EPON Triplexer Optical Module

Product Features

- Support IEEE802.3ah EPON Networks with video application
- Single fiber triple directional data links with 1.25Gbps Tx, 1.25Gbps Rx and 807MHz or 1GHz bandwidth analog video Rx
- Up to 20km reach
- 1310nm burst-mode transmitter with FP laser
- 1490nm continuous-mode receiver with PIN-TIA
- 1550 analog video receiver with ACG operation of 47M~870MHz or 47M~1002MHz bandwidth

- 2-wire interface for integrated digital diagnostic Monitoring
- 2x2 inch TRIPLEXER package with SC/APC pigtail optical interface
- Support RX_SD, TX_SD PIN definitions
- RF_out in PIN interface
- +3.3V and +12V power supply
- Operation case temperature -40~85°C for industrial and 0~70°C for commercial
- RoHS6 compliance

Operating Condition

Parameter	Unit	Min.	Typical	Max.
Storage Temperature	°C	-40		85
Operating Case Temp for C-temp	°C	0		70
Operating Case Temp for I-temp	°C	-40		85
3.3V Power Supply Voltage	V	3.15	3.3	3.45
3.3V Supply Current	mA			300
12V Power Supply Voltage	V	11.4	12	13.2
12V Supply Current for Video	mA			200
Analog Video Bandwidth	MHz	47		1002
Bit Rate for Digital Tx	MHz		1250	
Bit Rate for Digital Rx	MHz		1250	
Soldering Temperature (10s)	°C			260
HBM ESD Sensitivity	V	1000		

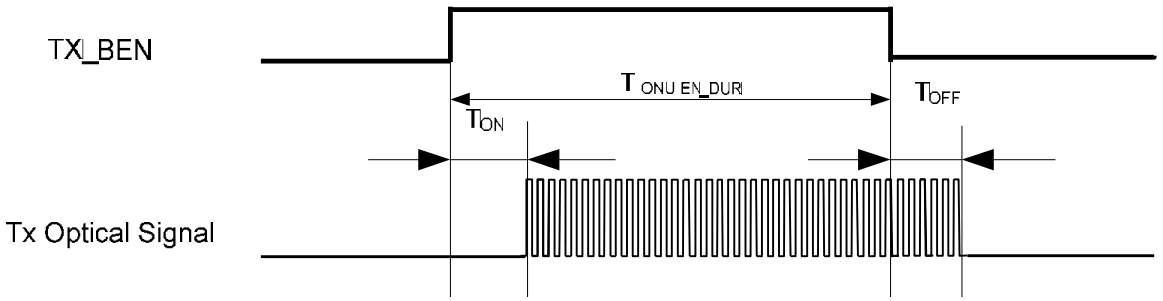
Characteristics

All performance is specified at whole working temperature and conditions

Parameter	Unit	Min.	Typical	Max.
Digital Transmitter				
TX Central Wavelength	nm	1260	1310	1360
Spectral Width (RMS)	nm			3
Mean Launched Power	dBm	0		4
Mean Launched Power (TX Off)	dBm			-45
Extinction Ratio	dB	10		
Optical Return Loss Tolerance	dB	-15		
Transmitter Mask ($PRBS2^7$-1@1.25Gbps)	Compliant With IEEE 802.3ah			
Digital Receiver				
Receive Wavelength	nm	1480	1490	1500
Sensitivity ($PRBS2^7$-1@1.25G, ER=10dB, BER<10^{-12})	dBm			-26
Overload	dBm	-3		
Signal Detected Assert Level	dBm			-29
Signal Detected De-assert Level	dBm	-45		
Signal Detected Hysteresis	dB	0.5		6
Video Channel Plans (CATV channel plan is 79 analog (NTSC) channels (OMI3.5%) and 79 digital (64 or 256QAM) channels. The equivalent value of the digital channels' RF level is 5dB lower than the analog channels**)**				
Frequency Range (Bandwidth)	MHz	47		1002
Receiver Wavelength		1546	1550	1554
Responsivity	A/W	0.8		
Video Signal Detected Assert Level (Video_SDA)	dBm			-11
Video Signal Detected De-assert Level (Video_SDD)	dBm	-13		
Video Signal Detected Hysteresis (Video_SDH)	dB			2
Analog Channels (OMI = 4.3%/channel)			40	
Digital Channels (OMI = 2.15%/channel)			63	
Total OMI			23.2%	
Channel Bandwidth	MHz		4	
Channel Spacing	MHz		6	
Video PD Monitor Accuracy (input -10~+2dBm)	dB			2
Received Average Optical Power	dBm	-6		2

