

HIGH POWER DFB LASERS

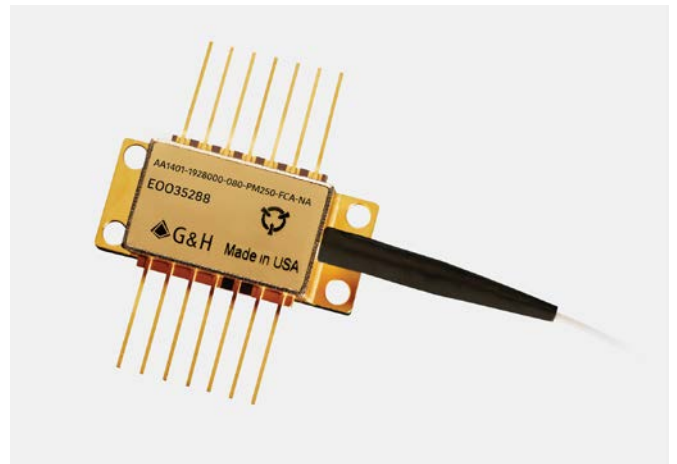
Single frequency lasers in 14-pin butterfly package

AA1427, AA1428 SERIES Featuring High Efficiency TEC and option with kink-free, high PER performance

The Gooch & Housego 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 G&H's high reliability platform for defense applications.



Key Characteristics

- Low RIN
- High PER, PM Fiber Coupled
- Channels available in the 1509-1617nm range
- 40, 50, 80, and 100mW power output options

Features

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

Applications

- RF links
- Seeding
- Pulsing
- Sensing
- CATV

Performance Characteristics

$T_C=25^\circ\text{C}$, continuous wave and beginning of life unless otherwise specified

Optical characteristics	Sym	Condition	Min	Typ	Max	Unit
Operating chip temperature	T_{CHIP}		20		40	$^\circ\text{C}$
Output power	P_{op}		See ordering information			mW
Center frequency	F_{opt}	$P=P_{op}$	See ordering information			THz
Linewidth ¹	$\Delta\nu$	Source dependent		1		MHz
Relative intensity noise	RIN	40mW			-142	dBc/Hz
		50mW			-145	dBc/Hz
		80mW, 100mW			-150	dBc/Hz
Side mode suppression	SMSR	$P=P_{op}$	30			dB
Optical isolation	ISO		30	35		dB
Polarization extinction ratio	PER	AA1427	17			dB
		AA1428	20			dB
Temperature tuning coefficient	$\Delta\lambda / \Delta T$	Chip temperature		-12.5		GHz/ $^\circ\text{C}$
Current tuning coefficient	$\Delta\lambda / \Delta I$	For reference only	400		800	MHz/mA
Relaxation oscillation frequency	F_{relax}	For reference only		6		GHz
Kink-free range		AA1427	$0.9 \cdot I_{op}$		$1.1 \cdot I_{op}$	
		AA1428	$1.1 \cdot I_{TH}$		$1.1 \cdot I_{op}$	

Electrical characteristics	Sym	Condition	Min	Typ	Max	Unit
Threshold current	I_{TH}			50		mA
Laser drive current ²	I_{op}				450	mA
Laser forward voltage	V_F	$I=I_{op}, \text{Max}$			3	V
Monitor photo diode current	I_{PD}	$P=P_{OP}$	100			μA
Monitor photo diode dark current	I_D	$V_{bias}=-5 \text{ V}$			100	nA
TEC current		$T_{amb}=25^\circ\text{C}$ for typ $T_{amb}=65^\circ\text{C}$ for max		0.1	2.2	A
TEC voltage		$P=P_{op}, T_{CHIP}=25^\circ\text{C}$		0.1	6.0	V
Thermistor resistance	R_{TH}	$T = 25^\circ\text{C}$	9500	10000	10500	Ω
Thermistor β coefficient	β	0 / 50°C		3892		
Thermistor Steinhart-Hart Coefficients		$A = 1.1291e^{-3}$	$B = 2.3413e^{-4}$		$C = 8.7674e^{-8}$	

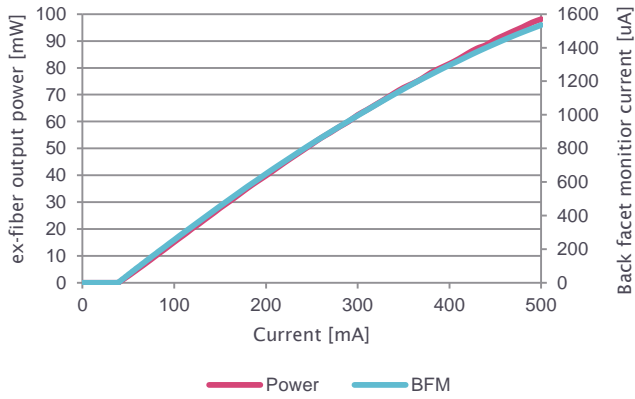
¹ Linewidth depends on current source noise. With G&H EM650 driver devices typically achieve between 100-350kHz linewidth (500kHz max specification).

