DATA SHEET

EYP-DFB-1064-00025-1500-BFY12-0002

Revision 0.71

2019-02-26

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

General Product Information

Product	Application
Tunable 1064 nm DFB Laser	Spectroscopy
with hermetic 14-Pin Butterfly Housing (RoHS compliant)	Metrology
including Monitor Diode, Thermoelectric Cooler and Thermistor	Nd:YAG Replacement
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	10		50	
Forward Current	I_F	mA			190	
Reverse Voltage	V_R	V			2	
Output Power	P_{opt}	mW			30	
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	15		40	measured by integrated Thermistor
Forward Current	I_F	mA			170	
Output Power	P_{opt}	mW	8		25	

Characteristics at T_{LD} = 25° at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	1063	1064	1065	see images on page 4
Linewidth (FWHM)	$\Delta\lambda$	MHz		2		P_{opt} = 25 mW
Mode-hop free Tuning Range	$\Delta\lambda_{tune}$	pm		1500		
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} = 25 mW

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Distributed Feedback Laser

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

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Mode-hop free Temperature Range	T_{LD}	° C	15		40	
Mode-hop free Power Range	P_{opt}	mW	10		25	
Laser Current @ P_{opt} = 25 mW	I_{LD}	mA			170	
Slope Efficiency	η	W / A		0.3		
Threshold Current	I_{th}	mA			70	
Polarization Extinction Ratio	PER	dB		20		P_{opt} = 25 mW

Monitor Diode

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Monitor Detector Responsivity	I_{mon} / P_{opt}	µA/mW	2		50	U_R = 5 V

Thermoelectric Cooler

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Current	I_{TEC}	A		0.4		P_{opt} = 25 mW, ΔT =30 K
Voltage	U_{TEC}	V		1.5		P_{opt} = 25 mW, ΔT = 30 K
Power Dissipation (total loss at case)	P_{loss}	W		0.5		P_{opt} = 25 mW, ΔT = 30 K
Temperature Difference	ΔT	K			45	P_{opt} = 25 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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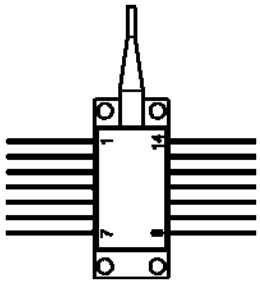
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

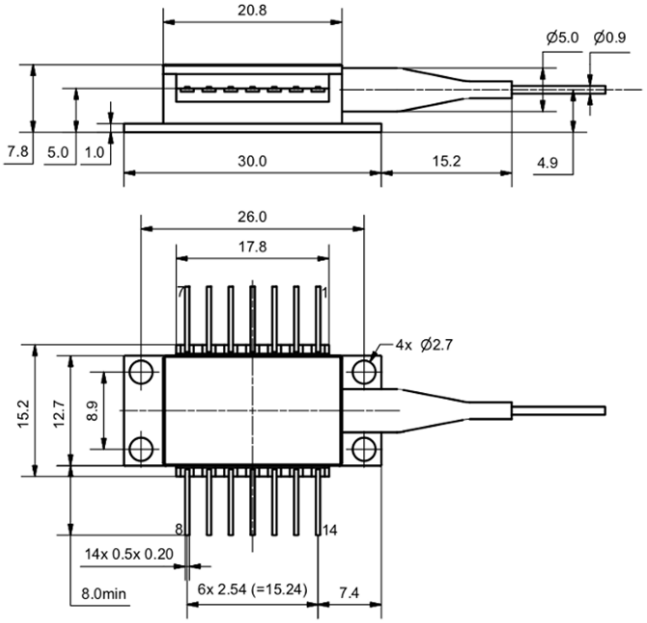
Pin Assignment

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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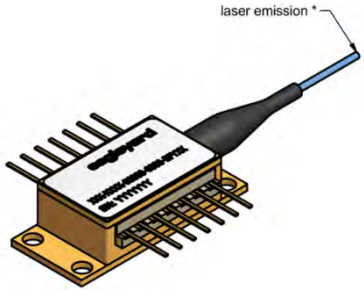


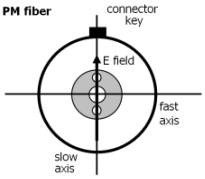
Caution. Excessive mechanical stress on the package can lead to a damage of the laser.

