



Active Components Pump Laser Modules

Datasheet

Key Features

Up to 540mW Pop

Small form factor, hermetically sealed
10-pin mini-butterfly package

Pin-out compatibility with 14-pin BTF
package

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

Ultra Low Power Consumption
($T_{chip}@40^{\circ}C$)

Fiber Bragg Grating (FBG) on SMF

High wavelength and power stability

RoHS compliant

Applications

High output power low noise Erbium-
Doped Fiber Amplifiers

Dense wavelength division multiplexing

CATV

For more Info

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1999SHX

980nm Low Power Consumption 10-pin mini- butterfly Pump Module Up to 600mW kink-free

The 1999SHX 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, 10-pin butterfly modules are available with an operating power up to 540 mW. They incorporate a thermoelectric cooler (TEC), a precision NTC thermistor and a back-facet monitoring photodiode.

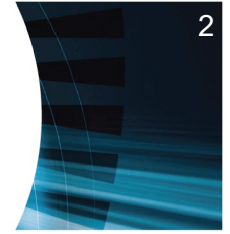
The 1999SHB family has been designed to ensure high wavelength and power stability performance at low power with a large dynamic range.

The 1999SHB pump module meets the Telcordia™ GR-468-Core requirements for hermetic 980 nm pump modules.

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FBG Stabilized,
980 nm 40°C Cooled
10-pin butterfly Pump
Laser Module

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ELECTRO-OPTICAL CHARACTERISTICS

The following parameters are specified BOL for a $T_{\text{submount}} = 40\text{ }^{\circ}\text{C}$, $T_{\text{case}} = -5\text{ }^{\circ}\text{C}$ to $75\text{ }^{\circ}\text{C}$, $V_{\text{BFM}} = -5\text{ V}$ and -50 dB max back-reflection unless otherwise stated.

Parameters	Conditions	Symbol	Min	Typ	Max	Unit
PUMP LASER						
Threshold current (1)		I_{th}	-		80	mA
Nominal operating power		P_{nom}	360	-	540	mW
Kink free power (2)		P_{kink}	$1.1 \times P_{\text{nom}}$	-	-	mW
Forward current (3)	$P_{\text{nom}} = 360\text{ mW}$	I_{nom}		-	740	mA
	$P_{\text{nom}} = 400\text{ mW}$			-	780	
	$P_{\text{nom}} = 440\text{ mW}$			-	830	
	$P_{\text{nom}} = 460\text{ mW}$			-	880	
	$P_{\text{nom}} = 480\text{ mW}$			-	910	
	$P_{\text{nom}} = 500\text{ mW}$			-	940	
	$P_{\text{nom}} = 540\text{ mW}$			-	1010	
Forward voltage	@ 540 mW	V_{nom}	-	-	1.9	V
Peak wavelength tolerance	@ $T_{\text{case}} = T_{\text{FBG}} = 25\text{ }^{\circ}\text{C}$ Power range	$\Delta\lambda_p$	-	-	± 1	nm
Center Wavelength		λ_{974}	973	974	975	nm
		λ_{976}	975	976	977	
Wavelength tuning vs temperature ($T_{\text{grating}} = -5$ to $75\text{ }^{\circ}\text{C}$)	Power range	$\Delta\lambda_p / \Delta T$	-	0.01	0.02	nm / $^{\circ}\text{C}$
Spectral width @ -3 dB	Power range	$\Delta\lambda_{\text{FWHM}}$	-	0.6	1.0	nm
Power in band (4)	P_{nom}	P_{band}	90	-	-	%
Power Range			15		P_{nom}	mW
Optical power stability	Peak to peak, 1 Hz-50 kHz, 60 sec $15\text{ mW} \leq P < 20\text{ mW}$ $20\text{ mW} \leq P \leq P_{\text{nom}}$	ΔP	-		0.2 0.1	dB
Power consumption,	$P_{\text{nom}} = 540\text{ mW}$		-	-	4.8	W
MONITOR DIODE						
Responsivity		I_{BFM} / P	0.5	-	10	$\mu\text{A} / \text{mW}$
Dark current	$V_r = 5\text{ V}$	$I_{\text{BFM_dark}}$	-	-	100	nA
THERMO-ELECTRICAL COOLER						
TEC voltage (EOL)	$T_{\text{case}} = 75\text{ }^{\circ}\text{C}$, $1.1 \times P_{\text{nom}} = 540\text{ mW}$	$V_{\text{TEC, EOL}}$	-	-	1.75	V
TEC current (EOL)		$I_{\text{TEC, EOL}}$	-	-	1.5	A
TEC Power consumption		$P_{\text{TEC, EOL}}$	-	-	2.6	W
THERMISTOR						
Resistance	$40\text{ }^{\circ}\text{C}$	R_{th}	9.5	10	10.5	$\text{k}\Omega$
Constant		β	3600	-	4200	K

