



5V 1x9 SC Transceiver for Fibre Channel & 1000Base-SX 850 nm VCSEL for Multimode Fiber

E2O Communications, Inc.

EMxxx-N5yz-ss Data Sheet



Features

- 850nm Vertical Cavity Surface Emitting Laser (VCSEL) Source Technology
- Compliant with specifications for IEEE-802.3z Gigabit Ethernet (1000Base-SX) at 1.25 Gbps
- Compliant with ANSI specifications for Fibre Channel Standards at 1.06 Gbps
- Class 1 Laser Safety Compliant
- Single +5V Power Supply
- Operates with 50 μ m and 62.5 μ m 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 EMxxx-N5 from E2O Communications is a duplex-SC transceiver designed for use in Fibre Channel and 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 EMxxx-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 while the receiver consists of a GaAs PIN and a preamplifier.

All EMxxx-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 EMxxx-N5 transceivers have been designed to perform to the specified limits. All transceivers comply with FCC Class B limits.

Immunity

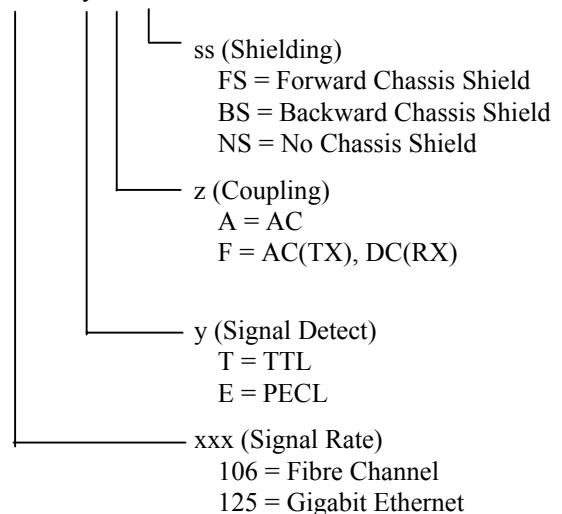
The EMxxx-N5 transceiver has been designed to provide good immunity to radio-frequency electromagnetic fields. Key components to achieve the good electromagnetic compliance (EMC) are the internal shields, the metal housing, and the chassis shield.

Eye Safety

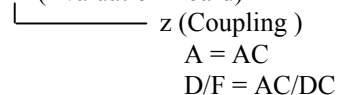
The EMxxx-N5 850-nm VCSEL-based transceivers have been designed to meet Class 1 eye safety and comply with FDA 21CFR1040.10 and 1040.11 and the IEC 825-1.

Ordering Information

EMxxx-N5 y z ss



EB-1x9-z (Evaluation Board)





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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 | V_{CC} - 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 | 0.6 | | 2.0 | V | |

ELECTRICAL CHARACTERISTICS ($T_A = 0^{\circ}\text{C}$ to 70°C , $V_{CC} = 4.75\text{V}$ to 5.25V)

| PARAMETER | SYMBOL | MIN. | TYP. | MAX. | UNITS | NOTES |
|---|--------------|------|--------------|----------|-------|---------------------|
| TRANSMITTER | | | | | | |
| Supply Current | I_{CCT} | | 80 | 100 | mA | |
| RECEIVER | | | | | | |
| Supply Current | I_{CCR} | | 100 | 200 | 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 | | | 0.25 | ns | 20-80% |
| TTL Signal Detect Output – High | $V_{OH,TTL}$ | 2.0 | | V_{CC} | V | |
| TTL Signal Detect Output - Low | $V_{OL,TTL}$ | 0.0 | | 0.5 | V | |
| ECL Signal Detect Output – High | $V_{OH,ECL}$ | | $V_{CC}-0.9$ | | V | ECL 100K Compatible |
| ECL Signal Detect Output - Low | $V_{OL,ECL}$ | | $V_{CC}-1.7$ | | V | ECL 100K Compatible |



