

# Product Specification

425Gb/s VR4 QSFP112 850nm 50m  
Optical Transceiver

P/N: 400G-Q112-VR4



## Features

- Hot Pluggable QSFP112 form factor
- Operating data rate 425Gbps
- Single +3.3V power supply
- Single MPO-12 APC connector
- Max power dissipation <9W
- Maximum link length of 50m
- 850nm VCSEL laser
- PIN receivers
- Built-in digital diagnostic function
- Commercial temperature range 0°C to 70°C

## Compliance

- Compliant with QSFP112 MSA
- IEEE 802.3db
- RoHS
- Class 1 laser

## Applications

- 400G Ethernet
- Data Center Interconnect
- Data center Enterprise networking
- Switches with QSFP112 ports

## Description

The 400G-Q112-VR4 is a high-performance, multi-mode optical transceiver module designed for 400 Gigabit Ethernet applications. It supports data rates of up to 425 Gbps and is optimized for short-reach communication, with a maximum transmission distance of up to 50 meters on OM4 multi-mode fiber (MMF) and 30 meters on OM3 MMF. This QSFP112 module operates at a wavelength of 850nm and utilizes an MTP/MPO-12 APC connector, making it ideal for high-speed data center interconnects, enterprise networks, and other short-distance applications. It is fully compliant with industry standards, including IEEE 802.3db, CMIS 5.2, and QSFP112 MSA, ensuring reliable and efficient data transmission.

The 400G-Q112-VR4 features advanced digital diagnostics monitoring (DDM) capabilities, enabling real-time monitoring of key parameters such as temperature, voltage, and optical power. It employs a 4-channel VCSEL transmitter and PIN receiver array, ensuring high sensitivity and performance. With a maximum power consumption of  $\leq 9\text{W}$  and a compact QSFP112 form factor, the 400G-Q112-VR4 is a cost-effective and energy-efficient solution for high-speed networking needs. Its robust design and compliance with environmental standards make it a dependable choice for modern network operators seeking to enhance their infrastructure with reliable, high-performance connectivity.

## Product performance Specifications

### 1. Basic Product Characteristics

| Parameter  | Symbol   | Min   | Typ. | Max          | Unit               |
|--|----------|-------|------|--------------|--------------------|
| Absolute Maximum Ratings                         |          |       |      |              |                    |
| Storage Temperature                              | $T_s$    | -40   | -    | 85           | $^{\circ}\text{C}$ |
| Operating Case Temperature                       | $T_{OP}$ | 0     | -    | 70           | $^{\circ}\text{C}$ |
| Supply Voltage                                   | $V_{CC}$ | -0.5  | -    | 3.6          | V                  |
| Relative Humidity (non-condensing)               | RH       | 5     | -    | 95           | %                  |
| Control Input Voltage                            | $V_I$    | -0.3  | -    | $V_{CC}+0.5$ | V                  |
| Operational Specifications                       |          |       |      |              |                    |
| Power Supply Voltage                             | $V_{CC}$ | 3.135 | -    | 3.3          | V                  |
| Instantaneous peak current at hot plug (400G)    | ICC_IP   | -     | -    | 3600         | mA                 |
| Sustained peak current at hot plug (400G)        | ICC_SP   | -     | -    | 3000         | mA                 |
| Maximum Power consumption (400G)                 | PD       | -     | 8.1  | 9            | W                  |
| Maximum Power consumption, Low Power Mode (400G) | PDLP     | -     | -    | 2            | W                  |
| Instantaneous peak current at hot plug (200G)    | ICC_IP   | -     | -    | 2200         | mA                 |
| Sustained peak current at hot plug (200G)        | ICC_SP   | -     | -    | 1840         | mA                 |

|  |       |    |        |     |          |
|--|-------|----|--------|-----|----------|
| Maximum Power consumption (200G)                 | PD    | -  | -      | 5.5 | W        |
| Maximum Power consumption, Low Power Mode (200G) | PDL P | -  | -      | 2   | W        |
| Signaling Rate per Lane                          | SRL   | -  | 53.125 | -   | GBd      |
| Two Wire Serial Interface Clock Rate             |       | -  | -      | 400 | kHz      |
| Power Supply Noise Tolerance (10Hz - 10MHz)      |       | 66 | -      | -   | mV       |
| Rx Differential Data Output Load                 |       | -  | 100    | -   | $\Omega$ |
| Operating distance (OM3)                         |       | 2  | -      | 30  | m        |
| Operating distance (OM4)                         |       | 2  | -      | 50  | m        |

