



1x10 Mini SFF 10GBASE-SR Transceiver **Duplex LC, 850nm VCSEL, MMF OM3 300M, I-Temp**

Part Number: FSFM-H7-M85-X3Di



Overview

FSFM-H7-M85-X3Di is a 1x10 Mini SFF package style transceiver, compliant with the industrial standard specification. The high performance uncooled 850nm VCSEL transmitter and high sensitivity PIN receiver provide superior performance for 10GBASE-SR Ethernet applications up to MMF OM3 300m optical links in Industrial Temperature range.

Applications

- 10GBASE-SR/SW Ethernet @10.3125G
- Fiber Channel 800-M5E-SN-I 8GFC @8.5G, 1200-M5E-SN-I 10GFC @10.51875G
- SONET OC-192 & SDH STM-64 @9.953G
- CPRI Option #7 @9.83G, #8 @10.1376G
- OTN OTU2 @10.7G, OTU2e @11.09G, OTU2f @11.32G

Features

- Compliant with IEEE802.3ae 10GBASE-SR/SW
- Compliant with CPRI Option 7, 8
- 1x10 Mini SFF Footprint
- Aluminum alloy case; Screw mount
- Surface mount I/O pins for high-speed signal integrity
- 850nm VCSEL laser transmitter
- Duplex LC connector
- AC-coupled CML Differential inputs
- Single +3.3V power supply
- Link distance 300m over MM OM3 fiber and 400m over MM OM4 fiber
- Operating Temperature -40~+85°C
- Maximum Power consumption 1W
- RoHS Compliant

Laser Safety

- This is a Class 1 Laser Product complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.
- Caution: Use of control or adjustments or performance of procedure other than those specified herein may result in hazardous radiation exposure.



Absolute Maximum Ratings

Parameters	Symbol	Min.	Max.	Unit
Storage Temperature	T _{ST}	-40	+85	°C
Storage Relative Humidity	RH	5	95	%
Supply Voltage	V _{CC}	-0.5	+4.0	V

Recommended Operating Conditions

Parameters	Symbol	Min.	Typ.	Max.	Unit
Case Operating Temperature	T _{OP}	-40	-	+85	°C
Supply Voltage	V _{CC}	+3.13	+3.3	+3.47	V
Supply Current	I _{CC}			300	mA
Power Consumption	P			1	W
Lead Soldering Limits	T _{Sold}			260/10	°C/Sec

Transmitter Electro-optical Characteristics

V_{CC} = 3.13V to 3.47V, T_{OP} = -40 °C to 85 °C

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Data Rate	DR	8.5	10.3125	11.32	Gb/s	
Optical Launch Power	P _o	-5		+1	dBm	1
Optical Center Wavelength	λ _c	840	850	860	nm	
Spectral Width (RMS)	Δλ			0.45	nm	
Optical Extinction Ratio	ER	3			dB	
Optical Eye Mask		IEEE802.3ae				
Differential Data Input Swing	V _{IN}	200		1200	mV	
Tx Disable Input Voltage-Low (Tx ON)	TDISV _L	GND		0.8	V	
Tx Disable Input Voltage-High (Tx OFF)	TDISV _H	2.0		V _{CC}	V	

Note1: The optical power is launched into a 50/125μm multi-mode fiber.

Receiver Electro-optical Characteristics

V_{CC} = 3.13V to 3.47V, T_{OP} = -40 °C to 85 °C

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Data Rate	DR	8.5	10.3125	11.32	Gb/s	
Receiver Sensitivity	SEN			-10	dBm	1
Maximum Receive Power	PRX-MAX	0			dBm	1
Optical Center Wavelength	λ_c	840	850	860	nm	
Signal Detect De-Assert	SD _D	-28			dBm	
Signal Detect Assert	SD _A			-11	dBm	
Signal Detect Hysteresis	SD _{HY}	0.5		6	dB	
Differential Data Output Swing	V _{OUT}	300		1000	mV	

Note1: Measured with a PRBS 2³¹-1 test pattern @10.3125Gbps BER<10⁻¹².

