RoHS Compliant 1x9 SC Duplex Optical Transceiver For Fast Ethernet, ATM, SONET OC-3/SDH STM-1

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-155B1xxxxx) or 3.3V (OPT-155B2xxxxx) Power Supply**
- **PECL Differential Inputs and Outputs**
- **PECL or TTL Receiver Signal Detect Indicator**
- **RoHS Compliance**
- **Wave Solder and Aqueous Wash Process Compatible**

Description

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

The OPT-155Bxxxx transceivers can meet Class 1 eye safety products and effective distance depending 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 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.

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

Performance

- OPT-155BxJxx data link up to 15Km in 9/125μm Single Mode Fiber.
- OPT-155BxMxx data link up to 40Km in 9/125μm Single Mode Fiber.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	T_S	-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	T_A	0		70	ºC	Note1
Supply Voltage	V_{CC}	4.75	5	5.25	V	OPT-155B1xxx
		3.15	3.3	3.45		OPT-155B2xxx OPT-155B4xxx

Note1: See “Order Information” for detail

Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Transmitter Data Input Voltage-Low	V_{IL} - V_{CC}	-1.81		-1.48	V	
Transmitter Data Input Voltage-High	V_{IH} - V_{CC}	-1.16		-0.88	V	
Receiver						
Data Output Voltage-Low	V_{OL} - V_{CC}	-1.95		-1.62	V	
Data Output Voltage-High	V_{OH} - V_{CC}	-1.045		-0.74	V	
SD Output Voltage-Low	V_{SDL} - V_{CC}	-1.95		-1.62	V	PECL
SD Output Voltage-High	V_{SDH} - V_{CC}	-1.045		-0.74	V	
SD Output Voltage-Low	V_{SDL}	0		0.8	V	LVTTL
SD Output Voltage-High	V_{SDH}	2		V_{CC}	V	

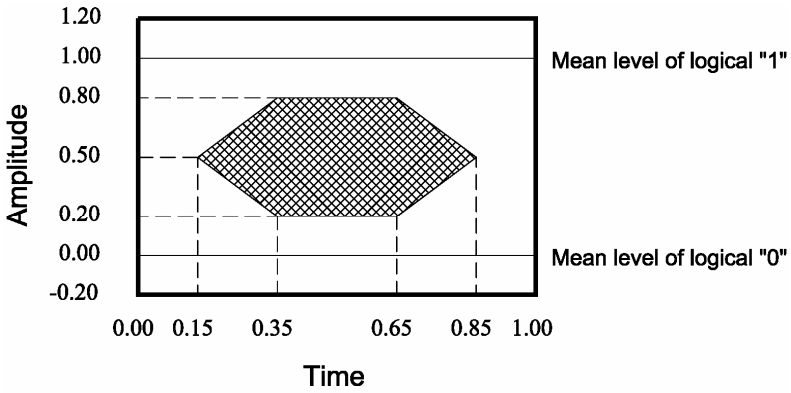
Optical Characteristics

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Supply Current	I_{CC}			165	mA	
Mean Launch Power	P_0	-15		-8	dBm	OPT-155BxJxx
		-5		0		OPT-155BxMxx
Optical Extinction Ratio	ER	8.2			dB	OPT-155BxJxx
		10				OPT-155BxMxx
Center Wavelength	λ_C	1270	1310	1360	nm	
Spectral Width (RMS)	σ			7.7	nm	OPT-155BxJxx
				3		OPT-155BxMxx
Output Eye Diagram	Compliant with ITU-T recommendation G.957					
Receiver						
Supply Current	I_{CC}			145	mA	
Sensitivity	P_{IN}			-31	dBm	OPT-155BxJxx Note1
				-34		OPT-155BxMxx Note1
Signal Detect-Asserted	P_A			-31	dBm	OPT-155BxJxx
				-34		OPT-155BxMxx
Signal Detect-DeAsserted	P_D	-45			dBm	

Signal Detect-Hysteresis	$P_A - P_D$	0.5			dB	
Receiver Saturation Power	P_{SAT}	-8			dBm	

Note1: The sensitivity should be tested at a BER of 1×10^{-10} or better with an input signal consisting of 155Mbps, 2^{23}-1 PRBS and ER=9dB.



