

**Active Components**  
**Pump Laser Modules**

**1948RxB Datasheet**

RCL IMA DSH 000 00093

**Key Features**

Operating Power up to 600mW

Ultra-Low Power Consumption

Operating Temperature from -5°C to 70°C

Wavelength stabilization with FBG on PMF pigtail

Integrated Thermo-Electric Cooler, Thermistor

Telcordia GR-468-CORE qualified

RoHs 6/6

**14xx/15xx nm**  
**Ultra-Low Power Consumption Pump Laser Module**

The 1948RxM is a family of new generation of Ultra-Low Power Consumption 14xx/15xx nm pump module designed for Raman amplification, powered by an in-house chip technology leading to outstanding level of performance, power consumption and reliability.

Low Profile 14-pin butterfly modules are available with operating power up to 600mW over a wavelength range from 1420nm to 1510nm and an extended case temperature range from -5°C to 70°C. They incorporate a thermoelectric cooler (TEC) and a precision NTC thermistor. In addition, a linear back-facet monitoring Photodiode allows for a precise diagnostic of the pump working behavior.

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

The module meets Telcordia™ GR-468-Core requirements for hermetic 14xx/15xx nm pump modules.

**Applications**

Raman Amplifier

**1948RMB** Raman Medium Power up to 400mW  
**1948RHB** Raman High Power up to 500mW

**Contact Info**

Please contact us at:

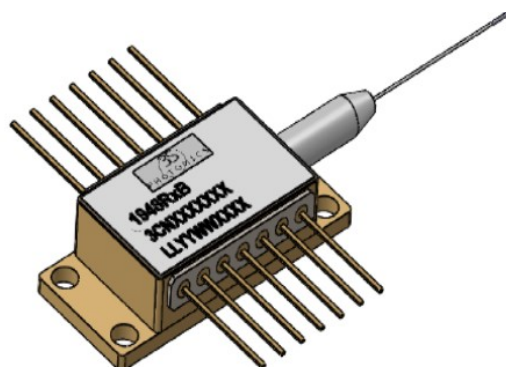
North America: +1 514 748 4848  
+1 888 922 1044

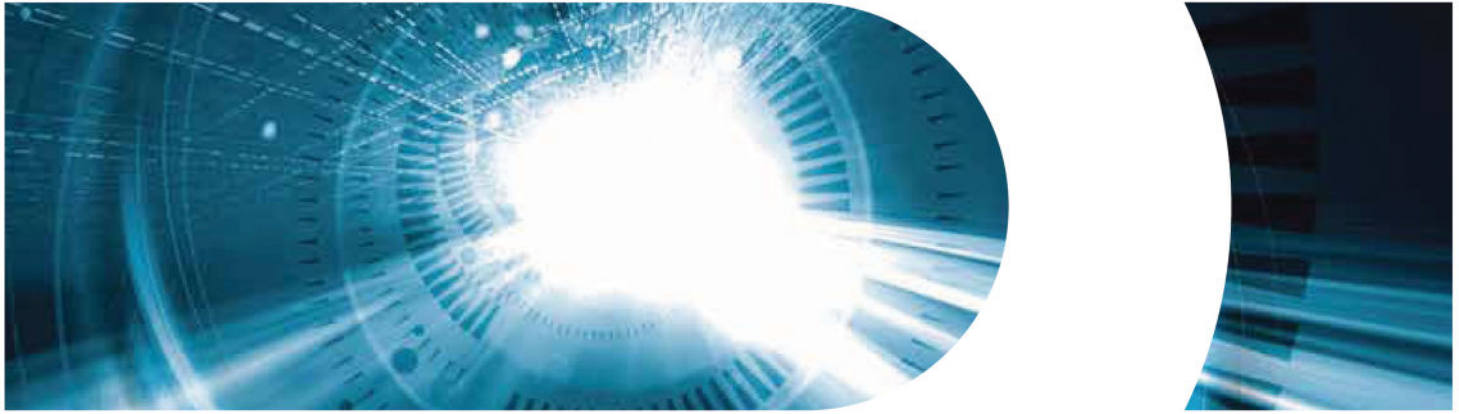
Europe & Asia: +33 (0) 1 69 80 57 50

China: +86 755 2671 0449

or via e-mail at [sales@3spgroup.com](mailto:sales@3spgroup.com)

Website [www.3sptechnologies.com](http://www.3sptechnologies.com)





## ELECTRO-OPTICAL CHARACTERISTICS

The following parameters are specified BOL for  $T_{SUB}= 35^{\circ}C$ ,  $T_{CASE}= -5$  to  $70^{\circ}C$ ,  $T_{FBG}=25^{\circ}C$ , unless otherwise stated.

