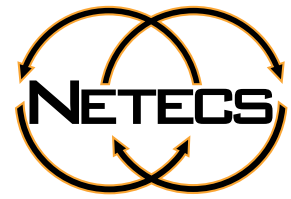


X2-10GB-SR-NT
10GBASE -SR X2 MMF
850NM 300M REACH SC

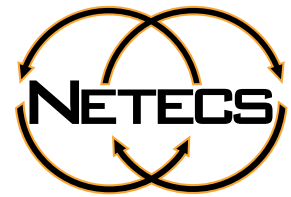


X2-10GB-SR-NT

10GBASE X2 Transceiver

Features

- Hot pluggable X2 MSA form factor
- Total power consumption: 2.2 W maximum
- RoHS-6 compliant (lead-free)
- Temperature range 0°C to 70°C
- Transmission distance of 300m
- Uncooled 850 nm VCSEL laser
- SC connector, multimode fiber
- Full duplex transmission mode
- Digital Optics Monitoring (DOM)
- Power supply: +5.0 V, +3.3 V
- Adaptable Power Supply (APS: +1.2 V)
- XAUI electrical interface
 - 4x 3.125 Gb/s Ethernet
 - 4x 3.1875 Gb/s Fibre Channel
- Management and control via MDIO 2-wire bus
- 70-pin connector
- Separated signal/chassis ground
- Mid Pak module variance for front panel mounting
- De-latch mechanism with low extraction force



Absolute Maximum Ratings

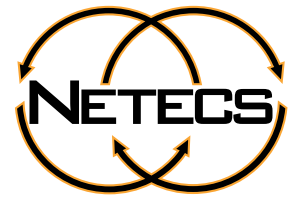
Parameter	Symbol	Min	Max	Unit
Storage Ambient Temperature ¹⁾	<i>TS</i>	-40	85	°C
Operating Case Temperature ¹⁾	<i>TC</i>	0	70	°C
Supply Voltage +5.0 V	<i>V5</i>	0	6	V
Supply Voltage +3.3 V	<i>V3</i>	0	4	V
Supply Voltage APS	<i>Vaps</i>	0	1.5	V
Static Discharge Voltage, All Pins ²⁾	<i>STd</i>		500	V
Average Receive Optical Power	RxP max		1.5	dBm

Exceeding any one of these values may permanently destroy the device.

Electrical Characteristics

Recommended Operating Conditions

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Operating Case Temperature	<i>TC</i>	0		70	°C
Transponder Total Power Consumption	<i>P</i>			2.2	W
Supply Voltage +5.0 V	<i>VCC5</i>	4.75	5	5.25	V
Supply Current +5.0 V	<i>ICC5</i>		157	190	mA
Supply Voltage +3.3 V	<i>VCC3</i>	3.14	3.3	3.47	V
Supply Current +3.3 V	<i>ICC3</i>		55	72	mA
Supply Voltage APS	<i>VCC aps</i>	1.152	1.2	1.248	V
Supply Current APS	<i>ICC aps</i>		830	850	mA



Electrical DC Characteristics

(VCC5= 4.75 V to 5.25 V, VCC3= 3.14 V to 3.47 V, VCCaps= 1.152 V to 1.248 V, TC= 0°C to 70°C)

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
1.2 V CMOS (1.8 V CMOS Compatible1)) I/O DC Characteristics (PRTAD; LASI; RESET; TX_ONOFF)					
External Pull-up Resistor for Open Drain	<i>Rpullup</i>	10		22	kΩ
Output High Voltage2)	<i>Voh</i>	1			V
Output Low Voltage2)	<i>Vol</i>			0.15	V
Input High Voltage	<i>Vih</i>	0.8 4		1.5	V
Input Low Voltage	<i>Vil</i>			0.36	V
Input Pull-down Current3)	<i>Ipd</i>	20		120	μA
XAUI I/O DC Characteristics (TXLANE[0..3]; RXLANE[0..3])					
Differential Input Amplitude (pk-pk) 4)	<i>Vin_xaui</i>	200		2500	mV
Differential Output Amplitude (pk-pk) 4)	<i>Vout_xaui</i>	800		1600	mV
MDIO I/O DC Characteristics (MDIO; MDC)					
Output Low Voltage5)	<i>VOL</i>	-0.3		0.2	V
Output Low Current	<i>IOL</i>			20	mA
Input High Voltage	<i>VIH</i>	0.84		1.5	V
Input Low Voltage	<i>VIL</i>	-0.3		0.36	V
Pull-up Supply Voltage	<i>VPU</i>	0.84	1.2	1.5	V
Input Capacitance	<i>CIN</i>			10	pF
Load Capacitance	<i>CLOAD</i>			470	pF
External Pull-up Resistance	<i>RLOAD</i>	200			Ω

