TCL
SERVICE MANUAL

NX56LA

This manual is the latest at the time of printing, and does not include the modification which may be made after the printing, by the constant improvement of product

1、CAUTION:

Use of controls, adjustments or procedures other than those specified herein may result in hazardous radiation exposure.

CAUTION: TO REDUCE THE RISK OF ELECTRICAL SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

The lighting flash with arrowhead symbol, with an equilateral triangle is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to the person.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

WARNING: TO REDUCE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

IMPORTANT SAFETY INSTRUCTIONS

CAUTION:

Read all of these instructions. Save these instructions for later use. Follow all Warnings and Instructions marked on the audio equipment.

1. Read Instructions- All the safety and operating instructions should be read before the product is operated.
2. Retain Instructions- The safety and operating instructions should be retained for future reference.
3. Heed Warnings- All warnings on the product and in the operating instructions should be adhered to.
4. Follow Instructions- All operating and use instructions should be followed.

FOR YOUR PERSONAL SAFETY

1. When the power cord or plug is damaged or frayed, unplug this television set from the wall outlet and refer servicing to qualified service personnel.
2. Do not overload wall outlets and extension cords as this can result in fire or electric shock.
3. Do not allow anything to rest on or roll over the power cord, and do not place the TV where power cord is subject to traffic or abuse. This may result in a shock or fire hazard.
4. Do not attempt to service this television set yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.
5. Never push objects of any kind into this television set through cabinet slots as they may touch dangerous voltage points or short out parts that could result in a fire or electric shock. Never spill liquid of any kind on the television set.
6. If the television set has been dropped or the cabinet has been damaged, unplug this television set from the wall outlet and refer servicing to qualified service personnel.
7. If liquid has been spilled into the television set, unplug this television set from the wall outlet and refer servicing to qualified service personnel.
8. Do not subject your television set to impact of any kind. Be particularly careful not to damage the picture tube surface.
9. Unplug this television set from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.

10.1. Do not place this television set on an unstable cart, stand, or table. The television set may fall, causing serious injury to a child or an adult, and serious damage to the appliance. Use only with a cart or stand recommended by the manufacturer, or sold with the television set. Wall or shelf mounting should follow the manufacturer's instructions, and should use a mounting kit approved by the manufacturer.

10.2. An appliance and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the appliance and cart combination to overturn.

PROTECTION AND LOCATION OF YOUR SET

11. • Do not use this television set near water ... for example, near a bathtub, washbowl, kitchen sink, or laundry tub, in a wet basement, or near a swimming pool, etc.
    • Never expose the set to rain or water. If the set has been exposed to rain or water, unplug the set from the wall outlet and refer servicing to qualified service personnel.

12. Choose a place where light (artificial or sunlight) does not shine directly on the screen.

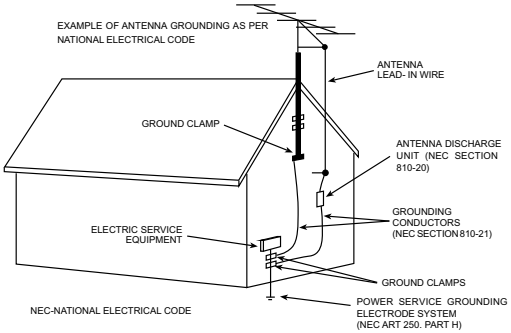
13. Avoid dusty places, since piling up of dust inside TV chassis may cause failure of the set when high humidity persists.

14. The set has slots, or openings in the cabinet for ventilation purposes, to provide reliable operation of the receiver, to protect it from overheating. These openings must not be blocked or covered.
    • Never cover the slots or openings with cloth or other material.
    • Never block the bottom ventilation slots of the set by placing it on a bed, sofa, rug, etc.
    • Never place the set near or over a radiator or heat register.
    • Never place the set in a "built-in" enclosure, unless proper ventilation is provided.

PROTECTION AND LOCATION OF YOUR SET

15.1. If an outside antenna is connected to the television set, be sure the antenna system is grounded so as to provide some protection against voltage surges and built up static charges, Section 810 of the National Electrical Code, NFPA No. 70-1975, provides information with respect to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna discharge unit, connection to grounding electrode, and requirements for the grounding electrode.

EXAMPLE OF ANTENNA GROUNDING AS PER NATIONAL ELECTRICAL CODE INSTRUCTIONS



15.2. Note to CATV system installer : (Only for the television set with CATV reception)

This reminder is provided to call the CATV system installer's attention to Article 820-40 of the NEC that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as practical.

16. An outside antenna system should not be located in the vicinity of overhead power lines or other electric lights or power circuits, or where it can fall into such power lines or circuits. When installing an outside antenna system, extreme care should be taken to keep from touching such power lines or circuits as contact with them might be fatal.

17. For added protection for this television set during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the wall outlet and disconnect the antenna. This will prevent damage due to lightning and power-line surges.

OPERATION OF YOUR SET

18. This television set should be operated only from the type of power source indicated on the marking label.If you are not sure of the type of power supply at your home, consult your television dealer or local power company. For television sets designed to operate from battery power, refer to the operating instructions.
19. If the television set does not operate normally by following the operating instructions, unplug this television set from the wall outlet and refer servicing to qualified service personnel. Adjust only those controls that are covered in the operating instructions as improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the television set to normal operation.
20. When going on a holiday : If your television set is to remain unused for a period of time, for instance, when you go on a holiday, turn the television set "off " and unplug the television set from the wall outlet.

IF THE SET DOES NOT OPERATE PROPERLY

21. If you are unable to restore normal operation by following the detailed procedure in your operating instructions, do not attempt any further adjustment. Unplug the set and call your dealer or service technician.
22. Whenever the television set is damaged or fails, or a distinct change in performance indicates a need for service, unplug the set and have it checked by a professional service technician.
23. It is normal for some TV sets to make occasional snapping or popping sounds, particularly when being turned on or off. If the snapping or popping is continuous or frequent, unplug the set and consult your dealer or service technician.

FOR SERVICE AND MODIFICATION

24. Do not use attachments not recommended by the television set manufacturer as they may cause hazards.
25. When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer that have the same characteristics as the original part. Unauthorized substitutions may result in fire, electric shock, or other hazards.
26. Upon completion of any service or repairs to the television set, ask the service technician to perform routine safety checks to determine that the television is in safe operating condition.

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Product Functional Specification

Disclosure

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- Version Information: Version states by two Arabic Numbers, which is separated by one dot, e.g. 1.2. The first number "1" means the version of approved file, the second one "2" means the version of draft.

Revision History

Model No.	Status		Date	Comment
29185	Prepared by	lipeng	2008.5.19	V1.0 03-B185SAE-SC31
	Checked by			
	Released by:			
21M63US	Prepared by	lipeng	2008.5.19	V1.0 03-DM63SAE-SC31S
	Checked by			
	Released by:			
	Revised by			
	Checked by			
	Released by:			
	Revised by			
	Checked by			
	Released by:			

Model / Item	NX56-LA 29185	NX56-LA 21M63US
Master Data		
-Version	1	1
-Customer ID	EM	EM
-Destination	EM	EM
-Brand		
-BOM NO.	03-B185SAE-SC31	03-DM63SAE-SC31S
-Chassis		
Reception		
-Tuning [Channels Amt.]	181	181
-Tuning [Technology]	PLL	PLL
-Tuning [Indication]	Channel	Channel
-Frequency Bands	Antenna AND Cable	Antenna AND Cable
-IF Frequency	45.7MHz	45.7MHz
-TV Systems (Color+ Sound)	PAL M/N NTSC M	PAL M/N NTSC M
-AV Systems	NTSC PAL	NTSC PAL
Picture-Processing		
-SCAN	Standard	Standard
-Wide Screen Switching		
-Comb filter		
-Picture Enhancement		
LTI / CTI		
Black Stretch		
Dynamic Skin		
Others		
-Picture Control [General]		
Brightness	X	X
Sharpness	X	X
Contrast	X	X
Tint	X	X
Color	X	X
-Picture Control [Special]		
Smart Pictures * modes	4 modes	4 modes
VM		
Color Temperature	3 modes	3 modes
Others		
-Picture Noise Reduction	X	X
Picture – Display		
-CRT Type		
Normal Flat		
Pure Flat	X	X
Super Flat		
-Deflection system		
1Fh	X	X
2Fh		
-Tube Technology		
Iron		
AK	X	X
Black Matrix		
Others		
-CRT Deflection (* Deg.)	110	120
-CRT Magnetic Field		
-Screen Type	4:3	4:3
-Screen Size / Vis. Size	29'	21' Super Slim
Sound		
-Audio Power Consumption	5W+5W	4W+4W
-Surround Sound		

Model / Item	NX56-LA 29185	NX56-LA 21M63US
-Nicam		
-America Stereo (MTS,BTSC,MPS)	X	X
-America SAP		
-Korea Stereo		
-Thai Bilingual		
-Super Woofer		
-AVL		
-Sound Control [General]		
Volume	X	X
Mute	X	X
-Sound Control [Special]		
Treble		
Bass		
Balance	X	X
Equalizer		
Smart Sound * modes		
Others		
-Speakers Quantity	2X1	2X1
User Interface		
-Menu Language	English/Portugal/Espanol	English/Portugal/Espanol
-Features [General]		
AT		
Biological Clock		
Calendar		
Clock		
Channel Swap	X	X
Channel Naming		
Child Lock	X	X
Favorite Channel	X	X
Game		
Hotel Mode	X	X
High Sensitive		
Notebook		
On/Off Timer		
Preset	X	X
Recall	X	X
Rotation		
Sleep	X	X
AVC		
-Features [Special]		
V-chip / CCD	X	X
Teletext *Pages		
Others		
New Features		
Smart signal		
Voltage display		
环境光检测		
Easy search		
Tuning Features		
-Auto Channel Program	X	X
-Auto/Manual Tuning	X	X
-Auto/Manual Store	X	X
-Fine Tuning	X	X
-Factory Mode	X	X
-Service Mode		
Cabinet		
-Cabinet Name		

Model / Item	NX56-LA 29185	NX56-LA 21M63US
-Front Cabinet Color		
-Middle Cabinet Color		
-Rear Cabinet Color		
-Local Controls Front		
Mains Switch	X	X
CH+ CH- VOL+ VOL-	X	X
TV/AV	X	X
Menu	X	X
Auto Search		
-Local Controls Top		
CH+ CH- VOL+ VOL-		
TV/AV		
Menu		
Auto Search		
-Indicator		
RC Received LED	X	X
Standby LED	X	X
Remote Controller		
-Type	RC166	RC166
-Batteries		
Connectors Rear		
-SCART Full w/o Y/C		
-SCART Full with Y/C		
-SCART Single (CVBS)		
-Component In (YPbPr) Cinch for 50Hz		
-In Y/C+Cinch(CVBS+ Stereo)	1 + 1	1 + 2
-In Y/C+Cinch (CVBS+ Mono)		
-In Cinch(CVBS+ Stereo)		
-In Cinch (CVBS+ Mono)		
-Out Cinch(CVBS+ Stereo)		
-Out Cinch(CVBS+ Mono)	1(follow TV)	1(follow TV)
- Y,Cb,Cr input	X	X
-Super Woofer		
-Digital Audio Out		
-Loudspeakers		
-Control Busses		
-Feature Slot		
-ITV Smart Port		
- Antenna in		
75 Ohms (F Type)	X	X
Connectors Front/Side		
-In Y/C+Cinch(CVBS+ Stereo)		
-In Y/C+Cinch (CVBS+ Mono)		
-In Cinch(CVBS+ Stereo)	X	
-In Cinch (CVBS+ Mono)		
-Out Headphone		
Mini-Jack 3.5mm		
Final Equipment		
-Packing –Methods		
2 Color Printing		
Carton Color		
-Documents and Manuals		
Instruction Book		
Screen Sticker		
Plastic Bag		
Warranty Card		

Item \ Model	NX56-LA 29185	NX56-LA 21M63US
Guarantee Doc.		
Warning Label		
Approbation Label		
Others		
-Languages DFU		
-Indication on BACKOVER		
Made-in in family sheet		
FCC/Elect Shock Caution Label		
CE/Elect Shock Caution Label		
Warning Label		
Others		
Approbation	IEC65	IEC65
Miscellaneous		
-Mains Voltage	100-240V	100-240V
-Mains Frequency	50/60Hz	50/60Hz
-Type Mains Cord		
-Power Consumption TV in ON	75W	75W
-Power Consumption TV in Standby	<3W	<3W

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NX56-LA Chassis Alignment Procedure

Chassis Name	NX56-LA	**Serial No.**	
Issued on	2008-05-19	**Page**	Page 1 of 12
Updated on		**Version**	1.0

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29185	Prepared by	LIPENG	2008-05-15	03-B185SAE-SC31 （29185/NX56-LA）
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	Released by			
21M63US	Prepared by	LIPENG	2008-05-15	03-DM62SAE-SC31S （21M63US/NX56-LA）
	Checked by			
	Released by			
	Revised by			
	Checked by			
	Released by			
	Revised by			
	Checked by			
	Released by			
	Revised by			
	Checked by			
	Released by			
	Revised by			
	Checked by			
	Released by			

1.1. The way to enter P-Mode

a) Method one

A) Switch on the TV set.

B) Press the "MENU" key on RC to show the "PICTURE" OSD menu.

C) Move the cursor to "Contrast" item then press the "9", "7", "3", "5" key continuously on RC within 3 seconds then enter P-Mode. The "P" letter will appear on the left low corner of the screen when enter P-Mode. Also the "FACTORY HOTKEY" will be set to "ON (= 1)".

b) Another method

Press the "RECALL" key on RC to enter P-mode directly.

*Notes:

1. This will be active only when the "FACTORY HOTKEY" had set to "ON (= 1)".

2. When the power on with "FACTORY HOTKEY" had set to "ON (= 1)", the set will enter the P-Mode automatically.

1.2. Exit the P-Mode

Press the "RECALL" or "MENU" key on RC to exit the P-Mode.

1.3. Keys' function on RC at the P-Mode

Use the RC to navigate in P-Mode:

Press **"0" to "9"** key to select factory adjustment page.

Press **"▲▼"** key to select option.

Press **"►◄"** key to adjust or select option.

Press **"DISPLAY"** key to display software version.

Press **"MENU"** key to exit the P-Mode.

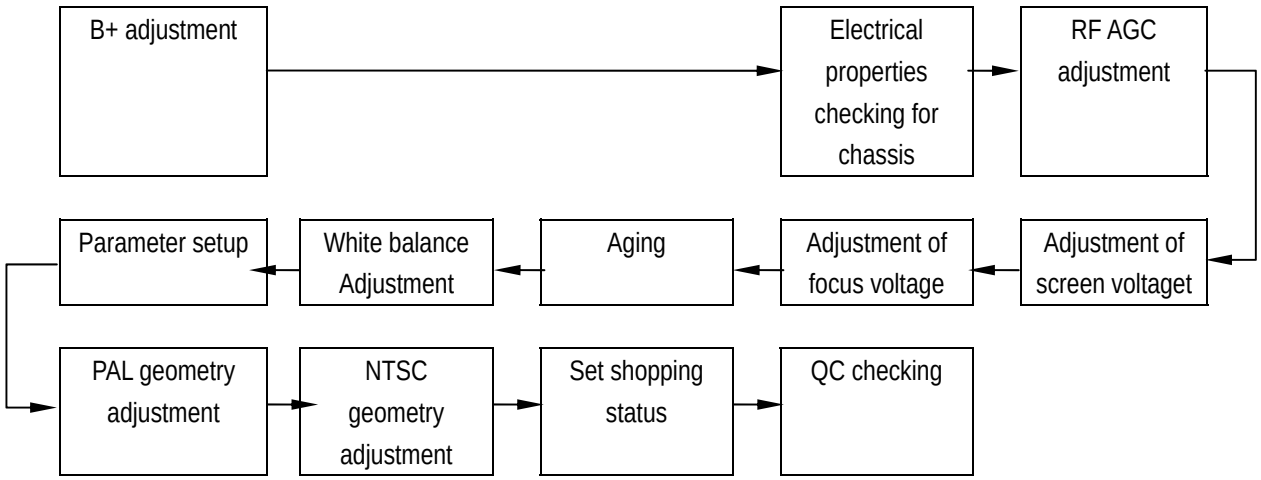
Press **"RECALL"** key to enter or exit the P-Mode.

All change in P-Mode will be saved in EEPROM automatically

1.4. The adjustment page list on P-Mode:

RC key	Item	Description
0	Screen voltage adjustment	
1	Picture Geometric adjustment 1	Vertical geometry
2	Picture Geometric adjustment 2	Horizontal geometry
3	White Balance Adjustment	
4	Setup 1	
5	Setup 2	
6	Setup 3	
7	Setup 4	
8	Setup 5	
9	I2C Bus OFF	Press this key to enter or exit BUS OFF mode
DISPLAY	Display software version	

2. Flowchart of alignment procedure



1) B+ Adjustment

2) RF AGC Adjustment

3) Screen & Focus adjustment

4) White balance adjustment

5) Producing parameter setup and option

6) Picture Geometry adjustment (Vertical first)

7) Set Shopping status

8) QC

3. Adjustment description

*Notes: Alignment should be done after 3 minutes warm up of TV.

3.1 B+ Voltages

1. All relevant connectors and modules must be connected and inserted.
2. Main voltage is at 220VAC, 50Hz.（voltage range:110VAC~240VAC,50Hz）
3. Connect a voltmeter to B+ (Cathode of D808) and switch on the set.
4. Input Philips test pattern signal and standard mode.
5. Adjust VR801, it should as the value in below form B+ Voltage.

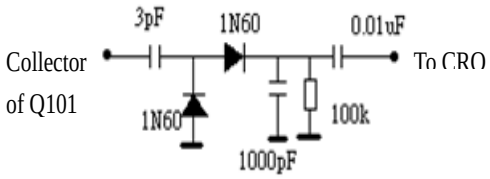
Table 3.1.1: The B+ value for vary tubes

CRT type (Part Number)	B+ Voltage
A68ERF185X013/MS (44-29RFLT-HFCA)	125V+/-0.5V
A51QGT420X34(44-21RFLS-LGDA)	108V+/-0.5V

3.2 RF AGC alignment

3.2.1 Method 1

A. Connect the detector as shown below (Picture 3.2) to collector of Q101.
B. Receive a grey scale signal with 70dBμV amplitude.
C. Enter P-Mode, press "6" key on RC to select "AGCT".
D. Adjust AGCT item until the output of the detector becomes 0.8Vpp



Picture 3.2

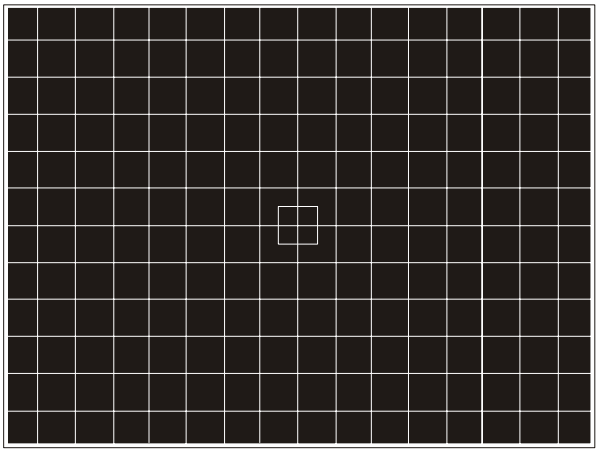
3.2.2 Method 2

A. Receive a grey scale signal with 60dBμV amplitude.
B. Enter P-Mode, press "6" key on RC to select "AGCT".
C. Adjust the "AGCT" value until the hint display "AGC" just change between "0" and "1".

