

Product Specification

8Gbps 850nm VCSEL, LC TOSA Package

HFE7192-6x1

PRODUCT FEATURES

- High performance VCSEL
 - Low electrical parasitic TO package with flexible interface
 - Data rates from DC to 8.5Gbps
 - Complete isolation between the VCSEL, Monitor Photodiode and Case
 - Mechanically compatible with all SFF, SFP and SFP+ MSA
- Optional Flex Circuit



The HFE7192-6x1 uses a high-performance Vertical Cavity Surface Emitting Laser (VCSEL) designed to meet performance requirements for 1/2/4/8 Gbps data communication over multimode optical fiber for the ANSI X2.T11 Fibre Channel protocols. The optical assembly is designed to interface either 50mm or 62.5mm multimode fiber and ensure launch conditioning requirements compatibility with enhanced bandwidth fiber as specified by TIA 455-203.

The HFE7192-6x1 incorporates a power monitoring photodiode that can be used for temperature compensation, average power control, and for compliance with Class 1 eye safety limits.

PRODUCT SELECTION

| Part Number | Description |
|-------------|---|
| HFE7192-661 | Differentially Driven, attenuated, LC TOSA, with 50Ω flex |
| HFE7192-681 | Differentially Driven, attenuated, SC TOSA |

I. Absolute Maximum Ratings

| Parameter | Rating |
|---------------------------------|-------------------|
| Storage Temperature | -40 to +85°C |
| Case Operating Temperature | -20 to +85°C |
| Lead Solder Temperature | 260°C, 10 sec. |
| Reverse Power Supply Voltage | 5V |
| Max continuous forward current | 12mA |
| ESD Exposure (Human Body Model) | 150V ¹ |



Notice

Stresses greater than those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operations section for extended periods of time may affect reliability.

Notice

The inherent design of this component causes it to be sensitive to electrostatic discharge (ESD). To prevent ESD-induced damage and/or degradation to equipment, take normal ESD precautions when handling this product

