

1.25 Gigabit OptoLock Transceiver

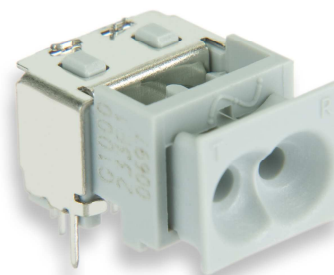
FB01GKVR

DATA SHEET



650 nm 1.25 Gbps Fiber Optic Transceiver with OptoLock Termination

*Gigabit Ethernet over SI and GI
Plastic Optical Fiber
LVDS I/O*



FEATURES

- Eye-safe visible 650 nm Resonant Cavity LED (RCLED)
- Bare fiber termination connector system for use with SI and GI POF
- Compatible with the Gigabit LAN/Ethernet data communications standard
- -20° to +70°C operating range
- Single 3.3V power supply
- Integrated CMOS driver IC for RCLED
- RoHS compliant

APPLICATIONS

Table 1 APPLICATIONS	
Applications	Industrial Networking Gigabit Ethernet LAN High-Speed Galvanic Isolation Printers Medical Equipment Machine Vision Systems Backplane Communications
Standard	IEEE 802.3 (1000Base-SX)
Distance	5 meters Step Index POF 30 meters Graded Index POF
Speed	1.25 Gbps

DESCRIPTION

The Firecomms industrial Gigabit connector housing includes a pair of Firecomms fiber optic transceiver components to provide instant termination for Plastic Optical Fiber (POF) with bare fiber cables. The OptoLock system offers compact termination ideal for rack mounted applications.

This version of the OptoLock system carries a pair of high speed Fiber Optic Transceivers (FOTs) designed to provide up to 1.25 Gbps data links. The FOTs are compatible with low-voltage differential signaling (LVDS) for seamless integration into existing logic bus structures. It is ideal for use with a Gigabit Ethernet PHY 1000Base-SX port or a high-speed FPGA or ASIC.

The Gigabit transceiver combines a gigabit visible optical transmitter and receiver. The use of a visible light source enhances safety and simplifies link set-up and testing.

SPECIFICATIONS

Table 2 ABSOLUTE MAXIMUM RATINGS				
These are the absolute maximum ratings at or beyond which the FOT can be expected to be damaged.				
Parameter	Symbol	Minimum	Maximum	Unit
Storage Temperature ^[1]	T _{stg}	-40	+85	°C
Supply Voltage ^[1]	V _{CC}	-0.5	4.5	V
Storage Conditions (Moisture Sensitivity Level)	MSL		2a	J-STD-020D

Notes:
1. 260°C, 10 sec, 1 time only, at least 2.2 mm away from lead root.

Table 3 RECOMMENDED OPERATING CONDITIONS					
Parameter	Symbol	Minimum	Typical	Maximum	Unit
Operating Temperature	T _{op}	-20		+70	°C
Supply Voltage	V _{CC}	3.0	3.3	3.6	V
Total Current Consumption	I _{CC}	120	140	165	mA

