

# GPON ONT Triplexer

Preliminary

## FTM-9823T-CGH(i)(G)

(ITU-T Rec.G.984.2)



### Members of Flexon™ Family

#### Standard

- ◆ Compliant with ITU-T G.984.2, G.984.2 Amendment 1, G.983.3
- ◆ Compliant with FCC 47 CFR Part 15, Class B
- ◆ Compliant with FDA 21 CFR 1040.10 and 1040.11, Class I

#### Features

- ◆ Single fiber bi-directional triple links with 1244Mbit/s upstream and 2488Mbit/s downstream and 46~870MHz CATV receiver
- ◆ Burst mode operation transmitter with 1310nm DFB laser
- ◆ Continuous mode operation digital receiver with 1490nm high sensitivity APD-TIA
- ◆ 46~870M CATV receiver with 1555nm analog PD
- ◆ Suitable for Voice/Data/Video FTTX applications
- ◆ 0 to 70°C(-40 to 85°C) operating case temperature
- ◆ Compact package with SC/APC pigtail
- ◆ Single 3.3V power supply for digital transceiver
- ◆ 12V power supply for CATV receiver
- ◆ LVPECL compatible data input and CML data output interface
- ◆ LVPECL compatible differential transmitter burst-mode control
- ◆ LVTTTL digital receiver signal-detected indication
- ◆ APD automatic protect function
- ◆ Power Levelling Mechanism (optional)
- ◆ Support MoCA application
- ◆ Flexible digital monitoring function implemented by a built-in microprocessor which can be accessed by I<sup>2</sup>C interface

#### Description

FTM-9823T-CGH(i)(G) is Optical Network Termination (ONT) triplexer for 1244/2488M Class B+ application in ITU-T Rec.G.984.2, G.984.2 Amendment 1, and G.983.3.

The triplexer is the high performance module for 1244/2488M data link in single fiber by using 1310nm burst mode transmitter and 1490nm continuous mode digital receiver with 1555nm CATV receiver.

The transmitter section uses a multiple quantum well 1310nm DFB laser, supporting power levelling with 3 modes (optional). The digital receiver section uses an integrated 1490nm APD and preamplifier mounted in an optical header and limiting post-amplifier IC. When the 1490nm optical power is too large, the APD protection circuit will works to protect APD. The CATV receiver section uses high performance analog PD and low noise RF amplifier at 46~870MHz.

The optical burst output can be enabled by a LVPECL differential logic high-level input BEN+/BEN-. When BEN is high, the 1310nm output optical power will be very low without the transmitter data in. Signal Detected (SD) output is provided to indicate the detection of an input optical signal of digital receiver. Flexible digital monitoring functional is implemented by a built-in microprocessor with I<sup>2</sup>C interface.

CATV AGC function is integrated in the triplexer, and user can set the RF level or disable the RF output through the I<sup>2</sup>C interface.

#### Applications

- ◆ Gigabit-capable Passive Optical Networks (GPON) – ONT side

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## Regulatory Compliance

The transceivers have been tested according to American and European product safety and electromagnetic compatibility regulations (See Table 1). For further information regarding regulatory certification, please refer to Flexon™ regulatory specification and safety guidelines, or contact with Fiberxon, Inc. America sales office listed at the end of documentation.

**Table 1 - Regulatory Compliance**

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class I (>500 V)
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B	Compliant with standards
Immunity	IEC 61000-4-3	Compliant with standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2	Compliant with Class I laser product
Component Recognition	UL and CSA	Compliant with standards
Flammability	UL60950	UL 94 V-0

## Absolute Maximum Ratings

Absolute Maximum Ratings are those values, beyond which, some damages may occur to the devices. Exposure to conditions above the Absolute Maximum Ratings listed in Table 2 may negatively impact the reliability of the products.

**Table 2 - Absolute Maximum Ratings**

Parameter	Symbol	Min.	Max.	Unit	Note
Storage Ambient Temperature	T <sub>STG</sub>	-40	85	°C	
Operating Temperature	T <sub>OPR</sub>	0	70	°C	FTM-9823T-CGH(G)
	T <sub>OPR</sub>	-40	85	°C	FTM-9823T-CGH(i)(G)
Operating Humidity (Non Condensing)	H <sub>OPR</sub>	10	90	%	
Power Supply Voltage	V <sub>CC</sub>	0	4	V	Digital Transceiver
	V <sub>DD_12V</sub>	0	15		Analog Part
Input Voltage		GND	V <sub>CC</sub>	V	Digital Transceiver
Digital Receiver Damaged Threshold		+4		dBm	1
CATV Receiver Damaged Threshold		+3		dBm	
Soldering Temperature			260/10	°C/s	
Bending Radius		30		mm	
Pigtail Fiber Contact Temperature			85	°C	

Note 1: When the optical power is great than -3dBm, the APD protection function will works, and the APD power supply will be cut off. Three way to make the APD work again: 1) Rewrite the APD protection Flag in EEPROM. 2) Rest the Microcontroller with software or hardware way. 3) Turn off ONT, and then turn it on again.

