Principle and Maintenance of DK1050S

Contents

Analysis of Working Principle of DK1050S

Chapter One Introduction to DK1050S

1. Functions

DK1050S is a medium- low-end machine integrating disk player and amplifier.

Its main features are:

1). Disk player uses “Sanyo loader + MT1389” scheme;

2). Amplifier uses digital power amplification circuit, low distortion; power IC is TAS5112DFD;

3). Audio processor is TAS5508, high integration and good performance/price ratio;

4). With radio function; save-up to 40 radio stations

5). Power uses switch-mode power design with small volume, high efficiency and stable performance;

6). With SCART (CVBS/RGB) interface;

7). Auxiliary channel input/output function;

8). Earphone output function;

9). Karaoke function and auto accompaniment function；

10). RSD support function;

11). Stand-by function, power consumption lower than 3W.

12) Decoder for Digital audio input (Optical, Coaxial)

13) Bass booster function to balance the Movie effect

2. Diagram of DK1050S complete-machine components and table of integrated circuit functions:

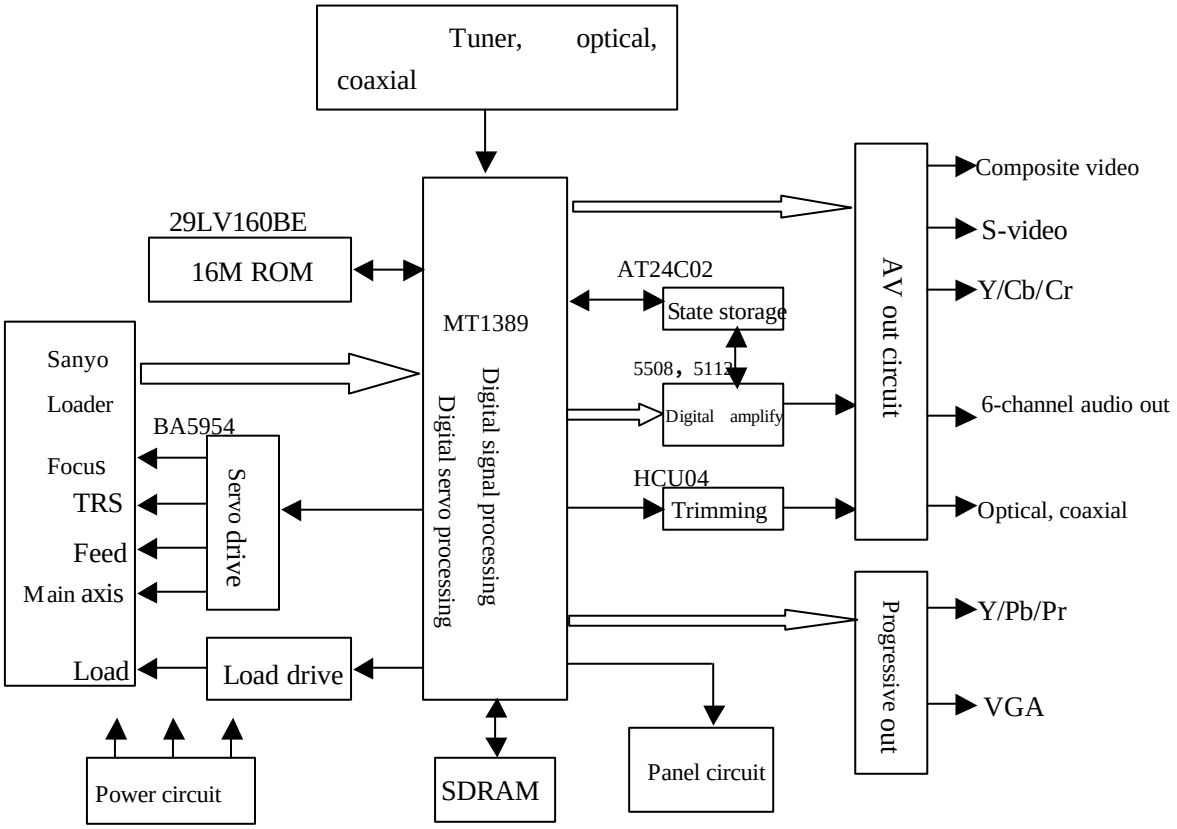


Figure 1

2. Table of DK1050S integrated circuit functions

Circuit Board	P/N	Name	Function
Loader		Sanyo loader	Disk signal picking
Main board	U201	MT1389	RF signal processing, digital signal processing, servo processing, MPEG decoder, line-by-line scanning, system control
	U202	AT24C02	Serial EEPROM, status memory
	U205	HCU04	6 inverter
	U209	LM1117MP-1.8	1.8V power supply
	U211	AE45164016	64Mbit SDRAM
	U214	29LV160BE	16Mbit FLASH ROM
	U302	D5954	4-channel servo drive circuit
Panel	N102	PT6317	Panel control, VFD play drive
	N103	REMOT	Remote radio head

Power switch	U501	NCP1200D	Power switch circuit
	U502	HS817	coupling amplifier
	U503	HA17431	2.5V reference voltage comparer
	U108	LM7805	5V three-terminal power supply
	U504	0880	Power switch circuit
	U506	HS817	coupling amplifier
	U507	LM431	2.5V reference voltage comparer
Amplifier board	N12	5508	Digital signal processing
	N13/14	5112	Power amplification
	N8/9	TLV272	Computation of amplification
	N10/11	RC4580	Digital signal amplification

Chapter Two Working Principle of Servo Circuit

1. Digital signal processing

DK1050S uses Sanyo's double-beam super error correction loader and MTK decoding scheme. Its servo circuit mainly consists of advanced signal processing, digital servo processing, digital signal processing IC MT1389 and drive circuit BA5954, of which MT1389 is also one of the main components of the decoder circuit.

Signals A, B, C, D, E, F, SA, SB and RFO, transmitted from the loader, are input from pins 2-13 of MT1389 and, after being amplified via the internal pre-amplifier of MT1389, are divided into two parts in MT1389:

One part of these signals, after being processed by MT1389's internal digital servo signal circuit, form corresponding servo control signals and output control signals focus (FOSO), tracking (TRSO), main axle (DMSO) and feed (FMSO) from MT1389's Pin P42, Pin P41, Pin P37 and Pin P38 respectively, which are then sent to the drive circuit BA5954 for drive amplification. After drive amplification, these output control signals drive the focus coil, tracking coil, Main axle motor and feed motor respectively. Focus and tracking servos are used for correcting object lens and enable laser beams to correctly read signals from CD; feed servo is used for driving laser head to make radial movement to scan the disk; main axle servo is used to control the Main axle motor to read signals at constant linear velocity to drive the disk.

The other part of the signals, after amplification, equal frequency compensation, etc via the internal voltage-controlled amplifier (VCA) of MT1389, are converted by the internal A/D

converter into digital signals and, when the loader reads CD/VCD signals, these signals are EFM demodulated in MT1389 and, after CIRC error correction in MT1389, are output for post audio and video frequency decoding; when the loader reads DVD signals, these signals are ESM demodulated in MT1389 and, after RSPC error correction in MT1389, are sent for post decoding.

2. Control signal processing

1). Laser power auto control. The circuit is as shown in Diagram 2.

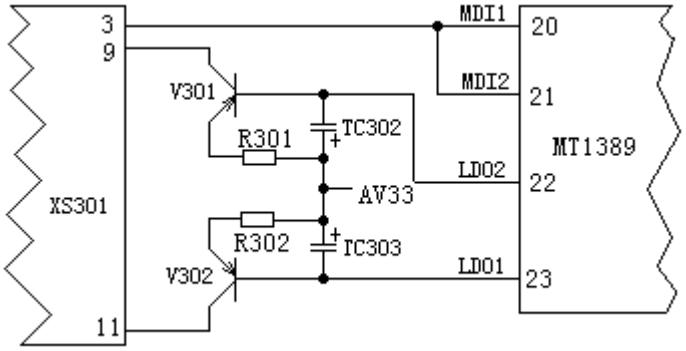


Diagram 2

MT1389 has an internally integrated APC (auto optical power control) circuit. Pin 20 is the pin for VCD laser power strength detection signal input, Pin 21 is pin for DVD laser power strength detection signal input and Pin 23 is pin for VCD/CD laser power drive control output. When it is detected by Pin 20 that laser output power is too strong, MT1389's internal circuit will process it so voltage output by Pin 23 will increase and V302 (2SB1132) conductivity will decrease, then the collector electrode voltage will drop, the voltage supplied to the laser tube will also drop, the light from the laser head will become weaker, thus automatically adjusting the laser power output. Pin 22 is the pin for DVD laser power drive control output and the control process is similar to that of VCD.

2). Inject/Eject control circuit. The circuit is as shown in Diagram 3.

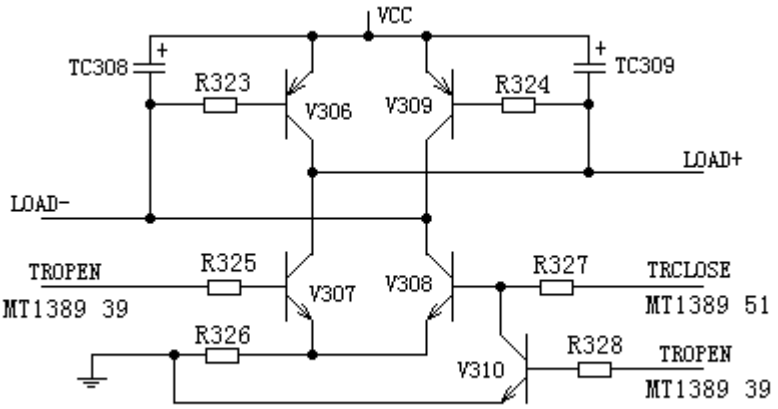


Diagram 3

What is different form the previous MTK circuit is MT1389 has an internally integrated advanced signal processing circuit, and the inject/eject control signals are processed by MT1389. The inject

control signal are processed by Pin 51 of MT1389 and the eject control signal is processed by Pin 39 of MT1389.

When we press the inject button, Pin 51 of MT1389 is high level and Pin 39 is low level. Now, the triode V308 conducts and the passes resistance R323, making the base of V306 low level. V306 also conducts. The direction of current is as shown in the following diagram:

Power supply voltage VCC ? V306 E-C junction? motor positive end LOAD+ ? motor negative end LOAD- ? V308 C-E junction ? ground

So the motor runs clockwise and completes the inject operation.

When we press the eject key, Pin 51 of MT1389 is low level and Pin 39 is high level. Now the triode V307 conducts and passes resistance R324, making the base of V309 low level. V309 also conducts. The direction of current is as shown in the following diagram:

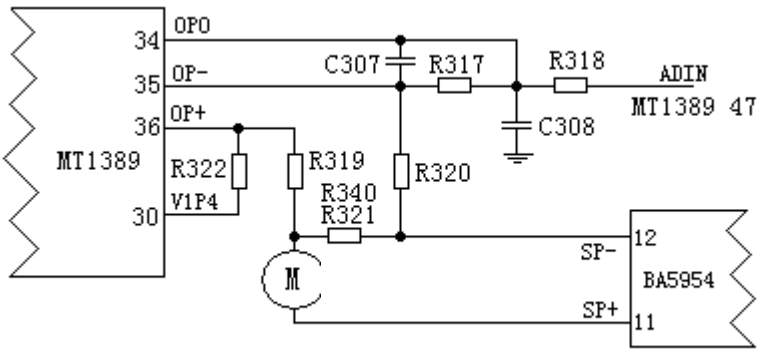
Power supply voltage VCC ? V309 E-C junction? motor negative end LOAD+ ? motor positive end LOAD- ? V307 C-E junction ? ground

So the motor runs counterclockwise and completes the eject operation.

3). Main axle motor control braking circuit. The circuit is as shown in Diagram 4.

In order to extend the service life of the motor and reduce the impact of starting current on the motor, when there is a disk, our R&D personnel design the main axle motor to be always at the status of running, so even if "STOP" key is pressed, the disk will not stop running. This way, when we press the "EJECT" key, a braking signal is needed to immediately stop the main axle motor and the "EJECT" operation can be completed within a short period of time.

When it is playing, if we press the "EJECT" key, the main axle drive signal will disappear, but the main axle motor, due to the effect of moment, will still run. At this time, the electromotive force generated by the motor operation can obtain induction voltage on the sampling resistances R321 and R340 and, through resistances R319 and R320, adds them to Pin 36 and Pin 35 of



4

MT1389, and after internal processing and amplification in MT1389, is output from Pin 34, then

sent to Pin 47 of MT1389 via R318. After internal analog/digital conversion and corresponding processing, MT1389 outputs a transient motor anti-braking signal from its Pin 37, thus immediately stopping the main axle motor to ensure that the disk no longer evolves when it is being ejected.

3. Servo drive circuit

The servo drive of this machine uses one 4-channel BA5954 drive circuit. This circuit is specially designed for servo. The circuit is as shown in Diagram 5.

MT1389 digital servo circuit generates four servo control signals: Focus control signal, tracking control signal, feed control signal and main axle control signal. These signals are respectively added to Pin 1, Pin 26, Pin 23 and Pin 5 of BA5954. After being amplified by BA5954 drive, the focus control signal and tracking control signal are output from Pin 13, Pin 14 and Pin 15, Pin 16 of BA5954 and then added to the focus and tracking coils to drive the laser head to complete the focus and tracking operations.

Feed and main axle drive signals are output from Pin 17, Pin 18 and Pin 11, Pin 12 of BA5954 and then added to the feed motor and main axle motor to drive the laser head to make radial movement and make the disk evolve at constant linear velocity.

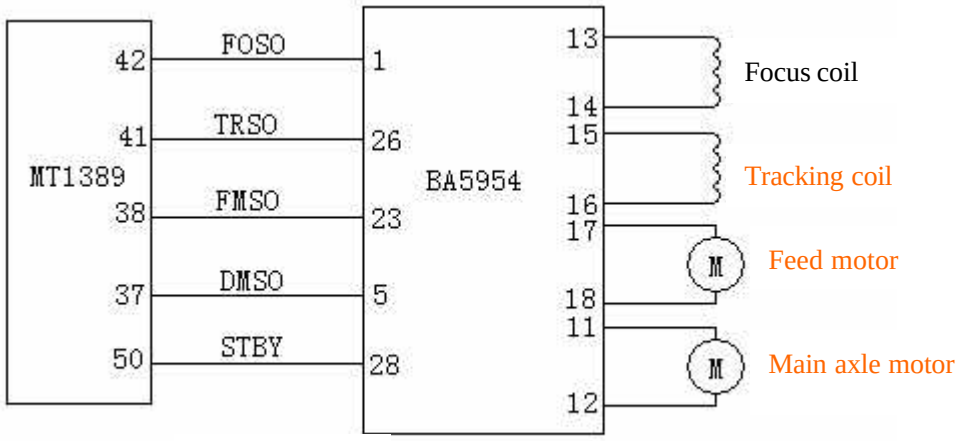


Diagram 5

Pin 28 (STBY) of BA5954 outputs enable/disable signals. Only when this pin is high level can the output terminal outputs drive voltage.

