

## 1792 ECCW Narrow Linewidth CW External Cavity Laser Diode



### Features

- Narrow linewidth, < 10 kHz available
- ITU wavelengths across the C-band
- 100 GHz channel spacing
- 10 mW minimum output power
- Industry standard, high reliability, hermetic 14-pin butterfly package
- Excellent long-term wavelength stability eliminates the need for a wavelength locker
- Back-facet monitor
- Designed to meet Telcordia GR-468 qualification standard
- RoHS

### Applications

- Seismic sensor applications
- Interferometry
- Spectroscopy
- Lidar
- Optical test and instrumentation
- Microwave photonics

The 1792 ECCW series external cavity laser is a cost effective solution for a coherent laser source. The laser is fabricated in a 14-pin hermetically sealed butterfly package that incorporates a bias tee circuit, an integrated thermoelectric cooler (TEC), a thermistor, and a back facet monitor photodiode. The 1792 ECCW provides substantially lower phase noise and a longer coherence length than other semiconductor lasers, including DFB lasers. The wavelength stability is assured by design, eliminating the need for wavelength lockers and complex feedback control circuits.

### Performance Highlights

Pigtail Type	Optical Power		Linewidth (kHz)
	Min (mW)	Typical (mW)	
SMF	10	12	50
	15	20	50
	15	20	10
PMF	10	12	50
	15	20	50

See following pages for complete specifications and conditions.

## Absolute Maximum Ratings<sup>1</sup>

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

Parameters	Symbol	Condition/Notes	MIN	MAX	Unit
Storage Temperature	$T_{STG}$	Non-Operating	-40	85	°C
Operating Case Temperature	$T_{OP}$	Continuous	-20	75	°C
Forward Current	$I_{OP}$	CW	-	300	mA
Reverse Voltage	$V_R$	Continuous	-	2	V
Photodiode Forward Current	$I_{MPD,F}$	Continuous	-	2	mA
Photodiode Reverse Voltage	$V_{MPD,R}$	Continuous	-	10	V
TEC Current <sup>2</sup>	$I_{TEC}$	-	-	1.8	A
TEC Voltage	$V_{TEC}$	Continuous	-	3.5	V
Fiber Bend Radius	R	Continuous	35	-	mm
Tensile Strength, Fiber to Case	F	Continuous	-	5	N
Lead Soldering Time <sup>3</sup>	$t_{sold}$	< 260°C	-	10	sec
Package Mounting Screw Torque <sup>4</sup>		-	-	0.12	m*N
Operating Humidity: Non-Condensing	$X_{OP}$	Continuous	5	95	%
Storage Humidity: Non-Condensing	$X_{OP}$	Continuous	5	95	%

1. Absolute maximum data are limited to system design only; proper device performance is not guaranteed over rating listed above. Operation beyond these maximum conditions may degrade device performance, lead to device failure, shorter lifetime, and will invalidate the device warranty.
2. TEC current should not exceed 2.0 A during turn on, and case temperature under any conditions should not change faster than 10°C/min.
3. Soldering iron only; no reflow or dip soldering allowed.
4. See mounting recommendations below.

