

QFP-SM31FG-10DC

40Gbps QSFP+ Transceiver, Single Mode, 10km Reach

Product Features

- 4 independent full-duplex channels
- Up to 11.2Gbps per channel bandwidth
- Aggregate bandwidth of > 40Gbps
- MTP/MPO connector
- Compliant with 40G Ethernet IEEE802.3ba and 40GBASE-LR4 Standard
- QSFP MSA compliant
- Up to 10km transmission
- Compliant with QDR/DDR Infiniband data rates
- Single +3.3V power supply operating
- Built-in digital diagnostic functions
- RoHS Compliant Part
- Temperature range 0°C to 70°C

Applications

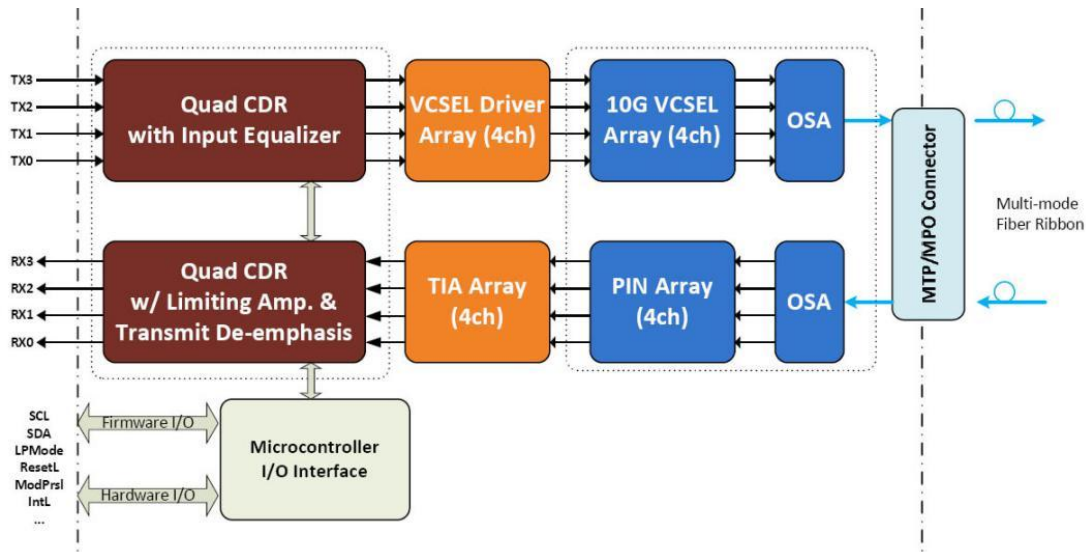
- Rack to rack
- Data centers Switches and Routers
- Metro networks
- Switches and Routers
- 40G BASE-LR4-PSM Ethernet Links

Description

The QFP-SM31FG-10DC transceiver is designed for 10km optical communication applications, which compliant to 40GBASE-LR4 of the IEEE P802.3ba standard. The module converts 4 inputs channels (ch) of 10Gb/s electrical data to 4 optical signals, and multiplexes them into a single channel for 40Gb/s optical transmission. Reversely, on the receiver side, the module optically de-multiplexes a 40Gb/s input into 4 channels signals, and converts them to 4 channel output electrical data.

The central wavelengths of the 4 channels is 1310 nm as members of the wavelength grid defined in ITU-T G694.2. It contains a MTP/MPO connector for the optical interface and a 38-pin connector for the electrical interface. To minimize the optical dispersion in the long-haul system, single-mode fiber (SMF) has to be applied in this module.

The product is designed with form factor, optical/electrical connection and digital diagnostic interface according to the QSFP Multi-Source Agreement (MSA). It has been designed to meet the harshest external operating conditions including temperature, humidity and EMI interference. The module operates from a single +3.3V power supply and LVCMOS/LVTTL global control signals such as Module Present, Reset, Interrupt and Low Power Mode are available with the modules. A 2-wire serial interface is available to send and receive more complex control signals and to obtain digital diagnostic information. Individual channels can be addressed and unused channels can be shut down for maximum design flexibility.