RF Channel Output Power	dBmV	18	22	25
(-6~+2dBm, OMI=3.5%, 450MHz)				
RF Total	dBuV	92		98
RF Tilt (47M~1002M)	dB	2		7
S22 Output Return Loss (75Ω)	dB	14		
Distortions CSO (+2dBm, OMI=3.5%)	dB	58		
Distortions CTB (+2dBm, OMI=3.5%)	dB	58		
Carrier to Noise Ratio CNR (-6dBm, OMI=3.5%, 4MHz bandwidth)	dB	44		
Electrical Interface Characteristics				
Data Input Swing Differential/TX	mV	200	-	2000
Data Output Swing Differential/RX	mV	400		1600
Date Differential Impedance	Ω	90	100	110
LVTTL Output High	V	2.4		Vcc
LVTTL Output Low	V	0		0.4
LVTTL Input High	V	2.0		Vcc+0.3
LVTTL Input Low	V	0		0.8
Timing Characteristics				
Turn On Time at Burst mode (T_{ON})	ns			30
Turn Off Time at Burst mode (T_{OFF})	ns			30
TX-SD Assert Time (T_{TXSD_ON})	ns			100
TX-SD De-assert Time (T_{TXSD_OFF})	ns			100
RX-SD Assert Time (T_{RXSDA})	us			100
RX-SD De-assert Time (T_{RXSDD})	us			100
Isolation and Crosstalk				
1550 external to 1490 nm Rx Isolation	dB	32		
1490nm external to 1550 Rx Isolation	dB	32		
1310nm external to 1550 Video Isolation	dB	40		
1310nm external to 1490nm data Isolation	dB	30		
1310nm Tx to 1490nm Rx Optical Crosstalk	dB			-47
1310nm Tx to 1550 Rx Optical Crosstalk	dB			-47
Back Reflection @ 1310nm	dB			-6
Back Reflection @ 1550	dB			-32
Back Reflection @ 1490nm	dB			-20
Pigtail				
Pigtail Length (including connector)	mm	235	255	275
Optical Return Loss	dB	50		
Connector		SC/APC		

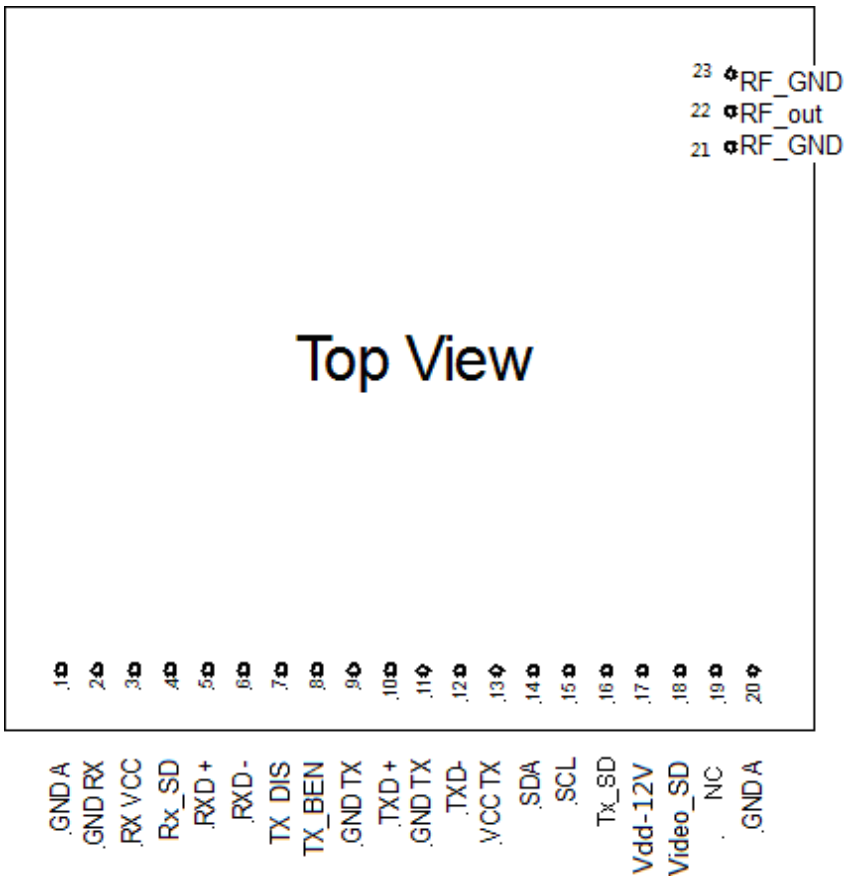
Burst Mode Transmitter Timing (transmitter on when Tx_BEN high)



