



The LTG1510 GBIC hot-pluggable single mode duplex optical transceiver is designed for 80 km reach applications in high speed 1062.5 or 1250 Mb/s Fibre Channel or Gigabit Ethernet LAN and SAN optical communications equipment where low-cost, low power consumption, extraordinary performance and reliability are essential. It is housed in an MSA complaint GBIC form factor package with an integral SC duplex optical receptacle and is capable of working from either a 3.3 or 5.0 volt power source. It incorporates the standard TTL / LVTTTL monitor and control functions: Rx\_LOS, Tx\_Disable and Tx\_Fault. The Rx\_DATA output and Tx\_DATA input lines are differential PECL / LVPECL compatible. It is IEEE 8023z/D2 and ITU-T G.957 complaint. The Class 1 laser transmitter incorporates a high-performance 1550 nm DFB optical subassembly, which meets the requirements of the international laser safety standard IEC6082-5. The receiver incorporates a InGaAs PIN photodiode coupled to a high sensitivity TIA that drives the quantizer electronics consisting of the post amplifier, signal detection and TTL logic interface.



Ligent GBIC Optical Transceiver

#### Applications

- 1.0625 Gb/sec Fibre Channel data links
- 1.25 Gb/sec Gigabit Ethernet data links
- Channel extenders and data storage networks
- Bus extenders
- High speed I/O file servers
- Storage Area Networks (SANs)
- LANs and RSANs
- Host adopter and mass storage system interconnects
- Switch to switch interfaces and hub interconnects
- Distributed multi processing
- Telecom switches and router interconnects

#### Features

- Auto Select Power Supply
  - 3.3 or 5.0 Volt Operation
- Low power consumption
- Single-Mode Operation
- SC Duplex Interface
- 1550 nm DFB Laser Transmitter
- InGaAs PIN / TIA Receiver
- Hot-pluggable
- 80 km Reach
- TTL / LVTTTL Monitor and Control Functions
  - Rx\_LOS
  - Tx\_FAULT
  - Tx\_DIS
- TTL / LVTTTL Serial ID Functions
  - MOD DEF (0)
  - MOD DEF (1)
  - MOD DEF (2)
- PECL / LVPECL Differential I/O
  - Rx\_DATA
  - Tx\_DATA
- IEEE802.3x/D2 Compliant
- FC-PI-2-100-SM-LC-L Compliant
- ITU-T G.957 compliant
- IEC60825 Class 1 Laser Safety Compliant
- Operating Temperature Range:
  - 0 to 70 degrees centigrade

#### HOW TO ORDER

Part Number	Description
<b>LTG1519</b>	1062.5 / 1250 Mb/s GBIC optical transceiver, single mode, 80 km reach, SC duplex optical receptacle, dual mode power supply, 0 to 70°C operating temperature range



Absolute Maximum Ratings						
Parameter	Symbol	Min	Max	Units	Notes	
Storage Temperature	T <sub>stg</sub>	-40	85	°C		
Operating Temperature	T <sub>amb</sub>	0	70	°C		
Relative Humidity - Storage	RH <sub>S</sub>	0	95	%		
Relative Humidity - Operating	RH <sub>O</sub>	0	95	%		
Soldering Temperature	T <sub>slid</sub>	0	260	°C		
Soldering Time Duration	t <sub>slid</sub>	0	10	seconds		
DC Supply Voltage	V <sub>CC</sub>	-0.5	6.0	VDC		

