

X2-10GB-SR-NC

MSA and TAA 10GBase-SR X2 Transceiver (MMF, 850nm, 300m, SC, DOM)

Features:

- X2 MSA 2.0 Compliance
- Duplex SC Connector
- Multi-mode Fiber
- Commercial Temperature 0 to 70 Celsius
- Hot Pluggable
- Metal with Lower EMI
- Excellent ESD Protection
- RoHS Compliant and Lead Free



Applications:

- 10GBase-SR Ethernet
- 8x/10x Fibre Channel
- Access, Datacenter and Enterprise
- Mobile Fronthaul CPRI/OBSAI

Product Description

This MSA Compliant X2 transceiver provides 10GBase-SR throughput up to 300m over multi-mode fiber (MMF) using a wavelength of 850nm via a SC connector. It is built to MSA standards and is uniquely serialized and data-traffic and application tested to ensure that they will integrate into your network seamlessly. Digital optical monitoring (DOM) support is also present to allow access to real-time operating parameters. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

ProLabs' transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S. – made or designated country end products."



Absolute Maximum Ratings

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|-----------------------------|-------------------|------|------|------|------|
| Storage Ambient Temperature | T _S | -40 | | 85 | °C |
| Supply Voltage (3.3V) | V ₃ | 0 | | 4 | V |
| Supply Voltage (APS) | V _{APS} | 0 | | 1.5 | V |
| Optical Receiver Input | P _{IMAX} | | | 1 | dBm |

General Specifications

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|----------------------------|--------------------|-------|---------|-------------------|------|
| Data Rate | DR | | 10.3125 | | GBd |
| Bit Error Rate | BER | | | 10 ⁻¹² | |
| Total Power Consumption | P | | | 2.2 | W |
| Supply Voltage (+3.3V) | V _{CC3} | 3.14 | 3.3 | 3.47 | V |
| Supply Voltage (APS) | V _{CCAPS} | 1.152 | 1.2 | 1.248 | V |
| Supply Current (+3.3V) | I _{CC3} | | | 300 | mA |
| Supply Current (APS) | I _{CCAPS} | | | 1000 | mA |
| Case Operating Temperature | T _C | 0 | | 70 | °C |

Link Distance

| Parameter | Fiber Type | Modal Bandwidth@ 850nm (MHz-km) | Distance Range (m) |
|-----------|----------------|---------------------------------|--------------------|
| 10.3 GBd | 62.5/125μm MMF | 160 | 2-26 |
| | 62.5/125μm MMF | 200 | 2-33 |
| | 50/125μm MMF | 400 | 2-66 |
| | 50/125μm MMF | 500 | 2-82 |
| | 50/125μm MMF | 2000 | 2-300 |

Electrical Characteristics - DC

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|--|-----------------|------|------|------|-----------|---------------------|
| A. 1.2V COMS I/O DC Characteristics (PRTAD; LASI; RESET; TX_ON/OFF) | | | | | | |
| External Pull-Up Resistor for Open Drain | R_{PU} | 10 | | 22 | $K\Omega$ | |
| Output High Voltage | V_{OH} | 1 | | | V | |
| Output Low Voltage | V_{OL} | | | 0.15 | V | |
| Input High Voltage | V_{IH} | 0.84 | | 1.2 | V | |
| Input Low Voltage | V_{IL} | | | 0.36 | V | |
| Input Pull-Down Current | IPD | 20 | 120 | 120 | μA | $V_{IN}=1.2V$ |
| B. XAUI I/O DC Characteristics (TXLAN[0..3]; RXLANE[0..3]) | | | | | | |
| Differential Input Amplitude (pk-pk) | V_{IN_XAUI} | 200 | | 1600 | mV | AC Coupled |
| Differential output Amplitude (pk-pk) | V_{OUT_XAUI} | 800 | | 1600 | mV | AC Coupled |
| C. MDIO I/O DC Characteristics (MDIO; MDC) | | | | | | |
| Output Low Voltage | V_{OL} | | | 0.2 | V | $I_{OL} = 100\mu A$ |
| Output Low Current | I_{OL} | | | 4 | mA | |
| Input High Voltage | V_{IH} | 0.84 | | 1.2 | V | |
| Input Low Voltage | V_{IL} | | | 0.36 | V | |
| Pull-Up Supply Voltage | V_{PU} | | 1.2 | | V | |
| Input Capacitance | C_{IN} | | | 10 | pF | |
| Load Capacitance | C_{LOAD} | | | 470 | pF | |
| External Pull-Up Resistance | RPU | 200 | | | Ω | |

