

## BIDI™ Transceiver Optical Module 1300/1300 nm, Low Power

SBL 51214X

- Designed for application in passive-optical networks
- Integrated beam splitter
- Bidirectional Transmission in one optical window
- Laser diode with Multi-Quantum Well structure
- Suitable for bit rates up to 1 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 18
- With singlemode fiber pigtail



Type	Ordering Code	Connector
SBL 51214A	Q62702-P3040	DIN
SBL 51214G	Q62702-Pxxxx	FC / PC

Component with other connector types on request.

### Maximum Ratings

Output power ratings refer to the optical port. The operating temperature of the submount is identical to the case temperature.

Parameter	Symbol	Values	Unit
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### Module

Operating temperature range at case	$T_C$	- 40 ... + 85	°C
Storage temperature range	$T_{stg}$	- 40 ... + 85	°C
Soldering temperature $t_{max} = 30$ s, 2 mm distance from bottom edge of case	$T_S$	260	°C

### Laser Diode

Forward current	$I_{F\ max}$	150	mA
Radiant power CW	$\Phi_e$	1	mW
Reverse voltage	$V_{R\ max}$	2	V

## Maximum Ratings (cont'd)

Parameter	Symbol	Values	Unit
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### Monitor Diode

Forward current	$I_{F \max}$	2	mA
Reverse voltage	$V_{R \max}$	10	V

### PIN Photodiode

Forward current	$I_{F \max}$	2	mA
Reverse voltage	$V_{BR}$	10	V
Maximum optical power into the optical port	$\Phi_{\text{port max}}$	1.5	mW

## Characteristics

All optical data refer to the optical port,  $T_C = 25 \text{ }^\circ\text{C}$ .

Parameter	Symbol	Values	Unit
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### Laser Diode

Optical output power	$\Phi_e$	> 0.4	mW
Emission wavelength center of range $\Phi_e = 0.2 \text{ mW}$	$\lambda$	1270 ... 1350	nm
Spectral bandwidth $\Phi_e = 0.2 \text{ mW}$ (RMS)	$\Delta\lambda$	5	nm
Threshold current (– 40 ... + 85 °C)	$I_{th}$	2 ... 45	mA
Forward voltage $\Phi_e = 0.2 \text{ mW}$	$V_F$	< 1.5	V
Radiant power at $I_{th}$	$\Phi_{eth}$	< 20	$\mu\text{W}$
Current above threshold at 25 °C, $\Phi_e = 0.4 \text{ mW}$	$\Delta I_F$	10 ... 35	mA
Current above threshold, $\Phi_e = 0.4 \text{ mW}$	$\Delta I_F$	7 ... 50	mA
Variation of 1st derivative of P/I (0.05 ... 0.4 mW)	$dP/dI$	– 30 ... 30	%
Differential series resistance	$r_S$	< 8	$\Omega$
Rise and fall time (10 % - 90 %)	$t_r, t_f$	< 1	ns
Temperature coefficient of wavelength	$TC_\lambda$	< 0.5	nm / K

## Characteristics (cont'd)

Parameter	Symbol	Values	Unit
<b>Monitor Diode</b>			
Dark current, $V_R = 2 \text{ V}$ , $\Phi_e = 0$ , $T_C = 85 \text{ }^\circ\text{C}$	$I_R$	200	nA
Photocurrent, $V_R = 2 \text{ V}$ , $\Phi_e = 0.2 \text{ mW}$	$I_P$	100 ... 1000	$\mu\text{A}$
Capacitance, $V_R = 2 \text{ V}$ , $f = 1 \text{ MHz}$	$C_2$	< 10	pF
Tracking error, $V_R = 2 \text{ V}$ ( <b>see note 1</b> )	$TE$	- 1 ... 1	dB
<b>Detector</b>			
Dark current, $V_R = 2 \text{ V}$ , $\Phi_e = 0$ , $T_C = 85 \text{ }^\circ\text{C}$	$I_R$	< 50	nA
Spectral sensitivity, $V_R = 2 \text{ V}$ , $\lambda = 1300 \text{ nm}$	$S_\lambda$	> 0.30	A / W
Capacitance, $V_R = 2 \text{ V}$ , $f = 1 \text{ MHz}$	$C_2$	< 1.5	pF
Rise and fall time, $V_R = 2 \text{ V}$ , 10 % - 90 %	$t_r, t_f$	< 1	ns
<b>Module</b>			
Optical crosstalk ( <b>see note 2</b> )	$CRT$	< - 22	dB

