

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-LX Version of IEEE 802.3u.
- Industry Standard 1x9 Footprint and Duplex SC Connector Interface.
- Single 5V (OPT-155B1xxx) or 3.3V (OPT-155B2xxx) Power Supply.
- PECL Differential Inputs and Outputs.
- PECL Receiver Signal Detect Indicator.
- RoHS Compliant per Directive 2002/95/EC.
- 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 also includes a Signal-Detect circuit that provides PECL 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	T _s	-40		85	°C	
Lead Soldering Temperature	T _{SOLD}			260	°C	
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	°C	1
Supply Voltage						
OPT-155B1xxxx	V _{CC}	4.75	5	5.25	V	
OPT-155B2xxxx		3.15	3.3	3.45		

Note: See ordering information for detail

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 Output Voltage-High	V _{OH-VCC}	-1.045		-0.74	V	
SD Output Voltage-Low	V _{SDH-VCC}	-1.95		-1.62	V	
SD Output Voltage-High	V _{SDL-VCC}	-1.045		-0.74	V	

Optical Characteristics

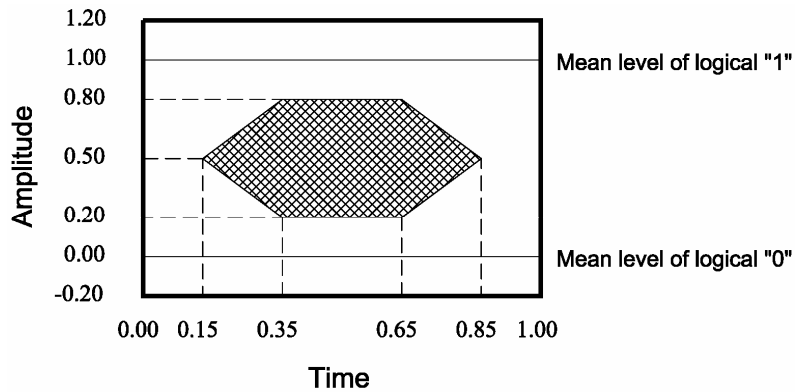
(Data Rate = 155.52Mbps, PRBS=2²³-1, NRZ, 9/125um SMF)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Supply Current	I _{CC}			165	mA	
Mean Launch Power						
OPT-155BxHxxx	P _O	-20		-15	dBm	
OPT-155BxJxxx		-15		-8		
OPT-155BxLxxx		-8		-5		
OPT-155BxMxxx		-5		0		
Optical Extinction Ratio						
OPT-155BxHxxx	E.R.			8.2	dB	
OPT-155BxJxxx				8.2		
OPT-155BxLxxx				8.2		
OPT-155BxMxxx				10		
Center Wavelength	λ _c	1270	1310	1360	nm	
Spectral Width (RMS)						
OPT-155BxHxxx	σ			7.7	nm	
OPT-155BxJxxx				7.7		
OPT-155BxLxxx				7.7		
OPT-155BxMxxx				3		
Output Eye Diagram	Compliant with ITU-T recommendation G.957					
Receiver						
Supply Current	I _{CC}			145	mA	

Sensitivity OPT-155BxHxxx OPT-155BxJxxx OPT-155BxLxxx OPT-155BxMxxx	P_{IN}	-31 -31 -31 -34	dBm	1
Overload	P_{ol}	-8	dBm	
Signal Detect-Asserted OPT-155BxHxxx OPT-155BxJxxx OPT-155BxLxxx OPT-155BxMxxx	P_A	-31 -31 -31 -34	dBm	
Signal Detect-DeAsserted	P_D	-45	dBm	
Signal Detect-Hysteresis	P_A-P_D	0.5	dB	

Notes:

- The sensitivity is provided at a BER of 1×10^{-10} or better with an input signal consisting of 155Mb/s, $2^{23}-1$ 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	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), SD

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

Fault Condition: Logic "0" Output.

Pin 5 Receiver Power Supply, VccR

Provide +3.3V dc power supply.

Pin 6 Transmitter Power Supply, VccT

Provide +3.3V dc power supply.

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

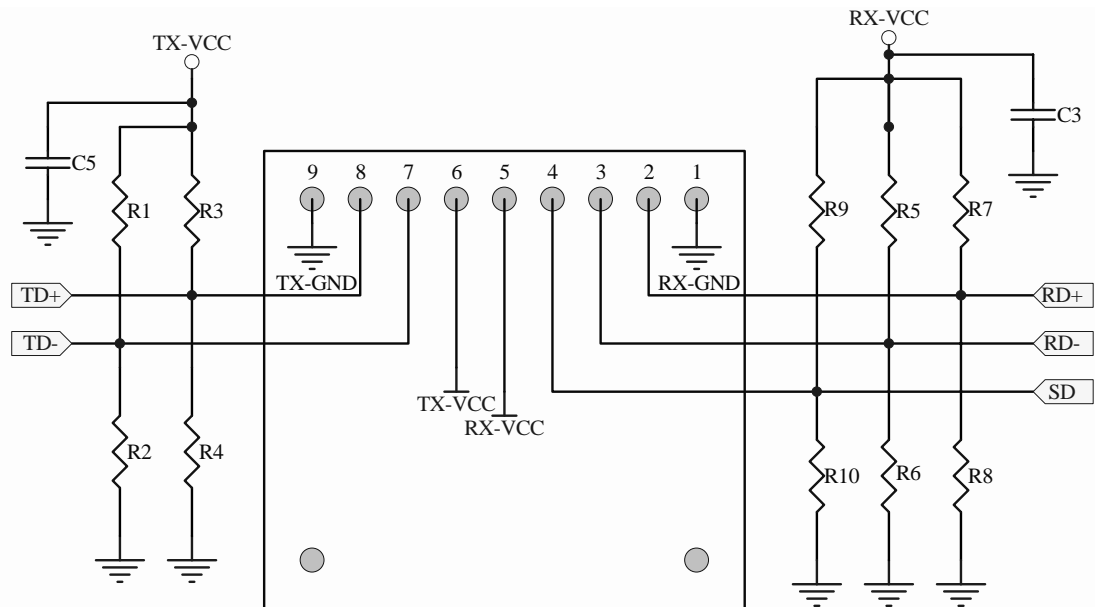
Pin 7 Transmitter Data Input (LVPECL), TD (-).

