Sized just right—for increased port density and reduced power consumption

Small Form Factor Transceiver Product Family

Highlights

Flexible, self-configuring 1 or 2 Gbps transmission rates for current or future speeds providing seamless transition

Robust, reliable VCSEL short-wave and Fabry Perot long-wave lasers for distance requirements

Transmission rates from 1.0625 to 2.125 Gbps supported by Pin-Through-Hole (PTH) and hot-pluggable versions

Manufactured to meet ANSI Fibre Channel and IEEE Gigabit Ethernet standards

Leading the networked world

The IBM Small Form Factor (SFF) product family is designed for a wide range of networking applications requiring high data rates, from gigabit Ethernet and gigabit Fibre Channel to client/server environments and distributed multiprocessing, as well as data acquisition. As demand for networking capabilities and rapid data transmission become more critical, IBM products and solutions can help you meet the changing technological challenges you face.

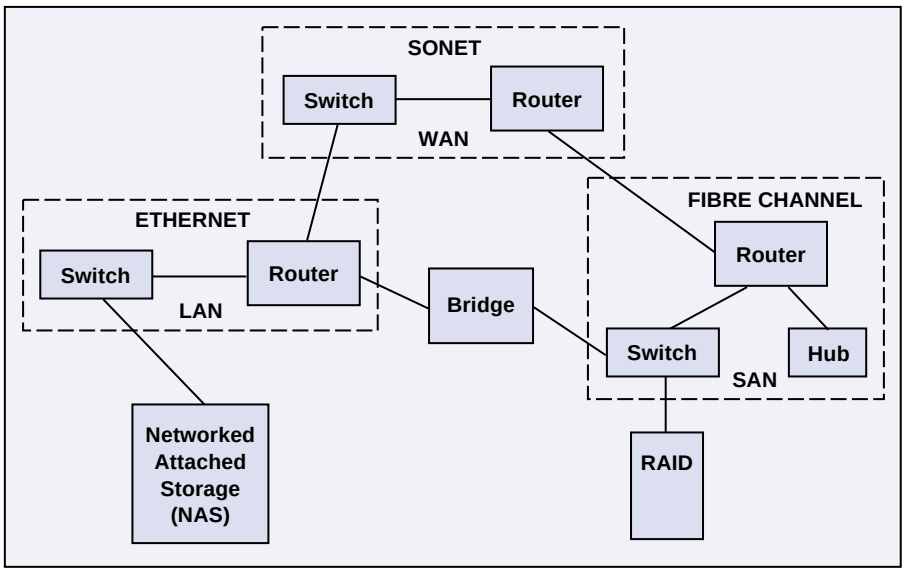
Increase density, flexibility and reduce power

IBM SFFs allow manufacturers to double the density of transceivers on a board compared to what was possible with GBICs, thereby allowing increased network connections. The small footprint of the IBM SFF enables its use in applications where dimension constraints are critical to overall design. The compact design incorporates an integrated photodetector and preamp on a single chip and an integrated laser driver and post amp on a single chip.

IBM SFF transceivers are bidirectional devices. They can receive serial optical signals and convert them into electrical signals or receive electrical signals and retransmit them as optical signals. IBM SFFs are designed to maintain signal integrity throughout the transmission process. Our SFFs have bit error rates of less than 10^{-12}.

Small-form-factor technology

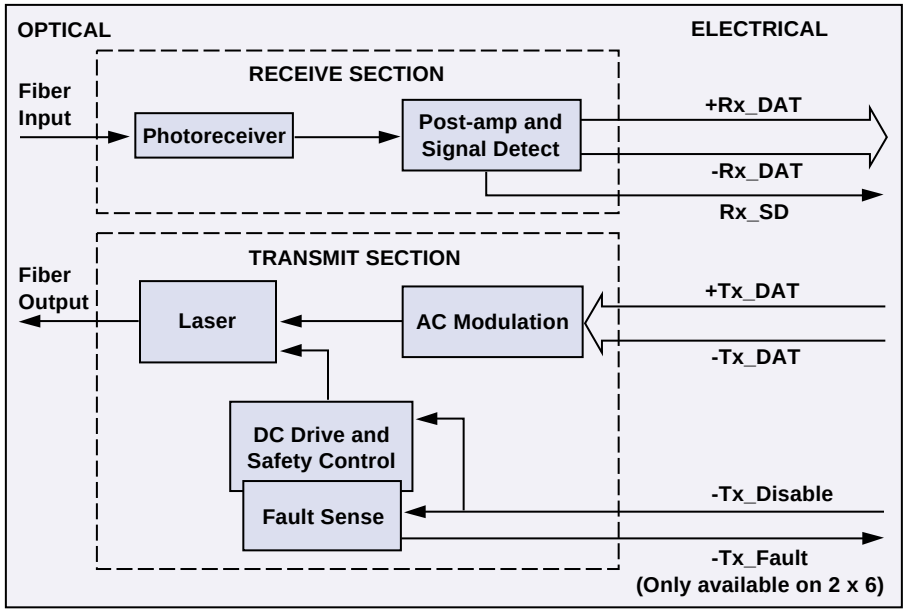
IBM offers a variety of SFF designs and data rates to meet speed and configuration specifications. IBM SFFs are available in PTH and pluggable versions that are easy to integrate and connect. Rates from 1.063 Gbps up to 2.125 Gbps using short or long wavelength lasers are available. Enhanced design features include frequency agility, reduced power consumption and lower cost transmission.



