

Datasheet

8 Gbps Multi-Mode SFP+ Transceiver

SFP-8GD-SX



Highlights

- SFP+ transceiver
- Data Rates: 2.125 to 8.5 Gbps
- Protocols:
 - 2/4/8 Gbps Fibre Channel
- Multi-mode fiber (MMF)
- Dual fiber, bi-directional
- 850 nm
- Up to 500 m range on 50/125 μm (OM3) MMF
- Duplex LC connector
- Digital Diagnostics (SFF-8472)
- Hot-swap

Overview

Small Form-Factor Pluggable (SFP) interfaces from MRV Communications provide flexible high speed links in a small industry standard package. They deliver the deployment options and inventory control that network administrators demand for growing networks.

SFPs are designed to Multi-Source Agreement (MSA) standards to ensure network equipment compatibility. They are a perfect addition to MRV’s extensive lines of networking equipment.

Visit the MRV website at www.mrv.com or contact your nearest authorized MRV Communications dealer for more information.

Specifications Overview

Data Rate	2.125 to 8.5 Gbps
Tx Wavelength	850 nm
Tx Power (Minimum)	-9 dBm
Tx Dispersion Penalty	4.2 dB
Tx Disable	Yes
Rx Wavelength	770 to 860 nm
Rx Sensitivity @ 8.5 Gbps (OMA)	-11.2 dBm
Rx Saturation	0 dBm
Operating Temperature Range	-5 to 70 °C
Power Consumption	1 Watt

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Optical Specifications					
Parameter	Symbol	Minimum	Maximum	Unit	Note
Transmitter					
Output Optical Power: 50 or 62.5 MMF	P_{OUT}	-9	-2	dBm	1
Optical Wavelength	λ	830	860	nm	-
Spectral Width	σ	-	0.65	nm	-
Optical Modulation Amplitude @ 2.125 Gbps	OMA	-7.1	-	dBm	2
Optical Modulation Amplitude @ 4.25 Gbps	OMA	-6.1	-	dBm	2
Optical Modulation Amplitude @ 8.5 Gbps	OMA	-5.2	-	dBm	2
Optical Rise/Fall Time @ 2.125, 4.25 Gbps	t_r, t_f	-	90	ps	3
Transmitter Waveform and Dispersion Penalty @ 8.5 Gbps	TWDP	-	4.2	dB	4
Relative Intensity Noise	RIN	-	-128	dB/Hz	-
Deterministic Jitter Contribution @ 2.125 Gbps	$TJ_{\Delta DJ}$	-	56.5	ps	-
Total Jitter Contribution @ 2.125 Gbps	$TJ_{\Delta TJ}$	-	119.6	ps	5
Deterministic Jitter Contribution @ 4.25 Gbps	$TJ_{\Delta DJ}$	-	28.2	ps	-
Total Jitter Contribution @ 4.25 Gbps	$TJ_{\Delta TJ}$	-	59.8	ps	5
Receiver					
Receiver OMA Sensitivity @ 2.125 Gbps	RX_{SENS}	-	-13.1	dBm	-
Receiver OMA Sensitivity @ 4.25 Gbps	RX_{SENS}	-	-12.1	dBm	-
Receiver OMA Sensitivity @ 8.5 Gbps	RX_{SENS}	-	-11.2	dBm	-
Maximum Average Receiver Power	RX_{MAX}	0	-	dBm	-
Optical Center Wavelength	λ_C	770	860	nm	-
Optical Return Loss	-	12	-	dB	-
LOS De-Assert	LOS_D	-	-18	dBm	-
LOS Assert	LOS_A	-30	-	dBm	-
LOS Hysteresis	-	0.5	-	dB	-

