**AP4X-MM85xxM**

 **QSFP40 40Gb/s to 4SFP+ Breakout Active Optical Cable**

**Features**

* Support 40GBASE-SR4
* Distance up to 100m
* Multi rate of up to 40Gbps
* QSFP+ interface compliant with SFF-8436
* SFP+ interface compliant with SFF-8431 and SFF- 8472
* Single power supply 3.3V
* Operating case temp 0°C to +70 °C
* RoHS compliant

**Applications**

* 40GBASE-SR4
* InfiniBand QDR. DDR, SDR
* Datacom and Telecom switch and router backplane

**Description**

Photonics Valley’s AP4X-MM85xxM is active optical cable assemblies with QSFP+ to 4 SFP+ hot pluggable connectors. Enjoys low power consumption. It is suitable for short distance and offer a cost-effective way to connect within racks and across adjacent racks. Its length is up to 100m over OM3.

**Ordering information**

|  |  |
| --- | --- |
| AP4X-MM8501M | 40GBase QSFP+ to 4 SFP+ Breakout Active Optical Cable 1 meter |
| AP4X-MM8502M | 40GBase QSFP+ to 4 SFP+ Breakout Active Optical Cable 2 meter |
| AP4X-MM8503M | 40GBase QSFP+ to 4 SFP+ Breakout Active Optical Cable 3 meter |
| AP4X-MM8505M | 40GBase QSFP+ to 4 SFP+ Breakout Active Optical Cable 5 meter |
| AP4X-MM8510M | 40GBase QSFP+ to 4 SFP+ Breakout Active Optical Cable 10 meter |
| AP4X-MM8520M | 40GBase QSFP+ to 4 SFP+ Breakout Active Optical Cable 20 meter |
| AP4X-MM8530M | 40GBase QSFP+ to 4 SFP+ Breakout Active Optical Cable 30 meter |

**Absolute Maximum Ratings**

The operation in excess of any absolute maximum ratings might cause permanent damage to this module.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Symbol** | **Min** | **Typical** | **Max** | **Unit** |
| Supply Voltage | Vcc | -0.5 | +3.3 | +3.6 | V |
| Storage Temperature | Ts | -10 | - | +70 | °C |
| Operating Humidity | RH | +5 | - | +85 | % |

**Recommended Operating Conditions**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Symbol | Min | Typical | Max | Unit |
| Operating Case Temperature | TC | 0 |  | +70 | ℃ |  |
| Supply Voltage | VCC | +3.14 | +3.3 | +3.47 | V |  |
| Supply current (QSFP+) | ICC |  |  | 450 | mA | 1 |
| Supply current (SFP+ per lane) | ICC |  |  | 150 | mA |  |
| Bit Rate Per lane | BR |  | 10.3125 |  | Gbps |  |

**Electrical and Optical characteristics**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Symbol | Min | Typical | Max | Unit |
| Transmitter |
| Centre Wavelength | λC | 830 | 850 |  870 | nm |
| RMS spectral width | Pm |  |  |  0.45 | nm |
| Average launch power, each lane | PAVG | -6.0 | - | +2.4 | dBm |
| Extinction Ratio | ER | 3.0 | - | - | dB |
| Input differential swing | Vin PP | 200 | - | 1600 | mV |
| Input differential impedance | Zin | 90 | 100 | 110 | ohm |
| Receiver |
| Centre Wavelength | λC | 830 | 850 | 870 | nm |
| Bit Error Rate | BER |  |  | E-12 |  |
| Differential Data Output Swing | Vout PP | 400 |  | 1000 | mV |
| Output Differential Impedance | Zout | 90 | 100 | 110 | ohm |

**Notes:** All parameters are specified under the recommended operating conditions with PRBS2^31-1@10.3125Gbps data pattern unless otherwise specified.