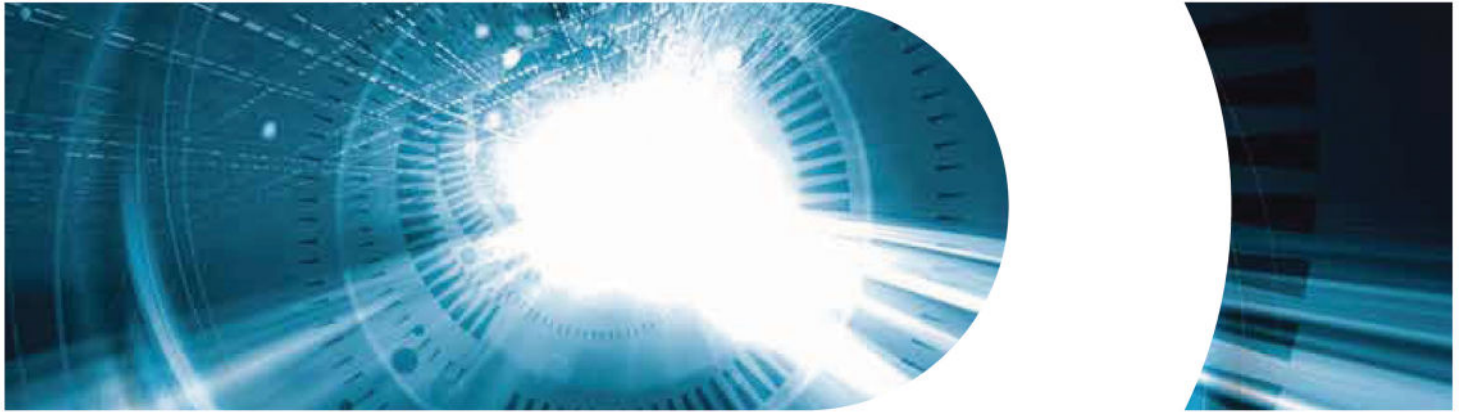
Parameter	Symbol	Test Condition	Minimum	Maximum
Target Wavelength	$\lambda$	$\lambda$ Specified by the customer	1420	1510nm
Center Wavelength Deviation	$\Delta\lambda$	$P_{OP}$	-0.5nm	+0.5nm
Operating Pump Powers	$P_{OP}$		300mW	500mW
Min Operating Pump Powers	$P_{min}$		50mW	
Power In Band	PIB	$\lambda\pm 2nm$	80%	
Spectrum Bandwidth	$\Delta\lambda_{RMS}$	$P_{OP}$ , RMS (-20dB)		2nm
Polarization Extinction Ratio	PER	$P_{OP}$	13dB	
Threshold Current	$I_{th}$			160mA
Relative Intensity Noise	RIN	100KHz<f<1GHz		-105dB/Hz
Wavelength Temperature Dependence	$\Delta\lambda_p / \Delta T$			0.015nm/ $^{\circ}C$
Thermistor Resistance	$R_{th}$	$T_{sub} = 25^{\circ}C$	9.5k $\Omega$	10.5k $\Omega$
		$T_{sub} = 35^{\circ}C$	6.2k $\Omega$	6.86k $\Omega$
Thermistor B Constant	B		3700K	4100K

## MONITORING PHOTODIODE

Parameter	Symbol	Test Condition	Minimum	Maximum
Monitor PD Responsivity	$I_{BFM} / P$	$V_{RPD}=5V$ , $P_{OP}$	0.2 $\mu A/mW$	10 $\mu A/mW$
Dark Current	$I_d$	$V_{RPD}=5V$		100nA
Monitor Capacitance	$C_m$	$V_{RPD}=5V$ , f=1MHz		15pF
Tracking Ratio	TR	100mW < P < $P_{OP}$ , $I_m$ const.	0.85	1.15
Tracking Error	TE	$I_m$ constant, Pop	-10%	10%

