

PROLABS – ZX-GBIC-CWDM-XXXX-C

1.25GBd GBIC CWDM (1470nm – 1610nm) Transceiver, 23dB Margin

ZX-GBIC-CWDM-XXXX-C Overview

PROLABS's ZX-GBIC-CWDM-XXXX-C GBIC optical transceivers are compatible with Gigabit Ethernet IEEE 802.3 standard and Fiber Channel FC-PH, FC-PH2, FC-PH3 and FC-PI 13, also can provide a quick and reliable interface for the GE/FC application. The Digital diagnostics functions are available via 2-wire serial bus. In addition, they comply with GBIC specification revision 5.5.

Product Features

- Up to 1.25 GBd bi-directional data links
- Compliant with IEEE 802.3z Gigabit Ethernet standard
- Compliant with Gigabit Interface Converter Specification
- Compliant with Fiber Channel
- Uncooled DFB laser transmitter in 8 possible CWDM wavelengths
- Duplex SC connector
- SCA-2 Host connector
- Built-in digital diagnostic functions
- Up to 80km on 9/125um SMF
- Power supply 3.3V/5V
- RoHS Compliance
- Class 1 laser product complies with EN 60825-1
- Operating temperature range: 0°C to 70°C.

Applications

- 1.25 GBd Gigabit Ethernet
- 1.063 GBd Fiber Channel

Product Selection

ZX-GBIC-CWDM-XXXX-C		ZX-GBIC-CWDM-XXXX-C		ZX-GBIC-CWDM-XXXX-C		ZX-GBIC-CWDM-XXXX-C	
Wavelengths	xxxx	Wavelengths	xxxx	Wavelengths	xxxx	Wavelengths	xxxx
1470nm	1470	1510nm	1510	1550nm	1550	1590nm	1590
1490nm	1490	1530nm	1530	1570nm	1570	1610nm	1610

Product Identify – By Color on Clasp

ZX-GBIC-CWDM-XXXX-C		ZX-GBIC-CWDM-XXXX-C		ZX-GBIC-CWDM-XXXX-C		ZX-GBIC-CWDM-XXXX-C	
Wavelengths	Color	Wavelengths	Color	Wavelengths	Color	Wavelengths	Color
1470nm	Gray	1510nm	Blue	1550nm	Yellow	1590nm	Red
1490nm	Violet	1530nm	Green	1570nm	Orange	1610nm	Brown

Ordering Information

Part Number	Description
ZX-GBIC-CWDM-1470-C	GE/FC GBIC CWDM 1470nm SMF 80km with DOM function
ZX-GBIC-CWDM-1490-C	GE/FC GBIC CWDM 1490nm SMF 80km with DOM function
ZX-GBIC-CWDM-1510-C	GE/FC GBIC CWDM 1510nm SMF 80km with DOM function
ZX-GBIC-CWDM-1530-C	GE/FC GBIC CWDM 1530nm SMF 80km with DOM function
ZX-GBIC-CWDM-1550-C	GE/FC GBIC CWDM 1550nm SMF 80km with DOM function
ZX-GBIC-CWDM-1570-C	GE/FC GBIC CWDM 1570nm SMF 80km with DOM function
ZX-GBIC-CWDM-1590-C	GE/FC GBIC CWDM 1590nm SMF 80km with DOM function
ZX-GBIC-CWDM-1610-C	GE/FC GBIC CWDM 1610nm SMF 80km with DOM function

General Specifications

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Data Rate	DR	0.622		1.25	GBd	
Bit Error Rate	BER		10^{-12}			
Operating Temperature	T_{OP}	0		70	°C	Case temperature
Storage Temperature	T_{STO}	- 40		85	°C	Ambient temperature
Operating Current	I_{OP}			400	mA	Absolute Rating
Supply Current	I_S		200	300	mA	For electrical power interface
Input Voltage	V_{CC}	3.1		5.5	V	
Maximum Voltage	V_{MAX}	- 0.5		4	V	For electrical power interface