Electrical Characteristics - AC

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes | |
|---|------------------------|---------------------------|-------|------|------------------|---|--|
| A. XAUI Input AC Characteristics (TXLANE[0..3]) | | | | | | | |
| Baud Rate | BR _{XAUI_IN} | | 3.125 | | GBd | | |
| Baud Rate Tolerance | BR _{TOL_XAUI} | -100 | | 100 | ppm | | |
| Differential Input Impedance | Z _{IN_XAUI} | | 100 | | Ω | | |
| Differential Return Loss | RL _{IN} | 10 | | | dB | 100MHz to 2.5 GHz | |
| Input Differential Skew | T _{IN_SKEW} | | | 75 | ps | Crossing Point | |
| Jitter Amplitude Tolerance | J _{XAUI_TOL} | | | 0.65 | UI _{PP} | IEEE 802.3ae | |
| B. XAUI Output AC Characteristics (RXLANE[0..3]) | | | | | | | |
| Baud Rate | BR _{XAUI_OUT} | | 3.125 | | GBd | | |
| Baud Rate Variation | BR _{XAUI_VAR} | -100 | | 100 | ppm | | |
| XAUI Eye Mask (far-end) | | According to IEEE 802.3ae | | | | | |
| Output Differential Skew | T _{OUT_SKEW} | | | 15 | ps | | |
| Output Differential Impedance | Z _{OUT_XAUI} | | 100 | | Ω | DC | |
| Differential Output Return Loss | RL _{OUT} | 10 | | | dB | 100 MHz to 2.5 GHz | |
| Total Jitter | TJ _{XAUI} | | | 0.35 | UI | Near-end No pre-equalization 1 UI=320 ps | |
| Deterministic Jitter | DJ _{XAUI} | | | 0.17 | UI | | |
| C. Power-On Reset Characteristics | | | | | | | |
| Power-On Reset and TX_ONOFF Characteristics | | According to X2 MSA Issue | | | | | |
| D. 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 | | |

