# DCU96**7*-10R

## Uncooled Dual Chip 10-pin Butterfly 980nm Pump Laser Module

### Features

- One package supporting two chips and two independent output fibers
- Up to 500mW kink free power from each fiber over the full operating temperature range
- Operating temperature range from -5°C to +75°C (case)
- Combined optical power of up to 1.0W with variable power ratios
- Minimal thermal or optical cross talks
- Polarization maintaining (PM) fiber
- Fiber Bragg grating stabilization for wavelength locking over the entire operating conditions
- Hermetically sealed 10pin butterfly package
- Telcordia GR-468-CORE compliant
- RoHS compliant

### Applications

- Which require higher optical power with low power consumption and small form factor package
- Low noise EDFAs
- Single or multi stage applications
- Mid-stage Access (MSA) EDFA
- Dense wavelength division multiplexing (DWDM) EDFAs
- Arrayed EDFA for ADD/DROP ROADM applications

### Product Overview

The DCU96-series is a high power, uncooled, dual-chip, dual-fiber pump laser, housed in a 10-pin mBTF package. This module represents IIVI's next generation uncooled product, and leverages our market-leading expertise in uncooled 980nm pump lasers. The DCU96-series provides high optical power yet low power consumption for highly reliable pumping of multi-stage, SFF metro and multi-channel amplifiers. The module specifically addresses arrayed EDFA for ADD/DROP ROADM application as well as compact 40/100Gb/s per-channel amplification.

The DCU96* has been designed specifically for uncooled operation over a wide operating temperature range and high power levels previously only addressable with cooled pump lasers. Qualification of the enhanced G08EL chip ensures high reliability even at 500mW kink free power, at 75°C. The DCU96* series uses a MSA 10-pin mBTF package, enabling smaller form factor designs with ease of integration and thermal management. External Fiber Bragg Grating (FBG) stabilization provides excellent wavelength lock and power stability over the entire operating range.

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## Operating Parameter

| Laser Power Code – per Fiber | Minimum Kink-Free Power $P_{kink}$ (mW) | Maximum Operating Power $P_{op}$ (mW) | Typical Operating Current $I_{op}$ (mA) | Maximum Operating Current $I_{op}$ (mA) |
|---|---|---|---|---|
| A | 200 | 180 | 360 | 470 |
| B | 220 | 200 | 400 | 510 |
| C | 240 | 220 | 440 | 550 |
| D | 260 | 235 | 470 | 580 |
| E | 280 | 255 | 510 | 620 |
| F | 300 | 270 | 560 | 650 |
| G | 320 | 290 | 585 | 700 |
| H | 340 | 310 | 615 | 725 |
| J | 360 | 325 | 645 | 755 |
| K | 380 | 345 | 680 | 800 |
| L | 400 | 365 | 720 | 850 |
| M | 420 | 380 | 745 | 880 |
| N | 440 | 400 | 780 | 920 |
| P | 460 | 420 | 820 | 960 |
| R | 480 | 440 | 855 | 1000 |
| S | 500 | 455 | 890 | 1000 |

**Notes;**
1. Conditions unless otherwise stated: Case temperature -5 to 75°C, Uncooled, Monitor diode bias -5V, CW operation
2. Operating power assumes a 10% ageing margin: Operating Power = Kink-Free Power/1.1
3. All parameters are per single chip unless specified otherwise

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## Product Specification

| Parameter | | Min. | Typ. | Max. | Units | Condition |
|---|---|---|---|---|---|---|
| Threshold current | $I_{th}$ | | 55 | 100 | mA | At 75°C case |
| Maximum combined current at 75°C case temperature | | | | 2200 | mA | |
| Operating forward voltage | $V_{op}$ | | 1.75 | 2.1 | V | 1100mA, 75°C |
| Centre Wavelength | | 973<br>975 | 974<br>976 | 975<br>977 | nm | -5 to 75°C, >50mW<br>Air reference. FBG temperatures is @<br>25 C. |
| Spectral width | Δλ | | 0.2 | 1.0 | nm | RMS at -13dB |
| Power in band ratio | | 90<br>75 | | | % | >100mW<br>50-100mW |
| Signal to noise ratio | SNR | 20 | | | dB | |
| Temperature dependence of peak wavelength | Δλ/ΔT | | 0.008 | 0.01 | nm/°C | FBG temperature dependency |
| Monitor detector responsivity | | 0.3 | 6 | 15 | μA/mW | |
| Monitor dark current | $I_{dark}$ | | | 60 | nA | -5V bias voltage |
| Fiber power stability<br>>30mW<br>20 – 30mW<br>10 – 20mW<br>5 – 10mW | ΔPf_t | | | <br>0.10<br>0.10<br>0.25<br>0.20 | dB | Peak-to-peak<br>Time = 60sec<br>DC to 50kHz |
| Return loss | RL | 20 | | | dB | 1500nm – 1600nm |
| Thermistor BETA value | β | 3539 | 3575 | 3611 | | ±1% temperature variation |
| Thermistor resistance | $R_{th}$ | 9.5 | 10.0 | 11.0 | kΩ | At submount temperature of 25°C |
| Optical power cross talk | | | | 1.0 | mW | At any condition |
| Thermal cross talk | | | | <1.0 | °C | Ifmax=1050mAper chip |
| Total electrical power consumption | | | 1.5 | 2.0 | W | Per laser diode;<br>Tcase= 75°C, 500mW |

