EYP-TPA-0780-03000-4006-BFU09-0011

Revision 0.73

2022-06-08

TAPERED AMPLIFIERS
Semiconductor Optical Amplifier

General Product Information

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

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	15		50	
Operational Temperature at Chip (non cond.)	T_{chip}	°C	15		35	
Forward Current	I_F	A			5	
Forward Peak Current	I_{peak}	A			6.5	
Reverse Voltage	V_R	V			2	
Output Power (cw)	P_{opt}	W			3.2	

Recommended Operational Conditions

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Operational Temperature at Case	T_C	°C	15		35	non condensing
Operational Temperature at Chip	T_{chip}	°C	15	25	35	
Forward Current	I_F	A			4.5	
Forward Peak Current	I_{peak}	A			6.0	
Input Power	P_{input}	mW	10		80	
Output Power	P_{opt}	W			3	with proper injection from a seed laser

Characteristics (cw Operation) T_{chip} = 25° C

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Design Wavelength	λ_C	nm		780		
Gain Width (FWHM)	$\Delta\lambda$	nm		20		
Temperature Coefficient of Wavelength	$d\lambda / dT$	nm / K		0.3		
Operational Current @ P_{opt} = 3 W	$I_{op\ Gain}$	A			4.0	
Output Power	P_{opt}	W	3.0			
Amplification	G	dB		23		at recommended maximum forward current

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Characteristics (cw Operation) T_{chip} = 25° C cont'd

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Output Beam Diameter parallel ($1/e^2$)	$d_{out\,||}$	mm		1		
Output Beam Diameter perpendicular ($1/e^2$)	$d_{out\perp}$	mm		1		
Output Divergence parallel ($1/e^2$)	$\Theta_{out\,||}$	mrad		3		
Output Divergence perpendicular ($1/e^2$)	$\Theta_{out\perp}$	mrad		3		
Polarization				TM		E field perpendicular to base plate

Pulse Mode Conditions

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Pulse Width	t_p	µs		100		
Pulse Repetition Rate	RR	Hz		100		seeded with 785 +/-5 nm, 10 mW min.
Peak Current	I_{peak}	A		5		

Characteristics (Pulse Mode Operation) T_{chip} = 25° C

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Power Content within Aperture of 2 mm	P_{2mm}	%	60			specified Pulse Mode Conditions; at 600 mm distance
Pulse Trace Stability (variation of power)	$P_{variation}$	%	-10		+10	s. *2022-05-25 TPA-780-BFU Correlation Measurements*
Speckle Contrast	$C_{speckle}$		0.5			s. *2022-05-25 TPA-780-BFU Correlation Measurements*

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Thermoelectric Cooler

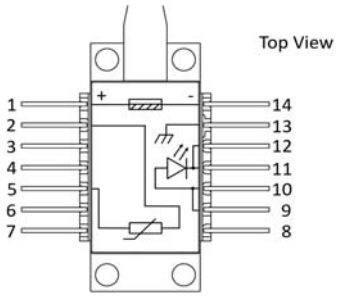
Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Current	I_{TEC}	A			2.5	Popt = 3 W
Voltage	U_{TEC}	V			5	Popt = 3 W
Power Dissipation (total loss at case)	P_{loss}	W		10		Popt = 3 W
Temperature Difference	ΔT	K			20	Popt = 3 W

Thermistor at Chip (Standard NTC Type)

Parameter	Symbol	Unit	min	typ	max	Measurement Conditions / Comments
Resistance	R	kΩ		10		T_{chip} = 25° C
Beta Coefficient	β			3892		$R_1 / R_2 = e^{\beta (1/T_1 - 1/T_2)}$ at T_{chip} = 20° … 30° 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

Pin Assignment

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



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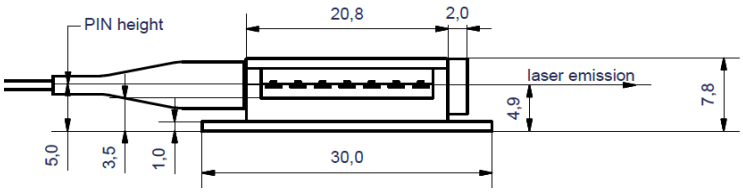
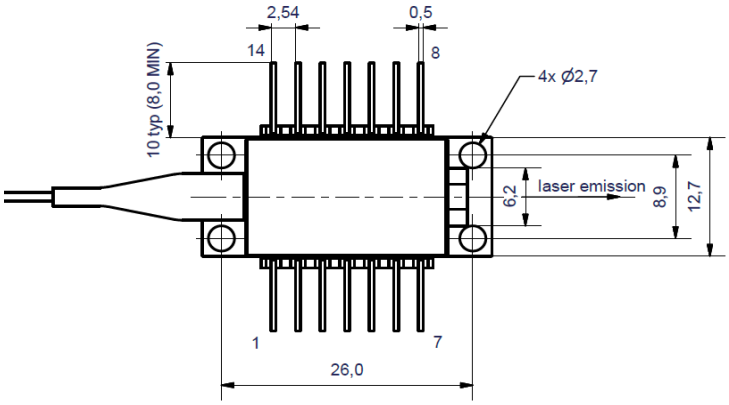
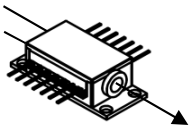
Package Drawings





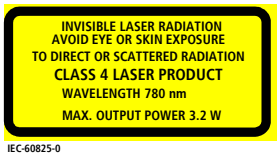
Unpacking, Installation and Laser Safety

Unpacking the taperd 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.



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