Datasheet

EYP-DFB-0760-00012-1500-BFY12-0005

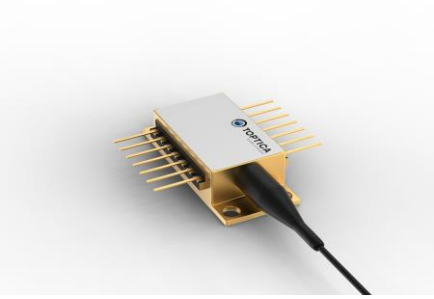
Revision 0.90

2023-05-25

SINGLE FREQUENCY LASER
DFB Laser

General Product Information

Product	Application
Tunable 760 nm DFB Laser	Spectroscopy
with hermetic 14-Pin Butterfly Housing (RoHS compliant)	Metrology
including Monitor Diode, Thermoelectric Cooler and Thermistor	Oxygen Detection
with PM Fiber, integrated µ-Isolator and Angled Physical Contact (APC)	



Absolute Maximum Ratings

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Storage Temperature	T_S	° C	-40		85	Stress in excess of one of the Absolute Maximum Ratings may damage the laser. Please note that a damaging optical power level may occur although the maximum current is not reached. These are stress ratings only, and functional operation at these or any other conditions beyond those indicated under Recommended Operational Conditions is not implied.
Operational Temperature at Case	T_C	° C	-15		70	
Operational Temperature at Chip	T_{chip}	° C	10		50	
Forward Current	I_F	mA			180	
Reverse Voltage	V_R	V			2	
Output Power	P_{opt}	mW			14	
TEC Current	I_{TEC}	A			1,4	
TEC Voltage	V_{TEC}	V			4,8	

Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Operational Temperature at Case	T_{case}	° C	5		60	
Operational Temperature at Chip	T_{chip}	° C	10		35	
Forward Current	I_F	mA			170	
Output Power	P_{opt}	mW	4		12	ex fiber

Characteristics = 25° C at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	759,9	760,9	761,9	
Target Wavelength	λ_T	nm		760,9		reached betweem 15° and 35° C at P = 12 mW
Mode-hop free Tuning Range	$\Delta\lambda_{tune}$	pm	40			at target wavevelength
Sidemode Suppression Ratio	SMSR	dB	30	45		Popt = 12 mW
Temp. Coefficient of Wavelength	dλ / dT	nm/K		0,06		
Current Coefficient of Wavelength	dλ / dI	nm/mA		0,002		

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SINGLE FREQUENCY LASER
DFB Laser

Characteristics = 25° C at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Laser Current	I_{LD}	mA			170	Popt = 12 mW
Slope Efficiency	η	mW/mA		0,1		
Threshold Current	I_{th}	mA			70	
Polarization Extinction Ratio	PER	dB		20		Popt = 12 mW

Monitor Diode

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Monitor Detector Responsivity	I_{mon} / P_{of}	µA/mW	10		800	5 V

Thermoelectric Cooler

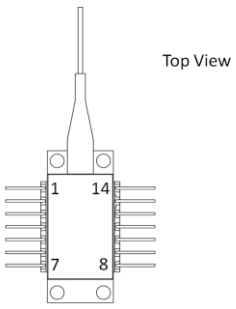
Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Current	I_{TEC}	A		0,4		Popt = 12 mW, ΔT = 30 K
Voltage	U_{TEC}	V		1,5		Popt = 12 mW, ΔT = 30 K
Power Dissipation (total loss at case)	P_{loss}	W		0,5		Popt = 12 mW, ΔT = 30 K
Temperature Difference	ΔT	K			50	Popt = 12 mW, ΔT = |Tcase - TLD|

Thermistor (Standard NTC Type)

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Resistance	R	kW		10		25° C
Beta Coefficient	b			3892		0° … 50° C
Steinhart & Hart Coefficient A	A			1.1293×10^{-3}		
Steinhart & Hart Coefficient B	B			2.3410×10^{-4}		
Steinhart & Hart Coefficient C	C			8.7755×10^{-8}		

Pin Assignment

1	Thermoelectric Cooler (+)	14	Thermoelectric Cooler (-)
2	Thermistor	13	Case
3	Photo Diode Anode	12	not connected
4	Photo Diode Cathode	11	Laser Diode Cathode
5	Thermistor	10	Laser Diode Anode
6	not connected	9	not connected
7	not connected	8	not connected



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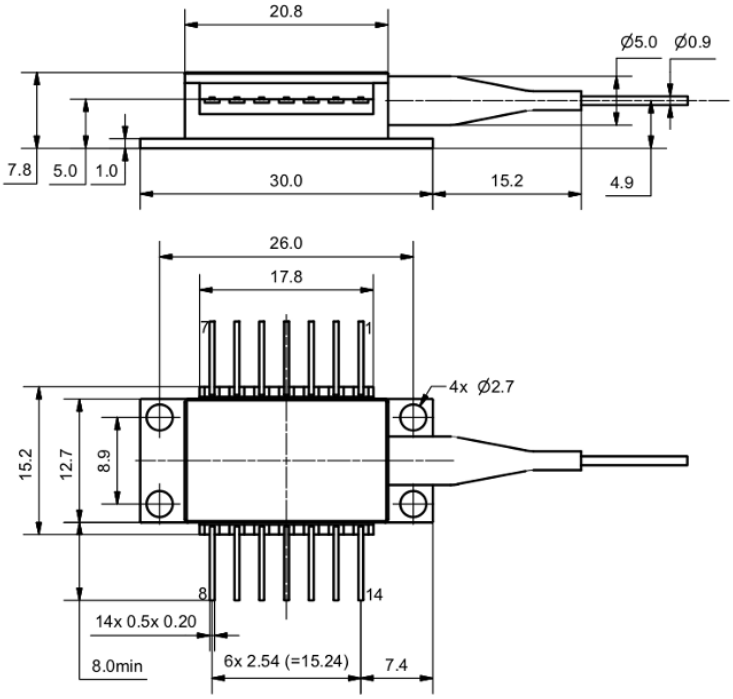
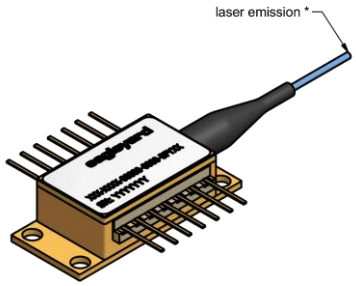
SINGLE FREQUENCY LASER
DFB Laser

Package Drawings





AIZ-16-0222-1415

Fiber and Connector Type (Output)

Parameter		Measurement Conditions / Comments
PM Fiber	900 / 125 / 5.5 µm, UV/Polyester-elastomer Coating (l = 1 +/-0.1 m)	
Connector	FC/APC (narrow key / 2mm)	

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SINGLE FREQUENCY LASER
DFB Laser

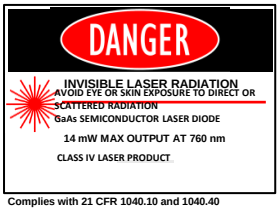
Unpacking, Installation and Laser Safety

Unpacking the laser diodes should only be done at electrostatic safe workstations (EPA). Though protection against electro static discharge (ESD) is implemented in the laser package, charges may occur at surfaces. Please store this product in its original package at a dry, clean place until final use. During device installation, ESD protection has to be maintained.

IEC-60825-1

A laser diode is sensitive against optical feedback, so an optical isolator may be required in order to avoid any disturbance of the emission spectrum. Operating at moderate temperatures on proper heat sinks will contribute to a long lifetime of the diode.

Each laser diode will come with an individual test protocol verifying the parameters given in this document.



Complies with 21 CFR 1040.10 and 1040.40

Avoid direct and/or indirect exposure to the free running beam. Collimating and focussing the free running beam with optics as common in optical instruments will increase threat to the human eye.

Performance figures, data and any illustrative material provided in this specification are typical and must be specifically confirmed in writing by eagleyard Photonics before they become applicable to any particular order or contract. In accordance with the eagleyard Photonics policy of continuous improvement specifications may change without notice.

DATA SHEET

EYP-DFB-0760-00040-1500-BFW01-0005

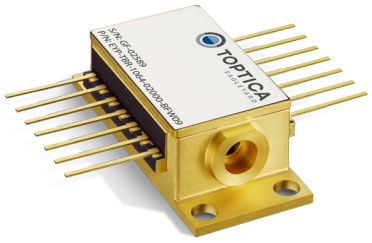
Revision 0.94

2020-11-11

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

General Product Information

Product	Application
Tunable 760 nm DFB Laser	Spectroscopy
with hermetic 14 Pin Butterfly Housing (RoHS compliant)	Metrology
including Monitor Diode, Thermoelectric Cooler and Thermistor	Oxygen Detection
with integrated Beam Collimation	



Absolute Maximum Ratings

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Storage Temperature	T_S	°C	-40		85	Stress in excess of one of the Absolute Maximum Ratings may damage the laser. Please note that a damaging optical power level may occur although the maximum current is not reached. These are stress ratings only, and functional operation at these or any other conditions beyond those indicated under Recommended Operational Conditions is not implied.
Operational Temperature at Case	T_C	°C	-40		85	
Operational Temperature at Laser Chip	T_{LD}	°C	10		50	
Forward Current	I_F	mA			130	
Reverse Voltage	V_R	V			2	
Output Power	P_{opt}	mW			50	
TEC Current	I_{TEC}	A			1.1	
TEC Voltage	V_{TEC}	V			2.8	

Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Operational Temperature at Case	T_{case}	°C	-20		65	
Operational Temperature at Laser Chip	T_{LD}	°C	10		35	measured by integrated thermistor
Forward Current	I_F	mA			120	
Output Power	P_{opt}	mW	10		40	

Characteristics at T_{LD} = 25° C at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	759.9	760.9	761.9	
Target Wavelength	λ_T	nm		760.9		reached within T_{LD} = 10° and 35° C at 40 mW
Linewidth (FWHM)	$\Delta\lambda$	MHz		2		P_{opt} = 40 mW
Mode-hop free Tuning Range	$\Delta\lambda_{tune}$	pm	40			at target wavevelength
Sidemode Supression Ratio	SMSR	dB	30	50		P_{opt} = 40 mW

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SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Characteristics at T_{LD} = 25° C at BOL cont'd

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Temperature Coefficient of Wavelength	$d\lambda / dT$	nm / K		0.06		
Current Coefficient of Wavelength	$d\lambda / dI$	nm / mA		0.002		
Laser Current @ P_{opt} = 40 mW	I_{LD}	mA			120	
Slope Efficiency	η	W / A	0.6	0.8	1.3	
Threshold Current	I_{th}	mA			70	
Divergence parallel (FWHM)	$\Theta_{\parallel}$	°		0.1		parallel to the base plate of the housing (see p. 3)
Divergence perpendicular (FWHM)	$\Theta_{\perp}$	°		0.1		perpendicular to base plate of the housing (see p. 3)
Beam Diameter horizontal	$d_{\parallel}$	mm		1.0	1.2	parallel to the base plate of the housing (see p. 3)
Beam Diameter vertical	$d_{\perp}$	mm		0.8	1.2	perpendicular to base plate of the housing (see p. 3)
Degree of Polarization	DOP	%		90		P_{opt} = 40 mW; E field perpendicular to base plate

Monitor Diode

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Monitor Detector Responsivity	I_{mon} / P_{opt}	µA/mW	3		60	U_R = 5 V

Thermoelectric Cooler

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Current	I_{TEC}	A		0.4		P_{opt} = 40 mW, ΔT = 20 K
Voltage	U_{TEC}	V		1.3		P_{opt} = 40 mW, ΔT = 20 K
Power Dissipation (total loss at case)	P_{loss}	W		0.4		P_{opt} = 40 mW, ΔT = 20 K
Temperature Difference	ΔT	K			50	P_{opt} = 40 mW, ΔT = |Tcase - TLD|

Thermistor (Standard NTC Type)

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Resistance	R	kΩ		10		T_{LD} = 25° C
Beta Coefficient	β			3892		$R_1 / R_2 = e^{\beta (1/T_1 - 1/T_2)}$ at T_{LD} = 0° … 50° C
Steinhart & Hart Coefficient A	A			1.1293×10^{-3}		$1/T = A + B(\ln R) + C(\ln R)^3$
Steinhart & Hart Coefficient B	B			2.3410×10^{-4}		T: temperature in Kelvin
Steinhart & Hart Coefficient C	C			8.7755×10^{-8}		R: resistance at T in Ohm

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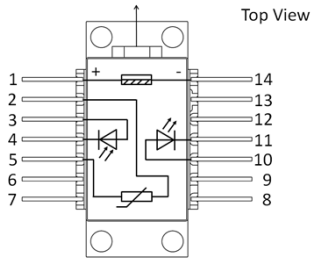
Revision 0.94

2020-11-11

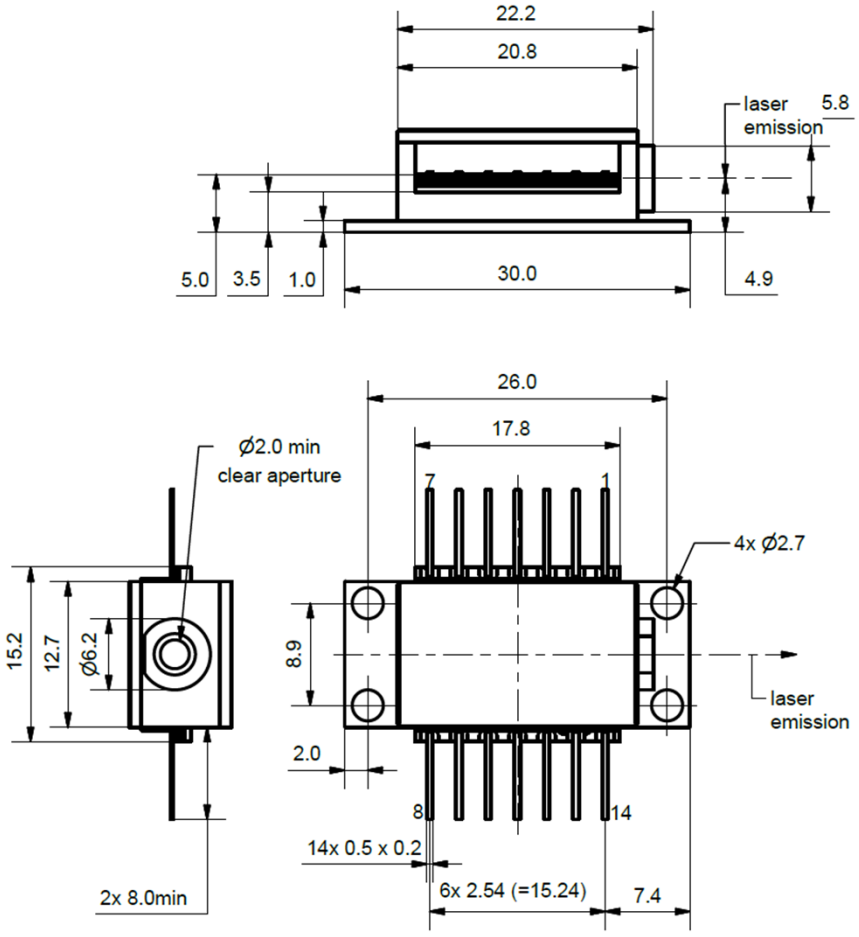
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Pin Assignment

1	Thermoelectric Cooler (+)	14	Thermoelectric Cooler (-)
2	Thermistor	13	Case
3	Photodiode (Anode)	12	not connected
4	Photodiode (Cathode)	11	Laser Diode (Cathode)
5	Thermistor	10	Laser Diode (Anode)
6	not connected	9	not connected
7	not connected	8	not connected



Package Drawings



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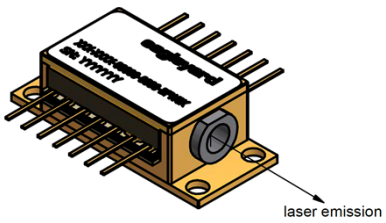

Caution. Excessive mechanical stress on the package can lead to a damage of the laser.
See instruction manual on www.eagleyard.com

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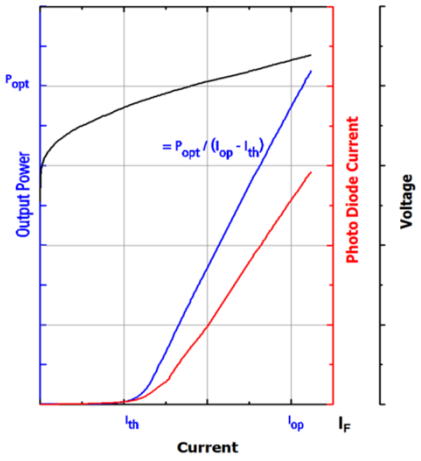
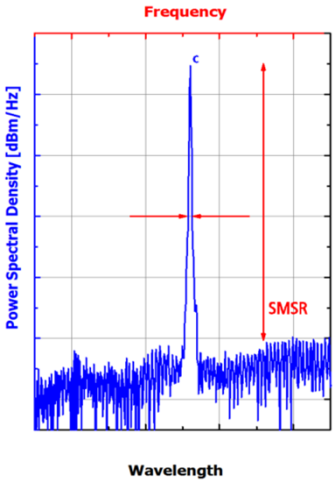
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Typical Measurement Results

Output Power vs. Current



Spectra at Specified Optical Output Power



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Unpacking, Installation and Laser Safety

Unpacking the laser diodes should only be done at electrostatic safe workstations (EPA). Though protection against electro static discharge (ESD) is implemented in the laser package, charges may occur at surfaces. Please store this product in its original package at a dry, clean place until final use. During device installation, ESD protection has to be maintained.

The DFB laser is sensitive against optical feedback, so an optical isolator may be required in order to avoid any disturbance of the emission spectrum. Operating at moderate temperatures on proper heat sinks will contribute to a long lifetime of the diode.

Avoid direct and/or indirect exposure to the free running beam. Collimating and focussing the free running beam with optics as common in optical instruments will increase threat to the human eye.

