

RUGGEDCOM SFP Transceivers

Catalog

Preface	
Introduction	1
Copper SFP Transceivers	2
Fast Ethernet SFP Transceivers	3
Gigabit Ethernet SFP Transceivers	4
10-Gigabit Ethernet SFP+ Transceivers	5
Installation/Removal	6

Copyright © 2017 Siemens Canada Ltd

All rights reserved. Dissemination or reproduction of this document, or evaluation and communication of its contents, is not authorized except where expressly permitted. Violations are liable for damages. All rights reserved, particularly for the purposes of patent application or trademark registration.

This document contains proprietary information, which is protected by copyright. All rights are reserved. No part of this document may be photocopied, reproduced or translated to another language without the prior written consent of Siemens Canada Ltd.

» Disclaimer Of Liability

Siemens has verified the contents of this document against the hardware and/or software described. However, deviations between the product and the documentation may exist.

Siemens shall not be liable for any errors or omissions contained herein or for consequential damages in connection with the furnishing, performance, or use of this material.

The information given in this document is reviewed regularly and any necessary corrections will be included in subsequent editions. We appreciate any suggested improvements. We reserve the right to make technical improvements without notice.

» Registered Trademarks

RUGGEDCOM™ and ROS™ are trademarks of Siemens Canada Ltd.

Other designations in this manual might be trademarks whose use by third parties for their own purposes would infringe the rights of the owner.

» Security Information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, machines, equipment and/or networks. They are important components in a holistic industrial security concept. With this in mind, Siemens' products and solutions undergo continuous development. Siemens recommends strongly that you regularly check for product updates.

For the secure operation of Siemens products and solutions, it is necessary to take suitable preventive action (e.g. cell protection concept) and integrate each component into a holistic, state-of-the-art industrial security concept. Third-party products that may be in use should also be considered. For more information about industrial security, visit <http://www.siemens.com/industrialsecurity>.

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

» Warranty

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

» Contacting Siemens

Address

Siemens Canada Ltd
Industry Sector
300 Applewood Crescent
Concord, Ontario
Canada, L4K 5C7

Telephone

Toll-free: 1 888 264 0006
Tel: +1 905 856 5288
Fax: +1 905 856 1995

E-mail

ruggedcom.info.i-ia@siemens.com

Web

www.siemens.com/ruggedcom

Table of Contents

Preface v

 Alerts v

 Training vi

 Customer Support vi

 Ordering RUGGEDCOM Products vi

Chapter 1

Introduction 1

 1.1 Selecting an SFP Transceiver 1

 1.2 Specifications Summary 2

 1.3 Product Compatibility Matrix 3

Chapter 2

Copper SFP Transceivers 5

 2.1 RUGGEDCOM SFP1112-1 5

Chapter 3

Fast Ethernet SFP Transceivers 7

 3.1 RUGGEDCOM SFP1121-1FX2 7

 3.2 RUGGEDCOM SFP1121-1FX2A 8

 3.3 RUGGEDCOM SFP1131-1FX20 9

 3.4 RUGGEDCOM SFP1131-1FX50 10

 3.5 RUGGEDCOM SFP1131-1FX90 12

Chapter 4

Gigabit Ethernet SFP Transceivers 13

 4.1 RUGGEDCOM SFP1132-1BX10R 13

 4.2 RUGGEDCOM SFP1132-1BX10T 14

 4.3 RUGGEDCOM SFP1132-1BX40R 16

 4.4 RUGGEDCOM SFP1132-1BX40T 17

 4.5 RUGGEDCOM SFP1122-1SX 18

 4.6 RUGGEDCOM SFP1122-1SX2 19

 4.7 RUGGEDCOM SFP1132-1LX10 20

 4.8 RUGGEDCOM SFP1132-1LX25 21

 4.9 RUGGEDCOM SFP1132-1LX40 22

 4.10 RUGGEDCOM SFP1132-1LX70 23

4.11 RUGGEDCOM SFP1132-1LX100 24

4.12 RUGGEDCOM SFP1132-1LX115 25

Chapter 5

10-Gigabit Ethernet SFP+ Transceivers 27

5.1 RUGGEDCOM SFP2133-1LR10 27

5.2 RUGGEDCOM SFP2133-1ER40 28

5.3 RUGGEDCOM SFP2133-1ZR80 29

Chapter 6

Installation/Removal 31

6.1 Handling SFP Transceivers 31

6.2 Required Tools 32

6.3 Installation 32

6.4 Removal 33

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.