Pin Assignment

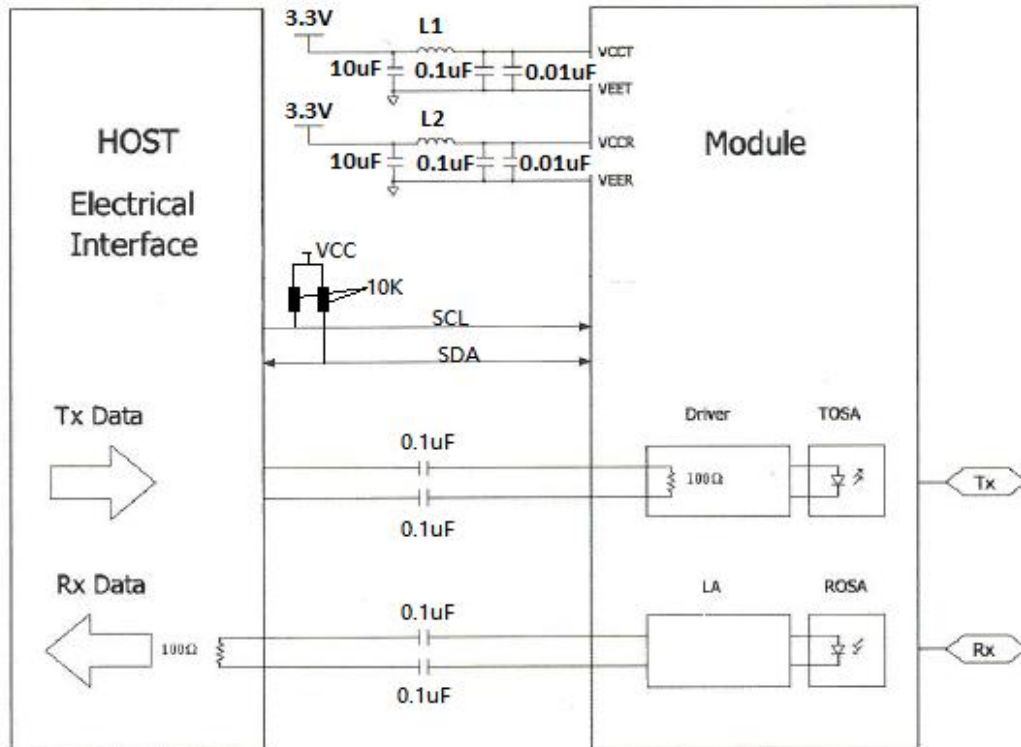


Pin Description

Pin	Name	Function / Description
1	TD+	Transmitter Non-Inverted Data Input (CML)
2	VEETX	Transmitter Ground
3	TD-	Transmitter Inverted Data Input (CML)
4	VccTx	Transmitter 3.3V Power Supply
5	SDA	2-wire Serial Interface Data Line (SDA: Serial Data Signal) (LVTTTL)
6	SCL	2-wire Serial Interface Clock (SCL: Serial Clock Signal) (LVTTTL)
7	RD+	Receiver Non-Inverted Data output (CML)
8	VccRx	Receiver 3.3V Power Supply
9	RD-	Receiver Inverted Data output (CML)
10	VEERX	Receiver Ground



Recommended Circuit





Digital Diagnostic Functions

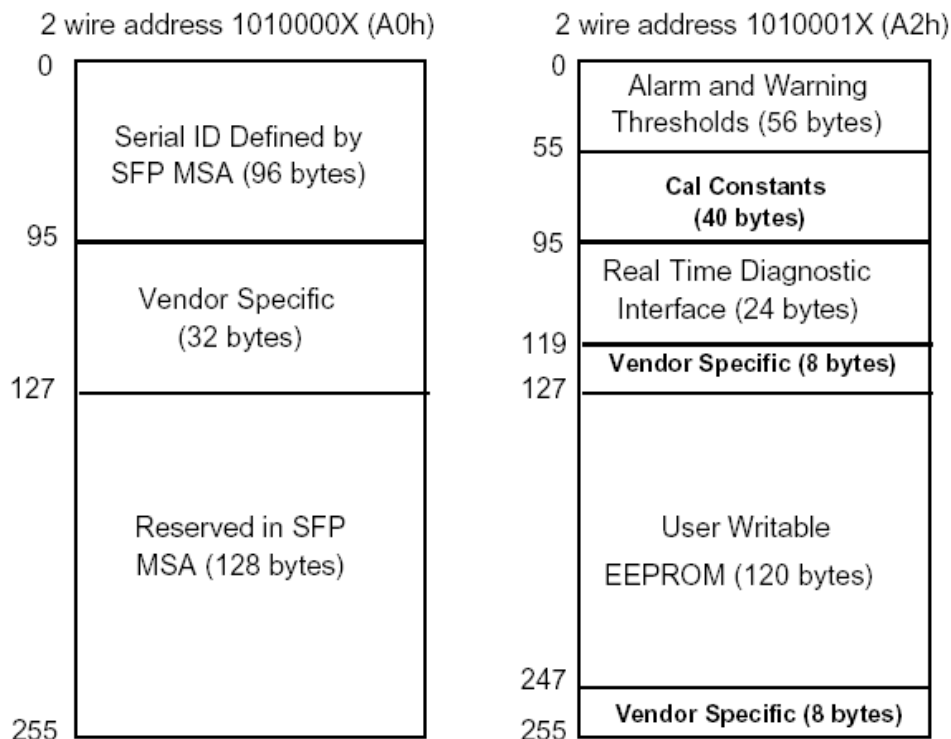
As defined by the SFF-8472, Ficer's Mini SFF Dual Receivers provide digital diagnostic functions via a 2-wire serial interface, which allows real-time access to the following operating parameters:

- Transceiver temperature
- Laser bias current
- Transmitted optical power
- Received optical power
- Transceiver supply voltage

It also provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range.

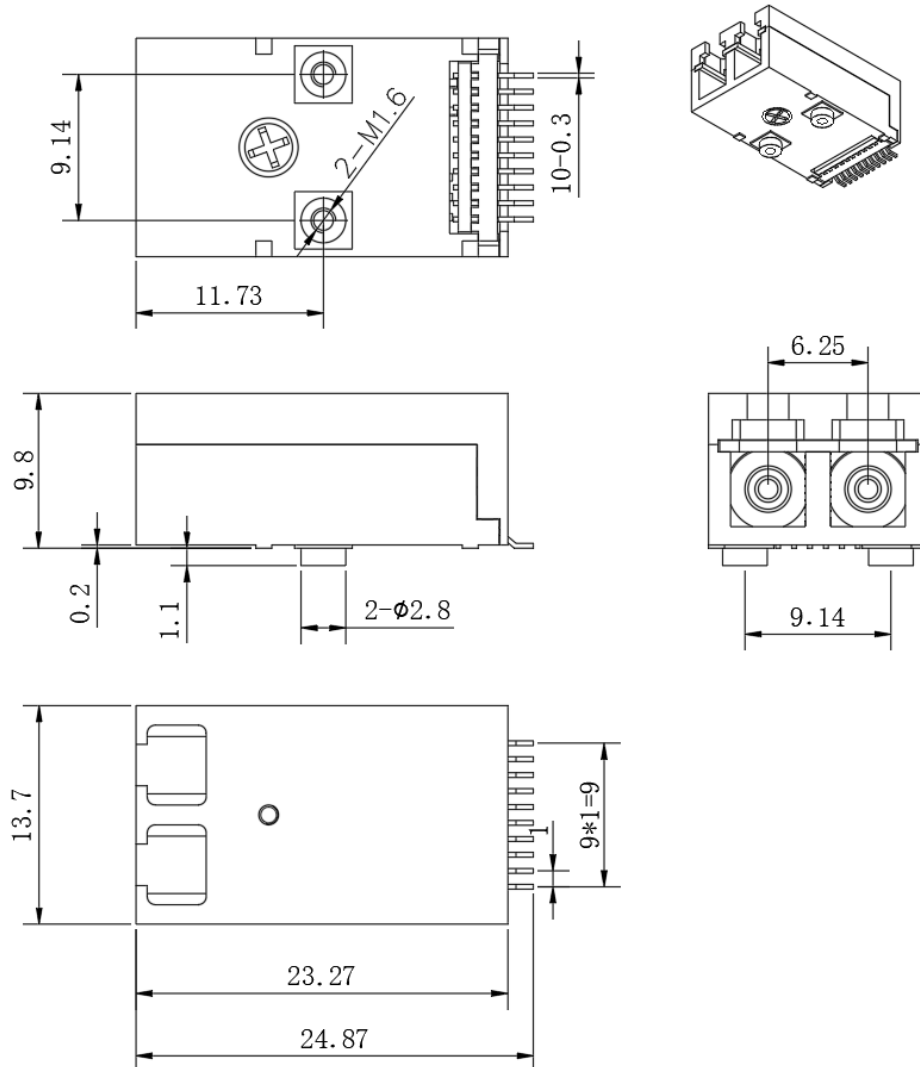
The operating and diagnostics information is monitored and reported by a Digital Diagnostics Controller (DDC) inside the transceiver, which is accessed through the 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL pin) is generated by the host. The positive edge clocks data into the SFP transceiver into those segments of its memory map that are not write-protected. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA pin) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.

