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

Features:

- **Full Compliance with the Optical Performance Requirement of 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 drives it.

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

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

Application:

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

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	T_s	-40		85	℃	
Lead Soldering Temperature	T_{sold}			260	℃	
Lead Soldering Time	t_{sold}			10	Second	
Supply Voltage	Vcc	0		6	V	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Data Rate		100	155.52	200	Mbps	
Ambient Operating Temperature	T_A	0		70	℃	
Supply Voltage OPT-155A1Hxx OPT-155A2Hxx	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	V_{IL}-Vcc	-1.81		-1.48	V	
Transmitter Data Input Voltage-High	V_{IH}-Vcc	-1.16		-0.88	V	
Receiver						
Data Output Voltage-Low	V_{OL}-Vcc	-1.95		-1.62	V	
Data Outpot Voltage-High	V_{OH}-Vcc	-1.045		-0.74	V	
SD Output Voltage-Low	V_{SDL}-Vcc	-1.95		-1.62	V	
SD Output Voltage-High	V_{SDH}-Vcc	-1.045		-0.74	V	

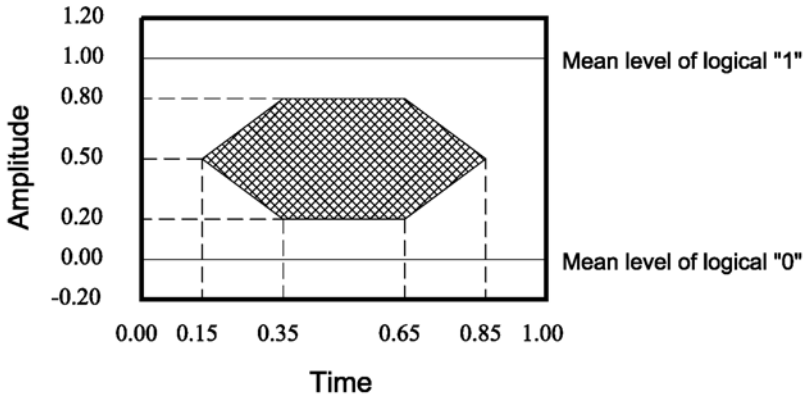
Optical Characteristics

(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	mA	OPT-155A2 Series
Mean Launch Power 62.5/125um, NA=0.275 Fiber 50/125um,NA=0.20 Fiber	Po	 -20 -22.5		 -14 -14	dBm	
Optical Extinction Ratio	E.R	9			dB	
Center Wavelength	λc		1310		nm	
Spectral Width (RMS)	σ			200	nm	
Optical Risetime /Falltime	t_r/r_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	mA	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_{SAT}	-14			dBm	

Note: The Sensitivity should be tested at BER of $1x10^{-10}$ or better with an input signal consisting of 155Mbps,

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 Non-inverted (PECL)
3	RD(-)	Receiver Data Out Inverted (PECL)
4	SD	Receiver Signal Detect (PECL)
5	VccR	Receiver Power Supply
6	VccT	Transmitter Power Supply
7	TD(-)	Transmitter Data In Inverted (PECL)
8	TD(+)	Transmitter Data In Non-inverted (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 Non-inverted (LVPECL), RD(+)

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

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

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

Pin 4 Receiver Signal Detect (LVPECL), SD

PECL logic family. Normal Operation: Logic ”1” Output.

Fault Condition: Logic “0” Output.

Pin 5 Receiver Power Supply, VccR

Provide 3.3V/5V DC power supply.

Pin 6 Transmitter Power Supply, VccT

Provide 3.3V/5V DC Power Supply.

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

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

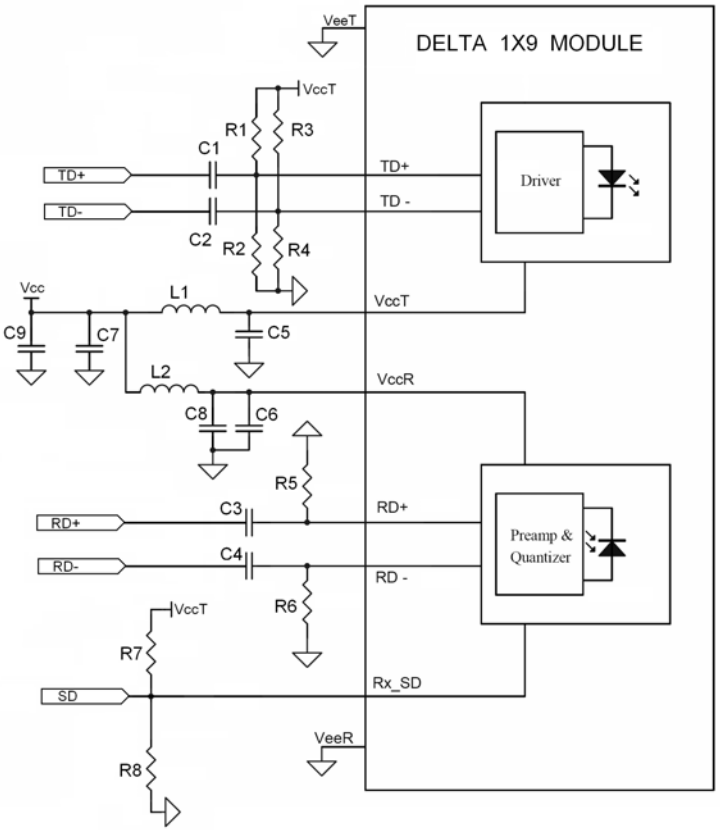
Ping 8 Transmitter Data In Non-inverted (LVPECL), TD(+)

