-----------------------------------**Features**

- Supports all variants of the MOT TEC controller and Laser drivers.
- Versions for laser current of 250mA, 500mA, 1A, and 1.5A.
- Versions for GC and GA
- Options for high Vf lasers.
- Ultra low noise.
- Ultra low drift.
- Butterfly laser mount with heatsink on top of the driver.
- Built in Bias-T and SMA connector
- Options for greater than 1GHz modulation.
- Both Pump laser pinout and Telecom laser pinout are available.
- Includes LDO power supply regulations
- Includes supply filtering for low noise applications.
- Standalone or host-controlled
- On-board dummy laser load
- Complete solution for OEM applications.
- Complete evaluation and verification solution

Introduction

The MOT6722GC and MOT6722GA _OEM is a small board designed to be used with all variants of MOT TEC controller and laser drivers. It is configurable for both CC and CP operations.

MOT6722_OEM is designed to have the lowest noise and drift suitable for demanding applications.

MOT6722_OEM is designed to be configured for lasers with high Vf.

This product incorporates power supply regulation for stable operations. Also, extensive supply filtering ensures low noise operation with little cross talk between the TEC controller and laser driver sections.

MOT6722_OEM board uses 2oz copper allowing good heat sinking ability for thermal management of the overall system design.

Please also refer to the appropriate Module datasheets for further description of the module functionality.

Before applying power to the EVM please ensure all jumpers are configured correctly! (see following pages)

Standard available Part numbers:

OEM products Part #s	Descriptions
MOT6722GC_2525	±2.5A TEC controller Plus 250mA Laser driver
MOT6722GC_2550	±2.5A TEC controller Plus 500mA Laser driver
MOT6722GC_25100	±2.5A TEC controller Plus 1000mA Laser driver
MOT6722GC_3525	±3A TEC controller Plus 250mA Laser driver
MOT6722GC_3550	±3A TEC controller Plus 500mA Laser driver
MOT6722GC_35100	±3A TEC controller Plus 1000mA Laser driver

Board Layout & Dimensions:

Notes:
CN3 has the maximum hight above the board, 14mm including the mating connector.
CN1 hight 8.5mm

(v1.2, Sept. 2020)

Configuration Links, Connectors, and Potentiometers:

The following table describe, links, Connectors, and potentiometers functions.

Refer to the board layout and components identification picture on page 2.

Component	Function	Default	Alternate
TEC Controller Section			
CN1 (PWR)	Power connector	VCC1_LD, GND, VCC2_TEC	
EN_SS	TEC Enable/disable	Enabled	Insert Link to disable
TEMP_SET	Temperature set		
LK3	DAC/ TEMP_SET potentiometer	Factory set for on board potentiometer (VR)	External DAC
R52	Limits TEC voltage	Open for Maximum voltage	
R54	Limits Positive current	Open for maximum current	
R55	Limits Negative current*	Open for maximum current	
D4	Power LED	Illuminates when power is connected (using VCC1_LD) power supply	
D6	Fault LED	Illuminates if the object temperature is outside ±1.5°C	
CN3	Output connector	See drawing below	

CN3 Pinout
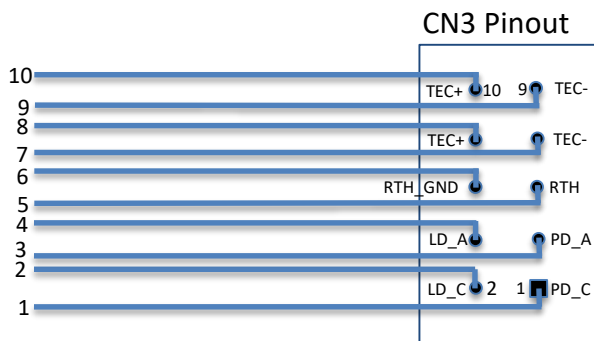
| Component	Function	Default	Alternate
Laser Driver section			
LK2	Select either to use on board dummy load or external laser.		
TP	Test point to measure the laser current across R50, when using dummy load		
LD_SET	Use to set laser current (Power)		
S4 PB switch	Shut down Reset		
D5	Fault LED	Illuminates when module is shut down due to Over Current or Over temperature	

FUNCTIONAL DESCRIPTIONS
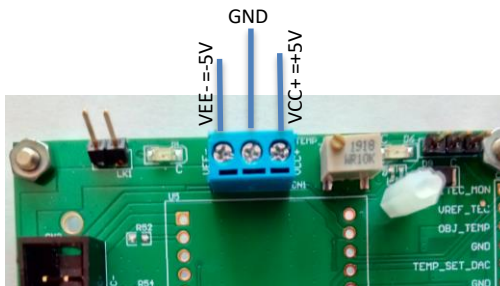
Power Supply For GC version
The power supply for TEC and the Laser driver has been separated to effectively remove any cross talk between TEC controller and the laser driver.
Each power supply should be capable of sourcing sufficient current.
VCC1_LD: +5V @ The LD current rating plus additional 15%
VCC2_TEC: +5V @ The TEC controller current rating plus additional 10%
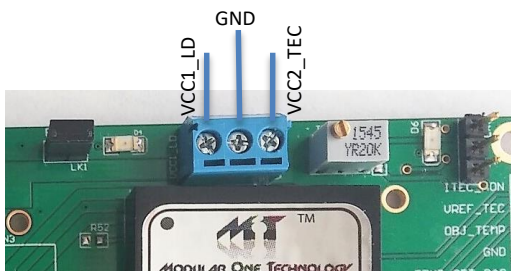
GC Power supplies

GA Power supplies

Power Supply For GA version
The power supply for TEC and the Laser driver has been separated to effectively remove any cross talk between TEC controller and the laser driver.
Each power supply should be capable of sourcing sufficient current.

