622 Mbps Single-Mode 48 km SFP Transceivers

SFP-O12D-LR1 and SFP-O12D-LR1TH

Features

- SFP transceiver
- Data Rates: 622 Mbps
- Protocols:
  - SDH STM-4
  - SONET OC-12
- Single-mode fiber
- 1310 nm
- 20 to 48 km
- Duplex LC connector
- Digital Diagnostics (SFF-8472)
- Hot-swap
- Industrial temperature models available
- Compliances (see last page for details)

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	622 Mbps
Tx Wavelength	1310 nm
Tx Power (Minimum)	-3 dBm
Dispersion Penalty	1 dB
Tx Disable	Yes
Rx Wavelength Range	1200 - 1625 nm
Rx Sensitivity	-28 dBm
Rx Saturation	-8 dBm
Rx Damage Threshold	0 dBm
Operating Temperature Range	0 to 70 ºC
Operating Temperature Range (TH Models)	-40 to 85 ºC
Power Consumption	1 Watt

Transmitter Specifications, Optical

Parameter	Symbol	Minimum	Maximum	Unit	Note
Optical Power	P_{OP}	-3	2	dBm	-
Average Launch Power Of Off Tx	P_{Off}	-	-30	dBm	-
Extinction Ratio	ER	8.2	-	dB	-
Eye Mask	-	SONET/SDH compliant			-
Optical Jitter Generation	Jgen	-	0.002	UI	-
Optical Rise Time	t_r	-	500	ps	1
Optical Fall Time	t_f	-	500	ps	1
Mean Wavelength	λ	1296	1330	nm	-
Spectral Width (RMS)	Δ λ	-	1.7	nm	-
Dispersion Penalty (at 40 Km)	-	-	1	dB	-
Relative Intensity Noise	RIN	-	-120	dB/Hz	

Notes: 1. 20%-80% values

Receiver Specifications, Optical

Parameter	Symbol	Minimum	Maximum	Unit	Note
Receive Power Low	$R_{sens,low}$	-	-28	dBm	1
Receive Power High	$R_{sens,high}$	-8	-	dBm	-
Damage Threshold for Receiver	$P_{in,damage}$	0	-	dBm	-
Wavelength	λ	1260	1360	nm	2
LOS Assert	LOS_A	-38	-	dBm	-
LOS De-Assert	LOS_D	-	-28	dBm	-
LOS Hysteresis	-	0.5	-	dB	-

Notes: 1. 10^{-12} at nominal wavelength
2. Operational over 1200 to 1625 nm range

Monitoring Specifications

Parameter	Range	Accuracy	Unit	Calibration	Formula
Temperature	-5 to 70 ºC	± 3	ºC	Internal	Tc(C)=Tad(16 bit signed twos complement)/256
Temperature (TH Models)	-40 to 85 ºC	± 3	ºC	Internal	Tc(C)=Tad(16 bit signed twos complement)/256
Voltage	0 to V_{CC}	± 0.1	V	Internal	V(Volts)=Vad(16 bit unsigned integer)*0.1
Bias Current	0 to 120	± 5	mA	External	I(mA)=Islope*Iad(16 bit unsigned integer)+Ioffset
Tx Power	-3 to 2	± 3	dBm	External	TX_PWR(µW)=TX_PWRslope*TX_PWRad (16 bit unsigned integer) +TX_PWRoffset
Rx Power	-28 to -8	± 3	dBm	External	RX_PWR(µW)=A0+A1*x+A2*x^2+A3*x^3+A4*x^4

General Operations

Parameter	Symbol	Minimum	Maximum	Unit	Note
Supply Voltage	V_{CC}	3.135	3.465	V	-
Total Current	I_{CC}	-	300	mA	-
Power Supply Noise Rejection	PSR	100	-	mV_{p-p}	1
Operating Case Temperature	T_{op}	-5	70	ºC	-
Operating Case Temperature (TH Models)	T_{op}	-40	85	ºC	-
Storage Temperature	T_{st}	-40	85	ºC	-
Data Rate OC-12/STM-4	DR	-	622	Mbps	-

Notes: 1. 20 Hz to 155 MHz

Transmitter Specifications, Electrical

Parameter	Symbol	Minimum	Maximum	Unit	Note
Input Differential Impedence	R_{in}	80	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	-