3.3 Screen & Focus adjustment

*Notes: Alignment below should be done after 15 minutes warm up of TV.

1. Input cross hatch pattern signal to RF input.
2. Enter P-Mode.
2. Press "0" key on the RC and the screen will become a horizontal line.
3. Adjust the "SCREEN" VR of the FBT until the horizontal line can just be seen barely (minimum visible intensity).
4. Press "0" key again on the RC to exit the screen voltage adjustment mode.
5. Adjust the "FCOUS" VR of the FBT until the vertical line and horizontal line becomes clear, like picture 3.3.



Picture 3.3

3.4 White Balance Adjustment

1. Input a black and white pattern to RF input.
2. Enter P-Mode, press key "3 " to select white balance adjustment menu.
3. Use the color analyzer to measure the black side of the screen. Adjust the value of "RC","GC" and "BC" to set the reading of the color analyzer to x=274, y=280. (11500 K).
4. Then measure the white side of the screen. Adjust the value of "RD", "GD" and "BD" to set the reading of the color analyzer to x=274, y=280. (11500 K).
5. Repeat step 3&4 until you can get the correct reading for both black and white sides.

*Notes:

A. The "SUBB" and "SubCON" items are used to assistant the white balance adjustment. It is the same function as the user OSD menu "Brightness" and "Contrast" items. You can adjust these items to get the expect intensity when adjusting the white balance.

B. YUV white balance black level offset setup:

It is not need to adjust the white balance for YUV mode when production, but the BLOR-Y, BLOG-Y and BLOB-Y items which locate in EEPROM address 0x0A, 0x0B and 0x0C need to write in the right values to set the YUV mode black level offset before production. These offset values should be written by the PE engineer when making the EEPROM copy for the new lot with difference tube.

Table 3.4.1: The White Balance adjustment OSD menu

OSD menu	Default Value	Description	Remark
RC	32	R cut-off setting(BLOR)	Adjust to right value
GC	32	G cut-off setting(BLOG)	Adjust to right value
BC	32	B cut-off setting(BLOB)	Adjust to right value
RD	37	R drive setting(WPR)	Adjust to right value
GD	32	G drive setting(WPG)	Adjust to right value
BD	37	B drive setting(WPB)	Adjust to right value
BLOC	3	Black level offset course(BLOC)	Recommended value= "8"
PWL	8	Peak White Limiting	Don't adjust, use default
BriVSD	32	Brightness of horizontal line when adjust G2	Don't adjust, use default
SUBB	32	Brightness	Same as user "Brightness" and "Contrast" adjust
SubCON	32	Contrast	
BRTC	31	Sub-Brightness	Adjust to right value
BLOR-Y	64	YUV R -OFFSET	64= offset value 0 63= offset value -1 65= offset value ＋1 Adjust to right value
BLOG-Y	62	YUV G-OFFSET	
BLOB-Y	64	YUV B -OFFSET	

3.5 Picture Geometry adjustment

3.5.1 Vertical geometry adjustment

1. Input a PAL crosshatch pattern signal to RF input.
2. Enter P-Mode, press key "1" to select vertical geometry adjustment. (The OSD menu for this adjustment as below table 3.5.1. For NTSC signal, the "-50" will replace with "-60".)
3. Adjust the value of the corresponding item to make the vertical geometry of the pattern look good.
4. Apply NTSC signal to adjust these value for NTSC vertical geometry.

Table 3.5.1: The vertical geometry adjustment OSD menu

OSD menu	Default Value	Description	Remark
VSLOPE-50	32	Vertical slope(VS)	Adjust to right value
VCEN-50	32	Vertical shift (VSH)	Adjust to right value
VSIZE-50	32	Vertical amplitude(VA)	Adjust to right value
VZOOM-50	25	Vertical zoom(VX)	Adjust to right value
VSC-50	32	S-correction(SC)	Adjust to right value
VSCROLL-50	32	Vertical Scroll（VCS）	Adjust to right value

*Notes:

1. For NTSC signal, the "-50" will replace with "-60".
2. For NTSC signal, only the **"VCEN-60"** and **"VSIZE-60"** items need the adjustment, the other items use the same data as PAL signal.
3. On producing, please use the **"AUTO OFFSET"** (On page "2") function to easy the geometry adjustment of NTSC signal. When finished the PAL signal geometry adjustment, press "2" key to enter page "2" to select "AUTO OFFSET" item, press "►" key to active the automatic offset function. Then the geometry adjustment of NTSC signal will finish automated. If the geometry of NTSC signal is look good, you don't need to adjust the geometry of NTSC signal any more.

3.5.2 Horizontal geometry adjustment

1. Input a PAL crosshatch pattern signal to RF input.
2. Enter P-Mode, press key "2" to select horizontal geometry adjustment. (The OSD menu for this adjustment as below table 3.5.2. For NTSC signal, the "-50" will replace with "-60".)
3. Adjust the value of the corresponding item to make the horizontal geometry of the pattern look good.
4. Apply NTSC signal to adjust these value for NTSC horizontal geometry.

Table 3.5.2: The horizontal geometry adjustment OSD menu

OSD menu	Default Value	Description	Remark
HCEN-50	32	Horizontal shift(HSH)	Adjust to right value
HSIZE-50	32	EW width(EWW)	Adjust to right value
HPARA-50	32	EW parabola width(PW)	Adjust to right value
HTRAP-50	32	EW trapezium(TC)	Adjust to right value
HCNRT-50	32	EW upper corner parabola(UCP)	Adjust to right value
HCNRB-50	32	EW lower corner parabola(LCP)	Adjust to right value
HBOW-50	32	Horizontal bow(HB)	Adjust to right value

HPARALLEL	32	Horizontal parallelogram(HP)	Adjust to right value
AUTO OFFSET	0	Automatic offset NTSC geometry	See below description

*Notes:

1. For NTSC signal, the "-50" will replace with "-60".
2. For NTSC signal, only the **"HCEN-60"** and **"HSIZE-60"** items need the adjustment, the other items use the same data as PAL signal.
3. On producing, please use the **"AUTO OFFSET"** (On page "2") function to easy the geometry adjustment of NTSC signal. When finished the PAL signal geometry adjustment, press "2" key to enter page "2" to select "AUTO OFFSET" item, press "►" key to active the automatic offset function. Then the geometry adjustment of NTSC signal will finish automated. If now the geometry of NTSC signal is look good, it not needed to adjust the geometry of NTSC signal any more.

3.6 Producing parameter setup and option

1. Enter P-Mode, press key "4" to select page "4".Set the corresponding item to require value. See below table 3.6.1 for detailed description.

Table 3.6.1: Producing parameter setup and option page "4"

OSD menu	Default Value	Description	Remark
WARM UP STATUS	0	Set aging mode	0=Aging mode off
			1=Aging mode on
SHOP INIT	0	Set the shopping status	0=>1= Set the shopping status
DCXO	2	Crystal oscillator frequency adjustment	Adjust this value to get the max color synchronization range
FACTORY HOTKEY	1	Set factory hotkey	0="FACTORY HOTKEY" off
			1="FACTORY HOTKEY" on
POWER ON MODE	LAST	Set the power on mode	ON=On when power on
			STB=Standby when power on
			LAST=Last power off status
EEPROM INIT	0	EEPROM initial	0=>1=Active EEPROM initial

2. Enter P-Mode, press key "5" to select page "5". Set the corresponding item to require value. See below table 3.6.2 for detailed description.

Table 3.6.2: Producing parameter setup and option page "5"

OSD menu	Default Value	Description	Remark
Track. Mode	1	EHT tracking mode	0=EHT tracking only on vertical
			1=EHT tracking on vertical and EW
VX Normal	25	4:3 mode vertical zoom	Don't adjust, use default

VX Compr.	0	16:9 mode vertical zoom	Don't adjust, use default
WBF	5	Wide blanking start	Don't adjust, use default
WBR	8	Wide blanking end	Don't adjust, use default
GET OFFSET	0	Get offset	See below description
ColdRD	60	Cold color temperature R and G drive offset	64= offset value 0 63= offset value -1 65= offset value ＋1 Adjust to right value
ColdGD	59		
WarmRD	74	Warm color temperature R and G drive offset	64= offset value 0 63= offset value -1 65= offset value ＋1 Adjust to right value
WarmGD	71		

Description for AUTO OFFSET and GET OFFSET:

The **"GET OFFSET"** can use to make the EEPROM copy by PE engineer. When the PAL and NTSC geometry adjustment had finished, trigger the "GET OFFSET" from "0" to "1" to store the geometry offset datum between PAL and NTSC in EEPROM.

On producing, these geometry offset datum can use to easy the NTSC geometry adjustment. When finished the PAL geometry adjustment, trigger the "AUTO OFFSET" from "0" to "1", then the geometry adjustment of NTSC signal will finish automated. If now the geometry of NTSC signal is look good, it not needed to adjust the geometry of NTSC signal any more.

3. Enter P-Mode, press key "6" to select page "6". Set the corresponding item to require value. See below table 3.6.3 for detailed description.

Table 3.6.3: Producing parameter setup and option page "6"

OSD menu	Default Value	Description	Remark
AGCT	32	AGC take over point	See section "3.2 RF AGC alignment" for detailed.
AGC	0	AGC take over point indicate	
OIF	32	IF demodulator offset	Don't adjust, use default
IF	45.7	IF frequency	Select the IF frequency
AGCS	1	AGC speed	Don't adjust, use default
AGNE	3	Audio gain	Don't adjust, use default

4. Enter P-Mode, press key "7" to select page "7". Set the corresponding item to require value. See below table 3.6.4 for detailed description.

Table 3.6.4: Producing parameter setup and option page "7"

OSD menu	Default Value	Description	Remark
EVG	0	Enable vertical guard(RGB blanking)	1= RGB blanking
DFL	0	Disable flash protection from defletion timer	Don't adjust, use default

XDT	0	X-ray detection	Don't adjust, use default
AKB	1	Black current stabilization	Don't adjust, use default
NBL	1	Black current loop application	Don't adjust, use default
OSVE	0	Black current measuring lines in over scan(for vertical zoom setting <1)	Don't adjust, use default
CL	8	Set the cathode drive level	Don't adjust, use default
CC-LINE	21	CC's line	Don't adjust
HSYNC DELAY	2	CC's position	Don't adjust

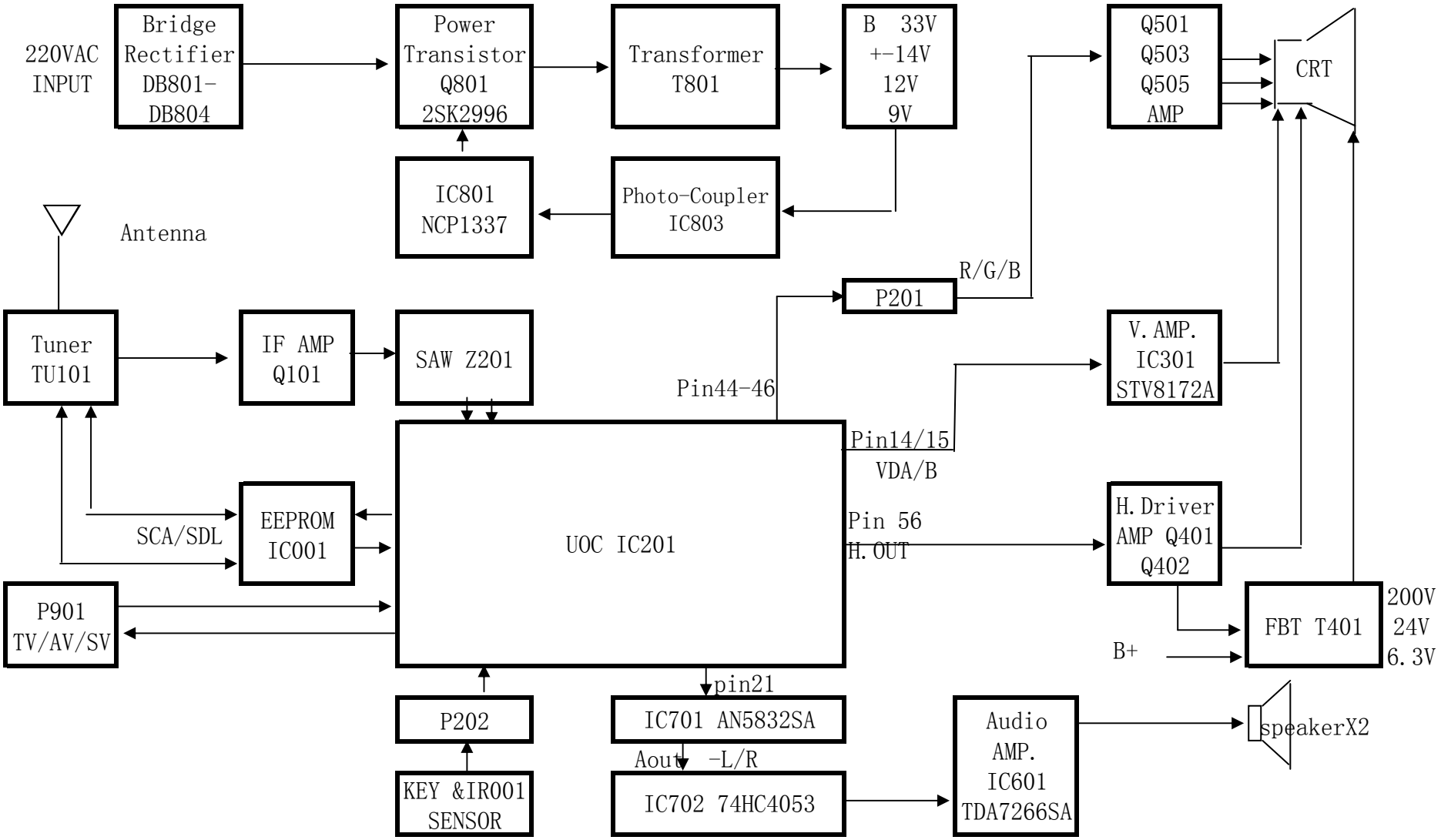
5. Enter P-Mode, press key "8" to select page "8". Set the corresponding item to require value. See below table 3.6.5 for detailed description.

Table 3.6.5: Producing parameter setup and option page "8"

OSD menu	Default Value	Description	Remark
BTSC	1	BTSC's option	1: open 0:close
AV ALIGMENT	1	AV terminal align	0=3 x 3 1=4 x 3
SHVS ENABLE	1	S-Video terminal enable	0=Disable 1=Enable
YUV ENABLE	1	YUV terminal enable	
NO COMMAND ENABLE	1	No operation within 2 hours automatic standby enable	
LANGUAGE2	1		
LANGUAGE3	1		

Note:

The "HEALTH FLAT" and "AC DISPLAY" options are valid only on model NX56-AP1 (example 29A41). The "LANGUAGE4" and "PIC PRESET" options are valid only on model NX56-AP2 (example 21E26).


220VAC
INPUT
Bridge
Rectifier
DB801-
DB804
Power
Transistor
Q801
2SK2996
Transformer
T801
B 33V
+-14V
12V
9V
Q501
Q503
Q505
AMP
CRT
IC801
NCP1337
Photo-Coupler
IC803
Antenna
R/G/B
P201
Tuner
TU101
IF AMP
Q101
SAW Z201
Pin44-46
V.AMP.
IC301
STV8172A
Pin14/15
VDA/B
EEPROM
IC001
SCA/SDL
UOC IC201
Pin 56
H.OUT
H.Driver
AMP Q401
Q402
P901
TV/AV/SV
FBT T401
200V
24V
6.3V
B+
pin21
P202
IC701 AN5832SA
Audio
AMP.
IC601
TDA7266SA
speakerX2
Aout -L/R
KEY &IR001
SENSOR
IC702 74HC4053

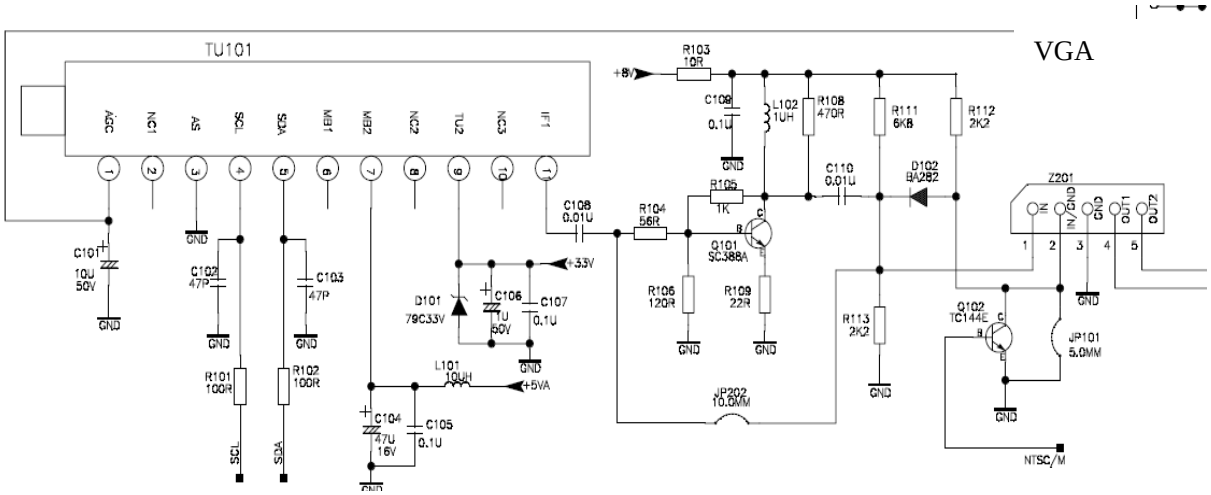
NX56 Chassis Signal Processing Introduction

Brief introduction

For different market requirements, our design it in two versions, one is for Latin America, we call the chassis as NX56-LA, the another one is for Asia Pacific Area, we call the chassis as NX56-AP. NX56-LA and NX56-AP adopt different UOC, The UOC for Latin America have CCD-Chip and BTSC function, so added AN5832SA to realize BTSC, but the UOC for Asia Pacific region does not have the two functions but SECAM system is necessary. NX56 Chassis not only match 21inches CRT, but also match 25 and 29inches CRT. Due to different screen sizes, maybe adopt different audio power amplifiers. The others should be the same. No matter NX56-AP what NX56-LA, they are use same main PCB board, just different peripheral components.

RF Section

Tuner Tu101 receive the radio frequency signal, after inside circuit to do signal receiving, and signal amplifying. The amplified high frequency signal accompany with the high frequency oscillation voltage oscillated by set oscillator input to the mixer. The IF picture signal and sound signal formed in mixer and output from mixer, then send to picture IF processing circuit.