Optical Characteristics – Transmitter

$V_{CC}=3.15V$ to $5.5V$, $T_C=0^{\circ}C$ to $70^{\circ}C$

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Output Optical Power	P_{TX}	0		5	dBm	Class 1 Product
Optical Center Wavelength – 1470nm	λ_C	1466	1471	1477	nm	
Optical Center Wavelength – 1490nm		1486	1491	1497	nm	
Optical Center Wavelength – 1510nm		1506	1511	1517	nm	
Optical Center Wavelength – 1530nm		1526	1531	1537	nm	
Optical Center Wavelength – 1550nm		1546	1551	1557	nm	
Optical Center Wavelength – 1570nm		1566	1571	1577	nm	
Optical Center Wavelength – 1590nm		1586	1591	1597	nm	
Optical Center Wavelength – 1610nm		1606	1611	1617	nm	
Wavelength Temperature Dependence			0.08	0.125	nm/°C	
Extinction Ratio	ER	9			dB	
SideMode Suppression ratio	SMSR	30			dB	
Spectral Width (– 20dB)	$\Delta\lambda$			1	nm	
Optical Rise/Fall Time (20% - 80%)	$T_{RF IN}$			180	ps	

Optical Characteristics – Receiver

$V_{CC}=3.15V$ to $5.5V$, $T_C=0^{\circ}C$ to $70^{\circ}C$

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Optical Receiver Power	P_{RX}	0			dBm	
Optical Center Wavelength	λ_C	1270		1620	nm	
Receiver Sensitivity @ 1.062GBd	R_{X_SEN1}			- 23	dBm	Measured with a PRBS 2^7-1 test pattern, BER< 10^{-12}
Receiver Sensitivity @ 1.25GBd	R_{X_SEN2}			- 23	dBm	
Optical Return Loss	ORL	12			dB	
Loss of Signal-Asserted	P_{LOS_A}	- 30			dBm	
Loss of Signal-Deasserted	P_{LOS_D}			- 23	dBm	
Loss of Signal-Hysteresis			1		dB	

Electrical Characteristics – Low Speed Signals

$V_{CC}=3.15V$ to $5.5V$, $T_C=0^{\circ}C$ to $70^{\circ}C$

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
GBIC output Low	V_{OL}	0		0.5	V	4.7k to 10k ohm pull-up to host_ V_{CC} . Measured at
GBIC output High	V_{OH}	$V_{CC\_HOST}-0.5$		$V_{CC\_HOST}+0.3$	V	host side of connector
GBIC output Low	V_{IL}	0		0.8	V	4.7k to 10k ohm pull-up to V_{CC} . Measured at
GBIC output High	V_{IH}	2		$V_{CC}+0.3$	V	GBIC side of connector

Electrical Characteristics – High Speed Signals

$V_{CC}=3.15V$ to $5.5V$, $T_C=0^{\circ}C$ to $70^{\circ}C$

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Data input voltage (peak to peak)	V_{IN}	650		2000	mV	PECL differential
Data output voltage (peak to peak)	V_{OUT}	370		2000	mV	PECL differential
PECL rise/fall (20% - 80%)	T_R/T_F			260	ps	
Tx input impedance	Z_{IN}		75		ohm	
Rx output impedance	Z_{OUT}		75		ohm	

Digital Diagnostic Functions

ZX-GBIC-CWDM-XXXX-C support the 2-wire serial communication protocol. Digital diagnostic information are accessible over the 2-wire interface at the address 0xA2. Digital Diagnostics for ZX-GBIC-CWDM-XXXX-C are internally calibrated by default. A micro controller unit inside the transceiver gathers the monitoring information and reports the status of transceiver.

Transceiver Temperature, internally measured, represented as a 16 bit signed twos complement value in increments of 1/256 degrees Celsius, Temperature accuracy is better than ± 3 degrees Celsius over specified operating temperature and voltage.

Transceiver Supply Power, internally measured, represented as a 16 bit unsigned integer with the voltage defined as the full 16 bit value (0 – 65535) with LSB equal to 100 μ Volt, yielding a total range of 0 to +6.55 Volts.

