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LDD-1124
Hardware Version v1.62

The LDD-1124 is a current driver designed to precision-drive low-current laser diodes or other loads in continuous wave applications. Featuring fully digital current and optional light power control, various safety features and comprehensive communication interfaces, it offers a complete solution for low current continuous wave control. The device communicates through various interfaces, provides an API for system integration and comes with a comprehensive GUI software for seamless operation.

HIGHLIGHTS

- **Input Voltage:** 12 – 24 VDC
- **Laser Diode Driver:**
  - Output Voltage: 0 – 15 V
  - Output Current: 0 – 1.5 A
  - Ultra-Fast Switch-off for optimal LD protection
  - High current resolution (30 µA) and very low ripple current (< 0.1 %)
  - Temperature Coefficient: 15 ppm/K
- Dimensions: 120 × 90 × 18 mm
- Digital PID-controlled current source with internal signal generator and LUT
- Safety features: Hardware enable input and overvoltage/ -current/ -temperature protection
- Easy configuration and graphical data acquisition via provided GUI software
- Stand-alone or remote-controlled operation via USB (isolated) and 2 × RS485 / RS422
- GPIO features for monitoring and control (Enable, Trigger, Error Indication, etc.)
- Optional -LPC version allows for precise controlling of Light Power through Photodiode feedback

Trial Device & Technical Support

Trial devices and technical support are available for evaluation projects.
Please contact support@meerstetter.ch or visit our support center.

RELATED PRODUCTS

Model	Output Range	Modes	Description
LDD-1321	0–1.5 A / 0–14 V	CW, Add-on TEC Controller available	recommended for new designs
LDD-1121	0–15 A / 0–15 V	1 µs – CW, modulated, QCW and pulsed modes	higher current, more modes
LDD-1301	0–20 A / 0.5–45 V	1 ms – CW	higher power
TEC-1091	±4 A / ±21 V	TEC Controller	for laser temperature regulation

See the full product overview in the Meerstetter Engineering's Product Compatibility section.

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1 SPECIFICATIONS

1.1 Absolute Maximum Ratings [1]

			Min	Max	Unit
Voltage	$U_{IN, DC}$			27	V
	U_{OUT}			U_{IN}	V
Current	I_{IN} (On Board Fuse)			4	A
	I_{OUT}			1.85	A

1 Operation at or beyond the absolute maximum ratings may result in permanent device damage. These limits are stress ratings only and functional operation of the device at these conditions is not guaranteed. Prolonged exposure to absolute maximum conditions can adversely affect long-term reliability and should be avoided during normal operation.

1.2 Operating Characteristics

		Min	Max	Unit
Temperature	Operation Temperature	0	60	°C
	System Base Plate		50	°C
	Storage	−30	70	°C
Humidity	RH_{OP}, non-condensing	5	95	%

1.3 Electrical Characteristics

Unless otherwise noted: T_A = 25 °C, U_{IN} = 24 V, U_{LD} = 10 V

Symbol	Parameter	Test Conditions / Hints	Min	Typ	Max	Unit
DC Power Supply Input:						
U_{IN}	Supply voltage		11.5	24	26.5	V
U_{IN_RIPPLE}	Ripple tolerance				300	mV_{PP}
System Characteristics:						
$\eta_{50\%}$	Power efficiency	@ 50% load		TBD		%
$\eta_{90\%}$	Power efficiency	@ 90% load		TBD		%

1.4 Laser Output Characteristics

Unless otherwise noted: T_A = 25 °C, U_{IN} = 24 V, U_{LD} = 10 V

Symbol	Parameter	Test Conditions / Hints	Min	Typ	Max	Unit
Output CW:						
I_{OUT}	Current range		0		1.5	A
$T_{coefficient}$	Temp. coefficient	$I_{out} = 1.5\,A$, $T_A = 25 - 50\,°C$		25 [1]	75 [1]	ppm/K
I_{OUT_RES}	Current resolution			30		µA
I_{OUT_RIPPLE}	Current ripple	$I_{out} > 100\,mA$		TBD	TBD	mA
U_{OUT_MAX}	Diode voltage		0		15	V
U_{OUT_LIMIT}	Output voltage			$U_{IN} - 8$		V
P_{OUT}	Output power	$U_{LD} = 15\,V$			22.5	W
f_{CW}	Current change	For $L_{Load} < 100\,nH$, higher f_{CW} are possible		TBD		kHz
I_{OUT_SLOPE}	Current slope limit	$I_{out} > 0.5\,A$		TBD		A/µs

