DW-S1234-20CGUB

RoHS Compliant GPON SFP ONU B+ Optical Transceiver

Features

- Single Fiber Transceiver with single mode SC receptacle
- 1310nm burst-mode 1.25G transmitter with DFB Laser
- 1490nm continuous-mode 2.5G receiver with APD-TIA
- Meets ITU-T G.984.2 Class B+
- Digital diagnostic interface compliant with SFF-8472 Rev 9.4, Digital Diagnostic Monitoring (DDM) with external calibration
- 3.3V Single power supply
- LVPECL interface logic level for data input
- CML interface logic level for data output
- Differential line input/output impedance 100 ohm
- LVTTL for burst signal input and signal detect output
- Complies with RoHS directive (2002/95/EC)
- Operating case temperature: Standard : 0 to +70°C

Application

- Gigabit Passive Optical Networks (G-PON) - ONU side

Description

The DW-S1234-20CGUB transceiver is a high performance module for single fiber communications using a 1310nm burst-mode transmitter and a 1490nm continuous-mode receiver. It is used in the optical network terminal (ONT) for GPON ONT Class B+ applications.

The Transmitter is designed for single mode fiber and operates at a nominal wavelength of 1310nm. The transmitter module uses a DFB laser diode with full IEC825 and CDRH class 1 eye safety. It contains APC functions, a temperature compensation circuit

to ensure compliance with G.984.2 requirement at operating temperature, LVPECL data inputs and DC coupling circuit.
The receiver section uses a hermetic packaged APD TIA (APD with trans-impedance amplifier) and a limiting amplifier. The APD converts optical power into electrical current and the current is transformed to voltage by the trans-impedance amplifier. The differential DATA and /DATA CML data signals are produced by the limiting amplifier. The APD TIA is AC coupled to the limiting amplifier through a low pass filter. As the optical input power decreases, the Signal Detect will switch from high to low (de-assert point). As the optical input power is increases, Signal Detect will switch back from low to high (assert point). The assert level is at least 0.5 dB higher than the de-assert level (Signal Detect Hysteresis)..

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Note
Storage Temperature	Tst	-40	+85	°C	
Operating Case Temperature	*Tc*	0	70	°C	
Relative Humidity	*RH*	*5*	90	%	
Input Voltage	-	*GND*	Vcc	V	
Power Supply Voltage	*Vcc-Vee*	*0*	3.6	V	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Supply Voltage	Vcc	3.13	3.3	3.47	V	
Supply Current	Icc			400	mA	
Operating Case Temp.	Tc	0		70	°C	

Electrical Input/Output Characteristics

Parameter		Symbol	Min.	Typ	Max.	Unit	Note
Transmitter							
Data input Swing Differential		V_{IN}	200		1600	mV	
Burst	Disable		2.0		Vcc	V	
	Enable		0		0.8		
Tx Fault	Fault		2.0		Vcc	V	
	Normal		0		0.8		
Input Diff. Impedance		Z_{IN}	*90*	100	*110*	Ω	1

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Parameter		Symbol	Min.	Typ	Max.	Unit	Note
Receiver							
Output Differential Impedance		Z_{IN}	90	*100*	110	Ω	
Data Output Swing Differential		V_{OUT}	400		1000	*mV*	
SD Output Voltage	H		2.0		Vcc	*V*	
	L		0		0.8		

Note 1) PECL input, internally AC-coupled and terminated

Optical Characteristics

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Transmitter						
Operating Wavelength		1260	1310	1360	nm	
Ave. output power (Enabled)	Po	0.5		4	dBm	1
Data Rate			1.25		Gb/s	
Average Launch Power-OFF Transmitter	Poff			-41	dBm	
Rise/Fall time (20%~80%)	Tr/Tf			160	ps	
Side Mode Suppression Ratio	SMSR	30			dB	
Extinction Ratio	ER	10			dB	
Spectral Width	Δλ			1	nm	
Burst Enable Delay	Ton			12.86	ns	
Burst Disable Delay	Toff			12.86	ns	
Output Optical Eye	Compliant with G984.2					

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Receiver						
Data Rate			2.5		Gb/s	
Operating Wavelength	λc	1480		1500	nm	
Sensitivity	Psen			-29	dBm	2
Receiver Overload	Sat	-8			dBm	2
Receiver Reflectance				-20	dB	
Signal Detect De-assert	SDD	-44			dBm	
Signal Detect Assert	SDA			-30	dBm	
Signal Detect Hysteresis	SDH	0.5		6	dBm	

