5V 1x9 Transceiver For Gigabit Ethernet

850 nm VCSEL for Multimode Fiber

EM125-N5yz-ss
Preliminary Data Sheet

Features

- **850nm Vertical Cavity Surface Emitting Laser (VCSEL) Source Technology**
- **Compliant with specifications for IEEE- 802.3z Gigabit Ethernet (1000Base-SX)**
- **Class 1 Laser Safety Compliant**
- **Single +5V Power Supply**
- **Operates with 50 mm and 62.5 mm multimode optical fibers**
- **Industry Standard 1x9 Footprint with Integral Duplex SC Connector**
- **Meets Mezzanine Height Standard of 9.8 mm**
- **Wave Solderable / Aqueous Washable**

Product Description

The EM125-N5 from E2O Communications is a duplex-SC transceiver designed for use in Gigabit Ethernet applications. It operates with a single +5V power supply. The transceiver complies with the industry standard 1x9 footprint and meets the mezzanine height requirement of 9.8 mm. Each EM125-N5 transceiver consists of a transmitter optical subassembly, a receiver optical subassembly and an electrical subassembly. All are housed in a plastic/metal package.

The transmitter consists of a high-performance 850-nm VCSEL and the receiver consists of an integrated GaAs PIN-preamplifier.

All EM125-N5 transceivers also include a Signal Detect circuit, which provides a TTL or ECL 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 EM125-N5 transceivers have been designed to perform to the specified limits. All transceivers comply with FCC Class B limits.

Immunity
The EM125-N5 transceiver has been designed to provide good immunity to radio-frequency electromagnetic fields. Key components to achieve the good electromagnetic compliance (EMC) are the internal shields, the metal housing, and the chassis shield.

Eye Safety
The EM125-N5 850-nm VCSEL-based transceivers have been designed to meet Class 1 eye safety and comply with FDA 21CFR1040.10 and 1040.11 and the IEC 825-1.

Ordering Information

EM125-N5 y z ss

- ss (Shielding)
  - FS = Forward Chassis Shield
  - BS = Backward Chassis Shield
- z (Coupling)
  - A = AC
  - D = DC
  - F = AC(TX), DC(RX)
- y (Signal Detect)
  - T = TTL
  - E = ECL

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}			6.0	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}	4.75		5.25	V	
Transmitter Differential Input Voltage	V_D	0.7		2.5	V	

ELECTRICAL CHARACTERISTICS (T_A = 0°C to 70°C, V_{CC} = 4.75V to 5.25V)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS	NOTES
TRANSMITTER						
Supply Current	I_{CCT}			80	mA	
RECEIVER						
Supply Current	I_{CCR}			130	mA	
Data Output Peak-to-Peak Differential Voltage	$V_{O,P-P}$	0.6		0.8	V	
Data Output Rise & Fall Times	t_r,t_f			0.25	ns	20-80%
TTL Signal Detect Output – High	Voh,TTL	2.0		Vcc	V	
TTL Signal Detect Output - Low	Vol,TTL	0.0		0.5	V	
ECL Signal Detect Output – High	Voh,ECL		Vcc-0.9		V	ECL 100K Compatible
ECL Signal Detect Output - Low	Vol,ECL		Vcc-1.7		V	ECL 100K Compatible

OPTICAL CHARACTERISTICS (T_A = 0°C to 70°C, V_{CC} = 4.75V to 5.25V)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS	NOTES
TRANSMITTER						
Output Optical Power 50/125 µm, NA = 0.20 fiber	P_{OUT}	-9.5		-4	dBm avg.	
Output Optical Power 62.5/125 µm, NA = 0.275 fiber	P_{OUT}	-9.5		-4	dBm avg.	
Optical Extinction Ratio		9			dB	
Center Wavelength	λ_C	840	850	860	nm	
Spectral Width – rms	σ			0.85	nm	
Optical Rise/Fall Time	t_r / t_f			0.26	ns	20-80%
RIN			-122	-116	dB/Hz	
Transmitter Optical Contributed Jitter (TOTAL)	TJ			225	ps	
RECEIVER						
Input Optical Power Minimum	P_{IN}	-17			dBm avg.	
Input Optical Power Maximum	P_{IN}	0.5			dBm avg.	
Operating Center Wavelength	λ_c	770		860	nm	
Return Loss		12			dB	
Signal Detect – Asserted	P_A			-17	dBm avg.	
Signal Detect – Deasserted	P_D	-30			dBm avg.	
Signal Detect – Hysteresis	P_A - P_D		3		dB	

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.
1	V_{EER}	Receiver Signal Ground
2	RD+	Receiver Data Non-inverted Differential Output
3	RD-	Receiver Data Inverted Differential Output
4	SD	Signal Detect is a TTL output. A high level indicates a valid optical signal.
5	V_{CCR}	+5 V Receiver Power Supply
6	V_{CCT}	+5 V Transmitter Power Supply
7	TD-	Transmitter Data Inverted Differential Input
8	TD+	Transmitter Data Non-inverted Differential Input
9	V_{EET}	Transmitter Signal Ground

