
# SFP-SM-1G-BD-20K-RGD

## COMMANDO FiberX GE/FC BiDi SFP, SM, Single LC, Tx1490/Rx1310nm, 20km, Ruggedized, DDM, Multi-brand

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## Product Overview

COMMANDO Lightning FIBER SFP-SM-1G-BD-20K-RGD is a 1.25Gb/s SFP (Small Form Pluggable) bi-directional optical transceiver operating with Tx 1490nm / Rx 1310nm wavelengths over single-mode fiber. The transceiver is based on the Gigabit Ethernet IEEE 802.3 standard and Fiber Channel FC-PI-2 Rev. 7.0, providing a fast and reliable optical interface for Gigabit Ethernet and Fiber Channel applications.

The module uses a single LC connector for bi-directional optical transmission and supports transmission distances of up to 20km over 9/125µm single-mode fiber.

The SFP-SM-1G-BD-20K-RGD implements digital diagnostics through a 2-wire serial interface compliant with the SFP MSA and SFF-8472 standard. The internal microcontroller monitors transceiver operating parameters including temperature, laser bias current, transmitted optical power, received optical power and supply voltage in real time.

The module supports internally calibrated digital diagnostic monitoring and provides alarm and warning functions when monitored operating parameters exceed factory-set thresholds.

The RGD version supports an industrial operating temperature range of -40°C to 85°C case temperature, making it suitable for applications requiring operation across an extended temperature range.

## Product Highlights

- Up to 1.25Gb/s bi-directional data links
- Tx 1490nm / Rx 1310nm bi-directional optical transmission
- Single LC connector
- Compliant with IEEE 802.3z Gigabit Ethernet
- Compatible with SFP MSA
- Hot-pluggable SFP footprint
- 1490nm DFB laser transmitter
- Built-in Digital Diagnostic Monitoring (DDM) functions
- Up to 20km on 9/125μm single-mode fiber
- Single power supply 3.3V
- Supply voltage range 3.14V to 3.46V
- 2-wire serial communication interface
- Internally calibrated digital diagnostics
- Real-time monitoring of:
- Transceiver temperature
- Laser bias current
- Transmitted optical power
- Received optical power
- Transceiver supply voltage
- Supports optical parameter alarm and warning thresholds
- Supports RX_LOS signal monitoring
- Supports TX_DIS signal monitoring and control
- Supports TX_FAULT signal monitoring
- A0h/A2h device register interface
- Security Level 1 password-protected write access
- RoHS compliant
- Class 1 laser product compliant with EN 60825-1
- Industrial operating temperature range: -40°C to 85°C
- Storage temperature range: -40°C to 85°C
- Ruggedized RGD model

## Features and Benefits

### Bi-Directional Fiber Transmission

The COMMANDO SFP-SM-1G-BD-20K-RGD uses a single optical fiber and a single LC connector for bi-directional communication. The transmitter operates at 1490nm, while the receiver operates at 1310nm.

### Gigabit Ethernet and Fiber Channel Support

The transceiver supports data rates up to 1.25Gb/s and is specified for Gigabit Ethernet and Fiber Channel applications.

### Extended 20km Transmission

The module supports transmission distances up to 20km using 9/125µm single-mode fiber, providing long-distance optical connectivity for compatible network equipment.

### Digital Diagnostic Monitoring

The module provides digital diagnostic information through a 2-wire serial communication interface. The internal microcontroller continuously accesses operating parameters including temperature, voltage, laser bias current, Tx optical power and Rx optical power.

### Alarm and Warning Monitoring

The module implements alarm functions and factory-defined warning thresholds. The monitored operating parameters can generate alarms or warnings when they exceed defined operating limits.

### Hot-Pluggable Design

The SFP module uses a standard hot-pluggable SFP footprint, allowing installation and removal without requiring replacement of the complete network device.

### Industrial Temperature Operation

The COMMANDO SFP-SM-1G-BD-20K-RGD supports a -40°C to 85°C case-temperature operating range, providing extended-temperature operation for ruggedized applications.

### Low-Voltage Single Supply

The module operates from a nominal 3.3V supply, with an input voltage range of 3.14V to 3.46V.

### Optical Protection and Control Functions

The module provides TX Disable, TX Fault, and RX LOS interface functions for controlling and monitoring the optical transceiver.

### Security-Level Write Protection

The module provides Security Level 1 access protection for A0h/A2h device registers. A password mechanism is specified for entering the security-level working state before protected device information can be written.

