AN2031
APPLICATION NOTE

STA308-508
EVALUATION BOARD DESCRIPTION

1 DESCRIPTION

The STA308A is a single chip solution for digital audio processing and control in multi-channel application.

It provides output capabilities for DDX (Direct Digital Amplification). In conjunction with DDX power device, it provides high quality, high efficiency, all digital amplification.

STA508 is a monolithic quad half bridge stage in Multipower BCD technology. The device can be used as dual bridge or reconfigured, by connecting CONFIG pin to V_{dd} pin, as single bridge with double current capability.

This device is particularly designed to make the Output stage of a stereo DDX amplifier capable to deliver 80 + 80W @THD = 10% at V_{cc} = 35V output power on 8Ω load.

In single BTL configuration, is also capable to deliver a peak of 160W@THD = 10% at V_{cc} = 35V on 4Ω load (t<= 1sec).

2 STA308-508// EVALUATION BOARD DESCRIPTION

In this board it is possible to solder STA308 or STA308A device how digital audio processor.

There are three jumpers (JP2, JP3, JP6) to select the correct device.

The board has one S/PDIF input (electrical single ended and optical).

In this board it is possible to use two different powers (10V to 35V on J2) and logic (5V on J1) stages or only one supply (10V to 35V on J2) for both stages. This feature is possible setting JP1 in EXT-SEL or INT-SEL respectively.

U6 and U7 are configured to drive 3 or 2 ohm (over 250W) on the channel.

2.1 SUPPLY VOLTAGE, REGULATORS

The STA308-508// board uses 5V, 3.3V power regulation for logic circuitry and 10<V_{cc}<35 for power section of STA508 device.

It is possible to apply only one power supply and to extract the logic power supply utilizing the L4971D step down device

2.2 S/PDIF INPUT INTERFACE

The STA308A controller's data interface is serial I^2S for input.

The STA308-508//-EVB input accommodates coaxial or optical S/PDIF digital audio interfaces using a digital audio receiver IC. Jumper JP5 may select either input. S/PDIF interfaces (STA120D) will support sample rates from 32KHz to 96KHz

Optical S/PDIF receiver IC is SHARP GP1F31R.

2.3 DIGITAL SIGNAL PROCESSING

The STA308A converts pulse code modulated, PCM, digital audio input signals into Pulse-Width Modulated PWM. This signal enters in the same time in the two STA508 ICs and the exit signal is at high level of power. The STA308A has two independent volume control registers

that have an adjustment range from +48dB to -78dB in 0.5dB increments. In addition, the mater volume is adjustable from 0dB to -127dB in 0.5dB steps.
Tone control registers boost or cut the treble and bass by +/-12dB, in 2dB steps.
EQ filters are IIR biquads configurable by programmable coefficients.

2.4 POWER OUTPUT

The power level signals are applied to passive two-pole low pass filter, and provide low distortion audio power to the load. The output filter functions to prevent unwanted high frequency switching signals from reaching the load. Filter designs for 2Ω. Peak voltage on power pins must not exceed 35V.
Snubber networks are employed to protect the output MOSFETs from inductive transients, which can reach levels higher than the supply voltage.
Output snubber filter values are R18/C66 and R14/C53.
The other critical components for device reliability are C47, C51, C58, C63 (1uF) and C48, C52, C59, C64 (100nF); these bypass capacitors from Vcc and power GND pins of STA508. These capacitors must be X7R Ceramic or Tantalum SMD construction and must be located as close as possible to the device pins.
The STA508 shuts down when it reaches 150°C.

2.5 JUMPERS CONNECTOR

The STA308-508//-EVB provides some jumpers to configure the board.

2.5.1 JUMPERS:

JP1: (INT-SEL-EXT): short on EXT-SEL to use different power supplies; short on INT-SEL to use only one power supply;

JP2: (2.5A): short (with solder tin) if STA308 IC is solder on the board. If there is the STA308A this jumper could be opened;

JP3: (2.5A): short (with solder tin) if STA308 IC is solder on the board. If there is the STA308A this jumper could be opened;

JP4: short this jumper to use two different power supply;

JP5: (OPTIC- SPDIF -ELEC): short the central pin with ELEC pin to use Electric S/PDIF; short the central pin with OPTIC pin to use the optical S/PDIF.

JP6: short (with solder tin) 3.3A and center if STA308A IC is solder on the board. If there is the STA308A this jumper could be short on 3.3V and center

JP7: this pin must be open.

2.5.2 CONNECTORS:

J1: Logic supply (5V)

J2: Power Supply (10V to 35V)

J3: Male 20 pin connector for plug control board

J4: RCA connector electric S/PDIF

J5: Optical S/PDIF SHARP GP1F31R

J6: Connector for output load A

3 CONFIGURE STA308A-508//-EVB WITH LPT INTERFACE

1) Plug the LPT Interface on the board utilizing J3 of STA308A-508//-EVB and J2 of LPT Interface;
2) Connect PC parallel port to the LPT board using a parallel cable;
3) Select S/PDIF Input mode (electric or optical) with JP5;
4) Connect logic supply (+5V) on J1 and power supply [10V..35V] on J2;
5) Connect output load on J6;
6) 6Turn on the board;
7) Run STA308A-508PControlPanel.exe on the PC.

