

SIEMENS

RUGGEDCOM SFP Transceivers

Catalog

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To stay informed about product updates as they occur, sign up for a product-specific newsletter. For more information, visit <https://support.automation.siemens.com>.

» Warranty

For warranty details, visit <https://www.siemens.com/ruggedcom> or contact a Siemens customer service representative.

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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.

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- [“Alerts”](#)
- [“Training”](#)
- [“Customer Support”](#)
- [“Ordering RUGGEDCOM Products”](#)

Alerts

The following types of alerts are used when necessary to highlight important information.



DANGER!

DANGER alerts describe imminently hazardous situations that, if not avoided, will result in death or serious injury.



WARNING!

WARNING alerts describe hazardous situations that, if not avoided, may result in serious injury and/or equipment damage.



CAUTION!

CAUTION alerts describe hazardous situations that, if not avoided, may result in equipment damage.



IMPORTANT!

IMPORTANT alerts provide important information that should be known before performing a procedure or step, or using a feature.



NOTE

NOTE alerts provide additional information, such as facts, tips and details.

Training

Siemens offers a wide range of educational services ranging from in-house training of standard courses on networking, Ethernet switches and routers, to on-site customized courses tailored to the customer's needs, experience and application.

Siemens' Educational Services team thrives on providing our customers with the essential practical skills to make sure users have the right knowledge and expertise to understand the various technologies associated with critical communications network infrastructure technologies.

Siemens' unique mix of IT/Telecommunications expertise combined with domain knowledge in the utility, transportation and industrial markets, allows Siemens to provide training specific to the customer's application.

For more information about training services and course availability, visit <https://www.siemens.com/ruggedcom> or contact a Siemens Sales representative.

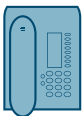
Customer Support

Customer support is available 24 hours, 7 days a week for all Siemens customers. For technical support or general information, contact Siemens Customer Support through any of the following methods:



Online

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 <http://www.automation.siemens.com/mcms/aspa-db/en/automation-technology/Pages/default.aspx>.



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

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/ruggedcom>.

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.

**IMPORTANT!**

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.

**IMPORTANT!**

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**

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

**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**

All optical power numbers are listed as dBm averages.

CONTENTS

- [Section 1.1, "Selecting an SFP Transceiver"](#)
- [Section 1.2, "Available SFP Transceivers"](#)

Section 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 [Section 1.2, "Available SFP Transceivers"](#).

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

Section 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

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	RS910	RS908C	RS910C	RS920P	RS9100(P)	RS92200	RS92288	RS92300(P)	RS92488	RS950G	RS907R	RS909R	RX1400	RST2228(P) Ports 1-4	RST2228(P) Modules	RX15xx FG50	RX15xx FX50/6FX50	RX5000 4FG50	RX5000 8FX50	RX5000 SM69	RX5000 SM09/SM39					
Copper	RJ45	0.1	SFP1112-1	6GK6000-8CG01-0AA0																													
		2	SFP1121-1FX2A	6GK6000-8FE50-0AA0																													
100 Mbps Active	MM	10	SFP1131-1FX10A	6GK6000-8FE60-0AA0																													
	SM	40	SFP1131S-1FX40A	6GK6000-8FE62-0AA0																													
100 Mbps	MM	2	SFP1121-1FX2	6GK6000-8FE51-0AA0																													
		20	SFP1131-1FX20	6GK6000-8FE52-0AA0																													
	SM	50	SFP1131-1FX50	6GK6000-8FE53-0AA0																													
		90	SFP1131-1FX90	6GK6000-8FE54-0AA0																													
1 Gbps Single-fiber Bidirectional		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																													
		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																													
		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 [Section 1.2, "Available SFP Transceivers"](#).

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- [Section 2.1, "RUGGEDCOM SFP1112-1"](#)

Section 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

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	RJ-45
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)

» Product-Specific Deviations

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

Product(s)	Specification	Rating
RUGGEDCOM RSG907R, RSG909R	Speed	Supports only 1000 Mbps on the coupler port on RUGGEDCOM ROS v5.2 firmware versions
RUGGEDCOM RSG908C, RSG910C	Speed	Supports only 1000 Mbps on RUGGEDCOM ROS v5.2 firmware versions

» Regulatory 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

» **Ordering Information**

Article Number	Name	Description
6GK6000-8CG01-0AA0	RUGGEDCOM SFP1112-1	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 [Section 1.2, "Available SFP Transceivers"](#).

