SIEMENS

Edition 08/2022

Catalog

# SIMATIC NET

## Networking Components

RUGGEDCOM SFP Transceivers

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SIEMENS

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# Networking Components RUGGEDCOM SFP Transceivers

Catalog




**08/2022**
C79000-G8976-1251-31

# Legal Information

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indicates that minor personal injury can result if proper precautions are not taken.

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We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Process Automation
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Canada

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# Table of Contents

# Preface

This document details the available SFP transceivers, including compatibility with the RUGGEDCOM product line, technical specifications, installation/removal instructions, and ordering information.

It is intended for use by network technical support personnel responsible for the installation, commissioning and maintenance of routers and switches. It is also recommended for use by network and system planners, system programmers, and line technicians.

## SIMATIC NET Glossary

The SIMATIC NET Glossary describes special terms that may be used in this document.

The glossary is available online via Siemens Industry Online Support (SIOS) at:

https://support.industry.siemens.com/cs/ww/en/view/50305045

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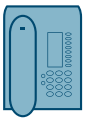
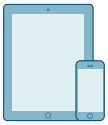
Visit http://www.siemens.com/automation/support-request to submit a Support Request (SR) or check on the status of an existing SR.



**Telephone**

Call a local hotline center to submit a Support Request (SR). To locate a local hotline center, visit https://w3.siemens.com/aspa_app/?lang=en.



**Mobile App**

Install the Industry Online Support app by Siemens AG on any Android, Apple iOS or Windows mobile device and be able to:

- Access Siemens' extensive library of support documentation, including FAQs and manuals
- Submit SRs or check on the status of an existing SR
- Contact a local Siemens representative from Sales, Technical Support, Training, etc.
- Ask questions or share knowledge with fellow Siemens customers and the support community

## Contacting Siemens

| | |
|---|---|
| **Address** | Siemens Canada Ltd.<br>Digital Industries<br>Process Automation<br>300 Applewood Crescent<br>Concord, Ontario<br>Canada, L4K 5C7 |
| **Telephone** | Toll-free: 1 888 264 0006<br>Tel: +1 905 856 5288 |

| | |
|---|---|
| | Fax: +1 905 856 1995 |
| **E-Mail** | info.ruggedcom@siemens.com |
| **Web** | https://www.siemens.com |

## Ordering RUGGEDCOM Products

Use the RUGGEDCOM-Selector to select and configure RUGGEDCOM products and accessories. Once selected, an item(s) can be transferred to the Siemens Industry Mall and ordered.

**RUGGEDCOM-Selector**

http://www.siemens.com/ruggedcom-selector.

For more information, refer to https://www.siemens.com.

# 1 Introduction

Siemens offers a wide range of convenient and cost-effective Fast Ethernet Small Form-Factor Pluggable (SFP) transceivers for select RUGGEDCOM routers and switches. SFP transceivers offer a variety of options for speed, distance and interfaces to extend the reach and functionality of networks.

**Note**

Some RUGGEDCOM routers/switches may only support specific SFP transceivers in select sockets. For information about which socket(s) an SFP transceiver is compatible with, refer to the "Installation Guide" for the compatible RUGGEDCOM router/switch.

**Note**

Only use SFP transceivers approved by Siemens for RUGGEDCOM products. Siemens accepts no liability as a result of performance issues related in whole or in part to third-party components.

**Note**

Some RUGGEDCOM routers/switches may only support specific SFP transceivers in select sockets. For information about which socket(s) an SFP transceiver is compatible with, refer to the "Installation Guide" for the compatible RUGGEDCOM router/switch.

**Note**

SFP transceivers contain no user-serviceable parts. Attempted service by unauthorized personnel shall render all warranties null and void.

Changes or modifications not expressly approved by Siemens could invalidate specifications, test results, and agency approvals, and void the user's authority to operate the product.

**Note**

Some RUGGEDCOM routers/switches may only support specific SFP transceivers in select sockets. For information about which socket(s) an SFP transceiver is compatible with, refer to the "Installation Guide" for the compatible RUGGEDCOM router/switch.

**Note**

All SFP transceivers are compatiblewith the Small Form-Factor Pluggable 20-pin Multi-Source Agreement (MSA).

**Note**

Some RUGGEDCOM routers/switches may only support specific SFP transceivers in select sockets. For information about which socket(s) an SFP transceiver is compatible with, refer to the "Installation Guide" for the compatible RUGGEDCOM router/switch.

**Note**

Maximum segment length is greatly dependent on factors such as fiber quality and the number of patches and splices. Consult a Siemens sales associate when determining maximum segment lengths.

**Note**

Some RUGGEDCOM routers/switches may only support specific SFP transceivers in select sockets. For information about which socket(s) an SFP transceiver is compatible with, refer to the "Installation Guide" for the compatible RUGGEDCOM router/switch.

**Note**

All optical power numbers are listed as dBm averages.

## 1.1 Selecting an SFP Transceiver

The following process for selecting an SFP transceiver is recommended:

1. Determine the basic application requirements, such as SFP type, link speed and operating distance, and then select an SFP transceiver.
2. Determine which RUGGEDCOM product(s) support the chosen SFP transceiver.
3. If the chosen SFP transceiver will be connected a fixed port or to a non-RUGGEDCOM device, review the full technical specifications for the SFP transceiver to make sure it is compatible with the other end of the link.

For a list of available SFP transceivers and general specifications, refer to "Available SFP Transceivers (Page 2)".

If assistance is required to select the appropriate SFP transceiver for the application, contact Siemens Customer Support.

## 1.2 Available SFP Transceivers

Each available SFP transceiver has been tested for compatibility with the following RUGGEDCOM routers and switches. Use in any other RUGGEDCOM or third-party router/switch is not supported or recommended by Siemens.

**Note**

Some RUGGEDCOM routers/switches may only support specific SFP transceivers in select sockets. For information about which socket(s) an SFP transceiver is compatible with, refer to the "Installation Guide" for the compatible RUGGEDCOM router/switch.

**Note**

Compatibility with some RUGGEDCOM routers/switches may contain restrictions. For more information about product-specific deviations, refer to the detailed description of the relevant SFP transceiver(s) in this catalog.

| Type | Media | Distance (km) | SFP Name | Article Number | RS900G | RS900GP | RS940G | RSL910 | RSG920P | RSG2100(P) | RSG2200 | RSG2288 | RSG2300(P) | RSG2488 | RS950G | RSG909R<br>RSG907R | RSG910C<br>RSG908C | RST916C<br>RST916P | RX1400 | RST2228(P) | | RX15xx | | RX5000 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | Ports 1-4 | Modules | FG50 | FX50/6FX50 | 4FG50 | 8FX50 | SM69 | SM09/SM39 |
| Copper | RJ45 | 0.1 | SFP1112-1 | 6GK6000-8CG01-0AA0 | ● | ● | | | | | ● | | | ● | | | ● | ● | ● | ● | ● | ● | | ● | | | |
| | | 0.1 | SFP1112-1I | 6GK6000-8CG02-0AA0 | ● | | | | | | | | | | | | | | | | | | | | | | |
| 100 Mbps Active | MM | 2 | SF1121-1FX2A | 6GK6000-8FE50-0AA0 | | | | | | | | | | | | | | | | | | | | | | | |
| | SM | 10 | SFP1131-1FX10A | 6GK6000-8FE60-0AA0 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 40 | SFP1131S-1FX40A | 6GK6000-8FE62-0AA0 | | | | | | | | | | | | | | | | | | | | | | | |
| 100 Mbps | MM | 2 | SFP1121-1FX2 | 6GK6000-8FE51-0AA0 | | ● | | | ● | | ● | | | ● | ● | | | | | | | | | | | | |
| | SM | 20 | SFP1131-1FX20 | 6GK6000-8FE52-0AA0 | | ● | | | ● | | ● | | | ● | ● | | | | | | | | | | | | |
| | | 50 | SFP1131-1FX50 | 6GK6000-8FE53-0AA0 | | ● | | | ● | | ● | | | ● | | | | | | | | | | | | | |
| | | 90 | SFP1131-1FX90 | 6GK6000-8FE54-0AA0 | | ● | | | ● | | ● | | | ● | | | | | | | | | | | | | |
| 1 Gbps Single-fiber Bidirectional | SM | 10 | SFP1132-1BX10R | 6GK6000-8FB51-0AA0 | ● | ● | | | ● | | ● | | | ● | | | | | | | | | | | | | |
| | | | SFP1132-1BX10T | 6GK6000-8FB52-0AA0 | ● | ● | | | ● | | ● | | | ● | | | | | | | | | | | | | |
| | | 40 | SFP1132-1BX40R | 6GK6000-8FB53-0AA0 | ● | ● | | | ● | | ● | | | ● | | | | | | | | | | | | | |
| | | | SFP1132-1BX40T | 6GK6000-8FB54-0AA0 | ● | ● | | | ● | | ● | | | ● | | | | | | | | | | | | | |
| 1 Gbps | MM | 0.5 | SFP1122-1SX | 6GK6000-8FG51-0AA0 | ● | ● | ● | | ● | ● | ● | | | ● | ● | | | | | | | | | | | | |
| | | 2 | SFP1122-1SX2 | 6GK6000-8FE58-0AA0 | ● | | | | | ● | | | ● | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | |
| | SM | 10 | SFP1132-1LX10 | 6GK6000-8FG52-0AA0 | ● | ● | ● | | ● | ● | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | |
| | | 25 | SFP1132-1LX25 | 6GK6000-8FG53-0AA0 | ● | ● | ● | | ● | ● | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | |
| | | 40 | SFP1132-1LX40 | 6GK6000-8FG57-0AA0 | ● | ● | ● | | ● | ● | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | |
| | | 70 | SFP1132-1LX70 | 6GK6000-8FG54-0AA0 | ● | ● | ● | | ● | ● | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | |
| | | 100 | SFP1132-1LX100 | 6GK6000-8FG55-0AA0 | ● | ● | ● | | ● | ● | ● | ● | ● | ● | | ● | | ● | ● | ● | ● | ● | ● | ● | | | |
| | | 115 | SFP1132-1LX115 | 6GK6000-8FE56-0AA0 | ● | ● | ● | | ● | ● | ● | ● | ● | ● | | | | ● | ● | ● | ● | ● | ● | ● | | | |
| 10 Gbps | MM | 0.4 | SFP2123-1SR | 6GK6000-8FT50-0AA0 | | ● | | | ● | | ● | | | ● | | | | ● | ● | ● | ● | ● | | | | | |
| | SM | 10 | SFP2133-1LR10 | 6GK6000-8FT51-0AA0 | | ● | | | ● | | ● | | | ● | | | | ● | ● | ● | ● | ● | | | | | |
| | | 40 | SFP2133-1ER40 | 6GK6000-8FT53-0AA0 | | ● | | | ● | | ● | | | ● | | | | ● | ● | ● | ● | ● | | | | | |
| | | 80 | SFP2133-1ZR80 | 6GK6000-8FT52-0AA0 | | ● | | | ● | | ● | | | ● | | | | ● | ● | ● | ● | ● | | | | | |

# 2 Copper SFP Transceivers

The following copper triple-speed SFP transceivers are available from Siemens for select RUGGEDCOM routers and switches. To determine compatibility, refer to "Available SFP Transceivers (Page 2)".