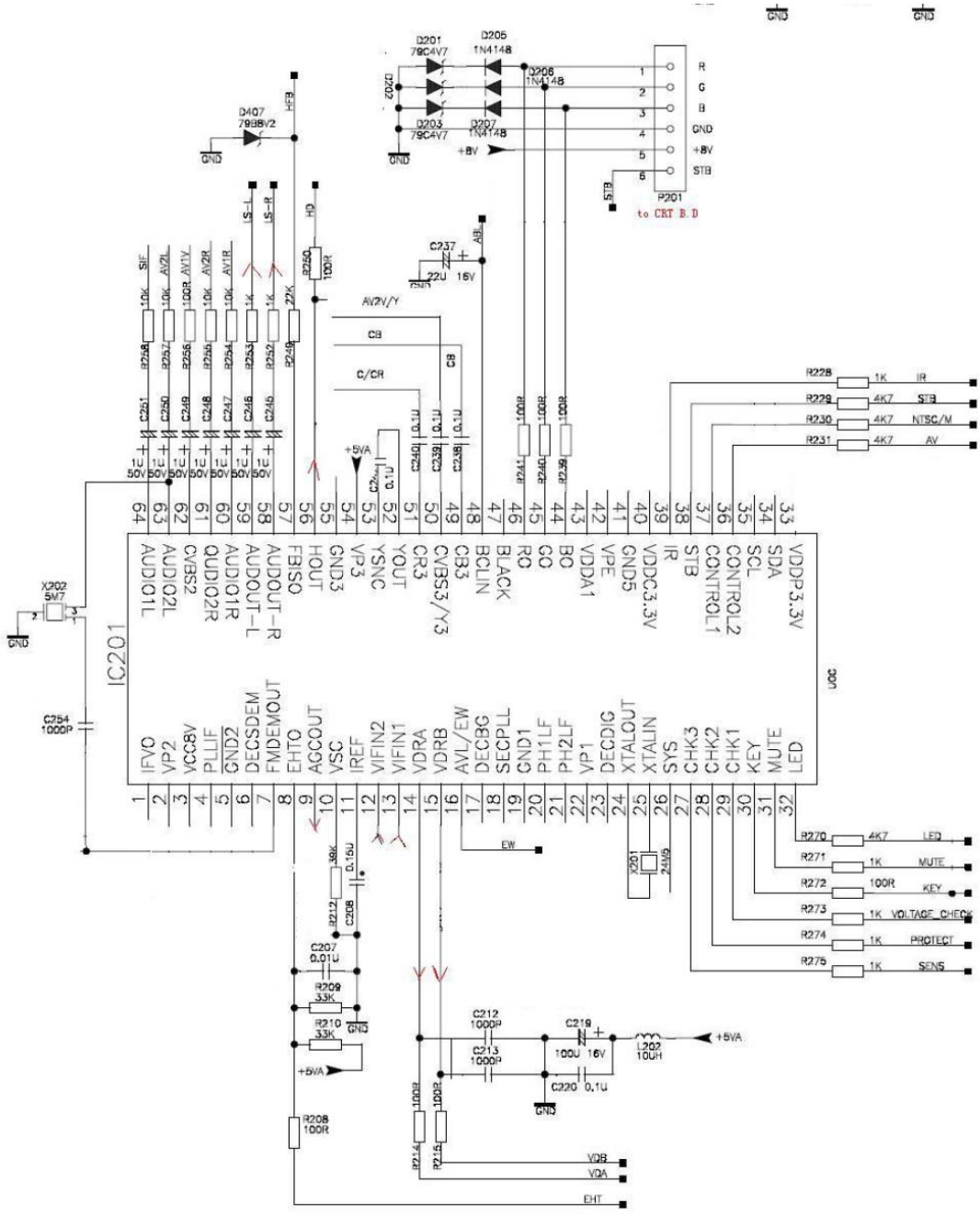
(Fig. 1. Tuner section)

Small Signal Processing Section

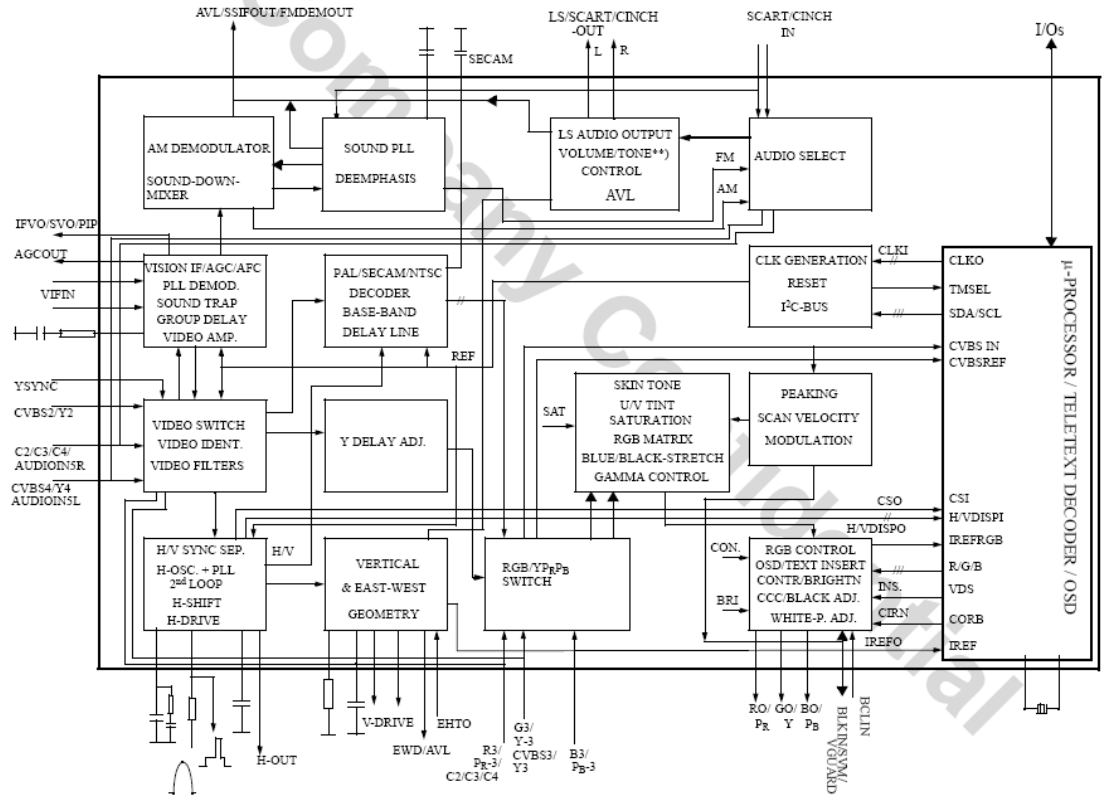
Small signal processing section is the IF (intermediate frequency) signal across saw filter send in the pin12 and pin13 of IC201. The VIFIN signal through built-in PLL DEMOD, sound trap, video amplifier and synchronous detector processing, get the color video broadcast signal and 2nd sound IF signal.

Video signal processing section is CVBS across video filter and delay line and horizontal & vertical synchronous separation circuit processing and get H-drive (pin56 of IC201)and V-drive signal (pin15/pin15 of IC201).

IF sound signal across the sound-down-mixer and AM demodulator processing, send out the AVL/ SSIF OUT signal. (Refer to Fig2 and Fig 3.)



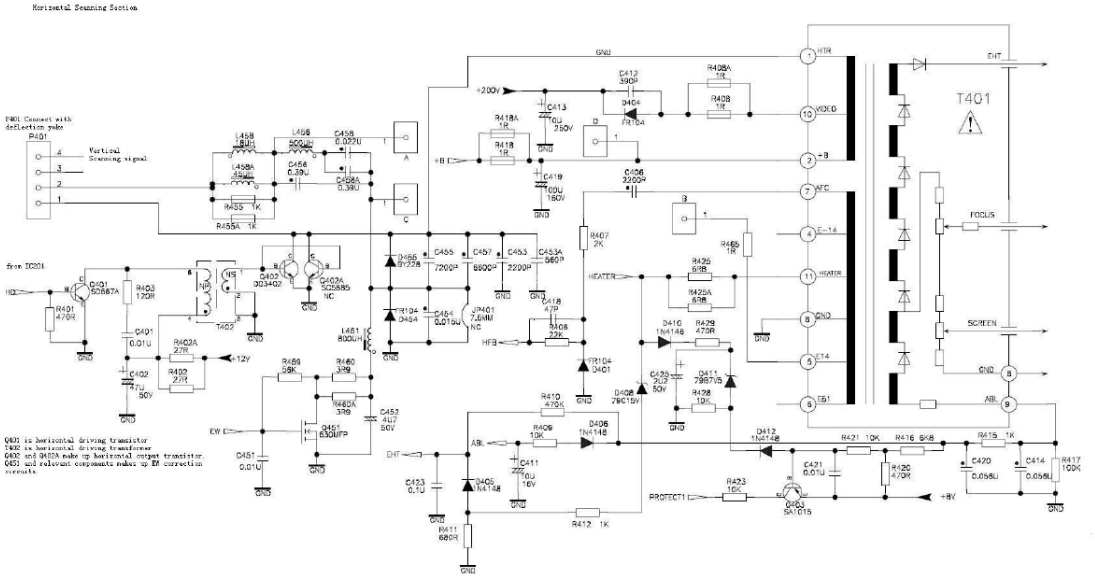
(Fig 2. Small Signal Processing Section)



(Fig3. Block Diagram of IC201.)

Horizontal Scanning Section

The horizontal drive signal send out from pin 56 of IC201, Q401 is horizontal driving transistor, coupled by horizontal driving transformer T402 , to control the horizontal output transistor working in switch on and off situation, get good linearly and enough amplitude of saw-tooth wave current to drive horizontal deflection yoke scanning. L456 is horizontal width coil and L458 is horizontal linearly coil. D455 is damping diode, C453,C455,C457 are retrace capacitors. T401 is FBT. Pin2 of T401 is B+ voltage input, Pin 10 of T401 get 200 Volt video amplifying voltage supply for CRT board. Pin11 of T401 sends out heater voltage supply for CRT heater.



Vertical Scanning Section

Vertical scanning section adopted STV8172A vertical deflection booster, we use as differential-output driver. The vertical raw-tooth wave signal sends out from pin14/15 of IC201 VDA/VDB. The two differential signal input pin 1 and 7 of STV8172A IC301. Pin2(+14v) and Pin7(-14v) of IC301 is power supply which come from the main power transformer. Pin 6 is boost voltage, rectified by D301. C309,C301 and R305 makes up a voltage feedback network, R306 is a damping resistor. C306 is correction capacitor, R308 is current feedback resistor.

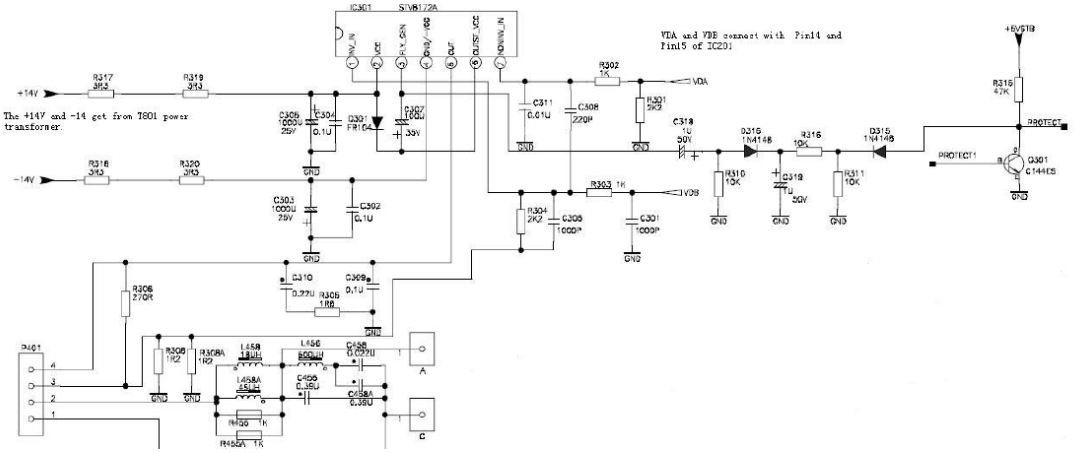
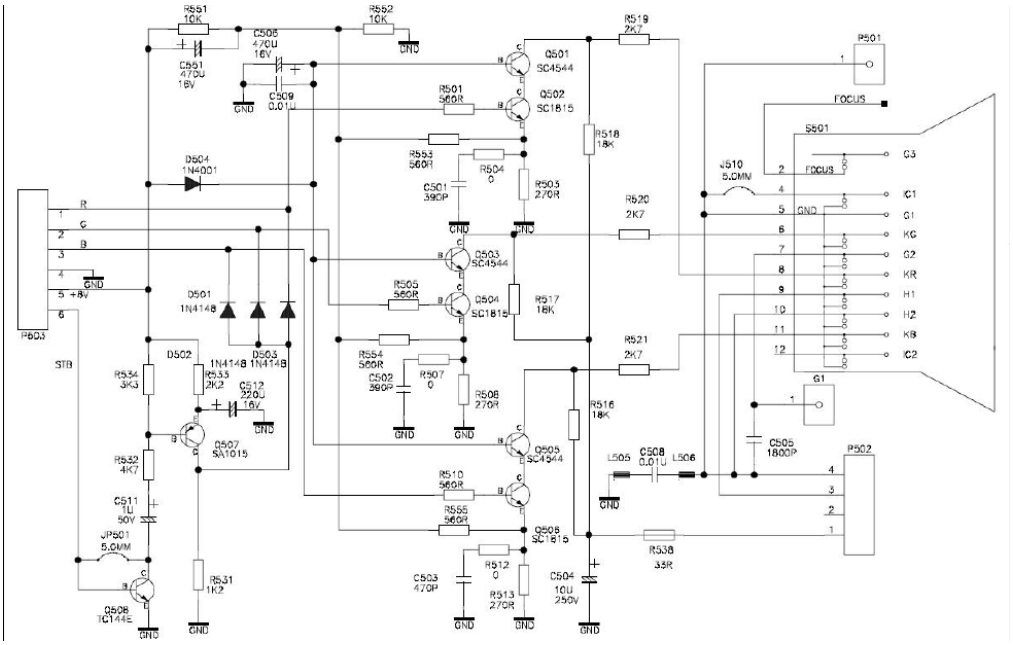


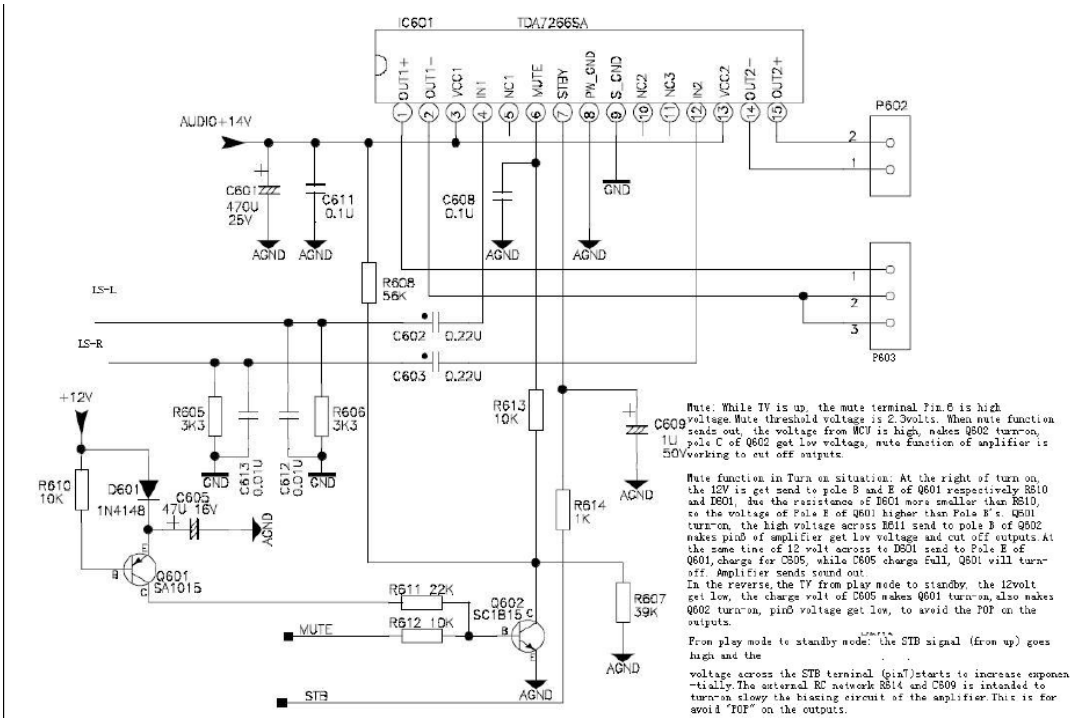
Fig 4. Vertical Scanning Processing Section

CRT Scanning Section

Q507,D501,D502 and D503 makes up a light eliminate circuit network. When the TV is playing mode, +8V voltage across R533 charge for C512, Q507 is cut off. At the right of turn off the TV, Q507 is turn-on, the current across D501, D502 and D503 send to R.G. B to discharge the electronic quickly.

