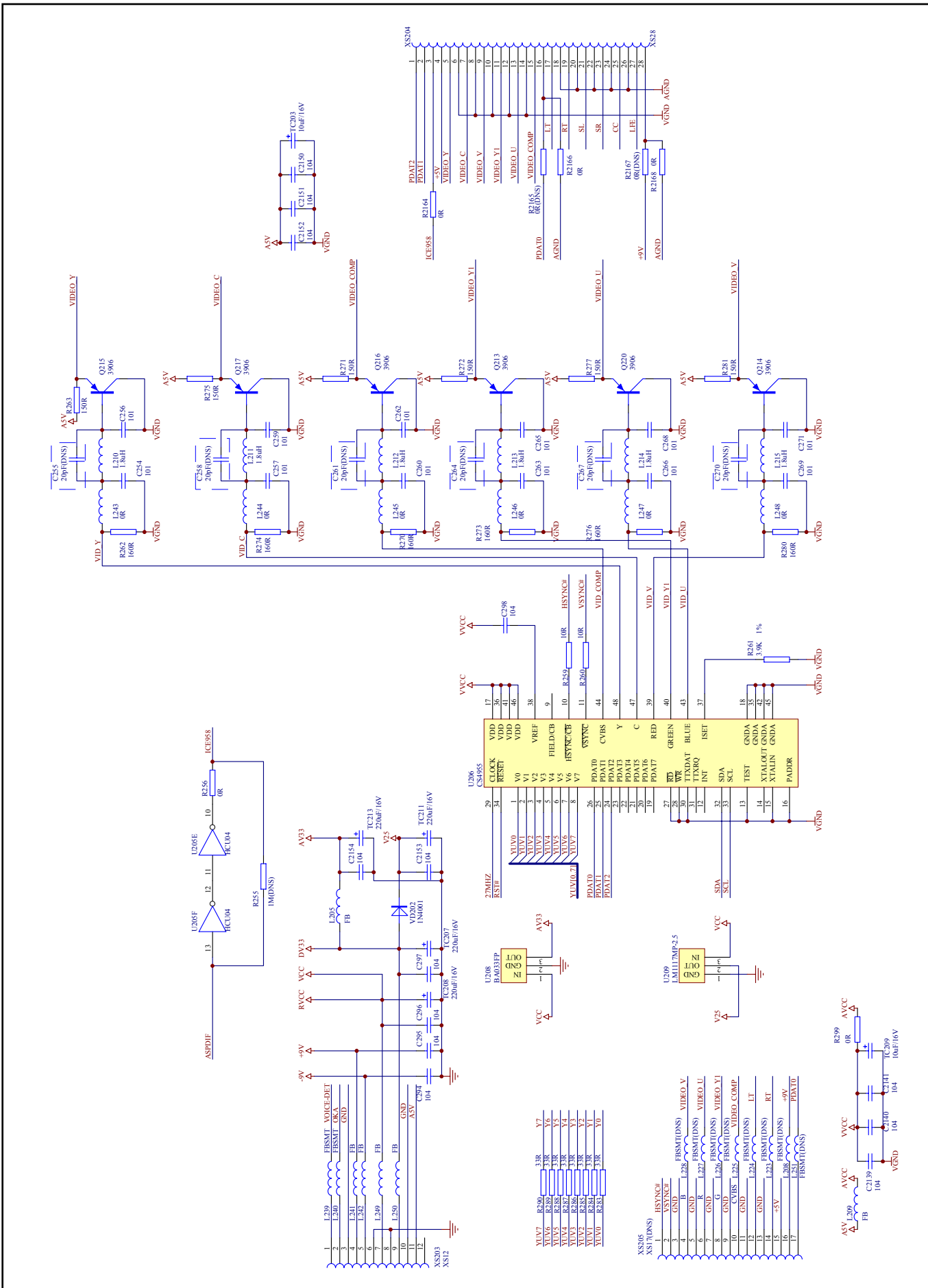


MIAN SCHEMATIC DIAGRAM

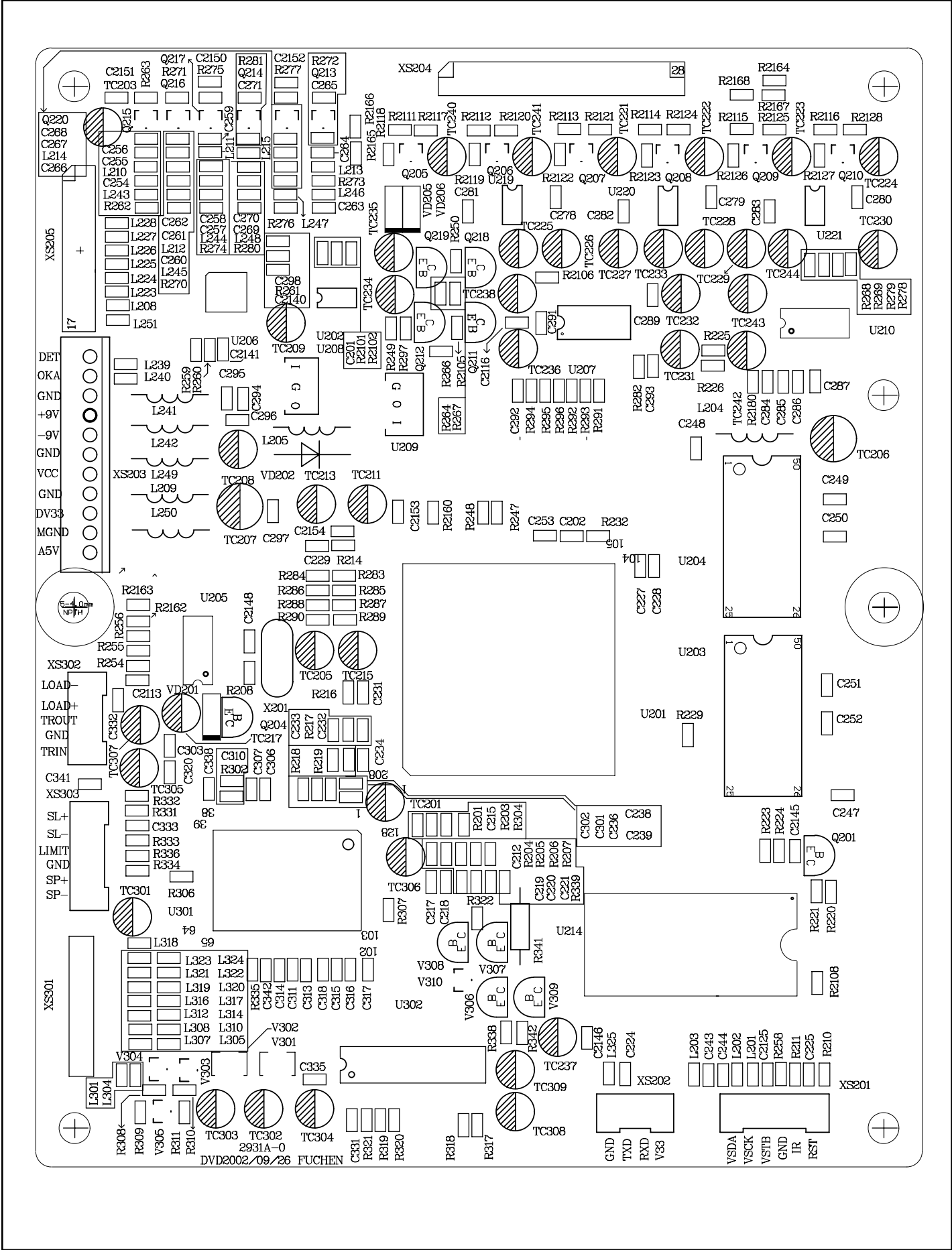


MIAN SCHEMATIC DIAGRAM





MIAN SCHEMATIC DIAGRAM



10.BBK916S(RU) MATERIAL LIST

1、DECODE BOARD

NO	MATERIAL	SPECIFICATIONS/PART NUMBER	QUANTITY	LOCATION
1	SMD RESISTOR	1/16W 0 Ω $\pm 5\%$	26	C2119,C2128,C2131,L243~L248, R205,R219,R220,R226,R240,R24 1,R243,R255,R257,R259,R282,R 297,R324,R325,R332,R337,R216
2	SMD RESISTOR	1/16W 75 Ω $\pm 5\%$	1	R256
3	CARBON FILM RESISTOR	1/4W2.2 Ω $\pm 5\%$	1	R341
4	SMD RESISTOR	1/16W1 Ω $\pm 5\%$	5	R312,R313,R317,R318,R336
5	SMD RESISTOR	1/16W 4.7 Ω $\pm 5\%$	4	R212,R213,R251,R252
6	SMD RESISTOR	1/16W 10 Ω $\pm 5\%$	1	R211
7	SMD RESISTOR	1/16W 22 Ω $\pm 5\%$	2	R314,R315
8	SMD RESISTOR	1/16W 33 Ω $\pm 5\%$	22	R2107~R2109,R2159,R229~R 235,R246~R249,R254,R291~ R296
