RoHS Compliant 1250Mbps Gigabit Interface Converters (GBIC) Transceiver Module for Gigabit Ethernet

Features

- Compliant with Gigabit Interface Converter (GBIC) Revision 5.4
- Compliant with proposed specifications for IEEE 802.3z/Gigabit Ethernet
- GBIC-1250AxFx compliant with the 1.0625GBd FC-PI 100-M5-SN-I and 100-M6-SN-I Rev.13
- GBIC-1250BxQx compliant with the 1.0625GBd FC-PI 100-SM-LC-L Rev.13
- Dual 5/3.3V Power Supply for GBIC-1250x5xx and Single 5V Power Supply for GBIC-1250x3xx
- TTL Logic TX_DISABLE / TX_FAULT / RX_LOS functions
- Class 1 Laser Product Compliant with the Requirements of IEC 60825-1 and IEC 60825-2
- Hot-Pluggable

Description

The GBIC-1250xxxx families are compliant with GBIC interface converters specification Rev. 5.4. as well as Gigabit Ethernet standard as specified in IEEE 802.3.

Delta's GBIC transceiver family uses a 20-pin connector to allow hot plug capability. The system designer can make configuration changes or maintenance simply by plugging in different type of converters without removing the power supply from the host system.

Applications

- 1.25 Gigabit Ethernet
- Fiber Channel

Performance

GBIC-1250AxFx:

- 850nm VCSEL, up to 500m in 50/125 μm MMF
- 850nm VCSEL, up to 220m in 62.5/125 μm MMF

GBIC-1250BxQx:

- 1310nm FP laser, up to 10km in 9/125 μm SMF
- 1310nm FP laser, up to 550m in 50/125 μm MMF
- 1310nm FP laser, up to 550m in 62.5/125 μm MMF

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Storage Temperature	Ts	-40		85	ºC	
Supply Voltage	Vcc	0		6	V	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Ambient Operating Temperature	T_A	0		70	℃	
Supply voltage GBIC-1250x3xx GBIC-1250x5xx	Vcc	 4.75 3.15/4.75	 5 3.3/5	 5.25 3.47/5.25	 V	
Total Supply Current	I_S			300	mA	
Data Input/Output Load	R_{DL}		75		Ω	

Electrical Characteristics

(T_A=0 ºC to 70 ºC, V_{CC}=3.15/4.75V to 3.47/5.25V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Transmitter Differential Input Voltage	V_{DT}	0.5		2.4	V	1
Transmitter Disable Input-High	V_{DISH}	2		V_{CC}+0.3	V	
Transmitter Disable Input-Low	V_{DISL}	0		0.8	V	
Transmitter Fault Output-High	V_{TXFH}	2		V_{CC}+0.3	V	2
Transmitter Fault Output-Low	V_{TXFL}	0		0.8	V	2
Receiver						
Receiver Differential Output Voltage	V_{DR}	0.35	0.7	2	V	3
LOS Output Voltage-High	V_{LOSH}	2		V_{CC}+0.3	V	2
LOS Output Voltage-Low	V_{LOSL}	0		0.8	V	2
Output Data Rise/Fall Time	t_r / t_f			400	psec	4
Total Jitter (pk-pk)	TJ_{RX}			220	psec	

Notes:

1. Internally AC coupled and terminated to 150-Ohm differential load.
2. Pull up to V_{CC} with a 4.7K – 10K Ohm resistor on host Board.
3. Internally AC coupled, but requires a 150-Ohm differential termination at or internal to Serializer/ Deserializer.
4. These are 20%~80% values.