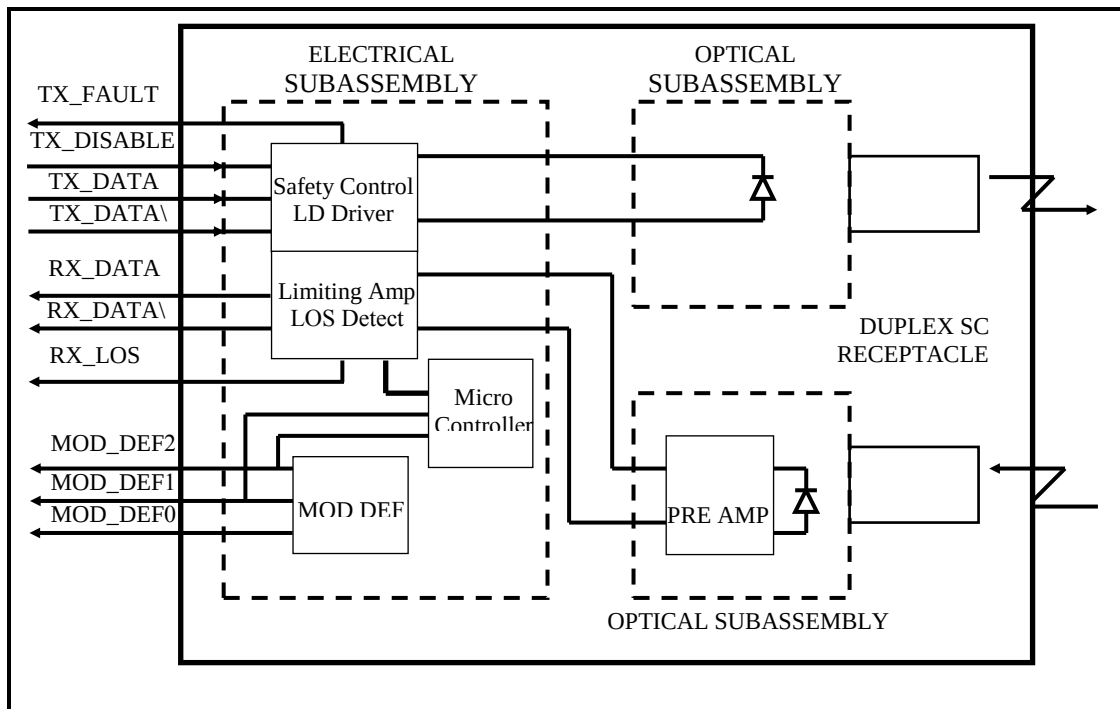
Transceiver TX bias current, internally measured, represented as a 16 bit unsigned integer with the current defined as the full 16 bit value (0 – 65535) with LSB equal to 2 μ A, yielding a total range of 0 to 131mA. Accuracy is better than $\pm 10\%$ over specified operating temperature and voltage.

Transceiver TX output power, internally measured, represented as a 16 bit unsigned integer with the power defined as the full 16 bit value (0 – 65535) with LSB equal to 0.1 μ W. Data is assumed to be based on measurement of laser monitor photodiode current. Accuracy is better than ± 3 dB over specified temperature and voltage. Data is not valid when the transmitter is disabled.

Transceiver RX received optical power, internally measured, represented as a 16 bit unsigned integer with the power defined as the full 16 bit 35 value (0 – 65535) with LSB equal to 0.1 μ W. Accuracy is better than ± 3 dB over specified temperature and voltage.

<i>Parameter</i>	<i>Symbol</i>	<i>Accuracy</i>	<i>Units</i>	<i>Report Range</i>	<i>Unit</i>	<i>Remarks</i>
<i>Internal Calibration</i>						
Temperature	T _{MON}	±3	°C	– 40	95	°C
Voltage	V _{MON}	±0.1	V	2.7	5.5	V
Bias Current	I _{MON}	±10	%	1	80	mA
Tx Power	P _{MON}	±3	dB	– 5	5	dBm
Rx Power	P _{MON}	±3	dB	– 30	0	dBm

Block Diagram of Transceiver



Transmitter Section

The DFB driver accept differential input data and provide bias and modulation currents for driving a laser. An automatic power-control (APC) feedback loop is incorporated to maintain a constant average optical power. DFB in an eye safe optical subassembly (OSA) mates to the fiber cable.

TX_DISABLE

The TX_DISABLE signal is high (TTL logic "1") to turn off the laser output. The laser will turn on within 1ms when TX_DISABLE is low (TTL logic "0").

TX_FAULT

When the TX_FAULT signal is high, output indicates a laser fault of some kind. Low indicates normal operation.

