AKAI

COLOUR TV SET

Models:
29CT24FS
29CT71FS

SERVICE MANUAL

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SPECIFICATIONS

Table 1 Specifications

Model Number		29CT24FS, 29CT71FS
RF system	Color system	PAL, SECAM
	Sound system	B/G, D/K
Video system		PAL4.43, SECAM, NTSC3.58, NTSC4.43 (50/60Hz)
Programs preset		236(0-235)
Antenna input		75Ω(unbalanced)
Picture tube (Approx.) Effective screen dimensions		478×363mm
Video/Audio inputs		Composite-3; component-1; S-video-1
Power source		170-260V ~, 50Hz
Weight (Approx.)		30kg
Video/Audio outputs		Composite - 1
Rated power consumption		110 W

Designs and specifications are subject to change without notice.

INSTRUCTIONS FOR SERVICE SAFETY AND MAINTENANCE

WARNING: BEFORE SERVICING THIS CHASSIS, READ THE "X-RAY RADIATION PRECAUTION", "SAFETY PRECAUTION" AND "PRODUCT SAFETY NOTICE" INSTRUCTION BELOW.

X-RAY RADIATION PRECAUTION

1. The EHT must be checked every time the TV is serviced to ensure that the CRT does not emit X-ray radiation as result of excessive EHT voltage. The maximum EHT voltage permissible in any operating circumstances must not exceed the rated value. When checking the EHT, use the High Voltage Check procedure in this manual using an accurate EHT voltmeter.
2. The only source of X-RAY radiation in this TV is the CRT. The TV minimizes X-RAY radiation, which ensures safety during normal operation. To prevent X-ray radiation, the replacement CRT must be identical to the original fitted as specified in the parts list.
3. Some components used in this TV have safety related characteristics preventing the CRT from emitting X-ray radiation. For continued safety, replacement component should be made after referring the PRODUCT SAFETY NOTICE below.
4. Service and adjustment of the TV may result in changes in the nominal EHT voltage of the CRT anode. So ensure that the maximum EHT voltage does not exceed the rated value after service and adjustment.

SAFETY PRECAUTION

WARNING: REFER SERVICING TO QUALIFIED SERVICE PERSONNEL ONLY.

1. The TV has a nominal working EHT voltage. Extreme caution should be exercised when working on the TV with the back removed.

1.1 Do not attempt to service this TV if you are not conversant with the precautions and procedures for working on high voltage equipment.

1.2 When handling or working on the CRT, always discharge the anode to the TV chassis before removing the anode cap in case of electric shock.

1.3 The CRT, if broken, will violently expel glass fragments. Use shatterproof goggles and take extreme care while handling.

1.4 Do not hold the CRT by the neck as this is a very dangerous practice.

2. It is essential that to maintain the safety of the customer all power cord forms be replaced exactly as supplied from factory.
3. Voltage exists between the hot and cold ground when the TV is in operation. Install a suitable isolating transformer of beyond rated overall power when servicing or connecting any test equipment for the sake of safety.
4. When replacing ICs, use specific tools or a static-proof electric iron with small power (below 35W).
5. Do not use a magnetized screwdriver when tightening or loosing the deflection yoke assembly to avoid electronic gun magnetized and decrement in convergence of the CRT.

6. When remounting the TV chassis, ensure that all guard devices, such as nonmetal control buttons, switch, insulating sleeve, shielding cover, isolating resistors and capacitors, are installed on the original place.
7. Replace blown fuses within the TV with the fuse specified in the parts list.
8. When replacing wires or components to terminals or tags, wind the leads around the terminal before soldering. When replacing safety components identified by the international hazard symbols on the circuit diagram and parts list, it must be the company-approved type and must be mounted as the original.
9. Keep wires away from high temperature components.

PRODUCT SAFETY NOTICE

CAUTION: FOR YOUR PROTECTION, THE FOLLOWING PRODUCT SAFETY NOTICE SHOULD BE READ CAREFULLY BEFORE OPERATING AND SERVICING THIS TV SET.

1. Many electrical and mechanical components in this 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 replacements rated at higher voltages or wattage, etc. Components which have these special safety characteristics in this manual and its supplements are identified by the international hazard symbols on the circuit diagram and parts list. Before replacing any of these components read the parts list in this manual carefully. Substitute replacement components which do not have the same safety characteristics as specified in the parts list may create X-ray radiation.
2. Do not slap or beat the cabinet or CRT, since this may result in fire or explosion.
3. Never allow the TV sharing a plug or socket with other large-power equipment. Doing so may result in too large load, causing fire.
4. Do not allow anything to rest on or roll over the power cord. Protect the power cord from being walked on, modified, cut or pinched, particularly at plugs.
5. Do not place any objects, especially heavy objects and lightings, on top of the TV set. Do not install the TV near any heat sources such as radiators, heat registers, stove, or other apparatus that produce heat.
6. Service personnel should observe the SAFETY INSTRUCTIONS in this manual during use and servicing of this TV set. Otherwise, the resulted damage is not protected by the manufacturer.

SAFETY SYMBOL DESCRIPTION

The lightning symbol in the triangle tells you that the voltage inside this product may be strong enough to cause an electric shock. Extreme caution should be exercised when working on the TV with the back removed.

This is an international hazard symbol, telling you that the components identified by the symbol have special safety-related characteristics.

FDA This symbol tells you that the critical components identified by the FDA marking have special safety-related characteristics.

UL This symbol tells you that the critical components identified by the UL marking

have special safety-related characteristics.

C UL This symbol tells you that the critical components identified by the C-UL marking have been evaluated to the UL and C-UL standards and have special safety-related characteristics.

VDE This symbol tells you that the critical components identified by the VDE marking have special safety-related characteristics.

MAINTENANCE

1. Place the TV set on a stable stand or base that is of adequate size and strength to prevent it from being accidentally tipped over, pushed off, or pulled off. Do not place the set near or over a radiator or heat register, or where it is exposed to direct sunlight.
2. Do not install the TV set in a place exposed to rain, water, excessive dust, mechanical vibrations or impacts.
3. Allow enough space (at least 10cm) between the TV and wall or enclosures for proper ventilation.
4. Slots and openings in the cabinet should never be blocked by clothes or other objects.
5. Please power off the TV set and disconnect it from the wall immediately if any abnormal condition are met, such as bad smell, belching smoke, sparkling, abnormal sound, no picture/sound/raster. Hold the plug firmly when disconnecting the power cord.
6. Unplug the TV set from the wall outlet before cleaning or polishing it. Use a dry soft cloth for cleaning the exterior of the TV set or CRT screen. Do not use liquid cleaners or aerosol cleaners.

ADJUSTMENTS

SET-UP ADJUSTMENTS

The following adjustments should be made when a complete realignment is required or a new picture tube is installed.

Perform the adjustments in the following order:

1. Color purity
2. Convergence
3. White balance

Notes:

① The purity/convergence magnet assembly and rubber wedges need mechanical positioning. Refer to Fig1, 2.

② For some picture tubes, purity/ convergence adjustments are not required.

1. Color Purity Adjustment

Preparation:

Before starting this adjustment, adjust the vertical sync, horizontal sync, vertical amplitude and focus.

1.1 Face the TV set north or south.

1.2 Connect the power plug into the wall outlet and turn on the main power switch of the TV set.

1.3 Operate the TV for at least 15 minutes.

1.4 Degauss the TV set using a specific degaussing coil.

1.5 Set the brightness and contrast to maximum.

1.6 Counter clockwise rotate the R /B low brightness potentiometers to the end and rotate the green low brightness potentiometer to center.

1.7 Receive green raster pattern signals.

1.8 Loosen the clamp screw holding the deflection yoke assembly and slide it forward or backward to display a vertical green zone on the screen. Rotate and spread the tabs of the purity magnet around the neck of the CRT until the green zone is located vertically at the center of the screen.

1.9 Slowly move the deflection yoke assembly forward or backward until a uniform green screen is obtained.

1.10 Tighten the clamp screw of the assembly temporarily. Check purity of the red raster and blue raster until purities of the three rasters meet the requirement.

2. Convergence Adjustment

Preparation:

Before attempting any convergence adjustment, the TV should be operated for at least 15 minutes.

2.1 Center convergence adjustment

2.1.1 Receive dot pattern.

2.1.2 Adjust the brightness/contrast controls to obtain a sharp picture.

2.1.3 Adjust two tabs of the 4-pole magnet to change the angle between them and red and blue vertical lines are superimposed each other on the center of the screen.

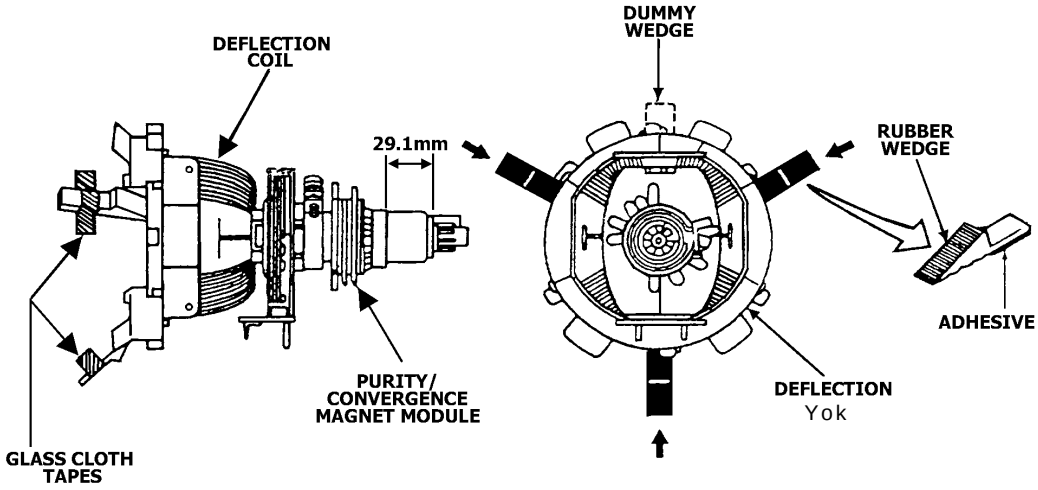


Fig. 1

2.1.4 Turn both tabs at the same time keeping the angle constant to superimpose red and blue horizontal on the center of the screen.

2.1.5 Adjust two tabs of the 6-pole magnet to superimpose red/blue line and green line.

2.1.6 Remember red and blue movement. Repeat steps 2.1.3)～2.1.5) until optimal convergence is obtained.

2.2 Circumference convergence adjustment

2.2.1 Loosen the clamp screw holding the deflection yoke assembly and allow it tilting.

2.2.2 Temporarily put the first wedge between the picture tube and deflection yoke assembly. Move front of the deflection yoke up or down to obtain better convergence in circumference. Push the mounted wedge in to fix the yoke temporarily.

2.2.3 Put the second wedge into bottom.

2.2.4 Move front of the deflection yoke to the left or right to obtain better convergence in circumference.

2.2.5 Fix the deflection yoke position and put the third wedge in either upper space. Fasten the deflection yoke assembly on the picture tube.

2.2.6 Detach the temporarily mounted wedge and put it in either upper space. Fasten the deflection yoke assembly on the picture tube.

2.2.7 After fastening the three wedges, recheck overall convergence and ensure to get optimal convergence. Tighten the lamp screw holding the deflection yoke assembly.

3. White Balance Adjustment

Generally, white balance adjustment is made with professional equipment. It's not practical to get good white balance only through manual adjustment. For TVs with I^2C bus control, change the bus data to adjust white balance.

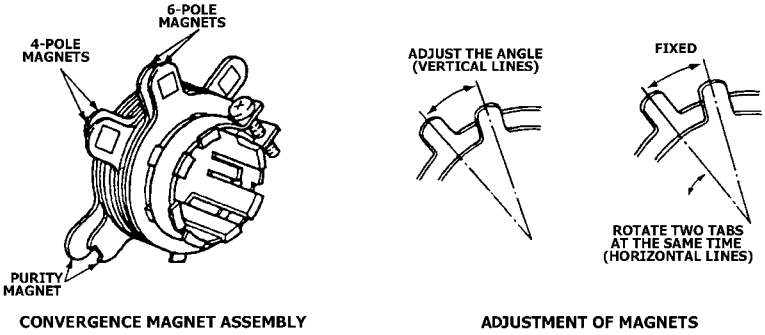
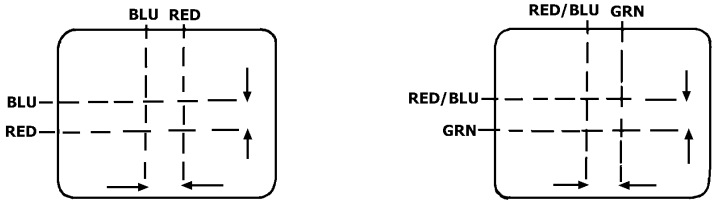


Fig. 2

4-pole Magnet Movement 6-pole Magnet Movement



Center Convergence by Convergence Magnets

Incline the Yoke Up (or Down) Incline the Yoke Right (or Left)

Circumference Convergence by DEF Yoke

Fig.3

CIRCUIT ADJUSTMENTS

Preparation:

Circuit adjustments should be made only after completion of set-up adjustments.

Circuit adjustments can be performed using the adjustable components inside the TV set. For TVs with I^2C bus control, first change the bus data.

1. Degaussing

A degaussing coil is built inside the TV set. Each time the TV is powered on, the degaussing coil will automatically degauss the TV. If the TV is magnetized by external strong magnetic field, causing color spot on the screen, use a specific degausser to demagnetize the TV in the following ways. Otherwise, color distortion will be shown on the screen.

1.1 Power on the TV set and operate it for at least 15 minutes.

1.2 Receive red full-field pattern.

1.3 Power on the specific degausser and face it to the TV screen.

1.4 Turn on the degausser. Slowly move it around the screen and slowly take it away from the TV.

1.5 Repeat the above steps until the TV is degaussed completely.

2. Confirmation and Adjustment for Voltage

Caution: +B voltage has close relation to high voltage. To prevent X-ray radiation, set +B voltage to the rated value.

2.1 Power on the TV and receive Philips test pattern.

2.2 Check the resistors and coils for being burned. (If the fuse is burned out, do not power on the TV again until the cause is found out.)

2.3 ---Measure voltages of test points with the digital voltmeter. Measure the CRT high voltage with the high-voltage testing equipment and heater voltage with the high-frequency effective voltmeter. The rated values are shown as below.

Table 2

Test Point	Voltage (V)	Test Point	Voltage (V)
Negative of VD871	82V±5V in standby 134±1.5V in use	Positive of C414	5±0.5V
Positive of C879	5±0.5V	Positive of C412	9±0.5V
Positive of C882	9±0.5V	Negative of VD872	16±1V
Positive of C117	32±1V	Negative of VD873	16±1V
Negative of VD402A	12.5±1V	Negative of VD874	16±1V
Negative of VD404	27±1.5V	Negative of VD403	190±5.0V
Heater	6.3+0.2\-0.3Vrms	CRT anode	29.5±1.2KV

3. High Voltage Inspection

Caution: No high voltage adjustment components inside the chassis. Please perform high voltage inspection in the following ways.

3.1 Connect a precise static high voltmeter to the second anode (inside the high voltage cap) of the CRT.

3.2 Plug in the supply socket (150-250V, AC) and turn on the TV. Set the brightness and contrast

to minimum (0μA).

3.3 The high voltage reading should be less than the limited EHT voltage.

3.4 Change the brightness from minimum to maximum, and ensure high voltage not beyond the limitation in any case.

Nominal EHT voltage: 29.5±1.2KV Limited EHT voltage: 32KV

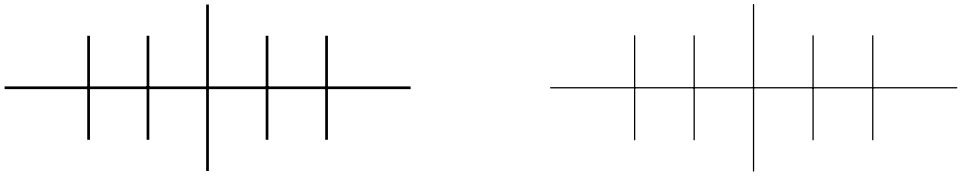
4. Focus Adjustment

Caution: Dangerously high voltages are present inside the TV. Extreme caution should be exercised when working on the TV with the back removed.

4.1 After removing the back cover, look for the FBT on the main PCB. There should be a FCB on the FBT.

4.2 Power on the TV and preheat it for 15 min.

4.3 Receive a normal TV signal. Rotate knob of the FCB until you get a sharp picture.



Before Adjusting After Adjusting

Fig. 4

5. Safety Inspection

5.1 Inspection for insulation and voltage-resistant

Perform safety test for all naked metal of the TV. Supply high voltage of 3000V AC, 50Hz (limit current of 10mA) between all naked metal and cold ground. Test every point for 3 sec. and ensure no arcing and sparking.

