



DATASHEET

MFELX1-C

Product specifications



MFELX1-C

155M 1310nm 2km SFP Transceiver

Product Features

- ✓ Up to 155Mb/s data links
- ✓ Duplex LC connector
- ✓ Hot-pluggable SFP footprint
- ✓ 1310nm FP laser transmitter
- ✓ RoHS compliant and Lead Free
- ✓ Up to 2km on 9/125um SMF
- ✓ Metal enclosure for lower EMI
- ✓ Single +3.3V power supply
- ✓ Low power dissipation <800mW
- ✓ Commercial and industrial operating temperature optional
- ✓ SFP MSA SFF-8074i Compliant

Applications

- ✓ SONET OC-3 IR-1 / SDH STM S-1.1
- ✓ Fast Ethernet

Regulatory Compliance

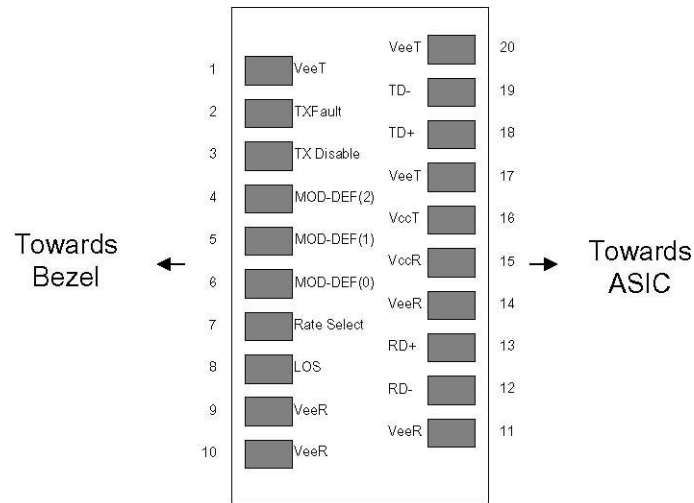
- ESD to the Electrical PINs: compatible with MIL-STD-883 Method 3015
- ESD to the Duplex LC Receptacle: compatible with IEC 61000-4-2
- Immunity compatible with IEC 61000-4-3
- EMI compatible with FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B
- Laser Eye Safety compatible with FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2
- RoHs compliant with 2002/95/EC 4.1&4.2 2005/747/EC

Pin Descriptions

Pin	Symbol	Name/Description	Ref.
1	VeeT	Transmitter Ground (Common with Receiver Ground)	1
2	TX Fault	Transmitter Fault.	
3	TX Disable	Transmitter Disable. Laser output disabled on high or open.	2
4	MOD_DEF(2)	Module Definition 2. Data line for Serial ID.	3
5	MOD_DEF(1)	Module Definition 1. Clock line for Serial ID.	3
6	MOD_DEF(0)	Module Definition 0. Grounded within the module.	3
7	Rate Select	No connection required	
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	4
9	VeeR	Receiver Ground (Common with Transmitter Ground)	1
10	VeeR	Receiver Ground (Common with Transmitter Ground)	1
11	VeeR	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	VeeR	Receiver Ground (Common with Transmitter Ground)	1
15	VccR	Receiver Power Supply	
16	VccT	Transmitter Power Supply	
17	VeeT	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	VeeT	Transmitter Ground (Common with Receiver Ground)	1

