

SO-QSFP28-Dxx

QSFP28, 100GBASE, PAM4, DWDM, 100GHz, DDM, D9200-D9590 (40ch)

OVERVIEW

The SO-QSFP28-Dxx is a pluggable QSFP28 DWDM transceiver designed for high capacity 100 Gigabit Ethernet (100GbE) Data Center Interconnect (DCI) optical communication applications up to 80km¹⁾ over a singlemode fiber.

The transceiver utilizes two PAM4-modulated 56 Gbps wavelengths that are grouped within a 100GHz channel, enabling up to 40 channels over a 100GHz DWDM grid system as specified in the ITU-T 694.1 standard. Integrated, high-gain FEC (Forward Error Correction) and advanced ADC/DSP technology enable optical reaches up to 80km over an amplified DWDM line system.

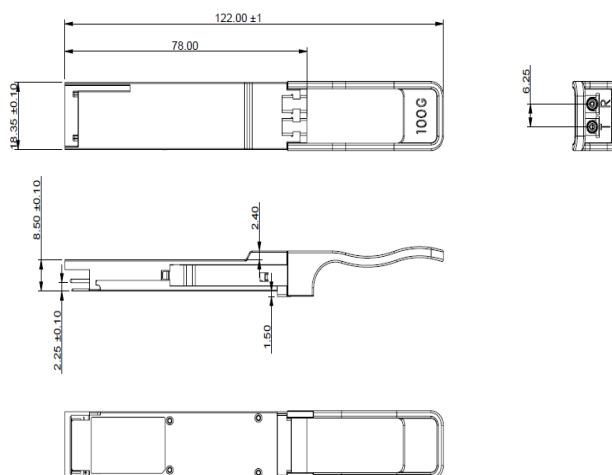
The electrical signals are transmitted and received from the host via a standard 38 pin connector described in the QSFP28 MSA (SFF-8679). The electrical interface is compliant to CAUI-4 (IEEE P802.3bm Annex 83E), splitting the 100Gbps signal in to four parallel 25 Gbps NRZ streams.

TECHNICAL DATA

Technology	DWDM 100GHz QSFP28
Transmission media	SM (2x LC)
Typical reach	80 km ¹⁾
Nominal wavelength	192.00 - 195.90 THz (40ch @ 100GHz)
Bit rate range	103.12 Gbps ²⁾
Protocols Eth:	100GbE
Dispersion tolerance	± 100 ps/nm ³⁾
Temperature range	20°C to +70°C ⁵⁾
Power consumption	< 5 W

Transmitter data	Output power, per lane	Min: -11 dBm Max: -8 dBm
	Tx wavelength (nm):	1530.33 – 1561.42 (G.694.1) ⁶⁾
Receiver data	Minimum input power:	-2 dBm ⁴⁾
	Overload (max power):	+6 dBm ⁴⁾
	Wavelength range (nm):	1529.55 – 1560.61
DDM		Yes
MSA compliance		SFF-8665 SFF-8636 SFF-8661 SFF-8679

- ¹⁾ requires a DWDM line system with amplification and dispersion management
- ²⁾ aggregated line rate 100GbE
- ³⁾ residual dispersion after dispersion compensation (DCM)
- ⁴⁾ per 56.25 Gbps lane
- ⁵⁾ case temperature
- ⁶⁾ Each transceiver uses two wavelengths within the grid, located +25GHz and -25GHz from the ITU-T center channel.



Safety	IEC 60825-1:2007 2nd edition GR-63-CORE (Issue 3, March 2006)
RoHS	RoHS 6

Storage temp.	-40°C to +85°C
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Note! See "Definitions" below.

Subject to change without notice.

For more information visit smaroptics.com.

