COMMANDO FiberX 1000BASE-SX

SFP-MM-1G Data Sheet

Contents

Product Overview

COMMANDO FiberX SFP-MM-1G, SFP (Small Form Pluggable) operates at 850nm is on multi-mode fiber transceiver based on IEEE 802.3z Ethernet standard and Fiber Channel FC-PI Rev.5.0, providing faster and reliable interface speed of 1Gbps for GE/FC applications. The product implements Digital Diagnostics Monitoring (DDM) via a 2-wire serial bus, compliant with the INF-8074i Small Form Factor Pluggable Multi-Source Agreement (MSA) and SFF-8472 standard. It is a multimode SFP transceiver module for bi-directional serial optical data communications. The transceiver module is designed to operate at a nominal wavelength of 850nm over multimode fiber for distance up to 550m.

The module is designed to offer multi-vendor compatibility offering users flexibility, scalability without incurring additional overhead and increasing interoperability.

It supports IEEE Std 802.3z Gigabit Ethernet Standard, which extends the operating speed of the local area network to 1Gbps for interconnecting high-performance switches, routers, and servers in the backbone of local area networks. It offers customers a wide variety of Gigabit Ethernet connectivity to multi-vendor equipment like routers, switches, server, NICs of data center, enterprise wiring closet, and service provider transport applications. The transceiver module is ideal for Internet Service Provider (ISP) Gigabit Ethernet communication links, Enterprise LAN & SAN Networks, Data Center LAN & SAN networks, and other optical links. It can be used as an uplink for 1G Ethernet Small Form-Factor Pluggable (SFP) Fiber Network Module for delivering robust performance and Cloud networking needs of growing businesses, data centers and high-end campus networks.

Product Highlights

- Multi-vendor platform compatible
- Supports up to 1.25Gbps bi-directional data links
- Hot-pluggable SFP to maximize uptime and simplify serviceability
- Compliant with IEEE 802.3z Gigabit Ethernet and 1000BASE-SX
- 850nm VCSEL laser transmitter
- Duplex LC connector
- Built-in Digital Diagnostic Monitoring (DDM) functions
- Up to 550m on 50/125 μm MMF
- Up to 300m on 62.5/125 μm MMF
- Single power supply 3.3V and TTL Logic Interface
- Standard size, Compact casing, and dust proof
- Compliant with SFP MSA
- RoHS Compliant
- Class 1 laser product complies with EN 60825-1
- Operating temperature range: 0℃ to 70℃
- Applications: 1.25Gbps Gigabit Ethernet, 1.063Gbps Fiber Channel

General Specifications

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Data Rate	DR	-	1.25	-	Gb/s	1
	DR	-	1.063	-	Gb/s	2
Bit Error Rate	BER			10^{-12}	-	-
Operating Temperature	T_C	0	-	70	°C	3
		-5	-	85	°C	3
		-40	-	85	°C	3
Storage Temperature	T_{STO}	-40	-	85	°C	4
Supply Current	Icc	-	130	180	mA	5
Input Voltage	Vcc	3.14	3.3	3.46	V	-
Maximum Voltage	V_{MAX}	-0.5	-	4	V	5

Notes:

1. IEEE 802.3z
2. FC-PI-2 Rev 5
3. Case temperature
4. Ambient temperature
5. For electrical power interface

Link Distances

Data Rate	Fiber Type	Distance Range (m)
1.25 Gb/s	62.5/125um MMF	300
1.25 Gb/s	50/125um MMF	550

Optical – Characteristics – Transmitter

V_{CC}=3.14V to 3.46V, T_C

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Output Optical Power	P_{TX}	-9.5	-	-3	dBm	1
Optical Center Wavelength	λ_C	830	-	860	nm	-
Extinction Ratio@1.25Gb/s	ER	9	-	-	dB	-
Spectral Width (RMS)	$\Delta\lambda$	-	-	0.85	nm	-
Optical Rise/Fall Time (20%-80%)	t_r/t_f	-	100	150	ps	-
Relative Intensity Noise	RIN	-	-	-120	dB/Hz	-
Deterministic Jitter Contribution	TX_DJ	-	20	60	ps	-
Total Jitter Contribution	TX_TJ	-	65	125	ps	-
Mask Margin	-	-	45	-	%	-