## 2. Product Optical and Electrical Characteristics

| Parameter   | Symbol           | Min          | Typ. | Max          | Unit  | Note |
|---|------------------|--------------|------|--------------|-------|------|
| Module output SCL and SDA   | VOL              | 0            | -    | 0.4          | V     |      |
|   | VOH              | $V_{CC}-0.5$ | -    | $V_{CC}+0.3$ | V     |      |
| Module Input SCL and SDA  | VIL              | -0.3         | -    | $V_{CC}*0.3$ | V     |      |
|   | VIH              | $V_{CC}*0.7$ | -    | $V_{CC}+0.5$ | V     |      |
| Transmitter   |                  |              |      |              |       |      |
| Differential pk-pk input Voltage tolerance                                  |                  | 750          | -    | -            | mV    |      |
| Differential termination mismatch   |                  | -            | -    | 10           | %     |      |
| Single-ended voltage tolerance range  |                  | -0.4         | -    | 3.3          | V     |      |
| DC common mode Voltage  |                  | -350         | -    | 2850         | mV    |      |
| Wavelength  | $\lambda_c$      | 844          | 850  | 863          | nm    |      |
| RMS spectral width  | $\Delta\lambda$  | -            | -    | 0.6          |       |      |
| Average Launch Power, each lane   | AOPL             | -4.6         | -    | 4.0          | dBm   | 1    |
| Outer Optical Modulation Amplitude (OMA <sub>outer</sub> ), each lane (min) | T <sub>OMA</sub> | -2.6         | -    | 3.5          | dBm   | 2    |
| Transmitter and Dispersion Eye Closure for PAM4 (TDECQ), each lane          | TDECQ            | -            | -    | 4.4          | dB    |      |
| Average Launch Power of OFF Transmitter, each lane                          | T <sub>OFF</sub> | -            | -    | -30          | dBm   |      |
| Extinction Ratio, each lane   | ER               | -            | 2.5  | -            | dB    |      |
| RIN <sub>21.4OMA</sub>  | RIN              | -            | -    | -132         | dB/Hz |      |
| Optical Return Loss Tolerance   | ORL              | -            | -    | 12           | dB    |      |
| Transmitter Reflectance   | TR               | -            | -    | -26          | dB    | 3    |
| Receiver  |                  |              |      |              |       |      |
| AC common-mode output Voltage (RMS)   |                  | -            | -    | 25           | mV    |      |
| Differential output Voltage (Long mode)                                     |                  | -            | -    | 845          | mV    |      |

|  |                      |      |     |      |     |   |
|--|----------------------|------|-----|------|-----|---|
| Differential output Voltage (Short mode)                         |                      | -    | -   | 600  | mV  |   |
| Near-end Eye height, differential                                |                      | 70   | -   | -    | mV  |   |
| Far-end Eye height, differential                                 |                      | 30   | -   | -    | mV  |   |
| Far end pre-cursor ratio   |                      | -4.5 | -   | 2.5  | %   |   |
| Differential Termination Mismatch                                |                      | -    | -   | 10   | %   |   |
| Transition Time (min, 20% to 80%)                                |                      | 9.5  | -   | -    | ps  |   |
| DC common mode Voltage   |                      | -350 | -   | 2850 | mV  |   |
| Wavelength   | $\lambda_c$          | 842  | 850 | 865  | nm  |   |
| Damage Threshold, average optical power, each lane               | AOPD                 | 5    | -   | -    | dBm |   |
| Average Receive Power, each lane                                 | AOPR                 | -6.4 | -   | 4.0  | dBm | 6 |
| Receive Power (OMA) per Lane                                     | OMA-R                | -    | -   | 3.5  | dBm |   |
| Receiver Reflectance   | RR                   | -    | -   | -26  | dB  |   |
| Receiver Sensitivity [OMA <sub>outer</sub> ], each lane          | SOMA                 | -    | -   | -4.4 | dBm | 4 |
| Stressed Receiver Sensitivity (OMA <sub>outer</sub> ), each lane | SRS                  | -    | -   | -1.8 | dBm | 5 |
| Stressed eye closure for PAM4                                    | SECQ                 | 4.4  | -   | -    | dB  |   |
| OMA <sub>outer</sub> of each aggressor lane                      | OMA <sub>outer</sub> | 3.5  | -   | -    | dBm |   |

**Note1:** Average launch power, each lane (min) is informative and not the principal indicator of signal strength.

**Note2:** Even if  $\max(\text{TECQ}, \text{TDECQ}) < 1.8\text{dB}$ , OMA<sub>outer</sub> (min) must exceed this value.

**Note3:** Transmitter reflectance is defined looking into the transmitter.

**Note4:** Receiver sensitivity (OMA<sub>outer</sub>), each lane (max) is informative and is defined for a transmitter with SECQ of 0.9 dB.