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ORDERING INFORMATION

Part number	Freq. THz	λ nm	Part number	Freq. THz	λ nm
SO-QSFP28-D20	192.00	1561.42	SO-QSFP28-D40	194.00	1545.32
SO-QSFP28-D21	192.10	1560.61	SO-QSFP28-D41	194.10	1544.53
SO-QSFP28-D22	192.20	1559.79	SO-QSFP28-D42	194.20	1543.73
SO-QSFP28-D23	192.30	1558.98	SO-QSFP28-D43	194.30	1542.94
SO-QSFP28-D24	192.40	1558.17	SO-QSFP28-D44	194.40	1542.14
SO-QSFP28-D25	192.50	1557.36	SO-QSFP28-D45	194.50	1541.35
SO-QSFP28-D26	192.60	1556.55	SO-QSFP28-D46	194.60	1540.56
SO-QSFP28-D27	192.70	1555.75	SO-QSFP28-D47	194.70	1539.77
SO-QSFP28-D28	192.80	1554.94	SO-QSFP28-D48	194.80	1538.98
SO-QSFP28-D29	192.90	1554.13	SO-QSFP28-D49	194.90	1538.19
SO-QSFP28-D30	193.00	1553.33	SO-QSFP28-D50	195.00	1537.40
SO-QSFP28-D31	193.10	1552.52	SO-QSFP28-D51	195.10	1536.61
SO-QSFP28-D32	193.20	1551.72	SO-QSFP28-D52	195.20	1535.82
SO-QSFP28-D33	193.30	1550.92	SO-QSFP28-D53	195.30	1535.04
SO-QSFP28-D34	193.40	1550.12	SO-QSFP28-D54	195.40	1534.25
SO-QSFP28-D35	193.50	1549.32	SO-QSFP28-D55	195.50	1533.47
SO-QSFP28-D36	193.60	1548.51	SO-QSFP28-D56	195.60	1532.68
SO-QSFP28-D37	193.70	1547.72	SO-QSFP28-D57	195.70	1531.90
SO-QSFP28-D38	193.80	1546.92	SO-QSFP28-D58	195.80	1531.12
SO-QSFP28-D39	193.90	1546.12	SO-QSFP28-D59	195.90	1530.33

Note: The above represents the center channels of the ITU-T G.694.1 grid. Each transceiver uses two wavelengths within the grid, located +25GHz and -25GHz from the center channel.

DEFINITIONS

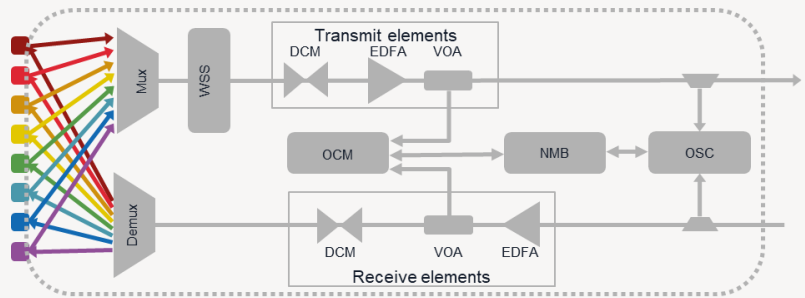
Technology:	Grey; Transceiver type for non-WDM applications. Electrical or optical. CWDM; Transceiver type for CWDM applications using G.694.2 channel grid. DWDM; Transceiver type for DWDM applications using G.694.1 channel grid. BiDi; Transceiver pair using two different wavelength channels operating on a single-fiber.
Transmission Media:	DAC: Direct Attach Cable (DAC). Electrical or optical cable with attached connectors. 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 dispersion and power budget properties, i.e. w/o dispersion compensation and optical amplification.
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 from transmitter.
Interface standards:	Referenced interface standards e.g. IEEE 802.3 standard for 10GbE services.
Power budget:	Min and max power budget between Transmitter and Receiver. Excluding any dispersion penalty.
Dispersion tolerance/penalty:	Maximum amount of tolerated dispersion and required reduction of power budget to maintain BER better than $1E^{-12}$. Defined at a specific bit rate.
Temperature range:	Max operating case temperature range. Standard temperature range: typically 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.
Transmitter Output power:	Average output power. Provided in min and max values.
Receiver minimum input power:	Minimum average input power at specified BER, normally $1E^{-12}$.
Receiver max input power:	Maximum average input power giving a BER, normally $1E^{-12}$.
DDM:	Digital Diagnostic Monitoring functionality as defined in SFF-8472 MSA.

