

## EYP-TPA-0650-00250-2007-CMT02-0000

Revision 1.00

## TAPERED AMPLIFIERS

### Semiconductor Optical Amplifier

Distributor



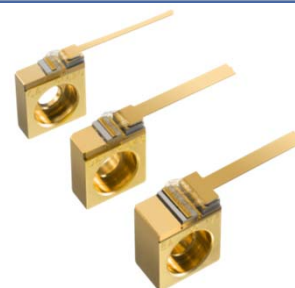
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## General Product Information

Product	Application
650 nm Tapered Amplifier	Spectroscopy
C-Mount Package	



## Absolute Maximum Ratings

Parameter	Symbol	Unit	min	typ	max
Storage Temperature (non condensing)	$T_S$	°C	-40		85
Operational Temperature at Case (non cond.)	$T_C$	°C	0		30
Forward Current	$I_F$	A			1
Reverse Voltage	$V_R$	V			0
Output Power	$P_{opt}$	W			0.3

## Measurement Conditions / Comments

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.

## Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max
Operational Temperature at Case	$T_C$	°C	5	15	20
Forward Current	$I_F$	A			0.75
Input Power	$P_{input}$	mW	10		50
Output Power	$P_{opt}$	W			0.25

## Measurement Conditions / Comments

non condensing

with proper injection from a seed laser

Characteristics at  $T_{LD} = 15\text{ °C}$  at BOL

Parameter	Symbol	Unit	min	typ	max
Design Wavelength	$\lambda_c$	nm		650	
Gain Width (FWHM)	$\Delta\lambda$	nm		10	
Temperature Coefficient of Wavelength	$d\lambda / dT$	nm / K		0.25	
Operational Current @ $P_{opt} = 0.25\text{ W}$	$I_{op\ Gain}$	A			0.75
Output Power	$P_{opt}$	W	0.25		
Amplification	G	dB		12	
Cavity length	$L_c$	μm		2000	

## Measurement Conditions / Comments

see images on page 4

with proper injection from a seed laser

with proper injection from a seed laser

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2011-12-08

TAPERED AMPLIFIERS  
Semiconductor Optical Amplifier

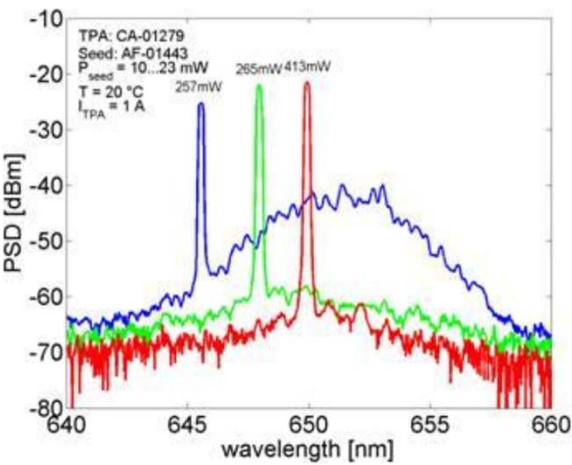


Characteristics at  $T_{LD} = 15\text{ }^{\circ}\text{C}$  at BOL cont'd

Parameter	Symbol	Unit	min	typ	max
Reflectivity at Front Facet	$R_{ff}$			3·10 <sup>-4</sup>	1·10 <sup>-3</sup>
Reflectivity at Rear Facet	$R_{rf}$			3·10 <sup>-4</sup>	1·10 <sup>-3</sup>
Input Aperture (at rear side)	$d_{in}$	μm		7.5	
Output Aperture (at front side)	$d_{out}$	μm		70	
Astigmatism	A	μm		tbd	
Input Divergence parallel (1/e <sup>2</sup> )	$\Theta_{in  }$	°		tbd	
Input Divergence perpendicular (1/e <sup>2</sup> )	$\Theta_{in\perp}$	°		tbd	
Output Divergence parallel (1/e <sup>2</sup> )	$\Theta_{out  }$	°		tbd	full angle
Output Divergence perpendicular (1/e <sup>2</sup> )	$\Theta_{out\perp}$	°		tbd	
Beam quality factor	$M^2$				
Polarization				TE	

Measurement Conditions / Comments
estimated at recommended maximum forward current
full angle
E field parallel to junction plane

Typical Measurement Results



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.

