DTR-1250-SM-GB

GBIC Interface Gigabit Ethernet 1300 & 1550 nm Laser Transceivers

Features

- ☑ *Compliant with Gigabit Interface Converter (GBIC) specification, Rev 5.1*
- ☑ *Compliant with IEEE 802.3z Draft D5.0 1000BASE-LX specifications for Gigabit Ethernet*
- ☑ *Compliant with optical interface requirements in Annex F of GBIC specification, Rev 5.1*
- ☑ *Compliant with GBIC Serial Module Definition Protocol (Module Definition 4 in Annex D)*
- ☑ *Hot-pluggable*
- ☑ *four distance options with single mode fiber: standard distance of 10 km, extended distances of 25 km, 40 km and 70 km*
- ☑ *Excellent EMI & ESD protection*
- ☑ *Eye Safe (Class I Laser Safety)*
- ☑ *Duplex SC interface*
- ☑ *Single +5 V supply voltage*

Description

The DTR-1250-SM-GB fiber optic transceiver offers a simple and convenient way to interface 1000BASE-SX Gigabit Ethernet boards running at 1.25 Gbaud to single mode fiber optic cables. In addition to the standard 10 km distance option “L1”, three other longer distance options are offered. In option “H3”, a 1300 nm DFB laser and a high sensitivity receiver are used to increase the distance to over 25 km or 30 km (assuming worst case fiber loss of 0.4 dB/km and 0.35 dB/km respectively). In option “H5”, a 1550 nm DFB laser and a high sensitivity receiver are used to increase the distance to over 35 km or 40 km (assuming worst case fiber loss of 0.3 and 0.25 dB/km respectively). Finally, in option “H7”, a high power 1550 nm DFB laser and an ultra high sensitivity receiver are used to increase the distance to 70 km (assuming fiber loss of 0.2 to 0.25 dB/km). All modules satisfy Class I Laser Safety requirements in accordance with the US FDA/ CDRH and international IEC-825 standards.

The DTR-1250-SM-GB is fully compliant with Annex F of Revision 5.1 of the GigaBit Interface Converter (GBIC) specification. It is fully compliant with Fibre Channel 100-SM-LC-L optical interface. It also fully satisfies the optical interface specifications defined in IEEE 802.3z Draft D5.0 for 1000BASE-LX Gigabit Ethernet.

The DTR-1250-SM-GB uses the GBIC 20-pin connector to allow hot plug capability. Thus, 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.

The transceiver operates from a single +5V power supply over an operating temperature range of 0°C to +70°C.

Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
Storage Temperature	T_{st}	- 40	+ 85	°C
Operating Temperature	T_{op}	0	+ 70	°C
Supply Voltage	V_{DD}	0	+ 6.0	V
Input Voltage	V_{in}	0	V_{DD}	V
Output Current	I_O	-	50	mA
Lead Soldering Temperature & Time	-	-	260°C, 10 sec	

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Transmitter Performance Characteristics (over Operating Temperature)

Parameter		Symbol	Minimum	Typical	Maximum	Units
Data Rate		B	50	1250	1300	Mb/s
Optical Output Power [1]	L1	P_o	- 9.0	-	- 3.0	dBm
	H3, H5		- 4.0	-	1.0	
	H7		- 3.0	-	2.0	
Center Wavelength	L1	λ_c	1285	1310	1345	nm
	H3		1280	1310	1335	
	H5, H7		1480	1550	1580	
Spectral Width (RMS) [1]	L1	$\Delta\lambda_{RMS}$	-	-	3.5	nm
Spectral Width (-20 dB)	H3, H5, H7	$\Delta\lambda_{20}$	-	-	1.0	
Extinction Ratio		P_{hi} / P_{lo}	9	-	-	dB
Transmitter Disabled Optical Output Power [1]		P_{dis}	-	-	- 35.0	
Deterministic Jitter		DJ	-	-	80	ps
Random Jitter		RJ	-	-	120	ps
Relative Intensity Noise		RIN	-	-	- 120	dB/Hz
Transmitter Output Eye		compliant with Eye Mask Defined in IEEE 802.3z standard				

[1] Measured average power coupled into single mode fiber (SMF).

