

**SERVICE**



**MANUAL**

# CONTENTS

1. INSTRUCTION.....	1
2. ALIGNMENT PROCEDURE.....	2
3. FOR FACTORY MENU ADJUSTMENT SEE CHART5~CHART11.....	5
4. GENERAL DESCRIPTION OF THE SDA 9380-B21.....	10
5. INTRODUCTION OF THE VPC 3230D.....	12
6. INTRODUCTION OF THE MSP 3425G.....	14
7. GENERAL DESCRIPTION OF THE PW1235.....	15
8. GENERAL DESCRIPTION OF THE TDA6111Q.....	18
WIRING DIAGRAM.....	20
BLOCK DIAGRAM.....	21
SCHEMATIC DIAGRAM.....	22
ELECTRICAL PARTS LIST.....	27

**CAUTION:** THIS SERVICE MANUAL IS ONLY FOR PROFESSIONAL SERVICE PERSONNEL'S REFERENCE. BEFORE SERVICING THIS CHASSIS, PLEASE READ THE FOLLOWING NOTICE ITEMS.

## 1. INSTRUCTION

Before servicing and aligning this equipment, please read the following “**X-RAY RADIATION PRECAUTION**”, “**SAFETY PRECAUTION**” and “**PRODUCT SAFETY NOTICE**”.

### 1.1 X-RAY RADIATION PRECAUTION

- 1) Excessive high voltage can produce potentially hazardous X-RAY RADIATION. To avoid such hazards, the high voltage must not be above the specified limit. The normal value of the high voltage of this receiver see below chart:

Chart 1 High voltage requirement

Model	High voltage normal value	Utmost value	Beam current
T2751	30 kV $\pm$ 1 kV	35 kV	1.6 mA
T3251	30 kV $\pm$ 1 kV	35 kV	1.6 mA

- 2) Each time a receiver requires servicing, the high voltage should be checked following the HIGH VOLTAGE CHECK procedure in this manual. It is recommended the reading of the high voltage be recorded as a part of service record. It is important to use an accurate and reliable high voltage meter.

\* When checking, main power (B+) should be kept at 135 V (for Toshiba pure flat CRT).

- 3) The primary source of X-RAY RADIATION in this TV receiver is the picture tube. For continuous X-RAY RADIATION protection, the replacement tube must be exactly the same type tube as specified in the parts list.
- 4) Some parts in this receiver have special safety-related characteristics for X-RAY RADIATION protection. For continuous safety, parts replacement should be undertaken only after referring to the PRODUCT SAFETY NOTICE below.

### 1.2 SAFETY PRECAUTION

#### WARNING:

Service should not be attempted by anyone unfamiliar with the necessary precaution on this receiver. The following are the necessary precautions to be observed before servicing this chassis.

- 1) Since the power supply circuit of this receiver is directly connected to the AC power line, an isolation transformer should be used during any dynamic service to avoid possible shock hazard.
- 2) Always discharge the picture tube anode to the CRT conductive coating before handling the picture tube. The picture tube is highly evacuated and if broken, glass fragments will be violently expelled. Use shatter proof goggles and keep picture tube away from the unprotected body while handling.

- 3) When replacing a chassis in the cabinet, always be certain that all the protective devices are put back in place, such as: non-metallic control knobs, insulating covers, shields, isolation resistor-capacitor network etc.
- 4) When replacing parts or circuit boards, disconnect the power cord.
- 5) When replacing a high wattage resistor (oxide metal film resistor) on the circuit board, keep the resistor 10mm (1/2in) away from circuit board.
- 6) Connection wires must be kept away from components with high voltage or high temperature.
- 7) If any fuse in this TV receiver is blown, replace it with the FUSE specified in the chassis parts list.

### **1.3 PRODUCT SAFETY NOTICE**

Many electrical and mechanical parts in the chassis have special safety-related characteristics. These characteristics are often passed unnoticed by a visual inspection and the X-RAY RADIATION protection afforded by them cannot necessarily be obtained by using replacement components rated for higher wattage, etc. Replacement parts which have these special safety characteristics are identified in this manual and its supplement electrical components having such features are shaded on the schematic diagram and the parts list.

Before replacing any of these components, read the parts list in this manual carefully. The use of substitute replacement parts which do not have the same characteristics as specified in the parts list may create shock, fire, X-RAY RADIATION or other hazards.

### **1.4 Testing equipment**

HDTV signal generator: VG853 or other same type, 1 set.

Signal generator: PM5515 or the same type, 1 set.

Voltmeter: FULK805A or the same type, 1 set.

White balance alignment equipment: 1 set

Standard testing jigs: 1 set.

Geometry alignment equipment: 1 set.

Alignment stick: 1 set.

Degaussor: 1 set.

## **2 Alignment procedure**

### **2.1 Instruction**

- a) In this chassis since there are a great amount of data needed to be set, these setting all are stored in E<sup>2</sup>PROM. To reduce the alignment working, use the aligned E<sup>2</sup>PROM as a female parent to copy and then use them. Or refer to appendix chart and preset E<sup>2</sup>PROM value and then use.
- b) To conduct the alignment, the power supply should be AC120 V,60 Hz. The whole unit should be preheated for 30 minutes.
- c) To conduct with color purity, convergence, white balance alignment or other alignment relative to color, the CRT should be degaussed thoroughly.
- d) Since this chassis adopts modulization structure, before mounting, every module should be conducted with alignment.
- e) The factory menu's alignment should use XOCECO RC-T03-0A remote control. Press power switch to turn on the set, in turn press button "SLP-MUTE-AV-MENU" to enter into factory menu.

Press SLP or 0 button to exit. Press MUTE button to preset before Out-factory.

f) For the supporting mode in this set see below chart 2.

Chart 2 The supporting mode in this set

Working mode	Mode instruction	H-frequency Hz	V-frequencyHz	Alignment instruction
TV	TV mode	33.75k	60	Adjust firstly, every item should adjust
1920*1080i/33.75K	American HDTV mode	33.75k	60	Horizontal and vertical parameter, white balance
720P*576/45.125K	American HDTV mode	33.75k	60	Horizontal and vertical parameter, white balance
640*480i(YCrCb)	YcbCr(15.7K,59.97HZ)	33.75k	60	Horizontal and vertical parameter, white balance
640*480p(YPrPb)	Progressive DVD(31.5K,60HZ)	33.75k	60	Horizontal and vertical parameter, white balance

## 2.2 Alignment procedure

### 2.2.1 Module alignment

In all the module alignment, use a normal working TV set as an alignment frock, pull the set's corresponding module and keep it as an example. Insert the module wanted to be check, then apply power to alignment.

#### a) AV board module

AV interface function check: check all the AV input/outputs function, it should meet the Product Standard requirements.

#### b) Digital processing board module

No alignment point, apply the power and check whether S-VIDEO, YCbCr, YpbPr input is normal.

#### c) Main board

No alignment point. Apply the power and measure "B+" voltage, the reading should be 105V, check there are no assemble error, the OSD,SVM is normal, and it is OK.

### 2.2.2 Chassis adjustment

Correctly insert all modules and parts, connect CRT board parts to CRT, apply power and check B+ voltage, the reading should be 105V. (on J332/J305)

### 2.2.3 The whole unit adjustment

Be sure the whole unit has been preheated for 30 minutes.

#### a) Focus adjustment

- 1) In TV mode receive crosshatch signal, at the same time set SVM to OFF.
- 2) Adjust FOCUS inductance L306 on Dynamic Power Board to make R323 dynamic focus voltage be 1KV+/-50V.
- 3) Adjust FOCUS potentiometer on FBT and CRT to make horizontal and vertical grid both thinnest, and consider horizontal grid mainly.
- 4) Set SVM to ON, check the whole effect.

#### b) Dark current (SCREEN voltage) adjustment

In TV mode receive gray scale signal, after entering into factory menu status, press "1" button to enter into "FACTORY MENU 1" factory menu, first preset WHITE-R, WHITE-G, WHITE-B's value all to 0, adjust SCREEN potentiometer to make SCREEN LOCK on the screen lower part

display OK and it is OK, at this time, if changing channel, it should not appear flyback line. This state should also be OK after finish adjusting the white balance.

c) White balance adjustment

Adjust on the basis of the above step, at standard status use gray scale signal to adjust.

- 1) Press “1” button to firstly adjust TV input white balance: fix the testing point at about 40 nits gray scale, then by adjusting WHITE-R, WHITE-G and WHITE-B to make the value meet chart 3’s requirement.
- 2) Press “5” button to adjust YpbPr input white balance: use oscilloscope to measure Y signal output on Digital Processing Board. Adjust G-0 gray scale to make blanking level be even with black level, adjust G-G to make signal amplitude to be 0.7V and eight level gray scale be even, then adjust R-G, B-G, R-0, B-0’s value to make white balance meet chart 3’s requirement.

Chart 3: chroma coordinates requirements

Colour temperature	12000K
X coordinate	0.270±0.008 MPDC
Y coordinate	0.283±0.008 MPDC

d) Picture size position and high voltage adjustment

In component mode input 1080I signal

- ① Use crosshatch and electrical circle signal, after entering into factory menu status, press “2” button to enter into “FACTORY MENU 2” factory menu to adjust picture’s linearity. Adjust R339 joint point to make the V-center deflection range be within ±5MM(T3251), or ±3MM(T2751).
- ② Change the signal to white background, or greatly change contrast and brightness, or press PIC button to switch among several kinds of analogue amount to make corresponding beam current changes, adjust V-EHT-COM, H-EHT-COM to make raster’s size basically not change when at different beam current status.

3) According to chart 2 in turn apply every testing signal (firstly apply YpbPr signal, then TV or AV signal), then press “5” button to enter into “FACTORY MENU 5”, adjust H-S, V-S, H-SIZE, V-SIZE to make picture normal.

e) Sub-brightness adjustment

Receive split field signal, set colour/contrast/brightness to 0, check whether screen second gray is slightly bright, otherwise press “6” button, in factory menu select CONTRAST MAX and BRIGHT MAX to adjust.

f) Filament/beam current/high voltage check and adjustment

- 1) Filament voltage: receive a TV program signal, set picture mode to “STANDARD”, the filament voltage effective value should be  $6.3 \pm 0.2$  Vrms.
- 2) Beam current check: receive all white field signal, set picture mode to “SPORTS”, measure R360 two terminals’ voltage and the reading should be less than or be equal to 1.6V. If not, after entering into factory menu status, press “4” button to enter into “RGB MENU” factory menu, adjust AV BEAM LIMIT item to make beam current meet requirements.
- 3) High voltage check: receive D8 signal, set picture mode to “STANDARD”, measure CRT high voltage and the reading should be A value in chart 3. When brightness, contrast is set to minimum (zero beam current), measure the high voltage, the reading should not exceed B value in chart 4.

Chart 4 High voltage check requirements

Parameters	CRT Size	
	74 cm (2751)	86 cm (3251)
A	30 kV ± 0.5 kV	30 kV ± 0.5 kV
B	34+ kV	34 kV

- 4) High voltage protection: receive a picture signal, adjust until picture and sound are normal, short R340 and the circuit should immediately enter into power-off protection state and the state should keep. Turn off the power switch and then turn on, the picture and sound should restore to before-testing state.
- g) Peak value adjustment  
 On the condition of SCREEN and beam current has been adjusted properly, in order to show picture's contrast well and control picture's colour tail, apply a little beam current picture (for example, black and white crosshatch) and set picture's contrast and brightness to maximum, then after entering into factory menu status, press "4" button to enter into "RGB MENU" factory menu, by adjusting PEAK DRIVE LIMIT item to make the whole unit's picture colour just without colour tail on the condition of maximum contrast and it is OK.
- h) Every control buttons' check  
 Check according to Instruction manual.
- i) Check all the input/output terminals' function, please check according to "PRODUCTION STANDARD"
- i) Out-factory setting  
 Set picture to "Standard".  
 Set sound to "Music".  
 Set Blue back to ON.  
 Set OSD language to English.  
 Set DNR to SOFT.  
 Set SVM to ON.  
 Set Volume to 30.  
 Set Loudness to OFF.  
 Set AVC to ON.  
 Set CCD to OFF.  
 Set child lock password, V-chip password to 0000.  
 Set V-chip all rating to no rating .  
 Set the channel to Cable 3.

### 3 For factory menu adjustment see Chart 5~Chart 11.

Chart 5 Factory menu (1)WRITE

Item name	Item instruction	Range	Default value	Adjusting method
WRITE R	Bright balance R	BF-3F		Refer to white balance adjustment part 1
WRITE G	Bright balance G	BF-3F		Refer to white balance adjustment part 1
WRITE B	Bright balance B	BF-3F		Refer to white balance adjustment part 1
SCREEN LOCK	Dark current adjustment	OK/OFF	OK	Adjust SCREEN potentiometer until OK
2003-XX-XX	Version date		fix	

Chart 6 factory menu (2)

Item	Item instruction	Range	Default value	Adjustment method
V SIZE	V-size	80-7F	39	To make vertical reproduction rate reach 90%—92%
V SHIFT	V-center	80-7F	17	To make picture center and CRT center be in accordance
V LINEAR	V-linearity	80-7F	41	To make V-linearity distortion minimum.
V S CORR	Vertical S-correction	80-7F	F7	To make vertical S-correction distortion minimum.
H SIZE	H-size	80-7F	08	To make horizontal reproduction rate reach 90%—92%
H SHIFT	H-center	80-7F	43	To make picture horizontal center be in accordance with CRT center.
V ANGLE	Parallelogram correction	80-7F	05	To correct parallelogram distortion
V BOW	Arch correction	80-7F	0E	To correct arch distortion
PIN AMP	Pincushion correction	80-7F	60	To make pincushion distortion minimum
PIN PHASE	Trapezoid correction	80-7F	AE	To make trapezoid distortion minimum
UP CORNER	Upper edge corner correction	80-7F	11	To correct upper two corners distortion
LOWER CORNER	Lower edge corner correction	80-7F	C5	To correct lower two corners distortion
EXT CORNER	Edge and corner correction	80-7F	C5	Corner edge correction
V SYNC CONT		80-7F	20	

Chart 7: factory menu (3)

Item	Item instruction	Range	Default value	Adjustment method
V SCROLL	Vertical scroll	0-FF	00	Not adjust, set default value
V ASPECT	V-size	0-FF	00	Not adjust, set default value
V EHT	Vertical high voltage correction	80-7F	BD	To make vertical raster size not change when beam current changes greatly.