3.1 Configuring GUI Software:

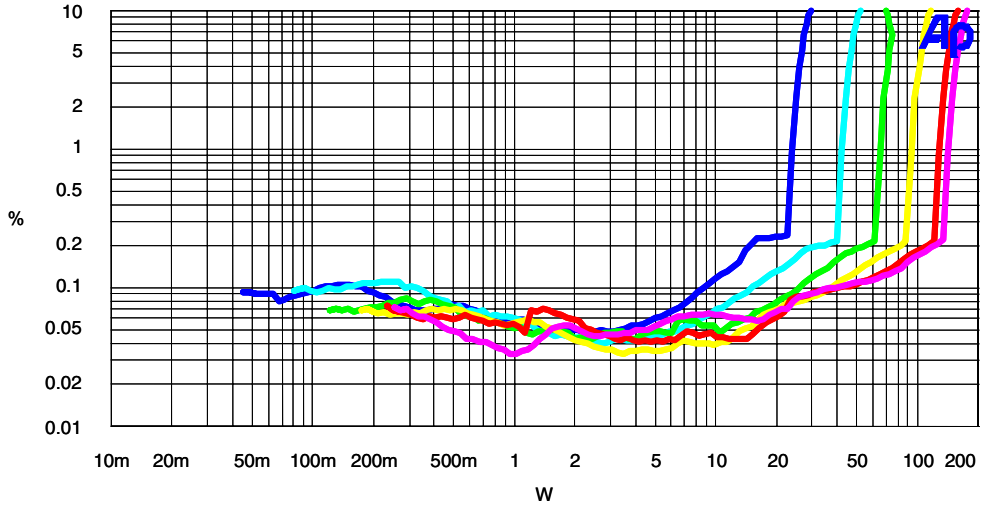
1) Go to "Registers" page on GUI.
2) Click "AutoFind LPT" button. It appears the number of LPT port (0x278 or 0x378);
3) Click "Reset" button
4) Click "Power Up" button
5) Click "Test Board I/O". If "passed" it is OK. If "failed", then perform manual board-reset by pressing SW1 button and try again. If still "failed" then make sure connections are OK.
6) Go to "Control" page on GUI.
7) Click "Ext Amp Power Up" to enable the output power.
8) Increase "ALL" master volume control.