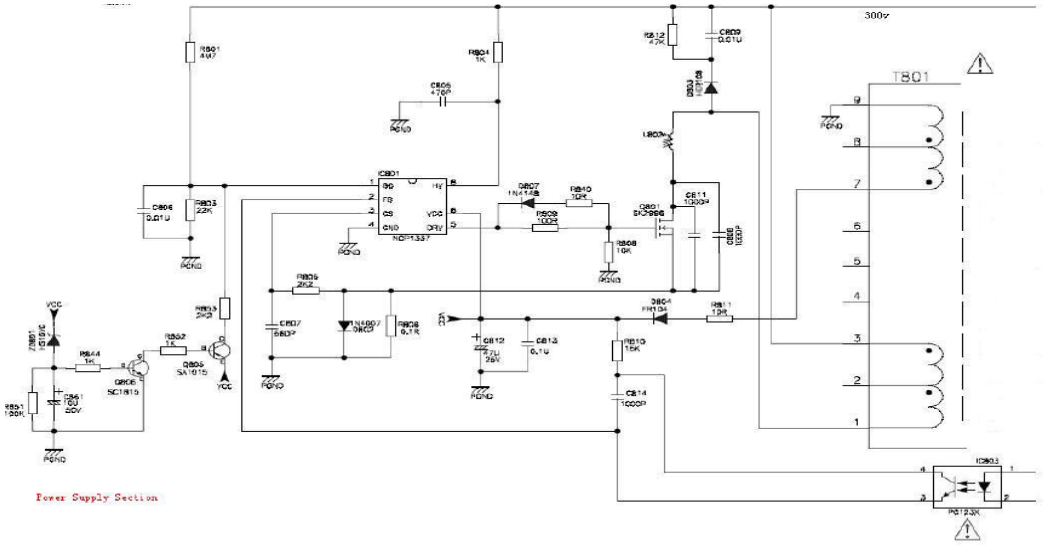


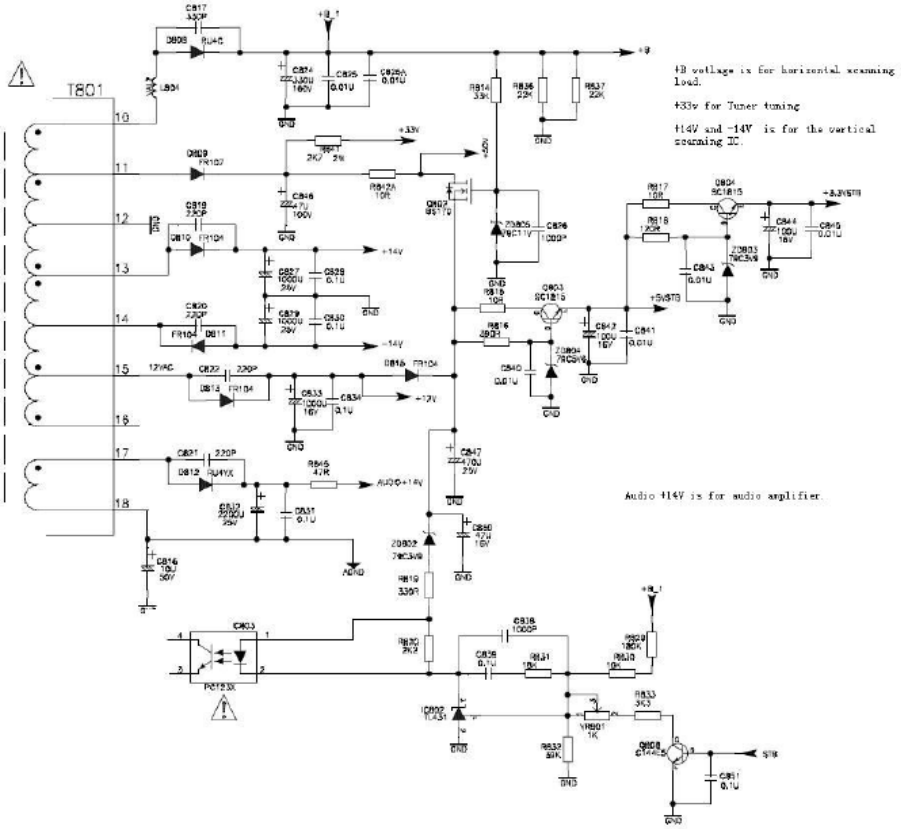
Audio Power Amplifying Section



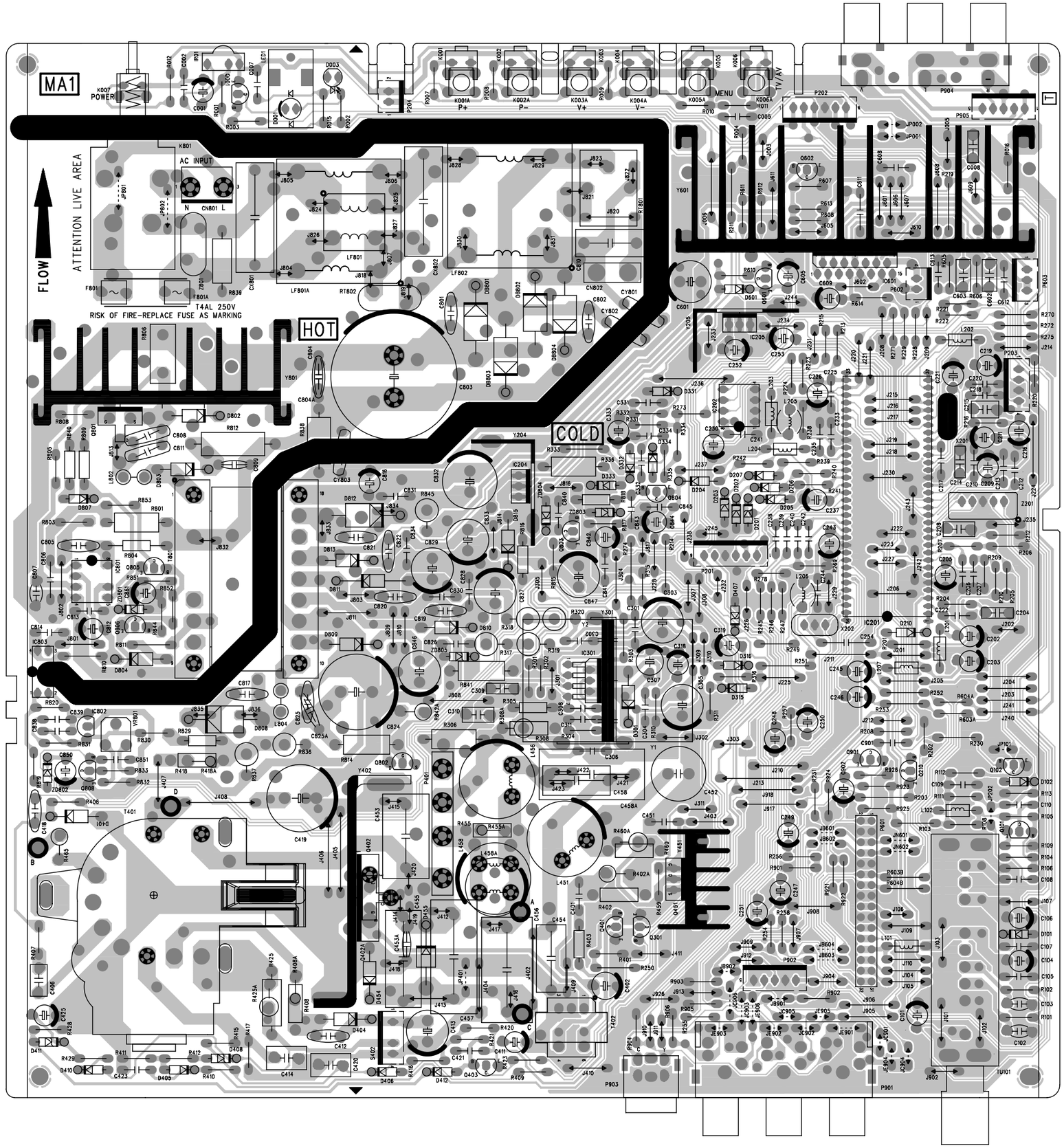
Power Supply Section

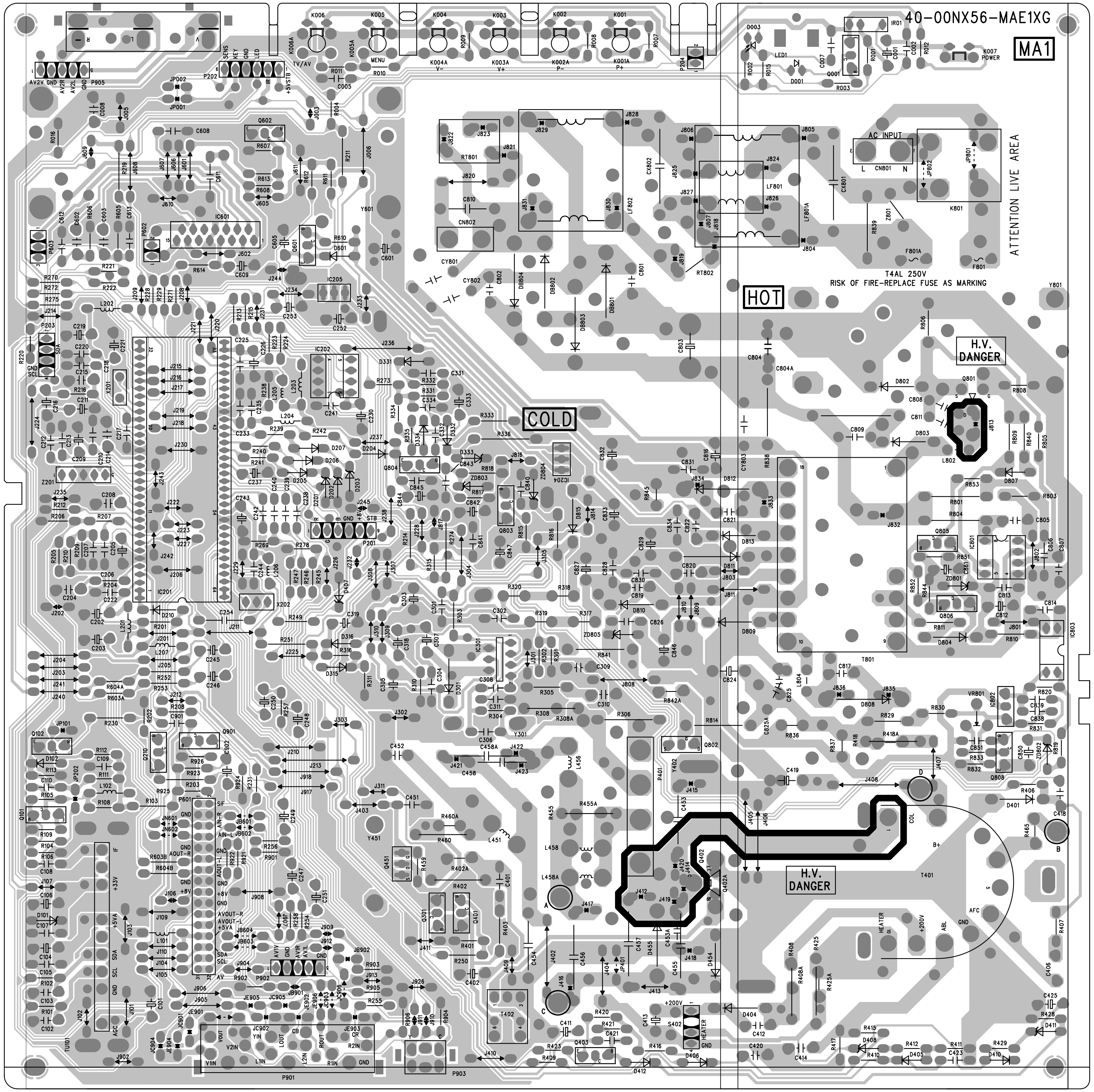
AC supply 220V/110v through filtering network and rectifying circuit and get 300Vdc voltage. LF801/LF801A and CX802 makes up a differential mode rejection, LF802 and CY801,CY802 makes up a common mode rejection network. D801-D804 is rectifying network. 300Vdc voltage supply pin3 of T801, also through R804 send to pin8 of IC801 NCP1337. Pin5 of IC801 sends out the PWM signal to control Q801 working in switch on and off situation. IC803 is optocoupler.




T801
+B voltage is for horizontal scanning load.
+33v for Tuner tuning
+14V and -14V is for the vertical scanning IC.
Audio +14V is for audio amplifier.

PCB Material
DS1108/EC207/CCP6400S
Thickness(MM)
1.6MM
Layer
SINGLESIDE
Copper Thickness
1OZ
Surface treatment
OSP
Solder slot(C-PAD)
Other





PCB Material
DS1108/EC207/CCP6400S
Thickness(MM)
1.6MM
Layer
SINGLESIDE
Copper Thickness
1OZ
Surface treatment
OSP
Solder slot(C-PAD)
Other

4

IC301 STV8172A
INV_IN VCC FLY_GEN GND/-VCC OUT OUTST_VCC NONINV_IN
+14V -14V +5VSTB +200V +12V +8V
R317 3R3 R319 3R3 R318 3R3 R320 3R3
C305 1000U 25V C304 0.1U D301 FR104 C307 100U 35V
C303 1000U 25V C302 0.1U
R302 1K R303 1K R304 2K2 C306 1000P C301 1000P
C311 0.01U C308 220P R301 2K2 VDA VDB
C318 1U 50V D316 1N4148 R316 10K D315 1N4148
R310 10K C319 1U 50V R311 10K
R315 47K PROTECT PROTECT1 Q301 C144ES
S402 GND HEATER +200V
R306 270R C310 0.22U R305 1R8 C309 0.1U
P401
R308 1R2 R308A 1R2 L458 18UH L456 500UH C458 0.022U
L458A 45UH C456 0.39U C458A 0.39U R455 1K R455A 1K
A C
R418A 1R R418 1R C413 T0U 250V D D404 FR104 C412 390P R408A 1R R408 1R
C419 T00U 160V B C406 2200P R465 1R R407 2K
HTR VIDEO +B AFC E-14 HEATER GND E14 E51
T401 EHT FOCUS SCREEN GND ABL
Q401 SD667A R401 470R R403 120R HD
Q402 DD3402 Q402A SC5885 NC T402 NS NP
C401 0.01U R402A 27R R402 27R C402 47U 50V
D455 BY228 C455 7200P C457 6600P C453 2200P C453A 560P
FR104 D454 C454 0.015U JP401 7.5MM NC
L451 800UH C418 47P R406 22K HFB
FR104 D401
R425 6R8 R425A 6R8 D410 1N4148 R429 470R
C425 2U2 50V D411 79B7V5 D408 79C15V R428 10K
R459 56K R460 3R9 R460A 3R9 C452 4U7 50V
EW Q451 630MFP C451 0.01U
R410 470K R409 10K D406 1N4148 ABL
EHT C423 0.1U D405 1N4148 C411 10U 16V R411 680R R412 1K
D412 1N4148 R421 10K R416 6K8 R415 1K
C421 0.01U R420 470R C420 0.056U C414 0.056U R417 100K
PROTECT1 R423 10K Q403 SA1015

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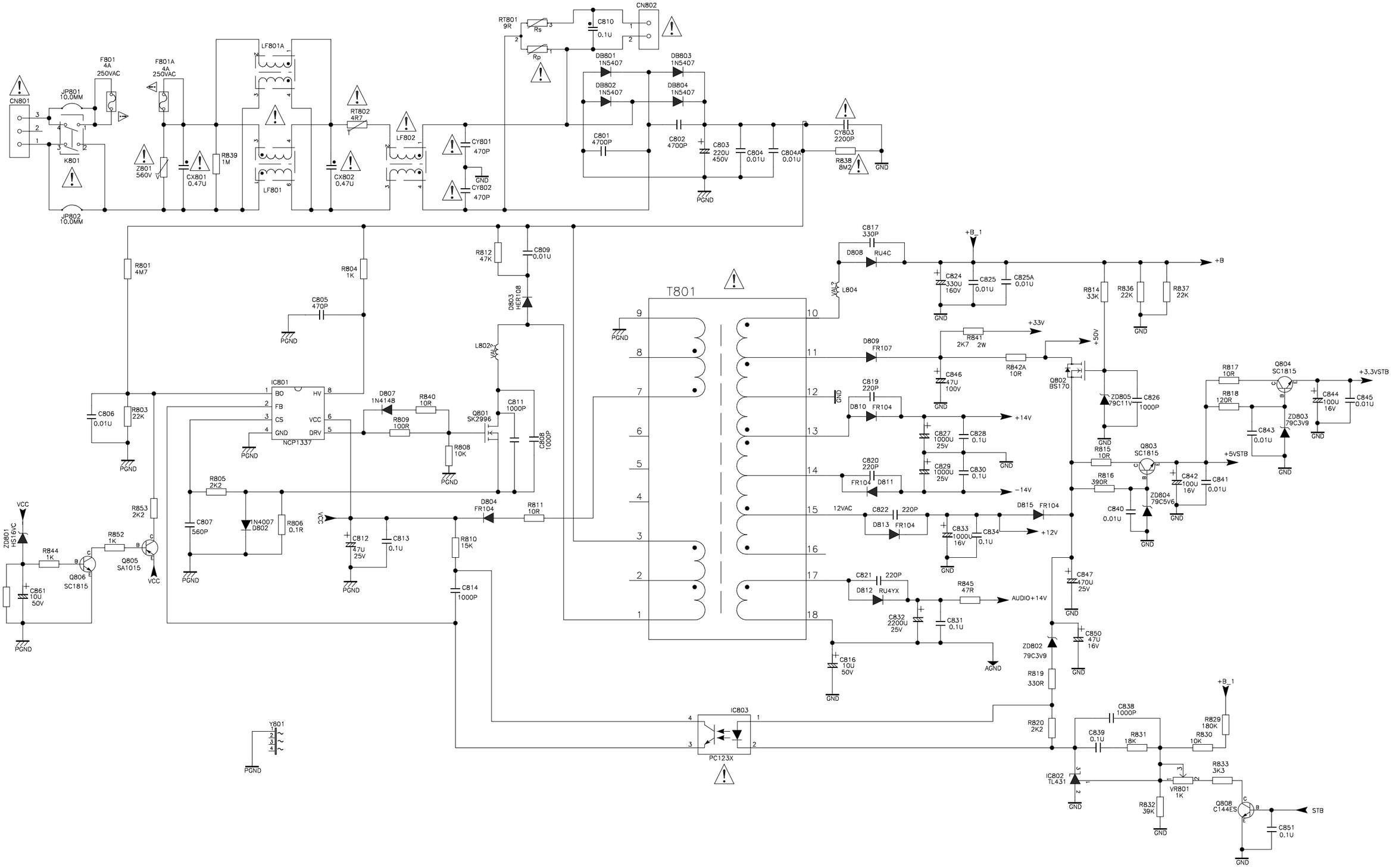

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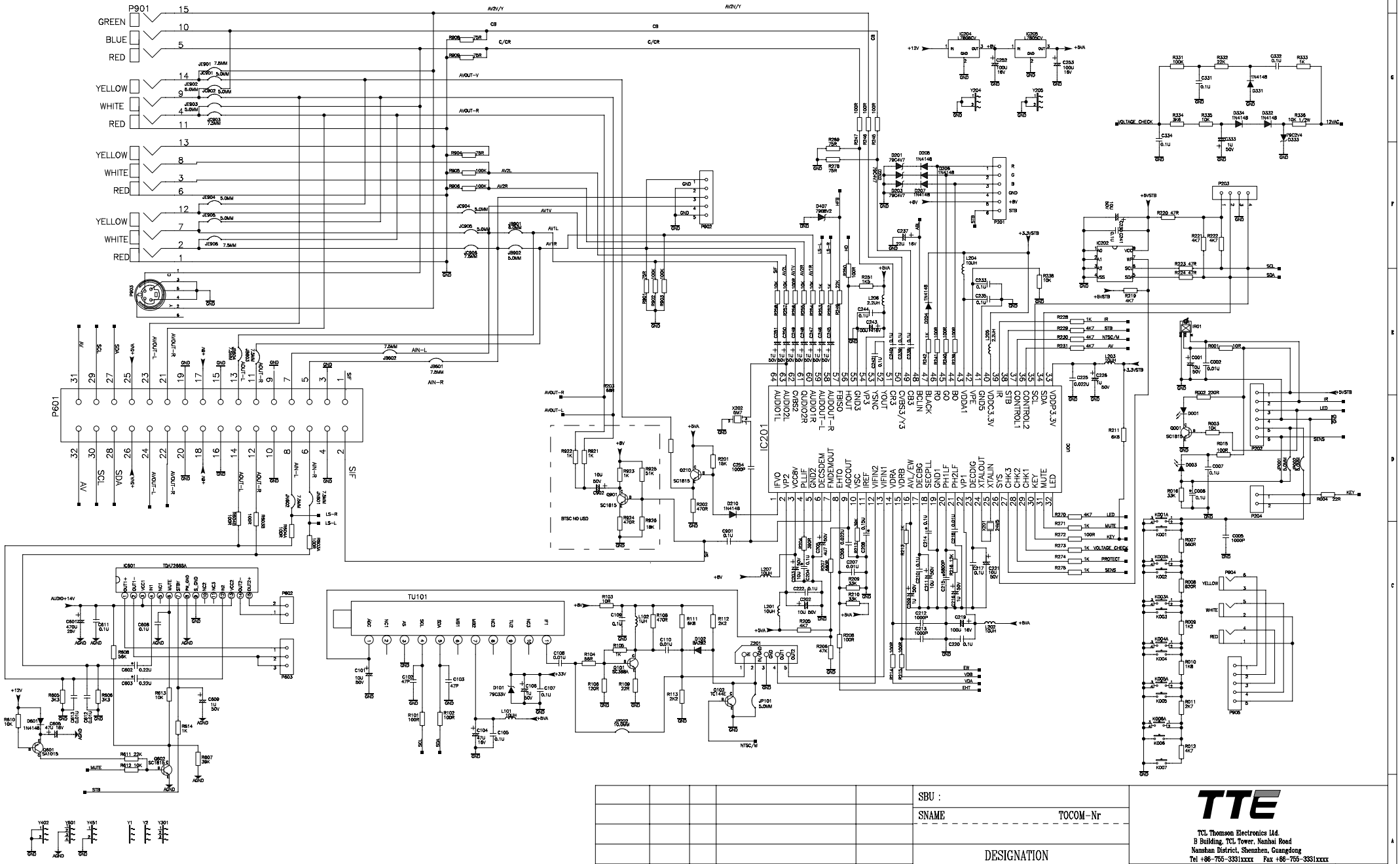

