

# PT-G7728/G7828 Series

## IEC 61850-3 28-port full gigabit modular managed Ethernet switches



- > IEC 61850-3 Edition 2 Class 2 compliant
- > Hot-swappable interface modules and power modules
- > Built-in MMS server based on IEC 61850-90-4 switch data modeling for Power SCADA
- > IEEE 1588 hardware time stamp supported
- > V-ON™ ensures millisecond-level multicast data and video network recovery



### Introduction

The PT-G7728/G7828 modular switches provide up to 28 gigabit ports, including 4 fixed ports, 6 interface module slots, and 2 power module slots to ensure sufficient flexibility for a variety of applications. The PT-G7728/G7828 switches are designed to meet evolving network requirements, including a hot-swappable module design that enables you to change or add devices without shutting down your device.

The multiple Ethernet modules (RJ45, SFP, PoE) and power units (24/48 VDC, 110/220 VAC/VDC) available provide even greater flexibility as well as suitability for different operating conditions. The switches support a full gigabit platform that provides enough bandwidth to set up an Ethernet backbone. Certifications include IEC 61850 Edition 2 Class 2 to ensure high availability and wide usage.

### Specifications

#### Technology

##### Standards:

- IEEE 802.3 for 10BaseT
- IEEE 802.3u for 100BaseT(X) and 100BaseFX
- IEEE 802.3ab for 1000BaseT(X)
- IEEE 802.3z for 1000BaseX
- IEEE 802.3x for Flow Control
- IEEE 802.1D-2004 for Spanning Tree Protocol
- IEEE 802.1w for Rapid Spanning Tree Protocol
- IEEE 802.1Q for VLAN Tagging
- IEEE 802.1p for Class of Service
- IEEE 802.1X for Authentication
- IEEE 802.3ad for Port Trunk with LACP

#### Software Features

**Management:** IPv4/IPv6\*, SNMPv1/v2c/v3, DHCP Server/Client, DHCP Option 66/67/82, BootP, TFTP, SNMP, SMTP, RARP, RMON, HTTP, HTTPS, Telnet, SNMP Inform, LLDP, Flow Control, Back Pressure Flow Control, Port Mirror, Fiber Check, Syslog, Dying Gasp

\*IPv6 applies only to the PT-G7728 model.

**Filter:** IGMPv1/v2/v3, GMRP, GVRP, 802.1Q, Q-in-Q VLAN

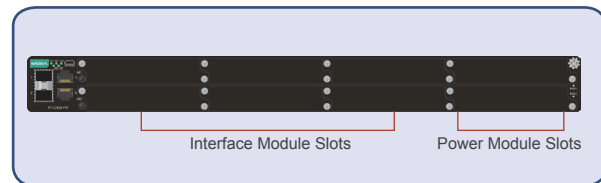
**Redundancy Protocols:** STP/RSTP, MSTP, Turbo Ring v1/v2, Turbo Chain, Link Aggregation

**Security:** RADIUS, TACACS+, SSL, SSH, Port Lock, Broadcast Storm Protection, MAC Authentication Bypass, MAC Sticky, Access Control Lists

**Unicast Routing:** Static Routing, RIP V1/V2, OSPF (PT-G7828)

**Multicast Routing:** DVMRP, PIM-DM (PT-G7828)

#### Modular Rackmount Ethernet Switch System, PT-G7728/G7828



**Time Management:** SNTP, NTP Server/Client, IEEE 1588v2 PTP (hardware-based)

**Industrial Protocols:** EtherNet/IP, Modbus/TCP

**MIB:** MIB-II, Ethernet-like MIB, P-BRIDGE MIB, Q-BRIDGE MIB, Bridge MIB, RSTP MIB, RMON MIB Group 1, 2, 3, 9

**Routing Redundancy:** VRRP (PT-G7828)

**Power Substation:** MMS, IEC 61850 QoS

#### Switch Properties

**Priority Queues:** 8

**Max. Number of VLANs:** 512

**VLAN ID Range:** VID 1 to 4094

**IGMP Groups:** 4096

**MAC Table Size:** 16K

**Packet Buffer Size:** 12 Mbits

**Jumbo Frame Size:** 9.6 KB

### Interface

**Port Types:** Supports up to 28 ports:

- 4 fixed ports:  
2 10/100/1000BaseT(X) ports and 2 100/1000BaseSFP ports
- 6 modular slots for 4-port interface modules that support 10/100/1000BaseT(X), PoE+ 10/100/1000BaseT(X), or 100/1000BaseSFP

