

## **SP-SM31010D-GP**

**1310nm SFP+ single-Mode Transceiver, With Diagnostic Monitoring  
10G BASE-LW/LR  
Duplex SFP+ Transceiver, RoHS 6 Compliant**

### **Features**

- ◆ Operating data rate up to 11.1Gbps
- ◆ 1310nm DFB-LD Transmitter
- ◆ Distance up to 10km
- ◆ Single 3.3V Power supply and TTL Logic Interface
- ◆ Duplex LC Connector Interface
- ◆ Hot Pluggable
- ◆ Power Dissipation < 1.0W
- ◆ Compliant with MSA SFP+ Specification SFF-8431
- ◆ Compliant with IEEE 802.3ae 10GBASE-LR/LW
- ◆ Operating Case Temperature

Standard: -5°C~+70°C

Industrial: -40°C~+85°C

### **Applications**

- ◆ 10GBASE-LR at 10.31Gbps
- ◆ 10GBASE-LW at 9.95Gbps
- ◆ Other optical links

### **Ordering information**

<b>Part No.</b>	<b>Description</b>
SP-SM31010D-GP	SFP+ LR 10Gbs 1310nm LC DDM SMF 10km

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### Absolute Maximum Ratings<sup>\*note3</sup>

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T <sub>s</sub>	-40	+85	°C
Supply Voltage	V <sub>CC</sub>	-0.5	3.6	V
Input Voltage	V <sub>in</sub>	-0.5	V <sub>CC</sub>	V
Output Current	I <sub>o</sub>	-	50	mA

Note3: Exceeding any one of these values may destroy the device permanently.

### Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Operating Case Temperature	T <sub>c</sub>	SP-SM31010D-GP	-5	+70	°C
		SP-SM31010DI-GP	-40	+85	
Power Supply Voltage	V <sub>CC</sub>	3.15	3.3	3.45	V
Power Supply Current	I <sub>CC</sub>			300	mA
Surge Current	I <sub>Surge</sub>			+30	mA
Baud Rate		0.6		11.1	Gbps

### Performance Specifications – Electrical

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
<b>Transmitter</b>						
CML Inputs(Differential)	V <sub>in</sub>	150		1200	mVpp	AC coupled inputs
Input AC Common Mode Voltage		0		25	mV	RMS
Input Impedance (Differential)	Z <sub>in</sub>	85	100	115	ohm	R <sub>in</sub> > 100 kohms @ DC
Differential Input S-parameter	S <sub>DD11</sub>	-	-	-10	dB	
Differential to Common Mode Conversion	S <sub>CD11</sub>	-	-	-10	dB	
Tx_DISABLE Input Voltage – High		2		3.45	V	
Tx_DISABLE Input Voltage – Low		0		0.8	V	
Tx_FAULT Output Voltage – High		2		V <sub>CC</sub> +0.3	V	I <sub>o</sub> = 400μA; Host V <sub>CC</sub>
Tx_FAULT Output Voltage – Low		0		0.5	V	I <sub>o</sub> = -4.0mA
<b>Receiver</b>						
CML Outputs (Differential)	V <sub>out</sub>	350		700	mVpp	AC coupled outputs
Output AC Common Mode Voltage		0		15	mV	RMS
Output Impedance (Differential)	Z <sub>out</sub>	90	100	110	ohm	

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Differential Output S-parameter	S <sub>D22</sub>	-	-	-10	dB	
Rx_LOS Output Voltage – High		2		V <sub>CC</sub> +0.3	V	I <sub>o</sub> = 400μA; Host V <sub>CC</sub>
Rx_LOS Output Voltage – Low		0		0.8	V	I <sub>o</sub> = -4.0mA
MOD_DEF ( 0:2 )	VoH	2.5			V	With Serial ID
	VoL	0		0.5	V	

### Performance Specifications – Optical

Parameter	Symbol	Min.	Typical	Max.	Unit	
9μm Core Diameter SMF			10		Km	
Data Rate		0.6		11.1	Gbps	
<b>Transmitter</b>						
Centre Wavelength	λ <sub>C</sub>	1270	1310	1355	nm	
Spectral Width (-20dB)	Δλ			1	nm	
Average Output Power*note4	P <sub>out</sub>	-6		0	dBm	
Extinction Ratio	ER	3.5			dB	
Average Power of OFF Transmitter	P <sub>off</sub>			-30	dBm	
Side Mode Suppression Ratio	SMSR	30			dB	
Transmitter Dispersion Penalty	TDP			3.2	dB	
Input Differential Impedance	Z <sub>IN</sub>	90	100	110	Ω	
TX Disable Assert Time	t <sub>off</sub>	-	-	10	us	
TX_DISABLE Negate Time	t <sub>on</sub>	-	-	1	ms	
TX_BISABLE time to start reset	t <sub>reset</sub>	10	-	-	us	
Time to initialize, include reset of TX_FAULT	t <sub>init</sub>	-	-	300	ms	
TX_FAULT from fault to assertion	t <sub>fault</sub>	-	-	100	us	
Total Jitter	TJ	-	-	0.28	UI(p-p)	
Data Dependant Jitter	DDJ	-	-	0.1	UI(p-p)	
Uncorrelated Jitter	UJ	-	-	0.023	RMS	
<b>Receiver</b>						
Centre Wavelength	λ	1260		1565	nm	
Sensitivity*note5	P <sub>min</sub>			-14.4	dBm	
Receiver Overload	P <sub>max</sub>	0.5			dBm	
Optical Return Loss	ORL			-12	dB	
LOS De-Assert	LOS <sub>D</sub>			-16	dBm	
LOS Assert	LOS <sub>A</sub>	-28			dBm	
LOS	High		2.0		V <sub>CC</sub> +0.3	V
	Low		0		0.8	

Note4: Output is coupled into a 9/125um SMF. The -4.7dBm is reference IEEE 802.3ae, the typical value is -1dBm.

Note5: Minimum average optical power measured at the BER less than 1E-12, back to back. The measure pattern is PRBS 2<sup>31</sup>-1.

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## Mechanical Specifications