(1) I_{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_{min} or above S_{max} . S_{min} is defined as $0.5 \times S_{\text{avg}}$ and S_{max} is defined as $1.5 \times S_{\text{avg}}$

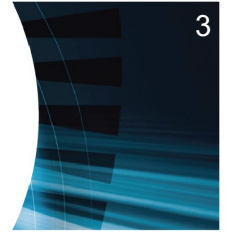
(3) EOL forward current $I(\text{EOL}) = 1.1 \times I(\text{BOL})$

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

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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 ($T_{submount} = 40\text{ °C}$)*	T_{op}	-20	75	°C
Storage relative humidity (Non condensing)		5	95	%
Operating relative humidity		5	85	%
Lead soldering temperature (10 s maximum)		-	280	°C
LD forward drive current (10 s maximum)	I_{f_max}	-	1150	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	$V_{TEC_C_max}$	-	3.6	V
TEC current	$I_{TEC_C_max}$	-	4	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.

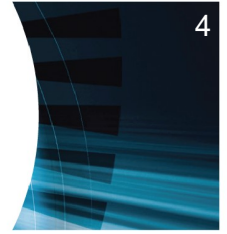
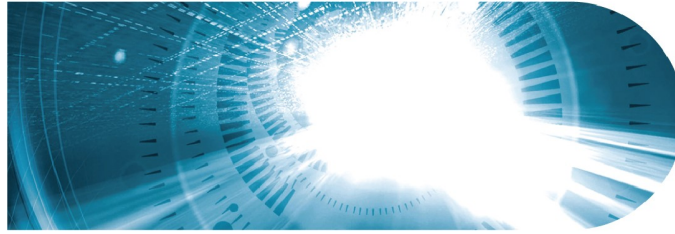
** Human Body model, C = 100 pF, R = 1.5 k Ω

FIBER PIGTAIL CHARACTERISTICS

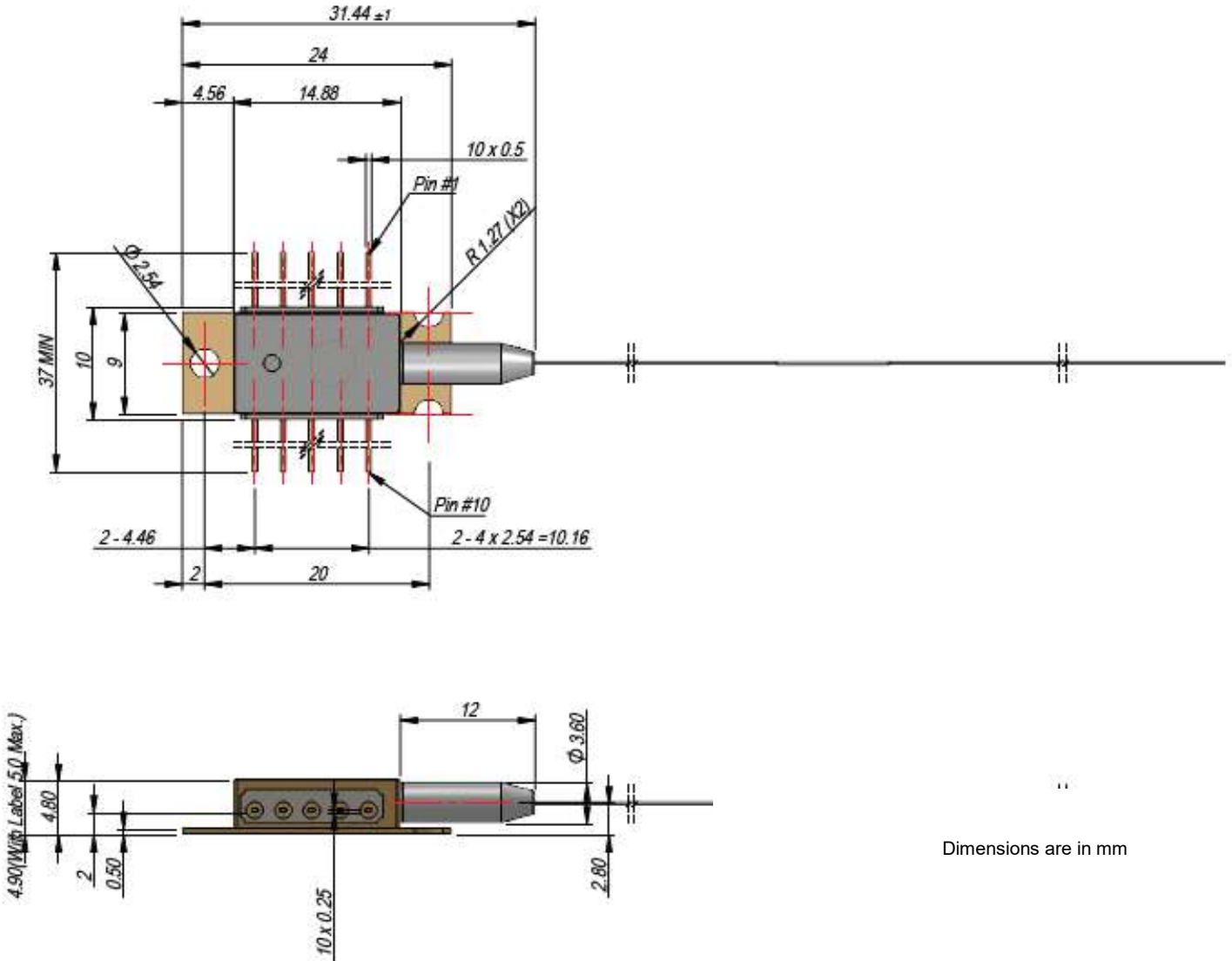
Parameter	Note	Min	Typ	Max	Unit
Fiber type		HI1060™ or equivalent			
Coating diameter	(except along grating)	230	250	270	μm
FBG recoat diameter		-	-	400	μm
FBG position	Module to center of FBG	1.9	2	2.1	m
	Center of FBG to end of pigtail	0.7			m
Fiber proof test level		200	-	-	kpsi
Grating proof test level		150	-	-	kpsi
Pigtail termination	Bare fiber				

