10GEPON OLT PR30 XFP Transceiver

XFP Series



- IEEE 802.3av D3.4 compliant
- IEEE 802.3ah™-2004 compliant
- Bi-directional XFP transceiver
- Pluggable 10 Gbps XFP MSA compliant footprint
- XFP package with SC/UPC receptacle optical interface
- Single +3.3 V power supply
- Extended operating temperature range of -20 °C to 80 °C
- Metal enclosure for durability and low EMI
- Low jitter provides high transmission performance

The ACT 10G-EPON OLT XFP transceiver is a hot-pluggable, single-fiber bidirectional optical module designed for use in EPON OLT equipment. It supports the optical interface between the OLT and multiple ONUs in fiber-to-the-home (FTTH), fiber-to-the-building (FTTB), and other broadband access network applications.

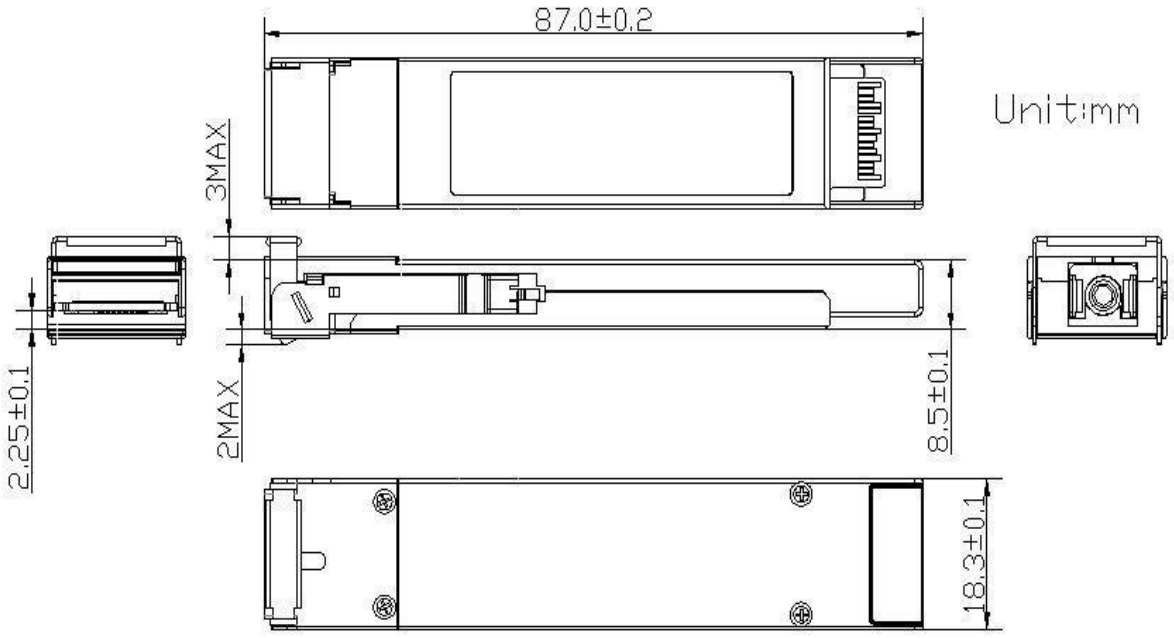
The module supports 10.3125 Gb/s symmetric, 10.3125 Gb/s downstream/1.25 Gb/s upstream asymmetric,2.50 Gb/s downstream/1.25 Gb/s upstream asymmetric, and legacy 1.25 Gb/s symmetric operation, enabling the OLT to serve both 10G-EPON and 1G-EPON networks. It integrates high-power 1577 nm EML and 1490 nm DFB transmitters with high-sensitivity 1270 nm and 1310 nm burst-mode APD receivers. utilizing a single fiber with a standard SC/UPC connector.

Housed in an XFP form factor with an SC receptacle, the module supports transmission distances of up to 20 km over single-mode fiber. It also provides digital diagnostic monitoring, hot-pluggable operation, low EMI, robust ESD protection, and 3.3 V/5 V power supplies. Commercial- and industrial-temperature versions are available, and the module is RoHS compliant.