**Note:** See the LM-7000H datasheet for Gigabit Ethernet module and PoE+ module information.

**Console Port:** Micro-B USB

**Storage Port:** USB storage port (Type A connector)

### Power Requirements

**Note:** The power requirements depend on which power module is being used. Detailed information can be found in the PWR-HV/LV-P48 datasheet.

#### Input Voltage:

- with PWR-LV-P48 installed:  
24/48 VDC for the switch system  
48 VDC for PoE system  
(53 to 57 VDC is recommended for PoE+ devices)
- with PWR-HV-P48 installed:  
110/220 VDC/VAC  
48 VDC for PoE system  
(53 to 57 VDC is recommended for PoE+ devices)

#### Operating Voltage:

- with PWR-LV-P48 installed:  
18 to 72 VDC for the switch system  
46 to 57 VDC for PoE systems
- with PWR-HV-P48 installed:  
88 to 300 VDC, 90 to 264 VAC  
46 to 57 VDC for PoE systems

#### Input Current:

- with PWR-LV-P48 installed:  
PWR input current (switch system)  
Max. 0.49 A @ 24 VDC  
Max. 0.25A @ 48 VDC  
EPS input current (PoE System)  
Max. 0.53 A @ 48 VDC  
(excluding power consumption of PoE devices)

- with PWR-HV-P48 installed  
PWR input current (switch system)  
Max. 0.12 A @ 110 VDC  
Max. 0.07 A @ 220 VDC  
Max. 0.29 A @ 110 VAC  
Max. 0.18 A @ 220 VAC  
EPS input current (PoE System)  
Max. 0.53 A @ 48 VDC  
(excluding power consumption of PoE devices)

