

### Features

- RoHS compliant
- Up to 10Gb/s data links
- Compliant with IEEE 802.3ae 10GBASE-L
- Compliant with Compact SFP MSA
- Compact SFP MSA Option 2
- Uncooled 1330nm CWDM DFB laser transmitter
- InGaAs PIN-PD receiver
- Metal package for lower EMI
- Single power supply voltage: +3.3V
- Low power dissipation
- LC duplex connector
- Operating temperature range: -40°C to 85°C



### Applications

- 10G Ethernet 20km
- Compatible with CPRI line rates: 1.2288Gb/s~9.8304Gb/s

### 1. General Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Absolute Supply Voltage	Vcc_max	0	-	4.0	V	-
Operating Voltage	Vcc	3.135	-	3.465	V	-
Total Current	Icc	-	-	490	mA	-
Operating Case Temperature	Top	-40	-	85	°C	1
Storage Temperature	Tst	-40	-	85	°C	-

Notes: 1. Measured on top side front center of SFP+ module.

## 2. Electrical Specifications (Each Channel)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
<b>Transmitter</b>						
Data Rate	B	9.9	10.3	11.3	Gb/s	-
Differential Input Impedance	R <sub>in</sub>	80	100	120	Ω	-
Differential Data Input Swing	V <sub>in,pp</sub>	150	-	1000	mVp-p	-
Data Input Rise/Fall Time	tr/tf	15	-	40	ps	-
Data Dependent Input Jitter	DDJ			0.1	UI	1
Data Input Total Jitter	T <sub>J</sub>	-	-	0.28	UI	-
Tx Disable Voltage	V <sub>d</sub>	2.0	-	V <sub>cc</sub> +0.3	V	-
Tx Enable Voltage	V <sub>en</sub>	0	-	0.8	V	-
Tx Disable Assert Time	T <sub>off</sub>	-	-	100	us	-
Tx Enable Assert Time	T <sub>on</sub>	-	-	2	ms	-
Initialization Time	T <sub>start</sub>	-	-	300	ms	-
<b>Receiver</b>						
Data Rate	B	9.9	10.3	11.3	Gb/s	-
Differential Output Impedance	R <sub>out</sub>	80	100	120		-
Differential Data Output Swing	V <sub>out</sub>	300	-	800	mVp-p	-
Data Output Rise/Fall Time	tr/tf	-	-	45	ps	2
Data Dependent Output Jitter	DDJ	-	-	0.42	UI	K28.5
Total Output Jitter	T <sub>J</sub>			0.70	UI	2 <sup>31</sup> -1
LOS Output High Voltage	V <sub>losh</sub>	2		V <sub>cc</sub>		
LOS Output Low Voltage	V <sub>losl</sub>	-	-	0.8	V	-
LOS Assert/Deassert Time Delay	T <sub>los_onoff</sub>	-	-	100	us	

**Notes:**

1. K28.5 pattern @10.3Gb/s
2. 20%~80% values

### 3. Optical Specifications (Each Channel)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
<b>Transmitter</b>						
Average Optical Power	Pout	0	-	5	dBm	1
Launch Power in OMA minus TDP	-	-1.1	-	-	dBm	-
Optical Modulation Amplitude	-	-0.1	-	-	dBm	
Optical Wavelength	$\lambda$	1260	1270	1280	nm	-
Spectral Width@-20dB	$\lambda\Delta$ -20dB	-	-	0.45	nm	-
Side Mode Suppression Ratio	SMSR	30	-		dB	-
Optical power of OFF transmitter	Pout-off	-	-	-30	dBm	-
Transmitter and Dispersion Penalty	TDP	-	-	3.0	dB	-
Optical Extinction Ratio	ER	4.5	-	-	dB	-
Relative Intensity Noise	RIN12OMA	-	-	-128	dB/Hz	-
Optical Return Loss Tolerance	-	-	-	12	dB	-
Transmitter Reflectance	-	-	-	-12	dB	-
Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3}= {0.25, 0.40, 0.45, 0.25, 0.28, 0.40}						
<b>Receiver</b>						
Optical Wavelength	$\lambda$	1320	1330	1340	nm	-
Average Receiver Sensitivity	RSENS	-	-	-13.4	dBm	2
Maximum Input Power	Pol	1.5	-	-	dBm	-
Receiver Sensitivity in OMA	RSENSoma	-	-	-13.6	dBm	3
Stressed Receiver Sensitivity in OMA	-	-	-	-11.1	dBm	3
Receiver Reflectance	-	-	-	-12	dB	-
LOS Assert	LOS_A	-30	-	-	dBm	-
LOS De-assert	LOS_D	-	-	-14.4	dBm	-
LOS Hysteresis	-	1	2.5	5	dB	-