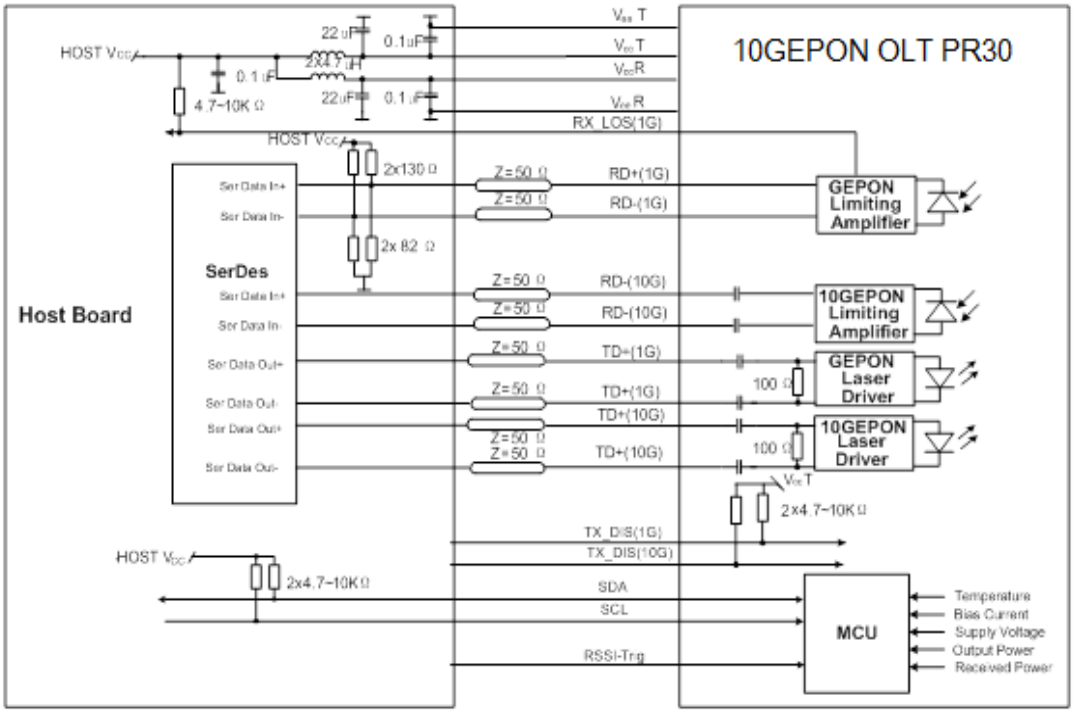
Key Features

- TX 10.3125 Gb/s / Burst Mode RX 10.3125 Gb/s application on single fiber
- TX 10.3125 Gb/s / Burst Mode RX 1.25 Gb/s on single fiber
- TX 1.25 Gb/s / Burst Mode RX 1.25 Gb/s on single fiber
- High power 1577 nm EML transmitter
- High power 1490 nm DFB LD
- High sensitivity 1270 nm and 1310 nm APD
- Support 20km transmission distance with SMF
- Low EMI and excellent ESD protection
- Digital diagnostic monitor interface
- RoHS compliance

