E2O Communications, Inc.

EM012-V3PA
Preliminary Data Sheet

Features

- **1310nm Light Emitting Diode Technology**
- **Compliant with specifications for IEEE-802.3z Fast Ethernet (100Base-FX) at 125 Mbps**
- **VF-45™ (SG) Receptacle Compatible with IEC Standard SG Optical Connector**
- **Compliant with Multi-Source Agreement (MSA) Small Form Factor (SFF) 2x5 Footprint**
- **Operates with 50 µm and 62.5 µm multimode optical fibers**
- **Class 1 Laser Safety Compliant**
- **Single +3.3V Power Supply**
- **Wave Solderable / Aqueous Washable**

Product Description

The EM012-V3 from E2O Communications is a 3.3V Small Form Factor (SFF) transceiver designed for use in Fast Ethernet applications. The EM012-V3 transceivers provide the ferrule-less VF-45™ (SG) optical receptacle that is compatible with the IEC standard SG connector. The transceiver also complies with the industry standard 2x5 footprint and meets the mezzanine height requirement of 9.8 mm. Each EM012-V3 transceiver consists of an optical subassembly housing both the transmitter and the receiver, and an electrical subassembly. All are housed within a plastic/metal package.

The transmitter consists of a high-performance 1310-nm LED while the receiver consists of an Indium Gallium Arsenide (InGaAs) PIN and a preamplifier. All EM012-V3 transceivers also include a Signal Detect circuit, which provides a PECL logic high output when a usable input optical signal level is detected.

Electromagnetic Interference (EMI)

Most equipment utilizing high-speed transceivers will be required to meet the following requirements:

1) FCC in the United States
2) CENELEC EN55022 (CISPR 22) in Europe. and
3) VCCI in Japan.

To assist the customer in managing the overall equipment EMI performance, the EM012-V3 transceivers have been designed to perform to the specified limits. All transceivers comply with the FCC Class B limits.

Immunity

The EM012-V3 transceiver has been designed to provide good immunity to radio-frequency electromagnetic fields. Key components to achieve the good electromagnetic compliance (EMC) are the metal housing, and the chassis shield.

Eye Safety

The EM012-V3 1310-nm LED-based transceivers have been designed to meet Class 1 eye safety and comply with FDA 21CFR 1040.10 and 1040.11and the IEC 825-1.

Ordering Information

EM012-V3 P A

- A — (Coupling) A = AC
- P — (Signal Detect) P = PECL

EB-SFF-z (Evaluation Board)

- z (Coupling) A = AC

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS	NOTES
Storage Temperature	T_S	-40		85	°C	
Soldering Temperature				260	°C	6 sec. on leads only
Supply Voltage	V_{CC}			5.0	V	Vcc – ground

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS	NOTES
Ambient Operating Temperature	T_A	0		70	°C	
Supply Voltage	V_{CC}	3.1		3.5	V	
Transmitter Differential Input Voltage	V_D	0.6		2.0	V	

ELECTRICAL CHARACTERISTICS (T_A = 0°C to 70°C, V_{CC} = 3.15V to 3.45V)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS	NOTES
TRANSMITTER						
Supply Current	I_{CCT}		150	200	mA	
Data Input Voltage - Low	V_{IL}-V_{CC}	-1.81		-1.475	V	
Data Input Voltage - High	V_{IH}-V_{CC}	-1.165		-0.88	V	
Data Input Voltage - Bias	V_B-V_{CC}		-1.32		V	
RECEIVER						
Supply Current	I_{CCR}		100	130	mA	
Data Output Peak-to-Peak Differential Voltage	$V_{O,P-P}$	0.5		1.9	V	
Data Output Rise & Fall Times	t_r,t_f			2.5	ns	20-80%
Signal Detect Output Voltage - Low	V_{OL}-V_{CC}	-1.81		-1.62	V	
Signal Detect Output Voltage - High	V_{OH}-V_{CC}	-1.045		-0.88	V	
Signal Detect Output Voltage - Bias	V_B-V_{CC}		-1.32		V	