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## Absolute Maximum Ratings

| Parameter | | Min. | Typ. | Max. | Units | Condition |
|---|---|---|---|---|---|---|
| Operating case temperature | $T_{op}$ | -20 | | 75 | °C | |
| Storage temperature | $T_{stg}$ | -40 | | 85 | °C | |
| Storage relative humidity | $RH_{stg}$ | 5 | | 95 | % | But not to exceed 0.024kg of water per 1.0kg of dry air |
| Operating relative humidity | $RH_{op}$ | 5 | | 85 | % | But not to exceed 0.024kg of water per 1.0kg of dry air |
| Pigtail axial pull force | | | | 10.0 | N | 3x10 seconds |
| Pigtail side pull force | | | | 5.0 | N | 3x10 seconds |
| Fiber bend radius | | 13 | | | mm | |
| Lead soldering temperature | | | | 350 | °C | 10 sec |
| Laser diode forward current | If_max | | | 1100 | mA | CW |
| Laser diode current transient | | | | 1200 | mA | Time = 1000ns max. |
| Laser diode reverse current | $I_r$ | | | 10 | µA | |
| Laser diode reverse voltage | $V_r$ | | | 2.0 | V | |
| Photodiode reverse voltage | | | | 20 | V | |
| Photodiode reverse current | | | | 5 | mA | |

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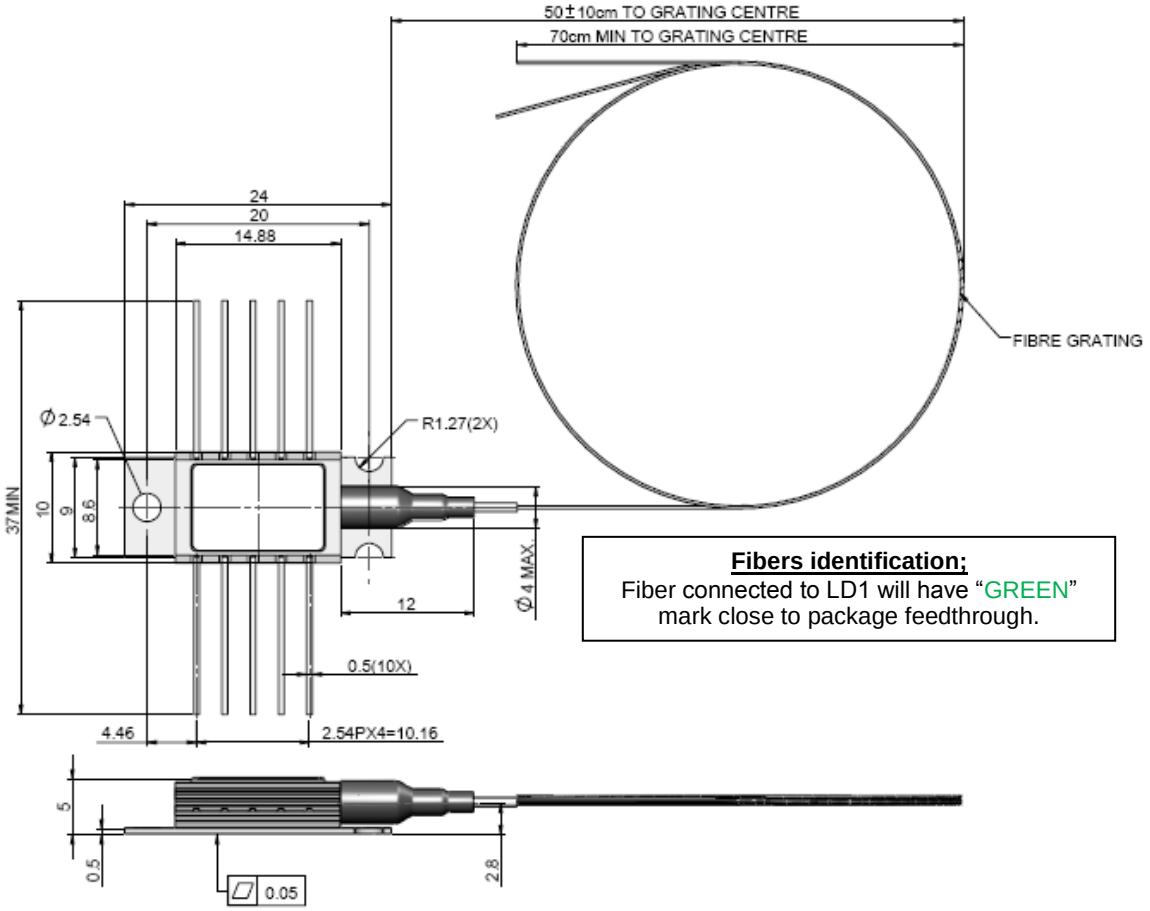
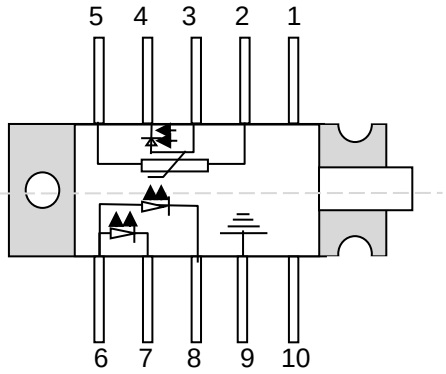
## Module Outlines Drawing and Pin Connections




