NuPhotonics

Part Number: DL10-13-TO-X-XX-X
Product State: Production Build

Rev. 1 – Aug. 2024

10G DFB 1310 nm Laser TOSA Package

Description

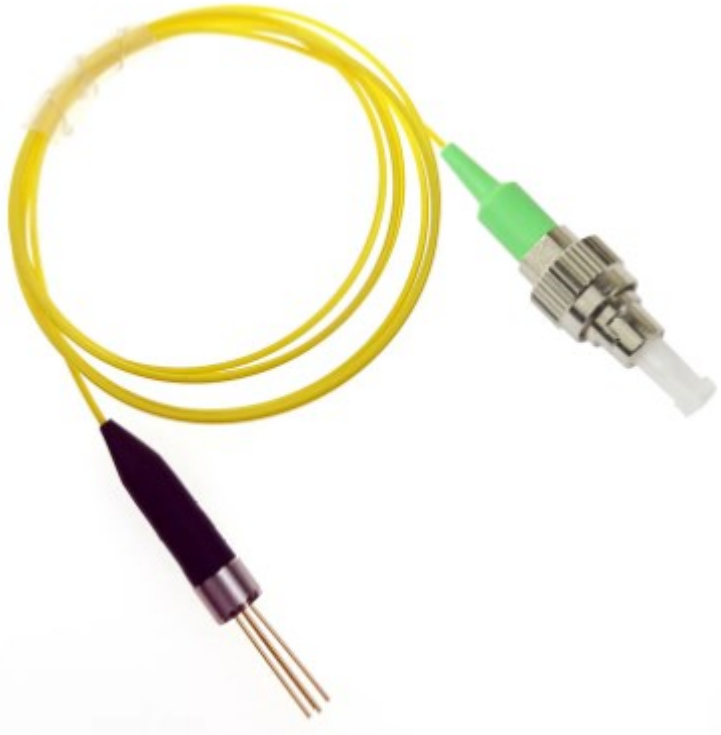
A 10 Gb/s edge emitting laser diode in a TO-can package. The Multi-quantum well distributed feedback (DFB) laser is directly modulated (DML) with a RF signal. This device comes with a built in Photodiode monitor to allow Auto-bias operation. Various build configurations allow the user to customize the optical connector as well as the mounting brackets for the device. Optics sub-assembly includes isolator.

Features

- TO-Can Package
- Single mode Pigtail cable
- 1310 nm CW
- High SFDR
- Built-in InGaAs monitor Photodiode
- Wide temperature operating range
- Built-in Optical Isolator

Applications

- Test and Measurement
- Datacenters
- RF over Fiber (RFoF)



Laser Electro-Optical Characteristics (T_{op} 23 ± 3°c, unless otherwise specified)