### Physical Characteristics

**IP Rating:** IP30

**Dimensions:** 443 x 44 x 280 mm (17.44 x 1.73 x 11.02 in)

**Weight:** 3.08 kg (6.8 lb)

**Installation:** 19-inch rack mounting

### Environmental Limits

**Operating Temperature:** -40 to 85°C (-40 to 185°F)

**Storage Temperature:** -40 to 85°C (-40 to 185°F)

**Ambient Relative Humidity:** 5 to 95% (non-condensing)

### Standards and Certifications

**Safety:** UL 61010-2-201, EN 61010 (LVD) (Pending)

**EMC:** EN 55032, EN 55024

**EMI:** CISPR 22, FCC Part 15B Class A

**EMS:**

IEC 61000-4-2 ESD: Contact: 8 kV; Air: 15 kV

IEC 61000-4-3 RS: 80 MHz to 1 GHz: 20 V/m

IEC 61000-4-4 EFT: Power: 4 kV; Signal: 4 kV

IEC 61000-4-5 Surge: Power: 4 kV; Signal: 4 kV

IEC 61000-4-6 CS: 10 V

IEC 61000-4-8

**Electrical Substations:** IEC 61850-3 ed2 Class 2, IEEE 1613

**Rail Traffic:** EN 50121-4

**MTBF (mean time between failures)**

**Time:** 449,542 hrs

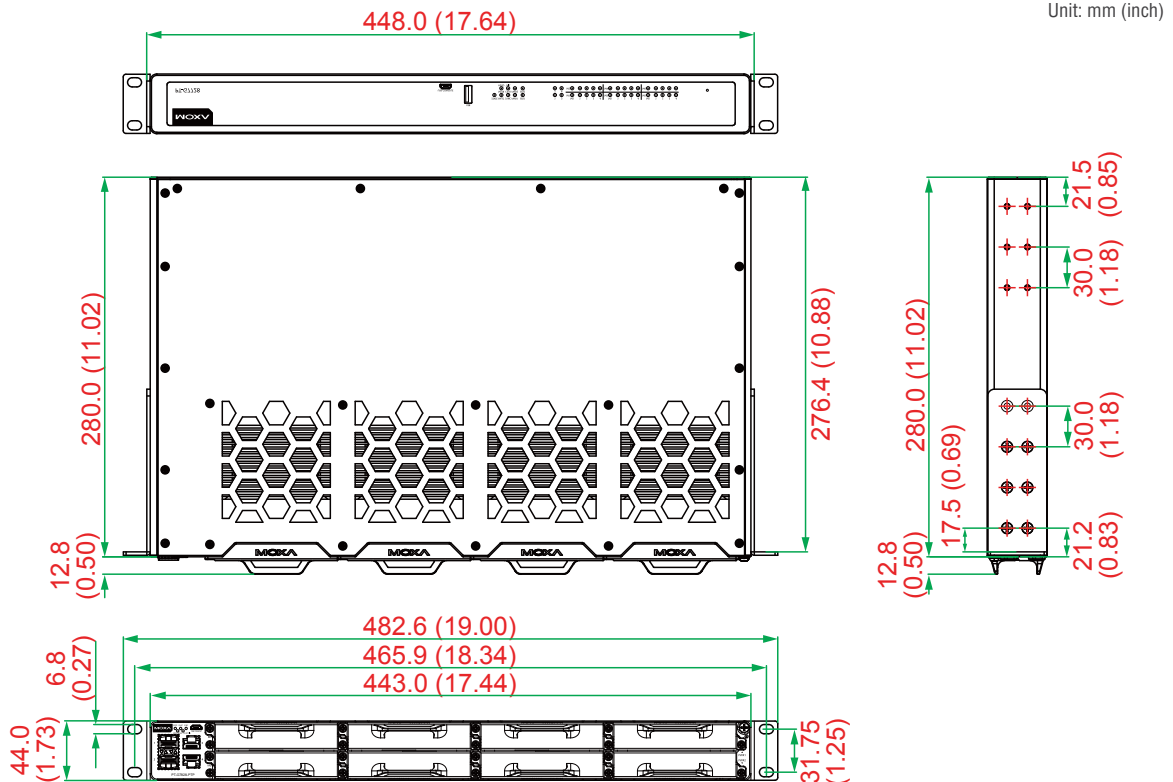
**Standard:** Telcordia (Bellcore), GB

### Warranty

**Warranty Period:** 5 years

**Details:** See [www.moxa.com/warranty](http://www.moxa.com/warranty)

### Dimensions



## Ordering Information

### Step 1: Select Ethernet switch system

PT-G7728 or PT-G7828



### Step 2: Select power modules

PWR-HV-P48 or PWR-LV-P48



### Step 3: Select interface modules

LM-7000H modules (Giga/PoE+ Ethernet)

Note: The PT-G7728/G7828 main system products are sold separately from the interface modules (LM-7000H Series), power modules (PWR-LV-P48, PWR-HV-P48), and dummy module (LM-7000H-DMY). See the PWR-HV/LV-P48 and LM-7000H datasheets for details on the power and interface modules.

## Main System and Interface Modules

Models	Layer	Port Interface		
		10/100/1000 Base T(X)	100/1000 Base SFP*	PoE+ 10/100/1000BaseT(X)
<b>Main System</b>				
PT-G7728	2	2	2	–
PT-G7828	3	2	2	–
<b>Interface Modules</b>				
LM-7000H-4GTX	–	4	0	0
LM-7000H-4GSFP	–	0	4	0
LM-7000H-4GPoE	–	0	0	4

Note: The PT-G7728/G7828 series supports 100/1000BaseSFP slots. Please check the SFP-1G, SFP-1G Copper and SFP-1GE datasheets for SFP module product information.  
Note: The IEEE 1588v2 accuracy is not guaranteed when using the SFP-1G Copper Series.

