QPC LASERS

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Product Test Report

Part Number: ES-6507-Z002
Description: BrightLock, 795nm-IG, 180W, Custom Optical Train

Unit Serial Number	1209201-S2
Test Date	06/05/2019
Tested by	XG

[X] This product passed final test and fully met the specifications

[ ] This product passed final test with contingency (Requires customer's waiver for shipping)

Test report reviewed by _____

Test report review date 06/06/2019

Laser Safety Information

This product is a Class IV laser. When powered, the laser emits radiation that may be invisible, visible or both. Radiation from the laser is potentially hazardous. Avoid eye or skin exposure to direct or scattered radiation. Failure to follow instructions may result in serious injury or fire. Before powering, be sure that radiation from the laser or from any optical fibers connected to it will be safety contained. Consult ANSI Z136.1 (Standard for Safe Use of Lasers) for general safety guidance.

1. Optical Train Assembly

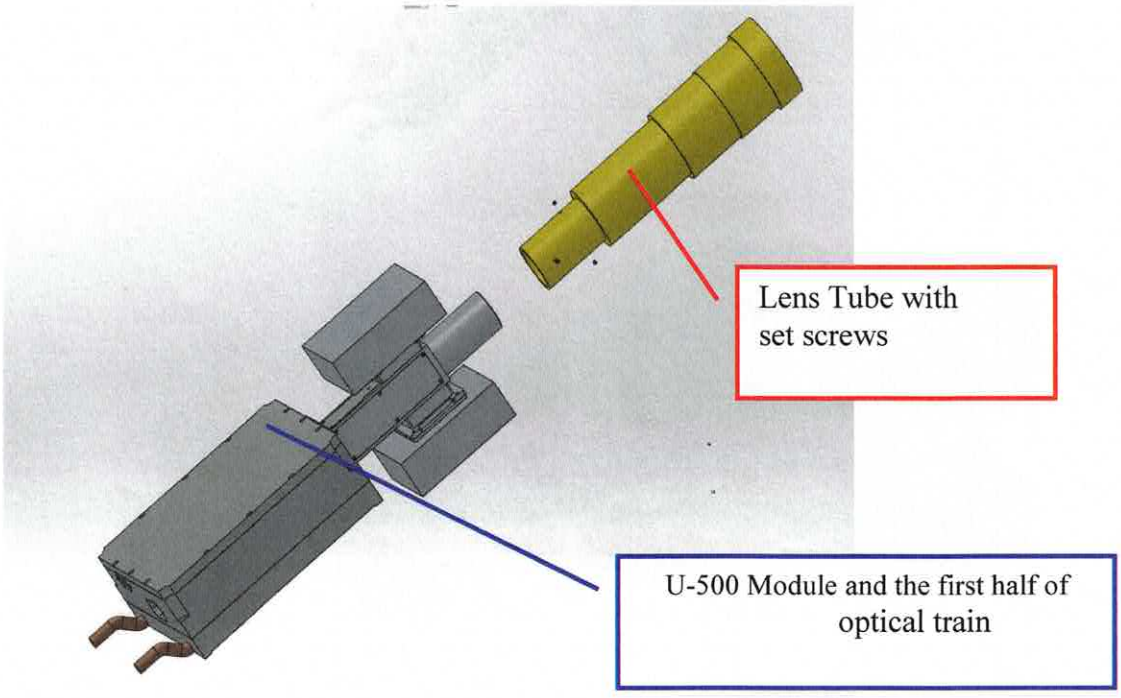
- The optical train (OT) assembly includes two different parts.

  Part 1: First half of the OT

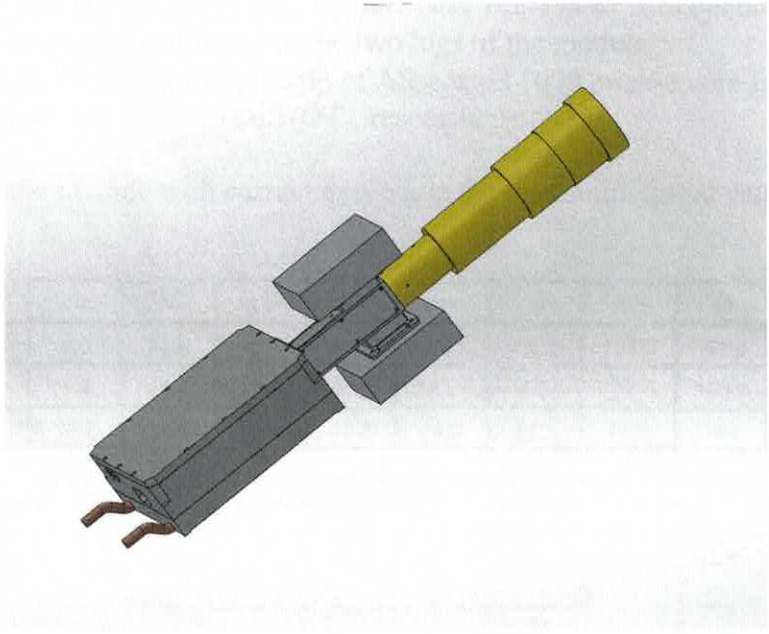
  Part 2: Second half of the OT - Lens tube (Option)

