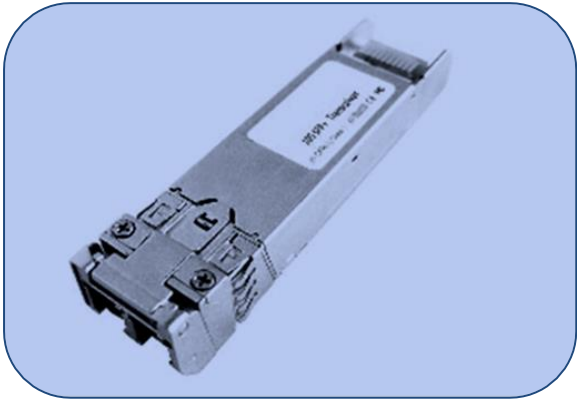




XTS31B-10Lx

16G FC 1310 nm Digital Diagnostic SFP+ LC Single-Mode Transceiver

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- Product Highlights**
- Up to 14.025 Gbps Bi-directional Data Links
 - Complaint with SFP+ MSA
 - Compliance with Fibre Channel 1600-SM-LC-L
 - Compliant with 8G and 4G Fibre Channel
 - SFF-8472 Digital Diagnostic Function I 1310 nr DFB LD Transmitter
 - AC/AC Coupling according to MSA
 - 2 to 10,000 m at 14.025 Gbps
 - Single +3.3 V Power Supply
 - RoHS 6/6 Compliant
 - 0 to 70oC Operating: XTS31B-10LY
 - -5 to 85oC Operating: XTS31B-10LE
 - -40 to 85oC Operating: XTS31B-10LM
 - Class 1 Laser International Safety Standard IEC-60825 Compliant

Applications

- Multi-rate 16x/8x/4x Fiber Channel
- 10G FCoE
- 10G Ethernet

Product description

The XTS31B-10LY series single mode transceiver is small form factor pluggable module for bi-directional serial optical data communications such as 16x/8x/4x Fibre Channel. It is with the SFP+ 20-pin connector to allow hot plug capability. Digital diagnostic functions are available via an I2C. This module is designed for single mode fiber and operates at a nominal wavelength of 1310 nm. The transmitter section uses a 1310 nm multiple quantum well DFB laser and is a class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses an integrated InGaAs detector preamplifier (IDP) mounted in an optical header and post amplifier IC.

Laser safety

This single mode transceiver is a Class 1 laser product. It complies with IEC-60825 and FDA 21 CFR 1040.10 and 1040.11. The transceiver must be operated within the specified temperature and voltage limits. The optical ports of the module shall be terminated with an optical connector or with a dust plug.

Absolute maximum rating

Parameters	Symbol	Min.	Max.	Unit	Notes
Storage Temperature	Tstg	-40	85	°C	
Operating Case Temperature	Topr	0	70	°C	XTS31B-10LY
		-5	85		XTS31B-10LE
		-40	85		XTS31B-10LM
Power Supply Voltage	Vcc	0	3.6	V	

Recommended operating environment

Parameters	Symbol	Min.	Typical	Max.	Units/Notes
Power Supply Voltage	VCC	3.13	3.3	3.47	V
Operating Case Temperature	Topr	0		70	°C /XTS31B-10LY
		-5		85	°C /XTS31B-10LE
		-40		85	°C /XTS31B-10LM
Power Supply Current	I _{CC (TX+RX)}		220	300	mA
Data Rate		4.25	14.025		Gb/s

Transmitter Optical Specifications (0°C < Topr < 70oC, 3.13V < Vcc < 3.47V)

Parameters	Symbol	Min.	Typical	Max.	Unit	Notes
Optical Modulation Amplitude	Po, OMA	-2		+2	dBm	
Average Launch Power	Po, Avg	-4		+2	dBm	1
Extinction Ratio	ER	3.5				
Output Center Wavelength	lc	1295		1325	nm	
Output Spectrum Width	σl			1	nm	-20 dB width
Side Mode Suppression Ratio	SMSR	30			dB	
Transmitter and Dispersion Penalty	TDP			4.4	dB	
Relative Intensity Noise	RIN			-130	dB/Hz	
Average Launch Power of OFF Transmitter				-30	dBm	

Notes:

- Output power is power coupled into a 9/125 mm single-mode fiber.

