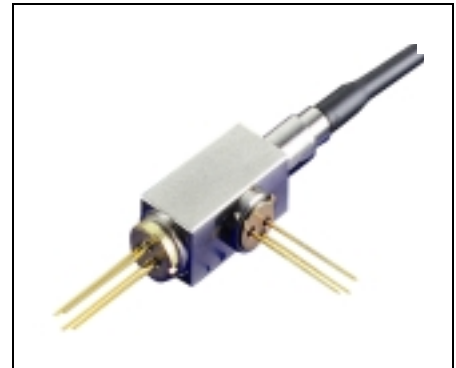


**High Power
BIDI® Optical Standard Module
1550 nm Emitting, 1310 nm Receiving**

SBH92314x-FSAN

Features

- Designed for application in passive-optical networks according to FSAN, ITU-T G.983
- Suitable for OLT applications, 155 Mbit/s and 622 Mbit/s downstream bitrate
- Integrated Wavelength Division Multiplexer (WDM)
- Bi-Directional Transmission in 2nd and 3rd optical window
- Single fiber solution
- DFB-Laser Diode with Multi-Quantum Well structure
- Class 3B Laser Product
- Suitable for bit rates up to 1.25 Gbit/s
- Ternary Photodiode at rear mirror for monitoring and control of radiant power
- Low noise / high bandwidth PIN diode
- Hermetically sealed subcomponents, similar to TO 46
- With singlemode fiber pigtail



