Data Sheet
October 2000

D370-Type Digital Uncooled Laser Module



The low-profile D370-Type Laser Module is ideally suited for short- and long-reach SONET and other high-speed digital applications.

Features

- Eight-pin package suitable for SONET/SDH applications
- MQW F-P 1.3 µm laser with single-mode fiber pigtail
- Wide operating temperature range: –40 °C to +85 °C
- No TEC required
- High output power: typically 1.0 mW peak power coupled into single-mode fiber; 0.2 mW and 2.0 mW versions available
- Hermetically sealed active components
- Internal back-facet monitor
- Qualification program: *Telcordia Technologies** TA-983

* *Telcordia Technologies* is a registered trademark of Telcordia Technologies, Inc.

Applications

- Long-reach SONET OC-3/OC-12 systems
- SDH STM-1/STM-4 systems
- Telecommunications
- Secure digital data systems

Benefits

- Easily board mounted
- Requires no lead bending
- No additional heat sinks required
- Pin compatible with industry-standard, 14-pin laser module

Description

The D370-type uncooled laser module consists of a laser diode coupled to a single-mode fiber pigtail. The device is available in a standard, 8-pin configuration (see Figure 1 and/or Table 1) and is ideal for long-haul (SONET) and other digital applications.

The module includes a multiquantum-well Fabry-Perot (MQW F-P) laser and an InGaAs PIN photodiode back-facet monitor in an epoxy-free, hermetically sealed package.

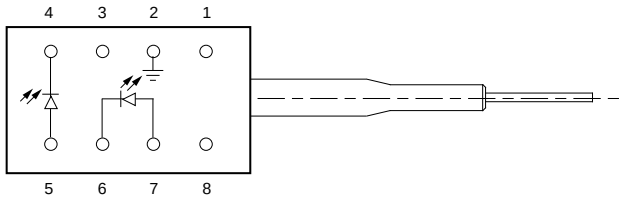
Description (continued)

The device characteristics listed in this document are met at 1.0 mW output power. Higher- or lower-power operation is possible. Under conditions of a fixed photodiode current, the change in optical output is typically ±0.5 dB over an operating temperature range of –40 °C to +85 °C.

This device incorporates the new laser 2000 manufacturing process from the Optoelectronic Products unit of Agere Systems Inc. Laser 2000 is a low-cost platform that targets high-volume manufacturing and tight product distributions on all optical subassemblies. This platform incorporates an advanced optical design that is produced on Agere Systems' highly automated production lines. The laser 2000 platform is qualified for the central office and uncontrolled environments, and can be used for applications requiring high performance and low cost.

Table 1. Pin Descriptions

Pin Number	Connection
1	NC/reserved
2	Case ground
3	NC/reserved
4	Photodiode cathode
5	Photodiode anode
6	Laser diode cathode
7	Laser diode anode
8	NC/reserved



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Figure 1. D370-Type Digital Uncooled Laser Module Schematic, Top View

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
Maximum Peak Laser Drive Current or Maximum Fiber Power*	I_{OP} P_{MAX}	— —	150 10	mA mW
Peak Reverse Laser Voltage: Laser Monitor	 V_{RL} V_{RD}	 — —	 2 20	 V V
Monitor Forward Current	I_{FD}	—	2	mA
Operating Case Temperature Range	T_C	–40	85	°C
Storage Case Temperature Range	T_{stg}	–40	85	°C
Lead Soldering Temperature/Time	—	—	260/10	°C/s
Relative Humidity (noncondensing)	RH	—	85	%

* Rating varies with temperature.

Handling Precautions

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

Although protection circuitry is designed into the device, take proper precautions to avoid exposure to ESD.

