

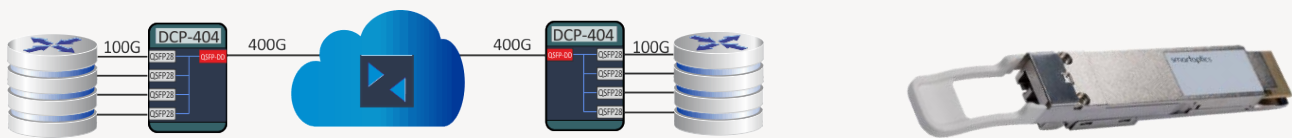
TQD027-S55C-SO

QSFP-DD, 400G Ethernet Coherent 193.7THz, 40km, CMIS 5.0.

OVERVIEW

The TQD027-S55C-SO is an QSFP-DD form-factor (type 2a) coherent transceiver intended for 400Gbps Ethernet applications over 40km without amplifiers. TQD027-S55C-SO is fixed to the frequency of 193.7THz.

The TQD027-S55C-SO is a flexible module with application codes that is compatible with asynchronous 100G/200G electrical streams 4x100GAUI-2 or 2x200GAUI-4 or the 400G electrical stream 400GAUI-8 stream. This makes the module compatible with a variety of hosts, including 400G Transponder and 4x100G or 2x200G Muxponder solutions to carry the optical 400G signal.



The below table lists the OIF 400ZR and OpenZR+ modes supported by TQD013-TUNC-SO.

CMIS Application Code	Host format	Electrical interface	Payload	FEC	Modulation	Line Symbol Baud Rate	MSA format
1	400GBASE-R	1x 400GAUI-8 (8x 50G)	400G	oFEC	DP-16QAM	60.1GBd	OpenZR+ MSA, extended
2	400GBASE-R	1x 400GAUI-8 (8x 50G)	400G	CFEC	DP-16QAM	59.8GBd	OIF 400ZR, app code 0x02
3	2 x 200GBASE-R	2x 200GAUI-4 (4x 50G)	400G	oFEC	DP-16QAM	60.1GBd	OpenZR+ MSA, extended
4	4 x 100GBASE-R	4x 100GAUI-2 (2x 50G)	400G	oFEC	DP-16QAM	60.1GBd	OpenZR+ MSA, extended

TQD013-TUNC-SO will automatically configure the above via the Application modes. For 400G applications, the TQD027-TUNC-SO asynchronously (GMP) maps an Ethernet signal from a switch/router to an intermediate 400ZR frame structure, then adapts the frame structure to the selected FEC engine. The encoded signal is subsequently DSP framed and modulated for transmission as a coherent Dual Polarity signal.

Note! CMIS application codes 1, 3 and 4 are not interoperable with the OpenZR+ MSA. These modes have been enhanced in to increase the optical performance on the Media side.

TECHNICAL DATA

The optical characteristics are into Generic and Application code sections. The *Generic* section defines the common characteristics, independent of the selected application modes. The *Application* code section defines application code based optical characteristics.

The performance is compliant with the respective specifications but can exceed the minimum requirements on some parameters.

GENERIC

Parameter	Value
Technology	DWDM QSFP-DD type 2a
Transmission media	SM (2x LC)
Nominal wavelength	193.7 THz
Interface standards	OIF 400ZR / OpenZR+ (extended)
Operating temperature	+15°C to +75°C ¹⁾
Storage temperature	-40°C to +85°C
DDM functions	Total received power
	Coherent channel power
	OSNR, eSNR, PDL, dispersion, DGD
	Case temperature

¹⁾ The module will turn up from cold start at ambient temperature as low as -5°C and will reach specifications after self-heating up to min temperature.

³⁾ The module transmit power can be provisioned up to the maximum available TX power. If the TX power is not provisioned by the host, the module TX power will default to the maximum available power, which can be any power level in the specified 10dB range.

⁴⁾ Set to comply with 400G modes. Can be changed on individual modules to fully support other modes.

Parameter	Value
MSA	QSFP-DD MSA's, CMIS5.0
Misc	Sync-E support, LLDP, MLG 2.0 & 3.0
Power consumption, EOL	20.0W @400G ²⁾
Tx Power	Min -9dBm ³⁾
	Max -4dBm ³⁾
Tx In-band OSNR	Min 34dB/0.1nm
Tx Out-Of-Band OSNR	Min 30dB/0.1nm
Rx_LOS Assert	-28.0dBm ⁴⁾
Receiver turn-up	Max 30ms from warm start
	Max 120s from cold start
Absolute max conditions	Rx signal input power: +13dBm
	Rx total input power: +15dBm

Safety/regulatory compliance:

TUV/UL/FDA (contact Smartoptics for latest certification information)

RoHS compliance

OPTICAL SPECIFICATION - APPLICATION CODES

The table below lists the primary optical parameters for each supported application code.

Appl mode	Line rate	Host format	Tx Power ¹⁾	Rx sensitivity	CDC range
1	400G	1x 400GAUI-8	-9 to -4dBm	-22dBm	2 400 ps/nm
2	400G	1x 400GAUI-8	-9 to -4dBm	-20dBm	2 400 ps/nm
3	400G	2x 200GAUI-4	-9 to -4dBm	-22dBm	2 400 ps/nm
4	400G	4x 100GAUI-2	-9 to -4dBm	-22dBm	2 400 ps/nm

1) The module transmit power can be provisioned up to the maximum available TX power. If the TX power is not provisioned by the host, the module TX power will default to the maximum available power, which can be any power level in the specified 10dB range.

ORDERING INFORMATION

Ordering code	Item Name
TQD027-TUNC-SO	QSFP-DD 400G-ER Coh 193.7THz SM 40km CMIS5.0

Latency:
 400G CFEC: 8us
 400G OFEC: 5us

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.
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.

Smartoptics makes no warranties or representations, expressed or implied, of any kind relative to the information or any portion thereof contained in this document or its adaptation or use, and assumes no responsibility or liability of any kind, including, but not limited to, indirect, special, consequential or incidental damages, for any errors or inaccuracies contained in the information or arising from the adaptation or use of the information or any portion thereof. The information in this document is subject to change without notice.