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**Recommended Operating Conditions****Table 3 - Recommended Operating Conditions**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply Voltage	V <sub>CC</sub>	3.13		3.47	V	3.3V±5%
	V <sub>DD_12V</sub>	11.4		12.6	V	12V±5%
Operating Case Temperature <sup>1</sup>	T <sub>C</sub>	0		70	°C	FTM-9823T-CGH(G)
		-40		85	°C	FTM-9823T-CGH(i)(G)
Data Rate (Upstream/Downstream)			1244.16/2488.32		Mbit/s	
Consecutive Identical Digital Immunity		72			Bit	
CATV Receiver Bandwidth		46		870	MHz	

Note 1: Refer to Figure 4 for the temperature test point

**Optical and Electrical Characteristics****Table 4 - Transmitter Optical and Electrical Characteristics**

FTM-9823T-CGH(G)

(0°C < T<sub>C</sub> < 70°C and 3.13V < V<sub>CC</sub> < 3.47V)

FTM-9823T-CGH(i)(G)

(-40°C < T<sub>C</sub> < 85°C and 3.13V < V<sub>CC</sub> < 3.47V)

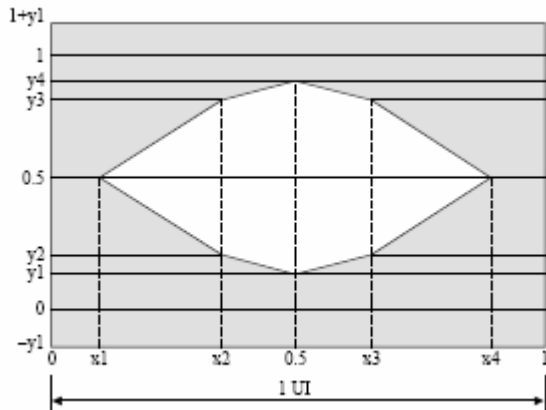
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Optical Center Wavelength	λ <sub>C</sub>	1260		1360	nm	
Optical Spectrum Width (-20dB)	Δλ			1	nm	
Side Mode Suppression Ratio	SMSR	30				
Average Launch Power	Mode 0	0.5	2	+5	dBm	1
	Mode 1	-2.5		+2	dBm	
	Mode 2	-5.5		0	dBm	
Average Launch Power-OFF Transmitter	P <sub>OFF</sub>			-45	dBm	2
Extinction Ratio	ER	10			dB	3
Burst Turn On Time	T <sub>ON</sub>			12.8	ns	4
Burst Turn Off Time	T <sub>OFF</sub>			12.8	ns	
Transmitter Reflectance				-10	dB	
Tolerance to Transmitter Incident Light Power		-15			dB	
Optical Path Penalty				0.5	dB	
Optical Eye Diagram	Compliant With ITU-T G984.2					3,5
Data Input Differential Swing	V <sub>IN</sub>	200		1600	mV	6
Data Common-Mode Input Voltage	V <sub>CM</sub>	V <sub>CC</sub> -1.49	V <sub>CC</sub> -1.32	V <sub>CC</sub> -V <sub>IN</sub> /4	V	
Input Differential Impedance	Z <sub>IN</sub>	90	100	110	Ω	
Power Supply Current	I <sub>CC_TX</sub>			300	mA	

Note 1: Power Levelling Mechanism is optional.

Note 2: Launched into 9/125um Single Mode Fiber.

Note 3: Measured with PRBS 2<sup>23</sup>-1 plus 72bits CID test pattern @1244.16Mbit/s and the Bessel-Thompson filter is turned on.Note 4: Refer to [Timing Parameter Definition in Burst Mode Sequence](#).

Note 5: Transmitter eye mask definition is shown as below.



	1244.16Mbit/s
x1/x4	0.22/0.78
x2/x3	0.40/0.60
y1/y4	0.17/0.83
y2/y3	0.20/0.80

Note 6: Compatible with LVPECL input

(See [Recommended Interface Circuit](#) and [Table 9 - Electrical Input/Output Coupling Mode](#))

**Table 5 - Digital Receiver Optical and Electrical Characteristics**

FTM-9823T-CGH(G)

(0°C < TC < 70°C and 3.13V < V<sub>CC</sub> < 3.47V)

FTM-9823T-CGH(i)(G)

(-40°C < TC < 85°C and 3.13V < V<sub>CC</sub> < 3.47V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Operating Wavelength		1480	1490	1500	nm	
Sensitivity				-28	dBm	1
Overload		-7				
Signal-Detected Assert Level	P <sub>SDA</sub>			-29	dBm	2
Signal-Detected Deassert Level	P <sub>SDD</sub>	-39			dBm	3
Signal-Detected Hysteresis	P <sub>SDA</sub> - P <sub>SDD</sub>	0.5		6	dBm	
Tolerance to Reflected Optical Power				10	dB	
Receiver Reflectance				-20	dB	
Power Supply Current	I <sub>CC_RX</sub>			200	mA	4
Data Output Differential Swing	V <sub>OUT</sub>	400		1000	mV	5
Signal-Detected Voltage - Low	V <sub>SD, L</sub>	0		0.4	V	6
Signal-Detected Voltage - High	V <sub>SD, H</sub>	2.4		V <sub>CC</sub>	V	
Signal-Detected Assert Time	T <sub>ASS</sub>			100	µs	
Signal-Detected Deassert Time	T <sub>DAS</sub>			100	µs	

Note 1: Measured with PRBS 2<sup>23</sup>-1 plus 72bits CID test pattern @2488.32Mbit/s, ER=10dB, BER = 10<sup>-10</sup>.

Note 2: An increase in optical power above the specified level will cause the Signal Detect output to switch from a low state to a high state.

Note 3: A decrease in optical power below the specified level will cause the Signal Detect output to switch from a high state to a low state.

Note 4: The power supply current includes the microcontroller power supply.