H EHT	Horizontal high voltage correction	80-7F	9D	To make horizontal raster size not change when beam current changes greatly.
AFC EHT COM	High voltage auto frequency control	20-1F	08	Not adjust, set default value
H BLANK TIME	Horizontal blanking width	80-7F	E4	Not adjust, set default value
H BLANK PHASE	Horizontal blanking phase	80-7F	F9	Not adjust, set default value
V BLANK START	V-sync phase	80-7F	FB	Not adjust, set default value
V BLANK END	V-sync phase	80-7F	11	Not adjust, set default value
MIN NO.OF LINE	H-blanking phase	80-1F	00	Not adjust, set default value
MAX NO.OF LINE	H-blanking end position	80-7F	FF	Not adjust, set default value
PWM CONTROL	H-blanking width	80-7F	02	Not adjust, set default value
PLL CONTROL 0	H-blanking width	80-7F	0B	Not adjust, set default value
PLL CONTROL 1	H-blanking width	80-7F	62	Not adjust, set default value

Chart 8 Factory menu (4)RGB MENU

Item	Item instruction	Range	Default value	Adjustment method
INT H-SYNC PHASE	H-sync phase	80-7F	12	Not adjust, set default value
AV BEAM LIMIT	Beam current limit	80-7F	1A	Refer to beam current adjustment part
AV BEAM LIMIT CHA	Beam current limit	80-7F	81	Refer to beam current adjustment part
PEA DRIVE LIMIT	Peak value limit	80-7F	00	Refer to peak value adjustment part
PEAK DRIVE TOP	Top peak value limit	80-7F	10	Not adjust, set default value
PEA DRIVE BOTTOM	Bottom peak value limit	80-7F	47	Not adjust, set default value
PEA DRIVE L-R	Left/right edge peak value limit	80-7F	88	Not adjust, set default value
DEFLECT 0		80-7F	03	Can not adjust, set default value
DEFLECT 1		80-7F	05	Not adjust, set default value
RGB CONTROL 0		80-7F	84	Not adjust, set default value
RGB CONTROL 1		80-7F	18	Not adjust, set default value
RGB CONTROL 2		80-7F	20	Not adjust, set default value
RGB CONTROL 3		80-7F	03	Not adjust, set default value
V INPUT MODE		80-7F	85	Not adjust, set default value

Chart 8 factory menu FACTORY 5(HDTV mode)

Item	Item instruction	Range	Default value	Adjustment method
R-G	Red gun gain	00-FF	80	Refer to white balance adjustment part2
G-G	Green gun gain	00-FF	80	Refer to white balance adjustment part2
B-G	Blue gun gain	00-FF	80	Refer to white balance adjustment part2
R-O	Red gun bias value	00-FF	80	Refer to white balance adjustment part2
G-O	Green gun bias value	00-FF	80	Refer to white balance adjustment part2
B-O	Blue gun bias value	00-FF	80	Refer to white balance adjustment part2
H-S	H-phase	00-FF		Geometrical adjustment
V-S	V-phase	00-FF		Geometrical adjustment
H-SIZE	H-size	00-FF		Geometrical adjustment
V-SIZE	V-size	00-FF		Geometrical adjustment

Chart 9: factory menu 6

Item	Item instruction	Range	Default value	Adjustment method
CONTRAST MAX	Contrast maximum	00-7F	7F	Not adjust, set to default value
CONTRAST CEN	Contrast center value	00-7F	3F	Not adjust, set to default value
CONTRAST MIN	Contrast minimum value	00-7F	00	Not adjust, set to default value
BRIGHT MAX	Brightness maximum value	00-7F	7F	Not adjust, set to default value
BRIGHT CEN	Brightness center value	00-7F	3F	Not adjust, set to default value
BRIGHT MIN	Brightness minimum value	00-7F	00	Not adjust, set to default value
COLOR MAX	Colour maximum value	00-7F	3F	Not adjust, set to default value
COLOR CEN	Colour center value	00-7F	20	Not adjust, set to default value
COLOR MIN	Colour minimum value	00-7F	00	Not adjust, set to default value
SHARP MAX	Sharpness maximum value	00-7F	7F	Not adjust, set to default value
TINT CEN	Tint center value	00-7F	00	Not adjust, set to default value

Chart 10 Factory menu 7

Item	Item instruction	Range	Default value	Adjustment value
VOLUME-1	Sound curve	00-7F	0F	Not adjust, set to default value
VOLUME-25	Sound curve	00-7F	1F	Not adjust, set to default value
VOLUME-50	Sound curve	00-7F	3F	Not adjust, set to default value
VOLUME-100	Sound curve	00-7F	7F	Not adjust, set to default value

BASS MAX	Bass maximum value	00-7F	7F	Not adjust, set to default value
BASS MIN	Bass minimum value	00-7F	00	Not adjust, set to default value
TREBLE MAX	Treble maximum value	00-7F	7F	Not adjust, set to default value
TREBLE MIN	Treble minimum value	00-7F	00	Not adjust, set to default value
SURROUND MAX	Surround sound maximum value	00-7F	7F	Not adjust, set to default value
SURROUND MIN	Surround sound minimum value	00-7F	00	Not adjust, set to default value
BLANCE CEN	Balance center value	00-7F	20	Not adjust, set to default value
LOUDNESS ON	Setting value when loudness is on	00-7F	7F	Not adjust, set to default value
LOUDNESS OFF	Setting value when loudness is off	00-7F	00	Not adjust, set to default value

Chart 11 Factory menu 8

Item	Item insruction	Range	Default value	Adjustment method
OSD-HP MENU	MENU phase	00-7F	00	Not adjust, set to default value (after adjustment, open the menu again and it is effective)
OSD-HP AV SEL	AV menu phase	00-7F	00	Not adjust, set to default value(after adjustment, open the AV selection menu again and it is effective)
OSD-HP NORMAL	Other menu phase	00-7F	00	Not adjust, set to default value (after adjustment, open the OSD again and it is effective)
SVM DELAY	SVM delay phase	00-7F	03	Not adjust, set to default value (after adjustment, turn on the set again and it is effective)
ZOOM DATA	16: 9 picture zoom	80-7F	20	Not adjust, set to default value(after adjustment, turn on the set again and it is effective)
OPTION DATA1	OPTION	00-FF	01	Not adjust, set to default value
H-MUTE DELAY	Horizontal failure of oscillations time delay amount	00-FF	5A	Not adjust, set to default value. If less than 10, the screen will light and burn the tube.

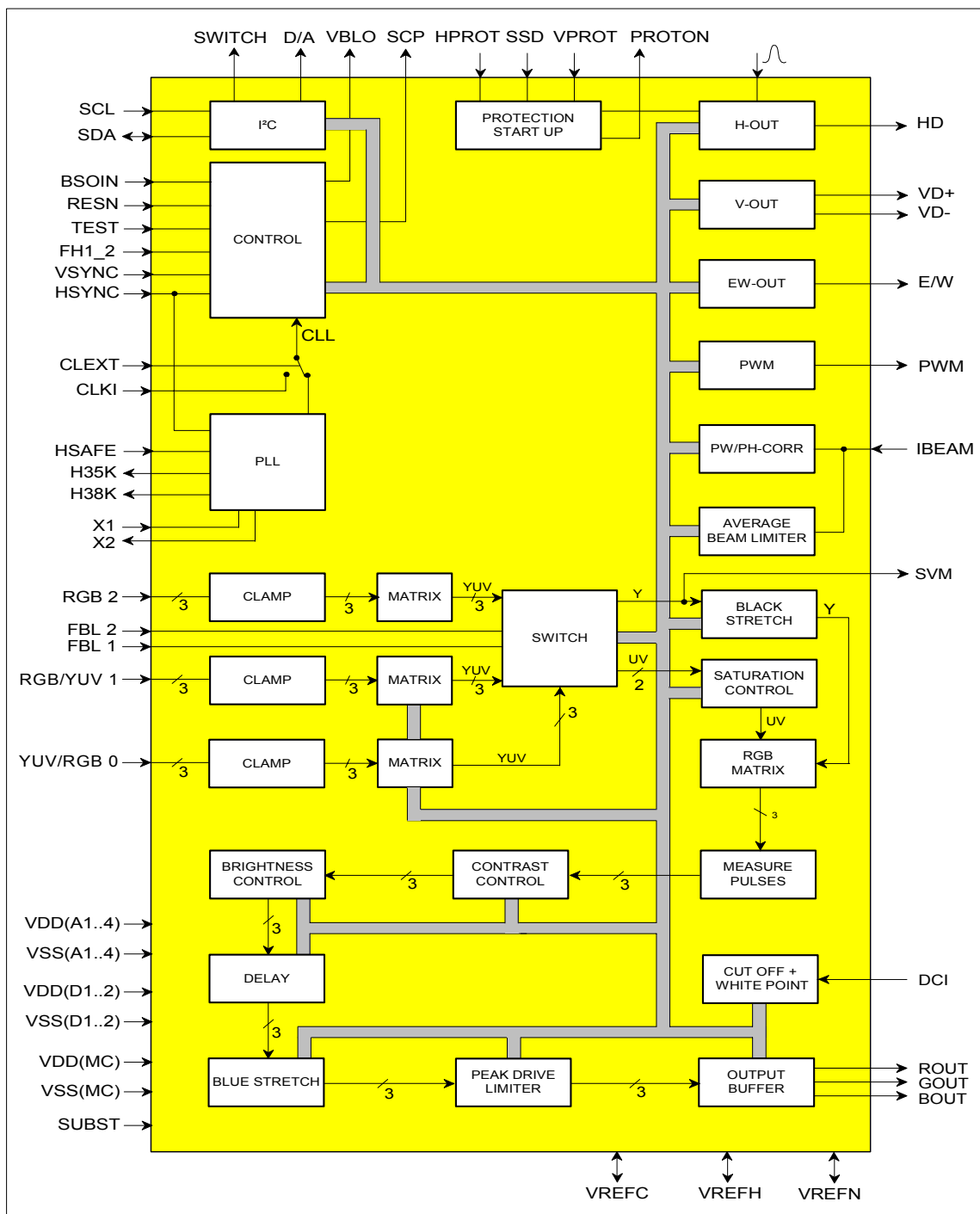
Chart 12 Factory menu 9 DESIGN MENU

Item	Item instruction	Range	Default value	Adjustment method
IC XXX	Relative IC chip			
ADD H	Address high 8 byte	00-FF		Press VOL+/- button to change
ADD L	Address high 8 byte	00-FF		Press VOL+/- button to change
DATA H	Data high 8 byte	00-FF		Press VOL+/- button to change
DATA L	Data lower 8 byte	00-FF		Press VOL+/- button to change
READ	Reading current data	YES/NO		
REFRESH	Refresh changed data	YES/NO		
SAVE	Save changed data	YES/NO		

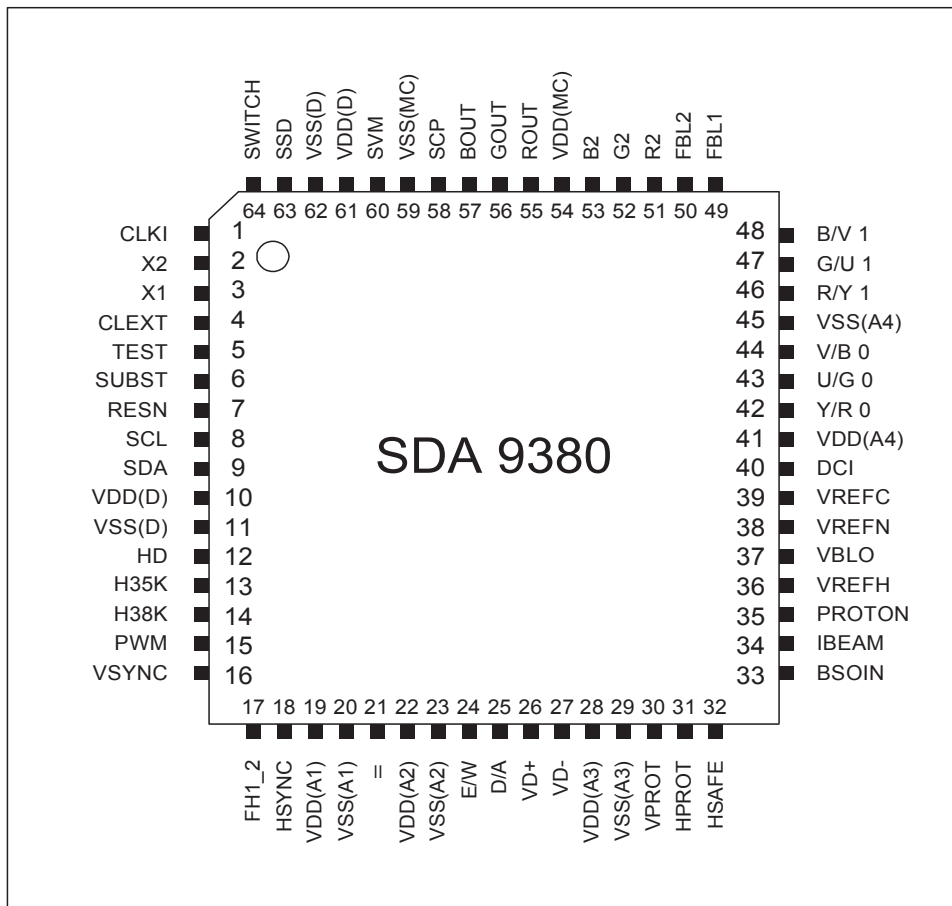
## 4. General description of the SDA 9380-B21.

The SDA 9380 is a highly integrated deflection controller and RGB video processor for CTV receivers with 15 to 19kHz or 31 to 38kHz line frequencies. The deflection component controls among others a horizontal driver circuit for a flyback line output stage, a DC coupled vertical saw-tooth output stage and an East-West raster correction circuit. All adjustable output parameters are I2C-Bus controlled. Inputs are HSYNC and VSYNC. The HSYNC signal is the reference for the internal clock system which includes the  $\mu 1$  and  $\mu 2$  control loops.

Block diagram of the SDA 9380-B21:

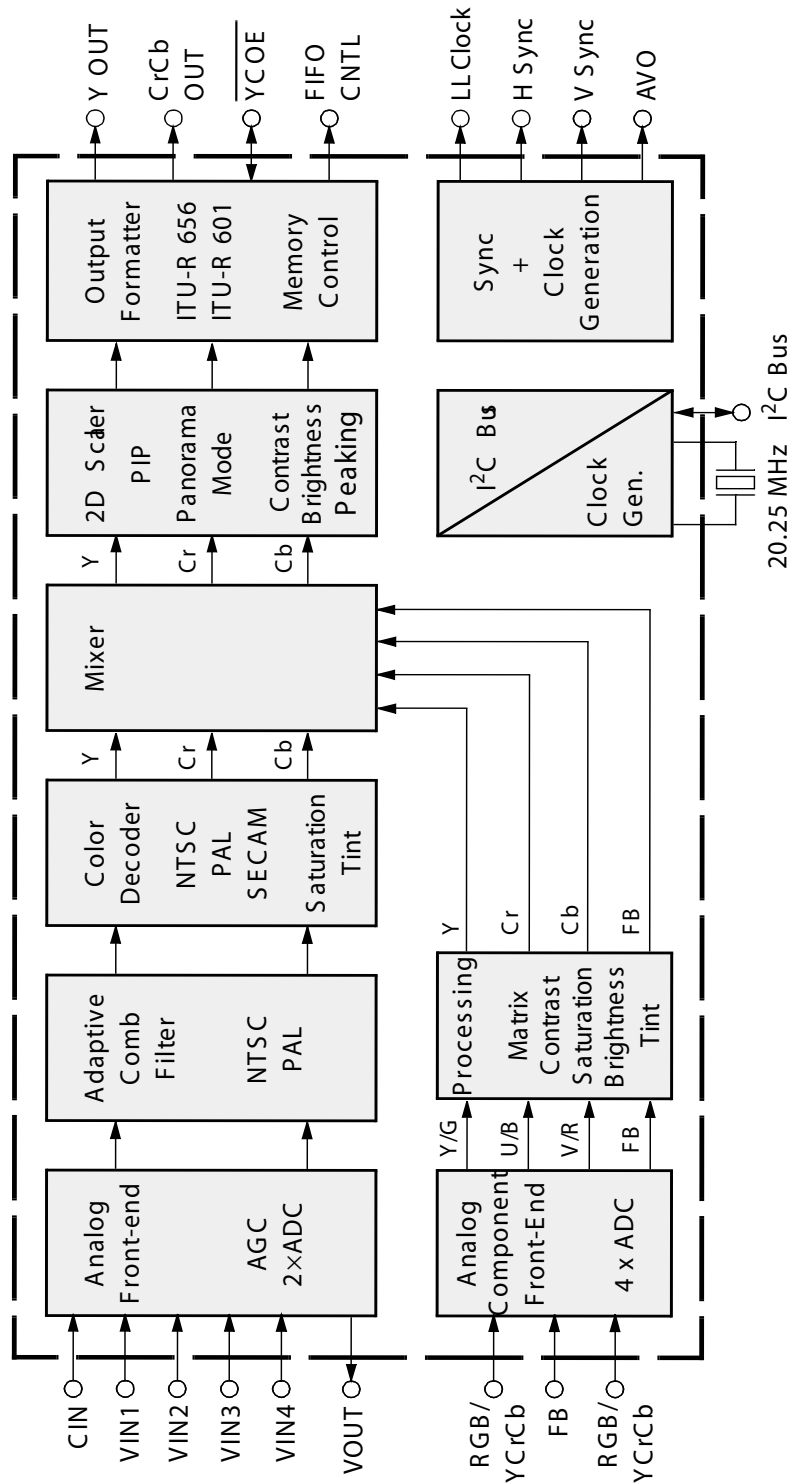


PIN CONFIGURATION:



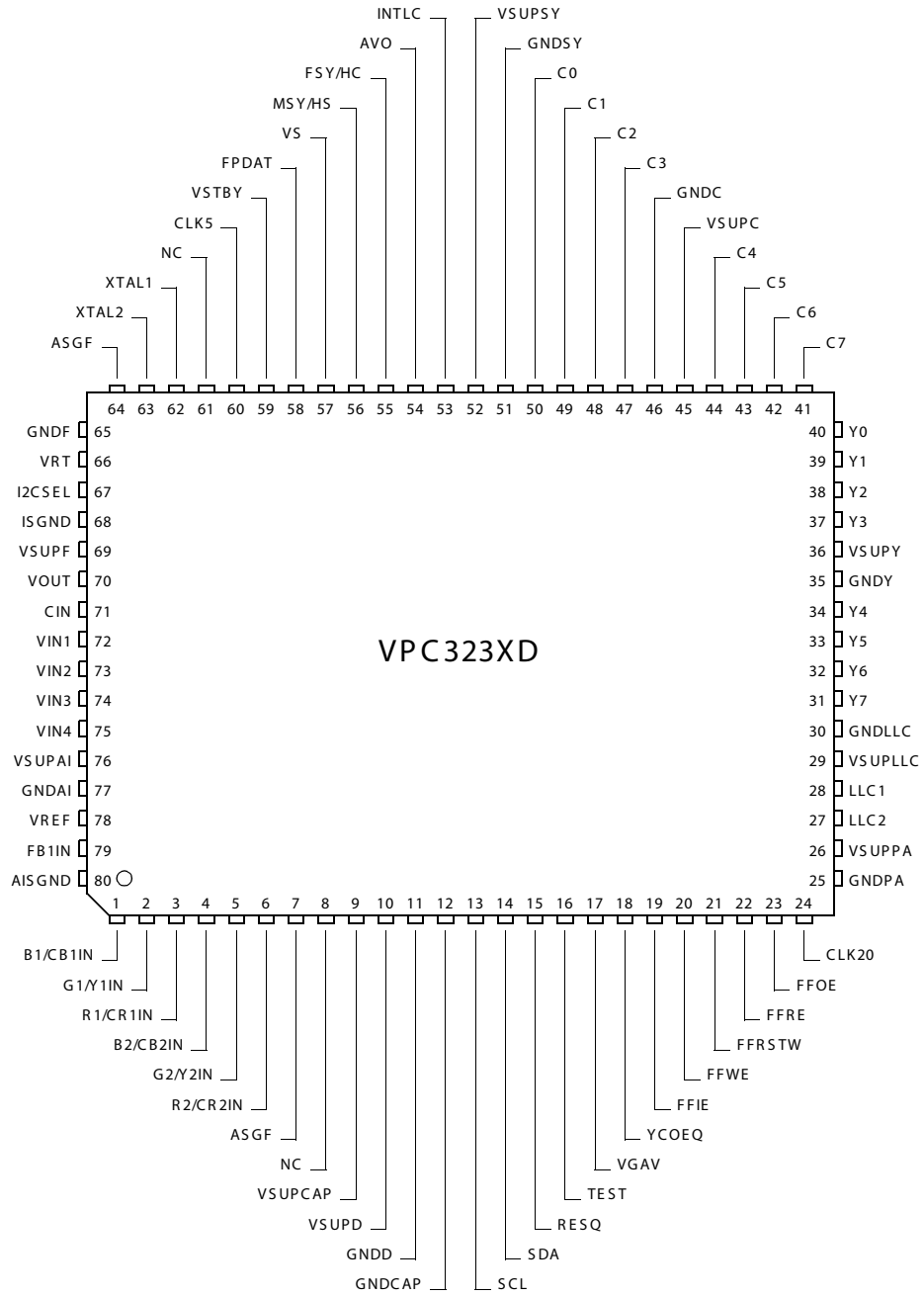
### 5. Introduction of the VPC 3230D.

The VPC 3230D is a high-quality, single-chip video front-end, which is targeted for 4:3 and 16:9, 50/ 60 and 100/120 Hz TV sets. It can be combined with other members of the DIGIT3000 IC family (such as DDP 33x0A/B, TPU 3040) and/or



it can be used with 3rd-party products.  
Block diagram of the VPC 3230D:

# PIN CONFIGURATION:

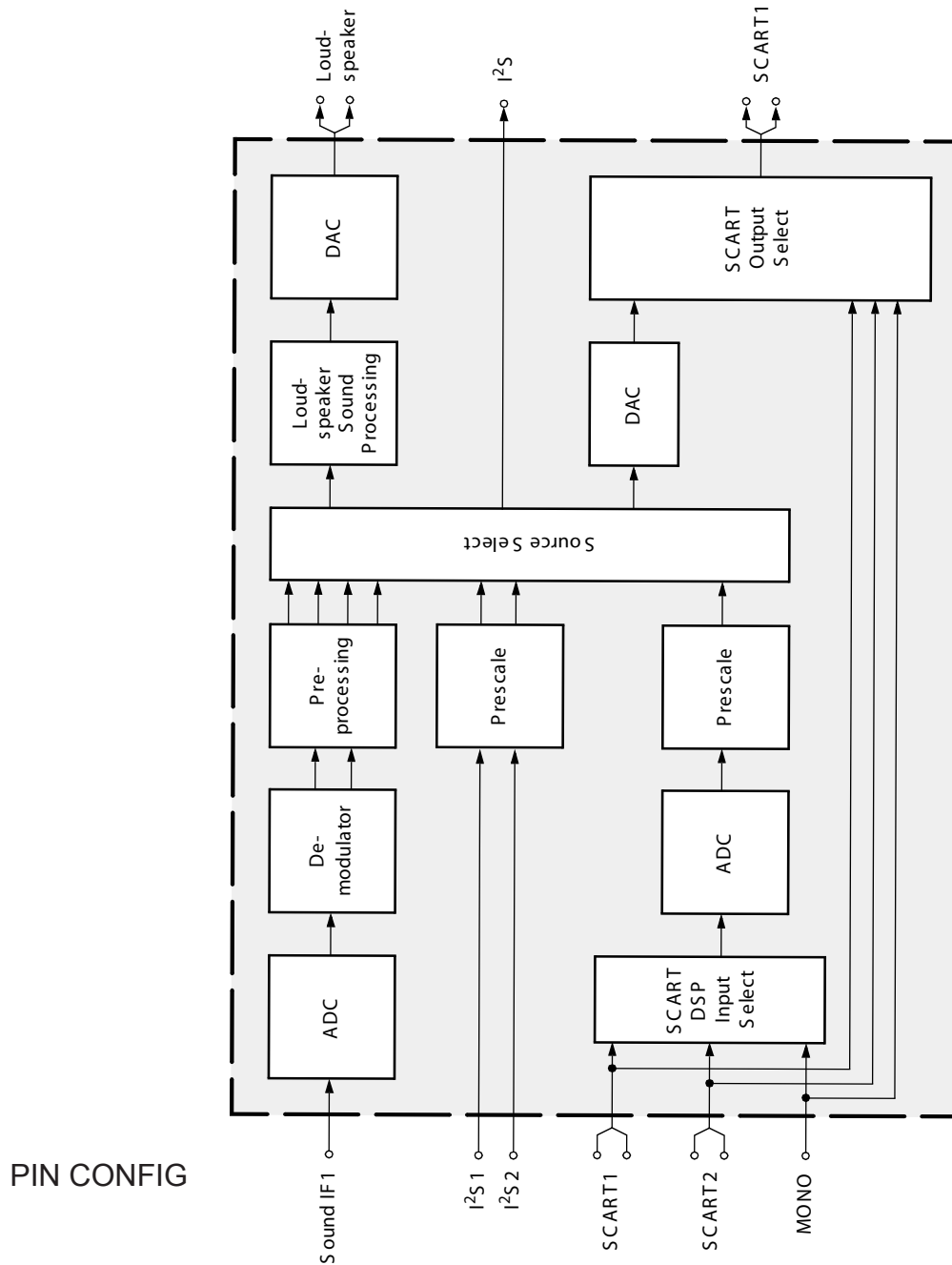


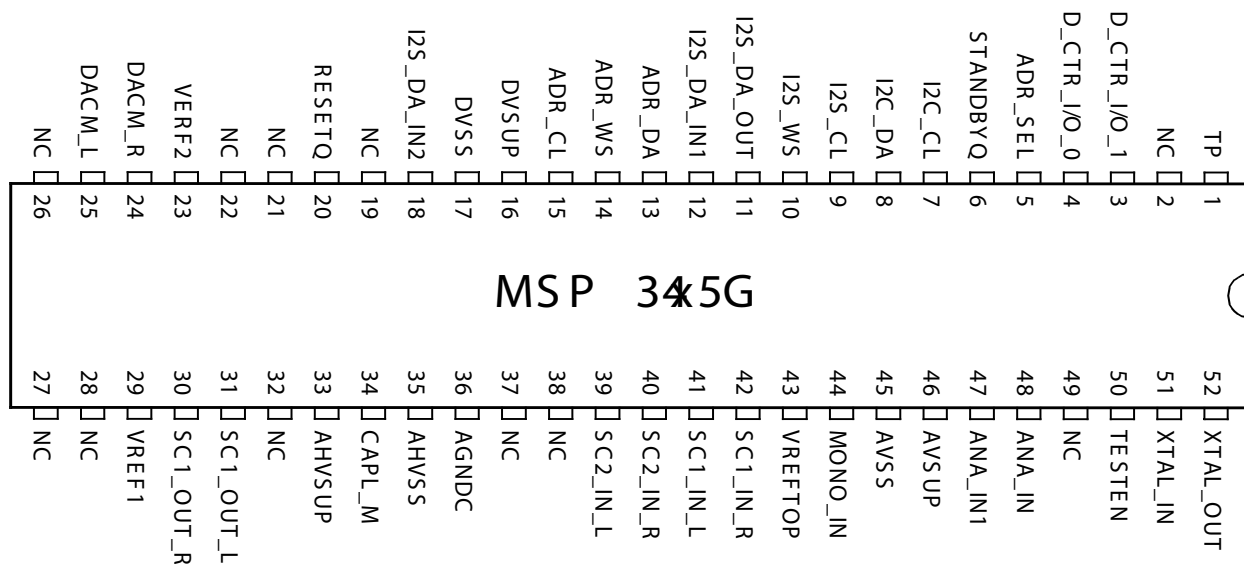


## 6.Introduction of the MSP 3425G.

The MSP 3425G family of single-chip Multistandard Sound Processors covers the sound processing of all analog TV standards worldwide, as well as the NICAM digital sound standards. The full TV sound processing, starting with analog sound IF signal-in, down to processed analog AF-out, is performed in a single chip.

Simplified functional block diagram of the MSP 3425G:





## 7. General description of the PW1235.

The PW1235 Video Signal Processor is a high quality, digital video signal processor that incorporates Pixelworks' patented, state-of-the-art video deinterlacer and scaler. Using sophisticated algorithms, the PW1235 is able to effectively deinterlace video input by creating motion vectors that follow frame-to-frame movement, and provide clear, progressive output in both analog and digital formats.

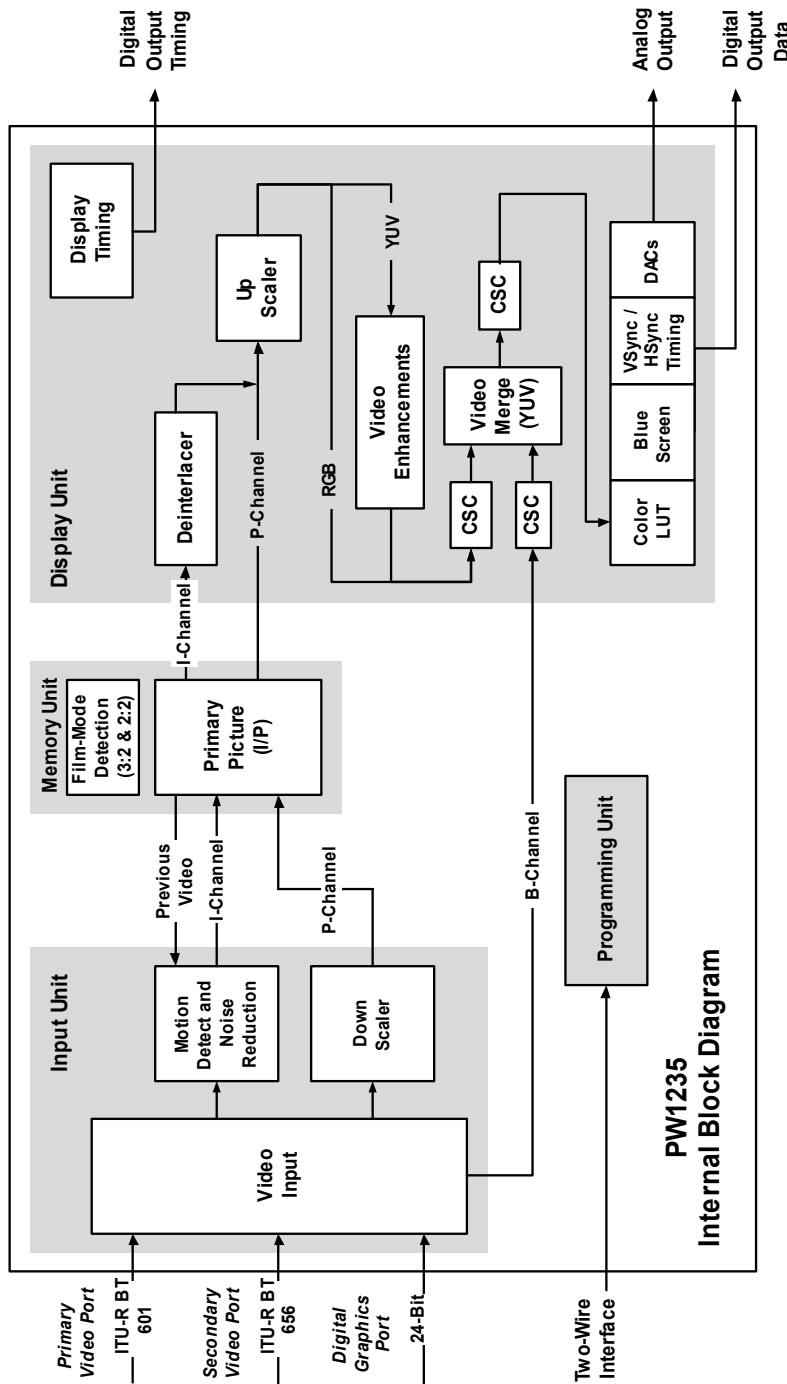
With support for NTSC and PAL video formats, the PW1235 can be designed into any TV, monitor, or projector application. Support for 3:2 and 2:2 film mode detection enables the PW1235 to provide the best quality display for existing film and video standards. The PW1235 can dynamically enter or exit film mode (with flexible programming) to display mixed content with the best possible quality.

