AKIRA

makes life better

Colour TV
Service Manual

CHASSIS: TD171

MODEL: 21PZP1MKI/ANZ

CONTENT

SAFETY NOTICE

SAFETY PRECAUTION

1. An isolation transformer should be connected in the power line between the receiver and the AC line when a service is performed on the primary of the converter transformer of the set.
2. Comply with all caution and safety-related notes provided on the cabinet back, inside the cabinet, on the chassis or the picture tube.
3. When replacing a chassis in the cabinet, always be certain that all the protective devices are installed properly, such as, control knobs, adjustment covers or shields, barriers, isolation resistor-capacitor networks etc.. Before returning any television to the customer, the service technician must be sure that it is completely safe to operate without danger of electrical shock.

X-RADIATION PRECAUTION

The primary source of X-RADIATION in television receiver is the picture tube. The picture tube is specially constructed to limit X-RADIATION emissions. For continued X-RADIATION protection, the replacement tube must be the same type as the original including suffix letter. Excessive high voltage may produce potentially hazardous X-RADIATION. To avoid such hazards, the high voltage must be maintained within specified limit. Refer to this service manual, high voltage adjustment for specific high voltage limit. If high voltage exceeds specified limits, take necessary corrective action. Carefully follow the instructions for +B1 volt power supply adjustment, and high voltage check to maintain the high voltage within the specified limits.

PRODUCT SAFETY NOTICE

Product safety should be considered when a component replacement is made in any area of a receiver. Components indicated by mark in the parts list and the schematic diagram designate components in which safety can be of special significance. It is particularly recommended that only parts designated on the parts list in this manual be used for component replacement designated by mark. No deviations from resistance wattage or voltage ratings may be made for replacement items designated by mark.

GENERAL DESCRIPTION

AKTP01/02 chassis series are applied A14T02/A14T02a respectively which uses mainly TOSHIBA' advanced UOC-ultimate chip TMPA8803/8821/8851 and I2C-bus controlled IC with combination of micro controller and small signal processor, the TMPA8803/8821/8851 series feature high-integration, high performance-to-price ratio and high-reliability and advanced functions with fewer external components, which provide much convenience for manufacturing and technical service.

Table 1: A14T02 mainly ICs and functions

Position	Type	Function Description	Remark
N204	8851CPNG6EG1	Micro controller and small signal processor (UOC)	
V501	Driver Transistor (C4460)	Power Supply	
T501	BCK-65-10 D3	Isolate Transformer	
A101	ET-5C1E-EV200K	Tuner	
T402	BSC25-05N2135	FlyBack Transformer	
N701	TA1343NG	Sound Processor	
N702	TDA7496SA	Sound power amplifier	
N402	STV9302	Vertical Scan Output Stage Circuit	
V411	TT2496	Horizontal Driver TST	
N901	ATMEL 24C16	EEPROM IC	
Z101	K2955	Saw Filter	
N203/N207	TC4053	AV1/AV2 Switch	

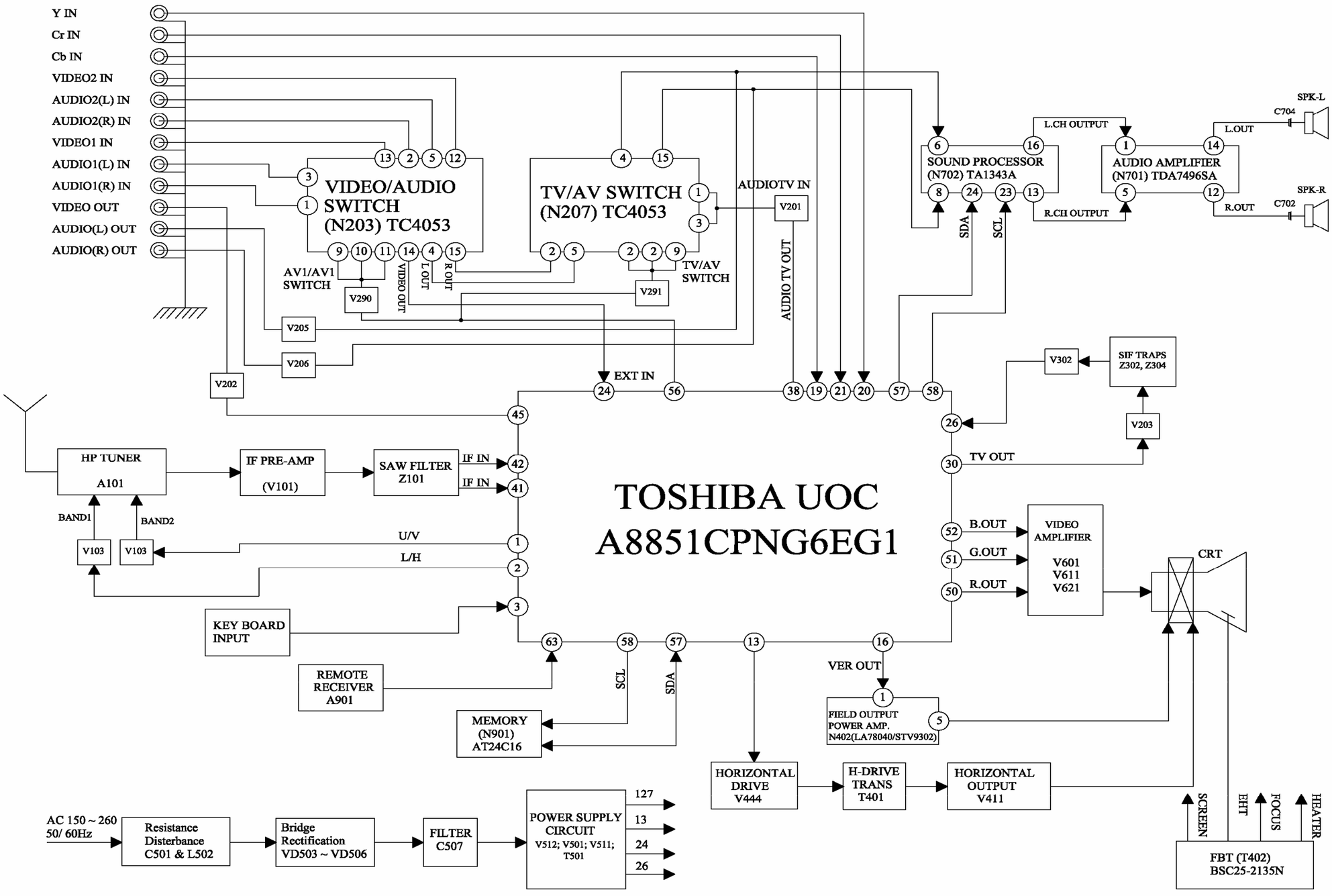
TECHNICAL SPECIFICATION

Test Item	Conditional	TD171
AC Operating Range	RF&AV signal input with sound loud speaker (volume maximum) & Picture set in Dynamic mode	115Vac ~ 240Vac
Total Power Consumption	Philips or Mono-scope pattern signal with howling sound Contrast & Brightness set in Maximum, sound increase maximum	100Watts
	Standby Mode	14 Watts
EHT	Brightness & contrast set in Maximum	Min: 26.2KVdc
	Typical Design value	Average: 26.5KVdc
	Brightness &contrast Minimum	Max: 27.8KVdc
Anode Current	Brightness &contrast Maximum	I_{ABL} = 1.08mA
Heater Voltage	TV operate normally	V_{Heater} = 6.2Vac
B^+	Normal operating	VB^+ = 112Vdc
Sound power output	RF signal input broadcasting at 217.25MHz/BG/DK(1KHz) Volume is maximum	V = 9.2Vrms P = 10Watts X 2

GENERAL SPECIFICATION

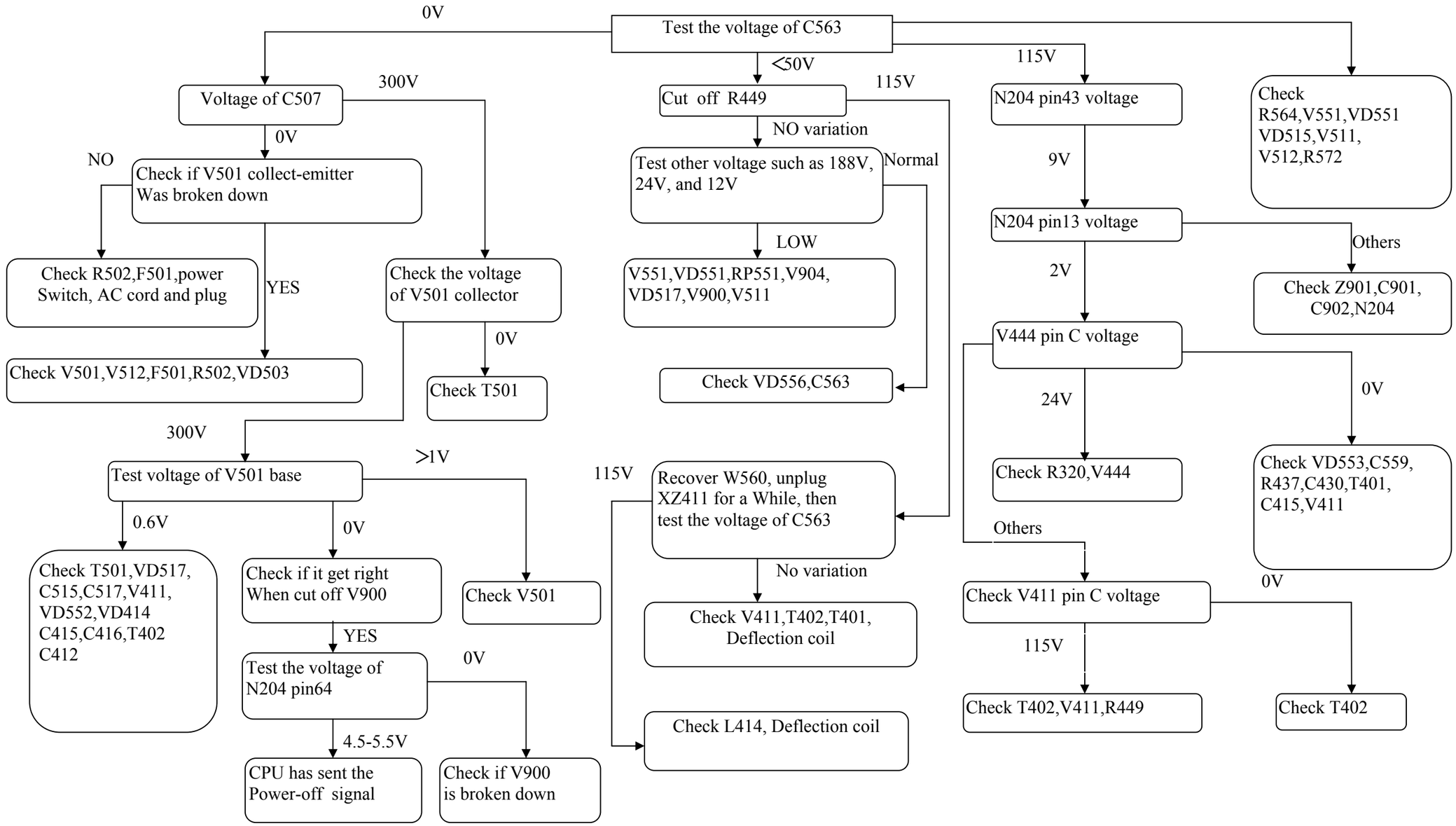
Power consumption	14”	70W	MAX
	21”	100W	MAX
Receive system	DK/BG		
Color system	PAL/ SECAM/ NTSC		
Vision intermediate frequency	38.9MHz		
Inter-carrier frequency	5.5 MHz(B/G)		
	6.5MHz(D/K)		
Chroma if frequency PAL	34.47/ 35.32MHz		
Antenna type	DIN TYPE 75 Ohm		
Channel receiving	VHF-L: 46.25-161.25MHz		
	VHF-H: 168.25-463.25MHz		
	UHF: 471.25-855.25MHz		
Tuning system	VS tuning		
AV IN/ OUT	2 AV STEREO IN + 1 AV STEREO OUT		
Component IN	1 YUV-Component IN		
AV IN/ OUT specification	VIDEO IN ----1.0 0.2V_{p-p} 75 Ohm		
	AUDIO IN ----0-2V (RMS)		
	VIDEO OUT ----1.0 0.2V_{p-p} 75 Ohm		
	AUDIO OUT ---- 0-2V (RMS)		
OSD language	English, Russian, Turkish, French, Spanish, Vietnamese, Indonesian, Arabian, Persian		
Audio output power	> 8W (1KHz, 0.5V INPUT, 10% THD		
Safety authentication standard	CB		
LED indicator	Power ON		
Hand set type	HS08		
Hans set power supply	Pin AAx2		
Color picture tube	14” 21” 90 degree tube		
Remote control distance	5m		

CHASSIS BLOCK DIAGRAM



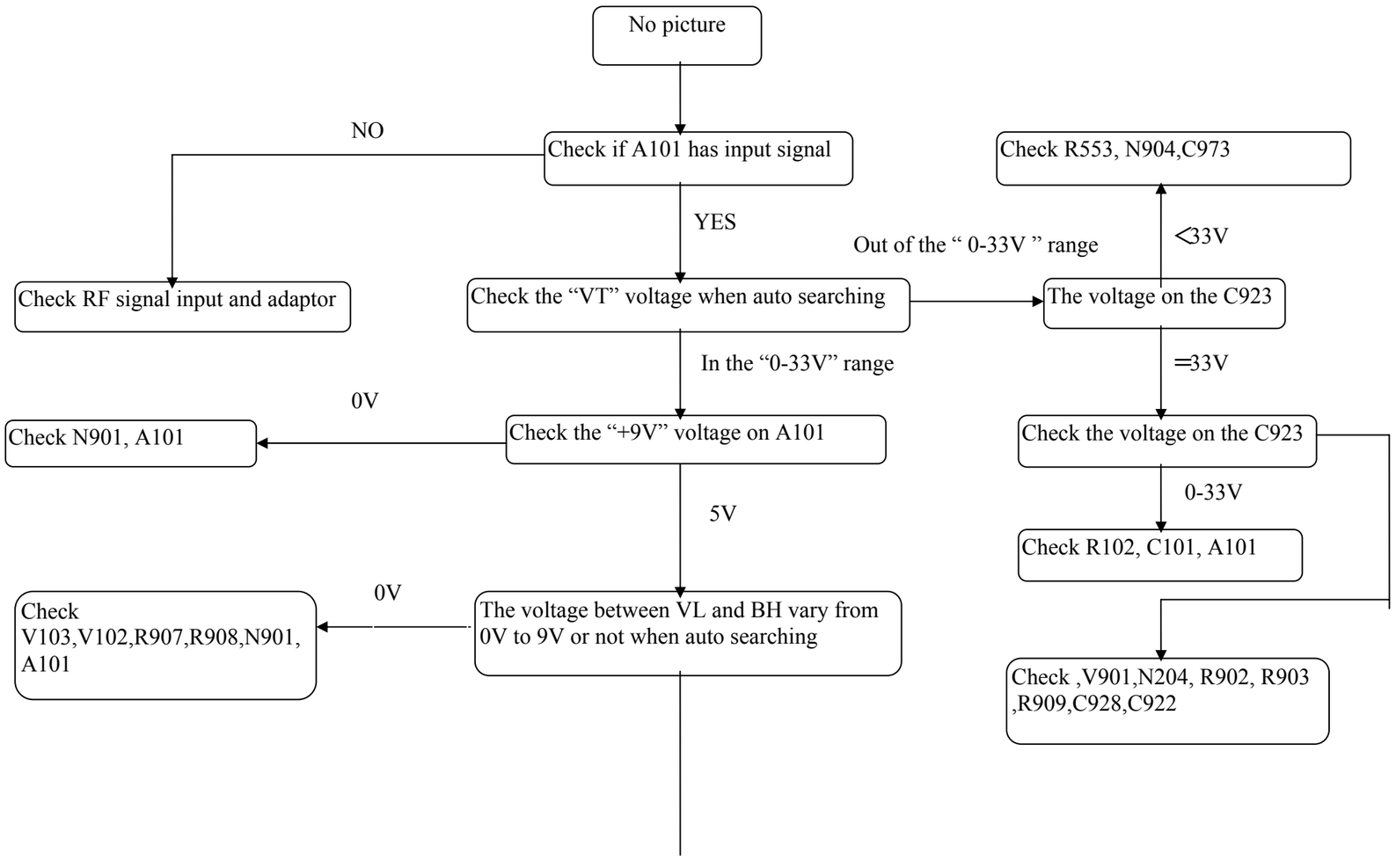
FAULT FINDING TREES

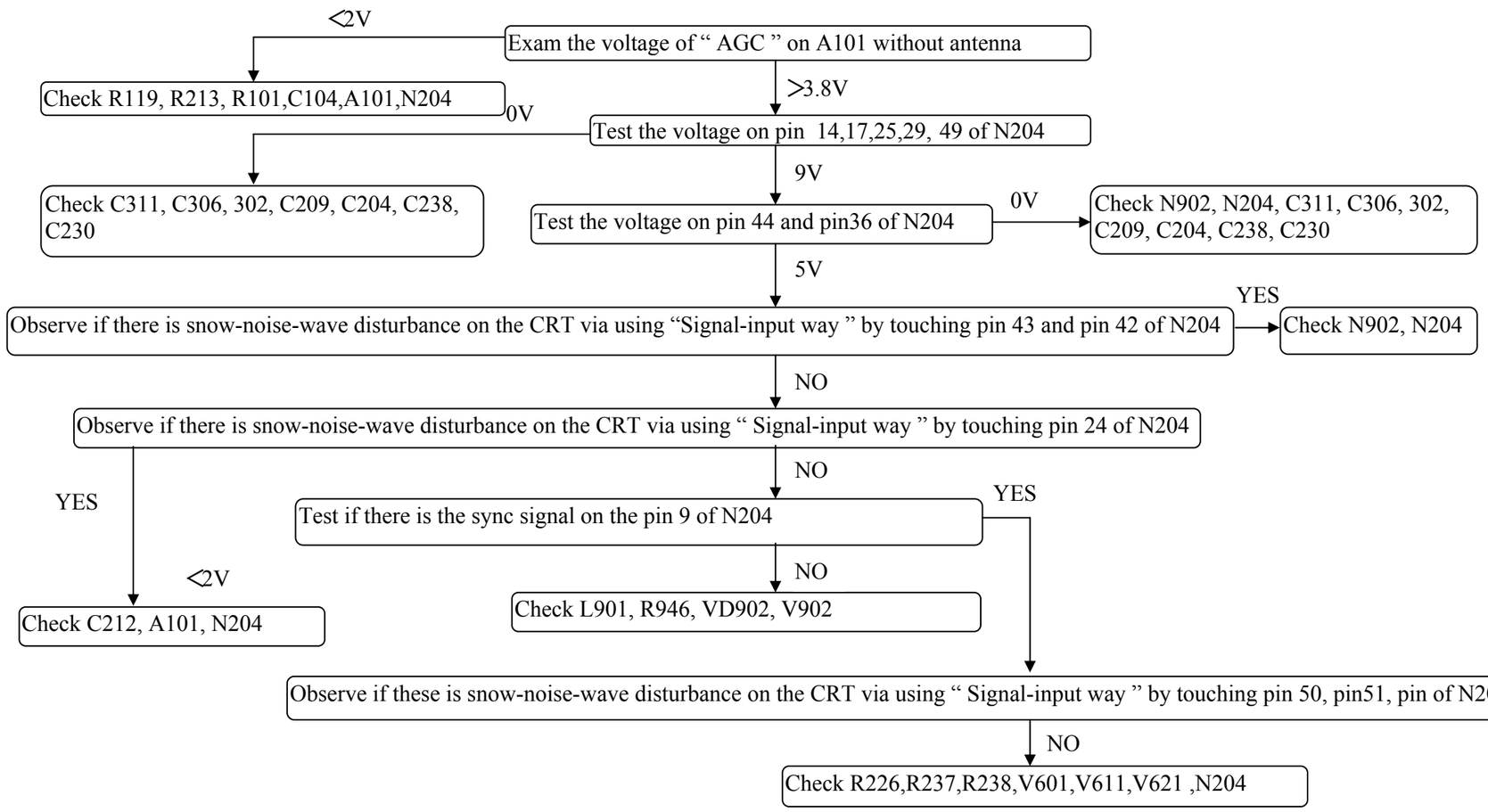
1. Three-None (no raster, no picture, no sound)
   This failure is mainly caused by big-power circuit such as power supply, horizontal scanning, vertical scanning.
   The detail checking and repairing steps are as follow.



