

FILE NO. SM-CTV-O-123

SERVICE MANUAL

CHASSIS NO.:CH-20

Please read this manual carefully before service.

TABLE OF CONTENTS

SAFETY INSTRUCTIONS.....	1
ADJUSTMENTS.....	4
STRUCTURE AND CHASSIS FUNCTION DESCRIPTION	17
SERVICE DATA	17
REPLACEMENT OF PARTS.....	55
APPENDIX CIRCUIT DIAGRAMS	

INSTRUCTIONS FOR SERVICE SAFETY AND MAINTENANCE ADJUSTMENTS

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 loosening 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:

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

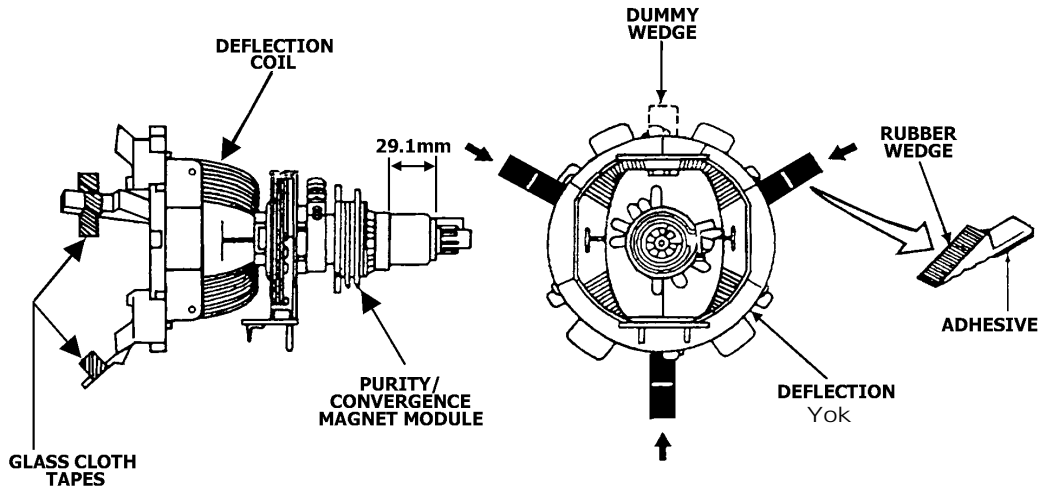


Fig. 1

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 I²C bus control, change

the bus data to adjust white balance.

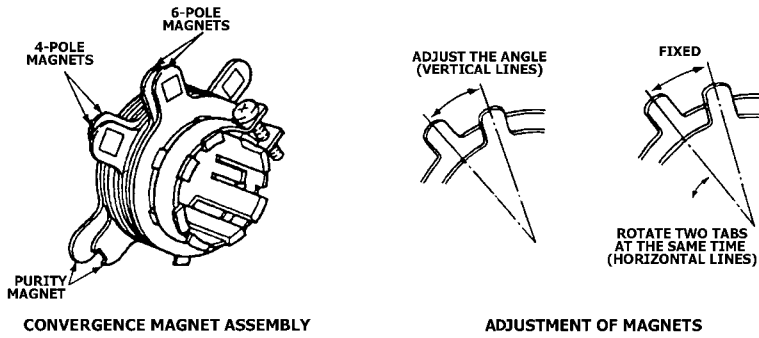


Fig. 2

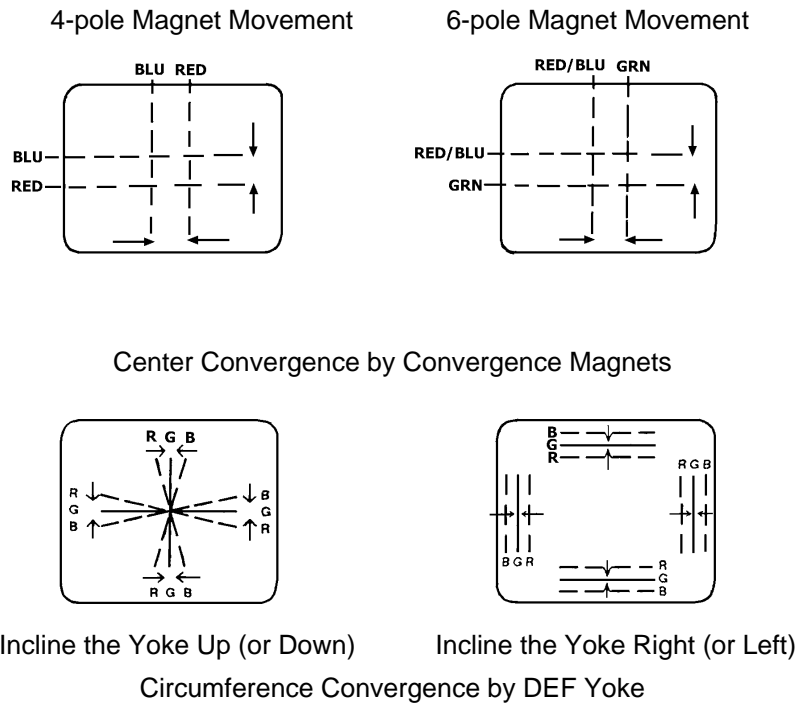


Fig.3

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 I²C 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 table 1

Table 1

Test Point	Voltage (V)
One Pin of L807	145V ± 1.5V
Positive of C834	12V ± 1V
Positive of C837	12V ± 1V
Positive of C832	16V ± 1V
One Pin of L806	16V ± 1.5V
Positive of C839	3.3 ± 0.3V
Positive of VD822	3.9 ± 0.3V
Positive of C429	195V ± 5V
Positive of C436A	48V ± 3V

(Continued)

Positive of C434	13.5V ± 1V
Positive of C840	8V ± 0.5V
One Pin of 326	12V ± 1V
Positive of C424	5V ± 0.5V
Heater	6.3V ± 0.3Vrms
CRT anode voltages	29KV ± 1.5KV (For 29" CRT)
	31.0KV ± 1.5KV (For 34" CRT)

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 (220V ~, 50Hz) and turn on the TV. Set the brightness and contrast to minimum (0 μ A).
- 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	Limited EHT voltage	Remarks
29KV ± 1.5KV	33KV	for 29" CRT
31.0KV ± 1.5KV	35KV	for 34" CRT

Note: The data sheet may differ dependent on different CRTs.

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.

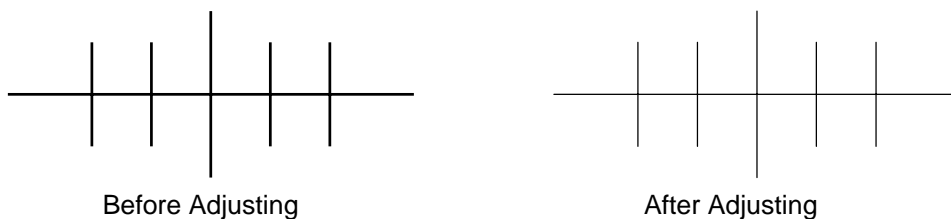


Fig. 4

5. SERVICE mode

5.1 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.

5.2 Bus data

Table 2 Bus data

Item	Adjustment	Description
VX00	19	4:3
VX50	01	16:9
VX99	38	ZOOM
5VS/6VS	Set to the optimal mode	Half vertical center for 50/60Hz
5VA/6VA	Set to the optimal mode	Vertical amplitude for 50/60Hz
5SC/6SC	Set to the optimal mode	Vertical S correction for 50/60Hz
5VSH/6VSH	Set to the optimal mode	Vertical center for 50/60Hz
5VOF/6VOF	Set to the optimal mode	Character position for 50/60Hz
5HP/6HP	Set to the optimal mode	Parallelogram correction for 50/60Hz
5HB/6HB	Set to the optimal mode	Curve correction for 50/60Hz
5HSH/6HSH	Set to the optimal mode	Horizontal center for 50/60Hz
5HA/6HA	Set to the optimal mode	Horizontal amplitude for 50/60Hz
5EW/6EW	Set to the optimal mode	Pincushion and barrel correction for 50/60Hz
5UCR/6UCR	Set to the optimal mode	Upper corner correction for 50/60Hz
5LCR/6LCR	Set to the optimal mode	Lower corner correction for 50/60Hz
5TC/6TC	Set to the optimal mode	Trapezoidal correction for 50/60Hz
RCUT	White balance adjustment	Red gun cutoff voltage
GCUT	White balance adjustment	Green gun cutoff voltage
RDRV	Dark balance adjustment	Red gun drive voltage
GDRV	Dark balance adjustment	Green gun drive voltage
BDRV	20	Blue gun drive voltage
YDFP	8	PAL brightness delay time
YDFN	2	NTSC brightness delay time
YDFS	2	SECAM brightness delay time

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SERVICE MANUAL

RAGC	Set to the optimal mode	AGC adjustment (19—1E recommended)
VOL	29	AV output volume control for TDA7442
WBF	30	
WBR	30	
SOC	1	PWL clip level (5%)
PWL	8	White peak limit
IFO	32	IF phase lock
PEAK	2	
BLS	0	Blue extension
BKS	1	Black stretch
CON100	23	Sub contrast
CON50	0D	
BRI100	32	Sub brightness
BRI50	20	
COL100	3F	Sub color
SHP100	3B	Sub sharpness
SHP50	1C	
VMDL	03	VM delay
VMAM	03	VM amplitude
COR	3	
WS	0	White stretch setting
HDOL	0B	Cathode drive level
AGCS	1	AGC speed
VG2B	24	Brightness setting when adjusting G2
VENH	03	Vertical enhance
CBNR	03	Comb noise reduce
TRE1	64	Treble linearity
TRE2	32	
BAS1	64	Bass linearity
BAS2	32	
VOLA	40/53	MSP3410G/TDA7442
VOLB	46/58	MSP3410G/TDA7442
VOLC	4B/60	MSP3410G/TDA7442
VOLD	51/63	MSP3410G/TDA7442
LOUD	20	Loudness (not for TDA7442)
SC1	74	SCART1 PRESCAL (not for TDA7442)
SC2	74	SCART2 PRESCAL (not for TDA7442)
SCIN	1E	SCART IN PRESCAL (not for TDA7442)
FMIN	13	FM frequency bias setting (not for TDA7442)
NNIN	5A	NICAM setting (not for TDA7442)

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SERVICE MANUAL

WOCF	1E	(not for TDA7442)
MEFF	44	MDB setting (not for TDA7442)
MAMP	FF	
MHAR	64	
MLOP	19	
MHIP	05	
OP1	F8 (For PF29T18/34t18 only) D8 (For CPF29T99 only)	Option set byte 1
OP2	20	Option set byte 2
OP3	0C	Option set byte 3
OP4	11	Option set byte 4
OP5	88	Option set byte 5
OP6	0F	Option set byte 6
OP7	08	Option set byte 7

Notes:

The data sheet may differ dependent on different models.

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

Designs and specifications are subject to change without notice.

Table 3 Option bit setting

	Bit	Item	Description
OP1	0	OP_NICAM	1: MSP3410 ; 0: TDA7442
	1	OP_COMB	1: Yes; 0: No
	2	OP_SVM	1: Yes; 0: No
	3	OP_AV2	1: Yes; 0: No
	4	OP_FAV	1: Yes; 0: No
	5	OP_FAVS	1: Yes; 0: No
	6	OP_STORE	0: West Europe 1: East Europe
	7	OP_OSO	1
OP2	0	OP_AVC	1: MSP3410; 0: TDA7442
	1	OP_MDB	1: MSP3410; 0: TDA7442
	2	Text setting	000: West Europe text 001: East Europe text
	3		010: Ukrainian text
	4		100: Russian text 110: Greek text
	5		OP_PARENT

(Continued)

SERVICE MANUAL

	6	OP_TILT	Tilt correction
	7	OP_FSL	0
OP3	0	OP_BSCREEN	1: Black screen available when changing channels; 0: Black screen not available when changing channels
	1	OP_5060	0
	2	OP_DK	1: D/K option
	3	OP_BG	1: B/G option
	4	OP_I	1: I option
	5	OP_L	1: L option
	6	OP_AUTO_SOUND	1: MSP3410 ; 0: TDA7442
	7	OP_EQUAL	1: MSP3410 ; 0: TDA7442
OP4	0	OP_FMWS	1
	1	OP_POWER	1: Memory on 0: Soft on
	2	OP_COUNTRY	1: COUNTRY display option
	3	OP_LOGO	0: LOGO display not available
	4	OP_DFL	1
	5	OP_BLUE_BACK	0: Blue back not available under no signal condition; 1: Blue back available under no signal condition
	6	OP_ACI	1: Yes; 0: No
	7	OP_ATS	1: Yes; 0: No
OP5	0	OP_LANG0	0
	1	OP_LANG1	0
	2	OP_LANG2	0
	3	OP_LANG3	0
	4	OP_SOUND0	0
	5	OP_SOUND1	0
	6	OP_SOUND2	1
	7	OP_STRIKE	1
OP6	0	OP_MUTE	1
	1	OP_TUNER	1: West Europe 0: BG
	2	OP_AFT	1
	3	OP_ENGLISH	1
	4	OP_FRANCE	1
	5	OP_GERMAN	1
	6	OP_SPAIN	1
	7	OP_DANMARK	1

(Continued)

OP7	0	OP_HOLAND	1
	1	OP_SUOMI	1
	2	OP_GREECE	1
	3	OP_ITALY	1
	4	OP_NORWAY	1
	5	OP_PORTUAL	1
	6	OP_SWEDEN	1
	7	OP_TURKY	1

Note :

Bit6, Bit5, Bit4 in OP5 are outgoing audio option settings as follows: 000: East Europe (D/K); 001: West Europe (B/G); 010: UK (I); 110: France (L); 100: Europe (Auto).

Bit3, Bit2, Bit1 and Bit0 in OP5 are outgoing language option settings as follows: English, French, German, Spanish, Danish, Dutch, Finnish, Greek, Italian, Norwegian, Portuguese, Swedish and Turkish successively begun with.

