

GPON Class C++ SFP OLT Transceiver

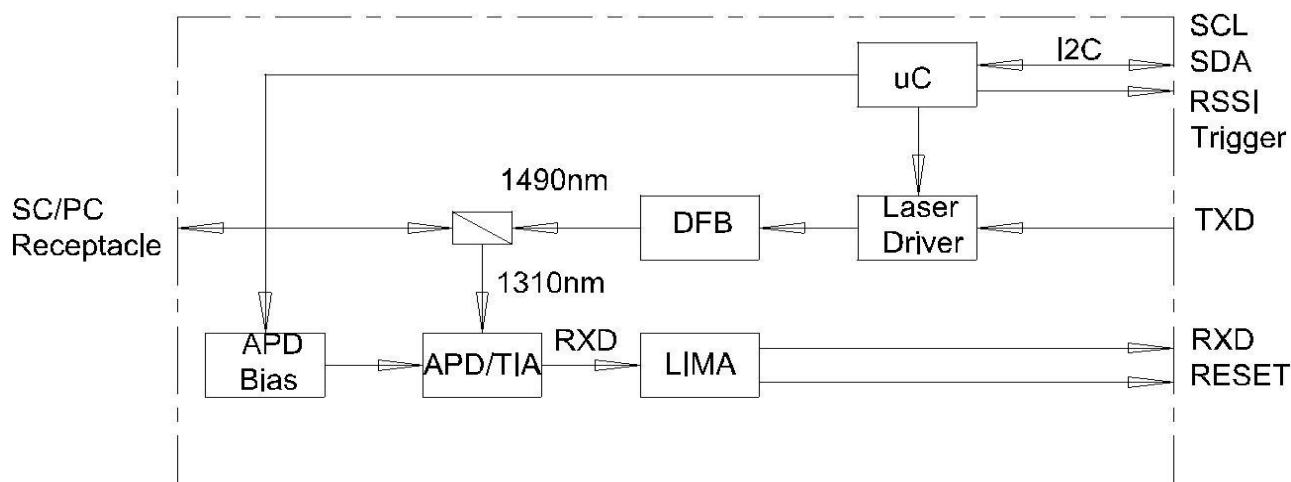
1. Features

- SFP with SC/PC Connector Transceiver
- 1490 nm DFB 2488Mbps Tx with isolator
- 1310 nm APD 1244Mbps Rx
- Digital diagnostics SFF-8472 Compliant
- 2488 Mbps continuous mode Transmission
- 1244 Mbps Burst mode receiver Data Rate
- RX Fast Burst Mode Detection
- Provide fast RSSI function
- Operation case temperature: -5~70°C, -40~85°C
- Class C++ link budget
- Complies with RoHS directive (2002/95/EC)

2. Application

- GPON OLT Class C++
- FTTx

3. Function Diagram



4. Recommended Operating Conditions

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T_{STG}	-40	85	°C
Operating Case Temperature	T_C	-5/-40	70/85	°C
Power Supply Voltage	V_{CC}	3.1	3.5	V
Total Power Supply Current	I_{CC}	-	500	mA

5. Transmitter Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Optical Transmitter Power	P_0	5	-	9	dBm	1
Optical Transmitter Power off	P_{OFF}	-	-	-50	dBm	
Output Center Wavelength	λ	1480	-	1500	nm	
Output Spectrum Width	$\Delta\lambda$	-	-	1.0	nm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Extinction Ratio	ER	10	-	-	dB	
Optical Rise Time	-	-	-	160	ps	
Optical Fall Time	-	-	-	160	ps	
Optical Eye Diagram	Compliant with ITU-T G.984.2 Mask					
TolerencetoTxBack Reflection	-	-15	-	-	dB	
Data Rate	-	-	2.488	-	Gb/s	
Differential Input Voltage	V_{PP}	300	-	1200	mV	
Differential Input Impedance	Z_{IN}	80	100	120	ohm	
Tx_fault Output Voltage- High	V_{IH}	2.4	-	-	V	
Tx_fault Output Voltage- Low	V_{IL}	-	-	0.4	V	
Tx_Dis Input Voltage- High	V_{IH}	2.0	-	-	V	
Tx_Dis Input Voltage- Low	V_{IL}	-	-	0.8	V	

Note 1: 2.488Gbps continuous-mode , PRBS²³-1.