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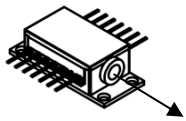
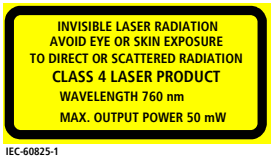


Laser Emission



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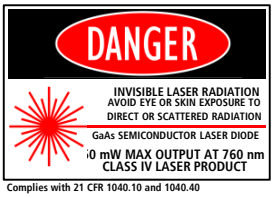


Complies with 21 CFR 1040.10 and 1040.40

DATA SHEET

EYP-DFB-0760-00040-1500-TOC03-0005

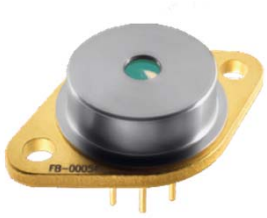
Revision 1.08

2020-04-30

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

General Product Information

Product	Application
Tunable 760 nm DFB Laser	Spectroscopy
with hermetic 8-Pin TO Package (RoHS compliant)	Metrology
including Monitor Diode, Thermoelectric Cooler and Thermistor	Oxygen Detection



Absolute Maximum Ratings

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Storage Temperature	T_S	°C	-40		85	Stress in excess of one of the Absolute Maximum Ratings may damage the laser. Please note that a damaging optical power level may occur although the maximum current is not reached. These are stress ratings only, and functional operation at these or any other conditions beyond those indicated under Recommended Operational Conditions is not implied.
Operational Temperature at Case	T_C	°C	-20		75	
Operational Temperature at Laser Chip	T_{LD}	°C	10		50	
Forward Current	I_F	mA			130	
Reverse Voltage	V_R	V			2	
Output Power	P_{opt}	mW			50	
TEC Current	I_{TEC}	A			1.8	
TEC Voltage	V_{TEC}	V			3.2	

Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Operational Temperature at Case	T_{case}	°C	-20		65	
Operational Temperature at Laser Chip	T_{LD}	°C	10		35	measured by integrated thermistor
Forward Current	I_F	mA			120	
Output Power	P_{opt}	mW	10		40	

Characteristics at T_{LD} = 25° C at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	759.9	760.9	761.9	see images on page 4
Target Wavelength	λ_T	nm		760.9		reached within T_{LD} = 10° and 35° C at 40 mW
Linewidth (FWHM)	$\Delta\lambda$	MHz		2		P_{opt} = 40 mW
Sidemode Supression Ratio	SMSR	dB	30	50		P_{opt} = 40 mW
Temperature Coefficient of Wavelength	$d\lambda / dT$	nm / K		0.06		
Current Coefficient of Wavelength	$d\lambda / dI$	nm / mA		0.002		
Mode-hop free Tuning Range	$\Delta\lambda_{tune}$	pm	40			at target wavevelength

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2020-04-30

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Characteristics at T_{LD} = 25° C at BOL cont'd

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Laser Current @ P_{opt} = 40 mW	I_{LD}	mA			120	
Slope Efficiency	η	W / A	0.6	0.8	1.3	
Threshold Current	I_{th}	mA			70	
Divergence parallel (FWHM)	$\Theta_{\parallel}$	°		8		parallel to short axis of the housing (see p. 3)
Divergence perpendicular (FWHM)	$\Theta_{\perp}$	°		21		parallel to long axis of the housing (see p. 3)
Degree of Polarization	DOP	%		90		P_{opt} = 40 mW; E field parallel to long axis of housing

Monitor Diode

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Monitor Detector Responsivity	I_{mon} / P_{opt}	µA/mW	1.5		50	U_R = 5 V

Thermoelectric Cooler

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Current	I_{TEC}	A		0.4		P_{opt} = 40 mW, ΔT = 20 K
Voltage	U_{TEC}	V		0.8		P_{opt} = 40 mW, ΔT = 20 K
Power Dissipation (total loss at case)	P_{loss}	W		0.5		P_{opt} = 40 mW, ΔT = 20 K
Temperature Difference	ΔT	K			50	P_{opt} = 40 mW, ΔT = |Tcase - TLD|

Thermistor (Standard NTC Type)

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Resistance	R	kΩ		10		T_{LD} = 25° C
Beta Coefficient	β			3892		$R_1 / R_2 = e^{\beta (1/T_1 - 1/T_2)}$ at T_{LD} = 0° … 50° C
Steinhart & Hart Coefficient A	A			1.1293×10^{-3}		$1/T = A + B(\ln R) + C(\ln R)^3$
Steinhart & Hart Coefficient B	B			2.3410×10^{-4}		T: temperature in Kelvin
Steinhart & Hart Coefficient C	C			8.7755×10^{-8}		R: resistance at T in Ohm

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Revision 1.08

2020-04-30

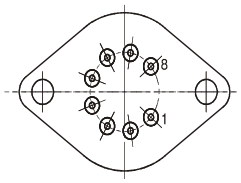
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Pin Assignment

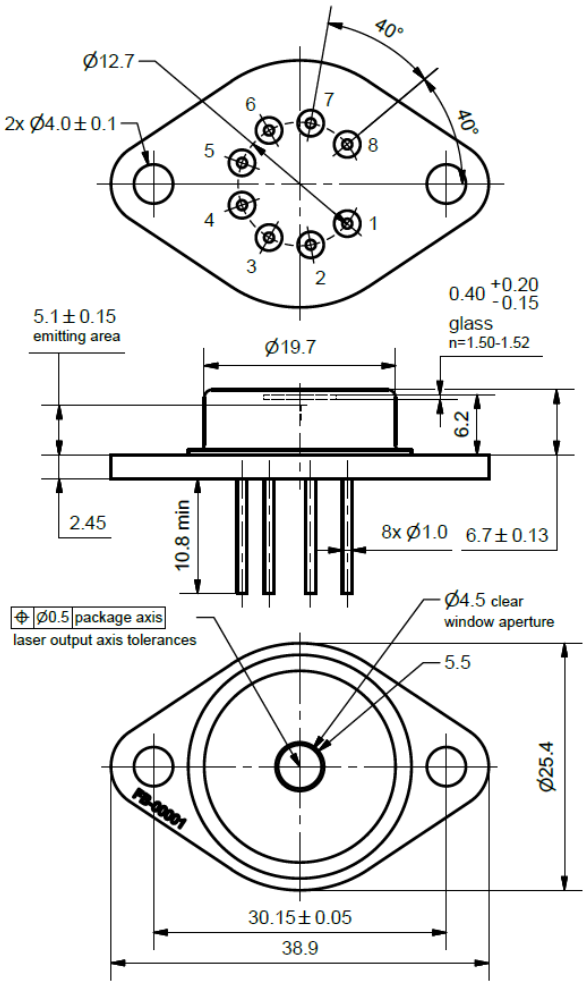
1	Thermoelectric Cooler (+)	5	Laser Diode Anode
2	Thermistor	6	Monitor Diode Anode
3	Thermistor	7	Photo Diode Cathode
4	Laser Diode Cathode	8	Thermoelectric Cooler (-)

All 8 pins are isolated from case.

bottom view

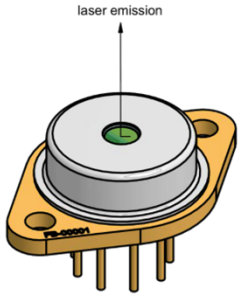


Package Drawings



AIZ-16-311-1543-B

laser emission



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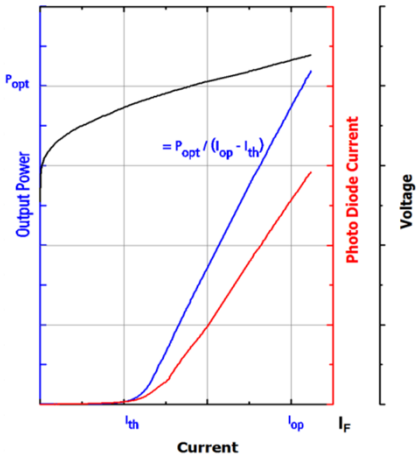
Revision 1.08

2020-04-30

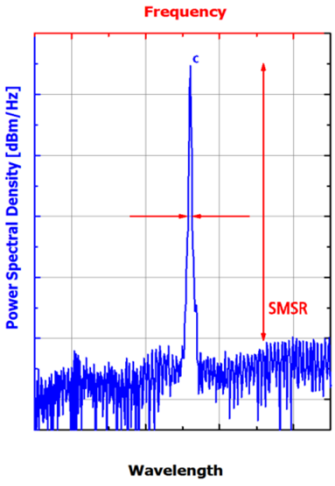
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Typical Measurement Results

Output Power vs. Current



Spectra at Specified Optical Output Power



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Unpacking, Installation and Laser Safety

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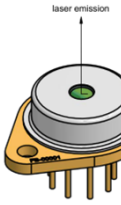
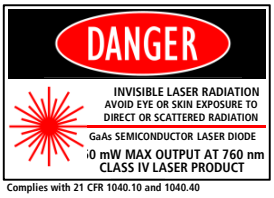


IEC-60825-1



Complies with 21 CFR 1040.10 and 1040.40

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DATA SHEET

EYP-DFB-0760-00040-1500-TOV01-0005

Revision 0.82

2020-04-30

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

General Product Information

Product	Application
760 nm DFB Laser	Oxygen Detection
with hermetic 8 Pin TO Package	
including Monitor Diode, Thermoelectric Cooler and Thermistor	

Absolute Maximum Ratings

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Storage Temperature	T_S	°C	-40		85	Stress in excess of one of the Absolute Maximum Ratings may damage the laser. Please note that a damaging optical power level may occur although the maximum current is not reached. These are stress ratings only, and functional operation at these or any other conditions beyond those indicated under Recommended Operational Conditions is not implied.
Operational Temperature at Case	T_C	°C	-20		75	
Operational Temperature at Laser Chip	T_{LD}	°C	10		50	
Forward Current	I_F	mA			130	
Reverse Voltage	V_R	V			2	
Output Power	P_{opt}	mW			60	
TEC Current	I_{TEC}	A			1.0	
TEC Voltage	V_{TEC}	V			1.0	

Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Operational Temperature at Case	T_{case}	°C	-20		65	
Operational Temperature at Laser Chip	T_{LD}	°C	10		35	measured by integrated thermistor
Forward Current	I_F	mA			120	
Output Power	P_{opt}	mW	10		40	

Characteristics at T_{LD} = 25° C at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	759.9	760.9	761.9	see images on page 4
Target Wavelength	λ_T	nm		760.9		reached within T_{LD} = 10° and 35° C at 40 mW
Linewidth (FWHM)	$\Delta\lambda$	MHz		2		P_{opt} = 40 mW
Sidemode Supression Ratio	SMSR	dB	30	50		P_{opt} = 40 mW
Temperature Coefficient of Wavelength	$d\lambda / dT$	nm / K		0.06		
Current Coefficient of Wavelength	$d\lambda / dI$	nm / mA		0.002		

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Revision 0.82

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SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Characteristics at T_{LD} = 25° C at BOL cont'd

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Mode-hop free Tuning Range	$\Delta\lambda_{tune}$	pm	40			at target wavevelength
Laser Current @ P_{opt} = 40 mW	I_{LD}	mA			120	
Slope Efficiency	η	W / A	0.6	0.8	1.3	
Threshold Current	I_{th}	mA			70	
Divergence parallel (FWHM)	$\Theta_{\parallel}$	°		8		parallel to Pin 1 - Pin 6 plane (see p. 3)
Divergence perpendicular (FWHM)	$\Theta_{\perp}$	°		21		perpendicular to Pin 1 - Pin 6 plane (see p. 3)
Degree of Polarization	DOP	%		90		P_{opt} = 40 mW; E field perpendicular to Pin 1 - 6 plane

Monitor Diode

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Monitor Detector Responsivity	I_{mon} / P_{opt}	µA/mW		2		U_R = 5 V

Thermoelectric Cooler

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Current	I_{TEC}	A		0.4		P_{opt} = 40 mW, ΔT = 20 K
Voltage	U_{TEC}	V		0.4		P_{opt} = 40 mW, ΔT = 20 K
Power Dissipation (total loss at case)	P_{loss}	W		0.4		P_{opt} = 40 mW, ΔT = 20 K
Temperature Difference	ΔT	K			40	P_{opt} = 40 mW, ΔT = |Tcase - TLD|

Thermistor (Standard NTC Type)

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Resistance	R	kΩ		10		T_{LD} = 25° C
Beta Coefficient	β			3930		$R_1 / R_2 = e^{\beta (1/T_1 - 1/T_2)}$ at T_{LD} = 0° … 50° C
Steinhart & Hart Coefficient A	A			1.029×10^{-3}		$1/T = A + B(\ln R) + C(\ln R)^3$
Steinhart & Hart Coefficient B	B			2.510×10^{-4}		T: temperature in Kelvin
Steinhart & Hart Coefficient C	C			1.051×10^{-7}		R: resistance at T in Ohm

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Revision 0.82

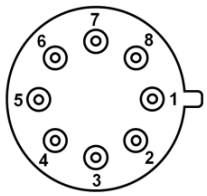
2020-04-30

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Pin Assignment

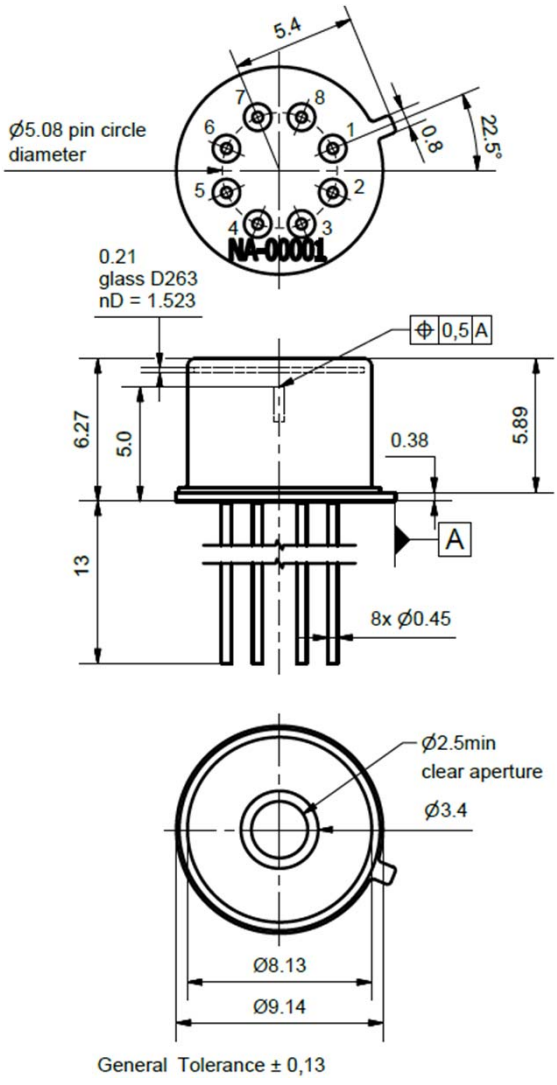
1	Laser Diode Anode	5	Thermistor
2	Laser Diode Cathode	6	Thermistor
3	Thermoelectric Cooler (-)	7	Photo Diode Anode
4	Thermoelectric Cooler (+)	8	Photo Diode Cathode

All 8 pins are isolated from case.



bottom view

Package Drawings



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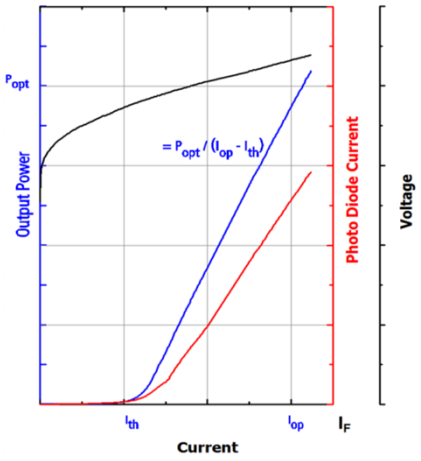
Revision 0.82

2020-04-30

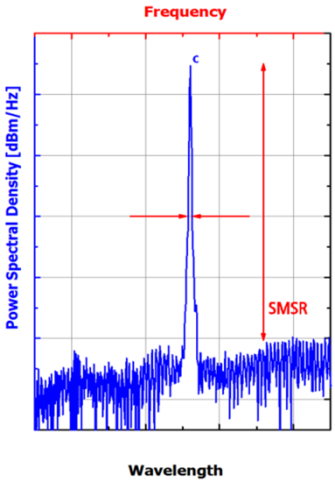
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Typical Measurement Results

Output Power vs. Current



Spectra at Specified Optical Output Power



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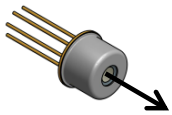
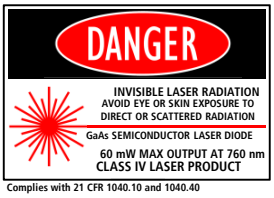


laser emission

IEC-60825-1



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DATA SHEET

EYP-DFB-0780-00020-1500-BFY12-0005

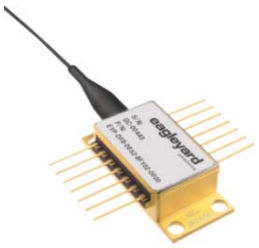
Revision 1.00

2022-12-20

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

General Product Information

Product	Application
780 nm DFB Laser	Spectroscopy (Rb D2 line)
with hermetic 14-Pin Butterfly Housing (RoHS compliant)	Metrology
including Monitor Diode, Thermoelectric Cooler and Thermistor	THz Generation
with PM Fiber, integrated µ-Isolator and Angled Physical Contact (APC)	



Absolute Maximum Ratings

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Storage Temperature	T_S	°C	-40		85	Stress in excess of one of the Absolute Maximum Ratings may damage the laser. Please note that a damaging optical power level may occur although the maximum current is not reached. These are stress ratings only, and functional operation at these or any other conditions beyond those indicated under Recommended Operational Conditions is not implied.
Operational Temperature at Case	T_C	°C	-15		70	
Operational Temperature at Laser Chip	T_{LD}	°C	5		50	
Forward Current	I_F	mA			220	
Reverse Voltage	V_R	V			2	
Output Power	P_{opt}	mW			20	
TEC Current	I_{TEC}	A			1.8	
TEC Voltage	V_{TEC}	V			3.2	

Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Operational Temperature at Case	T_{case}	°C	5		60	
Operational Temperature at Laser Chip	T_{LD}	°C	5		45	measured by integrated Thermistor
Forward Current	I_F	mA			200	
Output Power	P_{opt}	mW	5		20	

Characteristics at T_{LD} = 25° C at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	779	780	781	see images on page 4
Target Wavelength	λ_T	nm		780.24		reached within T_{LD} = 5 ° ... 45° C at 20 mW
Linewidth (FWHM)	$\Delta\lambda$	MHz		0.6	1	P_{opt} = 20 mW
Mode-hop free Tuning Range	$\Delta\lambda_{tune}$	pm	20			> 10 GHz, at target wavelength
Sidemode Supression Ratio	SMSR	dB	30	45		P_{opt} = 20 mW

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SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Characteristics at T_{LD} = 25° C at BOL cont'd

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Temperature Coefficient of Wavelength	$d\lambda / dT$	nm / K		0.06		
Current Coefficient of Wavelength	$d\lambda / dI$	nm / mA		0.003		
Laser Current @ P_{opt} = 20 mW	I_{LD}	mA			200	exfiber
Slope Efficiency	η	W / A		0.2		
Threshold Current	I_{th}	mA			70	
Polarization Extinction Ratio	PER	dB		20		P_{opt} = 20 mW

Monitor Diode

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Monitor Detector Responsivity	I_{mon} / P_{opt}	µA/mW	5		100	U_R = 5 V

Thermoelectric Cooler

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Current	I_{TEC}	A		0.4		P_{opt} = 20 mW, ΔT =30 K
Voltage	U_{TEC}	V		1.5		P_{opt} = 20 mW, ΔT = 30 K
Power Dissipation (total loss at case)	P_{loss}	W		0.5		P_{opt} = 20 mW, ΔT = 30 K
Temperature Difference	ΔT	K			55	P_{opt} = 20 mW, ΔT = |Tcase - TLD|

Thermistor (Standard NTC Type)

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Resistance	R	kΩ		10		T_{LD} = 25° C
Beta Coefficient	β			3892		$R_1 / R_2 = e^{\beta (1/T_1 - 1/T_2)}$ at T_{LD} = 0° … 50° C
Steinhart & Hart Coefficient A	A			1.1293×10^{-3}		$1/T = A + B(\ln R) + C(\ln R)^3$
Steinhart & Hart Coefficient B	B			2.3410×10^{-4}		T: temperature in Kelvin
Steinhart & Hart Coefficient C	C			8.7755×10^{-8}		R: resistance at T in Ohm

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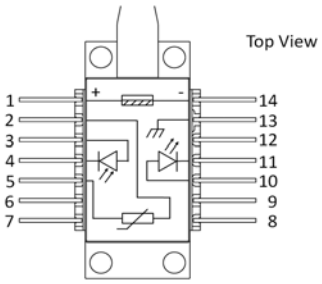
Revision 1.00