1 not validated

1.5 Safety Characteristics

Unless otherwise noted: T_A = 25 °C, U_{IN} = 24 V, U_{LD} = 10 V

Symbol	Parameter	Test Conditions / Hints	Min	Typ	Max	Unit
I/O Ports:						
$t_{OFF\_CURRENT}$	Overcurrent			6	8	µs
t_{OFF_OPVAL}	Operating Values	Voltages, currents		100		µs
t_{OFF_SFAIL}	System failure	System status		100		ms

1.6 Laser Diode Temperature Measurement

Unless otherwise noted: T_A = 25 °C, U_{IN} = 24 V, NTC = $B_{25/100}$ 3988K R_{25} 10k

Symbol	Parameter	Test Conditions / Hints	Min	Typ	Max	Unit
Temperature Measurement:						
R_{NTC}	NTC Resistance			10		kΩ
T_{RANGE}	Temperature Range		−6		150	°C
$T_{PRECISION}$	Temp. Precision	Not calibrated			1.5	°C

1.7 Light Measurement Characteristics [Devices with -LPC Option only]

Unless otherwise noted: T_A = 25 °C, U_{IN} = 24 V, U_{BIAS} = −3.3 V

Symbol	Parameter	Test Conditions / Hints	Min	Typ	Max	Unit
Photodiode Input Characteristics:						
I_{PD}	Photodiode current				4	mA
f_{ADC_LPC}	Sampling frequency	@ 16bit		0.5		MSPS

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2 FUNCTIONAL DESCRIPTION

2.1 Current-Controlled Operation Modes and Communication Options

The LDD-1124 is an OEM high performance current source that is primarily designed to operate as a CW laser diode driver at low currents. It is configured over an industry-standard RS485 or a USB connection, either GUI-driven using the included Service Software, or by direct parameter control using the predefined communication protocol. Basic system status is visually indicated by on-board LEDs, more detailed status information can be polled at any time. The LDD-1124 can operate in a stand-alone configuration as well as in a remotely-controlled manner, with parameters adjusted on the fly. The laser diode driver is current-PID-controlled.

Configuration parameters further include: control source selection, maximum current limits, nominal current ramping, PID controller settings, NTC temperature sensor modeling coefficients, measurement circuitry calibration, error thresholds, communication watchdog, etc. Please refer to the user manual for further information.