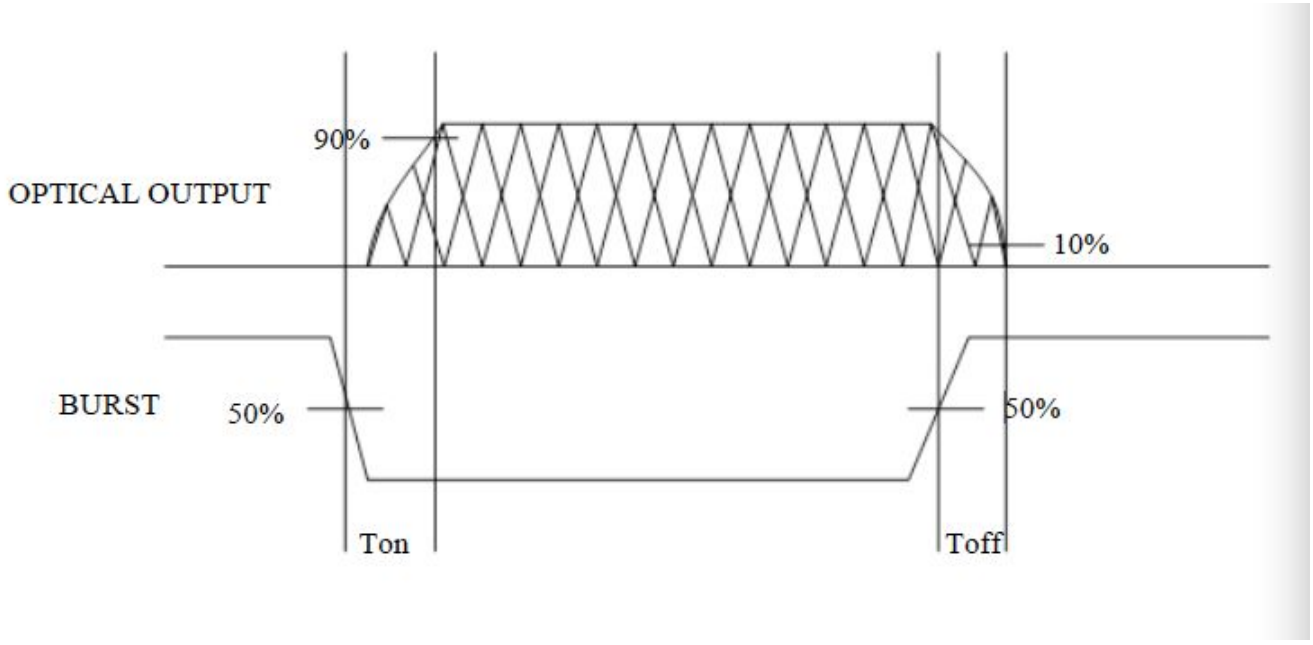
Note 1) The optical power is launched into SMF .
Note 2) Measured with a PRBS 2^{23}-1 test pattern @1250Mbps, BER ≤1×10^{-10}.
Note 3) RSSI DDM working range is between -8 to -28 dBm. RSSI DDM accuracy is better than +/- 3dB for input power levels between -12 to -28 dBm, the accuracy reduces to +/- 5 dBm for other input power levels.

Diagnostic Specification

Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70	°C	±3°C	Internal / External
Voltage	3.0 to 3.6	V	±3%	Internal / External
Bias Current	0 to 100	mA	±10%	Internal / External
Tx Power	0 to 5	dBm	±3dB	Internal / External
RX Power	-30 to -9	dBm	±3dB	Internal / External

