TS-GP2512-OLT-C++

OLT for ITU-T G.984.2 Class C++
Single Fiber Bi-Directional Transceiver
2.488Gbps Downstream and 1.244Gbps Upstream
RoHS6 Compliant

Features

◆ SFP Package with SC receptacle

◆ 1.244Gbps, 1310nm BM APD Receiver

◆ 2.488Gbps, 1490nm Transmitter With Isolator

◆ Fast Signal Detect feature reduces ranging overhead

◆ Simplified OLT Reset Timing

◆ Compliant With ITU-T G.984.2

◆ Squelched RX output

◆ Up to 20km distance at 9/125µm G.652 SMF

◆ Operating Case Temperature

   Commercial: 0℃~+70℃
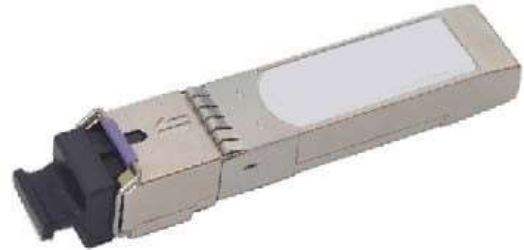
Applications

◆ GPON 20km OLT Side

◆ Access Networks

◆ Fiber to the Home, Curb, Office (FTTx)

Ordering information

Part No.	Input	Output	Burst-mode	DDM	Interface	Temp.
*(note1)	AC	DC	LVTTL	YES	SC	0~70℃

Note1: '21' means class C+ enhanced ODN; the corresponding transmission distance is maximum 20km.

Regulatory Compliance

Product Certificate	Certificate Number	Applicable Standard
TUV	R50135086	EN 60950-1:2006+A11+A1+A12
		EN 60825-1:2007
		EN 60825-2:2004+A1+A2
UL	E317337	UL 60950-1
		CSA C22.2 No. 60950-1-07
EMC CE	AE 50285865 0001	EN 55022:2010
		EN 55024:2010
CB	JPTUV-049251	IEC 60825-1
		IEC 60950-1
FCC	WTF14F0514437E	47 CFR PART 15 OCT., 2013
FDA	1331340-000	CDRH 1040.10
ROHS	RHS01G006464	2011/65/EU

*The above certificate number updated to June 2014, because some certificate will be updated every year, such as FCC, FDA and ROHS. For the latest certification information, please check with Skyloyal

Product Description

Transcom's high performance GPON OLT transceiver module is designed for Passive Optical Network application, 2.488Gbps downstream and 1.244Gbps upstream. It is fully compliant with ITU-T G.984.2.

The GPON OLT transceiver is packaged of small form factor pluggable with SC receptacle. The digital diagnostic monitoring function is compliant with SFP MSA.

The module consists of 1490nm DFB Laser, APD detector and WDM filter in a high-integrated optical sub-assembly. It transmits 2.488Gbps at 1490nm, and receives 1.244Gbps at 1310nm in burst mode.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T_S	-40	+85	°C
Supply Voltage	V_{CC}	0	3.6	V
Operating Relative Humidity		5	85	%

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

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Power Supply Voltage	V_{CC}	3.13	3.3	3.47	V
Power Supply Current	I_{CC}			500	mA
Operating Temperature	T_c	0		+70	°C
Relative Humidity	RH	5		85	%

Date Rate	Upstream/Downstream		1.244/2.488		Gbps

Performance Specifications - Electrical

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Transmitter						
Data input swing(Differential)	Vin	600		1600	mVpp	AC coupled internally
Input Impedance (Differential)	Zin		100		ohms	
Tx Disable		2		Vcc	V	
Tx Enable		0		0.8		
Tx Fault_High		2.4		Vcc	V	
Tx Fault_Normal		0		0.4		
Receiver						
Data Output swing(Differential)	Vout	400		1600	mVpp	DC coupled outputs
BRST_DET	High	2		Vcc	V	
	Low	0		0.8	V	

