

Pump Laser Modules

Key Features

400mW output power

Ultra high reliability
of <25 FIT at 90% CL

Epoxy free, flux free 14-pin low
profile butterfly package

Polarization maintaining fiber (PMF)
pigtail

Fiber Bragg Grating (FBG) stabilized

Internal monitoring photodiode

Full performance from
0 to 43°C

Low power consumption

Telcordia GR-468-CORE qualified

RoHS compliant

Applications

Low noise DWDM Erbium Doped
Fiber Amplifiers servicing Ultra Long
Haul submarine links

Military and space applications
requiring ultra high reliability

Uncooled multi pumping architec-
tures

For more info

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1994 SGP

High Power 980nm Pump Laser Module for Submarine Applications

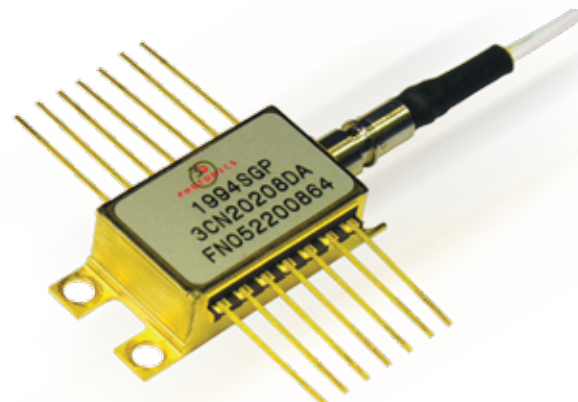
The 1994 SGP modules contain a new high power laser chip and an improved legacy package developed by 3SPGroup and based on our field deployed legacy design. It is rated at 400mW operating power, the highest available in the industry today.

The wavelength is “locked” utilizing a fiber Bragg grating (FBG) and polarization maintaining fiber (PMF), providing excellent stability and very wide dynamic range. These modules also contain a back-facet photodiode for monitoring purposes and a getter.

This pump is especially targeted for use in Erbium Doped Fiber Amplifiers (EDFAs) in submerged repeaters and active branching units.

Stringent burn-in and aging processes for the laser chip and module are utilized to guarantee ultra high reliability required by submarine systems, and “Pedigree Reviews” are provided to our customers as necessary.

3SPGroup's high power submarine pumps now enable new repeater designs with reduced pump count, low power consumption, and overall reduced amplifier footprint.



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ELECTRO-OPTICAL CHARACTERISTICS

The following parameters are specified BOL for VBFM= -5V, -50dB max back-re°ection and Tcase= 0°C to 43°C unless otherwise stated.

Parameters	Conditions	Symbol	Min	Typ	Max	Units
PUMP LASER						
Threshold current	Note 1	I_{th}			100	mA
Nominal operating power		P_{nom}		400		mW
Kink free power	Note 2	P_{kink}	$1.1 \times P_{nom}$	-	-	mW
Forward current @ P_{nom}	Note 3	I_{nom}		800		mA
Forward voltage		V_{nom}	-		2.4	V
Peak wavelength (vacuum)	@ $T_{case} = T_{FBG} = 25^\circ C$	λ_p	972	-	982	nm
Peak wavelength tolerance	@ $T_{case} = T_{FBG} = 25^\circ C$ 50mW to P_{nom}	$\Delta \lambda_p$	-	-	± 1	nm
Wavelength change vs temperature ($T_{grating} = 0$ to $43^\circ C$)	50mW to P_{nom}	$\Delta \lambda_p / \Delta T$	-	0.01	0.02	nm/ $^\circ C$
Spectral width @ -3dB	50mW to P_{nom}	$\Delta \lambda_{FWHM}$	-	-	1	nm
Power in band	Note 4	P_{inband}	80	-	-	%
Power consumption	@ 400mW	P_t	-	1.5	-	W
MONITOR DIODE						
Responsivity		dI_{BFM} / dP	0.5	-	25	$\mu A/mW$
Dark current	$V_r = 5V$	I_{BFM_dark}	-	-	25	nA

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

Note 2: A kink is detected when the local slope, dP/dI , is below S_{min} or above S_{max} .
 S_{min} is defined as $0.5 \times S_{avg}$ and S_{max} is defined as $1.5 \times S_{avg}$
 S_{avg} is the slope of a linear fit of the P(I) curve between 50 and 150mW.

Note 3: EOL forward current is defined as $I(EOL) = 1.1 \times I(BOL)$

Note 4: Power in band is defined as the ratio between the power contained within a band of $\pm 2nm$ around peak wavelength and the power contained within a band of $\pm 25nm$ around peak wavelength

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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 sections at any length of time.

Parameter Conditions	Symbol	Min	Max	Unit
Storage temperature (2000 hrs)	T_{stg}	-40	85	°C
Operating temperature	T_{op}	0	43	°C
Lead soldering temperature (10 sec maximum)		-	260	°C
LD forward drive current	I_{f_max}	-	950	mA
LD reverse voltage	V_{r_max}	-	2	V
PD reverse voltage	V_{PD_max}	-	10	V
PD forward current	I_{PD_max}	-	2	mA
ESD* applied on PIN detector (Pin 3 & 4)	V_{ESD}	-	300	V
ESD* applied on other Pins	V_{ESD}	-	1000	V
Mounting torque		-	150	mN.m
Fiber bend radius		20	-	mm
Axial pull force (10s maximum)		-	7	N

* Human Body Model, C= 100pF, R= 1.5Ω

PM Fiber Pigtail Characteristics

Parameters	Note	Min	Typ	Max	Unit
Fiber type			SM98-PS-U25A-H		
Coating diameter	(except along grating)	230	250	270	μm
FBG recoat diameter		-	-	400	μm
Loose tube buffer diameter		885	-	915	μm
Fiber proof test level		200			kpsi
Grating proof test level	2 seconds	13			N
Pigtail length			6		m
Grating position vs module end face			4		m
Pigtail termination	with or without APC ferrule				

Laser chip power is coupled into slow axis of the fiber.

