

Datasheet

4.25 Gbps Multi-Rate Fibre Channel 10 km SFP Transceiver

SFPFC401



Highlights

- SFP transceiver
- Data Rates: 1.0625 to 4.25 Gbps
- Protocols:
 - 1/2/4 Gbps Fibre Channel
 - Gigabit Ethernet compatible
- Single-mode fiber
- Dual fiber, bi-directional
- 1310 nm
- 0 to 10 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	1.0625 to 4.25 Gbps
Tx Wavelength	1310 nm
Tx Power (Minimum)	-8.4 dBm
Tx Dispersion Penalty	1 dB
Tx Disable	Yes
Rx Wavelength	1260 to 1360 nm
Rx Sensitivity	-18 dBm
Rx Saturation	0 dBm
Rx Damage Threshold	4 dBm
Operating Temperature Range	-5 to 70 °C
Power Consumption	1 Watt

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Optical Transmitter Specifications

Parameter	Symbol	Min	Max	Unit	Notes
Optical Power	P_{op}	-8.4	-1	dBm	-
Average Launch Power of Off Tx	P_{off}	-	-30	dBm	-
Eye Mask	Fibre Channel Compliant				1
Optical Rise Time	t_r	-	130	ps	2
Optical Fall Time	t_f	-	130	ps	2
Mean Tx Wavelength	λ	1260	1360	nm	-
Spectral Width (20 dB)	$\Delta\lambda_{20}$	-	1	nm	-
Dispersion Penalty (10 km)	dp	-	1	dB	3
Relative Intensity Noise	RIN	-	-120	dB/Hz	-
Reflection Tolerance	rp	-24	-	dB	4

- Notes:**
1. FC-400 compliant
 2. 20% - 80% values
 3. Measured at BER of $1e^{-12}$, PRBS of 2^7-1 , at eye center
 4. 1 dB degradation of receiver sensitivity

Optical Receiver Specifications

Parameter	Symbol	Min	Max	Unit	Notes
Receive Power	$R_{sens,low/high}$	-18	0	dBm	1
Damage Threshold	$P_{in,damage}$	4	-	dBm	-
Mean Rx Wavelength	λ	1260	1360	nm	-
Maximum Reflectance of Receiver	RX_r	-	-27	dB	-
LOS Assert	-	-30	-	dBm	-
LOS De-assert	-	-	-20	dBm	-
LOS Hysteresis	-	0.5	-	dB	-

- Notes:**
1. At 4.25 Gbps, $1e^{-12}$ BER, PRBS of 2^7-1

Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration	Formula
Temperature	-5 to 70	± 3	$^{\circ}C$	External	$Tc(C) = Tslope * T_{ad}(16 \text{ bit signed twos complement value}) + T_{offset}$
Voltage	0 to V_{CC}	± 0.1	V	External	$V(\text{Volts}) = Vslope * V_{ad}(16 \text{ bit unsigned integer}) + V_{offset}$
Bias Current	0 to 120	± 5	mA	External	$I(\text{mA}) = Islope * I_{ad}(16 \text{ bit unsigned integer}) + I_{offset}$
TX Power	14 to -8	± 3 dB	dBm	External	$TX_PWR(\mu W) = TX_PWRslope * TX_PWRad(16 \text{ bit unsigned integer}) + TX_PWRoffset$
RX Power	-28.2 to -8	± 3 dB	dBm	External	$RX_PWR(\mu W) = A0 + A1 * x + A2 * x^2 + A3 * x^3 + A4 * x^4$

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General Operations

Parameter	Symbol	Min.	Max.	Unit	Notes
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 Temperature of SFP Case	T_{op}	-5	70	°C	2
Storage Temperature	T_{st}	-40	85	°C	-
Data Rate	DR	1062.5	4250	Mbps	-

- Notes:**
1. 20 Hz to 155 MHz
 2. Maximum Relative Humidity is 85%, non-condensing

Electrical Transmitter Specifications

Parameter	Symbol	Min	Max	Unit	Notes
Input Differential Impedance	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 Receiver Specifications

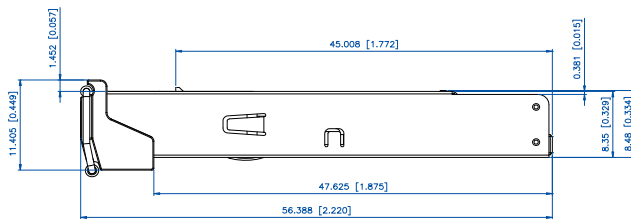
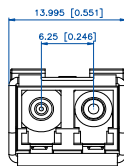
Parameter	Symbol	Min	Max	Unit	Notes
PECL Single Ended Data Output Swing	$V_{out,p-p}$	185	800	mV	-
Data Output Rise Time	t_r	-	175	ps	-
Data Output Fall Time	t_f	-	175	ps	-

Timing and Electrical

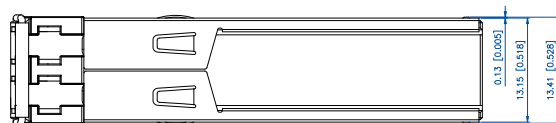
Parameter	Symbol	Min	Max	Unit	Notes
Tx Disable Negate Time	t_{on}	-	1	μs	-
Tx Disable Assert Time	t_{off}	-	10	μs	-
Time To Initialize, Including Reset of Tx Fault	t_{init}	-	300	ms	-
Tx Fault Assert Time	t_{fault}	-	100	μs	-
Tx Disable To Reset	t_{reset}	10	-	μs	-
LOS Assert Time	t_{loss_on}	-	100	μs	-
LOS De-assert Time	t_{loss_off}	-	100	μs	-
Serial ID Clock Rate	f_{serial_clock}	2	100	KHz	-
RX_LOS Voltage (High)	-	2	V_{CC}	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	-

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Pin Descriptions

Pin	Function	Name/Description
1	V _{ee} T	TX GND
2	TX_FAULT	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 GND
15	V _{cc} R	RX Power
16	V _{cc} T	TX Power
17	V _{ee} T	TX GND
18	TXD+	TX Data Positive
19	TXD-	TX Data Negative
20	V _{ee} T	TX GND

Outline Drawing


Units in mm(inch)





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Ordering Information

Model	Description	Data Rates (Mbps)	Wavelength (nm)	Connector Type	Digital Diagnostics	Bail Latch Color	Distance Range (km)
SFPFC401	1/2/4 Gbps Fibre Channel and 1 Gigabit Ethernet SFP Transceiver	1062.5 to 4250	1310	LC	Yes	Green	0 - 10

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; Telecordia Gr-468; 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.
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