GBIC Dual SC Optical Transceivers

Introduction

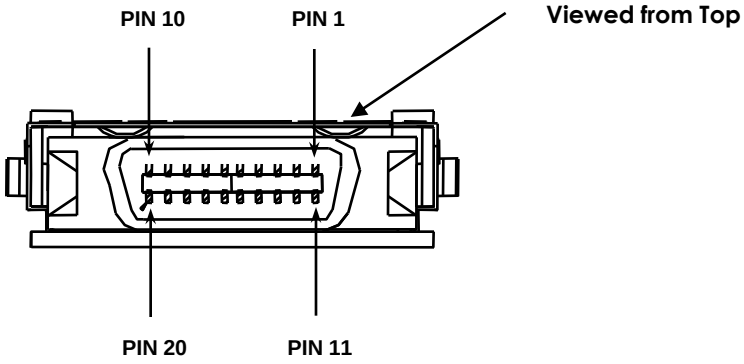
This design guide provides the information needed to incorporate OptixCom's fiber optics transceiver products in the customer's system. The GBIC series of the transceiver products are compliant with the SFF-8053 specification for GBIC, Rev. 5.5. For more detail information, please refer to the URL ftp://ftp.seagate.com/sff/SFF-8053.PDF, or visit OptixCom web site: http://www.OptixCom.com for the official documentation.

The GBIC transceiver contains a printed circuit board that mates with a 20-pin SCA-2 host electrical connector. The connector itself has two stages of contact sequencing, sequence stage 1 making contact before sequence 2 during insertion. Grounds and certain signals make contact in sequence stage1. Power makes contact in stage 2. The control interface provides controls for the transmitter, monitors for the transmitter and receiver, and identification information indicating the GBIC module definition. These signals are level compatible with TTL. The serial transfer interface uses 150 Ohm differential PECL signaling that is AC coupled.

The reference guide covers the following topics:

A. Pin Assignment & Description
B. Recommended Interface Circuit
C. Package Outline
D. Module Definition Determination
E. Electrical Connector Mechanical Layout
F. Connector Insertion, Extraction, and Retention Force
G. Timing Requirements of Control and Status I/O
H. Module Definition Interface and Data Field Description

A. Pin Assignment & Description



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PIN	Symbol	Description	PIN	Symbol	Description
1	RX_LOS	Receiver Loss of Signal	11	RX GND	Receiver Ground
2	RX GND	Receiver Ground	12	RD–	Receiver Data Output –
3	RX GND	Receiver Ground	13	RD+	Receiver Data output +
4	MOD_DEF (0)	Module Definition (0)	14	RX GND	Receiver Ground
5	MOD_DEF (1)	Module Definition (1)	15	RX Vcc	Receiver Power Supply
6	MOD_DEF (2)	Module Definition (2)	16	TX Vcc	Transmitter Power Supply
7	TX_DIS	Transmitter Disable	17	TX GND	Transmitter Ground
8	TX GND	Transmitter Ground	18	TD+	Transmitter Data Input +
9	TX GND	Transmitter Ground	19	TD–	Transmitter Data Input –
10	TX_FAULT	Transmitter Fault	20	TX GND	Transmitter Ground

RX_LOS TTL logic HIGH when the receiver optical power is below the specified value, logic LOW otherwise. Open collector compatible. Connect to ground if not needed.

TX DIS TTL logic HIGH when the transmitter is turned off. The optical output power is less than -35 dBm. Open collector compatible. Connect to ground if not needed.

TX_FAULT TTL logic HIGH when the transmitter is in fault condition and the laser is turned off. Can be reset by TX_DIS. Open collector compatible. Connect to ground if not needed.

MOD_DEF (0) Module definition and presence bit 0. TTL logic LOW after power up.

MOD_DEF (1) Module definition and presence bit 1. TTL logic LOW or Serial Clock Signal (SCL) for protocol.

MOD_DEF (2) Module definition and presence bit 2. TTL logic LOW or Serial Data Signal (SDA) for protocol.

RD+, RD–
TD+, TD– AC coupling, PECL differential outputs and inputs. Signals format is described below.

Electrical signal interface from host board, high speed serial transmitter

Parameter	Symbol	Min.	Max.	Unit	Conditions (measured at GBIC side of connector)
PECL amplitude	V_i	650	2000	mV	differential, pk-pk
PECL rise/fall		100	350	ps	20 - 80%, differential
differential skew			20	ps	

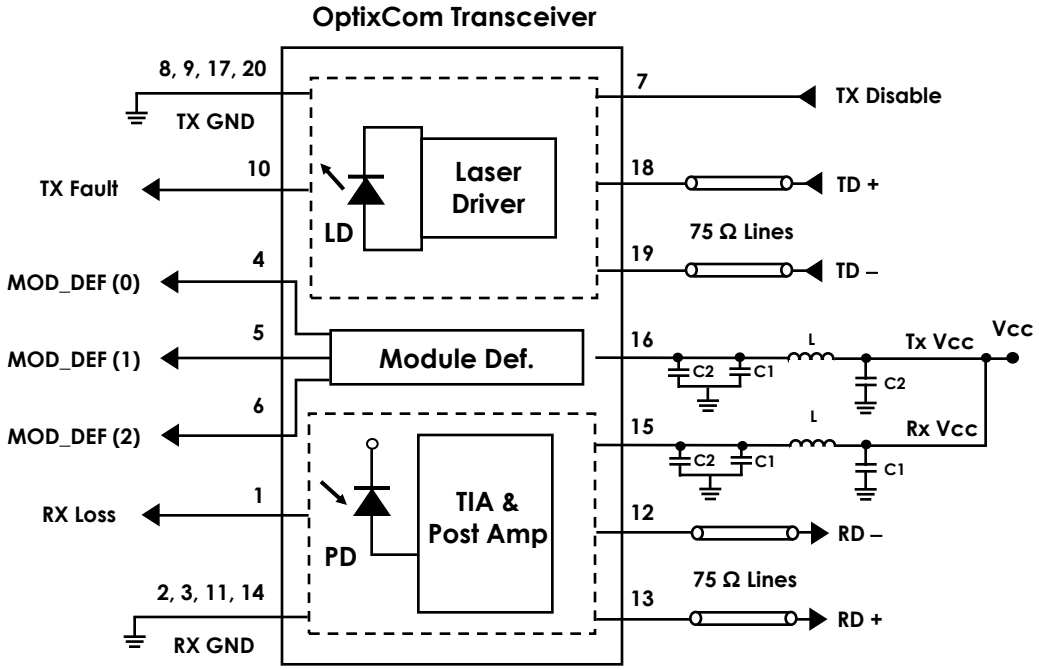
Electrical signal interface to host board, high speed serial receiver

