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



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.**

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.

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	Ts	-40		85	ºC	
Supply Voltage	Vcc	0		6	V	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Data Rate		100	155.52	200	Mbps	
Operating Temperature OPT-155Bxxx OPT-155BxxxT	TA	 0 -40	 25 25	 70 85	ºC	
Supply Voltage OPT-155B1xxxx、OPT-155B3xxxx OPT-155B2xxxx、OPT-155B4xxxx	Vcc	 4.75 3.15	 5 3.3	 5.25 3.45	V	

Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Transmitter Data Input Voltage-Low	VIL-Vcc	-1.81		-1.48	V	
Transmitter Data Input Voltage-High	VIH-Vcc	-1.16		-0.88	V	
Receiver						
Data Output Voltage-Low	VOL-Vcc	-1.95		-1.62	V	
Data Output Voltage-High	VOH-Vcc	-1.045		-0.74	V	
SD Output Voltage-Low	V_{SDH}-Vcc	-1.95		-1.62	V	ECL Family
SD Output Voltage-High	V_{SDL}-Vcc	-1.045		-0.74	V	ECL Family

Optical Characteristics

（Data Rate = 155.52Mbps, PRBS=2^{23}-1, NRZ, 9/125um SMF）

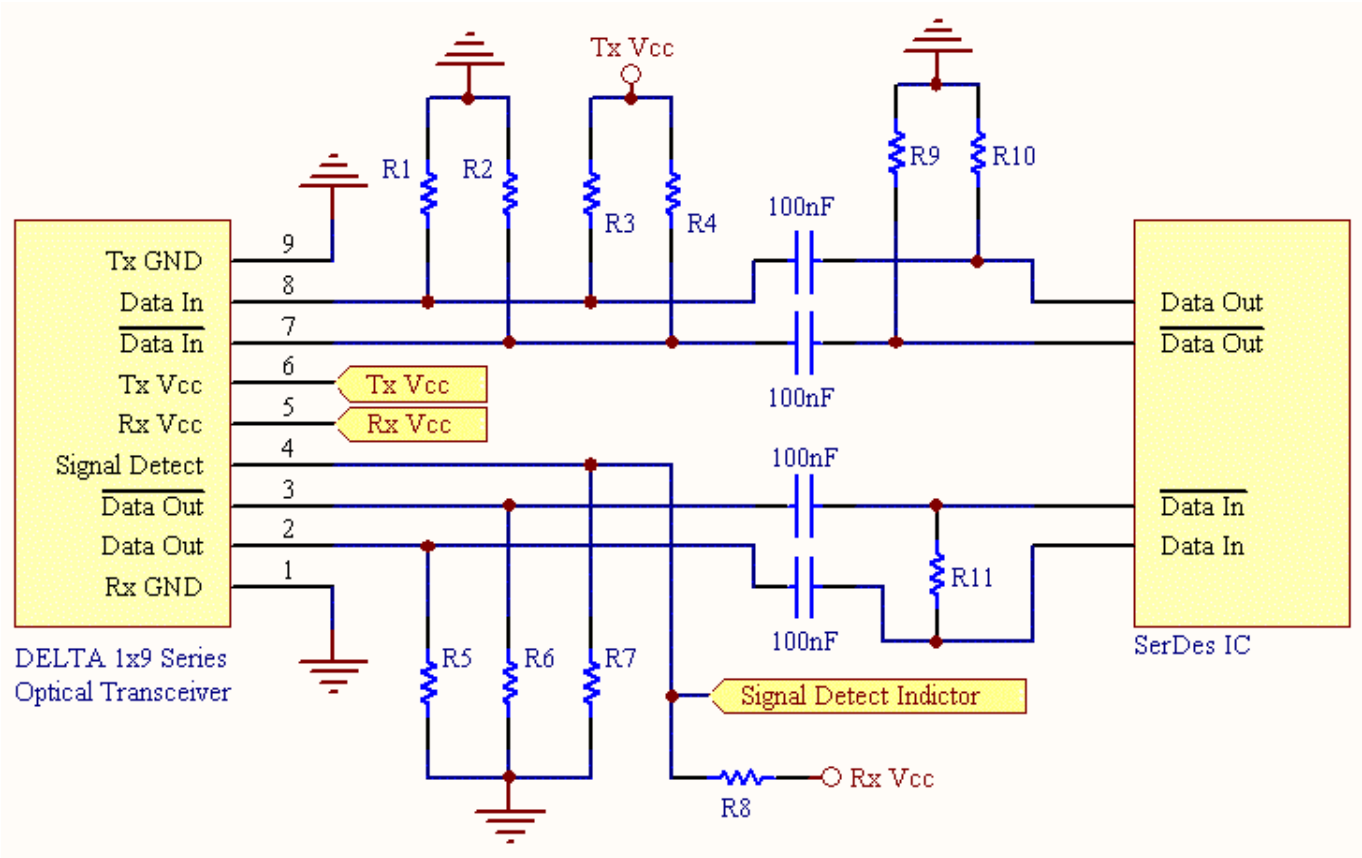
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Supply Current	Icc			165	mA	OPT-155B1、B3 Series
				145		OPT-155B2、B4 Series
Mean Launch Power	P_O	-20		-15	dBm	OPT-155BxHxxx
		-15		-8		OPT-155BxJxxx
		-8		-5		OPT-155BxLxxx
		-5		0		OPT-155BxMxxx
Optical Extinction Ratio	E.R.	9			dB	
Center Wavelength	λ_C	1280	1310	1340	nm	
Spectral Width (RMS)	σ			2	nm	
Optical Risetime / Falltime	t_r/t_f			0.7	ns	10%～90%
Output Eye Diagram	Compliant with ITU-T recommendation G.957					
Receiver						
Supply Current	Icc			145	mA	OPT-155B1、B3 Series
				120		OPT-155B2、B4 Series
Sensitivity	P_{IN}			-32	dBm	
				-34		OPT-155BxMxxx
Overload	Pol	-8			dBm	
Signal Detect-Asserted	P_A			-34	dBm	
Signal Detect-DeAsserted	P_D	-45			dBm	
Signal Detect-Hysteresis	P_A-P_D	1			dB	