**Note5:** Measured with conformance test signal at TP3 for the  $\text{BER} = 2.4 \times 10^{-4}$ .

**Note6:** Minimum power is informative. AOP above the minimum does not ensure compliance.



Optical Interface

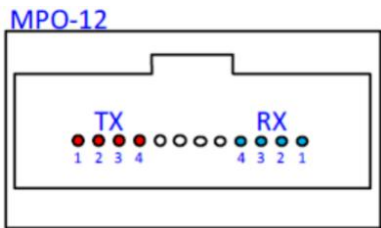


Figure3:Optical Lane Sequence

Pin-out Definition

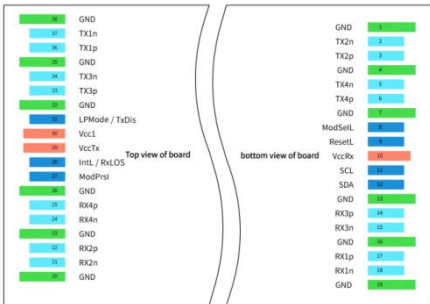


Figure4:QSFP112 Module contact assignment

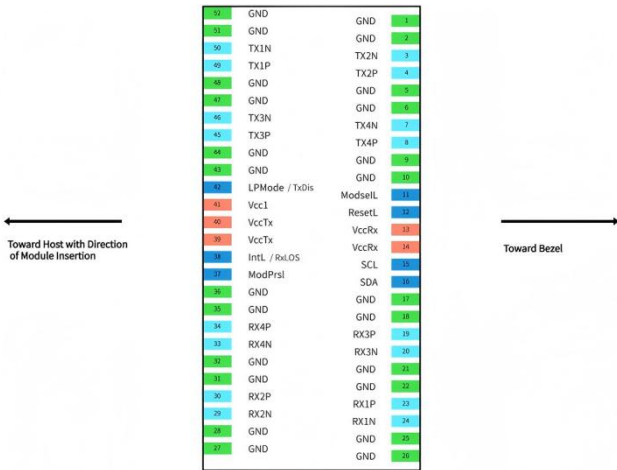


Figure5:Pin view

## Pin Function Definitions

| PIN | Module contact | Logic       | Symbol  | Description                         | Note |
|-----|----------------|-------------|---------|-------------------------------------|------|
| 1   | 1              |             | GND     | Ground                              | 1    |
| 2   |                |             | GND     | Ground                              | 1    |
| 3   | 2              | CML-I       | Tx2n    | Transmitter Inverted Data Input     |      |
| 4   | 3              | CML-I       | Tx2p    | Transmitter Non-Inverted Data Input |      |
| 5   | 4              |             | GND     | Ground                              | 1    |
| 6   |                |             | GND     | Ground                              | 1    |
| 7   | 5              | CML-I       | Tx4n    | Transmitter Inverted Data Input     |      |
| 8   | 6              | CML-I       | Tx4p    | Transmitter Non-Inverted Data Input |      |
| 9   | 7              |             | GND     | Ground                              | 1    |
| 10  |                |             | GND     | Ground                              | 1    |
| 11  | 8              | LVTTL-I     | ModSelL | Select                              |      |
| 12  | 9              | LVTTL-1     | ResetL  | Reset                               |      |
| 13  | 10             |             | Vcc Rx  | +3.3V Power supply receiver         | 2    |
| 14  |                |             | Vcc Rx  | +3.3V Power supply receiver         | 2    |
| 15  | 11             | LVC MOS-I/O | SCL     | 2-wire serial interface clock       |      |
| 16  | 12             | LVC MOS-I/O | SDA     | 2-wire serial interface data        |      |
| 17  | 13             |             | GND     | Ground                              | 1    |
| 18  |                |             | GND     | Ground                              | 1    |
| 19  | 14             | CML-O       | Rx3p    | Receiver Non-Inverted Data Output   |      |
| 20  | 15             | CML-O       | Rx3n    | Receiver Inverted Data Output       |      |
| 21  | 16             |             | GND     | Ground                              | 1    |
| 22  |                |             | GND     | Ground                              | 1    |
| 23  | 17             | CML-O       | Rx1p    | Receiver Non-Inverted Data Output   |      |
| 24  | 18             | CML-O       | Rx1n    | Receiver Inverted Data Output       |      |
| 25  | 19             |             | GND     | Ground                              | 1    |
| 26  |                |             | GND     | Ground                              | 1    |
| 27  | 20             |             | GND     | Ground                              | 1    |
| 28  |                |             | GND     | Ground                              | 1    |
| 29  | 21             | CML-O       | Rx2n    | Receiver Inverted Data Output       |      |
| 30  | 22             | CML-O       | Rx2p    | Receiver Non-Inverted Data Output   |      |
| 31  | 23             |             | GND     | Ground                              | 1    |
| 32  |                |             | GND     | Ground                              | 1    |
| 33  | 24             | CML-O       | Rx4n    | Receiver Inverted Data Output       |      |
| 34  | 25             | CML-O       | Rx4p    | Receiver Non-Inverted Data Output   |      |

