

## Pump Laser Modules

### Key Features

500mW operating power

Operating temperature from -5 to 75°C

Wavelength stabilization with FBG on PMF pigtail

Integrated Thermo-Electric Cooler, Thermistor & monitoring photodiode

RoHS 6/6

### Applications

Raman amplification

Ultra-Long Haul systems

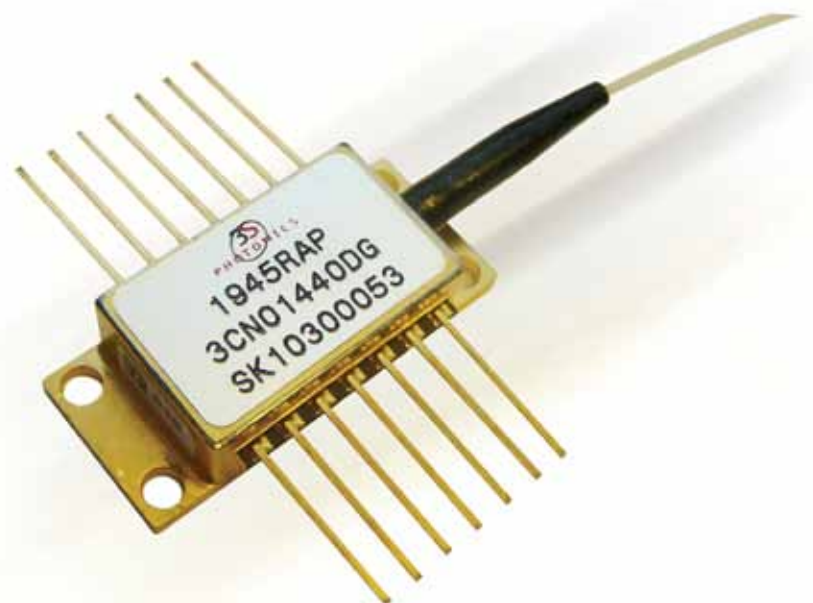
40G and 100G systems

## 1945 RAP

### 500mW FBG Stabilized 14xx nm Pump Laser Module

The 14xx 1945 RAP is a new generation of 14xxnm pump module designed for Raman amplification. These 14-pin butterfly modules are available with an operating power up to 500mW over an extended temperature range from -5 to 75°C.

The wavelength is “locked” utilizing a Fiber Bragg Grating (FBG) located in a single mode Polarization Maintaining Fiber (PMF).



## For more info

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## 1945 RAP

500mW FBG Stabilized  
14xx nm Pump Laser Module



### ELECTRO-OPTICAL CHARACTERISTICS

The following parameters are specified BOL for  $T_{LD}=25^{\circ}\text{C}$ ,  $T_{case}=-5$  to  $75^{\circ}\text{C}$ ,  $P_{op}=P_{nom}$ , unless otherwise stated.

Parameters	Conditions	Symbol	Min	Typ	Max	Unit
<b>PUMP LASER</b>						
Threshold current (BOL)	-	$I_{th}$	-	-	200	mA
Forward current (BOL) @ $P_{nom}$	$P_{nom}=450\text{mW}$	$I_{op}$	-	1400	1600	mA
	$P_{nom}=500\text{mW}$		-	1600	1800	
Operating current (EOL)	$P_{nom}$	$I_{op\ EOL}$	-	-	$1.20 \times I_{op}$	mA
Forward voltage	$P_{nom}$	$V_{nom}$	-	1.7	2.0	V
Target wavelength	$P_{nom}, T_{case}=25^{\circ}\text{C}$	$\lambda_t$	1420	-	1475	nm
Center wavelength	BOL, $T_{case}=25^{\circ}\text{C}$	$\lambda_c$	-	$\pm 0.5$	-	nm
Center wavelength tolerance	$P_{nom}, T_{case}=TFBG=25^{\circ}\text{C}$	$\Delta\lambda$	-	$\pm 1$	-	nm
Output spectral width	$P_{nom}$ RMS(-3dB)	$\Delta\lambda_{FWHM}$	-	-	2	nm
Power in band ( $\lambda_{nom} \pm 2\text{nm}$ )	$I(100\text{mW}) < I < I_{op}$	$P_{band}$	-	-	80	%
Polarization Extinction Ratio	$P_{nom}$	$R_e$	16	-	-	dB
Relative Intensity Noise	100kHz-1GHz	RIN	-	-	-105	dB/Hz
<b>MONITOR DIODE</b>						
Monitor Current	$P_{nom}$	$I_m$	100	-	3000	$\mu\text{A}$
Monitor Dark current	$V_r = -5\text{V}$	$I_{BFM\_dark}$	-	-	100	nA
Monitor Capacitance	$V_r = -5\text{V}, 1\text{MHz}$	-	-	-	20	pF
Front-to-Rear Tracking ratio	$I(100\text{mW}) < I < I_{op}$	$T_R$	0.9	-	1.1	
Front-to-Rear Tracking error	$I_M$ constant	$T_E$	-0.5	-	0.5	dB
<b>THERMO-ELECTRICAL COOLER</b>						
Cooling capacity	-	$\Delta T_{TEC}$	50	-	-	$^{\circ}\text{C}$
TEC voltage (EOL)	500mW	$V_{TEC, EOL}$	-	-	2.8	V
TEC current (EOL)	400mW	$I_{TEC, EOL}$	-	-	3.3	A
TEC Power consumption (EOL)	500mW	$P_{TEC}$	-	-	9.3	W
Total Power consumption (EOL)	500mW	-	-	-	13.2	W
<b>THERMISTOR</b>						
Thermistor Resistance	$25^{\circ}\text{C}$	$R_{th}$	9.5	10	10.5	k $\Omega$
Thermistor $\beta$ Constant	-	Th $\beta$	3900	-	4000	K