# TAPERED AMPLIFIERS

## Semiconductor Optical Amplifier



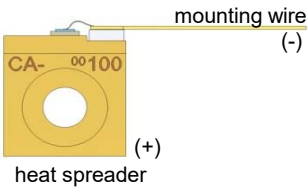
### Package Dimensions

Parameter	Symbol	Unit	min	typ	max
Height of Emission Plane	h	mm	7.05	7.10	7.20
C-Mount Thickness	t	mm		2.15	

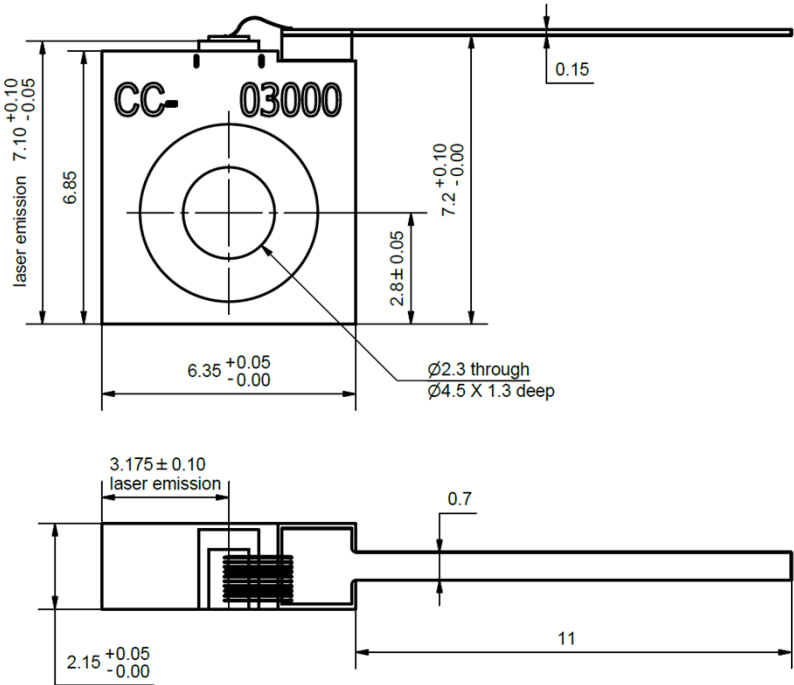
Measurement Conditions / Comments

### Package Pinout

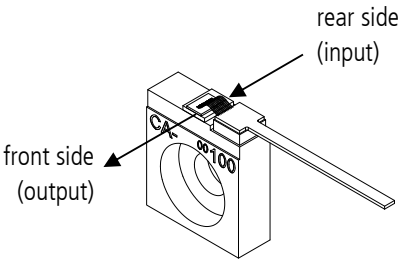
Mounting Wire	Cathode (-)
Housing	Anode (+)



### Package Drawings



AIZ-18-0413-1250



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Revision 1.00

2011-12-08

## TAPERED AMPLIFIERS

### Semiconductor Optical Amplifier

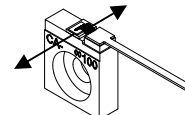
#### Unpacking, Installation and Laser Safety

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.

