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## Evaluation Kit

### APPLICABLE PARTS (SOLD SEPARATELY)

- PA50
- PA52

### INTRODUCTION

This easy to use kit provides a platform with good circuit board layout and grounding to evaluate linear power amplifier circuits using the PA50 / PA52 pin out. With additional prototype area, it is flexible enough to analyze a multitude of standard or proprietary circuit configurations. All components are provided with the kit. External connections to the evaluation kit can be made through the connectors at the edges of the circuit. The circuit provides a line termination of 50  $\Omega$ .

The Power amplifiers are configured for a gain of 21. This evaluation kit provides flexibility for modifying the gain, in inverting or non-inverting mode and for using a differential amplifier configuration.

Figure 1: PCB

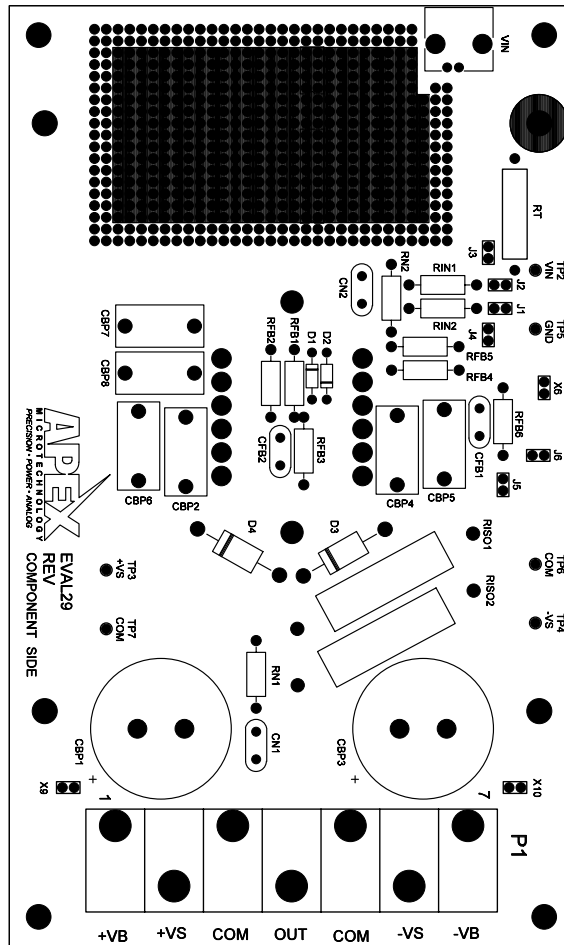


Figure 2: Schematic for Non-Inverting Amplifier

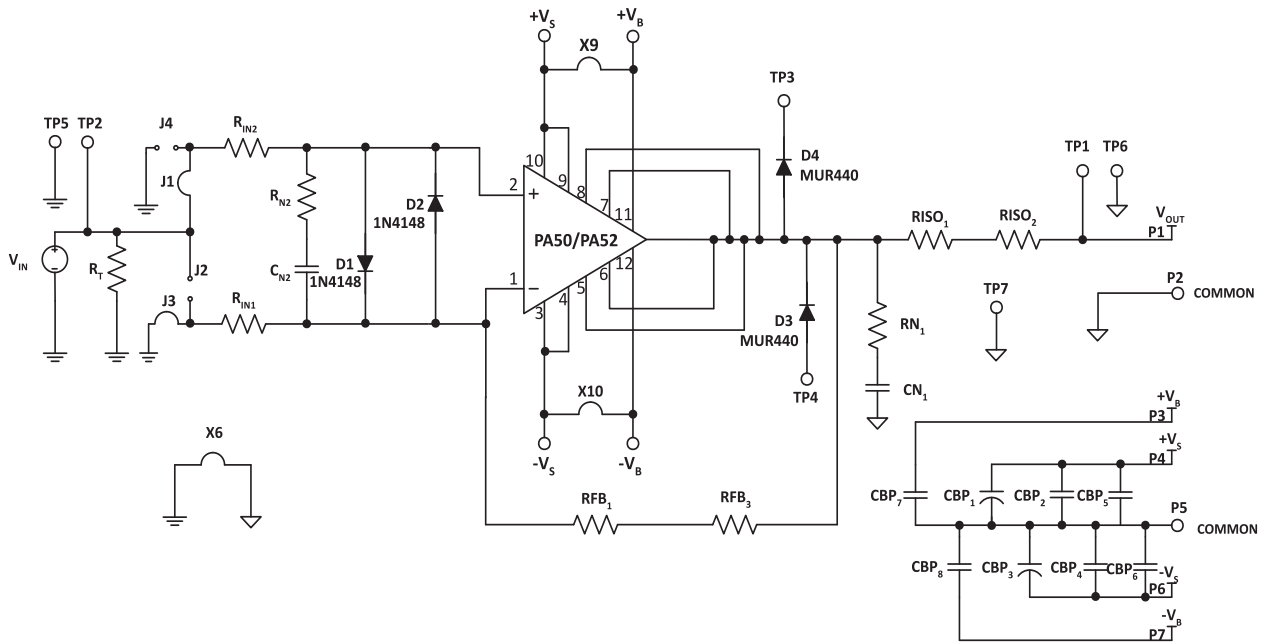
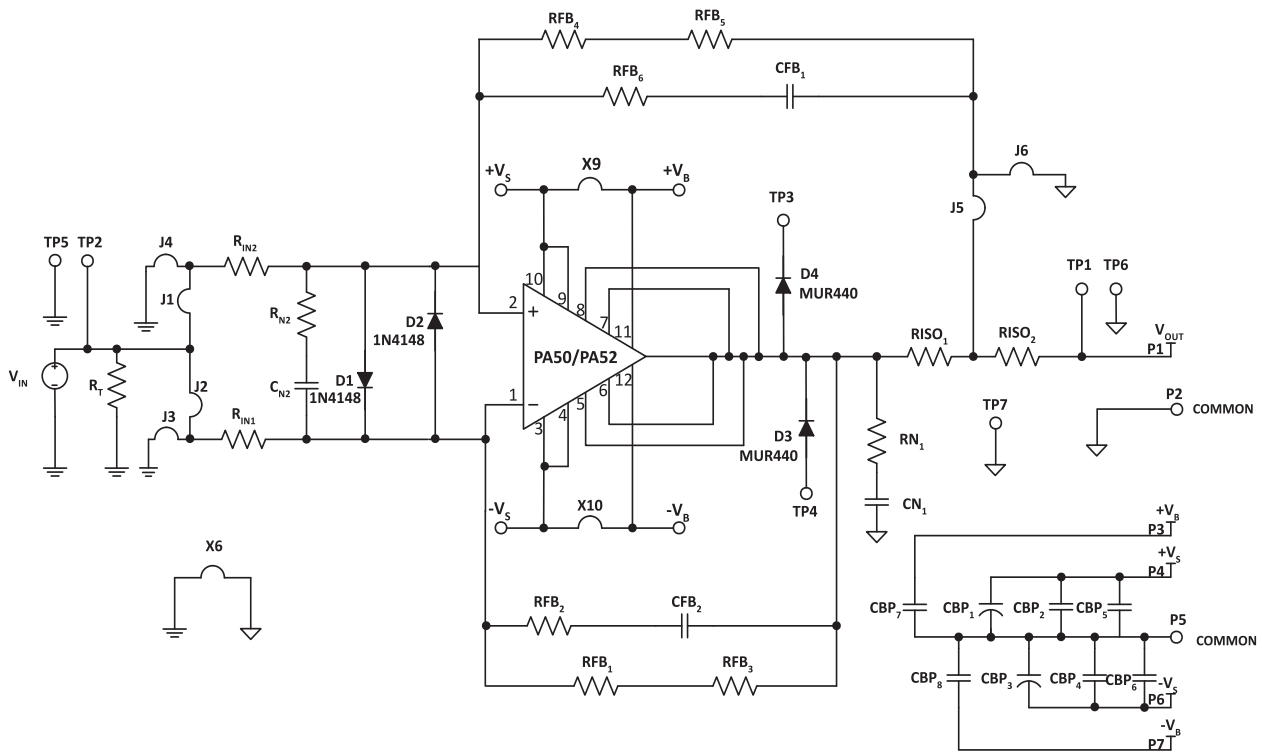