Chapter Three Working Principle of Decoder Circuit

The decoder circuit of this machine mainly consists of the decoder chips MT1389, SDRAM AE45164016, FLASH ROM 29LV160BE, audio frequency DAC CS4360, etc.

1. System control circuit

1). Resetting circuit is as shown in Diagram 6:

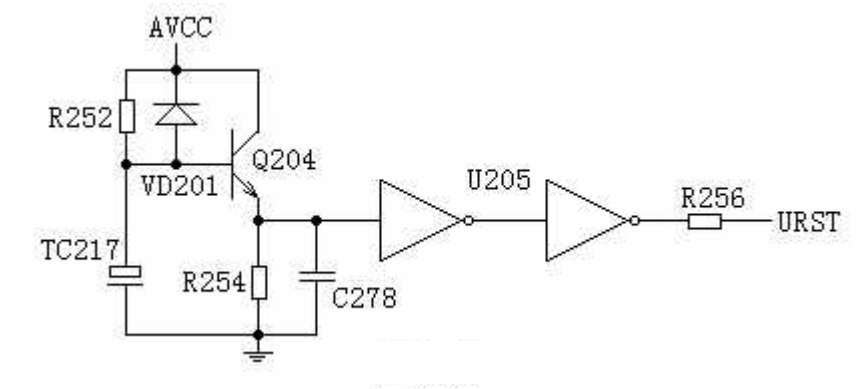


Diagram 6

The resetting circuit of this machine consists of the triode Q204 9014, resetting capacitor TC217 22uF/16V and inverter U205 HCU04. When we open the machine, because the end voltage of the capacitor cannot change suddenly, Q204 base is low level. The emitter of Q204 is low level and, after secondary inversion and trimming by U205, outputs low-level resetting signal to Pin 110 of MT1389 to provide resetting for MT1389.

When charging ofTC217 is finished, Q204 base changes to high level and Q204 conducts. Its emitter is high level and, after secondary inversion and trimming by U205, it outputs high level and adds it to Pin 110 of MT1389 to enable it to maintain high level during normal operation.

2). Clock circuit

X201 27MHz crystal oscillator, C275/27PF, C276/27PF and inverter HCU04 form the clock oscillation circuit. The clock signal generated passes R244 and R248 and is then added to Pin 229 and Pin 228 of MT1389 to provide MT1389 with working clock.

3). Data communication circuit

The data communication circuit of this machine mainly consists of the decoder chip MT1389, SDRAM AE45164016 and FLASH ROM 29LV160BE. It is shown in Diagram 7.

MT1389 is a super large-scale integrated circuit, whose working voltages are +3.3V and +1.8V. Its main functions are advanced RF small signal processing, digital servo processing, digital signal processing, MPEG decoding, video decoding, etc. At the same time, the built-in MCU of MT1389 is also the system control circuit of complete machine.

AE45164016 is a 4M*16bit large-capacity SDRAM. Its working voltage is +3.3V. The 6ns module used in DV971 is very fast and its maximum working frequency can reach 166MHz. As the working buffer memory of decoder chip MT1389, its main function is to store the audio and video data flows in the time of decoding.

29LV160BE is FLASH ROM, whose capacity is 16Mbit and working voltage is +3.3V. It is mainly used to store user information, such as OSD characters, working micro-codes, starting LOGO, ETC.

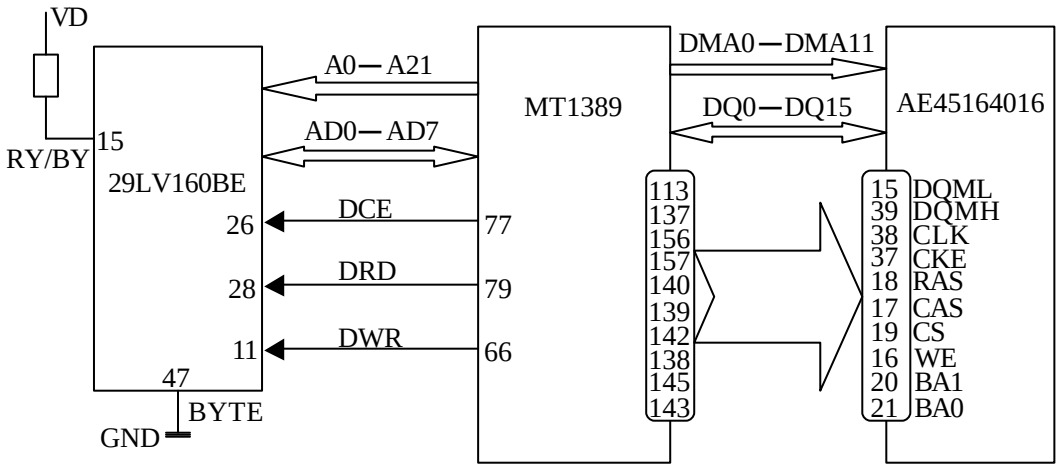


Diagram 7

2. Audio/video output circuit

1). Video output circuit

DK1050S not only outputs three interleave video signals: CVBS composite video signal, S terminal YC signal and Y/Cb/Cr color difference signal, but also outputs two line-by-line video signals: Y/Pb/Pr line-by-line color difference signal and VGA line-by-line signal.

Its decoder chip MT1389 has a built-in video encoder circuit that can directly outputs analog composite video signal CVBS, S terminal, color-difference signal and VGA signal.

CVBS composite video signal is output from Pin 198 of MT1389; S terminal signal YC is output from Pin 194 and Pin 196 of MT1389; color difference signal and R-B-G signal in VGA interface are output from Pin 203, Pin 202 and Pin 200 of MT1389; synchronous signals HSYNC and VSYNC of line and field in VGA interface are output respectively from Pin 207 and Pin 205 of MT1389.

It must be noted that interleave color difference, line-by-line color difference signal and line-by-line R-B-G signal are output from the same pin. So the corresponding signal output shall be selected through setting according to the port connected to TV; otherwise, there might be sound without picture.

2). Audio output circuit

After being processed by MT1389, the audio frequency signal outputs data signals of five audio tracks from its Pin 217, Pin 218 and Pin 219, and outputs clock signals of five channels from its Pin 214 and Pin 215. These signals, after passing IC 74HCT125, are sent to the audio frequency signal processing IC TAS5508 for audio frequency signal processing (see Exhibit for detailed IC data). After that, ten groups of PWM signals are output, six of which are sent to power amplification, two are sent to earphone output and two sent to auxiliary channels.

Of the six groups of signals sent to the power amplification IC, the surround sound and super bass share one N13 IC TAS5508 and the main audio track and the middle share N14 IC TAS5508. Signals are amplified in this IC. Because it is digital high-frequency signal amplification, the efficiency is very high and the heating value of power IC is very small. After amplification, the

output is still digital signal, so in order for output in the speaker, the amplified digital signal shall be processed before output.

For a PWM signal that contains audio frequency signals, because the high-frequency signal's frequency is very high and exceeds the hearing of human ear, so we can neglect the influence of high-frequency signals in the process of processing and only restore low-frequency audio frequency signals.

TAS5508 is an advanced 8-channel digital high-performance IC modulated by pulse width. It applies to processing of most audio frequency digital signals and presents good noise coefficients and dynamic range within 20—20KHZ. Its characteristics are as follows:

(1) Auto control over clock speed and data sampling speed;
(2) 8 groups of channels for audio frequency input;
(3) 8 groups of PWM output that can be configured into 6-channel stereo sound output line or 8-channel line output;
(4) Line output is one group of PWM signals drives one different input open-loop amplifier.

IC TAS5112 is a high-performance audio frequency digital power amplifier. When bridged with a 6-ohm load, each channel can output up to 50W and has a 95DB dynamic range. The distortion is low and power efficiency can reach 90%. The heating value is low. It provides low-voltage protection, hi-temperature protection, over-current protection, etc, and has a built-in drive power adjustment door circuit. It is suitable for home theaters, DVD receivers, mini composite acoustics, etc. Please see the appendix for detailed introduction to IC.

When the disk is normally read, the digital signals and clock signals processed from 1389, after selection by IC 74HCT125, are sent to Pins 26-31 of IC TAS5508 for processing. Now, plug in the earphone, the PH-SEL is high level and MUTE, when normally working, is also high level. Pin 37 of TAS5508 is also high level. The oscilloscope can detect all data lines and clock lines. Of the signals from 5508, one group is sent to N8 and N9 and, after processing, is output from the auxiliary channel; one group is sent to the earphone for processing; PWM signals are sent to the amplifier for amplification.

When the earphone is plugged in, the PH-SEL signal is peremptorily short circuited to the earth and changes to low level. The amplifier is mute, but the auxiliary channel output is normal.

When reading the disk, the system by default selects Karaoke for input. So, when playing the disk, Karaoke can be opened and this machine also has the auto accompaniment function that is realized by software. When playing VCD, if the system detects external input, it automatically shields the human voice signal in the disk and only keeps the accompanying sound.

DK1050S has the radio function and can receive RDS signals. Radio head control lines CE, DI, CL and DO, through 28P drop-out lines, are respectively connected to MT1389. When any control line is abnormal, radio function will become abnormal. The RDS signal received by the radio head is sent to special-purpose IC SAA6588 for processing.

3. Auxiliary channel, optical fiber and co-axial input

This machine has auxiliary channels, radio function, optical fiber and co-axial external input. This machine has radio function, and auxiliary channel input function and Karaoke function. All external input shall be selected by N3 CD4052 and then undergo the analog/digital conversion via N7 CS5340 and be sent to MT1389 for signal processing. Subsequent processing and output share the same process as normal disk reading signal output.

Optical fiber and co-axial signals, after inductance filtering and capacitance filtering, are sent to the

serial audio frequency digital signal to receive the input Pins 4, 12 and 14 of signal IC CS8415. After passing this IC, the serial audio frequency digital signal is converted into PCM signal, which is then output from Pin 16 (sampling rate signal), Pin 17 (clock signal of main track) and Pin 18 (audio frequency digital signal) of IC and sent to IC 1389 for signal processing.

Chapter Four Working Principle of power board

This machine has two groups of power supply. One group supplies power for the decoder board and small-power IC; the other group supplies power for the power amplification IC and the voltage is high. But both groups have the same design principle.

Introduction to the principle of circuit

The 220V AC current passes the power plug, protector tube, varistor R501 and common mode rejections BC501 and L501 and is added to the integrated bridge rectification circuit. The diode is IN4007 that has a good performance/price ratio and has a higher durable pressure than IN4001. After bridge rectification, 311V is output and flows through TC501 filter, then is respectively added to two transformers and sent to the DRAIN control pin of switch modules U501 and U502.

The power supply working voltage of IC is directly rectified, filtered, divided by the resistor and then supplied to IC. Diode D508, capacitor C516 and resister R516 form the absorb circuit to provide windings 1-4 of the transformer with the discharge circuit for reverse electromotive force. Pin FB controlling the IC is the feedback control pin. According to its current, the pulse width's conduction and starting and ending time are determined to ensure the stability of voltage output.

Five branch circuits are coupled to secondary via the transformer.

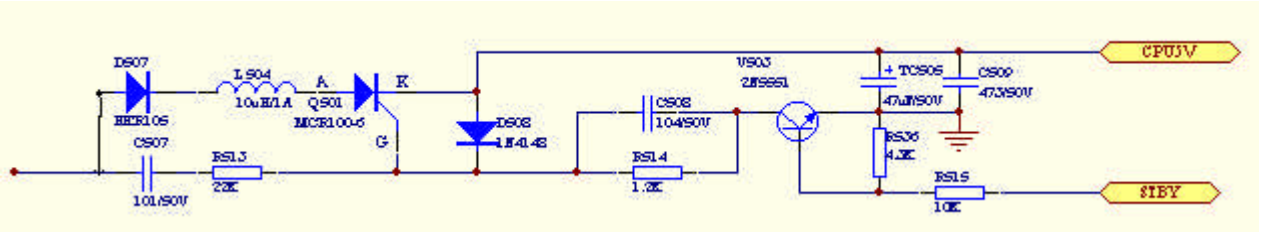
1. Voltage output from Pins 11 and 13 of transformer T502, after being rectified and filtered, outputs a group of +28V voltage for power amplification IC;
2. Voltage output from Pin 16 of transformer T501, after being rectified and filtered, outputs a group of +12V voltage that, after being rectified by IC LM7805, outputs a group of +5V voltage;
3. Voltage output from Pin 14 of transformer T501, after being rectified and filtered, outputs a +5V voltage to supply one end of coupling amplifier U502;
4. Voltage output from Pin 12 of transformer T501, after being rectified and filtered, outputs a +3.3V voltage and to supply a group of stable voltages for CPU;
5. Voltage output from Pin 9 of transformer T501, after being rectified and filtered, outputs a group of 21V voltage for displayer driver IC. Clamp ZD501 on -21V supplies panel display screen with filament voltage. Voltage to ground of FL+ and FL- is about -16V.

Because the two groups of power switches of the machine have different working principles, here we only analyze the group that supplies CPU with +5V voltage.

