

Wavelength-Selected High-Power D2587P-Type (with Wavelength Locker)/D2547P-Type Isolated DFB Laser Modules



Featuring wavelength selection and locking capabilities, the D2587P Laser Module is ideally suited for use with external lithium niobate modulators, and in high-power (20 mW) applications.

Features

- High-performance, multiquantum-well (MQW), distributed-feedback (DFB) laser
- D2587P-Type is offered on 50 GHz ITU grid wavelengths ranging from 1528.77 nm—1610.06 nm
- D2547P-Type is offered on 100 GHz ITU grid wavelengths ranging from 1528.77 nm—1610.06 nm
- Polarization-maintaining fiber pigtail
- For use with lithium niobate modulators
- High optical power (20 mW, CW)
- Hermetic, 14-pin package

Applications

- Telecommunications:
 - Dense WDM
 - SONET/SDH OC-192/STM-64
 - Extended and ultralong reach
 - Undersea systems
- Digital video

Description

The D2587P-Type DFB laser module is designed for use with an external lithium niobate modulator and also in applications where high power (20 mW) is required.

The use of an internal wavelength locker greatly enhances long-term reliability and reduces chirp and mode dispersion when used in conjunction with LN modulators at OC-192 data rates.

A companion device, the D2547P high-power DFB laser module, is also designed for use with a lithium niobate external modulator, but without the use of an internal wavelength locker.

Description (continued)

Principles of Operation (Controlled Wavelength)

The single-channel, wavelength-selected DFB (ILM) package contains internal wavelength-discriminating optics, i.e., two etalons and associated photodiodes. The output consists of analog signals suitable for controlling the electrical current of the thermoelectric cooler (TEC) and the DFB laser.

Controlled Feedback

The module contains an internal optical isolator that suppresses optical feedback in laser-based, fiber-optic systems. Light reflected back to the laser is attenuated a minimum of 30 dB.

Controlled Temperature

An integral TEC provides stable thermal characteristics. The TEC allows for heating and cooling of the laser chip to maintain a temperature of 25 °C for case temperatures from -25 °C to +70 °C. The laser temperature is monitored by the internal thermistor, which can be used with external circuitry to control the laser chip temperature.

Controlled Power

An internal, InGaAs, PIN photodiode functions as the back-facet monitor. The photodiode monitors emission from the rear facet of the laser and, when used in conjunction with control circuitry, can control optical power launched into the fiber. Normally, this configuration is used in a feedback arrangement to maintain consistent laser output power.

Standard Package

The laser module is fabricated in a 14-pin, hermetic, metal/ceramic butterfly package that incorporates a bias tee that separates the dc-bias path from the RF input. The RF input has a nominal 25 Ω impedance.

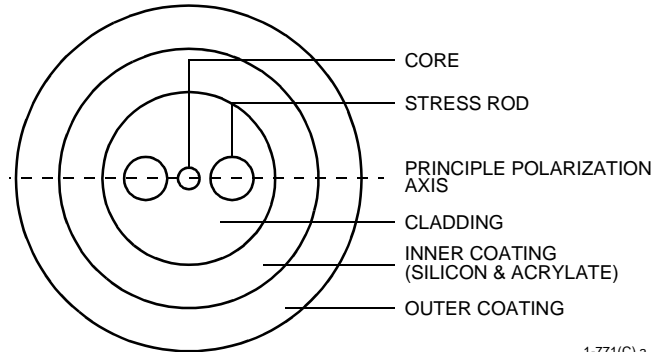
The laser module is equipped with *Fujikura** polarization-maintaining fiber (PMF). The fiber is PANDA type and is the same fiber that is used on the Agere Systems Inc. lithium niobate modulators. It has a mode field diameter of 10.5 μm, a cladding diameter of 125 μm ±3 μm, and a loose tube jacketed fiber 900 μm in diameter. Figure 1 shows the orientation of polarization in the fiber.

Agere Systems' optoelectronic components are being qualified to rigorous internal standards that are consistent with *Telcordia Technologies*† TR-NWT-000468. All design and manufacturing operations are *ISO*§ 9001 certified. The module is being fully qualified for central office applications.

* *Fujikura* is a registered trademark of Fujikura Ltd.

† *Telcordia Technologies* is a trademark of Telcordia Technologies Inc.

§ *ISO* is a registered trademark of The International Organization for Standardization.



1-771(C).a

Figure 1. Polarization-Maintaining Fiber

Pin Information

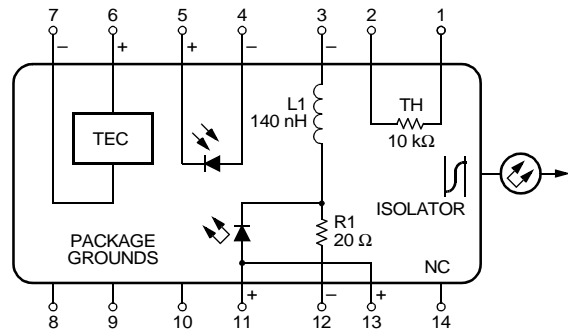
Table 1. Pin Descriptions

| Pin | D2587P-Type | D2547P-Type |
|-----|--------------------------------|--------------------------------|
| 1 | Thermistor | Thermistor |
| 2 | Thermistor | Thermistor |
| 3 | Laser dc Bias (Cathode) (-) | Laser dc Bias (Cathode) (-) |
| 4 | Back-facet Monitor Anode (-) | Back-facet Monitor Anode (-) |
| 5 | Back-facet Monitor Cathode (+) | Back-facet Monitor Cathode (+) |
| 6 | TEC (+) ¹ | TEC (+) ¹ |
| 7 | TEC (-) ¹ | TEC (-) ¹ |
| 8 | Case Ground | Case Ground |
| 9 | λ Photodiode 2 Anode | Case Ground |
| 10 | λ Photodiode 1 Anode | Case Ground |
| 11 | Laser Anode (+) ² | Laser Anode (+) ² |
| 12 | RF Laser Input Cathode (-) | RF Laser Input Cathode (-) |
| 13 | Laser Anode (+) ² | Laser Anode (+) ² |
| 14 | NC | Case Ground |