Transmitter Burst Mode Timing Characteristics

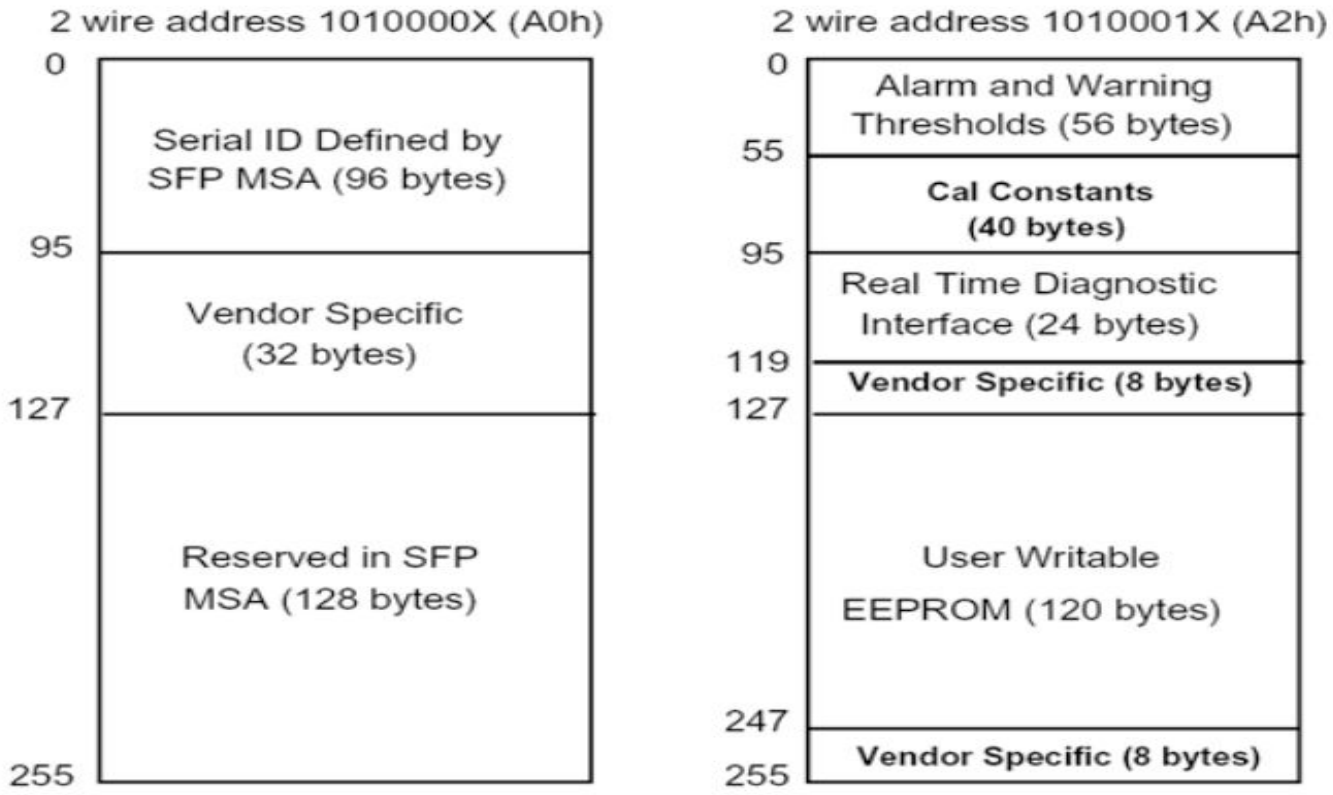
Definition of Burst Enable Delay (Ton) and Burst Disable Delay (Toff)