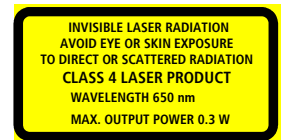
The TPA diode type is known to be sensitive against thermal stress. It should not be operated without appropriate injection from a seed laser. Operating at moderate temperatures on proper heat sinks will contribute to a long lifetime of the diode. The chip should be protected against moisture. A water 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

Distributor



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# EYP-TPA-0670-00500-2004-CMT02-0000

Revision 0.90

2023-01-05

## TAPERED AMPLIFIER Semiconductor Optical Amplifier



### General Product Information

Product	Application
670 nm Tapered Amplifier	Spectroscopy
C-Mount Package	

### Absolute Maximum Ratings

Parameter	Symbol	Unit	min	typ	max
Storage Temperature	$T_S$	°C	-40		85
Operational Temperature at Case	$T_C$	°C	0		30
Forward Current	$I_F$	A			1.3
Reverse Voltage	$V_R$	V			2
Output Power	$P_{opt}$	W			0.6

### Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max
Operational Temperature at Case	$T_{case}$	°C		20	
Forward Current	$I_F$	A			1.2
Input Power	$P_{opt}$	mW	10		50
Output Power	$P_{opt}$	W			0.5

### Characteristics $T_{case} = 20^\circ\text{C}$ at BOL

Parameter	Symbol	Unit	min	typ	max
Wavelength	$\lambda$	nm		670	
Gain Width (FWHM)	$\Delta\lambda$	nm		10	
Operational Current	$I_{Op\ Gain}$	A			1.2
Output Power	$P_{opt}$	W	0.5		
Polarization				TE	
Amplification	G	dB		13	
Temp. Coefficient of Wavelength	$d\lambda / dT$	nm/K		0.3	
Cavity Length	L	$\mu\text{m}$		2000	
Reflectivity at Front Facet	$R_{ff}$			$3 \cdot 10^{-4}$	$1 \cdot 10^{-3}$
Reflectivity at Rear Facet	$R_{ff}$			$3 \cdot 10^{-4}$	$1 \cdot 10^{-3}$



### Measurement Conditions / Comments

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.

### Measurement Conditions / Comments

non condensing  
seeding required above 0.6 A  
with proper injection from a seed laser

### Measurement Conditions / Comments

with proper injection from a seed laser  
E field parallel to junction plane  
with proper injection from a seed laser

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## TAPERED AMPLIFIER Semiconductor Optical Amplifier



### Characteristics Tcase'= 20° C at BOL cont'd

Parameter	Symbol	Unit	min	typ	max
Input Divergence parallel	$\Theta_{out  }$	°		10	
Input Divergence perpendicular	$\Theta_{out\perp}$	°		50	
Output Divergence parallel	$\Theta_{out  }$	°		10	
Output Divergence perpendicular	$\Theta_{out\perp}$	°		45	

Measurement Conditions / Comments
1/e <sup>2</sup> (full angle)
1/e <sup>2</sup> (full angle)
1/e <sup>2</sup> (full angle)
1/e <sup>2</sup> (full angle)

### Package Dimensions

Parameter	Symbol	Unit	min	typ	max
Height of Emission Plane	d <sub>EP</sub>		7.05	7.1	7.2

Measurement Conditions / Comments

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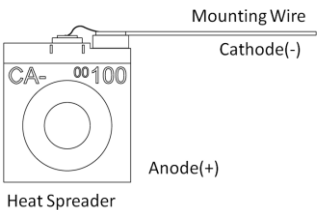
2023-01-05

