DATA SHEET

MODULETEK: QSFP28-LR4-RX-D10

100G QSFP28 LR4 Receiver

QSFP28-LR4-RX-D10 Overview

ModuleTek's QSFP28-LR4-RX-D10 receiver are based on the 100G Ethernet IEEE 802.3ba standard. At the receiving end, the module decomposes the 100Gb/s optical signal transmitted by a single fiber into four LAN-WDM wavelength optical signals through a demultiplexer (DEMUX), and then converts them into four 25Gb/s electrical signals. The center wavelengths of the four LAN WDM channels are 1295.56, 1300.05, 1304.58, and 1309.14 nm, respectively. This product complies with the QSFP28 Multi-Source Agreement (MSA).

Product Features

- Supports 103.1Gbps data rate
- compliant with QSFP28 MSA standards
- Integrated LAN WDM ROSA for up to 10 km reach over SMF
- LC connector
- Power dissipation<2W
- Built-in digital diagnostic functions
- RoHS compliant
- Operating temperature range: 0°C to 70°C

Applications

- 100GBASE-LR4 100G Ethernet

Ordering Information

Part Number	Product ID	Description	Color on Clasp
QSFP28-LR4-RX-D10	M463201	100G QSFP28 receiver, LC Connectors, Up to 10km on SMF, with DOM function.	blue

Note:
1.Product ID is the abbreviated order number of our company's standard model

For More Information:
ModuleTek Limited
Web: www.moduletek.com
Email: sales@moduletek.com

General Specifications

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Bit Error Rate	BER			10^{-12}		
Operating Temperature	T_C	0		70	°C	1
Storage Temperature	T_{STO}	-40		85	°C	2
Input Voltage	V_{CC}	3.14	3.3	3.46	V	
Maximum Voltage	V_{MAX}	-0.5		3.6	V	3
Module total power	P			2	W	

Notes:
1.Case temperature
2.Ambient temperature
3.For electrical power interface

Optical – Characteristics – Receiver

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Signaling Speed per lane		25.78125±100ppm			Gb/s	
Optical Center Wavelength (L0 Lane)	λ_C	1294.53	1295.56	1296.59	nm	
Optical Center Wavelength (L1 Lane)	λ_C	1299.02	1300.06	1301.09	nm	
Optical Center Wavelength (L2 Lane)	λ_C	1303.54	1304.59	1305.63	nm	
Optical Center Wavelength (L3 Lane)	λ_C	1308.09	1309.14	1310.19	nm	
Receiver Overload, each lane	P_{OL}	4.5			dBm	
Receiver Sensitivity, each Lane	R_{X_SEN}			-10.6	dBm	
LOS Assert	LOS_A		-18		dBm	
LOS De-Assert	LOS_D		-16		dBm	
LOS Hysteresis	LOS_H	0.5			dB	

Electrical – Characteristics – Receiver

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Signaling Rate per lane		25.78125±100ppm			Gb/s	
Differential data output swing	V_{OUT_PP}	400		800	mV	
Data output rise/fall time (20%-80%)	t_r/t_f		12		ps	
LOS Fault	LOS_A	V_{CC}-1.3		V_{CC_HOST}	V	
LOS Normal	LOS_D	V_{EE}		V_{EE}+0.5	V	

A0 Write Protection

Security Level 1 Password		
Password Entry ADDr	**Size**	**Vaules(hex)**
Page A0，7BH-7EH	4	00 00 10 11

This module has the A0 write protection function. The user can enter the security level 1 working state and write the contents of Table 00 and Table 01 of the device address A0H of the module. The method to enter the working state of security level 1 is to write the security level 1 password in order in the 7BH-7EH registers of A0H of the module. After entering security level 1, the user can directly write to the contents of the A0H device address, or modify the contents of the A0H 7F table selection register to write to the contents of Table 00 or Table 01. This version of the module does not support users to modify the password of security level 1.If you need to modify the security level 1 password,you must notify our company to modify it before shipping.

