DWDM Multirate SFP Transceivers

SFP27DWLR



Overview

The DWDM Multirate SFP Transceivers from MRV provide flexible DWDM solutions in a compact package about six times smaller than the standard hot-plug MSA transceiver. Nearly any equipment with SFP ports can easily use CWDM wavelengths or the narrower DWDM channels with 100 Ghz spacing.

The traditional CWDM advantages include cost, simplicity, power consumption, and equipment density. The MRV DWDM multirate SFPs maximize scalability in both channel count and distance. C-band DWDM systems currently use 44 channels that can easily reach across metro networks with inexpensive erbium-doped fiber amplifiers (EDFA). These DWDM SFPs combine the best of all these features.

Features

- 100 GHz ITU DWDM grid
  - C-band standard
  - L-band by request
- 80 km, 120 km, and 200 km long reach
- DWDM SFP MSA compliance
- Cold start up wavelength compliance
- Low power dissipation (<1.3W maximum)
- -5º C to 70º C operating case temperature
- 100 Mbps to 2.7 Gbps multirate functionality
- SONET OC-48 /SDH STM-16 compliance
- Standard SFP cage interface
- Diagnostic performance monitoring of transmit power, receive power, laser bias, module temperature, laser temperature, APD bias voltage, and TEC current
- -28 dBm at OC-48 APD-based receiver sensitivity

General Operating

Parameter	Symbol	Min.	Typical	Max.	Unit
Supply Voltage	V_{cc}	3.135	3.3	3.465	V
Total Current (BOL)	I_{cc}	-	-	375	mA
Power Supply Noise Rejection[a]	PSR	100	-	-	mV_{p-p}
Operating Temperature (case)	T_{op}	-5	-	70	ºC
Storage Temperature	T_{st}	-40	-	85	ºC
Data Rate Multirate	MR	100	-	2700	Mbps

a) 20 Hz to 155 MHz

Transmitter Specifications (Optical)

Parameter	Symbol	Min	Typical	Max	Unit
Optical Power	P_{OP}	0	2	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	Jgen(pk-pk)	-	-	0.07	UI
Optical Rise Time[b]	t_r	-	-	160	ps
Optical Fall Time[b]	t_f	-		160	ps
Channel Spacing	Δf	-	100	-	GHz
Deviation From Central Frequency, EOL	-	-	-	±12	GHz
Spectral Width (20 dB)	Δλ	-	-	0.3	nm
Side Mode Suppression Ratio	SMSR	30	-	-	dB
Dispersion Penalty at spacified distance[c]	dp	-	-	<2	dB
Relative Intensity Noise	RIN	-	-	-135	dB/Hz
Reflection Tolerance[d]	rp	-24	-	-	dB

b) 20%-80% values
c) Measured at BER of 10^{-12}, PRBS of 2^{23}-1, at eye center, OC-48.
d) 2 dB degradation of receiver sensitivity

Transmitter Specifications (Electical)

Parameter	Symbol	Min	Typical	Max	Unit
Input Differential Impedence	R_{in}	80	100	120	Ω
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

Receiver Specifications

Parameter	Symbol	Min	Typical	Max	Unit
Receive Power Low[e]	$R_{sens,low}$	-	-30	-28	dBm
Receive Power at Specified Distance and 20 dB OSNR[e]	$R_{sens,OSNR}$	-	-	-24	dBm
Receive Power High	$R_{sens,high}$	-6	-	-	dBm
Damage Threshold for Receiver	$P_{in,damage}$	4	-	-	dBm
Wavelength	λ	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

e) at 10^{-12} BER, PRS 2^{23}-1, OC-48

Electrical Output

Parameter	Symbol	Min	Typical	Max	Unit
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	Typical	Max	Unit
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	-	-	µs
LOS Assert Time	t_loss_on	-	-	100	µs
LOS De-assert Time	t_loss_off	-	-	100	µs
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