Notes:

1. Average

Optical – Characteristics – Receiver

V_{CC}=3.14V to 3.46V, T_C

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Receiver Overload	P_{OL}	0	-	-	dBm	-
Optical Center Wavelength	λ_C	770	-	860	nm	-
Receiver Sensitivity @ 1.063Gb/s	R_X SEN1	-	-	-23	dBm	1
Receiver Sensitivity @ 1.25Gb/s	R_X SEN2	-	-	-23	dBm	2
Optical Return Loss	ORL	12	-	-	dB	-

Receiver Electrical 3dB Upper cut off frequency	-	-	-	1500	MHz	-
LOS Assert	LOS_A	-30	-	-	dBm	-
LOS De-Assert	LOS_D	-	-	-23	dBm	
LOS Hysteresis	LOS_H	0.5	-	-	dB	-

Notes:

1. FC-PI-2
2. 2. Rev.5
3. IEEE 802.3z

Electrical – Characteristics – Transmitter

V_{CC}=3.14V to 3.46V, T_C

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Input differential impedance	R_{IN}	-	100	-	Ω	-
Single ended data input swing	$V_{IN\ PP}$	250	-	1200	mV	-
Transmit disable voltage	V_D	2	-	VCC	V	-
Transmit enable voltage	VEN	VEE	-	V_{EE}+0.8	V	-

Electrical – Characteristics – Receiver

V_{CC}=3.14V to 3.46V, T_C

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Single ended data output swing	$V_{OUT\ PP}$	250	450	550	mV	-
Data output rise/fall time (20%-80%)	t_r/t_f	-	90	175	ps	-
LOS Fault	$V_{LOS\ A}$	2	-	VCC	V	-

				HOST		
LOS Normal	VLOS D	VEE	-	V_{EE}+0.5	V	-

Digital Diagnostic Monitoring (DDM) Functions

COMMANDO SFP-MM-1G supports the 2-wire serial communication protocol as defined in SFP MSA. Digital diagnostic information is accessible over the 2-wire interface at address 0xA2. Digital diagnostics for SFP-MM-1G are internally calibrated by default. The internal micro control unit accesses the device's operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage in real time. The module implements the alarm function of the SFP MSA, alerts the user when a particular operating parameter exceeds the factory-set normal range.

DDM Threshold Information

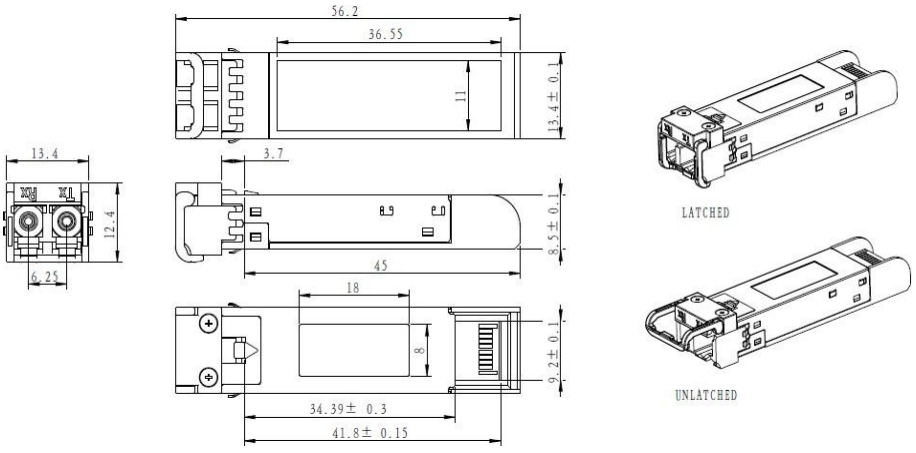
Parameter		Alarm Threshold		Warning Threshold	
		High Value	Low Value	High Value	Low Value
Temperature (°C)	C	90 (5A 00)	-45 (D3 00)	85 (55 00)	-40 (D8 00)
	E	90 (5A 00)	-45 (D3 00)	85 (55 00)	-40 (D8 00)
	I	90 (5A 00)	-45 (D3 00)	85 (55 00)	-40 (D8 00)
Vcc (V)		3.63(8D CC)	2.97 (74 04)	3.46 (87 28)	3.13 (7A 44)
Bias (mA)		15 (1D 4C)	1 (01 F4)	12 (17 70)	2 (03 E8)
TxPower (dBm)		-2.71 (14 F0)	-9.97 (03 EF)	-3.50 (11 72)	-9.00 (04 EA)
RxPower (dBm)		3.01 (4E 20)	-26.02 (00 19)	0.00 (27 10)	-23.01 (00 32)