## Power Module Support List

Model Name	Input Voltage	Operating Voltage
PWR-LV-P48	24/48 VDC	18 to 72 VDC
PWR-HV-P48	110/220 VAC/VDC	88 to 300 VDC, 90 to 264 VAC

Note: The PT-G7728/G7828 series requires an external 48 VDC (46 to 57 VDC) power supply for PoE+ output.

## Optional Accessories (can be purchased separately)

**LM-7000H-DMY:** 3 dummy modules for PT-G7728/G7828 Ethernet switches

**MXview:** Moxa industrial network management software with 50, 100, 250, 500, 1000, or 2000 nodes

**EDS-SNMP OPC Server Pro:** OPC server software that works with all SNMP devices

**ABC-02 Series:** Configuration backup and restoration tool for managed Ethernet switches

## Package Checklist

- PT-G7728/G7828 switch
- USB cable (Type A male to Micro USB type B)
- 2 protective caps for unused ports
- 3 protective caps for unused USB ports
  - 2 caps for Micro-B USB
  - 1 cap for the USB storage port (Type A connector)
- 2 rackmount ears
- Quick installation guide
- Warranty card
- Substance Disclosure Table
- Product Certificate of Quality Inspection (Simplified Chinese)
- Product Notices (Simplified Chinese)

# LM-7000H Series

Ethernet modules for PT-G7728/G7828 series switches

## Specifications

### LM-7000H Series



LM-7000H-4GTX



LM-7000H-4GSFP



LM-7000H-4GPoE

Note: See the SFP-1G, SFP-1G Copper, and SFP-1FE datasheets for SFP module product information.  
Note: The IEEE 1588v2 accuracy is not guaranteed when using the SFP-1G Copper Series.

#### Interface

**RJ45 Ports:** 10/100/1000BaseT(X)

**SFP Ports:** 100/1000Base SFP

**PoE Ports:** 100/1000BaseT(X), IEEE 802.3af/at standards, Mode A

#### Power Requirements

**Power Consumption:**

LM-7000H-4GTX: 1.98 W

LM-7000H-4GSFP: 1.56 W

LM-7000H-4GPoE: 1.98 W (w/o PoE output)

#### Physical Characteristics

**Weight:**

LM-7000H-4GTX: 0.24 kg (0.53 lb)

LM-7000H-4GSFP: 0.3 kg (0.66 lb)

LM-7000H-4GPoE: 0.24 kg (0.53 lb)

#### MTBF (mean time between failures)

**Time:**

LM-7000H-4GTX: 2,641,729 hrs

LM-7000H-4GSFP: 2,475,903 hrs

LM-7000H-4GPoE: 1,280,518 hrs

**Standard:** Telcordia (Bellcore), GB

#### Warranty

**Warranty Period:** 5 years

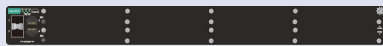
**Details:** See [www.moxa.com/warranty](http://www.moxa.com/warranty)

## Ordering Information

### Compatible Ethernet Switch Systems

#### Ethernet Switch System:

PT-G7728/G7828



### LM-7000H Series

Available Models	Port Interface		
	10/100/1000BaseT(X)	100/1000BaseSFP	PoE+ 10/100/1000BaseT(X)
LM-7000H-4GTX	4	–	–
LM-7000H-4GSFP	–	4	–
LM-7000H-4GPoE	–	–	4

### Package Checklist

- LM-7000H series interface module
- Substance Disclosure table
- Product Certificate of Quality Inspection (Simplified Chinese)
- Product Notices (Simplified Chinese)
- Warranty card

