

1.0625~1.25Gbps GBIC Transceiver

(Up to 20km transmission, RoHS compliant)

Members Of Flexon™ Family



Features

- ◆ 1.0625~1.25Gbps multi-rate
- ◆ 1310nm FP laser transmitter.
- ◆ 2m~10km with 9/125µm SMF for FTM-3012S-GG
- ◆ 2m~20km with 9/125µm SMF for FTM-3012S-G20G
- ◆ 550m with 50/125 µm MMF
- ◆ 550m with 62.5/125 µm MMF
- ◆ Class I laser product
- ◆ Low EMI and excellent ESD protection
- ◆ Duplex SC optical interface
- ◆ Extended power supply +3.3/5.0V compatibility
- ◆ Standard serial ID information compatible with SFF-8053
- ◆ Operating case temperature: 0 to +70°C

Applications

- ◆ Switch to Switch interface
- ◆ Switched backplane applications
- ◆ Router/Server interface
- ◆ Other optical transmission systems

Standard

- ◆ Compatible with GBIC specification (SFF-8053), Rev 5.5
- ◆ Compatible with ANSI specification for Fibre Channel
- ◆ 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 1.0625~1.25Gbps GBIC transceivers are high performance, cost effective modules. They are designed for Gigabit Ethernet and 1x Fibre Channel applications from 10km to 20km.

The transceiver consists of two sections: The transmitter section incorporates a highly reliable FP laser. And the receiver section consists of a PIN photodiode mounted together with a trans-impedance preamplifier (TIA). All modules satisfy Class I Laser Safety requirements.

The standard serial ID information compatible with 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 SFF-8053.

Fiberxon's FTM-3012S-GxxG transceiver series are compliant with RoHS

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 Flexon™ regulatory specification and safety guidelines, or contact with Fiberxon, Inc. America sales office listed at the end of the 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	Compliant with standards
RoHS	2002/95/EC 4.1&4.2	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	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			1.0625/1.25		Gbps

FTM-3012S-GG (1310nm FP and PIN, 10km)**Table 4 –Optical and Electrical Characteristics**

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes	
Transmitter							
Centre Wavelength	λ_C	1260	1310	1360	nm		
Average Output Power	P_{Out}	-9.5		-3	dBm	1	
Spectral Width (RMS)	σ			4	nm		
Extinction Ratio	EX	9			dB		
P_{Out} @TX Disable Asserted				-45	dBm	1	
Rise/Fall Time (20%~80%)	t_r/t_f			0.26	ns	2	
Total Jitter	1.25G	T_J		0.431	UI	3	
	1.0625G			0.43			
Deterministic Jitter	1.25G	D_J		0.2	UI		
	1.0625G			0.21			
Output Optical Eye	IEEE 802.3z and ANSI Fibre Channel compatible						4
Data Input Swing Differential	V_{IN}	200		1660	mV		5
Input Differential Impedance	Z_{IN}	140	150	160	Ω		
TX Disable	Disable		2.0	$V_{CC}+0.3$	V		
	Enable		0	0.8	V		
TX Fault	Fault		$Host_V_{CC}-0.5$	$Host_V_{CC}+0.3$	V		
	Normal		0	0.5	V		
Receiver							
Centre Wavelength	λ_C	1200	1310	1650	nm		
Receiver Sensitivity				-20	dBm	6	
Receiver Overload		-3			dBm		
Return Loss		12			dB		
LOS De-Assert	LOS_D			-21	dBm		
LOS Assert	LOS_A	-35			dBm		
LOS Hysteresis		1		4	dB		
Data Output Swing Differential	V_{OUT}	370		2000	mV	5	
Total Jitter	1.25G	T_J		0.749	UI	3	
	1.0625G			0.61			
Deterministic Jitter	1.25G	D_J		0.462	UI		
	1.0625G			0.36			
LOS	High		$Host_V_{CC}-0.5$	$Host_V_{CC}+0.3$	V		
	Low		0	0.5	V		

Note:

1. The optical power is launched into SMF.
2. Unfiltered, measured with a PRBS 2^7-1 test pattern @1.25Gbps
3. Measured with a PRBS 2^7-1 test pattern@1.25Gbps/1.0625Gbps, meet the specified maximum output jitter requirements if the specified maximum input jitter is present.

4. Measured with a PRBS 2^7-1 test pattern@1.25Gbps/1.0625Gbps.
5. AC coupled and terminated.
6. Worst-case Extinction Ration, measured with a PRBS 2^7-1 test pattern @1.25Gbps, $BER \leq 1 \times 10^{-12}$.