Pin Configuration

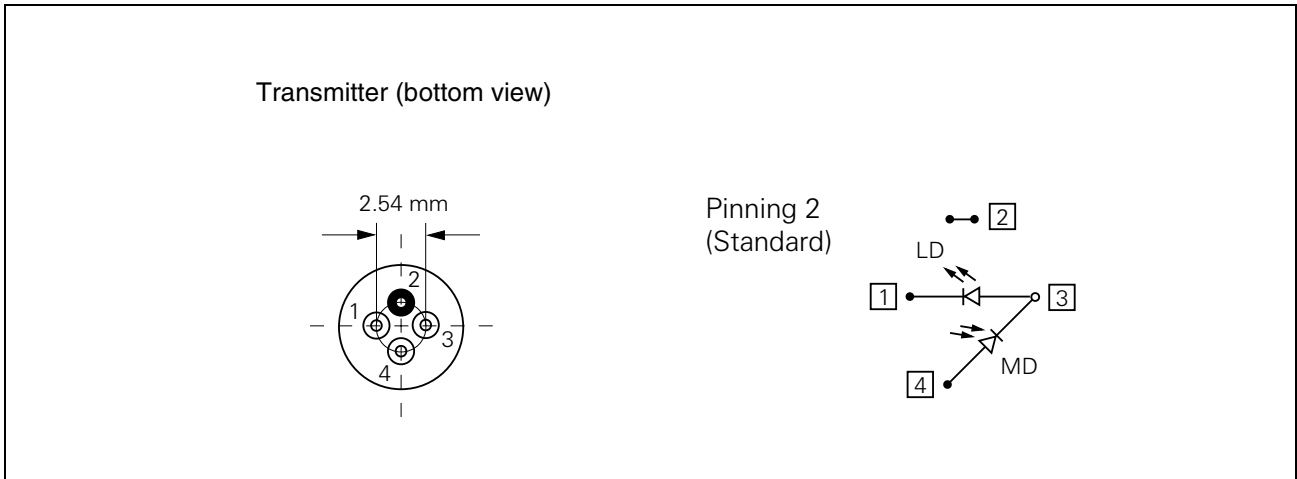


Figure 1 Transmitter

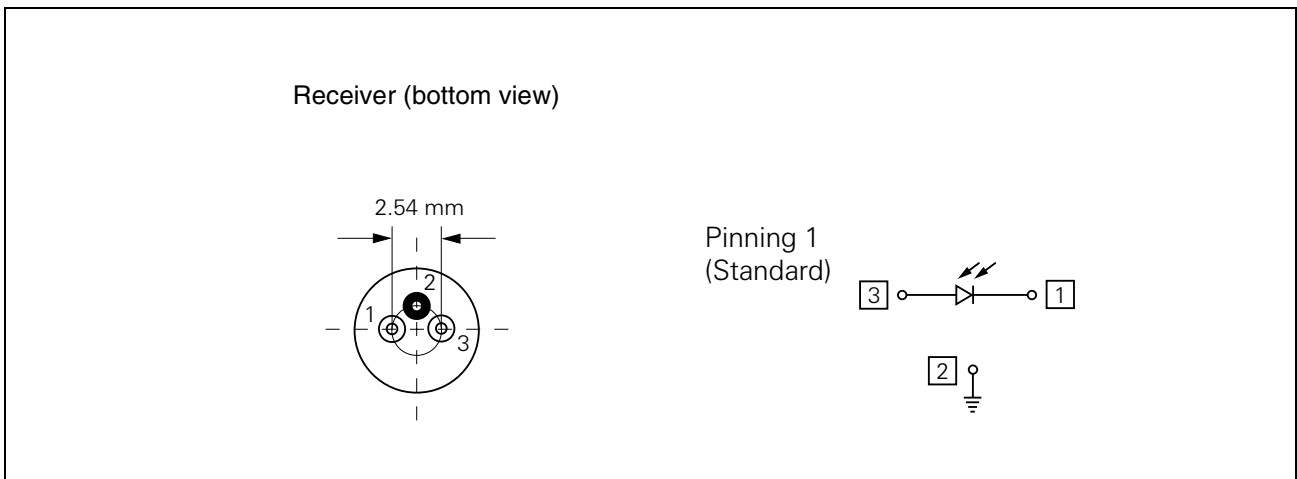


Figure 2 Receiver

Available Pinnings

| Type | Transmitter | Receiver |
|----------------|--------------|--------------|
| SBH92314x-FSAN | 2 (Standard) | 1 (Standard) |

Other Pinnings on request / different drawing set required for non standard pinning

Description

The Infineon module for bidirectional optical transmission has been designed for different optical networks structures.

In the last few years the structure has changed from point to point planned for Broad band ISDN to a point to multipoint passive optical network (PON) architecture for the optical network in the subscriber loop.

A transceiver can be realized with discrete elements (**Figure 3**). Transmitter and receiver with pigtailed are connected with a fiber-coupler (2:1 or 2:2, wavelength independent or WDM).

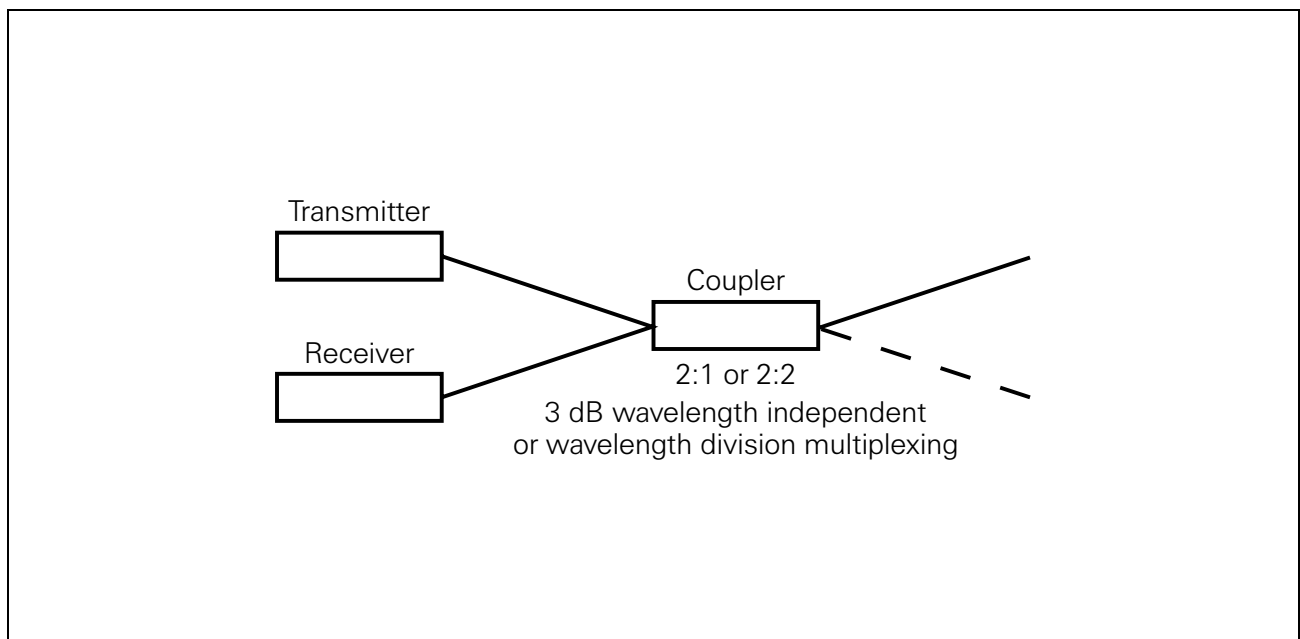


Figure 3 Realization with Discrete Elements

Infineon has realized this transceiver configuration in a compact module called a BIDI® (**Figure 4**).

