1.25Gbps Single Fiber Bi-directional GBIC Transceiver

(For 10～40km point-to-point transmission, RoHS compliant)

Members Of Flexon™ Family

Features

- 1.25Gbps bi-direction data links
- Up to 10km and 40km point-point transmission
- 1310nm FP transmitter and 1550nm PIN receiver for FTM-9312S-G10G
- 1310nm DFB transmitter and 1550nm PIN receiver for FTM-9312S-G40G
- 1550nm DFB transmitter and 1310nm PIN receiver for FTM-9512S-S10G and FTM-9512S-S40G
- Class I laser product
- Low EMI and excellent ESD protection
- GBIC MSA package with single SC receptacle
- Detailed product information in EEPROM
- Operating case temperature: 0 ~70℃

Applications

- WDM Application
- Gigabit Ethernet
- Point-to-Point FTTX Application

Standard

- Compatible with GBIC specification (SFF-8053), Rev 5.5
- Compatible with IEEE 802.3z
- Compatible with IEEE 802.3ah
- Compatible with FCC 47 CFR Part 15, Class B
- Compatible with FDA 21 CFR 1040.10 and 1040.11, Class I
- RoHS compliant

Description

Fiberxon 1.25G single fiber bi-directional GBIC transceivers are high performance, cost effective modules, which supports data rate of 1.25Gbps and transmission distance up to 10km and 40km.

FTM-9312S-G10G/FTM-9312S-G40G is normally used in the client side (ONT), which transmits 1310nm optical signal and receives 1550nm optical signal. While FTM-9512S-G10G/ FTM-9512S-G40G is used in the central office side (OLT), which transmits 1550nm optical signal and receives 1310nm optical signal.

The standard serial ID information compatible GBIC MSA describes the transceiver's capabilities, standard interfaces, manufacturer and other information. The host equipment can access this information via the 2-wire serial CMOS EEPROM protocol. For further information, please refer to GBIC MSA.

Fiberxon 1.25G single fiber bi-directional GBIC transceivers are RoHS compliant.

Regulatory Compliance

The transceivers have been tested according to American and European product safety and electromagnetic compatibility regulations (See Table 1). For further information regarding regulatory certification, please refer to FlexonTM regulatory specification and safety guidelines, or contact with Fiberxon, Inc. America sales office listed at the end of documentation.

Table 1 - Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>500 V)
Electrostatic Discharge (ESD) to the Duplex LC Receptacle	IEC 61000-4-2 GR-1089-CORE	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B	Compatible with standards
Immunity	IEC 61000-4-3	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2	Compatible with Class I laser product.
Component Recognition	UL and CSA	Compatible with standards
RoHS	2002/95/EC 4.1&4.2 2005/747/EC	Compliant with standards

Absolute Maximum Ratings

Absolute Maximum Ratings are those values beyond which damage to the devices may occur.

Table 2 – Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T_S	-40	+85	°C
Supply Voltage	V_{CC}	-0.5	6.0	V
Operating Humidity	-	5	95	%

Recommended Operating Conditions

Table 3 - Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Operating Case Temperature	T_C	0		+70	°C
Power Supply Voltage	V_{CC}	3.1		5.5	V
Power Supply Current	I_{CC}			300	mA
Data Rate			1.25		Gbps

FTM-9312S-G10G (1310nm FP Tx/1550nm PIN Rx for ONU, 10km)

Table 4 –Optical and Electrical Characteristics

Parameter		Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter							
Centre Wavelength		λ_C	1260		1360	nm	
Average Optical Output Power		P_{0ut}	-9		-3	dBm	1
P_{0ut}@TX Disable Asserted					-45	dBm	
Spectral Width (RMS)		Δλ			4	nm	
Extinction Ration		EX	9			dB	
Rise/Fall Time (20%~80%)		tr /tf			0.26	ns	
Total Jitter		TJ			345	ps	
Output Optical Eye		IEEE 802.3z compliant					2
Data Input Swing Differential		V_{IN}	650		2000	mV	3
Input Differential Impedance		Z_{IN}	140	150	160	Ω	
TX Disable	Disable		2.0		Vcc+0.3	V	
	Enable		0		0.8	V	
TX Fault	Fault		Vcc-0.5		Vcc+0.3	V	
	Normal		0		0.5	V	
Receiver							
Centre Wavelength		λ_C	1480		1580	nm	
Receiver Sensitivity					-20	dBm	4
Receiver Overload			0			dBm	4
Return Loss			12			dB	
LOS De-Assert		LOS_D			-21	dBm	
LOS Assert		LOS_A	-35			dBm	
LOS Hysteresis			0.5		4.5	dB	
Data Output Swing Differential		V_{OUT}	370		2000	mV	5
LOS	High		Vcc-0.5		Vcc+0.3	V	
	Low		0		0.5	V	

Note:

1. The optical power is launched into SMF.
2. Measured with a PRBS 2^7-1 test pattern @1.25Gbps.
3. CML input, internally AC coupled and terminated.
4. Worst-case Extinction Ration, measured with a PRBS 2^7 –1 test pattern@1.25Gbps, BER≤1×10^{-12}.
5. CML output, internally AC coupled.