4 PERFORMANCES

4.1 THD+Noise Ratio versus Output Power at different input power supply Input frequency: 1KHz; Output load: 4Ω;

Blue: 15V; Cyan: 20V; Green: 25V; Yellow: 30V; Red: 35V; Magenta: 37V

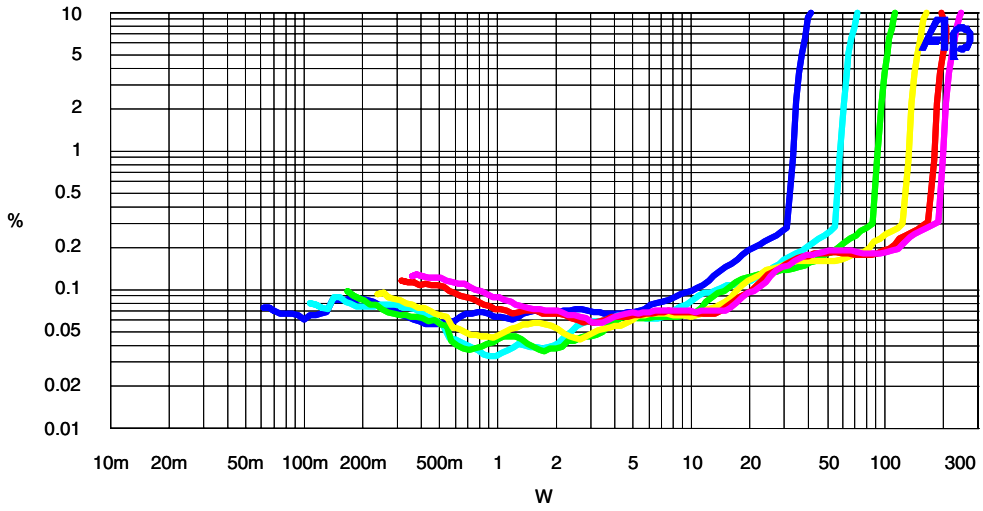
Figure 1. Audio Precision



4.2 THD+Noise Ratio versus Output Power at different input power supply Input frequency: 1KHz; Output load: 2.67Ω;

Blue: 15V; Cyan: 20V; Green: 25V; Yellow: 30V; Red: 35V; Magenta: 37V

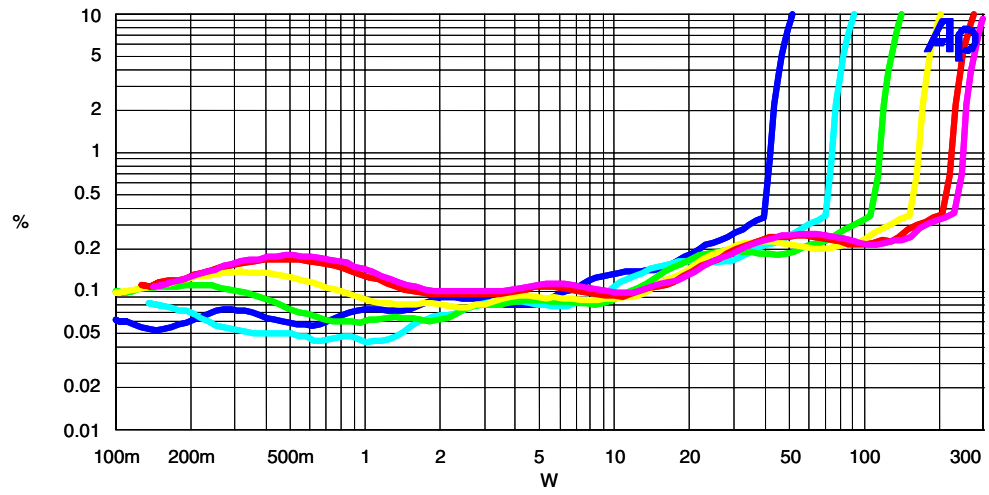
Figure 2. Audio Precision



4.3 THD+Noise Ratio versus Output Power at different input power supply Input frequency: 1KHz; Output load: 2Ω;

Blue: 15V; Cyan: 20V; Green: 25V; Yellow: 30V; Red: 35V; Magenta: 37V

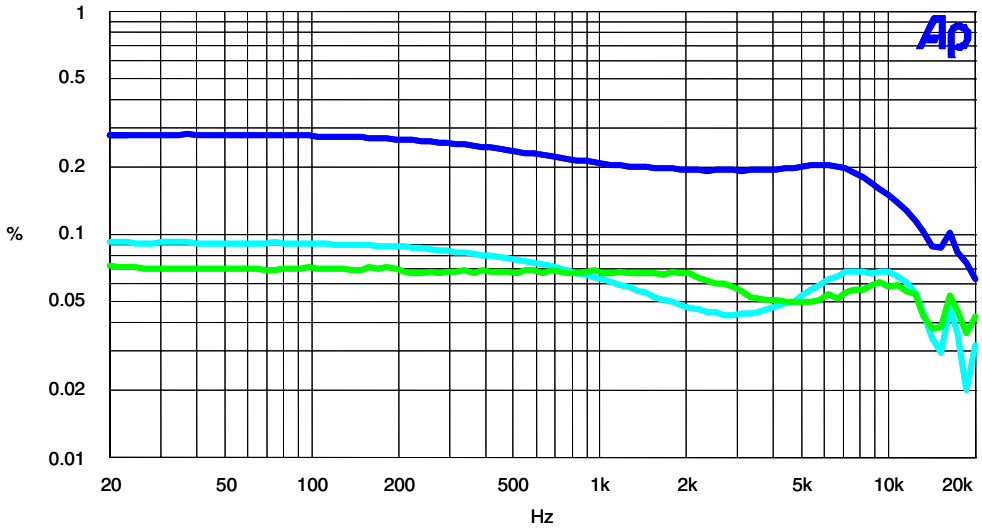
Figure 3. Audio Precision



4.4 THD+Noise Ratio versus frequency at different output power Input power supply: 25V; Output load: 4Ω;

Blue: 0dB; Cyan: -10dB; Green: -20dB;

