

A detailed close-up photograph of a television's internal circuit board. The board is a complex network of green and blue printed circuitry with numerous gold-plated components. A large, prominent component with a dense array of gold pins is visible in the center. To its left, several smaller components are labeled with white text: 'C108', 'C107', 'C113', 'C112', and 'U5'. The background is a soft-focus view of the rest of the television's interior, showing various other electronic parts and the metallic casing.

MB27
TFT TV
SERVICE MANUAL

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1 INTRODUCTION

The purpose of this document is to define the operation of 17MB27 chassis, capable of driving 15” and 19” TFT LCD panels. It is aimed to provide information to engineering staff to understand the operation and specs of the TV. The other related technical documents are given in Table1:

	Title
1	17MB27 schematics
2	IR receiver and LED display board schematics
3	Keypad board schematics
4	DVD module card schematics
5	DVB-T module card schematics

Table1.1: Related documents

2 GENERAL DESCRIPTION

The system is a low to mid end; 15” and 19” TFT TV solution basically for EU market with VCT4913G microcontroller / video audio processor chip on a 2-layer PCB. Since the target market is EU, the first release of the TV will support PAL/SECAM B/G/D/K/I/L/L’.

The target panels are 15” 1024x768 and 19”w 1440x900 TFT-LCD panels. A DVD loader is used to read DVD content and a DVB-T module card is used to support DVB-T. 15” TV will use 12V/4.16A DC adapter; 19” TV will use 12V/5.83A DC adapter.

Inputs

- 1xTuner (both analog and DVB-T)
- 1xDVD
- 1xScart
- 1xPC (VGA) (optional) (supports also YPbPr)
- 2xHDMI (optional)
- 1xBack AV (optional)

Outputs

- Speaker (stereo, 2x16 Ω , 2x2Watt)
- Headphone (stereo) (optional)
- Audio line out (stereo) (optional)
- DVD/DVB-T coaxial SPDIF out(optional)

General default features

- Multi System Reception: PAL-SECAM BG-DK-I/I’-L/L’
- Menu system (multi language)
- 100 program storage locations
- OSD (on-screen display)

- Teletext
- IR Control (RC5 and other customer specific protocols)
- “No Ident” Timer
- Child Lock
- Sleep Timer
- WSS (16:9/4:3 Aspect Ratio Auto Switch)

Sound Features

- Equalizer
- FM Radio
- Linear Stereo
- German-NICAM Stereo
- 5-Band Equalizer Control
- SRS TRU Surround (OPT)
- SRS TRU Bass (OPT)
- BBE, WOW (OPT)

Picture Features

- 4:3 PANEL --- 4:3, 16:9, Auto
- WIDE PANEL---4:3,16:9, Auto(opt), Subtitle(opt), Zoom(opt), Panoramic(opt)
- Picture Modes (Bright, Standard, Soft)
- Media Window Enhancement (MWE)
- White balance settings (warm/normal/cool) for TV&PC
- Backlight brightness setting (movie/normal/bright)
- Multi System Reception : PAL-SECAM BG-DK-I/I’-L/L’
- NTSC Video Playback
- WSS (16:9 / 4:3 Aspect Ratio Auto Switch)
- Channel Type Sorting (Favorite/Sport/Music/News/Movie)

Tuning Options

- FST
- Frequency Search (Optional)
- APS (Auto Search/Name/Sort)
- Auto Search
- CATV/HYPERBAND

Keyboard

- Volume -/ +Button
- Program -/+ Button
- Menu Button
- TV / AV Button

Teletext/OSD

- Simple Text 10 Pages
- Fastext & Top Text (OPT)
- Teletext Languages (ALL)
- Character Based OSD

- OSD Color & Transparency Selection

Electrical features

- 12V 4.16A DC / 100 - 240V AC adapter for 15" TV
- 12V 5.83A DC / 100 - 240V AC adapter for 19" TV
- <1W standby power consumption

System Building Blocks

17MB27 chassis main blocks are as follows:

- **Analog Front End** : VCTI (Microcontroller+Video Processor+Audio Processor+IF Demodulator+Teletext Decoder+ OSD Generator)
- **Back End** : MST517a-M, MST507a-M (Scaler, Deinterlacer, OSD Generator)

Analog Front End

17MB27 main board consists of two major blocks. The first block is analog front-end and this block is handled by VCTI chip that is highly multifunctional. VCTI performs Tuner IF demodulation, CVBS, RGB, SVHS and audio input selection and processing. The audio processor (MSP) supports equalizer, tone control, volume control, AVL, surround effect etc. The video processor (VSP) handles video processing such as color standard detection and demodulation, picture alignment (brightness, contrast, color etc.). The IC also has a teletext decoder with fastext memory. The processed video output is sent to MST5x7A-M, scaler/deinterlacer in RGB format together with a composite sync.

The TV tuner is PLL controlled symmetrical IF output type. The IF signal is filtered by a single SAW filter. Inter-carrier sound demodulation is performed by the system. After the SAW filter block, IF signal is processed by VCTI IF demodulator. Audio signal is digitally filtered in the IF demodulator block. The same IF signal is buffered and sent to DVB-T module card, tdm1300.

Since VCTI can handle all the audio processing, there is no need for additional audio processor solution on the board. MSP has two audio inputs which are assigned to the Scart in L/R and Audio Switch L/R output. MSP has three audio outputs which are assigned to the headphone amplifier L/R input, audio amplifier L/R input and Audio switch L/R input. The board employs TDA2822M and TDA1308 to drive speaker and headphone outputs, respectively. Switching control for other audio inputs and outputs (HDMI, Back AV, PC, DVD, and DVB-T) is achieved by an I2C controlled audio switch (TEA6422).

Back End

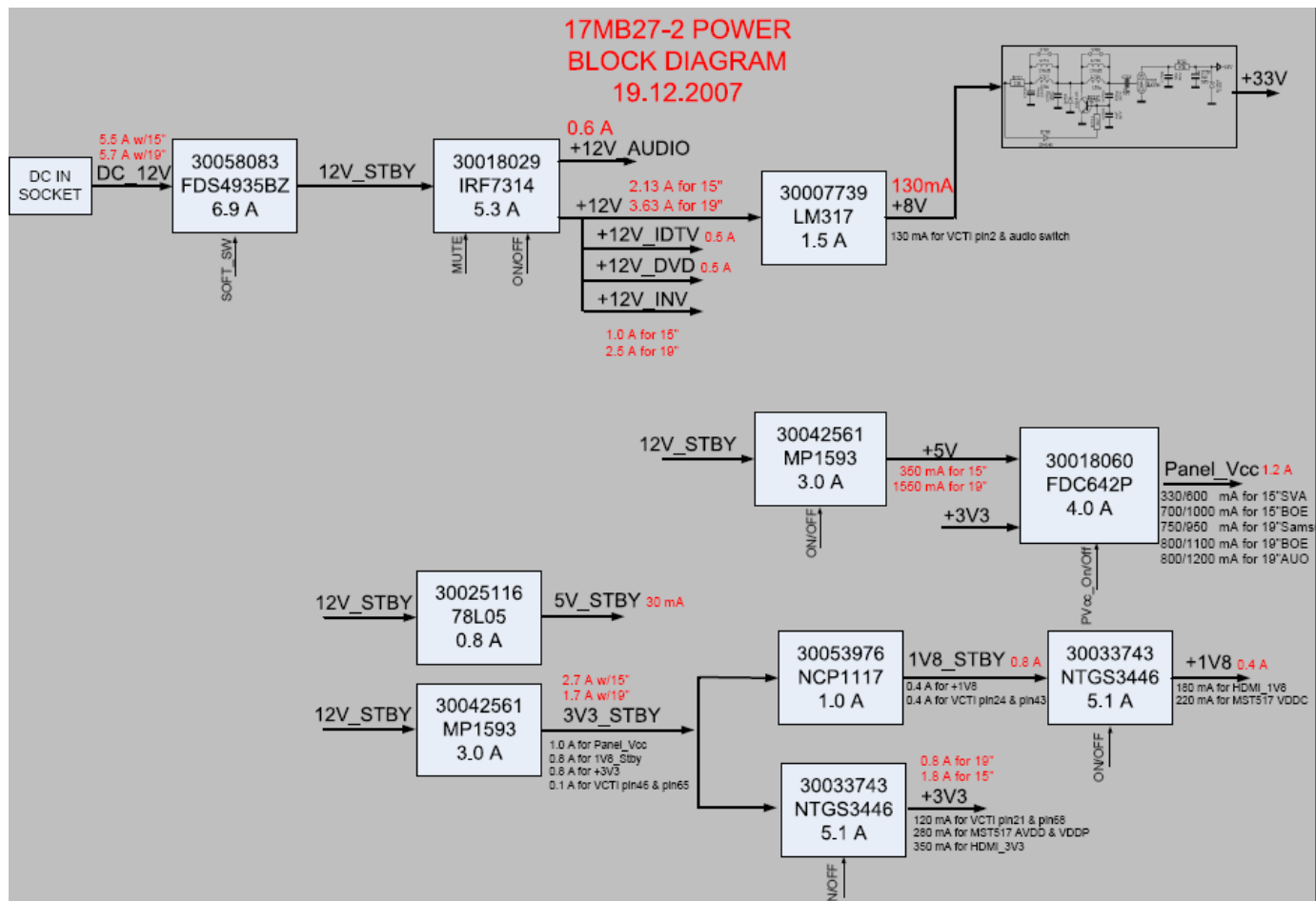
MST5x7A-M has two ADC inputs. First ADC input is assigned to the VCTI RGB output. Other RGB/YPbPr inputs are multiplexed for the second ADC input. HDMI receiver ANX9021 analog output, VGA RGB input and the synchronization signals are multiplexed by a primary RGB switch (PI5V512).

MST5x7A-M has an embedded LVDS transmitter. It can be configured as either single LVDS, or dual LVDS output.

There are three PWM output ports. PWM0 is assigned to analog/digital dimming control for the backlight, PWM1 is used for backlight on/off and panel logic power supply on/off control and PWM2 is used to control PC/HDMI switch IC (PI5V512).

3 POWER CONSUMPTION

The power block diagram with the currents drawn is shown below:



4 MICROCONTROLLER PORT CONFIGURATION

PIN NO	PORT NAME	SIGNAL NAME	TYPE	FUNCTION
47	P10	MST_RESET	O	Scaler reset
		PROTECT	I	Short circuit detection
48	P11	TV_RXD	I	IDTV UART receive signal
49	P12	TV_TXD	O	IDTV UART transmit signal
50	P13	IRQ	O	IDTV interrupt request signal
51	P14	KEY	I	Keyboard function select
52	P15	SC_PIN8	I	Scart function select
53	P16	DVD_IR_ON/OFF	O	DVD infrared signal on/off control
54	P17	POWCON	O	Standby on/off control

PIN NO	PORT NAME	SIGNAL NAME	TYPE	FUNCTION
55	P20	HDMI_HP_INV	O	HDMI hot plug signal
56	P21	CS	O	Switching control for Mstar bus and system I2C
62	Safety	VCTI_HS	O	VCTI composite sync output
78	FBIN	DVD_SENSE	I	DVD module detection
85	Vert+	TV/DVB_SW	O	IDTV/TV I2C and AGC switch control for tuner
27	P22	WP	O	Write protection control for NVM
28	P23	IR	I	Infrared input

Table 4.1 VCTI port configuration

5 SIDE BOARDS & CONNECTORS

5.1 Keyboard

A four-pin connector is used between 17mb27 and the keyboard:

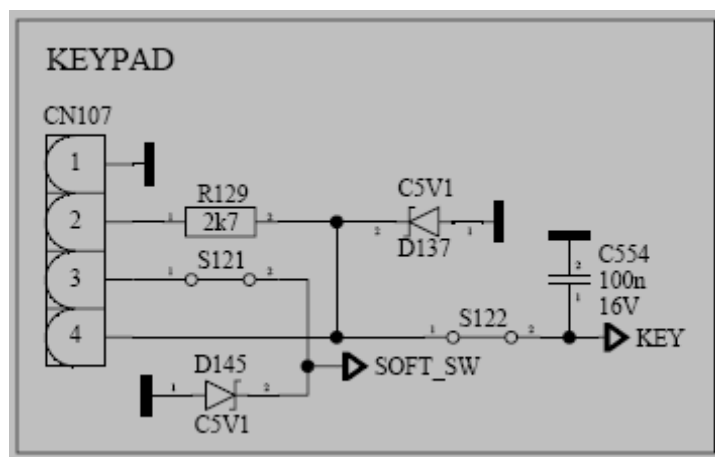


Figure 5.1.1: Keyboard connector

KEY signal is sent directly to microcontroller ADC port and depending on the voltage level of KEY signal, microcontroller performs one of these actions: menu, program+, program-, volume+, volume-, and source.

SOFT_SW signal is used to switch between “power-off” and “standby” modes.

5.2 Infra-red & LED

A five-pin connector is used between 17mb27 and the LED board:

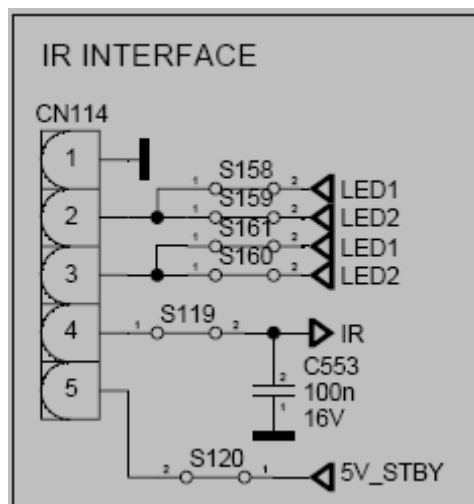


Figure 5.2.1: LED board connector

Pin2 and pin3 carry the control signals for the LED. Pin4 carries the infra-red signal to the microcontroller. Pin5 is used to power up the LED board.

5.3 DVB-T module board

DVB-T module board (tdm1300) is used to receive digital terrestrial broadcast signals. Three cables are used to connect 17mb27 and tdm1300: power, data, and IF.

12V (500mA) is sent to tdm1300 by power cable:

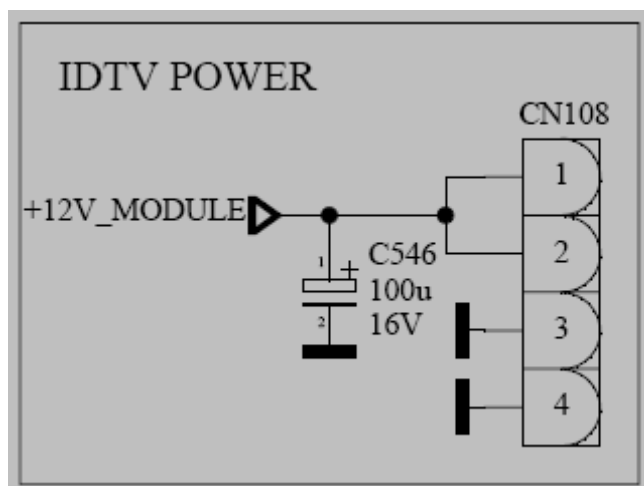


Figure 5.3.1: DVB-T module card power connection on 17mb27

Analog RGB(YPbPr), CVBS, stereo audio, tuner control (SCL, SDA, AGC), and three GPIO port outputs of tdm1300, together with UART ports (TV_RXD, TV_TXD, IRQ) are carried by data cable.

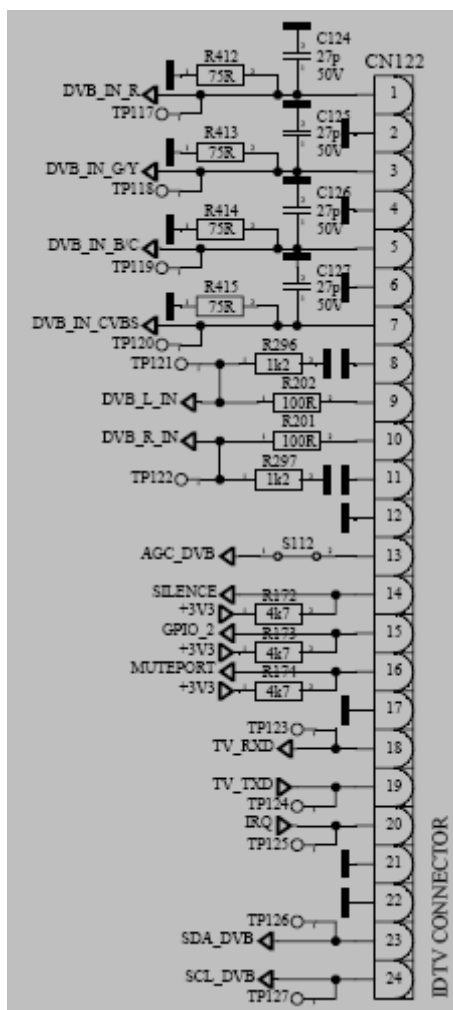


Figure 5.3.2: DVB-T data connector on 17mb27

Tdm1300 board has no tuner on it. Instead, the tuner of 17mb27 is used for both analogue and digital reception. Tuner is controlled by either the 17mb27 microcontroller (VCTI), or tdm1300 board microcontroller. The IF (intermediate frequency) output of the tuner is sent to tdm1300 board for digital reception.

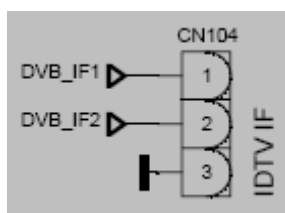


Figure 5.3.3: IDTV IF connector on 17mb27

5.4 DVD module board

DVD module board has two parts: a loader and an electronic card. Electronic card controls the loader and has connections with 17mb27 and DVD keypad.

Three cables are used to connect 17mb27 and DVD electronic card: power, data, and sense.