2. Two-None (no picture, no sound)
The failure shows that the set does not display the picture but it has noise wave or blue background or OSD on the screen. This means that the circuits of power supply, horizontal scanning, vertical scanning and video amplification are normal and they are not considered in the repairing. The failures are mainly in the small signal processing circuits.
Before checking these circuits, a kind of practical test method is introduced. It is called “Signal-input way”. The detail is described as follow: We can use the resistance function of an analog multimeter, connect the red pole (negative in ohm scope) on the circuit board ground, then touch softly the test point with another pole (black pole) in ohm scope meanwhile observe the reactivity on the output device.
Note: In the TV test, we mainly observe the noise wave on the CRT and listen to the noise voice liking as “Ka…..Ka” from the loudspeakers.

   a. No picture

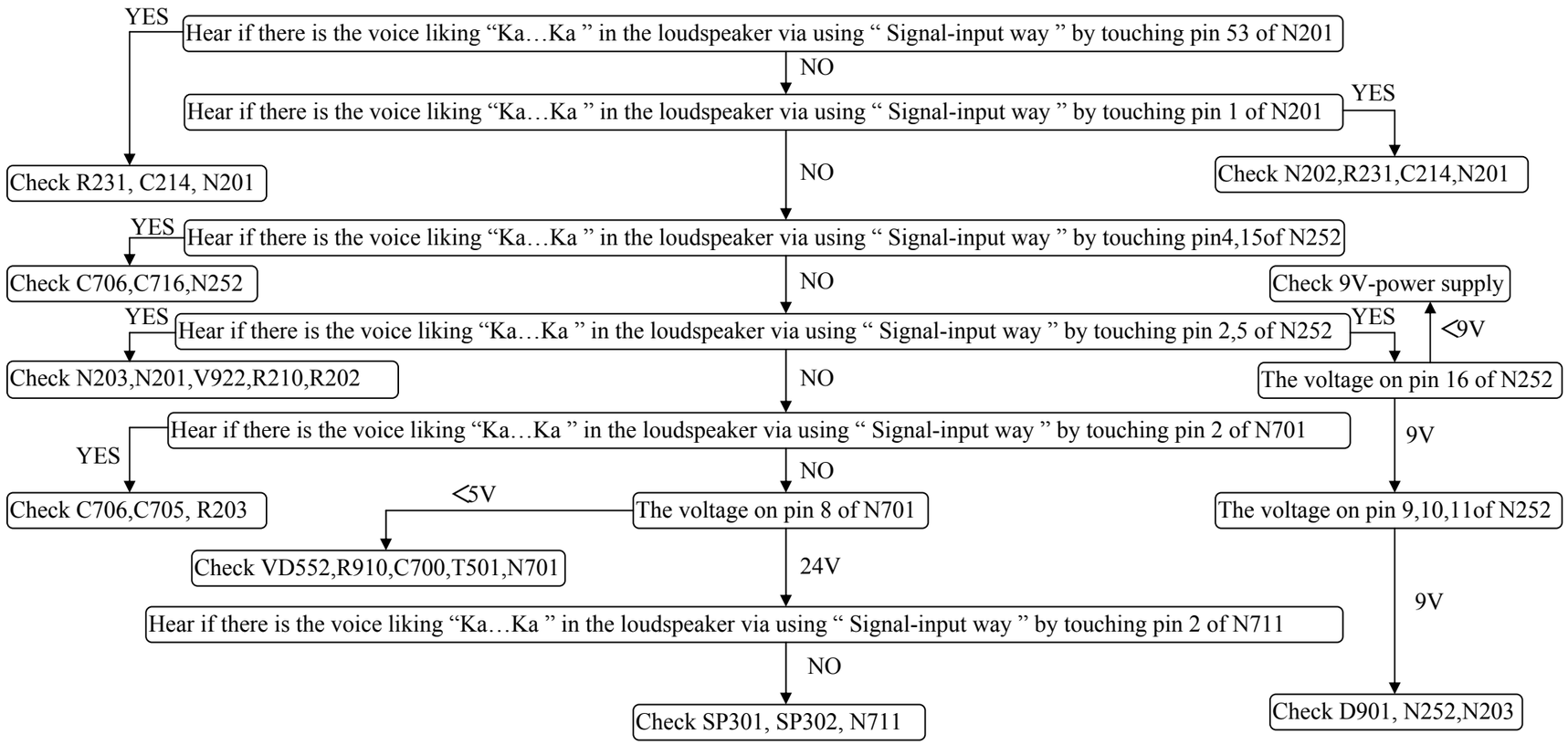



<2V
Exam the voltage of " AGC " on A101 without antenna
>3.8V
Check R119, R213, R101,C104,A101,N204
0V
Test the voltage on pin 14,17,25,29, 49 of N204
9V
Check C311, C306, 302, C209, C204, C238, C230
Test the voltage on pin 44 and pin36 of N204
0V
Check N902, N204, C311, C306, 302, C209, C204, C238, C230
5V
YES
Observe if there is snow-noise-wave disturbance on the CRT via using "Signal-input way " by touching pin 43 and pin 42 of N204
Check N902, N204
NO
Observe if there is snow-noise-wave disturbance on the CRT via using " Signal-input way " by touching pin 24 of N204
NO
YES
YES
Test if there is the sync signal on the pin 9 of N204
<2V
NO
Check C212, A101, N204
Check L901, R946, VD902, V902
Observe if these is snow-noise-wave disturbance on the CRT via using " Signal-input way " by touching pin 50, pin51, pin of N204
NO
Check R226,R237,R238,V601,V611,V621 ,N204

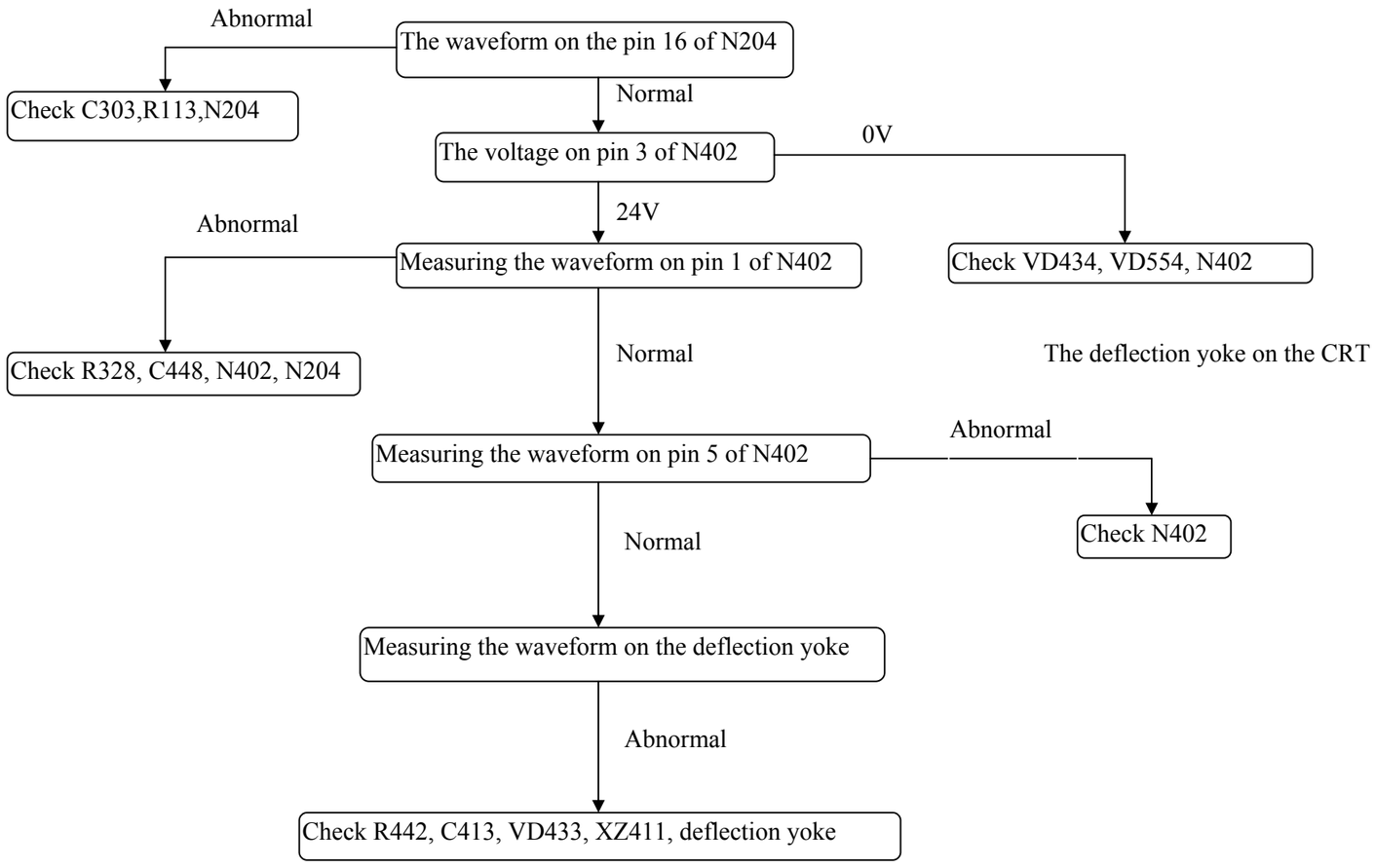
b. No sound

In this kind of failure, first of all we should observe if there is the picture on the CRT. It proves the small signal circuit to work correctly with the picture on the CRT and we only check the sound signal processing and sound amplification circuit. The repairing method (B1) may be referred without picture. The detail checking and repairing steps are as follow.

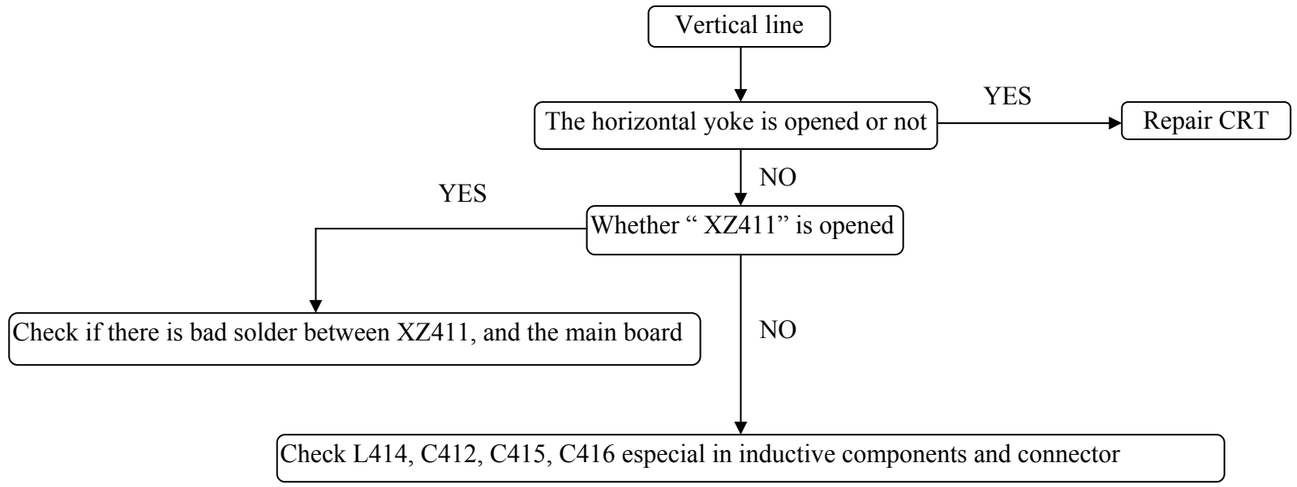
Note: Before repairing, assure that the volume is on and the state of set is in “TV”.



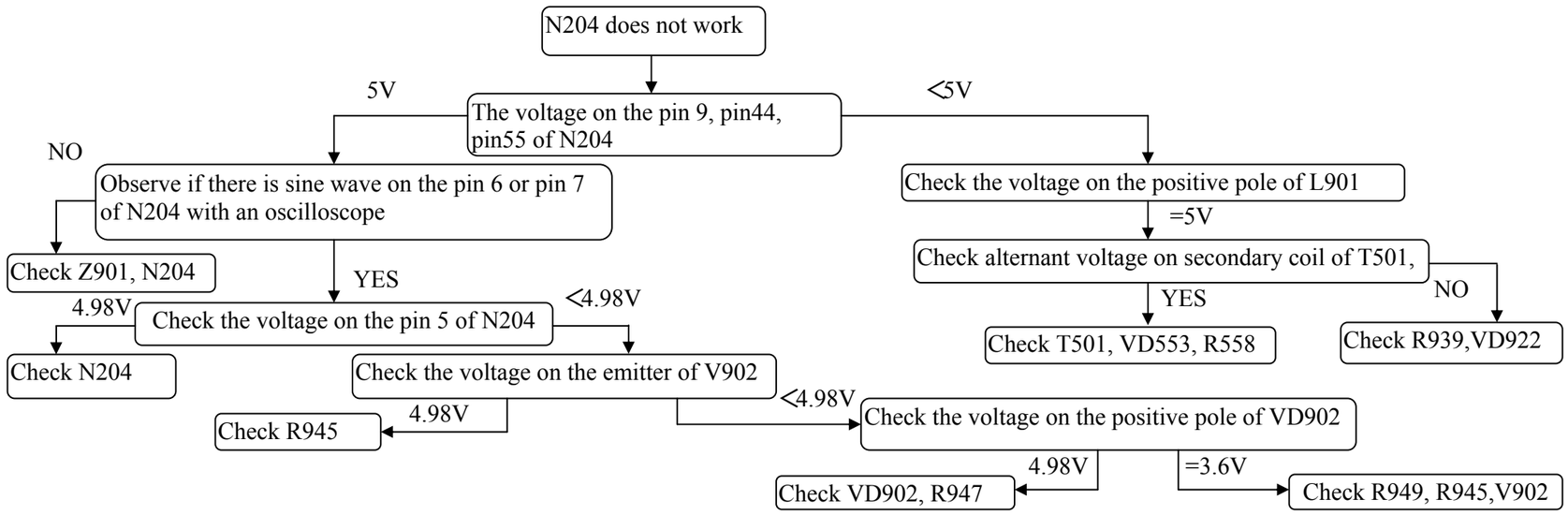
3. Only horizontal line in the middle of the screen:
   If vertical deflection circuit does not work, this kind of failure will happen. In deflection yoke, there only has horizontal sweeping, the electron beam in the CRT only moves in the horizontal orientation, so form this failure.
   (While checking horizontal and vertical deflection circuit's failure, we have better to use an oscilloscope.)



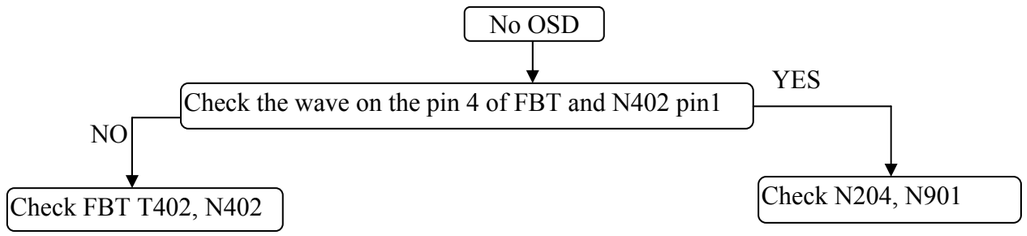
4. Only vertical line in the middle of the screen
   This is a dangerous failure. It probable causes flashover and smoking inside the set. Don't let your TV work for a long time as this failure appears. Because the electron beam can not move in the horizontal orientation, the failure should be in the horizontal deflection circuit. We mainly check the open-circuit fault in horizontal deflection circuit. The detail checking and repairing steps are as follow:



5. UOC does not work
   In television, remote-control system is similar with the computer system. In theory, it can work if it holds two conditions as follow:
   The power supply: In general, it is 5V, the error is not above 10% and the disturbance pulse is as small as possible.
   The clock pulse: In **TMPA88XX** circuit, the clock pulse is generated by pin 6 / pin 7 of N204 and 12M crystal oscillator.
   Television's remote-control system also needs reset circuit that can preset the values in internal register. The circuit around pin 5 of N204 is called auto-reset circuit. If UOC detects errors in resetting, it will come to the state of program protected.
   The detail checking and repairing steps are as follow:



6. No OSD (On Screen Display)
   This failure is usually cause by the circuit of character generated and located. Most of reasons are that the horizontal and vertical flyback pulse signals do not come to UOC.
   We can judge this failure by measuring the wave of the character in an oscilloscope.
   The detail checking and repairing steps are as follow:



IC BLOCK DIAGRAM

IC 204 (I^2C BUS-UOC Toshiba One Chip-A8851CPNG6EG1)

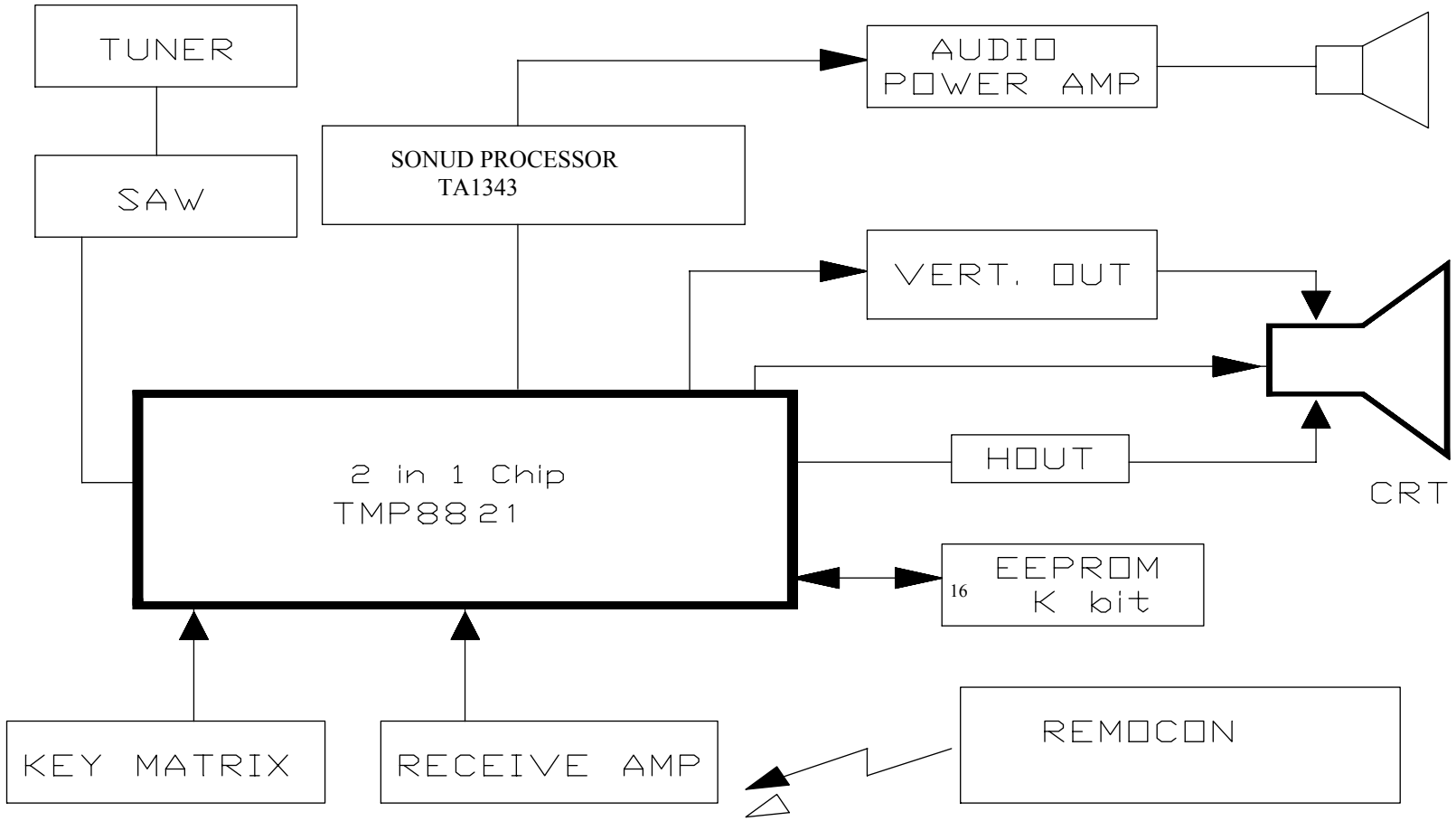
Note: Login Factory Mode:

Chassis	Key Location	Step to enter into factory Mode	Remark
8821 8823 8851 8853	TV front Panel	1/ Press and hold key "V-"	
	User Remote	2/ After Volume=0, Press Key "Display"	
	User Remote	3/ To Exit press and release key "Display"	

1. Language: English/ Arabic/ Farsi /Indonesian /Vietnamese /Spanish /French /Turkish /Russian or English only.
2. Number of position: 256 or 200
3. Open/Close curtain when power On/Off
4. Automatic Search Memory/Manual Search/ Manual Fine Tuning and Skip function
5. Clock/OFF-timer/ON-timer and sleep timer function (120min.)
6. Sound: Treble, Bass, Balance & Super Woofer
7. Selectable picture (MILD/ NATURE/ PERSONAL/ DYNAMIC/ MOVIE/ STANDARD) and selectable sound (NEWS/SURROUND OFF/ MUSIC/ THEATRE/ EXTEND1/ EXTEND2).
8. Auto-Power-Off (If a vacant channel is tuned or TV broadcast for a day is finished, the TV will automatically turn off after about 15 minutes.)
9. No-Signal-Mute (When the system receives a TV signal from the aerial input which does not contain a video signal, the sound will be muted. This No-Signal-Mute feature does not operate in the blue background OFF mode.
10. Selectable screen size(STANDARD/WIDE/ZOOM)
11. Child lock function (CHANNEL LOCK/TV LOCK/PANEL LOCK/VOLUME FIX)
12. Calendar function (1900-2099)-Telephone book function
13. MESSAGE function
14. Quick View function
15. MUSIC MODE function
16. NOISE REDUCER function and BLACK STRETEH function
17. Game function
18. IF Frequency (38MHz、38.9MHz)
19. Multi system (PAL/SECAM/NTCS3.58/NTCS4.43)
20. 2 AV Input or 1 AV Input, S-VHS Input, YUV Input
21. EYE GUARD function
22. HOTEL MODE function
23. VS/ FS option
24. Local buttons (P+, P-, V+, V-, TV/AV, MENU, POWER)

NOTE ： Some item are option.

A. BLOCK DIAGRAM:



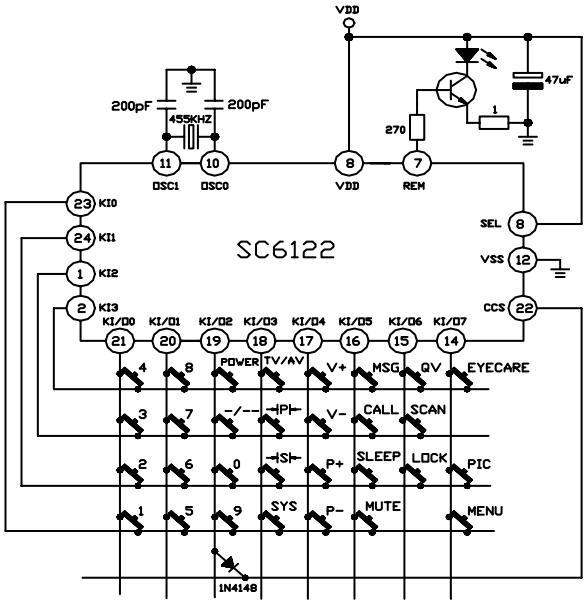
B. PIN NAME:

NO.	Pin name	I/O	Function
1	BAND1 (VS)/EyeCare or X-ray (FS)	I/O	BAND data output 1 (VS)/EyeCare or X-ray (FS)
2	BAND2 (VS) / DEGAUSSING	Out	BAND data output 2 (VS) / DEGAUSSING
3	KEY	In	Key input
4	VSS	-	GND connection
5	RESET	In	Reset signal input
6	XIN	In	8 MHz oscillator connecting
7	XOUT	Out	8 MHz oscillator connecting
8	TEST	In	GND connection
9	VDD	In	5V power supply
10	VSS	-	GND connection
11	VSS	-	GND connection
12	FBP in	In	Input terminal for FBP
13	H out	Out	**Output terminal for Horizontal driving pulse**
14	HAFC 1	-	Terminal To be connected capacitor for H AFC filter
15	V saw	-	Terminal To be connected capacitor to generate Vsaw signal
16	V out	Out	Output terminal for Vertical driving pulse
17	HVcc	-	Vcc terminal for DEF circuit
18	SECAM Fil	-	SECAM Filter
19	Cb in	In	Input terminal for Cb signal
20	Y in	In	Input terminal for Y signal
21	Cr in	In	Input terminal for Cr signal
22	TV GND	-	GND terminal for Digital block
23	C in	In	Input terminal for Chroma signal
24	V2 in	In	Input terminal for Video signal
25	TV DVcc	-	Vcc terminal for Digital block
26	V1 in	In	Input terminal for Video signal
27	ABCL	In	Input terminal for ABL/ACL control
28	AU out	Out	Output terminal for Audio signal
29	IF Vcc 9V	-	Vcc for terminal for IF Circuit
30	TV out	Out	Output terminal for detected PIF signal
31	SIF out	Out	Output terminal for detected SIF signal
32	Ext AU in	In	Input terminal for External Audio signal
33	H correct/SIF in	In	Input terminal for H correction and SIF
34	DC NF	Out	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 5V.
37	Reg Fil	-	Terminal to be connected capacitor for stabilizing internal bias.
38	Deempha	-	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	IF in	In	Input terminals for IF signals.
42	IF in –	In	Input terminals for IF signals.

