

EOL9-1312-10 20 40 Series

Single-Mode 1.25Gbps 1310nm
Duplex 1 x 9 Transceiver
RoHS6 Compliant

Features

- ◆ Duplex SC/FC/ST Single-Mode Transceiver
- ◆ Industry Standard 1 x 9 Footprint
- ◆ 1310nm FP-LD Transmitter
- ◆ 3.3V/5V Single Power Supply
- ◆ PECL Signal Input and Output^{*note1}
- ◆ Signal Detect Indicator (TTL version)^{*note1}
- ◆ Wave Solderable and Aqueous Washable with Process Plug Inserted
- ◆ Class 1 FDA and IEC60825-1 Laser Safety Compliant
- ◆ 10km/20km/40km optional
- ◆ Operating Case Temperature:
 Standard: 0°C~+70°C
 Industrial:-40°C~+85°C



Applications

- ◆ Gigabit Ethernet
- ◆ Fiber Channel
- ◆ Switch to Switch Interface
- ◆ Digital Video Transmission System
- ◆ Other Optical Links

Ordering Information

Part No.	Input	Output	SD	Distance	Voltage ^{*Note1}	Interface	Temp.
EOL9-1312-10-XV* Note2	AC	DC	PECL	10km	3.3V	SC	Standard
EOL9-1312-10-IXV	AC	DC	PECL	10km	3.3V	SC	Industrial
EOL9-1312-20-XV	AC	DC	PECL	20km	3.3V	SC	Standard
EOL9-1312-20-IXV	AC	DC	PECL	20km	3.3V	SC	Industrial
EOL9-1312-40-XV	AC	DC	PECL	40km	3.3V	SC	Standard
EOL9-1312-40-IXV	AC	DC	PECL	40km	3.3V	SC	Industrial
EOL9-1312-10-X	AC	DC	PECL	10km	3.3V/5V	SC	Standard
EOL9-1312-10-IX	AC	DC	PECL	10km	3.3V/5V	SC	Industrial
EOL9-1312-20-X	AC	DC	PECL	20km	3.3V/5V	SC	Standard



1X9Series

EOL9-1312-20-IX	AC	DC	PECL	20km	3.3V/5V	SC	Industrial
EOL9-1312-40-X	AC	DC	PECL	40km	3.3V/5V	SC	Standard
EOL9-1312-40-IX	AC	DC	PECL	40km	3.3V/5V	SC	Industrial

*For other ordering information in detail ,please contact eoptolink.

Note1: 5V for PECL or TTL, 3.3V for LVPECL or LVTTTL, refer the nomenclature.

Note2: Standard version

Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883G Method 3015.7	Class 1C (>1000 V)
Electrostatic Discharge to the enclosure	EN 55024:1998+A1+A2 IEC-61000-4-2 GR-1089-CORE	Compliant with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022:2006 CISPR 22B :2006 VCCI Class B	Compliant with standards Noise frequency range: 30MHz to 6GHz. Good system EMI design practice required to achieve Class B margins. System margins are dependent on customer host board and chassis design.
Immunity	EN 55024:1998+A1+A2 IEC 61000-4-3	Compliant with standards. 1KHz sine-wave, 80% AM, from 80 MHz to 1 GHz. No effect on transmitter/receiver performance is detectable between these limits.
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN (IEC) 60825-1:2007 EN (IEC) 60825-2:2004+A1	CDRH compliant and Class I laser product. TüV Certificate No. 50135086
Component Recognition	UL and CUL EN60950-1:2006	UL file E317337 TüV Certificate No. 50135086 (CB scheme)
RoHS6	2002/95/EC 4.1&4.2 2005/747/EC 5&7&13	Compliant with standards ^{note3}