12V (500mA) is sent to DVD electronic card by power cable:

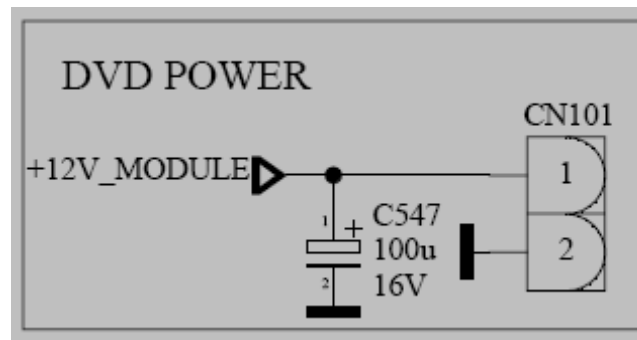


Figure 5.4.1: DVD module board power connection on 17mb27

Y/C and/or CVBS video, stereo audio outputs and infra-red input of DVD module board is carried on data cable:

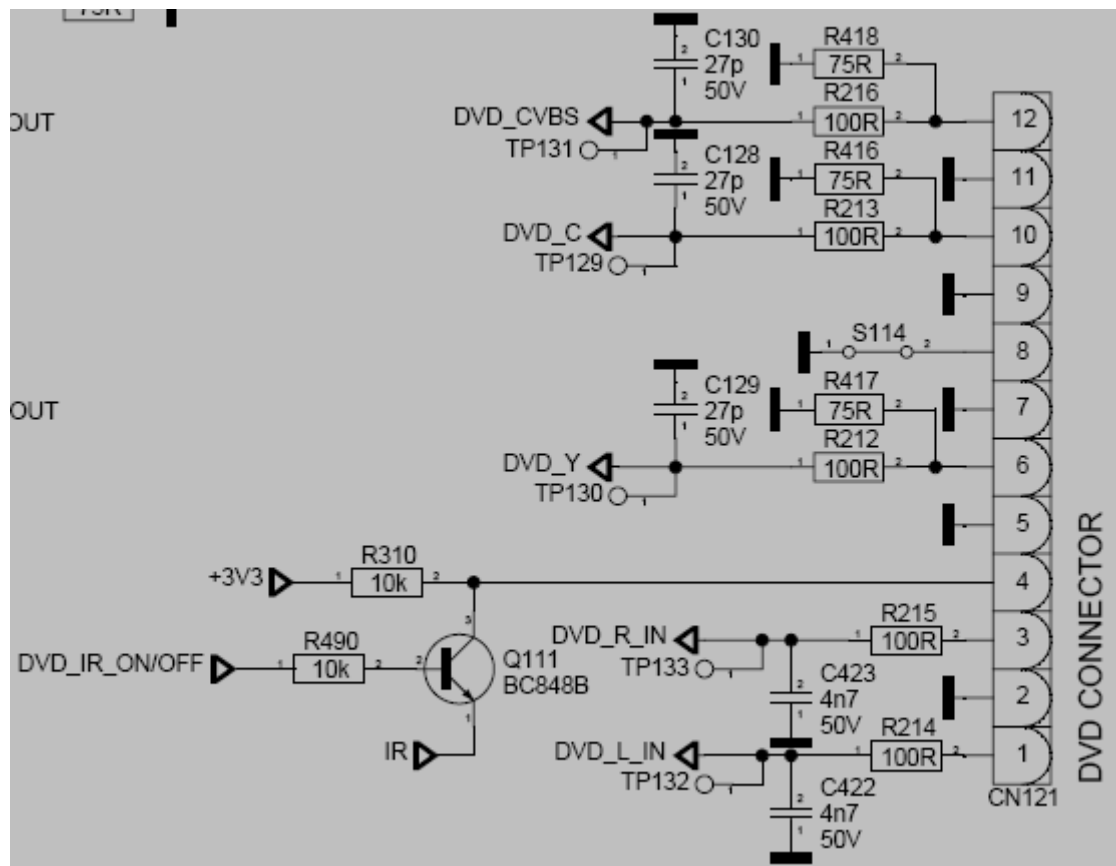


Figure 5.4.2: DVD data connector on 17mb27

When a DVD is inserted into the loader, the DVD electronic card sends an interrupt signal (DVD_SENSE) to the 17mb27 microcontroller:

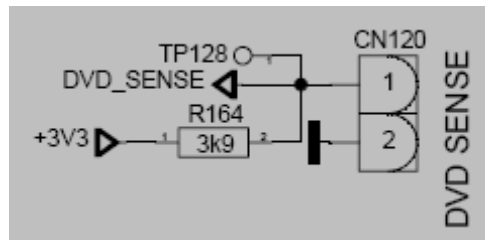


Figure 5.4.3: DVD_SENSE connector on 17mb27

5.5 LVDS connector

MST507A-M is used for single LVDS output and MST517A-M is used for dual LVDS output on 17mb27:

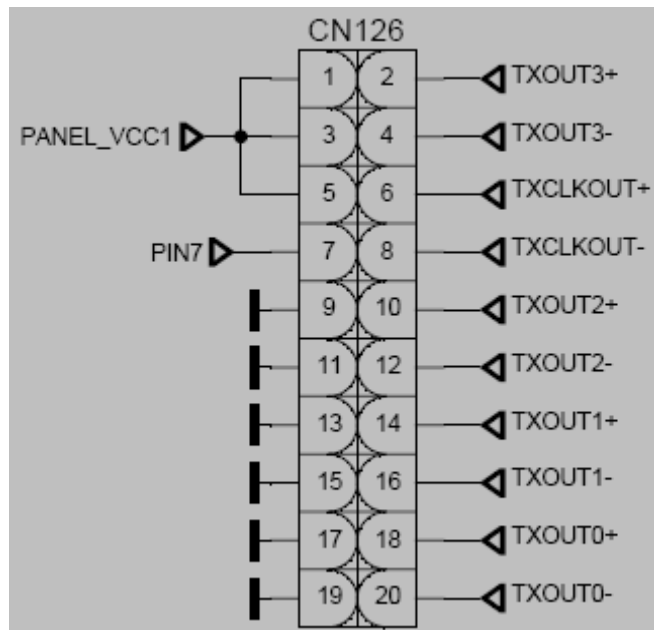


Figure 5.5.1: Single LVDS output connector on 17mb27

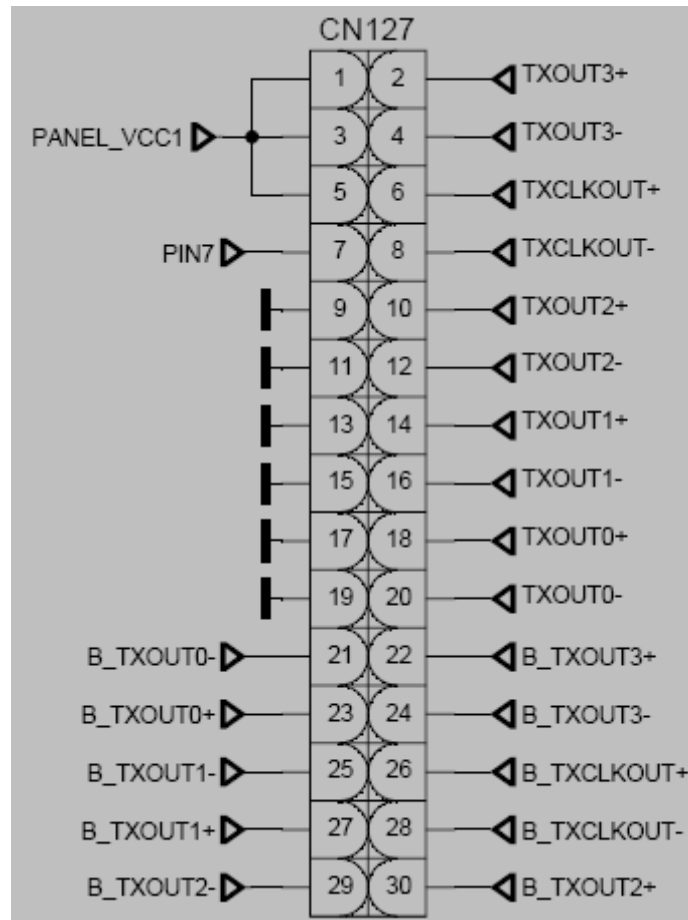


Figure 5.5.2: Dual LVDS output connector on 17mb27

Panel_Vcc1 is the power input for the panel LCD module. PIN7 signal is a logic 1 or 0 signal depending on the panel type.

5.6 Inverter

12V power, backlight on/off control, and dimming control signal are sent to the inverter board:

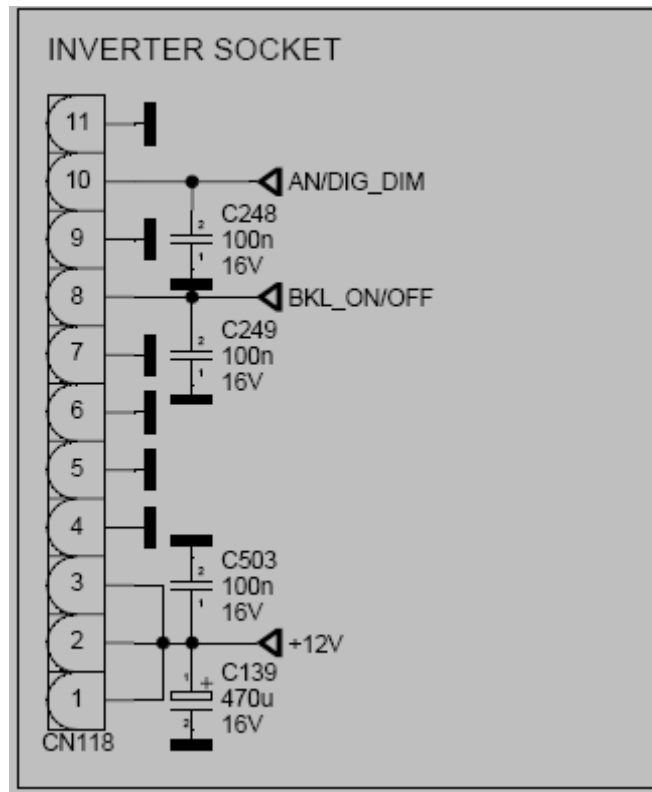


Figure 5.6.1: Inverter connector on 17mb27

6 IC SPECIFICATIONS

6.1 Microcontoller/Video&Audio Processor (VCT4913G)

VCTI49xy is composed of microcontroller, video processor, display and deflection processor, sound processor and IF blocks as shown in below figure .

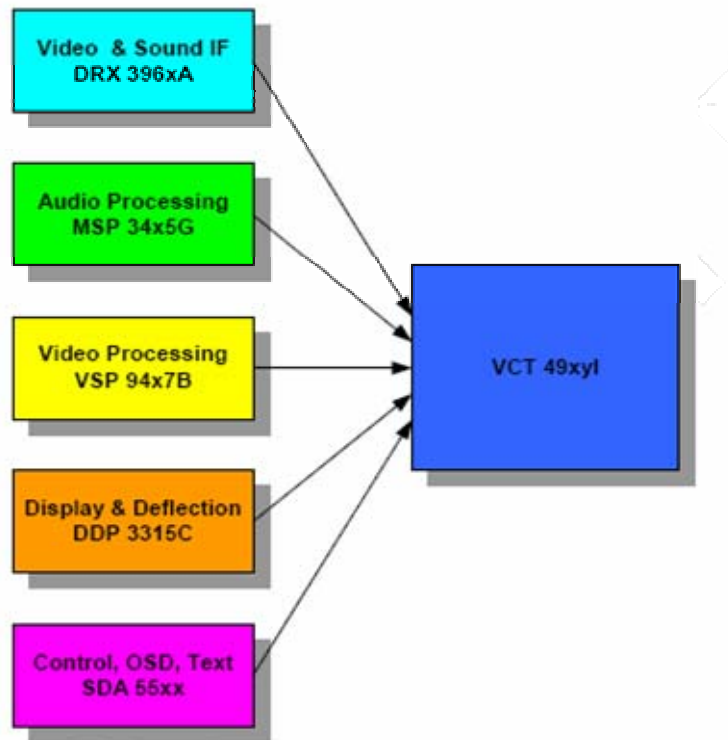


Figure 6.1.1: VCTI49xy block diagram

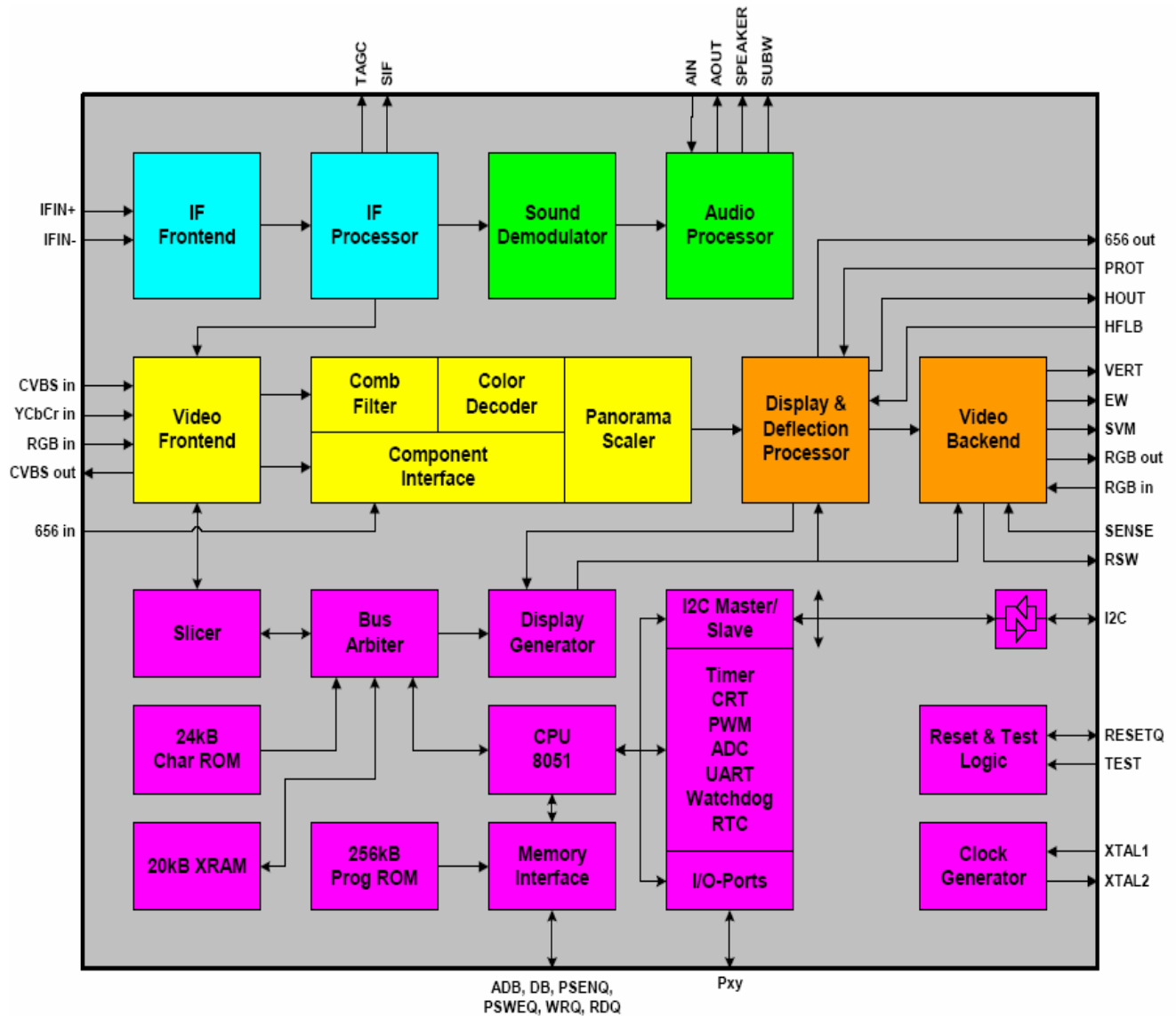


Figure 6.1.2: Detailed block diagram of VCTI49xy

VCTI49xyl family has two package types; PSSDIP88 and PMQFP144. PSSDIP88 package is chosen because of its convenience in the soldering process. PSSDIP88 package has two versions; 1 and 2. PSSDIP88-2 package is the “pinning mirrored” version of PSSDIP88-1 and is preferred to be used for layout compatibility.

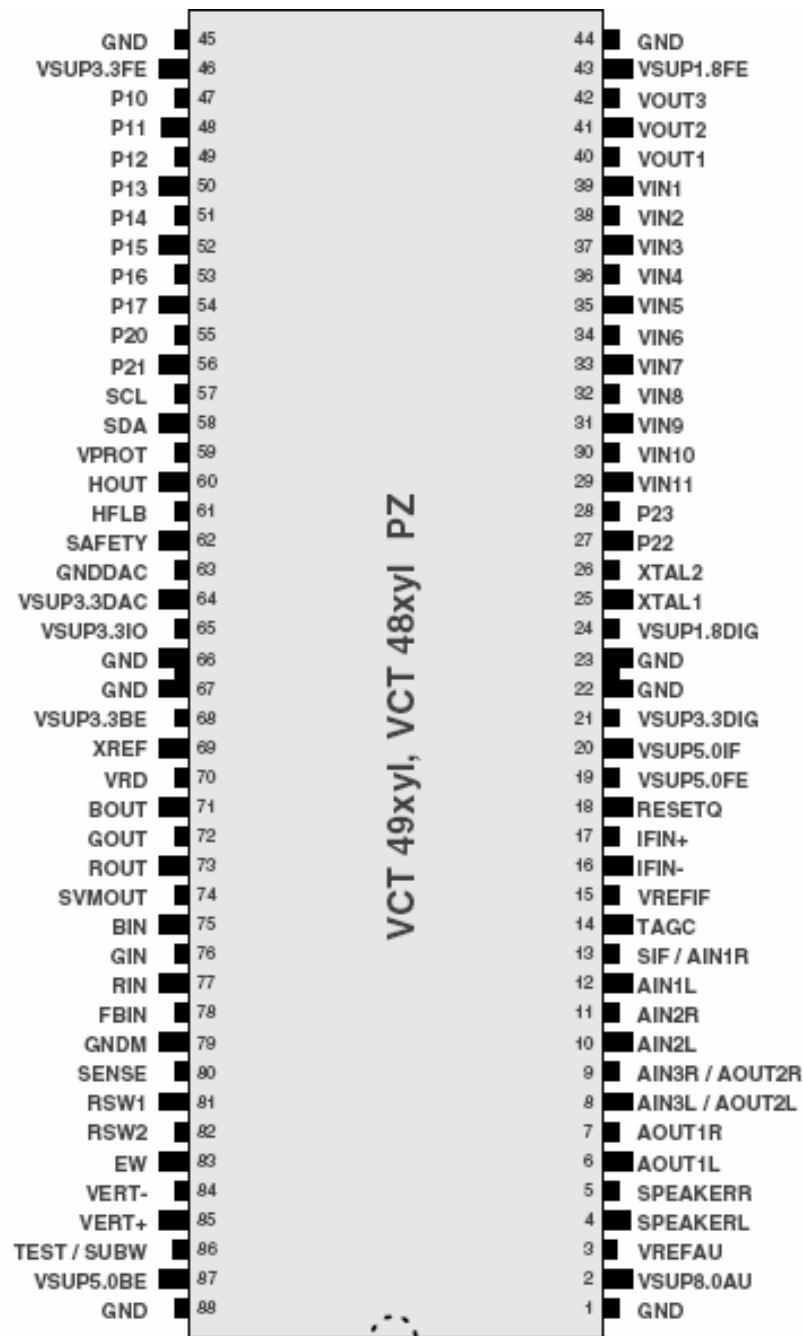


Figure 6.1.3: VCTI pinning diagram

6.2 Scaler/De-interlacer (MST5x7A-M)

The MST507A-M and MST517A-M are total solution graphics processing ICs for LCD displays with panel resolutions up to XGA and WXGA+ / SXGA+ respectively. They are configured with a high-speed integrated triple-ADC/PLL, a high quality display processing engine, and an integrated multi-purpose output display interface that can support all major panel interface formats. To further reduce system costs, the MST517A-M also integrates intelligent power management control capability for green-mode requirements and spread spectrum support for EMI management.