|    |    |         |                   |                                     |   |
|----|----|---------|-------------------|-------------------------------------|---|
| 35 | 26 |         | GND               | Ground                              | 1 |
| 36 |    |         | GND               | Ground                              | 1 |
| 37 | 27 | LVTTL-O | ModPrsL           | Present                             |   |
| 38 | 28 | LVTTL-O | IntL/RxLOS        | Interrupt/optional RxLOS            |   |
| 39 | 29 |         | Vcc Tx            | +3.3V Power supply transmitter      | 2 |
| 40 |    |         | Vcc Tx            | +3.3V Power supply transmitter      | 2 |
| 41 | 30 |         | Vcc1 <sub>2</sub> | +3.3V Power Supply                  | 2 |
| 42 | 31 | LVTTL-I | LPMode/TxD is     | Low Power Mode/optional TX Disable  |   |
| 43 | 32 |         | GND               | Ground                              | 1 |
| 44 |    |         | GND               | Ground                              | 1 |
| 45 | 33 | CML-I   | Tx3p              | Transmitter Non-Inverted Data Input |   |
| 46 | 34 | CML-I   | Tx3n              | Transmitter Inverted Data Input     |   |
| 47 | 35 |         | GND               | Ground                              | 1 |
| 48 |    |         | GND               | Ground                              | 1 |
| 49 | 36 | CML-I   | Tx1p              | Transmitter Non-Inverted Data Input |   |
| 50 | 37 | CML-I   | Tx1n              | Transmitter Inverted Data Input     |   |
| 51 | 38 |         | GND               | Ground                              | 1 |
| 52 |    |         | GND               | Ground                              | 1 |

**Note1:** GND is the symbol for signal and supply(power)common for the QSFP112module.Allare common within the QSFP112 module and all voltages are referenced to this potential unless otherwise noted.Connect these directly to the host board signal-common ground plane.

**Note2:** Vcc Rx,Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently. Requirements,defined for the host side of the Host Edge Card Connector,are listed in Table 4.Recommended host board power supply filtering is shown in Figure 4.Vcc Rx,Vecc1and Vcc Tx may be intemally connected within the QSFP112 module in any combination.The connector pins are each rated for amaximum current of 1.5A(max.current of 2.0 Ais required for high module power of15-20W).



