


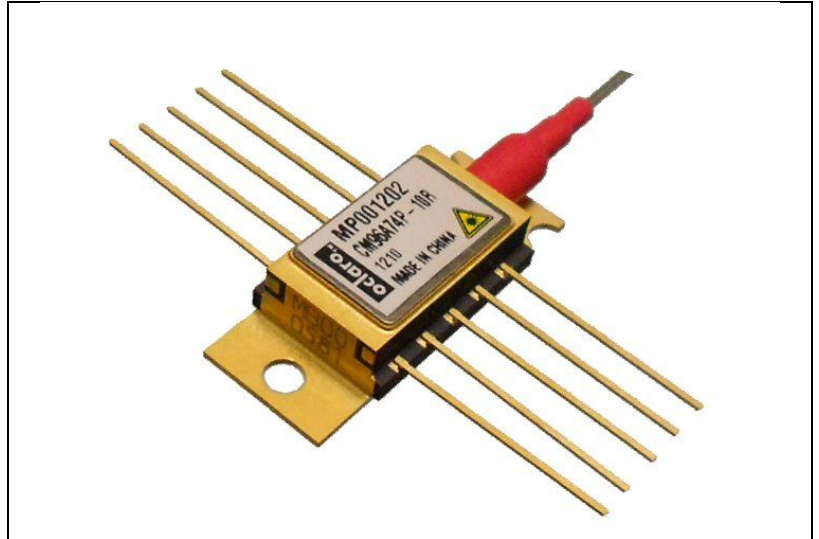
## Cooled Mini-Butterfly 980nm Pump Laser Module CM96\*\*\*P-10R

### Features:

- High output power, up to 600mW kink free
- Polarization maintaining fiber pigtail
- Fiber Bragg grating stabilization for wavelength locking over the entire operating conditions
- Small form factor (mini-Butterfly) package
- Internal thermoelectric heatpump and monitor photodiode
- Hermetically sealed 10 pin butterfly package
- Telcordia GR-468-CORE compliant
- Field-proven high reliability
- RoHS compliant 

### Applications:

- Low noise EDFAs
- Dense wavelength division multiplexing (DWDM) EDFAs
- CATV Applications



These lasers are designed as pump sources for erbium doped fiber amplifier (EDFA) applications. Processes and techniques of coupling the fiber to the laser allow high output powers that are very stable with both time and temperature. The grating is located in the pigtail to stabilize the wavelength. Oclaro laser diode chips incorporate E2 front mirror passivation that prevents Catastrophic Optical Damage (COD) to the laser diode facet. Processes and techniques of coupling the fiber to the laser chip allow high output powers that are very stable with both time and temperature.

Devices are available with fiber output power up to 600mW.

## Operating Characteristics

Conditions unless otherwise stated:

Case temperature -20 to 75°C  
 Submount temperature 25°C  
 Monitor diode bias -5V  
 CW operation

Kink-free Power	Operating Power	974nm Code	976nm Code
400mW	365mW	CM96A74P-10R	CM96A76P-10R
410mW	375mW	CM96B74P-10R	CM96B76P-10R
420mW	380mW	CM96C74P-10R	CM96C76P-10R
430mW	390mW	CM96D74P-10R	CM96D76P-10R
440mW	400mW	CM96E74P-10R	CM96E76P-10R
450mW	410mW	CM96F74P-10R	CM96F76P-10R
460mW	420mW	CM96G74P-10R	CM96G76P-10R
470mW	425mW	CM96H74P-10R	CM96H76P-10R
480mW	435mW	CM96J74P-10R	CM96J76P-10R
490mW	445mW	CM96K74P-10R	CM96K76P-10R
500mW	455mW	CM96L74P-10R	CM96L76P-10R
510mW	465mW	CM96M74P-10R	CM96M76P-10R
520mW	475mW	CM96N74P-10R	CM96N76P-10R
530mW	480mW	CM96P74P-10R	CM96P76P-10R
540mW	490mW	CM96R74P-10R	CM96R76P-10R
550mW	500mW	CM96S74P-10R	CM96S76P-10R
560mW	510mW	CM96T74P-10R	CM96T76P-10R
570mW	520mW	CM96U74P-10R	CM96U76P-10R
580mW	525mW	CM96V74P-10R	CM96V76P-10R
590mW	535mW	CM96W74P-10R	CM96W76P-10R
600mW	545mW	CM96X74P-10R	CM96X76P-10R