This module is especially suitable for separating the opposing signals at the ends of a link. It replaces a discrete solution with a transmitter, receiver and coupler.

The basic devices are a laser diode and a photodiode, each in a TO package, plus the filter in the beam path. A lens in the TO laser concentrates the light and enables it to be launched into the single-mode fiber of the module. In the same way the light from the fiber is focused onto the small, light-sensitive area of the photodiode to produce a high photo current. The mirror for coupling out the received signal is arranged in the beam so that the transmitter and receiver are at right angles to each other. This means the greatest possible degree of freedom in the layout of the electric circuit.

Description

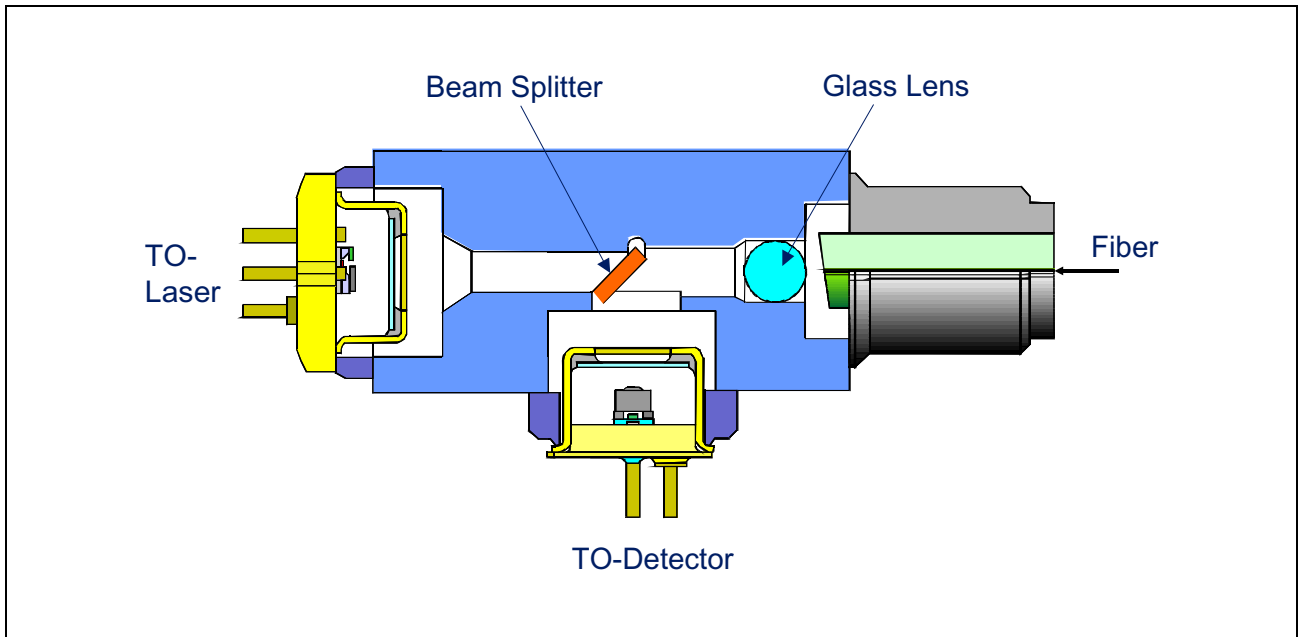


Figure 4 Compact Realization of the Transceiver in One Module

A decisive advantage of the module is its use of standard TO components. These devices, produced in large quantities, are hermetically sealed and tested before they are built in. This makes a very substantial contribution to the excellent reliability of the module. The solid metal package of the module serves the same purpose. It allows the use of modern laser welding techniques for reliable fixing of the different elements and the fiber holder.