Figure 1A – Backward Shield Module mechanical dimensions (mm)

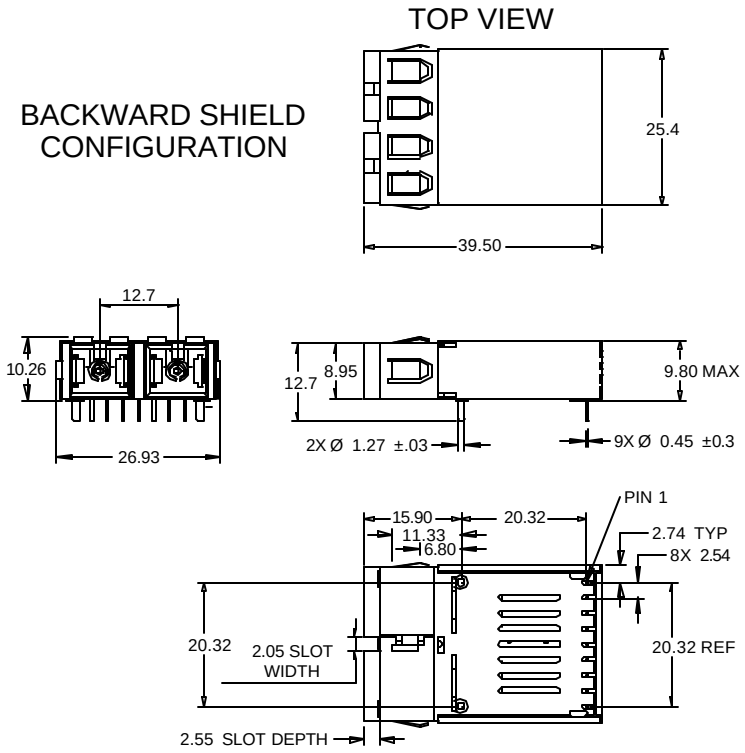


Figure 1B – Forward Shield Module mechanical dimensions (mm)

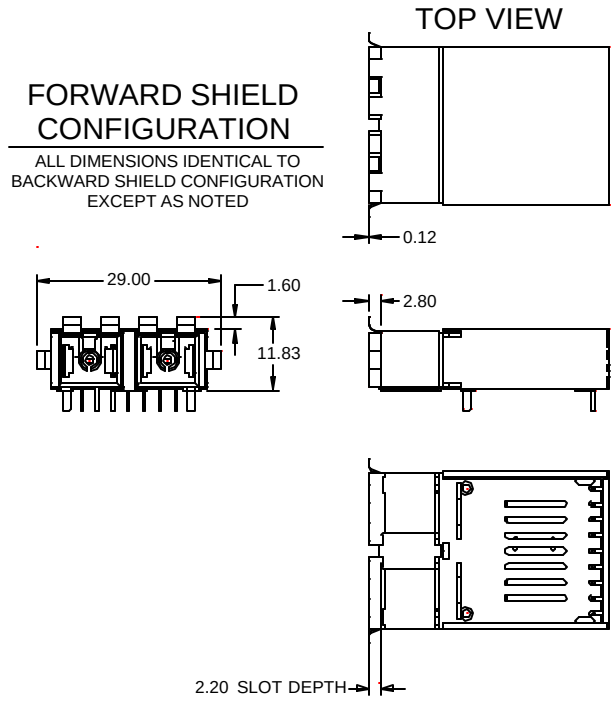


Figure 2 – Bezel Opening Dimensions (mm)

