

## 2.7 Gbps Multi-Rate 120 km DWDM SFP Transceivers

SFP27DWLR12-xx



### Features

- SFP transceiver
- C-band (standard 100 GHz DWDM ITU grid)\*
- Data Rates: 100 Mbps to 2.7 Gbps
- Protocols:
  - Fast Ethernet
  - Gigabit Ethernet
  - 1 Gbps Fibre Channel
  - 2 Gbps Fibre Channel
  - Digital Video
  - OC-3/STM-1 to OC-48/STM-16 and OC-48 with FEC
- Single-mode fiber
- 1-channel DWDM Tx
- Full-band Rx
- 40 - 120 km
- Duplex LC connector
- Digital Diagnostics (SFF-8472)
- Hot-swap

\* L-band channels are available by request

### 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](http://www.mrv.com) or contact your nearest authorized MRV Communications dealer for more information.

### Specifications Overview

Data Rate	100 - 2700 Mbps
Tx Wavelength	1-channel C-Band DWDM Tx (channel 17 – 61)
Tx Power (Minimum)	0 dBm
Tx Dispersion Penalty	< 2 dB
Tx Dispersion Tolerance	2400 ps/nm
Tx Disable	Yes
Rx Wavelength Range	1528 - 1564 nm
Rx Sensitivity	-28 dBm
Rx Saturation	-6 dBm
Damage Threshold	4 dBm
Operating Temperature Range	-5 to 70 °C
Power Consumption	1 Watt

## Datasheet

### Optical Transmitter Specifications

Parameter	Symbol	Min	Max	Unit	Notes
Optical Power	$P_{OP}$	0	4	dBm	-
Average Launch Power (Tx: Off)	$P_{Off}$	-	-30	dBm	-
Extinction Ratio	ER	8.2	-	dB	-
Eye Mask	IEEE 802.3z, SONET/SDH compliant				-
Optical Jitter Generation	$J_{gen}(pk-pk)$	-	0.07	UI	-
Optical Rise Time	$t_r$	-	160	ps	1
Optical Fall Time	$t_f$	-	160	ps	1
Channel Spacing	$\Delta f$	100		GHz	-
Deviation From Central Frequency, EOL	-	-	$\pm 12$	GHz	-
Spectral Width (20 dB)	$\Delta \lambda$	-	0.3	nm	-
Side Mode Suppression Ratio	SMSR	30	-	dB	-
Dispersion Penalty at specified distance	dp	-	<2	dB	2
Relative Intensity Noise	RIN	-	-135	dB/Hz	-
Reflection Tolerance	rp	-24	-	dB	3

- Notes:**
1. 20%-80% values
  2. Measured at BER of  $10^{-12}$ , PRBS of  $2^{23}-1$ , at eye center, OC-48.
  3. 2 dB degradation of receiver sensitivity

### Optical Receiver Specifications

Parameter	Symbol	Min	Max	Unit	Notes
Receive Power	$R_{sens,low/high}$	-28	-6	dBm	1
Receive Power at Specified Distance and 20 dB OSNR	$R_{sens,OSNR}$	-	-24	dBm	1
Damage Threshold for Receiver	$P_{in,damage}$	4	-	dBm	-
Wavelength	$\lambda$	1528	1564	nm	-
Maximum Reflectance of Receiver	$RX_r$	-	-27	dB	-
LOS Assert	-	-40	-	dBm	-
LOS De-assert	-	-	-28	dBm	-
LOS Hysteresis	-	0.5	-	dB	-

- Notes:**
1. At  $10^{-12}$  BER, PRS  $2^{23}-1$ , OC-48

### Digital Diagnostics

Parameter	Range	Accuracy	Unit	Notes
Temperature	-40 to 102	$\pm 3$	$^{\circ}C$	-
Voltage	0 to $V_{CC}$	$\pm 0.1$	V	-
Bias Current	0 to 120	$\pm 5$	mA	-
TX Power	0 to 4	$\pm 3$	dBm	-
RX Power	-32 to -9	$\pm 3$	dBm	-
TEC Current	-1200 to 1200	$\pm 60$	mA	-
TEC Temperature	20 to 70	$\pm 0.25$	$^{\circ}C$	1

