1998 Cooled, Coaxial DFB Laser Module with Flex Circuit

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

PRODUCT BRIEF | JULY 2019 WIRELESS

Applications

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

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.

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 Ratings[1]

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
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

Electrical/Optical Characteristics (continued)

Parameters	Symbol	Conditions/Notes	Min	Typ	Max	Unit
Tracking Error	ΔPf	I_{MON} = const ER = 10log(P_O/2.0) [dB]	-1	-	+1	dB
Optical Isolation, T_{case} = 25ºC	ISO	Single	25	-	-	dB
Spectral Width (-20 dB)	Δλ	I_{op}	-	0.1	1.0	nm
Side Mode Suppression Ratio	SMSR	I_{op}	30	45	-	dB
Optical Return Loss	ORL	T_{case} = 25ºC	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 @25ºC	R_{TH}		9.5	10	10.5	KΩ

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	Tc = 25°C, Iop Constant opt power	-	-	-155	dB/Hz
		Tc = -20°C to +85°C, Iop Constant opt power	-	-	-145	dB/Hz

1. I_{op}, T_{chip} = 25°C. Test with the laser Input pin matched to a 50Ω system.
4. Guaranteed by design. Not to be tested in production

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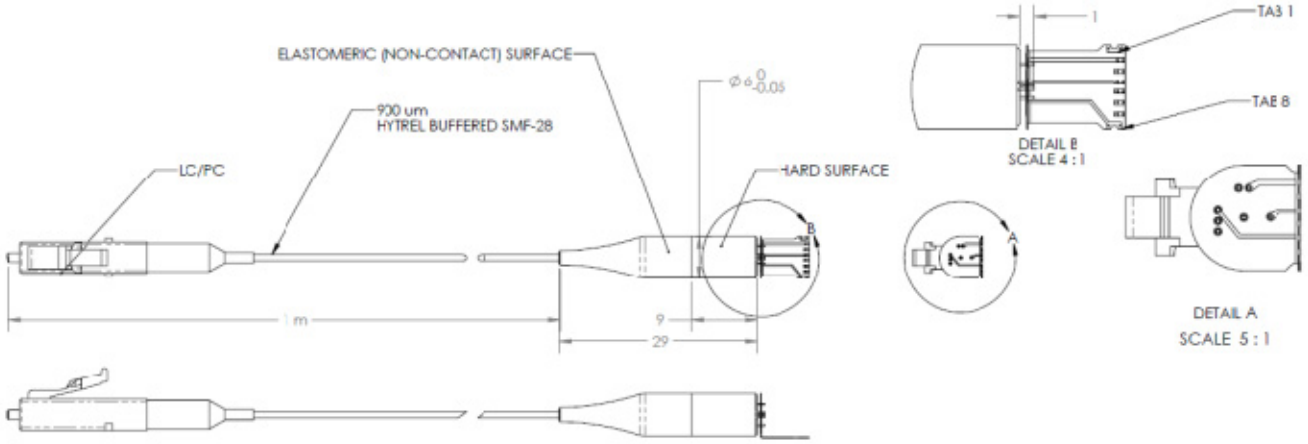
Package Outline Drawing (dimensions are in mm)



Pin Definitions

Flex Tab	Signal Name
1	TEC +
2	TEC -
3	GND, LD Anode, MPD-, Thermistor -
4	RF
5	GND, LD Anode, MPD-, Thermistor -L
6	MPD +
7	I_Bias
8	Thermistor +