I2C Memory Map(A0,Upper Page 00h)

Memory Map(2-Wire Serial Address 1010000xb, Upper Page 00h)					
IIC Addr	**Size**	**Name**	**Description**	**Type**	**Value (HEX)**
128	1	Identifier	QSFP28	R	11
129	1	Ext. Identifier	Extended Identifier	R	DC
130	1	Connector Type	Connector Type=LC	R	07
131-138	8	Specification Compliance	Code for electronic or optical compatibility	R	80 00 00 00 00 00 00 00
139	1	Encoding	64B/66B	R	05
140	1	Singaling rate,nominal	The nominal bit rate per channel,units of 100 Megabits per second	R	FF
141	1	Extended Rate Select Compliance	Extended Rate Select	R	00
142	1	Length (SMF)	Length (Standard SM Fiber) -km	R	0A
143	1	Length (OM3 50um)	Length (OM3 50um)	R	00
144	1	Length (OM2 50um)	Length (OM2 50um)	R	00
145	1	Length (OM1 62.5um)	Length (OM1 62.5um)	R	00
146	1	Length (OM4 50um)	Length (OM4 50um)	R	00
147	1	Device technology	Pin detector	R	40
148-163	16	Vendor name	MODULETEK	R	ASCII Format
164	1	Extended Module	Extended Module	R	00
165-167	3	Vendor OUI	Vendor OUI	R	000000
168-183	16	Vendor PN	Vendor PN	R	ASCII Format
184-185	2	Vendor rev	Vendor rev	R	ASCII Format
186-187	2	Wavelength	Wavelength ， units of 0.05 nm	R	00 00
188-189	2	Wavelength tolerance	Wavelength Tolerance，units of 0.005nm	R	00 00
190	1	Max case temp.	Maximum Case Temperature in Degrees C.	R	46
191	1	CC_BASE	Check sum of bytes 128-190	R	
192	1	Link codes	Reserve	R	00
193-195	3	Options	Options	R	00 00 00

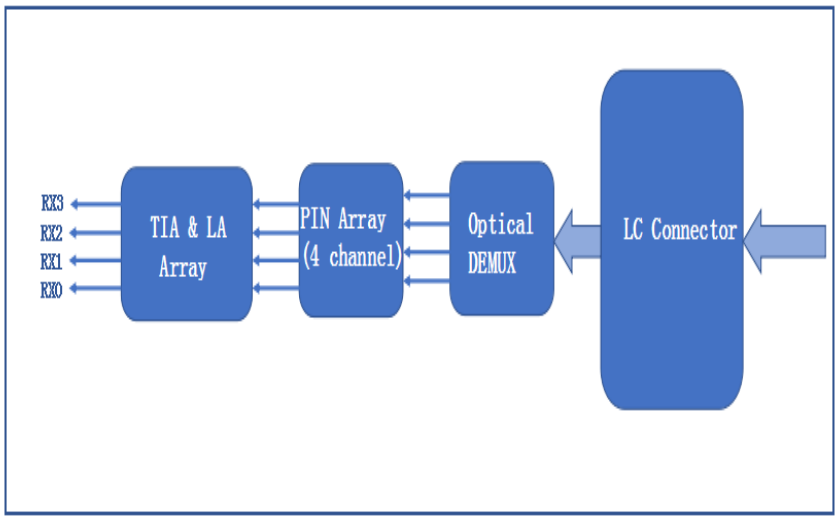
196-211	16	Vendor SN	Vendor SN	R	ASCII Format
212-219	8	Date Code	Date Code	R	ASCII Format
220	1	Diagnostic Monitoring Type	Received power measurement type-Average Power	R	08
221	1	Enhanced Options	Enhanced Options	R	00
222	1	Baud Rate,nominal	Baud Rate,nominal	R	00
223	1	CC_EXT	Check sum of bytes 192-222	R	
224-225	32	Vendor Specific	Vendor Specific	R	

Digital Diagnostic Functions

QSFP28-LR4-RX-D10 supports the 2-wire serial communication protocol,Digital diagnostic information is accessible over the 2-wire interface .Digital diagnostics for QSFP28-LR4-RX-D10 are internally calibrated by default.The internal micro control unit accesses the device operating parameters in real time,Such as transceiver temperature,received optical power and transceiver supply voltage.The module implements the alarm function ,alerts the user when a particular operating parameter exceeds the factory-set normal range.