FSAN Applications

The generation of a service-independent platform providing a high transport capacity based on the existing infrastructure is the most important goal with respect to the standardization of new systems for the access network. For FSAN (Full Service Access Network) there have been several Working Groups working on a special system configuration. The target of FSAN was to make a specification for:

- Fiber To The Cabinet (FTTCab)
- Fiber To The Curb (FTTC)
- Fiber To The Building (FTTB)
- Fiber To The Home (FTTH).

The FSAN Basic Network Structure is shown below.

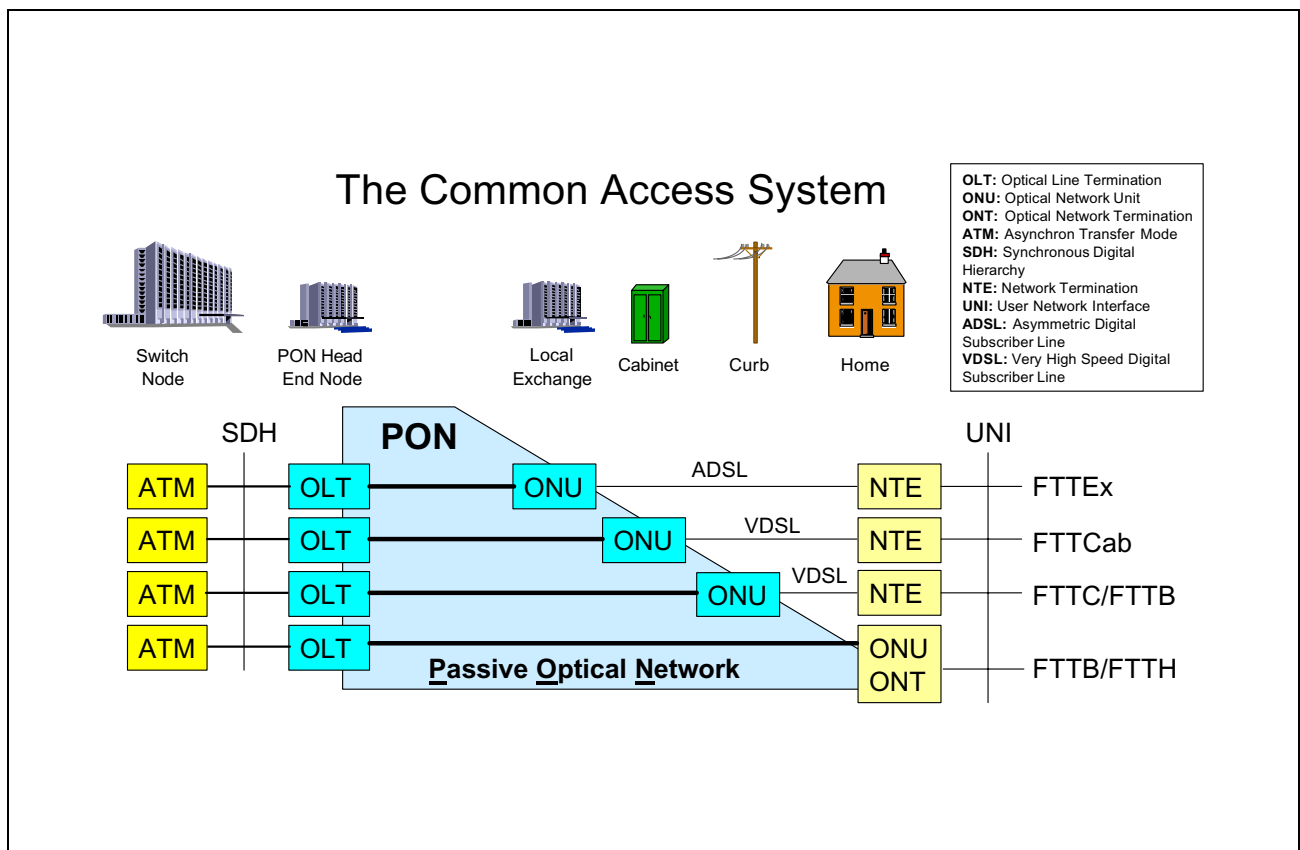


Figure 5 FSAN Basic Network Structure

Technical Data
Absolute Maximum Ratings

| Parameter | Symbol | Limit Values | | Unit |
|-----------|--------|--------------|------|------|
| | | min. | max. | |