- Notes:**
- Class 1 Laser Safety per FDA/CDRH, and EN (IEC) 60825 laser safety standards.
 - Equivalent extinction ratio specification for Fibre Channel. Allows smaller ER at higher average power.
 - Unfiltered, 20-80%. Complies with FC 1x and 2x eye mask when filtered.
 - TWDP is calculated with a 1.0 equalizer and a 6,860 MHz Gaussian filter for the fiber simulation. Jitter values at λ_T and λ_R are controlled by TWDP and stress receiver sensitivity.
 - If measured with TJ-free data input signal. In actual application, output TJ will be given by: $TJ_{OUT} = DJ_{IN} + \Delta DJ + \sqrt{(TJ_{IN} - DJ_{IN})^2 + (\Delta TJ - \Delta DJ)^2}$

General Specifications					
Parameter	Symbol	Minimum	Maximum	Unit	Note
Data Rate	BR	2.125	8.5	Gbps	1
Bit Error Rate	BER	-	10^{-12}	-	2
Fiber Length on 62.5/125 μ m 160 MHz/km MMF	L	0	55	m	3
			30		4
			15		5
Fiber Length on 62.5/125 μ m 200 MHz/km (OM1) MMF	L	0	70	m	3
			40		4
			21		5
Fiber Length on 50/125 μ m 160 MHz/km MMF	L	0	300	m	3
			150		4
			50		5
Fiber Length on 50/125 μ m 2000 MHz/km (OM3) MMF	L	0	500	m	3
			380		4
			150		5

- Notes:**
- 2x and 4x Fibre Channel compatible, per "Fibre Channel Physical Interface-4 Specification (FC-PI-4 Rev. 7.00)". American National Standard for Information Systems, September 20, 2007.
 - PRBS 2⁷-1.
 - At 2.125 Gb/s Fibre Channel data rate.
 - At 4.25 Gb/s Fibre Channel data rate.
 - At 8.5 Gb/s Fibre Channel data rate.

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Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Unit	Note
Maximum Supply Voltage	V _{CC}	-0.5	4.0	V	-
Case Operating Temperature	T _A	-5	70	°C	-
Storage Temperature	T _S	-40	85	°C	-
Relative Humidity (Non-Condensing)	RH	0	85	%	-

Electrical Specifications

Parameter	Symbol	Minimum	Maximum	Unit	Note
Supply Voltage	V _{CC}	3.00	3.60	V	-
Supply Current	I _{CC}	-	240	mA	-
Transmitter					
Input Differential Impedance	R _{in}	80	120	Ω	1
Single Ended Data Input Swing	V _{in} , pp	90	800	mV	-
Transmit Disable Voltage	V _D	2	V _{CC}	V	2
Transmit Enable Voltage	V _{EN}	V _{EE}	V _{EE} + 0.8	V	-
Receiver					
Single Ended Data Output Swing	V _{out} , pp	170	400	mV	3
Data Output Rise/Fall Time @ 2.125/4.25 Gbps	t _r , t _f	-	120	ps	4
Data Output Rise/Fall Time @ 8.5 Gbps	t _r , t _f	-	60	ps	4
LOS Fault	V _{LOS fault}	2	V _{CC_HOST}	V	5
LOS Normal	V _{LOS norm}	V _{EE}	V _{EE} + 0.8	V	5
Power Supply Rejection	PSR	100	-	mVpp	6
Deterministic Jitter Contribution @ 2.125 Gbps	RX Δ DJ	-	47.1	ps	-
Total Jitter Contribution @ 2.125 Gbps	RX Δ TJ	-	123.5	ps	7
Deterministic Jitter Contribution @ 4.25 Gbps	RX Δ DJ	-	23.5	ps	-
Total Jitter Contribution @ 4.25 Gbps	RX Δ TJ	-	61.8	ps	8
Deterministic Jitter @ 8.5 Gbps	RX DJ	-	49.4	ps	8
Pulse Width Shrinkage @ 8.5 Gbps	RX DDPWS	-	42.4	ps	8
Total Jitter @ 8.5 Gbps	RX TJ	-	83.5	ps	8

