
1 mW 14 Pin DIL Cooled Laser Modules

Technical Data

LSCX110

Features

- **1 Milliwatt Optical Output at 25 mA above Threshold, 25°C**
- **Center Wavelength between 1280 nm and 1330 nm**
- **Wide Modulation Bandwidth:
LSC2110 - 800 MHz
LSC4110 - 1.2 GHz**
- **Wide Operating Temperature Range: -40°C to +85°C**
- **Alternative Package Styles:
LSC2110 - 14 Pin DIL
LSC4110 - 14 Pin “Butterfly”**

Applications

- **Telecommunications**
- **Local Area and Metropolitan Area Networks**
- **Point-to-Point Data Communications**
- **Fiber Optic Sensors**
- **Cable Television**
- **Military Communications and Control Systems**
- **Instrumentation**

Description

LSCX110 laser modules are highly reliable fiber optic light sources operating in the 1300 nanometer band. The internal semiconductor lasers are based upon InGaAsP buried heterostructure (BH) technology and fabricated by the Metal Organic Vapor Phase Epitaxy (MOVPE) process, resulting in long lifetimes and modest threshold currents.

LSCX110 packages include a photodiode for monitoring the laser output, a thermistor for monitoring laser heatsink temperature and a Peltier effect thermoelectric cooler (TEC). A heatsink mounting flange is incorporated into the base of the 14 pin “butterfly” package and a “bullhorn” type flange is used on the 14 pin DIL package.

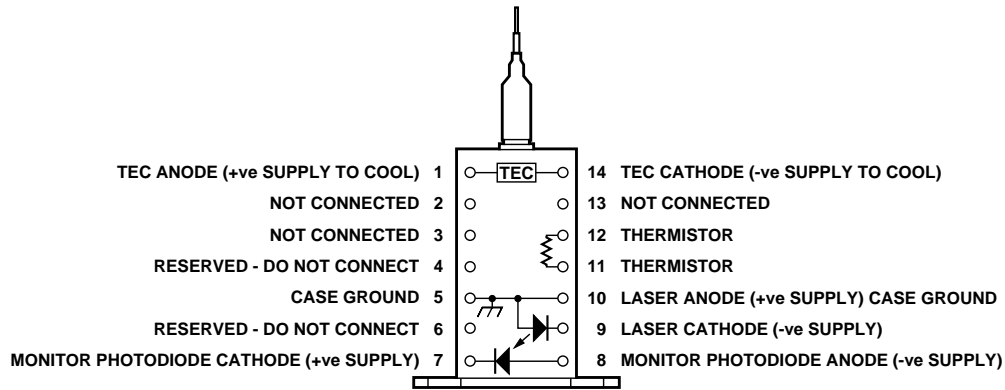


Laser Safety Warning

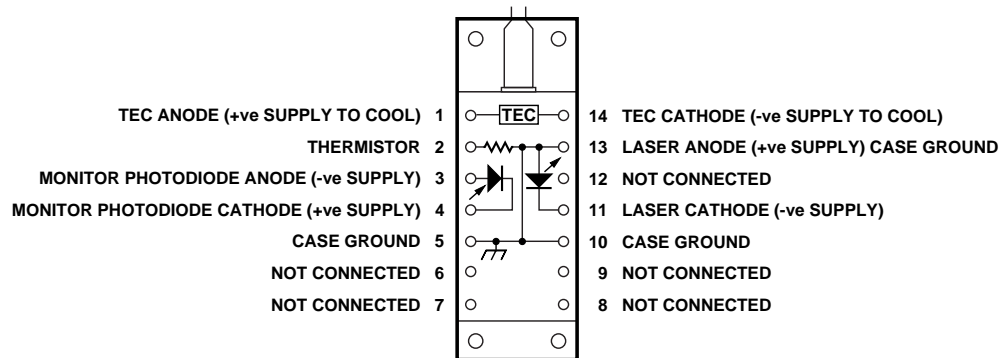
This device is a Class IIIb (3b) Laser Product. It may emit invisible laser radiation if operated with the fiber pigtail disconnected. To avoid possible eye damage do not look into an unconnected fiber pigtail during laser operation. Do not exceed specified operating limits.

