



UPCOM TECHNOLOGY CO., LTD.

MWXE-1X-85-03

**10Gb/s 300m Xenpak Transceiver
Hot Pluggable, Duplex SC, 850nm, VCSEL, Multi mode**



Add: 3/F, B26 Building, Heng Feng Industrial City, Xixiang, Bao'an District, Shenzhen China

Tel: +86 755 27364783

E-mail: Jungle@upcomnet.com

Fax: +86 755 27364477

[Http://www.upcomnet.com](http://www.upcomnet.com)

➤ Features

- XAUI Electrical Interface: 4 Lanes @ 3.125Gbit/s
- Hot Z-Pluggable
- SC-Duplex Optical Receptacle
- MDIO, DOM Support
- 850nm VCSEL LD
- PIN Photo-detector
- Compliant to IEEE 802.3ae 10GBASE-SR Application
- Compliant to Xenpak MSA
- Mechanical Footprint: 4.76" L x 1.42" W x 0.46" H
- Power supply: +5.0 V, +3.3 V
- Adaptable Power Supply (APS: +1.2 V)
- Total power consumption: 2.2 W maximum
- Operating Case Temperature: 0 to 70 °C
- RoHS Compliant Part

➤ Applications

- 10GBASE-SR Ethernet
- 1200-Mx-SN-I 10G Fiber Channel

➤ Introduction

MWXE-1X-85-03 is a hot pluggable in the Z-direction module that is usable in typical router line card applications, Storage, IP network and LAN and compliant to Xenpak MSA. The Xenpak-SR is a fully integrated 10.3Gbit/s optical transceiver module that consists of a 10.3Gbit/s optical transmitter and receiver, XAUI interface, Mux and Demux with clock and data recovery(CDR). This transceiver uses a 850nm VCSEL Laser Diode to achieve 300m over standard multi mode fiber as 10GBASE-SR of the IEEE 802.3ae.

● Absolute Maximum Ratings

| Parameter | Symbol | Min | Max | Unit |
|-----------------------|---------------|-----|------|------|
| Storage Temperature | T_{ST} | -40 | +85 | °C |
| Supply Voltage 1 | V_{CC5} | 0 | +6.0 | V |
| Supply Voltage 2 | V_{CC3} | 0 | +4.0 | V |
| Supply Voltage 3(APS) | $V_{CC\,APS}$ | 0 | +1.5 | V |

● Recommended Operating Environment:

| Parameter | Symbol | Min. | Typical | Max. | Unit |
|-----------------------|---------------|-------|---------|-------|------|
| Supply Voltage 1 | V_{CC5} | 4.75 | 5.0 | 5.25 | V |
| Supply Current 1 | I_{CC5} | | | 190 | mA |
| Supply Voltage 2 | V_{CC3} | 3.135 | 3.3 | 3.465 | V |
| Supply Current 2 | I_{CC3} | | | 72 | mA |
| Supply Voltage 3(APS) | $V_{CC\,APS}$ | 1.152 | 1.2 | 1.248 | V |
| Supply Current 3(APS) | $I_{CC\,APS}$ | | | 850 | mA |
| Case Temperature | T_C | 0 | | 70 | °C |

● Electrical Characteristics

Electrical DC Characteristics

($V_{CC5} = 4.75\text{ V to }5.25\text{ V}$, $V_{CC3} = 3.135\text{ V to }3.465\text{ V}$, $V_{CC\,aps} = 1.152\text{ V to }1.248\text{ V}$, $T_C = 0^\circ\text{C to }70^\circ\text{C}$)

| Parameter | Symbol | Values | | | Unit |
|---|----------------|--------|-----|------|---------------|
| | | min | typ | max | |
| 1.2 V CMOS (1.8 V CMOS Compatible¹⁾) I/O DC Characteristics | | | | | |
| (PRTAD; LASI; RESET; TX_ONOFF) | | | | | |
| External Pull-up Resistor for Open Drain | R_{pullup} | 10 | | 22 | k Ω |
| Output High Voltage ²⁾ | V_{oh} | 1 | | | V |
| Output Low Voltage ²⁾ | V_{ol} | | | 0.15 | V |
| Input High Voltage | V_{ih} | 0.84 | | 1.5 | V |
| Input Low Voltage | V_{il} | | | 0.36 | V |
| Input Pull-down Current ³⁾ | I_{pd} | 20 | | 120 | μA |
| XAUI I/O DC Characteristics (TXLANE[0..3]; RXLANE[0..3]) | | | | | |
| Differential Input Amplitude (pk-pk) ⁴⁾ | V_{in_xai} | 200 | | 2500 | mV |
| Differential Output Amplitude (pk-pk) ⁴⁾ | V_{out_xai} | 800 | | 1600 | mV |
| MDIO I/O DC Characteristics (MDIO; MDC) | | | | | |