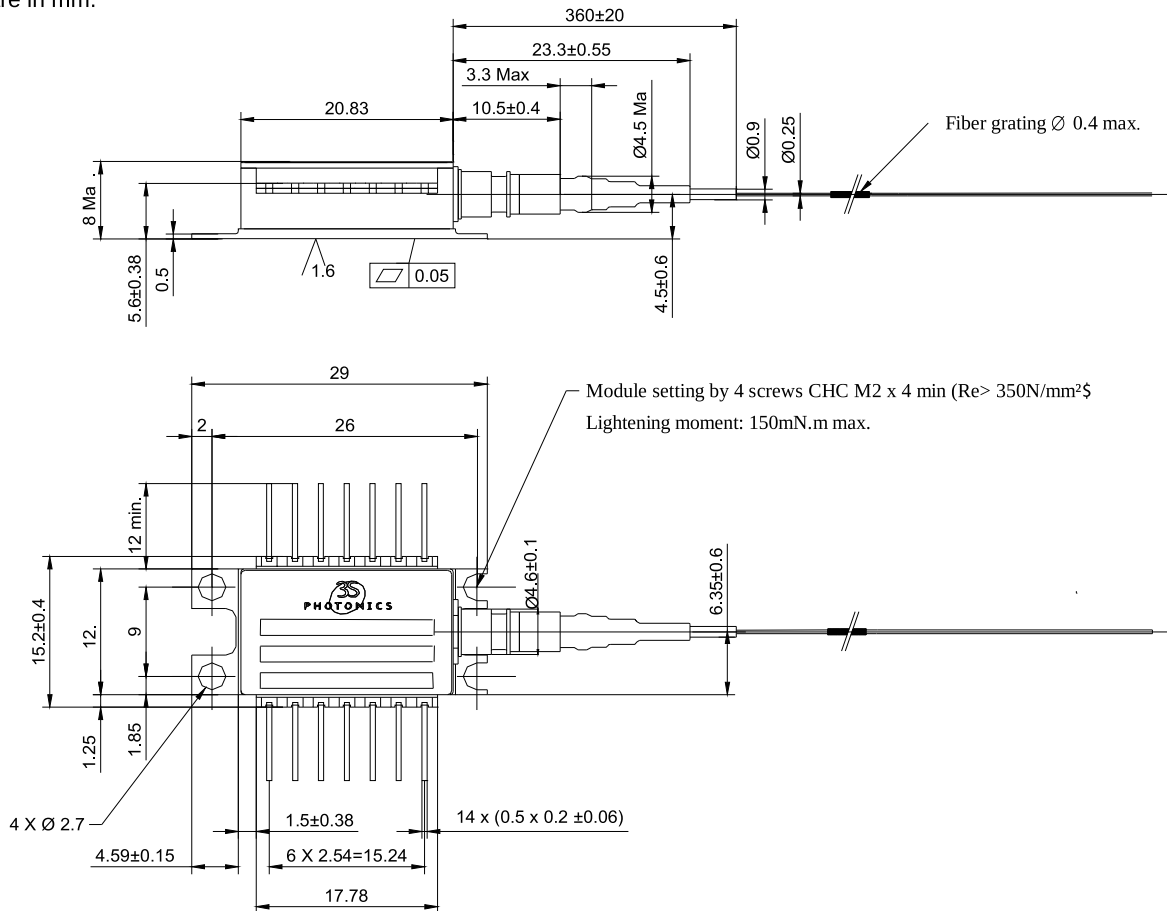
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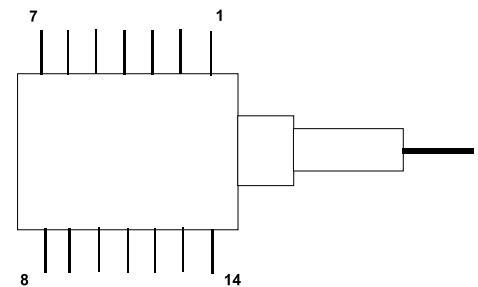
Mechanical Details

Dimensions are in mm.



Pin Assignment

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



Module Top View

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.

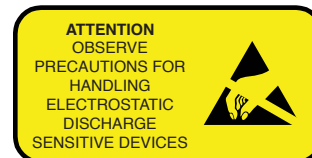
This product is classified Class 4 Laser Product according to IEC-825-1.

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 product. 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

Nominal Power (mW)	Part Number
200	On request
250	On request
300	On request
350	On request
400	On request

1994 SGP pump product family: Standard wavelengths : 974nm & 976nm - other wavelengths available upon request

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Please note: information in this document is typical and must be specifically confirmed in writing by your supplier before it becomes applicable to any order or contract. Information is subject to change without notice.
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ORDERING INFO

Please contact your Sales Manager. 3SPGroup can also develop custom products to meet a wide range of technical requirements.

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