Input mode detection support analyzes input video signal (H/V polarity, H/V frequency, interlace/field detect) – extensive status registers support robust detection of all VESA and IBM modes.

MST has a built-in OSD generator with 291 character font programmable RAM. OSD generator supports 2/4/8 multi-color fonts, 8/16/256 color palette and 1K code attributes.

MST also supports dual channel 6-bit/single channel 8-bit TTL panel interface and 6/8-bit LVDS panel interface. MST517A-M supports up to WXGA+ (1440x900)/SXGA+ (1400x1050) display resolution with up to 135 MHz dot clock and MST507A-M supports up to XGA (1024x768) display resolution with up to 85 MHz dot clock.

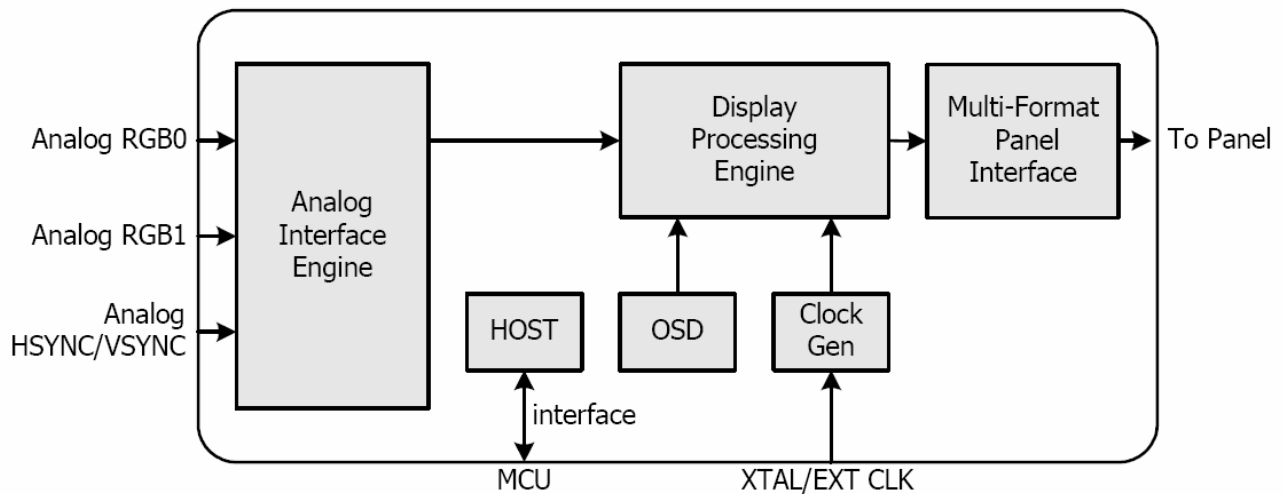


Figure 6.2.1: Internal block diagram of MST5x7A-M

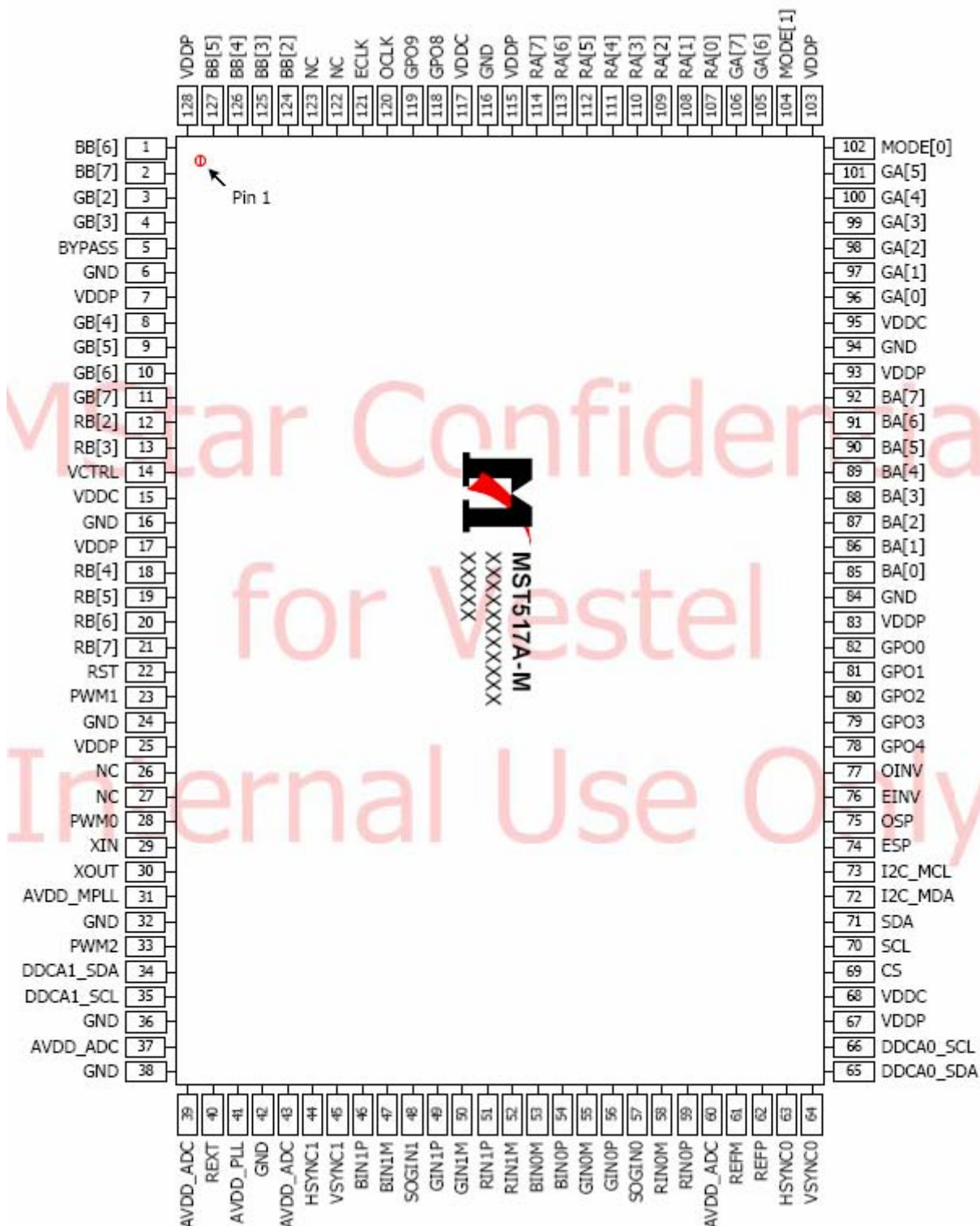


Figure 6.2.2: Pinning of MST5x7A-M

PIN NO	PORT NAME	SIGNAL NAME	TYPE	FUNCTION
28	PWM0	AN/DIG_DIM	O	Analog or digital dimming control
23	PWM1	BKL_ON/OFF	O	Backlight On/Off Control
		PVCC_ON/OFF	O	Panel Logic Power On/Off control
33	PWM2	PC/HDMI_SW	O	Video switching control

Table 6.2.1: MST5x7A-M port allocation

6.3 Audio Amplifier (TDA2822M)

TDA2822M is a dual low-voltage power amplifier in 8-lead minidip package. It is used in bridge configuration in 17mb27. The features of this amplifier are:

- Supply voltage down to 1.8 V
- Low crossover distortion
- Low quiescent current
- Bridge or stereo configuration

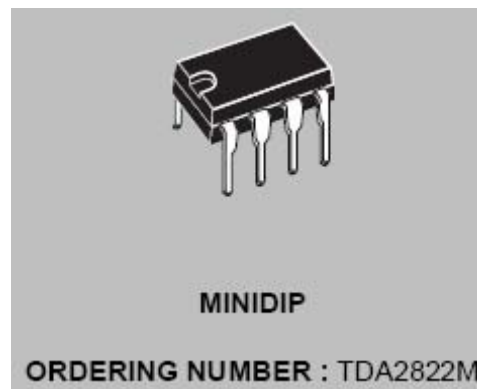


Figure 6.3.1: TDA2822M package

6.4 Headphone Amplifier (TDA1308T)

TDA1308T is an integrated class AB stereo headphone driver contained in an SO8, DIP8, or a TSSOP8 plastic package. SO8 package is used in 17mb27. The device is fabricated in a 1mm CMOS process. The main features of this IC are:

- Wide temperature range
- No switch ON/OFF clicks
- Power supply ripple rejection
- Low power consumption
- Short-circuit resistance
- High performance
 - high signal-to-noise ratio
 - high slew rate
 - low distortion

- Large output voltage swing

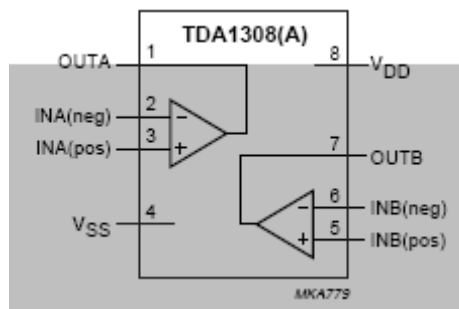


Figure 6.4.1: TDA1308T block diagram

PINNING		
SYMBOL	PIN	DESCRIPTION
OUTA	1	output A
CD)	2	inverting input A
INA(pos)	3	non-inverting input A
V _{SS}	4	negative supply
INB(pos)	5	non-inverting input B
INB(neg)	6	inverting input B
OUTB	7	output B
V _{DD}	8	positive supply

Figure 6.4.2: Pinning of TDA1308T

6.5 Audio Matrix Switch (TEA6422D)

TEA6422D is a bus-controlled audio matrix switch in an SO28 plastic monopackage. The main features of TEA6422 D are:

- 6 stereo inputs
- 3 stereo outputs
- Gain control
- Cascadable (2 different addresses)
- Serial bus controlled
- Low noise
- Low distortion
- ESD protection
- Wide dynamic range (3 Vrms)

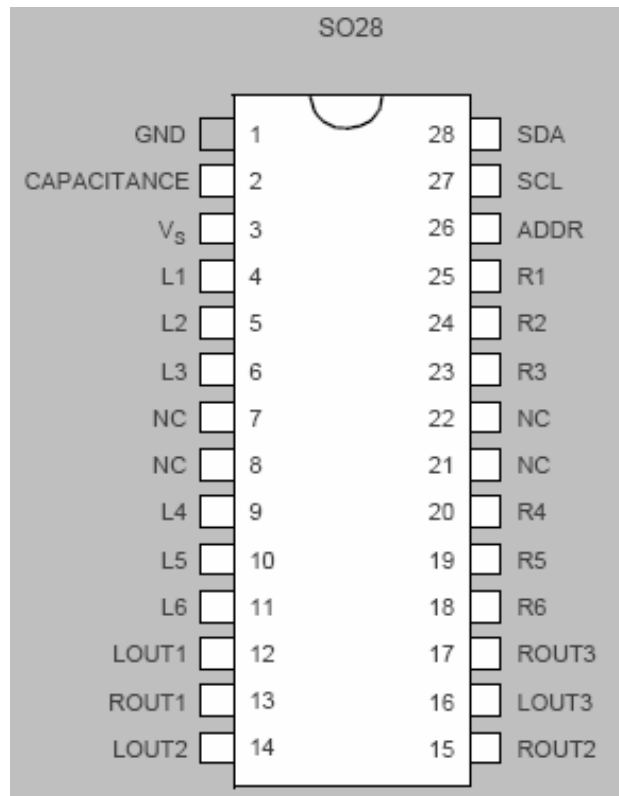


Figure 6.5.1: TEA6422D pinning

6.6 HDMI Receiver (ANX9021)

The ANX9021 is an advanced multimedia receiver compliant with High Definition Multimedia Interface (HDMI) Specification 1.2. HDMI is the first transport standard to unify digital video, audio, and control data over lowcost cables. It connects digital television, flat panel displays and project systems digitally to multimedia sources: DVD players, high definition settop boxes, digital video tape recorders, and personal computers. Digital transmission, in turn, delivers an uncompromising multimedia experience. HDMI also includes encryption for premium contents pursuant to the HighBandwidth Digital Content Protection (HDCP) standard. The ANX9021 embeds the HDCP keys and key selection vectors to reduce manufacturing complexity and system cost.

The ANX9021 receives two HDMI data streams and decodes the selected input into digital audio and video data outputs. The receiver incorporates Analogix's proprietary WideEye™ architecture, which has received considerable industry acclaim when introduced in Analogix's 6.25 Gbps SerDes products for telecom and datacom applications. Applying the same advanced techniques in ANX9021 allows displays systems to achieve errorfree HDMI reception over long, inexpensive cables up to 20 meters and assure the widest range of interoperability against uncertain qualities of cheap cables from lowcost suppliers as the standard matures.

The ANX9021 can receive and output up to eight digital audio channels at up to 192 kHz sampling rate, making it the leading component for integrated home theaters and high definition televisions. The device supports direct connections to a wide selection of audio DACs and decoders through industry standard I2S or S/PDIF interfaces. The ANX9021 is offered in 144-lead TQFP lead-free packages.

The main features of ANX9021 are:

- Dual-channel HDMI receiver supporting link data rate up to 1.65 Gbps
- HDMI 1.2, HDCP 1.1 and DVI 1.0 compliant
- WideEye™ architecture for signal conditioning and equalization
 - o support cable length up to 20m
 - o better than 10E-12 bit error rate
- Digital interface to video processor supporting
 - o 24-bit RGB / YCbCr 4:4:4
 - o 16/20/24 bit YCbCr 4:2:2
 - o 8/10/12 bit YCbCr 4:2:2 (ITU BT-656)
 - o 12-bit double data rate interface
- Color space conversion: RGB to/from YCbCr both directions (601 and 709 standards)
- Auto video mode configuration
- Analog RGB/YPbPr output with 8-bit linearity
- Digital audio interface
 - o 32 to 192 kHz audio sampling rate
 - o Up to 4 I2S interface for 8-channel audio
 - o S/PDIF interface supporting PCM, Dolby Digital™, DTS™ digital audio transmission using IEC 60958 and IEC 61937
 - o Configurable soft mute
- Integrated HDCP decryption engine and pre-programmed keys
- Programmable power management with automatic shutdown for power conservation
- Supports automated link integrity checking
- 144-lead TQFP package supporting lead-free and green requirements

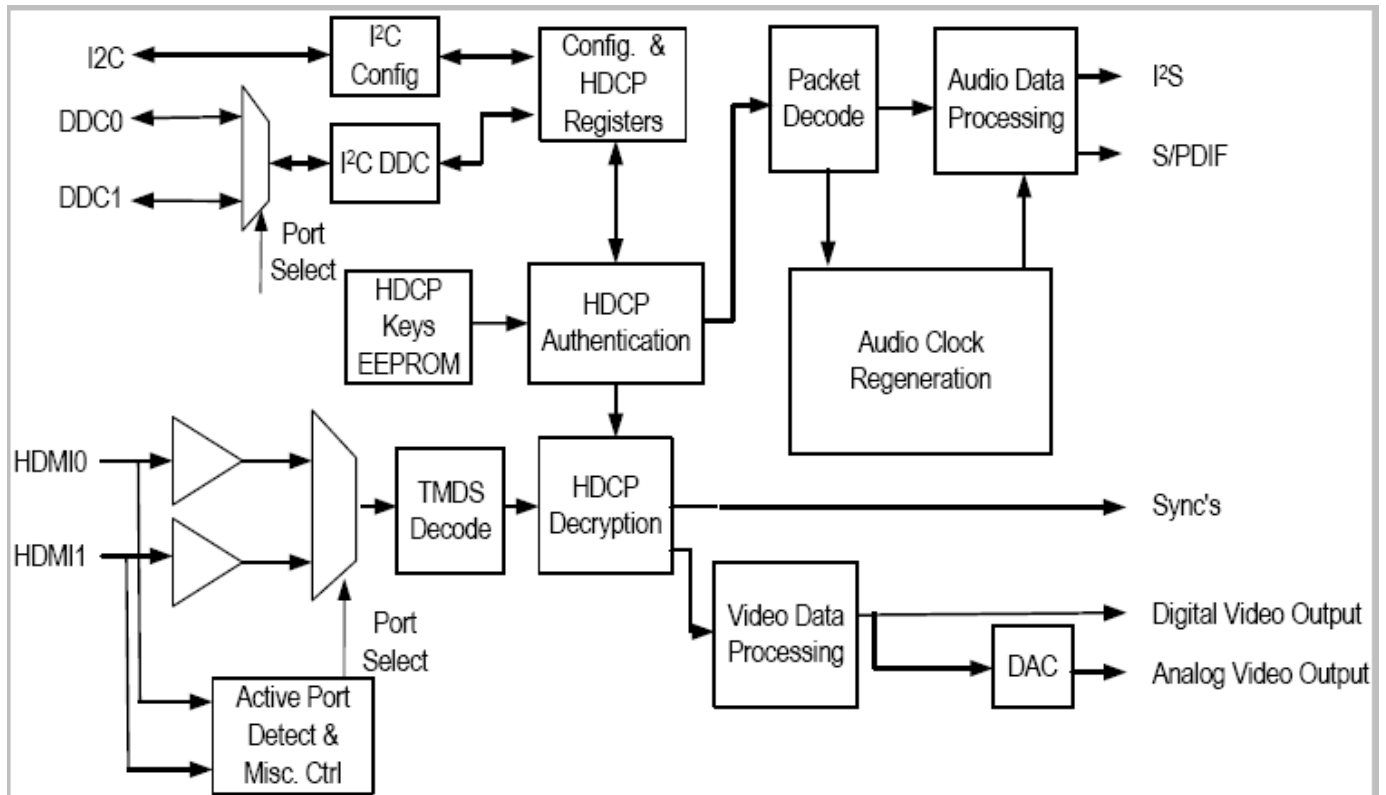


Figure 6.6.1: Internal Block Diagram of ANX9021

6.7 Video Switch (PI5V512)

PI5V512 is a wide-bandwidth 5-port 2:1 mux/demux video switch with High-Z outputs. The main features of PI5V512 are:

