

DIODE-PUMPED SOLID-STATE (DPSS) 1534-NM PULSED MICRO-LASERS

1.5-MICRON SOLID-STATE PULSED LASERS



Voxtel's high-peak-power lasers combine eyesafe-wavelength operation with high peak power, short pulse duration, and diffraction-limited beam quality to deliver unmatched size, weight, power, and cost (SWAP-C), range, and accuracy.

Many of today's laser ranging products use near-infrared lasers that emit in the 905-nm to 1064-nm-wavelength spectral range. When used at the power levels needed by the application requirements, this spectral range is not eyesafe, and a tradeoff is made between safety and performance.

In contrast, Voxtel's DPSS lasers operate at a 1534-nm wavelength. At this wavelength, eyesafe laser ranging systems can be easily configured without compromise to beam power or quality. This makes laser ranging applications safer for customers.

The excellent beam quality and tight beam divergence of Voxtel's micro-lasers allow pulses with high-photon-flux density to be transmitted down range to targets, which enables long-distance and high-resolution ranging.

The compact highly integrated laser transmitters are operational over a wide temperature range, robust to the environment, gun-shock-hardened, and qualified for a lifetime exceeding 50 million shots. To operate the laser safely, easy-to-configure pulse-driver electronics are available optionally. To simplify system integration, integrated 17x collimating optics and T0 pulse detectors are also available optionally.

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FEATURES

- **Eyesafe:** Class-1
- **Typical Peak Power:** to 115 kW
- **Excellent Beam Quality:** $M^2 < 1.15 * DL$ (where DL is the diffraction limit)
- **Narrow Pulse Width:** 4–7 ns
- **Long Lifetime:** > 50 million shots
- **Robust:** Qualified for extreme military and automotive environments
- **Wide Operating Temperature Range:** -45 – 65 °C* (high-operating-temp. options also available) with stable pulse energy and wavelength output

MODELS

- 29 kW (4-ns pulse length)
- 48 kW (7-ns pulse length)
- 115 kW (5-ns pulse length)

OPTIONS

- T₀ Pulse Detector
- Laser driver/system electronics
- Integrated 17x-magnification collimator (see below)



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SPECIFICATIONS

Model (bare laser; see <i>Ordering Information</i> for options)	LAK0-E00C	LAM0-F00C	LAN0-F00C
Optical			
Wavelength (center) ¹	1534 nm +/- 0.25 nm		
Spectral width (FWHM)	< 0.015 nm		
Temperature dependence	+0.03 nm/°C		
Pulse width, typical (FWHM)	4 ns	7 ns	5 ns
Peak power, typical	29 kW	48 kW	115 kW
Pulse repetition frequency (max, multi-pulse mode)	10 Hz	10 Hz	10 Hz ¹
Laser delay time, typical	1 – 2 ms	1.5 – 2.5 ms	1.8 – 3.5 ms
Pulse energy stability, typical	10%		
Beam diameter, typical	0.200 mm	0.300 mm	0.400 mm
Beam divergence, typical, full angle (1/e ²)	12 mrad	8 mrad	6 mrad
Beam quality, typical (M ²)	1.15 x DL	1.15 x DL	1.15 x DL
Environmental			
Operating temperature ^{2,3}	-45 °C to +65 °C		
Storage temperature ²	-55 °C to +85 °C		
Shock	1500 G, 0.5 ms		
Vibration	20 – 2000 Hz / 20 G		
Lifetime, MTTF	> 50 million shots		
Mechanical			
Dimensions	35.5 x 18.0 x 8.25 mm ³	36.0 x 18.5 x 8.8 mm ³	46.5 x 19.0 x 9.7 mm ³
Weight	8.6 g	7.3 g	17.5 g
Electrical			
Anode (red wire) voltage, typical	2 – 3 V	2 – 3V	3 – 3.5 V
Cathode (black wire) voltage, typical	GND	GND	GND
Current, typical	7.125 – 7.875 A	14.250 – 15.750 A	18.0 – 20.0 A
Power consumption, typical	700 mW	900 mW	1400 mW

