RYTQB10

Features

- Operating data rate support 27.95Gbps and 28.05Gbps
- 1310nm DFB-LD Transmitter
- Distance up to 10km
- Single 3.3V Power supply
- Duplex LC Connector Interface, Hot Pluggable
- Built-in dual CDR
- Compliant with MSA SFP+ Specification SFF-8402
- Power Dissipation < 1.2W
- Operating case temperature:
  Commercial : 0 to +70°C
  Extended: -10~+70℃

Applications

- OTU4
- 32GFC

Product Description

The RYTQB10 series single-mode transceiver is SFP28 module for duplex optical data communications support 27.95Gb/s and 28.05Gb/s. It is with the SFP+ 20-pin connector to allow hot plug capability. Digital diagnostic functions are available via an I2C. It has built-in clock and data recovery (CDR). This module is designed for single-mode fiber and operates at a nominal wavelength of 1310nm.

The transmitter section uses a 1310nm multiple quantum well DFB laser and is a class 1 laser compliant according to International Safety Standard IEC 60825. The receiver section uses an integrated InGaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

Absolute Maximum Ratings*Note3

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	TS	-45	85	°C
Supply Voltage	VCC	-0.5	4.0	V
Operating Relative Humidity	RH	5	95	%

Note3: Exceeding any one of these values may destroy the device permanently.

Recommended Operating Conditions

Parameter	Symbol		Min.	Typical	Max.	Unit
Operating Case Temperature	TC	Standard	0		70	°C
		Extended	-10		70	°C
Power Supply Voltage	VCC		3.135		3.465	V
Power Supply Current	ICC				340	mA

Performance Specifications – Electrical

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
		Transmitter				
CML Inputs(Single-ended)	Vin	90		800	mVpp	AC coupled inputs
Input Impedance (Differential)	Zin		100		ohms	Connected directly to TX pins
Tx_DISABLE Input Voltage – High		2		Vcc+0.3	V	
Tx_DISABLE Input Voltage – Low		-0.3		0.8	V	
Receiver						
CML Outputs (Single-ended)	Vout	185		425	mVpp	AC coupled outputs
Rx_LOS Output Voltage – High		2		Vcc+0.3	V	
Rx_LOS Output Voltage – Low		-0.3		0.8	V	