OPTICAL CHARACTERISTICS (T_A = 0°C to 70°C, V_{CC} = 3.15V to 3.45V)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS	NOTES
TRANSMITTER						
Output Optical Power 50/125 µm, NA = 0.20 fiber	P_{OUT}	-24		-14	dBm avg.	
Output Optical Power 62.5/125 µm, NA = 0.275 fiber	P_{OUT}	-20		-14	dBm avg.	
Optical Extinction Ratio		10			dB	
Center Wavelength	λ_c	1260	1320	1380	nm	
Spectral Width – rms	σ	135			nm	
Optical Rise/Fall Time	t_r / t_f			3	ns	10-90%
Transmitter Optical Contributed Jitter (TOTAL)	TJ			0.6	ns	
RECEIVER						
Minimum Optical Input Power (Sensitivity)	P_{IN} Min			-31	dBm avg.	
Maximum Optical Input Power (Saturation)	P_{IN} Max	-14			dBm avg.	
Operating Center Wavelength	λ_c	1260		1380	nm	
Signal Detect – Asserted	P_A	-42.5		-31	dBm avg.	
Signal Detect – Deasserted	P_D	-45		-31.5	dBm avg.	
Signal Detect – Hysteresis	$P_A - P_D$	0.5		1.5	dB	

Figure 1 - SFF Transceiver Package Dimensions in mm and [inches].

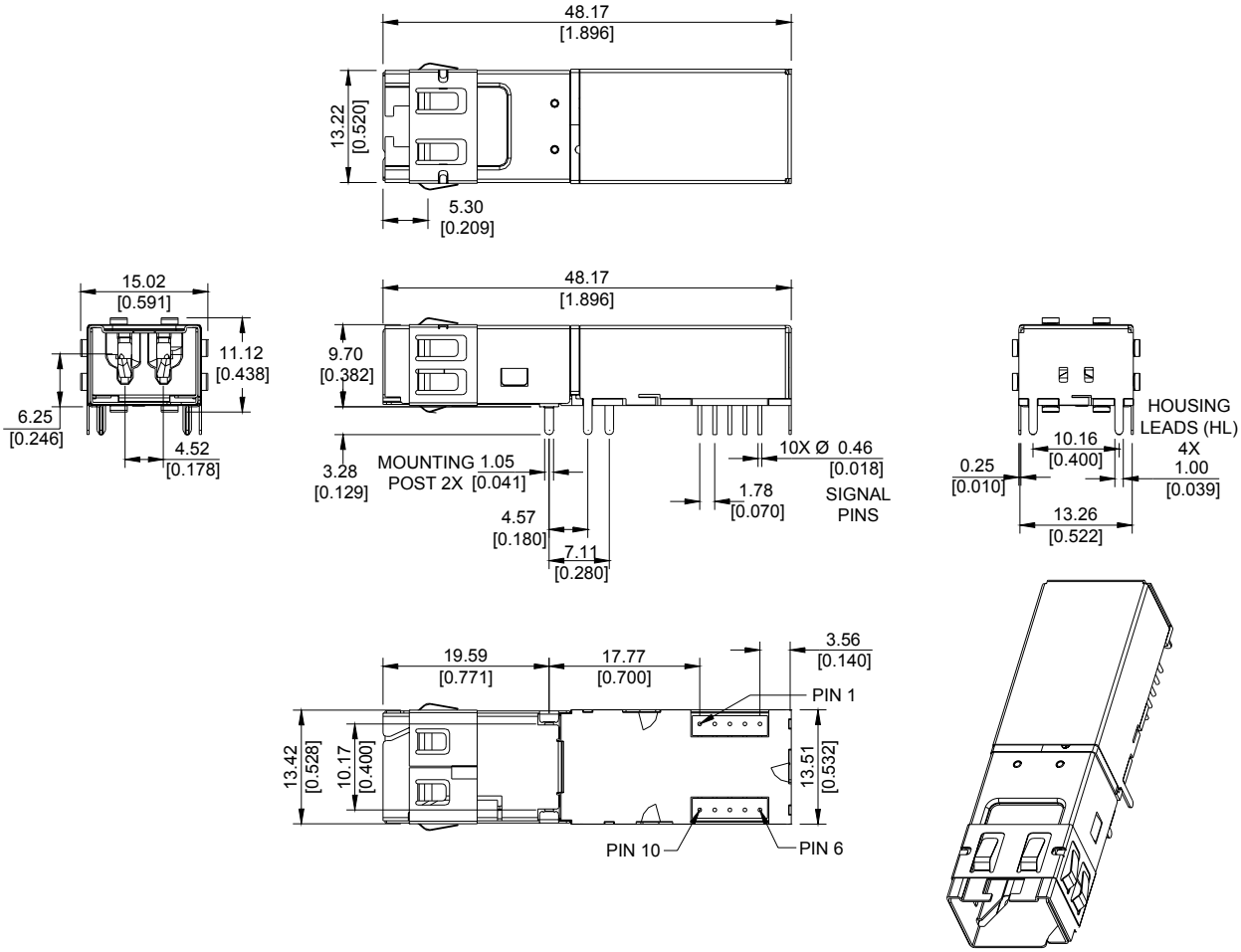
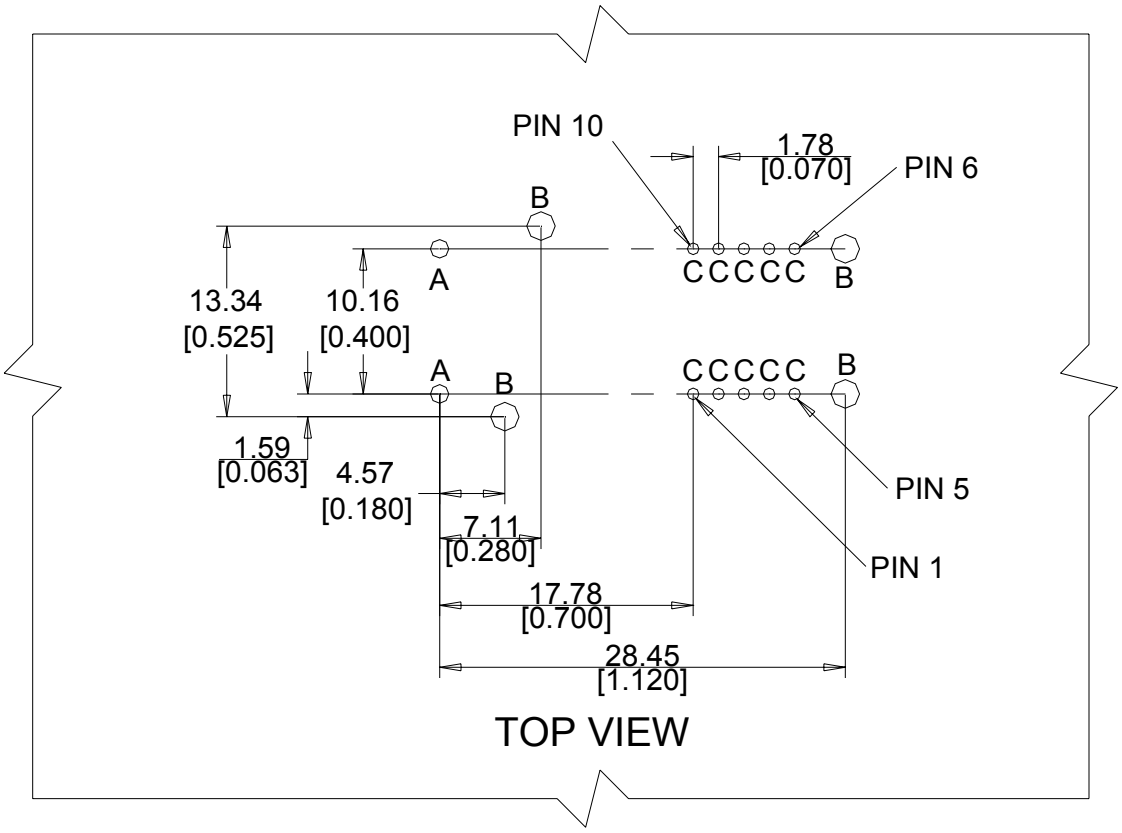


