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Service Manual

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1. Technical Specifications, Connections, and Chassis Overview

Index of this chapter:

- 1.1 Technical Specifications
- 1.2 Connection Overview
- 1.3 Chassis Overview (Mechanical chassis)

Note: Data below can deviate slightly from the actual situation, due to the different set executions.

1.1 Technical Specifications

1.1.1 Vision

Display type	: CRT
Screen size	: 21" (55 cm), 4:3
Tuning system	: PLL
TV Colour systems	: PAL B/G, D/K, I
Video playback	: NTSC M/N 3.58, 4.43
	: PAL 50
Presets/channels	: 200 channels
Tuner bands	: VHF
	: UHF

1.1.2 Sound

Sound systems	: FM-stereo
Maximum power (W_{RMS})	: 2 x 3

1.1.3 Miscellaneous

Power supply:	
- Mains voltage (V_{AC})	: 160 - 260 (/93)
	: 90 - 260 (/94)
- Mains frequency (Hz)	: 50 / 60
Ambient conditions:	
- Temperature range (°C)	: -5 to +45
- Maximum humidity	: 90% R.H.
Power consumption	
- Normal operation (W)	: \approx 62
- Stand-by (W)	: < 3

1.2 Connection Overview

Note: The following connector colour abbreviations are used (acc. to DIN/IEC 757): Bk= Black, Bu= Blue, Gn= Green, Gy= Grey, Rd= Red, Wh= White, and Ye= Yellow.

1.2.1 Rear and Side Connections

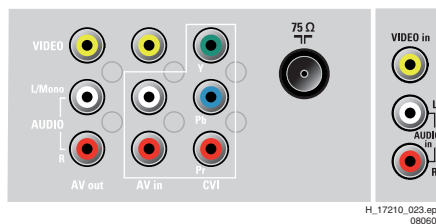


Figure 1-1 Rear and Side Connections

Cinch: Video CVBS - Out, Audio - Out

Ye - Video CVBS	1 V_{PP} / 75 ohm	⊕→⊙
Wh - Audio L	0.5 V_{RMS} / 10 kohm	⊕→⊙
Rd - Audio R	0.5 V_{RMS} / 10 kohm	⊕→⊙

Cinch: Video CVBS - In, Audio - In

Ye - Video CVBS	1 V_{PP} / 75 ohm	⊕→⊙
Wh - Audio L	0.5 V_{RMS} / 10 kohm	⊕→⊙
Rd - Audio R	0.5 V_{RMS} / 10 kohm	⊕→⊙

Cinch: Video YPbPr - In

Gn - Video Y	1 V_{PP} / 75 ohm	⊕→⊙
Bu - Video Pb	0.7 V_{PP} / 75 ohm	⊕→⊙
Rd - Video Pr	0.7 V_{PP} / 75 ohm	⊕→⊙

Aerial - In

- IEC-type (EU)	Coax, 75 ohm	⊥
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Cinch: Video CVBS - In, Audio - In

Ye - Video CVBS	1 V_{PP} / 75 ohm	⊕→⊙
Wh - Audio L	0.5 V_{RMS} / 10 kohm	⊕→⊙
Rd - Audio R	0.5 V_{RMS} / 10 kohm	⊕→⊙

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1.3 Chassis Overview (Mechanical chassis)

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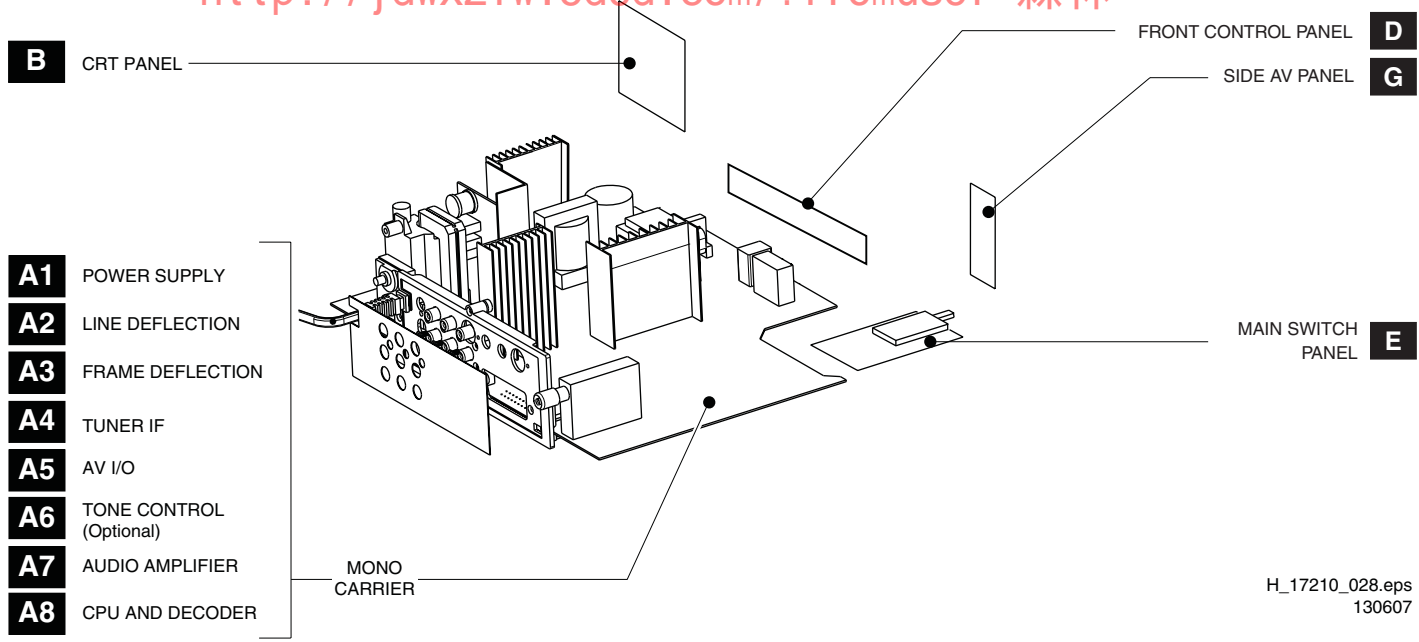


Figure 1-2 PWB location

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2. Safety Instructions, Warnings, and Notes

Index of this chapter:

- 2.1 Safety Instructions
- 2.2 Maintenance Instructions
- 2.3 Warnings
- 2.4 Notes

1. Perform the "general repair instruction" noted above.
2. Clean the power supply and deflection circuitry on the chassis.
3. Clean the picture tube panel and the neck of the picture tube.

2.1 Safety Instructions

Safety regulations require the following **during** a repair:

- Connect the set to the Mains/AC Power via an isolation transformer (> 800 VA).
- Replace safety components, indicated by the symbol ▲, only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard.
- Wear safety goggles when you replace the CRT.

Safety regulations require that **after** a repair, the set must be returned in its original condition. Pay in particular attention to the following points:

- General repair instruction: as a strict precaution, we advise you to re-solder the solder connections through which the horizontal deflection current flows. In particular this is valid for the:
 1. Pins of the line output transformer (LOT).
 2. Fly-back capacitor(s).
 3. S-correction capacitor(s).
 4. Line output transistor.
 5. Pins of the connector with wires to the deflection coil.
 6. Other components through which the deflection current flows.

Note: This re-soldering is advised to prevent bad connections due to metal fatigue in solder connections, and is therefore only necessary for television sets more than two years old.

- Route the wire trees and EHT cable correctly and secure them with the mounted cable clamps.
- Check the insulation of the Mains/AC Power lead for external damage.
- Check the strain relief of the Mains/AC Power cord for proper function, to prevent the cord from touching the CRT, hot components, or heat sinks.
- Check the electrical DC resistance between the Mains/AC Power plug and the secondary side (only for sets that have a Mains/AC Power isolated power supply):
 1. Unplug the Mains/AC Power cord and connect a wire between the two pins of the Mains/AC Power plug.
 2. Set the Mains/AC Power switch to the "on" position (keep the Mains/AC Power cord unplugged!).
 3. Measure the resistance value between the pins of the Mains/AC Power plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be between 4.5 Mohm and 12 Mohm.
 4. Switch "off" the set, and remove the wire between the two pins of the Mains/AC Power plug.
- Check the cabinet for defects, to prevent touching of any inner parts by the customer.

2.2 Maintenance Instructions

We recommend a maintenance inspection carried out by qualified service personnel. The interval depends on the usage conditions:

- When a customer uses the set under normal circumstances, for example in a living room, the recommended interval is three to five years.
- When a customer uses the set in an environment with higher dust, grease, or moisture levels, for example in a kitchen, the recommended interval is one year.
- The maintenance inspection includes the following actions:

2.3 Warnings

- In order to prevent damage to ICs and transistors, avoid all high voltage flashovers. In order to prevent damage to the picture tube, use the method shown in figure "Discharge picture tube", to discharge the picture tube. Use a high voltage probe and a multi-meter (position V_{DC}). Discharge until the meter reading is 0 V (after approx. 30 s).

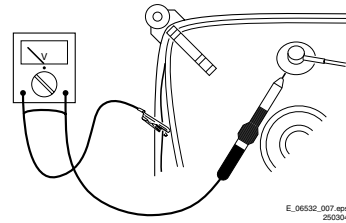


Figure 2-1 Discharge picture tube

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD ▲). Careless handling during repair can reduce life drastically. Make sure that, during repair, you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential. Available ESD protection equipment:
 - Complete kit ESD3 (small tablemat, wristband, connection box, extension cable and earth cable) 4822 310 10671.
 - Wristband tester 4822 344 13999.
- Be careful during measurements in the high voltage section.
- Never replace modules or other components while the unit is switched "on".
- When you align the set, use plastic rather than metal tools. This will prevent any short circuits and prevents circuits from becoming unstable.

2.4 Notes

2.4.1 General

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground (\perp), or hot ground (\downarrow), depending on the tested area of circuitry. The voltages and waveforms shown in the diagrams are indicative. Measure them in the Service Default Mode (see chapter 5) with a colour bar signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 475.25 MHz for PAL, or 61.25 MHz for NTSC (channel 3).
- Where necessary, measure the waveforms and voltages with (\square) and without (\times) aerial signal. Measure the voltages in the power supply section both in normal operation (\textcircled{D}) and in stand-by (\textcircled{S}). These values are indicated by means of the appropriate symbols.
- The semiconductors indicated in the circuit diagram and in the parts lists, are interchangeable per position with the semiconductors in the unit, irrespective of the type indication on these semiconductors.
- Manufactured under license from Dolby Laboratories. "Dolby", "Pro Logic" and the "double-D symbol", are trademarks of Dolby Laboratories.

2.4.2 Schematic Notes

- All resistor values are in ohms, and the value multiplier is often used to indicate the decimal point location (e.g. 2K2 indicates 2.2 kohm).
- Resistor values with no multiplier may be indicated with either an "E" or an "R" (e.g. 220E or 220R indicates 220 ohm).
- All capacitor values are given in micro-farads ($\mu = \times 10^{-6}$), nano-farads ($n = \times 10^{-9}$), or pico-farads ($p = \times 10^{-12}$).
- Capacitor values may also use the value multiplier as the decimal point indication (e.g. 2p2 indicates 2.2 pF).
- An "asterisk" (*) indicates component usage varies. Refer to the diversity tables for the correct values.
- The correct component values are listed in the Spare Parts List. Therefore, always check this list when there is any doubt.

2.4.3 Lead-free Soldering

Due to lead-free technology some rules have to be respected by the workshop during a repair:

- Use only lead-free soldering tin Philips SAC305 with order code 0622 149 00106. If lead-free solder paste is required, please contact the manufacturer of your soldering equipment. In general, use of solder paste within workshops should be avoided because paste is not easy to store and to handle.
- Use only adequate solder tools applicable for lead-free soldering tin. The solder tool must be able:
 - To reach a solder-tip temperature of at least 400°C.
 - To stabilize the adjusted temperature at the solder-tip.
 - To exchange solder-tips for different applications.
- Adjust your solder tool so that a temperature of around 360°C - 380°C is reached and stabilized at the solder joint. Heating time of the solder-joint should not exceed ~ 4 sec. Avoid temperatures above 400°C, otherwise wear-out of tips will increase drastically and flux-fluid will be destroyed. To avoid wear-out of tips, switch "off" unused equipment or reduce heat.
- Mix of lead-free soldering tin/parts with leaded soldering tin/parts is possible but PHILIPS recommends strongly to **avoid** mixed regimes. If this cannot be avoided, carefully clear the solder-joint from old tin and re-solder with new tin.

2.4.4 Alternative BOM identification

In September 2003, Philips CE introduced a change in the way the serial number (or production number, see Figure 2-2) is composed. From this date on, the **third digit** in the serial number (example: AG2B0335000001) indicates the number of the alternative BOM (Bill of Materials used for producing the specific model of TV set). It is possible that the same TV model on the market is produced with e.g. two different types of displays, coming from two different O.E.M.s.

By looking at the third digit of the serial number, the service technician can see if there is more than one type of B.O.M. used in the production of the TV set he is working with. He can then consult the At Your Service Web site, where he can type in the Commercial Type Version Number of the TV set (e.g. 28PW9515/12), after which a screen will appear that gives information about the number of alternative B.O.M.s used. If the third digit of the serial number contains the number 1 (example: AG1B0335000001), then there is only one B.O.M. version of the TV set on the market. If the third digit is a 2 (example: AG2B0335000001), then there are two different B.O.M.s. Information about this is important for ordering the correct spare parts!

For the third digit, the numbers 1...9 and the characters A...Z can be used, so in total: 9 plus 26 = 35 different B.O.M.s can be indicated by the third digit of the serial number.

2.4.5 Practical Service Precautions

- **It makes sense to avoid exposure to electrical shock.** While some sources are expected to have a possible dangerous impact, others of quite high potential are of limited current and are sometimes held in less regard.
- **Always respect voltages.** While some may not be dangerous in themselves, they can cause unexpected reactions that are best avoided. Before reaching into a powered TV set, it is best to test the high voltage insulation. It is easy to do, and is a good service precaution.

3. Directions for Use

You can download this information from the following websites:

<http://www.philips.com/support>

<http://www.p4c.philips.com>

<http://jdwxzlw.5d6d.com/?fromuser=森林>

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4. Mechanical Instructions

Index of this chapter:

- 4.1 Set Disassembly
- 4.2 Assembly / Board Removal
- 4.3 Set Re-assembly

4.2 Assembly / Board Removal

4.2.1 Side I/O Panel removal

Note: Figures below can deviate slightly from the actual situation, due to the different set executions.

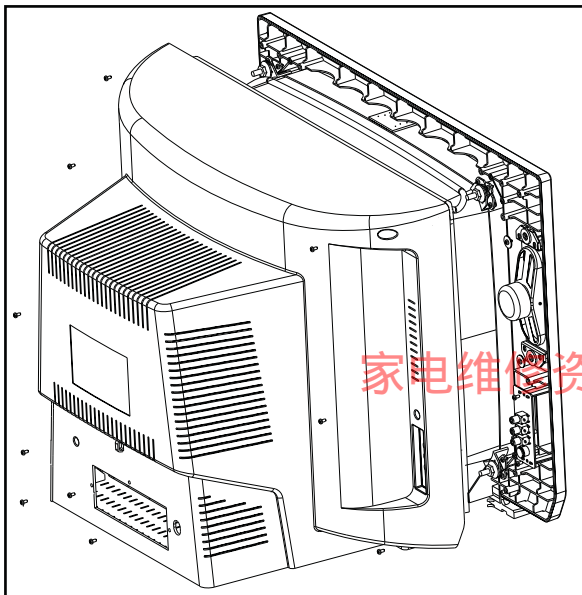
4.1 Set Disassembly

Follow the disassemble instructions in described order.

4.1.1 Rear Cover Removal

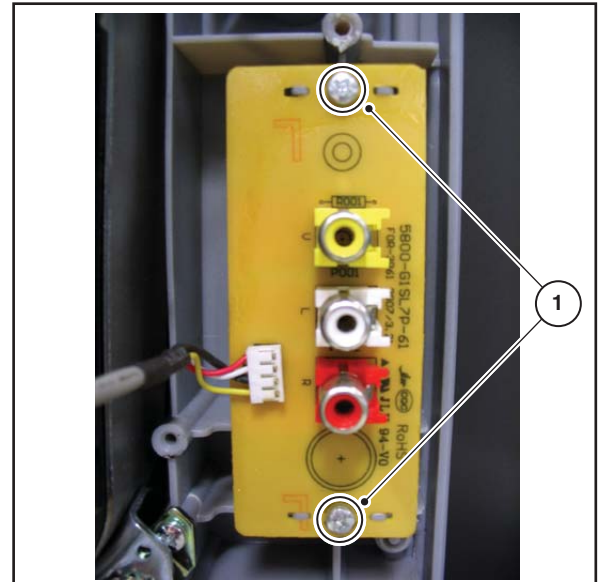
Warning: disconnect the mains power cord before you remove the rear cover.

1. Remove all the fixation screws of the rear cover.
2. Now, pull the rear cover backwards and remove it.



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Figure 4-1 Rear Cover removal

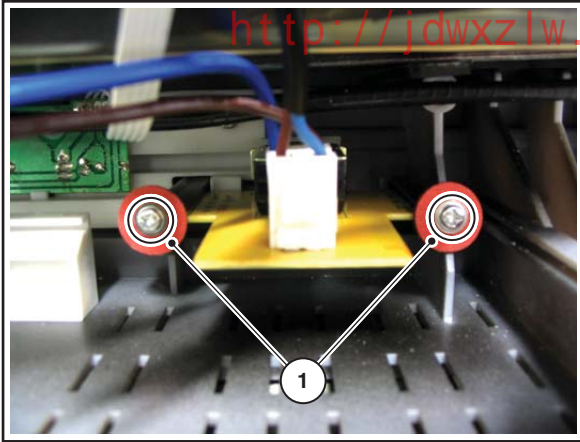


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Figure 4-2 Side-I/O panel removal

1. Disconnect the sidepanel cable from the mono carrier and remove the cable from it's strain reliefs.
2. Then, remove the two fixation screws (1) and remove the board.

4.2.2 Power Switch removal

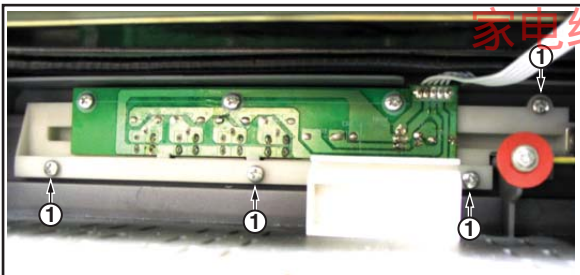


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Figure 4-3 Power switch removal

1. From the mono carrier disconnect the main power, the degaussing coil, the speakers, the front control panel, the side I/O panel and deflection coil cables. Release the main power cord and the side I/O panel cable from its strain reliefs. Pull out the mono carrier and place it sideways. This enables the removal of the power switch panel.
2. Then, remove the two fixation screws (1) of the power switch panel and remove the board.

4.2.3 Front Control Panel removal



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Figure 4-4 Front Control Panel removal

1. From the mainboard disconnect the main power, the degaussing coil, the speakers, the front control panel, the side I/O panel and deflection coil cables. Release the main power cord and the side I/O panel cable from its strain reliefs. Pull out the mono carrier and place it sideways. This enables the removal of the front control panel.
2. Then, remove the four fixation screws (1) of the Front Control panel and remove the board.

4.3 Set Re-assembly

To re-assemble the whole set, do all processes in reverse order.

Be sure that, before the rear cover is mounted:

- The mains cord is positioned correctly in its guiding brackets (make sure that the strain reliefs are replaced in its correct position and that it will function correctly!).
- All wires/cables are returned in their original positions.