Receiver Performance Characteristics (over Operating Temperature)

Parameter			Symbol	Minimum	Typical	Maximum	Units
Data Rate			B	1000	1250	1300	Mb/s
Minimum Input Optical Power (10^{-12} BER) [1]		L1	P_{min}	- 20.0	-	-	dBm
		H3, H5		- 21.0	-	-	
		H7		- 23.0	-	-	
Maximum Input Optical Power (10^{-12} BER) [1]			P_{max}	- 3.0	-	-	dBm
Signal Detect Thresholds	Increasing Light Input	L1	P_{sd+}	-	-	- 20.0	dBm
		H3, H5		-	-	- 21.0	
		H7		-	-	- 23.0	
	Decreasing Light Input		P_{sd-}	- 30.0	-	-	dBm
Signal Detect Hysteresis			-	0.5	-	-	dB
Deterministic Jitter			DJ	-	-	170	ps
Random Jitter			RJ	-	-	96	ps
Wavelength of Operation			λ	1100	-	1600	nm
Return Loss			-	12	-	-	dB
Electrical 3 dB upper cutoff frequency			-	-	-	1500	MHz
Stressed Receiver Sensitivity			compliant with IEEE 802.3z standard				

[1] Measured with 2^7-1 PRBS at 1250 Mb/s at 1300 nm wavelength.

Electrical Power Supply Characteristics (over Operating Temperature Range)

Parameter	Symbol	Minimum	Typical	Maximum	Units
Supply Voltage	V_{DD}	4.75	5.0	5.25	V
Supply Current	I_{DD}	-	160	220	mA

Transmitter Electrical Interface (over Operating Temperature Range)

Parameter	Symbol	Minimum	Typical	Maximum	Units
Input Voltage Swing (+TX_DAT & -TX_DAT) [1]	$V_{PP\text{-}DIF}$	0.65	-	2.0	V
Input HIGH Voltage (TX_DISABLE) [2]	V_{IH}	V_{DD} - 0.5	-	V_{DD} + 0.3	V
Input LOW Voltage (TX_DISABLE) [2]	V_{IL}	0	-	0.5	V
Output HIGH Voltage (TX_FAULT) [3]	V_{OH}	V_{CC} - 0.5	-	V_{CC} + 0.3	V
Output LOW Voltage (TX_FAULT) [3]	V_{OL}	0	-	0.5	V

[1] Differential peak-to-peak voltage.
[2] There is an internal 5.1 Kohm pullup resistor to *VDDT*.
[3] Open Collector compatible, 4.7 K to 10 Kohm pullup to*VCC* (Host Supply Voltage).

Receiver Electrical Interface (over Operating Temperature Range)

Parameter	Symbol	Minimum	Typical	Maximum	Units
Output Voltage Swing (+RX_DAT & -RX_DAT) [1]	$V_{PP\text{-}DIF}$	0.60	-	2.0	Vp-p
Output HIGH Voltage (RX_LOS) [2]	V_{OH}	V_{CC} - 0.5	-	V_{CC} + 0.3	V
Output LOW Voltage (RX_LOS) [2]	V_{OL}	0	-	0.5	V

[1] Differential peak-to-peak voltage across external 75 ohm load.
[2] Open Collector compatible, 4.7 K to 10 Kohm pullup to *VCC* (Host Supply Voltage).

Module Definition

Module Definition	MOD-DEF (0) pin 4	MOD-DEF (1) pin 5	MOD-DEF (2) pin 6	Interpretation by Host
4	TTL LOW	SCL	SDA	Serial module definition protocol

Application Notes

Connection of the GBIC transceiver to the host system:
A 20-pin connector is used to connect the GBIC transceiver to the host system. There are also two guide tabs which are electrically connected to the transceiver circuit ground. When the DTR-1250-SM-GB is inserted into the host system, these two ground tabs make contact to the host circuit ground before any of the connector pins, thereby discharging any possible component-damaging static electricity. In addition, the connector itself performs a two-stage contact sequence. Operational signals and grounds make contact first in stage 1 and then power supply makes contact in stage 2 as specified in Rev. 5.1 of the GBIC specification. Surge currents are eliminated by using this connector pin sequencing and a special slow start circuit.

Electrical interface: All the signal interfaces are compliant with Rev. 5.1 of the GBIC specification. The high speed DATA interface is differential AC-coupled PECL level. Thus, it can be connected to either 5 V or 3.3 V SERDES IC directly. All the low speed control and sense input/output signals are open collector TTL compatible. Therefore, proper pull-up resistor (4.7 K to 10 Kohm) is required.

When the TX_DISABLE pin is at logic HIGH, the transmitter optical output is disabled (less than -35 dBm).