## Monitoring Specification

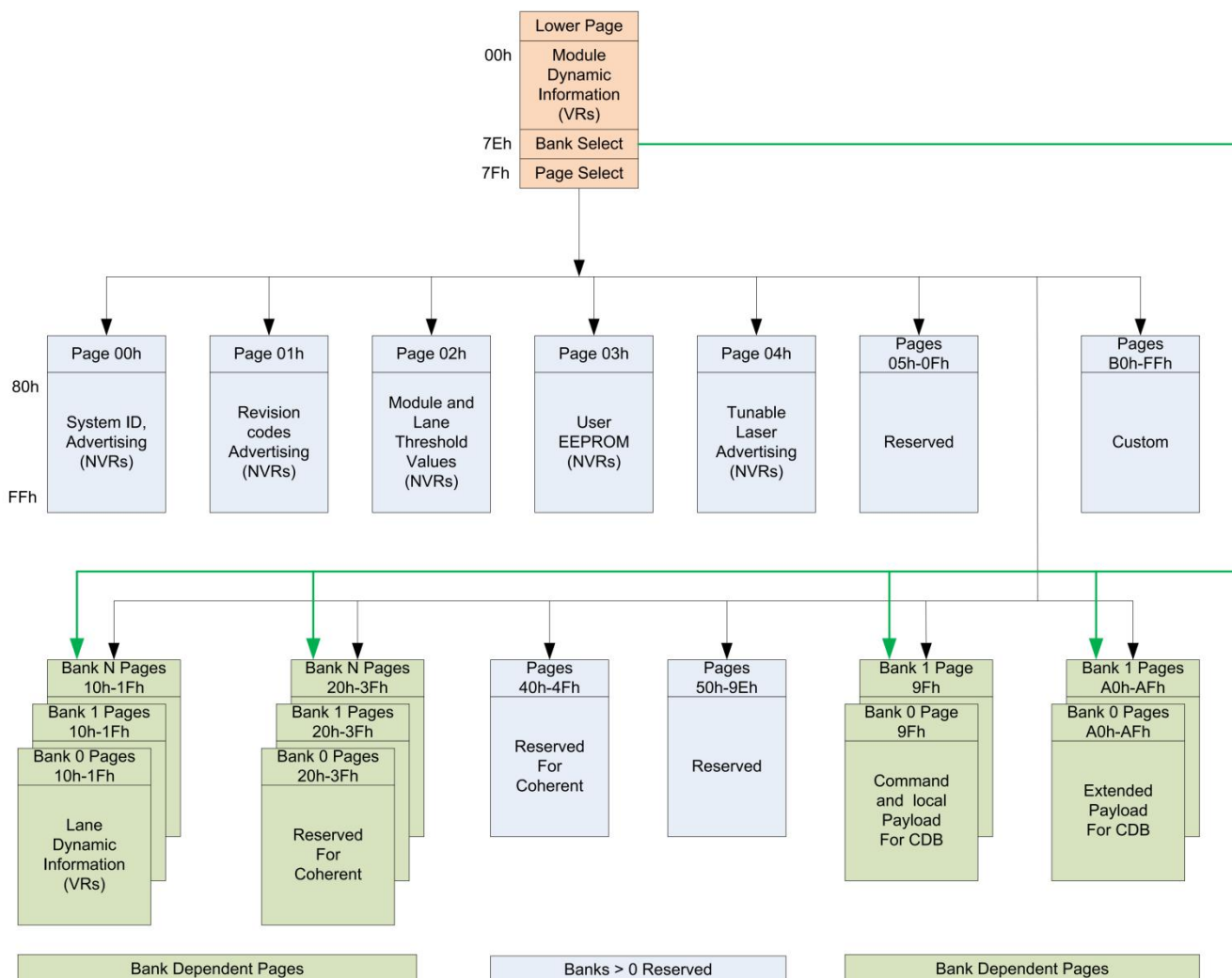


Figure5:Memory map

## Memory map Table

| Byte           | Unit | Name                | Description   |
|----------------|------|---------------------|---|
| Lower Page 00h |      |                     |   |
| 0              | 1    | Identifier          | Identifier - Type of Serial Module - See SFF-8024.  |
| 1              | 1    | Revision Compliance | Identifier – CMIS revision; the upper nibble is the whole number part and the lower nibble is the decimal part.<br>Example: 01h indicates version 0.1, 21h indicates version 2.1. |
| 2-3            | 2    | ID and Status Area  | Flat mem indication, CLEI present indicator, Maximum TWI speed,   |

|                |    |                                 |   |
|----------------|----|---------------------------------|---|
|                |    |                                 | Current state of Module, Current state of the Interrupt signal.                                   |
| 4-7            | 4  | Lane Flag Summary               | Flag summary of all lane flags on pages 10h-1Fh.  |
| 8-13           | 6  | Module-Level Flags              | All flags that are not lane or data path specific.  |
| 14-25          | 12 | Module-Level Monitors           | Monitors that are not lane or data path specific.   |
| 26-30          | 5  | Module Global Controls          | Controls applicable to the module as a whole  |
| 31-36          | 6  | Module-Level Flag Masks         | Masking bits for the Module-Level flags   |
| 37-38          | 2  | CDB Status Area                 | Status of most recent CDB command   |
| 39-40          | 2  | Module Firmware Version         | Module Firmware Version.  |
| 41-63          | 23 | Reserved Area                   | Reserved for future standardization   |
| 64-82          | 19 | Custom Area                     | Vendor or module type specific use  |
| 83-84          | 2  | Inactive Firmware Version       | Version Number of Inactive Firmware. Values of 00h indicates module supports only a single image. |
| 85-117         | 33 | Application Advertising         | Combinations of host and media interfaces that are supported by module data path(s)               |
| 118-125        | 8  | Password Entry and Change       | Password Entry and Change   |
| 126            | 1  | Bank Select Byte                | Bank address of currently visible Page  |
| 127            | 1  | Page Select Byte                | Page address of currently visible Page  |
| Upper Page 00h |    |                                 |   |
| 128            | 1  | Identifier                      | Identifier - Type of Serial Module - See SFF-8024.  |
| 129-144        | 16 | Vendor name                     | Vendor name (ASCII)   |
| 145-147        | 2  | Vendor OUI                      | Vendor IEEE company ID  |
| 148-163        | 16 | Vendor PN                       | Part number provided by vendor (ASCII)  |
| 164-165        | 8  | Vendor rev                      | Revision level for part number provided by vendor (ASCII)   |
| 166-181        | 10 | Vendor SN                       | Vendor Serial Number (ASCII)  |
| 182-183        | 2  | Date code year                  | ASCII code, two low order digits of year (00=2000)  |
| 184-185        | 2  | Date code month                 | ASCII code digits of month (01=Jan through 12=Dec)  |
| 186-187        | 2  | Date code day of month          | ASCII code day of month (01-31)   |
| 188-189        | 2  | Lot code                        | ASCII code, custom lot code, may be blank   |
| 190-199        | 10 | CLEI code                       | Common Language Equipment Identification code   |
| 200-201        | 2  | Module power characteristics    | Module power characteristics  |
| 202            | 1  | Cable assembly length           | Cable assembly length   |
| 203            | 1  | Media Connector Type            | Media Connector Type  |
| 204            | 1  | 5 GHz attenuation               | Passive copper cable attenuation at 5 GHz in 1 dB increments                                      |
| 205            | 1  | 7 GHz attenuation               | Passive copper cable attenuation at 7 GHz in 1 dB increments                                      |
| 206            | 1  | 12.9 GHz attenuation            | Passive copper cable attenuation at 12.9 GHz in 1 dB increments                                   |
| 207            | 1  | 25.8 GHz attenuation            | Passive copper cable attenuation at 25.8 GHz in 1 dB increments                                   |
| 208-209        | 2  | Reserved                        | Reserved  |
| 210-211        | 2  | Cable Assembly Lane Information | Cable Assembly Lane Information   |