- High-performance, low-cost solution to switch between video sources
- Wide bandwidth: 550 MHz
- Low On-Resistance: 5Ω
- Low crosstalk at 10 MHz: -90dB
- Ultra-low quiescent power ($0.1\mu\text{A}$ typical)
- Single supply operation: $+5.0\text{V}$
- Fast switching: 10ns
- Packaging (Pb-free & Green available): 24-pin 150-mil wide plastic QSOP (Q)

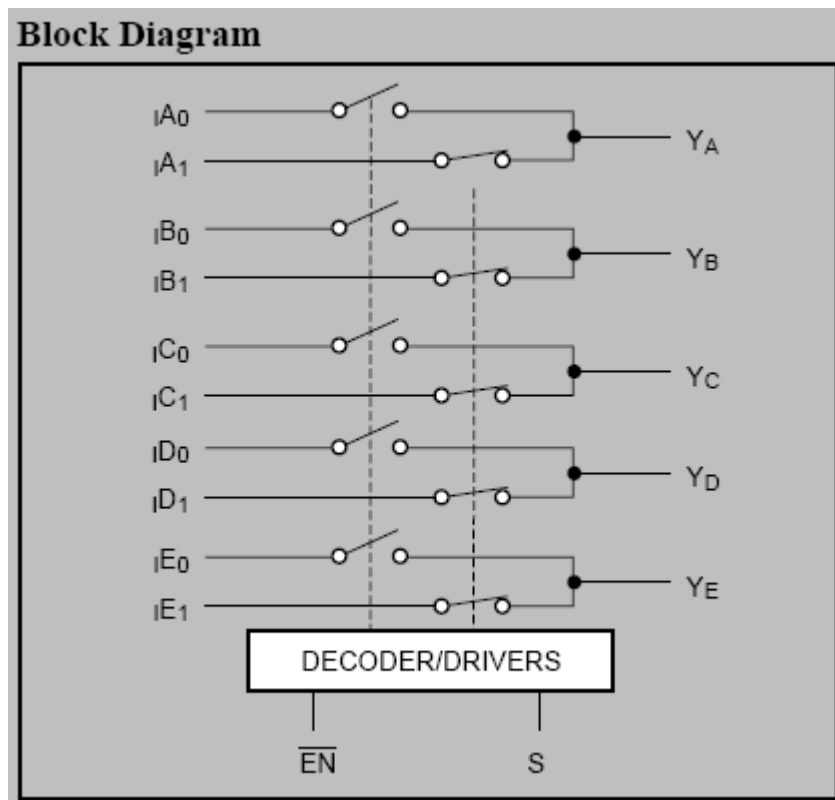


Figure 6.7.1: Block diagram of PI5V512

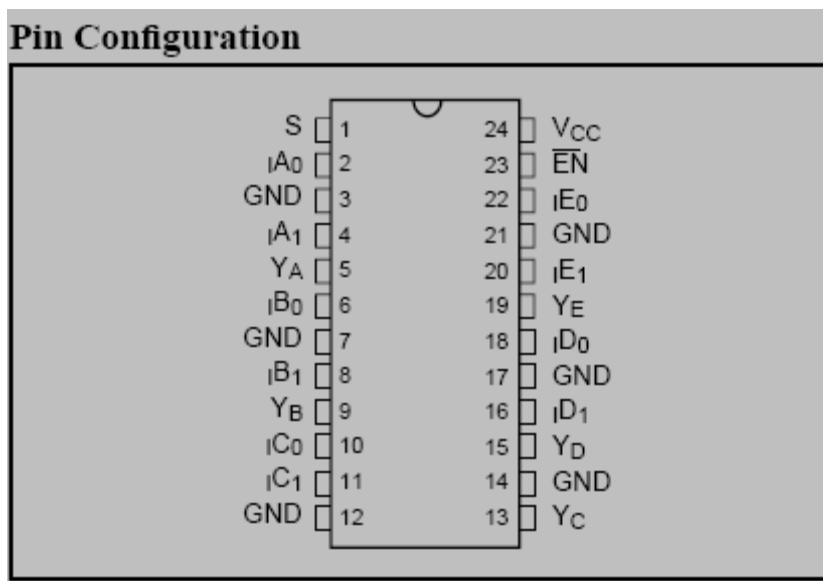


Figure 6.7.2: Pin configuration of PI5V512

Truth Table

$\overline{\text{EN}}$	S	ON Switch
0	0	IA ₀ , IB ₀ , IC ₀ , ID ₀ , IE ₀
0	1	IA ₁ , IB ₁ , IC ₁ , ID ₁ , IE ₁
1	X	Disabled

Figure 6.7.3: Truth table of PI5V512

6.8 Tuner (DTT71306)

DTT713xx is a digital terrestrial tuner designed for reception in VHF I, VHF III and UHF, compliant with the European digital terrestrial standard ETS 300744 and CENELEC standards EN 55013 and EN 55020. It covers all channels from 44.25 MHz to 863.25 MHz

The main features of DTT713xx are:

- Integrated tuner for digital and analog broadcasting
- Low phase noise, high sensitivity performance
- Small size: 50mm x 35mm x 12mm
- Internal wide band AGC
- 3V3 and 5V I2C bus programmable
- General-purpose port output
- Antenna power supply input

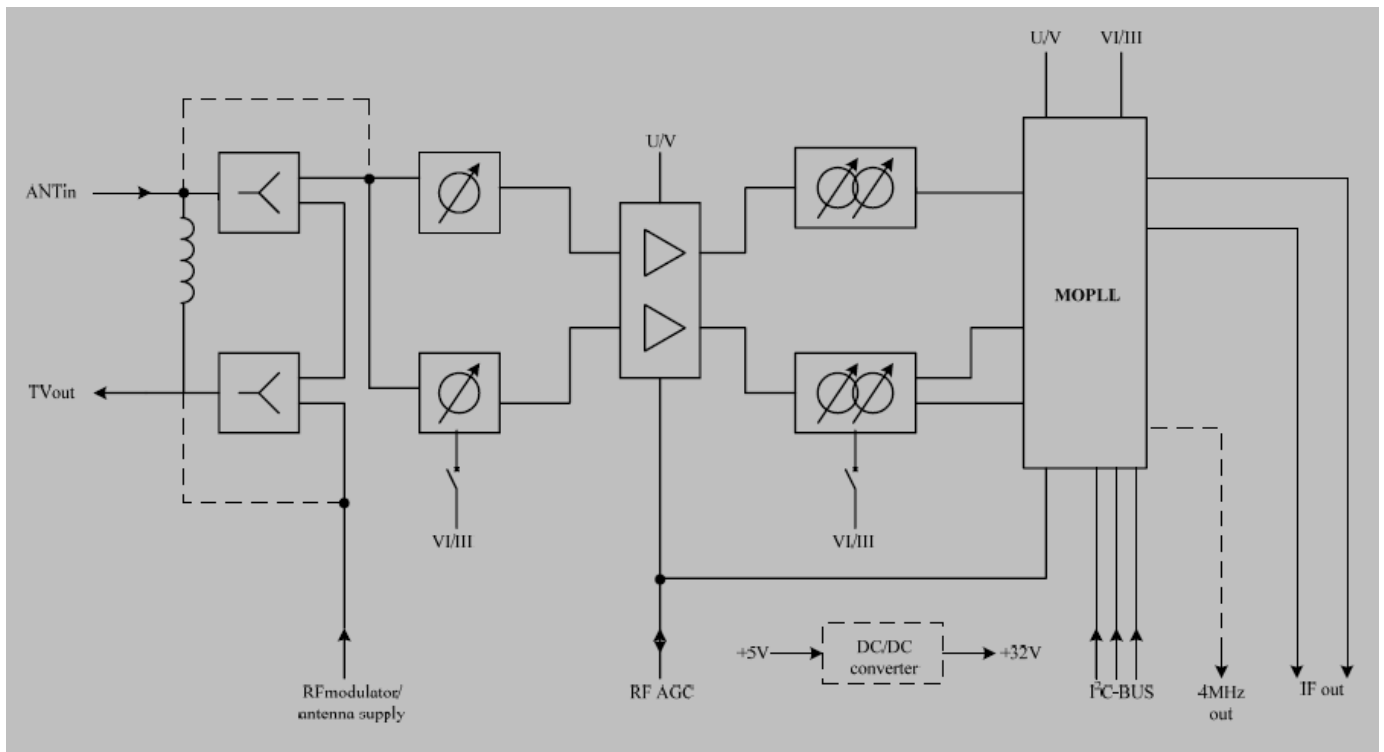


Figure 6.8.1: Block diagram of DTT713xx

6.9 SAW Filter (X6966M)

X6966M is a SAW (Surface Acoustic Wave) band-pass filter at 36.125 MHz.

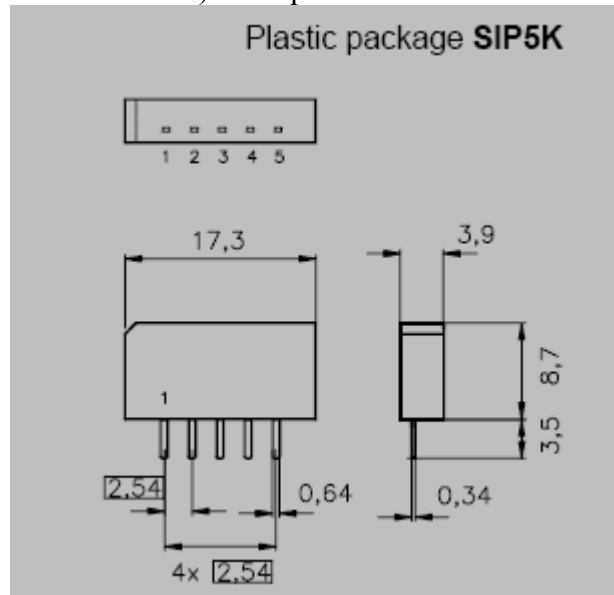


Figure 6.9.1: Package of X6966M



Figure 6.9.2: Pin configuration of X696M

6.10 I2C Switch (74HCT4053)

74HCT4053 is a triple 2-channel analog mux/demux with a common enable input. Each multiplexer/demultiplexer has two independent inputs/outputs (nY0 and nY1), a common input/output (nZ) and three digital select inputs (S1 to S3).

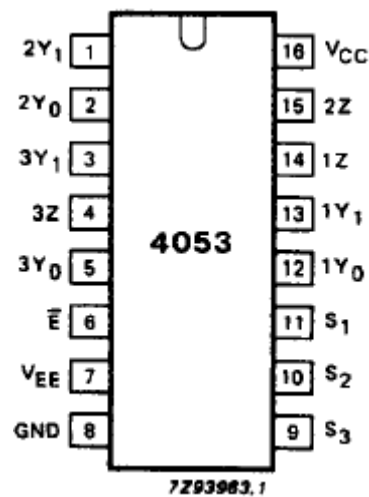


Figure 6.10.1: Pin configuration of 74HCT4053

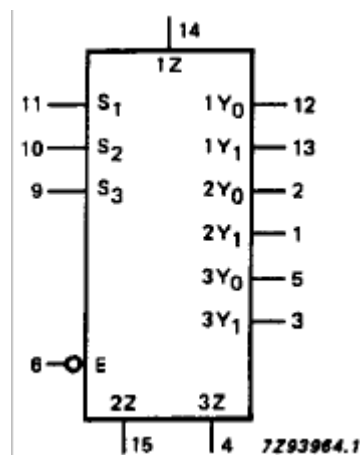


Figure 6.10.2: Logic symbol of 74HCT4053

FUNCTION TABLE		
INPUTS		CHANNEL ON
$\bar{E}$	S_n	
L	L	$nY_0 - nZ$
L	H	$nY_1 - nZ$
H	X	none

Figure 6.10.3: Function table of 74HCT4053

6.11 Audio DAC (CS4334)

CS4334 is a 8-pin, 24-bit, 96 kHz stereo D/A converter. The CS4334 family is based on Delta-Sigma modulation, where the modulator output controls the reference voltage input to an ultra-linear analog low-pass filter. This architecture allows for infinite adjustment of sample rate between 2 kHz and 100 kHz simply by changing the master clock frequency.

The main features of CS4334 are:

- Complete stereo DAC system: interpolation, D/A, output analog filtering
- 24-bit conversion
- 96 dB dynamic range
- -88 dB THD+N
- Low clock jitter sensitivity
- Single +5V power supply
- Filtered line level outputs
- On-chip digital de-emphasis
- Popguard

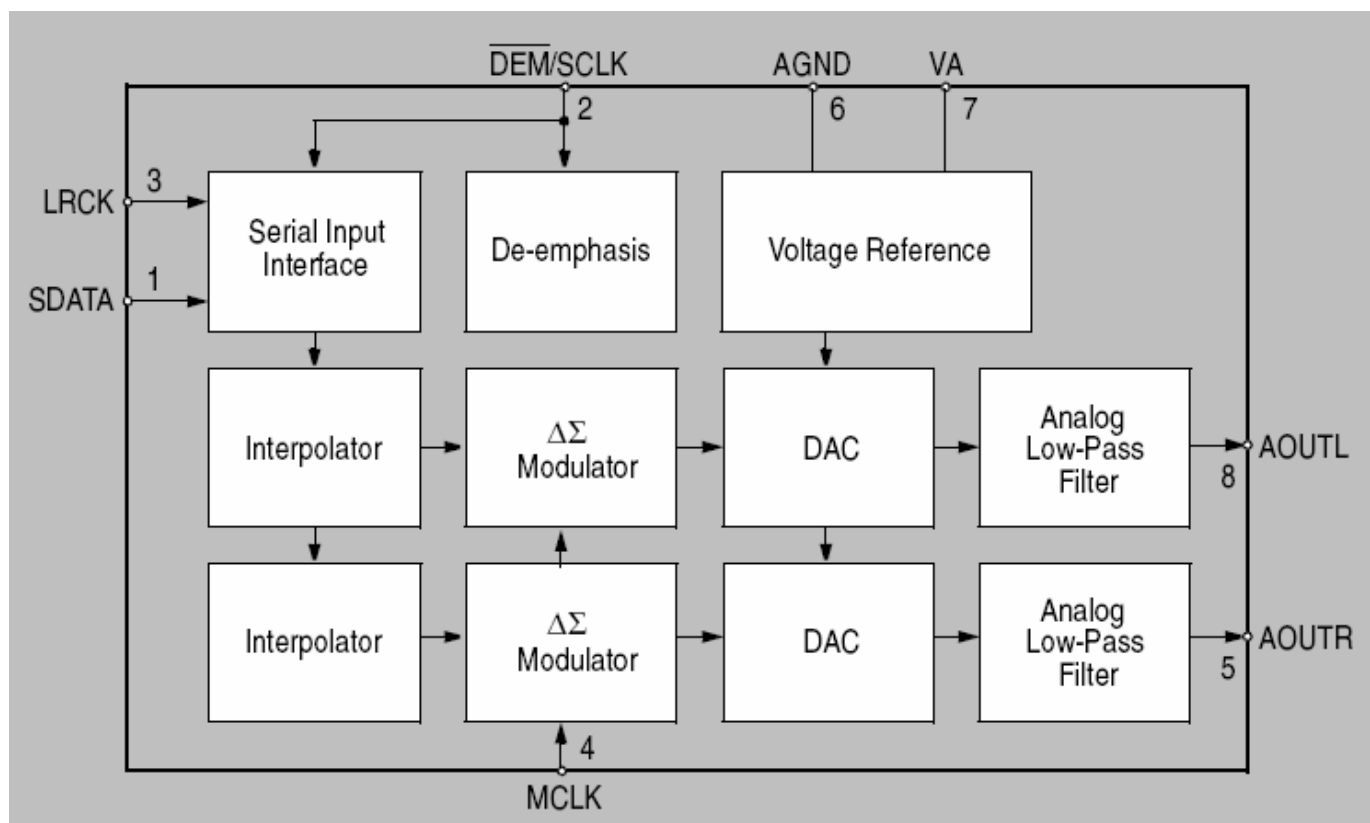


Figure 6.11.1: Block diagram of CS4334

6.12 SPDIF Switch (NLAST4599)

The NLAST4599 is an advanced high speed CMOS single pole – double throw analog switch fabricated with silicon gate CMOS technology. It achieves high speed propagation delays and low ON resistances while maintaining low power dissipation. This switch controls analog and digital voltages that may vary across the full power-supply range (from VCC to GND).

The device has been designed so the ON resistance (R_{ON}) is much lower and more linear over input voltage than R_{ON} of typical CMOS analog switches.

The channel select input structure provides protection when voltages between 0 V and 5.5 V are applied, regardless of the supply voltage. This input structure helps prevent device destruction caused by supply voltage – input/output voltage mismatch, battery backup, hot insertion, etc.