| | | | | | |
|----------------------------------|------------|------|-----|------|----------|
| Output Low Voltage ⁵⁾ | V_{OL} | -0.3 | | 0.2 | V |
| Output Low Current | I_{OL} | | | 20 | mA |
| Input High Voltage | V_{IH} | 0.84 | 1.2 | 1.5 | V |
| Input Low Voltage | V_{IL} | -0.3 | | 0.36 | V |
| Pull-up Supply Voltage | V_{PU} | 0.84 | 1.2 | 1.5 | V |
| Input Capacitance | C_{IN} | | | 10 | pF |
| Load Capacitance | C_{LOAD} | | | 470 | pF |
| External Pull-up Resistance | R_{LOAD} | 200 | | | Ω |

1) For 1.8 V_{CMOS} $V_{oh} = 1.65$ V min., $V_{ol} = 0.15$ V max., $V_{ih} = 1.17$ V min., $V_{il} = 0.63$ V max.

2) $R_{pull-up} = 10$ k Ω to 1.8 V.

3) $V_{in} = 1.8$ V.

4) AC coupled.

5) $I_{OL} = 100$ μ A

Electrical AC Characteristics

($V_{CC5} = 4.75$ V to 5.25 V, $V_{CC3} = 3.135$ V to 3.465 V, $V_{CCaps} = 1.152$ V to 1.248 V, TC = 0°C to 70°C)

| Parameter | Symbol | Values | | | Unit |
|--|---|--------|-----------------|------|----------|
| | | min | typ | max | |
| XAUI Input AC Characteristics (TXLANE[0..3]) | | | | | |
| Baud Rate Fibre Channel Ethernet | R_{XAUIIN} | | 3.1875 3.125 | | Gbit/s |
| Baud Rate Tolerance | $R_{TOLXAUI}$ | -100 | | 100 | ppm |
| Differential Input Impedance | Z_{INXAUI} | 80 | 100 | 120 | Ω |
| Differential Return Loss ¹⁾ | $ S_{11} $ | 10 | | | dB |
| Input Differential Skew ²⁾ | t_{SKEWIN} | | | 75 | ps |
| Jitter Amplitude Tolerance ³⁾ | $J_{XAUITOL}$ | | | 0.65 | Ulp-p |
| XAUI Output AC Characteristics (RXLANE[0..3]) | | | | | |
| Baud Rate Fibre Channel Ethernet | $R_{XAUIOUT}$ | | 3.1875 3.125 | | Gbit/s |
| Baud Rate Variation | $R_{XAUIVAR}$ | -100 | | 100 | ppm |
| XAUI Eye Mask (far-end) | According to IEEE 802.3ae and 10G Fiber Channel | | | | |
| Output Differential Skew | $t_{SKEWOUT}$ | | | 15 | ps |

| | | | | | |
|--|--|----|-----|------|----------|
| Output Differential Impedance | $Z_{OUTXAUI}$ | 80 | 100 | 120 | Ω |
| Differential Output Return Loss ¹⁾ | $ S_{22} $ | 10 | | | dB |
| Total Jitter ⁴⁾ | TJ_{XAUI} | | | 0.35 | UI |
| Deterministic Jitter ⁴⁾ | DJ_{XAUI} | | | 0.37 | UI |
| Power-On Reset AC Characteristics | | | | | |
| Power-On Reset and TX_ONOFF Characteristics | According to XENPAK MSA Issue 3.0, 2002-9-18 | | | | |
| MDIO I/O AC Characteristics (MDIO; MDC) | | | | | |
| MDIO Data Hold Time | t_{HOLD} | 10 | | | ns |
| MDIO Data Setup Time | t_{SU} | 10 | | | ns |
| Delay from MDC Rising Edge to MDIO Data Change | t_{DELAY} | | | 300 | ns |
| MDC Clock Rate | f_{MAX} | | | 2.5 | MHz |

1) 100 MHz to 2.5 GHz.

2) At crossing point.

3) Per IEEE Std 802.3ae.

