DATA SHEET

EYP-TPA-0960-02000-4006-CMT04-0000

Revision 1.00

TOPTICA EAGLEYARD

TAPERED AMPLIFIERS
Semiconductor Optical Amplifier

General Product Information

Product	Application
960 nm Tapered Amplifier	Spectroscopy
C-Mount Package	

Absolute Maximum Ratings

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Storage Temperature (non condensing)	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 (non cond.)	T_C	°C	0		50	
Forward Current	I_F	A			3.5	
Reverse Voltage	V_R	V			2	
Output Power	P_{opt}	W			2.2	

Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Operational Temperature at Case	T_C	°C	5		40	non condensing
Forward Current	I_F	A			3.2	
Input Power	P_{input}	mW	10		50	
Output Power	P_{opt}	W			2.0	with proper injection from a seed laser

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

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Design Wavelength	λ_C	nm		960		
Gain Width (FWHM)	$\Delta\lambda$	nm		20		
Temperature Coefficient of Wavelength	$d\lambda / dT$	nm / K		0.3		
Operational Current @ P_{opt} = 2.0 W	$I_{op\ Gain}$	A			3.2	with proper injection from a seed laser
Output Power	P_{opt}	W	2.0			
Amplification	G	dB				with proper injection from a seed laser at recommended
Cavity length	L_C	µm		4000		

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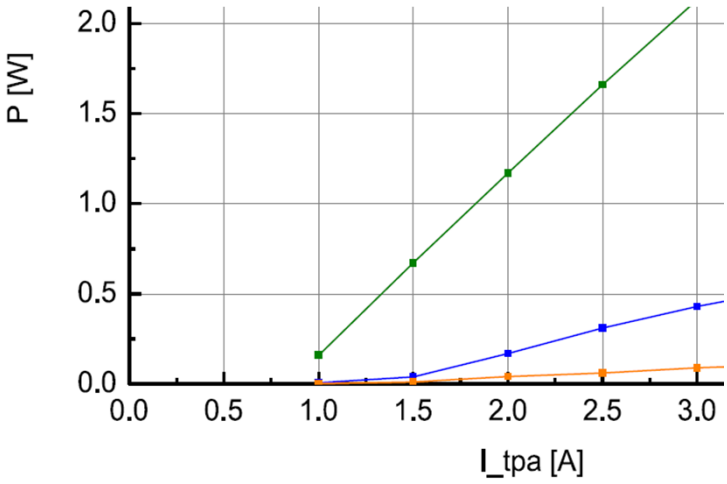
Semiconductor Optical Amplifier

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

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Reflectivity at Front Facet	R_{ff}			3·10-4	1·10-3	
Reflectivity at Rear Facet	R_{rf}			3·10-4	1·10-3	
Input Aperture (at rear side)	d_{in}	µm		3		
Output Aperture (at front side)	d_{out}	µm		210		
Astigmatism	A	µm		670		estimated at recommended maximum forward current
Input Divergence parallel ($1/e^2$)	$\Theta_{in\,||}$	°		24		
Input Divergence perpendicular ($1/e^2$)	$\Theta_{in\perp}$	°		37		
Output Divergence parallel ($1/e^2$)	$\Theta_{out\,||}$	°		18		
Output Divergence perpendicular ($1/e^2$)	$\Theta_{out\perp}$	°		37		
Polarization				TE		E field parallel to junction plane

Typical Measurement Results



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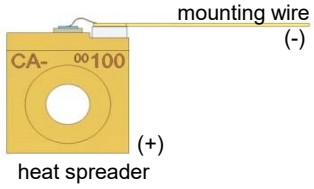
TAPERED AMPLIFIERS
Semiconductor Optical Amplifier