Main features of NLAST4599 are:

- Select Pin Compatible with TTL Levels
- Channel Select Input Over-Voltage Tolerant to 5.5 V
- Fast Switching and Propagation Speeds
- Break-Before-Make Circuitry
- Low Power Dissipation: $I_{CC} = 2 \text{ } \mu\text{A}$ (Max) at $T_A = 25^\circ\text{C}$
- Diode Protection Provided on Channel Select Input
- Improved Linearity and Lower ON Resistance over Input Voltage
- Latch-up Performance Exceeds 300 mA
- ESD Performance: HBM > 2000 V; MM > 200 V

- Chip Complexity: 38 FETs

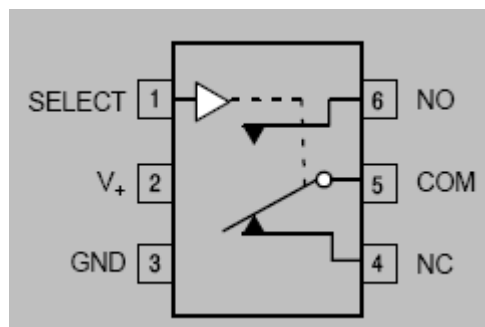


Figure 6.12.1: Pin assignment of NLAST4599

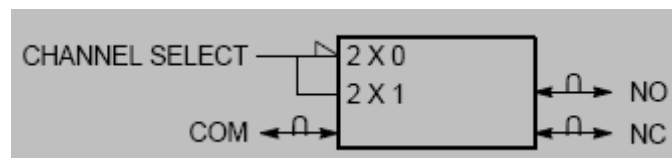
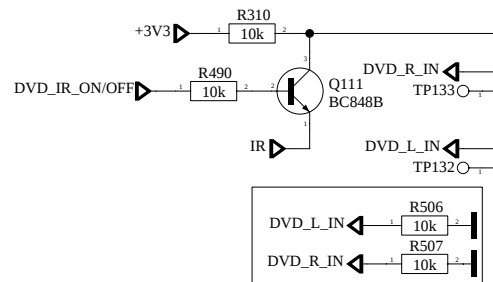
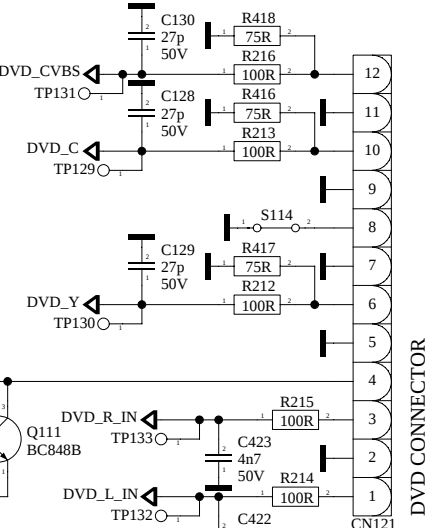
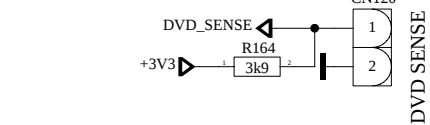
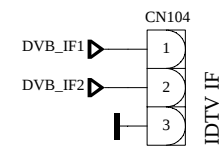
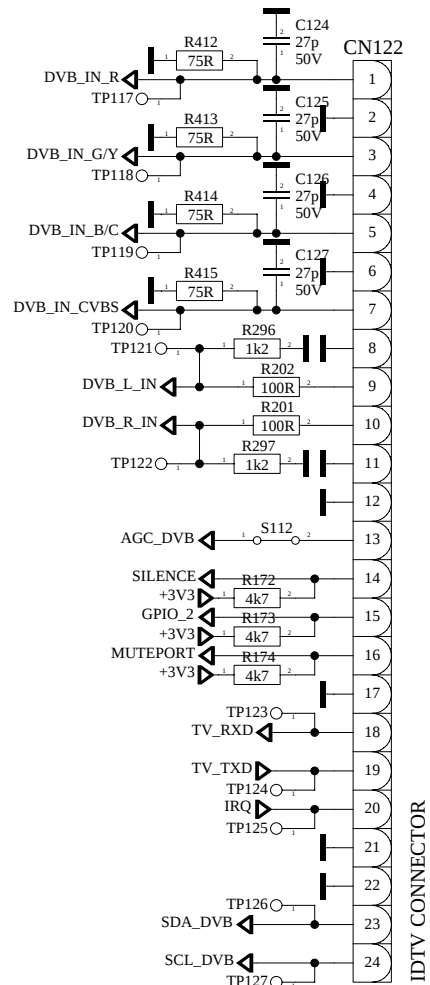
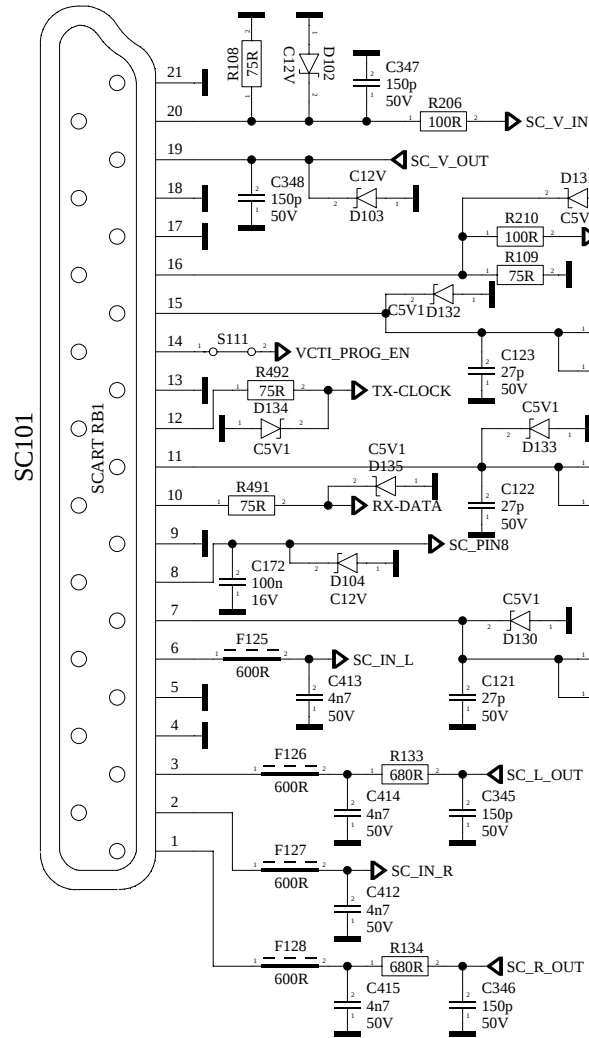
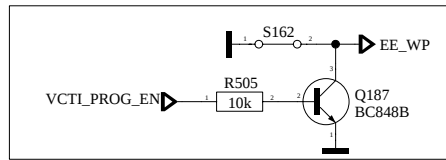
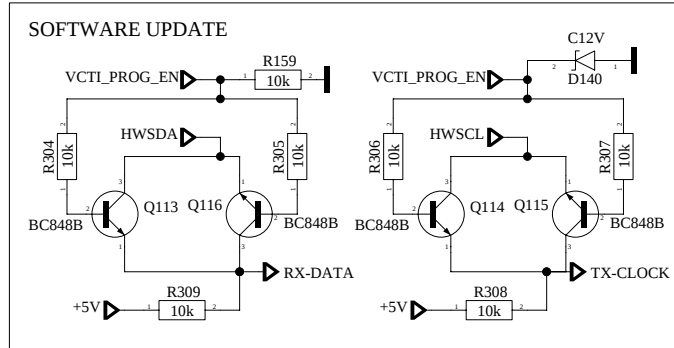
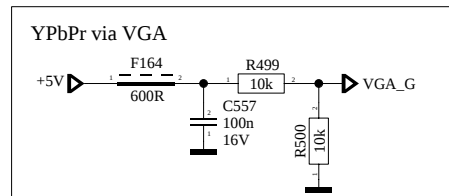
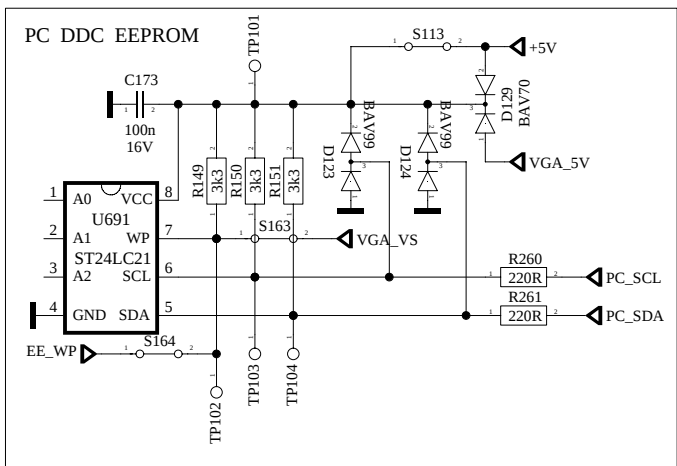
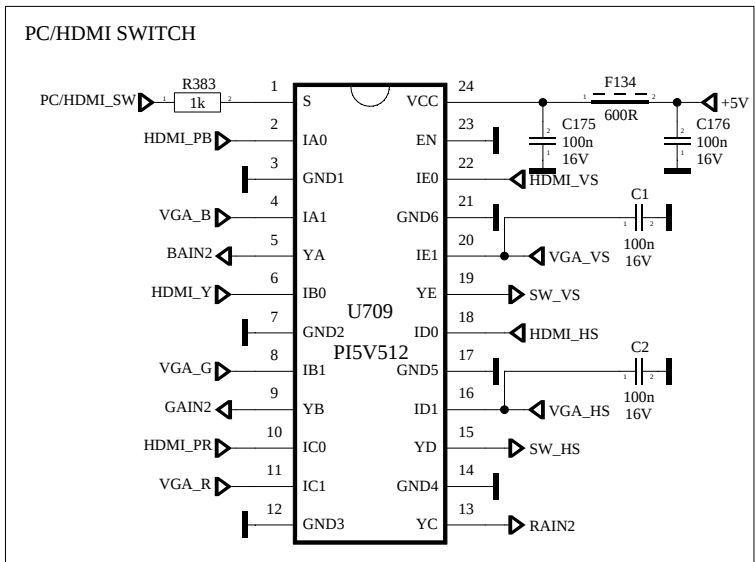
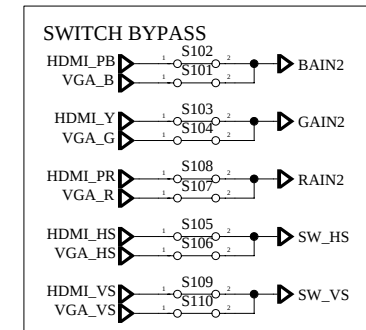
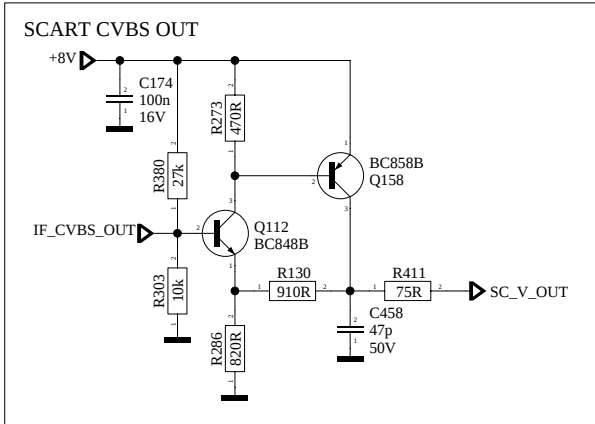
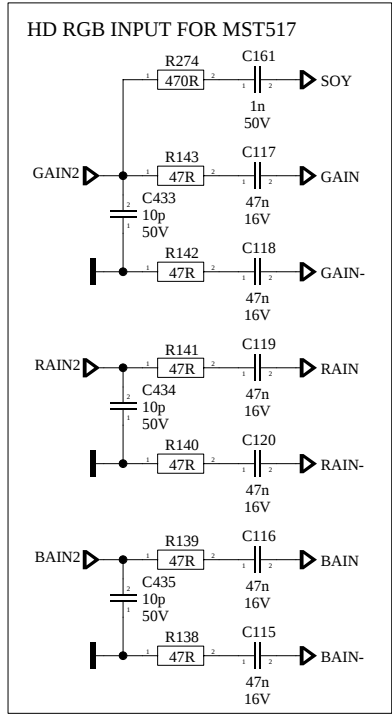
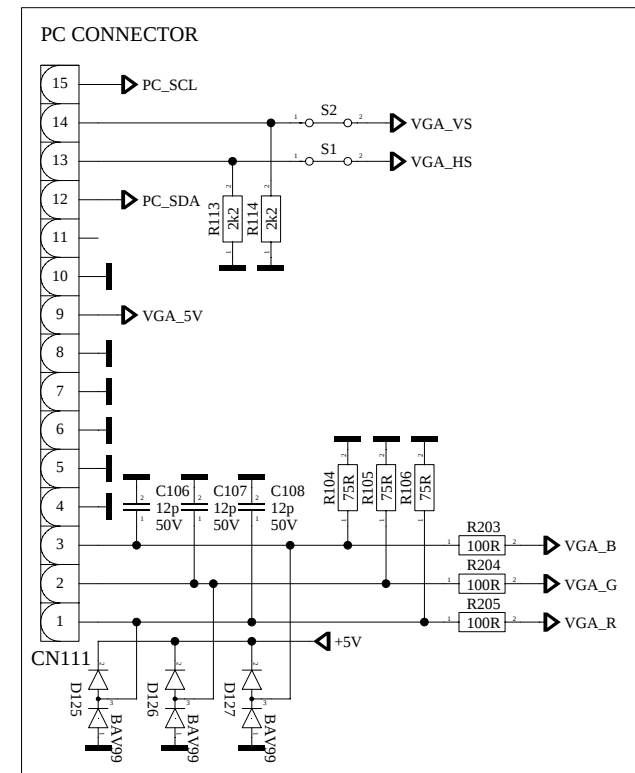
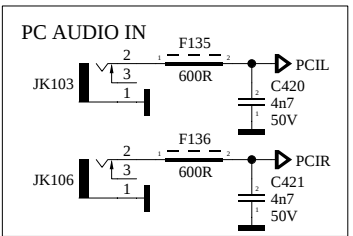
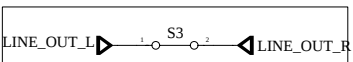
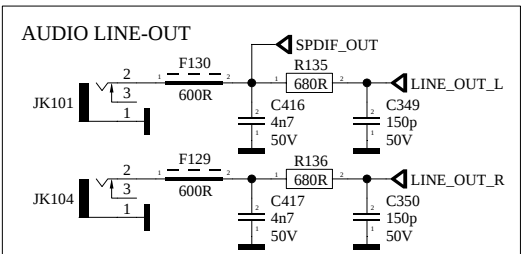
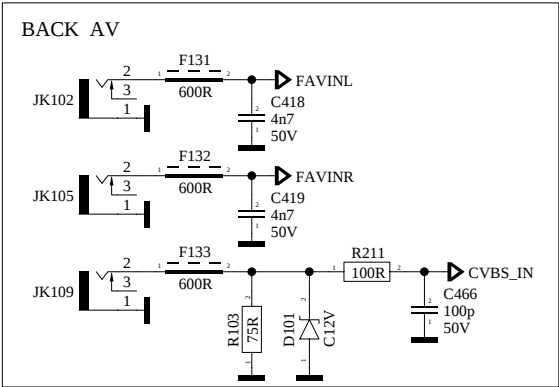


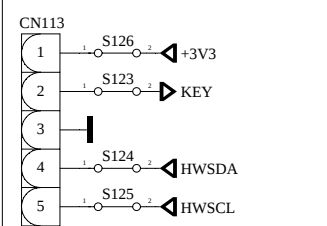
Figure 6.12.2: Logic symbol of NLAST4599

FUNCTION TABLE	
Select	ON Channel
L	NC
H	NO

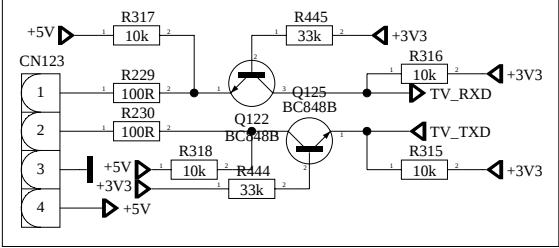
Figure 6.12.3: Function table of NLAST4599