Transceiver functional diagram

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.
Storage Temperature	T _s	-40		+85
Supply Voltage	V _{ccT, R}	-0.5		4
Relative Humidity	RH	0		85

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Case operating Temperature	T _c	0		+70	°C
Supply Voltage	V _{CCT,R}	+3.13	3.3	+3.47	V
Supply Current	I _{CC}			1000	mA
Power Dissipation	PD			3.5	W

Optical and Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Note
Data Rate per Channel		-	10.3125	11.2	Gbps	
Control I/O Voltage-High	V _{IH}	2.0		V _{CC}	V	
Control I/O Voltage-Low	V _{IL}	0		0.7	V	
Inter-Channel Skew	TSK			150	ps	
RESETL Duration			10		us	
RESETL De-assert time				100	ms	
Power On Time				100	ms	
Transmitter						
Single Ended Output Voltage Tolerance		0.3		4	V	1
Common mode Voltage Tolerance		15			mV	
Transmit Input Diff Voltage	V _I	150		1200	mV	
Transmit Input Diff Impedance	Z _{IN}	85	100	115		
Data Dependent Input Jitter	DDJ		0.3		UI	
Receiver						
Single Ended Output Voltage Tolerance		0.3		4	V	
Rx Output Diff Voltage	V _O	370	600	950	mV	
Rx Output Rise and Fall Voltage	Tr/Tf			35	ps	1
Total Jitter	T _J		0.3		UI	

Note:

1. 20~80%

Optical Parameters

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Wavelength Assignment		1300	1311	1320	nm	
Side-mode Suppression Ratio	SMSR	30	-	-	dB	
Average Optical Power per Channel		-5	-	+1	dBm	
TDP, each Lane	TDP			2.3	dB	
Extinction Ratio	ER	3.5	-	-	dB	
Transmitter Eye Mask Definition {X1, X2, X3, Y1, Y2, Y3}		{0.25, 0.4, 0.45, 0.25, 0.28, 0.4}				
Optical Return Loss Tolerance		-	-	20	dB	
Average Launch Power OFF Transmitter, each Lane	Poff			-30	dBm	
Relative Intensity Noise	Rin			-128	dB/HZ	1
Optical Return Loss Tolerance		-	-	12	dB	
Receiver						
Damage Threshold	THd	3.3			dBm	1
Average Power at Receiver Input, each Lane	R	-12.6		0	dBm	
Receive Electrical 3 dB upper Cut off Frequency, each Lane				12.3	GHz	
Receiver Reflectance	Rrx			-26	dB	
Receiver Power (OMA), each Lane		-	-	3.5	dBm	
Receive Electrical 3 dB upper Cutoff Frequency, each Lane				12.3	GHz	
LOS De-Assert	LOS _D			-13	dBm	
LOS Assert	LOS _A	-25			dBm	
LOS Hysteresis	LOS _H	0.5			dB	

Note

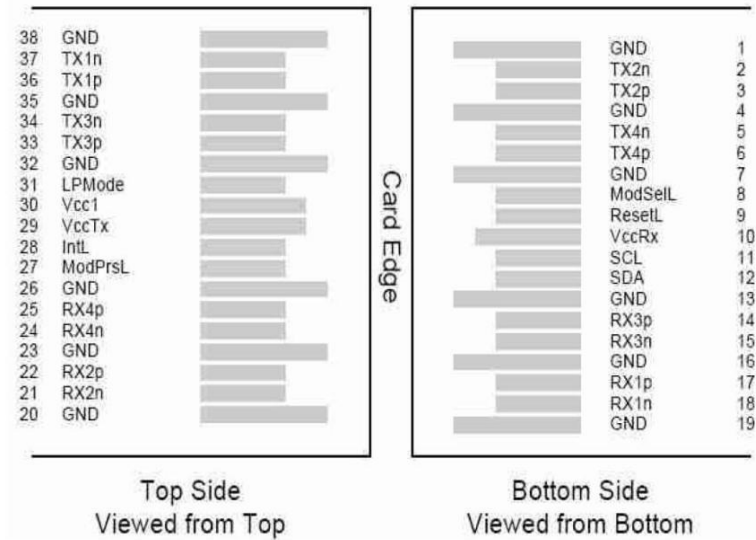
1. 12dB Reflection

Digital Diagnostic Memory Map

Digital diagnostics monitoring function is available on all QSFP+ LR4. A 2-wire serial interface provides user to contact with module. The structure of the memory is shown in flowing. 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 determine the affected channel and type of flag.