Module

| | | | | |
|--|-----------|-----|-----|----|
| Operating temperature range at case | T_C | 0 | 70 | °C |
| Storage temperature range | T_{stg} | -40 | 85 | |
| Soldering temperature ($t_{max} = 10$ s, 2 mm distance from bottom edge of case) | T_S | | 260 | |

Laser Diode

| | | | | |
|------------------------|---------------|--|-----|----|
| Direct forward current | $I_{F\ max}$ | | 120 | mA |
| Radiant power CW | $P_{F,\ rad}$ | | 4 | mW |
| Reverse Voltage | V_R | | 2 | V |

Monitor Diode

| | | | | |
|-----------------|-------|--|----|----|
| Reverse Voltage | V_R | | 10 | V |
| Forward Current | I_F | | 2 | mA |

Receiver Diode

| | | | | |
|-------------------------------------|------------|--|----|----|
| Reverse Voltage | V_R | | 10 | V |
| Forward Current | I_F | | 2 | mA |
| Optical power into the optical port | P_{port} | | 3 | mW |

Technical Data

The electro-optical characteristics described in the following tables are only valid for use within the specified maximum ratings or under the recommended operating conditions.

Transmitter Electro-Optical Characteristics

| Parameter | Symbol | Limit Values | | | Unit |
|--|--------------------------|--------------|------|------|---------------|
| | | min. | typ. | max. | |
| Optical output power (maximum) | $P_{F, \max}$ | 2 | | | mW |
| Emission wavelength center of range, $P_F = 0.5 P_{F, \max}$. | λ_{trans} | 1480 | | 1580 | nm |
| Spectral width (RMS) | σ_λ | | | 0.1 | |
| Temperature coefficient of wavelength | TC | | | 0.15 | nm/K |
| Threshold current (whole temperature range) | I_{th} | 2 | | 55 | mA |
| Forward voltage, $P_F = 0.5 P_{F, \max}$. | V_F | | | 1.5 | V |
| Radiant power at I_{th} | P_{th} | | | 50 | μW |
| Slope efficiency (0...70°C) | η | 35 | | 150 | mW/A |
| Variation of 1st derivative of P/I (0.1 to 2.0 mW) | S_{var} | -30 | | 30 | % |
| Differential series resistance | R_S | | | 8 | Ω |
| Rise time (10%–90%) | t_r | | 100 | 200 | ps |
| Fall time (10%–90%) | t_f | | 270 | 500 | |

Monitor Diode Electro-Optical Characteristics

| Parameter | Symbol | Limit Values | | Unit |
|--|--------|--------------|------|---------------|
| | | min. | max. | |
| Dark current, $V_R = 5 \text{ V}$, $P_F = 0$, $T = T_{\max}$ | I_R | | 500 | nA |
| Photocurrent, $V_R = 5 \text{ V}$, $P_F = 0.5 P_{F, \max}$ | I_P | 100 | 1000 | μA |
| Capacitance, $V_R = 5 \text{ V}$, $f = 1 \text{ MHz}$ | C_5 | | 10 | pF |
| Tracking error ¹⁾ , $V_R = 5 \text{ V}$ | TE | -1 | 1 | dB |

¹⁾ The tracking error TE is the maximum deviation of P_F at constant current I_{mon} over a specified temperature range and relative to the reference point: $I_{\text{mon, ref}} = I_{\text{mon}} (T = 25^\circ\text{C}, P_F = 0.5 P_{F, \max})$. Thus, TE is given by:

$$\text{TE}[\text{dB}] = 10 \times \log \frac{P_F[T_C]}{P_F[25^\circ\text{C}]}$$

Receiver Diode Electro-Optical Characteristics

| Parameter | Symbol | Limit Values | | Unit |
|---|------------------|--------------|------|------|
| | | min. | max. | |
| Spectral sensitivity, $V_R = 5 \text{ V}$, $\lambda = 1310 \text{ nm}$ | S_{rec} | 0.65 | 1 | A/W |
| Rise and fall time (10%–90%) $R_L = 50 \Omega$, $V_R = 5 \text{ V}$ | t_r ; t_f | | 0.5 | ns |
| Total capacitance $V_R = 5 \text{ V}$, $P_{\text{opt}} = 0$, $f = 1 \text{ MHz}$ | C | | 1.5 | pF |
| Dark current $V_R = 5 \text{ V}$, $P_{\text{opt}} = 0$ | I_D | | 50 | nA |