STRUCTURE AND CHASSIS FUNCTION DESCRIPTION

1. Structure Block Diagram

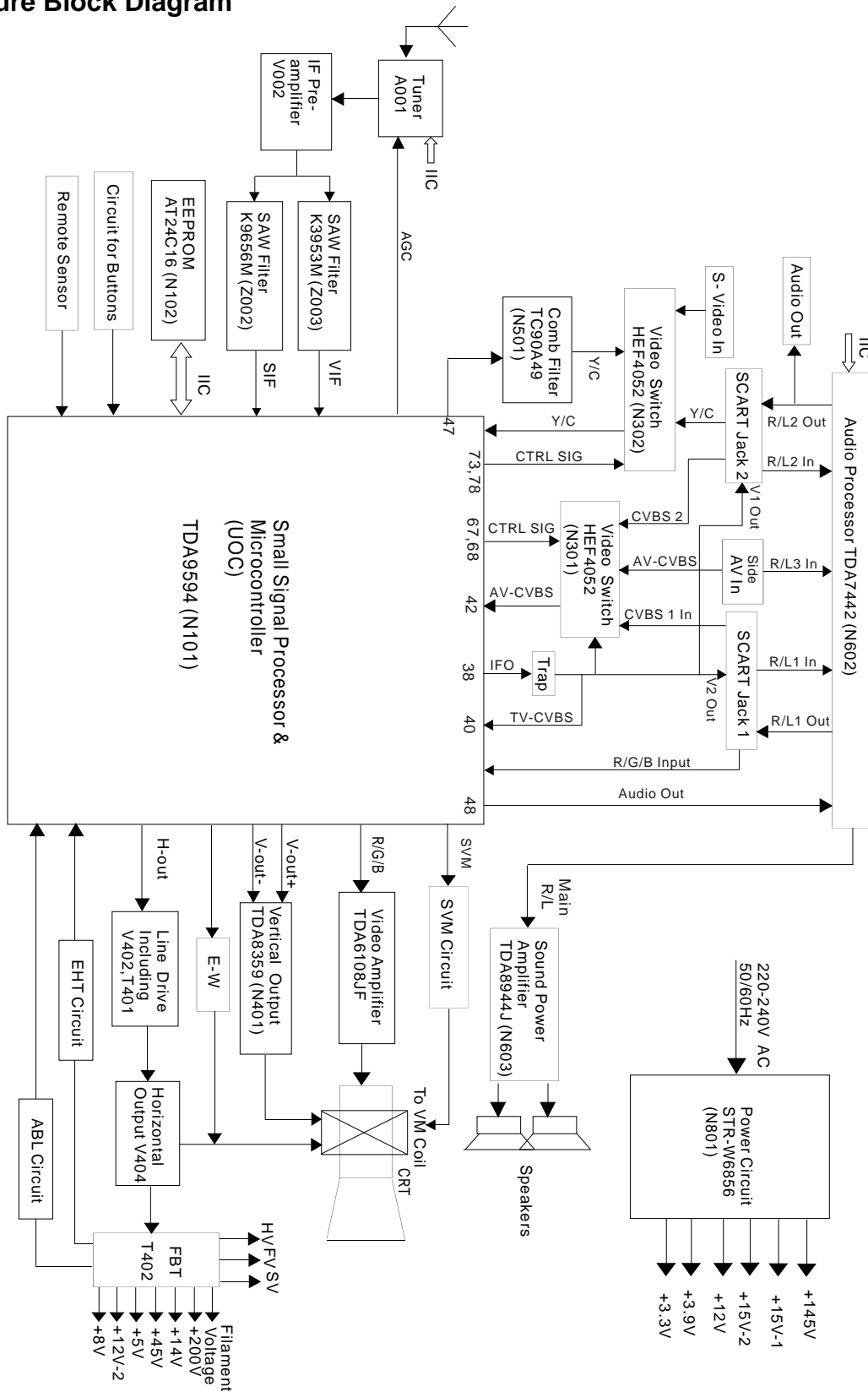


Fig.5 Structure Block Diagram for CH-20 Chassis

2. Block Diagram for Supply Voltage System

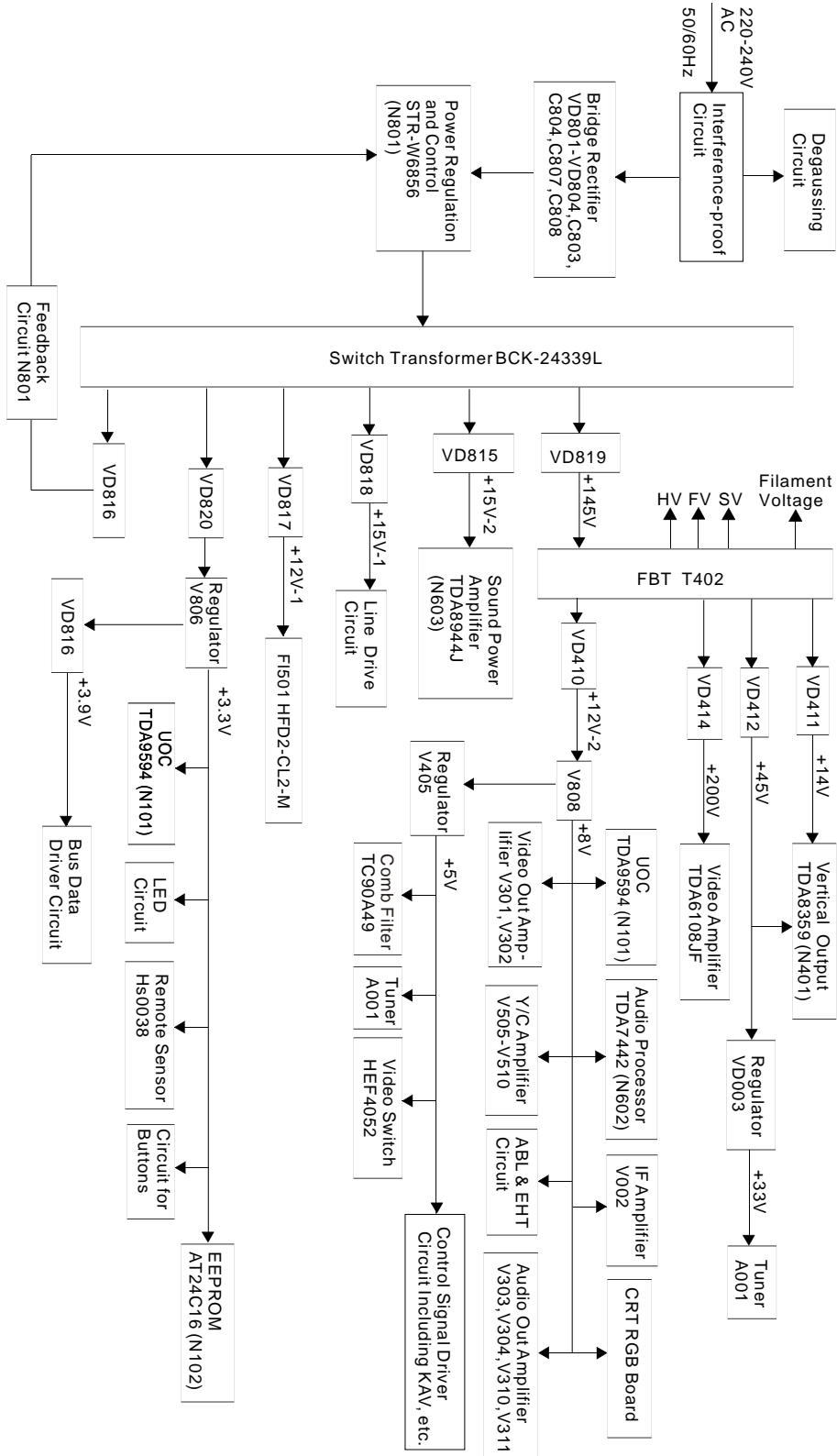


Fig.6 Block Diagram for Supply Voltage System for CH-20 Chassis

3. Chassis Description

General Description

CH-20 chassis is applied in CPF29T99/PF29T18/34T18, which mainly uses Philips' advanced UOC-ultimate one chip TDA959X and I²C-bus controlled IC. With combination of microcontroller and small signal processor, the TDA959X features high-integrity, high-performance-to-price ratio and high-reliability and advanced functions with fewer external components, which provide much more convenience for manufacturing and technical service. In addition, TDA959X is good in geometric distortion, more suitable for pure flat TV sets.

The following features are available in the chassis:

- RF color systems: PAL/SECAM
- Video systems: PAL/SECAM/NTSC
- Sound systems: D/K B/G I H L L1
- 100 programs preset
- I²C bus control
- Audio output: Main channel: 7W+7W (distortionless) (THD 7%)
- Selectable sound modes: Music, Theatre, Speech, Personal
- Selectable picture modes: Personal, Rich, Natural, Soft
- AV stereo + audio processing (MSP34XX or TDA7442)
- PAL/NTSC 3-line comb filter
- Earphone output
- Selectable aspect ratio: 4:3, 16:9, Zoom
- Auto identification and changeover of vertical frequency 50/60Hz
- Auto identification of SCART picture input format (4:3,16:9)
- Auto identification of SCART1 signal source input (RGB/CVBS)

The chassis mainly uses the following ICs and assemblies.

Table 4 Key ICs and Assemblies

Serial No.	Position	Type	Function Description
1	N101	TDA9594H	Microcontroller and small signal processor (UOC)
2	N102	AT24C16	EEPROM
3	N602	TDA7442	Audio processor
4	N603	TDA8944J	Sound power amplifier
5	NY01	TDA6107JF /TDA6108JF	Video amplifier
6	N501	TC90A49P	COMB Filter
7	N301/N302	HEF4052BP	Electronic switch circuit
8	N401	TDA8359J	Vertical scan output stage circuit
9	N801	STR-W6856	Power module
10	A001	TDQ-6B3-P/ TAF5-EPB2	Tuner

SERVICE DATA

1. Technical Data of Key ICs

1.1 Microcontroller and Small Signal Processor TDA959X

(1) General Description

The various versions of the TDA959X H/PS-N1 series combine the functions of a video processor together with a m-Controller and US Closed Caption decoder. Most versions have a Teletext decoder on board. The Teletext decoder has an internal RAM memory for 1 or 10 page text. Some versions can generate a 'Mixed-down' I-signal for the demodulation of DVB signals. The ICs are intended to be used in economy television receivers with 110 picture tubes.

The ICs have supply voltages of 8 V and 3.3 V and they are mounted in an SDIP-64 or QFP 80 envelope.

The features are given in the following feature list. The differences between the various ICs are given in the table.

(2) Features

TV-signal processor

Available in all versions

- Multi-standard vision IF circuit with alignment-free PLL demodulator
- Internal (switchable) time-constant for the IF-AGC circuit
- Integrated chrominance trap circuit Integrated luminance delay line with adjustable delay time
- Picture improvement features with peaking (with switchable centre frequency, depeaking, variable positive/negative overshoot ratio and video dependent coring), dynamic skin tone control and blue- and black stretching
- Scan Velocity Modulation output
- Integrated chroma band-pass filter with switchable centre frequency
- Only one reference (12 MHz) crystal required for the m-Controller, Teletext- and the colour decoder
- Multi-standard colour decoder with automatic search system
- Internal base-band delay line
- Indication of the Signal-to-Noise ratio of the incoming CVBS signal
- A linear RGB/YUV/YPBPR input with fast blanking for external RGB/YUV sources. The synchronization circuit can be connected to the incoming Y signal. The Text/OSD signals are internally supplied from the m-Controller/Teletext decoder.
- RGB Cathode Calibration', white point and black level off-set adjustment so that the colour temperature of the dark and the light parts of the screen can be chosen independently.
- Contrast reduction possibility during mixed-mode of OSD and Text signals
- Adjustable 'wide blanking' of the RGB outputs
- Horizontal synchronization with two control loops and alignment-free horizontal oscillator

- Vertical count-down circuit
- Vertical driver optimized for DC-coupled vertical output stages
- Horizontal and vertical geometry processing
- Horizontal and vertical zoom function for 16 : 9 applications
- Horizontal parallelogram and bow correction for large screen picture tubes
- Low-power start-up of the horizontal drive circuit

Available in S-DIP 64 versions

- Source selection between the 'internal' CVBS and an external CVBS or Y/C signal

Available in QFP-80 versions

- The mono intercarrier sound circuit has a selective FM-PLL demodulator which can be switched to the different FM sound frequencies (4.5/5.5/6.0/6.5 MHz). The quality of this system is such that the external band-pass filters can be omitted.
- The FM-PLL demodulator can be set to centre frequencies of 4.74/5.74 MHz so that a second sound channel can be demodulated. In such an application it is necessary that an external bandpass filter is inserted.

The vision IF and mono intercarrier sound circuit can be used for the demodulation of FM radio signals

- The QSS and mono FM functionality are both available so that an FM/AM TV receiver can be built without the use of additional ICs
- Video switch with 2 external CVBS inputs and a CVBS output. One of the CVBS inputs can be used as Y/C input.
- 2 external audio inputs. The selection of the various inputs is coupled to the selection of the CVBS signals
- Switchable group delay correction in the CVBS path
- White stretching and a switchable DC transfer ratio for the luminance signal

m-Controller

- 80C51 m-controller core standard instruction set and timing
- 1 ms machine cycle
- 32 - 128Kx8-bit late programmed ROM
- 3 - 12Kx8-bit Auxiliary RAM (shared with Display)
- Interrupt controller for individual enable/disable with two level priority
- Two 16-bit Timer/Counter registers
- One 16-bit Timer with 8-bit Pre-scaler
- WatchDog timer
- Auxiliary RAM page pointer
- 16-bit Data pointer
- Stand-by, Idle and Power Down modes
- 14 bits PWM for Voltage Synthesis Tuning
- 8-bit A/D converter with 4 multiplexed inputs
- 5 PWM (6-bits) outputs for control of TV analogue signals

Data Capture

- Text memory for 1 or 10 pages
- In the 10 page versions inventory of transmitted Teletext pages stored in the Transmitted Page Table (TPT) and Subtitle Page Table (SPT)
- Data Capture for US Closed Caption
- Data Capture for 525/625 line WST, VPS (PDC system A) and Wide Screen Signalling (WSS) bit decoding
- Automatic selection between 525 WST/625 WST
- Real-time capture and decoding for WST Teletext in Hardware, to enable optimized m-processor
- Automatic selection between 625 WST/VPS on line 16 of VBI
- throughput
- Automatic detection of FASTEXT transmission
- Real-time packet 26 engine in Hardware for processing accented, G2 and G3 characters
- Signal quality detector for video and WST/VPS data types
- Comprehensive teletext language coverage
- Full Field and Vertical Blanking Interval (VBI) data
- capture of WST data

Display

- Teletext and Enhanced OSD modes
- Features of level 1.5 WST and US Close Caption
- Serial and Parallel Display Attributes
- Single/Double/Quadruple Width and Height for characters
- Scrolling of display region
- Variable flash rate controlled by software
- Enhanced display features including overlining, underlining and italics
- Soft colours using CLUT with 4096 colour palette
- Globally selectable scan lines per row (9/10/13/16) and character matrix [12x10, 12x13, 12x16 (VxH)]
- Fringing (Shadow) selectable from N-S-E-W direction
- Fringe colour selectable
- Meshing of defined area
- Contrast reduction of defined area
- Cursor
- Special Graphics Characters with two planes, allowing four colours per character
- 32 software redefinable On-Screen display characters
- 4 WST Character sets (G0/G2) in single device (e.g. Latin, Cyrillic, Greek, Arabic)
- G1 Mosaic graphics, Limited G3 Line drawing characters
- WST Character sets and Closed Caption Character set in single device

(3) Functional Difference between the Various IC Versions

Table 5

IC Version (TDA)	9590PS	9591PS	9592PS	9593PS	9594PS	9590H	9591H	9592H	9593H	9594H
TV range	110	110	110	110	110	110	110	110	110	110
Mono intercarrier multi-standard sound demodulator (4.5 - 6.5 MHz) with switchable centre frequency										
Audio switch										
Automatic Volume Leveling or subcarrier output (for comb filter applications)										
QSS sound IF amplifier with separate input and AGC circuit										
AM sound demodulator without extra reference circuit										
Generation of a 'Mixed-down' I-signal for the demodulation of DVB signals										
FM radio option (via QSS amplifier)										
FM radio option (with FM tuner)										
PAL decoder										
SECAM decoder										
NTSC decoder										
Horizontal geometry (E-W)										
Horizontal and vertical zoom										
ROM size	64 k	64-28k	64 k	32-64k	64-128k	64 k	64-28k	64 k	32-64k	64-128k
User RAM size	2 k	2 k	2 k	2 k	2 k	2 k	2 k	2 k	2 k	2 k
Teletext		10 page		1 page	10 page		10 page		1 page	10 page
Closed captioning										

(4) Pinning (QFP-80 ENVELOPE)