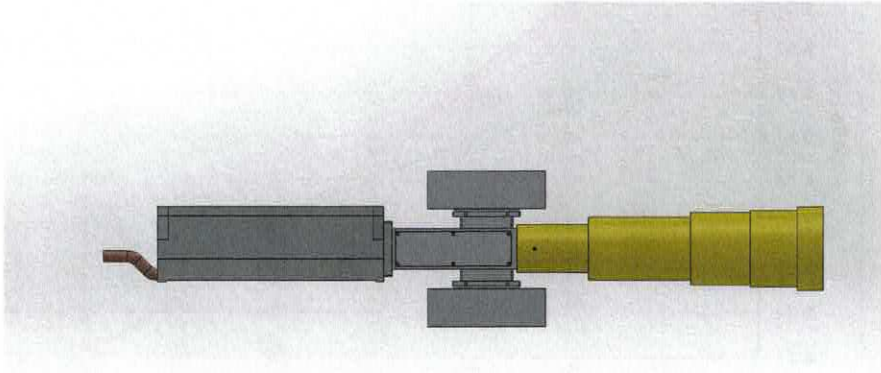
- The module is shipped to customer with the first half Optical Train (OT) attached to the front panel of the module.

- If Second half of the OT (option) is purchased, the user needs to attach the second half of the OT to the first half prior to operation.



- To install the Second half of the OT, remove the four (4) 4-40 set screws from Part 2 using a **0.050" Hex Screwdriver**. Carefully and slowly feed the lens tube onto the first half of the Optical Train, until it reaches the bottom (a hard stop). Hold the Tube in position and tighten the four (4) 4-40 setscrews to lock the lens tube in place. Now the Optical Train is fully restored.



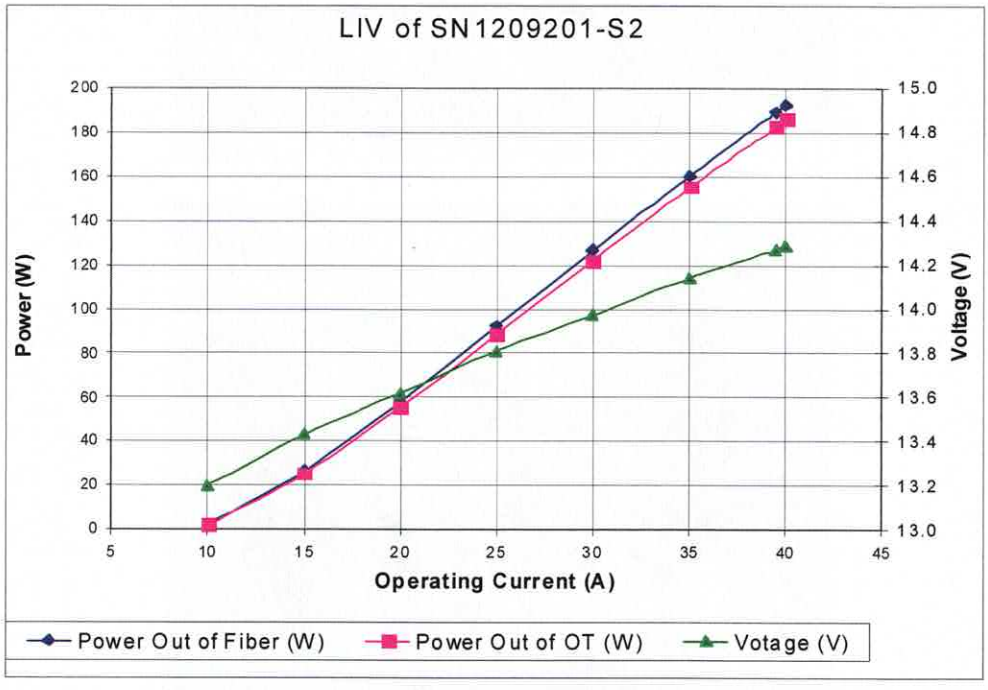


2. Power and Voltage Drop vs. Drive Current (LIV)

- Chiller temperature was set to **17°C** so that **23.5°C** module base temperature was achieved at 180 W output power from Optical Train.
- Module base temperature was measured by using the built-in NTC 10KΩ thermistor, which reflects the real temperature of the module base while laser is in operation
- The voltage drop was measured between the two lugs of the module.
- Optical powers were measured from the tip of AR coated 1000 micron core fiber with a NA of 0.22, and from the Optical Train (OT), respectively.