Receiver Optical Specifications (0°C < Topr < 70oC, 3.13V < Vcc < 3.47V)

Parameters	Symbol	Min.	Typical	Max.	Unit	Notes
Unstressed Sensitivity at 14.025 Gb/s	Sens			-12	dBm	2, OMA
				-10.9	dBm	3, Average Power
Stress Sensitivity at 14.025 Gb/s	Sens		---	-10.2	dBm	2, OMA
Receiver Overload	P _{MAX}	2	---		dBm	
LOS -- Deasserted	LOSD	---	---	-12	dBm	Transition: low to high

Parameters	Symbol	Min.	Typical	Max.	Unit	Notes
LOS -- Asserted	LOSA	-22	---	---	dBm	Transition: high to low
Wavelength of Operation	lc	1260		1565	nm	
Optical Return Loss	ORL			-12	dB	

Notes:

2. Measured with worst ER; BER < 10⁻¹² and PRBS 2³¹-1.

3. Represents sensitivity based on OMA spec, as corrected to incoming Extinction Ratio of 3.5 dB. For example, an OMA of 0.063 mW (-12 dBm) is approximately equal to an average power of -10.9 dBm, average with an Extinction ratio of 3.5 dB.

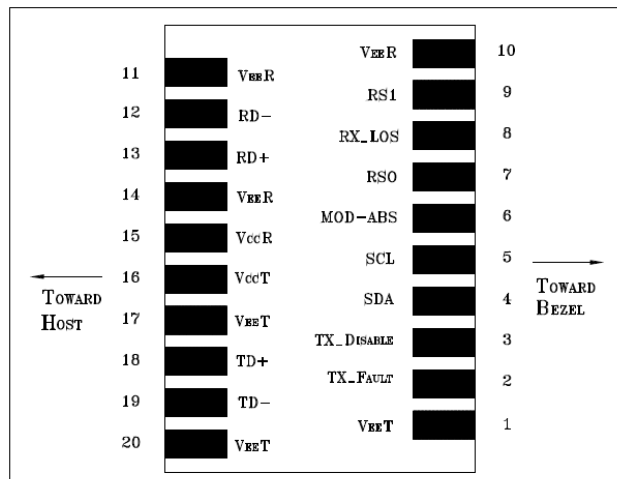
Electrical characteristics

Parameters	Symbol	Min.	Typical	Max.	Unit	Notes
High-Speed Signal (CML) Interface Specification						
Input Data Rate		4.25	14.025		Gb/s	
TX Clock Tolerance				±100	ppm	4
Differential Input Impedance	Rin		100		Ω	
Differential Data Input Amplitude [1]		150		1200	mVpp	Internally AC coupled
Output Data Rate		4.25	14.025		Gb/s	
RX Clock Tolerance				±100	ppm	4
Differential Output Impedance [1]	Rout		100		Ω	
Differential Data Output Amplitude		350	600	700	mVpp	Internally AC coupled
Low-Speed Signal (LVTTTL) Interface Specification						
Input High Voltage		2.0		Vcc+0.3	V	
Input Low Voltage		GND		0.8	V	
Output High Voltage		2.4		Vcc	V	
Output Low Voltage		GND		0.5	V	

Notes:

4. Clock tolerance for 14.025 Gb/s, 8.5Gb/s and 4.25 Gb/s.

Connection Diagram



Pin definition

PIN	Signal Name	Description	PIN	Signal Name	Description
1	VEET	Transmitter Signal Ground	11	VEER	Receiver Signal Ground
2	TX_Fault	Transmitter Fault Indication. Logic "1" Output = Laser Fault. Logic "0" Output = Normal operation	12	RD-	Inverse Receiver Data Out
3	TX_Disable	Logic "1" Input (or no connection) = TX off, Logic "0" = TX on.	13	RD+	Receiver Data Out
4	SDA	Modulation Definition 2 – Two wires serial ID Interface	14	VEER	Receiver Signal Ground
5	SDL	Modulation Definition 1 – Two wires serial ID Interface	15	VCCR	Receiver Power – 3.3V±5%
6	MOD-ABS	Modulation Absent, connected to VEET or VEER in the module.	16	VCCT	Transmitter Power – 3.3V±5%
7	RS0	RX Rate Select: This pin has an internal 30k pulldown to ground. A signal on this pin will not affect module performance.	17	VEET	Transmitter Signal Ground
8	RX_LOS	Loss of Signal Out (OC).	18	TD+	Transmitter Data In
9	RS1	TX Rate Select. This pin has an internal 30k pulldown to ground. A signal on this pin will not affect module performance.	19	TD-	Inverse Transmitter Data In
10	VEER	Receiver Signal Ground	20	VEET	Transmitter Signal Ground

Module Definition

Module Definition	PIN 4	PIN 5	PIN 6	Interpretation by Host
4	SDA	SCL	MOD-ABS	Serial module definition protocol

Module Definition 4 specifies a serial definition protocol. For this definition, upon power up, SDA and SDL appear as no connector (NC) and MOD-ABS is TTL LOW. When the host system detects this condition, it activates the serial protocol. The protocol uses the 2-wire serial CMOS E²PROM protocol of the ATMEL AT24C01A/02/04 family of components.

EEPROM Series ID Memory Contents (Address A0h)

Addr.	Hex	ASCII	Note	Addr.	Hex	ASCII	Note	Addr.	Hex	ASCII	Note	Addr.	Hex	ASCII	Note	
0	03		SFP+	32	20			64	00		Uncooled Tx, Txdis, Txfault, LOS enable	96	00		Vendor specific EEPROM	
1	04			33	20			65	1A			97	00			
2	07		LC	34	20			66	00		Up bitrate	98	00			
3	10		10G Base-SR	35	20			67	00		Lowbit rate	99	00			
4	00			36	00		NA	68			Serial number: eachpiece with differentserial number	100	00			
5	00			37	00		Vendor IEEE	69				101	00			
6	00			38	0E		OUI	70				102	00			
7	60		Short (S) and Intermediate (I) Distance	39	FA			71				103	00			
8	40		Shortwave Laser w/o OFC (SN)	40	53	S	Part Number	72				104	00			
9	0C		Multimode (M6, M5, M5E)	41	50	P			73				105	00		
10	F0		1600/1200/800/400 Mbytes/sec	42	4D	M			74				106	00		
11	06		64B/66B	43	2D	-			75				107	00		
12	8C		14.025Gbps	44	36	6			76				108	00		
13	00			45	31	1			77				109	00		
14	00			46	30	0			78				110	00		
15	00			47	30	0			79				111	00		
16	04		OM2 50/125um MME	48	57	W			80				112	00		
17	02		OM1 62.5/125um	49	47	G			81				113	00		
18	00			50	20			82				114	00			
19	0A		OM3 50/125um MME	51	20			83				115	00			
20	4F	O	Vendor name	52	20			84			Date Code	116	00			
21	50	P		53	20			85				117	00			
22	54	T		54	20			86				118	00			
23	4F	O		55	20			87				119	00			
24	57	W		56	30	0	Revision, depended on version	88				120	00			
25	41	A		57	30	0		89			121	00				
26	59	Y		58	30	0		90			122	00				
27	20			59	31	1		91			123	00				
28	20			60	03		850nm	92	68		Monitoring	124	00			
29	20			61	52			93	F0		SoftControl and	125	00			
30	20		62	00		Reserved	94	05		SFF-8472V11.0	126	00				
31	20		63			Checksum 0-62	95			Checksum 64-94	127	00				