5.2 Requirements for insulation resistance

Measure resistance between naked metal of the TV and feed end of the power cord to be infinity with a DC-500 high resistance meter and insulation resistance between the naked metal and degaussing coil to be over 20MΩ.

6. SERVICE mode

6.1 To enter the SERVICE mode

Set the volume to 0 by the remote control. Then press and hold the MUTE button on the remote control and MENU button on the TV at the same time for over 2 seconds. In the S mode, press the POWER button to quit the S mode.

(" S " is red and other items are yellow.)

Use the ↓/↑buttons on the remote control to highlight an adjustment and the ←/→ buttons to adjust it.

The POS+/-,↑/↓/←/→,1~6, RECALL, VOL+/-, MUTE and POWER buttons on the remote control function in the S mode, but 100+, 7, 8, 9 and 0 buttons not.

6.2 Adjustments for Service mode and design mode

Table 3

:

	Bit	Function Description	Status
MODE0	Bit7.6	Audio system options (available during auto search and use of AUTO button)	00: B/G 01: I 10: D/K 11: M
	Bit5	Function switchover for CPU's Pin 61	0: External mute 1: Audio system switchover
	Bit4	V MUTE	When changing channels: 0: Y- mute 1: RGB mute
	Bit3	SECAM gate pulse width	00: 2.2 μ S 01: 2.0 μ S
	Bit2		10:1.8 μ S 11: SECAM decoding disabled
	Bit1	SECAM	0: No 1:Yes
	Bit0	Fixed to 00	
MODE1	Bit7	Write-in LOGO option	0: No 1:Yes
	Bit6	Power-on modes	0: Memory on 1: Soft on
	Bit5	Step length setting for lighting up gradually during power-on	1：Large step 0: Small step
	Bit4	Screen saver setting	0: No 1: Yes
	Bit3	M option	0: No 1: Yes
	Bit2	D/K option	0: No 1: Yes
	Bit1	I option	0: No 1: Yes
	Bit0	B/G option	0: No 1: Yes
MODE2	Bit7	Arabic numeral	0: Yes 1: No
	Bit6	DVD setting bit for AV board TC90L01	0: No 1: Yes
	Bit5	Tilt correction setting bit	0: No 1: Yes
	Bit4	“ SVM ” in PICTURE menu	0: No 1: Yes
	Bit 3	TA1343/NICAM woofer output setting	0: Mono output 1: Overlapped to main channel
	Bit 2	“ WOOFER ” in SOUND menu	0: No 1: Yes
	Bit 1	Black-screen time setting	0: Short time 1: If OPT.2 = 1, long time; OPT.2 = 0, short time
	Bit.0	BBE AGC option	1: 300mv 0: 150mv
MODE3	BIT 7	Relay switch option	1: Yes 0: No
	BIT 6	Instant power-on option	1: Yes 0: No
	BIT 5.4	Fixed to 00	
	BIT 3	BBE/SRS IC	1: Yes 0: No
	BIT 2	TA1218 Multi AV switch options	BIT 0 BIT 1 BIT2 0 0 0 TV - AV1(S) - AV2 - AV3(S) - DVD 0 0 1 TV - AV1(S) - AV2 - AV3(S) 0 1 0 TV - AV1(S) - AV2 - DVD 0 1 1 TV - AV1(S) - AV2
	BIT 1		

(continued)

	BIT 0		1 0 0 TV - AV1(S) - AV3(S) - DVD 1 0 1 TV - AV1(S) - AV3(S) 1 1 0 TV - AV1(S) - DVD 1 1 1 TV - AV1
MODE4	BIT 7	TC90A49 option	0: No 1: Yes
	BIT 6	TA1343 option	0: No 1: Yes
	BIT 5	TC90L01 option	0: No 1: Yes
	BIT 4	TA1218 option	0: No 1: Yes
	BIT 3	NA	
	BIT 2	NJW1161 option	0: No 1: Yes
	BIT 1	NJW1160 option	0: No 1: Yes
	BIT 0	NJW1137 option	0: No 1: Yes
LANG-OPT When only with single language option, reset the CPU to enable the options.	BIT 7	Arabic	0: No 1: Yes
	BIT 6	Farsi	0: No 1: Yes
	BIT 5	Malay	0: No 1: Yes
	BIT 4	Indonesian	0: No 1: Yes
	BIT 3	Russian	0: No 1: Yes
	BIT 2	German	0: No 1: Yes
	BIT 1	French	0: No 1: Yes
	BIT 0	English	0: No 1: Yes
LANG-OUT		Ex-factory language options with AUTO key	00: English 01: French 02: German 03: Russian 04: Indonesian 05: Malay 06: Farsi 07: Arabic
OPT	Bit 7	Interval between relay on and off	0: No 1: Yes
	Bit 6	VCO adjustments	0: PIF VCO functions (PIFVCO = 10) during auto search and search ; 1: PIFVCO = 10 during turn-on, and PIFVCO = 00 in Normal mode
	Bit 5	Audio processing	1: Yes 0: No
	Bit 4	Large-amplitude AFT switch when no signal	1: Off 0: On
	Bit 3	Audio gain switch	1: Off 0: On
	Bit 2	Usage of Y-mute	0: No 1: Yes
	Bit 1	Thailand B/G (5.74M)	1: Yes 0: No
	Bit 0	Single audio system	1: Yes 0: No
OSD		Horizontal position of OSD	
RCUT		R cut off	
GCUT		G cut off	
BCUT		B cut off	
GDRV		G drive	
BDRV		B drive	
CNTX		Contrast Max.	
BRTC		Brightness center	

(continued)

COLC	Color center (for NTSC)		
TNTC	Tint center (for NTSC)		
TNTCAV	Tint center (for NTSC IN AV)		
COLP	Color center (for PAL)		
COLS	Color center (for SECAM)		
DCOL	DVD color		
SCOL	Sub color center (for DVD)		
SCNT	Y- sub contrast		
CNTC	Contrast center		
CNTN	Contrast Min.		
BRTX	Brightness Max.		
BRTN	Brightness Min.		
COLX	Color Max.		
COLN	Color Min.		
TNTX	Tint Max.		
TNTN	Tint Min.		
ST3	Sharpness center for NTSC 3.58 (TV)		
SV3	Sharpness center for NTSC 3.58 (VIDEO)		
ST4	Sharpness center for other color system (TV)		
SV4	Sharpness center for other color system (VIDEO)		
SVD	Sub Sharpness center in DVD		
ASSH	Asymmetry sharpness		
SHPX	Sharpness Max.		
SHPN	Sharpness Min.		
TXCX	Text RGB in user contrast Max.		
RGCN	Text RGB in user contrast Min.		
ABL	BIT 5	Y peak limiter	0: Off 1: On
	BIT 4	OSD ABL	0: Active 1: Inactive
	BIT 3.2	ABL start point	00: ABL start point: 0V 01: -0.15V 10: -0.30V 11: -0.45V
	BIT 1.0	ABL gain	00: -0.2V 01: -0.4V 10: -0.6V 11: -0.8V
DCBS	BIT 7	Blank SW	0: H, V blanking on 1: H, V blanking off
	Bit 6		
	Bit 5.4	OSD level	00: OSD level, 80 IRE 01: 70IRE 10: 60IRE 11: 50IRE
	Bit 3.2	Y gamma	00: Off 01: Y point 90 IRE, Gain –3dB 10: 80IRE 11: 70IRE
	Bi t 1.0	Black stretch	00: Off 01: Black stretch point, 25 IRE 10: 35IRE 11: 45IRE
CLTO Chroma data (TV & not M)	BIT 7	Killer off	0: Normal 1: Always killer off
	BIT 6	P/N ID	0: PAL/ NTSC killer sensitivity, 1mVpp 1: 10mVpp
	BIT 5	C gamma	0: Color gamma off 1: On

(continued)

CLTM (TV & M)	BIT 4.3	NTSC matrix	00: USA (105 degree) 01: Japan (93 degree) 10: DVD 11:
CLVD(DVD) CLVO(50hz) /CLVM（60hz） (VIDEO)	BIT 2.1.0	Y DL	000: -40 nsec 001: 0 010: 40 nsec 011: 80 nsec 100: 120 nsec 101: 160 nsec 110: 200 nsec 111: 240 nsec
DEF	BIT0 = 0: V AGC reference depends on YC VCC; BIT0 = 1: V AGC reference depends on integrated regulator		
SECD	No use		
HPOS	50Hz horizontal phase		00: -3usec 10: 0 1F: +3usec
VP50	V phase (50Hz)		0: V phase delay, 0H 7: 7H
HIT	V size		00: -50% 20: 0% 3F: 50%
HPS	Adjusting difference between horizontal centers in PAL and NTSC		
VP60	V phase (60Hz)		0: V phase delay, 0H 7: 7H
HITS	Adjusting difference between vertical amplitudes in PAL and NTSC		
VLIN	V-linearity		0: -15% 8: 0% F: 15%
VSC	V-S correction		0: -16% 8: 0% F: 16%
VLIS	Adjusting difference between vertical linear in PAL and NTSC		
VSS	Correction for shift data of 50 Hz/ 60 Hz		
DPC	EW parabola		00: 0Vpp 20: 1.4Vpp 3F: 2.8Vpp
DPCS	Shift data of EW parabola		
HIT69	Vertical amplitude in 16:9 mode (PAL)		
DPC69	EW parabola 16:9 in 16:9 mode (PAL)		
HIT69S	Vertical amplitude in 16:9 mode (NTSC)		
DPC69S	EW parabola 16:9 in 16:9 mode (NTSC)		
KEY	Trapezium		00: -13% 20: 0% 3F: 13%
KEYS	Shift data of trapezium		
WID	H size		00: 1.5V V20: 4V 3F: 6.5V
WIDS	Shift data of H size		
ECCT	EW corner top		00: -1.5V 10: 0V 1F: 1.5V
ECCB	EW corner bottom		00: -1.5V 10: 0V 1F: 1.5V
VEHT	V EHT gain		0: 0% 4: 5% 7: 10%
HEHT	H EHT gain		0: 0% 4: 5% 7: 10%
SBY	Use in SECAM		
SRY	Use in SECAM		
BRTS	Sub brightness (difference)		
RFAGC	RF AGC		00: IF mute 01: 65dBu 3F: 100dBu

(continued)

HAFC	BIT 3.2	AFC gain (in VIDEO mode)	Data / Description: Blanking Period / Picture Period 0 0 / 3 / 1 0 1 / 4/7 / 2/7 1 0 / 4/3 / 1 1 1 / Off / Off
	BIT 1.0	AFC gain (in TV mode)	Data / Description: Blanking Period / Picture Period 0 0 / 3 / 1 0 1 / 4/7 / 2/7 1 0 / 4/3 / 1 1 1 / Off / Off
V01	Volume output data at 1%		
V25	Volume output data at 25%		
V50	Volume output data at 50%		
V100	Volume output data at 100%		
Woofer	TA1343 woofer Max.		
STAT	No use		
FLG0	BIT 7	Readjust VCO when selecting position	0: Enable 1: Disable
	BIT 2	N buzz cancel	0: Nyquist buzz cancel, on 1: Off
	BIT 1	AFT window SW	0: Wide (-/+ 250kHz) AFT sensitivity, for channel search 1: Narrow (83kHz) For normal operation
	BIT 0	Over modulation	0: Normal 1: PIF over modulation switch on
FLG1	BIT 5	MIX GAIN	0: SIF 1MHz convert gain, low gain 1: High gain
	BIT 4	Sync separation.	0: Sync separation level 40% 1: 36%
REFP	AKB pulse position		000: 0H 001: 1H 010: 2H 011: 3H 100: 4H 101: 5H 110: 6H 111: 7H
RSNS	R SENSE		00: x 0 20: x 0.5 3F: x 1.0
GSNS	G SENSE		00: x 0 20: x 0.5 3F: x 1.0
BSNS	B SENSE		00: x 0 20: x 0.5 3F: x 1.0
MOD	Bit 6.5.4	PIF FREQUENCY	001: 45.75 MHz 011: 38.9 MHz 100: 38.0 MHz
	Bit 1.0	AKB MODE	00: AKB off 01: ACB (cutoff: align to targets) 10: ADB (drive: align to targets) 11: AKB (cutoff/drive: align to targets)
STBY	BIT 3.2	VCD STANDBY	00: Normal 01: Normal 10: Normal 11: VCD Standby
	BIT 1.0	IF Standby	00: Normal 01: Normal 10: Normal 11: IF Standby
SVM	BIT.4		1:co max=1 (-0.65 to +0.85) 0: co max=0 (cutoff range: -0.65 to +0.65)
SVM1	Data when SVM off		
SVM3	Data when SVM on		
VBLK	BIT 3.2	V blanking stop point	00: 310H(50hz) 263H(60hz) 01: 299H(50hz) 254H(60hz) 10: 295H(50hz) 250H(60hz) 11: 291H(50hz) 246H(60hz)
	BIT 1.0	V blanking start point	00: 23H(50hz) 22H(60hz) 01: 33H (50hz)30H(60hz) 10: 37H (50hz)34H(60hz) 11: 41H(50hz) 38H(60hz)
VCEN	Vertical centering		00: -32% 20: 0% 3F: 30%
UCOM	BIT 1.0	Internal ADC	00: GND 01: R output 10: B output 11: Monitor RF AGC via ADC
	BIT5.4.3	Improving NTSC color signal-to-noise ratio	Available range: 000….011

(continued)

VTST	No use		
PYNX	Normal H.SYNC Max.	0----------3F	
PYNN	Normal H.SYNC Min.	0----------3F	
PYXS	ASM/Search H.SYNC Max.	0----------3F	
PYNS	ASM/Search H.SYNC Min	0----------3F	
BASC	Bass volume Center		
BASX	Bass volume Max.		
TREC	Treble volume Center		
BALC	Balance volume Center		
BAS1	Bass in MUSIC mode setting		
TRE1	Treble in MUSIC mode setting		
WFL1	Woofer in MUSIC mode setting		
BAS2	Bass in NEWS mode setting		
TRE2	Treble in NEWS mode setting		
WFL2	Woofer in NEWS mode setting		
BAS3	Bass in THEATRE mode setting		
TRE3	Treble in THEATRE mode setting		
WFL3	Woofer in THEATRE mode setting		
WON1	TA1343 Max. woofer setting. The bigger the setting the smaller Max. woofer.		
WON2	Woofer linear setting		
NVOL	Prescale NICAM		
NICL	NICAM->MONO level		
NICH	MONO->NICAM level		
NOIS	BIT 2	AFC gain data setting in TV mode: 1: Adjust AFC gain in the lowest two bits of HAFC 0: With weak signal received, AFC gain = 0x10; with strong signal received, AFC gain = 0x00	
	BIT 7-BIT 0	Criterion of signal strength: >NOIS: Weak signal <= NOIS: Strong signal	
VATT	Audio ATT 00:-85DB or less 7F:0DB (7 BITS)		
COM1 (TC90A49)	BIT 3	Pedestal clip	0: On 1: Off
	BIT 2.1.0	VENH2.1.0	000: 0db(x1) …… 111: 3.52db(x1.5)
COM2 (TC90A49)	BIT 7.6.5.4	Set vertical enhancer non-linear point	0000: 4LSB …… 1111: 64LSB
	BIT 3	Set Y output horizontal peaking gain	0: 1.5dB 1: 3.0dB
	BIT2	Set Y output horizontal peaking on/off	0: On 1: Off
	BIT 1.0	Set vertical enhancer coring level	00: 0LSB …… 11: 3LSB
B1(12345)	NICAM chip five-equalizer data when the sound mode set to MUSIC: B11 (for 120Hz) B12 (for 500 Hz) B13 (for 1.5KHz) B14 (for 5KHz) B15 (for 10KHz)		
B2(12345)	NICAM chip five-equalizer data when the sound mode set to NEWS: B21 (for 120Hz) B22 (for 500 Hz) B23 (for 1.5KHz) B24 (for 5KHz) B25 (for 10KHz)		
B3(12345)	NICAM chip five-equalizer data when the sound mode set to THEATRE: B31(for 120Hz) B32 (for 500 Hz) B33 (for 1.5KHz) B34 (for 5KHz) B35 (for 10KHz)		
BBE	Highest four bits：BBE contour (0dB to 15dB); Lowest four bits: BBE process (0dB to 15dB)		
OSDF	OSD frequency setting		

6.3 Adjustments and Bus data

Table 4

Item	Data	Item	Data	Item	Data	Item	Data
* MODE0	A6	CNTC	40	# HITS	04	GSNS	00
* MODE1	35	CNTN	08	# VLIN	0C	BSNS	00
* MODE2	5D	BRTX	20	# VSC	06	MOD	40
* MODE3	00	BRTN	20	# VLIS	00	STBY	00
* MODE4	20	COLX	20	# VSS	01	SVM	00
LANG-OPT	09	COLN	00	# HIT69	14	SVM1	00
LANG-OUT	03	TNTX	28	# DPC69	10	SVM3	06
COM1	04	TNTN	28	# DPC69	18	VBLK	00
COM2	3F	ST3	30	# KEY	22	# VCEN	20
BBE	9B	SV3	30	# WID	16	UCOM	00
C-MT	99	ST4	28	# HIT69S	01	VTST	00
C-MTB	44	SV4	30	# DPC69S	01	PYNX	2E
C-MB	F9	SVD	30	# DPCS	03	PYNN	18
C-MBB	36	ASSH	07	# KEYS	00	PYXS	22
C-N	9E	SHPX	10	# WIDS	02	PYNS	1E
C-NB	36	SHPN	10	# ECCT	08	BASC	40
OSDF	70	TXCX	3F	# ECCB	08	BASX	70
# OSD	30	RGCN	1F	VEHT	04	TEEC	40
* OPT	00	ABL	21	HEHT	01	BALC	40
# RCUT	30	DCBS	16	# SBY	08	BAS1	3C
# GCUT	30	CLTO	3F	# SRY	08	TRE1	40
# BCUT	30	CLTS	30	# BRTS	17	WFL1	46
# GDRV	40	* CLTM	23	# RAGC	18	BAS2	20
# BDRV	40	CLVO	3F	HAFC	08	TRE2	50
CNTX	7F	* CLVM	20	* V01	25	WFL2	00
BRTC	40	CLVD	30	* V25	3A	BAS3	20
COLC	28	DEF	01	* V50	4A	TRE3	40
TNTC	30	AKB	00	* V100	7F	WFL3	20

(continued)

TNTCAV	48	SECD	08	* WOOFER	72	* WON1	00
COLP	00	# HPOS	0B	STST	00	WON2	00
COLS	40	# VP50	04	FLG0	06	NOIS	01
DCOL	40	# HIT	15	FLG1	18	VATT	5D
SCOL	00	# HPS	03	REFP	00		
SCNT	09	# VP60	02	RSNS	00		

Notes:

① The data sheet may differ dependent on different models.