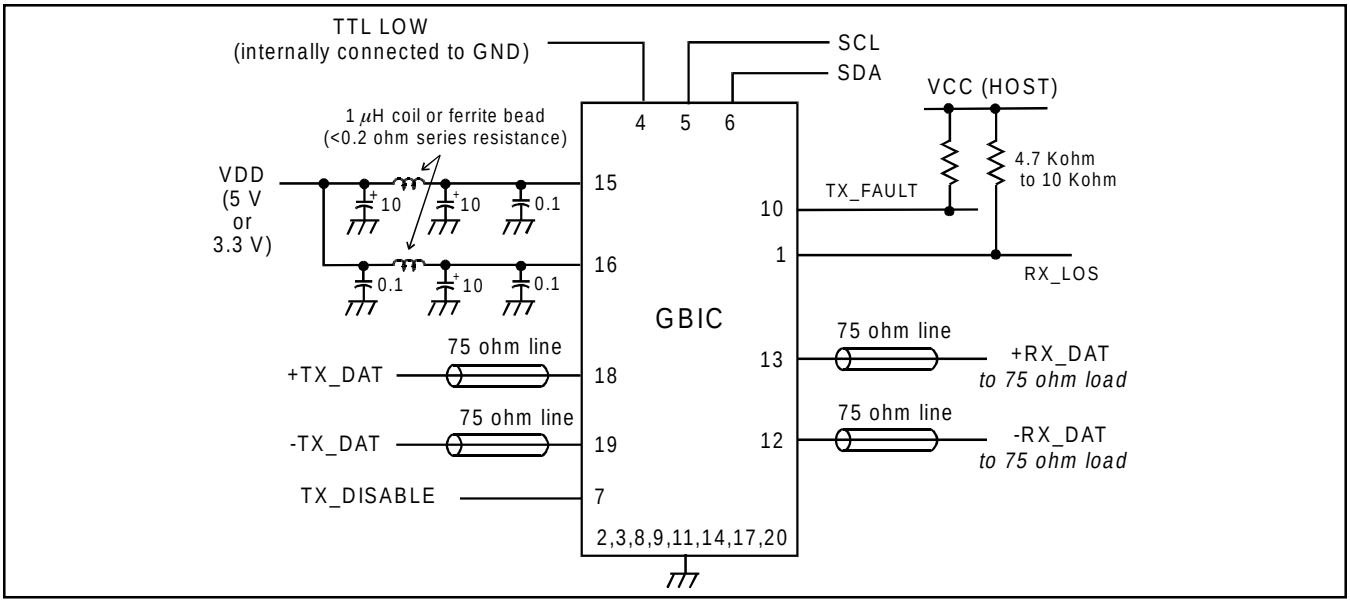
The Loss of Signal detection circuitry in the receiver provides a logic LOW RX_LOS output over the specified range of usable input optical power.

Power supply and grounding: The power supply line should be well-filtered. All 0.1 μF power supply bypass capacitors should be as close to the GBIC transceiver module as possible.

Serial Identification: The DTR-1250-SM-GB is compliant with Annex. D (Module Definition 4) of the GBIC specification Revision 5.1, which defines the Serial Identification Protocol. The module definition of GBIC is indicated by the 3 module definition pins MOD_DEF(0), MOD_DEF(1) and MOD_DEF(2). Module Definition 4 specifies a serial definition protocol. For this definition, upon power up, MOD_DEF(1:2) appear as NC (no connect) and MOD_DEF(0) is TTL LOW. When the host system detects this condition, it activates the serial protocol. The protocol uses the 2-wire serial CMOS E^{2}PROM protocol of the ATMEL AT24C01A/02/04 family of components.

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 these segments of the E^{2}PROM 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.

The data transfer protocol and the details of the mandatory and vendor specific data structures are defined in Annex D of the GBIC specification Revision 5.1.



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Pin Assignments

PIN	FUNCTION	PIN	FUNCTION
1	RX_LOS (RX LOSS OF SIGNAL)	11	RGND (RX GROUND)
2	RGND (RX GROUND)	12	-RX_DAT (RX DATA OUT -)
3	RGND (RX GROUND)	13	+RX_DAT (RX DATA OUT +)
4	MOD_DEF(0)	14	RGND (RX GROUND)
5	MOD_DEF(1)	15	VDDR (RX SUPPLY VOLTAGE)
6	MOD_DEF(2)	16	VDDT (TX SUPPLY VOLTAGE)
7	TX_DISABLE	17	TGND (TX GROUND)
8	TGND (TX GROUND)	18	+TX_DAT (TX DATA IN +)
9	TGND (TX GROUND)	19	-TX_DAT (TX DATA IN -)
10	TX_FAULT	20	TGND (TX GROUND)

