



## FTS-S12G-CxxL-41B

SFP 1000Base-ZX, CWDM, single-mode, 41dB



### Description

FTS-S12G-CxxL-41B series SFP transceiver can be used to establish multiple, high speed serial data links over single-mode fiber. Thanks to adoption of CWDM technology it is possible to send up to 18 separate data streams over single strain of fiber\*\*\*. At least 41 dB optical power budget is guaranteed. Transceivers are fully compliant with SFP MSA specifications and are available in various hardware versions:

\*\*\*eighteen pairs of CWDM modules and two pairs of optical multiplexer and demultiplexer devices will be required

Model(generic part number)	DDMI	Operating case temperature
FTS-S12G-CxxL-41B	No	0~70°C
FTS-S12G-CxxL-41BD	Yes	0~70°C
FTS-S12G-CxxL-41BI	No	-40~85°C
FTS-S12G-CxxL-41BDI	Yes	-40~85°C

xx – indicates central wavelength, must be specified while ordering module, more info available in Ordering Information chapter

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

DDMI (Digital Diagnostic Monitoring Interface) is fully compliant with DOM. Transceiver can be prepared as compatible with: Cisco, HP, Netgear, Avaya, D-Link, Brocade, Extreme Networks, Huawei, Enterasys, 3Com, Alcatel-Lucent and other. To confirm compatibility please contact technical support before ordering.

### Applications

- Gigabit Ethernet (1.25Gbps)
- Fiber Channel (1.0625Gbps)



## Key features

- LC Duplex receptacle
- Transmission distance up to\*\* 160km (1471~1611nm)
- DFB CWDM laser diode, APD receiver
- Throughput up to 1.25Gb/s (1x Fibre Channel, Gigabit Ethernet)
- Fully compliant with SFP MSA INF-8074i rev. 1.0 and INF-8472 rev. 11.3 (where applicable)
- 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

Gigabit Ethernet, Fibre Channel

### Speed supported for Ethernet technology

1.25Gbps

### Speed supported for Fibre Channel technology

1.0625Gbps

### Transmission medium

Single-mode fiber 9/125μm

### Transmission distance\*\*

160km (1471~1611nm)

### Receptacle type

LC Duplex

### Wavelength

1471-1611nm

### Output power

4~+7dBm

### Receiver sensitivity

-37dBm

### 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

55.6mm × 13.4mm × 8.5mm

\* - standard / industrial version

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



## Detailed technical specification

### Pin Description

Pin	Name	Function/Description	Engagement order	Notes
1	VeeT	Transmitter Ground	1	-
2	TX Fault	Transmitter Fault Indication	3	1
3	TX Disable	Transmitter Disable-Module disables on high or open	3	2
4	MOD-DEF2	Module Definition 2-Two wire serial ID interface	3	3
5	MOD-DEF1	Module Definition 1-Two wire serial ID interface	3	3
6	MOD-DEF0	Module Definition 0-Grounded in module	3	3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	4
9	VeeR	Receiver Ground	1	-
10	VeeR	Receiver Ground	1	-
11	VeeR	Receiver Ground	1	-
12	RD-	Inverse Received Data out	3	5
13	RD+	Received Data out	3	5
14	VeeR	Receiver Ground	1	-
15	VccR	Receiver Power - +3.3V±5%	2	6
16	VccT	Transmitter Power - +3.3 V±5%	2	6
17	VeeT	Transmitter Ground	1	-
18	TD+	Transmitter Data In	3	7
19	TD-	Inverse Transmitter Data In	3	7
20	VeeT	Transmitter Ground	1	-

#### Notes:

- TX Fault is open collector/drain output which should be pulled up externally with a 4.7KΩ-10KΩ resistor on the host board. When high, this output indicates a laser fault of some kind. Low indicates normal operation.
- TX Disable input is used to shut down the laser output per the state table below. It is pulled up to Vcc within the module.  
Low (0 – 0.8V): Transmitter on  
Open or High (2.0 – VccT): Transmitter Disabled
- Mod-Def 0, 1, 2. These are the module definition pins. They should be pulled up to Vcc with a 4.7KΩ-10KΩ resistor on the host board  
Mod-Def 0 is grounded by the module to indicate that the module is present.  
Mod-Def 1 is clock line of two wire serial interface for optional serial ID.  
Mod-Def 2 is data line of two wire serial interface for optional serial ID.
- LOS (Loss of signal) - when high, this output indicates the received optical power is below the worst case receiver sensitivity (as defined by the standard in use). Low indicates normal operation.
- These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω differential at the user SERDES. The AC coupling is done inside the module and thus not required on the host board.
- VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V±5% at the SFP connector pin. The in-rush current will typically be no more than 30mA above steady state supply current after 500ns.
- TD-/+: These are the differential transmitter inputs. They are AC coupled differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on host board.