6. Receiver Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Wavelength of Operation	-	1260	-	1360	nm	-
Data Rate	-	-	1.244	-	Gb/s	-
Sensitivity	Sen	-	-	-32	dBm	1
Saturation Optical Power	Sat	-12	-	-	dBm	1
Burst Packet Detect sensitivity	-	-	-	-30	dBm	1
Reflectance of equipment	-	-	-	-20	dB	
Receiver Burst-mode Dynamic Range	-	15	-	-	dB	2
Data Output Voltage - High	V_{OH}	VccR -1.05	-	VccR -0.85	V	-
Data Output Voltage - Low	V_{OL}	VccR -1.84	-	VccR -1.60	V	-
RSSI accuracy	-	-3	-	3	dB	3
BPD Output Voltage- High	V_{IH}	2.4	-	-	V	4
BPD Output Voltage- Low	V_{IL}	-	-	0.4	V	4
BPD Response time	t_{BPD}	-	-	6.4	ns	4

Note 1: Measured with 1310nm, 1.244Gbps PRBS2²³-1 burst-mode optical input, ER=10dB, BER=1x10⁻¹⁰; Single burst packet length is 40us and packet interval is 40us.

Note 2: Input optical power level difference of adjacent burst packets.

Note 3: Receiver optical power ranged from -8dBm to -28dBm, measured with 1310nm, 1.244Gbps PRBS2⁷-1 burst-mode optical input, ER=10dB, 50%duty cycle.

Note 4: BPD assert low when module receive “Reset” signal, assert high when burst package is detected and latch to high state until next“Reset” signal.

7. RSSI Timing Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units
RSSI Trigger Delay Time	t_{TRI}	25	-	-	ns
RSSI Sampling Time	t_{SAMPLE}	300	-	-	ns
RSSI Data Available Delay Time	t_{RSSI_DATA}	-	-	500	us