Parameter	Symbol	Min.	Max.	Unit	Conditions (measured at host side of connector)
PECL amplitude	V_o	370	2000	mV	differential, pk-pk
PECL skew			205	psec	

Low speed TTL control and sense signals, electronic characteristics

Parameter	Symbol	Min.	Max.	Unit	Conditions
Output from GBIC	V_{OL}	0.0	0.50	V	4.7K to 10K Ohms pullup to host_Vcc, measured at host side of connector
	V_{OH}	host_Vcc - 0.5	host_Vcc + 0.3	V	
Input to GBIC	V_{IL}	0	0.8	V	4.7K to 10K Ohms to $V_{DD}T$, measured at GBIC side of connector
	V_{IH}	2.0	$V_{DD}T + 0.3$	V	

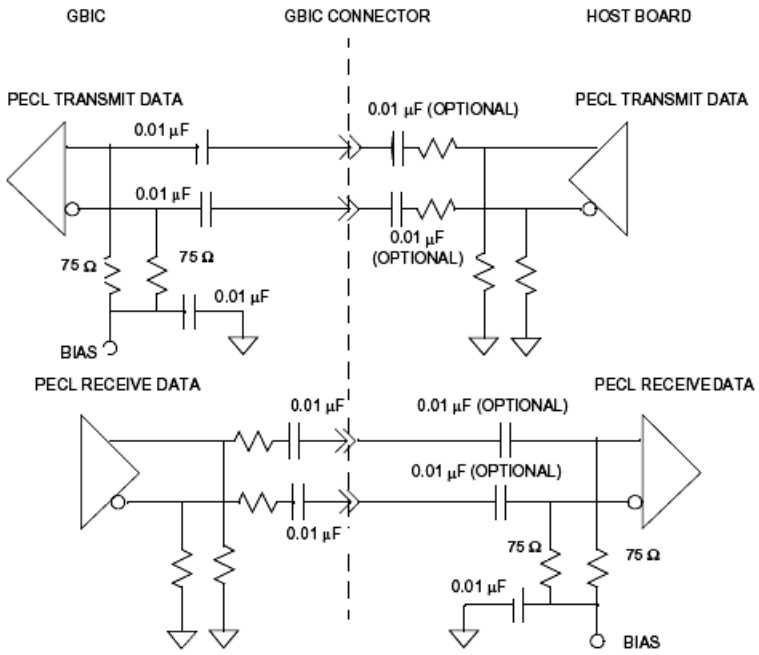
B. Recommended Interface Circuit



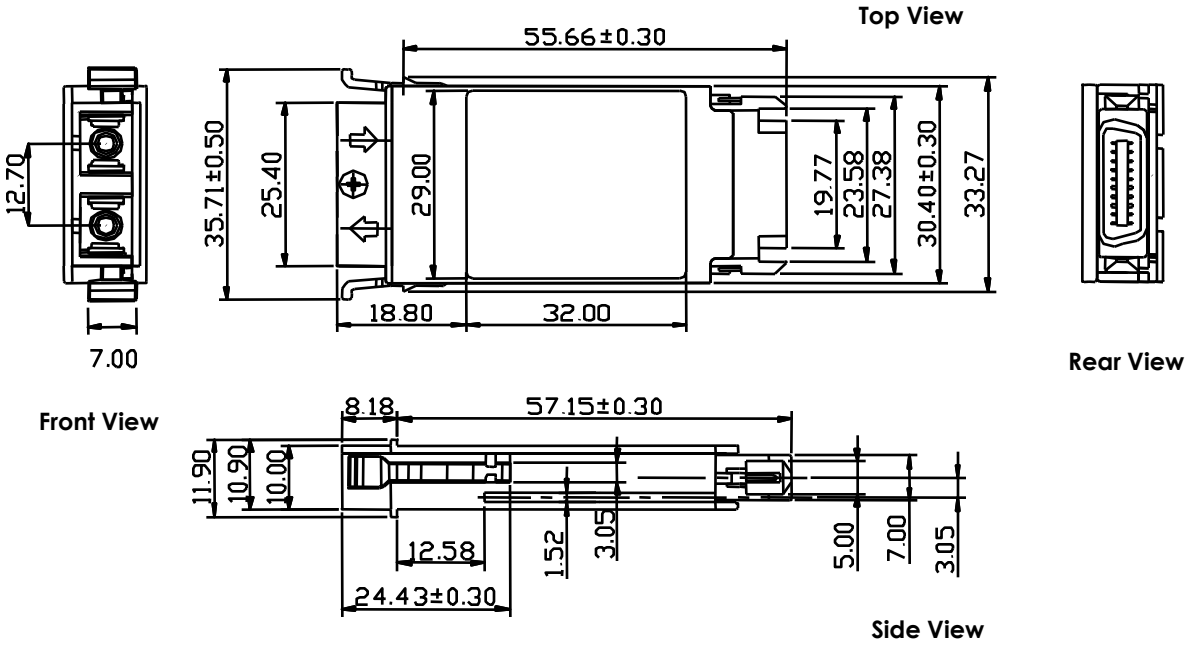
C1: 10 µF, C2: 0.1 µF, L: 1 µH

All the TTL interface logic pins are open collector compatible. A pull up resistor Rp is used in the following scheme. The value of Rp is between 4.7KΩ to 10K Ω.

PECL Termination Circuit Examples



C. Package Outline



Unit: mm, typical tolerance for these dimensions is ± 0.2 mm

D. Module Definition Determination

The module definition of GBIC that is installed is indicated by the 3 module definition pins. The assigned values for the MOD_DEF(0:2) bits are provided below. Definition 4 specifies a serial definition protocol. For this definition, upon power up, the MOD_DEF(1:2) shall appear as NC. If the host system detects definition number 4, the serial protocol may then be activated using MOD_DEF(1:2). The protocol uses the 2-wire serial CMOS E2PROM protocol

When the serial protocol is activated, the serial clock signal (SCL) is generated by the host. The positive edge clocks data into the GBIC into those segments of the E 2PROM that are not write protected. The negative edge clocks data from the GBIC. The serial data signal (SDA) is bidirectional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation.