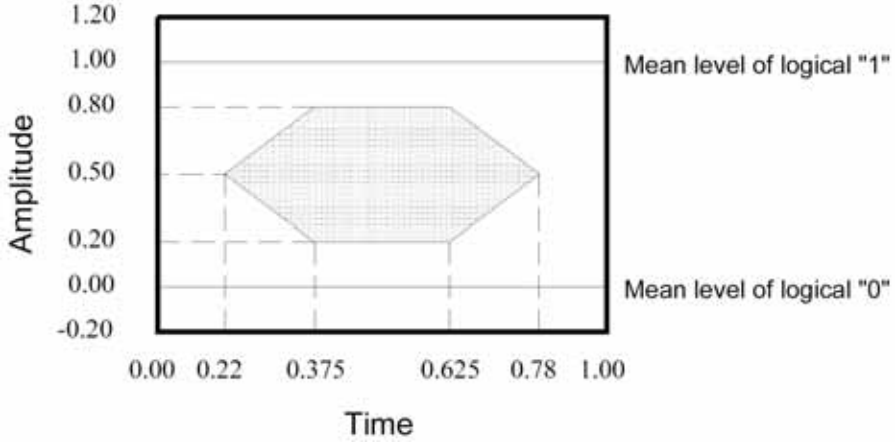
Optical Characteristics (GBIC-1250AxFx)

(V_{CC}=3.15/4.75V to 3.47/5.25V, Data Rate=1.25Gb/sec, PRBS=2^7-1 NRZ, 50/125μm MMF)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Output Optical Power (Avg.)	P_O	-9.5		-4	dBm	
Optical Extinction Ratio	ER	9			dB	
Center Wavelength	λ_c	830	850	860	nm	
Spectral Width (RMS)	σ			0.85	nm	
Optical Rise/Fall Time	t_r /t_f			260	psec	1
Total Jitter (pk-pk)	TJ_{TX}			220	psec	
Relative Intensity Noise	RIN			-117	dB/Hz	
Output Eye	Complies with the IEEE 802.3z/D2 specification, and is class 1 laser eye safety					
Receiver						
Sensitivity (Avg.)	P_{IN}			-17	dBm	2
Input Optical Wavelength	λ		850		nm	
LOS- De-Asserted (Avg.)	P_D			-17	dBm	
LOS- asserted (Avg.)	P_A	-30			dBm	
LOS-Hysteresis	P_D-P_A	0.5			dB	
Overload	P_O	-4			dBm	

Notes:

1. These are 20%~80% values
2. The sensitivity is provided at a BER of 1×10^{-10} or better with an input signal consisting of 1250Mb/s, 2^7-1 PRBS.



Mask of the eye diagram for the optical transmit signal

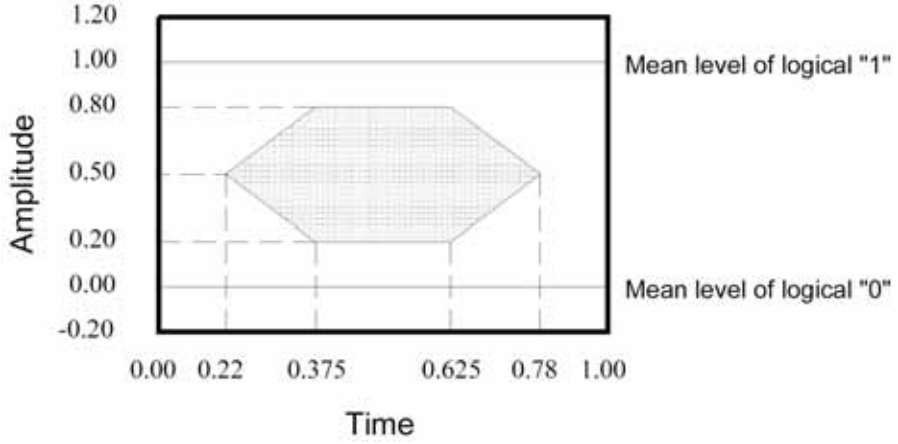
Optical Characteristics (GBIC-1250BxQx)

(V_{CC}=3.15/4.75V to 3.47/5.25V, Data Rate=1.25Gb/sec, PRBS=2^7-1 NRZ, 9/125μm SMF)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Output Optical Power (Avg.)	P_O	-9.5		-3	dBm	
Optical Extinction Ratio	ER	9			dB	
Center Wavelength	λ_c	1270	1310	1355	nm	
Spectral Width (RMS)	σ			2.8	nm	
Optical Rise/ Fall Time	t_r/t_f			260	psec	1
Total Jitter (pk-pk)	TJ_{TX}			220	psec	
Relative Intensity Noise	RIN			-120	dB/Hz	
Output Eye	Complies with the IEEE 802.3z/D2 specification, and is class 1 laser eye safety					
Receiver						
Sensitivity (Avg.)	P_{IN}			-19	dBm	1
Input Optical Wavelength	λ		1310		nm	
LOS- De-Asserted (Avg.)	P_D			-19	dBm	2
LOS- asserted (Avg.)	P_A	-30			dBm	2
LOS-Hysteresis	P_D-P_A	0.5			dB	
Overload	P_O	-3			dBm	