9	SMD RESISTOR	1/16W 470 Ω $\pm 5\%$	2	R322,R323
10	SMD RESISTOR	1/16W 150 Ω $\pm 5\%$	13	R262~R264,R270~R277,R280 ,R281
11	SMD RESISTOR	1/16W 330 Ω $\pm 5\%$	1	R253
12	SMD RESISTOR	1/16W 1K $\pm 5\%$	20	R227,R228,R266,R267,R2105 ,R2106,R2117~R2128,R2158, R2160
13	SMD RESISTOR	1/16W 1.5K $\pm 5\%$	3	R237,R338,R342
14	SMD RESISTOR	1/16W 4.7K $\pm 5\%$	15	R222,R223,R245,R2130,R213 1,R2134,R2135,R2138,R2139, R2142,R2143,R2146,R2147,R 2150,R2151
15	SMD RESISTOR	1/16W 6.8K $\pm 5\%$	6	R2136,R2148,R2152~R2155
16	SMD RESISTOR	1/16W 8.2K $\pm 5\%$	1	R201
17	SMD RESISTOR	1/16W 10K $\pm 5\%$	12	R206,R250,R265,R303~R306, R309,R311,R319,R339,R2157
18	SMD RESISTOR	1/16W 15K $\pm 5\%$	1	R207
19	SMD RESISTOR	1/16W 20K $\pm 5\%$	4	R203,R316,R320,R321