MOD_DEF(0:2) Table

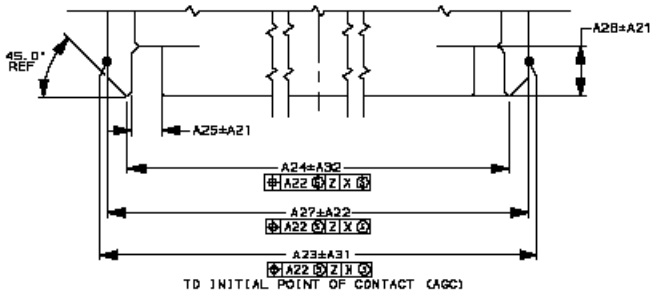
Module Definition	MOD_DEF(0) pin 4	MOD_DEF(1) pin 5	MOD_DEF(2) pin 6	Interpretation by host	Reference
0	NC	NC	NC	GBIC not present	clause 5.2
1	NC	NC	TTL LOW	Copper Style 1 or Style 2 connector, 1.0625 Gbd, 100-TW-EL- or 100-TP-EL-S, active inter-enclosure connection. and IEEE802.3 1000BASE-CX	Annex A
2	NC	TTL LO	NC	Copper Style 1 or Style 2 connector, 1.0625 Gbd, 100-TW-EL-S, or 100-TP-EL-S, active or passive intraenclosure con-nection	Annex B
3	NC	TTL LO	TTL LOW	Optical LW, 1.0625 Gbd 100-SM-LC-L	Annex C
4	TTL LOW	SCL	SDA	Serial module definition protocol	clause 5.2.1 Annex D
5	TTL LOW	NC	TTL LOW	Optical SW, 1.0625 Gbd 100-M5-SN-I or 100-M6-SN-I	Annex E
6	TTL LOW	TTL LO	NC	Optical LW, 1.0625 Gbd 100-SM-LC-L and similar to 1.25 Gbd IEEE802.3z 1000BASE-LX, single mode	Annex
7	TTL LOW	TTL LO	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	Annex G

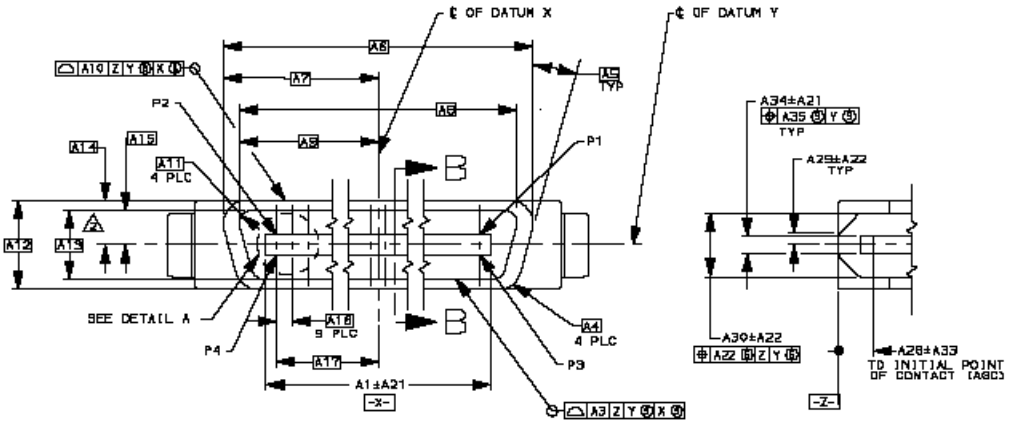
E. Electrical Connector Mechanical Layout

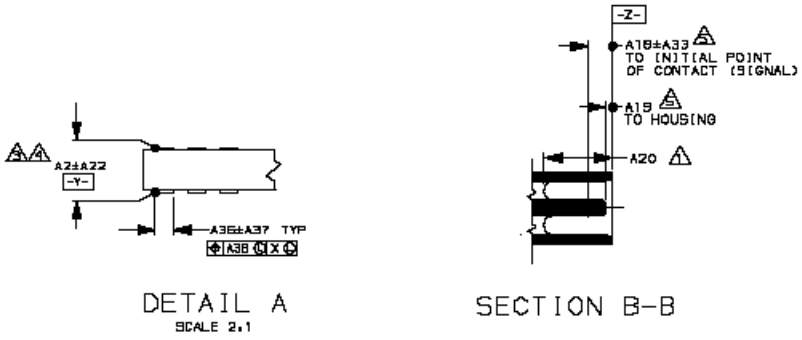
20 POSITION	
P1 = POSITION 1	P3 = POSITION 11
P2 = POSITION 10	P4 = POSITION 20

DIMENSION	MILLIMETERS	INCHES
A1	13.07	.515
A2	1.60	.063
A3	0.10	.004
A4	1.80 R	.071 R
A5	15°	15°
A6	19.77	.778
A7	9.885	.389
A8	17.17	.676
A9	8.585	.338
A10	0.20	.008
A11	1.00 R	.039 R
A12	7.00	.276
A13	5.325	.210
A14	3.50	.138
A15	2.653	.105
A16	1.27	.050
A17	5.715	.225
A18	2.00	.079
A19	0.60 MIN	.024 MIN
A20	6.50 MIN	.256 MIN
A21	0.10	.004
A22	0.08	.003
A23	27.28	1.074
A24	24.18	.952
A25	1.905	.075
A26	4.00	.157
A27	27.38	1.078
A28	1.85	.073
A29	0.80	.035
A30	5.00	.197
A31	0.28	.011
A32	0.24	.009
A33	0.25	.010
A34	1.35	.053
A35	0.05	.002
A36	0.80	.031
A37	0.15	.006
A38	0.13	.005

