ZHL-2425-250X+
Mounting Heat Sink Instructions

AN-60-110

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1. Introduction

Depending on the end system design or architecture either water cooling or air cooling can be used to cool the **ZHL-2425-250X+** power amplifier module.

In order to provide the user with the flexibility to decide on the cooling type, Mini-Circuits provides the ZHL- 2425-250X+ without a heat sink and the user decides what type of cooling they want to use.

This Applications note describes how to mount the ZHL-245-250X+ to a Mini-Circuits air cooled heatsink (**HSK-2425-250+**). This is a heat sink that is designed specifically for the ZHL-2425-250X+ amplifier and is also available through the Mini-Circuits website.

2. Heat Sink mounting instructions

2.1 Importance of the heat sink

Depending on the users' requirements the ZHL-2425-250X+ can be either water cooled or air cooled. It is absolutely critical that the amplifier is always mounted to a heat sink with a fan and it's airflow adjusted to keep the amplifier below 65degC at full RF power when operating, otherwise the amplifier will get too warm and the built-in protection alarms will be activated and the power amplifier will shut itself down.

2.2 Description of the mounting holes on the ZHL-2425-250X+ and the HSK-2425-250+ heat sink

There are 9 mounting holes designed onto the ZHL-2425-250X+, 8 under the shield and 1 outside the shield, see the figures 1. These can be used to mount the module to the heatsink, see figure 3. The following instructions describe how to do this.