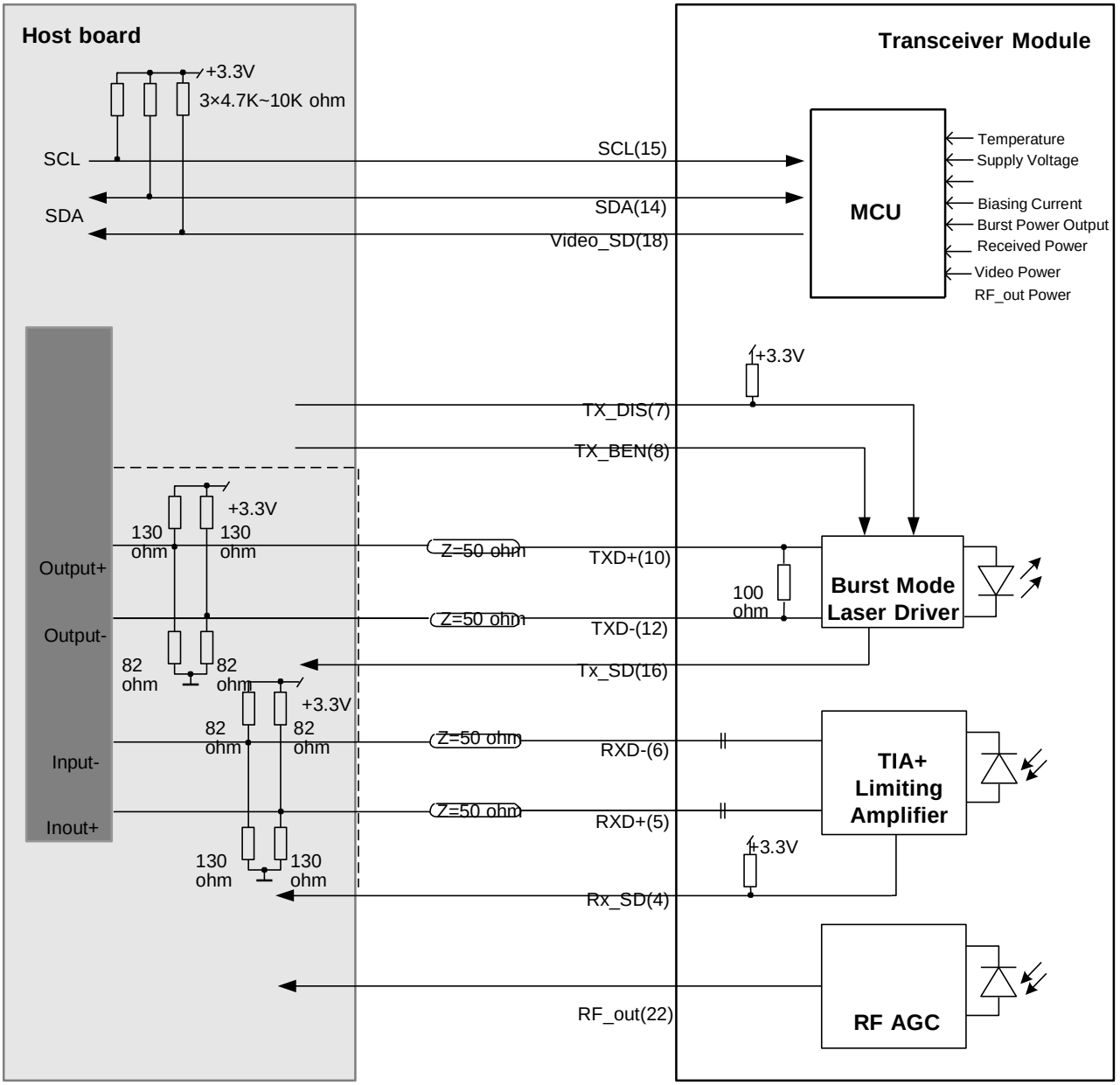
PIN Definition

Pin No.	Symbol	Level / Logic	Description
1	GND_A		Common Ground
2	GND_Rx		Digital Rx ground
3	Vcc_Rx		Digital Rx Vcc
4	RX_SD	LVTTL-O	1490nm Rx Signal Detect Indication, active high when received signal
5	RXD+	CML-O	Receiver Non-Inverted Data Output, AC-Coupled
6	RXD-	CML-O	Receiver Inverted Data Output, AC-Coupled
7	TX_DIS	LVTTL-I	Disable the Laser Diode when the input level is HIGH
8	TX_BEN	LVTTL-I	Enable the optical signal output when the input level is HIGH
9	GND_Tx		Digital Tx ground
10	TXD+	LVPECL-I	Transmitter Non-Inverted Data Input, DC-Coupled, 100Ω differential termination
11	GND_Tx		
12	TXD-	LVPECL-I	Transmitter Inverted Data Input, DC-Coupled, 100Ω differential termination
13	Vcc_Tx		Digital Tx Vcc, this power supply can be shut down by host when rogue ONU is detected
14	SDA	LVTTL-I/O	2-Wire Serial Interface Data Line
15	SCL	LVTTL-I	2-Wire Serial Interface Clock
16	TX_SD	LVTTL/O	transmitter on Indication, Active high when transmitter on