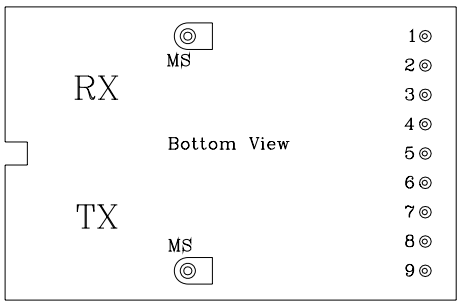
Optical Pulse Mask with Bessel Filter Specified in ITU-T G.957

Mask of the eye diagram for the optical transmit signal

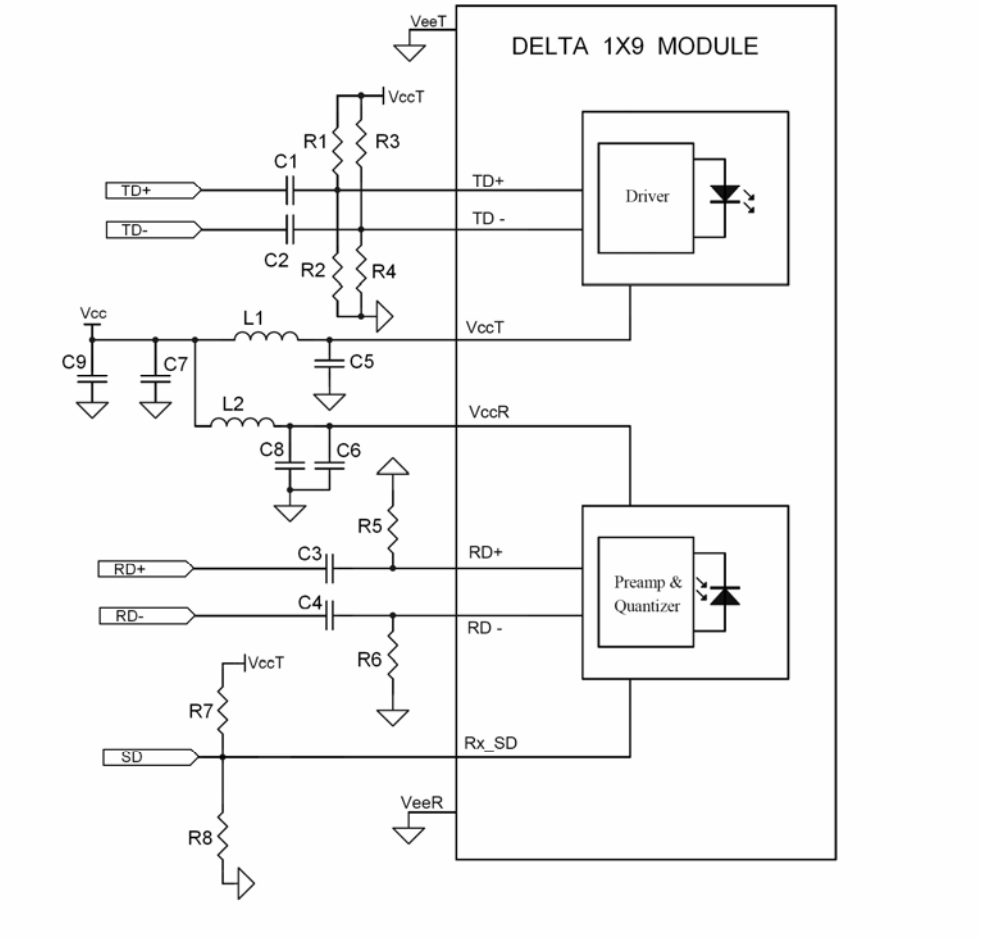
Pin Definition

Pin No.	Pin Name	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 or TTL)
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 Out Drawing