2022-12-20

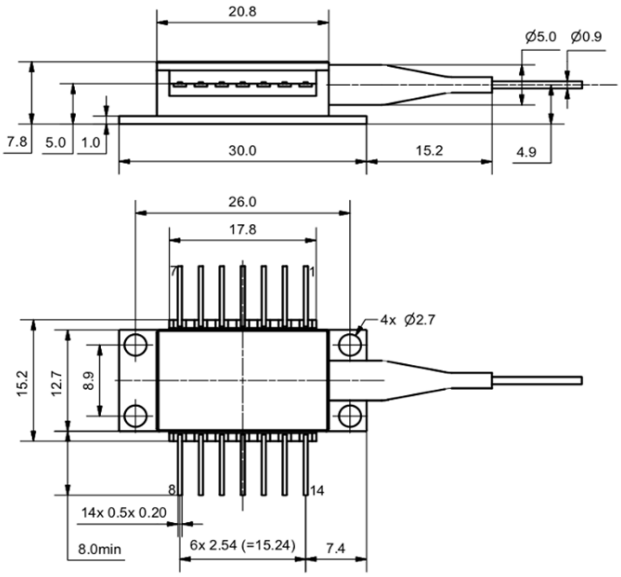
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Pin Assignment

1	Thermoelectric Cooler (+)	14	Thermoelectric Cooler (-)
2	Thermistor	13	Case
3	Photodiode (Anode)	12	not connected
4	Photodiode (Cathode)	11	Laser Diode (Cathode)
5	Thermistor	10	Laser Diode (Anode)
6	not connected	9	not connected
7	not connected	8	not connected



Package Drawings



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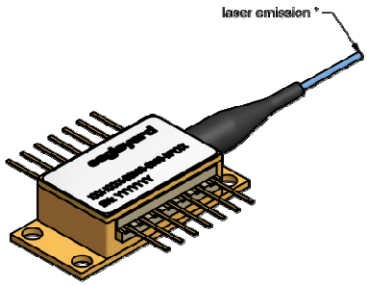
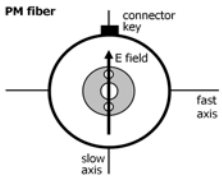


Caution. Excessive mechanical stress on the package can lead to a damage of the laser.
See instruction manual on www.eagleyard.com

Fiber and Connector Type

PM Fiber	900 / 125 / 5.5 µm, UV/Polyester-elastomer Coating (l = 1 +/-0.1 m)
Connector	FC/APC (narrow key / 2mm)
	other types on request

Measurement Conditions / Comments



EYP-DFB-0780-00020-1500-BFY12-0005

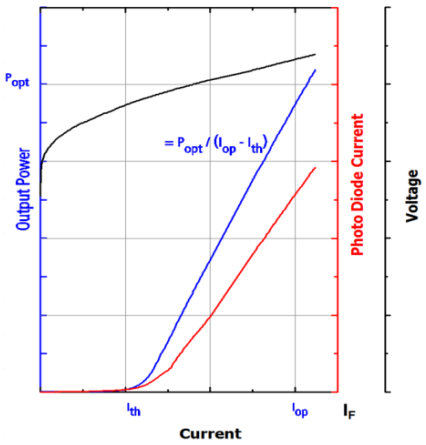
Revision 1.00

2022-12-20

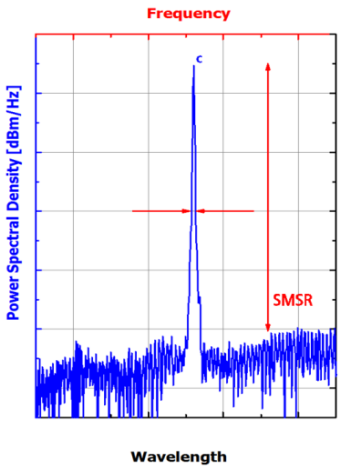
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Typical Measurement Results

Output Power vs. Current



Spectra at Specified Optical Output Power



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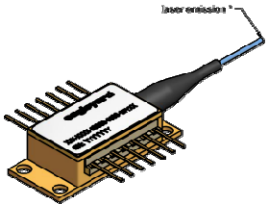


DATA SHEET

EYP-DFB-0780-00040-1500-BFW11-0005

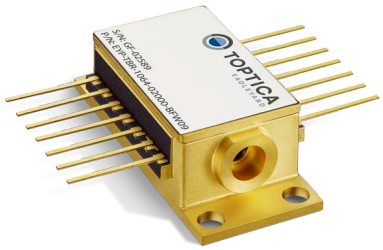
Revision 0.92

2022-01-19

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

General Product Information

Product	Application
780 nm DFB Laser	Spectroscopy (Rb D2 line)
with hermetic 14-Pin Butterfly Housing (RoHS compliant)	Metrology
including Monitor Diode, Thermoelectric Cooler and Thermistor	THz Generation
with integrated µ Isolator and Beam Collimation	



Absolute Maximum Ratings

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Storage Temperature	T_S	°C	-40		85	Stress in excess of one of the Absolute Maximum Ratings may damage the laser. Please note that a damaging optical power level may occur although the maximum current is not reached. These are stress ratings only, and functional operation at these or any other conditions beyond those indicated under Recommended Operational Conditions is not implied.
Operational Temperature at Case	T_C	°C	-40		85	
Operational Temperature at Laser Chip	T_{LD}	°C	5		50	
Forward Current	I_F	mA			190	
Reverse Voltage	V_R	V			2	
Output Power	P_{opt}	mW			50	
TEC Current	I_{TEC}	A			1.1	
TEC Voltage	V_{TEC}	V			2.8	

Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Operational Temperature at Case	T_{case}	°C	-20		65	
Operational Temperature at Laser Chip	T_{LD}	°C	5		45	measured by integrated Thermistor
Forward Current	I_F	mA			180	
Output Power	P_{opt}	mW	10		40	

Characteristics at T_{LD} = 25° C at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	779	780	781	see images on page 4
Target Wavelength	λ_T	nm		780.24		reached within T_{LD} = 5 ° ... 45° C at 40 mW
Linewidth (FWHM)	$\Delta\lambda$	MHz		0.6	1	P_{opt} = 80 mW
Mode-hop free Tuning Range	$\Delta\lambda_{tune}$	pm	25			> 10 GHz, at target wavelength
Sidemode Supression Ratio	SMSR	dB	30	50		P_{opt} = 40 mW

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Revision 0.92

2022-01-19

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Characteristics at T_{LD} = 25° C at BOL cont'd

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Temperature Coefficient of Wavelength	$d\lambda / dT$	nm / K		0.06		
Current Coefficient of Wavelength	$d\lambda / dI$	nm / mA		0.003		
Laser Current @ P_{opt} = 40 mW	I_{LD}	mA			180	
Slope Efficiency	η	W / A	0,3	0,4	0.6	
Threshold Current	I_{th}	mA			70	
Divergence parallel (FWHM)	$\Theta_{\parallel}$	°		0.1		parallel to the base plate of the housing (see p. 3)
Divergence perpendicular (FWHM)	$\Theta_{\perp}$	°		0.1		perpendicular to base plate of the housing (see p. 3)
Beam Diameter horizontal	$d_{\parallel}$	mm		1.0	1.2	parallel to the base plate of the housing (see p. 3)
Beam Diameter vertical	$d_{\perp}$	mm		0.8	1.2	perpendicular to base plate of the housing (see p. 3)
Degree of Polarization	DOP	%		95		P_{opt} = 40 mW; slant polarization (45°), see p. 3

Monitor Diode

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Monitor Detector Responsivity	I_{mon} / P_{opt}	µA/mW	2		40	U_R = 5 V

Thermoelectric Cooler

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Current	I_{TEC}	A		0.4		P_{opt} = 40 mW, ΔT = 20 K
Voltage	U_{TEC}	V		1.3		P_{opt} = 40 mW, ΔT = 20 K
Power Dissipation (total loss at case)	P_{loss}	W		0.5		P_{opt} = 40 mW, ΔT = 20 K
Temperature Difference	ΔT	K			50	P_{opt} = 40 mW, ΔT = |Tcase - TLD|

Thermistor (Standard NTC Type)

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Resistance	R	kΩ		10		T_{LD} = 25° C
Beta Coefficient	β			3892		$R_1 / R_2 = e^{\beta (1/T_1 - 1/T_2)}$ at T_{LD} = 0° … 50° C
Steinhart & Hart Coefficient A	A			1.1293×10^{-3}		$1/T = A + B(\ln R) + C(\ln R)^3$
Steinhart & Hart Coefficient B	B			2.3410×10^{-4}		T: temperature in Kelvin
Steinhart & Hart Coefficient C	C			8.7755×10^{-8}		R: resistance at T in Ohm

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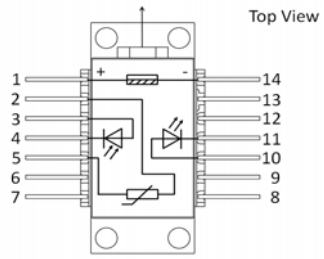
2022-01-19

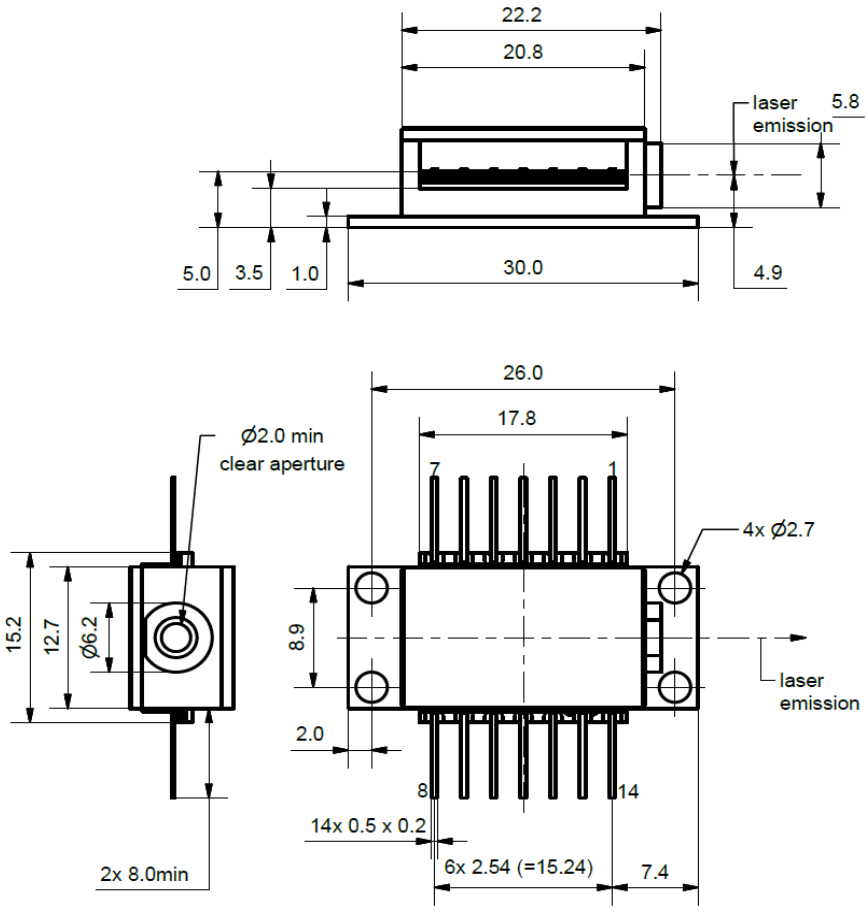
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Pin Assignment

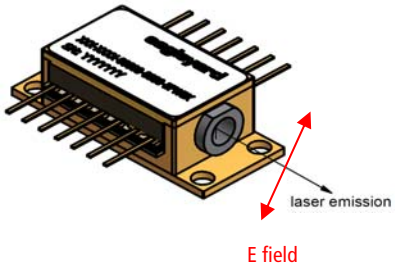
1	Thermoelectric Cooler (+)	14	Thermoelectric Cooler (-)
2	Thermistor	13	Case
3	Photodiode (Anode)	12	not connected
4	Photodiode (Cathode)	11	Laser Diode (Cathode)
5	Thermistor	10	Laser Diode (Anode)
6	not connected	9	not connected
7	not connected	8	not connected



Package Drawings



AIZ-20-1029-0928



E field

Caution. Excessive mechanical stress on the package can lead to a damage of the laser.
See instruction manual on www.eagleyard.com

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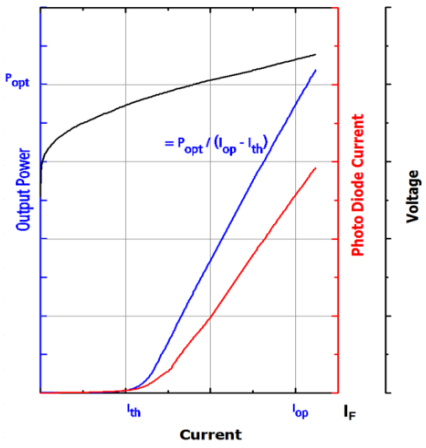
2022-01-19

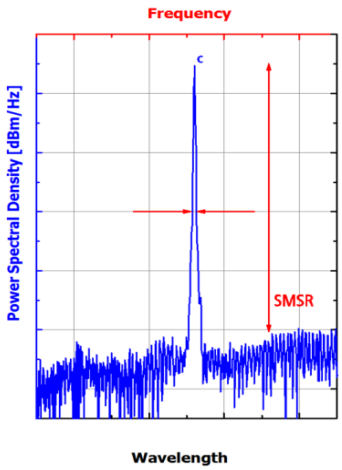
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Typical Measurement Results

Output Power vs. Current



Spectra at Specified Optical Output Power



Performance figures, data and any illustrative material provided in this specification are typical and must be specifically confirmed in writing by eagleyard Photonics before they become applicable to any particular order or contract. In accordance with the eagleyard Photonics policy of continuous improvement specifications may change without notice.

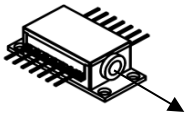
Unpacking, Installation and Laser Safety

Unpacking the laser diodes should only be done at electrostatic safe workstations (EPA). Though protection against electro static discharge (ESD) is implemented in the laser package, charges may occur at surfaces. Please store this product in its original package at a dry, clean place until final use. During device installation, ESD protection has to be maintained.

The DFB laser is sensitive against optical feedback, so an optical isolator may be required in order to avoid any disturbance of the emission spectrum. Operating at moderate temperatures on proper heat sinks will contribute to a long lifetime of the diode.

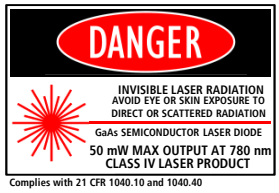
Avoid direct and/or indirect exposure to the free running beam. Collimating and focussing the free running beam with optics as common in optical instruments will increase threat to the human eye.

Performance figures, data and any illustrative material provided in this specification are typical and must be specifically confirmed in writing by eagleyard Photonics before they become applicable to any particular order or contract. In accordance with the eagleyard Photonics policy of continuous improvement specifications may change without notice.



Laser Emission

IEC-60825-1



Complies with 21 CFR 1040.10 and 1040.40

DATA SHEET

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Revision 1.01

2017-03-02

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

General Product Information

Product	Application
780 nm DFB Laser	Spectroscopy
with hermetic 14-Pin Butterfly Housing (RoHS compliant)	Metrology
including Monitor Diode, Thermoelectric Cooler and Thermistor	
with PM Fiber and angle-polished Connector (APC)	

Absolute Maximum Ratings

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Storage Temperature	T_S	°C	-40		85	Stress in excess of one of the Absolute Maximum Ratings may damage the laser. Please note that a damaging optical power level may occur although the maximum current is not reached. These are stress ratings only, and functional operation at these or any other conditions beyond those indicated under Recommended Operational Conditions is not implied.
Operational Temperature at Case	T_C	°C	-40		85	
Operational Temperature at Laser Chip	T_{LD}	°C	10		50	
Forward Current	I_F	mA			160	
Reverse Voltage	V_R	V			2	
Output Power	P_{opt}	mW			50	
TEC Current	I_{TEC}	A			1.8	
TEC Voltage	V_{TEC}	V			3.2	

Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Operational Temperature at Case	T_{case}	°C	-20		65	
Operational Temperature at Laser Chip	T_{LD}	°C		25		measured by integrated Thermistor
Forward Current	I_F	mA			140	
Output Power	P_{opt}	mW		40		

Characteristics at T_{LD} = 25° at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	779	780	781	see images on page 4
Linewidth (FWHM)	$\Delta\lambda$	MHz		2		40 mW
Temperature Coefficient of Wavelength	$d\lambda / dT$	nm / K		0.06		
Current Coefficient of Wavelength	$d\lambda / dI$	nm / mA		0.003		
Sidemode Supression Ratio	SMSR	dB	30	45		P_{opt} = 40 mW

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SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Characteristics at T_{LD} = 25° at BOL cont'd

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Laser Current @ P_{opt} = mW	I_{LD}	mA			140	ex fiber
Slope Efficiency	η	W / A	0.15	0.5	0.8	
Threshold Current	I_{th}	mA			70	
Polarization Extinction Ratio	PER	dB		15		P_{opt} = 40 mW

Monitor Diode

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Monitor Detector Responsivity	I_{mon} / P_{opt}	µA/mW	1		20	U_R = 5 V

Thermoelectric Cooler

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Current	I_{TEC}	A		0.4		P_{opt} = 40 mW, ΔT = 20 K
Voltage	U_{TEC}	V		0.8		P_{opt} = 40 mW, ΔT = 20 K
Power Dissipation (total loss at case)	P_{loss}	W		0.5		P_{opt} = 40 mW, ΔT = 20 K
Temperature Difference	ΔT	K			50	P_{opt} = 40 mW, ΔT = |Tcase - TLD|

Thermistor (Standard NTC Type)

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Resistance	R	kΩ		10		T_{LD} = 25° C
Beta Coefficient	β			3892		$R_1 / R_2 = e^{\beta (1/T_1 - 1/T_2)}$ at T_{LD} = 0° … 50° C
Steinhart & Hart Coefficient A	A			1.1293×10^{-3}		$1/T = A + B(\ln R) + C(\ln R)^3$
Steinhart & Hart Coefficient B	B			2.3410×10^{-4}		T: temperature in Kelvin
Steinhart & Hart Coefficient C	C			8.7755×10^{-8}		R: resistance at T in Ohm

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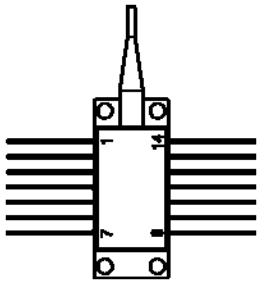
2017-03-02

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

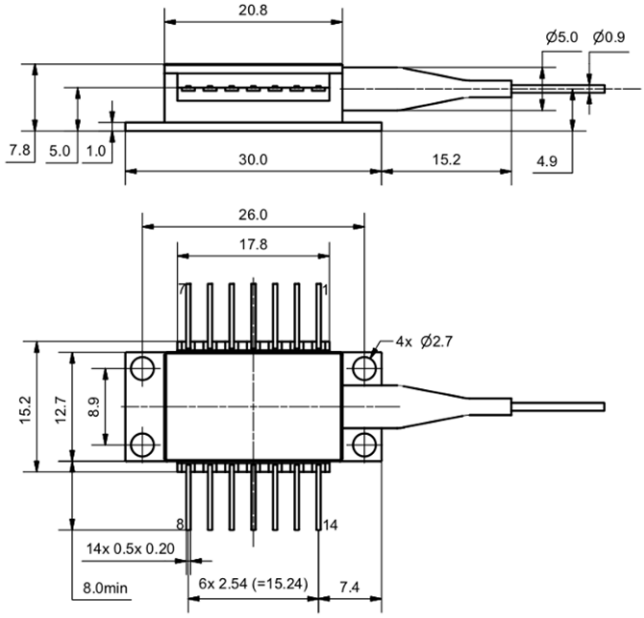
Pin Assignment

1	Thermoelectric Cooler (+)	14	Thermoelectric Cooler (-)
2	Thermistor	13	Case
3	Photodiode (Anode)	12	not connected
4	Photodiode (Cathode)	11	Laser Diode (Cathode)
5	Thermistor	10	Laser Diode (Anode)
6	not connected	9	not connected
7	not connected	8	not connected

All 14 pins are isolated from case.