#### Notes

1. The maximum Tx Pout is the lesser of the Class I eye safety limit and a maximum receiver input power level of 0dBm.
2. Measured with a PRBS of  $2^{31}-1$  at  $1 \times 10^{-12}$  BER and 4.5 dB extinction ratio at 10.3Gb/s
3. Measured with a PRBS of  $2^{31}-1$  at  $1 \times 10^{-12}$  BER and at 10.3Gb/s"

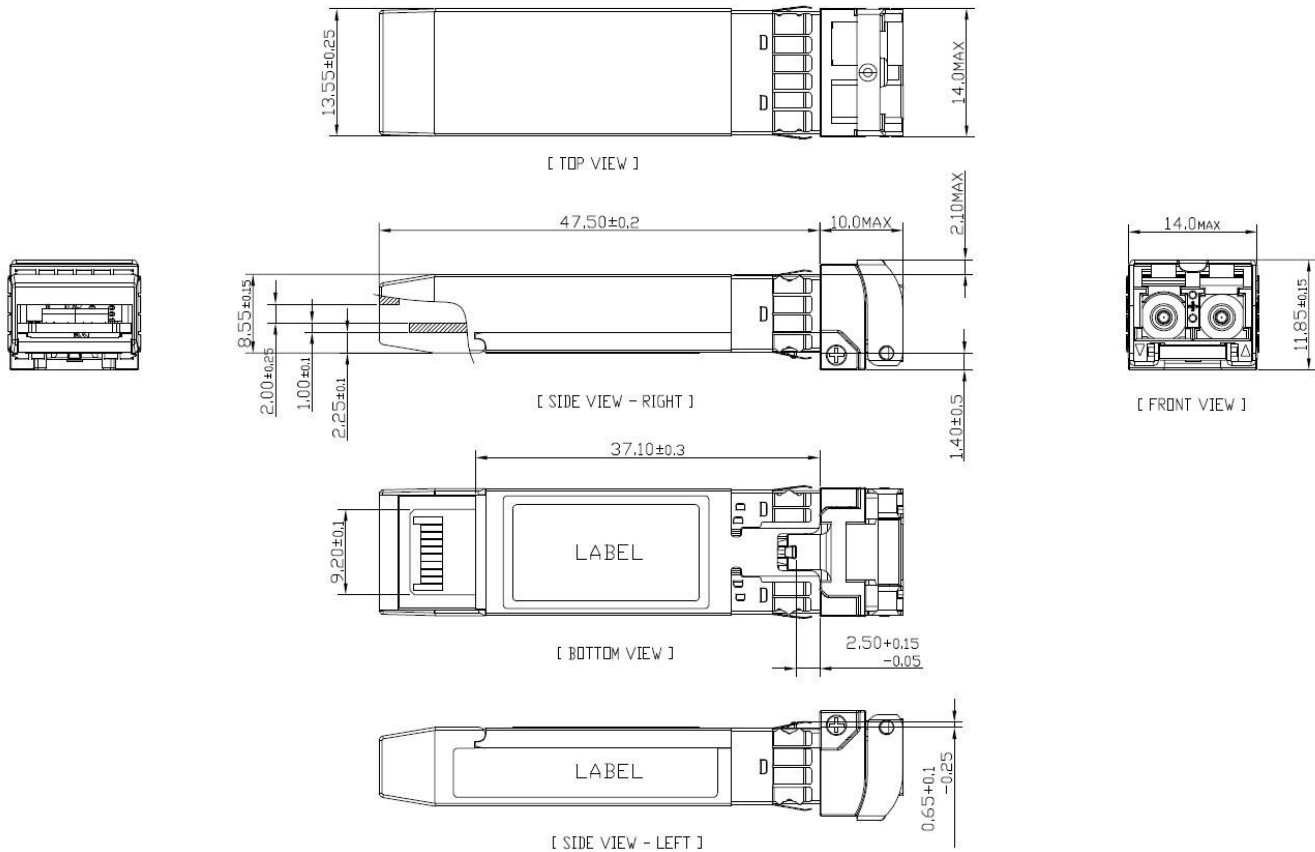
## 4. Link Budget Calculation

(based on the principle of IEEE 802.3ae)

Parameter	10G Base-L	Unit
Power Budget	13.44	dB
Operating Distance	20	km
Channel Insertion Loss	10.4	dB
Allocation for Penalties	3.04	dB
Additional Insertion Loss Allowed	0.0	dB

## 5. Mechanical Diagram

(Unit: mm)



**Note:** External physical characteristics are subject to variation. This may include, but is not limited to, external case designs, pull tab colors and/or shapes, removal latch styles or colors, and label sizes and placement. These variations do not affect the function or characteristics of the transceivers.

## 6. Ordering Information

OEM	Part Number	OEM	Part Number
MSA Generic	AN-CSFPP10G-BX23-20-I		

## 7. Contact Information

Tel: 800.590.9535

Web: <http://www.approvednetworks.com>