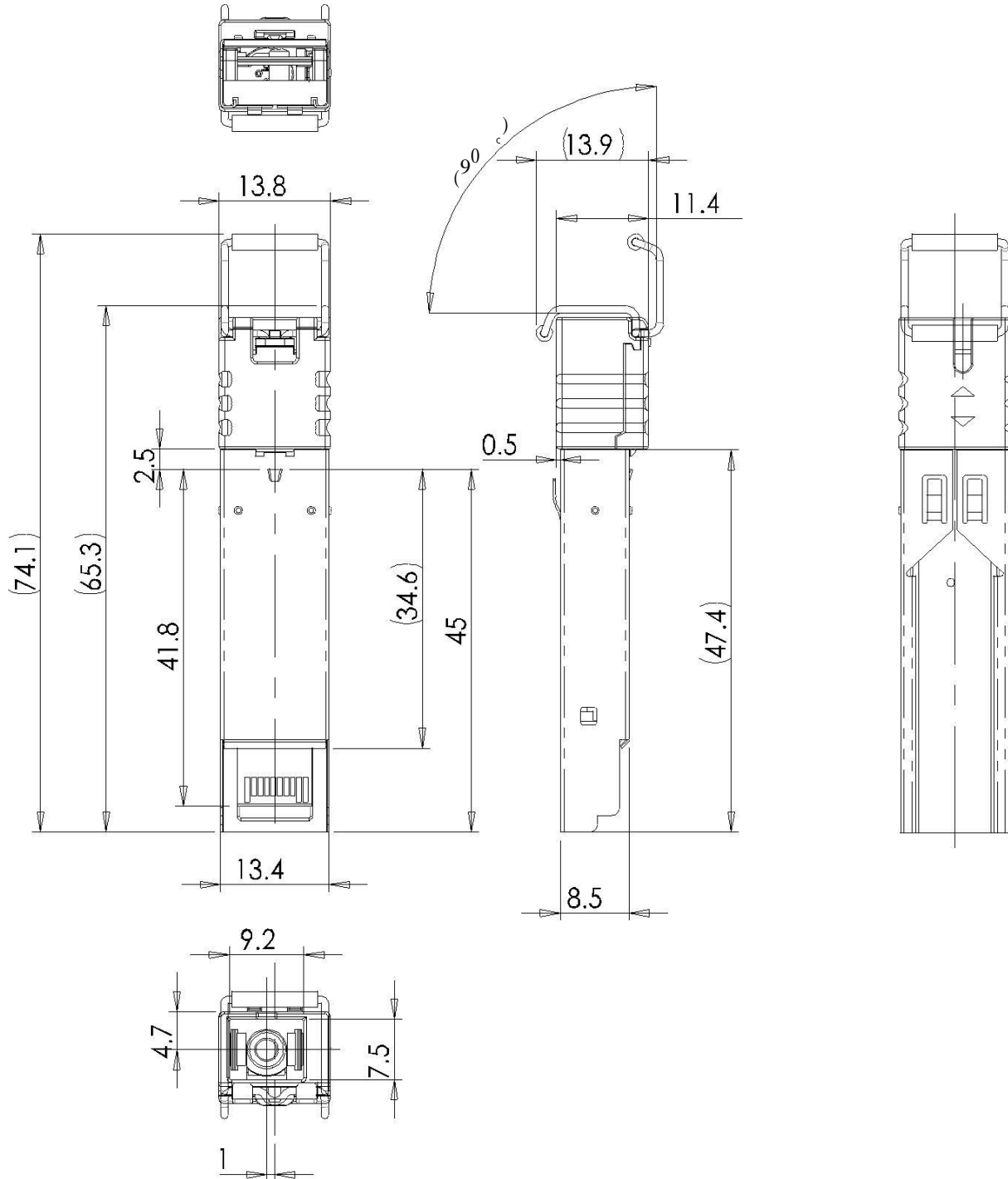
8. Digital Diagnostic Monitoring Accuracy

Parameter	Accuracy	Units	Notes
Transceiver Temperature	±3	°C	Temperature sensor
Power Supply Voltage	±3	%	Vcc=3.13~3.47V
TX Bias Current	±10	mA	
TX Optical Power	±2	dB	Average Power

