INDEPENDENT
DATA SOLUTIONS

smartoptics

DATASHEET 6.1

QSFP28 100G-LR4 SINGLE RATE, I-TEMP

QSFP28, 100GBASE-LR4, 1310nm, SM, DDM, 7.3dB, 10km, LC, I-temp

TQ2011-SL4I-SO

The TQ2011-SL4I-SO is a QSFP28 form-factor transceiver for 100 Gbps Ethernet (100GBASE-LR4) 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 100GBASE-LR standard, i.e. for optical distances up to 10km over a SingleMode (SM) fiber.

TQ2011-SL4I-SO uses four DFB lasers using LANWDM channels/lanes @ 25.78 Gbps to transport the Ethernet signal. Digital diagnostics functions are available via an I2C interface, as specified by the QSFP28 MSA.

TECHNICAL DATA

Parameter	Value
Technology	Grey QSFP28
Transmission media	SM (2x LC)
Typical reach	10km
Nominal wavelength	Lane 1: 1295.56nm
	Lane 2: 1300.05nm
	Lane 3: 1304.58nm
	Lane 4: 1309.14nm
Interface standards	100GBASE-LR4
Bit rate support	103.12Gbps [1]
	25.78Gbps [2]
Protocol support	100GbE
Power budget	0 – 7.3dB
Optical path penalty	2.2dB
Power consumption	< 5.0W
Operating temperature	-40°C to +85°C
Storage temperature	-40°C to +85°C

1) Aggregated line rate 100GbE

2) Per lane

3) Average power

4) Specified at BER 1x10^{-12}

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

Parameter	Value
Transmitter data:	
Output power, total	Max +10.5dBm [3]
Output power, per lane	Min: -4.3dBm [3]
	Max: +4.5dBm [3]
Ouput power, per lane, OMA	Min: -1.3dBm
	Max: +4.5dBm
Transmit wavelength	1294.53 – 1296.59nm
	1299.02 – 1301.09nm
	1303.54 – 1305.63nm
	1308.09 – 1310.19nm
Receiver data:	
Reciever sensitivity, OMA	-8.6dBm [4]
Minimum input power, per lane	-10.6dBm [3]
Overload (max power), per lane	+4.5dBm [3] [4]
Wavelength range	1294.53 – 1296.59nm
	1299.02 – 1301.09nm
	1303.54 – 1305.63nm
	1308.09 – 1310.19nm
LOS Assert	Min -25dBm
LOS De-assert	Max -12dBm
LOS Hysteresis	Min 0.5dB
DDM	Yes
MSA compliance	QSFP28 MSA, SFF-8636

ORDERING INFORMATION

Ordering number	Description
TQ2011-SL4I-SO	QSFP28 100GE-LR4 1310nm SM 10km I-temp

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.

GENERAL DEFINITIONS

Parameter	Description
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 as 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.