Datasheet

622 Mbps Dual Rate Single-Mode 25 km SFP Transceivers

SFP-DRO12D-IR1

Features

- SFP transceiver
- Data Rates: 155 to 622 Mbps
- Protocols:
  - SONET OC-3/SDH STM-1
  - SONET OC-12/SDH STM-4
- Single-mode fiber
- 1310 nm
- 0 to 25 km
- 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	155 to 622 Mbps
Tx Wavelength	1310 nm
Tx Power (Minimum)	-15 dBm
Tx Dispersion Penalty	1 dB
Tx Disable	Yes
Rx Wavelength Range	1260 - 1580 nm
Rx Sensitivity	-28 dBm
Rx Saturation	-8 dBm
Operating Temperature Range	0 to 70 ºC
Power Consumption	1 Watt

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Transmitter Specifications, Optical

Parameter	Symbol	Minimum	Maximum	Unit	Note
Centre Wavelength	λ_C	1274	1356	nm	-
Average Output Power	P_{OUT}	-15	-8	dBm	1
Spectral Width (RMS)	$\Delta\lambda$	-	2.5	nm	-
Extinction Ratio	EX	8.2	-	dB	-
Jitter Generation (RMS)	-	-	0.01	UI	-
Jitter Generation (pk-pk)	-	-	0.1	UI	-
Optical Eye Mask	-	Compatible with Telcordia GR-253-CORE and ITU-T G.957			2

Notes:
1. The optical power is launched into SMF.
2. Measured with a PRBS 2^{23}-1 test pattern @155/622 Mbps.

Receiver Specifications, Optical

Parameter	Symbol	Minimum	Maximum	Unit	Note
Centre Wavelength	λ_C	1260	1580	nm	-
Receiver Sensitivity	P_{IN}	-	-28	dBm	1
Receiver Overload	P_{IN}	-8	-	dBm	1
Optical Path Penalty	-	-	1	dB	2
LOS Assert	LOS_A	-42	-	dBm	-
LOS De-Assert	LOS_D	-	-31	dBm	-
LOS Hysteresis	-	1	4	dB	-

Notes:
1. Measured with a PRBS 2^{23}-1 test pattern @155/622 Mbps, BER ≤1×10^{-10}.
2. Measured with a PRBS 2^{23}-1 test pattern @155/622 Mbps, over 15 km G.652 SMF, BER ≤1×10^{-10}.

Monitoring Specifications

Parameter	Range	Unit	Accuracy	Calibration
Temperature	-10 to 80	ºC	± 3ºC	Internal
Voltage	3 to 3.6	V	± 3 %	Internal
Bias Current	0 to 100	mA	± 10 %	External
Tx Power	-16 to -7	dBm	± 3 dB	External
Rx Power	-30 to -7	dBm	± 3 dB	External

Transmitter Specifications, Electrical

Parameter	Symbol	Minimum	Maximum	Unit	Note
Data Input Swing Differential	V_{IN}	500	2400	mV	1
Input Differential Impedence	Z_{IN}	90	110	Ω	-
Tx_DIS Disable	V_D	2.0	V_{CC}	V	-
Tx_DIS Enable	V_{EN}	GND	GND + 0.8	V	-
Tx_Fault (Fault)	-	2.0	V_{CC} + 0.3	V	-
Tx_Fault (Normal)	-	0	0.8	V	-

Notes:
1. Internally AC coupled

Receiver Specifications, Electrical

Parameter	Symbol	Minimum	Maximum	Unit	Note
Data Output Swing Differential	V_{OUT}	370	2000	mV	1
Rx_LOS Fault	$V_{LOSS-Fault}$	2.0	V_{CC} + 0.3	V	-
Rx_LOS Normal	$V_{LOSS-Normal}$	GND	GND + 0.8	V	-

Notes:
1. Internally AC coupled

Recommended Operating Conditions

Parameter	Symbol	Minimum	Maximum	Unit	Note
Operating Case Temperature	T_C	-5	70	°C	-
Power Supply Voltage	V_{CC}	3.13	3.47	V	-
Power Supply Current	I_{CC}	-	300	mA	-
Power dissipation	P_D	-	1	W	-
Data Rate	DR	155	622	Mbps	-