Performance Specifications – Optical

Parameter	Symbol	Min.	Typical	Max.	Unit
Date Rate (Upstream/Downstream)			1.244/2.488		Gbps
Transmitter					
Centre Wavelength	λ_C	1480	1490	1500	nm
Spectral Width (-20dB)	$\Delta\lambda$			1	nm
Side Mode Suppression Ratio	SMSR	30			dB
Average Output Power@25°C (BOL)*[Note2]	Pout	5.5		10	dBm
Average Output Power@0 to 70°C (BOL)*[Note2]	Pout	4.5		10	dBm
Extinction Ratio*[Note3]	ER	8.2			dB
Tolerance to Tx back reflection		-15			dB
Output Optical Eye*[Note3][Note4]	ITU-T G.984.2 Compliant				
Optical Output Power with TX OFF	P_off			-40	dBm
Receiver					
Centre Wavelength	λc	1290	1310	1330	nm
Receiver Sensitivity@25°C *[Note5]	Pmin@10^{-4}			-33	dBm
	Pmin@10^{-10}			-31	dBm
Receiver Sensitivity@0 to 70°C *[Note5]	Pmin@10^{-4}			-32	dBm
	Pmin@10^{-10}			-30	dBm
Receiver Overload*[Note5]	Pmax	-12			dBm
Signal Detect Assert Level	SDA			-34	dBm
Signal Detect De-Assert Level	SDD	-45			dBm

Receiver CID Tolerance	CID	72			bits
Damage Threshold for Receiver	Pin, damage			+4	dBm
Maximum Receiver Reflectance	Rx_r			-20	dB

Note2: Measured with 9/125um G.652 SMF.

Note3: Filtered, Measured with PRBS2^{23}-1 test pattern @2.488Gbps.

Note4: Eye pattern mask

	1244.16 Mbit/s	2488.32 Mbit/s
x1/x4	0.28/0.72	---
x2/x3	0.40/0.60	---
x3 − x2	---	0.2
y1/y2	0.20/0.80	0.25/0.75
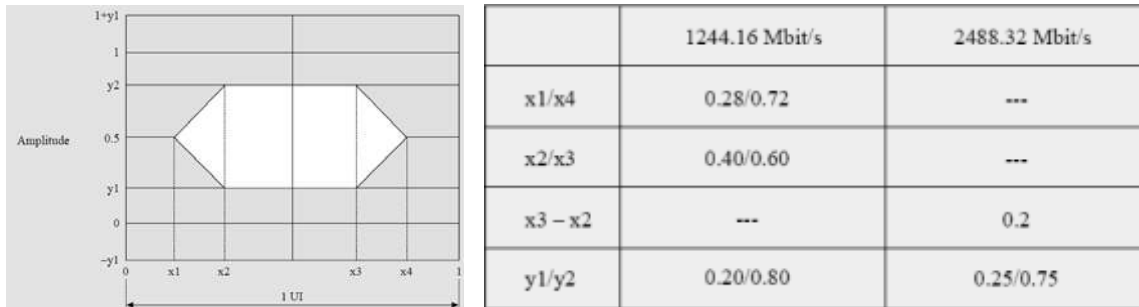
Note5: Measured with a PRBS 2^{23}-1 test pattern @1.244Gbps.

