QFP-SM31FG-02DC

QSFP+ PSM4 40Gb/s 2km Transceiver

Product Features

- Four-channel full-duplex transceiver modules
- Transmission data rate up to 11.2Gbit/s per channel
- Up to 2km transmission of single mode fiber
- Low power consumption <2.5W,meet class 3
- 3.3V power supply voltage
- Hot Pluggable QSFP+ form factor
- Single MPO connector receptacle
- Built-in digital diagnostic function
- RoHS 6 compliant
- Operating case temperature: 0℃ to +70℃

Applications

- Infiniband QDR and DDR Interconnects
- 40G Ethernet
- Proprietary High Speed Interconnections
- Data center

Functional Description

The QFP-SM31FG-02DC is a Four-Channel, Pluggable, Parallel, Fiber-Optic QSFP+ Transceiver for InfiniBand QDR/DDR/SDR, 10G/8G/4G/2G fiber channel, PCIe and SAS Applications. The QSFP full-duplex optical module offers 4 independent transmit and receive channels, each capable of 11.2Gbps operation for an aggregate data rate of 40Gbps 2km using single mode fiber. These modules are designed to operate over single mode fiber systems using 1310nm DFB laser array. An optical fiber ribbon cable with an MPO/MTP^{TM} connector can be plugged into the QSFP module receptacle. QSFP+ PSM IR4 is one kind of parallel transceiver which provides increased port density and total system cost savings.

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Absolute Maximum Ratings

The operation in excess of any absolute maximum ratings mig ht cause permanent damage to this module.

Parameter	Symbol	Min.	Max.	Unit	Note
Supply Voltage	V_{CC}	-0.3	3.6	V	
Storage Temperature	T_S	-40	85	°C	
Operating Case Temperature	TOP	0	70	°C	
Relative Humidity	R_H	0	85	%	
Input Voltage	Vin	-0.3	Vcc+0.3	V	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Operating Case Temperature	TOP	0		70	C	
Power Supply Voltage	VCC	3.135	3.3	3.465	V	
Power Consumption			1.7	2.5	W	
Data Rate	DR		10.3		Gbps	
Data Speed Tolerance	Δ DR	-100		+100	ppm	
Link Distance with G.652	D	0		2	km	

Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Differential input impedance	Zin	90	100	110	ohm	
Differential Output impedance	Zout	90	100	110	ohm	
Differential input voltage amplitude	ΔVin	300		1100	mVp-p	
Differential output voltage amplitude	ΔVout	500		800	mVp-p	
Bit Error Rate	BR			E-12		
Input Logic Level High	VIH	2.0		VCC	V	
Input Logic Level Low	VIL	0		0.8	V	
Output Logic Level High	VOH	VCC-0 .5		VCC	V	
Output Logic Level Low	VOL	0		0.4	V	

Optical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Transmitter						
Center Wavelength	λC	1270	1310	1350	nm	1
Average Launch Power, each lane	PAVG	-5.5	-0.5	+2.3	dBm	
Optical Modulation Amplitude (OMA)	POMA	-4.5	-0.5	+3.5	dBm	1
Difference in Launch Power between any two lanes	Ptx,diff			5.0	dB	
Launch Power in OMA minus Transmitter and Dispersion Penalty (TDP), each Lane	OMA-TDP	-9.7			dBm	1
Rise/Fall Time	Tr/Tf			50	ps	

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Extinction Ratio	ER	3.5			dB	
Relative Intensity Noise	Rin			-128	dB/Hz	
Optical Return Loss Tolerance	TOL			12	dB	
Transmitter Reflectance	RT			-12	dB	
Transmitter Eye Mask Margin	EMM	10			%	2
Transmitter Eye Mask Definition {X1, X2, X3, Y1, Y2, Y3}		{0.25, 0.4, 0.45, 0.25, 0.28, 0.4}				
Average Launch Power OFF Transmitter, each Lane	Poff			-30	dBm	
Receiver						
Center Wavelength	λC	1270	1310	1350	nm	
Damage Threshold	THd	+3			dBm	
Overload, each lane	OVL	+2.3			dBm	
Receiver Sensitivity in OMA, each Lane	SEN			-11 .5	dBm	
Difference in Receive Power between any two Lanes (OMA)	Prx,diff			5.0	dB	
Signal Loss Assert Threshold	LOSA	-30			dBm	
Signal Loss Deassert Threshold	LOSD			-15	dBm	
LOS Hysteresis	LOSH	0.5		6	dB	
Optical Return Loss	ORL			-12	dBm	
Receive Electrical 3 d B upper Cutoff Frequency, each Lane	Fc			12	GHz	

Notes:

