3SP Technologies
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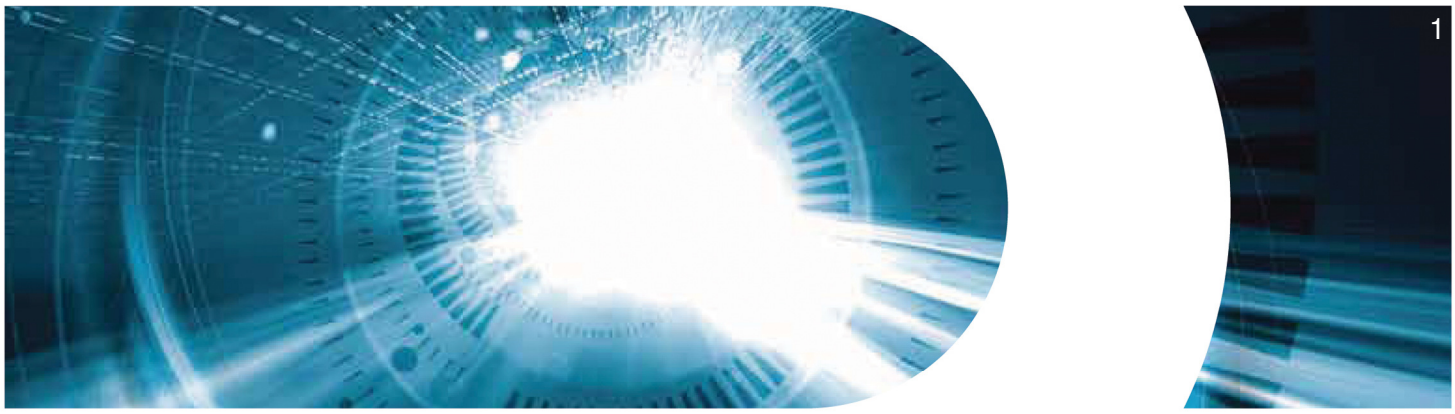


# Active Components
## Pump Laser Modules

## Key Features

- Up to 750 mW operating power
- Extended operating temperature range (-5 °C to +75 °C)
- Fiber Bragg Grating (FBG) on SMF or PMF pigtail
- Total Power Consumption: < 7.8 W @ 750 mW
- Telcordia GR-468-CORE qualified
- RoHS 6/6

## Applications

- High output power low noise Erbium-Doped Fiber Amplifier
- Sensors
- CATV
- Wavelength conversion

# 1999CHP

## 825 mW Kink-Free, FBG Stabilized, 980 nm Cooled Pump Laser Module

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

Low Profile, 14-pin butterfly modules are available with an operating power up to 750 mW.
They incorporate a thermoelectric cooler (TEC), a precision NTC thermistor and a back-facet monitoring photodiode.
The wavelength is “locked” utilizing a fiber Bragg grating (FBG) located in either a single mode Polarization Maintaining Fiber (PMF) or a Single Mode HI1060 Fiber (SMF) pigtail.

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


## For more Info

Please contact us at:
Europe & Asia: +33 169 805 833
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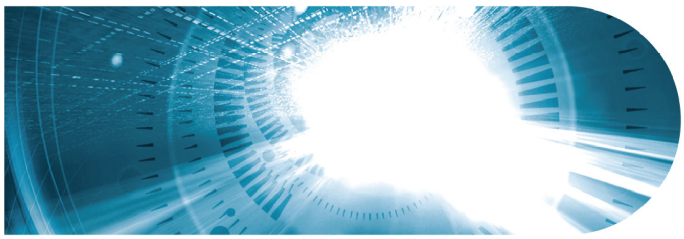
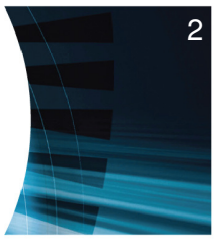
sales@3spgroup.com

# 1999CHP

**825 mW Kink-Free, FBG Stabilized, 980 nm Cooled Pump Laser Module**

3SP Technologies
Source of Smart Solutions






## ELECTRO-OPTICAL **CHARACTERISTICS**

The following parameters are specified BOL for a $T_{submount}$ = 25 °C, $T_{case}$ = -5 °C to 75 °C, $V_{BFM}$= -5 V and -50 dB max back-reflection unless otherwise stated.