## Hardware

### High Performance

- Data rate up to 1.25Gb/s
- Bi-directional optical transmission
- Single LC optical connector
- 1490nm DFB laser transmitter
- 20km transmission distance over 9/125µm SMF
- SFP MSA compliant
- Hot-pluggable SFP footprint
- Built-in digital diagnostic functions
- Single 3.3V power supply
- Supply voltage: 3.14V to 3.46V
- Supply current: 200mA typical / 300mA maximum

### Advanced Monitoring

The internal microcontroller monitors:

- Module temperature
- Supply voltage
- Laser bias current
- Transmitted optical power
- Received optical power

The module supports internally calibrated digital diagnostics through the 2-wire serial interface at address 0xA2.

### Ruggedized Operation

The COMMANDO SFP-SM-1G-BD-20K-RGD supports:

- Operating case temperature: -40°C to 85°C
- Storage temperature: -40°C to 85°C
- Industrial-level operation
- Class 1 laser safety compliance
- RoHS compliance

## Specifications

The COMMANDO SFP-SM-1G-BD-20K-RGD supports 1.25Gb/s Gigabit Ethernet and 1.063Gb/s Fiber Channel data rates. It is a compact, hot-pluggable SFP transceiver using a single LC connector for 1490nm transmit and 1310nm receive bi-directional operation.

### General Specifications.

| Parameter | Symbol | Min | Typ | Max | Unit | Remarks |
|---|---|---|---|---|---|---|
| **Data Rate** | **DR** | **—** | **1.25** | **—** | **Gb/s** | **IEEE 802.3** |
| Data Rate | DR | — | 1.062 | — | Gb/s | FC-PI-2 Rev. 5 |
| Bit Error Rate | BER | — | — | $10^{-12}$ | — | — |
| Operating Temperature | TC | -40 | — | 85 | °C | Case temperature |
| Storage Temperature | TSTO | -40 | — | 85 | °C | Ambient temperature |
| Supply Current | ICC | — | 200 | 300 | mA | Electrical power interface |
| Input Voltage | VCC | 3.14 | 3.3 | 3.46 | V | — |
| Maximum Voltage | VMAX | -0.5 | — | 4 | V | — |

### Industrial/Ruggedized Variant

SFP-SM-1G-BD-20K-RGD: -40°C to 85°C case temperature.

### Optical Characteristics – Transmitter

VCC = 3.14V to 3.46V, TC

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Output Optical Power | PTX | -9 | — | -3 | dBm |
| Optical Center Wavelength | λC | 1470 | 1490 | 1510 | nm |
| Extinction Ratio | ER | 9 | — | — | dB |
| Spectral Width (RMS) | Δλ | — | — | 5 | nm |
| Optical Rise/Fall Time (20%-80%) | tr/tf | — | 150 | 300 | ps |

### Optical Characteristics – Receiver

VCC = 3.14V to 3.46V, TC

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Receiver Overload | POL | 0 | | | dBm |
| Optical Center Wavelength | λ C | 1290 | | 1330 | nm |
| Receiver Sensitivity | RX SEN | | | -23 | dBm |
| LOS Assert | LOSA | -35 | | | dBm |
| LOS De-Assert | LOSD | | | -24 | dBm |
| LOS Hysteresis | LOSH | 0.5 | | | dB |

### Electrical Characteristics – Transmitter

VCC = 3.14V to 3.46V, TC

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Input Differential Impedance | RIN | — | 100 | — | Ω |
| Single-Ended Data Input Swing | VIN PP | 250 | — | 1200 | mV |
| Transmit Disable Voltage | VD | VCC-1.3 | — | VCC | V |
| Transmit Enable Voltage | VEN | VEE | — | VEE+0.8 | V |
| Transmit Disable Assert Time | — | — | — | 10 | μs |

## Electrical Characteristics – Receiver

VCC = 3.14V to 3.46V, TC

| Parameter | Symbol | Min | Typ | Max | Unit | Remarks |
|---|---|---|---|---|---|---|
| Single-Ended Data Output Swing | VOUT PP | 300 | 400 | 800 | mV | — |
| Data Output Rise/Fall Time (20%-80%) | tr/tf | — | — | 300 | ps | — |
| LOS Fault | VLOS A | VCC-0.5 | — | VCC HOST | V | — |
| LOS Normal | VLOS D | VEE | — | VEE+0.5 | V | — |

## Digital Diagnostic Monitoring (DDM) Functions

The COMMANDO SFP-SM-1G-BD-20K-RGD supports the 2-wire serial communication protocol as defined in the SFP MSA. Digital diagnostic information is accessible over the 2-wire interface at address 0xA2.

Digital diagnostics are internally calibrated by default.

The internal microcontroller accesses the following device operating parameters in real time:

- Transceiver temperature
- Laser bias current
- Transmitted optical power
- Received optical power
- Transceiver supply voltage

The module implements alarm functionality and alerts the user when a monitored operating parameter exceeds its factory-set normal range.