Note: Do not operate the module with current exceeding the maximum tested value

Current (A)	10	15	20	25	30	35	39.5	40
Power Out of Fiber (W)	2.0	26.6	57.8	92.3	126.7	160.2	189.3	192.4
Power Out of OT (W)	1.9	25.4	55.7	88.8	122.1	155.4	182.6	186.0
Votage (V)	13.2	13.4	13.6	13.8	14.0	14.1	14.3	14.3

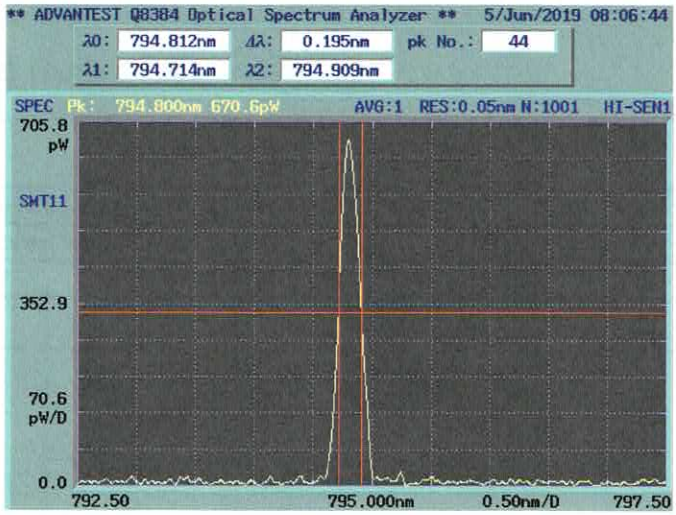


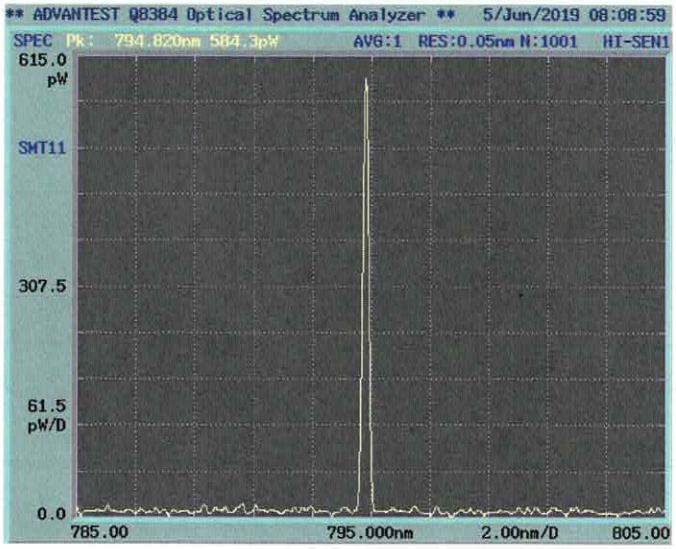
3. Optical Spectrum

3.1 Measurement Conditions

T_{base} = **23.5°C**; P=180 W from Optical Train

Centroid of Spectrum:	794.812 nm
Spectral Width (FWHM):	0.195 nm

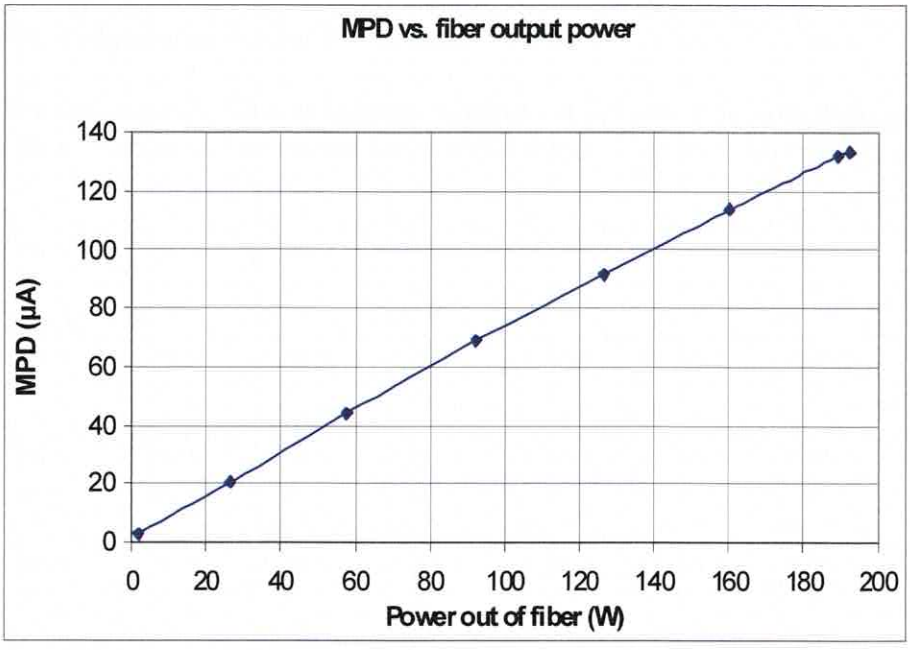




4. MPD Data

- A photodiode is installed in the module to monitor the diode power.
- The fiber output power vs. photodiode output current is calibrated.
- The photodiode output signal can be measured by using a multi-meter set for "μA" measurement
- MPD output connection definitions:
  - Pin 5 on 15-pin connector: "+"
  - Pin 6 on 15-pin connector: "-"

Driver Current (A)	10	15	20	25	30	35	39.5	40
Power ex fiber(W)	2.0	26.6	57.8	92.3	126.7	160.2	189.3	192.4
MPD (μA)	3.0	20.5	44.0	69.0	91.6	113.6	132.0	133.4



5. Aiming Beam Data

- Wavelength: **635** nm

Power out of the delivery fiber: 2.5**mW at** 5 **VDC** input