Notes:

1. These are unfiltered 20%~80% values
2. The sensitivity is provided at a BER of 1×10^{-12} or better with an input signal consisting of 1.25Gb/s, 2^7-1 PRBS and ER=9dB.



Mask of the eye diagram for the optical transmit signal

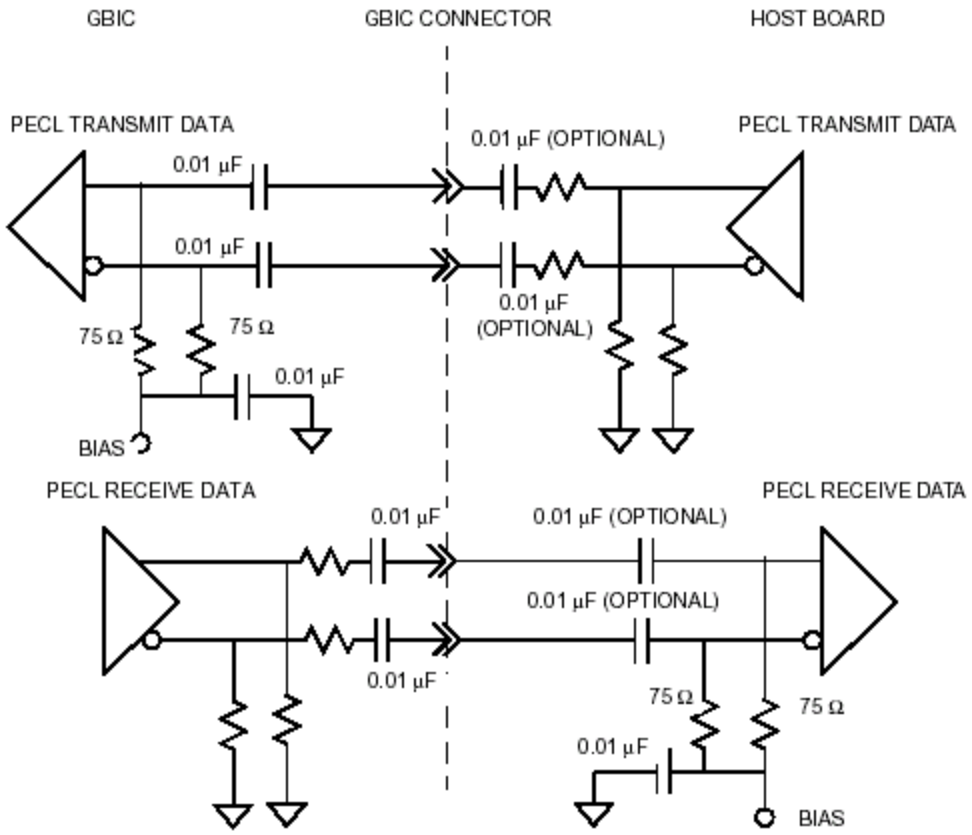
Pin Out Table

Pin Name	Pin#	Sequence	Sequence	Pin#	Pin Name
RX_LOS	1	2	1	11	RGND
RGND	2	2	1	12	-RX_DAT
RGND	3	2	1	13	+RX_DAT
MOD_DEF(0)	4	2	1	14	RGND
MOD_DEF(1)	5	2	2	15	VDDR
MOD_DEF(2)	6	2	2	16	VDDT
TX_DISABLE	7	2	1	17	TGND
TGND	8	2	1	18	+TX_DAT
TGND	9	2	1	19	-TX_DAT
TX_FAULT	10	2	1	20	TGND