As a single device, the PW1235 integrates many functions onto one chip. It has embedded a scaler, an advanced deinterlacer, memory controller, color space converter, and Digital-to-Analog Converter (DAC) onto one chip. There are two video input ports—a primary video port and a secondary input port—that are used to accept YUV video in the ITU-R601 and ITU-R656 formats respectively. Video content is analyzed on a single-pixel granularity to detect presence or absence of noise and compute the amount of motion. Motion video is processed using a highly intelligent algorithm that simultaneously eliminates noise and interpolates pixels along any angle to produce a noise-free picture without jagged-edge artifacts.

As part of a Pixelworks solution, combining the PW1235 with a Pixelworks ImageProcessor (such as the PW113, PW166 or PW181) offers the world's best combination of

deinterlacing and scaling of video or graphics. This combination of high quality deinterlacing and scaling is essential for higher resolution outputs such as XGA, SXGA, and UXGA that need to display NTSC and PAL video.

Internal block diagram of the PW1235:



PIN CONFIGURATION:

192	MCUCMD	193	PVSS	128	DG5
191	MCUWFR	194	NC	127	DG4
190	MCUCS	195	NC	126	PVSS
189	PVSS	196	DPAVSS	125	DG3
188	MCURDY	197	DPVDD	124	DG2
187	VSS	198	DPDVS	123	VDD
186	MCUD7	199	PVDD	122	DG1
185	MCUD6	200	MVE	121	DG0
184	MCUD5	201	PVSS	120	PVDD
183	MCUD4	202	MA4	119	DB7
182	MCUD3	203	MA3	118	DB6
181	MCUD2	204	MA2	117	DB5
180	PVDD	205	VDD	116	DB4
179	MCUD1	206	MA5	115	PVSS
178	MCUD0	207	MA2	114	DB3
177	MCLU7	208	PVDD	113	DB2
176	MCLU6	209	MA6	112	VSS
175	VDD	210	MA1	111	DB1
174	MCLU5	211	MA7	110	DB0
173	MCLU4	212	PVSS	109	PVDD
172	MCLU3	213	MA0	108	DENR
171	PVSS	214	MA8	107	DENB
170	MCLU2	215	MA10	106	DENG
169	MCLU1	216	PVDD	105	PVSS
168	MCLU0	217	MA9	104	DHS
167	ADGVSS	218	MA13	103	DVS
166	ADGVDD	219	VSS	102	DCLK
165	VDD	220	MA11	101	PVDD
164	ADAVSS	221	MA12	100	DGR7
163	ADAVDD	222	PVSS	99	DGR6
162	VREFOUT	223	MCLKFB	98	DGR5
161	VREFIN	224	PVDD	97	DGR4
160	COMP	225	MRAS	96	PVSS
159	RSET	226	MCAS	95	DGR3
158	AVSS3R	227	MWE	94	DGR2
157	AVD33R	228	PVSS	93	VDD
156	ADR	229	MCLK	92	DGR1
155	AVS3GG	230	PVDD	91	DGR0
154	AVD33G	231	MD8	90	PVDD
153	ADG	232	MD7	89	DGG7
152	AVS33B	233	PVSS	88	DGG6
151	AVD33B	234	MD9	87	DGG5
150	ADB	235	VDD	86	DGG4
149	ADDVDD	236	MD6	85	PVSS
148	ADDVSS	237	PVDD	84	DGG3
147	PVSS	238	MD10	83	DGG2
146	CGMS	239	MD5	82	DGG1
145	DEN	240	PVSS	81	DGG0
144	TESTCLK	241	MD11	80	PVDD
143	PVDD	242	MD4	79	DGB7
142	DR7	243	PVDD	78	DGB6
141	DR6	244	MD12	77	VSS
140	VDD	245	MD3	76	DGB5
139	DR5	246	PVSS	75	DGB4
138	DR4	247	MD13	74	PVSS
137	PVSS	248	MD2	73	DGB3
136	DR3	249	PVDD	72	DGB2
135	DR2	250	MD14	71	DGB1
134	VSS	251	VSS	70	DGB0
133	DR1	252	MD1	69	PVDD
132	DR0	253	PVSS	68	DGCLK
131	PVDD	254	MD15	67	DGVS
130	DG7	255	MD0	66	DGHS
129	DG6	256	PVDD	65	PVSS
		1	VDD		
		2	VB1		
		3	VB2		
		4	VB3		
		5	VDD		
		6	VB4		
		7	VB5		
		8	VB6		
		9	VB7		
		10	PVSS		
		11	SVHS		
		12	SVMS		
		13	SVCLK		
		14	PVDD		
		15	VG0		
		16	VG1		
		17	VG2		
		18	VG3		
		19	VSS		
		20	VG4		
		21	VG5		
		22	VG6		
		23	VG7		
		24	PVSS		
		25	PVCLK		
		26	CREF		
		27	PWS		
		28	PVHS		
		29	PVDD		
		30	VR0		
		31	VR1		
		32	VR2		
		33	VR3		
		34	VDD		
		35	VR4		
		36	VR5		
		37	VR6		
		38	VR7		
		39	PVSS		
		40	XTALI		
		41	XTALO		
		42	PVDD		
		43	2WA1		
		44	2WA2		
		45	2WCLK		
		46	PVSS		
		47	2WDAT		
		48	TDO		
		49	VSS		
		50	TCK		
		51	TDI		
		52	TMS		
		53	TRSTN		
		54	PVDD		
		55	RESET		
		56	TEST		
		57	PVSS		
		58	MPDVS		
		59	MPDVS		
		60	MPAVDD		
		61	MPAVSS		
		62	NC		
		63	NC		
		64	PVDD		

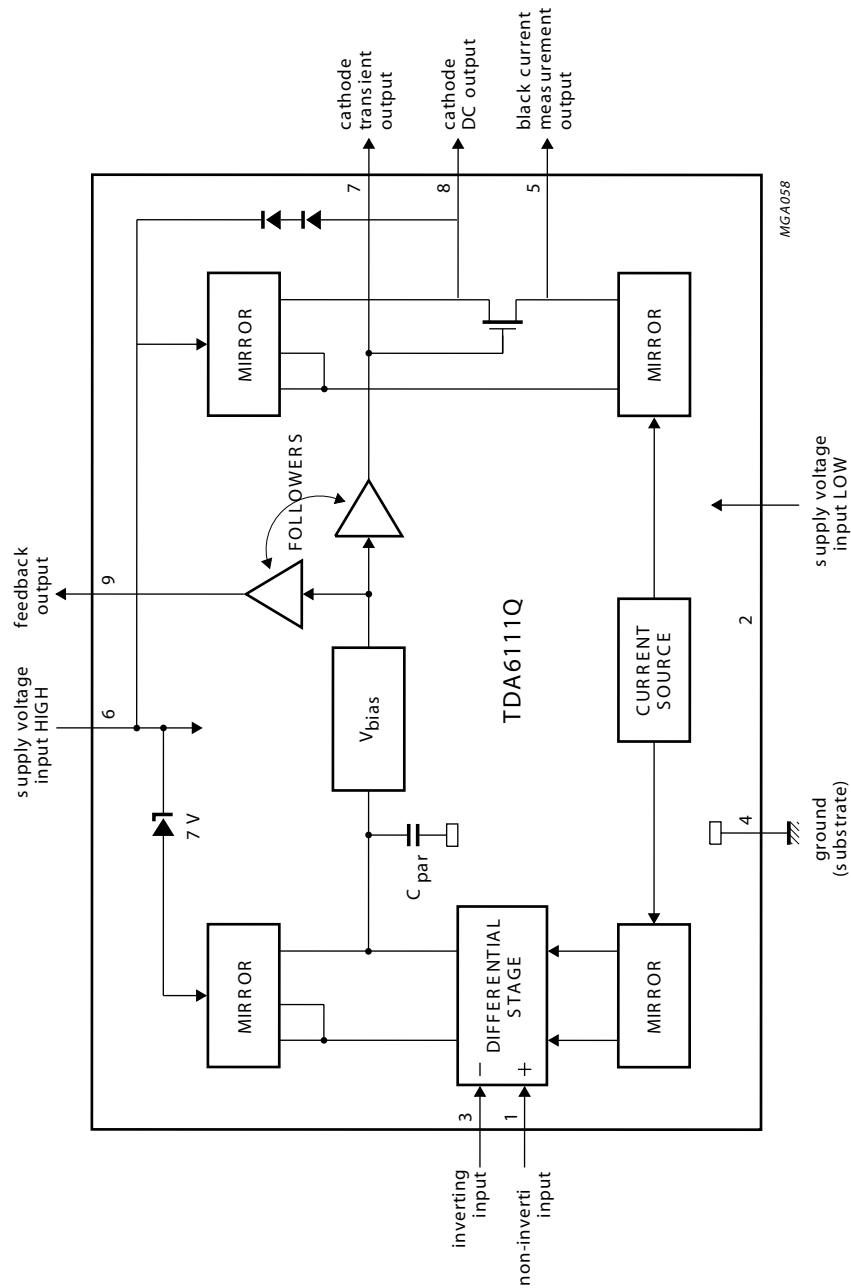
PW1235

## 8. General description of the TDA6111Q.

The TDA6111Q is a video output amplifier with 16 MHz bandwidth. The device is contained in a single in-line 9-pin medium power (DBS9MPF) package, using high-voltage DMOS technology, intended to drive the cathode of a colour CRT.

Block diagram of the TDA6111Q:

PIN CONFIGURATION:



PINNING

SYMBOL	PIN	DESCRIPTION
$V_{ip}$	1	non-inverting voltage input
$V_{DDL}$	2	supply voltage LOW
$V_{in}$	3	inverting voltage input
GND	4	ground, substrate
$I_{om}$	5	black current measurement output
$V_{DDH}$	6	supply voltage HIGH
$V_{cn}$	7	cathode transient voltage output
$V_{oc}$	8	cathode DC voltage output
$V_{fb}$	9	feedback voltage output