Symbol	Pin		Description
	QFP-80	SDIP-64	
P3.1/ADC1	1	6	port 3.1 or ADC1 input
P3.2/ADC2	2	7	port 3.2 or ADC2 input
P3.3/ADC3	3	8	port 3.3 or ADC3 input
VSSC/P	4	9	digital ground for m-Controller core and periphery
P0.5	5	10	port 0.5 (8 mA current sinking capability for direct drive of LEDs)
P0.6/CVBSTD	6	11	port 0.6 (8 mA current sinking capability for direct drive of LEDs) or Composite video input. A positive-going 1V(peak-to-peak) input is required
VSSA	7	12	digital ground of TV-processor
SECPLL	8	13	SECAM PLL decoupling
VP2	9	14	2nd supply voltage TV-processor (+8V)
DECDIG	10	15	supply voltage decoupling of digital circuit of TV-processor
PH2LF	11	16	phase-2 filter
PH1LF	12	17	phase-1 filter
GND3	13	18	ground 3 for TV-processor
DECBG	14	19	bandgap decoupling
EWD	15	20	East-West drive output
VDRB	16	21	vertical drive B output
VDRA	17	22	vertical drive A output
IFIN1	18	23	IF input 1
IFIN2	19	24	IF input 2
IREF	20	25	reference current input
VSC	21	26	vertical sawtooth capacitor
AGCOUT	22	27	tuner AGC output
SIFIN1/DVBIN1 (1)	23	28	SIF input 1 / DVB input 1
SIFIN2/DVBIN2 (1)	24	29	SIF input 2 / DVB input 2
GND2	25	30	ground 2 for TV processor
SNDPLL	26	-	narrow band PLL filter
AVL/REF0/SNDIF/ REFIN (1)	27	32	Automatic Volume Levelling / subcarrier reference output / sound IF input / external reference signal input for I signal mixer for DVB operation
AUDIO2	28	-	audio 2 input
AUDIO3	29	-	audio 3 input
HOUT	30	33	horizontal output
FBISO	31	34	flyback input/sandcastle output
DECSDEM	32	-	decoupling sound demodulator
QSSO/AMOUT/ AUDEEM (1)	33	35	QSS intercarrier output / AM output in stereo applications or deemphasis (front-end audio out) / AM output in mono applications
EHTO	34	36	EHT/over voltage protection input
PLLIF	35	37	IF-PLL loop filter
SIFAGC/DVBAGC (1)	36	31	AGC sound IF / internal-external AGC for DVB applications
INTCO/DVBO (1)	37	-	intercarrier output (from QSS or vision IF amplifier) / DVB output
IFVO/SVO/DVBO (1)	38	38	IF video output / selected CVBS output / DVB output
VP1	39	39	main supply voltage TV processor
CVBS1	40	40	internal CVBS input
GND	41	41	ground for TV processor

Symbol	Pin		Description
	QFP-80	SDIP-64	
CVBS2	42	-	external CVBS2 input
GND	43	-	ground for TV-processor
CVBS3/Y	44	42	CVBS3/Y input
C	45	43	chroma input
WHSTR	46	-	white stretch capacitor
CVBSO	47	-	CVBS output
AUDOUT /AMOUT	48	-	audio output /AM audio output (volume controlled)
SVM	49	44	scan velocity modulation output
INSSW2	50	45	2nd RGB / YUV insertion input
R2/VIN	51	46	2nd R input / V (R-Y) input / PR input
G2/YIN	52	47	2nd G input / Y input
B2/UIN	53	48	2nd B input / U (B-Y) input / PB input
BCLIN	54	49	beam current limiter input
BLKIN	55	50	black current input / V-guard input
RO	56	51	Red output
GO	57	52	Green output
BO	58	53	Blue output
VDDA	59	54	analog supply of Teletext decoder and digital supply of TV-processor (3.3 V)
VPE	60	55	OTP Programming Voltage
VDDC	61	56	digital supply to core (3.3 V)
OSCGND	62	57	oscillator ground supply
XTALIN	63	58	crystal oscillator input
XTALOUT	64	59	crystal oscillator output
RESET	65	60	reset
VDDP	66	61	digital supply to periphery (+3.3 V)
P1.0/INT1	67	62	port 1.0 or external interrupt 1 input
P1.1/T0	68	63	port 1.1 or Counter/Timer 0 input
P1.2/INT0	69	64	port 1.2 or external interrupt 0 input
P1.3/T1	70	1	port 1.3 or Counter/Timer 1 input
P1.6/SCL	71	2	port 1.6 or I ² C-bus clock line
P1.7/SDA	72	3	port 1.7 or I ² C-bus data line
P2.0/TPWM	73	4	port 2.0 or Tuning PWM output
P2.1/PWM0	74	-	port 2.1
P2.2/PWM1	75	-	port 2.2
P2.3/PWM2	76	-	port 2.3
P2.4/PWM3	77	-	port 2.4
P2.5/PWM4	78	-	port 2.5
SYNC_FILTER	79	-	CVBS (i.e. P0.6/CVBS) Sync filter input: This pin should be connected to VSSA via a 100 nF capacitor.
P3.0/ADC0	80	5	port 3.0 or ADC0 input

Note:

1. The functional content of these pins is dependent on the envelope (SDIP-64 or QFP-80), the mode of operation and on some I²C-bus control bits.

(5) Block Diagram

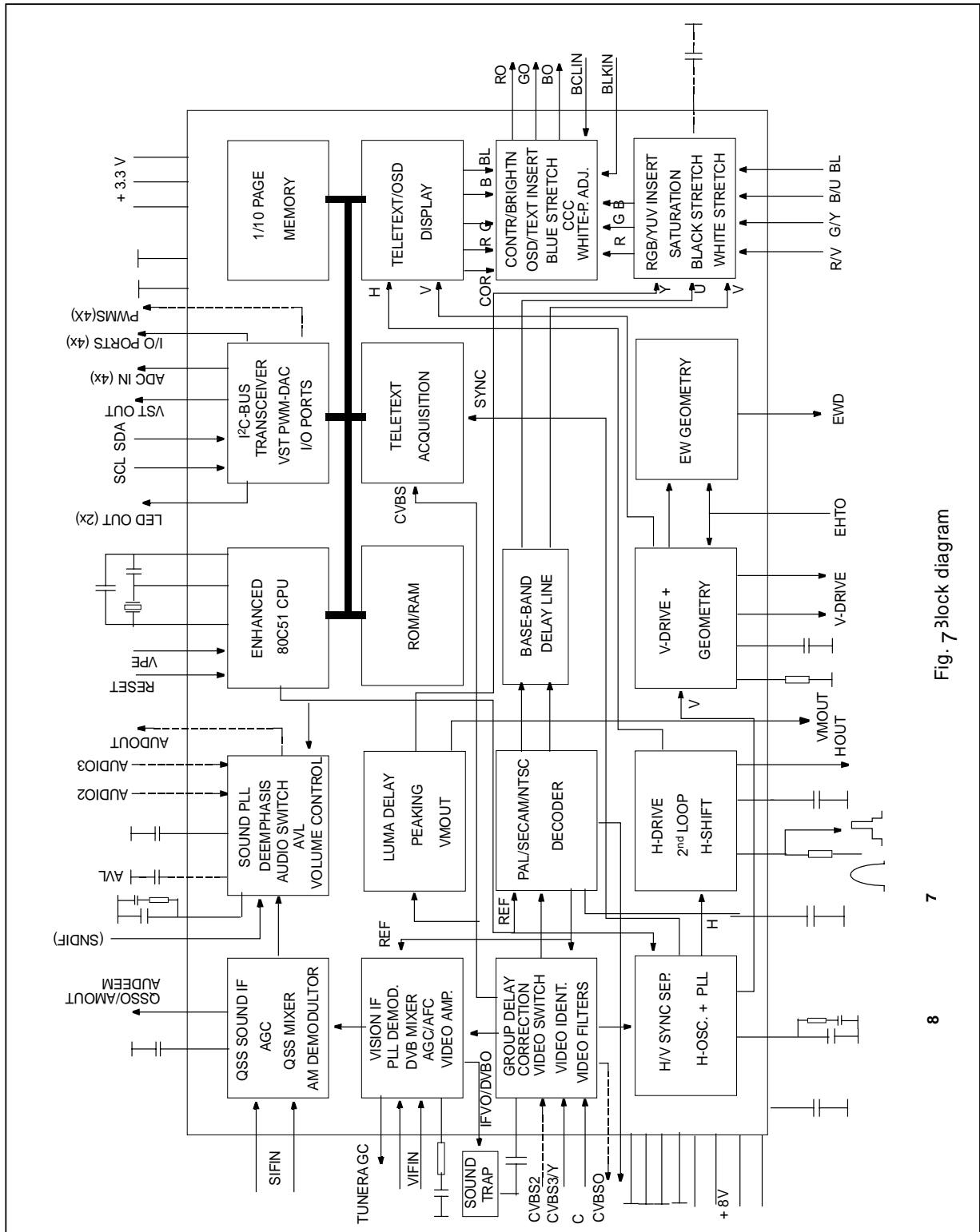


Fig. 7 3lock diagram

(6) Pining

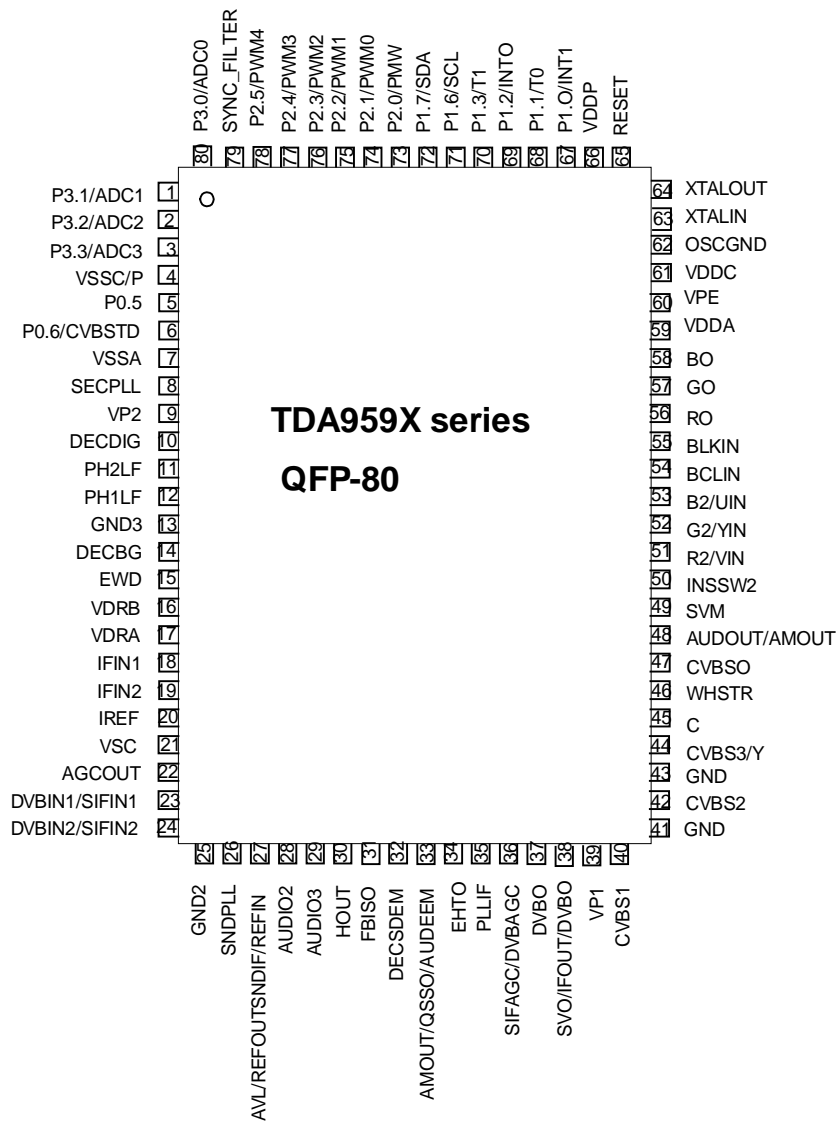


Fig. 8 Pin configuration (QFP-80)

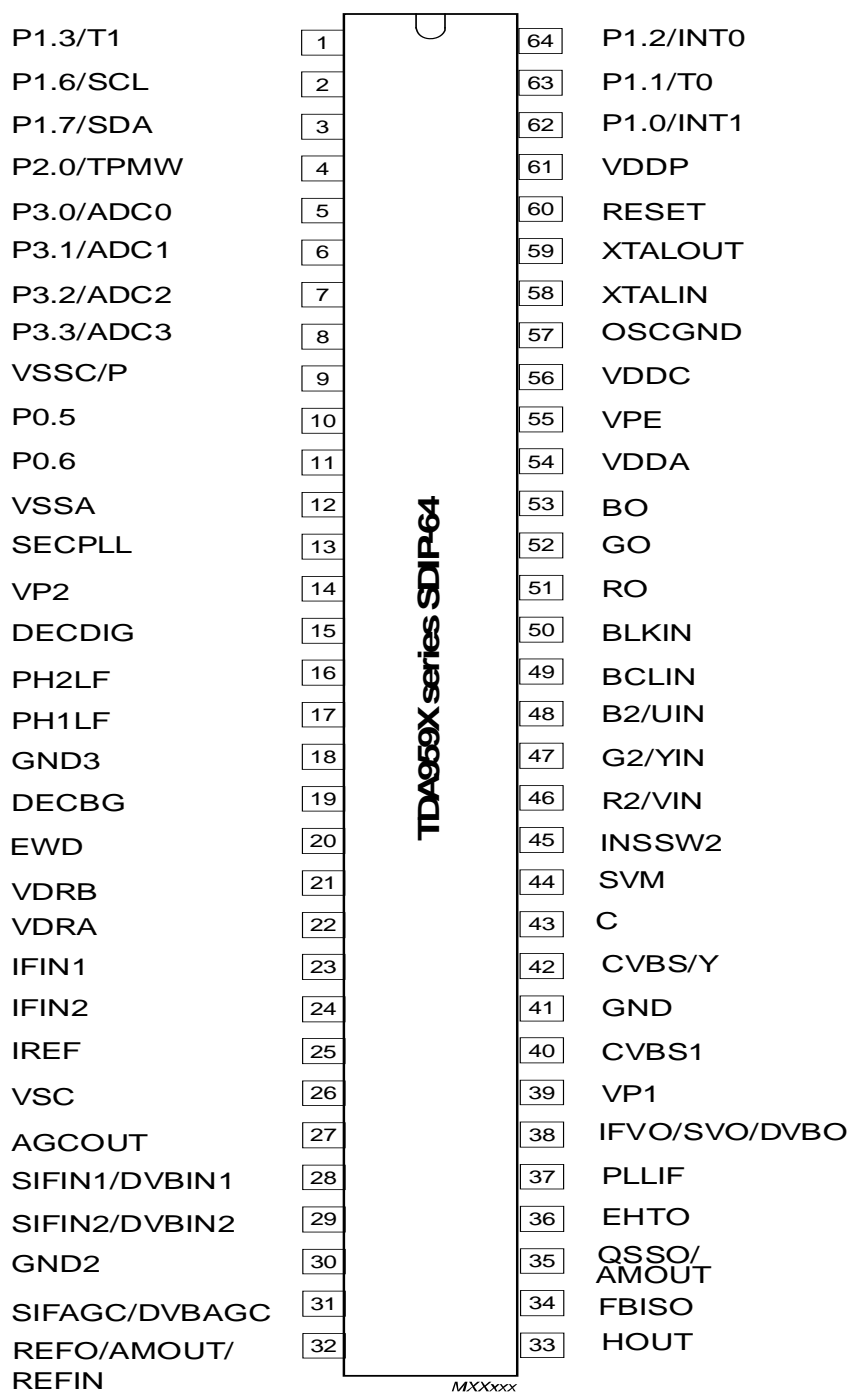


Fig. 9 Pin configuration (SDIP 64)

(7) Refer to Table 12 about Functions and Data of the IC's Pins.

1.2 EEPROM AT24C16 (N101)

(1) Features

- Low Voltage and Standard Voltage Operation
 - 5.0 ($V_{CC} = 4.5V$ to $5.5V$)
 - 2.7 ($V_{CC} = 2.7V$ to $5.5V$)
 - 2.5 ($V_{CC} = 2.5V$ to $5.5V$)
 - 1.8 ($V_{CC} = 1.8V$ to $5.5V$)
- Internally Organized 128 x 8 (1K), 256 x 8 (2K), 512 x 8 (4K), 1024 x 8 (8K) or 2048 x 8 (16K)
- 2-Wire Serial Interface
- Bidirectional Data Transfer Protocol
- 100 kHz (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 Cycles
 - Data Retention: 100 Years
- Automotive Grade and Extended Temperature

- 8-Pin and 14-Pin JEDEC SOIC and 8-Pin PDIP Packages

(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 operation are essential. The AT24C01A/02/04/08/16 is available in space saving 8-pin PDIP, 8-pin and 14-pin SOIC packages and is accessed via a 2-wire serial interface. In addition, the entire family is available in 5.0V (4.5V to 5.5V), 2.7V (2.7V to 5.5V), 2.5V (2.5V to 5.5V) and 1.8V (1.8V to 5.5V) versions.