Digital Diagnostic Threshold Range				
Parameter	**High Alarm(hex)**	**High Warning(hex)**	**Low Warning(hex)**	**Low Alarm(hex)**
Temperature(°C)	75 (0x4B00)	70 (0x4600)	0 (0x0000)	-5 (0xFB00)
Voltage(V)	3.63 (0x8DCC)	3.46 (0x8728)	3.13 (0x7A44)	2.97 (0x7404)
Rx Power(dBm)	7.5 (0xDBAA)	4.5 (0x6E18)	-10.6 (0x0367)	-14.6 (0x015B)

Block-Diagram-of-Transceiver



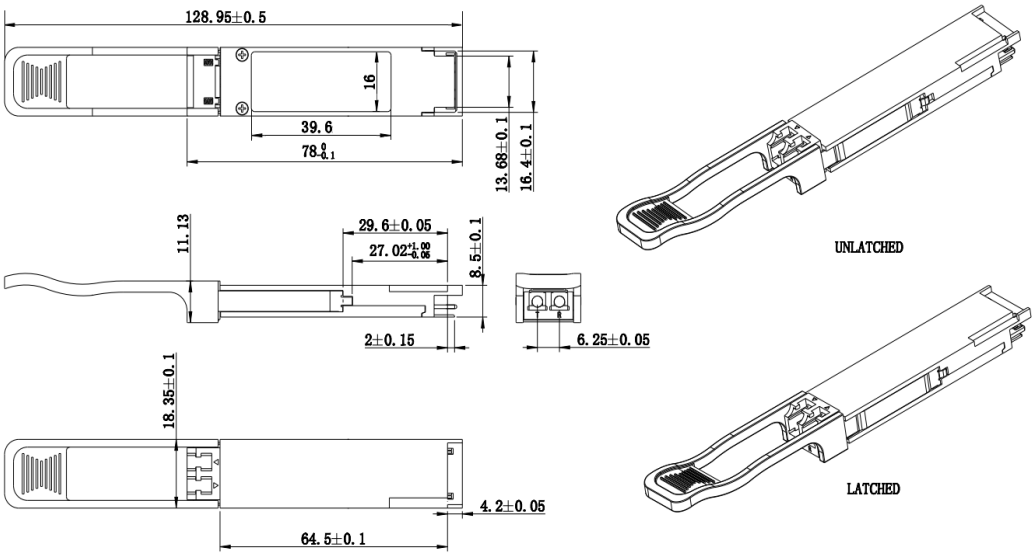
Functions Description

The receiver module accepts the 100Gb/s LAN WDM optical signals input, and de-multiplexes it into 4 individual 25Gb/s channels with different wavelength. Each wavelength light is collected by a discrete photo diode, and then outputted as electric data after amplified by a TIA.