| Parameters | Conditions | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **PUMP LASER** | | | | | | |
| Threshold current (1) | | $I_{th}$ | - | 60 | 80 | mA |
| Nominal operating power | | $P_{nom}$ | 350 | - | 750 | mW |
| Kink free power (2) | | $P_{kink}$ | 1.1 x $P_{nom}$ | - | - | mW |
| Forward current (3) | $P_{nom}$= 350 mW<br>$P_{nom}$= 400 mW<br>$P_{nom}$= 450 mW<br>$P_{nom}$= 480 mW<br>$P_{nom}$= 500 mW<br>$P_{nom}$= 520 mW<br>$P_{nom}$= 550 mW<br>$P_{nom}$= 600 mW<br>$P_{nom}$= 680 mW<br>$P_{nom}$= 720 mW<br>$P_{nom}$= 750 mW | $I_{nom}$ | -<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>- | 605<br>685<br>765<br>815<br>845<br>875<br>925<br>1005<br>1100<br>1110<br>1140 | 665<br>750<br>835<br>885<br>920<br>960<br>1005<br>1085<br>1120<br>1130<br>1150 | mA |
| Forward voltage | @ 750 mW | $V_{nom}$ | - | 1.9 | 2.2 | V |
| Peak wavelength tolerance | @ $T_{case}$= $T_{FBG}$= 25 °C<br>0.1x $P_{nom}$ to $P_{nom}$ | $\Delta\lambda_p$ | - | - | ±0.5 | nm |
| Wavelength tuning vs temperature ($T_{grating}$= -5 to 75 °C) | 0.1x $P_{nom}$ to $P_{nom}$ | $\Delta\lambda_p$ / $\Delta T$ | - | 0.01 | 0.02 | nm / °C |
| Spectral width @ -3 dB | 0.1x $P_{nom}$ to $P_{nom}$ | $\Delta\lambda_{FWHM}$ | - | 0.6 | 1.0 | nm |
| Power in band (4) | $P_{nom}$ | $P_{band}$ | 90 | - | - | % |
| Optical power stability | Peak to peak,<br>10 Hz-50 kHz, 60 sec, $P_{nom}$ | $\Delta P$ | - | <1 | 2 | % |
| Power consumption, EOL | $P_{nom}$ = 750 mW | | - | - | 7.8 | W |
| **MONITOR DIODE** | | | | | | |
| Responsivity | | $I_{BFM}$ / P | 0.5 | - | 10 | µA / mW |
| Dark current | $V_r$ = 5 V | $I_{BFM\_dark}$ | - | 50 | 100 | nA |
| **THERMO-ELECTRICAL COOLER** | | | | | | |
| Cooling capacity | | $\Delta T_{TEC}$ | 50 | - | - | °C |
| TEC voltage (EOL) | $T_{case}$= 75 °C, 1.1 x $I_{nom}$ | $V_{TEC,\ EOL}$ | - | - | 3.3 | V |
| TEC current (EOL) | | $I_{TEC,\ EOL}$ | - | - | 1.5 | A |
| TEC Power consumption | | $P_{TEC}$ | - | - | 4.95 | W |
| **THERMISTOR** | | | | | | |
| Resistance | 25 °C | $R_{th}$ | 9.5 | 10 | 10.5 | kΩ |
| 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 0.5x$S_{avg}$ and $S_{max}$ is defined as 1.5x$S_{avg}$
(3) EOL forward current I(EOL)= 1.1x I(BOL)
(4) $P_{band}$ is defined as the power within the band λp ±1.5 nm vs the total output power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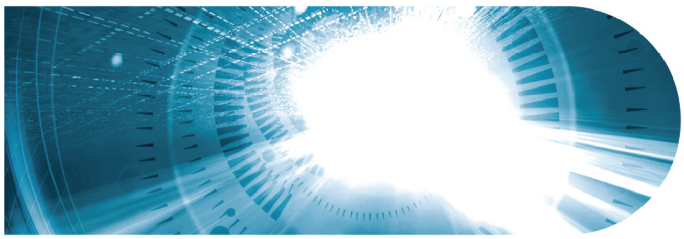
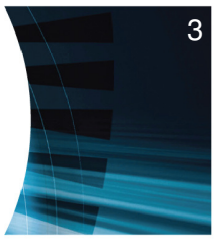





