HIGH POWER DFB LASERS

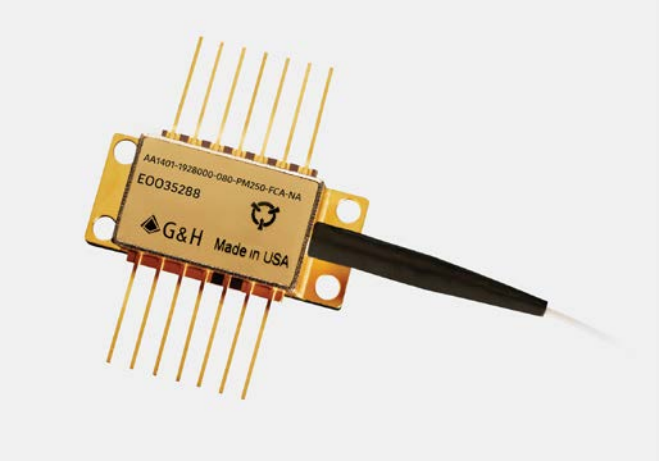
Single frequency lasers in 14-pin butterfly package

PRODUCT DATASHEET

The EM4 high power distributed feedback laser (DFB) is an InGaAs/InP multi-quantum well (MQW) laser diode.

The module is ideal in applications where low relative intensity noise (RIN) and stable polarization-maintaining properties are needed.

The module contains a thermo-electric cooler, thermistor, and monitor detector and is designed and built using EM4's high reliability platform for defense applications.



Key Characteristics

- C-band and L-band wavelengths
  1537-1565 and 1565-1617 nm
  40-100 mW ex-fiber output power options

Features

- ITU grid wavelengths, 50 or 100 GHz spacing
- Low RIN
- PM or SM fiber
- High isolation option
- Laser welded, hermetically sealed
- Built in thermistor and monitor photodiode
- Optional Bias-T
- Tested to Telcordia GR-468 Core/MIL-Std 883

Applications

- Long haul WDM transmission
- RF links
- Seeding
- Pulsing
- Sensing
- CATV

Performance Characteristics

T_C=25°C, continuous wave and beginning of life unless otherwise specified

Optical characteristics	Sym	Condition	Min	Typ	Max	Unit
Operating chip temperature	T_{CHIP}		20		40	°C
Output power	P_{op}		See ordering information			mW
Center frequency	F_{opt}	$P=P_{op}$	See ordering information			THz
Linewidth	A	Source dependent		1		MHz
Relative intensity noise	RIN	$P=P_{op}$, peak value			-150	dBc/Hz
Side mode suppression[1]	SMSR	$P=P_{op}$	30			dB
Optical isolation[1]	ISO	F_{opt} within C-band	30	35		dB
		AA1415-series	50	55		dB
Polarization extinction ratio	PER		17	21		dB
Temperature tuning coefficient	Δν/ΔT °C	Chip temperature		-12.5		GHz/°C
Current tuning coefficient	Δν/ΔI °C	For reference only	400		800	MHz/mA
Relaxation oscillation frequency	F_{relax}	For reference only		6		GHz
Kink screening		No kinks	0.9* I_{op}		1.1* I_{op}	

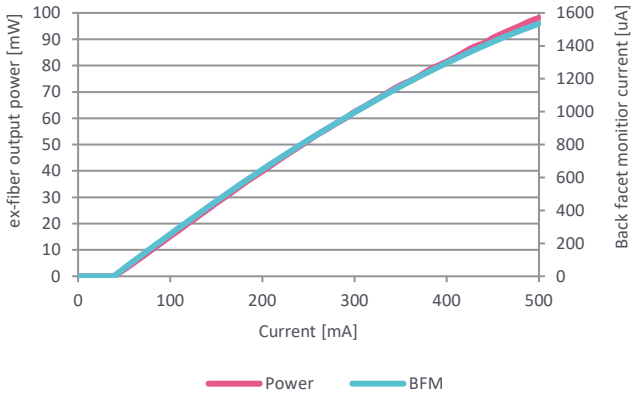
Electrical characteristics	Sym	Condition	Min	Typ	Max	Unit
Threshold current	I_{TH}			50		mA
Laser drive current[2]	I_{op}	40-63 mW models		300	350	mA
		80-100 mW models		375	500	mA
Laser forward voltage	V_F	$I=I_{op}$, Max			3	V
Monitor photo diode current	I_{PD}	$P=P_{OP}$	100			µA
Monitor photo diode dark current	I_D	V_{bias}=-5 V			100	nA
TEC current		T_{amb}=25°C for typ T_{amb}=70°C for max		0.1	4.0	A
TEC voltage		$P=P_{op}$, T_{CHIP}=25°C		0.1	4.0	V
Thermistor resistance	R_{TH}	T = 25°C	9500	10000	10500	Ω
Thermistor β coefficient	β	0 / 50°C		3892		
Thermistor Steinhart-Hart coefficients		$A = 1.1291e^{-3}$ $B = 2.3413e^{-4}$ $C = 8.7674e^{-8}$				

[1] Reference model number AA1408 for units without internal isolator. SMSR not specified for this model.