FTM-3012S-G20G (1310nm FP and PIN, 20km)

Table 5 –Optical and Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter						
Centre Wavelength	λ_C	1270	1310	1355	nm	
Average Output Power	P_{Out}	-8		-3	dBm	1
Spectral Width (RMS)	σ		2	4	nm	
Extinction Ration	EX	9			dB	
P_{Out} @TX Disable Asserted				-45	dBm	1
Rise/Fall Time (20%~80%)	t_r/t_f			0.26	ns	2
Total Jitter	1.25G	T_J		0.431	UI	3
	1.0625G			0.43		
Deterministic Jitter	1.25G	D_J		0.2	UI	
	1.0625G			0.21		
Output Optical Eye	IEEE 802.3z and ANSI Fibre Channel compatible					4
Data Input Swing Differential	V_{IN}	200		1660	mV	5
Input Differential Impedance	Z_{IN}	140	150	160	Ω	
TX Disable	Disable	2.0		$V_{CC}+0.3$	V	
	Enable	0		0.8	V	
TX Fault	Fault		$Host_V_{CC}-0.5$	$Host_V_{CC}+0.3$	V	
	Normal		0	0.5	V	
Receiver						
Centre Wavelength	λ_C	1200	1310	1650	nm	
Receiver Sensitivity				-22	dBm	6
Receiver Overload		-3			dBm	
Return Loss		12			dB	
LOS De-Assert	LOS_D			-23	dBm	
LOS Assert	LOS_A	-35			dBm	
LOS Hysteresis		1		4	dB	
Data Output Swing Differential	V_{OUT}	370		2000	mV	5
Total Jitter	1.25G	T_J		0.749	UI	3
	1.0625G			0.61		
Deterministic Jitter	1.25G	D_J		0.462	UI	
	1.0625G			0.36		
LOS	High		$Host_V_{CC}-0.5$	$Host_V_{CC}+0.3$	V	
	Low		0	0.5	V	

Note:

1. The optical power is launched into SMF.
2. Unfiltered, measured with a PRBS 27-1 test pattern @1.25Gbps
3. Measured with a PRBS 2⁷-1 test pattern@1.25Gbps, meet the specified maximum output jitter requirements if the specified maximum input jitter is present.
4. Measured with a PRBS 2⁷-1 test pattern@1.25Gbps.
5. PECL level, internally AC coupled and terminated.
6. Worst-case Extinction Ratio, measured with a PRBS 2⁷-1 test pattern@1.25Gbps, BER≤1×10⁻¹².

EEPROM Information

The SFF-8053 defines a 256-byte memory map in EEPROM describing the transceiver's capabilities, standard interfaces, manufacturer, and other information, which is accessible over a 2 wire serial interface at the 8-bit address 1010000X (A0h). The memory contents refer to Table 6

Table 6 - EEPROM Serial ID Memory Contents (A0h)

Addr.	Field Size (Bytes)	Name of Field	Hex	Description
0	1	Identifier	01	GBIC
1	1	Ext. Identifier	04	MOD4
2	1	Connector	01	SC
3—10	8	Transceiver	00 00 00 02 12 00 0D 01	Transmitter Code
11	1	Encoding	01	8B10B
12	1	BR, nominal	0D	1.25Gbps
13	1	Reserved	00	
14	1	Length (9um)-km	xx	xxkm
15	1	Length (9um)	64	
16	1	Length (50um)	37	550m
17	1	Length (62.5um)	37	550m
18	1	Length (copper)	00	
19	1	Reserved	00	
20—35	16	Vendor name	46 49 42 45 52 58 4F 4E 20 49 4E 43 2E 20 20 20	"FIBERXON INC." (ASC II)
36	1	Reserved	00	
37—39	3	Vendor OUI	00 00 00	
40—55	16	Vendor PN	46 54 4D 2D 33 30 31 32 53 2D 47 xx xx 47 20 20	"FTM-3012S-GxxG" (ASC II)
56—59	4	Vendor rev	xx xx xx xx	ASC II ("31 30 20 20" means 1.0 revision)
60-62	3	Reserved	00 00 00	
63	1	CC BASE	xx	Check sum of bytes 0 - 62
64—65	2	Options	00 1A	LOS, TX_FAULT and TX_DISABLE
66	1	BR, max	00	

67	1	BR, min	00	
68—83	16	Vendor SN	xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx	ASC II
84—91	8	Vendor date code	xx xx xx xx xx xx 20 20	Year (2 bytes), Month (2 bytes), Day (2 bytes)
92—94	1	Reserved	00	
95	1	CC_EXT	xx	Check sum of bytes 64 - 94
96—255	160	Vendor specific		

Note: The “xx” byte should be filled in according to practical case. For more information, please refer to the related document of SFF-8053 Rev 5.5.