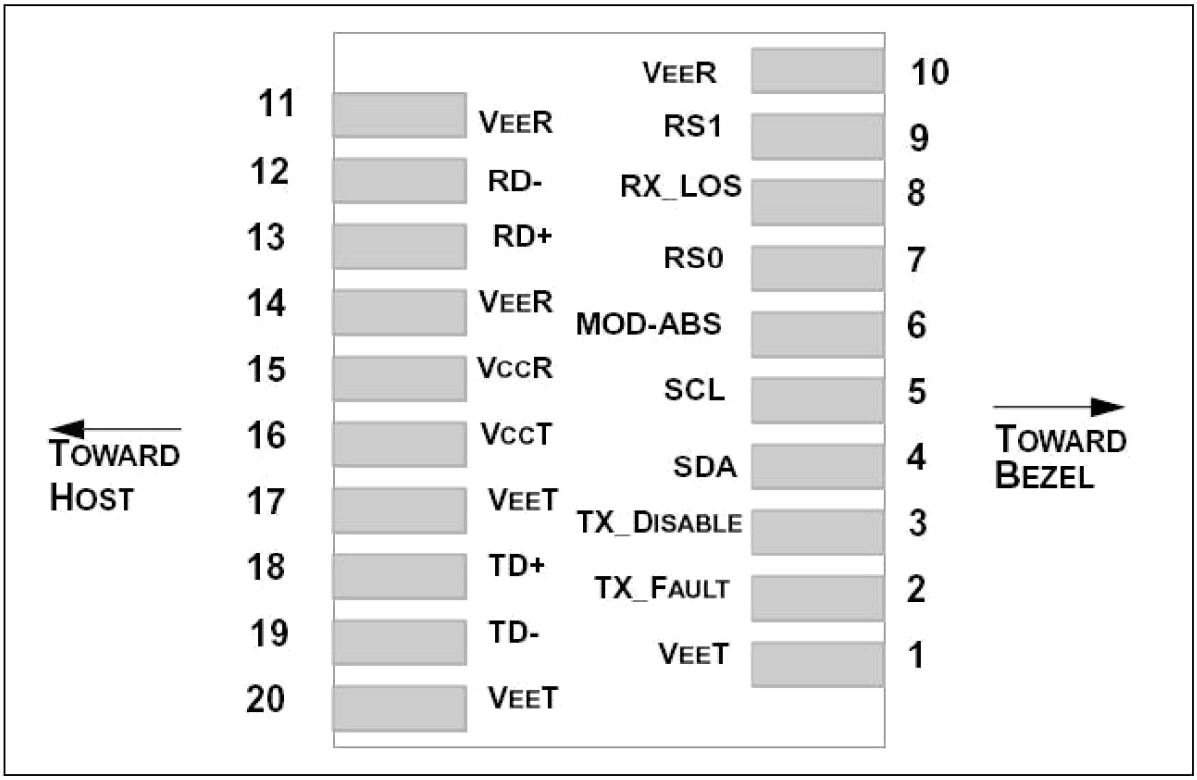
Optical and Electrical Characteristics

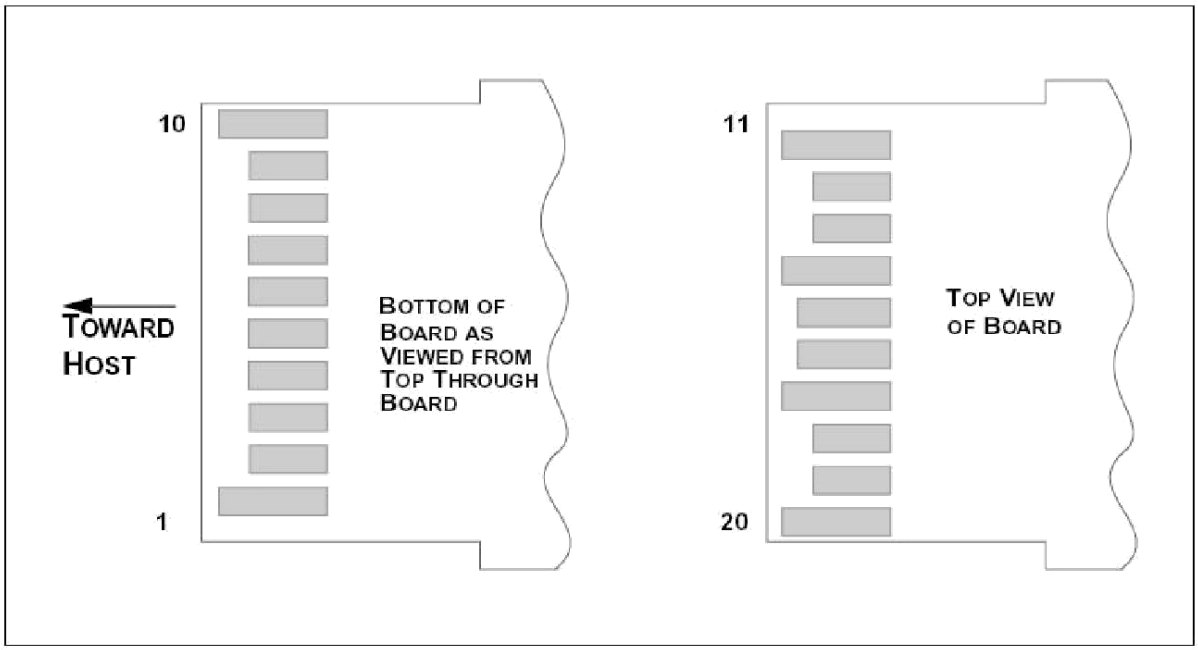
Parameter	Symbol	Min.	Typical	Max.	Unit
9um Core Diameter SMF				10	km
Transmitter					
Centre Wavelength	λC	1295	1310	1325	nm
Spectral Width (-20dB)	Δλ			1	nm
Average Output Power@28.05Gb/s	Pout	-5		2	dBm
Extinction Ratio	ER	4			dB
Transmitter Dispersion Penalty	TDP			3.2	dB
Receiver					
Centre Wavelength	λC	1260	1310	1355	nm
Unstressed Receiver Sensitivity(OMA)*[Note5]	Pmin			-11.4	dBm
Receiver Overload	Pmax	3			dBm
Optical Return Loss	ORL			-26	dB
LOS De-Assert	LOSD			-17	dBm
LOS Assert	LOS_A	-30			dBm