## 2.1 RUGGEDCOM SFP1112-1

Siemens' RUGGEDCOM SFP1112-1 is a 1 Gbps copper SFP transceiver that operates within a wide temperature range (0 to 70 °C or 32 to 158 °F) and provides high performance Gigabit Ethernet communication up to 100 m (328.1 ft).

**Note**

Some RUGGEDCOM routers/switches may only support specific SFP transceivers in select sockets. For information about which socket(s) an SFP transceiver is compatible with, refer to the "Installation Guide" for the compatible RUGGEDCOM router/switch.

**Note**

This SFP transceiver is not recommended for use with IEEE 1588.

### Highlights

- Compliant with SFP MSA and IEEE 802.3ab for 10/100/1000Base-T
- Transmission distance up to 100 m (328.1 ft)
- Bail latch
- Hot swappable
- RoHS compliant

### Specifications

#### Characteristics

| | |
|---|---|
| **Speed** | 10/100/1000 Mbps |
| **Connector** | RJ45 |
| **Cable Type** | > CAT-5e |
| **Duplex** | FDX/HDX |
| **Wiring Standard** | TIA/EIA T568A/B |
| **Nominal Distance** | 100 m (328.1 ft) |
| **Isolation** | 1.5 kV |

#### Environment

| | |
|---|---|
| **Operating Temperature** | 0 to 70 °C (32 to 158 °F) |
| **Storage Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Mean Time Between Failures (MTBF)** | 1382 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

### Requirements

| | |
|---|---|
| **Auto Negotiation** | Auto negotiation must be disabled in RUGGEDCOM ROS v3.9 and higher to support 100 Mbps. |

## Product-Specific Deviations

The RUGGEDCOM SFP1112-1 supports the following ratings when installed in the specified Siemens RUGGEDCOM routers and/or switches:

| Specification | Product(s) | Rating |
|---|---|---|
| Speed | RUGGEDCOM RSG907R, RSG909R | RUGGEDCOM ROS v5.2.2 only supports 1000 Mbps on the coupler port (port 5 for RSG907R or port 7 for RSG909R).<br>RUGGEDCOM ROS v5.3 and higher support 10/100/1000 Mbps on the coupler port (port 5 for RSG907R or port 7 for RSG909R). |
| | RUGGEDCOM RSG908C, RSG910C | RUGGEDCOM ROS v5.2.2 only supports 1000 Mbps on SFP transceiver ports (ports 5 to 8 for RSG908C or ports 7 to 10 for RSG910C).<br>RUGGEDCOM ROS v5.3 and higher support 10/100/1000 Mbps on SFP transceiver ports (ports 5 to 8 for RSG908C or ports 7 to 10 for RSG910C). |

## Regulator Compliance

The RUGGEDCOM SFP1112-1 meets the following standards when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| Electromagnetic Interference (EMI) | FCC Class A, CE Class A, VCCI Class A, C-Tick | Compliant |
| RoHS | EU RoHS Directive 2002/95/EC | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

## Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8CG01-0AA0 | RUGGEDCOM SFP1112-1 | 1000Base-T SFP – RJ45, 100 m |

## 2.2 RUGGEDCOM SFP1112-1I

Siemens' RUGGEDCOM SFP1112-1I is a 1 Gbps copper SFP transceiver that operates within a wide temperature range (-40 to 85 °C or -40 to 185 °F) and provides high performance Gigabit Ethernet communication up to 100 m (328.1 ft).

**Note**

Some RUGGEDCOM routers/switches may only support specific SFP transceivers in select sockets. For information about which socket(s) an SFP transceiver is compatible with, refer to the "Installation Guide" for the compatible RUGGEDCOM router/switch.

**Note**

This SFP transceiver is not recommended for use with IEEE 1588.

### Highlights

- Compliant with SFP MSA and IEEE 802.3ab for 10/100/1000Base-T
- Transmission distance up to 100 m (328.1 ft)
- Bail latch
- Hot swappable
- RoHS compliant

### Specifications

#### Characteristics

| | |
|---|---|
| **Speed** | 10/100/1000 Mbps |
| **Connector** | RJ45 |
| **Cable Type** | > CAT-5e |
| **Duplex** | FDX/HDX |
| **Wiring Standard** | TIA/EIA T568A/B |
| **Nominal Distance** | 100 m (328.1 ft) |
| **Isolation** | 1.5 kV |

#### Environment

| | |
|---|---|
| **Operating Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Storage Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Mean Time Between Failures (MTBF)** | 984 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

### Requirements

| | |
|---|---|
| **Firmware** | Only compatible with the following firmware versions:<br>• RUGGEDCOM ROS v5.4.0 or higher |

| | |
|---|---|
| | • RUGGEDCOM ROX v2.13.2 or higher |
| **Auto Negotiation** | Auto negotiation must be disabled in RUGGEDCOM ROS v5.5.2 and higher to support 100 Mbps. Applies to all compatible switches, with the exception of the following:<br>• RUGGEDCOM RST2228<br>• RUGGEDCOM RSG907R<br>• RUGGEDCOM RSG909R<br>• RUGGEDCOM RSG908C<br>• RUGGEDCOM RSG910C |

## Regulator Compliance

The RUGGEDCOM SFP1112-1I meets the following standards when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| Electromagnetic Interference (EMI) | FCC Class A, CE Class A, VCCI Class A, C-Tick | Compliant |
| RoHS | EU RoHS Directive 2002/95/EC | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

## Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8CG02-0AA0 | RUGGEDCOM SFP1112-1I | 1000Base-T SFP – RJ45, 100 m |

# 3 Fast Ethernet SFP Transceivers

The following Fast Ethernet SFP transceivers are available from Siemens for select RUGGEDCOM routers and switches. To determine compatibility, refer to "Available SFP Transceivers (Page 2)".

# 3.1 RUGGEDCOM SFP1121-1FX2

Siemens' RUGGEDCOM SFP1121-1FX2 industrial grade 100 Mbps fiber optic fast Ethernet SFP transceiver operates within a wide temperature range (-40 to 85 °C or -40 to 185 °F) and provides high performance Fast Ethernet communication up to 2 km (1.2 mi) using multi-mode fiber.

## Highlights

- Compliant with SFP MSA and IEEE 802.3ab for 100Base-FX
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface
- Transmission distance up to 2 km (1.2 mi)
- LC duplex connector optical interface
- Operates with 50/125 µm and 62.5/125 µm multi-mode fiber
- Supports Smart SFP functionality
- Bail latch
- Hot swappable
- RoHS compliant

## Specifications

### Optical Characteristics

| | |
|---|---|
| **Transmit Power (50/125 µm)** | -23.5 to -14.0 dBm |
| **Transmit Power (62.5/125 µm)** | -20.0 to -14.0 dBm |
| **Receiver Sensitivity** | -31.0 to -3.0 dBm |
| **Power Budget (50/125 µm)** | 7.5 dB |
| **Power Budget (62.5/125 µm)** | 11 dB |

### Cabling

| | |
|---|---|
| **Speed** | 100 Mbps[a] |
| **Mode** | MM (Multi-Mode) |
| **Interface** | FX |
| **Connector** | LC |
| **Cable Type** | 50/125 or 62.5/125 µm |
| **Wavelength (Tx)** | 1270 to 1380 nm |
| **Wavelength (Rx)** | 1270 to 1380 nm |
| **Nominal Distance** | 2 km (1.2 mi) |

[a] When Smart SFP mode is enabled, the RUGGEDCOM SFP1121-1FX2 can be used with Gigabit modules in RUGGEDCOM RX1500-series and RX5000 devices. For more information, refer to the "RUGGEDCOM ROX II Configuration Manual".

### Environment

| | |
|---|---|
| **Operating Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Storage Temperature** | -40 to 100 °C (-40 to 212 °F) |

| | |
|---|---|
| **Mean Time Between Failures (MTBF)** | 3087 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

## Restrictions

RUGGEDCOM ROX v2.10.0 or higher is required when this SFP transceiver is installed in one of the following modules:

- RUGGEDCOM RX1500PN LM FG50
- RUGGEDCOM RX5000PN LM 4FG50

## Regulator Compliance

The RUGGEDCOM SFP1121-1FX2 meets the following standards when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| Electrostatic Discharge (ESD) to the Electrical Pins | MIL-STD-883C | HBM 2 kV |
| Electrostatic Discharge (ESD) to the Duplex LC Receptacle | Variation of IEC 61000-4-2 | Compliant |
| Electromagnetic Interference (EMI) | CENELEC CEN55022 Class B | Compliant |
| Immunity | Variation of IEC 61000-4-3 | Compliant |
| Eye Safety | AEL Class 1<br>EN 60825-1 (+A11) | Compliant |
| RoHS | EU RoHS Directive 2002/95/EC | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

## Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8FE51-0AA0 | RUGGEDCOM SFP1121-1FX2 | 100Base-FX SFP – MM, 1310 nm, LC, 2 km |

## 3.2 RUGGEDCOM SFP1131-1FX20

Siemens' RUGGEDCOM SFP1131-1FX20 industrial grade 100 Mbps fiber optic fast Ethernet SFP transceiver operates within a wide temperature range (-40 to 85 °C or -40 to 185 °F) and provides high performance Fast Ethernet communication up to 20 km (12.4 mi) using single-mode fiber.