Product Weight

Net weight of module: 15.7g /pc

Net weight of dust cap: 0.95g /pc

Dimensions



All dimensions are ±0.2mm unless specified otherwise

Unit: mm

Features and Benefits

Multi-vendor Compatibility: The module is designed to offer multi-vendor compatibility offering users flexibility, scalability without incurring additional overhead and increasing interoperability.

1.25 Gbps Speed with Reliable performance: It provides and offers 1G speed. These SFP are well built and rigorously tested and can sustain in very rough environment to provide reliable performance.

Dust proof Enclosure: It has resilient dust proof enclosure protects against harsh outdoor condition with no ingress of dust.

Support uninterrupted critical network infrastructure: It is protected from any hardware failures with Extra Long operational life. With this feature protect on cost and the impact to your business by losing these network devices and thus the users/servers connected to them.

Cost Efficient: State of art quality product that can serve with world's top brand products along with COMMANDO devices on real time high-speed Performance, highly reliable, conformance to international open standards, durable, serviceable, aesthetics, perceived quality, enhanced performance leads to value to money.

Easy to Use: COMMANDO SFP Transceivers are easy to use with simple and hassle-free setup. Its compact and standard size makes it ideal for all top brand devices along with COMMANDO products. Easy Installation, Plug-and-play installation with no configuration required.

Green Technology:
It automatically adjusts power consumption according to the link status to limit the carbon footprint of your network. It also complies with RoHS, prohibiting the use of certain hazardous materials. Moreover, most of the packaging material can be recycled and reused.

Hardware

High Performance

- Low power consumption <1W typically, saving power
- 100us typical latency, MTBF over 1 million hours
- SFP Multi source Agreement (MSA) Compliant
- Input Voltage: 3.1V DC to 3.5V DC Maximum / 3.3V DC Typical.
- Input Current 300mA Maximum / 200mA Typical.

Extra Long operational life

- Stainless steel material
- Anti-corrosion and salt spray resistance
- Storage Relative Humidity: 5% to 95%
- Exceptional Performance in Harsh Outdoor Climates with dust proof enclosure ensuring it can withstand harsh outdoor and indoor environments.

Operating temperature range

- Commercial temperature range: 0 to 70°C (32 to 158°F)
- Storage temperature range: -40 to 85°C (-40 to 185°F)

