evolase

evolase Oy

HPLD-1000

HIGH POWER CONSTANT CURRENT **LASER DIODE DRIVER**

Key Features

- Wide input voltage range up to 48 Vdc
- Output Current up to 25 A
- Compliance voltage up to 40 V
- Efficiency up to 97%
- Low current ripple
- Triggering up to 3 kHz
- Analog modulation up to 30 kHz

- Overcurrent protection
- Reverse current protection
- Crowbar circuit protection
- External interlock function
- CAN interface
- Integrated heatsink
- Compact Size 70 mm × 56 mm × 34mm

Description

The HPLD-1000 is a compact non-isolated DC/DC switch mode power supply with constant current output. Driver produces high stability, low ripple current for powering laser diode modules. The output current value can be varied from 0 to 25 A. Driver can be controlled by CAN interface or external modulation signals.

Driver has three modes for use in various applications.

- Mode 1 – CW – is continuous current mode with parameters set by PC control software.
- Mode 2 – Trigger – allows to set current value by PC control software and to trigger output current by external TTL signal.
- Mode 3 – Analog – allows to modulate current by external modulation signal and to turn driver ON/OFF by external TTL trigger.

Protection features include an overcurrent protection, reverse current protection, crowbar clamp protection and over-temperature shutdown.

Powering
The driver requires a DC power supply. PSU's output characteristics must cover the driver output power and laser diode voltage. The power supply output voltage must be at least 15% higher than the laser diode voltage drop. We recommend to use a low voltage power supply (for example 12VDC) for powering low power laser diode with voltage drop 2÷10V.

Cooling
The HPLD-1000 PCB is completed by heatsink for easy thermal management. The driver produces up to 42W of power losses. Thus the driver heatsink has to be mounted on a thermal conductive surface to ensure proper operation and prevent an over-temperature shutdown. If the conduction cooling is not enough cooling can be improved by adding a fan.

Software
We offer own PC control software to control the driver.

Operating modes
Driver has three operating modes, that allows use it as independent driver for powering single laser or use it in system of powering lasers with external control.

#	Mode	Description
1	CW	Driver is controlled by PC control software. Constant current value is set from control software. "ON/OFF" button starts / stops driver with soft start function, that allows rise and fall current within 10 mS for safe laser turning ON / turning OFF. See details on figure 1.
2	Trigger	Current value is sets by PC control software. External trigger starts and stops driver with 50 µS rise / fall time. The frequency of external trigger can be from single pulse to 3 kHz. The mode is characterized by bias current 40mA between pulses. See trigger to current pulse delay details on figures 2.
3	Analog	Current is modulated by external analog (eg. sinusoidal) signal. Current wave form replicates external sinusoidal signal up to 10 kHz with full amplitude. Current modulation amplitude is reduced up to 30% for frequencies from 10 kHz to 30 kHz. It is not recommended to apply signal with rise / fall time less than 10µS. Accuracy of current amplitude setting is not more 20%. Use current sensing monitor for reading actual amplitude, frequency and form of laser current. Driver ON/OFF is done by PC control software.

Keep the connection between driver and laser diode as short as possible, not more than 200 mm, especially for modes 2, 3.
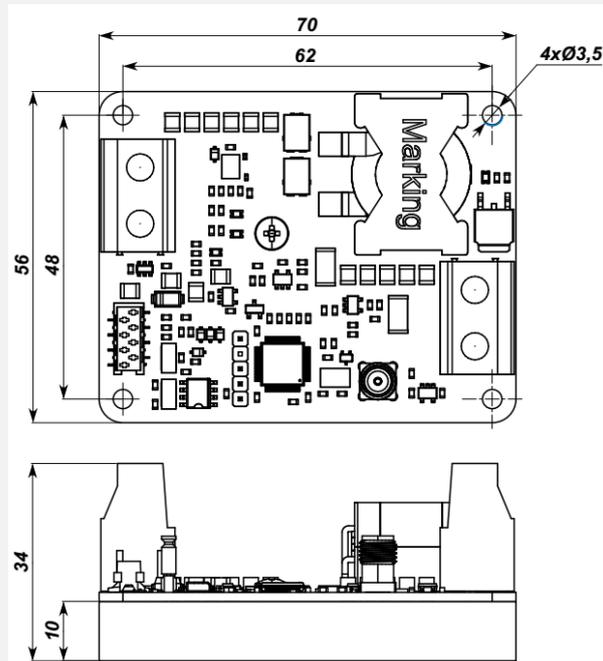
Specifications