# PWR-HV/LV-P48 Series

Power modules for PT-G7728/G7828 series switches

## Specifications

### PWR-HV/LV-P48 Series



PWR-HV-P48



PWR-LV-P48

#### Power Requirements

##### Input Voltage:

- PWR-LV-P48:  
24/48 VDC for the switch system  
48 VDC for PoE systems  
(53 to 57 VDC is recommended for PoE+ devices)
- PWR-HV-P48:  
110/220 VDC/VAC  
48 VDC for PoE systems  
(53 to 57 VDC is recommended for PoE+ devices)

##### Operating Voltage:

- PWR-LV-P48:  
18 to 72 VDC for the switch system  
46 to 57 VDC for PoE systems
- PWR-HV-P48:  
88 to 300 VDC, 90 to 264 VAC  
46 to 57 VDC for PoE systems

**Reverse Polarity Protection:** Supported

**Alarm Contact:** 1 relay output with current carrying capacity of 2 A @ 30 VDC or 0.5 A @ 125 VAC

#### Physical Characteristics

##### Weight:

PWR-HV-P48: 0.3 kg (0.66 lb)  
PWR-LV-P48: 0.3 kg (0.66 lb)

##### MTBF (mean time between failures)

##### Time:

PWR-HV-P48: 1,401,713 hrs  
PWR-LV-P48: 1,372,587 hrs

**Standard:** Telcordia (Bellcore), GB

#### Warranty

**Warranty Period:** 5 years

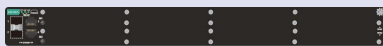
**Details:** See [www.moxa.com/warranty](http://www.moxa.com/warranty)

## Ordering Information

### Compatible Ethernet Switch Systems

#### Ethernet Switch System:

PT-G7728/G7828



### Power Module Information

Model Name	Input Voltage	Operating Voltage
PWR-LV-P48	24/48 VDC	18 to 72 VDC
PWR-HV-P48	110/220 VDC/VAC	88 to 300 VDC, 90 to 264 VAC

### Package Checklist

- PWR series power unit
- Substance Disclosure table
- Product Certificate of Quality Inspection (Simplified Chinese)
- Product Notices (Simplified Chinese)
- Warranty card

# SFP-1G Series

## 1-port Gigabit Ethernet SFP modules



- > Digital Diagnostic Monitor Function
- > -40 to 85°C operating temperature range (T models)
- > IEEE 802.3z compliant
- > Differential LVPECL inputs and outputs
- > TTL signal detect indicator
- > Hot pluggable LC duplex connector
- > Class 1 laser product, complies with EN 60825-1



### Specifications

#### Interface

Ethernet Ports: 1

Connectors: Duplex LC Connector or Simplex LC Connector (WDM-type only)

#### Optical Fiber

		Gigabit Ethernet SFP									
		SFP-SX		SFP-LSX		SFP-LX	SFP-LH	SFP-LHX	SFP-ZX	SFP-EZX	SFP-EZX-120
Transceiver Type		Multi-Mode		Multi-Mode		Single-Mode	Single-Mode	Single-Mode	Single-Mode	Single-Mode	Single-Mode
Fiber Cable Type		OM1	OM2	OM2	OM1	G.652	G.652	G.652	G.652	G.652	G.652
Typical Distance		300 m	550 m	1 km	2 km	10 km	30 km	40 km	80 km	110 km	120 km
Wave-length	Typical (nm)	850		1310		1310	1310	1310	1550	1550	1550
	TX Range (nm)	830 to 860		1270 to 1355		1280 to 1355	1280 to 1355	1280 to 1340	1530 to 1570	1530 to 1570	1530 to 1570
	RX Range (nm)	770 to 860		1260 to 1610		1260 to 1610	1260 to 1610	1260 to 1610	1260 to 1610	1260 to 1610	1100 to 1600
Optical Power	TX Range (dBm)	-4 to -9.5		-1 to -9		-3 to -9	-3 to -8	+3 to -4	+5 to 0	+5 to 0	+3 to -2
	RX Range (dBm)	0 to -18		-1 to -19		-3 to -21	-3 to -23	-1 to -24	-1 to -24	-9 to -30	-8 to -33
	Link Budget (dB)	8.5		10		12	15	20	24	30	31
	Dispersion Penalty (dB)	4.3	3.6	5	5	1	1	1	1	1	2

Note: When connecting the SFP-LHX, ZX, EZX, or EZX-120, we recommended using an attenuator to prevent the transceiver from being damaged by excessive optical power.