See instruction manual on www.eagleyard.com

Fiber and Connector Type

PM Fiber	900 / 125 / 6.6 µm, UV/Polyester-elastomer Coating (l = 1 +/-0.1 m)
Connector	FC/APC (narrow key / 2mm)

Measurement Conditions / Comments



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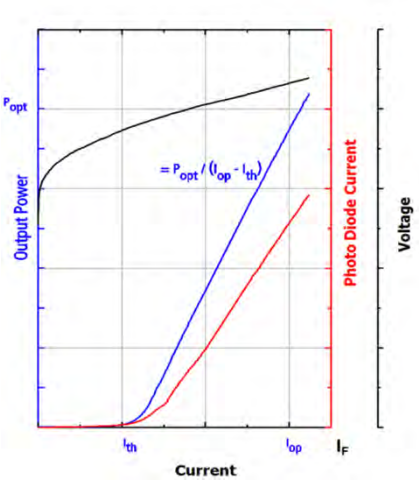
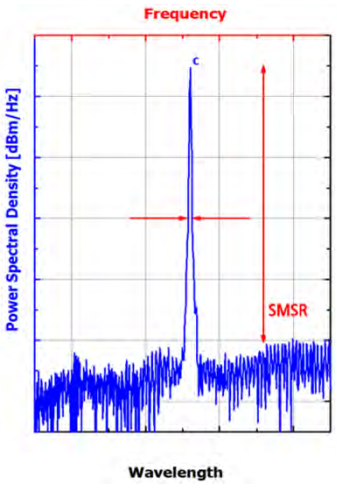
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Typical Measurement Results

Output Power vs. Current



Spectra at Specified Optical Output Power



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.

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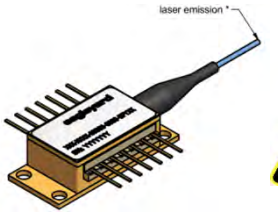

IEC-60825-0

Complies with 21 CFR 1040.10 and 1040.40

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DATA SHEET

EYP-DFB-1064-00040-1500-BFY02-0000

Revision 1.04

2019-02-26

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

General Product Information

Product	Application
1064 nm DFB Laser	Spectroscopy
with hermetic 14 Pin Butterfly Housing (RoHS compliant)	Metrology
including Monitor Diode, Thermoelectric Cooler and Thermistor	Nd:YAG Replacement
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			190	
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		25		
Forward Current	I_F	mA			170	
Output Power	P_{opt}	mW	10		40	

Characteristics at T_{LD} = 25° at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	1063	1064	1065	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	30	45		P_{opt} = 40 mW

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Revision 1.04

2019-02-26

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} = 40 mW	I_{LD}	mA			170	
Slope Efficiency	η	W / A	0.2	0.4	0.7	
Threshold Current	I_{th}	mA			70	
Polarization Extinction Ratio	PER	dB		20		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		30	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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Distributed Feedback Laser

Pin Assignment

1	Thermoelectric Cooler (+)	14	Thermoelectric Cooler (-)
2	Thermistor	13	Case
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4	Photodiode (Cathode)	11	Laser Diode (Cathode)
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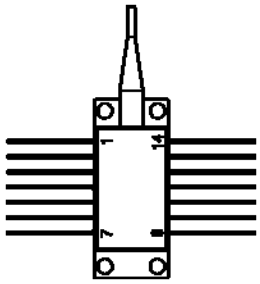
Pins are isolated from case unless noted otherwise.



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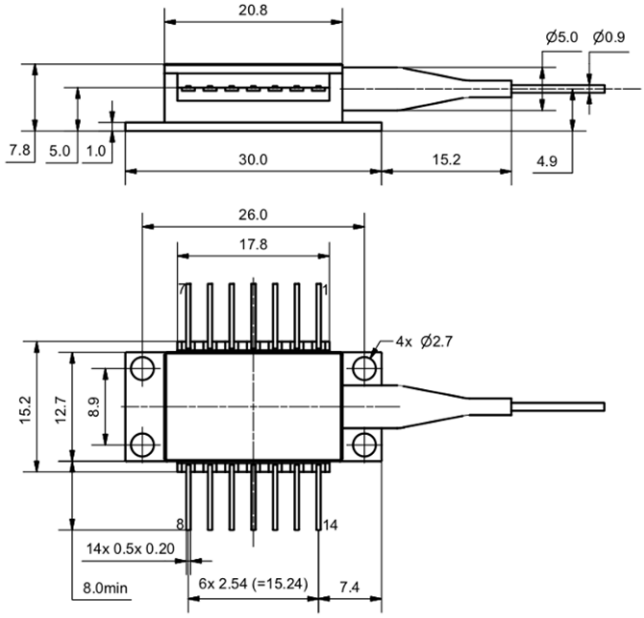