CONTENTS

- [“ 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 www.siemens.com/ruggedcom or contact a Siemens Sales representative.

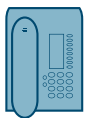
Customer Support

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 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, "Specifications Summary"](#)
- [Section 1.3, "Product Compatibility Matrix"](#)

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. For more information, refer to [Section 1.2, "Specifications Summary"](#).

2. Determine which RUGGEDCOM product(s) support the chosen SFP transceiver. For more information, refer to [Section 1.3, "Product Compatibility Matrix"](#).
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.

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

Section 1.2

Specifications Summary

The following lists the primary technical specifications for each RUGGEDCOM SFP transceiver. For more detailed specifications, refer to the individual section for the chosen SFP transceiver.

SFP Transceiver	Article Number	Speed (Mbit/s)	Mode ^a	Nominal Distance (km)
RUGGEDCOM SFP1112-1	6GK6000-8CG01-0AA0	10/100/1000	CAT-5e Copper	0.1
RUGGEDCOM SFP1121-1FX2	6GK6000-8FE51-0AA0	100	MM	2
RUGGEDCOM SFP1121-1FX2A	6GK6000-8FE50-0AA0	100	MM	2
RUGGEDCOM SFP1131-1FX20	6GK6000-8FE52-0AA0	100	SM	20
RUGGEDCOM SFP1131-1FX50	6GK6000-8FE53-0AA0	100	SM	50
RUGGEDCOM SFP1131-1FX90	6GK6000-8FE54-0AA0	100	SM	90
RUGGEDCOM SFP1132-1BX10R	6GK6000-8FB51-0AA0	1000	SM	10
RUGGEDCOM SFP1132-1BX10T	6GK6000-8FB52-0AA0	1000	SM	10
RUGGEDCOM SFP1132-1BX40R	6GK6000-8FB53-0AA0	1000	SM	40
RUGGEDCOM SFP1132-1BX40T	6GK6000-8FB54-0AA0	1000	SM	40
RUGGEDCOM SFP1122-1SX	6GK6000-8FG51-0AA0	1000	MM	0.5
RUGGEDCOM SFP1122-1SX2	6GK6000-8FE58-0AA0	1000	MM	2
RUGGEDCOM SFP1132-1LX10	6GK6000-8FG52-0AA0	1000	SM	10
RUGGEDCOM SFP1132-1LX25	6GK6000-8FG53-0AA0	1000	SM	25
RUGGEDCOM SFP1132-1LX40	6GK6000-8FG57-0AA0	1000	SM	40
RUGGEDCOM SFP1132-1LX70	6GK6000-8FG54-0AA0	1000	SM	70
RUGGEDCOM SFP1132-1LX100	6GK6000-8FG55-0AA0	1000	SM	100
RUGGEDCOM SFP1132-1LX115	6GK6000-8FE56-0AA0	1000	SM	115
RUGGEDCOM SFP2133-1LR10	6GK6000-8FT51-0AA0	10000	SM	10
RUGGEDCOM SFP2133-1ER40	6GK6000-8FT52-0AA0	10000	SM	40
RUGGEDCOM SFP2133-1ZR80	6GK6000-8FT53-0AA0	10000	SM	80

^a MM = Multi-Mode, SM = Single-Mode

Section 1.3

Product Compatibility Matrix

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.