② The data sheet may differ dependent on different CRTs for the same model.

③ The data marked with " * " can be adjusted.

STRUCTURE AND CHASSIS FUNCTION DESCRIPTION

1. STRUCTURE BLOCK DIAGRAM

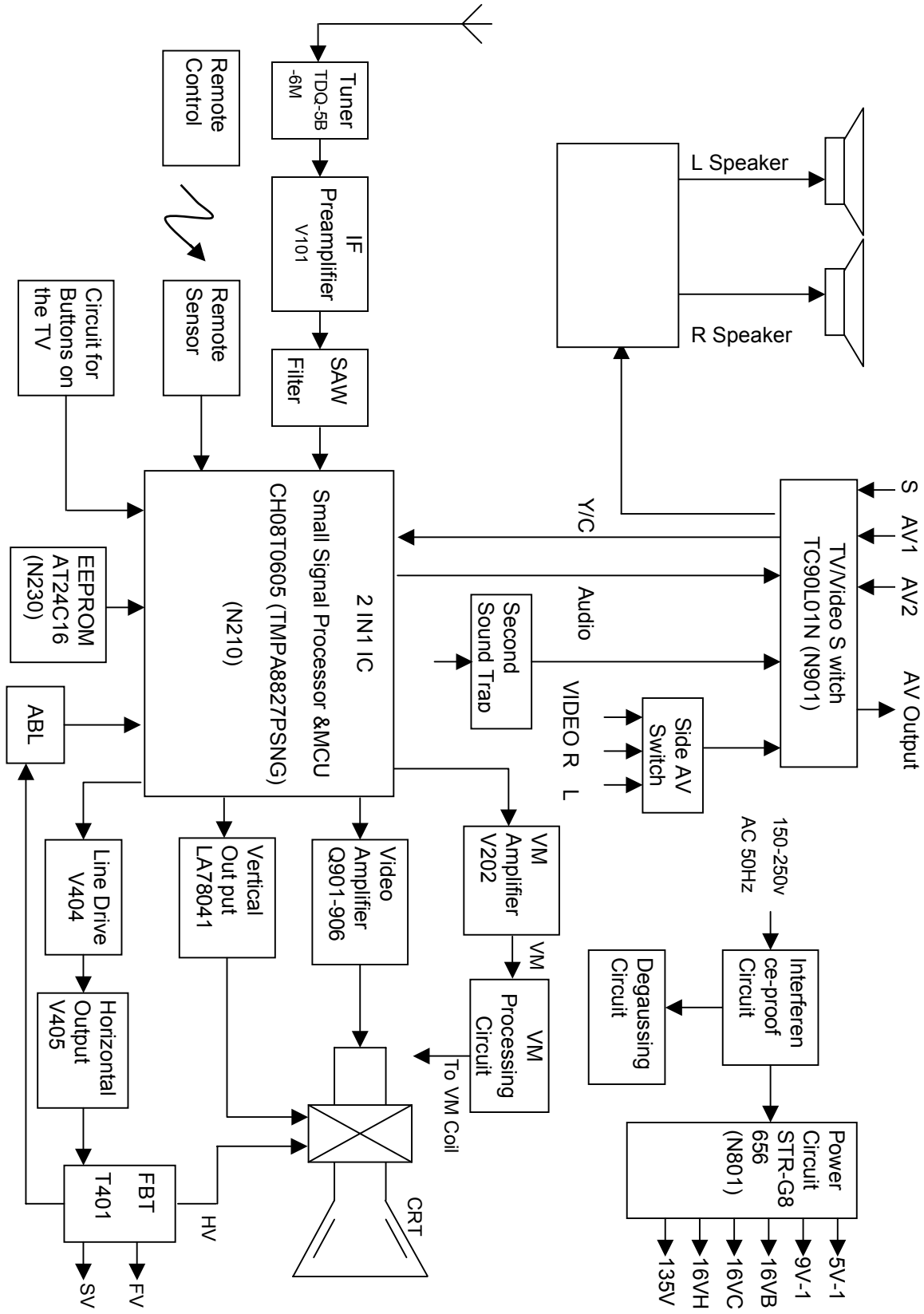


Fig. 5 Structure Block Diagram of CN -18ED Chassis

2. BLOCK DIAGRAM FOR SUPPLY VOLTAGE SYSTEM

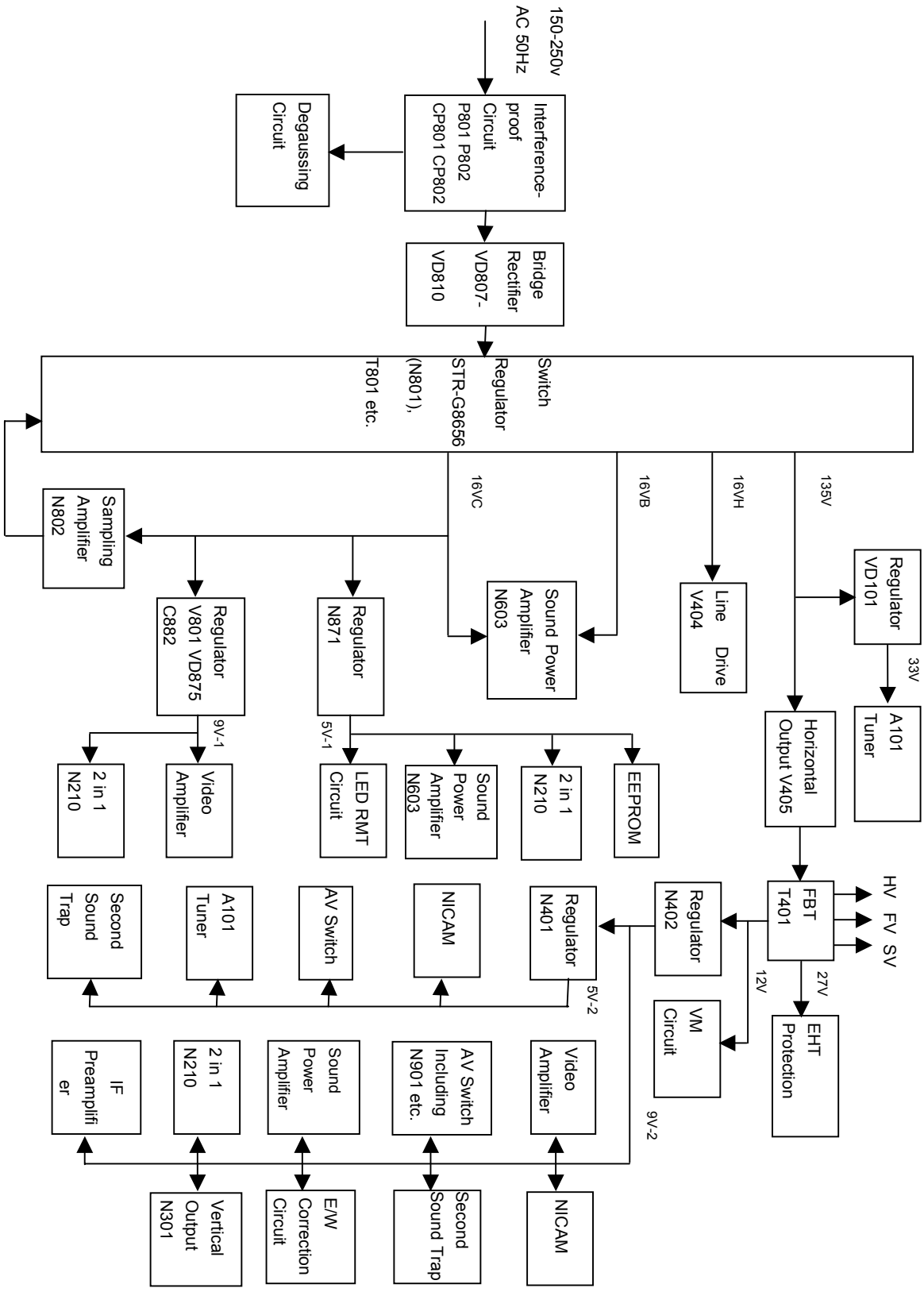


Fig. 5 Structure Block Diagram of CN -18ED Chassis Supply Voltage System

3．CHASSIS DESCRIPTION

General Description

CN-18ED chassis is applied in PF2939E. By use of Toshiba V/C/D-MCU 2IN1 IC for TV small signal processing and bus control, the chassis enables TV tuning, adjustment, control and picture correction, featuring high-integration, high-performance-to-price ratio and high-reliability and compact circuit with fewer external components. The chassis, widely used in small and medium TVs, provides much more convenience for manufacturing and technical service. It includes:

- 2IN1 IC TMAP8827PSNG with function of E/W correction for PAL/NTSC/SECAM small signal processing and bus control
- EEPROM AT24C16 for data memory
- LA78040 /LA78041for vertical output power amplifying
- TDA8944J (mono) for audio power amplifying
- Thick-film IC STR-G8656 for power circuit adjustment and control
- AV control TC90L01N

The following features are available in the chassis:

- Color systems: PAL/ SECAM
- Sound systems: D/K B/G
- 236 programs preset
- Multilingual on screen display
- I^2C bus control
- NICAM/AV stereo
- Selectable picture/sound modes
- Intelligent lock
- Message board
- Telephone directory
- Game
- Biorhythm
- Calendar inquiry

The chassis mainly uses the following ICs and assemblies.

Table 5 Key ICs and Assemblies

Serial No.	Position	Type	Description
1	N230	AT24C016	EERPOM
2	N210	CH08T0605 (TMPA8827PSNG)	2IN1 IC (Small signal processor + micro control (UOC))
3	N603	TDA8944J	Stereo audio power amplifier
4	N301	LA78040/LA78041	Vertical scan output stage circuit
5	N801	STR-G8656	Switch-mode power supply control
6	N901	TC90L01N	AV switch
7	A101	TDQ-5B6-M	Tuner

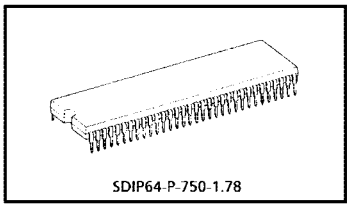
SERVICE DATA

TECHNICAL DATA OF KEY ICS

1. TOSHIBA 2IN1 IC SERIES TMPA8827CMBNG /CPNG/CSNG

MCU AND SIGNAL PROCESSOR FOR A PAL/NTSC/SECAM TV

The TMPA8827CMNG /CPNG /CSNG is an integrated circuit for a PAL/ NTSC/SECAM TV. A MCU and a TV signal processor are integrated in a 64-pin shrink DIP package. The MCU contains 8-bit CPU, ROM, RAM, I/O ports, timer/ counters, A/D converters, an on-screen display controller, remote control interfaces, IIC bus interfaces and the Closed Caption decoder. The TV signal processor contains PIF, SIF, Video, multi-standard chroma, Deflection, RGB processors.



Weight: 8.85 g (typ.)

Fig. 6

MROM: TMPA8827CMNG (ROM: 32k)
TMPA8827CPNG (ROM: 48k)
TMPA8827CSNG (ROM: 64k)
OTP: TMPA8827PSNG
Weight: 8.85 g (typ.)

1) Features

MCU

☐ High speed 8-bit CPU (TLCS-870/X series)
☐ Instruction execution time: 0.5 μs (at 8 MHz)
☐ (TMPA8827CMNG)
32-Kbytes ROM, 2-Kbytes RAM
(TMPA8827CPNG)
48-Kbytes ROM, 2-Kbytes RAM
(TMPA8827CSNG)
64-Kbytes ROM, 2-Kbytes RAM
☐ ROM correction
☐ 12 I/O ports
☐ 14-bit PWM output 1 ch for a voltage synthesizer
☐ 7-bit PWM output 1 channel
☐ 8-bit A/D converter 3 ch for a touch-key input with key ON wake-up CIRCUIT
☐ Remote control signal preprocessor
☐ Two 16-bit internal timer/counter 2 ch

CCD Decoder

☐Digital data slicer for NTSC

OSD

☐ Clock generation for OSD display
☐ Font ROM characters: 384 characters
☐ Characters display: 32 columns × 12 lines
☐ Composition: 16 × 18 dots
☐ Size of character: 3 (line by line)
☐ Color of character: 8 (character by character)
☐ Display position: H 256/V 512 steps
☐ BOX function
☐ Fringing, smoothing, Italic, underline function
☐ Conform to CCD REGULATION
☐ Jitter elimination

- Two 8-bit internal timer/counter 2 ch
- Time base timer, watchdog timer
- 16 interrupt sources: external 5, internal 11
- IIC bus interface (multi-master)

• TV Processor

IF

- Integrated PIF VCO aligned automatically
- Negative demodulation PIF
- Multi-frequency SIF demodulator without external Tank-coil

Video

- Integrated chroma traps
- Black stretch
- Y-gamma

Chroma

- Integrated chroma BPFs
- PAL/NTSC/SECAM demodulation

RGB/Base-Band

- Integrated 1 H base-band delay line
- Base-band TINT control
- Internal OSD interface
- Half-tone and transparent for OSD
- External YCbCr interface for DVD
- RGB cut-off/drive controls by bus
- ABCL (ABL and ACL combined)

Sync.