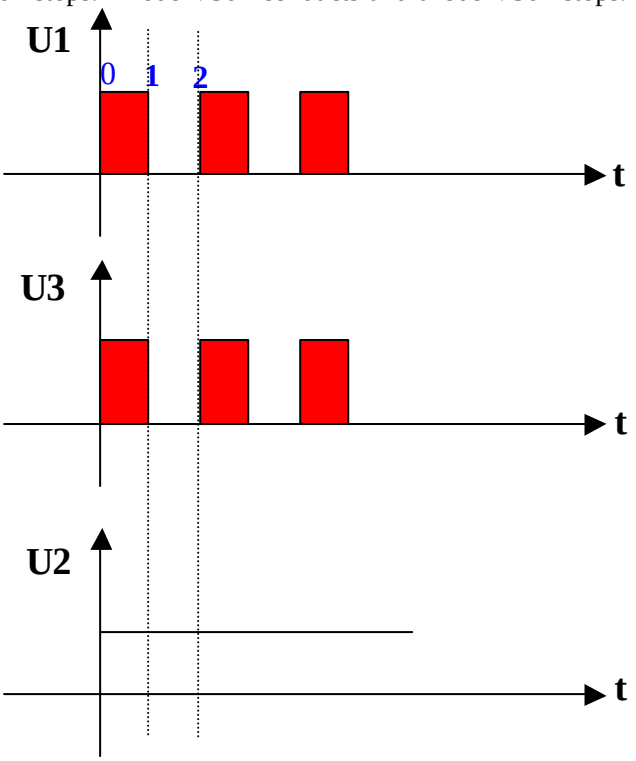
Feedback sampling of this group of power supply comes from 5V. It supplies the coupling amplifier HS817 via D514 and R517. At the same time, it is divided by R519 and R520 to supply the reference voltage pin R of 2.5V comparator. When 5V is high, the Pin KA of comparator LM17431A conducts, passes photoelectrical coupler HS817 and is sent to the fourth pin of switch IC 5L0380R to reduce the conduction time of internal switch tube, reduce the coupling of transformer, lower the 5V output and achieve the goal of automatic regulation and vice versa.

It must be noted that, in this power switch, the two groups of power switches use a base voltage that is different from IC. The group supplying the amplifier outputs a higher voltage, so it uses

LM431 that has better performance and a higher endurable pressure. However, the group supplying 3.3V voltage, because the output voltage is low, uses 17431. Because these two kinds of IC are different, care shall be taken in the process of maintenance to avoid confusion.
This machine uses DC switches.



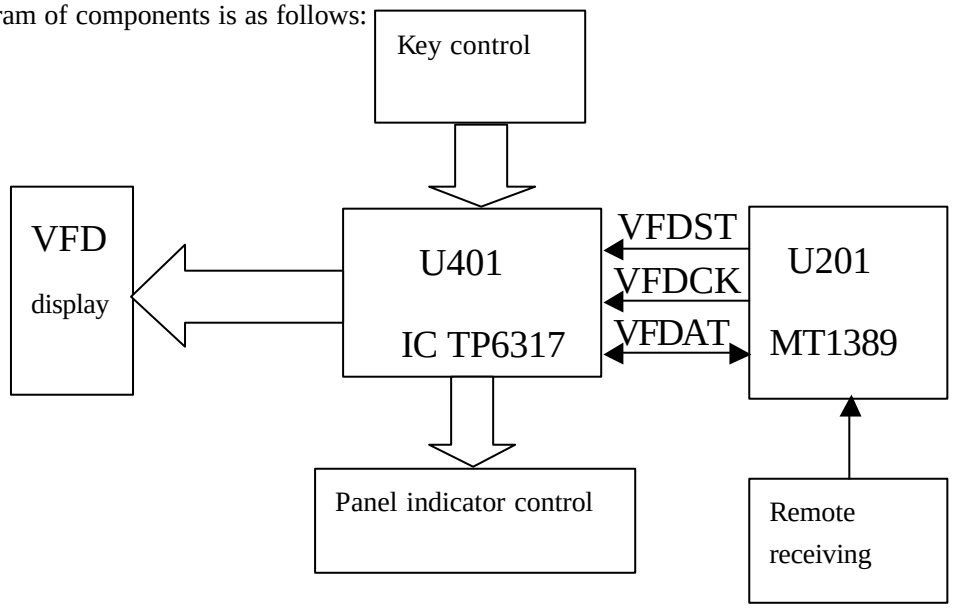
When the power of the machine is just on, voltage output from Pin No.16 of transformer, after being rectified by D507 half wave, generates a 76V high-frequency voltage on silicon-controlled pin 1. This voltage passes capacitors C507 and R513 and is coupled to Pin No.3 of Q501, the same high-frequency voltage. Because of the effect of feedback stable voltage, Pin No.2 of Q501 gets a stable 5V DC voltage. Its wave shape is as follows:
It can be seen from the above diagram that when T=t01, Pin P1 of Q501is high level and Pin P3 of Q501 is also high level and Q501 deducts and Pin P3 outputs a 5V DC voltage; when T=t12, Pin P1 of Q501 and Pin P3 of Q501 are low level and, because U2 > U1, Q501 stops and Pin P3 does not output voltage and 5 VDC voltage is supplied by capacitor TC505;
At the moment the power is on, the voltage of U1 is 76V. But, because the conduction of silicon-controlled, Pin P2 of Q501shall be maintained at 5V causing the voltage of U1 to drop to around 7V, so other secondary windings do not output. Power switch only outputs CPU5V and the power supply is at the low-load working status.
When the machine is open, only 5V is supplied to the panel via transformer coupling and the complete machine is stand-by. When pressing the stand-by on the panel or on the remote controller, Pin 40 of panel IC TP6317 outputs a high level and triode V503 conducts, giving Pole G of Q501a low level and silicon-controlled Q501 stops. Triode V504 conducts and triode V502 stops. Other windings begin to work normally.



Chapter Five Panel Control and VFD Display Circuit

The panel mainly consists of the VFD display screen, drive IC TP6317, remote receiving head HSOO38A2, keys control and indicator display circuit. It mainly accomplishes the man-machine dialogue and displays the working status.

Diagram of components is as follows:



Under the control of built-in CPU of MT1389 and via VFDST (status), VFDCK (clock) and VFDAT (data), U401 IC TP6317 is controlled to display complete-machine working status and receive the user control command given by TP6317 to control the complete-machine control circuit and enable complete machine to work under designated status.

When pressing the user operating panel key, the control command via the key scans the circuit and sends control command to IC TP6317. After internal encoder drive of IC TP6317, control data is output from Pin 5 and Pin 6 (VFDAT) to internal CPU of MT1389 and the CPU controls the controlled circuit and controls VFD via IC TP6317.

VFD401 is a vacuum fluorescent display screen. Its most obvious feature is height. Its working principle is similar to TV display tube. Pins 1, 2, 34 and 35 supply the filament; Pins 27-32 supply the GRID poles. In each GRID there are 16 different characters for display. Pins 4-19 are SEG poles. CPU, through controlling IC TP6317, finally controls SEG poles, thus enabling the characters of working status to display on the display screen.

Remote receiving head circuit mainly consists of remote receiving head HS0038A2. Pin No.1 is for grounding, Pin No.2 is the supply end and Pin No.3 is the output pin for received signals and is directly connected to the CPU inside MT1389 to control corresponding circuit.

This machine has the earphone output function. One of the pins inside the earphone is directly connected to TAS5508. When the earphone is plugged in, detection line H-DET is grounded and becomes low level. When Pin 12 of TAS5508 becomes low level, the amplifier partially outputs mute; when it works normally, the detection pin is high level (about 3.3V).

Typical Trouble Shooting Process

1. Key-point voltages of DK1050S

Decoder circuit

Resetting

1. U205 (HCU04), Pin 8, about 5V
2. MT1389, Pin 110, about 5V
3. FLASH ROM, Pin 12, about 5V

Clock:

27MHZ crystal oscillator, both ends, about 0.77V

I^2C bus SDA, 3.3V

I^2C bus SCL, 3.3V

Servo circuit:

LD01: 3.3V; LD02: 3.3V

V301 and V302 collector electrode LD, voltage: 2.3V

BA5954 Pin 4 base voltage: 1.4V

BA5954 Pins 15 &16, tracking drive output, about 2.5V.

BA5954 Pins 17 & 18, feed drive output, about 2.5V

BA5954 Pins 13 & 14, focus drive signal output, about 2.5V

BA5954 Pins 11 & 12, main axle drive output, about 2.5V

BA5954 Pin 1, focus control signal input 1.4V

BA5954 Pin 5, main axle control signal input 1.4V

BA5954 Pin 26, tracking control signal input 1.4V

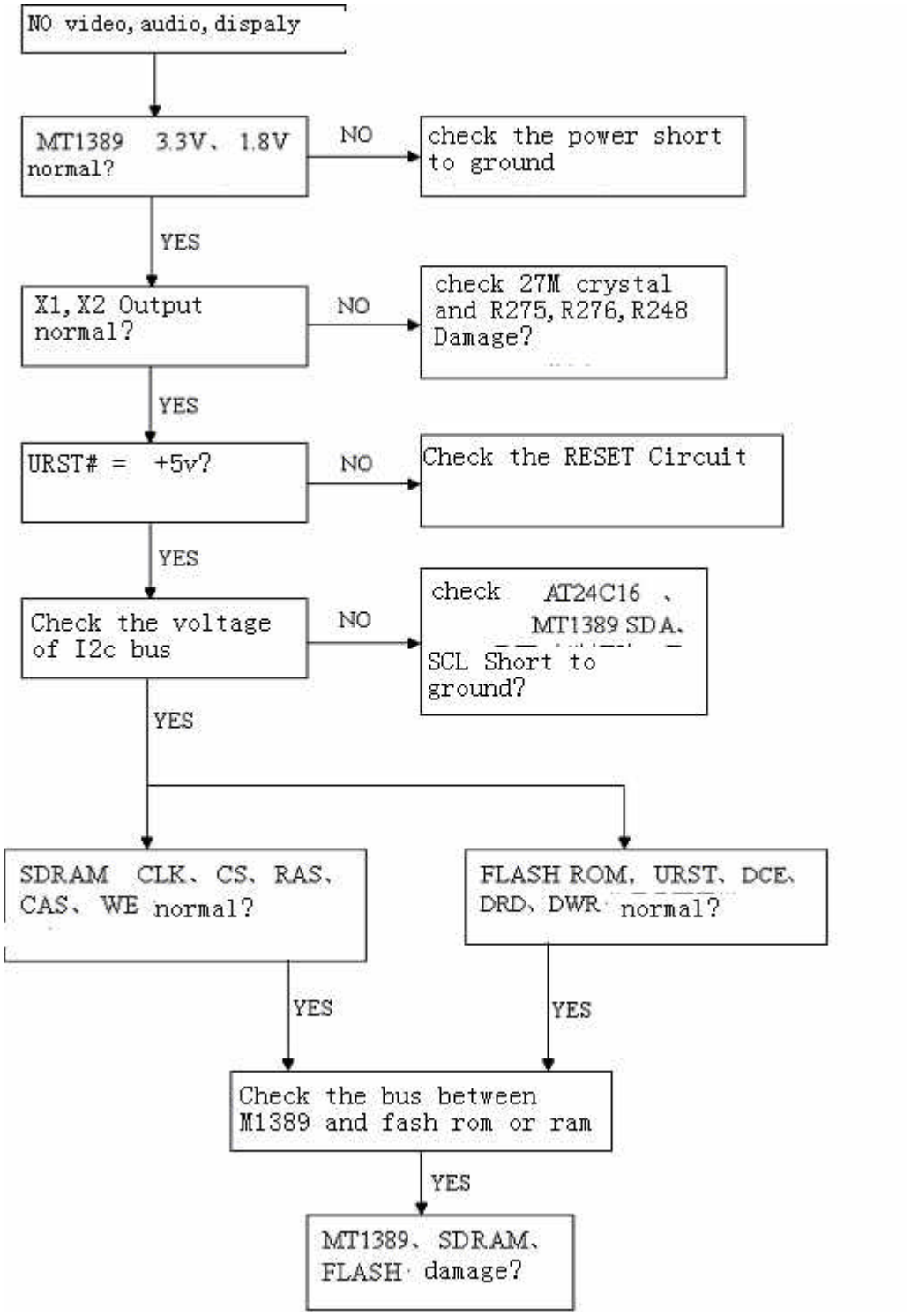
BA5954 Pin 23, feed control signal input 1.4V

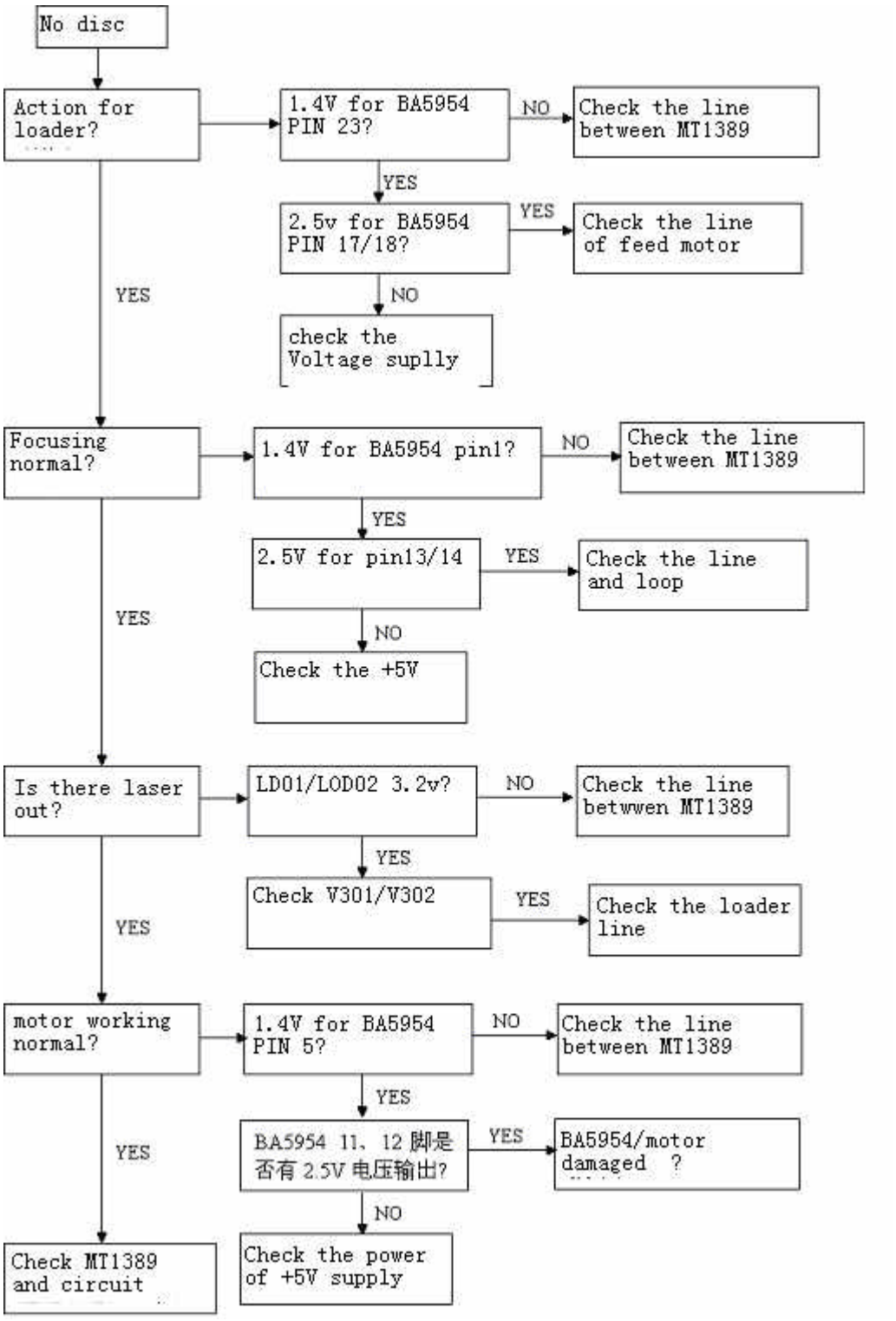
Amplifier circuit:

TAS5508 Pin 9, power supply pin, 3.3V

TAS5112 32, 33, 40, 41, 44, 45, 52 and 53 power supply 28V.