5. Service Modes, Error Codes, and Fault Finding

Index of this chapter:

- 5.1 Test Points
- 5.2 Service Modes
- 5.3 Error Codes
- 5.4 Fault Finding

5.4.6 Picture not or incorrect Coloured

- Check the circuit from IC201 to R.G.B. three gun circuit.
- Check the IC soldering and relevant circuitry on physical damage or check for defective capacitors.

5.1 Test Points

See chapter 6 "Block Diagrams, Testpoint Overviews, and Waveforms".

Perform measurements under the following conditions:

- Service Default Mode.
- Video: colour bar signal.
- Audio: 3 kHz left, 1 kHz right.

5.2 Service Modes

This chassis does not contain a specific Service Mode. Service and Alignment of the TV set can be done via the Factory Mode by the service technician, see further down in this manual.

5.3 Error Codes

Not applicable.

5.4 Fault Finding

5.4.1 Power on Failure

Check whether the power supply is working properly and whether the values of voltages normal. If those are correct, check line transistor and transformer are working properly or check fore or back line for defects.

5.4.2 Horizontal Deflection Transistor Defective: No Picture, No Sound.

To find the fault for a defect horizontal deflection transistor please check the following items:

- Over voltage to breakdown.
- Over current to burn.
- Horizontal frequency too low.
- Horizontal drive inefficient.

5.4.3 Picture Interference

- Check if the signal line contact is good.
- Change Tuner if is necessary.

5.4.4 Can't find any TV program

Checking method: Check the closed circuit from tuner to picture decoder IC to detect whether there are defective components. Or check whether the resistance of R117, R118, R203 and R204 has increased which also could cause the problem.

5.4.5 No Good Picture or Double Image

Check the correctness of the signal from IF1/IF2 to Q101 and relevant circuit. In this case the problem can be Q101 and/or SAW101.

5.4.7 Picture with Horizontal Bright Line and Sound

Check both supply voltages of vertical IC301 and relevant circuitry on correctness. Also check the vertical synchronizing signal from IC201.

5.4.8 Remote Control Malfunction

Check the voltage on pin 64 of IC201. The normal value should be 5.15 V. If this is correct check front control panels soldering connections. If can't be solved, check the remote control, crystal or transmitting diode of the remote control are in good condition.

5.4.9 No Sound

Check power supply of sound IC (IC402) and relevant circuitry (not exclude IC402 to be defective) or change speakers.

5.4.10 Poor Sound Quality

Check the sound system after searching the channel which should set at DK, I or AUTO. If still has problem, check accompany board circuit on chassis good or not.

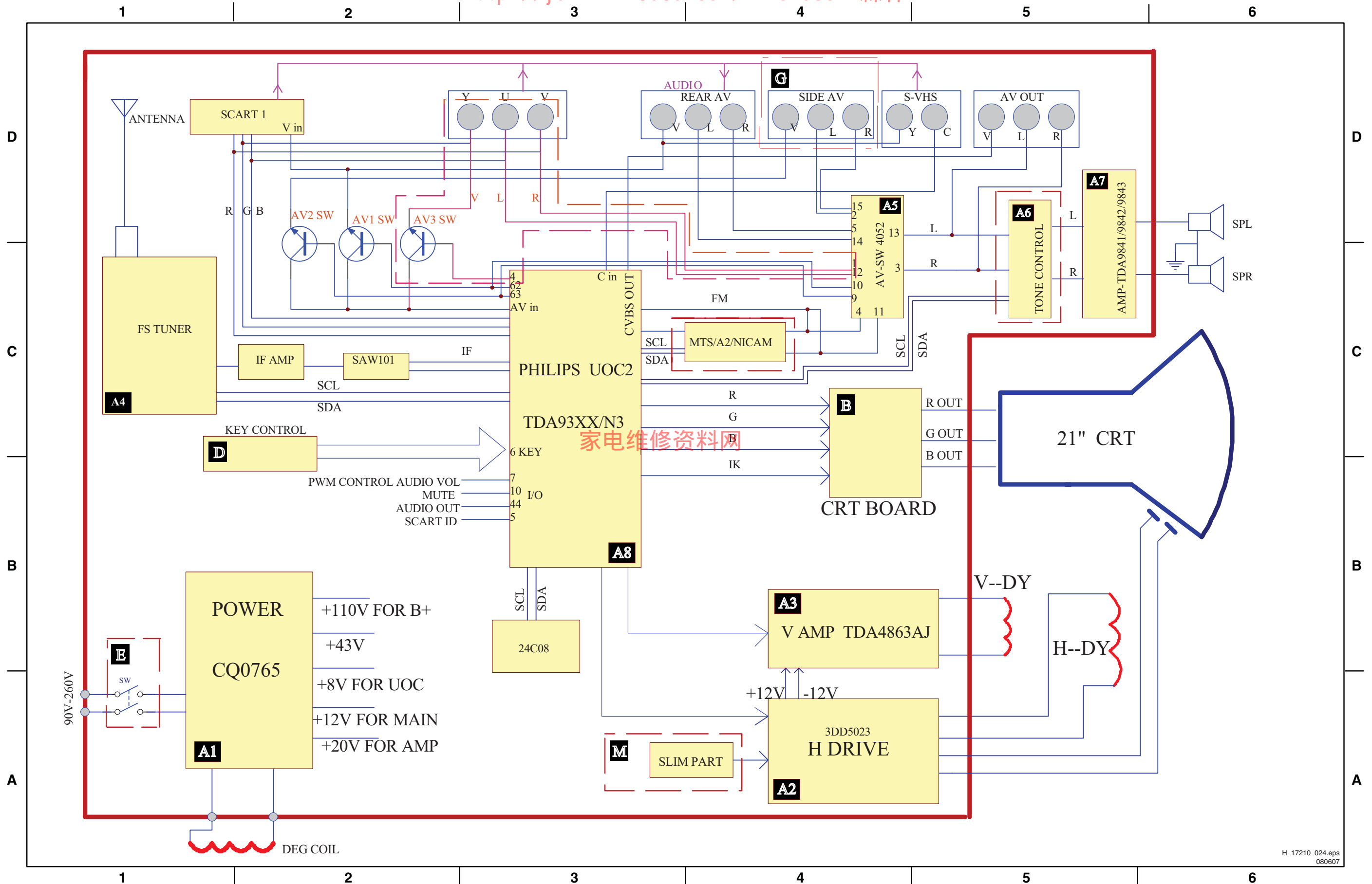
Personal Notes: <http://jdwxyzlw.5d6d.com/?fromuser=森林>

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6. Block Diagrams, Test Point Overviews, and Waveforms

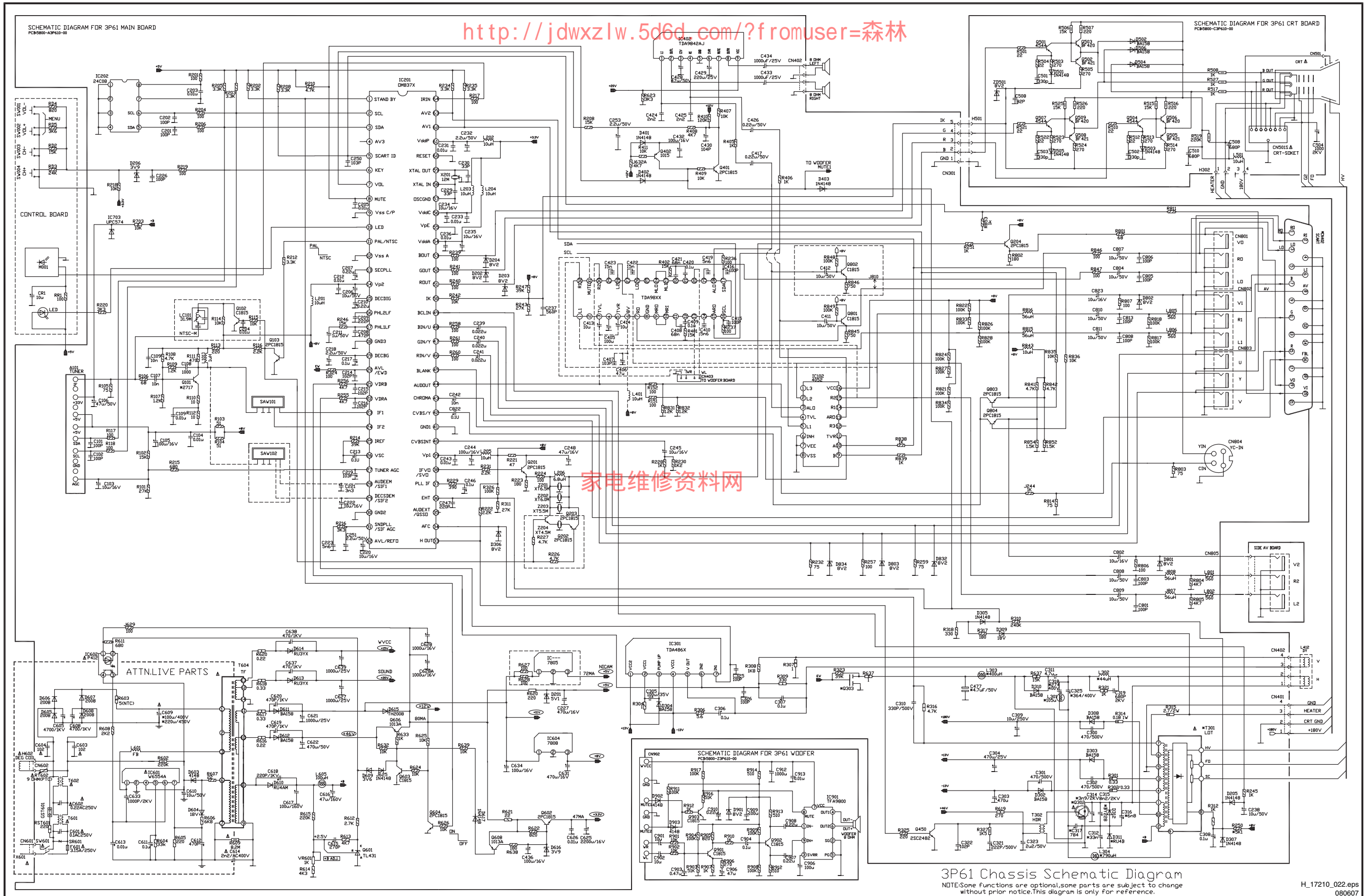
Block Diagram Chassis

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Schematic Overview Chassis



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3P61 Chassis Schematic Diagram

NOTE: Some functions are optional, some parts are subject to change without prior notice. This diagram is only for reference.

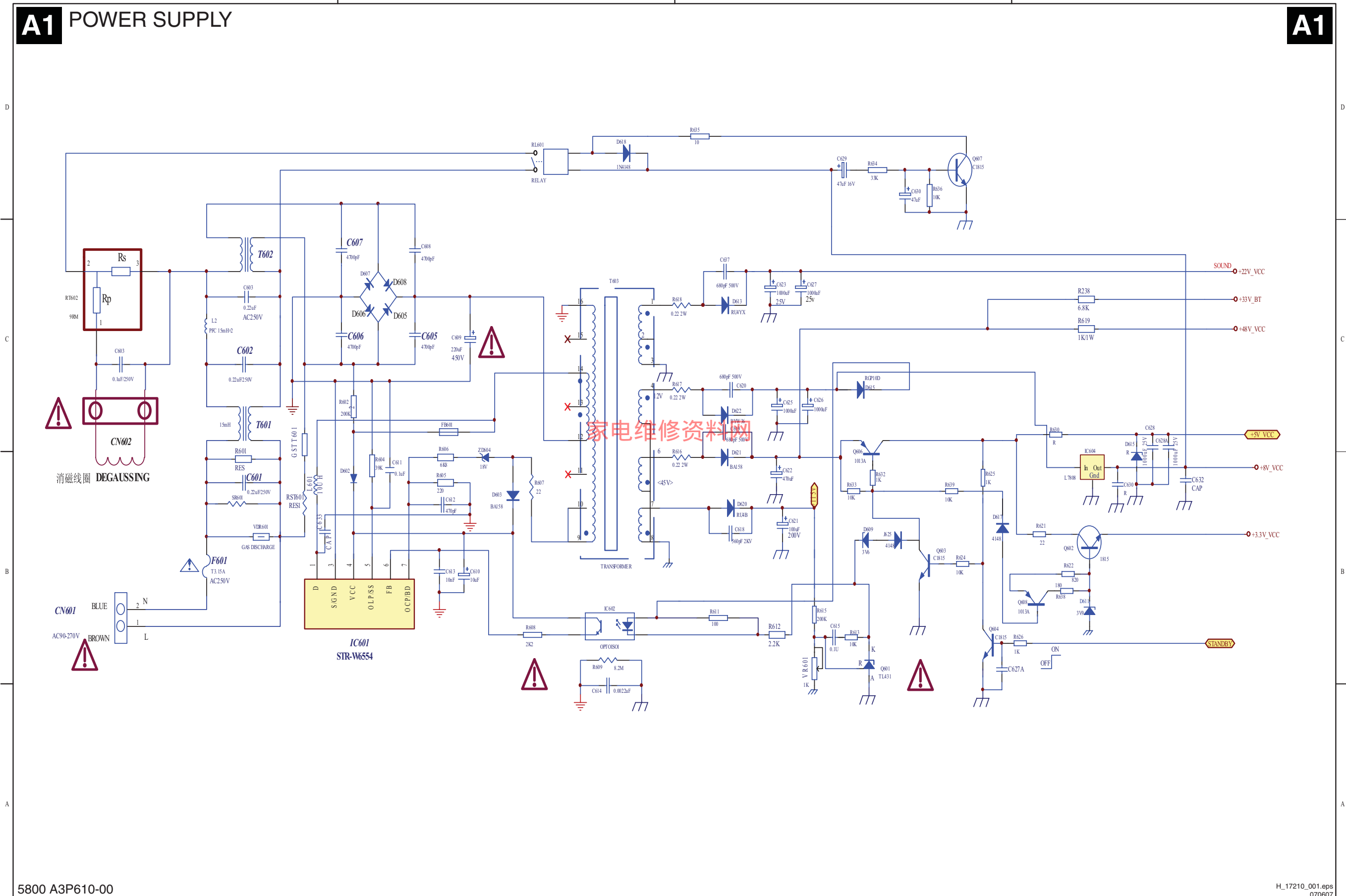
7. Circuit Diagrams and PWB Layouts

Mono Carrier: Power Supply

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A1 POWER SUPPLY

A1



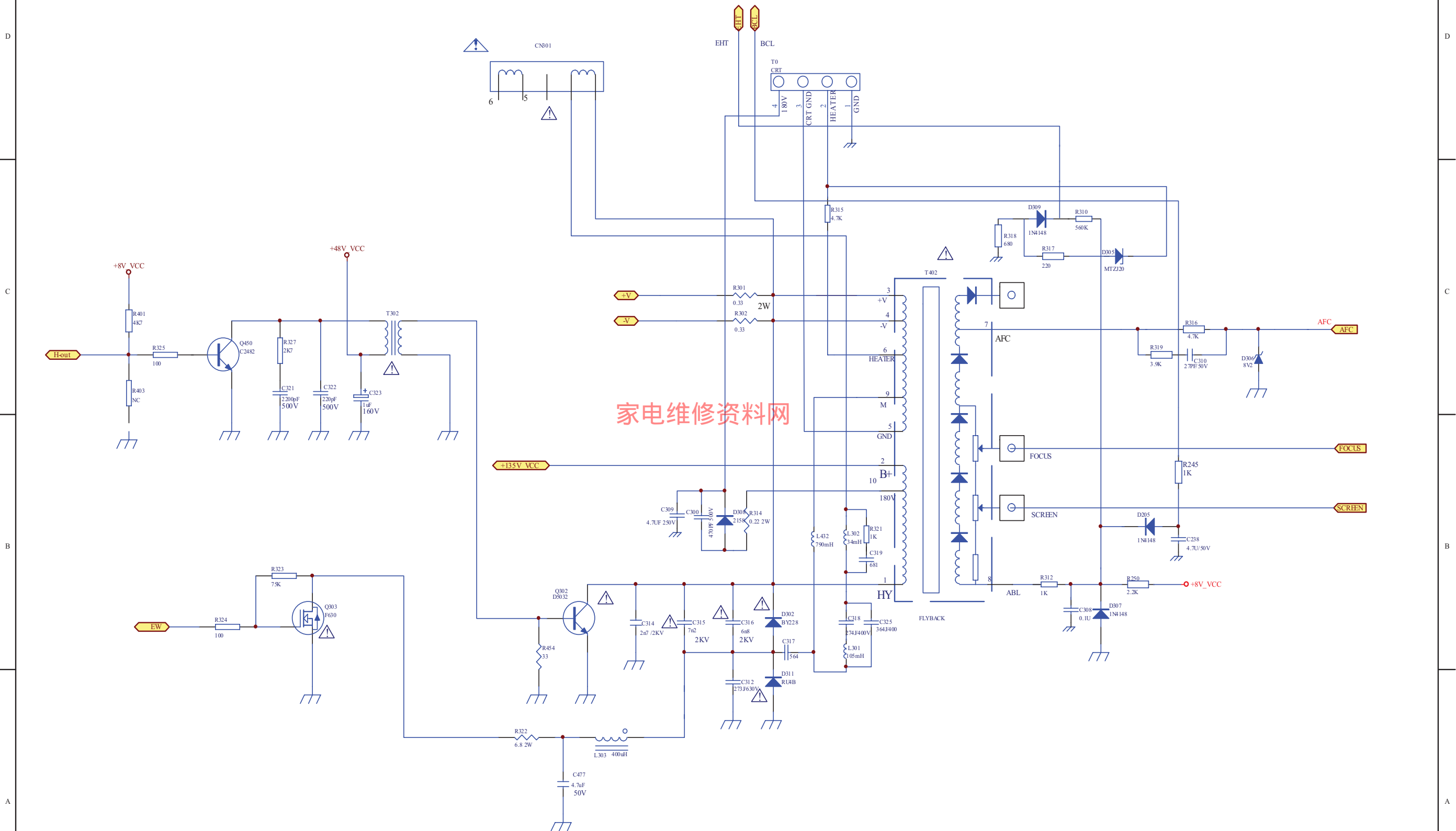
Mono Carrier: Line Deflection

A2 LINE DEFLECTION

A2

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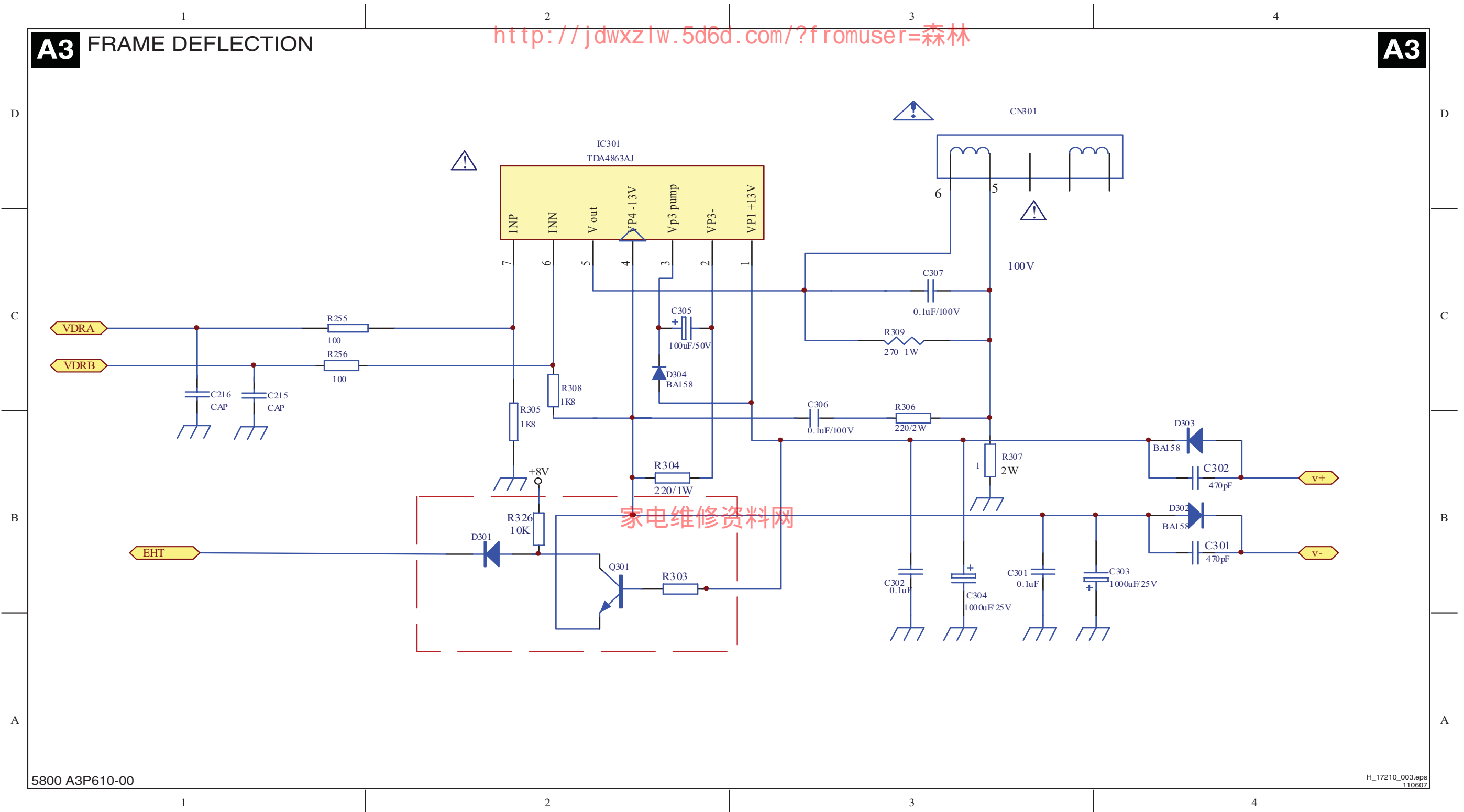
Mono Carrier: Frame Deflection