- Integrated fH × 640 VCO
- DC coupled vert. ramp output (single) EW correction with EHT input

2) Block Diagram

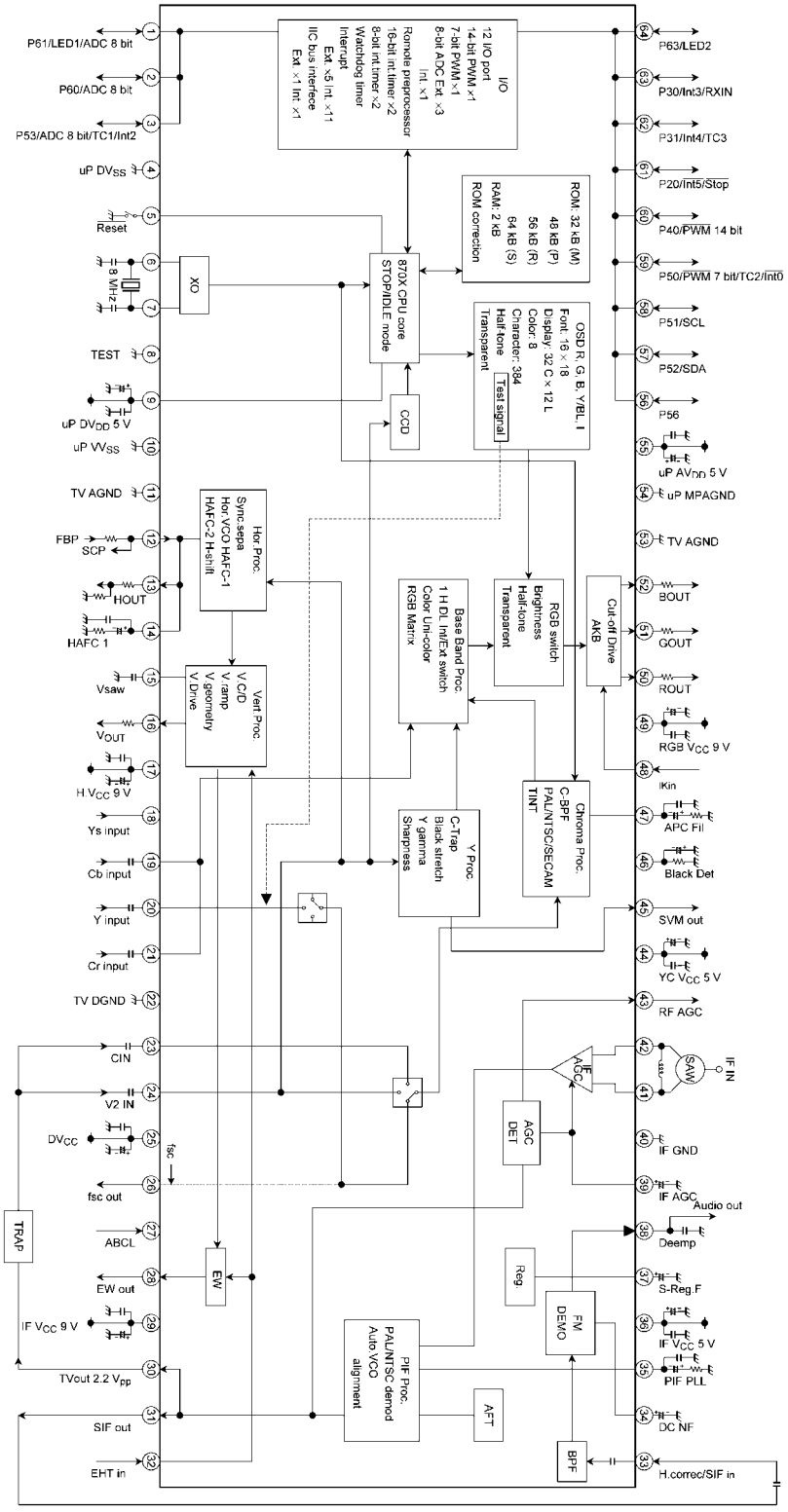


Fig. 7 Block diagram

3) Basic Structure

3.1) Internal Connections

TMPA8827 has two pieces of IC chip in one package, using Multi-Chip-Package (MCP) technology. One is a micro controller (MCU) and the other one is a signal processor (SP) for a color TV. There are some internal connections between these two ICs for handling below signals.

Table 6 Signal Name Direction Description

No.	Signal Name	Direction	Description
1	SCL	M to S	Internal IIC bus SCL
2	SDA	Bi-direction	Internal IIC bus SDA
3	OSD R	M to S	OSD signal connection
4	OSD G	M to S	OSD signal connection
5	OSD B	M to S	OSD signal connection
6	OSD Y/BL	M to S	OSD display control
7	OSD I, CS OUT	M to S	OSD half-tone control/Test pattern signal
8	C-Video	S to M	Composite video signal from internal video switch, for CCD
9	C-Sync	S to M	Composite sync. signal from sync. Separator, for CCD
10	HD	S to M	Horizontal timing pulse regenerated from FBP, for OSD
11	VD	S to M	Vertical timing pulse from sync. Separator, for OSD
12	CLK	M to S	8 MHz clock
13	AVDD	M to S	Reference voltage for C-Video interface
14	ADC	S to M	A/D converter monitoring RF-AGC, R-Y and B-Y

Functions of SP from MCU are controllable through the IIC bus of the internal connections.

3.2) Power Supply

TMPA8827 has some power supply and GND pins. Power supplies related MCU must be applied at the first. Power supplies for H.VCC and TV D.VCC are the second with at least 100 ms delay after MCU power ON. The other power supplies are the last, which are recommended to be supplied from a regulator circuit using FBP.

3.3) Crystal Resonator

TMPA8827 requires only one crystal resonator, in stead that a conventional two-chip solution requires two resonators at least, one for MCU and the other one for SP. An oscillation clock with the crystal resonator of TMPA8827is supplied for MCU operation, PIF VCO automatic alignment, alignment free AFT, chroma demodulation and horizontal oscillation. The oscillation frequency is very important so that those of functions work properly, so that designing the oscillation frequency accurately is required. The spec of crystal is recommended to be within

fosc: 8 MHz +/-20 ppm

ftemp: 8 MHz +/-40 ppm (-20°C to +65°C)

While RESET of MCU is active, the MCU function stops. Hardware and software initialization sequence including power supplies control is required, because status of any hardware after the

RESET period is unknown especially horizontal oscillator which is a very basic timing generator of SP operation.

4) Terminal Interface

MCU Block

Table 7

Pin No.	Pin Name Interface Ci	I/O	Function
1	P61/LED1/ADC 8 bit (/KWU5) (AIN5) (LED1)	I/O (input) (input) (output)	 Key on wake up input A/D converter analog input High current sink open drain output
2	P60/ADC 8 bit (/KWU4) (AIN4)	I/O (input) (input)	 Key on wake up input A/D converter analog input
3	P53/ADC 8 bit/TC1/Int2 (/KWU0) (AIN0) (TC1) (INT2)	I/O (input) (input) (input) (input)	 Key on wake up input A/D converter analog input Timer/counter input External interrupt input
4	uP DVSS	Power Supply	GND
5	/Reset	I/O	Reset signal input or watchdog timer output Address trap reset output
6 7	XOUT XIN	Output Input	X'tal connecting pins
8	TEST	Input	Test pin for out-going test. Be tied to low.
9	uP DVDD 5 V	Power Supply	VDD Supply 5 V
10	uP VVSS	Power Supply	GND for Slicer circuit
54	uP MPAGND	Power Suppl	GND for Oscillator circuit
55	uP AVDD 5 V	Power Supply	VDD for OSD Oscillator circuit Supply 5 V
56	P56	I/O	
57	P52/SDA (SDA)	I/O (I/O)	IIC bus serial data input/output
58	P51/SCL (SCL)	I/O (I/O)	IIC bus serial clock input/output
59	P50/PWM 7 bit/TC2/ Int0 (/PWM8)	I/O (output) (input)	7-bit D/A conversion (PWM) output Timer/Counter input External interrupt input

(continued)

	(TC2) (/INT0)	(input)	
60	P40/PWM 14 bit (/PWM0)	I/O (output)	14/12-bit D/A conversion (PWM) output
61	P20/Int5/Stop (/INT5) (/STOP)	I/O (input) (input)	External interrupt input STOP mode release signal input
62	P31/Int4/TC3 (INT4) (TC3)	I/O (input) (input)	External interrupt input Timer/Counter input
63	P30/Int3/RXIN (INT3) (RXIN)	I/O (input) (input)	External interrupt input Remote control signal Preprocessor input
64	P63/LED2/ (LED2)	I/O (output)	High current sink open drain output

Signal Processor Block

Table 8

Pin No.	Pin Name	Function
11	TV AGND	GND terminal for Analog block.
12	FBP in	Input terminal for FBP.
13	HOUT	Output terminal for Horizontal driving pulse.
14	HAFC 1	Terminal to be connected capacitor for HAFC filter. This terminal voltage controls H VCO frequency.
15	V saw	Terminal to be connected capacitor to generate V saw signal. V saw amplitude is kept constant by V AGC function.
16	V OUT	Output terminal for Vertical driving pulse.
17	H.VCC 9 V	VCC terminal for DEF circuit. Supply 9 V.
18	S Filter	Terminal to be connected capacitor for SECAM filter.
19	Cb input	Input terminal for Cb signal.
20	Y input	Input terminal for Y signal. (Input level =1 Vp-p
21	Cr input	Input terminal for Cr signal. It is recommended that input impedance is low.
22	TV DGND	GND terminal for Digital block.
23	CIN	Input terminal for Chroma signal.
24	EXT CVBS/Y (V2 IN)	Input terminal for Video signal. (Input level =1 Vp-p)
25	TV DVCC	VCC terminal for Digital block. This terminal voltage is clipped about 3.3 V by regulator circuit. Supply TV DVCC voltage from HVCC

(continued)

		(#17) voltage via 270Ω.
26	fsc out	Output terminal for fsc wave signal. (Output level =0.55Vp-p typ.)
27	ABCL	Input terminal for ABL/ACL control.
28	Ew out	Output terminal for East-West correction signal.
29	IF VCC 9 V	VCC terminal for IF circuit. Supply 9 V.
30	TV out	Output terminal for detected PIF signal. (Output level =2.2 Vp-p)
31	SIF out	Output terminal for detected SIF signal.
32	EHT in	Input terminal for EHT feedback signal.
33	H.correc/SIF in	Input terminal for H correction and 2nd SIF.
34	DC NF	Terminal to be connected capacitor for DC Negative Feedback from SIF Det. output.
35	PIF PLL	Terminal to be connected with loop filter for PIF PLL. This terminal voltage is controlled PIF VCO frequency.
36	IF VCC 5V	VCC terminal for IF circuit. Supply 5 V.
37	S-Reg.F	Terminal to be connected capacitor for stabilizing internal bias.
38	Deemph/ Audio out	Terminal to be connected capacitor for SIF Det. De-Emphasis.
39	IF AGC	Terminal to be connected with IF AGC filter.
40	IF GND	GND terminal for IF circuit.
41 42	IF IN	Input terminals for IF signals. Pin 41 and Pin 42 are both input poles of differential amplifier.
43	RF AGC	Output terminal for RF AGC control level.
44	YC VCC 5 V	VCC terminal for Y/C circuit. Supply 5 V.
45	Monitor out	Output terminal for CVBS or Y signal selected by BUS (video SW).
46	Black Det.	Terminal to be connected with Black Det. filter for black stretch.
47	APC Fil. (Chrome PLL filter)	Terminal to be connected with APC filter for Chroma demodulation. This terminal voltage controls frequency of VCXO.
48	IKin	Input terminal to sense AKB cathode current.

(continued)

49	RGB VCC9 V	VCC terminal for RGB circuit. Supply 9 V.
50	ROUT	Output terminal for R signal.
51	GOUT	Output terminal for G signal.
52	BOUT	Output terminal for B signal.
53	TV AGND	GND terminal for Analog block.

5) Microcontrollers Descriptions

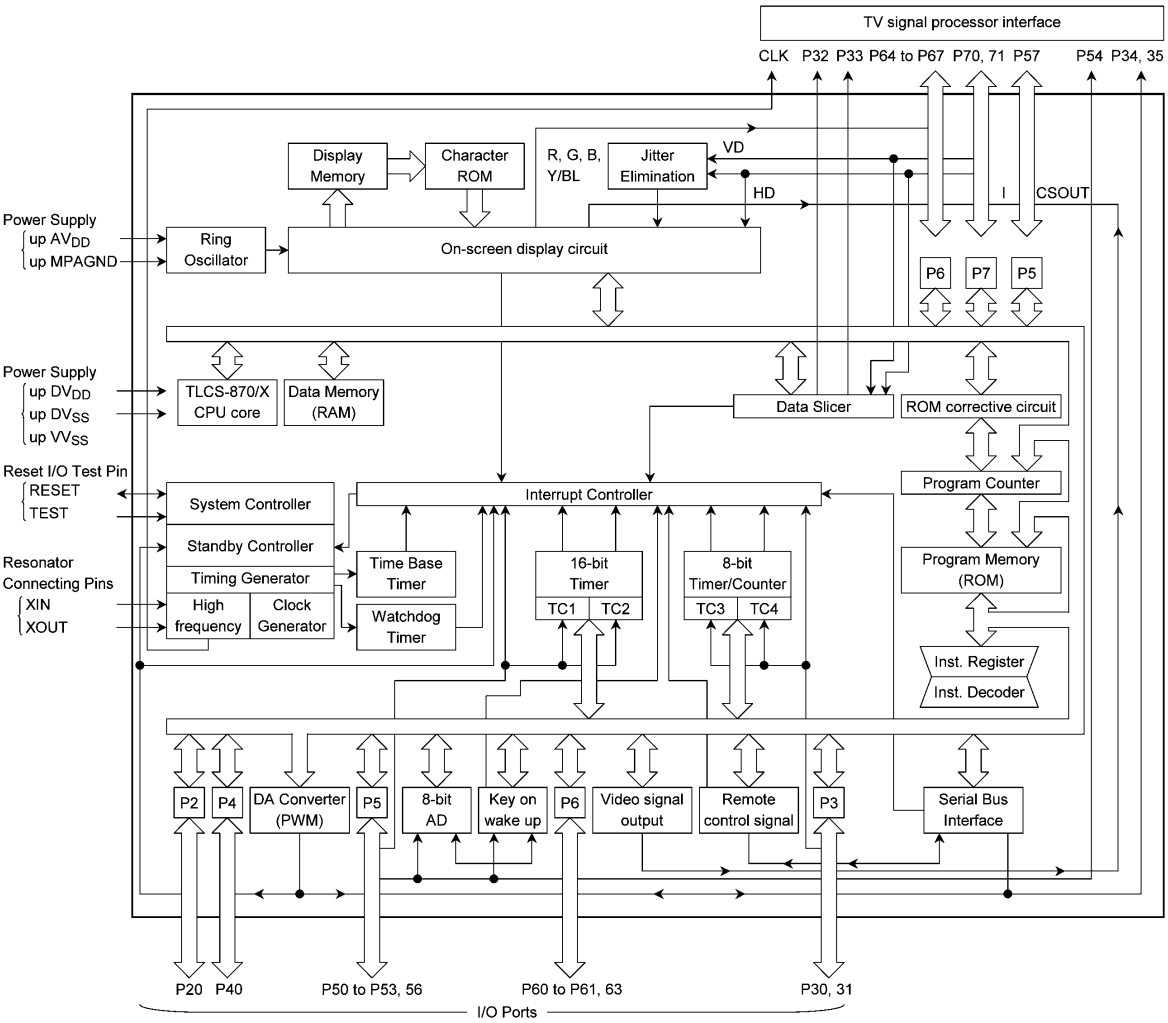


Fig. 8 Functional Diagram

6) Refer to Table 13 about Functions and Data of the IC's Pins.

2. AUDIO POWER AMPLIFIER TDA8944J

2 X 7 W STEREO BRIDGE TIED LOAD (BTL) AUDIO AMPLIFIER

1) General description

The TDA8944J is a dual-channel audio power amplifier with an output power of 2×7 W at an 8 Ω load and a 12 V supply. The circuit contains two Bridge Tied Load (BTL) amplifiers with an all-NPN output stage and standby/mute logic. The TDA8944J comes in a 17-pin DIL-bent-SIL (DBS) power package. The TDA8944J is printed-circuit board (PCB) compatible with all other types in the TDA894x family. One PCB footprint accommodates both the mono and the stereo products.

2) Features

- ❷ Few external components
- ❷ Fixed gain
- ❷ Standby and mute mode
- ❷ No on/off switching plops
- ❷ Low standby current
- ❷ High supply voltage ripple rejection
- ❷ Outputs short-circuit protected to ground, supply and across the load
- ❷ Thermally protected
- ❷ Printed-circuit board compatible.

3) Block diagram

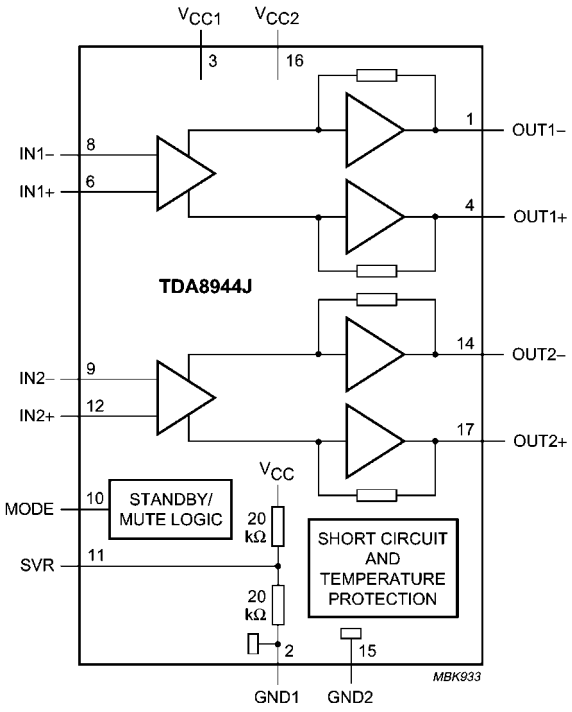


Fig 9. Block diagram.

