

## Datasheet

### SFP Bidirectional Single Fiber Transceivers

SFP-GD-BD35xx and SFP-GD-BD53xx



#### Features

- SFF-8472 compliance (SFP)
- 1250 Mbps data rates  
- IEEE 802.3ah
- Single-mode optics (Simplex LC)
- Single fiber, bi-directional
- Separate Tx and Rx wavelengths
- Class 1 laser (Tx): 1310 nm or 1550 nm
- 38 km reach
- Digital Diagnostics (SFF-8724)
- Commercial and industrial temperature availability

#### General Operations

Parameter	Symbol	Min	Max	Unit
Supply Voltage	$V_{cc}$	3.135	3.465	V
Total Current	$I_{cc}$	-	300	mA
Power Supply Noise Rejection	PSR	100	-	mV <sub>p-p</sub>
Operating Temperature of SFP Case <sup>a</sup>	$T_{opr}$	-5	70	°C
Operating Temperature of SFP Case <sup>a</sup> (TH)	$T_{opr}$	-40	85	°C
Storage Temperature	$T_{stg}$	-40	85	°C
Data Rate	DR	-	1250	Mbps

a) Maximum Relative Humidity is 85%, non-condensing

#### Transmitter Specifications (Optical)

Parameter	Symbol	Min	Max	Unit
Optical Power	$P_{op}$	-5	0	dBm
Optical Crosstalk	XT	-	-40	dB
Average Launch Power Of Off Tx	$P_{off}$	-	-45	dBm
Extinction Ratio	ER	9	-	dB
Eye Mask	IEEE 802.3ah compliant			
Optical Rise Time (20% to 80% values)	$t_r$	-	260	ps
Optical Fall Time (20% to 80% values)	$t_f$	-	260	ps
Mean Tx Wavelength SFP-GD-BD35xx: 1310	$\lambda$	1260	1360	nm
Mean Tx Wavelength SFP-GD-BD53xx: 1550	$\lambda$	1500	1600	nm
Spectral Width	$\Delta\lambda$	-	1	nm
Relative Intensity Noise	RIN	-	-120	dB/Hz
Transmitter Reflectance	-	-	-12	dB
Reflection Tolerance	$r_p$	12	-	dB

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### Transmitter Specifications (Electrical)

Parameter	Symbol	Min	Max	Unit
Input Differential Impedance	$R_{in}$	80	120	$\Omega$
PECL Single-Ended Data Input Swing	$V_{in,p-p}$	250	1200	mV
TxFault_Fault	$V_{fault}$	2	$V_{cc}$	V
TxFault_Normal	$V_{normal}$	$V_{ee}$	$V_{ee}+0.5$	V
TxDisable_Disable	$V_d$	2	$V_{cc}$	V
TxDisable_Enable	$V_{en}$	$V_{ee}$	$V_{ee}+0.8$	V

### Receiver Specifications (Optical)

Parameter	Symbol	Min	Max	Unit
Receive Power <sup>b</sup>	$R_{sens,low/high}$	-24 (sensitivity)	-3 (saturation)	dBm
Damage Threshold For Receiver	$P_{in,damage}$	-	0	dBm
Mean Rx Wavelength SFP-GD-BD35xx: 1550	$\lambda$	1500	1600	nm
Mean Rx Wavelength SFP-GD-BD53xx: 1310	$\lambda$	1260	1360	nm
LOS Assert	-	-45	-	dBm
LOS De-assert	-	-	-20	dBm
LOS Hysteresis	-	0.5	-	dB
Receiver Reflectance	-	-	-12	dB

b) Measured at  $10^{-12}$  BER, PRBS 2<sup>7</sup>-1, 6dB ER

### Receiver Specifications (Electrical)

Parameter	Symbol	Min	Max	Unit
PECL Single Ended Data Output Swing	$V_{out,p-p}$	185	800	mV
Data Output Rise Time	$t_r$	-	500	ps
Data Output Fall Time	$t_f$	-	500	ps

### Timing and Electrical

Parameter	Symbol	Min	Max	Unit
Tx Disable Negate Time	$t_{on}$	-	1	ms
Tx Disable Assert Time	$t_{off}$	-	10	$\mu$ s
Time To Initialize, Including Reset Of Tx Fault	$t_{init}$	-	300	ms
Tx Fault Assert Time	$t_{fault}$	-	100	$\mu$ s
Tx Disable To Reset	$t_{reset}$	10	-	$\mu$ s
LOS Assert Time	$t_{loss_{on}}$	-	100	$\mu$ s
LOS De-assert Time	$t_{loss_{off}}$	-	100	$\mu$ s
Serial ID Clock Rate	$f_{serial\_clock}$	-	100	KHz
RX_LOS Voltage (High)	$RX\_LOS_H$	2	-	V
RX_LOS Voltage (Low)	$RX\_LOS_L$	-	0.8	V
LOS Output Voltage-Fault	$V_{LOS\ fault}$	2	$V_{cc}$	V
LOS Output Voltage-Normal	$V_{LOS\ normal}$	$V_{ee}$	$V_{ee}+0.5$	V
MOD_DEF (0:2)-High	$V_H$	2	$V_{cc}$	V
MOD_DEF (0:2)-Low	$V_L$	$V_{ee}$	$V_{ee}+0.5$	V

