GEUS-3515S-X3CDA

Asymmetricl 10G EPON ONU Transceiver

Features

- Single fiber Bi-Directional transceiver with single mode SC receptacle
- 1310nm burst-mode 1.25Gbps transmitter with DFB laser
- 1577nm continuous-mode 10.3125Gbps receiver with APD-TIA
- Complies with IEEE P802.3™D3.2 10/1GBASE–PRX30
- 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 LOS detect output
- Complies with RoHS directive (2002/95/EC)
- Operating case temperature:
  Standard : 0 to +70°C

Applications

- Asymmetric 10G/1G Ethernet Passive Optical Network ONT

Description

The GEUS-3515S-X3CDA Bi-Directional Transceiver is the high performance module for single fiber communications by using 1310nm 1.25Gbps burst mode transmitter and 1577nm 10.3125Gbps continuous receiver. It is Optical Network Unit (ONU) for IEEE802.3av. The optical transceiver is compliant with the Small Form- Factor Pluggable (SFP) Multi-Source Agreement (MSA).

The transmitter section uses a 1310nm DFB laser diode with automatic power control (APC) function and temperature compensation circuitry to ensure stable extinction ratio over all operating temperature range, and full IEC825 and CDRH class 1 eye safety. The receiver has a hermetically packaged APD-TIA (trans-impedance amplifier) pre-amplifier and a limiting amplifier with CML compatible differential outputs.

The receiver section also provides LVTTL Loss of signal output (LOS). As the input optical power is decreased, LOS output switches from low to high (signal loss point). As the input optical power is increased from very low levels, LOS output will switch back from high to low (signal detection point). The level of signal detection point is at least 0.5 dB higher than the level of signal loss point. LVTTL logic interface simplifies interface to external circuitry.

Absolute Maximum Ratings

Table 1 - Absolute Maximum Ratings

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

Recommended Operating Conditions

Table 2 - Recommended Operating Conditions

Parameter		Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Standard	Tc	0	-	+70	°C
Power Supply Voltage		Vcc	3.13	3.3	3.47	V
Power Supply Current		Icc	-	-	500	mA

Optical and Electrical Characteristics

Table 3 - Optical and Electrical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Transmitter						

Tx Data Rate		R_T	-	1.25	-	Gb/S	-
Centre Wavelength		λc	1260	1310	1360	nm	-
Spectral Width		Δλ	-	-	1	nm	-
Side Mode Suppression Ratio		SMSR	30	-	-	dB	-
Average Output Power		Pout	1	-	6	dBm	1
Extinction Ratio		ER	8	-	-	dB	-
Burst Enable Delay		Ton	-	-	32	ns	Fig.2
Burst Disable Delay		Toff	-	-	32	ns	Fig.2
Average Launch Power-OFF Transmitter		Poff			-40	dBm	
Optical Eye Diagram		Compliant with of IEEE 802.3av (Fig.1) transmitter eye mask definition					
Optical Rise/Fall Time (20%~80%)		tr/tf			260	ps	
Data Input Swing Differential		V_{IN}	200		1600	mV	2
Input Differential Impedance		Z_{IN}	90	100	110	Ω	
Burst	Disable		2.0		Vcc	V	
	Enable		0		0.8	V	
TX Fault	Fault		2.0		Vcc	V	
	Normal		0		0.8	V	
Receiver							
Rx Data Rate		R_R	-	10.3125	-	Gb/s	
Centre Wavelength		λc	1575		1580	nm	
Receiver Sensitivity		Sen			-28.5	dBm	3
Stressed receive sensitivity		Sen			-27	dBm	3
Receiver Overload		Sat	-10			dBm	3
Damage threshold		-	-9				4
Receiver Reflectance					-12	dB	
LOS De-Assert		LOSd	-44			dBm	
LOS Assert		LOSa			-29	dBm	
LOS Hysteresis		-	0.5	-	6	dB	

Output Differential Impedance		Z_{IN}	90	100	110	Ω	
Data Output Swing Differential		V_{out}	600		800	mV	5
LOS Voltage Level	High		2.0		Vcc	V	
	Low		0		0.8	V	

Notes:

1. The optical power is launched into SMF, 1.25Gbps continuous-mode , PRBS2^7-1.
2. PECL input, internally DC-coupled and terminated.
3. Measured with a PRBS 2^{31}-1 test pattern @10312.5Mbps, BER ≤1×10^{-3}.
4. Direct ONU-OLT connection may result in damage of the receiver
5. Internally AC-coupled.