Package Dimensions

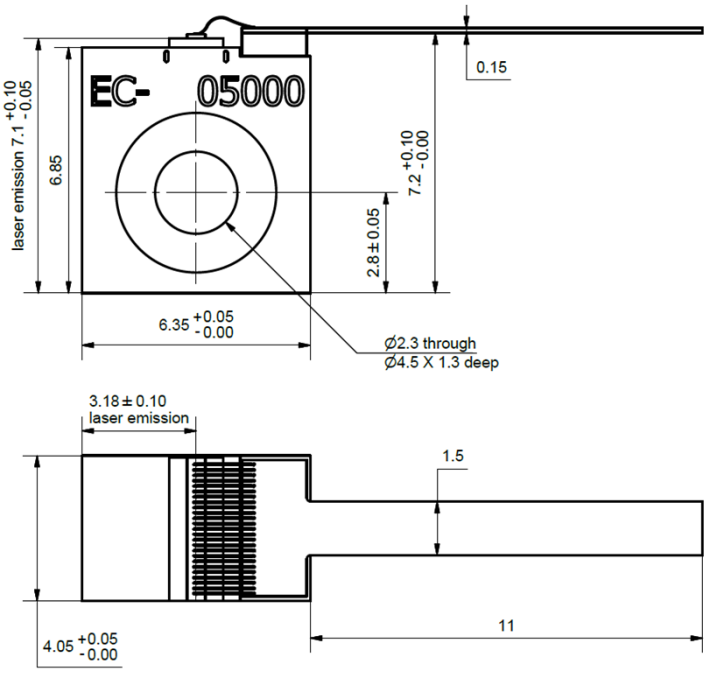
Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Height of Emission Plane	h	mm	7.05	7.10	7.20	
C-Mount Thickness	t	mm		4.05		

Package Pinout

Mounting Wire	Cathode (-)
Housing	Anode (+)



Package Drawings



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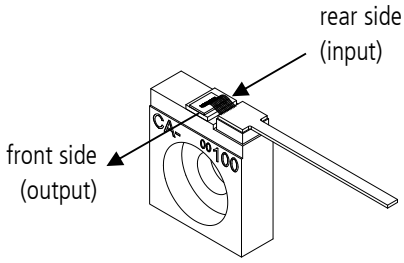

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TAPERED AMPLIFIERS
Semiconductor Optical Amplifier

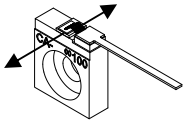
Unpacking, Installation and Laser Safety

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 TPA diode type is known to be sensitive against thermal stress. It should not be operated without appropriate injection from a seed laser. Operating at moderate temperatures on proper heat sinks willl contribute to a long lifetime of the diode. The chip should be protected against moisture. A water vapor content below 5000 ppm is recommended for applications with high reliability requirements.

The laser emission from this diode is close to the invisible infrared region of the electromagnetic spectrum. Avoid direct and/or indirect exposure to the free running beam. Collimating the free running beam with optics as common in optical instruments will increase threat to the human eye.

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



Laser Emission

IEC-60825-0

Complies with 21 CFR 1040.10 and 1040.40

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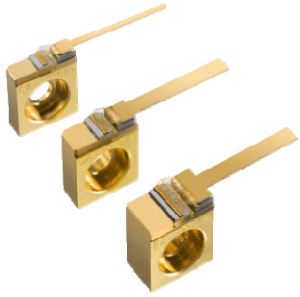
TAPERED AMPLIFIERS
Semiconductor Optical Amplifier

General Product Information

Product	Application
970 nm Tapered Amplifier	Spectroscopy
Gain from 950 nm to 980 nm (see p. 2)	Metrology
C-Mount Package	



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	0		50	
Forward Current	I_F	A			4.5	
Reverse Voltage	V_R	V			2	
Output Power	P_{opt}	W			3.0	

Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Operational Temperature at Case	T_C	°C	5		40	non condensing
Forward Current	I_F	A			4.0	
Input Power	P_{input}	mW	10		50	operation without seeding not recommended
Output Power	P_{opt}	W			3.0	with proper injection from a seed laser

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

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Wavelength	λ_C	nm		970		maximum gain
Gain Width (FWHM)	$\Delta\lambda$	nm		30		see Typical Measurement Results (p. 2)
Temp. Coefficient of Wavelength	$d\lambda / dT$	nm / K		0.3		
Output Power	P_{opt}	W		2.5		at maximum gain
Amplification	G	dB		21		with proper injection from a seed laser
Cavity length	L_C	µm		4000		