4) Pinning information

4.1) Pinning

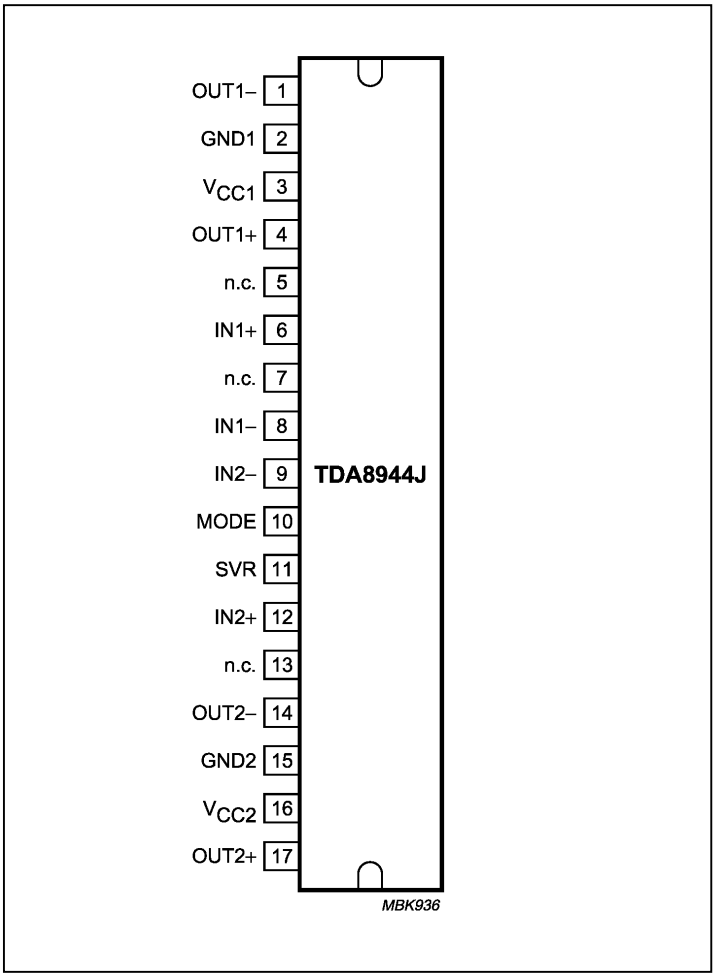


Fig 10. Pin configuration.

4.2) Pin description

Table 9: Pin description

Symbol	Pin	Description
OUT1−	1	negative loudspeaker terminal 1
GND1	2	ground channel 1
V_{CC1}	3	supply voltage channel 1
OUT1+	4	positive loudspeaker terminal 1
n.c.	5	not connected
IN1+	6	positive input 1
n.c.	7	not connected
IN1−	8	Negative input 1
IN2−	9	Negative input 2
MODE	10	Mode selection input (standby, mute, operating)
SVR	11	Half supply voltage decoupling (ripple rejection)
IN2+	12	Positive input 2
n.c.	13	Not connected
OUT2−	14	Negative loudspeaker terminal 2
GND2	15	Ground channel 2
V_{CC2}	16	Supply voltage channel 2
OUT2+	17	Positive loudspeaker terminal 2

TDA8944J: Stereo power amplifier, Max output power: 2×7W

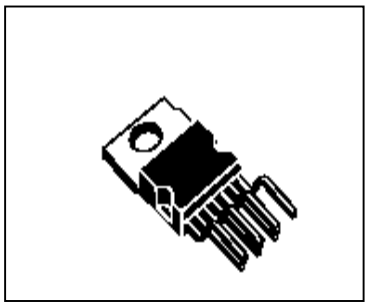
5) Refer to Table 14 about Functions and Data of the IC's Pins.

3. VERTICAL SCAN OUTPUT STAGE CIRCUIT LA78040/LA78041

Both LA78040/LA78041 are vertical scan output stage power amplifiers. But there is a little bit difference between the two amplifiers, that is, LA78040 has supply voltage of 24V and output current of 1.8A_{P-P} while LA78041 has supply voltage of 30V and output current of 2.2A_{P-P}.

LA7840 (N301)

Vertical Deflection Output Circuit



Package Type: TO-220-7H

Fig. 11

1) Features

Low power dissipation due to built-in pump-up circuit

·Vertical output circuit

·Thermal protection circuit built in

·Excellent crossover characteristics

DC coupling possible

2) Block Diagram

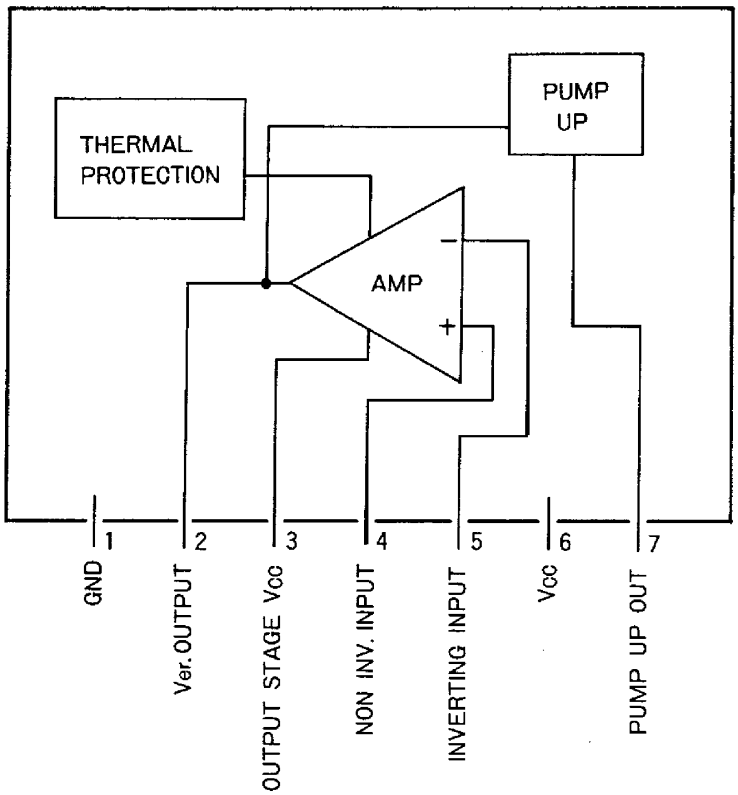


Fig.12 Block diagram

3) Refer to Table 15 about Functions and Data of the IC's Pins.

4. EEPROM AT24C04/08/16

1) Features

Low-voltage and Standard-voltage Operation

-2.7 (Vcc=2.7V to 5.5V)

-1.8 (Vcc=1.8V to 5.5V)

Internally Organized 128x8(1K), 256x8 (2K), 512x8 (4K),

1024x8 (8K) or 2048x8 (16K)

2-wire Serial Interface

Schmitt Trigger, Filtered Inputs for Noise Suppression

Bi-directional Data Transfer Protocol

100kHz (1.8V, 2.5V, 2.7V) and 400 kHz (5V) Compatibility

Write Protect Pin for Hardware Data Protection

8-byte Page (1K, 2K), 16-byte Page (4K, 8K, 16K) Write Modes

Partial Page Writes are allowed

Self-timed Write Cycle (10 ms max)

High-reliability

-Endurance: 1 Million Write Cycles

- Data Retention: 100 Years

Automotive Grade and Extended Temperature Devices Available

8-lead PDIP, 8-lead JEDEC SOIC, 8-lead MAP and 8-lead TSSOP Package

2-wire

Serial EEPROM

AT24C01A 1K (128 x 8)

AT24C02 2K (256 x 8)

AT24C04 4K (512 x 8)

AT24C08 8K (1024 x 8)

AT24C16 6K (2048 x 8)

2) Description

The AT24C01A/02/04/08/16 provides 1024/2048/4096/8192/16384 bits of serial electrically erasable and programmable read-only memory (EEPROM) organized as 128/256/512/1024/2048 words of 8 bits each. The device is optimized for use in many industrial and commercial applications where low-power and low-voltage operations are essential. The AT24C01A/02/04/08/16 is available in space-saving 8-pin PDIP, 8-lead JEDEC SOIC, 8-lead MAP and 8-lead TSSOP packages and is accessed via a 2-wire serial interface. In addition, the entire family is available in 2.7V (2.7V to 5.5V) and 1.8V (1.8V to 5.5V) versions.

3) Pin Configuration

Pin Name	Function
A0-A2	Address Inputs
SDA	Serial Data
SCL	Serial Clock Input
WP	Write Protect
NC	No Connect

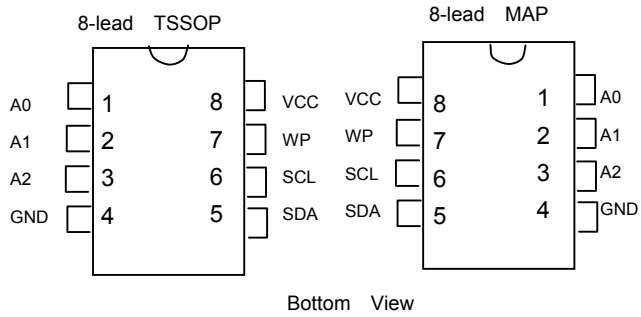


Fig. 13

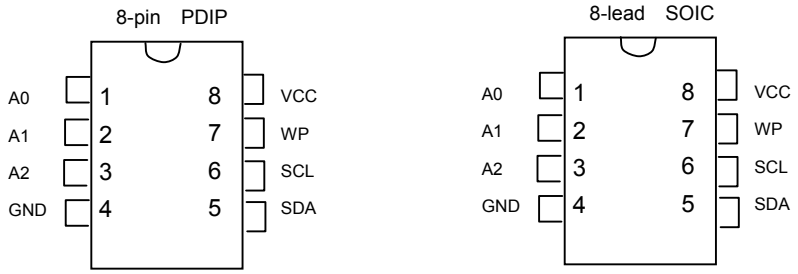


Fig. 14

4) Pin Description

SERIAL CLOCK (SCL): The SCL input is used to positive edge clock data into each EEPROM device and negative edge clock data out of each device.

SERIAL DATA (SDA): The SDA pin is bi-directional for serial data transfer. This pin is open-drain driven and may be wired with any number of other open-drain or open-collector devices.

DEVICE/PAGE ADDRESSES (A2, A1, A0): The A2, A1 and A0 pins are device address inputs that are hard wired for the AT24C01A and the AT24C02. As many as eight 1K/2K devices may be addressed on a single bus system (device addressing is discussed in detail under the Device Addressing section).

The AT24C04 uses the A2 and A1 inputs for hard wire addressing and a total of four 4K devices may be addressed on a single bus system. The A0 pin is a no connect.

The AT24C08 only uses the A2 input for hardwire addressing and a total of two 8K devices may be addressed on a single bus system. The A0 and A1 pins are no connects.

The AT24C16 does not use the device address pins, which limits the number of devices on a single bus to one. The A0, A1 and A2 pins are no connects.

WRITE PROTECT (WP): The AT24C01A/02/04/16 has a Write Protect pin that provides hardware data protection. The Write Protect pin allows normal read/write operations when connected to ground (GND). When the Write Protect pin is connected to Vcc, the write protection feature is enabled and operates as shown in the following table.

Table 10

WP Pin Status	Part of the Array Protected				
	24C01A	24C02	24C04	24C08	24C16
At Vcc	Full (1K) Array	Full (2K) Array	Full (4K) Array	Normal Read/ Write Operation	Upper Half (8K) Array
At GND	Normal Read/Write Operations				

5) Memory Organization

- AT24C01A, 1K SERIAL EEPROM: Internally organized with 16 pages of 8 bytes each, the 1K requires a 7-bit data word address for random word addressing.
- AT24C02, 2K SERIAL EEPROM: Internally organized with 32 pages of 8 bytes each, the 2K requires an 8-bit data word address for random word addressing.
- AT24C04, 4K SERIAL EEPROM: Internally organized with 32 pages of 16 bytes each, the 4K requires a 9-bit data word address for random word addressing.
- AT24C08, 8K SERIAL EEPROM: Internally organized with 64 pages of 16 bytes each, the 8K requires a 10-bit data word address for random word addressing.
- AT24C16, 16K SERIAL EEPROM: Internally organized with 128 pages of 16 bytes each, the 16K requires an 11-bit data word address for random word addressing.

6) Block Diagram

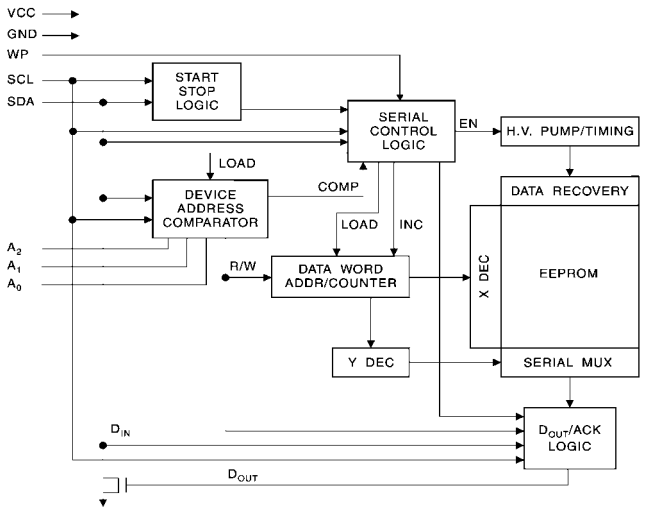


Fig. 15 Block diagram

7) **Refer to Table 16 about Functions and Data of the IC's Pins.**

5. SWITCH-MODE POWER SUPPLY IC STRG5653/G8656

1) General Description

The STRG5653/G8656 are part of the STRG5600/G8600 series thick-film ICs for switch-mode power supply incorporating power MOSFET with a high-precise error amplifier. The ICs feature fewer external components, small-size and standard power supply.

The series STR-G8600 use Chip on Chip technology with the same operation principle as STR-G5600. Pin configuration, function and threshold of STR-G8600 are compatible with those of STR-G5600.

2) Block Diagram

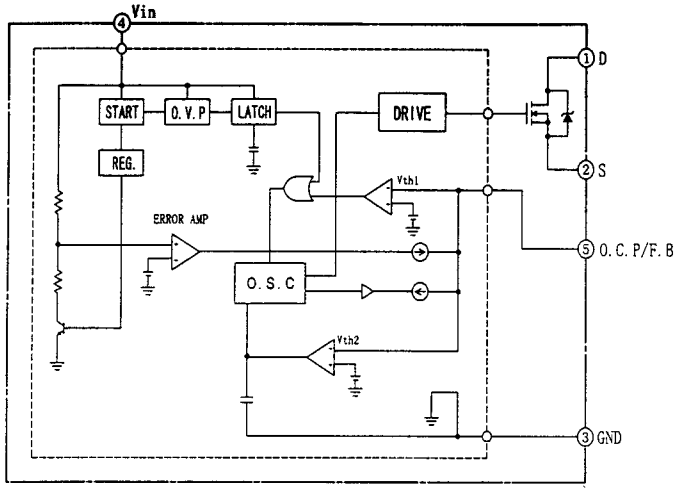


Fig.16 Block diagram

3) Function of Terminal

Table 11

Terminal No.	Symbols	Description	Functions
1	D	Drain Terminal	MOS FET drain
2	S	Source Terminal	MOS FET source
3	GND	Ground Terminal	Ground
4	VIN	Power supply Terminal	Input of power supply for control signals
5	O.C.P/F.B	Overcurrent/Feedback Terminal	Input of overcurrent detection signal and constant voltage signals

4) Refer to Table 17 about Functions and Data of the IC's Pins.

6. TC90L01N

AUDIO/VIDEO SWITCHING IC FOR TVs

The TC90L01N is an audio/video switching IC for TV sets. Conforming to I^2C bus standards, it allows you to perform various switching operations through the bus lines by using a microcomputer. This IC has the functions of audio mute, ALC (Auto Level Control), audio volume and so on.

