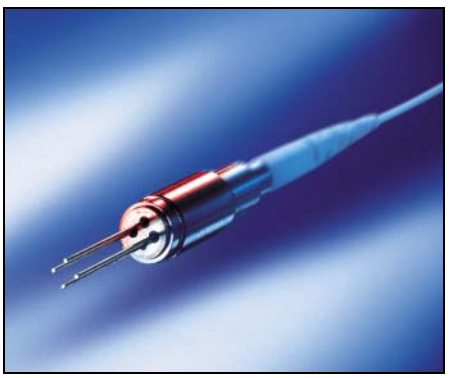
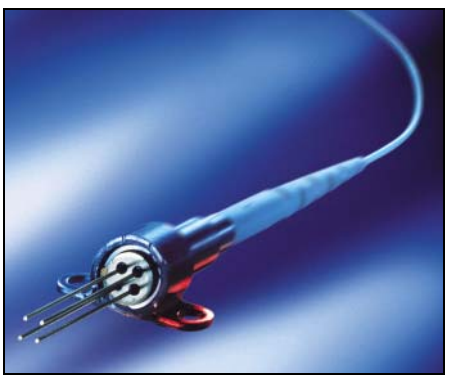
Ternary PIN Photodiode with integrated Preamplifier IC

SRP00294x
SRP00295x

Features

- InGaAs/InP PIN photodiode with preamplifier IC
- Designed for SONET OC-48 / SDH STM-16 applications in fiber-optics communication systems
- Sensitive receiver for 2nd and 3rd optical window (1300 nm and 1550 nm)
- Suitable for bit rates up to 2.5 Gbit/s
- Module with high optical sensitivity
- Fast switching times
- Low dark current
- Excellent noise immunity
- High reverse current stability from planar structure
- Hermetically sealed TO46 package





Pin Configuration

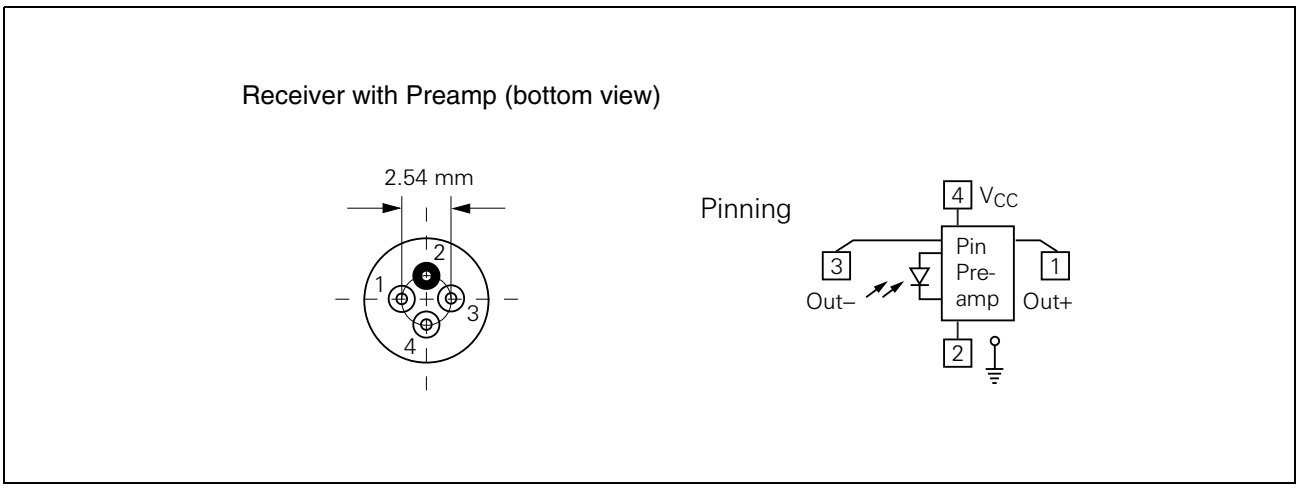


Figure 1 Receiver with Preamp

Description

The Infineon optical receiver module has been designed for use in optical networks and is suitable for bit rates up to max. 2.5 Gbit/s if used without any TIA.

The optical receiver module uses a high-speed PIN photodetector optional coupled with a hybrid low noise transimpedance amplifier (PIN-TIA). The optical receiver photodiode can be used for 1310 nm or 1550 nm optical communications.