| Pin | Description | Pin | Description |
|---|---|---|---|
| 1 | Not conected | 6 | LD1&2 Anode (+) |
| 2 | Thermistor | 7 | LD1 Cathode (-) |
| 3 | Monitor anode (-) | 8 | LD2 Cathode (-) |
| 4 | Monitor cathode (+) | 9 | Package Ground |
| 5 | Thermistor | 10 | Not connected |

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## Fiber Specification

| Parameter | | Min. | Typ. | Max. | Units | Condition |
|---|---|---|---|---|---|---|
| Fiber type | Nufern PM980-XP or Corning PM 98-U25 | | | | | |
| Cut-off wavelength | | 830 | 900 | 970 | nm | |
| Mode field diameter | | 5.6 | 6.6 | 7.6 | µm | @ 980nm |
| Cladding diameter | | 124 | 125 | 126 | µm | |
| Fiber coating diameter | | 230 | 245 | 260 | µm | Acrylate material, mechanically strippable |
| Grating recoat diameter | | 260 | 290 | 320 | µm | |
| Core/cladding concentricity | | | | <0.5 | µm | |
| Coating-clad offset | | | | ≤5 | µm | |
| Fiber proof test | | 200 | | | kpsi | |
| Fiber Bragg Grating proof test | | 150 | | | kpsi | |

**Note;** Fiber termination; bare fiber with rough cleave.

## Ordering Information

| DLU | 96 | * | * | 7* | P | -10 | R |
|---|---|---|---|---|---|---|---|
| Product Type | Chip Type | LD1 KFP | LD2 KFP | Wavelength 74 for 974nm 76 for 976nm | Product Design | Package type | RoHS Compliance |

**Examples:**
**DCU96AL74P-10R refers to "200mW KFP for LD1 and 400mW KFP for LD2, 974nm product**

## Contact Information

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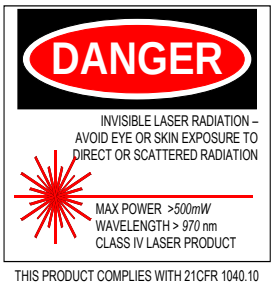
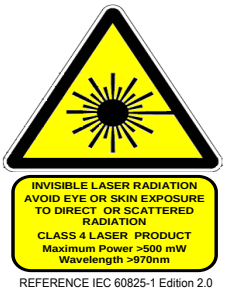
## RoHs Compliance

II-VI Photonics is fully committed to environment protection and sustainable development and has set in place a comprehensive program for removing polluting and hazardous substances from all of its products. The relevant evidence of RoHS compliance is held as part of our controlled documentation for each of our compliant products. RoHS compliance parts are available to order, please refer to the ordering information section for further details.

## User Safety

The laser light is invisible and maybe harmful to human eyes.
ESD protection, it is important that devices are handled correctly during all stages of manufacture and use.





Caution - use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

## Important Notice

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