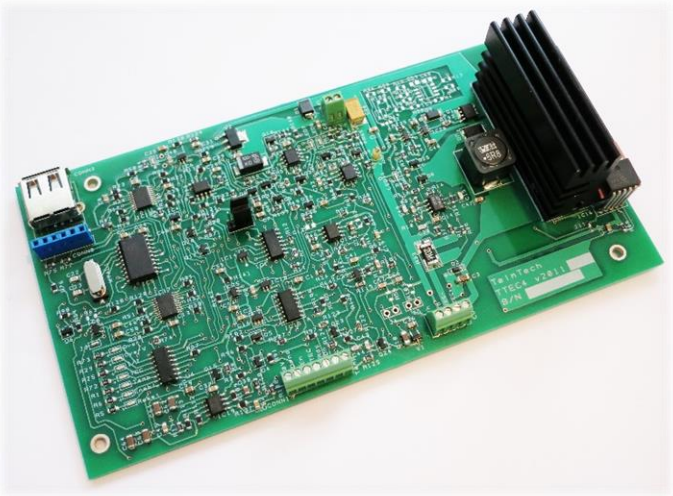
TTEC4



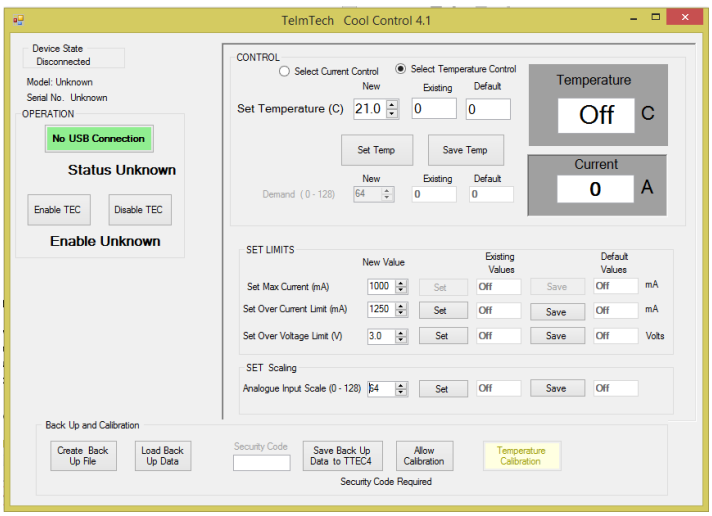
Description

The TTEC4 is a driver board for thermo-electric cooler (TEC) modules and is specifically intended to cool and maintain a constant temperature of a laser diode mounted on a TEC module. The TTEC4 comprises a micro-controller with USB compatible connection and employs switch mode technology enabling it to supply currents up to 4A at high efficiency and is designed to work with thermoelectric cooler modules in a cooling only configuration. Set temperatures are in the range 0 to 25C. The board uses a thermistor sensor and is supplied calibrated with a 10k thermistor. It includes an over current and over voltage trip feature for protection in the event of a fault.

Features

- Maximum current to 4A
- Temperature control under constant load and slowly changing ambient ≤ 0.03C [4]
- Over current and over voltage shutdown
- TEC voltage to 10.5V
- Supplied with the 'Cool Control' graphical user interface for set up and control
- Remote control using 5V logic and analogue signals

Cool Control Graphical User Interface



The TTEC4 is intended to be used with TelmTech's 'Cool Control' user interface which runs on Windows computer systems. This is required to setup and control the TTEC4. The interface allows the set temperature to be set and saved. In addition, the maximum operating current, the over current trip and over voltage can also be set and saved. The 'Cool Control' displays the temperature together with the current being supplied to the TEC. There is also the facility to create a backup file for calibration parameters.

TTEC4 Specification

Maximum TEC current	4A
Maximum TEC voltage	10.5V
Input power supply DC voltage	12V
Input power supply ripple peak to peak	±10% [1]
Max Input current	5A
Maximum Current set range	1 to 4A
Over current range	1 to 4A
Over voltage range	1 to 11V
Set temperature range	0 – 25C [2]
Number of temperature levels (Cool Control)	128
Set temperature accuracy	± 1C
Set temperature repeatability	± 0.1C
Set temperature resolution	0.2C [3]
Temperature control/regulation for constant load and ambient (4hr)	≤ 0.03C [4]
Temperature control/regulation for constant load and ambient (8hr)	≤0.03C [4]
Control temperature offset from set temperature in the range 2 to 20C	0.3C
Control temperature offset from set temperature in the range 20 to 25C	0.4C
Calibrated displayed temperature range	0 to 35C
Displayed temperature accuracy	1C
Displayed Temperature repeatability	0.1C
Display Temperature resolution	0.1C
Electrical response time constant	typ. 120s
Sensor type	10k Thermistor (NTC) [5] (EPCOS B57551G1103F000)
USB connection	USB 2 or 3

Remote Control

Inputs

Enable on logic level	5V (>=3V)
Enable off logic level	0V (< 1.5V)
TEC on logic level	5V (>=3V)
TEC off logic level	0V (<1.5V)
Analogue demand temperature voltage range	0 to 5V
Analogue demand voltage for 0C	typ. 5V
Analogue demand voltage for 25C	typ. 2.5V

Outputs

Ready out signal	typ. 5V (>=4.3V)
TEC On	typ. 5V (>=4.3V)
Temperature out analogue range	0 to 5V
Typical ‘Temp’ voltage output for temperatures ranges from 0 to 25C	3.6 to 2.0V

