INDEPENDENT
DATA SOLUTIONS

smartoptics

DATASHEET 5.0

SO-QSFP28-ER4-OTU4

QSFP28, 100G Ethernet ER4, OTU4, SM 1296/1300/1305/1309nm, 40km, 18dB, LC

OVERVIEW

The SO-QSFP28-ER4 is a QSFP28 form-factor transceiver for 100Gbps Ethernet and OTN (OT4) applications. It is intended for use in inter- and intra-connect applications within and between data centers between switches, routers, storage equipment etc. The optical performance is in accordance with the 100G 4WDM-40 MSA standard, i.e. for optical distances up to 40km over a SingleMode (SM) fiber.

SO-QSFP28-ER4 uses four LANWDM channels/lanes @ 25.78Gbps and 27.95Gbps to transport an Ethernet and OTN signal respectively.

Forward Error Correction (FEC) is required in the host equipment in order to ensure reliable system operation at the specified distance. The FEC type shall be as defined in IEEE802.3bj, i.e. Reed Solomon RS(528,514). The below optical parameters will provide a bit error ratio (BER) of 5×10^{-5}. FEC will render in the required BER of better than 1×10^{-12}.

TECHNICAL DATA

Parameter	Value
Technology	Grey QSFP28
Transmission media	SM (2x LC)
Typical reach	40km
Nominal wavelength	Lane 1: 1295.56nm
	Lane 2: 1300.05nm
	Lane 3: 1304.58nm
	Lane 4: 1309.14nm
Interface standards	100G 4WDM-40
Bit rate support	103.12 / 111.81 Gbps [1]
	25.78 / 27.95 Gbps [2]
Protocol support	100GbE, OTU4
Power budget	10 – 18dB (100 GbE)
	10 – 19.5dB (100 GbE)
Optical path penalty	3dB (100GbE), 1.5dB (OTU4)
Power consumption	< 5W
Operating temperature	0°C to +70°C
Storage temperature	-40°C to +85°C

Parameter	Value
Transmitter data:	
Output power, total	Min: +12.5dBm [3] (100GbE)
	Max: +11.1dBm [3] (OTU4)
Output power, per lane 100GbE	Min: -0.3dBm [3]
	Max: +6.5dBm [3]
Output power, per lane OTU4	Min: 0.6dBm [3]
	Max: +5.1dBm [3]
Transmit wavelength	1294.53 – 1296.59nm
	1299.02 – 1301.02nm
	1303.54 – 1305.63nm
	1308.09 – 1310.19nm
Receiver data:	
Minimum input power, per lane	-18.3dBm [3] [4] (100GbE)
	-18.9dBm [3] [5] (OTU4)
Overload (max power), per lane	-3.5dBm [3] [4] (100GbE)
	-4.9dBm [3] [5] (OTU4)
Wavelength range	1294.53 – 1296.59nm
	1299.02 – 1301.09nm
	1303.54 – 1305.63nm
	1308.09 – 1310.19nm
LOS Assert, min	-32dBm
LOS De-assert, max	-22dBm
LOS Hysteresis	0.5
DDM	Yes
MSA compliance	QSFP28 MSA, SFF-8636,
	100G 4WDM-40

1) Aggregated line rate 100GbE/OTU4

2) Per lane

3) Average power

4) Specified at pre-FEC BER $5x10^{-5}$

5) Specified at pre-FEC BER $1x10^{-6}$

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

ORDERING INFORMATION

Ordering number	Description
SO-QSFP28-ER4-OTU4	QSFP28 100GE ER4 OTU4 1310nm SM 40km

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.
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): typically 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.