

# PRODUCT SPECIFICATION

<b>Part No.:</b>	<b>AC-XP-3G10-10</b>	
<b>Description:</b>	10G SFP+ Transceiver, SMF 1310nm 10km	
<b>Release Date</b>	<b>Rev.</b>	<b>Revision Change Description</b>
<b>2017/06/07</b>	<b>A0</b>	New Release
<b>2020/12/28</b>	<b>A1</b>	Template Update

## Features

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- ✧ Up to 9.95 Gbps to 10.5Gbps
- ✧ 1310nm Uncooled DFB Laser and PIN photo detector
- ✧ Duplex LC receptacle optical interface compliant
- ✧ Single +3.3V power supply
- ✧ Hot-pluggable
- ✧ AC coupling of LVPECL signals
- ✧ International Class1 laser safety certified
- ✧ Operating temperature range:
- ✧ Commercial: 0°C~+70°C
- ✧ Industry: -40°C~+85°C
- ✧ RoHS Compliant
- ✧ DDMI function available with internally calibrated mode
- ✧ Up to 10km transmission distance over Single Mode Fiber(SMF) without CDR inside

## Application

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- ✧ 10GBASE-LR/LW
- ✧ 10G Fiber Channel

## Standard

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- ✧ Compliant with MSA SFP+ specification(SFF-8431)
- ✧ Compliant with SFF-8472
- ✧ CPRI Line Rate Option: 9830.4Mbps
- ✧ Compliant to IEEE 802.3ae

## Specification

Absolute Maximum Ratings				
Parameter	Symbol	Min	Max	Unit
Storage temperature	TS	-40	85	°C
Power Supply Voltage	Vcc3	-0.5	+4	V
Relative Humidity	RH	5	95	%

Recommended Operating Conditions					
Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature (Commercial)	Tc	0		70	°C
Operating Case Temperature (industry)	Tc	-40		85	°C
Power Supply Voltage	Vcc3	3.13	3.3	3.47	V
Supply Current	Icc3			285	mA
Data Rate			10.3125		Gbps
Fiber Length 9/125μm core SMF		-	10	-	km

Electrical Characteristics						
Parameter	Symbol	Min	Typical	Max	Unit	Notes
Transmitter differential input voltage	Vin,pp	180		700	mV	
Receiver differential output Voltage	Vout,pp	300		850	mV	
Transmit Fault (TX_Fault)	Voh	2.4		Vdd3+0.3	V	LVTTL
	Vol	-0.3		0.4	V	LVTTL
Transmit disable voltage	VIH	2.0		Vcc+0.3	v	LVTTL
Transmit enable voltage	VIL	-0.3		0.8	v	LVTTL
Loss of Signal (LOS)	Voh	2.4		Vdd3+0.3	V	LVTTL
	Vol	-0.3		0.4	V	LVTTL

Optical transmitter Characteristics						
Parameter	Symbol	Min	Typical	Max	Unit	Notes
Launched Power (avg.)	Pout	-6		0.5	dBm	EOL
		-6		0.5	dBm	BOL
Operating Wavelength Range	λc	1260	1310	1355	nm	
Spectral Width	Δλ			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	

Extinction Ratio	ER	3.5			dB	2
Transmitter and Dispersion Penalty	TDP			3.2	dB	
Optical Modulation Amplitude	P <sub>OMA</sub>	-5.2			dBm	
Optical Return Loss Tolerance				12	dB	
Relative Intensity Noise	RIN			-128	dB/Hz	
Optical Rise/Fall Time	Tris/Tfall	28			PS	3
Optical Tx Output disable	P <sub>dis</sub>			-30	dBm	
Output Eye Diagram	Compliant with ITU-T G.691 eye mask and IEEE802.3ae eye mask					
Optical receiver Characteristics						
Parameter	Symbol	Min	Typical	Max	Unit	Notes
Receiver Sensitivity	S			-14.4	dBm	4
Wavelength Range	$\lambda_c$	1260		1355	nm	
Receiver Reflectance				-12	dB	
Optical Power Input Overload	P <sub>in-max</sub>	0.5			dBm	4
LOS	Optical De-assert	P <sub>d</sub>		-17	dBm	4
	Optical Assert	P <sub>a</sub>	-30			
LOS hysteresis		0.5		5	dB	5

**Notes:**

- 1) The supply current is SFP+ module's working current.
- 2) For the measurements, the device was driven with 10.3125Gbps data pattern with 2<sup>31</sup>-1 PRBS payload.
- 3) Optical transition time is the time interval required for the rising or falling edge of an optical pulse to transition between the 20% and 80% amplitudes relative to the logical 1 and 0 levels.
- 4) Measured with a PRBS 2<sup>31</sup>-1 test pattern, @10.3125Gbps, ER=3.5dB, BER<10<sup>-12</sup>.
- 5) The LOS Hysteresis minimizes 'chatter' on the output line. In principle, Hysteresis alone does not guarantee chatter-free operation.