Module Electro-Optical Characteristics

| Parameter | Symbol | Limit Values | | Unit |
|--------------------------------------|--------|--------------|------|------|
| | | min. | max. | |
| Optical Crosstalk ¹⁾ | CRT | | –47 | dB |
| Backreflection (Return Loss) 1310 nm | RL | | –20 | |
| Backreflection (Return Loss) 1550 nm | | | | |

¹⁾ Optical Crosstalk is defined as

$$\text{CRT}[\text{dB}] = 10 \times \log \frac{I_{\text{Det.0}}}{I_{\text{Det.1}}}$$

with: $I_{\text{Det.0}}$: the photocurrent with $P_F = 0.5 P_{F, \text{max.}}$, without optical input, CW laser operation, $V_R = 2 \text{ V}$ and $I_{\text{Det.1}}$: the photocurrent without P_F , but $0.5 P_{F, \text{max.}}$ optical input power, $\lambda = 1310 \text{ nm}$.

End of Life Time Characteristics

| Parameter | Symbol | Limit Values | | Unit |
|---|-----------------|--------------|------|---------------|
| | | min. | max. | |
| Threshold current at $T = T_{\text{max}}$ | I_{th} | | 60 | mA |
| Current above threshold, over full temperature range, at $I_{\text{mon, ref}} = I_{\text{mon}}$ ($T = 25^\circ\text{C}$, $P_F = 0.5 P_{F, \text{max.}}$, BOL) | ΔI_F | 7 | 70 | |
| Tracking Error | TE | –1.5 | 1.5 | dB |
| Detector Dark Current, $V_R = 2 \text{ V}$, $T = T_{\text{max}}$ | I_R | | 400 | nA |
| Monitor Dark Current, $V_R = 2 \text{ V}$, $T = T_{\text{max}}$ | I_R | | 1 | μA |

Fiber Data

The mechanical fiber characteristics are described in the following table.

Fiber Characteristics

| Parameter | Limit Values | | | Unit |
|---|--------------|------|------|------|
| | min. | typ. | max. | |
| Mode Field Diameter | 8 | 9 | 10 | μm |
| Cladding Diameter | 123 | 125 | 127 | |
| Mode Field/Cladding Concentricity Error | | | 1 | |
| Cladding Non-circularity | | | 2 | % |
| Mode Field Non-circularity | | | 6 | |
| Cut off Wavelength | 1250 | | | nm |
| Jacket Diameter | 0.8 | | 1 | mm |
| Bending Radius | 30 | | | |
| Tensile Strength Fiber Case | 5 | | | N |
| Length | 0.8 | | 1.2 | m |

Eye Safety

Ensure to avoid exposure of human eyes to high power laser diode emitted laser beams. Especially do not look directly into the laser diode or the collimated laser beam when the diode is activated.

Class 3B Laser Product According to IEC 60825-1

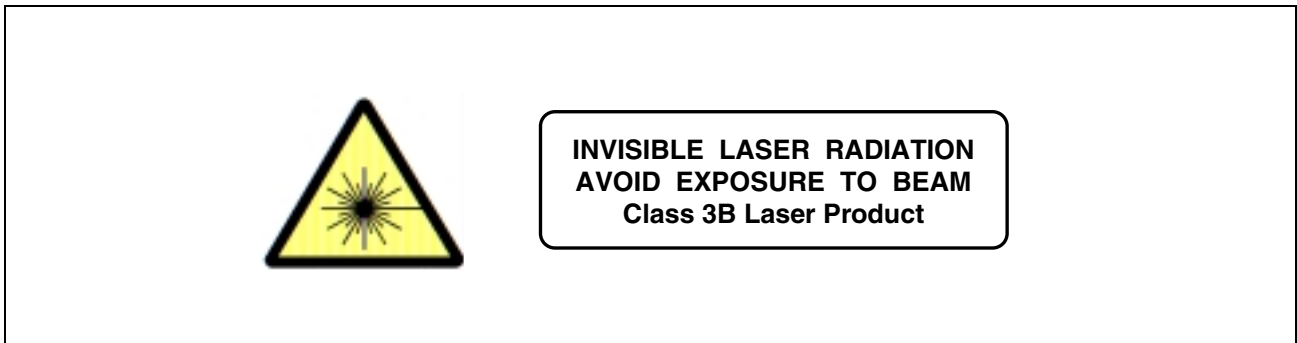


Figure 6 Required Labels

Class IIIb Laser Product According to FDA Regulations Complies with 21 CFR 1040.10 and 1040.11



