



## FT2-S1XG-S31Q-010D

X2 10GBase-LR, 1310nm, single-mode, 10km



### Description

FT2-S1XG-S31Q-010D series X2 transceiver can be used to setup a reliable, high speed serial data link over single-mode fiber. Maximum link span can reach 10km. Casing made fully from metal alloys ensures very good EMI immunity. Module is fully compliant with X2 MSA specification and it is available in two hardware versions:

Model	Operating case temperature
FT2-S1XG-S31Q-010D	0~70°C
FT2-S1XG-S31Q-010DI	-40~85°C

Host device can access module internal EEPROM memory and DDMI via I<sup>2</sup>C interface.

Built-in digital diagnostic interface (DOM, DDMI) allows a network administrator to monitor module parameters such as: transmitted and received optical power, temperature, supply voltage and laser current. Those information and data are very helpful e.g. in prediction and prevention of connection failures. A module is available in various dedicated versions, which can be compatible with devices from vendors such as Cisco, HP, Juniper, Extreme Networks, Alcatel-Lucent, 3Com, Linksys and more.

### Applications

- 10G Ethernet
- SONET/SDH (OC-192/STM64)
- Gigabit Ethernet (1.25Gbps)



## Key features

- SC Duplex receptacle
- Transmission distance up to 10km\*
- DFB laser diode 1310nm transmitter, PIN receiver
- Throughput up to 11.3Gb/s
- Fully compliant with X2 MSA INF-8474i
- Hot-Pluggable
- RoHS compliant
- Class 1 laser safety
- Low power dissipation (<1W)
- Metal case for low EMI
- Operating case temperature\* : 0~70°C / -40~85°C

