QSFP-DD 400G SR4.2 MPO, CMIS5.1

QSFP-DD SR4.2 400G Ethernet, PAM4 CMIS5.1, 4x 100G-SR1.2 100m 2.1dB MPO

TQD022-MS2C-SO

The TQD022-MS2C-SO is a QSFP-DD form-factor transceivers for 400Gbps Ethernet applications. The intended use is intra-data center interconnect between switches, routers, storage equipment etc. for optical distances up to 100m over a MultiMode (MM) ribbon fiber cable.

The electrical interface consists of eight 53.125G signals (400GAUI-8) that are converted to eight BiDi PAM4-modulated channels/lanes to transport the Ethernet signal. The channels are transported as 8lanes of 100G SR1.2 signals with wavelengths of 850 and 908nm. The transceiver can also be used in 4x100GAUI-2 mode to enable 400G to 4x 100G break-out configurations together with the 100G SR1.2 transceiver TQ2016-MS2C-SO.

Digital diagnostics functions are available via an I2C interface, as specified by the QSFP-DD MSA. The optical interface to the transceiver is an MPO12 connector.

Forward Error Correction (FEC) is required to be implemented by the host in order to ensure reliable system operation. The FEC type shall be as defined in IEEE802.3bj, i.e. Reed Solomon RS(528,514). The optical parameters will provide a bit error ratio (BER) of 2.4 x 10-4.

The TQD022-MS2C-SO is compliant with Common Management Interface Specification CMIS5.1.

TECHNICAL DATA

Parameter	Value
Technology	Grey QSFP-DD
Transmission media	MM (MPO-12 UPC)
Typical reach	100m @ OM4
Nominal wavelength	850/908nm
Interface standards	100G SR4.2
Electrical interfaces	400GAUI-8 or 4x100GAUI-2
Bit rate support	425Gbps [1]
	26.56Gbd [2]
Protocol support	400GbE, 4x100GbE
Power budget	0 – 2.1dB
Power consumption	< 12W
Operating temperature	0°C to +70°C
Storage temperature	-40°C to +85°C

[1] Aggregated line rate 400GbE

[2] Line baud rate

[3] Average receive power, (min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance.

[4] Specified at BER $2.4x10^{-4}$

Parameter	Value
Transmitter data:	
Output power, per lane	Min: -6.5dBm [3]
	Max: +4.0dBm
Output power, OMA, per lane	Min: -4.5dBm
	Max: +3.0dBm
ER	Min: 3dB
Transmit wavelength	840 – 868nm, 900-918nm
Receiver data:	
Receiver sensitivity, OMA, per lane	-6.6dBm [4]
Minimum input power, per lane	-8.5dBm [3]
Overload (max power), per lane	+4.5dBm
Wavelength range	840 – 868nm, 900-918nm
LOS Assert	Min -24.6dBm
LOS De-assert	Max -8.6dBm
LOS Hysteresis	Min 0.5dB
DDM	Yes
MSA compliance	QSFP-DD MSA
	CMIS5.1

Safety/regulatory compliance:
TUV/UL/FDA (contact Smartoptics for latest certification information)
RoHS compliance

APPLICATION CODE LIST

CMIS Application Code	Host format	Electrical interface	Payload	FEC	MSA
1	8 x 50GBASE-R	8x 50GAUI-1 (8x 50G) [1]	400G	RS-FEC[1]	8x 50GBASE-SR
2	4 x 100GBASE-R	4x 100GAUI-2 (2x 50G) [2]	400G	RS-FEC[2]	4x 100G SR1.2
3	4x 100GBASE-R	4x 100GAUI-2 (2x 50G) [2]	400G	P-FEC[2]	4x 100G, with P-FEC
4	4x 100GBASE-R	4x 100GAUI-2 (2x 50G) [1]	400G	RS-FEC[1]	4x 100G SR1.2
5	1x 400GBASE-R	1x 400GAUI-8 (8x50G) [1]	400G	RS-FEC[1]	400G SR4.2

1) Transceiver will not add FEC. Host shall apply FEC

2) On-board FEC, host shall not provide FEC

ORDERING INFORMATION

Ordering number	Description
TQD022-MS2C-SO	QSFP-DD 400G-SR4.2 850/908nm C5.1 MPO

GENERAL DEFINITIONS

Parameter	Description
Technology	Grey; Transceiver type for non-WDM applications. Electrical or optical. CWDM; Transceiver type for CWDM applications using G.694.2 channel grid. DWDM; Transceiver type for DWDM applications using G.694.1 channel grid. BiDi; Transceiver pair using two different wavelength channels operating on a single-fiber. DAC: Direct Attach Cable. Electrical cable with attached connectors. AOC: Active Optical Cable. Optical cable with attached connectors.
Transmission Media	Type of fiber, e.g. Multimode (MM) or Singlemode (SM). Number of and connector type within brackets (e.g. 2x LC, 1x MPO).
Typical reach	Nominal distance performance based on typical fiber dispersion, fiber loss and power budget properties, i.e. w/o dispersion compensation and optical amplification. Actual distance is dependent on actual optical path loss and dispersion properties.
Bit rate range	Supported bit rate range in Gigabit or Megabit per second (Gbps or Mbps).
Protocols	Protocols within supported bit rate range.
Nominal wavelength	Typical wavelength(s) from transmitter.
Interface standards	Referenced interface standards or MSA's, e.g. IEEE 802.3 standard for 10GbE services or 100G 4WDM-10 etc.
Power budget	Min and max power budget between Transmitter and Receiver w/o optical path penalties.
Dispersion tolerance/penalty	Maximum amount of tolerated dispersion and required reduction of power budget to maintain stipulated Bit Error Rate (BER) and at a given bit rate.
Temperature range	Max operating case temperature range. Standard temperature range (C-temp): 0°C to +70°C (32°F to +158°F) Extended temperature range (E-temp): typically -20°C to +75°C (-4°F to +167°F) Industrial temperature range (I-temp): -40°C to +85°C (-40°F to +185°F)
Power consumption	Worst case power consumption. Will vary over temperature.
Transmitter Output power	Average output power. Provided in min and max values.
Receiver minimum input power	Minimum average input power at specified BER, normally $1E^{-12}$. Note that some protocols require FEC to achieve sufficient BER.
Receiver max input power	Maximum average input power giving a BER, normally $1E^{-12}$.
Optical modulation Amplitude, OMA	Optical Modulation Amplitude is a parameter that, in certain standards, specifies the output power and receiver sensitivity. To measure the OMA, a oscilloscope with a baud rate corresponding to the transceiver is required. Thus, this parameter cannot be measured using an ordinary optical power meter.
DDM	Digital Diagnostic Monitoring functionality as defined in e.g. SFF-8472 MSA.

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