## TAPERED AMPLIFIER Semiconductor Optical Amplifier

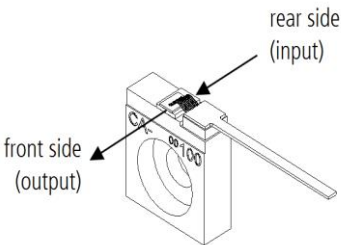
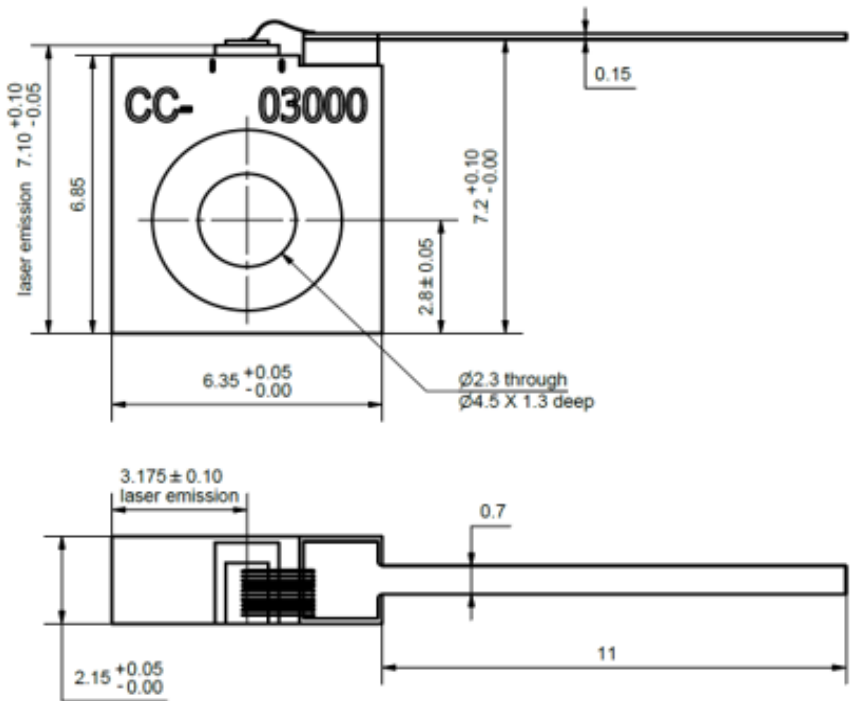


### Pin Assignment

Laser Diode Cathode (-)	Mounting Wire
Laser Diode Anode (+)	Housing



### Package Drawings



AIZ-18-0413-1250

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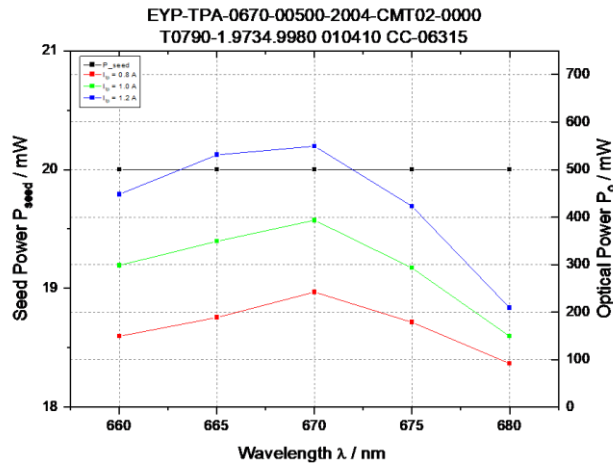
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2023-01-05

## TAPERED AMPLIFIER Semiconductor Optical Amplifier



### Typical Measurement Results



Measurement results and other 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.

### Unpacking, Installation and Laser Safety

Unpacking the tapered amplifier 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.

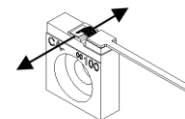
The TPA diode type is known to be sensitive against thermal stress. It should not be operated without appropriate injection from a seed laser. Operating at moderate temperatures on proper heat sinks will contribute to a long lifetime of the diode.

This amplifier is designed for the setup of MOPA systems. An optical isolator should be used between seed laser and amplifier in order to suppress backreflections that may disturb the emission spectrum of the seed laser and may cause mode-hops in case of wavelength tuning.

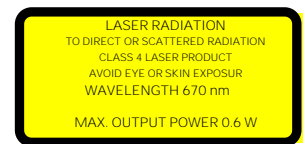
Each tapered amplifier will come with an individual test protocol verifying the parameters given in this document.

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.

In accordance with the eagleyard Photonics policy of continuous improvement specifications may change without notice.