Notes:

1. Connected directly to TX data input pins. AC coupling from pins into laser driver IC.
2. Or open circuit.
3. Into 100 ohms differential termination.
4. Unfiltered, 20 – 80 %
5. LOS is an open collector output. Should be pulled up with 4.7 k – 10 kohms on the host board. Normal operation is logic 0; loss of signal is logic 1. Maximum pull-up voltage is 5.5 V.
6. Receiver sensitivity is compliant with power supply sinusoidal modulation of 20 Hz to 1.5 MHz up to specified value applied through the recommended power supply filtering network.
7. If measured with TJ-free data input signal. In actual application, output TJ will be given by:

$$TJ_{OUT} = DJ_{IN} + \Delta DJ + \sqrt{(TJ_{IN} - DJ_{IN})^2 + (\Delta TJ - \Delta DJ)^2}$$

8. As defined in FC-PI-4, Rev 7.0, Table 13, 800-Mx-SN-y, "Fibre Channel Physical Interface-4 Specification (FC-PI-4 Rev. 7.00)". American National Standard for Information Systems, September 20, 2007.

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Pin Descriptions

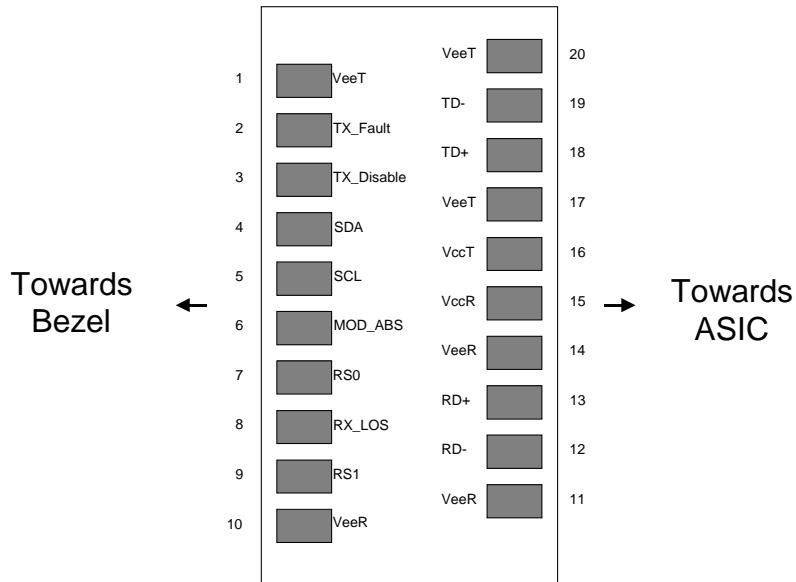
Pin	Function	Name/Description	Note
1	V _{EET}	Transmitter Ground (Common with Receiver Ground)	1
2	T _{FAULT}	Transmitter Fault.	2
3	T _{DIS}	Transmitter Disable. Laser Output Disabled on High or Open.	3
4	SDA	2-wire Serial Interface Data Line (MOD-DEF2)	4
5	SCA	2-wire Serial Interface Clock (MOD-DEF1)	4
6	MOD_ABS	Module Absent, connected to V _{EET} or V _{EER}	4
7	RS0	No connection required	-
8	LOS	Loss of Signal Indication. Logic 0 Indicates Normal Operation.	5
9	RS1	No connection required	-
10	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
11	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA Out. AC Coupled.	-
13	RD+	Receiver Non-Inverted DATA Out. AC Coupled.	-
14	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
15	V _{CCR}	Receiver Power Supply	-
16	V _{CCT}	Transmitter Power Supply	-
17	V _{EET}	Receiver Ground (Common with Transmitter Ground)	1
18	TD+	Transmitter Non-Inverted DATA In. AC Coupled.	-
19	TD-	Transmitter Inverted DATA In. AC Coupled.	-
20	V _{EET}	Receiver Ground (Common with Transmitter Ground)	1