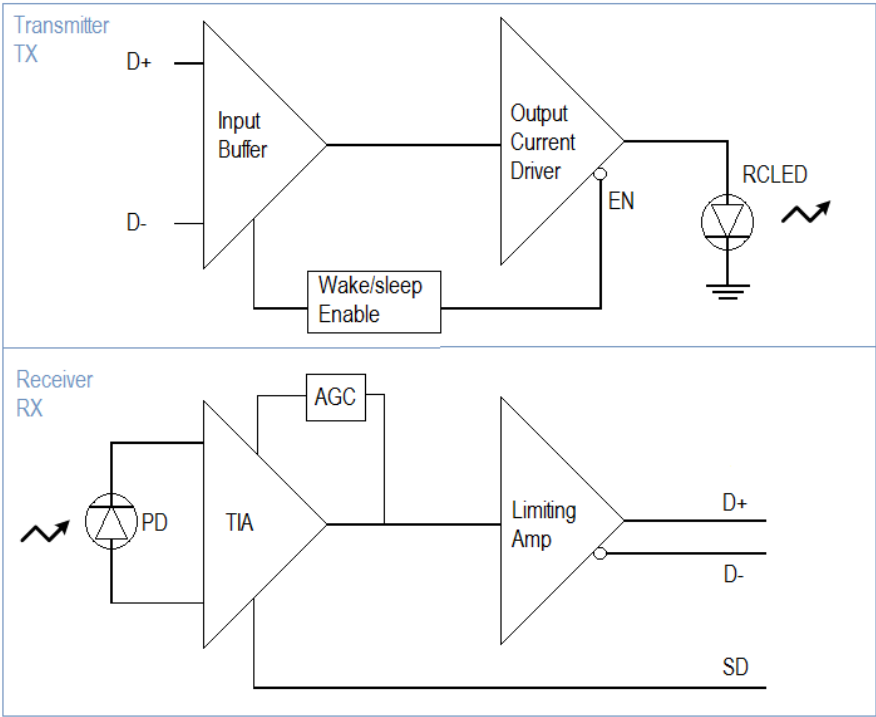


FIGURE 1
Electronic block diagrams of the TX and RX fiber optic transceivers

SPECIFICATIONS (continued)

Table 4
TRANSMITTER ELECTRICAL AND OPTICAL CHARACTERISTICS

Test Conditions:

1. Test data was validated over the full temperature range of -20°C to +70°C, and over the supply range of 3.0V to 3.6V.
2. Test data represents operation at the maximum data rate of 1.25 Gbps using a PRBS7 test pattern (8B/10B encoding) unless otherwise stated.
3. Optical power is measured when coupled into 0.5 m of a 1 mm diameter 0.5 NA plastic fiber.

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Differential Input Voltage Swing	V_{ID}	500		1200	mV (pk-pk)
Differential Input Impedance	Z_{IN}	80	100	120	Ω
Data Rate		0.1		1.25	Gbps
Peak Wavelength	λ_{peak}	640	665	670	nm
Spectral Bandwidth (FWHM)	$\Delta\lambda$		23	30	nm
Average Optical Power Coupled into Standard 1 mm \varnothing SI POF	P_{70}	-10	-3	0.5	dBm
Optical Rise Time (30%-70%)	t_r		240	400	ps
Optical Fall Time (70%-30%)	t_f		240	350	ps
Total Additive Jitter		0	220	350	ps
Optical Modulation Amplitude (OMA) (at Max Data Rate 1.25 Gbps)	OMA	150	500	1200	μW
Input High Voltage	V_{IH}	2.0			V
Input Low Voltage	V_{IL}			0.8	V
Power Down Leakage Current	ICC_{OFF}			10	μA
Optical Power Light Off (DIS=H)	P_{OFF}			-30	dBm

SPECIFICATIONS (continued)

Table 5
RECEIVER CHARACTERISTICS

Test Conditions:

1. Test data was validated over the full temperature range of -20°C to +70°C, and over the supply range of 3.0V to 3.6V.
2. Test data represents operation at the maximum data rate of 1.25 Gbps using a PRBS7 test pattern (8B/10B encoding) unless otherwise stated.
3. Optical power was coupled from a minimum 0.5 m length of 1 mm diameter core and 0.5 NA step index plastic optic fiber.

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Data Rate		0.1		1.25	GBd
Spectral Range	λ	640	665	670	nm
Optical Sensitivity (Standard 1 mm Ø SI POF)	S_{SI}	-13.0			dBm
Optical Overload	P_{max}			0.5	dBm
Differential Output Impedance	Z_{OD}	75	100	125	Ω
Differential Data Output Voltage	$Z_{D+/-}$	0.6	1	1.3	V
Signal Detect Voltage High	V_{SDH}	$V_{CC}-0.4$		V_{CC}	V
Signal Detect Voltage Low	V_{SDL}			0.4	V
Average Optical Power for SD Assert	P_{AS}	-18			dBm
Average Optical Power for SD De-Assert	P_{DA}			-24	dBm

SPECIFICATIONS (continued)

Table 6 TRANSCEIVER PIN DESCRIPTION		
Pin	Name	Symbol
TRANSMITTER		
1	Shielding Ground	GND
2	Positive Supply for Receiver (3.3V)	Vcc
3	Positive Data Output (RX+)	RD+
4	Receiver Ground (RX)	GND
5	Negative Data Output (RX-)	RD-
6	Signal Detect	SD
RECEIVER		
7	Pull Low (GND) to Enable Pull High or Leave Floating to Disable Transmitter	DIS
8	Positive Data Input (TX+)	TD+
9	Transmitter Ground (TX)	GND
10	Negative Data Input (TX-)	TD-
11	Positive Supply for Transmitter (3.3V)	Vcc
12	Shielding Ground	GND



FIGURE 2
GigE OptoLock connector shown with dust plug, as open connector, and with POF inserted

APPLICATION CIRCUIT

Following is the general interface circuit. Each Ethernet PHY manufacturer recommends a termination configuration for its design. Examples of the most commonly used PHYs are given in the Firecomms Ethernet Application Note.