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- [Section 3.1, "RUGGEDCOM SFP1121-1FX2"](#)
- [Section 3.2, "RUGGEDCOM SFP1131-1FX20"](#)
- [Section 3.3, "RUGGEDCOM SFP1131-1FX50"](#)
- [Section 3.4, "RUGGEDCOM SFP1131-1FX90"](#)

Section 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
- 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	1310 nm
Nominal Distance	2 km (1.2 mi)

Environment

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

^a When Smart SFP mode is enabled, the RUGGEDCOM SFP1121-1FX2 can be used with Gigabit modules in RUGGEDCOM RX1500, RX1501, RX1510, RX1511, RX1512, and RX5000 devices. For more information, refer to the RUGGEDCOM ROX II User Guide.

» Regulatory 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 EN 60825-1 (+A11)	Compliant

Feature	Standard	Performance
RoHS	EU RoHS Directive 2002/95/EC	Compliant

» **Ordering Information**

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

Section 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

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

» Highlights

- Compliant with SFP MSA for 100Base-FX
- 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	-31 to -8 dBm
Power Budget	16 dB

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)

Cabling

Speed	100 Mbps ^b
Interface	FX
Mode	SM (Single-Mode)
Connector	LC
Cable Type	9/125 μm
Wavelength	1300 nm
Nominal Distance	20 km (12.4 mi)

^b When Smart SFP mode is enabled, the RUGGEDCOM SFP1131-1FX20 can be used with Gigabit modules in RUGGEDCOM RX1500, RX1501, RX1510, RX1511, RX1512, and RX5000 devices. For more information, refer to the RUGGEDCOM ROX II User Guide.

» Regulatory 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 JEDEC/EIA JESD22-A114-A	Class 2 (2000 V)
Electrostatic Discharge (ESD) to the Duplex LC Receptacle	Bellcore GR1089-CORE	25 kV Air Discharge 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

Feature	Standard	Performance
Eye Safety	US FDA CDRH AEL Class 1 IEC/EN 60825-1 and 60825-2 EN 60950 Class 1	Compliant with Class 1 laser product
RoHS	EU RoHS Directive 2002/95/EC	Compliant

» **Ordering Information**

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

Section 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 -0 dBm
Power Budget	29

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)

Cabling

Speed	100 Mbps ^c
Mode	SM (Single-Mode)
Interface	FX
Connector	LC
Cable Type	9/125 μm
Wavelength	1300 nm
Nominal Distance	50 km (31.1 mi)

^c When Smart SFP mode is enabled, the RUGGEDCOM SFP1131-1FX50 can be used with Gigabit modules in RUGGEDCOM RX1500, RX1501, RX1510, RX1511, RX1512, and RX5000 devices. For more information, refer to the RUGGEDCOM ROX II User Guide.

» Regulatory 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 JEDEC/EIA JESD22-A114-A	Class 2 (2000 V)
Electrostatic Discharge (ESD) to the Duplex LC Receptacle	Bellcore GR1089-CORE	25 kV Air Discharge 10 Zaps at 8 kV (contact discharge) on the electrical faceplate on panel

Feature	Standard	Performance
Electromagnetic Interference (EMI)	FCC Class B	Compliant
Immunity	Variation of IEC 61000-4-3	Compliant
Eye Safety	US FDA CDRH AEL Class 1 IEC/EN 60825-1 and 60825-2 EN 60950 Class 1	Class 1
RoHS	EU RoHS Directive 2002/95/EC	Compliant

» **Ordering Information**

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

Section 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
- 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

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)

Cabling

Speed	100 Mbps ^d
Mode	SM (Single-Mode)
Interface	FX
Connector	LC
Cable Type	9/125 μm
Wavelength	1550 nm
Nominal Distance	90 km (55.9 mi)

^d When Smart SFP mode is enabled, the RUGGEDCOM SFP1131-1FX90 can be used with Gigabit modules in RUGGEDCOM RX1500, RX1501, RX1510, RX1511, RX1512, and RX5000 devices. For more information, refer to the RUGGEDCOM ROX II User Guide.

» Regulatory 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

» 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 [Section 1.2, "Available SFP Transceivers"](#).