**Note**

Some RUGGEDCOM routers/switches may only support specific SFP transceivers in select sockets. For information about which socket(s) an SFP transceiver is compatible with, refer to the "Installation Guide" for the compatible RUGGEDCOM router/switch.

**Note**

Maximum distance is 15 km (9.3 mi) in OC-3 mode.

### Highlights

- Compliant with SFP MSA for 100Base-FX
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface
- Transmission distance up to 20 km (12.4 mi)
- LC duplex fiber connector
- Supports Smart SFP functionality
- Bail latch
- Hot swappable
- RoHS compliant

### Specifications

#### Optical Characteristics

| | |
|---|---|
| **Transmit Power** | -15 to -8 dBm |
| **Receiver Sensitivity** | -28 to -8 dBm |
| **Power Budget** | 13 dB |

#### Cabling

| | |
|---|---|
| **Speed** | 100 Mbps[a] |
| **Interface** | FX |
| **Mode** | SM (Single-Mode) |
| **Connector** | LC |
| **Cable Type** | 9/125 µm |
| **Wavelength (Tx)** | 1261 to 1360 nm |
| **Wavelength (Rx)** | 1260 to 1600 nm |
| **Nominal Distance** | 20 km (12.4 mi) |

[a] When Smart SFP mode is enabled, the RUGGEDCOM SFP1131-1FX20 can be used with Gigabit modules in RUGGEDCOM RX1500-series and RX5000 devices. For more information, refer to the "RUGGEDCOM ROX II Configuration Manual".

### Environment

| | |
|---|---|
| **Operating Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Operating Relative Humidity** | 0 to 85% (non-condensing) |
| **Storage Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Mean Time Between Failures (MTBF)** | 653 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

## Restrictions

RUGGEDCOM ROX v2.10.0 or higher is required when this SFP transceiver is installed in one of the following modules:

- RUGGEDCOM RX1500PN LM FG50
- RUGGEDCOM RX5000PN LM 4FG50

## Regulator Compliance

The RUGGEDCOM SFP1131-1FX20 complies with the following regulatory requirements when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| Electrostatic Discharge (ESD) to the Electrical Pins | MIL-STD-883C, Method 3015.4<br>JEDEC/EIA JESD22-A114-A | Class 2 (2000 V) |
| Electrostatic Discharge (ESD) to the Duplex LC Receptacle | Bellcore GR1089-CORE | 25 kV Air Discharge<br>10 Zaps at 8 kV (contact discharge) on the electrical faceplate on panel |
| Electromagnetic Interference (EMI) | FCC Class B | Compliant |
| Immunity | Variation of IEC 61000-4-3 | Compliant |
| Eye Safety | US FDA CDRH AEL Class 1<br>IEC/EN 60825-1 and 60825-2<br>EN 60950 Class 1 | Compliant with Class 1 laser product |
| RoHS | EU RoHS Directive 2002/95/EC | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

## Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8FE52-0AA0 | RUGGEDCOM SFP1131-1FX20 | 100Base-FX SFP – SM, 1300 nm, LC, 20 km |

## 3.3 RUGGEDCOM SFP1131-1FX50

Siemens' RUGGEDCOM SFP1131-1FX50 industrial grade 100 Mbps fiber optic fast Ethernet SFP transceiver operates within a wide temperature range (-40 to 85 °C or -40 to 185 °F) and provides high performance Fast Ethernet communication up to 50 km (31.1 mi) using single-mode fiber.

### Highlights

- Compliant with SFP MSA and SFF 8074i for 100Base-FX
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface
- Compliant with ITU-T G957 STM-1 L1.1 Optical Interface
- Compliant with Telcordia GR253 OC3 LR-1 Optical Interface
- Transmission distance up to 50 km (31.1 mi)
- Supports Smart SFP functionality
- LC duplex fiber connector
- Bail latch
- Hot swappable
- RoHS compliant

### Specifications

#### Optical Characteristics

| | |
|---|---|
| **Transmit Power** | -5 to -0 dBm |
| **Receiver Sensitivity** | -34 to -10 dBm |
| **Power Budget** | 29 |

#### Cabling

| | |
|---|---|
| **Speed** | 100 Mbps[a] |
| **Mode** | SM (Single-Mode) |
| **Interface** | FX |
| **Connector** | LC |
| **Cable Type** | 9/125 µm |
| **Wavelength (Tx)** | 1263 to 1360 nm |
| **Wavelength (Rx)** | 1260 to 1600 nm |
| **Nominal Distance** | 50 km (31.1 mi) |

[a] When Smart SFP mode is enabled, the RUGGEDCOM SFP1131-1FX50 can be used with Gigabit modules in RUGGEDCOM RX1500-series and RX5000 devices. For more information, refer to the "RUGGEDCOM ROX II Configuration Manual".

#### Environment

| | |
|---|---|
| **Operating Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Operating Relative Humidity** | 0 to 85% (non-condensing) |

| | |
|---|---|
| **Storage Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Mean Time Between Failures (MTBF)** | 640 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

## Restrictions

RUGGEDCOM ROX v2.10.0 or higher is required when this SFP transceiver is installed in one of the following modules:

- RUGGEDCOM RX1500PN LM FG50M
- RUGGEDCOM RX5000PN LM 4FG50

## Regulator Compliance

The RUGGEDCOM SFP1131-1FX50 complies with the following regulatory requirements when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| Electrostatic Discharge (ESD) to the Electrical Pins | MIL-STD-883C, Method 3015.4<br>JEDEC/EIA JESD22-A114-A | Class 2 (2000 V) |
| Electrostatic Discharge (ESD) to the Duplex LC Receptacle | Bellcore GR1089-CORE | 25 kV Air Discharge<br>10 Zaps at 8 kV (contact discharge) on the electrical faceplate on panel |
| Electromagnetic Interference (EMI) | FCC Class B | Compliant |
| Immunity | Variation of IEC 61000-4-3 | Compliant |
| Eye Safety | US FDA CDRH AEL Class 1<br>IEC/EN 60825-1 and 60825-2<br>EN 60950 Class 1 | Class 1 |
| RoHS | EU RoHS Directive 2002/95/EC | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

## Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8FE53-0AA0 | RUGGEDCOM SFP1131-1FX50 | 100Base-FX SFP – SM, 1300 nm, LC, 50 km |

## 3.4 RUGGEDCOM SFP1131-1FX90

Siemens' RUGGEDCOM SFP1131-1FX90 industrial grade 100 Mbps fiber optic fast Ethernet SFP transceiver operates within a wide temperature range (-40 to 85 °C or -40 to 185 °F) and provides high performance Fast Ethernet communication up to 90 km (55.9 mi) using single-mode fiber.

### Highlights

- Compliant with SFP MSA for 100Base-FX
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface
- Transmission distance up to 90 km (55.9 mi)
- LC duplex fiber connector
- Supports Smart SFP functionality
- Bail latch
- Hot swappable
- RoHS compliant

### Specifications

#### Optical Characteristics

| | |
|---|---|
| **Transmit Power** | -5 to -0 dBm |
| **Receiver Sensitivity** | -34 to -10 dBm |
| **Power Budget** | 29 |

#### Cabling

| | |
|---|---|
| **Speed** | 100 Mbps[a] |
| **Mode** | SM (Single-Mode) |
| **Interface** | FX |
| **Connector** | LC |
| **Cable Type** | 9/125 µm |
| **Wavelength (Tx)** | 1480 to 1580 nm |
| **Wavelength (Rx)** | 1260 to 1600 nm |
| **Nominal Distance** | 90 km (55.9 mi) |

[a] When Smart SFP mode is enabled, the RUGGEDCOM SFP1131-1FX90 can be used with Gigabit modules in RUGGEDCOM RX1500-series and RX5000 devices. For more information, refer to the "RUGGEDCOM ROX II Configuration Manual".

#### Environment

| | |
|---|---|
| **Operating Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Operating Relative Humidity** | 0 to 85% (non-condensing) |
| **Storage Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Mean Time Between Failures (MTBF)** | 496 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

### Restrictions

RUGGEDCOM ROX v2.10.0 or higher is required when this SFP transceiver is installed in one of the following modules:

- RUGGEDCOM RX1500PN LM FG50
- RUGGEDCOM RX5000PN LM 4FG50

### Regulator Compliance

The RUGGEDCOM SFP1131-1FX90 complies with the following regulatory requirements when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| Laser Eye Safety | IEC/EN 60825 | Class 1 |
| Electrical Safety | IEC/EN 60950 | Compliant |
| RoHS | EU RoHS Directive 2002/95/EC | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

### Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8FE54-0AA0 | RUGGEDCOM SFP1131-1FX90 | 100Base-FX SFP – SM, 1550 nm, LC, 90 km |

# 4 Active 100 Mbps SFP Transceivers

The following active 100 Mbps Ethernet SFP transceivers are available from Siemens for select RUGGEDCOM routers and switches. To determine compatibility, refer to "Available SFP Transceivers (Page 2)".

## 4.1 RUGGEDCOM SFP1121-1FX2A

Siemens' RUGGEDCOM SFP1121-1FX2A industrial grade 100 Mbps fiber optic fast Ethernet SFP transceiver operates within a wide temperature range (-40 to 85 °C or -40 to 185 °F) and provides high performance Fast Ethernet communication up to 2 km (1.2 mi) using multi-mode fiber.

**Note**

Some RUGGEDCOM routers/switches may only support specific SFP transceivers in select sockets. For information about which socket(s) an SFP transceiver is compatible with, refer to the "Installation Guide" for the compatible RUGGEDCOM router/switch.

**Note**

This SFP transceiver is not recommended for use with IEEE 1588.

