

10Gb/s SFP+ CWDM 1270-1610nm 10km Optical Transceiver

Features

- Up to 10km on 9/125µm SMF
- Up to 11.3Gb/s data links
- CWDM DFB transmitter and PIN receiver
- Hot-pluggable SFP+ footprint
- Compliant with SFF+MSA and SFF-8472
- Duplex LC/UPC type pluggable optical interface
- RoHS-10 compliant and lead-free
- Support Digital Diagnostic Monitoring interface
- Hot pluggable
- Metal enclosure, for lower EMI
- Meet ESD requirements, resist 8KV direct contact voltage
- +3.3V power supply
- Operating case temperature: 0~+70°C

Applications

- 10GBASE-LR/LW & 10G Ethernet
- SDH STM64
- Other Optical Links

Compliance

- Compliant with IEEE 802.3ae-2002
- Compliant with MSA SFF-8472
- Compliant with MSA SFF-8431

Description

The SFP-10G-CW10 transceivers are designed for use in 10-Gigabit Ethernet links up to 10km over single mode fiber. The module consists of CWDM DFB Laser, PIN and Preamplifier in a high-integrated optical sub-assembly. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472.

SFP-10G-CW10 transceivers provide a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, and received optical power and transceiver supply voltage. It also defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

The SFP+ MSA defines a 256-byte memory map in EEPROM that is accessible over a 2-wire serial interface at the 8 bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8 bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged.

Wavelength

Table1-Wavelength			
Wavelength	Clasp Color Code	Wavelength	Clasp Color Code
1270	Gray	1450	Brown
1290	Gray	1470	Gray
1310	Gray	1490	Purple
1330	Purple	1510	Blue
1350	Blue	1530	Green
1370	Green	1550	Yellow
1390	Yellow	1570	Orange
1410	Orange	1590	Red
1430	Red	1610	Brown

Absolute Maximum Ratings

Table2-Absolute Maximum Ratings				
Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	Ts	-40	+85	°C
Power Supply Voltage	Vcc	-0.5	3.6	V
Relative Humidity (non-condensation)	RH	5	95	%
Damage Threshold	TH _d	5		dBm

Recommended Operating Conditions and Power Supply Requirements

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	T _{op}	0		+70	°C	
Power Supply Voltage	VCC	3.135	3.3	3.465	V	
Data Rate			10.3125		Gb/s	
Control Input Voltage High		2		V _{cc}	V	
Control Input Voltage Low		0		0.8	V	
Link Distance (SMF)	D			10	km	9/125 μ m

Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Power Consumption	p			1.5	W	
Supply Current	I _{cc}			450	mA	
Transmitter						
Single-ended Input Voltage Tolerance	V _{cc}	-0.3		4.0	V	
AC Common Mode Input Voltage Tolerance (RMS)		15			mV	
Differential Input Voltage Swing	V _{in,pp}	180		1200	mV _{pp}	
Differential Input Impedance	Z _{in}	90	100	110	Ohm	1
Transmit Disable Assert Time				10	us	
Transmit Disable Voltage	V _{dis}	V _{cc} -1.3		V _{cc}	V	
Transmit Enable Voltage	V _{en}	V _{ee}		V _{ee} +0.8	V	2
Receiver						
Differential Output Voltage Swing	V _{out,pp}	300		850	mV _{pp}	
Differential Output Impedance	Z _{out}	90	100	110	Ohm	3
Data output rise/fall time	T _r /T _f	28			ps	4
LOS Assert Voltage	V _{losH}	V _{cc} -1.3		V _{cc}	V	5
LOS De-assert Voltage	V _{losL}	V _{ee}		V _{ee} +0.8	V	5
Power Supply Rejection	PSR	100			mV _{pp}	6

Notes:

[1] Connected directly to TX data input pins. AC coupled thereafter.