# ABSOLUTE MAXIMUM **RATINGS**

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 | ℃ |
| Operating temperature ($T_{submount}$ = 25 ℃)* | $T_{op}$ | -20 | 75 | ℃ |
| Lead soldering temperature (10 s maximum) | | - | 280 | ℃ |
| 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** damage | $V_{ESD}$ | - | 1000 | 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 | | PMF version: SM98-PS-U25A-H or equivalent<br>SMF version: HI1060™ 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<br>to the slow axis | | | | |

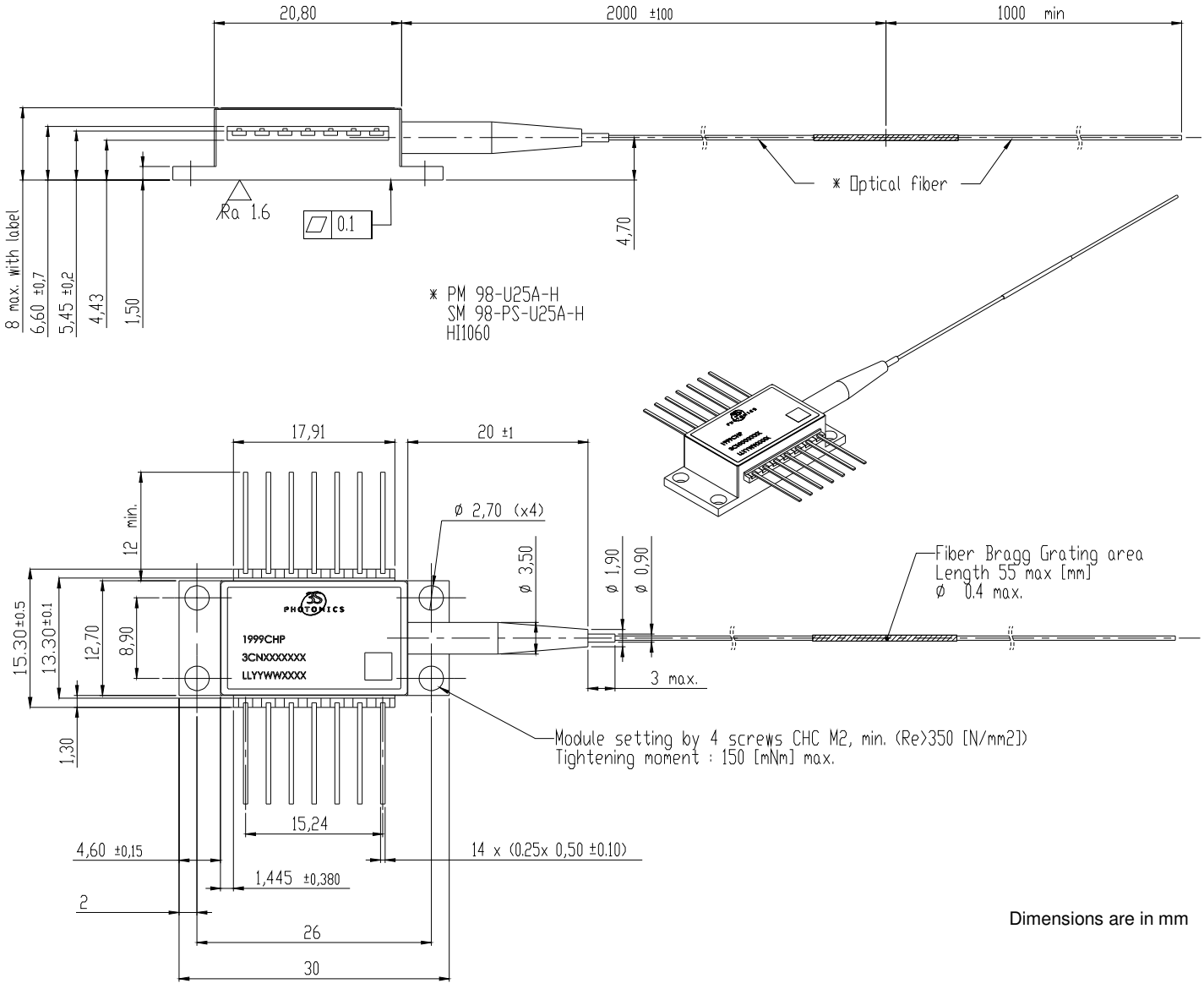
# 1999CHP

**825 mW Kink-Free,
FBG Stabilized,
980 nm Cooled
Pump Laser Module**

3SP Technologies
Source of Smart Solutions



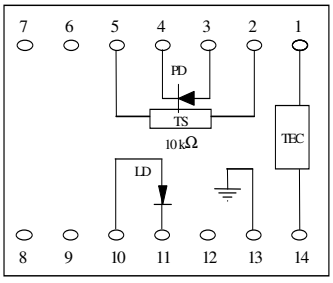
## MECHANICAL **DETAILS**




Dimensions are in mm

## PIN **ASSIGNEMENT**

| 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

# 1999CHP

**825 mW Kink-Free, FBG Stabilized, 980 nm Cooled Pump Laser Module**

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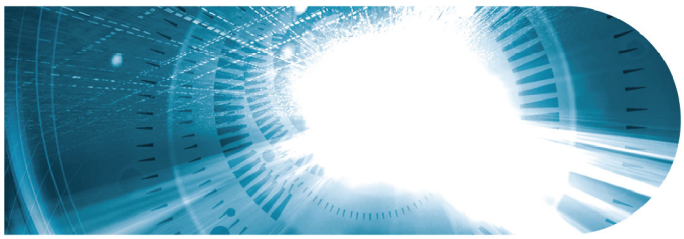




## LASER SAFETY **INFORMATION**

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:

RCL IMA APN 000 00007 “Handling, Mounting, Testing and Operating Cooled 14-pin Butterfly Laser Pumps”

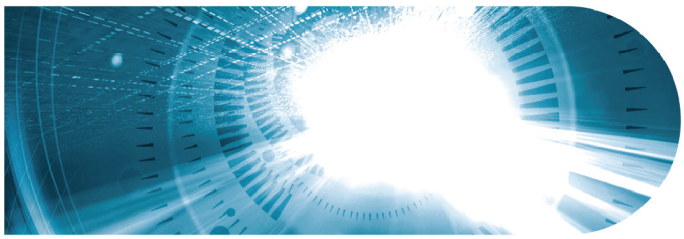
## ORDERING **INFORMATION**

**1999CHP PUMP PRODUCT FAMILY**

| SMF Pigtail | $\lambda_p$= 974.5 nm, T= 25 °C | $\lambda_p$= 976.0 nm T= 25 °C |
|---|---|---|
| Nominal Power | Part Number | Part Number |