20	SMD RESISTOR	1/16W 18K $\pm 5\%$	2	R204,R216
21	SMD RESISTOR	1/16W24K $\pm 5\%$	8	R2129,R2132,R2133,R2137,R 2141,R2145,R2149,R2156
22	SMD RESISTOR	1/16W 27K $\pm 5\%$	1	R302
23	SMD RESISTOR	1/16W 33K $\pm 5\%$	1	R307
24	SMD RESISTOR	1/16W 330K $\pm 5\%$	2	R333,R334
25	SMD RESISTOR	1/16W 750K $\pm 5\%$	3	R202,R331,R335
26	SMD RESISTOR	1/16W 100K $\pm 5\%$	11	R208,R2111~R2116,R217,R3 01,R308,R310
27	CD	CD11 16V10U $\pm 20\%$ 5 $\times$ 11 2	23	TC201,TC202,TC203,TC217, TC219,TC221~TC233,TC236, TC240,TC241,TC306,TC307
28	CD	CD11 16V220U $\pm 20\%$ 6 $\times$ 12 2.5	6	TC207,TC208,TC211,TC213, TC235,TC301
29	CD	CD11C 16V47U $\pm 20\%$ 5 $\times$ 7 2	11	TC204,TC206,TC215,TC234, TC237,TC302~TC305,TC308, TC309
30	SMD CAPACITOR	50V 10P $\pm 5\%$ NPO 0603	1	C309

