MQBG1D1-DZC-XXXT

Features

- Hot-pluggable QSFP28 form factor
- Supports 25.78125Gb/s bit rate per channel
- 4 channels 850nm VCSEL laser and 4 channels PIN photo detector array
- Maximum link length of 70m over OM3 MMF and 100m over OM4 MMF
- Internal CDR circuits on both receiver and transmitter channels
- Case operating temperature range:0 ~ +70°C
- Single 3.3V power supply
- power dissipation: <2.5W per end
- Flat, rubberized, LSZH cable
- QSFP28 housing with enhanced EMI shielding

Applications

- 100GBASE-SR4 100G Ethernet
- Data center
- Infiniband EDR

Standards

- Compliant with QSFP28 MSA
- Compliant with IEEE 802.3bm
- Compliant with SFF-8636
- RoHS Compliant

1. General Description

This product is a Four-Channel, Pluggable, Parallel, Fiber-Optic QSFP8 AOC for 100 Gigabit Ethernet, Infiniband EDR Applications. This transceiver is a high performance module for short-range multi-lane data communication and interconnect applications. It integrates four data lanes in each direction with 100Gbps bandwidth. MNC QSFP28 Active Optical Cable's length is up to 70 meters over OM3 MMF or 100 meters over OM4 MMF. These modules are designed to operate over multimode fiber systems using a nominal wavelength of 850nm. The electrical interface uses a 38 contact edge type connector.

2. Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min	Max	Units	Notes
Storage Temperature	Ts	-40	85	°C	
Operating Case Temperature	Tc	0	70	°C	
Power Supply Voltage	Vcc	0	3.6	V	
Relative Humidity	RH	0	85	%	

3. Recommended Operating Environment

Recommended Operating Environment specifies parameters for which the electrical and optical characteristics hold unless otherwise noted.

Parameter	Symbol	Min	Typical	Max	Units	Notes
Operating Case Temperature	Tc	0	25	70	°C	
Power Supply Voltage	Vcc	3.135	3.3	3.465	V	
Data Rate, each Lane			25.78125		Gb/s	
Data Rate Accuracy		-100		100	ppm	
Control Input Voltage High		2		Vcc	V	
Control Input Voltage Low		0		0.8	V	
Fiber Bend Radius	Rbend	3			cm	
Fiber Length on 50/125μm high-bandwidth(OM3) MMF				70	m	
Fiber Length on 50/125μm high-bandwidth(OM4) MMF				100	m	

4. Electrical Characteristics

The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Test Point	Min	Typical	Max	Units	Notes
Power Consumption				2.5	W	1
Supply Current	Icc			757	mA	1
Supply Voltage	Vcc	3.135	3.3	3.465		
Transmitter(each lane)						
Overload Differential Voltage pk-pk	TP1a	900			mV	
Common Mode Voltage (Vcm)	TP1	-350		2850	mV	2
Differential Termination Resistance Mismatch	TP1			10	%	At 1MHz
Differential Return Loss (SDD11)	TP1			See CEI-28G-VSR Equation 13-19	dB	
Common Mode to Differential conversion and Differential to Common Mode conversion (SDC11, SCD11)	TP1			See CEI-28G-VSR Equation 13-20	dB	
Stressed Input Test	TP1a	See CEI-28G-VSR Section 13.3.11.2.1				
Receiver(each lane)						
Differential Voltage, pk-pk	TP4			900	mV	
Common Mode Voltage (Vcm)	TP4	-350		2850	mV	2
Common Mode Noise, RMS	TP4			17.5	mV	
Differential Termination Resistance Mismatch	TP4			10	%	At 1 MHz
Differential Return Loss (SDD22)	TP4			See CEI-28G-VSR Equation 13-19	dB	
Common Mode to Differential conversion and Differential to Common Mode conversion	TP4			See CEI-28G-VSR Equation	dB	

(SDC22, SCD22)				13-21		
Common Mode Return Loss (SCC22)	TP4			-2	dB	3
Transition Time, 20 to 80%	TP4	9.5			ps	
Vertical Eye Closure (VEC)	TP4			5.5	dB	
Eye Width at 10^{-15} probability (EW15)	TP4	0.57			UI	
Eye Height at 10^{-15} probability (EH15)	TP4	228			mV	

