



# LTA8512-PC+ QSFP+ SR4 Transceiver

## 4 x 10.3125Gb/s 850nm Transceiver

### Product Description

The LTA8512 is a QSFP+ Optical transceiver for 40GBASE-SR4 Ethernet and 4x10G InfiniBand applications, and which also supports optical interoperability with IEEE 10GBASE-SR compliant products. This transceiver is compliant with SFF-8436 QSFP+ MSA, IEEE802.3ba 40GBASE-SR4 specifications. It operates at 10.3125Gb/s up to 300m over OM3 multimode optical fiber.

### Applications

- Infiniband QDR interconnects.
- High performance computing interconnect
- 40GBASE-SR4 Ethernet
- Breakout 10GBASE-SR Ethernet

### Features

- 4 independent parallel optical channels
- Each channel data rate up to 10.3125Gb/s
- Hot Pluggable QSFP+ form factor
- Up to 300m link on OM3 MMF
- 850nm VCSEL/PD Array Technology
- CML Compatible electrical I/O
- Maximum power consumption <1.5W
- QSFP+ MSA Compliance
- Case Operating Temperature:
  - Commercial: 0 to 70°C
- RoHS II Compliance

Ordering Information	
Part Number	Case Operating Temperature
LTA8512-PC+	0 to 70 °C

Recommended Operating Conditions						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Case Operating Temperature	$T_{case}$	0	+25	+70	°C	Temperature Range = C
Module Supply Voltage	$V_{CC}$	3.135	3.3	3.465	V	
Module Supply Current	$I_{IN}$	-	-	350	mA	
Signaling Speed Per Channel	S	-	10.3125	-	Gb/s	



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Absolute Maximum Ratings						
Parameter	Symbol	Min	Max	Units	Notes	
Storage Ambient Temperature	$T_{stg}$	-40	+85	°C	Exceeding the Absolute Maximum Ratings may cause irreversible damage to the device. The device is not intended to be operated under the condition of simultaneous Absolute Maximum Ratings, a condition which may cause irreversible damage to the device.	
Relative Humidity - Storage	$RH_S$	0	95	%		
Relative Humidity - Operating	$RH_O$	0	85	%		
Module Supply Voltage	$V_{CC}$	-0.5	3.6	V		
Damage Input Optical Power	$P_{IN(MAX)}$	-	3.4	dBm		

Transmitter Electrical Interfaces							
Parameter	Symbol	Min	Typ	Max	Units	Notes	
Tx_Data Differential Input Voltage	$V_{IN}$	200	-	1600	mV		
Tx_Data Differential Input Impedance	$Z_{IN}$	-	100	-	$\Omega$		
Differential Input Return Loss	SDD11	Compatible with IEEE 802.3ba 86A.4.1.1		-	-	dB	10MHz to 11.1GHz
Differential to Common Mode Conversion Loss	SCD11	10	-	-	-	dB	10MHz to 11.1GHz
J2 Jitter Tolerance	$T_{J2}$	-	-	0.17	UI		
J9 Jitter Tolerance	$T_{J9}$	-	-	0.29	UI		

Receiver Electrical Interfaces							
Parameter	Symbol	Min	Typ	Max	Units	Notes	
Rx_Data Differential Output Voltage	$V_{OUT}$	-	440	-	mV		
Rx_Data Differential Output Impedance	$Z_{OUT}$	90	100	110	$\Omega$		
Differential Output Return Loss		Per IEEE P802.3ba, Section 86A.4.2.1			-	dB	10MHz to 11.1GHz
Common Mode Output Return Loss		Per IEEE P802.3ba, Section 86A.4.2.2			-	dB	10MHz to 11.1GHz
J2 Jitter Output	$T_{J2}$	-	-	0.42	UI		
J9 Jitter Output	$T_{J9}$	-	-	0.65	UI		
Rx output Data Rising Time (20% to 80%)	$T_r$	28	-	-	ps		
Rx output Data Falling Time (20% to 80%)	$T_f$	28	-	-	ps		



