

RoHS Compliant 1X9 SC Duplex Receptacle Transceiver Module for Gigabit Ethernet



Features

- Industry Standard 1 x 9 Footprint and duplex SC Connector interface
- Compliant with Specifications for IEEE 802.3z Gigabit Ethernet
- OPT-1250Bxxx compliant with the 1.0625GBd Fibre Channel 100-SM-LC-L FC-PI Rev.13
- OPT-1250Axxx compliant with the 1.0625GBd Fibre Channel FC-PI 100-M5-SN-I Rev.13
- Single +3.3V or 5V Power Supply
- PECL or TTL Receiver Signal Detect Indicator
- Wave Solderable and Aqueous Washable
- Laser Class 1 Product which comply with the requirements of IEC 60825-1 and IEC 60825-2

Description

The OPT-1250xxxx series from DELTA is a 1X9 transceiver module designed expressly for high-speed communication applications that require rates of up to 1.25Gbit/sec. It is compliant with the Gigabit Ethernet standards as well as 1x Fiber channel standards.

The OPT-1250xxxx transceivers are provided with the SC receptacle that is compatible with the industry standard SC connector.

The post-amplifier of the OPT-1250xxxx also includes a Signal Detect circuit that provides a PECL or TTL logic-Low output when an unusable optical signal level is detected. (see order information)

The OPT-1250xxxx transceiver is a Class 1 eye safety product. The optical power levels, under normal operation, are at eye safe level.

Applications

- Gigabit Ethernet/Fast Ethernet
- Switched backplane applications

Performance

OPT-1250AxFxx:

- 850nm VCSEL, up to 500m in 50/125 μ m MMF
- 850nm VCSEL, up to 220m in 62.5/125 μ m MMF

OPT-1250B2I1x:

- 1310nm FP laser, Data Link up to 5km in 9/125um SMF

OPT-1250BxQxx:

- 1310nm FP laser, Data Link up to 10km in 9/125um SMF
- 1310nm FP laser, up to 550m in 50/125 μ m MMF
- 1310nm FP laser, up to 550m in 62.5/125 μ m MMF

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
Ambient Operating Temperature	T _A	0		70	°C	1
Supply Voltage	V _{CC}				V	
OPT-1250x1xx		4.75		5.25		
OPT-1250x2xx, OPT-1250x4xx		3.135		3.465		

Note: See ordering information for detail

Electrical Characteristics

(At recommended ambient operating temperature, T_A and supply voltage, V_{CC})

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Total Supply Current	I _{CCT}			300	mA	
Transmitter						
Transmitter Data Input Voltage-Low	V _{IL} -V _{CC}	-1.810		-1.475	V	1
Transmitter Data Input Voltage-High	V _{IH} -V _{CC}	-1.165		-0.880	V	1
Transmitter Differential Input Voltage	V _{DT}	0.3		1.6	V	2
Receiver						
Data Output Voltage-Low	V _{OL} -V _{CC}	-1.95		-1.62	V	1
Data Output Voltage-High	V _{OH} -V _{CC}	-1.045		-0.74	V	1
Receiver Differential Output Voltage	V _{DR}	0.5	0.7	1.2	V	2
Output Data Rise/Fall Time	t _r /t _f			0.4	ns	3
PECL SD Output						
LOW level output voltage	V _{SDH} -V _{CC}	-1.84		-1.60	V	4
HIGH level output voltage	V _{SDL} -V _{CC}	-1.1		-0.9		
TTL SD Output						
LOW level output voltage	V _{SDH}	2		V _{CC}	V	5
HIGH level output voltage	V _{SDL}	0		0.8		

Notes:

1. For OPT-1250A1F1x, OPT-1250A4F1x, OPT-1250B211x, OPT-1250B2Q1x and OPT-1250B1Q1x.
2. For OPT-1250A2F2x and OPT-1250B4Q2x.
3. These are 20%~80% values
4. For OPT-1250A1F1x, OPT-1250A2F2x, OPT-1250B211x, OPT-1250B1Q1x and OPT-1250B2Q1x
5. For OPT-1250A4F1x and OPT-1250B4Q2x

Single Mode Transceiver (OPT-1250B211x, OPT-1250B1Q1x, OPT-1250B2Q1x, OPT-1250B4Q2x)