FTM-9512S-G10G (1550nm DFB Tx/1310nm PIN Rx for OLT, 10km)

Table 5 –Optical and Electrical Characteristics

Parameter		Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter							
Centre Wavelength		λ_C	1480	1550	1580	nm	
Average Output Power		P_{0ut}	-9		-3	dBm	1
P_{0ut}@TX Disable Asserted					-45	dBm	
Spectral Width (-20dB)		Δλ			1	nm	
Extinction Ration		EX	9			dB	
Rise/Fall Time (20%~80%)		tr /tf			0.26	ns	
Total Jitter		TJ			345	ps	
Output Optical Eye		IEEE 802.3z compliant					2
Data Input Swing Differential		V_{IN}	650		2000	mV	3
Input Differential Impedance		Z_{IN}	140	150	160	Ω	
TX Disable	Disable		2.0		Vcc+0.3	V	
	Enable		0		0.8	V	
TX Fault	Fault		Vcc-0.5		Vcc+0.3	V	
	Normal		0		0.5	V	
Receiver							
Centre Wavelength		λ_C	1260		1360	nm	
Receiver Sensitivity					-20	dBm	4
Receiver Overload			0			dBm	4
Return Loss			12			dB	
LOS De-Assert		LOS_D			-21	dBm	
LOS Assert		LOS_A	-35			dBm	
LOS Hysteresis			0.5		4.5	dB	
Data Output Swing Differential		V_{OUT}	370		2000	mV	5
LOS	High		Vcc-0.5		Vcc+0.3	V	
	Low		0		0.5	V	

Note:

1. The optical power is launched into SMF.
2. Measured with a PRBS 2^7-1 test pattern @1.25Gbps.
3. CML input, internally AC coupled and terminated.
4. Worst-case Extinction Ration, measured with a PRBS 2^7–1 test pattern@1.25Gbps, BER$\leqslant 1\times 10^{-12}$
5. CML output, internally AC coupled.

FTM-9312S-G40G (1310nm DFB Tx/1550nm PIN Rx for ONU, 40km)

Table 6 –Optical and Electrical Characteristics

Parameter		Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter							
Centre Wavelength		λ_C	1290	1310	1330	nm	
Average Optical Output Power		P_{0ut}	-2		+3	dBm	1
P_{0ut}@TX Disable Asserted					-45	dBm	
Spectral Width (-20dB)		Δλ			1	nm	
Extinction Ration		EX	9			dB	
Rise/Fall Time (20%~80%)		tr /tf			0.26	ns	
Total Jitter		TJ			345	ps	
Output Optical Eye		IEEE 802.3z compliant					2
Data Input Swing Differential		V_{IN}	650		2000	mV	3
Input Differential Impedance		Z_{IN}	140	150	160	Ω	
TX Disable	Disable		2.0		Vcc+0.3	V	
	Enable		0		0.8	V	
TX Fault	Fault		Vcc-0.5		Vcc+0.3	V	
	Normal		0		0.5	V	
Receiver							
Centre Wavelength		λ_C	1480		1580	nm	
Receiver Sensitivity					-23	dBm	4
Receiver Overload			0			dBm	4
Return Loss			12			dB	
LOS De-Assert		LOS_D			-24	dBm	
LOS Assert		LOS_A	-35			dBm	
LOS Hysteresis			0.5		4.5	dB	
Data Output Swing Differential		V_{OUT}	370		2000	mV	5
LOS	High		Vcc-0.5		Vcc+0.3	V	
	Low		0		0.5	V	

Note:

1. The optical power is launched into SMF.
2. Measured with a PRBS 2^7-1 test pattern @1.25Gbps.
3. CML input, internally AC coupled and terminated.
4. Worst-case Extinction Ration, measured with a PRBS 2^7 –1 test pattern@1.25Gbps, BER≤1×10^{-12}.
5. CML output, internally AC coupled.