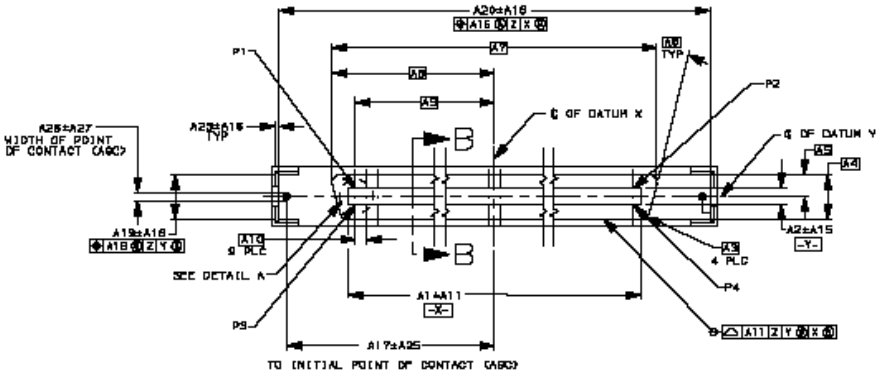
Reference drawing for GBIC male plug



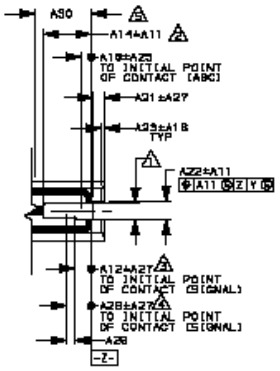




Reference drawing for GBIC receptacle



DETAIL A
SCALE 2:1



SECTION B–B

ZD POSITION	
P1 = POSITION 1	P3 = POSITION 11
P2 = POSITION 10	P4 = POSITION 20

DIMENSION	MILLIMETERS	INCHES
A1	13.33	.525
A2	1.80	.075
A3	1.00 R	.039 R
A4	5.05	.199
A5	2.525	.0995
A6	15°	15°
A7	16.97	.668
A8	8.485	.334
A9	5.715	.225
A10	1.27	.050
A11	0.10	.004
A12	1.98	.078
A13	1.60	.063
A14	5.70	.224
A15	0.05	.002
A16	0.08	.003
A17	13.24	.521
A18	0.98	.039
A19	5.30	.209
A20	27.68	1.090
A21	1.45	.057
A22	2.20	.087
A23	0.40	.016
A24	0.28	.011
A25	0.15	.008
A26	0.95	.037
A27	0.15	.006
A28	2.48	.098
A29	0.35 MIN	.014 MIN
A30	8.50 MIN	.258 MIN
A31	0.30	.012

F. Connector Insertion, Extraction, and Retention Force

The requirements for insertion forces, extraction forces, and retention forces are specified in the following.

Insertion, extraction, and retention forces

Measurement	Minimum	Maximum	Units	Comments
GBIC insertion	0	20	newtons	(~4.5 lbs)
GBIC extraction	0	15	newtons	(~3.3 lbs)
GBIC retention	130	N/A	newtons	straight out (~29.3 lbs)
Insertion/removal cycles	100		cycles	

G. Timing Requirements

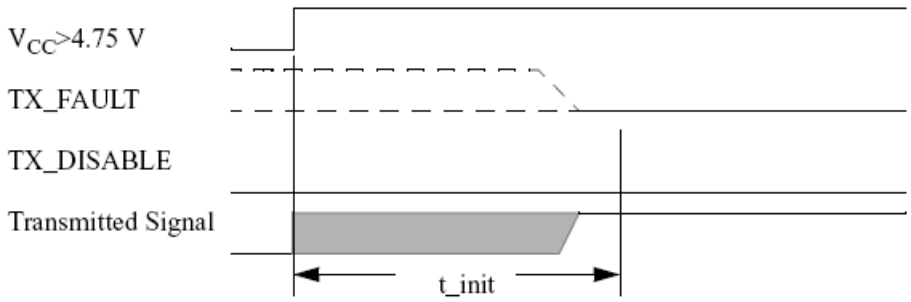
Timing parameters for GBIC management

Parameter	Symbol	Min.	Max.	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	msec	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 after $V_{DD}T > 4.75$ 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 (output safety violation or $_{DD}T <$ 4.5 volts)
TX_DISABLE time to start reset	t_reset	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 power on initialization procedure, TX_DISABLE negated

During power on of the GBIC, TX_FAULT, if implemented, may be asserted (High) as soon as power supply voltages are within specification. For GBIC initialization with TX_DISABLE negated, TX_FAULT shall be negated when the transmitter safety circuitry, if implemented, has detected that the transmitter is operating in its normal state. If a transmitter fault has not occurred, TX_FAULT shall be negated within a period t_init from the time that VDDT exceeds the specified minimum operating voltage. If TX_FAULT remains asserted beyond the period t_init, the host may assume that a transmission fault has been detected by the GBIC. If no transmitter safety circuitry is implemented, the TX_FAULT signal may be tied to its negated state.

The power on initialization timing for a GBIC with TX_DISABLE negated is shown in the following figure.

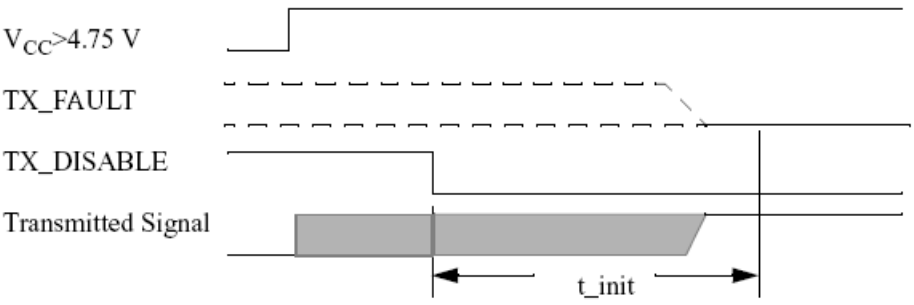


Power on initialization of GBIC transceiver, TX_DISABLE negated

GBIC power on initialization procedure, TX_DISABLE asserted.

For GBIC power on initialization with TX_DISABLE asserted, the state of TX_FAULT is not defined while TX_DISABLE is asserted. After TX_DISABLE is negated, TX_FAULT may be asserted while safety circuit initialization is performed. TX_FAULT shall be negated when the transmitter safety circuitry, if implemented, has detected that the transmitter is operating in its normal state. If a transmitter fault has not occurred, TX_FAULT shall be negated within a period t_init from the time that TX_DISABLE is negated. If TX_FAULT remains asserted beyond the period t_init, the host may assume that a transmission fault has been detected by the GBIC. If no transmitter safety circuitry is implemented, the TX_FAULT signal may be tied to its negated state.