Digital Diagnostic Memory Map





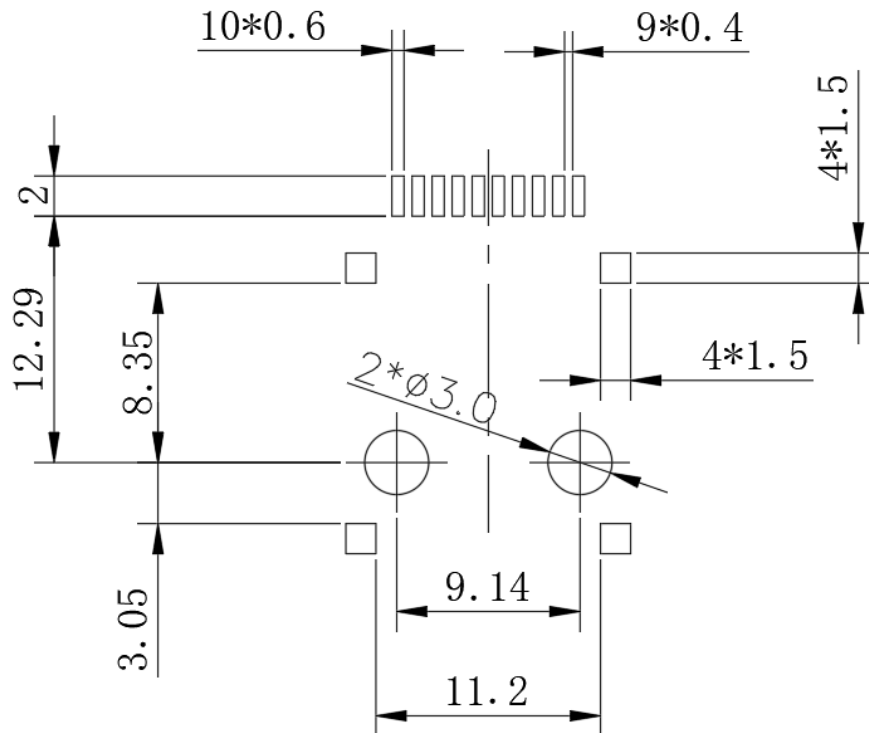
Mechanical Dimensions



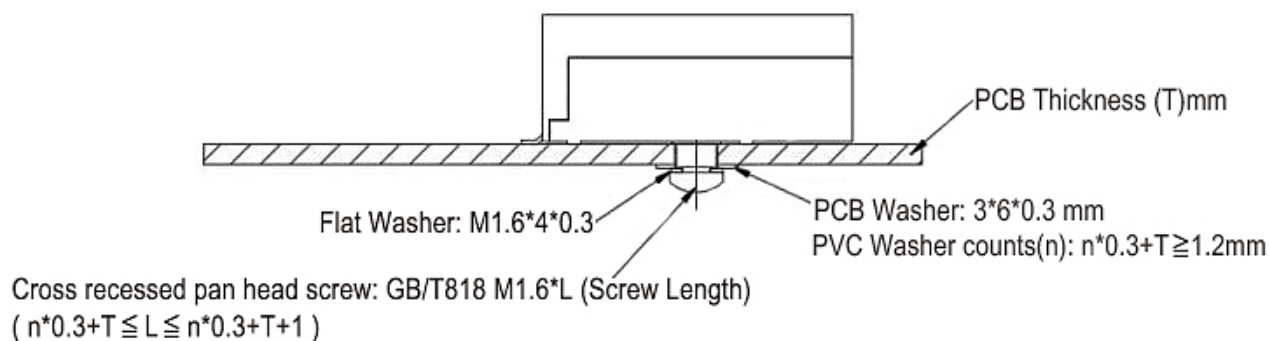
(All Dimensions are $\pm 0.20\text{mm}$ Unless Otherwise Specified, Unit: mm)



Recommended PCB Layout



Installation Diagram



Common PCB Thickness and Accessories						
PCB Thickness (T)mm	Cross recessed pan head screw		Flat Washer (Stainless)		PVC Washer	
Value	SPEC	Qty	SPEC	Qty	SPEC	Qty
1.0	GB/T818 M1.6*2	2	M1.6*4*0.3	2	3*6*0.3mm Inner Dia: 3.0 Outer Dia: 6.0 Thickmess:0.3	2
1.2						0
1.6						
2.0	4					
2.5	2					
3.0	4					
	GB/T818 M1.6*3					
	GB/T818 M1.6*4					

Ordering Information

Part No.	Tx / Rx	Connector	Data Input	Link	Voltage	Temp.
FSFM-H7-M85-X3Di	850nm	Duplex LC	AC-coupled CML	MMF OM3 300m	3.3V	-40~85°C

Note: Distances are indicative only. To calculate a more precise link budget based on specific conditions in your application, please refer to the optical characteristics.