



OWSFP-1401

Optiworks OWSFP-1401 10Gb/s SFP+ transceivers are based on 10-Gigabit Ethernet links over multimode fiber at 850nm. They are compliant with SFF-8431, SFF-8432, IEEE 802.3ae 10GBASE-SR/SW, and 8G Fiber Channel 800-Mx-SN-I. The digital diagnostics functions are available via 2-wire serial bus specified in SFF 8472. The transceiver is RoHS compliant and lead-free per Europe and China requirements.



FEATURES

- Optiworks Transmitter Optical Subassembly Technology
- Supports up to 10GE Applications
- Supports up to 300m Transmission Distance at up to 10.3Gbps
- SFP+ MSA Package with Duplex LC Connector
- Hot-Pluggable SFP+ Footprint
- 850nm VCSEL and PIN Photodetector
- SFI High-Speed Electrical Interface
- 2-Wire Interface with Integrated Digital Diagnostic Monitoring
- Single 3.3V Power Supply
- Typical Power Dissipation 528mW
- Operating Case Temperature: 0~70°C

APPLICATIONS

- 10GBASE-SR/SW Ethernet
- 1200-Mx-SN-I 10G Fiber Channel
- 800-Mx-SN-I 8G Fiber Channel

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Unit	Min	Typ	Max	Notes
Storage Temperature	T _s	°C	-40	-	100	
Case Operating Temperature	T _c	°C	0	-	70	
Relative Humidity	RH	%	5	-	95	
Supply Voltage	VccT, VccR	V	-0.3	-	3.8	

ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Unit	Min	Typ	Max	Notes
Supply Voltage	V _{CC} T, V _{CC} R	V	3.135	-	3.465	
Supply Current	I _{CC}	mA	-	160	220	
Power Supply Noise Tolerance	-	mV	-	-	66	
Bit Rate	BR	Gbps	8.5	10.3	10.5	
Bit Error Ratio	BER	-	-	-	1e-12	
Transmitter						
Input Differential Impedance	R _{IN,P-P}	Ω	-	100	-	
Differential Data Input Swing	V _{IN,P-P}	mV _p	180	-	1200	
Transmit Disable	V _{IH}	V	2	-	V _{CC} T+0.3	
Transmit Enable	V _{IL}	V	-0.3	-	0.8	
Transmit Fault Assert	I _{OH}	uA	-50	-	+37.5	
Transmit Fault De-Assert	V _{OL}	V	-0.3	-	0.4	
Tx Input Differential S-parameter (100Ω Ref)	SDD11	dB	-	-	-12 See(1)	0.01 to 3.9GHz 3.9 to 11.1GHz
Tx Input Differential to Common Mode Conversion (25Ω Ref)	SCD11	dB	-	-	-10	0.01 to 11.1GHz
Receiver						
Differential Data Output Swing	V _{OUT,P-P}	mV _p	300	-	850	
Output Rise and Fall Time	t _r ,t _f	ps	28	-	-	
Rx Output Total Jitter	TJ	UI	-	-	0.70	
Rx Output 99% Jitter	DJ	UI	-	-	0.42	
Rx Output Differential S-Parameter (100Ω Ref)	SDD22	dB	-	-	-12 See(1)	0.01 to 3.9GHz 3.9GHz to 11.1GHz
Rx Output Differential to Common Mode Conversion (25Ω Ref)	SCC22	dB	-	-	-7 -3	0.01 to 2.5GHz 2.5 to 11.1GHz



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Parameter	Symbol	Unit	Min	Typ	Max	Notes
LOS Fault	$I_{\text{LOS-fault}}$	uA	-50	-	+37.5	
LOS Normal	$V_{\text{LOS-norm}}$	V	-0.3	-	0.4	
Receiver Output Eye Mask	Compliant with IEEE 802.3ae-2005					

(1) $SDD11, SDD22 = \text{Max}(-12 + 2 \cdot \sqrt{f}, -6.3 + 13 \cdot \log_{10}(f/5.5))$, for f in GHz