Devices Available

(3) Pin Configurations

Pin Name	Function
A ₀ to A ₂	Address Inputs
SDA	Serial Data
SCL	Serial Clock Input
WP	Write Protect
NC	No Connect

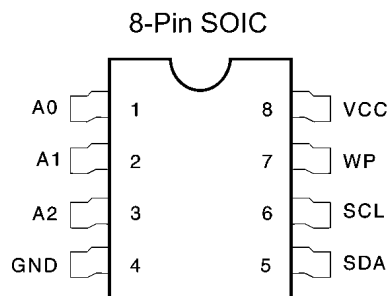
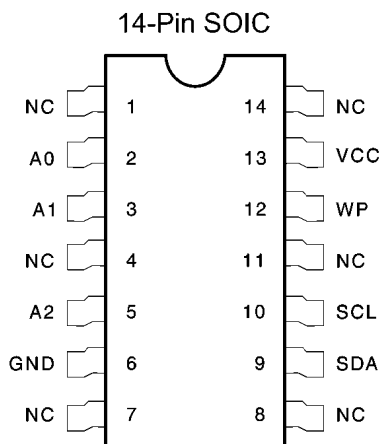
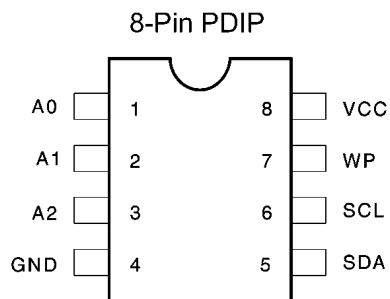


Fig. 10

(4) Block Diagram

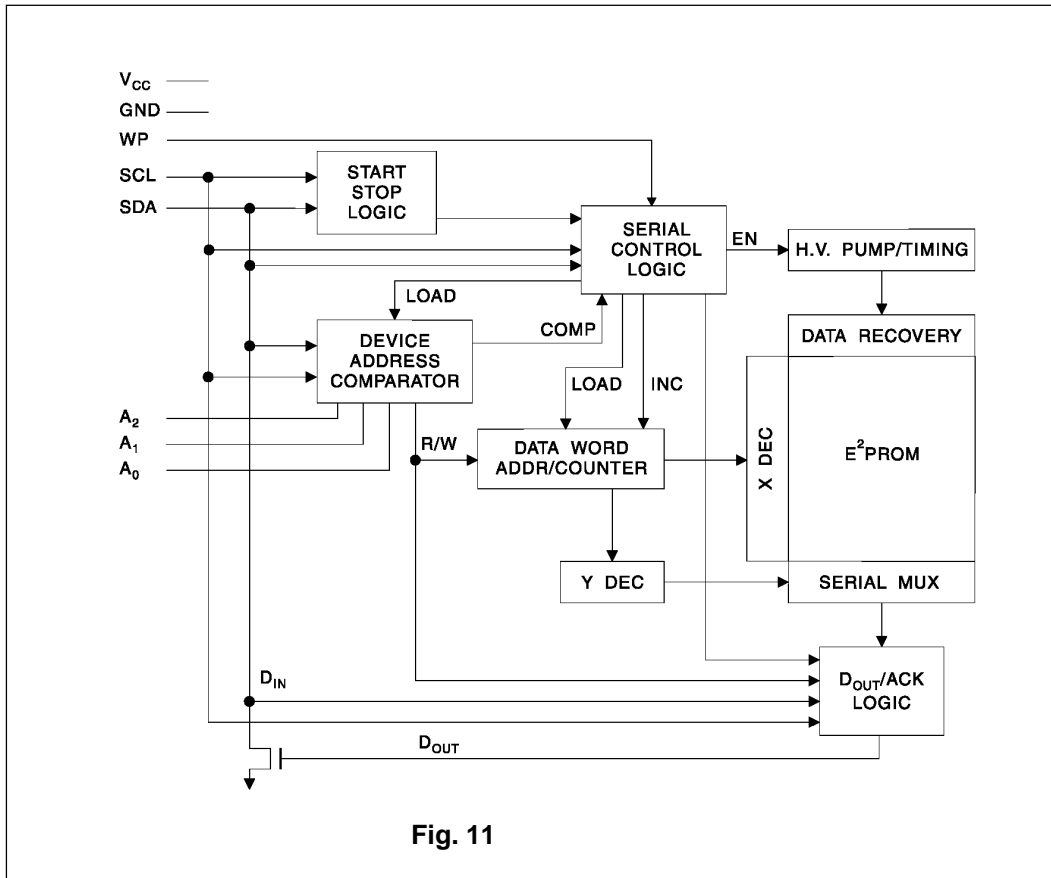


Fig. 11

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

1.3 Tone Control and Surround Digitally Controlled Audio Processor TDA7442/TDA7442D

(1) Features

4 Stereo Inputs

Input Attenuation Control In 0.5db Step

Treble And Bass Control

Two Surround Mode Available With 4 Selectable Responses:

- Music
- Simulated Stereo

Two Speaker Attenuators:

- 2 Independent Speaker Controls

In 1db Steps For Balance Facility

- Independent Mute Function

All Functions Programmable Via Serial Bus

2 Monitor Output (Only For Tda7442)

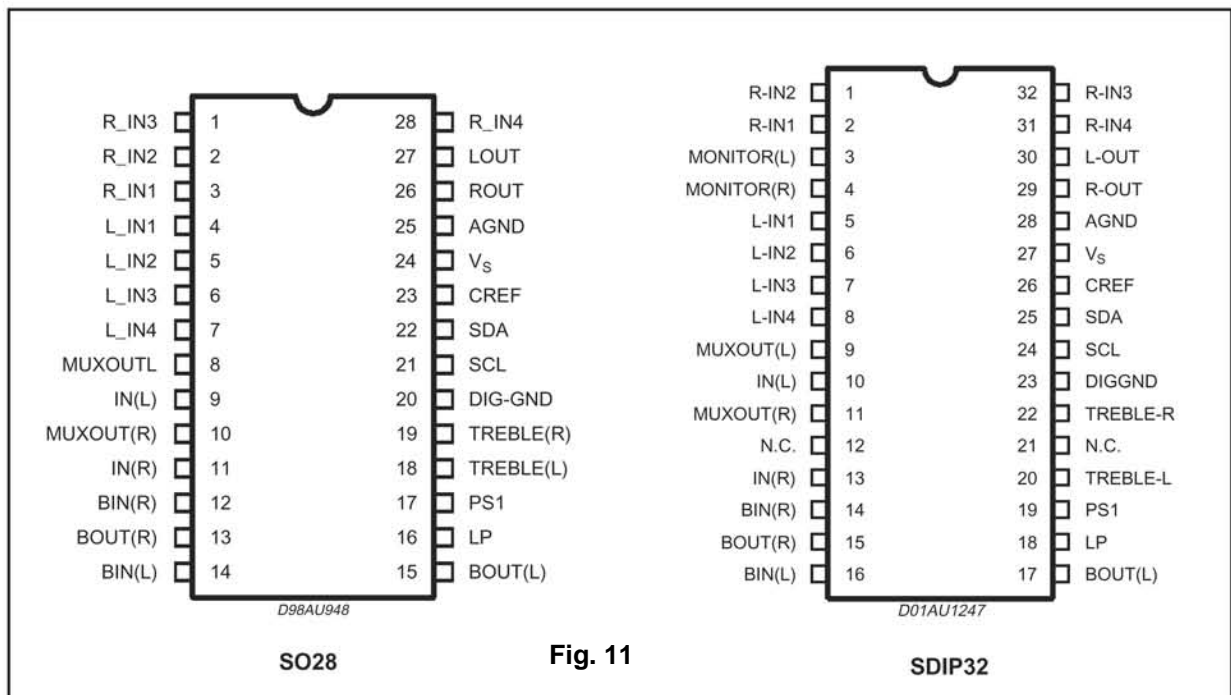
(2) Description

The TDA7442/42D is volume tone (bass and treble) balance (Left/Right) processors for quality audio applications in TV and Hi-Fi systems. It reproduces surround sound by using a programmable phase shifter. Control of all the functions is accomplished by serial bus.

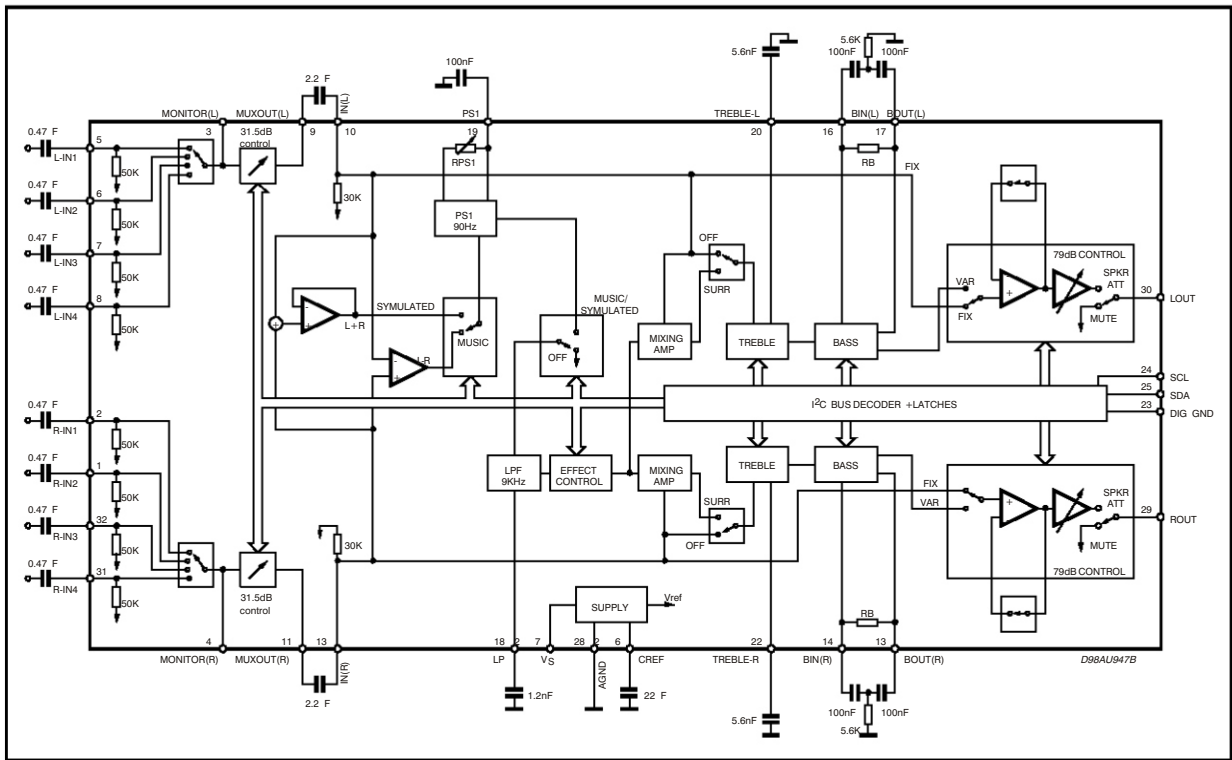
The AC signal setting is obtained by resistor networks and switches combined with operational amplifiers.

Thanks to the BIPOLAR/CMOS Technology used, Low Distortion, Low Noise and DC stepping are obtained.

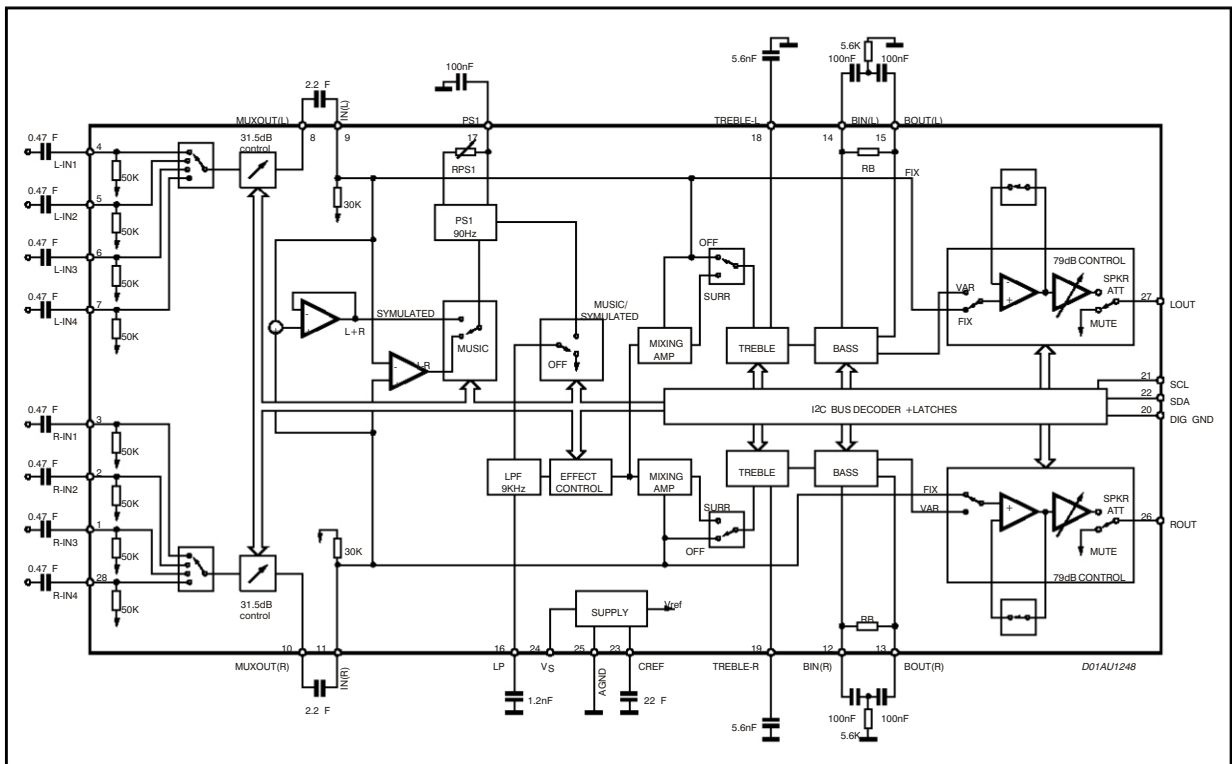
(3) Pin Connections



(4) Block Diagram (TDA7442)



(5) Block Diagram (TDA7442D)



1.4 Sound Power Amplifier TDA8944J (N603)

(1) General Description

The TDA8944J is a dual-channel audio power amplifier with an output power of $2 \times 7 \text{ W}$ at an 8Ω load and a 12V 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

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

(3) Block Diagram

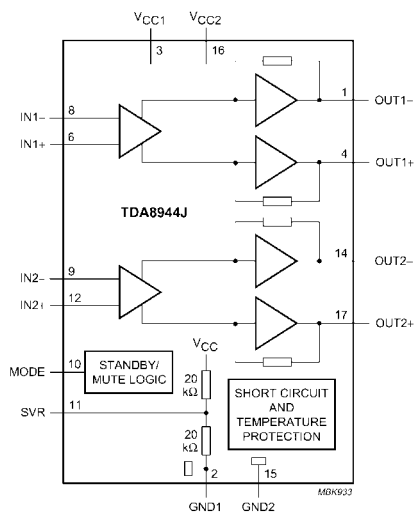


Fig. 10 Block Diagram

Pinning

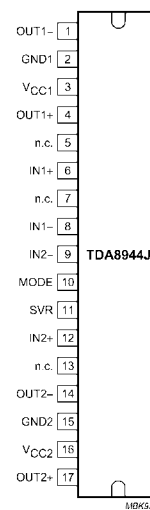


Fig. 11 Pin Configuration.