31		SMD CAPACITOR	50V 27P ±5% NPO 0603	4	C310,C222,C223,C333
32		SMD CAPACITOR	50V 47P ±5% NPO 0603	14	C225,C241,C242,C243,C254,C256,C257,C259,C260,C262,C266,C268,C269,C271
33		SMD CAPACITOR	50V 101 ±5% NPO 0603	10	C216,C273,C274,C342,C2111,C2114,C2117,C2120,C2123,C2126
34		SMD CAPACITOR	50V 331 ±5% NPO 0603	2	C217,C218
35		SMD CAPACITOR	50V 151 ±5% NPO 0603	2	C331,C334
36		SMD CAPACITOR	50V 391 ±10% 0603	2	C304,C305
37		SMD CAPACITOR	50V 471 ±10% 0603	1	C307
38		SMD CAPACITOR	50V 104 +80%-20% 0603	78	C201~C211,C221,C224,C227,C230~C232,C234,C235,C237,C240,C245~C253,C272,C278~C283,C289~C297,C301~C303,C311~C313,C320~C330,C332,C335~C339,C341,C2113,C2137,C2146,C2150~C2154
	38.1	SMD CAPACITOR	25V 104 +80%-20% 0603	78	C201~C211,C221,C224,C227,C230~C232,C234,C235,C237,C240,C245~C253,C272,C278~C283,C289~C297,C301~C303,C311~C313,C320~C330,C332,C335~C339,C341,C2113,C2137,C2146,C2150~C2154
39		SMD CAPACITOR	16V 105 +80%-20% 0603	4	C315~C318
40		SMD CAPACITOR	10V 225 +80%-20% 0805	2	C226,C228
41		SMD CAPACITOR	50V 102 ±10% 0603	11	C233,C238,C239,C2112,C2115,C2116,C2118,C2121,C2124,C2127,C2148
42		SMD CAPACITOR	50V 122 ±10% 0603	6	C2122,C2129,C2130,C2133,C2135,C2136
43		SMD CAPACITOR	50V 103 ±10% 0603	4	C212~C215
44		SMD CAPACITOR	50V 153 ±10% 0603	3	C220,C308,C319
45		SMD CAPACITOR	16V 333 ±10% 0603	1	C306
46		SMD INDUCTOR	10UH ±10% 2012	2	L303,L306
47		SMD INDUCTOR	1.8UH ±10% 1608	6	L210~L215
48		MAGNETIC BEADS INDUCTOR	RH354708	7	L204,L205,L209,L241,L242,L249,L250
49		SMD MAGNETIC BEADS	FCM1608K-221T05	26	L201~L203,L239,L240,L301,L304,L305,L307,L308,L310,L311,L312,L314,L316~L324,L329~L331
50		SMD DIODE	1N4148	6	VD201,VD205~VD209
	50.1	SMD DIODE	LS4148	6	VD201,VD205~VD209
	50.2	SMD DIODE	LL4148	6	VD201,VD205~VD209
51		TRIODE	C8050	3	V307,V308,Q201
52		TRIODE	8550C	2	V306,V309
53		TRIODE	9014C	1	Q204
54		TRIODE	C1815Y	1	Q212
55		SMD TRIODE	C1815	6	Q205~Q210
56		TRIODE	2SA1015	3	Q211,Q218,Q219
57		SMD TRIODE	3906	6	Q213~Q217,Q220
58		SMD TRIODE	3904	1	V305
59		SMD TRIODE	9014C	1	V310