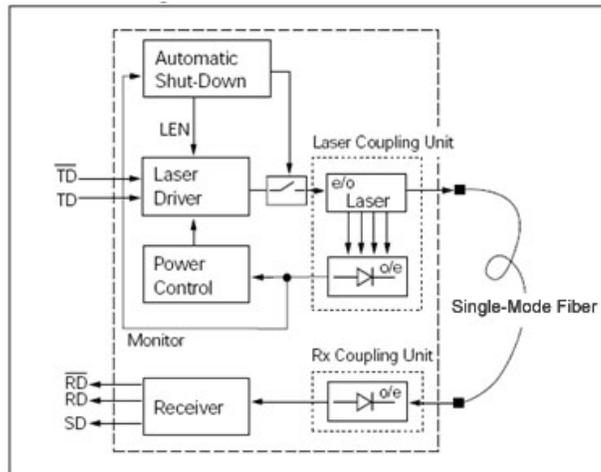
Note3: For update of the equipments and strict control of raw materials, EOPTOLINK has the ability to supply the customized products since Jan 1st, 2007, which meet the requirements of RoHS6 (Restrictions on use of certain Hazardous Substances) of European Union.

In light of item 5 in RoHS exemption list of RoHS Directive 2002/95/EC, Item 5: Lead in glass of cathode ray tubes, electronic components and fluorescent tubes.

In light of item 13 in RoHS exemption list of RoHS Directive 2005/747/EC, Item 13: Lead and cadmium in optical

and filter glass. The three exemptions are being concerned for Eoptolink's transceivers, because Eoptolink's transceivers use glass, which may contain Pb, for optical components such as lenses, isolators, and other electronic components.

Functional Diagram



The Signal Detect (SD, active high), Normal optical input of receiver represents to a logic "1" level, which means asserted.

The following versions are available:

1. AC/DC Transceiver
TX has differential 100Ω load.
2. DC/DC Transceiver
Standard PECL inputs and outputs, TX and RX are DC coupling.

Product Description

The EOL9-1312-X series is high performance module for Gigabit Ethernet and Fiber Channel single fiber communications by using 1310nm transmitter.

The transmitter section uses a multiple quantum well laser and is a class 1 laser compliant according to International Safety Standard IEC 60825. The receiver section uses an integrated detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

A PECL logic interface simplifies interface to the external circuitry.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	
Storage Temperature	T _s	-40	+85	°C	
Supply Voltage	V _{CC}	5V	-0.5	7.0	V
		3.3V	-0.5	5.5	
Operating Relative Humidity	-		95	%	
Soldering Conditions Temp/Time			260/10	°C/S	

*Exceeding any one of these values may destroy the device immediately.

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Operating Case Temperature	T_c	0		+70	°C
		-40		+85	
Power Supply Voltage	V_{CC}	4.75	5	5.25	V
		3.15	3.3	3.45	
Power Supply Current ^{*(note4)}	I_{CC}			300	mA
Data Rate			1250		Mbps

Note4: Maximum current is specified at V_{CC} equaling to Maximum @ maximum temperature.

Optical and Electrical Characteristic

(EOL9-1312-10 Series, FP and PIN)

Parameter	Symbol	Min.	Typical	Max.	Unit
Transmitter					
Center Wavelength	λ_C	1260	1310	1360	nm
Spectral Width	$\Delta\lambda$			4	nm
Average Output Power ^{*(note5)}	P_{out}	-9		-3	dBm
Extinction Ratio	ER	9			dB
Rise/Fall Time(20%~80%)	tr/tf			0.26	ns
Relative Intensity Noise	RIN			-117	dB/Hz
Total Jitter	TJ			56.5	ps
Data Input Swing Differential	V_{in}	400		2000	Mv
Input Differential Impedance	Z_{in}	90	100	110	Ω
Input High Voltage	V_H	-1165		-880	Mv
Input Low Voltage	V_L	-1810		-1475	Mv
Eye Diagram	Compliant with IEEE 802.3 ^{*(note7)}				
Data Input	PECL ^{*(note1)}				
Receiver					
Receiver Rate	1250				Mbps
Input center wavelength	λ_C	1260		1620	nm
Receiver Sensitivity ^{*(note6)}	P_{min}			-21	dBm
Receiver Overload	P_{max}	-3			dBm
SD Assert	SDA			-22	dBm
SD De-Assert	SDD	-35			dBm
SD Hysteresis ^{*(note8)}		0.5			dB
Output High Voltage	V_H	-1165		-880	Mv
Output Low Voltage	V_L	-1810		-1475	Mv
SD Voltage(TTL-H) ^{*(note1)}	V_H	2			V
SD Voltage (TTL-L) ^{*(note1)}	V_L			0.8	V
Data Output	PECL ^{*(note1)}				