Segment architecture

Choose VCSEL short-wave or Fabry Perot long-wave lasers

IBM offers both VCSEL short-wave and Fabry Perot long-wave lasers to meet customer needs. The 850 nm VCSEL short-wave lasers provide maximum interconnect distances of 500 meters to 550 meters depending on transmission rate and fiber optic cabling. The short-wave IBM SFF is ideal for products where port density, low power and cost transmission are crucial. For longer interconnect distances, the Fabry Perot long-wave, 1310 nm lasers, are a robust and highly reliable source of transmission, and have a maximum operating run of 10,000 meters. All products are International Class 1 laser-safety approved.



Small Form Factor transceiver block diagram

Fibre Channel products: fast, flexible, plug and play

The IBM SFF 2.125 Gbps is a short-wave transceiver that can receive or transmit data at 1 or 2 Gbps. With its auto-negotiate function, the transition from 1 to 2 Gbps is seamless and undetectable. This capability enables the device to automatically self-configure for either a 1 or 2 Gigabit transmission rate, and allows manufacturers to capitalize on a single solution for current and future speeds.

Ethernet products: reliable, robust, cost-effective

For communication applications, IBM SFFs are used throughout ethernet connections from servers, routers, hubs, and switches to network-attached storage. They are integrated into network interface cards and provide data transmission for internet and e-mail service. The IBM SFF pluggable (SFP) devices have an auto-detect feature that can detect the presence or loss of the transmission signal.

Small Form Factor transceiver (SFP) with LC connector fiber cable

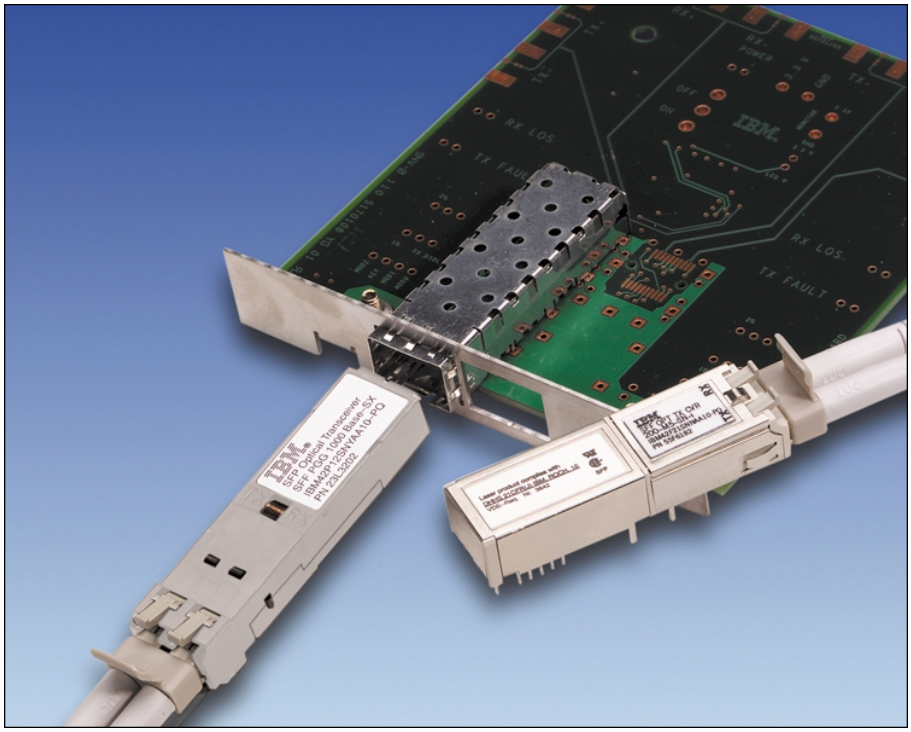
Ordering Information

2x/1x Fibre Channel Small Form Factor PTH and Hot-Pluggable (SFP) Transceivers

Product descriptor	Part number	Max. signaling rate (Gbps)	Wavelength (nm)
SFF-PTH-2125-SW-2x5	IBM42F21SNNAA10	2.125	850
SFF-PTH-2125-LW-2x5	IBM42F21LNNAA10	2.125	1310
SFF-PTH-2125-SW-2x6	IBM42G21SNNAA10	2.125	850
SFF-PTH-2125-LW-2x6	IBM42G21LNNAA10	2.125	1310
SFF-SFP-2125-SW-2x10	IBM42P21SNYAA10	2.125	850
SFF-SFP-2125-LW-2x10	IBM42P21LNYAA10	2.125	1310