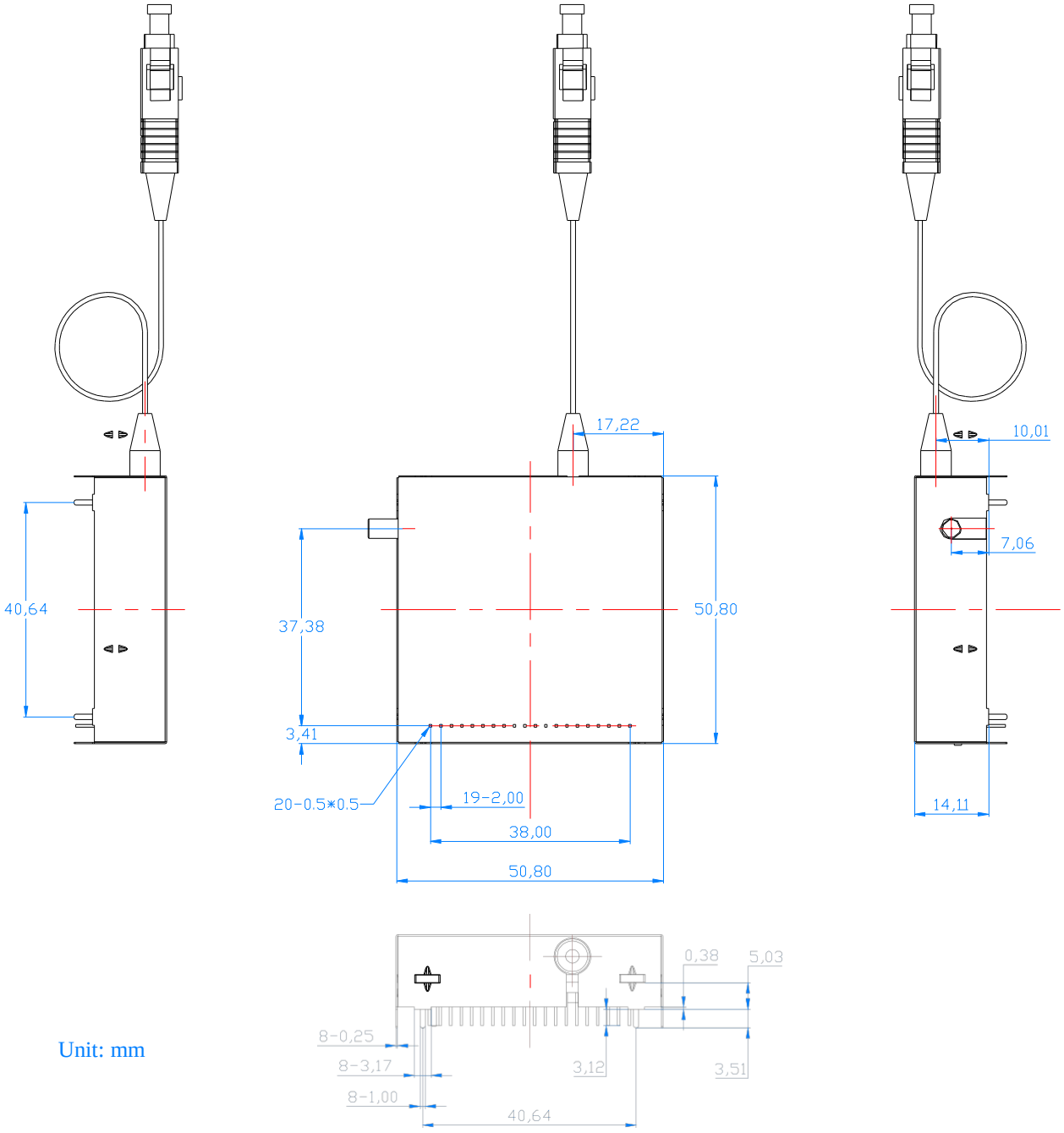
17	Vdd_+12V		Video Rx 12V Vdd
18	Video_SD	LVTTL-O	Video Signal Detected Indicator, assert HIGH when analog input optical signal level is above threshold
19	NC		Not connected
20	GND_A		Common ground
21	RF_GND		RF ground
22	RF_OUT		RF output signal
23	RF_GND		RF ground