## Electrical/Optical Characteristics

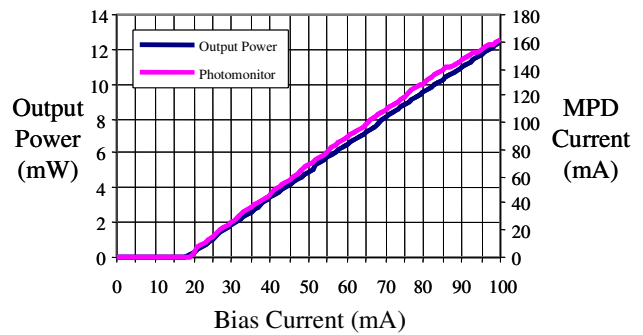
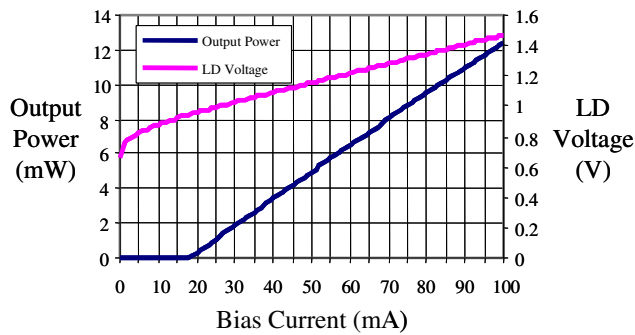
Parameters	Symbol	Conditions/Notes	MIN	Typ	MAX	Unit
Minimum Optical Output Power	$P_O$	15mW Option 10mW Option	15 10	20 12	- -	mW
Optical Linewidth <sup>1,2,3,4</sup>		Available for 15mW, SMF fiber Available for all other models	- -	- 25	10 50	kHz
Threshold Current	$I_{TH}$	-	-	-	30	mA
Laser Bias Current	$T_{OP}$	-	-	-	250	mA
Forward Voltage	$V_F$	CW, $P_O = 10$ mW	-	-	2.0	V
MPD Current	$I_{MON}$	CW, $P_O = 10$ mW	0.05	-	0.5	mA
MPD Tracking Error	TE	$-10^{\circ}\text{C} < T_C < 65^{\circ}\text{C}$	-	-	$\pm 0.5$	dB
TEC Set Temperature <sup>5</sup>	$T_s$	Specified for every laser	16	-	35	$^{\circ}\text{C}$
Center Wavelength (100 GHz ITU Grid)	$\lambda_c$	See ITU Grid Channel Numbering Table				nm
Wavelength Drift with Case (-10 to 65 $^{\circ}\text{C}$ ) Temperature	$\Delta\lambda_{T_C}$	Relative to 25 $^{\circ}\text{C}$ Case Temperature	-	-	$\pm 40$	pm
Wavelength Offset from DWDM ITU Grid	$\Delta\lambda_{\text{offset}}$	TEC Temperature at $T_s$	-	-	$\pm 80$	pm
Frequency Temperature Coefficient	$\Delta f/\Delta T$	-	-	3.5	5	GHz/ $^{\circ}\text{C}$
Frequency Current Coefficient	$\Delta f/\Delta I$	-	-	200	250	MHz/mA
Optical Isolation	-	$-10^{\circ}\text{C} < T_C < 65^{\circ}\text{C}$	35	-	-	dB
Relative Intensity Noise	RIN	CW, at 200 MHz	-	-155	-	dB/Hz
Side Mode Suppression Ratio	SMSR	CW, $P_O > 1$ mW	40	-	-	dB
Optical Return Loss	ORL	-	40	-	-	dB
TEC Current	$I_{TEC}$	$T_C = 65^{\circ}\text{C}$ , $T_{OP} = T_s$	-	-	1.5	A
TEC Voltage	$V_{TEC}$	$T_C = 65^{\circ}\text{C}$ , $T_{OP} = T_s$	-	-	3.0	V
TEC Capacity	$\Delta T$	$T_C = 65^{\circ}\text{C}$	50	-	-	$^{\circ}\text{C}$
Thermistor Resistance	$R_{TH}$	$T_{OP} = T_s$	9.5	10.0	10.5	k $\Omega$
Thermistor Beta Constant	B	-	-	3891	-	K

1. CW, at rated power.
2. Lorentzian linewidth measured at -30 dB.
3. Gaussian linewidth measured at -20 dB.
4. Linewidth measured with self-delayed heterodyne method at  $T_s$ ,  $I_{op}$
5. TEC temperature at the recommended value.

## Fiber Pigtail Specifications

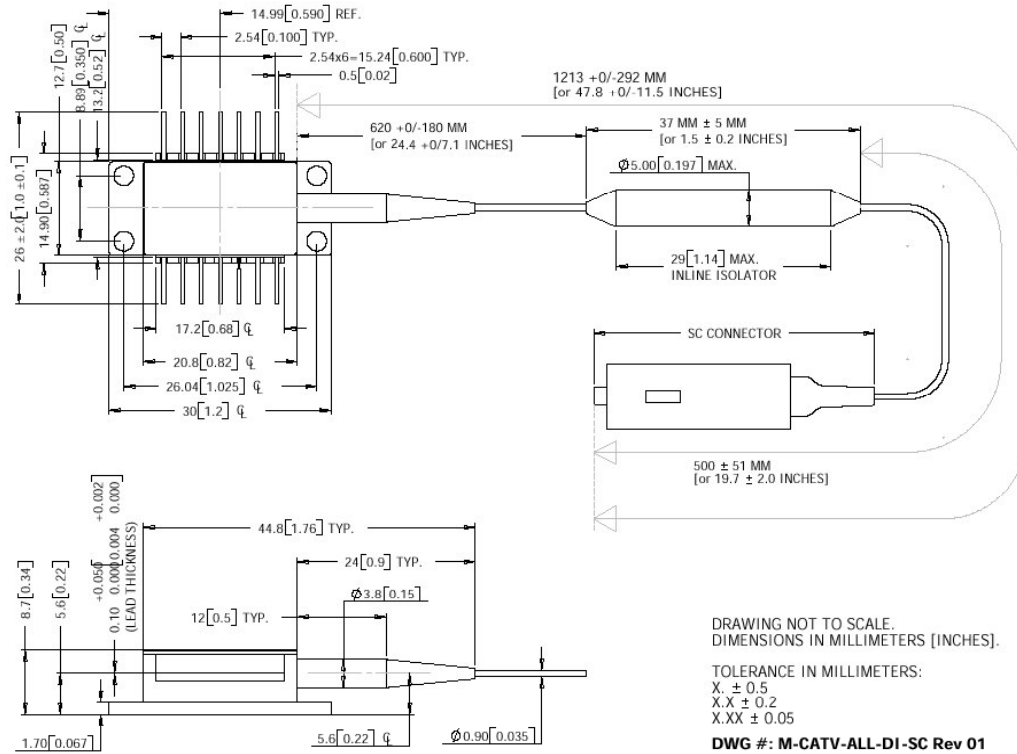
Parameters	Conditions/Notes	MIN	Typ	MAX	Unit
Fiber Type	Single Mode Fiber, Corning SMF-28 <sup>1M</sup> , or Polarization Maintaining Fiber, Fujikura PANDA <sup>*</sup>				
Mode Field Diameter	-	9.0	10.4	11	μm
Cladding Diameter	-	123.5	125.0	126.5	μm
Outer Diameter of Buffer	-	-	900	-	μm
Length of Pigtail	-	-	2	-	m
Optical Connector	(See Ordering Information)				