60		SMD TRIODE	2SK3018	2	V303,V304
61		SMD TRIODE	2SB1132	2	V301,V302
62		IC	NJM4558M SOP	3	U219,U220,U221
	62.1	IC	4580 SOP	3	U219,U220,U221
	62.2	IC	4558 SOP	3	U219,U220,U221
63		IC	MM74HCU04M SOP	1	U205
	63.1	IC	HCU04 SOP	1	U205
64		IC	HY57V161610DTC-7 TSOP	2	U203,U204
	64.1	IC	M12L16161A-7T SOP	2	U203,U204
	64.2	IC	GM72V161621ET75 SOP	2	U203,U204
	64.3	IC	AE45C16016T-7 SOP	2	U203,U204
65		IC	CS4360 SSOP	1	U207
66		IC	24C02N SOP	1	U202
67		IC	MT1336E QFP	1	U301
68		IC	MT1379E QFP	1	U201
69		IC	BA5954FP HSOP	1	U302
70		CRYSTAL OSCILLATOR	27.00MHz 49-S	1	X201
71		CABLE SOCKET	14 PIN 1.0mm DOUBLE LINE	1	XS204
72		PCB	2933K-0	1	
73		SOFTWARE PROGRAM FLASH	ROM916S2-0A(8M)	1	
74		SOCKET	5 PIN 2.0mm	2	XS201,XS302
75		SOCKET	6 PIN 2.0mm	1	XS303
76		SOCKET	11 PIN 2.5mm	1	XS203
77		CABLE SOCKET	24 PIN 0.5mm SMD WITH BUCKLE	1	XS301

2、POWER BOARD

NO		MATERIAL	SPECIFICATIONS/PART NUMBER	QUANTITY	LOCATION
1		CARBON FILM RESISTOR	1/4W33 Ω $\pm$ 5% SHAPED 10	1	R505
2		CARBON FILM RESISTOR	1/4W330 Ω $\pm$ 5% SHAPED 10	1	R506
3		CARBON FILM RESISTOR	1/4W10K $\pm$ 5% SHAPED 10	1	R507
4		CARBON FILM RESISTOR	1/4W4.7K $\pm$ 5% SHAPED 10	1	R510
5		CARBON FILM RESISTOR	1/4W1M Ω $\pm$ 5% SHAPED 10	1	R504
6		METAL FILM RESISTOR	1/4W4.7K $\pm$ 1%	1	R508
7		METAL FILM RESISTOR	1/4W12K $\pm$ 1% SHAPED 10	1	R509
8		METAL OXIDE FILM RESISTOR	1W330 Ω $\pm$ 5% R- SHAPED 15 $\times$ 8	1	R511
9		METAL OXIDE FILM RESISTOR	2W39K $\pm$ 5% FLAT- SHAPED 15 $\times$ 9	1	R503
	9.1	METAL OXIDE FILM RESISTOR	2W39K $\pm$ 5% FLAT- SHAPED 15 $\times$ 7	1	R503
10		METAL OXIDE FILM RESISTOR	2W120K $\pm$ 5% FLAT- SHAPED 15 $\times$ 7	1	R502
11		HIGH VOLTAGE RESISTOR	1/2W680K $\pm$ 5%	1	R501

