

HIGH POWER IR DFB LASERS

Single frequency infrared lasers in ruggedized 14-pin butterfly package featuring a High Efficiency TEC option with kink-free, high PER performance

The AA1427 & AA1428 is the latest addition to EM4's family of ultra-robust high power 1550nm DFB lasers.

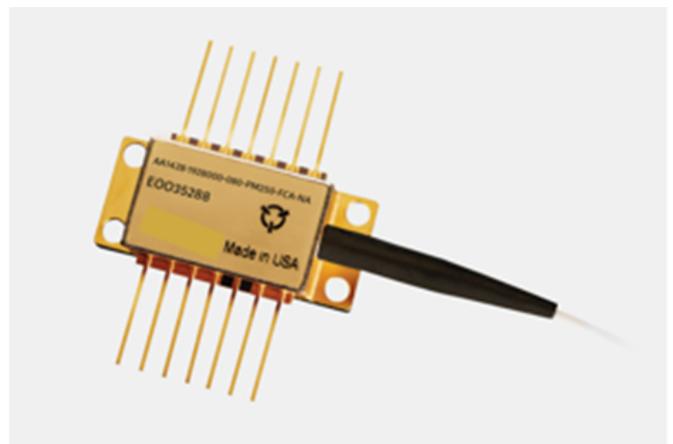
It is available in 40mW, 80mW, and 100mW configurations packaged into a standard 14-pin butterfly package together with our NEW higher efficiency TEC cooler that can result in power consumption savings of up to 50% The AA1428 also provides improved "kink-free" and high PER performance.

As with all our AA14XX DFB lasers the package contains a thermistor, monitor photodiode, a single stage optical isolator, Bias-T and PM single mode fiber.

The AA1427 and AA1428 are ideal for space applications where low electrical power consumption, low Relative Intensity Noise (RIN) and stable polarization-maintaining performance are essential.

The AA1427 and AA1428 are also offered integrated into our EM650 DFB Laser Module which includes an ultra-low noise current source and a high-performance temperature controller in an EMI shielded package. Enabling linewidths below 200kHz and tuning range of ~50GHz.

Please call us if you have additional qualification and screening requirements.



Key Characteristics

- Laser welded, hermetically sealed, rugged packaging for mission critical robustness
- Low electrical power consumption
- C-band and L-band wavelengths
- 40-100 mW ex-fiber output power options

Features

- Integrated High Efficiency TEC
- ITU grid wavelengths
- Low Relative Intensity Noise (RIN)
- Built in thermistor and monitor photodiode
- Optional Bias-T
- Tested to Telcordia GR-468 Core/MIL-Std 883

Applications

- Satellite Communications - SATCOM
- Space and Automotive LIDAR
- RF over Fiber links (RFOF)
- Seed Lasers for MOPA laser architectures
- Remote sensing

AA1427, AA1428 SERIES

Performance Characteristics

T_{Case}=25°C, continuous wave and beginning of life unless otherwise specified

Optical characteristics	Sym	Condition	Min	Typ	Max	Unit
Output power	P _{op}		40mW, 80mW, 100mW options			mW
Wavelength	λ		1525 -1565 / 1617 (ITU grid)			nm
Center frequency	F _{opt}	P=P _{op}	See ordering information			THz
Operating chip temperature	T _{CHIP}		20		40	°C
Linewidth	Δν	Current source dependent	170kHz ¹	<1		MHz
Relative intensity noise	RIN	40mW P=P _{op} , peak value			-142	dBc/Hz
		80mW P=P _{op} , peak value			-148	dBc/Hz
		100mW P=P _{op} , peak value			-150	dBc/Hz
Side mode suppression	SMSR	P=P _{op}	30			dB
Optical isolation	ISO	F _{opt} within C-band	30	35		dB
Polarization extinction ratio	PER	AA1427	17			dB
		AA1428	20			dB
Temperature tuning coefficient	Δλ / ΔT	Chip temperature		-12.5		GHz/°C
Current tuning coefficient	Δν / ΔI	For reference only	400		800	MHz/mA
Relaxation oscillation frequency	F _{relax}	For reference only		6		GHz
Kink screening		AA1427 No kinks	0.9* I _{op}		1.1* I _{op}	
		AA1428 No kinks	I _{th} +25mA		1.1* I _{op}	