Timing Characteristics
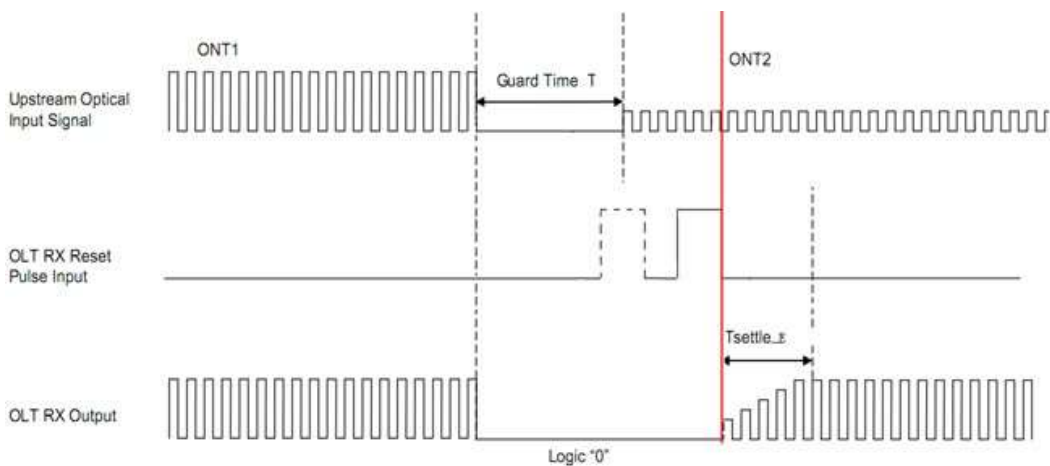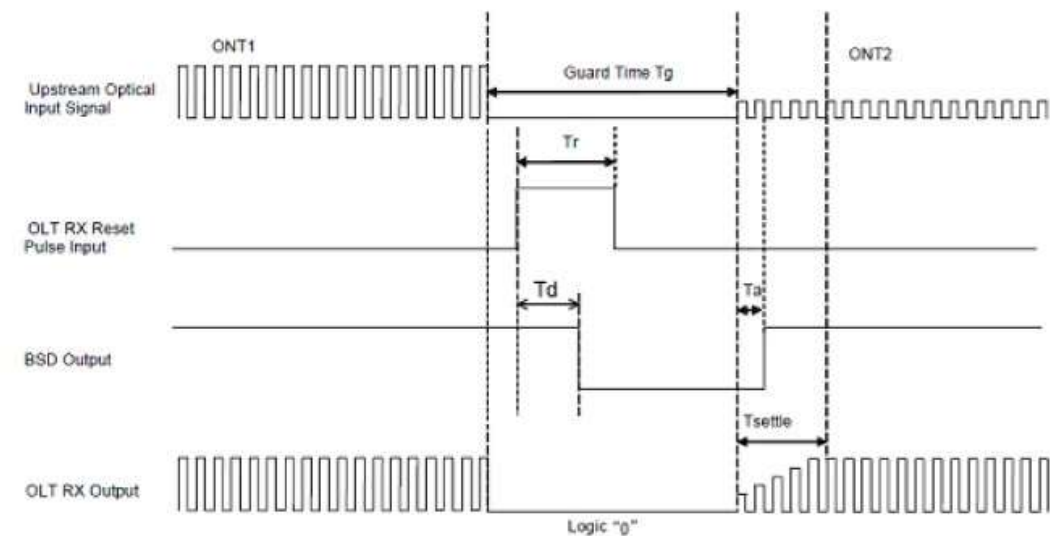
Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Guard Time	T_g	4	-		Bytes	
Reset Pulse Width*[Note6]	T_r		16		Bits	
Burst Signal Detect Response*[Note7]	T_a		-	25	ns	
	T_d			10	ns	
Burst Mode Rx Setting Time	T_{settle}			24	Bits	
	$T_{settle-E}$			16	Bits	
DCD_A				10	%	

Note6: The Reset signal should occur in the Guard Band time slot and commence immediately at the end of the ONT signal.

Note7: The Rx Burst Mode Signal Detect asserts Low when the Reset signal is applied; assets High when an incoming burst is detected and latches High until the next Reset signal.

Digital RSSI_ACQ Timing Characteristics

The RSSI function consists of a photo detector current mirror, sample/hold circuits, analog to digital converter (ADC) and embedded microcontroller (MCU). The RSSI provides digital data via the I^2C data bus (SDA) to the host system at memory locations 104H and 105H. At the time the transceiver is powered on the I^2C RSSI memory registers are cleared to zero and t_w is held LOW. The RSSI data will not change until PON traffic is present and the system requests an update to the RSSI by pulling t_w HIGH after delay t_d.
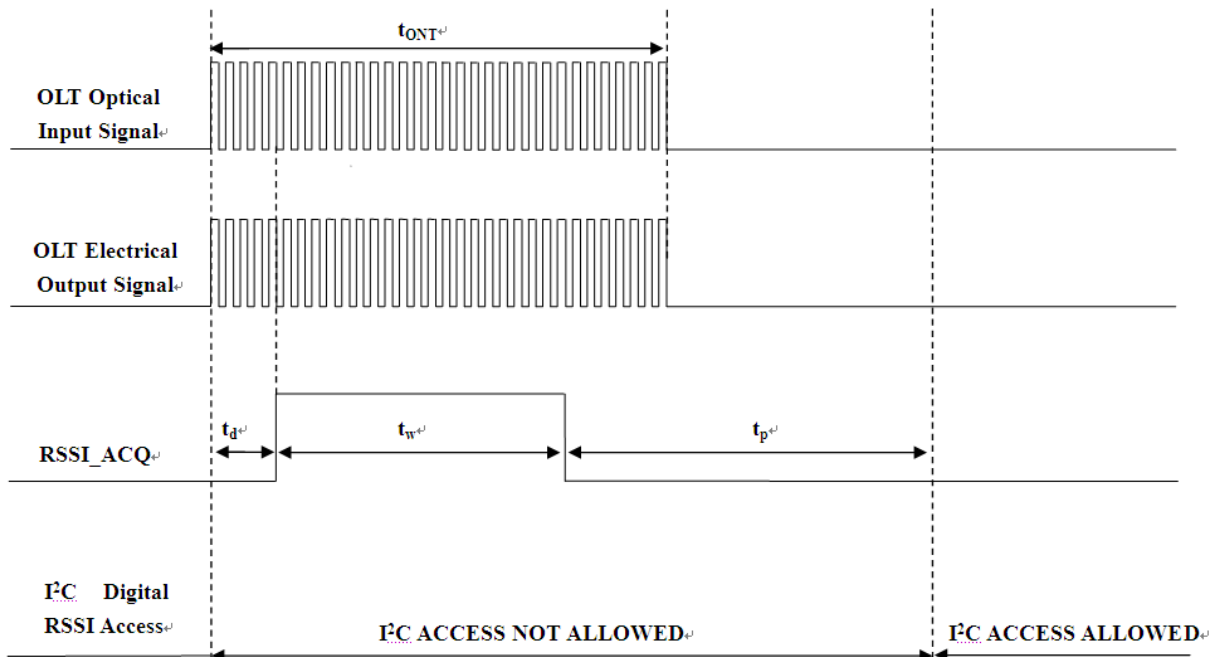