The PIN photodiode is made of InGaAs/InP and has an active diameter of 75 µm. The function of the PIN and PIN-TIA optical receiver module is to detect input optical power, to transduce the incident radiation into current (PIN) and then to convert the current into a voltage (PIN-TIA).

The low input noise current density of the used transimpedance amplifiers in PIN-TIA's provides the optical receiver module, when used with appropriate filtering, with ample sensitivity for realizing minimum input power requirements. Designers of optical receivers can use the module in any application that benefits from integration of the photodiode and TIA into a TO coaxial package. Typical for such applications are receivers for digital crossconnects, digital loop carriers, add/drop-multiplexers and optical network units.

Last but not least the fast switching times, low dark currents and the packaging in a compact and hermetically sealed TO46 make the optical receivers usable in many other fiber optic receiver applications. One application is the use in a Compact realization of a transceiver in one module like the so called BIDI® (**Figure 2**).

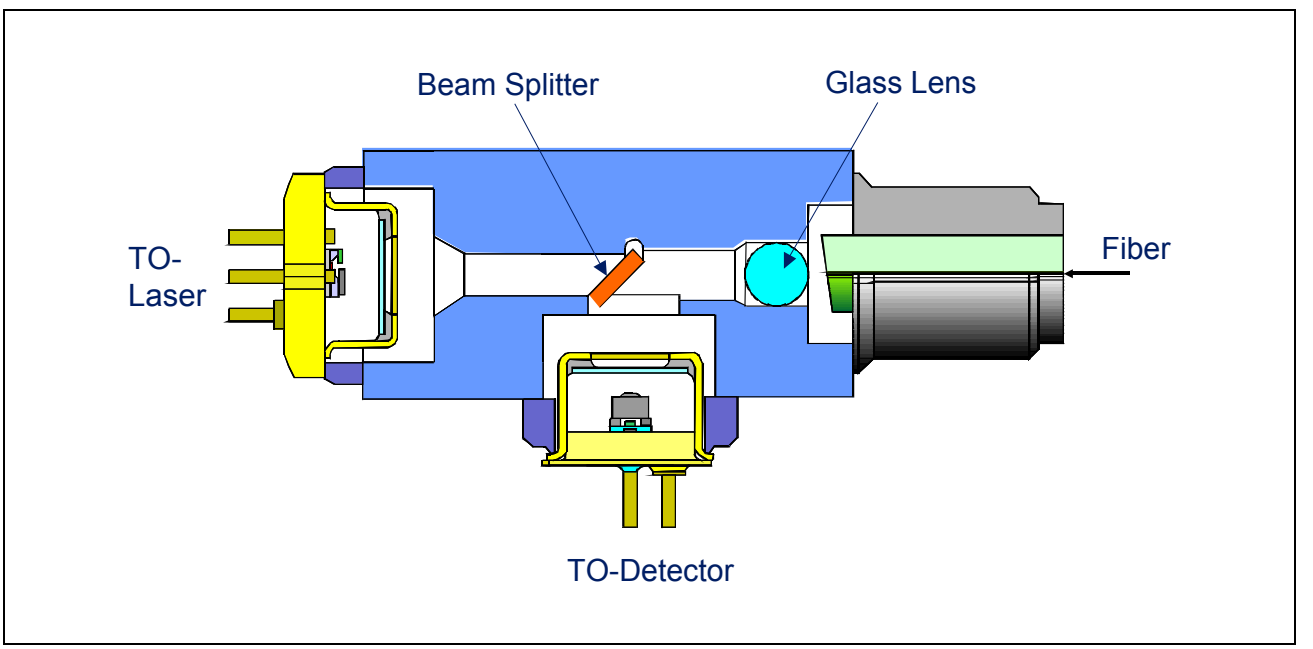


Figure 2 Compact Realization of the Transceiver in One Module

Technical Data

Absolute Maximum Ratings

Parameter	Symbol	Limit Values		Unit
		min.	max.	
Module				
Operating temperature range at case	T_C	–40	85	°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	
Receiver Diode				
Reverse Voltage	V_R		20	V
Forward Current	I_F		10	mA
Optical power into the optical port	P_{port}		1	mW

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

Characteristics for Pin-Preamp Receivers at T_A = 25°C, unless otherwise specified.