Notes:

1. Per terminal.
2. Vcm is generated by the host. Specification includes effects of ground offset voltage.
3. From 250MHz to 30GHz

5. Digital Diagnostic Monitoring Information

Parameter	Units	Min	Max	Accuracy	Calibration	Notes
Temperature	°C	0	+70	±3°C	Internal	
Voltage	V	3.135	3.465	±3%	Internal	
Bias Current	mA	0	12	±10%	Internal	1
TX Power	dBm	-8.4	2.4	±3dB	Internal	
RX Power	dBm	-10.3	2.4	±3dB	Internal	

Notes:

1. Accuracy of Measured Tx Bias Current is 10% of the actual Bias Current from the laser driver to the laser.

6. Pin Definition

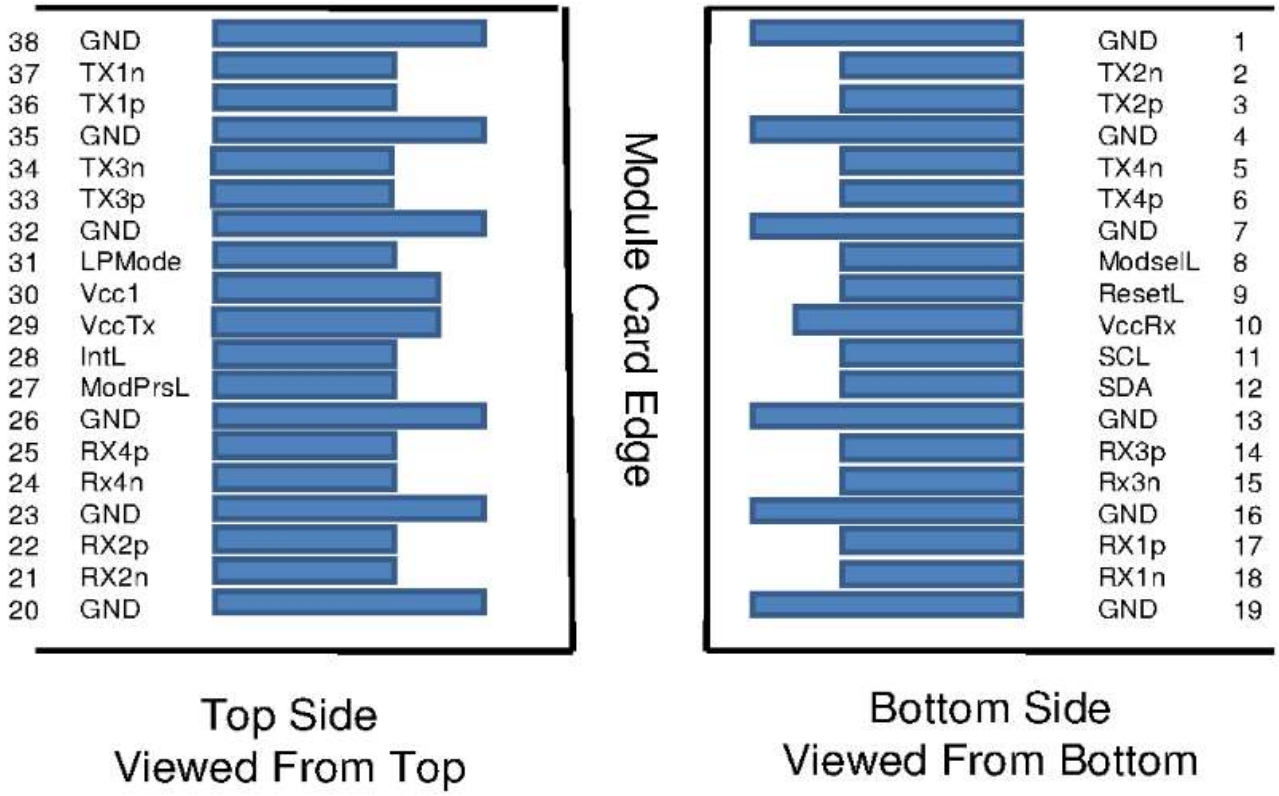


Figure1 QSFP MSA-compliant 38-pin connector

Pin	Symbol	Name/Description	Power Seq.	Ref.
1	GND	Ground	1	
2	TX2N	Transmitter Inverted Data Input		
3	TX2P	Transmitter Non-Inverted Data Input		
4	GND	Ground	1	
5	TX4N	Transmitter Inverted Data Input		
6	TX4P	Transmitter Non-Inverted Data Input		
7	GND	Ground	1	
8	ModSelL	Module Select		
9	ResetL	Module Reset		
10	Vcc Rx	+3.3 V Power supply receiver	2	
11	SCL	2-wire serial interface clock		
12	SDA	2-wire serial interface data		
13	GND	Ground	1	

