FEASTMP_CLP

Radiation and magnetic field tolerant 10W DC/DC converter module

Description

FEASTMP_CLP is a modified version of the FEASTMP module customized for applications needing a module stack height below 1cm. The connector used in FEASTMP has been replaced here with another one allowing for direct contact of the DCDC module with the receiving board: this decreases the overall stack height to below 1cm and removes the need for any mechanical interface, easing the integration of the module. However, the new connection scheme requires more handling care and a longer module.
Other than the replacement of the connector and the increase of the module length (to allow for an additional screw to secure the module to the receiving board), the module is identical to FEASTMP. For this reason, this datasheet does not repeat all the information reported for the FEASTMP but only the few mechanical differences. For all electrical characteristics, please refer to the FEASTMP datasheet that can be found in the public web page of the DCDC converter project: http://project-dcdc.web.cern.ch.

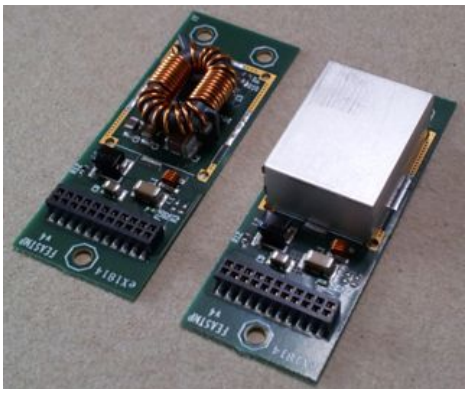
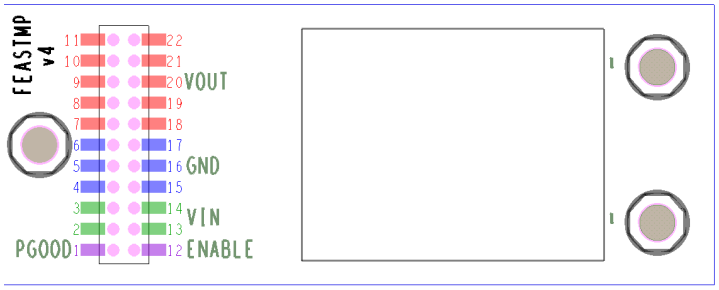


Figure 1: View of the FEASTMP_CLP module fully assembled (right) and with shield removed (left).

Pin Configuration

Pin Number	Function
1	PGood
12	En
7,8,9,10,11,18,19,20,21,22	Vout
4,5,6,15,16,17	Gnd
2,3,13,14	Vin



Module size, footprint, and stack height

The outline of the module, seen from above, is shown in Figure 2 together with all relevant sizes.

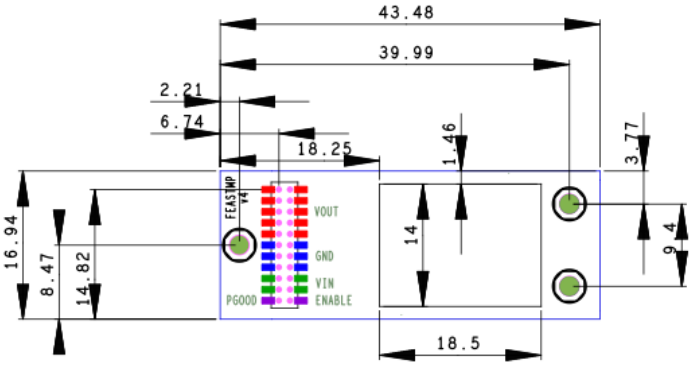


Figure 2: Top view of the FEASTMP_CLP module with mechanical dimensions.

The 22-pin power connector is located to the left, close to one of the three 2.1mm diameter holes giving the possibility to screw the module to the receiving board for optimal mechanical attachment and thermal contact. The highlighted rectangle in the middle of the module represents the shield, which is 8mm high, under which the ASIC, the main inductor and most of the other passives are arranged. When mated, the bottom of the module stays about 1mm above the receiving board – a thermal pad should be inserted in this gap for cooling. Adding the 0.4mm thickness of the PCB and the 8 mm height of the shield, the full stack height is below 10mm.

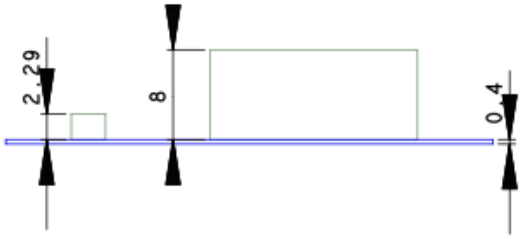


Figure 3: Side view of the FEASTMP_CLP module with mechanical dimensions. When mated, a gap of about 1mm exists between the module and the receiving board. A thermal pad should be inserted there for efficient cooling of the module.