Name	RUGGEDCOM Products																		
	RS900G	RS900GP	RS940G	RS950G	RS92100	RS92100P	RS92200	RS92288	RS92300	RS92300P	RS92488	RS92920P	RX1400	RX1500	RX1501	RX1510	RX1511	RX1512	RX5000
RUGGEDCOM SFP1112-1	•	•			•	•	•		•	•	•	•							
RUGGEDCOM SFP1121-1FX2		•		•			•		•	•	•	•		•	•	•	•	•	•
RUGGEDCOM SFP1121-1FX2A													•						
RUGGEDCOM SFP1131-1FX20		•		•			•		•	•	•	•		•	•	•	•	•	•
RUGGEDCOM SFP1131-1FX50		•					•		•	•	•	•		•	•	•	•	•	•
RUGGEDCOM SFP1131-1FX90		•					•		•	•	•	•		•	•	•	•	•	•
RUGGEDCOM SFP1132-1BX10R	•	•					•		•	•	•	•	•	•	•	•	•	•	•
RUGGEDCOM SFP1132-1BX10T	•	•					•		•	•	•	•	•	•	•	•	•	•	•
RUGGEDCOM SFP1132-1BX40R	•	•					•		•	•	•	•	•	•	•	•	•	•	•
RUGGEDCOM SFP1132-1BX40T	•	•					•		•	•	•	•	•	•	•	•	•	•	•
RUGGEDCOM SFP1122-1SX	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
RUGGEDCOM SFP1122-1SX2														•	•	•	•	•	
RUGGEDCOM SFP1132-1LX10	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
RUGGEDCOM SFP1132-1LX25	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
RUGGEDCOM SFP1132-1LX40	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
RUGGEDCOM SFP1132-1LX70	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
RUGGEDCOM SFP1132-1LX100	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
RUGGEDCOM SFP1132-1LX115	•	•	•		•	•	•	•	•	•	•	•							
RUGGEDCOM SFP2133-1LR10																			•
RUGGEDCOM SFP2133-1ER40																			•
RUGGEDCOM SFP2133-1ZR80																			•

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 1.3, “Product Compatibility Matrix”](#).

CONTENTS

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

Section 2.1

RUGGEDCOM SFP1112-1

Siemens' RUGGEDCOM SFP1112-1 industrial grade 1 Gbps copper 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 m (328.1 ft).

» 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)

» 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 1.3, “Product Compatibility Matrix”](#).

CONTENTS

- [Section 3.1, “RUGGEDCOM SFP1121-1FX2”](#)
- [Section 3.2, “RUGGEDCOM SFP1121-1FX2A”](#)
- [Section 3.3, “RUGGEDCOM SFP1131-1FX20”](#)
- [Section 3.4, “RUGGEDCOM SFP1131-1FX50”](#)
- [Section 3.5, “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
- Bail latch
 - Hot swappable
 - RoHS compliant

» Specifications

Optical Characteristics		Cabling	
Transmit Power (50/125 µm)	-23.5 to -14.0 dBm	Speed	100 Mbps
Transmit Power (62.5/125 µm)	-20.0 to -14.0 dBm	Mode	MM (Multi-Mode)
Receiver Sensitivity	-31.0 to -3.0 dBm	Interface	FX
Power Budget (50/125 µm)	7.5 dB	Connector	LC
Power Budget (62.5/125 µm)	11 dB	Cable Type	50/125 or 62.5/125 µm
Environment		Wavelength	1310 nm
Operating Temperature	-40 to 85 °C (-40 to 185 °F)	Nominal Distance	2 km (1.2 mi)

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

» 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
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 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.

» 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
- Bail latch
- Hot swappable
- RoHS compliant

» Specifications

Optical Characteristics

Transmit Power	-20 -14 dBm
Receiver Sensitivity	-31.5 to -8 dBm
Power Budget	11.5 dB

Environment

Cabling

Speed	100 Mbps
Mode	MM (Multi-Mode)
Interface	FZ
Connector	LC

Operating Temperature	-40 to 85 °C (-40 to 185 °F)	Cable Type	62.5/125 µm
Operating Relative Humidity	5 to 95% (non-condensing)	Wavelength	1310 nm
Storage Temperature	-40 to 85 °C (-40 to 185 °F)	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 I laser product
RoHS	EU RoHS Directive 2011/65/EU	Compliant

» Ordering Information

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

Section 3.3

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
- Bail latch
- Hot swappable
- RoHS compliant

» Specifications

Optical Characteristics

Cabling

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)

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

» 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
Eye Safety	US FDA CDRH AEL Class 1 IEC/EN 60825-1 and 60825-2 EN 60950 Class 1	Compliant with Class I 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 3.4

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
- LC duplex fiber connector
- Bail latch

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

» 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
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 3.5

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

» 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 I
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 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 1.3, "Product Compatibility Matrix"](#).