14	RX3P	Transmitter Inverted Data Input		
15	RX3N	Transmitter Non-Inverted Data Input		
16	GND	Ground	1	
17	RX1P	Transmitter Inverted Data Input		
18	RX1N	Transmitter Non-Inverted Data Input		
19	GND	Ground	1	
20	GND	Ground	1	
21	RX2N	Transmitter Inverted Data Input		
22	RX2P	Transmitter Non-Inverted Data Input		
23	GND	Ground	1	
24	RX4N	Transmitter Inverted Data Input		
25	RX4P	Transmitter Non-Inverted Data Input		
26	GND	Ground	1	
27	ModPrsL	Module Present		
28	IntL	Interrupt		
29	VccTx	+3.3 V Power supply transmitter	2	
30	Vcc1	+3.3 V Power Supply	2	
31	LPMode	Low Power Mode		
32	GND	Ground	1	
33	TX3P	Transmitter Inverted Data Input		
34	TX3N	Transmitter Non-Inverted Data Input		
35	GND	Ground	1	
36	TX1P	Transmitter Inverted Data Input		
37	TX1N	Transmitter Non-Inverted Data Input		
38	GND	Ground	1	

Table 1: QSFP Module PIN Definition

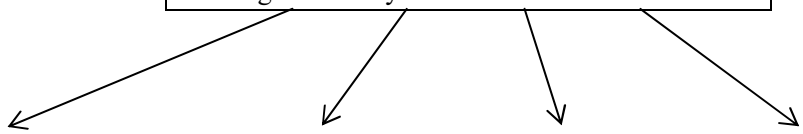
Power Seq.:

1. GND is the symbol for signal and supply (power) common for QSFP8 modules. All are common within the QSFP8 module and all module voltages are referenced to this potential unless otherwise noted. 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. Recommended host board power supply filtering is shown in Figure 3 below. Vcc Rx, Vcc1 and VccTx may be internally connected within the QSFP8 transceiver module in any combination. The connector pins are each rated for a maximum current of 500mA.

7. EEPROM Memory Map

2-Wire Serial Address 1010000x
Lower Page 00h
0 Identifier
1-2 Statues
3-21 Interrupt Flags
22-33 Free Side Device Monitors
34-81 Chanel Monitors
82-85 Reserved
86-98 Control
99 Reserved
100-104 Hardware Interrupt Pin Masks
105-106 Vendor Specific
107 Reserved
108-110 Free Side Device Properties
111-112 Assigned for use by PCI Express
113 Free Side Device Properties
114-118 Reserved
119-122 Password Change Entry Area(Optional)
123-126 Password Entry Area(Optional)
127 Page Select Byte



	Optional	**Optional**	**Optional**
Upper Page 00h	**Page 01h**	**Page 02h**	**Page 03h**
128 Identifier	128 CC_APPS	128-255 User EEPROM Data	128-175 Free Side Device Thresholds
129-191 Base ID Fields	129 AST Table Length (TL)		176-223 Channel Thresholds
	130-131 Application Code Entry 0		224 TX EQ & RX Emphasis Magnitude ID
	132-133 Application Code Entry 1		225 RX output amplitude indicators
192-223 Extended ID	134-253 Others Entries		226-241 Channel Controls
224-255 Vendor Specific ID			242-251 Channel Monitor Masks
	254-255 Application Code Entry TL		252-255 Reserved

EEPROM Serial ID Memory Contents (2-Wire Serial Address A0h Upper Page 00h)