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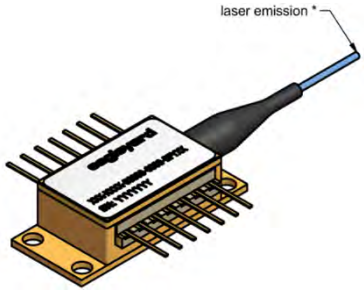


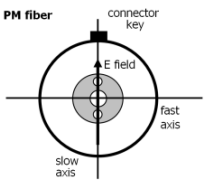
Caution. Excessive mechanical stress on the package can lead to a damage of the laser.

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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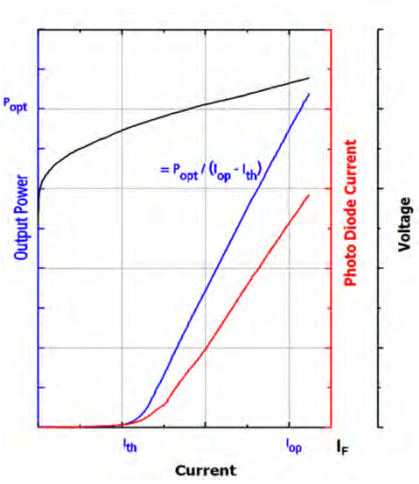
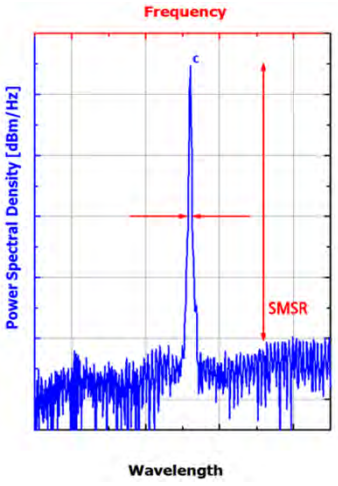
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Typical Measurement Results

Output Power vs. Current



Spectra at Specified Optical Output Power



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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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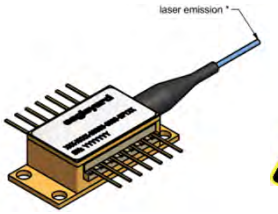

IEC-60825-0

Complies with 21 CFR 1040.10 and 1040.40

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SINGLE FREQUENCY LASER DIODES
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General Product Information

Product	Application
Tunable 1064 nm DFB Laser	Spectroscopy
with hermetic 14 Pin Butterfly Housing (RoHS compliant)	Metrology
including Monitor Diode, Thermoelectric Cooler and Thermistor	Nd:YAG Replacement
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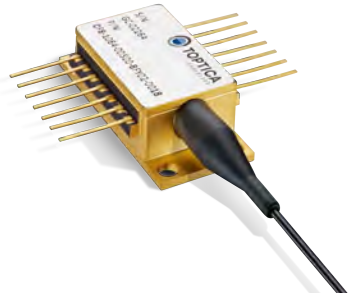

Absolute Maximum Ratings

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			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		40	
Forward Current	I_F	mA			170	
Output Power	P_{opt}	mW	10		40	

Characteristics at T_{LD} = 25° at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	1063	1064	1065	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	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
Mode-hop free Temperature Range	T_{LD}	° C	15		40	
Mode-hop free Power Range	P_{opt}	mW	10		40	
Laser Current @ P_{opt} = 40 mW	I_{LD}	mA			170	
Slope Efficiency	η	W / A	0.2	0.4	0.7	
Threshold Current	I_{th}	mA			70	
Polarization Extinction Ratio	PER	dB		20		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.