Parameter	Min.	Typ.	Max.	Units
INPUT				
Voltage	12	-	48	Vdc
Current	-	-	22	A
OUTPUT				
Power	-	-	1000	W
Compliance Voltage[1]	2	-	40	V
Current range	0.0	-	25.0	A
Current ripple amplitude	-	40	60	mA
Current ripple frequency	-	425	-	kHz
Current set accuracy	-	-	1.5	%
Overcurrent value[2]	5	26	30	A
Soft start rise time[3]	-	-	11	ms
Soft start fall time[3]	-	-	16	ms
Rise/Fall time[4]	-	50	70	µs
Current setting monitor	-	50	-	mV/A
MODULATION				
Trigger input voltage	3.3	-	5	V
Trigger input impedance	-	500	-	Ω
Trigger pulse frequency	-	-	3	kHz
Trigger pulse width	150	-	-	µS
Trigger to current delay	-	-	20	µS
Analog input voltage	0	-	10	V
Analog input impedance	-	4	-	kΩ
Current setpoint	-	2.5	-	A/V
Analog input frequency[5]	-	-	30	kHz
POWER DISSIPATION				
Efficiency[6]	-	-	97	%
Maximum power losses	-	-	42	W

| Parameter	Min.	Typ.	Max.	Units
TEMPERATURE				
Operating	+10	-	+40	˚C
Storage	-20	-	+70	˚C
Humidity, Non-Condensing	-	-	95	%
CONNECTIONS				
Power	2-pin Terminal Block (393900102 Molex)			
CAN interface	8-pin Ribbon Cable Connectors (7-188275-8 TE Connectivity)			
Interlock				
Trigger				
Modulation				
Current monitor	SMA (5-1814832-2 Molex)			
MECHANICAL				
Size	70 × 56 × 34 mm			
Weight, not more	200 g			

1) Output voltage cannot be more than 0.85*Vin.
2) Default value is 26A. Can be programed from 5 A to 30 A.
   Overcurrent will cause immediately stop driver with crowbar protection.
3) For mode 1.
4) For mode 2, 3. Depends on wires length from driver to laser.
5) See details on figure 5.
6) Depends on input voltage, output voltage, output current. See details on figure 6.