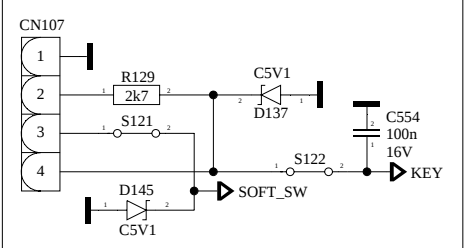
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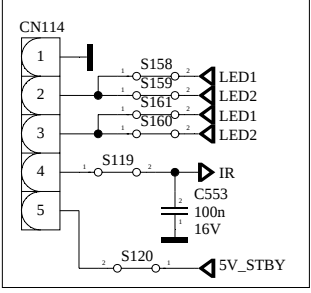
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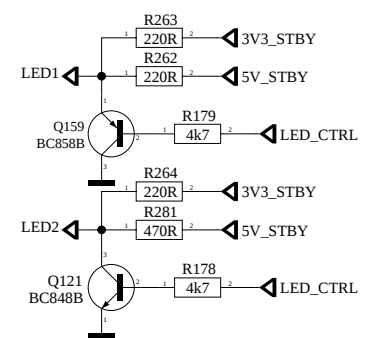
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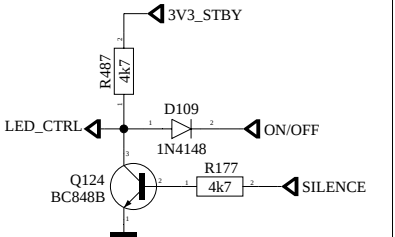
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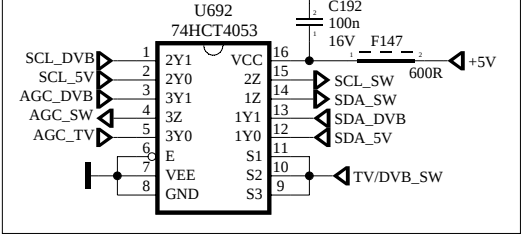
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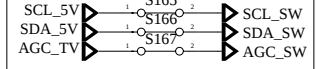
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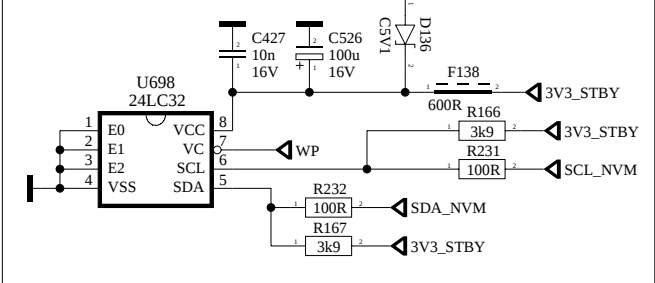
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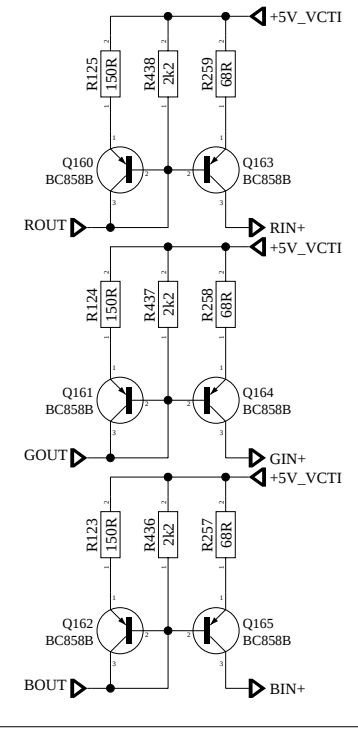
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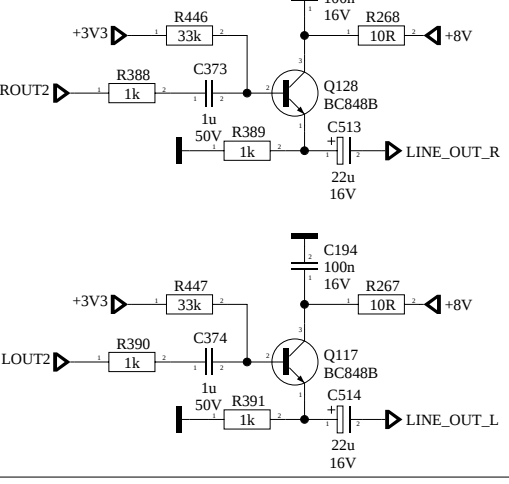
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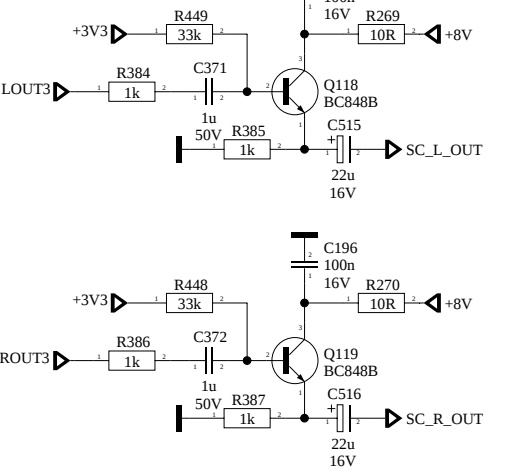
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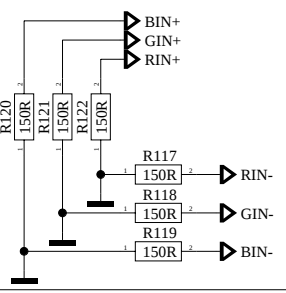
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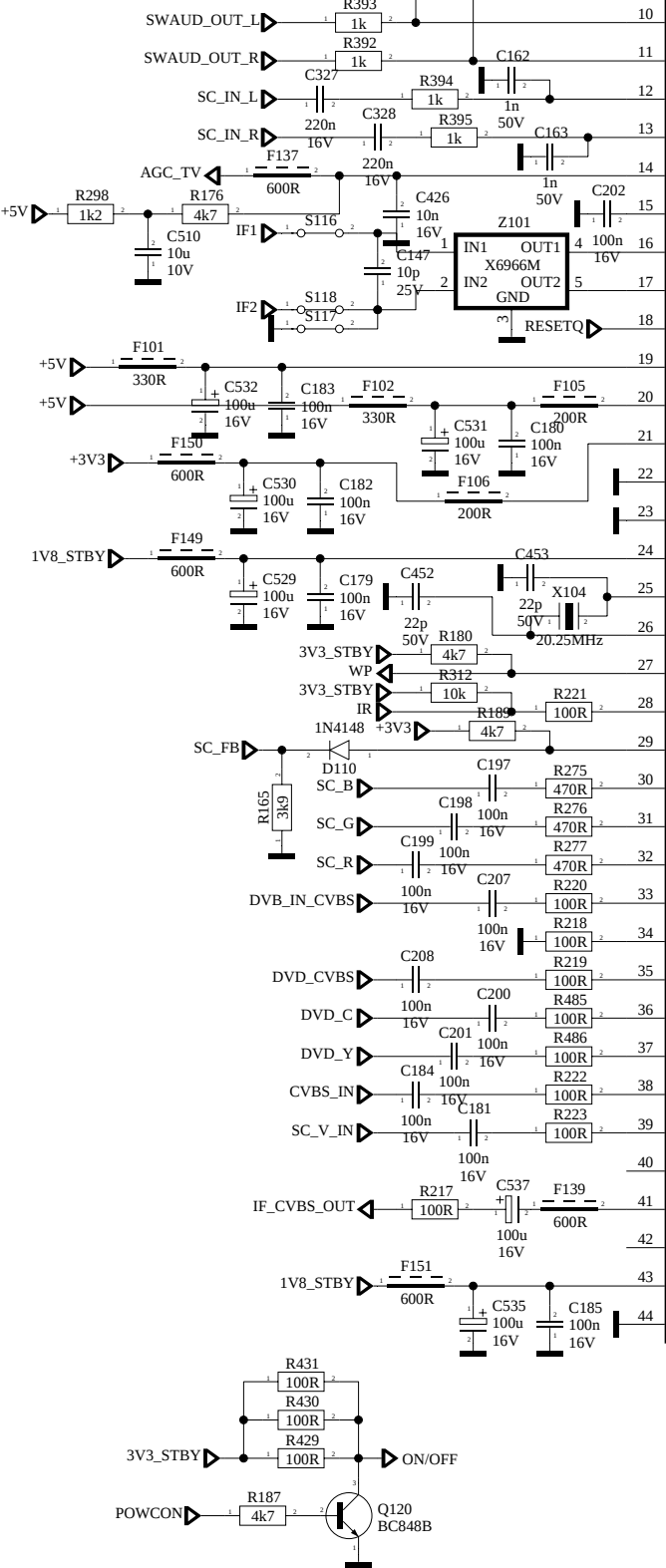
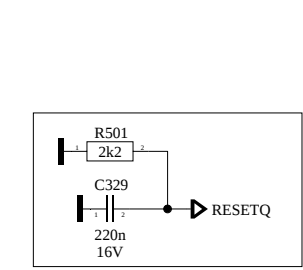
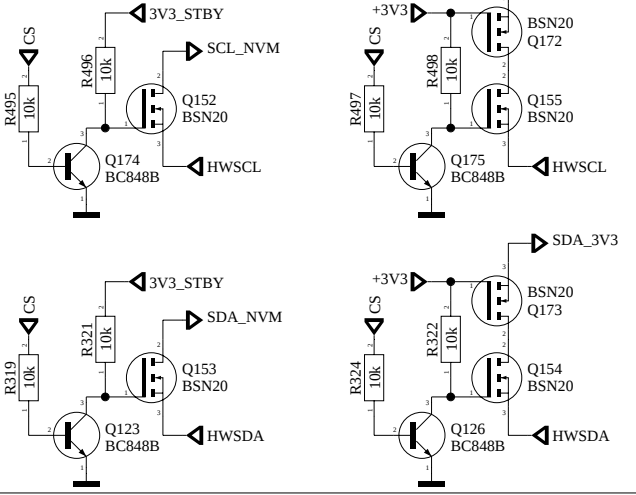
SCART AUDIO OUT



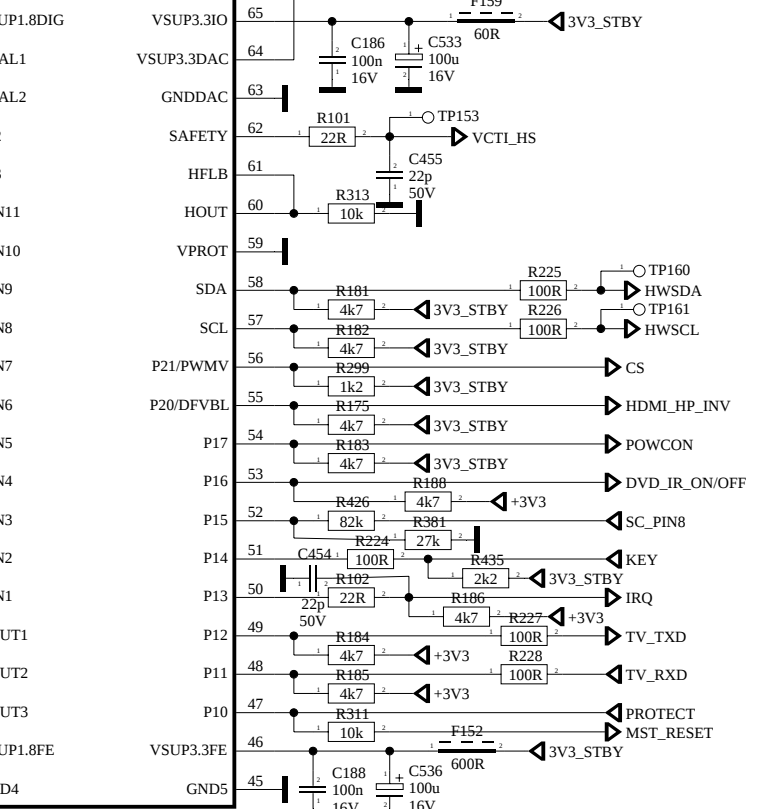
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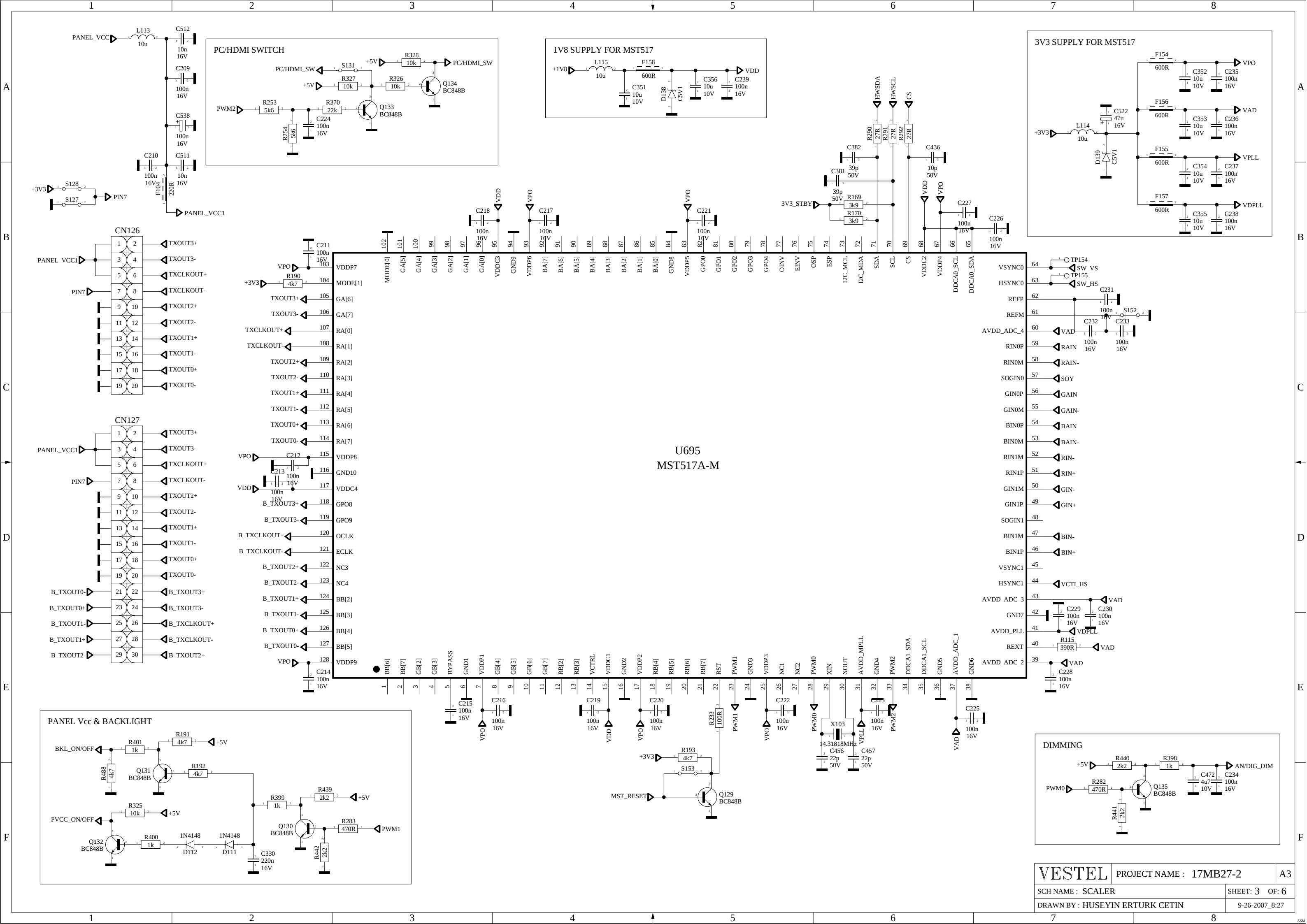