Monitor Diode

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Monitor Detector Responsivity	I_{mon} / P_{opt}	µA/mW	1		30	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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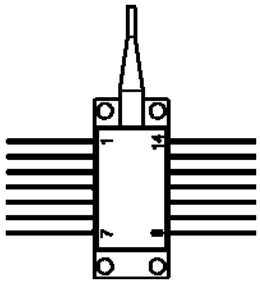
Distributed Feedback Laser

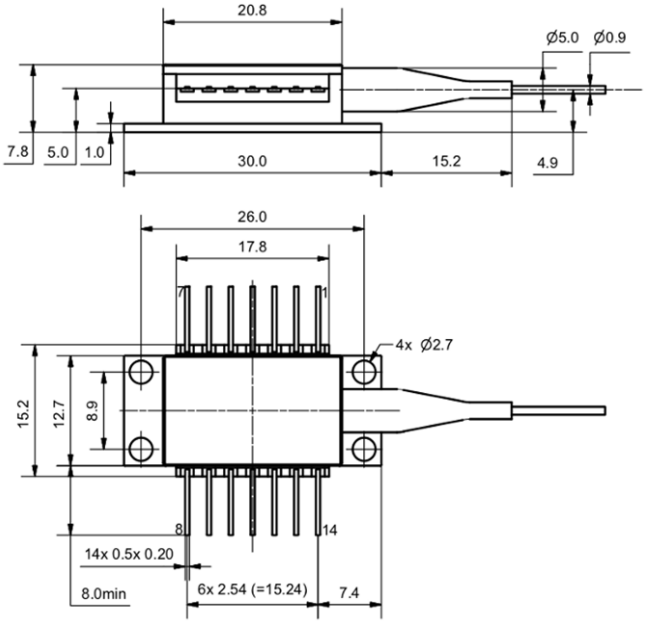
Pin Assignment

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

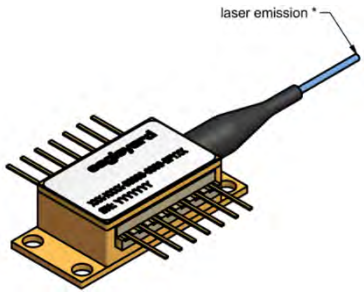
Pins are isolated from case unless noted otherwise.



Package Drawings



AIZ-16-0222-1415



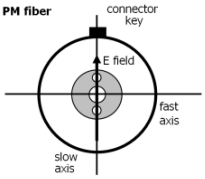
Caution. Excessive mechanical stress on the package can lead to a damage of the laser.

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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EYP-DFB-1064-00040-1500-BFY02-0002

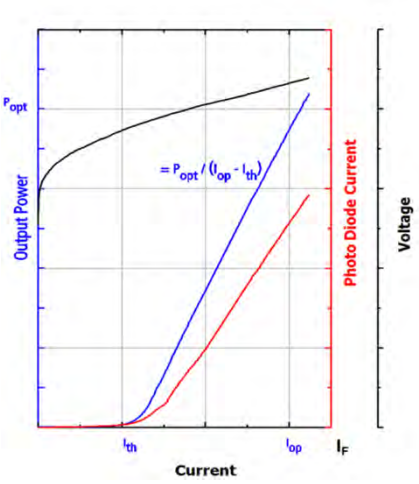
Revision 1.04

2019-02-26

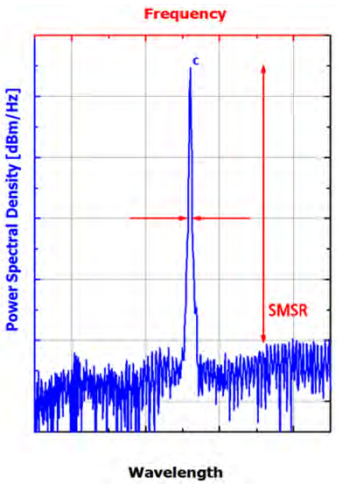
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

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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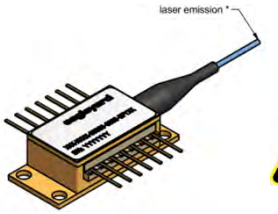

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Complies with 21 CFR 1040.10 and 1040.40

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DATA SHEET

EYP-DFB-1064-00080-1500-TOC03-0000

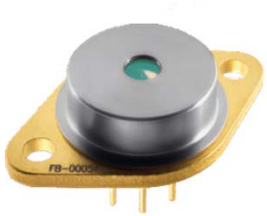
Revision 0.93

2018-03-02

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

General Product Information

Product	Application
1064 nm DFB Laser	Spectroscopy
with hermetic 8-Pin TO Package (RoHS compliant)	Metrology
including Monitor Diode, Thermoelectric Cooler and Thermistor	Nd:YAG Replacement