Preamp Characteristics

Parameter	Symbol	Limit Values			Unit
		min.	typ.	max.	
DC-Characteristics					
Supply Voltage	V_{CC}	4.5	5	5.5	V
Supply Current	I_{CC}	35	47	65	mA
AC-Characteristics					
Optical Sensitivity (BER ≤ 10^{-9}, PN23)	S		–22		dBm
Linear Bandwidth (–3 dB)	BW	1200	1600		MHz
Optical overload (avg.)	P_{max}		0		dBm
Transimpedance (single ended)	R_T	9	13	17	kΩ
Output resistance	R_{out}	40	50	60	Ω
Noise current density			3		pa/√Hz
Gain (differential)	G	11	21	34	V/mW
Return Loss, λ = 1310 nm	RL			–27	dB

Some Eye Diagrams

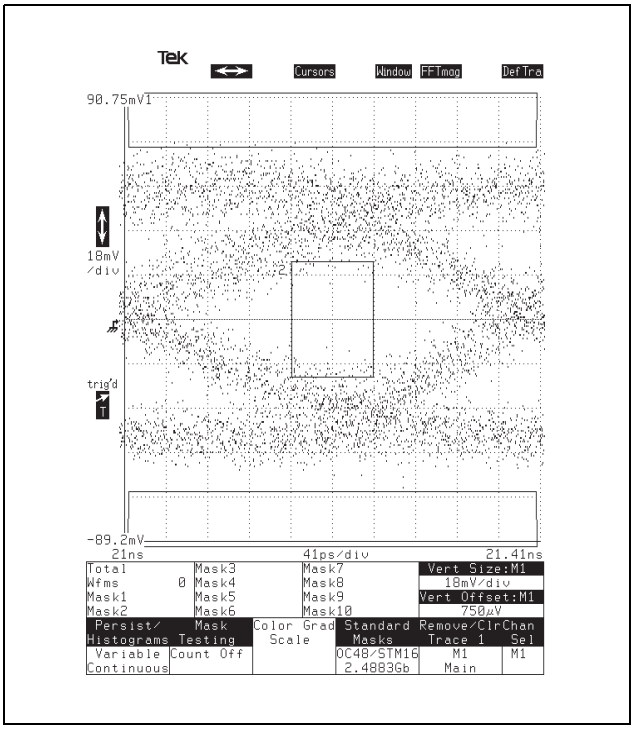


Figure 3 P_{opt} = 5 µW avg. (OC-48/STM-16)

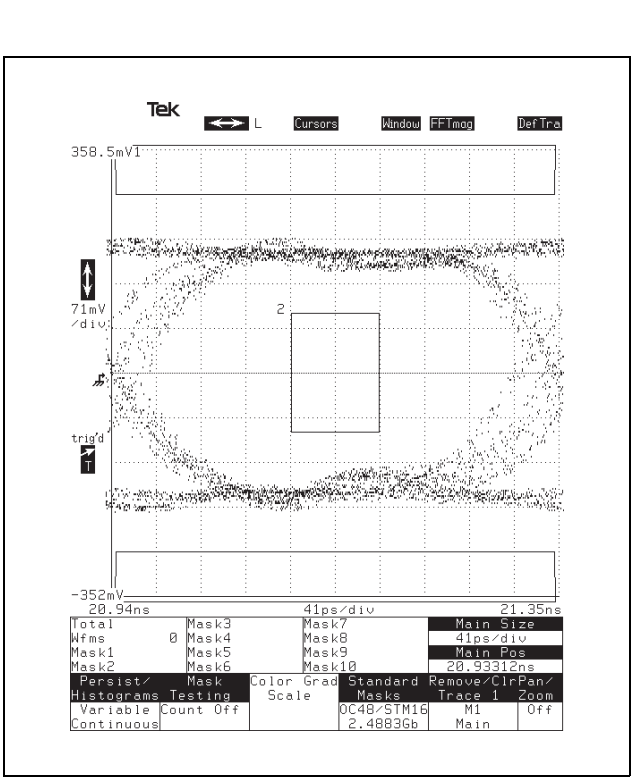


Figure 4 P_{opt} = 100 µW avg. (OC-48/STM-16)