1. A positive current through the thermoelectric heat pump cools the laser.

2. Both leads should be grounded for optimum performance.

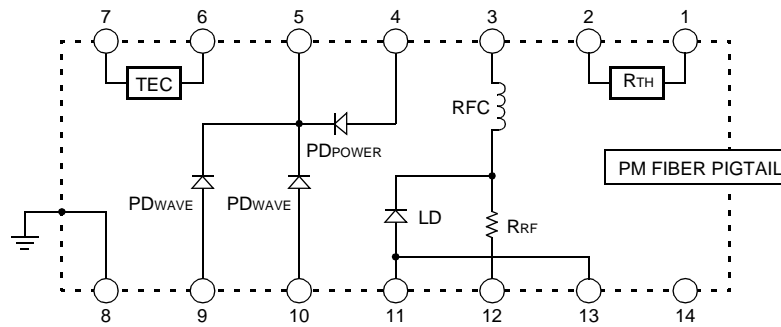
Description (continued)



Top view.

1-567

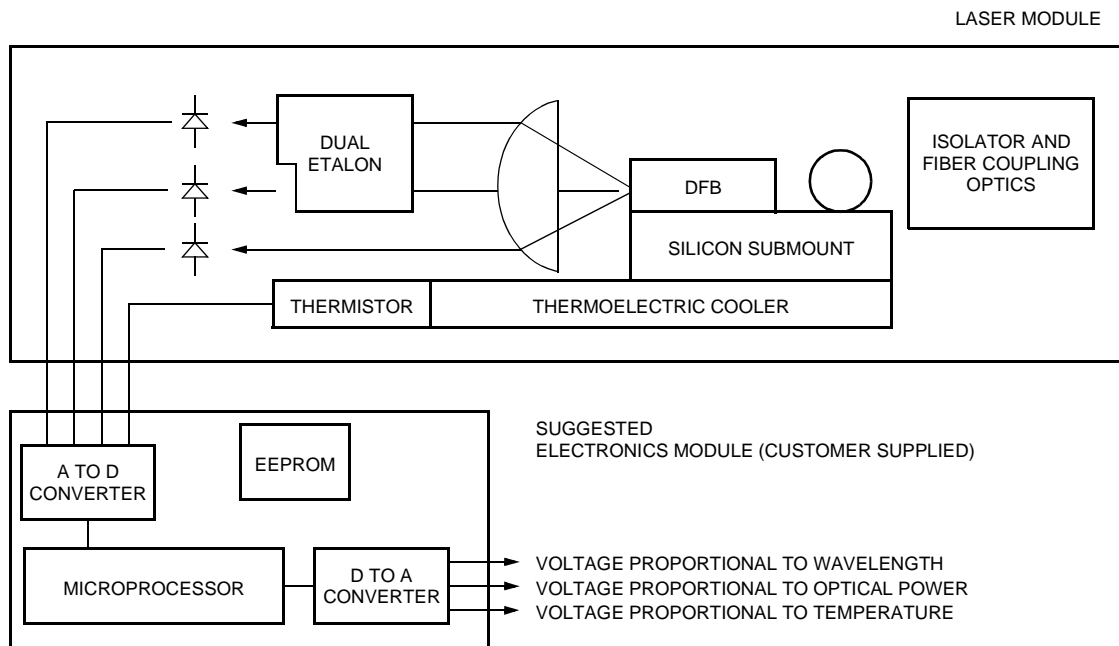
Figure 2. D2547P Circuit Schematic



1-1130(F)

Figure 3. D2587P Circuit Schematic

Block Diagram



1-1129(F)

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operations sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

| Parameter | Symbol | Min | Max | Unit |
|----------------------------------|------------------|-----|-----|------|
| Laser Reverse Voltage | VRLMAX | — | 2 | V |
| dc Forward Current | IFLMAX | — | 225 | mA |
| Operating Case Temperature Range | T _C | -25 | 70 | °C |
| Storage Case Temperature Range* | T _{stg} | -40 | 70 | °C |
| Photodiode Reverse Voltage | VRPDMAX | — | 10 | V |
| Photodiode Forward Current | IFPDMAX | — | 2 | mA |

* Does not apply to shipping container.

Handling Precautions

Power Sequencing

To avoid the possibility of damage to the laser module from power supply switching transients, follow this turn-on sequence:

1. All ground connections
2. Most negative supply
3. Most positive supply
4. All remaining connections

Reverse the order for the proper turn-off sequence.

Electrostatic Discharge

CAUTION: This device is susceptible to damage as a result of electrostatic discharge. Take proper precautions during both handling and testing. Follow guidelines such as JEDEC Publication No. 108-A (Dec. 1988).

Agere Systems employs a human-body model (HBM) for ESD-susceptibility testing and protection-design evaluation. ESD voltage thresholds are dependent on the critical parameters used to define the model. A standard HBM (resistance = 1.5 kΩ, capacitance = 100 pF) is widely used and, therefore, can be used for comparison purposes. The HBM ESD threshold presented here was obtained using these circuit parameters:

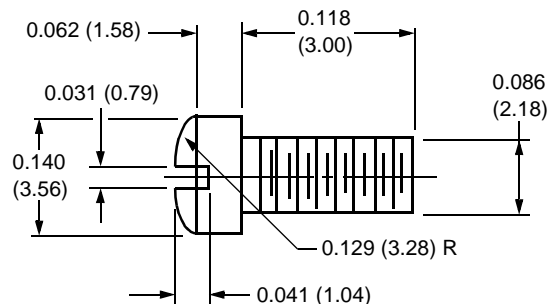
| Parameter | Value | Unit |
|------------------|-------|------|
| Human-body Model | >400 | V |

Mounting Instructions

The minimum fiber bend radius is 1.0 in. (25.4 mm)

To avoid degradation in performance, mount the module on the board as follows:

1. Place the bottom flange of the module on a flat heat sink at least 0.5 in. x 1.180 in. (12.7 mm x 30 mm) in size. The surface finish of the heat sink should be better than 32 μin. (0.8 μm), and the surface flatness must be better than 0.001 in. (25.4 μm). Using thermal conductive grease is optional; however, thermal performance can be improved by up to 5% if conductive grease is applied between the bottom flange and the heat sink.
2. Mount four #2-56 screws with Fillister heads (M2-3 mm) at the four screw hole locations (see Outline Diagram). The Fillister head diameter must not exceed 0.140 in. (3.55 mm). Do not apply more than 1 in.-lb. of torque to the screws.