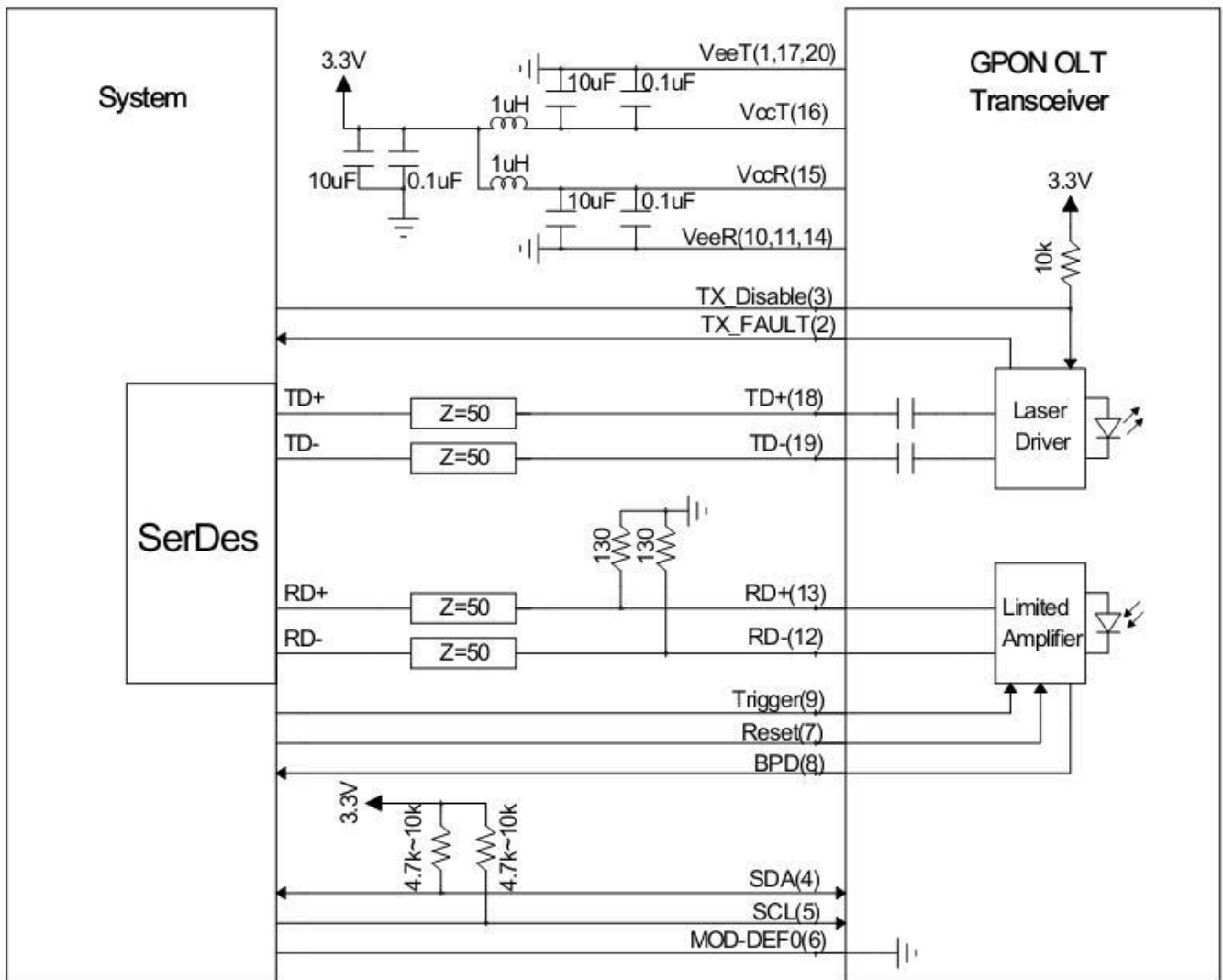
9. Pin Definitions

Pin#	Name	Function
1	VeeT	Transmitter Ground
2	TX_Fault	Transmitter Fault Indication, LVTTTL Output, Active High
3	TX_Disable	Transmitter Disable, LVTTTL Input. Optical output power is off when this PIN is high or left unconnected.
4	SDA	I ² C Data
5	SCL	I ² C Clock
6	MOD-DEF(0)	Internally grounded
7	Reset	Receiver Reset , LVTTTL Input. Set “Reset” high at the end of previous burst, 2 bytes in duration
8	BPD	Burst Packet Detect, LVTTTL output. BPD assert low when module receives “reset” signal, assert high when incoming burst is present.
9	RSSI_Trigger	RSSI Trigger Signal from Host, LVTTTL input.
10	VeeR	Receiver Ground
11	VeeR	Receiver Ground
12	RD-	Inv. Received Data Out, LVPECL,DC coupled
13	RD+	Received Data Out, LVPECL,DC coupled
14	VeeR	Receiver Ground
15	VccR	Receiver Power
16	VccT	Transmitter Power
17	VeeT	Transmitter Ground
18	TD+	Transmit Data In, LVPECL or CML (AC coupled; internally 100 ohms differential termination)
19	TD-	Inv. Transmit Data In, LVPECL or CML (AC coupled; internally 100 ohms differential termination)
20	VeeT	Transmitter Ground

10. Outline Drawing



11. Recommended Application Circuit



12. EEPROM serial ID memory contents (A0h)

Address (DEC)	Field Size (Byte)	Name of Field	Hex	Description
0	1	Identifier	03	SFP-GPON
1	1	Ext. Identifier	04	
2	1	Connector	01	SC
3-10	8	Transceiver	00 00 00 00 00 00 00 00	not defined

