

# TD8005-TUNC-SO

QSFP-DD 800G OIF 800ZR High Tx-power Coh Tunable Flexgrid CMIS5.3 LC

## OVERVIEW

The TD8005-TUNC-SO is an QSFP-DD form-factor (type 2a) DWDM transceiver conforming to the OIF 800ZR MSA, Class A, for 800Gbps Ethernet applications. The transceiver also supports 400-600Gbps rates with different modulation formats, according to the OpenROADM MSA, resulting in an optimized OSNR performance for the application needs.

The transceiver provides a flexible solution for operators having routers that not yet have migrated to 800G services. The TD8005-TUNC-SO can as an example be used to combine up to 8x100G/4x200G/2x400G flows to a 800G signal to be transported over an optical network.



The below table lists the Host and NTKW modes supported by TD8005-TUNC-SO.

Host framing	Network Frame	Payload	Modulation	Line Symbol Baud Rate	Channel spacing	Media code <sup>1)</sup>	MSA format	NTWK Mode description
1x 800GAUI-8 2x 400GAUI-4 4x 200GAUI-2 8x 100GAUI-1	800ZR	800G	DP-16QAM	118.2GBd	150GHz	0x6E	800ZR Power class A	OIF 800ZR
4x 200GAUI-2 8x 100GAUI-1	FlexO-6(e)	600G	PCS-118	118.7GBd	150GHz	0x6A	FLEXO-6e-DPO-16QAM / FOIC6e-DPO	OpenROADM 600G 118Gbd
4x 200GAUI-2 8x 100GAUI-1	FlexO-6(e)	600G	PCS-118	118.5GBd	150GHz	0xF2	600G-PCS-118 <sup>2)</sup>	600G PCS-118Gbd
1x 400GAUI-8 2x 400GAUI-4 2x 200GAUI-4 4x 200GAUI-2 4x 100GAUI-2 8x 100GAUI-1	FlexO-4(e)	400G	DP-QPSK	118.2GBd	150GHz	0x64	FLEXO-4e-DO-QPSK / FOIC4e.4-DO	OpenROADM 400G QPSK
1x 400GAUI-8 2x 400GAUI-4 2x 200GAUI-4 4x 200GAUI-2 4x 100GAUI-2 8x 100GAUI-1	OpenZR400	400G	DP-16QAM	60.1GBd	75GHz	0x36	ZR400-OFEC-16QAM-HB	OpenZR+ 400G 16QAM-HB

1) The media code is defined through the reference code tables listed in SFF-8024.  
 2) Non-MSA compliant code.

TD8005-TUNC-SO will automatically configure the above via the Host and NTKW modes. For 800G applications, the TD8005-TUNC-SO asynchronously (GMP) maps an Ethernet signal from a switch/router to an intermediate 800ZR/FlexO 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.

## 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 *NTWK/Media* 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-DD800 type 2a
Transmission media	SM (2x LC)
Nominal wavelengths	191.25 - 196.1THz (tunable) 6.25GHz Grid
Interface standards	400-800G 800ZR/OpenZR+/OpenROADM
Operating temperature	+15°C to +75°C <sup>1)</sup>
Storage temperature	-40°C to +85°C
DDM functions	Total received power
	Coherent channel power
	OSNR, eSNR, PDL, dispersion, DGD
	Case temperature

Parameter	Value
MSA	OSFP800 MSA's, CMIS5.3
Misc	Sync-E support, LLDP, RMON
Power consumption, EOL	See Section below.
Tx Power	Min -2dBm <sup>2)</sup>
Tx In-band OSNR	37dB
Tx Out-Of-Band OSNR	TDB
Receiver turn-up	Max 30ms from warm start
	Max 125s from cold start
Absolute max conditions	Rx signal input power: +1dBm
	Rx total input power: +15dBm

<sup>1)</sup> 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.

<sup>2)</sup> 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. The provisional Tx power range of the module is 10dB.

### Safety/regulatory compliance:

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

RoHS compliance

## OPTICAL SPECIFICATION – NTKW/MEDIA CODES

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

Media code	Line rate	Network frame	Modulation	Tx Power <sup>1</sup>	Rx sens @ OSNR > 36dB	Rx @ OSNR <sup>2</sup>	Rx OSNR @ ~1dB penalty <sup>2</sup>	Default CDC range [ps/nm]	Maximum CDC search range
0x6E	800G	800ZR	DP-16QAM	-2dBm	-18.5dBm	26.4dB@ -9dBm	27.4dB@ -13dBm	3 000	58 000
0x6A	600G	FlexO-6(e)	PCS-118	-2dBm	-23.5dBm	22.8dB@ -9dBm	23.8dB@ -14dBm	29 000	58 000
0xF2	600G	FlexO-6(e)	PCS-118	-2dBm	-23.5dBm	21.6dB@ -9dBm	22.6dB@ -14dBm	29 000	58 000
0x64	400G	FlexO-4(e)	DP-QPSK	-2dBm	-27.0dBm	17.9dB@ -12dBm	18.9dB@ -18dBm	58 000	58 000
0x36	400G	OpenZR400	DP-16QAM	-2dBm	-22.5dBm	23.1dB@ -12dBm	24.1dB@ -18dBm	23 000	175 000

- 1) Minimum Tx power without attenuation. The module Tx power can be attenuated with 10dB from 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.
- 2) Specified as [Min OSNR Value @ Min Rx power for the OSNR value].
- 3) maximum provisionable CD search range. Increasing the search range will increase the power consumption of the transceiver.

## ELECTICAL CHARACTERISTICS

The table below lists the worst case power consumption for each media code. The power consumption will also increase based on the host interface

Media code	Line rate	Network frame	Modulation	Worst case power consumption	If non-Muxponder mode <sup>1</sup>	Additional Max CD range <sup>2</sup>
0x6E	800G	800ZR	DP-16QAM	28.0W	TBD	TBD
0x6A	600G	FlexO-6(e)	PCS-118	28.0W	TBD	TBD
0xF2	600G	FlexO-6(e)	PCS-118	28.0W	TBD	TBD
0x64	400G	FlexO-4(e)	DP-QPSK	25.0W	TBD	TBD
0x36	400G	OpenZR400	DP-16QAM	22.5W	TBD	TBD

- 1) The power consumption figures are listed with the transceiver multiplexing the host streams. If the transceiver is running a 400GBASE-R stream, the transceiver shall remove the power consumption according to the numbers listed in the table..
- 2) The power consumption figures are listed with the default chromatic dispersion compensation range. For maximum dispersion compensation, the transceiver shall add the power consumption figures according to the numbers listed in the table.

## ORDERING INFORMATION

Ordering code	Item Name
TD8005-TUNC-SO	QSFP-DD800 800G OIF 800ZR HP CMIS5.3

## 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.

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