Dimensions

Terminal functions

Terminal		Description
Vin+		Connect to the positive and negative terminals of power supply. Note polarity. Use wires sizes AWG#13 or 2.5mm^2 with length not more 1m.
Vin-		
LD+		Connect to the laser diode anode (+) and cathode (-). Note polarity. Use wires sizes AWG#13 or 2.5mm^2 with length not more 2m for mode 1 and not more 200mm for modes 2, 3.
LD-		
Control Connector	1	CANH	Connect to the CAN interface. Note polarity. Use onboard jumper J1 to connect one driver to CAN device. Delete all onboard jumper J1 except the last driver, if you connect several drivers to CAN device.
	2	CANL	
	3	Interlock+	Connect to the external interlock circuit. Open: locked, Low: operational. Internally pulled up to 3.3V by 1 kΩ resistor. Use open collector or dry contact. Note polarity. Use onboard jumper J2 to imitate interlock function. Delete onboard jumper J2 to activate interlock function.
	4	Interlock-	
	5	Trigger+	Connect to the external pulse signal generator for modes 2, 3. Note polarity.
	6	Trigger-	
	7	Modulation+	Connect to external analog voltage or external sinusoidal signal generator for mode 3. Note polarity.
	8	Modulation-	
Current monitor			Connect to 50Ω oscillography input for current monitoring. 50mV correspond 1A. Use SMA connector.
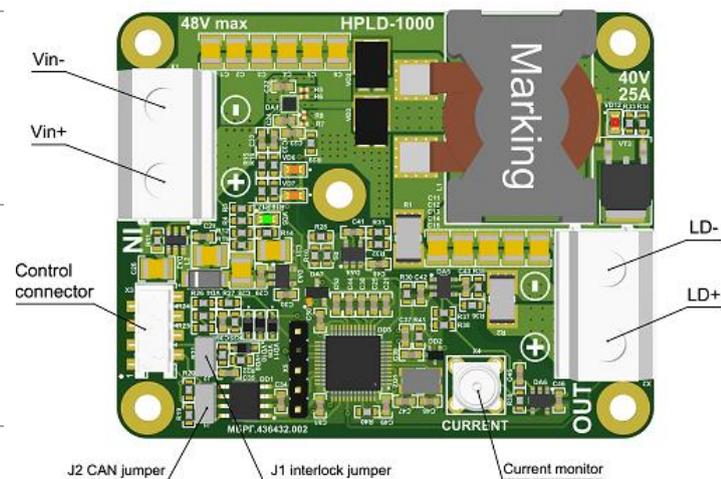
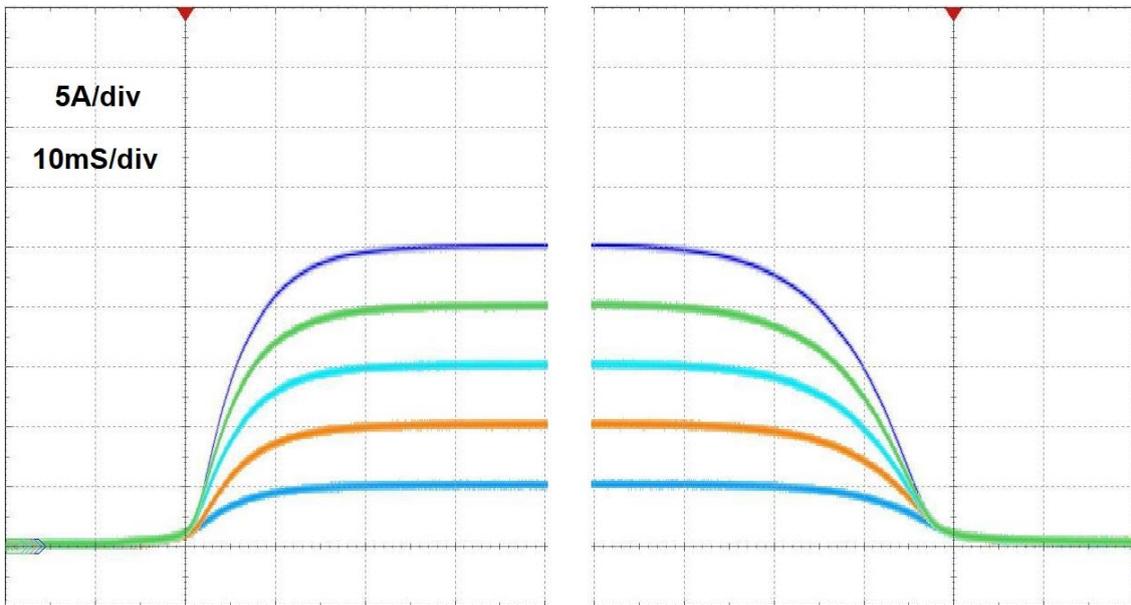# Typical Performance Characteristics
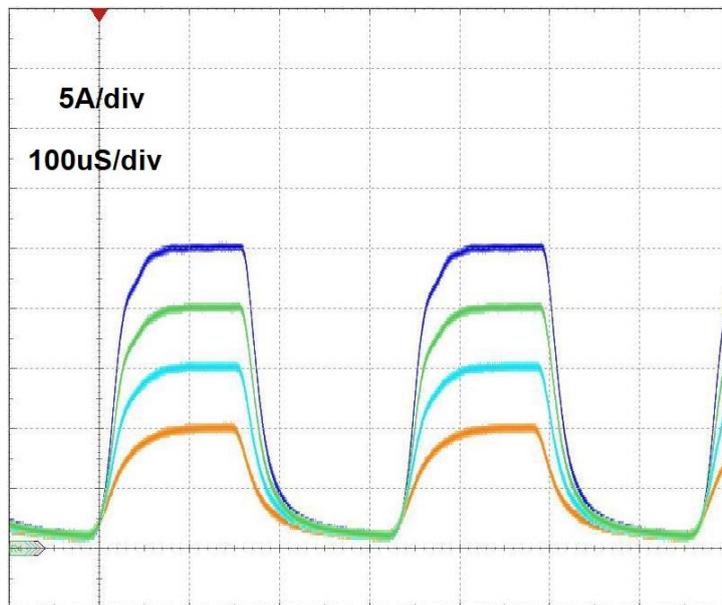

Figure 1. Typical current rise/fall time for Mode 1

Figure 2. Typical current pulses fore Mode 2, triggering by F = 3kHz, Tp = 150µs

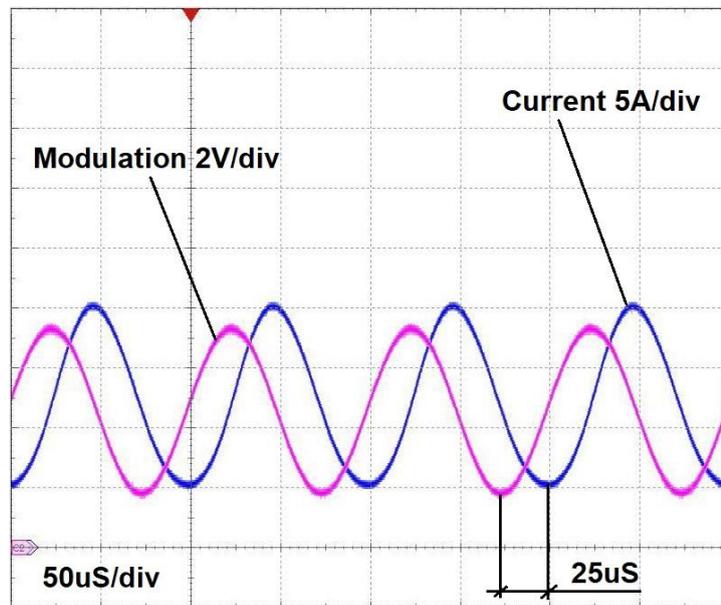Figure 3. Typical trigger to current delay for Mode 2