Typical Interface Circuit

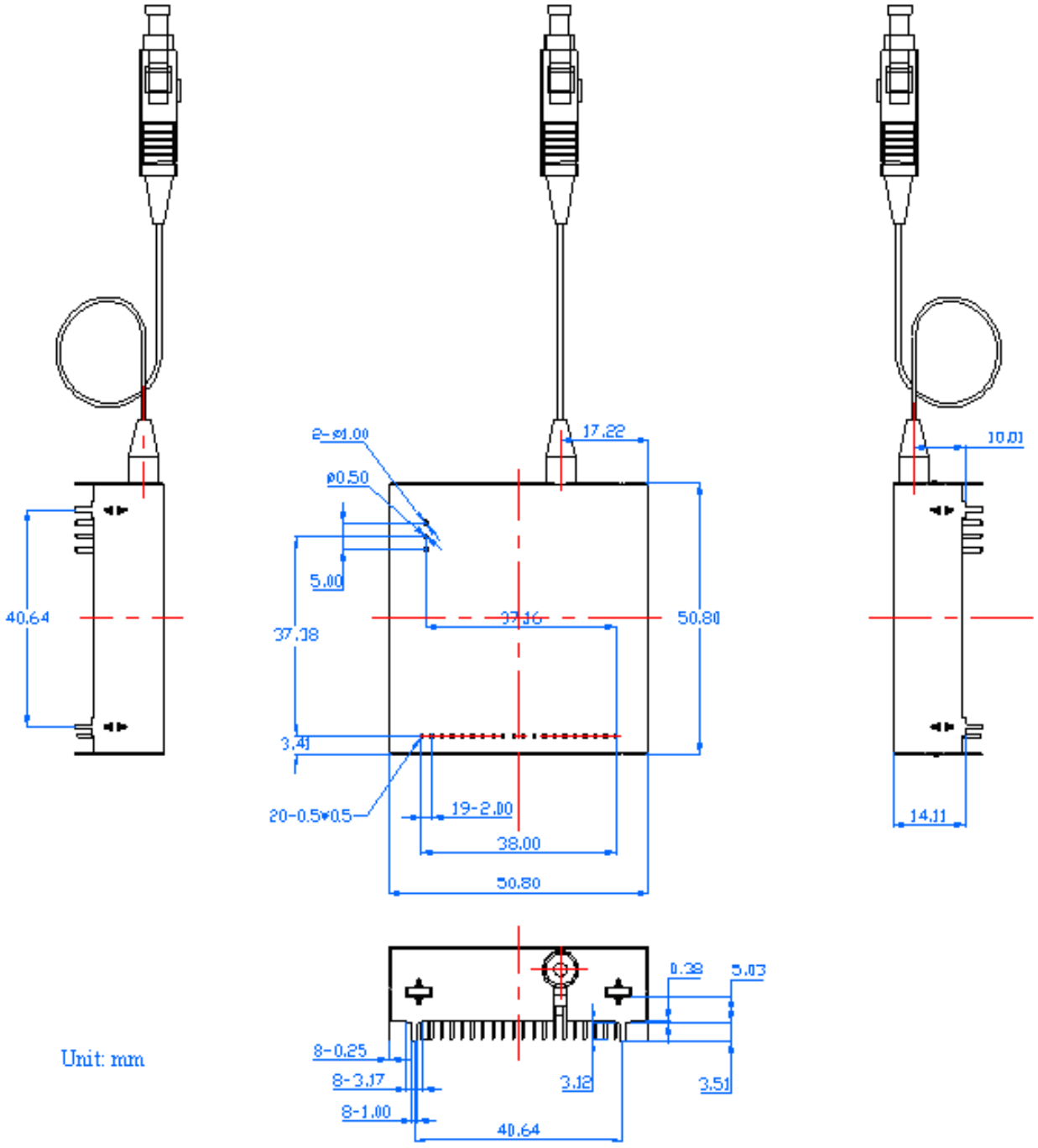


Mechanical Diagram



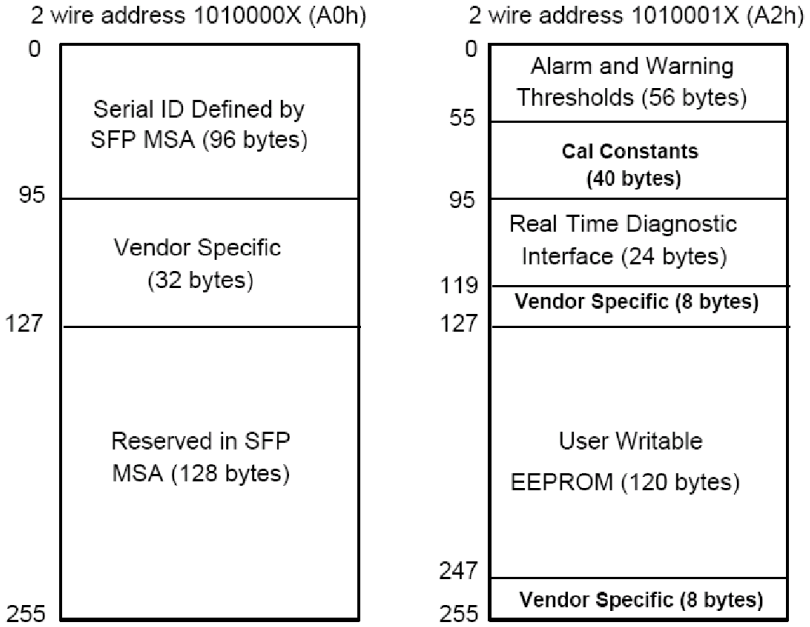
Unit: mm

SMB RF Output



3PIN RF Output

EEPROM Memory Map



Address	Name of Field	Value	Description
A0.00	Identifier	0x02	2X2 inch type device (soldered device)
A0.01	Ext. Identifier	0x04	Serial ID module supported
A0.02	Connector	0x0B	Optical pigtail
A0.03	Transceiver Codes	0x00	Undefined for PON
A0.04		0x00	Undefined for PON
A0.05		0x00	Undefined for PON
A0.06		0x00	Undefined for PON
A0.07		0x00	Undefined for PON
A0.08		0x00	Undefined for PON
A0.09		0x00	Undefined for PON
A0.10		0x00	Undefined for PON
A0.11	Encoding	0x03	Compatible with NRZ encoding code
A0.12	BR, Nominal	0x0C	Nominal 1244Mbps (indicate transmitter data rate)
A0.13	Reserved	0x00	Reserved
A0.14	Length (9um)-km	0x14	20km @9/125um fiber
A0.15	Length (9um)-100m	0xC8	20000m @9/125um fiber
A0.16	Length for MMF	0x00	Undefined for PON
A0.17		0x00	
A0.18		0x00	
A0.19	Reserved	0x00	Reserved

A0.20	Vendor Name	0x44	DIPPEROPTICSLTD.
A0.21		0x49	
A0.22		0x50	
A0.23		0x50	
A0.24		0x45	
A0.25		0x52	
A0.26		0x4F	
A0.27		0x50	
A0.28		0x54	
A0.29		0x49	
A0.30		0x43	
A0.31		0x53	
A0.32		0x4C	
A0.33		0x54	
A0.34		0x44	
A0.35		0x2E	
A0.36	Channel Spacing	0x00	Undefined
A0.37	Vendor OUI	0x00	Undefined
