

## 155Mbps 1x9 SC Duplex Optical Transceiver Module for Fast Ethernet, ATM, SONET/SDH STM-1/OC-3



### Description :

The OPT-155Bxxxx series from DELTA are 1x9 optical transceiver modules designed expressly for high-speed communication applications that require rates of up to 155Mbps. They are all compliant with the SONET/SDH standards.

The OPT-155Bxxxx transceivers are supplied in industry standard 1x9 SIP package style with duplex SC connector.

The OPT-155Bxxxx also includes a Signal-Detect circuit that provides PECL or TTL logic output state.

The OPT-155Bxxxx transceivers are Class-1 eye safety products and effective distance depends on ITU-T G.957 standard or power penalty.

The transmitter sections utilize 1310nm Edge Emitting InGaAsP Laser Diode. This Laser Diode is packaged in the optical subassembly portion of the transmitter section. A custom silicon IC that converts differential PECL logical signals into an analog LD driving current then drive it.

The receiver sections utilize InGaAs PIN photodiodes coupled into a custom silicon transimpedance preamplifier IC. These are packaged in the optical subassembly portion of receiver.

### Features :

- Full Compliance with the Optical Performance Requirements of the ATM 100Mbps and 100 Base-FX Version of IEEE 802.3u.
- Industry Standard 1x9 Footprint and Duplex SC Connector Interface.
- Single 5V (OPT-155B1xxx、OPT-155B3xxx) or 3.3V(OPT-155B2xxx、OPT-155B4xxx)Power Supply.
- PECL Differential Inputs and Outputs.
- PECL or TTL Receiver Signal Detect Indicator.
- Wave Solder and Aqueous Wash Process Compatible.

These PIN / Preamplifier combinations are coupled into a custom quantizer IC which provides the final pulse shaping for the logic output and the Signal Detect function. The data output is differential. The signal detect output is single-ended.

### Application :

- Single-mode Fiber Backbone Links.
- Fast Ethernet and ATM Compatible.
- Single-mode Fiber Media Converter.

**Absolute Maximum Ratings**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	T <sub>s</sub>	-40		85	°C	
Supply Voltage	V <sub>CC</sub>	0		6	V	

**Recommended Operating Conditions**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Data Rate		100	155.52	200	Mbps	
Operating Temperature						
OPT-155Bxxx	T <sub>A</sub>	0	25	70	°C	
OPT-155BxxxT		-40	25	85		
Supply Voltage						
OPT-155B1xxxx · OPT-155B3xxxx	V <sub>CC</sub>	4.75	5	5.25	V	
OPT-155B2xxxx · OPT-155B4xxxx		3.15	3.3	3.45		

**Electrical Characteristics**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
<b>Transmitter</b>						
Transmitter Data Input Voltage-Low	V <sub>IL-VCC</sub>	-1.81		-1.48	V	
Transmitter Data Input Voltage-High	V <sub>IH-VCC</sub>	-1.16		-0.88	V	
<b>Receiver</b>						
Data Output Voltage-Low	V <sub>OL-VCC</sub>	-1.95		-1.62	V	
Data Output Voltage-High	V <sub>OH-VCC</sub>	-1.045		-0.74	V	
SD Output Voltage-Low	V <sub>SDH-VCC</sub>	-1.95		-1.62	V	ECL Family
SD Output Voltage-High	V <sub>SDL-VCC</sub>	-1.045		-0.74	V	ECL Family