- [2] Or open circuit.
- [3] Input 100 ohms differential termination.
- [4] These are unfiltered 20-80% values.
- [5] Loss of Signal is LVTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
- [6] Receiver sensitivity is compliant with power supply sinusoidal modulation of 20 Hz to 1.5 MHz up to specified value applied through the recommended power supply filtering network.

Optical Characteristics

Table5-Optical Characteristics						
Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter						
Center Wavelength	λ_c	$\lambda - 6.5$		$\lambda + 6.5$	nm	1
Optical Spectral Width	$\Delta \lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Optical Power	P_{AVG}	-6		-0.5	dBm	2
Optical Extinction Ratio	ER	3.5			dB	
Transmitter and Dispersion Penalty	TDP			3.2	dB	
Transmitter OFF Output Power	Poff			-30	dBm	
Transmitter Eye Mask	Compliant with IEEE802.3ae					
Receiver						
Center Wavelength	λ_c	1270		1610	nm	
Receiver Sensitivity (Average Power)	Sen.			-14.4	dBm	3
Input Saturation Power (overload)	Psat	0.5			dBm	
LOS Assert	LOSA	-30			dBm	
LOS De-assert	LOSD			-17	dBm	
LOS Hysteresis	LOSH	0.5			dB	

Notes:

- [1] λ refer to wavelength selection, 1270~1610nm please the "product selection.
- [2] Class 1 Laser Safety per FDA/CDRH and IEC-825-1 regulations.
- [3] Measured with Light source 1270~1610nm, ER=3.5dB; BER = $\leq 10^{-12}$ @10.3125Gbps, PRBS=2³¹-1 NRZ.

Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF-8472 Rev10.2 with internal calibration mode. For external calibration mode please contact our sales staff.

Table6-Digital Diagnostic Functions					
Parameter	Symbols	Min.	Max.	Unit	Notes
Temperature monitor absolute error	DMI_Temp	-3	3	degC	Over operating temp
Supply voltage monitor absolute error	DMI_VCC	-0.15	0.15	V	Full operating range
RX power monitor absolute error	DMI_RX	-3	3	dB	
Bias current monitor	DMI_bias	-10%	10%	mA	
TX power monitor absolute error	DMI_TX	-3	3	dB	

Pin Description

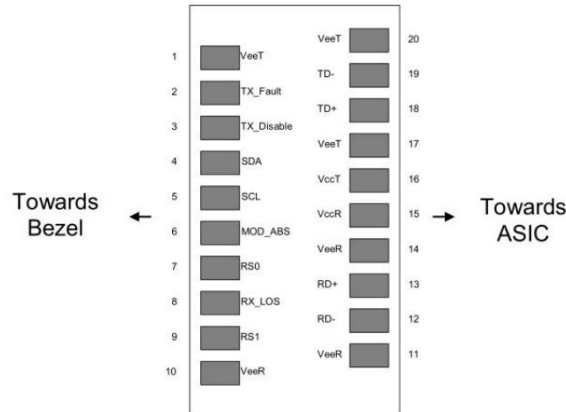


Figure1 Pin view

Pin Function Definitions

Table7-Pin Function Definitions			
Pin	Symbol	Name/Description	Note
1	VeeT	Module Transmitter Ground	1
2	TX_Fault	Module Transmitter Fault	2
3	TX_Dis	Transmitter Disable. Laser output disabled on high or open	3
4	SDA	2-Wire Serial Interface Data Line	4
5	SCL	2-Wire Serial Interface Clock	4
6	MOD_ABS	Module Absent, connected to VeeT or VeeR in the module	4
7	RS0	Not used	5
8	RX_LOS	Receiver Loss of Signal Indication Active High	6
9	RS1	Not used	
10	VeeR	Module Receiver Ground	1
11	VeeR	Module Receiver Ground	1
12	RD-	Receiver Inverted Data Output	
13	RD+	Receiver Data Output	
14	VeeR	Module Receiver Ground	1
15	VccR	Module Receiver 3.3 V Supply	
16	VccT	Module Receiver 3.3 V Supply	
17	VeeT	Module Transmitter Ground	1
18	TD+	Transmitter Non-Inverted Data Input	
19	TD-	Transmitter Inverted Data Input	
20	VeeT	Module Transmitter Ground	1