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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 h)	$T_{stg}$	-40	85	°C
Operating temperature ( $T_{submount} = 25^{\circ}\text{C}$ )	$T_{op}$	-20	75	°C
Lead soldering temperature (10s maximum)		-	260	°C
LD forward drive current	$I_{f\_max}$	-	2200	mA
LD reverse voltage	$V_{r\_max}$	-	2	V
PD reverse voltage	$V_{PD\_max}$	-	20	V
PD forward current	$I_{PD\_max}$	-	10	mA
TEC voltage	$V_{TEC\_max}$	-	4.5	V
TEC current	$I_{TEC\_max}$	-	3.5	A
ESD* damage	$V_{ESD}$	-	500	V
Mounting torque		-	150	mN.m
Fiber temperature		-40	85	°C
Fiber bend radius		25	-	mm
Axial pull force (10s maximum)		-	5	N

\* Human Body Model, C= 100pF, R= 1.5Ω

## Fiber Pigtail Characteristics

Parameters	Note	Min	Typ	Max	Unit
Fiber type		SM15 Fujikura Panda PM fiber 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
Grating proof test level		150			kpsi
Pigtail termination	APC Ferule				
Polarization State	Aligned parallel to the slow axis				

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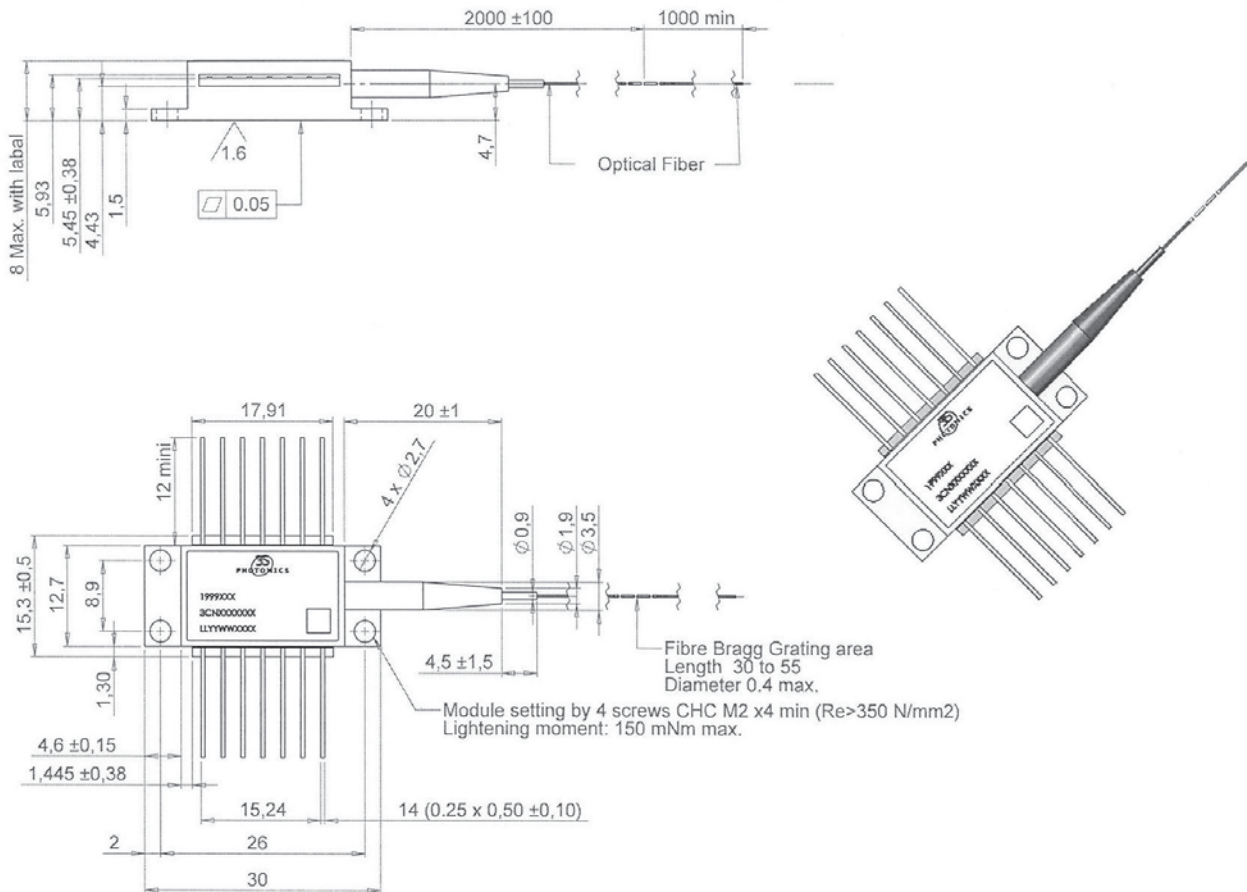
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## Mechanical Details

Dimensions are in mm.



## Pin Assignment

N°	Description	N°	Description
1	Cooler anode	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	Case
7	No connect	14	Cooler cathode

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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 modules. 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 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 may cause permanent damage to the device.



## Ordering Information

Please contact us

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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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