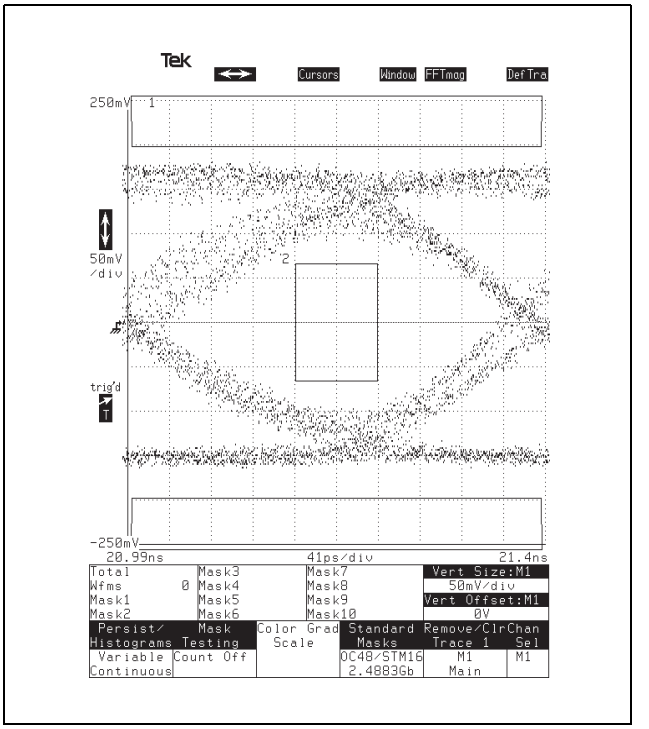


Figure 5 P_{opt} = 10 µW avg. (OC-48/STM-16)

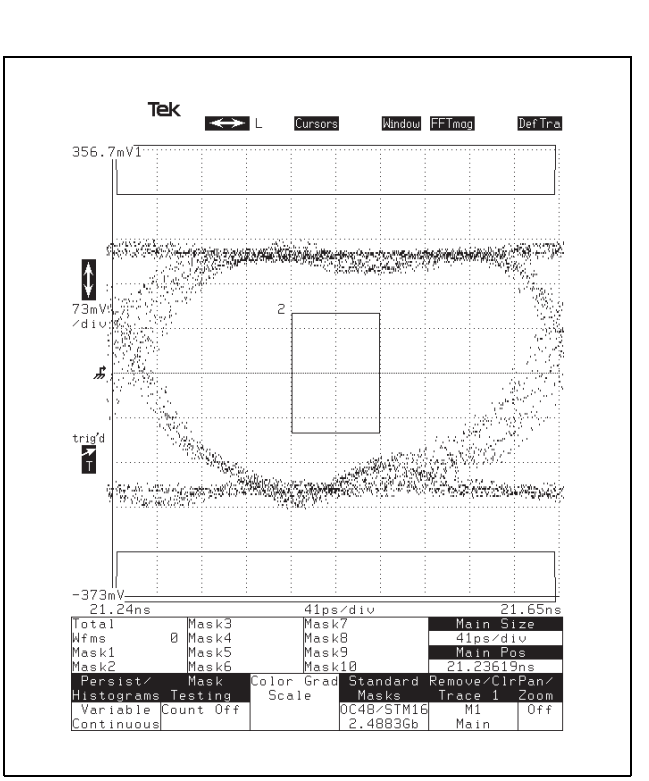


Figure 6 P_{opt} = 500 µW avg. (OC-48/STM-16)

Fiber Data

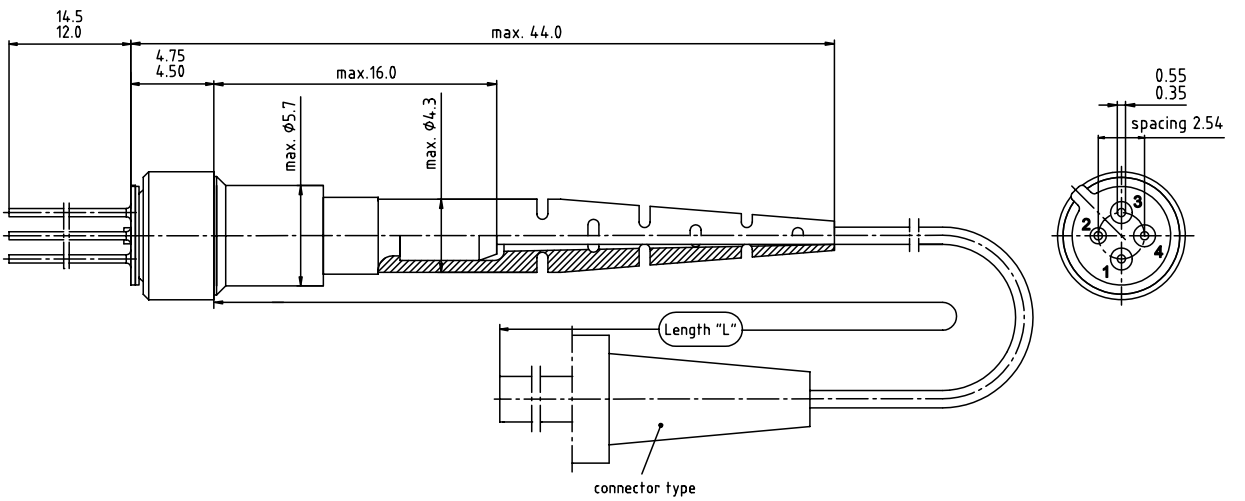
The mechanical fiber characteristics are described in the following table.