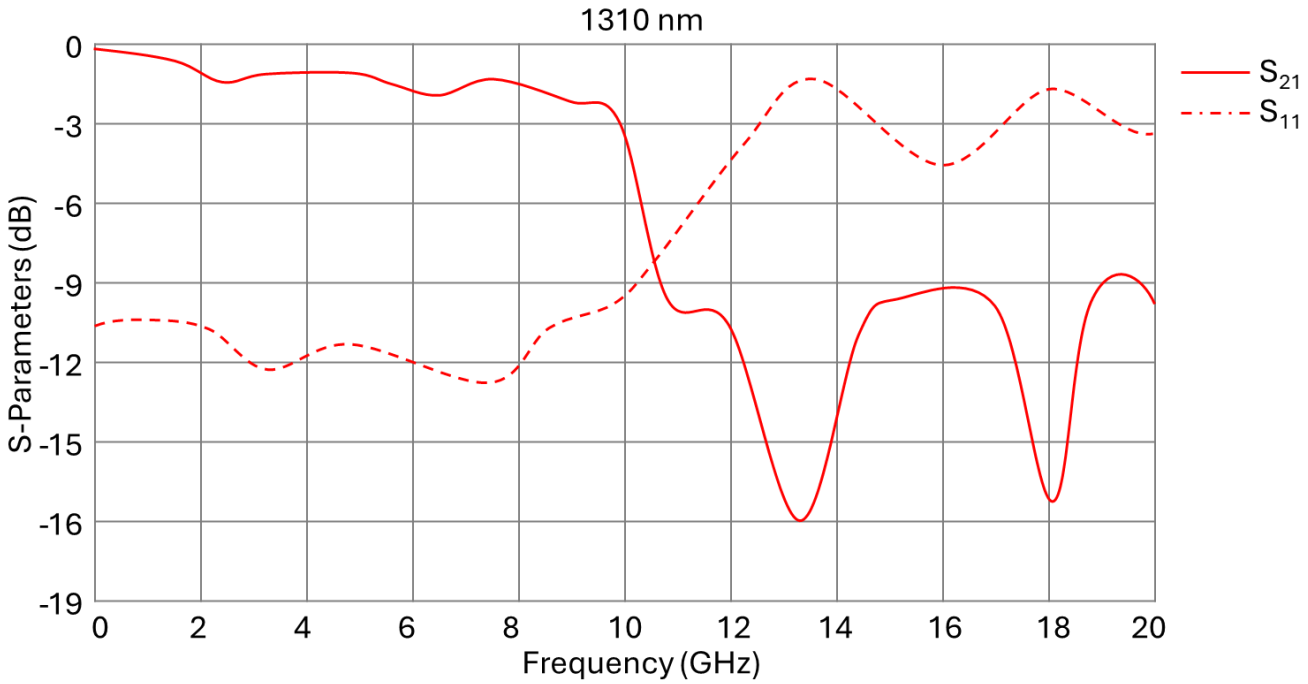
Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Peak Wavelength	λ	1304.5	1310	1317.5	nm	
Threshold Current	I_{th}		5	15	mA	T=25 °C
Front Power	P_o	2.0			mW	$I_f = I_{th}$ + 20 mA
Slope Efficiency	η	0.1			W/A	$I_f = I_{th}$ + 20 mA
Series Resistance	R		8		Ohms	P_o = 8 mW
Forward Voltage	V_f		1.1	1.5	V	$I_f = I_{th}$ + 20 mA
Spectral Wavelength Width (RMS)	Δλ		0.5		nm	P_O = 5mW at -20 dB
Frequency Bandwidth	BW	8			GHz	Designed RF board.
Side Mode Suppression Ratio	SMSR	30			dB	
Monitor Current	Im	0.4	0.5	1.0	mA	Iop = 30 mA
Optical Return Loss	ORL			-30	dB	CW = 1310 nm
Tracking Error	Te	-1.5		1.5	dB	-40 – 80 °C
Rise/Fall Time	Tr/Tf		0.2		ns	20-80%, If = Ith
Optical Isolation	ISO	30			dB	
Relative Intensity Noise	RIN			-130	dB/Hz	

Laser Absolute Maximum Ratings

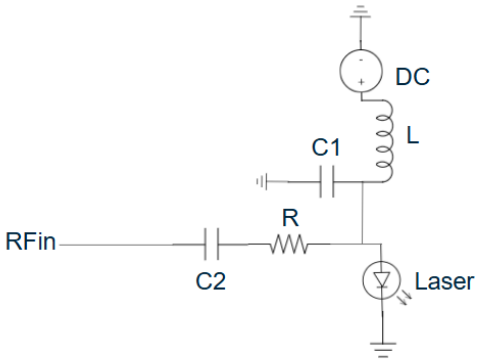
Parameter	Symbol	Condition	Min.	Max.	Unit
Voltage	V			1.8	V
Forward Current	I_F			80	mA
Storage Temperature	T_{stg}		-25	90	°C
Storage Humidity	H_{stg}			85	% r.H.
Operating Temperature	T_{op}		-25	85	°C
Soldering Temperature	T_{st}	60 sec		200	°C
ESD Susceptibility		HBM	100		V

Operating at maximum operating specs for prolong periods of time will damage the device.