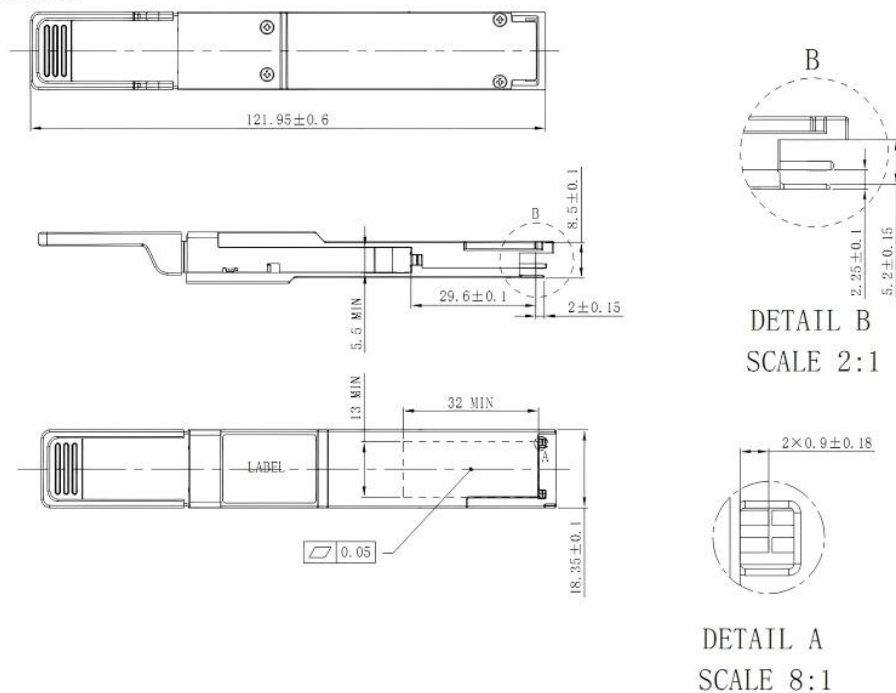
|                     |    |  |   |
|---------------------|----|--|---|
| 212                 | 1  | Media Interface Technology                         | Media Interface Technology  |
| 213-220             | 8  | Reserved   | Reserved  |
| 221                 | 1  | Custom   | Custom  |
| 222                 | 1  | Checksum   | Includes bytes 128-221  |
| 223-255             | 33 | Custom Info NV                                     | Custom Info NV  |
| Page 01h (Optional) |    |  |   |
| 128                 | 1  | Inactive Module firmware major revision            | Numeric representation of inactive module firmware major revision   |
| 129                 | 1  | Inactive Module firmware minor revision            | Inactive Module firmware minor revision   |
| 130                 | 1  | Module hardware major revision                     | Module hardware major revision  |
| 131                 | 1  | Module hardware minor revision                     | Module hardware minor revision  |
| 132                 | 1  | Length (SMF)                                       | Bits 7-6 Length multiplier (SMF), Bits 5-0 Base Length (SMF)  |
| 133                 | 1  | Length (OM5)                                       | Link length supported for OM5 fiber, units of 2 m (2 to 510 m)  |
| 134                 | 1  | Length (OM4)                                       | Link length supported for OM4 fiber, units of 2 m (2 to 510 m)  |
| 135                 | 1  | Length (OM3)                                       | Link length supported for EBW 50/125 $\mu$ m fiber (OM3), units of 2m (2 to 510 m)  |
| 136                 | 1  | Length (OM2)                                       | Link length supported for 50/125 $\mu$ m fiber (OM2), units of 1m (1 to 255 m)  |
| 137                 | 1  | Reserved   | Reserved  |
| 138-139             | 2  | Nominal Wavelength                                 | Nominal Wavelength  |
| 140-141             | 2  | Wavelength Tolerance                               | Wavelength Tolerance  |
| 142-144             | 3  | Implemented Memory Pages and Durations advertising | Implemented Memory Pages and Durations advertising  |
| 145-154             | 10 | Module Characteristics advertising                 | Module Characteristics advertising  |
| 155-156             | 2  | Implemented Controls advertising                   | Implemented Controls advertising  |
| 157-158             | 2  | Implemented Flags advertising                      | Implemented Flags advertising   |
| 159-160             | 2  | Implemented Monitors advertising                   | Implemented Monitors advertising  |
| 161-162             | 2  | Implemented Signal Integrity Controls advertising  | Implemented Signal Integrity Controls advertising   |
| 163-166             | 4  | CDB support advertising                            | CDB support advertising   |
| 167-168             | 2  | Additional Durations advertising                   | Additional Durations advertising  |
| 169-175             | 7  | Reserved   | Reserved  |
| 176-190             | 15 | Module Media Lane advertising                      | Coded 1 if the Application is allowed to begin on a given media lane. Bits 0-7 correspond to Host Lanes 1-8. In multi-lane Applications each instance of an Application shall use contiguous media lane numbers. If multiple instances of a single Application are allowed each starting point is identified. If multiple instances are advertised, |