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- [Section 4.1, "RUGGEDCOM SFP1121-1FX2A"](#)
- [Section 4.2, "RUGGEDCOM SFP1131-1FX10A"](#)
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Section 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

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

» Highlights

- Compliant with SFP MSA and IEEE 802.3 for 100Base-FX
- 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	-20 to -14 dBm
Receiver Sensitivity	-31.5 to -8 dBm
Power Budget	11.5 dB

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)

Cabling

Speed	100 Mbps
Mode	MM (Multi-Mode)
Interface	FX
Connector	LC
Cable Type	50/125 or 62.5/125 µm
Wavelength	1310 nm
Nominal Distance	2 km (1.2 mi)

» Regulatory 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 GR-1089-CORE	Compliant
Electromagnetic Interference (EMI)	FCC Part 15, Class B	Compliant
Laser Eye Safety	US FDA 21CFR 1040.10 and 1040.11 IEC/EN 60825-1 and 60825-2	Compliant with Class 1 laser product

Feature	Standard	Performance
RoHS	EU RoHS Directive 2011/65/EU	Compliant

» **Ordering Information**

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

Section 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.

» Highlights

- Compliant with SFP MSA for 100Base-FX
- 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

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)

Cabling

Speed	100 Mbps
Interface	FX
Mode	SM (Single-Mode)
Connector	LC
Cable Type	9/125 μm
Wavelength	1310 nm
Nominal Distance	10 km (6.2 mi)

» Regulatory 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 GR-1089-CORE	Compliant
Electromagnetic Interference (EMI)	FCC Part 15, Class B	Compliant
Eye Safety	US FDA 21CFR 1040.10 and 1040.11 IEC/EN 60825-1 and 60825-2	Compliant with Class 1 laser product
RoHS	EU RoHS Directive 2011/65/EU	Compliant

» **Ordering Information**

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

Section 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.

» Highlights

- Compliant with SFP MSA for 100Base-FX
- 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

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)

Cabling

Speed	100 Mbps
Interface	FX
Mode	SM (Single-Mode)
Connector	LC
Cable Type	9/125 μm
Wavelength	1310 nm
Nominal Distance	40 km (24.9 mi)

» Regulatory 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 GR-1089-CORE	Compliant
Electromagnetic Interference (EMI)	FCC Part 15, Class B	Compliant
Eye Safety	US FDA 21CFR 1040.10 and 1040.11 IEC/EN 60825-1 and 60825-2	Compliant with Class 1 laser product
RoHS	EU RoHS Directive 2011/65/EU	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 [Section 1.2, "Available SFP Transceivers"](#).

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- [Section 5.1, "RUGGEDCOM SFP1122-1SX"](#)
- [Section 5.2, "RUGGEDCOM SFP1122-1SX2"](#)
- [Section 5.3, "RUGGEDCOM SFP1132-1LX10"](#)
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- [Section 5.5, "RUGGEDCOM SFP1132-1LX40"](#)
- [Section 5.6, "RUGGEDCOM SFP1132-1LX70"](#)
- [Section 5.7, "RUGGEDCOM SFP1132-1LX100"](#)
- [Section 5.8, "RUGGEDCOM SFP1132-1LX115"](#)

Section 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
- 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	-20 to 0 dBm
Power Budget	11 dB

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)

Cabling

Speed	1 Gbps
Mode	MM (Multi-Mode)
Interface	SX
Connector	LC
Cable Type	50/125 or 62.5/125 μm
Wavelength	850 nm
Nominal Distance (50/125 μm)	0.5 km (0.3 mi)
Nominal Distance (62.5/125 μm)	0.3 km (0.2 mi)

» Regulatory 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

» **Ordering Information**

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

Section 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
- 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	-23 to -3 dBm
Power Budget	14 dB

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)

Cabling

Speed	1 Gbps
Mode	MM (Multi-Mode)
Interface	SX
Connector	LC
Cable Type	50/125 or 62.5/125 μm
Wavelength	1310 nm
Nominal Distance	2 km (1.2 mi)

» Regulatory 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

» Ordering Information

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

Section 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 -3.0 dBm
Power Budget	9.5 dB

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)

Cabling

Speed	1 Gbps
Mode	SM (Single-Mode)
Interface	LX
Connector	LC
Cable Type	9/125 μm
Wavelength	1310 nm
Nominal Distance	10 km (6.2 mi)