Figure 3: Assembled Schematic



**PARTS LIST**

Reference	Manufacturer Part #	Description	QTY
<b><u>Resistors</u></b>			
RT	PR03000205109JAC00	51Ω, 3W, 5%	1
RIN-1, RIN-2	RN60D1801FB14	1.8KΩ, 1/4W, 1%	2
RFB1-B, RFB3-B	RN60D1802FB14	18KΩ, 1/4W, 1%	2
RIS0-1, RIS0-2	N/A	0Ω, Wire Jumper	2
<b><u>Printed Circuit Board</u></b>			
EVAL29	EVAL29	Printed Circuit Board	1
<b><u>Capacitors</u></b>			
CBP-1, CBP-3	SLP222M100C4P3	ALUM, 2200Uf, 100V	2
CBP-1', CBP-3'	SLP681M200C7P3	ALUM, 680uF, 200V	2
CBP-2, CBP-4			
CBP-5, CBP-6	ECW-F21055A	FILM, 1uF, 250VDC	6
CBP-7, CBP-8			
<b><u>Diodes</u></b>			
D1, D2	1N4148-T	Switching Diode	2
D3, D4	MUR440 G	Rectifier, Ultra Fast	2
<b><u>Hardware</u></b>			
	HS18	Heatsink	1
	TW05	Thermal Washer (Pack Of 10 Pcs)	1
	MS05	Socket	1
	146510CJ	BNC Connector, PC Mount	1
	91735A190	Screw, Panhead, #8 X 0.25"	4
	91735A192	Screw, Panhead, #8 X 0.375"	4
	91841A009	Nut, Hex, #8	4
	8426	Spacer, Hex, With Stud, #8 X 0.375"	4
	8413	Spacer, Hex, With Stud, #6 X 0.375"	4
	2221	Standoff, Hex, #8 X 2.00"	4
	91735A151	Screw, Panhead, #6 X 0.75"	2
	90730A007	Nut, Hex, #6 X 1/4"	2
	TSO2	Terminal Strip	1
<b><u>Miscellaneous</u></b>			
	TFT20014 NA005-6"	Tubing, Teflon, #18AWG, 6 Inches	1
	SPC02SVJN-RC	Jumper, Slip On	10
	PRPC002SADN-RC	Header, Connector	10
	5001	Test Point, Pc Mini	10

## BEFORE YOU GET STARTED

- All Apex Microtechnology amplifiers should be handled using proper ESD precautions.
- Always use the heat sink and thermal washers included in this kit.
- Always use adequate power supply bypassing.
- Do not change the connections while the circuit is powered.
- Initially set all power supplies to the minimum operations levels allowed in the device data sheet.
- Check for oscillations.
- Please refer to Application Note, AN01 for general operating conditions.

## ASSEMBLY

During the assembly, please refer to the circuit schematics, assembly drawings, and the data sheet of the part being used on the evaluation kit.

1. Note that each side of the circuit board is identified as either the component side or the DUT side. The component side has the designators printed on that side.
2. All the components are installed on the component side of the board and soldered on the DUT side.
3. First mount diodes D1, D2 and resistors RFB1, RFB3 on the component side of the board.
4. A power DIP socket (MS05) is supplied with this kit. The MS05 socket incorporates two cavities to retain the #6 x 1/4" nuts (90730A007). Insert one #6 nut into each cavity. Make sure the nuts are fully seated into the cavities. Using #6 x 0.75" screws (91735A151) provided with the kit, mount the socket from the DUT side of the board.
5. Attach the heat sink to the board from the DUT side, using #8 x 0.375" screws (91735A192). Refer to the assembly drawings for the correct way to attach the heat sink. This is done to keep the socket tightly mounted to the board and to provide support, and eliminate stress so that the socket pins do not move while being soldered from the component side. Once the socket pins are soldered, and the socket is now attached to the board, remove the heat sink and all the screws.
6. First install all the smaller components on the board. This is done because it becomes difficult to install a smaller part on the board once all the larger components are installed.
7. Mount electrolytic capacitors CBP-1 and CBP-2 for PA50. Mount capacitors CBP-1' and CBP-2' for PA52.
8. Ensure that the orientation of the electrolytic capacitors and the diodes match the circuit schematic drawing.
9. Mount the BNC connector provided with the kit (146510CJ) and solder it to the board. Also mount the terminal strip (TSO2) provided in the kit. Refer to the assembly drawings before mounting the terminal strip. Make sure the terminal strip sits flat against the circuit board.
10. #8 hex stand offs (91841A009) are also provided with the kit. Install the # 8 x 0.25" screws (91735A190), provided with the kit, from the component side. Attach the standoffs to these screws on the corners of the board. Refer to the assembly drawings while installing the standoffs.
11. Attach the heatsink as before in step 5. Cut the Teflon tubing into 12 pieces, each of length 0.21 inches or 5.33 mm (1/5 of an inch) approximately. These pieces go onto the pins of the Power Amplifier before inserting it into the socket. This is done to insulate the pins from the heat sink and make sure that the PA is tightly fixed into the socket. An Exacto knife works well for this.  
**NOTE:** The Teflon pieces should not be longer than the suggested length. If the pieces are longer, they may interfere in the seating of the part to the heat sink and create a gap between the heat sink and the part body.
12. Ten thermal washers (TW05) are provided with the kit. The thermal washer is used between the part and the heat sink. A new washer must be used for each mounting. Mount the Power amplifier to the socket using the thermal washer provided with the kit. Secure with the #6 screws. Note, the pin closest to the input resistors (RIN1 and RIN2) is the pin #1 of the amplifier.