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Transmitter Optical Characteristics						
Parameter	Symbol	LTA8512			Units	Notes
		Min	Typ	Max		
Average Launch Power ,each lane	$P_{OUT}$	-7.6	-	0.5	dBm	Average Optical Output
Optical Output with Tx OFF	$P_{OFF}$	-	-	-30	dBm	
Center Wavelength	$\lambda$	840	850	860	nm	
RMS Spectral Width	$\Delta\lambda$	-	-	0.45	nm	
Extinction Ratio	ER	3	-	-	dB	
Optical Rise and Fall Time	$t_r, t_f$	-	40	-	ps	20% - 80%
Optical modulation Amplitude , each lane	OMA	-5.6	-	3	dBm	
Difference in launch power between any two lane	$\Delta_{OMA}$	-	-	4	dB	
Optical return loss tolerance	ORL	-	-	12	dB	
Transmitter eye mask definition {X1,X2,X3,Y1,Y2,Y3}		0.23,0.34,0.43,0.27,0.35,0.4				Hit ratio $5 \times 10^{-5}$ hits per sample

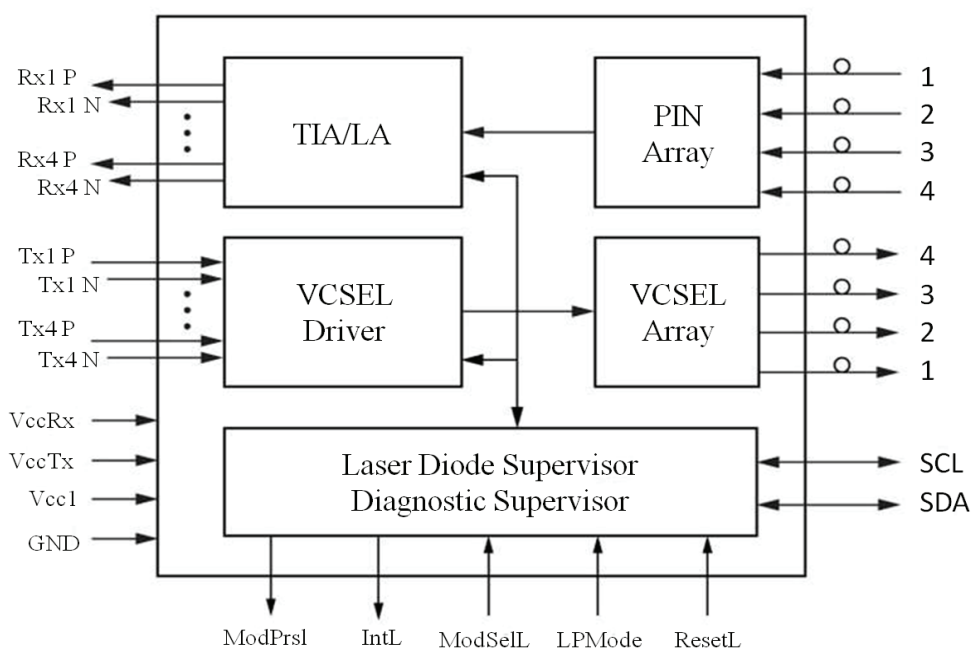
Receiver Optical Characteristics						
Parameter	Symbol	LTA8512			Units	Notes
		Min	Typ	Max		
Average power at receive input, each lane	$P_{IN}$	-	-9.9	2.4	dBm	Note1
Center Wavelength	$\lambda$	840	850	860	nm	
Receiver Reflectance	RFL	-	-	-12	dB	
Rx_LOS of Signal - Assert	$P_A$	-30	-	-	dBm	
Rx_LOS of Signal - Deassert (OMA)	$P_D$	-	-	-12	dBm	
Rx_LOS of Signal - Hysteresis	$P_{Hy}$	0.5	-	-	dBm	
Stressed receiver sensitivity in OMA, each lane	$R_{SS}$	-	-	-7.5	dBm	According to IEEE802.3ae
Peak power, each lane		-	-	4	dBm	
Note 1: Average received power where the BER = $10^{-12}$ , measured with a PRBS $2^{31}-1$ test pattern@10.3125Gb/s						