		WDM Gigabit Ethernet SFP							
		SFP-10A		SFP-10B		SFP-20B		SFP-40B	
Transceiver Type		Single-Mode		Single-Mode		Single-Mode		Single-Mode	
Fiber Cable Type		G.652		G.652		G.652		G.652	
Typical Distance		10 km		20 km		40 km		40 km	
Wave-length	Typical (nm)	TX 1310, RX 1550		TX 1550, RX 1310		TX 1310, RX 1550		TX 1550, RX 1310	
	TX Range (nm)	1270 to 1355		1530 to 1570		1270 to 1355		1530 to 1570	
	RX Range (nm)	1480 to 1580		1260 to 1360		1480 to 1580		1260 to 1360	
Optical Power	TX Range (dBm)	-3 to -9		-2 to -8		-2 to -8		+2 to -3	
	RX Range (dBm)	-3 to -21		-2 to -23		-2 to -23		-1 to -23	
	Link Budget (dB)	12		15		15		20	
	Dispersion Penalty (dB)	2		3		3		1	

Note: WDM-type SFP modules must be used in pairs (e.g., SFP-1G10ALC and SFP-1G10BLC)

Note: When connecting the SFP-40A and 40B, we recommend using an attenuator to prevent damage caused by excessive optical power.

**Typical Distance:** To reach the typical distance of specified fiber transceiver, please refer to formula: Link budget(dB) > dispersion penalty(dB) + total link loss(dB).

### Power Requirements

Power Consumption: Max. 1 W

### Environmental Limits

Operating Temperature:

Standard Models: 0 to 60°C (32 to 140°F)

Wide Temp. Models: -40 to 85°C (-40 to 185°F)

Storage Temperature: -40 to 85°C (-40 to 185°F)

Ambient Relative Humidity: 5 to 95% (non-condensing)

### Standards and Certifications

Safety: CE, FCC, TÜV (EN 60825), UL 60950-1

Marine: DNV, GL

### Warranty

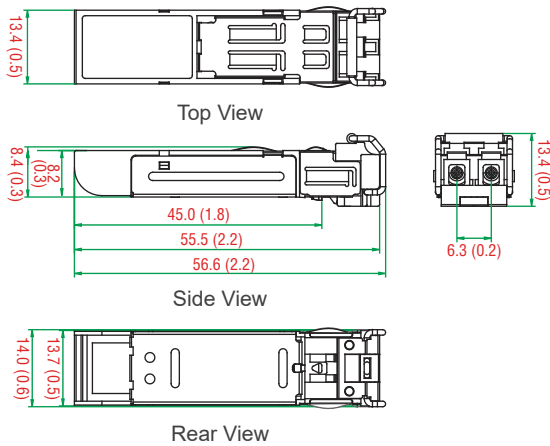
Warranty Period: 5 years

Details: See [www.moxa.com/warranty](http://www.moxa.com/warranty)

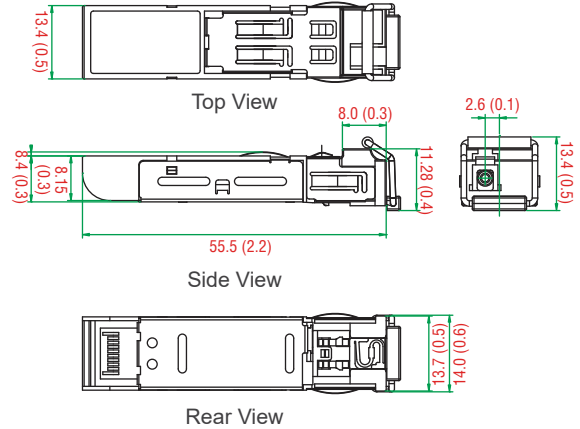
### Dimensions

Unit: mm (inch)