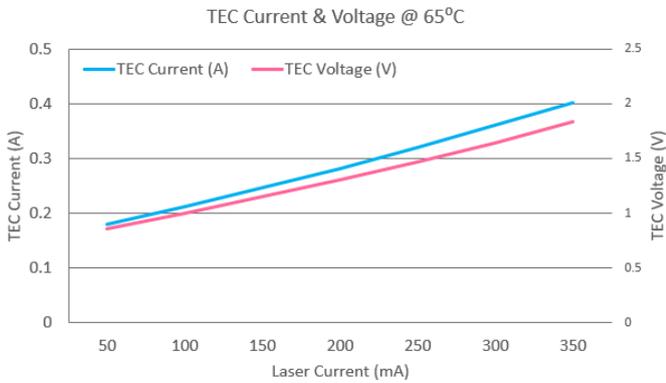
Electrical characteristics	Sym	Condition	Min	Typ	Max	Unit
Threshold current	I _{TH}			50		mA
Laser drive current	I _{op}	40 mW models		200	350	mA
		80 / 100 mW models		330 / 420	450	mA
Laser forward voltage	V _F	I=I _{op} , Max			3	V
Monitor photo diode current	I _{PD}	P=P _{OP}	100			μA
Monitor photo diode dark current	I _D	V _{bias} =-5 V			100	nA
TEC current		T _{amb} =25°C for typ		0.1	2.2	A
TEC voltage		T _{amb} =70°C for max P=P _{op} , T _{CHIP} =25°C		0.1	6.0	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 Achievable with EM650 ultra-low noise current source. ² I_{op} and T_{op} to achieve rated power and frequency at factory test

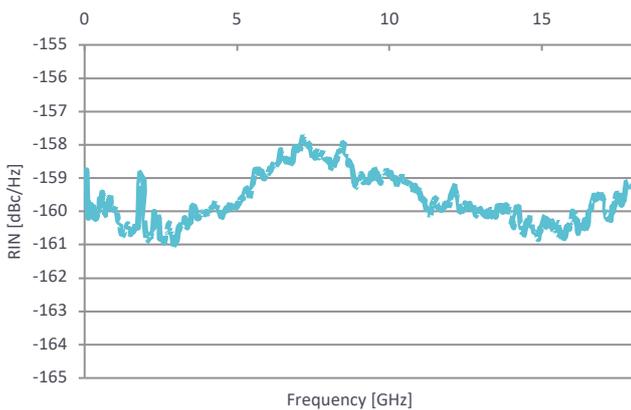
DFB LASER WITH HIGH EFFICIENCY TEC

defined on device specific test sheet supplied with each unit. Typical output power & back facet monitor current vs input current.

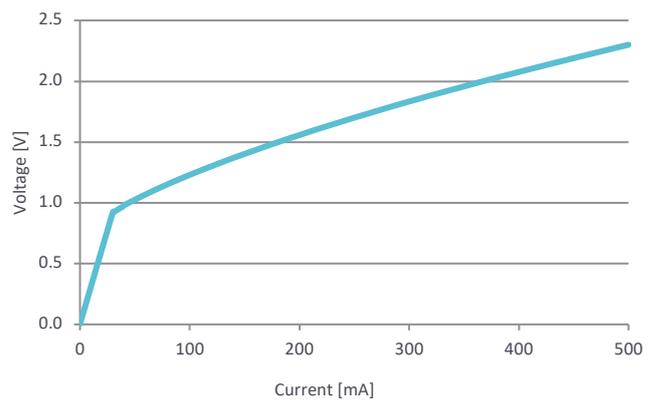
Typical TEC performance – Device running at 40mW max



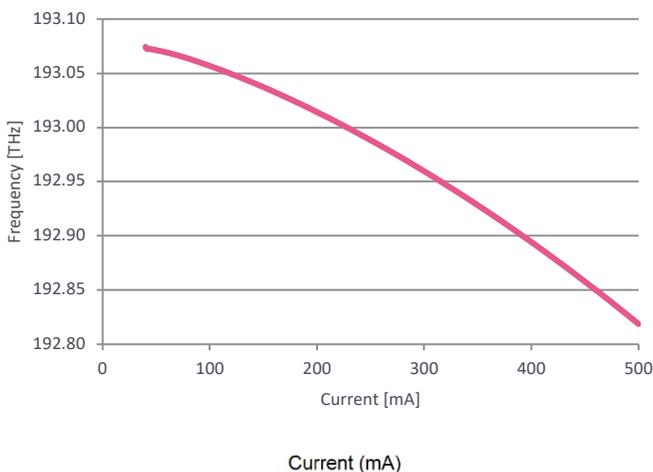
Typical RIN (100mW) (Relative Intensity Noise)



Typical voltage vs current (non-BIAS-T)