Receiver Section

The receiver utilizes a PIN detector integrated with a trans-impedance preamplifier in an OSA. This OSA is connected to a Limiting Amplifier which providing post-amplification quantization, and optical signal detection. The limiting Amplifier is AC-coupled to the transimpedance amplifier, with internal 100Ω differential termination.

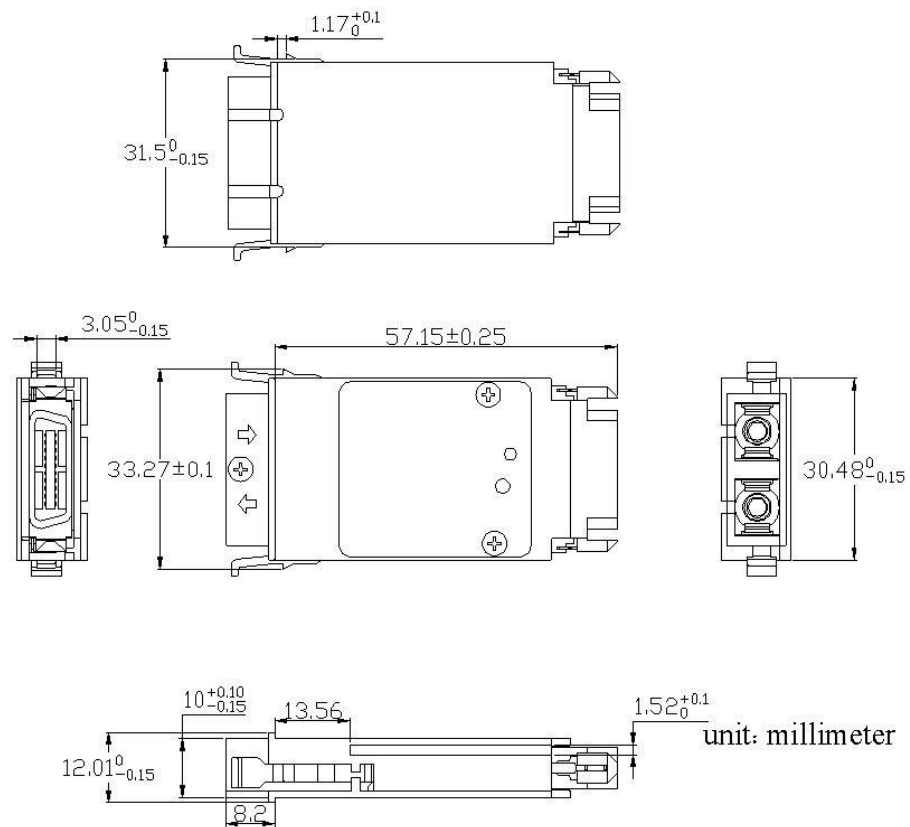
Receive Loss (RX_LOS)

The RX_LOS is high (logic "1") when there is no incoming light from the companion transceiver. This signal is normally used by the system for the diagnostic purpose. The signal is operated in TTL level.