Notes:

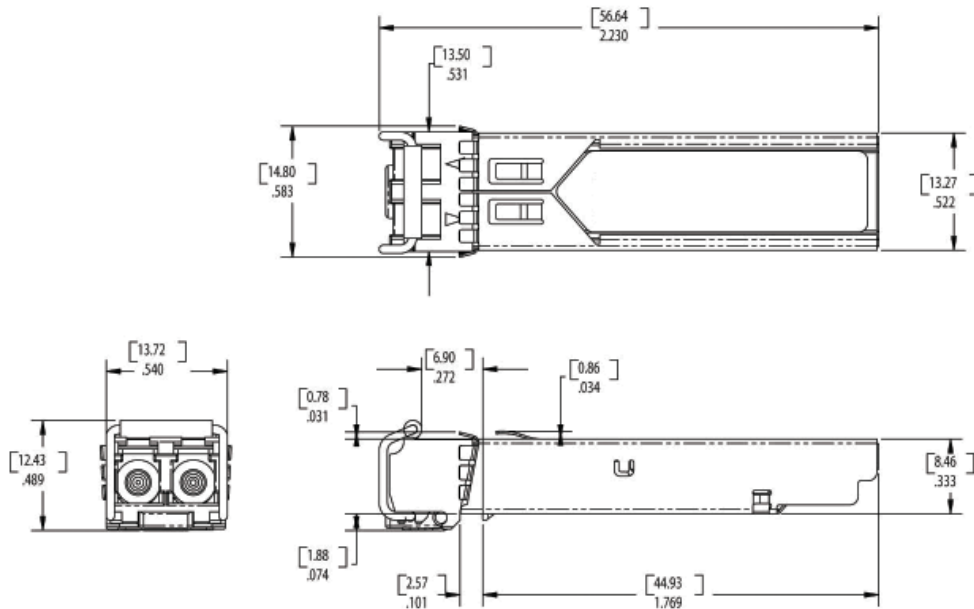
1. Circuit ground is internally isolated from chassis ground.
2. T_{FAULT} is an open collector/drain output, which should be pulled up with a 4.7 k – 10 kohms resistor on the host board if intended for use. Pull up voltage should be between 2.0 V to V_{CC} + 0.3 V. A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to < 0.8V.
3. Laser output disabled on T_{DIS} > 2.0 V or open, enabled on T_{DIS} < 0.8 V.
4. Should be pulled up with 4.7 k – 10 kohms on host board to a voltage between 2.0 V and 3.6 V. MOD_ABS pulls line low to indicate module is plugged in.
5. LOS is open collector output. Should be pulled up with 4.7 k – 10 kohms on host board to a voltage between 2.0 V and 3.6 V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

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Diagram of Host Board Connector Block Pin Numbers and Names



Mechanical Dimensions





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Ordering Information

Model	Description	Data Rate (Mbps)	Wavelength (nm)	Connector	Digital Diagnostics	Bail Latch Color	Max. Link Length (m)
SFP-8GD-SX	2.125/4.25/8.5 Gbps SFP+ Transceiver, MM	2125 - 8500	850	Duplex LC	Yes	Black	500 (50/125 µm OM3 MMF)

Regulatory and Industry Compliances

Class 1 Laser Product, complies with EN 60825-1 and 21 CFR 1040.10 except for deviations pursuant to Laser Notice No. 50. dated June 24, 2007
MSA SFF-8074i; Digital Diagnostic SFF-8472

Certified by one or more of the following agencies: TÜV, UL, CSA

RoHS Directive; China RoHS; California RoHS Law, REACH Directive SVHC; WEEE Directive

The Quality Management System is certified to ISO 9001 by QMI-SAI Global

The Environmental Management System is in compliance with ISO 14001

Warnings

Handling Precautions: This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

Laser Safety: Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

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