LOS Hysteresis		0.5			dB

Note4: Measured with data rate at 28.05Gb/s, BER less than1E-6 with PRBS 231-1.

SFP28 Transceiver Electrical Pad Layout





Pin Function Definitions

Pin Num.	Name	Function	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	
2	TX Fault	Transmitter Fault Indication	3	Note 1
3	TX Disable	Transmitter Disable	3	Note 2, Module disables on high or open
4	SDA	Module Definition 2	3	Data line for Serial ID.
5	SCL	Module Definition 1	3	Clock line for Serial ID.
6	MOD-ABS	Module Definition 0	3	Note 3
7	RS0	RX Rate Select (LVTTL).	3	Rate Select 0, optionally controls SFP28 module receiver. This pin is pulled low to VeeT with a >30K resistor..
8	LOS	Loss of Signal	3	Note 4
9	RS1	TX Rate Select (LVTTL).	1	Rate Select 1, optionally controls SFP28 module transmitter. This pin is pulled low to VeeT with a >30K resistor.
10	VeeR	Receiver Ground	1	Note 5
11	VeeR	Receiver Ground	1	Note 5
12	RD-	Inv. Received Data Out	3	Note 6
13	RD+	Received Data Out	3	Note 6
14	VeeR	Receiver Ground	1	Note 5
15	VccR	Receiver Power	2	3.3V ± 5%, Note 7
16	VccT	Transmitter Power	2	3.3V ± 5%, Note 7
17	VeeT	Transmitter Ground	1	Note 5
18	TD+	Transmit Data In	3	Note 8
19	TD-	Inv. Transmit Data In	3	Note 8
20	VeeT	Transmitter Ground	1	Note 5

NOTES:

1) TX Fault is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor on the host board. Pull up voltage between 2.4V and VccT/R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.4V.

2) TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7K~10 K Ω resistor. Its states are:
Low (-0.3 – 0.8V): Transmitter on
(>0.8, < 2.0V): Undefined
High (2.0 – VccT/R+0.3V): Transmitter Disabled

Open: Transmitter Disabled

3) Module Absent, connected to VeeT or VeeR in the module.

4) LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor. Pull up voltage between 2.4V and VccT/R+0.3V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.4V.

5) VeeR and VeeT may be internally connected within the SFP28 module.

6) RD-/+: These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be between 185 mV-425mV single-ended when properly terminated.

7) TD-/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board. The inputs will accept swings of 90mV-800mV single-ended, though it is recommended that values between 90mV-800mV single-ended be used for best EMI performance.