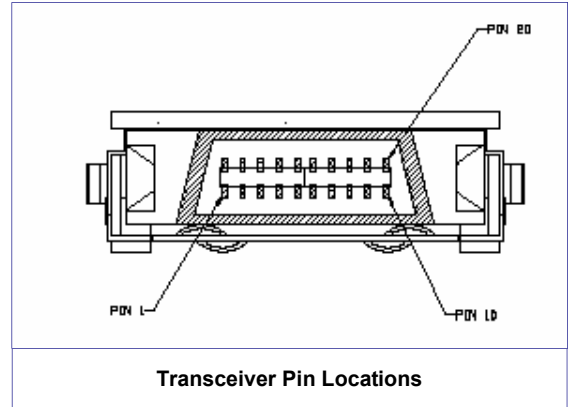
Recommended Operating Conditions						
Parameter	Symbol	Min	Typ	Max	Units	Notes
DC Supply Voltage	V <sub>CC</sub>	3.15	-	5.25	Volts	
Total Module Supply Current (I <sub>TX</sub> +I <sub>RX</sub> )	I <sub>CC</sub>	-	180	300	mA	

Transmitter Electro-Optical Characteristics (T <sub>amb</sub> = 25 °C)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical Output Power	P <sub>OUT</sub>	-2	-	3	dBm	
Extinction Ratio	ER	9.0	-	-	dB	
Center Wavelength	λ <sub>C</sub>	1500	1550	1580	nm	
Spectral Line Width @ -20 dB	Δλ	-	-	1	nm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Optical Rise and Fall Time	t <sub>r</sub> / t <sub>f</sub>	-	-	260	ps	20% ~ 80%
Tx_DIS Voltage (DISABLE)	V <sub>DIS</sub>	V <sub>CC</sub> -1.3	-	V <sub>CC</sub>	V	
Tx_DIS Voltage (ENABLE)	V <sub>EN</sub>	V <sub>ee</sub>	-	V <sub>ee</sub> +0.8	V	

Receiver Electro-Optical Characteristics (T <sub>amb</sub> = 25 °C)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Average Received Power (Max)	P <sub>in max</sub>	-3	-	-	dBm	
Receive Sensitivity	P <sub>in</sub>	-	-	-22	dBm	
Center Wavelength	λ <sub>C</sub>	1100	1550	1600	nm	
Optical Return Loss	RL	12	-	-	dB	
Rx_LOS - Assert	LOS <sub>A</sub>	-	-	-22	dBm	
Rx_LOS - De-Asserted	LOS <sub>D</sub>	-30	-	-	dBm	
Rx_LOS - Hysteresis	-	0.5	-	5	dB	
Data Output Rise Time	t <sub>r</sub>	-	-	400	ps	20% - 80%
Data Output Fall Time	t <sub>f</sub>	-	-	400	ps	20% - 80%



Pin Assignment					
Pin	Symbol	Sequence	Pin	Symbol	Sequence
1	Rx_LOS	2	11	RGND	1
2	RGND	2	12	Rx_DAT (-)	1
3	RGND	2	13	Rx_DAT (+)	1
4	MOD_DEF(0)	2	14	RGND	1
5	MOD_DEF(1)	2	15	VCC <sub>R</sub>	2
6	MOD_DEF(2)	2	16	VCC <sub>T</sub>	2
7	Tx-DISABLE	2	17	TGND	1
8	TGND	2	18	Tx_DAT (+)	1
9	TGND	2	19	Tx_DAT (-)	1
10	Tx_FAULT	2	20	TGND	1