Overview of internal interface signal Definition

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
VDDR	15	Receiver +5 volt (may be connected with VDDT 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 compat-ible,4.7 K to 10 K Ohm pullup to VDDT on host	Low speed, from GBIC
Transmitter Signals			
TGND	8,9,17,20	Transmitter Ground (may be connected with RGND internally)	Ground, to GBIC
VDDT	16	Transmitter +5 volt (may be connected with VDDR 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,4.7 K to 10 K Ohm pullup to VDDT on GBIC	Low speed, to GBIC
TX_FAULT	10	Transmitter Fault, logic high, open collector compatible,4.7 K to 10 K Ohm pullup to VDDT on host	Low speed, from GBIC
Control Signals			
MOD_DEF(0)	4	GBIC module definition and presence, bit 0,4.7 K to 10 K Ohm pullup to VDDT on host	Low speed, from GBIC
MOD_DEF(1)	5	GBIC module definition and presence, bit 1,4.7 K to 10 K Ohm pullup to VDDT on host	Low speed, from GBIC
MOD_DEF(2)	6	GBIC module definition and presence, bit 2,4.7 K to 10 K Ohm pullup to VDDT on host	Low speed, from GBIC

Recommend Circuit Schematic



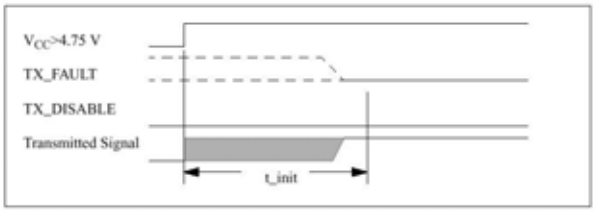
GBIC module definition parameters

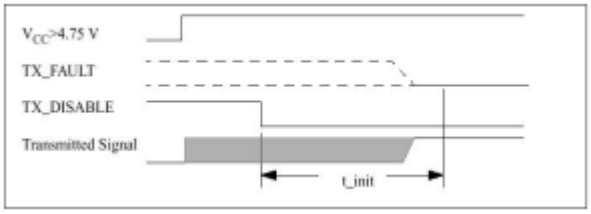
Module Definition	MOD_DEF(0) Pin 4	MOD_DEF(1) Pin 5	MOD_DEF(2) Pin 6	Interpretation by host Reference
0	NC	NC	NC	GBIC not present clause
1	NC	NC	TTL LOW	Copper Style 1 or Style 2 connector, 1.0625 Gbd, 100-TW-EL-S or 100-TP-EL-S, active inter-enclosure connection and IEEE802.3 1000BASE-CX
2	NC	TTL LOW	NC	Copper Style 1 or Style 2 connector, 1.0625 Gbd, 100-TW-EL-S, or 100-TP-EL-S, active or passive intra-enclosure connection
3	NC	TTL LOW	TTL LOW	Optical LW, 1.0625 Gbd 100-SM-LC-L
4	TTL LOW	SCL	SDA	Serial module definition protocol
5	TTL LOW	NC	TTL LOW	Optical SW, 1.0625 Gbd 100-M5-SN-I or 100-M6-SN-I
6	TTL LOW	TTL LOW	NC	Optical LW, 1.0625 Gbd 100-SM-LC-L and similar to 1.25 Gbd IEEE802.3z 1000BASE-LX, single mode
7	TTL LOW	TTL LOW	TTL LOW	Optical SW, 1.0625 Gbd 100-M5-SN-I or 100-M6-SN-I and 1.25 Gbd, IEEE 802.3z, 1000BASE-SX

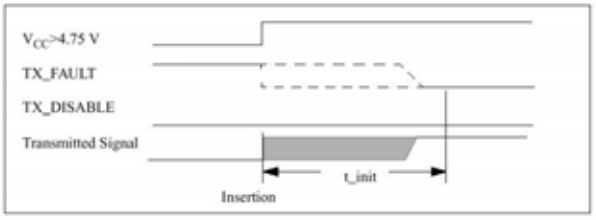
GBIC timing parameters for GBIC management