Pin Descriptions

Pin	Function	Name/Description	Plug Seq.	Note
1	VeeT	Transmitter Ground	1	-
2	Tx Fault	Transmitter Fault Indication	3	1
3	Tx Disable	Transmitter Disable	3	2
4	MOD-DEF2	Module Definition 2	3	3
5	MOD-DEF1	Module Definition 1	3	3
6	MOD-DEF0	Module Definition 0	3	3
7	Rate Select	Not Connected	3	-
8	LOS	Loss of Signal Indication	3	4
9	VeeR	Receiver Ground	1	-
10	VeeR	Receiver Ground	1	-
11	VeeR	Receiver Ground	1	-
12	RD-	Inverted Received Data Out	3	5
13	RD+	Received Data Out	3	5
14	VeeR	Receiver Ground	1	-
15	VccR	Receiver Power	2	-
16	VccT	Transmitter Power	2	-
17	VeeT	Transmitter Ground	1	-
18	TD+	Transmitter Data In	3	6
19	TD-	Inverted Transmitter Data In	3	6
20	VeeT	Transmitter Ground	1	-

Notes:

1. TX Fault is an open collector output, which should be pulled up with a 4.7 k~10 kΩ resistor on the host board to a voltage between 2.0 V and Vcc+0.3V. Logic 0 indicates normal operation; logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8 V.

2. TX Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7 k~10 kΩ resistor. Its states are:
   Low (0~0.8 V):   Transmitter on
   (>0.8V, <2.0V):   Undefined
   High (2.0~3.465V):   Transmitter Disabled
   Open: Transmitter Disabled

3. MOD-DEF 0,1,2 are the module definition pins. They should be pulled up with a 4.7 k~10 kΩ resistor on the host board. The pull-up voltage shall be VccT or VccR.
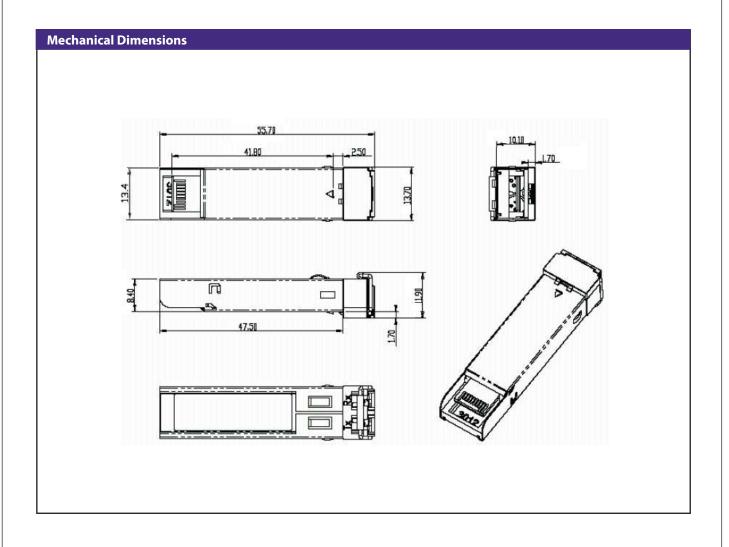   MOD-DEF 0 is grounded by the module to indicate that the module is present
   MOD-DEF 1 is the clock line of two wires serial interface for serial ID
   MOD-DEF 2 is the data line of two wires serial interface for serial ID

4. LOS is an open collector output, which should be pulled up with a 4.7 k~10 kΩ resistor on the host board to a voltage between 2.0 V and Vcc+0.3V. Logic 0 indicates normal operation; logic 1 indicates loss of signal. In the low state, the output will be pulled to less than 0.8 V.

5. These are the differential receiver output. They are internally AC-coupled 100 Ω differential lines which should be terminated with 100 Ω (differential) at the user SERDES.

6. These are the differential transmitter inputs. They are AC-coupled, differential lines with 100 Ω differential termination inside the module.

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Mechanical Dimensions

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Ordering Information

Model	Description	Data Rate (Mbps)	Wavelength (nm)	Connector	Bail Latch Color	Digital Diagnostics	Maximum Distance Range (km)*
SFP-DRO12D-IR1	SDH STM-1, SONET OC-3, SDH STM-4, SONET OC-12 SFP Transceiver	155 - 622	1310	Duplex LC	Gray	Yes	0 - 25

* 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 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 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.

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