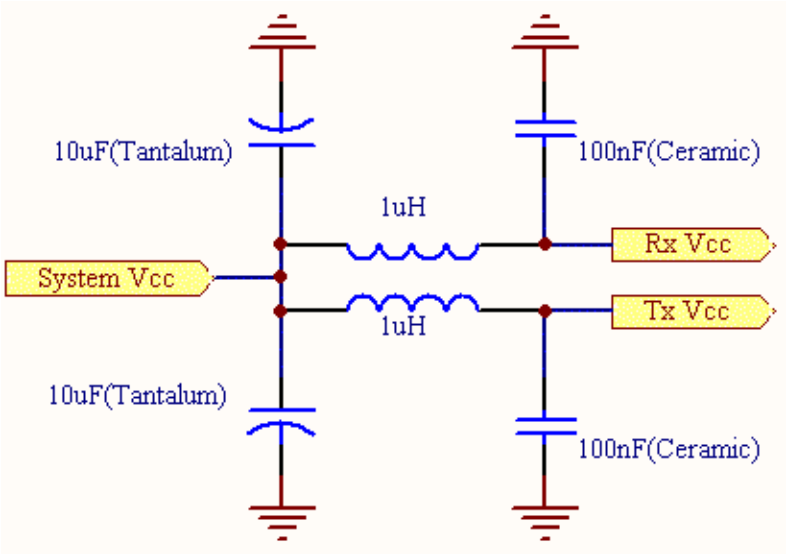
Notes：The sensitivity should be tested at BER of 1×10^{-10} or better with an input signal consisting of 155.52Mb/s, NRZ, PRBS=2^{23}-1 and E.R.= 9dB.

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、LVTTL 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：

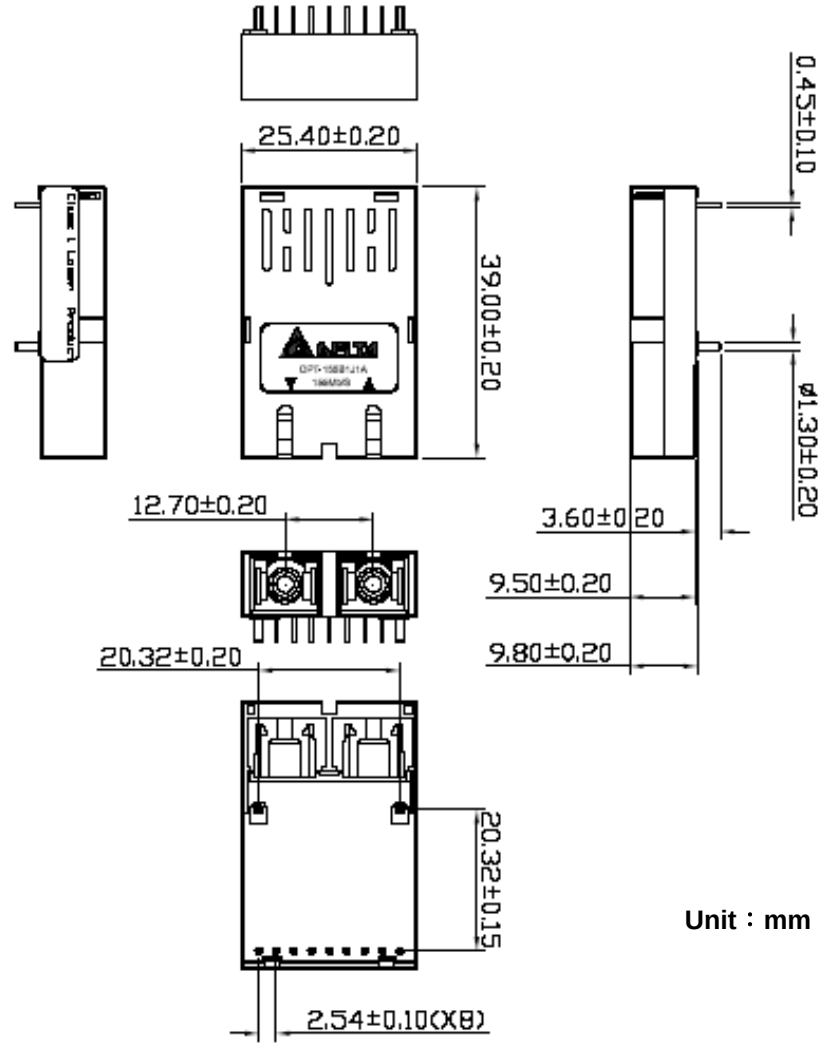




Note：

- When system Vcc is 5V, the resistors are as below:
  R1=R2=191Ω；R3=R4=68Ω
  R5=R6=270Ω
  For PECL Level：R7=130Ω；R8=82Ω
  For TTL Level：R7、R8, No use.
- When system Vcc is 3.3V, the resistors are as below:
  R1=R2=130Ω；R3=R4=82Ω
  R5=R6=150Ω
  For PECL Level：R7=82Ω；R8=130Ω
  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$x_1x_2x_3x_4$

X_1： 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_2： Effective Distance Grade

H： 2Km
J： 15Km
L： 30Km
M： 40Km

x_3： Performance

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

x_4： Temperature

Blank： 0℃ to 70℃
T： -40℃ to 85℃

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.