Controller Section

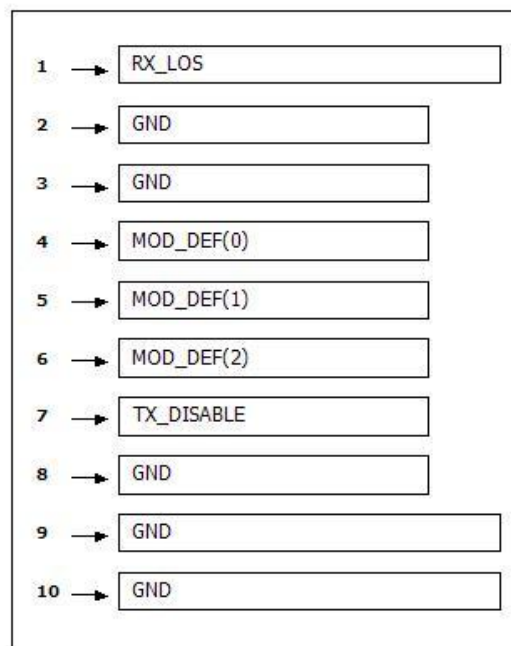
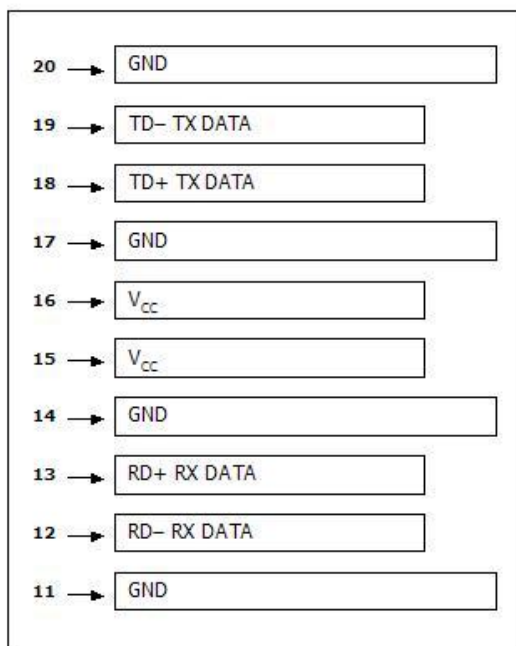
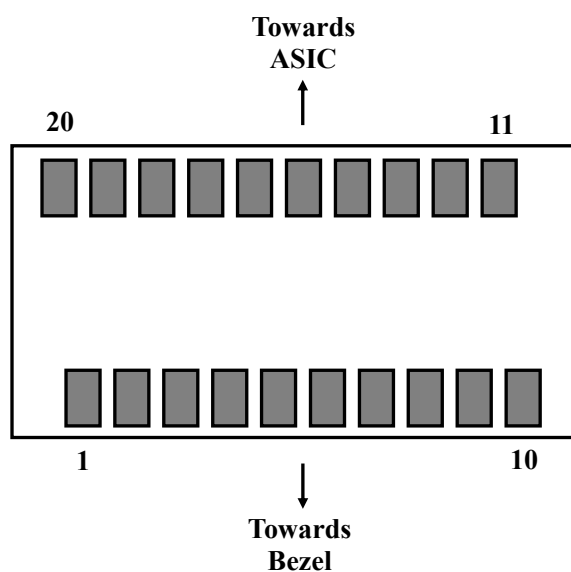
The micro controller unit monitors the operation information of LD driver and Limiting Amplifier. And report these status to the customer.

Dimensions



ALL DIMENSIONS ARE $\pm 0.2\text{mm}$ UNLESS OTHERWISE SPECIFIED
UNIT: mm

Electrical Pad Layout



Pin Assignment

PIN #	Symbol	Description	Remarks
1	RX_LOS	Receiver Loss of Signal	
2	RGND	Receiver Ground	Ground to GBIC
3	RGND	Receiver Ground	Ground to GBIC
4	MOD_DEF (0)	TTL Low	Ground to GBIC
5	MOD_DEF (1)	SCL Serial Clock Signal	Low speed, from GBIC
6	MOD_DEF (2)	SDA Serial Data Signal	Low speed, from GBIC
7	TX_DISABLE	Transmitter Disable	Low speed, to GBIC
8	TGND	Transmitter Ground	Ground to GBIC
9	TGND	Transmitter Ground	Ground to GBIC
10	TX_FAULT	Transmitter Fault	Ground to GBIC
11	RGND	Receiver Ground	Ground to GBIC
12	RD-	Receiver Inverted DATA out. AC coupled	High speed serial from GBIC
13	RD+	Receiver Non-inverted DATA out. AC coupled	High speed serial from GBIC
14	RGND	Receiver Ground	Ground to GBIC
15	V _{CCR}	Receiver power supply	
16	V _{CCT}	Transmitter power supply	
17	TGND	Transmitter Ground	Ground to GBIC
18	TD+	Transmitter Non-Inverted DATA in. AC coupled	High speed serial from GBIC
19	TD-	Transmitter Inverted DATA in. AC coupled	High speed serial from GBIC
20	TGND	Transmitter Ground	Ground to GBIC

References

1. IEEE standard 802.3. IEEE Standard Department, 2002.
2. Gigabit Interface Converter (GBIC) Revision 5.5.
3. Atmel Corporation – AT24C01A/02/04/08/16 2-Wire Serial CMOS EEPROM.
4. Fiber Channel Physical and Signaling Interface (FC-PH/PH2/PH3).
5. Fiber Channel Draft Physical Interface Specification (FC-PI 13.0)