A3 FRAME DEFLECTION

A3

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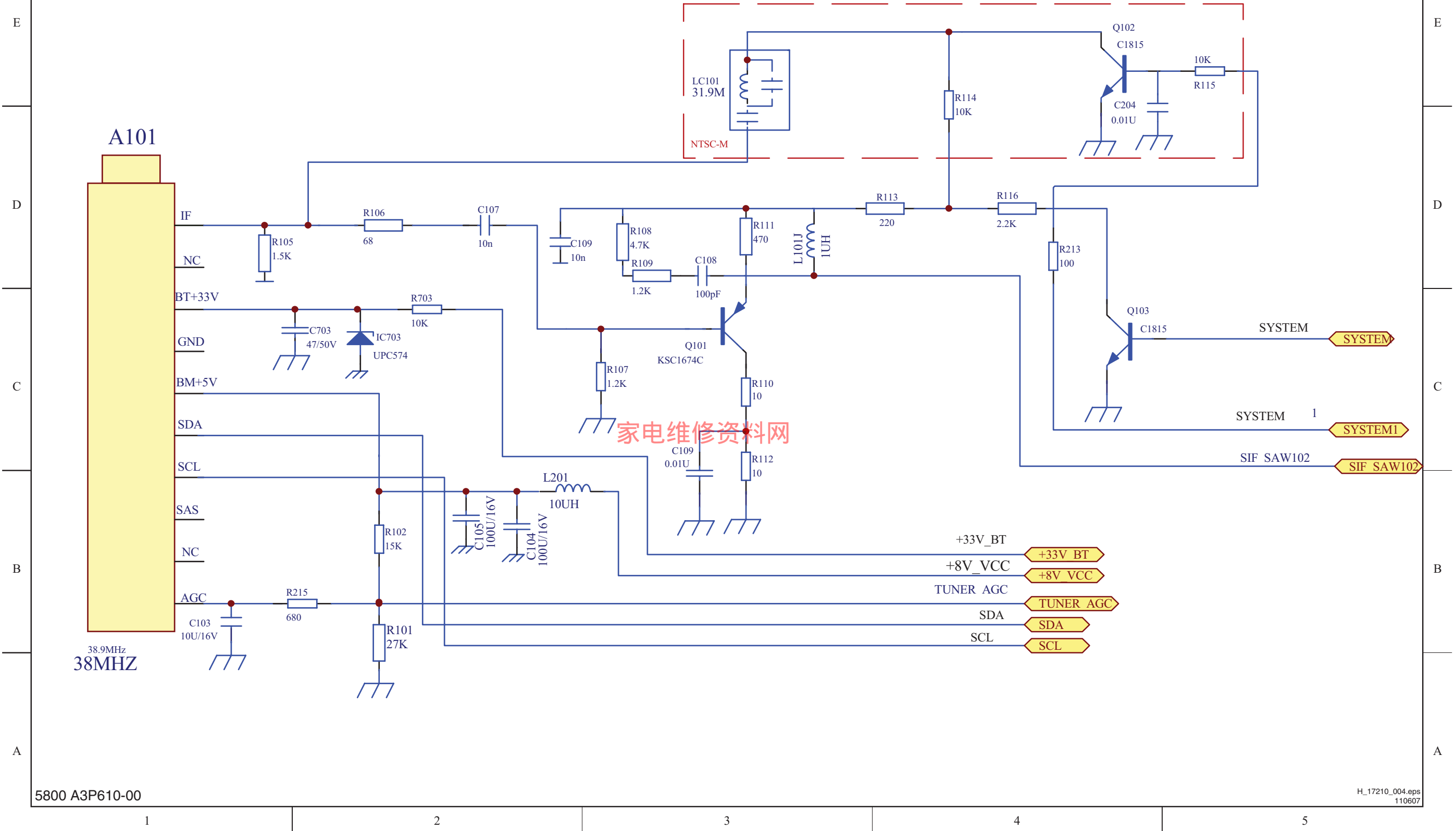
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Mono Carrier: Tuner IF

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A4 TUNER IF

A4

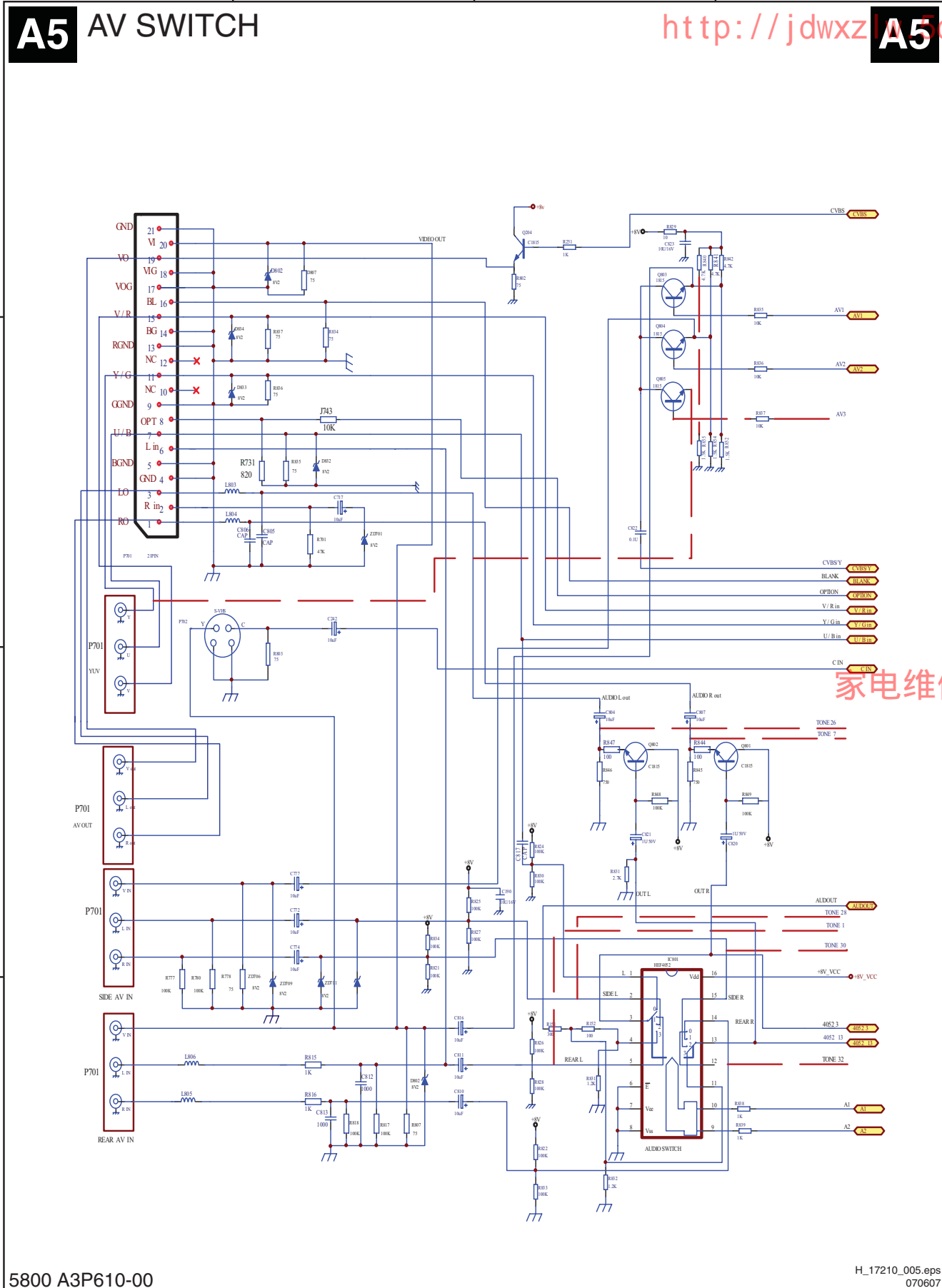


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Mono Carrier: AV Switch



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Personal Notes:

<http://jdwxz.com/?fromuser=森林>

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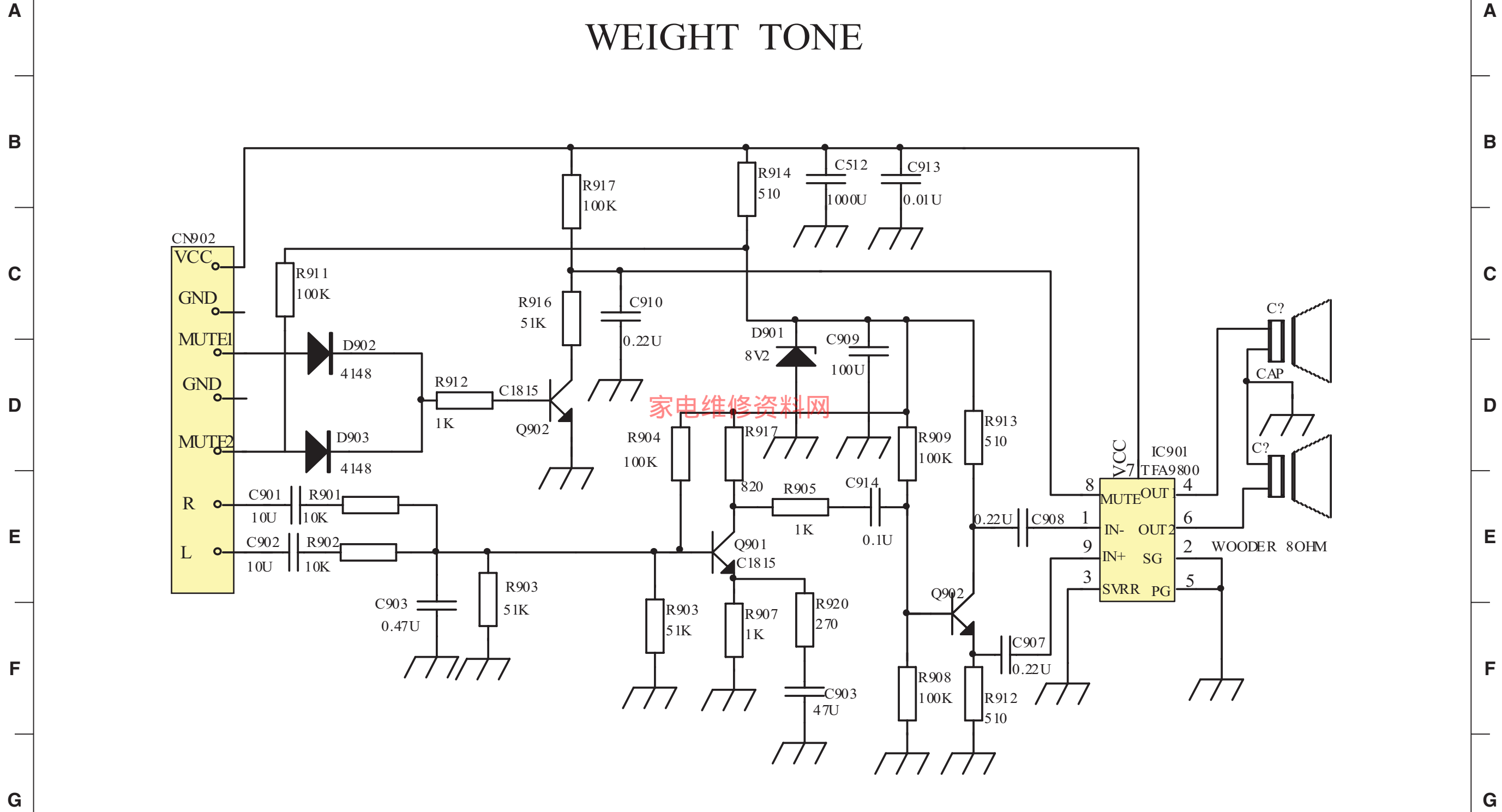
Mono Carrier: Tone Control (Optional)

A6 TONE CONTROL

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WEIGHT TONE



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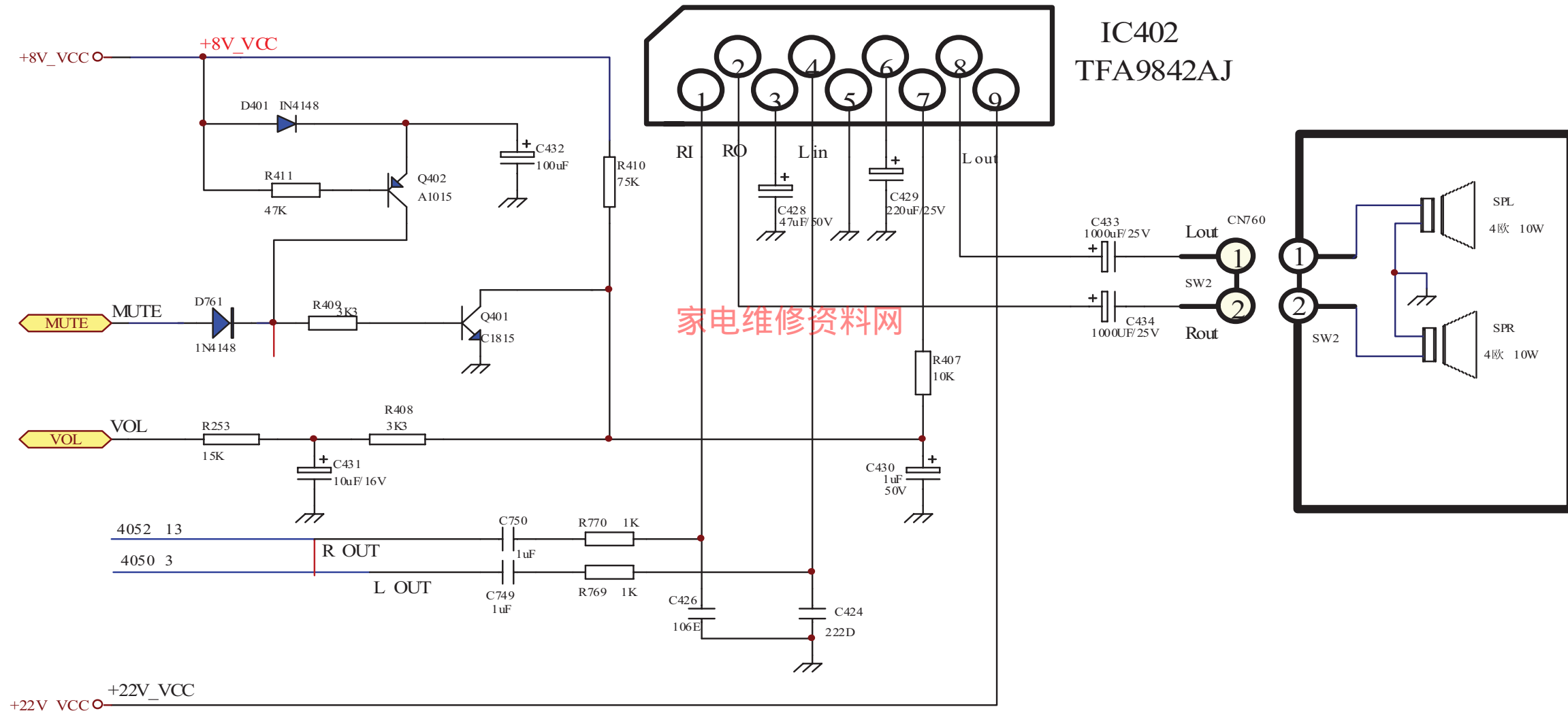
Mono Carrier: Audio Amplifier

A7 AUDIO AMPLIFIER

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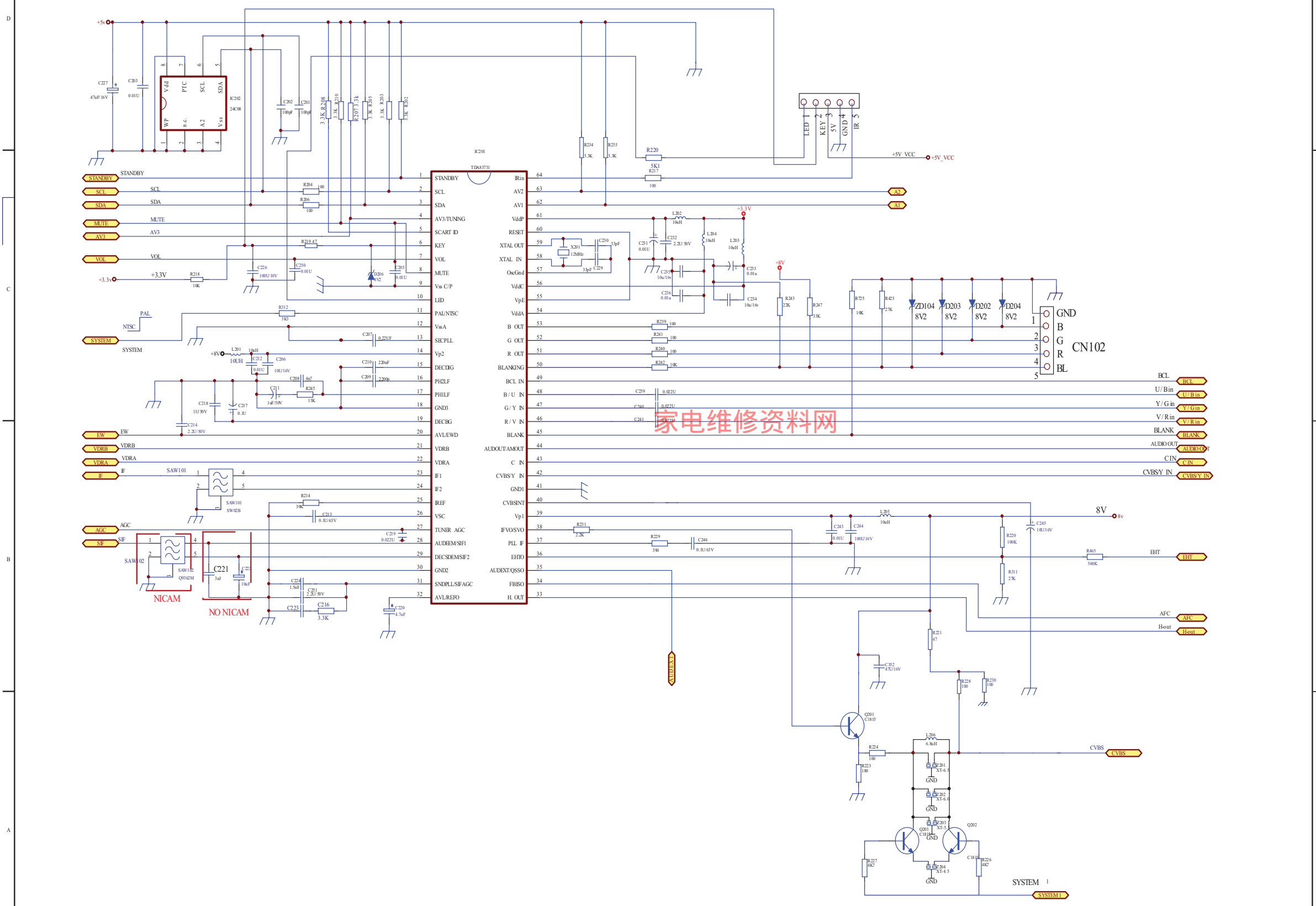