Laser Emission



Complies with 21 CFR 1040.10 and 1040.40



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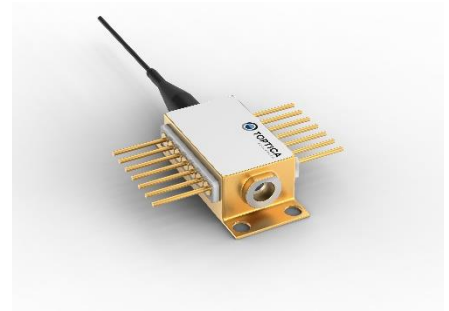
2024-04-03

## TAPERED AMPLIFIER Semiconductor Optical Amplifier



### General Product Information

Product	Application
670 nm Tapered Amplifier	Spectroscopy
14 Pin Butterfly Package	
with PM Fiber and FC/APC Connector (Input)	
and collimated Output Beam	



### Absolute Maximum Ratings

Parameter	Symbol	Unit	min	typ	max
Storage Temperature	$T_S$	°C	-40		85
Operational Temperature at Case	$T_C$	°C	-20		75
Forward Current	$I_F$	A			2.2
Reverse Voltage	$V_R$	V			2
Output Power	$P_{opt}$	W			1.2
TEC Current	$I_{TEC}$	A			5
TEC Voltage	$V_{TEC}$	V			7

### Measurement Conditions / Comments

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.

### Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max
Operational Temperature at Case	$T_{case}$	°C	0		50
Operational Temperature at Chip	$T_{chip}$	°C	10	20	30
Forward Current	$I_F$	A			1.8
Input Power	$P_{opt}$	mW	10		50
Output Power	$P_{opt}$	W		0.8	1

### Measurement Conditions / Comments

measured with integrated thermistor  
seeding required above 1 A  
Insertion loss  $\leq 0.3$  dB  
with proper injection from a seed laser

### Characteristics $T_{case} = 20^\circ \text{C}$ at BOL

Parameter	Symbol	Unit	min	typ	max
Wavelength	$\lambda$	nm		670	
Gain Width (FWHM)	$\Delta\lambda$	nm		10	
Operational Current	$I_{Op \text{ Gain}}$	A			1.8
Output Power	$P_{opt}$	W		0.8	
Polarization				TE	
Amplification	G	dB		15	
Temp. Coefficient of Wavelength	$d\lambda / dT$	nm/K		0.25	

### Measurement Conditions / Comments

$P_{opt} = 0.8 \text{ W}$

E field parallel to base plate  
at recommended maximum forward current

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## TAPERED AMPLIFIER Semiconductor Optical Amplifier



### Characteristics Tcase = 20° C at BOL

Parameter	Symbol	Unit	min	typ	max
Beam Diameter	d	mm		1	
Output Divergence parallel	$\Theta_{out  }$	mrad		3	
Output Divergence perpendicular	$\Theta_{out\perp}$	mrad		3	

Measurement Conditions / Comments
1/e <sup>2</sup>
1/e <sup>2</sup> (full angle)
1/e <sup>2</sup> (full angle)

### Thermoelectric Cooler

Parameter	Symbol	Unit	min	typ	max
Current	I <sub>TEC</sub>	A		1.2	
Voltage	U <sub>TEC</sub>	V		2	
Power Dissipation (total loss at case)	P <sub>loss</sub>	W		8	
Temperature Difference	$\Delta T$	K			40

Measurement Conditions / Comments
P <sub>opt</sub> = 0.8 W; $\Delta T$ = 20 K
P <sub>opt</sub> = 0.8 W; $\Delta T$ = 20 K
P <sub>opt</sub> = 0.8 W; $\Delta T$ = 20 K
P <sub>opt</sub> = 0.8 W

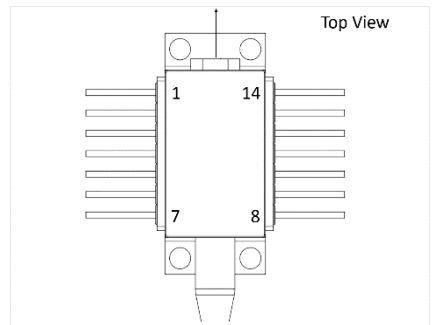
### Thermistor (Standard NTC Type)