43	RF AGC		Output terminal for RF AGC control level.
44	TV YC Vcc	-	Vcc terminal for Y/C circuit. Supply 5V.
45	Monitor out	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	Chroma PLL	-	Terminal to be connected with APC filter for chroma demodulation.
48	Sync Output	Out	Sync Output
49	RGB Vcc	-	Vcc terminal for RGB circuit. Supply 5V.
50	R out	Out	Output terminal for R signal.
51	G out	Out	Output terminal for G signal.
52	B out	Out	Output terminal for B signal.
53	TV AGND	-	GND terminal for Analog block.
54	VSS	-	GND connection
55	VDD	In	5V power supply
56	MUTE（Mo）/VIDEO1/2(St)	Out	Mono: mute/ Stereo: TV=0,AV1=2.5V，AV2=5V
57	SDA1	I/O	IIC-BUS SDA1
58	SCL1	I/O	IIC-BUS SCL1
59	Volume control or 50/60Hz	Out	Volume control(PWM) or 50/60Hz control
60	PWM	Out	PWM output
61	AV Control / MUTE	Out	Mono: AV Control,AV1=0,AV2=5V/Stereo:Mute Output
62	H.SYNC	In	Horizontal sync signal input
63	REMOTE	In	Remote controller signal input
64	POWER	I/O	Power control & Check, On=Hi-Z(input),Off=L(output)

C/ SYSTEM:

1 . REMOTE CONTROL



For Example: If Pin19 with diode

14	15	16	17	18	19	20	21	Pin	
7	6	5	4	3	2	1	0	bit	
0	0	0	0	0	1	0	0	CUSL	04
1	1	1	1	1	0	1	1	CUSH	FB

2. BAND

	BAND1 (Pin1)	BAND2 (Pin2)
VHF L	L	H
VHF H	H	L
UHF	L	L

D. Mode

1.MOD(30)

Bit7: No Use
Bit6-4:IF Frequency

Bit6	Bit5	Bit4	PIF Freq.
0	0	0	58.75MHz
0	0	1	45.75MHz
0	1	0	-
0	1	1	38.9MHz
1	0	0	38MHz
1	0	1	-
1	1	0	-
1	1	1	-

Bit3,2:AKB MODE
Bit1,0:Cutoff Gain×10

2.OPT(C4)

Bit7: Mute of AV Switch Key	0: Port Mute ON	1: No Port Mute
Bit6: Monitor Sync	0: Always TV Sync	1: Monitor Sync
Bit5: TINT polarity select	0: Red	1: Green
Bit4: VT DOWN No Signal	Not VT Down of AFT when No Signal(=1)	
Bit3: AUDIO GAIN SW of 2in1	0: 927mVrms at 50KHz/dev	1: 500mVrms at 500KHz/dev
Bit2: Select Screen	0: No Use	1: Used
Bit1: RFAGC status when AV	0: Normal	1: When AV: RFAGC=00
Bit0: Ex-mute while Pos Change	0: Mute	1: No Mute

3.AV OPT(01)

Bit7-2: No Use
Bit1-0:AV Input Select

Bit1	Bit0		Description
0	0	0	TV/VIDEO1(S-VIDEO)/DVD
0	1	1	TV/ VIDEO1(S-VIDEO)/DVD/ VIDEO2
1	0	2	TV/ VIDEO1(S-VIDEO)
1	1	3	TV/ VIDEO1(S-VIDEO) / VIDEO2

4.OPT2(AA)

Bit7: Be used to set LOGO when BB　0：No Use　1：Used
Bit6: SRY/SBY　0：SRY/SBY White　1：SRY/SBY Black
Bit5: Chassis select　0：Mono PCB (Pin56 mute/ Pin61TV/AV)　1：Stereo PCB(Pin56 TV/AV/ Pin61mute)
Bit4: Fjp-mute-exmute　0:no use　1:use
Bit3: AV sound mute when B.B　0：No Use　1：Used
Bit2: Fjp_mute_process　0: unused　1: decreasing
Bit1: IF Frequency OPTION WHEN FS 0：38MHz　1：38.9MHz
Bit0: Power on delay timer　0：No Use　1：delay 1S

5. MOD0(82)

Bit7-6： Shop-out Setting

Bit7	Bit6	SHOP-OUT
0	0	No Use
0	1	I
1	0	B/G
1	1	D/K

Bit5：Pin59 PWM 0：No Use 1：Used

Bit4：Pin2 DEGAUSSING 0：No Use 1：Used（FS status）

Bit3：Eye Care 0: No Use 1：Used（FS status）

Bit2：SECAM 0: No Use 1：Used

Bit1：Be used to VCO adjust 0: No Use 1：Used (This Bit Must Set 1)

Bit0：X-Ray protect(Pin1) 0：No Use 1：Used（FS status and Eye Care no use）

6.MOD1(21)

Bit7: Extend mode attenuation 0：according to effect1 1:-5db

Bit6: Super woofer 0：No Use 1：Used

Bit5: sound menu 0：No Use 1：Used

Bit4: Sound system BG2 0: No Use 1：Used

Bit3: Sound system M 0: No Use 1：Used

Bit2: Sound system D/K 0: No Use 1：Used

Bit1: Sound system I 0: No Use 1：Used

Bit0: Sound system B/G 0: No Use 1：Used

7.MOD2(1F)

Bit7-6: FS Tuner select

00	38.9MHz JINXIN UVL5705VEA（IC：KTS6029）/JINXIN UVL7605VEA（IC：TDA6509） L：48.25-147.25 MHz(E2-S7)/M:154.25-423.25 MHz(S8-S36)/H:431.25-855.25 MHz(S37-CH57)
01	38.9MHz XIMEI FTDC3Y15BV03（IC：TDA6509）/GDC：EWT-5F3P1-E06W（IC：TDA6509） L：48.25-140.25 MHz(E2-S6)/M:147.25-423.25 MHz(S7-S36)/H:431.25-855.25 MHz(S37-CH57)
10	38MHz XIMEI FTDC3Y15V03（IC：TDA6509）JINXIN UVL5705VCA（IC：KTS6029）/ JINXIN UVL7605VCA（IC：TDA6509） L：49.75-144.25 MHz(C1-Z5)/M:152.25-424.25 MHz(Z6-Z33)/H:432.25-863.25 MHz(Z34-C57)

Bit5: Fjp_power_option 0:open TV directly 1: must use remote control to open TV

Bit4: Select Telephone book 0: No Use 1: Used(Must use 16KEEPROM)

Bit3: Close curtain when power off 0：No Use 1：Used

Bit2: Open curtain when power off 0：No Use 1：Used

Bit1: Position select 0：200Pos（8KE^{2}PROM） 1：256Pos（16KE^{2}PROM）

Bit0: Tuner select(VS or FS) 0: use VS Tuner 1：use FS Tuner

8.LANG: English/ Arabic/ Farsi /Indonesian /Vietnamese /Spanish /French /Turkish /Russian(00)

Bit7: Arabic 0: No Use 1：Used

Bit6: Farsi 0: No Use 1：Used

Bit5: Indonesian 0: No Use 1：Used

Bit4: Vietnamese 0: No Use 1：Used

Bit3: Spanish 0: No Use 1：Used

Bit2: French 0: No Use 1：Used

Bit1: Turkish 0: No Use 1：Used

Bit0: Russian 0: No Use 1：Used

9.EFFECT1(00)

Bit7: This bit must be zero

Bit6: ALS SW for TA1343 0：off 1：on

Bit5- 4 : ALS start point

Bit5	Bit4	
0	0	220mV
0	1	380mV
1	0	525mV
1	1	770mV

Bit3: This bit must be zero

Bit2: Input attenuation 0： 0 dB 1： 5dB

Bit1-0: Input matrix

Bit1	Bit0	
0	0	normal
0	1	Rch
1	0	Lch
1	1	reverse

10.EFFECT2(27)

Bit7: Bass boost 0：off 1：on

Bit6: This bit must be zero

Bit5- 4 : Woofer LPF

Bit5	Bit4	
0	0	100Hz
0	1	125Hz
1	0	170Hz
1	1	210Hz

Bit3: No Use

Bit2-0:Surround effect level 000:1
001:2
……
111:7

11.HITZ/ HITW/HITZS/ HITWS

HITZ: 50Hz ZOOM SIZE(35)

HITW: 50Hz WIDE SIZE(20)

HITZS: 60Hz ZOOM SIZE (00)
HITWS: 60Hz WIDE SIZE (00)

12. NADJ(16)

Noise reducer adjustment

13. VPL(CE)

X-Ray protect adjustment

14. VOLM(64)

HOTEL MODE: Volume maximal limit

15. LOGO(60)

Bit7: DVD control option 0：same to AV1 1：same to AV2

Bit6: Pin59 control option 0：DVD control 1：50/60Hz control（50Hz: L/60Hz: H）

Bit5: LOGO alphabet size 0: Small 1:Big

Bit4-3: LOGO color

Bit1	Bit0	Color
0	0	red
0	1	white
1	0	purple
1	1	yellow

Bit2-0: LOGO horizontal position

16. LOGH(60)

Bit7: When MUSIC MODE 0：Screen always B.B 1: Later 1 minute, screen disappear(with sound)

Bit6: Hardware Mute 0:NO USE 1: USE

Bit5: V-MUTE During POS change 0:Y-MUTE 1:RGB-CUT OFF DC

Bit4-0: These seven bits are used to adjust the horizontal display position of logo smoothly

17. LOGV:

Bit7-5: These three bits are used to adjust the OSD line position

000: fifth line
001: sixth line
010: seventh line
011: eighth line
100: ninth line
101: tenth line
110: eleventh line
111: twelfth line

Bit4-0: These five bits are used to adjust the vertical display position of logo smoothly

18. MENU COLOR

A．CCOL /TCOL/BCOL/HCOL:

1）CCOL:

Bit7: No use

Bit6: Italic enable specification register 0: normal 1: italic

Bit5-4: **No use**

Bit3: DARK/ NORMAL　0：NORMAL　1：DARK
Bit2-0: Color

Bit2	Bit1	Bit0	Color
0	0	0	Black
0	0	1	Blue
0	1	0	Green
0	1	1	Cyan
1	0	0	Red
1	0	1	purple
1	1	0	Yellow
1	1	1	White

2） TCOL

Bit7:When Panel lock　0：unlock POWER key 1：lock all key
Bit6: Italic enable specification register　0: normal　1: italic
Bit5: Underline enable specification register　0:normal　1: underline
Bit4:NO USE
Bit3: DARK/ NORMAL　0：NORMAL　1：DARK
Bit2-0: Set menu top character's color

Bit2	Bit1	Bit0	Color
0	0	0	Black
0	0	1	Blue
0	1	0	Green
0	1	1	Cyan
1	0	0	Red
1	0	1	purple
1	1	0	Yellow
1	1	1	White

3） BCOL

Bit7: HOTEL MODE　0：USE　1：NO USE
Bit6: Tuner select　0：Normal Tuner　1：Use High Gain Tuner
Bit5: Pin60 PWM　0：NO USE　1: USED
Bit4: DVD-TV　0：TV　1：DVD/TV
Bit3: Message　0：NO USE　1：USED
Bit2: UHF P2/P3 option　0：P3　1：P2
Bit1-0：FS Tuner search speed

Bit1	Bit0	FS Tuner search speed
0	0	Normal
0	1	slow
1	0	fast

4) HCOL

Bit7: NO USE

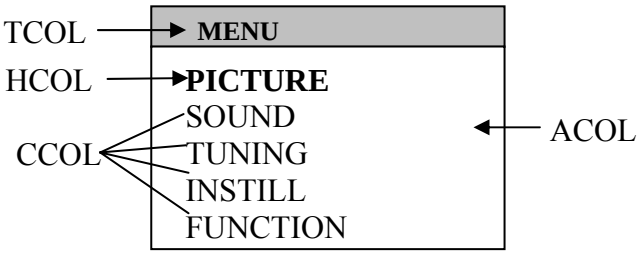
Bit6: DARK/ NORMAL 0 : NORMAL 1 : DARK

Bit5-4: NO USE

Bit3: DARK/ NORMAL 0 : NORMAL 1 : DARK

Bit2-0:

Bit2	Bit1	Bit0	Color
0	0	0	Black
0	0	1	Blue
0	1	0	Green
0	1	1	Cyan
1	0	0	Red
1	0	1	purple
1	1	0	Yellow
1	1	1	White



B) ACOL

Bit7: Transparency enable register for menu area 0: opacity 1: translucence

Bit6-4: Main menu background select

Bit6	Bit5	Bit4	Color
0	0	0	Black
0	0	1	Blue
0	1	0	Green
0	1	1	Cyan
1	0	0	Red
1	0	1	purple
1	1	0	Yellow
1	1	1	White

Bit3:Transparency enable register for highlight area 0: opacity 1: translucence

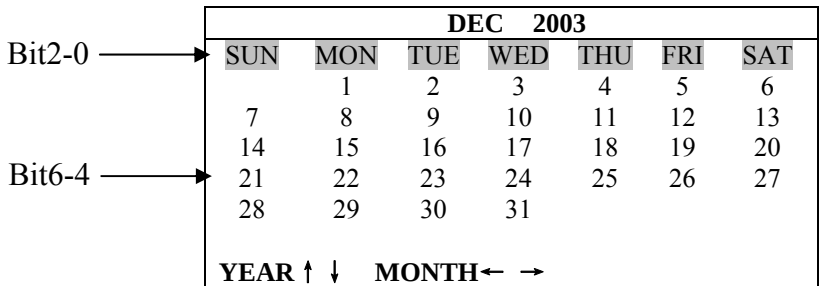
Bit2-0: Color select for highlight area

Bit2	Bit1	Bit0	Color
0	0	0	Black
0	0	1	Blue
0	1	0	Green
0	1	1	Cyan
1	0	0	Red
1	0	1	Purple
1	1	0	Yellow
1	1	1	White

C) CALC (calendar Color:F9)

Bit7: Date background 0: opacity 1: translucence
Bit6-4: Date background color select

000 : Black
001 : Blue
010 : Green
011 : Cyan
100 : Red
101 : Purple
110 : Yellow
111 : White



Bit3: Week background 0: opacity 1: translucence
Bit2-0: Week background color select

000 : Black
001 : Blue
010 : Green
011 : Cyan
100 : Red
101 : Purple
110 : Yellow
111 : White

19.FSAD(C0)

(FS Tuner address)

C0 : 0-0.1V
C2 : OPEN or 0.2-0.3V
C4 : 0.4-0.6V
C6 : 0.9-1.0V

20.VADJ(00)

Eye Care Range Adjustment
00-0A

21.SADJ(00)

Eye Care Speed Adjustment
01-0A

22.SYNT(F1)

00-FF

23.SSYN(FA)

00-FF

24. LOGO/SCREEN SAVED(Use NO.5 BRTC Key)

1) LOGO address 770-77B

2) A~Z

A	B	C	D	E	F	G	H	I	J	K	L	M
41	42	43	44	45	46	47	48	49	4A	4B	4C	4D

N	O	P	Q	R	S	T	U	V	W	X	Y	Z
4E	4F	50	51	52	53	54	55	56	57	58	59	5A

3) a~z

a	b	c	d	e	f	g	h	i	j	k	l	m
80-21	80-22	80-23	80-24	80-25	80-26	80-27	80-28	80-29	80-2A	80-2B	80-2C	80-2D

n	o	p	q	r	s	t	u	v	w	x	y	z
80-2E	80-2F	80-30	80-31	80-32	80-33	80-34	80-35	80-36	80-37	80-38	80-39	80-3A

4) 0~9

0	1	2	3	4	5	6	7	8	9
30	31	32	33	34	35	36	37	38	39

25) Spacing 20

26)End00:

ITEM	DATA	REMARK		ITEM	DATA	REMARK
RCUT	20	R CUT OFF		SVM	00	SVM
GCUT	20	G CUT OFF		VBLK	00	V BLK Start/Stop
BCUT	20	B CUT OFF		VCEN	27	V CENTERING
GDRV	40	G DRIVE		EHT	24	V EHT/H ENT
BDRV	40	B DRIVE		UCOM	1C	Miciom Control
CNTX	7F	SUB CONTRAST MAX		PYNX	2E	NORMAL H.SYNC MAX
BRTC	48	SUB BRIGHT CENTER		PYNN	18	NORMAL H.SYNC MIN
COLC	40	SUB COLOR for NTSC		PYXS	22	SEARCH H.SYNC MAX
TNTC	40	SUB TINT CENTER		PYNS	1E	SEARCH H.SYNC MIN
COLP	00	SUB COLOR for PAL		RCUTS	00	FOR YCbCr R CUTOFF
COLS	40	SUB COLOR for SECAM		GCUTS	00	FOR YCbCr G CUTOFF
SCOL	07	SUB COLOR		BCUTS	00	FOR YCbCr B CUTOFF
SCNT	0D	Y-SUB CONTRAST		GDRVS	00	FOR YCbCr G DRIVE
CNTC	58	SUB CONTRAST CENTER		BDRVS	00	FOR YCbCr B DRIVE
CNTN	00	SUB CONTRAST MIN		NOIS	01	HAFC CONTROL

BRTX	35	SUB BRIGHT MAX		AOPT	01	AV MODEL SELECT
BRTN	25	SUB BRIGHT MIN		OPT2	AA	OPT2 SELECT
COLX	3F	SUB COLOR MAX		WAIT	2F	WAITING TIME IN THE OPEN CURTAIN
ST3	25	TV—3.58 SHARP		CURC	A5	CURTAIN CENTER
SV3	25	AV—3.58 SHARP		CURS	02	STEPS OF THE WIDTH OFCURTAIN FUNCTION
ST4	25	TV—4.43 SHARP		AUSTP	04	When Mute off, Vol. ATT up step number
SV4	25	AV—4.43 SHARP		MOD0	82	MODE 0
SVD	26	DVD SHARP CENTER		MOD1	21	MODE1
SHPX	38	SUB SHARP MAX		MOD2	1F	MODE2
SHPN	15	SUB SHARP MIN		OSDF	53	OSD WIDTH
TXCX	10	OSD CONTRAST MAX		HITZ	35	50Hz SIZE ZOOM Vertical size
RGCN	1F	OSD CONTRAST MIN		HITW	20	50Hz SIZE WIDE Vertical size.
ABL	37	ABL SYSTEM		HITZS	00	60Hz SIZE ZOOM Vertical size.
DCBS	33	A part of Video data in detail		HITWS	00	60Hz SIZE WIDE Vertical size.
CLTO	0B	The data when TV mode & SOUND SYS!=M		EFF1	00	SOUND EFFECT1
CLTM	4B	The data when TV mode & SOUND SYS=M		EFF2	27	SOUND EFFECT2
CLVO	4D	The data when YUV mode & SOUND SYS!=M		BASC	40	BASS CENTER VALUE
CLVD	48	The data when YUV mode & SOUND SYS=M		TREC	40	TREBLE CENTER VALUE
DEF	01	A part of DEF COMP data in detail		BALC	3F	BALANCE CENTER VALUE
SECD	18	SECAM mode		WOFC	39	WOFFER CENTER VALUE
HPOS	13	50Hz HORIZONTAL PHASE		NADJ	16	Noise
VP50	02	50Hz VERTICAL PHASE		CCOL	03	Menu Color
HIT	2B	50Hz VERTICAL AMPLITUDE		TCOL	07	Menu Color
HPS	02	60Hz HORIZONTAL PHASE		BCOL	08	Menu Color
VP60	00	60Hz VERTICAL PHASE		HCOL	06	Menu Color
HITS	02	60Hz VERTICAL AMPLITUDE		ACOL	98	Menu Color
VLIN	0D	50Hz VERTICAL-LINEARILTY		CALC	F9	Calendar Color
VSC	09	50Hz VERTICAL-S CORRECTION		A50	57	AV VOLUME50%
VLIS	02	60Hz VERTICAL-LINEARILTY		A100	7F	AVVOLUME100%

VSS	00	60Hz VERTICAL-S CORRECTION		FSAD	C0	FS Tuner address
SBY	08	SECAM B-Y Black		LOGO	60	LOGO option
SRY	08	SECAM R-Y Black		LOGH	60	LOGOH. position
BRTS	00	SUB BRIGHNESS		LOGV	00	LOGO V. position
AGC	25	RF AGC		VADJ	00	Eye Care range
AFC	09	1/2 AFC DATA ADJUSTMENT		SADJ	00	Eye Care speed
V1	03	VOLUME1%		CUSL	00	Remote Controller Code (Low)
V25	3D	VOLUME 25%		CUSH	Ff	Remote Controller Code (High)
V50	57	TV VOLUME50%		SYNT	F1	Sync
V100	7F	TV VOLUME100%		SSNT	FA	Sync
MUTT	00	Y-MUTE SOFT START		LANG	00	Language select
FLG0	52	FLAGS FOR IF		VPL	CE	X-Ray Protect delay timer
FLG1	04	FLAGS		ERAS	A3	DEGAUSSING
RSNS	00	R SENS		VOLM	64	Hotel mode volume maximal
GSNS	00	G SENS		OSD	10	OSD POSITION ADJUSTMENT
BSNS	00	B SENS		OPT	C4	OPTION SELECT
MOD	30	MOD DATA				
STBY	00	VCD/IF STANDBY				

IC N702 (8W AUDIO POWER OUTPUT) TDA7496SA

SGS-THOMSON MICROELECTRONICS

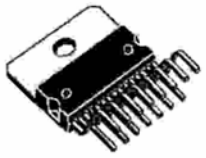
TDA7496

5W+5W AMPLIFIER WITH DC VOLUME CONTROL

PRODUCT PREVIEW

- 5+5W OUTPUT POWER
  R_L = 8W@THD = 10% V_{CC} = 22V
- ST-BY AND MUTE FUNCTIONS
- LOW TURN-ON TURN-OFF POP NOISE
- LINEAR VOLUME CONTROL DC COUPLED WITH POWER OP. AMP.
- NO BOUCHEROT CELL
- NO ST-BY RC INPUT NETWORK
- SINGLE SUPPLY RANGING UP TO 35V
- SHORT CIRCUIT PROTECTION
- THERMAL OVERLOAD PROTECTION
- INTERNALLY FIXED GAIN
- SOFT CLIPPING
- VARIABLE OUTPUT AFTER VOLUME CONTROL CIRCUIT
- MULTIWATT 15 PACKAGE

MULTIPOWER BI50II TECHNOLOGY



Multiwatt15

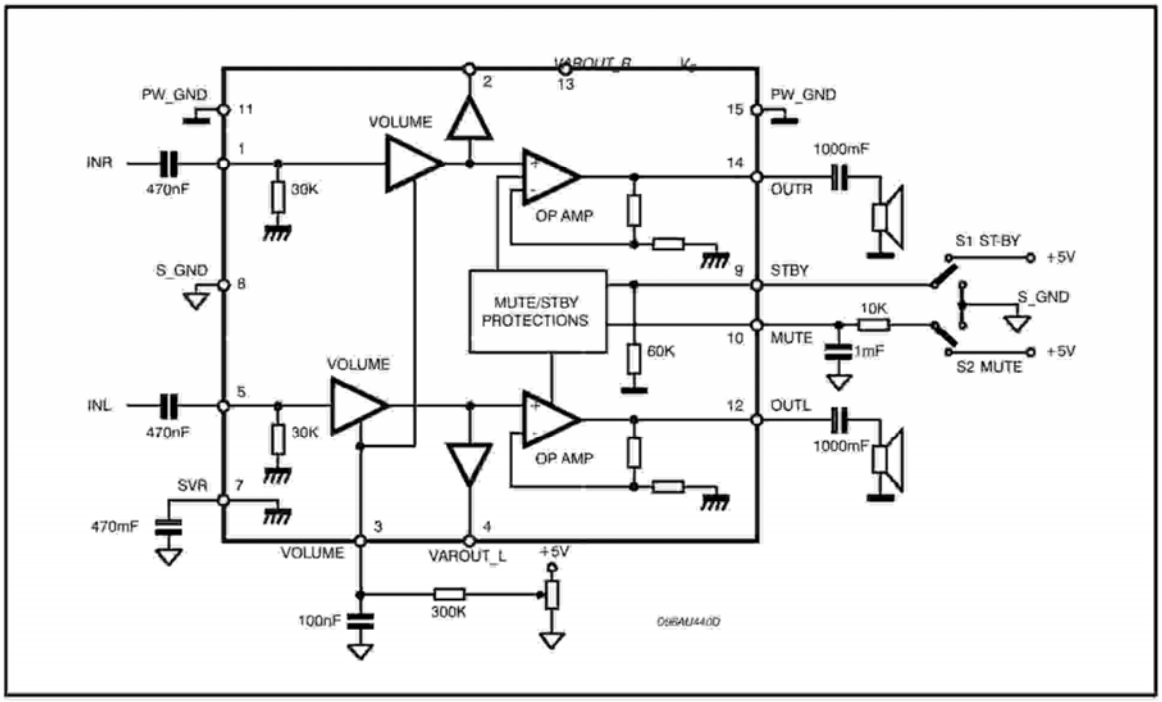
ORDERING NUMBER: TDA7496

DESCRIPTION

The TDA7496 is a stereo 5+5W class AB power amplifier assembled in the @ Multiwatt 15 package, specially designed for high quality sound, TV applications.