Diagnostics

Table 4 – Diagnostics 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	1 to 6	dBm	±3dB	Internal / External
RX Power	-29 to -10	dBm	±3dB	Internal / External

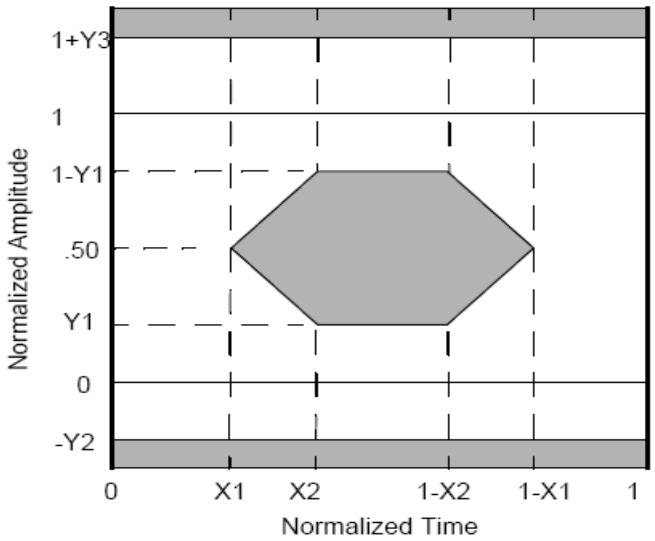


Fig.1

Transmitter Burst Mode Timing Characteristics

Definition of Burst Enable Delay (T_{on}) and Burst Disable Delay (T_{off})

