

## QSP-50SM31-40C

### Features

- Supports 50GBASE-ER;
- Lane signaling rate 26.5625 Gb/s with PAM4;
- Up to 40km transmission on SMF;
- EML laser and APD receiver;
- High speed I/O electrical interface (CAUI-4);
- I2C interface with integrated Digital Diagnostic monitoring;
- QSFP28 MSA package with duplex LC connector;
- Single +3.3V power supply;
- Maximum power consumption 4.5 W;
- Operating case temperature: 0 to +70 ° C;
- Compliant to IEEE 802.3cn v0.1;
- Compliant to SFF-8636 and SFF-8679;
- Complies with EU Directive 2015/863/EU;



### Application

- 50GBASE-ER;

### Absolute Maximum Ratings

Table 1-Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Storage Temperature	T <sub>S</sub>	-40	-	+85	°C	
Supply Voltage	V <sub>CC</sub>	-0.5	-	+4.0	V	
Operating Relative Humidity	RH	5	-	+85	%	

### Recommended Operating Conditions

Table 2-Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	TC	0	-	+70	°C	
Power Supply Voltage	VCC	3.13	3.3	3.47	V	

Power Supply Current	ICC	-	-	1.3	A	
Maximum Power Dissipation	PD	-	-	4.5	W	
Data Rate(optical)	DRo	-	53.125	-	Gb/s	
Data Rate(Electrical)	DRe	-	26.5625	-	Gb/s	
Transmission Distance	TD	-	-	40	km	Over SMF

## Optical Characteristics

Table 3-Optical Characteristics

Transmitter						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Center Wavelength	CW	1304.5	1311	1317.5	nm	
Side-mode Suppression ratio	SMSR	30			dB	
Average Launch Power	PTX	0.4	-	6.63	dBm	Note 1
Outer Optical Modulation Amplitude	OMA	3.4	-	7.4	dBm	Note 2
Launch power in OMA minus TDECQ(min)	OMA-TDECQ	2	-	-	dB	Note 3
Transmitter and dispersion eye closure for PAM4 (TDECQ) (max)	TDECQ	-	-	3.2	dBm	
Average Output Power (Laser Turn off)	P0UT-OF F	-	-	-30	dBm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Extinction Ratio	ER	6	-	-	dB	
Receiver						
Center Wavelength	CW	1304.5	1311	1317.5	nm	
Damage threshold	Pdamage	-2.37	-	-	dBm	Note 4
Average Rx Power	PRx	-17.6	-	-3.37	dBm	Note 5
Receive power (OMAAouter) (max)	Poma	-	-	-2.6	dBm	
Receiver sensitivity _OMA	SEN _OMA	-	-	-15.1	dBm	@BER 2.4E-4
Stressed receiver sensitivity (OMAAouter) (max)	SRS	-	-	-13.3	dBm	@BER 2.4E-4
Conditions of stressed receiver sensitivity test						
Stressed eye closure for PAM4 (SECQ)	SECQ	-	-	3.2	dB	
SECQ – 10log10(Ceq)f (max)		-	-	3.2	dB	

**Notes:**

1. Average launch power(min) is informative and not the principal indicator of signal strength. A transmitter with launch power below this value cannot be compliant; however, a value above this does not ensure compliance.
2. Even if the TDECQ < 1dB, the OMA (min) must exceed this value.
3. TDECQ is the Transmitter and Dispersion eye closure for PAM4.
4. The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level.
5. Average received power(min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance.

## Electrical Characteristics

**Table 5-Electrical Characteristics**

Transmitter (Module Input)						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Input Differential Impedance	Rin	-	100	-	Ohm	
Differential Data Input Amplitude	VIN,P-P	80	-	900	mVpp	
Differential termination mismatch (max)	D-mismatch	-	-	10%		
DC common-mode input voltage		-0.3	-	2.8	V	
Transition time(20%~80%)	Tr Tf	10	-	-	ps	
LPMODE, Reset and ModSelL, V in low	VIL	-0.3	-	0.8	V	
LPMODE, Reset and ModSelL, V in high	VIH	2.0	-	VCC+0.3	V	
Receiver (Module Output)						
Output Differential Impedance	Rout	-	100	-	Ohm	
Differential Data Output Amplitude	VOUT,P-P	-	-	900	mVpp	
Differential termination mismatch (max)	D-mismatch	-	-	10	%	
Transition time, 20% to 80%	Tr Tf	12	-		ps	
ModPrsL and IntL, V out low	VOL	0	-	0.4	V	
ModPrsL and IntL, V out high	VOH	VCC-0.5	-	VCC+0.3	V	