### Highlights

- Compliant with SFP MSA and IEEE 802.3 for 100Base-FX
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface
- Transmission distance up to 2 km (1.2 mi)
- LC duplex connector optical interface
- Operates with 50/125 µm and 62.5/125 µm multi-mode fiber
- Bail latch
- Hot swappable
- RoHS compliant

### Specifications

#### Optical Characteristics

| | |
|---|---|
| **Transmit Power (50/125 µm)** | -23.5 to -14 dBm |
| **Transmit Power (62.5/125 µm)** | -20 to -14 dBm |
| **Receiver Sensitivity** | -31.0 to -8 dBm |
| **Power Budget** | 11.5 dB |

#### Cabling

| | |
|---|---|
| **Speed** | 100 Mbps |
| **Mode** | MM (Multi-Mode) |
| **Interface** | FZ |
| **Connector** | LC |
| **Cable Type** | 50/125 or 62.5/125 µm |
| **Wavelength (Tx)** | 1260 to 1360 nm |

| | |
|---|---|
| **Wavelength (Rx)** | 1260 to 1570 nm |
| **Nominal Distance** | 2 km (1.2 mi) |

### Environment

| | |
|---|---|
| **Operating Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Operating Relative Humidity** | 5 to 95% (non-condensing) |
| **Storage Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Mean Time Between Failures (MTBF)** | 236 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

## Regulator Compliance

The RUGGEDCOM SFP1121-1FX2A meets the following standards when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| Electrostatic Discharge (ESD) to the Electrical Pins | MIL-STD-883E, Method 3015.7 | Class 1 |
| Electrostatic Discharge (ESD) to the Duplex LC Receptacle | IEC 61000-4-2<br>GR-1089-CORE | Compliant |
| Electromagnetic Interference (EMI) | FCC Part 15, Class B | Compliant |
| Laser Eye Safety | US FDA 21CFR 1040.10 and 1040.11<br>IEC/EN 60825-1 and 60825-2 | Compliant with Class 1 laser product |
| RoHS | EU RoHS Directive 2002/95/EC | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

## Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8FE50-0AA0 | RUGGEDCOM SFP1121-1FX2A | 100Base-FX SFP – MM, 1310 nm, LC, 2 km |

## 4.2 RUGGEDCOM SFP1131-1FX10A

Siemens' RUGGEDCOMSFP1131-1FX10A industrial grade 100 Mbps fiber optic fast Ethernet SFP transceiver operates within a wide temperature range (-40 to 85 °C or -40 to 185 °F) and provides high performance Fast Ethernet communication up to 10 km (6.2 mi) using single-mode fiber.

**Note**

Some RUGGEDCOM routers/switches may only support specific SFP transceivers in select sockets. For information about which socket(s) an SFP transceiver is compatible with, refer to the "Installation Guide" for the compatible RUGGEDCOM router/switch.

**Note**

This SFP transceiver is not recommended for use with IEEE 1588.

### Highlights

- Compliant with SFP MSA for 100Base-FX
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface
- Transmission distance up to 10 km (6.2 mi)
- LC duplex fiber connector
- Bail latch
- Hot swappable
- RoHS compliant

### Specifications

#### Optical Characteristics

| | |
|---|---|
| **Transmit Power** | -15 to -8 dBm |
| **Receiver Sensitivity** | -31.5 to -8 dBm |
| **Power Budget** | 16.5 |

#### Cabling

| | |
|---|---|
| **Speed** | 100 Mbps |
| **Interface** | FX |
| **Mode** | SM (Single-Mode) |
| **Connector** | LC |
| **Cable Type** | 9/125 µm |
| **Wavelength (Tx)** | 1260 to 1360 nm |
| **Wavelength (Rx)** | 1260 to 1570 nm |
| **Nominal Distance** | 10 km (6.2 mi) |

#### Environment

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

| | |
|---|---|
| **Operating Relative Humidity** | 0 to 85% (non-condensing) |
| **Storage Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Mean Time Between Failures (MTBF)** | 544 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

## Regulator Compliance

The RUGGEDCOM SFP1131-1FX10A complies with the following regulatory requirements when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| Electrostatic Discharge (ESD) to the Electrical Pins | MIL-STD-883E, Method 3015.7 | Class 1 |
| Electrostatic Discharge (ESD) to the Duplex LC Receptacle | IEC 61000-4-2<br>GR-1089-CORE | Compliant |
| Electromagnetic Interference (EMI) | FCC Part 15, Class B | Compliant |
| Eye Safety | US FDA 21CFR 1040.10 and 1040.11<br>IEC/EN 60825-1 and 60825-2 | Compliant with Class 1 laser product |
| RoHS | EU RoHS Directive 2002/95/EC | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

## Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8FE60-0AA0 | RUGGEDCOM SFP1131-1FX10A | 100Base-LX SFP – SM, 1310 nm, LC, 10 km |

## 4.3 RUGGEDCOM SFP1131S-1FX40A

Siemens' RUGGEDCOMSFP1131S-1FX40A industrial grade 100 Mbps fiber optic fast Ethernet SFP transceiver operates within a wide temperature range (-5 to 70 °C or 23 to 158 °F) and provides high performance Fast Ethernet communication up to 40 km (24.9 mi) using single-mode fiber.

**Note**

Some RUGGEDCOM routers/switches may only support specific SFP transceivers in select sockets. For information about which socket(s) an SFP transceiver is compatible with, refer to the "Installation Guide" for the compatible RUGGEDCOM router/switch.

**Note**

This SFP transceiver is not recommended for use with IEEE 1588.

### Highlights

- Compliant with SFP MSA for 100Base-FX
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface
- Transmission distance up to 40 km (24.9 mi)
- LC duplex fiber connector
- Bail latch
- Hot swappable
- RoHS compliant

### Specifications

#### Optical Characteristics

| | |
|---|---|
| **Transmit Power** | -5 to 0 dBm |
| **Receiver Sensitivity** | -23 to 0 dBm |
| **Power Budget** | 18 |

#### Cabling

| | |
|---|---|
| **Speed** | 100 Mbps |
| **Interface** | FX |
| **Mode** | SM (Single-Mode) |
| **Connector** | LC |
| **Cable Type** | 9/125 µm |
| **Wavelength (Tx)** | 1260 to 1360 nm |
| **Wavelength (Rx)** | 1260 to 1580 nm |
| **Nominal Distance** | 40 km (24.9 mi) |

#### Environment

| | |
|---|---|
| **Operating Temperature** | -5 to 70 °C (23 to 158 °F) |

| | |
|---|---|
| **Operating Relative Humidity** | 0 to 85% (non-condensing) |
| **Storage Temperature** | -5 to 70 °C (23 to 158 °F) |
| **Mean Time Between Failures (MTBF)** | 181 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

## Regulator Compliance

The RUGGEDCOM SFP1131S-1FX40A complies with the following regulatory requirements when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| Electrostatic Discharge (ESD) to the Electrical Pins | MIL-STD-883E, Method 3015.7 | Class 1 |
| Electrostatic Discharge (ESD) to the Duplex LC Receptacle | IEC 61000-4-2<br>GR-1089-CORE | Compliant |
| Electromagnetic Interference (EMI) | FCC Part 15, Class B | Compliant |
| Eye Safety | US FDA 21CFR 1040.10 and 1040.11<br>IEC/EN 60825-1 and 60825-2 | Compliant with Class 1 laser product |
| RoHS | EU RoHS Directive 2002/95/EC | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

## Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8FE62-0AA0 | RUGGEDCOM SFP1131S-1FX40A | 100Base-LX SFP – SM, 1310 nm, LC, 40 km |

# 5 Gigabit Ethernet SFP Transceivers

The following Gigabit Ethernet SFP transceivers are available from Siemens for select RUGGEDCOM routers and switches. To determine compatibility, refer to "Available SFP Transceivers (Page 2)".

# 5.1 RUGGEDCOM SFP1122-1SX

Siemens' RUGGEDCOM SFP1122-1SX industrial grade 1 Gbps fiber optic SFP transceiver operates within a wide temperature range (-40 to 85 °C or -40 to 185 °F) and provides high performance Gigabit Ethernet communication up to either 0.5 km (0.3 mi) or 0.3 km (0.2 mi) using multi-mode fiber, depending on the cable type in use.

## Highlights

- Compliant with SFP MSA and IEEE 802.3 for 1000Base-SX
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface
- Transmission distance up to 0.5 km (0.3 mi) or 0.3 km (0.2 mi)
- LC duplex connector optical interface
- Operates with 50/125 µm and 62.5/125 µm multi-mode fiber
- Bail latch
- Hot swappable
- RoHS compliant

## Specifications

### Optical Characteristics

| | |
|---|---|
| **Transmit Power** | -9 to -2.5 dBm |
| **Receiver Sensitivity** | -18 to 0 dBm |
| **Power Budget** | 9 dB |

### Cabling

| | |
|---|---|
| **Speed** | 1 Gbps |
| **Mode** | MM (Multi-Mode) |
| **Interface** | SX |
| **Connector** | LC |
| **Cable Type** | 50/125 or 62.5/125 µm |
| **Wavelength (Tx)** | 830 to 860 nm |
| **Wavelength (Rx)** | 770 to 860 nm |
| **Nominal Distance (50/125 µm)** | 0.5 km (0.3 mi) |
| **Nominal Distance (62.5/125 µm)** | 0.3 km (0.2 mi) |

### Environment

| | |
|---|---|
| **Operating Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Operating Relative Humidity** | 5 to 95% (non-condensing) |
| **Storage Temperature** | -40 to 100 °C (-40 to 212 °F) |

| | |
|---|---|
| **Mean Time Between Failures (MTBF)** | 697 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

## Regulator Compliance

The RUGGEDCOM SFP1122-1SX meets the following standards when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| Laser Eye Safety | IEC/EN 60825 | Class 1 |
| Electrical Safety | IEC/EN 60950 | Compliant |
| RoHS | EU RoHS Directive 2002/95/EC | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

## Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8FG51-0AA0 | RUGGEDCOM SFP1122-1SX | 1000Base-SX SFP – MM, 850 nm, LC, 0.5 km |

## 5.2 RUGGEDCOM SFP1122-1SX2

Siemens' RUGGEDCOM SFP1122-1SX2 industrial grade 1 Gbps fiber optic SFP transceiver operates within a wide temperature range (-40 to 85 °C or -40 to 185 °F) and provides high performance Gigabit Ethernet communication up to 2 km (1.2 mi) using multi-mode fiber.