Recommended Interface Circuit

Figure 1 shows the recommended interface circuit.

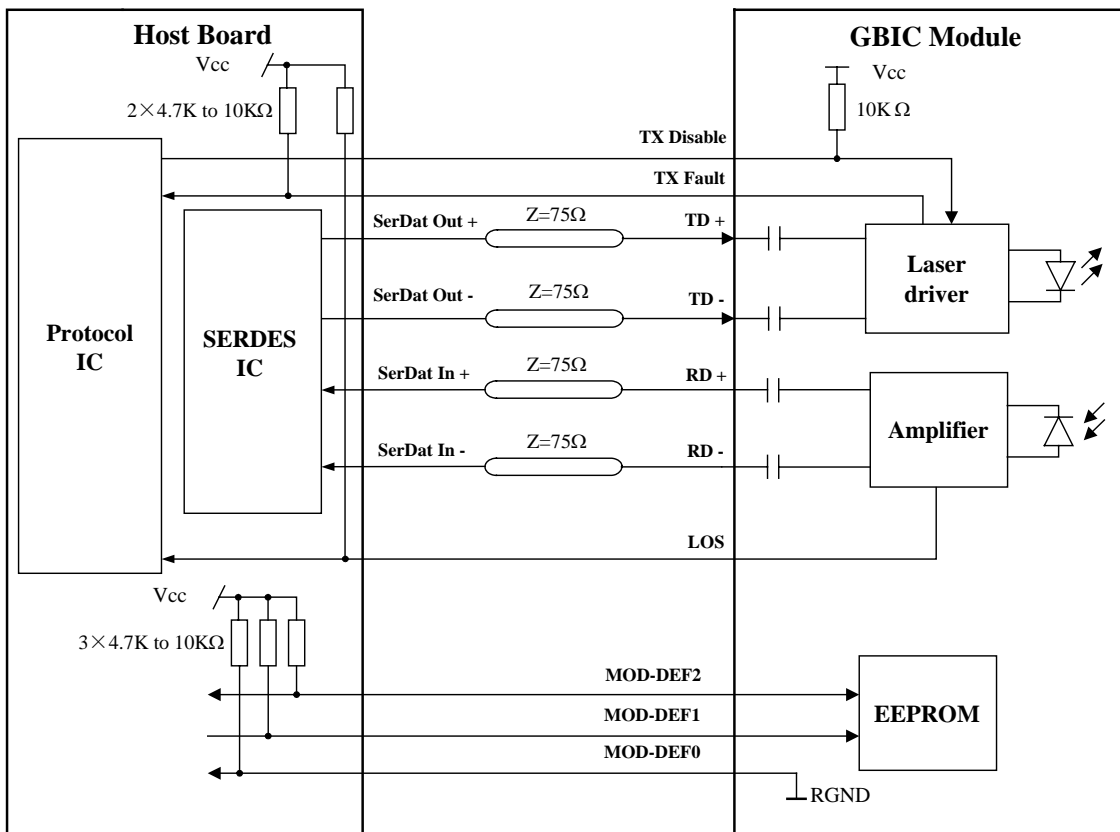


Figure 1, Recommended Interface Circuit

Pin Definitions

Figure 2 below shows the pin numbering of GBIC electrical interface. The pin functions are described in Table 7.

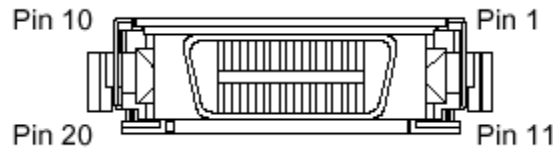


Figure 2, Pin View

Table 7 – 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 _{DDR}	15	Receiver +3.3/5 volt (may be connected with V _{DDT} 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 _{DDT} 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 _{DDT}	16	Transmitter +3.3/5 volt (may be connected with V _{DDR} 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 _{DDT} on GBIC	Low speed, to GBIC
TX_FAULT	10	Transmitter Fault, logic high, open collector compatible, 4.7k to 10kΩ pull up to V _{DDT} on host	Low speed, from GBIC
CONTROL SIGNALS			
MOD_DEF(0)	4	TTL low, output	Please reference SFF-8053, 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

