16G-ER-DxxS-BR2

SFP+, 16/8G/4G FC, Secure Optics DWDM 100GHz grid, 192.00 - 196.00THz (41ch), 40km, 14dB, LC, D200-D600

BROCADE

OVERVIEW

The 16G-ER-DxxS-BR2 is a versatile DWDM transceiver in SFP+ form-factor supporting a wide range of Fiber Channel (FC) services (4G to 16G). The transceiver is provided in versions covering all C-band channels in the 100GHz DWDM grid as specified in the ITU-T G.694.1 standard. The transceiver is approved by Brocade and supports the authentication protocol required for the Gen7 system platforms.

The optical performance provides a bridgeable distance of up to 40km (without dispersion compensation) for 16GFC.
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
Bit rate support	14.025Gbps
	8.500Gbps
	4.250Gbps
Protocol support	16G FC
	8G FC
	4G FC
Power budget	4 – 14.0dB
Dispersion tolerance	800ps/nm [1]
Dispersion penalty	3.5dB
Power consumption	< 2.0W
Operating temperature	0°C to +70°C
Storage temperature	-40°C to +85°C

Parameter	Value
Transmitter data:	
Output power	Min: 0dBm [3]
	Max: +4.0dBm [3]
Transmit wavelengths	192.00 - 196.00THz
	100GHz (ITU-T G.694.1)
Receiver data:	
Minimum input power	-14.0dBm [2] [3]
Overload (max power)	0dBm [2] [3]
Wavelength range	1260 - 1565nm
LOS De-Assert	Max -16dBm
LOS Assert	Min -26dBm
DDM	Yes
MSA compliance	SFF-8431
	SFF-8432

[1] @ 14.025 Gbps (16G FC)

[2] @ BER < 1E-6 using PRBS 2^{31}-1

[3] Average power

Safety/regulatory compliance:
TUV/UL/FDA (contact Smartoptics for latest certification information)
RoHS compliance

ORDERING INFORMATION

Ordering number	Frequency THz	Wavelength nm	Ordering number	Frequency THz	Wavelength nm
16G-ER-D20S--BR2	192.00	1561.42	16G-ER-D41S--BR2	194.10	1544.53
16G-ER-D21S--BR2	192.10	1560.61	16G-ER-D42S--BR2	194.20	1543.73
16G-ER-D22S--BR2	192.20	1559.79	16G-ER-D43S--BR2	194.30	1542.94
16G-ER-D23S--BR2	192.30	1558.98	16G-ER-D44S--BR2	194.40	1542.14
16G-ER-D24S--BR2	192.40	1558.17	16G-ER-D45S--BR2	194.50	1541.35
16G-ER-D25S--BR2	192.50	1557.36	16G-ER-D46S--BR2	194.60	1540.56
16G-ER-D26S--BR2	192.60	1556.55	16G-ER-D47S--BR2	194.70	1539.77
16G-ER-D27S--BR2	192.70	1555.75	16G-ER-D48S--BR2	194.80	1538.98
16G-ER-D28S--BR2	192.80	1554.94	16G-ER-D49S--BR2	194.90	1538.19
16G-ER-D29S--BR2	192.90	1554.13	16G-ER-D50S--BR2	195.00	1537.40
16G-ER-D30S--BR2	193.00	1553.33	16G-ER-D51S--BR2	195.10	1536.61
16G-ER-D31S--BR2	193.10	1552.52	16G-ER-D52S--BR2	195.20	1535.82
16G-ER-D32S--BR2	193.20	1551.72	16G-ER-D53S--BR2	195.30	1535.04
16G-ER-D33S--BR2	193.30	1550.92	16G-ER-D54S--BR2	195.40	1534.25
16G-ER-D34S--BR2	193.40	1550.12	16G-ER-D55S--BR2	195.50	1533.47
16G-ER-D35S--BR2	193.50	1549.32	16G-ER-D56S--BR2	195.60	1532.68
16G-ER-D36S--BR2	193.60	1548.51	16G-ER-D57S--BR2	195.70	1531.90
16G-ER-D37S--BR2	193.70	1547.72	16G-ER-D58S--BR2	195.80	1531.12
16G-ER-D38S--BR2	193.80	1546.92	16G-ER-D59S--BR2	195.90	1530.33
16G-ER-D39S--BR2	193.90	1546.12	16G-ER-D60S--BR2	196.00	1529.55
16G-ER-D40S--BR2	194.00	1545.32			

LOOPBACK CONFIGURATION

Loopback can be configured on optical side (OWRAP) and electrical side (EWRAP), with and without forwarding. See definition in figure.
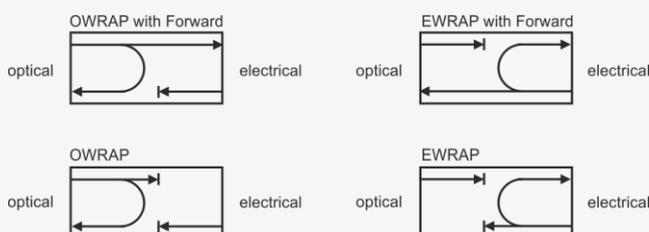
Loopback is set in A2H, BYTE 111.

OWRAP+F Bit 3	OWRAP Bit 2	EWRAP+F Bit 1	EWRAP Bit 0	Write	Read	Mode
0	0	0	0	0x00	0x00	Normal mode
0	0	0	1	0x01	0x01	EWRAP
0	0	1	0	0x02	0x03	EWRAP with Forward
0	1	0	0	0x04	0x04	OWRAP
1	0	0	0	0x08	0x0C	OWRAP with Forward

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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.