



## Active Components Pump Laser Modules

[Datasheet](#)

### Key Features

Up to 680mW Pop

Low Power Consumption

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

Fiber Bragg Grating (FBG) on PMF

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

## 1999CHB

### 980 nm Cooled Pump Laser Module 750mW Kink-free with PM Fiber pig-tail

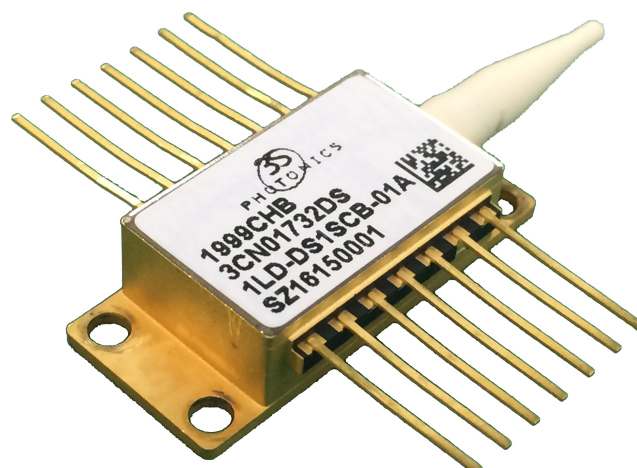
The 1999CHB is a new generation of 980 nm terrestrial pump modules powered by an in-house chip technology fully qualified, ensuring an outstanding level of performance and reliability.

Low Profile, 14-pin butterfly modules are provided with a single mode Polarization Maintaining Fiber (PMF) pigtail integrating a fiber bragg grating (FBG) to “lock” the wavelength.

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

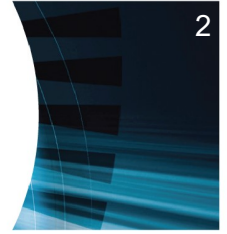
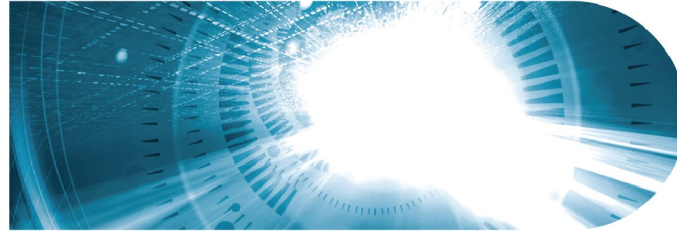
The 1999CHB family has been designed to ensure high wavelength and power stability performance at low power with a 16.5dB dynamic range.

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 (1)		$I_{\text{th}}$	-		70	mA
Nominal operating power		$P_{\text{nom}}$	450	-	680	mW
Kink free power (2)		$P_{\text{kink}}$	$1.1 \times P_{\text{nom}}$	-	-	mW
Forward current (3)	$P_{\text{nom}} = 350\text{ mW}$	$I_{\text{nom}}$	-	-	670	mA
	$P_{\text{nom}} = 400\text{ mW}$		-	-	770	
	$P_{\text{nom}} = 450\text{ mW}$		-	-	860	
	$P_{\text{nom}} = 500\text{ mW}$		-	-	935	
	$P_{\text{nom}} = 540\text{ mW}$		-	-	975	
	$P_{\text{nom}} = 600\text{ mW}$		-	-	1050	
	$P_{\text{nom}} = 650\text{ mW}$		-	-	1150	
	$P_{\text{nom}} = 680\text{ mW}$	-	-	1150		
Forward voltage	@ 680 mW	$V_{\text{nom}}$	-		1.9	V
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			15		$P_{\text{nom}}$	mW
Power in band (4)	$P_{\text{nom}}$	$P_{\text{band}}$	90	-	-	%
Optical power stability	Peak to peak, 1 Hz-50 kHz, 60 sec, $15\text{ mW} \leq P < 20\text{ mW}$ $20\text{ mW} \leq P \leq P_{\text{nom}}$	$\Delta P$	-		0.2 0.1	dB
Power consumption, EOL	$P_{\text{nom}} = 680\text{ mW}$		-	-	7.0	W
Polarization Extinction Ratio (5)	$T_{\text{case}} = 25\text{ }^{\circ}\text{C}$		13			dB
<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)	$T_{\text{case}} = 75\text{ }^{\circ}\text{C}$ , $1.1 P_{\text{nom}} = 680\text{ mW}$	$V_{\text{TEC, EOL}}$	-	-	3.2	V
TEC current (EOL)		$I_{\text{TEC, EOL}}$	-	-	1.4	A
TEC Power consumption		$P_{\text{TEC, EOL}}$	-	-	4.5	W
<b>THERMISTOR</b>						
Resistance	$25\text{ }^{\circ}\text{C}$	$R_{\text{th}}$	9.5	-	10.5	$\text{k}\Omega$
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  $I(\text{EOL}) = 1.1 \times I(\text{BOL})$