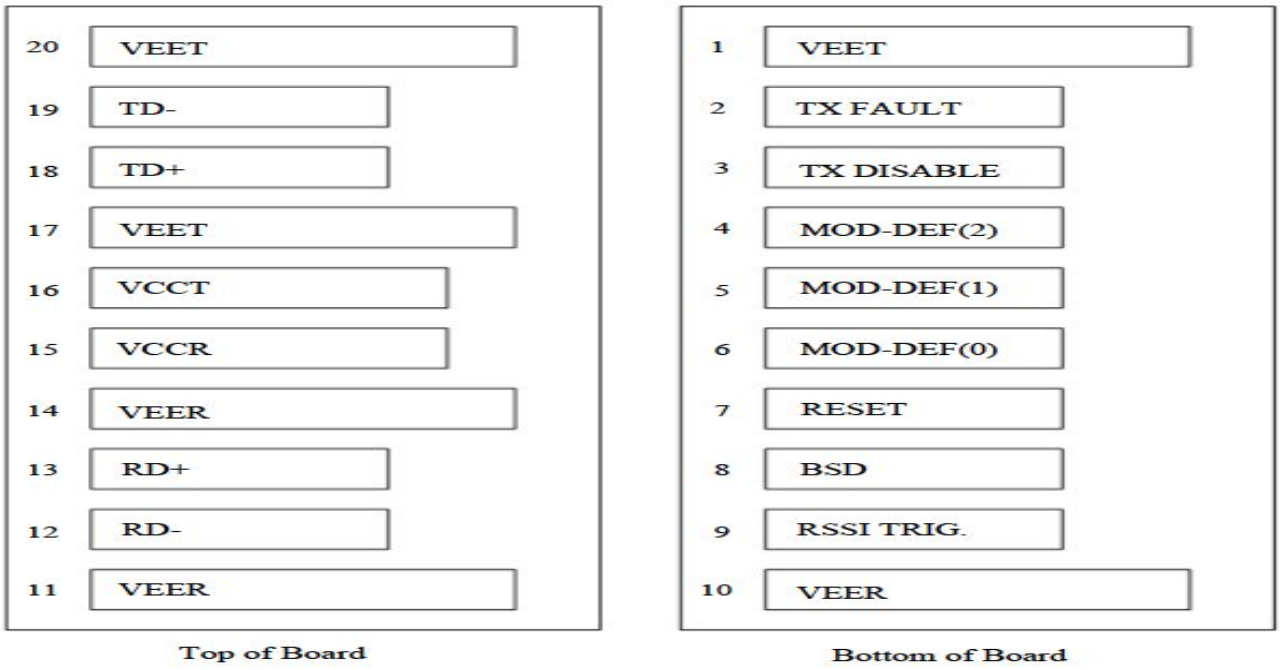
Digital Diagnostic Memory Map

The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.
The digital diagnostic memory map specific data field defines as following.



Pin Diagram



Pin Description

PIN #	Name	Function	Plug Seq.	Notes
1	V_{EET}	Module transmitter ground	1	
2	Tx Fault	Module Fault Indication	3	1
3	BURST	Burst Single	3	2
4	MOD_DEF(2)	SDA Serial Data Signal	3	3
5	MOD_DEF(1)	SDA Serial Clock Signal	3	3
6	MOD_DEF(0)	TTL Low	3	3
7	-	-	3	
8	SD	Signal Detect Output	3	4
9	-	-	3	
10	V_{EER}	Module receiver ground	1	
11	V_{EER}	Module receiver ground	1	
12	RD-	Inv. Receiver Data CML Output, internal AC Coupling	3	5

13	RD+	Receiver Data CML Output, internal AC Coupling	3	5
14	V_{EER}	Module receiver ground	1	
15	V_{CCR}	Module Receiver Power Supply	2	
16	V_{CCT}	Module Transmitter Power Supply	2	
17	V_{EET}	Module transmitter ground	1	
18	TD+	Transmitter Data LVPECL Input, Internal DC Coupling	3	6
19	TD-	Inv. Transmitter Data LVPECL Input, Internal DC Coupling	3	6
20	V_{EET}	Module transmitter ground	1	

Plug Seq.: Pin engagement sequence during hot plugging.

1) TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; Logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.

2) BURST is a TTL input. When it is low, LD is on; when it is high, LD is off.

3) Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7k~10kΩ resistor on the host board.

The pull-up voltage shall be VccT or VccR.