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LTA8512 Block Diagram





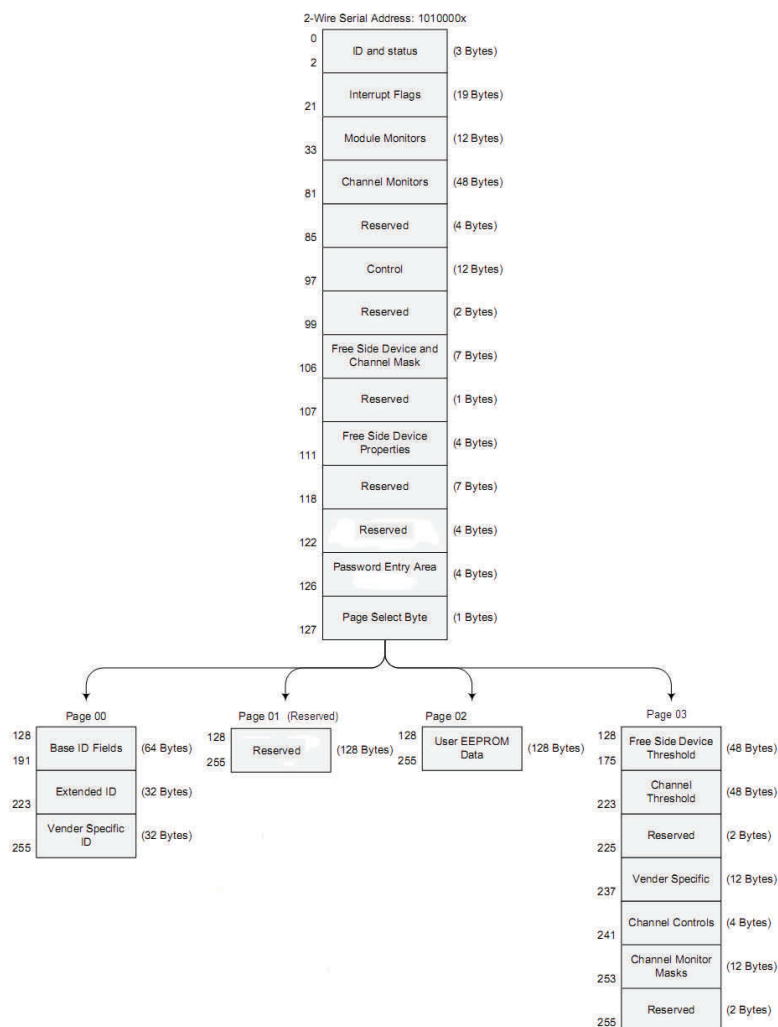
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### QSFP Monitoring Interface

Digital monitoring is available on the QSFP+ modules. A 2-wire serial interface provides user to contact with module. The module provides real-time per channel received power monitoring (optional), per channel transmitted laser bias current monitoring, supply voltage and temperature monitoring.

The memory is structured as a single address, multiple page approach. The address is given as A0h. The structure of the memory is shown in followed figure. The memory space is arranged into a lower, single page, address space of 128 bytes and multiple upper address space pages of 128 bytes each. This structure permits timely access to addresses in the lower page, e.g. Interrupt Flags and Monitors. Less time critical entries, e.g. serial ID information and threshold settings are available with the Page Select function.





