



## Active Components Pump Laser Modules

Datasheet

### Key Features

Up to 540mW Pop

Low Power Consumption

Extended operating temperature range  
(-5 °C to +75 °C)

Fiber Bragg Grating (FBG) on SMF

High wavelength and power stability  
Telcordia GR-468-CORE qualified  
RoHS compliant

### Applications

High output power low noise EDFAs

Dense wavelength division multiplexing  
EDFAs

CATV

## 1999CMB

### 980 nm Cooled Pump Laser Module 594mW Kink-free

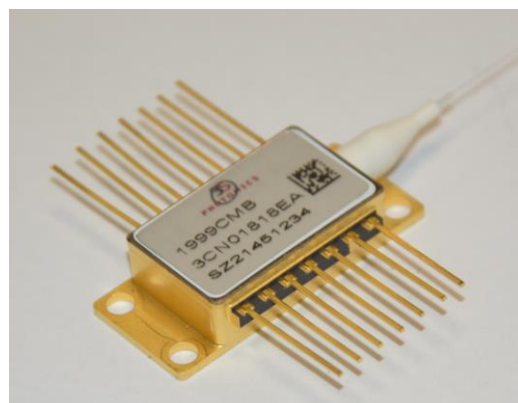
The 1999CMB is a new generation of 980 nm terrestrial pump modules powered by an in-house chip technology fully qualified, ensuring an outstanding level of performance and reliability.

Low Profile, 14-pin butterfly modules are available with an operating power up to 594 mW kink free.

They incorporate a thermoelectric cooler (TEC), a precision NTC thermistor and a back-facet monitoring photodiode.

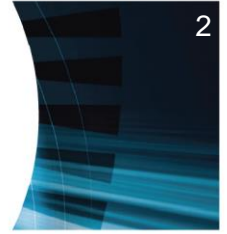
The 1999CMB family has been designed to ensure high wavelength and power stability performance at low power with a 16.5dB dynamic range.

The module meets the Telcordia™ GR-468-Core requirements for hermetic 980 nm pump modules.



## For more Info

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## ELECTRO-OPTICAL CHARACTERISTICS

The following parameters are specified BOL for a  $T_{\text{submount}} = 25\text{ }^{\circ}\text{C}$ ,  $T_{\text{case}} = -5\text{ }^{\circ}\text{C}$  to  $75\text{ }^{\circ}\text{C}$ ,  $V_{\text{BFM}} = -5\text{ V}$  and  $-50\text{ dB}$  max back-reflection unless otherwise stated.