Figure 7 Required Label

Laser Data

| | |
|-------------------------------------|-----------------|
| Wavelength | 1550 nm |
| Maximum total output power | less than 50 mW |
| Beam divergence (1/e ²) | 10° |

Package Outlines

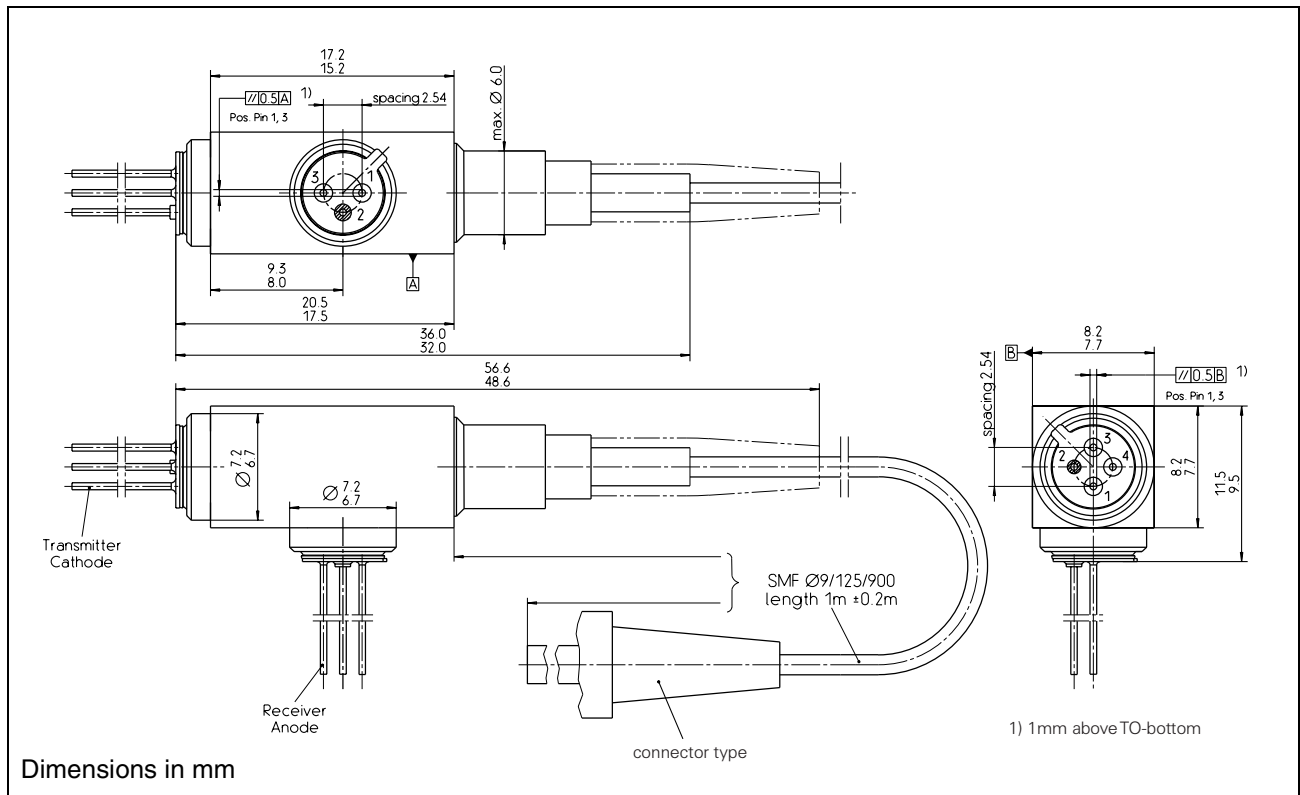


Figure 8

Connector Options

| Model | Type |
|----------------|----------------------|
| SBH92314G-FSAN | SM FC/PC |
| SBH92314N-FSAN | SM SC/PC 0° |
| SBH92314P-FSAN | SM SC/APC 8° |
| SBH92314Z-FSAN | SM without connector |

SBH92314x-FSAN

Revision History: **2002-05-28**

DS0

Previous Version:

| Page | Subjects (major changes since last revision) |
|------|---|
| | Document's layout has been changed: 2002-Aug. |

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