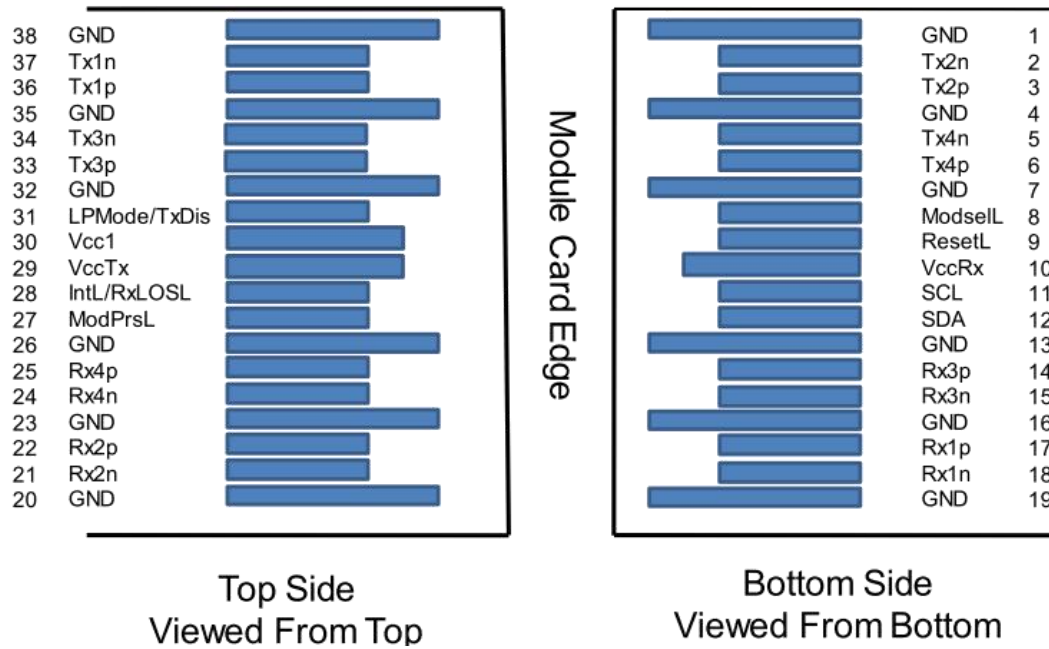
## Digital Diagnostics

**Table 6-Digital Diagnostics**

Parameter	Range	Accuracy	Unit	Calibration
Temperature	0 to 70	±3	°C	Internal
Voltage	0 to VCC	0.1	V	Internal
Tx Bias Current	0 to 100	10%	mA	Internal
Tx Output Power	0.4 to 6.63	±3	dBm	Internal
Rx Power	-17.6 to -3.37	±3	dBm	Internal

## Pin Assignment

Pin Diagram



## Pin Descriptions

Table 6- Pin Descriptions

PIN	Logic	Symbol	Description	Plug Seq.	Notes
1		GND	Ground	1	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	3	
3	CML-I	Tx2p	Transmitter Non-Inverted Data output	3	
4		GND	Ground	1	1
5		NC		3	
6		NC		3	
7		GND	Ground	1	1
8	LVTLL-I	ModSelL	Module Select	3	
9	LVTLL-I	ResetL	Module Reset	3	
10		VccRx	+ 3.3V Power Supply Receiver	2	2
11	LVC MOS-I/O	SCL	2-Wire Serial Interface Clock	3	
12	LVC MOS-I/O	SDA	2-Wire Serial Interface Data	3	
13		GND	Ground	1	
14		NC		3	
15		NC		3	
16		GND	Ground	1	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3	

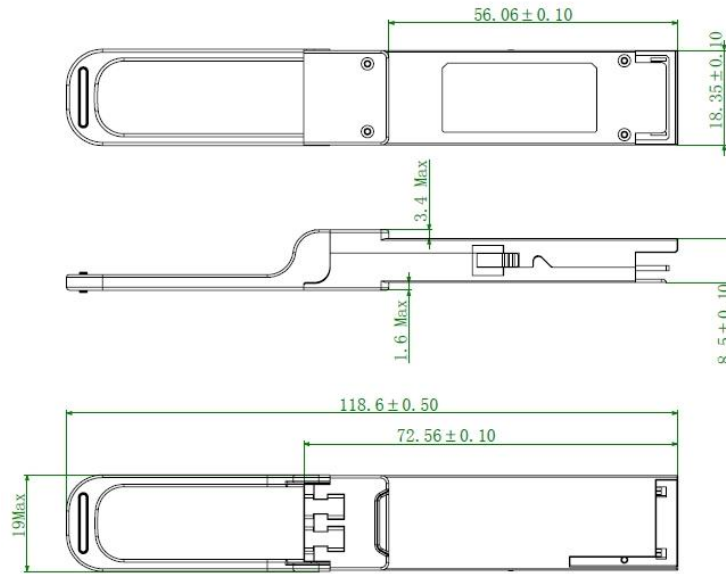
18	CML-O	Rx1n	Receiver Inverted Data Output	3	
19		GND	Ground	1	1
20		GND	Ground	1	1
21	CML-O	Rx2n	Receiver Inverted Data Output	3	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3	
23		GND	Ground	1	1
24		NC		3	
25		NC		3	
26		GND	Ground	1	1
27	LVTTTL-O	ModPrsL	Module Present	3	
28	LVTTTL-O	IntL	Interrupt	3	
29		VccTx	+3.3 V Power Supply transmitter	2	2
30		Vcc1	+3.3 V Power Supply	2	2
31	LVTTTL-I	LPMODE	Low Power Mode	3	
32		GND	Ground	1	1
33		NC		3	
34		NC		3	
35		GND	Ground	1	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	3	
37	CML-I	Tx1n	Transmitter Inverted Data Output	3	
38		GND	Ground	1	1

**Note :**

1.GND is the symbol for signal and supply (power) common for the QSFP28 module. All are common within the QSFP28 module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.

2.Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently. Requirements defined for the host side of the Host Edge Card Connector are listed in MSA. The connector pins are each rated for a maximum current of 1000 mA.

## Mechanical Dimension



## Order Information

Table 1- order information

Part Number	Description
QSP-50SM31-40C	53.125Gbps, 1310nm, SMF, 40km, LC, 0~70C, with DDM

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