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			190	
Reverse Voltage	V_R	V			2	
Output Power	P_{opt}	mW			90	
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		40	measured by integrated Thermistor
Forward Current	I_F	mA			170	
Output Power	P_{opt}	mW	20		80	

Characteristics at T_{LD} = 25° at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	1063	1064	1065	see images on page 4
Linewidth (FWHM)	$\Delta\lambda$	MHz		2		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		
Sidemode Supression Ratio	SMSR	dB	30	45		P_{opt} = 80 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} = 80 mW	I_{LD}	mA			170	
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	0.5		10	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 0.93

2018-03-02

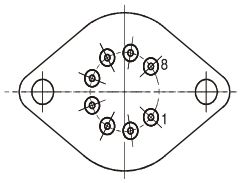
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Pin Assignment

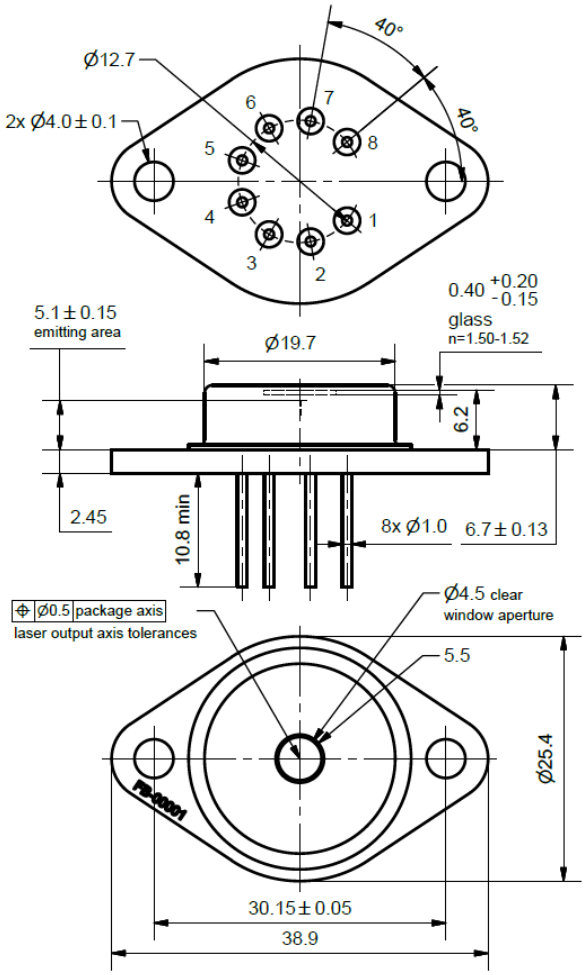
1	Thermoelectric Cooler (+)	5	Laser Diode Anode
2	Thermistor	6	Monitor Diode Anode
3	Thermistor	7	Photo Diode Cathode
4	Laser Diode Cathode	8	Thermoelectric Cooler (-)

All 8 pins are isolated from case.

bottom view

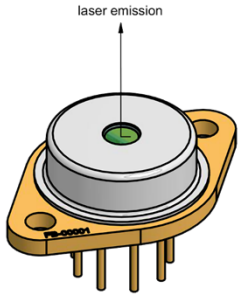


Package Drawings



AIZ-16-311-1543-B

laser emission



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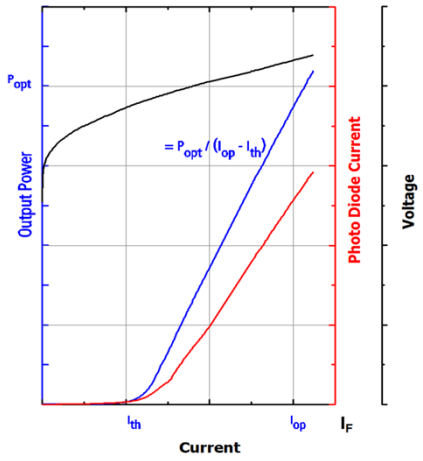
Revision 0.93

