

# SO-SFP-10GE-ER-Dxxxx & Dxxxx-I

SFP+, 10G Multirate, DWDM 100GHz, DDM, 14dB, 40km, D919-D960 (42ch)

## OVERVIEW

The SO-SFP-10GE-ER-Dxxxx is a versatile DWDM transceiver supporting a wide range of traffic formats ranging from 600 Mbps to 11.3 Gbps. The transceiver is provided in 42 channel versions at the 100GHz DWDM grid as specified in the ITU-T 694.1 standard.

The distance performance is in accordance with the IEEE 802.3ae ER/EW-standard, providing a bridgeable distance of up to 40km (without dispersion compensation) for 10GbE-LAN (10GBASE-ER) and 10GbE-WAN (10GBASE-EW) services.

This transceiver provides digital diagnostic functions via a 2-wire serial interface as defined by the SFF-8472 specification. The transceiver is available in two temperature range options, one being the Industrial temperature range (I-temp): -40°C to 85°C (-40°F to 185°F).

The transceiver module is compliant to RoHS-6/6.

## TECHNICAL DATA

Parameter	Value
Technology	DWDM SFP+ 100GHz
Transmission media	SM (2x LC)
Typical reach	40km
Nominal wavelength	191.90 - 196.00THz (42ch)
Bit rate support	0.6Gbps to 11.3Gbps
Interface standards	10GBASE-ER, 10GBASE-EW
Protocol support	GbE, 10GbE-LAN, 10GbE-WAN
	OTU1, OTU2, OTU2e
	STM-64/OC192
	STM-16/OC48, STM-4/OC12
	1G, 2G, 4G, 8G, 10G FC
	CPRI Opt, 1, 2, 3, 4, 5, 6, 7, 7A, 8
	OBSAI 1x, 2x, 4x, 8x
Power budget	5 – 14dB
Dispersion penalty	Max 2dB
Dispersion tolerance	+800ps/nm
Power consumption	< 1.5W
Operating temperature	0°C to +70°C (-Dxxxx)
	-40°C to +85°C (-Dxxxx-I)
Storage temperature	-40°C to +85°C

### Safety/regulatory compliance:

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

RoHS compliance

Parameter	Value
<b>Transmitter data:</b>	
Output power	Min: -1.0dBm <sup>1)</sup>
	Max: +4.0dBm <sup>1)</sup>
Transmit wavelength	191.90 - 196.00THz (G.694.1)
<b>Receiver data:</b>	
Minimum input power	-15.0dBm <sup>1) 2)</sup>
Overload (max power)	-1.0dBm <sup>1) 2)</sup>
Wavelength range	1480nm – 1580nm
LOS assert	Min -29dBm
LOS de-assert	Max -17dBm
DDM	Yes
MSA compliance	SFF-8431, -8432, -8472

<sup>1)</sup> Average power.

<sup>2)</sup> @ 10.3Gbps, BER 1x10<sup>-12</sup>, PRBS 2<sup>31</sup>-1, back-to-back.

Note: IEEE 802.3ae 10GBASE-ER/EW is defined only at 1550nm. The standard is referred to from bridgeable distance perspective for the other wavelengths within the DWDM band.

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## ORDERING INFORMATION

Part number	Freq. THz	$\lambda$ nm	Part number	Freq. THz	$\lambda$ nm
SO-SFP-10GE-ER-D9210	191.90	1562.23	SO-SFP-10GE-ER-D9400	194.00	1545.32
SO-SFP-10GE-ER-D9220	192.00	1561.42	SO-SFP-10GE-ER-D9410	194.10	1544.53
SO-SFP-10GE-ER-D9210	192.10	1560.61	SO-SFP-10GE-ER-D9420	194.20	1543.73
SO-SFP-10GE-ER-D9220	192.20	1559.79	SO-SFP-10GE-ER-D9430	194.30	1542.94
SO-SFP-10GE-ER-D9230	192.30	1558.98	SO-SFP-10GE-ER-D9440	194.40	1542.14
SO-SFP-10GE-ER-D9240	192.40	1558.17	SO-SFP-10GE-ER-D9450	194.50	1541.35
SO-SFP-10GE-ER-D9250	192.50	1557.36	SO-SFP-10GE-ER-D9460	194.60	1540.56
SO-SFP-10GE-ER-D9260	192.60	1556.55	SO-SFP-10GE-ER-D9470	194.70	1539.77
SO-SFP-10GE-ER-D9270	192.70	1555.75	SO-SFP-10GE-ER-D9480	194.80	1538.98
SO-SFP-10GE-ER-D9280	192.80	1554.94	SO-SFP-10GE-ER-D9490	194.90	1538.19
SO-SFP-10GE-ER-D9290	192.90	1554.13	SO-SFP-10GE-ER-D9500	195.00	1537.40
SO-SFP-10GE-ER-D9300	193.00	1553.33	SO-SFP-10GE-ER-D9510	195.10	1536.61
SO-SFP-10GE-ER-D9310	193.10	1552.52	SO-SFP-10GE-ER-D9520	195.20	1535.82
SO-SFP-10GE-ER-D9320	193.20	1551.72	SO-SFP-10GE-ER-D9530	195.30	1535.04
SO-SFP-10GE-ER-D9330	193.30	1550.92	SO-SFP-10GE-ER-D9540	195.40	1534.25
SO-SFP-10GE-ER-D9340	193.40	1550.12	SO-SFP-10GE-ER-D9550	195.50	1533.47
SO-SFP-10GE-ER-D9350	193.50	1549.32	SO-SFP-10GE-ER-D9560	195.60	1532.68
SO-SFP-10GE-ER-D9360	193.60	1548.51	SO-SFP-10GE-ER-D9570	195.70	1531.90
SO-SFP-10GE-ER-D9370	193.70	1547.72	SO-SFP-10GE-ER-D9580	195.80	1531.12
SO-SFP-10GE-ER-D9380	193.80	1546.92	SO-SFP-10GE-ER-D9590	195.90	1530.33
SO-SFP-10GE-ER-D9390	193.90	1546.12	SO-SFP-10GE-ER-D9600	196.00	1529.55

The transceiver version supporting the extended temperature range -40°C to 85°C (-40°F to 185°F) has the suffix “-I” in the part number, e.g. SO-SFP-10GE-ER-D9210-I.

## 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 $1\text{E}^{-12}$ . Note that some protocols require FEC to achieve sufficient BER.
Receiver max input power	Maximum average input power giving a BER, normally $1\text{E}^{-12}$ .
DDM	Digital Diagnostic Monitoring functionality as defined in e.g. SFF-8472 MSA.

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