2.2 Service Software
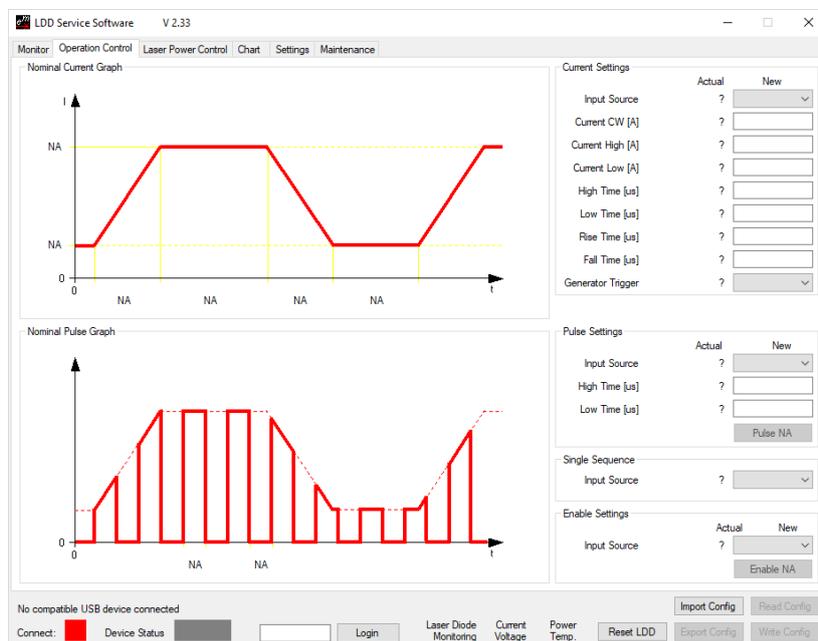
CW Current Modulation by Internal Generator.

The included Service Software is a powerful tool that allows monitoring and full configuration of the LDD-1124 via a standard USB or an RS485 connection from a PC running Windows.
This tool is ideal for laboratory setups, product evaluation diagnosis, debugging and commissioning:

- internal generators set up (see Figure above)
- configuration import and export
- data charting with trigger functionality
- error codes and built-in descriptions
- hardware configuration (e.g. calibration)
- maintenance (e.g. firmware upgrades)

Please refer to the laser diode driver user manual for more information on features and system requirements.

2.3 Light-Power-Controlled Operation Mode [Devices with -LPC Option only]

The LDD-1124-LPC is a laser power controller that is based on the LDD-1124, with additional light measurement circuitry (photodiode input). A user-defined 'Light System Scale' factor links the generated photocurrent to the absolute light power. The light PID controller's output is fed to the current controllers input. The nominal light power value may be CW, modulated CW (using internal generation) or remotely controlled. A configurable soft-start feature is available, as well.

2.4 Typical LPC Waveforms
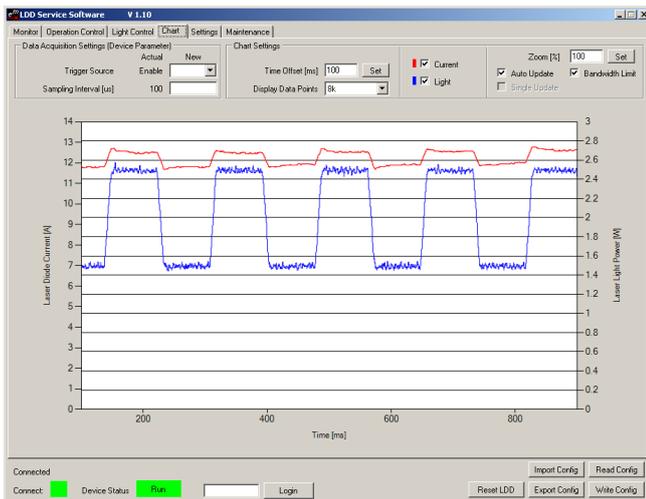
Laser Power Control (blue) and Diode Current (red).
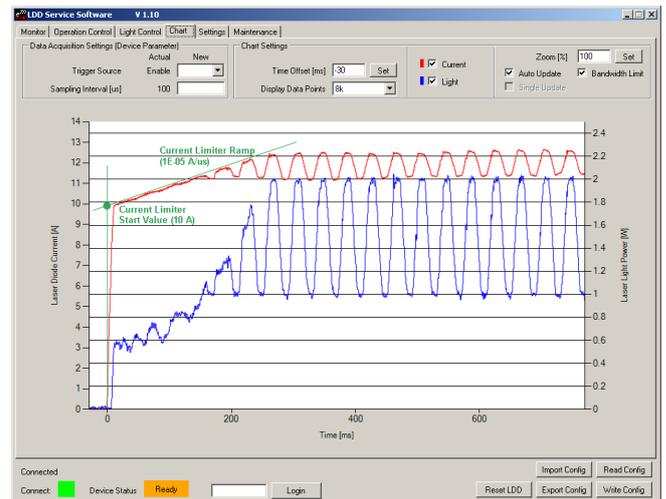
LPC Soft-Start Limitation (green)