Address	Name of field	Hex	Description
BASE ID Fields			
128	Identifier	11	QSFP28 transceiver
129	Ext. Identifier	8C	Extend Identifier of free side device
130	Connector Type	0C	MPO 1*12 (Multifiber Parallel Optic)
131-138	Specification Compliance	80 00 00 00 00 00 00 00	Code for electronic or optical compatibility
139	Encoding	07	Code for serial encoding algorithm
140	BR, nominal	FF	Nominal bit rate per channel, units of 100Mbps
141	Extended Rate Select Compliance	00	Tags for extended rate select compliance
142	Length(SMF)-km	00	Not Supported
143	Length(OM3 50um)-2m	00	
144	Length(OM2 50um)-1m	00	Not Supported
145	Length(OM1 62.5um)-1m	00	Not Supported
146	Length(passive copper or active cable)-1m (OM4 50um)-2m)	xx	Reserved
147	Device technology	00	Device technology
148-163	Vendor name	4D 45 4E 54 45 43 48 4F 50 54 4F 20 20 20 20 20	“MENTECHOPTO”(ASCII character)
164	Extended Module	00	
165-167	Vendor OUI	00 00 00	Free side device vendor IEEE company ID
168-183	Vendor PN	4D 51 42 47 31 44 31 2D 44 5A 43 2D xx xx xx 54	“MQBG1D1-DZC-XXXT”(ASCII character)
184-185	Vendor rev	41 30	“A0”(ASCII character)
186-187	Wavelength or Copper Cable Attenuation	42 68	Nominal laser wavelength or copper cable attenuation in dB at 2.5 GHz and 5.0 GHz
188-189	Wavelength tolerance or Copper Cable Attenuation	07 D0	Guaranteed range of laser wavelength from nominal wavelength or copper cable attenuation in dB at 7.0 GHz and 12 GHz
190	Max case temp.	00	Maximum case temperature in degrees C.

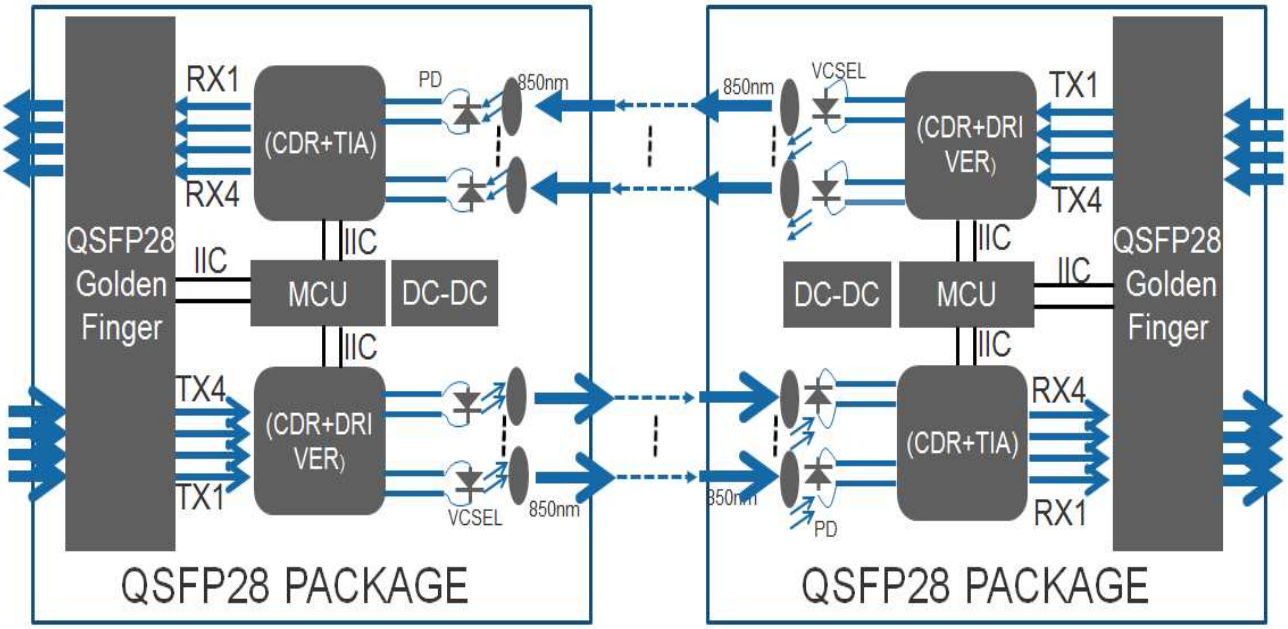
191	CC_BASE	Programmed by Factory	Check code for base ID fields
Extended ID Fields			
192	Link codes	01	100G AOC
193-195	Options	07 31 DA	
196-211	Vendor SN	xx……xx	Serial number provided by vendor(ASCII)
212-219	Date Code	Data Code	Vendor's manufacturing date code
220	Diagnostic Monitoring Type	0C	Indicates which type of diagnostic monitoring is implemented
221	Enhanced Options	00	Indicates which optional enhanced features are implemented in the free side device
222	BR, nominal	67	Nominal bit rate per channel, units of 250 Mbps.
223	CC-EXT	Programmed by Factory	Check code for the Extended ID Fields
Vendor Specific ID Field			
224-255	Vendor Specific	00	Vendor specific EEPROM

