

**SP-SM31040D-GP**

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

**Features**

- ◆ Operating data rate up to 10.3Gbps
- ◆ 1310nm DFB-LD Transmitter
- ◆ Distance up to 40km
- ◆ Single 3.3V Power supply and TTL Logic Interface
- ◆ Duplex LC Connector Interface
- ◆ Hot Pluggable
- ◆ Build-in dual CDR optional
- ◆ Power Dissipation < 1.5W
- ◆ Compliant with MSA SFP+ Specification SFF-8431
- ◆ Compliant with IEEE 802.3ae 10GBASE-ER/EW
- ◆ Operating Case Temperature  
Standard: -5°C ~+70°C  
Industrial: -40°C ~+85°C

**Applications**

- ◆ 10GBASE-ER at 10.31Gbps
- ◆ 10GBASE-EW at 9.95Gbps
- ◆ Other optical links

**Ordering information**

Part No.	Description
SP-SM31040D-GP	SFP+ ER 10Gbs 1310nm LC DDM SMF 40km

**Absolute Maximum Ratings**

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

**Recommended Operating Conditions**

Parameter	Symbol	Min.	Typical	Max.	Unit
Operating Case Temperature	T <sub>c</sub>	SP-SM31040D-GP	-5	+70	°C
		SP-SM31040DI-GP	-40	+85	
Power Supply Voltage	V <sub>CC</sub>	3.15	3.3	3.45	V
Power Supply Current	I <sub>CC</sub>			430	mA
Surge Current	I <sub>Surge</sub>			+30	mA
Baud Rate	10GBASE-ER		10.31		Gbps
	10GBASE-EW		9.95		

**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	
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				40		Km
Data Rate					10.3	Gbps
<b>Transmitter</b>						
Centre Wavelength		λ <sub>C</sub>	1270	1310	1355	nm
Spectral Width (-20dB)		Δλ			1	nm
Average Output Power		P <sub>out</sub>	-1		+4	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			2	dB
Input Differential Impedance		Z <sub>IN</sub>	90	100	110	Ω
TX Disable	Disable		2.0		V <sub>CC</sub> +0.3	V
	Enable		0		0.8	
TX Fault	Fault		2.0		V <sub>CC</sub> +0.3	V
	Normal		0		0.8	
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		P <sub>min</sub>			-15	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>	-25			dBm
LOS	High		2.0		V <sub>CC</sub> +0.3	V
	Low		0		0.8	

**Mechanical Specifications**

