



AXFT-E453 1.25Gbps GEAPON 1000Base-PX20 2x5 SFF OLT Transceiver



Product Overview

The AXFT-E453 is specifically designed for Gigabit Ethernet Passive Optical Network (GEAPON) transmission. These transceiver modules are compliant with the Small Form-factor (SFF) Multisource Agreement (MSA) and 2x5 pin package with SC/PC pigtail connector.

The AXFT-E453 GEAPON OLT transceivers are based on the IEEE 802.3ah 1000BASE-PX20 specification for bi-directional communication up to 20km over a single fiber. The module incorporates a high performance 1490 nm continuous mode DFB transmitter and 1310 nm burst mode APD-TIA receiver.

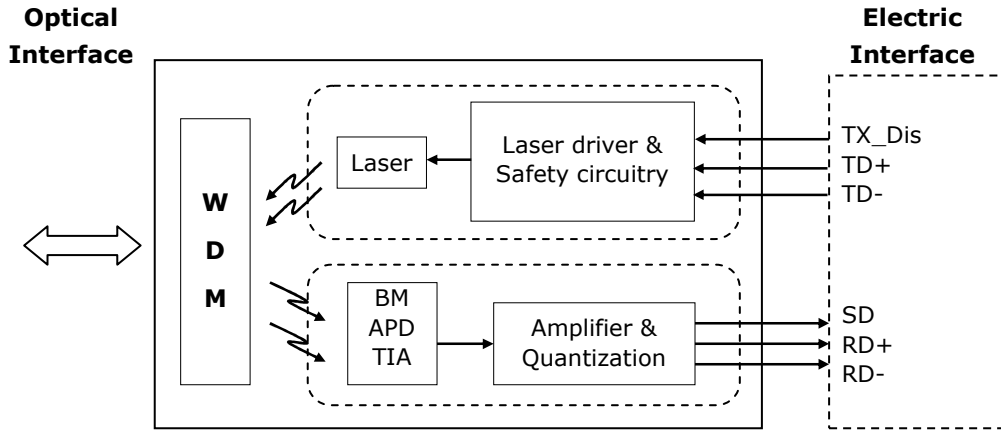
Applications

- **Gigabit Ethernet PON System**

Features

- **1.25G bi-directional single-fiber link**
- **2x5 SFF compatible package with SC/PC pigtail connector**
- **1490nm continuous-mode transmitter with DFB laser, 1310nm burst-mode receiver with APD-TIA**
- **20km point to multi-point transmission**
- **IEEE 802.3ah 1000BASE-PX20-D compliant**
- **Differential LVPECL inputs and outputs**
- **Class 1 laser safety standard IEC 60825 compliant**
- **Single +3.3V power supply**
- **RoHS compliant**
- **Low power dissipation**

Block diagram



The transceiver is fundamentally consisted by two parts: transmitter and receiver. The transmitter features LVPECL differential data inputs (TD+ and TD-) and an LVTTTL for Transmitter Disable (TX_Dis). The receiver features LVPECL differential data outputs (RD+ and RD-) and LVTTTL for signal detect output (SD).

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Note
Storage Temperature	T _s	-40	85	°C	
Supply Voltage	V _{CC}	-0.5	4.0	V	
Storage Relative Humidity	RH	5	95	%	
Soldering Temperature / Time	T _{SOLD} / t _{SOLD}		260/10	°C/sec	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	T _C	0		70	°C	
Supply Voltage	V _{CC} T V _{CC} R	3.1	3.3	3.5	V	
Supply Current	I _{TX} + I _{RX}		180	300	mA	

Transmitter Electro-Optical Interface

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
TX Differential Input Voltage	TD +/-	400		2000	mV	
TX Burst Control Voltage - Low	V _{Burst, L}	V _{eeT}		V _{eeT} +0.8	V	
TX Burst Control Voltage - High	V _{Burst, L}	2		V _{ccT}	V	
Optical Output Power	P _o	2		7	dBm	1
Optical Extinction Ratio	E _R	9			dB	
Center Wavelength	λ _c	1480	1490	1500	nm	
Spectral Width (-20dB)	Δλ			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Optical Rise / Fall Time	t _r / t _f			260	ps	
Relative Intensity Noise	RIN			-113	dB/Hz	
Total Contributed Jitter	TJ			227	ps	