Dimensions

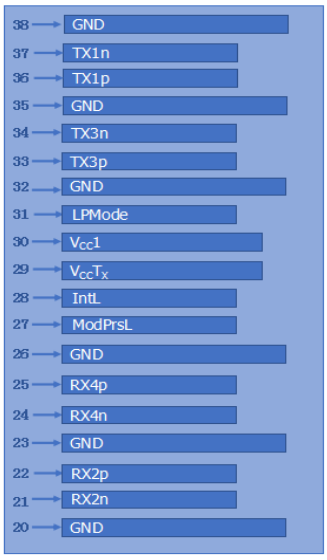
Module Weight: 33g

Dust Cap Weight: 0.95g

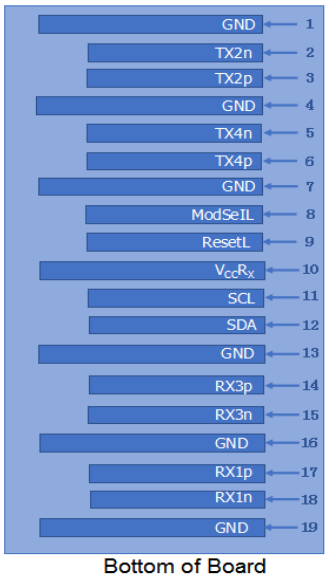


ALL DIMENSIONS ARE ±0.2mm UNLESS OTHERWISE SPECIFIED
UNIT: mm

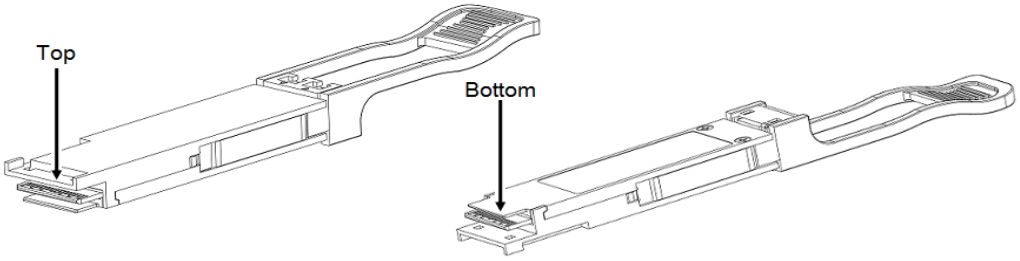
Electrical Pad Layout



Top of Board



Bottom of Board



Pin Assignment

PIN #	Symbol	Description	Remarks
1	GND	Ground	5
2	Tx2n	Transmitter Inverted Data Input, LAN2	
3	Tx2p	Transmitter Non-Inverted Data Input, LAN2	
4	GND	Ground	5
5	Tx4n	Transmitter Inverted Data Input, LAN4	
6	Tx4p	Transmitter Non-Inverted Data Input, LAN4	
7	GND	Ground	5
8	ModSelL	Module select pin, the module responds to two-wire serial communication when low level	1
9	ResetL	Module Reset	2
10	$V_{cc}R_X$	+3.3V Power Supply Receiver	
11	SCL	2-wire serial interface clock	
12	SDA	2-wire serial interface data	
13	GND	Ground	5
14	Rx3p	Receiver Non-Inverted Data Output, LAN3	
15	Rx3n	Receiver Inverted Data Output, LAN3	
16	GND	Ground	5
17	Rx1p	Receiver Non-Inverted Data Output, LAN1	
18	Rx1n	Receiver Inverted Data Output, LAN1	
19	GND	Ground	5
20	GND	Ground	5
21	Rx2n	Receiver Inverted Data Output, LAN2	
22	Rx2p	Receiver Non-Inverted Data Output, LAN2	
23	GND	Ground	5
24	Rx4n	Receiver Inverted Data Output, LAN4	
25	Rx4p	Receiver Non-Inverted Data Output, LAN4	
26	GND	Ground	5
27	ModPrsL	The module is inserted into the indicate pin and grounded in the module.	3
28	IntL	Interrupt	4
29	$V_{cc}T_X$	+3.3V Power Supply transmitter	
30	V_{cc1}	+3.3V Power Supply	
31	LPMode	Low Power Mode	5
32	GND	Ground	5

33	Tx3p	Transmitter Non-Inverted Data Input, LAN3	
34	Tx3n	Transmitter Inverted Data Input, LAN3	
35	GND	Ground	5
36	Tx1p	Transmitter Non-Inverted Data Input, LAN1	
37	Tx1n	Transmitter Inverted Data Input, LAN1	
38	GND	Ground	5

Notes:
1. ModSelL is the input pin. The module responds to 2-wire serial communication commands when it is held low by the host. ModSelL allows multiple QSFP modules to be used on a single 2-wire interface bus. If ModSelL is High, the module will not respond to any 2-wire interface communication from the host. ModSelL has internal pull-up resistors in the module
2. The module restart pin, when the low level on the ResetL pin lasts longer than the minimum pulse length, resets the module and restores all user modules to their default state. When performing reset device, the host should ignore all status bits. Until the module reset interrupt is completed, please note that during hot plugging, the module will issue this information to complete the reset interrupt without resetting
3. This pin is active high, indicating that the module is running under a low power module.
4. IntL is the output pin, which is the open collector output and must be pulled up to Vcc on the motherboard. When it is low, it indicates that the module may malfunction. The host uses a 2-wire serial interface to identify the interrupt source
5.Circuit ground is internally isolated from chassis ground.

References

1. IEEE standard 802.3ba. IEEE Standard Department.
2. QSFP28 4X PLUGGABLE TRANSCEIVER –SFF-8665.