FTM-9512S-G40G (1550nm DFB Tx/1310nm PIN Rx for OLT, 40km)

Table 7 –Optical and Electrical Characteristics

Parameter		Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter							
Centre Wavelength		λ_C	1480	1550	1580	nm	
Average Output Power		P_{0ut}	-2		+3	dBm	1
P_{0ut}@TX Disable Asserted					-45	dBm	
Spectral Width (-20dB)		Δλ			1	nm	
Extinction Ration		EX	9			dB	
Rise/Fall Time (20%~80%)		tr /tf			0.26	ns	
Total Jitter		TJ			345	ps	
Output Optical Eye		IEEE 802.3z compliant					2
Data Input Swing Differential		V_{IN}	650		2000	mV	3
Input Differential Impedance		Z_{IN}	140	150	160	Ω	
TX Disable	Disable		2.0		Vcc+0.3	V	
	Enable		0		0.8	V	
TX Fault	Fault		Vcc-0.5		Vcc+0.3	V	
	Normal		0		0.5	V	
Receiver							
Centre Wavelength		λ_C	1260		1360	nm	
Receiver Sensitivity					-23	dBm	4
Receiver Overload			0			dBm	4
Return Loss			12			dB	
LOS De-Assert		LOS_D			-24	dBm	
LOS Assert		LOS_A	-35			dBm	
LOS Hysteresis			0.5		4.5	dB	
Data Output Swing Differential		V_{OUT}	370		2000	mV	5
LOS	High		Vcc-0.5		Vcc+0.3	V	
	Low		0		0.5	V	

Note:

1. The optical power is launched into SMF.
2. Measured with a PRBS 2^7-1 test pattern @1.25Gbps.
3. CML input, internally AC coupled and terminated.
4. Worst-case Extinction Ration, measured with a PRBS 2^7–1 test pattern@1.25Gbps, BER$\leqslant 1\times 10^{-12}$
5. CML output, internally AC coupled.

Recommended Interface Circuit

Figure 1 shows the recommended interface circuit.