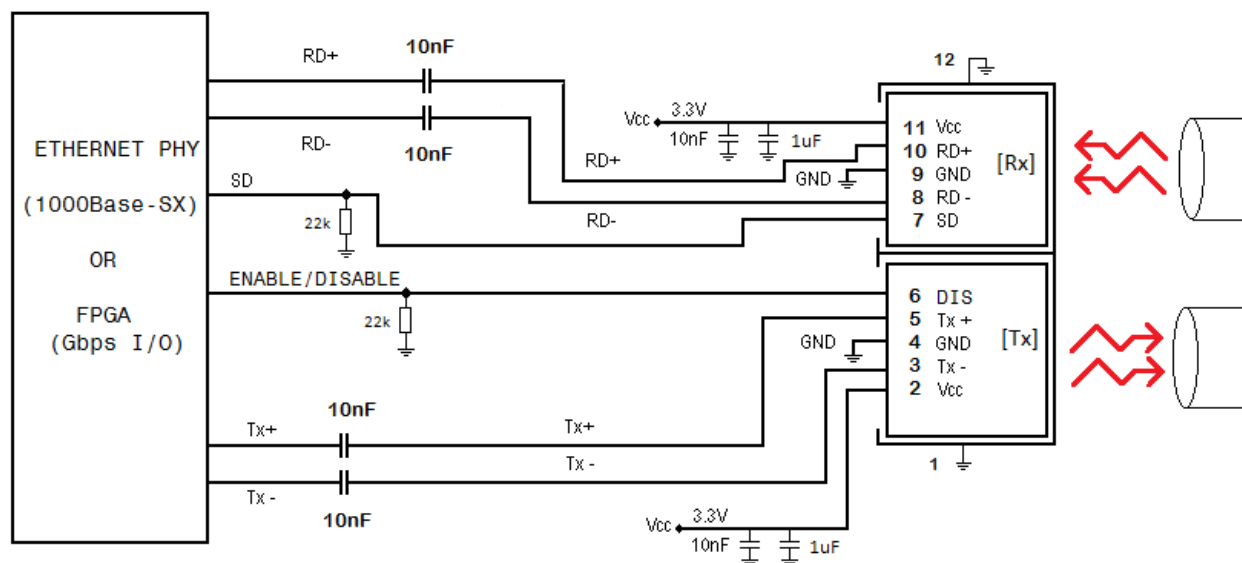


FIGURE 3

Typical application circuit for interfacing to 1000BaseSX port of a Gigabit Ethernet PHY or FPGA

Notes:

1. Interfacing circuit design is PHY-specific. Contact Firecomms for assistance on specific PHY interface.
2. Availability of SD input is PHY-specific. In case such input is not available, leave the RX SD pin floating.
3. Pull DIS pin low if PHY does not control transmitter power status.
4. TD+/- and RD+/- pins are high-speed IO; care must be taken to ensure the PCB traces are 50 Ohm single ended (100 Ohm differential).