VCC+:   +5.0V @ The TEC current rating plus additional 10%
VEE -:   -5.0V @ The LD controller current rating plus additional 15%

TEC controller section:

The following picture shows the upper section of the MOT6722_OEM board.

Components controlling the TEC controller are:

TEMP_SET:	sets the object temperature
EN_SS:	Enable & disable TEC controller. No link enables the controller.
R52:	Limits the TEC maximum voltage.
R54, R55:	Limit the positive & negative currents to the TEC.
D4:	Power supply indicator.
D6:	Fault Indicator.

Maximum Output Voltage

By default the MOT6722_OEM ships with R52 being open, resulting in maximum output voltage swing. In some applications it may be desired to reduce the maximum voltage and this can be accomplished by the addition of a single resistor, R52.

The formula for calculating R52 and VMAX is: VMAX = 6 R / (39K + R)

Maximum Output positive & negative currents

By default the MOT6722_OEM ships with R54 and R55 being open, resulting in maximum output currents. In some applications it may be desired to reduce the maximum currents and this can be accomplished by the addition of resistors, R54 and R55. The values depends on the TEC controller being used. The following table gives the resistor values in each case.

MOT7001-30		MOT3000-25	
Max. Positive & Negative Currents	Resistor (kΩ)	Max. Positive & Negative Currents	Resistor (kΩ)
+/-3.0	Open	-	-
+/-2.5	200	+/-2.5	Open
+/-2.0	78	+/-2.0	157
+/-1.5	39	+/-1.5	59

Laser connection

For quick initial evaluation the on-board dummy load can be used in place of a real laser. The dummy load consists of a number of series-connected diodes (diodes are underneath the board) and a resistor (R21). which approximate to an actual laser diode. Link LK2 is used to either connect to the dummy load or the external laser. When using dummy load only Constant Current mode can be used (see LK4) since there is no feedback mechanism for measuring power.

LK2:
Link pins 2 & 3
For using Dummy load.
Link pins 1 & 2
For using external laser

"I_LIMIT" Potentiometer to soft limit the maximum current of the laser

R50 Dummy Load Resistor = 1R
(Measure current across TP and the adjacent pin GND

Operating Mode

The MOT6722_OEM can be operated in either Constant Current or Constant Power modes. Selection of mode is accomplished using LK7, by default (no link) it is set to the CC (Constant Current) mode. The module can be forced into the CP mode, by simply installing a jumper on LK7.

Current Limit:

MOT6722_OEM allows customers to adjust the output current limit to suit their laser maximum current limit.

There are two current limit on this product;

1. A latching current limit which is set internally according to the module being used. That is 250mA, 500mA, 1A, and 1.5A modules. This current limit will be activated if the set current goes beyond these limits. In this case laser current will be shut down and an LED indicator (D5) will be illuminated. To recover from this action a reset is required. Use push bottom switch S4 to reset

2. A soft limit which can be set by the customer to limit the maximum current according to the laser maximum current. A potentiometer "I_LIMIT" is used to set this current limit. When using this current limit, make sure that the operating current is at least about 15% below the set soft limit. The soft current limit is designed to have a range of 30% to 40% of the maximum hard limit.

Laser Current / Power Setting

Control of the laser output power (in CP mode) or current (in CC mode) is accomplished by adjusting potentiometer (LD_SET). This applies a control voltage to the module in the range 0V to ~ 3.3V.

Constant Power Mode

In Constant Power mode a real laser should be attached to the MOT6722 board using CN3 connector. Power supply to the MO6722 must be turned off at this time.

Important note:
__Before connecting a laser to MOT6722 make sure that the laser maximum current rating is compatible with the laser driver module you are using. Always use a laser with current rating greater than the laser driver module. Applying current greater than the laser maximum rating shall destroy the laser permanently.__

The coupling of laser power to the back face PD (inside the laser package) differs for each laser. A potentiometer, "CP_ADJ" is used to adjust for this coupling efficiency. Before attaching the laser, set "CP_ADJ" to its maximum and set LK2 for using external laser.

Connect the laser to CN3 making sure correct terminals have been identified and connected according to the module being used. CN3 pinout has been given on page 3.

Important note:
Lasers must be handled by qualified personnel having full understanding of laser safety principles and procedures.
Connect the laser pigtail optical connector to a suitable optical power meter. The power meter must be capable of handling high power if you are using high power lasers.