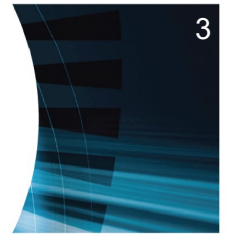
(4)  $P_{\text{band}}$  is defined as the power within the band  $\lambda_p \pm 1.5\text{ nm}$  vs the total output power

(5) The intensity noise is sensitive to varying stress (by mechanical and temperature effects) introduced to the PM fiber. Measurement is performed at  $25\text{ }^{\circ}\text{C}$  case temperature.

# 1999CHB

750mW Kink-free,  
FBG Stabilized,  
980 nm Cooled  
Pump Laser Module with  
PMF pig-tail

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3

## 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)	$I_{f\_max}$	-	1300	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 kΩ

## FIBER PIGTAIL CHARACTERISTICS

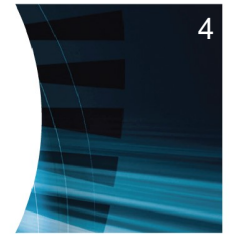
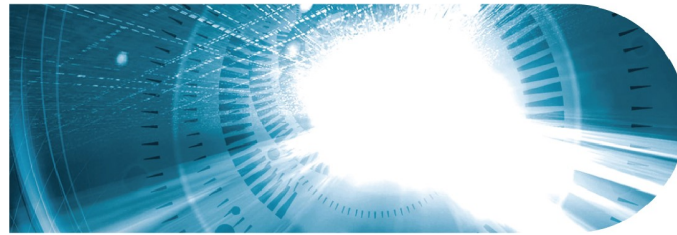
Parameter	Note	Min	Typ	Max	Unit
Fiber type		SM98-PS-U25D-H or equivalent			
Coating diameter	(except along grating)	230	250	270	μm
FBG recoat diameter		-	-	400	μm
FBG position	Module to center of FBG	-	2	-	m
Loose tube buffer diameter		885	-	915	μm
Fiber proof test level		200	-	-	kpsi
Grating proof test level		150	-	-	kpsi
Pigtail termination	Bare fiber				
Polarization State	Aligned parallel to the slow axis				

# 1999CHB

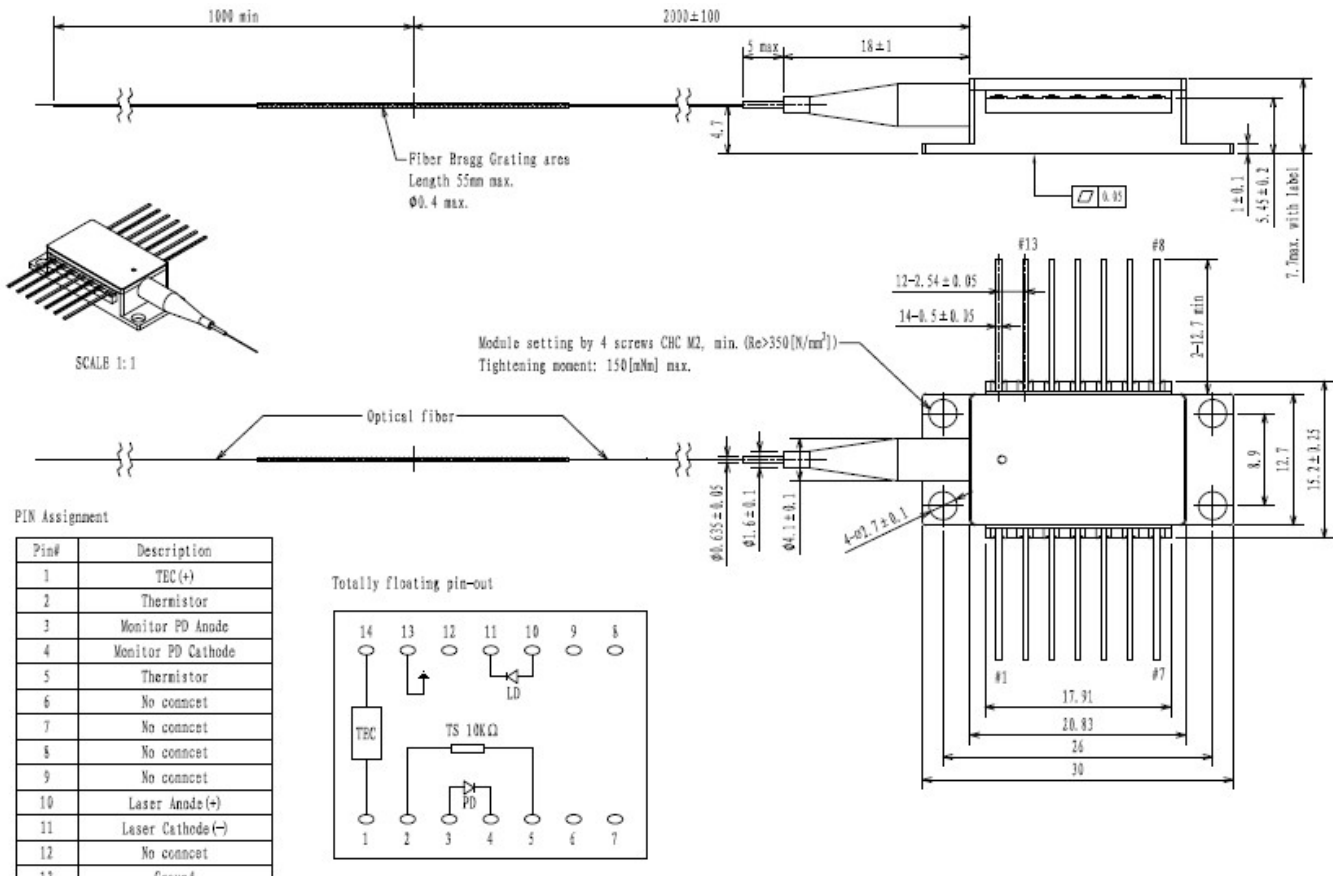
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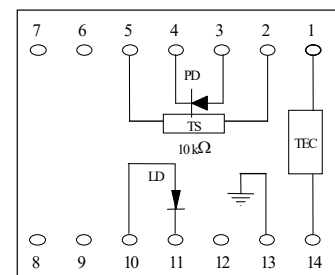
## MECHANICAL DETAILS