## Digital Diagnostic Monitoring Information

Parameter	Accuracy	Calibration	Range
Temperature	±3°C	internal	0~70
Voltage	±3%	internal	V <sub>cc</sub> =3.3V±5%
Bias Current	±10%	internal	5 to 100mA
TX Power	±2dB	internal	-6 to 0.5dBm
RX Power	±3dB	internal	-14.4 to 0.5dBm

## Pin Descriptions

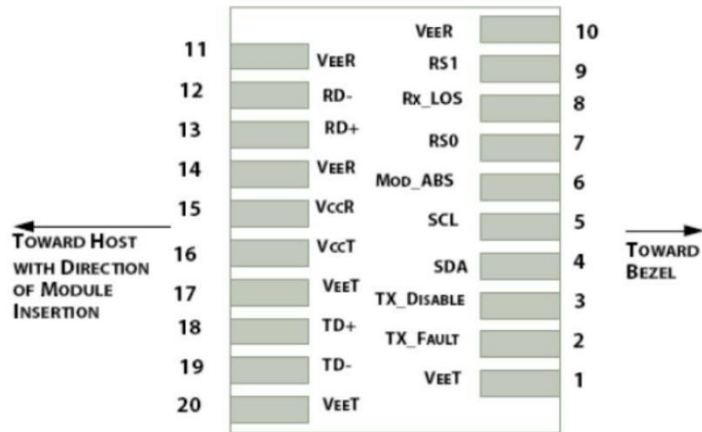


Figure 1 SFP+ Pad assignment Top View

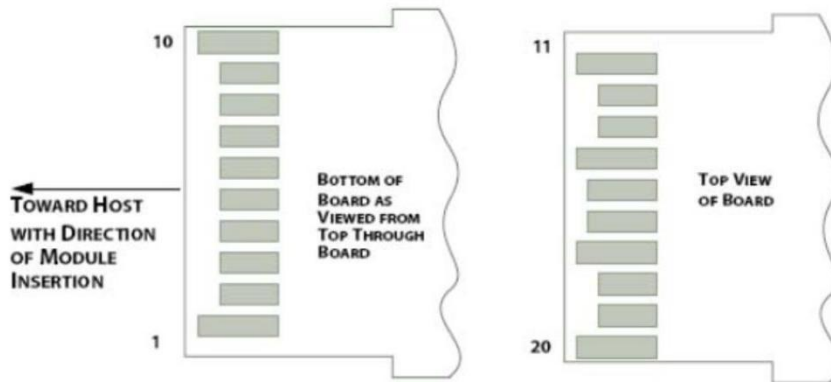


Figure 2 SFP+ Module Contact Assignments

## Pin Assignment

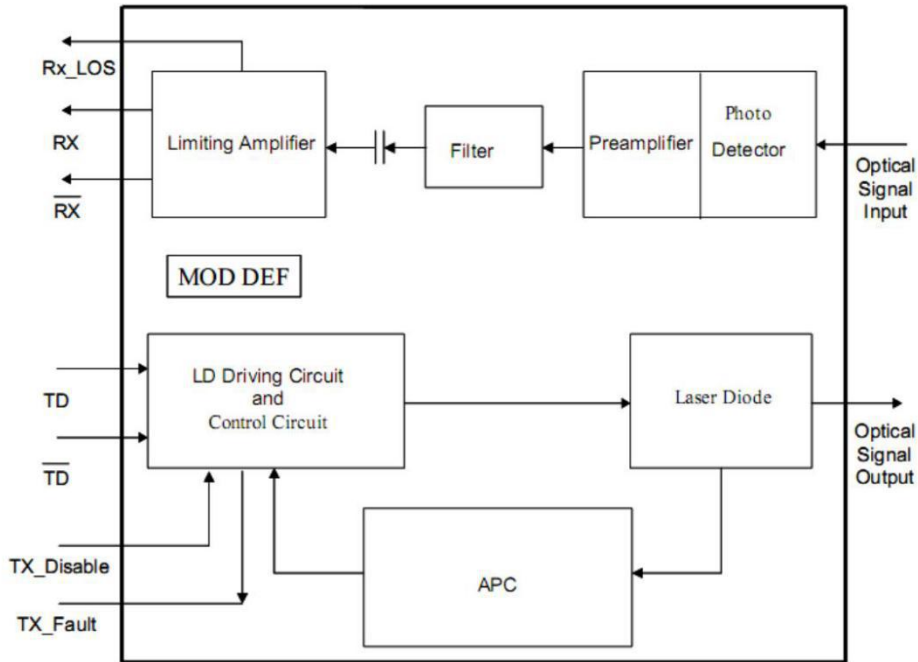
Pin	Power Seq.	Symbol	Description	Ref
1	1st	VeeT	Module Ground(Common with Receiver Ground)	1
2	3rd	TX_Fault	Transmitter Fault, Low: normal; High: abnormal	2
3	3rd	TX_Disable	Transmitter Disable High: Transmitter off Low: Transmitter on	3
4	3rd	SDA	2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i)	4
5	3rd	SCL	2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i)	4
6	3rd	Mod_ABS	Module Absent, Connect to VeeT or VeeR in Module	5
7	3rd	RS0	Rate Select 0, optionally controls SFP+ module receiver	6
8	3rd	RX_LOS	Receiver Loss of Signal indication High: loss of signal	7

			Low: signal detected	
8	3rd	RX_LOS	Receiver Loss of Signal indication High: loss of signal Low: signal detected	7
9	3rd	RS1	Rate Select 1, optionally controls SFP+ module transmitter	8
10	1st	VeeR	Receiver Ground	1
11	1st	VeeR	Receiver Ground	1
12	3rd	RD-	Receiver Inverted DATA out. AC Coupled. CML-O	9
13	3rd	RD+	Receiver Non-inverted DATA out. AC Coupled. CML-O	9