Note 5: CML output, AC coupled internally, guaranteed in the full range of input optical power

(See [Recommended Interface Circuit](#))

Note 6: SD (See [Pin Function Definitions](#))

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**Table 6 - CATV Receiver Optical and Electrical Characteristics**

FTM-9823T-CGH(G)

(0°C <TC<70°C, 3.13V<V<sub>CC</sub><3.47V, and 11.4V<V<sub>DD\_12V</sub><12.6V)

FTM-9823T-CGH(i)(G)

(-40°C <TC<85°C, 3.13V<V<sub>CC</sub><3.47V, and 11.4V<V<sub>DD\_12V</sub><12.6V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Operating Wavelength		1540		1560	nm	
Receiving Average Optical Power		-8		+2	dBm	
RF AGC Dynamic Range		24			dB	
Responsivity		0.9			mA/mW	
RF Output Level		18			dBmV/ch	1
Total RF output power		36			dBmV	
RF Output Impedance			75		Ω	2
CNR	CNR	45			dB	3
C/CSO	C/CSO	55			dB	4
C/CTB	C/CTB	55			dB	
Rejection	975~1700M	25			dB	5
	1700~2100M	40				
RF Return Loss		14			dB	
RF Output Tilt			2		dB	
RF Output Flatness				3.0	dB	
Power Supply Current	I <sub>DD-12V</sub>			200	mA	
RF AGC Time Constant		0.1		3	ms	6

Note 1: Tested at 450MHz, OMI=4.4% per channel, RF\_Setting=0 (Refer to Monitoring Specification).

Note 2: Mini SMB Jack RF Connector

Note 3: Tested at -8dBm, 88 channels in 46M~870M, OMI=3.5% per channel

Note 4: Test at +2dBm, 88channels in 46M~870M

Note 5: This rejection is relative to gain at 870 MHz

Note 6: The specification is specified with the I<sup>2</sup>C communication silence.**Table 7 – Microcontroller Circuit Characteristics**

FTM-9823T-CGH(G)

(0°C <TC<70°C and 3.13V<V<sub>CC</sub><3.47V)

FTM-9823T-CGH(i)(G)

(-40°C <TC<85°C and 3.13V<V<sub>CC</sub><3.47V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Reset Voltage – Low		0		0.8	V	
Reset Voltage – High		2.0		V <sub>CC</sub>	V	
INT Voltage – Low		0		0.4	V	
INT Voltage – High		2.4		V <sub>CC</sub>	V	
I <sup>2</sup> C Rate		DC		100	kbs	Standard Mode
SCL, SDA Voltage - Low		0		0.8	V	
SCL, SDA Voltage - High		2.0		V <sub>CC</sub>	V	
Power Supply Current	I <sub>MC</sub>			50	mA	

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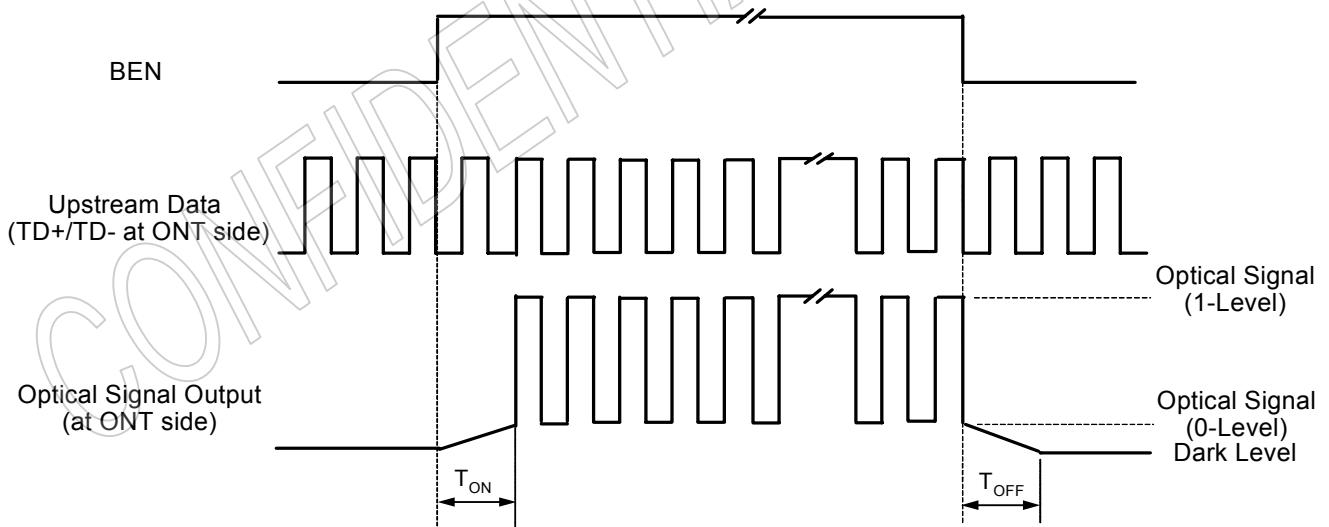
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**Table 8 - General TPXM Specifications**

Parameter	Conditions	Minimum	Typical	Maximum	Units
Optical Isolation	From external 1310 nm to 1490 nm Rx	28			dB
Optical Isolation	From external 1310 nm to 1555 nm Rx	40			
Optical Cross-talk	From 1310 nm Tx to 1490 nm Rx			-47	dB
Optical Cross-talk	From 1310 nm Tx to 1555 nm Rx			-47	dB
Optical Isolation	From external 1555 nm to 1490 nm Rx	35			dB
Optical Isolation	From external 1490 nm to 1555 nm Rx	35			dB
Reflectance	1480 ~ 1500 nm	-30			dB
Reflectance	1260 ~ 1360 nm	-30			dB