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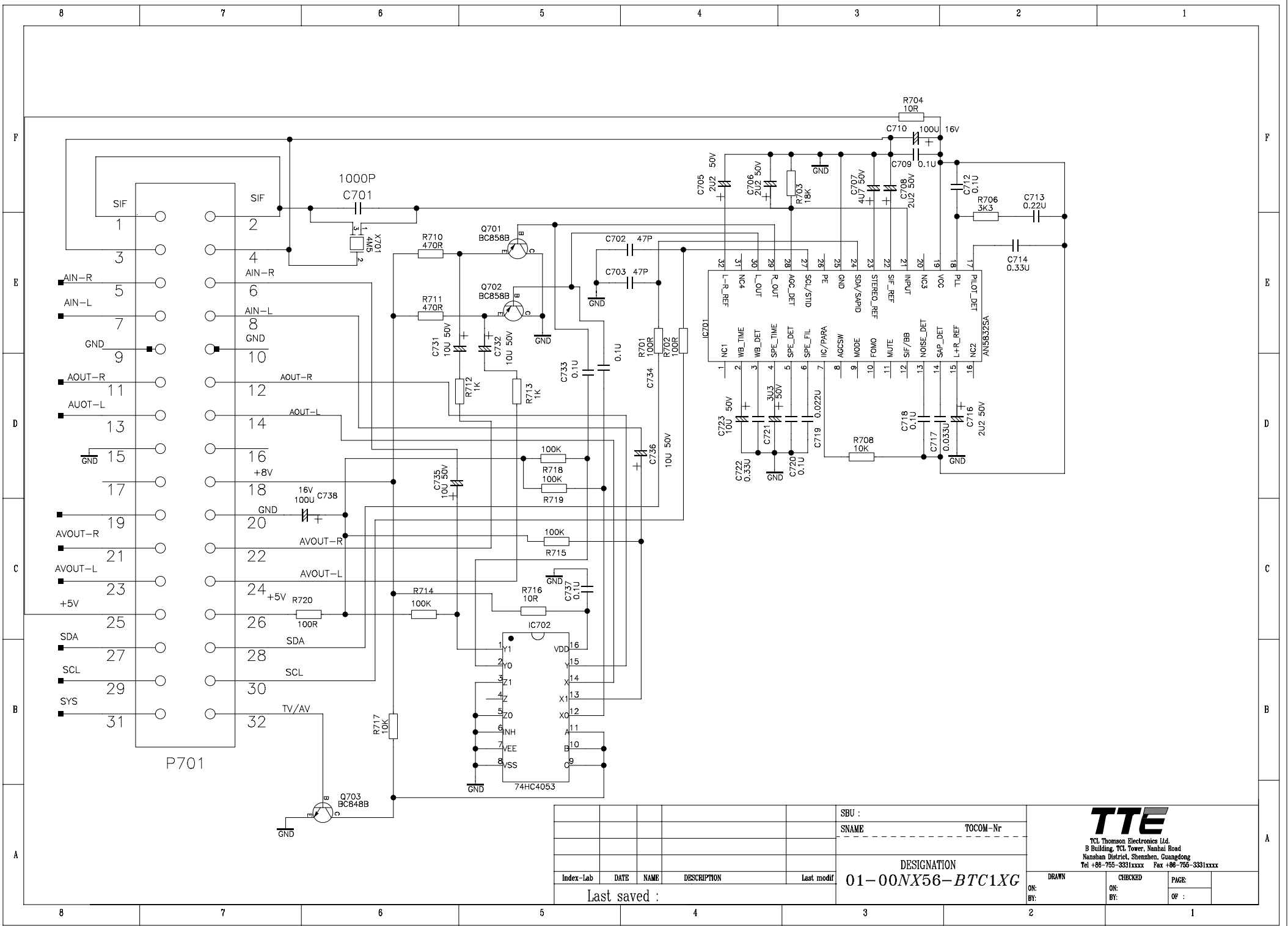

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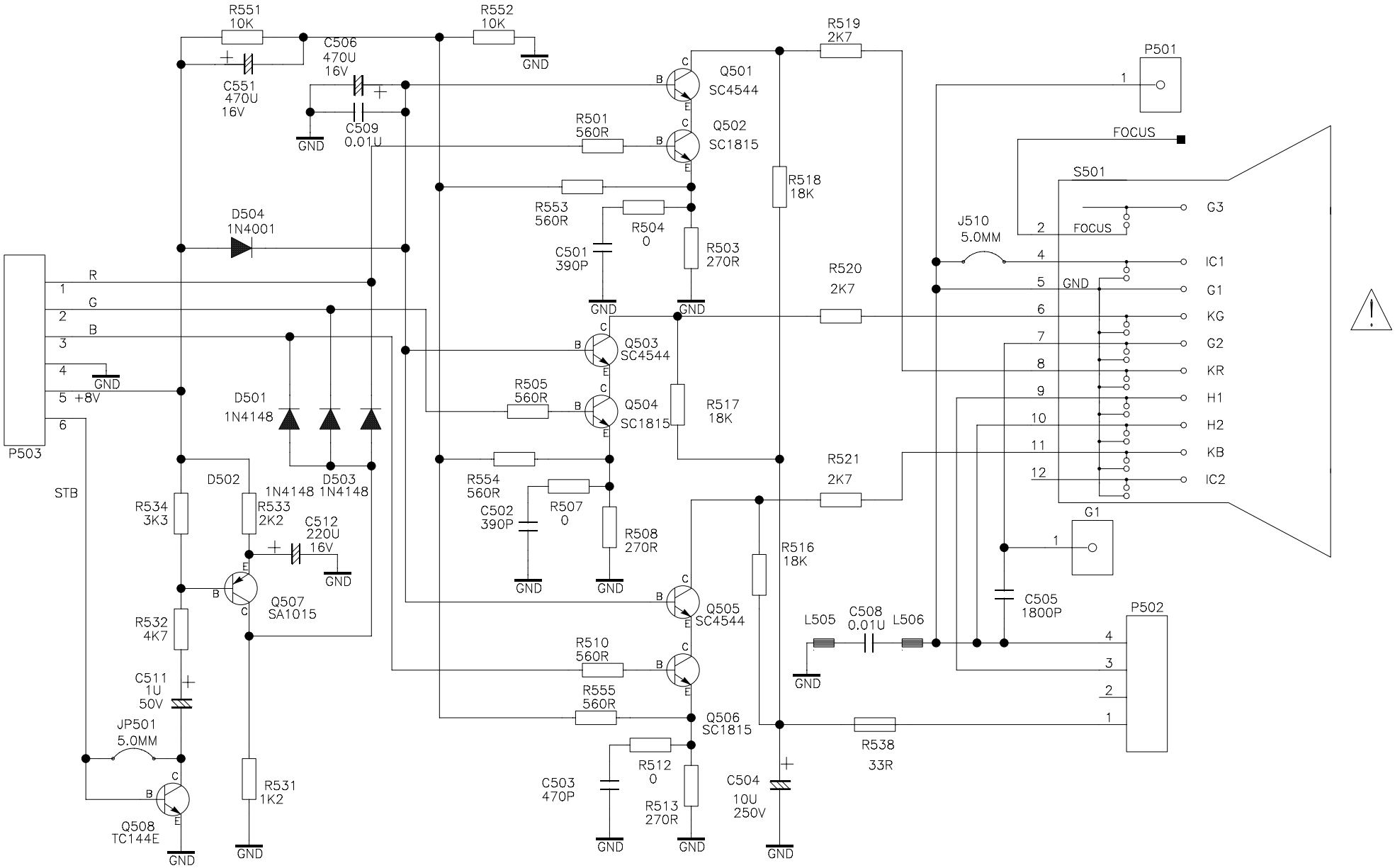

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UOC-TOP-64 N1 series

Versatile signal processor for CRT TV applications

Rev. 0.11 — 25 January 2007 Product data sheet

1. General description

The UOC-TOP-64 series is a very flexible concept which offers attractive solutions for $1f_H$ TV receivers with CRTs. This new concept offers a complete range of products with the right price level to cover TV receivers from basic mono 14 inch sets up to the best featured large and/or wide screen AV-stereo TV sets. The UOC-TOP-64 concept can also be used as front-end for $2f_H$ and LCD TV receivers.

The UOC-TOP-64 concept is mounted in a SDIP64 package and is split up in the following ranges:

- AV-110 (AV-stereo) concept. It contains a video processor with many features and it has an analog audio control circuit with balance, treble, bass and loudness control. Two different micro processor are available for this concept, one with OSD and Closed Captioning or Teletext and Closed Captioning features (UOCTOP_1PTXT version), the other with (extended) OSD features (UOCTOP_OSD version). The block diagram is given in Figure 1.
- AV-90 concept. This concept is nearly identical to the AV-110 concept. The only difference that it does not contain an East-West and Scan Velocity Modulation (SVM) output. This concept is intended for 90× picture tubes.
- Mono-110 concept. The functional content of this concept is comparable with that of the AV 110 concept, however, it has just stereo input switch and no audio control circuit. The block diagram is given in Figure 1.
- Mono-90 concept. This concept is intended for 90× picture tubes. The circuit has an audio switch for mono signals but the mono inputs can also be used as a stereo input. In this range most of the video and audio processing features have been omitted. Also this concept can be supplied with one of the two micro processors (UOCTOP_1PTXT or UOCTOP_OSD version). The block diagram is given in Figure 2.

The most important features of the complete IC series are given in the following feature lists.

All packages are according to the ROHS legislation, which also means that these packages are lead-free. The ICs have supply voltages of 8V, 5V and 3.3V.

UOC-TOP-64 is supported by a comprehensive Global TV Software Development kit to enable easy programming and fast time-to-market (see also Section 20.4 “Licenses”).

2. Features

2.1 Analog Video Processing

2.1.1 Overview of available features (AV-110/90 and Mono-110 concept)

- Multi-standard vision IF circuit with alignment-free PLL demodulator
- Internal (switchable) time-constant for the IF-AGC circuit
- Switchable group delay correction and sound trap (with switchable centre frequency) for the demodulated CVBS signal
- Separate Second Sound IF output or FM demodulator output without de-emphasis available, which can be used as input for an external BTSC decoder or as input for external sound band-pass filter for second language processing.
- Separate SSIF input available as input for the FM-PLL demodulator to demodulate FM-radio with an IF frequency of 10.7 MHz, or as input from an external sound band-pass filter for second language processing.
- AM demodulator without extra reference circuit
- 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 4.72/5.74 MHz so that a second sound channel can be demodulated. In such an application it is necessary that an external bandpass filter is inserted.
- Audio switch circuit with 2 stereo inputs (1 stereo input can also be switched into two mono sound inputs) and a stereo output which can be used for the drive of for audio power amplifiers (with volume and tone-control) or as SCART/CINCH output. The second stereo input is only available via the combined C2/C3/C4/AUDIOIN5R pin for the right channel and via the combined CVBS4/Y4/AUDIOIN5L pin for the left channel.
- Video switch with 3 external CVBS inputs. All CVBS inputs can be used as Y-input for Y/C signals. However, only 1 Y/C source can be selected because the circuit has 1 chroma input. CVBS3/Y3 input available in combination with the G/Y-3 input pin.
- 1 CVBS output, this output can be used as monitor video output or as front-end video output or as independent selectable video output.
- Automatic Y/C signal detector.
- Integrated luminance delay line with adjustable delay time
- Only one reference (24.576 MHz) crystal required for the m-Controller, Teletext- and the color decoder
- Multi-standard color decoder with automatic search system and various “forced mode” possibilities
- Internal base-band delay line
- Indication of the Signal-to-Noise ratio of the incoming CVBS signal
- Linear RGB/YP_BP_R input.
- Scan Velocity Modulation output. The SVM circuit is active for all the incoming CVBS, Y/C and RGB/YP_BP_R signals. The SVM output is combined with the black current input of the black current stabilisation circuit. By means of a small application adaptation both functions can be operational in parallel.

- Picture improvement features with peaking (with switchable centre frequency, depeaking, variable positive/negative peak ratio, variable pre-/overshoot ratio and video dependent coring), dynamic skin tone control, gamma control and blue- and black stretching. All features are available for CVBS, Y/C and RGB/YP_BP_R signals
- The effect of the various features can de demonstrated by means of a ‘split screen’ mode in which the features are activated in one half of the picture and switched off in the other half
- Switchable DC transfer ratio for the luminance signal
- Tint control for external RGB/YP_BP_R signals
- Contrast reduction possibility during mixed-mode of OSD and Text signals. Option to make a colored and in contrast reduced window.
- RGB control circuit with ‘Continuous Cathode Calibration’, white point and black level off-set adjustment so that the color temperature of the dark and the light parts of the screen can be chosen independently. When this ‘Continuous Cathode Calibration’ is not used, simple alignment of the cutoff level is possible.
- 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 with horizontal parallelogram and bow correction and horizontal and vertical zoom
- The IC can be used as front-end for Progressive Scan or LCD TV receivers
- Low-power start-up of the horizontal drive circuit

2.1.2 Features of the AV-110/90 concept which are not available in the Mono-110 concept

- Analog audio tone control circuit with treble, bass and loudness controls

2.1.3 Features of the AV-110 and Mono-110 concept which are not available in the AV-90 concept

- Horizontal geometry processing and Scan Velocity Modulation output

2.1.4 Differences in feature list for the MONO-90 concept compared with AV-110/90 and Mono-110 concept

- Audio switch circuit with 1 stereo input, which can also be switched into two mono sound inputs, a mono output for SCART/CINCH with the possibility to serve as front/monitor audio output.
- Stereo output (with volume and AVL) for audio power amplifiers. This stereo output can also be switched to one mono loudspeaker output and one fixed mono sound output.
- CVBS output, this output can only be used as monitor video output or as front-end video output.
- Only basic video processing. The remaining video features are peaking with coring, black stretching and gamma control.
- No horizontal geometry processing and Scan Velocity Modulation output.

2.2 Micro-Controller

- 80C51 m-controller core standard instruction set and timing
- 0.9766 ms machine cycle
- maximum of 80 k x 8-bit late programmed ROM
- maximum of 3 k x 8-bit Auxiliary RAM
- I^2C byte level bus interface.
- Interrupt controller for individual enable/disable with two level priority
- Two 16-bit Timer/Counter registers
- One 24-bit Timer (16-bit timer with 8-bit Pre-scaler)
- 16-bit Data pointer
- WatchDog timer
- Auxiliary RAM page pointer
- Stand-by, Idle and Power Down modes
- Up to 13 general-purpose I/O pins
- 14 bits PWM for Voltage Synthesis Tuning
- 8-bit A/D converter with 4 multiplexed inputs
- 4 PWM (6-bits) outputs for analogue control functions

2.3 Data Capture (Teletext and Closed Caption devices)

- Text memory for 1 page
- 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 625 line Wide Screen Signalling (WSS) bit decoding
- Automatic selection between 525 WST/625 WST
- Automatic selection between 625 WST/VPS on line 16 of VBI
- Real-time capture and decoding for WST Teletext in Hardware, to enable optimized m-processor 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
- Vertical Blanking Interval (VBI) data capture of WST data

2.4 Display

2.4.1 Features of the OSD-only devices

- Up to 4 character sets with 256 characters each (size 16 pixels x 18 lines)
- Enhanced OSD modes
- 50Hz/60Hz display timing modes
- Serial and Parallel Display Attributes
- Single/Double Width and Height for characters
- Scrolling of display region
- Variable flash rate controlled by software
- Enhanced display features including overlining, underlining and italics
- Soft colors using CLUT with 4096 color palette
- Global selectable matrix: (12/16)
- By attribute selectable: 1.5x characters (18/24)
- Globally selectable character spacing
- Fringing (Shadow) selectable from N-S-E-W direction
- Fringe color selectable
- Contrast reduction of defined area with option of coloration
- Programmable Cursor
- Special Graphics Characters with two planes, allowing four colors per character

2.4.2 Features of the Teletext and Closed Caption devices

- Four character sets
- Up to 576 characters with a size of 12 pixels x 16 lines are supported
- Teletext and Enhanced OSD modes
- 50Hz/60Hz display timing modes
- Serial and Parallel Display Attributes
- Scrolling of display region
- Variable flash rate controlled by software
- Soft colors using CLUT with 4096 color palette
- Global selectable matrix: (12)
- Features of level 1.5 WST and US Close Caption
- Single/Double/Quadruple Width and Height for characters
- 64 software redefinable On-Screen display characters
- G1 Mosaic graphics, Limited G3 Line drawing characters
- WST Character sets and Closed Caption Character set in single device
- Curtaining effect via software
- Fringing (Shadow) selectable from N-S-E-W direction
- Fringe color selectable
- Contrast reduction of defined area with option of coloration
- Programmable Cursor
- Special Graphics Characters with two planes, allowing four colors per character

