Ag5800

Thermal considerations

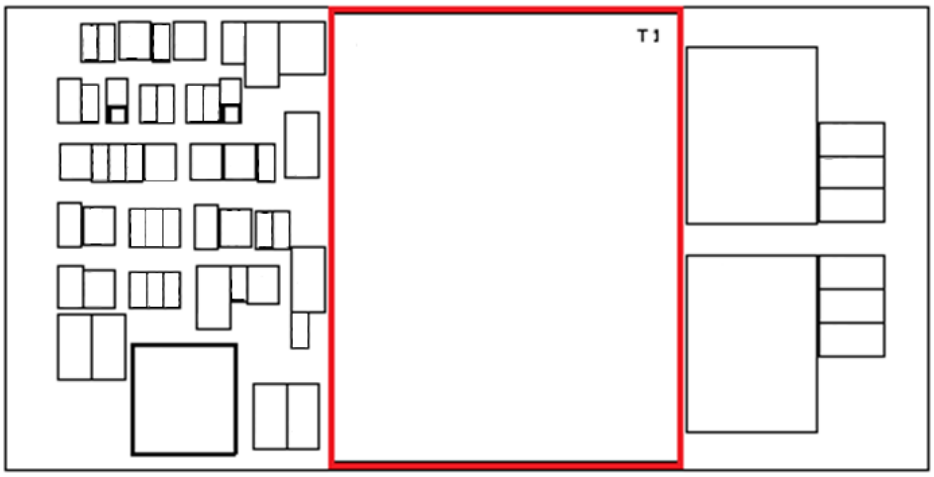
Version 1.1

The following document details the thermal performance of the Ag5800 for use with designing thermal management of the Ag5800 when integrating into designs.

The Ag5800 module is a power component and as a result will generate heat. In order to keep the module compact, it has been designed to be thermally bridged to a larger thermal mass. In order to maintain a continuous output of 85W it is required that the Ag5800 is soldered into the customers PCB in addition to the use of thermal pads or thermal paste, such as Thermally Conductive Oxime Cure paste, to dissipate the heat generated in the part.

Indicated in the pictures below are the hottest components on both the top and bottom sides of the Ag5800

Ag5800 Top Side



The hottest component on the top of the Ag5800 is the transformer, T1

Ag5800 Bottom Side

On the bottom the hottest components are the switching MOSFET, Q9 and the two output diodes, D1 and D3.