A0.38		0x00	Undefined
A0.39		0x00	Undefined
A0.40	Vendor P/N	0x44	T342033A-xPx
A0.41		0x32	
A0.42		0x33	
A0.43		0x34	
A0.44		0x35	
A0.45		0x35	
A0.46		0x2D	
A0.47		0x54	
A0.48		0x41	
A0.49		0x43	
A0.50		0x41	
A0.51		0x20	
A0.52		0x20	
A0.53		0x20	
A0.54		0x20	
A0.55		0x20	
A0.56	Vendor P/N Rev.	0x30	000A
A0.57		0x30	
A0.58		0x30	
A0.59		0x41	
A0.60	Laser Wavelength	0x05	1310nm in Hex byte
A0.61		0x1E	

A0.62	DWDM Wavelength Fraction	0x00	Undefined
A0.63	CC_BASE	XX	Check sum of bytes 0-62
A0.64	Options	0x00	TX_Disable, Tx_FAULT, Rx_SD
A0.65		0x1C	
A0.66	BR, Max.	0x00	Undefined
A0.67	BR, Min.	0x00	Undefined
A0.68	Vendor SN	0x30	Vendor serial number in ASCII character
A0.69		0x30	
A0.70		0x30	
A0.71		0x30	
A0.72		0x30	
A0.73		0x30	
A0.74		0x30	
A0.75		0x30	
A0.76		0x30	
A0.77		0x30	
A0.78		0x30	
A0.79		0x30	
A0.80		0x30	
A0.81		0x30	
A0.82		0x30	
A0.83		0x30	
A0.84	Date Code	0x30	Vendor date code in ASCII character
A0.85		0x30	
A0.86		0x30	
A0.87		0x30	
A0.88		0x30	
A0.89		0x30	
A0.90		0x20	
A0.91		0x20	
A0.92	Diagnostic Monitoring Type	0x68	Implemented with internal calibration and received power measurement type by Avg. power
A0.93	Enhanced options	0xF0	Alarm/Warning flags monitor are implemented
A0.94	SFF-8472 compliant	0x02	SFF-8472 compliant with revision 9.5
A0.95	CC_EXT	XX	Check sum of bytes 64-94