OPTICAL CHARACTERISTICS

Parameter	Symbol	Unit	Min	Typ	Max	Notes
Transmitter						
Center Wavelength	λ_c	nm	840	-	860	
Average Output Power	P_{OUT}	dBm	-7.3	-	-1.0	Class 1 Eye Safety Limit
Average Output Power (Laser Off)	$P_{\text{OUT-OFF}}$	dBm	-	-	-30	
Optical Modulation Amplitude	P_{OMA}	dBm	-4.3	-	-	Per Tradeoff Table 52.8, IEEE 802.3ae 2005
RMS Spectral Width	$\Delta\lambda_{\text{rms}}$	nm	-	-	0.45	Per Tradeoff Table 52.8, IEEE 802.3ae 2005
Extinction Ratio	ER	dB	3.0	-	-	
Transmitter and Dispersion Penalty	TDP	dB	-	-	3.9	
Optical Return Loss Tolerance	ORLT	dB	-	-	12	
Encircled Flux	EF	Measured into Type A1a (50/125 μm Multimode) Fiber per ANSI/TIA/EIA-455-203-2001.				
Relative Intensity Noise	$RIN_{12\text{OMA}}$	dB/HZ	-	-	-128	
Optical Eye Mask	Compliant with IEEE 802.3ae-2005					
Receiver						
Center Wavelength	λ_c	nm	840	-	860	
Receiver Sensitivity (OMA)	R_{SENS1}	dBm	-	-	-11.1	Measured with a PRBS $2^{31}-1$ Test Pattern @ 10.3Gbps, BER $\leq 10^{-12}$
Stressed Receiver Sensitivity (OMA)	R_{SENS2}	dBm	-	-	-7.5	Per IEEE 802.3ae
Receiver Overload	$P_{\text{IN-OL}}$	dBm	-1.0	-	-	Measured at Worst ER



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Parameter	Symbol	Unit	Min	Typ	Max	Notes
						with a PRBS 2 ³¹ -1 Test Pattern @ 10.3Gbps, BER<=10 ⁻¹²
Receiver Reflectance	Rrx	dB	-	-	-12	
LOS Assert	LOS _A	dBm	-30	-	-	
LOS De-Assert	LOS _D	dBm	-	-	-12	
LOS Hysteresis	LOS _H	dB	0.5	-	-	

DIGITAL DIAGNOSTIC SPECIFICATIONS

Parameter	Symbol	Accuracy	Units	Report Range		Notes
Temperature	T _{MON}	±3°C	°C	-10	85	
Voltage	V _{MON}	±0.1 V	V	2.97	3.63	
Bias Current	I _{MON}	±10 %	mA	1	15	
Tx Power	P _T	±3 dB	dBm	-10.0	-3.0	
Rx Power	P _R	±3 dB	dBm	-11.1	-3.0	

REGULATORY COMPLIANCE

Feature	Test Method	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883C Method 3015.7	Class 1(>2000 Volts)
Electrostatic Discharge (ESD) to the Duplex LC Receptacle	IEC 61000-4-2	Typically, no damage occurs with 15 kV air discharges during operation and 8 kV direct contact discharges to the case.
Electromagnetic Interference(EMI)	FCC CLASSB	Compliant with Standards
	CENELEC EN55022 Class B	
	CISPR22 ITE Class B	
RF Immunity	IEC61000-4-3	Typically shows no measurableEffect from a 10V/m Field Swept from 80 to 1000MHz.
Laser Eye Safety	US FDA CDRH AEL Class 1, US21 CFR, Subchapter J per Paragraphs 1002.10 and	Compatible with Class I Laser Product



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Feature	Test Method	Performance
	1002.12	
	EN60950, EN (IEC) 60825-1,2	
RoHS Compliance	RoHS Directive 2002/95/EC and it's Amendment Directives 6/6	RoHS 6/6 Compliant