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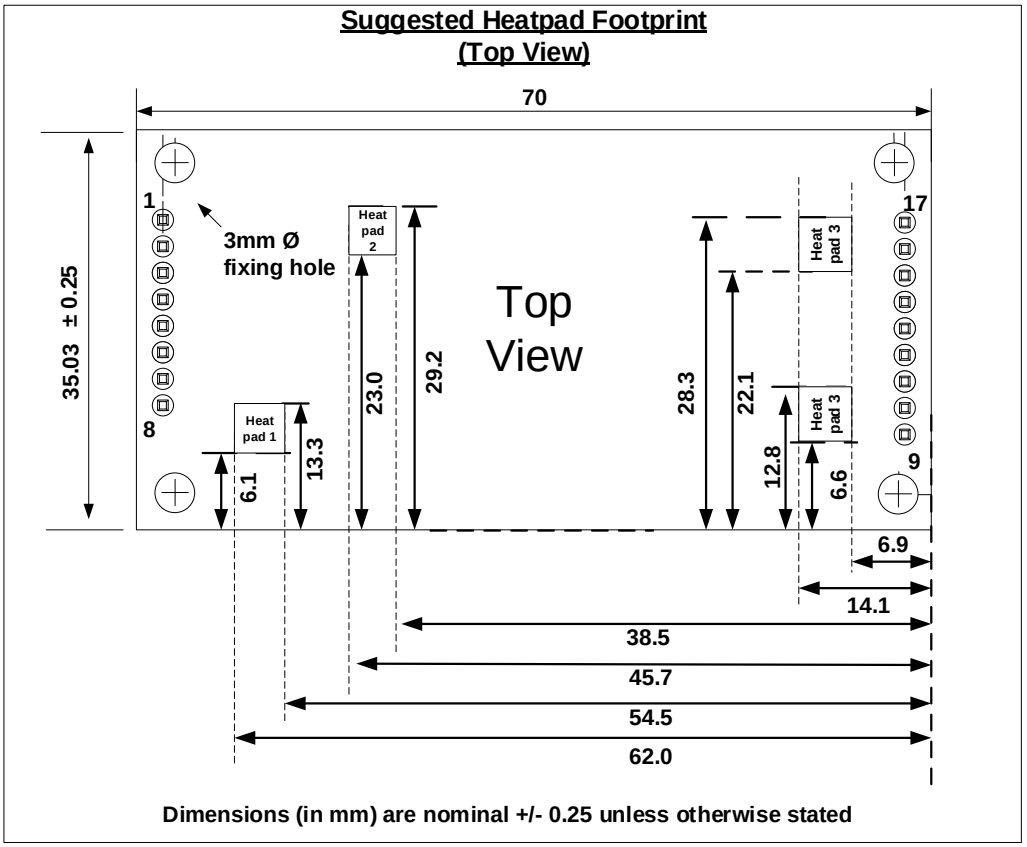
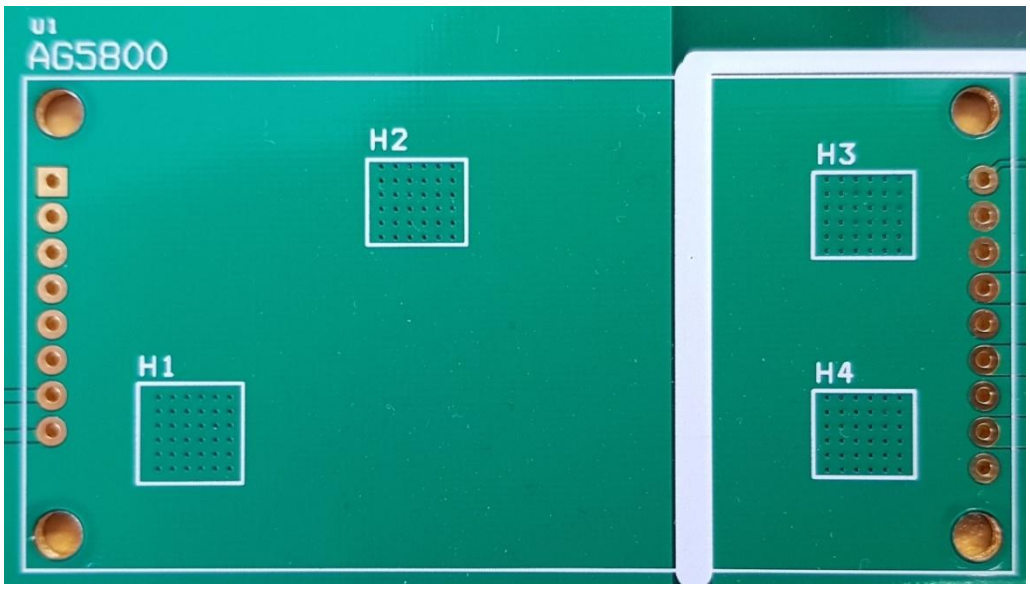
In order to dissipate the generated heat away from the components, Silvertel recommends that a combination of copper pour and via arrays are used to thermally connect the Ag5800 to the host PCB and then to the enclosure. Below is a suggested layout of the copper pour and vias. H2, H3 and H4 are lined up with Q8, D3 and D1 respectively. H1 is lined up with Q12, which while not a power generating component is added to assist in the heat transfer from the PCB of the Ag5800 to the host PCB.