Features of the TDA7496 include linear volume control, Stand-by and mute functions.

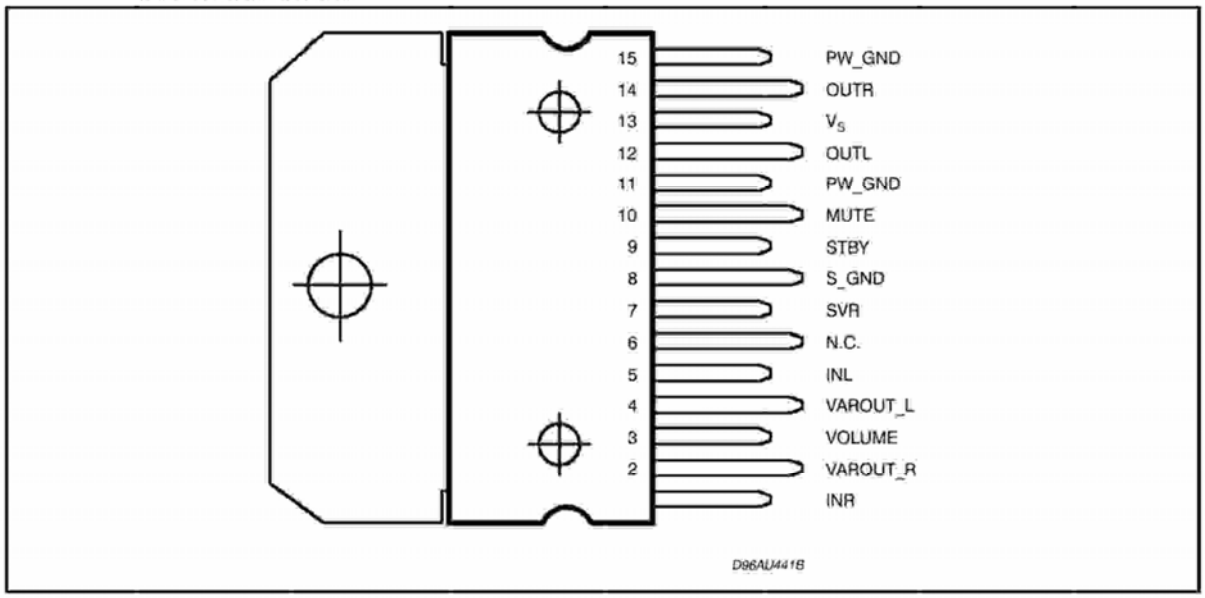
BLOCK AND APPLICATION DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_S	DC Supply Voltage	35	V
V_{IN}	Maximum Input Voltage	8	Vpp
P_{tot}	Total Power Dissipation (Tamb = 805C)	15	W
T_{amb}	Ambient Operating Temperature	0 to 70	5C
T_{stg}, T_j	Storage and Junction Temperature	-40 to 150	5C
V_3	Volume CTRL DC voltage	7	V

PIN CONNECTION (Top view)



THERMAL DATA

Symbol	Parameter	Value	Unit
$R_{th\ j\text{-}case}$	Thermal Resistance Junction-case	Typ. = 4 Max. = 4.6	5C/W
$R_{th\ j\text{-}amb}$	Thermal Resistance Junction-ambient max	35	5C/W

ELECTRICAL CHARACTERISTICS (Refer to the test circuit V_S = 22V; R_L = 8W, R_g = 50W, T_{amb} = 25C).

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_S	Supply Voltage Range		11		35	V
I_q	Total Quiescent Current			25	70	mA
DCVos	Output DC Offset Referred to SVR Potenial	No Input Signal	-650		650	mV
V_O	Quiescent Output Voltage			10		V
P_O	Output Power	THD = 10%; R_L = 8 W	5	5.3		W
		THD = 1%; R_L = 8W;		4		W
		THD = 10%; R_L = 4 W V_{CC} = 12V		2.1		W
		THD = 1%; R_L = 4W; V_{CC} = 12V		1.0		W
THD	Total Harmonic Distortion	Gv = 30dB; P_O = 1W; f = 1KHz;			0.4	%
I_{peak}	Output Peak Current	(internally limited)	1	1.3		A
V_{in}	Input Signal				2.8	Vrms
Gv	Closed Loop Gain	Vol Ctrl > 4.5V	28.5	30	31.5	dB

ELECTRICAL CHARACTERISTICS(continued)

G_{vLine}	Monitor Out Gain	Vol Ctrl > 4.5V; Zload > 30KW	-1.5	0	1.5	dB
$A_{Min\ VOL}$	Attenuation at Minimum Volume	Vol Ctrl < 0.5V	80			dB
BW				0.6		MHz
e_N	Total Output Noise	f = 20Hz to 22KHz Play, max volume		500	800	mV
		f = 20Hz to 22KHz Play, max attenuation		100	250	mV
		f = 20Hz to 22KHz Mute	55	60 85	150	mV dB
SR	Slew Rate		5	8		V/ms
R_i	Input Resistance		22.5	30		KW
$R_{Var\ Out}$	Variable Output Resistance			30	100	W
$R_{load\ Var\ Out}$	Variable Output Load		2			KW
SVR	Supply Voltage Rejection	f = 1kHz; max volume C_{SVR} = 470mF; V = 1Vms	35	39		dB
		f = 1kHz; max attenuation C_{SVR} = 470mF; V				
T_M	Thermal Muting			150		5C
T_s	Thermal Shut-down			160		5C
MUTE STAND-BY & INPUT SELECTION FUNCTIONS						
V_{ST-BY}	Stand-by threshold		2.3	2.5	2.7	V
V_{MUTE}	Mute Threshold		2.3	2.5	2.7	V
I_{qST-BY}	Quiescent Current @ Stand-by			0.6	1	mA
A_{MUTE}	Mute Attenuation		50	65		dB
$I_{stbyBIAS}$	Stand-by bias current	Stand by on V_{ST-BY} = 5V V_{MUTE} = 5V		80		mA mA
		Play or Mute	-20	-5		mA
$I_{muteBIAS}$	Mute bias current	Mute		1	5	mA
		Play		0.2	2	mA

APPLICATION SUGGESTIONS

The recommended values of the external components are those shown on the application circuit of figure 1a. Different values can be used, the following table can help the designer.

COMPONENT	SUGGESTION VALUE	PURPOSE	LARGER THAN SUGGESTION	SMALLER THAN SUGGESTION
R1	300K	Volume control circuit	Larger volume regulation time	Smaller volume regulation time
R2	10K	Mute time constant	Larger mute on/off time	Smaller mute on/off time
P1	50K	Volume control circuit		
C1	1000mF	Supply voltage bypass		Danger of oscillation
C2	470nF	Input DC decoupling	Lower low frequency cutoff	Higher low frequency cutoff
C3	470nF	Input DC decoupling	Lower low frequency cutoff	Higher low frequency cutoff
C4	470mF	Ripple rejection	Better SVR	Worse SVR
C5	100nF	Volume control time costant	Larger volume regulation time	Smaller volume regulation time
C6	1000mF	Output DC decoupling	Lower low frequency cutoff	Higher low frequency cutoff
C7	1mF	Mute time costant	Larger mute on/off time	Smaller mute on/off time
C8	1000mF	Output DC decoupling	Lower low frequency cutoff	Higher low frequency cutoff
C9	100nF	Supply voltage bypass		Danger of oscillation

Figure 1a: Application Circuit.

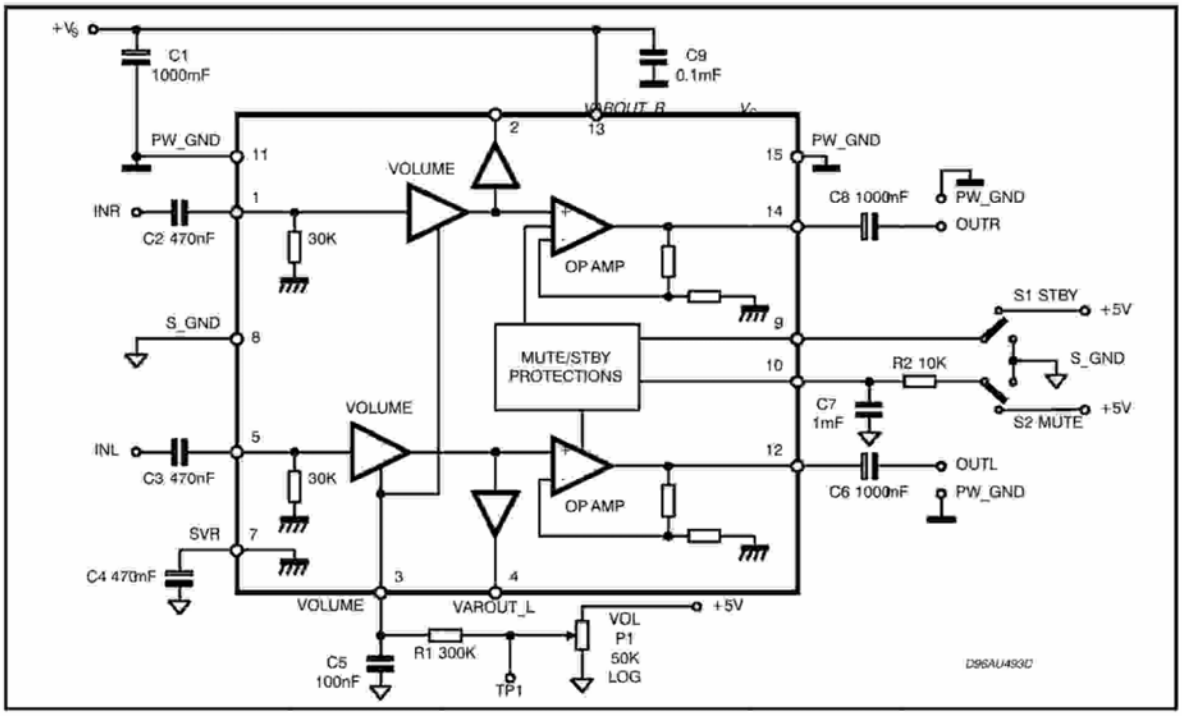
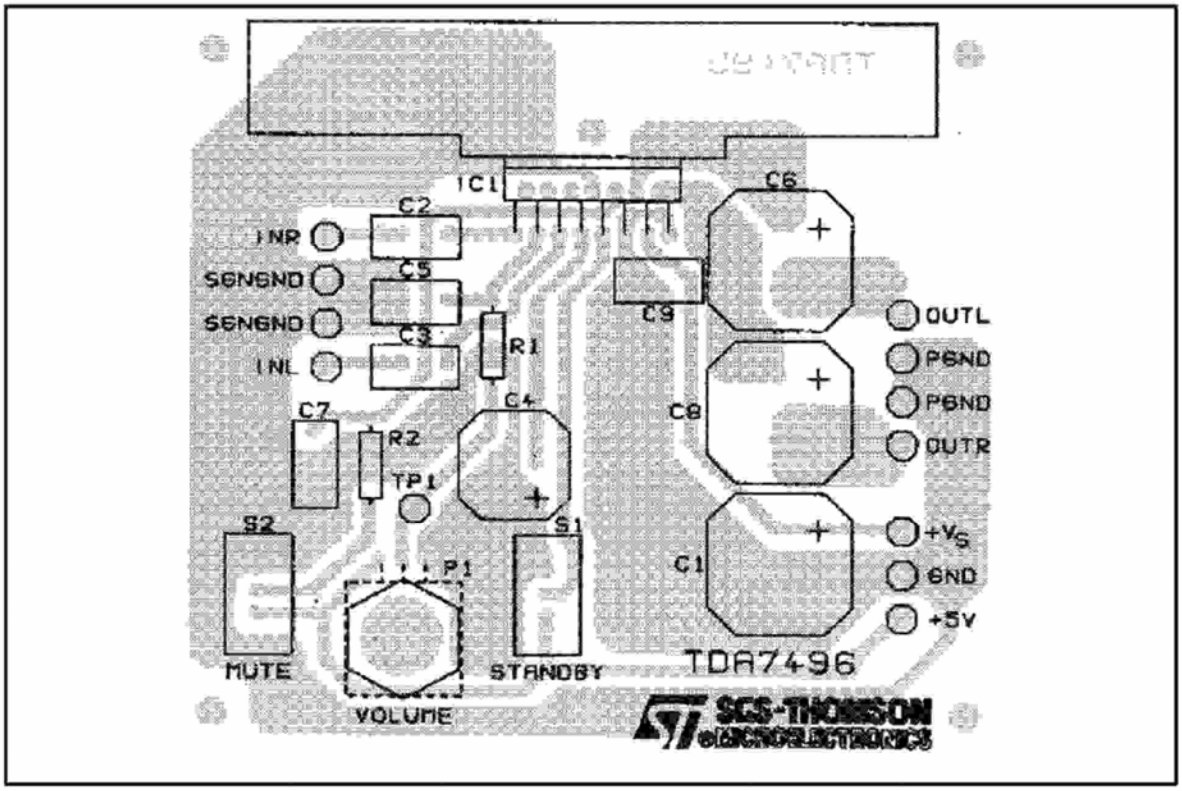


Figure 1b: P.C.B. and Component Layout.

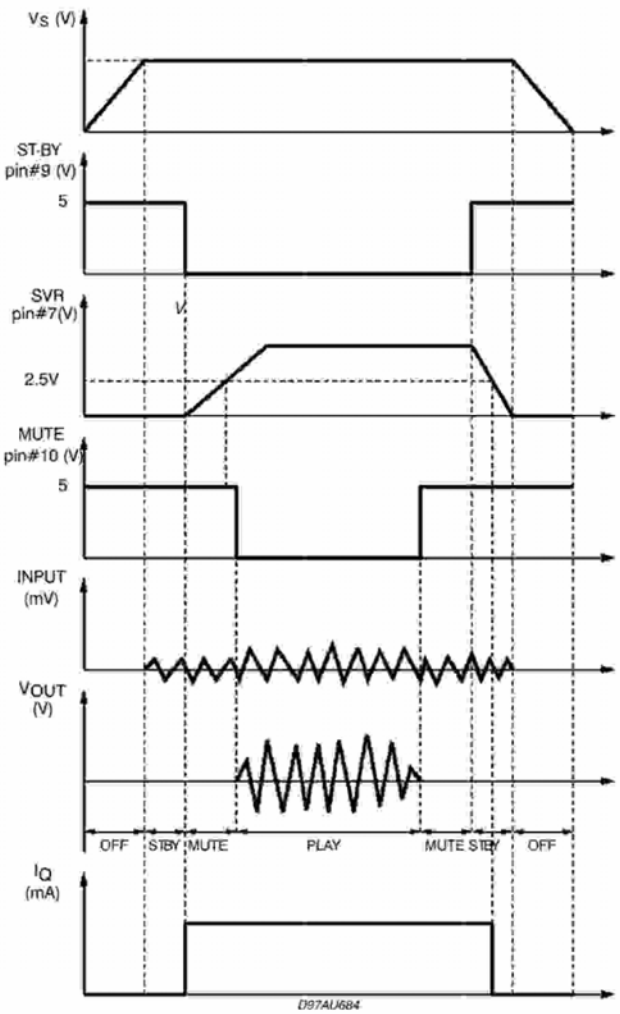


MUTE STAND-BY TRUTH TABLE

MUTE	ST-BY	OPERATING CONDITION
H	H	STANDBY
L	H	STANDBY
H	L	MUTE
L	L	PLAY

Turn ON/OFF Sequences (for optimizing the POP performances)

A) USING MUTE AND STAND-BY FUNCTIONS



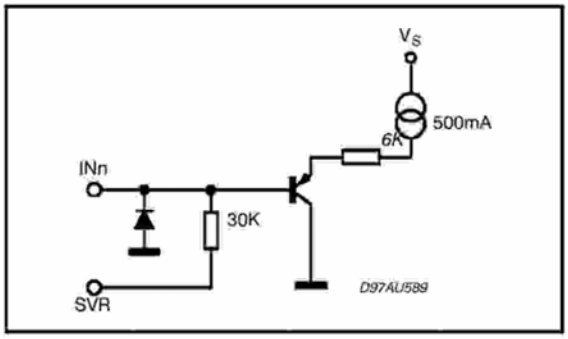
B) USING ONLY THE MUTE FUNCTION

To semplify the application, the stand-by pin can be connected directly to Ground.

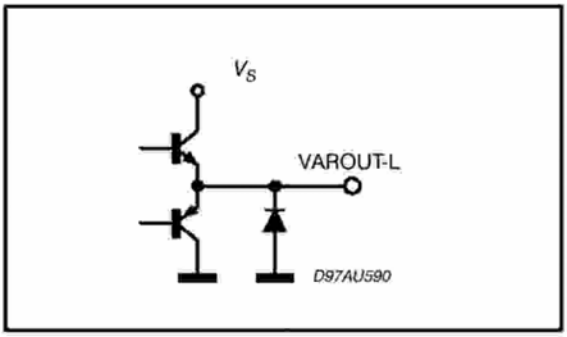
During the ON/OFF transitions of recommend to respect the following conditions.

- At the turn-on the transition mute - play must be made wmhen the sur pin is higher turn 2.5V
- At the turn-off the TDA7496 must be brought to mute from the play condition when the sur pin is higher than 2.5V.