12		PORCELAIN CAPACITOR	50V 100P ±10% 5mm	6	C505,C507,C509,C511,C513,C514
13		PORCELAIN CAPACITOR	50V 104 ±20% 5mm	4	C504,C508,C510,C515
14		PORCELAIN CAPACITOR	1000V 101 +80%-20% 7.5mm	1	C503
	14.1	PORCELAIN CAPACITOR	1000V 101 ±10% 7.5mm	1	C503
15		PORCELAIN CAPACITOR	1000V 103 +80%-20% 7.5mm	1	C502
16		CERAMIC CAPACITOR	CT81 400V 221±20% 10mm	1	BC503
	16.1	CERAMIC CAPACITOR	CT81 400V221±10% 10mm	1	BC503
17		TERYLENE CAPACITOR	100V 223 ±10% 5mm	1	C506
18		TERYLENE CAPACITOR	275V 104 ±20% 15mm	1	BC501
	18.1	TERYLENE CAPACITOR	275V 104 ±10% 15mm	1	BC501
19		CD	GZ16V100U±20%6×12 2.5	3	TC508,TC511,TC513
	19.1	CD	CD11 16V100U±20%6×12 2.5	3	TC508,TC511,TC513
	19.2	CD	CD110 16V100U±20%6×12 2.5	3	TC508,TC511,TC513
	19.3	CD	CD11C 16V100U+20%-15%6×7 2.5	3	TC508,TC511,TC513
	19.4	CD	CD11C 16V100U±20%6×7 2.5	3	TC508,TC511,TC513
20		CD	CD11 25V470U+20%-10%10×16 5	2	TC503,TC504
	20.1	CD	CD11 25V470U±20%10×16 5	2	TC503,TC504
21		CD	CD11 50V47U±20%6×12 2.5	2	TC502,TC512
22		CD	CD11 10V1000U±20%8×16 3.5	4	TC505,TC506,TC509,TC510
	22.1	CD	CD11 10V1000U±20%8×14 3.5	4	TC505,TC506,TC509,TC510
	22.2	CD	GS 10V1000U±20%8×16 3.5	4	TC505,TC506,TC509,TC510
	22.3	CD	GS 10V1000U±20%8×14 3.5	4	TC505,TC506,TC509,TC510
23		CD	LP3 400V47U±20%22×28 10	1	TC501
	23.1	CD	LS 400V47U±20%22×25 10	1	TC501
24		MAGNETIC BEADS INDUCTOR	RH354708	1	L503
25		CHOKE COIL	VERTICAL 10UH 1A 5mm	1	L505
26		CHOKE COIL	VERTICAL 10UH 2A 5mm	2	L506,L507
27		SWITCH POWER SUPPLY TRANSFORMER	BCK-4025B-2876	1	T501
28		DIODE	HER105	4	D506,D508,D511,D512
29		DIODE	HER306	1	D510
30		SCHOTTKY DIODE	SR360	1	D509
31		DIODE	HER107	1	D505
32		VOLTAGE REGULATOR DIODE	5.1V 1/2W	1	ZD501
33		VOLTAGE REGULATOR DIODE	9.1V 1W	1	ZD502
34		DIODE	1N4007	4	D501~D504
35		IC	5L0380R YDTU	1	U501
36		IC	LM431ACZ TO-92	1	U503
	36.1	IC	TL431C TO-226AA(LP)	1	U503
	36.2	IC	431L TO-92	1	U503

	36.3	IC	KA431AZ TO-92	1	U503
37		POWR GRID FILTER	UT-20 40mH $\pm 20\%$ 10 $\times$ 13	1	L502
38		PHOTOELECTRIC COUPLER	HS817	1	U502
39		IC	LM7805 METAL SEALED TO-220	1	U504
40		PCB	5907KB-2	1	
41		SOCKET	5 PIN 2.0mm	1	CN501
42		SOCKET	9 PIN 2.5mm	1	CN503
43		SOCKET	2 PIN 2.5mm	1	CN502
44		SOCKET	6 PIN 2.5mm	1	CN504
45		SOCKET	2 PIN 8.0mm 2#	2	BCN501,BCN502
46		CONNECTION CORDS	$\Phi 0.6$ SHAPED 7.5mm	2	J502,J503
47		CONNECTION CORDS	$\Phi 0.6$ SHAPED 10mm	3	L501,J501
48		CONNECTION CORDS	$\Phi 0.6$ SHAPED 12.5mm	1	J504
49		FUSE	T1.6AL 250V	1	F501
50		FUSE HOLDER	BLX-2	1	FOR F501
51		RADIATOR BOARD	11 $\times$ 15 $\times$ 25 AB009K	2	U501,U504 FOR HEAT RADIATION
	51.1	RADIATOR BOARD	11 $\times$ 15 $\times$ 25 白 AB905	2	U501,U504 FOR HEAT RADIATION
52		EARTH CHIP OF THE POWER BOARD	AB903	2	G501~G502
53		TAPPING SCREW	BT 3 $\times$ 8 BLACK	2	FIX RADIATOR BOARD