Optical Characteristics

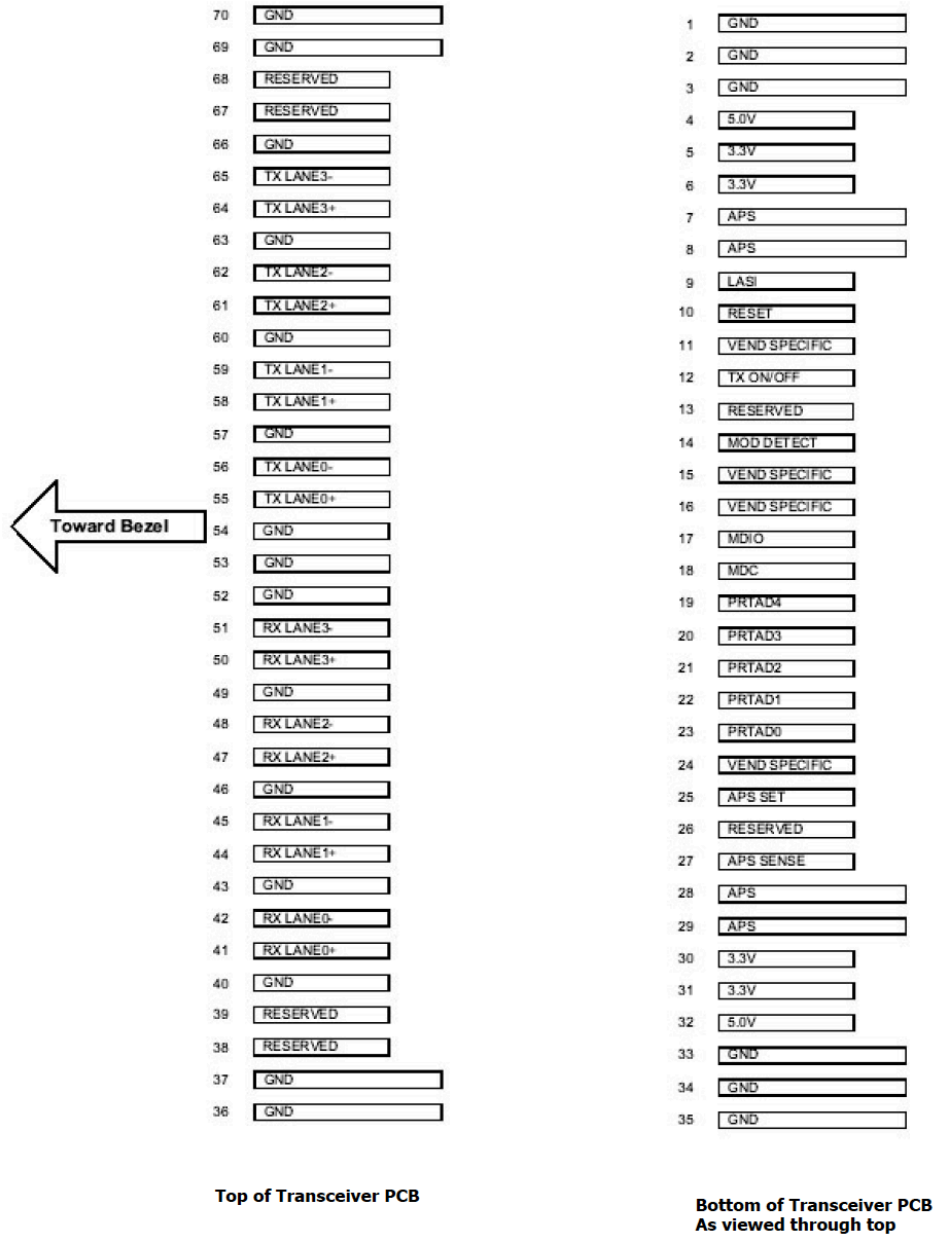
| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|--|------------------|---|------|-------|---------|-------|
| Transmitter | | | | | | |
| Optical Wavelength | λ | 840 | 850 | 860 | nm | |
| Launch Power | P_{OUT} | -7.3 | | -1.3 | dBm | |
| Launch Power in OMA | P_{OUT_OMA} | -4.3 | | -2.8 | dBm | |
| Launch Power of OFF Transmitter | P_{OUT_OFF} | | | -30 | dBm | |
| Side Mode Suppression Ratio | SMSR | 30 | | | dB | |
| Spectral Width (RMS) | $\Delta \lambda$ | | | 0.45 | nm | |
| Optical Extinction Ratio | ER | 3 | | | dB | |
| Optical Modulation amplitude | OMA | 525 | | | μ W | |
| Optical Return Loss Tolerance | ORL_T | | | 12 | dB | |
| Relative Intensity Noise | RIN | | | -128 | dB/Hz | |
| Transmitter Dispersion Penalty | TDP | | | 3.9 | dB | |
| Eye Mask Definition | | According to IEE 802.3ae and 10Gbase-SR | | | | |
| Receiver | | | | | | |
| Center Wavelength Range | λ_C | 840 | | 860 | nm | |
| Optical Input Power | P_{IN} | -9.9 | | -1 | dBm | |
| Receiver Sensitivity in OMA | P_{IN_OMA} | | | -11.1 | dBm | |
| Stressed Receiver Sensitivity | P_{IN_S} | | | -7.5 | dBm | |
| Receiver Reflectance | TR_{RX} | | | -12 | dB | |
| Receiver electrical 3dB upper cutoff frequency | FR | | | 12.3 | GHz | |