Connectors

CONN1 (Remote control)	7-way screw terminal
CONN2 (Power supply)	2-way screw terminal
CONN3 (Computer control)	USB Style ‘A’
CONN5 (TEC and thermistor)	4-way screw terminal
CONN8 (not for use, do not connect to this connector) [6]	

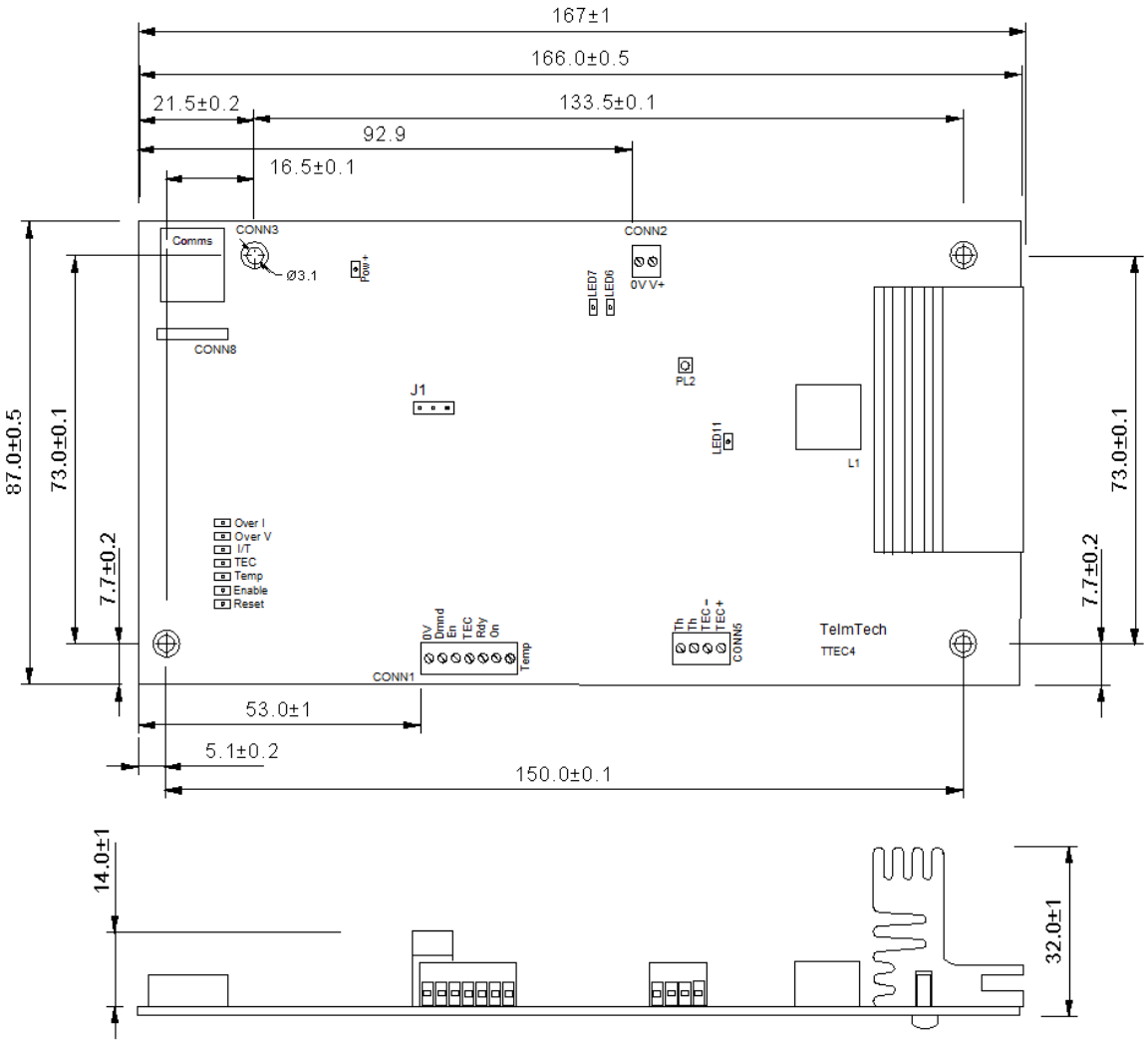
Dimensions

Size LxWxH (mm)	167x78x32
Weight (g)	128

Environment

Ambient temperature	10 – 30C

Mechanical Dimensions



1. The absolute maximum peak power supply voltage must not exceed 14V.
2. Please remember that the TTEC4 operates in cool only mode and that TEC cooling will only commence when the device temperature increases to the set temperature. In addition, for best temperature control the heat sink temperature should be ≥ the set temperature.
3. The set temperature has to be converted to an integer in the range 0 to 128, hence for the set temperature range of 0 to 25C the resolution is ~0.2C.
4. Test condition: The analogue signal at the 'Temp' out terminal was recorded with a set temperature between 10 to 23C when the laser was an 808nm, 300mW device cooled by a 30x30x5.5mm TEC (2A max) mounted to a passively cooled heat sink with a thermal resistance of 1.8C/W which was at a temperature above the laser target temperature. To achieve ≤0.03C temperature control the heat load and heat dissipation to ambient must be such that the TTEC4 is delivering a continuous current >0.06A. Under light loads the temperature excursion is typically 0.06C.
5. Sensor type has to be negative temperature coefficient (NTC) thermistor with 10k nominal value at 25C
6. Please note that CONN8 is for programming the microcontroller and is for TelmTech's use only. Do NOT make any connections to this connector.

Important Notice: The TTEC4 is NOT to be used in high reliability and risk applications, such as medical, aerospace & transport, where failure might present a risk to life or serious injuring. In addition, the information presented in this data sheet is provided in good faith and is considered to be accurate at the time but may be subject to change without notice.