2018-03-02

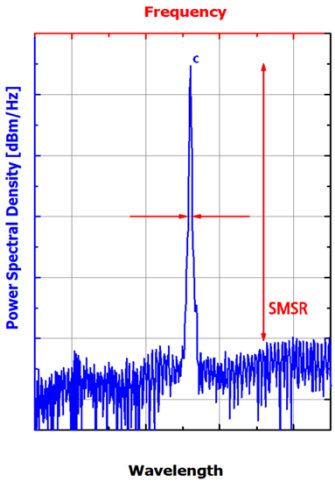
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

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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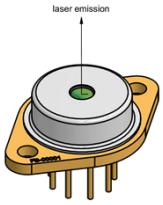

IEC-60825-0

Complies with 21 CFR 1040.10 and 1040.40

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DATA SHEET

EYP-DFB-1064-00080-1500-TOC03-0002

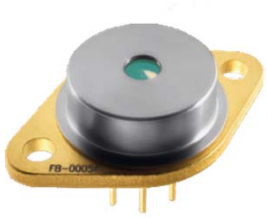
Revision 0.93

2018-03-02

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

General Product Information

Product	Application
Tunable 1064 nm DFB Laser	Spectroscopy
with hermetic 8-Pin TO Package (RoHS compliant)	Metrology
including Monitor Diode, Thermoelectric Cooler and Thermistor	Nd:YAG Replacement



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			190	
Reverse Voltage	V_R	V			2	
Output Power	P_{opt}	mW			90	
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		40	measured by integrated Thermistor
Forward Current	I_F	mA			170	
Output Power	P_{opt}	mW	20		80	

Characteristics at T_{LD} = 25° at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	1063	1064	1065	see images on page 4
Linewidth (FWHM)	$\Delta\lambda$	MHz		2		80 mW
Mode-hop free Tuning Range	$\Delta\lambda_{tune}$	pm		1500		
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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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
Mode-hop free Temperature Range	T_{LD}	° C	15		40	
Mode-hop free Power Range	P_{opt}	mW	20		80	
Laser Current @ P_{opt} = 80 mW	I_{LD}	mA			170	
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	0.5		10	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 0.93

2018-03-02

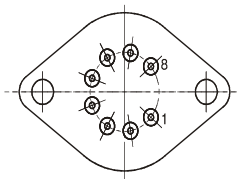
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Pin Assignment

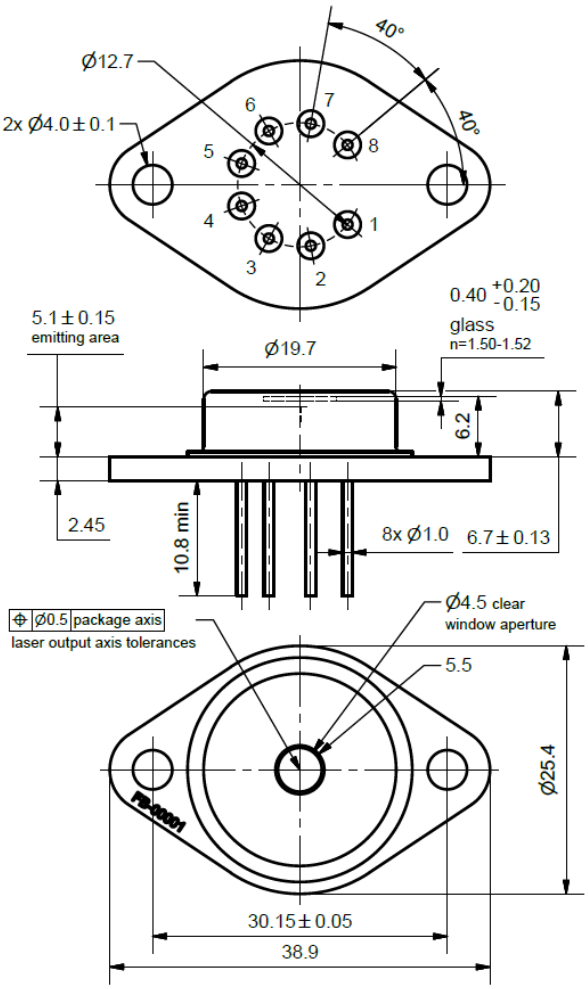
1	Thermoelectric Cooler (+)	5	Laser Diode Anode
2	Thermistor	6	Monitor Diode Anode
3	Thermistor	7	Photo Diode Cathode
4	Laser Diode Cathode	8	Thermoelectric Cooler (-)

