SO-QSFP-DD-4C-FR4-4

QSFP-DD 400G-FR4 Ethernet, PAM4 CMIS4.0, 1271nm/1291nm/1311nm/1331nm 2km LC

OVERVIEW

The SO-QSFP-DD-4C-FR4 is a QSFP-DD form-factor transceiver for 400Gbps Ethernet applications. It is intended for use in data center interconnect between switches, routers, storage equipment etc. for optical distances up to 2km over a SingleMode (SM) fiber cable.

The electrical interface consists of eight 53.125G signals (400GAUI-8) that are converted to eight PAM4-modulated channels/lanes to transport the Ethernet signal. The transceiver can also be set in 4x100GAUI-2 mode (application code 2) to enable 400G to 4x 100G break-out configurations. Digital diagnostics functions are available via an I^2C interface, as specified by the QSFP-DD MSA.

Forward Error Correction (FEC) is required to be implemented by the host 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 2.4×10^{-4}.

The optical interface to the transceiver is 2x LC connectors.

TECHNICAL DATA

Parameter	Value
Technology	Grey QSFP-DD
Transmission media	SM (2x LC)
Typical reach	2km
Nominal wavelengths	1271nm
	1291nm
	1311nm
	1331nm
Interface standards	400GBASE-FR4
Electrical interfaces	400GAUI-8 or 4x100GAUI-2
Bit rate support	425Gbps [1]
	53.125Gbd [2]
Protocol support	400GbE
Power budget	0 – 4.3dB
Power consumption	< 10W
Operating temperature	0°C to +70°C
Storage temperature	-40°C to +85°C

[1] Aggregated line rate 400GbE

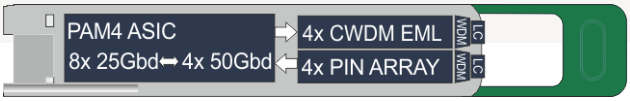
[2] Line baud rate per lane

[3] Average power, 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 2.4×10^{-4}

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

Parameter	Value
Transmitter data:	
Output power, per lane	Min: -3.3dBm [3]
	Max: +3.5dBm
Output power, OMA, per lane	Min: -0.3dBm
	Max: +3.7dBm
ER	Min: 3.5dB
Transmit wavelengths	1264.5 - 1277.5nm
	1284.5 - 1297.5nm
	1304.5 - 1317.5nm
	1324.5 - 1337.5nm
Receiver data:	
Receiver sensitivity, OMA, per lane	-4.6dBm [4]
Minimum input power, per lane	-7.3dBm [3]
Overload (max power), per lane	+3.5dBm [3] [4]
Receive Wavelengths	1264.5 - 1277.5nm
	1284.5 - 1297.5nm
	1304.5 - 1317.5nm
	1324.5 - 1337.5nm
LOS Assert	Min -15dBm
LOS De-assert	Max -9.5dBm
LOS Hysteresis	Min 0.5dB
DDM	Yes
MSA compliance	QSFP-DD MSA / CMIS4.0



Subject to change without notice.

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APPLICATION CODE LIST

CMIS Application Code	Host format	Electrical interface	Payload	FEC	MSA
1	400GBASE-R	1x 400GAUI-8 (8x 50G)	400G	RS-FEC	400GBASE-FR4 (Clause 151)
2	4 x 100GBASE-R	4x 100GAUI-2 (2x 50G)	400G	RS-FEC	100GBASE-FR1 (Clause 140)

ORDERING INFORMATION

Ordering number	Description
SO-QSFP-DD-4C-FR4-4	QSFP-DD 400G-FR4 Ethernet, 4×100G-FR, PAM4 CMIS4.0, 1271nm/1291nm/1311nm/1331nm 2km LC

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.

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