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OPTICAL CHARACTERISTICS ($T_A = 0^\circ\text{C}$ to 70°C , $V_{CC} = 4.75\text{V}$ 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% |
| Optical Modulation Amplitude | OMA | 160 | | | μW | Pk to Pk Applies to FC |
| Relative Intensity Noise | RIN | | -122 | -117 | dB/Hz | |
| Transmitter Optical Contributed Jitter (TOTAL) | TJ | | | 225 | ps | |
| RECEIVER | | | | | | |
| Minimum Optical Input Power (Sensitivity) | $P_{\text{IN Min}}$ | | | -17 | dBm avg. | |
| Maximum Optical Input Power (Saturation) | $P_{\text{IN Max}}$ | 0 | | | dBm avg. | |
| Operating Center Wavelength | λ_c | 770 | | 860 | nm | |
| Optical Modulation Amplitude | OMA | 31 | | | μW | Pk to Pk Applies to FC |
| Return Loss | | 12 | | | dB | |
| Signal Detect – Asserted | P_A | | | -17 | dBm avg. | |
| Signal Detect – Deasserted | P_D | -30 | | | dBm avg. | |
| Signal Detect – Hysteresis | $P_A - P_D$ | 0.5 | | 5.0 | 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 or ECL 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 |



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Figure 1A – Backward Shield Module mechanical dimensions in mm [inches].

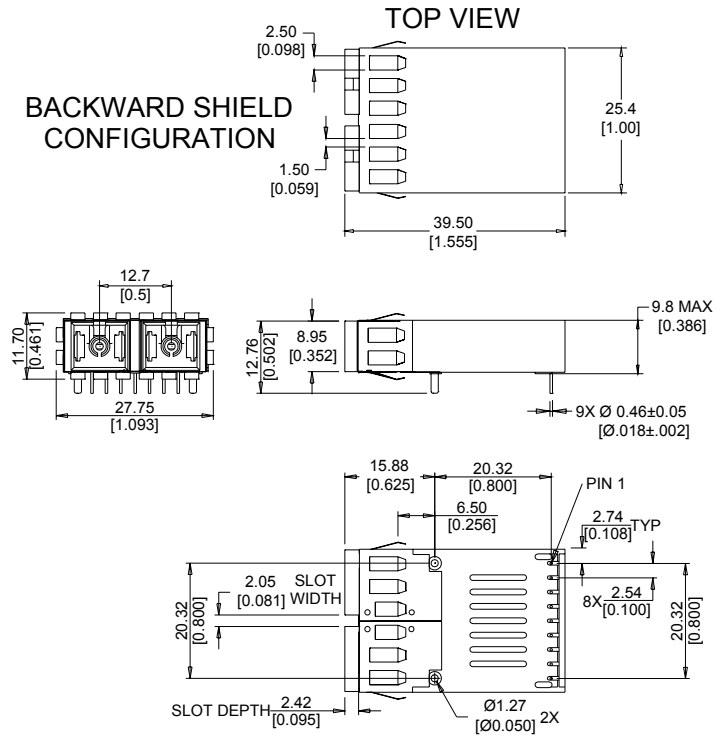
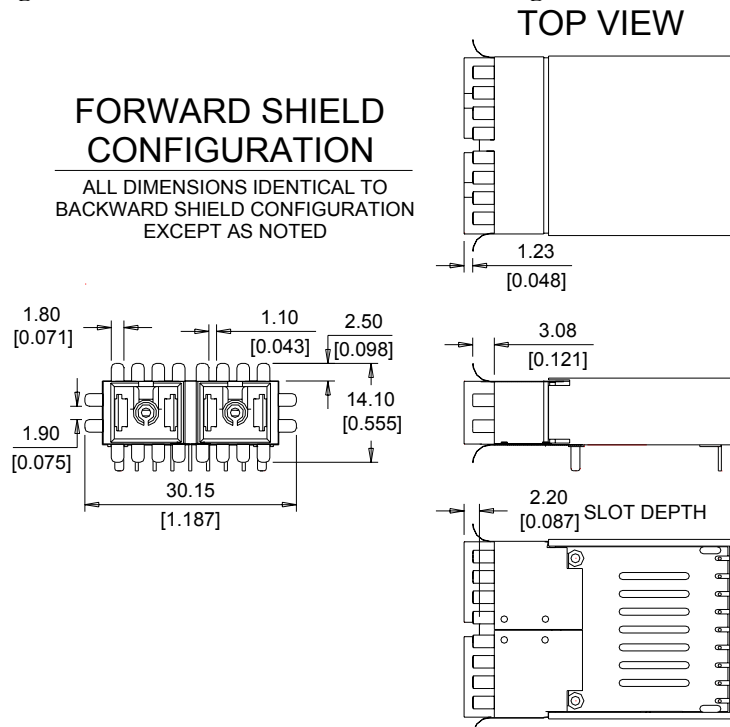