All 8 pins are isolated from case.

bottom view

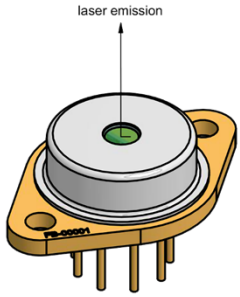


Package Drawings



AIZ-16-311-1543-B

laser emission



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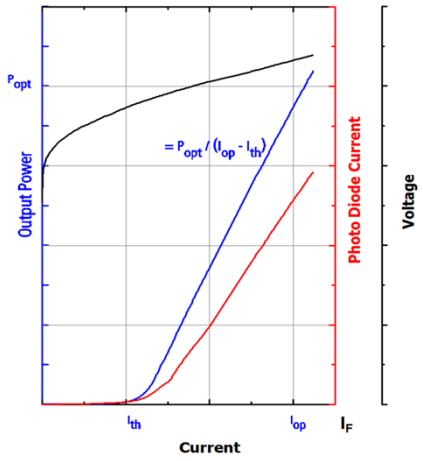
Revision 0.93

2018-03-02

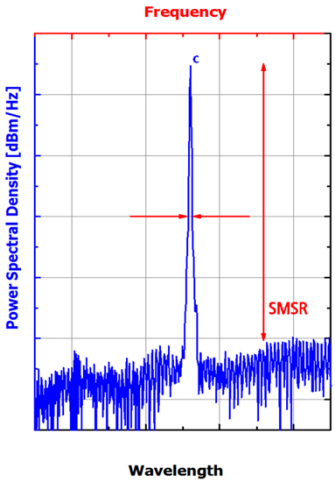
SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

Typical Measurement Results

Output Power vs. Current



Spectra at Specified Optical Output Power



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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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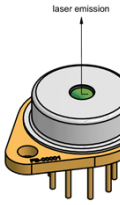

IEC-60825-0

Complies with 21 CFR 1040.10 and 1040.40

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DATA SHEET

EYP-DFB-1064-00500-1500-BFY02-0010

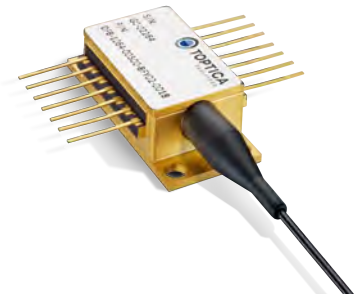
Revision 1.04

2020-10-05

SINGLE FREQUENCY LASER DIODES
Distributed Feedback Laser

General Product Information

Product	Application
1064 nm DFB Laser for Pulse Mode Operation	Spectroscopy
with hermetic 14 Pin Butterfly Housing (RoHS compliant)	Metrology
including Monitor Diode, Thermoelectric Cooler and Thermistor	Seed Laser
with PM Fiber and Angled Physical Contact (APC)	Sensing



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 (cw)	I_F	mA			190	
Forward Current (pulse mode)	I_{Fpeak}	mA			1600	
Reverse Voltage	V_R	V			2	
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		40	measured by integrated Thermistor
Forward Current (cw)	I_F	mA			170	under cw conditions
Forward Current (pulse mode)	I_{fpeak}	mA			1500	under Pulse Mode Conditions

Pulse Mode Conditions

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Pulse Width	t_p	ns		10		longer pulses, higher rep rates or duty cycles may damage the laser - other pulse conditions may be applicable but have not been specifically tested
Pulse Repetition Rate	RR	kHz		200		
Duty Cycle	D.C.	%		0.2		

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Characteristics (Pulse Mode Operation) T_{LD} selected by eagleyard

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	1062	1064	1066	at optimum temperature selected by eagleyard
Peak Power	P_{peak}	mW		600		
Sidemode Supression Ratio	SMSR	dB	25			at optimum temperature selected by eagleyard
Wavelength Chirp	I_{LD}	pm			200	at optimum temperature selected by eagleyard
Pulse-to-Pulse Stability	ΔP_{peak}	%		3		Integration >1,000 pulses (infinite persistence)

Characteristics (cw Operation) T_{LD} = 25° at BOL

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Center Wavelength	λ_C	nm	1062	1064	1066	
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		
Laser Current @ Popt = 40 mW	I_{LD}	mA			170	
Slope Efficiency	η	W / A	0.2	0.4	0.7	
Threshold Current	I_{th}	mA			70	