13. Place jumpers J1 and J3 for a non-inverting amplifier. Connect X6 jumper.
14. Connect jumpers X9 and X10 to connect boost voltage and supply voltage.
15. Connect the external connections via the BNC connector and terminal strip. Hook up power supply and signals as necessary. The amplifier is now ready for testing.

Figure 3 shows the schematic diagram for the assembled circuit.

Figure 4: Top View

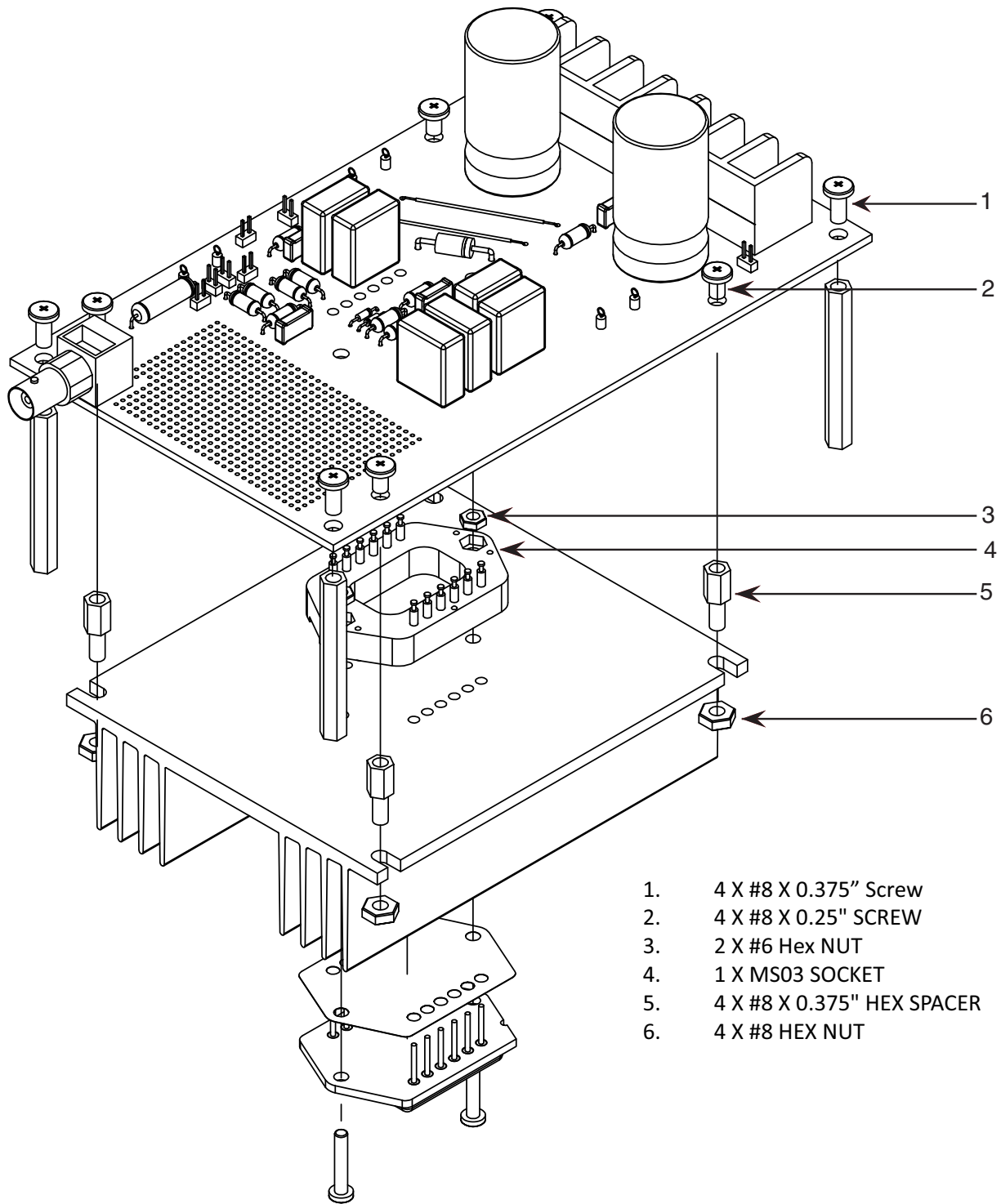
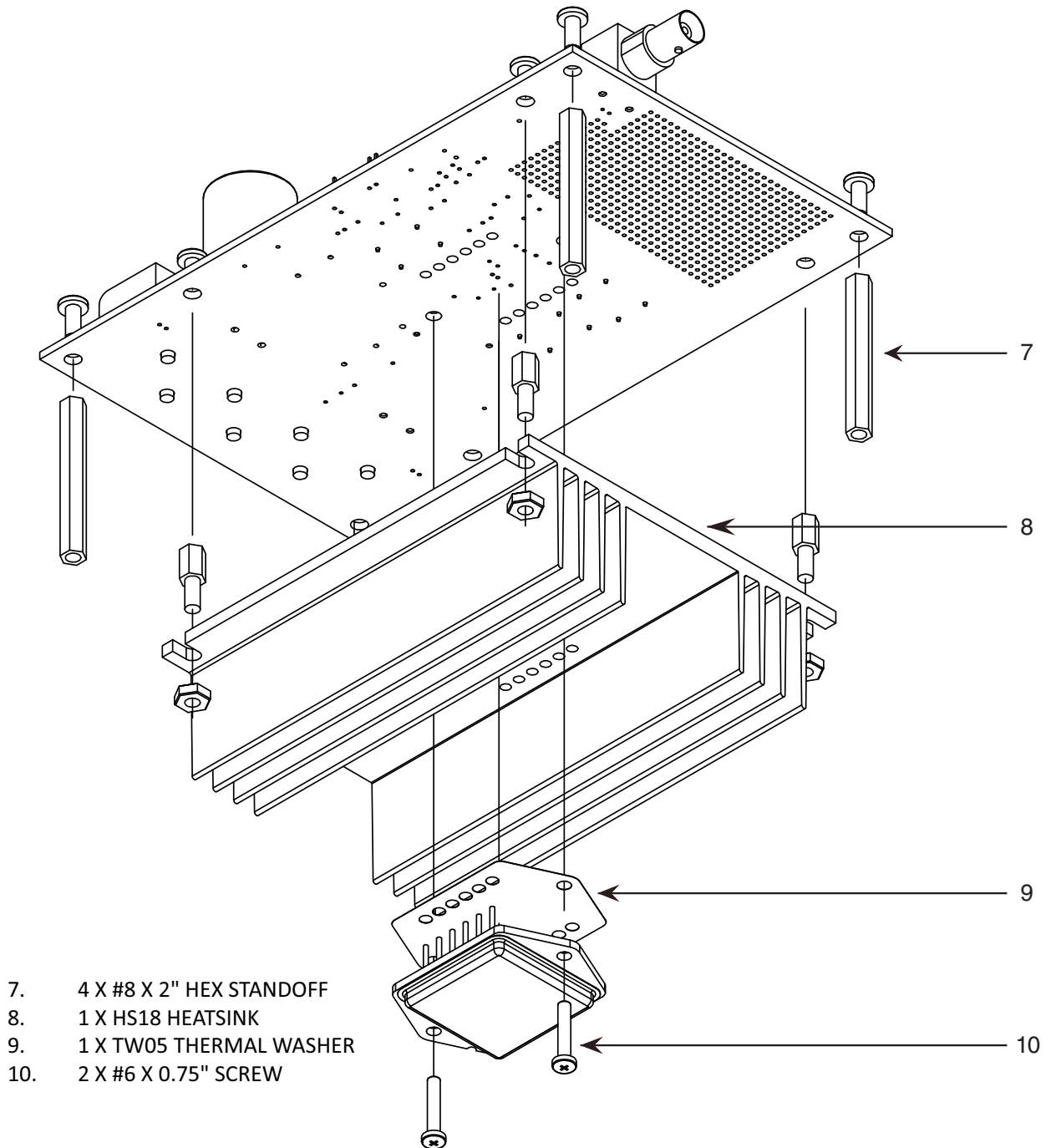