**Table 9 - Electrical Input/Output Coupling Mode**

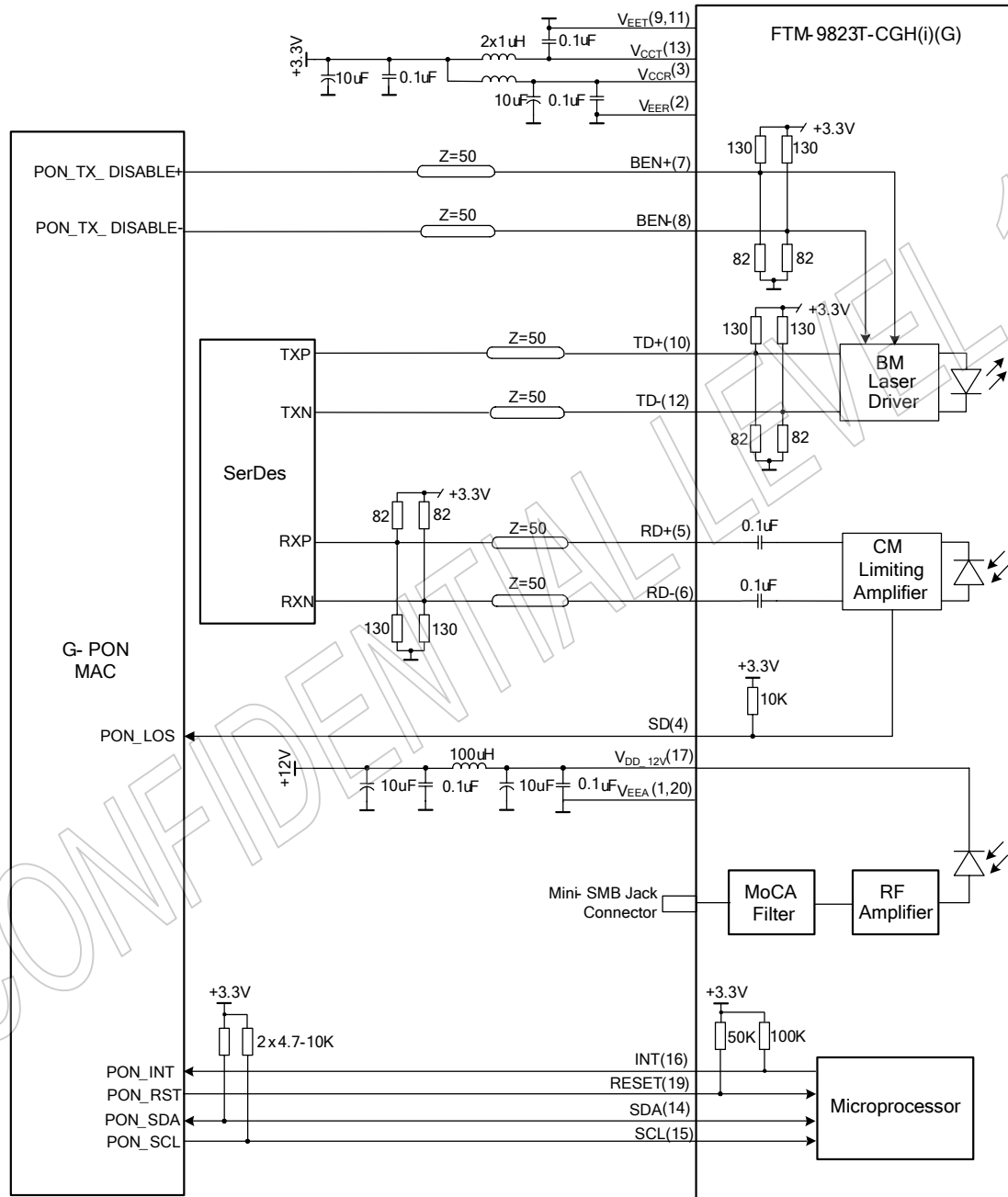
P/N	Input (TD+/TD-)	Output (RD+/RD-)	Analog Output
FTM-9823T-CGH	Internal DC Coupling	Internal AC Coupling	75Ω Mini SMB Jack Connector
FTM-9823T-CGHG	Internal DC Coupling	Internal AC Coupling	75Ω Mini SMB Jack Connector
FTM-9823T-CGHi	Internal DC Coupling	Internal AC Coupling	75Ω Mini SMB Jack Connector
FTM-9823T-CGHIG	Internal DC Coupling	Internal AC Coupling	75Ω Mini SMB Jack Connector



**Figure 1 Timing Parameter Definition in Burst Mode Sequence**

**Recommended Interface Circuit**

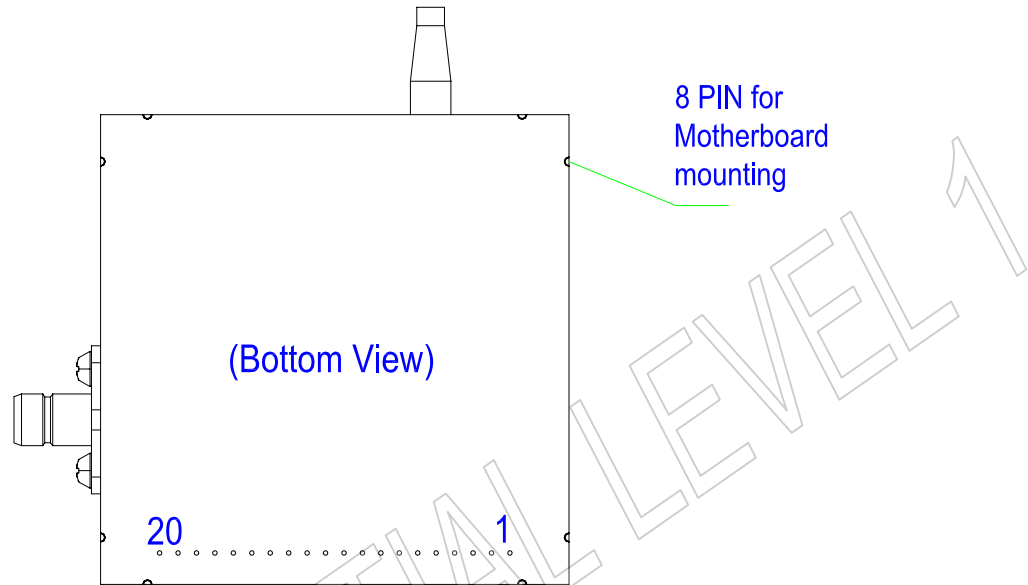
Figure 2 shows the recommended interface scheme.



