

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

SFP+, 10G Multirate, DWDM 100GHz, DDM, 14dB, 40km, D921-D960 (40ch)

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 40 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 | 192.10 - 196.00THz (40ch) |
| 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

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.

| Parameter | Value |
|--------------------------|--|
| Transmitter data: | |
| Output power | Min: -1.0dBm ¹⁾ Max: +4.0dBm ¹⁾ |
| Transmit wavelength | 192.10 - 196.00THz (G.694.1) |
| Receiver data: | |
| Minimum input power | -15.0dBm ^{1) 2)} |
| Overload (max power) | -1.0dBm ^{1) 2)} |
| Wavelength range | 1480nm – 1580nm |
| LOS assert | Min -29dBm |
| LOS de-assert | Max -17dBm |
| DDM | Yes |
| MSA compliance | SFF-8431, -8432, -8472 |

¹⁾ Average power.

²⁾ @ 10.3Gbps, BER 1x10⁻¹², PRBS 2³¹-1, back-to-back.

Subject to change without notice.

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ORDERING INFORMATION

| Part number | Freq. THz | λ nm | Part number | Freq. THz | λ nm |
|----------------------|-----------|--------------|----------------------|-----------|--------------|
| SO-SFP-10GE-ER-D9210 | 192.10 | 1560.61 | SO-SFP-10GE-ER-D9410 | 194.10 | 1544.53 |
| SO-SFP-10GE-ER-D9220 | 192.20 | 1559.79 | SO-SFP-10GE-ER-D9420 | 194.20 | 1543.73 |
| SO-SFP-10GE-ER-D9230 | 192.30 | 1558.98 | SO-SFP-10GE-ER-D9430 | 194.30 | 1542.94 |
| SO-SFP-10GE-ER-D9240 | 192.40 | 1558.17 | SO-SFP-10GE-ER-D9440 | 194.40 | 1542.14 |
| SO-SFP-10GE-ER-D9250 | 192.50 | 1557.36 | SO-SFP-10GE-ER-D9450 | 194.50 | 1541.35 |
| SO-SFP-10GE-ER-D9260 | 192.60 | 1556.55 | SO-SFP-10GE-ER-D9460 | 194.60 | 1540.56 |
| SO-SFP-10GE-ER-D9270 | 192.70 | 1555.75 | SO-SFP-10GE-ER-D9470 | 194.70 | 1539.77 |
| SO-SFP-10GE-ER-D9280 | 192.80 | 1554.94 | SO-SFP-10GE-ER-D9480 | 194.80 | 1538.98 |
| SO-SFP-10GE-ER-D9290 | 192.90 | 1554.13 | SO-SFP-10GE-ER-D9490 | 194.90 | 1538.19 |
| SO-SFP-10GE-ER-D9300 | 193.00 | 1553.33 | SO-SFP-10GE-ER-D9500 | 195.00 | 1537.40 |
| SO-SFP-10GE-ER-D9310 | 193.10 | 1552.52 | SO-SFP-10GE-ER-D9510 | 195.10 | 1536.61 |
| SO-SFP-10GE-ER-D9320 | 193.20 | 1551.72 | SO-SFP-10GE-ER-D9520 | 195.20 | 1535.82 |
| SO-SFP-10GE-ER-D9330 | 193.30 | 1550.92 | SO-SFP-10GE-ER-D9530 | 195.30 | 1535.04 |
| SO-SFP-10GE-ER-D9340 | 193.40 | 1550.12 | SO-SFP-10GE-ER-D9540 | 195.40 | 1534.25 |
| SO-SFP-10GE-ER-D9350 | 193.50 | 1549.32 | SO-SFP-10GE-ER-D9550 | 195.50 | 1533.47 |
| SO-SFP-10GE-ER-D9360 | 193.60 | 1548.51 | SO-SFP-10GE-ER-D9560 | 195.60 | 1532.68 |
| SO-SFP-10GE-ER-D9370 | 193.70 | 1547.72 | SO-SFP-10GE-ER-D9570 | 195.70 | 1531.90 |
| SO-SFP-10GE-ER-D9380 | 193.80 | 1546.92 | SO-SFP-10GE-ER-D9580 | 195.80 | 1531.12 |
| SO-SFP-10GE-ER-D9390 | 193.90 | 1546.12 | SO-SFP-10GE-ER-D9590 | 195.90 | 1530.33 |
| SO-SFP-10GE-ER-D9400 | 194.00 | 1545.32 | 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 $1E^{-12}$. 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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