TABLE 1. PINOUT TABLE

Pin	Symbol	Functional Description
Mounting Posts		The mounting posts are provided for transceiver mechanical attachment to the circuit board. They should not be connected to the circuit ground but can be connected to the chassis ground.
Housing Leads		The housing leads should be connected to circuit ground.
1	V_{EER}	Receiver Signal Ground
2	V_{CCR}	+3.3 Volt Receiver Power Supply
3	SD	Signal Detect is a PECL output. A high level indicates a valid optical signal.
4	RD-	Receiver Data Inverted Differential Output
5	RD+	Receiver Data Non-inverted Differential Output
6	V_{CCT}	+3.3V Transmitter Power Supply
7	V_{EET}	Transmitter Signal Ground
8	NC	No Connection
9	TD+	Transmitter Data Non-inverted Differential Input
10	TD-	Transmitter Data Inverted Differential Input

Figure 2 – Recommended PCB Layout in mm and [inches].



RECOMMENDED HOLE SIZES

SYMBOL	QTY	DIAMETER(mm)	DIAMETER[inches]
A	2	1.40±0.1	[0.055±0.004]
B	4	1.40±0.1	[0.055±0.004]
C	10	0.81±0.1	[0.032±0.004]

Figure 3 – Bezel Opening Dimensions in mm and [inches].