

SP-SM31020D-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 10.3Gbps
- ◆ 1310nm DFB-LD Transmitter
- ◆ Distance up to 20km
- ◆ Single 3.3V Power supply and TTL Logic Interface
- ◆ Duplex LC Connector Interface
- ◆ Hot Pluggable
- ◆ Power Dissipation < 1.5W
- ◆ 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
- ◆ Other optical links

Ordering information

Part No.	Description
SP-SM31020D-GP	SFP+ LR 10Gbs 1310nm LC DDM SMF 20km

Absolute Maximum Ratings*note3

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T _s	-40	+85	°C
Supply Voltage	V _{CC}	-0.5	3.6	V
Input Voltage	V _{in}	-0.5	V _{CC}	V
Output Current	I _o	-	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 _c	SP-SM31020D-GP	-5		+70	°C
		SP-SM31020DI-GP	-40		+85	
Power Supply Voltage	V _{CC}	3.15	3.3	3.45	V	
Power Supply Current	I _{CC}			430	mA	
Surge Current	I _{Surge}			+30	mA	
Baud Rate	10GBASE-LR		10.31		Gbps	
	10GBASE-LW		9.95			

Performance Specifications – Electrical

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

Output AC Common Mode Voltage		0		15	mV	RMS
Output Impedance (Differential)	Z _{out}	90	100	110	ohm	
Differential Output S-parameter	S _{D22}	-	-	-10	dB	
Rx_LOS Output Voltage – High		2		V _{CC} +0.3	V	I _o = 400μA; Host V _{CC}
Rx_LOS Output Voltage – Low		0		0.8	V	I _o = -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				20		Km
Data Rate					10.3	Gbps
Transmitter						
Centre Wavelength		λ _C	1270	1310	1355	nm
Spectral Width (-20dB)		Δλ			1	nm
Average Output Power*note4		P _{out}	-3		+1	dBm
Extinction Ratio		ER	3.5			dB
Average Power of OFF Transmitter		P _{off}			-30	dBm
Side Mode Suppression Ratio		SMSR	30			dB
Transmitter Dispersion Penalty		TDP			2	dB
Input Differential Impedance		Z _{IN}	90	100	110	Ω
TX Disable	Disable		2.0		V _{CC} +0.3	V
	Enable		0		0.8	
TX Fault	Fault		2.0		V _{CC} +0.3	V
	Normal		0		0.8	
TX Disable Assert Time		t _{off}	-	-	10	us
TX_DISABLE Negate Time		t _{on}	-	-	1	ms
TX_BISABLE time to start reset		t _{reset}	10	-	-	us
Time to initialize, include reset of TX_FAULT		t _{init}	-	-	300	ms
TX_FAULT from fault to assertion		t _{fault}	-	-	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
Receiver						
Centre Wavelength		λ	1260		1565	nm
Sensitivity*note5		P _{min}			-14.4	dBm
Receiver Overload		P _{max}	0.5			dBm
Optical Return Loss		ORL			-12	dB

LOS De-Assert		LOS _D			-15	dBm
LOS Assert		LOS _A	-25			dBm
LOS	High		2.0		V _{CC} +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 2³¹-1.

Mechanical Specifications