### Highlights

- Compliant with SFP MSA and IEEE 802.3z for 1000Base-SX
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface
- Transmission distance up to 2 km (1.2 mi)
- LC duplex connector optical interface
- Operates with 50/125 µm and 62.5/125 µm multi-mode fiber
- Bail latch
- Hot swappable
- RoHS compliant

### Specifications

#### Optical Characteristics

| | |
|---|---|
| **Transmit Power** | -9 to 1 dBm |
| **Receiver Sensitivity** | -19 to -1 dBm |
| **Power Budget** | 10 dB |

#### Cabling

| | |
|---|---|
| **Speed** | 1 Gbps |
| **Mode** | MM (Multi-Mode) |
| **Interface** | SX |
| **Connector** | LC |
| **Cable Type** | 50/125 or 62.5/125 µm |
| **Wavelength (Tx)** | 1280 to 1355 nm |
| **Wavelength (Rx)** | 1270 to 1620 nm |
| **Nominal Distance** | 2 km (1.2 mi) |

#### Environment

| | |
|---|---|
| **Operating Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Operating Relative Humidity** | 5 to 85% (non-condensing) |
| **Storage Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Mean Time Between Failures (MTBF)** | 182 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

## Regulator Compliance

The RUGGEDCOM SFP1122-1SX2 meets the following standards when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| Laser Eye Safety | IEC/EN 60825 | Class 1 |
| Electrical Safety | IEC/EN 60950 | Compliant |
| RoHS | EU RoHS Directive 2002/95/EC | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

## Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8FE58-0AA0 | RUGGEDCOM SFP1122-1SX2 | 1000Base-SX SFP – MM, 1310 nm, LC, 2 km |

# 5.3 RUGGEDCOM SFP1132-1LX10

Siemens' RUGGEDCOM SFP1132-1LX10 industrial grade 1 Gbps fiber optic long haul SFP transceiver operates within a wide temperature range (-40 to 85 °C or -40 to 185 °F) and provides high performance Gigabit Ethernet communication up to 10 km (6.2 mi) using single-mode fiber.

## Highlights

- Compliant with SFP MSA and IEEE 802.3 for 1000Base-LX
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface
- Transmission distance up to 10 km (6.2 mi)
- LC duplex connector optical interface
- Bail latch
- Hot swappable
- RoHS compliant

## Specifications

### Optical Characteristics

| | |
|---|---|
| **Transmit Power** | -9.5 to -3.0 dBm |
| **Receiver Sensitivity** | -19.0 to 0.0 dBm |
| **Power Budget** | 9.5 dB |

### Cabling

| | |
|---|---|
| **Speed** | 1 Gbps |
| **Mode** | SM (Single-Mode) |
| **Interface** | LX |
| **Connector** | LC |
| **Cable Type** | 9/125 µm |
| **Wavelength (Tx)** | 1270 to 1355 nm |
| **Wavelength (Rx)** | 1265 to 1600 nm |
| **Nominal Distance** | 10 km (6.2 mi) |

### Environment

| | |
|---|---|
| **Operating Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Operating Relative Humidity** | 5 to 95% (non-condensing) |
| **Storage Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Mean Time Between Failures (MTBF)** | 761 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

## Regulator Compliance

The RUGGEDCOM SFP1132-1LX10 meets the following standards when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| Electrostatic Discharge (ESD) to the Electrical Pins | MIL-STD-883C, Method 3015.4<br>JEDEC/EIA JESD22-A114-A | Class 2 (> 2000 V) |
| Electrostatic Discharge (ESD) to the Duplex LC Receptacle | Bellcore GR1089-CORE | Compliant |
| Electromagnetic Interference (EMI) | FCC Class B | Compliant |
| Immunity | Variation of IEC 61000-4-3 | Compliant |
| Eye Safety | US FDA CDRH AEL Class 1<br>IEC/EN 60825-1 and 60825-2<br>EN 60950 Class 1 | Compliant |
| RoHS | EU RoHS Directive 2002/95/EC | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

## Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8FG52-0AA0 | RUGGEDCOM SFP1132-1LX10 | 1000Base-LX SFP – SM, 1310 nm, LC, 10 km |

## 5.4 RUGGEDCOM SFP1132-1LX25

Siemens' RUGGEDCOM SFP1132-1LX25 industrial grade 1 Gbps fiber optic long haul SFP transceiver operates within a wide temperature range (-40 to 85 °C or -40 to 185 °F) and provides high performance Gigabit Ethernet communication up to 25 km (15.5 mi) using single-mode fiber.

### Highlights

- Compliant with SFP MSA for 1000Base-LX
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface
- Transmission distance up to 25 km (15.5 mi)
- LC duplex connector optical interface
- Bail latch
- Hot swappable
- RoHS compliant

### Specifications

#### Optical Characteristics

| | |
|---|---|
| **Transmit Power** | -5.0 to 0.0 dBm |
| **Receiver Sensitivity** | -24.0 to -0.0 dBm |
| **Power Budget** | 19 dB |

#### Cabling

| | |
|---|---|
| **Speed** | 1 Gbps |
| **Mode** | SM (Single-Mode) |
| **Interface** | LX |
| **Connector** | LC |
| **Cable Type** | 9/125 µm |
| **Wavelength (Tx)** | 1260 to 1360 nm |
| **Wavelength (Rx)** | 1260 to 1610 nm |
| **Nominal Distance** | 25 km (15.5 mi) |

#### Environment

| | |
|---|---|
| **Operating Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Storage Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Mean Time Between Failures (MTBF)** | 174 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

## Regulator Compliance

The RUGGEDCOM SFP1132-1LX25 meets the following standards when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| Electromagnetic Interference (EMI) | FCC Class B | Compliant |
| Eye Safety | IEC/EN 60825-1 | Compliant |
| RoHS | EU RoHS Directive 2002/95/EC | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

## Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8FG53-0AA0 | RUGGEDCOM SFP1132-1LX25 | 1000Base-LX SFP – SM, 1310 nm, LC, 25 km |

# 5.5 RUGGEDCOM SFP1132-1LX40

Siemens' RUGGEDCOM SFP1132-1LX40 industrial grade 1 Gbps fiber optic long haul SFP transceiver operates within a wide temperature range (-40 to 85 °C or -40 to 185 °F) and provides high performance Gigabit Ethernet communication up to 40 km (24.9 mi) using single-mode fiber.

## Highlights

- Compliant with SFP MSA for 1000Base-LX
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface
- Transmission distance up to 40 km (24.9 mi)
- LC duplex connector optical interface
- Bail latch
- Hot swappable
- RoHS compliant

## Specifications

### Optical Characteristics

| | |
|---|---|
| **Transmit Power** | 0.0 to 5.0 dBm |
| **Receiver Sensitivity** | -22.0 to 0.0 dBm |
| **Power Budget** | 22 dB |

### Cabling

| | |
|---|---|
| **Speed** | 1 Gbps |
| **Mode** | SM (Single-Mode) |
| **Interface** | LX |
| **Connector** | LC |
| **Cable Type** | 9/125 µm |
| **Wavelength (Tx)** | 1540 to 1570 nm |
| **Wavelength (Rx)** | 1270 to 1600 nm |
| **Nominal Distance** | 40 km (24.9 mi) |

### Environment

| | |
|---|---|
| **Operating Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Storage Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Mean Time Between Failures (MTBF)** | 482 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

## Regulator Compliance

The RUGGEDCOM SFP1132-1LX40 meets the following standards when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| Electromagnetic Interference (EMI) | FCC Class B | Compliant |
| Eye Safety | IEC/EN 60825-1 | Compliant |
| RoHS | EU RoHS Directive 2002/95/EC | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

## Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8FG57-0AA0 | RUGGEDCOM SFP1132-1LX40 | 1000Base-LX SFP – SM, 1550 nm, LC, 40 km |

## 5.6 RUGGEDCOM SFP1132-1LX70

Siemens' RUGGEDCOM SFP1132-1LX70 industrial grade 1 Gbps fiber optic long haul SFP transceiver operates within a wide temperature range (-40 to 85 °C or -40 to 185 °F) and provides high performance Gigabit Ethernet communication up to 70 km (43.5 mi) using single-mode fiber.

### Highlights

- Compliant with SFP MSA for 1000Base-LX
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface
- Transmission distance up to 70 km (43.5 mi)
- LC duplex connector optical interface
- Bail latch
- Hot swappable
- RoHS compliant

### Specifications

#### Optical Characteristics

| | |
|---|---|
| **Transmit Power** | -0.0 to 5.0 dBm |
| **Receiver Sensitivity** | -22.0 to 0.0 dBm |
| **Power Budget** | 22 dB |

#### Cabling

| | |
|---|---|
| **Speed** | 1 Gbps |
| **Mode** | SM (Single-Mode) |
| **Interface** | LX |
| **Connector** | LC |
| **Cable Type** | 9/125 µm |
| **Wavelength (Tx)** | 1540 to 1570 nm |
| **Wavelength (Rx)** | 1270 to 1600 nm |
| **Nominal Distance** | 70 km (43.5 mi) |

#### Environment

| | |
|---|---|
| **Operating Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Storage Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Mean Time Between Failures (MTBF)** | 482 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

## Regulator Compliance

The RUGGEDCOM SFP1132-1LX70 meets the following standards when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| Electromagnetic Interference (EMI) | FCC Class B | Compliant |
| Eye Safety | IEC/EN 60825-1 | Compliant |
| RoHS | EU RoHS Directive 2002/95/EC | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

## Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8FG54-0AA0 | RUGGEDCOM SFP1132-1LX70 | 1000Base-LX SFP – SM, 1550 nm, LC, 70 km |

# 5.7 RUGGEDCOM SFP1132-1LX100

Siemens' RUGGEDCOM SFP1132-1LX100 industrial grade 1 Gbps fiber optic long haul SFP transceiver operates within a wide temperature range (0 to 70 °C or 32 to 158 °F) and provides high performance Gigabit Ethernet communication up to 100 km (62.1 mi) using single-mode fiber.