II. Electro-Optical Characteristics ($T_A=25C$, unless otherwise stated)

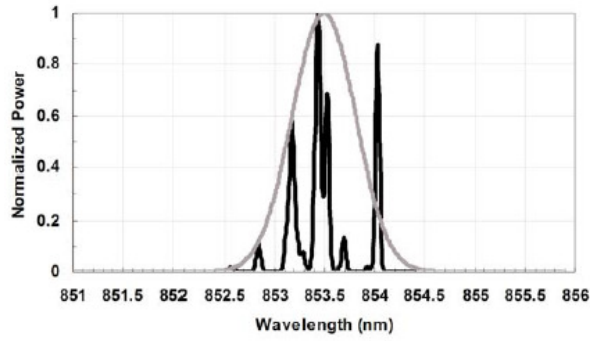
| VCSEL Parameters | Test Condition | Symbol | Min. | Typ. | Max. | Units | Notes |
|---|--|----------------------------|-------|----------|-----------|----------------------|-------|
| Fiber coupled optical power | $I_F = 6.7\text{mA}$ peak | P_{OC} | 360 | 470 | | μW | |
| Coupling Efficiency | 50/125 μm fiber | PO_PCT | 65 | | | % | 1 |
| Threshold Current | | I_{TH} | | 1 | 1.5 | mA | |
| Threshold Current Temperature Variation | | ΔI_{TH} | | | 1.5 | mA | 2 |
| Slope Efficiency | $T_A=0$ to 70°C | η | 0.065 | 0.075 | 0.105 | mW/mA | 3 |
| Slope Efficiency Temperature Variation | $P_{OC}=0.47\text{mW}$ | $\Delta\eta/\Delta T$ | | -0.4 | | %/ $^\circ\text{C}$ | |
| Peak Wavelength | $T_A=0$ to 70°C | λ_p | 840 | | 860 | nm | |
| λ_p Temperature Variation | $I_F=6.7\text{mA}$ | $\Delta\lambda_p/\Delta T$ | | 0.06 | | nm/ $^\circ\text{C}$ | |
| RMS Spectral Bandwidth | $T_A=0$ to 70°C | $\Delta\lambda$ | | | 0.4 | nm | |
| Laser Forward Voltage | $I_F=6.7\text{mA}$ | V_F | 1.5 | 1.8 | 2.2 | V | |
| Laser Reverse Voltage | $I_F=6.7\text{mA}$ | V_R | 5 | 10 | | V | |
| Rise/Fall Time | $I_R=10\mu\text{A}$ | T_R T_F | | | 50 50 | ps | 4 |
| Relative Intensity Noise | Bias above threshold 20%-80% | RIN_{12} | | | -128 | dB/Hz | 5 |
| Series Resistance | $I_F=6.7\text{mA}$ | R | 35 | 50 | 75 | Ohms | |
| Series Resistance Temperature Variation | $I_F=6.7\text{mA}$ | $\Delta R/\Delta T$ | | -0.2 | | %/ $^\circ\text{C}$ | |
| Total Capacitance | $I_F=6.7\text{mA}$ | C_T | | | 0.5 | pF | 6 |
| Encircled Flux Diameter | $I_F=6.7\text{mA}$ | EF | | | | | 7 |
| Photodiode Parameters | Test Condition | Symbol | Min. | Typ. | Max. | Units | Notes |
| Monitor Current | $P_{OC}=0.47\text{mW}$, $V_R=3\text{V}$ | I_{PD} | 100 | 250 | 500 | μA | |
| Monitor Current Temperature Variation | $P_{OC}=0.47\text{mW}$ $T_A=0$ to 70°C | $\Delta I_{PD}/\Delta T$ | | 0.0 | | %/ $^\circ\text{C}$ | |
| Tracking Ratio Variation (Open Bore) | $P_{OB}=-2.5\text{dBm}$ $T_A=0$ to 70°C | ΔTR | -0.5 | | +0.5 | dB | |
| Dark Current | $P_{OC}=0\text{mW}$, $V_R=3\text{V}$ | I_{DARK} | | | 20 | nA | |
| PD Reverse Voltage | $P_{OC}=0\text{mW}$, $I_R=10\mu\text{A}$ | BVR_{PD} | 30 | 115 | | V | 8 |
| PD Capacitance | $V_R=0\text{V}$, Freq=1MHz $V_R=3\text{V}$, Freq=1MHz | C_{PD} | | 75 40 | 100 55 | pF | |

Notes:

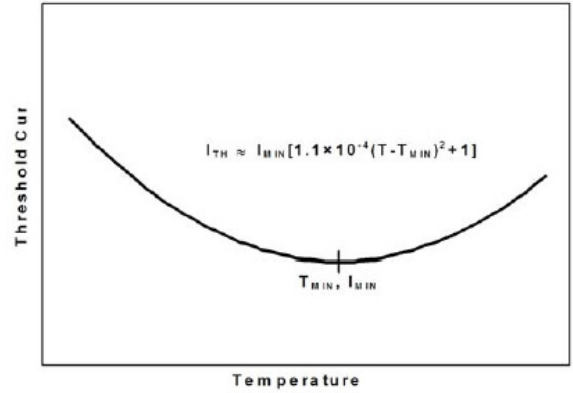
1. PO_PCT is defined as the ratio of the coupled power into a 50/125 micron fiber to the total power output from the optical front end as measured on a large area detector.
2. Operation outside of the specified range may result in the threshold current exceeding the maximums defined in the electro-optical characteristics table. DITH is the maximum deviation from the 25°C value.
3. Slope efficiency is defined as $\Delta PO/\Delta IF$ at a total power output of 0.6mW. Slope efficiency is intentionally lowered to the value shown by attenuation.
4. Rise and fall times are sensitive to drive electronics. Rise and fall times are measured 20%-80% using a 1GHz square wave AC coupled to the VCSEL using a bias-T. The DC current is adjusted to achieve a minimum OMA of -4dBm. Corrections are made for finite detector bandwidth.
5. RIN_{12} is measured using the OMA technique with 12dB return.
6. Total capacitance is measured with the VCSEL forward biased using a Network analyzer at 1GHz.
7. Encircled flux is measured per TIA-455-203.
8. To prevent VCSEL damage, short the VCSEL anode and cathode during BVR testing

III. Typical Performance Curves

RMS Spectral Width is defined and measured using TIA-455-127



Threshold Current vs. Temperature: Threshold current varies parabolically with temperature; thus it can be nearly constant for a limited temperature range.