#### SFP-1G Series



#### SFP-1G Series (WDM Type)



## Ordering Information

Gigabit Ethernet SFP Models				WDM Gigabit Ethernet SFP Models			
Standard Temperature Models (0 to 60°C)	Wide Temperature Models (-40 to 85°C)	Transceiver Type	Typical Distance	Standard Temperature (0 to 60°C)	Wide Temperature (-40 to 85°C)	Transceiver Type	Typical Distance
SFP-1GSXLC	SFP-1GSXLC-T	Multi-Mode	300/550 m	SFP-1G10ALC	SFP-1G10ALC-T	Single-Mode	10 km
SFP-1GLSXLC	SFP-1GLSXLC-T	Multi-Mode	1/2 km	SFP-1G10BLC	SFP-1G10BLC-T	Single-Mode	10 km
SFP-1GLXLC	SFP-1GLXLC-T	Single-Mode	10 km	SFP-1G20ALC	SFP-1G20ALC-T	Single-Mode	20 km
SFP-1GLHLC	SFP-1GLHLC-T	Single-Mode	30 km	SFP-1G20BLC	SFP-1G20BLC-T	Single-Mode	20 km
SFP-1GLHXLC	SFP-1GLHXLC-T	Single-Mode	40 km	SFP-1G40ALC	SFP-1G40ALC-T	Single-Mode	40 km
SFP-1GZXLC	SFP-1GZXLC-T	Single-Mode	80 km	SFP-1G40BLC	SFP-1G40BLC-T	Single-Mode	40 km
SFP-1GEZXLC	-	Single-Mode	110 km	-	-	-	-
SFP-1GEZXLC-120	-	Single-Mode	120 km	-	-	-	-

#### Package Checklist

- SFP-1G module
- Warranty card

# SFP-1FE Series

## 1-port Fast Ethernet SFP modules



- > Digital Diagnostic Monitor Function
- > IEEE 802.3u compliant
- > Differential PECL inputs and outputs
- > TTL signal detect indicator
- > Hot pluggable LC duplex connector
- > Class 1 laser product; complies with EN 60825-1



### Specifications

#### Interface

Ethernet Ports: 1

Connectors: Duplex LC Connector

#### Optical Fiber

	Fast Ethernet SFP			
	SFP-M		SFP-S	SFP-L
Transceiver Type	Multi-Mode		Single-Mode	
Fiber Cable Type	OM1/OM2	62.5/125, 50/125 $\mu$ m	G.652	G.652
		800 MHz* km		
Typical Distance	2 km	4 km	40 km	80 km
Wave-length	Typical (nm)	1310	1310	1550
	TX Range (nm)	1280 to 1340	1280 to 1340	1530 to 1570
	RX Range (nm)	1100 to 1650	1100 to 1600	1100 to 1600
Optical Power	TX Range (dBm)	-8 to -18	0 to -5	0 to -5
	RX Range (dBm)	-3 to -32	-3 to -34	-3 to -34
	Link Budget (dB)	14	29	29
	Dispersion Penalty (dB)	2	3	1

Note: When connecting the SFP-S or L, we recommend using an attenuator to prevent damage caused by excessive optical power.