1.   Transmitter wavelength, power need to meet the OMA minus TDP specs to guarantee link performance.

2.   The eye diagram is tested with 1000 waveform.

Digital Diagnostic Functions

Digital diagnostics monitoring function is available on all FIBERTOP QSFP+ PSM LR4. A 2-wire serial interface provides user to contact with module. The structure of the memory is shown in Figure 3. The memory space is arranged into a lower, single page, address space of 128 bytes and multiple upper address space pages. This structure permits timely access to addresses in the lower page, such as Interrupt Flags and Monitors. Less time critical time entries, such as serial ID information and threshold settings, are available with the Page Select function. The interface address used is A0xh and is mainly used for time critical data like interrupt handling in order to enable a one-time-read for all data related to an interrupt situation. After an interrupt, IntL, has been asserted, the host can read out the flag field to determi ne the affected channel and type of flag.

| Parameter	Symbol	Min	Max	Unit	Notes
Temperature monitor absolute error	DMI_Temp	-3	+3	C	Over operating temp
Supply voltage monitor absolute error	DMI _VCC	-0. 1	+0.1	V	Over Full operating range
Channel RX power monitor absolute error	DMI_ RX	-3	+3	dB	1
Channel Bias current monitor	DMI_ Ibias	-10%	+10%	mA	
Channel TX power monitor absolute error	DMI_Tx	-3	+3	dB	1

Power Supply Filtering
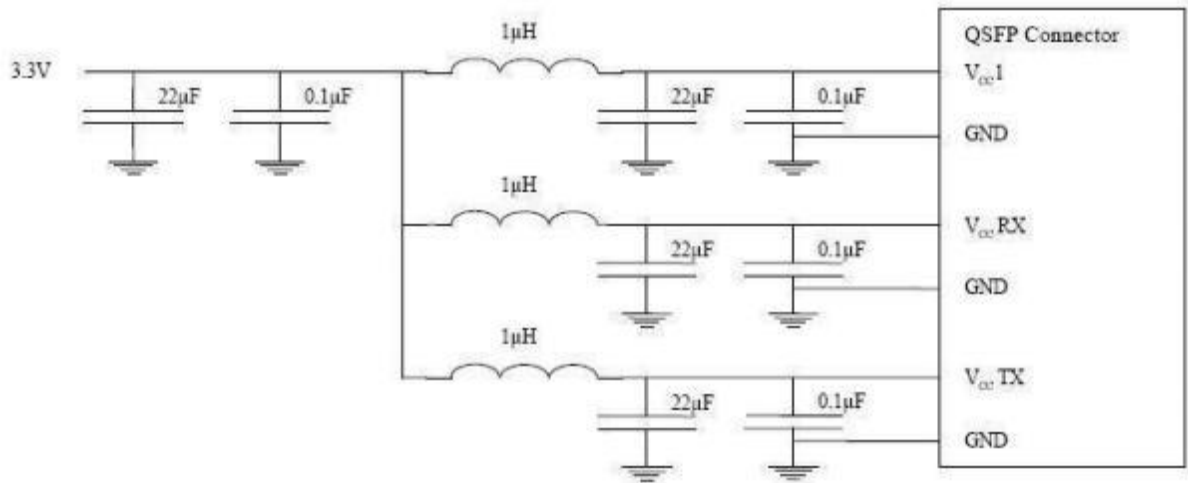
Figure1. Host Board Power Supply Filtering

Optical Interface Lanes and Assignment

The optical interface port is a male MPO connector. The four fiber positions on the left as shown in Figure 2, with the key up, are used for the optical transmit signals (Channel 1 through4). The fiber positions on the right are used for the optical receive signals (Channel 4 through 1). The central four fibers are physically present.
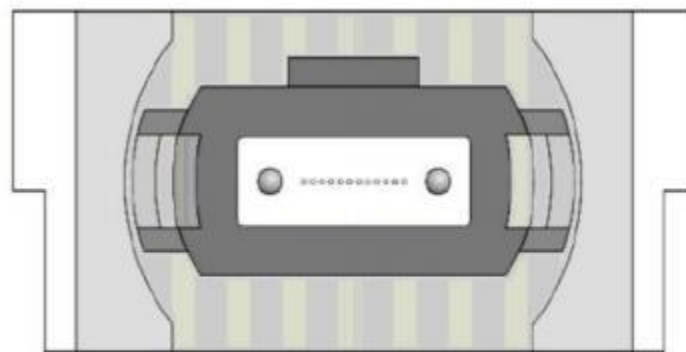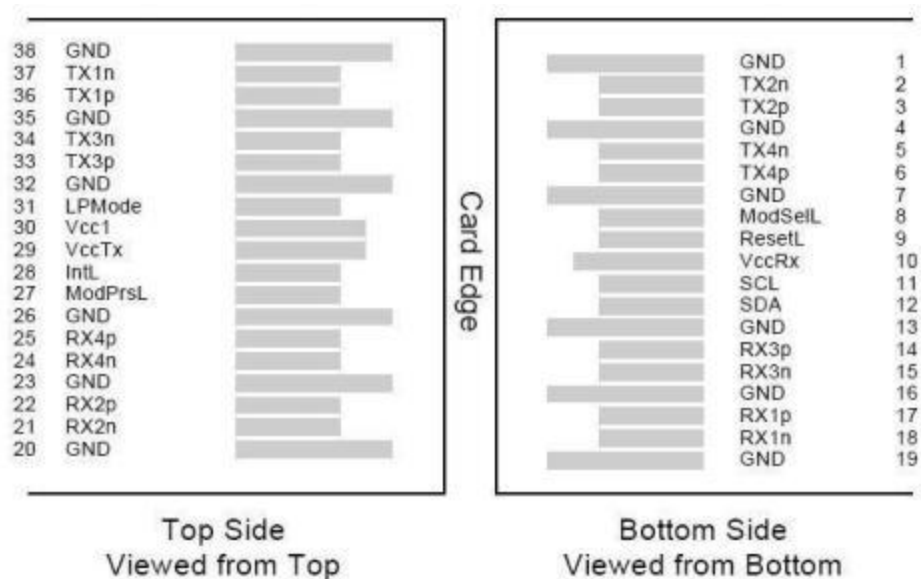