Note: Dimensions are in inches and (millimeters).

1-532(C)

Figure 4. Fillister Head Screw

Characteristics

Minimum and maximum values are testing requirements. Typical values are device characteristics and are results of engineering evaluations; they are for information purposes only and are not part of the testing requirements.

Table 2. D2587-Type Electrical Characteristics (at 25 °C laser temperature)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|-------------------------------|-------------------|--|-------|------|------|------------------------|
| Threshold Current | I_{TH} | — | — | 15 | 40 | mA |
| Drive Current | — | $I_F = 20$ mW | — | — | 165 | mA |
| Laser Forward Voltage | V_{LF} | $I_F = 20$ mW (CW) | — | 2 | 2.5 | V |
| Monitor Reverse-bias Voltage* | V_{RMON} | — | 3 | 5 | 10 | V |
| Monitor Current: | | $P_O = 20$ mW (CW) | | | | |
| Back-facet Monitor | I_{RMON} | | 0.003 | — | 0.06 | mA |
| λ Photodiode 1 | $I_{\lambda PD1}$ | | 0.003 | — | 0.06 | mA |
| λ Photodiode 2 | $I_{\lambda PD2}$ | | 0.003 | — | 0.06 | mA |
| Monitor Dark Current | I_D | $I_F = 0$, $V_{RMON} = 5$ V | — | 0.01 | 0.1 | μ A |
| Input Impedance | Z_{IN} | — | — | 25 | — | Ω |
| Filter Slope | — | — | 0.5 | — | 8 | $\text{\AA}/\text{nm}$ |
| Frequency Capture Range | — | Measured from λ_{ITU} toward increasing λ and decreasing λ | 15 | — | — | GHz |
| Thermistor Current | I_{TC} | — | 10 | — | 100 | μ A |
| Resistance Ratio [†] | — | — | 9.1 | 9.6 | 10.1 | — |
| Thermistor Resistance | R_{TH} | $T_L = 25$ °C | 9.5 | — | 10.5 | k Ω |
| Laser Submount Temperature | T_{SET} | — | 20 | — | 35 | °C |
| TEC Current | I_{TEC} | $T_L = 25$ °C, $T_C = 70$ °C | — | — | 1.7 | A |
| TEC Voltage | V_{TEC} | $T_L = 25$ °C, $T_C = 70$ °C | — | — | 2.8 | V |
| TEC Capacity | ΔT | $T_C = 70$ °C | — | — | 50 | °C |

* Standard operating condition is 5.0 V reverse bias.

[†] Ratio of thermistor resistance at 0 °C to thermistor resistance at 50 °C.

Table 3. D2587-Type Optical Characteristics (at 25 °C laser temperature)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|-------------------|---|---------|-----|-----------|--------|
| Peak Optical Output Power | P_P | — | 20.0 | — | — | mW |
| Center Wavelength* (See Ordering Information, page 9.) | λ_C | $T_L = T_{SET}$ $\lambda_C = \lambda_{ITU} \pm 0.1$ nm | 1528.77 | — | 1610.06 | nm |
| Line Width (3 dB full width) | $\Delta\lambda$ | CW, $P_F = 20.0$ mW | — | 2 | 10 | MHz |
| Side-mode Suppression Ratio | SMSR | CW | 35 | 45 | — | dB |
| Relative Intensity Noise | RIN | CW, $P_F = 20$ mW 200 MHz < f < 10 GHz | — | — | -135 | dB/Hz |
| Optical Isolation | — | $T_C = 0$ °C to 75 °C | 30 | — | — | dB |
| Optical Polarization Extinction Ratio [†] | — | 0 °C to 75 °C | 20 | — | — | dB |
| FM Efficiency | FM | $f_{MOD} = 30$ kHz, $P_F = 20$ mW | — | 100 | — | MHz/mA |
| Wavelength Drift (EOL) | $\Delta\lambda_C$ | Tested over 25-year lifetime | — | — | ± 2.5 | GHz |

* Custom wavelengths available.

[†] The ST[®] ferrule key is not aligned to slow axis of fiber. Connector is intended for testing purposes only.

Characteristics (continued)

Minimum and maximum values are testing requirements. Typical values are device characteristics and are results of engineering evaluations; they are for information purposes only and are not part of the testing requirements.

Table 4. D2547P-Type Electrical Characteristics (at 25 °C laser temperature)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|-------------------------------|-------------|------------------------------|-----|------|------|------------|
| Threshold Current | I_{TH} | — | — | 15 | 40 | mA |
| Drive Current | — | $I_F = 20$ mW | — | — | 165 | mA |
| Laser Forward Voltage | V_{LF} | $I_F = 20$ mW (CW) | — | 2 | 2.5 | V |
| Monitor Reverse-bias Voltage* | V_{RMON} | — | 3 | 5 | 10 | V |
| Back-facet Monitor Current: | I_{RMON} | $P_O = 20$ mW (CW) | 0.2 | — | — | mA |
| Monitor Dark Current | I_D | $I_F = 0$, $V_{RMON} = 5$ V | — | 0.01 | 0.1 | μ A |
| Input Impedance | Z_{IN} | — | — | 25 | — | Ω |
| Thermistor Current | I_{TC} | — | 10 | — | 100 | μ A |
| Resistance Ratio† | — | — | 9.1 | 9.6 | 10.1 | — |
| Thermistor Resistance | R_{TH} | $T_L = 25$ °C | 9.5 | — | 10.5 | k Ω |
| Laser Submount Temperature | T_{LASER} | — | 20 | — | 35 | °C |
| TEC Current | I_{TEC} | $T_L = 25$ °C, $T_C = 70$ °C | — | — | 1.7 | A |
| TEC Voltage | V_{TEC} | $T_L = 25$ °C, $T_C = 70$ °C | — | — | 2.8 | V |
| TEC Capacity | ΔT | $T_C = 70$ °C | — | — | 50 | °C |

* Standard operating condition is 5.0 V reverse bias.