Operating power assumes a 10% ageing margin: Operating Power = Kink-Free Power/1.1

Parameter	Symbol	Measurement Conditions	Min	Typ	Max	Unit
Threshold current	I <sub>th</sub>	Thermistor @ 10kΩ		40	55	mA
Operating current	I <sub>op</sub>	365mW		560	620	mA
		375mW		575	635	
		380mW		590	655	
		390mW		600	670	
		400mW		615	685	
		410mW		625	695	
		420mW		640	710	
		425mW		655	725	
		435mW		670	745	
		445mW		680	755	
		455mW		690	770	
		465mW		705	785	
		475mW		720	800	
		480mW		735	820	
		490mW		750	835	
		500mW		755	840	
510mW		770	860			
520mW		785	875			
525mW		795	885			
535mW		810	900			
545mW		820	920			
Operating forward voltage	V <sub>op</sub>			1.8	2.0	V
Center wavelength	λ <sub>c</sub>	974nm series 976nm series	973 975	974 976	975 977	nm
Spectral width at -13dB	Δλ			0.2	1.0	nm
Signal to noise ratio	SNR		20			dB
Temperature dependence of peak wavelength	dλ/dT			0.02		nm/°C
Monitor diode responsivity	R <sub>mon</sub>		1		10	μA/mW
Photodiode dark current	I <sub>dark</sub>	-5V bias			50	nA
Fiber power stability >30mW 20 – 30mW 10 – 20mW 5 – 10mW		Peak-to-peak Time = 60sec DC to 50kHz			0.22 0.10 0.15 0.30	dB
Thermistor BETA value		±1%	3539	3575	3611	K
Thermistor resistance	R <sub>th</sub>	At T <sub>case</sub> set to 25°C	9.5	10.0	10.5	kΩ
Heat pump current	I <sub>tec</sub>	T <sub>case</sub> = 75°C, I <sub>F</sub> = 1000mA		1.5	1.7	A
Heat pump voltage	V <sub>tec</sub>	T <sub>case</sub> = 75°C, I <sub>F</sub> = 1000mA		2.3	2.6	V

## Absolute Maximum Ratings

Parameter	Symbol	Measurement Conditions	Min	Max	Unit
Operating case temperature	Top		-20	75	°C
Storage temperature	Tstg		-40	85	°C
Storage relative humidity	RHstg	But not to exceed 0.024kg of water per 1.0kg of dry air		85	%RH
Operating relative humidity	RHop		5	80	%RH
Pigtail axial pull force		3x10 seconds		10.0	N
Pigtail side pull force		3x10 seconds		5.0	N
Fiber bend radius			20		mm
Lead soldering temperature		10 sec		350	°C
Laser diode forward current	If max	CW		1200	mA
Laser diode reverse Current	Ir max	Reverse voltage <2V		10	µA
Laser diode current transient		t = 1000ns max.		1400	mA
Laser diode reverse voltage	VrevLD			2	V

## Fiber Specification

Parameter	Note	Min	Typ	Max	Unit
Fiber type	Nufern PM980-HP or Corning PM 98-U25A				
Fiber termination	Bare fiber, rough cleave				
Cut-off wavelength		830	900	970	nm
Mode field diameter	@ 980nm	5.6	6.6	7.6	µm
Cladding diameter		124	125	126	µm
Fiber coating diameter	Acrylate material, mechanically strippable	230	245	260	µm
Grating recoat diameter		260	280	300	µm
Core/cladding concentricity				<0.5	µm
Coating-clad offset				≤5	µm
Fiber proof test		200			kpsi
Grating proof test		150			kpsi