**Optical Characteristics**

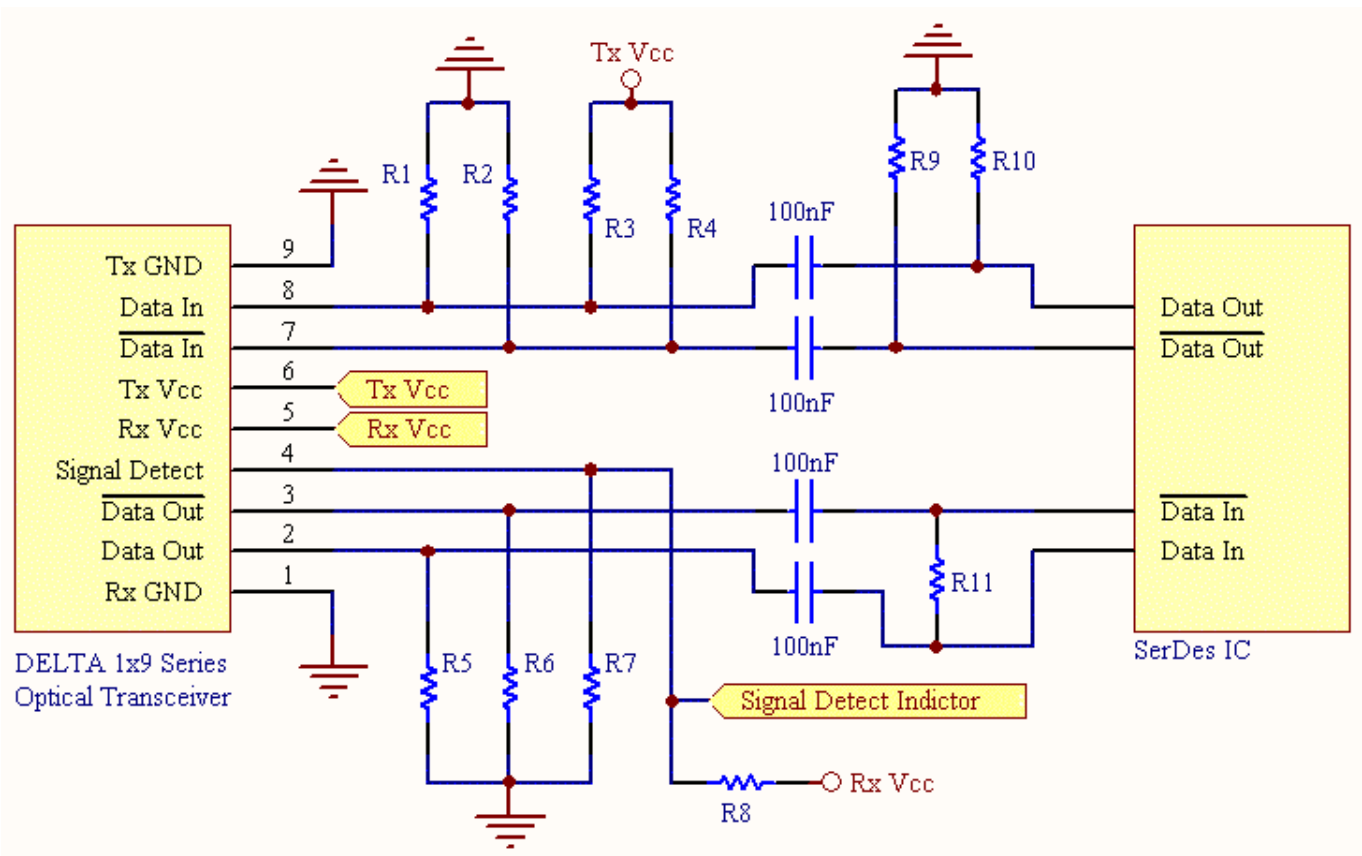
 ( Data Rate = 155.52Mbps, PRBS=2<sup>23</sup>-1, NRZ, 9/125um SMF )