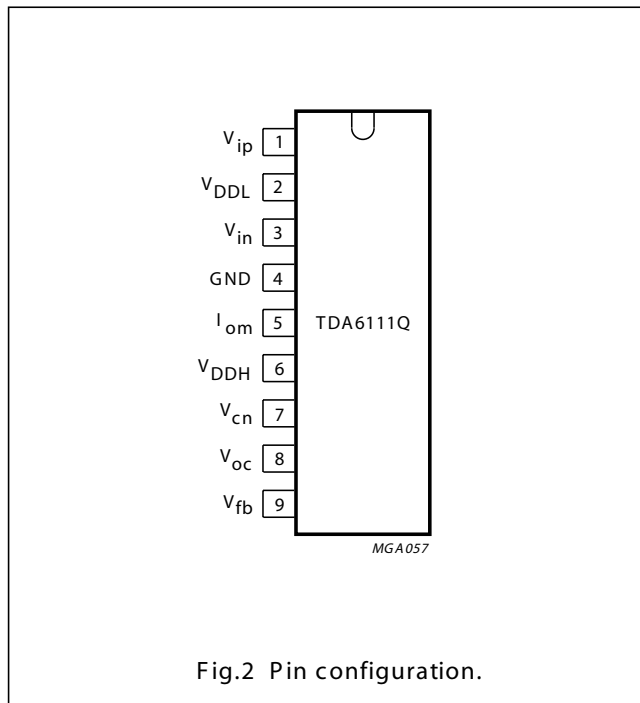
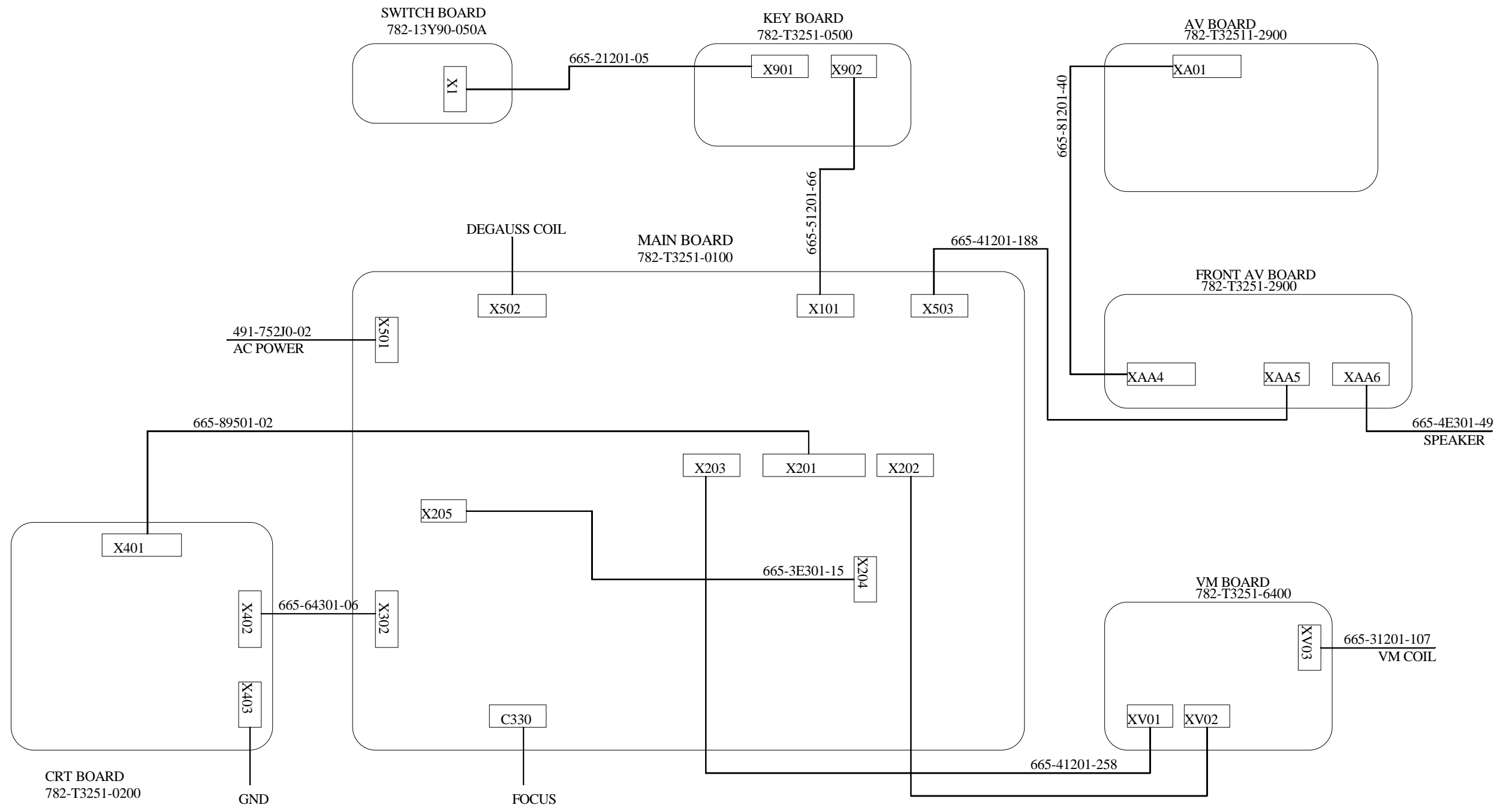
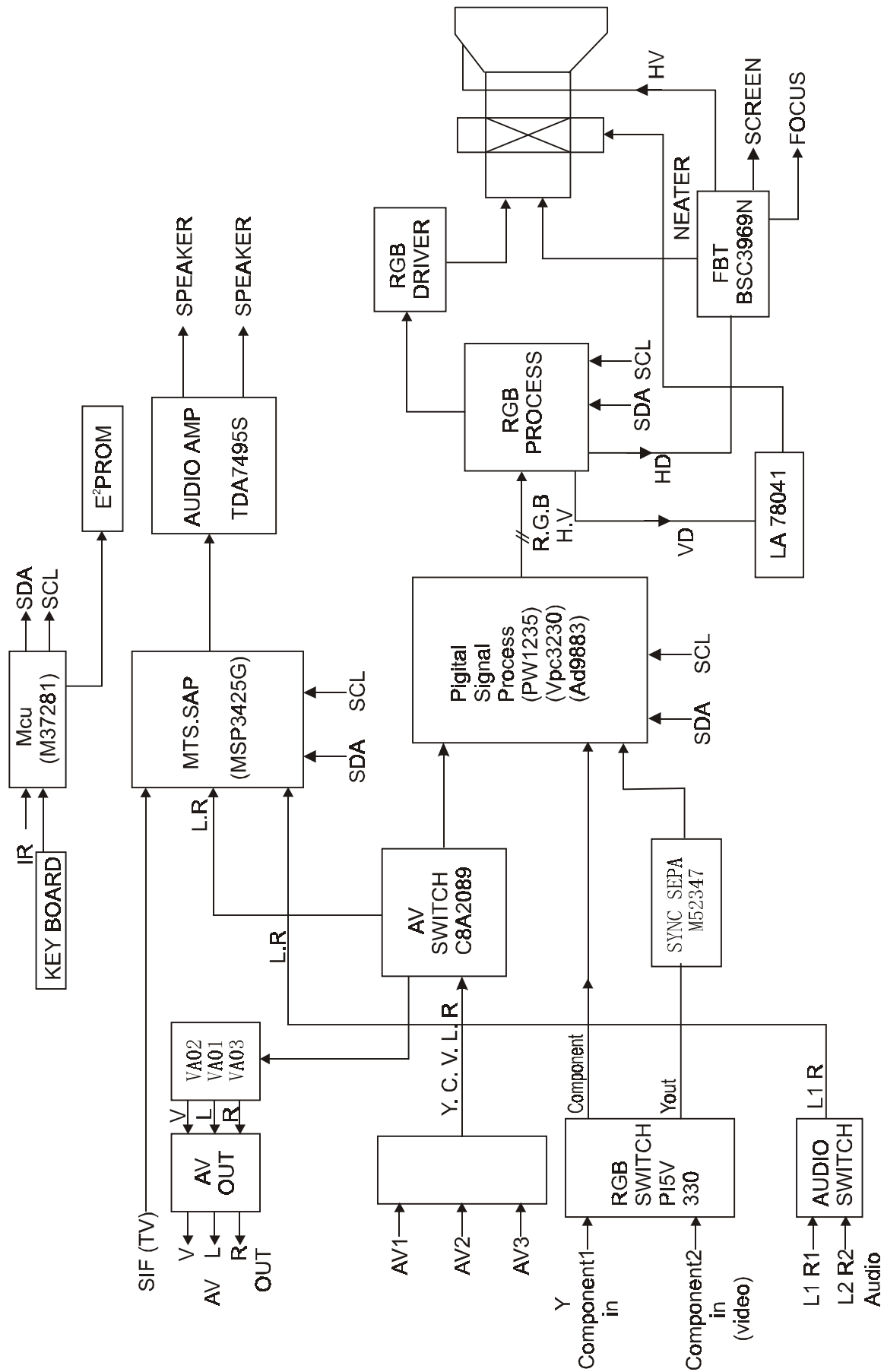


Fig.2 Pin configuration.