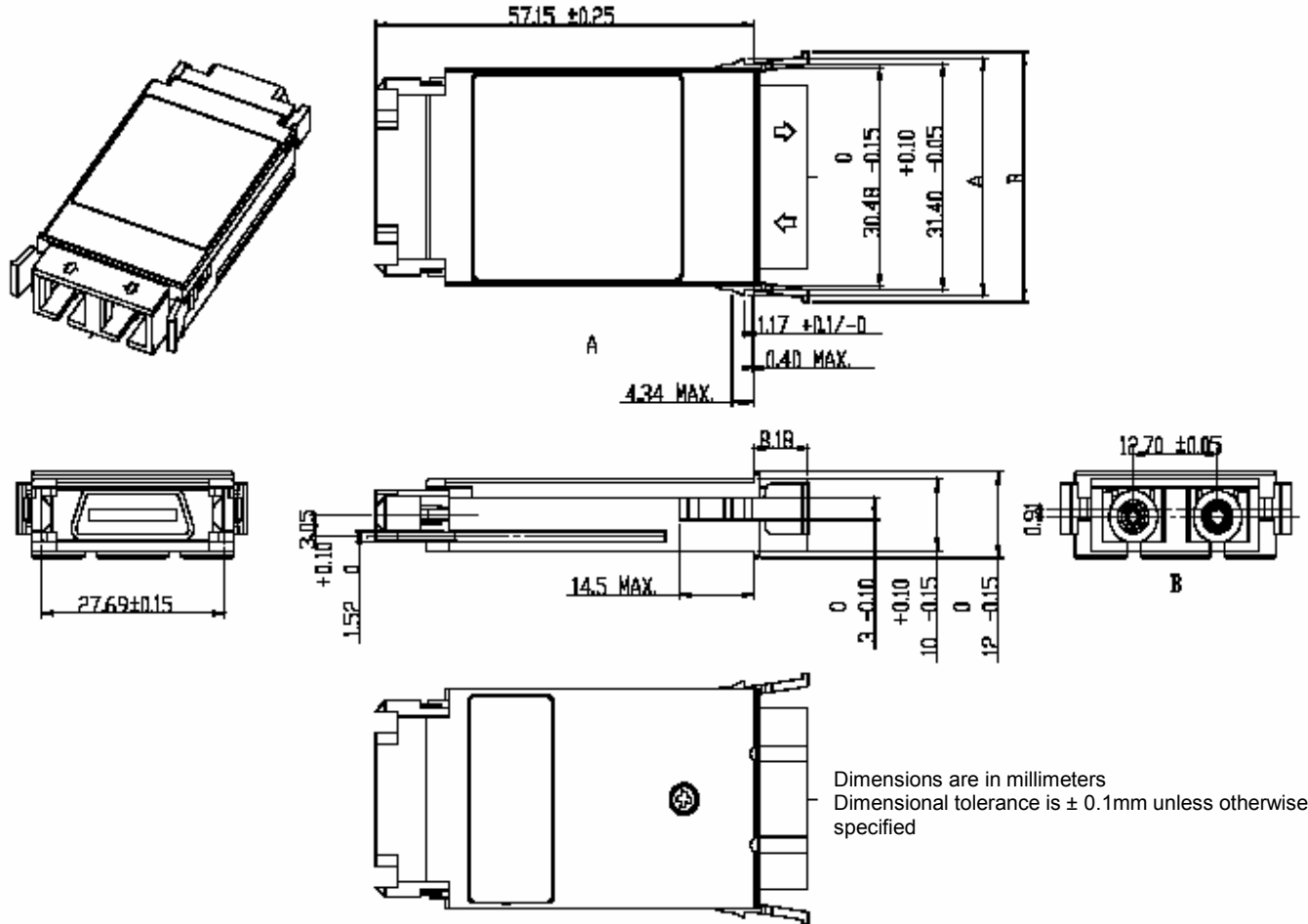


### Overview of Internal Signal Interface

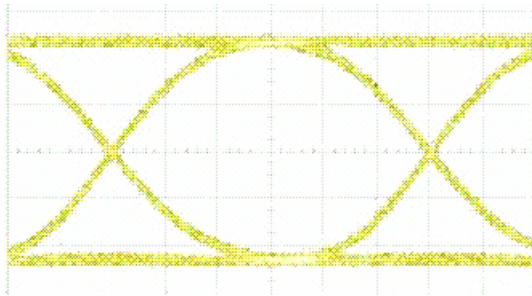
Receiver Signals			
Symbol	Pin	Description	Notes
RxGND	2, 3, 11, 14	Receiver Ground (may be connected to TxGND in GBIC )	Ground
VCCR	15	Receiver +3.3/5.0 volt (may be connected to VCCT in GBIC)	Receiver DC power
Rx_DATA (-)	12	Receive Data, Inverted, Differential PECL	High speed serial data output
Rx_DATA (+)	13	Receive Data, Non-Inverted, Differential PECL	High speed serial data output
Rx_LOS	1	Receiver LOSS OF SIGNAL Logic LOW indicates NORMAL operation Requires 4.7 K to 10 K Ohm pull up to VCC <sub>R</sub> on host	TTL / LVTTTL Receiver monitor
Transmitter Signals			
TxGBD	8, 9, 17, 20	Transmitter Ground (may be internally connected to RxGND)	Ground
VCCT	16	+3.3 volt (may be connected to VCCR in GBIC)	Transmitter DC Power
Tx_DATA (+)	18	Transmit Data, Non-Inverted, Differential PECL	High speed serial data input
Tx_DATA (-)	19	Transmit Data, Inverted, Differential PECL	High speed serial data input
Tx_DIS	7	Transmit DISABLE Logic HIGH indicates that the transmitter is DISABLED Requires 4.7 K to 10 K Ohm pull up to VCCT on host	TTL / LVTTTL transmitter control
Tx_FAULT	10	Transmitter FAULT Logic LOW indicates that the transmitter is operating normally Open Collector Requires 4.7 K to 10 K Ohm pull up to VCCT on host	TTL / LVTTTL transmitter monitor
Control Signals			
MOD_DEF(0)	4	Two-Wire Serial Interface - Ground	
MOD_DEF(1)	5	Two-Wire Serial Interface - Clock Input Open Collector Requires 4.7 K to 10 K Ohm pull up to VCCT on host	
MOD_DEF(2)	6	Two-Wire Serial Interface - Serial Data Open Collector Requires 4.7 K to 10 K Ohm pull up to VCCT on host	



### Mechanical Dimensions

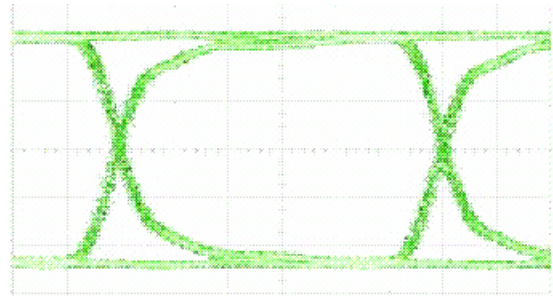