† Ratio of thermistor resistance at 0 °C to thermistor resistance at 50 °C.

Table 5. D2547P-Type Optical Characteristics (at 25 °C laser temperature)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|-------------------|---|---------|-----|-----------|--------|
| Peak Optical Output Power | P_P | — | 20.0 | — | — | mW |
| Center Wavelength* (See Ordering Information, page 12.) | λ_C | $T_L = T_{SET}$ $\lambda_C = \lambda_{ITU} \pm 0.1$ nm | 1528.77 | — | 1610.06 | nm |
| Line Width (3 dB full width) | $\Delta\lambda$ | CW, $P_F = 20.0$ mW | — | 2 | 10 | MHz |
| Side-mode Suppression Ratio | SMSR | CW | 35 | 45 | — | dB |
| Relative Intensity Noise | RIN | CW, $P_F = 20$ mW 200 MHz < f < 10 GHz | — | — | -135 | dB/Hz |
| Optical Isolation | — | $T_C = 0$ °C to 75 °C | 30 | — | — | dB |
| Optical Polarization Extinction Ratio† | — | 0 °C to 75 °C | 20 | — | — | dB |
| FM Efficiency | FM | $f_{MOD} = 30$ kHz, $P_F = 20$ mW | — | 100 | — | MHz/mA |
| Wavelength Drift (EOL) | $\Delta\lambda_C$ | Tested over 25-year lifetime | — | — | ± 0.1 | nm |

* Custom wavelengths available.

† The ST ferrule key is not aligned to slow axis of fiber. Connector is intended for testing purposes only.

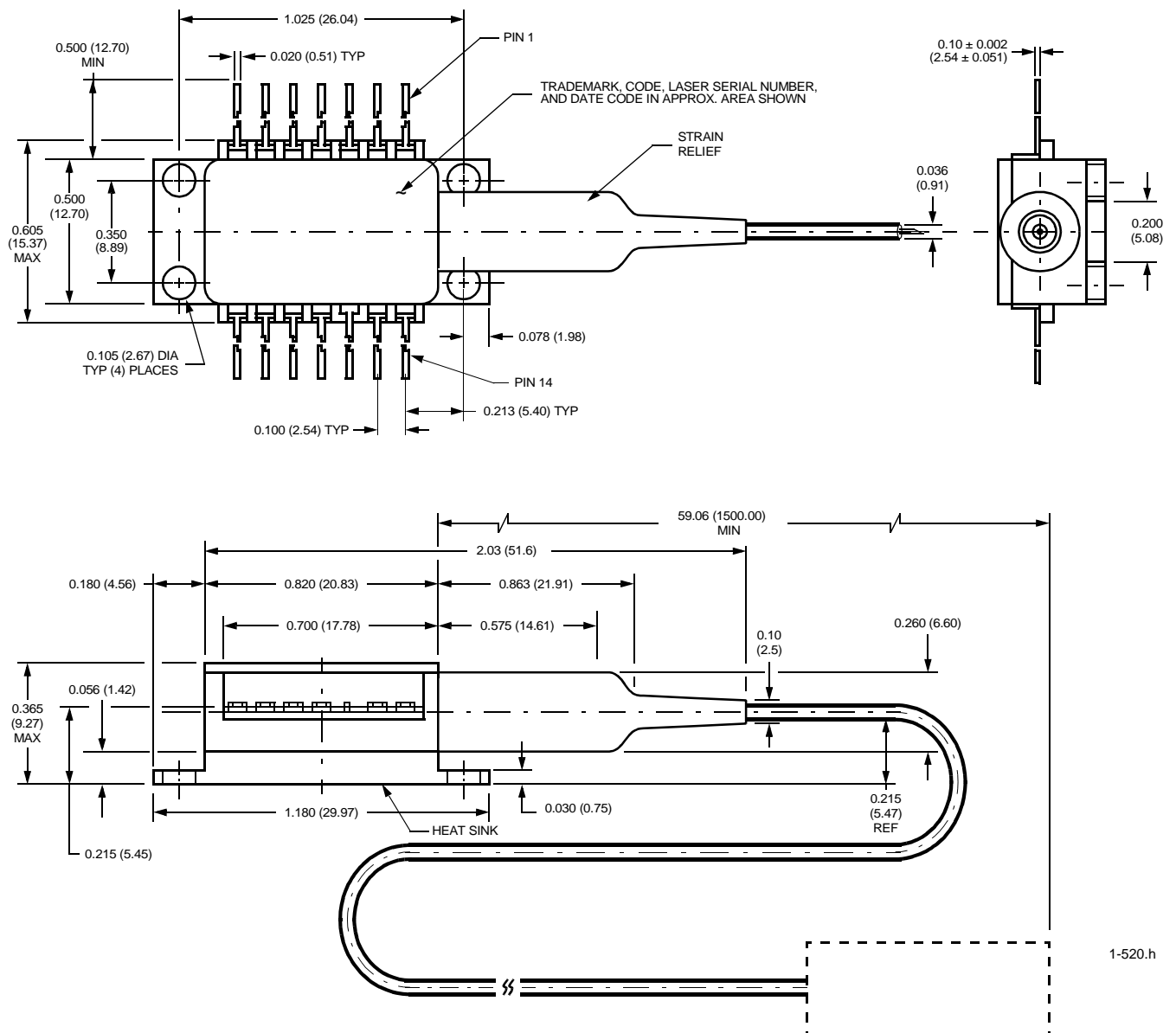
Characteristics (continued)

Table 6. D2587P/D2547P Fiber Pigtail and Optical Connector Characteristics

| Parameter | Symbol | Description | Min | Typ | Max | Unit |
|-----------------|--------|---|-----|-----|-----|------|
| Pigtail Length | L | Fujikura PANDA or equivalent polarization-maintaining fiber | 1.5 | — | — | m |
| Connector Style | — | ST plug (FC/PC optional) | — | — | — | — |

Outline Diagram

Dimensions are in inches and (millimeters). Tolerances are ± 0.005 in. (± 0.127 mm).