Notes:

1. Coupling into a 9/125μm single-mode fiber.

Receiver Electro-Optical Interface

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
RX Differential Output Voltage	RD +/-	400		2000	mV	
Receiver Overload	P _{INMAX}	-6			dBm	1
Receiver Sensitivity	P _{INMIN}			-30	dBm	1
Dynamic Range		-30		-6	dBm	2
Operating Center Wavelength	λ _c	1260		1360	nm	
Receiver Reflectance	RL			-12	dB	
Receiver Settling Time	T _{SETTLING}			400	ns	3
Signal Detect - Assert Power	P _A			-30	dBm	
Signal Detect - Deassert Power	P _D	-45			dBm	
Receiver Signal Detect - Hysteresis	P _{RX_SDH}	0.5			dB	
Signal Detect Output Voltage - Low	V _{SD, L}	V _{eeT}		V _{eeT} +0.8	V	
Signal Detect Output Voltage - High	V _{SD, H}	2		V _{ccT}	V	

Notes:

1. With BER better than or equal to 1×10⁻¹², measured in the center of the eye opening with PRBS 2⁷ -1
2. See Figure 1
3. See Figure 2

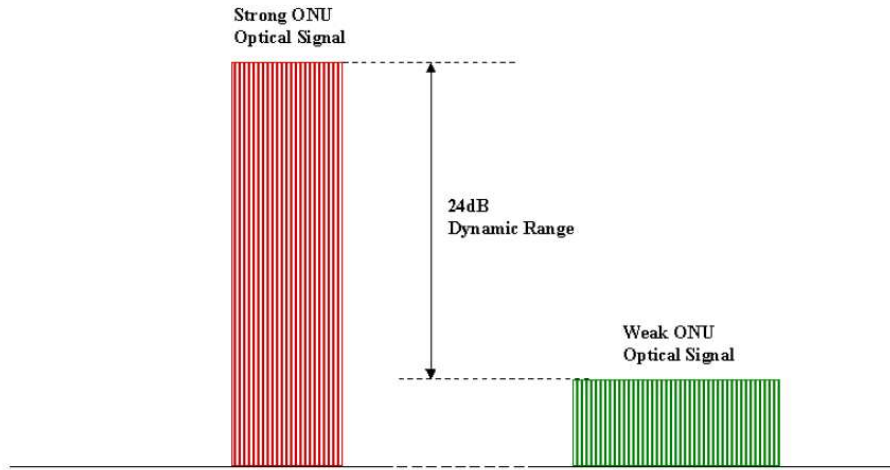
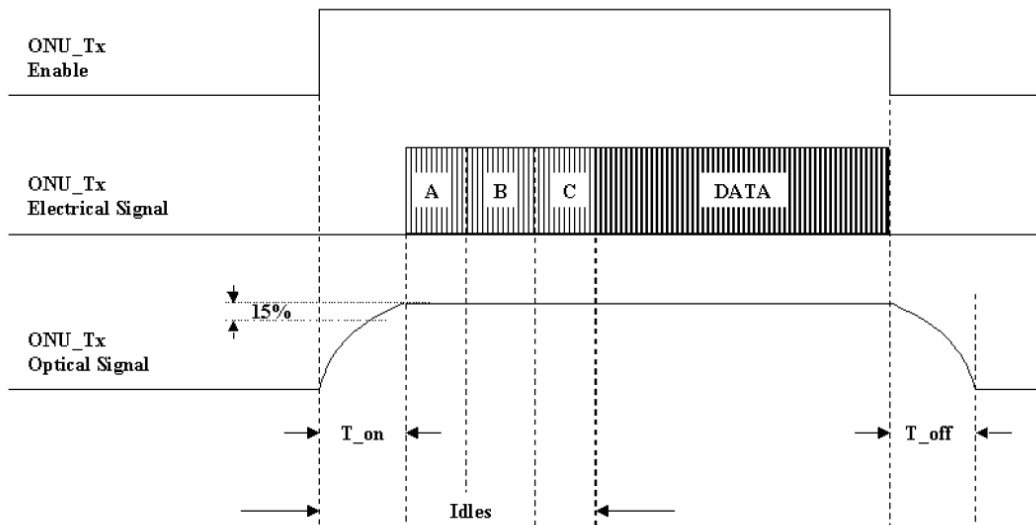