11	1	Encoding	03	NRZ
12	1	BR, Nominal	19	2.5 Gbps
13	1	Reserved	00	Reserved
14	1	Length (9um)-km	14	20(km)
15	1	Length (9um)	C8	200(100m)
16	1	Length (50um)	00	Not Support
17	1	Length (62.5um)	00	Not Support
18	1	Length (Copper)	00	Not Support
19	1	Reserved	00	Reserved
20-35	16	Vendor name		"HONLUS"
36	1	Reserved	00	Reserved
37-39	3	Vendor OUI	00 00 00	OUI
40-55	16	Vendor PN		"HOLS-P432043-C++"
56-59	4	Vendor Rev	31 20 20 20h	Revision
60-61	2	Wavelength	05 D2	1490nm Laser Wavelength
62	1	Reserved	00	Reserved
63	1	CC_BASE	xx	Check sum of byte 0-62
64-65	2	Options	00 1C	SD, TX_FAULT and TX_DISABLE
66	1	BR, max	00	Not Support
67	1	BR, min	00	Not Support
68-83	16	Vendor SN	xx.....xx	ASCII
84-91	8	Date code	xx.....xx 20 20	Year, Month, Day
92	1	Diagnostic Monitoring Type	58	Externally Calibrated Received power measurement type-Average Power
93	1	Enhanced Options	E0	Alarm/warning flags implemented Soft TX_DISABLE control and monitoring implemented Soft TX_FAULT monitoring implemented
94	1	SFF-8472 Compliance	02	Diagnostics Compliance(SFF-8472 V9.5)
95	1	CC_EXT	xx	Check sum of byte 64-94
96-255	160	Vendor specific	xx	Vendor specific

13. EEPROM serial ID memory contents (A2h)

Address	Field Size (Byte)	Name of Field	Hex	Description
00~01	2	Temp High Alarm Thresholds	xx	MSB at low address, 95°C
02~03	2	Temp Low Alarm Thresholds	xx	MSB at low address, -10°C
04~05	2	Temp High Warning Thresholds	xx	MSB at low address, 90°C
06~07	2	Temp Low Warning Thresholds	xx	MSB at low address, 0°C
08~09	2	Voltage High Alarm Thresholds	xx	MSB at low address, 3.6V
10~11	2	Voltage Low Alarm Thresholds	xx	MSB at low address, 3.0V
12~13	2	Voltage High Warning Thresholds	xx	MSB at low address, 3.5V
14~15	2	Voltage Low Warning Thresholds	xx	MSB at low address, 3.1V
16~17	2	Bias High Alarm Thresholds	xx	MSB at low address, 90mA
18~19	2	Bias Low Alarm Thresholds	xx	MSB at low address, 1mA
20~21	2	Bias High Warning Thresholds	xx	MSB at low address, 70mA
22~23	2	Bias Low Warning Thresholds	xx	MSB at low address, 2mA
24~25	2	TX Power High Alarm Thresholds	xx	MSB at low address, 5.5dBm
26~27	2	TX Power Low Alarm Thresholds	xx	MSB at low address, 1dBm
28~29	2	TX Power High Warning Thresholds	xx	MSB at low address, 5dBm
30~31	2	TX Power Low Warning Thresholds	xx	MSB at low address, 1.5dBm
32~33	2	RX Power High Alarm Thresholds	xx	MSB at low address, -7dBm
34~35	2	RX Power Low Alarm Thresholds	xx	MSB at low address, -29dBm