Electrical/Optical Characteristics

Table 2. Electrical/Optical Characteristics (over operating temperature range unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Operating Temperature Range	T	—	–40	—	85	°C
Optical Output Power*	P_F	CW, nominal	—	1	—	mW
Threshold Current	I_{TH}	T = 25 °C T = full range	4.5 1	9 —	15 45	mA mA
Modulation Current	I_{MOD}	CW, P_F = 1.0 mW, T = 25 °C CW, I_{MON} = constant T = full range	10 8	15 —	20 35	mA mA
Slope Efficiency†	SE	CW, P_F = 1.0 mW, T = 25 °C	50	75	100	µW/mA
Center Wavelength	λ_C	P_F = 1.0 mW, CW	1270	—	1350	nm
RMS Spectral Width	$\Delta\lambda$	P_F = 1.0 mW, 155 Mbits/s	—	2	3	nm
Tracking Error	TE	I_{MON} = constant, CW	—	0.5	±1	dB
Spontaneous Emission	P_{TH}	I = I_{TH} x 0.9	—	—	50	µW
Rise/Fall Times	t_R, t_F	10%—90% pulse, T = 25 °C	—	0.25	0.5	ns
Forward Voltage	V_F	CW	—	1.1	1.6	V
Input Impedance	R	—	3	—	8	Ω
Monitor Current	I_{MON}	V_R‡ = 5 V	150	—	750	µA
Monitor Dark Current	I_D	V_R‡ = 5 V	—	10	200	nA
Wavelength Temperature Coefficient	—	—	—	0.4	0.5	nm/°C

* Higher and lower powers available. See Table 4 for more information.

† The slope efficiency is used to calculate the modulation current for a desired output power. This modulation current plus the threshold current comprise the total operating current for the device.

‡ V_R = reverse voltage.