14	1st	VeeR	Receiver Ground	1
15	2nd	VccR	Receiver Power Supply	10
16	2nd	VccT	Transmitter Power Supply	10
17	1st	VeeT	Transmitter Ground	1
18	3rd	TD+	Transmitter Non-Inverted DATA in. AC Coupled. CML-I	11
19	3rd	TD-	Transmitter Inverted DATA in. AC Coupled. CML-I	11
20	1st	SDA	Transmitter Ground	1

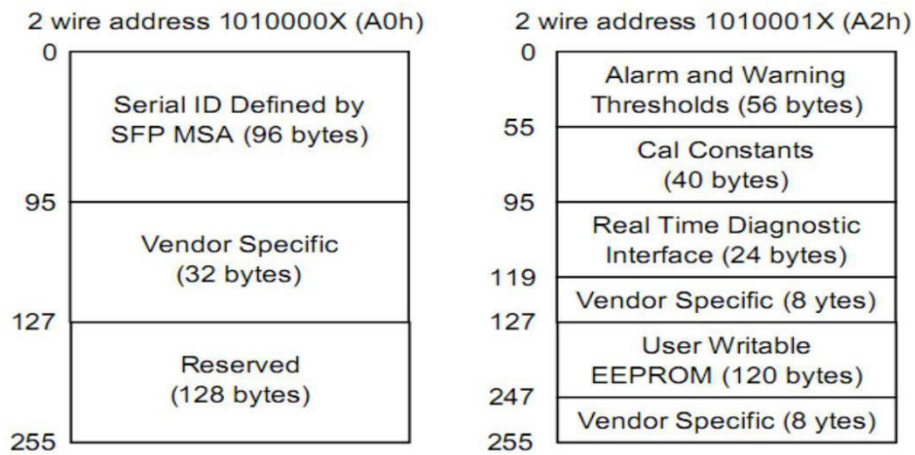
**Notes:**

- 1) The module signal ground contacts.
- 2) This pin is an open drain/collector and should be pulled up to Vcc-host in the host with a 4.7k~10k Ohm resistor.
- 3) This pin should be pulled up to Vcct with a 4.7k~10k Ohm resistor in modules.
- 4) SDA&SCL (IIC) are needed pull up 4.7k~10k Ohm resistors on host board.
- 5) Mod\_ABS is connected to VeeT or VeeR in the SFP+ module.
- 6) Rate Select 0,Optionally controls SFP+ module receiver , High: RX input signaling rate >4.25GBd and Low: RX input signaling rates ≤4.25GBd.
- 7) Module RX\_Los of signal indication need pull up 4.7k~10k Ohm resistor on host board.
- 8) Rate Select 1,Optionally controls SFP+ module transmitter, High: Tx input signaling rate >4.25GBd and Low : Tx input signaling rates ≤4.25GBd.
- 9) RD -/+ : These are the differential receiver outputs. They are CML AC-coupled with 100 Ohm terminal resistor matching internal.
- 10) VccR and VccT are the receiver and transmitter power supplies.
- 11) TD-/+ : These are the differential transmitter inputs. They are CML AC-coupled with 100 Ohm terminal resistor matching internal.