Mono Carrier: CPU & Decoder

A8 CPU & DECODER

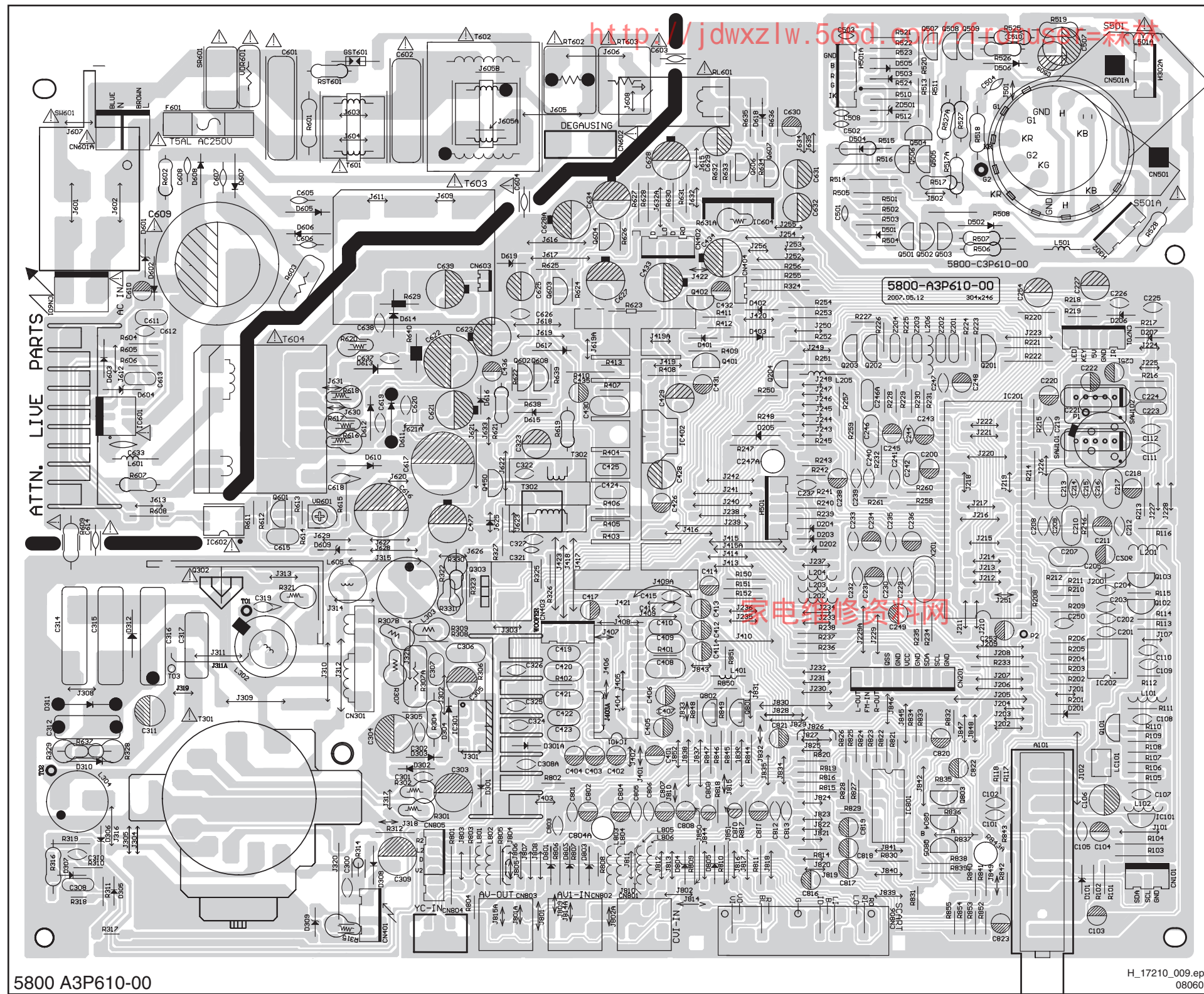
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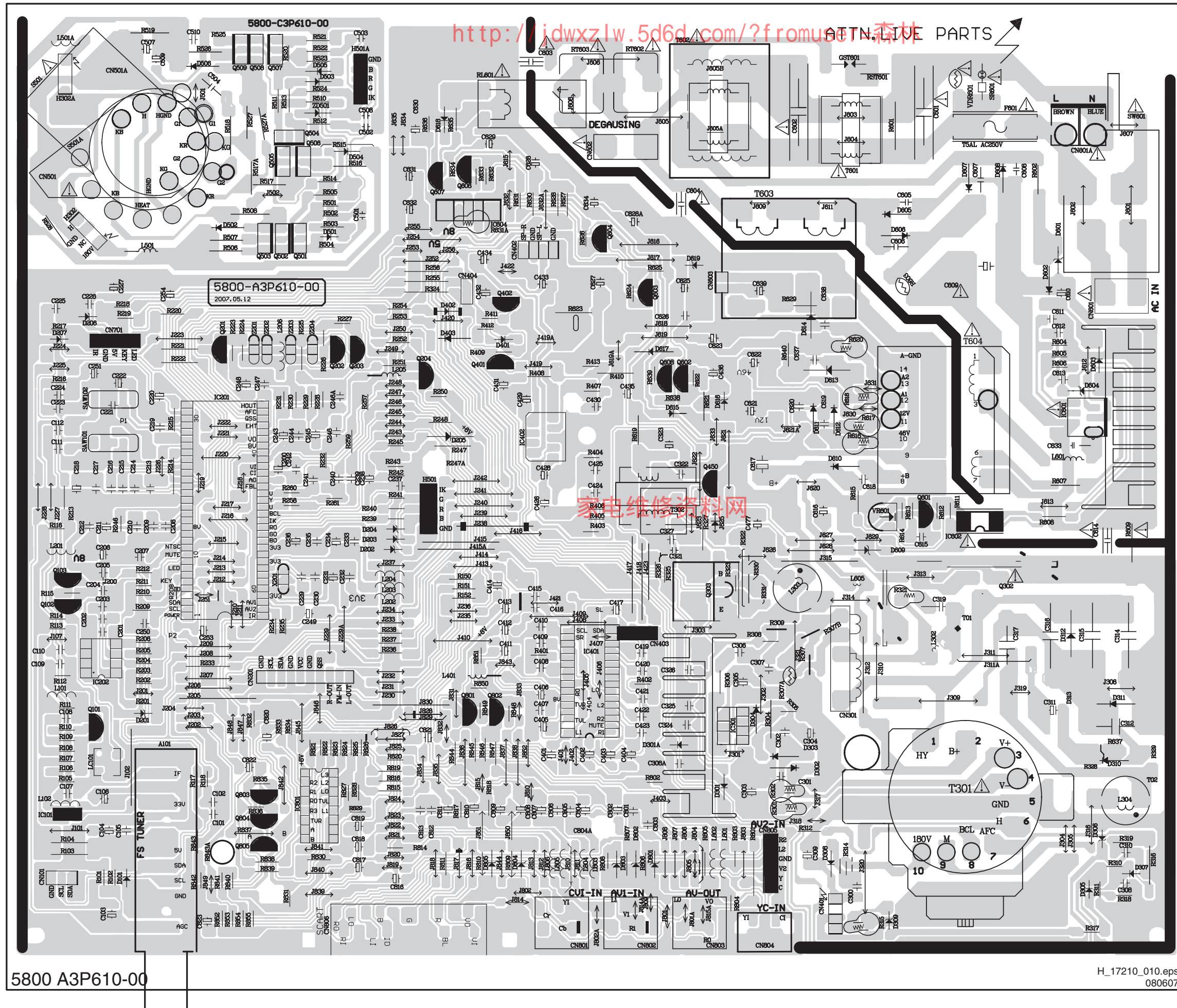


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Layout Mono Carrier (Top Side)



Layout Mono Carrier (Bottom Side)



5800 A3P610-00

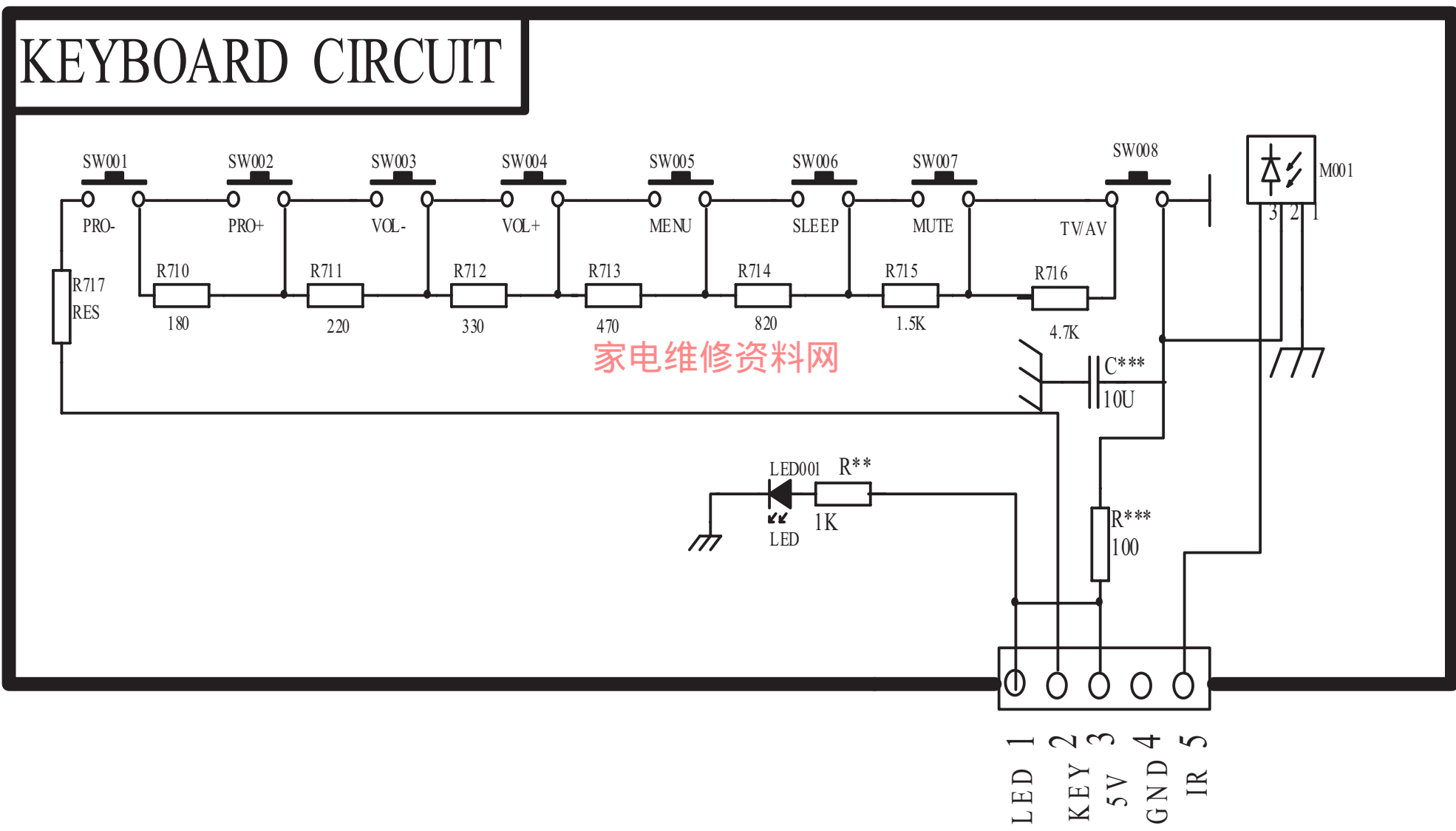
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Keyboard Control Panel

D KEYBOARD CONTROL

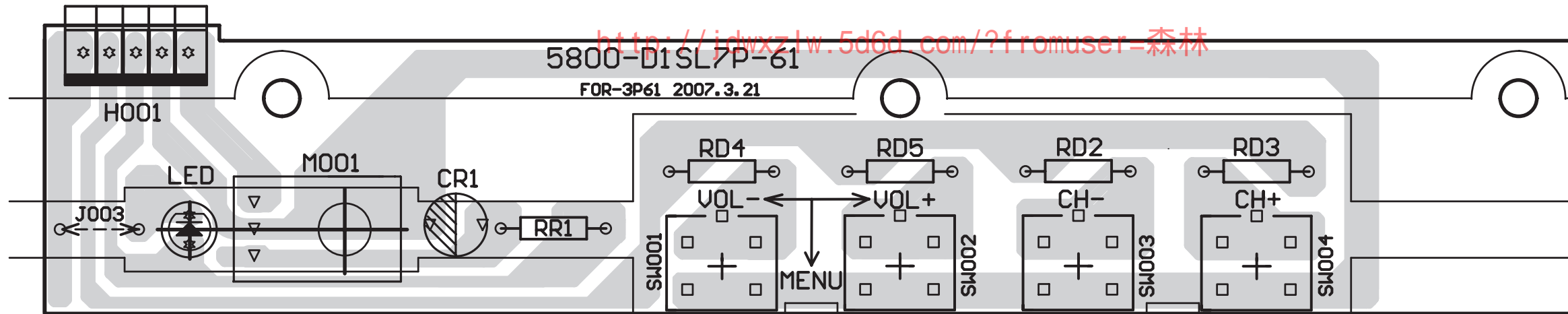
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KEYBOARD CIRCUIT



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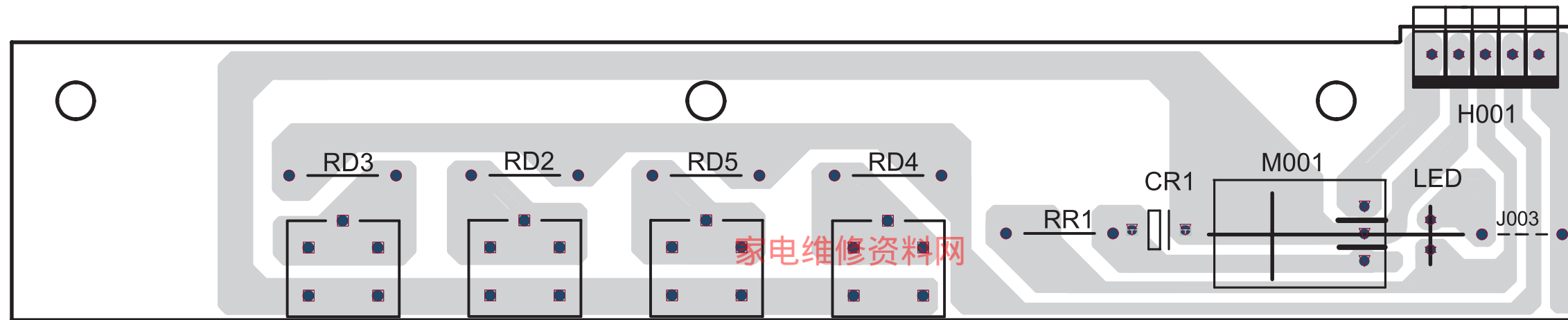
Layout Keyboard Control Panel (Top Side)



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Layout Keyboard Control Panel (Bottom Side)

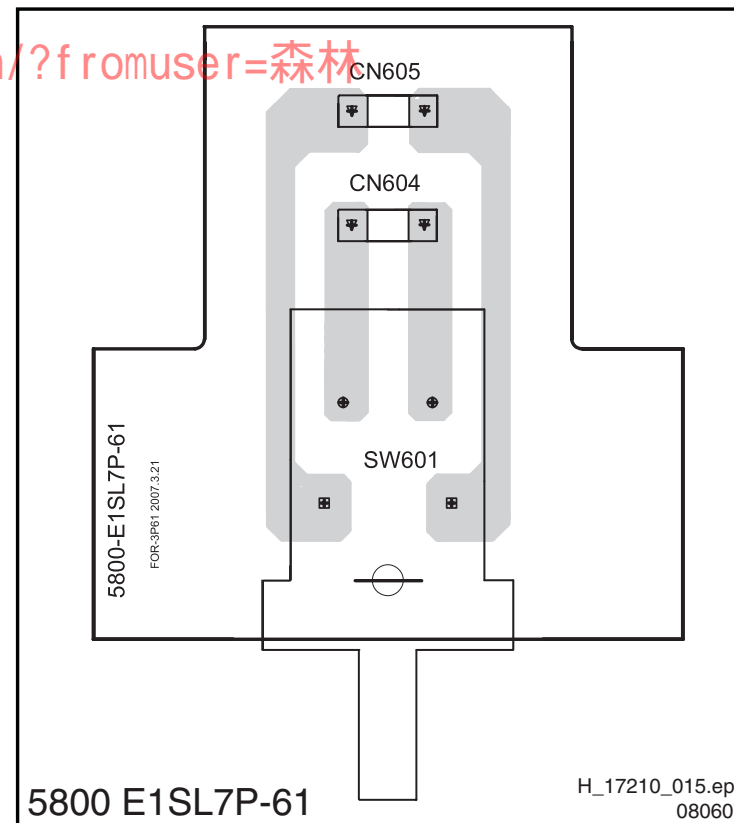
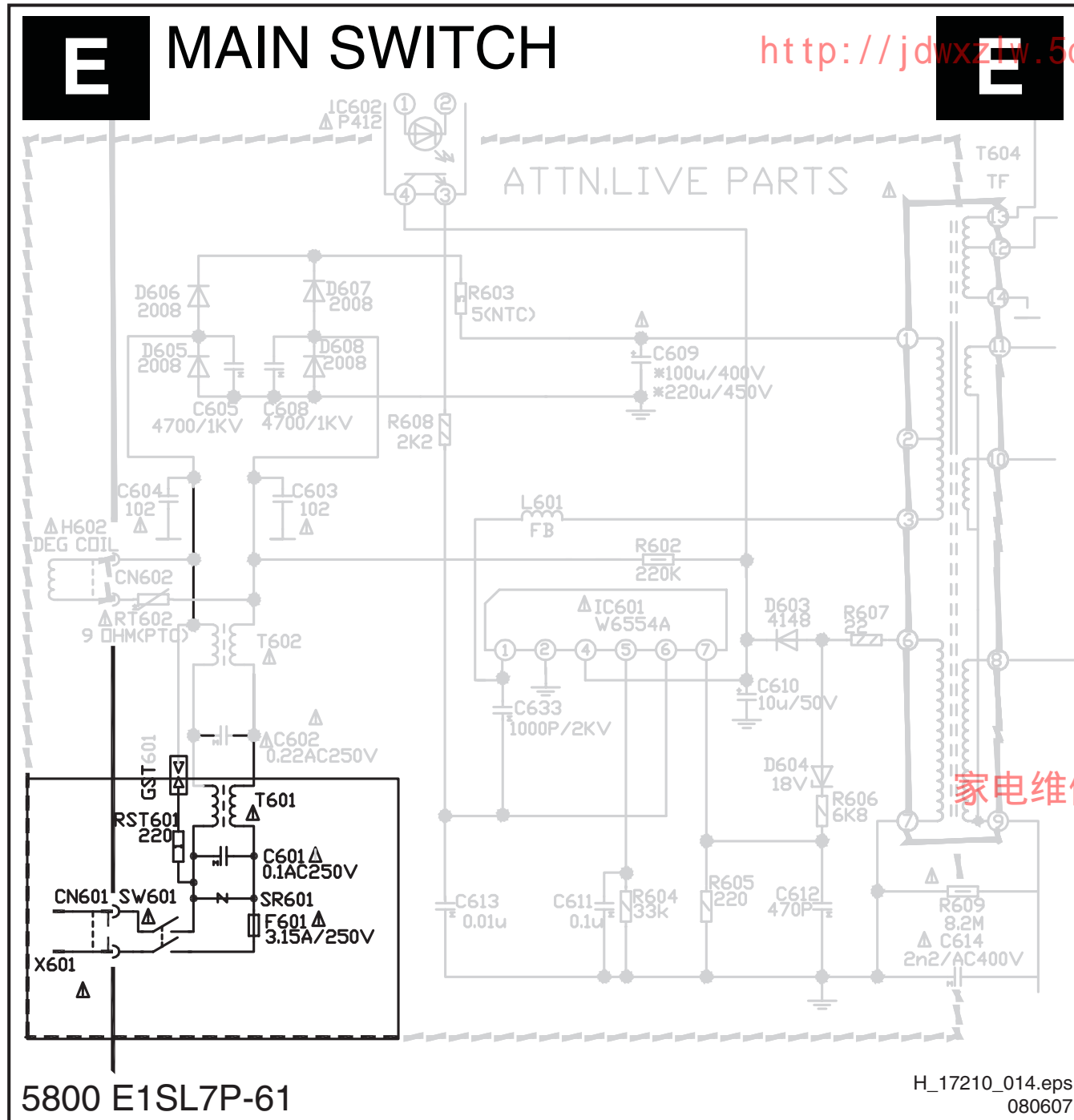