Mod-Def 0 is grounded by the module to indicate that the module is present

Mod-Def 1 is the clock line of two wire serial interface for serial

ID

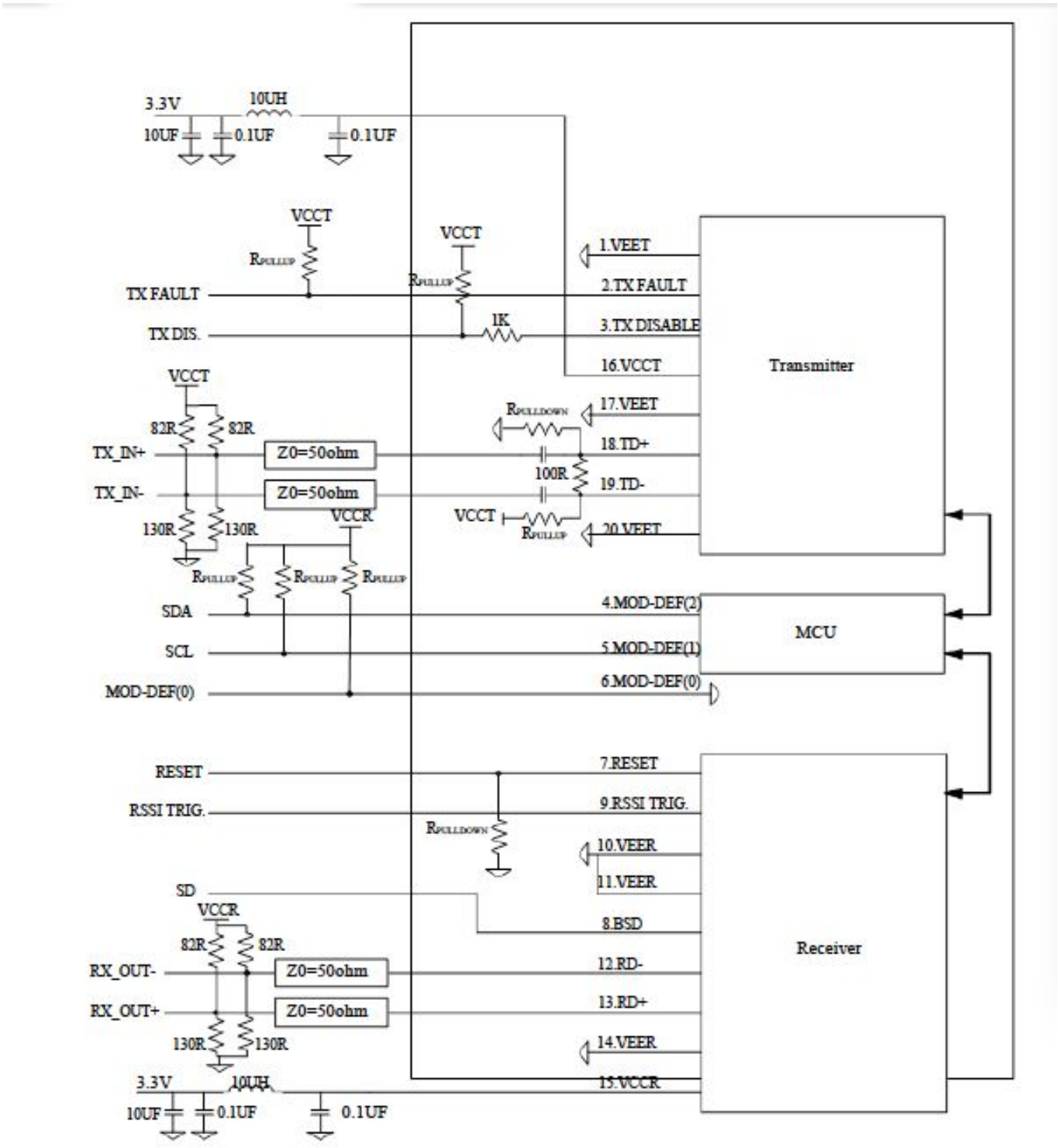
Mod-Def 2 is the data line of two wire serial interface for serial ID

4) SD is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor. Pull up voltage between 2.0V and Vcc+0.3V. Logic 0 indicates loss of signal; Logic 1 indicates normal operation. In the low state, the output will be pulled to less than 0.8V.

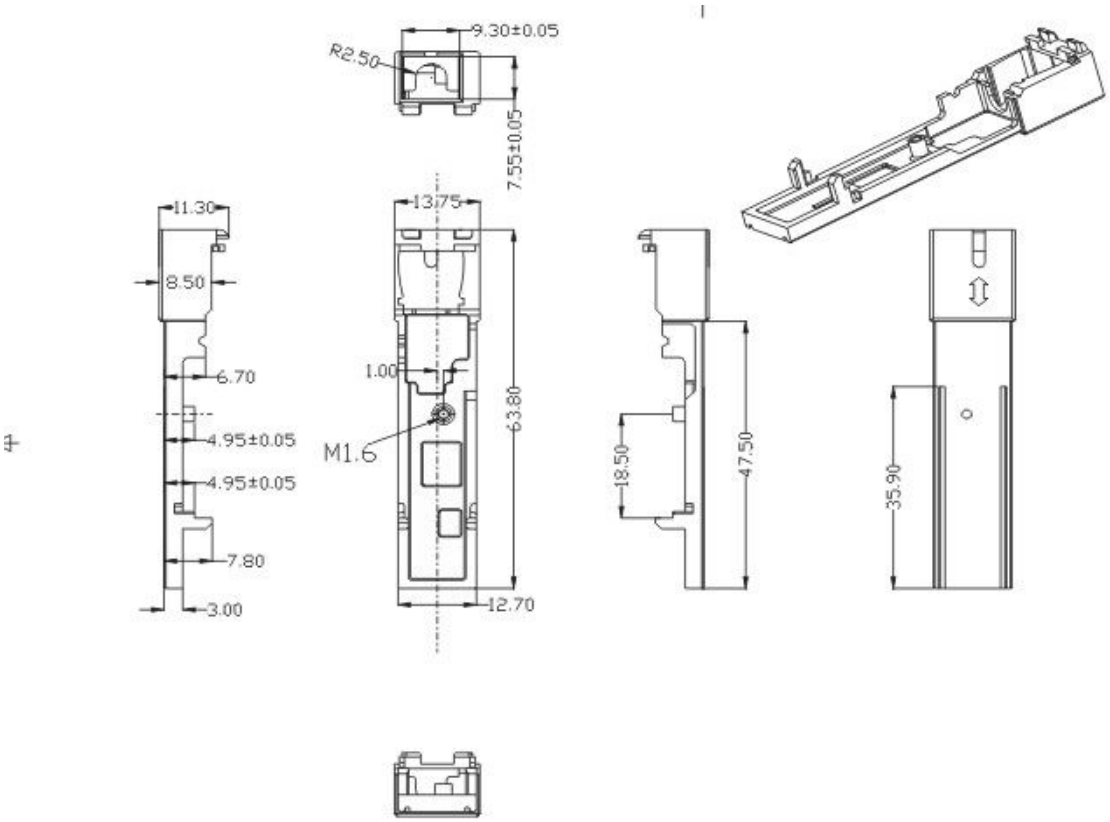
5) RD-/+: These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.