## WAVELENGTH TABLE

$\lambda$ (nm)	##	$\lambda$ (nm)	##	$\lambda$ (nm)	##	$\lambda$ (nm)	##	$\lambda$ (nm)	##
1420,00	CY	1438,00	EL	1456,00	FY	1474,00	HL	1493,00	KA
1421,00	DA	1439,00	EN	1457,00	GA	1475,00	HN	1494,00	KC
1422,00	DC	1440,00	EQ	1458,00	GC	1476,00	HQ	1495,00	KE
1423,00	DE	1441,00	ES	1459,00	GE	1477,00	HS	1496,00	KG
1424,00	DG	1442,00	EU	1460,00	GG	1478,00	HU	1497,00	KJ
1425,00	DJ	1443,00	EW	1461,00	GJ	1479,00	HW	1498,00	KL
1426,00	DL	1444,00	EY	1462,00	GL	1480,00	HY	1499,00	KN
1427,00	DN	1445,00	FA	1463,00	GN	1481,00	JA	1500,00	KQ
1428,00	DQ	1446,00	FC	1464,00	GQ	1482,00	JC	1501,00	KS
1429,00	DS	1447,00	FE	1465,00	GS	1483,00	JE	1502,00	KU
1430,00	DU	1448,00	FG	1466,00	GU	1484,00	JG	1503,00	KW
1431,00	DW	1449,00	FJ	1467,00	GW	1485,00	JJ	1504,00	KY
1432,00	DY	1450,00	FL	1468,00	GY	1486,00	JL	1505,00	LA
1433,00	EA	1451,00	FN	1469,00	HA	1487,00	JN	1506,00	LC
1434,00	EC	1452,00	FQ	1470,00	HC	1488,00	JQ	1507,00	LE
1435,00	EE	1453,00	FS	1471,00	HE	1489,00	JS	1508,00	LG
1436,00	EG	1454,00	FU	1472,00	HG	1490,00	JU	1509,00	LL
1437,00	EJ	1455,00	FW	1473,00	HJ	1492,00	JY	1510,00	LN



## ABSOLUTE MAXIMUM RATINGS

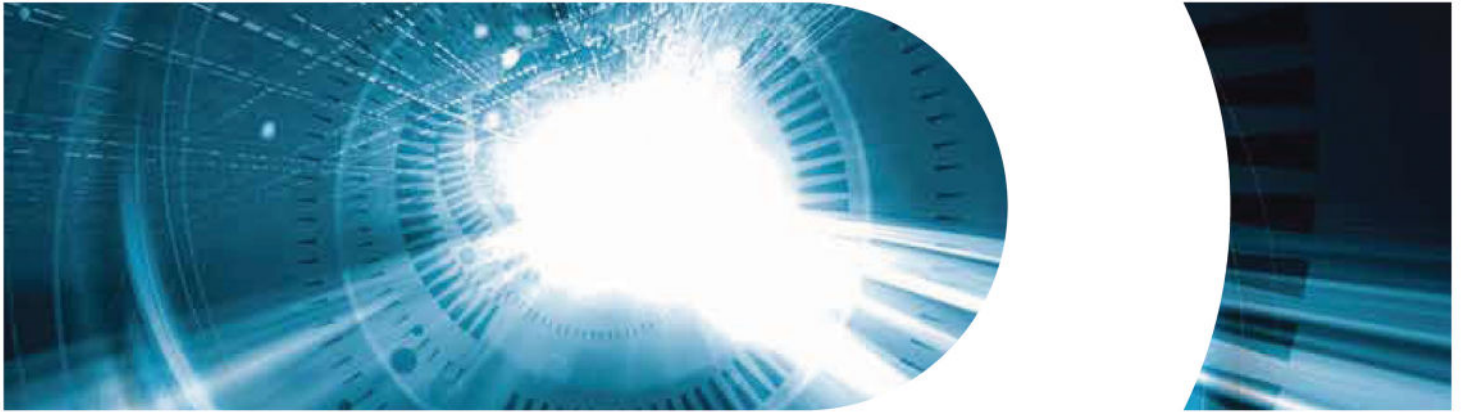
Exposing this device to stresses and conditions above those listed in this section could cause permanent damage and affect reliability. The device is not meant to operate outside the operational limits described in previous section at any length of time.

Parameter	Symbol	Test Condition	Minimum	Maximum
Operating Case Temperature	T <sub>OP</sub>	No cold start. TEC will be turned-on first	-5°C	70°C
Operating FBG Temperature	T <sub>FBG</sub>		-5°C	70°C
Storage Temperature	T <sub>STG</sub>		-40C	85°C
Relative Humidity	RH	40°C not condensing	0%	95%
Lead Soldering Temperature		10s maximum		300°C
LD Reverse Voltage	V <sub>r</sub>			2V
LD Forward Current	I <sub>f</sub>	P <sub>OP</sub> < 400mW		2500mA
		P <sub>OP</sub> ≥ 400mW		3000mA
LD Reverse Current	I <sub>rev</sub>			10µA
LD ESD	V <sub>ESD</sub>	HBM C=100pF, R=1.5kΩ		500V
MPD Reverse Voltage	V <sub>RPD</sub>			20V
MPD Forward Current	I <sub>FPD</sub>			10mA
TEC Current	I <sub>TEC</sub>	P <sub>OP</sub> < 400mW	-2A	3A
		P <sub>OP</sub> ≥ 400mW	-2A	4A
TEC Voltage	V <sub>TEC</sub>	P <sub>OP</sub> < 400mW	-2V	4.5V
		P <sub>OP</sub> ≥ 400mW	-2V	4.5V
Thermistor Current	I <sub>th</sub>			5mA
Fiber Tensile Load		10sec Max		5.0N
Fiber Bend Radius			16mm	