Pin Connections

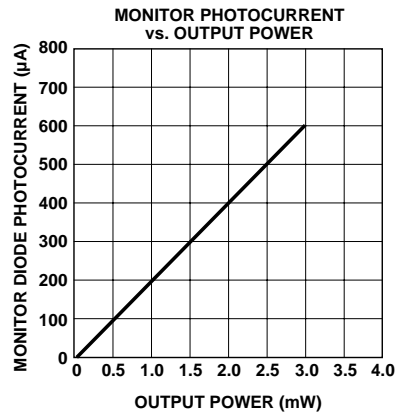
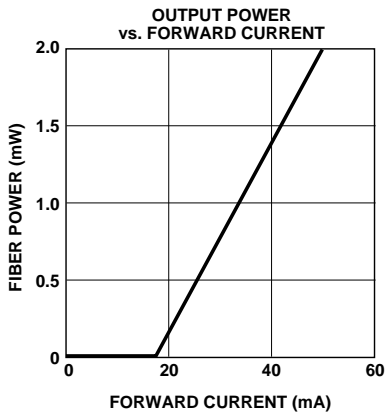
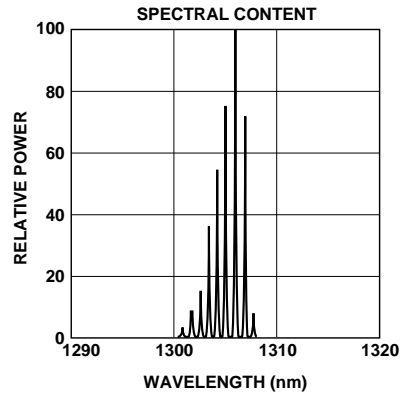
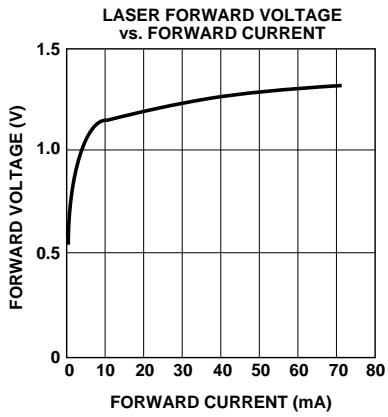
LSC2110 Top View



LSC4110 Top View



LSCX110 Laser Diode Typical Operating Characteristics



Absolute Maximum Ratings

Absolute maximum limits mean that no catastrophic damage will occur if the product is subjected to these ratings for short periods, provided each limiting parameter is in isolation and all other parameters have values within the performance specification. It should not be assumed that limiting values of more than one parameter can be applied to the product at the same time.

| Parameter | Symbol | Conditions | Limits | | Units |
|------------------------------|-----------------|--|--------|----------------|-------|
| | | | Min. | Max. | |
| Laser Forward Current | I _f | DC | - | 150 | mA |
| Laser Reverse Current | I _r | DC | - | 100 | μA |
| Laser Reverse Voltage | V _{Ir} | DC | - | 2 | V |
| Photodiode Reverse Voltage | V _r | DC | - | 10 | V |
| Photodiode Forward Current | I _{pf} | DC | - | 1 | mA |
| Operating Temperature (Case) | C | Pf = 1 mW | -40 | +85 | °C |
| Storage Temperature | T _s | | -40 | +85 | °C |
| Relative Humidity RH | | | 0-0 | non-condensing | %RH |
| Fiber Pull Strength | | | - | 10 | N |
| Mechanical Shock | | Mil Std 883, Method 2002, Test Condition A | | | |
| Vibration | | Mil Std 883, Method 2007, Test Condition A | | | |

Performance Specifications

| Parameter | Symbol | Test Conditions | Test Limits | | Units |
|---|----------------------|---|-------------|------|-------|
| | | | Min. | Max. | |
| LASER | | CW, R _t = 10 kΩ, T _c = ~25°C unless otherwise specified | | | |
| Threshold Current | I _{th} | | 5 | 25 | mA |
| I _{th} Change with Temperature | ΔI _{th} /ΔT | T _c = 65°C to 85°C | - | 2.5 | %/°C |
| Peak Optical Output | P _f | P _f = P _f @ I _{th} + 25 mA | 1 | 2.5 | mW |
| Optical Output Power | P _{th} | P _{th} = P _f @ I _{th} - 2 mA | - | 50 | μW |
| Slope Efficiency | η | | 0.04 | 0.1 | mW/mA |
| Forward Voltage | V _f | | - | 1.8 | V |
| Differential Resistance | R _d | dV/dI | - | 10 | Ω |
| Center Wavelength | λ _c | Note 1 | 1280 | 1330 | nm |
| λ _c Change with Temperature | Δλ _c /ΔT | T _c = 65°C to 85°C, ΔT = -40°C | - | 0.4 | nm/°C |
| Linewidth | Δλ | FWHM (2.35 σ), Note 1 | - | 5 | nm |
| Rise Time | τ _r | 10% to 90%: I _{th} to P _f = 1 mW | - | 0.5 | ns |
| Fall Time | τ _f | 90% to 10%: P _f = 1 mW to I _{th} | - | 0.5 | ns |
| Small Signal Frequency Response | | | | | |
| LSC2110 | Bw | m = 0.8 | 800 | - | MHz |
| LSC4110 | Bw | m = 0.8 | 1.2 | - | GHz |