3. Quick reference data

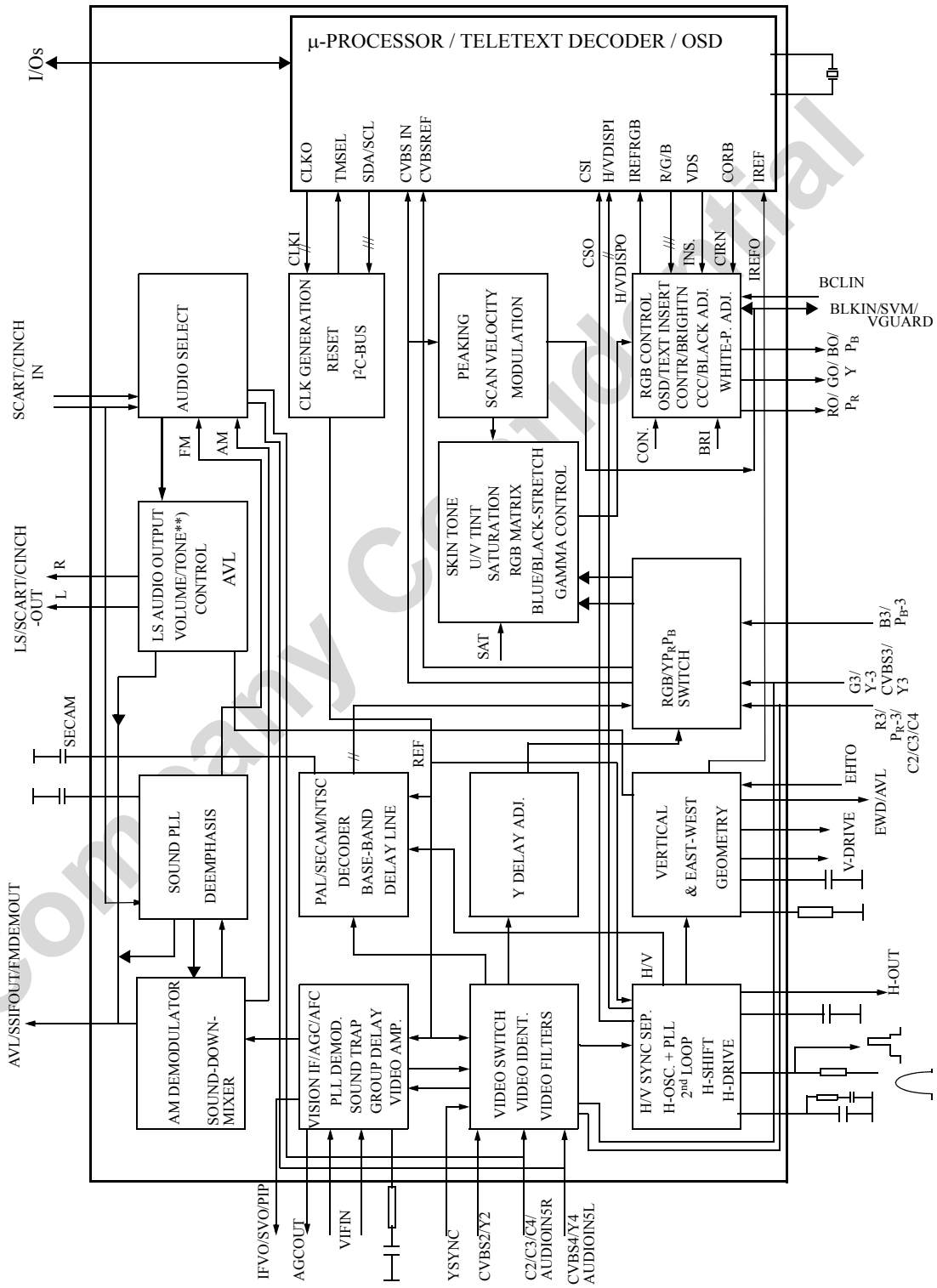
Table 1: Quick reference data

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
Supply					
V_P	analogue supply voltage VSP	4.7	5.0	5.3	V
I_P	supply current (5.0 V)	–	160	–	mA
V_{DDA}	digital supply VSP / analogue supply periphery	3.0	3.3	3.6	V
I_{DDA}	supply current (3.3 V); Mono90 version	–	50	–	mA
I_{DDA}	supply current (3.3 V); AV110/90 and Mono110 versions	–	70	–	mA
V_{PAudio}[1]	audio supply voltage	4.7	8.0	8.4	V
I_{PAudio}[1]	supply current (5.0/8.0 V); mono-90 version	–	0.5	–	mA
I_{PAudio}	supply current (8.0 V); AV-110/90 and mono-110 version	–	10	–	mA
P_{tot}	total power dissipation	–	–	1.1	W
Input voltages					
$V_{iVIFrms)}$	video IF amplifier sensitivity (RMS value)	–	75	150	µV
$V_{iSSIF(rms)}$	sound IF amplifier sensitivity (RMS value)	–	1.0	–	mV
$V_{iAUDIO(rms)}$	external audio input (RMS value)	–	1.0	1.3	V
$V_{iCVBS(p-p)}$	external CVBS/Y input (peak-to-peak value)	–	1.0	1.4	V
$V_{iCHROMA(p-p)}$	external chroma input voltage (burst amplitude) (peak-to-peak value)	–	0.3	1.0	V
$V_{iRGB(p-p)}$	RGB inputs (peak-to-peak value)	–	0.7	0.8	V
$V_{iY(p-p)}$	luminance input signal (peak-to-peak value)	–	1.0	–	V
$V_{iPB(p-p)}$	P_B input signal (peak-to-peak value)[2]	–	0.7	–	V
$V_{iPR(p-p)}$	P_R input signal (peak-to-peak value)[2]	–	0.7	–	V
Output signals					
$V_{o(IFVO)(p-p)}$	demodulated CVBS output (peak-to-peak value)	–	2.0	–	V
$V_{o(QSSO)(rms)}$	sound IF intercarrier output (RMS value)	–	100	–	mV
$V_{o(AMOUT)(rms)}$	demodulated AM sound output (RMS value)	–	250	–	mV
$V_{o(AUDIO)(rms)}$[1]	non-controlled audio output signals (RMS value)	1.0	–	–	V
$V_{o(CVBSO)(p-p)}$	selected CVBS output (peak-to-peak value)	–	2.0	–	V
$I_{o(AGCOUT)}$	tuner AGC output current range	0	–	1	mA
$V_{oRGB(p-p)}$	RGB output signal amplitudes (peak-to-peak value)	–	1.2	–	V
I_{oHOUT}	horizontal output current	10	–	–	mA
I_{oVERT}	vertical output current (peak-to-peak value)	–	1	–	mA
I_{oEWD}	EW drive output current	–	–	1.2	mA

[1] The supply voltage for the analogue audio part of the mono-90 version can be 5V or 8V. For a supply voltage of 5V the maximum signal amplitudes at in and outputs are $1V_{rms}$. For a supply voltage of 8V the maximum output signal amplitude is 2 V_{rms}. The AV-110/90 and Mono-110 versions need a supply voltage of 8 V.

[2] The YP_BP_R input signal amplitudes are based on a color bar signal with 100% saturation.

5. Block diagram



**) The mono-110 version has only volume control and no tone control functions

Fig 1. Block diagram of the "AV-110/90" and "MONO-110" TV processor

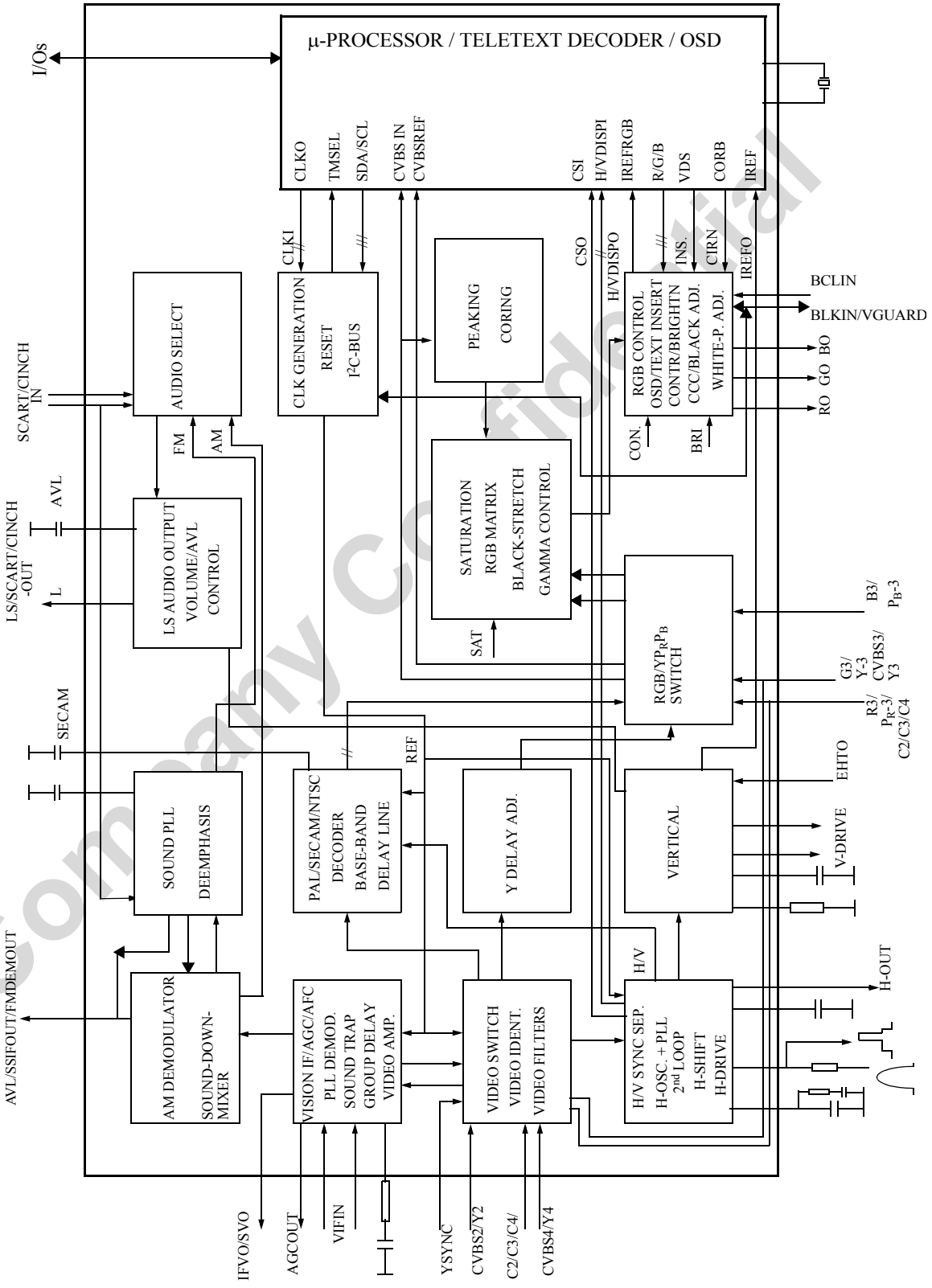


Fig 2. Block diagram of the "MONO-90" TV processor

6. Pinning information

Table 6: Pinning information

SYMBOL	SDIP64			DESCRIPTION
	AV-110 Mono-110	AV-90	Mono-90	
IFVO/SVO/PIP [3]	1	1	–	IF video output / selected CVBS output / PIP output
IFVO/SVO [3]	–	–	1	IF video output / selected CVBS output
VP2	2	2	2	2nd supply voltage TV processor (+5 V)
VCC8V	3	3	3	8 Volt supply for audio switches
PLLIF	4	4	4	IF-PLL loop filter
GND2	5	5	5	ground 2 for TV processor
DECSDEM	6	6	6	decoupling sound demodulator
AVL/SSIFOUT/SNDDEMOUT[2]	7	7	7	AVL / Second sound IF output / sound demodulator output
EHTO	8	8	8	EHT/overvoltage protection input
AGCOUT	9	9	9	tuner AGC output
IREF	10	10	10	reference current input
VSC	11	11	11	vertical sawtooth capacitor
VIFIN2	12	12	12	IF input 2
VIFIN1	13	13	13	IF input 1
VDRA	14	14	14	vertical drive A output
VDRB	15	15	15	vertical drive B output
EWD/AVL	16	–	–	East-West drive output / AVL capacitor
AVL	–	16	16	AVL capacitor
DECBG	17	17	17	bandgap decoupling
SECPLL	18	18	18	SECAM PLL decoupling
GND1	19	19	19	ground 1 for TV-processor
PH1LF	20	20	20	phase-1 filter
PH2LF	21	21	21	phase-2 filter
VP1	22	22	22	1st supply voltage TV-processor (+5 V)
DECDIG	23	23	23	decoupling digital supply
XTALOUT	24	24	24	crystal oscillator output
XTALIN	25	25	25	crystal oscillator input
P1.5	26	26	26	port 1.5
P3.3/ADC3/PWM3	27	27	27	port 3.3 or ADC3 input or PWM3 output
P3.2/ADC2/PWM2	28	28	28	port 3.2 or ADC2 input or PWM2 output
P3.1/ADC1/PWM1	29	29	29	port 3.1 or ADC1 input or PWM1 output
P3.0/ADC0/PWM0	30	30	30	port 3.0 or ADC0 input or PWM0 output
P2.1/PWM0	31	31	31	port 2.1 or PWM0 output
P2.0/TPWM	32	32	32	port 2.0 or Tuning PWM output
VDDP(3.3V)	33	33	33	supply to periphery (3.3V)
P1.7/SDA	34	34	34	port 1.7 or I2C-bus data line
P1.6/SCL	35	35	35	port 1.6 or I2C-bus clock line
P1.3/T1	36	36	36	port 1.3 or Counter/Timer 1 input
P1.1/T0	37	37	37	port 1.1 or Counter/Timer 0 input
P1.0/INT1	38	38	38	port 1.0 or external interrupt 1
INT0/P0.5	39	39	39	external interrupt 0 or port 0.5 (4 mA current sinking capability for direct drive of LEDs)
VDDC(3.3V)	40	40	40	supply

Table 6: Pinning information

SYMBOL	SDIP64			DESCRIPTION
	AV-110 Mono-110	AV-90	Mono-90	
GND5	41	41	41	ground
VPE	42	42	42	OTP Programming Voltage
VDDA1(3.3V)	43	43	43	supply voltage
BO/PBOUT	44	44	–	Blue output / P_B output
BO	–	–	44	Blue output
GO/YOUT	45	45	–	Green output / Y output
GO	–	–	45	Green output
RO/PROUT	46	46	–	Red output / P_R output
RO	–	–	46	Red output
BLKIN/VGUARD/SVM [1][6]	47	–	–	black current input / vertical guard / scan velocity modulation output
BLKIN/VGUARD [1][6]	–	47	47	black current input / vertical guard
BCLIN	48	48	48	beam current limiter input
B3/P_B3	49	49	49	3rd B input / P_B input
G3/Y3/CVBS3/Y3 [1]	50	50	50	3rd G input / Y input / CVBS input / Y input
R3/P_R3/C2/C3/C4 [1]	51	51	51	3rd R input / P_R input / C2/3/4 input
YOUT	52	52	52	Y-output (for YUV interface)
YSYNC	53	53	53	Y-input for sync separator
VP3	54	54	54	supply voltage (5 V)
GND3	55	55	55	ground connection
HOUT	56	56	56	horizontal output
FBISO/SANDCA	57	57	57	flyback input/sandcastle output
AUDOUTSM2/LSR	58	58	58	audio output for audio power amplifier (right signal) or fixed audio output for mono applications
AUDOUTLSM1/LSL	59	59	59	audio output for audio power amplifier (left signal) or speaker output for mono applications
C2/C3/C4/AUDIOIN5R [1]	60	60	-	chroma-2/3/4 input / audio 5 right input
C2/C3/C4	–	–	60	chroma-2/3/4 input
AUDIOIN3/IN1R [5]	61	61	61	audio 3 input / right stereo input
CVBS2/Y2	62	62	62	CVBS2/Y2 input
AUDIOIN2/IN1L/SSIF [4][5]	63	63	63	audio 2 input / left stereo input / sound IF input
CVBS4/Y4/AUDIOIN5L [1]	64	64	–	CVBS4/Y4 input / audio 5 left input
CVBS4/Y4	–	–	64	CVBS4/Y4 input

[1] The function of these pins is dependent on some I²C-bus control bits. More details are given in Table 7.

[2] The function of this pin is selected by means of the CMB2-0 bits

[3] The function of this pin is selected by means of the SVO1-0 bits

[4] The SSIF input is selected by means of the SSIFM bit

[5] The choice between two mono inputs or one stereo input is realized by means of the bits SAS3-0

[6] The black current input, vertical guard input and SVM output (AV-110/90 and Mono-110 versions) have been combined on this pin. For a reliable operation of the protection system and the black current stabilization system or SVM system, the end of the vertical guard protection pulse during normal operation should not overlap the measuring pulses. Therefore this pulse must end before line 14.

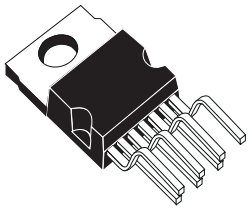
STV8172A

Vertical Deflection Booster for 3-A_{PP} TV/Monitor Applications with 75-V Flyback Generator

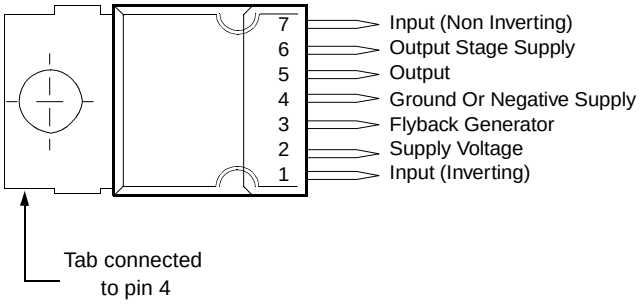
PRODUCT PREVIEW

Main Features

- **Power Amplifier**
- **Flyback Generator**
- **Stand-by Control**
- **Output Current up to 3 App**
- **Thermal Protection**



HEPTAWATT
(Plastic Package)
ORDER CODE: STV8172A



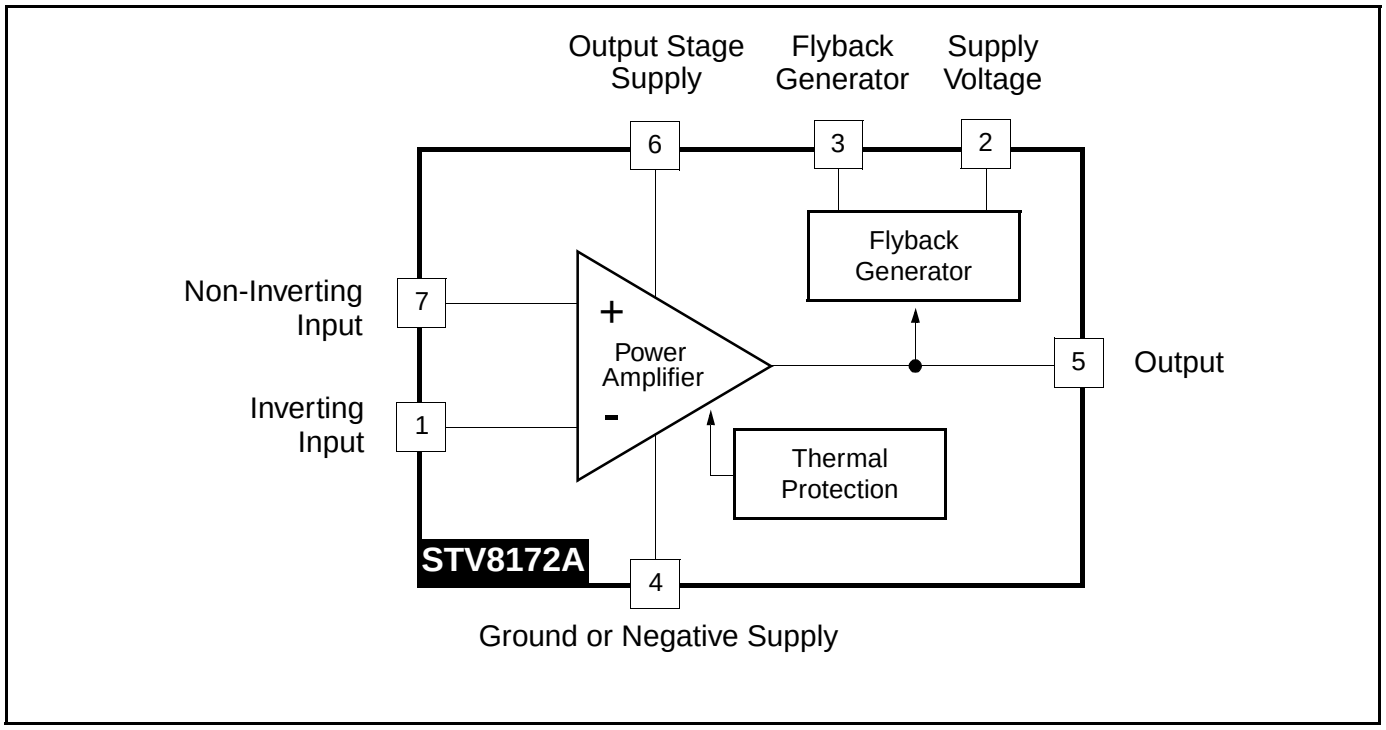
Description

The STV8172A is a vertical deflection booster designed for TV and monitor applications.