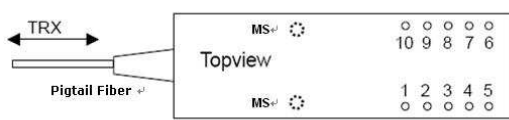
Figure 1



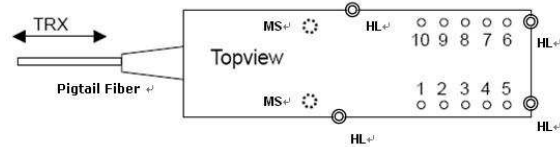
- A: Transceiver Settling Time
- B: Clock and Data Recovery (CDR) Time
- C: Code-Group Alignment Time

Figure 2

Pin Description



SFF 2x5 without housing leads

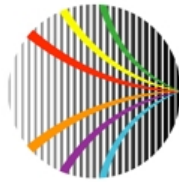


SFF 2x5 with housing leads

Pin No.	Pin Name	Function	Notes
MS	MS	Mounting Stubs	1
HL	HL	Housing Leads	2
1	VeeR	Receiver Signal Ground	
2	VccR	Receiver Power Supply	
3	SD	Signal Detect	3
4	RD-	Receiver Data Out Bar	4
5	RD+	Receiver Data Out	4
6	VccT	Transmitter Power Supply	
7	VeeT	Transmitter Signal Ground	
8	TX_Dis	Transmitter Disable	5
9	TD+	Transmitter Data In	6
10	TD-	Transmitter Data In Bar	6

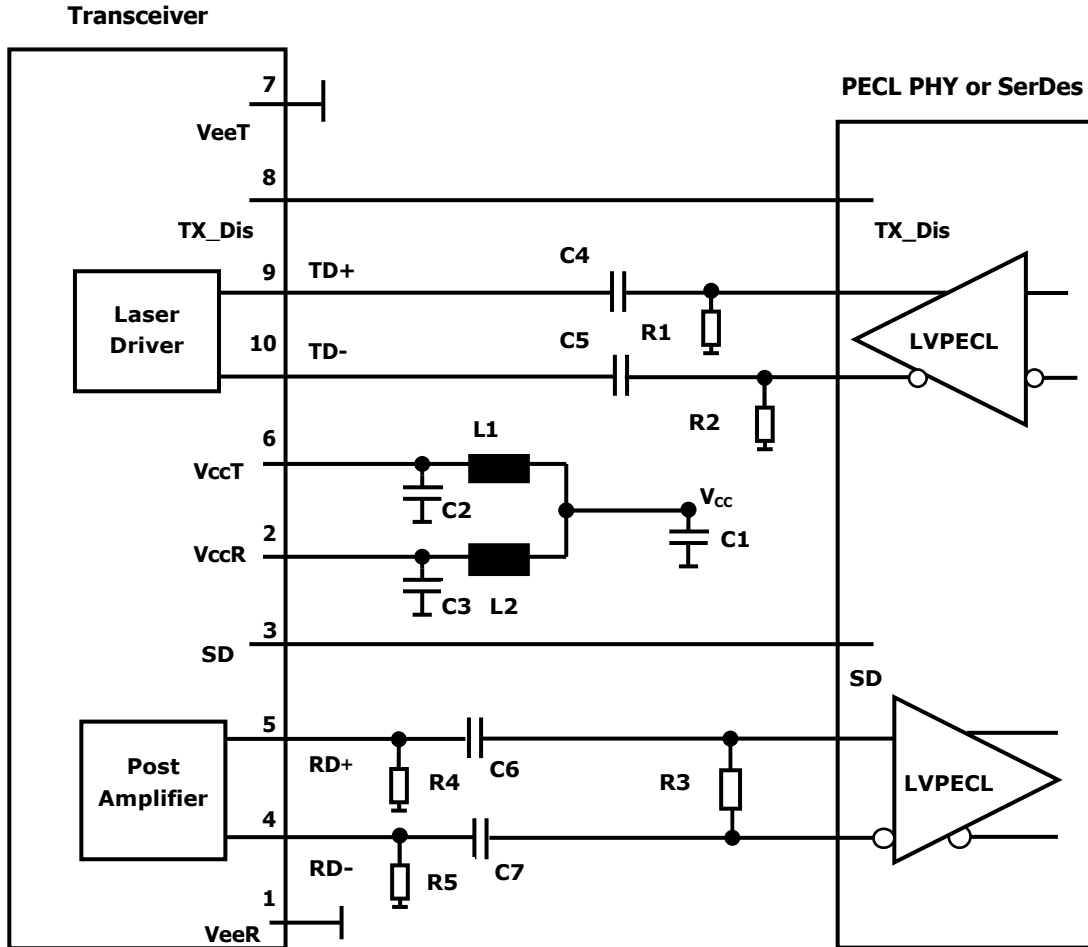
Notes:

1. The mounting stubs are provided for transceiver mechanical attachment to the circuit board. They may also provide an optional connection of the transceiver to the equipment chassis ground.
2. The optional transceiver housing leads may be provided for additional signal grounding. These additional grounds may improve signal integrity, EMC, or ESD performance.
3. Normal Operation: Logic "1" Output; Fault Condition: Logic "0" Output..
4. No internal terminations will be provided.
5. Transmitter Disabled: $(V_{ccT}-1.3V) < V < V_{ccT}$
Transmitter Enabled: $V_{eeT} < V < (V_{eeT}+0.8V)$ or open circuit
6. An internal 50ohm termination will be provided.



Recommended Interface Circuit

TX DC Coupling / RX DC Coupling



Notes:

R1=R2 =Depends on SerDes chip used.

R3= 100 ohm (Depends on SerDes chip used.)

R4=R5=150 ohm

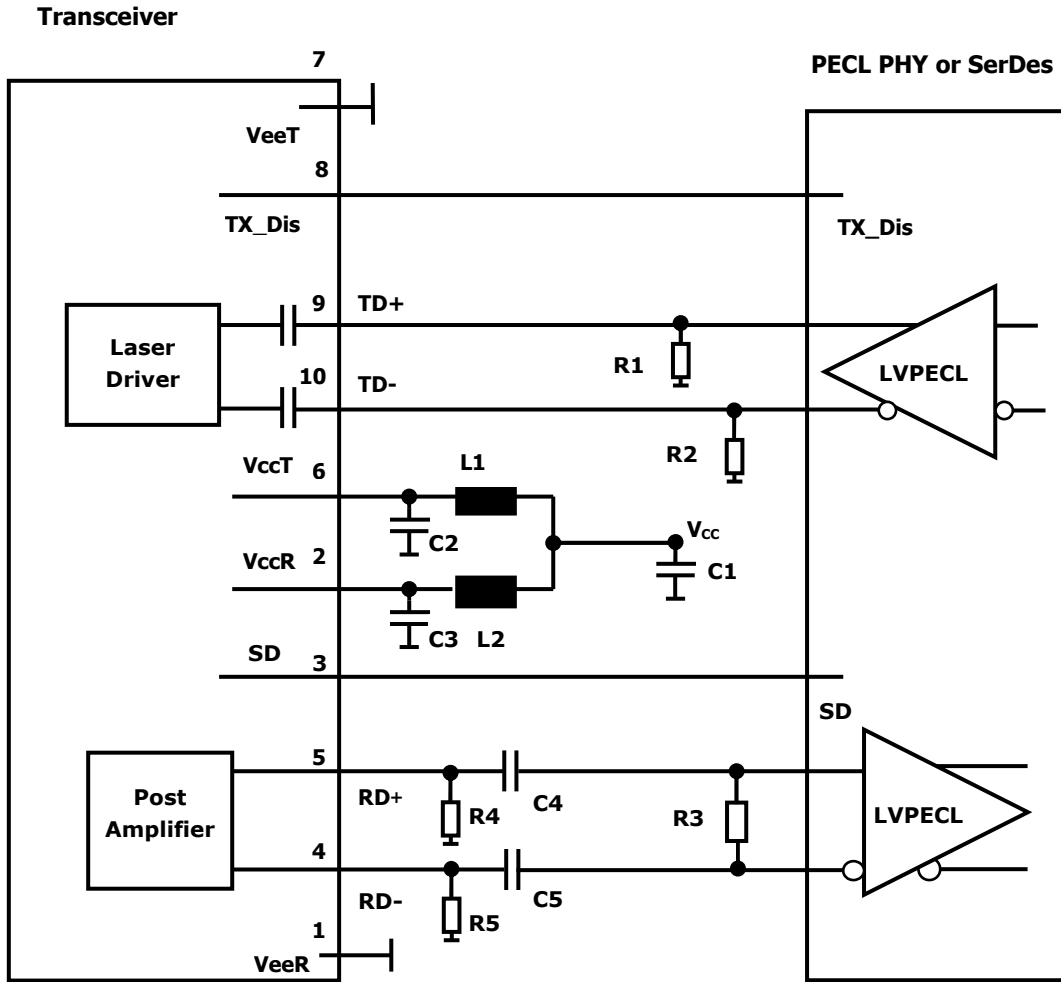
C1=10uF

C2=C3= C4=C5=C6=C7=0.1uF

L1=L2=1uH

Recommended Interface Circuit

TX AC Coupling / RX DC Coupling



Notes:

R1=R2 =Depends on SerDes chip used.

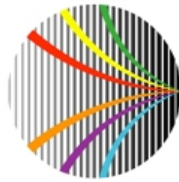
R3= 100 ohm (Depends on SerDes chip used.)