- Notes:**
1. Relative accuracy. Absolute accuracy is  $\pm 3^{\circ}C$

## Datasheet

### General Operating

Parameter	Symbol	Min.	Max.	Unit	Notes
Supply Voltage	$V_{CC}$	3.135	3.465	V	-
Total Current (BOL)	$I_{CC}$	-	375	mA	-
Power Supply Noise Rejection <sup>a</sup>	PSR	100	-	mV <sub>p-p</sub>	1
Operating Temperature (case)	$T_{op}$	-5	70	°C	-
Storage Temperature	$T_{st}$	-40	85	°C	-
Data Rate Multirate	MR	100	2700	Mbps	-

**Notes:** 1. 20 Hz to 155 MHz

### Electrical Transmitter Specifications

Parameter	Symbol	Min	Max	Unit	Notes
Input Differential Impedance	$R_{in}$	80	120	$\Omega$	-
PECL Single-Ended Data Input Swing	$V_{in,p-p}$	250	1200	mV	-
TxFault_Fault	$V_{fault}$	2	$V_{CC}$	V	-
TxFault_Normal	$V_{normal}$	$V_{EE}$	$V_{EE}+0.5$	V	-
TxDisable_Disable	$V_d$	2	$V_{CC}$	V	-
TxDisable_Enable	$V_{en}$	$V_{EE}$	$V_{EE}+0.8$	V	-

### Electrical Output

Parameter	Symbol	Min	Max	Unit	Notes
Single-Ended Data Output	$V_{out,p-p}$	185	800	mV	-
Data Output Rise Time	$t_r$	-	175	ps	-
Data Output Fall Time	$t_f$	-	175	ps	-

### Timing and Electrical

Parameter	Symbol	Min	Max	Unit	Notes
Tx Disable Negate Time	$t_{on}$	-	20	ms	-
Tx Disable Assert Time	$t_{off}$	-	20	ms	-
Time to Initialize, after Reset of Tx_Fault/INT in Normal Operation	$t_{init}$	-	300	ms	-
Start-up Time	$t_{startup}$	-	90	secs	-
Tx Fault/INT Assert Time	$t_{fault}$	-	50	ms	-
Tx Disable to Reset	$t_{reset}$	10	-	$\mu$ s	-
LOS Assert Time	$t_{loss\_on}$	-	100	$\mu$ s	-
LOS De-assert Time	$t_{loss\_off}$	-	100	$\mu$ s	-
Serial ID Clock Rate	$f_{serial\_clock}$	-	100	KHz	-
RX_LOS Voltage (High)	-	2	-	V	-
RX_LOS Voltage (Low)	-	-	0.8	V	-
LOS Output Voltage-Fault	$V_{LOS\ fault}$	2	$V_{CC}$	V	-
LOS Output Voltage-Normal	$V_{LOS\ normal}$	$V_{EE}$	$V_{EE}+0.55$	V	-
MOD_DEF (0:2)-High	$V_H$	2	$V_{CC}$	V	-
MOD_DEF (0:2)-Low	$V_L$	$V_{EE}$	$V_{EE}+0.5$	V	-