Address	Name of Field	Value(HEX)	Real Value
A2.00	Temp High Alarm	0x5F	95
A2.01		0x00	

A2.02	Temp Low Alarm	0xF6	-10
A2.03		0x00	
A2.04	Temp High Warning	0x55	85
A2.05		0x00	
A2.06	Temp Low Warning	0xFB	-5
A2.07		0x00	
A2.08	Voltage High Alarm	0x8C	3.6
A2.09		0xA0	
A2.10	Voltage Low Alarm	0x75	3
A2.11		0x30	
A2.12	Voltage High Warning	0x88	3.5
A2.13		0xB8	
A2.14	Voltage Low Warning	0x79	3.1
A2.15		0x18	
A2.16	Bias High Alarm	0xAF	90
A2.17		0xC8	
A2.18	Bias Low Alarm	0x05	3
A2.19		0xDC	
A2.20	Bias High Warning	0x9C	80
A2.21		0x40	
A2.22	Bias Low Warning	0x07	4
A2.23		0xD0	
A2.24	TX Power High Alarm	0x9B	6
A2.25		0x82	
A2.26	TX Power Low Alarm	0x18	-2
A2.27		0xA5	
A2.28	TX Power High Warning	0x7B	5
A2.29		0x86	
A2.30	TX Power Low Warning	0x1F	-1
A2.31		0x07	
A2.32	RX Power High Alarm	0x09	-1
A2.33		0xCF	
A2.34	RX Power Low Alarm	0x00	-28
A2.35		0x0A	
A2.36	RX Power High Warning	0x07	-2
A2.37		0xCB	
A2.38	RX Power Low Warning	0x00	-27
A2.39		0x0C	
A2.40	Threshold_VideoPWR_Alarm_High	0x3D	4
A2.41		0xE8	
A2.42	Threshold_VideoPWR_Alarm_Low	0x04	-7
A2.43		0xEA	

A2.44	Threshold_VideoPWR_Warning_High	0x4D	3
A2.45		0xF0	
A2.46	Threshold_VideoPWR_Warning_Low	0x03	-8
A2.47		0xE8	
A2.48	Threshold_RFPWR_Alarm_High	0x03	99
A2.49		0xD4	
A2.50	Threshold_RFPWR_Alarm_Low	0x03	91
A2.51		0x8E	
A2.52	Threshold_RFPWR_Warning_High	0x03	100
A2.53		0xE8	
A2.54	Threshold_RFPWR_Warning_Low	0x03	89
A2.55		0x7A	
A2.56	Rx_PWR(4)	0x00	0
A2.57		0x00	
A2.58		0x00	
A2.59		0x00	
A2.60	Rx_PWR(3)	0x00	0
A2.61		0x00	
A2.62		0x00	
A2.63		0x00	
A2.64	Rx_PWR(2)	0x00	0
A2.65		0x00	
A2.66		0x00	
A2.67		0x00	
A2.68	Rx_PWR(1)	0x3F	1
A2.69		0x80	
A2.70		0x00	
A2.71		0x00	
A2.72	Rx_PWR(0)	0x00	0
A2.73		0x00	
A2.74		0x00	
A2.75		0x00	
A2.76	Tx_I(Slope)	0x01	1
A2.77		0x00	
A2.78	Tx_I(Offset)	0x00	0
A2.79		0x00	
A2.80	Tx_PWR(Slope)	0x01	1
A2.81		0x00	
A2.82	Tx_PWR(Offset)	0x00	0
A2.83		0x00	
A2.84	T (Slope)	0x01	1
A2.85		0x00	