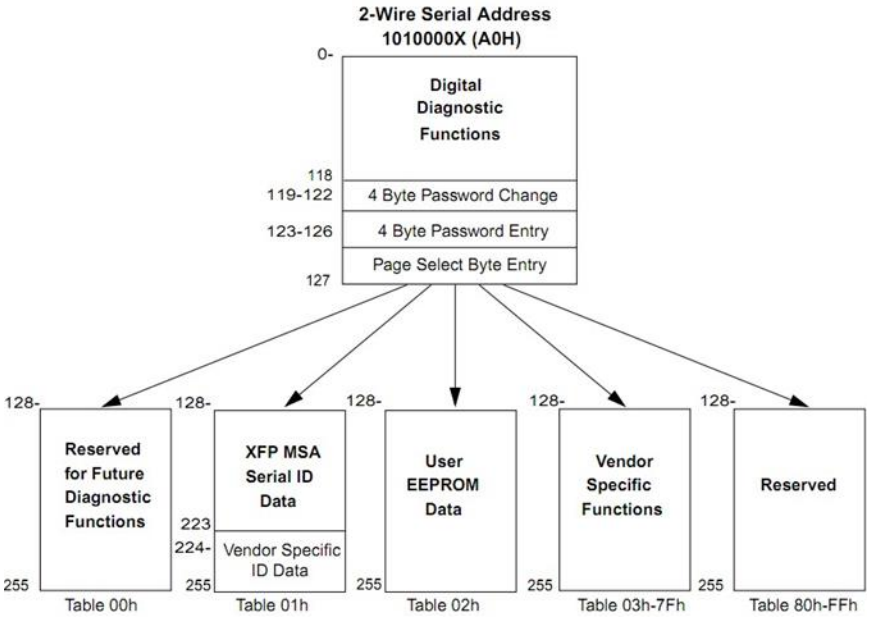
Outline Diagram



Recommended Circuit Schematic



EEPROM Information



DIGITAL DIAGNOSTIC MONITORING INTERFACE				
Parameter	**Range**	**Accuracy**	**Calibration**	**Notes**
Temperature	0 to 70°C	±3℃	Internal	Commercial
	-20 to 80℃			Extended
Voltage	2.97 to 3.63V	±3%	Internal	
Bias Current_1G	0 to 100mA	±10%	Internal	LSB:4uA
TX Power_1G	2 to 7dBm	±3dB	Internal	LSB:0.2uW
Bias Current_10G	0 to 150mA	±10%	Internal	LSB:4uA
TX Power_10G	2 to 7dBm	±3dB	Internal	LSB:0.2uW
RX Power monitor	-30 to -6dBm	±3dB	Internal	LSB:0.1uW

Pin Descriptions

Pin No.	Name	Description	Notes
1	GND	Module Ground	
2	TX_1G_Pa	Non-Inverted Transmit Data in	LVPECL input, AC coupled
3	TX_1G_Na	Inverted Transmit Data in	LVPECL input, AC coupled
4	GND	Module Ground	
5	TX_DIS	Transmitter Disable	LVTTL Input, Low: transmitter on
6	VCC5	+5V Power Supply	
7	GND	Module Ground	
8	VCC3_TX	Transmitter 3.3V Power Supply	
9	VCC3_RX	Receiver 3.3V Power Supply	
10	SCL	The clock line	The clock line of two wire serial interface
11	SDA	The data line	The data line of two wire serial interface
12	MOD_ABS	Indicates Module is not present.	Grounded in the Module
13	N.C.	No-connect in the transceiver	
14	RX_LOS	Loss of signal	LVTTL output, RX LOS pin indication 10G receiver or 1.25G receiver LOS status.
15	GND	Module Ground	
16	GND	Module Ground	
17	RD_10G_N	Inverted 10G Received Data Out	CML
18	RD_10G_P	Non-inverted 10G Received Data Out	CML
19	GND	Module Ground	
20	RD_1G_N	Inverted 1G Received Data Out	LVPECL Output, DC coupled
21	RD_1G_P	Non-inverted 1G Received Data Out	LVPECL Output, DC coupled
22	N.C.	No-connect in the transceiver	

23	RSSI_TRIG	RSSI Trigger for Transceiver	High: enable RSSI A/D conversion
24	N.C.	No-connect in the transceiver	
25	N.C.	No-connect in the transceiver	
26	N.C.	No-connect in the transceiver	
27	GND	Module Ground	
28	TX_10G_N	Inverted Transmit Data in	CML input, AC coupled
29	TX_10G_P	Non-Inverted Transmit Data in	CML input, AC coupled
30	GND	Module Ground	

Specifications

ABSOLUTE MAXIMUM RATINGS					
Parameter	**Symbol**	**Min**	**Max**	**Units**	**Notes**
Storage Ambient Temperature	T_{STG}	-40	85	°C	
Commercial Case Operating Temperature Range	T_C	0	70	°C	
Industrial Case Operating Temperature Range		-20	80	°C	
Operating Humidity	OH	5	95	%	

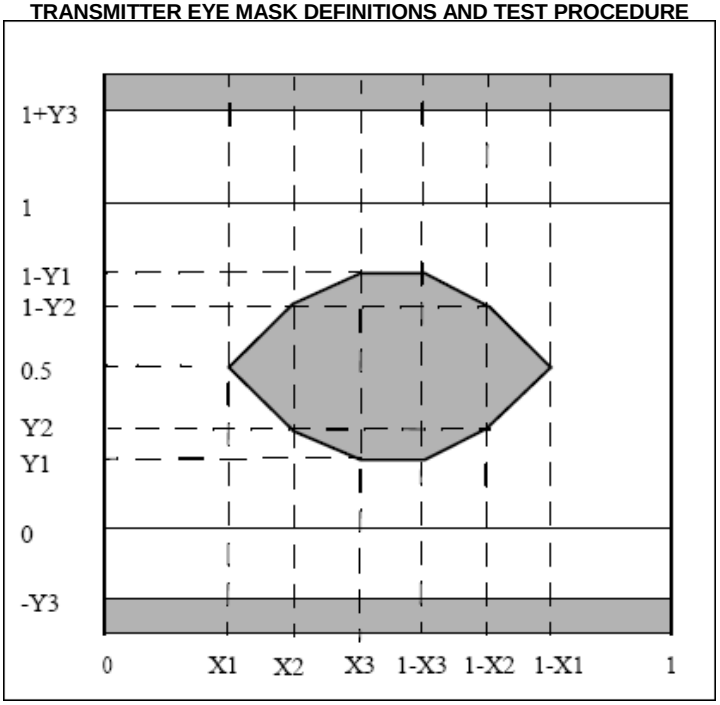
RECOMMENDED OPERATING CONDITION						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Unit**	**Notes**
VCC3 Power Supply Voltage	V_{CC}	3.13	3.3	3.47	V	
VCC5 Power Supply Voltage	V_{CC}	4.75	5	5.25	V	
VCC3 Power Supply Current	ICC3		-	900	mA	
VCC5 Power Supply Current	ICC5		-	300	mA	
Line Rate			10.3125/1.25		Gbps	
Data Rate Drift		-100		+100	ppm	

