

## Product Features

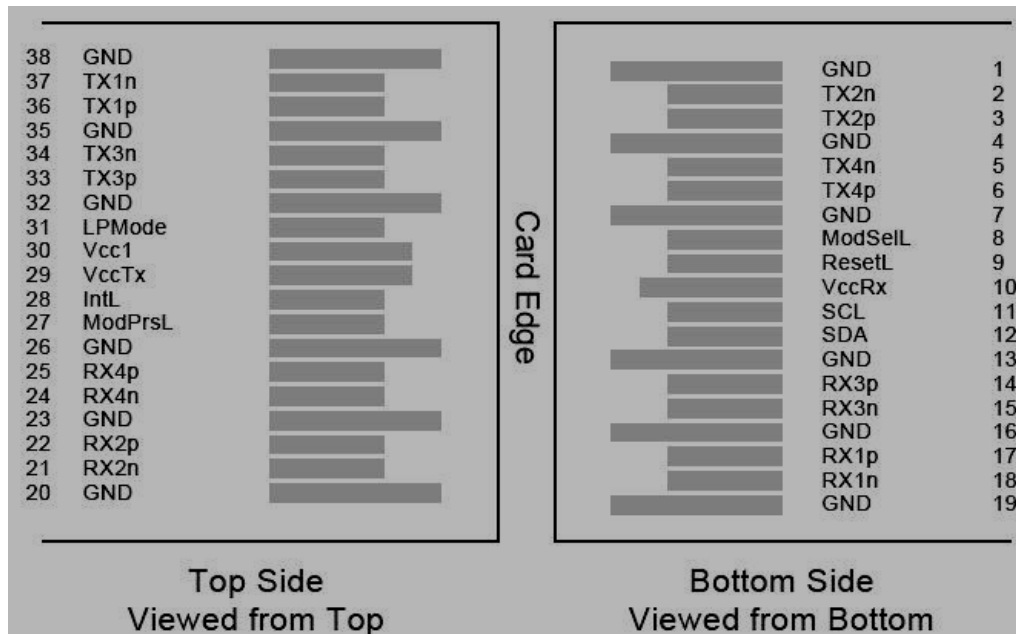
- 4 independent full-duplex channels  
Up to 11.2Gbps data rate per channel
- MTP/MPO optical connector
- QSFP MSA compliant
- Digital diagnostic capabilities
- Capable of over 100m transmission on OM3 multi-mode ribbon fiber
- Single +3.3V power supply
- Operating case temperature: 0~70C
- Maximum 1.5W operation power
- RoHS-6 compliant
- Compliant with IEEE802.3ba
- Compliant with QSFP+ MSA:
- SFF-8436

## Applications

- 40G Ethernet
- Infiniband 4X SDR DDR QDR
- 40G Telecom connections



## Pin Assignment and Pin Description



**QSFP Transceiver Electrical Pad Layout**

## Pin Descriptions

PIN	Logic	Symbol	Name/Description	Note
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	LVC MOS-I/O	SCL	2-Wire Serial Interface Clock	
12	LVC MOS-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

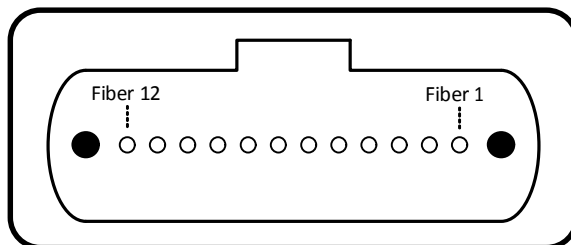
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	
18	CML-O	Rx1n	Receiver Inverted Data Output	
19		GND	Ground	1
20		GND	Ground	1
21	CML-O	Rx2n	Receiver Inverted Data Output	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	
23		GND	Ground	1
24	CML-O	Rx4n	Receiver Inverted Data Output	1
25	CML-O	Rx4p	Receiver 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	Tx1p	Transmitter Non-Inverted Data Input	
37	CML-I	Tx1n	Transmitter Inverted Data Output	

**Notes:**

1. GND is the symbol for signal and supply (power), Connect these directly to the host board signal common ground plane
2. VccRx, Vcc1 and VccTx are the receiving and transmission power suppliers and shall be applied concurrently. Vcc Rx, Vcc1 and Vcc Tx may be internally connected within the QSFP+, The connector pins are each rated for a maximum current of 500mA.

