QSFP112 400GBASE-DR4, CMIS5.2

QSFP112 400G-DR4 Ethernet, 4x100G-DR PAM4, 4x 1311nm, 500m, 3.6dB, MPO12

TQC002-S31C-SO

The TQC002-S31C-SO is a QSFP112 form-factor transceivers for 400Gbps Ethernet applications. The intended use is in data center interconnect between switches, routers, storage equipment etc. for optical distances up to 500m over a SingleMode (SM) ribbon fiber cable.

The electrical interface consists of eight 106.25G signals (400GAUI-4) that are converted to four PAM4-modulated channels/lanes to transport the Ethernet signal. The transceiver can also be set in 4x100GAUI-1 mode to enable 400G to 4x 100G break-out configurations. Digital diagnostics functions are available via an I^2C interface, as specified by the QSFP112 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(544,514). The optical parameters will provide a bit error ratio (BER) of $2.4E \times 10^{-4}$.

The TQC002-S31C-SO is compliant with Common Management Interface Specification CMIS5.2.

TECHNICAL DATA

Parameter	Value
Technology	Grey QSFP112
Transmission media	SM (1x MPO12)
Typical reach	500m
Nominal wavelengths	4x 1311nm
Interface standards	400GBASE-DR4
Electrical interfaces	400GAUI-4 or 4x100GAUI-1
Bit rate support	425Gbps [1]
	53.125Gbd [2]
Protocol support	400GbE
Power budget	0 – 3.6dB
Power consumption	< 9W
Operating temperature	0°C to +70°C
Storage temperature	-40°C to +85°C

[1] Aggregated line rate 400GbE

[2] Line baud rate per lane

[3] Average power, per lane

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

Parameter	Value
Transmitter data:	
Output power, per lane	Min: -2.9dBm [3]
	Max: +4.0dBm [3]
Output power, OMA, per lane	Min: -0.8dBm [3]
	Max: +4.2dBm [3]
Transmit wavelength range	1304.5 – 1317.5nm
Receiver data:	
Receiver sensitivity, OMA, per lane	-4.4dBm
Minimum input power, per lane	-5.9dBm [3] [4]
Overload (max power), per lane	+4.0dBm [3] [4]
Receiver wavelength range	1304.5 – 1317.5nm
LOS Assert	Min: -11dBm
LOS De-assert	Max: -9.5dBm
LOS Hysteresis	Min 0.5dB
DDM	Yes
MSA compliance	QSFP112 MSA, CMIS5.2

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

APPLICATION CODE LIST

CMIS Application Code	Host format	Electrical interface	Host Electrical ID	Payload	FEC	MSA	Media ID
1	400GBASE-R	1x 400GAUI-4-L (4x 100G)	0x50	400G	RS-FEC	400GBASE-DR4	0x1C
2	2 x 200GBASE-R	2x 200GAUI-2 (2x 200G)	0x4E	400G	RS-FEC	-	0x00
3	4x 100GBASE-R	4x 100GAUI-1-L (1x 100G)	0x4C	100G	RS-FEC	100GBASE-DR	0x0F

ORDERING INFORMATION

Ordering number	Description
TQC002-S31C-SO	QSFP112 400G-DR4 Ethernet, 4x100G-DR PAM4 CMIS5.2, 4x 1311nm 500m 3.6dB MPO12

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 $1E^{-12}$.
DDM	Digital Diagnostic Monitoring functionality as defined in e.g. SFF-8472 MSA.