10GEPON TRANSMITTER OPTICAL CHARACTERISTICS						
Parameter	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**	**Notes**
Optical Center Wavelength	λ_C	1575	1577	1580	nm	
Optical Spectrum Width (-20dB)	$\Delta\lambda$	-	-	1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Launch Optical Power	AOP	2		5	dBm	Launched into SMF
Power-OFF Transmitter Optical Power				-39	dBm	
Extinction Ratio	ER	6			dB	PRBS2^{31}-1@10.3125Gbps
Transmitter Reflectance				-10	dB	

Transmitter and Dispersion Penalty	TDP			1.5	dB	Transmit on 20km SMF
Optical Waveform Diagram	Compliant with IEEE Std 802.3av					Figure 1, Margin>5%
10GEPON TRANSMITTER ELECTRICAL CHARACTERISTICS						
Data Input Differential Swing		120		850	mV	CML input, AC coupled
Input Differential Impedance		90	100	110	Ω	
Transmitter Disable Voltage - Low		0		0.8	V	
Transmitter Disable Voltage - High		2.0		V_{CC}	V	

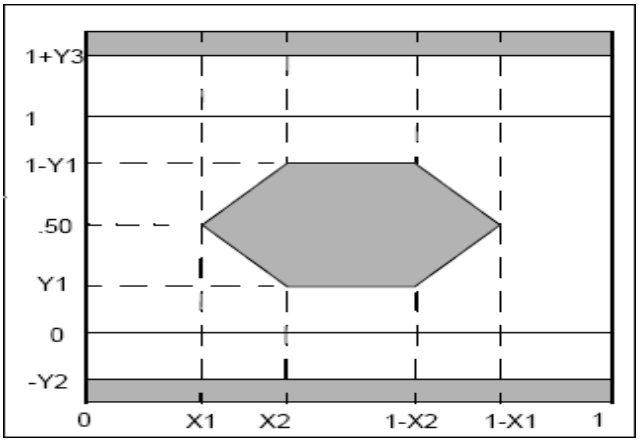
GEPON TRANSMITTER OPTICAL CHARACTERISTICS						
Parameter	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**	**Notes**
Optical Center Wavelength	λ_C	1480	1490	1500	nm	
Optical Spectrum Width (-20dB)	$\Delta\lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Launch Optical Power	AOP	2		7	dBm	Launched into SMF
Power-OFF Transmitter Optical Power				-39	dBm	
Extinction Ratio	ER	9			dB	PRBS 2^7-1 test pattern@1.25Gbit/s
Transmitter Reflectance				-10	dB	
Transmitter and Dispersion Penalty	TDP			2.3	dB	Transmit on 20km SMF
Optical Waveform Diagram	Compliant with IEEE Std 802.3ah™-2004					Figure 2, Margin>5%
GEPON TRANSMITTER ELECTRICAL CHARACTERISTICS						
Data Input Differential Swing		200		1600	mV	LVPECL input, AC coupled
Input Differential Impedance		90	100	110	Ω	
Optical Return Loss Tolerance				15	dB	
Transmitter Disable Voltage - Low		0		0.8	V	
Transmitter Disable Voltage - High		2.0		V_{CC}	V	

TRANSMITTER EYE MASK DEFINITIONS AND TEST PROCEDURE



X1	X2	X3	Y1	Y2	Y3	Unit
0.25	0.40	0.45	0.25	0.28	0.40	UI

Figure 1: 10GEPON Transmitter Eye Mask Definitions



X1	X2	Y1	Y2	Y3	Unit
0.22	0.375	0.20	0.20	0.30	UI

Figure 2: 1GEPON Transmitter Eye Mask Definitions

10GEPON RECEIVER OPTICAL CHARACTERISTICS						
Parameter	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**	**Notes**
Operating Wavelength		1260	1270	1280	nm	
Sensitivity	SEN			-28	dBm	PRBS2^{31}-