Note:

1. Modulated measurements also available.

Performance Specifications (cont'd.)

| Parameter | Symbol | Test Conditions | Test Limits | | Units |
|--------------------|--------|---|-------------|-------|-------|
| | | | Min. | Max. | |
| MONITOR PHOTODIODE | | Rt = 10 kΩ, Tc = ~25°C, CW, Pf = 1 mW, Vr = 5 V (Note 2) unless otherwise specified | | | |
| Photocurrent | Im | | 80 | 800 | μA |
| Responsivity | R | | 0.08 | 0.8 | A/W |
| Dark Current | Id | Pf = 0 mW | - | 20 | nA |
| Tracking Error | ΔR | Im = Im @ (Pf = 1 mW, Tc = 25°C) ΔT = -40°C, Tc = 85°C ΔT = +65°C, Tc = -40°C | - | ± 0.5 | dB |
| | | | - | ± 0.5 | dB |

Note:

2. Monitor Photodiode will also operate under zero bias conditions.

| Parameter | Symbol | Test Conditions | Test Limits | | Units |
|-------------------------------|--------|--|-------------|------|-------|
| | | | Min. | Max. | |
| THERMISTOR | | Tc = 25°C, Pf = 0 mW unless otherwise specified | | | |
| Resistance | Rt | | 9.5 | 10.5 | kΩ |
| Temperature Coefficient of Rt | ΔRt/ΔT | | Typ -4.4 | | %dR/K |
| β Constant | β | 0°C to 50°C | Typ 3900 | | °K |

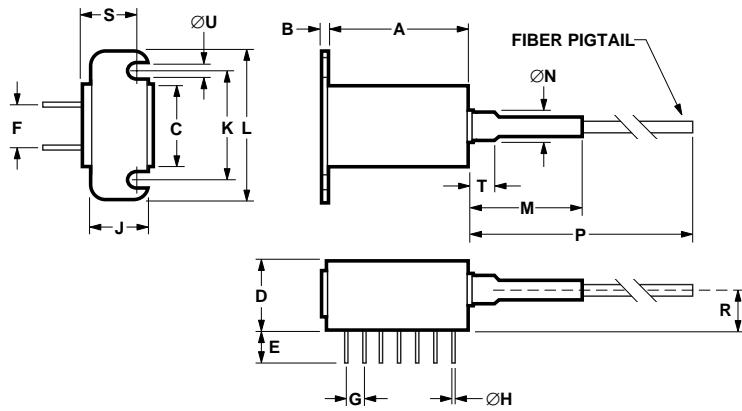
| Parameter | Symbol | Test Conditions | Test Limits | | Units |
|---------------------|--------|--|-------------|------|-------|
| | | | Min. | Max. | |
| TEC | | Tc = 25°C, Pf = 1 mW unless otherwise specified | | | |
| TEC Cooling Current | Ic | ΔT = -40°C, Tc = 85°C | - | 1.0 | A |
| TEC Heating Current | Ih | ΔT = 65°C, Tc = -40°C | - | 1.0 | A |
| Voltage | Vc | ΔT = -40°C to +65°C | - | 2.0 | V |

Fiber Pigtail: Tight jacketed, self-mode stripping, single mode fiber

| Parameter | Minimum | Maximum | Units |
|------------------------------|---------|---------|-------|
| Length | 1.0 | - | m |
| Spot Size (mode radius) | 4.5 | 5.5 | μm |
| Cladding Diameter | 122 | 128 | μm |
| Core/Cladding Concentricity | - | 1.0 | μm |
| Secondary Jacket Diameter | 0.8 | 1.0 | mm |
| Effective Cut-off Wavelength | 1150 | 1240 | nm |

Hewlett-Packard can offer a ruggedized fiber pigtail for this product range if extreme mechanical strength is required. The pigtail length can be customized to your specific length, with a connector, to a tolerance of ±25 mm.