|                     |    |  |   |
|---------------------|----|--|---|
|                     |    |  | all instance must be supported concurrently.  |
| 191-222             | 32 | Custom   | Custom  |
| 223-250             | 28 | Extended Module Host-Media Interface Advertising options | Extended Module Host-Media Interface Advertising options  |
| 251-254             | 4  | Reserved   | Reserved  |
| 255                 | 1  | Checksum   | Checksum  |
| Page 02h (Optional) |    |  |   |
| 128-129             | 2  | Temperature monitor high alarm                           | Thresholds for internally measured temperature monitor: signed 2's complement in 1/256 degree Celsius increments  |
| 130-131             | 2  | Temperature monitor low alarm                            |   |
| 132-133             | 2  | Temperature monitor high warning                         |   |
| 134-135             | 2  | Temperature monitor low warning                          |   |
| 136-137             | 2  | Supply 3.3-volt monitor high alarm                       | Thresholds for internally measured 3.3 volt input supply voltage: in 100 $\mu$ V increments   |
| 138-139             | 2  | Supply 3.3-volt monitor low alarm                        |   |
| 140-141             | 2  | Supply 3.3-volt monitor high warning                     |   |
| 142-143             | 2  | Supply 3.3-volt monitor low warning                      |   |
| 144-145             | 2  | Aux 1 monitor high alarm                                 | Thresholds for TEC Current or Reserved monitor TEC Current: signed 2's complement in 100/32767% increments of maximum TEC current<br>+32767 is max TEC current (100%) – Max Heating<br>-32767 is min TEC current (100%) – Max Cooling   |
| 146-147             | 2  | Aux 1 monitor low alarm                                  |   |
| 148-149             | 2  | Aux 1 monitor high warning                               |   |
| 150-151             | 2  | Aux 1 monitor low warning                                |   |
| 152-153             | 2  | Aux 2 monitor high alarm                                 | Thresholds for TEC Current or Laser Temperature monitor TEC Current: signed 2's complement in 100/32767% increments of maximum TEC current<br>+32767 is max TEC current (100%) – Max Heating<br>-32767 is min TEC current (100%) – Max Cooling<br>Laser Temperature: signed 2's complement in 1/256 degree Celsius increments |
| 154-155             | 2  | Aux 2 monitor low alarm                                  |   |
| 156-157             | 2  | Aux 2 monitor high warning                               |   |
| 158-159             | 2  | Aux 2 monitor low warning                                |   |
| 160-161             | 2  | Aux 3 monitor high alarm                                 | Thresholds for Laser Temperature or additional supply voltage monitor<br>Laser Temperature: signed 2's complement in 1/256 degree Celsius increments<br>NOTE: Laser Temp can be below 0 if uncooled or in Tx Disable.<br>Additional supply voltage monitor: in 100 $\mu$ V increments   |
| 162-163             | 2  | Aux 3 monitor low alarm                                  |   |
| 164-165             | 2  | Aux 3 monitor high warning                               |   |
| 166-167             | 2  | Aux 3 monitor low warning                                |   |
| 168-169             | 2  | Custom monitor high alarm                                | Custom monitor: signed or unsigned 16 bit value   |
| 170-171             | 2  | Custom monitor low alarm                                 |   |
| 172-173             | 2  | Custom monitor high warning                              |   |
| 174-175             | 2  | Custom monitor low warning                               |   |