36~37	2	RX Power High Warning Thresholds	xx	MSB at low address, -8dBm
38~39	2	RX Power Low Warning Thresholds	xx	MSB at low address, -28dBm
40~55	16	Reserved	xx	Reserved
56~59	4	Rx_PWR(4)	xx	Single precision floating point calibration data - Rx optical power. Bit7 of byte 56 is MSB. Bit 0 of byte 59 is LSB. For "internally calibrated" devices, Rx_PWR(4) should be set to zero , and useless.
60~63	4	Rx_PWR(3)	xx	Single precision floating point calibration data - Rx optical power. Bit 7 of byte 60 is MSB. Bit 0 of byte 63 is LSB. For "internally calibrated" devices, Rx_PWR(3) should be set to zero , and useless.
64~67	4	Rx_PWR(2)	xx	Single precision floating point calibration data, Rx optical power. Bit 7 of byte 64 is MSB, bit 0 of byte 67 is LSB. For "internally calibrated" devices, Rx_PWR(2) should be set to zero, and useless.
68~71	4	Rx_PWR(1)	xx	Single precision floating point calibration data, Rx optical power. Bit 7 of byte 68 is MSB, bit 0 of byte 71 is LSB. For "internally calibrated" devices, Rx_PWR(1) should be set to 1 , and useless.
72~75	4	Rx_PWR(0)	xx	Single precision floating point calibration data, Rx optical power. Bit 7 of byte 72 is MSB, bit 0 of byte 75 is LSB. For "internally calibrated" devices, Rx_PWR(0) should be set to zero , and useless.
76~77	2	Tx_I(Slope)	xx	Fixed decimal (unsigned) calibration data, laser bias current. Bit 7 of byte 76 is MSB, bit 0 of byte 77 is LSB. For "internally calibrated" devices, Tx_I(Slope) should be set to 1, and useless.
78~79	2	Tx_I(Offset)	xx	Fixed decimal (signed two's complement) calibration data, laser bias current. Bit 7 of byte 78 is MSB, bit 0 of byte 79 is LSB. For "internally calibrated" devices, Tx_I(Offset) should be set to zero , and useless.
80~81	2	Tx_PWR(Slope)	xx	Fixed decimal (unsigned) calibration data, transmitter coupled output power. Bit 7 of byte 80 is MSB, bit 0 of byte 81 is LSB. For "internally calibrated" devices, Tx_PWR(Slope) should be set to 1 , and useless.
82~83	2	Tx_PWR(Offset)	xx	Fixed decimal (signed two's complement) calibration data, transmitter coupled output power. Bit 7 of byte 82 is MSB, bit 0 of byte 83 is LSB. For "internally calibrated" devices, Tx_PWR(Offset) should be set to zero , and useless.

84~85	2	T (Slope)	xx	Fixed decimal (unsigned) calibration data, internal module temperature. Bit 7 of byte 84 is MSB, bit 0 of byte 85 is LSB. For “internally calibrated” devices, T(Slope) should be set to 1 , and useless.
86~87	2	T (Offset)	xx	Fixed decimal (signed two’s complement) calibration data, internal module temperature. Bit 7 of byte 86 is MSB, bit 0 of byte 87 is LSB. For “internally calibrated” devices, T(Offset) should be set to zero, and useless.
88~89	2	V (Slope)	xx	Fixed decimal (unsigned) calibration data, internal module supply voltage. Bit 7 of byte 88 is MSB, bit 0 of byte 89 is LSB. For “internally calibrated” devices, V(Slope)should be set to 1 , and useless.
90~91	2	V (Offset)	xx	Fixed decimal (signed two’s complement) calibration data, internal module supply voltage. Bit 7 of byte 90 is MSB. Bit 0 of byte 91 is LSB. For “internally calibrated” devices, V(Offset) should be set to zero, and useless.
92~94	3	Reserved	xx	Reserved
95	1	Checksum	xx	Byte 95 contains the low order 8 bits of the sum of bytes 0 – 94.
96	1	Temperature MSB	xx	Internally measured module temperature.
97	1	Temperature LSB	xx	
98	1	Vcc MSB	xx	Internally measured supply voltage in transceiver.
99	1	Vcc LSB	xx	
100	1	TX Bias MSB	xx	Internally measured TX Bias Current.
101	1	TX Bias LSB	xx	
102	1	TX Power MSB	xx	Measured TX output power.
103	1	TX Power LSB	xx	
104	1	RX Power MSB	xx	Measured RX input power.
105	1	RX Power LSB	xx	
106~109	4	Reserved	xx	Reserved
110	1 Bit	Reserved	x	Reserved
	1 Bit	Soft TX Disable	x	Read/write bit that allows software disable of laser. Writing ‘1’ disables laser.
	1 Bit	Reserved	x	Reserved
	1 Bit	Reserved	x	Reserved
	1 Bit	Reserved	x	Reserved
	1 Bit	TX Fault	x	Tx Fail Status: 1=TX Fail; 0=TX Normal
	1 Bit	LOS	x	Signal Detect Status. Active High.
	1 Bit	Reserved	x	Reserved