¹ Preliminary data

² Dry N₂ purged environment

³ Custom to +75° C also available upon request

OPTIONS

Bare Laser with T ₀ Detector Integrated into Laser	LAK0-EB0C	LAM0-FB0C	LAN0-FB0C
Trigger pulse voltage and duration	2 V; 100 ns	2 V; 100 ns	2 V; 100 ns
Dimensions	35.5 x 18.0 x 8.25 mm ³	36.0 x 18.5 x 10.0 mm ³	46.5 x 19 x 9.7 mm ³
Weight		8.62 g	
Bare Laser with 17X-Magnification Beam-Expanding/Collimating Optics			
Beam divergence, full angle (1/e ²)	0.7 mrad	0.5 mrad	0.4 mrad
Beam diameter	4.25 mm	5.10 mm	6.78 mm
Beam quality, typical (M ²)	1.15 x DL	1.15 x DL	1.15 x DL
Dimensions (laser and collimator only)	67.0 x 26.0 x 25.0 mm ³	76.0 x 26.0 x 25.0 mm ³	86.0 x 26.0 x 25.0 mm ³
Weight (laser and collimator only)	60 g	63 g	76 g
Bare Laser with Laser Pulse Driver [shipped with BNC cable for Laser Trigger and AC Wall Plug (USA) to 5 VDC Power Converter]			
Input voltage	5 V	5 V	5 V
Input current (peak during lasing)	1 A	1 A	1 A
Input current average (1 Hz rate)	0.1 A	0.1 A	0.1 A

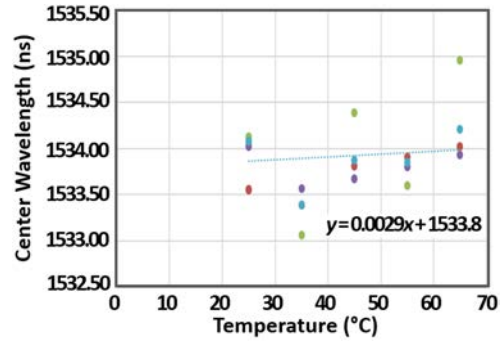
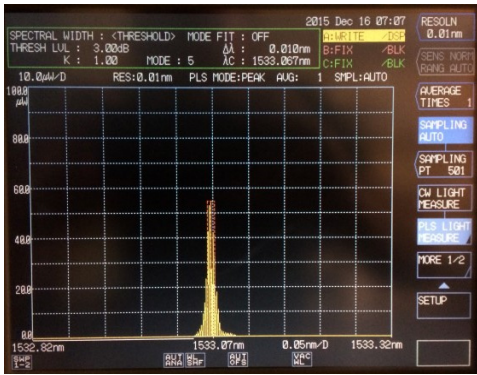
All values are at 25 °C unless stated otherwise.



ORDERING INFORMATION

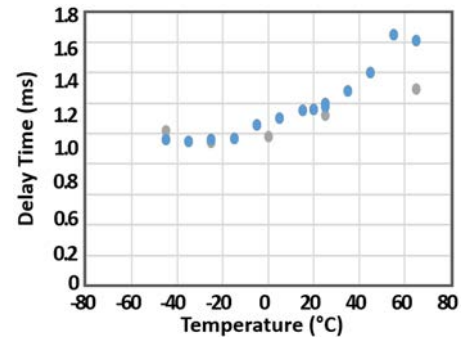
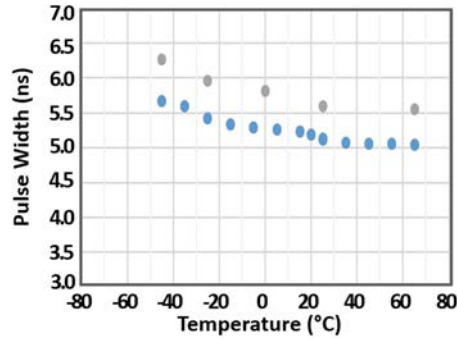
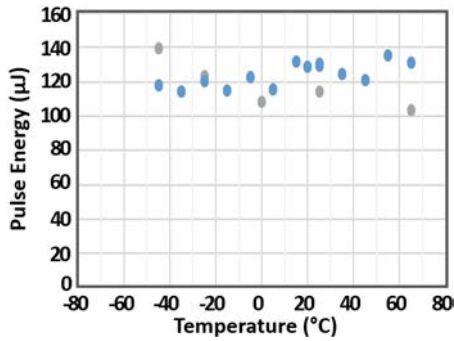
1534-nm DPSS Laser	Bare Laser	Bare Laser w/T ₀ Detector & U.FL Connector	Laser & Laser Driver Board	Laser w/T ₀ Detector & Laser Driver Board
29 kW	LAK0-E00C	LAK0-EB0C	LAKK-E00C	LAKK-EB0C
48 kW	LAM0-F00C	LAM0-FB0C	LAMM-F00C	LAMM-FB0C
115 kW	LAN0-F00C	LAN0-FB0C	LANN-F00C	LANN-FB0C
29 kW laser with 17X Collimator	LAK0-E0BC	LAK0-EBBC	LAKK-E0BC	LAKK-EBBC
48 kW laser with 17X Collimator	LAM0-F0BC	LAM0-FBBC	LAMM-F0BC	LAMM-FBBC
115 kW laser with 17X Collimator	LAN0-F0BC	LAN0-FBBC	LANN-F0BC	LANN-FBBC