Figure 5: Bottom View





## TEST ASSEMBLY

Equipment needed:

1. Power supply
2. Function Generator
3. Oscilloscope
4. Proper heat sinking system (if operating at high current)

## TEST SETUP

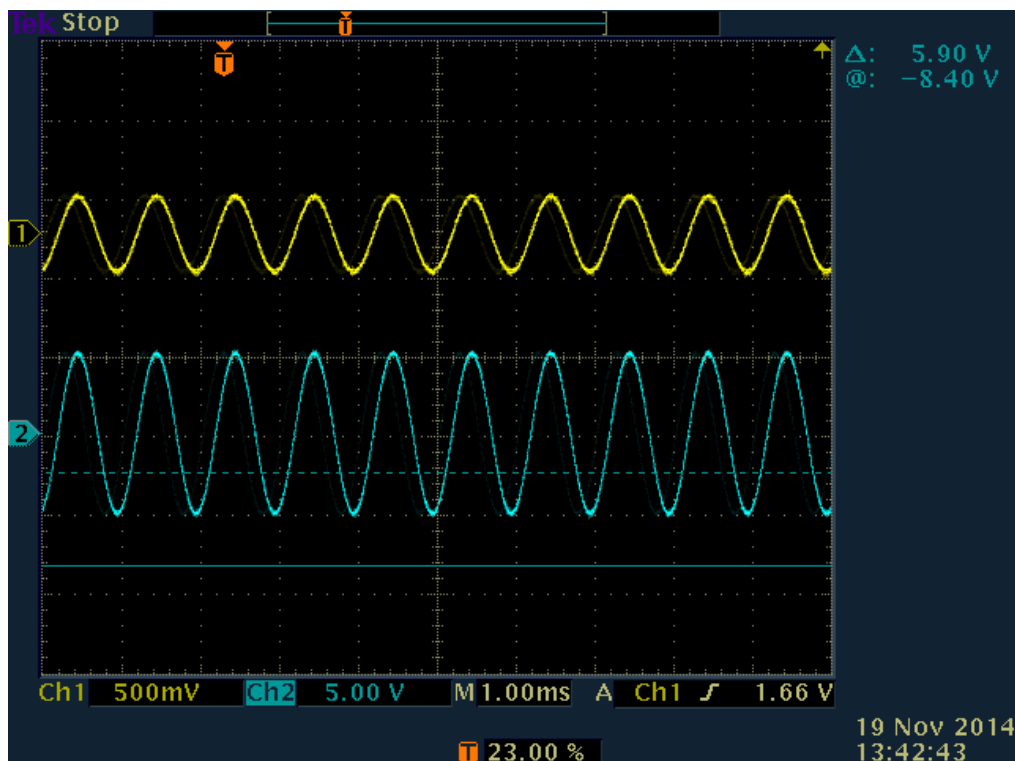
Connect the power supply to the terminal strip. Connect the BNC cable from the function generator to the BNC connector marked VIN, mounted on the board. Connect the load to the terminals on the terminal strip. Refer to the amplifier datasheet for typical values of input voltage, frequency and supply voltage. Input and output waveforms can be checked on an Oscilloscope by connecting it to the test points mounted on the board. Begin the test with minimum values of input and supply voltage

**NOTE:** After everything is connected, switch on the power to the board, and check the socket at each pin without the DUT, for correct voltage / signal at respective pin. Once this is done, plug in the DUT and check for the correct signal.

## TEST RESULTS

Figure 6 shows input (yellow waveform) and output (blue waveform) waveforms for a PA52 power amplifier connected to a resistive load. The part was tested for an input voltage of 500mV p-p, at 10 kHz frequency. The supply voltage is set at  $\pm 20$  Volts.

Figure 6:



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