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.

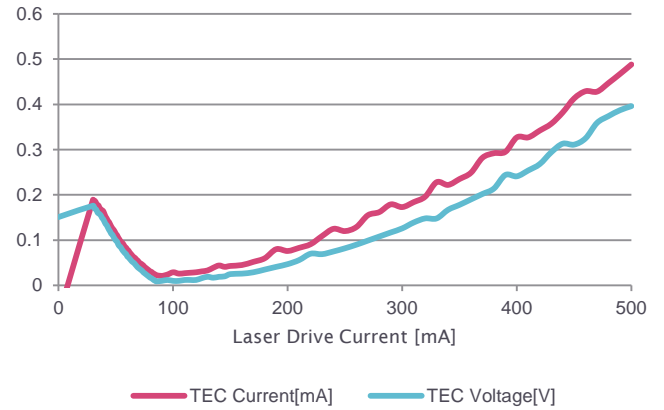
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Data Tables (80 mW laser shown)

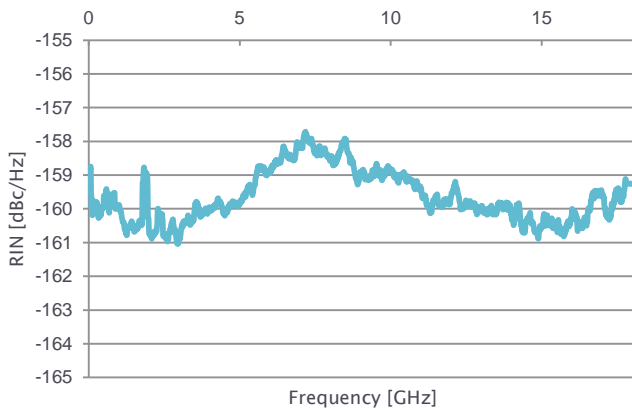
Typical output power and back facet monitor current vs input current



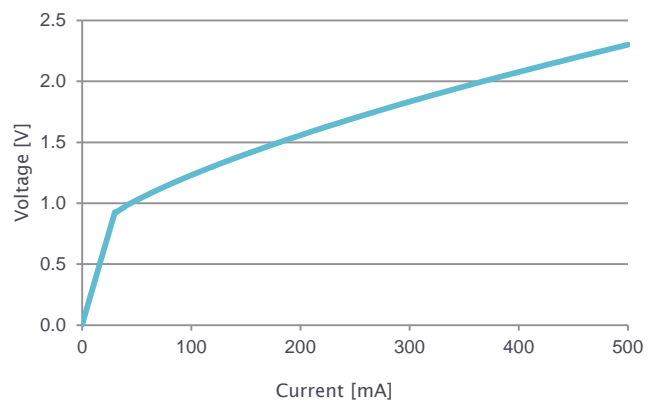
Typical TEC performance
 $T_c = 25^\circ\text{C}$



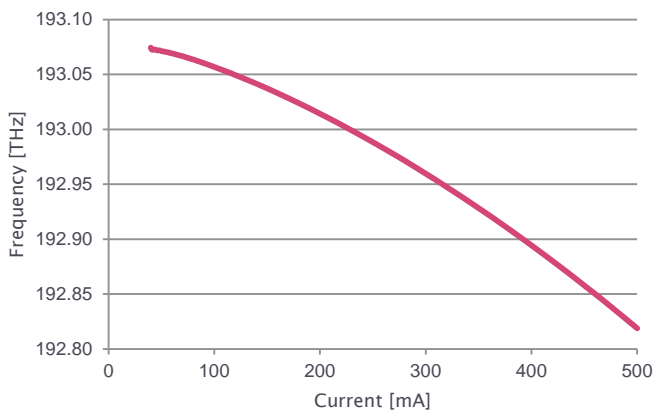
Typical RIN
(Relative Intensity Noise)



Typical voltage vs current



Typical current tuning



Typical TEC Current & Voltage vs Baseplate Temp
($T_{\text{chip}} = 25^\circ\text{C}$)
(TBD)