Characteristic Curve

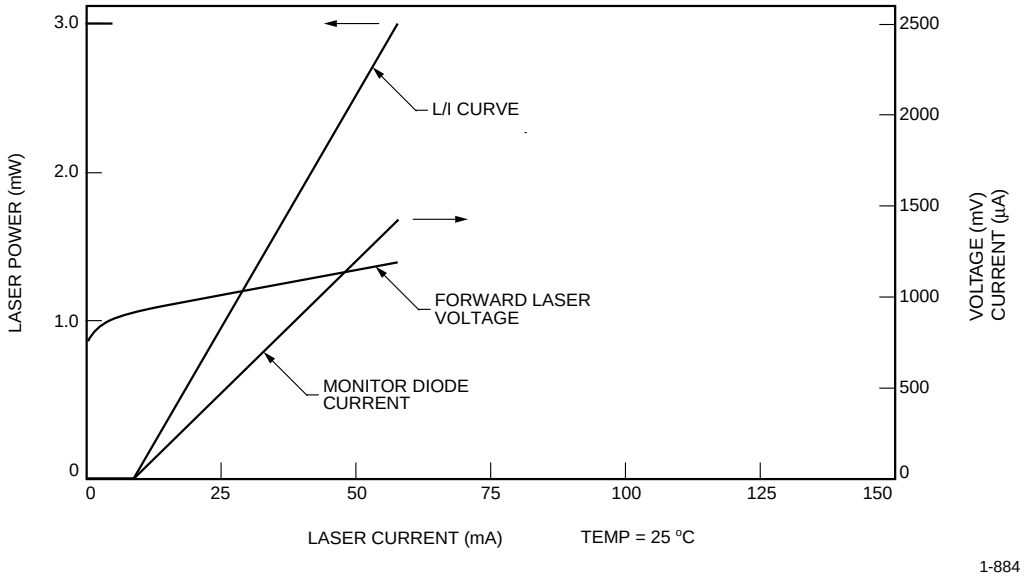
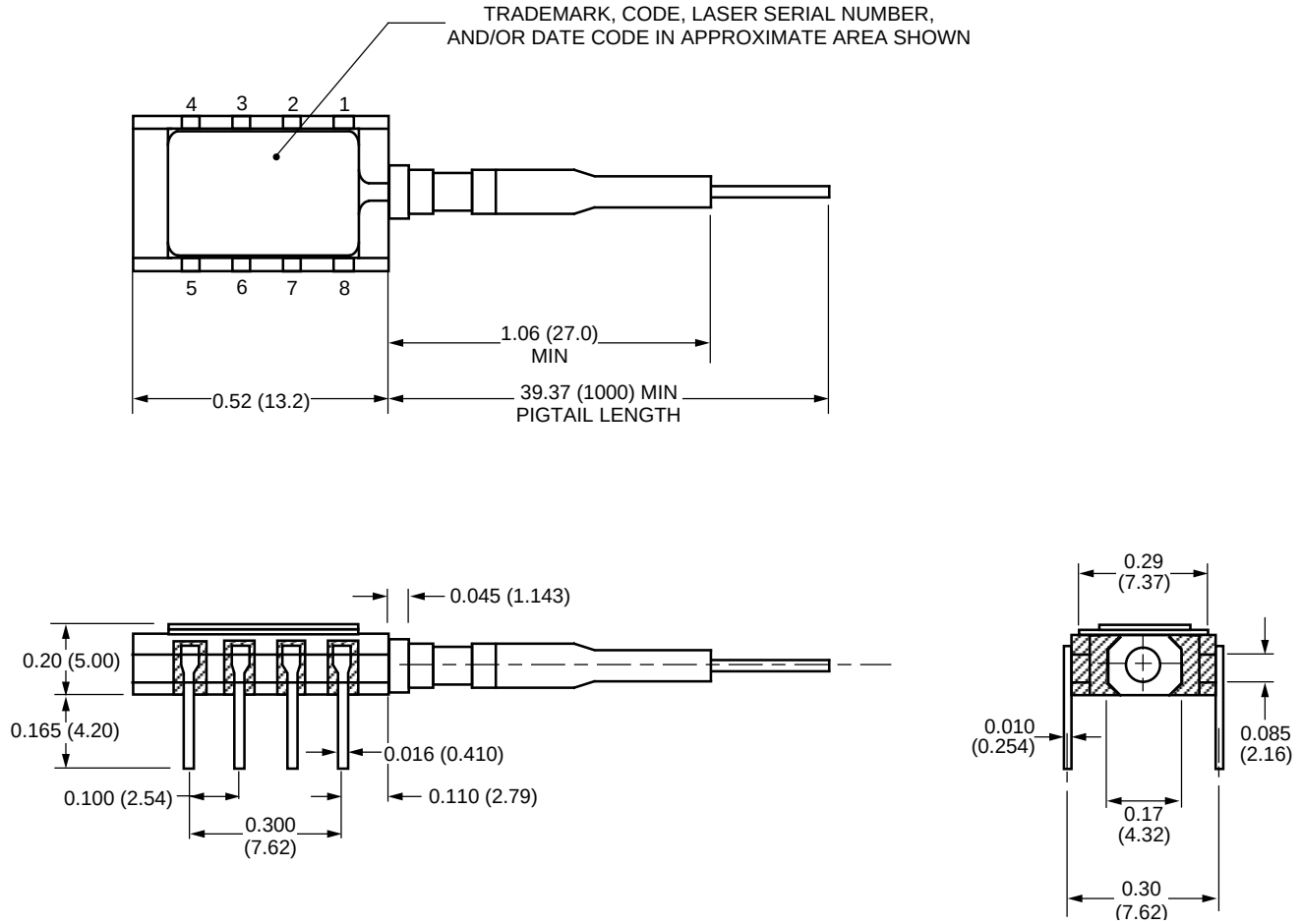


Figure 2. Typical D370-Type Laser Module L/I Curve

Outline Diagram

Dimensions are in inches and (millimeters).



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Qualification Information

The D370-type laser module has passed the following qualification tests and meets the intent of *Telcordia Technologies* TR-NWT-000468 for interoffice environments and TA-TSY-000983 for outside plant environments.