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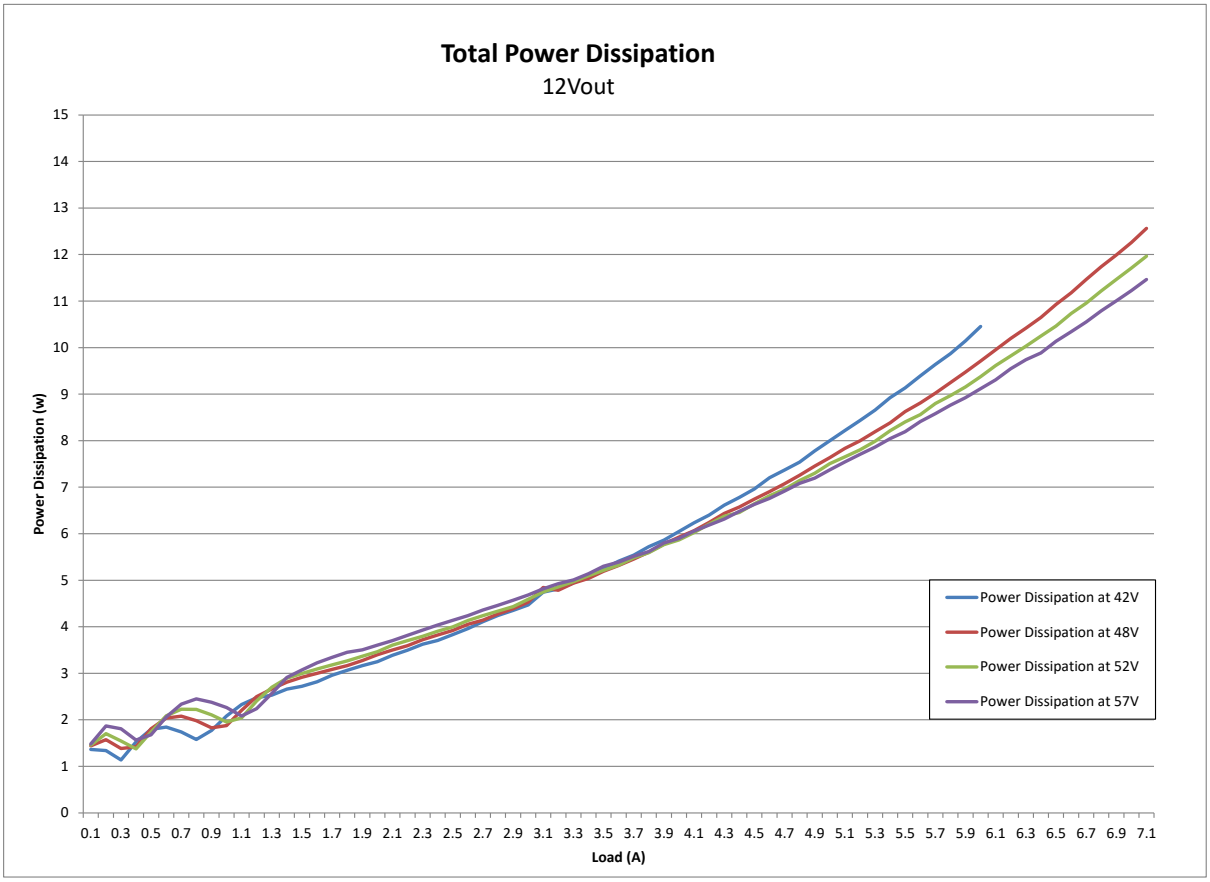
Any enclosure that the Ag5800 is to be housed in should be designed to dissipate the total energy of the system. In addition to the power consumed by the output of the Ag5800, a peak of 12.5W will be added due to the power dissipation across the Ag5800.



Note: data calculated using the efficiency curves of the module.

The following tests were performed in an Associated Environmental Systems SD-302 chamber with gentle circulating air. The Ag5800 was first tested only heatsinking to the EvalAg5800 Evaluation board. The second test was done by heatsinking the base of the evaluation board to a 180x160x1mm metal plate using thermal gap pads to be more indicative of the increased surface area for heat dissipation provided by an enclosure.

