3.3V Single-Mode LC SFP Transceiver
For Gigabit Ethernet

ES125-LP3TA-x-y-z
Preliminary Data Sheet

Features

- **1300nm Fabry Perot Laser**
- **Available for 5, 10, and 20 km Distances**
- **Conforms to IEEE 802.3z Gigabit Ethernet specifications**
- **Class 1 Laser Safety Conformance**
- **EMI meets FCC Class B Limit**
- **Single +3.3V Power Supply**
- **LV-PECL Data Input and Receiver Output Levels**
- **TTL Loss of Signal detection**
- **Industry Standard Duplex LC Optical Connector**
- **Operates with 9/125 µm single mode optical fibers**
- **Conforms to Small Form-factor Pluggable (SFP) Multi-Source Agreement**
- **Compatible with Industry Standard RFT Electrical Connector & Cage**
- **Meets Mezzanine Height Standard of 9.8 mm**
- **Hot Pluggable**
- **EEPROM with Serial ID Functionality**

Product Description

The ES125-LP3TA from E2O Communications is a hot pluggable duplex-LC transceiver designed for use in Gigabit Ethernet applications. It operates with a single +3.3V power supply. The transceiver is compatible with the industry standard RFT connector and cage and conforms to the Small Form-factor Pluggable (SFP) multi-source agreement (MSA). It meets the mezzanine height requirement of 9.8 mm. The transceiver consists of three sections: the transmitter and receiver optical subassemblies, an electrical subassembly, and the metal package housing.

The optical subassembly consists of 2 parts. The transmitter side has a high-performance 1300-nm FP laser and back facet monitor. The receiver side has an InGaAs PIN and a preamplifier.

All ES125-LP3TA transceivers also include a Loss of Signal detection circuit, which provides a TTL logic high output when there is an unusable input optical signal level. The Tx Disable and Tx Fault pins use TTL logic for communication with the host board. See MSA for details.

A serial EEPROM in the transceiver allows the user to access information. Details of the Serial Identification Protocol will be contained in the SFP Multi-Source Agreement.

Electromagnetic Interference (EMI) & Immunity

Most equipment designs utilizing high-speed transceivers will be required to meet the requirements of FCC in the United States, CENELEC EN55022 (CISPR 22) in Europe and VCCI in Japan.

The ES125-LP3TA transceivers, with their shielded design, perform to the specified limits to assist the designer in the management of the overall equipment EMI performance. They meet the FCC Class B limits.

The ES125-LP3TA transceiver has been designed to provide good immunity to radio-frequency electromagnetic fields. Key components to achieve the good electromagnetic performance (EMC) are the internal shields, the metal housing, and the RFT cage. The RFT cage is designed to provide protection for EMI emission and EMI susceptibility. All transceivers conform to the FCC Class B limits.

Eye Safety

The ES125-LP3TA 1300-nm laser-based transceivers have been designed to meet Class 1 eye safety. They conform to FDA 21CFR1040.10 and 1040.11 and IEC 60825-1.

Ordering Information

ES125-LP3TA -x -y -z

- z (Reach)
  - LX1= 5 Km
  - 101 = 10 Km
  - 201 = 20 Km
- y (Laser)
  - F2=FP (LX1 only)
  - F0=FP (101 only)
  - D3=DFB (201 only)
- x (Temp)
  - A= -40 to +85 deg C
  - B= 0 to +70 deg C

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS	NOTES
Storage Temperature	T_S	-40		+85	°C	
Supply Voltage	V_{CC}			3.5	V	

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS	NOTES
Ambient Operating Temperature	T_A	0		+70	°C	Version "B"
		-40		+85	°C	Version "A"
Supply Voltage	V_{CC}	3.1		3.5	V	
Transmitter Differential Input Voltage	V_D	0.6		2.0	V	
Transmit Disable Input Volt –Lo	TD_{Lo}			0.3	V	
Transmit Disable Input Volt – Hi	TD_{Hi}	2.3			V	

ELECTRICAL CHARACTERISTICS (Over Specified T_{op} Range, V_{CC} = +3.1V to +3.5V)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS	NOTES
TRANSMITTER						
Supply Current	I_{CCT}			200	mA	
RECEIVER						
Supply Current	I_{CCR}			100	mA	
Data Output Voltage Swing (Differential)	Vdiff	0.5		1.9	V	
Data Output Rise & Fall Times	t_r,t_f			0.4	ns	20% - 80%
Loss of Signal Detect Output – High	Voh, TTL	2.0		Vcc	V	
Loss of Signal Detect Output - Low	Vol, TTL	0.0		0.8	V	

OPTICAL CHARACTERISTICS (Over Specified T_{op} Range, V_{CC} = +3.1V to +3.5V)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS	NOTES
TRANSMITTER						
Output Optical Power 9/125 μm, NA = 0.10 fiber	P_{OUT}	-11		-3	dBm avg.	For F2 option
Output Optical Power 9/125 μm, NA = 0.10 fiber	P_{OUT}	-5		-0	dBm avg.	For F0 option
Output Optical Power 9/125 μm, NA = 0.10 fiber	P_{OUT}	-4		1	dBm avg.	For D3 option
Optical Extinction Ratio		9			dB	
Center Wavelength	λ_c	1270		1355	nm	
Spectral Width – rms	σ			4	nm	
Optical Rise/Fall Time	t_r / t_f			0.26	ns	20-80%
RECEIVER						
Minimum Optical Input Power (Sensitivity)	P_{IN}			-19	dBm avg.	
Maximum Optical Input Power (Saturation)	P_{IN}	-3			dBm avg.	
Operating Center Wavelength	λ_c	1270		1380	nm	
Loss of Signal – Deasserted	P_A			-19	dBm avg.	
Loss of Signal – Asserted	P_D	-30			dBm avg.	
Loss of Signal – Hysteresis	P_A - P_D	1.0		5.0	dB	