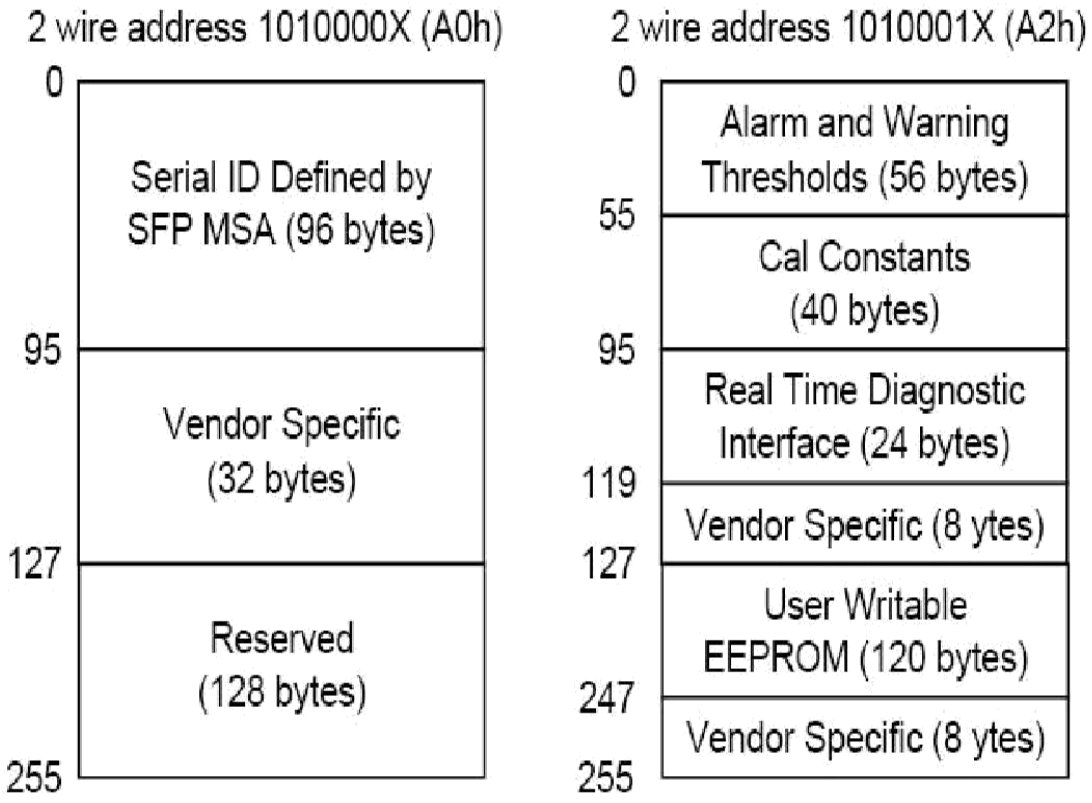
8) VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V ±5% at the SFP+ connector pin. Maximum supply current is 360mA. Inductors with DC resistance of less than 1 ohm should be used in order to maintain the required voltage at the SFP28 input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot plugging of the SFP28 transceiver module will result in an inrush current of no more than 30mA greater than the steady state value. VccR and VccT may be internally connected within the SFP28 transceiver module.

EEPROM

The serial interface uses the 2-wire serial CMOS EEPROM protocol defined for the ATMEL AT24C02/04 family of components. When the serial protocol is activated, the host generates the serial clock signal (SCL). The positive edge clocks data into those segments of the EEPROM that are not writing protected within the SFP28 transceiver. The negative edge clocks data from the SFP28 transceiver. The serial data signal (SDA) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.

The Module provides diagnostic information about the present operating conditions. The transceiver generates this diagnostic data by digitization of internal analog signals. Calibration and alarm/warning threshold data is written during device manufacture. Received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring all are implemented. If the module is defined as external calibrated, the diagnostic data are raw A/D values and must be converted to real world units using calibration constants stored in EEPROM locations 56 – 95 at wire serial bus address A2H. The digital diagnostic memory map

specific data field define as following .For detail EEPROM information, please refer to the related document of SFF 8472 Rev 12.2.



RYTQB10 A0HL V1.0

EEPROM Address			A0h	Version	V1.0
Data Addr	**Field Size (Byte)**	**Name Of filed**	**Description of field**	**Coded value**	**Hex**
			BASE ID FIELDS		
0	1	Identifier	Type of serial transceiver	SFP28	03
1	1	Ext.Identifier	Extended identifier of Type of serial transceiver	MOD4	04
2	1	Connector	Code for connector type	LC	07
3	8	Transceiver	10G Ethernet Compliance Codes & Infiniband Compliance Codes		00
4			Part of SONET Compliance Codes		00
5			SONET Compliance Codes		00
6			Ethernet Compliance Codes		00
7			Fiber Channel link length & part of Fibre Channel technology	long distance (L),Longwave laser (LC)	12
8			Part of Fiber Channel transmitter technology		00
9			Fiber Channel Transmission media	Single Mode (SM)	01
10	1	Encoding	Fiber Channel speed	3200MBytes/sec	08
11			Code for high speed serial encoding algorithm	64B/66B	06
12	1	BR, Nominal	Nominal signalling rate,units of 100MBd.(see details for rates >25.0Gb/s)	28.05Gbps	FF