» Regulatory 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 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 IEC/EN 60825-1 and 60825-2 EN 60950 Class 1	Compliant
RoHS	EU RoHS Directive 2002/95/EC	Compliant

» Ordering Information

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

Section 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	-7.0 to -3.0 dBm
Receiver Sensitivity	-23.0 to -3.0 dBm
Power Budget	16 dB

Environment

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

Cabling

Speed	1 Gbps
Mode	SM (Single-Mode)
Interface	LX
Connector	LC
Cable Type	9/125 μm
Wavelength	1310 nm
Nominal Distance	25 km (15.5 mi)

» Regulatory 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

» Ordering Information

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

Section 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	-6.0 to 0.0 dBm
Receiver Sensitivity	-23.0 to -3.0 dBm
Power Budget	17 dB

Environment

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

Cabling

Speed	1 Gbps
Mode	SM (Single-Mode)
Interface	LX
Connector	LC
Cable Type	9/125 μm
Wavelength	1550 nm
Nominal Distance	40 km (24.9 mi)

» Regulatory 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

» Ordering Information

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

Section 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	-23.0 to -3.0 dBm
Power Budget	23 dB

Environment

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

Cabling

Speed	1 Gbps
Mode	SM (Single-Mode)
Interface	LX
Connector	LC
Cable Type	9/125 μm
Wavelength	1550 nm
Nominal Distance	70 km (43.5 mi)

» Regulatory 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

» Ordering Information

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

Section 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

Environment

Operating Temperature	0 to 70 °C (32 to 158 °F)
Storage Temperature	-40 to 85 °C (-40 to 185 °F)

Cabling

Speed	1 Gbps
Mode	SM (Single-Mode)
Interface	LX
Connector	LC
Cable Type	9/125 μm
Wavelength	1550 nm
Nominal Distance:	100 km (62.1 mi)

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

» Regulatory 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

» Ordering Information

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

Section 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
- 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

Environment

Operating Temperature	-10 to 70 °C (14 to 158 °F)
Operating Relative Humidity	0 to 85% (non-condensing)
Storage Temperature	-40 to 85 °C (-40 to 185 °F)

Cabling

Speed	1 Gbps
Mode	SM (Single-Mode)
Interface	LX
Connector	LC
Cable Type	9/125 μm
Wavelength	1550 nm
Nominal Distance	115 km (71.5 mi)

» Regulatory 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

» 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 [Section 1.2, "Available SFP Transceivers"](#).

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- [Section 6.1, "RUGGEDCOM SFP1132-1BX10R"](#)
- [Section 6.2, "RUGGEDCOM SFP1132-1BX10T"](#)
- [Section 6.3, "RUGGEDCOM SFP1132-1BX40R"](#)
- [Section 6.4, "RUGGEDCOM SFP1132-1BX40T"](#)

Section 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

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)

Cabling

Speed	1000 Mbit/s
Mode	SM
Interface	BX
Connector	LC
Cable Type (µm)	9/125
Wavelength (Tx)	1310 nm
Wavelength (Rx)	1490 nm
Nominal Distance	10 km (6.2 mi)

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

» Regulatory 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 21CFR 1040.10 and 1040.11 IEC/EN 60825-1 and 60825-2 EN 60950	Compliant with Class 1 laser product
RoHS	EU RoHS Directive 2011/65/EU	Compliant

» **Ordering Information**

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

Section 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 ^b	10.5 dB

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)

Cabling

Speed	1 Gbps
Mode	SM (Single-Mode)
Interface	BX
Connector	LC
Cable Type	9/125 μm
Wavelength (Tx)	1490 nm
Wavelength (Rx)	1310 nm
Nominal Distance	10 km (6.2 mi)

^b Assumes an SFP1132-1BX10R is used at the other end of the connection.

» Regulatory 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 21CFR 1040.10 and 1040.11 IEC/EN 60825-1 and 60825-2 EN 60950	Compliant with Class 1 laser product
RoHS	EU RoHS Directive 2011/65/EU	Compliant

» **Ordering Information**

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

Section 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 ^c	21 dB

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)

Cabling

Speed	1 Gbps
Mode	SM (Single-Mode)
Interface	BX
Connector	LC
Cable Type	9/125 μm
Wavelength (Tx)	1310 nm
Wavelength (Rx)	1490 nm
Nominal Distance	40 km (24.9 mi)

^c Assumes an SFP1132-1BX40T is used at the other end of the connection.