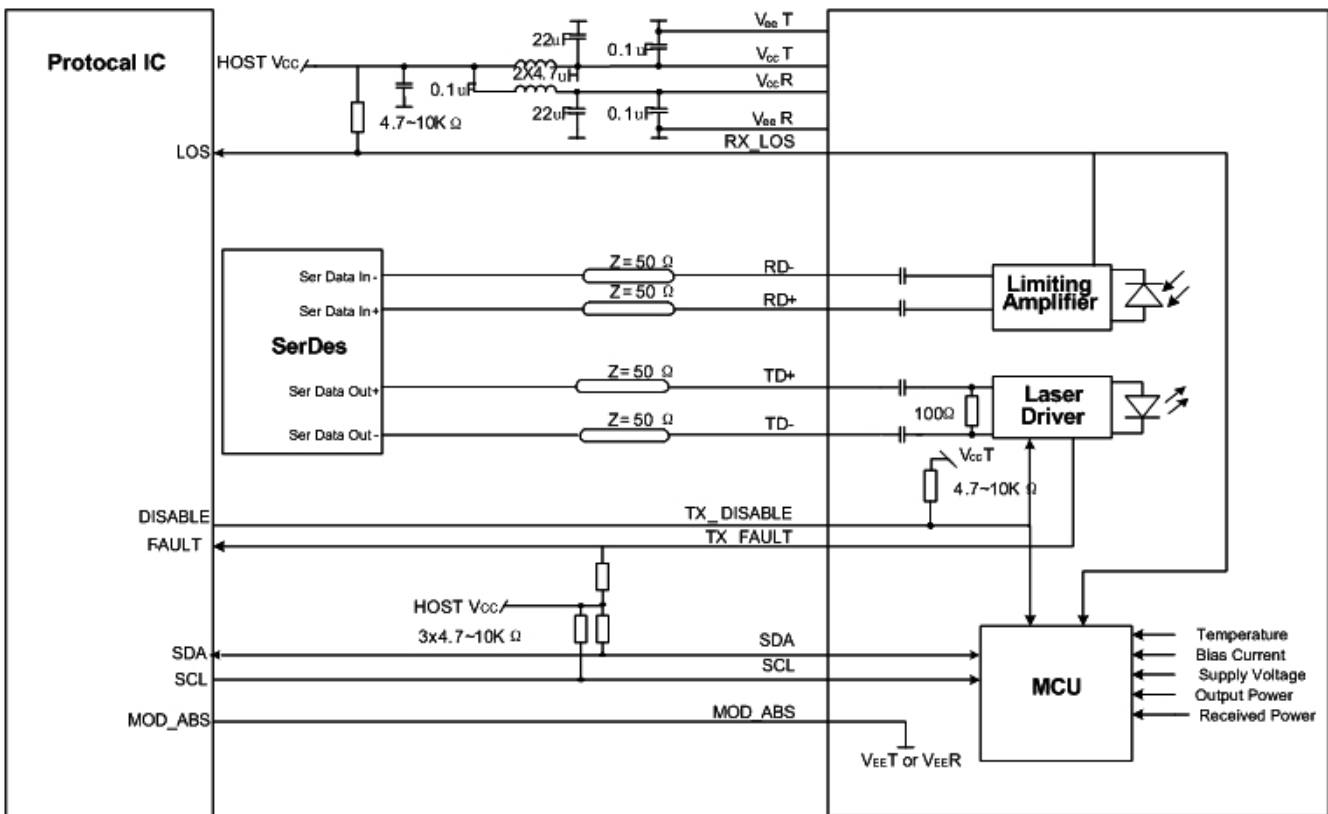
Notes:

1. Circuit ground is internally isolated from chassis ground.
2. Laser output disabled on TX Disable >2.0V or open, enabled on TX Disable <0.8V.
3. Should be pulled up with 4.7k - 10kohms on host board to a voltage between 2.0V and 3.6V. MOD_DEF(0) pulls line low to indicate module is plugged in.
4. LOS is open collector output. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.



Pin-out of Connector Block on Host Board

Recommend Circuit Schematic



Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Maximum Supply Voltage	Vcc	-0.5		+4.0	V	
Storage Temperature	TS	-40		+85	°C	
Operating Humidity	RH	5		95	%	

Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Power Supply Voltage	Vcc	3.13	3.30	3.47	V	
Power Supply Current	Icc	-	-	250	mA	
Case Operating Temperature	Tc	0	-	+70	°C	1
	Ti	-40	-	+85		2
Data Rate(SONET/SDH)	-	-	155	-	Mbps	
9/125um G.652 SMF	Lmax	-	-	2	km	

Notes:

1. For commercial class product.
2. For industrial class product.

Electrical Characteristics (TOP=25°C, Vcc=3.3Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Input differential impedance	Rin	-	100	-	Ω	1
Single ended data input swing	Vin, pp	250	-	1200	mV	
TX Disable-High	-	Vcc – 1.3	-	Vcc	V	
TX Disable-Low	-	Vee	-	Vee+ 0.8	V	
TX Fault-High	-	Vcc-0.5	-	Vcc	V	
TX Fault-Low	-	Vee	-	Vee+0.5	V	
Receiver						
Single ended data output swing	Vout, pp	300	400	800	mV	2
Data output rise time	tr	-	-	1500	ps	3
Data output fall time	tf	-	-	1500	ps	3
LOS-High	-	Vcc – 0.5		Vcc	V	
LOS-Low	-	Vee		Vee+0.5	V	

Notes:

1. AC coupled.
2. Into 100 ohm differential termination.
3. 20 – 80 %

Optical Characteristics (TOP=25°C, Vcc=3.3 Volts)