CONTENTS

- [Section 4.1, "RUGGEDCOM SFP1132-1BX10R"](#)
- [Section 4.2, "RUGGEDCOM SFP1132-1BX10T"](#)
- [Section 4.3, "RUGGEDCOM SFP1132-1BX40R"](#)
- [Section 4.4, "RUGGEDCOM SFP1132-1BX40T"](#)
- [Section 4.5, "RUGGEDCOM SFP1122-1SX"](#)
- [Section 4.6, "RUGGEDCOM SFP1122-1SX2"](#)
- [Section 4.7, "RUGGEDCOM SFP1132-1LX10"](#)
- [Section 4.8, "RUGGEDCOM SFP1132-1LX25"](#)
- [Section 4.9, "RUGGEDCOM SFP1132-1LX40"](#)
- [Section 4.10, "RUGGEDCOM SFP1132-1LX70"](#)
- [Section 4.11, "RUGGEDCOM SFP1132-1LX100"](#)
- [Section 4.12, "RUGGEDCOM SFP1132-1LX115"](#)

Section 4.1

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

Cabling

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)

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 I 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, 40 km

Section 4.2

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
- Bail latch
- Hot swappable

- Transmission distance up to 10 km (6.2 mi)
- LC duplex fiber connector
- 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 I 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, 40 km

Section 4.3

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-BX-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	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 EN 60950	Compliant with Class I laser product
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 4.4

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

Feature	Standard	Performance
Laser Eye Safety	US FDA 21CFR 1040.10 and 1040.11 IEC/EN 60825-1 and 60825-2 EN 60950	Compliant with Class I laser product
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

Section 4.5

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 I
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 4.6

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 I

Feature	Standard	Performance
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 4.7

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)

Feature	Standard	Performance
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 4.8

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 4.9

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 4.10

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

Feature	Standard	Performance
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 4.11

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 IEEE 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 ^e	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)

^e 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

Feature	Standard	Performance
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 4.12

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
Receiver Sensitivity	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 I
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

5 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 1.3, "Product Compatibility Matrix"](#).

CONTENTS

- [Section 5.1, "RUGGEDCOM SFP2133-1LR10"](#)
- [Section 5.2, "RUGGEDCOM SFP2133-1ER40"](#)
- [Section 5.3, "RUGGEDCOM SFP2133-1ZR80"](#)

Section 5.1

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

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)

Allocation for Penalties (dB)	2.3
-------------------------------	-----

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)

>> 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	10000Base-LR SFP – SM, 1310 nm, LC, 10 km

Section 5.2

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

Cabling

Speed	10 Gbps
Mode	SM (Single-Mode)

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

Interface	ER
Connector	LC
Cable Type	9/125 µm
Wavelength	1550 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)

» 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	10000Base-ER SFP – SM, 1550 nm, LC, 40 km

Section 5.3

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

Cabling

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)

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	10000Base-ZR SFP – SM, 1550 nm, LC, 80 km

6 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 1.3, "Product Compatibility Matrix"](#).

CONTENTS

- [Section 6.1, "Handling SFP Transceivers"](#)
- [Section 6.2, "Required Tools"](#)
- [Section 6.3, "Installation"](#)
- [Section 6.4, "Removal"](#)

Section 6.1

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 6.2

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 6.3

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 1.3, "Product Compatibility Matrix"](#).

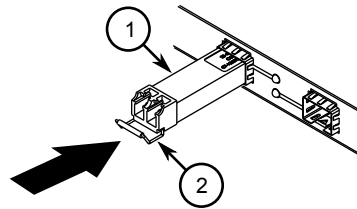
1. Make sure all potential electrostatic build-up has been properly discharged to prevent an electrostatic discharge (ESD). This can be accomplished by wearing an ESD-preventive wrist trap connected to either the chassis ground connector or a bare metal surface on the router/switch.
2. Remove the SFP 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
Off	No link detected

Section 6.4

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.

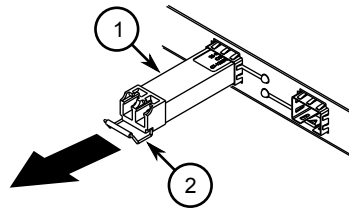


Figure 2: Removing an SFP Transceiver (Typical)

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.