**Note 1:** The tracking error  $TE$  is the variation rate of  $\Phi_e$  at constant current  $I_{\text{mon}}$  over a specified temperature range and relative to the reference point:  $I = I_{\text{mon}}$  ( $T = 25 \text{ }^\circ\text{C}$ ,  $\Phi_e = 0.2 \text{ mW}$ ). Thus,  $TE$  is given by:

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

**Note 2:** Optical Crosstalk is defined as  $CRT = 10 \times \log(I_{\text{Det},0}/I_{\text{Det},1})$  with:  $I_{\text{Det},0}$  the photocurrent with  $\Phi_e = 0.2 \text{ mW}$  CW laser operation,  $V_R = 2 \text{ V}$ , with minimum optical return loss from fiber end and  $I_{\text{Det},1}$  the photocurrent without  $\Phi_e$ , but  $0.2 \text{ mW}$  optical input power,  $\lambda = 1300 \text{ nm}$ .

**Accompanying Information**

$T = 25\text{ °C}$ : Threshold current, current above threshold for 0.4 mW output power, monitor current for 0.2 mW output power, peak wavelength.  
 $T = 85\text{ °C}$ : Threshold current, current above threshold for 0.4 mW output power, monitor current for 0.2 mW output power.

**End of Life Values**

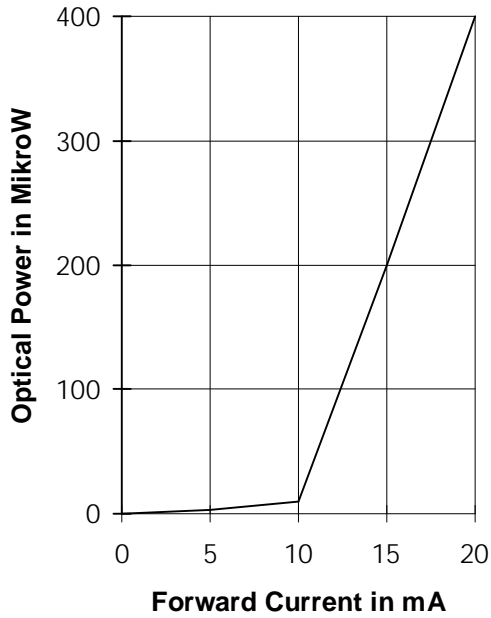
Parameter	Symbol	Values	Unit
Threshold current at $T = 85\text{ °C}$	$I_{th}$	< 60	mA
Current above threshold, over full temperature range, at $I_{mon,ref} = I_{mon}$ ( $T = 25\text{ °C}$ , $\Phi_e = 0.4\text{ mW}$ , BOL)	$\Delta I_F$	7 ... 70	mA
Tracking error (see note 1)	$TE$	- 1.5 ... 1.5	dB
Detector dark current, $V_R = 2\text{ V}$ , $T = 85\text{ °C}$	$I_R$	< 400	nA
Monitor dark current, $V_R = 2\text{ V}$ , $T = 85\text{ °C}$	$I_R$	< 1	$\mu\text{A}$