Pin Descriptions

| Pin# | Symbol | I/O | Logic | Description | Pin# |
|------|---------------|-----|------------|---|------|
| 1 | GND | I | Supply | Electrical ground | 1 |
| 2 | GND | I | Supply | Electrical ground | 2 |
| 3 | GND | I | Supply | Electrical ground | 3 |
| 4 | 5.0V | I | Supply | Power | 4 |
| 5 | 3.3V | I | Supply | Power | 5 |
| 6 | 3.3V | I | Supply | Power | 6 |
| 7 | APS | I | Supply | Adaptive Power Supply | 7 |
| 8 | APS | I | Supply | Adaptive Power Supply | 8 |
| 9 | LASI | O | Open Drain | Link Alarm Status Interrupt. 10-22k ohm pull up on host | 9 |
| 10 | REST | I | 1.2V CMOS | TX OFF when MDIO RESET | 10 |
| 11 | VEND SPECIFIC | | | Vendor Specific Pin. Leave unconnected | 11 |
| 12 | TX ON/OFF | I | 1.2V CMOS | Transmitter ON/OFF | 12 |
| 13 | Reserved | | | Reserved | 13 |
| 14 | MOD DETECT | O | | Pulled low inside module through 1k ohm | 14 |
| 15 | VEND SPECIFIC | | | Vendor Specific Pin. Leave unconnected | 15 |
| 16 | VEND SPECIFIC | | | Vender Specific Pin. Leave unconnected | 16 |
| 17 | MDIO | I/O | Open Drain | Management Data IO | 17 |
| 18 | MDC | I | 1.2V CMOS | Management data clock | 18 |
| 19 | PRTAD4 | I | 1.2V CMOS | Port Address bit 4 (Low=0) | 19 |
| 20 | PRTAD3 | I | 1.2V CMOS | Port Address bit 3 (Low=0) | 20 |
| 21 | PRTAD2 | I | 1.2V CMOS | Port Address bit 2 (Low=0) | 21 |
| 22 | PRTAD1 | I | 1.2V CMOS | Port Address bit 1 (Low=0) | 22 |
| 23 | PRTAD0 | I | 1.2V CMOS | Port Address bit 0 (Low=0) | 23 |
| 24 | VEND SPECIFIC | | | Vendor Specific Pin. Leave unconnected | 24 |
| 25 | APS SET | O | | Feedback output for APS | 25 |
| 26 | RESERVED | | | Reserved for Avalanche Photodiode use | 26 |
| 27 | APS SENSE | O | Analog | APS Sense Connection | 27 |
| 28 | APS | I | Supply | Adaptive Power Supply | 28 |
| 29 | APS | I | Supply | Adaptive Power Supply | 29 |
| 30 | 3.3V | I | Supply | Power | 30 |
| 31 | 3.3V | I | Supply | Power | 31 |
| 32 | 5.0V | | Supply | Power | 32 |
| 33 | GND | I | Supply | Electrical Ground | 33 |
| 34 | GND | I | Supply | Electrical Ground | 34 |
| 35 | GND | I | Supply | Electrical Ground | 35 |
| 36 | GND | I | Supply | Electrical Ground | 36 |
| 37 | GND | I | Supply | Electrical Ground | 37 |
| 38 | RESERVED | | | Reserved | 38 |