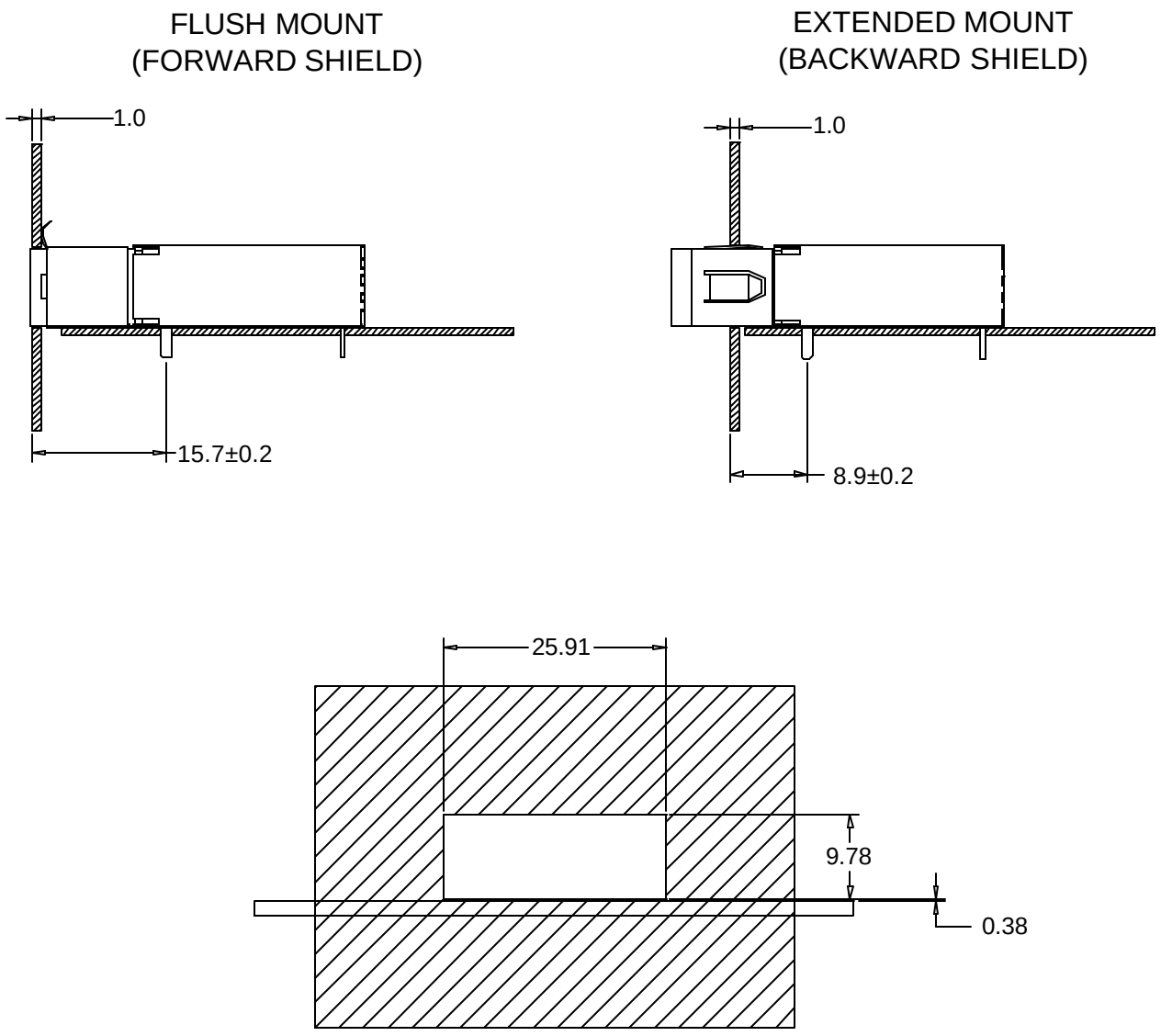
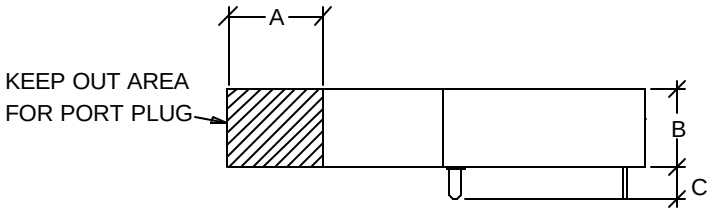
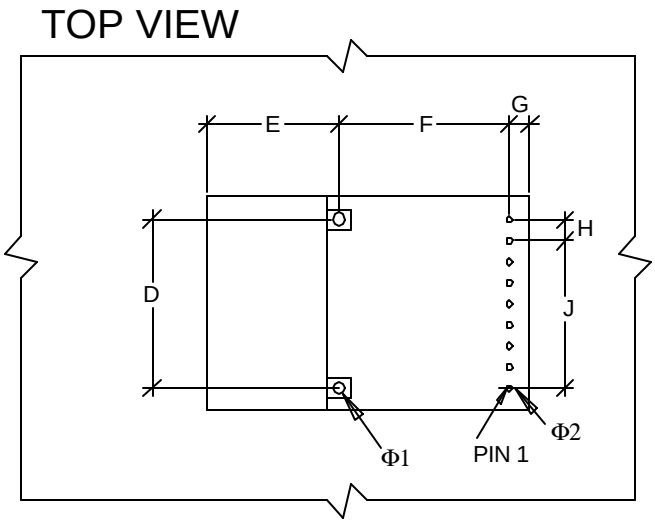


Figure 3 – Recommended PCB Layout





DIMENSIONS (mm)	
A	11.50
B	9.78
C	3.30
D	20.32
E	15.90
F	20.32
G	3.40
H	2.54
J	17.78

RECOMMENDED HOLE SCHEDULE

QTY	SYMBOL	SIZE (mm)
2	Φ1	1.90
9	Φ2	0.80