A2.86	T (Offset)	0x00	0
A2.87		0x00	
A2.88	V (Slope)	0x01	1
A2.89		0x00	
A2.90	V (Offset)	0x00	0
A2.91		0x00	
A2.92	RF_OFFSET	0x00	0
A2.93	reserved	0x00	
A2.94	reserved	0x00	
A2.95	CC_EXT	XX	
A2.96	RT_TEMP	0xFF	
A2.97		0xFF	
A2.98	RT_VCC	0xFF	
A2.99		0xFF	
A2.100	RT_TXBIAS	0xFF	
A2.101		0xFF	
A2.102	RT_TXPWR	0xFF	
A2.103		0xFF	
A2.104	RT_RXPWR	0xFF	
A2.105		0xFF	
A2.106	RT_VideoPWR	0xFF	
A2.107		0xFF	
A2.108	RT_RFPWR	0xFF	
A2.109		0xFF	
A2.110	status/control	0xFF	
A2.111	reserved	0xFF	
A2.112	Alarm1	0xFF	
A2.113	Alarm2	0xFF	
A2.114	Inerrupt Alarm Mask for A2[112]	0xFF	
A2.115	Inerrupt Alarm Mask for A2[113]	0xFF	
A2.116	Warning1	0xFF	
A2.117	Warning2	0xFF	
A2.118	Inerrupt Warning Mask for A2[116]	0xFF	
A2.119	Inerrupt Warning Mask for A2[117]	0xFF	

Address	Type	Name of Field	Description
92	FLASH	RF_OFFSET	R/W. RF AGC control (0.1dB / LSB), 8bit singed integer, password protected
93-94	FLASH		reserved
95	FLASH	Checksum	Checksum of A2[0..94]

96-97	RAM	Temperature	Case temperature monitoring value (1/256°C / LSB)
98-99	RAM	Voltage	+3.3V Voltage monitoring value
			(0.1mV / LSB)
100-101	RAM	Bias Current	Bias Current monitoring value (2uA / LSB)
102-103	RAM	1310nm_power	1310nm Transmitter power monitoring value (0.1uW / LSB)
104-105	RAM	1490nm_power	1490nm Receiver power monitoring value (0.1uW / LSB)
106-107	RAM	1550nm_power	1550nm Video power monitoring value (0.1uW / LSB)
108-109	RAM	RF_out_power	RF_output power monitoring value (0.1dBuV / LSB)
110	RAM	status/control	bit7: TX_DIS_STATE, high means the transmitter output disabled bit6: soft_TX_disable, high disable the transmitter output bit5: Interrupt status indicator bit4: Video_en, high active video AGC amplifier in default bit3: Video_SD, Video Signal detect status bit2: TX_fault status, high indicate the Tx fault bit1: RX_SD status, high indicate the 1490nm signal detected bit0: Data-Ready
111	RAM	reserved	
112	RAM	Alram1	bit7: TEMP Alarm HI bit6: TEMP Alarm LO bit5: VCC Alarm HI bit4: VCC Alarm LO bit3: TX_Bias Alarm HI bit2: TX_Bias Alarm LO bit1: TX_Power Alarm HI bit0: TX_Power Alarm LO
113	RAM	Alram2	bit7: RX_Power Alarm HI bit6: RX_Power Alarm LO bit5: Video_Power Alarm HI bit4: Video_Power Alarm HI bit3: RF_Power Alarm HI bit2: RF_Power Alarm LO bit1: reserved bit0: reserved

Ordering Information

Ordering P/Ns	Description
T342033A-CPA	EPON Triplexer, 1.25Gbps Tx 1310nm, 1.25Gbps Rx 1490nm, 1G Bandwidth Video Rx 1550, single-ended LVTTL TX_BEN signal high active transmitter on, 2*2 inch form-factor, SC/APC pigtail connector, RF_out in PIN interface, 0~70°C Commercial temperature
T342033A-IPA	EPON Triplexer, 1.25Gbps Tx 1310nm, 1.25Gbps Rx 1490nm, 1G Bandwidth Video Rx 1550, Single-ended LVTTL TX_BEN signal high active transmitter on, 2*2 inch form-factor, SC/APC pigtail connector, RF_out in PIN interface, -40~85°C Industrial temperature
T342033A-CPB	EPON Triplexer, 1.25Gbps Tx 1310nm, 1.25Gbps Rx 1490nm, 870M Bandwidth Video Rx 1550, Single-ended LVTTL TX_BEN signal high active transmitter on, 2*2 inch form-factor, SC/APC pigtail connector, RF_out in PIN interface, 0~70°C Commercial temperature
T342033A-IPB	EPON Triplexer, 1.25Gbps Tx 1310nm, 1.25Gbps Rx 1490nm, 870M Bandwidth Video Rx 1550, Single-ended LVTTL TX_BEN signal high active transmitter on, 2*2 inch form-factor, SC/APC pigtail connector, RF_out in PIN interface, -40~85°C Industrial temperature