| | | | | | |
|----|------------|---|--------|----------------------------|----|
| 39 | RESERVED | | | Reserved | 39 |
| 40 | GND | I | Supply | Electrical ground | 40 |
| 41 | RX LANE 0+ | O | AC | Module XAUI Output Lane 0+ | 41 |
| 42 | RX LANE 0- | O | AC | Module XAUI Output Lane 0- | 42 |
| 43 | GND | I | Supply | Electrical ground | 43 |
| 44 | RX LANE 1+ | O | AC | Module XAUI Output Lane 1+ | 44 |
| 45 | RX LANE 1- | O | AC | Module XAUI Output Lane 1- | 45 |
| 46 | GND | I | Supply | Electrical ground | 46 |
| 47 | RX LANE 2+ | O | AC | Module XAUI Output Lane 2+ | 47 |
| 48 | RX LANE 2- | O | AC | Module XAUI Output Lane 2- | 48 |
| 49 | GND | I | Supply | Electrical ground | 49 |
| 50 | RX LANE 3+ | O | AC | Module XAUI Output Lane 3+ | 50 |
| 51 | RX LANE 3- | O | AC | Module XAUI Output Lane 3- | 51 |
| 52 | GND | I | Supply | Electrical ground | 52 |
| 53 | GND | I | Supply | Electrical ground | 53 |
| 54 | GND | I | Supply | Electrical ground | 54 |
| 55 | TX LANE 0+ | O | AC | Module XAUI Input Lane 0+ | 55 |
| 56 | TX LANE 0- | O | AC | Module XAUI Input Lane 0- | 56 |
| 57 | GND | I | Supply | Electrical ground | 57 |
| 58 | TX LANE 1+ | O | AC | Module XAUI Input Lane 1+ | 58 |
| 59 | TX LANE 1- | O | AC | Module XAUI Input Lane 1- | 59 |
| 60 | GND | I | Supply | Electrical ground | 60 |
| 61 | TX LANE 2+ | O | AC | Module XAUI Input Lane 2+ | 61 |
| 62 | TX LANE 2- | O | AC | Module XAUI Input Lane 2- | 62 |
| 63 | GND | I | Supply | Electrical ground | 63 |
| 64 | TX LANE 3+ | O | AC | Module XAUI Input Lane 3+ | 64 |
| 65 | TX LANE 3- | O | AC | Module XAUI Input Lane 3- | 65 |
| 66 | GND | I | Supply | Electrical ground | 66 |
| 67 | RESERVED | | | Reserved | 67 |
| 68 | RESERVED | | | Reserved | 68 |
| 69 | GND | I | Supply | Electrical Ground | 69 |
| 70 | GND | I | Supply | Electrical Ground | 70 |