Figure 4. Audio Precision



5 SCHEMATIC AND LAYOUT

5.1 Schematic

Figure 5. Power Section

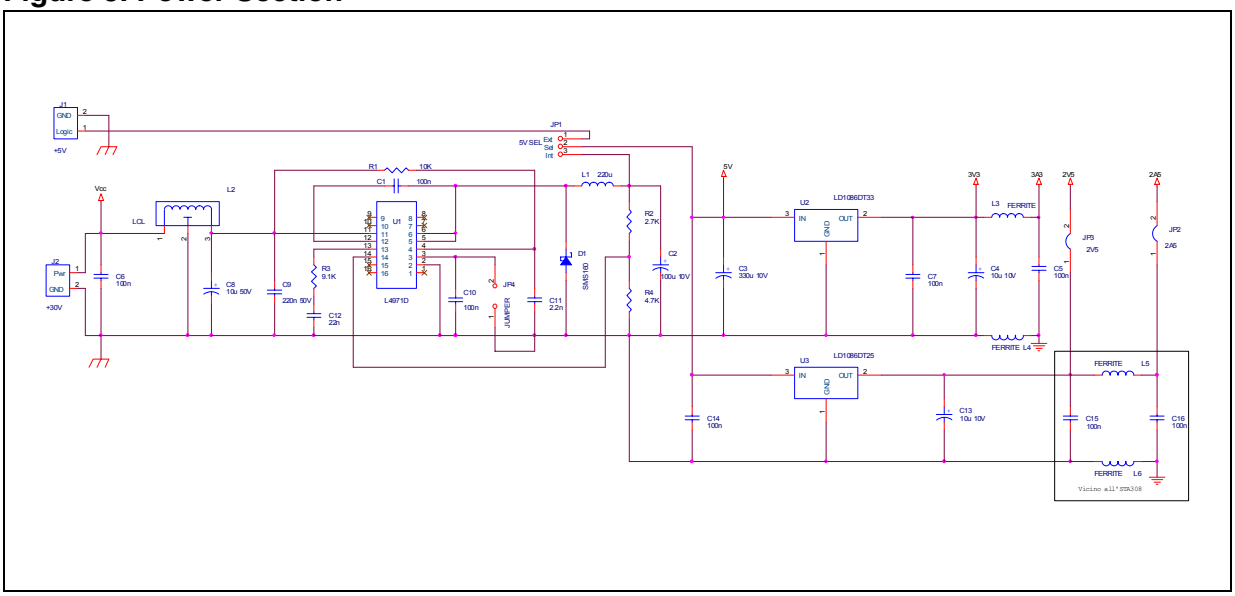


Figure 6. Connection Section