(4) Refer to Table 14 about functions and Service Data of the IC's Pin's

1.5 Triple Video Output Amplifier TDA6108JF/6107Q

(1) Features

- Typical bandwidth of 9.0MHz (for TDA6108JF) or 5.5MHz (for TDA6107Q) for an output signal of 60 V (peak-to-peak value)
- High slew rate of 1850V/μs (for TDA6108JF) or 900V/μs (for TDA6107Q)
- No external components required
- Very simple application
- Single supply voltage of 200 V
- Internal reference voltage of 2.5 V
- Fixed gain of 51 (for TDA6108JF) or 50 (for TDA6107Q)
- Black-Current Stabilization (BCS) circuit
- Thermal protection.

(2) General Description

The TDA6107Q/6108JF includes three video output amplifiers in one plastic DIL-bent-SIL 9-pin medium power (DBS9MPF) package (SOT 111-1), using high-voltage DMOS technology, and is intended to drive the three cathodes of a colour CRT directly. To obtain maximum performance, the amplifier should be used with black-current control.

(3) Ordering Information

Table 6

Type Number	Package		
	Name	Description	Version
TDA6108JF/ TDA6107Q	DBS9MPF	Plastic DIL-bent-SIL medium power package with fin; 9 leads	SOT111-1

(4) Block Diagram

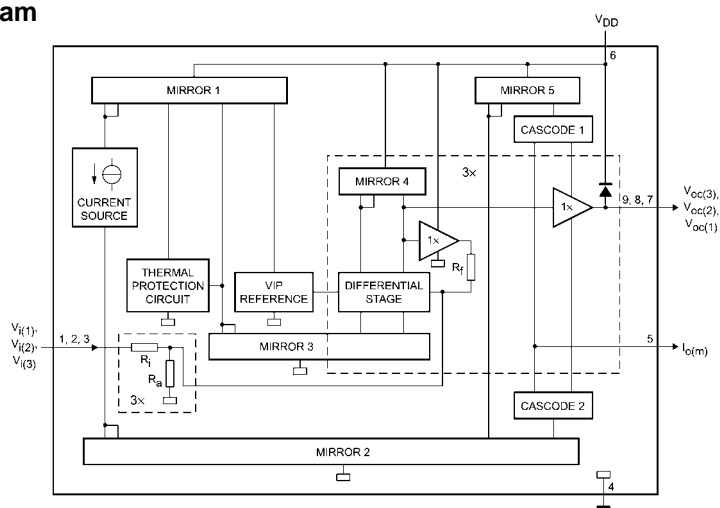


Fig. 12

Table 7 Pinning

Symbol	Pin	Description
$V_{i(1)}$	1	Inverting input 1
$V_{i(2)}$	2	Inverting input 2
$V_{i(3)}$	3	Inverting input 3
GND	4	ground (fin)
I_{om}	5	Black-current measurement output
V_{DD}	6	Supply voltage
$V_{oc(3)}$	7	Cathode output 3
$V_{oc(2)}$	8	Cathode output 2
$V_{oc(1)}$	9	Cathode output 1

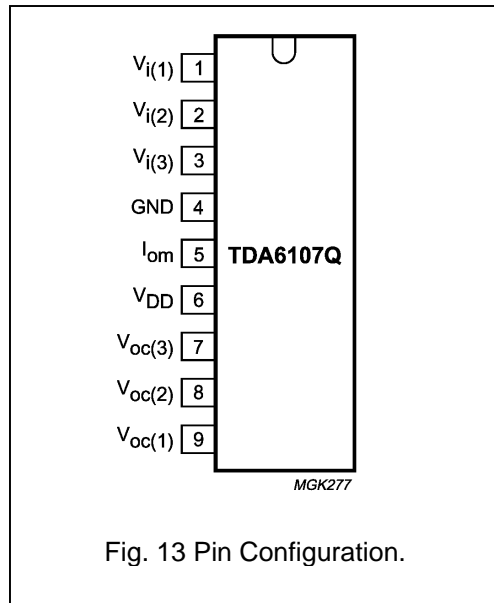


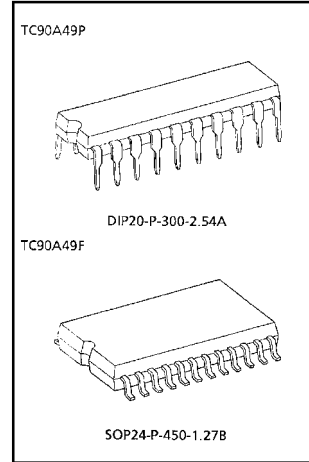
Fig. 13 Pin Configuration.

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

1.6 COMB Filter TC90A49P (N1)

(1) Features

- TV format : NTSC (3.58), PAL, M-PAL, and N-PAL
- Dynamic comb filter
- Vertical edge enhancement circuit
- PLL 8 × multiplier circuit
- Internal 8-bit 4 fsc AD converter
- Internal 8-bit precision 8 fsc DA converter (2 ch)
- Sync tip clamp circuit
- Internal 4H-line memory
- I²C bus interface
- Package : DIP 20-pin and SOP 24-pin
- 5V single power supply



Weight
 DIP20-P-300-2.54A : 1.11 g (Typ.)
 SOP24-P-450-1.27B : 0.44 g (Typ.)

(2) Block Diagram

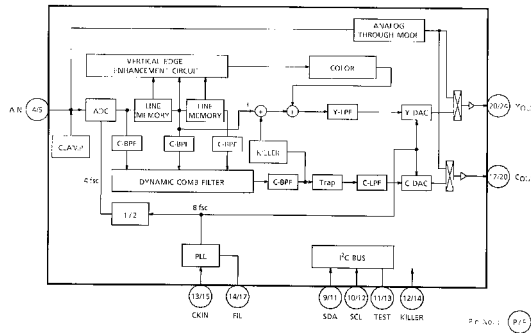
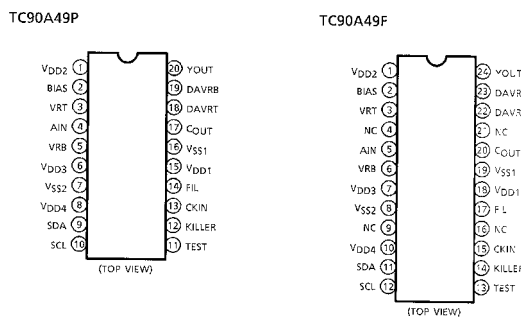


Fig. 14

Fig. 15

(3) Pin Assignment



The IC which was writing in PIN ASSIGNMENT must use the open condition.

Fig. 16

(4) Refer to Table 16 about Functions and Service Data of the IC's Pins.

1.7 Dual 4-channel Analog Multiplexer/Demultiplexer HEF4052

(1) Description

The HEF4052 is a dual 4-channel analog multiplexer/demultiplexer with common channel select logic. Each multiplexer/demultiplexer has four independent inputs/outputs (Y_0 to Y_3) and a common input/output (Z). The common channel select logic includes two address inputs (A_0 and A_1) and an active LOW enable input (E).

Both multiplexers/demultiplexers contain four bidirectional analog switches, each with one side connected to an independent input/output (Y_0 to Y_3) and the other side connected to a common input/output (Z).

With \overline{E} LOW, one of the four switches is selected (low impedance ON-state) by A_0 and A_1 . With E HIGH, all switches are in the high impedance OFF-state, independent of A_0 and A_1 . V_{DD} and V_{SS} are the supply voltage connections for the digital control inputs (A_0 , A_1 and E). The V_{DD} to V_{SS} range is 3 to 15 V. The analog inputs/outputs (Y_0 to Y_3 , and Z) can swing between V_{DD} as a positive limit and V_{EE} as a negative limit.

V_{DD} V_{EE} may not exceed 15 V.

For operation as a digital multiplexer/demultiplexer, V_{EE} is connected to V_{SS} (typically ground)

(2) Block Diagrams

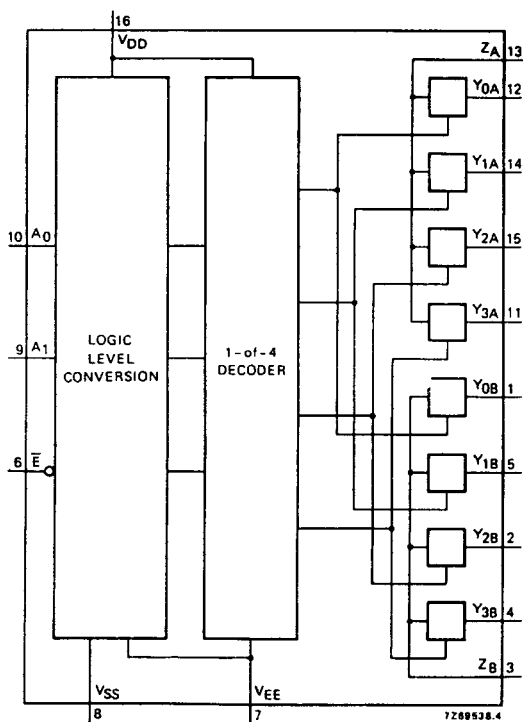


Fig. 17

Table 8 Pinning

Y_{0A} to Y_{3A}	Independent inputs/outputs
Y_{0B} to Y_{3B}	Independent inputs/outputs
A_0 A_1	Address inputs
\overline{E}	Enable input (active LOW)
Z_A Z_B	Common inputs/outputs

Family data, I_{DD} LIMITS category MSI

See Family Specifications

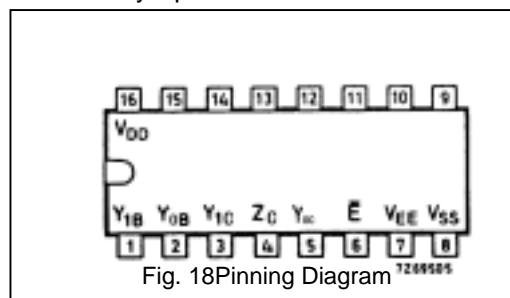


Fig. 18 Pinning Diagram 7248505

HEF4052P (N): 16-lead DIL; plastic (SOT38-1)

HEF4052D (F): 16-lead DIL; ceramic (cerdip) (SOT74)

HEF4052T (D): 16-lead SO; plastic (SOT109-1)

() : Package Designator North America

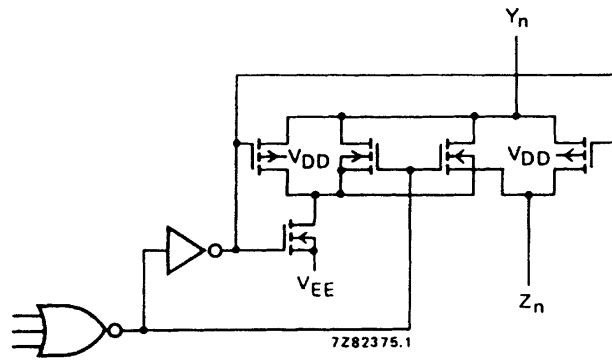


Fig. 19 Schematic Diagram (One Switch)

(3) Function Table

Table 9

Inputs			Channel
E	A_1	A_0	On
L	L	L	$Y_{0A}-Z_A; Y_{0B}-Z_B$
L	L	H	$Y_{1A}-Z_A; Y_{1B}-Z_B$
L	H	L	$Y_{2A}-Z_A; Y_{2B}-Z_B$
L	H	H	$Y_{3A}-Z_A; Y_{3B}-Z_B$
H	X	X	none

Notes

H=HIGH state (the more positive voltage)

L=LOW state (the less positive voltage)

X=state is immaterial

Ratings

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Supply voltage (with reference to V_{DD}) V_{EE} -18 to +0,5 V

Note

To avoid drawing V_{DD} current out of terminal Z, when switch current flows into terminals Y, the voltage drop across the bidirectional switch must not exceed 0,4V. If the switch current flows into terminal Z, no V_{DD} current will flow out of terminals Y, in this case is no limit for the voltage drop across the switch, but the voltages at Y and Z may not exceed V_{DD} or V_{EE}

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

1.8 Vertical deflection output TDA8359J

(1) Introduction

The TDA8359J is an integrated power circuit for use in 90° and 110° colour deflection systems. It contains a vertical deflection bridge output, operating as a high efficiency class G system and can handle field frequencies from 25 to 200 Hz. The vertical coil of a 4 : 3 as well a 16 : 9 picture tube can be connected to this vertical deflection device. Due to the bridge configuration a DC deflection output application can be designed with a positive main supply of typical 12 Volts and a positive flyback supply of typical 45 Volt. (Depending on the coil data).

This integrated circuit is designed in a Low Voltage DMOS (LVDMOS) process that combines bipolar, CMOS and DMOS components. DMOS output transistors (MOSFETs) are used because of the absence of secondary breakdown, which gives a better SOAR performance. The internal circuits are designed in such way that only a few external components are needed to get a correct working application.

The TDA8359J is functional the same as the TDA8357J vertical deflection output stage. The TDA8359J differs in only one aspect from the TDA8357J, it is able to deliver a higher output current which is more suitable for large picture tubes.

A detailed investigation procedure to determine an optimum application is given at the end of this report.

(2) Features

- Few external components required
- High efficiency fully DC coupled vertical bridge output circuit
- Short rise and fall time of the vertical flyback switch
- Picture tube burn in protection signal (guard circuit)
- Temperature (thermal) protection circuit
- Differential mode inputs
- Blanking pulse generator (guard)
- Improved EMC performance due to differential inputs

(3) Pinning

Table 10

Symbol	Pin	Description
INA	1	Input A
INB	2	Input B
VP	3	Supply voltage
OUTB	4	Output B
GND	5	Ground
VFB	6	Flyback supply voltage
OUTA	7	Output A
GUARD	8	Guard output
FEEDB	9	Feedback input

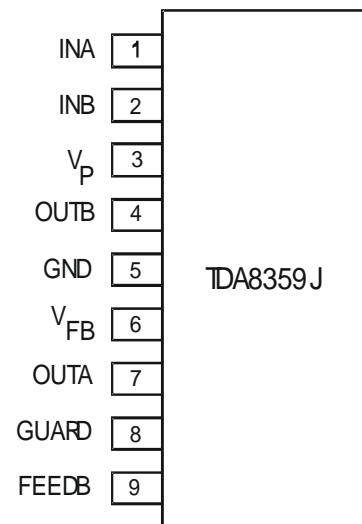


Fig. 20

(3) Block Diagram

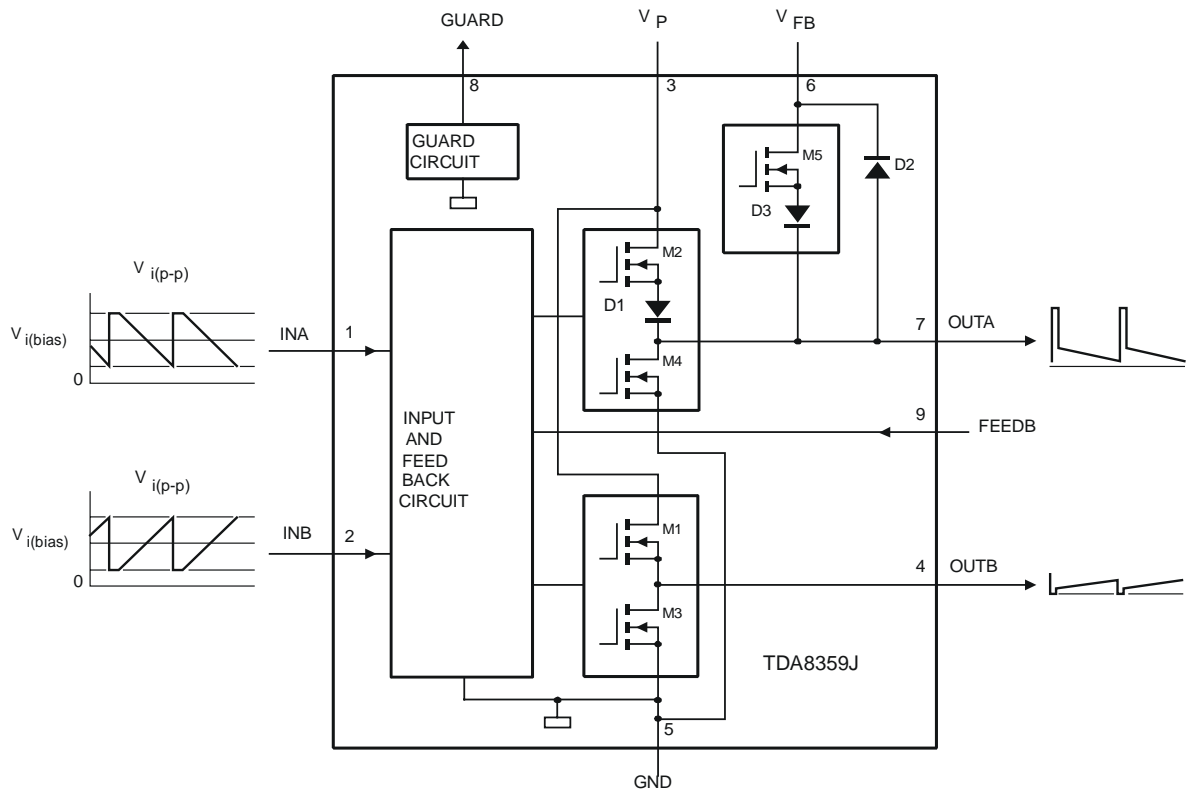


Fig. 21

1.9 Switch-mode Power Supply STR- W68XX

(1) General Description

The STR-W6800 Series are thick-film ICs for Quasi-Resonant flyback SMPS with MOSFET and control built-in, featuring fewer external components, simplified circuit design, small-size and standard power supply.