(EOL9-1312-20 Series, FP and PIN)

Parameter	Symbol	Min.	Typical	Max.	Unit
Transmitter					
Center Wavelength	λ_C	1260	1310	1360	nm
Spectral Width	$\Delta\lambda$			4	nm
Average Output Power ^{*(note5)}	P_{out}	-8		-3	dBm
Extinction Ratio	ER	9			dB
Rise/Fall Time(20%~80%)	tr/tf			0.26	ns
Relative Intensity Noise	RIN			-117	dB/Hz
Total Jitter	TJ			56.5	ps
Data Input Swing Differential	V_{in}	400		2000	Mv
Input Differential Impedance	Z_{in}	90	100	110	Ω
Input High Voltage	V_H	-1165		-880	Mv
Input Low Voltage	V_L	-1810		-1475	Mv
Eye Diagram	Compliant with IEEE 802.3 ^{*(note7)}				
Data Input	PECL ^{*(note1)}				
Receiver					
Receiver Rate	1250				Mbps
Input center wavelength	λ_C	1260		1620	nm
Receiver Sensitivity ^{*(note6)}	P_{min}			-22	dBm
Receiver Overload	P_{max}	-3			dBm
SD Assert	SDA			-23	dBm
SD De-Assert	SDD	-35			dBm
SD Hysteresis ^{*(note8)}		0.5			dB
Output High Voltage	V_H	-1165		-880	Mv
Output Low Voltage	V_L	-1810		-1475	Mv
SD Voltage(TTL-H) ^{*(note1)}	V_H	2			V
SD Voltage (TTL-L) ^{*(note1)}	V_L			0.8	V
Data Output	PECL ^{*(note1)}				

(EOL9-1312-40 Series, FP and PIN)

Parameter	Symbol	Min.	Typical	Max.	Unit
Transmitter					
Center Wavelength	λ_C	1260	1310	1360	nm
Spectral Width	$\Delta\lambda$			4	nm
Average Output Power ^{*(note5)}	P_{out}	-2		+3	dBm
Extinction Ratio	ER	9			dB
Rise/Fall Time(20%~80%)	tr/tf			0.26	ns
Relative Intensity Noise	RIN			-117	dB/Hz
Total Jitter	TJ			56.5	ps
Data Input Swing Differential	V_{in}	400		2000	Mv
Input Differential Impedance	Z_{in}	90	100	110	Ω
Input High Voltage	V_H	-1165		-880	Mv

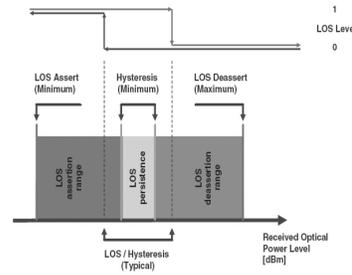
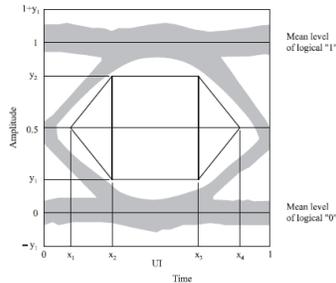
Input Low Voltage	V_L	-1810		-1475	Mv
Eye Diagram	Compliant with IEEE 802.3 *(note7)				
Data Input	PECL *(note1)				
Receiver					
Receiver Rate	1250				Mbps
Input center wavelength	λ_C	1260		1620	nm
Receiver Sensitivity*(note6)	Pmin			-24	dBm
Receiver Overload	Pmax	-3			dBm
SD Assert	SDA			-25	dBm
SD De-Assert	SDD	-35			dBm
SD Hysteresis *(note8)		0.5			dB
Output High Voltage	V_H	-1165		-880	Mv
Output Low Voltage	V_L	-1810		-1475	Mv
SD Voltage(TTL-H) *(note1)	V_H	2			V
SD Voltage (TTL-L) *(note1)	V_L			0.8	V
Data Output	PECL *(note1)				

Note5: The optical power is launched into 9/125um SMF.