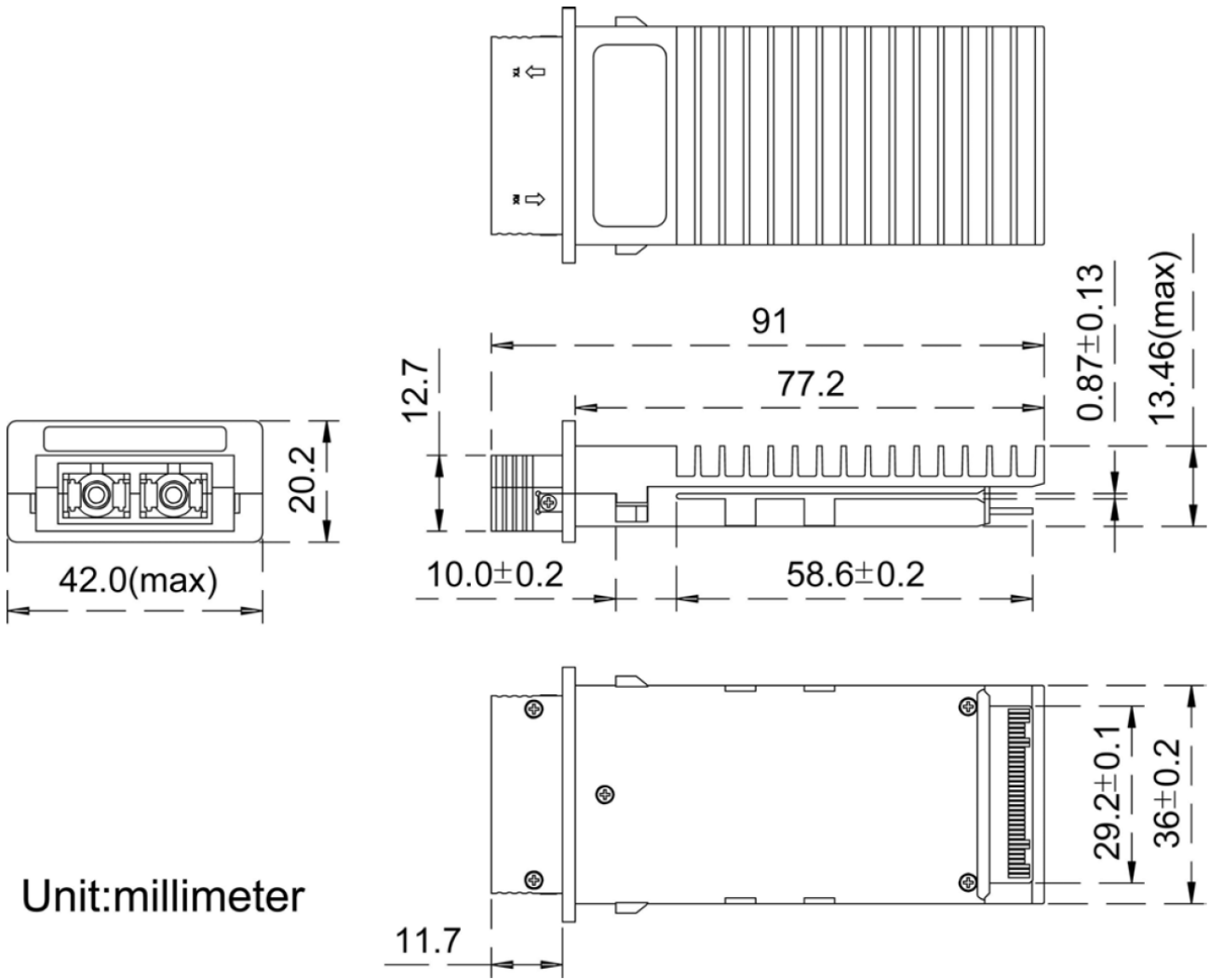
Electrical Pad Layout



Digital Diagnostic

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---------------------|------------------|------|------|------|------|-------|
| Temperature Monitor | T _{MON} | -5 | | 5 | °C | |
| Laser Bias Monitor | I _{MON} | -10 | | 10 | % | |
| TX Power Monitor | P _{TX} | -3 | | 3 | dBm | |
| RX Power Monitor | P _{RX} | -3 | | 3 | dBm | |

Mechanical Specifications



Unit: millimeter

About ProLabs

Our experience comes as standard; for over 15 years ProLabs has delivered optical connectivity solutions that give our customers freedom and choice through our ability to provide seamless interoperability. At the heart of our company is the ability to provide state-of-the-art optical transport and connectivity solutions that are compatible with over 90 optical switching and transport platforms.

Complete Portfolio of Network Solutions

ProLabs is focused on innovations in optical transport and connectivity. The combination of our knowledge of optics and networking equipment enables ProLabs to be your single source for optical transport and connectivity solutions from 100Mb to 400G while providing innovative solutions that increase network efficiency. We provide the optical connectivity expertise that is compatible with and enhances your switching and transport equipment.

Trusted Partner

Customer service is our number one value. ProLabs has invested in people, labs and manufacturing capacity to ensure that you get immediate answers to your questions and compatible product when needed. With Engineering and Manufacturing offices in the U.K. and U.S. augmented by field offices throughout the U.S., U.K. and Asia, ProLabs is able to be our customers best advocate 24 hours a day.



Contact Information

ProLabs US

Email: sales@prolabs.com

Telephone: 952-852-0252

ProLabs UK

Email: salessupport@prolabs.com

Telephone: +44 1285 719 600