Package Outline Drawing and Dimensions

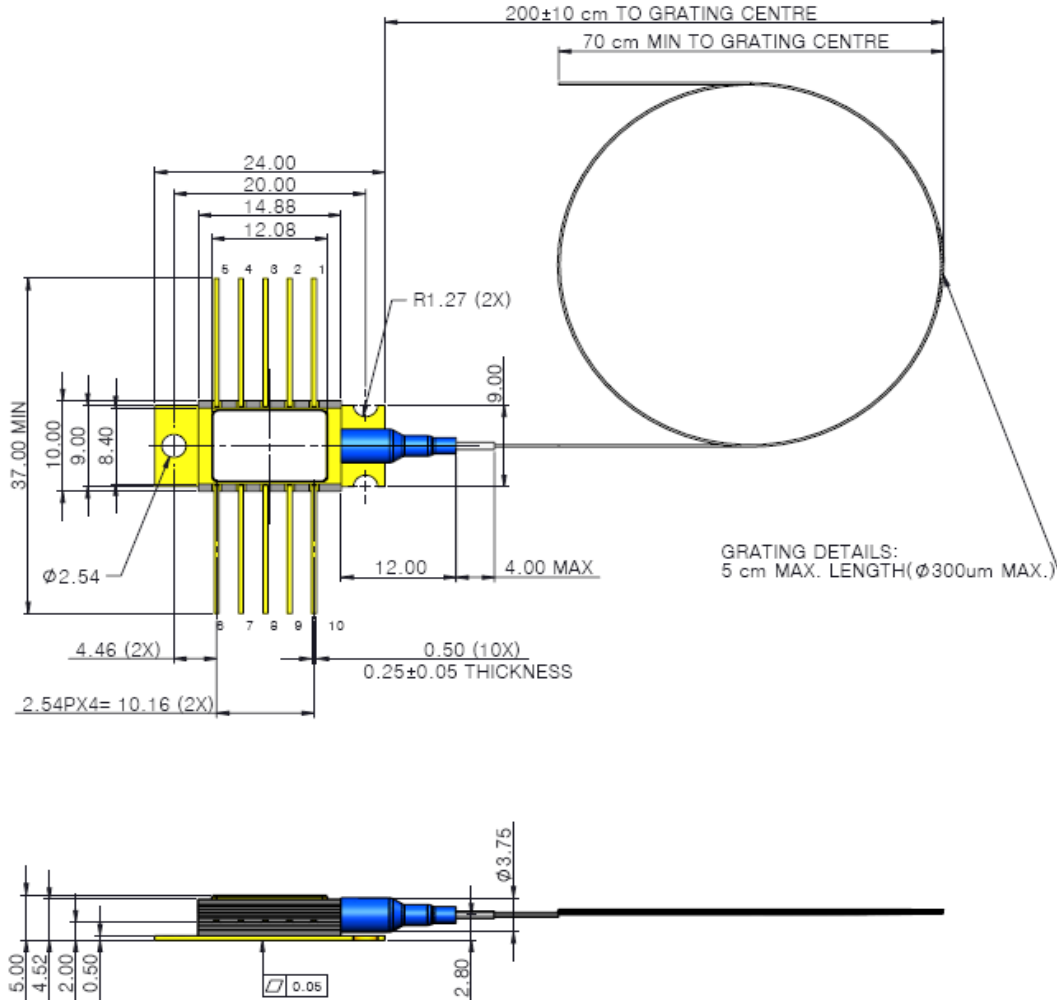


Figure 1: Package Outline Drawing and Dimensions (mm)

Connections

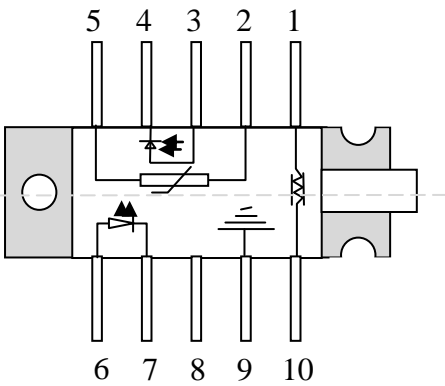


Figure 2: Connections

Pin #	Description	Pin#	Description
1	TEC (+)	6	Laser anode (+) 1
2	Thermistor	7	Laser cathode (-) 1
3	Monitor anode (-)	8	NC
4	Monitor cathode (+)	9	Package ground
5	Thermistor	10	TEC (-)

## RoHS Compliance



Oclaro is fully committed to environment protection and sustainable development and has set in place a comprehensive program for removing polluting and hazardous substances from all of its products. The relevant evidence of RoHS compliance is held as part of our controlled documentation for each of our compliant products. RoHS compliance parts are available to order, please refer to the ordering information section for further details.

## Contact Information    Ordering Information

[www.oclaro.com](http://www.oclaro.com)

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580mW	525mW	CM96V74P-10R	CM96V76P-10R
590mW	535mW	CM96W74P-10R	CM96W76P-10R
600mW	545mW	CM96X74P-10R	CM96X76P-10R

## Patents

This product is protected by US patent numbers 6,359,330, 6,528,329, 6,782,024, 6,798,815, 6,837,075, 7,173,953 and 7,218,659 and other patents and applications pending worldwide.

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Caution - use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

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