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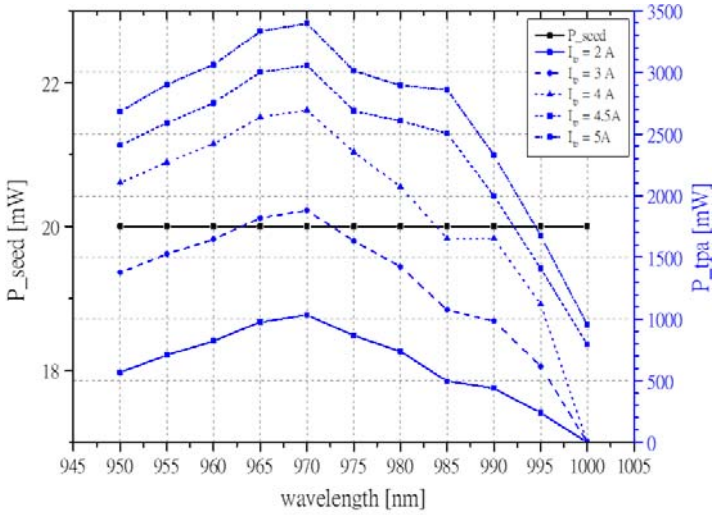
TAPERED AMPLIFIERS
Semiconductor Optical Amplifier

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

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Reflectivity at Front Facet	R_{ff}			3·10-4	1·10-3	
Reflectivity at Rear Facet	R_{rf}			3·10-4	1·10-3	
Input Aperture (at rear side)	d_{in}	µm		2.4		
Output Aperture (at front side)	d_{out}	µm		210		
Astigmatism	A	µm		700		at recommended maximum forward current
Input Divergence parallel	$\Theta_{in\,\|\|}$	°		24		1/e2
Input Divergence perpendicular	$\Theta_{in\perp}$	°		37		1/e2
Output Divergence parallel	$\Theta_{out\,\|\|}$	°		18		1/e2
Output Divergence perpendicular	$\Theta_{out\perp}$	°		37		1/e2
Polarization				TE		E field parallel to junction plane

Typical Measurement Results

output power with seeding at different wavelengths



Graphs, data and any illustrative material provided in this specification describe the typical performance of the tapered amplifier. The achievable amplification depends strongly on a proper injection of the seed laser. In accordance with the eagleyard Photonics policy of continuous improvement specifications may change without notice.

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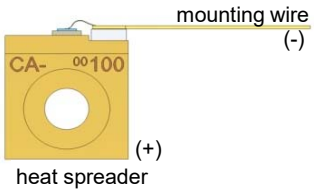
TAPERED AMPLIFIERS
Semiconductor Optical Amplifier

Package Dimensions

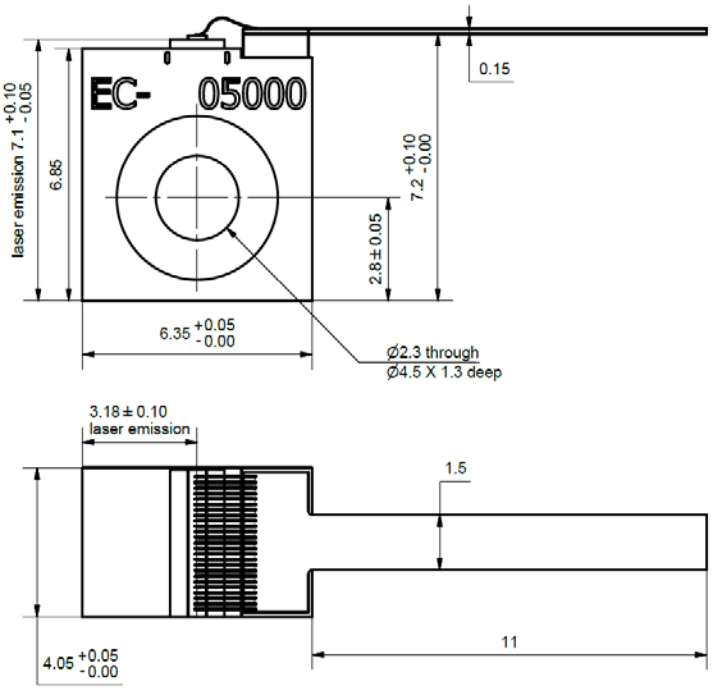
Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Height of Emission Plane	h	mm	7.5	7.10	20.7	
C-Mount Thickness	t	mm		4.5		