## Electrical parameters

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter Differential Input Volt	+/-TX_DAT	300		2200	mV p-p	1
Receiver Differential Output Volt	+/-RX_DAT	600		1400	mV p-p	2
Tx_Disable Input Voltage – Low	V <sub>IL</sub>	0		0.8	V	
Tx_Disable Input Voltage – High	V <sub>IH</sub>	2.0		V <sub>CC</sub>	V	
Tx_Fault Output Voltage – Low	V <sub>OL</sub>	0		0.8	V	3
Tx_Fault Output Voltage – High	V <sub>OH</sub>	2.0		V <sub>CC</sub>	V	3
Rx_LOS Output Voltage- Low	V <sub>OL</sub>	0		0.8	V	3
Rx_LOS Output Voltage- High	V <sub>OH</sub>	2.0		V <sub>CC</sub>	V	3
Throughput	B		1250		Mb/s	
Total current requirement				300	mA	

## Transmitter parameters

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Central wavelength	$\lambda_c$	$\lambda-6$	$\lambda$	$\lambda+6$	nm	
Spectral width	$\Delta\lambda$			1	nm	
Site mode suppression ratio	SMSR	30			dB	
Launch optical power	P <sub>o</sub>	+4		+7	dBm	4
Extinction ratio	EX	9			dB	
Dispersion penalty				2	dB	
Optical rise/fall time	T <sub>rise</sub> /T <sub>fall</sub>			260	ps	5
Eye diagram	Compliant with IEEE802.3-2005 Gigabit Ethernet 1000BASE-ZX					

## Receiver parameters

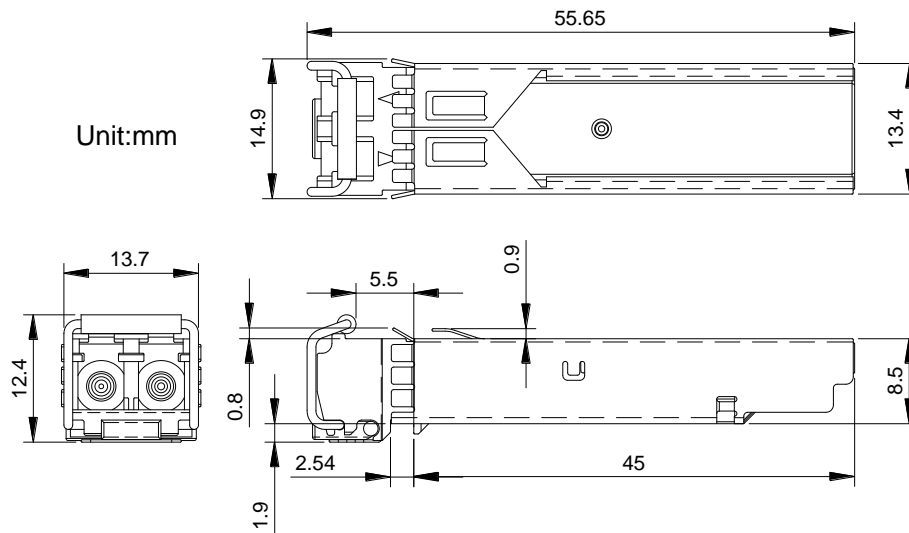
Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Sensitivity	P <sub>min</sub>			-37	dBm	6
Central wavelength	$\lambda_c$	1461		1621	nm	
Receiver overload	P <sub>MAX</sub>	-10			dBm	6
RX_LOS Asserted	S <sub>A</sub>	-45			dBm	
RX_LOS De-Asserted	S <sub>D</sub>			-38	dBm	
RX_LOS Hysteresis	-		3.0		dB	
Optical return loss	ORL	12			dB	

### Notes:

- Internally AC coupled and terminated to 100Ω differential load.
- Internally AC coupled, but requires a 100Ω differential termination or internal to Serializer/Deserializer.
- It is open collector/drain output which should be pulled up externally to V<sub>CC</sub> with a 4.7KΩ-10KΩ resistor on the host board. LOS: logic 0 indicates normal operation; logic 1 indicates no signal detected.
- Optical power is launched into SMF
- 20-80%
- Measured with PRBS 2<sup>23</sup>-1 at 10<sup>-12</sup> BER



## 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
Relative Humidity	RH	5	-	95	%

## Ordering information

- FTS-S12G-CxxL-41B – CWDM SFP, without DDMI, commercial temperature (0~70°C)
  - FTS-S12G-CxxL-41BD - CWDM SFP, **with DDMI**, commercial temperature (0~70°C)
  - FTS-S12G-CxxL-41BI - CWDM SFP, without DDMI, **extended temperature (-40~85°C)**
  - FTS-S12G-CxxL-41BDI - CWDM SFP, **with DDMI, extended temperature (-40~85°C)**
- \_\_\_ denotes central wavelength, for example. 47 – 1471nm, 61 – 1611nm

Wavelengths available to choose from [nm]:

1471, 1491, 1511, 1531, 1551, 1571, 1591, 1611

Example part number: FTS-S12G-C47L-41BD – SFP CWDM, 1471nm, 37dB, DDMI, commercial temperature (0~70°C)

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

[SFF-8472 - Description of EEPROM and Digital Diagnostic Monitoring Interface](#) and [INF-8074 - Technical specification for SFP transceiver](#)

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