Transmit Channels: 1 2 3 4
Unused positions: x x x x
Receive Channels: 4 3 2 1

Figure 2. Optical Receptacle and Channel Orientation

ESD

This transceiver is specified as ESD threshold 1 kV for SFI pins and 2 kV for all other electrical input pins, tested per MIL-STD-883, Method 3015.4 /JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

Pin Description

38	GND
37	TX1n
36	TX1p
35	GND
34	TX3n
33	TX3p
32	GND
31	LPMode
30	Vcc1
29	VccTx
28	IntL
27	ModPrsL
26	GND
25	RX4p
24	RX4n
23	GND
22	RX2p
21	RX2n
20	GND

Card Edge

GND	1
TX2n	2
TX2p	3
GND	4
TX4n	5
TX4p	6
GND	7
ModSelL	8
ResetL	9
VccRx	10
SCL	11
SDA	12
GND	13
RX3p	14
RX3n	15
GND	16
RX1p	17
RX1n	18
GND	19

Top Side
Viewed from Top

Bottom Side
Viewed from Bottom

ModSelL Pin

The ModSelL is an input pin. When held low by the host, the module responds to 2-wi re serial communication commands. The ModSelL allows the use of multiple QSFP modules on a single 2-wire interface bus. When the ModSelL is "High ", the module will not respond to any 2-wire interface communication from the host. ModSelL has an internal pull-up in the module.

ResetL Pin

Reset. LPMode_ Reset has an internal pull-up in the module. A low level on the Reset L pin for longer than the minimum pulse length (t_Reset_i nit) initiates a complete module reset, returning all user module settings to their default state. Module Reset Assert Time (t_init) starts on the rising edge after the low level on the Reset L pin is released. During the execution of a reset (t_init) the host

shall disregard all status bits until the module indicates a completion of the reset interrupt. The module indicates this by posting an   IntL signal with the Data_Not_Ready bit negated. Note that on power up (including hot insertion) the module will post this completion of reset interrupt without requiring a reset.

LPMode Pin

FIBERTOP PSM IR4 operate in the low power mode (less than 1.5 W power consumption) This pin active high will decrease power consumption to less than 1W.

ModPrsL Pin

Mod PrsL is pulled up to Vcc on the host board and grounded in the module. The Mod PrsL is asserted "Low" when the module is inserted and deasserted "High " when the module is physically absent from the host connector.

IntL Pin

IntL is an output pin. When "Low", it indicates a possible module operational fault or a status critical to the host system. The host identifies the source of the interrupt by using the 2-wire serial interface. The IntL pin is an open collector output and must be pulled up to Vcc on the host board.

Pin	Logic	Symbol	Description	Notes
1		GND	Ground	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	
3	CML-I	Tx2p	Transmitter Non-Inverted Data output	
4		GND	Ground	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	
6	CML-I	Tx4p	Transmitter Non-Inverted Data output	
7		GND	Ground	1
8	LVTLL-I	ModSelL	Module Select	
9	LVTLL-I	ResetL	Module Reset	
10		VccRx	+3.3V Power Supply Receiver	2
11	LVCMOS-I/O	SCL	2-Wire Serial Interface Clock	