## DDM Threshold Information

| Parameter | Alarm High | Alarm Low | Warning High | Warning Low |
|---|---|---|---|---|
| Temperature (°C) | 75 (4B 00) | -5 (FB 00) | 70 (46 00) | 0 (00 00) |
| Temperature / Industrial range (°C) | 90* | -40* | 85* | -40* |
| Voltage (V) | 3.63 (8D CC) | 2.97 (74 04) | 3.46 (87 28) | 3.13 (7A 44) |
| Bias Current (mA) | 100 (C3 50) | 2 (03 E8) | 80 (9C 40) | 4 (07 D0) |
| Tx Power (dBm) | -2.21 (17 7E) | -9.97 (03 EF) | -3.00 (13 93) | -9 (04 EA) |
| Rx Power (dBm) | 3.01 (4E 20) | -30.46 (00 09) | 0.00 (27 10) | -27.21 (00 13) |

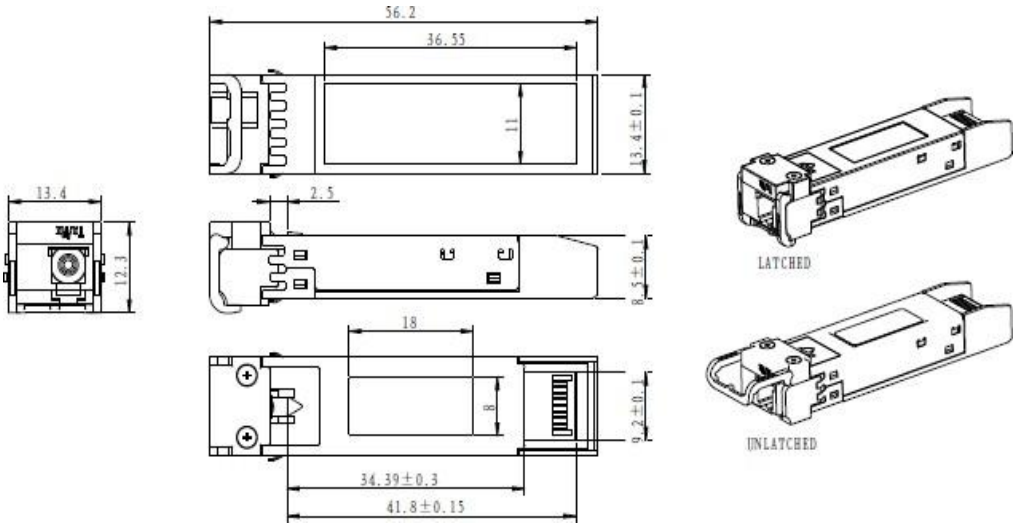
## Product Weight

- Module weight: 18.5 grams each
- Dust cap weight: 0.65 grams each

## Dimensions

All dimensions are ±0.2mm unless otherwise specified.

Unit: mm



## Included in the bundle/box

All COMMANDO SFP-SM-1G-BD-20K-RGD Transceivers are made available for use globally along with accessory used to facilitate or enhance operations. COMMANDO SFP-SM-1G-BD-20K-RGD Transceivers comes with following Accessories.

1x (COMMANDO 1G SFP Transceiver Module) SFP-SM-1G-BD-20K-RGD

## Support and Warranty

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

COMMANDO WarrantyX Program available
on: https://www.commandonetworks.com/warranty

**Table 3. Support and Warranty**

| Warranty and Support | |
|---|---|
| Products covered | COMMANDO FiberX GE/FC BiDi SFP, SM, Single LC, Tx1490/Rx1310nm, 20km, Ruggedized, DDM, Multi-brand |
| Warranty duration | One Year RTB (Return To Base) replacement warranty – optionally extendable up to 3 years. |
| Hardware replacement | COMMANDO, its resellers, or its service center will use commercially reasonable efforts to replace the product subject to stock availability. Otherwise, a replacement will be arranged within 15 working days after receipt of the Return Materials Authorization (RMA) request. |
| End-of-life policy | In case of discontinuation of the product, support is limited to 3 years from announcement date. |
| Effective date | Hardware warranty commences from the date of shipment to customer (and in case of resale by a COMMANDO reseller, not more than 90 days after original shipment by COMMANDO). |
| Support duration | Lifetime support. |
| COMMANDO Care | COMMANDO will provide 24x7 support for basic configuration, diagnosis, and troubleshooting of device-level problems for up to |

| | |
|---|---|
| | one year from the date of shipment of the originally purchased product. This support does not include solution or network-level support beyond the specific device under consideration. |
| Online Portal Access | Warranty allows guest access to commandonetworks.com for all available technical queries. |