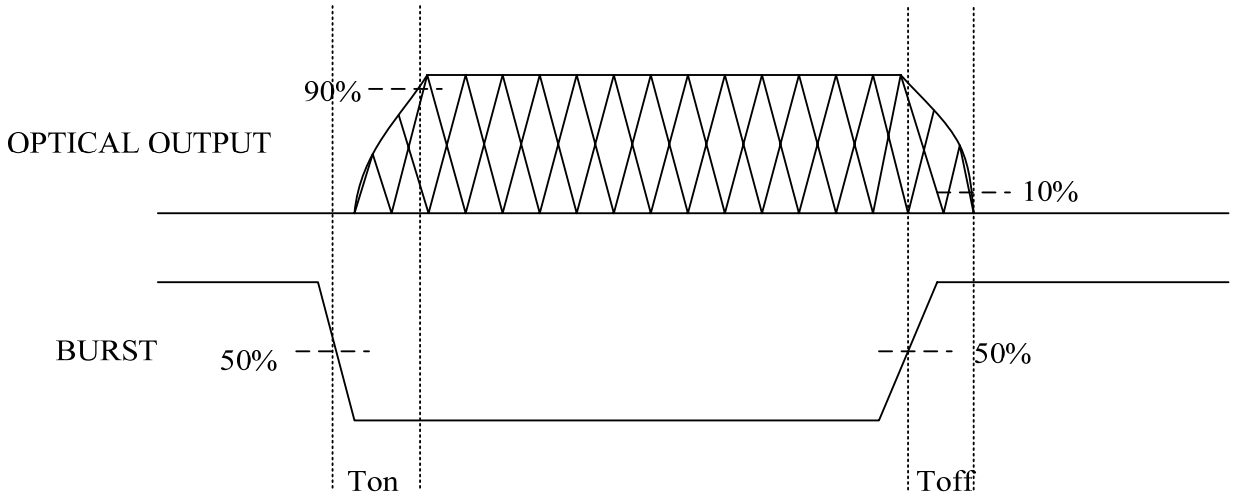


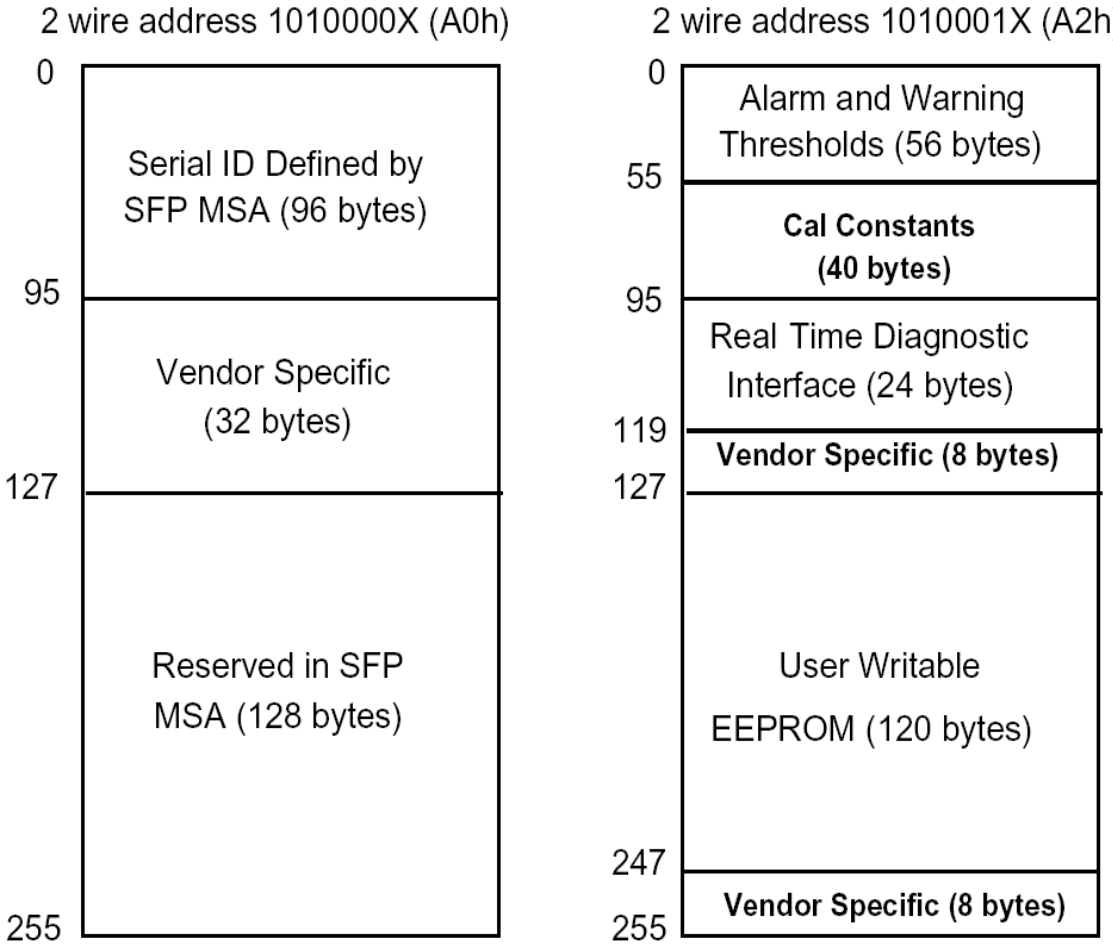
Fig.2

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).