## Optical Interface Lanes and Assignment

shows the orientation of the multi-mode fiber facets of the optical connector. Table 1 provides the lane assignment.



Outside view of the QSFP module MPO

## lane assignment

Fiber #	Lane Assignment
1	RX0
2	RX1
3	RX2
4	RX3
5	Not used
6	Not used
7	Not used
8	Not used
9	TX3
10	TX2
11	TX1
12	TX0

## Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Note
Storage Temperature	TS	-40	85	°C	
Relative Humidity	RH	0	85	%	
Supply Voltage	V <sub>cc</sub>	-0.5	4.0	V	

## Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit	Note.
Power Supply Voltage	V <sub>cc</sub>	3.13	3.30	3.47	V	
Power Supply Current	I <sub>cc</sub>	-	-	100	mA	
Case Operating Temperature	T <sub>c</sub>	-5	-	+70	°C	

## Optical Characteristics

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
<b>Transmitter</b>						
Center Wavelength	$\lambda_t$	840	850	860	nm	
RMS Spectral Width	$P_m$	-	0.5	0.65	nm	
Average Optical Power, each Lane	$P_{avg}$	-8	-2.5	+1	dBm	
Optical Modulation Amplitude (OMA)	$P_{oma}$	-6	-	+3	dBm	
Peak Power, each Lane	$P_{Pt}$			4	dBm	
Launch Power in OMA minus Transmitter and Dispersion Penalty (TDP), each Lane		-7	-		dB	
TDP, each Lane				4	dB	
Extinction Ratio	ER	3	-	-	dB	
Relative Intensity Noise	$R_{in}$	-	-	-128	dB/Hz	12dB reflection
Optical Return Loss Tolerance		-	-	12	dB	
Encircled Flux		>86% at 19um <30% at 4.5um				
Transmitter Eye Mask Definition {X1, X2, X3, Y1, Y2, Y3}		0.23, 0.34, 0.43, 0.27, 0.33, 0.4				
Average Launch Power OFF Transmitter, each Lane	$P_{off}$			-30	dBm	
<b>Receiver</b>						
Center Wavelength	$\lambda_r$	830	850	860	nm	
Damage Threshold	THd	2			dBm	1
Average Power at Receiver Input, each Lane		-9.9		0	dBm	
Receiver Reflectance		-	-	-12	dB	
OMA, each Lane				3	dBm	
Stressed Receiver Sensitivity in OMA, each Lane		-	-	-5.4	dBm	
Receiver Sensitivity per Channel	$P_{sens}$	-	-13		dBm	
Peak Power, each Lane	$P_{Pr}$			4	dBm	
Receiver Jitter Tolerance Signal Level in OMA, each Lane				-5.4	dBm	

Los Assert	LosA	-30	-	-	dBm	
Los Dessert	LosD	-	-	-14	dBm	
Los Hysteresis	LosH	0.5	-	-	dB	
Overload	Pin	+1	-	-	dBm	
<b>Conditions of Stress Receiver Sensitivity Test<sup>2</sup></b>						
Vertical Eye Closure Penalty, each Lane			2		dB	
Stressed Eye J2 Jitter, each Lane			0.35		UI	
Stressed Eye J9 Jitter, each Lane			0.47		UI	
Conditions of Receiver Jitter Tolerance Test:						
Jitter Frequency and Peak-peak Amplitude		(75, 5)			KHz,	
		(375,1)			UI	

**Notes:**

1. The receiver shall be able to tolerate, without damage, continuous exposure to a modulated optical input signal having this power level on one lane. The receiver does not have to operate correctly at this input power. Vertical eye closure penalty and stressed eye jitter are test conditions for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

## Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
Data Rate, each Lane		-	10.3125	11.2	Gbps	
Power Consumption (XLPPi)		-		1.5	W	
Supply Current	ICC		0.75	1.0	A	
Control I/O Voltage, High	VIH	2.0		VCC	V	
Control I/O Voltage, Low	VIL	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	
<b>Transmitter (XLPPi)</b>						
Single Ended Output Voltage Tolerance		-0.3	-	4	V	Referred to signal common
AC Common mode Voltage Tolerance (RMS)		15	-	-	mV	

Tx Input Diff Voltage	VI	90		1600	mV	
Tx Input Diff Impedance	ZIN	80	100	120	$\Omega$	
Differential Input Return Loss		See IEEE 802.3ba 86A.4.11			dB	10MHz-11.1GHz
J2 Jitter Tolerance	Jt2			0.18	UI	
J9 Jitter Tolerance	Jt9			0.26	UI	
Data Dependent Pulse Width Shrinkage	DDPWS			0.07	UI	
Eye Mask Coordinates {X1, X2, Y1, Y2}		0.1 , 0.31 95 , 350			UI mV	
<b>Receiver (XLPP1)</b>						
Single Ended Output Voltage Tolerance <sup>1</sup>		-0.3	-	4	V	Referred to TP1 signal common
AC Common mode Voltage Tolerance (RMS)		-	-	7.5	mV	
Termination Mismatch at 1MHz				5	%	
Differential Output Return Loss		See IEEE 802.3ba 86A.4.2.1			dB	10MHz-11.1GHz
Common-mode Output Return Loss		See IEEE 802.3ba 86A.4.2.2			dB	10MHz-11.1GHz
Rx Output Diff Voltage	Vo		600	800	mV	
Rx Output Rise and Fall Time	Tr/Tf			35	ps	20% to 80%
J2 Jitter Tolerance	Jr2			0.46	UI	
J9 Jitter Tolerance	Jr9			0.63	UI	
Eye Mask Coordinates {X1, X2, Y1, Y2}		0.29 , 0.5 150 , 425			UI mV	