Typical Performance Curves (Top = 25°C ± 3°C, 401 Pts, 16 Avgs, 1.5% Smoothing)



Test circuit (Dielectric material - Rogers RO3003® ξ_r – 3.00 Tan-δ - 0.001)



Test Circuit Configuration

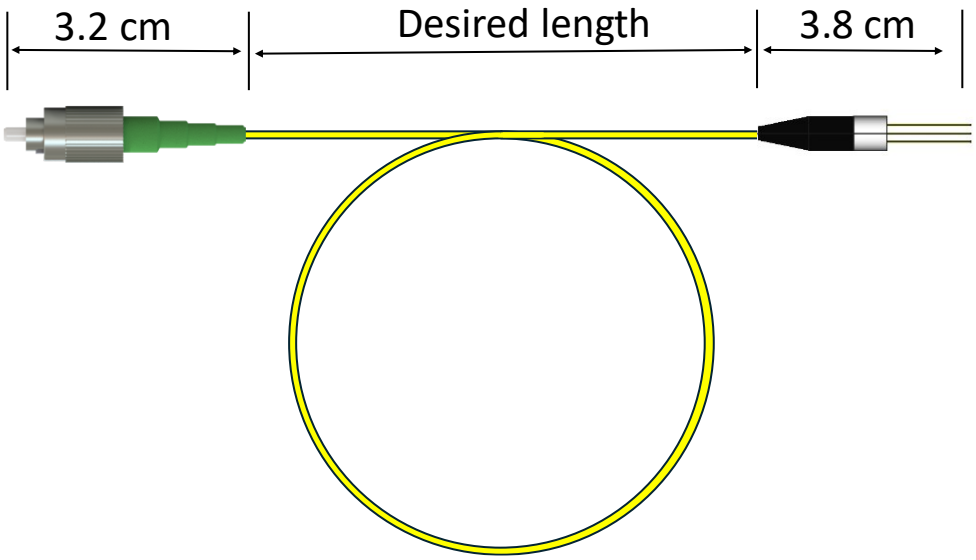
L – 1.65 µH Coil inductor (Rated 26 GHz)
C1 – 470 pF 0201 RF Capacitor
C2 – 820 pF 0201 RF Capacitor
R – 5 Ω 0402 RF Resistor

Microstrip traces - 50 Ω ground backed coplanar waveguide (GB-CPW)

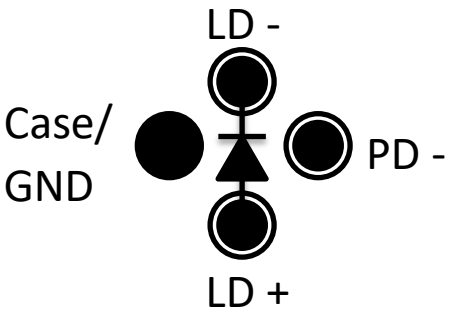
Engineering Notes:

The DFB laser diode is an 8 Ohm series device. Impedance matching the device can be difficult for large bandwidths. To improve S11 impedance matching, a series SMD resistor **R** can be placed which will help lower the S11 < -10 dB. Limiting **R** < 5 dB will help minimize S21 additional losses. If a flatter S21 is more desirable, **C1** can be added to the impedance matching structure. Balancing **R** and **C1** will yield a flatter S21 response with better S11 matching.

Device Dimensions



Device Pin Configuration (Bottom View)