**Figure 2 Recommended Interface Circuit**

**Pin Definitions**

Compact package bottom view in Figure 3 shows the pin information of electrical interface and mounting studs. Functions are described in Table 9 with some accompanying notes.



**Figure 3 Compact Package Planform**

**Table 10 - Pin Function Definitions**

Pin No.	Name	Description	Notes
1	V <sub>EEA</sub>	Common Ground	
2	V <sub>EER</sub>	Digital Receiver Signal Ground	
3	V <sub>CCR</sub>	Digital Receiver Power Supply (+3.3V)	
4	SD	Digital Receiver Signal-Detected Indication	1
5	RD+	Non-inverted Receiver Data Output	2
6	RD-	Inverted Receiver Data Output	
7	BEN+	Non-inverted Burst Enable Input	3
8	BEN-	Inverted Burst Enable Input	
9	V <sub>EET</sub>	Digital Transmitter Signal Ground	
10	TD+	Non-inverted Transmitter Data Input	4
11	V <sub>EET</sub>	Digital Transmitter Signal Ground	
12	TD-	Inverted Transmitter Data Input	4
13	V <sub>CCT</sub>	Transmitter Power Supply (+3.3V)	
14	SDA	Data Line of I <sup>2</sup> C interface	5
15	SCL	Clock Line of I <sup>2</sup> C interface	
16	INT	Microprocessor Interrupt Output	6
17	V <sub>DD_12V</sub>	CATV Receive Power Supply (+12V)	
18	N.C	N.C	
19	RESET	Reset Input to Microprocessor	7



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20	V <sub>EEA</sub>	Common Ground	
Mini SMB	RF Output	CATV Receiver RF Analog Output (75Ω)	8

Note 1: LVTTTL logic output, with internal 3.3KΩ pull-up resistor.

Optical Signal-Detected: High; Optical Signal Loss: Low

Note 2: CML logic output, AC coupled internally. (See [Recommended Interface Circuit](#))

Note 3: LVPECL differential transmitter burst-mode control signal input. DC coupled internally.

(See [Recommended Interface Circuit](#)) and (See [Timing Parameter Definition in Burst Mode Sequence](#))

Note 4: Compatible with LVPECL input, DC coupled internally

(See [Recommended Interface Circuit](#) and [Table 9 - Electrical Input/Output Coupling Mode](#))

Note 5: I<sup>2</sup>C interface, they should be pulled up with two 4.7K-10KΩ resistors on the host board.

Note 6: LVTTTL interrupt output, generated by built-in microprocessor, with internal 100KΩ pull-up resistor, active low.

Note 7: LVTTTL reset input to microprocessor, with Internal 50 KΩ pull-up resistor, active low.

Note 8: Mini SMB Jack connector.

### Mechanical Design Diagram

The form factor is 20-PIN compact package with pigtail fiber. The pigtail fiber has a length of 1000 ± 100mm and 30mm minimum bending radius. The fiber connector type is SC/APC. The heat-sink can be added on the surface of the module by user or provided by Fiberxon. The mechanical design diagram is shown in Figure 4. (Dimension in mm)

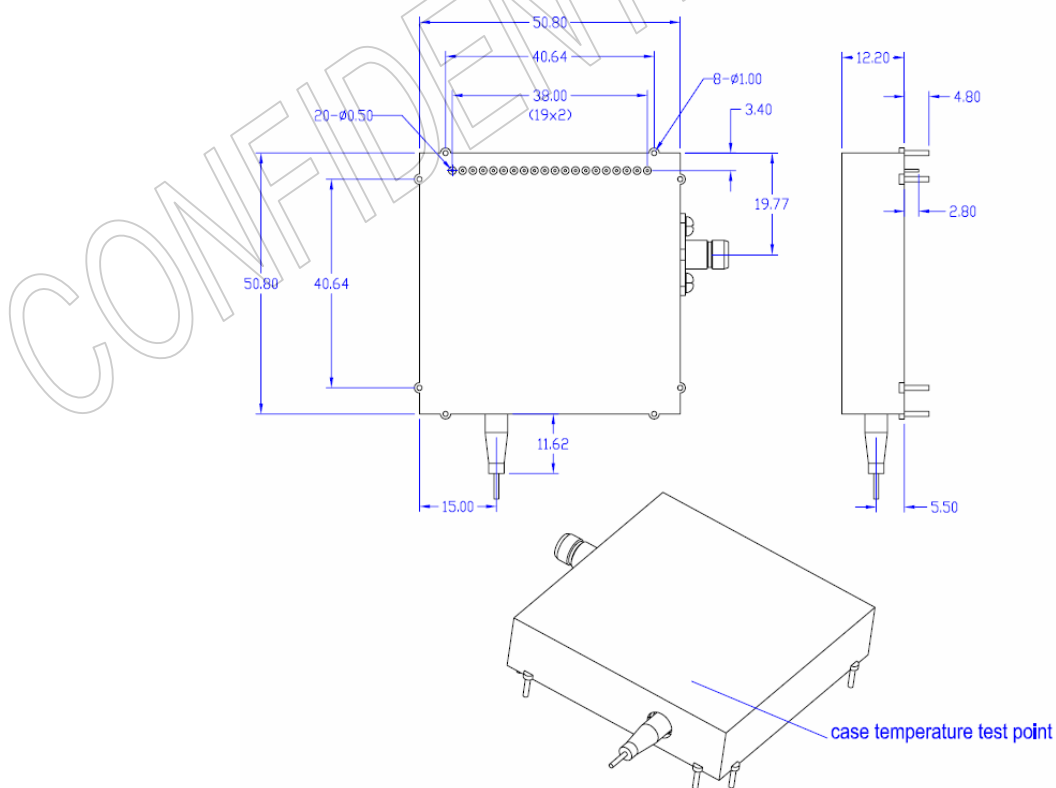


Figure 4 Mechanical Design Diagram

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**Table 11 - Pigtail Fibre Characteristics**

