155Mbps 1x9 SC/ST 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 or ST Connector Interface.**
- **Single 5V（OPT-155A1Hxx）or 3.3V（OPT-155A2Hxx）Power Supply.**
- **PECL Differential Inputs and Outputs.**
- **PECL Receiver Signal Detect Indicator.**
- **Wave Solder and Aqueous Wash Process Compatible.**
- **RoHS Compliant per Directive 2002/95/EC**

Description：

The OPT-155AxHxx series 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-155AxHxx transceivers are supplied in industry standard 1x9 SIP package style with either duplex SC or duplex ST connector. Moreover the OPT-155AxHx series also include a Signal-Detect circuit that provides PECL logic output state.

The OPT-155AxHxx series meet Class-1 eye safety standard and effective distance up to 2Km.

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	ºC	
Lead Soldering Temperature	T_{SOLD}			260	ºC	
Lead Soldering Time	t_{SOLD}			10	Sec.	
Supply Voltage	V_{CC}	0		6	V	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Data Rate		100	155.52	200	Mbps	
Ambient Operating Temperature	TA	0		70	ºC	1
Supply Voltage OPT-155A1Hxx OPT-155A2Hxx	VCC	 4.75 3.15	 5 3.3	 5.25 3.45	V	

Note: See ordering information for detail

Electrical Characteristics

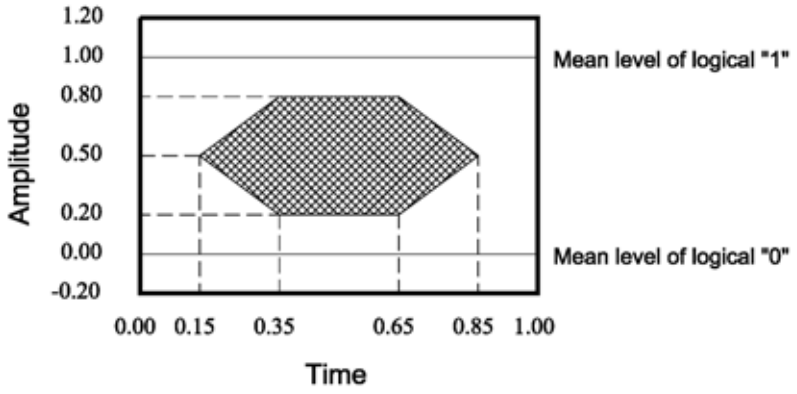
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Transmitter Data Input Voltage-Low	VIL-VCC	-1.81		-1.48	V	
Transmitter Data Input Voltage-High	VIH-VCC	-1.16		-0.88	V	
Receiver						
Data Output Voltage-Low	VOL-VCC	-1.95		-1.62	V	
Data Output Voltage-High	VOH-VCC	-1.045		-0.74	V	
SD Output 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, 62.5/125um MMF）

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Supply Current	Icc			185	mA	OPT-155A1 Series
				165		OPT-155A2 Series
Mean Launch Power 62.5/125 μm, NA=0.275 Fiber 50/125 μm, NA=0.20 Fiber	P_O	 -20 -22.5		 -14 -14	dBm	
Optical Extinction Ratio	E.R.	9			dB	
Center Wavelength	λ_C		1310		nm	
Spectral Width (RMS)	σ			200	nm	
Optical Risetime / Falltime	t_r/t_f			3.0	ns	10%～90%
Output Eye Diagram	Compliant with ITU-T recommendation G.957					
Receiver						
Supply Current	Icc			145	mA	OPT-155A1 Series
				120		OPT-155A2 Series
Sensitivity	P_{IN}			-31	dBm	
Input Optical Wavelength	λ	1100		1600	nm	
Signal Detect-Asserted	P_A			-31	dBm	
Signal Detect-DeAsserted	P_D	-45			dBm	
Signal Detect-Hysteresis	P_A-P_D	0.5			dB	
Overload	P_O	-14			dBm	

Notes：The sensitivity should be tested at BER of 1×10^{-10} or better with an input signal consisting of 155Mb/s, NRZ, PRBS=2^{23}-1 and E.R.= 9dB.



Optical Pulse Mask with Bessel Filter Specified in ITU-T G.957

Mask of the eye diagram for the optical transmit signal

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

Pin Descriptions:

Pin 1 Receiver Signal Ground, GND

Directly connect these pins to the ground plane.