1). Set the mode to constant current (CC) using LK7 (no link) and set "LD_SET" for minimum current. Turn on the power supply to the MOT6722. Increase the laser current using "LD_SET" by increasing the voltage at the LD_SET pin. The optical power meter should now be reading corresponding power and increasing as the LD_SET voltage is being increased. Set LD_SET to approximately 1dB below the maximum power you require in your application, and note optical power as well as the laser current for this LD_SET value.

2). Change the mode to constant power mode using LK7 (insert Link). You will notice that the laser current as well as the laser power decreases. Increase the laser current (power) using "CP_ADJ" until laser power reaches approximately 1dB less than the power you noted in step 1. Keep "CP_ADJ" at this setting.

The laser power can now be changed using "LD_SET". It is now possible to change mode from CC to CP and vice versa with no transients. Keep "CP_ADJ" setting fixed for this laser.

Shutdown functionality

If over-current or over-temperature conditions are detected the module will shutdown and D5 will illuminate red. The module will remain shutdown until reset by pressing S4. If the fault conditions have been cleared the module will resume operation after performing a soft start. If a fault persists the module will not restart and D5 will illuminate once more when S4 is released.

The shutdown functionality can also be monitored and restarted externally:

1. In shutdown the OVR_C/T connection on CN2 will be pulled low.
2. A reset can be initiated by pulling the SHDN_RST pin on CN2 low

External Monitoring and Control

A number of system parameters are available for monitoring, along with several control signal inputs, which would be used when the MOT6722 is connected to an external microcontroller using CN2 and CN4
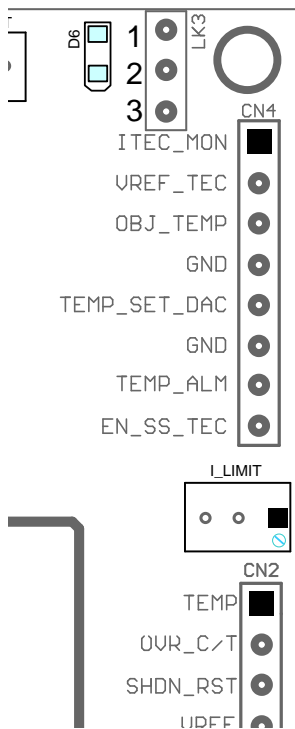
TEC controller Interface Pin descriptions (CN4):
Current Monitor (ITEC_MON)

An analog voltage representing the output current to the TEC.

VREF_TEC

Reference voltage output (1.5V).

Object Temperature (OBJ_TEMP)

An analog voltage representing the temperature of the object being monitored.

Temperature Set Voltage (TEMP_SET_DAC)

An analog voltage to set the object temperature. Values from 0.3V – 1.05V may be applied. To use external control voltage set LK3 link to connect pins 2 & 3. To use on board potentiometer link pins 1 & 2 on the LK3.

Temperature Alarm (TEMP_ALM)

This pin is pulled low when the temperature falls outside a +/-1.5˚ C window.

Enable / Soft start (EN_SS_TEC)

A low level voltage puts the module in standby. When releases the module resumes normal operation.

EN_SS_TEC

I_LIMIT

CN2

TEMP
OVR_C/T
SHDN_RST
VREF
I_MON
ANALOG_IN
GND
REMOTE_EN
GND
PWR_ON
GND

S4

D5

Laser driver Interface pin descriptions (CN2):

TEMP (Module Temperature)

An analog voltage representing the internal temperature of the module
$(0.744V = 0°C)$

OVR_C/T (Over Current / Temperature) flag – *see "Shutdown Functionality"*

This pin is pulled low when a fault has caused shutdown.

SHDN_RST– *see "Shutdown Functionality"*

Pull this pin low to reset the device

I_MON (Output Current Monitor)

An analog voltage representing laser current. Values from 0 – 3V correspond to
output current from zero to the specified maximum.

VREF (Laser driver Precision Reference)

A 4.09V reference voltage, stable over temperature and voltage.

**ANALOG_IN (DAC voltage to set the output current/Power),**

An analog voltage in the range of 0-3.3 volt will set the laser current/power. Set
"LD_SET" on board potentiometer to 0V (fully anti-clockwise)when using
external voltage.

REMOTE_EN

To enable the output of the laser, this pin must be pulled low. A GND pin is
located next to this pin to facilitate this function.

PWR_ON

To enable the power to the module after applying power to the board, this pin
must be pulled low. A GND pin is located next to this pin to facilitate this
function.
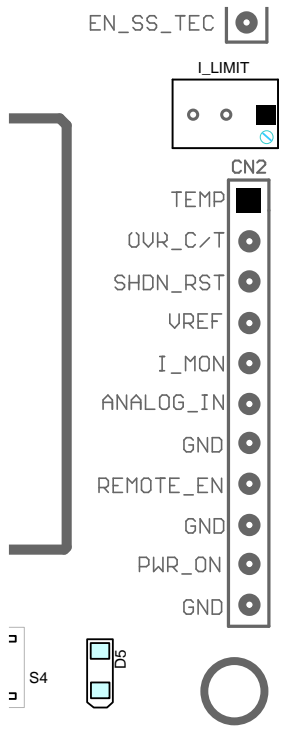
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