This device, supplied with up to 35 V, provides up to 2.5 App output current to drive the vertical deflection yoke.

The internal flyback generator delivers flyback voltages up to 75 V.

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



1 Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
Voltage			
V_S	Supply Voltage (pin 2) - Note 1 and Note 2	40	V
V_5, V_6	Flyback Peak Voltage - Note 2	70	V
V_3	Voltage at Pin 3 - Note 2, Note 3 and Note 6	-0.4 to (V_S + 3)	V
V_1, V_7	Amplifier Input Voltage - Note 2, Note 6 and Note 7	- 0.4 to (V_S + 2) or +40	V
Current			
I_0 (1)	Output Peak Current at f = 50 to 200 Hz, t ≤ 10µs - Note 4	±5	A
I_0 (2)	Output Peak Current non-repetitive - Note 5	±2	A
I_3 Sink	Sink Current, t<1ms - Note 3	2	A
I_3 Source	Source Current, t < 1ms	2	A
I_3	Flyback pulse current at f=50 to 200 Hz, t≤10µs - Note 4	±5	A
ESD Susceptibility			
ESD1	Human body model (100 pF discharged through 1.5 kΩ)	2	kV
ESD2	EIAJ Standard (200 pF discharged through 0 Ω)	300	V
Temperature			
T_s	Storage Temperature	-40 to 150	°C
T_j	Junction Temperature	+150	°C

Note:1. Usually the flyback voltage is slightly more than 2 x V_S. This must be taken into consideration when setting V_S.

2. Versus pin 4

3. V3 is higher than V_S during the first half of the flyback pulse.

4. Such repetitive output peak currents are usually observed just before and after the flyback pulse.

5. This non-repetitive output peak current can be observed, for example, during the Switch-On/Switch-Off phases. This peak current is acceptable providing the SOA is respected (Figure 8 and Figure 9).

6. All pins have a reverse diode towards pin 4, these diodes should never be forward-biased.

7. Input voltages must not exceed the lower value of either V_S + 2 or 40 volts.

2 Thermal Data

Symbol	Parameter	Value	Unit
R_{thJC}	Junction-to-Case Thermal Resistance	3	°C/W
T_T	Temperature for Thermal Shutdown	150	°C
T_J	Recommended Max. Junction Temperature	120	°C

3 Electrical Characteristics

(V_S = 34 V, T_{AMB} = 25°C, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit	Fig.
Supply							
V_S	Operating Supply Voltage Range (V_2-V_4)	Note 8	10		35	V	
I_2	Pin 2 Quiescent Current	I_3 = 0, I_5 = 0		5	20	mA	1
I_6	Pin 6 Quiescent Current	I_3 = 0, I_5 = 0, V_6 =35v	8	19	50	mA	1
Input							
I_1	Input Bias Current	V_1 = 1 V, V_7 = 2.2 V		- 0.6	-1.5	µA	1
I_7	Input Bias Current	V_1 = 2.2 V, V_7 = 1 V		- 0.6	-1.5	µA	
V_{IR}	Operating Input Voltage Range		0		V_S - 2	V	
V_{I0}	Offset Voltage			2		mV	
$\Delta V_{I0}/dt$	Offset Drift versus Temperature			10		µV/°C	
Output							
I_0	Operating Peak Output Current	0^o<Tcase<125^oC			±1.5	A	
V_{5L}	Output Saturation Voltage to pin 4	I_5 = 1.5 A		1	1.7	V	3
V_{5H}	Output Saturation Voltage to pin 6	I_5 = -1.5 A		1.8	2.3	V	2
Stand-by							
V_{5STBY}	Output Voltage in Stand-by	V_1 = V_7 = V_S = 0 See Note 9	V_S - 2			V	
Miscellaneous							
G	Voltage Gain		80			dB	
V_{D5-6}	Diode Forward Voltage Between pins 5-6	I_5 = 1.5 A		1.8	2.3	V	
V_{D3-2}	Diode Forward Voltage between pins 3-2	I_3 = 1.5 A		1.6	2.2	V	
V_{3SL}	Saturation Voltage on pin 3	I_3 = 20 mA		0.4	1	V	3
V_{3SH}	Saturation Voltage to pin 2 (2nd part of flyback)	I_3 = -1.5 A		2.1	2.8	V	

8. *In normal applications, the peak flyback voltage is slightly greater than 2 x (V_S - V_4). Therefore, (V_S - V_4) = 35 V is not allowed without special circuitry.*
9. *Refer to Figure 4, Stand-by condition.*

Figure 1: Measurement of I_1, I_2 and I_6

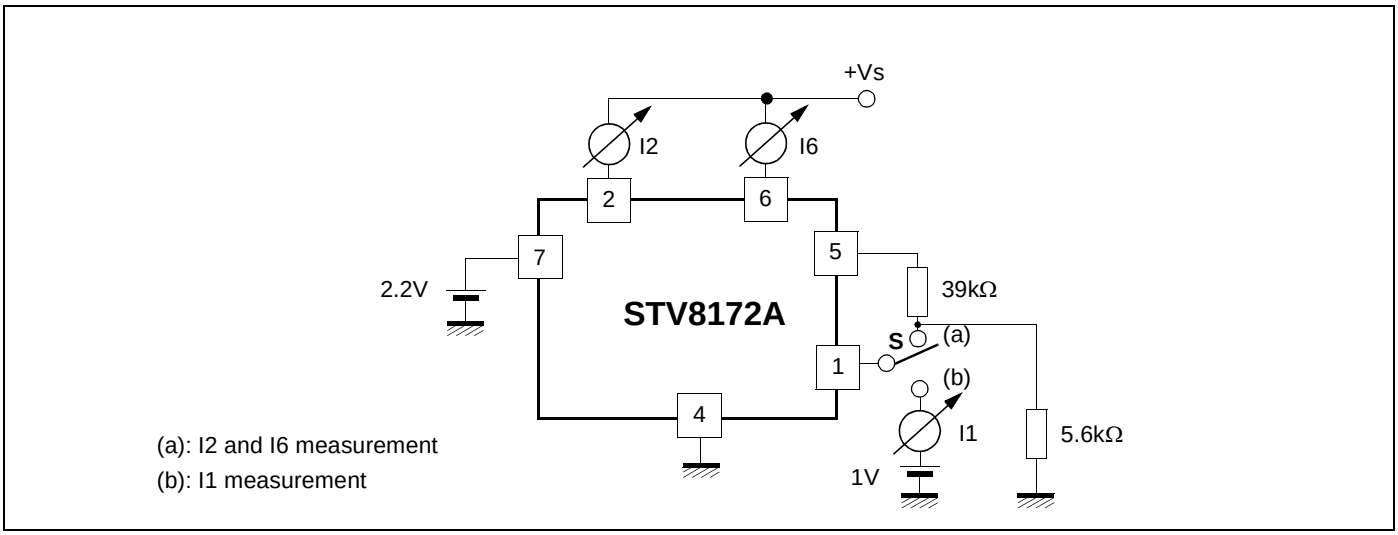


Figure 2: Measurement of V_{5H}

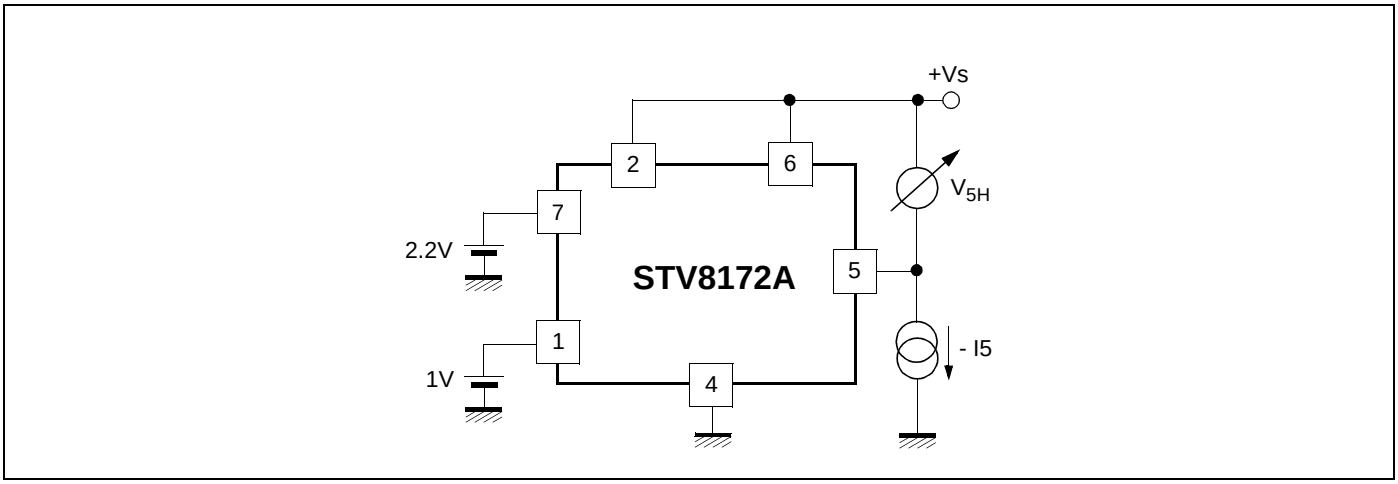
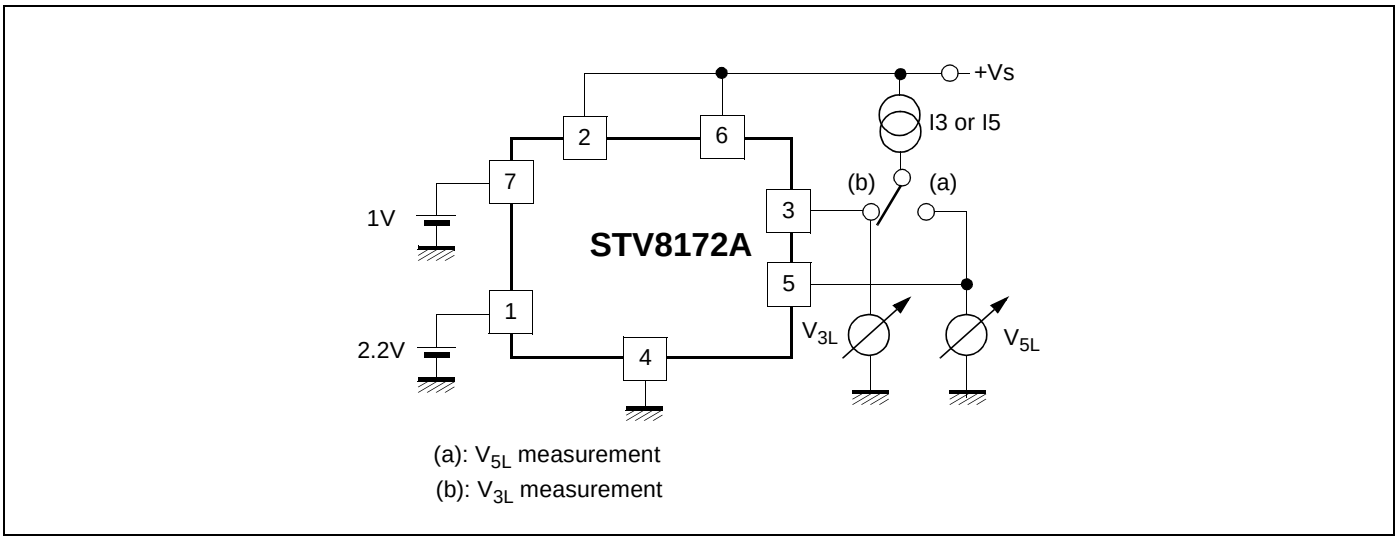


Figure 3: Measurement of V_{3L} and V_{5L}



4 Application Hints

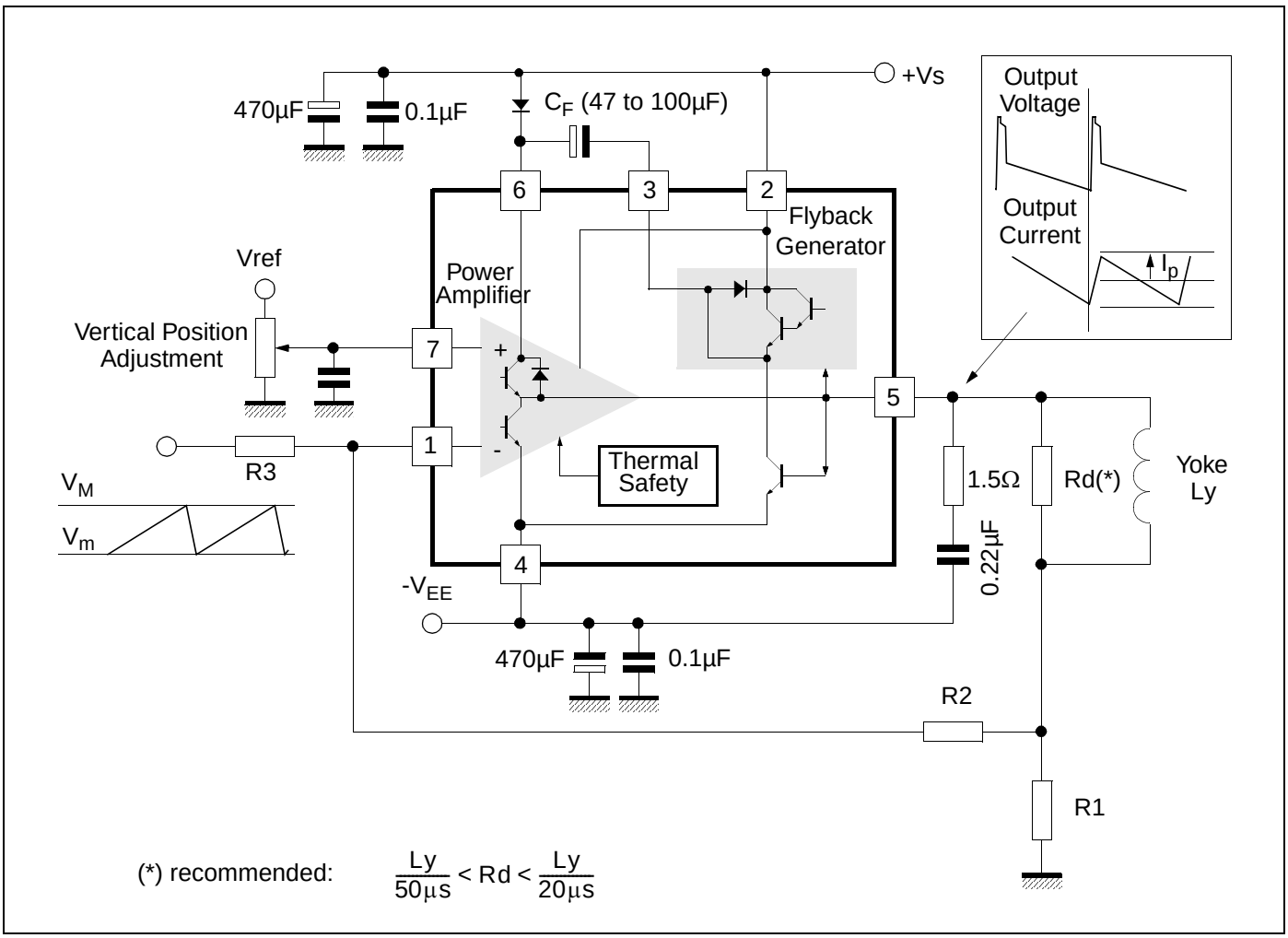
The yoke can be coupled either in AC or DC.

4.1 DC-coupled Application

When DC coupled (see Figure 4), the display vertical position can be adjusted with input bias. On the other hand, 2 supply sources (V_S and $-V_{EE}$) are required.

A Stand-by state will be reached by switching OFF the positive supply alone. In this state, where both inputs are the same voltage as pin 2 or higher, the output will sink negligible current from the deviation coil.

Figure 4: DC-coupled Application



4.1.1 Application Hints

For calculations, treat the IC as an op-amp, where the feedback loop maintains $V_1 = V_7$.

