

## **CWDM SFP+ 1470~1610nm 80km DDM LC SMF Transceiver**

### **P/N: AE-SFP+-C80-XX**

#### **Features**

- Supports 9.95 to 11.3Gb/s bit rates
- Duplex LC connector
- Hot pluggable SFP+ footprint
- Cooled 1470nm~1610nm EML transmitter, APD Receiver
- Applicable for 80km SMF connection
- Low power consumption, < 1.5W
- Digital Diagnostic Monitor Interface
- Optical interface compliant to IEEE 802.3ae 10GBASE-ZR
- Electrical interface compliant to SFF-8431
- Operating case temperature: Commercial: 0 to 70 °C Industrial: -40 to 85 °C

#### **Applications**

- 10GBASE-ZR at 10.3125Gbps
- 10G Ethernet
- Other optical links

## I. Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Note
Supply Voltage	Vcc	-0.5	4.0	V	
Storage Temperature	TS	-40	85	°C	
Relative Humidity	RH	0	85	%	

**Note:**

Stress in excess of the maximum absolute ratings can cause permanent damage to the transceiver.

## II. General Operating Characteristics

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Data Rate	DR	9.95	10.3125	11.3	Gb/s	
Supply Voltage	Vcc	3.13	3.3	3.47	V	
Supply Current	Icc5			455	mA	
Operating Case Temp.	Tc	0		70	°C	
	Tl	-40		85		

## III. Electrical Characteristics

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Transmitter						
Differential data input swing	VIN,PP	120		820	mVpp	1
Transmit Disable Voltage	VD	VCC-0.8		Vcc	V	
Transmit Enable Voltage	VEN	Vee		Vee+0.8		
Input differential impedance	Rin		100		Ω	
Receiver						
Differential data output swing	Vout,pp	340	650	800	mVpp	2
Output rise time and fall time	Tr, Tf	28			Ps	3
LOS asserted	VLOS_F	VCC-0.8		Vcc	V	4
LOS de-asserted	VLOS_N	Vee		Vee+0.8	V	4

**Notes:**

Connected directly to TX data input pins. AC coupling from pins into laser driver IC.

Into 100Ω differential termination.

20 – 80%. Measured with Module Compliance Test Board and OMA test pattern. Use of four 1's and four 0's sequence in the PRBS 9 is an acceptable alternative.

LOS is an open collector output. Should be pulled up with 4.7kΩ – 10kΩ on the host board. Normal operation is logic 0; loss of signal is logic 1.

## IV. Optical Characteristics

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Transmitter						
Operating Wavelength	λ	λ-7.5nm	λ	λ+7.5nm	nm	1

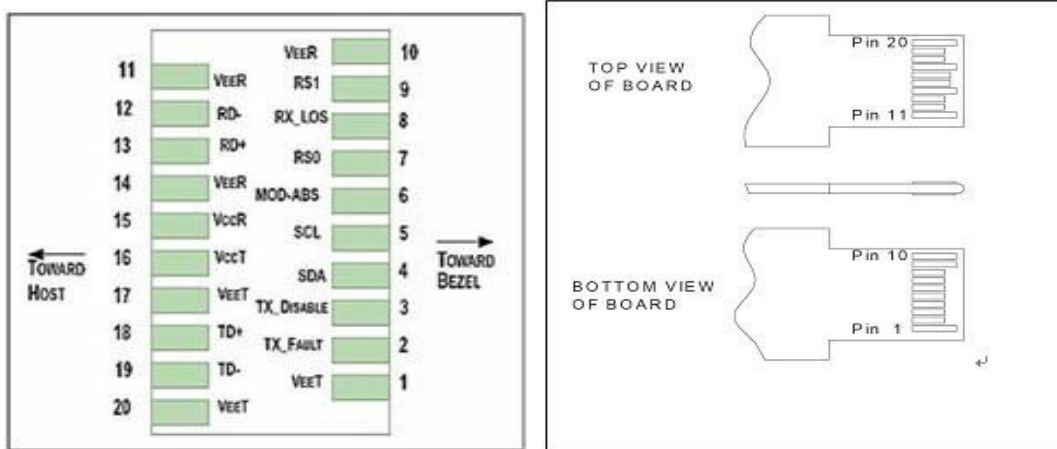
Ave. output power (Enabled)	PAVE	0	5	dBm	2
Side-Mode Suppression Ratio	SMSR	30		dB	
Extinction Ratio	ER	3.5		dB	
RMS spectral width	$\Delta\lambda$		1	nm	
Rise/Fall time (20%~80%)	Tr/Tf		50	ps	
Dispersion penalty	TDP		3	dB	
Relative Intensity Noise	RIN		-128	dB/Hz	
Output Optical Eye	Compliant with IEEE 0802.3ae				
Receiver					
Operating Wavelength	$\lambda$	1260	1620	nm	
Receiver Sensitivity	PSEN1		-23	dBm	3
Overload	PAVE		-7	dBm	
LOS Assert	Pa	-37		dBm	
LOS De-assert	Pd		-24	dBm	
LOS Hysteresis	Pd-Pa	0.5		dB	

**Notes:**

The wavelength  $\lambda=1470\text{nm}\sim 1610\text{nm}$ , Total 8 wavelengths, 20nm spacing

Measured at 10.3125b/s with PRBS 231 – 1 NRZ test pattern.

Under the ER worst =9, measured at 10.3125 Gb/s with PRBS 231 - 1 NRZ test pattern for BER < 1x10-12

**V. Pin Definition and Functions**

Pin	Symbol	Name/Description
1	VEET [1]	Transmitter Ground
2	Tx_FAULT [2]	Transmitter Fault
3	Tx_DIS [3]	Transmitter Disable. Laser output disabled on high or open
4	SDA [2]	2-wire Serial Interface Data Line
5	SCL [2]	2-wire Serial Interface Clock Line
6	MOD_ABS [4]	Module Absent. Grounded within the module
7	RS0	Rate Select 0
8	RX_LOS [2]	Loss of Signal indication. Logic 0 indicates normal operation

9	RS1 [5]	Rate Select 1
10	VEER [1]	Receiver Ground
11	VEER [1]	Receiver Ground
12	RD-	Receiver Inverted DATA out. AC Coupled
13	RD+	Receiver DATA out. AC Coupled
14	VEER [1]	Receiver Ground
15	VCCR	Receiver Power Supply
16	VCCT	Transmitter Power Supply
17	VEET [1]	Transmitter Ground
18	TD+	Transmitter DATA in. AC Coupled
19	TD-	Transmitter Inverted DATA in. AC Coupled
20	VEET [1]	Transmitter Ground

**Notes:**

1. Module circuit ground is isolated from module chassis ground within the module.
2. Should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15V and 3.6V.
3. Tx\_Disable is an input contact with a 4.7 k $\Omega$  to 10 k $\Omega$  pullup to VccT inside the module.
4. Mod\_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull this contact up to Vcc\_Host with a resistor in the range 4.7 k $\Omega$  to 10 k $\Omega$ . Mod\_ABS is asserted “High” when the SFP+ module is physically absent from a host slot.

**VI. Ordering information**

Part Number	Product Description
AE-SFP+-C80-XX	SFP+, 10Gbps, 1470-1610nm, SMF, 80KM, DDM, LC Connector, 0°C~ +70°C