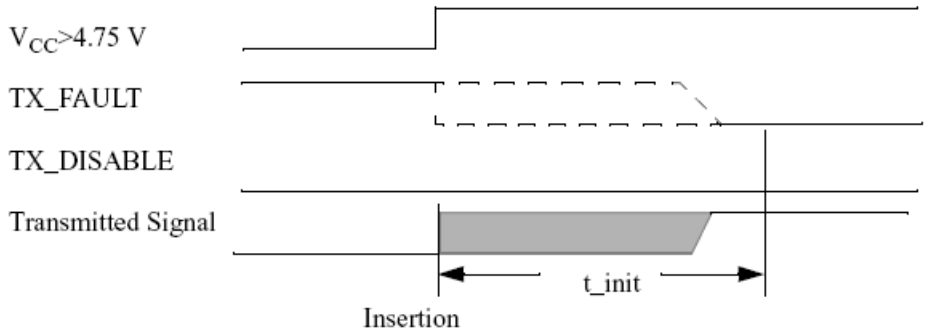
The power on initialization timing for a GBIC with TX_DISABLE asserted is shown below. Note that the management of the transmit signal by TX_DISABLE is not required for GBICs of some module definitions, so that the transmitted signal may appear while TX_DISABLE is asserted.



Power on initialization of GBIC, TX_DISABLE asserted

Initialization during hot plugging of GBIC.

When a GBIC is not installed, TX_FAULT is held to the asserted state by the pull up circuits on the host. As the GBIC is installed, contact is made with the ground, voltage, and signal contacts in the specified order. After the GBIC has determined that VDDT has reached the specified value, the power on initialization takes place. An example of initialization during hot plugging is provided in the following.

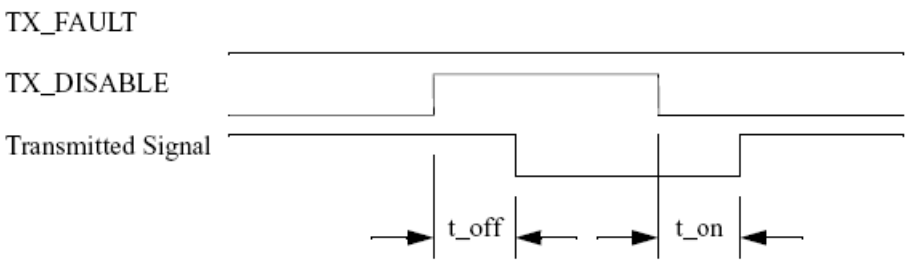


Example of initialization during hot plugging, TX_DISABLE negated.

GBIC transmitter management

If implemented, the TX_DISABLE may be asserted to disable the transmitter for diagnostic, configuration, or security purposes. Since control of the transmit signal by TX_DISABLE is not required for all module definitions, the software managing the GBIC transmitter must consider the MOD_DEF value to determine how the interface will respond when TX_DISABLE is asserted.

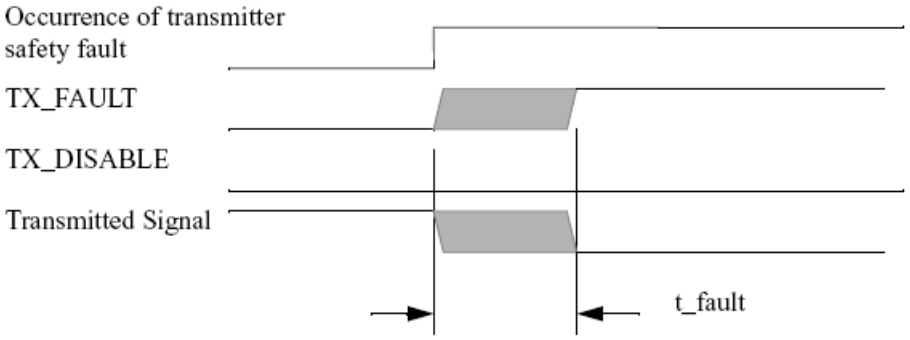
The timing requirements for the management of optical outputs from the GBIC using the TX_DISABLE signal are shown in the following figure. Implementation of the TX_DISABLE signal is required for module definitions that use TX_DISABLE to clear a latched TX_FAULT condition and is optional for other module definitions unless specifically required.



Management of GBIC during normal operation, TX_DISABLE implemented

GBIC fault detection and presentation

TX_FAULT shall be implemented by those module definitions of GBIC supporting safety circuitry. If TX_FAULT is not implemented, the signal shall be held to the low state by the GBIC.

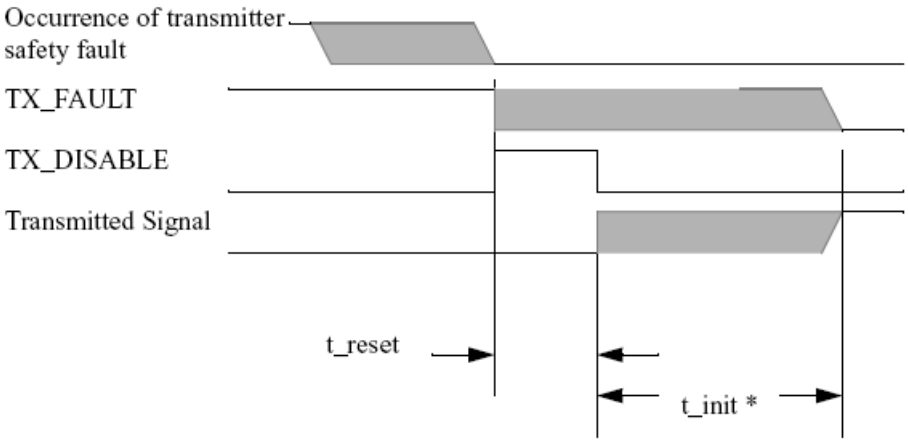


Detection of transmitter safety fault condition

GBIC fault recovery

The detection of a safety-related transmitter fault condition presented by TX_FAULT shall be latched. The following protocol may be used to reset the latch in case the transmitter fault condition is transient.