PIN DESCRIPTIONS

Pin	Symbol	Logic	Name/Description
1	VeeT	-	Module Transmitter Ground
2	TX_Fault	LVTTL_O	Module Transmitter Fault
3	TX_Disable	LVTTL_I	Transmitter Disable; Turns off Transmitter Laser Output
4	SDA	LVTTL_I/O	2-Wire Serial Interface Data Line
5	SCL	LVTTL_I/O	2-Wire Serial Interface Clock
6	MOD_ABS	-	Module Absent, Connected to VeeT or VeeR in the Module
7	RS0	LVTTL-I	Rate Select 0, Optionally Controls SFP+ Module Receiver
8	RX_LOS	LVTTL-O	Receiver Loss of Signal Indication (In FC designated as Rx_LOS and in Ethernet Designated as Signal Detect)
9	RS1	LVTTL_I	Rate Select 1, Optionally Controls SFP+ Module Transmitter
10	VeeR	-	Module Receiver Ground
11	VeeR	-	Module Receiver Ground
12	RD-	CML-O	Receiver Inverted Data Output
13	RD+	CML-O	Receiver Non-Inverted Data Output
14	VeeR	-	Module Receiver Ground
15	VccR	-	Module Receiver 3.3V Supply
16	VccT	-	Module Transmitter 3.3V Supply
17	VeeT	-	Module Transmitter Ground
18	TD+	CML-I	Transmitter Non-Inverted Data Input
19	TD-	CML-I	Transmitter Inverted Data Input
20	VeeT	-	Module Transmitter Ground

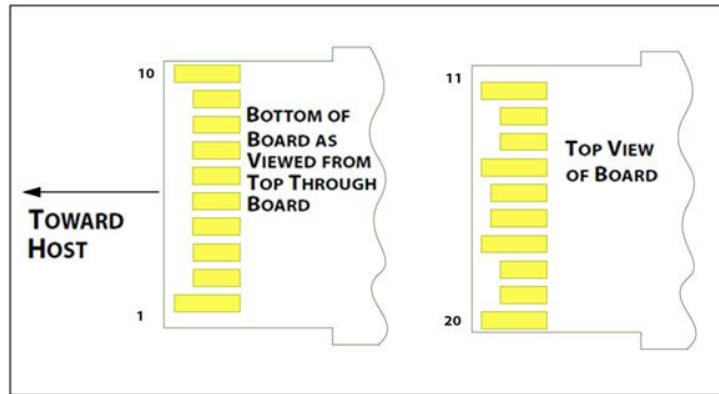
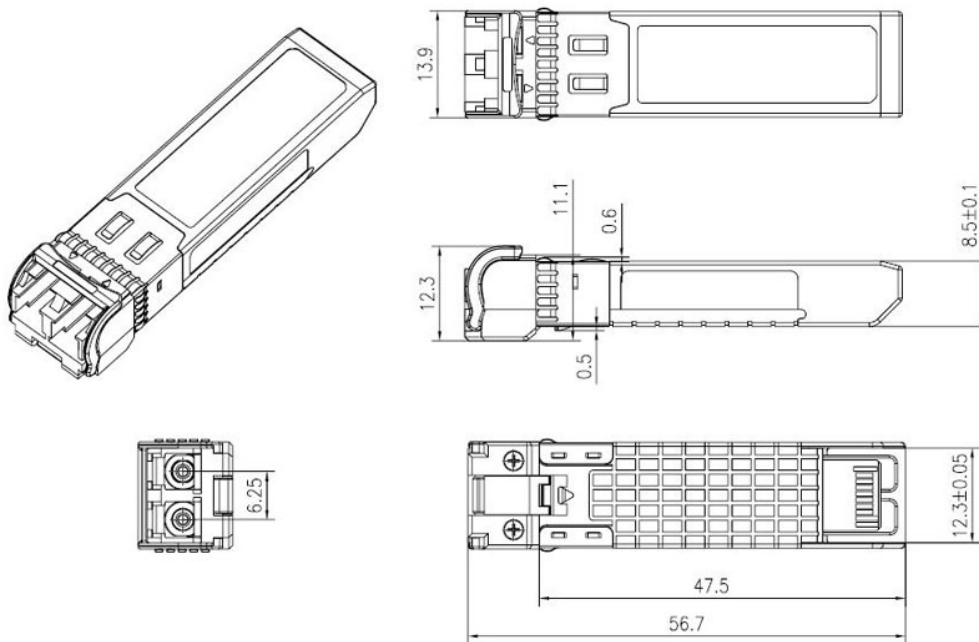


Figure 1: Module Contact Assignment

MECHANICAL DIAGRAM



REVISION HISTORY

Date	Revision	Changes
8/30/2012	1	Initial Version
1/31/2013	2	Specifications Updated



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7/26/2013	3	Specs & Formatting Updated
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