### Tx and Rx Eye Diagrams



**Transmitter Test Conditions**

- Test Pattern =  $2^7-1$  NRZ PRBS



**Receiver Test Conditions**

- Test Pattern =  $2^7-1$  NRZ PRBS



#### REGULATORY INFORMATION

##### Eye Safety

The transceiver is a Class 1 eye-safe device according to FDA 21CFR1040.10 and IEC 60825-2.

##### Electromagnetic Interference (EMI), Immunity and Product Safety

The transceiver is ESD safe (electrical pins) when tested according to MIL-STD-883, Method 3015.7 and ESD safe (optical connector) when tested according to IEC 61000-4-2. The device is immune to strong RF fields when tested in accordance with IEC 610004-3. The device complies with (US) FCC, Part 15, Subpart J; (Europe) CENELEC EN 55022; (Canada) Class B (CISPR22A); and (Japan) VCCI Class 1. The device has been designed to conform to product safety requirements including UL1950, CSA 22.2, and IEC 60950-1, and has been designed to meet the flammability requirements of UL94.

##### Notice

The factory has made all adjustments to this device prior to shipment. No adjustments or modifications to the device are required or permitted. Any adjustment, modification or tampering of the device voids the product warranty. The US Food and Drug Administration may consider that any adjustment or modification to this device is an act of manufacturing and therefore will require that the device be recertified in accordance with 21 CFR 1040.10 Subpart j.

##### Required Label

##### Laser Emission

##### Laser Radiation Information

Wavelength	1550 nm
FDA Total Pout: 7 mm aperture at 20 cm distance	< 790 microwatts
IEC Total Pout : 7 mm aperture at 10 cm distance	< 10,000 microwatts
Beam Divergence	17.25°



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