Free Side Device and Channel Thresholds (2-Wire Serial Address A0h Page 03h)

Address	#Bytes	Name of field	Real Value	Unit	Hex
128-129	2	Temp High Alarm	75	°C	
130-131	2	Temp Low Alarm	-5	°C	
132-133	2	Temp High Warning	73	°C	
134-135	2	Temp Low Warning	-3	°C	
136-143	8	Reserved	Reserved		
144-145	2	Vcc High Alarm	3.63	V	
146-147	2	Vcc Low Alarm	2.97	V	
148-149	2	Vcc High Warning	3.46	V	
150-151	2	Vcc Low Warning	3.13	V	
152-159	8	Reserved	Reserved		
160-175	16	Vendor Specific			
176-177	2	RX Power High Alarm	3.4	dBm	
178-179	2	RX Power Low Alarm	-12.3	dBm	
180-181	2	RX Power High Warning	2.4	dBm	
182-183	2	RX Power Low Warning	-10.3	dBm	

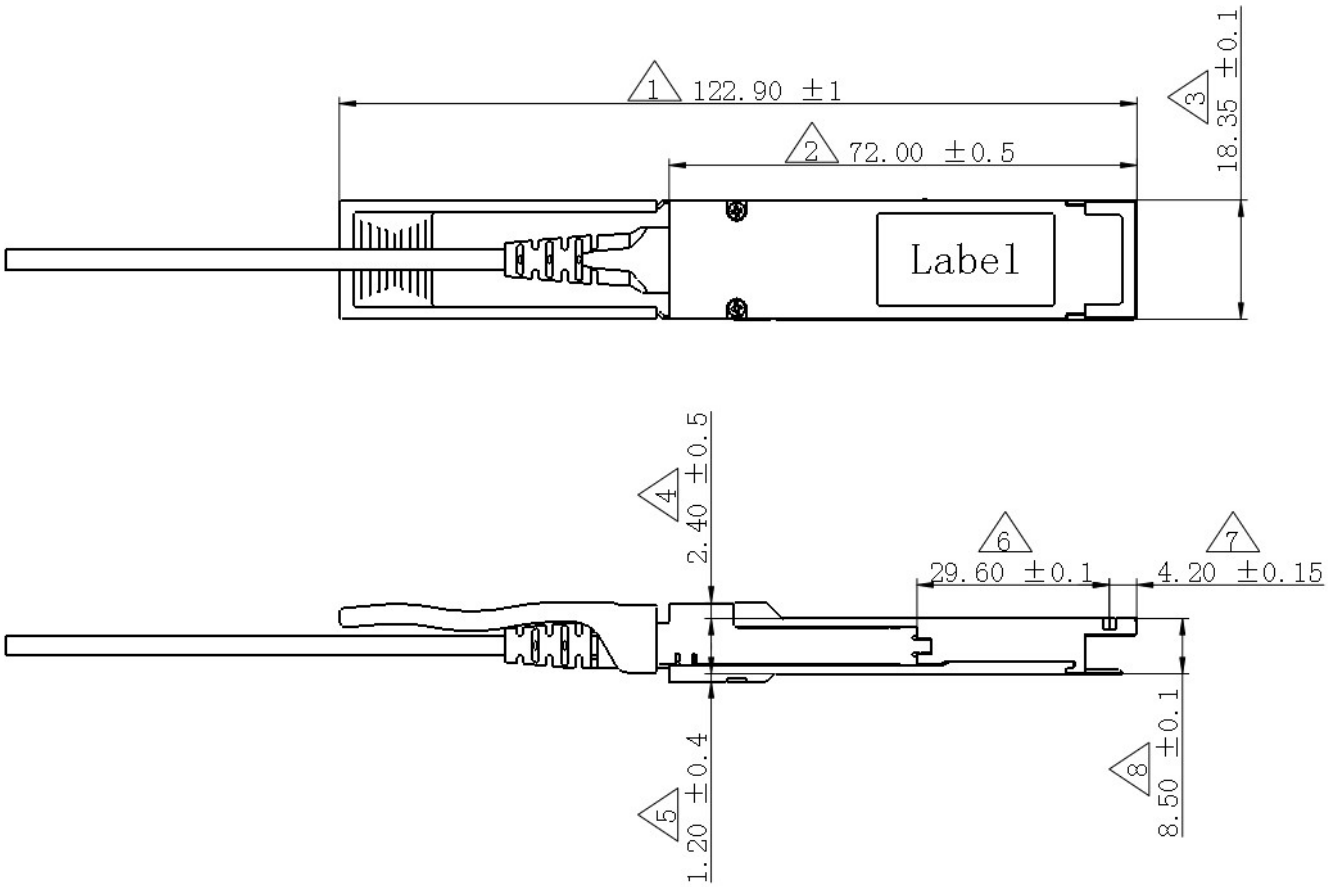
184-185	2	TX Bias High Alarm	12	mA	
186-187	2	TX Bias Low Alarm	1	mA	
188-189	2	TX Bias High Warning	11.5	mA	
190-191	2	TX Bias Low Warning	1.5	mA	
192-193	2	TX Power High Alarm	3.4	dBm	
194-195	2	TX Power Low Alarm	-10.4	dBm	
196-197	2	TX Power High Warning	2.4	dBm	
198-199	2	TX Power Low Warning	-8.4	dBm	
200-207	8	Reserved	Reserved		
208-223	16	Vendor Specific			