Digital RSSI Timing Specification

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
RSSI Trigger Delay*[Note8]	t_d	0	6.4	3000	ns	
RSSI Sampling Time*[Note8]	t_w	300	-	-	ns	
I^2C Access "invalid" Time Interval*[Note8]	t_p			500	us	

Range of RSSI		-10		-32	dBm	

Note8: RSSI_ACQ input signal rising edge will trigger RSSI sampling, and falling edge will trigger internal digital RSSI information written to I2C. It is recommended that host shall not trigger RSSI_ACQ input again until RSSI data is valid in I2C from previous RSSI trigger.

Digital Diagnostic Interface

The memory map in the following describes an extension to the memory map defined in SFP-8472. The enhanced interface uses the two wire serial bus address 1010001X (A2h) to provide diagnostic information about the module's present operating conditions.
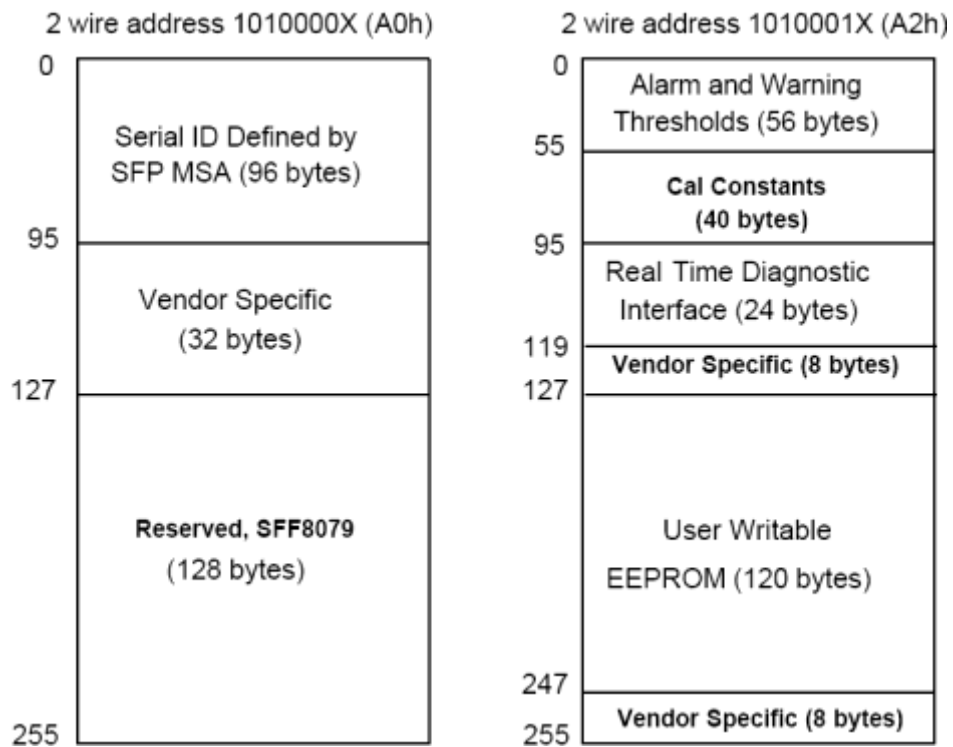
EEPROM Serial ID Memory Contents (2-Wire Address A0h)