**QSFP+ PIN Description**



**Pin Function Definition**

|  |  |  |  |
| --- | --- | --- | --- |
| **Pin** | **Symbol** | **Name/Description** | **Notes** |
| 1 | GND | Ground | 1 |
| 2 | Tx2n | Transmitter Inverted Data Input |  |
| 3 | Tx2p | Transmitter Non-Inverted Data Input |  |
| 4 | GND | Ground | 1 |
| 5 | Tx4n | Transmitter Inverted Data Input |  |
| 6 | Tx4p | Transmitter Non-Inverted Data Input |  |
| 7 | GND | Ground | 1 |
| 8 | ModSelL | Module Select |  |
| 9 | ResetL | Module Reset |  |
| 10 | Vcc Rx | +3.3V Power Supply Receiver |  |
| 11 | SCL | 2-wire serial interface clock |  |
| 12 | SDA | 2-wire serial interface data |  |
| 13 | GND | Ground | 1 |
| 14 | Rx3p | Receiver Non-Inverted Data Output |  |
| 15 | Rx3n | Receiver Inverted Data Output |  |
| 16 | GND | Ground | 1 |
| 17 | Rx1p | Receiver Non-Inverted Data Output |  |
| 18 | Rx1n | Receiver Inverted Data Output |  |
| 19 | GND | Ground | 1 |
| 20 | GND | Ground | 1 |
| 21 | Rx2n | Receiver Inverted Data Output |  |
| 22 | Rx2p | Receiver Non-Inverted Data Output |  |
| 23 | GND | Ground | 1 |
| 24 | Rx4n | Receiver Inverted Data Output |  |
| 25 | Rx4p | Receiver Non-Inverted Data Output |  |
| 26 | GND | Ground | 1 |
| 27 | ModPrsL | Module Present |  |
| 28 | IntL | Interrupt |  |
| 29 | Vcc Tx | +3.3V Power supply transmitter |  |
| 30 | Vcc1 | +3.3V Power supply |  |
| 31 | LPMode | Low Power Mode |  |
| 32 | GND | Ground | 1 |
| 33 | Tx3p | Transmitter Non-Inverted Data Input |  |
| 34 | Tx3n | Transmitter Inverted Data Input |  |
| 35 | GND | Ground | 1 |
| 36 | Tx1p | Transmitter Non-Inverted Data Input |  |
| 37 | Tx1n | Transmitter Inverted Data Input |  |
| 38 | GND | Ground | 1 |

**Notes:** All Circuit ground is internally isolated from chassis ground.

**SFP+ Pin Function Definition**

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|  |  |  |
| --- | --- | --- |
| **Pin** | **Symbol** | **Description** |
| 1 | VEET | Module Transmitter Ground |
| 2 | TX\_FAULT | Module Transmitter Fault |
| 3 | TX\_DISABLE | Transmitter Disable; Turns off transmitter laser output |
| 4 | SDA | 2-Wire Serial Interface Data Line (MOD-DEF2) |
| 5 | SCL | 2-Wire Serial Interface Clock (MOD-DEF1) |
| 6 | MOD\_ABS | Module Absent, connected to VEET or VEER in the module |
| 7 | RS0 | Rate Select 0, optionally controls SFP+ module receiver |
| 8 | RX\_LOS | Receiver Loss of Signal Indication (In FC designated as RxLOS and in Ethernet designated as NOT Signal Detect) |
| 9 | RS1 | Rate Select 1, optionally controls SFP+ module transmitter |
| 10 | VEER | Module Receiver Ground |
| 11 | VEER | Module Receiver Ground |
| 12 | RD- | Receiver Inverted Data Output |
| 13 | RD+ | Receiver Non-Inverted Data Output |
| 14 | VEER | Module Receiver Ground |
| 15 | VCCR | Module Receiver 3.3 V Supply |
| 16 | VCCT | Module Transmitter 3.3 V Supply |
|  17 | VEET | Module Transmitter Ground |
| 18 | TD+ | Transmitter Non-Inverted Data Input |
| 19 | TD- | Transmitter Inverted Data Input |
| 20 | VEET | Module Transmitter Ground |

**Mechanical Design**



**Cable Length & Tolerance**

|  |  |
| --- | --- |
| **Cable Length/ m** | **Tolerance /cm** |
| ＜1.0 | +10/-0 |
| 1.0≤L≤4.5 | +15/-0 |
| 4.5＜L≤14.5 | +30/-0 |
| ＞14.5 | +2 L/-0 |

**Regulatory Compliance**

|  |  |  |
| --- | --- | --- |
| **Feature**  | **Reference**  | **Performance**  |
| Electrostatic discharge（ESD）  | IEC/EN 61000-4-2  | Compatible with standards  |
| Electromagnetic Interference (EMI)  | FCC Part 15 Class B EN 55022 Class B (CISPR 22A)  | Compatible with standards  |
| Laser Eye Safety  | FDA 21CFR 1040.10, 1040.11 IEC/EN 60825-1, 2  | Class 1 laser product  |
| Component Recognition  | IEC/EN 60950, UL  | Compatible with standards  |
| ROHS  | 2002/95/EC  | Compatible with standards  |
| EMC  | EN61000-3  | Compatible with standards  |

**Appendix A. Document Revision**

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| --- | --- | --- |
| **Version No.**  | **Date**  | **Description**  |
| 1.0  | 2019-3-1  | Preliminary datasheet  |