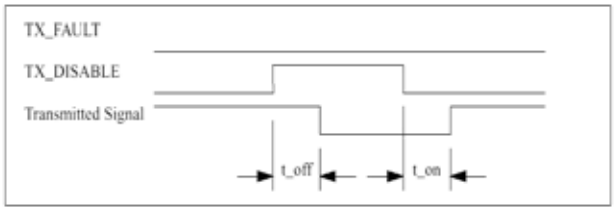
Parameter	Symbol	Min.	Max.	Unit	Unit Conditions
TX_DISABLE assert time	t_off		10	μsec	Rising edge of TX_DISABLE to fall of output signal below 10% of nominal
TX_DISABLE negate time	t_on		1	mec	Falling edge of TX_DISABLE to rise of output signal above 90% of nominal
Time to initialize, includes reset of TX_FAULT	t_init		300	msec	From power on or hot plug fter V DD T > 4.75 volts or From negation of TX_DISABLE during reset of TX_FAULT.
TX_FAULT from fault to assertion	t_fault		100	μsec	From occurrence of fault (out-put safety violation or V DD T < 4.5 volts)
TX_DISABLE time to start reset	t_rest	10		μsec	TX_DISABLE HIGH before TX_DISABLE set LOW
RX_LOS assert delay	t_loss_on		100	μsec	From detection of loss of signal to assertion of RX_LOS
RX_LOS negate delay	t_loss_off		100	μsec	From detection of presence of signal to negation of RX_LOS

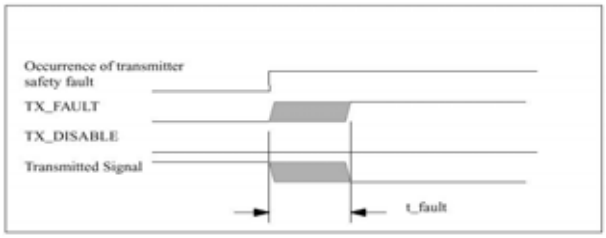
GBIC timing parameters

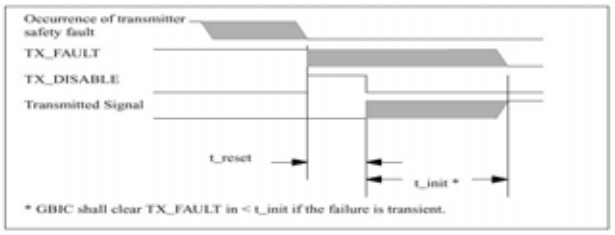


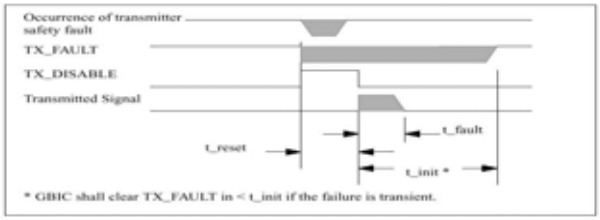


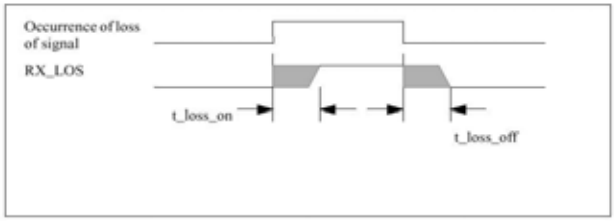












GBIC-1250AxFx EEPROM Serial ID Memory Contents (2-Wire Address A0h)

Address	Hex	ASCII	Address	Hex	ASCII	Address	Hex	ASCII	Address	Hex	ASCII	Address	Hex	ASCII	Address	Hex	ASCII
00	01		25	20		50	33/35	3/5	75	SN		100	00		125	00	
01	04		26	20		51	46	F	76	SN		101	00		126	00	
02	01		27	20		52	53/52	S/R	77	SN		102	00		127	00	
03	00		28	20		53	20		78	SN		103	00				
04	00		29	20		54	20		79	SN		104	00				
05	00		30	20		55	20		80	SN		105	00				
06	01		31	20		56	56		81	SN		106	00				
07	20		32	20		57	31		82	SN		107	00				
08	40		33	20		58	31		83	SN		108	00				
09	0C		34	20		59	31		84	DC	Note 3	109	00				
10	01		35	20		60	00		85	DC		110	00				
11	01		36	00		61	00		86	DC		111	00				
12	0D		37	00		62	00		87	DC		112	00				
13	00		38	00		63	CS1	Note 1	88	DC		113	00				
14	00		39	00		64	00		89	DC		114	00				
15	00		40	47	G	65	1A		90	DC		115	00				
16	32		41	42	B	66	00		91	DC		116	00				
17	16		42	49	I	67	00		92	00		117	00				
18	00		43	43	C	68	SN	Note 2	93	00		118	00				
19	00		44	2D	-	69	SN		94	00		119	00				
20	44	D	45	31	1	70	SN		95	CS2	Note 4	120	00				
21	45	E	46	32	2	71	SN		96	00		121	00				
22	4C	L	47	35	5	72	SN		97	00		122	00				
23	54	T	48	30	0	73	SN		98	00		123	00				
24	41	A	49	41	A	74	SN		99	00		124	00				