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 (-)

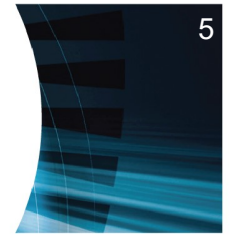
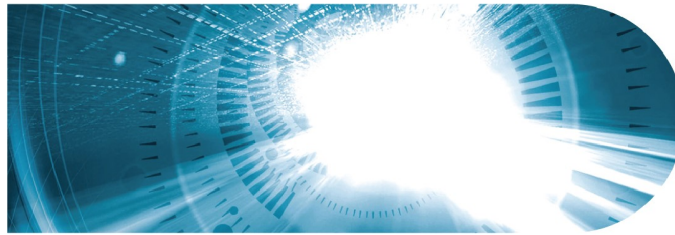


Totally floating pin-out

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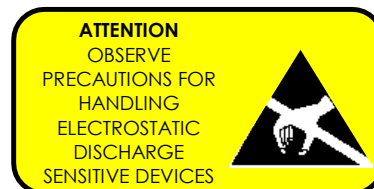
## LASER SAFETY INFORMATION

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:

[http://www.3sptechnologies.com/data/File/3SP\\_AN\\_AC\\_Cooled-BTF-Pumps\\_R1407\\_RCLIMAAPN00000007\\_01.pdf](http://www.3sptechnologies.com/data/File/3SP_AN_AC_Cooled-BTF-Pumps_R1407_RCLIMAAPN00000007_01.pdf)

## ORDERING INFORMATION

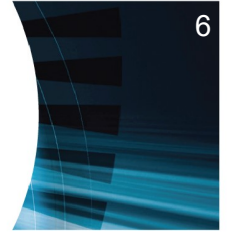
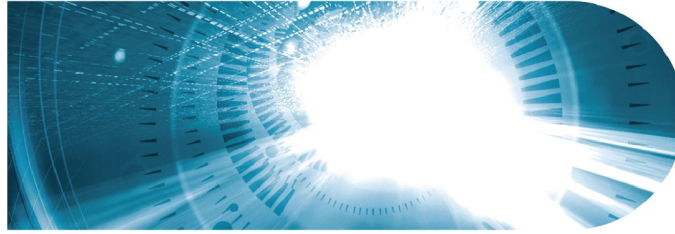
### 1999CHB PUMP PRODUCT FAMILY

PMF 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
350mW	3CN01784CL	3CN01794CL
400mW	3CN01784DA	3CN01794DA
450mW	3CN01784DL	3CN01794DL
500mW	3CN01784EA	3CN01794EA
540mW	3CN01784EJ	3CN01794EJ
600 mW	3CN01784FA	3CN01794FA
650 mW	3CN01784FL	3CN01794FL
680 mW	3CN01784FS	3CN01794FS

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