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Monitor Diode

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Monitor Detector Responsivity	I_{mon} / P_{opt}	µA/mW	1		30	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		$R_1 / R_2 = e^{\beta (1/T_1 - 1/T_2)}$
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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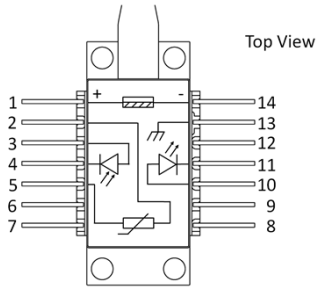
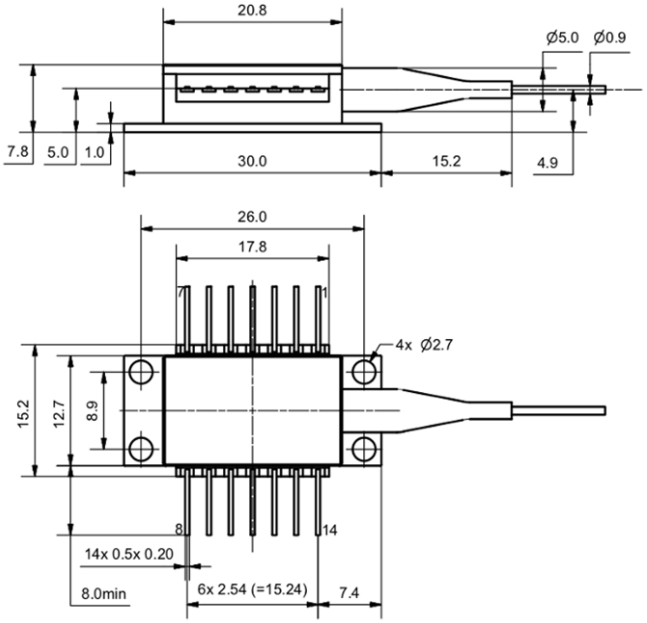
Pin Assignment

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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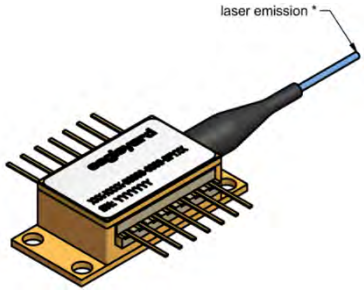


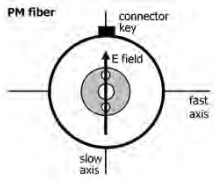
Caution. Excessive mechanical stress on the package can lead to a damage of the laser.

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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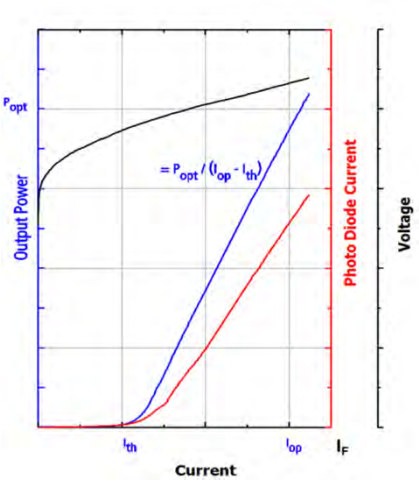
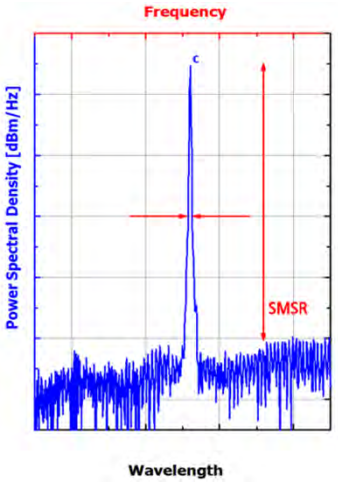
Typical Measurement Results

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.

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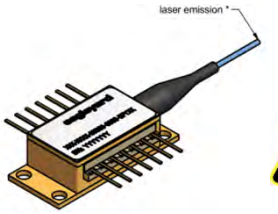

IEC-60825-1

Complies with 21 CFR 1040.10 and 1040.40