



HealthyPhoton

Model : HPTCD-Q

Integrated Current & TEC Driver for QCLs



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Index

Index.....	2
1. Introduction.....	3
2. Product Description.....	3
2.1. Parameters.....	3
3. Comparison against Near-IR Laser Driver.....	4



1. Introduction

Current and temperature controllers with low noise and little drift are necessary for the stable performance of QCLs. HealthyPhoton's all-in-one driver has a QCL current source integrated with a high-stability TEC temperature controller. Considering the high cost of a QCL chip, our QCL driver has a variety of protection mechanisms to ensure that the QCL is operated within safe parameters.

2. Product Description

- all-in-one module with both current driver and temperature controller
- current noise density as low as $1.0 \text{ nA}/(\text{Hz})^{1/2}$
- temperature drift as low as 15ppm
- output protection mechanisms to ensure the safety of QCL chip
- easy setup, fully compatible with HealthyPhoton's QCL module
- cost-effective

2.1. Parameters

Bias current driving module	
Max driving voltage	15 V
Driving voltage range	standard: 0 ~ 750 mA; optional: 0 ~ 1500 mA
24hr current stability (@25°C)	15 ppm
Min current noise density (1kHz~200kHz@500mA)	$< 1.0 \text{ nA}/(\text{Hz})^{1/2}$
Driving current tuning	DC bias: on-board potentiometer; AC signal: analog voltage (SMA female)
Analog modulation bandwidth	DC ~ 1 MHz (bandwidth depends on the QCL impedance and the connection length)
Output enable	Local: dial switch; Remote: optocoupler isolated input (TTL high->current output enable; TTL grounded or high impedance->output turns off)
Power supply	+15 VDC
QCL safety protection	(potentiometer) adjustable current clamp, output ramp start, overvoltage and undervoltage protection, overtemperature protection, short circuit output protection
TEC temperature-controlling module	
Max TEC driving current	+4 A
Max thermal power dissipation	20 W
Control accuracy (@25°C)	0.01°C



Output enable	Controlled by the main power switch
Temperature setting	Default: on-board potentiometer; Remote adjustment: analog voltage (SMA female)
Temperature control method	Linear output that extends Peltier device lifetime

3. Comparison against Near-IR Laser Driver

	Near-IR Laser Current Driver	HPTCD-Q
Brief	Universal circuit design, universal components, low reliability	Specially designed for QCLs with components featuring low temperature drift and high reliability
Max driving current	250 mA	750 mA (standard) , 1500 mA (opt.)
Max driving volt.	5 V (unable to drive most QCLs)	15 V (Suitable for most QCL operating voltages)
Current noise	NA	<1 nA/(Hz) ^{1/2} suitable for ultra-high precision spectroscopy measurement
Laser protection	NA	Current clamp, ramp start, overvoltage and undervoluted protection