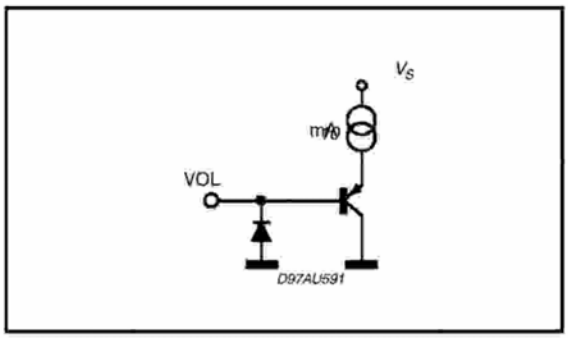
PINS: INL, INR



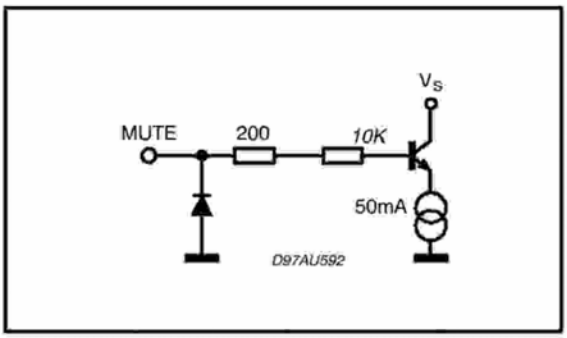
PINS: VAROUT-L, VAROUT-R



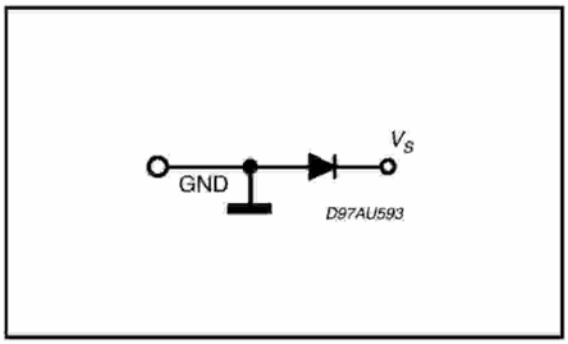
VOLUME



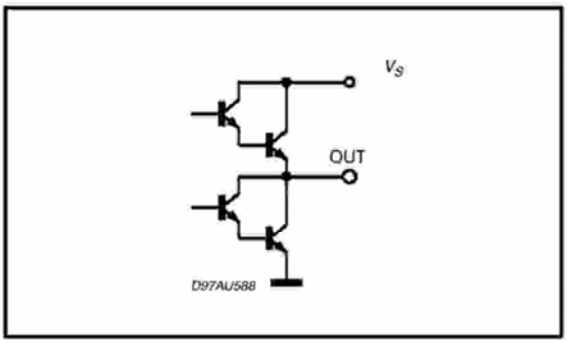
PIN: MUTE



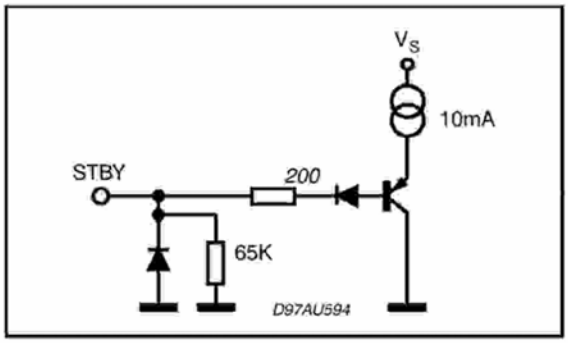
PINS: SVR, GND, S-GND



PINS: OUT R, OUT L

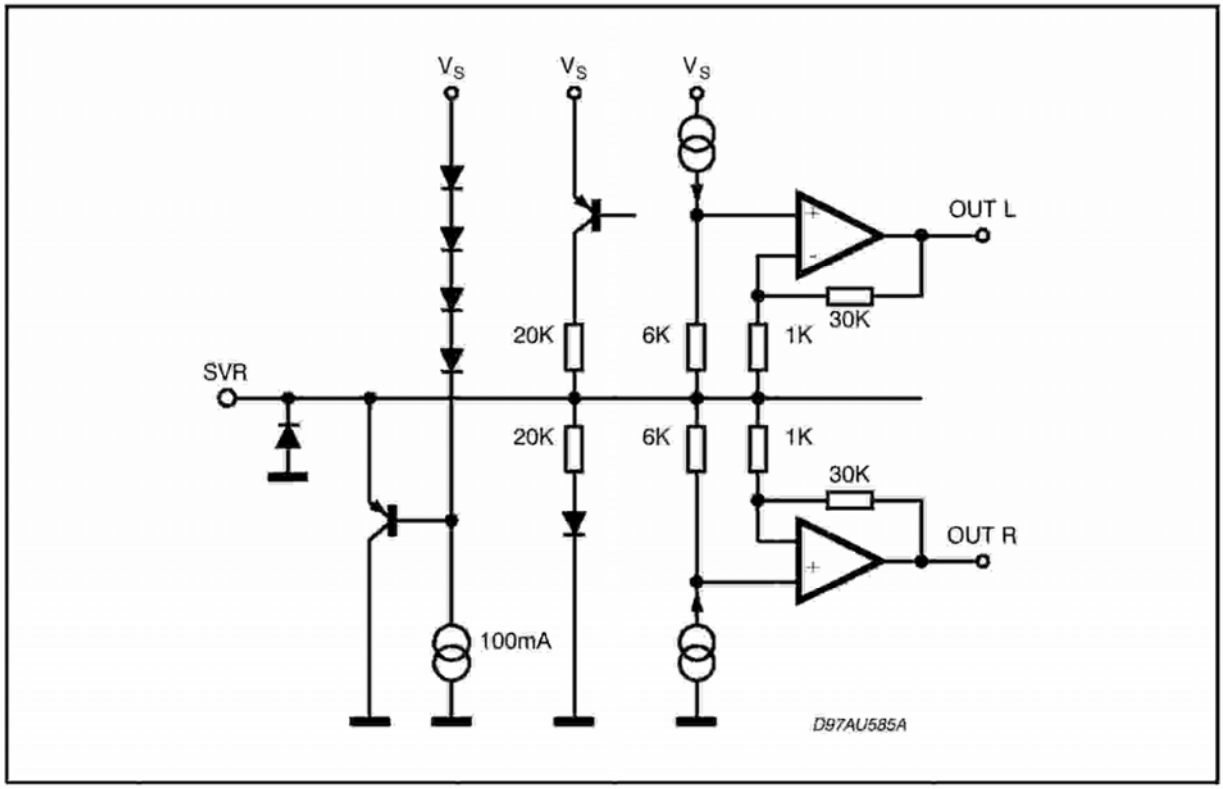


PIN: STBY



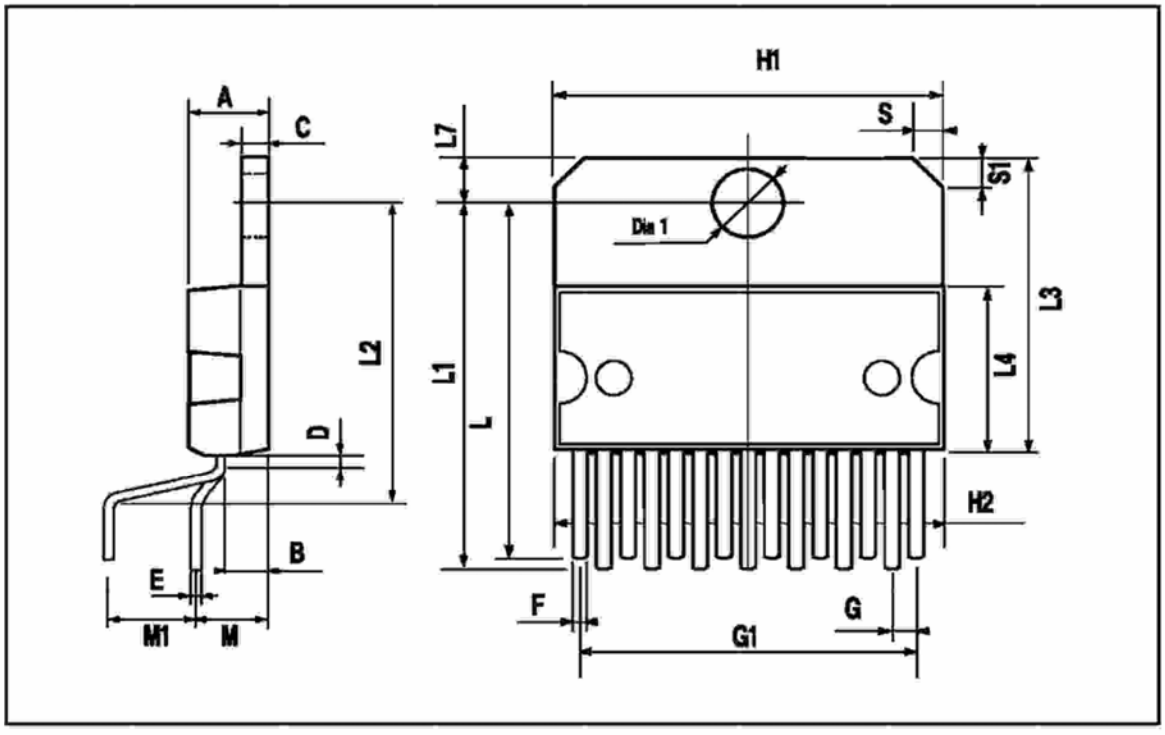
SVR

PIN:


VS
VS
VS
OUT L
20K
6K
1K
30K
SVR
20K
6K
1K
30K
OUT R
100mA
D97AU585A

MULTIWATT15 PACKAGE MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			5			0.197
B			2.65			0.104
C			1.6			0.063
D		1			0.039	
E	0.49		0.55	0.019		0.022
F	0.66		0.75	0.026		0.030
G	1.02	1.27	1.52	0.040	0.050	0.060
G1	17.53	17.78	18.03	0.690	0.700	0.710
H1	19.6			0.772		
H2			20.2			0.795
L	21.9	22.2	22.5	0.862	0.874	0.886
L1	21.7	22.1	22.5	0.854	0.870	0.886
L2	17.65		18.1	0.695		0.713
L3	17.25	17.5	17.75	0.679	0.689	0.699
L4	10.3	10.7	10.9	0.406	0.421	0.429
L7	2.65		2.9	0.104		0.114
M	4.25	4.55	4.85	0.167	0.179	0.191
M1	4.63	5.08	5.53	0.182	0.200	0.218
S	1.9		2.6	0.075		0.102
S1	1.9		2.6	0.075		0.102
Dia1	3.65		3.85	0.144		0.152



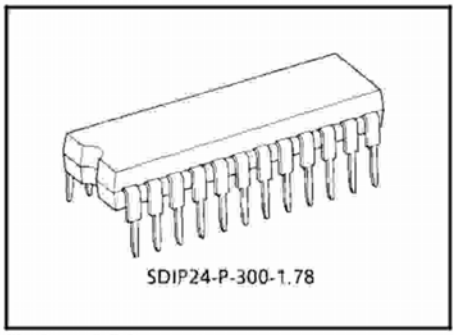
IC 701 (SOUND PROCESSOR) TA1343NG

TA1343N

TV Sound Processor

TA1343N is a sound processor controlled by I²C bus. It incorporates the following: 2-channel input, 3-channel output signal processing circuit, phase shift circuit for surround, and LPF for woofer channel.

ALS (Automatic Level Suppresser) circuit which prevents distort the signal in large signal condition for woofer channel is also incorporated



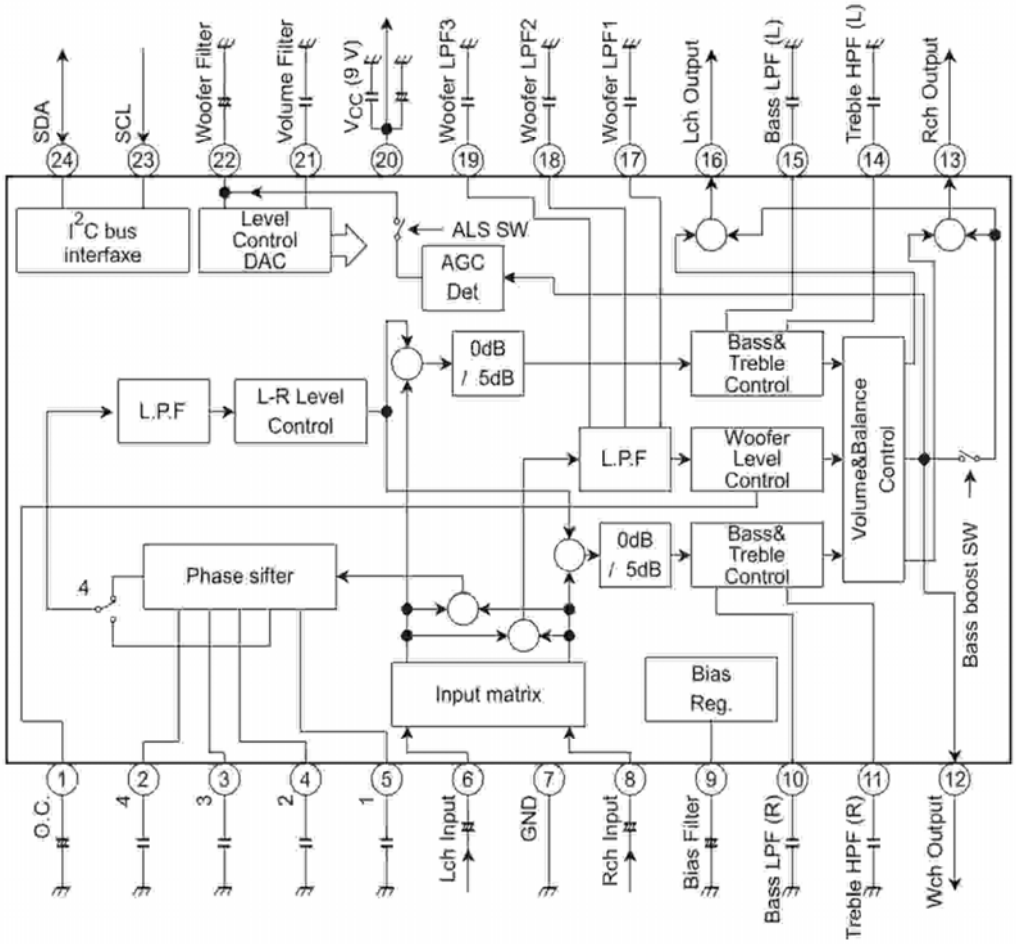
Weight: 1.22 g (typ.)

Features

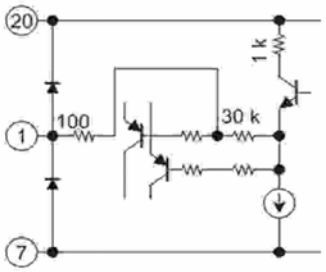
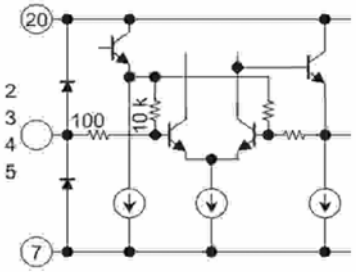
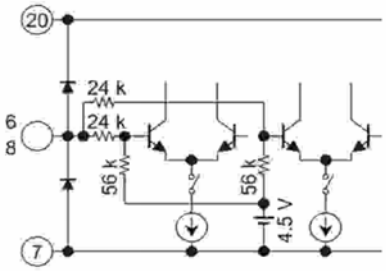
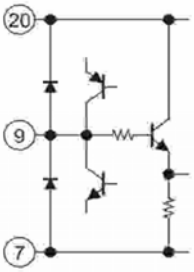
Sound processing circuit
- 2 ch inputs (Lch, Rch)
- 3 ch outputs (Lch, Rch, Wch)
- Input matrix switch
- Volume control
- Bass, treble, and balance adjustment
- Woofer level and surround effect level adjustment
- ALS (automatic level suppresser) circuit
- Built-in LPF for bass boost

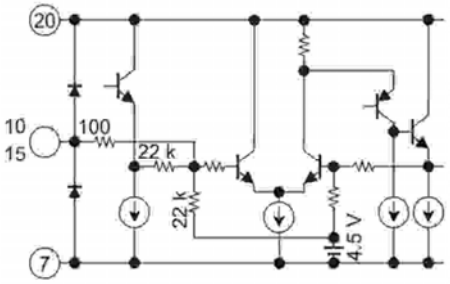
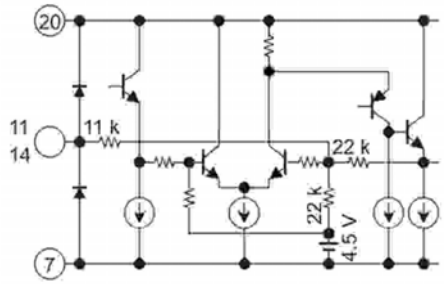
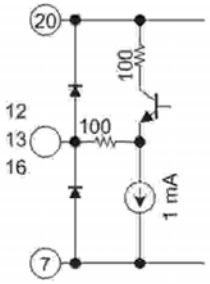
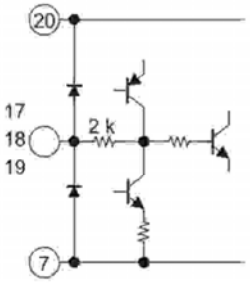
Surround circuit
- Phase shift surround system
- 2 modes stereo surround
- Pseudo stereo mode

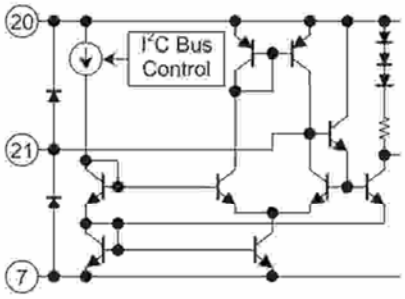
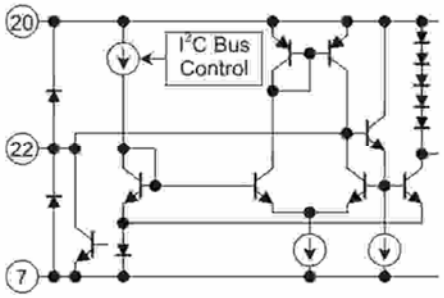
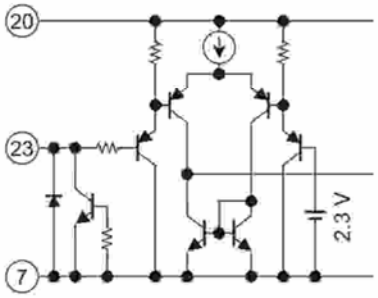
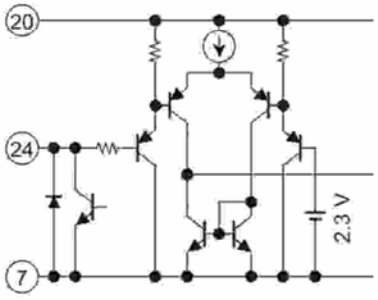
Block Diagram



Terminal Function

Pin No.	Name	Function	Interface Circuit
1	Offset canceling filter	DC offset canceling filter for bass boost. Connect a capacitor (10 F) between this terminal and GND.	
2 3 4 5	4 3 2 1	Terminals for capacitors of the phase shift blocks. Value of phase shift each block is deg. 2tan ^{1} (2 fCR) C is capacitance of external capacitor R is resistance of internal resister (10 k (typ.)).	
6 8	Lch Input Rch Input	Audio input terminals.	
7	GND	GND terminals.	
9	Bias Filter	Filter for noise rejection of the bias. Connect a capacitor (4.7 F) between this terminal and GND.	

Pin No.	Name	Function	Interface Circuit
10 15	Bass LPF (R) Bass LPF (L)	LPFs for bass control circuits. Connect capacitors (0.027 F) between each terminals and GND.	
11 14	Treble HPF (R) Treble HPF (L)	HPFs for treble control circuits. Connect capacitors (8200 pF) between each terminals and GND.	
12 13 16	Wch Output Rch Output Lch Output	Audio output terminal.	
17 18 19	Woofer LPF 1 Woofer LPF 2 Woofer LPF 3	LPFs for bass boost circuit. Connect a capacitor (0.033 F) between terminal 17 and GND. Connect a capacitor (0.047 F) between terminal 18 and GND. Connect a capacitor (0.022 F) between terminal 19 and GND.	
20	V_{CC}	V_{CC} terminal. Recommended operation voltage is 9 V 10%.	

Pin No.	Name	Function	Interface Circuit
21	Volume Filter	Smoothing filter for volume control. Connect a capacitor (0.01 F) between this terminal and GND.	
22	Woofer Filter	Smoothing filter for bass boost level control. Connect a capacitor (3.3 F) between this terminal and GND. This filter is also for ALS circuit.	
23	SCL	SCL terminal.	
24	SDA	SDA terminal.	

I²C Bus Control Data Table

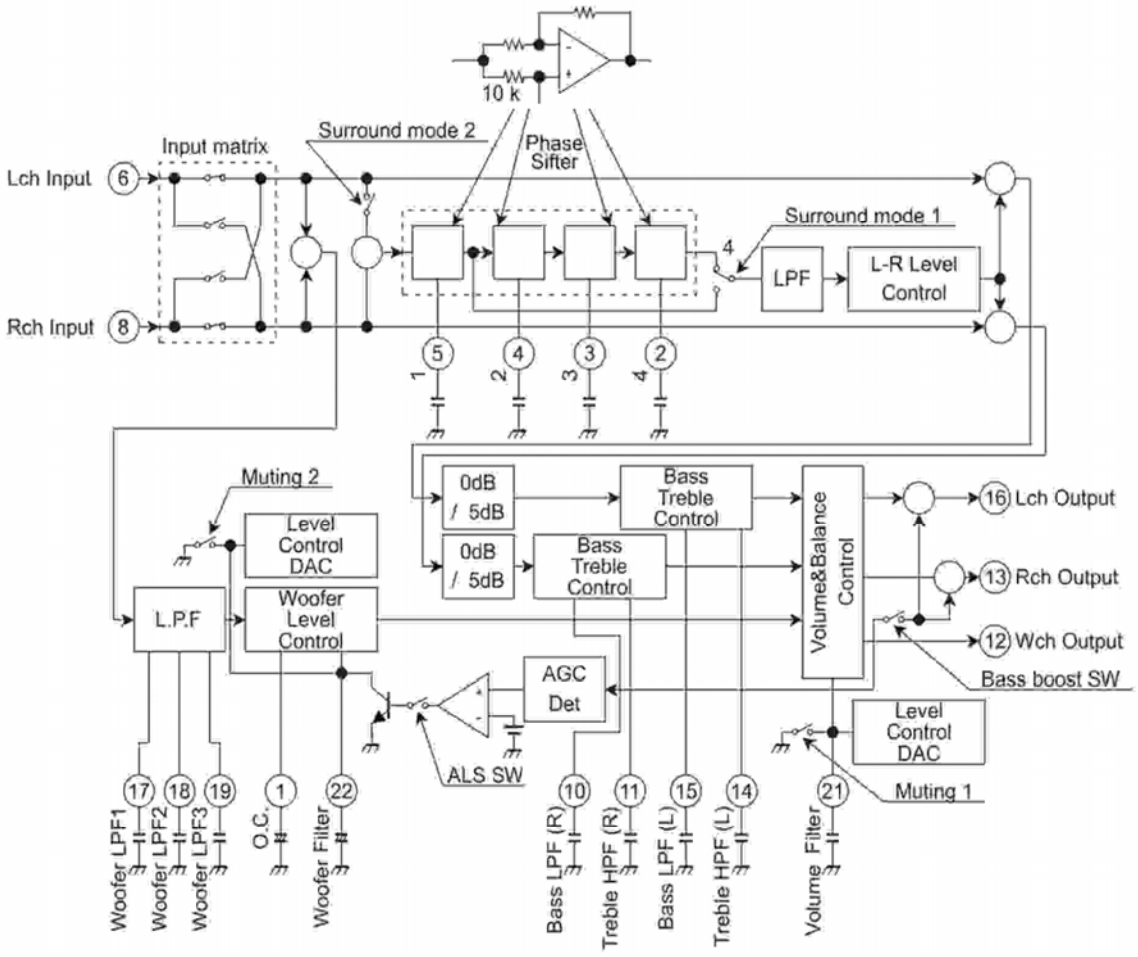
Slave Address: 80 (h)

Address Map

Sub Address	MSB (b7)	b6	b5	b4	b3	b2	b1	LSB (b0)	Default Data
00		Bass level (effective data range: 0E (h) to 72 (h))							40 (h) (Bass: Center)
01		Treble level (effective data range: 0E (h) to 72 (h))							40 (h) (Treble: Center)
02		Volume (effective data range: 00 (h) to 72 (h))							00 (h) (Volume: min)
03		ALS SW "0": OFF "1": ON	ALS start point "00": 220 mV "01": 380 mV "10": 525 mV "11": 770 mV			Input attenuation "0": 0dB "1": 5dB	Input matrix "00": Normal "01": Rch "10": Lch "11": Reverse		00 (h) (ALS SW: OFF ALS start point: 220 mV Input attenuation: 0dB Input matrix: Normal)
04		Woofer level (effective data range: 00 (h) to 72 (h))							00 (h) (Woofer level: min)
05		Balance (effective data range: 00 (h) to 7F (h))							40 (h) (Balance: Center)
06	Surround mode 2 "0": Ste. "1": Mono.	Surround mode 1 "0": "1": 4				Surround effect level (effective data range 1 (h) to 7 (h)) 0 (h): OFF			C0 (h) (Surround mode 1: 4 Surround mode 2: Mono. Surround effect level: OFF)
07	Bass boost SW "0": OFF "1": ON		Woofer LPF fo "00": 100 Hz "01": 125 Hz "10": 170 Hz "11": 210 Hz			Woofer LPF defeat "0": OFF "1": ON	Muting 2 "0": OFF "1": ON	Muting 1 "0": OFF "1": ON	10 (h) Bass boost SW: OFF Woofer LPF fo: 125 Hz Muting 1: OFF Muting 2: OFF

The bits shown gray area must be "0".

Block Diagram



The on/off status of each switches drawn on this scheme shows the default setting of I^2C bus control.

Explanation of the Functions. (note: (h) means hexadecimal data, (b) means binary data)

Bass level control (sub address 00 (h))

Bass level control. Crossover frequency is 1 kHz.
Effective control data range is 0E (h) to 72 (h) (100 steps). Set this data to 0E (h), bass level goes to minimum level, and set this data to 72 (h), bass level goes to maximum level. Set this data to 40 (h), bass level goes to center level.
Switch on default data is 40 (h).
Control range is 12dB (typ.).

Treble level control (sub address 01 (h))

Treble level control. Crossover frequency is 1 kHz.
Effective control data range is 0E (h) to 72 (h) (100 steps). Set this data to 0E (h), treble level goes to minimum level, and set this data to 72 (h), treble level goes to maximum level. Set this data to 40 (h), treble level goes to center level.
Switch on default data is 40 (h).
Control range is 12dB (typ.).

Volume control (sub address 02 (h))

Volume control of only Lch and Rch output.
Effective control data range is 00 (h) to 72 (h).
Switch on default data is 00 (h).

Woofer level control (sub address 04 (h))

Volume control of only Wch output.
Effective control data range is 00 (h) to 72 (h).
Switch on default data is 00 (h).

Balance control (sub address 05 (h))

Balance control. Set this data to 40 (h), balance goes to center.
Effective control data range is 00 (h) to 7F (h).
Switch on default data is 40 (h).

Surround effect level control (sub address 06 (h)/b2 to b0)

Surround effect level control.
Effective control data range is 1 (h) to 7 (h). Set this data to 0 (h), surround function is off. Recommend setting surround 2 data to 1 (b) when surround effect level set to "0".
Set mute on when surround effect level is changed.
Switch on default data is 0 (h).

Input matrix switch (sub address 03 (h)/b1 to b0)

Output signal selection control.
Set these bits to 00 (b), output mode goes to normal mode (input signal of terminal 6 is outputted to terminal 16, and input signal of terminal 8 is outputted to terminal 13). Set these bits to 01 (b) output mode goes to Rch mode (input signal of terminal 8 is outputted to terminal 13 and terminal 16). Set these bits to 10 (b) output mode goes to Lch mode (input signal of terminal 6 is outputted to terminal 13 and terminal 16). Set these bits to 11 (b), output mode goes to reverse mode (input signal of terminal 6 is outputted to terminal 13, and input signal of terminal 8 is outputted to terminal 16).
Switch on default data is 00 (b).

