

1998 Cooled, Coaxial DFB Laser Module with Flex Circuit

1550 nm, DWDM ITU 100 GHz Channels, Wide Bandwidth 0.01 – 6 GHz



EMCORE's Model 1998 DFB cooled coaxial laser offers a high-performance solution for linear wideband fiber optic links. The 1998 is internally cooled with thermo-electric coolers already installed for high-stability with low power consumption. The 1998 DFB laser builds upon EMCORE's long history of high-performance, leading-edge designs for CATV, wireless and high-speed digital applications. The laser diode device is packaged in a compact, hermetic assembly together with monitor photodiode, thermistor, TEC and optical isolator for flexible integration into various transmitter configurations.

Applications

- Signal Distribution in L-Band, S-band and 5G Wireless Remoting Links
- Distributed Antenna Systems (DAS)
- High-Linearity and Wide Bandwidth Fiber Links

Features

- Linear DFB Laser Design
- 100 GHz ITU DWDM Channels
- Output Power > 10 dBm
- Bandwidth > 6 GHz
- Optical Isolator
- Thermistor
- Monitor Photodiode
- Highly-efficient Thermo-Electric Cooler
- Flex Circuit Interconnect
- RoHS Compliance

Performance Highlights

Parameters	Min	Typical	Max	Units
Operating Case Temperature Range	-40	-	85	°C
Optical Output Power ⁽¹⁾	6	-	10	dBm
Frequency Range	0.01	-	6	GHz
Input Impedance	-	50	-	Ohm
Input IP2 ⁽¹⁾	40	-	-	dBm
Input IP3 ⁽¹⁾	32	-	-	dBm
Noise Figure ⁽¹⁾	-	-	44	dB
Relative Intensity Noise (RIN) ⁽¹⁾	-	-160	-155	dB/Hz
Center Wavelength	-	1550	-	nm
Optical Return Loss ⁽¹⁾	35	-	-	dB
Side Mode Suppression Ratio, CW ⁽¹⁾	30	-	-	dB
Laser Linewidth ⁽¹⁾	-	5	-	MHz

1. Performance at T_{chip} = 25°C



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Absolute Maximum Ratings¹

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 datasheet. 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	-40	85	°C
Laser Diode Forward Current	I _{OP}	CW	-	100	mA
Laser Diode Reverse Voltage	V _R	Continuous	-	1.0	V
Photodiode Forward Current	I _{MPD}	Continuous	-	2	mA
Photodiode Reverse Voltage	V _{MPD,R}	Continuous	-	10	V
Maximum RF Input Power	Pin_max	60 Seconds	-	25	dBm
Lead Soldering Temperature/Time	-	-	-	260/10	°C/sec
Relative Humidity	RH	Continuous	-	85	%
ESD	-	Human Body Model	-500	+500	V

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.

Electrical/Optical Characteristics

Parameters	Symbol	Conditions/Notes	Min	Typ	Max	Unit
Optical Output Power	P _O	T _{chip} = 25°C I _{op}	6	10	-	dBm
Threshold Current	I _{TH}	T _{chip} = 25°C	-	8	15	mA
Laser Bias Current	I _{OP}		-	-	80	mA
Forward Voltage	V _F	I _{op}	-	1.17	1.8	V
Slope Efficiency	SE	T _{chip} = 25°C, I _{op}	0.07	-	0.3	mW/mA
Thermal Slope Efficiency	TSE	SE(T _c)/SE(25°C) T _{case} = -20°C to 85°C	0.4	-	1.2	-
Module Input Impedance	Z _{in}	-	45	50	55	Ω
MPD Current	I _{MPD}	V _{MPD} = 5V, I _{op}	200	-	2000	μA
MPD Dark Current	I _D	V _{MPD} = 5V, I _{op} = 0 T _{case} = 25°C	-	-	50	nA
Center Wavelength (depending on ITU channel)	λ _c	I _{op}	1525	-	1565	nm
Relative Intensity Noise	RIN	CW, I _{op} , T _{chip} = 25°C 10 MHz - 6000 MHz	-	-160	-150	dB/Hz

Information contained herein is deemed reliable and accurate as of the issue date. EMCORE reserves the right to change the design or specification at any time without notice. EMCORE is a registered trademark of EMCORE Corporation in the U.S. and other countries.

Electrical/Optical Characteristics (continued)

Parameters	Symbol	Conditions/Notes	Min	Typ	Max	Unit
Tracking Error	ΔPf	$I_{MON} = \text{const}$ $ER = 10\log(P_o/2.0)$ [dB]	-1	-	+1	dB
Optical Isolation, $T_{case} = 25^\circ C$	ISO	Single	25	-	-	dB
Spectral Width (-20 dB)	$\Delta\lambda$	I_{op}	-	0.1	1.0	nm
Side Mode Suppression Ratio	SMSR	I_{op}	30	45	-	dB
Optical Return Loss	ORL	$T_{case} = 25^\circ C$	35	-	-	dB
TEC Current	I_{TEC}		-	0.5	1.1	A
TEC Voltage	V_{TEC}		-	-	0.84	V
Thermistor B Constant	-		-	3930	-	K
Thermistor Resistnace @25°C	R_{TH}		9.5	10	10.5	K Ω

1. Referenced to base of TO header.

Wide Bandwidth Path RF Characteristics

1989 Performance Parameters	Symbol	Conditions/Notes	Min	Typ	Max	Unit
Frequency Response Flatness ¹	$ S_{21} $	0.1 to 6.0 GHz	-	-	4	dB _{p-p}
Input Second Order Intercept ¹	IIP2	0.1 to 6.0 GHz	40	-	-	dBm
Input Third Order Intercept ¹	IIP3	0.1 to 6.0 GHz	32	-	-	dBm
Relative Intensity Noise ⁴ (BW = 50 MHz – 6 GHz)	RIN	$T_c = 25^\circ C$, I_{op} Constant opt power	-	-	-155	dB/Hz
		$T_c = -20^\circ C$ to $+85^\circ C$, I_{op} Constant opt power	-	-	-145	dB/Hz

1. I_{op} , $T_{chip} = 25^\circ C$. Test with the laser Input pin matched to a 50 Ω system.

4. Guaranteed by design. Not to be tested in production

Package Outline Drawing (dimensions are in mm)