Package Pinout

Mounting Wire	Cathode (-)
Housing	Anode (+)



Package Drawings



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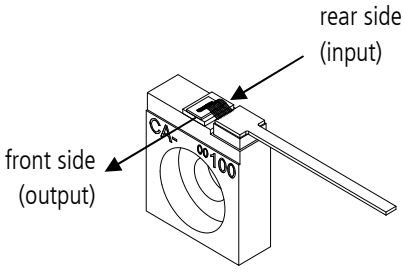

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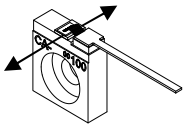
TAPERED AMPLIFIERS
Semiconductor Optical Amplifier

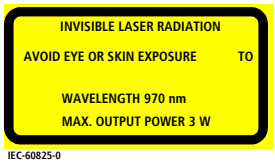
Unpacking, Installation and Laser Safety

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.



Laser Emission

The TPA diode type is known to be sensitive against thermal stress. It should not be operated without appropriate injection from a seed laser. Operating at moderate temperatures on proper heat sinks willl contribute to a long lifetime of the diode. The chip should be protected against moisture. A water vapor content below 5000 ppm is recommended for applications with high reliability requirements.



IEC-60825-0

The laser emission from this diode is close to the invisible infrared region of the electromagnetic spectrum. Avoid direct and/or indirect exposure to the free running beam. Collimating the free running beam with optics as common in optical instruments will increase threat to the human eye.

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

Complies with 21 CFR 1040.10 and 1040.40

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Revision 0.91

TAPERED AMPLIFIERS
Semiconductor Optical Amplifier

General Product Information

Product	Application
980 nm Tapered Amplifier	Spectroscopy
C-Mount Package	Metrology

Absolute Maximum Ratings

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Storage Temperature (non condensing)	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 (non cond.)	T_C	°C	0		50	
Forward Current	I_F	A			2.0	
Reverse Voltage	V_R	V			0	
Output Power	P_{opt}	W			0.6	

Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Operational Temperature at Case	T_C	°C	5		40	non condensing
Forward Current	I_F	A			1.8	
Input Power	P_{input}	mW	10		50	
Output Power	P_{opt}	W			0.5	with proper injection from a seed laser

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

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Design Wavelength	λ_C	nm		980		
Gain Width (FWHM)	$\Delta\lambda$	nm		30		
Temperature Coefficient of Wavelength	$d\lambda / dT$	nm / K		0.3		
Operational Current @ P_{opt} = 0.5 W	$I_{op\ Gain}$	A			1.8	with proper injection from a seed laser
Output Power	P_{opt}	W	0.5			
Amplification	G	dB				with proper injection from a seed laser
Cavity Length	L_C	µm		2750		

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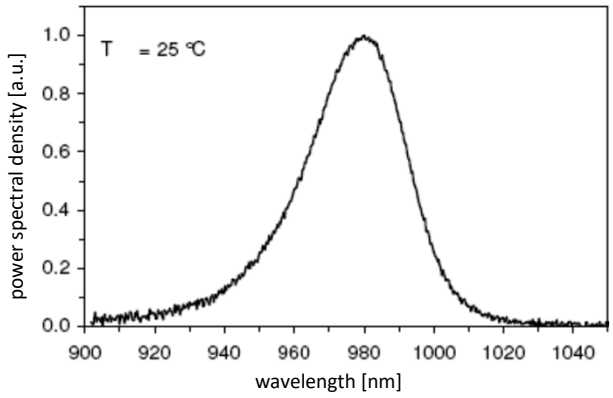
TAPERED AMPLIFIERS
Semiconductor Optical Amplifier