Fiber Characteristics

Parameter	Limit Values			Unit
	min.	typ.	max.	
Mode Field Diameter		50		µm
Cladding Diameter	123	125	127	
Mode Field/Cladding Concentricity Error			1	
Cladding Non-circularity			2	%
Mode Field Non-circularity			6	
Cut off Wavelength	1270			nm
Jacket Diameter	0.8		1	mm
Bending Radius	30			
Tensile Strength Fiber Case	5			N
Length	0.8		1.2	m

Package Outlines

SRP00294x



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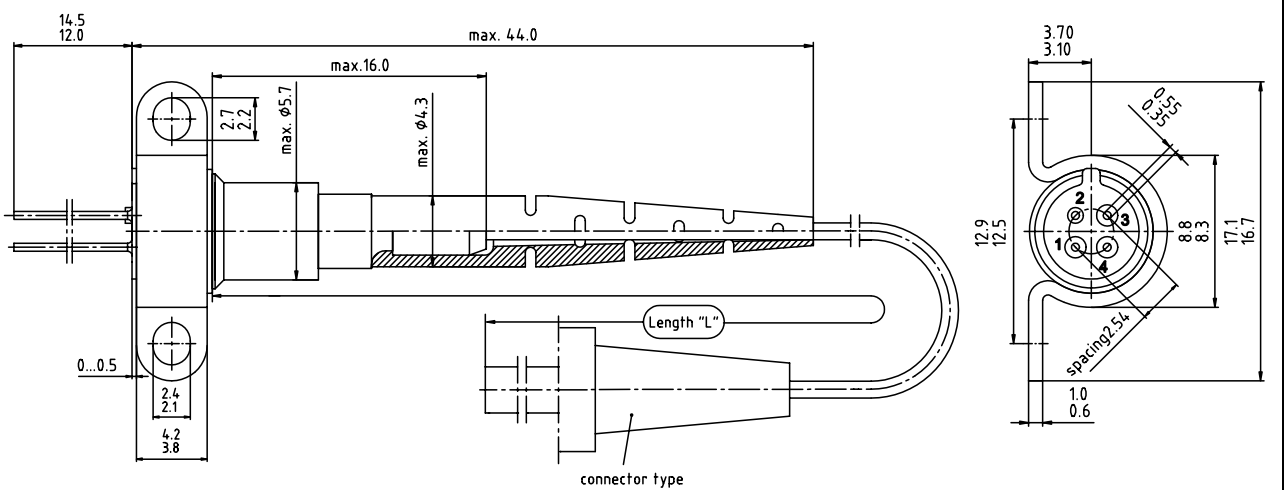

Dimensions in mm

Figure 7

Flange Options

Type	Flange
SRP00294x	without
SRP00295x	with

Connector Options

Model	Type
SRP00294H SRP00295H	MM FC/PC
SRP00294G SRP00295G	SM FC/PC
SRP00294O SRP00295O	MM SC/PC 0°
SRP00294N SRP00295N	SM SC/PC 0°
SRP00294Q SRP00295Q	MM SC 8° APC
SRP00294P SRP00295P	SM SC 8° APC
SRP00294W SRP00295W	MM without connector
SRP00294Z SRP00295Z	SM without connector

Other connectors on request

SRP00294x
SRP00295x
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Page	Subjects (major changes since last revision)
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