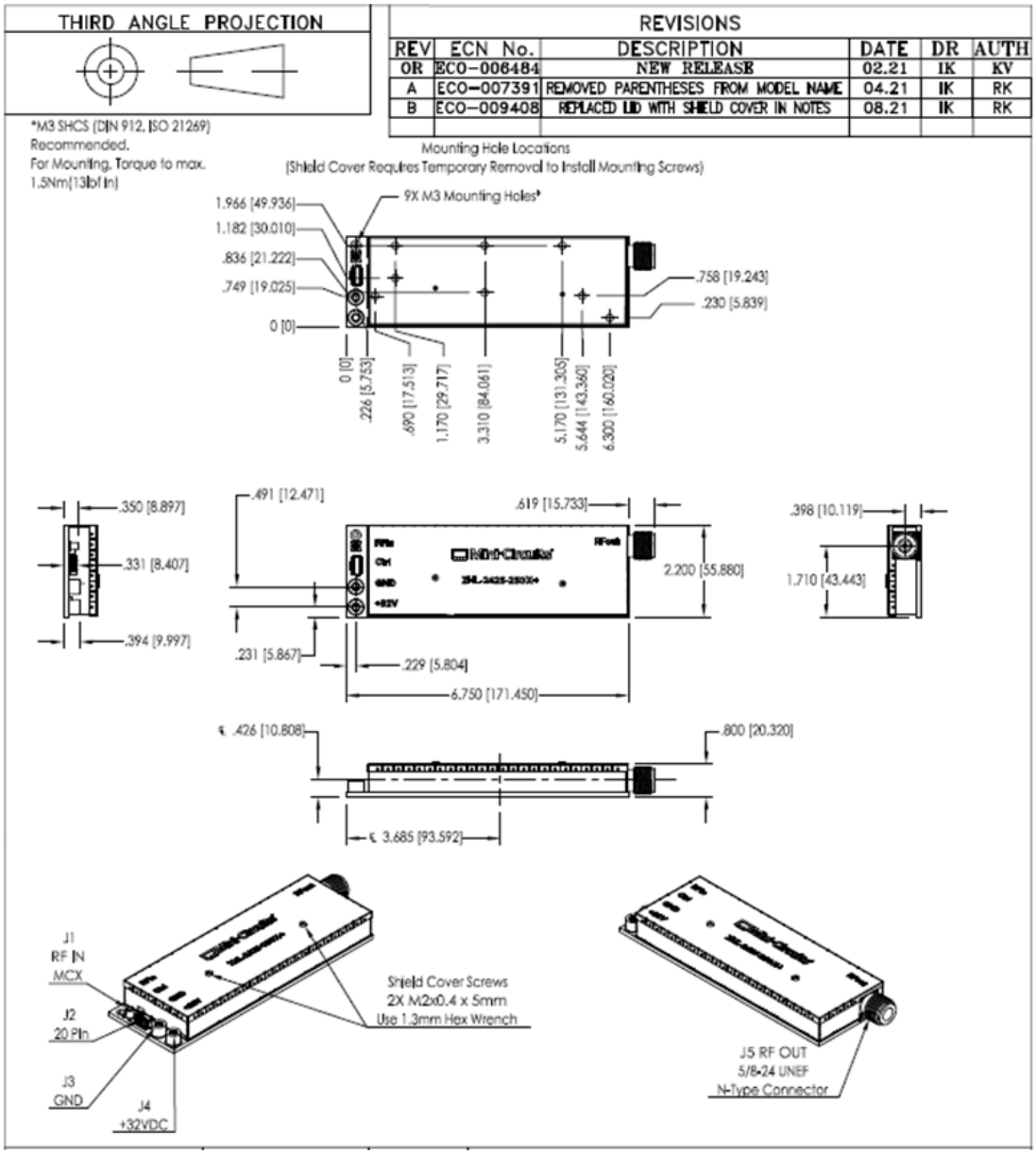

Figure 1: Outling drawing showing the locations of the 9 mounting holes on the ZHL-2425-250X+ (.124in. Dia., 7 under the cover, sized for M3 socket head screw)

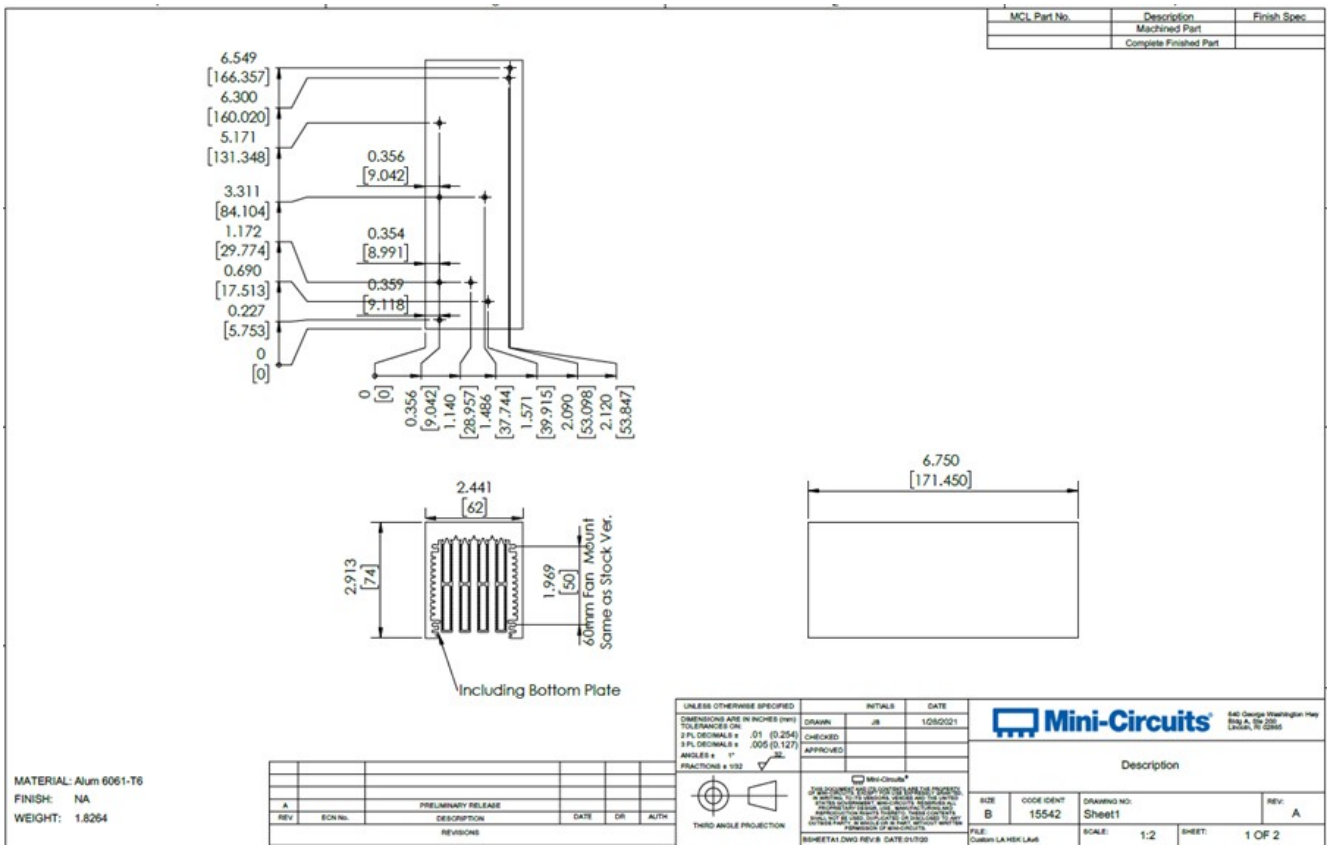

Figure 2: Outline drawing of the HSK-2425-250+ heat sink, the exact locations of the screw holes are shown