| **450 mW** | 3CN01350DL | 3CN01351DL |
| **480 mW** | 3CN01350DS | 3CN01351DS |
| **500 mW** | 3CN01350EA | 3CN01351EA |
| **520 mW** | 3CN01350EE | 3CN01351EE |
| **550 mW** | 3CN01350EL | 3CN01351EL |
| **600 mW** | 3CN01350FA | 3CN01351FA |
| **680 mW** | 3CN01350FS | 3CN01351FS |
| **720 mW** | 3CN01350GE | 3CN01351GE |
| **750 mW** | 3CN01350GL | 3CN01351GL |

| PMF Pigtail | $\lambda_p$= 974.5 nm, T= 25 °C | $\lambda_p$= 976.0 nm T= 25 °C | $\lambda_p$= 979.5 nm, T= 25 °C | $\lambda_p$= 980.0 nm T= 25 °C | $\lambda_p$= 981.0 nm, T= 25 °C |
|---|---|---|---|---|---|
| Nominal Power | Part Number | Part Number | Part Number | Part Number | Part Number |
| **350 mW** | 3CN01178CL | 3CN01344CL | - | - | - |
| **400 mW** | 3CN01178DA | 3CN01344DA | - | - | - |
| **450 mW** | 3CN01178DL | 3CN01344DL | - | - | - |
| **500 mW** | 3CN01178EA | 3CN01344EA | - | - | - |
| **550 mW** | 3CN01178EL | 3CN01344EL | - | - | - |
| **600 mW** | 3CN01178FA | 3CN01344FA | 3CN01382FA | 3CN01458FA | 3CN01657FA |
| **680 mW** | 3CN01178FS | 3CN01344FS | 3CN01382FS | 3CN01458FS | 3CN01657FS |
| **700 mW** | 3CN01178GA | 3CN01344GA | 3CN01382GA | 3CN01458GA | 3CN01657GA |
| **720 mW** | 3CN01178GE | 3CN01344GE | 3CN01382GE | 3CN01458GE | - |
| **750 mW** | 3CN01178GL | 3CN01344GL | 3CN01382GL | 3CN01458GL | 3CN01657GL |

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





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## IMPORTANT **NOTICE**

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