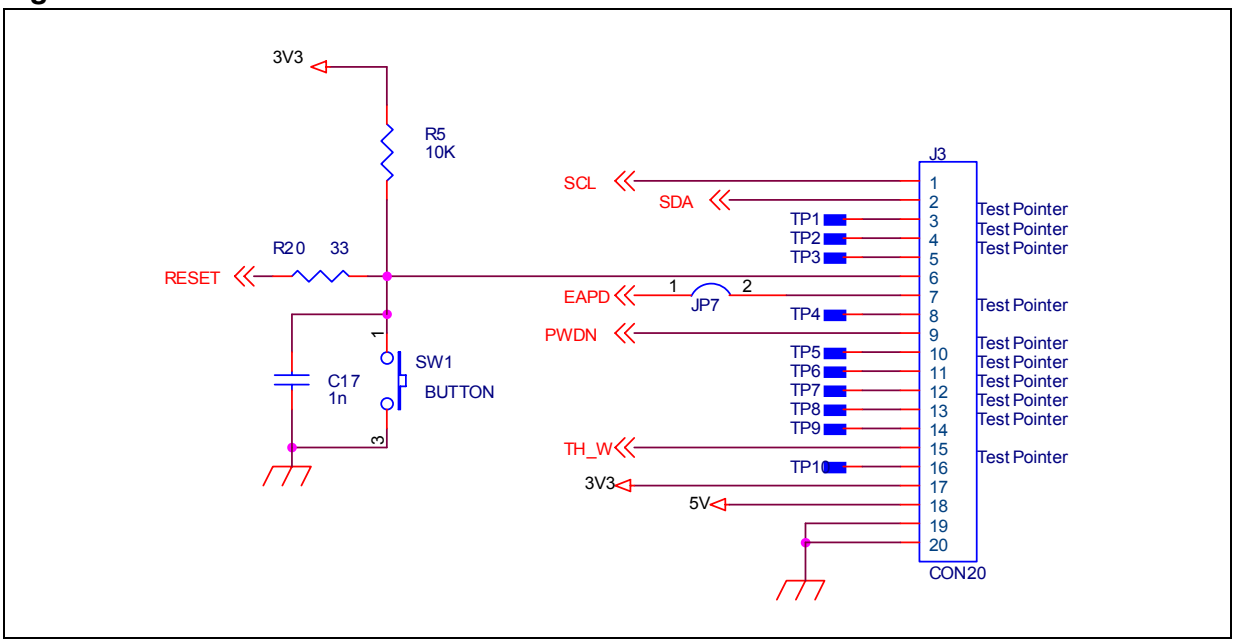


Figure 7. S/P DIF Section

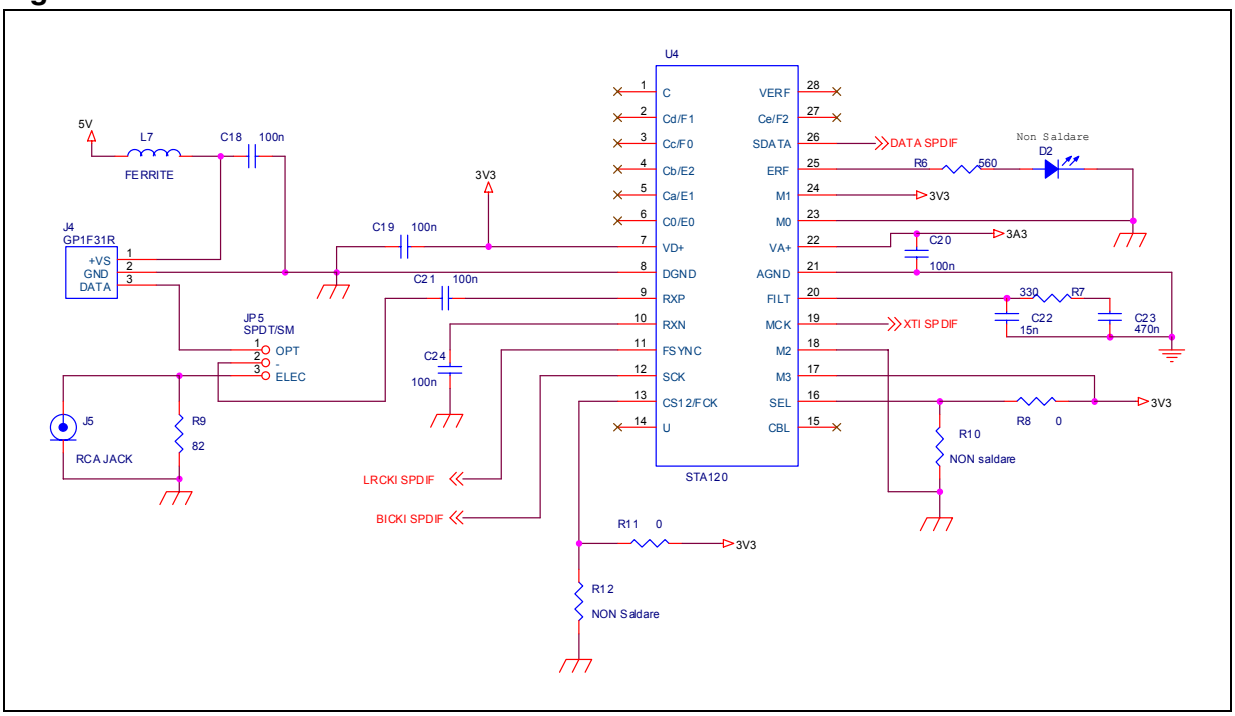


Figure 8. STA308A Section