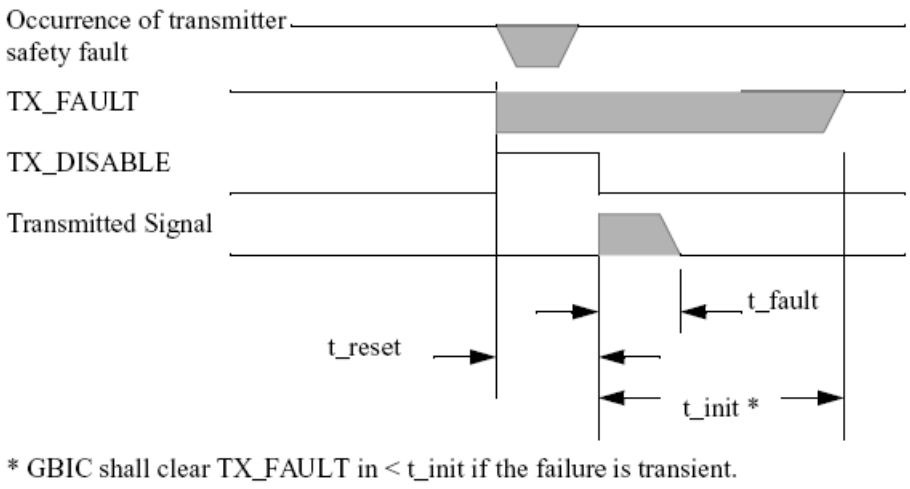
To reset the fault condition and associated detection circuitry, TX_DISABLE shall be asserted for a minimum of t_reset. TX_DISABLE shall then be negated. In less than the maximum value of t_init the optical transmitter will correctly reinitialize the laser circuits, negate TX_FAULT, and begin normal operation if the fault condition is no longer present. If a fault condition is detected during the re-initialization, TX_FAULT shall again be asserted, the fault condition again latched, and the optical transmitter circuitry will again be disabled until the next time a reset protocol is attempted. The manufacturer of the GBIC shall ensure that the optical power emitted from an open connector or fiber is compliant with IEC825-1 and CDRH during all reset attempts, during normal operation or upon the occurrence of reasonable single fault conditions. The GBIC may require internal protective circuitry to prevent the frequent assertion of the TX_DISABLE signal from generating frequent pulses of energy that violate the safety requirements. The timing for successful recovery from a transient safety fault condition is shown below.



* GBIC shall clear TX_FAULT in < t_init if the failure is transient.

Successful recovery from transient safety fault condition

An example of an unsuccessful recovery, where the fault condition was not transient, is shown in the figure below.

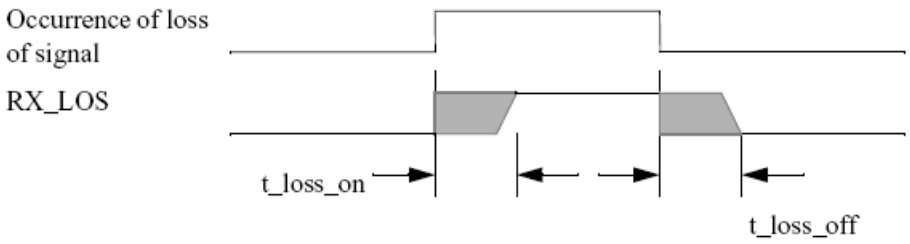


Unsuccessful recovery from safety fault condition

GBIC loss of signal indication

The RX_LOS signal is intended as a preliminary indication to the system in which the GBIC is installed that the link signals are likely to be outside the required values for proper operation. Such indications typically point to non-installed cables, broken cables, or a disabled, failing or powered off transmitter at the far end of the cable. Additional indications are provided by the system in which the GBIC is installed to verify that the information being transmitted is valid, correctly encoded, and in the correct format. Such additional indications are outside the scope of the GBIC specification.

The signal levels that create RX_LOS and the timing of RX_LOS assertion and negation are not precise enough to be used for low-frequency binary signaling on the link. If RX_LOS is not implemented on a GBIC, it shall be held to the low state by the GBIC. If the module definition of the GBIC is specified as implementing RX_LOS, the timing is specified in the following figure.



Timing of RX_LOS detection

H. Module Definition Interface and Data Field Description

Module definition "4" GBIC (Serial Identification)

1 Overview of module definition 4 GBIC

A GBIC having module definition 4 provides access to sophisticated identification information that describes the GBIC's capabilities, standard interfaces, manufacturer, and other information. The serial interface uses the 2-wire serial CMOS E 2PROM protocol. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.

A GBIC shall meet the electrical and optical requirements, including amplitude, eye diagram, jitter, and other parameters, specified for the standards with which the GBIC claims compliance.

2 Serial information definition

The 2-wire serial CMOS E2PROM provides sequential or random access to 8 bit parameters, addressed from 0000h to the maximum address of the memory. The address select pins for the serial CMOS E2PROM shall be set to zero (fixed at the VIL low level). The fields specified by this annex shall not be written by the host in which it is installed. The GBIC may enforce this by using the write protect features of the CMOS E2PROM.

The word address is transmitted with the high order bit transmitted first. The protocol for the 2-wire serial interface sequentially transmits one or more 8-bit bytes, with the data byte addressed by the lowest word address transmitted first. In each data byte, the high order bit (bit 7 in the accompanying tables) is transmitted first.

Numeric fields are expressed in binary, with the high order byte being transferred first and the high order bit of each byte being transferred first. Numeric fields are padded on the left with binary zero values.

Character strings are ordered with the first character to be displayed located in the lowest word address of the string. Each character shall be coded as a US-ASCII character as defined by ISO 8859-1, with the high order bit transmitted first. All character strings will be padded on the right with ASCII spaces (20h) to fill empty bytes.

All bits of reserved fields shall be set to zero until future definitions require their use.

A minimum of 96 bytes shall be readable by the serial identification process.

The maximum clock rate of the serial interface shall be 100 KHz.

The following tables define the contents of the serial CMOS E2PROM. The first table is a summary of all the data fields in the serial ID chip. The remaining tables contain detailed descriptions of the individual data fields.