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I <sup>2</sup> C Memory Map (Upper memory map Page00-Serial ID: Data Fields , Unlisted Fields are Blank / Empty)				
IIC Addr	Size (byte)	Name	Description	Values (HEX)
128	1	Identifier	QSFP+	0D
129	1	Ext. Identifier	No Extended Identifier	00
130	1	Connector	No separable connector	0C
131-138	8	Specification compliance	40GBASE-SR4 /Short distance /Shortwave laser w/o OFC	04 00 00 00 40 40 02 80
139	1	Encoding	64B66B	05
140	1	BR, nominal	Nominal bit rate 10.3G	67
141	1	Extended rateselect	QSFP+ Rate Select Version	00
142	1	Length(SMF)	the module does not support single mode fiber	00
143	1	Length(OM3 50 um)	Link length supported for EBW 50/125 um fiber (OM3), units of 2m (note 1)	96
144	1	Length(OM2 50 um)	Link length supported for 50/125 um fiber (OM2), units of 1m (note 1)	00
145	1	Length(OM1 62.5 um)	Link length supported for 62.5/125 um fiber (OM1), units of 1m (note 1)	00
146	1	Length (Copper/AOC)	Link length of copper or active cable, units of 1 m	00
147	1	Device tech	No wavelength control/Transmitter not tunable	00
148-163	16	Vendor name	QSFP+ vendor name ( <b>ASCII</b> )	Hisense
164	1	Extended Module	Extended Module codes QDR	04
165-167	3	Vendor OUI	the Vendor OUI is unspecified	AC 4A FE
168-183	16	Vendor PN	Part number provided by QSFP+ vendor ( <b>ASCII</b> )	LTA8512-PC+
184-185	2	Vendor rev	Revision level for part number provided by vendor ( <b>ASCII</b> )	1
186-187	2	Wave length	Nominal laser wavelength = 850nm	42 68
188-189	2	Wavelength tolerance	Guaranteed range of laser wavelength=10nm	07 D0
190	1	Max case temp.	Maximum case temperature in degrees C=70	00
191	1	CC_BASE	Check code for base ID fields (addresses 128-190)	
192-195	4	Options	Rx Output Disable capable; Tx_DISABLE is implemented and disables the serial output; Tx_FAULT signal implemented	00 00 04 98
196-211	16	Vendor SN	Serial number provided by vendor ( <b>ASCII</b> )	Programmed by Factory
212-219	8	Date Code	Vendor's manufacturing date code	Programmed by Factory
220	1	Monitoring Type	Received power measurements type: OMA	00
221	1	Enhanced Options	Reserved	00
222	1	Reserved		
223	1	CC_EXT	Check code for the Extended ID Fields (addresses 192-222)	
224-255	32	Vendor Specific EEPROM		



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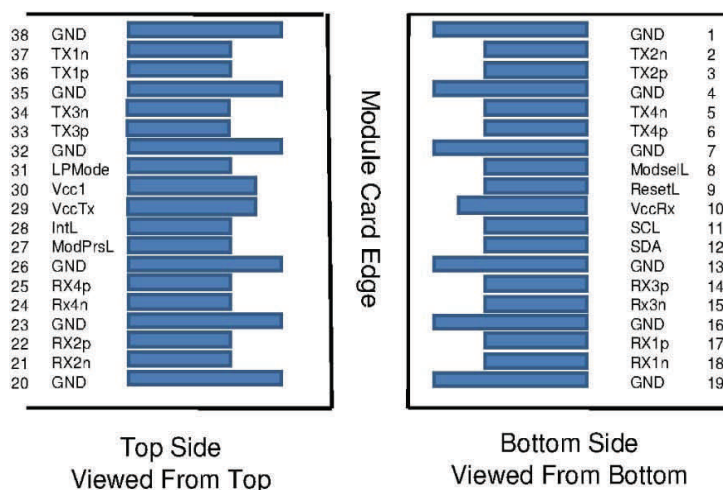
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I <sup>2</sup> C Memory Map (Module and Channel Thresholds (Page 03))				
IIC Addr	Byte	Name	Description	Values
128-129	2	Case temp High Alarm (°C)	MSB at low address	80
130-131	2	Case temp Low Alarm (°C)	MSB at low address	-10
132-133	2	Case temp High Warning(°C)	MSB at low address	75
134-135	2	Case temp Low Warning (°C)	MSB at low address	-5
136-143	8	Reserved	MSB at low address	
144-145	2	Vcc High Alarm (V)	MSB at low address	3.6
146-147	2	Vcc Low Alarm (V)	MSB at low address	3.0
148-149	2	Vcc High Warning (V)	MSB at low address	3.5
150-151	2	Vcc Low Warning (V)	MSB at low address	3.1
152-159	8	Reserved		
160-175	16	Reserved		
176-177	2	RX Power High Alarm (dBm)	MSB at low address	3.4
178-179	2	RX Power Low Alarm (dBm)	MSB at low address	-10.9
180-181	2	RX Power High Warning (dBm)	MSB at low address	2.4
182-183	2	RX Power Low Warning (dBm)	MSB at low address	-9.9
184-185	2	Tx Bias High Alarm (mA)	MSB at low address	12
186-187	2	Tx Bias Low Alarm (mA)	MSB at low address	0
188-189	2	Tx Bias High Warning (mA)	MSB at low address	10
190-191	2	Tx Bias Low Warning (mA)	MSB at low address	0
192-193	2	Tx Power High Alarm (dBm)	MSB at low address	1
194-195	2	Tx Power Low Alarm (dBm)	MSB at low address	-8.6
196-197	2	Tx Power High Warning (dBm)	MSB at low address	0.5
198-199	2	Tx Power Low Warning (dBm)	MSB at low address	-8.1
200-207	8	Reserved		
208-223	16	Reserved		