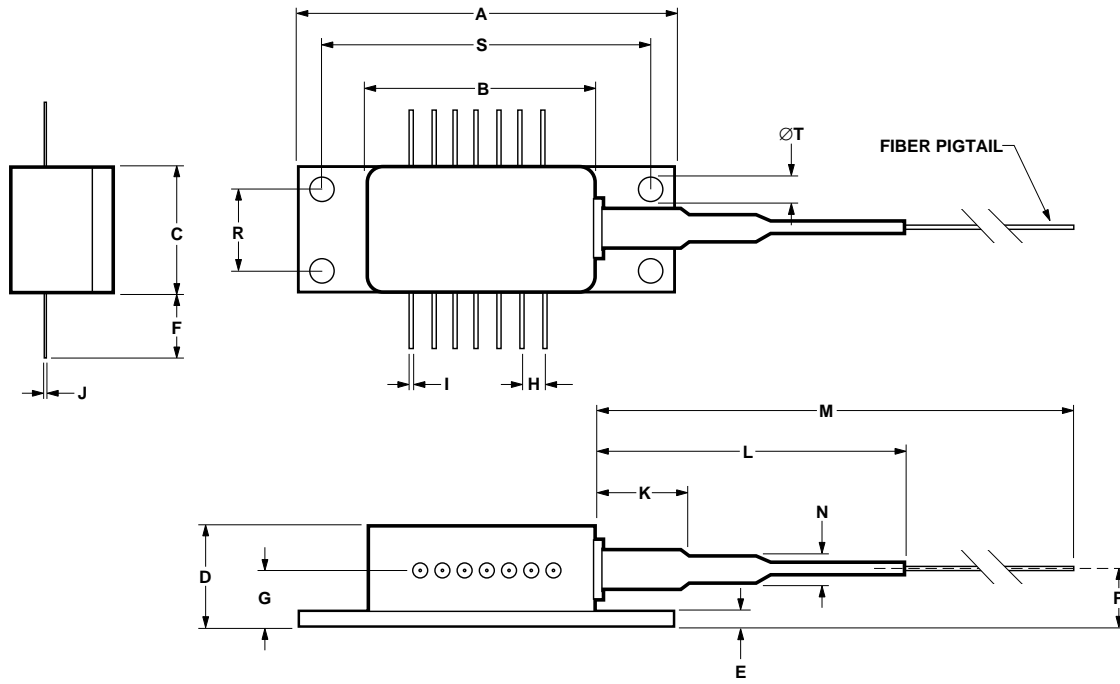
LSC2110 Mechanical Outline



| DIM. | MIN. | MAX. | DIM. | MIN. | MAX. |
|------|------------|-------|------|------------|-------|
| A | 20.68 | 20.98 | K | 19.05 NOM. | |
| B | 0.90 | 1.10 | L | 25.10 | 25.70 |
| C | 12.55 | 13.00 | M | 30.00 NOM. | |
| D | 8.51 | 9.60 | ØN | - | 4.20 |
| E | 6.10 | 6.60 | P | 1000 | - |
| F | 7.62 NOM. | | R | 5.80 | 6.20 |
| G | 2.54 NOM. | | S | 6.00 NOM. | |
| ØH | 0.457 NOM. | | T | - | 6.00 |
| J | 7.01 | 7.21 | ØU | 3.17 NOM. | |

ALL DIMENSIONS IN MILLIMETERS

LSC4110 Mechanical Outline



| DIM. | MIN. | MAX. | DIM. | MIN. | MAX. |
|------|-----------|-------|------|------------|-------|
| A | 29.85 | 30.15 | J | 0.25 NOM. | |
| B | 20.65 | 20.95 | K | 19.05 NOM. | |
| C | 12.45 | 12.75 | L | 30.00 NOM. | |
| D | 9.05 | 9.35 | M | 1000 | - |
| E | 1.40 | 1.60 | N | 4.05 | 4.35 |
| F | 4.90 | 6.10 | P | 5.25 | 5.55 |
| G | 5.45 | 5.75 | R | 8.85 | 9.15 |
| H | 2.54 NOM. | | S | 25.85 | 26.15 |
| I | 0.38 NOM. | | ØT | 1.90 | 2.10 |

ALL DIMENSIONS IN MILLIMETERS

Ordering Information

LSCX110 - XX

Connector Type:

FP = FC/PC

ST = ST[®]

SC = SC

DN = DIN

BI = Biconic

D4 = D4

SF = Super Polish FC/PC

Package Style:

2 = 14 PIN DIL

4 = 14 PIN "Butterfly"

Handling Precautions

1. The LSCX110 can be damaged by current surges or overvoltage.
2. Power supply transient precautions should be taken.
3. Normal handling precautions for electrostatic sensitive devices should be taken.


CDRH Certification

Hewlett-Packard Ltd
Whitehouse Road
Ipswich, Suffolk IP1 5PB
England

Manufactured: ____ Serial No. ____
Model No. _____

This product conforms to the applicable requirements of 21 CFR 1040 at the date of manufacture.

Laser Warning

| | |
|---|--|
| DANGER | |
|  | Invisible LASER Radiation - Avoid direct exposure to beam |
| | Peak power 15 mW |
| | Wavelength 1300 nm |
| | Class III b LASER product |

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