GBIC-1250BxQx EEPROM Serial ID Memory Contents (2-Wire Address A0h)

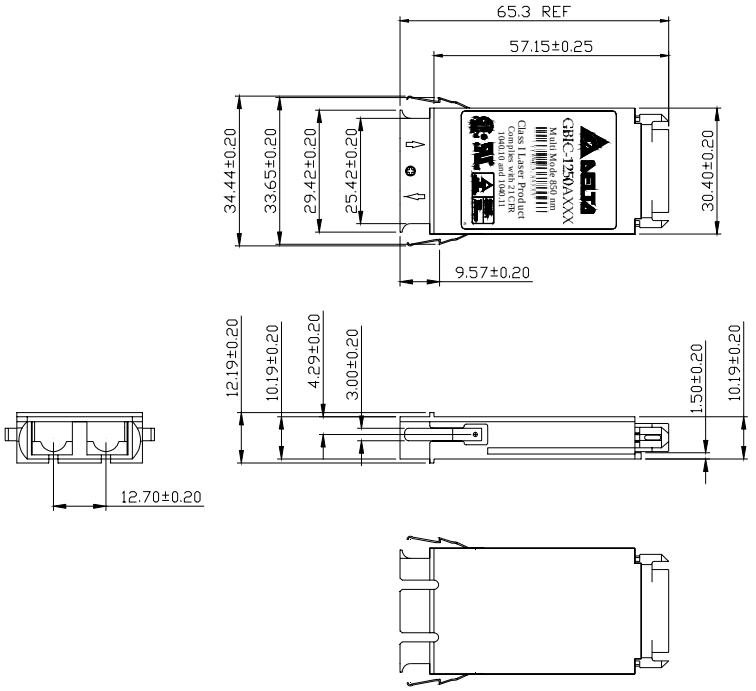
Address	Hex	ASCII	Address	Hex	ASCII	Address	Hex	ASCII	Address	Hex	ASCII	Address	Hex	ASCII	Address	Hex	ASCII
00	01		25	20		50	33/35	3/5	75	SN		100	00		125	00	
01	04		26	20		51	51	Q	76	SN		101	00		126	00	
02	01		27	20		52	53/52	S/R	77	SN		102	00		127	00	
03	00		28	20		53	20		78	SN		103	00				
04	00		29	20		54	20		79	SN		104	00				
05	00		30	20		55	20		80	SN		105	00				
06	02		31	20		56	56		81	SN		106	00				
07	12		32	20		57	31		82	SN		107	00				
08	00		33	20		58	31		83	SN		108	00				
09	01		34	20		59	31		84	DC	Note 3	109	00				
10	01		35	20		60	00		85	DC		110	00				
11	01		36	00		61	00		86	DC		111	00				
12	0D		37	00		62	00		87	DC		112	00				
13	00		38	00		63	CS1	Note 1	88	DC		113	00				
14	00		39	00		64	00		89	DC		114	00				
15	64		40	47	G	65	1A		90	DC		115	00				
16	37		41	42	B	66	05		91	DC		116	00				
17	37		42	49	I	67	05		92	00		117	00				
18	00		43	43	C	68	SN	Note 2	93	00		118	00				
19	00		44	2D	-	69	SN		94	00		119	00				
20	44	D	45	31	1	70	SN		95	CS2	Note 4	120	00				
21	45	E	46	32	2	71	SN		96	00		121	00				
22	4C	L	47	35	5	72	SN		97	00		122	00				
23	54	T	48	30	0	73	SN		98	00		123	00				
24	41	A	49	42	B	74	SN		99	00		124	00				