## Highlights

- Compliant with SFP MSA and IEE 802.3 for 1000Base-LX
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface
- Transmission distance up to 100 km (62.1 mi)
- LC duplex connector optical interface
- Bail latch
- Hot swappable
- RoHS compliant

## Specifications

### Optical Characteristics

| | |
|---|---|
| **Transmit Power** | -0.0 to 5.0 dBm |
| **Receiver Sensitivity** | -30.0 to -8.0 dBm |
| **Power Budget**[a] | 30 dB |

[a] Assumes the same SFP transceiver is used on both ends of the connection.

### Cabling

| | |
|---|---|
| **Speed** | 1 Gbps |
| **Mode** | SM (Single-Mode) |
| **Interface** | LX |
| **Connector** | LC |
| **Cable Type** | 9/125 µm |
| **Wavelength (Tx)** | 1540 to 1570 nm |
| **Wavelength (Rx)** | 1270 to 1600 nm |
| **Nominal Distance:** | 100 km (62.1 mi) |

### Environment

| | |
|---|---|
| **Operating Temperature** | 0 to 70 °C (32 to 158 °F) |
| **Storage Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Mean Time Between Failures (MTBF)** | 392 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

## Regulator Compliance

The RUGGEDCOM SFP1132-1LX100 meets the following standards when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| Electromagnetic Interference (EMI) | FCC Class B | Compliant |
| Eye Safety | IEC/EN 60825-1 | Compliant |
| RoHS | EU RoHS Directive 2002/95/EC | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

## Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8FG55-0AA0 | RUGGEDCOM SFP1132-1LX100 | 1000Base-LX SFP – SM, 1550 nm, LC, 100 km |

# 5.8 RUGGEDCOM SFP1132-1LX115

Siemens' RUGGEDCOM SFP1132-1LX115 industrial grade 1 Gbps fiber optic long haul SFP transceiver operates within a wide temperature range (-10 to 70 °C or 14 to 158 °F) and provides high performance Gigabit Ethernet communication up to 115 km (71.5 mi) using single-mode fiber.

## Highlights

- Compliant with SFP MSA for 1000Base-LX
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface
- Transmission distance up to 115 km (71.5 mi)
- LC duplex fiber connector
- Bail latch
- Hot swappable
- RoHS compliant

## Specifications

### Optical Characteristics

| | |
|---|---|
| **Transmit Power** | 0 to 5 dBm |
| **Receiver Sensitivity** | -30 to -9 dBm |
| **Power Budget** | 30 dB |

### Cabling

| | |
|---|---|
| **Speed** | 1 Gbps |
| **Mode** | SM (Single-Mode) |
| **Interface** | LX |
| **Connector** | LC |
| **Cable Type** | 9/125 µm |
| **Wavelength (Tx)** | 1540 to 1570 nm |
| **Wavelength (Rx)** | 1270 to 1600 nm |
| **Nominal Distance** | 115 km (71.5 mi) |

### Environment

| | |
|---|---|
| **Operating Temperature** | -10 to 70 °C (14to 158 °F) |
| **Operating Relative Humidity** | 0 to 85% (non-condensing) |
| **Storage Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Mean Time Between Failures (MTBF)** | 392 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

## Regulator Compliance

The RUGGEDCOM SFP1132-1LX115 meets the following standards when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| Laser Eye Safety | IEC/EN 60825 | Class 1 |
| Electrical Safety | IEC/EN 60950 | Compliant |
| RoHS | EU RoHS Directive 2002/95/EC | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

## Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8FE56-0AA0 | RUGGEDCOM SFP1132-1LX115 | 1000Base-LX SFP – SM, 1550 nm, LC, 115 km |

# 6 Bidirectional Gigabit Ethernet SFP Transceivers

The following Bidirectional (BiDi) SFP transceivers are available from Siemens for select RUGGEDCOM routers and switches. To determine compatibility, refer to "Available SFP Transceivers (Page 2)".

# 6.1 RUGGEDCOM SFP1132-1BX10R

Siemens' RUGGEDCOM SFP1132-1BX10R industrial grade 1 Gbps fiber optic bi-directional SFP transceiver operates within a wide temperature range (-40 to 85 °C or -40 to 185 °F) and provides high performance Gigabit Ethernet communication up to 10 km (6.2 mi) using single-mode fiber.

## Highlights

- Compliant with SFP MSA for 1000BASE-BX10-U
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface
- Transmission distance up to 10 km (6.2 mi)
- LC duplex fiber connector
- Bail latch
- Hot swappable
- RoHS compliant

## Specifications

### Optical Characteristics

| | |
|---|---|
| **Transmit Power** | -9.0 to -3.0 dBm |
| **Receiver Sensitivity** | -19.5 to -3.0 dBm |
| **Power Budget**[a] | 10.5 db |

[a] Assumes an SFP1132-1BX10T is used at the other end of the connection.

### Cabling

| | |
|---|---|
| **Speed** | 1 Gbps |
| **Mode** | SM (Single Mode) |
| **Interface** | BX |
| **Connector** | LC |
| **Cable Type (µm)** | 9/125 |
| **Wavelength (Tx)** | 1260 to 1360 nm |
| **Wavelength (Rx)** | 1480 to 1500 nm |
| **Nominal Distance** | 10 km (6.2 mi) |

### Environment

| | |
|---|---|
| **Operating Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Operating Relative Humidity** | 5 to 95% (non-condensing) |
| **Storage Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Mean Time Between Failures (MTBF)** | 384 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

## Regulator Compliance

The RUGGEDCOM SFP1132-1BX10R meets the following standards when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| Electrostatic Discharge (ESD) to the Electrical Pins | MIL-STD-883E, Method 3015.7 | Class 1 |
| Electrostatic Discharge (ESD) to the Duplex LC Receptacle | IEC 61000-4-2 | Compliant |
| Electromagnetic Interference (EMI) | FCC Part 15, Class B | Compliant |
| Laser Eye Safety | US FDA 21CRF 1040.10 and 1040.11<br>IEC/EN 60825-1 and 60825-2<br>EN 60950 | Compliant with Class 1 laser product |
| RoHS | EU RoHS Directive 2011/65/EU | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

## Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8FB51-0AA0 | RUGGEDCOM SFP1132-1BX10R | 1000Base-BX SFP – SM, 1310/1490 nm, LC, 10 km |

## 6.2 RUGGEDCOM SFP1132-1BX10T

Siemens' RUGGEDCOM SFP1132-1BX10T industrial grade 1 Gbps fiber optic bi-directional SFP transceiver operates within a wide temperature range (-40 to 85 °C or -40 to 185 °F) and provides high performance Gigabit Ethernet communication up to 10 km (6.2 mi) using single-mode fiber.

### Highlights

- Compliant with SFP MSA for 1000BASE-BX10-D
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface
- Transmission distance up to 10 km (6.2 mi)
- LC duplex fiber connector
- Bail latch
- Hot swappable
- RoHS compliant

### Specifications

#### Optical Characteristics

| | |
|---|---|
| **Transmit Power** | -9.0 to -3.0 dBm |
| **Receiver Sensitivity** | -19.5 to -3.0 dBm |
| **Power Budget**[a] | 10.5 dB |

[a] Assumes an SFP1132-1BX10R is used at the other end of the connection.

#### Cabling

| | |
|---|---|
| **Speed** | 1 Gbps |
| **Mode** | SM (Single-Mode) |
| **Interface** | BX |
| **Connector** | LC |
| **Cable Type** | 9/125 µm |
| **Wavelength (Tx)** | 1480 to 1500 nm |
| **Wavelength (Rx)** | 1260 to 1360 nm |
| **Nominal Distance** | 10 km (6.2 mi) |

#### Environment

| | |
|---|---|
| **Operating Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Operating Relative Humidity** | 5 to 95% (non-condensing) |
| **Storage Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Mean Time Between Failures (MTBF)** | 310 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

## Regulator Compliance

The RUGGEDCOM SFP1132-1BX10T meets the following standards when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| Electrostatic Discharge (ESD) to the Electrical Pins | MIL-STD-883E, Method 3015.7 | Class 1 |
| Electrostatic Discharge (ESD) to the Duplex LC Receptacle | IEC 61000-4-2 | Compliant |
| Electromagnetic Interference (EMI) | FCC Part 15, Class B | Compliant |
| Laser Eye Safety | US FDA 21CRF 1040.10 and 1040.11<br>IEC/EN 60825-1 and 60825-2<br>EN 60950 | Compliant with Class 1 laser product |
| RoHS | EU RoHS Directive 2002/95/EC | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

## Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8FB52-0AA0 | RUGGEDCOM SFP1132-1BX10T | 1000Base-BX SFP – SM, 1490/1310 nm, LC, 10 km |

## 6.3 RUGGEDCOM SFP1132-1BX40R

Siemens' RUGGEDCOM SFP1132-1BX40R industrial grade 1 Gbps fiber optic bi-directional SFP transceiver operates within a wide temperature range (-40 to 85 °C or -40 to 185 °F) and provides high performance Gigabit Ethernet communication up to 40 km (24.9 mi) using single-mode fiber.

### Highlights

- Compliant with SFP MSA and IEEE 802.3ah for 1000Base-BX40-U
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface
- Transmission distance up to 40 km (24.9 mi)
- LC duplex fiber connector
- Bail latch
- Hot swappable
- RoHS compliant

### Specifications

#### Optical Characteristics

| | |
|---|---|
| **Transmit Power** | -2.0 to 3.0 dBm |
| **Receiver Sensitivity** | -23.0 to -3.0 dBm |
| **Power Budget**[a] | 21 dB |

[a] Assumes an SFP1132-1BX40T is used at the other end of the connection.