Package Drawings



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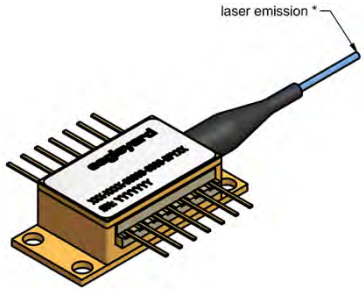
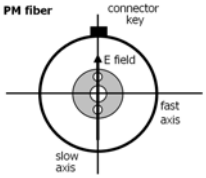


Fiber and Connector Type

PM Fiber	900 / 125 / 5.5 µm, UV/Polyester-elastomer Coating (l = 1 +/-0.1 m)
Connector	different variants available

Measurement Conditions / Comments



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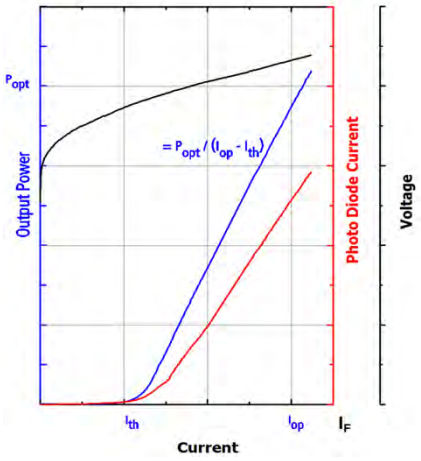
2017-03-02

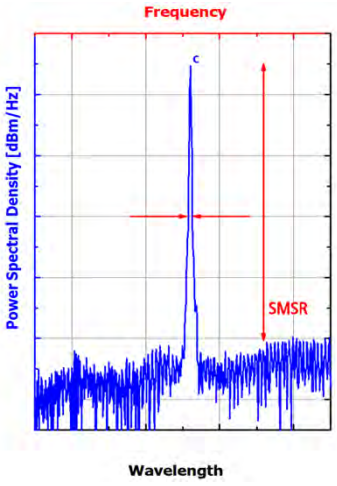
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Typical Measurement Results

Output Power vs. Current



Spectra at Specified Optical Output Power



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Unpacking, Installation and Laser Safety

Unpacking the laser diodes should only be done at electrostatic safe workstations (EPA). Though protection against electro static discharge (ESD) is implemented in the laser package, charges may occur at surfaces. Please store this product in its original package at a dry, clean place until final use. During device installation, ESD protection has to be maintained.

The DFB laser is sensitive against optical feedback, so an optical isolator may be required in order to avoid any disturbance of the emission spectrum. Operating at moderate temperatures on proper heat sinks will contribute to a long lifetime of the diode.

Avoid direct and/or indirect exposure to the free running beam. Collimating and focussing the free running beam with optics as common in optical instruments will increase threat to the human eye.

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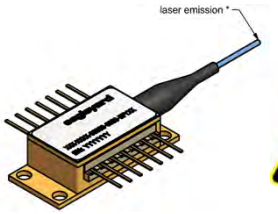

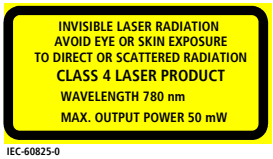

IEC-60825-0

Complies with 21 CFR 1040.10 and 1040.40

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DATA SHEET

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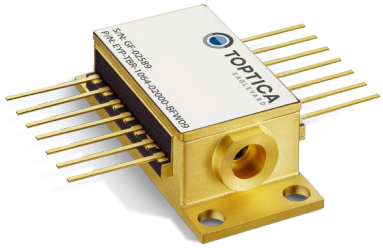
Revision 0.91

2020-11-11

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

General Product Information

Product	Application
Tunable 780 nm DFB Laser	Spectroscopy
with hermetic 14-Pin Butterfly Housing (RoHS compliant)	Metrology
including Monitor Diode, Thermoelectric Cooler and Thermistor	THz Generation
with integrated Beam Collimation	



Absolute Maximum Ratings

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Storage Temperature	T_S	°C	-40		85	Stress in excess of one of the Absolute Maximum Ratings may damage the laser. Please note that a damaging optical power level may occur although the maximum current is not reached. These are stress ratings only, and functional operation at these or any other conditions beyond those indicated under Recommended Operational Conditions is not implied.
Operational Temperature at Case	T_C	°C	-40		85	
Operational Temperature at Laser Chip	T_{LD}	°C	10		50	
Forward Current	I_F	mA			190	
Reverse Voltage	V_R	V			2	
Output Power	P_{opt}	mW			90	
TEC Current	I_{TEC}	A			1.1	
TEC Voltage	V_{TEC}	V			2.8	

Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Operational Temperature at Case	T_{case}	°C	-20		65	
Operational Temperature at Laser Chip	T_{LD}	°C	15		45	measured by integrated Thermistor
Forward Current	I_F	mA			180	
Output Power	P_{opt}	mW	20		80	

Characteristics at T_{LD} = 25° C at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	779	780	781	see images on page 4
Linewidth (FWHM)	$\Delta\lambda$	MHz		2		P_{opt} = 80 mW
Mode-hop free Tuning Range	$\Delta\lambda_{tune}$	pm		1500		reached by temperature modulation
Sidemode Supression Ratio	SMSR	dB	30	50		P_{opt} = 80 mW
Temperature Coefficient of Wavelength	$d\lambda / dT$	nm / K		0.06		
Current Coefficient of Wavelength	$d\lambda / dI$	nm / mA		0.003		

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SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Characteristics at T_{LD} = 25° C at BOL cont'd

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Mode-hop free Temperature Range	T_{LD}	° C	15		40	Temperature at Laser Chip
Mode-hop free Power Range	P_{opt}	mW	20		80	
Laser Current @ P_{opt} = 80 mW	I_{LD}	mA			180	
Slope Efficiency	η	W / A	0.6	0.8	1.1	
Threshold Current	I_{th}	mA			70	
Divergence parallel (FWHM)	$\Theta_{\parallel}$	°		0.1		parallel to the base plate of the housing (see p. 3)
Divergence perpendicular (FWHM)	$\Theta_{\perp}$	°		0.1		perpendicular to base plate of the housing (see p. 3)
Beam Diameter horizontal ($1/e^2$)	$d_{\parallel}$	mm		1.0	1.2	parallel to the base plate of the housing (see p. 3)
Beam Diameter vertical ($1/e^2$)	$d_{\perp}$	mm		0.8	1.2	perpendicular to base plate of the housing (see p. 3)

Monitor Diode

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Monitor Detector Responsivity	I_{mon} / P_{opt}	µA/mW	1		20	U_R = 5 V

Thermoelectric Cooler

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Current	I_{TEC}	A		0.4		P_{opt} = 80 mW, ΔT = 20 K
Voltage	U_{TEC}	V		1.3		P_{opt} = 80 mW, ΔT = 20 K
Power Dissipation (total loss at case)	P_{loss}	W		0.5		P_{opt} = 80 mW, ΔT = 20 K
Temperature Difference	ΔT	K			50	P_{opt} = 80 mW, ΔT = |Tcase - TLD|

Thermistor (Standard NTC Type)

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Resistance	R	kΩ		10		T_{LD} = 25° C
Beta Coefficient	β			3892		$R_1 / R_2 = e^{\beta (1/T_1 - 1/T_2)}$ at T_{LD} = 0° … 50° C
Steinhart & Hart Coefficient A	A			1.1293×10^{-3}		$1/T = A + B(\ln R) + C(\ln R)^3$
Steinhart & Hart Coefficient B	B			2.3410×10^{-4}		T: temperature in Kelvin
Steinhart & Hart Coefficient C	C			8.7755×10^{-8}		R: resistance at T in Ohm

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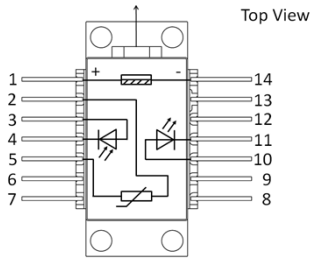
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

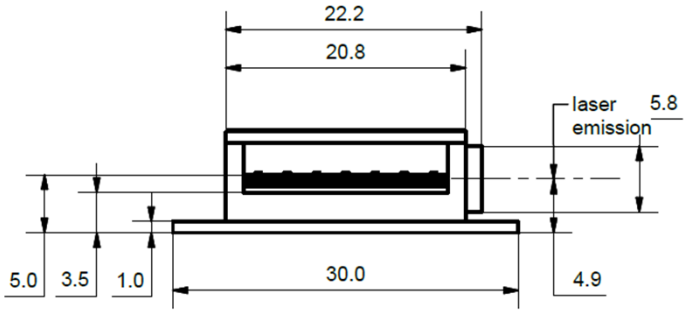
Pin Assignment

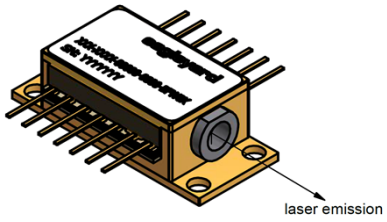
1	Thermoelectric Cooler (+)	14	Thermoelectric Cooler (-)
2	Thermistor	13	Case
3	Photodiode (Anode)	12	not connected
4	Photodiode (Cathode)	11	Laser Diode (Cathode)
5	Thermistor	10	Laser Diode (Anode)
6	not connected	9	not connected
7	not connected	8	not connected

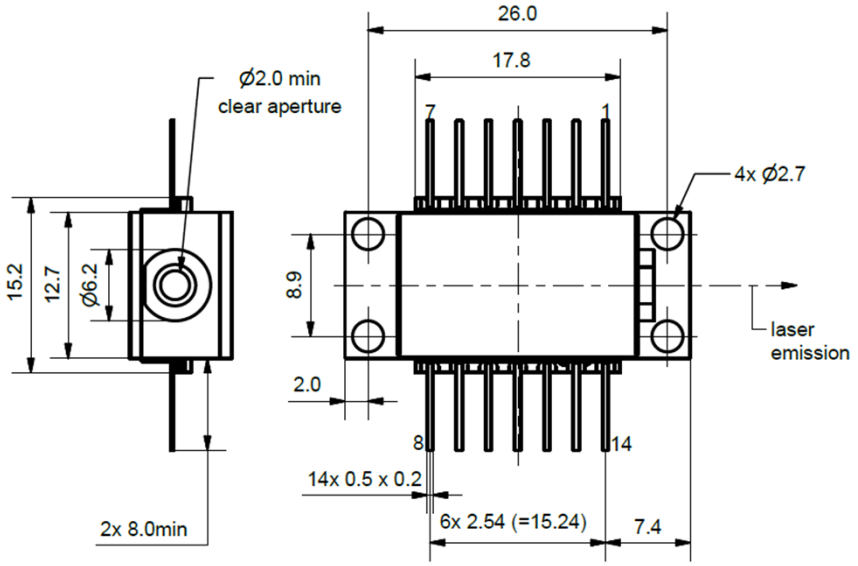
Pins are isolated from case unless noted otherwise.



Package Drawings







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Caution. Excessive mechanical stress on the package can lead to a damage of the laser.
See instruction manual on www.eagleyard.com

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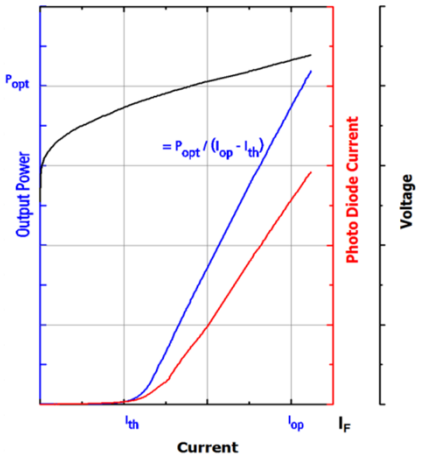
2020-11-11

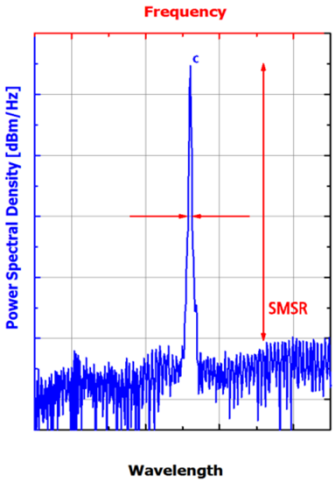
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Typical Measurement Results

Output Power vs. Current



Spectra at Specified Optical Output Power



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Unpacking, Installation and Laser Safety

Unpacking the laser diodes should only be done at electrostatic safe workstations (EPA). Though protection against electro static discharge (ESD) is implemented in the laser package, charges may occur at surfaces. Please store this product in its original package at a dry, clean place until final use. During device installation, ESD protection has to be maintained.

The DFB laser is sensitive against optical feedback, so an optical isolator may be required in order to avoid any disturbance of the emission spectrum. Operating at moderate temperatures on proper heat sinks will contribute to a long lifetime of the diode.

Avoid direct and/or indirect exposure to the free running beam. Collimating and focussing the free running beam with optics as common in optical instruments will increase threat to the human eye.

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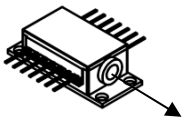
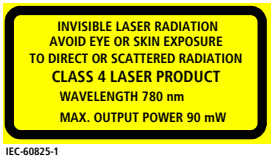


Laser Emission



IEC-60825-1

Complies with 21 CFR 1040.10 and 1040.40

DATA SHEET

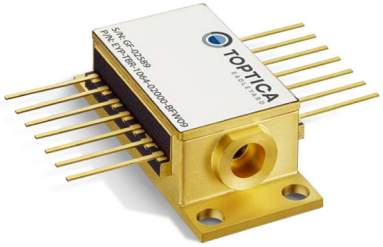
EYP-DFB-0780-00080-1500-BFW01-0005

Revision 0.92

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

General Product Information

Product	Application
780 nm DFB Laser	Spectroscopy (Rb D2 line)
with hermetic 14-Pin Butterfly Housing (RoHS compliant)	Metrology
including Monitor Diode, Thermoelectric Cooler and Thermistor	THz Generation
with integrated Beam Collimation	



Absolute Maximum Ratings

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Storage Temperature	T_S	°C	-40		85	Stress in excess of one of the Absolute Maximum Ratings may damage the laser. Please note that a damaging optical power level may occur although the maximum current is not reached. These are stress ratings only, and functional operation at these or any other conditions beyond those indicated under Recommended Operational Conditions is not implied.
Operational Temperature at Case	T_C	°C	-40		85	
Operational Temperature at Laser Chip	T_{LD}	°C	5		50	
Forward Current	I_F	mA			190	
Reverse Voltage	V_R	V			2	
Output Power	P_{opt}	mW			90	
TEC Current	I_{TEC}	A			1.1	
TEC Voltage	V_{TEC}	V			2.8	

Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Operational Temperature at Case	T_{case}	°C	-20		65	
Operational Temperature at Laser Chip	T_{LD}	°C	5		45	measured by integrated Thermistor
Forward Current	I_F	mA			180	
Output Power	P_{opt}	mW	20		80	

Characteristics at T_{LD} = 25° C at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	779	780	781	see images on page 4
Target Wavelength	λ_T	nm		780.24		reached within T_{LD} = 5 ° ... 45° C at 80 mW
Linewidth (FWHM)	$\Delta\lambda$	MHz		0.6	1	P_{opt} = 80 mW
Mode-hop free Tuning Range	$\Delta\lambda_{tune}$	pm	25			> 10 GHz, at target wavelength
Sidemode Supression Ratio	SMSR	dB	30	50		P_{opt} = 80 mW

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Revision 0.92

2022-01-19

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Characteristics at T_{LD} = 25° C at BOL cont'd

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Temperature Coefficient of Wavelength	$d\lambda / dT$	nm / K		0.06		
Current Coefficient of Wavelength	$d\lambda / dI$	nm / mA		0.003		
Laser Current @ P_{opt} = 80 mW	I_{LD}	mA			180	
Slope Efficiency	η	W / A	0.6	0.8	1.1	
Threshold Current	I_{th}	mA			70	
Divergence parallel (FWHM)	$\Theta_{\parallel}$	°		0.1		parallel to the base plate of the housing (see p. 3)
Divergence perpendicular (FWHM)	$\Theta_{\perp}$	°		0.1		perpendicular to base plate of the housing (see p. 3)
Beam Diameter horizontal	$d_{\parallel}$	mm		1.0	1.2	parallel to the base plate of the housing (see p. 3)
Beam Diameter vertical	$d_{\perp}$	mm		0.8	1.2	perpendicular to base plate of the housing (see p. 3)
Degree of Polarization	DOP	%		90		P_{opt} = 80 mW; E field perpendicular to the base plate

Monitor Diode

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Monitor Detector Responsivity	I_{mon} / P_{opt}	µA/mW	1		20	U_R = 5 V

Thermoelectric Cooler

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Current	I_{TEC}	A		0.4		P_{opt} = 80 mW, ΔT = 20 K
Voltage	U_{TEC}	V		1.3		P_{opt} = 80 mW, ΔT = 20 K
Power Dissipation (total loss at case)	P_{loss}	W		0.5		P_{opt} = 80 mW, ΔT = 20 K
Temperature Difference	ΔT	K			50	P_{opt} = 80 mW, ΔT = |Tcase - TLD|

Thermistor (Standard NTC Type)

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Resistance	R	kΩ		10		T_{LD} = 25° C
Beta Coefficient	β			3892		$R_1 / R_2 = e^{\beta (1/T_1 - 1/T_2)}$ at T_{LD} = 0° … 50° C
Steinhart & Hart Coefficient A	A			1.1293×10^{-3}		$1/T = A + B(\ln R) + C(\ln R)^3$
Steinhart & Hart Coefficient B	B			2.3410×10^{-4}		T: temperature in Kelvin
Steinhart & Hart Coefficient C	C			8.7755×10^{-8}		R: resistance at T in Ohm

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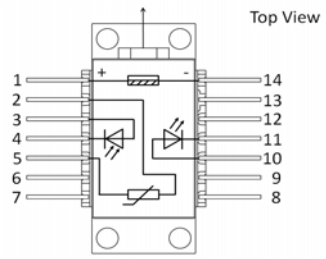
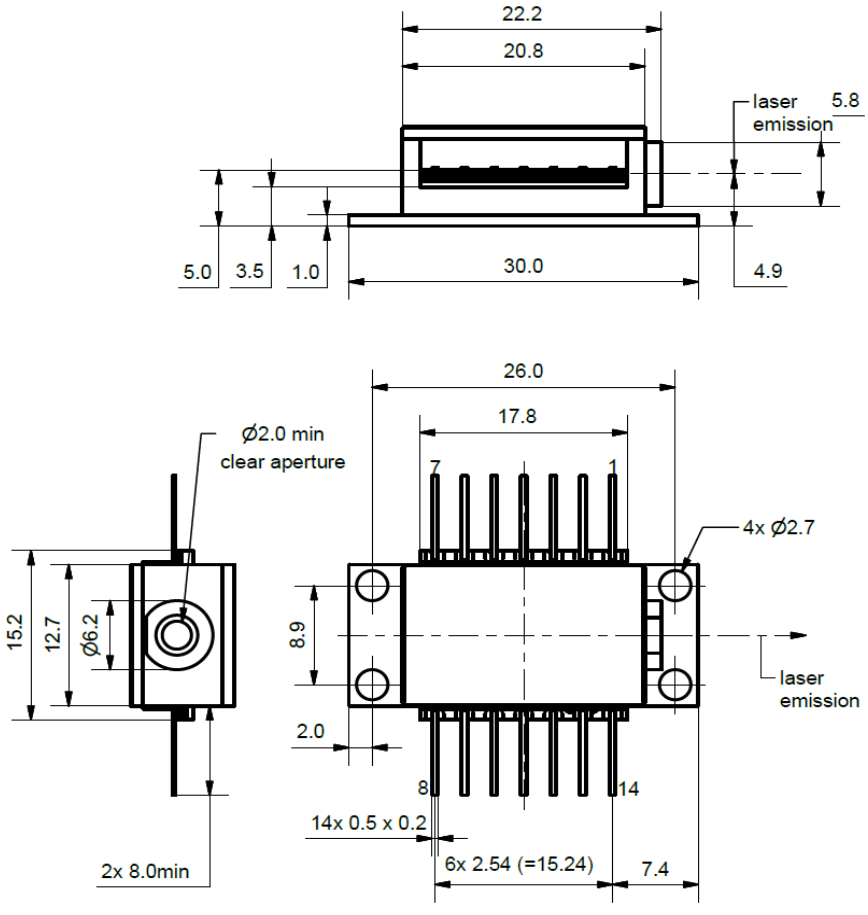
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Pin Assignment