## Specification

### Supported transmission technology

10G Ethernet

### Speed supported for Ethernet technology

10.25Gbps

### Speed supported for Fibre Channel technology

N/A

### Transmission medium

Single-mode fiber 9/125µm

### Transmission distance\*\*

10km

### Receptacle type

SC Duplex

### Wavelength

1310nm

### Output power

-8.2~+0.5dBm

### Receiver sensitivity

-14.4dBm

### Power supply voltage

3.3V

### Total power consumption

< 1W

### Operating environment – temperature\*

0~70°C / -40~+85°C

### Operating environment - humidity

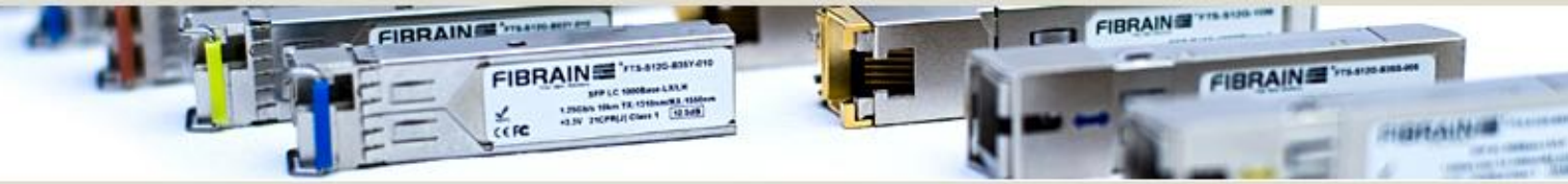
5~95% non-condensing

### Dimensions

Compliant with X2 Multi-Source Agreement

\* - standard / industrial version

\*\* - transmission distance depends on optical link attenuation



## Detailed technical specification

### Pin Description

Pin	Name	Function/Description	Logic
1	GND	Electrical Ground	-
2	GND	Electrical Ground	-
3	GND	Electrical Ground	-
4	5.0V	Reserved - Not Required	-
5	3.3V	Power Supply	I
6	3.3V	Power Supply	I
7	APS	Adaptive power supply	I
8	APS	Adaptive power supply	I
9	LASI	Link Alarm Status Interrupt. 10-22KΩ resistor pull-up to 1.2V on host	Open Drain-O
10	RESET	Low active Reset input ,10KΩ pull-up inside Transponder	Open Drain-I
11	VEND SPECIFIC	Vendor Specific Pin, leave unconnected	-
12	TX ON/OFF	High active Transmitter Enable, 10kΩ pull-up inside Transponder	Open Drain-I
13	RESERVED	Reserved	-
14	MOD DETECT	1KΩ to Ground inside Transponder	O
15	VEND SPECIFIC	Vendor Specific Pin, leave unconnected	-
16	VEND SPECIFIC	Vendor Specific Pin, leave unconnected	-
17	MDIO	Management Data I/O. Requires external 10-22KΩ pull-up to 1.2V on host	Open Drain-I/O
18	MDC	Management Clock Input	1.2V COMS-I
19	PRTAD4	Port Address bit 4(low=0)	1.2V COMS-I
20	PRTAD3	Port Address bit 3(low=0)	1.2V COMS-I
21	PRTAD2	Port Address bit 2(low=0)	1.2V COMS-I
22	PRTAD1	Port Address bit 1(low=0)	1.2V COMS-I
23	PRTAD0	Port Address bit 0(low=0)	1.2V COMS-I
24	VEND SPECIFIC	Vendor Specific Pin, leave unconnected	-
25	APS SET	Feedback input for APS, Input of APS setting resistor	I
26	RESERVED	Reserved	-
27	APS SENSE	APS Sense output for APS control circuit	O
28	APS	Adaptive power supply	I
29	APS	Adaptive power supply	I
30	3.3V	Power Supply	I
31	3.3V	Power Supply	I
32	5.0V	Reserved - <b>Not Required</b>	-
33	GND	Electrical Ground	-
34	GND	Electrical Ground	-
35	GND	Electrical Ground	-



36	GND	Electrical Ground	-
37	GND	Electrical Ground	-
38	RESERVED	Reserved	-
39	RESERVED	Reserved	-
40	GND	Electrical Ground	-
41	RX LANE 0+	Module XAUI output lane 0+	0
42	RX LANE 0-	Module XAUI output lane 0-	0
43	GND	Electrical Ground	
44	RX LANE 1+	Module XAUI output lane 1+	0
45	RX LANE 1-	Module XAUI output lane 1-	0
46	GND	Electrical Ground	
47	RX LANE 2+	Module XAUI output lane 2+	0
48	RX LANE 2-	Module XAUI output lane 2-	0
49	GND	Electrical Ground	
50	RX LANE 3+	Module XAUI output lane 3+	0
51	RX LANE 3-	Module XAUI output lane 3-	0
52	GND	Electrical Ground	
53	GND	Electrical Ground	
54	GND	Electrical Ground	
55	TX LANE 0+	Module XAUI Input lane 0+	1
56	TX LANE 0-	Module XAUI Input lane 0-	1
57	GND	Electrical Ground	
58	TX LANE 1+	Module XAUI Input lane 1+	1
59	TX LANE 1-	Module XAUI Input lane 1-	1
60	GND	Electrical Ground	
61	TX LANE 2+	Module XAUI Input lane 2+	1
62	TX LANE 2-	Module XAUI Input lane 2-	1
63	GND	Electrical Ground	
64	TX LANE 3+	Module XAUI Input lane 3+	1
65	TX LANE 3-	Module XAUI Input lane 3-	1
66	GND	Electrical Ground	
67	RESERVED	Reserved	
68	RESERVED	Reserved	
69	GND	Electrical Ground	
70	GND	Electrical Ground	



## Electrical parameters

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes	
Transmitter Differential Input Volt	+/-TX_DAT	200		1600	mV p-p	1	
Receiver Differential Output Volt	+/-RX_DAT	800		1600	mV p-p	1	
XAUI Baud Rate Tolerance		-100		+100	ppm		
Total Jitter	T <sub>JXAUI</sub>			0.35	UI		
Deterministic Jitter	D <sub>JXAUI</sub>			0.37	UI		
1.2V CMOS I/O	Input Voltage – Low	V <sub>IL</sub>		0.36	V		
	Input Voltage - High	V <sub>IH</sub>	0.84	1.5	V		
	Output Voltage – Low	V <sub>OL</sub>		0.15	V		
	Output Voltage - High	V <sub>OH</sub>	1		V		
MDIO I/O	Input Voltage – Low	V <sub>ILM</sub>	-0.3	0.36	V		
	Input Voltage - High	V <sub>IHM</sub>	0.84	1.5	V		
	Output Voltage – Low	V <sub>OLM</sub>	-0.3	0.2	V		
	Output Voltage - High	V <sub>OHM</sub>	1	1.5	V		
	MDIO Data Hold Time	t <sub>HOLD</sub>	10			ns	
	MDIO Data Setup Time	t <sub>SU</sub>	10			ns	
	Delay from MDC Rising Edge to MDIO Data Change	t <sub>DELAY</sub>			300	ns	
	MDC Clock Rate	f <sub>MAX</sub>			2.5	MHz	
Throughput	B			11.3	Gb/s		