**Fiber Pigtail**

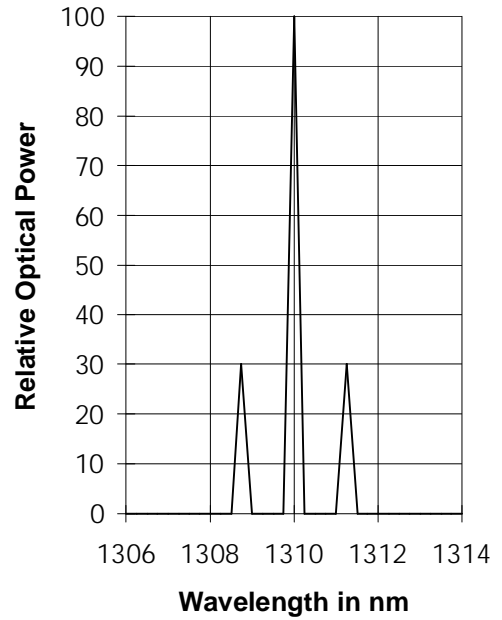
Type: single mode, silica

Parameter	Values	Unit
Mode field diameter	$9 \pm 1$	$\mu\text{m}$
Cladding diameter	$125 \pm 2$	$\mu\text{m}$
Mode field/cladding concentricity error	< 1	$\mu\text{m}$
Cladding non-circularity	< 2	%
Mode field non-circularity	< 6	%
Cut-off wavelength	> 1270	nm
Jacket diameter	$0.9 \pm 0.1$	mm
Bending radius	> 30	mm
Tensile strength fiber/case	> 5	N
Length	$1 \pm 0.2$	m

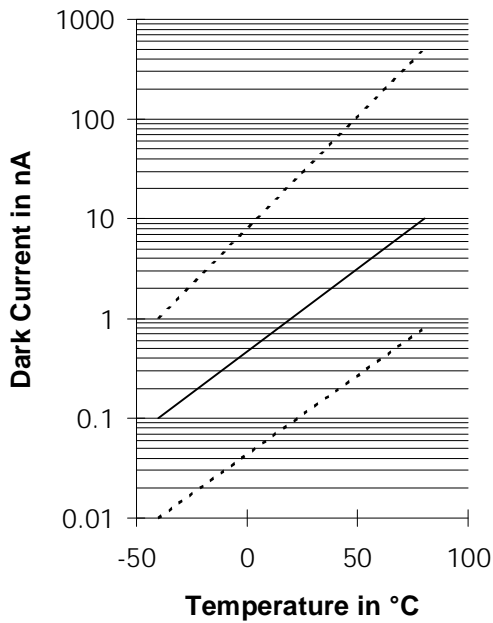
**Laser Diode**  
Radiant Power in Singlemode Fiber



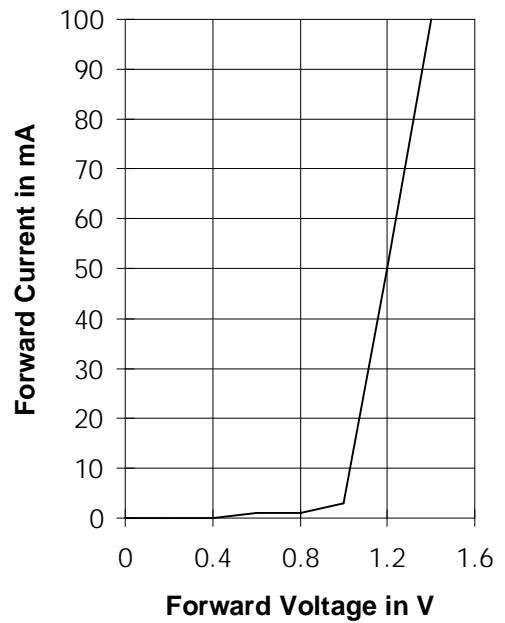
**Relative Radiant Power**  
 $\Phi_e = f(\lambda)$



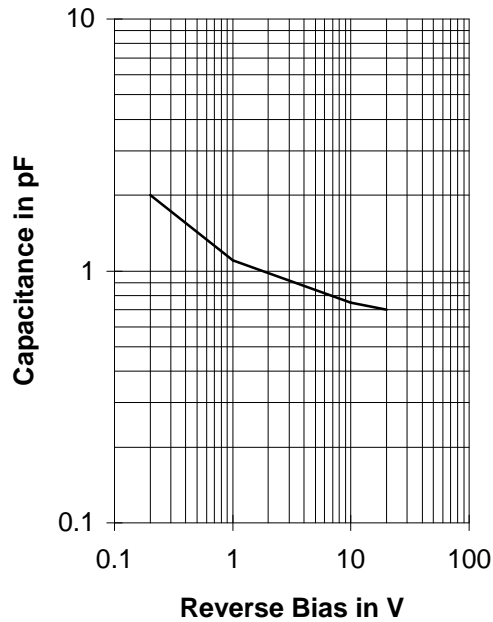
**Monitor Diode Dark Current  $I_R = f(T_A)$**   
 $\Phi_{port} = 0, V_R = 5 V$