## Block Diagram

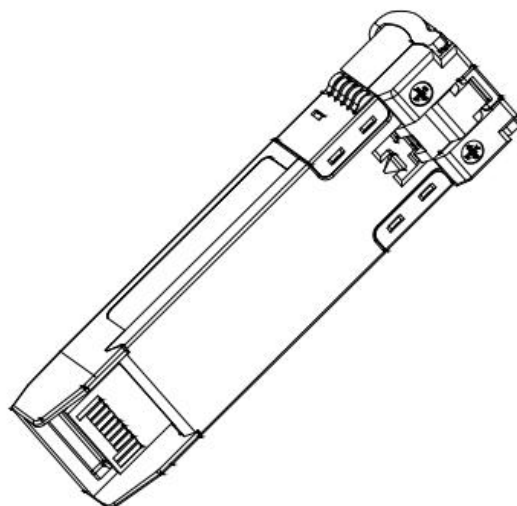
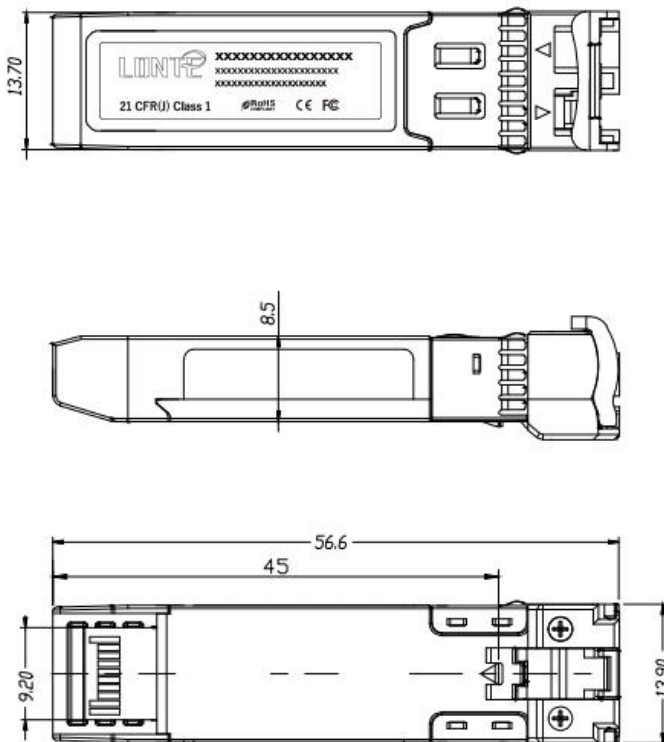


## Digital Diagnostic Memory Map



## Package Outline

Dimensions are in millimeters. All dimensions are  $\pm 0.2\text{mm}$  unless otherwise specified. (Unit: mm)



All dimensions are  $\pm 0.2\text{mm}$  unless otherwise specified.  
Unit: mm

## Regulatory Compliance

Feature	Test	Method
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>1000V for SFI pins, >2000V for other pins.)
Electrostatic Discharge (ESD) Immunity	IEC61000-4-2	Class 2(>4.0kV)
Electromagnetic Interference (EMI)	CISPR22 ITE Class B FCC Class B CENELEC EN55022 VCCI Class 1	Comply with standard
Immunity	IEC61000-4-3	Comply with standard
Eye Safety	FDA 21CFR 1040.10 and 1040.11	Compatible with Class I laser Product

	EN (IEC) 60825-1,2	
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## Ordering information

Part. No	Specifications								
	Pack	Rate (Gbps)	Tx (nm)	Po (dBm)	RX	Sen (dBm)	Temp (°C)	Reach (km)	DDM
AC-XP-3G10-10	SFP+	10.3125	1310	-6~0.5	PIN	<-14.4	0~70	10	Y
AC-XP-3G10-10F	SFP+	10.3125	1310	-6~0.5	PIN	<-14.4	-40~85	10	Y