Parameter	Symbol	Unit	min	typ	max
Resistance	R	kOhm		10	
Beta Coefficient	$\beta$			3892	
Steinhart & Hart Coefficient A	A			$1.1293 \times 10^{-3}$	
Steinhart & Hart Coefficient B	B			$2.3410 \times 10^{-4}$	
Steinhart & Hart Coefficient C	C			$8.7755 \times 10^{-8}$	

Measurement Conditions / Comments
25°C
0°C ... 50°C

### Pin Assignment

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



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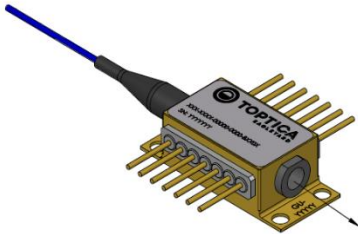
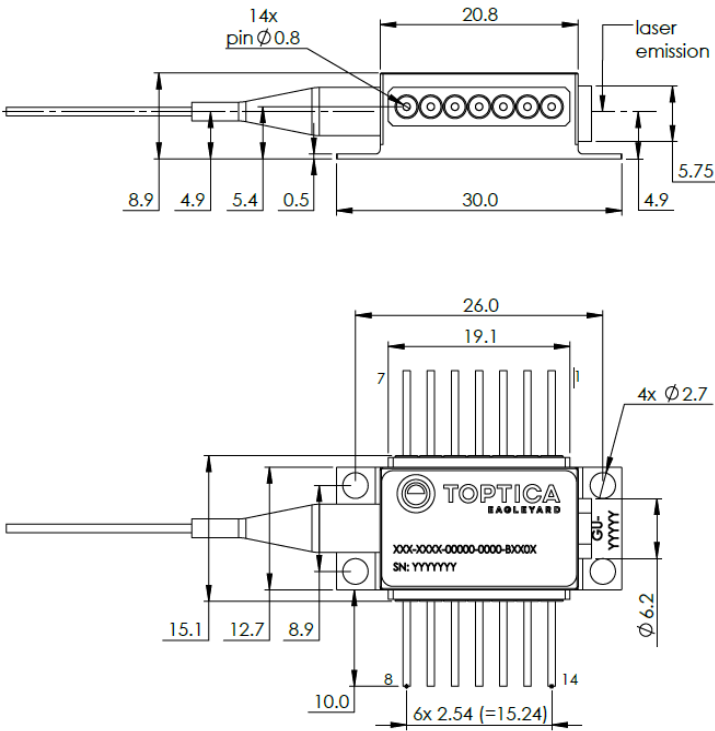
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2024-04-03

## TAPERED AMPLIFIER Semiconductor Optical Amplifier



### Package Drawings

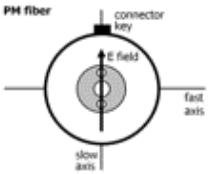


SWZ-23-0117-1237

### Fiber and Connector Type (Input)

Parameter	
PM Fiber	900 / 125 / 4.5 $\mu$ m, UV/Polyester-elastomer Coating length: 1 +/-0.1 m
Connector	FC/APC narrow key / 2 mm

### Measurement Conditions / Comments



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## TAPERED AMPLIFIER Semiconductor Optical Amplifier



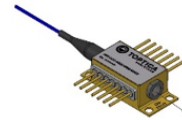
### Unpacking, Installation and Laser Safety

Unpacking the tapered amplifier 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.

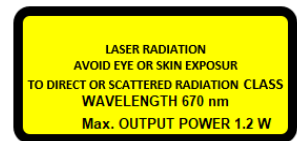
The TPA diode type is known to be sensitive against thermal stress. It should not be operated without appropriate injection from a seed laser. Operating at moderate temperatures on proper heat sinks will contribute to a long lifetime of the diode.

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.



Laser Emission



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Complies with 21 CFR 1040.10 and 1040.40



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