Notes:

- [1] Circuit ground is internally isolated from chassis ground.
- [2] TFAULT is an open collector/drain output, which should be pulled up with a 4.7k -10k Ohms resistor on the host board if intended for use. Pull up voltage should be between 2.0V to Vcc + 0.3V. A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to <0.8V.
- [3] Laser output disabled on TDIS>2.0V or open, enabled on TDIS <0.8V.
- [4] Should be pulled up with 4.7kΩ-10kΩ on host board to a voltage between 2.0V and 3.6V. MOD_ABS pulls line low to indicate module is plugged in.
- [5] Internally pulled down per SFF-8431 Rev 4.1.
- [6] LOS is open collector output. It should be pulled up with 4.7kΩ-10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

Mechanical Dimensions

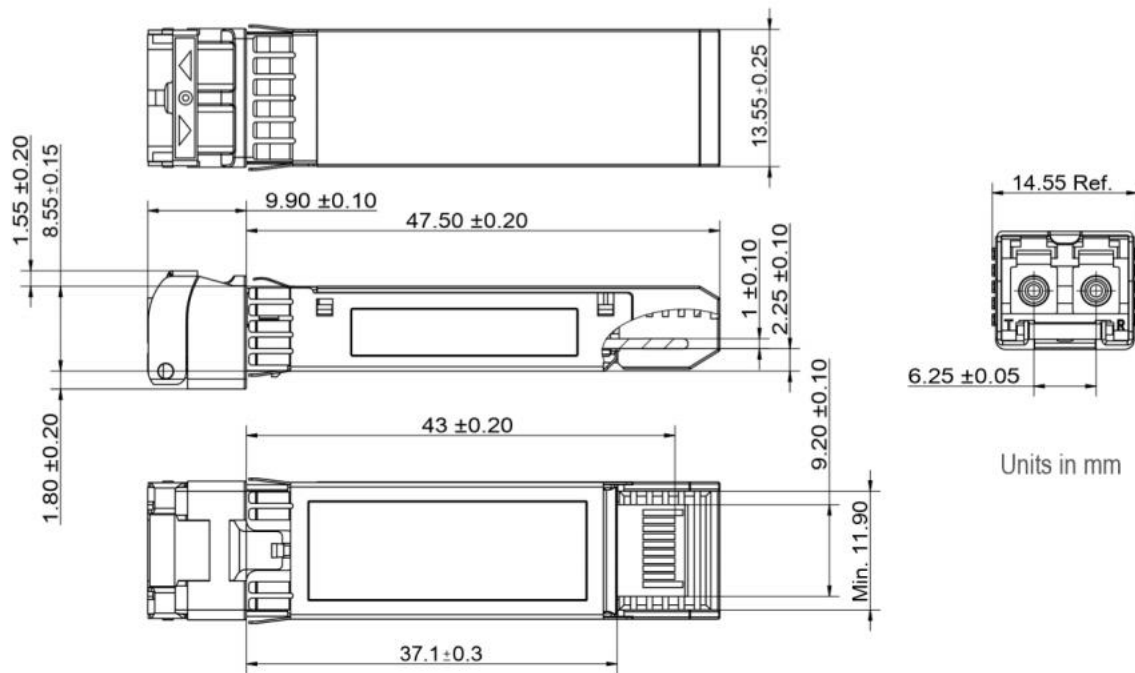


Figure2 Mechanical Outline

Precautions

- a. 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.
- b. Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

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Disclaimer

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2. Nothing herein should be construed as constituting an additional warranty.

3. NADDOD assumes no responsibility for the use or reliability of equipment or software not provided by NADDOD.

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