2. Main trouble shooting process




No disc
Action for loader?
1.4V for BA5954 PIN 23?
NO
Check the line between MT1389
YES
2.5v for BA5954 PIN 17/18?
YES
Check the line of feed motor
NO
check the Voltage suplly
YES
Focusing normal?
1.4V for BA5954 pin1?
NO
Check the line between MT1389
YES
2.5V for pin13/14
YES
Check the line and loop
NO
Check the +5V
YES
Is there laser out?
LD01/LOD02 3.2v?
NO
Check the line betwwen MT1389
YES
Check V301/V302
YES
Check the loader line
YES
motor working normal?
1.4V for BA5954 PIN 5?
NO
Check the line between MT1389
YES
BA5954 11、12 脚是否有 2.5V 电压输出?
YES
BA5954/motor damaged ?
NO
Check the power of +5V supply
YES
Check MT1389 and circuit

Appendix: Introduction to IC Data

1. MT1389

MT1389 uses LQFP 256-pin encapsulation and 3.3V/1.8V dual voltage working mode. It is a good-performance and large-scale CD-ROM and DVD-ROM front-end CMOS integrated circuit and a special-purpose single chip for CD/VCD/DVD player. It has focus servo error amplification and tracking servo amplification functions and RF horizontal output servo control. Its main functions are:

Pre-processing of RF small signals. Its main function is to process and amplify RF signals transmitted by laser head and to automatically regulate the laser power output. At the same time, it identifies VCD disks and DVD disks.

Digital-servo processing. It can generate focus, tracking, feed and main axle servo control signals.

Digital-signal processing completes EFM/EFM+ DEMODULATION of RF signal.

MPEG-1/MPEG–2/MPEG4/JPEG Video decoding. This chip decodes not only VCD and DVD but also MPEG 4 network video. It can also decode "Movie Network" disks and at the same time can read JPEG pictures to play digital albums.

In terms of audio frequency, it not only dual decodes AC-3/DTS, but also reads MP3. It can also decode DVD-Audio to achieve a high-resolution tonal quality that is 1000 times higher than CD.

Using the built-in 8032 micro processor of the chip, MT1369E can also achieve the system control function of the complete machine, thus greatly simplifying the circuit design.

MT1389 pins have the following functions:

Pin	Name	Function
1	AGND	Analog earth
2	DVDA	DVD-RF hi-frequency AC coupling signal A
3	DVDB	DVD-RF hi-frequency AC coupling signal B
4	DVDC	DVD-RF hi-frequency AC coupling signal C
5	DVDD	DVD-RF hi-frequency AC coupling signal D
6	DVDRFIP	DVD-RF hi-frequency AC coupling signal RFIP input
7	DVDRFIN	DVD-RF hi-frequency AC coupling signal RFIN input
8	MA	DVD-RAM main beam RF DC signal input A
9	MB	DVD-RAM main beam RF DC signal input B
10	MC	DVD-RAM main beam RF DC signal input C
11	MD	DVD-RAM main beam RF DC signal input D
12	SA	DVD-RAM auxiliary beam RF DC signal input A
13	SB	DVD-RAM auxiliary beam RF DC signal

		input B
14	SC	DVD-RAM auxiliary beam RF DC signal input C
15	SD	DVD-RAM auxiliary beam RF DC signal input D
16	CDFON	CD focus error inverted input
17	CDFOP	CD focus error positive input
18	TNI	3-beam auxiliary PD signal inverted input
19	TPI	4-beam auxiliary PD signal positive input
20	MDI1	Laser power monitoring input 1
21	MDI2	Laser power monitoring input 2
22	LDO2	Laser power output 2
23	LDO1	Laser power output 1
24	SVDD3	Servo 3.3V power supply
25	CSO/RFOP	Main servo signal output/RF positive output
26	RFLVL/RFON	RF level output/RF inverted output
27	SGND	Servo earth
28	V2REFO	Reference voltage 2.8V
29	V20	Reference voltage 2.0V
30	VREFO	Reference voltage 1.4V
31	FEO	Focus error signal output
32	TEO	Tracking error signal output
33	TEZISLV	Tracking over-zero error input
34	OP_OUT	Sensor signal amplification output
35	OP_INN	Sensor signal inverted input
36	OP_INP	Sensor signal in-phase input
37	DMO	Main axle control signal output
38	FMO	Feed control signal output
39	TROPEN PWM	OPEN signal output
40	PWMOUT1/ADIN9	No.1 pulse width modulation signal output/AD general input
41	TRO	Tracking control signal output
42	FOO	Focus control signal output
43	USB_VSS	USB earth
44	USBP	USB data
45	USBM	USB data
46	USB_VDD3	USB 3.3V power
47	FG/ADIN8	Motor Honeywell Sensor signal input/AD

		general input
48	TDI/ADIN4	OPEN detection signal input/AD general input
49	TMS/ADIN5	CLOSE detection signal input/AD general input
50	TCK/ADIN6	BA5954 enable signal output/Ad general input
51	TDO/ADIN7	CLOSE signal output/AD general input
52、97、122、152、173、221	DVDD18	Digital 1.8V power supply
53-58	IOA2-7	Micro controller address bit 2-7
59	HIGHA0	Micro controller address bit 0
60、61	IOA18-19	Micro controller address bit 18-19
62、85、94、116、119、134、144、148、161、163、175、216、223	DVSS	Digital earth
63	APLLCAP	Analog phase lock loop external capacitor
64	APLLVSS	Analog phase lock loop earth
65	APLLVDD3	Analog phase lock loop3.3V power supply
66	IOWR	FLASH read-and-write control signal
67-72	HIGHA3-7	Micro controller address bit 3-7
73、80、108、127、141、155、167、182、204、212	DVDD3	Digital3.3V power
74、75	HIGHA1-2	Micro controller address bit 1-2
76	IOA20	Micro controller address bit 20
77	IOCS	FLASH chip selection
78	IOA1	Micro controller address bit1
79	IOOE	FLASH output enable
81-84	AD0-3	Micro controller address /data bit0-3
86-88	AD4-6	Micro controller address /data bit4-6
89	IOA21/ADIN0	Micro controller address bit 21/AD general input
90	ALE	Micro controller address enable
91	AD7	Micro controller address /data bit 7
92	A17	FLASH address bit 17
93	IOA0	Micro controller address bit 0

95	UWR	Micro controller write operation
96	URD	Micro controller read operation
98	UP1_2-1_7	Micro controller port
104	UP3_0	Micro controller port
105	UP3_1	Micro controller port
106	UP3_4	Micro controller port
107	UP3_5	Micro controller port
109	ICE	Micro controller correction mode enable
110	PRST	Resetting input
111	IR	Remote control signal input
112	INT0	Micro controller break 0
113	DQM0	DRAM input/output shield signal
114	DQS0	DRAM input/output shield signal
115	RD7	DRAM data
117-118	RD5-6	DRAM data
120-121	RD3-4	DRAM data
123-125	RD0-2	DRAM data
126	RD15	DRAM data
128-133	RD9-14	DRAM data
135	RD8	DRAM data
136	DQS1	DRAM input/output shield signal
137	DQM1	DRAM input/output shield signal
138	RWE	DRAM write enable
139	CAS	DRAM column address selection
140	RAS	DRAM row address selection
142	RCS	DRAM chip selection
143	BA0	DRAM section address 0
145	BA1	DRAM section address 1
146	RA10	DRAM address
147	RA0	DRAM address
149	RA1-3	DRAM address
153	RVREF/ADIN3	Reference voltage/AD general input
154	RCLKB	DRAM clock
156	RCLK	DRAM clock
157	CKE	DRAM clock enable
158	RA11	DRAM address
159-160	RA8-9	DRAM address

162	RA7	DRAM address
164	RA4-6	DRAM address
168	RD13/ASDATA5	DRAM data/audio frequency serial data
169	RD27-30	DRAM data
174	RD26	DRAM data
176-177	RD24-25	DRAM data
178-179	DQM2-3	DRAM input/output shield signal
180-181	RD22-23	DRAM data
183-188	RD16-21	DRAM data
189	DACVDDC	Digital/analog conversion 3.3V power
190	VREF	Reference voltage
191	FS	
192	YUV0/CIN	
193	DACVSSC	Digital/analog conversion earth
194	YUV1/Y	Video signal YUV1 output /Y signal output
195	DACVDDB	Digital/analog conversion 3.3V power
196	YUV2/C	Video signal YUV2 output /C signal output
197	DACVSSB	Digital/analog conversion earth
198	YUV3/CVBS	Video signal YUV3 output /CVBS signal output
199	DACVDDA	Digital/analog conversion 3.3V power
200	YUV4/G	Video signal YUV4 output /G signal output
201	DACVSSA	Digital/analog conversion earth
202	TUV5/B	Video signal YUV5 output /B signal output
203	YUV6/R	Video signalYUV6 output /R signal output
205	VSYNC/ADIN1	Field synchronization signal output /AD general input
206	YUV7/ASDATA5	Video signal YUV7 output / audio frequency serial data
207	HSYNC/ADIN2	Row synchronization signal output/AD general input
208	SPMCLK	
209	SPDATA	
210	SPLRCK	
211	SPBCK/ASDATA5	
213	ALRCK	Audio frequency right/left track clock
214	ABCK	Audio frequency bit clock
215	ACLK	Audio frequency DAC external clock

217-220	ASDATA0-3	Audio frequency serial data
222	ASDATA4	Audio frequency serial data
224	MC_DATA	Microphone digital audio frequency input
225	SPDIF	Digital audio frequency signal output
226	RFGND18	RF signal earth
227	RFVDD18	RFsignal1.8V power
228	XTALO	Clock output
229	XTALI	Clock input
230	JITFO	RF small signal output
231	JITFN	RF small signal inverted amplification input
232	PLLVSS	Phase lock loop earth
233	IDACEXLP	
234	PLLVDD3	Phase lock loop3.3V power
235	LPFON	Amplifier circuit filter output
236	LPFIP	Amplifier circuit filter input
237	LPFIN	Amplifier circuit filter input
238	LPFOP	Amplifier circuit filter output
239	ADCVDD3	Analog/digital conversion 3.3V power
240	S_VCM	
241	ADCVSS	Analog/digital conversion earth
242	S_VREFP	
243	S_VREFN	
244	RFVDD3	RF 3.3V power
245	RFRPDC	DC RF error signal input
246	RFRPAC	AC RF error signal input
247	HRFZC	Hi-frequency RF signal over-zero detection
248	CRTPLP	
249	RFGND	RF earth
250	CEQP	
251	CEQN	
252	OSP	
253	OSN	
254	RFGC	
255	IREF	Reference current
256	AVDD3	Analog 3.3V power

2. BA5954

BA5954 is a servo-driven single-chip integrated circuit with a built-in 4-channel BTL-driven circuit. It can directly receive the PWM control signal output by digital servo IC. After internal filtering and drive amplification, it drives the executing components in the servo mechanism to complete the focus, tracking, feed and main axle drives. BA5954 uses 28-pin encapsulation.
Notes: The 28 pins of BA5954 output a valid control signal, which is supplied by the 50 pins of MT1389. When this signal is high level, BA5954 output is valid; while when this signal is low level, BA5954 is not started and its output ends are closed.

BA5954 pins have the following functions:

Pin	Name	Function
1	VINFC	Focus control signal input
2	CF1	External feedback circuit
3	CF2	External feedback circuit
4	VINSL+	Positive control input, reference voltage
5	VINSL-	Main axle control signal input
6	VOSL	External feedback resistor
7	VINFFC	Focus feedback signal input
8	VCC	5V power
9	PVCC1	5V power
10	PGND	Earth
11	VOSL-	Main axle drive reverse voltage output
12	VO2+	Main axle drive positive voltage output
13	VOFC-	Focus drive reverse voltage output
14	VOSC+	Focus drive positive voltage output
15	VOTK+	Tracking drive positive voltage output
16	VOTK-	Tracking drive reverse voltage output
17	VOLD+	Feed drive Positive voltage output
18	VOLD-	Feed drive reverse voltage output
19	PGND	Earth
20	VINFTK	Tracking feedback signal input
21	PVCC2	5V power
22	PREGND	Earth
23	VINLD	Feed control signal input
24	CTK2	External feedback circuit
25	CTK1	External feedback circuit
26	VINTK	Tracking control signal input
27	BIAS	1.4VReference voltage input
28	STBY	Enable control signal

3. 29LV160BE

29LV160BE is a 16M bit FLASH memory. It uses the 0.23-um manufacturing process. It has16-bit data width DQ0-DQ15 and its capacity is 16M bits. Its working voltage is 3.3V. It uses the 48-pin TSOP encapsulation. Its working mode is shown in the following table:

Working Status	CE	OE	WE	RESET	A0~A19	DQ0~QD7	DQ8~DQ15	
							BYTE: Hi Level	BYTE: Low Level
Read	L	L	H	H	Ain	Dout	Dout	Hi resistance
Write	L	H	L	H	Ain	Din	Din	Hi resistance
Stand-by	H	×	×	H	×	Hi resistance	Hi resistance	Hi resistance
Output Disabled	L	H	H	H	×	Hi resistance	Hi resistance	Hi resistance
Resetting	×	×	×	L	×	Hi resistance	Hi resistance	Hi resistance

Functions of 29LV160BE pins are shown in the following table:

Pin	Name	Function
15	RY/BY	Ready/System busy
1~9、16~25、48	A0~A19	20-bit address bus
26	CE	Chip enable
27、46	VSS	Earth
28	OE	Output enable
29~36、38~44	DQ0~DQ14	15-bit data bus
37	VCC	5V power
45	DQ15/A-1	Character expansion mode is data line; bit expansion mode is address line
47	BYTE	Select 8-bit or 16-bit output mode. 16-bit output for high level and 8-bit output for low level.
11	WE	Write enable
12	RESET	Resetting, low level valid
10、13、14	NC	Void pin

4. AE45164016

AE45164016 is a 4Banks× 1M× 16bit 64Mb CMOS synchronous DRAM. Its features are big capacity, high speed, etc. Its working voltage is 3.0V~3.6V. This memorizer uses 54-pin TSOP encapsulation.