Input attenuation (sub address 03 (h)/b2)

When this function is active, input signals are 5dB attenuated at input stage of Lch and Rch. Wch signal isn't attenuated.
So, Wch output signal level is up to 5dB from Lch and Rch outputs relatively.
Set the bit to 0 (b), attenuation is inactive, set the bit to 1 (b), attenuation is active.
Switch on default data is 0 (b).

ALS switch (sub address 03 (h)/b6), ALS start point (sub address 03 (h)/b5 to b4)

Gain of Wch is large. So output signals of Wch is distort easily when the input signals are large. ALS (Automatic Level Suppresser) suppresses Wch signal level under ALS start point, and reduces the distortion in large signals input condition.

Set the bit of sub address 03 (h)/b6 to 0 (b), ALS is inactive. Set the bit 1 to (b), ALS is active.

Switch on default data is 0 (b).

The bits of 03 (h)/b5 to b4 set ALS start point. Set the bits to 00 (b), ALS start point is 220 mV_{rms}. Set the bits to 01 (b), ALS start point is 380 mV_{rms}. Set the bits to 10 (b), ALS start point is 525 mV_{rms}. And set the bits to 11 (b), ALS start point is 770 mV_{rms}.

Switch on default data is 00 (b).

Surround mode 1 (sub address 06 (h)/b6), Surround mode 2 (sub address 06 (h)/b7)

Surround mode 1 is selection of phase shift value of the surround circuit. Set the bit to 0 (b), L-R signal is shifted by 1 phase shift stage. Set the bit to 1 (b), L-R signal is shifted by 4 phase shift stages.

Surround mode 2 is selected by condition of the input signal. When input signal is stereo, surround mode 2 must be set to 0 (b). When input signal is monaural, surround mode 2 must be set to 1 (b) (pseudo stereo mode).

Recommend setting surround 1 to 1 (b) when pseudo stereo mode is selected.

Mute 1 (sub address 07 (h)/b0), Mute 2 (sub address 07 (h)/b1)

When Mute 1 is active, all outputs are muted.

Set the bit to 0 (b), mute 1 is inactive. Set the bit to 1 (b), Mute 1 is active.

Switch on default data is 0 (b).

When Mute 2 is active, only Wch output is muted. Set the bit to 0 (b), Mute 2 is inactive. Set the bit to 1 (b), Mute 2 is active.

Switch on default data is 0 (b).

Woofer LPF fo (sub address 07 (h)/b5 to b4)

These bits set cut off frequency (fo) of the low pass filter for Wch.

Set the bits to 00 (b), fo is 100 Hz (3dB point). Set the bits to 01 (b), fo is 125 Hz. Set the bits to 10 (b), fo is 170 Hz. Set the bits to 11 (b), fo is 210 Hz.

Switch on default data is 01 (h).

Woofer LPF defeat (sub address 07 (h)/b3)

Set the bit to 1 (b), Woofer LPF is defeated.

This function is for device test. So, this bit must be set to 0 (b).

Switch on default data is 0 (b).

Bass boost switch (sub address 07 (h)/b7)

Bass boost function is adding Wch signal to main channel signals. It can boost low frequency signal without woofer output.

Set the bit 0 (b), Bass boost is inactive. Set the bit 1 (b), bass boost is active.

Switch on default data is 0 (b).

Purchase of TOSHIBA I^2C components conveys a license under the Philips I^2C Patent Rights to use these components in an I^2C system, provided that the system conforms to the I^2C Standard Specification as define by Philips.

Maximum Ratings (Ta 25°C)

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	12	V
Power dissipation	P_D	1400 (Note 1) mW	
Operating temperature	T_{opr}	20 to 75	°C
Storage temperature	T_{stg}	55 to 150	°C
Maximum input voltage	V_{MAX} V	CC 0.3	V
Minimum input voltage	V_{MIN} V	CC 0.3	V

Note 1: When using the device at Ta 25°C, decrease the power dissipation by 11.2 mW for each increase of 1°C

Recommended Supply Voltage

Pin No.	Pin Name	Min	Typ.	Max	Unit
20	V_{CC}	8.1	9.0	9.9	V

Electrical Characteristics

DC Characteristics (V_{CC} 9 V, Ta 25°C)

Characteristics	Pin No.	Pin Name	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Power dissipation	20	V_{CC} I	CC			39	50	63	mA
Pin voltage	1	Offset canceling filter	V1	1	In power on default	4.0	4.5	5.0	V
	2	4	V2			4.0	4.5	5.0	
	3	3	V3			4.0	4.5	5.0	
	4	2	V4			4.0	4.5	5.0	
	5	1	V5			4.0	4.5	5.0	
	[illegible]	[illegible] V6			4.0 4.5 5.0				
	8	Rch Input	V8			4.0	4.5	5.0	
	9	Bias Filter	V9			5.2	5.7	6.2	
	10	Bass LPF (R)	V10			4.0	4.5	5.0	
	11	Treble LPF (R)	V11			4.0	4.5	5.0	
	12	Wch Output	V12			4.0	4.5	5.0	
	13	Rch Output	V13			4.0	4.5	5.0	
	14	Treble LPF (L)	V14			4.0	4.5	5.0	
	15	Bass LPF (L)	V15			4.0	4.5	5.0	
	16	Lch Output	V16			4.0	4.5	5.0	
	17	Woofer1 RF1 V17			4.6 5.1 5.6				
	18	Woofer2 RF2 V18			4.6 5.1 5.6				
	19	Woofer3 RF3 V19			4.6 5.1 5.6				
	21	Volume Filter	V21				0.0		
	22	Woofer Filter	V22			0.5	1.5	2.0	

AC Characteristics (V_{CC} 9 V, Ta 25°C)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Gain	Go L		(Note 1)	0.0	2.0	4.0	dB
	Go R						
	Go_{Att} L			7.0	5.0	3.0	
	Go_{Att} R						
	Go_{Bst} L			11.0	13.0	15.0	
	Go_{Bst} R						
	Go W			16.0	19.0	22.0	
THD	THD L		(Note 2)		0.03	1.0	%
	THD R						
	THD W				0.25		
S/N	SN L		(Note 3)	70	74		dB
	SN R						
	SN W			68	72		
Residual noise	V_{NO} L		(Note 4)		20	50	μV_{rms}
	V_{NO} R						
	V_{NO} W						
Frequency response (100 Hz)	Go100 L		(Note 5)	2.0	0.0	2.0	dB
	Go100 R						
Frequency response (10 kHz)	Go10k L		(Note 6)	2.0	0.0	2.0	dB
	Go10k R						
	Go10k S			13.0	11.0	8.0	
LPF frequency response	$G_{LPF}100$		(Note 7)	4.0	6.0	8.0	dB
	$G_{LPF}125$			5.5	7.5	9.5	
	$G_{LPF}170$			4.0	6.0	8.0	
	$G_{LPF}210$			1.0	8.0	15.0	
Surround sound gain	G S		(Note 8)	1.5	3.5	5.5	dB
Surround sound phase	Ph 4		(Note 9)	65	110	65	deg.
Balance center	G_{LR}		(Note 10)	2.0	0.0	2.0	dB
Balance minimum	G_{BLMIN} L		(Note 11)		70	60	dB
	G_{BLMIN} R						
Bass maximum	G_{BSMAX} L		(Note 12)	9	12	14	dB
	G_{BSMAX} R						
Bass minimum	G_{BSMIN} L		(Note 13)	14	12	9	dB
	G_{BSMIN} R						
Treble maximum	G_{TRMAX} L		(Note 14)	9	12	14	dB
	G_{TRMAX} R						
Treble minimum	G_{TRMIN} L		(Note 15)	14	12	9	dB
	G_{TRMIN} R						
Volume center	G_{VLCNT} L		(Note 16)	17	15	12	dB
	G_{VLCNT} R						
	G_{VLCNT} W						

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Volume minimum	G_{VLMIN} L		(Note 17)		77	65	dB
	G_{VLMIN} R						
	G_{VLMIN} W						
Woofer level center	G_{WLCNT}		(Note 18)	9.5	7.5	5.5	dB
ALS start point 0	$v_{ALS}0$		(Note 19)	185	220	255	mV_{rms}
ALS start point 1	$v_{ALS}1$			325	380	430	mV_{rms}
ALS start point 2	$v_{ALS}2$			460	525	585	mV_{rms}
ALS start point 3	$v_{ALS}3$			655	770	880	mV_{rms}
Cross talk	CT_{L-R}		(Note 20)		82	72	dB
	CT_{R-L}						
Ripple rejection (volume minimum)	RR1 L		(Note 21)		48	30	dB
	RR1 R						
	RR1 W				53		
Ripple rejection (volume maximum)	RR2 L		(Note 22)		42	30	dB
	RR2 R						
	RR2 W				32	25	
Output dynamic range	v_{DOUT} L		(Note 23)	6.0	6.7		V_{p-p}
	v_{DOUT} R			5.5	6.3		
	v_{DOUT} W			6.0	6.7		
Input dynamic range	v_{DIN} L		(Note 24)	5.5	7.5		V_{p-p}
	v_{DIN} R						
	v_{DIN} W			3.0	4.5		
DC offset (muting)	V_M L		(Note 25)			380	mV
	V_M R						
	V_M W						
DC offset (surround switch)	V_S L		(Note 26)			50	mV
	V_S R						
Mute residual level	G_{MUT} L		(Note 27)		90	70	dB
	G_{MUT} R						
	G_{MUT} W						

Test Condition

Note	Test Condition											
	Input Point	Meas. Point	Bus Data (hexadecimal)								SW1	
			00	01	02	03	04	05	06	07		
1	TP6 TP8	TP12 TP13 TP16	40	40	72	00 / 04	72	40	C0	10 / 90	(a)	Set data of sub address 03 (h) to 00 (h) and set data of sub address 07 (h) to 10 (h). Input signal (1 kHz, 500 mV_{rms}, sine wave) to TP6 and TP8. Measure amplitude of T13 and TP16 ($v13_1$ mV_{rms}, $v16_1$ mV_{rms}). Go RdB 20log ($v13_1$/500) Go LdB 20log ($v16_1$/500) Set data of sub address 03 (h) to 04 (h). Measure amplitude of T13 and TP16 ($v13_2$ mV_{rms}, $v16_2$ mV_{rms}). Go_{Att} RdB 20log ($v13_2/v13_1$) Go_{Att} LdB 20log ($v16_2/v16_1$) Set data of sub address 03 (h) to 00 (h) and set data of sub address 07 (h) to 10 (h). Input signal (80 Hz, 100 mV_{rms}, sine wave) to TP6 and TP8. Measure amplitude of T13 and TP16 ($v13_3$ mV_{rms}, $v16_3$ mV_{rms}). Set data sub address 07 (h) to 90 (h). Measure amplitude of T13 and TP16 ($v13_4$ mV_{rms}, $v16_4$ mV_{rms}). GoBst RdB 20log ($v13_4/v13_3$) GoBst LdB 20log ($v16_4/v16_3$) Measure amplitude of TP12 (v12 mV_{rms}). Go WdB 20log (v12/100)
2	TP6 TP8	TP12 TP13 TP16	40	40	72	00	72	40	C0	10	(a)	Input signal (1 kHz, 500 mV_{rms}, sine wave) to TP6 and TP8. Measure THD of TP13 and TP 16 (THD R%, THD L%). Input signal (80 Hz, 100 mV_{rms}, sine wave) to TP6 and TP8. Measure THD of TP12 (THD W%)
3	TP6 TP8	TP12 TP13 TP16	40	40	72	00	72	40	C0	10	(a)	Input signal (1 kHz, 500 mV_{rms}, sine wave) to TP6 and TP8. Measure amplitude of T13 and TP16 (v13s mV_{rms}, v16s mV_{rms}). Connect TP6 and TP8 to GND. Measure amplitude of T13 and TP16 (v13n mV_{rms}, v16n mV_{rms}). SN RdB 20log (v13s/v13n) SN LdB 20log (v16s/v16n) Input signal (80 Hz, 100 mV_{rms}, sine wave) to TP6 and TP8. Measure amplitude of T12 (v12s mV_{rms}). Connect TP6 and TP8 to GND. Measure amplitude of T12 (v12n mV_{rms}). SN WdB 20log (v12s/v12n)
4		TP12 TP13 TP16	40	40	00	00	00	40	C0	10	(a)	Connect TP6 and TP8 to GND. Measure amplitude of TP12, TP13 and TP16 (v_{NO} W V_{rms}, v_{NO} R V_{rms}, v_{NO} L V_{rms}).

Note	Test Condition											
	Input Point	Meas. Point	Bus Data (hexadecimal)								SW1	
			00	01	02	03	04	05	06	07		
5	TP6 TP8	TP13 TP16	40	40	72	00	00	40	C0	10	(a)	Input signal (1 kHz, 500 mV_{rms}, sine wave) to TP6 and TP8. Measure amplitude of T13 and TP16 ($v13_0$ mV_{rms}, $v16_0$ mV_{rms}). Input signal (100 Hz, 500 mV_{rms}, sine wave) to TP6 and TP8. Measure amplitude of T13 and TP16 (v13 mV_{rms}, v16 mV_{rms}). G100 RdB 20log (v13/$v13_0$) G100 LdB 20log (v16/$v16_0$)
6	TP6 TP8	TP13 TP16	40	40	72	00	00	40	C0 / C7	10	(a)	Set data of sub address 06 (h) to 00 (h). Input signal (1 kHz, 500 mV_{rms}, sine wave) to TP6 and TP8. Measure amplitude of T13 and TP16 ($v13_0$ mV_{rms}, $v16_0$ mV_{rms}). Input signal (10 kHz, 500 mV_{rms}, sine wave) to TP6 and TP8. Measure amplitude of T13 and TP16 ($v13_1$ mV_{rms}, $v16_1$ mV_{rms}). G10k RdB 20log ($v13_1$/$v13_0$) G10k LdB 20log ($v16_1$/$v16_0$) Set data of sub address 06 (h) to C7 (h). Connect TP6 to GND. Input signal (1 kHz, 500 mV_{rms}, sine wave) to TP8. Measure amplitude of T16 ($v16_2$ mV_{rms}). Input signal (10 kHz, 500 mV_{rms}, sine wave) to TP8. Measure amplitude of T16 ($v16_3$ mV_{rms}). G10k SdB 20log ($v16_3$/$v16_2$)
7	TP6 TP8	TP12	40	40	72	00	00	40	C0	00 / 10 / 20 / 30 / 14	(a)	Input signal (300 Hz, 100 mV_{rms}, sine wave) to TP6 and TP8. Set data of sub address 07 (h) to 00 (h). Measure amplitude of TP12 ($v12_0$ mV_{rms}). Set data of sub address 07 (h) to 10 (h). Measure amplitude of TP12 ($v12_1$ mV_{rms}). Set data of sub address 07 (h) to 20 (h). Measure amplitude of TP12 ($v12_2$ mV_{rms}). Set data of sub address 07 (h) to 30 (h). Measure amplitude of TP12 ($v12_3$ mV_{rms}). Set data of sub address 07 (h) to 14 (h). Measure amplitude of TP12 ($v12_X$ mV_{rms}). G_{LPF}100dB 20log ($v12_0$/$v12_1$) G_{LPF}125dB 20log ($v12_1$/$v12_2$) G_{LPF}170dB 20log ($v12_2$/$v12_3$) G_{LPF}210dB 20log ($v12_3$/$v12_X$)

Note	Test Condition											
	Input Point	Meas. Point	Bus Data (hexadecimal)								SW1	
			00	01	02	03	04	05	06	07		
8	TP6 TP8	TP16	40	40	72	00	00	40	C0 / C7	10	(a)	Set data of sub address 06 (h) to C0 (h). Connect TP8 to GND and input signal (1 kHz, 500 mV_{rms}, sine wave) to TP6. Measure amplitude of TP16 ($v16_0$ mV_{rms}). Set data of sub address 06 (h) to C7 (h). Connect TP6 to GND and input signal (1 kHz, 500 mV_{rms}, sine wave) to TP8. Measure amplitude of TP16 ($v16_1$ mV_{rms}). G SdB 20log ($v16_1/v16_0$)
9	TP8	TP16	40	40	72	00	00	40	C7	10	(a)	Connect TP6 to GND. Input signal (400 Hz, 500 mV_{rms}, sine wave) to TP8. Measure phase between TP8 and TP16 (Ph 4 deg.).
10	TP6 TP8	TP13 TP16	40	40	72	00	00	40	C0	10	(a)	Input signal (1 kHz, 500 mV_{rms}, sine wave) to TP6 and TP8. Measure amplitude of TP13 and TP16 (v13 mV_{rms}, v16 mV_{rms}). G_{LR}dB 20log (v16/V13)
11	TP6 TP8	TP13 TP16	40	40	72	00	00	0E / 72	C0	10	(a)	Input signal (1 kHz, 500 mV_{rms}, sine wave) to TP6 and TP8. Set data of sub address 05 (h) to 0E (h). Measure amplitude of TP13 and TP16 ($v13_R$ mV_{rms}, $v16_R$ mV_{rms}). Set data of sub address 05 (h) to 72 (h). Measure amplitude of TP13 and TP16 ($v13_L$ mV_{rms}, $v16_L$ mV_{rms}). G_{BLMIN} R 20log ($v13_R/v16_R$) G_{BLMIN} L 20log ($v16_L/v13_L$)
12	TP6 TP8	TP13 TP16	40 / 72	40	72	00	00	40	C0	10	(a)	Input signal (100 Hz, 250 mV_{rms}, sine wave) to TP6 and TP8. Set data of sub address 00 (h) to 40 (h). Measure amplitude of TP13 and TP16 ($v13_0$ mV_{rms}, $v16_0$ mV_{rms}). Set data of sub address 00 (h) to 72 (h). Measure amplitude of TP13 and TP16 ($v13_B$ mV_{rms}, $v16_B$ mV_{rms}). G_{BSMAX} R 20log ($v13_B/v13_0$) G_{BSMAX} L 20log ($v16_B/v13_0$)
13	TP6 TP8	TP13 TP16	40 / 0E	40	72	00	00	40	C0	10	(a)	Input signal (100 Hz, 250 mV_{rms}, sine wave) to TP6 and TP8. Set data of sub address 00 (h) to 40 (h). Measure amplitude of TP13 and TP16 ($v13_0$ mV_{rms}, $v16_0$ mV_{rms}). Set data of sub address 00 (h) to 0E (h). Measure amplitude of TP13 and TP16 ($v13_B$ mV_{rms}, $v16_B$ mV_{rms}). G_{BSMIN} R 20log ($v13_B/v13_0$) G_{BSMIN} L 20log ($v16_B/v13_0$)

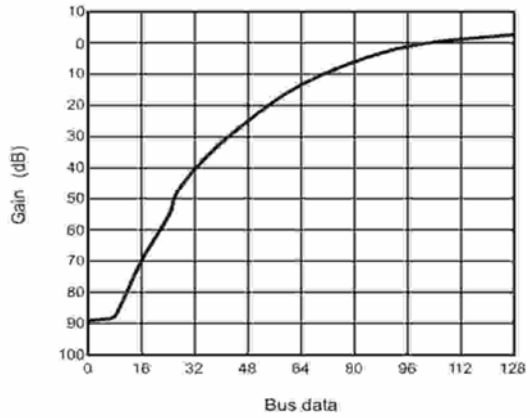
Note	Test Condition											
	Input Point	Meas. Point	Bus Data (hexadecimal)								SW1	
			00	01	02	03	04	05	06	07		
14	TP6 TP8	TP13 TP16	40	40 / 72	72	00	00	40	C0	10	(a)	Input signal (10 kHz, 250 mV_{rms}, sine wave) to TP6 and TP8. Set data of sub address 01 (h) to 40 (h). Measure amplitude of TP13 and TP16 ($v13_0$ mV_{rms}, $v16_0$ mV_{rms}). Set data of sub address 01 (h) to 72 (h). Measure amplitude of TP13 and TP16 ($v13_T$ mV_{rms}, $v16_T$ mV_{rms}). G_{TRMAX} R 20log ($v13_T/v13_0$) G_{TRMAX} L 20log ($v16_T/v13_0$)
15	TP6 TP8	TP13 TP16	40	40 / 0E	72	00	00	40	C0	10	(a)	Input signal (10 kHz, 250 mV_{rms}, sine wave) to TP6 and TP8. Set data of sub address 01 (h) to 40 (h). Measure amplitude of TP13 and TP16 ($v13_0$ mV_{rms}, $v16_0$ mV_{rms}). Set data of sub address 01 (h) to 0E (h). Measure amplitude of TP13 and TP16 ($v13_T$ mV_{rms}, $v16_T$ mV_{rms}). G_{TRMIN} R 20log ($v13_T/v13_0$) G_{TRMIN} L 20log ($v16_T/v13_0$)
16	TP6 TP8	TP12 TP13 TP16	40	40	72 / 40	00	72	40	C0	10	(a)	Input signal (1 kHz, 500 mV_{rms}, sine wave) to TP6 and TP8. Set data of sub address 02 (h) to 72 (h). Measure amplitude of TP13 and TP16 ($v13_0$ mV_{rms}, $v16_0$ mV_{rms}). Set data of sub address 02 (h) to 40 (h). Measure amplitude of TP13 and TP16 ($v13_C$ mV_{rms}, $v16_C$ mV_{rms}). G_{VRCNT} R 20log ($v13_C/v13_0$) G_{VRCNT} L 20log ($v16_C/v13_0$) Input signal (80 Hz, 100 mV_{rms}, sine wave) to TP6 and TP8. Set data of sub address 02 (h) to 72 (h). Measure amplitude of TP12 ($v12_0$ mV_{rms}). Set data of sub address 02 (h) to 40 (h). Measure amplitude of TP12 ($v12_C$ mV_{rms}). G_{VRCNT} W 20log ($v12_C/v12_0$)

Note	Test Condition											
	Input Point	Meas. Point	Bus Data (hexadecimal)								SW1	
			00	01	02	03	04	05	06	07		
17	TP6 TP8	TP12 TP13 TP16	40	40	72 / 0E	00	72	40	C0	10	(a)	Input signal (1 kHz, 500 mV_{rms}, sine wave) to TP6 and TP8. Set data of sub address 02 (h) to 72 (h). Measure amplitude of TP13 and TP16 ($v13_0$ mV_{rms}, $v16_0$ mV_{rms}). Set data of sub address 02 (h) to 0E (h). Measure amplitude of TP13 and TP16 ($v13_{MIN}$ mV_{rms}, $v16_{MIN}$ mV_{rms}). G_{VRMIN} R 20log ($v13_{MIN}/v13_0$) G_{VRMIN} L 20log ($v16_{MIN}/v13_0$) Input signal (80 Hz, 100 mV_{rms}, sine wave) to TP6 and TP8. Set data of sub address 02 (h) to 72 (h). Measure amplitude of TP12 ($v12_0$ mV_{rms}). Set data of sub address 02 (h) to 0E (h). Measure amplitude of TP12 ($v12_{MIN}$ mV_{rms}). G_{VRMIN} W 20log ($v12_{MIN}/v12_0$)
18	TP6 TP8	TP12	40	40	72	00	72 / 40	40	C0	10	(a)	Input signal (80 Hz, 100 mV_{rms}, sine wave) to TP6 and TP8. Set data of sub address 04 (h) to 72 (h). Measure amplitude of TP12 ($v12_0$ mV_{rms}). Set data of sub address 04 (h) to 40 (h). Measure amplitude of TP12 ($v12_C$ mV_{rms}). G_{WLCNT} 20log ($v12_C/v12_0$)
19	TP6 TP8	TP12	40	40	72	40 / 50 / 60 / 70	72	40	C0	10	(a)	Input signal (80 Hz, 500 mV_{rms}, sine wave) to TP6 and TP8. Set data of sub address 03 (h) to 40 (h). Measure amplitude of TP12 ($v_{ALS}0$ mV_{rms}) Set data of sub address 03 (h) to 50 (h). Measure amplitude of TP12 ($v_{ALS}1$ mV_{rms}) Set data of sub address 03 (h) to 60 (h). Measure amplitude of TP12 ($v_{ALS}2$ mV_{rms}) Set data of sub address 03 (h) to 70 (h). Measure amplitude of TP12 ($v_{ALS}3$ mV_{rms})
20	TP6 TP8	TP13 TP16	40	40	72	00	00	40	C0	10	(a)	Connect TP8 to GND. Input signal (1 kHz, 500 mV_{rms}, sine wave) to TP6. Measure 1 kHz spectrum of TP16 ($v16_1$dB V). Measure 1 kHz spectrum of TP13 ($v13_1$dB V). CT_{L-R} 20log ($v13_1$ $v16_1$) Connect TP6 to GND. Input signal (1 kHz, 500 mV_{rms}, sine wave) to TP8. Measure 1 kHz spectrum of TP13 ($v13_2$dB V). Measure 1 kHz spectrum of TP16 ($v16_2$dB V). CT_{R-L} 20log ($v16_2$ $v13_2$)