"STR-W6800 Series ICs" offers three operation modes: Quasi-Resonant, Multi-Bottom Skip and Time Fix Control, thus guaranteeing high efficiency in all loading areas by means of the automatic change-over of the operation modes.

QR---- Quasi-Resonant operation at the time of heavy load

MBS---- Multi-Bottom Skip operation at the time of medium load for preventing oscillating frequency rising up and fixing operating frequency

TFC---- Time Fix Control at the time of light load such as stand-by load

By adopting chip-on-chip construction, even small package can deal with big power.

(2) Features

- Seven-pin small SIP style package FM207 (generally called TO220), affording dielectric isolation
- Guarantees space of 1.8mm between high voltage pin and other pins, thus high voltage MOSFET built-in allowed
- Offers low startup current by employing BCD-Process
- Automatic change-over of QR and MBS operations
With MOSFET turn-on at the bottom of VDS, "STR-W 6800 Series ICs" offers high efficiency and low noise at the wide areas from the heavy load to stand-by load and fixed operating frequency, and enables SMPS to become smaller.
- TFC operation delivers low-power standby mode for fixing turn-on time, enabling external components to adjust turn-on time.
- Avalanche breakdown energy-guaranteed and high damage-resistance power MOSFET
By guaranteeing avalanche breakdown energy of built-in power MOSFET, "STR-W 6800 Series ICs" simplifies design of absorption circuit of surge voltage without VDSS residual considered during design.
- MOSFET fixed voltage drive circuit built in
- Various protection functions
Pulse-by-pulse over-current protection
Over-voltage protection →lockout
Over-load protection →lockout
Thermal protection →lockout (not for STR-W6854/6)

(3) Block Diagram

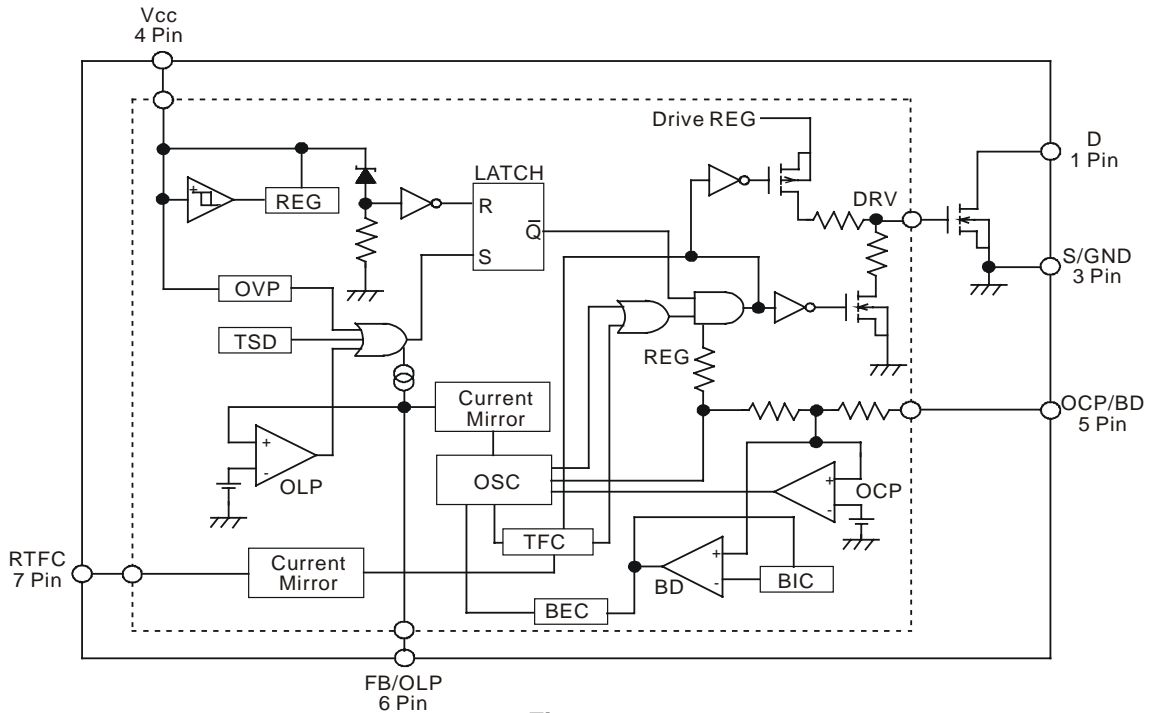


Fig. 22

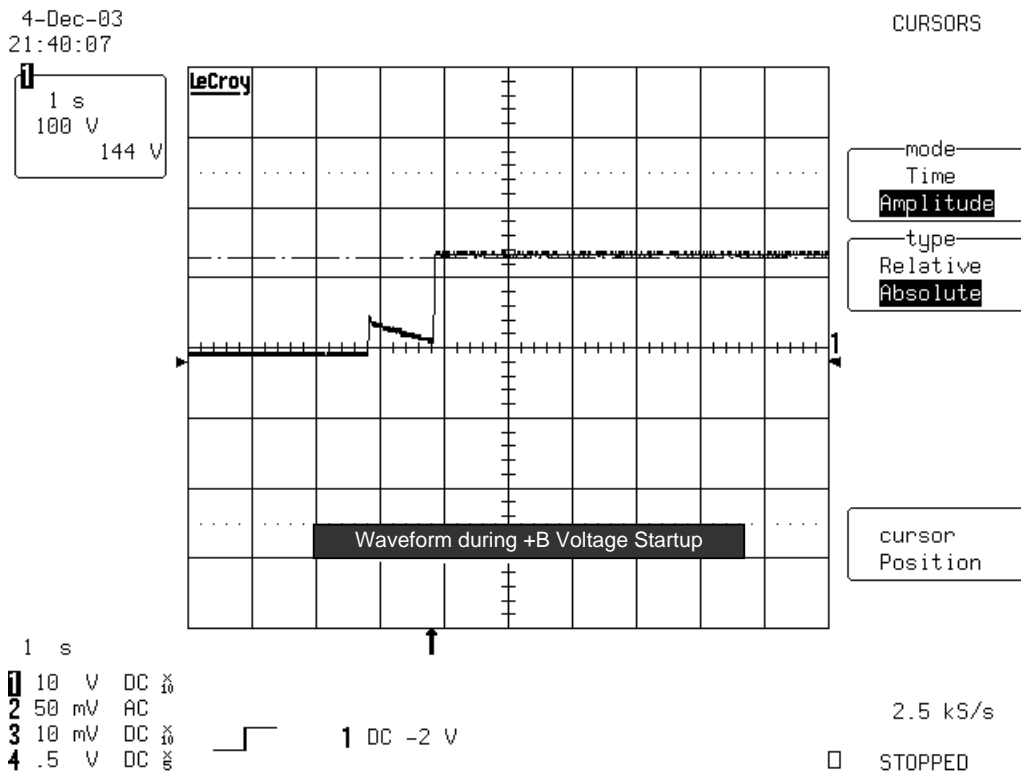
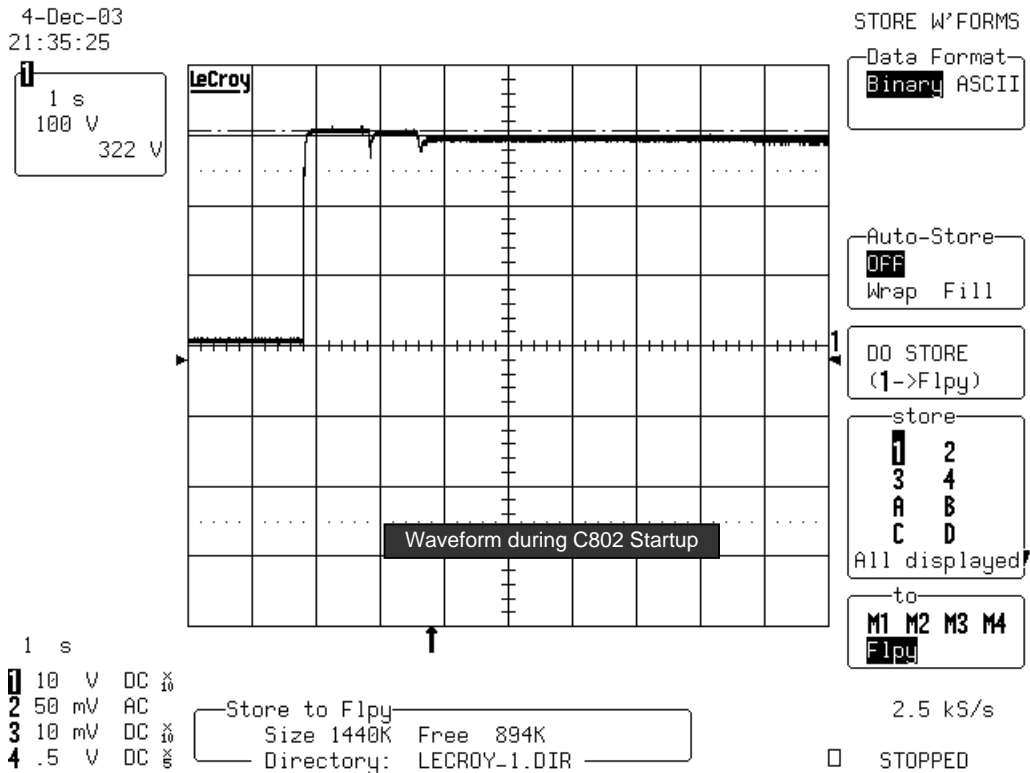
(4) Pinning

Table 11

Pin No.	Symbol	Name	Function Description
1	D	Source for MOSFET	
2	NC		
3	S/GND	Source/GND for MOSFET	Source/ GND for Control
4	Vcc	Supply voltage	
5	OCP/BD	Over-current protection detection/Bottom detection	
6	FB/OLP	Feedback/Over-load protection detection	
7	RTFC	Time Fix Control regulation	

(5) Refer to Table 18 about Functions and Data of the IC's Pins.

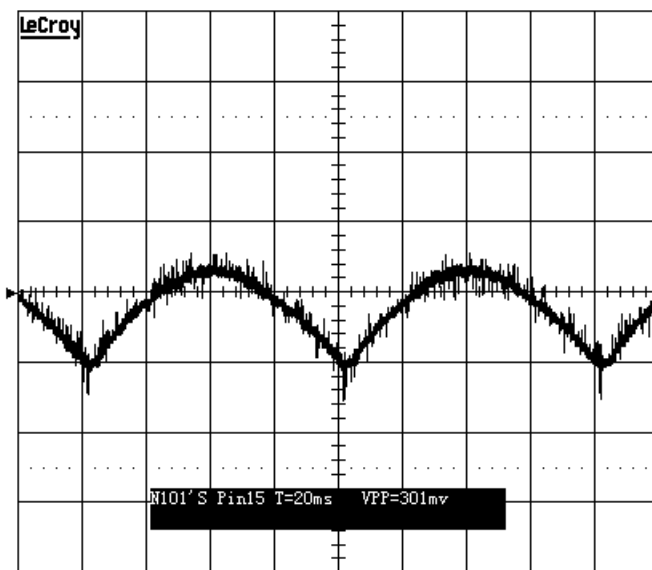
2. WAVEFORMS OF KEY POINTS



4-Dec-03
21:58:19

CURSORS

5 ms
200mV
25mV



mode
Time
Amplitude

type
Relative
Absolute

show
↓↑ ↓&↑
Slope

Reference
cursor
Track OFF On

Diifference
cursor

5 ms

- 1 20 mV AC $\frac{\text{V}}{\text{mV}}$
- 2 50 mV AC
- 3 10 mV DC $\frac{\text{V}}{\text{mV}}$
- 4 .5 V DC $\frac{\text{V}}{\text{mV}}$

Δt -19.928 ms $\frac{1}{\Delta t}$ -50.181 Hz



1 DC 0.044 V

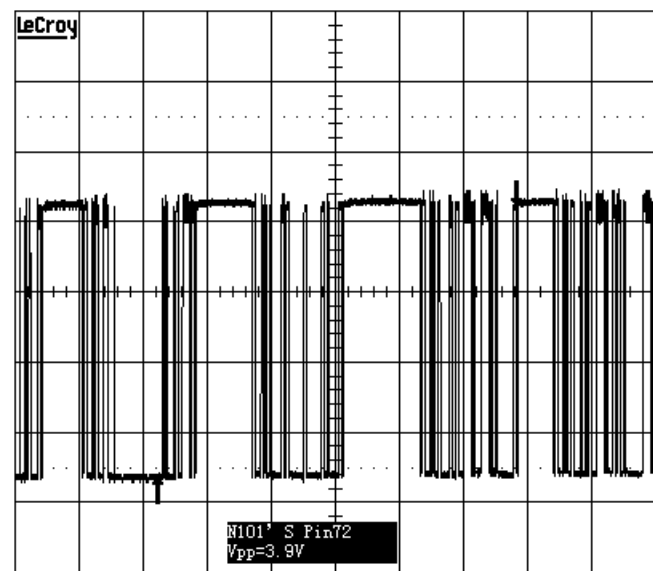
500 kS/s

STOPPED

5-Dec-03
19:44:26

QUICK ZOOM

.5 ms
1.00 V
-3.875 V



Multi-Zoom
OFF On
(no trace)

One of
traces ABCD
must be on
to scroll.