1	Thermoelectric Cooler (+)	14	Thermoelectric Cooler (-)
2	Thermistor	13	Case
3	Photodiode (Anode)	12	not connected
4	Photodiode (Cathode)	11	Laser Diode (Cathode)
5	Thermistor	10	Laser Diode (Anode)
6	not connected	9	not connected
7	not connected	8	not connected



Package Drawings



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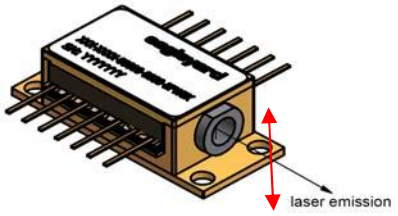

E field

Caution. Excessive mechanical stress on the package can lead to a damage of the laser.
See instruction manual on www.eagleyard.com

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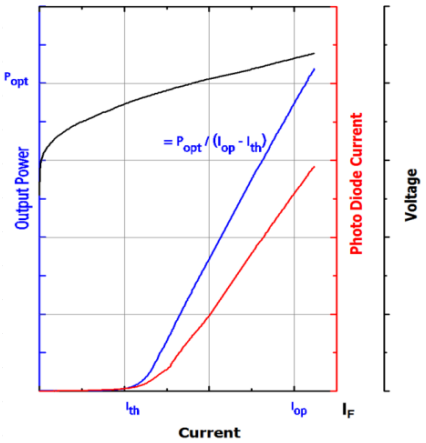
Revision 0.92

2022-01-19

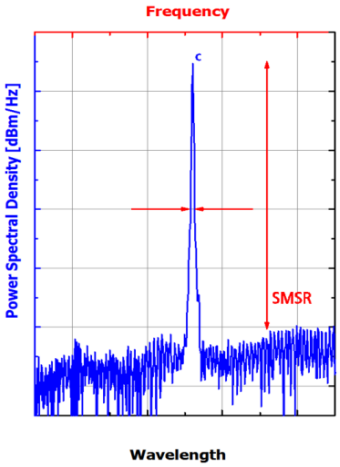
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Typical Measurement Results

Output Power vs. Current



Spectra at Specified Optical Output Power



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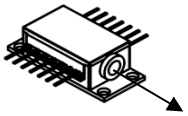
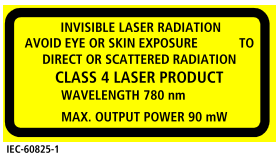


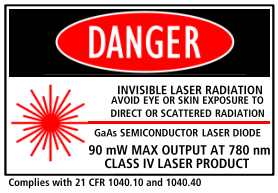
Laser Emission

The DFB laser is sensitive against optical feedback, so an optical isolator may be required in order to avoid any disturbance of the emission spectrum. Operating at moderate temperatures on proper heat sinks will contribute to a long lifetime of the diode.



IEC-60825-1

Avoid direct and/or indirect exposure to the free running beam. Collimating and focussing the free running beam with optics as common in optical instruments will increase threat to the human eye.



Complies with 21 CFR 1040.10 and 1040.40

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DATA SHEET

EYP-DFB-0780-00080-1500-TOC03-0000

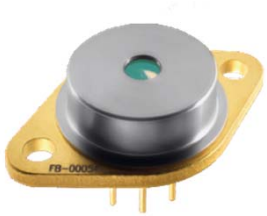
Revision 1.02

2018-03-21

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

General Product Information

Product	Application
780 nm DFB Laser	Spectroscopy
with hermetic 8-Pin TO Package (RoHS compliant)	Metrology
including Monitor Diode, Thermoelectric Cooler and Thermistor	THz Generation



Absolute Maximum Ratings

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Storage Temperature	T_S	°C	-40		85	Stress in excess of one of the Absolute Maximum Ratings may damage the laser. Please note that a damaging optical power level may occur although the maximum current is not reached. These are stress ratings only, and functional operation at these or any other conditions beyond those indicated under Recommended Operational Conditions is not implied.
Operational Temperature at Case	T_C	°C	-20		75	
Operational Temperature at Laser Chip	T_{LD}	°C	0		50	
Forward Current	I_F	mA			200	
Reverse Voltage	V_R	V			2	
Output Power	P_{opt}	mW			100	
TEC Current	I_{TEC}	A			1.8	
TEC Voltage	V_{TEC}	V			3.2	

Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Operational Temperature at Case	T_{case}	°C	-20		65	
Operational Temperature at Laser Chip	T_{LD}	°C	5		40	measured by integrated Thermistor
Forward Current	I_F	mA			180	
Output Power	P_{opt}	mW	20		80	

Characteristics at T_{LD} = 25° C at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	779	780	781	see images on page 4
Linewidth (FWHM)	$\Delta\lambda$	MHz		2		
Temperature Coefficient of Wavelength	$d\lambda / dT$	nm / K		0.06		
Current Coefficient of Wavelength	$d\lambda / dI$	nm / mA		0.003		
Sidemode Supression Ratio	SMSR	dB	30	45		P_{opt} = 80 mW

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Revision 1.02

2018-03-21

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Characteristics at T_{LD} = 25° C at BOL cont'd

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Laser Current @ P_{opt} = 80 mW	I_{LD}	mA			180	
Slope Efficiency	η	W / A	0.6	0.8	1.1	
Threshold Current	I_{th}	mA			70	
Divergence parallel (FWHM)	$\Theta_{\parallel}$	°		8		parallel to short axis of the housing (see p. 3)
Divergence perpendicular (FWHM)	$\Theta_{\perp}$	°		21		parallel to long axis of the housing (see p. 3)
Degree of Polarization	DOP	%		90		80 mW; E field parallel to long axis of housing

Monitor Diode

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Monitor Detector Responsivity	I_{mon} / P_{opt}	µA/mW	1		20	U_R = 5 V

Thermoelectric Cooler

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Current	I_{TEC}	A		0.4		P_{opt} = 80 mW, ΔT = 20 K
Voltage	U_{TEC}	V		0.8		P_{opt} = 80 mW, ΔT = 20 K
Power Dissipation (total loss at case)	P_{loss}	W		0.5		P_{opt} = 80 mW, ΔT = 20 K
Temperature Difference	ΔT	K			50	P_{opt} = 80 mW, ΔT = |Tcase - TLD|

Thermistor (Standard NTC Type)

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Resistance	R	kΩ		10		T_{LD} = 25° C
Beta Coefficient	β			3892		$R_1 / R_2 = e^{\beta (1/T_1 - 1/T_2)}$ at T_{LD} = 0° … 50° C
Steinhart & Hart Coefficient A	A			1.1293×10^{-3}		$1/T = A + B(\ln R) + C(\ln R)^3$
Steinhart & Hart Coefficient B	B			2.3410×10^{-4}		T: temperature in Kelvin
Steinhart & Hart Coefficient C	C			8.7755×10^{-8}		R: resistance at T in Ohm

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2018-03-21

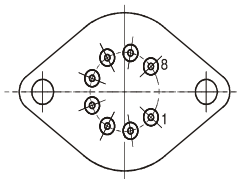
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Pin Assignment

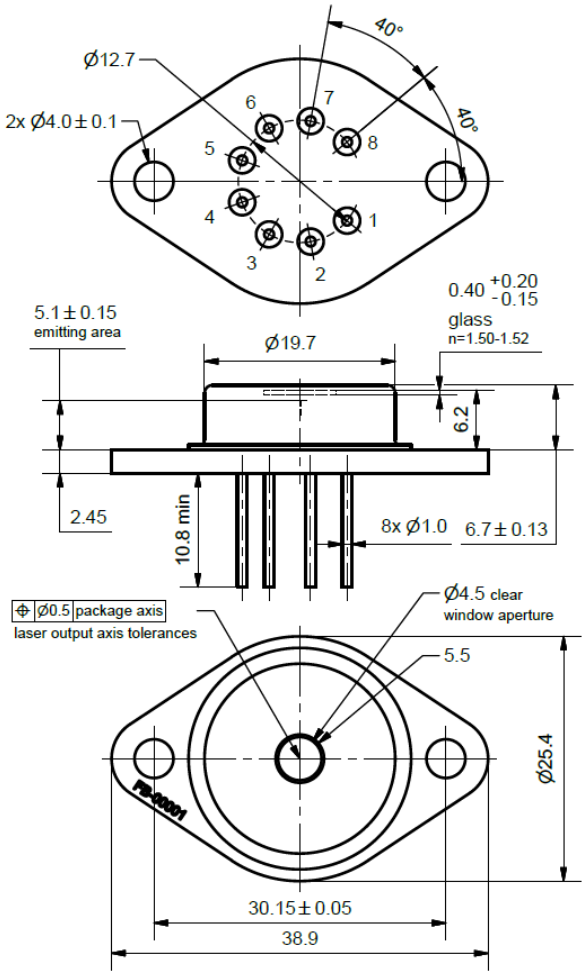
1	Thermoelectric Cooler (+)	5	Laser Diode Anode
2	Thermistor	6	Monitor Diode Anode
3	Thermistor	7	Photo Diode Cathode
4	Laser Diode Cathode	8	Thermoelectric Cooler (-)

All 8 pins are isolated from case.

bottom view

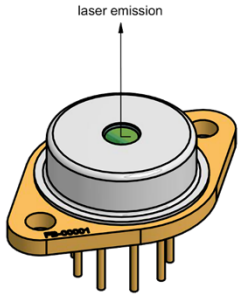


Package Drawings



AIZ-16-311-1543-B

laser emission



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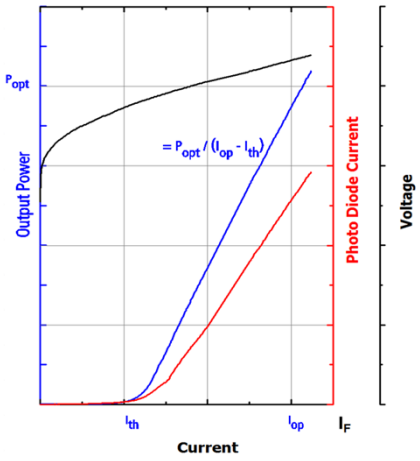
Revision 1.02

2018-03-21

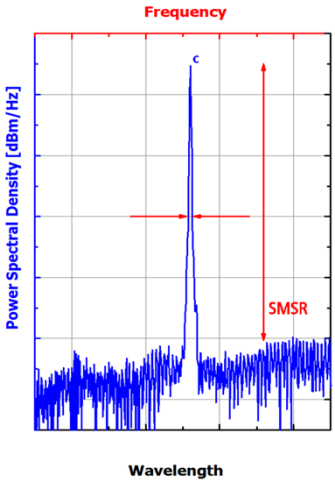
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Typical Measurement Results

Output Power vs. Current



Spectra at Specified Optical Output Power



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Avoid direct and/or indirect exposure to the free running beam. Collimating and focussing the free running beam with optics as common in optical instruments will increase threat to the human eye.

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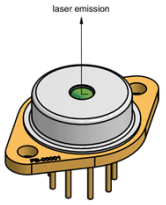


INVISIBLE LASER RADIATION
AVOID EYE OR SKIN EXPOSURE
TO DIRECT OR SCATTERED RADIATION
CLASS 4 LASER PRODUCT
WAVELENGTH 780 nm
MAX. OUTPUT POWER 100 mW

IEC-60825-0

DANGER
INVISIBLE LASER RADIATION
AVOID EYE OR SKIN EXPOSURE TO
DIRECT OR SCATTERED RADIATION
GaAs SEMICONDUCTOR LASER DIODE
100 mW MAX OUTPUT AT 780 nm
CLASS IV LASER PRODUCT

Complies with 21 CFR 1040.10 and 1040.40

DATA SHEET

EYP-DFB-0780-00080-1500-TOC03-0002

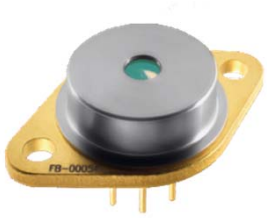
Revision 1.02

2018-03-21

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

General Product Information

Product	Application
Tunable 780 nm DFB Laser	Spectroscopy
with hermetic 8-Pin TO Package (RoHS compliant)	Metrology
including Monitor Diode, Thermoelectric Cooler and Thermistor	THz Generation



Absolute Maximum Ratings

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Storage Temperature	T_S	°C	-40		85	Stress in excess of one of the Absolute Maximum Ratings may damage the laser. Please note that a damaging optical power level may occur although the maximum current is not reached. These are stress ratings only, and functional operation at these or any other conditions beyond those indicated under Recommended Operational Conditions is not implied.
Operational Temperature at Case	T_C	°C	-20		75	
Operational Temperature at Laser Chip	T_{LD}	°C	0		50	
Forward Current	I_F	mA			200	
Reverse Voltage	V_R	V			2	
Output Power	P_{opt}	mW			100	
TEC Current	I_{TEC}	A			1.8	
TEC Voltage	V_{TEC}	V			3.2	

Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Operational Temperature at Case	T_{case}	°C	-20		65	
Operational Temperature at Laser Chip	T_{LD}	°C	5		40	measured by integrated Thermistor
Forward Current	I_F	mA			180	
Output Power	P_{opt}	mW	20		80	

Characteristics at T_{LD} = 25° C at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	779	780	781	see images on page 4
Linewidth (FWHM)	$\Delta\lambda$	MHz		2		
Mode-hop free Tuning Range	$\Delta\lambda_{tune}$	pm		1500		reached by temperature modulation
Temperature Coefficient of Wavelength	$d\lambda / dT$	nm / K		0.06		
Current Coefficient of Wavelength	$d\lambda / dI$	nm / mA		0.003		
Sidemode Supression Ratio	SMSR	dB	30	45		P_{opt} = 80 mW

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EYP-DFB-0780-00080-1500-TOC03-0002

Revision 1.02

2018-03-21

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Characteristics at T_{LD} = 25° C at BOL cont'd

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Mode-hop free Temperature Range	T_{LD}	° C	15		40	Temperature at Laser Chip
Mode-hop free Power Range	P_{opt}	mW	20		80	
Laser Current @ P_{opt} = 80 mW	I_{LD}	mA			180	
Slope Efficiency	η	W / A	0.6	0.8	1.1	
Threshold Current	I_{th}	mA			70	
Divergence parallel (FWHM)	$\Theta_{\parallel}$	°		8		parallel to short axis of the housing (see p. 3)
Divergence perpendicular (FWHM)	$\Theta_{\perp}$	°		21		parallel to long axis of the housing (see p. 3)
Degree of Polarization	DOP	%		90		80 mW; E field parallel to long axis of housing

Monitor Diode

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Monitor Detector Responsivity	I_{mon} / P_{opt}	µA/mW	1		20	U_R = 5 V

Thermoelectric Cooler

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Current	I_{TEC}	A		0.4		P_{opt} = 80 mW, ΔT = 20 K
Voltage	U_{TEC}	V		0.8		P_{opt} = 80 mW, ΔT = 20 K
Power Dissipation (total loss at case)	P_{loss}	W		0.5		P_{opt} = 80 mW, ΔT = 20 K
Temperature Difference	ΔT	K			50	P_{opt} = 80 mW, ΔT = |Tcase - TLD|

Thermistor (Standard NTC Type)

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Resistance	R	kΩ		10		T_{LD} = 25° C
Beta Coefficient	β			3892		$R_1 / R_2 = e^{\beta (1/T_1 - 1/T_2)}$ at T_{LD} = 0° … 50° C
Steinhart & Hart Coefficient A	A			1.1293×10^{-3}		$1/T = A + B(\ln R) + C(\ln R)^3$
Steinhart & Hart Coefficient B	B			2.3410×10^{-4}		T: temperature in Kelvin
Steinhart & Hart Coefficient C	C			8.7755×10^{-8}		R: resistance at T in Ohm

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EYP-DFB-0780-00080-1500-TOC03-0002

Revision 1.02

2018-03-21

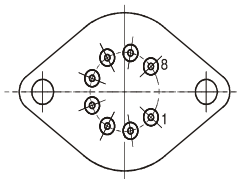
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Pin Assignment

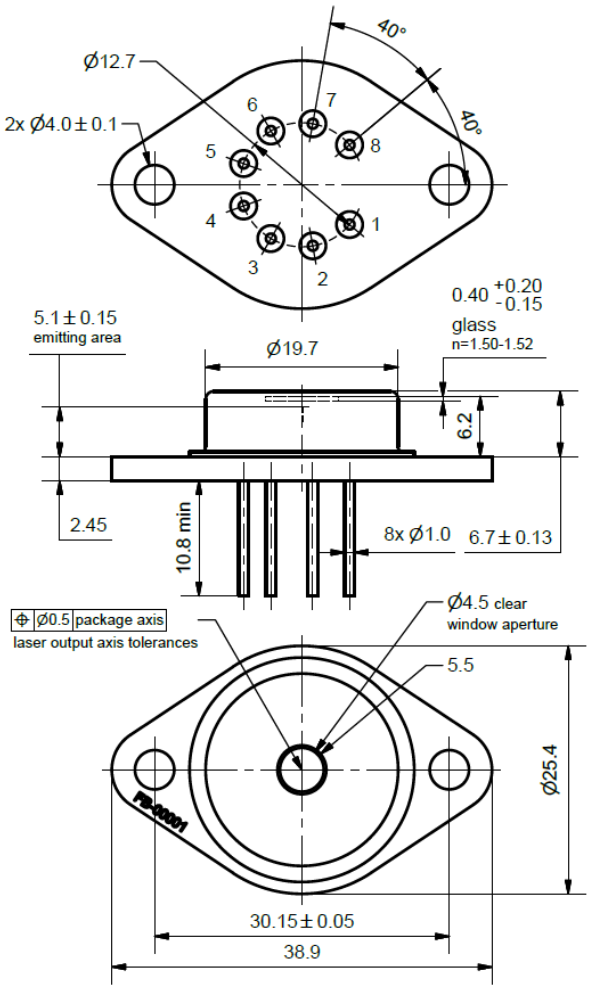
1	Thermoelectric Cooler (+)	5	Laser Diode Anode
2	Thermistor	6	Monitor Diode Anode
3	Thermistor	7	Photo Diode Cathode
4	Laser Diode Cathode	8	Thermoelectric Cooler (-)

All 8 pins are isolated from case.

bottom view

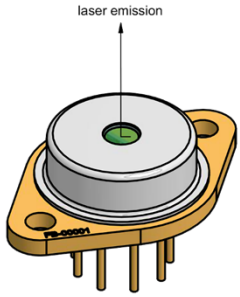


Package Drawings



AIZ-16-311-1543-B

laser emission



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EYP-DFB-0780-00080-1500-TOC03-0002

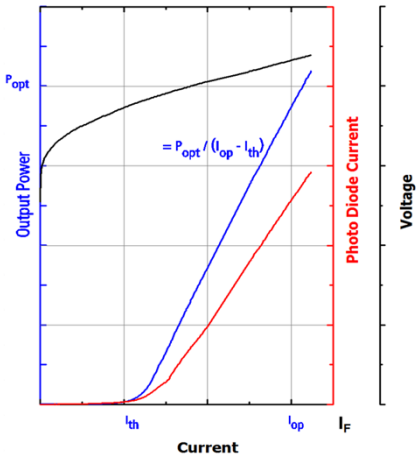
Revision 1.02

2018-03-21

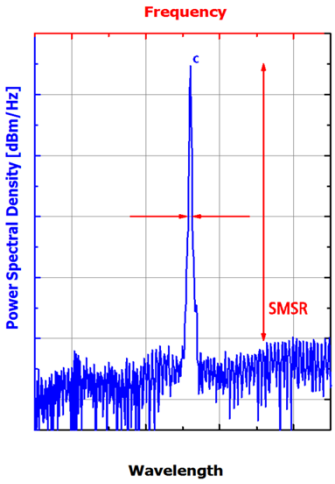
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Typical Measurement Results

Output Power vs. Current



Spectra at Specified Optical Output Power



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Unpacking, Installation and Laser Safety

Unpacking the laser diodes should only be done at electrostatic safe workstations (EPA). Though protection against electro static discharge (ESD) is implemented in the laser package, charges may occur at surfaces. Please store this product in its original package at a dry, clean place until final use. During device installation, ESD protection has to be maintained.