PERFORMANCE (TYPICAL)

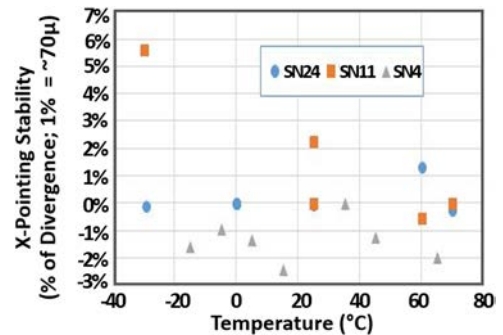
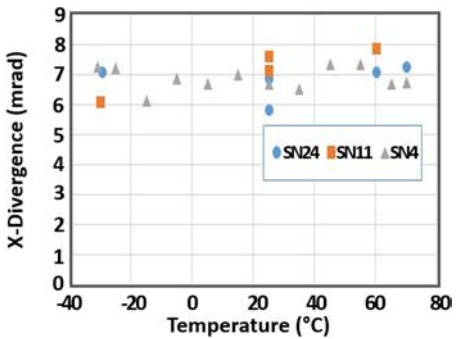
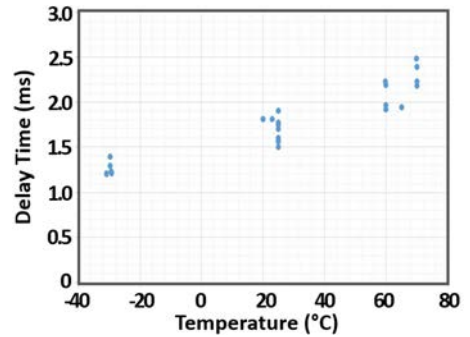
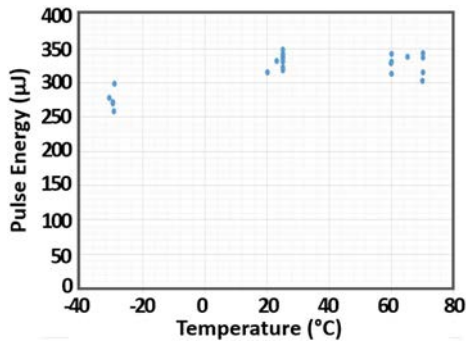


Spectral Line Width (0.010 nm) at 35 °C (left) and Center Wavelength vs. Temperature (right)

LAKO-E00C (29-kW Laser)



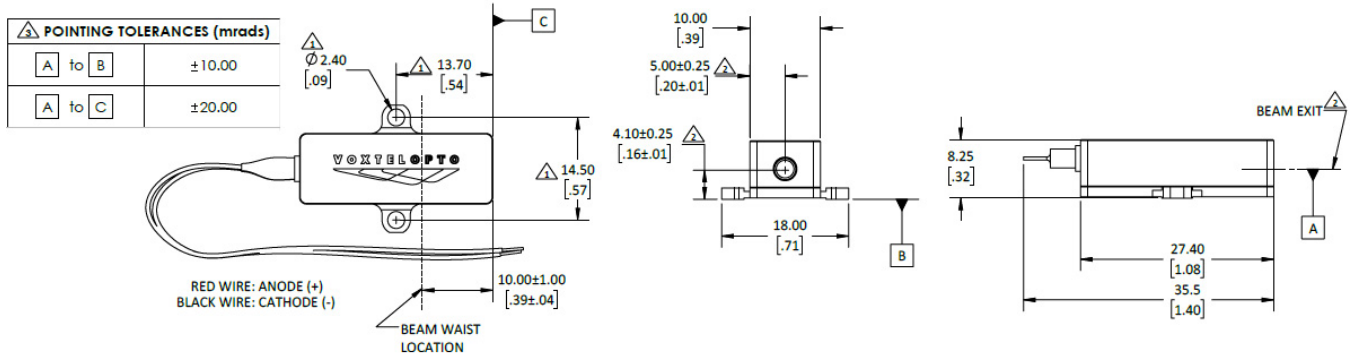
LAM0-F00C (48-kW laser)