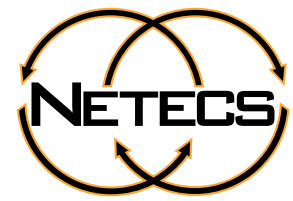
1) For 1.8 V CMOS $V_{oh} = 1.65$ V min., $V_{ol} = 0.15$ V max., $V_{ih} = 1.17$ V min., $V_{il} = 0.63$ V max.

2) $R_{pull-up} = 10$ kΩ to 1.8 V.

3) $V_{in} = 1.8$ V.

4) AC coupled.

5) $I_{OL} = 100$ μA



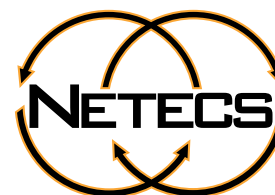
Electrical AC Characteristics

(VCC5 = 4.75 V to 5.25 V, VCC3 = 3.14 V to 3.47 V, VCCaps= 1.152 V to 1.248 V, TC= 0°C to 70°C)

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
XAUI Input AC Characteristics (TXLANE[0..3])					
Baud Rate	RXAUIIN				Gbit/s
Fibre Channel			3.1875		
Ethernet			3.125		
Baud Rate Tolerance	RTOLXAUI	-100		100	ppm
Differential Input Impedance	ZINXAUI	80	100	120	Ω
Differential Return Loss1)	S11	10			dB
Input Differential Skew2)	<i>t</i> SKEWIN			75	ps
Jitter Amplitude Tolerance3)	JXAUITOL			0.65	UIp-p
XAUI Output AC Characteristics (RXLANE[0..3])					
Baud Rate Fibre Channel Ethernet	RXAUIOUT		3.1875 3.125		Gbit/s
Baud Rate Variation	RXAUIVAR	-100		100	ppm
XAUI Eye Mask (far-end)	According to IEEE 802.3ae and 10G Fibre Channel				
Output Differential Skew	<i>t</i> SKEWOUT			15	ps
Output Differential Impedance	ZOUTXAUI	80	100	120	Ω
Differential Output Return Loss1)	S22	10			dB
Total Jitter4)	TJXAUI			0.35	UI
Deterministic Jitter4)	DJXAUI			0.37	UI
Power-On Reset AC Characteristics					
Power-On Reset and TX_ONOFF Characteristics	According to XENPAK MSA Issue 3.0, 2002-9-18				
MDIO I/O AC Characteristics (MDIO; MDC)					
MDIO Data Hold Time	<i>t</i> HOLD	10			ns
MDIO Data Setup Time	<i>t</i> SU	10			ns
Delay from MDC Rising Edge to MDIO Data Change	<i>t</i> DELAY			300	ns
MDC Clock Rate	<i>f</i> MAX			2.5	MHz

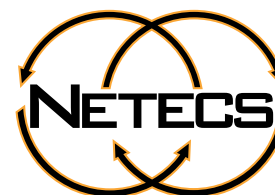
- 1) 100 MHz to 2.5 GHz.
- 2) At crossing point.
- 3) Per IEEE Std 802.3ae.
- 4) At near-end, No pre-equalization, 1 UI = 320 ps.

X2-10GB-SR-NT
 10GBASE-SR X2 MMF
 850NM 300M REACH SC



Optical Characteristics

Parameter	Bandwidth Min Modal (MHz*Km)	Condition s	Symbol	Min	Typ	Max	Unit s
Transmitter							
Nominal Wavelength			ITRP	840	850	860	nm
Spectral Width					0.4	0.45	nm
Operating Range	62.5/125 m MMF	160	lop	2		26	m
	50/125 m MMF	400		2		66	
	62.5/125 m MMF	200		2		33	
	50/125 m MMF	500		2		82	
	50/125 m MMF	2000		2		300	
Nominal Signaling Speed			fOPT	9.95		10.71	GBd
Launch Power		in OMA	PoptOMA	-4.3			dBm
Average Launch Power			Poptavg	-7.3	-2.6	-1	dBm
Extinction Ratio			ER	3.5	5.5		dB
Relative Intensity Noise			RIN			-128	dB/Hz
Receiver							
Center Wavelength			λ_X	840	850	860	nm
Receiver Sensitivity		in OMA, BER 10 ⁻¹² @ 231 -11)	PINS		-13.5	-11.1	dBm
Stressed Receiver Sensitivity		in OMA	PIN			-7.5	dBm
Saturation Input Power			PSAT			1	dBm