The following diagnostic information is according to the TS-GP2512-OLT-C++

Address	Name of Field	Hex	Description
Base ID Fields			
00	Identifier	03	SFP physical device (soldered device)
01	Ext. Identifier	04	Serial ID module supported
02	Connector	01	SC
03-10	Transceiver Codes	00 00 00 00 00 00 00 00	Undefined
11	Encoding	03	NRZ
12	BR, Nominal	19	Nominal 2.488Gbps (indicate transmitter data rate)

13	Reserved	00	-
14	Length (9um)-km	14	20km @9/125um fiber
15	Length (9um)-100m	C8	20000m @9/125um fiber
16-18	Length for MMF	00	Undefined for GPON
19	Reserved	00	-
20-35	Vendor Name	45 4F 50 54 4F4C 49 4E 4B 20 49 4E 43 20 20 20	Skyloyal (ASCⅡ)
36	Channel Spacing	00	-
37~39	Vendor OUI	00 00 00	-
40-55	Vendor P/N	45 4F 4C 53 2D 47 54 2D 33 37 2D 44 20 20 20 20	04001221 (ASCⅡ)
56-59	Vendor P/N Rev.	31 2E 30 20	31 2E 30 20 means 1.0 revision.
60-61	Laser Wavelength	05 D2	1490nm in Hex byte
62	DWDM Wavelength Fraction	00	Undefined
63	CC_BASE	XX	Check sum of byte 0-62
Extended ID Fields			
64-65	Options	00 1C	TX_Fault, TX_Dis, Signal Detect are implemented
66	BR, Max.	00	-
67	BR, Min.	00	-
68-83	Vendor SN	XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX	Vendor serial number in ASCII
84-91	Date Code	XX XX XX XX XX XX 20 20	Vendor date code in ASCII (Year Month Date)
92	Diagnostic Monitoring Type	68	Internal Calibration, Average Power
93	Enhanced options	E0	Alarm/Warning flags, soft TX_DIS, TX_FAULT if SP implemented.
94	SFF-8472 compliant	02	SFP-8472 compliant with revision 9.5
95	CC_EXT	XX	Check sum of bytes 64-94
Vendor Specific ID Fields			
96-127	Vendor Specific	00	Vendor specific EEPROM
128-256	Reserved	00	Reserved for future use

Note9: 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.

*The "XX" byte should be filled in according to practical case. For more information, please refer to the related document of SFP Multi-Source Agreement (MSA).

Identification Specification for TS-GP2512-OLT-C++

2 wire address 1010000X（A0H）

Address	Bytes Number	Name	Description
96-99	4		reserved
100-111	12		reserved
112-115	4	Revision Number	reserved

Password Specification for TS-GP2512-OLT-C++

2 wire address 1010001X（A2H）

Address	Bytes Number	Name	Description
128-131	4	Password input area for consumer	Actually, the password is not in flash, but in internal storage of optical module for judging the validity of the password. Reading this area to get the value that filled in recently, the default value is 0X0[*(not10)]
132-135	4	Password storage area for consumer reading	Consumer's password storage area, the default value is 0x0b,0x0c,0x0d,0x0e
136-139	4	Password storage area for consumer writing	Consumer's password storage area, the default value is 0x0a,0x0b,0x0c,0x0d[*(note10)]
140-247	108	Data area	This area can read or write(R/W) when the password is correct. Consumer can't write this area when the password is not correct, and the reading value is 0x0

Note10: Data in 132-247 can be read when the reading password and writing password is correct in 128-131. Data in 140-247 can be changed directly when the writing password is correct in 128- 131.