Parameter	Min.	Typical	Max.	Unit
Mode Field Diameter		9		µm
Cladding Diameter		125		µm
Jacket Diameter		0.9		mm
Bending Radius of Pigtail Fiber	30			mm
Tension Force on Pigtail Fiber			1	Kg
Pigtail Fiber Length	900	1000	1100	mm
Optical Return Loss (APC type) -1310nm	55			dB

**EEPROM Information**

The SFP MSA defines a 256-byte memory map in EEPROM describing the transceiver's capabilities, standard interfaces, manufacturer, and other information, which is accessible over a 2 wire serial interface at the 8-bit address 1010000X (A0h). The memory contents refer to Table 11.

**Table 12 - EEPROM Serial ID Memory Contents (A0h)**

Data Addr	Name Of filed	Coded value	Hex
0~11	Customer Part Number		02 04 0B 20 20 20 20 20 20 20 20 20
12	BR, Upstream	1.244GHz	0C
13~19		Reserved	FF FF FF FF FF FF FF
20~35	Vendor Name	FIBERXON INC.	46 49 42 45 52 58 4F 4E 20 49 4E 43 2E 20 20 20
36		Reserved	FF
37~39	Vendor OUI		00 00 00
40~55	Vendor PN	FTM9823TCGH	46 54 4D 39 38 32 33 54 43 47 48 20 20 20 20 20
		FTM9823TCGHG	46 54 4D 39 38 32 33 54 43 47 48 47 20 20 20 20
		FTM9823TCGHi	46 54 4D 39 38 32 33 54 43 47 48 69 20 20 20 20
		FTM9823TCGHIG	46 54 4D 39 38 32 33 54 43 47 48 69 47 20 20 20
56~59	Vendor rev	0006	30 30 30 36
60~61	Digital TX Wavelength	1310nm	05 1E
62		Reserved	FF
63	CC_BASE	X	XX
64~65	Options	TX_DISABLE, TX_FAULT, Loss of Signal	00 1C
66	BR, max		00

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67	BR, min		00
68~83	Vendor SN	XXXXXXXXXXXXXXXXXX	XX... XX (16bytes)
84	Date code	Year	XX
85		Year	XX
86		Month	XX
87		Month	XX
88		Day	XX
89		Day	XX
90		<Space>	20
91		<Space>	20
92	Diagnostic Monitoring Type	Internally Calibrated; Average Power Monitored	28
93~94	Reserved		00 00
95	CC_EXT	X	XX
96	BR, Downstream	2.488GHz	18
97~101	Reserved		05 D2 06 13 62
102	Low Video Input Power	-8dBm (1LSB=0.1dBm)	B0
103	High Video Input Power	2dBm(1LSB=0.1dBm)	14
104	Nominal RF Tilt	2(1LSB=0.1dB)	14
105~108	Reserved		00 2F 03 66
109	Video PD Responsivity	X (1LSB=0.01mA/mW/)	XX
110~121	Reserved		FF... FF (12 bytes)
122	Firmware Version	20	14
123~127	Reserved		FF FF FF FF FF

Note 1: The check code shall be the low order 8 bits of the sum of the contents of all the bytes from byte 0 to byte 62, inclusive.

Note 2: 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.

### Monitoring Specification

The field can be accessible over a 2 wire serial interface at the 8-bit address 1010001X (A2h)

The reserved bits and bytes are internal used for Fiberson, and **MUST NOT** be changed.

**Table 13 - EEPROM Serial ID Memory Contents (A2h)**

Addr	Name Of filed	Coded value	Hex
0~1	Temp High Alarm Threshold	90°C (1LSB=1/256°C) (C-Temp)	5A 00
		105°C (1LSB=1/256°C) (I-Temp)	69 00
2~3	Temp Low Alarm Threshold	-5°C(1LSB=1/256°C) (C-Temp)	FB 00

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Template ver. 1e

		-40°C(1LSB=1/256°C) (I-Temp)	D8 00
4~5	Temp High Warning Threshold	85°C (1LSB=1/256°C) (C-Temp)	55 00
		100°C (1LSB=1/256°C) (I-Temp)	64 00
6~7	Temp Low Warning Threshold	0°C(1LSB=1/256°C) (C-Temp)	00 00
		-30°C(1LSB=1/256°C) (I-Temp)	E2 00
8~9	Voltage High Alarm Threshold	3.6V(1LSB=100uV)	8C A0
10~11	Voltage Low Alarm Threshold	3.0V(1LSB=100uV)	75 30
12~13	Voltage High Warning Threshold	3.465V(1LSB=100uV)	87 5A
14~15	Voltage Low Warning Threshold	3.135V(1LSB=100uV)	7A 76
16~17	Bias High Alarm Threshold	70mA(1LSB=2uA)	88 B8
18~19	Bias Low Alarm Threshold	0mA(1LSB=2uA)	00 00
20~21	Bias High Warning Threshold	60mA(1LSB=2uA)	75 30
22~23	Bias Low Warning Threshold	0.5mA(1LSB=2uA)	00 FA
24~31	Reserved		9C 40 09 CF 7B 84 0C 5A
32~33	RX Power High Alarm Threshold	0.5mW (1LSB=0.1uW)	13 88
34~35	RX Power Low Alarm Threshold	0.001mW (1LSB=0.1uW)	00 0A
36~37	RX Power High Warning Threshold	0.158mW (1LSB=0.1uW)	06 2C
38~39	RX Power Low Warning Threshold	0.00158mW (1LSB=0.1uW)	00 10
40~41	Reserved		9C 40
42~55	Reserved		FF ...FF (14 bytes)
56~75	Digital RX Optical Power Calibration		00 00 00 00 00 00 00 00 00 00 00 00 3F80 00 00 00 00 00 00
76~79	Laser Bias Current Calibration		01 00 00 00
80~83	Reserved		01 00 00 00
84~87	Temperature Calibration		01 00 00 00
88~91	Power Supply Voltage Calibration		01 00 00 00
92~94	Reserved		FF FF FF
95	CC_EXT	X	XX
96~97	Temperature Monitor	XX (1LSB=1/256°C)	XX XX
98~99	Vcc Monitor	XX(1LSB=100uV)	XX XX
100~101	TX Bias Monitor	XX(1LSB=2uA)	XX XX
102~103	Reserved		XX XX
104~105	RX Power (Digital part)	XX(1LSB=0.1uW)	XX XX
106~109	Reserved		XX XX FF FF
110	Status & Control Bits //bit6=Soft_Tx_Dis, High active, '0' default; //bit5=reserved; //bit4=reserved; //bit3=reserved; //bit2=TX_Fault, // bit1=LOS; //bit0=Data_Ready,		00
111	Reserved		FF