4.1.1.1 Centering

Display will be centered (null mean current in yoke) when voltage on pin 7 is (R_1 is negligible):

$$V_7 = \frac{V_M + V_m}{2} \times \left(\frac{R_2}{R_2 + R_3} \right)$$

4.1.1.2 Peak Current

$$I_P = \frac{(V_M - V_m)}{2} \times \frac{R_2}{R_1 x R_3}$$

Example: for V_m = 2 V, V_M = 5 V and I_P = 1 A

Choose R_1 in the1 Ω range, for instance R_1=1 Ω

From equation of peak current: $\frac{R_2}{R_3} = \frac{2 \times I_P \times R_1}{V_M - V_m} = \frac{2}{3}$

Then choose R_2 or R_3. For instance, if R_2 = 10 kΩ, then R_3 = 15 kΩ

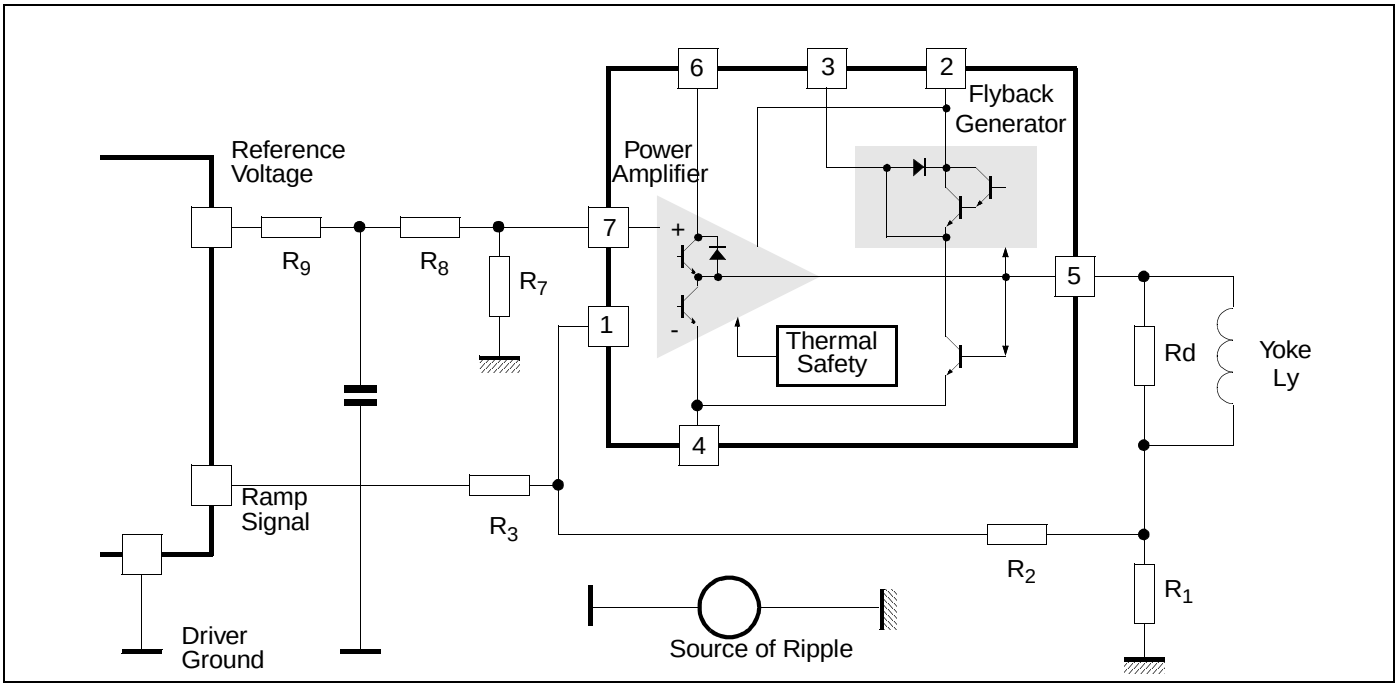
Finally, the bias voltage on pin 7 should be:

$$V_7 = \frac{V_M + V_m}{2} \times \frac{1}{1 + \frac{R_3}{R_2}} = \frac{7}{2} \times \frac{1}{2.5} = 1.4V$$

4.1.2 Ripple Rejection

When both ramp signal and bias are provided by the same driver IC, you can gain natural rejection of any ripple caused by a voltage drop in the ground (see Figure 5), if you manage to apply the same fraction of ripple voltage to both booster inputs. For that purpose, arrange an intermediate point in the bias resistor bridge, such that (R_8 / R_7) = (R_3 / R_2), and connect the bias filtering capacitor between the intermediate point and the local driver ground. Of course, R_7 should be connected to the booster reference point, which is the ground side of R_1.

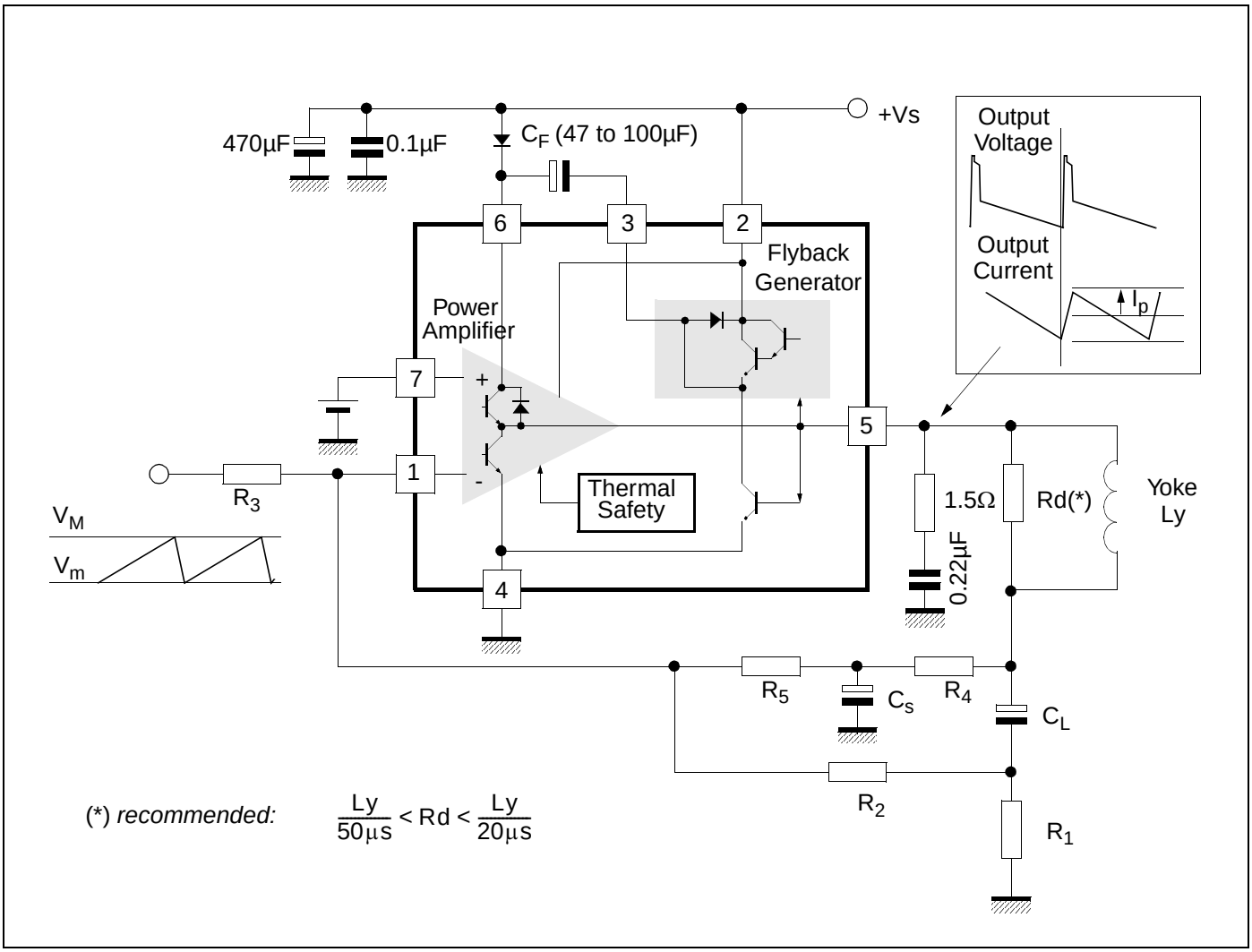
Figure 5: Ripple Rejection



4.2 AC-Coupled Applications

In AC-coupled applications (See Figure 6), only one supply (V_S) is needed. The vertical position of the scanning cannot be adjusted with input bias (for that purpose, usually some current is injected or sunk with a resistor in the low side of the yoke).

Figure 6: AC-coupled Application



4.2.1 Application Hints

Gain is defined as in the previous case:

$$I_p = \frac{V_M - V_m}{2} \times \frac{R_2}{R_1 \times R_3}$$

Choose R_1 then either R_2 or R_3. For good output centering, V_7 must fulfill the following equation:

$$\frac{\frac{V_S}{2} - V_7}{R_4 + R_5} = \frac{V_7 - \frac{V_M + V_m}{2}}{R_3} + \frac{V_7}{R_2}$$

or

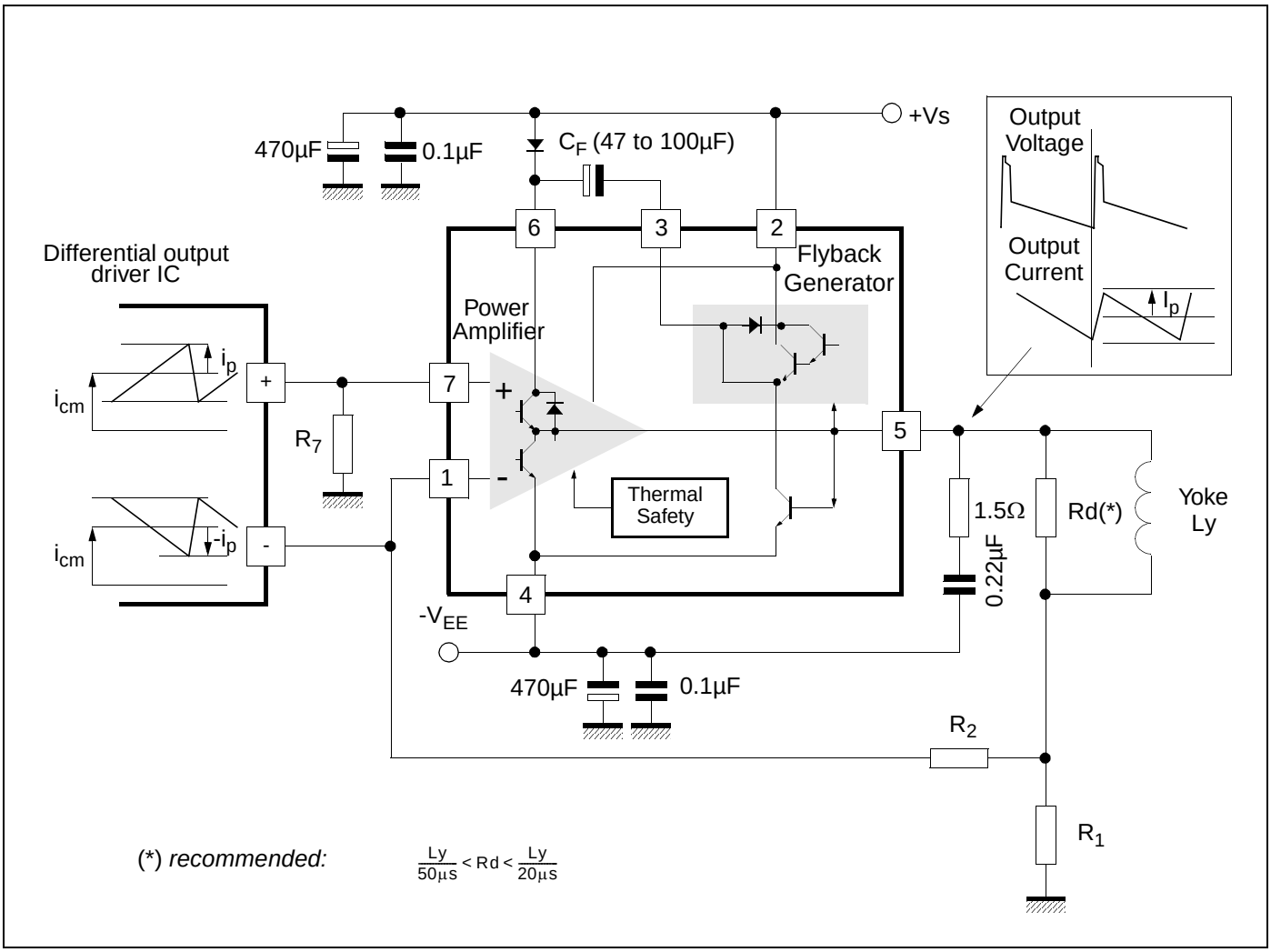
$$V_7 \times \left(\frac{1}{R_3} + \frac{1}{R_2} + \frac{1}{R_4 + R_5}\right) = \left(\frac{V_S}{2(R_4 + R_5)} + \frac{V_M + V_m}{2 \times R_3}\right)$$

C_S performs an integration of the parabolic signal on C_L, therefore the amount of S correction is set by the combination of C_L and C_S.

4.3 Application with Differential-output Drivers

Certain driver ICs provide the ramp signal in differential form, as two current sources i_+ and i_- with opposite variations.

Figure 7: Using a Differential-output Driver



Let us set some definitions:

- i_{cm} is the common-mode current: $i_{cm} = \frac{1}{2}(i_+ + i_-)$
- at peak of signal, $i_+ = i_{cm} + i_p$ and $i_- = i_{cm} - i_p$, therefore the peak differential signal is $i_p - (-i_p) = 2\,i_p$, and the peak-peak differential signal, $4i_p$.

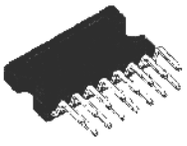
The application is described in Figure 7 with DC yoke coupling. The calculations still rely on the fact that V_1 remains equal to V_7.

TDA7266SA

7W+7W DUAL BRIDGE AMPLIFIER

- WIDE SUPPLY VOLTAGE RANGE (3.5-18V)
- MINIMUM EXTERNAL COMPONENTS
  - NO SWR CAPACITOR
  - NO BOOTSTRAP
  - NO BOUCHEROT CELLS
  - INTERNALLY FIXED GAIN
- STAND-BY & MUTE FUNCTIONS
- SHORT CIRCUIT PROTECTION
- THERMAL OVERLOAD PROTECTION

TECHNOLOGY BI20II



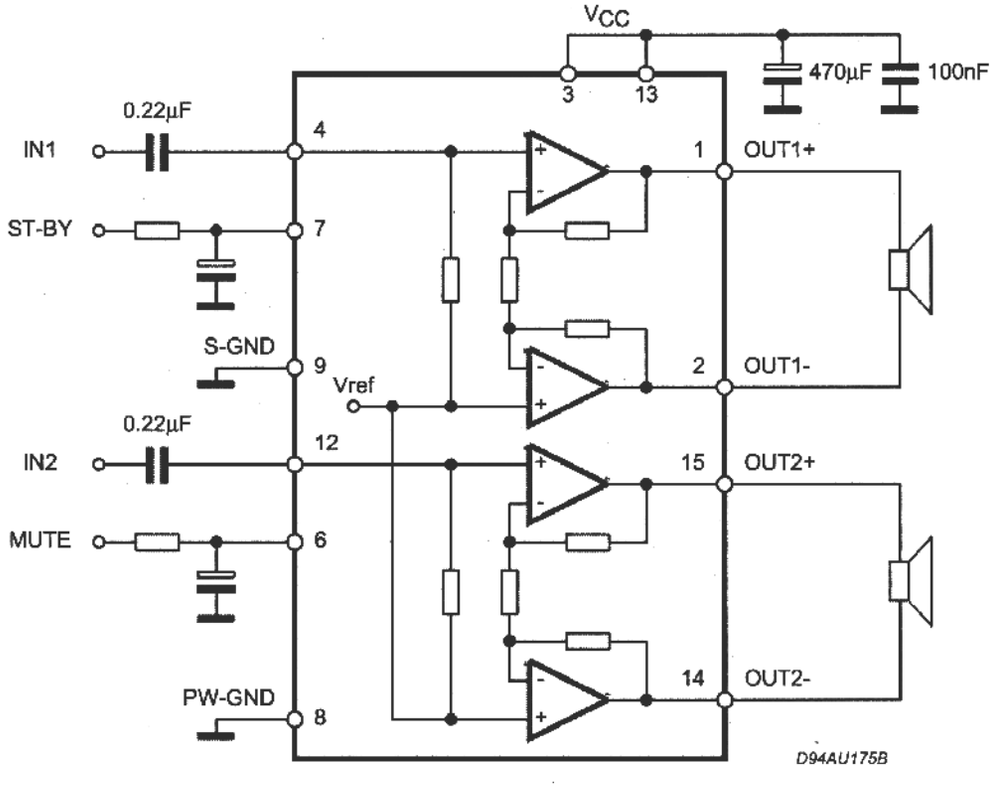
CLIPWATT15
ORDERING NUMBER: TDA7266SA

DESCRIPTION

The TDA7266SA is a dual bridge amplifier specially designed for LCD Monitor, PC Motherboard, TV and Portable Radio applications.

Pin to pin compatible with: TDA7266S, TDA7266, TDA7266M, TDA7266MA, TDA7266B, TDA7297SA & TDA7297.

BLOCK AND APPLICATION DIAGRAM



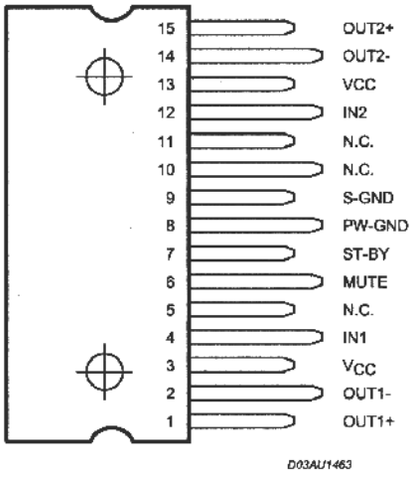
ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_s	Supply Voltage	20	V
I_O	Output Peak Current (internally limited)	2	A
T_{op}	Operating Temperature	0 to 70	°C
T_{stg}, T_j	Storage and Junction Temperature	-40 to 150	°C

THERMAL DATA

Symbol	Parameter	Value	Unit
$R_{th\ j\text{-}case}$	Thermal Resistance Junction-case	3	°C/W

PIN CONNECTION (Top view)



ELECTRICAL CHARACTERISTCS

(V_{CC} = 11V, R_L = 8Ω, f = 1KHz, T_{amb} = 25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_{CC}	Supply Range		3	11	18	V
I_q	Total Quiescent Current			50	65	mA
V_{OS}	Output Offset Voltage				120	mV
P_O	Output Power	THD 10%	6.3	6		W
THD	Total Harmonic Distortion	P_O = 1W		0.05	0.2	%
		P_O = 0.1W to 2W f = 100Hz to 15KHz			1	%
SVR	Supply Voltage Rejection	f = 100Hz, VR =0.5V	40	56		dB
CT	Crosstalk		46	60		dB
A_{MUTE}	Mute Attenuation		60	80		dB
T_w	Thermal Threshold			150		°C
G_V	Closed Loop Voltage Gain		25	26	27	dB
ΔG_V	Voltage Gain Matching				0.5	dB

ELECTRICAL CHARACTERISTCS (continued)
(V_{CC} = 11V, R_L = 8Ω, f = 1KHz, T_{amb} = 25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
R_i	Input Resistance		25	30		KΩ
VT_{MUTE}	Mute Threshold	for V_{CC} > 6.4V; Vo = -30dB	2.3	2.9	4.1	V
		for V_{CC} < 6.4V; Vo = -30dB	$V_{CC}/2$ -1	$V_{CC}/2$ -075	$V_{CC}/2$ -0.5	V
VT_{ST-BY}	St-by Threshold		0.8	1.3	1.8	V
I_{ST-BY}	St-by Current V6 = GND				100	µA
e_N	Total Output Voltage	A Curve; f = 20Hzto 20KHz		150		µV

APPLICATION SUGGESTION

STAND-BY AND MUTE FUNCTIONS

(A) Microprocessor Application

In order to avoid annoying "Pop-Noise" during Turn-On/Off transients, it is necessary to guarantee the right St-by and mute signals sequence. It is quite simple to obtain this function using a microprocessor (Fig. 1 and 2).

At first St-by signal (from µP) goes high and the voltage across the St-by terminal (Pin 7) starts to increase exponentially. The external RC network is intended to turn-on slowly the biasing circuits of the amplifier, this to avoid "POP" and "CLICK" on the outputs.

When this voltage reaches the St-by threshold level, the amplifier is switched-on and the external capacitors in series to the input terminals (C3, C53) start to charge.

It's necessary to mantain the mute signal low until the capacitors are fully charged, this to avoid that the device goes in play mode causing a loud "Pop Noise" on the speakers.

A delay of 100-200ms between St-by and mute signals is suitable for a proper operation.

Figure 1. Microprocessor Application