General Specifications

Optical Interface Standard Specifications

Standard	Fiber Type	Minimum Modal Bandwidth at 850 nm (MHz*km)	Operating Range 1) (meters)
IEEE	62.5 μ m MMF	160	2 to 26
	50 μ m MMF	400	2 to 66
Fibre Channel	62.5 μ m MMF	200	0.5 to 33
	50 μ m MMF	500	0.5 to 82
	50 μ m MMF	2000	0.5 to 300

Notes:

1) Operating range as defined by IEEE and Fibre Channel standards. Longer reach possible depending upon link implementation.

Environmental Performance

Operating case temperature:

0°C to +70°C

Operating humidity:

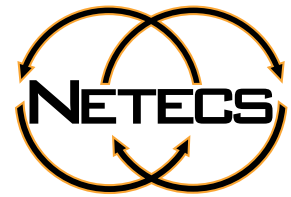
0% -95% RH non-condensing

Fibers and Connectors

The transponder has SC receptacles for both Tx and Rx. The transponder is designed for multimode SC cables, 0° polished endface (PC).

70-pin Connector

The module interface connector is a 70-pin, printed circuit board edge connection with a 0.5 mm pitch. The appropriate mating connector for the customer PCB is a 70-pin SMT, dual row, right angled, edge connector, 0.5 mm pitch (Tyco Electronics part number 1367337-1, Molex part number 74441-0003 or equivalent).

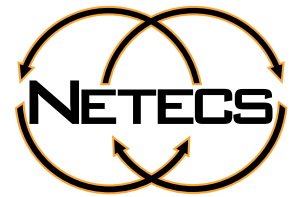


Rail and Mechanical Mounting Requirements

The X2 rail system required to mount the X2 module is fully defined by the MSA. (Tyco Electronics part number 1367608-1: designed for belly to belly applications; and 1367610-1, designed for single sided board mount to fit into the standard host PCB footprint; or equivalent). For further details please refer to vendor-supplied information.

Regulatory Compliance

Feature	Standard	Comments
ESD: Electrostatic Discharge to the	EIA/JESD22-A114-B (MIL-STD 883D)	Class 1a (> 500 V)
Electrical Pins (HBM)	Method 3015.7)	
Immunity: Against Electrostatic Discharge (ESD) to the Module Receptacle	EN 61000-4-2 IEC 61000-4-2	Discharges ranging from ± 2 kV to ± 25 kV to the front end / faceplate / receptacle cause no damage to module (under recommended conditions).
Immunity: Against Radio Frequency Electromagnetic Field	EN 61000-4-3 IEC 61000-4-3	With a field strength of 10 V/m, noise frequency ranges from 10 MHz to 2 GHz. No effect on module performance between the specification limits.
		Noise frequency range:30 MHz to 40 GHz
Emission:	FCC 47 CFR Part 15,	Radiated emission does not exceed specified
Electromagnetic Interference	Class B EN 55022	limits when measured with module inside a
(EMI)	Class B CISPR 22	shielding enclosure with a MSA conforming cutout



DOM Parameters

Parameter	Values			Unit
	Min.	typ.	Max	
Laser Bias Current Monitor Accuracy 2)	-10		10	%
Transmit Power Monitor Accuracy 3)	-3		3	dB
Receive Power Monitor Accuracy 3)	-3		3	dB

- 1) 0 to 70°C case temperature.
- 2) 0 to 12.5 mA.
- 3) -8.2 dBm to +0.5 dBm.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Module Retention Force (latch strength)	FRET		200		N
Module Insertion Force	FIN		40		N
Module Extraction Force (with kick-out)	FEXT-K		16		N
Module Extraction Force (without kick-out)	FEXT		25		N

Eye Safety

This laser based multimode transceiver is a Class 1 product. It complies with IEC 60825-1 Ed.2: 2007 and FDA performance standards for laser products (21 CFR 1040.10 and 1040.11) except for deviations pursuant to Laser Notice 50, dated June 24, 2007.