» Regulatory 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 21CFR 1040.10 and 1040.11 IEC/EN 60825-1 and 60825-2	Compliant with Class 1 laser product

Feature	Standard	Performance
	EN 60950	
RoHS	EU RoHS Directive 2011/65/EU	Compliant

» **Ordering Information**

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

Section 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 ^d	21 dB

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)

Cabling

Speed	1 Gbps
Mode	SM (Single-Mode)
Interface	BX
Connector	LC
Cable Type	9/125 μm
Wavelength (Tx)	1490 nm
Wavelength (Rx)	1310 nm
Nominal Distance	40 km (24.9 mi)

^d Assumes an SFP1132-1BX40R is used at the other end of the connection.

» Regulatory 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 21CFR 1040.10 and 1040.11 IEC/EN 60825-1 and 60825-2	Compliant with Class 1 laser product

Feature	Standard	Performance
	EN 60950	
RoHS	EU RoHS Directive 2011/65/EU	Compliant

» **Ordering Information**

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

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 [Section 1.2, "Available SFP Transceivers"](#).

CONTENTS

- [Section 7.1, "RUGGEDCOM SFP2123-1SR"](#)
- [Section 7.2, "RUGGEDCOM SFP2133-1LR10"](#)
- [Section 7.3, "RUGGEDCOM SFP2133-1ER40"](#)
- [Section 7.4, "RUGGEDCOM SFP2133-1ZR80"](#)

Section 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-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

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)

Cabling

Speed	10 Gbps
Mode	MM (Multi-Mode)
Interface	SR
Connector	LC
Cable Type	50/125 or 62.5/125 μm
Wavelength	850 nm
Nominal Distance	400 m (1312 ft)

» Regulatory 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 21CFR 1040.10 and 1040.11 IEC/EN 60825-1	Class 1
RoHS	EU RoHS Directive 2002/95/EC	Compliant

» **Ordering Information**

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

Section 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-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	1310 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)

» 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)

» Regulatory 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 21CFR 1040.10 and 1040.11 IEC/EN 60825-1	Class 1
RoHS	EU RoHS Directive 2002/95/EC	Compliant

» Ordering Information

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

Section 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

Environment

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

Cabling

Speed	10 Gbps
Mode	SM (Single-Mode)
Interface	ER
Connector	LC
Cable Type	9/125 µm
Wavelength	1550 nm
Nominal Distance	40 km (24.9 mi)

» Regulatory 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

» Ordering Information

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

Section 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

Environment

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

Cabling

Speed	10 Gbps
Mode	SM (Single-Mode)
Interface	ZR
Connector	LC
Cable Type	9/125 μm
Wavelength	1550 nm
Nominal Distance	80 km (49.7 mi)

» Regulatory 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

» 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.



IMPORTANT!

SFP transceivers can only be hot swapped with SFPs supported by the router/switch. To determine compatibility, refer to [Section 1.2, "Available SFP Transceivers"](#).

CONTENTS

- [Section 8.1, "Handling SFP Transceivers"](#)
- [Section 8.2, "Required Tools"](#)
- [Section 8.3, "Installation"](#)
- [Section 8.4, "Removal"](#)

Section 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. Do not install/remove SFP transceivers more than necessary. Repeated installation/removal can reduce the life of the transceiver.



IMPORTANT!

Only permit trained and qualified personnel to install and remove SFP transceivers.

Section 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

Section 8.3

Installation

To install 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.



IMPORTANT!

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 [Section 1.2, “Available SFP Transceivers”](#).

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. 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.

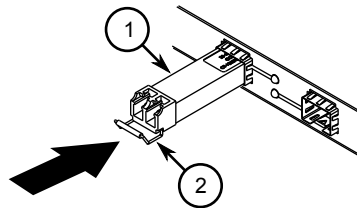


Figure 1: Installing an SFP Transceiver (Typical)

1. SFP Transceiver 2. Bail-Latch



IMPORTANT!

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

State	Description
Off	No link detected

Section 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.

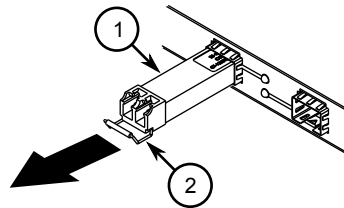


Figure 2: Removing an SFP Transceiver (Typical)

1. SFP Transceiver 2. Bail-Latch



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.