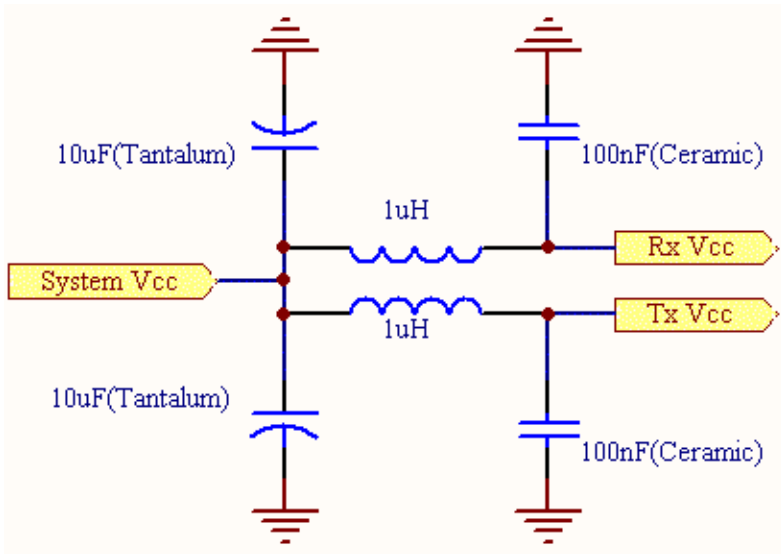
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
<b>Transmitter</b>						
Supply Current	I <sub>CC</sub>			165 145	mA	OPT-155B1 · B3 Series OPT-155B2 · B4 Series
Mean Launch Power	P <sub>O</sub>	-20 -15 -8 -5		-15 -8 -5 0	dBm	OPT-155BxHxxx OPT-155BxJxxx OPT-155BxLxxx OPT-155BxMxxx
Optical Extinction Ratio	E.R.	9			dB	
Center Wavelength	λ <sub>C</sub>	1280	1310	1340	nm	
Spectral Width (RMS)	σ			2	nm	
Optical Risetime / Falltime	t <sub>r</sub> /t <sub>f</sub>			0.7	ns	10%~90%
Output Eye Diagram	Compliant with ITU-T recommendation G.957					
<b>Receiver</b>						
Supply Current	I <sub>CC</sub>			145 120	mA	OPT-155B1 · B3 Series OPT-155B2 · B4 Series
Sensitivity	P <sub>IN</sub>			-32 -34	dBm	OPT-155BxMxxx
Overload	P <sub>OL</sub>	-8			dBm	
Signal Detect-Asserted	P <sub>A</sub>			-34	dBm	
Signal Detect-DeAsserted	P <sub>D</sub>	-45			dBm	
Signal Detect-Hysteresis	P <sub>A</sub> -P <sub>D</sub>	1			dB	

 Notes : The sensitivity should be tested at BER of 1×10<sup>-10</sup> or better with an input signal consisting of 155.52Mb/s, NRZ, PRBS=2<sup>23</sup>-1 and E.R.= 9dB.