3、OUTPUT BOARD

NO		MATERIAL	SPECIFICATIONS/PART NUMBER	QUANTITY	LOCATION
1		CARBON FILM RESISTOR	1/4W68 $\Omega \pm 5\%$	1	R703
2		CARBON FILM RESISTOR	1/4W100 $\Omega \pm 5\%$	1	R702
3		CARBON FILM RESISTOR	1/4W220 $\Omega \pm 5\%$	1	R701
4		CARBON FILM RESISTOR	1/4W330 $\Omega \pm 5\%$	1	R709
5		SMD RESISTOR	1/16W 2.2 $\Omega \pm 5\%$	1	R706
6		CARBON FILM RESISTOR	1/4W1K $\pm 5\%$	1	R711
7		CARBON FILM RESISTOR	1/4W33 $\Omega \pm 5\%$	1	R708
8		CARBON FILM RESISTOR	1/4W2.2K $\pm 5\%$	2	R710,R712
9		CARBON FILM RESISTOR	1/4W4.7K $\pm 5\%$	1	R704
10		CARBON FILM RESISTOR	1/4W75 $\Omega \pm 5\%$ SHAPED 10	1	R705
11		SMD RESISTOR	50V 102 $\pm 10\%$ 0603	6	C701~C706
12		SMD RESISTOR	16V 105 +80%-20% 0603	1	C707
13		PORCELAIN CAPACITOR	50V 104 $\pm 20\%$ 5mm	3	C710,C711,C713
	13.1	PORCELAIN CAPACITOR	50V 104 +80%-20% 5mm	3	C710,C711,C713

14		TRIODE	S8050D	3	V701~V703
15		CD	CD11 16V220U±20%6×12 2.5	5	TC701,TC703~TC706
16		CD	CD110 16V220U±20%8×11 3.5	1	TC702
17		MAGNETIC BEADS INDUCTOR	RH354708	12	L701~L712
18		SMD MAGNETIC BEADS	FCM1608K-221T05	2	L713,L714
19		PHOTOELECTRIC CONVERTER	TX179ATW	1	JK705
	19.1	PHOTOELECTRIC CONVERTER	TX179AT	1	JK705
20		TERMINAL SOCKET	CS-09	1	JK704
21		TERMINAL SOCKET	AV8-8.4-6G-3	1	JK703
22		SCART SOCKET	SCART-01	1	JK701
23		EARTH CHIP OF THE POWER BOARD	AB903	1	G701
24		CABLE SOCKET	14 PIN 1.0mm DOUBLE LINE	1	XS701
25		TERMINAL SOCKET	AV4-8.4-6G-3	1	JK702
26		CONNECTION CORDS	Φ0.6 SHAPED 5mm	6	JP701~JP705,JP708
27		CONNECTION CORDS	Φ0.6 SHAPED 10mm	1	R707
28		CONNECTION CORDS	Φ0.6 SHAPED 7.5mm	1	JP706
29		PCB	7931-1	1	