Pin Descriptions



Pin	Logic	Symbol	Name/Description	Ref.
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 Output	
6	CML-I	Tx4p	Transmitter Non-Inverted Data Output	
7		GND	Ground	1
8	LVTTL-I	ModSelL	Module Select	
9	LVTTL-I	ResetL	Module Reset	
10		VccRx	+3.3V Power Supply Receiver	2
11	LVC MOS-I/O	SCL	2-Wire Serial Interface Clock	
12	LVC MOS-I/O	SDA	2-Wire Serial Interface Data	
13		GND	Ground	1
14	CML-O	Rx3p	Receiver Inverted Data Output	
15	CML-O	Rx3n	Receiver Non-Inverted Data Output	
16		GND	Ground	1

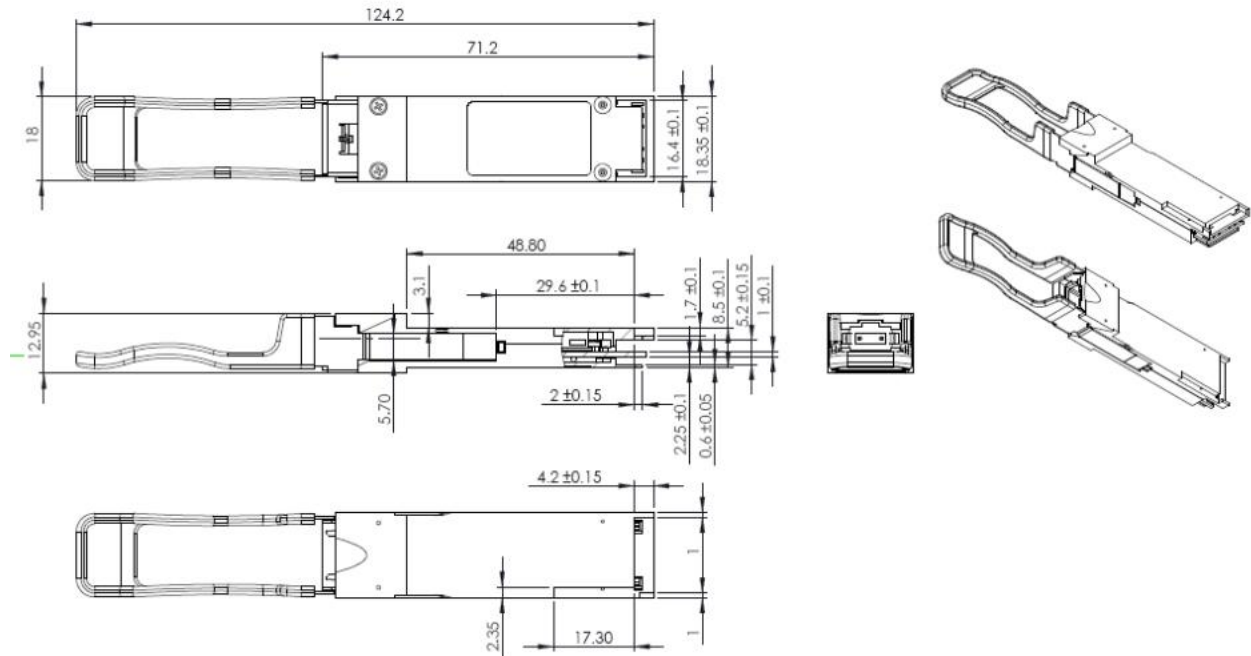
17	CML-O	Rx1p	Receiver Inverted Data Output	
18	CML-O	Rx1n	Receiver Non-Inverted Data Output	
19		GND	Ground	1
20		GND	Ground	1
21	CML-O	Rx2n	Receiver Inverted Data Output	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	
23		GND	Ground	1
24	CML-O	Rx4n	Receiver Inverted Data Output	
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	
26		GND	Ground	1
27	LVTTL-O	ModPrsL	Module Present	
28	LVTTL-O	IntL	Interrupt	
29		VccTx	+3.3V Power Supply Transmitter	2
30		Vcc1	+3.3V Power Supply	2
31	LVTTL-I	LPMODE	Low Power Mode	
32		GND	Ground	1
33	CML-I	Tx3p	Transmitter Inverted Data Output	
34	CML-I	Tx3n	Transmitter Non-Inverted Data Output	
35		GND	Ground	1
36	CML-I	Tx1p	Transmitter Inverted Data Output	
37	CML-I	Tx1n	Transmitter Non-Inverted Data Output	
38		GND	Ground	1

Notes:

1. GND is the symbol for single and supply(power) common for QSFP modules, All are common within the QSFP module and all module voltages are referenced to this potential otherwise noted. Connect these directly to the host board signal common ground plane. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.

2. VccRx, Vcc1 and VccTx are the receiver and transmitter power suppliers and shall be applied concurrently. Recommended host board power supply filtering is shown below. VccRx, Vcc1 and VccTx may be internally connected within the QSFP transceiver module in any combination. The connector pins are each rated for maximum current of 500mA.

Mechanical Dimensions



Ordering information

Part Number	Product Description
QFP-SM31FG-10DC	1310nm, 40Gbps, PSM4 10km, 0°C~+70°C, with DDM

For More Information

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