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### Pin Assignment



Pin Description			
Pin	Symbol	Description	Notes
1	GND	Ground	
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non Inverted Data Input	
4	GND	Ground	
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non Inverted Data Input	
7	GND	Ground	
8	ModselL	Module Select	
9	RetsetL	Module Reset	
10	V <sub>CC</sub> Rx	Receiver +3.3V DC Power Supply	
11	SCL	I <sup>2</sup> C Serial Clock	
12	SDA	I <sup>2</sup> C Serial Data	
13	GND	Ground	
14	Rx3p	Receiver Non Inverted Differential Output	
15	Rx3n	Receiver Inverted Differential Output	
16	GND	Ground	
17	Rx1p	Receiver Non Inverted Differential Output	
18	Rx1n	Receiver Inverted Differential Output	
19	GND	Ground	
20	GND	Ground	
21	Rx2n	Receiver Inverted Differential Output	
22	Rx2p	Receiver Non Inverted Differential Output	
23	GND	Ground	





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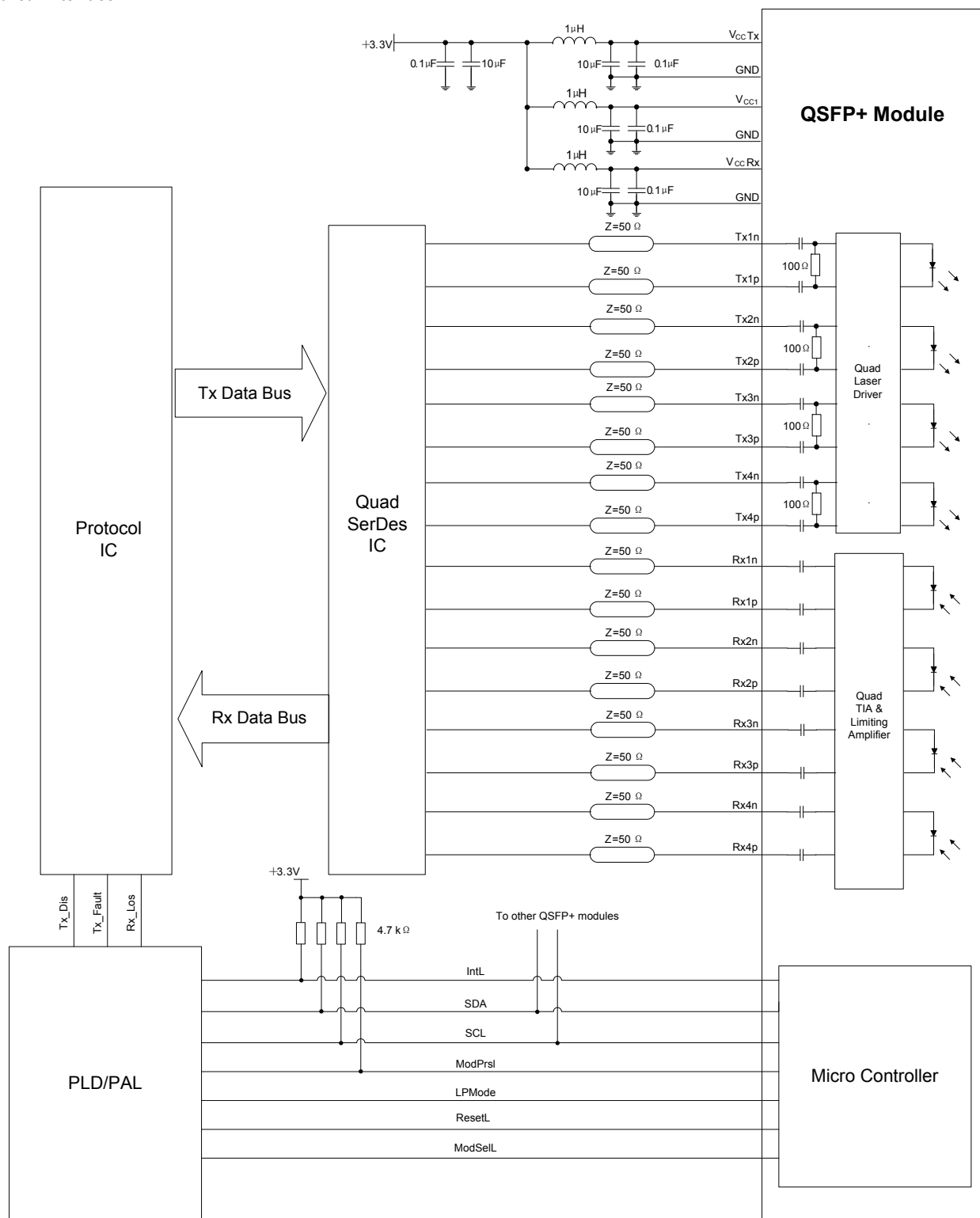
24	Rx4n	Receiver Inverted Differential Output	
25	Rx4p	Receiver Non Inverted Differential Output	
26	GND	Ground	
27	ModPrsL	Module Present	
28	IntL	Interrupt	
29	V <sub>CC</sub> Tx	Transmitter +3.3V DC Power Supply	
30	V <sub>CC1</sub>	+3.3V DC Power Supply	
31	LPMMod	Low Power Mode	
32	GND	Ground	
33	Tx3p	Transmitter Non Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Input	
35	GND	Ground	
36	Tx1p	Transmitter Non Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Ground	