Serial ID: Data Fields

Data Address	Field Size (Bytes)	Name of field	Description of field
BASE ID FIELDS			
0	1	Identifier	Type of serial transceiver (see table D.2)
1	1	Ext. Identifier	Extended identifier of type of serial transceiver (See table D.3)
2	1	Connector	Code for connector type (see table D.4)
3-10	8	Transceiver	Code for electronic compatibility or optical compatibility (see table D.5)
11	1	Encoding	Code for serial encoding algorithm (see table D.6)
12	1	BR, Nominal	Nominal bit rate, units of 100 M Bits/sec.
13	1	Reserved	
14	1	Length (9µ)	Link length supported for 9/125 mm fiber, units of k
15	1	Length (9µ)	Link length supported for 9/125 µm fiber, units of 100 m
16	1	Length (50µ)	Link length supported for 50/125 µm fiber, units of 10 m
17	1	Length (62.5µ)	Link length supported for 62.5/125 µm fiber, units of 10 m
18	1	Length (Copper)	Link length supported for copper, units of meters
19	1	Reserved	
20-35	16	Vendor name	GBIC vendor name (ASCII)
36	1	Reserved	
37-39	3	Vendor OUI	GBIC vendor IEEE company ID
40-55	16	Vendor PN	Part number provided by GBIC vendor (ASCII)
56-59	4	Vendor rev	Revision level for part number provided by vendor (ASCII)
60-62	3	Reserved	
63	1	CC_BASE	Check code for Base ID Fields (addresses 0 to 62)
EXTENDED ID FIELDS			
64-65	2	Options	Indicates which optional GBIC signals are implemented (see table D.7)
66	1	BR, max	Upper bit rate margin, units of %
67	1	BR, min	Lower bit rate margin, units of %
68-83	16	Vendor SN	Serial number provided by vendor (ASCII)
84-91	8	Date code	Vendor's manufacturing date code (see table D.8)
92-94	3	Reserved	
95	1	CC_EXT	Check code for the Extended ID Fields (addresses 64 to 94)
VENDOR SPECIFIC ID FIELDS			
96-127	32	Read-only	Vendor specific data, read only
128-51	384	Reserved	
512-n			Vendor specific

Identifier

The identifier value specifies the physical device described by the serial information. This value shall be included in the serial data. The defined identifier values are shown in the table below.

Identifier values

Value	Description of physical device
00h	Unknown or unspecified
01h	GBIC
02h	Module/connector soldered to motherboard
03h	SFP transceiver
04-7Fh	Reserved
80-FFh	Vendor specific

Extended Identifier

The extended identifier value provides additional information about the transceiver. At present, extended identifier values are specified only for the identifier value of 01h (GBIC). The Extended Identifier value is reserved for all other identifier values.

In many cases, the GBIC elects to use MOD_DEF 4 to make additional information about the GBIC available, even though the GBIC is actually compliant with one of the 6 other MOD_DEF values. The extended identifier allows the GBIC to explicitly specify such compliance without requiring the MOD_DEF value to be inferred from the other information provided. The defined extended identifier values for the GBIC are shown here.

Extended Identifier values for Identifier 01h (GBIC)

Value	Description of connector
00h	GBIC definition is not specified or the GBIC definition is not compliant with a defined MOD_DEF. See product specification for details.
01h	GBIC is compliant with MOD_DEF 1
02h	GBIC is compliant with MOD_DEF 2
03h	GBIC is compliant with MOD_DEF 3
04h	GBIC function is defined by serial ID only
05h	GBIC is compliant with MOD_DEF 5
06h	GBIC is compliant with MOD_DEF 6
07h	GBIC is compliant with MOD_DEF 7
08-FFh	Reserved

Connector

The Connector value indicates the external connector provided on the interface. This value shall be included in the serial data.

Connector values

Value	Description of connector
00h	Unknown or unspecified
01h	Fibre Channel definition of SC connector
02h	Fibre Channel definition of style 1 copper connector
03h	Fibre Channel definition of style 2 copper connector
04h	Fibre Channel definition of BNC/TNC
05h	Fibre Channel definition of coaxial headers
06h	FiberJack
07h	LC
08h	MT-RJ
09h	MU
0Ah	SG
0Bh	Optical pigtail
0C - 1Fh	Reserved
20h	HSSDC II
21h	Copper Pigtail
22-7Fh	Reserved
80-FFh	Vendor specific

Transceiver

The following bit significant indicators define the electronic or optical interfaces that are supported by the GBIC. At least one bit shall be set in this field. For Fibre Channel GBICs, the Fibre Channel speed, transmission media, transmitter technology, and distance capability shall all be indicated.

Transceiver codes

Data Addr	Bit[a]	Description of transceiver	Data Addr	Bit[a]	Description of transceiver
Reserved Standard Compliance Codes			Fibre Channel link length		
3	7-0	Reserved	7	7	Reserved
4	7-4	Reserved	7	6	short distance (S)
SONET Compliance Codes			7	5	intermediate distance (I)
4	3	Reserved	7	4	long distance (L)
4	2	OC 48, long reach	Fibre Channel transmitter technology		
4	1	OC 48, intermediate reach	7	3-2	Reserved
4	0	OC 48, short reach	7	1	Longwave laser (LC)
5	7	Reserved	7	0	Electrical inter-enclosure (EL)
5	6	OC 12, single mode long reach	8	7	Electrical intra-enclosure (EL)
5	5	OC 12, single mode intermediate reach	8	6	Shortwave laser w/o OFC (SN)
5	4	OC 12 multi-mode short reach	8	5	Shortwave laser w/ OFC (SL)
5	3	Reserved	8	4	Longwave laser (LL)
5	2	OC 3, single mode long reach	Fibre Channel transmission media		
5	1	OC 3, single mode intermediate reach	8	0-3	Reserved
5	0	OC 3, multi-mode short reach	9	7	Twin Axial Pair (TW)
Gigabit Ethernet Compliance Code			9	6	Shielded Twisted Pair (TP)
6	7-4	Reserved	9	5	Miniature Coax (MI)
6	3	1000BASE-T	9	4	Video Coax (TV)
6	2	1000BASE-CX	9	3	Multi-mode, 62.5µ (M6)
6	1	1000BASE-LX	9	2	Multi-mode, 50 µ (M5)
6	0	1000BASE-SX	9	1	Reserved
			9	0	Single Mode (SM)
			Fibre Channel speed		
			10	7-5	Reserved
			10	4	400 MBytes/Sec
			10	3	Reserved
			10	2	200 MBytes./Sec
			10	1	Reserved
			10	0	100 MBytes/Sec

a. Bit 7 is the high order bit and is transmitted first in each byte.