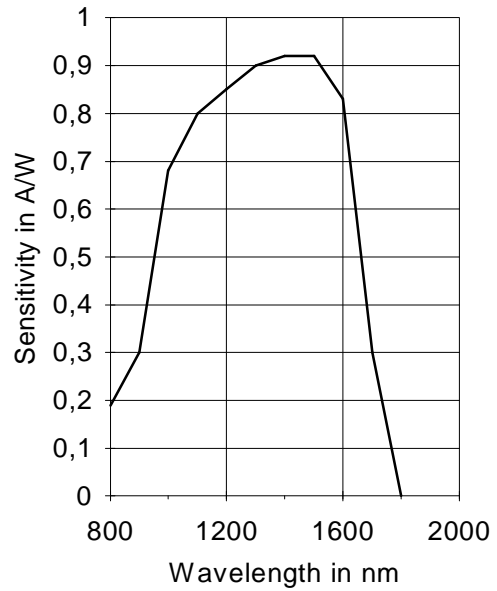
**Laser Forward Current**  
 $I_F = f(V_F)$



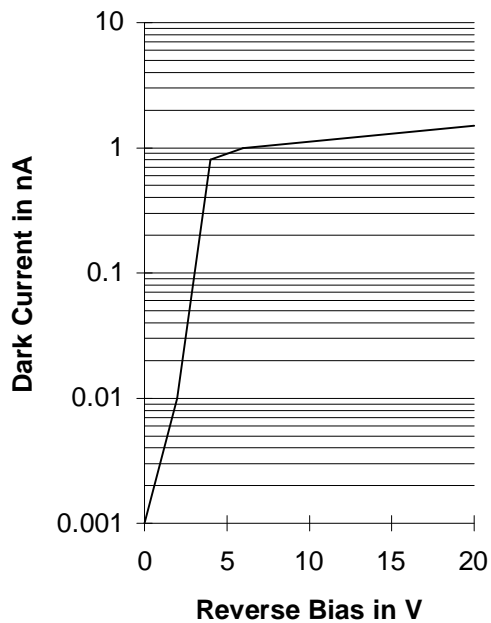
**Capacitance of PIN Diode  $C = f(V_R)$**   
 $\Phi_{port} = 0, f = 1 \text{ MHz}$



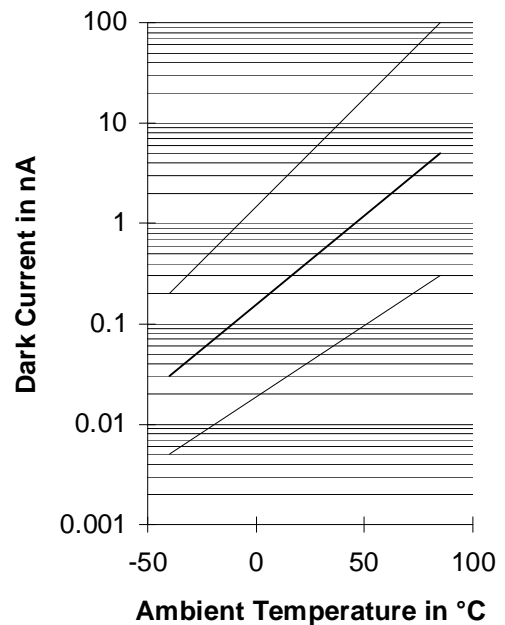
**Rel. Spectral Sensitivity of PIN Diode**  
 $V_R = 5 \text{ V}$