● Optical Parameters

($V_{CC5} = 4.75\text{ V to }5.25\text{ V}$, $V_{CC3} = 3.135\text{ V to }3.465\text{ V}$, $V_{CC\text{aps}} = 1.152\text{ V to }1.248\text{ V}$, $TC = 0^{\circ}\text{C to }70^{\circ}\text{C}$, BER 1E-12, Bit Rate 10.3125)

| Parameter | Symbols | Min. | Typ. | Max. | Unit |
|--------------------------------------|-----------------------|-------|---------|-------|--------|
| Transmitter | | | | | |
| Center Wavelength | λ_c | 840 | 850 | 860 | nm |
| RMS Spectral Width | $\Delta\lambda_{RMS}$ | | | 0.45 | nm |
| Signaling speed | | - | 10.3125 | - | Gbit/s |
| Optical modulation amplitude | OMA | -2.8 | -1.5 | | dBm |
| Optical Output Power | P_o | -5 | - | -1 | dBm |
| Extinction Ratio | E_r | 3 | - | | dB |
| Off Transmit Power | P_{off} | - | - | -30 | dBm |
| Receiver | | | | | |
| Center Wavelength | λ_c | 840 | | 860 | nm |
| Receiver Stressed Sensitivity In OMA | Sen_{st} | | | -11.1 | dBm |
| Receiver Overload | R_{ro} | -1 | - | - | dBm |
| Signal Detect De-assert Level | P_{SDD} | | | -12 | dBm |
| Signal Detect Assert Level | P_{SDA} | -30.0 | | | dBm |
| Receiver Reflectance | R_{rx} | | - | -12 | dB |

● Pin Assignment

| | | | |
|----|-----------|----|---------------|
| 70 | GND | 1 | GND |
| 69 | GND | 2 | GND |
| 68 | RESERVED | 3 | GND |
| 67 | RESERVED | 4 | 5.0V |
| 66 | GND | 5 | 3.3V |
| 65 | TX LANE3- | 6 | 3.3V |
| 64 | TX LANE3+ | 7 | APS |
| 63 | GND | 8 | APS |
| 62 | TX LANE2- | 9 | LASI |
| 61 | TX LANE2+ | 10 | RESET |
| 60 | GND | 11 | VEND SPECIFIC |
| 59 | TX LANE1- | 12 | TX ON/OFF |
| 58 | TX LANE1+ | 13 | RESERVED |
| 57 | GND | 14 | MOD DETECT |
| 56 | TX LANE0- | 15 | VEND SPECIFIC |
| 55 | TX LANE0+ | 16 | VEND SPECIFIC |
| 54 | GND | 17 | MDIO |
| 53 | GND | 18 | MDC |
| 52 | GND | 19 | PRTAD4 |
| 51 | RX LANE3- | 20 | PRTAD3 |
| 50 | RX LANE3+ | 21 | PRTAD2 |
| 49 | GND | 22 | PRTAD1 |
| 48 | RX LANE2- | 23 | PRTAD0 |
| 47 | RX LANE2+ | 24 | VEND SPECIFIC |
| 46 | GND | 25 | APS SET |
| 45 | RX LANE1- | 26 | RESERVED |
| 44 | RX LANE1+ | 27 | APS SENSE |
| 43 | GND | 28 | APS |
| 42 | RX LANE0- | 29 | APS |
| 41 | RX LANE0+ | 30 | 3.3V |
| 40 | GND | 31 | 3.3V |
| 39 | RESERVED | 32 | 5.0V |
| 38 | RESERVED | 33 | GND |
| 37 | GND | 34 | GND |
| 36 | GND | 35 | GND |