111	1	Reserved	xx	Reserved
112	1 Bit	Temp High Alarm	x	Set when internal temperature exceeds high alarm level.
	1 Bit	Temp Low Alarm	x	Set when internal temperature is below low alarm level.
	1 Bit	Vcc High Alarm	x	Set when internal supply voltage exceeds high alarm level.
	1 Bit	Vcc Low Alarm	x	Set when internal supply voltage is below low alarm level.
	1 Bit	TX Bias High Alarm	x	Set when TX Bias current exceeds high alarm level.
	1 Bit	TX Bias Low Alarm	x	Set when TX Bias current is below low alarm level.
	1 Bit	TX Power High Alarm	x	Set when TX output power exceeds high alarm level.
	1 Bit	TX Power Low Alarm	x	Set when TX output power is below low alarm level.
113	1 Bit	RX Power High Alarm	x	Set when Received Power exceeds high alarm level.
	1 Bit	RX Power Low Alarm	x	Set when Received Power is below low alarm level.
	1 Bit	Reserved	x	Reserved
	1 Bit	Reserved	x	Reserved
	1 Bit	Reserved	x	Reserved
	1 Bit	Reserved	x	Reserved
	1 Bit	Reserved	x	Reserved
	1 Bit	Reserved	x	Reserved
114	1	Reserved	xx	Reserved
115	1	Reserved	xx	Reserved
116	1 Bit	Temp High Warning	x	Set when internal temperature exceeds high warning level.
	1 Bit	Temp Low Warning	x	Set when internal temperature is below low warning level.
	1 Bit	Vcc High Warning	x	Set when internal supply voltage exceeds high warning level.
	1 Bit	Vcc Low Warning	x	Set when internal supply voltage is below low warning level.
	1 Bit	TX Bias High Warning	x	Set when TX Bias current exceeds high warning level.
	1 Bit	TX Bias Low Warning	x	Set when TX Bias current is below low warning level.
	1 Bit	TX Power High Warning	x	Set when TX output power exceeds high warning level.
	1 Bit	TX Power Low Warning	x	Set when TX output power is below low warning level.
117	1 Bit	RX Power High Warning	x	Set when Received Power exceeds high warning level.
	1 Bit	RX Power Low Warning	x	Set when Received Power is below low warning level.
	1 Bit	Reserved	x	Reserved

	1 Bit	Reserved	x	Reserved
	1 Bit	Reserved	x	Reserved
	1 Bit	Reserved	x	Reserved
	1 Bit	Reserved	x	Reserved
	1 Bit	Reserved	x	Reserved
118	1	Reserved	xx	Reserved
119	1	Reserved	xx	Reserved
120-127	8	Vendor Specific	xx	Vendor Specific
128-247	120	User EEPROM	00	User writable EEPROM
248-255	8	Vendor Specific	00	Vendor Specific

14. Ordering Information

Part Number	Product description	RoHS Compliant
HOLS-P432043-C++-CD	GPON Class C++ OLT SFP with digital RSSI, -5~70C, SC/PC	RoHS-5
HOLS-P432043-C++-ID	GPON Class C++ OLT SFP with digital RSSI, -40~85C, SC/PC	RoHS-5