

16G-ER-Dxxx-BR1

SFP+, 16/8/4 Gbps FC/FICON, DWDM 100GHz, DDM, 13dB, 40km, D200 - D600 (41ch)



OVERVIEW

The 16G-ER-Dxxx-BR1 is a versatile DWDM transceiver in SFP+ form-factor supporting a wide range of Fiber Channel (FC) services (4G to 16G). The transceiver has been layer-1 tested and approved by Brocade.

The transceiver is provided in 41 channel versions at the 100GHz DWDM grid as specified in the ITU-T 694.1 standard. The transceiver can also be used in 1550/1530nm CWDM applications by selecting wavelength versions that match these.

The optical performance provides a bridgeable distance of up to 40km (without dispersion compensation) for 16G FC. This transceiver provides digital diagnostic functions via a 2-wire serial interface as defined by the SFF-8472 specification.

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

TECHNICAL DATA

Parameter	Value
Technology	DWDM 100GHz SFP+
Transmission media	SM (2x LC)
Typical reach	40km
Nominal wavelengths	192.00 - 196.00THz (41ch)
Bit rate support	14.025Gbps 8.500Gbps 4.250Gbps
Protocol support	16G FC 8G FC 4G FC
Power budget	6 – 13dB @ 16G FC 6 – 14dB @ 8G/4G FC
Dispersion tolerance	800ps/nm ¹⁾
Dispersion penalty	Max 2dB
Power consumption	< 2.2W
Operating temperature	0°C to +70°C
Storage temperature	-40°C to +85°C

¹⁾ Average power

²⁾ @ BER < 1E-12 using PRBS 2³¹-1

Safety/regulatory compliance:

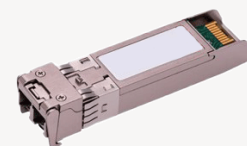
TUV/UL/FDA (contact Smartoptics for latest certification information)

RoHS compliance

For a 1550nm CWDM channel the DWDM channels D250 – D410 can be used.
For a 1530nm CWDM channel the DWDM channels D500 – D600 can be used.
(The ITU G.694.2 channel grid states 1551/1531nm ± 7nm)

For 1550nm single-channel applications, the ITU-T G.959 states 1500nm – 1565nm, which means any channel between D200 – D600.

Parameter	Value
Transmitter data:	
Output power	Min: 0.0dBm ¹⁾ Max: +4.0dBm ¹⁾
Transmit wavelengths	192.00 - 196.00THz 100GHz (ITU-T G.694.1)
Receiver data:	
Minimum input power 16G FC	-13.0dBm ^{1) 2)}
8G FC	-14.0dBm ^{1) 2)}
4G FC	-14.0dBm ^{1) 2)}
Overload (max power)	-2.0dBm ^{1) 2)}
Wavelength range	1480 - 1580nm
DDM	Yes
MSA compliance	SFF-8431, -8432, -8472



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ORDERING INFORMATION

Ordering number	Frequency THz	Wavelength nm	Ordering number	Frequency THz	Wavelength nm
16G-ER-D200-BR1	192.00	1561.42	16G-ER-D410-BR1	194.10	1544.53
16G-ER-D210-BR1	192.10	1560.61	16G-ER-D420-BR1	194.20	1543.73
16G-ER-D220-BR1	192.20	1559.79	16G-ER-D430-BR1	194.30	1542.94
16G-ER-D230-BR1	192.30	1558.98	16G-ER-D440-BR1	194.40	1542.14
16G-ER-D240-BR1	192.40	1558.17	16G-ER-D450-BR1	194.50	1541.35
16G-ER-D250-BR1	192.50	1557.36	16G-ER-D460-BR1	194.60	1540.56
16G-ER-D260-BR1	192.60	1556.55	16G-ER-D470-BR1	194.70	1539.77
16G-ER-D270-BR1	192.70	1555.75	16G-ER-D480-BR1	194.80	1538.98
16G-ER-D280-BR1	192.80	1554.94	16G-ER-D490-BR1	194.90	1538.19
16G-ER-D290-BR1	192.90	1554.13	16G-ER-D500-BR1	195.00	1537.40
16G-ER-D300-BR1	193.00	1553.33	16G-ER-D510-BR1	195.10	1536.61
16G-ER-D310-BR1	193.10	1552.52	16G-ER-D520-BR1	195.20	1535.82
16G-ER-D320-BR1	193.20	1551.72	16G-ER-D530-BR1	195.30	1535.04
16G-ER-D330-BR1	193.30	1550.92	16G-ER-D540-BR1	195.40	1534.25
16G-ER-D340-BR1	193.40	1550.12	16G-ER-D550-BR1	195.50	1533.47
16G-ER-D350-BR1	193.50	1549.32	16G-ER-D560-BR1	195.60	1532.68
16G-ER-D360-BR1	193.60	1548.51	16G-ER-D570-BR1	195.70	1531.90
16G-ER-D370-BR1	193.70	1547.72	16G-ER-D580-BR1	195.80	1531.12
16G-ER-D380-BR1	193.80	1546.92	16G-ER-D590-BR1	195.90	1530.33
16G-ER-D390-BR1	193.90	1546.12	16G-ER-D600-BR1	196.00	1529.55
16G-ER-D400-BR1	194.00	1545.32			

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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