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 View

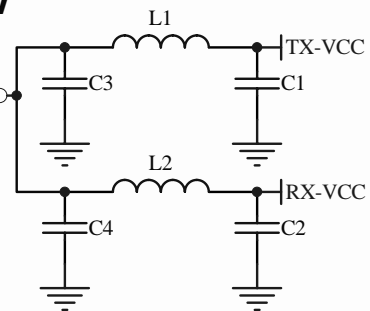
$R1=R3=R5=R7=R9=130\ \Omega$ (3.3V), $82\ \Omega$ (5V)

$R2=R4=R6=R8=R10=82\ \Omega$ (3.3V), $130\ \Omega$ (5V)

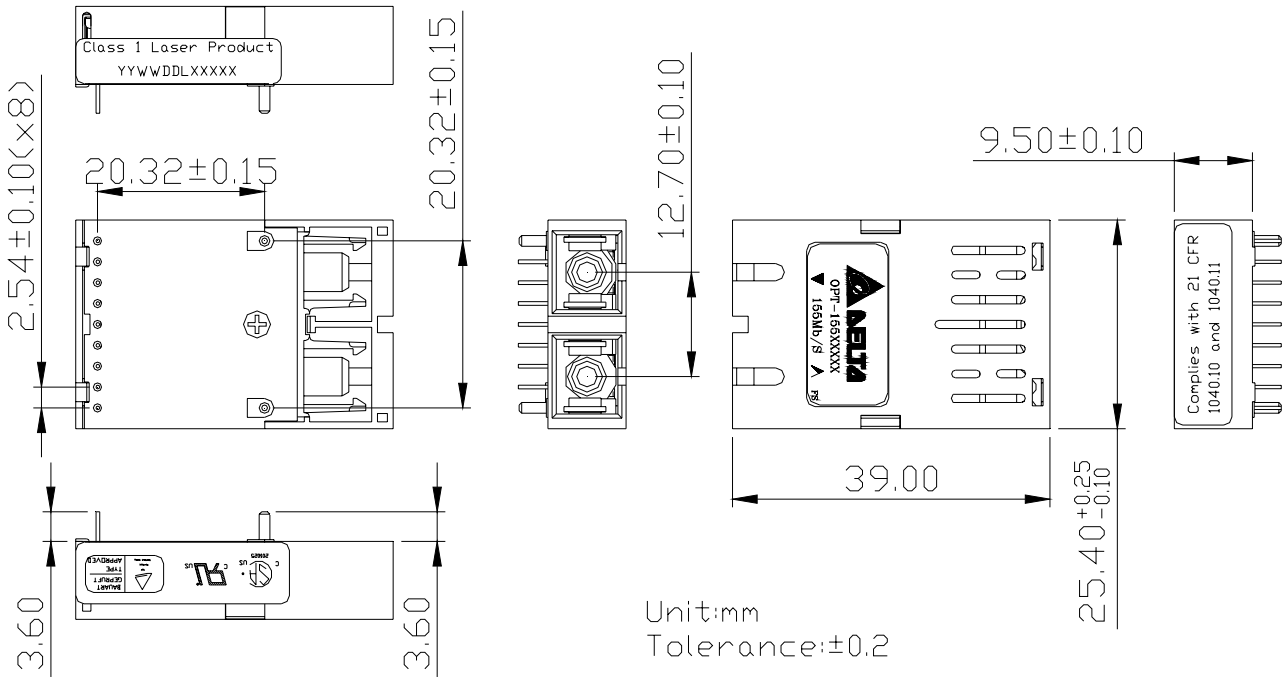
$C1=C2=C3=C5=C6=0.1\ \mu\text{F}$

$C4=10\ \mu\text{F}$

$L1=L2=1\ \mu\text{H}$ or ferrite inductor



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 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- 155X₁X₂X₃X₄X₅X₆X₇

X₁: Fiber

B: Single-mode 1310nm

X₅: RoHS Compliant

Blank: Non-RoHS Compliant
R: RoHS Compliant

X₂: Power Supply Voltage and SD Level

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

X₆: Performance

Blank: Old Design
A: New Design

X₃: Distance

H: 2km
J: 15km
L: 30km
M: 40km

X₇: Temperature

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

X₄: Data Coupling

1: 1x9SC DC/DC