● Pin Descriptions

| Signal Name | Level | I/O | Pin No | Description |
|--|--|-----|-------------|---|
| Management and Monitoring Ports | | | | |
| MDIO | Open Drain | I/O | 17 | Management Data I/O. Requires external 10 - 22 k Ω pull-up to the APS on host. |
| MDC | 1.2 V CMOS | I | 18 | Management Data Clock Input |
| PRTAD4 | 1.2 V CMOS | I | 19 | Port Address Input bit 4 |
| PRTAD3 | 1.2 V CMOS | I | 20 | Port Address Input bit 3 |
| PRTAD2 | 1.2 V CMOS | I | 21 | Port Address Input bit 2 |
| PRTAD1 | 1.2 V CMOS | I | 22 | Port Address Input bit 1 |
| PRTAD0 | 1.2 V CMOS | I | 23 | Port Address Input bit 0 |
| LASI | Open Drain | O | 9 | Link Alarm Status Interrupt Output. Open Drain Compatible Output with 10 - 20 k Ω pull-up on host. Logic high = Normal Operation Logic low = Status Flag Triggered |
| RESET | Open Drain | I | 10 | Reset Input. Open Drain Compatible Input with 22 k Ω pull-up to APS internal to transponder. Logic high = Normal Operation Logic low = RESET |
| Vendor Specific | | | 11,15,16,24 | Vendor Specific Pins. Leave unconnected when not used. |
| TX ON/OFF | Open Drain | I | 12 | TX ON/OFF Input. Open Drain Compatible Input with 22 k Ω pull-up to APS internal to transponder. Logic high = Transmitter On Logic low = Transmitter Off |
| MOD DETECT | | O | 14 | Pulled low inside transponder through a 1 k Ω resistor to Ground |
| Transmit Functions | | | | |
| Reserved | | I | 68 | Reserved For Future Use |
| Reserved | | I | 67 | Reserved For Future Use |
| TX LANE 3– | AC-coupled, Internally biased differential XAUI | I | 65 | Module XAUI Input Lane 3– |
| TX LANE 3+ | | I | 64 | Module XAUI Input Lane 3+ |
| TX LANE 2– | | I | 62 | Module XAUI Input Lane 2– |
| TX LANE 2+ | | I | 61 | Module XAUI Input Lane 2+ |
| TX LANE 1– | | I | 59 | Module XAUI Input Lane 1– |

| | | | | |
|--------------------------|-----------|---|---|--|
| TX LANE 1+ | | I | 58 | Module XAUI Input Lane 1+ |
| TX LANE 0- | | I | 56 | Module XAUI Input Lane 0- |
| TX LANE 0+ | | I | 55 | Module XAUI Input Lane 0+ |
| Receive Functions | | | | |
| Reserved | | O | 38 | Reserved For Future Use |
| Reserved | | O | 39 | Reserved For Future Use |
| RX LANE 0+ | | O | 41 | Module XAUI Output Lane 0+ |
| RX LANE 0- | | O | 42 | Module XAUI Output Lane 0- |
| RX LANE 1+ | | O | 44 | Module XAUI Output Lane 1+ |
| RX LANE 1- | | O | 45 | Module XAUI Output Lane 1- |
| RX LANE 2+ | | O | 47 | Module XAUI Output Lane 2+ |
| RX LANE 2- | | O | 48 | Module XAUI Output Lane 2- |
| RX LANE 3+ | | O | 50 | Module XAUI Output Lane 3+ |
| RX LANE 3- | | O | 51 | Module XAUI Output Lane 3- |
| DC Power | | | | |
| GND | 0 V DC | | 1, 2, 3, 33, 34, 35, 36, 37, 40, 43, 46, 49, 52, 53, 54, 57, 60, 63, 66, 69, 70 | Ground connection for signal ground on the module |
| APS | +1.2 V | | 7, 8, 28, 29 | Input from Adaptive Power Supply |
| APS SENSE | +1.2 V | | 27 | APS Sense Output. Connected to the APS input inside transponder. |
| APS SET | | | 25 | Feedback input from APS. Connected to GND through a 1180Ω resistor inside the transponder. |
| 3.3 V | +3.3 V DC | | 5, 6, 30, 31 | DC Power Input, +3.3 V DC, Nominal |
| 5.0 V | +5.0 V DC | | 4, 32 | DC Power Input, +5.0 V DC, Nominal |
| Reserved | | | 26 | Reserved for APD. |
| Reserved | | | 13 | Reserved. |

● Digital Diagnostic Monitor Characteristics

| Parameter | Values | | | Unit |
|--|--------|------|------|------|
| | min. | typ. | max. | |
| Transponder Temperature Monitor Accuracy ¹⁾ | -5 | | +5 | °C |
| Laser Bias Current Monitor Accuracy ²⁾ | -10 | | +10 | % |
| Transmit Power Monitor Accuracy ³⁾ | -3 | | +3 | dB |
| Receive Power Monitor Accuracy ³⁾ | -3 | | +3 | dB |

1) 0 to 70°C case temperature.

2) 0 to 12.5 mA.

3) -8.2 dBm to +0.5 dBm.

● Mechanical Dimensions