Note20: Dividing the reading password and writing password to avoid misoperation when the I2C Timing is not correct. The module got the operation is reading the user area or writing the user area by judging the password which stored in 128-131. If the password is error, the operating processing will defeat. We can change the reading password and writing password as the password change flow which describe as following.
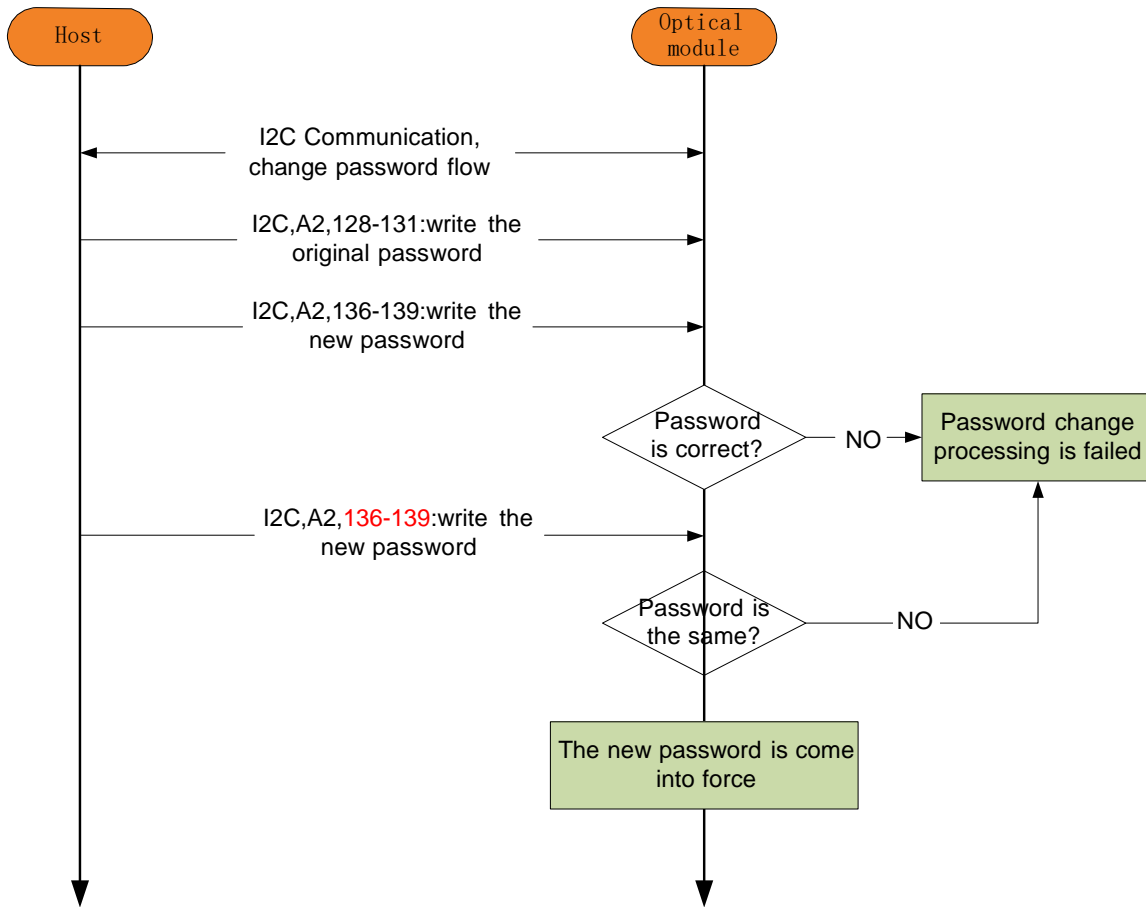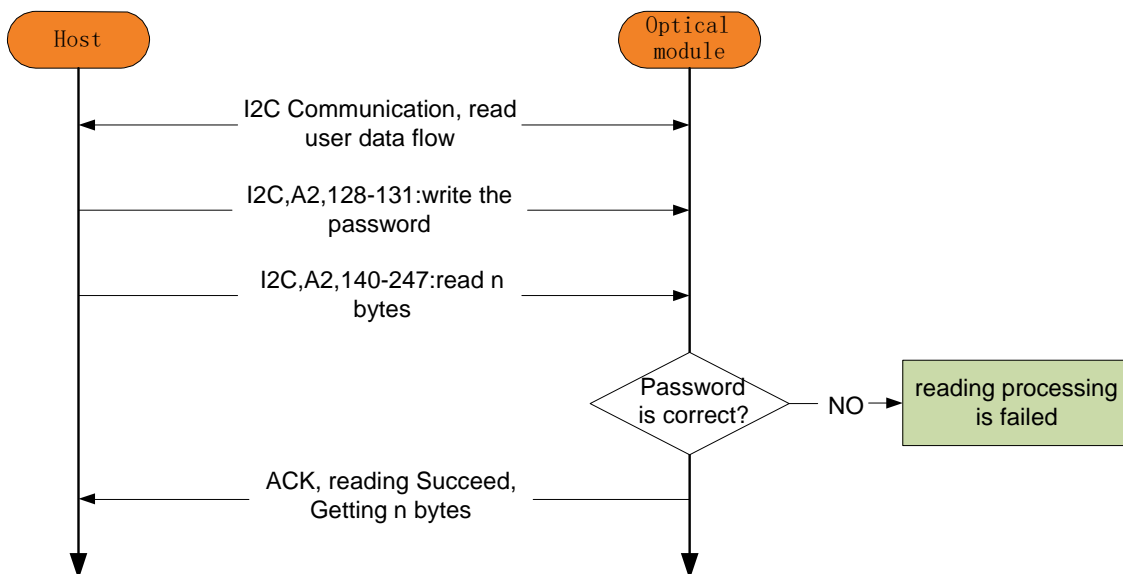
a) Change reading password flow
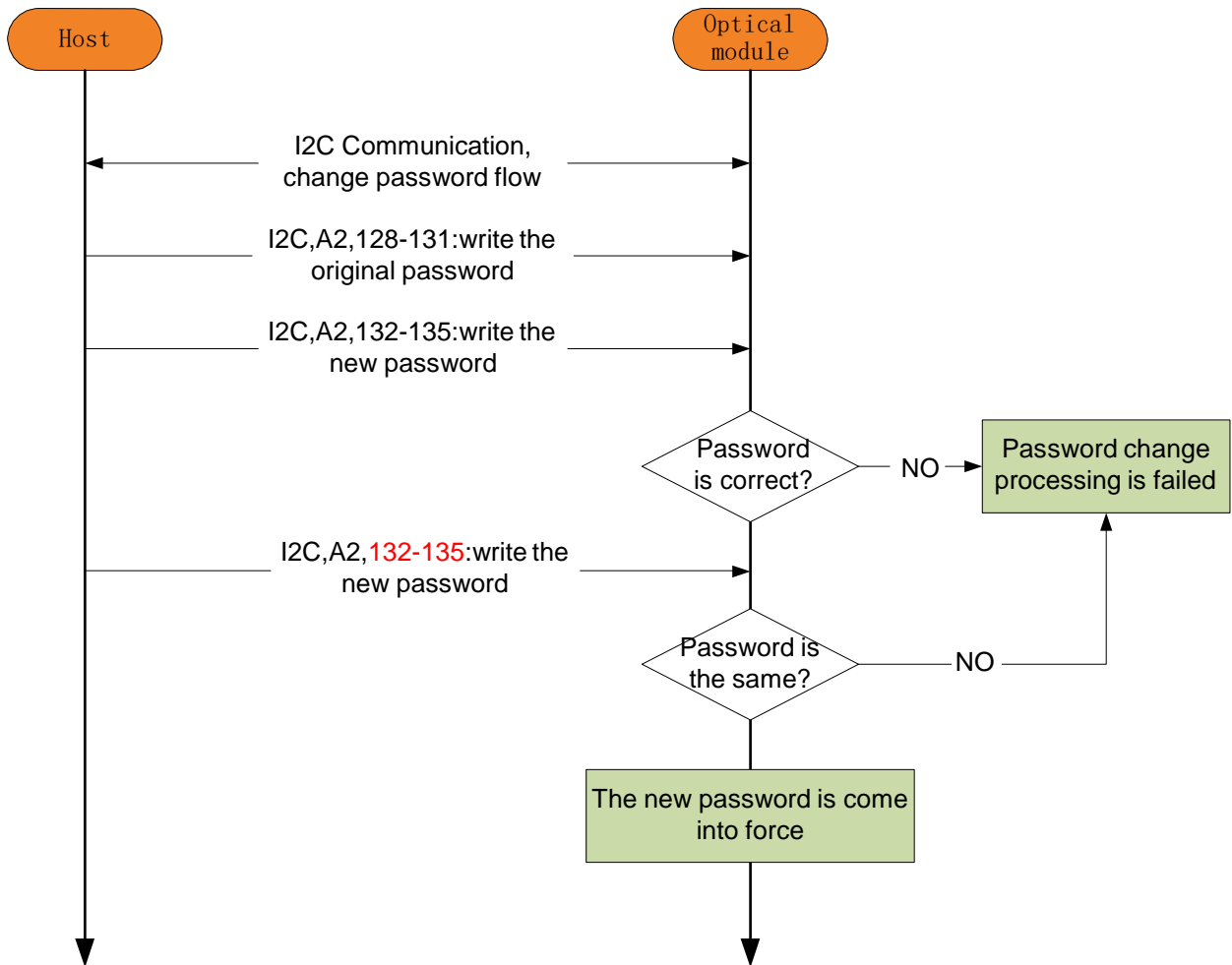
Notice: 1.Verified the new password twice in the flow to avoid changing the password carelessly.