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Main Switch Panel

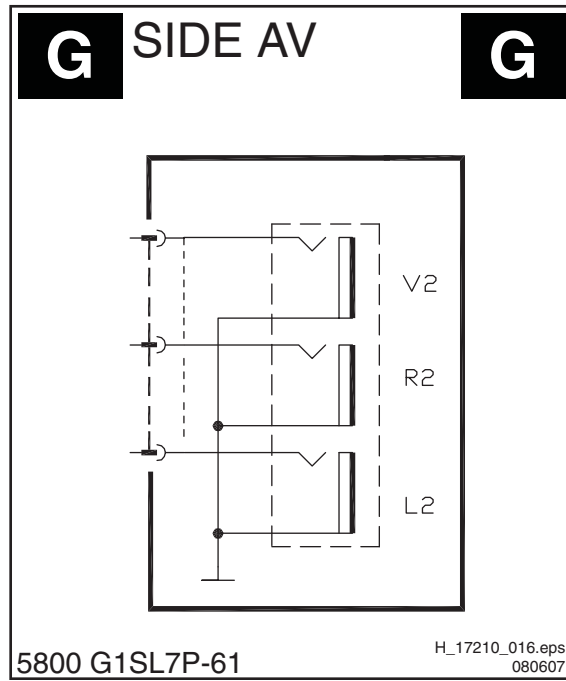
Layout Main Switch (Top Side)



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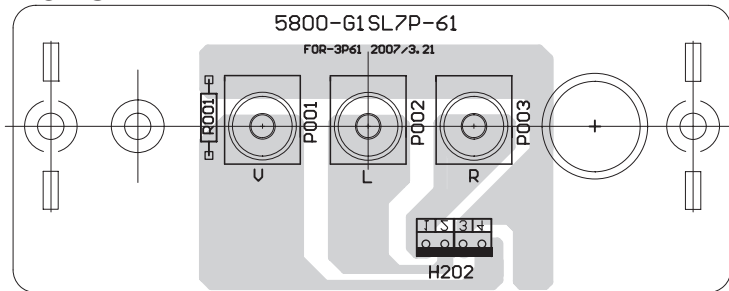
Side A/V Panel



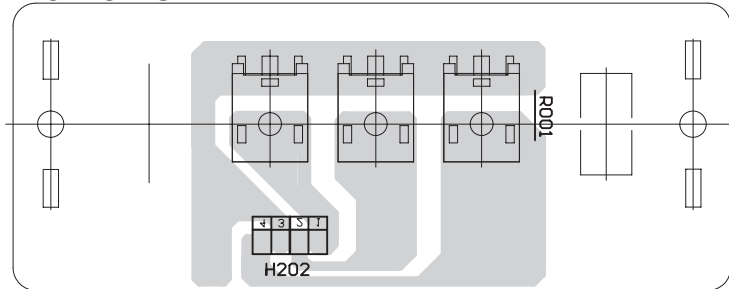
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Layout Side A/V Panel

TOP SIDE



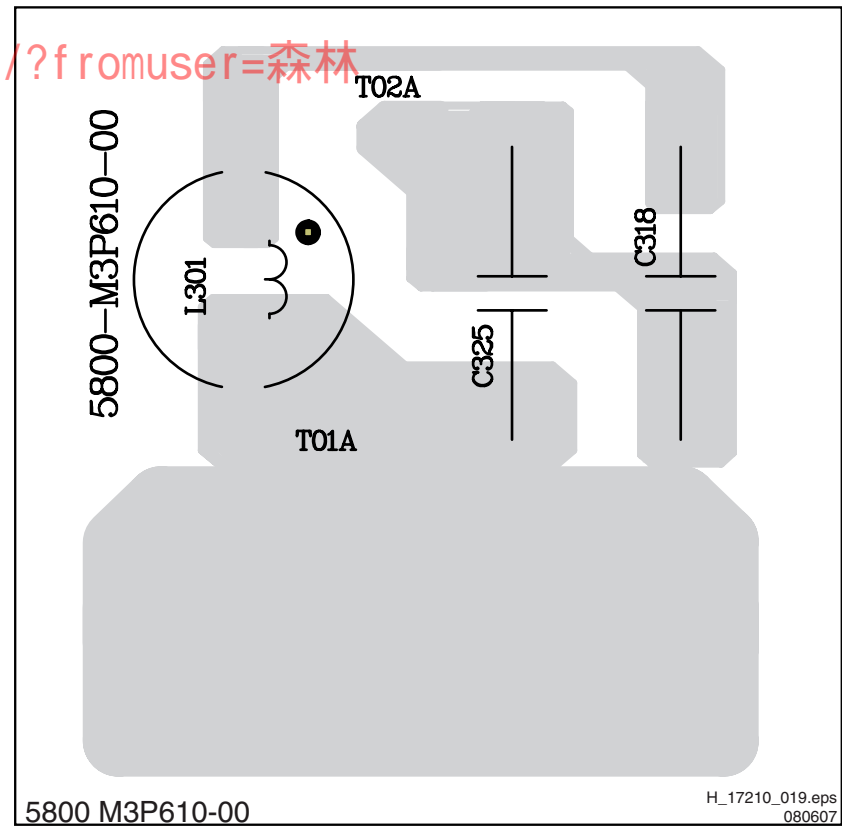
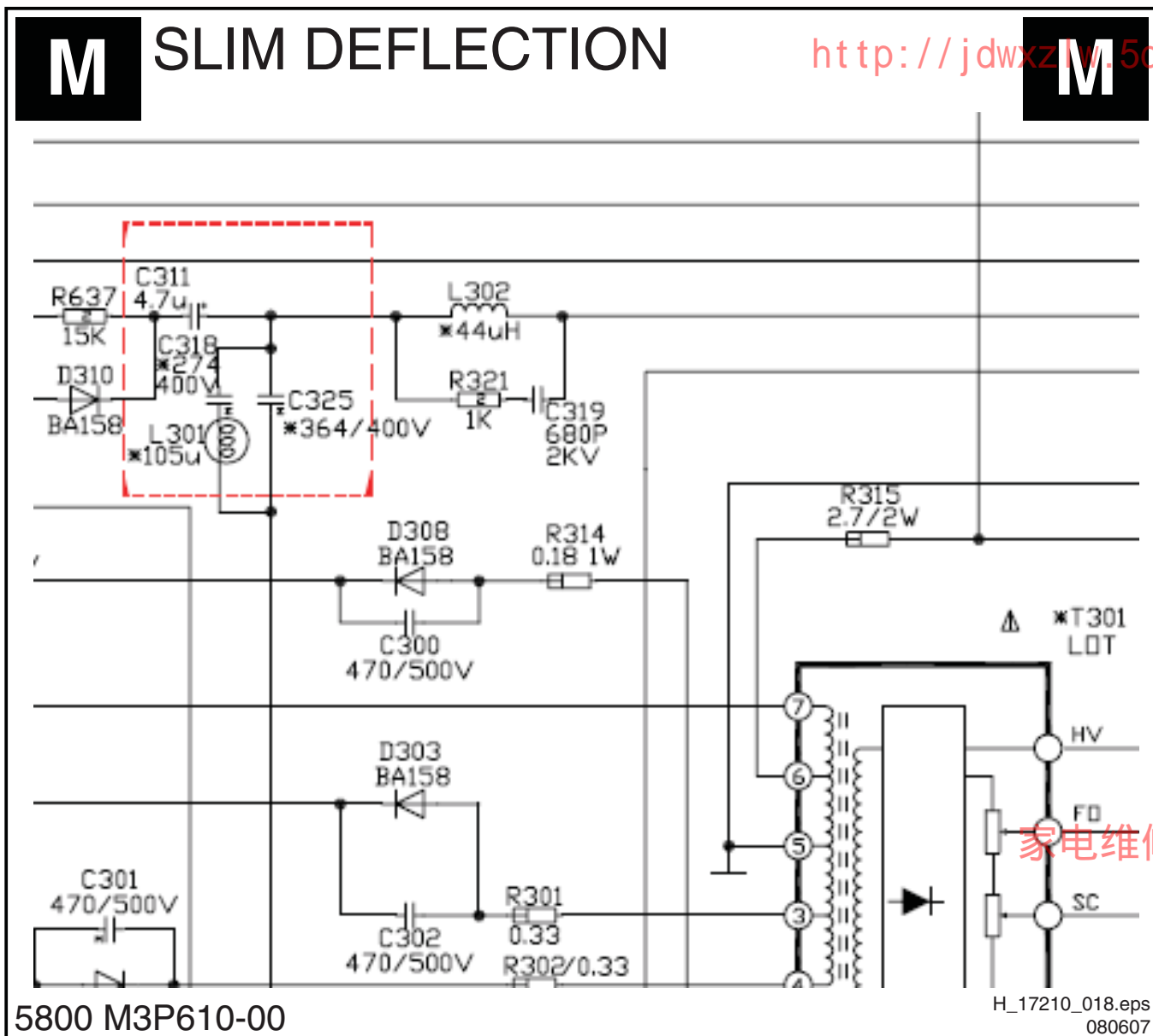
BOTTOM SIDE



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Slim EW Panel

Layout Slim EW Panel



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Sub Woofer Panel (Optional)

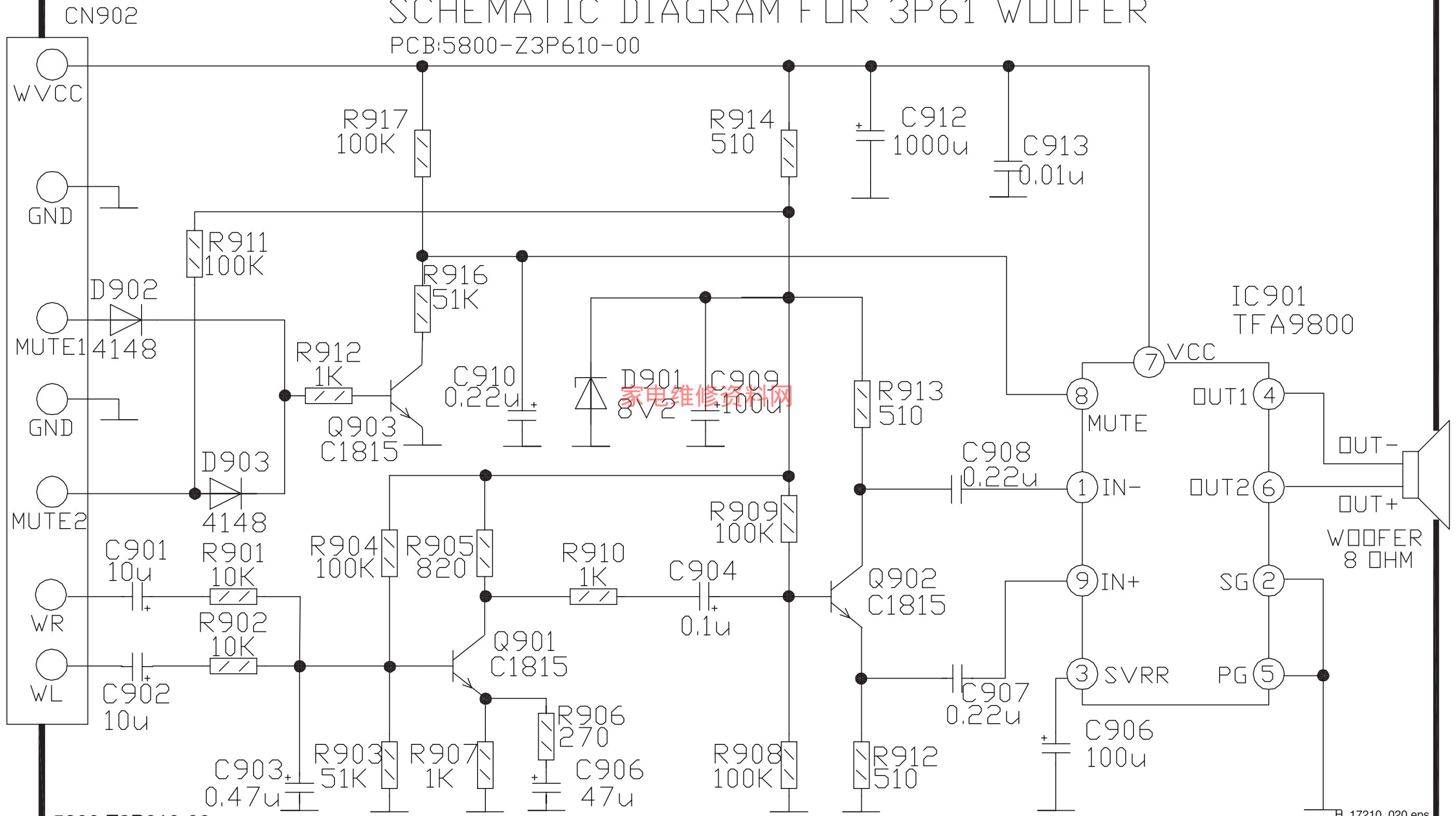
Z SUB WOOFER

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Z

SCHEMATIC DIAGRAM FOR 3P61 WOOFER

PCB:5800-Z3P610-00



5800 Z3P610-00

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8. Alignments

Index of this chapter:

- 8.1 General Alignment Conditions
- 8.2 Hardware Alignments
- 8.3 Software Alignments
- 8.4 E2PROM initialization

8.1 General Alignment Conditions

8.1.1 Default Alignment Settings

Perform all electrical adjustments under the following conditions:

- Power supply voltage: 230 V_{AC} / 50 Hz (± 10 %).
- Connect the set to the mains via an isolation transformer with low internal resistance.
- Allow the set to warm up for approximately 20 to 30 minutes.
- Measure voltages and waveforms in relation to chassis ground (with the exception of the voltages on the primary side of the power supply).

Caution: never use heatsinks as ground.

- Test probe: 100 : 1, R_i > 10 Mohm, C_i < 3.5 pF.
- Use an isolated trimmer/screwdriver to perform alignments.

8.2 Hardware Alignments

Note: The only hardware alignment in this TV set is the adjustment of the main voltage (B+), see below.

8.2.1 Main Voltage Adjustment

In order to adjust the main voltage, connect a voltage meter to the cathode of diode D610, and adjust VR601 to a voltage of 110 V ± 0.3 V.

8.3 Software Alignments

Put the set in its MENU mode (factory mode) as follows (see also figure "Factory Mode" on the next page):

- Press the keys [i+], \downarrow and \square to enter the factory menu.
- Press the number keys to enter the adjust page, press \blacktriangle / \blacktriangledown to choose the items that to be adjusted, Press \blacktriangleleft / \blacktriangleright to adjust its value. Press CH+ / CH- to change the display in order.
- Press [i+] to quit factory mode.

The different alignment parameters are described further on.

8.3.1 Rf AGC Voltage Adjust

1. Provide a 475.25 MHz, 60 dB half colour bar signal.
2. Enter factory mode and press key 4.
3. Measure tuner AGC point voltage, adjust AGC item till the voltage is 2.4 V, or till picture noise just disappears.

8.3.2 Focus Fine Adjust

1. Provide a cross-hatch pattern signal.
2. Set state to dynamic.
3. Adjust flyback transformers Focus knob till picture is clear.

8.3.3 Screen Voltage Adjust (Key 0).

1. Set picture to "Standard" mode, without signal input.
2. Enter factory mode and press key "0". There will be a level bright line displays.

3. Adjust flyback transformers Screen knob till the level bright line just can be seen, press PROG+ and turn to other factory menu.

8.3.4 Horizontal Adjustment (key 1)

1. Provide a 50 Hz monoscope pattern. Put the set in the MENU mode. Press key 1 to enter factory mode.
2. Adjust 5HSH (for 60 Hz picture, its is 6HSH) to set picture horizontal centre to CRT horizontal centre.
3. Provide a 60 Hz monoscope pattern. Put the set in the MENU mode. Press key 1 to enter factory mode.
4. Adjust 6HSH to set picture horizontal centre to CRT horizontal centre.

8.3.5 Vertical & YUV/RGB Horizontal Adjust (key2)

1. Provide a 50 Hz cross hatch signal, set TV to standard mode. Adjust 5VSL so that half picture of the pane cross appears. The picture's vertical line is just at the bottom of the half picture. Adjust 5VSL to make the centre of the picture's vertical line and the kinescope are in superposition.
2. Adjust 5VAM to obtain picture's vertical re-display ratio more than 90%.
3. Provide a 60 Hz cross hatch signal, do step 1 and 2 again to adjust.
4. If necessary, fine adjust above items.
5. Provide a 50 Hz RGB or YUV cross hatch signal, set the TV in the standard mode, adjust 5RGH till picture horizontal centre is at the CRT centre (optional).
6. Provide a 60 Hz RGB or YUV cross hatch signal, set the TV in the standard mode, in the factory menu, adjust 6RGH to make the pane cross vertical centre at the centre of the screen (optional).