High-Power Product

Class IIIb Laser Product

FDA/CDRH Class IIIb laser product. All versions are Class IIIb laser products per CDRH, 21 CFR 1040 Laser Safety requirements. The device has been classified with the FDA under accession number 8720010.

This product complies with 21 CFR 1040.10 and 1040.11.

8 μm /125 μm ± 3 μm single-mode fiber with 900 μm loose-tube jacketed fiber and connector

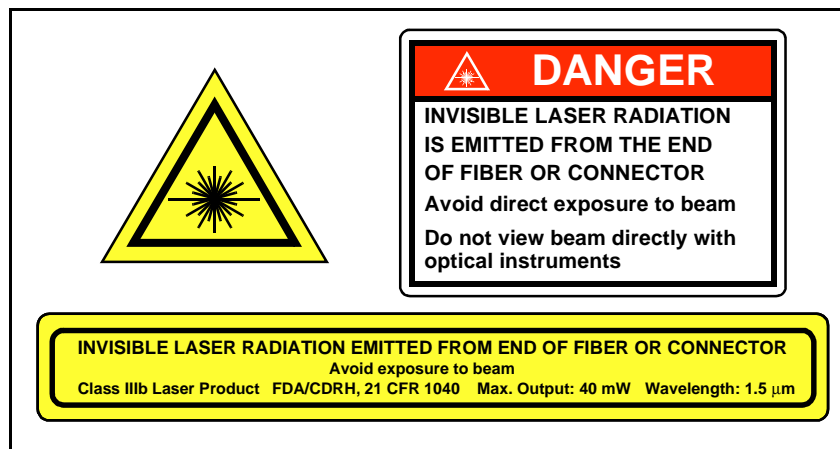
Wavelength = 1.5 μm

Maximum power = 40 mW

Because of size constraints, laser safety labeling (including an FDA Class IIIb label) is not affixed to the module but attached to the outside of the shipping carton.

Product is not shipped with power supply.

Caution: Use of controls, adjustments, and procedures other than those specified herein may result in hazardous laser radiation exposure.



Ordering Information

Table 7. D2587P 20 mW CW Laser with Locker (C- and L-Band) Ordering Information

| Device Code | ITU-T Frequency (THz) | Center Wavelength (nm) | Comcode | Device Code | ITU-T Frequency (THz) | Center Wavelength (nm) | Comcode |
|-------------|-----------------------|------------------------|-----------|-------------|-----------------------|------------------------|-----------|
| D2587P61 | 196.1 | 1528.77 | 108835422 | D2587P41 | 194.1 | 1544.53 | 108835620 |
| D2587P605 | 196.05 | 1529.16 | 108875220 | D2587P405 | 194.05 | 1544.92 | 108875444 |
| D2587P60 | 196.0 | 1529.55 | 108835430 | D2587P40 | 194.0 | 1545.32 | 108835638 |
| D2587P595 | 195.95 | 1529.94 | 108875238 | D2587P395 | 193.95 | 1545.72 | 108875451 |
| D2587P59 | 195.9 | 1530.33 | 108835448 | D2587P39 | 193.9 | 1546.12 | 108835646 |
| D2587P585 | 195.85 | 1530.72 | 108875246 | D2587P385 | 193.85 | 1546.52 | 108875469 |
| D2587P58 | 195.8 | 1531.12 | 108835455 | D2587P38 | 193.8 | 1546.92 | 108835653 |
| D2587P575 | 195.75 | 1531.51 | 108875253 | D2587P375 | 193.75 | 1547.32 | 108875477 |
| D2587P57 | 195.7 | 1531.90 | 108835463 | D2587P37 | 193.7 | 1547.72 | 108835661 |
| D2587P565 | 195.65 | 1532.29 | 108875261 | D2587P365 | 193.65 | 1548.11 | 108875485 |
| D2587P56 | 195.6 | 1532.68 | 108835471 | D2587P36 | 193.6 | 1548.51 | 108835679 |
| D2587P555 | 195.55 | 1533.07 | 108875279 | D2587P355 | 193.55 | 1548.91 | 108875493 |
| D2587P55 | 195.5 | 1533.47 | 108835489 | D2587P35 | 193.5 | 1549.32 | 108835687 |
| D2587P545 | 195.45 | 1533.86 | 108875287 | D2587P345 | 193.45 | 1549.72 | 108875501 |
| D2587P54 | 195.4 | 1534.25 | 108835497 | D2587P34 | 193.4 | 1550.12 | 108835695 |
| D2587P535 | 195.35 | 1534.64 | 108875303 | D2587P335 | 193.35 | 1550.52 | 108875519 |
| D2587P53 | 195.3 | 1535.04 | 108835505 | D2587P33 | 193.3 | 1550.92 | 108835703 |
| D2587P525 | 195.25 | 1535.43 | 108875311 | D2587P325 | 193.25 | 1551.58 | 108875527 |
| D2587P52 | 195.2 | 1535.82 | 108835513 | D2587P32 | 193.2 | 1551.72 | 108835711 |
| D2587P515 | 195.15 | 1536.22 | 108875329 | D2587P315 | 193.15 | 1552.12 | 108875535 |
| D2587P51 | 195.1 | 1536.61 | 108835521 | D2587P31 | 193.1 | 1552.52 | 108835729 |
| D2587P505 | 195.05 | 1537.00 | 108875345 | D2587P305 | 193.05 | 1552.93 | 108875543 |
| D2587P50 | 195.0 | 1537.40 | 108835539 | D2587P30 | 193.0 | 1553.33 | 108835737 |
| D2587P495 | 194.95 | 1537.79 | 108875352 | D2587P295 | 192.95 | 1553.73 | 108875550 |
| D2587P49 | 194.9 | 1538.19 | 108835547 | D2587P29 | 192.9 | 1554.13 | 108835745 |
| D2587P485 | 194.85 | 1538.58 | 108875360 | D2587P285 | 192.85 | 1554.54 | 108875568 |
| D2587P48 | 194.8 | 1538.98 | 108835554 | D2587P28 | 192.8 | 1554.94 | 108835752 |
| D2587P475 | 194.75 | 1539.37 | 108875378 | D2587P275 | 192.75 | 1555.34 | 108875576 |
| D2587P47 | 194.7 | 1539.77 | 108835562 | D2587P27 | 192.7 | 1555.75 | 108835760 |
| D2587P465 | 194.65 | 1540.16 | 108875386 | D2587P265 | 192.65 | 1556.15 | 108875584 |
| D2587P46 | 194.6 | 1540.56 | 108835570 | D2587P26 | 192.6 | 1556.55 | 108835778 |
| D2587P455 | 194.55 | 1540.95 | 108875394 | D2587P255 | 192.55 | 1556.96 | 108875592 |
| D2587P45 | 194.5 | 1541.35 | 108835588 | D2587P25 | 192.5 | 1557.36 | 108835786 |
| D2587P445 | 194.45 | 1541.75 | 108875402 | D2587P245 | 192.45 | 1557.77 | 108875600 |
| D2587P44 | 194.4 | 1542.14 | 108835596 | D2587P24 | 192.4 | 1558.17 | 108835794 |
| D2587P435 | 194.35 | 1542.54 | 108875410 | D2587P235 | 192.35 | 1558.58 | 108875618 |
| D2587P43 | 194.3 | 1542.94 | 108835604 | D2587P23 | 192.3 | 1558.98 | 108835802 |
| D2587P425 | 194.25 | 1543.33 | 108875428 | D2587P225 | 192.25 | 1559.39 | 108875626 |
| D2587P42 | 194.2 | 1543.73 | 108835612 | D2587P22 | 192.2 | 1559.79 | 108835810 |
| D2587P415 | 194.15 | 1544.13 | 108875436 | D2587P215 | 192.15 | 1560.20 | 108875634 |