Pins of AE45164016 have the following functions:

Pin	Name	Function
1、14、27	VDD	+3.3Vpower
2、4、5、7、8、10、11、13、42、44、45、47、48、50、51、53	DQ[0~15]	16-bit data bus
3、9、43、49	VDDQ	+3.3V power
6、12、46、52	VSSQ	Earth
28、41、54	VSS	Earth
15	LDQM	Data input/output shield signal
16	WE	Write control signal
17	CAS	Column address gating signal
18	RAS	Row address gating signal
19	CS	Chip selection signal
20	SD-BS0	Segment address 0 gating signal
21	SD-BS1	Segment address 1 gating signal
22~26、29~35	MA [0~11]	12-bit address bus
36、40	NC	Void pin
37	CKE	Clock enable signal
38	CLK	System clock input
39	UDQM	Data input/output shield signal

5. Functions of TAS5508 pins

TAS5508 is a high-performance audio frequency signal processing IC launched by TI Co. It has an 8-track pulse width modulation function and has a complete protection function. It features low distortion and good dynamic characteristics.

1	**VRA_PLL**	Supply PLL with a 1.8V reference voltage
2	**PLL_FLT_RET**	External filter circuit of PLL
3	**PLL_FLTM**	Inverted input end of PLL
4	**PLL_FLTP**	In-phase input end of PLL
5	**AVSS**	Analog earth
6	**AVSS**	Analog earth
7	**VRD_PLL**	Supply PLL with a 1.8V reference voltage
8	**AVSS_PLL**	Analog earth of PLL
9	**AVDD_PLL**	PLL supplies a 3.3V voltage
10	**VBGAP**	Supply a 1.2V reference voltage
11	**RESET**	System resetting signal, low level valid
12	**HP_SEL**	Microphone input/output selection
13	**PDN**	Close voltage, low level valid

14	**MUTE**	Software control mute, low level valid
15	**DVDD**	3.3V digital supply pin
16	**DVSS**	Digital grounding pin
17	**VR_DPLL**	Supply PLL with a 1.8V reference voltage
18	**OSC_CAP**	Oscillating capacitor
19	**XTL_OUT**	Crystal oscillator output pin
20	**XTL_IN**	Crystal oscillator input pin
21	**RESERVED**	Connected to digital earth
22	**TBASE_SEL**	Connected to digital earth
23	**RESERVED**	Connected to digital earth
24	**SDA**	Data signal
25	**SCL**	Clock signal
26	**LRCLK**	Right/left track clock signal
27	**SCLK**	Audio frequency clock signal
28	**SDIN4**	Audio frequency data input end
29	**SDIN3**	Audio frequency data input end
30	**SDIN2**	Audio frequency data input end
31	**SDIN1**	Audio frequency data input end
32	**PSVC**	Control PWM signal output
33	**VR_DIG**	Digital center reference voltage 1.8V
34	**DVSS**	Digital earth
35	**DVSS**	Digital earth
36	**DVDD**	3.3V digital supply voltage
37	**BKND_ERR**	Logic-error control pin, low level valid
38	**DVSS**	Digital earth
39	**VALID**	Output PWM signal normal display, hig level valid
40	**PWM_M_1**	Pulse width modulation signal output 1
41	**PWM_P_1**	Pulse width modulation signal output 1
42	**PWM_M_2**	Pulse width modulation signal output 2
43	**PWM_P_2**	Pulse width modulation signal output 2
44	**PWM_M_3**	Pulse width modulation signal output 3
45	**PWM_P_3**	Pulse width modulation signal output 3
46	**PWM_M_4**	Pulse width modulation signal output 4
47	**PWM_P_4**	Pulse width modulation signal output 4
48	**VR_PWM**	PWM core reference voltage 1.8V
49	**PWM_M_7**	Pulse width modulation signal output 7
50	**PWM_P_7**	Pulse width modulation signal output 7
51	**PWM_M_8**	Pulse width modulation signal output 8
52	**PWM_P_8**	Pulse width modulation signal output 8
53	**DVSS_PWM**	Supply PWM signal with digital earth
54	**DVDD_PWM**	Supply PWM signal with 3.3V voltage

55	**PWM_M_5**	Pulse width modulation signal output 5
56	**PWM_P_5**	Pulse width modulation signal output 5
57	**PWM_M_6**	Pulse width modulation signal output 6
58	**PWM_P_6**	Pulse width modulation signal output 6
59	**PWM_HPML**	Earphone output PWM left track
60	**PWM_HPPL**	Earphone output PWM left track
61	**PWM_HPMR**	Earphone output PWM right track
62	**PWM_HPPR**	Earphone output PWM right track
63	**MCLK**	3.3V clock input
64	**RESERVED**	Connected to digital earth

6. IC TAS5112

IC TAS5112 is a TI-produced high-performance audio frequency digital power amplifier IC. When bridge-connected to a 6ohm load, each channel can output up to 50W. It has a 95DB dynamic range and low distortion. It has power efficiency up to 90%, low heat radiation, low-voltage protection, high-temperature protection, over-current protection, etc. In addition, it has a built-in drive power door adjustment circuit。 Basic functions of its pins are as follows:

Pin	Name	Function Description
31	BST_A	Auxiliary power
42	BST_B	Auxiliary power
43	BST_C	Auxiliary power
54	BST_D	Auxiliary power
23	DGND	Digital input/output reference earth
16	DREG	Digital supply voltage adjustment pin
12	DREG_RTN	Digital supply voltage adjustment circuit
25	DVDD	Input/output reference pin
1，2，22，24，28，29，27，36，37，48，49，56	GND	Grounding pin
3，26	GREG	Door circuit drive voltage adjustment pin
30，55	GVDD	Digital voltage adjustment pin
15	M1 (TST0)	Mode selection pin
14	M2	Mode selection pin
13	M2	Mode selection pin
4	OTW	Hi-temperature protection pin
34，35	OUT_A	Output pin A
38，39	OUT_B	Output pin B
46，47	OUT_C	Output pin C
50，51	OUT_D	Output pin D
32,33	PVDD_A	Supply voltage of half-bridge A
40,41	PVDD_B	Supply voltage of half-bridge B

44,45	PVDD_C	Supply voltage of half-bridge C
52,53	PVDD_D	Supply voltage of half-bridge D
20	PWM_AM	Inverted input end
21	PWM_AP	In-phase input end
18	PWM_BM	Inverted input end
17	PWM_BP	In-phase input end
10	PWM_CM	Inverted input end
11	PWM_CP	In-phase input end
8	PWM_DM	Inverted input end
7	PWM_DP	In-phase input end
19	RESET_AB	Resetting signal, low level valid
9	RESET_CD	Resetting signal, low level valid
6	SD_AB	Signal closed control
5	SD_CD	Signal closed control

7. IC RC4558

IC RC4558 is a dual-channel low-noise amplifier IC. Compared with most amplifier ICs, it has a smaller noise, better output performance and wider power band. Its main features are small signal band, DC voltage gain up to 50000, AC voltage gain up to 2200 at 10KHZ, power band up to 140KHZ, wide supply range and very high conversion rate. Basic functions of its pins are as follows:

Pin	Name	Function Description
1	OUTPUT-A	Output channel A
2	INVERTING INPUT-A	Inverted input A
3	NON-INVERTING INPUT-A	In-phase input A
4	V-	Negative power supply
5	NON-INVERTING INPUT-B	In-phase input B
6	INVERTING INPUT-B	Inverted input B
7	OUTPUT-B	Output B
8	V+	Positive power supply

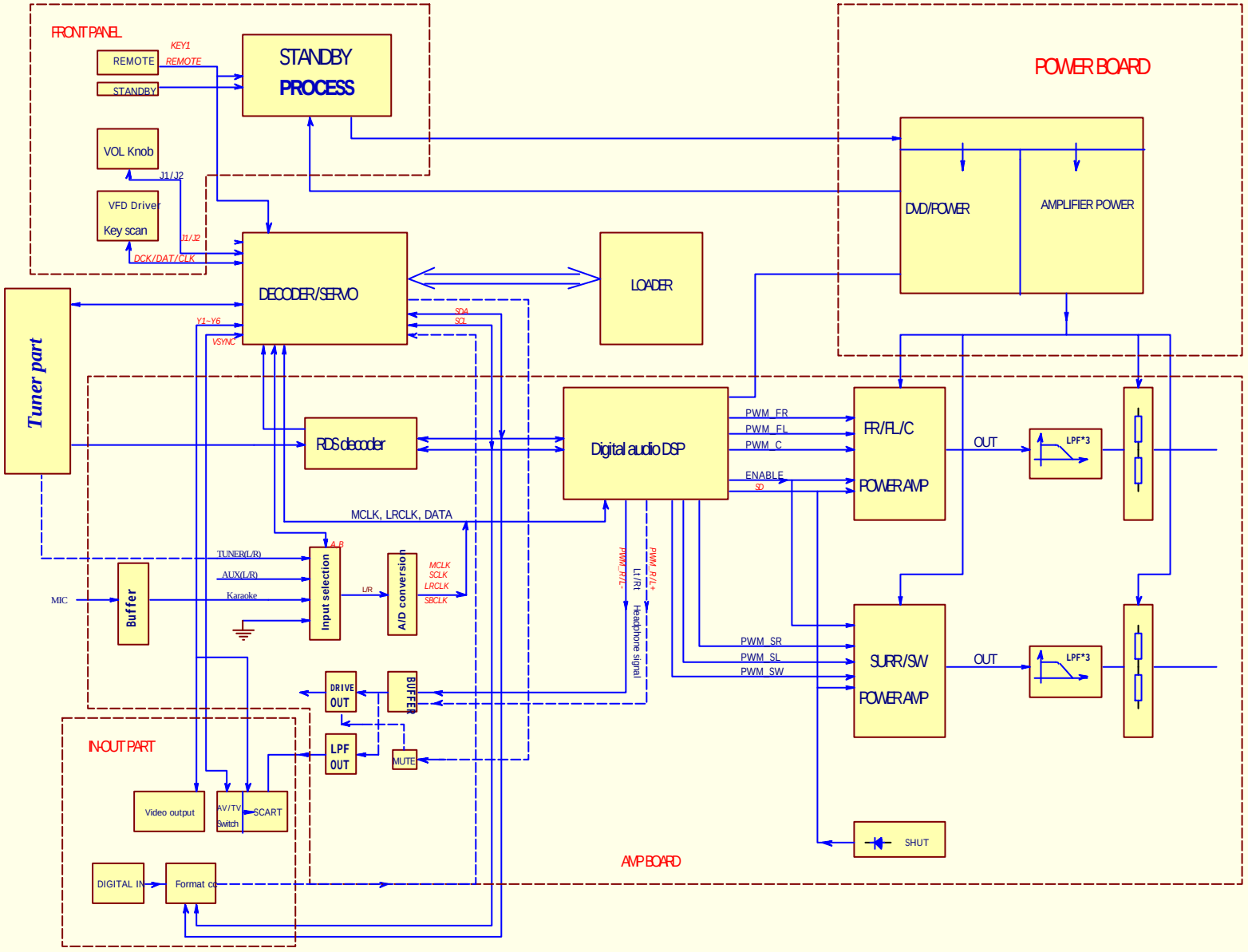
8. CS 5340

CS 5340 is an A/D conversion IC. It can complete sampling, analog/digital conversion and has the filtering function. Under continuous input, its sampling frequency can reach 200KHZ/track. Its main features are as follows:

24-byte conversion; supporting all audio frequency sampling frequencies up to 192KHZ; under 5V supply, the dynamic range up to 101DB; high-conductivity filter for filtering DC, etc. Basic

functions of its pins are as follows:

Pin	Name	Function Description
1	M0	Mode selection
16	M1	Mode selection
2	MCLK	Main clock signal
3	VL	Logic voltage supply
4	SDOUT	Audio frequency data output
5，14	GND	Grounding pin
6	VD	Digital power
7	SCLK	Continuous clock signal
8	LRCK	Right/left clock signal
9	RST	Resetting signal
10	AINL	Analog input
12	AINR	Analog input
11	VQ	Static voltage
13	VA	Analog power
15	FILT+	Reference voltage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DECODER/SERVO
LOADER
POWER BOARD
DVD/POWER
AMPLIFIER POWER
Tuner part
Y1~Y6
VSYNC
SDA
SCL
RDS decoder
Digital audio DSP
PWM_FR
PWM_FL
PWM_C
ENABLE
SD
FR/FL/C
POWER AMP
OUT
LPF*3
MCLK, LRCLK, DATA
A,B
TUNER(L/R)
AUX(L/R)
Karaoke
MIC
Buffer
Input selection
L/R
A/D conversion
MCLK
SCLK
LRCLK
SBCLK
PWM_R_T/L-
PWM_R_T/L+
Lt/Rt
Headphone signal
PWM_SR
PWM_SL
PWM_SW
SURR/SW
POWER AMP
OUT
LPF*3
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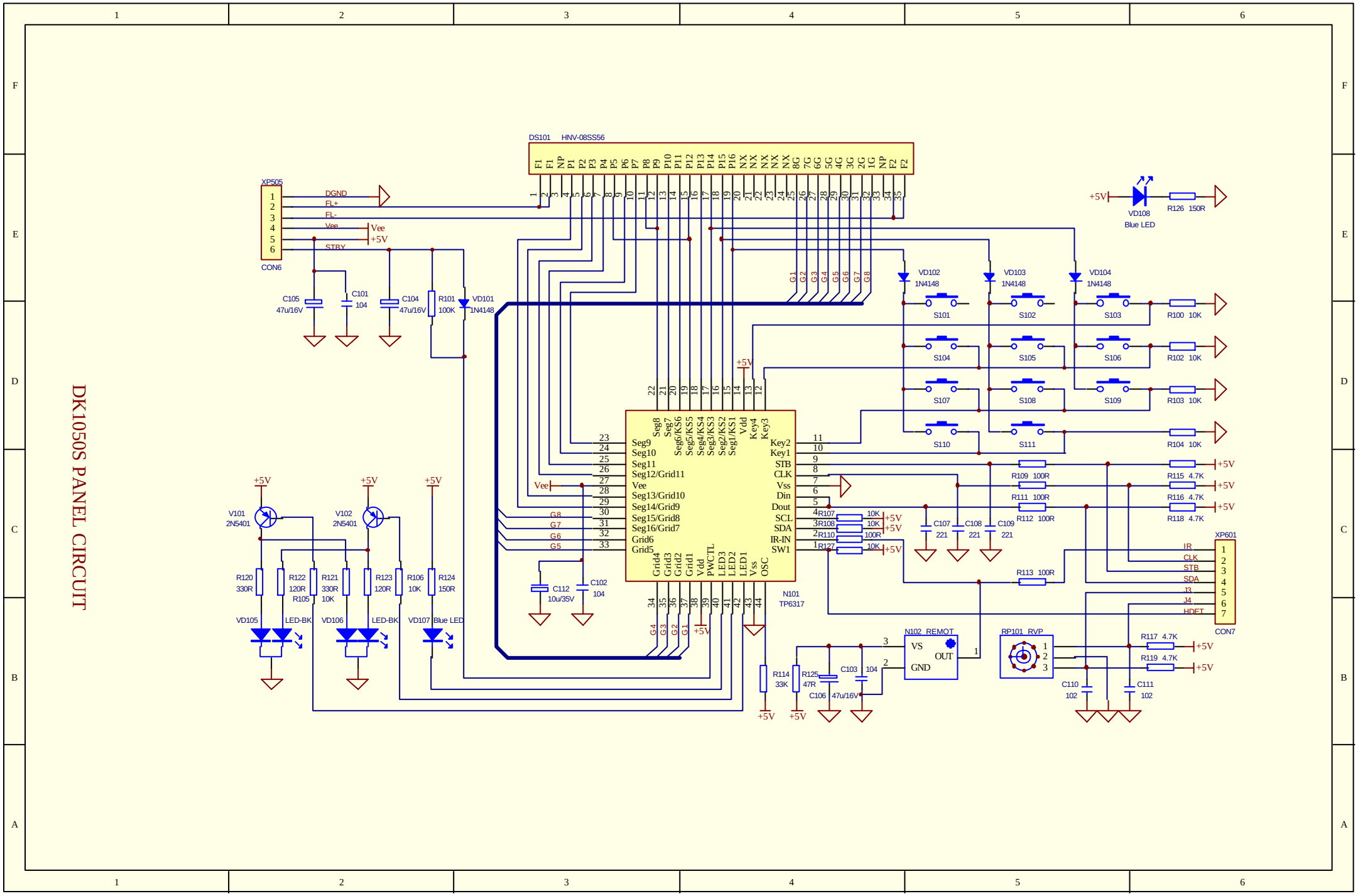
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C104 47u/16V
R101 100K
VD101 1N4148
VD108 Blue LED
R126 150R
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S101
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S110
S111
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R111 100R
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R113 100R
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C110 102
C111 102
C112 10u/35V
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C103 104
C106 47u/16V
R114 33K
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N101 TP6317
N102 REMOT
VS
OUT
GND
RP101 RVP
XP601
IR
CLK
STB
SDA
J3
J4
HDET
CON7
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V102 2N5401
R120 330R
R122 120R
R105
R121 330R 10K
R123 120R
R106 10K
R124 150R
VD105 LED-BK
VD106 LED-BK
VD107 Blue LED
Seg9
Seg10
Seg11
Seg12/Grid11
Vee
Seg13/Grid10
Seg14/Grid9
Seg15/Grid8
Seg16/Grid7
Grid6
Grid5
Grid4
Grid3
Grid2
Grid1
Vdd
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LED3
LED2
LED1
Vss
OSC
Seg8
Seg7
Seg6/KS6
Seg5/KS5
Seg4/KS4
Seg3/KS3
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Key3
Key2
Key1
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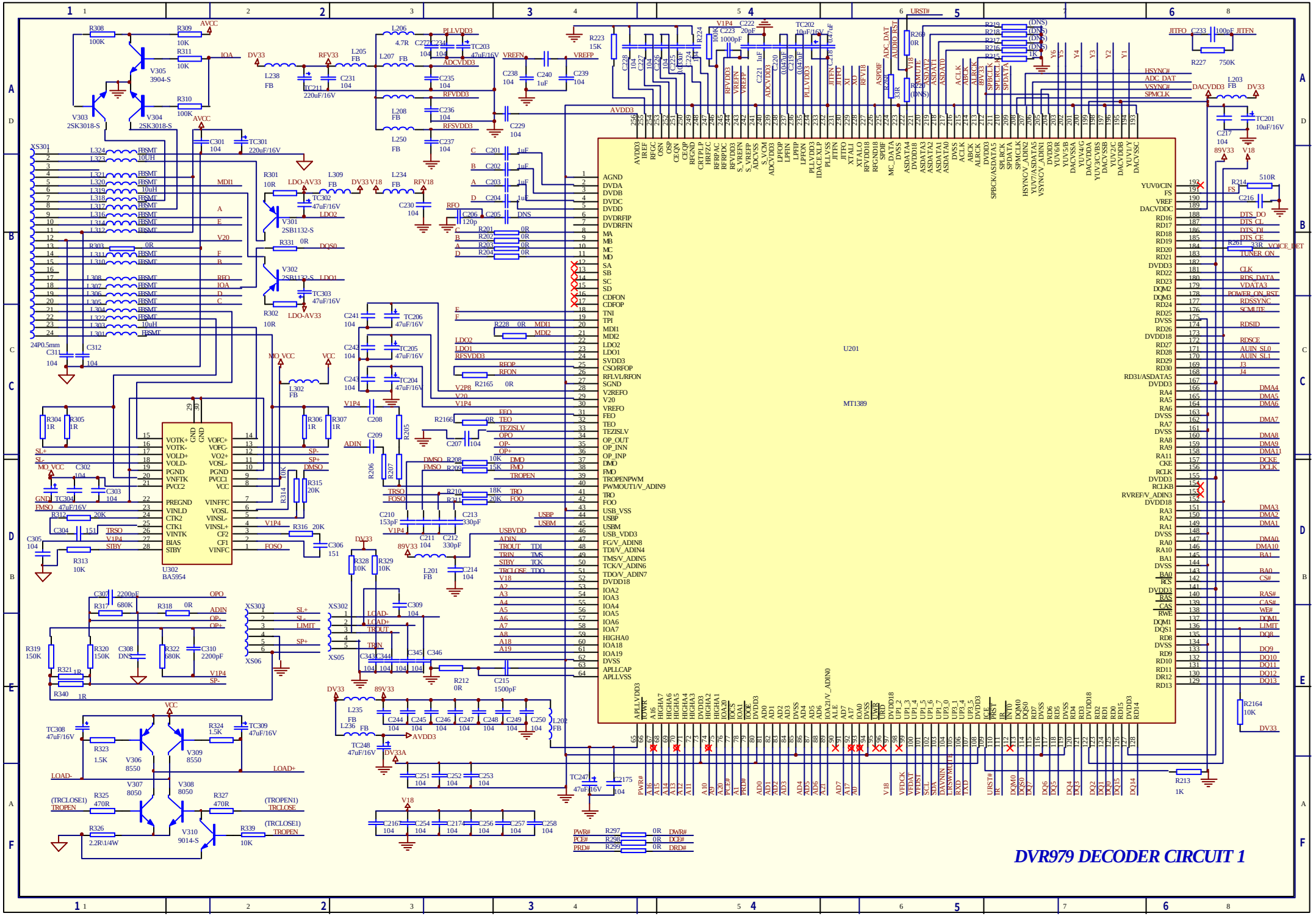
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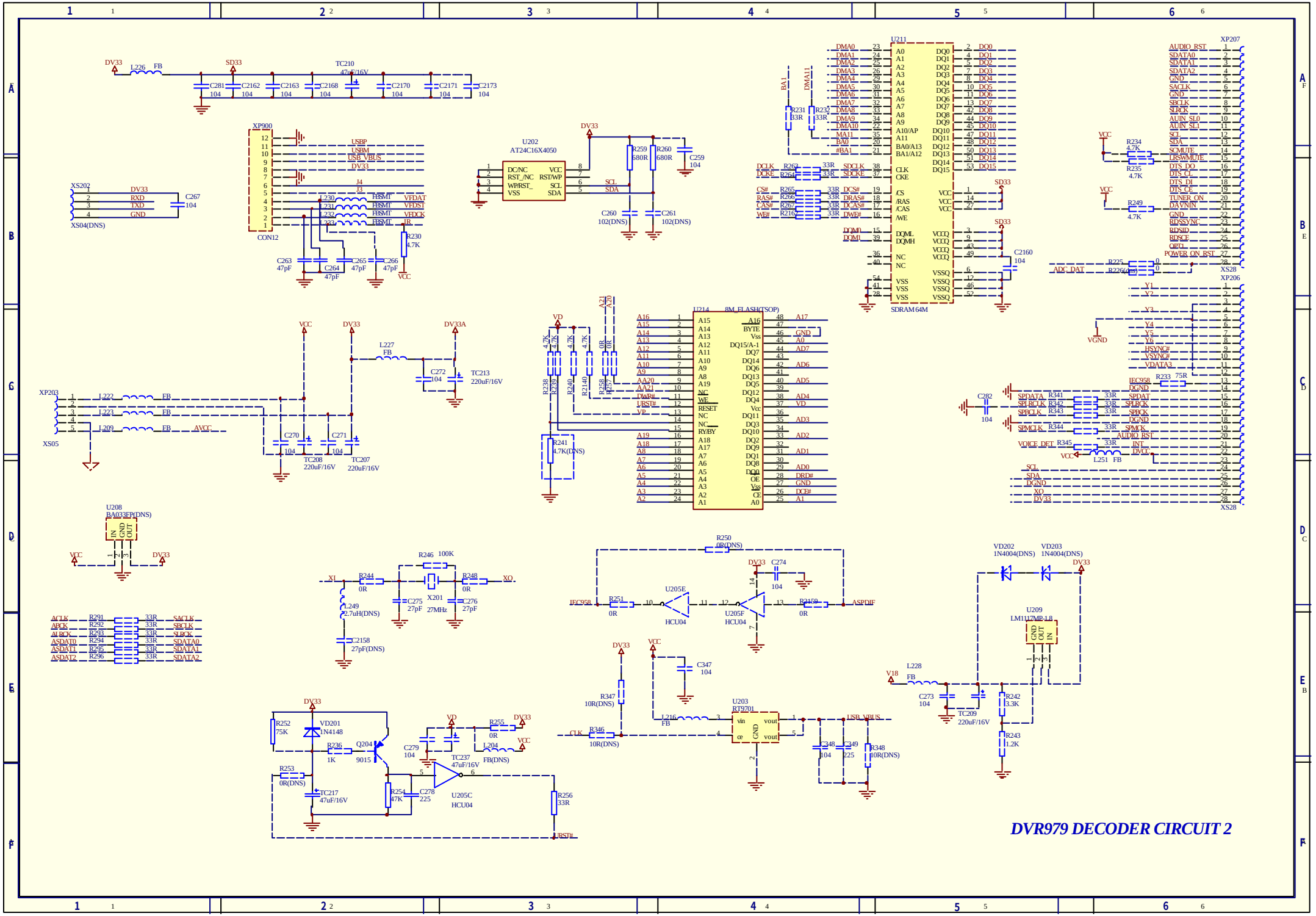
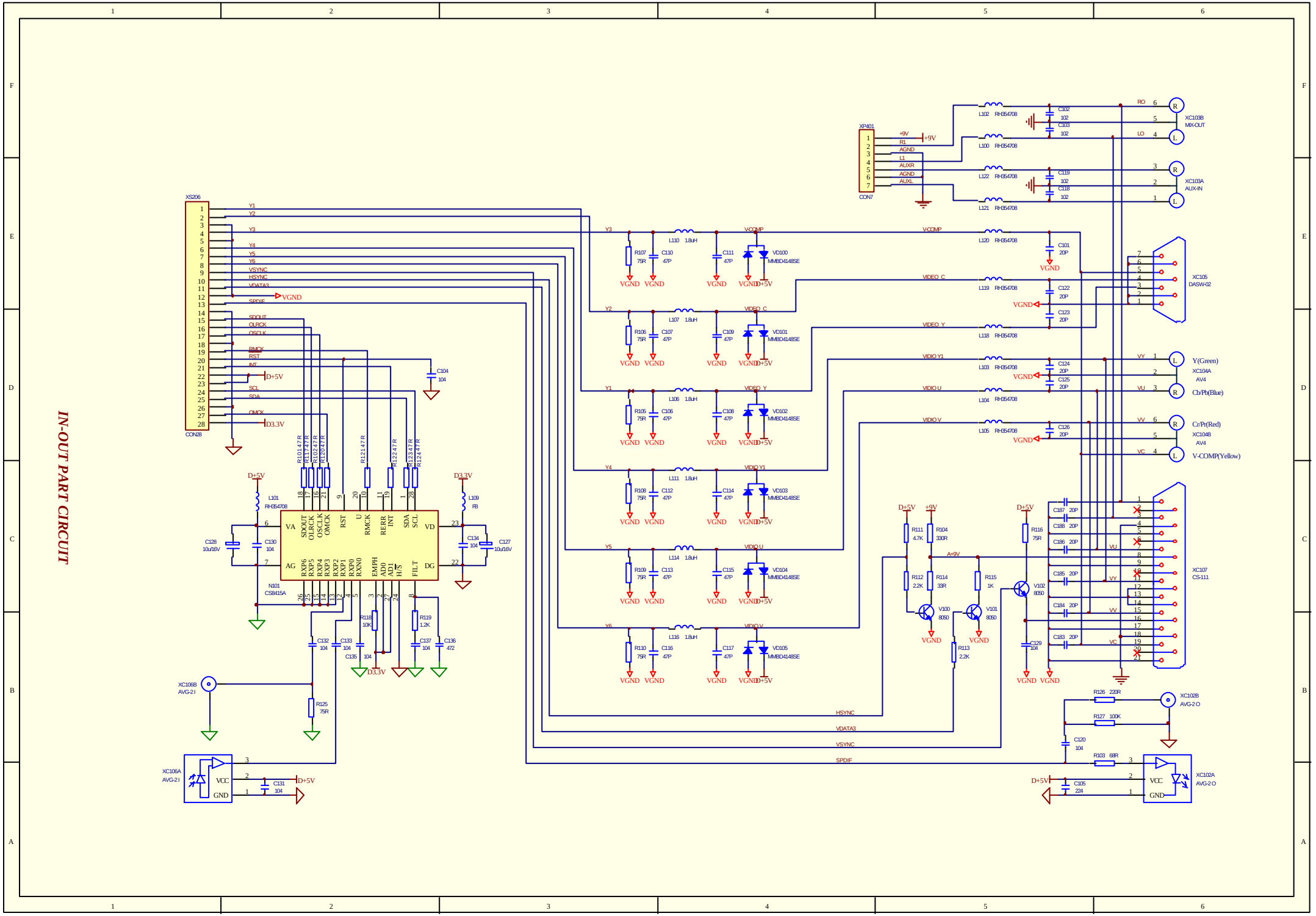
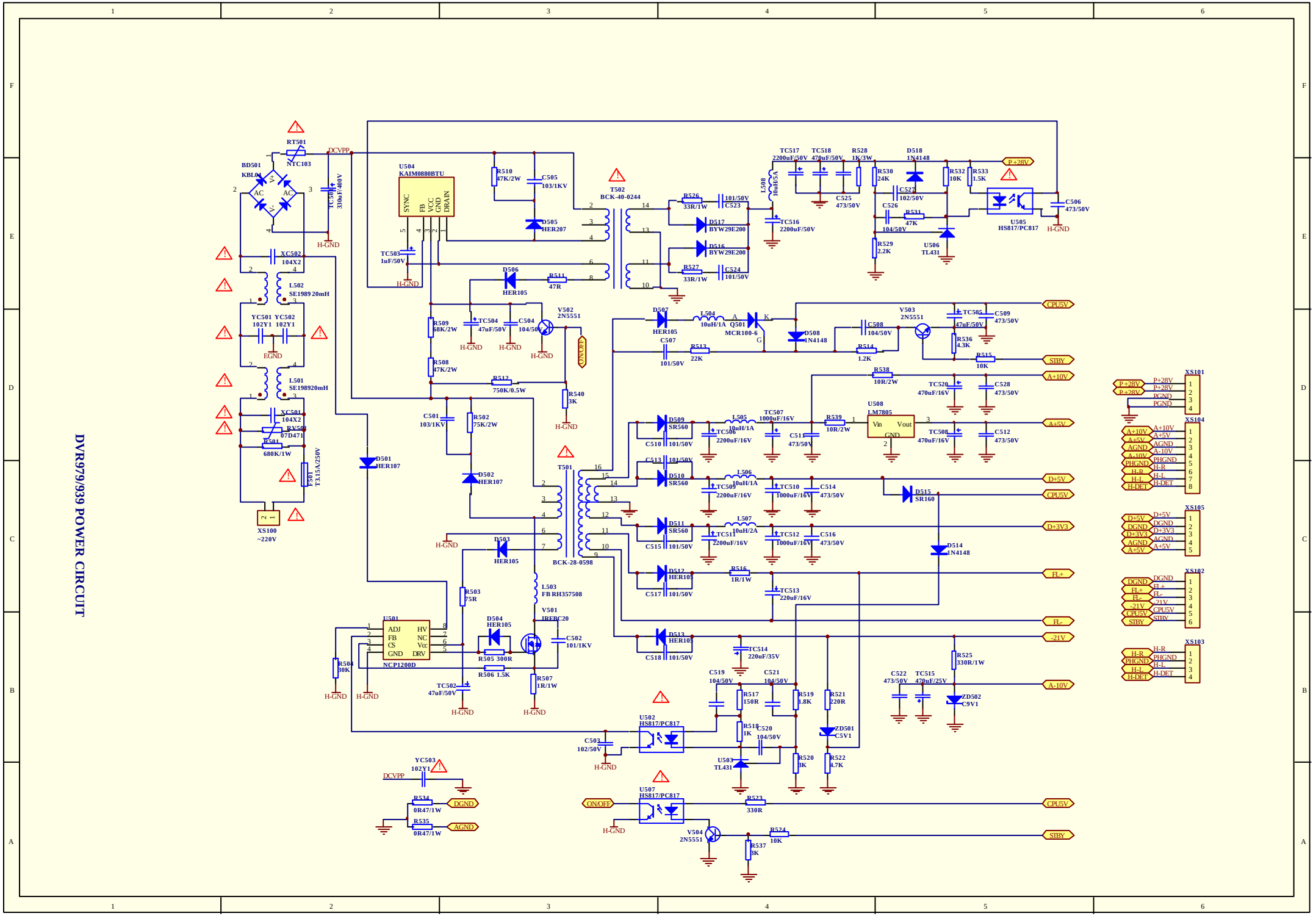
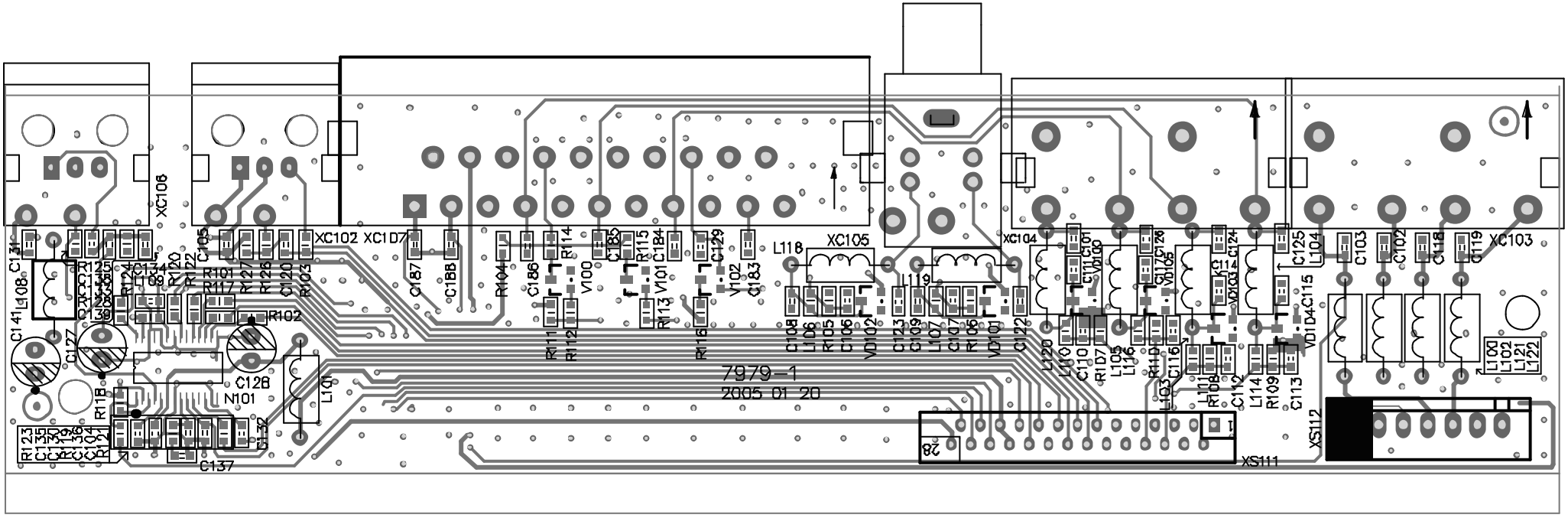
XS05
XS06
DVR979 DECODER CIRCUIT 1