8.3.6 OSD Position

1. Menu OSD position adjustment: Provide a 50/60 Hz cross hatch pattern. Put the set in MENU mode. Press key 2 to enter the factory mode. Adjust 5VOF/6VOF and HOF item, to obtain menu OSD at the centre of CRT screen.
2. LOGO position adjustment: Provide a 50/60 Hz cross hatch pattern. Put the set in MENU mode. Press key 7 to enter the factory mode. Adjust XMIN, XMAX, YMIN and YMAX, to obtain LOGO at the centre up to 1/3 of CRT screen.
3. Teletext OSD position adjustment: Provide a red signal in the standard mode. Press key 7 to enter the factory mode. Adjust TXMI and 5TYM/6TYM to obtain index at the centre of screen.

8.3.7 White Balance Adjustment (key 3)

Normally, this chassis can auto adjust white balance, but for some CRTs it a necessity to adjust white balance carefully by hand. Set Brightness and Contrast at normal status, provide a gray scale testpattern and from the MENU mode press key 3 to enter the factory mode. Set WPR at 31, adjust WPG and WPR to obtain white balance.

Enter Factory Mode:
 Press sequentially: |< --> Smart Sound --> Smart Picture
 Main Menu in red box.

Navigation:
 Method 1 From the first menu, use the arrow Up or Down to navigate to different pages.
 Method 2 Selecting the number "0 - 9" on the remote control to go directly to the pages.
 At any point, enter the "Menu" key twice to go back to the main Menu.

Changing value
 Move to the intended parameter with the arrow "up" and "down" key on the RC.
 Use the arrow "Right" and "Left" to increase and decrease the value respectively.

Exit
 Enter " | + " on the RC to exit factory mode.

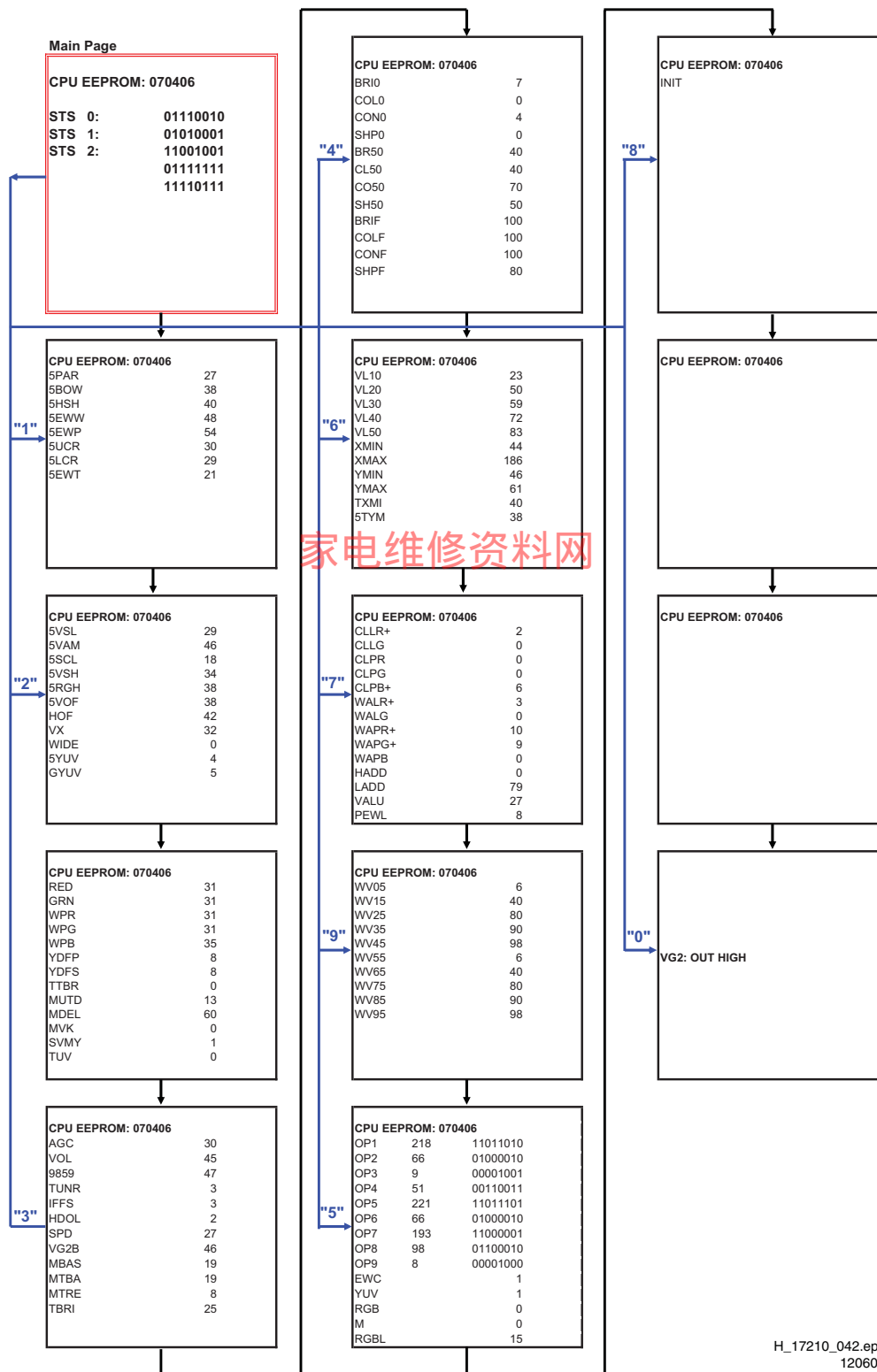


Figure 8-1 Software Alignments

8.4 E2PROM initialization

8.4.1 E2PROM Initialization (key 8)

An empty or used E2PROM can be used for servicing. The following steps have to be passed through to initialize the E2PROM.

While in the MENU mode press key 8 to enter the factory mode. Now enter the initialization menu by pressing ◀▶. The set shows the OSD "INIT BUSY" on screen, 5 minutes later, the text "BUSY" disappears. Now power OFF and ON the set. This finalizes the initialization.

8.4.2 Function Settings (key 5)

1. While in the MENU mode press key 5 to enter the factory menu.
2. The Logo setting is used when powered on or no signal. Press MENU in the factory mode to enter the compile mode, there are to rows. The first can set the customer's name etc. The second row is intended to display the customer's e-mail, telephone etc. Press ◀▶ to select the character to edit. Use keys ▲▼ to choose the character. Press MENU again to exit this view.
3. Set values for Option 1 to Option 8.

8.5 Option Settings

Item	Storage address	Display string	Range (Index value)		21PT8667/93	21PT8867/93	21PT8857/93	21PT5547/94	21PT8867/94
					Reference	Reference	Reference	Reference	Reference
option 1	189	OP1	0	1	218	218	218	218	218
Shade bar adjust mode		Bit 0	AVG	VSD	0	0	0	0	0
YUV or Yprpb		Bit 1	YUV	Yprpb	1	1	1	1	1
WIDE BAND SOUND		Bit 2	Off	On	0	0	0	0	0
BLACK STRETCH AMOUNT		Bit 3	10%	20%	1	1	1	1	1
AV2		Bit 4	Off	On	1	1	1	1	1
SVHS		Bit 5	Off	On	0	0	0	0	0
BLACK STRETCH DEPTH		Bit 6	20IRE	30IRE	1	1	1	1	1
CMSS		Bit 7	Off	On	1	1	1	1	1
option 2	190	OP2	0	1	64	64	64	66	66
AVL		Bit 0	Off	On	0	0	0	0	0
Auto sound in auto search mode		Bit 1	Off	On	0	0	0	1	1
Pan Europe Teletext set		Bit 2	Off	On	0	0	0	0	0
Cyrillic Teletext set		Bit 3	Off	On	0	0	0	0	0
Farsi Teletext set		Bit 4	Off	On	0	0	0	0	0
Arabic Teletext set		Bit 5	Off	On	0	0	0	0	0
Sync On Y (YUV/Yprpb mode)		Bit 6	no	yes	1	1	1	1	1
Slicing lever		Bit 7	Dependent on noise	Fixed	0	0	0	0	0
option 3	191	OP3	0	1	9	9	9	1	1
3P61		Bit 0	Off	On	1	1	1	1	1
English									
XXX		Bit 1	Off	On	0	0	0	0	0
XXX		Bit 2	Off	On	0	0	0	0	0
Chinese		Bit 3	Off	On	1	1	1	0	0
XXX		Bit 4	Off	On	0	0	0	0	0
XXX		Bit 5	Off	On	0	0	0	0	0
XXX		Bit 6	Off	On	0	0	0	0	0
XXX		Bit 7	HITACHI remote control code	Skyworth code	0	0	0	0	0
option 4	192	OP4	0	1	51	51	51	51	51
Sound intermediate frequency control(FWMS)450KHz frequency deflection		Bit 0	Narrow	Wide	1	1	1	1	1
Boot-strap mode		Bit 1	Boot-strap standby	Memory mode	1	1	1	1	1
geomagnetism adjust function		Bit 2	Off	On	0	0	0	0	0
Logo		Bit 3	Off	On	0	0	0	0	0
EHT tracking mode		Bit 4	Vertical	Vertical/horizontal	1	1	1	1	1
Search tuing mode sensitivity		Bit 5	Normal	Low	1	1	1	1	1
Calendar translucence function		Bit 6	Off	On	0	0	0	0	0
Zoom function		Bit 7	Off	On	0	0	0	0	0
option 5	193	OP5	0	1	221	221	221	223	223
DK sound system		Bit 0	Off	On	1	1	1	1	1
BG sound system		Bit 1	Off	On	0	0	0	1	1
I sound system		Bit 2	Off	On	1	1	1	1	1
CORING0		Bit 3	Off	On	1	1	1	1	1
CORING1		Bit 4	Off	On	1	1	1	1	1
XXX (comb filter)		Bit 5	Off	On	0	0	0	0	0
Switch-off in vertical overscan		Bit 6	Undefined	Vert. overscan	1	1	1	1	1
Power on to last status		Bit 7	Off	On	1	1	1	1	1
option 6	194	OP6	0	1	66	66	66	66	66
XXX ("NO SINGAN" screen protection)		Bit 0	Off	On	0	0	0	0	0
No signal black/blue background		Bit 1	Black	Blue	1	1	1	1	1
16:9 function		Bit 2	Off	On	0	0	0	0	0

Item	Storage address	Display string	Range (Index value)		21PT8667/93	21PT8867/93	21PT8857/93	21PT5547/94	21PT8867/94
					Reference	Reference	Reference	Reference	Reference
Child lock		Bit 3	Off	On	0	0	0	0	0
No signal blue screen channel switch sign shake		Bit 4	No shake	shake	0	0	0	0	0
XXX menu middle colour bar (hotel mode)		Bit 5	Off	On	0	0	0	0	0
Set "POC" bit when no signal game		Bit 6	Off	On	1	1	1	1	1
		Bit 7	Off	on	0	0	0	0	0
option 7	195	OP7	0	1	193	193	193	193	193
AV1		Bit 0	Off	On	1	1	1	1	1
XXX (AV3)		Bit 1	0	1	0	0	0	0	0
video/audio output control		Bit 2	When No SCART, follow screen	When Yes SCART follow TV	0	0	0	0	0
LISTEN function		Bit 3	Off	On	0	0	0	0	0
Boot-strap mode 2		Bit 4	See OP4 bit 1	Boot-strap	0	0	0	0	0
Noise reduce point 1		Bit 5			0	0	0	0	0
Noise reduce point 2		Bit 6			1	1	1	1	1
M system absorb control level (UOC 11th pin)		Bit 7	0 high	1 low	1	1	1	1	1
option 8	196	OP8	0	1	102	102	102	102	102
9373 (9363/9384)									
XXX (Nicam)		Bit 0	No	Yes	0	0	0	0	0
4052		Bit 1	No/no	Yes/yes	1	1	1	1	1
X-ray (XDT)		Bit 2	XDT=1: bit 4 not applicable	XDT=0: bit 4 is valid	1	1	1	1	1
3p or 5p (STB)		Bit 3	3p	5p	0	0	0	0	0
		Bit 4	yes	no	0	0	0	0	0
When X-ray		Bit 5	No power off	Power off	1	1	1	1	1
Blue/black background switch		Bit 6	Off	On	1	1	1	1	1
Blink power supply indicator		Bit7	No flash	flash	0	0	0	0	0
option 9	197	OP9	0	1	0	0	0	8	8
FMWS setting When searching		Bit0	0	1	0	0	0	0	0
FMWS1 setting When searching		Bit1	0	1	0	0	0	0	0
WOOFER switch		Bit2	Off	On	0	0	0	0	0
AUTO sound system		Bit3	No	Yes	0	0	0	1	1
Soft clipping level (SOC0)		Bit4	0	1	0	0	0	0	0
Soft clipping level (SOC1)		Bit5	0	1	0	0	0	0	0
Tint control on UV single (TUV)		Bit6	0	1	0	0	0	0	0
Other options									
EW-C	198		0	0	0	0	0	0	0
RGB function switch	200	RGB	Off	On	0	0	0	0	0
YUV function switch	199	YUV	Off	On	1	1	1	1	1
M function switch	201	M	Off	On	0	0	0	0	0
RGBL	202	RGBL	0-25		15	15	15	15	15

9. Circuit Descriptions, Abbreviation List, and IC Data Sheets

Index of this chapter:

- 9.1 Introduction
- 9.2 The various circuits
- 9.3 Abbreviation List
- 9.4 IC Data Sheets

9.1 Introduction

The SK4.0A CA is a CRT TV for the year 2007, based on the 3P61 platform. In this chapter, only a general description of the various circuits is given. For more detailed information, see the circuit diagrams in this manual.

9.2 The various circuits

9.2.1 Tuner

The function of the tuner is to select the channel to be received and suppress the interference of neighboring channels, to amplify the high frequency signal, to improve the receiving sensitivity and SNR, and to generate a PIF signal through frequency conversion.

9.2.2 IF Channel

The IF Channel mainly ensures the sensitivity and selectivity of the complete TV set. The IF AMP integrated in the UOCIII is made up of a three-stage dual-differential amplifier with a gain value above 70dB, a SNR of 55dB and a bandwidth of 7 MHz. The video demodulation circuit is made from the built-in PLL Sync Detector. The spectrum of the demodulation carrier is unitary and it is not affected by the content of the video signal. The tuner features stable receptivity while the signal output from the video detector features high fidelity. The built-in PLL circuit of the UOCIII generates a 38.0 MHz or 38.9 MHz demodulation reference signal for the sync detector to demodulate the video signal; this is called "PLL sync demodulation".

9.2.3 Sound Channel

An external ceramic filter is used to select the second SIF signal for the sound channel of UOCIII from the signal output of the video detector. The audio signal is obtained after limiting amplification and demodulation by the intermediate frequency detector for the SIF signal, and then the audio signal is output to the audio amplifier TFA9842., which drives the speakers to provide the sound. The intermediate frequency detector and volume-control attenuator that are built in the UOCIII are set and adjusted via the CPU.

9.2.4 CRT Drive Circuit

In the driver circuit, both the voltage and current of the R/G/B signal are amplified, after which the CRT drive circuit modulates the cathode beam current of the CRT. The R/G/B signal input into the driver circuit is of negative polarity.

9.2.5 Power Supply Circuit

The function of the power supply circuit is to supply various stabilized operating voltages and to provide protections against excessive voltages and currents.

9.3 Abbreviation List

2CS	2 Carrier Sound
A2	Commonly known as 2 Carrier Sound (2CS) system
AC	Alternating Current
ACI	Automatic Channel Installation: algorithm that installs TV channels directly from a cable network by means of a predefined TXT page
ADC	Analogue to Digital Converter
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency
AGC	Automatic Gain Control: algorithm that controls the video input of the feature box
AM	Amplitude Modulation
ANC	Automatic Noise Reduction; One of the algorithms of Auto TV
AP	Asia Pacific
AR	Aspect Ratio: 4 by 3 or 16 by 9
AV	Audio Video
AVL	Automatic Volume Level control
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz
BCL	Beam Current Limiter
CBA	Circuit Board Assembly (or PWB)
CFR	Carbon Film Resistor
ComPair	Computer aided rePair
CRT	Cathode Ray Tube (or picture tube)
CVBS	Composite Video Blanking and Synchronisation
CVI	Component Video Input
D/K	Monochrome TV system. Sound carrier distance is 6.5 MHz. D= VHF-band, K= UHF-band
DAC	Digital to Analogue Converter
DC	Direct Current
DC-filament	Filament supply voltage
DFU	Directions For Use: owner's manual
DPL	Dolby Pro Logic
DRAM	Dynamic RAM; dynamically refreshed RAM
DVD	Digital Versatile Disc
EEPROM	Electrically Erasable and Programmable Read Only Memory
EHT	Extreme High Tension; the voltage between the cathode and the shadow mask that accelerates the electrons towards the screen (around 25 kV)
EMI	Electro Magnetic Interference; Leakage of high-frequency radiation from a transmission medium
EU	EUrope
EW	East West, related to horizontal deflection of the set
EW-DRIVE	East -West correction drive signal.
EXT	EXTernal (source), entering the set by SCART or by cinches (jacks)
FBL	Fast Blanking: DC signal accompanying RGB signals
FE	Front End; Tuner and RF part together
Field	Each interlaced broadcast FRAME is composed of two Fields, each Field consists of either Odd or Even lines
Filament	Filament of CRT
FM	Field Memory / Frequency Modulation
Frame	A complete TV picture comprising all lines (625/525)
FTV	Flat TeleVision

G	Green	PCB	Printed Circuit Board (or PWB)
H	H_sync to the module	PLL	Phase Locked Loop; Used for e.g. FST tuning systems. The customer can directly provide the desired frequency
H-DRIVE	Horizontal Drive		
H-FLYBACK	Horizontal Flyback		
H-OUT	H_sync output of the module		
	Horizontal Output pulse	Progressive Scan	Scan mode where all scan lines are displayed in one frame at the same time, creating a double vertical resolution.
HA	Horizontal Acquisition; horizontal sync pulse		
HFB	Horizontal Flyback Pulse; Horizontal sync pulse from large signal deflection	PTC	Positive Temperature Coefficient, non linear resistor (resistance increases if temperature increases)
HW	Hardware	PWB	Printed Wiring Board (also called PCB or CBA)
I	Monochrome TV system. Sound carrier distance is 6.0 MHz. VHF- and UHF-band	QSS	Quasi Split Sound
I ² C	Inter IC bus (also called IIC)	R	Right audio channel / Red
I ² S	Inter IC Sound bus	RAM	Random Access Memory
IC	Integrated Circuit	RC	Remote Control transmitter
IF	Intermediate Frequency	RC5 (6)	Remote Control system 5 (6), the signal from the remote control receiver
IIC	Inter IC bus (also called I2C)	RF	Real Flat (picture tube) or Radio Frequency
Interlaced	Scan mode where two fields are used to form one frame. Each field contains half the number of the total amount of lines. The fields are written in "pairs", causing line flicker.	RGB	Red, Green, and Blue colour space; The primary colour signals for TV. By mixing levels of R, G, and B, all colours (Y/C) are reproduced
IO	In/Out	RGBHV	Red, Green, Blue, Horizontal sync, and Vertical sync
IR	Infra Red	RMS	Root Mean Square value
L	Left audio channel	ROM	Read Only Memory
L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I	SAP	Secondary Audio Program; Generally used to transmit audio in a second language
LATAM	LATin America	SAW	Surface Acoustic Wave
LED	Light Emitting Diode	SC	SandCastle: two-level pulse derived from sync signals
LOT	Line Output Transformer (also called FBT); The transformer in which the EHT is generated	S/C	Short Circuit
LS	Loud Speaker	SCL	Serial Clock signal on I ² C bus
M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz. M= 525 lines @ 60 Hz, N= 625 lines @ 50 Hz	SD	Standard Definition
MOFR	Metal Oxide Film Resistor	SDA	Serial Data line of I ² C bus
MOSFET	Metal Oxide Semiconductor Field Effect Transistor	SDRAM	Synchronous DRAM
MPX	MultiPleX	SIF	Sound Intermediate Frequency
NAFTA	North American Free Trade Association: Trade agreement between Canada, USA and Mexico	SMC	Surface Mounted Component
		SMD	Surface Mounted Device
		SMPS	Switched Mode Power Supply
NC	Not Connected	SND	SouND
NICAM	Near Instantaneously Companded Audio Multiplexing; This is a digital sound system, mainly used in Europe	SRAM	Static RAM
		STBY	STandBY
NTC	Negative Temperature Coefficient, non-linear resistor (resistance decreases if temperature increases)	SVHS	Super Video Home System
NTSC	National Television Standard Committee. Colour system used mainly in North America and Japan. Colour carrier NTSC M/N = 3.579545 MHz, NTSC 4.43 = 4.433619 MHz (this is a VCR norm, it is not transmitted off-air)	TBD	To Be Defined
		TXT	Teletext; TXT is a digital addition to analogue TV signals that contain textual and graphical information (25 rows x 40 columns). The information is transmitted within the first 25 lines during the Vertical Blank Interval (VBI)
NVM	Non Volatile Memory; IC containing data such as alignment values, preset stations	µC	Microcontroller
		UOC	Ultimate One Chip
		µP	Microprocessor
		UV	Colour difference signals
		V	V_sync
		V-BAT	Main supply for deflection (usually 141 V)
OB	Option Byte	VA	Vertical Acquisition
OC	Open Circuit	VBI	Vertical Blanking Interval; Time during which the video signal is blanked when going from bottom to top of the display
OP	OPtion byte		
OSD	On Screen Display	VCR	Video Cassette Recorder
P50	Project 50; Communication protocol between TV and peripherals	VGA	Video Graphics Array
PAL	Phase Alternating Line; Colour system mainly used in West Europe (colour carrier= 4.433619 MHz) and South America (colour carrier PAL M= 3.575612 MHz and PAL N= 3.582056 MHz)	VIF	Video Intermediate Frequency
		WE	Write Enable control line
		WST	World System Teletext
		XTAL	Quartz crystal
		Y	Luminance signal