Ordering Information (continued)**Table 7. D2587P 20 mW CW Laser with Locker (C- and L-Band) Ordering Information** (continued)

| Device Code | ITU-T Frequency (THz) | Center Wavelength (nm) | Comcode | Device Code | ITU-T Frequency (THz) | Center Wavelength (nm) | Comcode |
|-------------|-----------------------|------------------------|-----------|-------------|-----------------------|------------------------|-----------|
| D2587P21 | 192.1 | 1560.61 | 108835828 | D2587P900 | 190.0 | 1577.86 | 108836990 |
| D2587P205 | 192.05 | 1561.01 | 108875642 | D2587P8995 | 189.95 | 1578.27 | 108876079 |
| D2587P20 | 192.0 | 1561.42 | 108835836 | D2587P899 | 189.9 | 1578.69 | 108836982 |
| D2587P195 | 191.95 | 1561.83 | 108875659 | D2587P8985 | 189.85 | 1579.10 | 108876061 |
| D2587P19 | 191.9 | 1562.23 | 108835844 | D2587P898 | 189.8 | 1579.52 | 108836974 |
| D2587P185 | 191.85 | 1562.64 | 108875667 | D2587P8975 | 189.75 | 1579.93 | 108876046 |
| D2587P18 | 191.8 | 1563.05 | 108835851 | D2587P897 | 189.7 | 1580.35 | 108836511 |
| D2587P175 | 191.75 | 1563.45 | 108875675 | D2587P8965 | 189.65 | 1580.77 | 108876038 |
| D2587P17 | 191.7 | 1563.86 | 108835869 | D2587P896 | 189.6 | 1581.18 | 108836503 |
| D2587P9165 | 191.65 | 1564.27 | 109976244 | D2587P8955 | 189.55 | 1581.60 | 108876020 |
| D2587P916 | 191.6 | 1564.68 | 108838418 | D2587P895 | 189.5 | 1582.02 | 108836495 |
| D2587P9155 | 191.55 | 1565.09 | 108876236 | D2587P8945 | 189.45 | 1582.44 | 108876012 |
| D2587P915 | 191.5 | 1565.50 | 108838400 | D2587P894 | 189.4 | 1582.85 | 108836487 |
| D2587P9145 | 191.45 | 1565.90 | 108876228 | D2587P8935 | 189.35 | 1583.27 | 108876004 |
| D2587P914 | 191.4 | 1566.31 | 108837139 | D2587P893 | 189.3 | 1583.69 | 108836479 |
| D2587P9135 | 191.35 | 1566.72 | 108876210 | D2587P8925 | 189.25 | 1584.11 | 108875980 |
| D2587P913 | 191.3 | 1567.13 | 108837121 | D2587P892 | 189.2 | 1584.53 | 108836461 |
| D2587P9125 | 191.25 | 1567.54 | 108876202 | D2587P8915 | 189.15 | 1584.95 | 108875972 |
| D2587P912 | 191.2 | 1567.95 | 108837113 | D2587P891 | 189.1 | 1585.36 | 108836453 |
| D2587P9115 | 191.15 | 1568.36 | 108876194 | D2587P8905 | 189.05 | 1585.78 | 108875964 |
| D2587P911 | 191.1 | 1568.77 | 108837105 | D2587P890 | 189.0 | 1586.20 | 108836446 |
| D2587P9105 | 191.05 | 1569.18 | 108876186 | D2587P8895 | 188.95 | 1586.62 | 108875956 |
| D2587P910 | 191.0 | 1569.59 | 108837097 | D2587P889 | 188.9 | 1587.04 | 108836438 |
| D2587P9095 | 190.95 | 1570.01 | 108876178 | D2587P8885 | 188.85 | 1587.46 | 108875949 |
| D2587P909 | 190.9 | 1570.42 | 108837089 | D2587P888 | 188.8 | 1587.88 | 108836420 |
| D2587P9085 | 190.85 | 1570.83 | 108876160 | D2587P8875 | 188.75 | 1588.30 | 108875931 |
| D2587P908 | 190.8 | 1571.24 | 108837071 | D2587P887 | 188.7 | 1588.72 | 108836412 |
| D2587P9075 | 190.75 | 1571.65 | 108876152 | D2587P8865 | 188.65 | 1589.15 | 108875923 |
| D2587P907 | 190.7 | 1572.06 | 108837063 | D2587P886 | 188.6 | 1589.57 | 108836404 |
| D2587P9065 | 190.65 | 1572.48 | 108876145 | D2587P8855 | 188.55 | 1589.99 | 108875915 |
| D2587P906 | 190.6 | 1572.89 | 108837055 | D2587P885 | 188.5 | 1590.41 | 108836396 |
| D2587P9055 | 190.55 | 1573.30 | 108876137 | D2587P8845 | 188.45 | 1590.83 | 108875907 |
| D2587P905 | 190.5 | 1573.71 | 108837048 | D2587P884 | 188.4 | 1591.26 | 108836388 |
| D2587P9045 | 190.45 | 1574.13 | 108876129 | D2587P8835 | 188.35 | 1591.68 | 108875899 |
| D2587P904 | 190.4 | 1574.54 | 108837030 | D2587P883 | 188.3 | 1592.10 | 108836370 |
| D2587P9035 | 190.35 | 1574.95 | 108876111 | D2587P8825 | 188.25 | 1592.52 | 108875881 |
| D2587P903 | 190.3 | 1575.37 | 108837022 | D2587P882 | 188.2 | 1592.95 | 108836362 |
| D2587P9025 | 190.25 | 1575.78 | 108876103 | D2587P8815 | 188.15 | 1593.37 | 108875873 |
| D2587P902 | 190.2 | 1576.20 | 108837014 | D2587P881 | 188.1 | 1593.79 | 108836354 |
| D2587P9015 | 190.15 | 1576.61 | 108876095 | D2587P8805 | 188.05 | 1594.22 | 108875865 |
| D2587P901 | 190.1 | 1577.03 | 108837006 | D2587P880 | 188.0 | 1594.64 | 108836347 |
| D2587P9005 | 190.05 | 1577.44 | 108876087 | D2587P8795 | 187.95 | 1595.06 | 108875857 |