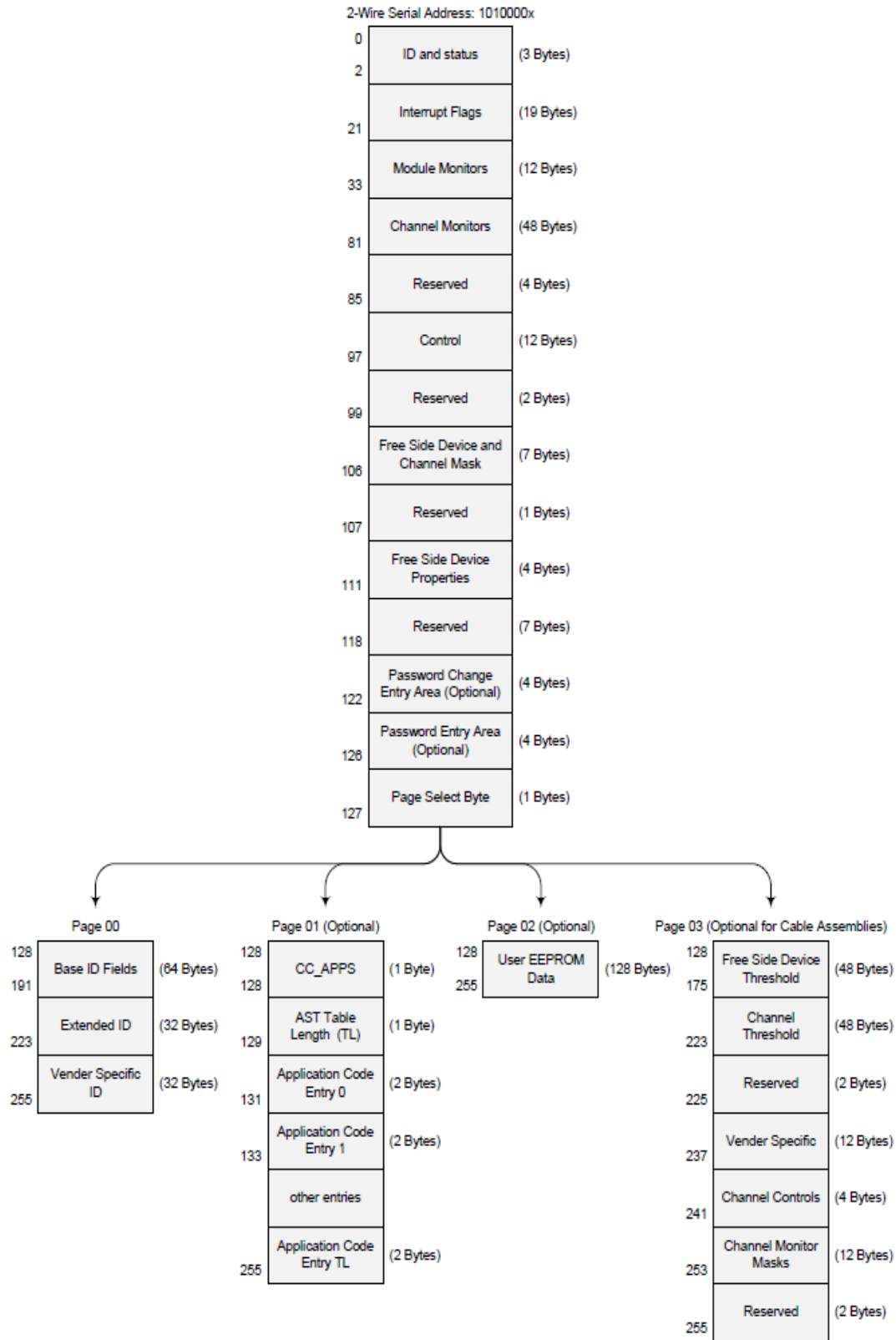
**Notes:**

1. The single ended input voltage tolerance is the allowable range of the instantaneous input signals

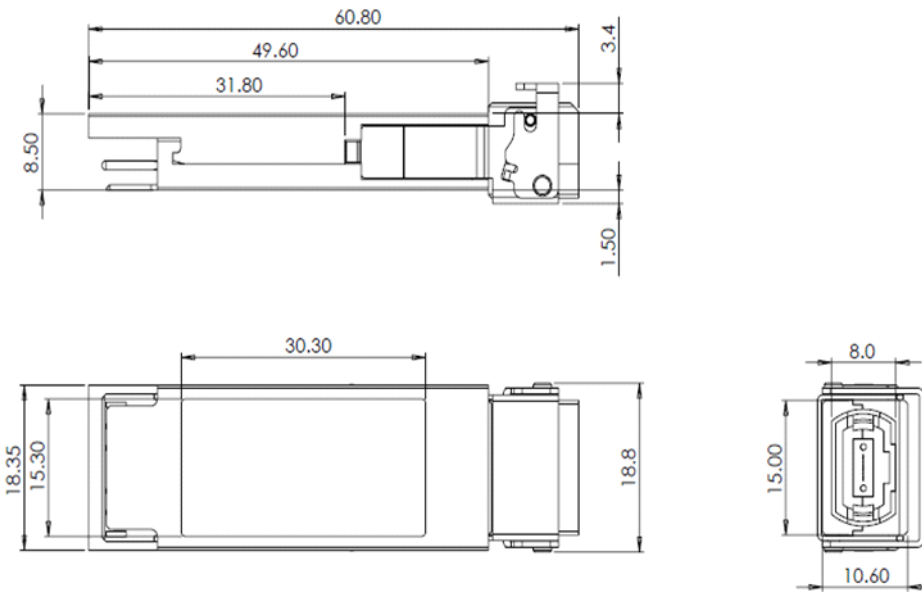


# EEPROM Information

EEPROM memory map specific data field description is as below:



## Mechanical Dimensions



## Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883E Method 3015.7
- ESD to the LC Receptacle: compatible with IEC 61000-4-2 GR-1089-CORE
- Immunity compatible with IEC 61000-4-3
- EMI compatible with FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B
- Laser Eye Safety compatible with FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2
- RoHS compliant with 2002/95/EC 4.1&4.2 2005/747/EC

## For More Information

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