8. Optical Module Block Diagram



9. Mechanical Dimensions

Dimensions are in millimeters. All dimensions are ±0.1mm unless otherwise specified.
(unit: mm)



10. Ordering information

Part. No	Specifications							
	Pack	Rate (Gbps)	Tx (nm)	Rx	Temp (℃)	Reach (m)	Pull Tab Color	Others
MQBG1D1-DZC-001T	QSFP28	103.125	850 VCSEL	PIN	0~+70	1	Beige	RoHS
MQBG1D1-DZC-003T	QSFP28	103.125	850 VCSEL	PIN	0~+70	3	Beige	RoHS
MQBG1D1-DZC-005T	QSFP28	103.125	850 VCSEL	PIN	0~+70	5	Beige	RoHS
MQBG1D1-DZC-007T	QSFP28	103.125	850 VCSEL	PIN	0~+70	7	Beige	RoHS
MQBG1D1-DZC-010T	QSFP28	103.125	850 VCSEL	PIN	0~+70	10	Beige	RoHS
MQBG1D1-DZC-015T	QSFP28	103.125	850 VCSEL	PIN	0~+70	15	Beige	RoHS
MQBG1D1-DZC-020T	QSFP28	103.125	850 VCSEL	PIN	0~+70	20	Beige	RoHS
MQBG1D1-DZC-025T	QSFP28	103.125	850 VCSEL	PIN	0~+70	25	Beige	RoHS
MQBG1D1-DZC-030T	QSFP28	103.125	850 VCSEL	PIN	0~+70	30	Beige	RoHS
MQBG1D1-DZC-040T	QSFP28	103.125	850 VCSEL	PIN	0~+70	40	Beige	RoHS
MQBG1D1-DZC-050T	QSFP28	103.125	850 VCSEL	PIN	0~+70	50	Beige	RoHS
MQBG1D1-DZC-100T	QSFP28	103.125	850 VCSEL	PIN	0~+70	100	Beige	RoHS

*Note：

1. OM4 Cable length =<100m OM3 Cable length =<70m
2 More detail product selection and cable lengths，please contact MNC
3 Measured with a PRBS 2^{31}-1 test pattern, @25.78Gb/s, BER<5E-5, for each channel.