3 INTERFACE AND CONNECTORS

3.1 General Purpose Digital I/O Characteristics on X3 (RES1 … RES8)

Unless otherwise noted: T_A = 25°C, U_{IN} = 24 V

Symbol	Parameter	Test Conditions / Hints	Min	Typ	Max	Unit
Input Characteristics:						
U_{IN}	Logic high input threshold		2.35			V
U_{IL}	Logic low input threshold				0.9	V
U_{IMAX}	Maximum input voltage		−0.3		5.5	V
U_{AN}	Input voltage range	Analog input	0		3	V
Output Characteristics: (RES1 … RES4)						
U_{OH}	Logic high output voltage		2.9	3.3		V
U_{OL}	Logic low output voltage			0	0.4	V
R_S	Series Resistor		170	200	230	Ω
Output Characteristics: (RES5 … RES8)						
U_{OH}	Logic high output voltage		2.9	3.3		V
U_{OL}	Logic low output voltage			0	0.4	V
R_S	Series Resistor		1160	1200	1240	Ω
ESD Protection:						
U_{PP}	ESD discharge	IEC61000-4-2			100	kV

3.2 Package Outline and Pin Configuration

Mounting (M3-size Bores, 7.5mm in Length):
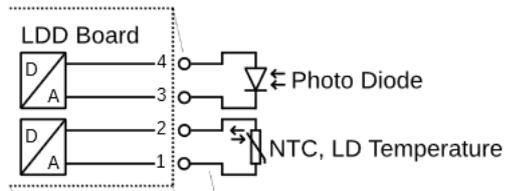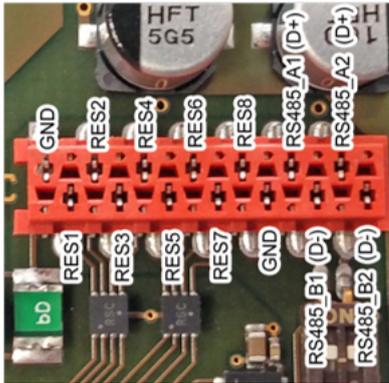M1: x =   4.0 mm, y = 86.0 mm
M2: x = 98.0 mm, y = 86.0 mm
M3: x =   4.0 mm, y =   4.0 mm
M4: x = 98.0 mm, y =   4.0 mm
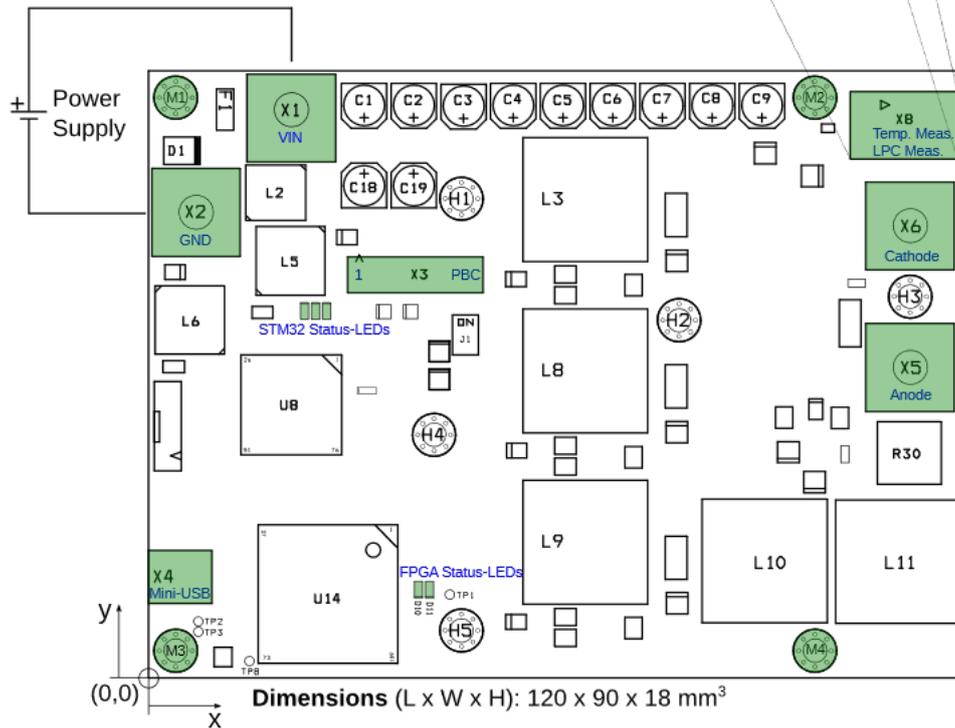
Power Terminals: M4-size Screws

Pin Descriptions Plattform Bus X3:
TE Connectivity PLUG 14-POL: 8-215083-4
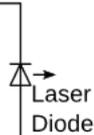
Laser diode, temperature probes, power supply and connectors not included.