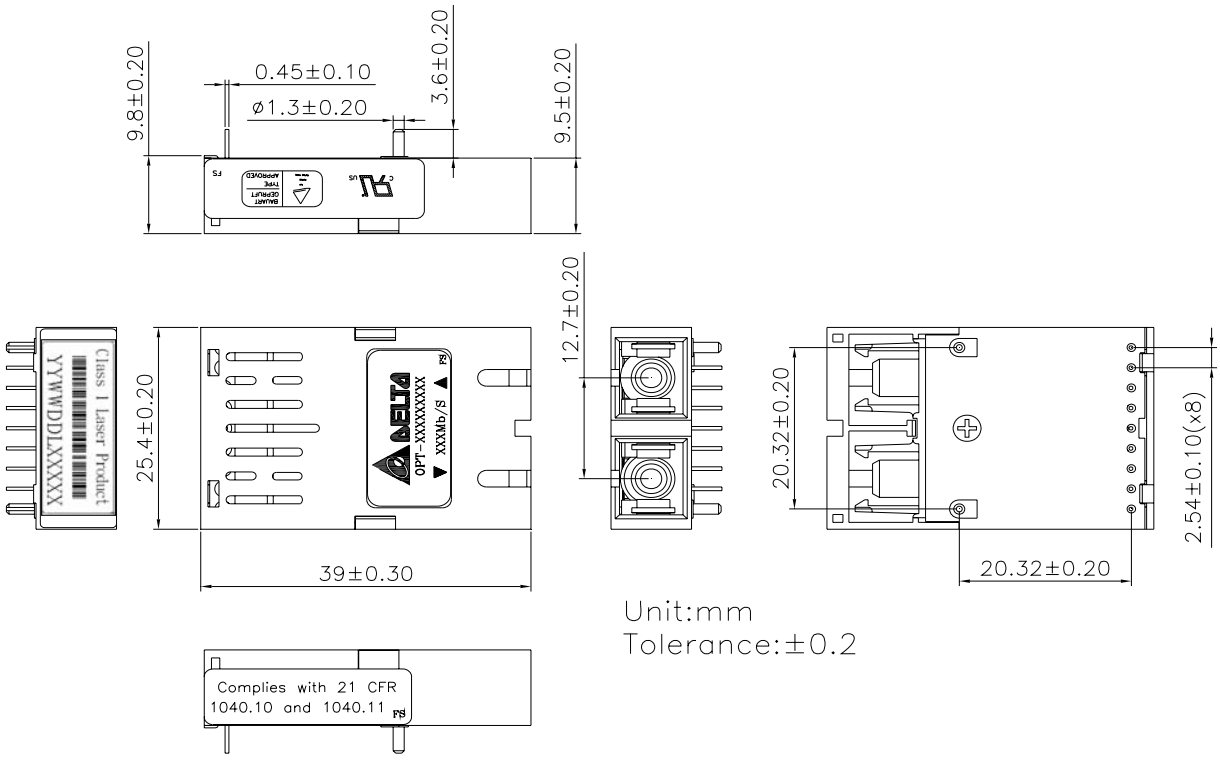
Recommended Circuit Schematic



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 Drawing



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 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- 155B$X_1X_2X_3X_4X_5X_6$

X_1 Power Supply Voltage and SD Level

1: 5.0V, PECL SD Level
2: 3.3V, PECL SD Level
4: 3.3V, TTL SD Level

X_2 Distance

J: 15km
M: 40km

X_3 Data Coupling

1: 1x9 SC DC/DC

X_4 RoHS

R: RoHS Compliant

X_5 Performance

Blank: Old Design
A: New Design
E: OPT without EMI Shielding Plastic Housing

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
0G	2006-11	Release
0H	2008-01	Update “Recommended Circuit Schematic”; Correct SD Output Voltage, Pin Definition, Package Outline, Order Information.
0I	2008-04	Update “E” definition of “OPT-155B2J1RET”.
0J	2008-12	Update Outline Package Instruction.
0K	2009-02	Update label change.
0L	2009-04	Revise Document Style; Cut off OPT-155BxHxx PNs, OPT-155BxLxx PNs, Non-RoHS PNs; Revise Parameter symbols; Revise Pin Out Drawing.