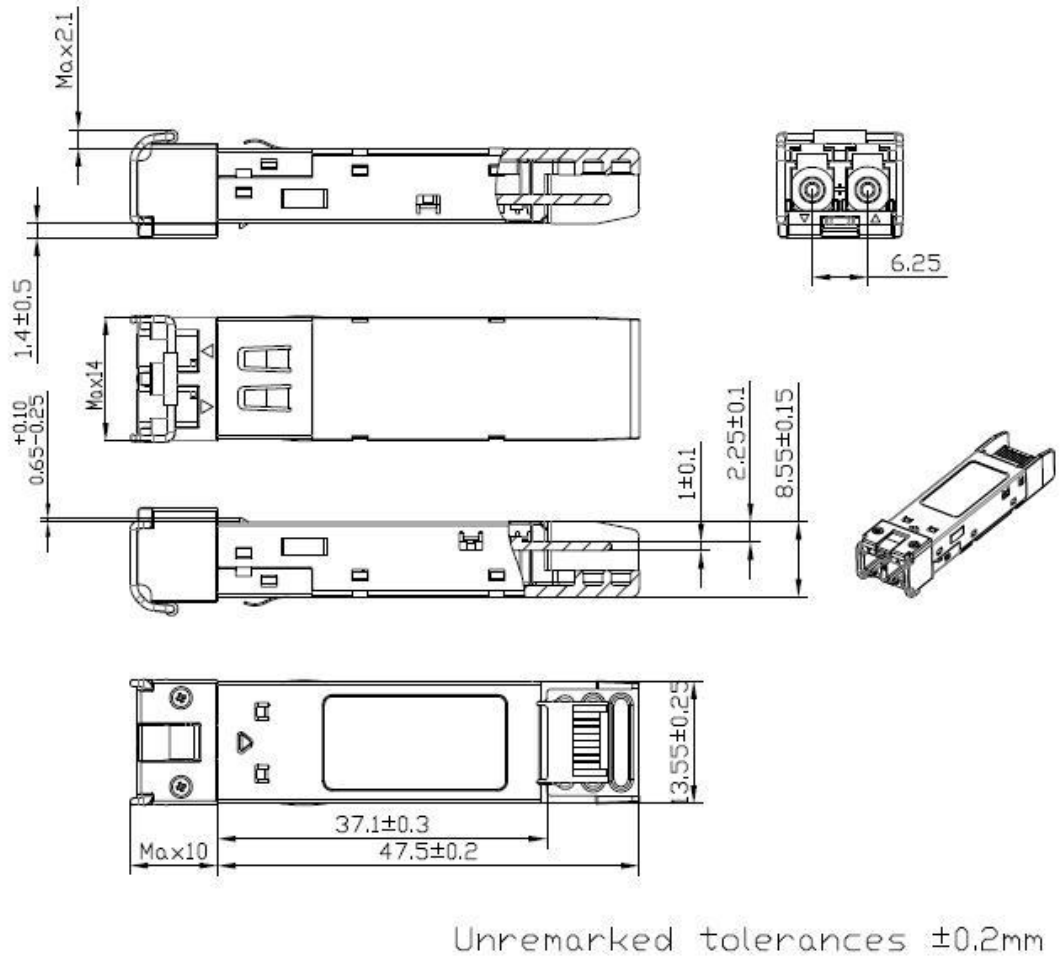
13	1	Rate Identifier	Type of rate select functionality		00
14	1	Length(SMF,km)	Link length supported for single mode fiber, units of km	10(km)	0A
15	1	Length (SMF)	Link length supported for single mode fiber, units of 100 m	100(100m)	64
16	1	Length (50um)	Link length supported for 50 um OM2 fiber, units of 10 m		00
17	1	Length (62.5um)	Link length supported for 62.5 um OM1 fiber, units of 10 m		00
18	1	Length (OM4 or copper cable)	Link length supported for 50um OM4 fiber, units of 10m. Alternatively copper or direct attach cable, units of m		00
19	1	Length (OM3)	Link length supported for 50 um OM3 fiber, units of 10 m		00
20	16	Vendor name	Vendor name (ASCII)		00
21					00
22					00
23					00
24					00
25					00
26					00
27					00
28					00
29				<space>	20
30				<space>	20
31				<space>	20
32				<space>	20
33				<space>	20