Notes:

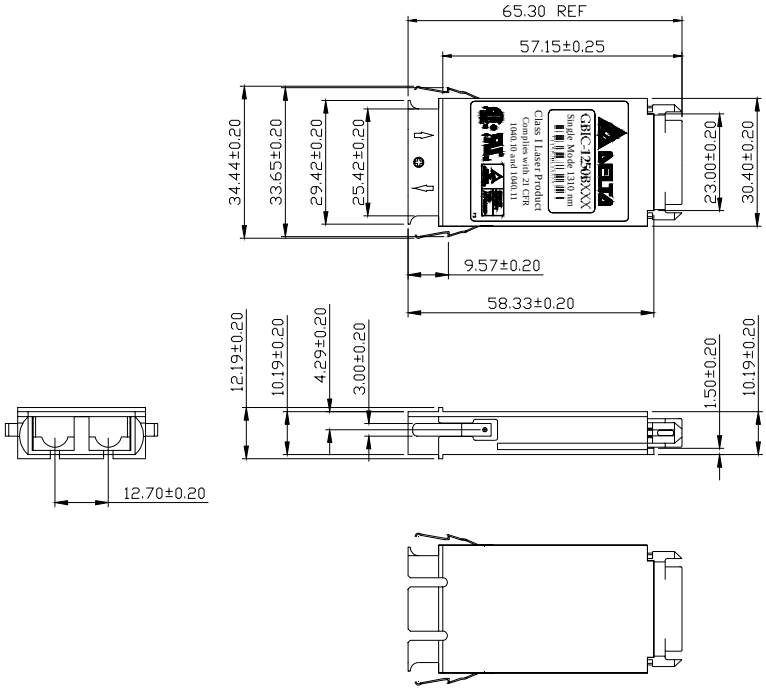
1) Byte 63(CS1): Check sum of bytes 0-62.
2) Byte 68-83 (SN): Serial number.
3) Byte 84-91 (DC): Date code.
4) Byte 95 (CS2): Check sum of bytes 64-94.
5) Byte 128-255 had been set hex. 00.

Package Outline Drawing

GBIC-1250AxFx



GBIC-1250BxQx



Regulatory Compliance

Test Item	Reference	Qty'	Evaluation
(#1) Electromagnetic Interference EMC	FCC Class B EN 55022 Class B CISPR 22	5	(1) Satisfied with electrical characteristics of product spec. (2) No physical damage
(#2) Immunity：Radio Frequency Electromagnetic Field	EN 61000-4-3 IEC 1000-4-3	5	
(#3) Immunity：Electrostatic Discharge to the Duplex SC Receptacle	EN 61000-4-2 IEC 1000-4-2 IEC 801.2	5	
(#4) Electrostatic Discharge to the Electrical Pins	MIL-STD-883C Method 3015.4 EIAJ#1988.3.2B Version 2, Machine model	5	

Ordering information for GBIC modules

GBIC-1250$X_1X_2X_3X_4$

X1: **Light source types**
A: Multi-mode
B: 1310nm Single-mode

X2: **Power Supply Voltage**
3: 5V
5: 3.3 and 5V

X3: **Distance**
F: 500m, 50/125 μm MMF
Q: 10km, 9/125 μm SMF

X4: R: RoHS Compliant

Available Products

- **GBIC-1250B5Lx**: Dual supply voltage (3.3/5V), 1310nm DFB-LD, SMF 40km.
- **GBIC-1250D5Mx**: Dual supply voltage (3.3/5V), 1550nm DFB-LD, SMF 40km.
- **GBIC-1250D5Wx**: Dual supply voltage (3.3/5V), 1550nm DFB-LD, SMF 70km.
- **GBIC-1250D5Rx**: Dual supply voltage (3.3/5V), 1550nm DFB-LD, SMF 80km.
- **GBIC-1250D5Vx**: Dual supply voltage (3.3/5V), 1550nm DFB-LD, SMF 100km.