Parameters	Conditions	Symbol	Min	Typ	Max	Unit
<b>PUMP LASER</b>						
Threshold current <sup>(1)</sup>		$I_{\text{th}}$	-		50	mA
Nominal operating power		$P_{\text{nom}}$	150	-	540	mW
Kink free power <sup>(2)</sup>		$P_{\text{kink}}$	$1.1 \times P_{\text{nom}}$	-	-	mW
Forward current <sup>(3)</sup>	$P_{\text{nom}} = 150\text{ mW}$	$I_{\text{nom}}$	-	-	290	mA
	$P_{\text{nom}} = 200\text{ mW}$		-	-	370	
	$P_{\text{nom}} = 250\text{ mW}$		-	-	450	
	$P_{\text{nom}} = 300\text{ mW}$		-	-	520	
	$P_{\text{nom}} = 350\text{ mW}$		-	-	580	
	$P_{\text{nom}} = 360\text{ mW}$		-	-	620	
	$P_{\text{nom}} = 400\text{ mW}$		-	-	680	
	$P_{\text{nom}} = 450\text{ mW}$		-	-	740	
	$P_{\text{nom}} = 460\text{ mW}$		-	-	780	
	$P_{\text{nom}} = 480\text{ mW}$		-	-	820	
$P_{\text{nom}} = 500\text{ mW}$	-	-	860			
$P_{\text{nom}} = 540\text{ mW}$	-	-	870			
Forward voltage	@ 540 mW	$V_{\text{nom}}$	-		1.9	V
Center Wavelength		$\lambda_{974}$	973	974	975	nm
		$\lambda_{976}$	975	976	977	
Peak wavelength tolerance	@ $T_{\text{case}} = T_{\text{FBG}} = 25\text{ }^{\circ}\text{C}$ Power Range	$\Delta\lambda_p$	-	-	$\pm 1$	nm
Wavelength tuning vs temperature ( $T_{\text{FBG}} = -5$ to $75\text{ }^{\circ}\text{C}$ )	Power Range	$\Delta\lambda_p / \Delta T$	-	-	0.02	nm / $^{\circ}\text{C}$
Spectral width @ -3 dB	Power Range	$\Delta\lambda_{\text{FWHM}}$	-	-	1.0	nm
Power range			10		$P_{\text{nom}}$	mW
Power in band <sup>(4)</sup>	$P_{\text{nom}}$	$P_{\text{band}}$	90	-	-	%
Optical power stability	Peak to peak, 1 Hz-50 kHz, 60 sec, $10\text{ mW} \leq P < 15\text{ mW}$ $15\text{ mW} \leq P \leq P_{\text{nom}}$	$\Delta P$	-		0.2	dB
					0.1	
Power consumption, EOL	$T_{\text{case}} = 75\text{ }^{\circ}\text{C}$ , $1.1 P_{\text{nom}} = 540\text{ mW}$		-	-	5.2	W
<b>MONITOR DIODE</b>						
Responsivity		$I_{\text{BFM}} / P$	0.5	-	10	$\mu\text{A} / \text{mW}$
Dark current	$V_r = 5\text{ V}$	$I_{\text{BFM\_dark}}$	-	-	100	nA
<b>THERMO-ELECTRICAL COOLER</b>						
TEC voltage (EOL)	$T_{\text{case}} = 75\text{ }^{\circ}\text{C}$ , $1.1 P_{\text{nom}} = 540\text{ mW}$	$V_{\text{TEC, EOL}}$	-	-	2.7	V
TEC current (EOL)		$I_{\text{TEC, EOL}}$	-	-	1.2	A
TEC Power consumption		$P_{\text{TEC, EOL}}$	-	-	3.2	W
<b>THERMISTOR</b>						
Resistance	$25\text{ }^{\circ}\text{C}$	$R_{\text{th}}$	9.5	-	10.5	k $\Omega$
Constant		$\beta$	3600	-	4200	K

(1)  $I_{\text{th}}$  is the intersection point with the x-axis of a linear fit of the  $P(I)$  curve between 15 mW and 50 mW

(2) A kink is detected when the local slope  $dP/dI$  is below  $S_{\text{min}}$  or above  $S_{\text{max}}$ .  $S_{\text{min}}$  is defined as  $0.5 \times S_{\text{avg}}$  and  $S_{\text{max}}$  is defined as  $1.5 \times S_{\text{avg}}$

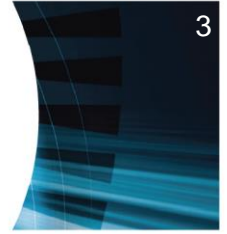
(3) EOL forward current  $I(\text{EOL}) = 1.1 \times I(\text{BOL})$

(4)  $P_{\text{band}}$  is defined as the power within the band  $\lambda_p \pm 1.5\text{ nm}$  vs the total output power

# 1999CMB

605mW Kink-free,  
FBG Stabilized,  
980 nm Cooled  
Pump Laser Module

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## ABSOLUTE MAXIMUM RATINGS

Exposing this device to stresses and conditions above those listed in this section could cause permanent damage and affect reliability. The device is not meant to operate outside the operational limits described in previous section at any length of time.

Parameter Conditions	Symbol	Min	Max	Unit
Storage temperature (2000 h)	$T_{stg}$	-40	85	°C
Operating temperature ( $T_{submount} = 25\text{ °C}$ ) *	$T_{op}$	-20	75	°C
Lead soldering temperature (10 s maximum)		-	280	°C
Storage Relative Humidity (Non-Condensing)		5	95	%
Operating Relative humidity		5	85	%
LD forward drive current (10 s maximum)	$I_{f\_max}$	-	1000	mA
LD reverse voltage	$V_{r\_max}$	-	2.0	V
PD reverse voltage	$V_{PD\_max}$	-	15	V
PD forward current	$I_{PD\_max}$	-	10	mA
TEC voltage	$V_{TEC\_C\_max}$	-	4.2	V
TEC current	$I_{TEC\_C\_max}$	-	2.0	A
ESD** LD damage	$V_{ESD-LD}$	-	1000	V
ESD** MPD damage	$V_{ESD-MPD}$	-	500	V
Mounting torque		-	150	mN.m
Fiber bend radius		16	-	mm
Axial pull force (1x1 min)		-	5	N

\* No cold start. TEC will be turned on first.