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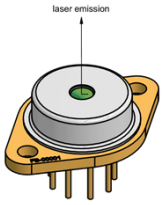


INVISIBLE LASER RADIATION
AVOID EYE OR SKIN EXPOSURE
TO DIRECT OR SCATTERED RADIATION
CLASS 4 LASER PRODUCT
WAVELENGTH 780 nm
MAX. OUTPUT POWER 100 mW

IEC-60825-0

DANGER
INVISIBLE LASER RADIATION
AVOID EYE OR SKIN EXPOSURE TO
DIRECT OR SCATTERED RADIATION
GaAs SEMICONDUCTOR LASER DIODE
100 mW MAX OUTPUT AT 780 nm
CLASS IV LASER PRODUCT

Complies with 21 CFR 1040.10 and 1040.40

DATA SHEET

EYP-DFB-0780-00080-1500-TOC03-0005

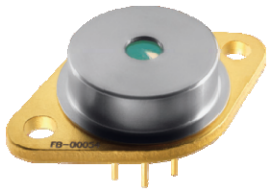
Revision 1.03

2022-01-19

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

General Product Information

Product	Application
780 nm DFB Laser	Spectroscopy (Rb D2 line)
with hermetic 8-Pin TO Package (RoHS compliant)	Metrology
including Monitor Diode, Thermoelectric Cooler and Thermistor	THz Generation



Absolute Maximum Ratings

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Storage Temperature	T_S	°C	-40		85	Stress in excess of one of the Absolute Maximum Ratings may damage the laser. Please note that a damaging optical power level may occur although the maximum current is not reached. These are stress ratings only, and functional operation at these or any other conditions beyond those indicated under Recommended Operational Conditions is not implied.
Operational Temperature at Case	T_C	°C	-20		75	
Operational Temperature at Laser Chip	T_{LD}	°C	0		50	
Forward Current	I_F	mA			200	
Reverse Voltage	V_R	V			2	
Output Power	P_{opt}	mW			100	
TEC Current	I_{TEC}	A			1.8	
TEC Voltage	V_{TEC}	V			3.2	

Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Operational Temperature at Case	T_{case}	°C	-20		65	
Operational Temperature at Laser Chip	T_{LD}	°C	5		40	measured by integrated Thermistor
Forward Current	I_F	mA			180	
Output Power	P_{opt}	mW	20		80	

Characteristics at T_{LD} = 25° C at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	779	780	781	see images on page 4
Target Wavelength	λ_T	nm		780.24		reached within T_{LD} = 5 ° ... 45° C at 80 mW
Linewidth (FWHM)	$\Delta\lambda$	MHz		0.6	1	P_{opt} = 80 mW
Sidemode Supression Ratio	SMSR	dB	30	45		P_{opt} = 80 mW
Temperature Coefficient of Wavelength	$d\lambda / dT$	nm / K		0.06		
Current Coefficient of Wavelength	$d\lambda / dI$	nm / mA		0.003		
Mode-hop free Tuning Range	$\Delta\lambda_{tune}$	pm	25			> 10 GHz, at target wavelength

EYP-DFB-0780-00080-1500-TOC03-0005

Revision 1.03

2022-01-19

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Characteristics at T_{LD} = 25° C at BOL cont'd

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Laser Current @ P_{opt} = 80 mW	I_{LD}	mA			180	
Slope Efficiency	η	W / A	0.6	0.8	1.1	
Threshold Current	I_{th}	mA			70	
Divergence parallel (FWHM)	$\Theta_{\parallel}$	°		8		parallel to short axis of the housing (see p. 3)
Divergence perpendicular (FWHM)	$\Theta_{\perp}$	°		21		parallel to long axis of the housing (see p. 3)
Degree of Polarization	DOP	%		90		P_{opt} = 80 mW; E field parallel to long axis of housing

Monitor Diode

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Monitor Detector Responsivity	I_{mon} / P_{opt}	µA/mW	1		20	U_R = 5 V

Thermoelectric Cooler

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Current	I_{TEC}	A		0.4		P_{opt} = 80 mW, ΔT = 20 K
Voltage	U_{TEC}	V		0.8		P_{opt} = 80 mW, ΔT = 20 K
Power Dissipation (total loss at case)	P_{loss}	W		0.5		P_{opt} = 80 mW, ΔT = 20 K
Temperature Difference	ΔT	K			50	P_{opt} = 80 mW, ΔT = |Tcase - TLD|

Thermistor (Standard NTC Type)

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Resistance	R	kΩ		10		T_{LD} = 25° C
Beta Coefficient	β			3892		$R_1 / R_2 = e^{\beta (1/T_1 - 1/T_2)}$ at T_{LD} = 0° … 50° C
Steinhart & Hart Coefficient A	A			1.1293×10^{-3}		$1/T = A + B(\ln R) + C(\ln R)^3$
Steinhart & Hart Coefficient B	B			2.3410×10^{-4}		T: temperature in Kelvin
Steinhart & Hart Coefficient C	C			8.7755×10^{-8}		R: resistance at T in Ohm

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Revision 1.03

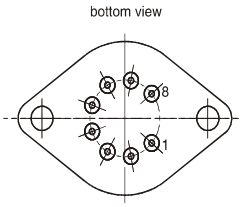
2022-01-19

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

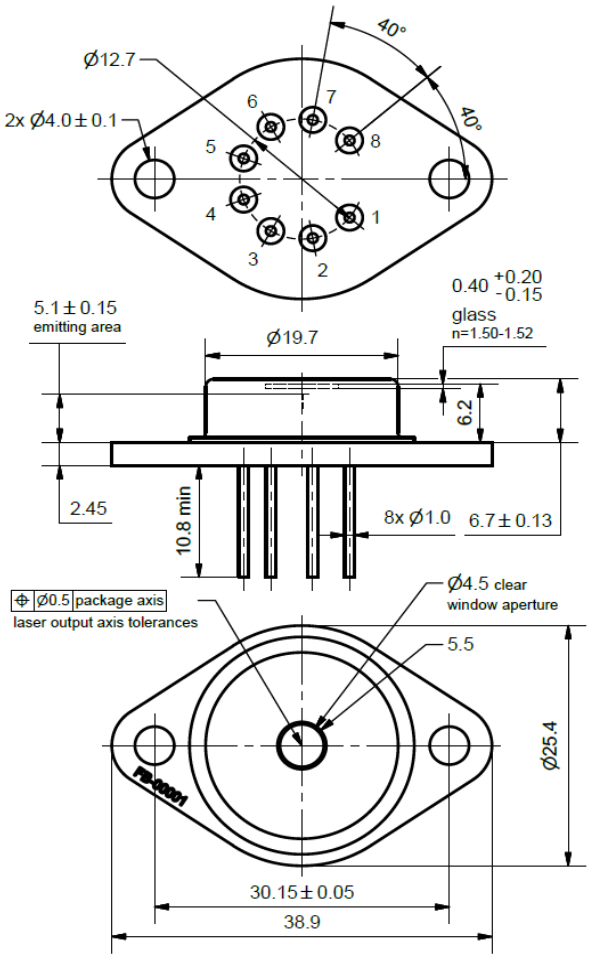
Pin Assignment

1	Thermoelectric Cooler (+)	5	Laser Diode Anode
2	Thermistor	6	Monitor Diode Anode
3	Thermistor	7	Photo Diode Cathode
4	Laser Diode Cathode	8	Thermoelectric Cooler (-)

All 8 pins are isolated from case.



Package Drawings



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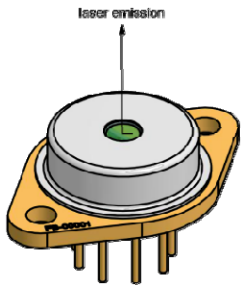

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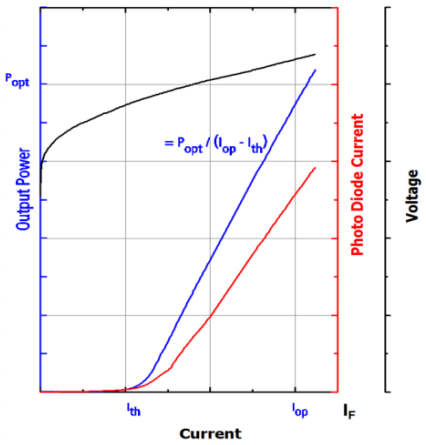
Revision 1.03

2022-01-19

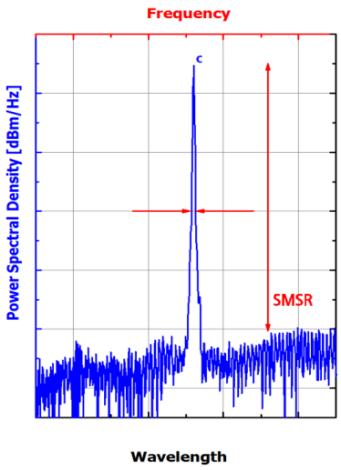
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Typical Measurement Results

Output Power vs. Current



Spectra at Specified Optical Output Power



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The DFB laser is sensitive against optical feedback, so an optical isolator may be required in order to avoid any disturbance of the emission spectrum. Operating at moderate temperatures on proper heat sinks will contribute to a long lifetime of the diode.

Avoid direct and/or indirect exposure to the free running beam. Collimating and focussing the free running beam with optics as common in optical instruments will increase threat to the human eye.

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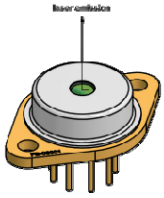

DATA SHEET

EYP-DFB-0780-00080-1500-TOV01-0005

Revision 0.81

2022-01-19

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

General Product Information

Product	Application
780 nm DFB Laser	Spectroscopy (Rb D2 line)
with hermetic 8-Pin TO Package (RoHS compliant)	Metrology
including Monitor Diode, Thermoelectric Cooler and Thermistor	THz Generation

Absolute Maximum Ratings

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Storage Temperature	T_S	°C	-40		85	Stress in excess of one of the Absolute Maximum Ratings may damage the laser. Please note that a damaging optical power level may occur although the maximum current is not reached. These are stress ratings only, and functional operation at these or any other conditions beyond those indicated under Recommended Operational Conditions is not implied.
Operational Temperature at Case	T_C	°C	-20		75	
Operational Temperature at Laser Chip	T_{LD}	°C	0		50	
Forward Current	I_F	mA			200	
Reverse Voltage	V_R	V			2	
Output Power	P_{opt}	mW			100	
TEC Current	I_{TEC}	A			1.0	
TEC Voltage	V_{TEC}	V			1.0	

Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Operational Temperature at Case	T_{case}	°C	-20		65	
Operational Temperature at Laser Chip	T_{LD}	°C	5		45	measured by integrated Thermistor
Forward Current	I_F	mA			180	
Output Power	P_{opt}	mW	20		80	

Characteristics at T_{LD} = 25° C at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	779	780	781	see images on page 4
Target Wavelength	λ_T	nm		780.24		reached within T_{LD} = 5 ° ... 45° C at 80 mW
Linewidth (FWHM)	$\Delta\lambda$	MHz		0.6	1	P_{opt} = 80 mW
Sidemode Supression Ratio	SMSR	dB	30	45		P_{opt} = 80 mW
Temperature Coefficient of Wavelength	$d\lambda / dT$	nm / K		0.06		
Current Coefficient of Wavelength	$d\lambda / dI$	nm / mA		0.003		

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2022-01-19

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Characteristics at T_{LD} = 25° C at BOL cont'd

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Mode-hop free Tuning Range	$\Delta\lambda_{tune}$	pm	25			> 10 GHz, at target wavelength
Laser Current @ P_{opt} = 80 mW	I_{LD}	mA			180	
Slope Efficiency	η	W / A	0.6	0.8	1.1	
Threshold Current	I_{th}	mA			70	
Divergence parallel (FWHM)	$\Theta_{\parallel}$	°		8		parallel to Pin 1 - Pin 6 plane (see p. 3)
Divergence perpendicular (FWHM)	$\Theta_{\perp}$	°		21		perpendicular to Pin 1 - Pin 6 plane (see p. 3)
Degree of Polarization	DOP	%		90		P_{opt} = 80 mW; E field perpendicular to Pin 1 - 6 plane

Monitor Diode

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Monitor Detector Responsivity	I_{mon} / P_{opt}	µA/mW		t.b.d.		U_R = 5 V

Thermoelectric Cooler

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Current	I_{TEC}	A		0.4		P_{opt} = 80 mW, ΔT = 20 K
Voltage	U_{TEC}	V		0.4		P_{opt} = 80 mW, ΔT = 20 K
Power Dissipation (total loss at case)	P_{loss}	W		0.4		P_{opt} = 80 mW, ΔT = 20 K
Temperature Difference	ΔT	K			40	P_{opt} = 80 mW, ΔT = |Tcase - TLD|

Thermistor (Standard NTC Type)

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Resistance	R	kΩ		10		T_{LD} = 25° C
Beta Coefficient	β			3930		$R_1 / R_2 = e^{\beta (1/T_1 - 1/T_2)}$ at T_{LD} = 0° … 50° C
Steinhart & Hart Coefficient A	A			1.029×10^{-3}		$1/T = A + B(\ln R) + C(\ln R)^3$
Steinhart & Hart Coefficient B	B			2.510×10^{-4}		T: temperature in Kelvin
Steinhart & Hart Coefficient C	C			1.051×10^{-7}		R: resistance at T in Ohm

EYP-DFB-0780-00080-1500-TOV01-0005

Revision 0.81

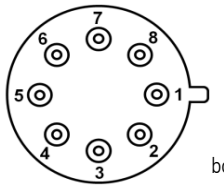
2022-01-19

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Pin Assignment

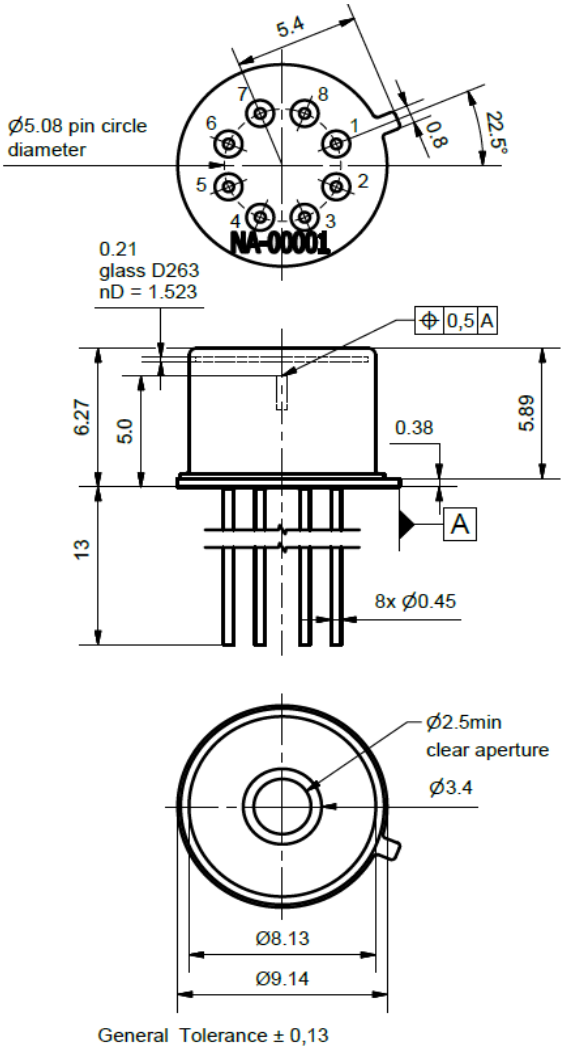
1	Laser Diode Anode	5	Thermistor
2	Laser Diode Cathode	6	Thermistor
3	Thermoelectric Cooler (-)	7	Photo Diode Anode
4	Thermoelectric Cooler (+)	8	Photo Diode Cathode

All 8 pins are isolated from case.



bottom view

Package Drawings



General Tolerance ± 0,13

AIZ-19-0129-1426B

EYP-DFB-0780-00080-1500-TOV01-0005

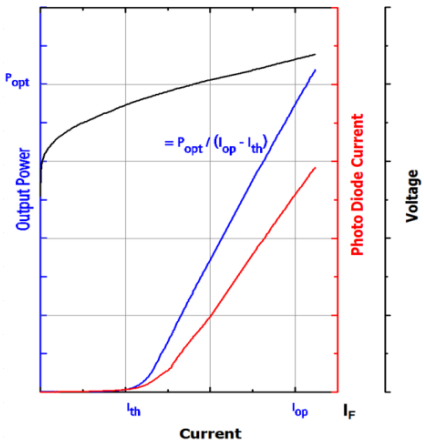
Revision 0.81

2022-01-19

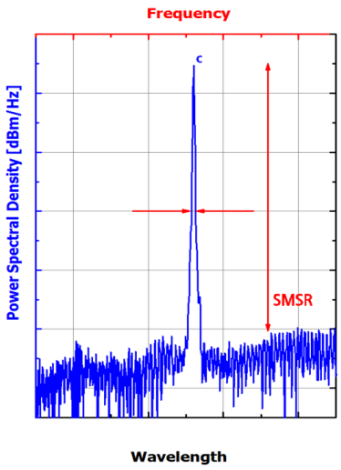
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Typical Measurement Results

Output Power vs. Current



Spectra at Specified Optical Output Power



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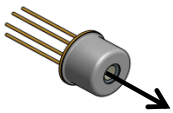

laser emission

IEC-60825-1

Complies with 21 CFR 1040.10 and 1040.40

DATA SHEET

EYP-DFB-0785-00040-1500-BFY02-0000

Revision 0.94

2021-02-05

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

General Product Information

Product	Application
785 nm DFB Laser	Spectroscopy
with hermetic 14-Pin Butterfly Housing (RoHS compliant)	Metrology
including Monitor Diode, Thermoelectric Cooler and Thermistor	
with PM Fiber and Angled Physical Contact (APC)	

Absolute Maximum Ratings

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Storage Temperature	T_S	°C	-40		85	Stress in excess of one of the Absolute Maximum Ratings may damage the laser. Please note that a damaging optical power level may occur although the maximum current is not reached. These are stress ratings only, and functional operation at these or any other conditions beyond those indicated under Recommended Operational Conditions is not implied.
Operational Temperature at Case	T_C	°C	-40		85	
Operational Temperature at Laser Chip	T_{LD}	°C	10		50	
Forward Current	I_F	mA			170	
Reverse Voltage	V_R	V			2	
Output Power	P_{opt}	mW			45	
TEC Current	I_{TEC}	A			1.8	
TEC Voltage	V_{TEC}	V			3.2	

Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Operational Temperature at Case	T_{case}	°C	-20		65	
Operational Temperature at Laser Chip	T_{LD}	°C	15		45	measured by integrated Thermistor
Forward Current	I_F	mA			150	
Output Power	P_{opt}	mW	10		40	ex fiber

Characteristics at T_{LD} = 25° C at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	784	785	786	see images on page 4
Linewidth (FWHM)	$\Delta\lambda$	MHz		2		P_{opt} = 40 mW
Temperature Coefficient of Wavelength	$d\lambda / dT$	nm / K		0.06		
Current Coefficient of Wavelength	$d\lambda / dI$	nm / mA		0.003		
Sidemode Supression Ratio	SMSR	dB		50		P_{opt} = 40 mW

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SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Characteristics at T_{LD} = 25° C at BOL cont'd

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Mode-hop free Temperature Range	T_{LD}	° C				
Mode-hop free Power Range	P_{opt}	mW				
Laser Current @ P_{opt} = 40 mW	I_{LD}	mA			150	
Slope Efficiency	η	W / A	0.2	0.4	0.7	
Threshold Current	I_{th}	mA			70	
Polarization Extinction Ratio	PER	dB		15		P_{opt} = 40 mW

Monitor Diode

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Monitor Detector Responsivity	I_{mon} / P_{opt}	µA/mW	1		20	U_R = 5 V

Thermoelectric Cooler

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Current	I_{TEC}	A		0.4		P_{opt} = 40 mW, ΔT = 20 K
Voltage	U_{TEC}	V		0.8		P_{opt} = 40 mW, ΔT = 20 K
Power Dissipation (total loss at case)	P_{loss}	W		0.5		P_{opt} = 40 mW, ΔT = 20 K
Temperature Difference	ΔT	K			50	P_{opt} = 40 mW, ΔT = |Tcase - TLD|

Thermistor (Standard NTC Type)

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Resistance	R	kΩ		10		T_{LD} = 25° C
Beta Coefficient	β			3892		$R_1 / R_2 = e^{\beta (1/T_1 - 1/T_2)}$ at T_{LD} = 0° … 50° C
Steinhart & Hart Coefficient A	A			1.1293×10^{-3}		$1/T = A + B(\ln R) + C(\ln R)^3$
Steinhart & Hart Coefficient B	B			2.3410×10^{-4}		T: temperature in Kelvin
Steinhart & Hart Coefficient C	C			8.7755×10^{-8}		R: resistance at T in Ohm

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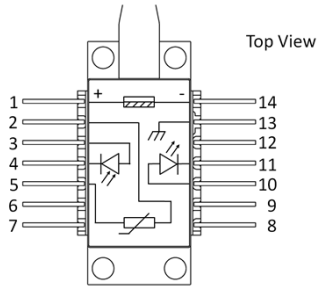
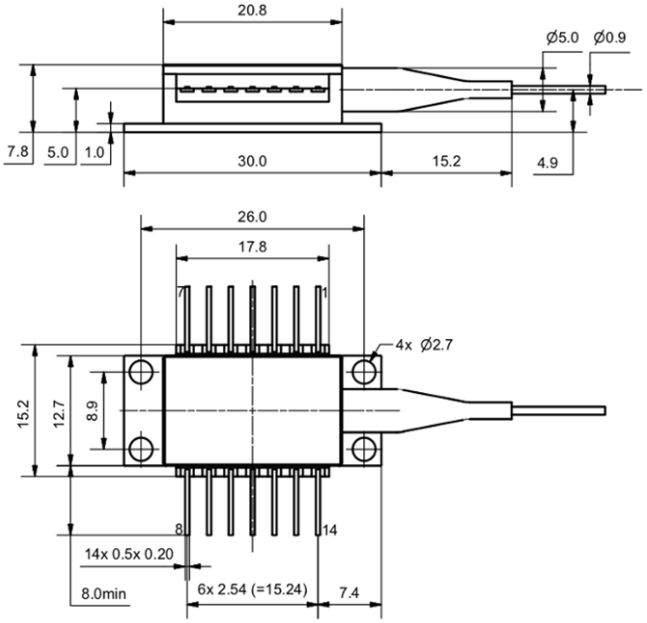
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Pin Assignment

1	Thermoelectric Cooler (+)	14	Thermoelectric Cooler (-)
2	Thermistor	13	Case
3	Photodiode (Anode)	12	not connected
4	Photodiode (Cathode)	11	Laser Diode (Cathode)
5	Thermistor	10	Laser Diode (Anode)
6	not connected	9	not connected
7	not connected	8	not connected



Package Drawings



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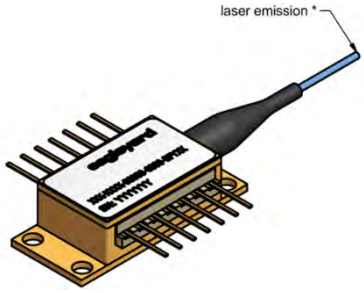


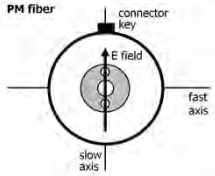
Caution. Excessive mechanical stress on the package can lead to a damage of the laser.

See instruction manual on www.eagleyard.com

Fiber and Connector Type

PM Fiber	900 / 125 / 5.5 µm, UV/Polyester-elastomer Coating (l = 1 +/-0.1 m)
Connector	FC/APC (narrow key / 2mm)

Measurement Conditions / Comments



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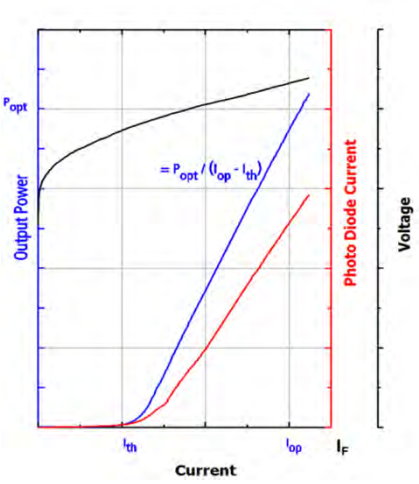
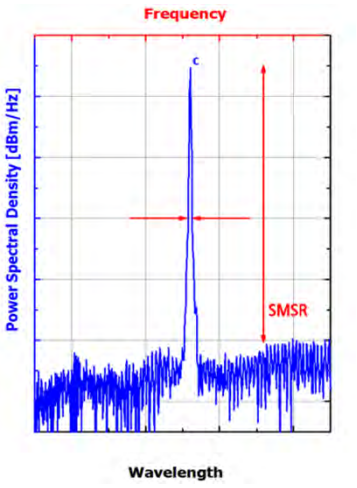
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Typical Measurement Results

Output Power vs. Current



Spectra at Specified Optical Output Power



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Unpacking, Installation and Laser Safety

Unpacking the laser diodes should only be done at electrostatic safe workstations (EPA). Though protection against electro static discharge (ESD) is implemented in the laser package, charges may occur at surfaces. Please store this product in its original package at a dry, clean place until final use. During device installation, ESD protection has to be maintained.

The DFB laser is sensitive against optical feedback, so an optical isolator may be required in order to avoid any disturbance of the emission spectrum. Operating at moderate temperatures on proper heat sinks will contribute to a long lifetime of the diode.

Avoid direct and/or indirect exposure to the free running beam. Collimating and focussing the free running beam with optics as common in optical instruments will increase threat to the human eye.

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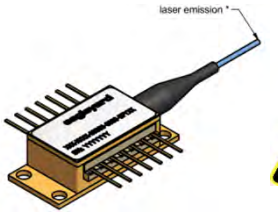

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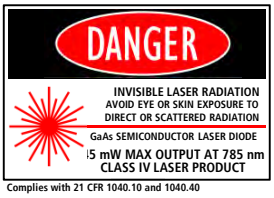

Complies with 21 CFR 1040.10 and 1040.40

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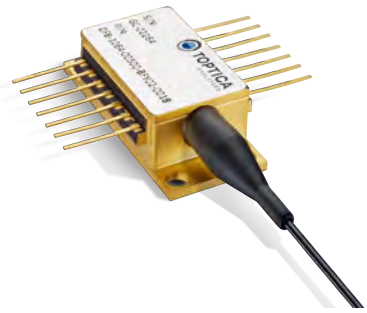
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

General Product Information

Product	Application
Tunable 785 nm DFB Laser	Spectroscopy
with hermetic 14-Pin Butterfly Housing (RoHS compliant)	Metrology
including Monitor Diode, Thermoelectric Cooler and Thermistor	
with PM Fiber and Angled Physical Contact (APC)	



Absolute Maximum Ratings

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Storage Temperature	T_S	°C	-40		85	Stress in excess of one of the Absolute Maximum Ratings may damage the laser. Please note that a damaging optical power level may occur although the maximum current is not reached. These are stress ratings only, and functional operation at these or any other conditions beyond those indicated under Recommended Operational Conditions is not implied.
Operational Temperature at Case	T_C	°C	-40		85	
Operational Temperature at Laser Chip	T_{LD}	°C	10		50	
Forward Current	I_F	mA			170	
Reverse Voltage	V_R	V			2	
Output Power	P_{opt}	mW			45	
TEC Current	I_{TEC}	A			1.8	
TEC Voltage	V_{TEC}	V			3.2	

Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Operational Temperature at Case	T_{case}	°C	-20		65	
Operational Temperature at Laser Chip	T_{LD}	°C	15		45	measured by integrated Thermistor
Forward Current	I_F	mA			150	
Output Power	P_{opt}	mW	10		40	ex fiber

Characteristics at T_{LD} = 25° C at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	784	785	786	see images on page 4
Linewidth (FWHM)	$\Delta\lambda$	MHz		2		P_{opt} = 40 mW
Mode-hop free Tuning Range	$\Delta\lambda_{tune}$	pm		1500		see note 1)
Temperature Coefficient of Wavelength	$d\lambda / dT$	nm / K		0.06		
Current Coefficient of Wavelength	$d\lambda / dI$	nm / mA		0.003		
Sidemode Supression Ratio	SMSR	dB		50		P_{opt} = 40 mW

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SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Characteristics at T_{LD} = 25° C at BOL cont'd

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Mode-hop free Temperature Range	T_{LD}	° C	15		45	Temperature at Laser Chip
Mode-hop free Power Range	P_{opt}	mW	10		40	
Laser Current @ P_{opt} = 40 mW	I_{LD}	mA			150	
Slope Efficiency	η	W / A	0.2	0.4	0.7	
Threshold Current	I_{th}	mA			70	
Polarization Extinction Ratio	PER	dB		15		P_{opt} = 40 mW

1) This variant allows wavelength tuning by temperature or current variation; in case of external backreflections small mode-hops of 100 MHz or less may appear.
The use of a BFW01 or TOC03 package variants and effective optical isolation is recommended for spectroscopic application requiring absolutely mode-hop-free tuning.
A butterfly package with integrated isolator (BFY1x or BFW1x) is also available for some lasers.

Monitor Diode

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Monitor Detector Responsivity	I_{mon} / P_{opt}	µA/mW	1		20	U_R = 5 V

Thermoelectric Cooler

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Current	I_{TEC}	A		0.4		P_{opt} = 40 mW, ΔT = 20 K
Voltage	U_{TEC}	V		0.8		P_{opt} = 40 mW, ΔT = 20 K
Power Dissipation (total loss at case)	P_{loss}	W		0.5		P_{opt} = 40 mW, ΔT = 20 K
Temperature Difference	ΔT	K			50	P_{opt} = 40 mW, ΔT = |Tcase - TLD|

Thermistor (Standard NTC Type)

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Resistance	R	kΩ		10		T_{LD} = 25° C
Beta Coefficient	β			3892		$R_1 / R_2 = e^{\beta (1/T_1 - 1/T_2)}$ at T_{LD} = 0° … 50° C
Steinhart & Hart Coefficient A	A			1.1293×10^{-3}		$1/T = A + B(\ln R) + C(\ln R)^3$
Steinhart & Hart Coefficient B	B			2.3410×10^{-4}		T: temperature in Kelvin
Steinhart & Hart Coefficient C	C			8.7755×10^{-8}		R: resistance at T in Ohm

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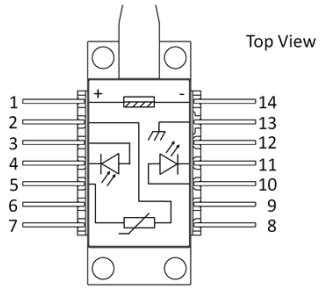
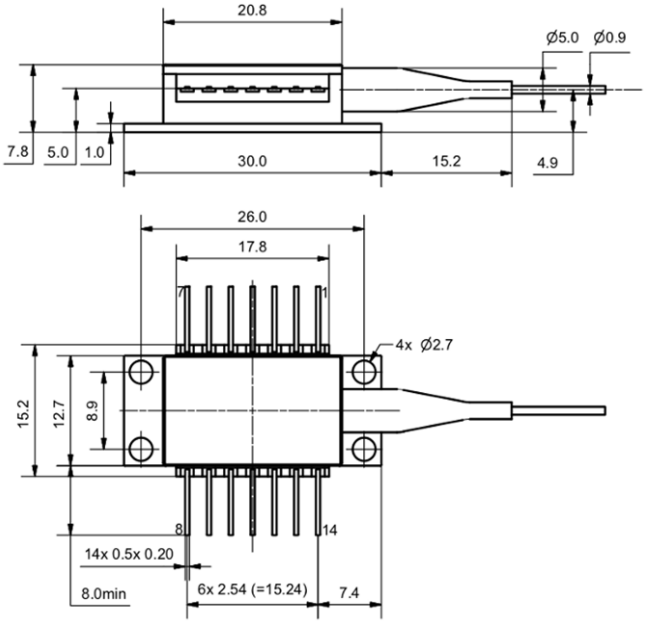
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Pin Assignment

1	Thermoelectric Cooler (+)	14	Thermoelectric Cooler (-)
2	Thermistor	13	Case
3	Photodiode (Anode)	12	not connected
4	Photodiode (Cathode)	11	Laser Diode (Cathode)
5	Thermistor	10	Laser Diode (Anode)
6	not connected	9	not connected
7	not connected	8	not connected



Package Drawings



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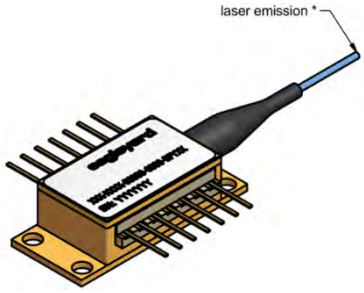


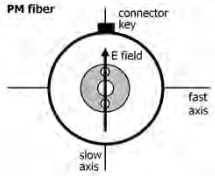
Caution. Excessive mechanical stress on the package can lead to a damage of the laser.

See instruction manual on www.eagleyard.com

Fiber and Connector Type

PM Fiber	900 / 125 / 5.5 µm, UV/Polyester-elastomer Coating (l = 1 +/-0.1 m)
Connector	FC/APC (narrow key / 2mm)

Measurement Conditions / Comments



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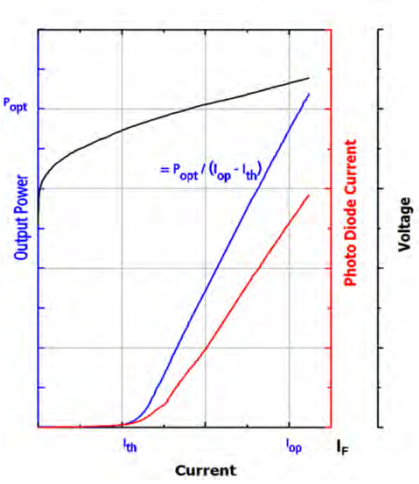
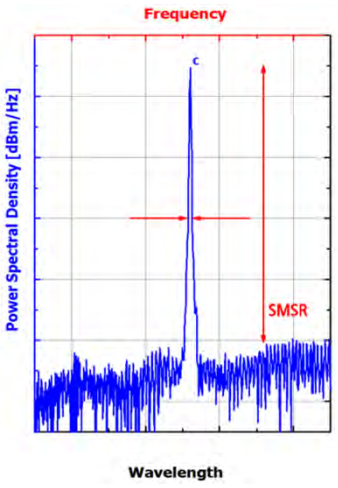
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Typical Measurement Results

Output Power vs. Current



Spectra at Specified Optical Output Power



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Unpacking, Installation and Laser Safety

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The DFB laser is sensitive against optical feedback, so an optical isolator may be required in order to avoid any disturbance of the emission spectrum. Operating at moderate temperatures on proper heat sinks will contribute to a long lifetime of the diode.

Avoid direct and/or indirect exposure to the free running beam. Collimating and focussing the free running beam with optics as common in optical instruments will increase threat to the human eye.

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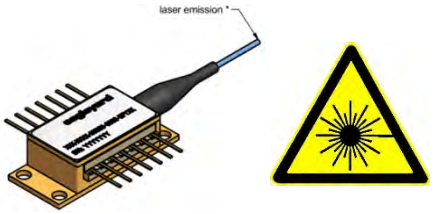

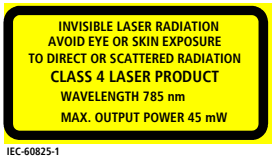

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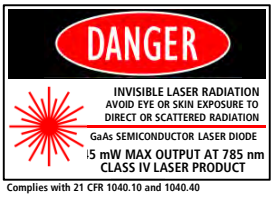

Complies with 21 CFR 1040.10 and 1040.40

DATA SHEET

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Revision 0.91

2021-01-07

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

General Product Information

Product	Application
785 nm DFB Laser	Raman Spectroscopy
with hermetic TO Package (RoHS compliant)	Metrology
including Monitor Diode	Interferometry

Absolute Maximum Ratings

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Storage Temperature	T_S	°C	-40		85	Stress in excess of one of the Absolute Maximum Ratings may damage the laser. Please note that a damaging optical power level may occur although the maximum current is not reached. These are stress ratings only, and functional operation at these or any other conditions beyond those indicated under Recommended Operational Conditions is not implied.
Operational Temperature at Case	T_C	°C	-20		75	
Operational Temperature at Laser Chip	T_{LD}	°C	0		50	
Forward Current	I_F	mA			190	
Reverse Voltage	V_R	V			2	
Output Power	P_{opt}	mW			110	
TEC Current	I_{TEC}	A			1.0	
TEC Voltage	V_{TEC}	V			1.0	

Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Operational Temperature at Case	T_{case}	°C	-20		65	
Operational Temperature at Laser Chip	T_{LD}	°C	15		40	
Forward Current	I_F	mA			170	
Output Power	P_{opt}	mW	20		100	measured with integrating sphere

Characteristics at T_{LD} = 25° C at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	784	785	786	
Linewidth (FWHM)	$\Delta\lambda$	MHz		2		P_{opt} = 100 mW
Sidemode Supression Ratio	SMSR	dB		50		P_{opt} = 100 mW
Temperature Coefficient of Wavelength	$d\lambda / dT$	nm / K		0.06		
Current Coefficient of Wavelength	$d\lambda / dI$	nm / mA		0.003		

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SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Characteristics at T_{LD} = 25° C at BOL cont'd

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Laser Current @ P_{opt} = 100 mW	I_{LD}	mA			170	
Slope Efficiency	η	W / A	0.6	0.8	1.4	
Threshold Current	I_{th}	mA			70	
Divergence parallel (FWHM)	$\Theta_{\parallel}$	°		5		parallel to Pin 1 - Pin 6 plane (see p. 3)
Divergence perpendicular (FWHM)	$\Theta_{\perp}$	°		18		perpendicular to Pin 1 - Pin 6 plane (see p. 3)
Degree of Polarization	DOP	%		80		P_{opt} = 100 mW; E field perpendicular to Pin 1 - 6 plane

