

## 155Mbps, 2Km, 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-155A1H1A) or 3.3V (OPT-155A2H1A) Power Supply.
- PECL Differential Inputs and Outputs.
- PECL Receiver Signal Detect Indicator.
- Wave Solder and Aqueous Wash Process Compatible.

### Description :

The OPT-155AxH1A 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-155AxH1A transceivers are supplied in industry standard 1x9 SIP package style with duplex SC connector and include a Signal-Detect circuit that provide PECL logic output state.

The performances of OPT-155AxH1A are better than general LED-based optical transceivers as the product specification. All of them can meet Class-1 eye safety standard and effective distance are 2Km at least.

The transmitter sections utilize 1310nm Surface Emitting InGaAsP LEDs. These LEDs are packaged in the optical subassembly portion of the transmitter section. A custom silicon IC that converts differential PECL logical signals into an analog LED 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 :

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

**Absolute Maximum Ratings**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	Ts	-40		85	°C	
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	TA	0	25	70	°C	
Supply Voltage						
OPT-155A1H1A	Vcc	4.75	5	5.25	V	
OPT-155A2H1A		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</sub> -V <sub>CC</sub>	-1.81		-1.48	V	
Transmitter Data Input Voltage-High	V <sub>IH</sub> -V <sub>CC</sub>	-1.16		-0.88	V	
<b>Receiver</b>						
Data Output Voltage-Low	V <sub>OL</sub> -V <sub>CC</sub>	-1.95		-1.62	V	
Data Output Voltage-High	V <sub>OH</sub> -V <sub>CC</sub>	-1.045		-0.74	V	
SD Output Voltage-Low	V <sub>SDH</sub> -V <sub>CC</sub>	-1.95		-1.62	V	ECL Family
SD Output Voltage-High	V <sub>SDL</sub> -V <sub>CC</sub>	-1.045		-0.74	V	ECL Family

**Optical Characteristics**

 (Data Rate = 155.52Mbps, PRBS=2<sup>23</sup>-1, NRZ, 62.5/125um MMF)