Diagnostics

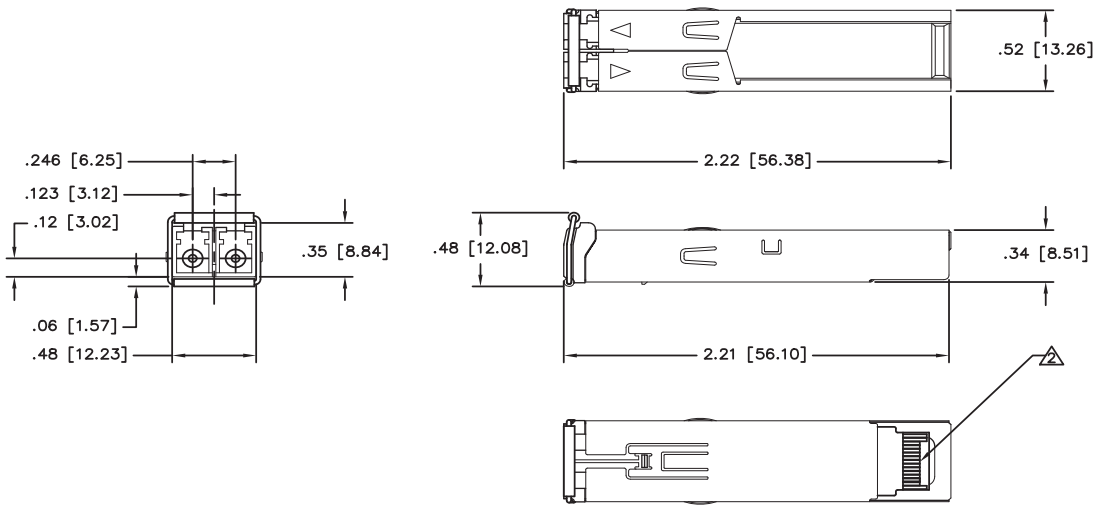
Parameter	Range	Accuracy	Unit
Temperature	-40 to 102	± 3	°C
Voltage	0 to V_{cc}	0.1	V
Bias Current	0 to 120	5	mA
TX Power	0 to 4	±2	dBm
RX Power	-32 to -9	±2	dBm
TEC Current	-1200 to 1200	±60	mA
TEC Temperature[f]	20 to 70	±0.25	°C

f) Relative accuracy. Absolute accuracy is +/-3°C

Datasheet

Pin	Function	Notes
1	$V_{ee}T$	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	$V_{ee}R$	RX Ground
10	$V_{ee}R$	RX Ground
11	$V_{ee}R$	RX Ground
12	RXD-	RX Data Negative
13	RXD+	RX Data Positive
14	$V_{ee}R$	RX Ground
15	V_{ccR}	RX Power
16	V_{ccT}	TX Power
17	$V_{ee}T$	TX Ground
18	TXD+	TX Data Positive
19	TXD-	TX Data Negative
20	$V_{ee}T$	TX Ground

Outline Drawing



Datasheet

Ordering Information

Model	Description	Data Rate (Mbps)	Dispersion Penalty(dB)	Bail Latch Color	Distance Range (km)
SFP27DWLR08-*xx**	SFP Multirate DWDM Transceiver	100 - 2700 Mbps	<2dB (@ 1600 ps/nm)	Black	40 - 80
SFP27DWLR12-*xx**	SFP Multirate DWDM Transceiver	100 - 2700 Mbps	<2dB (@ 2400 ps/nm)	Black	40 - 120
SFP27DWLR20-*xx**	SFP Multirate DWDM Transceiver	100 - 2700 Mbps	<2dB (@ 4000 ps/nm)	Black	40 - 200**

* See tables below for ITU channel "xx" values. L-band wavelengths are available by special order.
** EDFA is equired for full distance reach

C-Band Channel Guide

ITU Channel (*xx*)	Frequency (THz)	Wavelength (nm)	ITU Channel (*xx*)	Frequency (THz)	Wavelength (nm)
17	191.7	1563.863	**39**	193.9	1546.119
18	191.8	1563.047	**40**	194.0	1545.322
19	191.9	1562.233	**41**	194.1	1544.526
20	192.0	1561.419	**42**	194.2	1543.730
21	192.1	1560.606	**43**	194.3	1542.936
22	192.2	1559.794	**44**	194.4	1542.142
23	192.3	1558.983	**45**	194.5	1541.349
24	192.4	1558.173	**46**	194.6	1540.557
25	192.5	1557.363	**47**	194.7	1539.766
26	192.6	1556.555	**48**	194.8	1538.976
27	192.7	1555.747	**49**	194.9	1538.186
28	192.8	1554.940	**50**	195.0	1537.397
29	192.9	1554.134	**51**	195.1	1536.609
30	193.0	1553.329	**52**	195.2	1535.822
31	193.1	1552.524	**53**	195.3	1535.036
32	193.2	1551.721	**54**	195.4	1534.250
33	193.3	1550.918	**55**	195.5	1533.465
34	193.4	1550.116	**56**	195.6	1532.681
35	193.5	1549.315	**57**	195.7	1531.898
36	193.6	1548.515	**58**	195.8	1531.116
37	193.7	1547.715	**59**	195.9	1530.334
38	193.8	1546.917	**60**	196.0	1529.553

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