## POWER CONSUMPTION

The following parameters are specified max values for T<sub>SUB</sub>= 35°C, T<sub>CASE</sub>=70°C, T<sub>FBG</sub>=25°C unless otherwise stated. I<sub>OP EOL</sub>= I<sub>OP BOL</sub> X 1,15.

Wavelength (nm)	Power (mW)	Pump	Laser Diode Forward Current	Laser Diode Forward Voltage	TEC Current	TEC Voltage	Total Power Consumption
			I <sub>OP</sub> (A) BOL	V <sub>OP</sub> (V) BOL	I <sub>TEC</sub> (A) EOL	V <sub>TEC</sub> (V) EOL	P <sub>TOT</sub> (W) EOL
1420-1470	300	1948RMB	1.40	1.70	1.30	2.30	4.50
	360	1948RMB	1.60	1.90	1.55	2.50	5.50
	380	1948RMB	1.65	1.95	1.60	2.55	6.00
	400	1948RMB	1.67	2.00	1.65	2.60	6.50
	430	1948RHB	1.85	1.85	1.75	2.25	7.50
	450	1948RHB	1.90	1.90	1.80	2.30	8.00
	500	1948RHB	2.10	2.00	2.20	2.50	9.00
1471-1510	300	1948RMB	1.50	1.80	1.40	2.40	5.30
	360	1948RMB	1.65	1.95	1.60	2.55	6.50
	380	1948RMB	1.67	2.00	1.65	2.60	7.00
	400	1948RMB	1.75	2.10	1.70	2.65	7.50
	430	1948RHB	1.90	1.90	1.80	2.30	9.00
	450	1948RHB	2.10	2.00	2.20	2.50	9.50
	500	1948RHB	2.20	2.10	2.30	2.60	11.0

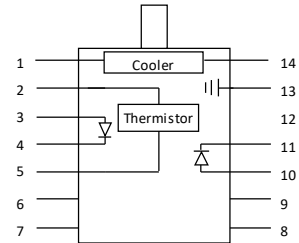


## FIBER PIGTAIL CHARACTERISTICS

Parameter	Minimum	Typical	Maximum
Fiber	Fujikura PMF or equivalent		
FBG To Fiber End	500mm		
FBG Center From Module		2500mm	
FBG Recoating Diameter		250µm	
Pigtail Length		3400mm	
Fiber Connector		None	