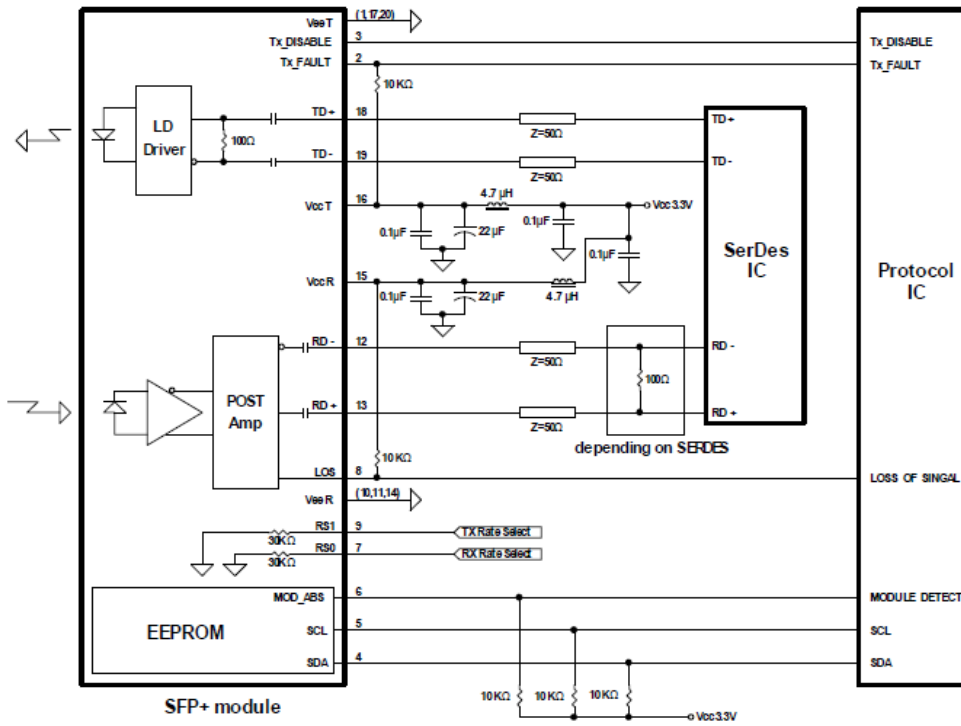
EEPROM Series ID Memory Contents (Address A2h)

Addr.	Hex	Note	Addr.	Hex	Note	Addr.	Hex	Note	Addr.	Hex	Note
0	4B	Temp.High Alarm (75oC)	32	31	Rx Power High Alarm (1dBm)	64	00	For External Cal.	96		Real TimeTemp. MSB
1	00		33	2D		65	00	For External Cal.	97		Real TimeTemp.LSB
2	FB	Temp. Low Alarm(-5oC)	34	02	Rx Power Low Alarm (-12.5dBm)	66	00	For External Cal.	98		Real Time Vcc MSB
3	00		35	32		67	00	For External Cal.	99		Real Time Vcc LSB
4	49	Temp.High Warming(73oC)	36	27	Rx Power High Warming(0dBm)	68	3F	For External Cal.	100		Real Time Tx Bias MSB
5	00		37	10		69	80	For External Cal.	101		Real Time Tx Bias LSB
6	00	Temp. Low Warming(0oC)	38	03	Rx Power Low Warming(-10.5dBm)	70	00	For External Cal.	102		Real Time Tx Pwr MSB
7	00		39	7B		71	00	For External Cal.	103		Real TimeTx Pwr LSB
8	8C	Voltage High Alarm (3.6V)	40	00	Reserved	72	00	For External Cal.	104		Real Time Rx Pwr MSB
9	A0		41	00	Reserved	73	00	For External Cal.	105		Real Time Rx Pwr LSB
10	75	Voltage Low Alarm(3.0V)	42	00	Reserved	74	00	For External Cal.	106		Reserved
11	30		43	00	Reserved	75	00	For External Cal.	107		Reserved
12	88	Voltage High Warming(3.5V)	44	00	Reserved	76	01	For External Cal.	108		Reserved
13	B8		45	00	Reserved	77	00	For External Cal.	109		Reserved
14	79	Voltage Low Warming (3.1V)	46	00	Reserved	78	00	For External Cal.	110		TxDis,Tx Fault, Rx Los
15	18		47	00	Reserved	79	00	For External Cal.	111		OWRAP, EWRAP
16	27	Tx Bias High Alarm(20mA)	48	00	Reserved	80	01	For External Cal.	112		Alarm Flag
17	10		49	00	Reserved	81	00	For External Cal.	113		Alarm Flag/Reserved
18	01	Tx BiasLow Alarm(1mA)	50	00	Reserved	82	00	For External Cal.	114		Reserved
19	F4		51	00	Reserved	83	00	For External Cal.	115		Reserved
20	1D	Tx Bias High Warming(15mA)	52	00	Reserved	84	01	For External Cal.	116		Warming Flag
21	4C		53	00	Reserved	85	00	For External Cal.	117		WarmingFlag/Reserved
22	03	Tx Bias Low Warming(2mA)	54	00	Reserved	86	00	For External Cal.	118		Reserved
23	E8		55	00	Reserved	87	00	For External Cal.	119		Reserved
24	27	Tx Power High Alarm (0dBm)	56	00	For External Cal.	88	01	For External Cal.	120		Vendor Specific
25	10		57	00	For External Cal.	89	00	For External Cal.	121		
26	05	Tx Power Low Alarm(-8.8dBm)	58	00	For External Cal.	90	00	For External Cal.	122		
27	26		59	00	For External Cal.	91	00	For External Cal.	123		
28	1F	Tx Power High Warming(-1dBm)	60	00	For External Cal.	92	00	For External Cal.	124		
29	07		61	00	For External Cal.	93	00	For External Cal.	125		
30	06	Tx Power Low Warming(-7.8dBm)	62	00	For External Cal.	94	00	For External Cal.	126		
31	7C		63	00	For External Cal.	95		Check Sum	127		