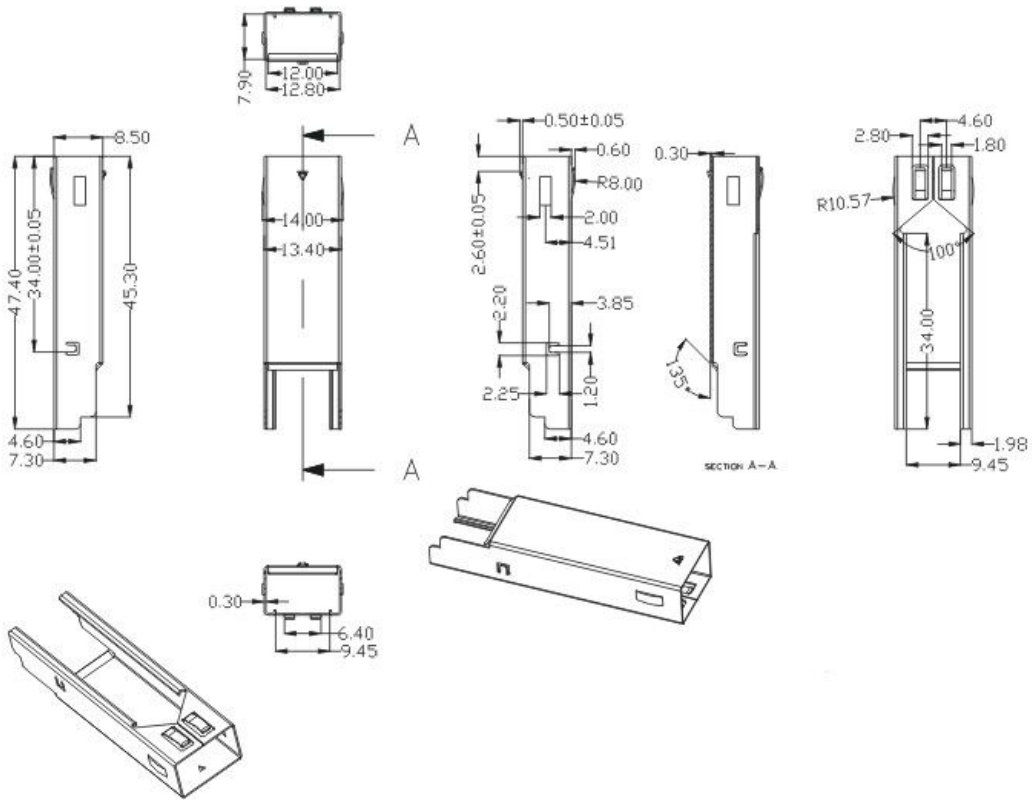
6) TD-/+: These are the differential transmitter inputs. They are internally DC-coupled, differential lines with 100Ω differential termination inside the module。

Recommended Interface Circuit



Package Dimensions





Ordering Information

Part Number	Description
DW-S1234-20CGUC	Tx1310nm/Rx1490nm , 1.25Gbps/2.5Gbps, Class C+, 0ºC ~ +70ºC With DDM; ONU Type
DW-S1234-20CGUB	Tx1310nm/Rx1490nm , 1.25Gbps/2.5Gbps, Class B+, 0ºC ~ +70ºC With DDM; ONU Type