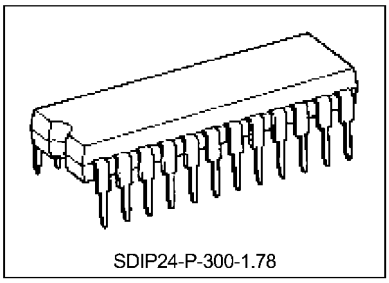


Fig. 17

1) Features

·I^2C bus control

·Video: 3-channel inputs and 1-channel outputs (1 channels conforming to S system)

·Audio: 3-channel inputs and 3-channel outputs

·Monitor Audio out

·ALC (Auto Level Control)

·Audio volume by attenuator circuit

·Audio mute

·2 I/O ports

2). Block Diagram

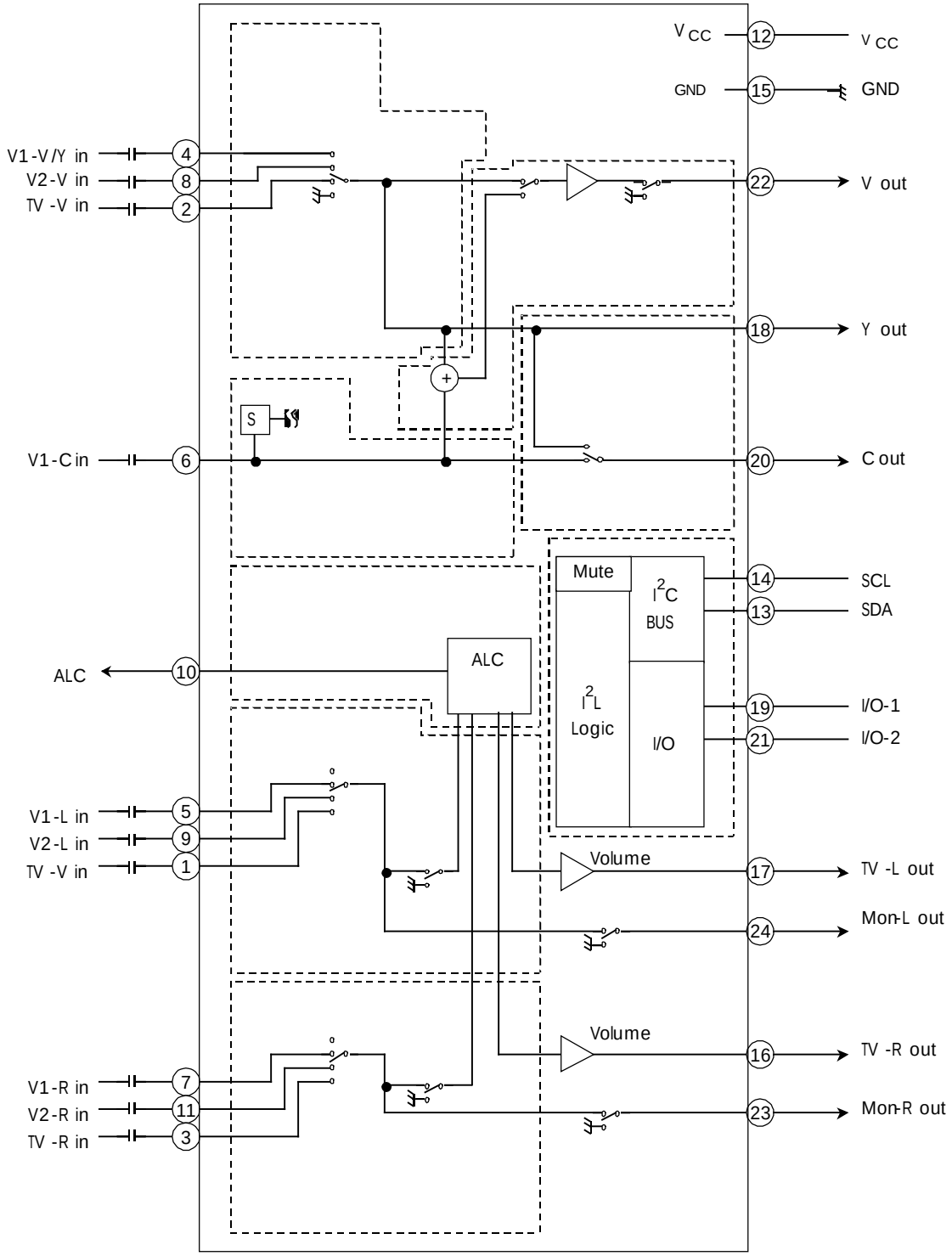


Fig. 18 Block diagram

3) Pin Assignment

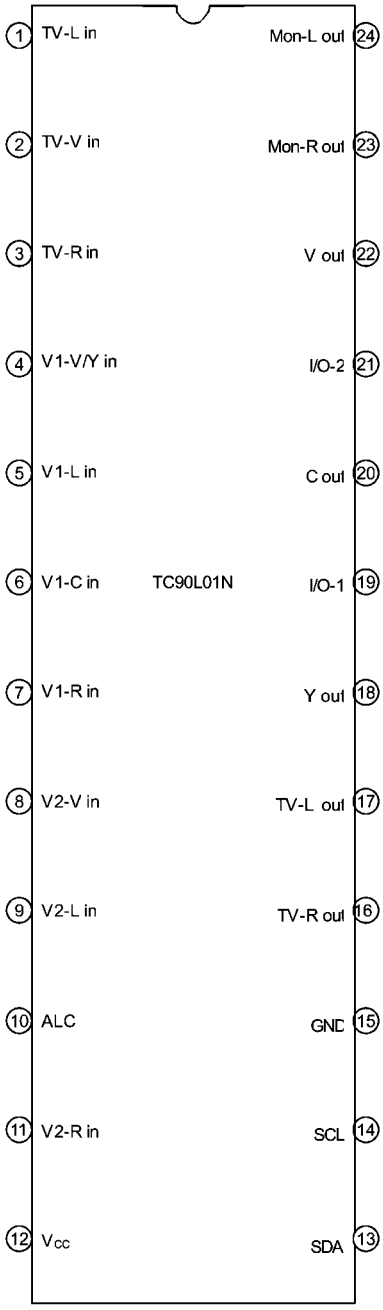


Fig.19 Pin assignment

4) Pin Description

Table 12

Pin No.	Name	Function
1	TV-L in	This pin is for input a left audio signal from the main demodulator in the TV set. The signal fed into this pin is presented to TV-L out, and Mon-L out. The input dynamic range of this pin is 6.0 Vp-p and the input resistance is 120 k.
2	TV-V in	This pin is for input a composite audio signal from the main demodulator in the TV set. The signal fed into this pin is presented to V out, Y out, and C out. The input dynamic range of this pin is 2.0 Vp-p and the input resistance is 30 k.
3	TV-R in	This pin is for input a right audio signal from the main demodulator in the TV set. The signal fed into this pin is presented to TV-R out, and Mon-R out. The input dynamic range of this pin is 6.0 Vp-p and the input resistance is 120 k.
4	V1-V/Y in	This pin is for input a luminance signal or composite video signal from an external source (V1 channel). The signal fed into this pin is presented to V out, Y out, and C out. The input dynamic range of this pin is 2.0 Vp-p and the input resistance is 30 k .
5	V1-L in	This pin is for input a left audio signal from an external source (V1 channel). The signal fed into this pin is presented to TV-L out, and Mon-L out. The input dynamic range of this pin is 6.0 Vp-p and the input resistance is 120k.
6	V1-C in	This pin is for input a chroma signal from an external source (S1 channel). The signal fed into this pin is presented to C out directly and to V out after being combined with the V1-Y in signal. The input dynamic range of this pin is 2.0 Vp-p and the input

(continued)

		resistance is 30 k.
7	V1-R in	This pin is for input a right audio signal from an external source (V1 channel). The signal fed into this pin is presented to TV-R out, and Mon-R out. The input dynamic range of this pin is 6.0 Vp-p and the input resistance is 120 k.
8	V2-V in	This pin is for input a composite video signal from an external source (V2 channel). The signal fed into this pin is presented to V out, Y out, and C out. The input dynamic range of this pin is 2.0 Vp-p and the input resistance is 30 k.
9	V2-L in	This pin is for input a left audio signal from an external source (V2 channel). The signal fed into this pin is presented to TV-L out and Mon-L out. The input dynamic range of this pin is 6.0 Vp-p and the input resistance is 120.
10	ALC	This is an detect output pin of ALC[:Auto Level Control]. It controls ALC.
11	V2-R in	This pin is for input a right audio signal from an external source (V2 channel). The signal fed into this pin is presented to TV-R out and Mon-Rout. The input dynamic range of this pin is 6.0 Vp-p and the input resistance is 120 k .
12	VCC	This is the power supply pin. Apply 9 V to this pin. The current consumption of this pin is 32 mA.
13	SDA	This is an I^2C bus data input/output pin. The input threshold level of this in is 3.0 V. Make sure that the current flowing into this pin is 3.0 mA or less.
14	SCL	This is an I^2C bus data input/output pin. The input threshold level of this pin is 3.0 V.
15	GND	This is the GND pin.
16	TV-R out	This pin is for output right audio signal. The signal fed into TV-R in, V1-R in, or V2-R in is outputted from this pin.

(continued)

		This outputted can be muted independently of TV-L out by bus control.
17	TV-L out	This pin is for output left audio signal. The signal fed into TV-L in, V1-L in, or V2-L in is outputted from this pin. This output can be muted independently of TV-R out by bus control.
18	Y out	This pin is for output a luminance signal. The signal fed into V1-V/Y in, V2-V in, or TV-V in is outputted from this pin.
19	I/O－1	This is an ADC input/DAC output pin. The ADC is a 2-level detection type (1 bits). The threshold level is 3.0 V. The DAC (1 bit) is an open-drain output. Make sure that the current flowing into this pin is 2.0 mA or less.
20	C out	This pin is for output a chroma signal. The signal fed into V1-C in, V1-V in, V2-V in , or TV-V in is outputted from this pin.
21	I/O－2	This is an ADC input/DAC output pin. The ADC is a 2-level detection type (1 bits). The threshold level is 3.0 V. The DAC (1 bit) is an open-drain output. Make sure that the current flowing into this pin is 2.0 mA or less.
22	V out	This pin is for output the main channel composite video signal. The signal fed into TV-V in, V1-V in, V2-V in, or V1-Y in +_V1-C in is outputted from this pin. This output can be muted by bus control.
23	Mon-R out	This pin is for monitor-output right audio signal. The signals fed into the chip via V1-R in, V2-R in, or TV-R in is output from this pin. This output can be muted in combination with Mon-L out by bus control.
24	Mon-L out	This pin is for monitor-output left audio signal. The signals fed into the chip via V1-L in, V2-L in, or TV-L in is output from this pin. This output can be muted in combination with Mon-R out by bus control.

(continued)

SERVICE DATA OF KEY ICS

Table 13 Functions and Service Data of TMPA8827PSGN (N210)'s Pins

Pin No.	1	2	3	4	5	6	7	8
Voltage（V）	4.9	4.9	5	0	5	2.22	2	0
Resistance(KΩ)	8.8	8.8	22	0	4.55	22.8	22.7	0
Pin No.	9	10	11	12	13	14	15	16
Voltage（V）	5	0	0	1.22	1.87	6.63	4.16	5
Resistance(KΩ)	3.6	0	0	35.7	0.79	36.3	36.3	15.6
Pin No.	17	18	19	20	21	22	23	24
Voltage（V）	9	2	2.45	4.43	2.44	0	4.8	2.47
Resistance(KΩ)	10	26	26	26	26	0	26	26
Pin No.	25	26	27	28	29	30	31	32
Voltage（V）	3.4	1.9	4.85	5.4	8.84	3.1	0	3.8
Resistance(KΩ)	10.3	26	24.2	22.9	0.39	3.32	3.3	2.9
Pin No.	33	34	35	36	37	38	39	40
Voltage（V）	2.97	2.44	2.49	4.96	2.2	4.39	1.8	0
Resistance(KΩ)	26	24.8	26	1.6	20	22.8	26	0
Pin No.	41	42	43	44	45	46	47	48
Voltage（V）	1.6	1.6	2.4	4.9	2.5	3.3	2.4	0
Resistance(KΩ)	26	26	12.9	1.6	3.3	26	26	0
Pin No.	49	50	51	52	53	54	55	56
Voltage（V）	8.88	2	2	2	0	0	5	5
Resistance(KΩ)	0	23.1	23.1	23.1	0	0	3.52	8.2
Pin No.	57	58	59	60	61	62	63	64
Voltage（V）	5	5	5	4.38	1.6	4.29	0	0
Resistance(KΩ)	13.7	13.7	12	22.6	13.5	20.4	6.6	6.7

Table 14 Functions and Service Data of TDA8944J (N603)'s Pins

Pin No.	Functions Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (20KΩ)	Negative Resistance (20KΩ)
1	Negative loudspeaker terminal 1	7.98	∞	∞
2	Ground channel 1	0	0	0
3	Supply voltage channel 1	14.9	5.8	7.7
4	Positive loudspeaker terminal 1	7.3	∞	∞
5	Not connected	0	∞	∞
6	Positive input 1	7.3	∞	∞
7	Not connected	0	∞	∞
8	Negative input 1	7.4	∞	∞
9	Negative input 2	7.3	∞	∞
10	Mode selection input (standby, mute, operating)	0	7.8	8.9
11	Half supply voltage decoupling (ripple rejection)	7.6	∞	∞
12	Positive input 2	7.3	∞	∞
13	Not connected	0	∞	∞
14	Negative loudspeaker terminal 2	7.3	∞	∞
15	Ground channel 2	0	0	0
16	Supply voltage channel 2	14.8	3.5	3.5
17	Positive loudspeaker terminal 2	7.3	∞	∞

Table 15 Functions and Service Data of LA78040/78041 (N301)'s Pins

Pin No.	Function Description	GDM8145 Multimeter		
		Voltage of Pin (V)	Ground Resistance (KΩ)	
			Measure with red probe while grounding black probe.	Measure with black probe while grounding red probe.
1	Ground	0	0	0
2	Vertical output terminal	9.73	0.58	0.58
3	Pump supply voltage input	24.88	∞	∞

(continued)

4	In-phase input terminal	2.22	1.30	1.30
5	Inverting input terminal	2.22	4.58	4.55
6	Supply voltage	24.13	1.55	1.55
7	Pump supply voltage output/vertical flyback pulse output	2.61	7.09	5.93

Table 16 Functions and Service Data of AT24C16 (N230)'s Pins

Pin No.	Function Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (20KΩ)	Negative Resistance (20KΩ)
1	Address input	0	0.001	0.00
2	Address input	0	0.001	0.00
3	Address input	0	0.001	0.00
4	Common ground	0	0.001	0.00
5	Clock line	5	7	4.83
6	Data line	4.99	6.9	5.15
7	PW write protect	4.99	9.5	5.31
8	Supply voltage	5	3.5	3.25

Table 17 Functions and Service Data of STR-G8656 (N801)'s Pins

Pin No.	Functions Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (20KΩ)	Negative Resistance (20KΩ)
1	Drain terminal	146.3	∞	∞
2	Source terminal	0	0	0
3	Ground terminal	0	0	0
4	Power supply terminal	31.96	∞	∞
5	Overcurrent/Freedback terminal	1.72	0.699	0.166

REPLACEMENT OF PARTS

1. Description

Many electrical and mechanical components in this chassis have special safety-related characteristics. Components which have these special safety characteristics in this manual and its supplements are identified by the international hazard symbols or UL, FCC, FDA or VDE marking on the circuit diagram and parts list. When replacing any of these components, substitute the one which has the same safety characteristics as specified in the manual.

Description of the special markings:

A: The components identified by the A marking have special safety-related characteristics.

AE: The components identified by the AE marking are listed by EMC and have special safety-related characteristics.

CB: The components identified by the CB marking have been evaluated to the CB standard.

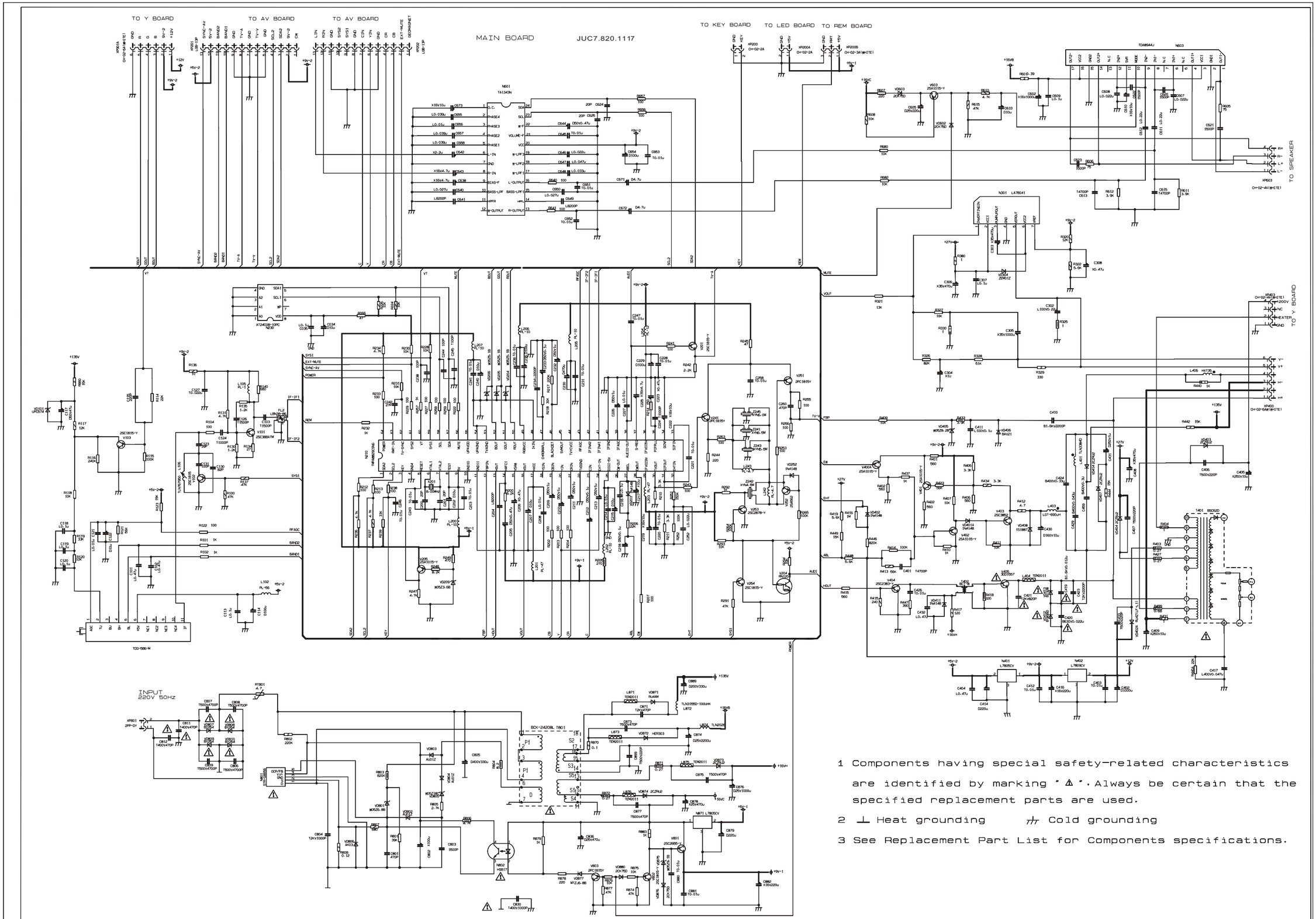
E: The components identified by the E marking are listed by EMC

G: The components identified by the G marking have critical characteristics.