Table 3. D370-Type Laser Module Qualification Test Plan

Qualification Test	Conditions	Sample Size	Reference
Mechanical Shock	500 G	11	MIL-STD-883 Method 2002
Vibration	20 g, 20 Hz—2,000 Hz	11	MIL-STD-883 Method 2007
Solderability	—	11	MIL-STD-883 Method 2007
Thermal Shock	Delta T = 100 °C	11	MIL-STD-883 Method 2003
Fiber Pull	1 kg; 3 times	11	*Telcordia Technologies* 983
Accelerated (Biased) Aging	85 °C, 5,000 hrs.	25	*Telcordia Technologies* 983, Section 5.18
High-temperature Storage	85 °C, 2,000 hrs.	11	*Telcordia Technologies* 983
Temperature Cycling	500 cycles	11	*Telcordia Technologies* 983, Section 5.20
Cyclic Moisture Resistance	10 cycles	11	*Telcordia Technologies* 983, Section 5.23
Damp Heat	40 °C, 95% RH, 1344 hrs.	11	MIL-STD-202 Method 103
Internal Moisture	<5,000 ppm water vapor	11	MIL-STD-883 Method 1018
Flammability	—	—	TR357 Section 4.4.2.5
ESD Threshold	—	6	*Telcordia Technologies* 983, Section 5.22

Laser Safety Information

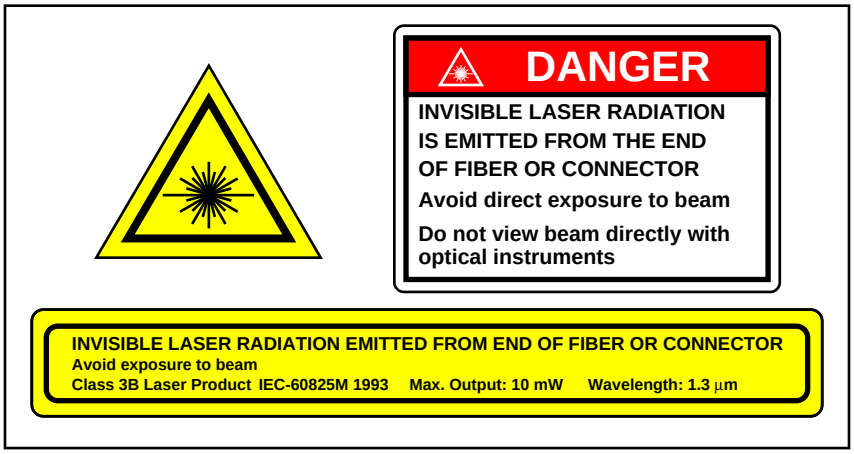
Class IIIb Laser Product

FDA/CDRH Class IIIb laser product. All versions are Class IIIb laser products per CDRH, 21 CFR 1040 Laser Safety requirements. All versions are Class 3B laser products per *IEC** 60825-1:1993. The device has been classified with the FDA under accession number 8720010.

This product complies with 21 CFR 1040.10 and 1040.11.
8.3 µm single-mode pigtail with optional connector.
Wavelength = 1.3 µm
Maximum power = 10 mW

Because of size constraints, labeling 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.



* *IEC* is a registered trademark of The International Electrotechnical Commission.

Ordering Information

Table 4. Ordering Information

Device Code	Comcode	Pfiber	Connector
D370-02A	107950859	0.2 mW	SC-PC
D370-10A	107950867	1.0 mW	SC-PC
D370-20A	107950875	2.0 mW	SC-PC
D370-10B	108096322	1.0 mW	SC-APC
D370-02F	107950883	0.2 mW	FC-PC
D370-10F	107950891	1.0 mW	FC-PC
D370-20F	107950909	2.0 mW	FC-PC
D370-02N	107950917	0.2 mW	none
D370-10N	107950925	1.0 mW	none
D370-20N	107950933	2.0 mW	none

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DS99-033LWP-1 (Replaces DS99-033LWP)