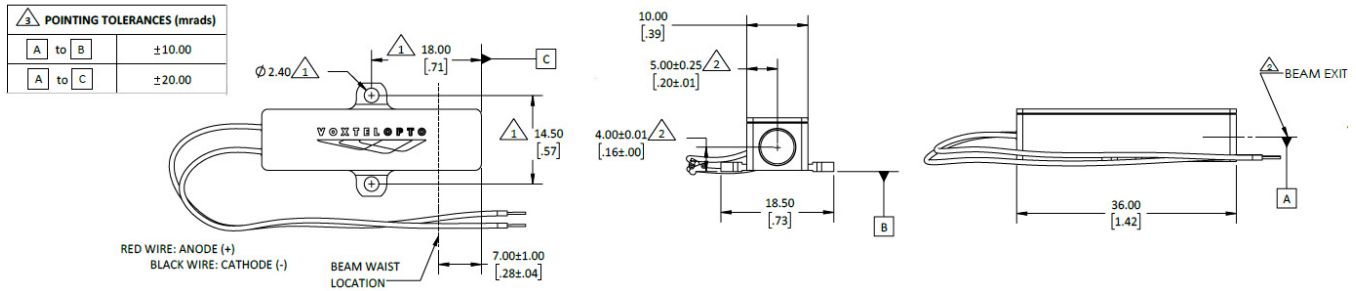
MECHANICAL

Bare DPSS Lasers

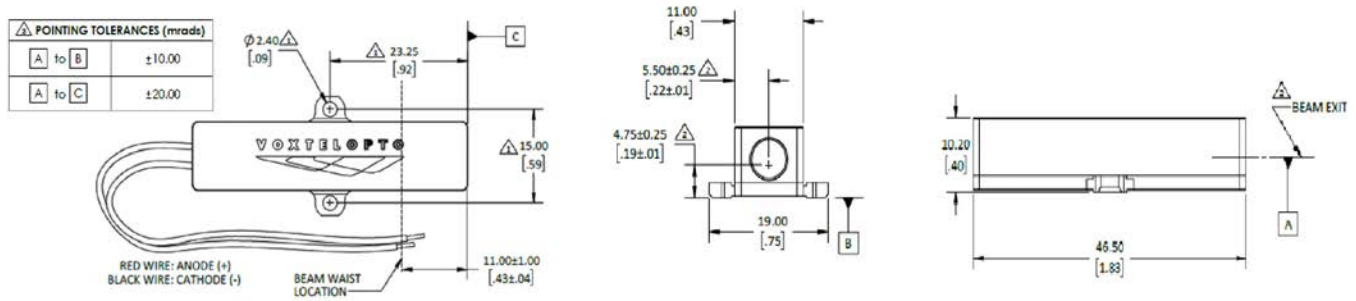
29-kW DPSS Laser (LAK0-E00C)



48-kW DPSS Laser (LAM0-F00C)