# Wiring Diagram

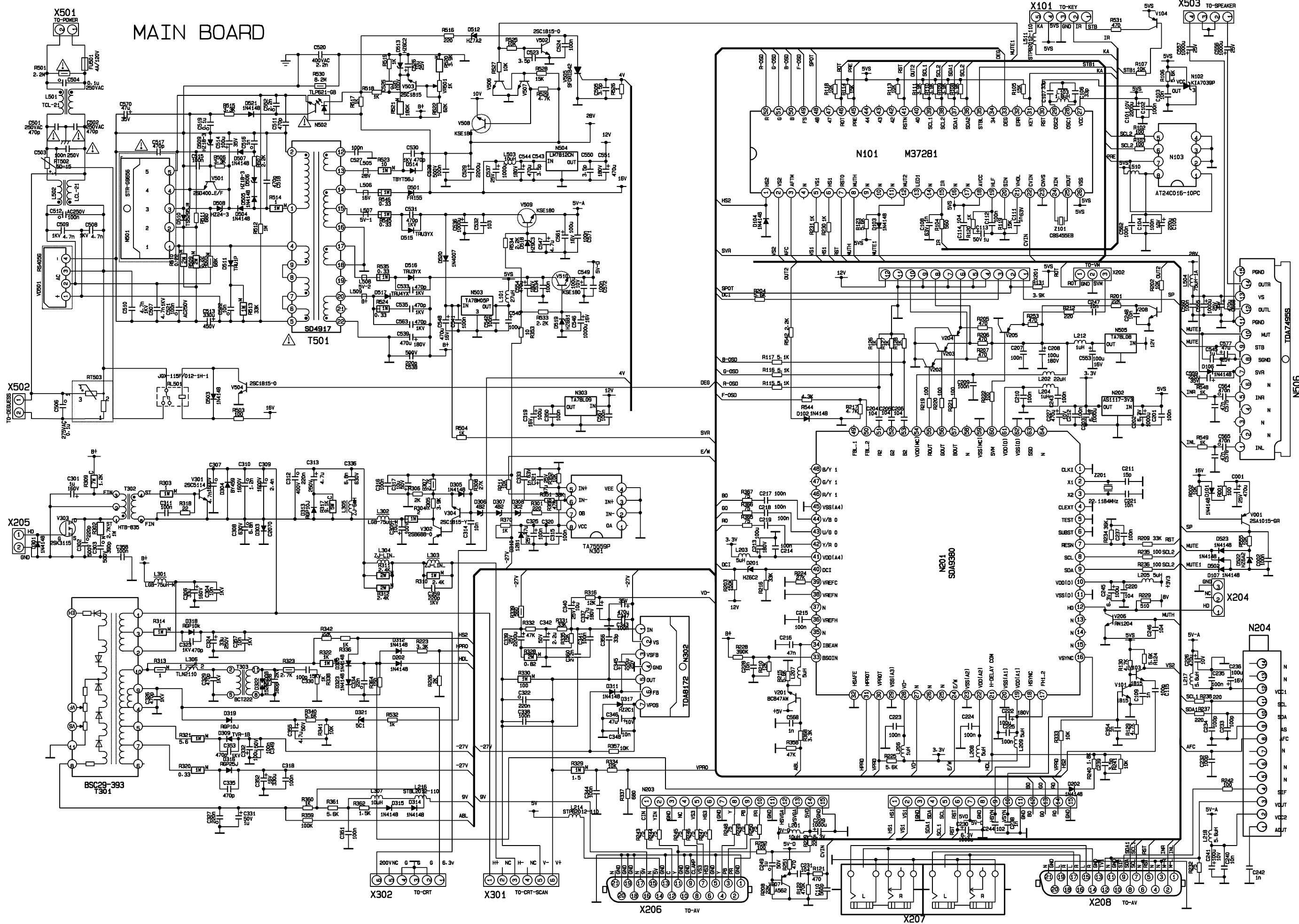


# BLOCK DIAGRAM

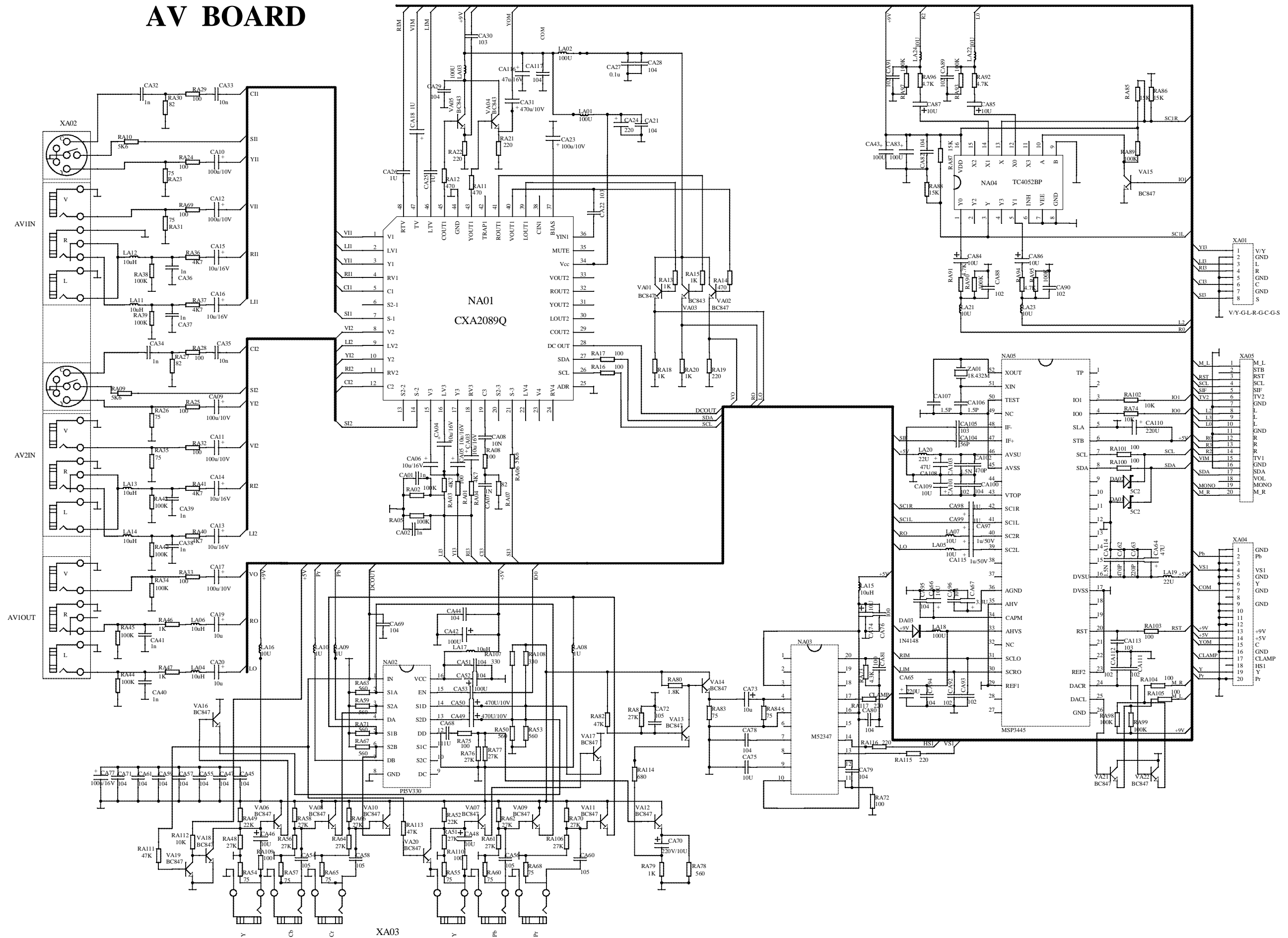




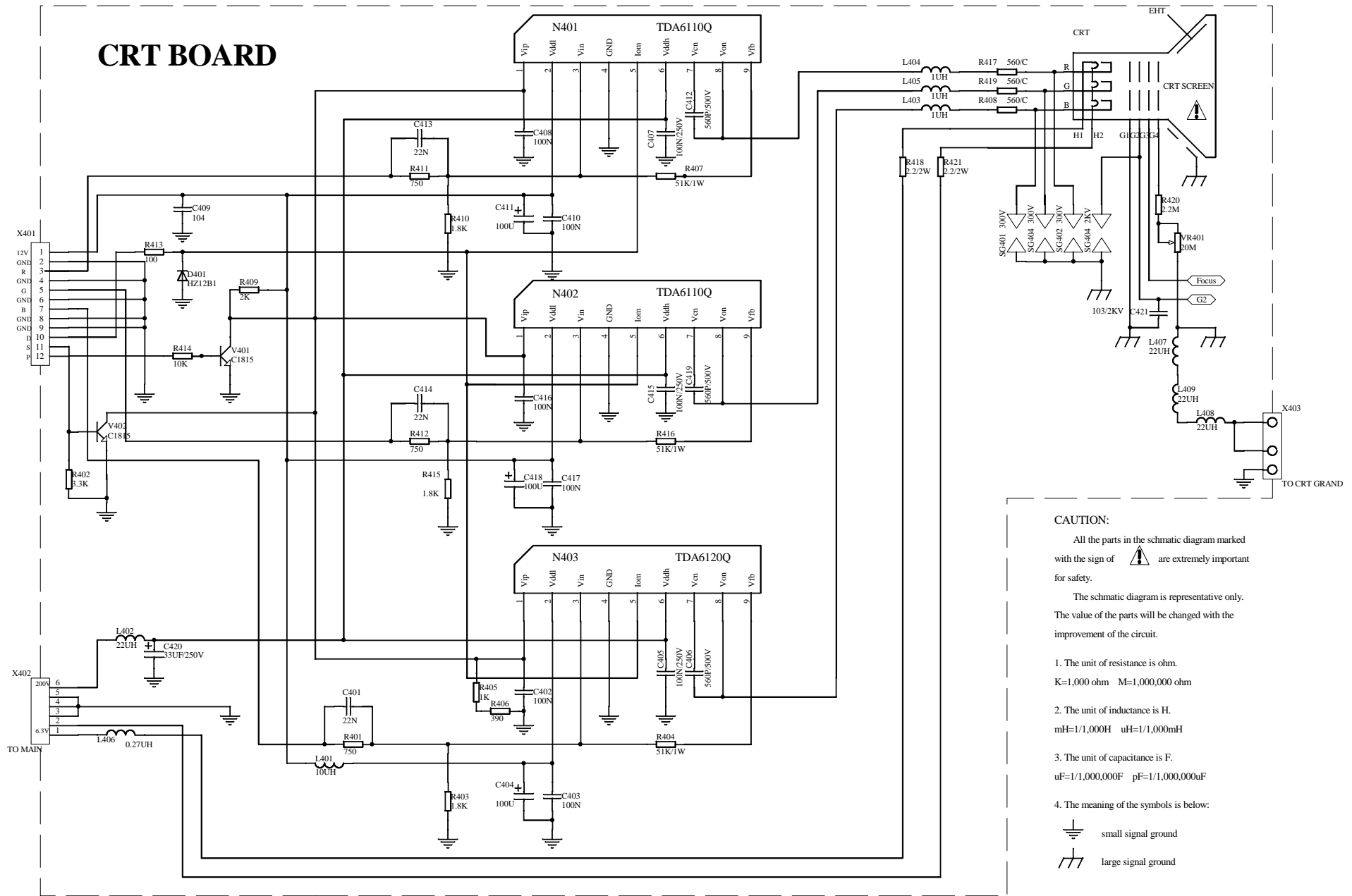
MAIN BOARD



# AV BOARD



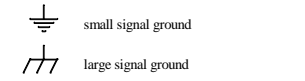
# CRT BOARD

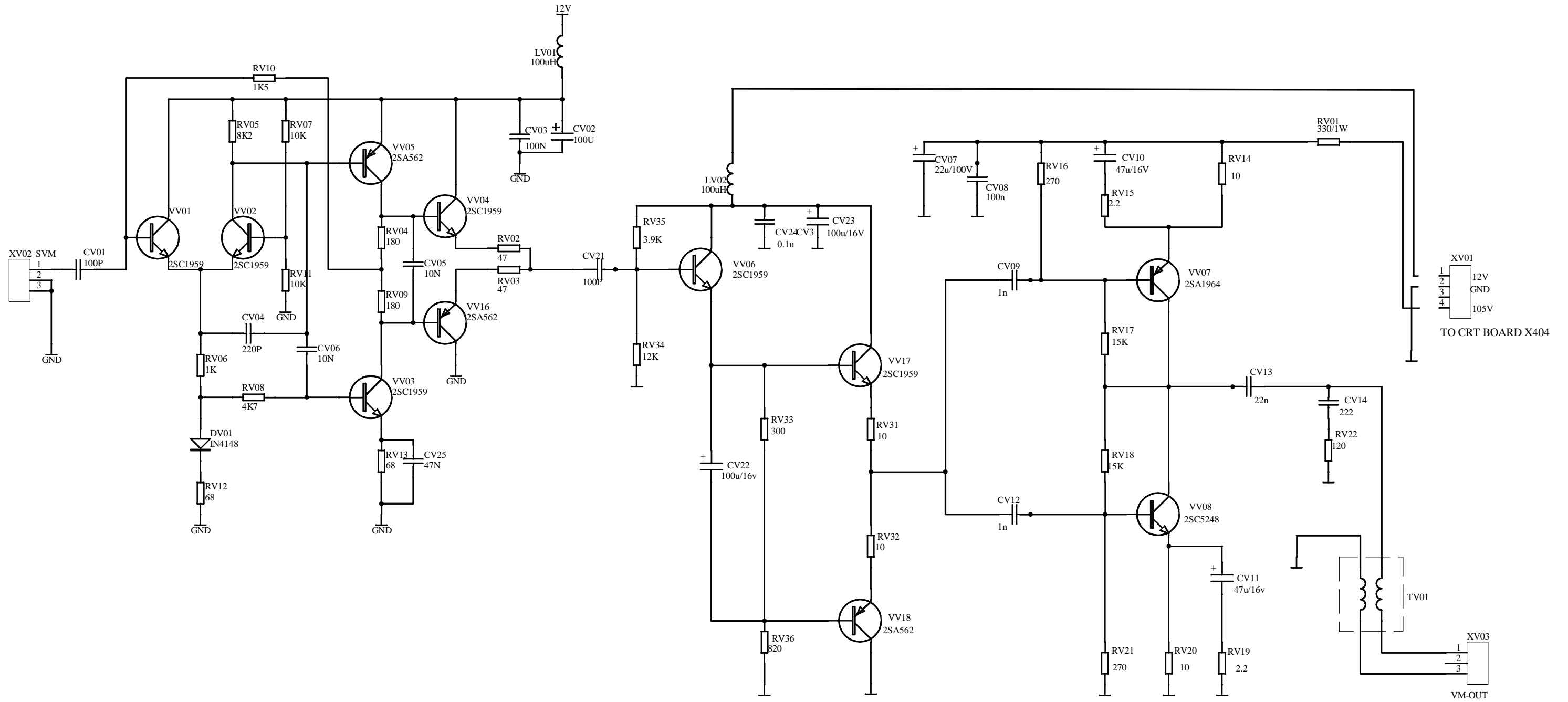


**CAUTION:**  
 All the parts in the schematic diagram marked with the sign of ⚡ are extremely important for safety.

The schematic diagram is representative only. The value of the parts will be changed with the improvement of the circuit.

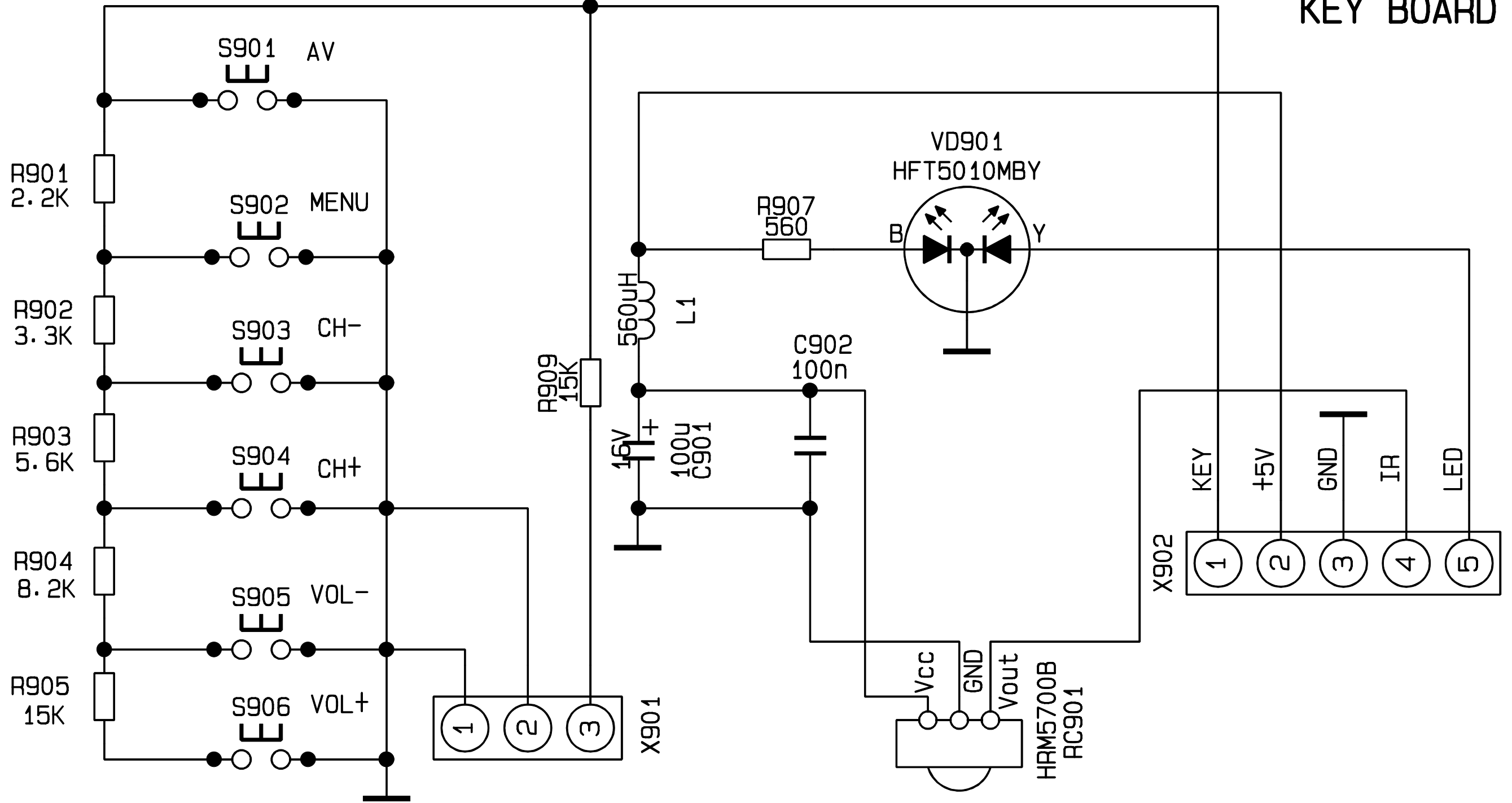
1. The unit of resistance is ohm.  
 K=1,000 ohm M=1,000,000 ohm
2. The unit of inductance is H.  
 mH=1/1,000H uH=1/1,000mH
3. The unit of capacitance is F.  
 uF=1/1,000,000F pF=1/1,000,000uF
4. The meaning of the symbols is below:

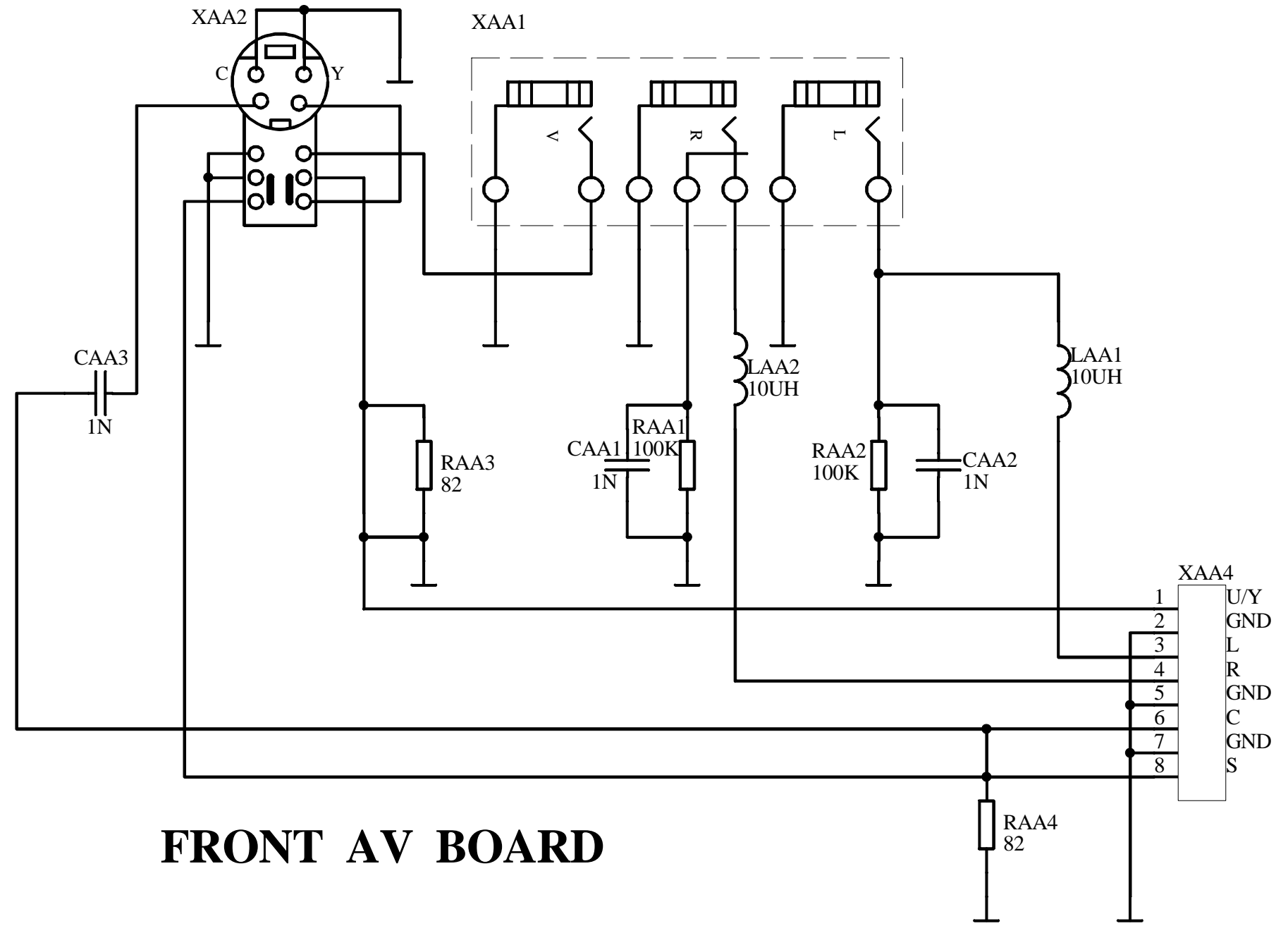
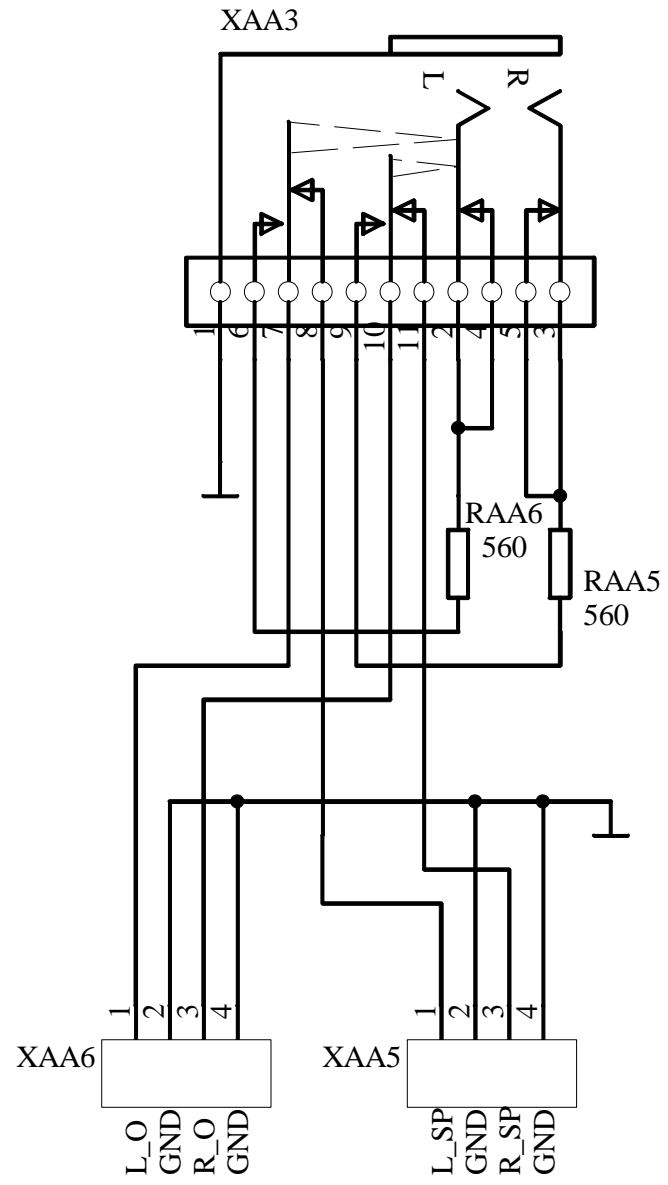