IV. Environmental Specifications

| Parameter | Symbol | Min | Typ | Max | Units | Ref. |
|----------------------------|------------------|-----|-----|-----|-------|------|
| Case Operating Temperature | T _{op} | -20 | | 85 | °C | |
| Storage Temperature | T _{sto} | -40 | | 85 | °C | |

V. Regulatory Compliance

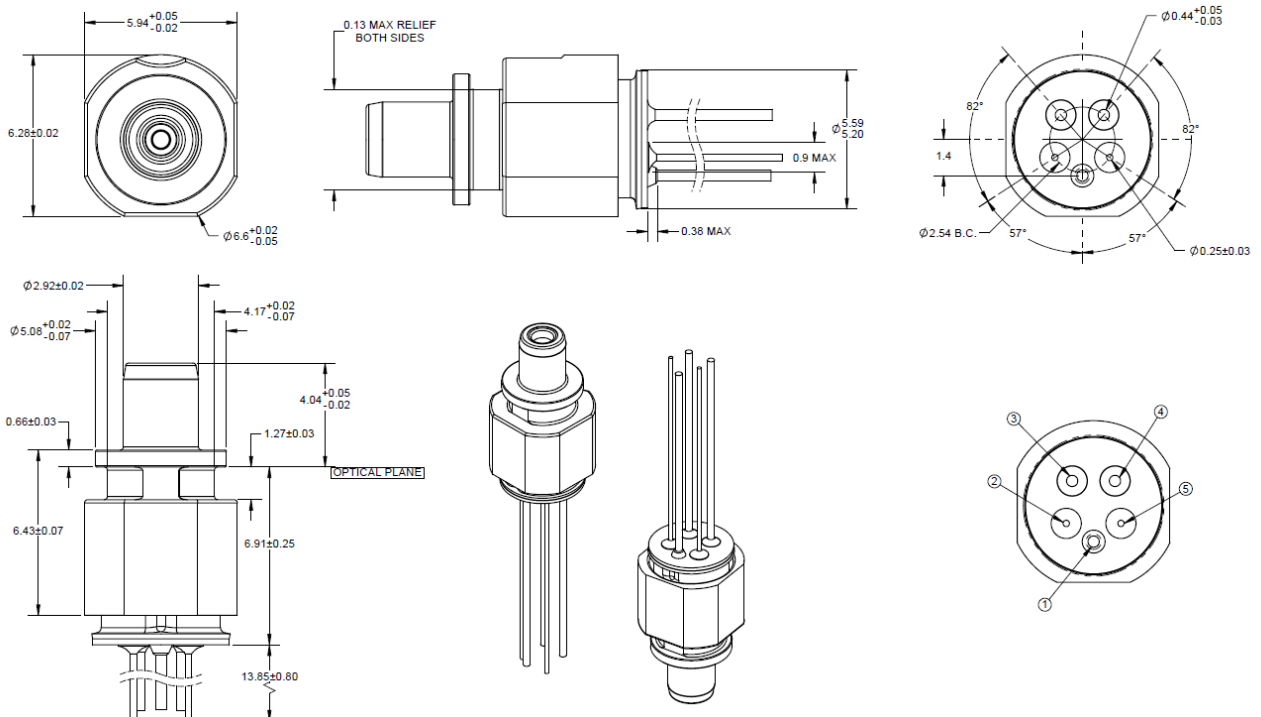
| Feature | Agency | Standard | Certificate Number |
|------------------|----------|--------------------------------------|--------------------|
| Laser Eye Safety | FDA/CDRH | CDRH 21 CFR 1040 and Laser Notice 50 | 9521487 |

Copies of the referenced certificates are available at Finisar Corporation upon request.