Note6: Minimum average optical power at which the BER is less than 1E-12 or lower. Measured with a 2⁷-1 NRZ PRBS and ER=9 dB.

Note7: Eye Pattern Mask

Note8: LOS Hysteresis(SD signal coincides with the Los signal inversion)

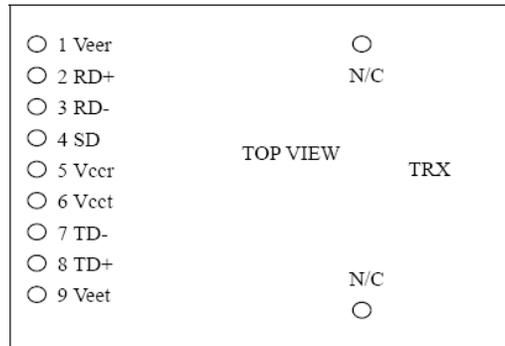


Pin Description

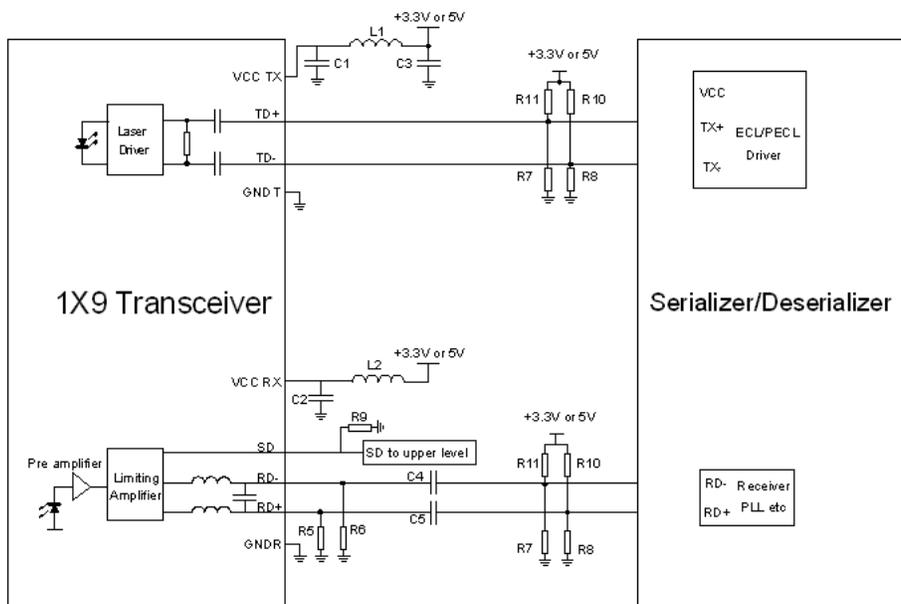
Pin	Name	Level	Description
1	Veer		Receiver Signal Ground, connect to receiver signal ground plane directly
2	RD+	PECL *(note1)	Receiver data out
3	RD-	PECL *(note1)	Inverted receiver data out
4	SD	TTL *(note1)	Signal Detect, TTL (Load resistor > 4.7KΩ)or PECL output, Normal optical input levels to the receiver result in a logic "1" output, asserted. Low input levels to the receiver result in a fault condition indicated by a logic "0"output, de-asserted.
5	Vccr		Receiver Power Supply, provide +5V (+3.3V) the recommended receiver power supply filter circuit. Locate the power filter circuit as close as possible to the Vccr pin
6	Vcct		Transmitter Power Supply, provide +5V DC(+3.3V) via the

			recommended transmitter power supply filter circuit. Locate the power filter circuit as close as possible to the Vcct pin
7	TD-	PECL ^{*(note1)}	Inverted transmitter Data in
8	TD+	PECL ^{*(note1)}	Transmitter Data in
9	Veet		Transmitter Signal Ground, connect to the transmitter signal ground planed directly