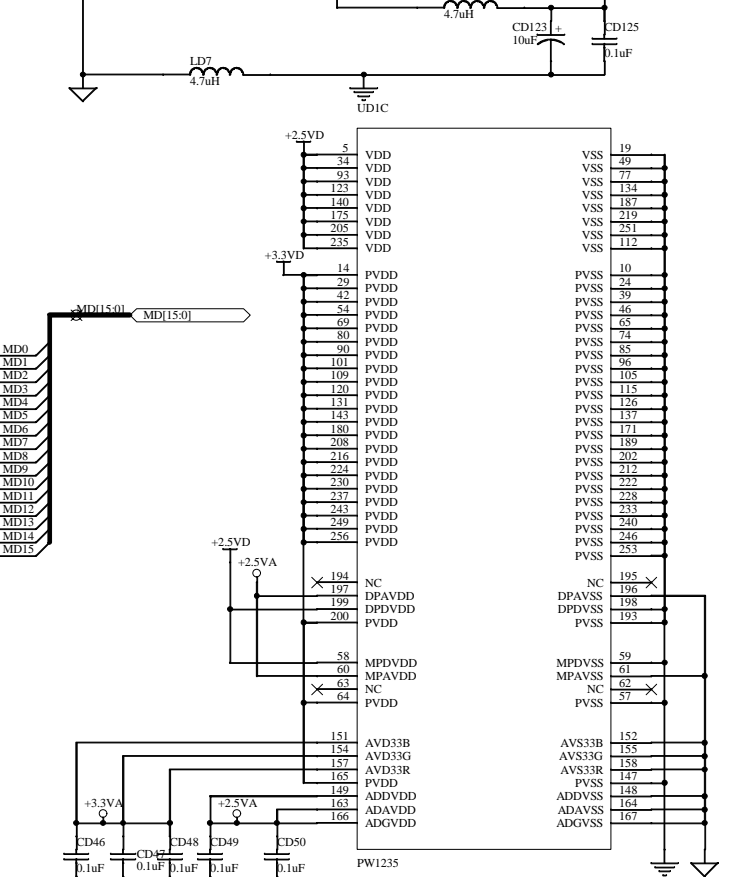
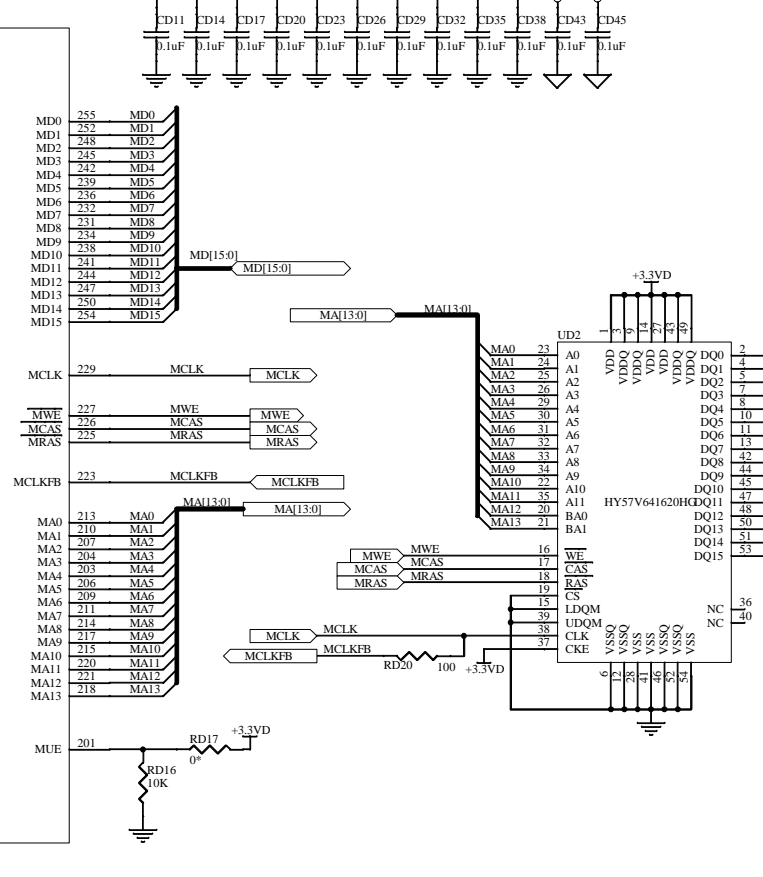
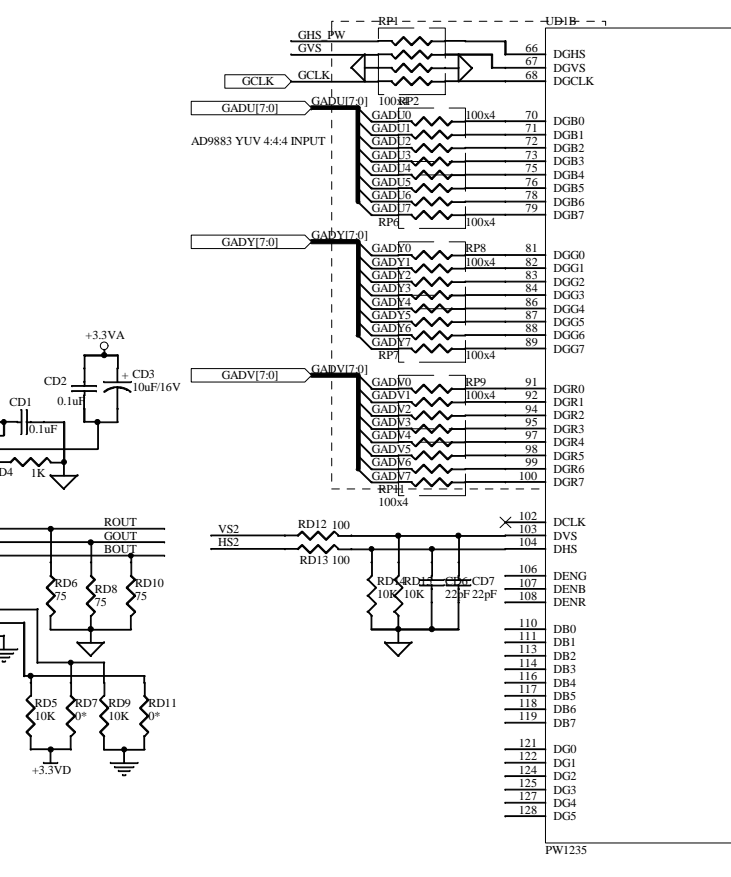
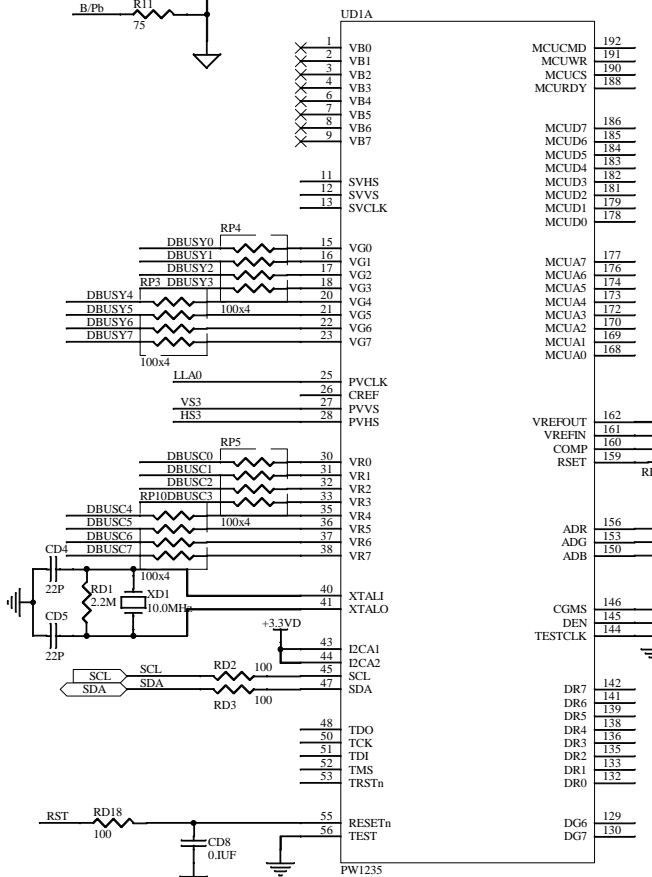
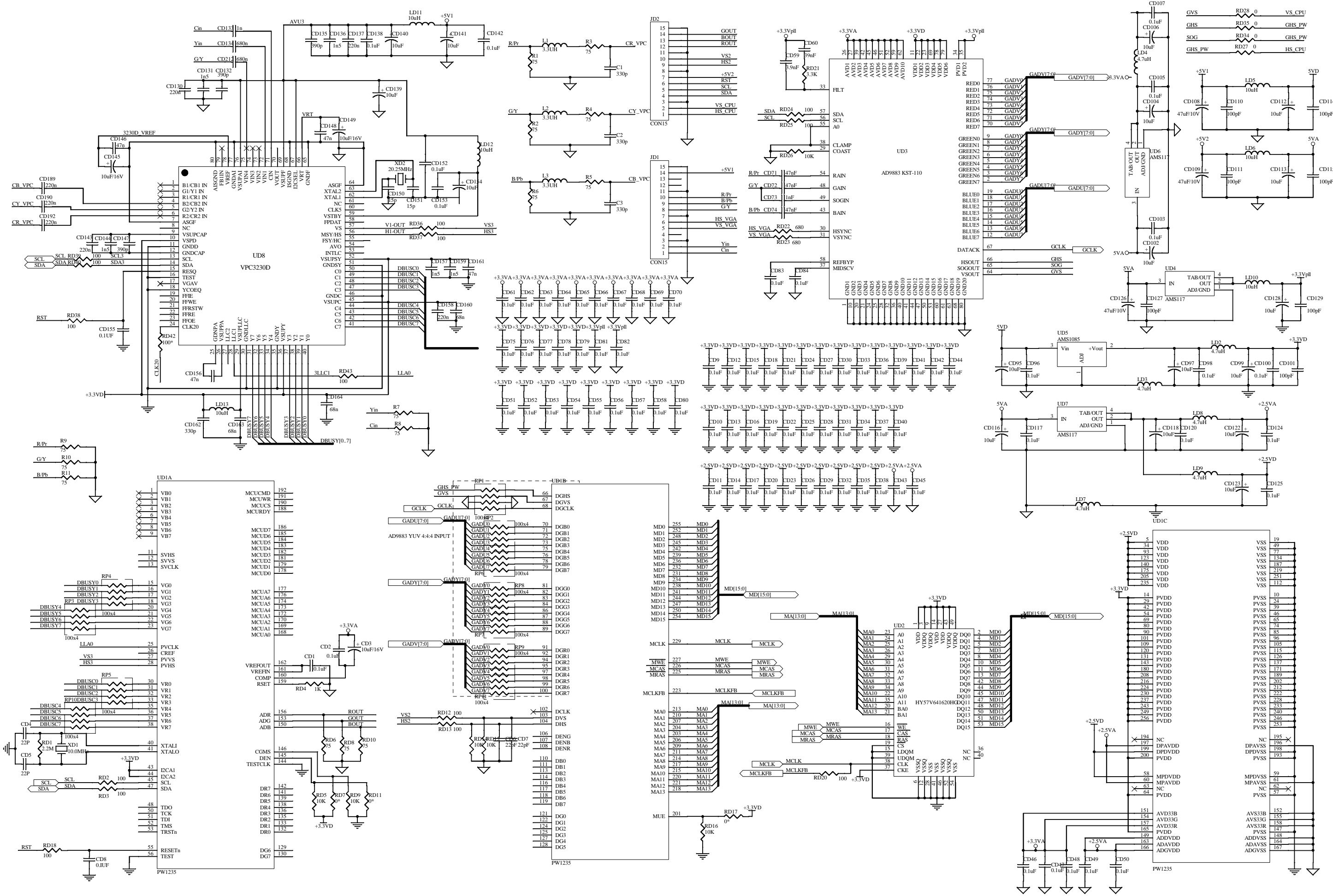
VM BOARD

# KEY BOARD





**FRONT AV BOARD**



**WARNING:** BEFORE SERVICING THIS CHASSIS, READ THE “X-RAY RADIATION PERCAUTION”, “SAFETY PRECAUTION” AND “PRODUCT SAFETY NOTICE” ON PAGE 1&2 OF THIS MANUAL.

**CAUTION:** 1. The shaded areas makes in the schematic diagram and the parts list designate components which have special characteristics important for safety and should be replaced only with type identical to those in the original circuit or specified in the parts list. Before replacing any of these components, read carefully the PRODUCT SAFETY NOTICE on page 2.  
2. Do not degrade the safety of the receiver through improper servicing.

## ELECTRICAL PARTS LIST

### MAIN BOARD

SYMBOL	PART NO.	DESCRIPTION
	782-T3251-0100	MAIN PCB
<b>CRYSTAL</b>		
Z101	329-58001-00	8MHZ
Z201	329-62404-00	HC-49/US 24.576MHZ
<b>DISCHARGE TUBE</b>		
D322	339-10017-00	DSP-152MS00B
	339-10017-00	DSP-152MS00B
<b>DIODE</b>		
D102	340-00001-003	1N4148
D103	340-00001-003	1N4148
D510	340-00001-003	1N4148
D502	340-00001-003	1N4148
D202	340-00001-003	1N4148
D503	340-00001-003	1N4148
D301	340-00001-003	1N4148
D504	340-00001-003	1N4148
D505	340-00001-003	1N4148
D305	340-00001-003	1N4148
D312	340-00001-003	1N4148
D507	340-00001-003	1N4148
D315	340-00001-003	1N4148
D314	340-00001-003	1N4148
D101	340-00001-003	1N4148
D320	340-00001-003	1N4148
D323	340-00001-003	1N4148
D104	340-00001-003	1N4148



<b>SYMBOL</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>
D523	340-00001-003	1N4148
D318	340-00005-003	S5295J
D511	340-00005-003	S5295J
D319	340-00010-003	S5295G
D313	340-00014-003	RGP10J
D309	340-00086-003	TVR-1B
D311	340-00086-003	TVR-1B
D316	340-00288-003	TFR155
D303	340-00132-00	ERC20-06
D520	340-00197-00	IN4007
D304	340-00254-00	BY459X
D517	340-00257-00	BYT56J
D514	340-00283-00	TRU3YX
D501	340-00288-00	TFR155
D515	340-00288-00	TFR155
D516	340-00288-00	TFR155
<b>REGULATED DIODE</b>		
D317	340-50240-003	HZ2C2
D307	340-50390-003	HZ4B2
D512	340-50470-003	HZ5B1
D518	340-50560-003	HZ6B1
D519	340-50560-003	HZ6B1
D522	340-50610-003	HZ6C2
D201	340-50610-003	HZ6C2
D513	340-50610-003	HZ6C2
D306	340-50750-003	HZ7C2
D308	340-51180-003	HZ12A1
D310	340-51850-003	HZ18-3
D509	340-51670-003	HZ16-3
D321	340-51670-003	HZ16-3
D506	340-51850-003	HZ18-3
D508	340-52490-003	HZ24-3
<b>TRANSISTOR</b>		
V501	343-04000-304	2SD400 E/F
V207	343-05620-104	2SA562TM-Y
V205	343-05620-104	2SA562TM-Y
V204	343-05620-104	2SA562TM-Y
V202	343-05620-104	2SA562TM-Y
V203	343-05620-104	2SA562TM-Y
V104	343-05620-104	2SA562TM-Y
V001	343-10150-104	2SA1015Y Pr2.5
V206	343-12040-004	RN1204

<b>SYMBOL</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>
V507	343-18150-104	2SC1815-Y
V506	343-18150-104	2SC1815-Y
V103	343-18150-104	2SC1815-Y
V504	343-18150-104	2SC1815-Y
V304	343-18150-104	2SC1815-Y
V503	343-18150-104	2SC1815-Y
V201	343-18150-104	2SC1815-Y
V508	343-01800-00	KSE180 TO-126
V509	343-01800-00	KSE180 TO-126
V510	343-01800-00	KSE180 TO-126
V303	343-03040-00	BSN304
V302	343-06880-60	2SB688-0
V301	343-51440-00	2SC5144
V502	343-18150-10	2SC1815-Y
V208	343-07520-10	2SC752GTM-Y
<b>INDUCTANCE WITH COLOUR CODES</b>		
L206	471-2A22K-003	SPT0305-2R2K-5
L205	471-2022K-003	SPT0305-220K-5
L208	471-2022K-003	SPT0305-220K-5
L101	471-2022K-003	SPT0305-220K-5
L103	471-2A18K-00	SPT0305-1R8K-5
L207	471-2A47K-00	SPT0305-4R7K-5
L212	471-2010K-A0	SP0203-10uH-K
L503	471-2010K-A0	SP0203-10uH-K
L217	471-2010K-A0	SP0203-10uH-K
L218	471-2010K-A0	SP0203-10uH-K
L307	471-2010K-A0	SP0203-10uH-K
L202	471-2022K-00	SPT0305-220K-5
L209	471-2022K-00	SPT0305-220K-5
L102	471-2068K-A0	SP0203-68uH-K
<b>ADJUSTABLE INDUCTANCE</b>		
L306	477-30027-00	TLN2110
<b>FIXED INDUCTANCE</b>		
L304	477-40167-00	PSC1726H-200K5R0 !
L504	477-40031-00	LG750
L301	477-40057-00	LG101
L302	477-40073-00	TLN3197D
L305	477-40179-00	LE1949
<b>RECTIFIER</b>		
VD501	340-80011-00	RBV-606
<b>IC</b>		
N502	352-06210-70	TLP621-GB(UL) (O)!