Ordering Information (continued)

Table 7. D2587P 20 mW CW Laser with Locker (C- and L-Band) Ordering Information (continued)

| Device Code | ITU-T Frequency (THz) | Center Wavelength (nm) | Comcode | Device Code | ITU-T Frequency (THz) | Center Wavelength (nm) | Comcode |
|-------------|-----------------------|------------------------|-----------|-------------|-----------------------|------------------------|-----------|
| D2587P879 | 187.9 | 1595.49 | 108836339 | D2587P870 | 187.0 | 1603.17 | 108835950 |
| D2587P8785 | 187.85 | 1595.91 | 108875840 | D2587P8695 | 186.95 | 1603.60 | 108875758 |
| D2587P878 | 187.8 | 1596.34 | 108836321 | D2587P869 | 186.9 | 1604.03 | 108835943 |
| D2587P8775 | 187.75 | 1596.76 | 108875832 | D2587P8685 | 186.85 | 1604.46 | 108875741 |
| D2587P877 | 187.7 | 1597.19 | 108836313 | D2587P868 | 186.8 | 1604.88 | 108835935 |
| D2587P8765 | 187.65 | 1597.62 | 108875824 | D2587P8675 | 186.75 | 1605.31 | 108875733 |
| D2587P876 | 187.6 | 1598.04 | 108836016 | D2587P867 | 186.7 | 1605.74 | 108835927 |
| D2587P8755 | 187.55 | 1598.47 | 108875816 | D2587P8665 | 186.65 | 1606.17 | 108875725 |
| D2587P875 | 187.5 | 1598.89 | 108836008 | D2587P866 | 186.6 | 1606.60 | 108835919 |
| D2587P8745 | 187.45 | 1599.32 | 108875808 | D2587P8655 | 186.55 | 1607.04 | 108875717 |
| D2587P874 | 187.4 | 1599.75 | 108835992 | D2587P865 | 186.5 | 1607.47 | 108835901 |
| D2587P8735 | 187.35 | 1600.17 | 108875790 | D2587P8645 | 186.45 | 1607.90 | 108875709 |
| D2587P873 | 187.3 | 1600.60 | 108835984 | D2587P864 | 186.4 | 1608.33 | 108835893 |
| D2587P8725 | 187.25 | 1601.03 | 108875782 | D2587P8635 | 186.35 | 1608.76 | 108875691 |
| D2587P872 | 187.2 | 1601.46 | 108835976 | D2587P863 | 186.3 | 1609.19 | 108835885 |
| D2587P8715 | 187.15 | 1601.88 | 108875774 | D2587P8625 | 186.25 | 1609.62 | 108875683 |
| D2587P871 | 187.1 | 1602.31 | 108835968 | D2587P862 | 186.2 | 1610.06 | 108835877 |
| D2587P8705 | 187.05 | 1602.74 | 108875766 | | | | |

Ordering Information (continued)

Table 8. D2547P 20 mW CW Laser without Locker (C-Band)