Pin Definitions



Recommended Circuit

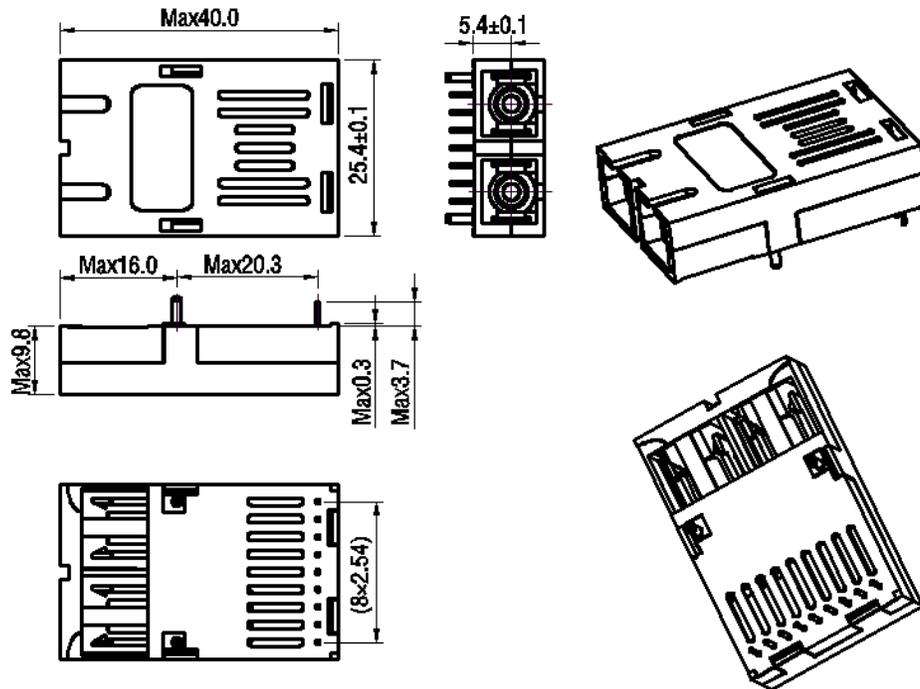


C1 C2 C3=4.7uF
 C4 C5 =100nF
 L1 L2=1uH
 R5 R6=270Ω(5V)/150Ω(3.3V)
 R7 R8=127Ω(5V)/82Ω(3.3V)
 (Depends on serdes chips used)
 R9=510Ω(5V)/270Ω(3.3V)
 R10 R11=82Ω(5V)/127Ω(3.3V)
 (Depends on serdes chips used)

AC/DC couple

AC/DC Coupling Inside

Package Outline (Unit: mm)

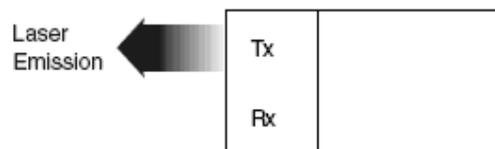


SC Receptacle

Laser Emission Data

Wavelength	1310nm
Total output power (as defined by FDA: 7mm aperture at 20cm distance)	< 0.195Mw
Total output power (as defined by IEC: 7mm aperture at 10cm distance)	< 15.6Mw
Beam divergence	12.5°

Laser Emission



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Or contact Eoptolink Technology Inc., Ltd. Listed at the end of the documentation to get the latest documentation.

Revision History

Revision	Initiated	Reviewed	Approved	Revision History	Release Date
V2.a	Tim.Liang	Kelly.Cao Florence.Dai		Released.	Feb 25, 2005
V2.b	Tim.Liang	Kelly.Cao		Add the nomenclature option.	Sep 28,2009
V2.c	Kelly.Cao			Delete item7 in note3.	Mar 2, 2010
V2.d	David			Correct some spelling mistakes.	2011-08-11
V2.e	Kelly			Update photo.	Dec 6, 2011
V2.f	David			Update Recommended Circuit	2012-3-23
V2.g	Angela	Kelly		Add typical PN.	2012-9-7
V2.h	Jans	Kelly/Angela		Update the Pout of 10KM products.	June 13, 2013

Notice:

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