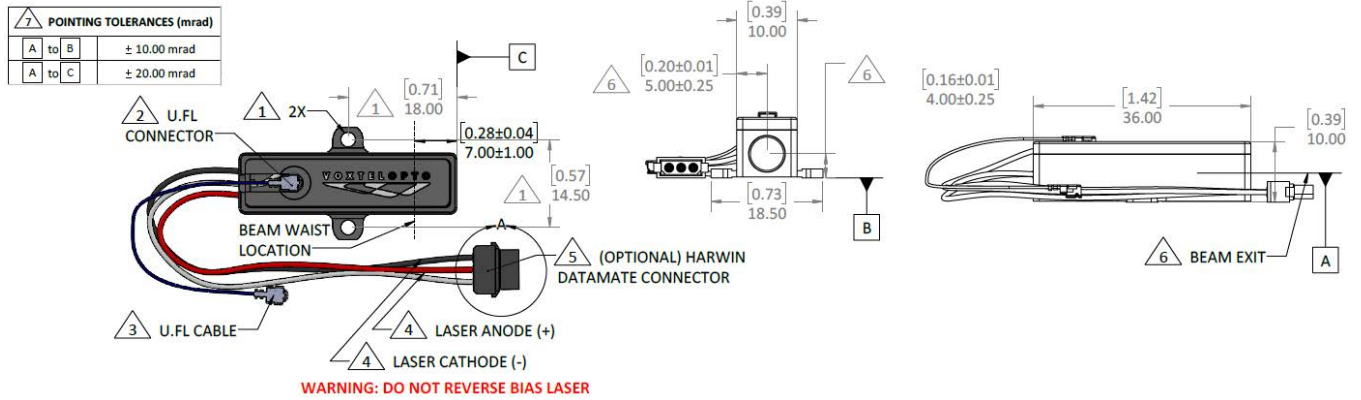


115-kW DPSS Laser (LAN0-F00C)

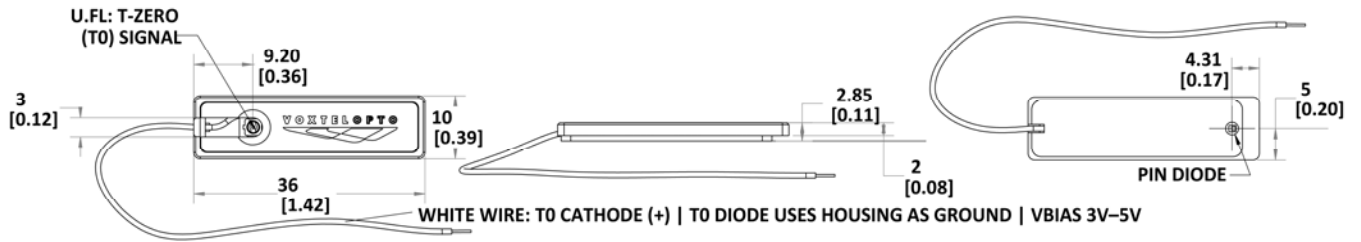


DPSS Lasers with Integrated T0 Detectors

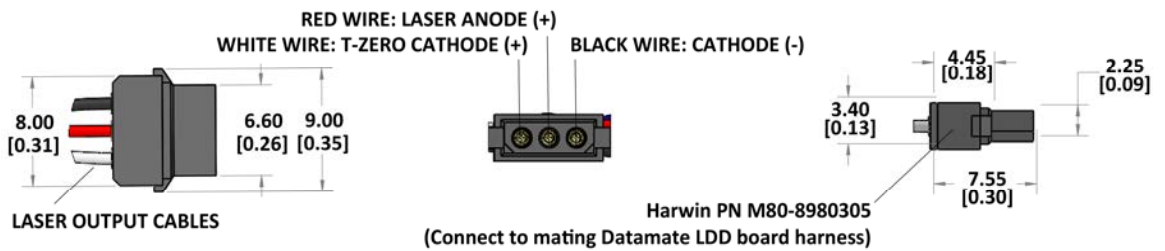
48-kW DPSS Laser with T0 (LAMO-FBOC)