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### Electrical Interface

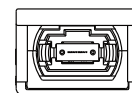
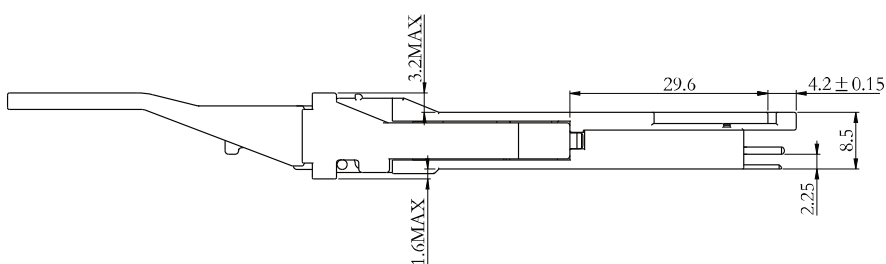
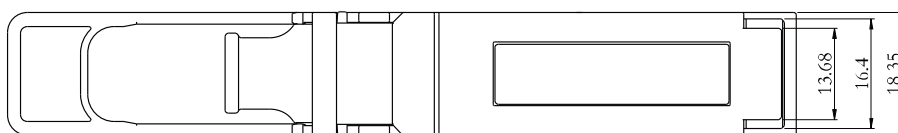




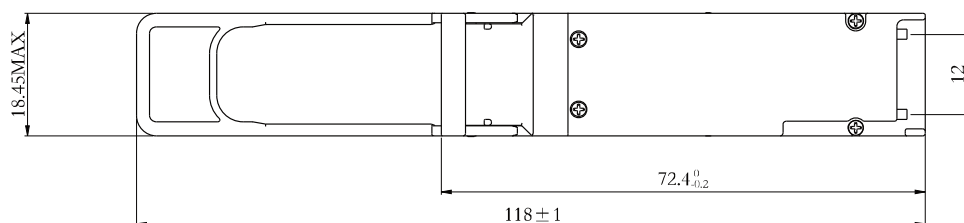
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### Mechanical Dimensions



Plug hidden



Dimensions are mm  
Tolerance is  $\pm 0.1\text{mm}$   
Others according to MSA Drawing



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#### Warnings

##### Handling Precautions:

This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

##### Laser Safety:

Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

##### Notice:

The information provided on this page contains the product target specifications which are subject to change without notice.

Check with your Hisense Sales Office for product updates, changes in specifications, sample availability and production release dates.

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