Figure 1B – Forward Shield Module Package Dimensions in mm and [inches].

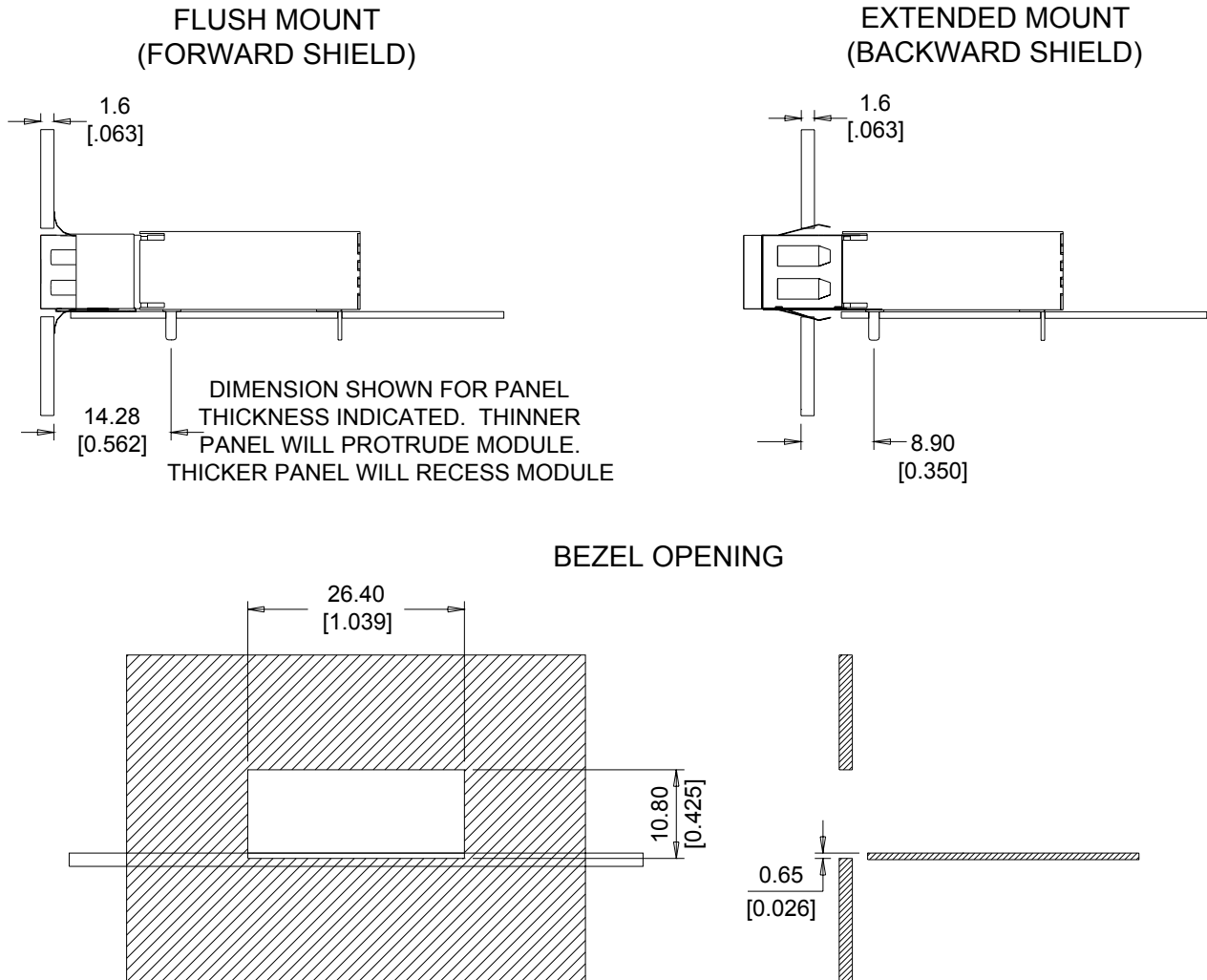




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Figure 2 – Bezel Opening Dimensions in mm and [inches].

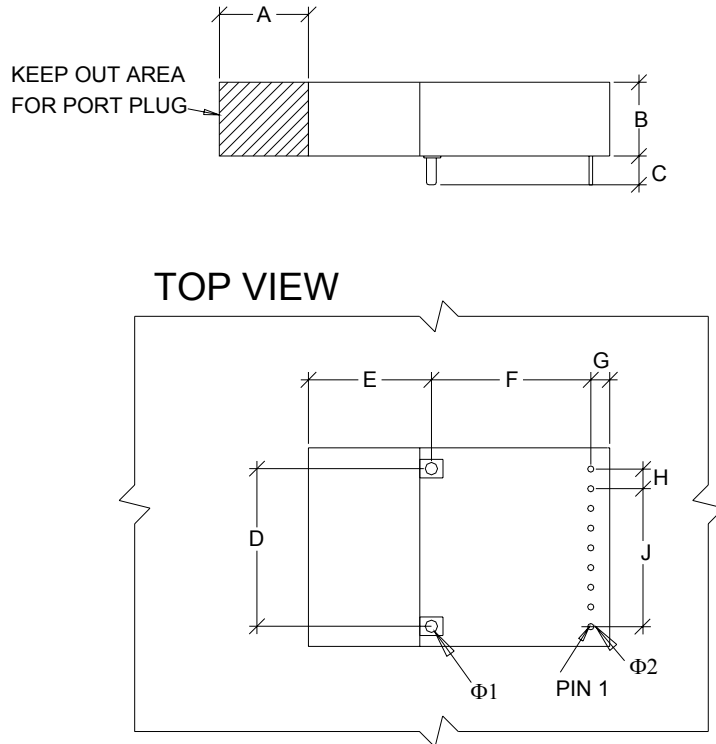




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Figure 3 – Recommended PCB Layout



| DIMENSIONS (mm) | | DIMENSIONS [inch] | | RECOMMENDED HOLE SCHEDULE | | |
|-----------------|-------|-------------------|---------|---------------------------|--------|-----------|
| A | 11.50 | A | [0.453] | QTY | SYMBOL | SIZE (mm) |
| B | 9.78 | B | [0.385] | 2 | Φ1 | Ø1.90 |
| C | 3.30 | C | [0.130] | 9 | Φ2 | Ø0.80 |
| D | 20.32 | D | [0.800] | | | [Ø0.075] |
| E | 15.90 | E | [0.626] | | | [Ø0.031] |
| F | 20.32 | F | [0.800] | | | |
| G | 3.40 | G | [0.134] | | | |
| H | 2.54 | H | [0.100] | | | |
| J | 17.78 | J | [0.700] | | | |

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