Pin 2 Receiver Data Out (LVPECL), RD (+)

PECL logic family. Output external biased and internal dc coupled.

Pin 3 Receiver Data Out Bar (LVPECL), RD (-)

PECL logic family. Output external biased and internal dc coupled.

Pin 4 Receiver Signal Detect (LVPECL/TTL), SD

PECL/TTL logic family. Normal Operation: Logic “1” Output

Fault Condition: Logic”0” Output

Pin 5 Receiver Power Supply, VccR

Provide +3.3/5V dc power supply.

Pin 6 Transmitter Power Supply, VccT

Provide +3.3/5V dc power supply.

Pin 7 Transmitter Data In Bar (LVPECL), TD (-)

Pin 7 Transmitter Data Input (LVPECL), TD (-)

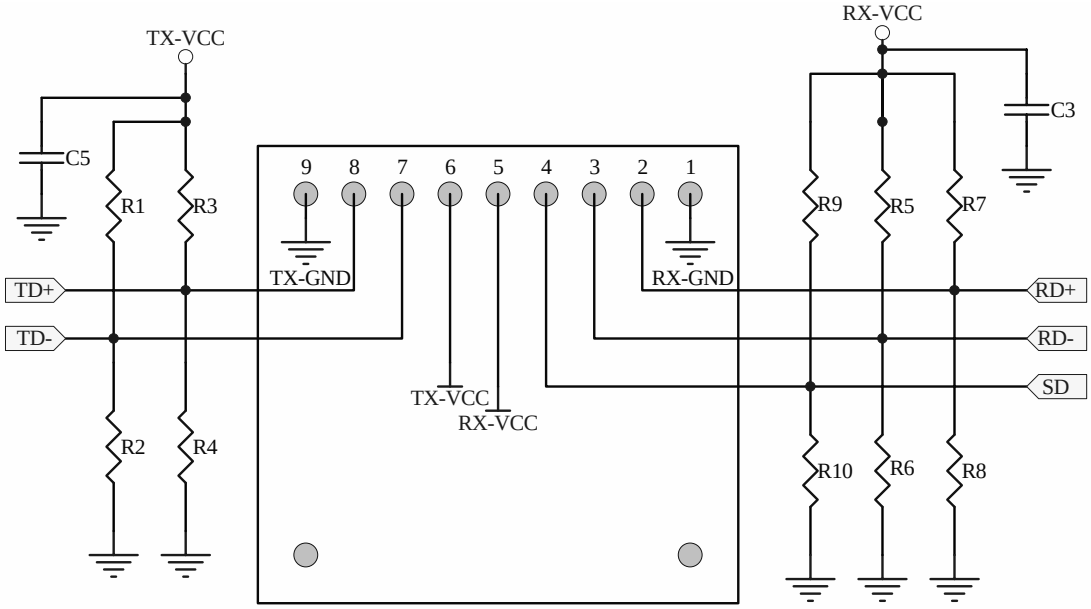
Pin 8 Transmitter Data In (LVPECL), TD (+)

Pin 8 Transmitter Data Input Bar (LVPECL), TD (+)

Pin 9 Transmitter Signal Ground, GND

Directly connect these pins to the ground plane.

Recommend Circuit Schematic for Internal DC Coupled Transceivers



Transceiver Top Niew

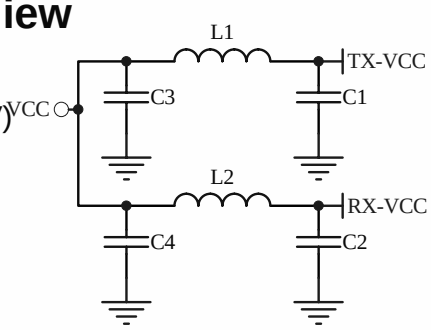
R1=R3=R5=R7=R9=130 Ohm (3.3V), 82 Ohm (5V)

R2=R4=R6=R8=R10=82 Ohm (3.3V), 130 Ohm (5V)