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112	Digital Monitor Alarm Flag Bits //bit7=Temp_High_AL; //bit6=Temp_Low_AL; //bit5=Vcc_High_AL; //bit4=Vcc-Low_AL; //bit3=Tx_Bias_High_AL; //bit2=Tx_Bias_Low_AL; //bit1=Tx_PWR_High_AL; //bit0=Tx_PWR_Low_AL;		00
113	Digital Monitor Alarm Flag Bits //bit7=Rx_PWR_High_AL; //bit6=Rx_PWR_Low-AL; //bit4=VAPD_SHDN_FLAG <sup>(Note 5)</sup>		00
114~115	Reserved		FF FF
116	Digital Monitor Warning Flag Bits //bit7=Temp_High_WN; //bit6=Temp_Low_WN; //bit5=Vcc_High_WN //bit4=Vcc-Low_WN //bit3=Tx_Bias_High_WN //bit2=Tx_Bias_Low_WN		00
117	Digital Monitor Warning Flag Bits //bit7=Rx_PWR_High_WN; //bit6=Rx_PWR_Low_WN;		00
118~119	Reserved		FF FF
120~127	Vendor specific		FF FF FF FF FF FF FF FF
128~129	1555nm Optical Power High Alarm Threshold	3.0dBm (1LSB=0.1uW)	4D F0
130~131	1555nm Optical Power Low Alarm Threshold	-9dBm (1LSB=0.1uW)	04 EA
132~133	1555nm Optical Power High Warn Threshold	-8dBm (1LSB=0.1uW)	3D E8
134~135	1555nm Optical Power Low Warm Threshold	2dBm (1LSB=0.1uW)	06 30
136~137	RF Power High Alarm Threshold	103.4dBuV(1LSB=0.1dBuV)	04 0A
138~139	RF Power Low Alarm Threshold	87.4dBuV (1LSB=0.1dBuV)	03 6A
140~141	RF Power High Warning Threshold	100.4dBuV(1LSB=0.1dBuV)	03 EC
142~143	RF Power Low Warning Threshold	90.4dBuV (1LSB=0.1dBuV)	03 88
144~151	Reserved		67 20 54 60 62 70 59
152~171	1555nm Optical Power Calibration		00 00 00 00 00 00 00 00 00 00 00 00 3F80 00 00 00 00 00 00
172~191	RF Level Calibration		00 00 00 00 00 00 00 00 00 00 00 00 3F80 00 00 00 00 00 00
192~195	Reserved		FF FF FF FF
196~197	V <sub>DD_12V</sub> Power Supply Monitor	XX(1LSB = 500uV)	XX XX
198	Reserved		FF
199	TX_Mode		X (0= Mode 0; 1= Mode 1; 2= Mode 2)
200	RF_Setting <sup>(Note 2)</sup>	0(1LSB=0.1dB)	0
201~202	Analog part Optical Power	XX(1LSB=0.1uW)	XX XX
203~204	RF Power	XX(1LSB=0.1dBuV)	XX XX
205	//bit2=Video_EN, control; '1' default; <sup>(Note 3)</sup>		D4
206~207	Reserved		XX XX

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208	//bit3=RF_High_AL; //bit2=RF_Low_AL; //bit1=1555nm_Optical_Power_High_AL; //bit0=1555nm_Optical_Power_Low_AL; (Video Monitor Alarm Statue Bits)		00
209	//bit3=RF_High_WN; //bit2=RF_Low_WN; //bit1=1555nm_Optical_Power_High_WN; //bit0=1555nm_Optical_Power_Low_WN; (Video Monitor Warning Statue Bits)		00
210	Mask1	Interrupt Mask for Byte 112 (1 = enabled)	FF
211	Mask2	Interrupt Mask for Byte 113 (1 = enabled)	FF
212	Mask3	Interrupt Mask for Byte 116 (1 = enabled)	FF
213	Mask4	Interrupt Mask for Byte 117 (1 = enabled)	FF
214	Mask5	Interrupt Mask for Byte 208 (1 = enabled)	FF
215	Mask6	Interrupt Mask for Byte 209 (1 = enabled)	FF
216~217	Reserved		FF FF
218	//bit7= APD_SHDN_CLR <sup>(Note 6)</sup> ; //bit1=SAVE data, Active high; '0' default; <sup>(Note 4)</sup> //bit0=Software Reset, Active high; '0' default;		00
219~221	FirmWare_Version	20	00 14
221~247	User Writable		FF.....FF(27 bytes)
248~255	Vender Specific Control Functions		FF FF FF FF FF FF FF FF

Note1: The reserved bits and bytes are internal used for Fiberxon, and must not be changed.