Build A: Standard Configuration

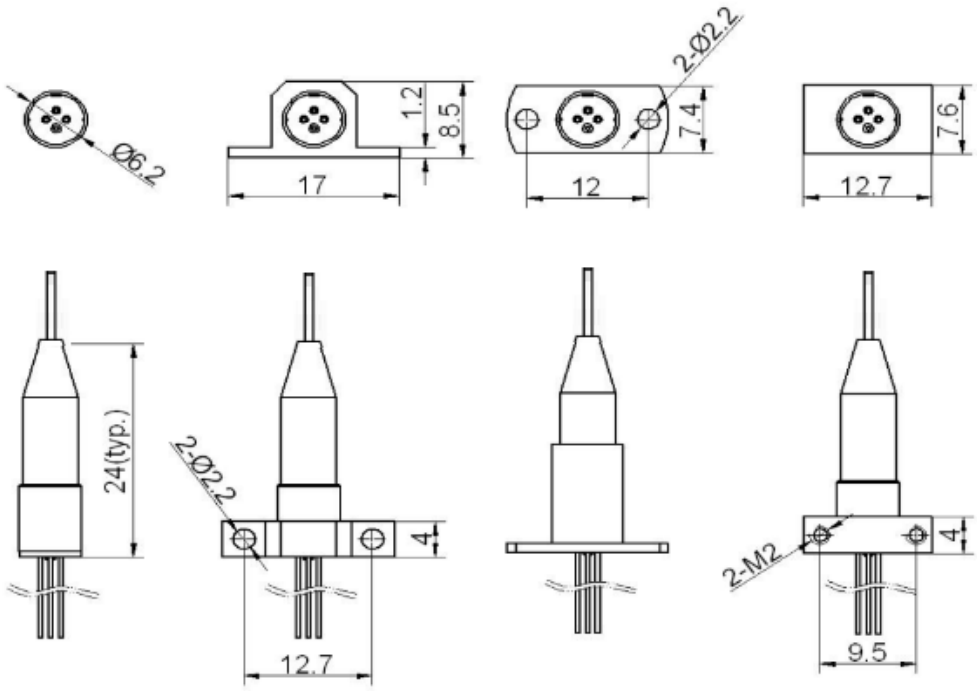
Pin Function:

1) Laser Anode
2) Photodiode Anode Tied to Case Ground
3) Laser Cathode
4) Monitor PD Cathode

Build B: Custom Pinout

Pinout can be customized

Build Configurations – Mounting Support



(a) (b) (c) (d)

Device Nomenclature

DL10-13-TO-X-XX-X

Product Line – 10G DFB Laser

Wavelength – 1310 nm

Device body style – TO-CAN

Device Mounting Support

- **(a)** No Mount
- **(b)** Horizontal Mount
- **(c)** Vertical Mount
- **(d)** Horizontal threaded

Pin Configuration

a) Standard Pinout
b) Custom Pinout

Optical Connector

(00) No Connector
(FA) FC/APC
(FP) FC/PC
(SA) SA/APC
(SP) SC/PC

Inquiry Information

Sales: For all inquiries regarding sales, please contact Sales@NuPhotonics.com

General: For inquiries regarding custom solutions, general information, or engineering related information please contact Inquiry@NuPhotonics.com

IMPORTANT NOTICES AND DISCLAIMERS

Warranty: NUPHOTONICS PROVIDES ALL OF THE INFORMATION ON TECHNICAL AND RELIABILITY DATA. THIS INCLUDES INFORMATION PRESENTED IN DATA SHEETS, DESIGN FILES, APPLICATIONS, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD-PARTY INTELLECTUAL PROPERTY RIGHTS.

The information and resources are presented and intended for developers that are skilled and adequately qualified to work with this technology. You, the customer, are solely responsible for and accept full responsibility for selecting the appropriate NuPhotonics devices for your application. You accept the sole responsibility of designing, validating, and testing your application. You bear all responsibility for your application meeting standards, safety, security, and other regulatory requirements.

NuPhotonics retains the right to change these resources without notice. All rights are reserved for NuPhotonics. NuPhotonics grants you permission to use the information in these resources to design with NuPhotonics devices. Reproduction and display of these resources is prohibited. No Third-party licenses are offered. You will fully indemnify NuPhotonics against any claims, damages, costs, losses, and liabilities that arise from you using these resources.

NuPhotonics does not accept and objects to any terms you have proposed.

For terms and conditions for all NuPhotonics products please refer to www.nuphotonics.com Legal section.

Definitions: Product State

Alpha Build: Devices in Alpha build are in internal engineering build and testing stages. Major changes may happen for production build.

Beta Build: Devices in Beta build are for external customer and engineering sample testing stages. Minor changes may happen for production build.

Production Build: Customer ready devices. Small appearance changes may appear between devices.

Obsolete: Currently not supported.