## Ordering Information

Ordering information for the COMMANDO SFP-SM-1G-BD-20K-RGD Transceivers, To place an order, please contact your local reseller/distributor or COMMANDO Sales Representative at www.commandonetworks.com/catalog

Table 4. Ordering Information

| Product Code | Description |
|---|---|
| SFP-SM-1G-BD-20K-RGD | COMMANDO FiberX GE/FC BiDi SFP, SM, Single LC, Tx1490/Rx1310nm, 20km, Ruggedized, DDM, Multi-brand |
| SFP-SM-1G | COMMANDO FiberX 1000BASE-LX/LH, SFP, 1310nm, 20km, SMF, DDM |
| SFP-MM-1G | COMMANDO FiberX 1000BASE-SX, SFP, 850nm, 550m, MMF, DDM |
| SFP-UTP-1G | COMMANDO CopperX 1000BASE-T SFP, RJ45, 100m, Standard |
| SFP-EX-1G | COMMANDO FiberX 1000BASE-EX, SFP, 1310nm, 40km, SMF, DDM, Multi-brand |
| SFP-ZX-1G | COMMANDO FiberX 1000BASE-ZX, SFP, 1550nm, 80km, SMF, DDM, Multi-brand |
| SFP-EZX-1G | COMMANDO FiberX 1000BASE-EZX, SFP, 1550nm, 120km, SMF, DDM, Multi-brand |
| SFP-SM-1G-RGD | COMMANDO FiberX 1000BASE-LX/LH, SFP, 1310nm, 20km, SMF, DDM, Multi-brand, Rugged |
| SFP-MM-1G-RGD | COMMANDO FiberX 1000BASE-SX, SFP, 850nm, 550m, MMF, DDM, Multi-brand, Rugged |
| SFP-SM-1G-BD-20K | COMMANDO FiberX GE/FC BiDi SFP, SM, Single LC, Tx1490/Rx1310nm, 20km, DDM, Multi-brand |
| SFP-SR-10G | COMMANDO FiberX 10GBASE-SR, SFP+, 850nm, 300m, MMF, DDM |
| SFP-LR-10G | COMMANDO FiberX 10GBASE-LR, SFP+, 1310nm, 10km, SMF, DDM, Multi-brand |
| SFP-ER-10G | COMMANDO FiberX 10GBASE-ER, SFP+, 1550nm, 40km, SMF, DDM |

| | |
|---|---|
| SFP-ZR-10G | COMMANDO FiberX 10GBASE-ZR/ZW, SFP+, 1550nm, 80km, SMF, DDM |
| SFP-UTP-10G | COMMANDO CopperX 10GBASE-T RJ45, SFP+, 30m, Cat 6a/7, Multi-brand |
| SFP-LR-10G-20K | COMMANDO FiberX 10GBASE-LR, SFP+, 1310nm, 20km, Ultra-long, SMF, DDM, Multi-brand |
| SFP-UTP-10G-80M | COMMANDO CopperX 10GBASE-T RJ45, SFP+, 80m, Ultra-long, Cat 6a/7, Multi-brand |
| SFP-SR-25G | COMMANDO FiberX 25GBASE-SR, SFP28, 850nm, 70/100m, OM3/4 MMF, DDM, Multi-brand |
| SFP-LR-25G | COMMANDO FiberX 10/25GBASE-LR, SFP28, 1310nm, 10km, SMF, DDM, Multi-brand |
| QSFP-SR4-40G | COMMANDO FiberX 40GBASE-SR4, QSFP+, 850nm, 100m, MMF, DDM |
| QSFP-LR4-40G | COMMANDO FiberX 40GBASE-LR4, QSFP+, 1310nm, 10km, SMF, DDM |
| QSFP-SR4-100G | COMMANDO FiberX 100GBASE-SR4, QSFP28+, 850nm, 100m, MTP/MPO-12, MMF, DDM |
| QSFP-LR4-100G | COMMANDO FiberX 100GBASE-LR4, QSFP28+, 1310nm, 10km, SMF, DDM |
| QSFP-ER4L-100G | COMMANDO FiberX 100GBASE-ER4L, 4x25G NRZ, 1310nm, 40km, Duplex LC SMF, DDM, Multi-brand |
| QSFP-ZR4-100G | COMMANDO FiberX 100GBASE-ZR4, 4x25G NRZ, 1310nm, 80km, Duplex LC SMF, DDM, Multi-brand |

## Document History

| Release | New or Revision | Described in | Date |
|---|---|---|---|
| Release 1 | First Release | First Release | August 5th, 2026 |