Saturation Optical Power	SAT	-6			dBm	1@10.3125Gbps BER ≤1×10^{-12}.with FEC
Loss Of Signal De-assert Level				-28	dBm	
Loss Of Signal Assert Level		-42			dBm	
Loss Of Signal Hysteresis		0.5		6	dB	
Receiver Reflectance				-12	dB	
10GEPON RECEIVER ELECTRICAL CHARACTERISTICS						
Receiver Threshold Settling Time	$T_{SETTLING}$			800	ns	
Data Output Differential Swing		400		1600	mV	CML output, AC coupled
Loss Of Signal Assert Time			0.5		μs	
Loss Of Signal De-assert Time			0.5		μs	
Loss Of Signal Voltage - Low		0		0.4	V	
Loss Of Signal Voltage - High		2.4		VCC	V	

GEPON RECEIVER OPTICAL CHARACTERISTICS						
Parameter	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**	**Notes**
Operating Wavelength		1260		1360	nm	
Sensitivity	SEN			-29.78	dBm	PRBS 2^7-1@1.25Gbps BER ≤1×10^{-12}
Saturation Optical Power	SAT	–9.38			dBm	
Loss Of Signal De-assert Level				-31	dBm	
Loss Of Signal Assert Level		-45			dBm	
Loss Of Signal Hysteresis		0.5		6	dB	
Receiver Reflectance				-12	dB	
GEPON RECEIVER ELECTRICAL CHARACTERISTICS						
Receiver Threshold Settling Time	$T_{SETTLING}$			400	ns	
Data Output Differential Swing		400		1600	mV	LVPECL output, DC coupled
Loss Of Signal Assert Time				512	ns	
Loss Of Signal Deassert Time				512	ns	
Loss Of Signal Voltage - Low		0		0.4	V	
Loss Of Signal Voltage - High		2.4		VCC	V	

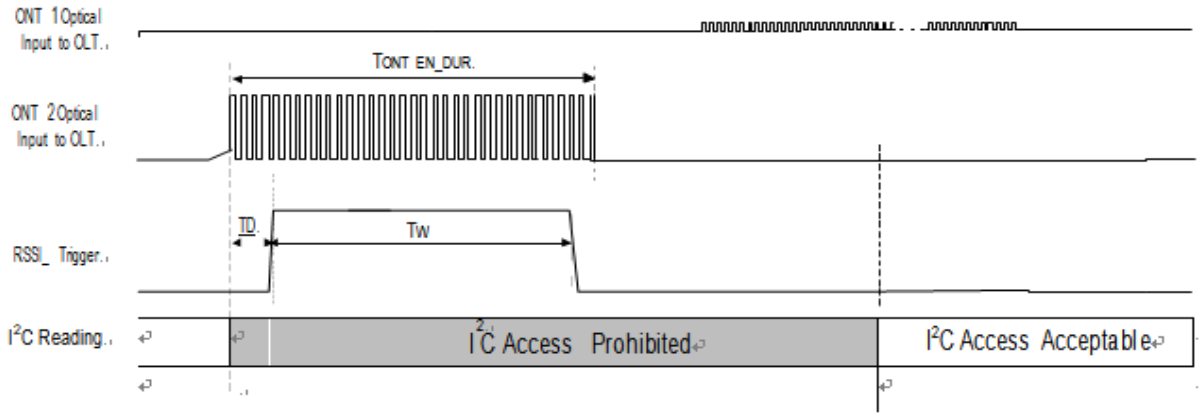
Parameter	**Unit**	**Min.**	**Typical**	**Max.**
Bias Current_1G	mA	0		100
TX Power_1G	dBm	2		7

Bias Current_10G	mA	0		150
TX Power_10G	dBm	2		7
RX Power monitor	dBm	-30		-6

Timing Sequences

Timing Sequence for RSSI

RSSI CHARACTERISTICS						
Parameter	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**	**Notes**
RSSI Trigger-Low		0		0.8	V	
RSSI Trigger-High		2.0		Vcc	V	
RSSI Trigger Delay	T_D	496	512	528	ns	
RSSI Trigger Width	T_W	584	600	616	ns	
I^2C Access Prohibited Time		500			μs	



Ordering Information

Product Name	Product Description
XFP-10G-EP-20	XFP 10GEPON OLT PR30, Tx 1577nm/1490nm, Rx 1270nm/1310nm, XFP form-factor SC/UPC, 20km, 0 to +70 °C
XFP-10G-EP-20-A	XFP 10GEPON OLT PR30, Tx 1577nm/1490nm, Rx 1270nm/1310nm, XFP form-factor SC/UPC, 20km, -20 to +80℃

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