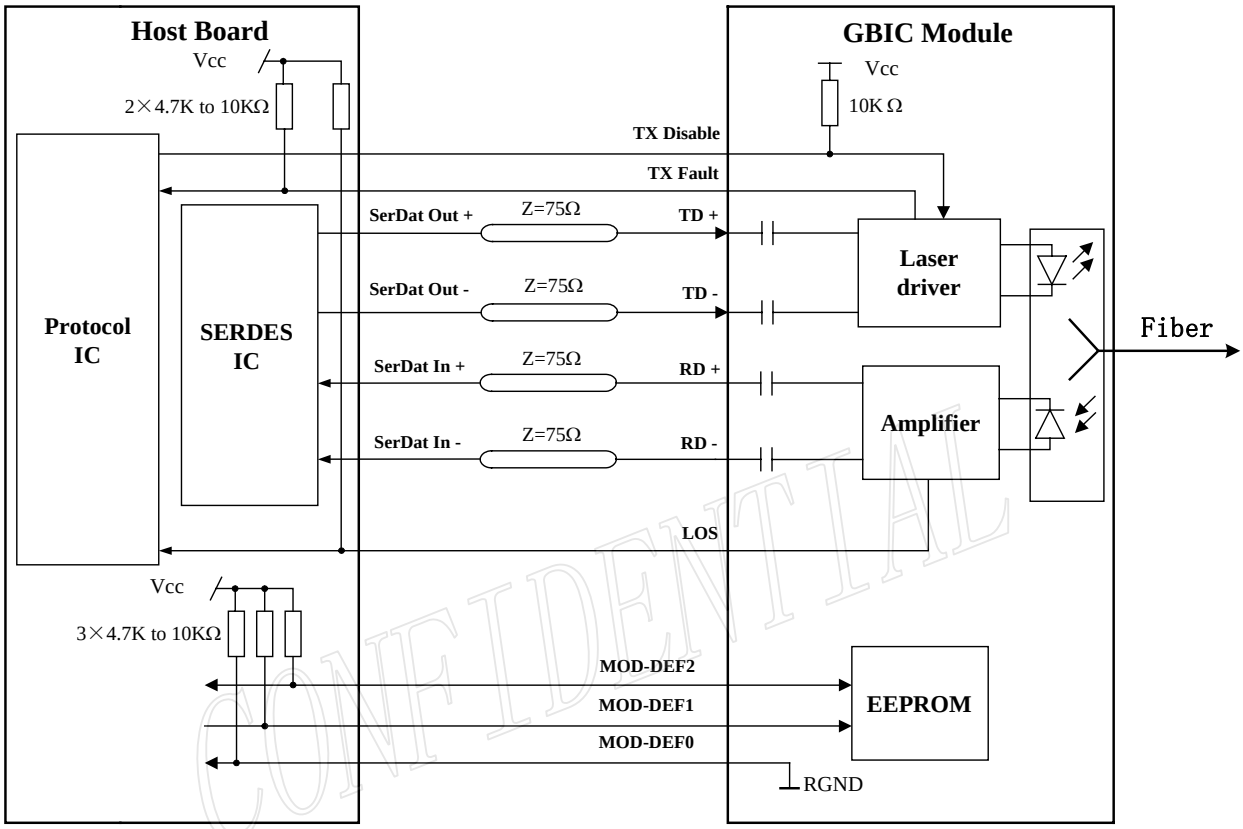


Figure 1, Recommended Interface Circuit

Pin Definitions

Figure 2 below shows the pin numbering of GBIC electrical interface. The pin functions are described in Table 8 with the accompanying notes.

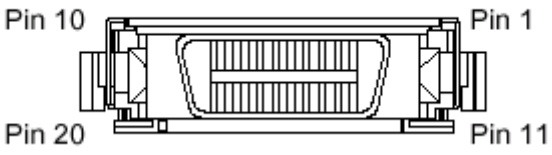


Figure 2, Pin View

Table 8 – Pin Function Definitions

Pin Name	Pin #	Name/Function	Signal Specification
RECEIVER SIGNALS			
RGND	2, 3, 11, 14	Receiver Ground (may be connected with TGND in GBIC)	Ground, to GBIC
$V_{DD}R$	15	Receiver +3.3/5 volt (may be connected with $V_{DD}T$ in GBIC)	Power, to GBIC
-RX_DAT	12	Receive Data, Differential PECL	High speed serial, from GBIC
+RX_DAT	13	Receive Data, Differential PECL	High speed serial, from GBIC
RX_LOS	1	Receiver Loss of Signal, logic high, open collector compatible, 4.7k to 10kΩ pull up to $V_{DD}T$ on host	Low speed, from GBIC
TRANSMITTER SIGNALS			
TGND	8, 9, 17, 20	Transmitter Ground (may be connected with RGND internally)	Ground, to GBIC
$V_{DD}T$	16	Transmitter +3.3/5 volt (may be connected with $V_{DD}R$ in GBIC)	Power, to GBIC
+TX_DAT	18	Transmit Data, Differential PECL	High speed serial, to GBIC
-TX_DAT	19	Transmit Data, Differential PECL	High speed serial, to GBIC
TX_DISABLE	7	Transmitter Disable, logic high, open collector compatible, 4.7k to 10kΩ pull up to $V_{DD}T$ on GBIC	Low speed, to GBIC
TX_FAULT	10	Transmitter Fault, logic high, open collector compatible, 4.7k to 10kΩ pull up to $V_{DD}T$ on host	Low speed, from GBIC
CONTROL SIGNALS			
MOD_DEF(0)	4	TTL low, output	Please reference GBIC standard, Annex D: Module definition “4”
MOD_DEF(1)	5	SCL serial clock signal, input	
MOD_DEF(2)	6	SDA serial data signal, input/output	

Mechanical Design Diagram

The mechanical design diagram is shown in Figure 3.