.5 ms

- 1 .1 V AC $\frac{\text{V}}{\text{mV}}$
- 2 50 mV AC
- 3 10 mV DC $\frac{\text{V}}{\text{mV}}$
- 4 .5 V DC $\frac{\text{V}}{\text{mV}}$

Δt -2.8020 ms $\frac{1}{\Delta t}$ -356.89 Hz



1 DC -5.00 V

5 MS/s

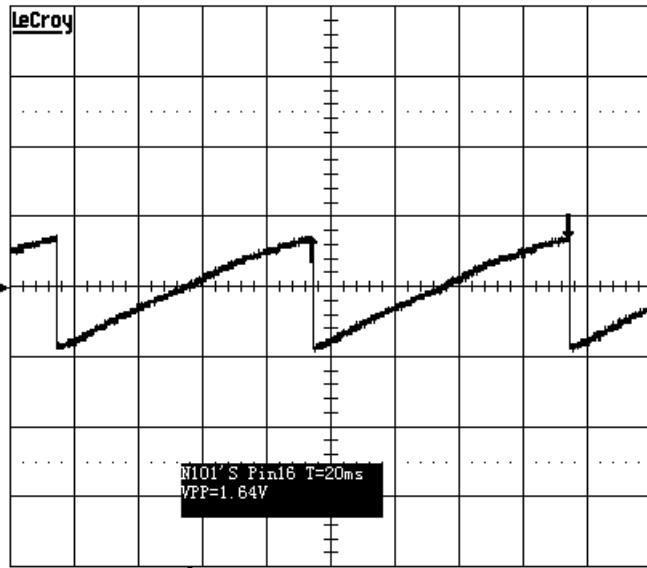
STOPPED

SERVICE MANUAL

4-Dec-03
22:12:33

CURSORS

5 ms
1.00 V
31mV



mode
Time
Amplitude

type
Relative
Absolute

show
↓↑ ↓&↑
Slope

Reference
cursor
Track OFF On

Difference
cursor

5 ms

- 1 .1 V AC \times
- 2 50 mV AC
- 3 10 mV DC \times
- 4 .5 V DC \times

Δt -20.000 ms $\frac{1}{\Delta t}$ 50.001 Hz

1 DC 0.04 V

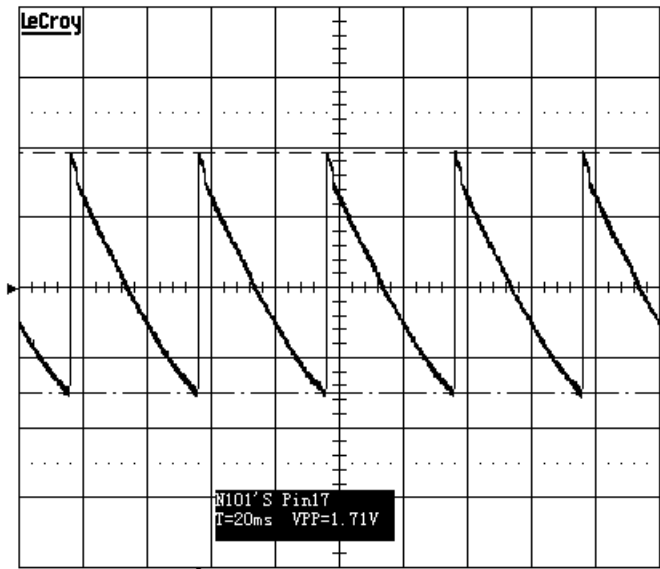
500 kS/s

STOPPED

4-Dec-03
22:13:55

CURSORS

10 ms
0.50 V
1.71 V



mode
Time
Amplitude

type
Relative
Absolute

Reference
cursor
Track OFF On

Difference
cursor

10 ms

- 1 50 mV AC \times
- 2 50 mV AC
- 3 10 mV DC \times
- 4 .5 V DC \times

1 DC 0.04 V

250 kS/s

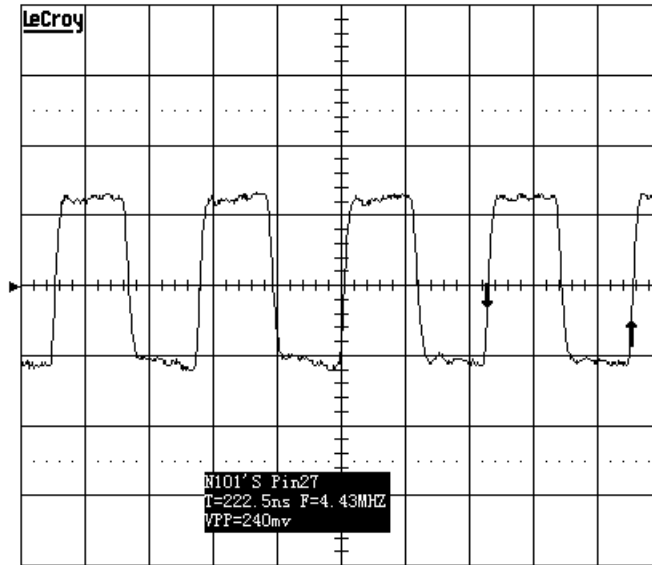
STOPPED

4-Dec-03
22:34:23

CURSORS

1
.1 μ s
100mV
-18.1mV

2
.1 μ s
100mV
-18.1mV



mode
Time
Amplitude

type
Relative
Absolute

show
↓-↑ ↓&↑
Slope

Reference
cursor
Track OFF On

Difference
cursor

.1 μ s

- 1** 10 mV AC \times
- 2** 50 mV AC
- 3** 10 mV DC \times
- 4** .5 V DC \times

Δt 225.5 ns $\frac{1}{\Delta t}$ 4.435 MHz

1 DC -6mV

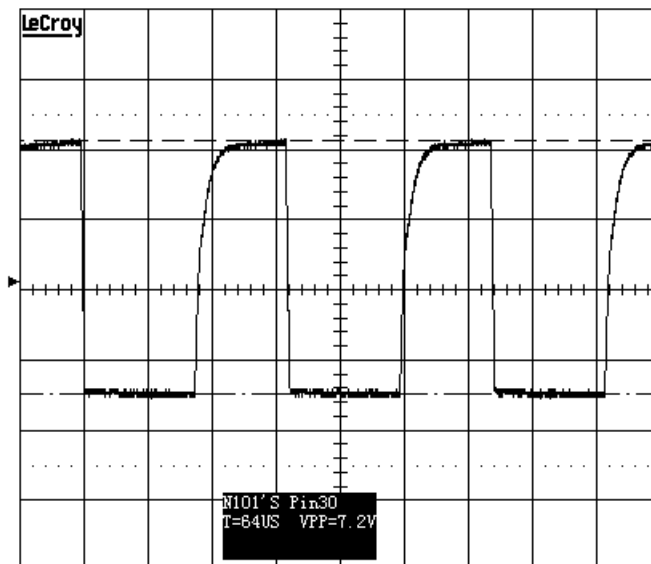
1 GS/s

STOPPED

4-Dec-03
22:45:06

CURSORS

1
20 μ s
2.00 V
7.20 V



mode
Time
Amplitude

type
Relative
Absolute

Reference
cursor
Track OFF On

Difference
cursor

20 μ s

- 1** .2 V AC \times
- 2** 50 mV AC
- 3** 10 mV DC \times
- 4** .5 V DC \times

1 DC 0.24 V

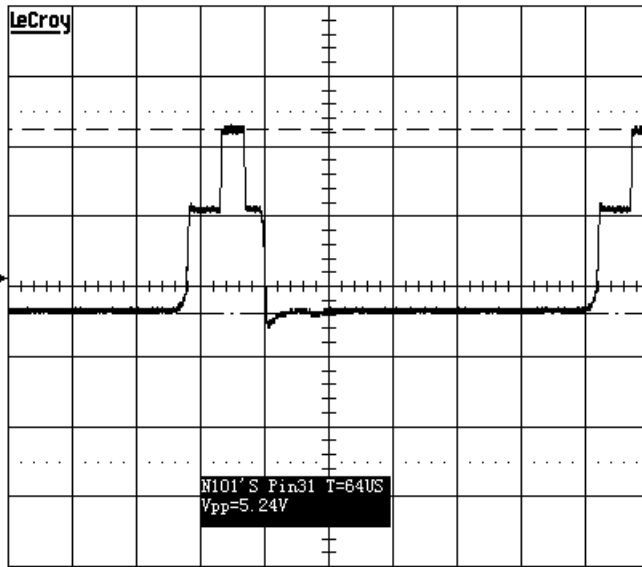
100 MS/s

STOPPED

4-Dec-03
22:51:11

CURSORS

10 μ s
2.00 V
5.24 V



mode
Time
Amplitude

type
Relative
Absolute

Reference
cursor
Track OFF On

DiFFerence
cursor

10 μ s
1 .2 V AC $\frac{\%}{10}$
2 50 mV AC
3 10 mV DC $\frac{\%}{10}$
4 .5 V DC $\frac{\%}{10}$

1 DC 0.24 V

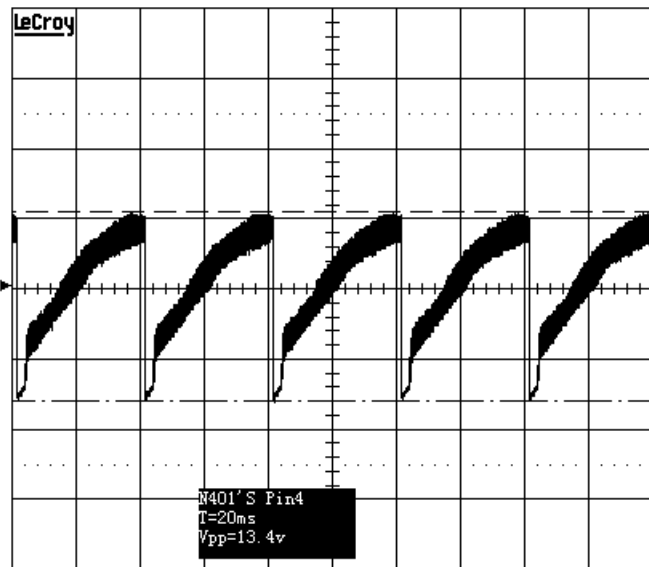
250 MS/s

STOPPED

5-Dec-03
14:48:35

CURSORS

10 ms
5.0 V
13.4 V



mode
Time
Amplitude

type
Relative
Absolute

Reference
cursor
Track OFF On

DiFFerence
cursor

10 ms
1 .5 V AC $\frac{\%}{10}$
2 50 mV AC
3 10 mV DC $\frac{\%}{10}$
4 .5 V DC $\frac{\%}{10}$