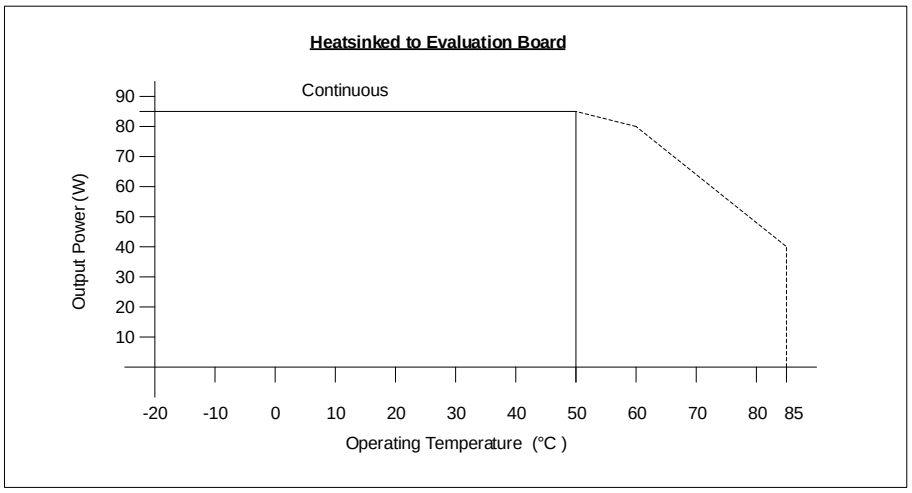
Chamber temperature (˚C)	Q9 (˚C)	D1 (˚C)	D3 (˚C)	T1 (˚C)	Power (W)
30	86.60	80.67	85.65	69.10	100
70	110.69	104.59	107.65	96.39	70
85	110.46	106.00	107.70	101.59	40

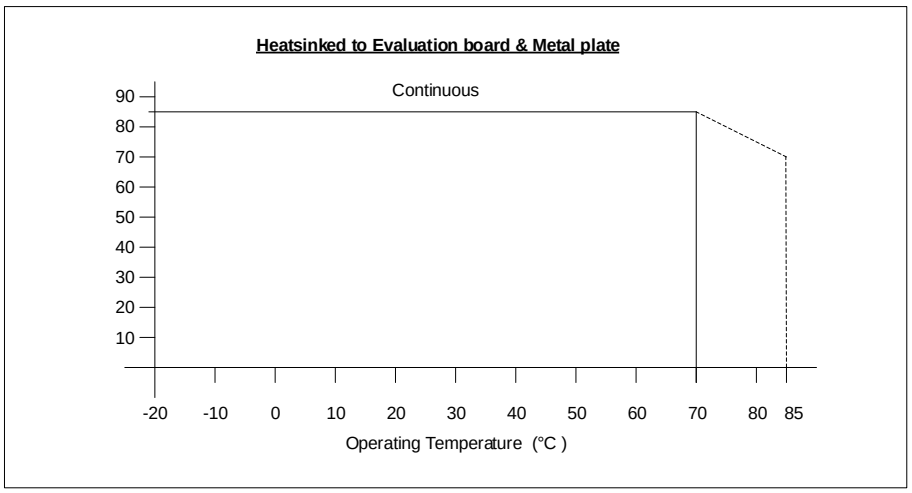
Mounted to Evaluation board only

Chamber temperature (˚C)	Q9 (˚C)	D1 (˚C)	D3 (˚C)	T1 (˚C)	Power (W)
35	90.34	80.83	83.27	76.12	100
70	112.39	101.83	103.91	97.05	84.8
80	114.41	108.01	109.06	104.14	61.1

Evaluation board mounted to metal plate

From this data the Ag5800 has a rated output of up to 85W of continuous output up to an environmental temperature of 50˚C while heatsinked to the host PCB with airflow over the device, and up to an environmental temperature 70 ˚C if additionally heatsinked to a suitable enclosure.





If the airflow is to be limited inside of the enclosure, causing the ambient temperature around the part to rise noticeably higher than the environmental temperatures detailed above, then it is essential that the thermal energy is able to dissipate into a lower temperature environment to prevent the module shutting off due to its thermal protection.