- Wire connection definitions
    - Pin 14 on 15-pin connector: "+"
    - Pin 15 on 15-pin connector: "-"

6. Dumping power from the PBS due to polarization impurity out of fiber

The measured power dumped by the PBS (polarization Beam splitter) through one of the Optical Train beam dump windows is <10W at 180W output from the OT.

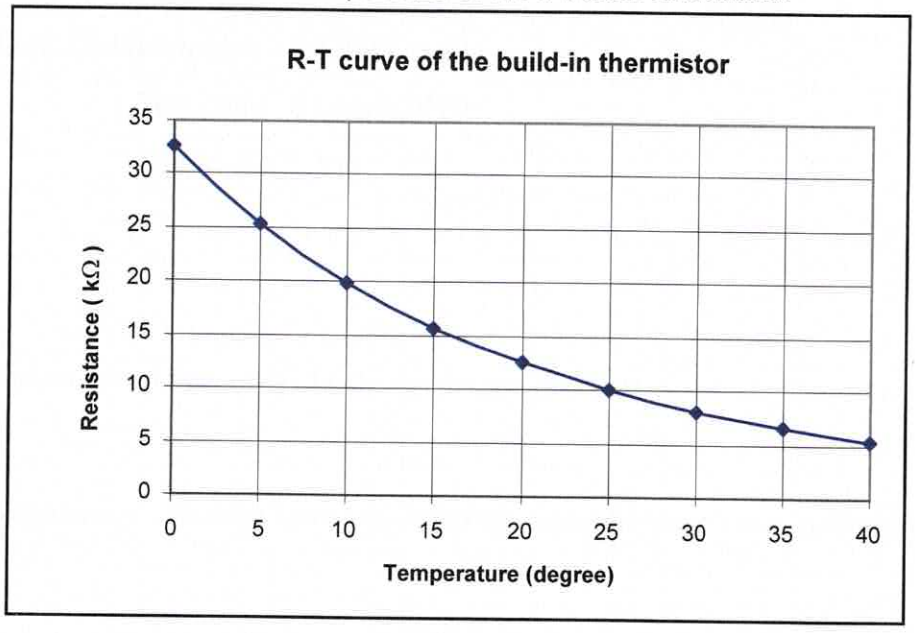
7. Circular Polarization out of the Optical Train

A ¼ Waveplate in the OT has been adjusted to get the best Circular Polarization, limited to the measurement accuracy, the measured Purity of Circular Polarization is better than 98%.

8. Thermistor R-T Curve

- Two temperature sensors are installed on the module base plate. One is NTC 10KΩ thermistor which is connected to the Pin 1 and 2 of the D-sub connector. Another one is PT100 resistance temperature detector which is connected to the Pin 3 and 4.

Resistance vs. temperature of NTC 10KΩ Thermsitor



NOTE:
The temperature can be calculated from the measured resistance by using the following formula:

$A = 0.001129148$
$B = 0.000234125$
$C = 8.77\text{E-}08$
$D =$ **Resistance** (Ω)
$E = 1 / [A + B^{*}\text{LN}(D) + C^{*}\{\text{LN}(D)\}^{3}]$
$F = E - 273.15 =$ **Temperature (Celsius)**