Fiber Characteristics

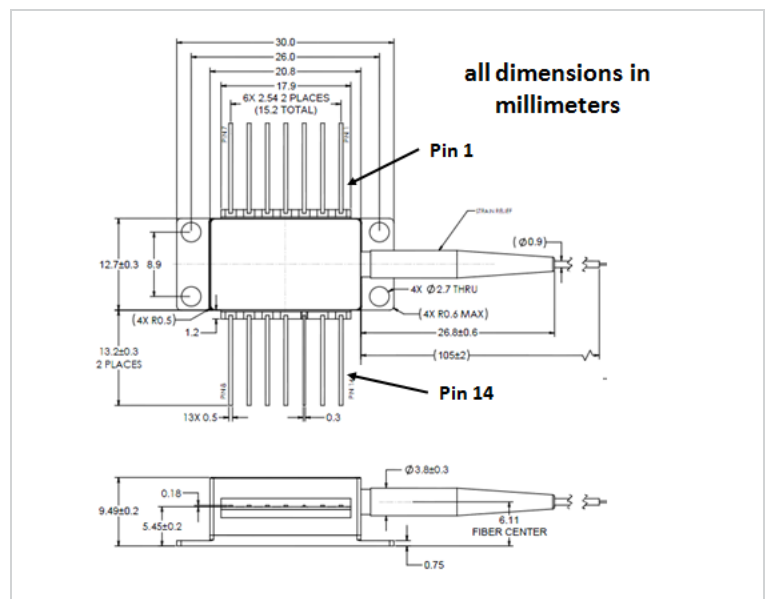
Fiber type	PM or non-PM single mode fiber
Jacket material ²	Acrylate
Core / outer / buffer ² diameters	8 μm / 125 μm / 250 μm
Minimum fiber length	1.0 m
Minimum bend radius	35 mm
Proof strength	100 kPSI
Connector ³ , output polarization	FC/APC, polarization parallel to slow axis

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

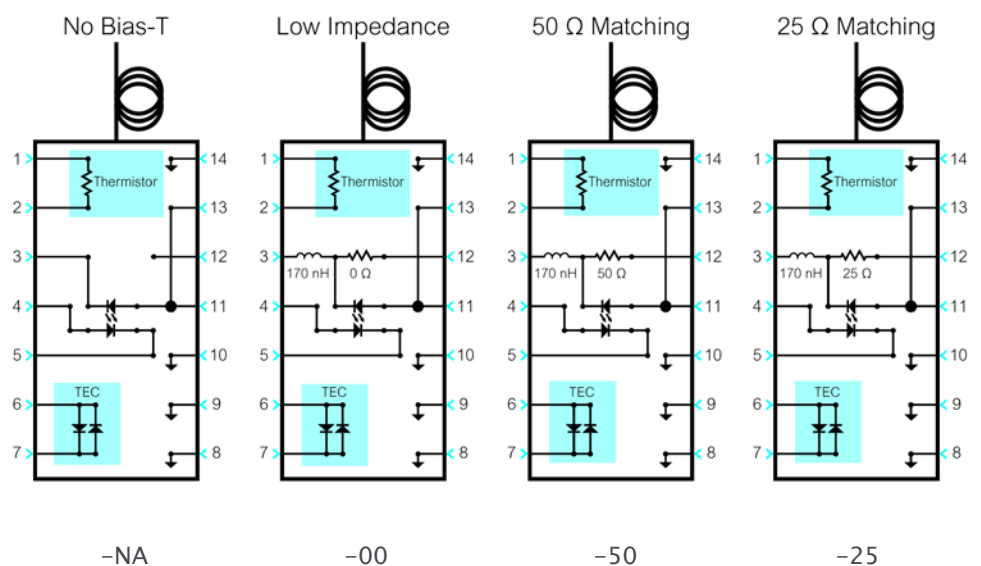
³ Other connector options available, contact sales for more information.

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



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Absolute Maximum Ratings	Sym	Min	Max	Unit
Storage temperature	T _{STG}	-40	+85	°C
Operating case temperature	T _{OP}	-20	+65	°C
Laser forward current	I _F		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}		2.2	A
TEC voltage	V _{TEC}		6	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: AA1427-193500-080-PM250-FCA-NA

Order code		①	②	③	④	⑤	⑥
A	A	1	4	-	-	-	-
①	Model	Standard			High PER, Kink-Free		
	Code	27			28		
②	Wavelength ¹	1509 through 1617 nm					
	Code	XXXXXX (Wavelength: based on desired frequency)					
③	Power	40 mW	50 mW	80 mW	100 mW		
	Code	040	050	080	100		
④	Fiber	PM fiber, 250 um tight buffer			PM fiber, 900 um loose buffer		
	Code	PM250			PM900		
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 Contact sales for channel availability.

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

For further information

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