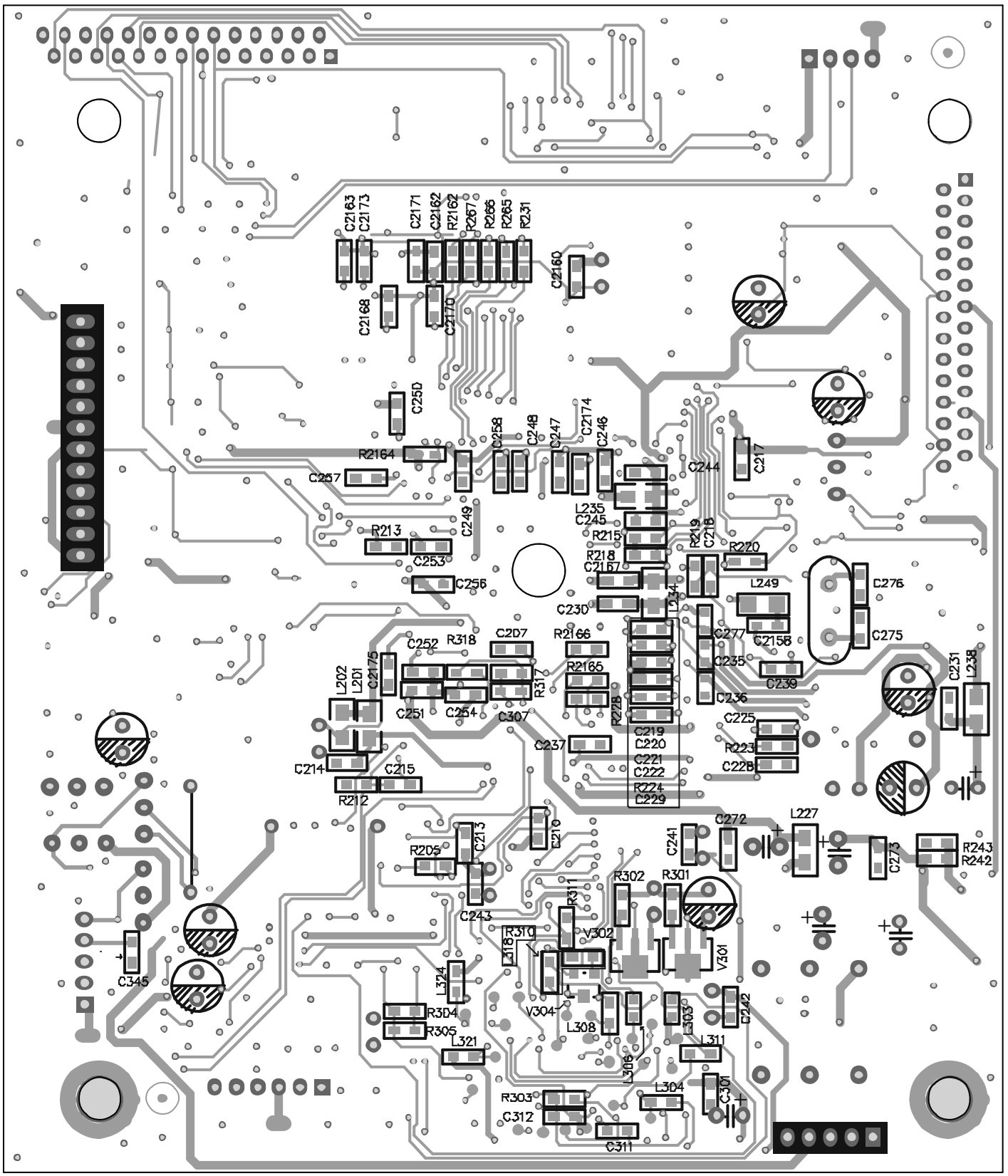

DVR979 DECODER CIRCUIT 2

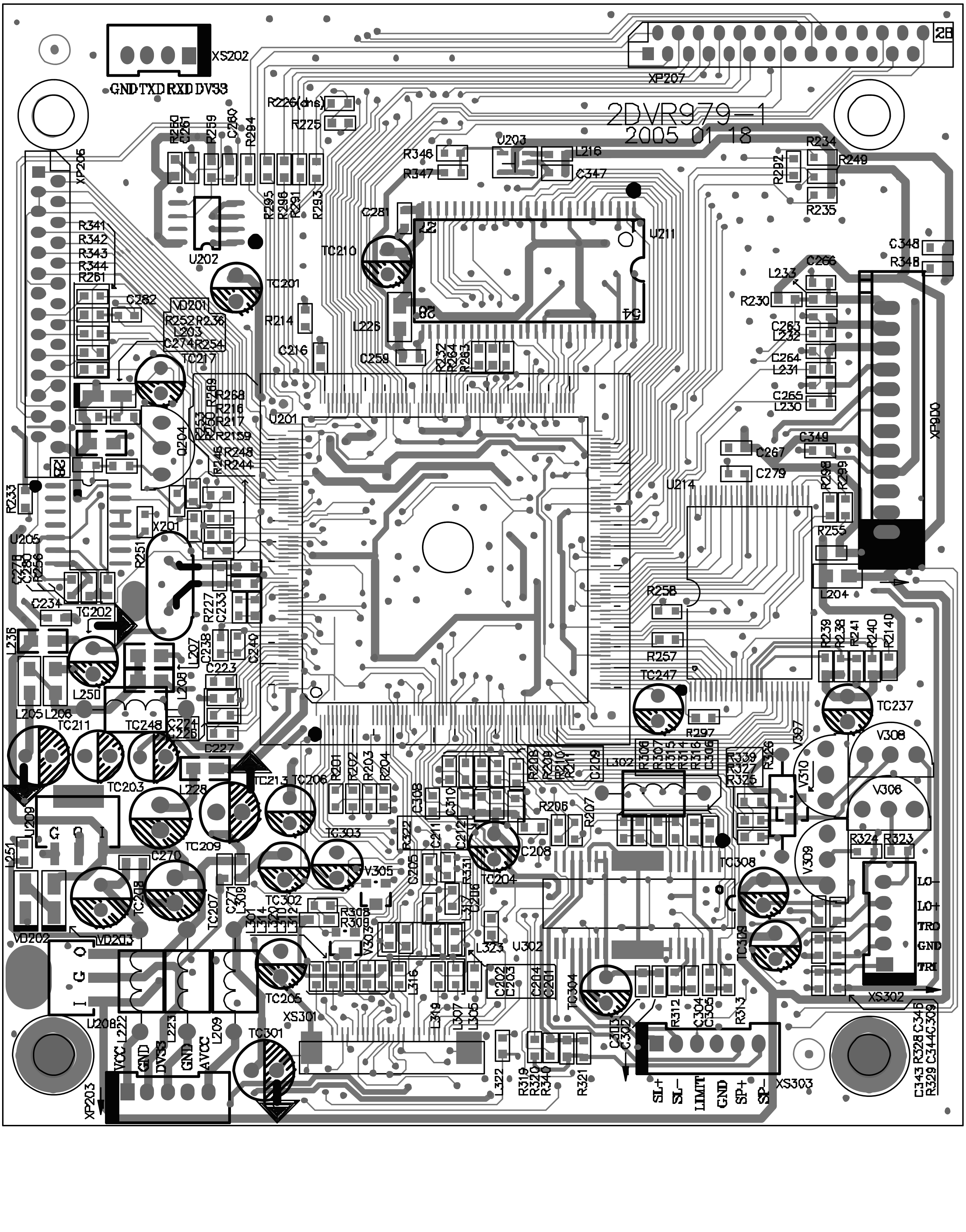

IN-OUT PART CIRCUIT
XS206
CON28
XP401
CON7
N101
CS8415A
XC103B
MIX-OUT
XC103A
AUX-IN
XC105
DASW-02
XC104A
AV4
Y(Green)
CB/Pb(Blue)
XC104B
AV4
CR/Pr(Red)
V-COMP(Yellow)
XC107
CS-111
XC106B
AVG-2I
XC106A
AVG-2I
XC102B
AVG-2O
XC102A
AVG-2O
VGND
D+5V
D3.3V
+9V
HSYNC
VDATA3
VSYNC
SPDIF