#### Cabling

| | |
|---|---|
| **Speed** | 1 Gbps |
| **Mode** | SM (Single-Mode) |
| **Interface** | BX |
| **Connector** | LC |
| **Cable Type** | 9/125 µm |
| **Wavelength (Tx)** | 1260 to 1360 nm |
| **Wavelength (Rx)** | 1480 to 1500 nm |
| **Nominal Distance** | 40 km (24.9 mi) |

#### Environment

| | |
|---|---|
| **Operating Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Operating Relative Humidity** | 5 to 95% (non-condensing) |
| **Storage Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Mean Time Between Failures (MTBF)** | 336 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

## Regulator Compliance

The RUGGEDCOM SFP1132-1BX40R meets the following standards when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| Electrostatic Discharge (ESD) to the Electrical Pins | MIL-STD-883E, Method 3015.7 | Class 1 |
| Electrostatic Discharge (ESD) to the Duplex LC Receptacle | IEC 61000-4-2 | Compliant |
| Electromagnetic Interference (EMI) | FCC Part 15, Class B | Compliant |
| Immunity | Variation of IEC 61000-4-3 | Compliant |
| Laser Eye Safety | US FDA 21CRF 1040.10 and 1040.11<br>IEC/EN 60825-1 and 60825-2<br>EN 60950 | Compliant with Class 1 laser product |
| RoHS | EU RoHS Directive 2002/95/EC | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

## Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8FB53-0AA0 | RUGGEDCOM SFP1132-1BX40R | 1000Base-BX SFP – SM, 1310/1490 nm, LC, 40 km |

## 6.4 RUGGEDCOM SFP1132-1BX40T

Siemens' RUGGEDCOM SFP1132-1BX40T industrial grade 1 Gbps fiber optic bi-directional SFP transceiver operates within a wide temperature range (-40 to 85 °C or -40 to 185 °F) and provides high performance Gigabit Ethernet communication up to 40 km (24.9 mi) using single-mode fiber.

### Highlights

- Compliant with SFP MSA and IEEE 802.3ah for 1000Base-BX-D
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface
- Transmission distance up to 40 km (24.9 mi)
- LC duplex fiber connector
- Bail latch
- Hot swappable
- RoHS compliant

### Specifications

#### Optical Characteristics

| | |
|---|---|
| **Transmit Power** | -2.0 to 3.0 dBm |
| **Receiver Sensitivity** | -23.0 to -3.0 dBm |
| **Power Budget**[a] | 21 dB |

[a] Assumes an SFP1132-1BX40R is used at the other end of the connection.

#### Cabling

| | |
|---|---|
| **Speed** | 1 Gbps |
| **Mode** | SM (Single-Mode) |
| **Interface** | BX |
| **Connector** | LC |
| **Cable Type** | 9/125 µm |
| **Wavelength (Tx)** | 1480 to 1500 nm |
| **Wavelength (Rx)** | 1260 to 1360 nm |
| **Nominal Distance** | 40 km (24.9 mi) |

#### Environment

| | |
|---|---|
| **Operating Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Operating Relative Humidity** | 5 to 95% (non-condensing) |
| **Storage Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Mean Time Between Failures (MTBF)** | 336 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

## Regulator Compliance

The RUGGEDCOM SFP1132-1BX40T meets the following standards when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| Electrostatic Discharge (ESD) to the Electrical Pins | MIL-STD-883E, Method 3015.7 | Class 1 |
| Electrostatic Discharge (ESD) to the Duplex LC Receptacle | IEC 61000-4-2 | Compliant |
| Electromagnetic Interference (EMI) | FCC Part 15, Class B | Compliant |
| Immunity | Variation of IEC 61000-4-3 | Compliant |
| Laser Eye Safety | US FDA 21CRF 1040.10 and 1040.11<br>IEC/EN 60825-1 and 60825-2<br>EN 60950 | Compliant with Class 1 laser product |
| RoHS | EU RoHS Directive 2002/95/EC | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

## Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8FB54-0AA0 | RUGGEDCOM SFP1132-1BX40T | 1000Base-BX SFP – SM, 1490/1310 nm, LC, 40 km |

# 7 10-Gigabit Ethernet SFP+ Transceivers

The following 10-Gigabit Ethernet SFP+ transceivers are available from Siemens for select RUGGEDCOM routers and switches. To determine compatibility, refer to "Available SFP Transceivers (Page 2)".

# 7.1 RUGGEDCOM SFP2123-1SR

Siemens' RUGGEDCOM SFP2123-1SR industrial grade 10 Gbps fiber optic long reach SFP+ transceiver operates within a wide temperature range (-40 to 85 °C or -40 to 185 °F) and provides high performance Gigabit Ethernet communication up to 400 m (1312 ft) using multi-mode fiber.

## Highlights

- Compliant with SFP+ MSA and IEEE 802.3ae for 10GBase-SR
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface
- Compliant with SFF-8431 (Rev 2)
- Compliant with SFF-8432 (Rev 4.3)
- Transmission distance up to 400 m (1312 ft)
- LC duplex connector optical interface
- Bail latch
- Hot swappable
- RoHS compliant

## Specifications

### Optical Characteristics

| | |
|---|---|
| **Transmit Power** | -5.0 to -1.0 dBm |
| **Tx Typical OMA** | -1.5 |
| **Minimum Extinction Ratio** | 3.0 |
| **Rx Sensitivity OMA (dBm)** | -11.1 |
| **Stressed RX Sensitivity (dBm)** | -7.5 |
| **Rx Saturation (dBm)** | 0.5 |

### Cabling

| | |
|---|---|
| **Speed** | 10 Gbps |
| **Mode** | MM (Multi-Mode) |
| **Interface** | SR |
| **Connector** | LC |
| **Cable Type** | 50/125 or 62.5/125 µm |
| **Wavelength (Tx)** | 840 to 860 nm |
| **Wavelength (Rx)** | 840 to 860 nm |
| **Nominal Distance** | 400 m (1312 ft) |

### Environment

| | |
|---|---|
| **Operating Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Operating Relative Humidity** | 0 to 85% (non-condensing) |
| **Storage Temperature** | -40 to 85 °C (-40 to 185 °F) |

| | |
|---|---|
| **Mean Time Between Failures (MTBF)** | 611 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

## Regulator Compliance

The RUGGEDCOM SFP2123-1SR meets the following standards when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| Electromagnetic Interference (EMI) | FCC Class B | Compliant |
| Eye Safety | US FDA 21CRF 1040.10 and 1040.11<br>IEC/EN 60825-1 | Class 1 |
| RoHS | EU RoHS Directive 2002/95/EC | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

## Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8FT50-0AA0 | RUGGEDCOM SFP2123-1SR | 10GBase-SR SFP – SM, 850 nm, LC, 400 m |

## 7.2 RUGGEDCOM SFP2133-1LR10

Siemens' RUGGEDCOM SFP2133-1LR10 industrial grade 10 Gbps fiber optic long reach SFP+ transceiver operates within a wide temperature range (-40 to 85 °C or -40 to 185 °F) and provides high performance Gigabit Ethernet communication up to 10 km (6.2 mi) using single-mode fiber.

### Highlights

- Compliant with SFP+ MSA and IEEE 802.3ae for 10GBase-LR/LW
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface
- Compliant with SFF-8431 (Rev 2)
- Compliant with SFF-8432 (Rev 4.3)
- Transmission distance up to 10 km (6.2 mi)
- LC duplex connector optical interface
- Bail latch
- Hot swappable
- RoHS compliant

### Specifications

#### Optical Characteristics

| | |
|---|---|
| **Transmit Power** | -8.2 to 0.5 dBm |
| **Tx Minimum OMA** | -5.2 |
| **Minimum Extinction Ratio** | 3.5 |
| **Rx Sensitivity OMA (dBm)** | -12.6 |
| **Stressed RX Sensitivity (dBm)** | -10.3 |
| **Rx Saturation (dBm)** | 0.5 |
| **Power Budget (dB)** | 4.4 |
| **Channel Insertion Loss (dB)** | 5.1 |
| **Allocation for Penalties (dB)** | 2.3 |

#### Cabling

| | |
|---|---|
| **Speed** | 10 Gbps |
| **Mode** | SM (Single-Mode) |
| **Interface** | LR |
| **Connector** | LC |
| **Cable Type** | 9/125 µm |
| **Wavelength (Tx)** | 1260 to 1355 nm |
| **Wavelength (Rx)** | 1260 to 1600 nm |
| **Nominal Distance** | 10 km (6.2 mi) |

#### Environment

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

| | |
|---|---|
| **Operating Relative Humidity** | 0 to 85% (non-condensing) |
| **Storage Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Mean Time Between Failures (MTBF)** | 247 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

## Product-Specific Deviations

The RUGGEDCOM SFP2133-1LR10 supports the following ratings when installed in the specified Siemens RUGGEDCOM routers and/or switches:

| Product(s) | Specification | Rating |
|---|---|---|
| RUGGEDCOM RX5000 | Operating Temperature | -40 to 80 °C (-40 to 176 °F) |
| RUGGEDCOM MX5000 | Operating Temperature | -40 to 80 °C (-40 to 176 °F) |

## Regulator Compliance

The RUGGEDCOM SFP2133-1LR10 meets the following standards when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| Electromagnetic Interference (EMI) | FCC Class B | Compliant |
| Eye Safety | US FDA 21CRF 1040.10 and 1040.11<br>IEC/EN 60825-1 | Class 1 |
| RoHS | EU RoHS Directive 2002/95/EC | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

## Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8FT51-0AA0 | RUGGEDCOM SFP2133-1LR10 | 10GBase-LR SFP – SM, 1310 nm, LC, 10 km |

## 7.3 RUGGEDCOM SFP2133-1ER40

Siemens' RUGGEDCOM SFP2133-1ER40 industrial grade 10 Gbps fiber optic extended reach SFP+ transceiver operates within a wide temperature range (-40 to 85 °C or -40 to 185 °F) and provides high performance Gigabit Ethernet communication up to 40 km (24.9 mi) using single-mode fiber.