SYMBOL	PART NO.	DESCRIPTION
N202	352-11170-20	AS1117M-3.3 (M)
N103	352-24160-50	M24C16BN6 (M)
N101	352-37281-10	*M37281EKSP (M)
N301	352-55590-40	TA75559P (D)
N102	352-70390-10	* KIA7039P (D)
N506	352-74950-10	* TDA7495S (D)
N302	352-78041-00	LA78041 (M)
N503	352-78050-00	KA7805 (M)
N505	352-78080-00	AN7808 (D)
N303	352-78090-40	TA78M09P (D)
N504	352-78120-60	KA7812 (M)
N201	352-93800-00	SDA9380-B21 (D)
N501	352-96560-00	STR-G9656 (M)
<b>RELAY</b>		
RL501	457-12003-9G	JQX-14FF-012-1HS !
<b>CERAMIC CAPACITOR</b>		
C502	459-B147M-20	ECK-DNS471MBX !
C501	459-B147M-20	ECK-DNS471MBX !
C520	459-B222M-20	ECK-DNS222MEX !
<b>THIN-FILM CAPACITOR</b>		
C504	462-2B410-M0V	250VAC-0.1uF-M !
C503	462-2B410-M0V	250VAC-0.1uF-M !
C506	462-2B410-M0V	250VAC-0.1uF-M !
C512	462-2B410-M0V	250VAC-0.1uF-M !
C310	462-88212-H0	CBB81-1600V-1200PF-J
C307	462-8E247-H4	CBB81-2KV-4700PF-J
C309	462-88224-H0	ECWH12H242JR
<b>ELECTROLYTIC CAPACITOR</b>		
C536	464-60822-M0	CD110-16V-2200 uF-M
<b>THERMISTOR</b>		
RT502	469-40004-00	5D2-14LC
RT503	469-10028-00	MZ73C-9RM !
<b>METAL RESISTOR</b>		
R224	467-2C327-G03	1/6W-27K-G
R308	467-2C327-G03	1/6W-27K-G
R512	467-2C510-G03	1/6W-1M-G
R307	467-2E227-H0	1/2W-2.7K-JL
R323	467-2E227-H0	1/2W-2.7K-JL
R342	467-2E322-H0	1/2W-22K-JL
R329	467-2FA15-H0	1W-1.5Ω-JL
R321	467-2FA56-H0	1W-5.6Ω-JL
R303	467-2FB33-H0	1W-0.33Ω-JL

SYMBOL	PART NO.	DESCRIPTION
R328	467-2FB82-H0	1W-0.82Ω-JL
R304	467-2F002-H0	1W-2Ω-JL
R524	467-2F012-H0	1W-12Ω-JL
R330	467-2F110-H0	1W-100Ω-JL
R339	467-2F156-H0	1W-560Ω-JL
R302	467-2F227-H0	1W-2.7KΩ-JL
R322	467-2F315-H0	1W-15kΩ-JL
R513	467-2F333-H0	1W-33kΩ-JL
R505	467-2F368-H0	1W-68kΩ-JL
R509	467-2GB15-H0	2W-0.15Ω-JL
R510	467-2GB15-H0	2W-0.15Ω-JL
R529	467-2F182-H0	1W-820Ω-JL
R310	467-2G224-H0	2W-2.4kΩ-JL
R311	467-2G224-H0	2W-2.4kΩ-JL
R312	467-2G224-H0	2W-2.4kΩ-JL
J517	467-2E139-H0	1/2W-390Ω-JL
<b>MELTABLE RESISTOR</b>		
R313	467-4E001-H0	1/2W-1Ω-JL
R535	467-4FB27-H0	1W-0.27Ω-JL
R545	467-4FB27-H0	1W-0.27Ω-JL
R320	467-4FB33-H0	1W-0.33Ω-JL
R523	467-4FB33-H0	1W-0.33Ω-JL
R546	467-4FB33-H0	1W-0.33Ω-JL
R314	467-4F001-H0	1W-1Ω-JL
R514	467-4F001-H0	1W-1Ω-JL
<b>CEMENT RESISTOR</b>		
R317	467-50291-H8	RY27-3H-5W-9.1K-J !
R309	467-51224-H8	RY27-3H-7W-2.4K-J !
<b>CARBON RESISTOR</b>		
R501	467-8E522-H0	1/2W-2.2MΩ-JL !
R530	467-8E582-H0	1/2W-8.2MΩ-JL !
<b>SWITCH TRANSFORMER</b>		
T501	470-00316-00	SD4922 !
<b>H-DRIVE TRANSFORMER</b>		
T302	472-10047-00	ZE2526
<b>FBT</b>		
	472-2B119-00	BSC29-3969N !
<b>DYNAMIC FOCUS TRANSFORMER</b>		
T303	472-60001-00	BCT222
<b>H-LINEARITY COIL</b>		
L303	477-00085-00	HL1830H-X30-1

<b>POWER FILTER</b>			
L502	477-20031-00	LCL-21	!
L501	477-20031-00	LCL-21	!
<b>OTHER</b>			
DEGAUSSING COIL(32")	477-13401-00	DX-87	!
POWER CORD	491-752J0-02	UL	!
CRT(32")	335-3412D-00	A80LTM350X97	!
N204 (TUNER)	590-40714-00	JS-6AM/L134	!
FU501 (FUSE)	569-20141-00	U/C/T51S 125V/4A	!
CRT(27")	335-2932E-00	A68LTF356X	!
DEGAUSSING COIL(27")	477-12904-00	DX-29	!

### CRT BOARD

<b>SYMBOL</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>	
	782-T3251-0200	CRT PCB	
<b>REGULATED DIODE</b>			
D401	340-51260-003	HZ12B1	
<b>POTENTIOMETER</b>			
VR401	468-26201-00	VG153HB206	
<b>IC</b>			
N403	352-61110-80	TDA6111Q	(M)
N401	352-61110-80	TDA6111Q	(M)
N402	352-61110-80	TDA6111Q	(M)
<b>METAL RESISTOR</b>			
R404	467-2F339-H0	1W-39kΩ-JL	
R416	467-2F339-H0	1W-39kΩ-JL	
R407	467-2F339-H0	1W-39kΩ-JL	
<b>CARBON RESISTOR</b>			
R408	467-8E156-H0	1/2W-560Ω-JL	!
R417	467-8E156-H0	1/2W-560Ω-JL	!
R419	467-8E156-H0	1/2W-560Ω-JL	!
R420	467-8E510-H0A	1/2W-1MΩ-J	!
<b>MELTABLE RESISTOR</b>			
R418	467-4FA22-H0	1W-2.2Ω-JL	
<b>INDUCTANCE WITH COLOUR CODES</b>			
L401	471-2010K-00	SPT0305-100K-5	
L402	471-2022K-00	SPT0305-220K-5	
<b>TRANSISTOR</b>			
V401	343-18150-10	2SC1815-Y	
<b>CRT SOCKET</b>			
CPT	364-58215-00	GZS10-2-4T1	!

## BUTTON BOARD

SYMBOL	PART NO.	DESCRIPTION
	782-T3251-0500	BUTTON PCB
<b>INDUCTANCE WITH COLOUR CODES</b>		
L1	471-2156K-10	LGA0410-560uH-K
<b>IC</b>		
RC901	352-03810-80	AT138B-T12 (M)

## FRONT AV BOARD

SYMBOL	PART NO.	DESCRIPTION
	782-T3251-2900	FRONT AV PCB
<b>INDUCTANCE WITH COLOUR CODES</b>		
LAA1	471-2010K-A0	SP0203-10uH-K
LAA2	471-2010K-A0	SP0203-10uH-K

## VM BOARD

SYMBOL	PART NO.	DESCRIPTION
	782-T3251-6400	VM PCB
<b>DIODE</b>		
DV01	340-00001-00	1N4148
<b>TRANSISTOR</b>		
VV18	343-05620-10	2SA562TM-Y
VV16	343-05620-10	2SA562TM-Y
VV05	343-05620-10	2SA562TM-Y
VV01	343-19590-10	2SC1959-Y
VV02	343-19590-10	2SC1959-Y
VV03	343-19590-10	2SC1959-Y
VV04	343-19590-10	2SC1959-Y
VV17	343-19590-10	2SC1959-Y
VV06	343-19590-10	2SC1959-Y
VV07	343-19640-30	2SA1964E
VV08	343-52480-30	2SC5248E
<b>INDUCTANCE WITH COLOUR CODES</b>		
LV02	471-2110K-A0	SP0203-100uH-K
LV01	471-2110K-A0	SP0203-100uH-K
<b>METAL RESISTOR</b>		
RV14	467-2E010-H0	1/2W-10Ω-JL
RV20	467-2E010-H0	1/2W-10Ω-JL
RV22	467-2F112-H0	1W-120Ω-JL

SYMBOL	PART NO.	DESCRIPTION
RV01	467-2F133-H0	1W-330Ω-JL
<b>POWER FILTER</b>		
TV01	477-20056-00	LCL-25 !

### DIGITAL PROCESSING BOARD

SYMBOL	PART NO.	DESCRIPTION
	782-T3251-6900	DIGITAL PROCESSING PCB
<b>CRYSTAL</b>		
XD1	329-61003-00	HC-49/US 10.000MHZ
<b>INDUCTANCE WITH COLOUR CODES</b>		
LD9	471-2A47K-00	SPT0305-4R7K-5
LD8	471-2A47K-00	SPT0305-4R7K-5
LD4	471-2A47K-00	SPT0305-4R7K-5
LD2	471-2A47K-00	SPT0305-4R7K-5
LD12	471-2010K-00	SPT0305-100K-5
LD11	471-2010K-00	SPT0305-100K-5
LD5	471-2010K-00	SPT0305-100K-5
LD10	471-2010K-00	SPT0305-100K-5
LD13	471-2010K-00	SPT0305-100K-5
LD6	471-2010K-00	SPT0305-100K-5
<b>PASTE INDUCTANCE</b>		
L1	474-14A33-M0	SGMI3216M3R3MT
L2	474-14A33-M0	SGMI3216M3R3MT
L3	474-14A33-M0	SGMI3216M3R3MT
<b>IC</b>		
UD7	352-11170-10	* AS1117M-2.5V (D)
UD3	352-98830-00	* AD9883AKST-110 (D)
UD6	352-11170-20	AS1117M-3.3 (M)
UD4	352-11170-20	AS1117M-3.3 (M)
UD5	352-11170-20	AS1117M-3.3 (M)
UD2	352-64163-20	* K4S641632E-TC70(M)
UD1	352-12350-20	* PW1235 (D)
UD8	352-32300-80	VPC3230D (D)

## REAR AV BOARD

SYMBOL	PART NO.	DESCRIPTION
	782-T32511-2900	REAR AV PCB
<b>CRYSTAL</b>		
ZA01	329-61801-00	HC49US 18.432MHZ
<b>DIODE</b>		
DA03	340-00001-00	1N4148
<b>REGULATED DIODE</b>		
DA02	340-50510-00	HZ5C2
DA01	340-50510-00	HZ5C2
<b>IC</b>		
NA05	352-34250-60	MSP3425G (M)
NA02	352-03300-20	*PI5V330 (M)
NA01	352-20890-80	CXA2089Q (D)
NA04	352-40520-80	HEF4052BT (M)
NA03	352-52347-10	M52347FP (M)
<b>INDUCTANCE WITH COLOUR CODES</b>		
LA01	471-2022K-A0	SP0203-22uH-K
LA17	471-2022K-A0	SP0203-22uH-K
LA20	471-2022K-A0	SP0203-22uH-K
LA10	471-2001K-A0	SP0203-1uH-K
LA09	471-2001K-A0	SP0203-1uH-K
LA08	471-2001K-A0	SP0203-1uH-K
LA16	471-2010K-A0	SP0203-10uH-K
LA07	471-2010K-A0	SP0203-10uH-K
LA06	471-2010K-A0	SP0203-10uH-K
LA05	471-2010K-A0	SP0203-10uH-K
LA04	471-2010K-A0	SP0203-10uH-K
LA15	471-2010K-A0	SP0203-10uH-K
LA02	471-2010K-A0	SP0203-10uH-K
LA03	471-2010K-A0	SP0203-10uH-K
LA14	471-2010K-A0	SP0203-10uH-K
LA13	471-2010K-A0	SP0203-10uH-K
LA12	471-2010K-A0	SP0203-10uH-K
LA11	471-2010K-A0	SP0203-10uH-K
LA24	471-2010K-A0	SP0203-10uH-K
LA23	471-2010K-A0	SP0203-10uH-K
LA22	471-2010K-A0	SP0203-10uH-K
LA21	471-2010K-A0	SP0203-10uH-K
LA19	471-2022K-A0	SP0203-22uH-K
LA18	471-2110K-00	SPT0305-101K-5



<b>SYMBOL</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>
<b>PASTE TRANSISTOR</b>		
VA16	342-08570-90	BC857 AW
VA17	342-08570-90	BC857 AW
VA21	342-08570-90	BC857 AW
VA22	342-08570-90	BC857 AW
VA18	342-08470-90	BC847AW
VA19	342-08470-90	BC847AW
VA20	342-08470-90	BC847AW