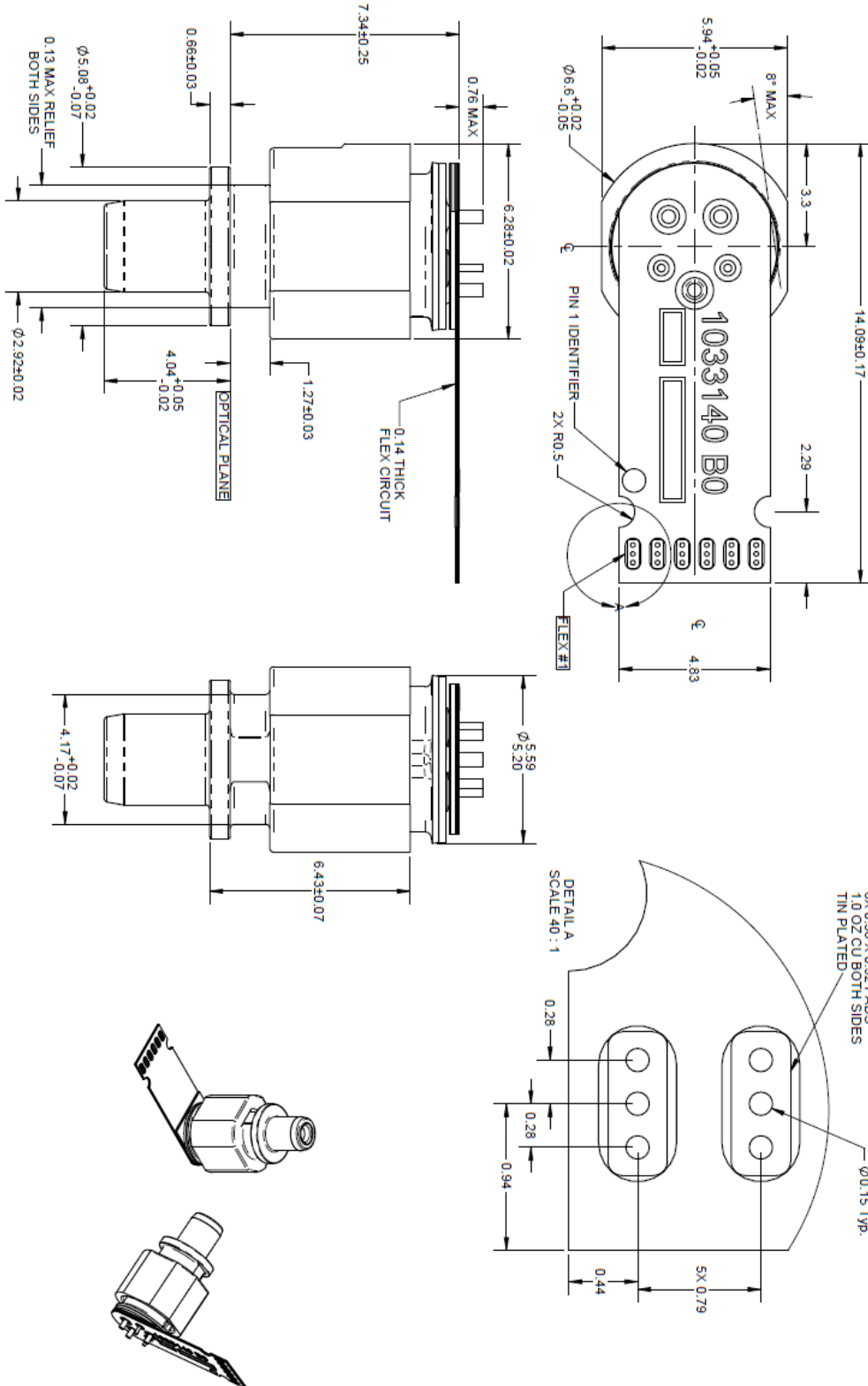
VI. Mechanical Specifications

| PIN | Description | |
|-----|-------------|-------------|
| | HFE7192-681 | HFE7192-661 |
| 1 | Case | PDK |
| 2 | LDK | GND |
| 3 | MPK | LDA |
| 4 | MPA | LDK |
| 5 | LDA | GND |
| 6 | | PDA |

(Dimensions are in mm)



LC TOSA
All dimensions in mm



VII. Revision History

| Revision | Date | Description |
|-----------------|-------------|---|
| B00 | 10/6/2014 | <ul style="list-style-type: none">• Changed to Finisar format |

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VIII. For More Information

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