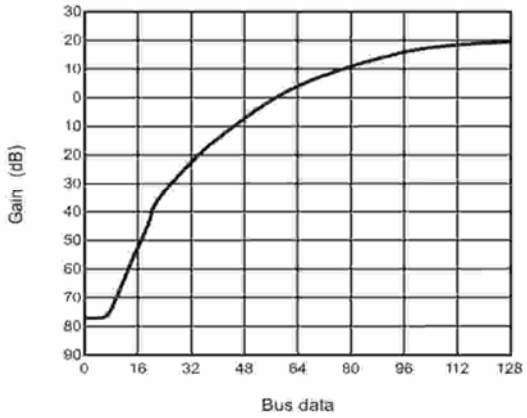
Note	Test Condition											
	Input Point	Meas. Point	Bus Data (hexadecimal)								SW1	
			00	01	02	03	04	05	06	07		
21	TP6 TP8	TP12 TP13 TP16	40	40	00	00	00	40	C0	10	(b)	Connect TP6 and TP8 to GND. Apply 9.0 V DC and sine wave (60Hz, 500 mV_{rms}) to V_{CC} terminal. Measure amplitude of TP12, TP13 and TP16 (v12 mV_{rms}, v13 mV_{rms}, v16 mV_{rms}). RR1 WdB 20log (v12/500) RR1 RdB 20log (v13/500) RR1 LdB 20log (v16/500)
22	TP6 TP8	TP12 TP13 TP16	40	40	72	00	72	40	C0	10	(b)	Connect TP6 and TP8 to GND. Apply 9.0 V DC and sine wave (60Hz, 500 mV_{rms}) to V_{CC} terminal. Measure amplitude of TP12, TP13 and TP16 (v12 mV_{rms}, v13 mV_{rms}, v16 mV_{rms}). RR2 WdB 20log (v12/500) RR2 RdB 20log (v13/500) RR2 LdB 20log (v16/500)
23	TP6 TP8	TP12 TP13 TP16	72	72	72	00	72	40	C0	10	(a)	Input signal (100 Hz, sine wave) to TP6 and TP8. Increase amplitude of the input signal, and measure THD of TP13 and TP16. Measure amplitude of TP13 and TP16 when THD of the outputs are 1% (v_{DOUT} R1 V_{p-p}, v_{DOUT} L1 V_{p-p}). Input signal (10 kHz, sine wave) to TP6 and TP8. Increase amplitude of the input signal, and measure THD of TP13 and TP16. Measure amplitude of TP13 and TP16 when THD of the outputs are 1% (v_{DOUT} R2 V_{p-p}, v_{DOUT} L2 V_{p-p}). Smaller value v_{DOUT} R1 or v_{DOUT} R2 is v_{DOUT} R. Smaller value v_{DOUT} L1 or v_{DOUT} L2 is v_{DOUT} L. Input signal (80 Hz, sine wave) to TP6 and TP8. Increase amplitude of the input signal, and measure THD of TP 12. Measure amplitude of TP12 when THD of the output is 1% (v_{DOUT} W V_{p-p}).
24	TP6 TP8	TP12 TP13 TP16	40	40	40	00	40	40	C0	10	(a)	Input signal (1 kHz, sine wave) to TP6 and TP8. Increase amplitude of the input signal, and measure THD of TP13 and TP16. Measure amplitude of TP6 and TP8 when THD of the outputs are 1% (v_{DIN} R V_{p-p}, v_{DIN} L V_{p-p}). Input signal (80 Hz, sine wave) to TP6 and TP8. Increase amplitude of the input signal, and measure THD of TP 12. Measure amplitude of TP6 and TP8 when THD of the outputs are 1% (v_{DIN} W V_{p-p})
25	TP6 TP8	TP12 TP13 TP16	40	40	72	00	72	40	C0	10 / 11 / 12	(a)	Connect TP6 and TP8 to GND. Set data of sub address 07(h) to 10 (h), 11 (h), 12 (h). Measure DC offset of TP12, TP13 and TP16 (V_M W mV, V_M R mV, V_M L mV).

Note	Test Condition											
	Input Point	Meas. Point	Bus Data (hexadecimal)								SW1	
			00	01	02	03	04	05	06	07		
26	TP6 TP8	TP13 TP16	40	40	72	00	72	40	07 / 47 / 87 / C7	10	(a)	Connect TP6 and TP8 to GND. Change data of sub address 06 (h) to 07 (h), 47 (h), 87 (h), and C7 (h). Measure DC offset of TP13 and TP16 (V_S R mV, V_S L mV).
27	TP6 TP8	TP13 TP16	40	40	72	00	72	40	C0	10 / 11 / 12	(a)	Input signal (1 kHz, 500 mV_{rms}, sine wave) to TP6 and TP8. Set data of sub address 07 (h) to 10 (h). Measure amplitude of TP13 and TP16 ($v13_0$ mV_{rms}, $v16_0$ mV_{rms}). Set data of sub address 07 (h) to 11 (h). Measure amplitude of TP13 and TP16 ($v13_{MUT}$ mV_{rms}, $v16_{MUT}$ mV_{rms}). G_{MUT} RdB 20log ($v13_{MUT}/v13_0$) G_{MUT} LdB 20log ($v16_{MUT}/v16_0$) Input signal (80 Hz, 100 mV_{rms}, sine wave) to TP6 and TP8. Set data of sub address 07 (h) to 10 (h). Measure amplitude of TP12 ($v12_0$ mV_{rms}) Set data of sub address 07 (h) to 12 (h). Measure amplitude of TP12 ($v12_{MUT}$ mV_{rms}). G_{MUT} WdB 20log ($v12_{MUT}/v12_0$)

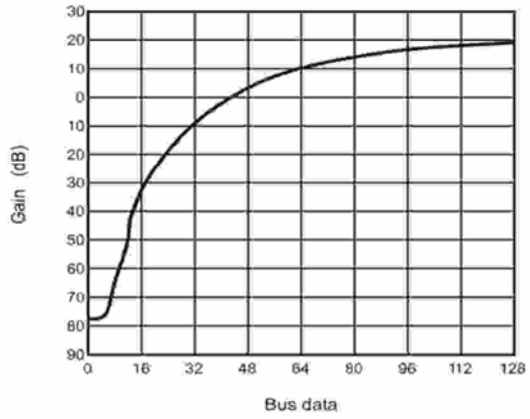
Volume control characteristic (L, Rch)



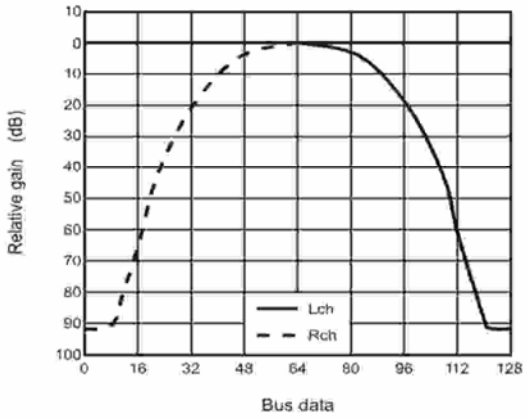
Volume control characteristic (Wch)



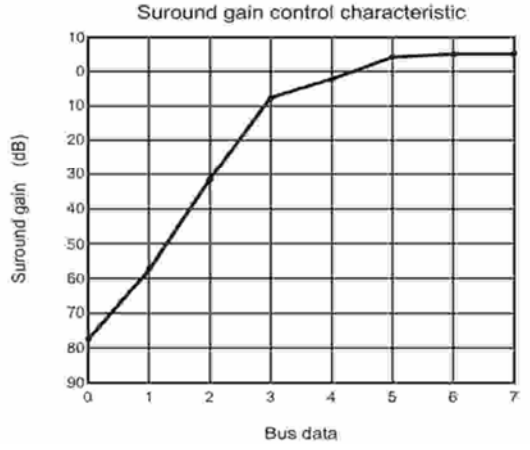
Wch level control characteristic



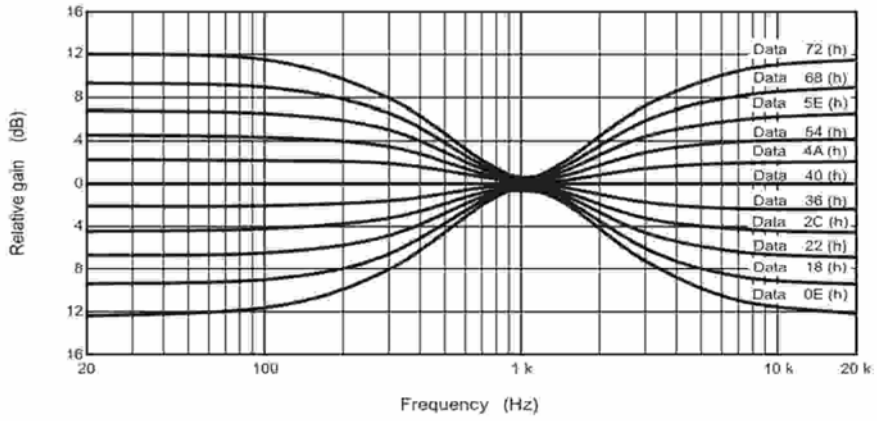
Balance control characteristic



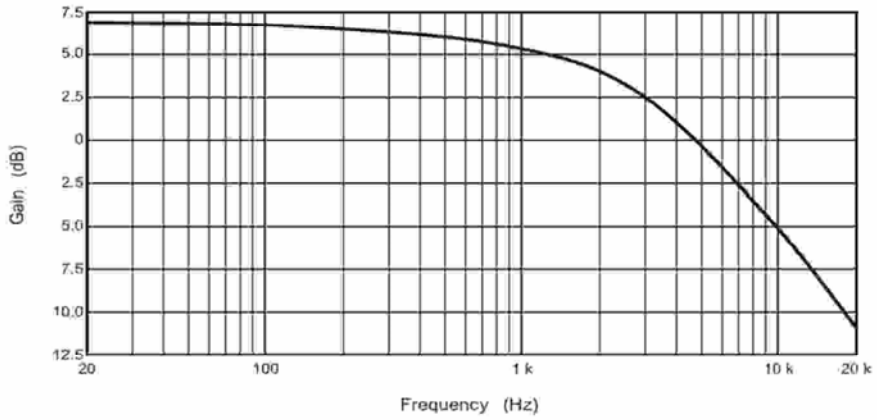
Suround gain control characteristic



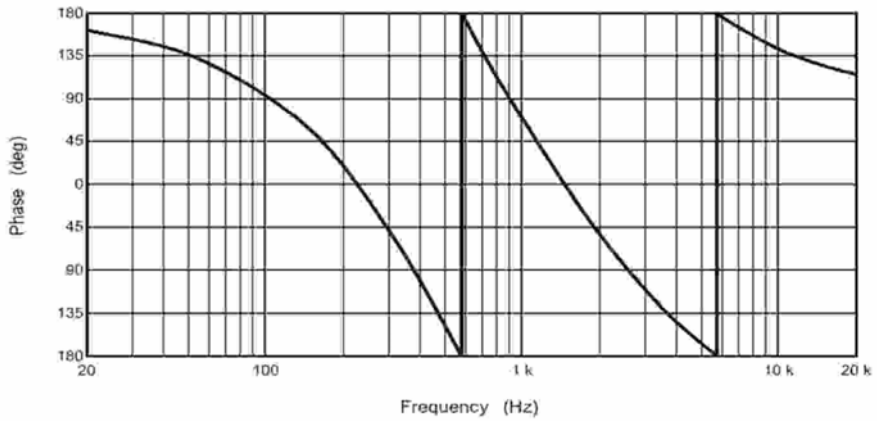
Tone control characteristics



Surround frequency characteristic (gain)

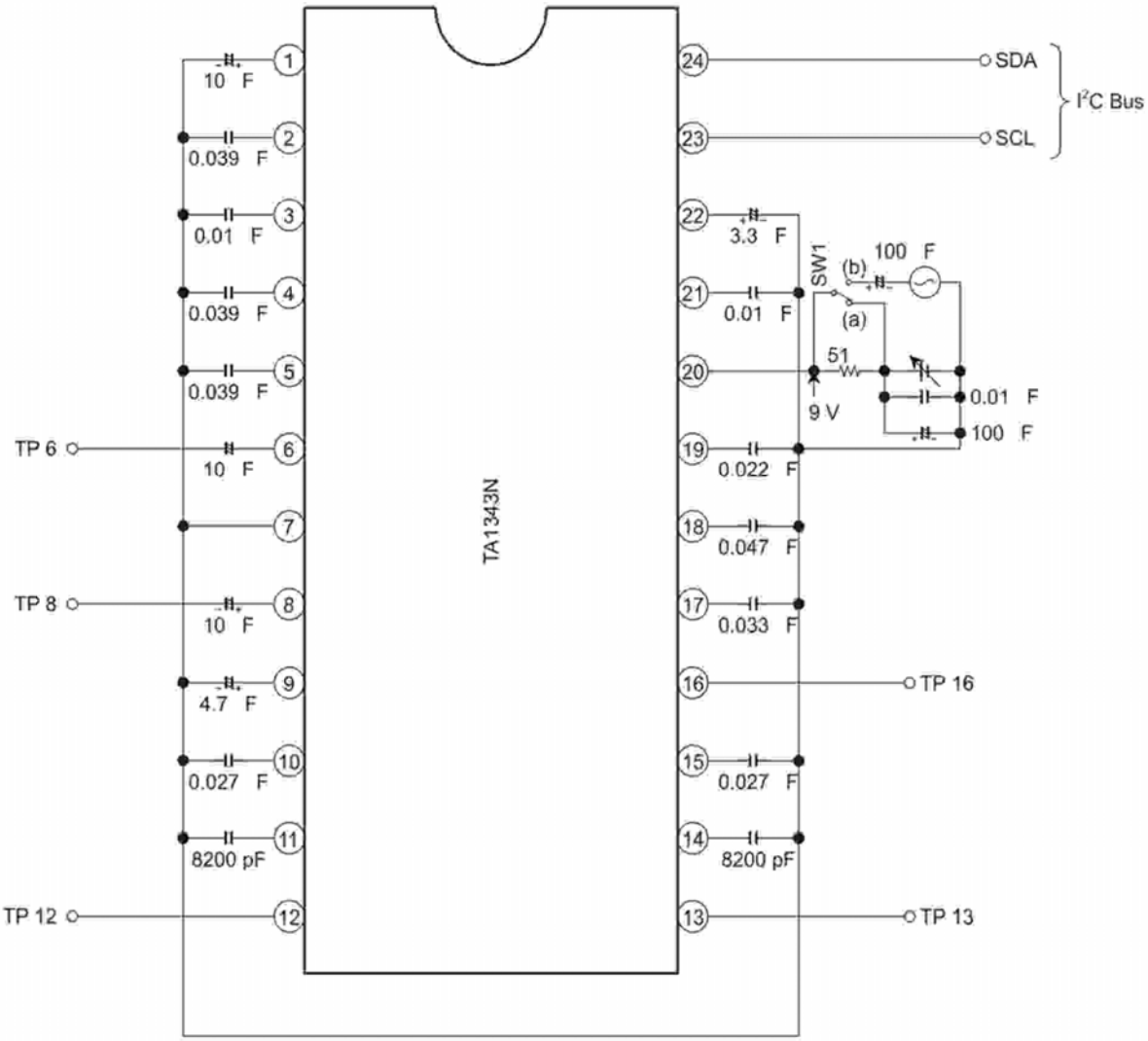


Surround frequency characteristic (phase)/Mode 4

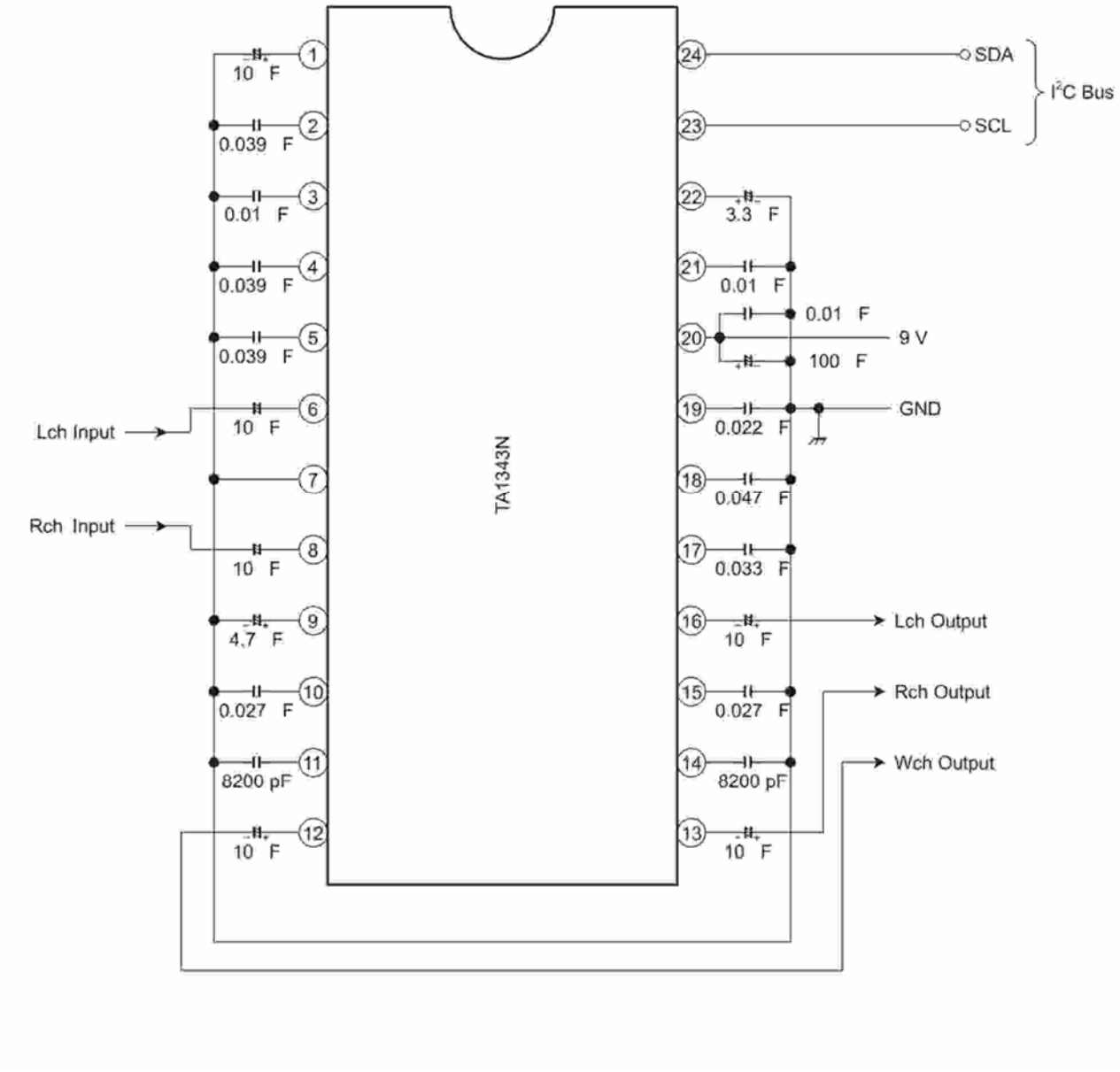


Test Circuit 2

AC Characteristics

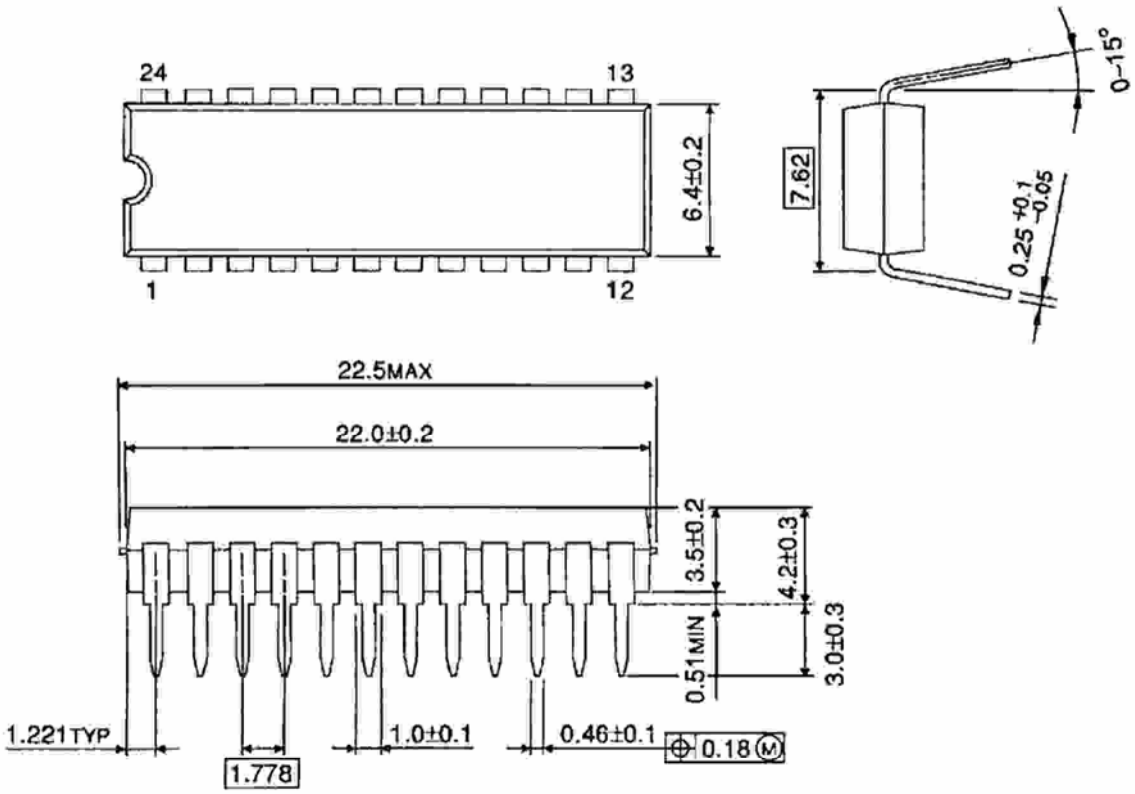


Application Circuit



Package Dimensions

SDIP24-P-300-1.78 Unit : mm



Weight: 1.22 g (typ.)