(At recommended ambient operating temperature, T_A and supply voltage, V_{CC} ; Data Rate=1.25Gb/sec, PRBS= 2^7-1 NRZ, 9/125um SMF)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Output Optical Power (Avg.) OPT-1250Bx1x OPT-1250BxQx	P_O	-12 -9.5		-3 -3	dBm	
Optical Extinction Ratio	ER	9			dB	
Center Wavelength	c	1270	1310	1355	nm	
Spectral Width (RMS)				2.8	nm	
Optical Rise/Fall time	t_r/t_f			0.26	ns	1
Relative Intensity Noise	RIN			-120	dB/Hz	
Output Eye	Complies with the IEEE 802.3z/D2 specification, and is class 1 laser eye safety					
Receiver						
Sensitivity (Avg.)	P_{IN}			-19	dBm	2
Input Optical Wavelength			1310		nm	
Signal Detect-Asserted (Avg.)	P_A			-19	dBm	
Signal Detect-De-asserted (Avg.)	P_D	-35			dBm	
Signal Detect-Hysteresis	P_A-P_D	0.5			dB	
Receiver saturation power	P_{SAT}	-3			dBm	

Notes:

- These are 20%~80% values
- The sensitivity is provided at a BER of 1×10^{-10} or better with an input signal consisting of 1250Mb/s, 2^7-1 PRBS.


Mask of the eye diagram for the optical transmit signal

Multi-Mode Series Transceiver (OPT-1250A1F1x, OPT-1250A2F2x, OPT-1250A4F1x)

(At recommended ambient operating temperature, T_A and supply voltage, V_{CC} ; Data Rate=1.25Gb/sec, PRBS= 2^7-1 NRZ, 62.5/125um MMF)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Output Optical Power (Avg.)	P_O	-9.5		-4	dBm	
Optical Extinction Ratio	ER	9			dB	
Center Wavelength	λ_c	830	850	860	nm	
Spectral Width (RMS)				0.85	nm	
Optical Rise/Fall time	t_r/t_f			0.26	ns	1
Relative Intensity Noise	RIN			-117	dB/Hz	
Output Eye	Complies with the IEEE 802.3z/D2 specification, and is class 1 laser eye safety					
Receiver						
Sensitivity (Avg.)	P_{IN}			-17	dBm	2
Input Optical Wavelength			850		nm	
Signal Detect-Asserted (Avg.)	P_A			-17	dBm	
Signal Detect-De-asserted (Avg.)	P_D	-30			dBm	
Signal Detect-Hysteresis	P_A-P_D	0.5			dB	
Receiver saturation power	P_{SAT}	-4			dBm	

Notes:

- These are 20%~80% values
- The sensitivity is provided at a BER of 1×10^{-10} or better with an input signal consisting of 1250Mb/s, 2^7-1 PRBS.


Mask of the eye diagram for the optical transmit signal

Pin Out Table

PIN	Symbol	Functional description
1	GND	Receiver Signal Ground
2	RD (+)	Receiver Data Out (LVPECL)
3	RD (-)	Receiver Data Out Bar (LVPECL)
4	SD	Receiver Signal Detect (LVPECL or TTL)
5	VccR	Receiver Power Supply,
6	VccT	Transmitter Power Supply
7	TD (-)	Transmitter Data In Bar (LVPECL)
8	TD (+)	Transmitter Data In (LVPECL)
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 (+)

Receiver Data output (LVPECL), RD (+).

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

Receiver Data output (LVPECL), RD (-).

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 (-)

Transmitter Data Input (LVPECL), TD (-)

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

Transmitter Data Input (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=82 Ohm (3.3V), 68 Ohm (5V)
 - R2=R4=130 Ohm (3.3V), 191 Ohm (5V)
 - R5=270 Ohm (3.3V, PECL), 510 Ohm (5V, PECL)
 - NC (TTL)
 - R6=R7=274 Ohm (5V)
 - C1=C2=C3=C4=C6=C8=100 nF
 - C5=100 uF
 - C7=C9=10 uF
 - L1=L2=1 uH or ferrite inductor



Recommend Circuit Schematic for Internal AC Coupled Transceivers



- Transceiver Top View**
- R1=270 Ohm(3.3V, PECL), 510 Ohm (5V, PECL)
 - NC(TTL)
 - C1=C2=C3=C4=C6=C8=100 nF
 - C5=100 uF
 - C7=C9=10 uF
 - L1=L2=1 uH or ferrite inductor



Package Outline Drawing (without shielding)



Package Outline Drawing (A type shielding)



Package Outline Drawing (B type shielding)



Package Outline Drawing (C type shielding)



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

Ordering informationOPT- 1250X₁X₂X₃X₄X₅X₆X₇**X₁: Fiber**

A: Multi-mode 850nm
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
4: 3.3V, TTL SD Level

X₆: Shielding Type

Blank: Plastic housing
A: A type shielding
B: B type shielding
C: C type shielding

X₃: Distance

F: 500m, 50/125 μm MMF
I: 5km, 9/125 μm SMF
Q: 10km, 9/125 μm SMF

X₇: Temperature

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

X₄: Data Coupling

1: 1x9SC DC/DC
2: 1x9SC AC/AC

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