MECHANICAL DATA

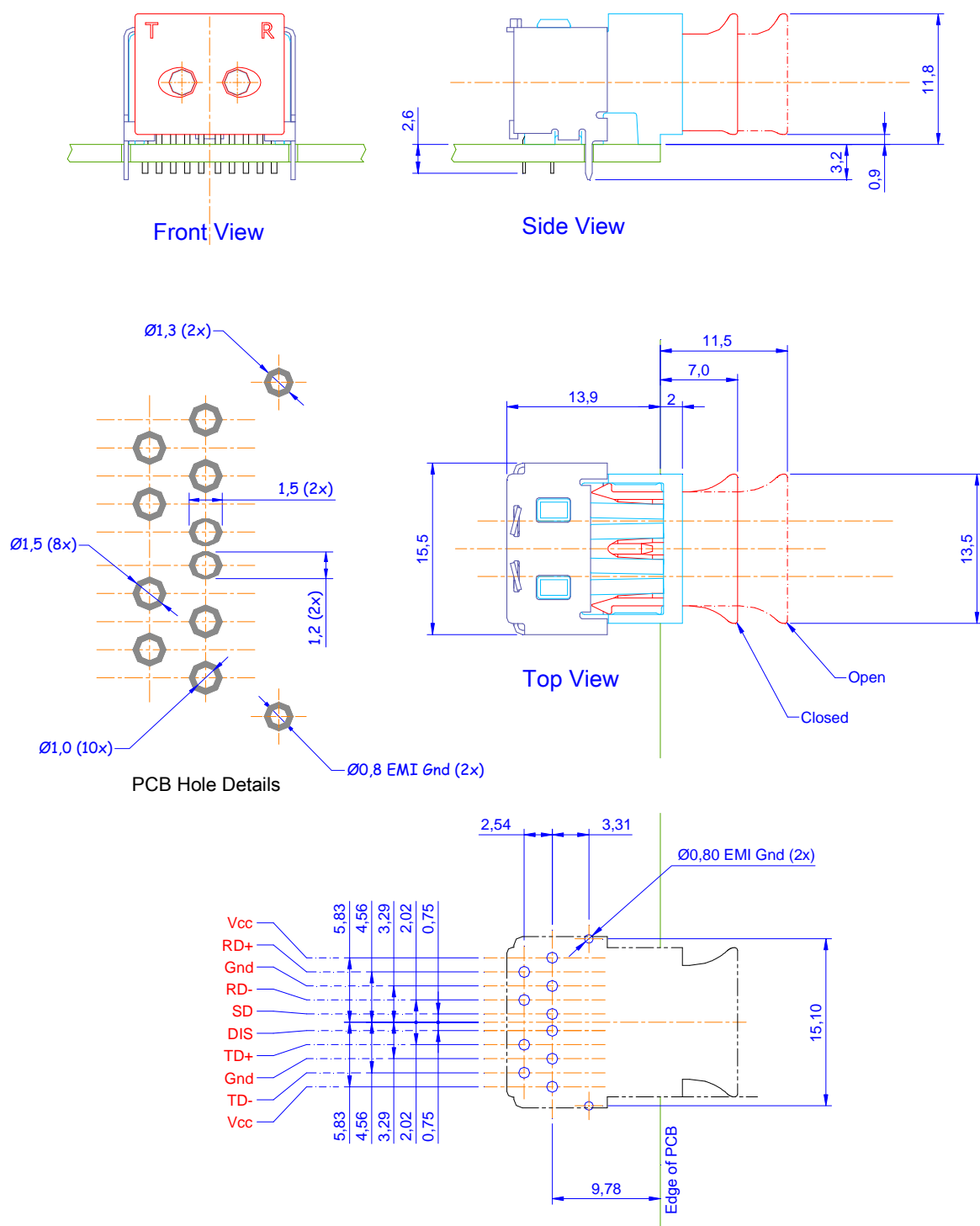


FIGURE 4

Mechanical dimensions of the GigE OptoLock connector and PCB footprint, which is a top view. General dimensional tolerance is $\pm 0.2\text{mm}$.

PACKING INFORMATION

Components are packed in PVC anti-static tubes in moisture barrier bags. Bags should be opened only in static-controlled locations, and standard procedures should be followed for handling moisture sensitive components.

Table 7 PACKING INFORMATION		
Components per Tube		25
	Tube Length	440 mm
	Tube Height	20 mm
	Tube Width	31 mm
Tubes per Bag		10
Bags per Inner Carton		1
	Inner Carton Length	590 mm
	Inner Carton Height	85 mm
	Inner Carton Width	145 mm
Weight per Inner Carton, Complete		1.8 Kg
Components per Inner Carton		250
Inner Cartons per Outer Carton		4
	Outer Carton Length	600 mm
	Outer Carton Height	300 mm
	Outer Carton Width	200-285 mm
Weight per Outer Carton, Complete		8.6 Kg
Components per Outer Carton		1,000

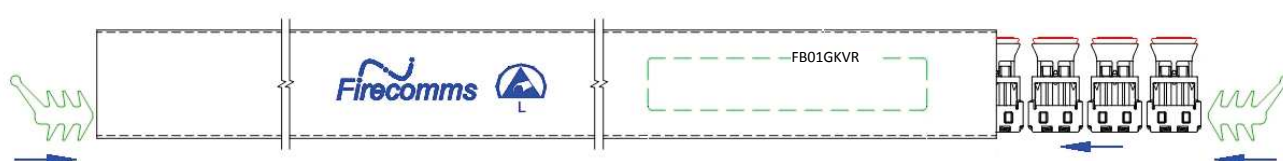


FIGURE 5
Packing tube for the Firecomms GigE OptoLock transceiver

ORDERING INFORMATION

Table 8 ORDERING INFORMATION		
Part Number	Name	Description
FB01GKVR	OptoLock Connector for Gigabit Ethernet over POF	650 nm RCLED-Based Transceiver with OptoLock Termination for POF