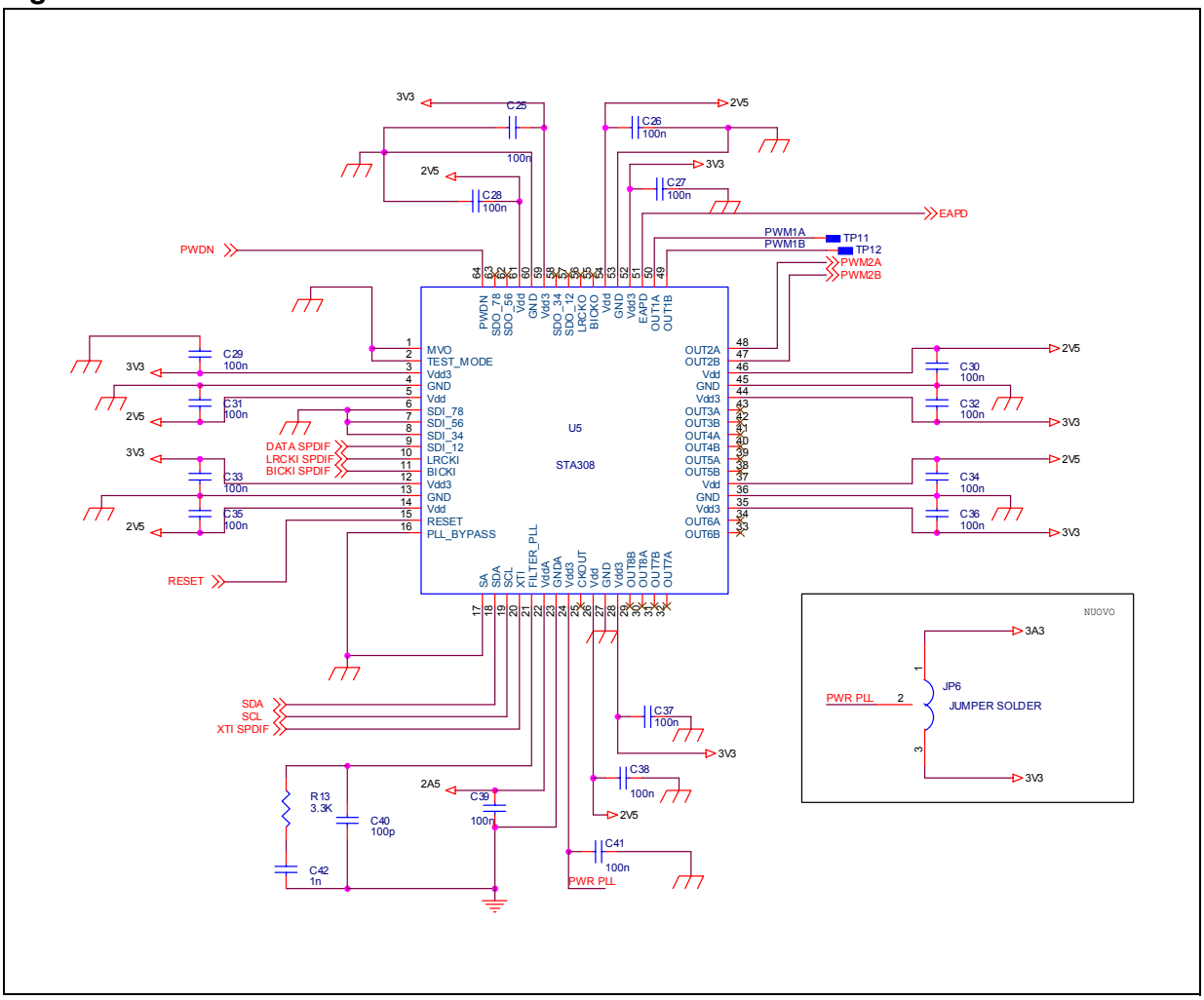


Figure 9. STA508 Section

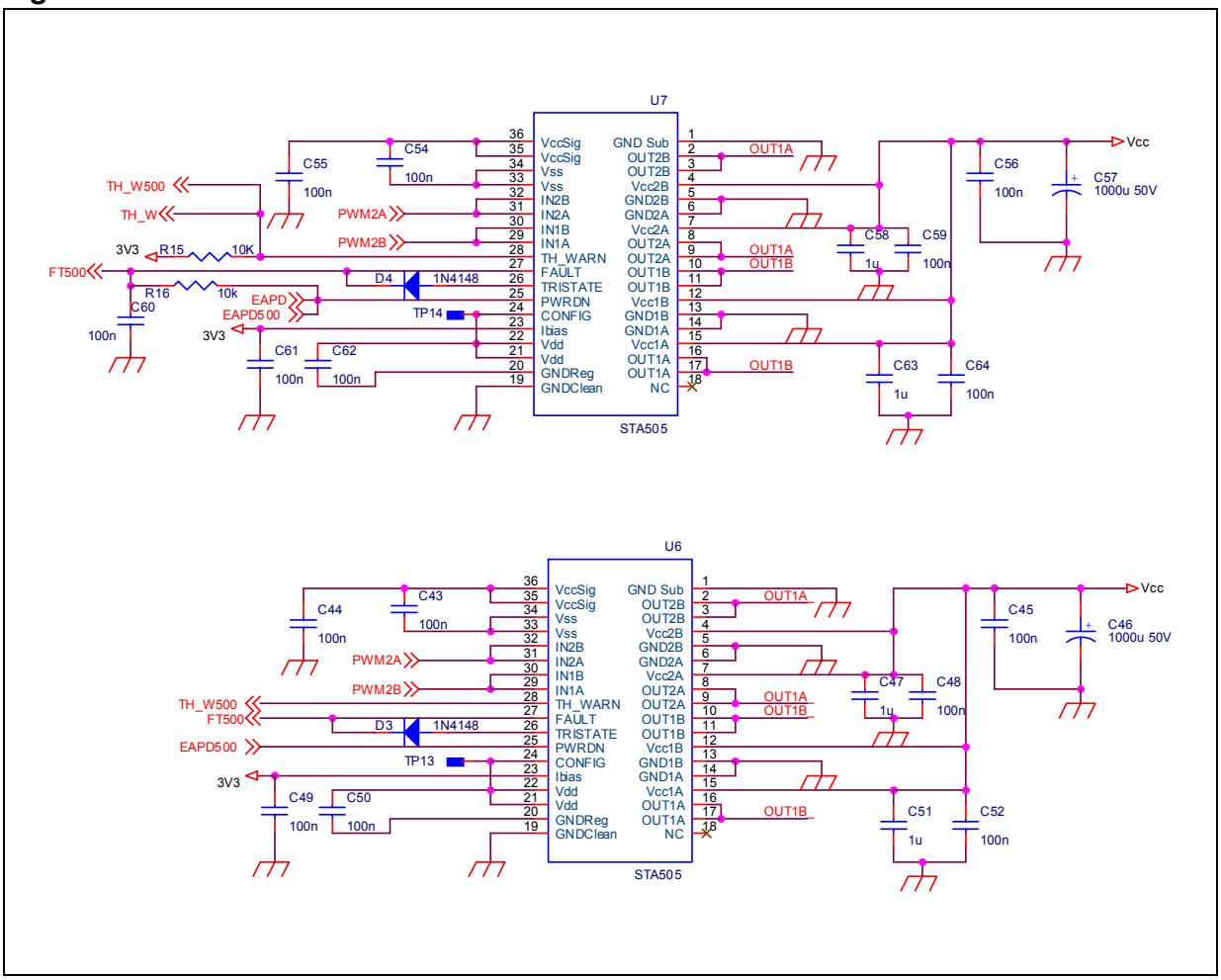
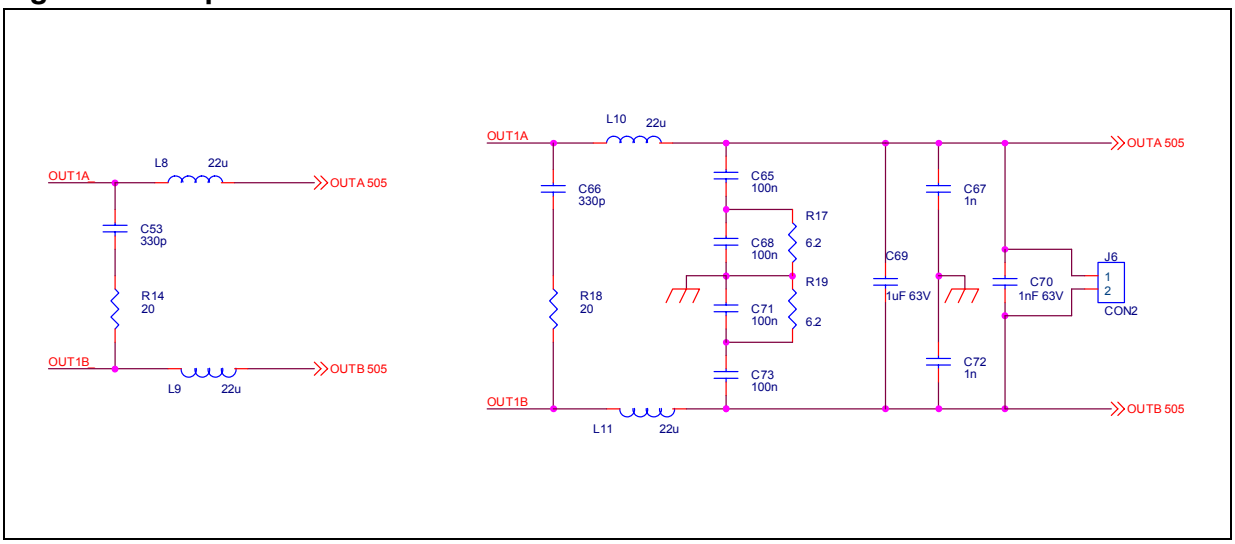