R4=R5=150 ohm

C1=10uF

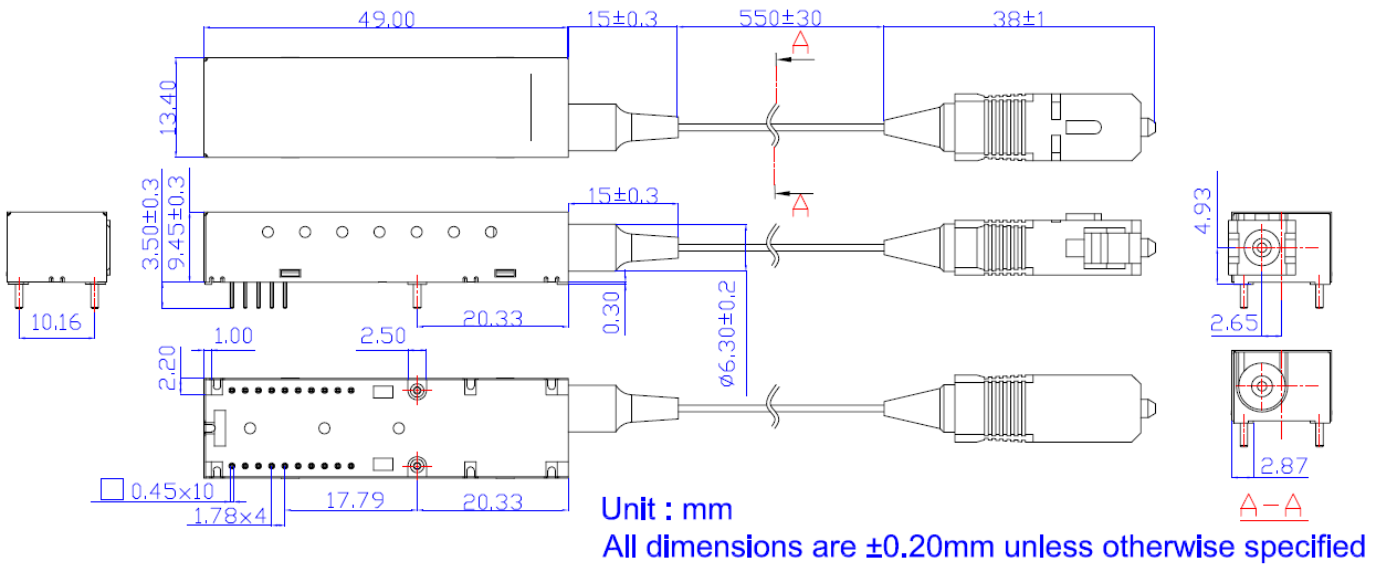
C2=C3=C4=C5=0.1uF

L1=L2=1uH

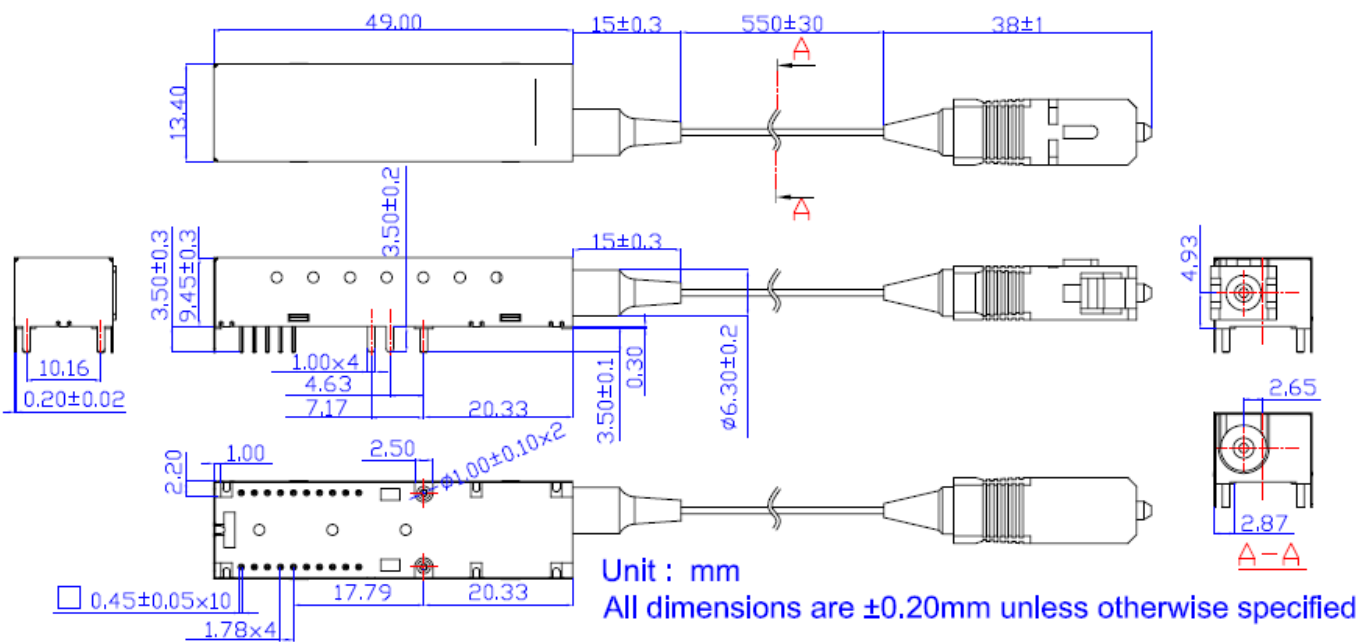


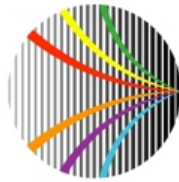
Mechanical Dimensions (Units in mm)

SFF 2x5 without housing leads



SFF 2x5 with housing leads



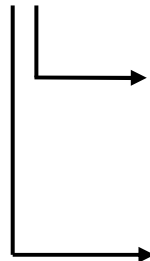


AXCEN

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Ordering Information

AXFT-E453-xy81



I/O Interface

6: TX DC coupling / RX DC coupling

7: TX AC coupling / RX DC coupling

Case Type

4: Without Housing Leads

5: With Housing Leads

Model No.	Tx	LD	Rx	I/O	SD	Case	Link	Temp.
AXFT-E453-4681	1490nm	DFB	1310nm	DC/DC	TTL	W/o Lead	20km	0~70°C
AXFT-E453-4781	1490nm	DFB	1310nm	AC/DC	TTL	W/o Lead	20km	0~70°C
AXFT-E453-5681	1490nm	DFB	1310nm	DC/DC	TTL	With Lead	20km	0~70°C
AXFT-E453-5781	1490nm	DFB	1310nm	AC/DC	TTL	With Lead	20km	0~70°C