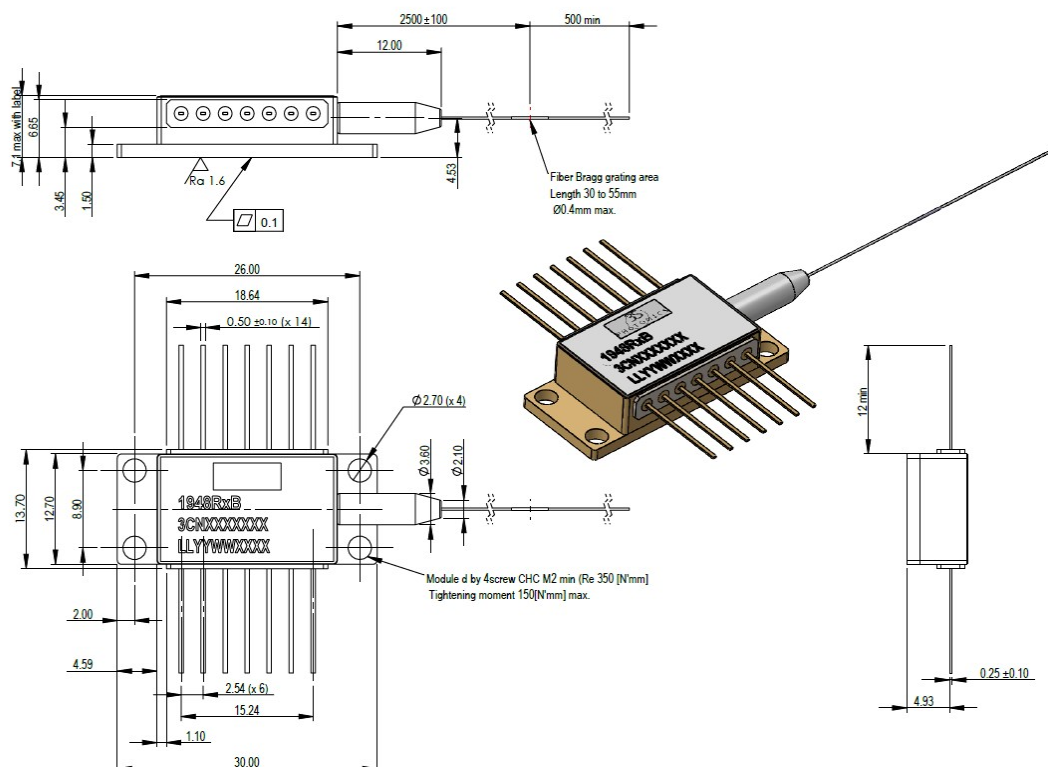
## PIN ASSIGNMENT

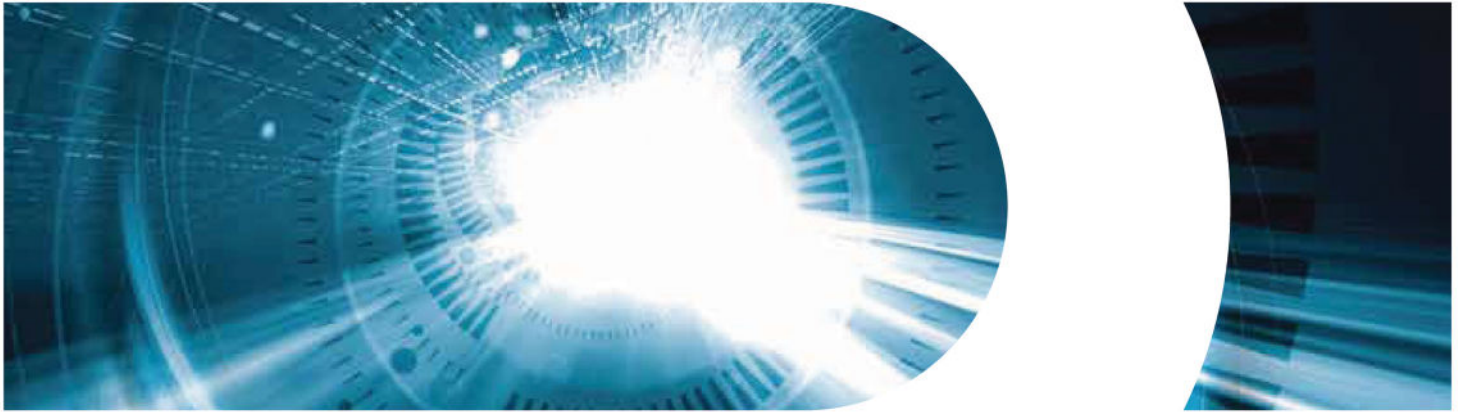
N°	Description	N°	Description
1	TEC (+)	14	TEC (-)
2	Thermistor (TS)	13	Case Ground
3	PD node (-)	12	N/C
4	PD Cathode (+)	11	Laser Diode Cathode (-)
5	Thermistor (TS)	10	Laser Diode Anode (+)
6	N/C	9	N/C
7	N/C	8	N/C



## MECHANICAL DETAILS

Dimensions are in mm.





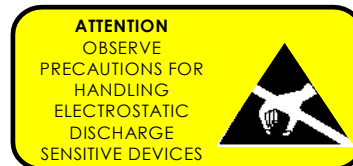
## LASER SAFETY INFORMATION

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 handling. 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.



## 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: [RCL IMA APN 000 00007 "Handling, Mounting, Testing and Operating Cooled 14-pin Butterfly Laser Pumps"](#).

## ORDERING INFORMATION

Operating Power	3SP Part Number	Pump Name
300mW	3CN01830##	1948RMB
320mW	3CN01832##	1948RMB
340mW	3CN01834##	1948RMB
360mW	3CN01836##	1948RMB
380mW	3CN01838##	1948RMB
400mW	3CN01840##	1948RMB
430mW	3CN01843##	1948RHB
450mW	3CN01845##	1948RHB
480mW	3CN01848##	1948RHB
500mW	3CN01850##	1948RHB

## refers to wavelength table. Other Powers are available upon request.

## IMPORTANT NOTICE

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.



3S Photonics is a trademark of 3SP Technologies S.A.S.