



FTF-M16G-S85L-10MD

16G Fiber Channel, 850nm, multi-mode, 100m



Description

FTF-M16G-S85L-10MD series SFP+ transceiver can be used to setup a reliable, high speed serial data link over multi-mode fiber. Maximum link span over OM3 fiber can reach 100m. Casing made fully from metal alloys ensures very good EMI immunity. Module is fully compliant with SFP+ MSA specification and it is available in two hardware versions:

Model	Operating case temperature
FTF-M16G-S85L-10MD	0~70°C
FTF-M16G-S85L-10MDI	-40~85°C

Host device can access module internal EEPROM memory and DDMI via I²C 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

- Fiber Channel (16G FC)
- Tri-Rate 4.25/8.5/14.025 Gb/s Fibre Channel



Key features

- LC Duplex receptacle
- Transmission distance up to 380m*
- VCSEL laser diode 850nm transmitter, PIN receiver
- Throughput up to 14.025Gb/s bi-directional data links
- Fully compliant with SFP+ MSA INF-8431 and INF-8472 rev. 11.3
- 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

Fibre Channel

Speed supported for Ethernet technology

N/A

Speed supported for Fibre Channel technology

4.25Gbps, 8.5Gbps, 14.025Gbps

Transmission medium

Multi-mode fiber 50/125µm

Transmission distance**

100m(at 14.025Gbps)/380m(at 4.25Gbps)

Receptacle type

LC Duplex

Wavelength

850nm

Output power

-6~-1.2dBm

Receiver sensitivity

-10.5dBm (at 14.025G)

Power supply voltage

3.3V

Total power consumption

< 1W

Operating environment – temperature*

0~70°C / -40~+85°C

Operating environment - humidity

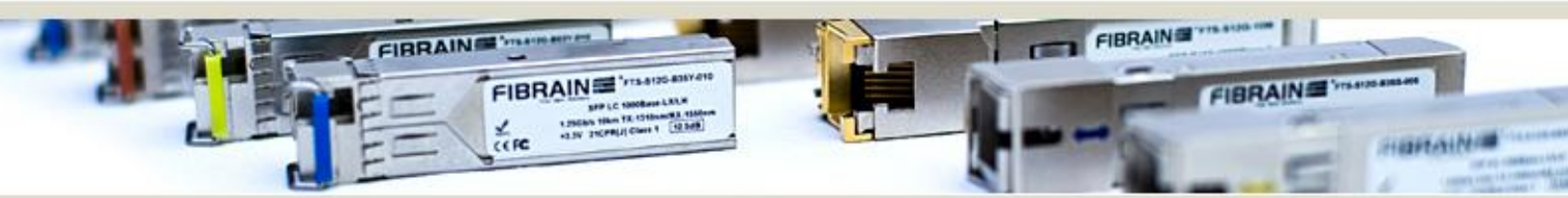
5~95% non-condensing

Dimensions

Compliant with SFP+ Multi-Source Agreement

* - standard / industrial version

** - transmission distance depends on optical link attenuation and speed



Detailed technical specification

Pin Description

Pin	Name	Function/Description	Engagement order	Notes
1	VeeT	Transmitter Ground	1	8
2	TX Fault	Transmitter Fault Indication	3	1
3	TX Disable	Transmitter Disable-Module disables on high or open	3	2
4	SDA	Module Definition 2-Two wire serial ID interface	3	3
5	SCL	Module Definition 1-Two wire serial ID interface	3	3
6	MOD_ABS	Module Definition 0-Grounded in module	3	3
7	RS0	Not Used	3	-
8	RX_LOS	Receiver Loss of Signal	3	4
9	RS1	Not Used	1	-
10	VeeR	Receiver Ground	1	8
11	VeeR	Receiver Ground	1	8
12	RD-	Inverse Received Data out	3	5
13	RD+	Received Data out	3	5
14	VeeR	Receiver Ground	1	8
15	VccR	Receiver Power - +3.3V±5%	2	6
16	VccT	Transmitter Power - +3.3 V±5%	2	6
17	VeeT	Transmitter Ground	1	8
18	TD+	Transmitter Data In	3	7
19	TD-	Inverse Transmitter Data In	3	7
20	VeeT	Transmitter Ground	1	8

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 - when high, output indicates the received optical power is below the worst case receiver sensitivity. 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.
- The module signal grounds are isolated from the module case.



Electrical parameters

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter Differential Input Volt	+/-TX_DAT	180		700	mV p-p	1
Receiver Differential Output Volt	+/-RX_DAT	300		850	mV p-p	2
Tx_Disable	Transmitter Enable	V _{IL}	0	0.8	V	
	Transmitter Disable	V _{IH}	2.0	V _{CC}	V	
Tx_Fault	Normal Operation	V _{OL}	0	0.8	V	3
	Transmitter Fault	V _{OH}	2.0	V _{CC}	V	3
Rx_LOS	Normal Operation	V _{OL}	0	0.8	V	3
	Loss of Signal (LOS)	V _{OH}	2.0	V _{CC}	V	3
Throughput	B			14.025	Gb/s	
Total current requirement				300	mA	