[2] I_{op} and T_{op} to achieve rated power and frequency at factory test defined on device specific test sheet supplied with each unit.

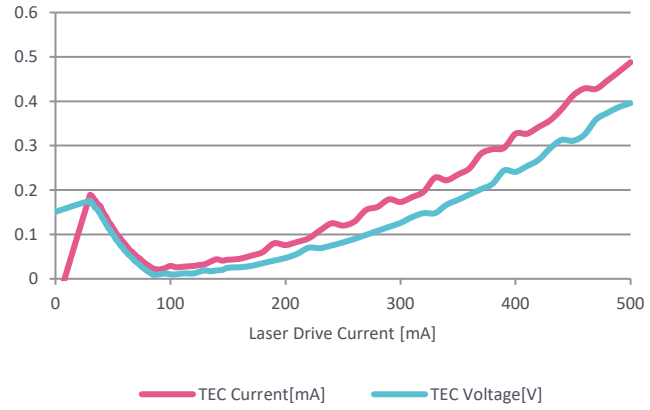
Data Tables (80 mW laser shown)

Typical output power and back facet monitor current vs input current

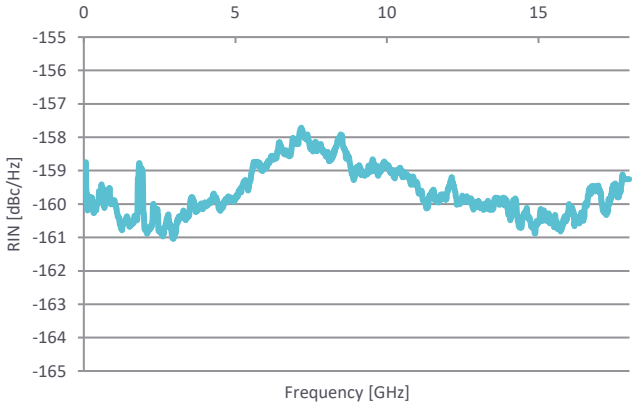


Typical TEC performance

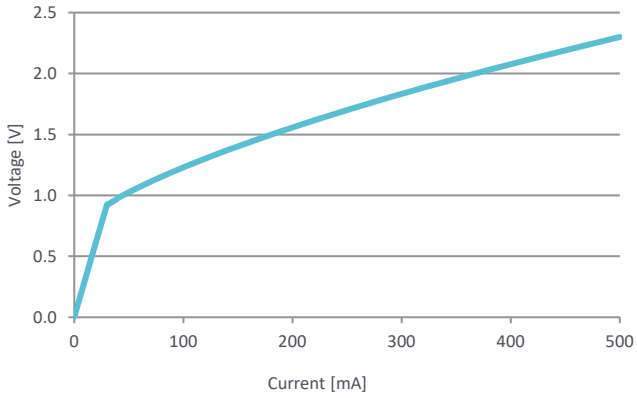
T_c=25°C



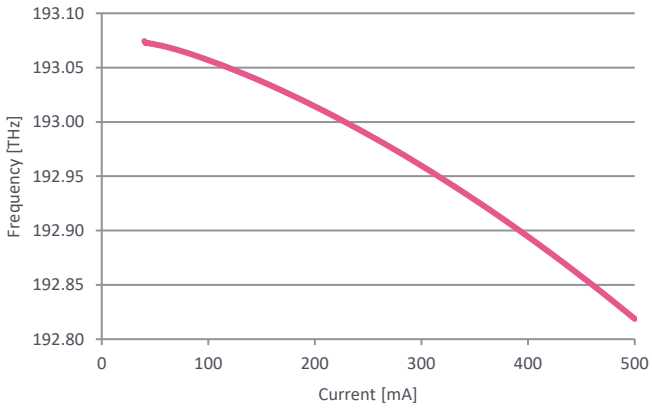
Typical RIN (Relative Intensity Noise)



Typical voltage vs current



Typical current tuning



Fiber Characteristics

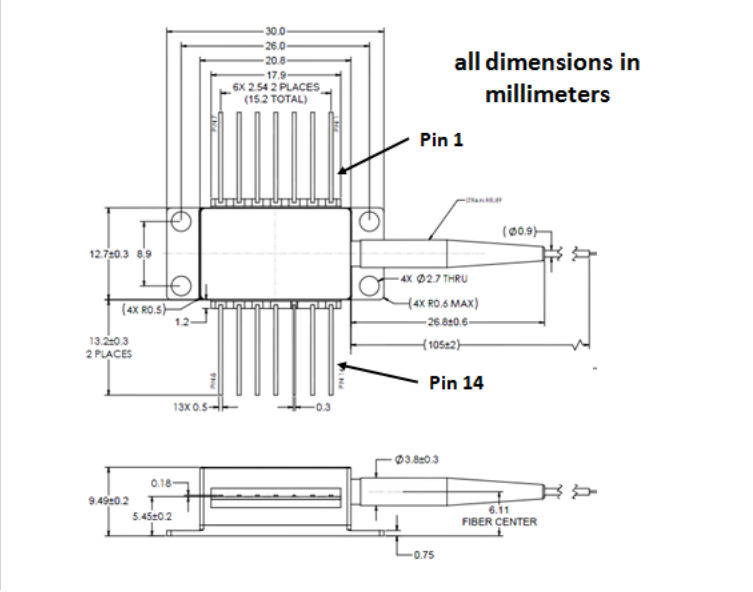
Fiber type	PM or non-PM single mode fiber
Jacket material[2]	Acrylate
Core / outer / buffer[2] diameters	8 µm / 125 µm / 250 µm
Minimum fiber length	1.0 m
Minimum bend radius	35 mm
Proof strength	100 kPSI
Connector[3], output polarization	FC/APC, polarization parallel to slow axis