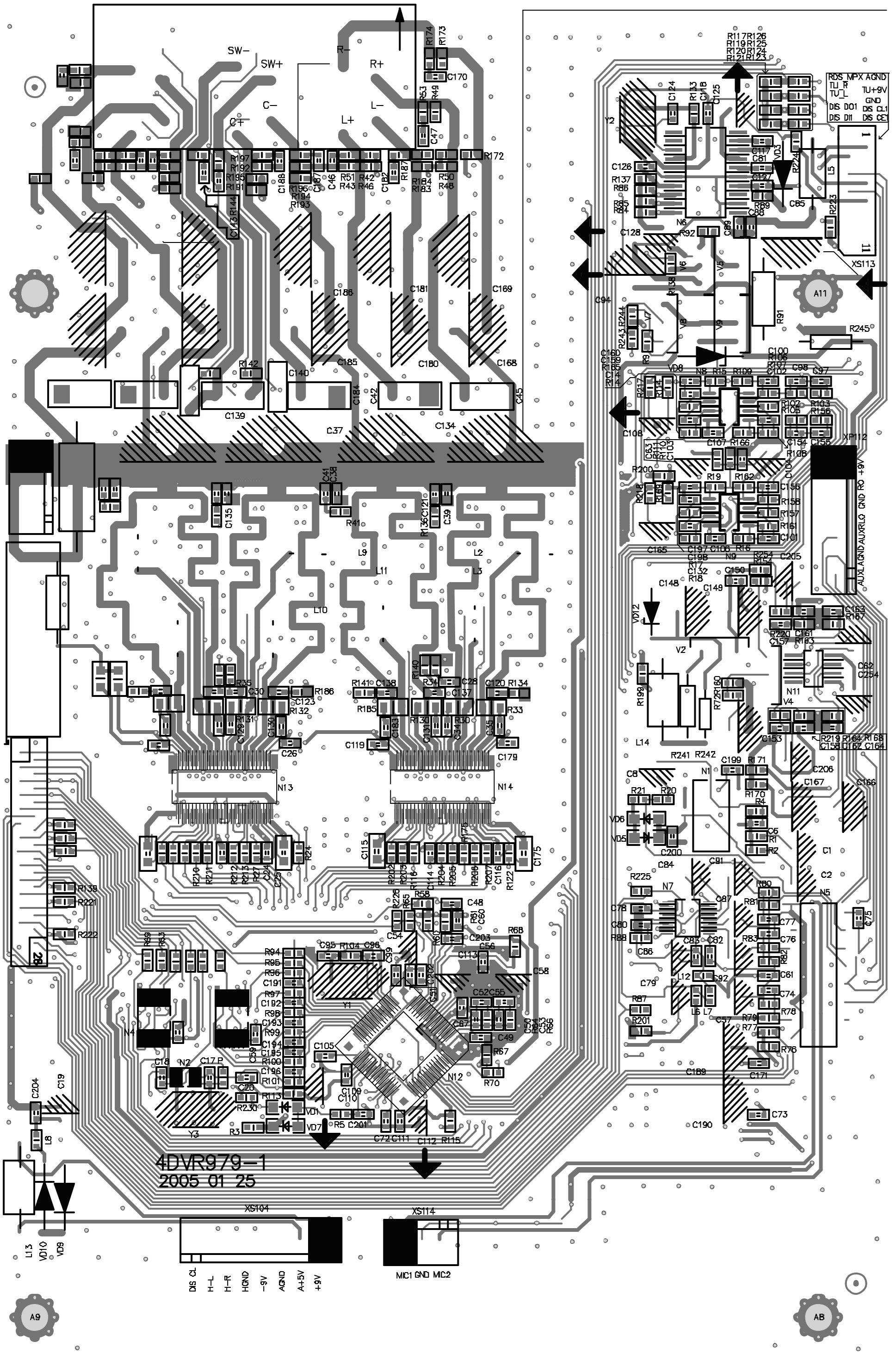
更改	数量	更改单号	签名	日期	DVR979功放板电原理图	BBK
设计		审核	标准化	批准		第 张 共 张 版次：
李林存 1-Jun-2005						东莞市步步高视听电子有限公司

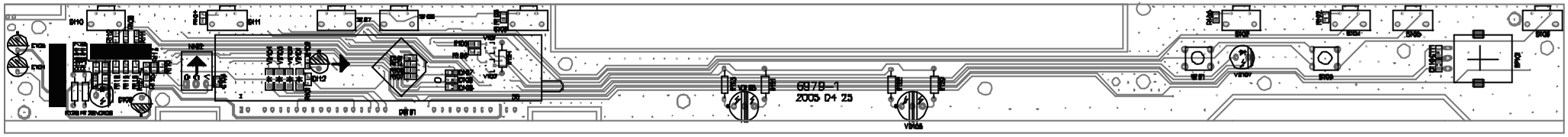

DVR979/939 POWER CIRCUIT
RT501
NTC103
DCVPP
BD501
KBL04
TC500
330uF/400V
H-GND
XC502
104X2
L502
SE1989 20mH
YC501 YC502
102Y1 102Y1
EGND
L501
SE198920mH
XC501
104X2
RV501
07D471
R501
680K/1W
T501
T3.15A/250V
XS100
~220V
D501
HER107
D502
HER107
D503
HER105
U504
KAIM0880BTU
SYNC
FB
VCC
GND
DRAIN
R510
47K/2W
C505
103/1KV
D505
HER207
TC503
1uF/50V
D506
HER105
R511
47R
T502
BCK-40-0244
R509
68K/2W
TC504
47uF/50V
C504
104/50V
V502
2N5551
ON/OFF
R508
47K/2W
R512
750K/0.5W
R540
3K
C501
103/1KV
R502
75K/2W
T501
BCK-28-0598
R503
75R
L503
FB RH357508
V501
IRFBC20
C502
101/1KV
U501
ADJ
FB
CS
GND
HV
NC
Vcc
DRV
NCP1200D
D504
HER105
R505 300R
R506 1.5K
R507
1R/1W
R504
80K
TC502
47uF/50V
R526
33R/1W
C523
101/50V
D517
BYW29E200
D516
BYW29E200
R527
33R/1W
C524
101/50V
TC516
2200uF/50V
L508
10uH/5A
TC517
2200uF/50V
TC518
470uF/50V
R528
1K/3W
C525
473/50V
D518
1N4148
R530
24K
C527
102/50V
C526
104/50V
R531
47K
R529
2.2K
U506
TL431
R532
10K
R533
1.5K
U505
HS817/PC817
C506
473/50V
P+28V
D507
HER105
C507
101/50V
R513
22K
L504
10uH/1A
Q501
MCR100-6
D508
1N4148
R514
1.2K
V503
2N5551
TC505
47uF/50V
C509
473/50V
R536
4.3K
R515
10K
CPU5V
STBY
R538
10R/2W
U508
LM7805
Vin
Vout
GND
TC520
470uF/16V
C528
473/50V
TC508
470uF/16V
C512
473/50V
A+10V
A+5V
D509
SR560
C510
101/50V
L505
10uH/1A
TC506
2200uF/16V
TC507
1000uF/16V
R539
10R/2W
C511
473/50V
C513
101/50V
D510
SR560
L506
10uH/1A
TC509
2200uF/16V
TC510
1000uF/16V
C514
473/50V
D515
SR160
D+5V
D511
SR560
C515
101/50V
L507
10uH/2A
TC511
2200uF/16V
TC512
1000uF/16V
C516
473/50V
D514
1N4148
D+3V3
D512
HER105
C517
101/50V
R516
1R/1W
TC513
220uF/16V
FL+
FL-
D513
HER105
C518
101/50V
TC514
220uF/35V
-21V
C519
104/50V
C521
104/50V
R517
150R
R519
1.8K
R521
220R
R525
330R/1W
C522
473/50V
TC515
470uF/25V
ZD502
C9V1
A-10V
R518
1K
C520
104/50V
ZD501
C5V1
U502
HS817/PC817
C503
102/50V
U503
TL431
R520
3K
R522
4.7K
YC503
102Y1
DCVPP
R534
0R47/1W
R535
0R47/1W
DGND
AGND
U507
HS817/PC817
R523
330R
V504
2N5551
R524
10K
R537
3K
XS101
P+28V
P+28V
PGND
XS104
A+10V
A+5V
AGND
A-10V
PHGND
H-R
H-L
H-DET
XS105
D+5V
DGND
D+3V3
AGND
A+5V
XS102
DGND
FL+
FL-
-21V
CPU5V
STBY
XS103
H-R
PHGND
H-L
H-DET

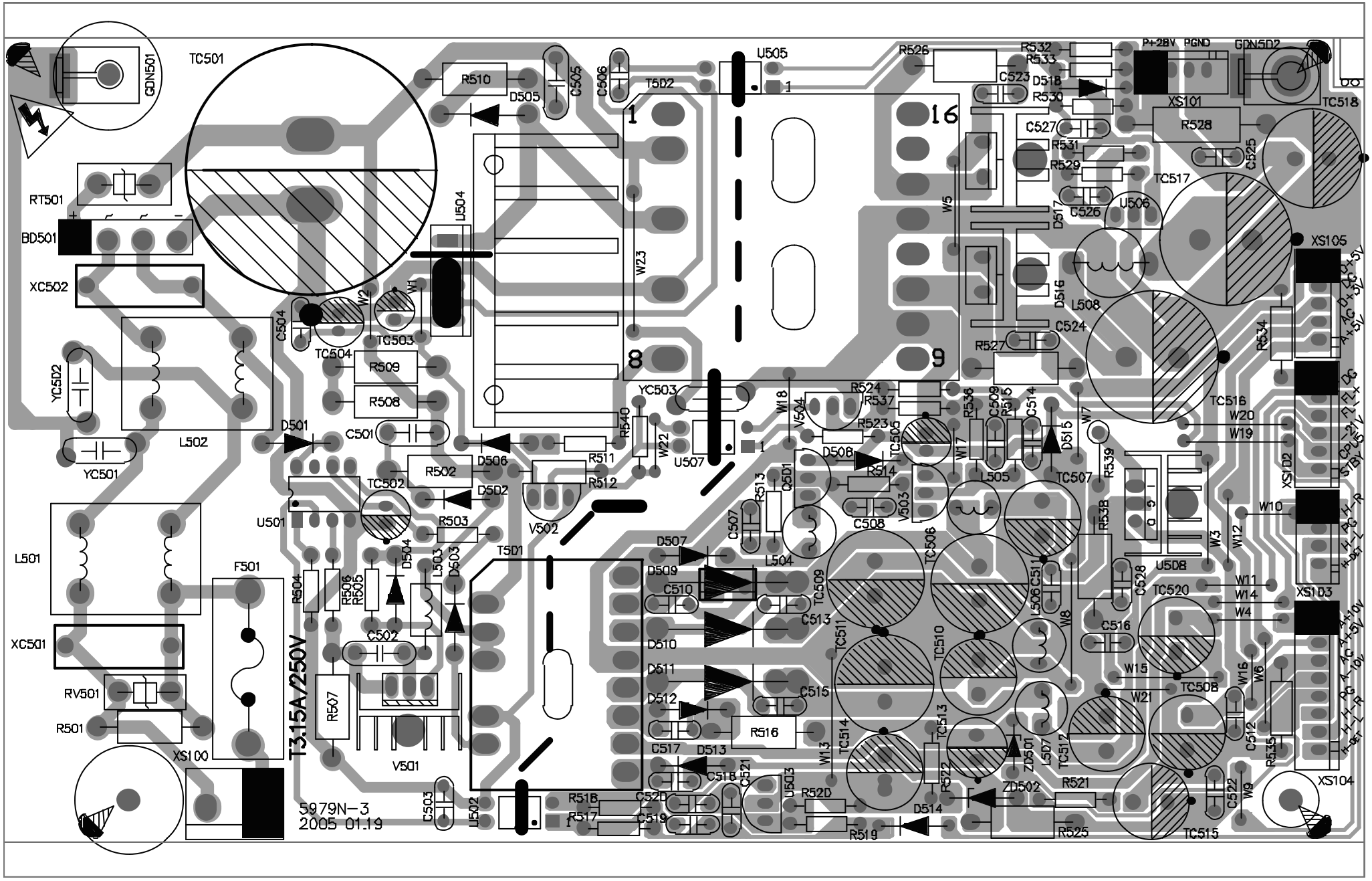

7979-1
2005 01 20


C2163
C2173
C2171
C2162
R2162
R267
R266
R265
R231
C2160
C2168
C2170
C250
C258
C248
C247
C2174
C246
R2164
C257
C244
C217
C249
L235
C245
R213
C253
R215
R219
C218
R220
C256
R218
C2167
L234
C230
L249
C276
C277
C2156
C275
C252
R318
C207
R2166
C235
C231
L238
L202
L201
C2175
R2165
C239
C251
C254
C307
R317
R228
C236
C225
C237
C219
C220
C221
C222
R223
C226
C214
C215
R212
C224
C229
C272
L227
C241
C210
C213
R205
C273
R243
R242
R311
R302
R301
C243
R310
C218
V302
V301
C345
L324
V304
C242
R304
R305
L308
L303
L311
L321
L306
L304
C301
R303
C312
C311


2DVR979-1
2005 01 18
XS202
GND TXD RXD DV33
XP207
XP206
XP900
XS302
LO-
LO+
TRD
GND
TRI
XS303
SL+
SL-
LIMIT
GND
SP+
SP-
XP203
VCC
GND
DV33
GND
AVCC
XS301
U201
U202
U203
U211
U214
U302
U205
U208
U209


SW−
SW+
R−
R+
C−
C+
L+
L−
4DVR979−1
2005 01 25
XS104
XS114
XS113
XP112
DIS CL
H−L
H−R
HGND
−9V
AGND
A+5V
+9V
MIC1 GND MIC2
AUXL AGND AUXR LO GND RO +9V
RDS MPX AGND
TU_R
TU_L
TU+9V
GND
DIS DO1
DIS CL1
DIS DI1
DIS CE1
A9
A8
A11


6878-1
2005 04 25


T3.15A/250V
5979N-3
2005 01.19