1 DC 0.3 V

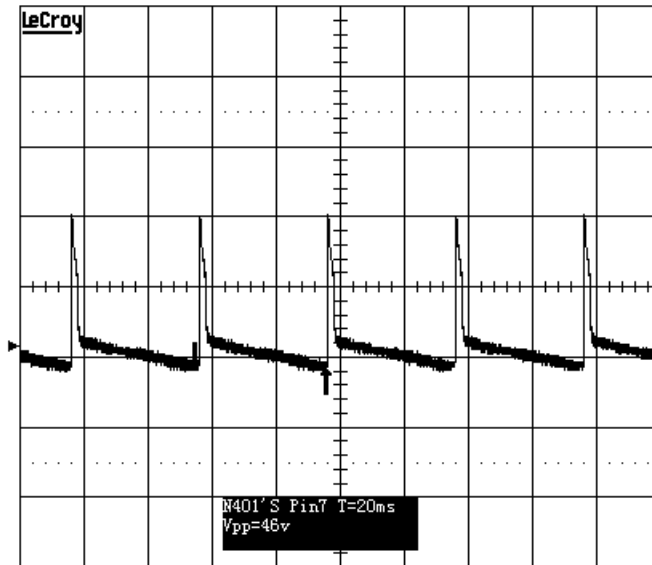
250 kS/s

AUTO

SERVICE MANUAL

5-Dec-03
14:51:07

10 ms
20.0 V
-0.6 V



10 ms

- 1 2 V AC \times
- 2 50 mV AC
- 3 10 mV DC \times
- 4 .5 V DC \times



1 DC 0.4 V

Δt 20.676 ms $\frac{1}{\Delta t}$ 48.365 Hz

CURSORS

mode
Time
Amplitude

type
Relative
Absolute

show
↓↑ ↓&↑
Slope

Reference
cursor
Track OFF On

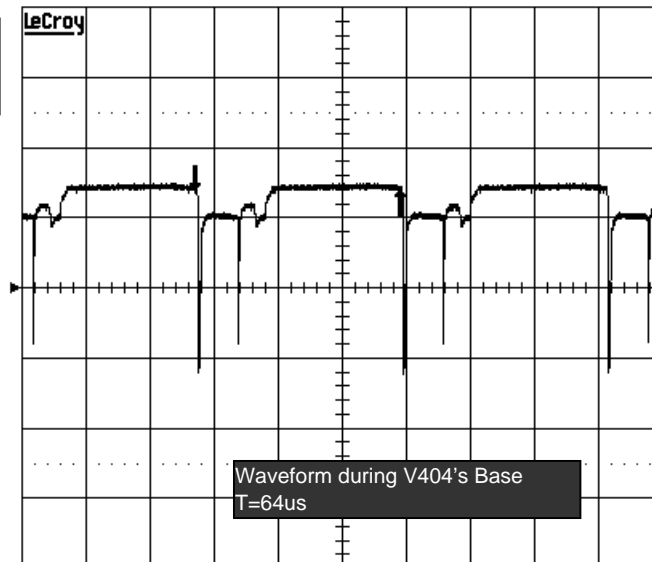
Difference
cursor

250 kS/s

AUTO

5-Dec-03
14:54:19

20 μ s
5.0 V
0.00 V



50 μ s

- 1 .5 V AC \times
- 2 50 mV AC
- 3 10 mV DC \times
- 4 .5 V DC \times



1 DC -6.2 V

Δt 64.01 μ s $\frac{1}{\Delta t}$ 15.623 kHz

CURSORS

mode
Time
Amplitude

type
Relative
Absolute

show
↓↑ ↓&↑
Slope

Reference
cursor
Track OFF On

Difference
cursor

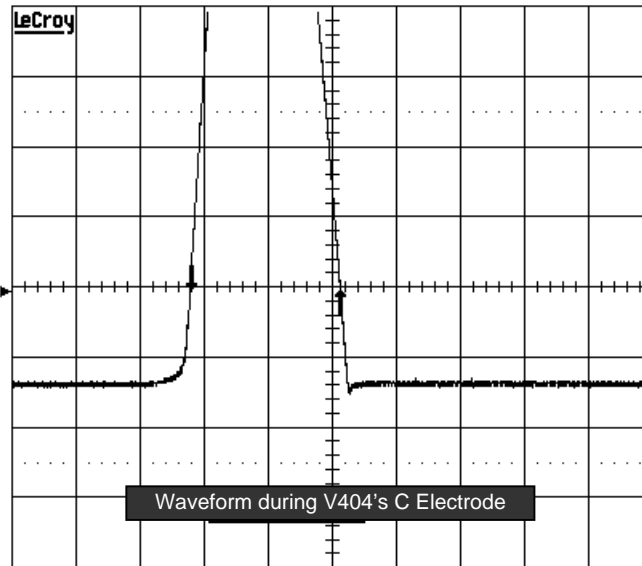
50 MS/s

STOPPED

5-Dec-03
14:59:33

CURSORS

5 μ s
100 V
0.0 V



mode
Time
Amplitude

type
Relative
Absolute

show
↓ ↑ ↓ & ↑
Slope

Reference
cursor
Track OFF On

DiFFerence
cursor

5 μ s

- 1 10 V AC \times
- 2 50 mV AC
- 3 10 mV DC \times
- 4 .5 V DC \times

Δt 11.706 μ s $\frac{1}{\Delta t}$ 85.426 kHz



1 DC -6 V

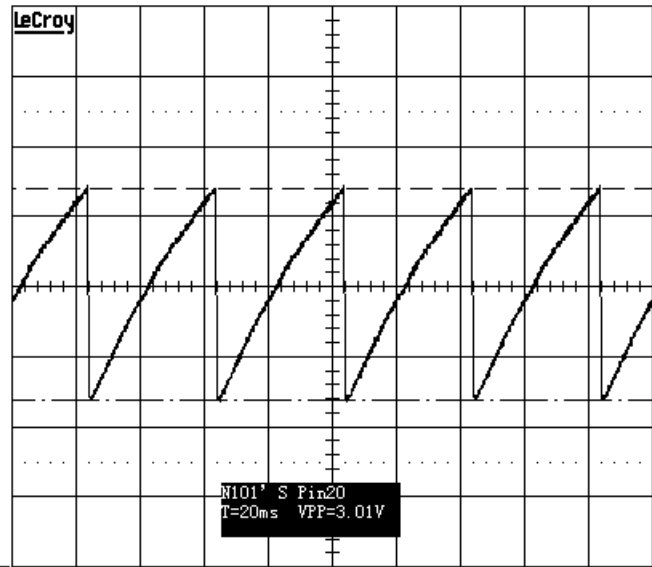
500 MS/s

STOPPED

5-Dec-03
15:53:16

CURSORS

10 ms
1.00 V
3.01 V



mode
Time
Amplitude

type
Relative
Absolute

Reference
cursor
Track OFF On

DiFFerence
cursor

10 ms

- 1 .1 V AC \times
- 2 50 mV AC
- 3 10 mV DC \times
- 4 .5 V DC \times

1 DC -5.00 V

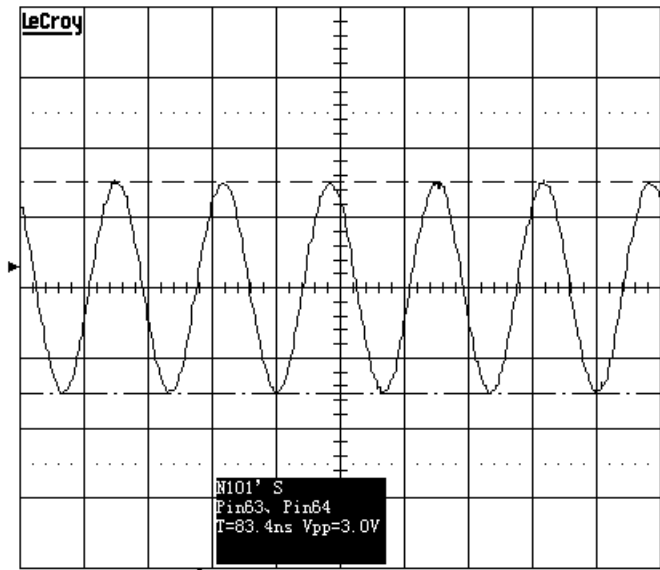
250 kS/s

STOPPED

4-Dec-03
23:28:37

CURSORS

50 ns
1.00 V
3.01 V



mode
Time
Amplitude

type
Relative
Absolute

Reference
cursor
Track OFF On

Difference
cursor

50 ns
1 .1 V AC \times
2 50 mV AC
3 10 mV DC \times
4 .5 V DC \times

1 DC 0.30 V

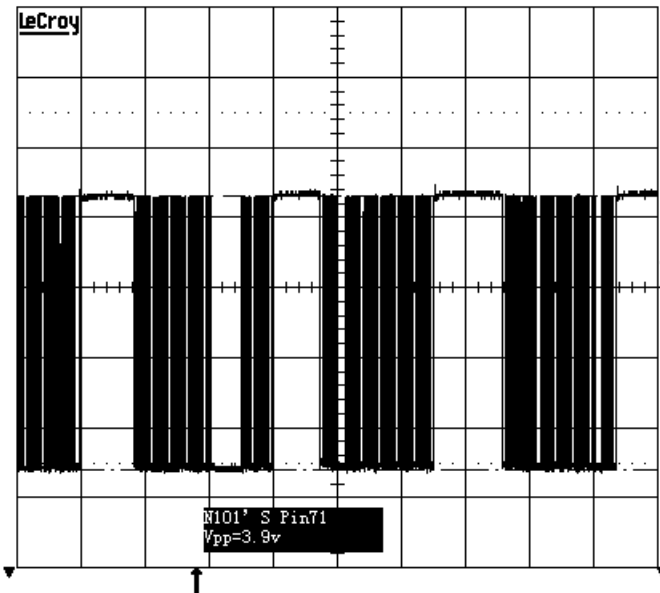
1 GS/s

AUTO

5-Dec-03
19:45:46

CURSORS

.5 ms
1.00 V
3.90 V



mode
Time
Amplitude

type
Relative
Absolute

Reference
cursor
Track OFF On

Difference
cursor

.5 ms
1 .1 V AC \times
2 50 mV AC
3 10 mV DC \times
4 .5 V DC \times

1 DC -5.00 V

5 MS/s

STOPPED

3. SERVICE DATA OF KEY ICS

Table 12 Functions and Service Data of TDA9594H (N101)'s Pins

Pin No.	Function Description	Resistance to Ground (K)	Reference Voltage (V)
1	P3.1/ADC1	6.8	
2	P3.2/ADC2	6.8	
3	P3.3/ADC3	1.3	0.196
4	VSSC/P	0	0
5	P0.5	10.4	0
6	P0.6/CVBSTD	10.4	0
7	VSSA	0	0
8	SECPLL	5,420	
9	VP2	1.1	7.68
10	DECDIG	30.6	
11	PH2LF	5,410	
12	PH1LF	5,450	
13	GND3	0	0
14	DECDBG	38	
15	EWD	1,760	
16	VDRB	3.03	
17	VDRA	3.03	
18	IFIN1	36.4	1.89
19	IFIN2	36.4	1.9
20	IREF	38.9	
21	VSC	5,440	
22	AGCOUT	1.7	2.0
23	SIFIN1/DVBIN1 (1)	36.5	1.89
24	SIFIN2/DVBIN2 (1)	36.6	1.89
25	GND2	0	0
26	SNDPLL	-	-

(Continued)

SERVICE MANUAL

27	AVL/REF0/SNDIF/REFIN (1)	3,680	2.4
28	AUDIO2	-	-
29	AUDIO3	-	-
30	HOUT	7,660	3.2
31	FBISO	1,360	0.9
32	DECSDEM	5,290	
33	QSSO/AMOUT/ AUDEEM (1)	3,690	0.6
34	EHTO	7.4	2.54
35	PLLIF	5,440	
36	SIFAGC/DVBAGC (1)	5,000	
37	INTCO/DVBO (1)	-	-
38	IFVO/SVO/DVBO (1)	3,660	2.05
39	VP1	1.1	7.6
40	CVBS1	5,230	
41	GND	0	0
42	CVBS2	5,380	
43	GND	0	0
44	CVBS3/Y	5,340	3.74
45	C	82.3	1.47
46	WHSTR	5,190	
47	CVBSO	5,500	
48	AUDOUT /AMOUT	5,500	
49	SVM	5,500	4.5
50	INSSW2	0.075	
51	R2/VIN	5,500	2.5
52	G2/YIN	5,500	2.5
53	B2/UIN	5,500	2.5
54	BCLIN	0.069	3.7
55	BLKIN	23	3.2
56	RO	5.8	2.7

(Continued)

SERVICE MANUAL

57	GO	5.8	2.6
58	BO	5.8	2.7
59	VDDA	0.28	3.2
60	VPE	0	0
61	VDDC	0.28	3.3
62	OSCGND	0.014	
63	XTALIN	2,500	1.5
64	XTALOUT	5	1.5
65	RESET	0	0
66	VDDP	0.28	3.3
67	P1.0/INT1	10	0.06
68	P1.1/T0	10	0.06
69	P1.2/INT0	12,200	3.3
70	P1.3/T1	0.19	0.7
71	P1.6/SCL	8.7	3.7
72	P1.7/SDA	9	3.8
73	P2.0/TPWM	10.5	0.06
74	P2.1/PWM0	2.5	0.1
75	P2.2/PWM1	3.7	0.06
76	P2.3/PWM2	6.2	0.05
77	P2.4/PWM3	-	-
78	P2.5/PWM4	10.6	0.1
79	SYNC_FILTER	3,700	
80	P3.0/ADC0	-	-

Table 13 Functions and Service Data of AT24C16 (N102)'s Pins

Pin No.	Functions Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (20K)	Negative Resistance (20K)
1	Address input	0	0	0
2	Address input	0	0	0
3	Address input	0	0	0
4	Common ground	0	0	0
5	Serial data	4	6.37	6.4
6	Serial clock input	4.2	6.37	6.44
7	Write protect	0	0	0
8	Supply voltage	4.9	3.03	3.02

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

Pin No.	Functions Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (20K)	Negative Resistance (20K)
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		

(Continued)

SERVICE MANUAL

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 TDA6107Q/TDA6108JF (NY01)'s Pins

Pin No.	Function Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (20K)	Negative Resistance (20K)
1	G inverting input	3.33	5.32	4.72
2	R inverting input	3.26	5.32	4.72
3	B inverting input	3.28	5.32	4.72
4	Ground	0.00	0.00	0.00
5	Black level current input	6.03	18.65	5.65
6	Supply voltage	199		4.48
7	B output	69.9		5.45
8	R output	69.18		5.45
9	G output	65.9		5.45

Table 16 Functions and Service Data of TC90A49P (N501)'s Pins

Pin No.	Functions Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (20K)	Negative Resistance (20K)
1	ADC and DAC analog power supply.	4.98	0.55	0.54
2	ADC bias voltage. Stabilize by attaching a 0.01 μ F capacitor.	1.41		

(Continued)

SERVICE MANUAL

3	ADC input range D upper limit voltage. Stabilize by attaching a 0.01 μ F capacitor.	3.15	0.64	0.63
4	ADC input. Inputs 1.0 Vp-p video signal. Sync tip clamp is performed.	2.14		
5	ADC input range D lower limit voltage. Stabilize by attaching a 0.01 μ F capacitor.	1.84	0.497	0.49
6	ADC and DAC logic power supply.	4.98	0.55	0.55
7	Logic and internal DRAM GND (digital).	0	0	0
8	Internal DRAM power supply	4.98	0.55	0.55
9	I ² C BUS SDA	4.12	6.39	6.44
10	I ² C BUS SCL	4.25	6.4	6.45
11	Shipment test mode switch or I ² C bus setting reset pin.	0	0	0
12	Y signal comb function ON / OFF switch.	0	0	0
13	Clock input pin.	2.54		
14	Connect the APC filter in the 8 fsc PLL circuit	0		
15	PLL power supply	4.98	0.55	0.55
16	ADC, DAC, and PLL GND (analog).	0	0	0
17	Outputs chrominance signal.	2.25		
18	DAC output range D upper limit voltage.	3.14	0.57	0.57
19	DAC output range D lower limit voltage	1.84	0.42	.043
20	Outputs luminance signal.	2.16		

Table 17 Functions and Service Data of HEF4052 (N301/N302)'s Pins

Pin No.	Function Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (K)	Negative Resistance (K)
1	Signal input	0	12.52	6.46
2	Signal input	0	12.5	6.46
3	Signal input	0	12.52	6.46
4	Signal output	0	12.43	6.25
5	Signal input	0	12.5	6.46
6	Ground	0	0	0
7	Ground	0	0	0
8	Ground	0	0	0
9	Control signal input	4.98	7.8	5.6
10	Control signal input	4.98	7.8	5.6
11	Control signal input	0	0	0
12	Signal input	0	0	0
13	Signal output	0	0	0
14	Signal input	0	0	0
15	Audio output	0	12.48	6.46
16	Supply voltage	5.09	6.89	4.44

Table 18 Functions and Service Data of STR-W6856 (N801)'s Pins

Pin No.	Symbol	Reference Voltage (V)	Resistance to Ground (M)
1	D	303	∞
2	NC	0	1.3
3	S/GND	16.7	∞
4	Vcc	3.1	8.5
5	OCP/BD	1.5	1.3
6	FB/OLP	7.2	1.6
7	RTFC		

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.

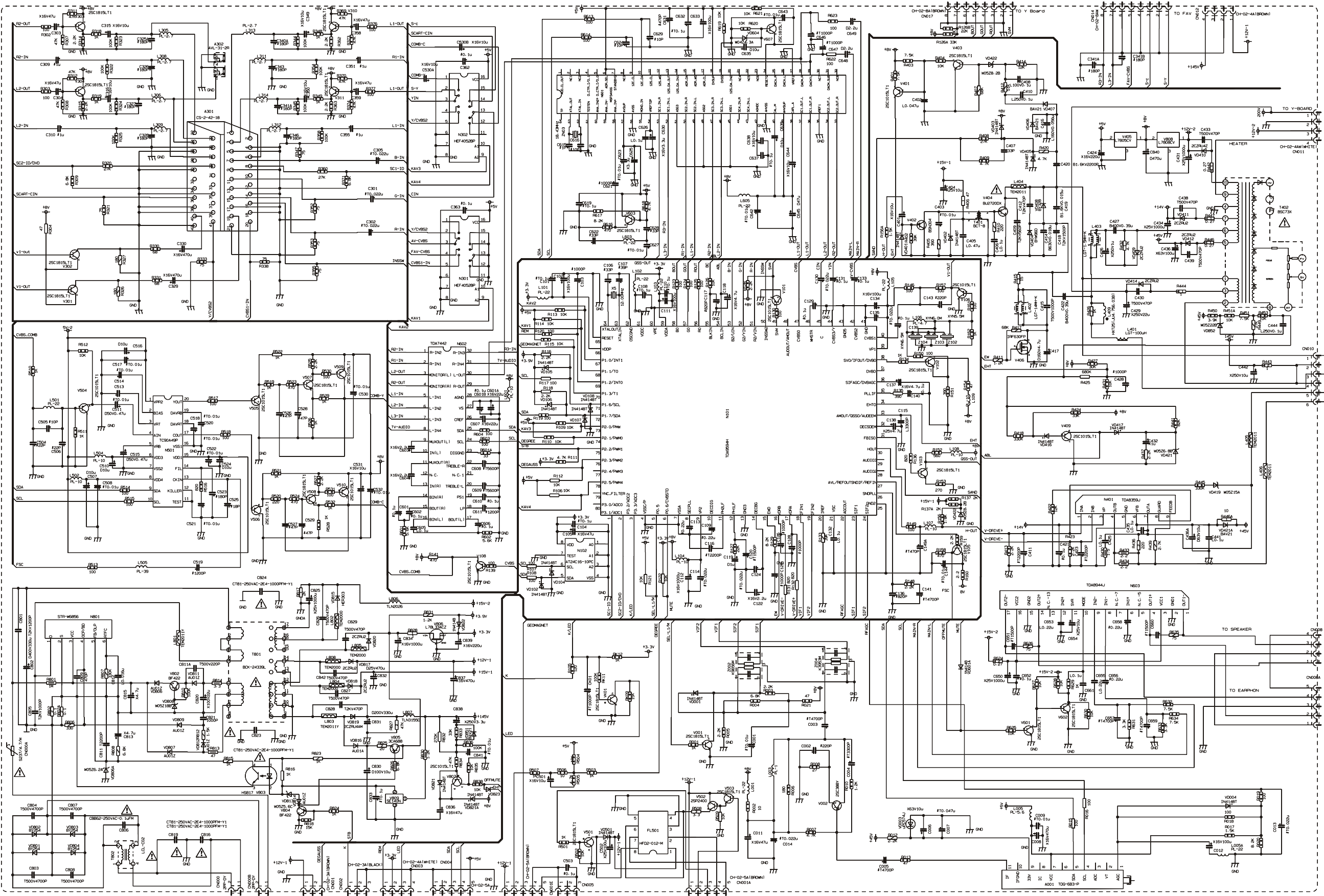
Z: The components identified by the Z marking have important characteristics.

Note:

Models and specifications of components in this table may be somewhat different with your unit.

In this case, please rely on the actual unit.

Circuit Diagram for PF29T18 (1)



This circuit diagram is only for reference, specifications are subject to change without reference.

1. Any components identified by  have special safety-related characteristics. Use replacement

2.  Cold ground  Hot ground