[2] Optional additional 900 µm loose-tube PVDF buffer recommended for laboratory use.

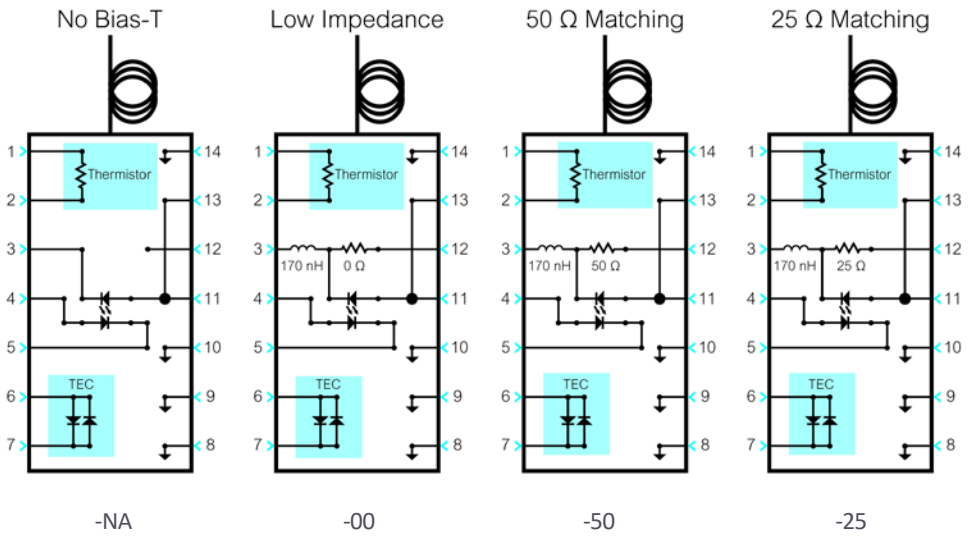
[3] Other connector options available, contact sales for more information.

Pinout and Mechanical Drawing

Pin	Description	Pin	Description
1	Thermistor	14	Case
2	Thermistor	13	Laser anode
3	Laser cathode (Bias)	12	Laser cathode (optional bias T)
4	Monitor PD anode	11	Laser anode
5	Monitor PD cathode	10	Case
6	TEC+	9	Case
7	TEC-	8	Case



Bias-T Options



Absolute Maximum Ratings	Sym	Min	Max	Unit
Storage temperature	T_{STG}	-40	+85	°C
Operating case temperature	T_{OP}	-20	+70	°C
Laser forward current, 40-63 mW models	I_F		350	mA
Laser forward current, 80-100 mW models			500	mA
Laser reverse voltage	V_R		2	V
Photo diode photo current	I_{PD}		10	mA
Photo diode reverse voltage	V_{PD}		20	V
TEC current	I_{TEC}		4	A
TEC voltage	V_{TEC}		4	V
Thermistor current			2	mA
Thermistor voltage			5	V
Lead soldering time			10	S
Lead soldering temperature			250	°C
ESD (human body model)			500	V

- Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only and operation of the device at or beyond these conditions is not implied. Exposure to absolute maximum ratings for extended periods of time may affect device reliability.

Ordering information

Example part number: AA1401-193500-080-PM250-FCA-NA

Order code	①			②						③			④						⑤				⑥	
A	A	1	4			-						-				-						-				-		

①	Model	Standard	1617 nm	100 mW	No isolation[1]	High isolation
	Code	01	02	06	08	15

②	Wavelength	1509 through 1617 nm
	Code	XXXXXX (Wavelength: based on desired frequency)

③	Power	40 mW	50 mW	63 mW	80 mW	100 mW
	Code	040	050	063	080	100

④	Fiber	PM fiber, 250 um tight buffer	PM fiber, 900 um loose buffer	SM fiber, 900 um loose buffer
	Code	PM250	PM900	SM900

⑤	Connector[2]	FC/APC[2]
	Code	FCA

⑥	Bias T	None	0 Ω (Low impedance)	25 Ω	50 Ω
	Code	NA	00	25	50

[1] SMSR not specified for lasers without isolators.

[2] Other connector options available, contact sales for more information.

For further information

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