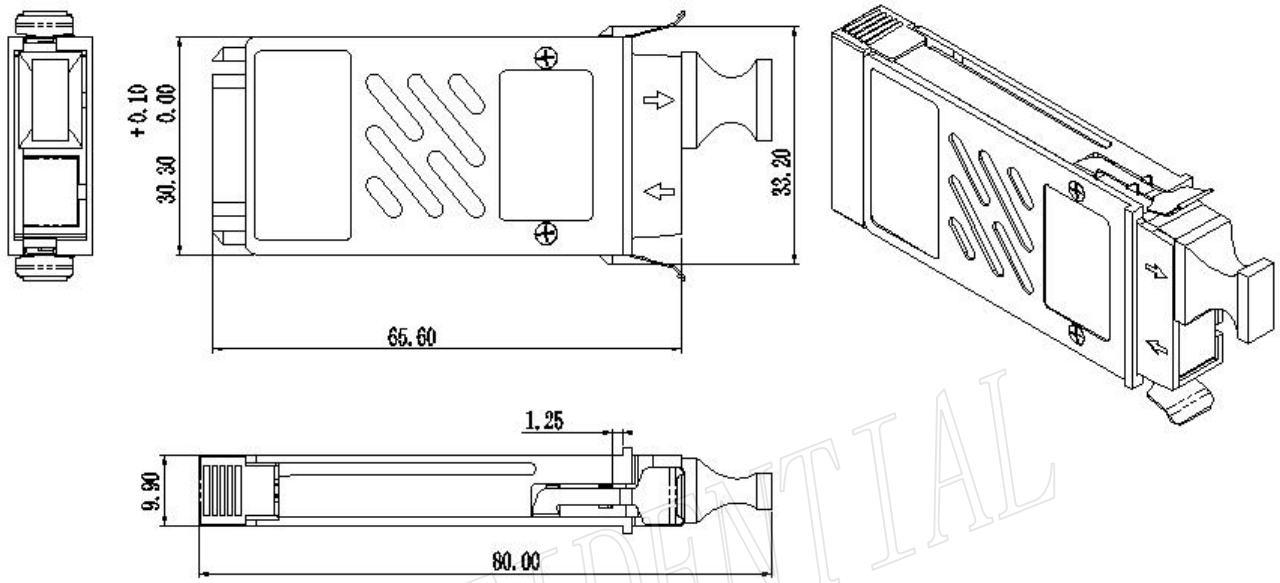
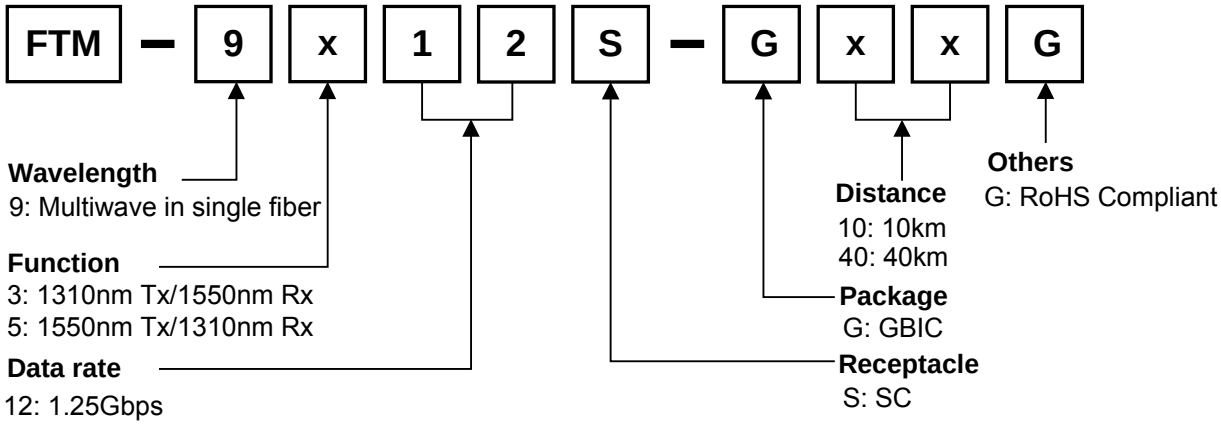


Figure 3, Mechanical Design Diagram (Unit mm)

Ordering information



Part No.	Product Description
FTM-9312S-G10G	1310nm Tx/1550nm RX for ONU, 1.25Gbps, 10km, GBIC with SC receptacle, 0°C~+70°C
FTM-9312S-G40G	1310nm Tx/1550nm RX for ONU, 1.25Gbps, 40km, GBIC with SC receptacle, 0°C~+70°C
FTM-9512S-G10G	1550nm Tx/1310nm RX for OLT, 1.25Gbps, 10km, GBIC with SC receptacle, 0°C~+70°C
FTM-9512S-G40G	1550nm Tx/1310nm RX for OLT, 1.25Gbps, 40km, GBIC with SC receptacle, 0°C~+70°C

Related Documents

For further information, please refer to the following documents:

- *Flexon™ GBIC Installation Guide*
- SFF-8053, Proposed Specification for GBIC (Gigabit Interface Converter), Rev 5.5

Obtaining Document

You can visit our website:

http://www.fiberxon.com
Or contact with Fiberxon, Inc. America Sales Office listed at the end of documentation to get the latest documents.

Revision History

Revision	Initiate	Review	Approve	Subject	Release Date
Rev. 1a	Univer.Yang	Simon.Jiang	Walker.Wei	Initial datasheet	March 17, 2006

Contact
U.S.A. Headquarter:
5201 Great America Parkway, Suite 340
Santa Clara, CA 95054
U. S. A.
Tel: 408-562-6288
Fax: 408-562-6289
Or visit our website: http://www.fiberxon.com