C1=C2=C3=C5=C6=0.1 uF

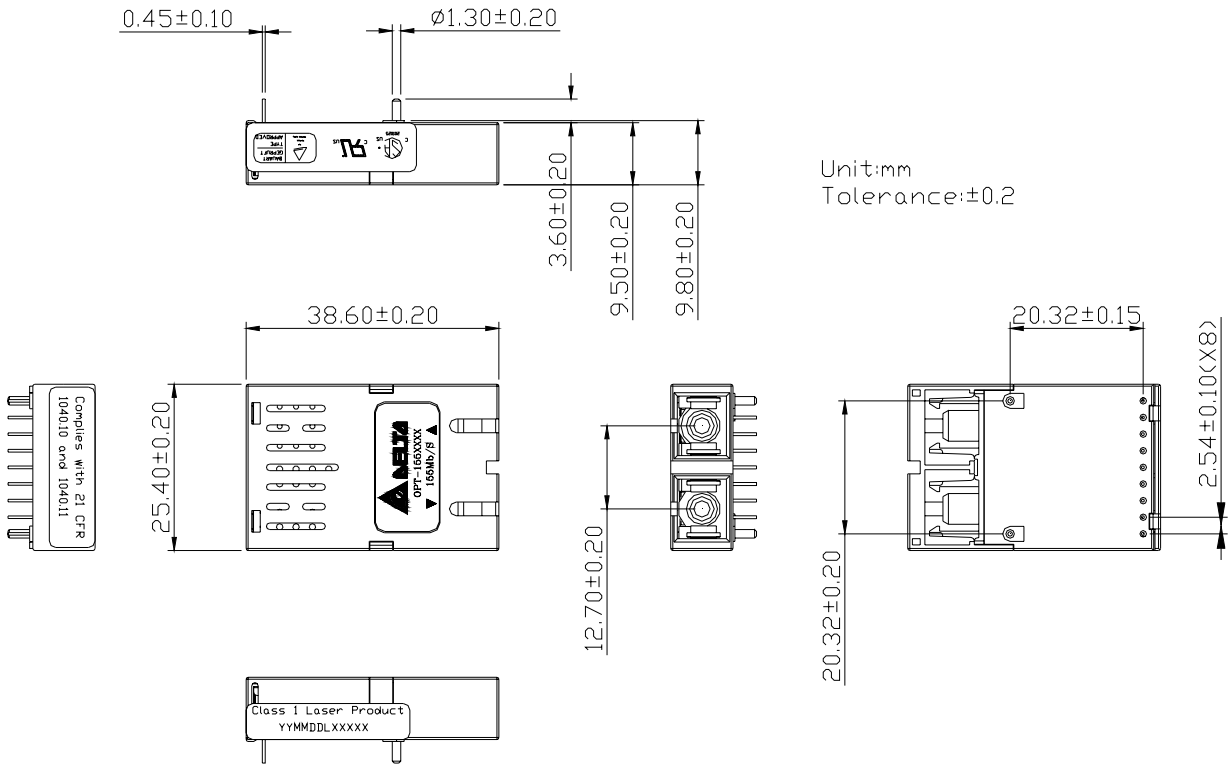
C4=10 uF

L1=L2=1 uH or ferrite inductor

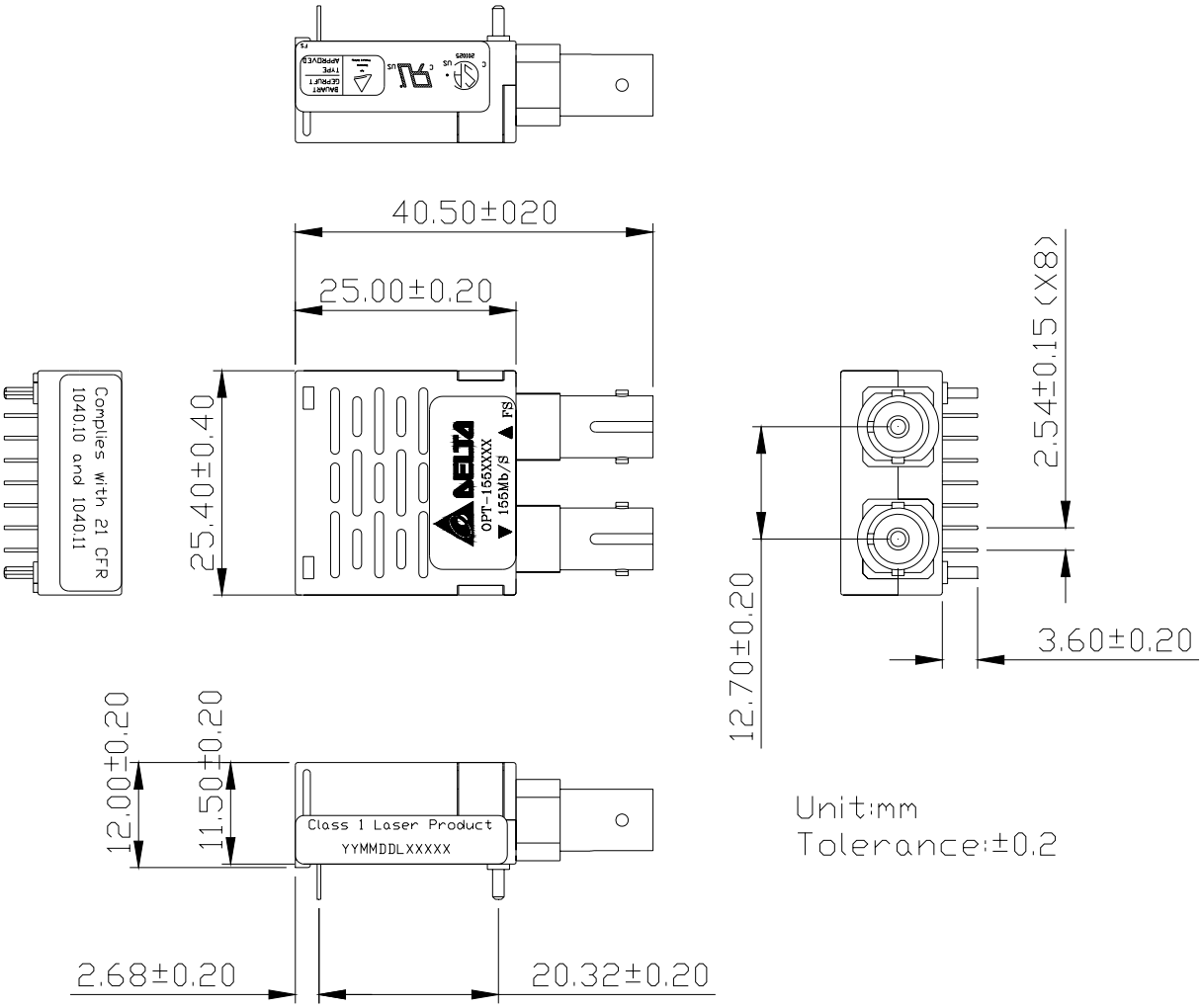


Package Outline：

(1) OPT-155AxH1x Series with SC-type Connector



(2) OPT-155AxH4x Series with ST-type Connector



Regulatory Compliance

Feature	Reference	Performance
Electromagnetic Interference (EMI)	FCC Class B EN 55022 Class B (CISPR 22A)	(1) Satisfied with electrical characteristics of product spec. (2) No physical damage
Radio Frequency Electromagnetic Field	EN 61000-4-3 IEC 1000-4-3	
Electrostatic Discharge to the Duplex LC Receptacle	EN 61000-4-2 IEC 1000-4-2 IEC 801.2	
Electrostatic Discharge to the Electrical Pins	MIL-STD-883E Method 3015.7	
Eye Safety	US FDA CDRH AEL Class 1 EN 60950: 2000 EN 60825-1: 1994+A11+A2 EN 60825-2: 2000	CDRH File # 0321539-00 TUV Certificate No. R50032471
Component Recognition	Underwriters Laboratories and Canadian Standards Association Joint Component Recognition for Information Technology Equipment Including Electrical Business Equipment	UL File # E239394

Order information：

OPT- 155$X_1X_2X_3X_4X_5X_6X_7$

X_1: Fiber
A: Multi-mode 1310nm

X_2: Power Supply Voltage and SD Level
1: 5.0V, PECL SD Level
2: 3.3V, PECL SD Level

X_3: Distance
H: 2km, Multi-mode

X_4: Data Coupling
1: 1x9SC DC/DC
4: 1x9ST DC/DC

X_5: RoHS Compliant
Blank: Non-RoHS Compliant
R: RoHS Compliant

X_6: Performance
Blank: Old Design
A: New Design

X_7: Temperature
Blank: 0 to +70 degree C
H: -10 to + 85 degree C
T: -40 to + 85 degree C