Typical current tuning



DFB LASER WITH HIGH EFFICIENCY TEC

Fiber Characteristics

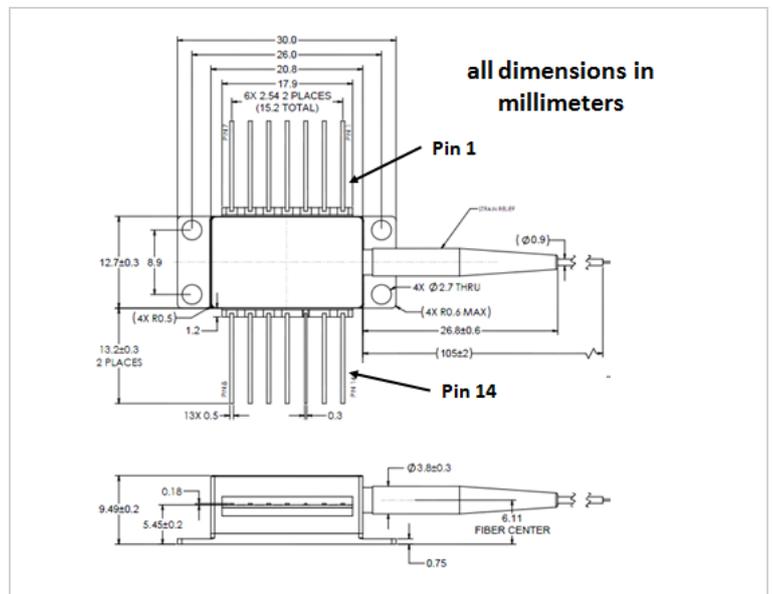
Fiber type	PM or non-PM single mode fiber
Jacket material ²	Acrylate
Core / outer / buffer ² diameters	8 μm / 125 μm / 250 μm
Minimum fiber length	1.0 m
Minimum bend radius	35 mm
Proof strength	100 kPSI
Connector ³ , output polarization	FC/APC, polarization parallel to slow axis

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

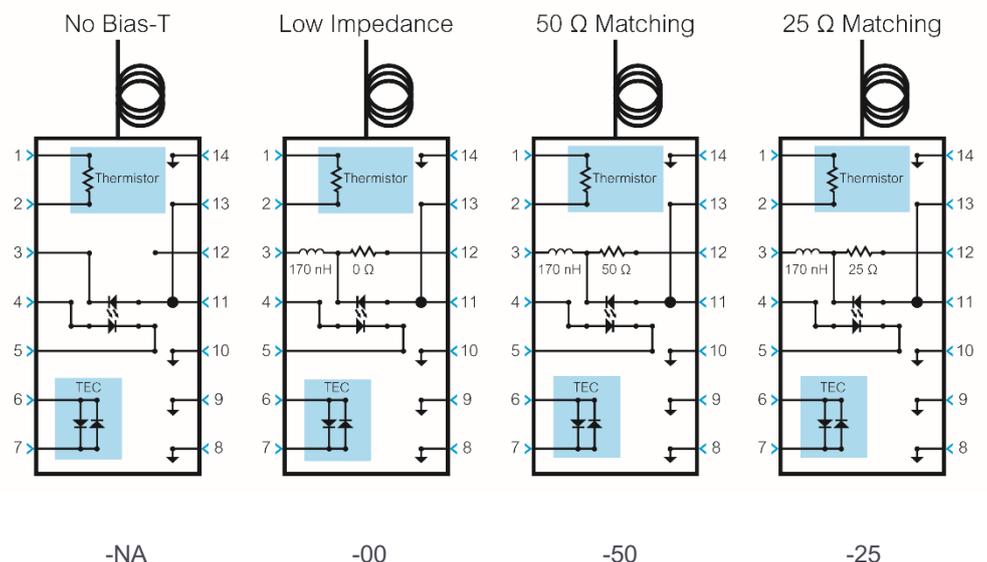
³ Other connector options available, contact sales for more information.

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



DFB LASER WITH HIGH EFFICIENCY TEC

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 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}		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			Kink/PER Improved		
	Code	27			28		
②	Wavelength	1509 through 1617 nm					
	Code	XXXXXX (Wavelength: based on desired frequency)					
③	Power	40 mW	80 mW	100 mW			
	Code	040	080	100			
④	Fiber	PM fiber, 250 um tight buffer			PM fiber, 900 um loose buffer		
	Code	PM250			PM900		
⑤	Connector ¹	FC/APC ¹					
	Code	FCA					
⑥	Bias T	None	0 Ω (Low impedance)	25 Ω	50 Ω		
	Code	NA	00	25	50		

¹ Other connector options available, contact sales for more information.

For further information

T: +1-781-275-7501

E: em4-sales@luminarsemi.com

EM4photonics.com