T0 External Integrated Detector Lid

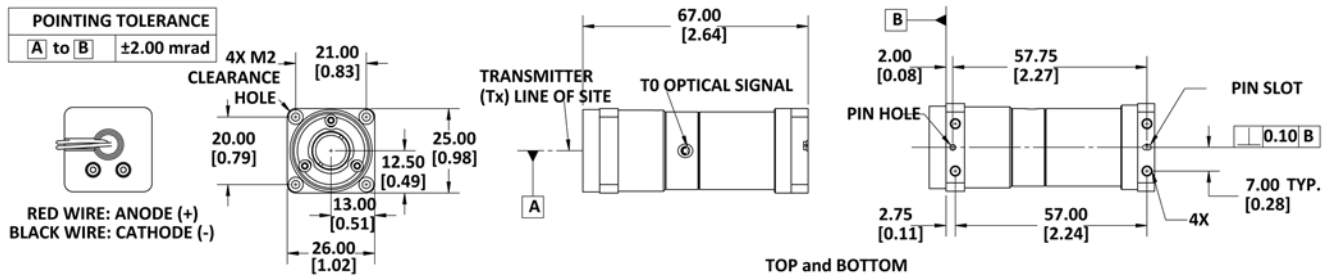


OPTIONAL: 3-Pin Datamate Connector Harness Assembly—Available on Any Laser

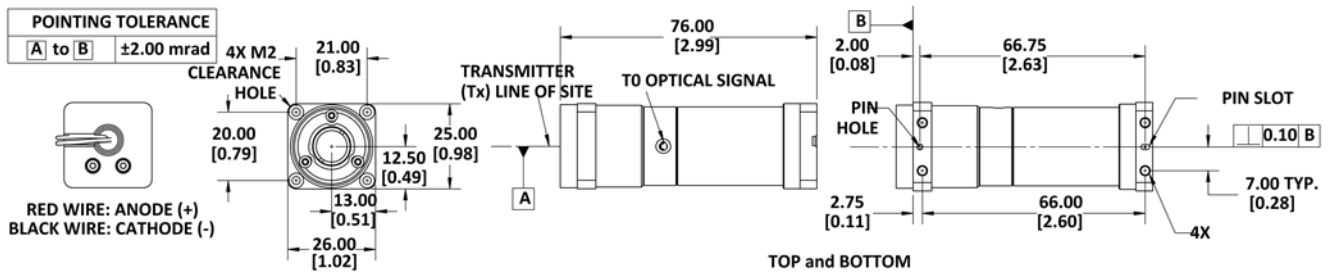


DPSS Lasers Integrated with 17x Collimating Optics

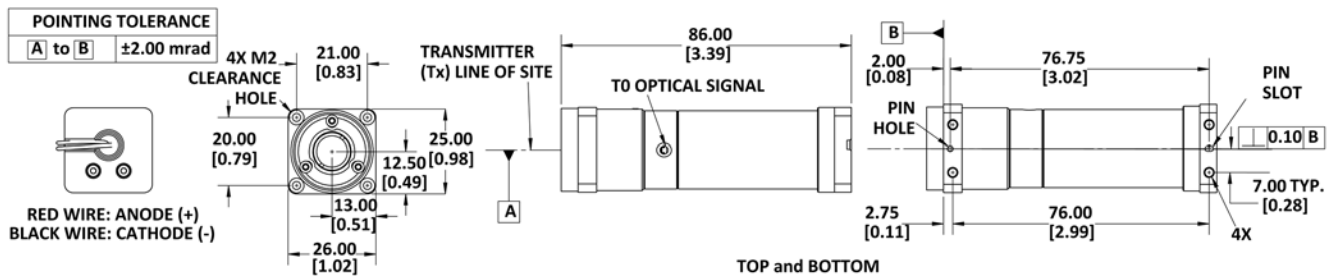
29-kW DPSS Laser Integrated with 17x Collimating Optics (LAK0-E0BC)



48-kW DPSS Laser Integrated with 17x Collimating Optics (LAM0-F0BC)

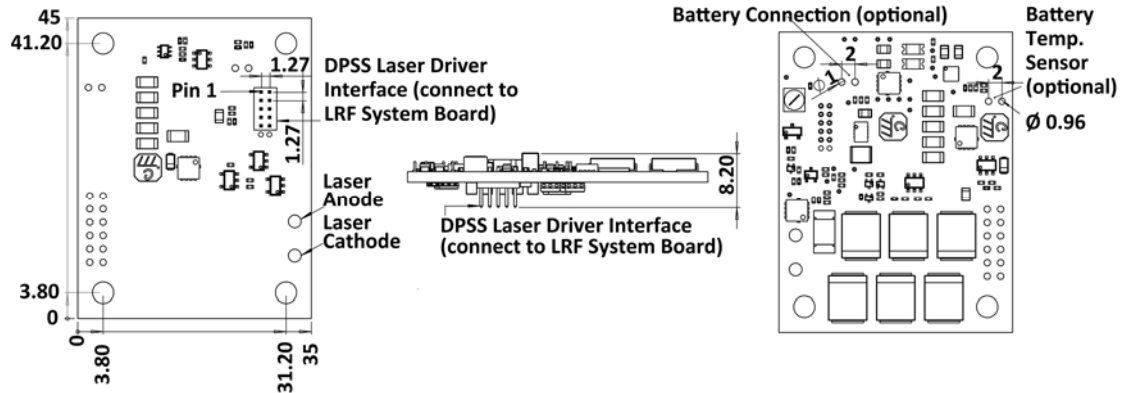


115-kW DPSS Laser Integrated with 17x Collimating Optics (LAN0-F0BC)