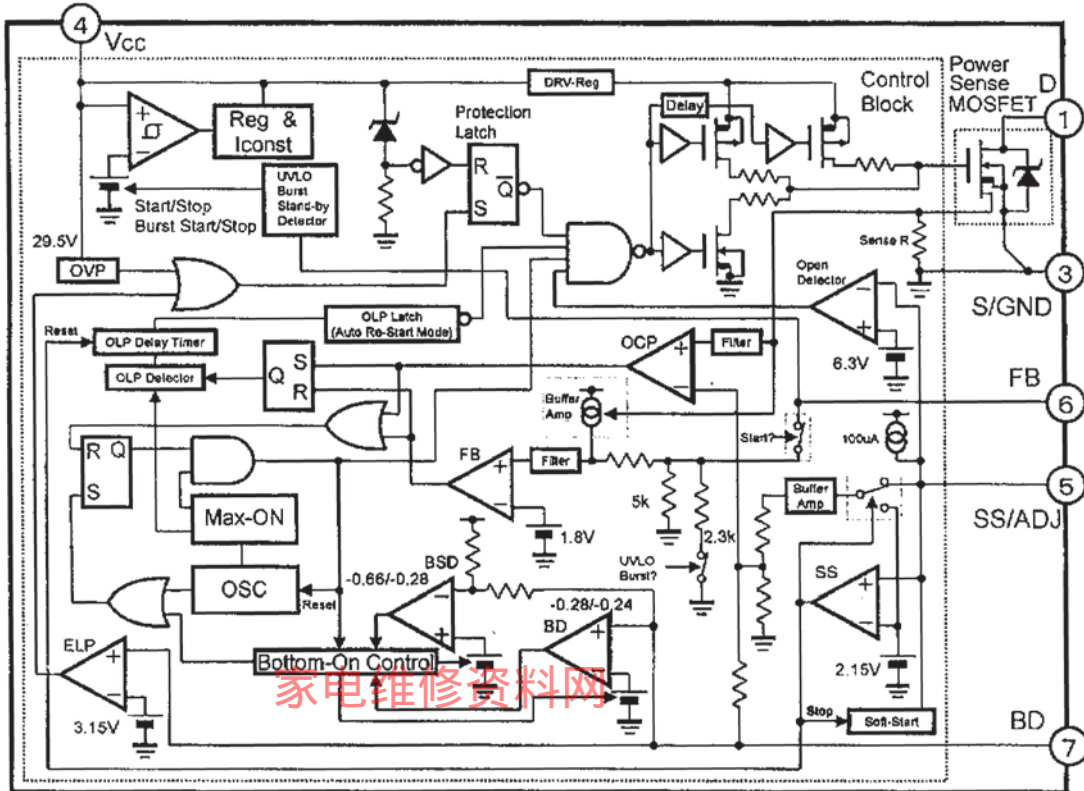
9.4 IC Data Sheets

This section shows the internal block diagrams and pin layouts of ICs that are drawn as "black boxes" in the electrical diagrams.

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9.4.1 Diagram A1, W6554A, (IC601)

Block diagram (Connection diagram)



Functions of Each Terminal

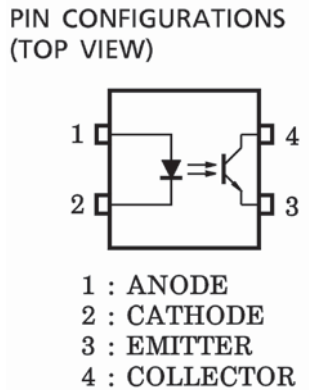
Terminal No.	Symbols	Descriptions	Functions
1	D	Drain terminal	MOSFET drain
3	S/GND	Source and Ground terminal	MOSFET Source and Ground
4	VCC	Power supply terminal	Input of power supply for control circuit
5	SS/ADJ	Soft Start and Over-current protection adjustment Terminal	Adjustment of over-current protection and Soft Start Operation Time set up
6	FB	Feedback terminal	Constant Voltage Control Signal Input and Burst(intermittent) mode Oscillation Control
7	BD	Bottom Detection Terminal	Bottom Detection Signal Input and External Latch Signal Input

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Figure 9-1 Block Diagram and Pin Configuration

9.4.2 Diagram A1, P412, (IC602)

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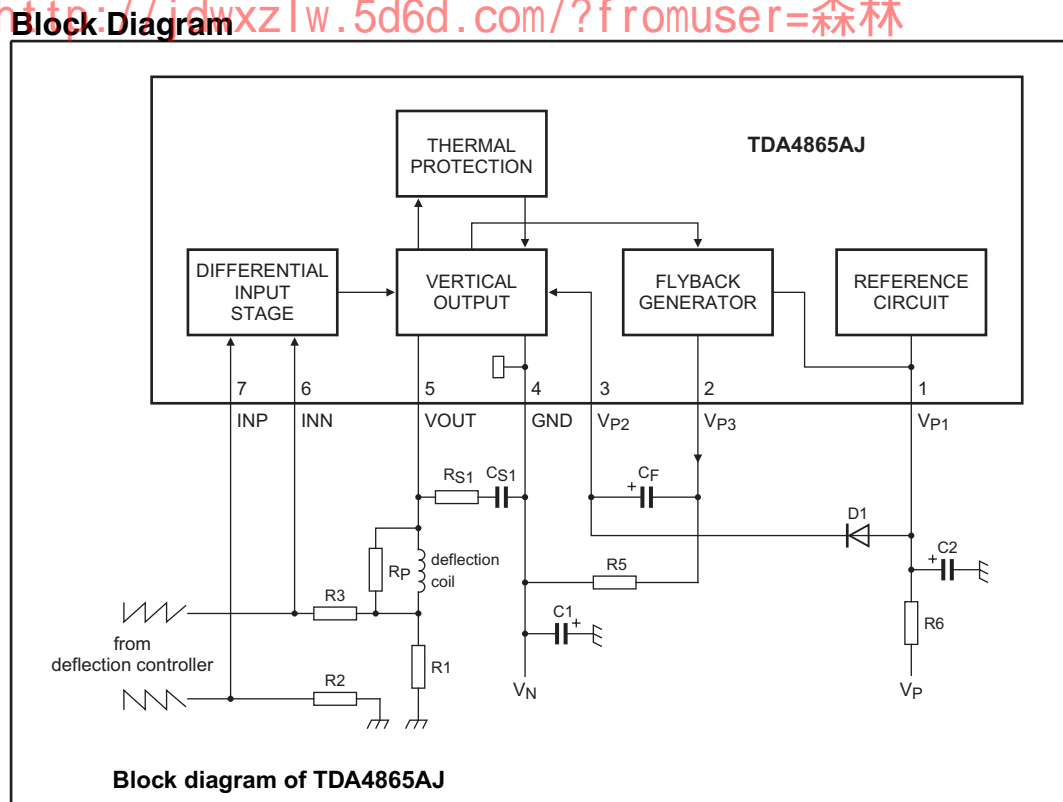
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Figure 9-2 Block Diagram and Pin Configuration

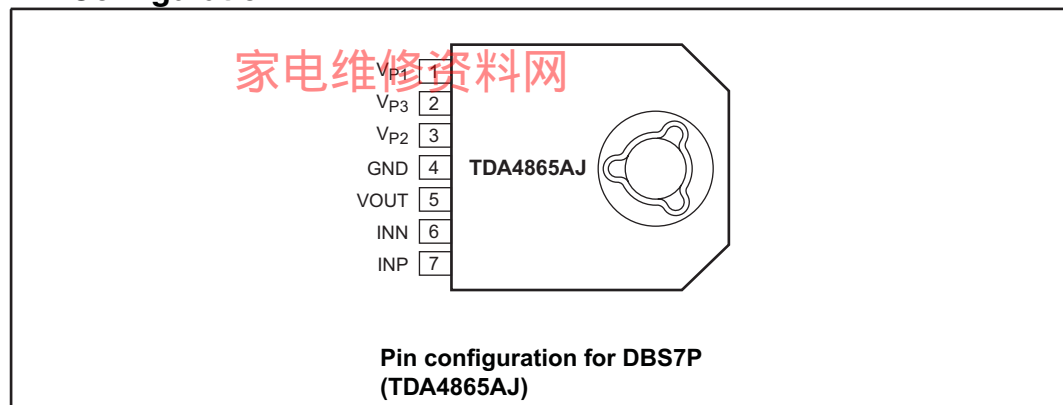
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9.4.3 Diagram A3, TDA486x, (IC301)

<http://jdwxzlw.5d6d.com/?fromuser=森林>



Pin Configuration



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Figure 9-3 Block Diagram and Pin Configuration

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BLOCK DIAGRAM

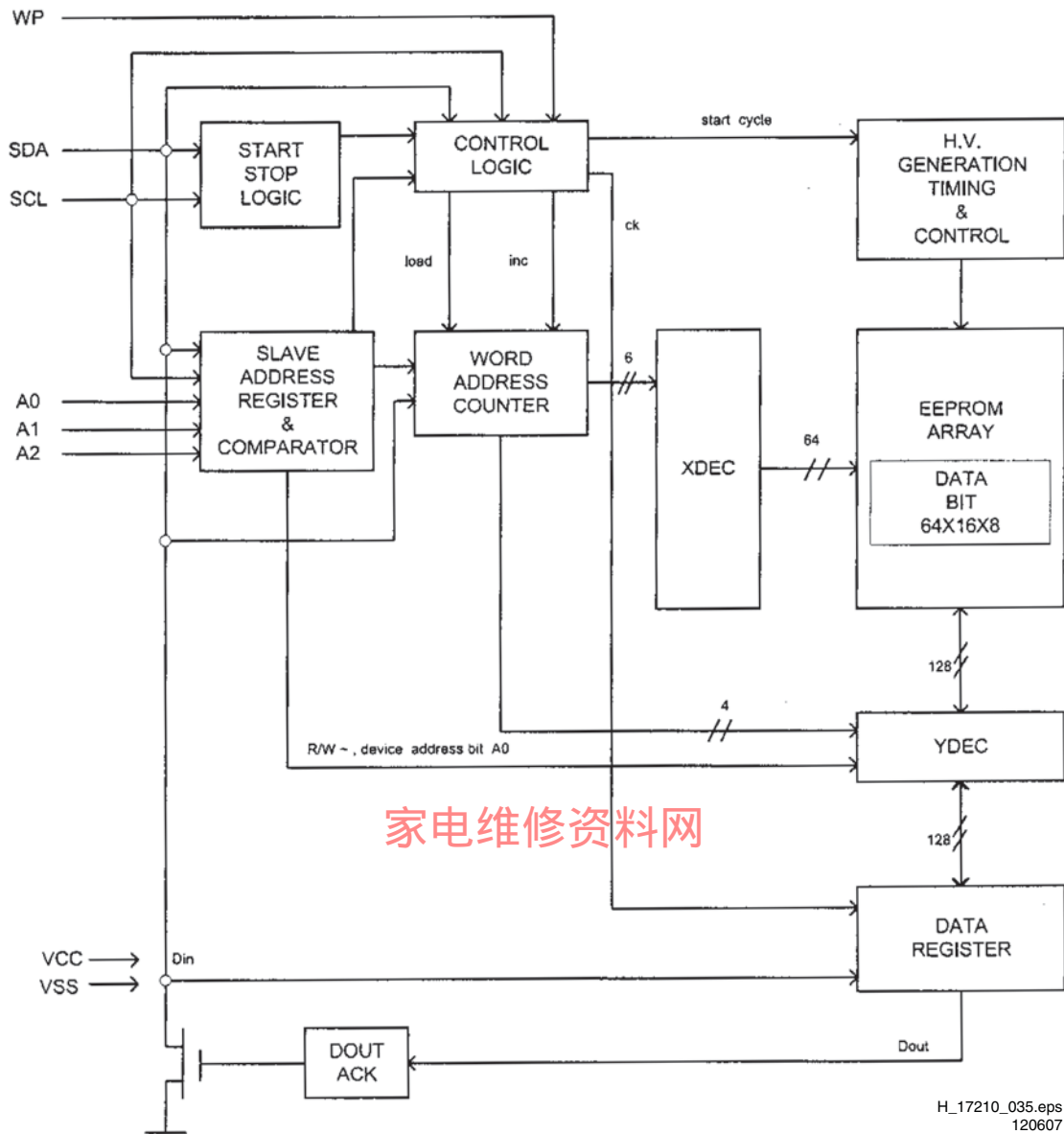
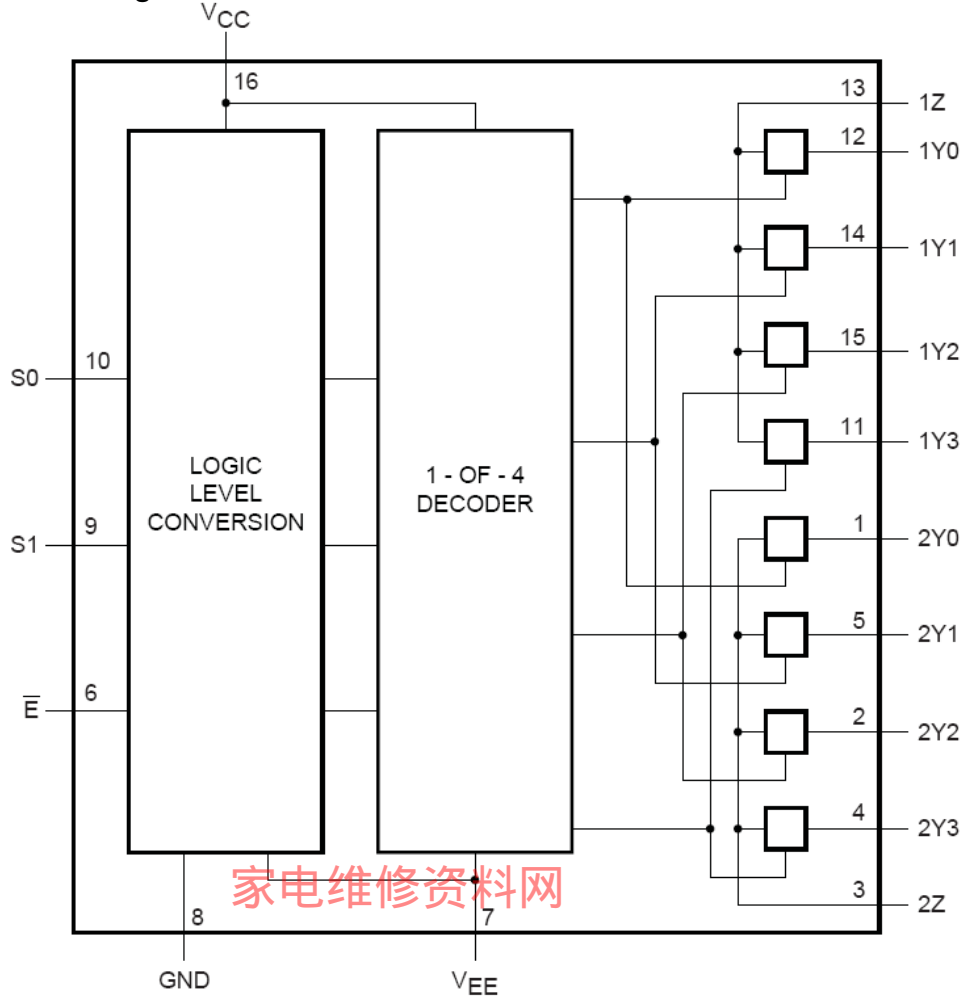


Figure 9-4 Block Diagram

9.4.4 Diagram A5, 4052, (IC102)

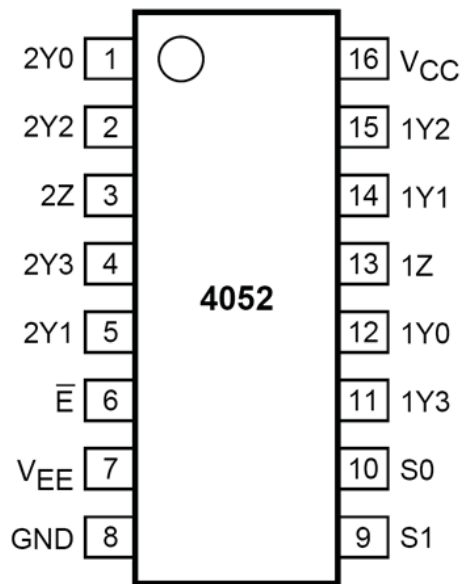
<http://idwxzlw.5d6d.com/?fromuser=森林>

Block Diagram



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Pin Configuration

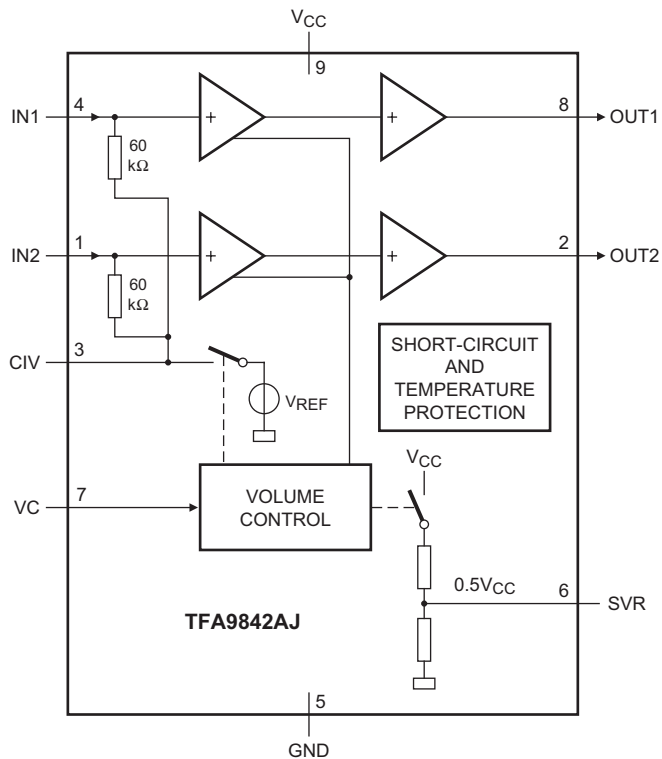


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Figure 9-5 Block Diagram and Pin Configuration