**Datasheet**

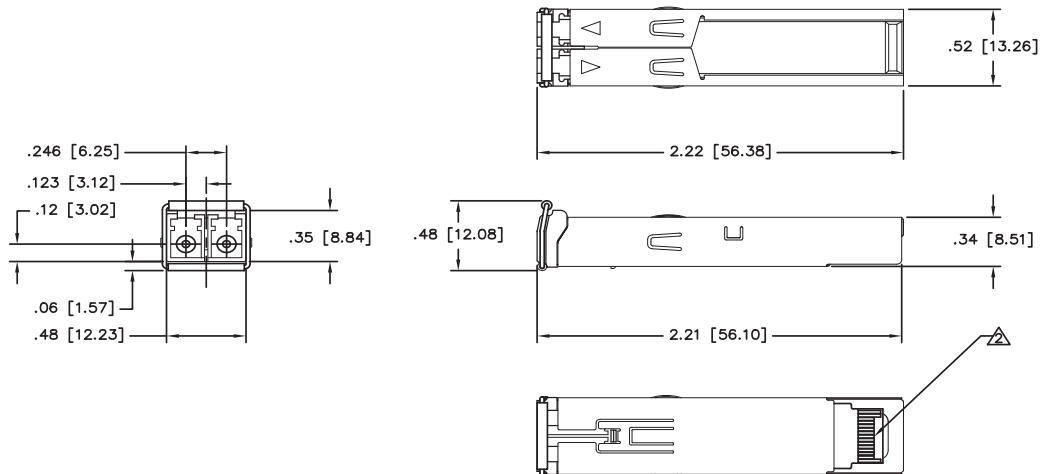
Pin	Function	Notes
1	V <sub>ee</sub> T	TX Ground
2	TX_FAULT/INT	Open Collector
3	TX_DISABLE	Internally Pulled High
4	MOD_DEF2	Serial Data Input
5	MOD_DEF1	Serial Clock Input
6	MOD_DEF0	Internally Grounded
7	NC	Not Connected
8	LOS	Open Collector
9	V <sub>ee</sub> R	RX Ground
10	V <sub>ee</sub> R	RX Ground
11	V <sub>ee</sub> R	RX Ground
12	RXD-	RX Data Negative
13	RXD+	RX Data Positive
14	V <sub>ee</sub> R	RX Ground
15	V <sub>cc</sub> R	RX Power
16	V <sub>cc</sub> T	TX Power
17	V <sub>ee</sub> T	TX Ground
18	TXD+	TX Data Positive
19	TXD-	TX Data Negative
20	V <sub>ee</sub> T	TX Ground

**DWDM Channel Guide (ITU C-Band)**

ITU Channel (xx)	Frequency (THz)	Wavelength (nm)	ITU Channel (xx)	Frequency (THz)	Wavelength (nm)
17	191.7	1563.86	40	194.0	1545.32
18	191.8	1563.05	41	194.1	1544.53
19	191.9	1562.23	42	194.2	1543.73
20	192.0	1561.42	43	194.3	1542.94
21	192.1	1560.61	44	194.4	1542.14
22	192.2	1559.79	45	194.5	1541.35
23	192.3	1558.98	46	194.6	1540.56
24	192.4	1558.17	47	194.7	1539.77
25	192.5	1557.36	48	194.8	1538.98
26	192.6	1556.55	49	194.9	1538.19
27	192.7	1555.75	50	195.0	1537.40
28	192.8	1554.94	51	195.1	1536.61
29	192.9	1554.13	52	195.2	1535.82
30	193.0	1553.33	53	195.3	1535.04
31	193.1	1552.52	54	195.4	1534.25
32	193.2	1551.72	55	195.5	1533.47
33	193.3	1550.92	56	195.6	1532.68
34	193.4	1550.12	57	195.7	1531.90
35	193.5	1549.32	58	195.8	1531.12
36	193.6	1548.51	59	195.9	1530.33
37	193.7	1547.72	60	196.0	1529.55
38	193.8	1546.92	61	196.1	1528.77
39	193.9	1546.12	-	-	-

## Datasheet

### Outline Drawing



### Ordering Information

Model	Description	Data Rate (Mbps)	Dispersion	Tx Channel	Link Range (km)
SFP27DWLR12-xx*	SFP Multirate DWDM Transceiver	100 - 2700	<2 dB (@ 2400 ps/nm)	xx*	40 - 120

\* See DWDM C-band ITU grid for "xx" channels, wavelengths, and frequencies. L-band wavelengths are available by special order.

### 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.

MRV has more than 50 offices throughout the world. Addresses, phone numbers and fax numbers are listed at [www.mrv.com](http://www.mrv.com). Please e-mail us at [info@mrv.com](mailto:info@mrv.com) or call us for assistance.

MRV Los Angeles  
 20415 Nordhoff Street  
 Chatsworth, CA 91311  
 800-338-5316  
 818-773-0900

MRV Boston  
 300 Apollo Drive  
 Chelmsford, MA 01824  
 800-338-5316  
 978-674-6800

MRV International  
 Business Park Moerfelden  
 Waldeckerstrasse 13  
 64546 Moerfelden-Walldorf  
 Germany  
 Tel. (49) 6105/2070  
 Fax (49) 6105/207-100

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