APPLICATION: EMBEDDED 0-80KM 100G DWDM DCI: PAM4 AND OPEN LINE SYSTEM

The QSFP28 PAM4 transceiver utilizes advanced PAM4 signaling and delivers up to 4Tb/s of bandwidth over a single fiber, allowing multiple data centers located up to 80km of each other to be connected and act like a single data center. The transceiver can be used in data switches with QSFP28 transceiver interfaces. The result is 100G networking with the smallest footprint, lowest power consumption and lowest capex/opex. Perfect for web scale data centers and Internet Exchanges looking to keep costs, inventory and rack space down. The transceiver requires a line system with amplification and dispersion compensation and Smartoptics DCP-M is the perfect accompaniment, enabling true open-line embedded 100G networking.

DCP-M40, 1U TRUE OPEN LINE SYSTEM

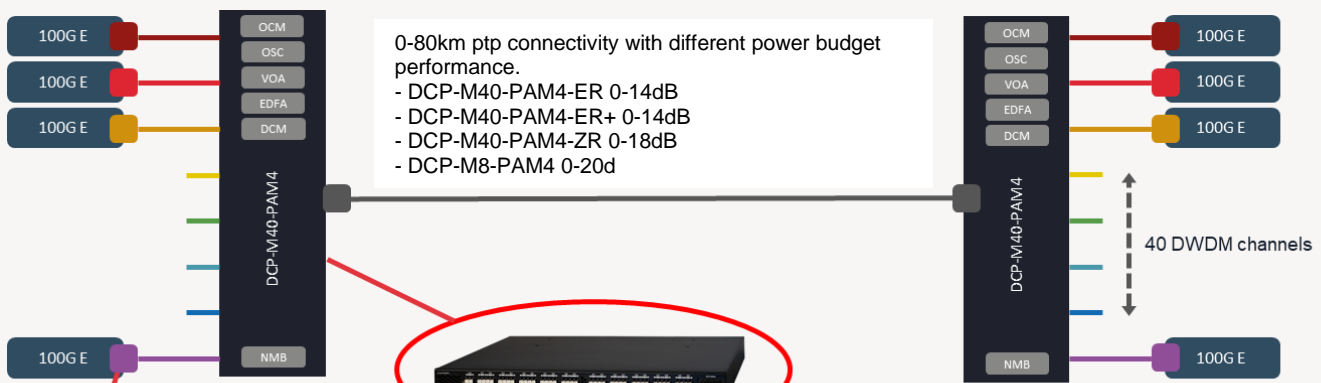
Form factor and appearance



Generic DCP-M40-xxxx schematic diagram

DCP-M AND PAM4 ADVANTAGES:

- The only 1U true plug and play PAM4 connectivity solutions on the market
- No transponders required; fewer transceivers and electrical points of failure. Reduced cost, complexity and time to service
- New 100G interconnects added in the same way as a DWDM transceiver is added to an embedded DWDM network
- Simple provisioning and management
- New high capacity DCs and services brought on line as integrated elements of a larger infrastructure
- Flexible expansion to new lower cost locations with no change in architecture
- Standardization for geographically distributed topologies
- Lower opex. No incremental software or support services needed
- No transport platform training or services are needed beyond basic CLI skills
- Removes the transport issue from all metro builds. Only access to fiber is needed



0-80km ptp connectivity with different power budget performance.
 - DCP-M40-PAM4-ER 0-14dB
 - DCP-M40-PAM4-ER+ 0-14dB
 - DCP-M40-PAM4-ZR 0-18dB
 - DCP-M8-PAM4 0-20d

40 DWDM channels



PAM4 QSFP28 DWDM transceiver embedded in a 100G router/switch or in a Smartoptics DCP-108 Transponder

DCP-M – True Open Line System
 • 40 channel DWDM Mux/Demux
 • Integrated amplification, Dispersion management, Optical Monitoring & Control
 • Any DWDM modulation format: PAM4, NRZ (16/10/8G), Coherent (QPSK/8QSM/16QAM)