### Highlights

- Compliant with SFP+ MSA and IEEE 802.3ae for 10GBase-ER/EW
- Compliant with SFF-8431 (Rev 2)
- Compliant with SFF-8432 (Rev 4.3)
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface (Rev 10.4)
- Transmission distance up to 40 km (24.9 mi)
- LC duplex connector optical interface
- Bail latch
- Hot swappable
- RoHS compliant

### Specifications

#### Optical Characteristics

| | |
|---|---|
| **Transmit Power** | -4.4 to 4.0 dBm |
| **Tx Minimum OMA** | -1.7 |
| **Minimum Extinction Ratio** | 8.2 |
| **Rx Sensitivity OMA (dBm)** | -14.1 |
| **Stressed RX Sensitivity (dBm)** | -11.3 |
| **Rx Saturation (dBm)** | -1.0 |
| **Power Budget (dB)** | 9.4 |
| **Channel Insertion Loss (dB)** | 10.9 |
| **Allocation for Penalties (dB)** | 4.1 |

#### Cabling

| | |
|---|---|
| **Speed** | 10 Gbps |
| **Mode** | SM (Single-Mode) |
| **Interface** | ER |
| **Connector** | LC |
| **Cable Type** | 9/125 µm |
| **Wavelength (Tx)** | 1530 to 1565 nm |
| **Wavelength (Tx)** | 1530 to 1565 nm |
| **Nominal Distance** | 40 km (24.9 mi) |

### Environment

| | |
|---|---|
| **Operating Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Storage Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Mean Time Between Failures (MTBF)** | 630 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

## Regulator Compliance

The RUGGEDCOM SFP2133-1ER40 meets the following standards when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| RoHS | EU RoHS Directive 2002/95/EC | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

## Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8FT53-0AA0 | RUGGEDCOM SFP2133-1ER40 | 10GBase-ER SFP – SM, 1550 nm, LC, 40 km |

## 7.4 RUGGEDCOM SFP2133-1ZR80

Siemens' RUGGEDCOM SFP2133-1ZR80 industrial grade 10 Gbps fiber optic extended reach SFP+ transceiver operates within a wide temperature range (-40 to 85 °C or -40 to 185 °F) and provides high performance Gigabit Ethernet communication up to 80 km (49.7 mi) using single-mode fiber.

### Highlights

- Compliant with SFP+ MSA and OC-192/STM-64 for 10GBase-ZR/ZW
- Compliant with SFF-8431 (Rev 2)
- Compliant with SFF-8432 (Rev 4.3)
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface (Rev 10.4)
- Transmission distance up to 80 km (49.7 mi)
- LC duplex connector optical interface
- Bail latch
- Hot swappable
- RoHS compliant

### Specifications

#### Optical Characteristics

| | |
|---|---|
| **Transmit Power** | -1.0 to 4.0 dBm |
| **Minimum Extinction Ratio** | 9.0 |
| **Rx Sensitivity OMA (dBm)** | -23.0 |
| **Rx Saturation (dBm)** | -7.0 |
| **Power Budget (dB)** | 22.0 |

#### Cabling

| | |
|---|---|
| **Speed** | 10 Gbps |
| **Mode** | SM (Single-Mode) |
| **Interface** | ZR |
| **Connector** | LC |
| **Cable Type** | 9/125 µm |
| **Wavelength (Tx)** | 1520 to 1565 nm |
| **Wavelength (Rx)** | 1530 to 1565 nm |
| **Nominal Distance** | 80 km (49.7 mi) |

#### Environment

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

| | |
|---|---|
| **Mean Time Between Failures (MTBF)** | 950 years[a] |

[a] Tested at an operating temperature of 40 °C (104 °F)

## Regulator Compliance

The RUGGEDCOM SFP2133-1ZR80 meets the following standards when installed in Siemens RUGGEDCOM routers and/or switches:

| Feature | Standard | Performance |
|---|---|---|
| RoHS | EU RoHS Directive 2002/95/EC | Compliant |
| Eurasian Conformity (EAC) | CU TR 004/2011, CU TR 020/2011 | Compliant |

## Ordering Information

| Article Number | Name | Description |
|---|---|---|
| 6GK6000-8FT52-0AA0 | RUGGEDCOM SFP2133-1ZR80 | 10GBase-ZR SFP – SM, 1550 nm, LC, 80 km |

# 8 Installation/Removal

All SFP transceivers are hot swappable, making it possible to install or remove them while the router/switch is in operation.

**⚠ NOTICE**

SFP transceivers can only be hot swapped with SFPs supported by the router/switch. To determine compatibility, refer to "Available SFP Transceivers (Page 2)".

## 8.1 Handling SFP Transceivers

Before handling an SFP transceiver, note the following:

**⚠ WARNING**

**Radiation hazard – risk of serious personal injury.**

SFP transceivers are equipped with a Class 1 laser. When installed, each SFP emits invisible radiation even when a cable is not connected. Avoid exposure to laser radiation and do not stare into open SFP ports.

**⚠ CAUTION**

**Electrical hazard – risk of damage to equipment.**

Use only components certified by Siemens with RUGGEDCOM products. Damage to the router/switch may occur if compatibility and reliability have not been properly assessed.

**⚠ CAUTION**

**Static electricity hazard – risk of damage to equipment.**

SFP transceivers are sensitive to static electricity. An electrostatic discharge (ESD) can cause serious damage to the component once it is outside the chassis. Make sure to wear an ESD-preventive wrist strap connected to the chassis to prevent an electrostatic discharge (ESD).

**⚠ CAUTION**

**Dirt/debris hazard – risk of damage to equipment.**

SFP transceivers and sockets are sensitive to the ingress of dirt/debris. Always install a dust plug in both the SFP transceiver and the socket on the router/switch after removing the SFP. Do not remove the plugs until inserting the SFP.

| ⚠ CAUTION |
| --- |
| **Mechanical hazard – risk of damage to equipment.**<br>Do not install/remove SFP transceivers more than necessary. Repeated installation/removal can reduce the life of the transceiver. |

| ⚠ NOTICE |
| --- |
| Only permit trained and qualified personnel to install and remove SFP transceivers. |

## 8.2 Required Tools

The following tools are required for installing/removing SFP transceivers:

- An ESD-preventive wrist trap or other personal grounding device
- An anti-static mat or foam to set the transceiver on

## 8.3 Installation

To install an SFP transceiver, do the following:

| ⚠ WARNING |
| --- |
| **Explosion hazard – risk of serious personal injury and/or equipment damage.**<br>Do not install or remove SFP transceivers when an explosive atmosphere is present. |

**Note**

Some RUGGEDCOM routers/switches may only support specific SFP transceivers in select sockets. For information about which socket(s) an SFP transceiver is compatible with, refer to the "Installation Guide" for the compatible RUGGEDCOM router/switch.

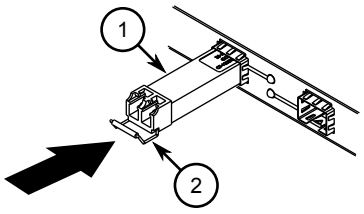
**Note**

Only install SFP transceivers that are compatible with the RUGGEDCOM router/switch. For information about which RUGGEDCOM routers/switches are compatible with an SFP transceiver, refer to "Available SFP Transceivers (Page 2)".

1. Make sure all potential electrostatic build-up has been properly discharged to prevent an electrostatic discharge (ESD). This can be accomplished by wearing an ESD-preventive wrist trap connected to either the chassis ground connector or a bare metal surface on the router/switch.
2. Remove the SFP transceiver from its packaging.

| ⚠ CAUTION |
| --- |
| **Mechanical hazard – risk of component damage**<br>SFP transceivers are designed to insert in only one orientation. Do not force the SFP transceiver into the socket. |

3. Remove the dust plug from the socket and store for future use.
4. Insert the SFP transceiver into the socket, and then swing the bail-latch on the SFP transceiver up and push it in to lock the transceiver in place.




① SFP Transceiver
② Bail-Latch

Figure 8.1 Installing an SFP Transceiver (Typical)

| ⚠ NOTICE |
| --- |
| Only remove the dust plug when ready to connect a cable to the SFP transceiver. |

5. Remove the dust plug from the SFP transceiver and store for future use.
6. Remove the dust cap from the cable and immediately connect it to the SFP transceiver.
7. Connect the cable to a network and observe the LED associated with the SFP transceiver.

| State | Description |
| --- | --- |
| Green (Solid) | Link established |
| Green (Blinking) | Link activity |
| Off | No link detected |

## 8.4 Removal

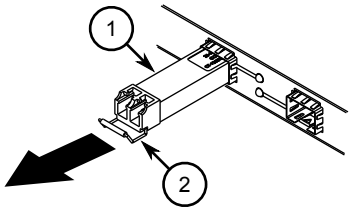
To remove an SFP transceiver, do the following:

**⚠ WARNING**

**Explosion hazard – risk of serious personal injury and/or equipment damage.**

Do not install or remove SFP transceivers when an explosive atmosphere is present.

1. Make sure all potential electrostatic build-up has been properly discharged to prevent an electrostatic discharge (ESD). This can be accomplished by wearing an ESD-preventive wrist trap connected to either the chassis ground connector or a bare metal surface on the router/switch.
2. Disconnect the cable from the SFP transceiver and install the dust cap to the cable end.
3. Pull the bail-latch out and down on the SFP transceiver, and then immediately insert a dust plug into the SFP transceiver port.
4. Remove the transceiver from the socket and then immediately insert a dust plug into the socket.




① SFP Transceiver
② Bail-Latch

Figure 8.2 Removing an SFP Transceiver (Typical)

**Note**

Some RUGGEDCOM routers/switches may only support specific SFP transceivers in select sockets. For information about which socket(s) an SFP transceiver is compatible with, refer to the "Installation Guide" for the compatible RUGGEDCOM router/switch.

**Note**

Refer to the specifications for the specific SFP transceiver to determine the required storage temperature range.

5. Store the SFP port in an ESD-safe bag or other suitable ESD-safe environment, free from moisture and stored at the proper temperature.
6. Insert a dust plug into the socket opening to prevent the ingress of dust and dirt.

## For more information

Siemens RUGGEDCOM
**https://www.siemens.com/ruggedcom**

Industry Online Support (service and support)
**https://support.industry.siemens.com**

Industry Mall
**https://mall.industry.siemens.com**

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