| Device Code | ITU-T Frequency (THz) | Center Wavelength (nm) | Comcode | Device Code | ITU-T Frequency (THz) | Center Wavelength (nm) | Comcode |
|-------------|-----------------------|------------------------|-----------|-------------|-----------------------|------------------------|-----------|
| D2547P61 | 196.1 | 1528.77 | 108838301 | D2547P38 | 193.8 | 1546.92 | 108838079 |
| D2547P60 | 196.0 | 1529.55 | 108838293 | D2547P37 | 193.7 | 1547.72 | 108838061 |
| D2547P59 | 195.9 | 1530.33 | 108838285 | D2547P36 | 193.6 | 1548.51 | 108838053 |
| D2547P58 | 195.8 | 1531.12 | 108838277 | D2547P35 | 193.5 | 1549.32 | 108838046 |
| D2547P57 | 195.7 | 1531.90 | 108838269 | D2547P34 | 193.4 | 1550.12 | 108838038 |
| D2547P56 | 195.6 | 1532.68 | 108838251 | D2547P33 | 193.3 | 1550.92 | 108838020 |
| D2547P55 | 195.5 | 1533.47 | 108838244 | D2547P32 | 193.2 | 1551.72 | 108838012 |
| D2547P54 | 195.4 | 1534.25 | 108838236 | D2547P31 | 193.1 | 1552.52 | 108838004 |
| D2547P53 | 195.3 | 1535.04 | 108838228 | D2547P30 | 193.0 | 1553.33 | 108837998 |
| D2547P52 | 195.2 | 1535.82 | 108838210 | D2547P29 | 192.9 | 1554.13 | 108837980 |
| D2547P51 | 195.1 | 1536.61 | 108838202 | D2547P28 | 192.8 | 1554.94 | 108837972 |
| D2547P50 | 195.0 | 1537.40 | 108838194 | D2547P27 | 192.7 | 1555.75 | 108837964 |
| D2547P49 | 194.9 | 1538.19 | 108838186 | D2547P26 | 192.6 | 1556.55 | 108837956 |
| D2547P48 | 194.8 | 1538.98 | 108838178 | D2547P25 | 192.5 | 1557.36 | 108837949 |
| D2547P47 | 194.7 | 1539.77 | 108838160 | D2547P24 | 192.4 | 1558.17 | 108837931 |
| D2547P46 | 194.6 | 1540.56 | 108838152 | D2547P23 | 192.3 | 1558.98 | 108837923 |
| D2547P45 | 194.5 | 1541.35 | 108838145 | D2547P22 | 192.2 | 1559.79 | 108837915 |
| D2547P44 | 194.4 | 1542.14 | 108838137 | D2547P21 | 192.1 | 1560.61 | 108837907 |
| D2547P43 | 194.3 | 1542.94 | 108838129 | D2547P20 | 192.0 | 1561.42 | 108837899 |
| D2547P42 | 194.2 | 1543.73 | 108838111 | D2547P19 | 191.9 | 1562.23 | 108837881 |
| D2547P41 | 194.1 | 1544.53 | 108838103 | D2547P18 | 191.8 | 1563.05 | 108837873 |
| D2547P40 | 194.0 | 1545.32 | 108838095 | D2547P17 | 191.7 | 1563.86 | 108837865 |
| D2547P39 | 193.9 | 1546.12 | 108838087 | | | | |

Ordering Information (continued)

Table 9. D2547P 20 mW CW Laser without Locker (L-Band) Ordering Information

| Device Code | ITU Frequency (THz) | Center Wavelength (nm) | Comcode | Device Code | ITU Frequency (THz) | Center Wavelength (nm) | Comcode |
|-------------|---------------------|------------------------|-----------|-------------|---------------------|------------------------|-----------|
| D2547P916 | 191.6 | 1564.68 | 108837840 | D2547P888 | 188.8 | 1587.88 | 108837568 |
| D2547P915 | 191.5 | 1565.50 | 108837832 | D2547P887 | 188.7 | 1588.73 | 108837394 |
| D2547P914 | 191.4 | 1566.31 | 108837824 | D2547P886 | 188.6 | 1589.57 | 108837386 |
| D2547P913 | 191.3 | 1567.13 | 108837816 | D2547P885 | 188.5 | 1590.41 | 108837378 |
| D2547P912 | 191.2 | 1567.95 | 108837808 | D2547P884 | 188.4 | 1591.26 | 108837360 |
| D2547P911 | 191.1 | 1568.77 | 108837790 | D2547P883 | 188.3 | 1592.10 | 108837352 |
| D2547P910 | 191.0 | 1569.59 | 108837782 | D2547P882 | 188.2 | 1592.95 | 108837345 |
| D2547P909 | 190.9 | 1570.42 | 108837774 | D2547P881 | 188.1 | 1593.79 | 108837337 |
| D2547P908 | 190.8 | 1571.24 | 108837766 | D2547P880 | 188.0 | 1594.64 | 108837329 |
| D2547P907 | 190.7 | 1572.06 | 108837758 | D2547P879 | 187.9 | 1595.49 | 108837311 |
| D2547P906 | 190.6 | 1572.89 | 108837741 | D2547P878 | 187.8 | 1596.34 | 108837303 |
| D2547P905 | 190.5 | 1573.71 | 108837733 | D2547P877 | 187.7 | 1597.19 | 108837295 |
| D2547P904 | 190.4 | 1574.54 | 108837725 | D2547P876 | 187.6 | 1598.04 | 108837287 |
| D2547P903 | 190.3 | 1575.37 | 108837717 | D2547P875 | 187.5 | 1598.89 | 108837279 |
| D2547P902 | 190.2 | 1576.20 | 108837709 | D2547P874 | 187.4 | 1599.75 | 108837261 |
| D2547P901 | 190.1 | 1577.03 | 108837691 | D2547P873 | 187.3 | 1600.60 | 108837253 |
| D2547P900 | 190.0 | 1577.86 | 108837683 | D2547P872 | 187.2 | 1601.46 | 108837246 |
| D2547P899 | 189.9 | 1578.69 | 108837675 | D2547P871 | 187.1 | 1602.31 | 108837238 |
| D2547P898 | 189.8 | 1579.52 | 108837667 | D2547P870 | 187.0 | 1603.17 | 108837220 |
| D2547P897 | 189.7 | 1580.35 | 108837659 | D2547P869 | 186.9 | 1604.03 | 108837212 |
| D2547P896 | 189.6 | 1581.18 | 108837642 | D2547P868 | 186.8 | 1604.88 | 108837204 |
| D2547P895 | 189.5 | 1582.02 | 108837634 | D2547P867 | 186.7 | 1605.74 | 108837196 |
| D2547P894 | 189.4 | 1582.85 | 108837626 | D2547P866 | 186.6 | 1606.60 | 108837188 |
| D2547P893 | 189.3 | 1583.69 | 108837618 | D2547P865 | 186.5 | 1607.47 | 108837170 |
| D2547P892 | 189.2 | 1584.53 | 108837600 | D2547P864 | 186.4 | 1608.33 | 108837162 |
| D2547P891 | 189.1 | 1585.36 | 108837592 | D2547P863 | 186.3 | 1609.19 | 108837154 |
| D2547P890 | 189.0 | 1586.20 | 108837584 | D2547P862 | 186.2 | 1610.06 | 108837147 |
| D2547P889 | 188.9 | 1587.04 | 108837576 | | | | |

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