## Test Data



NOTE: The test data above assumes 10mW optical power option.

## Outline Drawing



## Pin Definitions

Pin No.	Function	Pin No.	Function
1	Thermistor	8	Not Connected
2	Thermistor	9	Case Ground
3	Laser DC bias (-)	10	Case Ground
4	Photodetector Anode (-)	11	Case Ground
5	Photodetector Cathode (+)	12	Laser RF Cathode (-)
6	TEC (+)	13	Case Ground
7	TEC (-)	14	Case Ground

## ITU Grid Channel Numbering

Channel	Wavelength (nm)	Channel	Wavelength (nm)	Channel	Wavelength (nm)
-	-	46	1540.56	30	1553.33
-	-	45	1541.35	29	1554.13
60	1529.55	44	1542.14	28	1554.94
59	1530.33	43	1542.94	27	1555.75
58	1531.12	42	1543.73	26	1556.56
57	1531.90	41	1544.53	25	1557.36
56	1532.68	40	1545.32	24	1558.17
55	1533.47	39	1546.12	23	1558.98
54	1534.25	38	1546.92	22	1559.79
53	1535.04	37	1547.72	21	1560.61
52	1535.82	36	1548.51	20	1561.42
51	1536.61	35	1549.32	-	-
50	1537.40	34	1550.12	-	-
49	1538.19	33	1550.92	-	-
48	1538.98	32	1551.72	-	-
47	1539.77	31	1552.52	-	-

## Reliability/Quality

Designed to meet qualification requirements of Telcordia™ (Bellcore) GR-468-CORE.

## Handling and Mounting

1. The Laser should be mounted on a heat sink at least 13 x 35 mm in size with surface finish better than 1  $\mu\text{m}$  and flatness better than 25 $\mu\text{m}$ . It is recommended that the laser be mechanically mounted to the heat sink using M2-3 mm (#2-56) screws. Apply torque 0.1-0.11 m\*N (0.8-1 lb\*in). It is also recommended to use thermally conductive grease between the laser package and heat sink.
2. The fiber pigtail must not be subject to a bend radius below 35mm. The fiber is unable to withstand temperatures in excess of 120 °C without degradation. Avoid high temperature contact during soldering

## Laser Safety

### Class IIIb Laser Product

This product meets the appropriate standard in Title 21 of the Code of Federal Regulations (CFR). FDA/CDRH Class IIIb laser product. This device has been classified with the FDA/CDRH under accession number TBD.

Wavelength = 1.5  $\mu\text{m}$ .

Maximum power = 100 mW.

Because of size constraints, laser safety labeling (including an FDA class IIIb label) is not affixed to the module, but attached to the outside of the shipping carton.

Product is not shipped with power supply.

**Caution: Use of controls, adjustments and procedures other than those specified herein may result in hazardous laser radiation exposure.**



# 1792 ECCW Narrow Linewidth CW External Cavity Laser Diode

DATASHEET | JUNE 21, 2008

## Ordering Code Definitions

1792	-	SMF	-	www	-	10	-	50	-	zz
1792	-	PMF	-	www	-	10	-	50	-	zz

1792	-	SMF	-	www	-	15	-	10	-	zz
1792	-	SMF	-	www	-	15	-	50	-	zz
1792	-	PMF	-	www	-	15	-	50	-	zz

**Family Name**  
ECCW

**Fiber Pigtail**  
SMF: Single Mode Fiber  
PMF: Polarization Maintaining Fiber

**Wavelength**  
020: ITU Channel 20, 1561.42 nm  
021: ITU Channel 21, 1560.61 nm  
...  
059: ITU Channel 59, 1530.33 nm  
060: ITU Channel 60, 1529.55 nm

**Minimum Optical Output Power**  
10: 10 mW  
15: 15 mW

**Linewidth**  
10: 10 kHz  
50: 50 kHz

**Connector**  
FA: FC/APC  
SA: SC/APC

## Example

**1792-SMF-043-10-50-FA:** ECCW, SMF fiber pigtail, ITU channel 43, 1542.94 nm, 10 mW minimum output power, 50kHz linewidth, FC/APC optical connector

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