Z: The components identified by the Z marking have important characteristics.

APPENDIX:

CIRCUIT DIAGRAM (1)

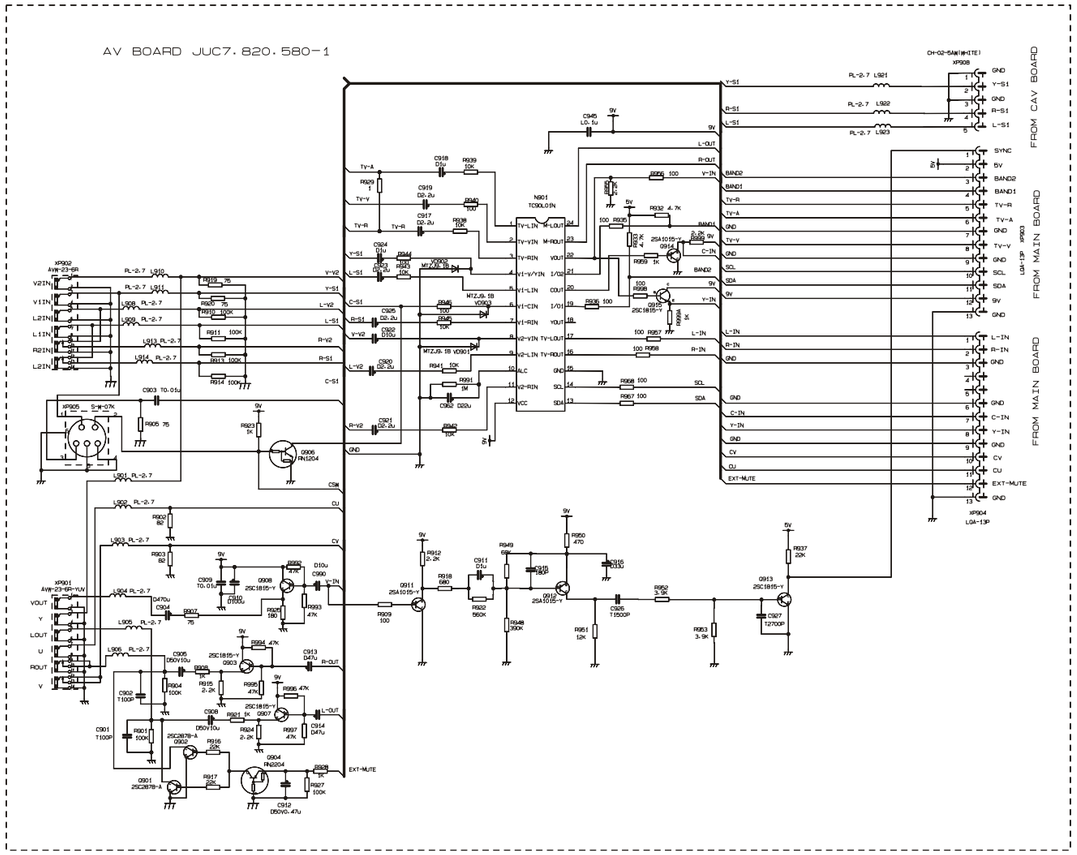


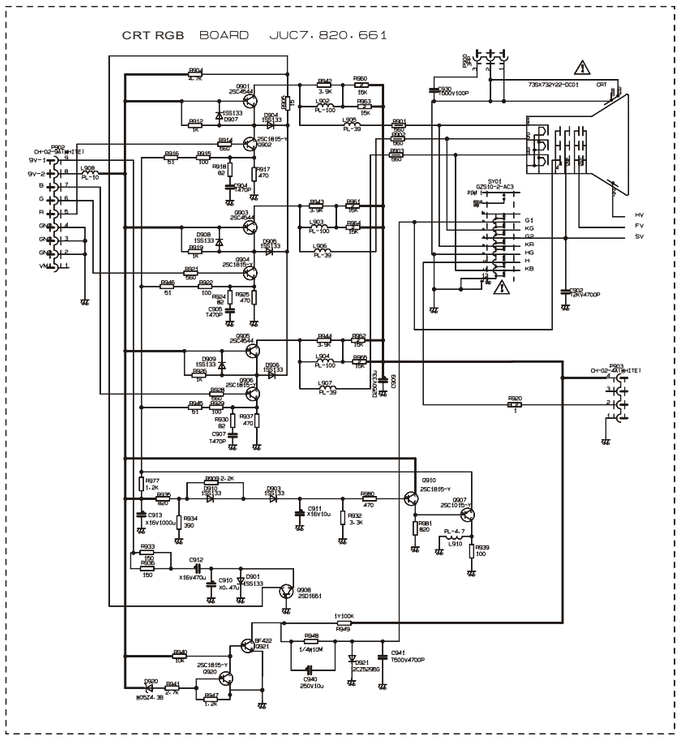
1 Components having special safety-related characteristics are identified by marking " ⚠ ". Always be certain that the specified replacement parts are used.

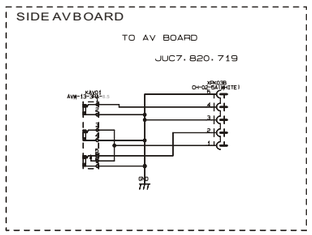
2 ⊥ Heat grounding ⏚ Cold grounding

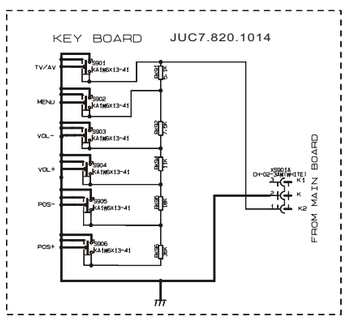
3 See Replacement Part List for Components specifications.

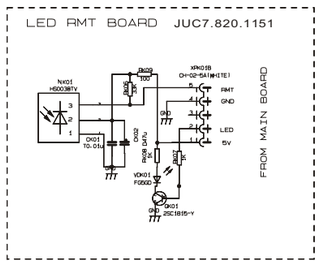
CIRCUIT DIAGRAM (2)

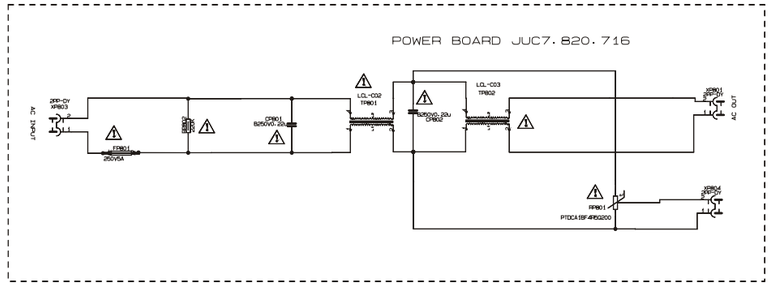










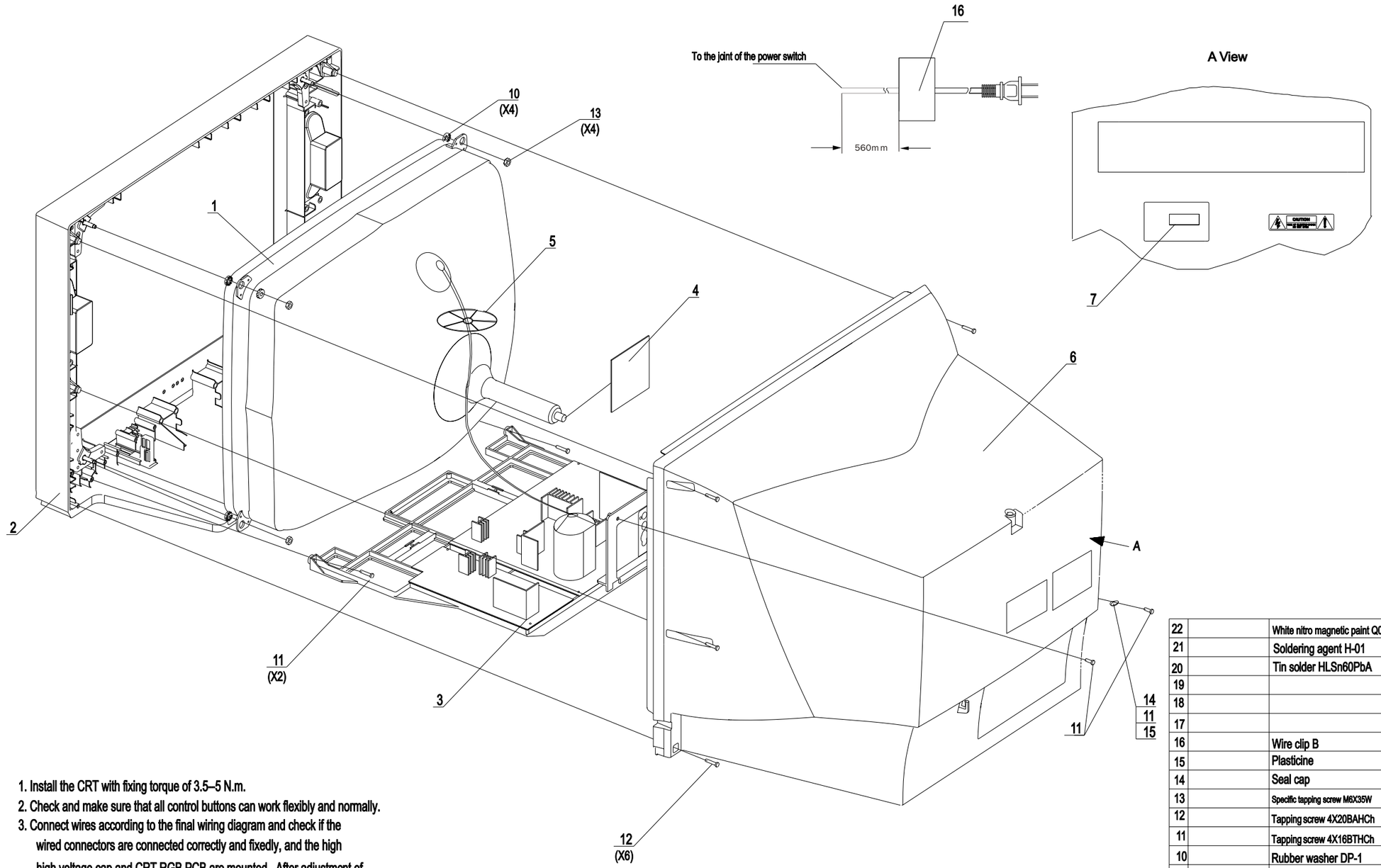


1 Components having special safety-related characteristics are identified by marking " ⚠ ". Always be certain that the specified replacement parts are used.

2 ⊥ Heat grounding ⏚ Cold grounding

3 See Replacement Part List for Components specifications.

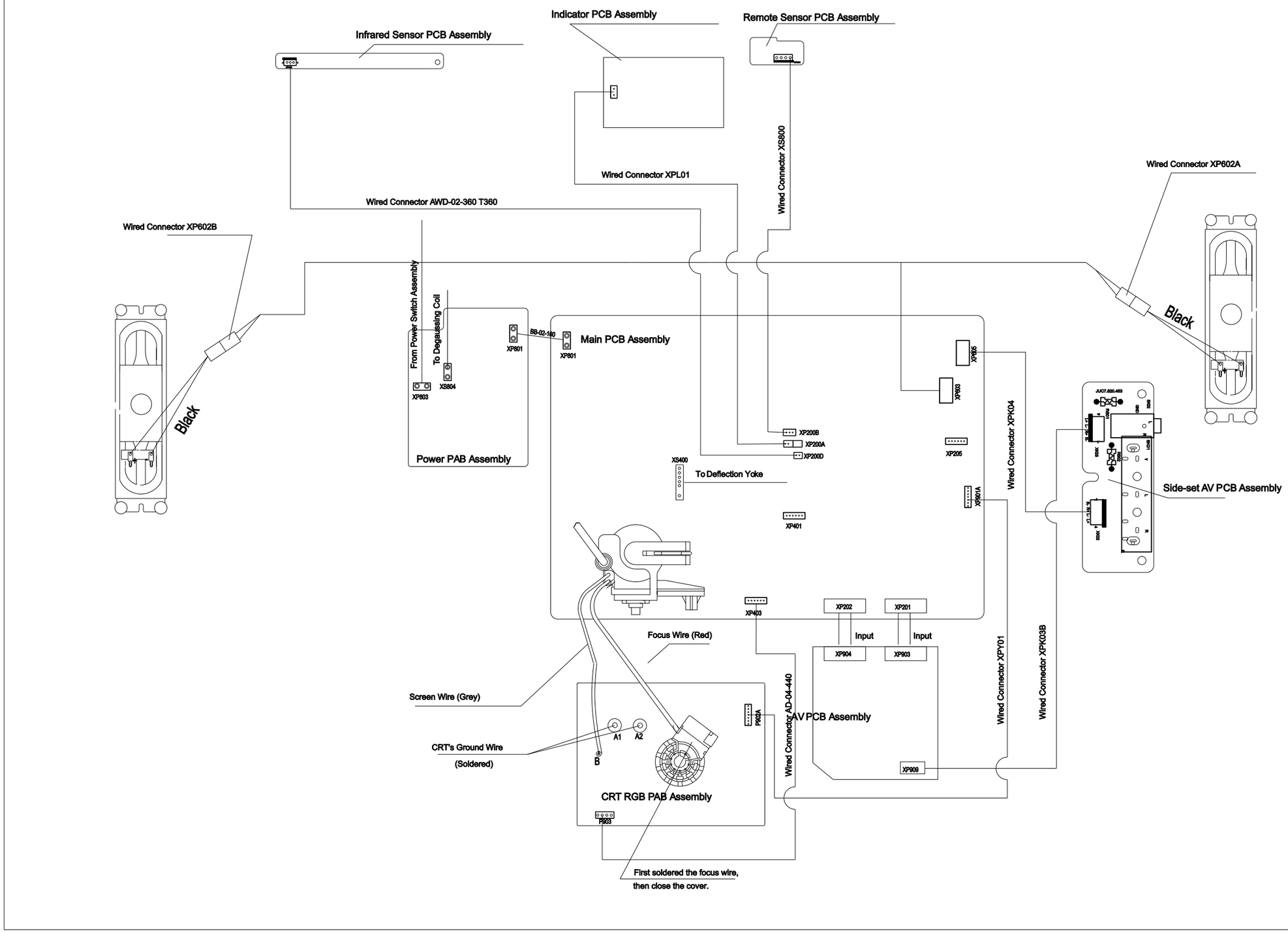
FINAL ASSEMBLY DIAGRAM FOR 29CT24FS, 29CT71FS