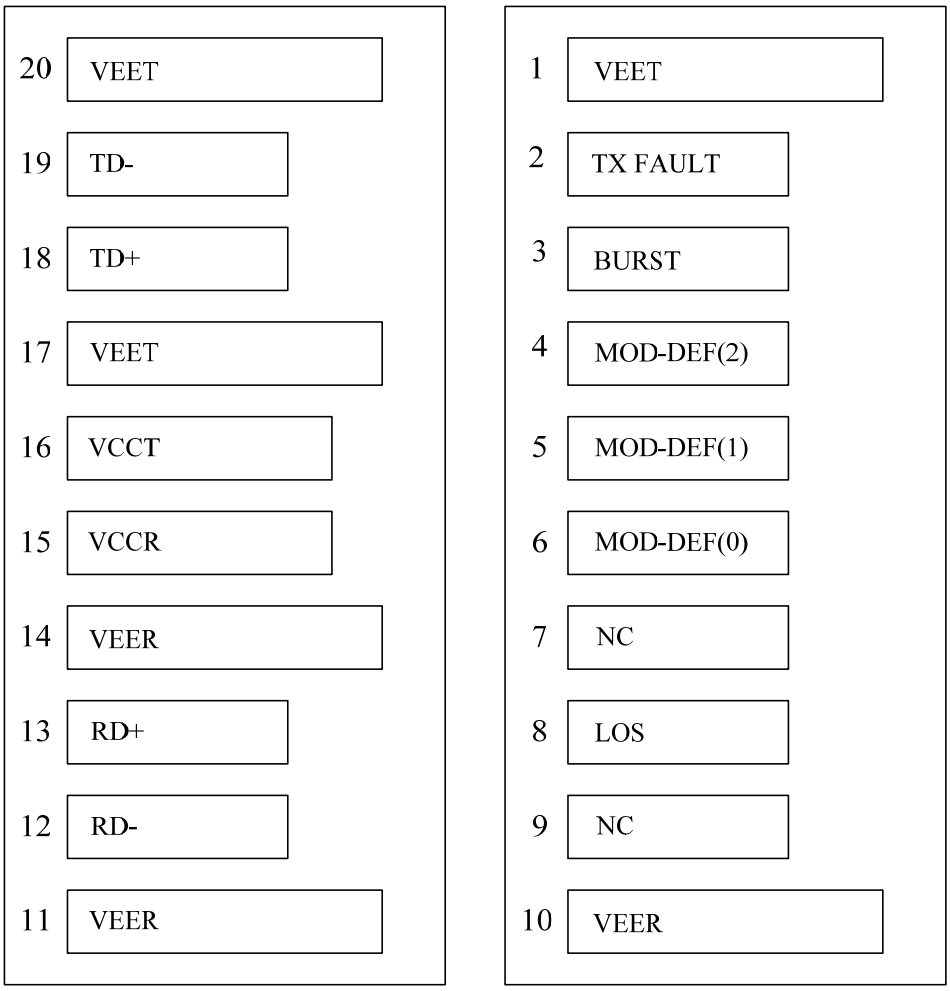
The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.

The digital diagnostic memory map specific data field defines as following.



Pin Definitions

Pin Diagram



Top of Board

Bottom of Board

Pin Descriptions

Pin	Signal Name	Description	Plug Seq.	Notes
1	V_{EET}	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	Burst_BEN	Burst Single	3	Note 2
4	MOD_DEF(2)	SDA Serial Data Signal	3	Note 3
5	MOD_DEF(1)	SCL Serial Clock Signal	3	Note 3
6	MOD_DEF(0)	TTL Low	3	Note 3

7	-	-	3	
8	LOS	Loss of Signal	3	Note 4
9	-	-	3	
10	V_{EER}	Receiver ground	1	
11	V_{EER}	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	V_{EER}	Receiver ground	1	
15	V_{CCR}	Receiver Power Supply	2	
16	V_{CCT}	Transmitter Power Supply	2	
17	V_{EET}	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	V_{EET}	Transmitter Ground	1	

Notes:

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

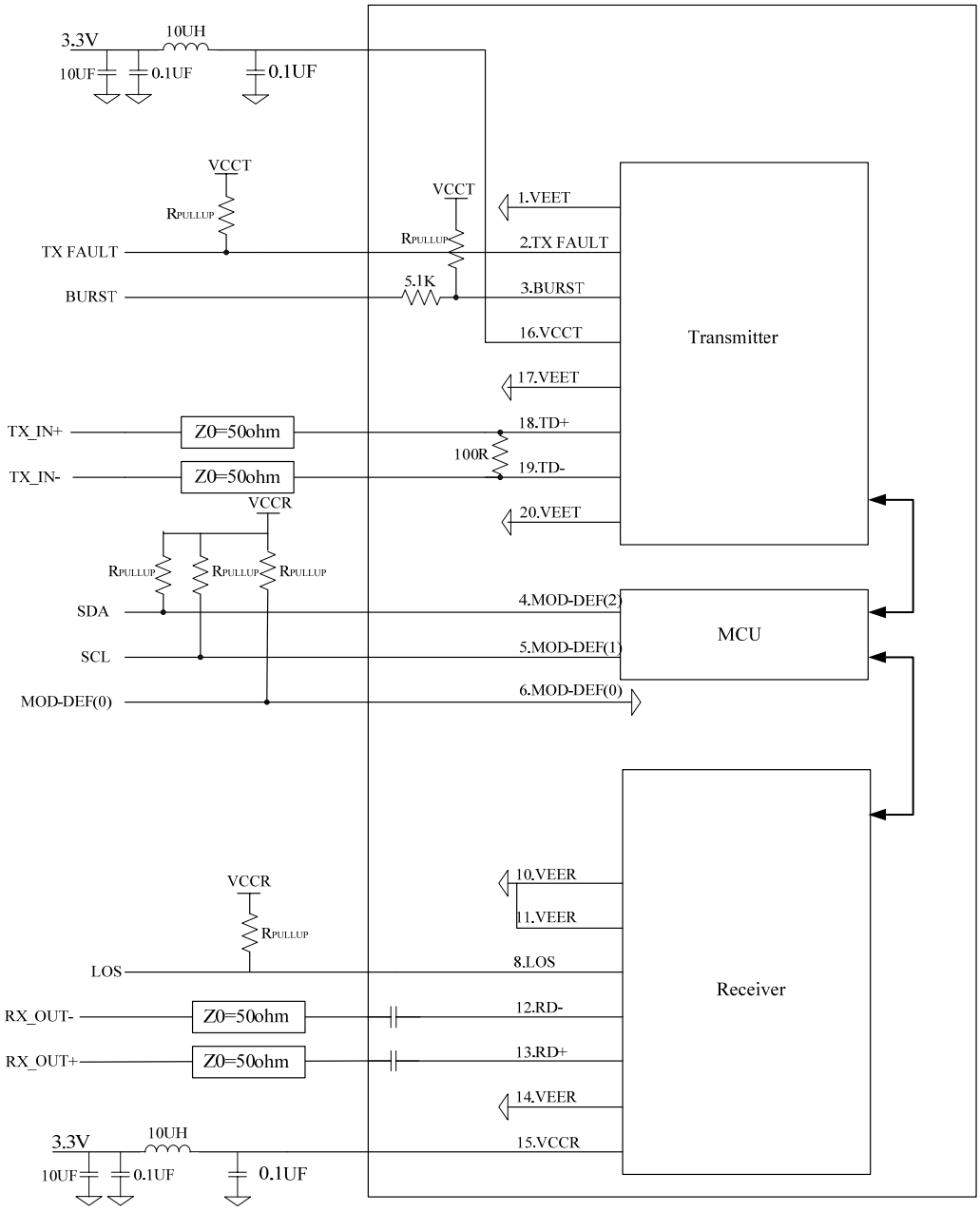
4) LOS is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor. Pull up voltage between 2.0V and Vcc+0.3V. Logic 1 indicates loss of signal; Logic 0 indicates normal operation. In the low state, the output will be pulled to less than 0.8V.