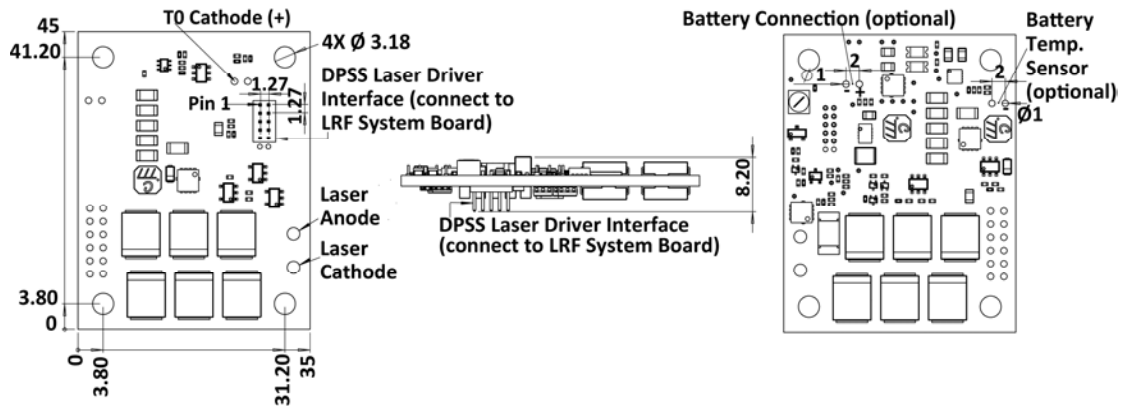


Laser Driver Boards

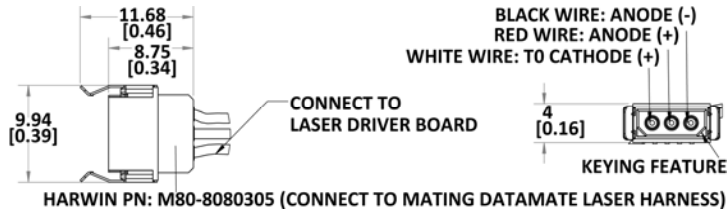
29-kW Laser Driver Board (WLK00)



48-kW Laser Driver Board (WLM00)



(Option) 3-Pin Datamate Connector Harness Assembly—Available on any Driver Board



ELECTRICAL

J4 Connector on Laser Driver Board

Pin	Name	I/O	Description	Min	Typical	Max	Units
1	PUSH_BUTTON	Input	Momentary switch input. Used to connect/disconnect battery (optional).	3.3	3.3	5	V
2,4	VIN_USER	Input	User Supplied DC Power. Current draw is 1A during laser driver charging	2.7*	5	5.5	ma
3	EN_LDD	Input	Laser driver capacitor charge enable. Enable high between ranges; low during ranging.	3.3	3.3	5	V
5	BATT_V	Output	Battery monitor. Tracks voltage on LiPO battery (optional)	2.7	3.7	4.2	V
6, 8	GND	Input	Ground		GND		V
7	LASERGATE	Input	Laser trigger activates/terminates laser diode pump source (typ. 2.5 ms max)	3.3	3.3	5	V
9	EN_CHRG	Input	Battery charger enable. Activates/terminates battery charging (optional)	3.3	3.3	5	V
10	5V_OUT	Output	Output from DC boost circuit. Powers system board (optional)	3.3	5V	5	V
11	BATT_STAT0	Output	Battery status indicator 0 (optional)	2.9	3.3	5	V
12	BATT_STAT1	Output	Battery status indicator 1 (optional)	2.9	3.3	5	V

Cable (Provided with Laser Driver Board) Connecting BNC (for Laser Trigger) and 5V Power Supply to J4 Connector on Laser Driver Board

Pin	Name	Connected to	Description	Min	Typical	Max	Units
BNC							
1	Laser Gate	J4; Pin 7	Laser trigger activates/terminates laser diode pump source, typ. 2.5 ms max	3.3	3.3	5	V
Shield	GND	J4; Pin 6	Ground		GND		
Power							
Pin	BATT_V	J4, Pin 2	Battery monitor. Tracks voltage on LiPO battery (optional)	2.7	3.7	4.2	V
Shield	GND	J4, Pin 8	Ground		GND		V

U.FL Cable (Provided with 48 kW Laser with External T0 Detector Lid) for T0 Electrical Output

Pin	Name	Description	Min	Typical	Max	Units
Center Pin	SIGNAL	External T0 Detector Signal	1.1	2.5	3.5	V
Shield	GND	Ground		GND		V