Table 1 COMMANDO SFP Hardware Specifications Comparison

Product Code	Form Factor	Transmission Speed	IEEE Standard Compliance	Connector Type	TX Power (dBm)	Receiver Sensitivity (dBm)
SFP-SM-1G	SFP	1000Mbps	1000BASE-LX/LH	LC duplex	-9.5 ~ -3dBm	< -23dBm
SFP-MM-1G	SFP	1000Mbps	1000BASE-SX	LC duplex	-9.5 ~ -3dBm	< -17dBm
SFP-UTP-1G	GBIC-T, SFP	1000Mbps	1000BASE-T	RJ-45	Standard	<1W
SFP-SR-10G	SFP+	10.3125Gbps	10GBASE-SR	LC Duplex	-7.3~-1dBm	< -11.1dBm
SFP-LR-10G	SFP+	10.3125Gbps	10GBASE-LR	LC Duplex	-8.2~0.5dBm	<-14.4dBm
SFP-ER-10G	SFP+	10.3125Gbps	10GBASE-ER	LC Duplex	-7.3~-1dBm	< -11.1dBm
SFP-ZR-10G	SFP+	11.3Gbps	10GBASE-ZR	LC Duplex	0~5dBm	<-23dBm
SFP-UTP-10G	10GBASE-T SFP+	10Gbps	10GBASE-T	Copper Cat 6a/7	Standard	<1W
QSFP-SR4-40G	QSFP+	41.2Gbps	40GBASE-SR4	MTP/MPO-12 Male	-7.6~1dBm	<-11.1dBm
QSFP-LR4-40G	QSFP+	44.6Gbps	40GBASE-LR4	LC duplex	-7~2.3dBm	<-11.5dBm
QSFP-SR4-100G	QSFP28	103.1 Gbps	100GBASE-SR4	MTP/MPO-12	-8.4~2.4dBm	<-10.3dBm
QSFP-LR4-100G	QSFP28	103.125Gbps	100GBASE-LR4	LC duplex	-4.3~4.5dBm	<-10.6dBm

Specifications

COMMANDO SFP-SM-1G, SFP used for speed 1 Gigabit Ethernet fiber speed, and It is a compact, hot-swappable device that plugs into a physical port of a network device. SFP optics are used in communication networks and have a transmitting side (Tx) and a receiving side (Rx) work with 850nm wavelength & up to 550m distance.

Table 2. COMMANDO SFP Model Comparison

Product Code	Center Wavelength (nm)	Media Type	Max Transmission Distance	Digital Diagnostics Monitoring Supported
SFP-SM-1G	GBIC-LX/LH, 1310nm	MMF/SMF	550m/20km	DDM
SFP-MM-1G	GBIC-SX, 850nm	MMF	550m	DDM
SFP-UTP-1G	GBIC-T, RJ-45	Copper	100m	Standard
SFP-SR-10G	10GBASE-SR, 850nm	MMF	300m	DDM
SFP-LR-10G	10GBASE-LR, 1310nm	SMF	20km	DDM
SFP-ER-10G	10GBASE-ER, 1550nm	SMF	40km	DDM
SFP-ZR-10G	10GBASE-ZR/ZW, 1550nm	SMF	80km	DDM
SFP-UTP-10G	10GBASE-T RJ-45	Copper Cat 6a/7	80m	Standard
QSFP-SR4-40G	40GBASE-SR4, 850nm	MMF	100m	DDM

QSFP-LR4-40G	40GBASE-LR4, 1310nm	SMF	10km	DDM
QSFP-SR4-100G	100GBASE-SR4, 850nm	MTP/MPO-12, MMF	100m	DDM
QSFP-LR4-100G	100GBASE-LR4, 1310nm	LC Duplex, SMF	10km	DDM

Included in the bundle/box

All COMMANDO SFP-MM-1G, SFP Transceivers are made available for use globally along with accessory used to facilitate or enhance operations. All COMMANDO SFP-MM-1G, SFP Transceivers Comes with following Accessories.

1x (COMMANDO 1G SFP Transceiver) SFP-MM-1G

Support and Warranty

- Same-day assistance.
- Comprehensive 24-hour support using common communication/chat platforms, Email and Telephone.
- Provide FAQs and troubleshooting help online (self-service) through cloud-based solutions.
- Highly technical and trained representatives to resolve issues.
- One-year default warranty with option of warranty extension up to 3 years