Electrical Output

Parameter	Symbol	Minimum	Maximum	Unit	Note
PECL Single Ended Data Output Swing	$V_{out,p-p}$	185	800	mV	-
Data Output Rise Time	t_r	-	500	ps	-
Data Output Fall Time	t_f	-	500	ps	-

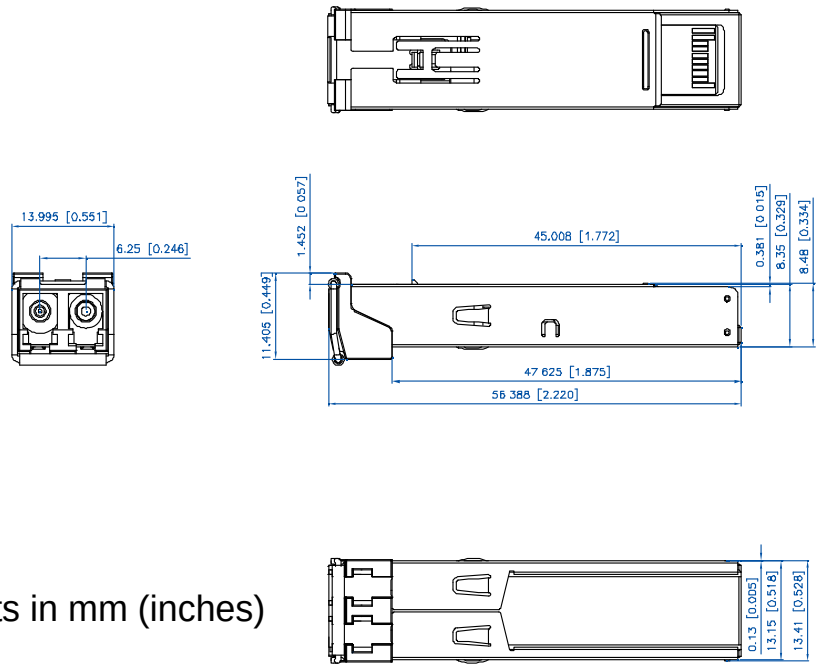
Timing and Electrical

Parameter	Symbol	Minimum	Maximum	Unit	Note
Tx Disable Negate Time	t_on	-	1	ms	-
Tx Disable Assert Time	t_off	-	10	µs	-
Time To Initialize, Including Reset Of Tx Fault	t_init	-	300	ms	-
Tx Fault Assert Time	t_fault	-	100	µs	-
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}+0.5	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	-

Pin Descriptions

Pin	Function	Name/Description
1	$V_{ee}T$	Transmitter Ground
2	Tx_Fault	Open Collector
3	Tx_Disable	Internally Pulled High
4	MOD_DEF(2)	Serial Data Input
5	MOD_DEF(1)	Serial Clock Input
6	MOD_DEF(0)	Internally Grounded
7	NC	Not Connected
8	LOS	Open Collector
9	$V_{ee}R$	Receiver Ground
10	$V_{ee}R$	Receiver Ground
11	$V_{ee}R$	Receiver Ground
12	RXD-	Receiver Data Negative
13	RXD+	Receiver Data Positive
14	$V_{ee}R$	Receiver Ground
15	$V_{cc}R$	Receiver Power
16	$V_{cc}T$	Transmitter Power
17	$V_{ee}T$	Transmitter Ground
18	TXD+	Transmitter Data Positive
19	TXD-	Transmitter Data Negative
20	$V_{ee}T$	Transmitter Ground

Mechanical Dimensions



Units in mm (inches)

MRV | Connectivity Unlimited™

Datasheet

Ordering Information

Model	Description	Data Rate (Mbps)	Wavelength (nm)	Connector	Bail Latch Color	Digital Diagnostics	Maximum Distance Range (km)*
SFP-O12D-LR1	SDH STM-4, SONET OC-12 SFP Transceiver	622	1310	Duplex LC	Red	Yes	20 - 48
SFP-O12D-LR1TH	SDH STM-4, SONET OC-12 SFP Transceiver, ***Temperature Hardened***	622	1310	Duplex LC	Red	Yes	20 - 48

* Maximum range quoted is not possible with all wavelength and/or fiber. Please consult MRV.

Regulatory and Industry Compliances

Class 1 Laser Product, Complies with 21CFR 1040.10, 1040.11 and EN 60825;
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 descharge (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.
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