## Transmitter parameters

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Central wavelength	$\lambda_c$	1260	1310	1355	nm	
Spectral width	$\Delta\lambda$			1	nm	
Launch optical power	P <sub>o</sub>	-8.2		+0.5	dBm	4
Extinction ratio	EX	3.5			dB	
Dispersion penalty				3.2	dB	
Optical Return Loss Tolerance	ORLT	12			dB	
Optical rise/fall time	T <sub>rise</sub> /T <sub>fall</sub>			30	ps	5
Eye diagram	Compliant with IEEE802.3-2005 10G BASE-LR					

## Receiver parameters

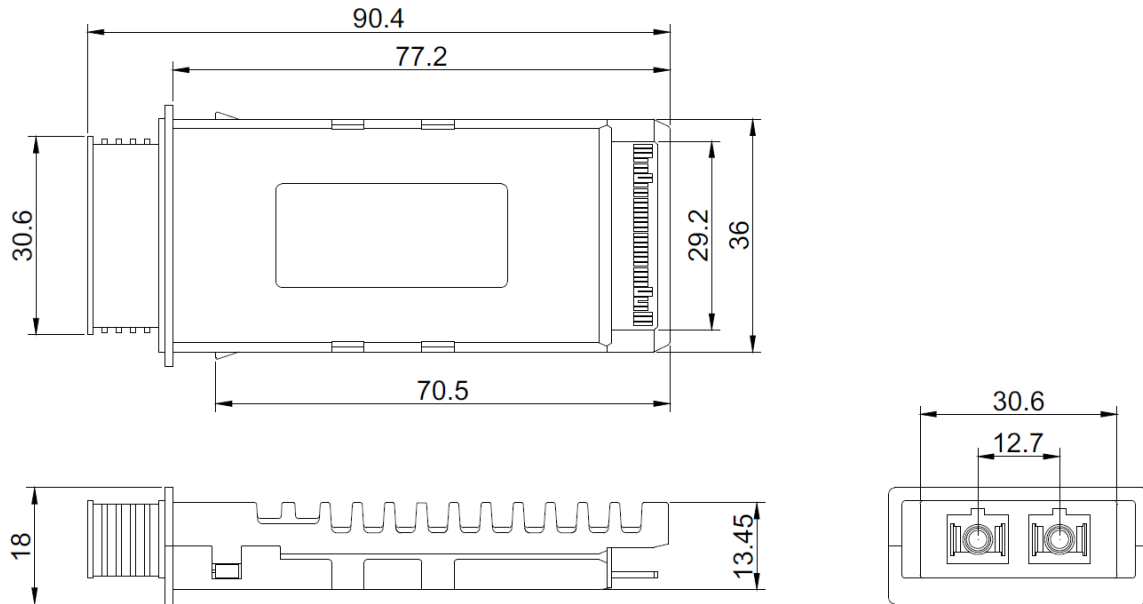
Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Sensitivity	P <sub>min</sub>			-14.4	dBm	6
Stressed Sensitivity (OMA)				-10.3	dBm	
Central wavelength	$\lambda_c$	1260		1355	nm	
Receiver overload	P <sub>MAX</sub>	+0.5			dBm	6
RX_LOS Asserted	S <sub>A</sub>	-30			dBm	
RX_LOS De-Asserted	S <sub>D</sub>			-17	dBm	
RX_LOS Hysteresis	-		3.0		dB	

### Notes:

- Internally AC coupled.



## Mechanical specification



## Recommended environment conditions

Parameter	Symbol	Min	Typ	Max	Unit
Operating Temperature Range (industrial)	T	-40	-	85	°C
Operating Temperature Range (standard)	T	0	25	70	°C
Supply Voltage	V <sub>CC</sub>	3.135	3.3	3.465	V
Supply Voltage	V <sub>aps</sub>	1.152	1.2	1.248	V
Relative Humidity	RH	5	-	95	%

## Ordering information

FT2-S1XG-S31Q-010D- 1310nm, 10km, single-mode, SC duplex, **DDMI**, commercial temperature (0~70°C)

FT2-S1XG-S31Q-010DI- 1310nm, 10km, single-mode, SC duplex, **DDMI**, **extended temperature** (-40~85°C)

For further information regarding host device PCB layout recommendation, power supply requirements, EEPROM memory map, DDMI specification please check:

[INF-8476i - Technical specification for X2 transceiver](#)

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