

Datasheet

## 4.25 Gbps Multi-Rate Fibre Channel 40 km SFP Transceiver

SFPFC404



### 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
- 1550 nm
- 0 to 40 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](http://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	1550 nm
Tx Power (Minimum)	0 dBm
Tx Dispersion Penalty	2 dB
Tx Disable	Yes
Rx Wavelength	1200 to 1625 nm
Rx Sensitivity	-18 dBm
Rx Saturation	-3 dBm
Rx Damage Threshold	5 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	$P_{op}$	0	4	dBm	-
Average Launch Power of Off Tx	$P_{off}$	-	-45	dBm	-
Eye Mask	-	Fibre Channel Compliant			-
Extinction Ratio	ER	5	-	dB	-
Optical Rise Time	$t_r$	-	120	ps	1
Optical Fall Time	$t_f$	-	120	ps	1
Mean Wavelength	$\lambda$	1530	1570	nm	-
Spectral Width (20 dB)	$\Delta\lambda_{20}$	-	1	nm	-
Dispersion Penalty (40 km, 800 ps/nm)	dp	-	2	dB	2
Relative Intensity Noise	RIN	-	-120	dB/Hz	-
Reflection Tolerance	rp	-24	-	dB	3

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

### Optical Receiver Specifications

Parameter	Symbol	Min	Max	Unit	Notes
Receive Power	$R_{sens,low/high}$	-18	-3	dBm	1
Damage Threshold	$P_{in,damage}$	5	-	dBm	-
Mean Wavelength	$\lambda$	1200	1620	nm	-
Maximum Reflectance of Receiver	$RX_r$	-	-27	dB	-
LOS Assert	-	-28	-	dBm	-
LOS De-assert	-	-	-18	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	$\pm 3$	°C	External	$T_c(C) = T_{slope} * T_{ad}(16 \text{ bit signed twos complement value}) + T_{offset}$
Voltage	0 to $V_{CC}$	$\pm 0.1$	V	External	$V(\text{Volts}) = V_{slope} * V_{ad}(16 \text{ bit unsigned integer}) + V_{offset}$
Bias Current	0 to 120	$\pm 5$	mA	External	$I(\text{mA}) = I_{slope} * I_{ad}(16 \text{ bit unsigned integer}) + I_{offset}$
TX Power	0 to 4	$\pm 3$ dB	dBm	External	$TX\_PWR(\mu W) = TX\_PWR_{slope} * TX\_PWR_{ad}(16 \text{ bit unsigned integer}) + TX\_PWR_{offset}$
RX Power	-18 to -3	$\pm 3$ dB	dBm	External	$RX\_PWR(\mu W) = A_0 + A_1 * x + A_2 * x^2 + A_3 * x^3 + A_4 * x^4$

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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 <sub>p-p</sub>	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

### Electical Transmitter Specifications

Parameter	Symbol	Min	Max	Unit	Notes
Input Differential Impedence	$R_{in}$	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 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

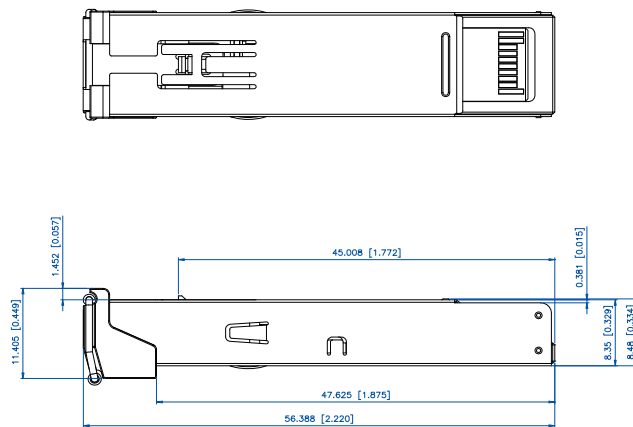
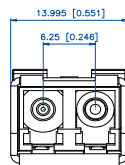
Parameter	Symbol	Min	Max	Unit	Notes
Tx Disable Negate Time	$t_{on}$	-	50	$\mu s$	-
Tx Disable Assert Time	$t_{off}$	-	10	$\mu s$	-
Time To Initialize, Including Reset of Tx Fault	$t_{init}$	-	300	ms	-
Tx Fault Assert Time	$t_{fault}$	-	100	$\mu s$	-
Tx Disable To Reset	$t_{reset}$	10	-	$\mu s$	-
LOS Assert Time	$t_{loss\_on}$	-	100	$\mu s$	-
LOS De-assert Time	$t_{loss\_off}$	-	100	$\mu s$	-
Serial ID Clock Rate	$f_{serial\_clock}$	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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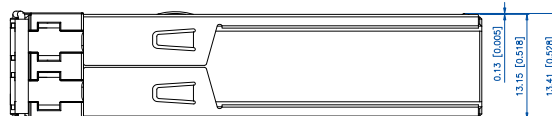
### Pin Descriptions

Pin	Function	Name/Description
1	V <sub>ee</sub> 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 <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 GND
15	V <sub>cc</sub> R	RX Power
16	V <sub>cc</sub> T	TX Power
17	V <sub>ee</sub> T	TX GND
18	TXD+	TX Data Positive
19	TXD-	TX Data Negative
20	V <sub>ee</sub> 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)
SFPFC404	1/2/4 Gbps Fibre Channel and 1 Gigabit Ethernet SFP Transceiver	1062.5 to 4250	1550	LC	Yes	Green	0 - 40

### 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](http://www.mrv.com).  
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