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4 ORDERING AND CONFIGURATION

4.1 LDD-1124 Ordering Information & Configuration

Example Configuration:
LDD-1124 (NA) FW2.33

Variant Name	Requirement	Description	Options / Single choice
Photodiode Input	**Required**	**Select the presence of the photodiode input and the associated laser power control feature. Default: maximum measurable photocurrent 4mA, reverse bias voltage 0V. Options (0.5mA/1mA/2mA/4mA and 0V/3.3V/8.5V) can be specified in the customer specific modifications.**	**NA, LPC**
Firmware Version	Optional	Select a compatible firmware if you do not want the latest version (default). Check the relevant Software Release Notes for details.	Example: FW2.33
Customer Specific Modifications	Advanced	Usually hardware modifications, available only on demand and quote.	Empty, or example: CS3
Customer Specific Profile	Advanced	Preset parameters/configuration, available only on demand and quote.	Empty, or example: 15
Hardware Version	-	For reference, specifies the hardware version (latest by default, subject to future change).	Example: HW1.62

Further customization can include digital lines for control, diagnosis and communication protocols. Please contact Meerstetter Engineering GmbH with your inquiry.

4.2 Ordering Confirmation Example

LDD-1124 (NA, HW1.62)
Firmware Version: FW2.33

String can additionally contain:
Profile: Default

5 ALL MEERSTETTER ENGINEERING PRODUCTS

5.1 Meerstetter Engineering's Product Compatibility

The Laser Diode Drivers and TEC Controllers from Meerstetter have been developed to work along with each other. They share the same platform bus, communication protocol and hardware architecture. See the following table for an overview of the Laser Diode Drivers and TEC Controllers from Meerstetter Engineering:

Model		Output	Description
Laser Diode Drivers			
LDD-1321		0–1.5 A / 0–14 V	CW, Add-on TEC Controller available
LDD-1301		0–20 A / 0.5–45 V	1 ms – CW
LDD-1303		0–20 A / 1–120 V	1 ms – CW
LDD-1137		0–75 A / 0–70 V	1 ms – CW
LDD-1124		0–1.5 A / 0–15 V	CW, modulated modes
LDD-1121		0–15 A / 0–15 V	1 µs – CW, modulated, QCW and pulsed modes
LDD-1125		0–30 A / 0–27 V	1 µs – CW, modulated, QCW and pulsed modes
TEC Controllers			
Single-Channel Models	TEC-1092	±1.2 A / ±9.6 V	Micro
	TEC-1091	±4 A / ±21 V	Small
	TEC-1089	±10 A / ±21 V	Medium
	TEC-1162	±5 A / ±56 V	Medium-high
	TEC-1090	±16 A / ±30 V	Large
	TEC-1163	±25 A / ±56 V	Extra-large
Dual-Channel Models	TEC-1161-4A	2 x (±4 A / ±21 V)	Small
	TEC-1161-10A	2 x (±10 A / ±21 V)	Medium
	TEC-1122	2 x (±10 A / ±21 V)	Medium
	TEC-1166	2 x (±5 A / ±56 V)	Medium-high
	TEC-1123	2 x (±16 A / ±30 V)	Large
	TEC-1167	2 x (±25 A / ±56 V)	Extra-large

6 CHANGE HISTORY

Date of change	Version	Changed / Approved	HW Version
April 20, 2026	L	NJ / RS	v1.62

Change / Reason
- Mod: Datasheet design
- Del: Old Ordering codes
- Add: Standardized product designations and ordering codes tables
- Del: Pulsing Capabilities

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Meerstetter Engineering GmbH (ME) reserves the right to make changes without further notice to the product described herein. Information furnished by ME is believed to be accurate and reliable. However typical parameters can vary depending on the application and actual performance may vary over time. All operating parameters must be validated by the customer under actual application conditions.