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### Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration	Bit Value	Formula
Temperature (SFP-GD-BD35/53)	-5 to 70	± 3	°C	Internal	1/256 C	$T_c(C) = T_{ad}(16 \text{ bit signed twos complement}) / 256$
Temperature (SFP-GD-BD35/53TH)	-40 to 85	± 3	°C	Internal	1/256 C	$T_c(C) = T_{ad}(16 \text{ bit signed twos complement}) / 256$
Voltage	0 to $V_{CC}$	0.1	V	Internal	100µV	$V(\text{Volts}) = V_{ad}(16 \text{ bit unsigned integer}) * 0.1$
Bias Current	0 to 120	5	mA	External	-	$I(\text{mA}) = I_{slope} * I_{ad}(16 \text{ bit unsigned integer}) + I_{offset}$
TX Power	-5 to 0	±3 dB	dBm	External	-	$TX\_PWR(\mu W) = TX\_PWR_{slope} * TX\_PWR_{ad}(16 \text{ bit unsigned integer}) + TX\_PWR_{offset}$
RX Power	-24 to -3	±3 dB	dBm	External	-	$RX\_PWR(\mu W) = A_0 + A_1 * x + A_2 * x^2 + A_3 * x^3 + A_4 * x^4$

Pin	Function	Notes
1	$V_{eeT}$	TX GND
2	TX_FAULT	Open Collector
3	TX_DISABLE	Internally Pulled High
4	MOD_DEF2	Serial Data Input
5	MOD_DEF1	Serial Clock Input
6	MOD_DEF0	Internally Grounded
7	NC	Not Connected
8	LOS	Open Collector
9	$V_{eeR}$	RX Ground
10	$V_{eeR}$	RX Ground
11	$V_{eeR}$	RX Ground
12	RXD-	RX Data Negative
13	RXD+	RX Data Positive
14	$V_{eeR}$	RX GND
15	$V_{ccR}$	RX Power
16	$V_{ccT}$	TX Power
17	$V_{eeT}$	TX GND
18	TXD+	TX Data Positive
19	TXD-	TX Data Negative
20	$V_{eeT}$	TX GND

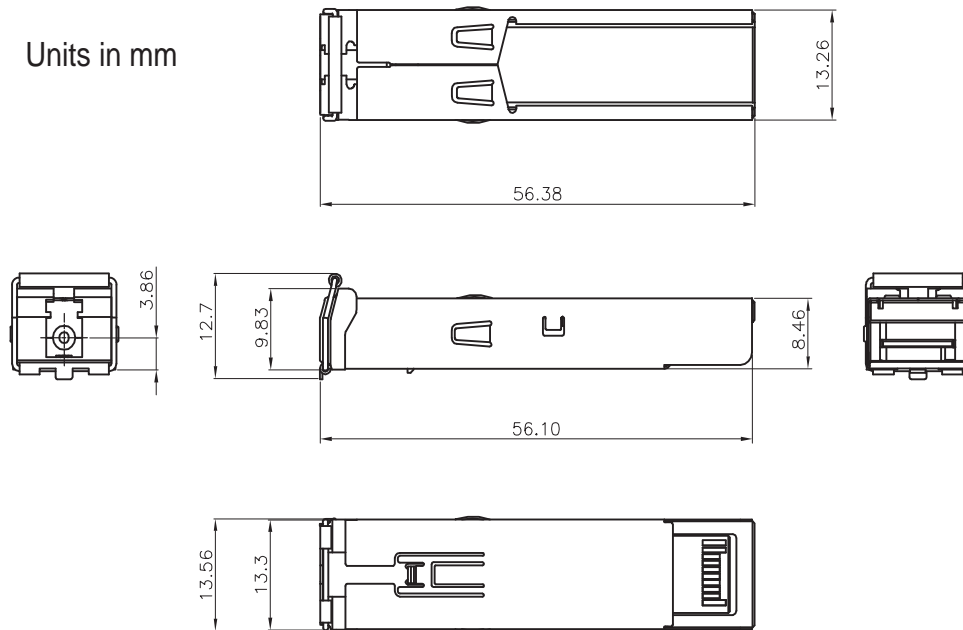
### Ordering Information

Model	Description	Data Rate (Mbps)	Wavelength (nm)		Connector Type	Bail Latch Color	Distance Range (km)
			Tx	Rx			
<b>SFP-GD-BD35</b>	SFP Bidirectional Transceiver	1250	1310	1550	LC	Blue	6 – 38
<b>SFP-GD-BD53</b>	SFP Bidirectional Transceiver	1250	1550	1310	LC	Yellow	6 – 38
<b>SFP-GD-BD35TH</b>	SFP Bidirectional Transceiver <i>(Temperature Hardened)</i>	1250	1310	1550	LC	Blue	6 – 38
<b>SFP-GD-BD53TH</b>	SFP Bidirectional Transceiver <i>(Temperature Hardened)</i>	1250	1550	1310	LC	Yellow	6 – 38

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Outline Drawing

Units in mm



Regulatory Compliances

RoHS directive; China RoHS; California RoHS Law, USA and Canada UL listing; 21CFR 1040.10 and 1040.11; SFP MSA SFF-8074i; SFF-8472; Telecordia GR-468

Warnings

**Handling Precautions:** This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

**Laser Safety:** Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

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