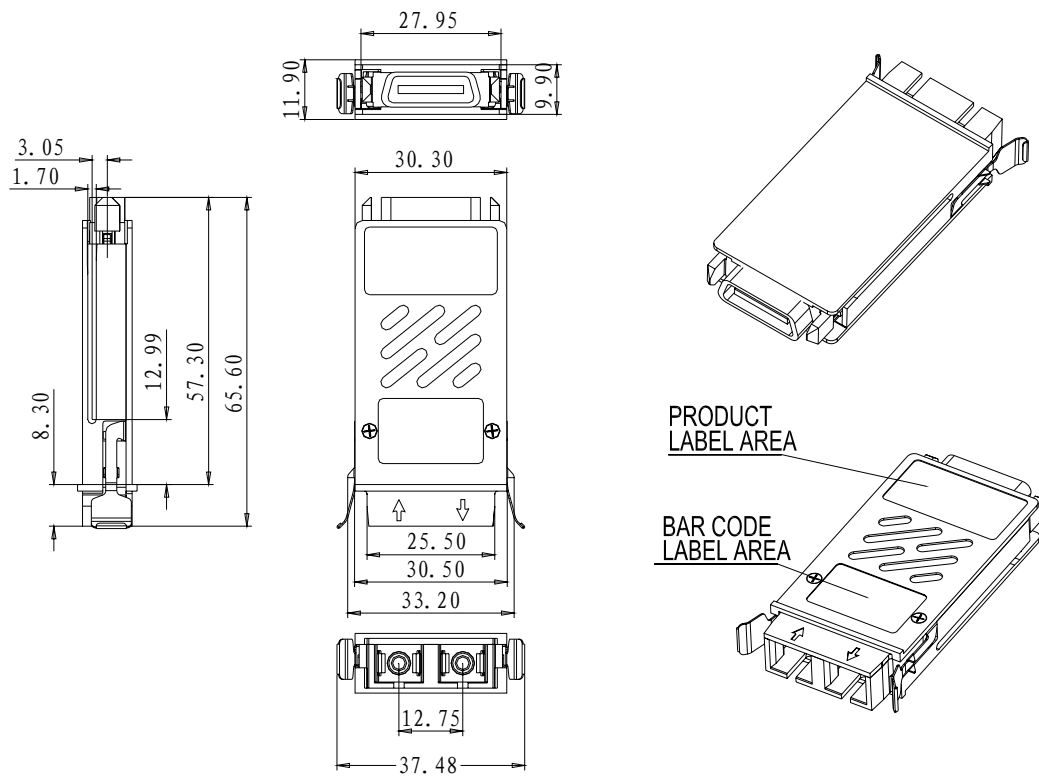
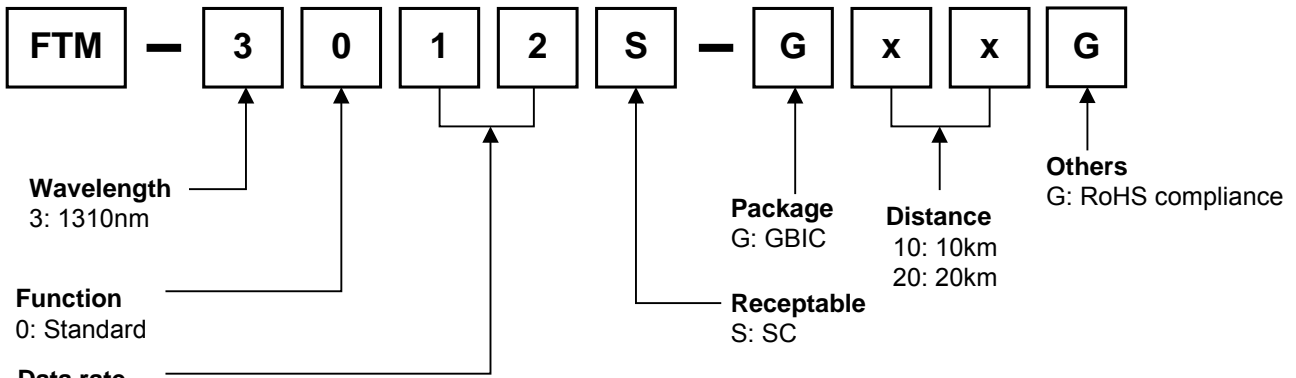


Figure 3, Mechanical Design Diagram of GBIC (1310nm)

Ordering information



Note: The "Distance" bit may be omitted when it is "10"

Part No.	Product Description
FTM-3012S-GG	1310nm, 1.0625~1.25Gbps, 10km, GBIC, RoHS compliant, 0°C~+70°C
FTM-3012S-G20G	1310nm, 1.0625~1.25Gbps, 20km, GBIC, RoHS compliance, 0°C~+70°C

Related Documents

For further information, please refer to the following documents:

- ◆ *Flexon™ GBIC Installation Guide*
- ◆ *Flexon™ GBIC Application Notes*
- ◆ *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	Simon.jiang	Initialize datasheet	April 15, 2006
Rev. 1b	Henry xiao	Simon.jiang	Simon.jiang	Add FTM-3012S-G20G	June 15, 2006

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