2.3 Heat Sink Mounting Instructions

Step 1:
The ZHL-2425-250X+ is delivered fully tested and calibrated with the shield attached. First remove the shield cover by removing the two shield screws**.**

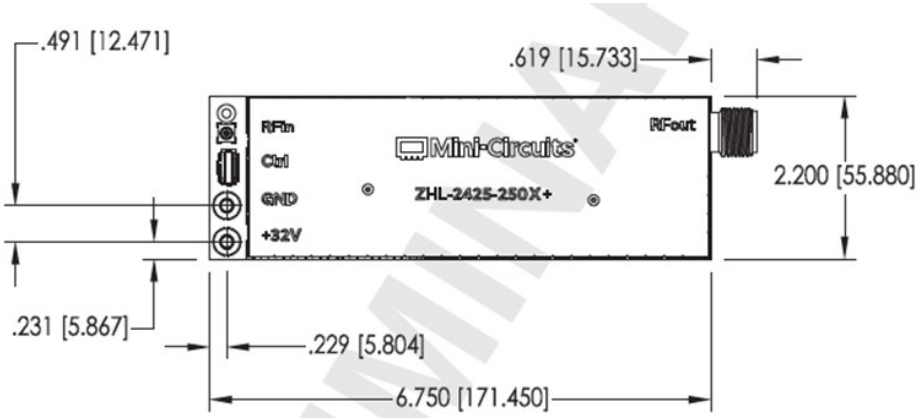

Figure 4: Shield screws

Step 2:

- Apply a layer of electrically non-conductive thermal paste to a ~3x4" area of a plate.
- Then roll the roller in the paste to get the roller covered.
- Now roll the roller over the bottom of the amplifier module to create approximately a 2-5 mil uniform layer of thermal grease.
- The thermal compound is used only to fill in air gaps between the heat sink and the base of the amplifier pallet so the thickness should be kept to a minimum.

A roller and thermal compound similar to what we use in our lab is show in the link below.

Thermal Paste:
https://www.digikey.com/en/products/detail/wakefield-vette/120-2/340305

Note: Any electrically non-conductive thermal compound with at least the same thermal conductivity of the one listed should be ok to use.

Roller:
https://www.amazon.com/Speedball-Deluxe-Soft-Rubber-Brayer/dp/B001KWGU92/ref=sr_1_12?dchild=1&keywords=ink%2Broller&qid=1610462500&sr=8-12&th=1

Step 3:
Now place the module on the heatsink and insert the 9 mounting screws and torque these to a maximum of 1.5Nm (13lbf in), see diagram 1 & 2 above.

Step 4:
Now replace the shield.

2.4 Fan and fan controller recommendations

The Mini-Circuits heat sink has been designed with mount holes for the following fan and fan controller modules. While Mini-Circuits recommend these modules the user is free to use other modules if they prefer.

FAN:
Delta Electronics P/N PFR0612XHE-SP00 Fan Axial, 60x38mm 12V, 4 wire PWM control

Digi-key Link:
https://www.digikey.com/en/products/detail/delta-electronics/PFR0612XHE SP00/3078693

Fan Controller:
Cold & Colder P/N B07L1DZMKS DC 12V, 3A, 4 pin PWM Fan temp. control, thermostat speed controller and thermal probe included.

Amazon link: https://www.amazon.com/Temperature-Control-Thermostat-Speed-Controller/dp/B07L1DZMKS/ref=pd_di_sccai_14?pd_rd_w=eKIhk&pf_rd_p=c9443270-b914-4430-a90b-72e3e7e784e0&pfrdr=X6NHV0TYE32HWJQ948BP&pdrdr=126bd08694d84a28b6e5c75e15e9c796&pd_rd_wg=x6njk&pd_rd_i=B07L1DZMKS&psc=1

Molex Connector Housing (for fan wiring):
Molex P/N 0470541000

Mouser Link: https://www.mouser.com/ProductDetail/Molex/47054-1000?qs=RQ9zk%252B50r5G5REk KmXuucQ%3D%3D

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