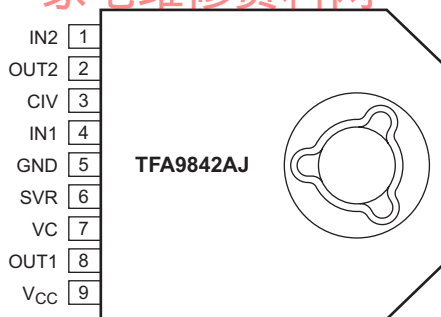
9.4.5 Diagram A7, TDA9842, (IC402)

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Block Diagram



Pin Configuration

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Figure 9-6 Block Diagram and Pin Configuration

9.4.6 Diagram A8, OM837x (IC201)

Block Diagram

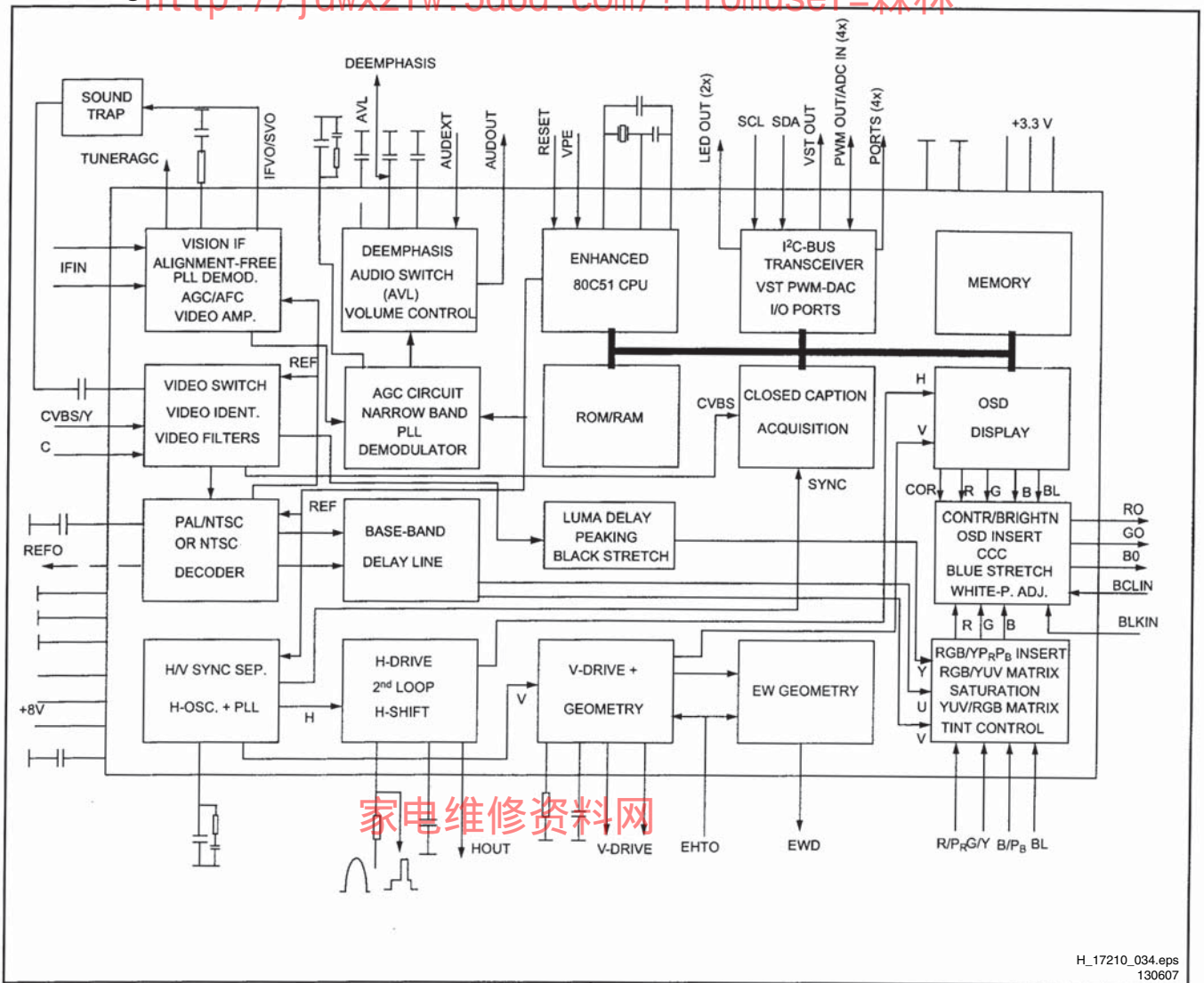
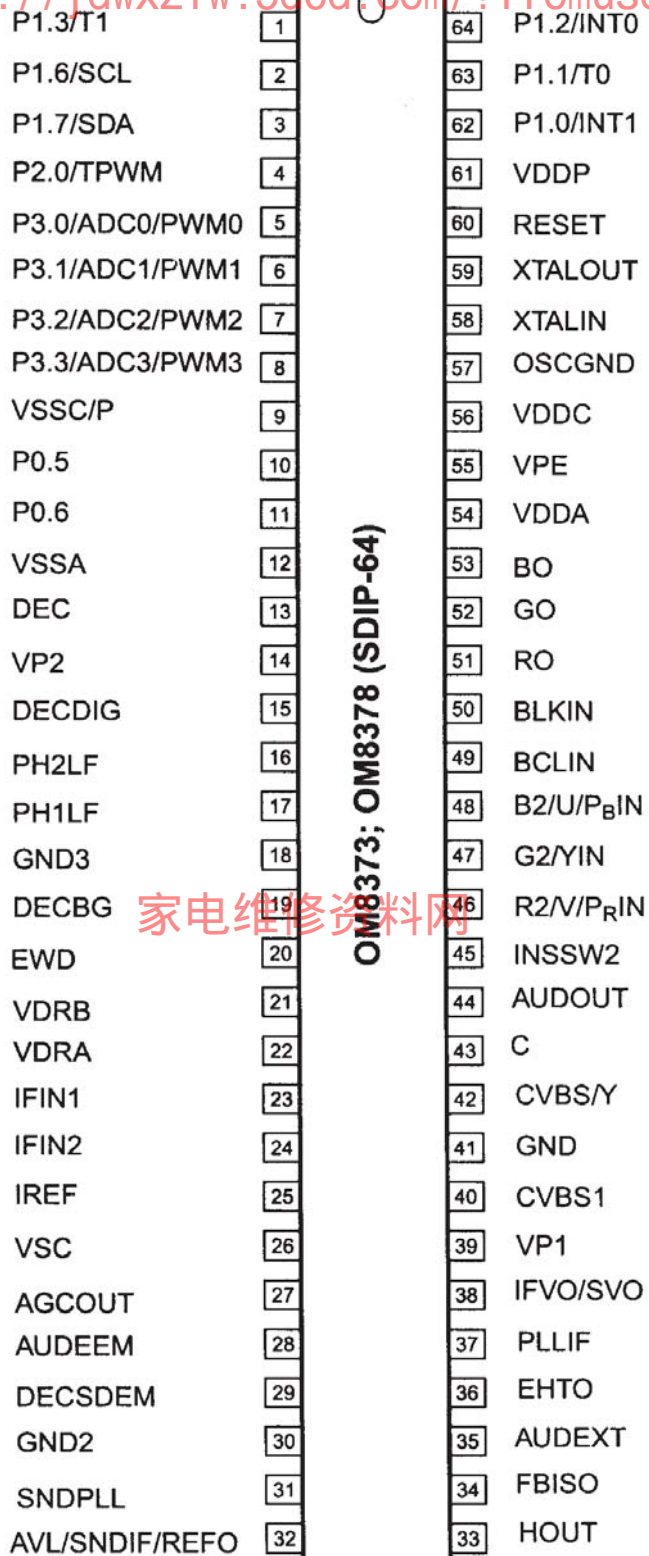


Figure 9-7 Block Diagram

Pin Configuration

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Figure 9-8 Pin Configuration

PINNING

SYMBOL	PIN	DESCRIPTION
P1.3/T1	1	port 1.3 or Counter/Timer 1 input
P1.6/SCL	2	port 1.6 or I ² C-bus clock line
P1.7/SDA	3	port 1.7 or I ² C-bus data line
P2.0/TPWM	4	port 2.0 or Tuning PWM output
P3.0/ADC0/PWM0	5	port 3.0 or ADC0 input or PWM0 output
P3.1/ADC1/PWM1	6	port 3.1 or ADC1 input or PWM1 output
P3.2/ADC2/PWM2	7	port 3.2 or ADC2 input or PWM2 output
P3.3/ADC3/PWM3	8	port 3.3 or ADC3 input or PWM3 output
VSSC/P	9	digital ground for μ -Controller core and periphery
P0.5	10	port 0.5 (8 mA current sinking capability for direct drive of LEDs)
P0.6	11	port 0.6 (8 mA current sinking capability for direct drive of LEDs)
VSSA	12	digital ground of TV-processor
DEC	13	decoupling
VP2	14	2 nd supply voltage TV-processor (+8V)
DECDIG	15	supply voltage decoupling of digital circuit of TV-processor
PH2LF	16	phase-2 filter
PH1LF	17	phase-1 filter
GND3	18	ground 3 for TV-processor
DECBG	19	bandgap decoupling
EWD	20	E-W drive output
VDRB	21	vertical drive B output
VDRA	22	vertical drive A output
IFIN1	23	IF input 1
IFIN2	24	IF input 2
IREF	25	reference current input
VSC	26	vertical sawtooth capacitor
AGCOUT	27	tuner AGC output
AUDEEM	28	audio deemphasis
DECSDEM	29	decoupling sound demodulator
GND2	30	ground 2 for TV processor
SNDPLL	31	narrow band PLL filter
AVL/REFO/SNDIF ⁽¹⁾	32	Automatic Volume Levelling / subcarrier reference output / sound IF input
HOUT	33	horizontal output
FBISO	34	flyback input/sandcastle output
AUDEXT	35	external audio input
EHTO	36	EHT/overvoltage protection input
PLLIF	37	IF-PLL loop filter
IFVO/SVO	38	IF video output / selected video output

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Figure 9-9 Pin Configuration

Pinning

SYMBOL	PIN	DESCRIPTION
VP1	39	main supply voltage TV processor
CVBS1	40	internal CVBS input
GND	41	ground for TV processor
CVBS3/Y	42	CVBS3/Y input
C	43	chroma input
AUDOUT	44	audio output
INSSW2	45	2 nd RGB / YUV insertion input
R2/U/P _R IN	46	2 nd R input / V (R-Y) input / P _R input
G2/YIN	47	2 nd G input / Y input
B2/U/P _B IN	48	2 nd B input / U (B-Y) input / P _B input
BCLIN	49	beam current limiter input
BLKIN	50	black current input / V-guard input
RO	51	Red output
GO	52	Green output
BO	53	Blue output
VDDA	54	analog supply of Teletext decoder and digital supply of TV-processor (3.3 V)
VPE	55	OTP Programming Voltage
VDDC	56	digital supply to core (3.3 V)
OSCGND	57	oscillator ground supply
XTALIN	58	crystal oscillator input
XTALOUT	59	crystal oscillator output
RESET	60	reset
VDDP	61	digital supply to periphery (+3.3 V)
P1.0/INT1	62	port 1.0 or external interrupt 1 input
P1.1/T0	63	port 1.1 or Counter/Timer 0 input
P1.2/INT0	64	port 1.2 or external interrupt 0 input

Note

1. The function of this pin is controlled by the CMB1/CMB0 bits in subaddress 22H and the SIF bit in subaddress 28H.

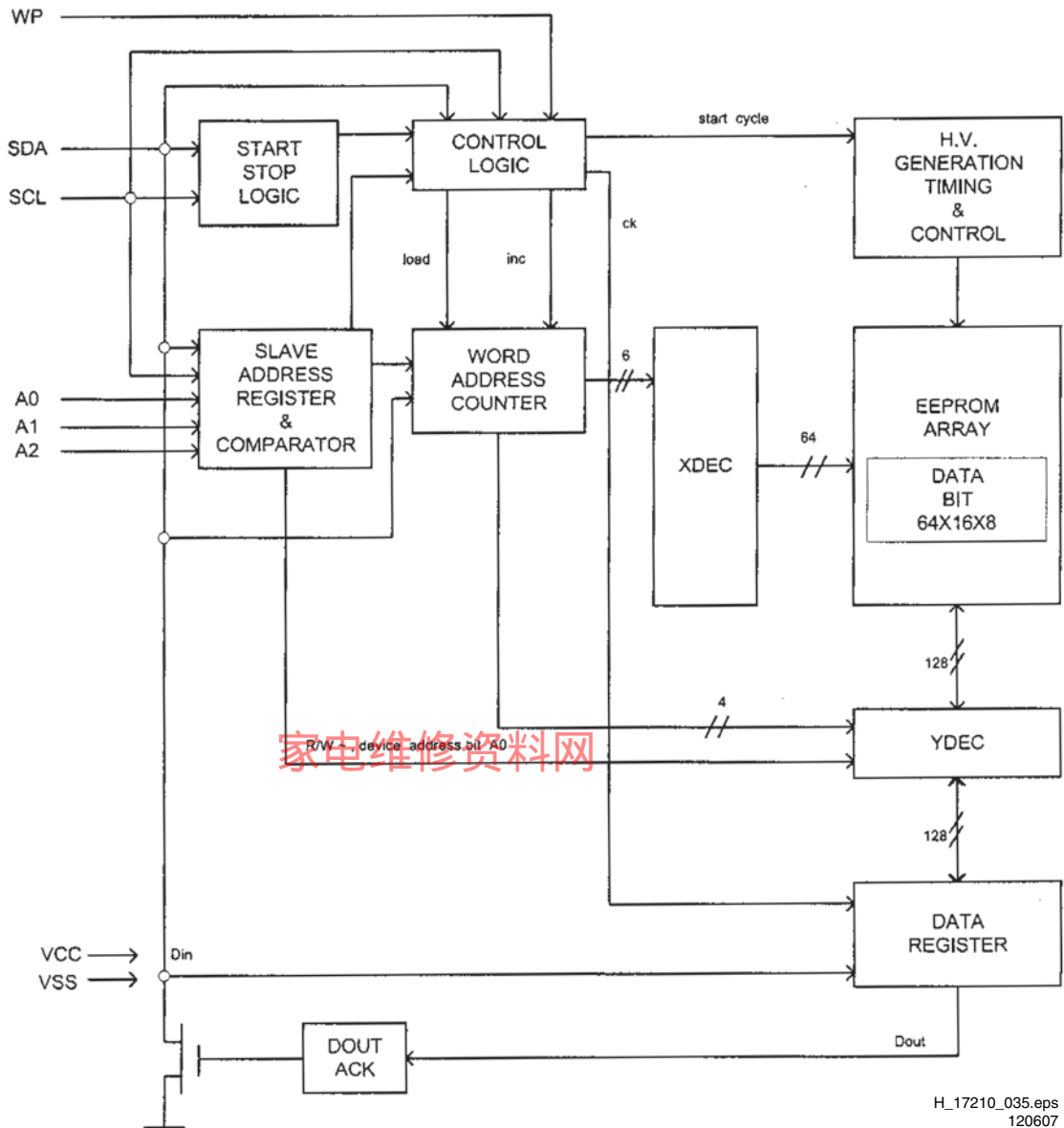
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Figure 9-10 Pin Configuration

9.4.7 Diagram A8, 24C08 (IC202)

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BLOCK DIAGRAM

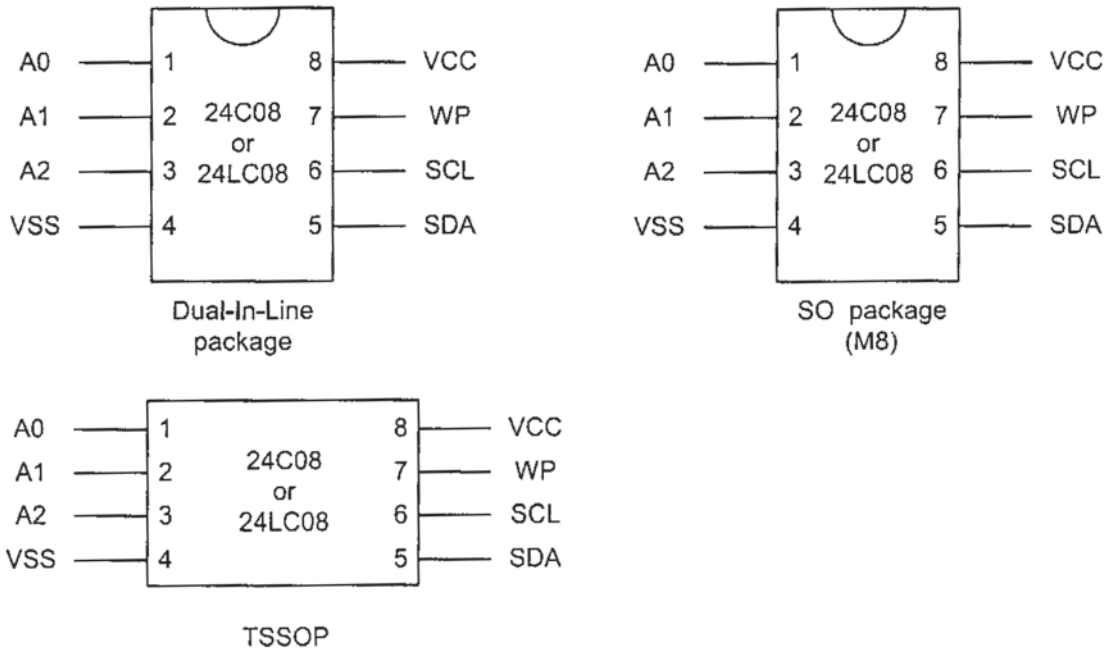


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Figure 9-11 Block Diagram

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Pin Configuration



Pin Name

A0, A1	N.C.
A2	Device Address inputs
Vss	Ground
SDA	Data I/O
SCL	Clock input
WP	Write Protect
Vcc	+ 5 V or + 3 V

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Figure 9-12 Pin Configuration

Q506	9965 000 40238	BF422 NPN (250V)
Q506	9965 100 05318	BF422 NPN (250V)
Q507	9965 000 40238	BF422 NPN (250V)
Q507	9965 100 05318	BF422 NPN (250V)
Q508	9965 000 40239	BF423 PNP (-250V)
Q508	9965 100 05319	BF423 PNP (-250V)
Q509	9965 000 40238	BF422 NPN (250V)
Q509	9965 100 05318	BF422 NPN (250V)
Q601	9965 100 04919	I.C.AZ431AZ-BAAC
Q601	9965 100 05321	TL431ALF/TL431ALS Ik
Q602	9965 100 04913	Transistor 2SC2120Y
Q603	9965 000 40232	2SC1815Y/2PC1815
Q604	9965 000 40232	2SC1815Y/2PC1815
Q606	9965 100 04912	Transistor 2SA1013
Q608	9965 000 40231	2SA1015Y/2PA1015
Q801	9965 000 40232	2SC1815Y/2PC1815
Q802	9965 000 40232	2SC1815Y/2PC1815
Q803	9965 000 40232	2SC1815Y/2PC1815
Q804	9965 000 40232	2SC1815Y/2PC1815
I601	9965 000 41227	Bead 3.5 x 1 x 9mm

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11. Revision List

Manual 3122 785 17210

- First release.

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