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.

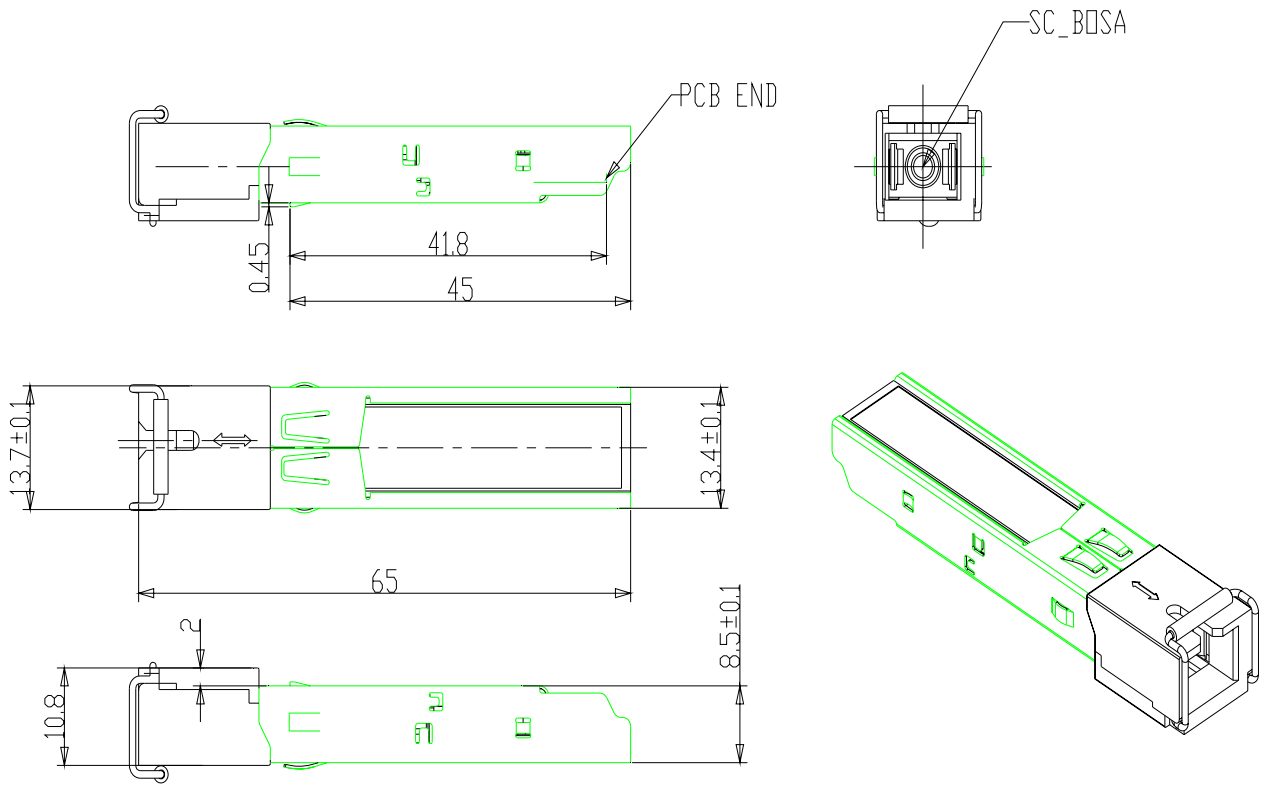
6) TD-/+: These are the differential transmitter inputs. They are internally DC-coupled, differential lines with 100Ω

differential termination inside the module.

Recommend Application Circuit



Mechanical Dimensions



Ordering information

Part Number	Product Description
GEUS-3515S-X3CDA	Tx1310nm, Rx1577nm, 1.25Gbps/10.3125Gbps, 10/1GBASE–PRX30, 0ºC ~ +70ºC with Digital Diagnostic Monitoring

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