Pin 8 Transmitter Data Input Non-inverted (LVPECL), TD(+).

Pin 9 Transmitter Signal Ground, GND

Directly connect these pins to the ground plane.

Recommend Circuit Schematic for Internal DC Coupled Transceivers



R1=R3=82 ohm (3.3V),68 ohm(5V)

R2=R4=130 ohm (3.3V),191 ohm (5V)

R5=R6=150 ohm (3.3V),270 ohm (5V)

R7=130 ohm (3.3V PECL),82 ohm(5V),NC (TTL)

R8=82 ohm (3.3V PECL),130 ohm(5V),NC (TTL)

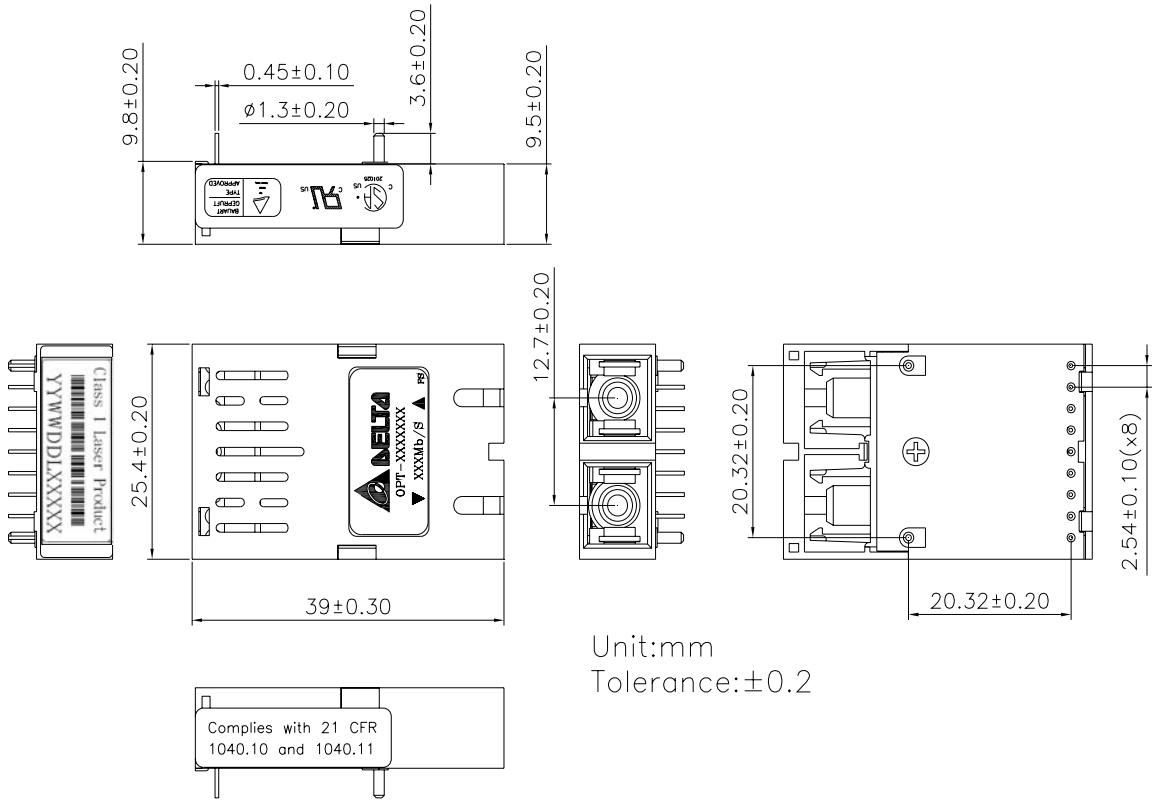
C1=C2=C3=C4=C5=C6=C7=100 nF

C8=C9=10uF

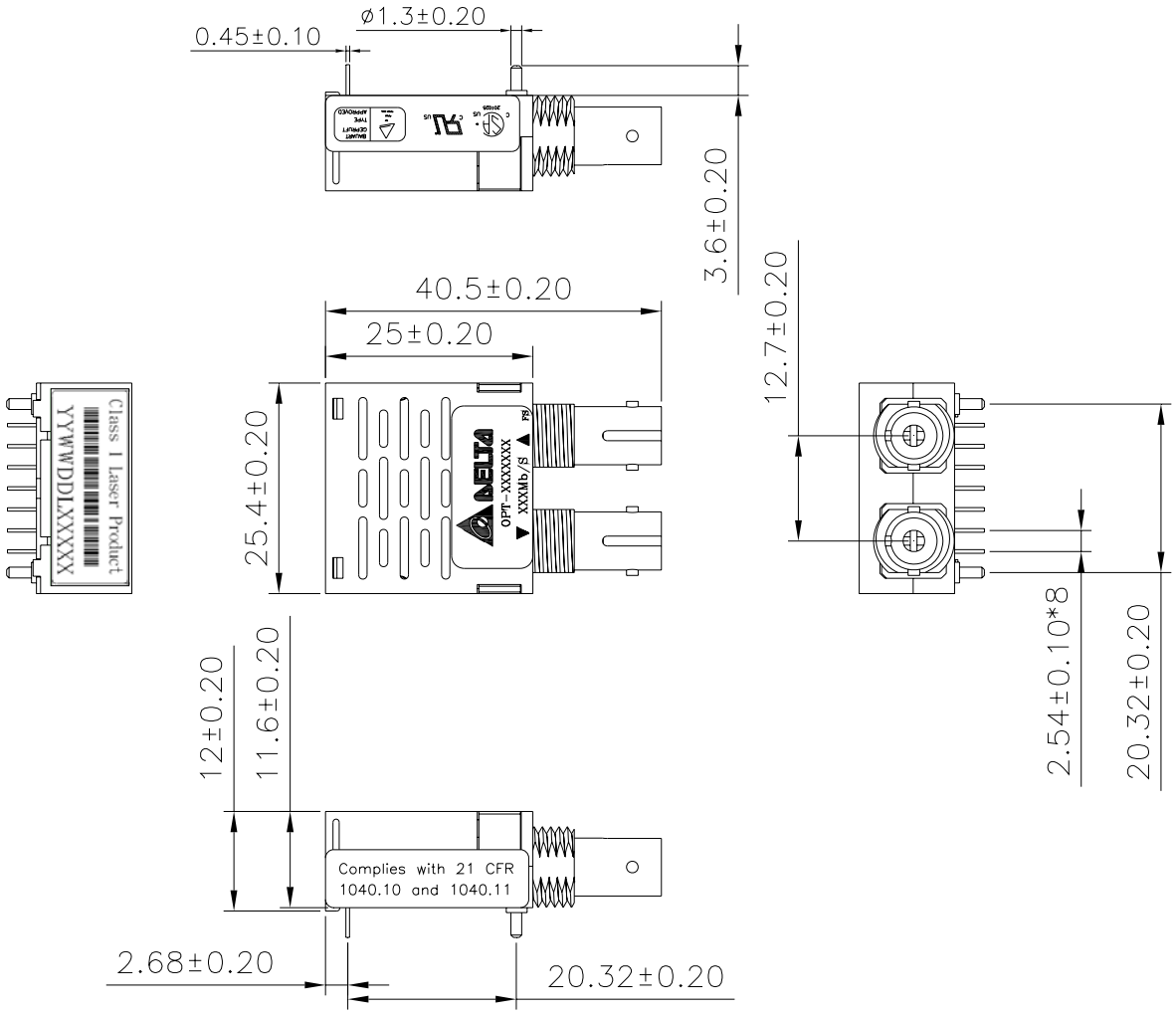
L1=L2=1uH

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 – 155A$X_1X_2X_3X_4X_5X_6$

X_1 Power Supply Voltage and SD Level
- **1:** 5.0V, PECL SD Level
- **2:** 3.3V, PECL SD Level

X_2 Effective Distance Grade
- **H:** 2km, Multi-mode

X_3 Package type & coupling type
- **1:** 1x9 SC DC/DC
- **4:** 1x9 ST DC/DC

X_4 RoHS
- **Blank**: Non-RoHS Compliant
- **R**: RoHS Compliant

X_5 Performance
- **Blank:** Old Design
- **A:** New Design

X_6 Temperature
- **Blank**: 0 to + 70 degree C
- **H**: -10 to + 85 degree C
- **T**: -40 to + 85 degree C

Appendix A. Document Revision

Version No.	Date	Description
0E	2006-09	Release
0F	2008-01	Update Optical Receiver Overload， Correct Schematic、Pin Definition、Package Outline、Order Information