Figure 10. Output Filter Section



5.2 Layout

Figure 11. Component Layer

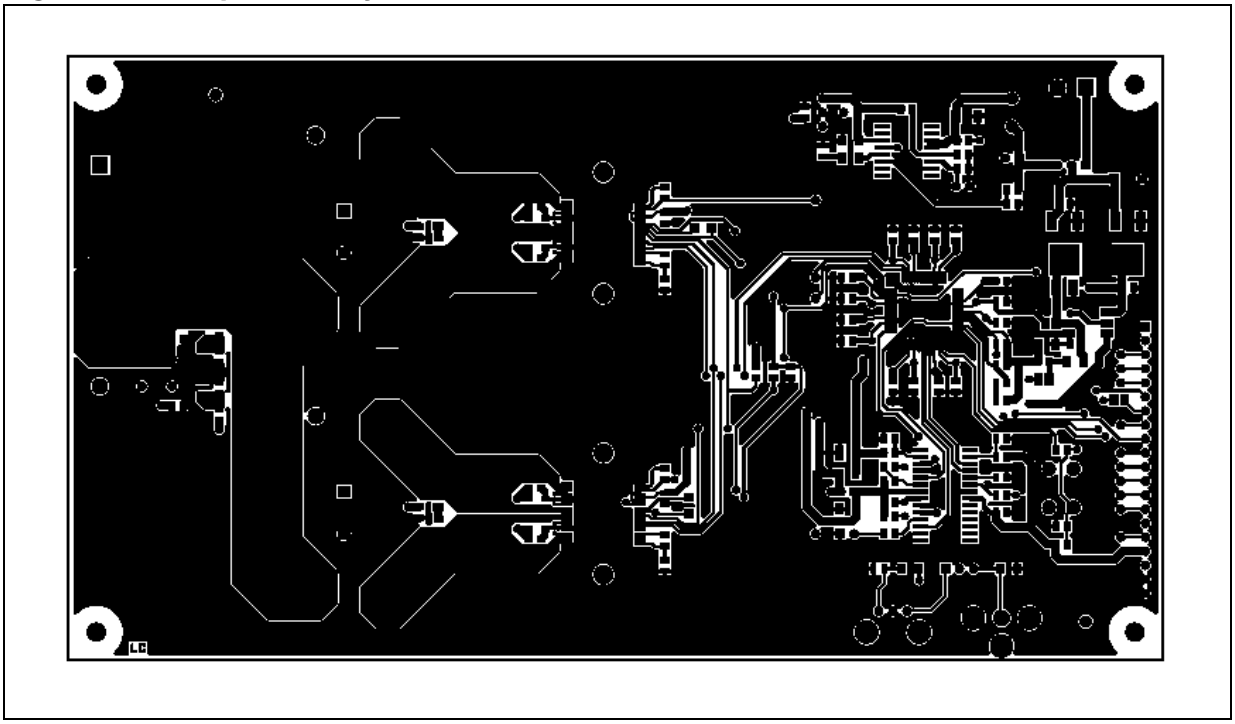


Figure 12. Solder Layer

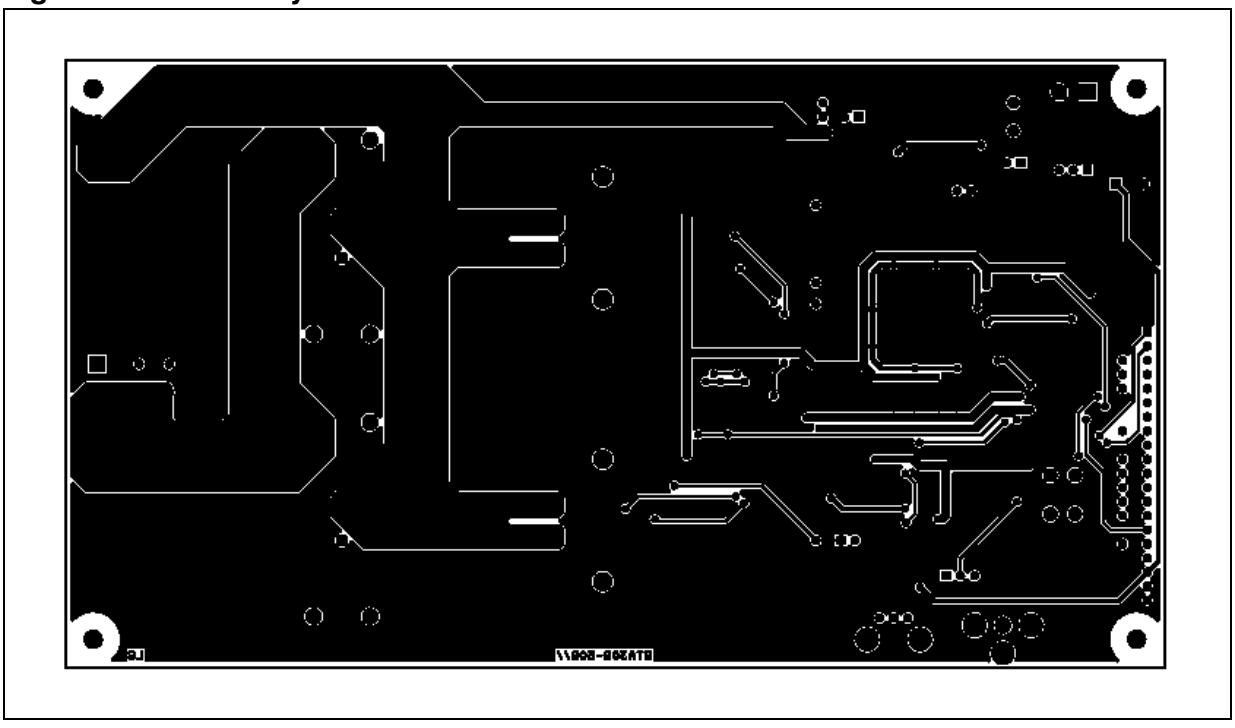