#### Power Requirements

Power Consumption: Max. 1 W

#### Environmental Limits

Operating Temperature: -40 to 85°C (-40 to 185°F)  
 Storage Temperature: -40 to 85°C (-40 to 185°F)  
 Ambient Relative Humidity: 5 to 95% (non-condensing)

#### Standards and Certifications

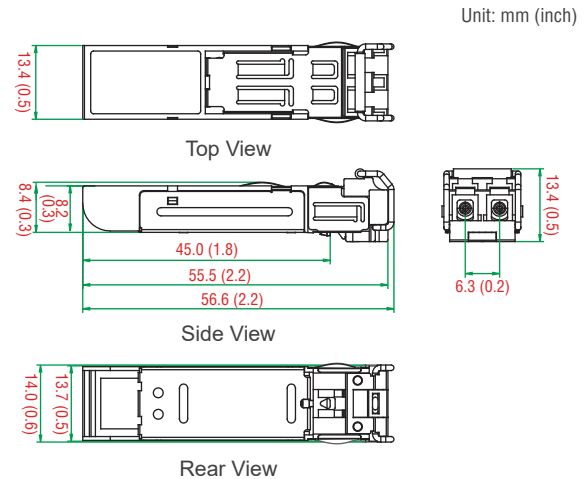
Safety: CE, FCC, TÜV, UL 60950-1  
 Marine: DNV, GL

#### Warranty

Warranty Period: 5 years

Details: See [www.moxa.com/warranty](http://www.moxa.com/warranty)

#### Dimensions



### Ordering Information

Available Models	Port Interface		
	100BaseFX, Multi-Mode, LC Connector, 4 km	100BaseFX, Single-Mode, LC Connector, 40 km	100BaseFX, Single-Mode, LC Connector, 80 km
SFP-1FEMLC-T	1	-	-
SFP-1FESLC-T	-	1	-
SFP-1FELLC-T	-	-	1

#### Package Checklist

- SFP-1FE module
- Warranty card



# SFP-1G Copper Series

## 1-port Gigabit Ethernet copper SFP modules



- > Compliant with IEEE 802.3,2002
- > Fixed 1000 BASE-T speed
- > Hot pluggable RJ45 connector
- > TTL signal detection (RX los)
- > RoHS compliant and lead free



### Specifications

#### Interface

Connectors: RJ45

The port can not be used for Turbo Ring v1, Turbo Ring v2, and Turbo Chain.

Gigabit Ethernet Ports: 1

#### Power Requirements

Power Consumption: Max. 1.2 W

#### Environmental Limits

Operating Temperature: -40 to 75°C (-40 to 167°F)

Storage Temperature: -40 to 85°C (-40 to 185°F)

Ambient Relative Humidity: 5 to 95% (non-condensing)

#### Standards and Certifications

Safety: CE, FCC, TÜV, UL 60950-1

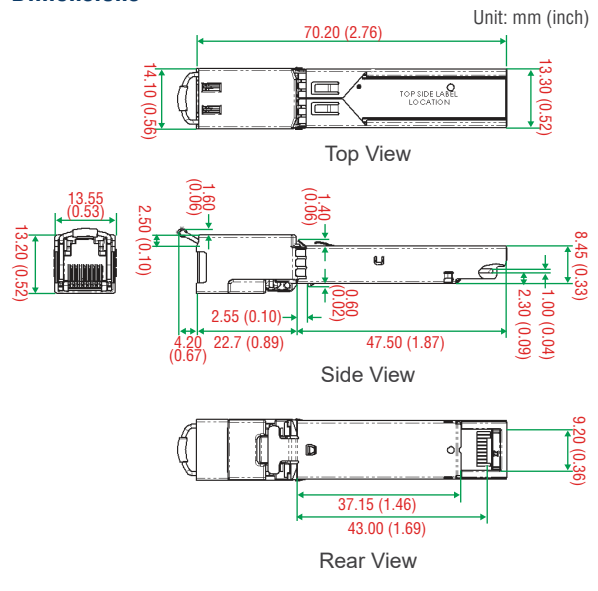
Marine: DNV, GL

#### Warranty

Warranty Period: 5 years

Details: See [www.moxa.com/warranty](http://www.moxa.com/warranty)

### Dimensions



### Ordering Information

#### Available Models

SFP-1GTXRJ45-T: SFP module with fixed 1000BaseT port, RJ45 connector, -40 to 75°C operating temperature

#### Package Checklist

- SFP-1G copper module
- Warranty card