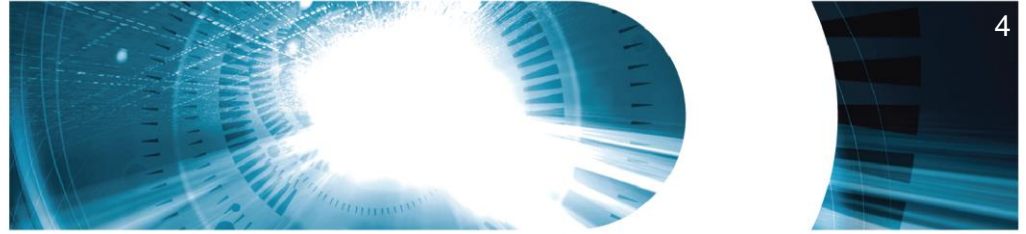
\*\* Human Body model, C = 100 pF, R = 1.5 k $\Omega$

## FIBER PIGTAIL CHARACTERISTICS

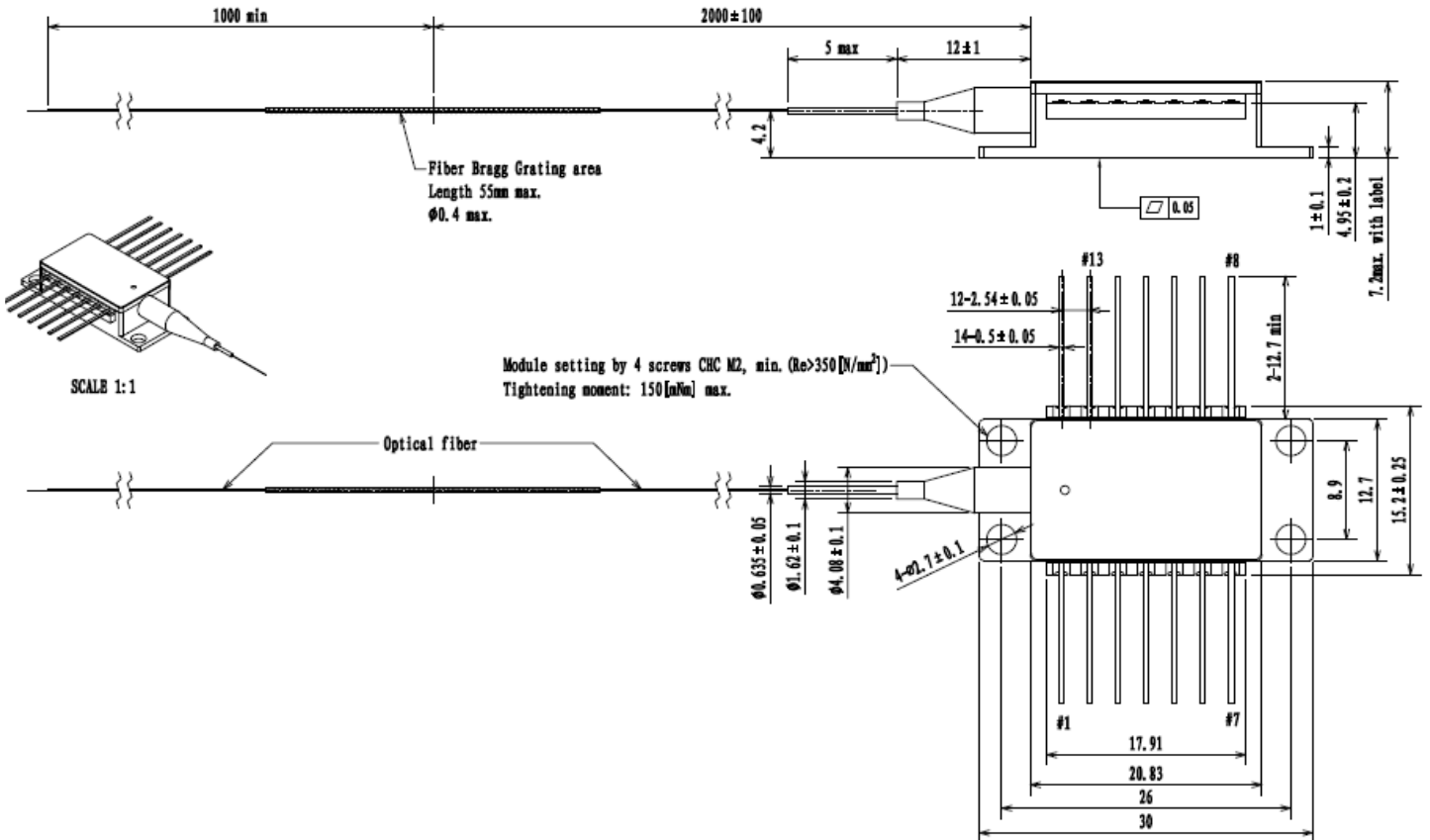
Parameter	Note	Min	Typ	Max	Unit
Fiber type		HI1060™ or equivalent			
Coating diameter	(except along grating)	230	250	270	$\mu\text{m}$
FBG recoat diameter		-	-	400	$\mu\text{m}$
FBG position	Module to center of FBG	-	2	-	m
Fiber proof test level		200	-	-	kpsi
Grating proof test level		150	-	-	kpsi
Pigtail termination	Bare fiber				