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

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Reflectivity at Front Facet	R_{ff}			3·10-4	1·10-3	
Reflectivity at Rear Facet	R_{rf}			3·10-4	1·10-3	
Input Aperture (at rear side)	d_{in}	µm		3		
Output Aperture (at front side)	d_{out}	µm		190		
Astigmatism	A	µm		625		estimated at recommended maximum forward current
Input Divergence parallel ($1/e^2$)	$\Theta_{in\,\|\|}$	°				
Input Divergence perpendicular ($1/e^2$)	$\Theta_{in\perp}$	°				
Output Divergence parallel ($1/e^2$)	$\Theta_{out\,\|\|}$	°				
Output Divergence perpendicular ($1/e^2$)	$\Theta_{out\perp}$	°				
Beam quality factor	M^2					
Polarization				TE		E field parallel to junction plane

Typical Measurement Results

spectrum measured w/o injection



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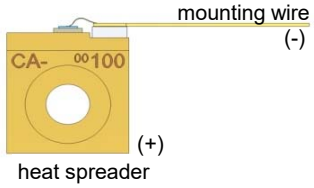
TAPERED AMPLIFIERS
Semiconductor Optical Amplifier

Package Dimensions

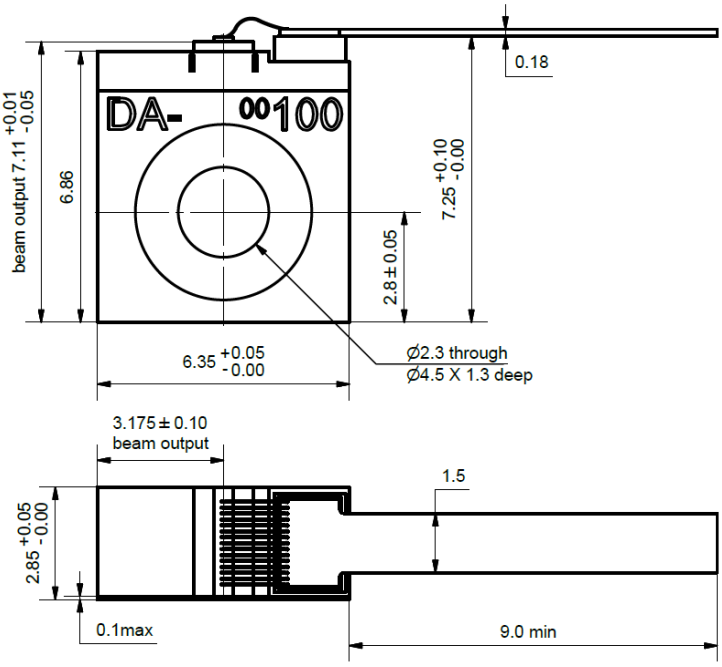
Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Height of Emission Plane	h	mm	7.05	7.10	7.20	
C-Mount Thickness	t	mm		2.80		

Package Pinout

Mounting Wire	Cathode (-)
Housing	Anode (+)



Package Drawings



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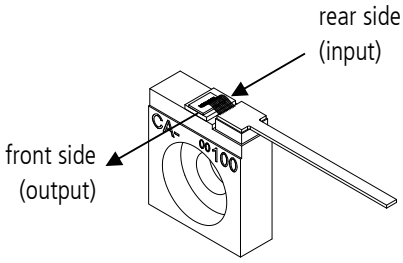

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TAPERED AMPLIFIERS
Semiconductor Optical Amplifier

Unpacking, Installation and Laser Safety

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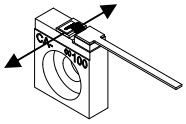

Laser Emission

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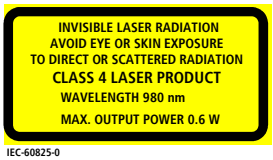

IEC-60825-0

The laser emission from this diode is close to the invisible infrared region of the electromagnetic spectrum. Avoid direct and/or indirect exposure to the free running beam. Collimating 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.