Transmitter parameters

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Central wavelength	λ_c	840	850	860	nm	
Spectral width (at 14.025Gbps)	$\Delta\lambda$			0.59	nm	
Launch optical power	P _o	-6	-2.5	-1.2	dBm	4
Extinction ratio	EX	4			dB	
Dispersion penalty (at 4.25Gbps)				3.2	dB	
Optical Return Loss Tolerance	ORLT	12			dB	
Optical rise/fall time	T _{rise} /T _{fall}			90	ps	5
Eye diagram	Compliant with requirements					

Receiver parameters

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
OMA Sensitivity = 4.25 Gb/s	RxSENS			-12.1	dBm	6
OMA Sensitivity = 8.5 Gb/s	RxSENS			-11.2	dBm	6
OMA Sensitivity = 14.025 Gb/s	RxSENS			-10.5	dBm	7
Central wavelength	λ_c	840		860	nm	
Receiver overload	P _{MAX}	0			dBm	
RX_LOS Asserted	S _A	-30			dBm	
RX_LOS De-Asserted	S _D			-13	dBm	
RX_LOS Hysteresis	-	0.5			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_{CC} 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 MMF
- 20-80%
- Measured with PRBS 2⁷-1 at 10⁻¹² BER, Unstress sensitivity.
- Measured with PRBS 2³¹-1 at 10⁻¹² BER, Unstress sensitivity.



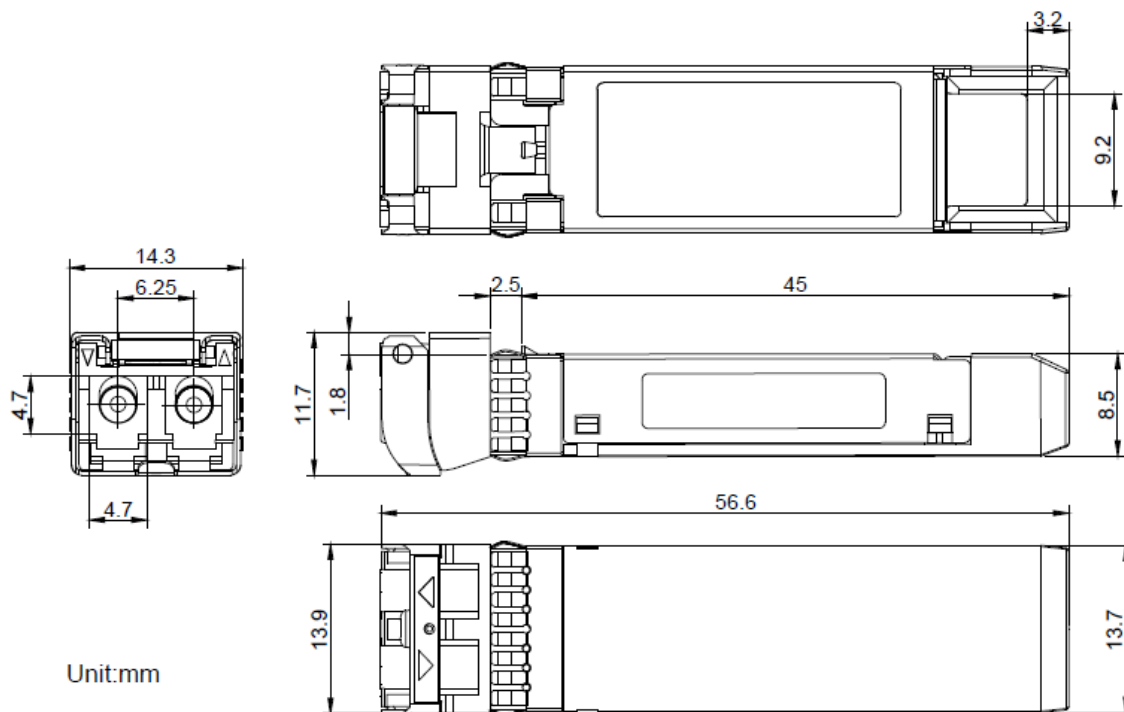
General Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Data Rate	BR		4.25 8.5 14.025		Gb/s	1
Bit Error Rate	BER			10 ⁻¹²		2
Fiber Length on 50/125µm MMF	L			150 50 35	m	3 4 5
Fiber Length on 50/125µm high-bandwidth (OM3) MMF	L			380 150 100	m	3 4 5

Notes:

1. 4x and 8x Fibre Channel compatible, per FC-P1-4
2. PRBS 27⁻¹ for 4GFC and 8GFC. PRBS 2³¹-1 for 16GFC.
3. At 4.25 Gb/s Fibre Channel data rate.
4. At 8.5 Gb/s Fibre Channel data rate.
5. At 14.025 Gb/s Fibre Channel data rate.

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 _{CC}	3.135	3.3	3.465	V
Relative Humidity	RH	5	-	95	%

Ordering information

FTF-M16G-S85L-10MD– 850nm, 100m, multi-mode, LC duplex, **DDMI**, commercial temperature (0~70°C)

FTF-M16G-S85L-10MDI– 850nm, 100m, multi-mode, LC 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:

[SFF-8472 - Description of EEPROM and Digital Diagnostic Monitoring Interface](#) and [SFF-8431 - Technical specification for SFP+ transceiver](#)

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