Table 3. Support and Warranty

Warranty and Support	
Products covered	COMMANDO FiberX 1000BASE-SX, SFP, 850nm, 550m, MMF, DDM (SFP-MM-1G)
Warranty duration	One Year RTB (Return To Base) replacement warranty – optionally extendable up to 3 years.
Hardware replacement	COMMANDO, its resellers, or its service center will use commercially reasonable efforts to replace the product subject to stock availability. Otherwise, a replacement will be arranged within 15 working days after receipt of the Return Materials Authorization (RMA) request.
End-of-life policy	In case of discontinuation of the product, support is limited to 3 years from announcement date.
Effective date	Hardware warranty commences from the date of shipment to customer (and in case of resale by a COMMANDO reseller, not more than 90 days after original shipment by COMMANDO).
Support duration	Lifetime support.
COMMANDO Care	COMMANDO will provide 24x7 support for basic configuration, diagnosis, and troubleshooting of device-level problems for up to one year from the date of shipment of the originally purchased product. This support does not include solution or network-level support beyond the specific device under consideration.
Online Portal Access	Warranty allows guest access to commandonetworks.com for all available technical queries.

Ordering Information

Ordering information for the COMMANDO SFP-MM-1G, SFP Transceivers, to place an order, please contact your local reseller/distributor or COMMANDO Sales Representative at www.commandonetworks.com/ordering

Table 4. Ordering Information

Product Code	Description
SFP-EPON	COMMANDO FiberX EPON SFP Class PX20++++, 1.25Gbps, 1490nm/1310nm, DDM, 20km
SFP-GPON	COMMANDO FiberX GPON SFP Class C++++, 2.5G/1.25G, 1490nm/1310nm, DDM, 20km
SFP-XPON	COMMANDO FiberX XPON SFP, 1.25G/2.5G, 1490nm/1310nm, DDM, 20km
SFP-XGSPON	COMMANDO FiberX XGSPON 10G SFP+, 1577nm/1270nm, DDM, 20km
SFP-SM-1G	COMMANDO FiberX 1000BASE-LX/LH, SFP, 1310nm, 20km, SMF, DDM
SFP-MM-1G	COMMANDO FiberX 1000BASE-SX, SFP, 850nm, 550m, MMF, DDM
SFP-UTP-1G	COMMANDO CopperX 1000BASE-T SFP, RJ45, 100m, Standard
SFP-SR-10G	COMMANDO FiberX 10GBASE-SR, SFP+, 850nm, 300m, MMF, DDM
SFP-LR-10G	COMMANDO FiberX 10GBASE-LR, SFP+, 1310nm, 10km, SMF, DDM, Multi-brand
SFP-ER-10G	COMMANDO FiberX 10GBASE-ER, SFP+, 1550nm, 40km, SMF, DDM
SFP-ZR-10G	COMMANDO FiberX 10GBASE-ZR/ZW, SFP+, 1550nm, 80km, SMF, DDM
SFP-UTP-10G	COMMANDO CopperX 10GBASE-T RJ45, SFP+, 30m, Cat 6a/7, Multi-brand
SFP-LR-10G-20K	COMMANDO FiberX 10GBASE-LR, SFP+, 1310nm, 20km, SMF, DDM, Multi-brand
SFP-UTP-10G-80M	COMMANDO CopperX 10GBASE-T RJ45, SFP+, 80m, Ultra-long, Cat 6a/7, Multi-brand
SFP-SR-25G	COMMANDO FiberX 25GBASE-SR, SFP28, 850nm, 70/100m, OM3/4 MMF, DDM, Multi-brand
SFP-LR-25G	COMMANDO FiberX 10/25GBASE-LR, SFP28, 1310nm, 10km, SMF, DDM, Multi-brand
QSFP-SR4-40G	COMMANDO FiberX 40GBASE-SR4, QSFP+, 850nm, 100m, MMF, DDM
QSFP-LR4-40G	COMMANDO FiberX 40GBASE-LR4, QSFP+, 1310nm, 10km, SMF, DDM
QSFP-SR4-100G	COMMANDO FiberX 100GBASE-SR4, QSFP28+, 850nm, 100m, MTP/MPO-12, MMF, DDM
QSFP-LR4-100G	COMMANDO FiberX 100GBASE-LR4, QSFP28+, 1310nm, 10km, SMF, DDM

Document History

Release	New or Revision	Described in	Date
Release 1	First Release	First Release	March 24, 2021
Release 2	Second Release	Multi-brand compatibility improvement and model adjustment	November 9, 2022