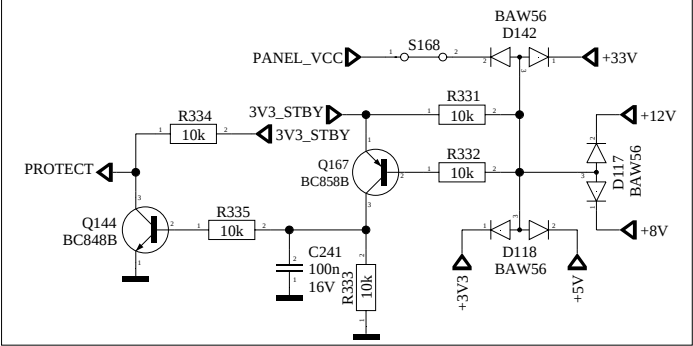
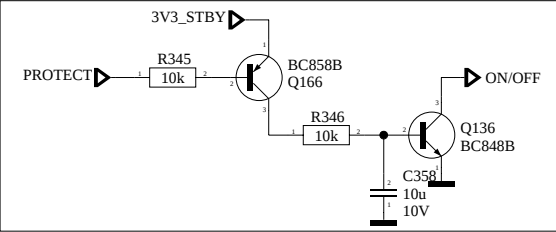
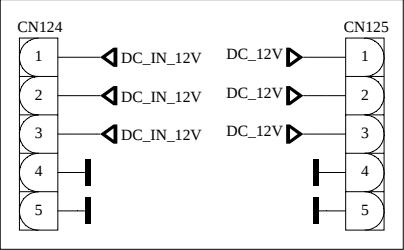
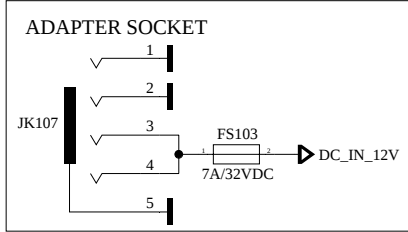
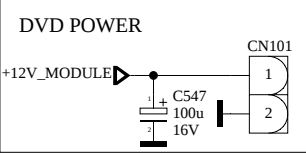
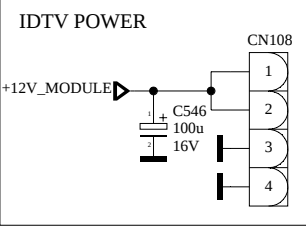
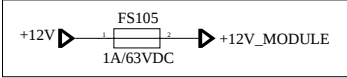
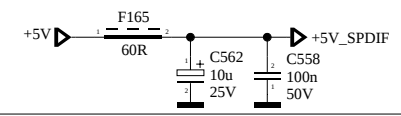
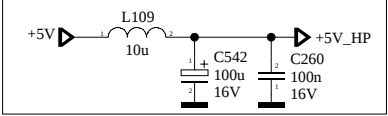
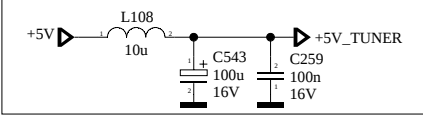
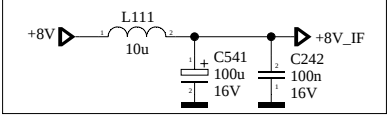
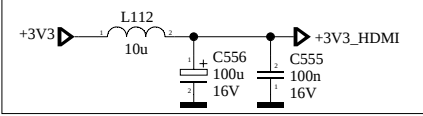
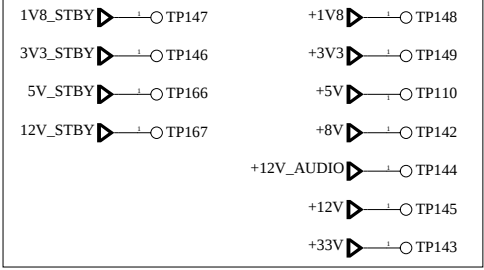
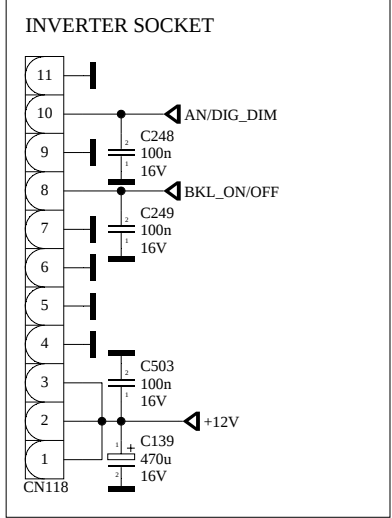
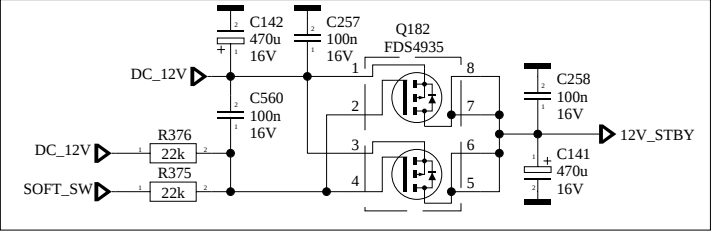
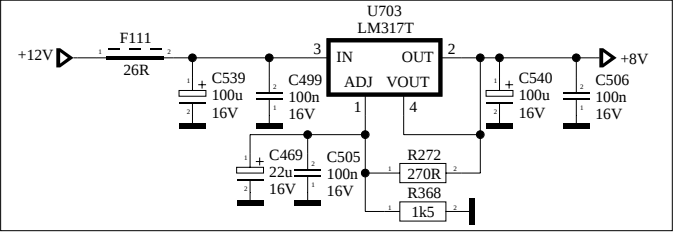
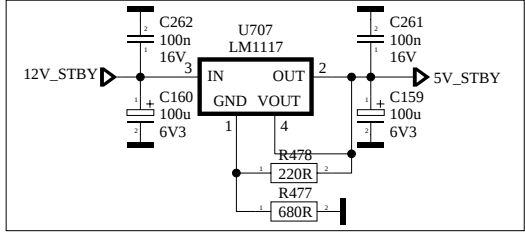
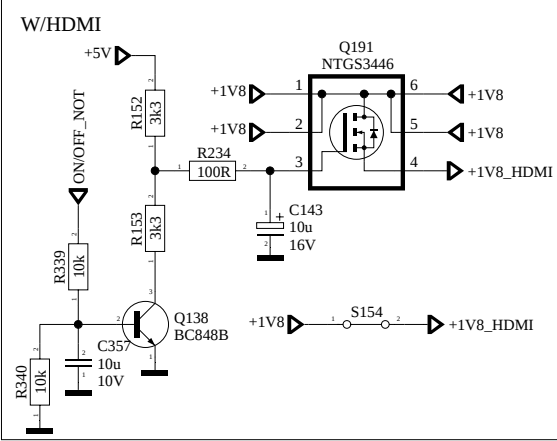
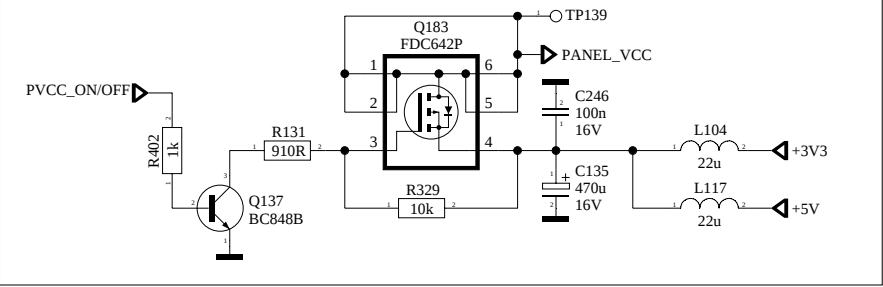
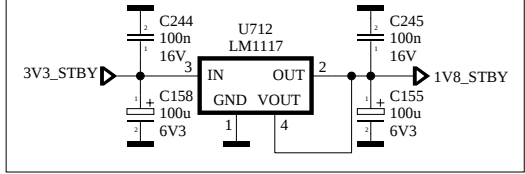
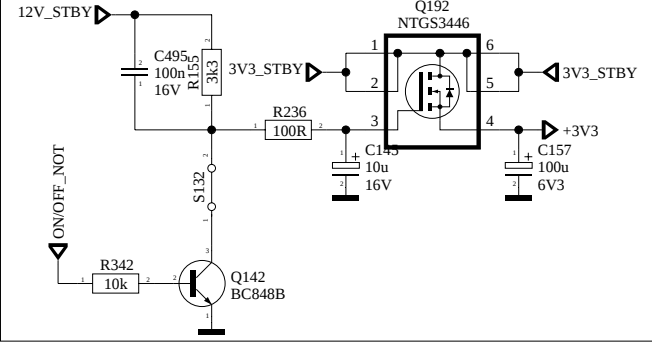
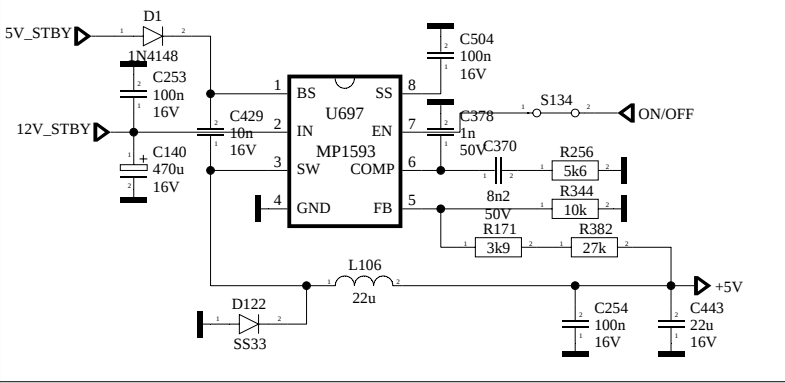
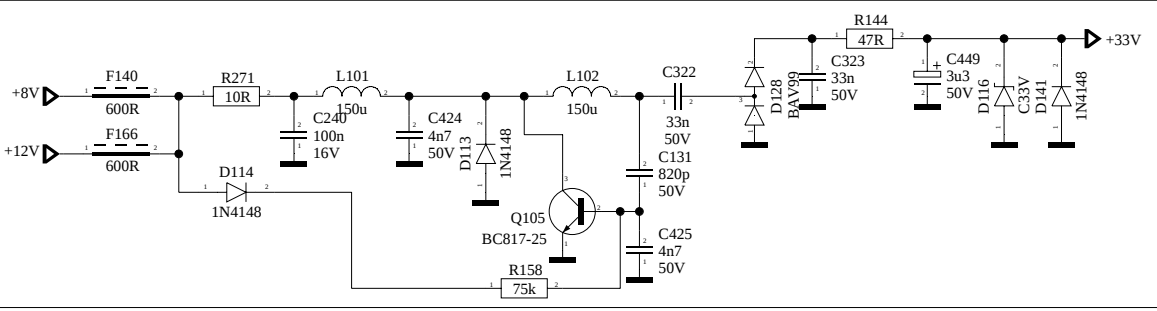
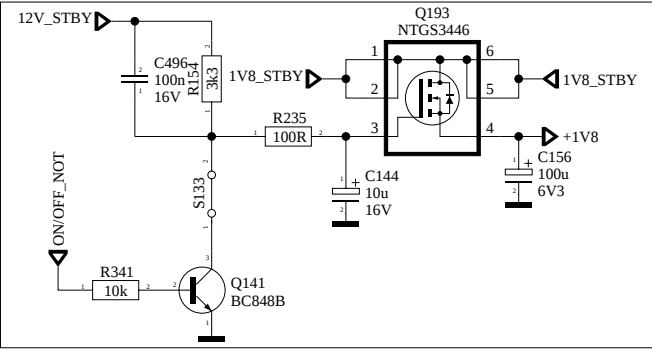
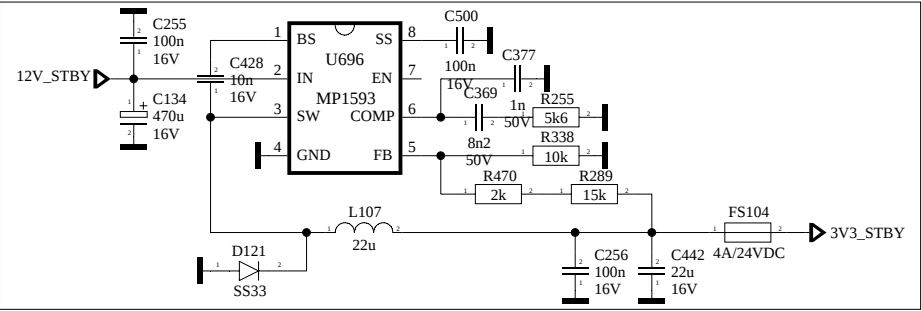
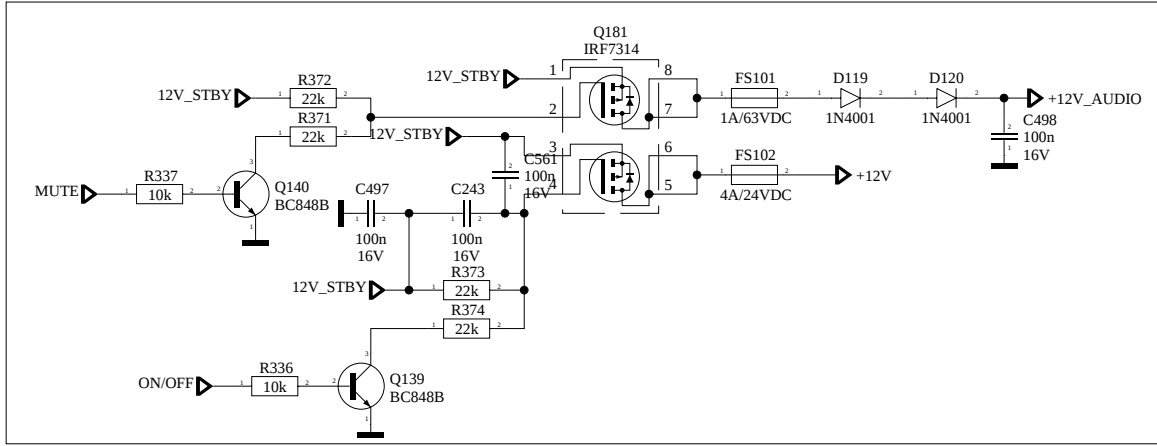
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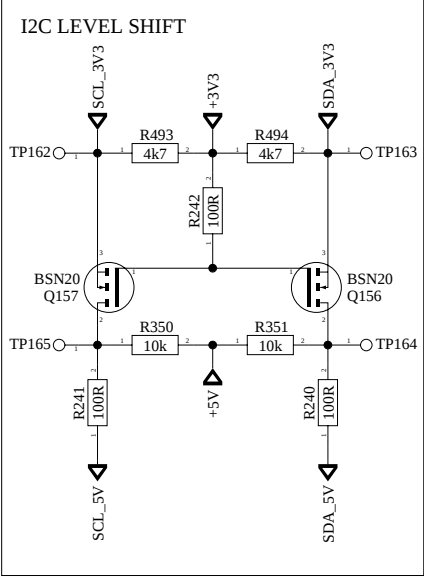
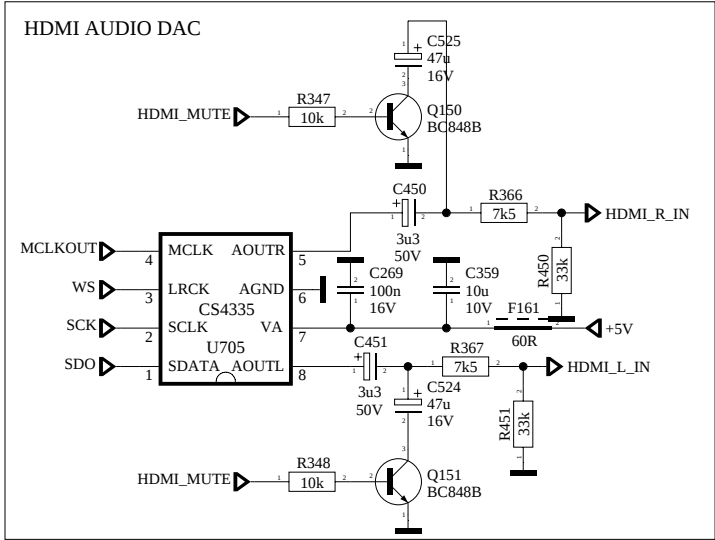
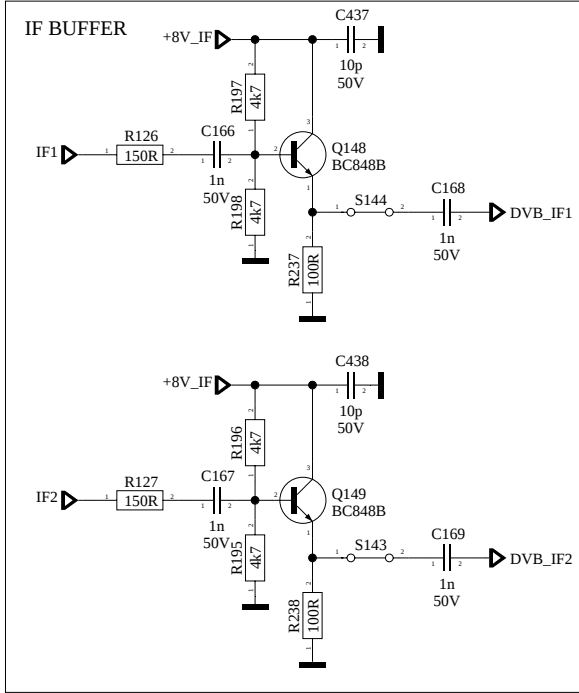
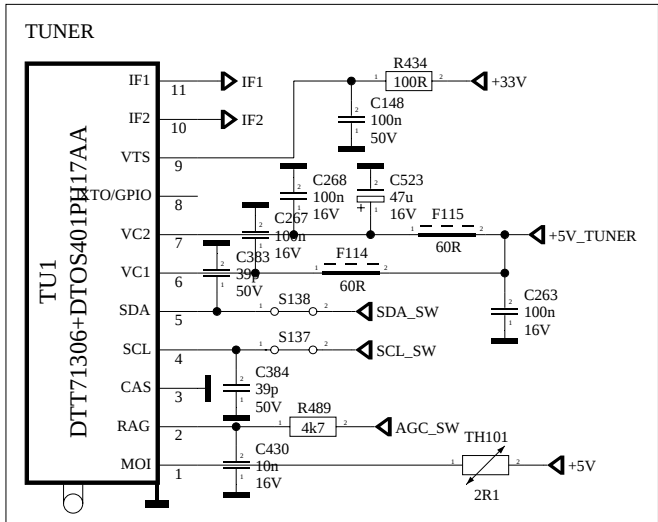
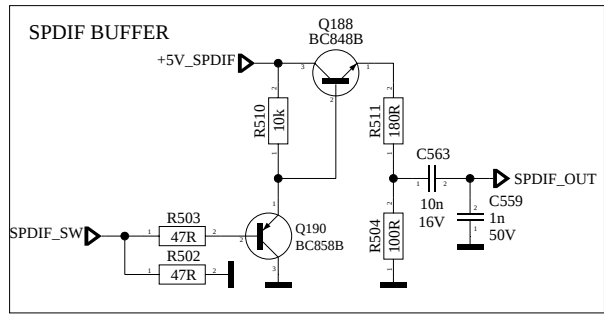
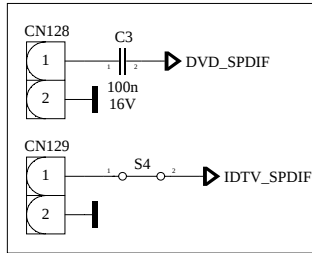
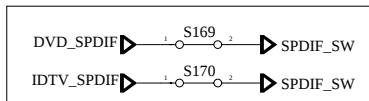
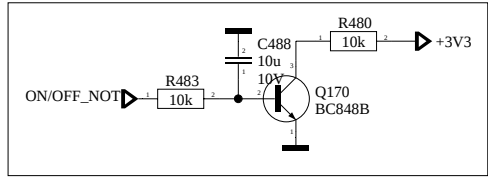
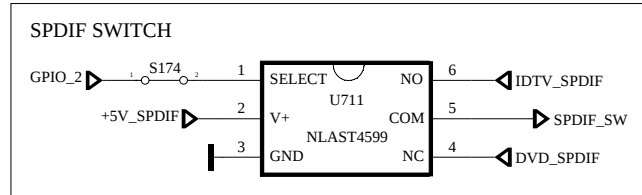
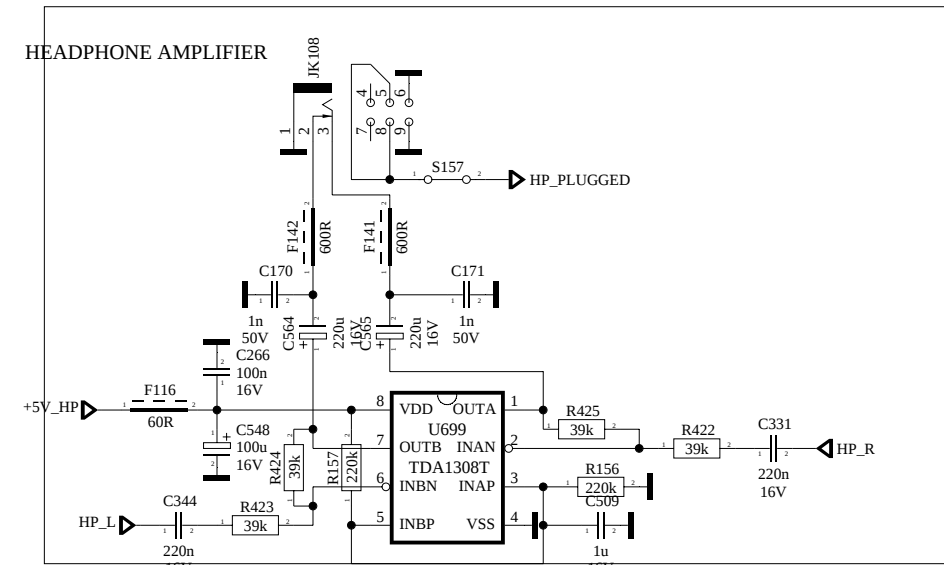
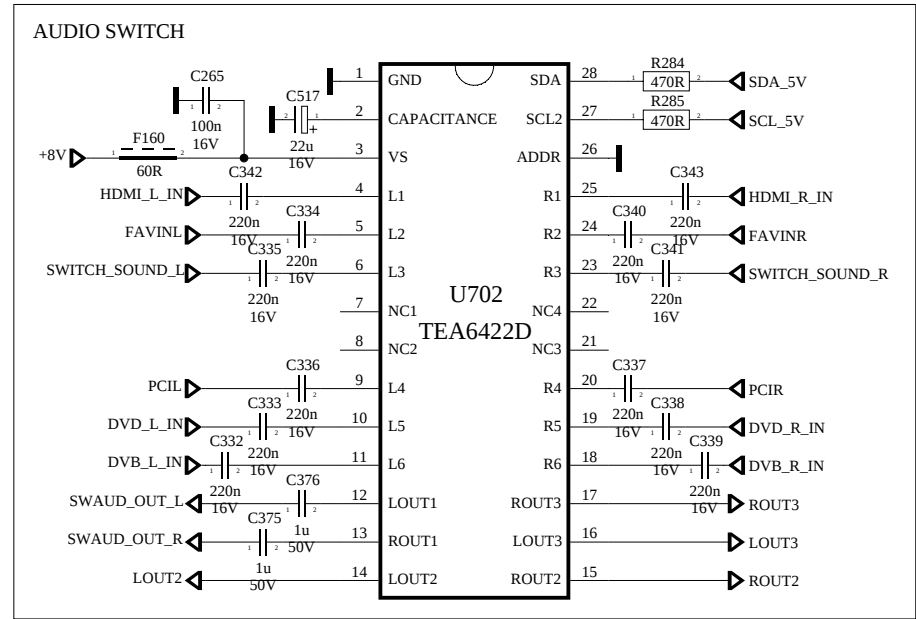
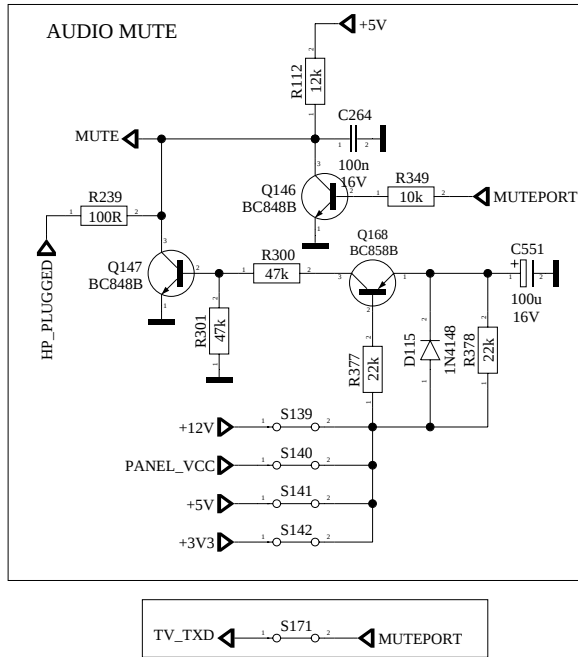
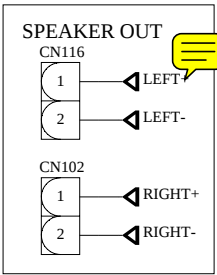
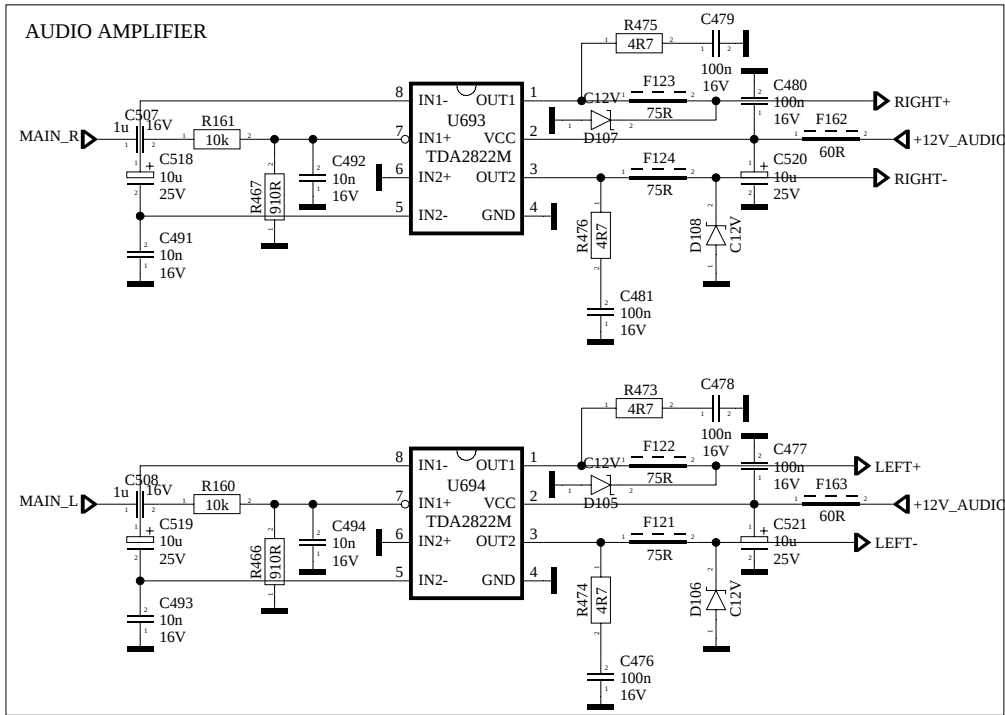