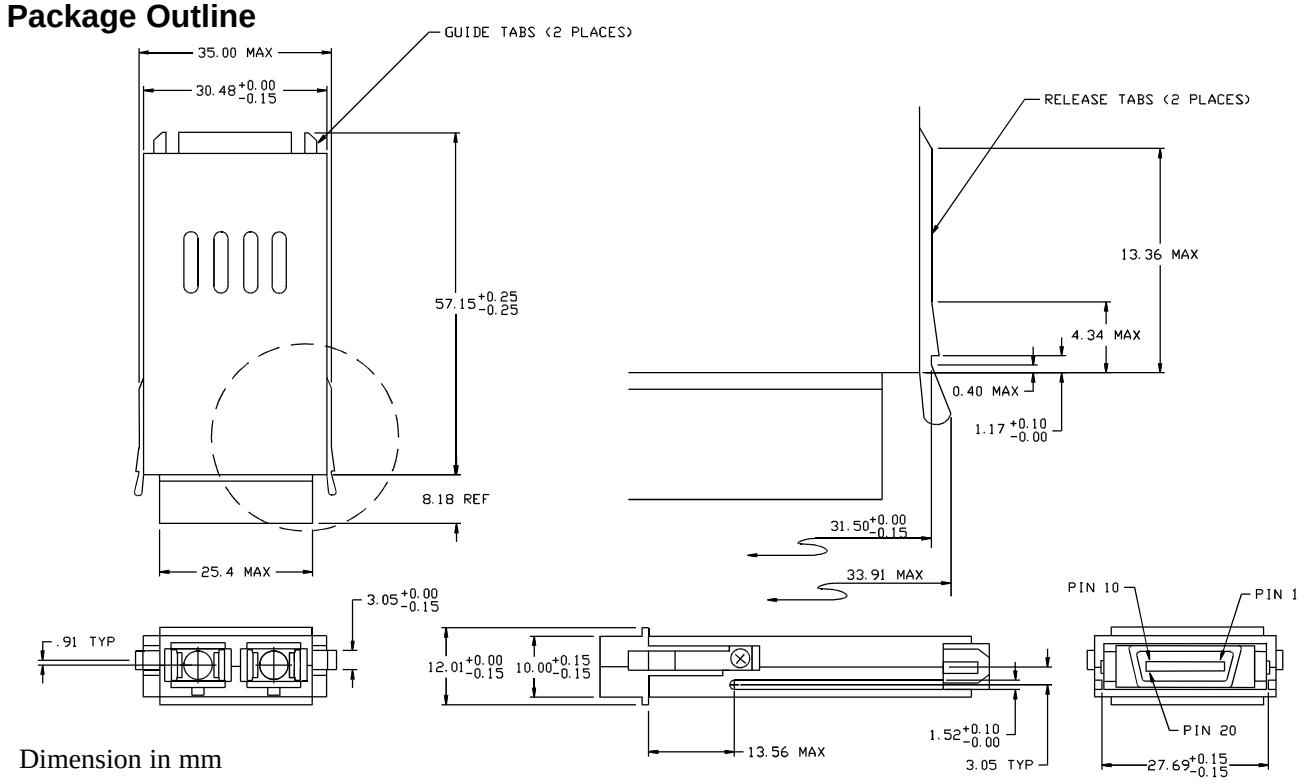
Qualification & Reliability: Qualification testing of the DTR-1250-SM-GB Transceivers is being performed using the relevant sections of Bellcore TA-NWT-000983 specification. Please refer to the "Qualification & Reliability Report of the GBIC Single Mode Transceivers".

Laser Safety: All transceivers are Class I Laser products per FDA/CDRH and IEC-825 standards. They must be operated under specified operating conditions.

Optical Communication Products, Inc.
DATE OF MANUFACTURE:

MANUFACTURED IN THE USA
This product complies with
21 CFR 1040.10 and 1040.11
Meets Class I Laser Safety Requirements

Package Outline



Dimension in mm

Ordering Information

DTR - 1250 - SM - GB - *Yn*

Options for *Yn*: L1 (10 km), H3 (25 to 30 km with 1300 nm DFB laser), H5 (40 km with 1550 nm DFB laser), H7 (70 km with 1550 nm DFB laser)

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