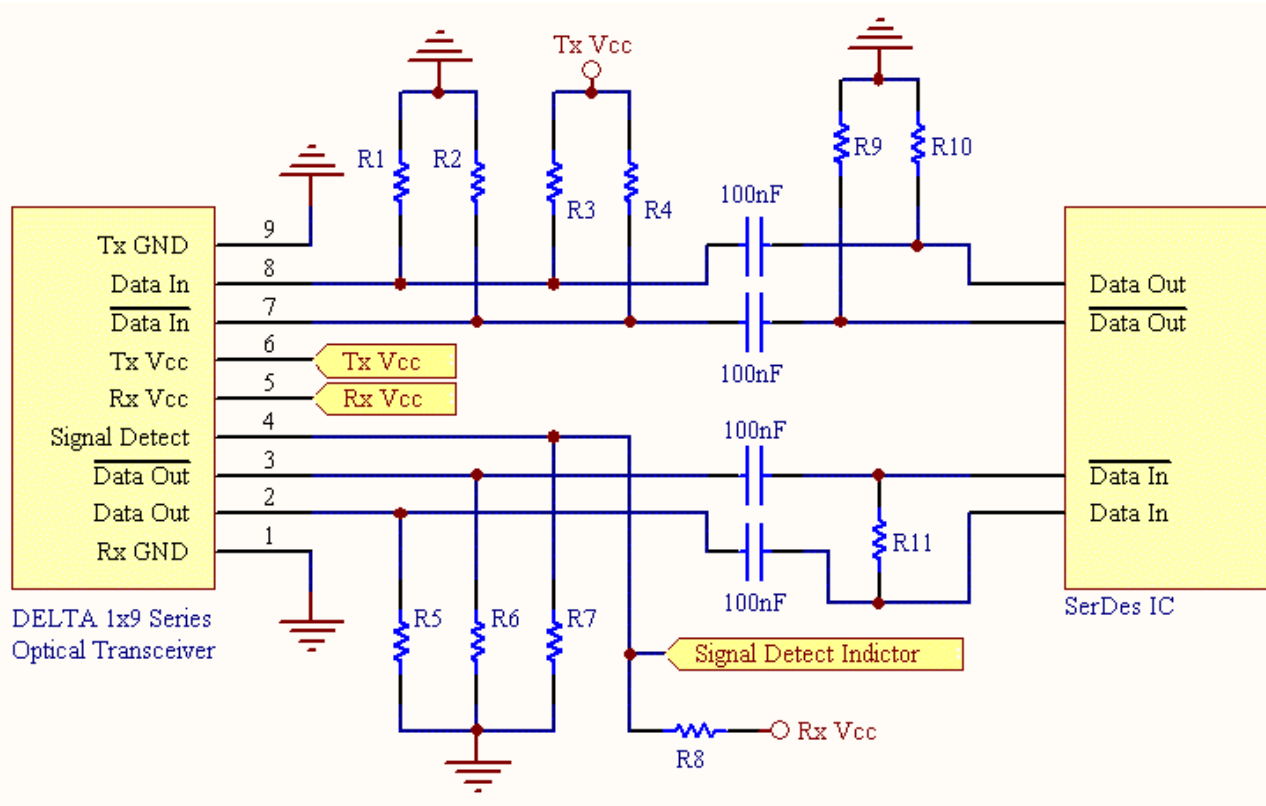
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
<b>Transmitter</b>						
Supply Current	I <sub>cc</sub>			165	mA	OPT-155A1 Series
				145		OPT-155A2 Series
Mean Launch Power	P <sub>O</sub>	-18.5		-14	dBm	
Optical Extinction Ratio	E.R.	9			dB	
Center Wavelength	λ <sub>c</sub>	1280	1310	1340	nm	
Spectral Width (RMS)	σ			170	nm	
Optical Risetime / Falltime	t <sub>r</sub> /t <sub>f</sub>			3.0	ns	10%~90%
Output Eye Diagram	Compliant with ITU-T recommendation G.957					
<b>Receiver</b>						
Supply Current	I <sub>cc</sub>			145	mA	OPT-155A1 Series
				120		OPT-155A2 Series
Sensitivity	P <sub>IN</sub>			-32	dBm	
Overload	P <sub>ol</sub>	-14			dBm	
Signal Detect-Asserted	P <sub>A</sub>			-33	dBm	
Signal Detect-Asserted (Avg.)	P <sub>D</sub>	-45			dBm	
Signal Detect-Hysteresis	P <sub>A</sub> -P <sub>D</sub>	1			dB	

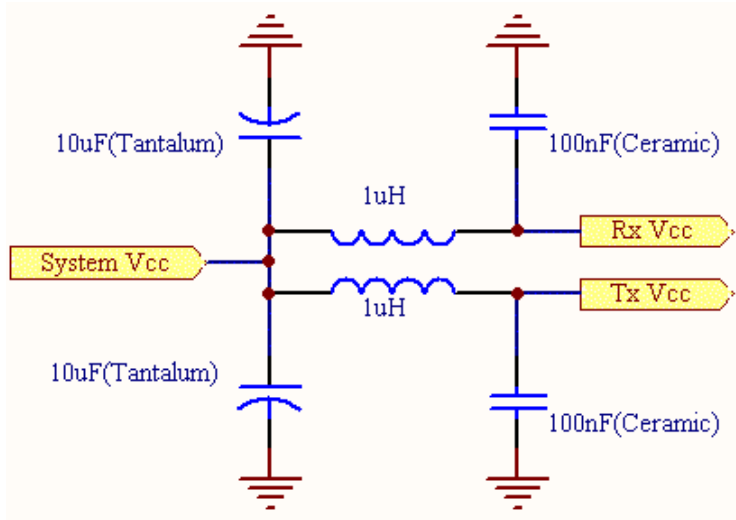
Notes : The sensitivity should be tested at BER of 1×10<sup>-10</sup> or better with an input signal consisting of 155.52Mb/s, NRZ, PRBS=2<sup>23</sup>-1 and E.R.= 9dB.