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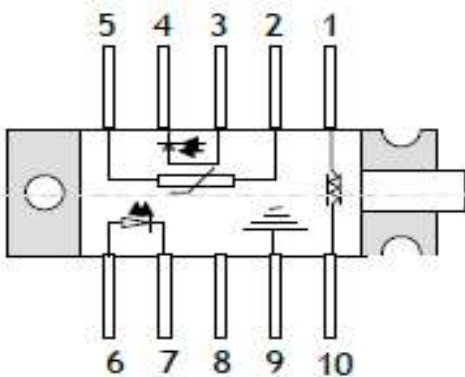


MECHANICAL DETAILS



Dimensions are in mm

PIN ASSIGNMENT

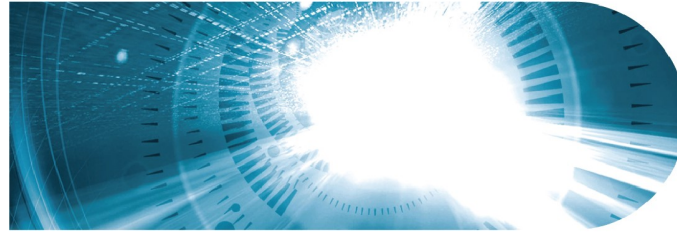


Pin	Description	Pin	Description
1	TEC (+)	6	Laser anode (+)
2	Thermistor	7	Laser cathode (-)
3	Monitor anode (-)	8	NC
4	Monitor cathode (+)	9	Package ground
5	Thermistor	10	TEC (-)

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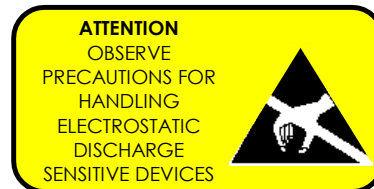
LASER SAFETY INFORMATION

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.



ORDERING INFORMATION

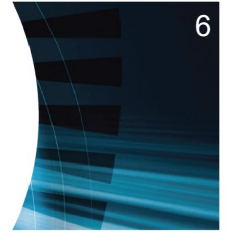
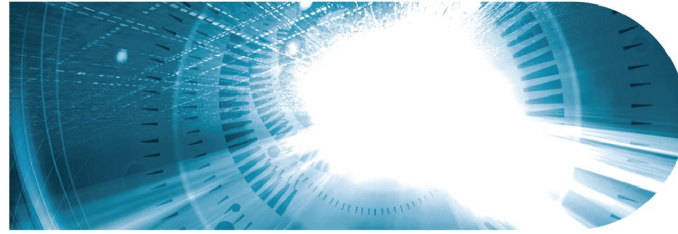
1999SHX PUMP PRODUCT FAMILY

SMF Pigtail	$\lambda_p = 974.0 \text{ nm}$, T= 40 °C	$\lambda_p = 976.0 \text{ nm}$, T= 40 °C
Nominal Power	Part Number	Part Number
360mW	3CN01760CN	3CN01761CN
400mW	3CN01760DA	3CN01761DA
440 mW	3CN01760DJ	3CN01761DJ
460 mW	3CN01760DN	3CN01761DN
480 mW	3CN01760DS	3CN01761DS
500 mW	3CN01760EA	3CN01761EA
540 mW	3CN01760EJ	3CN01761EJ

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