4、KARAOKE BOARD

NO	MATERIAL	SPECIFICATIONS/PART NUMBER	QUANTITY	LOCATION
1	CARBON FILM RESISTOR	1/6W10 Ω±5% SHAPED 7.5	2	R632,R633
2	CARBON FILM RESISTOR	1/6W1K±5% SHAPED 7.5	1	R619
3	CARBON FILM RESISTOR	1/6W4.7K±5% SHAPED 7.5	2	R622,R628
4	CARBON FILM RESISTOR	1/6W10K±5% SHAPED 7.5	2	R612,R620
5	CARBON FILM RESISTOR	1/6W15K±5% SHAPED 7.5	1	R614
6	CARBON FILM RESISTOR	1/6W30K±5% SHAPED 7.5	1	R613
7	ROTATING POTENTIOMETER	R0901N-BA1-B10K	1	VR601
8	ROTATING POTENTIOMETER	R0901N-BA1-B50K	1	VR602
9	CD	CD11 16V4.7U±20%5×11 2	9	TC601~TC604,TC607,TC610,TC611,TC613,TC621
10	CD	CD11 16V22U±20%5×11 2	2	TC605,TC606
11	CD	CD11 10V47U±20%5×7 2	1	TC609
12	CD	CD11 25V100U±20%6×12 2.5	3	TC608,TC615,TC616
13	MAGNETIC BEADS INDUCTOR	RH354708	2	L601,L602
14	IC	NJM4558D DIP	2	U601,U602
15	IC	PT2399 DIP	1	U603
16	FLAT CORDS	6P80 2.5 2 PLUG WITH NEEDLES	1	XS601

17		EARTH CHIP OF THE POWER BOARD	AB903	2	G501, G502
18		MICROPHONE SOCKET	CK3-6.35-106	2	MIC601,MIC602
19		CONNECTION CORDS	Φ0.6 SHAPED 7.5mm	4	JP601~JP604
20		SEMI-FINISHED PCB	6921A-0-SMD DV921	1	

5、MAIN FRONT BOARD

NO		MATERIAL	SPECIFICATIONS/PART NUMBER	QUANTITY	LOCATION
1		SPONGE SPACER	15×7×3.5 DOUBLE FACED ADHESIVE TAPE	3	STICK VFD AND FRONT PANEL PCB
2		SPONGE SPACER	10×10×10 DOUBLE FACED ADHESIVE TAPE	1	STICK IR SENSOR AND FRONT PANEL PCB
3		CARBON FILM RESISTOR	1/4W2.2 Ω ±5% SHAPED 10	1	R418
4		CARBON FILM RESISTOR	1/4W100 Ω ±5%	1	R415
	4.1	CARBON FILM RESISTOR	1/4W100 Ω ±5% SHAPED 10	1	R415
5		CARBON FILM RESISTOR	1/4W10K±5%	7	R406~R410,R416,R417
	5.1	CARBON FILM RESISTOR	1/4W10K±5% SHAPED 10	7	R406~R410,R416,R417
6		CARBON FILM RESISTOR	1/4W33K±5%	8	R401~R404,R411~R414
	6.1	CARBON FILM RESISTOR	1/4W33K±5% SHAPED 10	8	R401~R404,R411~R414
7		CARBON FILM RESISTOR	1/4W51K±5%	1	R405
8		PORCELAIN CAPACITOR	50V 103 +80%-20% 2.5mm	2	C401,C405
	8.1	PORCELAIN CAPACITOR	50V 103 ±20% 2.5mm	2	C401,C405
9		CD	CD11C 10V100U±20%5×7 2	2	C402,C407
10		DIODE	1N4148	2	D401、 D402
11		IC	D16312GB QFP	1	U401
	11.1	IC	PT6312LQ QFP	1	U401
12		VFD	HNV-05SS32	1	VFD401
13		LIGHT TOUCH RESTORE SWITCH	HORIZONTAL 6×6×1	5	K401~K405
14		PCB	4921A-0	1	
15		CONNECTION CORDS	Φ0.6 SHAPED 10mm	1	J401
16		CABLES	20# 100mm WITH BLACK SOLDERING CHIP	1	WELDED TO C401, SOLDERING CHIP SCREWED TO DECODE BOARD
17		FLAT CABLES	5P380 2.0 2 PLUG WITH L NEEDLE, REVERSED	1	XS401
18		FLAT CABLES	5P100 2.0 2 PLUG WITH L NEEDLE, REVERSED	1	XS402
19		INFRARED SENSOR	HS0038B	1	U403