Encoding

The encoding value indicates the serial encoding mechanism that is the nominal design target of the particular GBIC. The value shall be contained in the serial data. The defined encoding values are shown in the table below.

Encoding codes

code	Description of encoding mechanism
00h	Unspecified
01h	8B10B
02h	4B5B
03h	NRZ
04h	Manchester
05h -FFh	Reserved

BR, nominal

The nominal bit rate (BR, nominal) is specified in units of 100 Megabits per second, rounded off to the nearest 100 Megabits per second. The bit rate includes those bits necessary to encode and delimit the signal as well as those bits carrying data information. A value of 0 indicates that the bit rate is not specified and must be determined from the transceiver technology. The actual information transfer rate will depend on the encoding of the data, as defined by the encoding value.

Length (9μ)-km

This value specifies the link length that is supported by a GBIC or other transceiver while operating in compliance with the applicable standards using single mode fiber. The value is in units of kilometers. A value of 255 means that the transceiver supports a link length greater than 254 km. A value of zero means that the transceiver does not support single mode fiber or that the length information must be determined from the transceiver technology.

Length (9μ)

This value specifies the link length that is supported by the GBIC while operating in compliance with the applicable standards using single mode fiber. The value is in units of 100 meters. A value of 255 means that the GBIC supports a link length greater than 25.4 km. A value of zero means that the GBIC does not support single mode fiber or that the length information must be determined from the transceiver technology.

Length (50μ)

This value specifies the link length that is supported by the GBIC while operating in compliance with the applicable standards using 50 micron multi-mode fiber. The value is in units of 10 meters. A value of 255 means that the GBIC supports a link length greater than 2.54 km. A value of zero means that the GBIC does not support 50 micron multi-mode fiber or that the length information must be determined from the transceiver technology.

Length (62.5μ)

This value specifies the link length that is supported by the GBIC while operating in compliance with the applicable standards using 62.5 micron multi-mode fiber. The value is in units of 10 meters. A value of 255 means that the GBIC supports a link length greater than 2.54 km. A value of zero means that the GBIC does not 62.5 micron multi-mode fiber or that the length information must determined from the transceiver technology. It is common for GBICs to support both 50 micron and 62.5 micron fiber.

Length (Copper)

This value specifies the minimum link length that is supported by the GBIC while operating in compliance with the applicable standards using copper cable. The value is in units of 1 meter. A value of 255 means that the GBIC supports a link length greater than 254 meters. A value of zero means that the GBIC does not support copper cables or that the length information must be determined from the transceiver technology. Further information about the cable design, equalization, and connectors is usually required to guarantee meeting a particular length requirement.

Vendor name

The vendor name is a 16 character field that contains ASCII characters, left-aligned and padded on the right with ASCII spaces (20h). The vendor name shall be the full name of the corporation, a commonly accepted abbreviation of the name of the corporation, the SCSI company code for the corporation, or the stock exchange code for the corporation. At least one of the vendor name or the vendor OUI fields shall contain valid serial data.

Vendor OUI

The vendor organizationally unique identifier field (vendor OUI) is a 3-byte field that contains the IEEE Company Identifier for the vendor. A value of all zero in the 3-byte field indicates that the Vendor OUI is unspecified.

Vendor PN

The vendor part number (vendor PN) is a 16-byte field that contains ASCII characters, left-aligned and padded on the right with ASCII spaces (20h), defining the vendor part number or product name. A value of all zero in the 16-byte field indicates that the vendor PN is unspecified.

Vendor Rev

The vendor revision number (vendor rev) is a 4-byte field that contains ASCII characters, left-aligned and padded on the right with ASCII spaces (20h), defining the vendor's product revision number. A value of all zero in the 4-byte field indicates that the vendor PN is unspecified.

CC_BASE

The check code is a one byte code that can be used to verify that the first 64 bytes of serial information in the GBIC is valid. The check code shall be the low order 8 bits of the sum of the contents of all the bytes from byte 0 to byte 62, inclusive.

Options

The bits in the option field shall specify the options implemented in the GBIC as described in the table below.

Option values

data address	bit	Description of option
64	7-0	Reserved
65	7-6	Reserved
65	5	RATE_SELECT is implemented If bit is set then active control of the rate select pin is required to change rates. If bit is not set, no control of pin is required. In all cases, compliance with multiple rate standards should be determined by Transceiver Codes in Bytes 4, 5, 6 and 10. (See table D.5)
65	4	TX_DISABLE is implemented and disables the serial output.
65	3	TX_FAULT signal implemented. (Reset as defined in 5.3)
65	2	Loss of Signal implemented, signal inverted from definition in 3.3 NOTE: This is not standard GBIC behavior and should be avoided, since non-interoperable behavior results.
65	1	Loss of Signal implemented, signal as defined in 3.3
65	0	Reserved

BR, max

The upper bit rate limit at which the GBIC will still meet its specifications (BR, max) is specified in units of 1% above the nominal bit rate. A value of zero indicates that this field is not specified.

BR, min

The lower bit rate limit at which the GBIC will still meet its specifications (BR, min) is specified in units of 1% below the nominal bit rate. A value of zero indicates that this field is not specified.

Vendor SN

The vendor serial number (vendor SN) is a 16 character field that contains ASCII characters, left-aligned and padded on the right with ASCII spaces (20h), defining the vendor's serial number for the GBIC. A value of all zero in the 16-byte field indicates that the vendor PN is unspecified.

Date Code

The date code is an 8-byte field that contains the vendor's date code in ASCII characters. The date code is mandatory.

Date Code

Data Address	Description of field
84-85	ASCII code, two low order digits of year. (00 = 2000).
86-87	ASCII code, digits of month (01 = Jan through 12 = Dec)
88-89	ASCII code, day of month (01 - 31)
90-91	ASCII code, vendor specific lot code, may be blank

CC_EXT

The check code is a one byte code that can be used to verify that the first 32 bytes of extended serial information in the GBIC is valid. The check code shall be the low order 8 bits of the sum of the contents of all the bytes from byte 64 to byte 94, inclusive.

Read-only

This area may contain vendor specific information which can be read from the GBIC. The data is read only.