Gigabit Ethernet/Fibre Channel Small Form Factor PTH and Hot-Pluggable Transceivers

Product descriptor	Part number	Max. signaling rate (Gbps)	Wavelength (nm)
SFF-PTH-1063-SW-2x5	IBM42F10SNNAA30	1.0625	850
SFF-PTH-1250-SW-2x5	IBM42F12SNNAA30	1.25	850
SFF-PTH-1063-LW-2x5	IBM42F10LNNAA30	1.0625	1310
SFF-PTH-1250-LW-2x5	IBM42F12LNNAA30	1.25	1310
SFF-PTH-1063-SW-2x6	IBM42G10SNNAA30	1.0625	850
SFF-PTH-1250-SW-2x6	IBM42G12SNNAA30	1.25	850
SFF-PTH-1063-LW-2x6	IBM42G10LNNAA30	1.0625	1310
SFF-PTH-1250-LW-2x6	IBM42G12LNNAA30	1.25	1310
SFF-SFP-1063-SW-2x10	IBM42P10SNYAA10	1.0625	850
SFF-SFP-1250-SW-2x10	IBM42P12SNYAA10	1.25	850
SFF-SFP-1063-LW-2x10	IBM42P10LNYAA10	1.0625	1310
SFF-SFP-1250-LW-2x10	IBM42P12LNYAA10	1.25	1310



Small Form Factor transceivers with IBM evaluation card

SFF models for every application

IBM SFFs are available in three versions with a choice of VCSEL short-wave or Fabry Perot long-wave lasers.

The IBM hot-pluggable 2 x 10 SFP version includes a Serial ID module that stores up to 128 bytes of product information, is easy to install, and can have cables connected while the transceiver is in operation.

Standard IBM 2 x 5 and 2 x 6 PTH versions are designed to withstand standard wave soldering and aqueous cleaning, allowing a simpler and more cost-effective manufacturing process. The enhanced IBM 2 x 6 PTH model can identify when the laser drive current is at an improper level, thus providing monitoring capabilities.

Supports industry standards

The IBM SFF product family supports the physical layer of the American National Standards Institute's (ANSI's) Fibre Channel and IEEE gigabit-Ethernet standards. It also complies with the Fibre Channel-Physical Interface (FC-PI) specification for short-wave and long-wave operation and is approved internally as a Class 1 laser-safe product. All products are manufactured and tested to meet IBM's quality standards.

Future connections

Designing for the next generation of networking devices is an evolutionary process. IBM has always relied on the creativity, integrity and innovation of its experienced design teams to stay ahead of the curve. IBM's commitment to research and development, quality and manufacturing standards, and customer satisfaction ensures that IBM will be there to support your needs in communication and storage applications.

Specifications

Electrical interface		
Transmit signal input differential swing		400 to 2000 mVpp
Transmit signal input differential impedance		100 ohms Nominal
Receive signal output differential swing		600 to 1000 mVpp
Receive signal output differential impedance		100 ohms Nominal
Control I/O signals		TTL
Optical		
Data rate		1.0625 to 2.125 Gbps
Short wavelength		850 nm to 860 nm
Long wavelength		1310 nm
Maximum launch power into fiber (avg.)		-4.0 dBm
Minimum launch power into fiber (avg.)		-10.0 dBm
Receiver optical modulation amplitude (OMA)— 1.0625 Gbps		31 to 2000 µWpp
Receiver optical modulation amplitude (OMA)— 2.125 Gbps		49 to 2000 µWpp
Power		
Voltage		+3.3 V +/-5%
Current		200 mA maximum
Short wavelength		
50/125 µm Optical Fiber		
Distance—1.0625 Gbps		2 to 500 m
Distance—1.25 Gbps		2 to 550 m
Distance—2.125 Gbps		2 to 300 m
62.5/125 µm Optical Fiber		
Distance—1.0625 Gbps		2 to 300 m
Distance—1.2 Gbps		2 to 275 m
Distance—2.125 Gbps		2 to 150 m
Long wavelength		
9/125 µm Optical Fiber		
Distance—1.0625 Gbps		2 to 10,000 m
Distance—1.25 Gbps		2 to 5,000 m
Distance—2.150 Gbps		2 to 10,000 m
Environmental		
Operating temperature		0° C to 70° C
Operating humidity		8% RH to 80% RH
Storage temperature		-40° C to 85° C
Physical size	**PTH**	**Hot-pluggable**
Height	9.8 mm	8.6 mm
Width	13.5 mm	13.5 mm
Depth	49.5 mm	56.5 mm
Form factor		
Small form factor, LC connector, 2x5 or 2x6 pin through hole (PTH) and hot-pluggable (SFP)		
Laser safety (Class I) and certifications		
U.S.	DHHS 21 CFR (J) Conformant and UL	
International	IEC 825-1 Conformant and CSA	
Reliability		
Average failure rate (AFR)		< 0.01% / khr (50° C)
Maximum bit error rate at minimum receiver sensitivity		$< 10^{-12}$

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