|         |    |                               |   |
|---------|----|-------------------------------|---|
| 176-177 | 2  | Tx optical power high alarm   | Threshold for Tx optical power monitor: unsigned integer in 0.1 uW increments, yielding a total measurement range of 0 to 6.5535 mW (~-40 to +8.2 dBm) See section 8.8.3 for monitor details including accuracy |
| 178-179 | 2  | Tx optical power low alarm    |   |
| 180-181 | 2  | Tx optical power high warning |   |
| 182-183 | 2  | Tx optical power low warning  |   |
| 184-185 | 2  | Tx bias current high alarm    | Threshold for Tx bias monitor: unsigned integer in 2 uA increments, times the multiplier from Table 8-33. See section 8.8.3 for monitor details including accuracy  |
| 186-187 | 2  | Tx bias current low alarm     |   |
| 188-189 | 2  | Tx bias current high warning  |   |
| 190-191 | 2  | Tx bias current low warning   |   |
| 192-193 | 2  | Rx optical power high alarm   | Threshold for Rx optical power monitor: unsigned integer in 0.1 uW increments, yielding a total measurement range of 0 to 6.5535 mW (~-40 to +8.2 dBm) See section 8.8.3 for accuracy.                          |
| 194-195 | 2  | Rx bias current low alarm     |   |
| 196-197 | 2  | Rx bias current high warning  |   |
| 198-199 | 2  | Rx bias current low warning   |   |
| 200-229 | 30 | Reserved                      | Reserved  |
| 230-254 | 25 | Custom                        | Custom  |
| 255     | 1  | Checksum                      | Covers bytes 128-254  |

## Mechanical Dimension

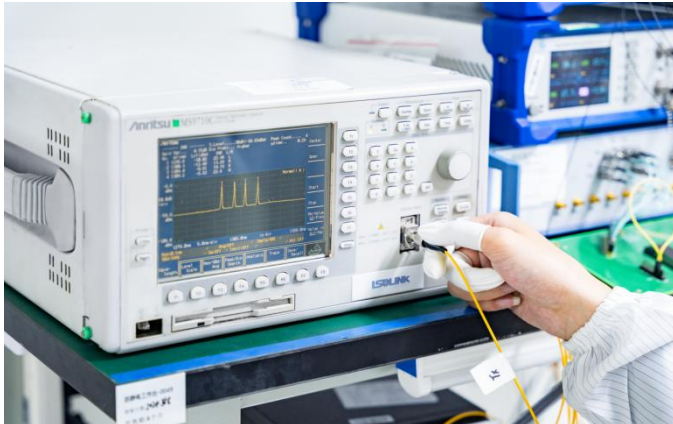
Unit mm



## Test Center

### 1. Performance Testing

Every fiber optic transceiver is thoroughly tested by the LSOLINK Assurance Program, which is equipped with the world's most advanced analytical equipment to ensure that our transceivers meet the industry's international public protocol standards while still functioning flawlessly in your facility.



#### Optical Spectrum Inspection

Using the industry's leading optical spectrum analyser to check in real time that the parameters of the optical transceiver's laser comply with industry standards.

- **Peak:** Peak wavelength and peak level
- **2nd Peak:** Side-mode wavelength and level
- **Mean Wl:** Center wavelength
- **Total Power:** Total power of spectrum
- **SMSR:** Side-Mode Suppression Ratio



#### Optical Signal Quality Inspection

Using highly efficient sampling oscilloscopes and BERT testers, equipped with an automated test platform to accurately test the signal quality of the transceiver, test records are kept for up to 5 years to ensure the traceability of each transceiver.

- **Eye Mask Margin(NRZ)**
- **TDECQ(PAM4):**transmitter dispersion eye closure
- **OMA:** Optical modulation amplitude
- **BER:** Bit error rate
- **ER:** Extinction Ratio



#### Flow Pressure Test

Using multi-protocol network traffic analyser with various brands of switches to test the transceiver's ability to transmit at full speed.

- **Bandwidth:** Actual transceiver bandwidth on the port
- **Packet Loss**
- **Packet Errors:**CRC Errors/PCS Errors/Symbol Errors
- **LinkDown Counts**
- **latency**

Above is part of our test bed network equipment. For more information, Please click [download](#) for optical transceiver performance test report.



## 2. Quality Control

We adopt advanced quality management solutions. Each transceiver is self-inspected, including: 20x microscope inspection, 200x microscope inspection, and QC process inspection.



**visual inspection**



**Microscopic inspection: 20X**



**Microscopic inspection: 200X**



**Reliability Verification**



**Optical endface inspection**



**OQC Inspection**

## Order Information

| Part Number   | Description   |
|---------------|---|
| 400G-Q112-VR4 | 400GBASE-VR4 QSFP112 PAM4 850nm 50m DOM MTP/MPO-12 APC MMF Optical Transceiver Module   |
| 400G-Q112-SR4 | 400GBASE-SR4 QSFP112 PAM4 850nm 100m DOM MTP/MPO-12 APC MMF Optical Transceiver Module  |
| 400G-Q112-DR4 | 400GBASE-DR4 QSFP112 PAM4 1310nm 500m DOM MTP/MPO-12 APC SMF Optical Transceiver Module |



## Further Information

 | Lighting the Path to Global Links

 **Web** | [www.lsolink.com](http://www.lsolink.com)

 **Email** | For [Sales@lsolink.com](mailto:Sales@lsolink.com)

## Disclaimer

1. We are committed to continuous product improvement and feature upgrades, and the contents contained in this manual are subject to change without notice.
2. Nothing herein should be construed as constituting an additional warranty.
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