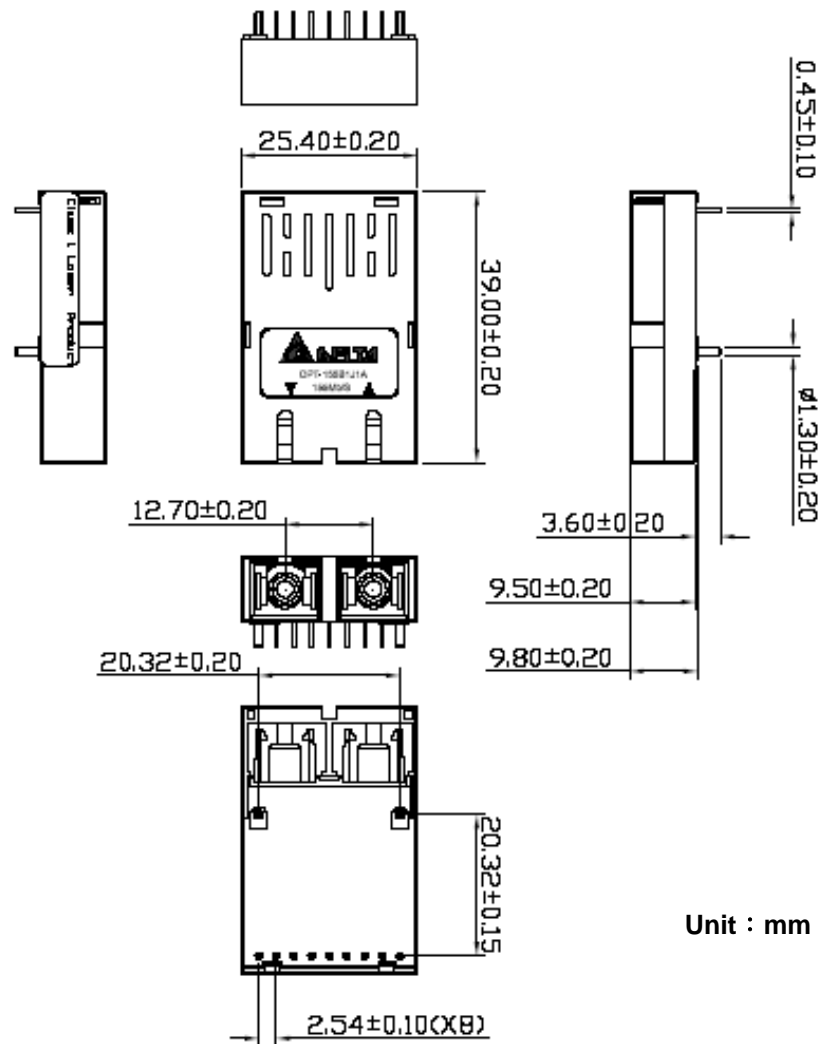
**Pin Definition :**

PIN	Symbol	Functional description
1	GND	Receiver Signal Ground
2	RD (+)	Receiver Data Out (LVPECL or PECL)
3	RD (-)	Receiver Data Out Bar (LVPECL or PECL)
4	SD	Receiver Signal Detect (LVPECL , PECL , LVTTTL or TTL)
5	VccR	Receiver Power Supply
6	VccT	Transmitter Power Supply
7	TD (-)	Transmitter Data In Bar (LVPECL or PECL)
8	TD (+)	Transmitter Data In (LVPECL or PECL)
9	GND	Transmitter Signal Ground

**Recommend Circuit Schematic :**



**Note :**

- When system Vcc is 5V, the resistors are as below:  
 $R1=R2=191\Omega$  ;  $R3=R4=68\Omega$   
 $R5=R6=270\Omega$   
 For PECL Level :  $R7=130\Omega$  ;  $R8=82\Omega$   
 For TTL Level :  $R7$ 、 $R8$ , No use.
- When system Vcc is 3.3V, the resistors are as below:  
 $R1=R2=130\Omega$  ;  $R3=R4=82\Omega$   
 $R5=R6=150\Omega$   
 For PECL Level :  $R7=82\Omega$  ;  $R8=130\Omega$   
 For TTL Level :  $R7$ 、 $R8$ , No use.
- $R9$ ,  $R10$ ,  $R11$  depend on SerDes IC specification.
- For getting better EMI performance, the Tx Vcc and Rx Vcc should isolate each other as left photograph.

**Package Outline :**


Unit : mm

**OPT-155B Series with SC-type Connector**

**Order information :**

**OPT-155B<sub>x<sub>1</sub>x<sub>2</sub>x<sub>3</sub>x<sub>4</sub></sub>**

**X<sub>1</sub> : Power Supply Voltage and SD Level**

- 1 : 5.0V ; Data In/Out ( PECL ) ; SD Output ( PECL )
- 2 : 3.3V ; Data In/Out ( PECL ) ; SD Output ( PECL )
- 3 : 5.0V ; Data In/Out ( PECL ) ; SD Output ( TTL )
- 4 : 3.3V ; Data In/Out ( PECL ) ; SD Output ( TTL )

**x<sub>2</sub> : Effective Distance Grade**

- H : 2Km
- J : 15Km
- L : 30Km
- M : 40Km

**x<sub>3</sub> : Performance**

- 1 : Normal

Other Symbol : It represents special specifications that depend on customers' requirement.

**x<sub>4</sub> : Temperature**

- Blank : 0°C to 70°C
- T : -40°C to 85°C

**Regulatory Compliance**

Feature	Standard	Comments
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD 883C Method 3015.4	Class 1 (>1000 V)
Immunity: Electrostatic Discharge (ESD) to the Duplex SC Receptacle	EN 61000-4-2 IEC 61000-4-2	Discharges of ±15 kV with an air discharge probe on the receptacle cause no damage.
Immunity: Radio Frequency Electromagnetic Field	EN 61000-4-3 IEC 61000-4-3	With a field strength of 10 V/m rms, noise frequency ranges from 3 MHz to 1 GHz. No effect on transceiver performance between the specification limits.
Emission: Electromagnetic Interference (EMI)	FCC Class B EN 55022 Class B CISPR 22	Noise frequency range: 30 MHz to 6 GHz, margins depend on PCB layout and chassis design.