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000707EBA

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IC N402 <VERTICAL OUTPUT> LA78040 (or STV9302)

STV9302A

Vertical Deflection Booster for 2-App TV/Monitor Applications with 70-V Flyback Generator

Main Features

- **Power Amplifier**
- **Flyback Generator**
- **Output Current up to 2 App**
- **Thermal Protection**
- **Stand-by Control**

HEPTAWATT
(Plastic Package)
ORDER CODE: STV9302A

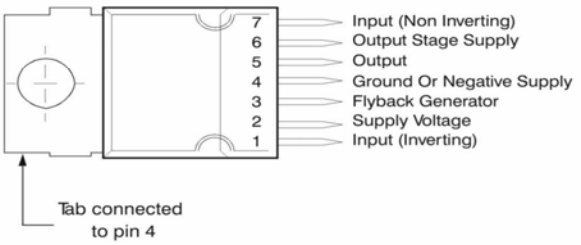
Description

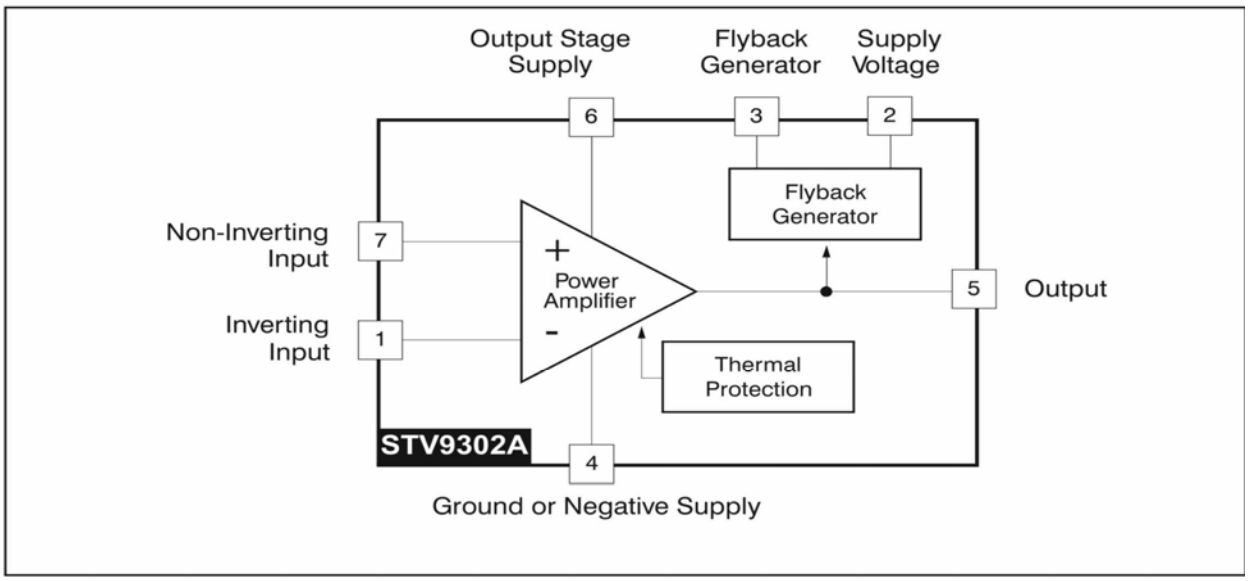
The STV9302A is a vertical deflection booster designed for TV and monitor applications.

This device, supplied with up to 35 V, provides up to 2 App output current to drive the vertical deflection yoke.

The internal flyback generator delivers flyback voltages up to 70 V.

in double-supply applications, a stand-by state will be reached by stopping the (+) supply alone.





ADJUSTMENT MODE

Geometry Adjustment

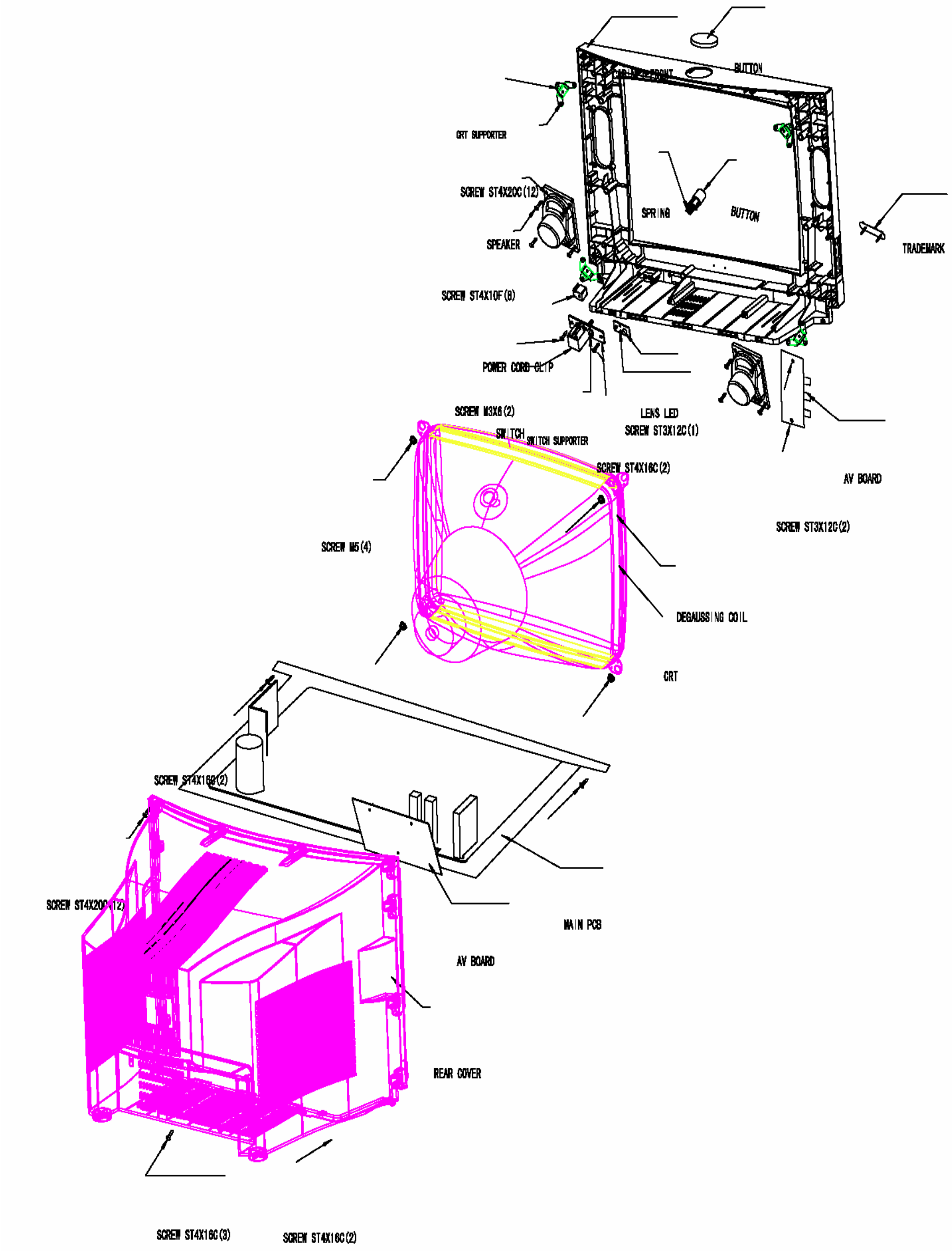
Item	Function	Data
HPOS	50Hz HORIZONTAL PHASE	09
VP50	50Hz VERTICAL PHASE	03
HIT	50Hz VERTICAL AMPLITUDE	35
HPS	60Hz HORIZONTAL PHASE	03
VP60	60Hz VERTICAL PHASE	00
HITS	60Hz VERTICAL AMPLITUDE	02
VLIN	50Hz VERTICAL-LINEARILTY	0B
VSC	50Hz VERTICAL-S CORRECTION	06
VLIS	60Hz VERTICAL-LINEARILTY	00
VSS	60Hz VERTICAL-S CORRECTION	04

White Balance Adjustment

Item	Function	DATA
RCUT	ALIGN RED OUT DC LEVEL	00 ~ FF
GCUT	ALIGN GREEN OUT DC LEVEL	00 ~ FF
BCUT	ALIGN BLUE OUT DC LEVEL	00 ~ FF
GDRV	ALIGN GREEN OUT AC LEVEL	00 ~ 7F
BDRV	ALIGN BLUE OUT AC LEVEL	00 ~ 7F
CNTX	SUB CONTRAST MAX	7F
BRTC	SUB BRIGHT CENTER	04
COLC	SUB COLOR for NTSC	40
TNTC	SUB TINT CENTER	40
COLP	SUB COLOR for PAL	12
COLS	SUB COLOR for SECAM	43
SCOL	SUB COLOR	07
SCNT	Y-SUB CONTRAST	0F
CNTC	SUB CONTRAST CENTER	50
CNTN	SUB CONTRAST MIN	10
BRTX	SUB BRIGHT MAX	35
BRTN	SUB BRIGHT MIN	25

COLX	SUB COLOR MAX	3F
BRTS	SUB BRIGHNESS	00
ST3	TV—3.58 SHARP	25
SV3	AV—3.58 SHARP	25
ST4	TV—4.43 SHARP	25
SV4	AV—4.43 SHARP	25

EXPLODED VIEW AND PART LIST



BOM LIST

Item No	Part Name	Qty	Position
CARBON RESISTOR			
1	1/6W 4.7	1	R444
2	1/6W 33	1	R113
3	1/6W 68	1	R215
4	1/6W 100	17	R203 R204 R217 R221 R222 R223 R225 R229 R286 R287 R292 R294 R307 R318 R330 R901 R902
5	1/6W 150	3	R111 R201 R404
6	1/6W 180	1	R310
7	1/6W 220	6	R106 R107 R282 R306 R326 R938
8	1/6W 270	5	R205 R236 R237 R238 R325
9	1/6W 330	3	R607 R617 R627
10	1/6W 560	2	R320 R945
11	1/6W 1K	10	R283 R289 R517 R701 R710 R712 R900 R904 R925 R930
12	1/6W 1.5K	6	R1001 R115 R726 R727 R944 R946
13	1/6W 2K	1	R1002
14	1/6W 2.2K	3	R209 R212 R214
15	1/6W 3.3K	6	R202 R230 R244 R301 R446 R523
16	1/6W 3.9K	5	R108 R608 R618 R628 R916
17	1/6W 4.7K	6	R1003 R252 R255 R918 R919 R941
18	1/6W 5.6K	4	R443 R511 R905 R920
19	1/6W 8.2K	2	R322 R947
20	1/6W 9.1K	1	R1004
21	1/6W 10K	21	R102 R243 R280 R284 R290 R298 R321 R423 R448 R640 R704 R907 R908 R912 R922 R935 R939 R942 R950 R989 RVD904
22	1/6W 12K	1	R943
23	1/6W 15K	13	R1005 R210 R213 R216 R278 R285 R291 R293 R295 R299 R328 R424 R447
24	1/6W 22K	7	R279 R297 R480 R515 R557 R909 R929
25	1/6W 30K	1	R1006
26	1/6W 33K	3	R232 R903 R913
27	1/6W 39K	1	R721
28	1/6W 47K	3	R450 R635 R928
29	1/6W 68K	1	R101
30	1/6W 100K	3	R245 R473 R734
31	1/6W 220K	1	R233
32	1/6W 330K	1	R211
33	1/4W 2.2	1	R641

34	1/4W 220	1	R519
35	1/4W 470	1	R960
36	1/4W 2.2K	1	R526
37	1/4W 5.1K	1	R552
38	1/4W 15K	1	R522
39	1/4W 47K	2	R556 R572
40	1/4W 150K	1	R555
41	1/2W 1.2	1	R445
42	1/2W 220	2	R327 R442
43	1/2W 1K	1	R407
44	1/2W 3.3K	5	R560 R566 R605 R615 R625
45	1/2W 12K	1	R462
46	1/2W 47K	1	R564
47	1/2W 100K	2	R520 R521
48	1/2W 470K	1	R420
FUSE RESISTOR			
49	1/2W 0.47	1	R573
50	1/2W 1.0	3	R418 R467 R558
OXIDE FILM RESISTOR			
51	1W/4.7K 开档12.5mm(升功)	1	R413
52	2W 1	1	R410
53	2W 68	2	R525 R580
54	2W 120	1	R567
55	2W 270	1	R437
56	2W 12K	4	R553 R606 R616 R626
57	2W 18K	1	R565
58	3W 56	1	R528A
SOLID RESISTOR			
59	1/2W 12M	1	R531
THERMISTOR			
60	PTC 18ohm (消磁热敏)	1	PS501
61	NTC 4.7ohm	1	R503
WIRE RESISTOR			
62	5W 3.9 (开档 5mm) 立式	1	R449
VARIABLE RESISTOR			
63	2KB	1	RP551
CERAMIC CAPACITOR			
64	50V 220p	3	C247 C909 C912
65	50V 390p	3	C602 C612 C622
66	50V 1000p	2	C203 C934
67	50V 20p	1	C902
68	50V 22p	1	C313
69	50V 33p	1	C901
70	50V 47p	2	C910 C911

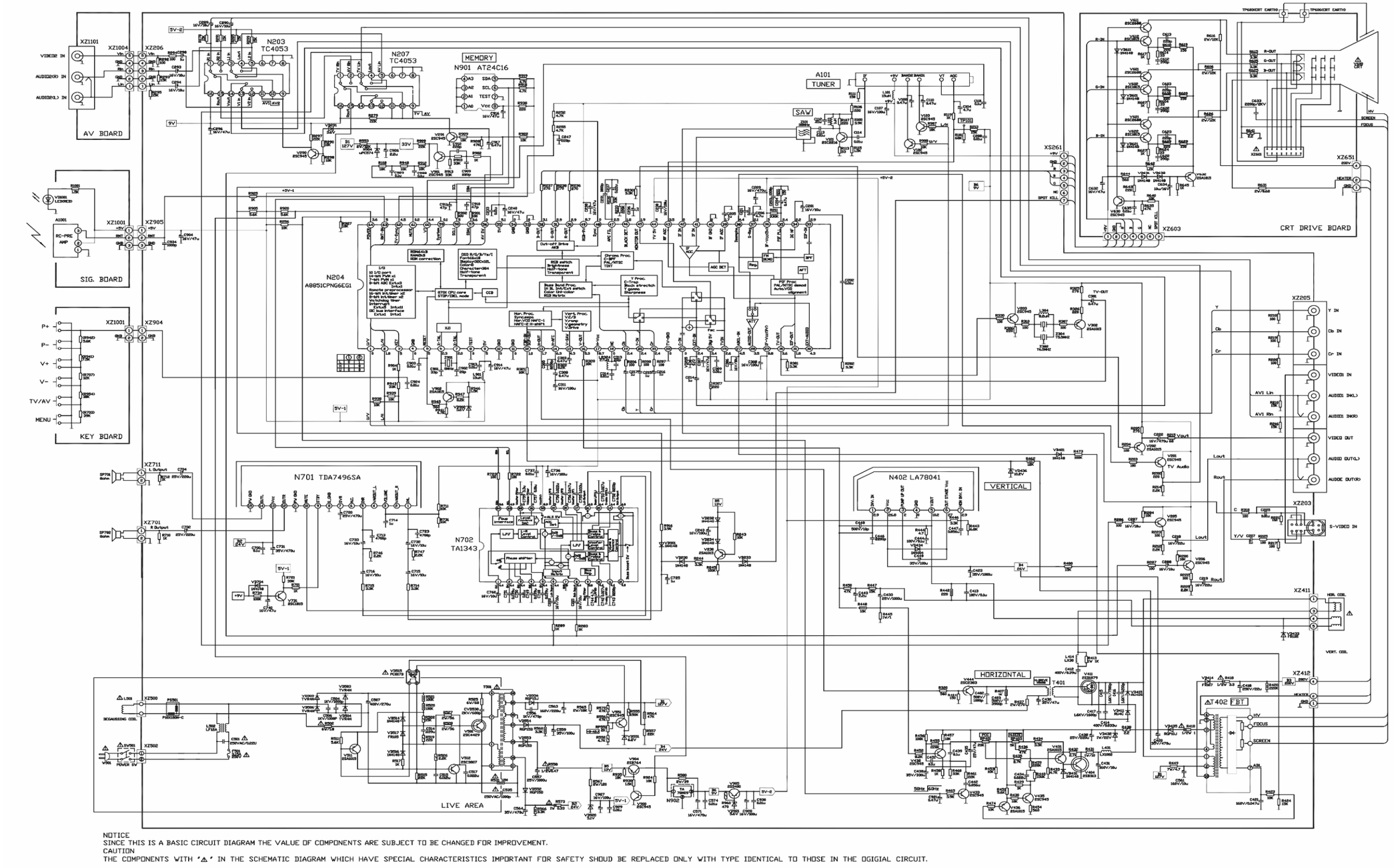
71	50V 0.01u	20	C112 C113 C114 C202 C208 C210 C211 C225 C232 C304 C309 C310 C314 C574 C635 C903 C913 C924 C929 C930
72	500V 1000p	1	C402
73	500V 3900p	1	C403
74	1KV 1000p	2	C504 C506
75	1KV 470p	1	C556
76	2KV 2200P	1	C630
77	2KV 220p(开档7.5mm)	1	C416
78	2KV 680p	1	C530
79	AC 250V 1000p	1	C535
ELECTROLYTIC CAP			
80	16V 10u	12	C201 C220 C221 C287 C288 C289 C290 C293 C294 C306 C746 C747
81	16V 22u	2	C218 C219
82	16V 47u	9	C238 C240 C296 C307 C632 C740 C904 C914 C916
83	16V 100u	7	C107 C230 C243 C302 C311 C927 C928
84	16V 220U	1	C222
85	16V 470U	2	C209 C571
86	25V 220u	2	C702 C704
87	25V 470U	4	C557 C564 C720 C731
88	25V 1000U	1	C433
89	35V 47u	1	C430
90	35V 100U	3	C423 C449 C559
91	35V 470u	1	C420
92	50V 0.22uF	1	C237
93	50V 0.47u	7	C108 C110 C204 C301 C303 C308 C917
94	50V 1u	7	C205 C207 C214 C236 C298 C714 C725
95	50V 2.2u	2	C443 C926
96	50V 4.7u	3	C104 C206 C919
97	160V 1u	1	C411
98	160V 10u	1	C561
99	160V 220u	1	C563
100	CD288H 250V/22uF	1	C418
101	400V 100u	1	C507
FILM CAPACITOR			

102	50V 1000P	1	C231
103	50V 2200p	1	C446
104	50V 4700p	2	C713 C723
105	50V 8200p	1	C305
106	CL21X 50V 0.012u	1	C515
107	50V 0.022u	1	C517
108	50V 0.039U	1	C514
109	50V 0.056U	1	C447
110	50V 0.1U	4	C101 C700 C922 C923
111	100V 0.1u	2	C413 C444
112	160V 0.047uF	1	C421
113	200V 0.33u	1	C412
114	250VAC 0.1u	2	C501 C502
115	1.6KV 10000p	1	C415
COIL AND INDUCTANCE			
116	21" 行线性(配LG-Philips管)	1	L414
117	1uH-K	1	L103
118	8.2uH-K	1	L304
119	15uH-K	6	L102 L104 L201 L302 L305 L901
120	27uH-K	1	LR324
121	33uH-K	1	LVD430
PHOTO-TRANSISTOR			
122	PC817B/C(光电藕合器)	1	VD515
DIOD			
123	发光二极管(红 5mm)	1	VD1001
	整流二极管		
124	1S1555/IN4148A	13	VD230 VD232 VD233 VD234 VD401 VD514 VD516 VD518 VD601 VD611 VD621 VD704 VD901
125	FR105	2	VD517 VD553
126	1N5398	4	VD503 VD504 VD505 VD506
127	GP10D/1N4004	2	VD433 VD434
128	FR107	2	VD403 VD414
129	RGP10J	1	VD556
130	RGP10D	3	VD435 VD552 VD554
ZENER DIODE			
131	RD6.2EB3/HZ7A1	1	VD551
132	RD5.1EB2/HZ5C1/BZX79B5V1	1	VD920
133	RD10EB2/HZ11C1/BZX79-C11	1	VD436
134	RD3.6L/HZ4A2/BZX79-C3V6	2	VD291 VD902
135	RD8.2EB3/HZ9A2/BZX79C8V2	1	VD519
136	RD9.1EB2/HZ9B2/BZX79C9V1	1	VD205
137	RD5.6EB2/HZ6B1/BZX79B5V6	1	VD921

INTEGRATED CIRCUIT			
138	uPC574J	1	N904
139	TA78M09 9V稳压	1	N902
140	LC4053B	2	N203 N207
141	BR ST24C16-W	1	N901
142	TDA9302A (25"帧)	1	N401
143	TDA7496SA	1	N701
144	A8851CPNG-6EG1	1	N204
TRANSISTOR			
145	2SA1015Y/2SA608/2SA733Q	5	V202 V230 V302 V511 V902
146	2SB764	1	V904
147	2SC2216(GB)	1	V101
148	2SC2383O	1	V444
149	2SC2482	3	V601 V611 V621
150	2SC3807/2SC5070	1	V512
151	2SC4458X	1	V501
152	2SC945/2SC1815/2SC536E	13	V102 V103 V201 V203 V205 V206 V290 V291 V551 V630 V731 V900 V901
153	TT2140行管/ST1803	1	V411
154	2SD400D	1	V905
OTHER COMPONENT			
155	T 6.5M(陷波器)	1	Z304
156	T 5.5M(陷波器)	1	Z302
157	IF38B1M(单排金属壳)	1	Z101
158	FUSE 2.5A 250V(保险丝)	1	F501
159	KDC-A11 (电源开关)	1	SW501
160	PUSH SW.卧式 (5.0mm)	6	SW901 SW902 SW903 SW904 SW905 SW906
161	一体化收信头	1	A1001
162	SP 8OHM YDT613-14 (5W)	2	SP701 SP702
163	470M D/K国际9V(内置频段)	1	A101
164	R/C 黑色(CROWN)	1	*
165	8.0M(配18.5p) 高精度晶振	1	Z901
CABLE AND SOCKET			
166	接地网线(一钩 21")	1	ZZ015a
167	带头无夹二芯圆插电源线	1	W501
168	SP 2 LINE(580MM)	2	SP-L SP-R
169	DY LINE(21" 420) UL	1	DY
170	视放连线(四芯D8)	1	XZ603
171	键板连线(400mm) 弯脚	1	*
172	TD22 AV连线(长)	1	XZ1004
173	6P LINE AV-视放线400mm	1	XZ602

174	CRT SOCKET(29"东芝)插拔	1	XZ601
175	S-VHS端子(D8)	1	XZ203
176	A/V SOCKET TX2-6ZA1	1	XZ201
177	单孔AV插座(红色)带开关	1	R
178	单孔AV插座(白色)	1	L
179	单孔AV插座(黄色)	1	V
180	AC SOCKET(2S 大型)	1	XZ501
181	SPEAKER SOCKET(小型二芯)	3	XZ701 XZ711 XZ904
182	2S SOCKET(中型) KEa	1	XZ504
183	3S SOCKET(小型)	2	XZ900 XZ901
184	DY SOCKET(中型) DYa	1	XZ411
185	5S SOCKET(小型)	1	XZ207
TRANSFORMER			
186	LINE FILTER(电源滤波器)	1	L502
187	21"FBT高聚27KV视放帧24V	1	T402
188	21"变压器B+105V(同28)	1	T501
189	H-DRIVER(行推动)	1	T401

CIRCUIT DIAGRAM



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