Power connector

The FEASTMP_CLP module uses a 22-pin Samtec CLP-111-02-L-D-BE-K-TR female connector. The male mating connector is custom developed by Samtec to fit the specific mounting scheme of the module: the module thickness influences the design of the male connector for precise mating. For this reason, the mating connector is provided together with the FEASTMP-CLP module and spare connectors can be provided on request. However, only the pin length is custom, the footprint being identical to the one of the standard FTS-111-xx-L-D male connector. The custom male is optimized for mounting on receiving boards 2.36mm thick, the length of the pins inserting in the receiving boards being about 3.2mm.
All information about these connectors can be found in the Samtec web page (http://www.samtec.com/) for the CLP and FTS series. In particular, at the time of releasing this document the footprint for the male connector could be found on the FTS series page: http://www.samtec.com/technical-specifications/Default.aspx?SeriesMaster=FTS

Thermal interface

The bottom side of the module is equipped with a thermal interface of 10x10 mm in the form of exposed gnd plane. For the adequate operation of the module, this interface must be attached to a cooling element but electrically isolated from it. For this, an electrically insulating thermal pad must be inserted between the DCDC module and the receiving board (for instance the Bergquist Gap Pad 30S3000, Farnell code 878-3527). Pre-cut thermal pads 1-mm thick and of the appropriate size and thermal properties can be provided with the module as an option on demand (see below). It must be noted that the custom design of the male Samtec connector on the receiving board takes into account the presence of this 1-mm thick pad, so that optimal mating is achieved in its presence.

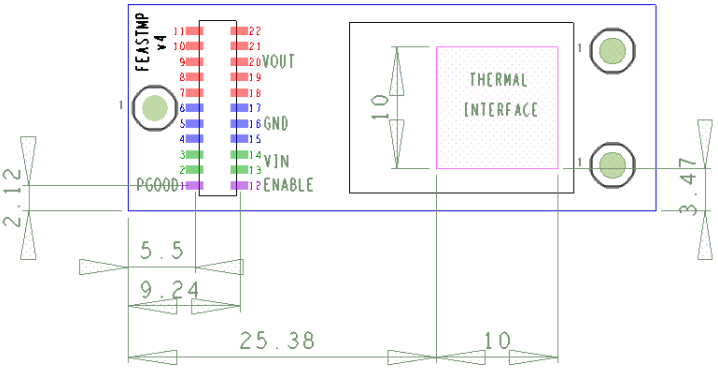


Figure 4: Top view of the module with size and position of the thermal interface.

Optional parts

This section lists the accessories that can be supplied on demand with each FEASTMP module to ease their procurement.

Spare mating male connectors

The male connector to be mounted on the receiving board has been custom developed by Samtec and therefore one mating connector is provided for each supplied FEASTMP-CLP board. However, additional spare male connectors can be provided on demand. It is advisable for the user to procure some spares since the male pins are exposed and can rather easily be damaged when the connector is not mated.

Thermal gap pad

To ensure good thermal contact with the cooling system (user-specific), a thermal interface material has to be added under the FEASTMP module. An exposed ground plane has been prepared for that purpose on the bottom side of the module, which should be in thermal contact with the cooling system but electrically isolated from it. During the whole development of the DCDC converter a thermal gap pad has been used for that purpose, evidencing very adequate thermal and mechanical properties. The material chosen is the Gap Pad 3000S30 from Bergquist, a soft gap filling material rated at a thermal conductivity of 3 W/m-K, at the thickness of 1mm. Once the final size and layout of the module was known, the adequate shape and size of the gap pad has been defined and a large number of pre-cut pads of this material has been procured. Pads can hence be supplied on demand together with any quantity of FEASTMP modules (prototype or even large-volume).

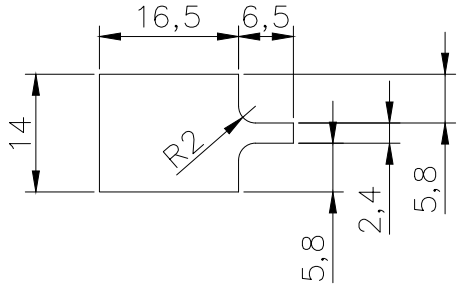


Figure 5: Shape of the pre-cut gap pad ensuring good thermal contact but electrical isolation between FEASTMP and the cooling system.

Figure 6: The pre-cut thermal pad, of a light blue color, is here positioned on top of a metal cooling plate fitting the FEASTMP module. The same pad is adequate for FEASTMP_CLP and can be provided to users.

Revision history

Revision	Date	Description
1.0	Sept. 2014	First release of the document.