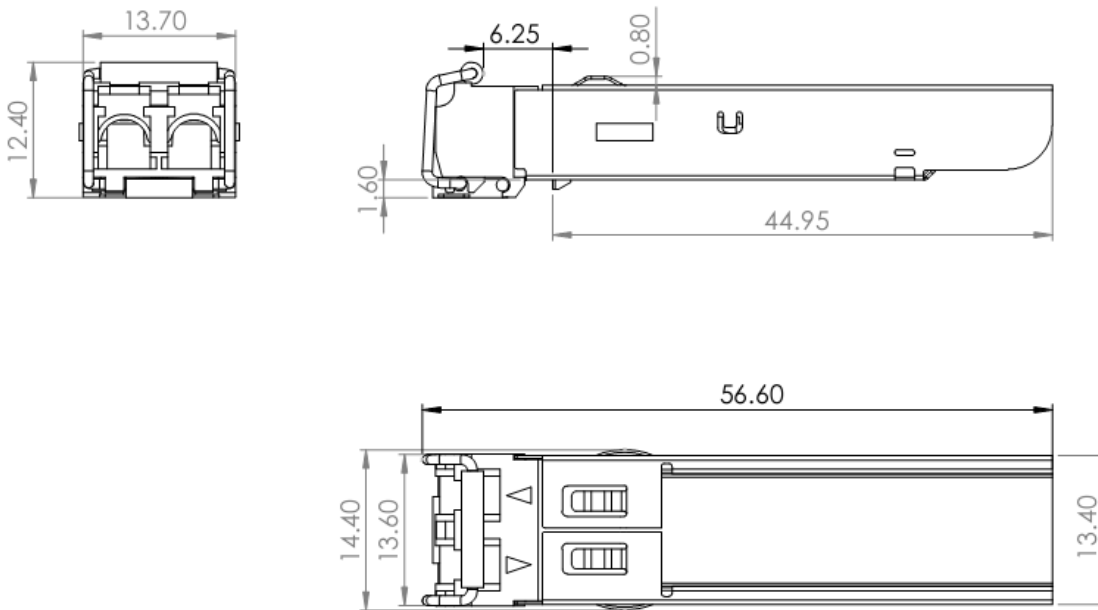
Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Output Opt. Power	PO	-15	-	-8	dBm	1
Optical Wavelength	λ	1261	1310	1360	nm	
RMS Spectral Width	σ	-	-	7.7	nm	
Optical Rise/Fall Time	tr/tf	-	-	1500	ps	2
Total Generated Transmitter Jitter (peak to peak)		-	-	0.07	UI	3
Total Generated Transmitter Jitter (rms)		-	-	0.007	UI	
Optical Extinction Ratio	ER	10	-	-	dB	
Receiver						
RX Sensitivity @155Mb/s	SENS	-	-	-28	dBm	4
Receiver Overload		-8	-	-	dBm	
Optical Center Wavelength	λ_C	1270	-	1600	nm	
LOS De-Assert	LOSD	-	-	-29	dBm	
LOS Assert	LOSA	-40	-	-	dBm	
LOS Hysteresis	-	0.5	-	5	dB	

Notes:

1. Class 1 Laser Safety.
2. Unfiltered, 20-80%. Complies with OC-3 eye masks when filtered.
3. Measured with DJ-free data input signal .In actual application, output DJ will be the sum of input DJ and ΔDJ .
4. Measured with PRBS $2^{23}-1$ at 10^{-10} BER.

Mechanical Specifications

Rapidcon's Small Form Factor Pluggable (SFP) transceivers are compatible with the dimensions defined by the SFP Multi-Sourcing Agreement (MSA).



MFELX1-C

EEPROM Information

EEPROM memory map specific data field description is as below:

2 wire address 1010000X (A0h)		2 wire address 1010001X (A2h)	
0	Serial ID Defined by SFP MSA (96 bytes)	0	Alarm and Warning Thresholds (56 bytes)
95		55	Cal Constants (40 bytes)
127	Vendor Specific (32 bytes)	95	Real Time Diagnostic Interface (24 bytes)
	Reserved, SFF8079 (128 bytes)	119	Vendor Specific (8 bytes)
255		127	User Writable EEPROM (120 bytes)
		247	Vendor Specific (8 bytes)
		255	

Digital Diagnostic Monitoring Interface

Five transceiver parameter values are monitored. The following table defines the monitored parameter's accuracy.

Parameter	Range	Accuracy	Calibration
Temperature	0 to +70°C (C)	±3°C	Internal
	-40 to +85°C (I)		
Voltage	2.97 to 3.63V	±3%	Internal
Bias Current	0 to 100mA	±10%	Internal
TX Power	-15 to -8dBm	±3dB	Internal
RX Power	-28 to -8dBm	±3dB	Internal