Figure 4. Typical current for Mode 3, analog modulation by sinusoidal 10kHz.
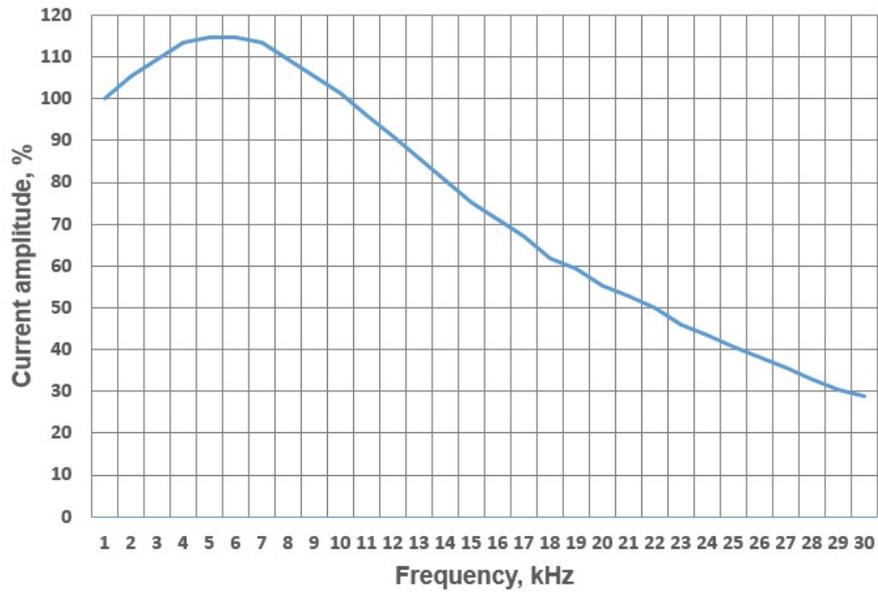
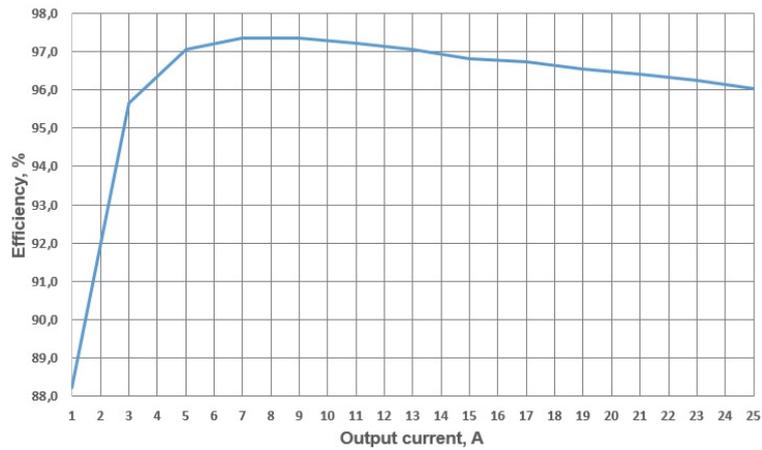Figure 5. Current amplitude vs Frequency for Mode 3

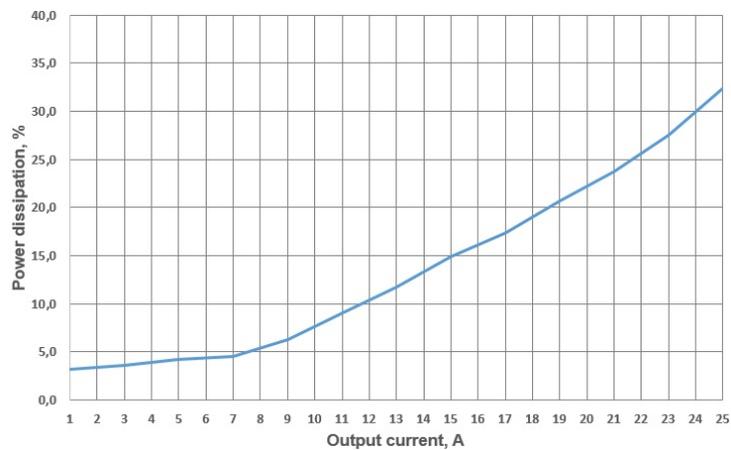Figure 6. Efficiency vs. output current at Vin=48V, Vout=30V

Figure 7. Power dissipation vs. output current at Vin=48V, Vout=30V

Evolase Oy

Kivipolku 1
56100 Ruokolahti, Finland

Tel. +358 41 477 47 81
VAT 32417214

evolase.com