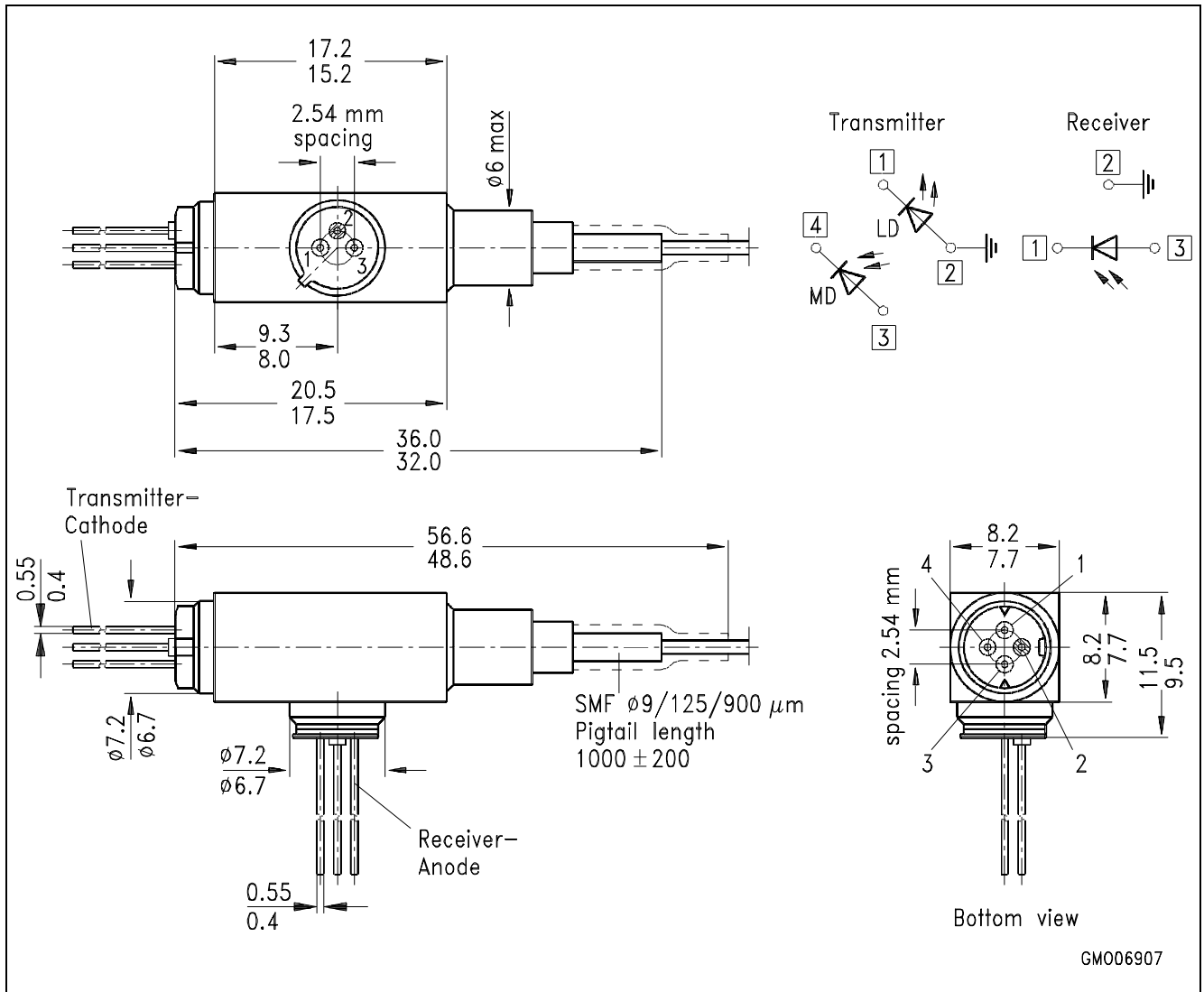
**Dark Current of PIN Diode  $I_R = f(V_R)$**   
 $I_F = f(V_F)$



**Dark Current of PIN Diode  $I_R = f(T_A)$**   
 $\Phi_{port} = 0, V_R = 5 \text{ V}$



Package Outlines (Dimensions in mm)



SBL 51214X