   2.Host judge the password whether come into force by reading the user data, if the data is correct, the new password is effectively.

b) Change writing password flow

c) Reading user data flow

Notice: 1.After inputting the reading password and writing password, the data in 132-135 will compare with the data in 136-139 to judge the processing is reading or writing.

DDM Specification

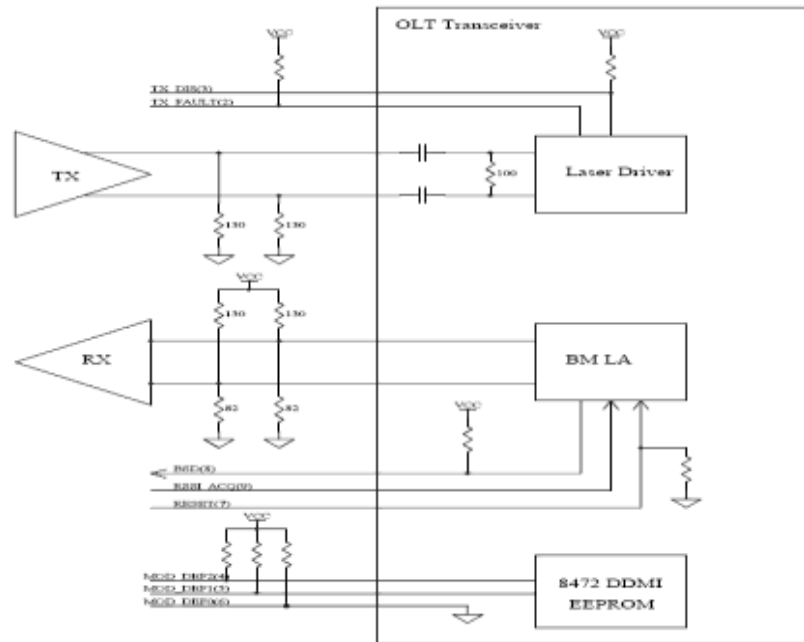| Byte	Name	Description	Accuracy	Notes
96	Temperature MSB	Temperature	±3℃	
97	Temperature LSB			
98	VCC MSB	Voltage	±3％	
99	VCC LSB			
100	TX Bias MSB	Bias Current	±10％	
101	TX Bias LSB			
102	TX Power MSB	TX Power	±2dB	
103	TX Power LSB			
104	RX Power MSB	RX Power	±2dB	
105	RX Power LSB			
106~109	Reserved	Reserved		

SFP Pin Function Definitions

Below figure shows the pin information of electrical interface and mounting studs. Functions are described in the following table.

Pin No.	Pin Name	Description
1	Veet	Tx Ground
2	Tx Fault	Tx Fault Alarm. LVTTL Output Active High
3	Tx DIS	Tx Disable. LVTTL input. Laser output is disabled when this pin is asserted high or left unconnected. Laser output is enabled when this pin is asserted low.
4	MOD_DEF(2)	2-Wire Serial Data I/O Pin.
5	MOD_DEF(1)	2-Wire Serial Clock Input.
6	MOD_DEF(0)	Internally Grounded
7	Reset	CMOS input. Assert "Reset" high at the end of previous burst, 2 bytes in duration
8	BRST_Det	LVTTL output. BRST_Det assert low when module receives "reset" signal, assert high when incoming burst is present.
9	RSSI_ACQ	RSSI acquire/hold LVTTL Input. Digital RSSI output through I2C
10	Veer	Rx Ground
11	Veer	Rx Ground
12	RXD-	Negative Data Output, LVPECL; DC coupled
13	RXD+	Positive Data Output, LVPECL; DC coupled
14	Veer	Rx Ground
15	Vcc_RX	Rx Vcc
16	Vcc_TX	Tx Vcc
17	Veet	Tx Ground

18	TXD+	Positive Data Input, LVPECL or CML (AC coupled; internally 100 ohms differential termination)
19	TXD	Negative Data Input, LVPECLor CML (AC coupled; internally 100 ohms differential termination)
20	Veet	Tx Ground
	F	Mounting Stubs

Recommend Circuit Schematic

Mechanical Specifications

Unremarked tolerances±0.2mm