Table 1: SFP PIN DEFINITION

PIN	SYMBOL	DESCRIPTION OF FUNCTION
1	VeeT	Transmitter Signal Ground
2	TX Fault	Transmitter Fault Indication
3	TX Disable	Transmitter Disable
4	MOD-DEF2	Module Definition 2
5	MOD-DEF1	Module Definition 1
6	MOD-DEF0	Module Definition 0
7	Rate Select	Select between full or reduced receiver bandwidth
8	LOS	Loss of Signal
9	VeeR	Receiver Signal Ground
10	VeeR	Receiver Signal Ground
11	VeeR	Receiver Signal Ground
12	RD-	Received Data Inverted Differential Output
13	RD+	Received Data Non-Inverted Differential Output
14	VeeR	Receiver Signal Ground
15	VccR	+3.3V Receiver Power Supply
16	VccT	+3.3V Transmitter Power Supply
17	VeeT	Transmitter Signal Ground
18	TD+	Transmitter Data Non-Inverted Differential Input
19	TD-	Transmitter Data Inverted Differential Input
20	VeeT	Transmitter Signal Ground

Mechanical Specs:

Figure 1: SFP Transceiver Package Outline

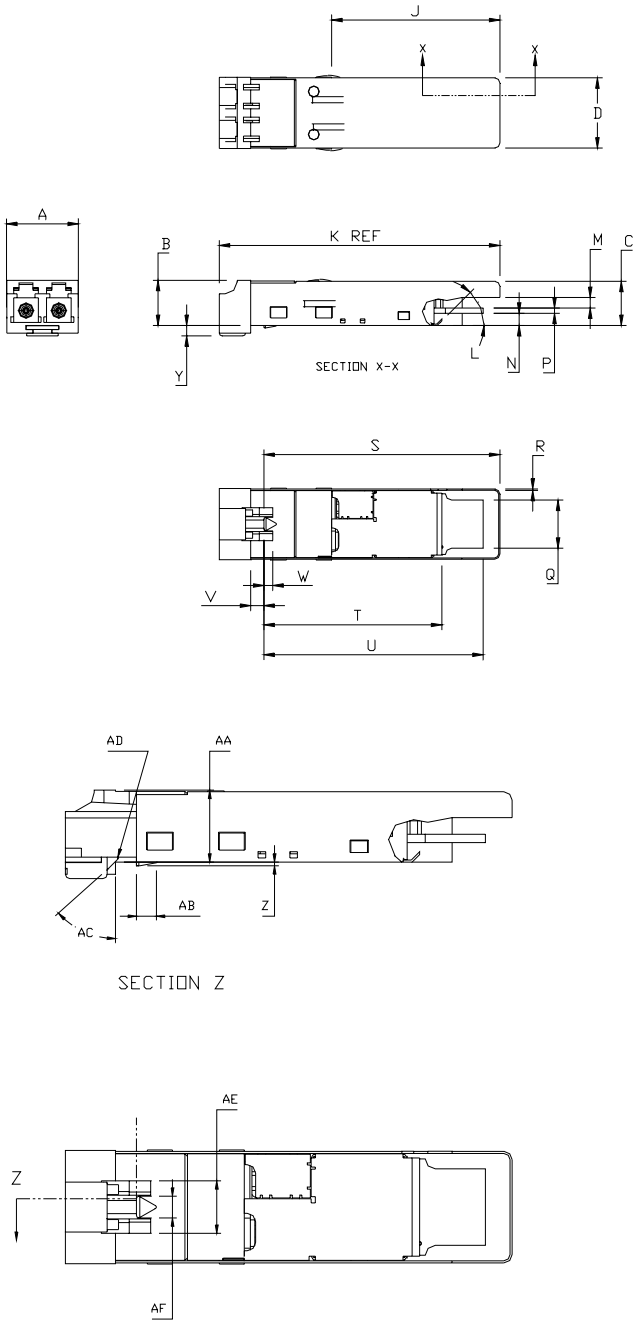

Table 2: Dimensions for SFP Transceiver

Designator	Dimension (mm)	Tol (mm)	Dimension (inch)	Tol (inch)
A	13.70	± 0.10	0.539	± 0.004
B	8.60	± 0.10	0.339	± 0.004
C	8.45	± 0.10	0.333	± 0.004
D	13.40	± 0.10	0.528	± 0.004
J	32.00	± 0.10	1.260	± 0.004
K	53.50	Reference	2.106	Reference
L	1.20 x 45°	Minimum	0.047 x 45°	Minimum
M	2.00	± 0.25	0.079	± 0.01
N	2.35	+0.00/ -0.10	0.093	+0.000/ -0.004
P	1.00	± 0.10	0.039	± 0.004
Q	9.20	± 0.10	0.362	± 0.004
R	0.25	Maximum	0.010	Maximum
S	45.00	± 0.20	1.772	± 0.008
T	34.30	± 0.30	1.350	± 0.012
U	41.80	± 0.15	1.646	± 0.006
V	2.50	± 0.05	0.098	± 0.002
W	1.70	± 0.10	0.067	± 0.004
Y	1.98	Maximum	0.078	Maximum
Z	0.45	± 0.10	0.018	± 0.004
AA	8.60	± 0.10	0.339	± 0.004
AB	2.30	± 0.10	0.091	± 0.004
AC	45º	± 3º	45º	± 3º
AD	0.10	Reference	0.004	Reference
AE	6.30	Reference	0.248	Reference
AF	2.60	± 0.05	0.102	± 0.002