Note2: It's used for the CATV RF level setting. We set the RF-Setting =0 as the following condition: 1) Total OMI is 23.2%; and 2) Total RF output is 38dBmV.

Note3: The bit is used for the Video disable. "1" for enable, "0" for disable.

Note4: When the A2 is changed, the user must set this bit as "1" to save the A2 data into the flash if the user wants to save the configure data.

Note5: When the optical power is great than -3dBm, the APD protection function will works, and the APD power supply will be cut off, and VAPD\_SHDN\_FLAG =1.

Note6: When VAPD\_SHDN\_CLEAR is set to 1, APD circuit will works, and VAPD\_SHDN\_CLEAR will be set to 0 automatically.

## Ordering Information

Part No.	Product Description
FTM-9823T-CGH	1310nm(TX)/1490nm(Digital RX)/1555nm(Analog RX), SC/APC Pigtailed Compact Package for G-PON ONT 1244/2488M Class B+ application, 0°C ~ 70°C, Tx DC Coupling, Rx AC Coupling
FTM-9823T-CGHG	1310nm(TX)/1490nm(Digital RX)/1555nm(Analog RX), SC/APC Pigtailed Compact Package for G-PON ONT 1244/2488M Class B+ application, 0°C ~ 70°C, Tx DC Coupling, Rx AC Coupling, RoHS-6 Compliance
FTM-9823T-CGHi	1310nm(TX)/1490nm(Digital RX)/1555nm(Analog RX), SC/APC Pigtailed Compact Package for G-PON ONT 1244/2488M Class B+ application, -40°C ~ 85°C, Tx DC Coupling, Rx AC Coupling
FTM-9823T-CGHIG	1310nm(TX)/1490nm(Digital RX)/1555nm(Analog RX), SC/APC Pigtailed Compact Package for G-PON ONT 1244/2488M Class B+ application, -40°C ~ 85°C, Tx DC Coupling, Rx AC Coupling, RoHS-6 Compliance

## Related Documents

For further information, please refer to the following documents:

- ITU-T G.984.2
- ITU-T G.984.2 Amendment 1
- ITU-T G.983.3

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**Revision History**

Reversion	Initiate	Review	Approve	Subject	Release Date
Pre 1a	Johnny Yang	Peter Tang	Peter Tang	Initial datasheet (temporary) (Doc No. DS3523003-1a)	Dec.2, 2005
Pre 1b	Johnny Yang	Peter Tang	Peter Tang	Revised datasheet 1. Update operating temperature to operating case temperature. 2. Modify "Optical Return Loss (1310nm)" to "Transmitter Reflectance" in Table 4. 3. Append "Tolerance to Reflected Optical Power" and "Receiver Reflectance" in Table 5. 4. Modify "Signal-Detected Voltage" in Table 5. 5. Update Figure 1. (Doc No. DS3523003-1b) (temporary)	Dec.15, 2005
Pre 2a	Johnny Yang	Peter Tang	Peter Tang	1. Update the package structure (Page 9). 2. Delete 5V power supply, add 3.3V microcontroller power supply(optional). (Doc No. DS3523003-2a)	Mar.7,2006
Pre 2b	Johnny Yang	Peter Tang	Peter Tang	1. Update the EEPROM definition 2. Add FTM-9823T-CGHIG (Doc No. DS3523003-2b)	May 4,2006
Pre 2c	Johnny Yang	Peter Tang	Peter Tang	Append the Power_levelling function	Jul. 10,2006
Pre 2d	Johnny Yang	Peter Tang	Peter Tang	Update the EEPROM 1, update A0[56~59], the version is 0006. 2, update A0[96~101], the value(Hex) is 18 05 D2 06 13 62. 3, update A0[104], the tilt is 2dB. 4, update A0[122], the Firmware version is 20. 5, update A2[18~19], the bias alarm threshold is 0mA. 6, update A2[22~23], the bias warn threshold is 0.5mA. 7, update A2[24~31], the value is 9C 40 09 CF 7B 84 0C 5A. 7, update A2[42~43], the value is reserved(FF FF). 8, update A2[113], add bit4=VAPD_SHDN_FLAG. 9, update A2[117], delete bit4=VAPD_SHDN_FLAG. 10, update A2[116], delete bit1=Tx_PWR_High_WN and bit0=Tx_PWR_Low_WN. 11, update A2[144~151], the value is(Hex) 67 20 54 60 62 70 59. 12, update A2[192~193], the value is reserved(FF FF).	Jul. 25,2006



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				<p>13, update A2[196~197], add VDD_12V monitor value</p> <p>14, update A2[205], the value (Hex) is D4.</p> <p>15, update A2[210~215], add the interrupt mask.</p> <p>16, update A2[219~220], the Firmware version is 20.</p>	
2e	Johnny Yang	Peter Tang	Peter Tang	<p>1, Update Table 4 P<sub>OUT</sub> spec., the MODE2 range is updated form (-5.5~-1dBm) to (-5.5~0dBm).</p> <p>2, Update Table 6 CNR spec., and is updated form 46dB to 45dB.</p>	Aug.4,2006
1h	Jacob Cai	Johnny Yang	Peter Tang	<p>Revised datasheet</p> <p>1, Add FTM-9823T-CGH, FTM-9823T-CGHG</p> <p>2, Update the value of overload in Table 4 from -4 dBm to -7dBm</p> <p>3, Correct "SMB" in the Note 2 of Table 6 to "Mini SMB"</p> <p>4, Change the Power leveling mechanism to optional (Doc No. DS3633003-1h)</p>	May 14,2007

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