34				<space>	20
35				<space>	20
36	1	Transceiver	Code for electronic or optical compatibility		00
37	3	Vendor OUI	SFP vendor IEEE company ID		00
38					00
39					00
40	16	Vendor PN	Part number provided by vendor (ASCII)		00
41					00
42					00
43					00
44					00
45					00
46					00
47					00
48					00
49					00
50					00
51					00
52					00
53					00
54					00
55				<space> / I	20 / 49
56	4	Vendor rev	Revision level for part number provided by vendor (ASCII)	1	31
57				.	2E
58				0	30
59				<space>	20
60	2	Wavelength	Laser Wavelength	1310nm	05
61					1E
62	1	Reserved			00
63	1	CC_BASE	Check code for Base ID Fields (addresses 0 to 62)		A2/CB
64	2	Options	Indicates which optional transceiver signals are implemented	CDR indicator;power Level Declaration:power level 2	0A
65				TX_DISABLE, TX_FAULT signal,Rx_LOS	1A
66	1	BR, max	Nominal bit rate per channel,units of 250 Mbps. Complements Byte 12	28.05Gbps	70

67	1	BR, min	Lower bit rate margin, units of %(see details for rates > 25.0Gb/s)		00
68	16	Vendor SN	Serial number provided by vendor (ASCII)	x	xx
69				x	xx
70				x	xx
71				x	xx
72				x	xx
73				x	xx
74				x	xx
75				x	xx
76				x	xx
77				x	xx
78				<space>	20
79				<space>	20
80				<space>	20
81				<space>	20
82				<space>	20
83				<space>	20
84	8	Date code	Vendor’s manufacturing date code	Year	x
85				Year	x
86				Month	x
87				Month	x
88				Day	x
89				Day	x
90				<Space>	20
91				<Space>	20
92	1	Diagnostic Monitoring Type	Type of diagnostic monitoring is implemented	DD Implemented; Internally Calibrated; Average Power	68
93	1	Enhanced Options	Optional enhanced features are implemented	Optional Alarm/warning Flags Implemented,Optional soft TX_DISABLE,Optional soft TX_FAULT monitoring,Optional soft RX_LOS monitoring	F0
94	1	SFF-8472 Compliance	Revision of SFF-8472 the transceiver complies with	Rev 12.0 of SFF-8472.	08
95	1	CC_EXT	Check code for the Extended ID Fields	Note 5	xx

			(addresses 64 to 94)
Note 5: The check code shall be the low order 8 bits of the sum of the contents of all the bytes from byte 64 to byte 94, inclusive.			

Mechanical Specifications*



*This 2D drawing only for reference, please check with ZBC before ordering.

Eye Safety

This single-mode transceiver is a Class 1 laser product. It complies with IEC-60825 and FDA 21 CFR 1040.10 and 1040.11. The transceiver must be operated within the specified temperature and voltage limits. The optical ports of the module shall be terminated with an optical connector or with a dust plug.

Ordering information

Part No.	Data Rate	Laser	Fiber Type	Distance	Temp.	CDR	DDMI
RYTQB10	27.95Gbps and 28.05Gbps	1310nm DFB	SMF	10km	0℃ ~+70℃	√	√
RYTQB10-I	27.95Gbps and 28.05Gbps	1310nm DFB	SMF	10km	-10℃ ~+70℃	√	√

Note1: Standard version
Note2: Extended version
*The product image only for reference purpose.