Figure 13. Serigraphy

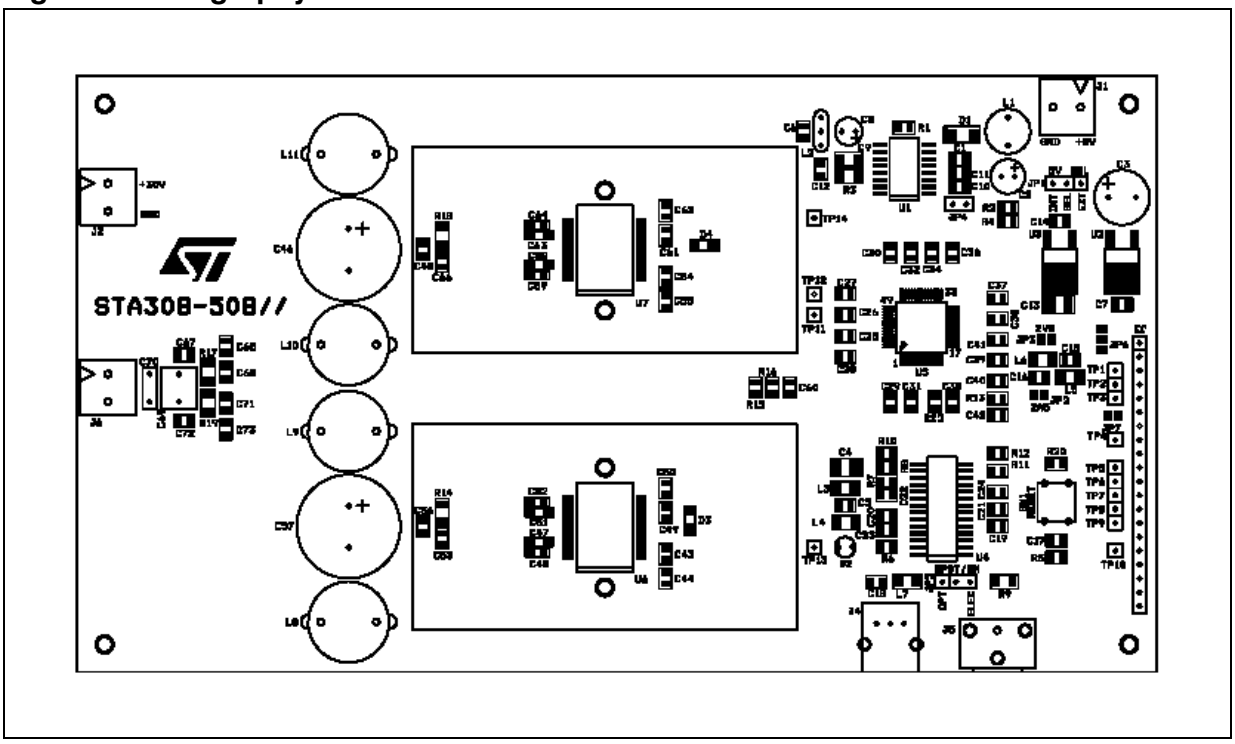


Table 1. Revision History

Date	Revision	Description of Changes
July 2005	1	First Issue

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