Note: Address 128 – 247: customer R/W eeprom. Address 248 – 255: Vendor Specific.

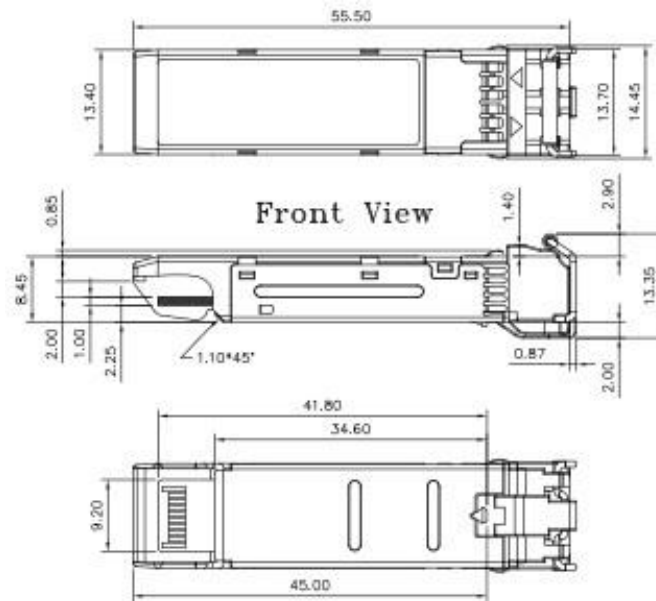
Note: Specifications subject to change without notice.

Recommended Circuit Schematic



Package Diagram

Units in mm



Ordering information

Part Number	Description
XTS31B-10LY	1310 nm, up to 14,025 Gbps, FC 16/8/4 G, SFP+ 10km, DMI, 0°C ~ +70°C
XTS31B-10LE	1310 nm, up to 14,025 Gbps, FC 16/8/4 G, SFP+ 10km, DMI, -5°C ~ +85°C
XTS31B-10LM	1310 nm, up to 14,025 Gbps, FC 16/8/4 G, SFP+ 10km, DMI, -40°C ~ +85°C

Notice. Please specify any compatibility requirements at time of ordering. Standard MSA compatible pluggable components may not work or some function of these components may not be available in devices that require customized compatible devices. Pluggable components compatible with one type of communications equipment may not work in other type of communications equipment.

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