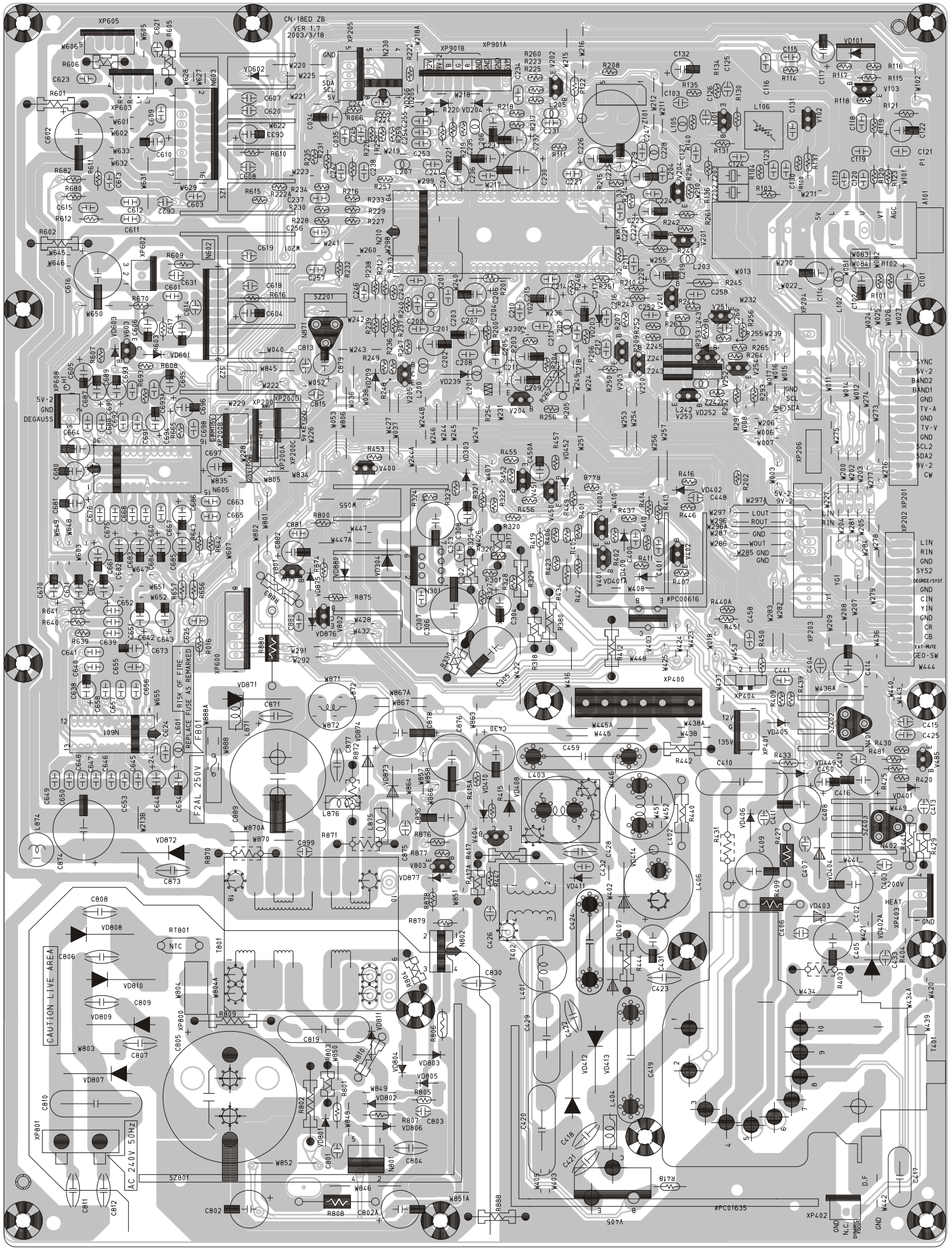
1. Install the CRT with fixing torque of 3.5–5 N.m.
2. Check and make sure that all control buttons can work flexibly and normally.
3. Connect wires according to the final wiring diagram and check if the wired connectors are connected correctly and fixedly, and the high high voltage cap and CRT RGB PCB are mounted. After adjustment of the two FCBs, lock them with white nitro magnetic paint Q04-3 on the shafts. After inspection and ensuring O.K, Reinstall the back cover.
4. Insert the wire clip B(16) into the slot on the rear terminal board.
5. Tie the degaussing coil with the wire clip XJ-100(9) to make the wire far from high temperature components.

Serial No.	Code No.	Parts	Qty	Remarks
22		White nitro magnetic paint Q04-3		
21		Soldering agent H-01		
20		Tin solder HLSn60PbA		
19				
18				
17				
16		Wire clip B	1	
15		Plasticine	0.5g	
14		Seal cap	1	
13		Specific tapping screw M6X35W	4	
12		Tapping screw 4X20BAHCh	6	
11		Tapping screw 4X16BTHCh	4	
10		Rubber washer DP-1	4	
9		Wire clip XJ-100	1	
8				
7		Rear plate	1	
6		Back cover	1	
5		Distance clip	1	
4		CRT RGB PCB assembly	1	
3		Chassis assembly	1	
2		Front Cover Assembly	1	
1		CRT assembly	1	

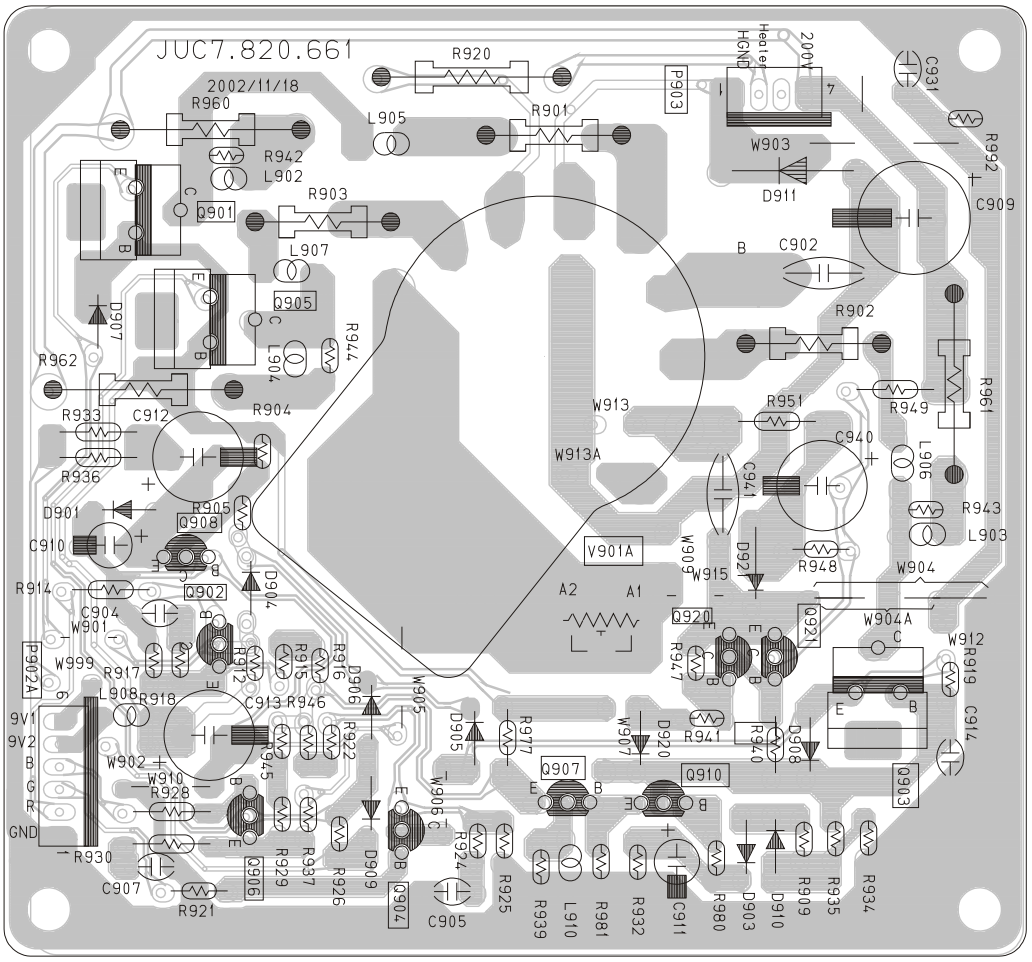
FINAL WIRING DIAGRAM FOR 29CT24FS, 29CT71FS



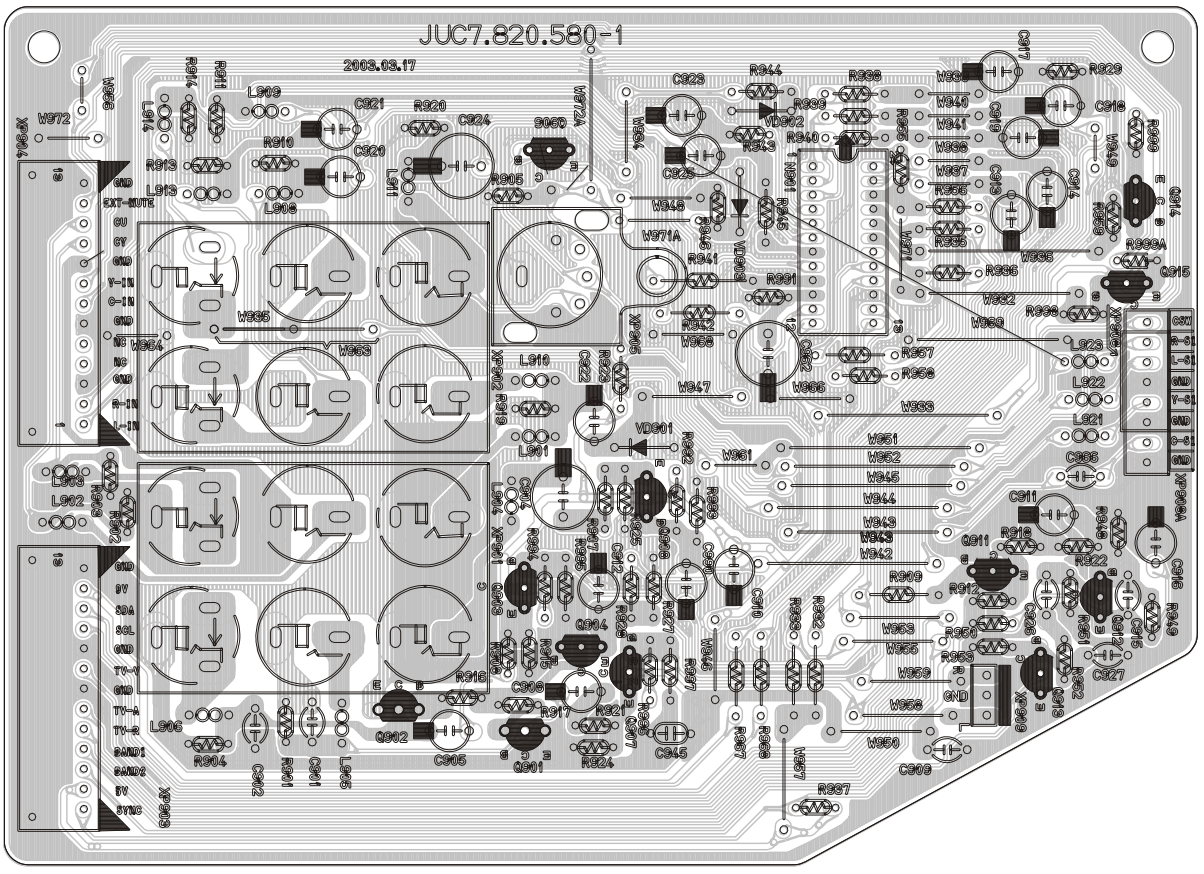
MAIN PRINTED CIRCUIT BOARD DIAGRAMS



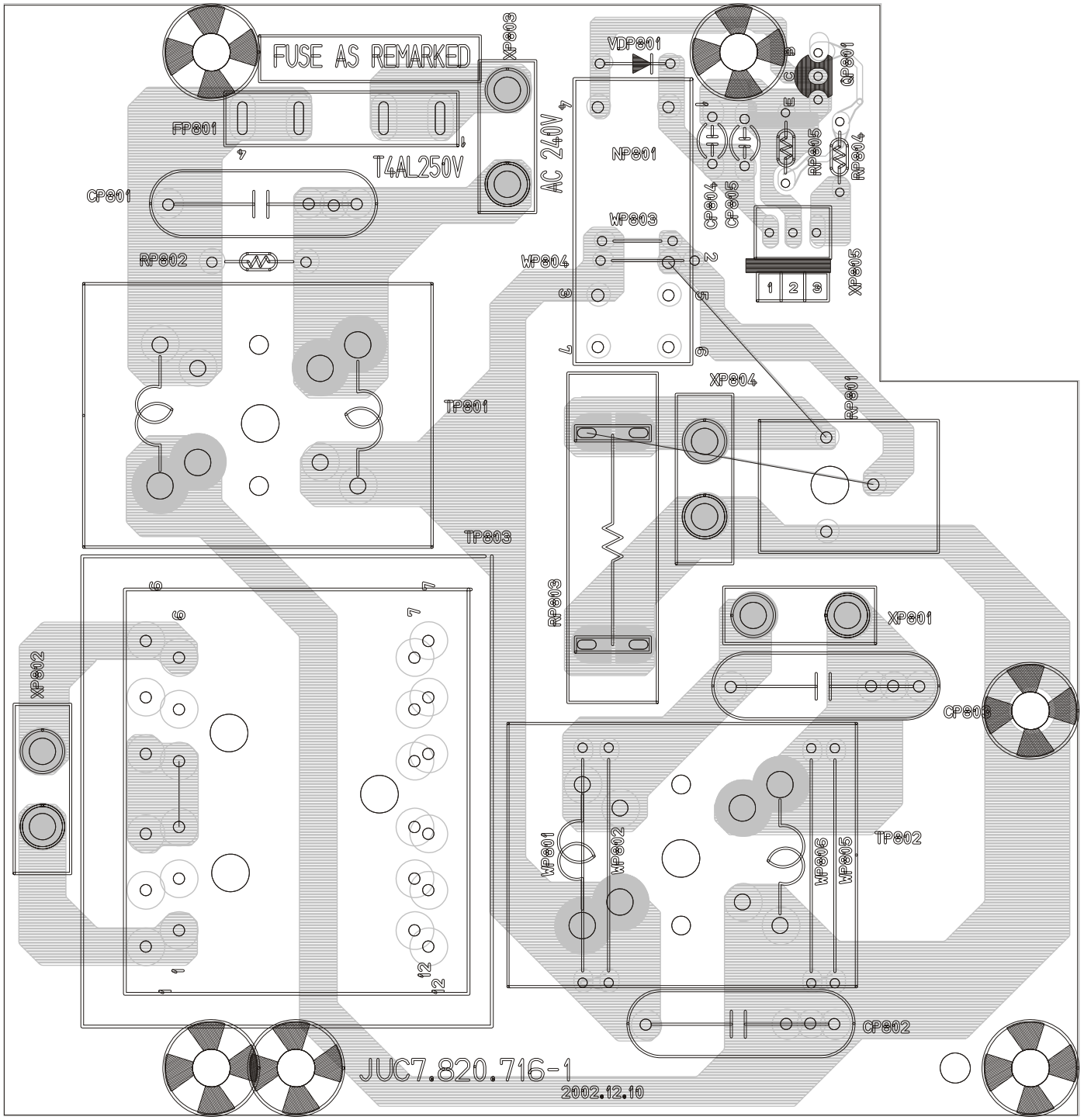
CRT RGB PRINTED CIRCUIT BOARD



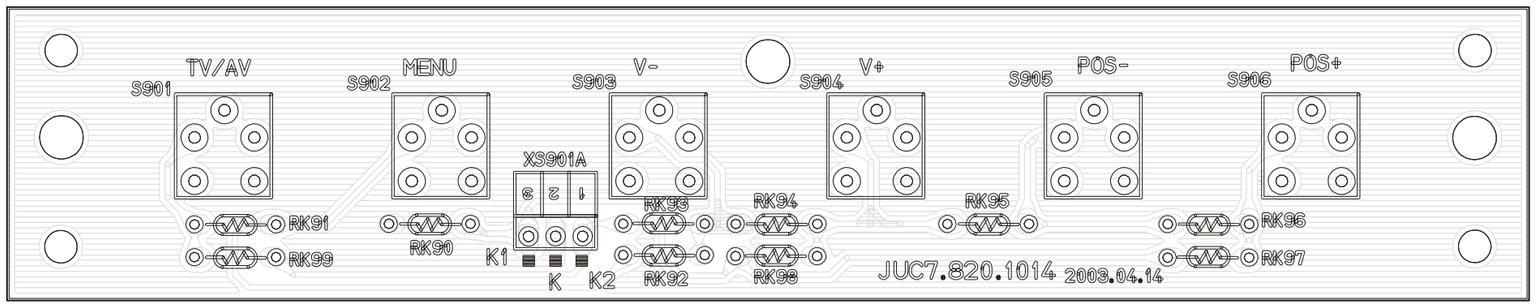
AV PRINTED CIRCUIT BOARD



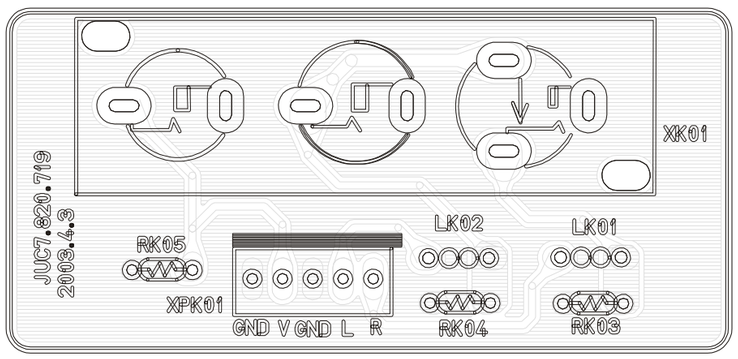
POWER PRINTED CIRCUIT BOARD



PARTS ON SOFT SWITCH PRINTED CIRCUIT BOARD



SIDE AV PRINTED CIRCUIT BOARD



REMOTE SENSOR AND INDICATOR PRINTED CIRCUIT BOARD