**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 or PECL)
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 :**

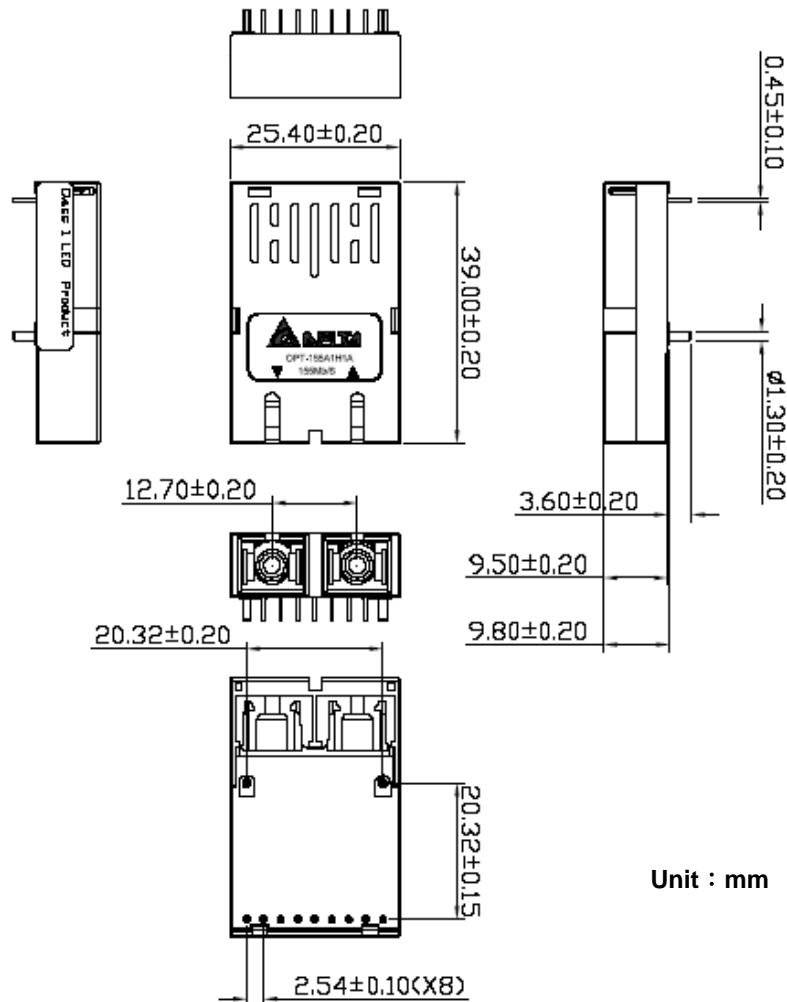




Note :

- When system Vcc is 5V, the resistors are as below:  
 $R1=R2=191\Omega$  ;  $R3=R4=68\Omega$   
 $R5=R6=270\Omega$  ;  $R7=130\Omega$  ;  $R8=82\Omega$
- When system Vcc is 3.3V, the resistors are as below:  
 $R1=R2=130\Omega$  ;  $R3=R4=82\Omega$   
 $R5=R6=150\Omega$  ;  $R7=82\Omega$  ;  $R8=130\Omega$
- $R9, R10, R11$  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-155AxH1Ax Series with SC-type Connector

**Order information :**

**OPT-155A<sub>x1</sub>H1A**

**X1 : 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 )

**Regulatory Compliance Table**

Feature	Test Method	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883C Method 3015.4	Meets Class 2 (2000 to 3999 Volts) Withstand up to 2200 V applied between electrical pins.
Electrostatic Discharge (ESD) to the Duplex SC Receptacle	Variation of IEC 801-2	Typically withstand at least 25 kV without damage when the Duplex SC Connector Receptacle is contacted by a Human Body Model probe.
Electromagnetic Interference (EMC)	FCC Class B CENELEC CEN55022 Class B (CISPR 22B) VCCI Class 2	Typically provide a 13 dB margin (with duplex SC package) or a 9 dB margin (with duplex ST package) to the noted standard limits when tested at a certified test range with the transceiver mounted to a circuit card without a chassis enclosure.
Immunity	Variation of IEC 801-3	Typically show no measurable effect from a 10 V/m field swept from 10 to 450 MHz applied to the transceiver when mounted to a circuit card without a chassis enclosure.