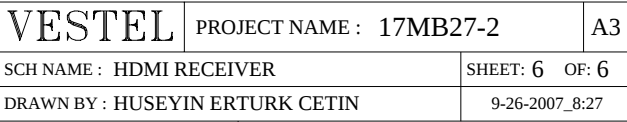
U701 VCT4953

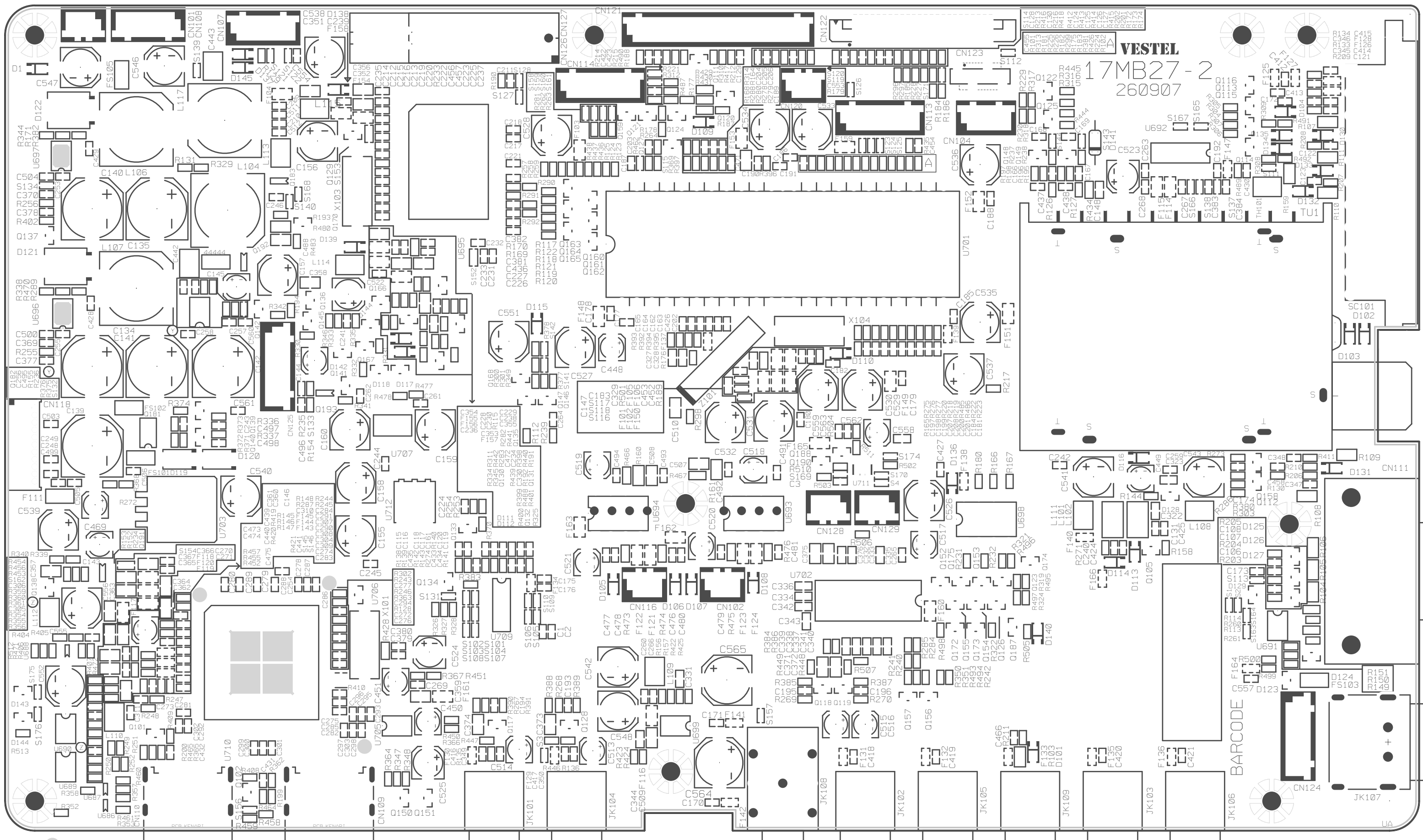


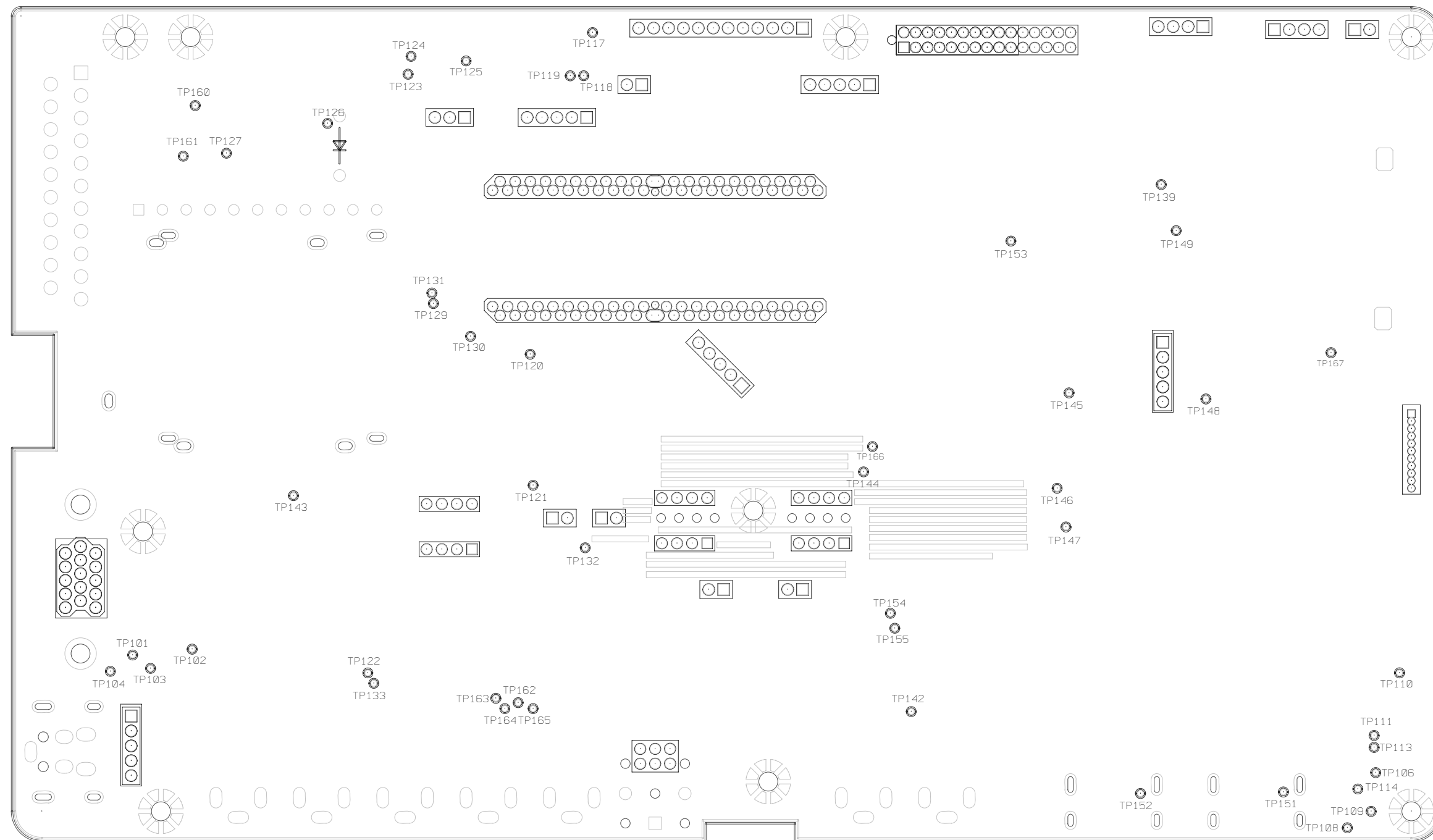


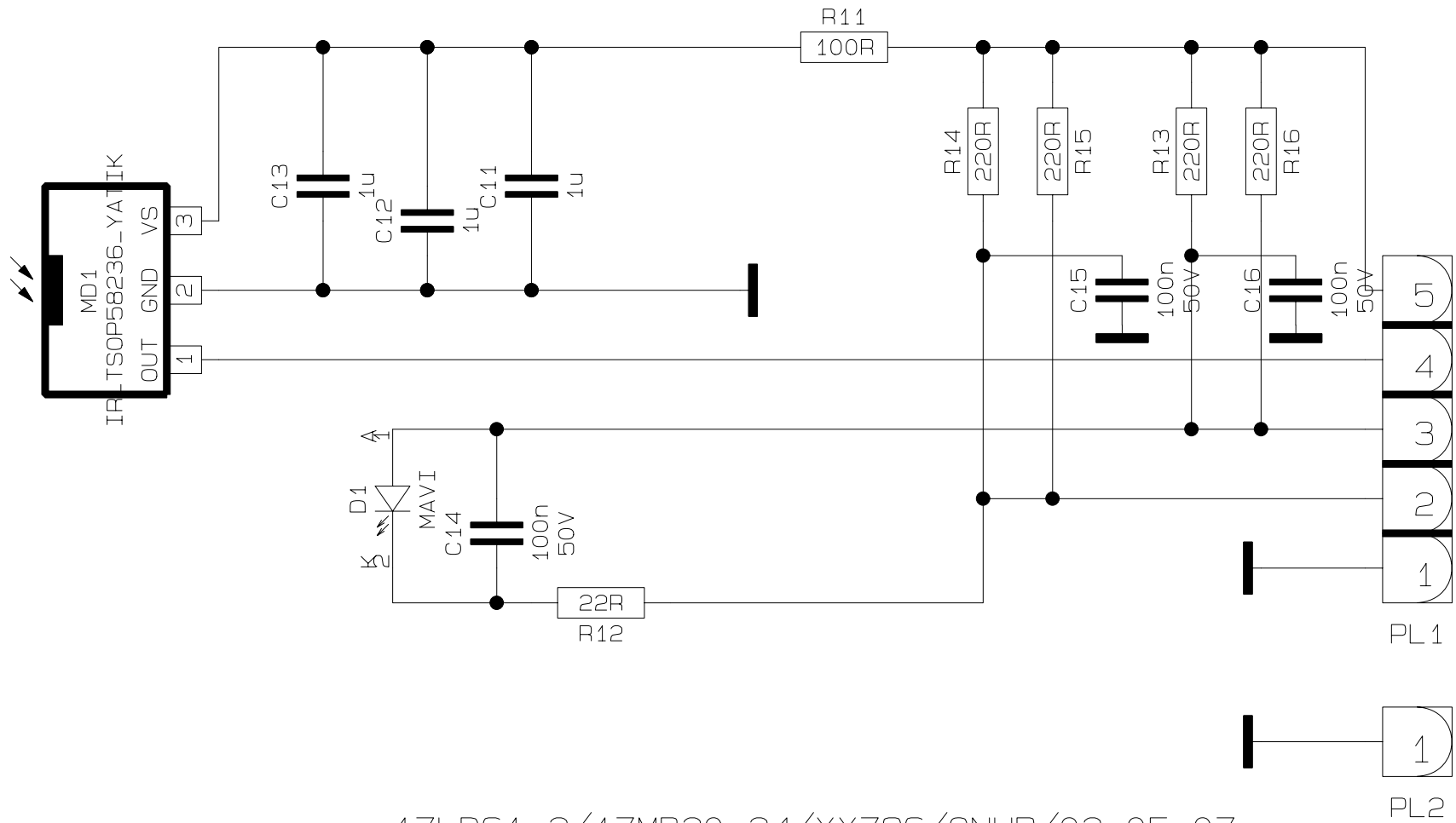




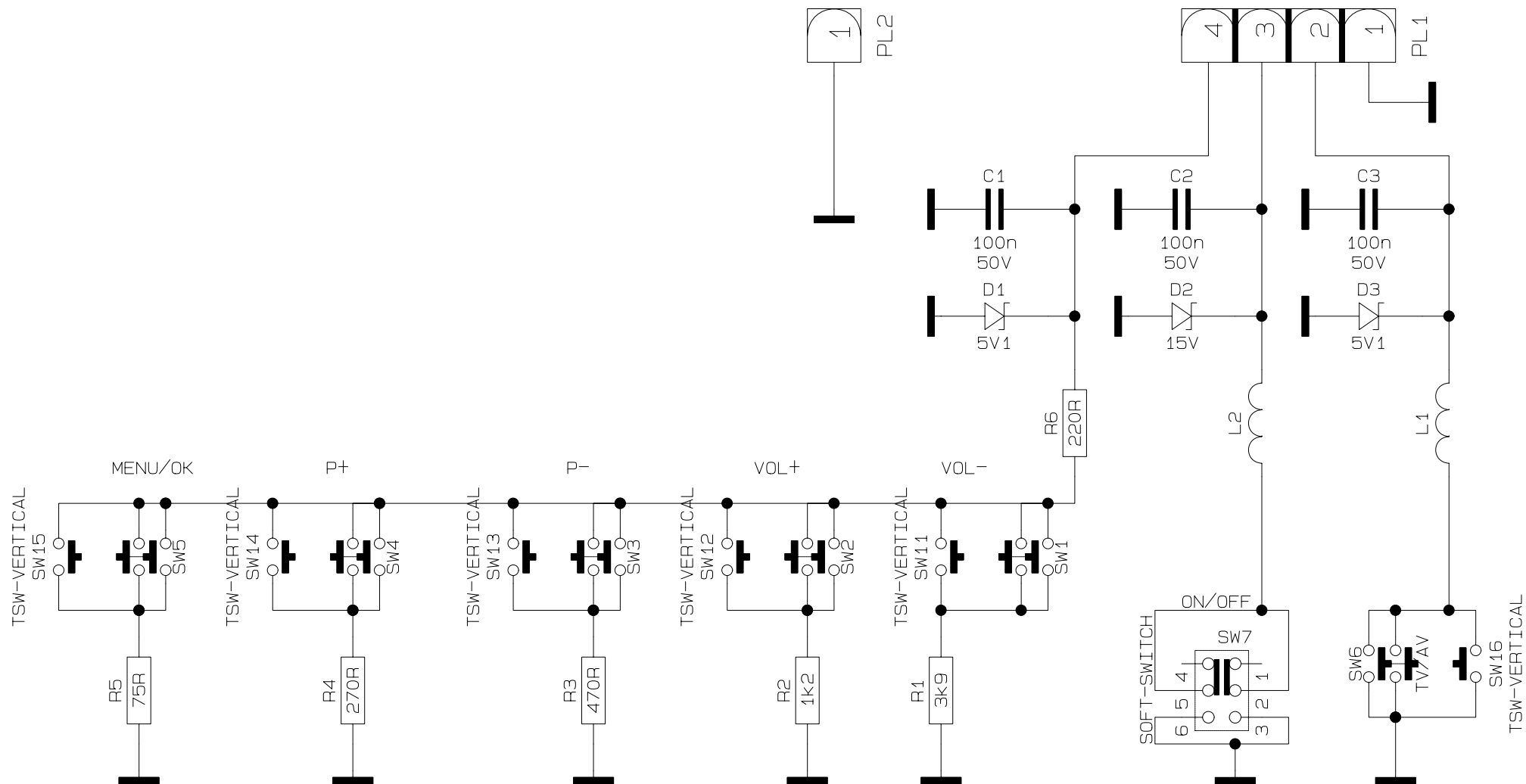








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