Monitor Diode

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Monitor Detector Responsivity	I_{mon} / P_{opt}	µA/mW	1	t.b.d.	100	U_R = 5 V

Thermoelectric Cooler

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Current	I_{TEC}	A		0.4		P_{opt} = 100 mW, ΔT = 20 K
Voltage	U_{TEC}	V		0.4		P_{opt} = 100 mW, ΔT = 20 K
Power Dissipation (total loss at case)	P_{loss}	W		0.4		P_{opt} = 100 mW, ΔT = 20 K
Temperature Difference	ΔT	K			40	P_{opt} = 100 mW, ΔT = |Tcase - TLD|

Thermistor (Standard NTC Type)

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Resistance	R	kΩ		10		T_{LD} = 25° C
Beta Coefficient	β			3930		$R_1 / R_2 = e^{\beta (1/T_1 - 1/T_2)}$ at T_{LD} = 0° … 50° C
Steinhart & Hart Coefficient A	A			1.029×10^{-3}		$1/T = A + B(\ln R) + C(\ln R)^3$
Steinhart & Hart Coefficient B	B			2.510×10^{-4}		T: temperature in Kelvin
Steinhart & Hart Coefficient C	C			1.051×10^{-7}		R: resistance at T in Ohm

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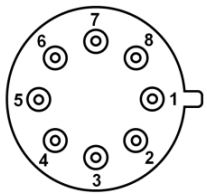
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Pin Assignment

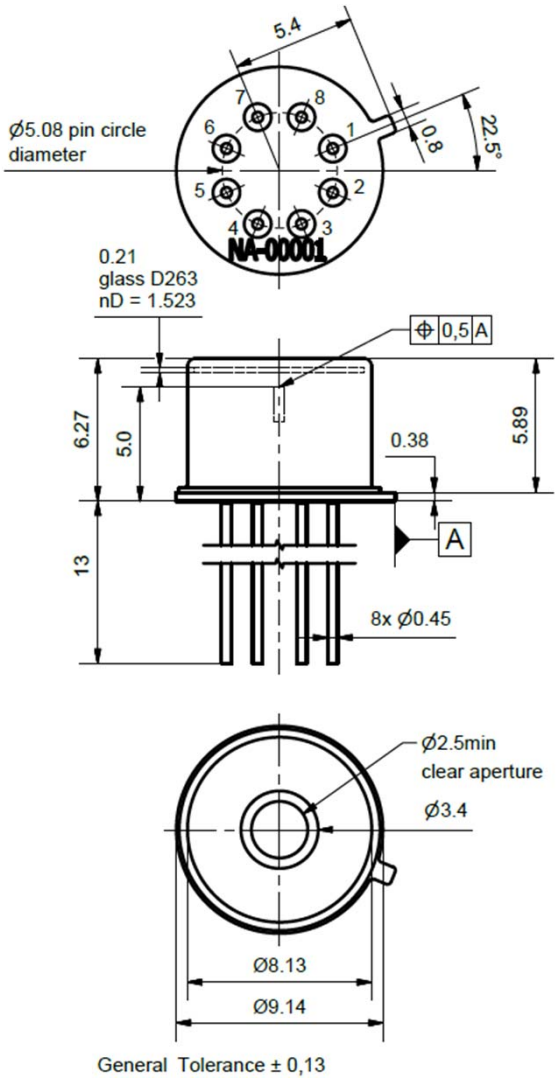
1	Laser Diode Anode	5	Thermistor
2	Laser Diode Cathode	6	Thermistor
3	Thermoelectric Cooler (-)	7	Photo Diode Anode
4	Thermoelectric Cooler (+)	8	Photo Diode Cathode

All 8 pins are isolated from case.



bottom view

Package Drawings



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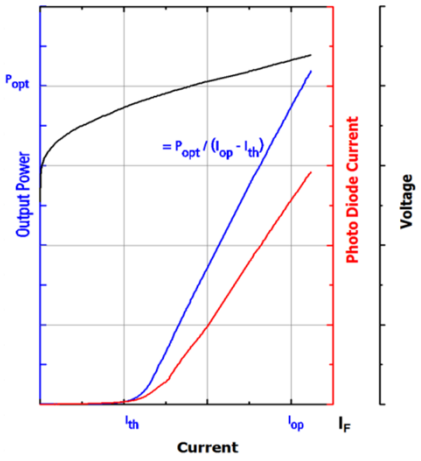
2021-01-07

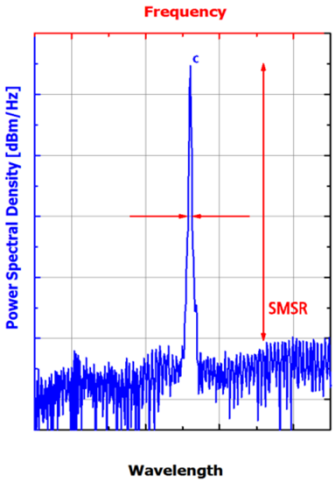
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Typical Measurement Results

Output Power vs. Current



Spectra at Specified Optical Output Power



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Unpacking, Installation and Laser Safety

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The DFB laser is sensitive against optical feedback, so an optical isolator may be required in order to avoid any disturbance of the emission spectrum. Operating at moderate temperatures on proper heat sinks will contribute to a long lifetime of the diode.

Avoid direct and/or indirect exposure to the free running beam. Collimating and focussing the free running beam with optics as common in optical instruments will increase threat to the human eye.

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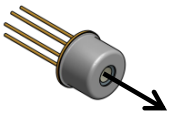


laser emission

IEC-60825-1

Complies with 21 CFR 1040.10 and 1040.40

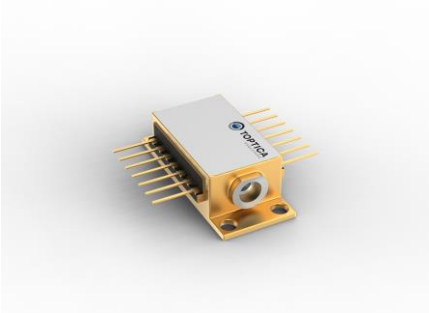
EYP-DFB-0795-00040-1500-BFW11-0005

Revision 0.92

SINGLE FREQUENCY LASER
DFB Laser

General Product Information

Product	Application
795 nm DFB Laser	Spectroscopy (Rb D1 line)
with hermetic 14-Pin Butterfly Housing (RoHS compliant)	Metrology
including Monitor Diode, Thermoelectric Cooler and Thermistor	
with integrated µ-Isolator and Beam Collimation	



Absolute Maximum Ratings

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Storage Temperature	T_S	° C	-40		85	Stress in excess of one of the Absolute Maximum Ratings may damage the laser. Please note that a damaging optical power level may occur although the maximum current is not reached. These are stress ratings only, and functional operation at these or any other conditions beyond those indicated under Recommended Operational Conditions is not implied.
Operational Temperature at Case	T_C	° C	-40		85	
Operational Temperature at Chip	T_{chip}	° C	5		50	
Forward Current	I_F	mA			170	
Reverse Voltage	V_R	V			2	
Output Power	P_{opt}	mW			45	
TEC Current	I_{TEC}	A			1,4	
TEC Voltage	V_{TEC}	V			4,8	

Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Operational Temperature at Case	T_{case}	° C	-20		60	
Operational Temperature at Chip	T_{chip}	° C	10		45	measured by integrated Thermistor
Forward Current	I_F	mA			160	
Output Power	P_{opt}	mW	10		40	

Characteristics Tchip = 25° at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	794	795	796	
Target Wavelength	λ_T	nm		794.98		Tchip = 10 ° ... 45° C at Popt = 40 mW
Linewidth	$\Delta\lambda$	MHz		0,6	1	FWHM, Popt = 80 mW
Mode-hop free Tuning Range	$\Delta\lambda_{tune}$	pm	25			> 10 GHz, at target wavelength
Sidemode Suppression Ratio	SMSR	dB	30	45		Popt = 40 mW
Temp. Coefficient of Wavelength	$d\lambda / dT$	nm/K		0,06		
Current Coefficient of Wavelength	$d\lambda / dI$	nm/mA		0,003		

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SINGLE FREQUENCY LASER
DFB Laser

Characteristics Tchip = 25° at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Mode-hop free Temperature Range	T_{chip}	° C	0		0	
Laser Current	I_{LD}	mA			160	Popt = 40 mW
Slope Efficiency	η	mW/mA		0,4		
Threshold Current	I_{th}	mA			70	
Divergence parallel	$\Theta_{\parallel}$	°		0,1		parallel to the base plate of the housing
Divergence perpendicular	$\Theta_{\perp}$	°		0,1		perpendicular to base plate of the housing
Beam Diameter horizontal	$d_{\parallel}$	mm		1	1,2	parallel to the base plate of the housing
Beam Diameter vertical	$d_{\perp}$	mm		0,8	1,2	perpendicular to base plate of the housing
Degree of Polarization	DOP	%		99		Popt = 40 mW; slant polarization (45°)

Monitor Diode

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Monitor Detector Responsivity	I_{mon} / P_{op}	µA/mW	1		20	5 V

Thermoelectric Cooler

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Current	I_{TEC}	A		0,4		Popt = 40 mW, ΔT = 20 K
Voltage	U_{TEC}	V		1,3		Popt = 40 mW, ΔT = 20 K
Power Dissipation (total loss at case)	P_{loss}	W		0,4		Popt = 40 mW, ΔT = 20 K
Temperature Difference	ΔT	K			50	Popt = 40 mW, ΔT = |Tcase - TLD|

Thermistor (Standard NTC Type)

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Resistance	R	kΩ		10		Tchip = 25° C
Beta Coefficient	β			3892		$R_1/R_2 = e^{\beta(1/T_1 - 1/T_2)}$ at Tchip = 0° … 50° C
Steinhart & Hart Coefficient A	A			1.1293×10^{-3}		$1/T = A + B(\ln R) + C(\ln R)^3$
Steinhart & Hart Coefficient B	B			2.3410×10^{-4}		T: Temperature in Kelvin
Steinhart & Hart Coefficient C	C			8.7755×10^{-8}		R: resistance at T in Ω

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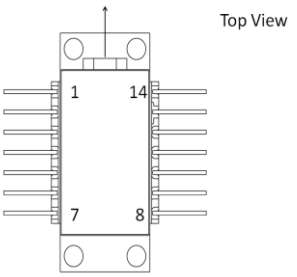
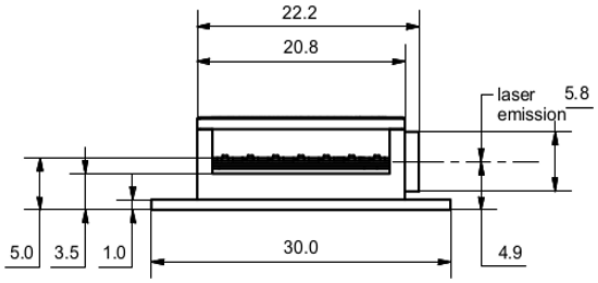
SINGLE FREQUENCY LASER
DFB Laser

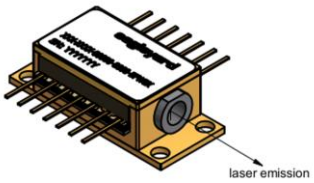
Pin Assignment

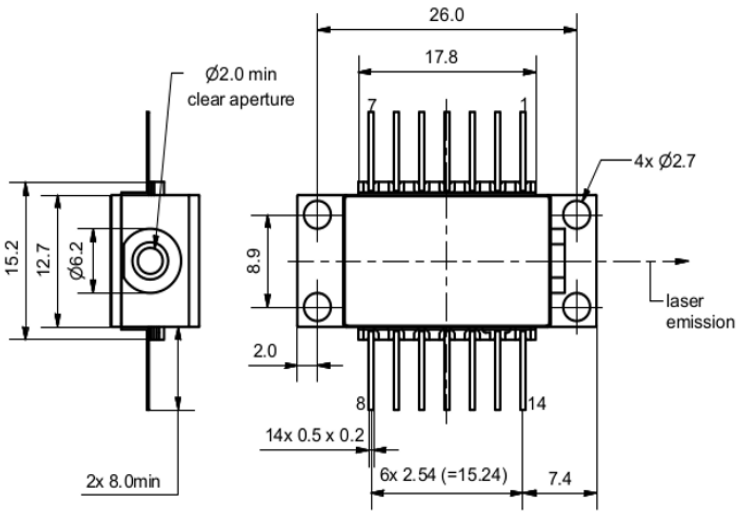
1	Thermoelectric Cooler (+)	14	Thermoelectric Cooler (-)
2	Thermistor	13	Case
3	Photo Diode Anode	12	not connected
4	Photo Diode Cathode	11	Laser Diode Cathode
5	Thermistor	10	Laser Diode Anode
6	not connected	9	not connected
7	not connected	8	not connected



Package Drawings







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SINGLE FREQUENCY LASER
DFB Laser

Unpacking, Installation and Laser Safety

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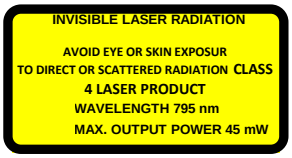

IEC-60825-1

A laser diode is sensitive against optical feedback, so an optical isolator may be required in order to avoid any disturbance of the emission spectrum. Operating at moderate temperatures on proper heat sinks will contribute to a long lifetime of the diode.

Avoid direct and/or indirect exposure to the free running beam. Collimating and focussing the free running beam with optics as common in optical instruments will increase threat to the human eye.

Complies with 21 CFR 1040.10 and 1040.40

Each laser diode will come with an individual test protocol verifying the parameters given in this document.

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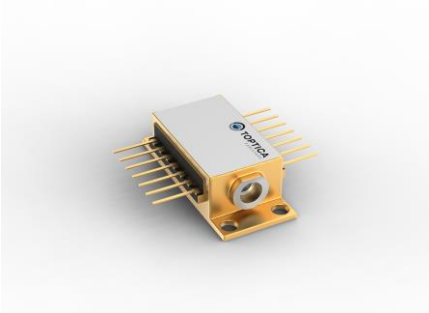
Revision 0.93

SINGLE FREQUENCY LASER
DFB Laser

General Product Information

Product	Application
795 nm DFB Laser	Spectroscopy (Rb D1 line)
with hermetic 14-Pin Butterfly Housing (RoHS compliant)	Metrology
including Monitor Diode, Thermoelectric Cooler and Thermistor	
with integrated Beam Collimation	



Absolute Maximum Ratings

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Storage Temperature	T_S	° C	-40		85	Stress in excess of one of the Absolute Maximum Ratings may damage the laser. Please note that a damaging optical power level may occur although the maximum current is not reached. These are stress ratings only, and functional operation at these or any other conditions beyond those indicated under Recommended Operational Conditions is not implied.
Operational Temperature at Case	T_C	° C	-40		85	
Operational Temperature at Chip	T_{chip}	° C	5		50	
Forward Current	I_F	mA			170	
Reverse Voltage	V_R	V			2	
Output Power	P_{opt}	mW			90	
TEC Current	I_{TEC}	A			1,4	
TEC Voltage	V_{TEC}	V			3,2	

Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Operational Temperature at Case	T_{case}	° C	-20		60	
Operational Temperature at Chip	T_{chip}	° C	10		45	measured by integrated Thermistor
Forward Current	I_F	mA			160	
Output Power	P_{opt}	mW	20		80	

Characteristics Tchip = 25° at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	794	795	796	
Target Wavelength	λ_T	nm		794.98		Tchip = 10 ° ... 45° C at Popt = 80 mW
Linewidth	$\Delta\lambda$	MHz		0,6	1	FWHM, Popt = 80 mW
Mode-hop free Tuning Range	$\Delta\lambda_{tune}$	pm	25			> 10 GHz, at target wavelength
Sidemode Suppression Ratio	SMSR	dB	30	45		Popt = 80 mW
Temp. Coefficient of Wavelength	$d\lambda / dT$	nm/K		0,06		
Current Coefficient of Wavelength	$d\lambda / dI$	nm/mA		0,003		

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SINGLE FREQUENCY LASER
DFB Laser

Characteristics Tchip = 25° at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Laser Current	I_{LD}	mA			160	Popt = 80 mW
Slope Efficiency	η	mW/mA		0,8		
Threshold Current	I_{th}	mA			70	
Divergence parallel	$\Theta_{\parallel}$	°		0,1		parallel to the base plate of the housing
Divergence perpendicular	$\Theta_{\perp}$	°		0,1		perpendicular to base plate of the housing
Beam Diameter horizontal	$d_{\parallel}$	mm		1	1,2	parallel to the base plate of the housing
Beam Diameter vertical	$d_{\perp}$	mm		0,8	1,2	perpendicular to base plate of the housing
Degree of Polarization	DOP	%		90		Popt = 80 mW; vertical polarization

Monitor Diode

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Monitor Detector Responsivity	I_{mon} / P_{opt}	µA/mW	1		20	5 V

Thermoelectric Cooler

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Current	I_{TEC}	A		0,4		Popt = 80 mW, ΔT = 20 K
Voltage	U_{TEC}	V		1,3		Popt = 80 mW, ΔT = 20 K
Power Dissipation (total loss at case)	P_{loss}	W		0,4		Popt = 80 mW, ΔT = 20 K
Temperature Difference	ΔT	K			50	Popt = 80 mW, ΔT = |Tcase - Tchip|

Thermistor (Standard NTC Type)

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
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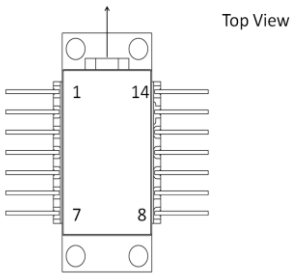

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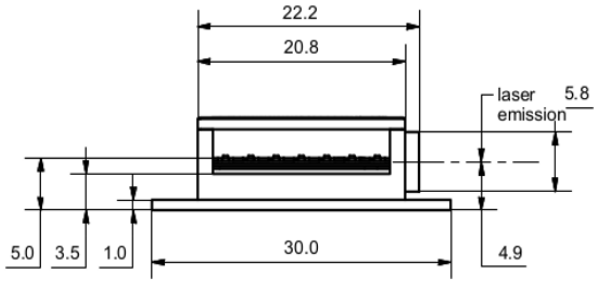

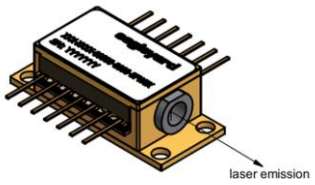

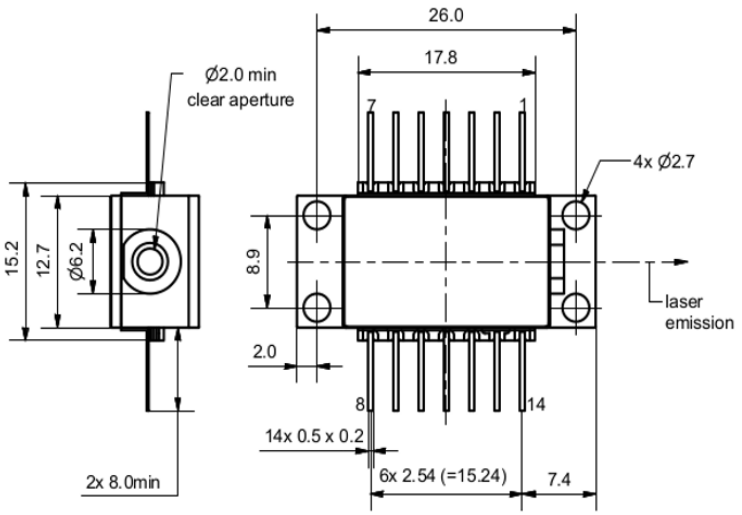

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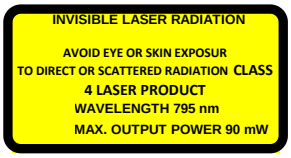

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