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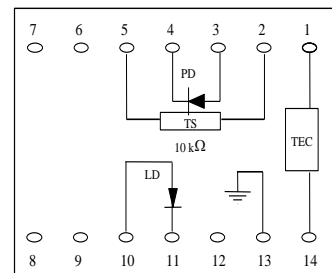
## MECHANICAL DETAILS



Dimensions are in mm

## PIN ASSIGNMENT

N°	Description	N°	Description
1	TEC (+)	8	No connect
2	Thermistor	9	No connect
3	Monitor PD Anode	10	Laser Anode (+)
4	Monitor PD Cathode	11	Laser Cathode (-)
5	Thermistor	12	No connect
6	No connect	13	Ground
7	No connect	14	TEC (-)



Totally floating pin-out

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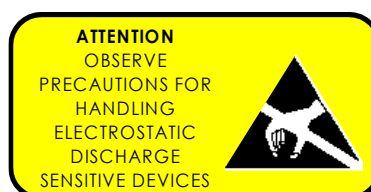


## LASER SAFETY INFORMATION

This laser module emits invisible light. Take appropriate precautions to prevent undue exposure to naked eye when module is in operation. This product is classified Class 4 Laser Product according to IEC-60825-1.

## HANDLING

This product is sensitive to electrostatic discharge and should not be handled except at a static free workstation. Take precautions to prevent ESD; use wrist straps, grounded work surfaces and recognized anti-static techniques when handling the pump laser module. Caution! Handle the module by its package only; never hold it by its pigtail. Care should be taken to avoid supply transient currents and voltages. Drive voltage above the maximum specified in absolute maximum rating section may cause permanent damage to the device.



## APPLICATION NOTE

In order to prevent any mishandling, misuse, neglect or accident, it is highly recommended to read and follow the instructions detailed in the application note reference “3SPT\_980nm Cooled 14\_10 pin butterfly module & Raman pump\_Application Note\_RCLIMAAPN00000007” that can be downloaded from 3SP Technologies website: <http://www.3sptechnologies.com>

## ORDERING INFORMATION

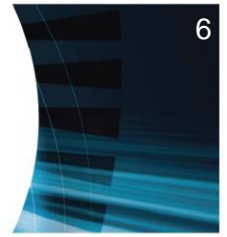
### 1999CMB PUMP PRODUCT FAMILY

SMF Pigtail	$\lambda_p = 974.0 \text{ nm}$ , T= 25 °C	$\lambda_p = 976.0 \text{ nm}$ , T= 25 °C
Nominal Power	Part Number	Part Number
150mW	3CN01818AL	3CN04001AL
200mW	3CN01818BA	3CN04001BA
250mW	3CN01818BL	3CN04001BL
300mW	3CN01818CA	3CN04001CA
350mW	3CN01818CL	3CN04001CL
360mW	3CN01818CN	3CN04001CN
400mW	3CN01818DA	3CN04001DA
450mW	3CN01818DL	3CN04001DL
460mW	3CN01818DN	3CN04001DN
480mW	3CN01818DS	3CN04001DS
500mW	3CN01818EA	3CN04001EA
540mW	3CN01818EJ	3CN04001EJ

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## CONTACT INFORMATION

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