Pin	Logic	Symbol	Description	Notes
12	LVCMOS-I/O	SDA	2-Wire Serial Interface Data	
13		GND	Ground	
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	
15	CML-O	Rx3n	Receiver Inverted Data Output	
16		GND	Ground	1
17	CML-O	Rx 1p	Receiver Non-Inverted Data Output	
18	CML-O	Rx 1n	Receiver Inverted Data Output	
19		GND	Ground	1
20		GND	Ground	1
21	CML-O	Rx2n	Receiver Inverted Data Output	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	
23		GND	Ground	1
24	CML-O	Rx4n	Receiver Inverted Data Output	1
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	
26		GND	Ground	1
27	LVTTL-O	ModPrsL	Module Present	
28	LVTTL-O	IntL	Interrupt	
29		VccTx	+3.3 V Power Supply transmitter	2
30		Vcc1	+3.3 V Power Supply	2
31	LVTTL-I	LPMode	Low Power Mode	
32		GND	Ground	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	
34	CML-I	Tx3n	Transmitter Inverted Data Output	
35		GND	Ground	1
36	CML-I	Tx 1p	Transmitter Non-Inverted Data Input	
37	CML-I	Tx 1n	Transmitter Inverted Data Output	
38		GND	Ground	1

Notes:

1. Module circuit ground is isolated from module chassis ground within the module. GND is the symbol for signal and supply（power）common for QSFP modules.

2. The connector pins are each rated for a maximum current of 500mA.

Package Dimensions

Shen Zhen Fibertop Technology Co.,Ltd

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http://www.fibertopsfp.com
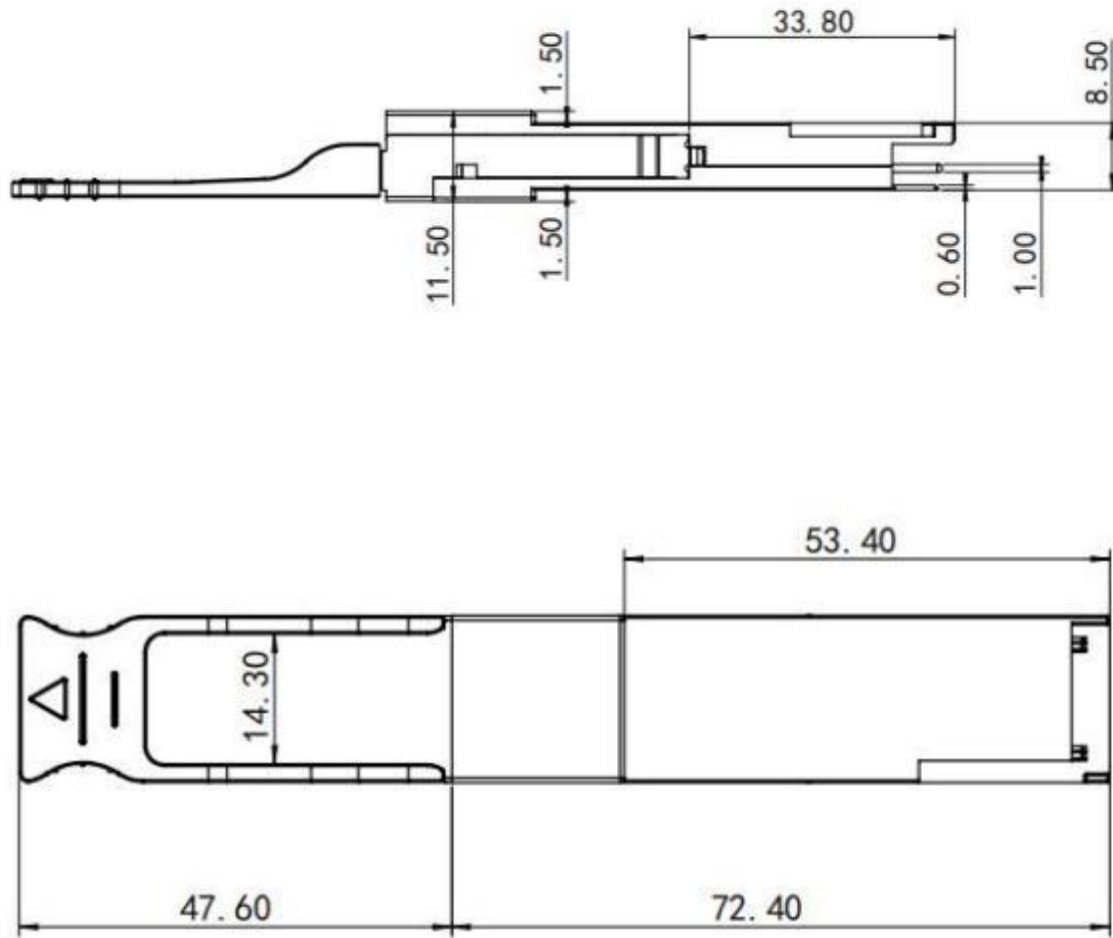
Ordering information

Part Number	Product Description
QFP-SM31FG-02DC	40Gbps QSFP+ PSM4,MPO 12-APC, 2km, 0°C~+70°C, with DDM

For More Information

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