

# SBD53020FExx – SFP Single Downstream Transceiver

## Tx 1550nm & Rx 1310nm / 20km / Fast Ethernet

For your product safety, please read the following information carefully before any manipulation of the transceiver:



### ESD

This transceiver is specified as ESD threshold 1kV for SFI pins and 2kV for all others electrical input pins, tested per MIL-STD-883G, Method 3015.4 / JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module.



### LASER SAFETY

This is a Class1 Laser Product according to IEC 60825-1:2007. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2007).

The optical ports of the module need to be terminated with an optical connector or with a dust plug in order to avoid contamination.

## 1. Overview

SBD53020FExx is a high performance transceiver module for Fast Ethernet data links over a single mode fibre pair. The maximum reach is 20km, with 14dB end of life (EOL) power budget. The transmitter is a 1550nm Fabry-Pérot (FP) laser, the receiver is a 1310nm PIN photodiode. Consequently, a module with a 1310nm transmitter and a 1550nm receiver is required at the opposite side of the link. The recommended counterpart is SBU35020FExx.

This transceiver module is compliant with the Small Form-factor Pluggable (SFP) Multisource Agreement (MSA) and hot pluggable. Always contact Skylane Optics® commercial agents for compatibility with different equipment platforms.

## 2. Features

- SFP Multi-Source Agreement compliant (INF-8074)
- Hot pluggable SFP footprint
- Serial ID functionality supported according to (SFF-8472)
- Class 1 laser safety standard IEC 60825 compliant
- Single LC or SC connector
- 1550nm FP transmitter, 1310nm PIN receiver
- 20km point-to-point transmission over single mode fibre
- Operating temperature range 0°C to 70°C or -40°C to 85°C
- Low power dissipation (<1W)
- Digital diagnostic monitoring (DDM)

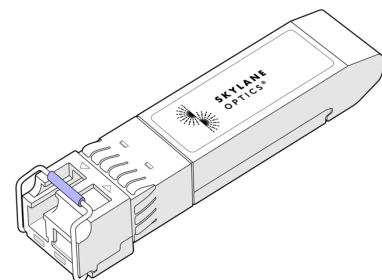


Figure 1. SFP Single Fiber (non-binding illustration)

## 3. Applications

- Fast Ethernet

## 4. Optical Interface

| P/N          | Wavelength [nm]          | Output Optical Power <sup>2</sup> [dBm] | Optical Receiver Sensitivity <sup>3</sup> [dBm] | Optical Receiver Overload <sup>4</sup> [dBm] | Power Budget <sup>2</sup> [dB] |
|--------------|--------------------------|---|---|--|--------------------------------|
| SBD53020FExx | Tx 1550 nm<br>Rx 1310 nm | -15 to -8                               | ≤ -29   | -3   | ≥ 14                           |

1. Distance is estimated assuming typical optical losses after decent quality fibre deployment; Only optical budget value is guaranteed.

2. EOL, over operating temperature range

3. Measured with 125Mbps PRBS 223-1, ER=9dB, BER≤10<sup>-10</sup>

4. The optical input to the receiver should not exceed this value. Transmitters must never be directly connected to receivers (optical loop back) before ensuring that proper optical attenuation is used.

## 5. Technical Parameters

### 5.1. Recommended Operating Conditions

| Parameter                  | Min  | Typ | Max  | Unit | Notes                      |
|----------------------------|------|-----|------|------|----------------------------|
| Storage temperature        | -40  |     | 85   | °C   |                            |
| Operating Case Temperature | 0    |     | 70   | °C   | SBD53020FE0x, SBD53020FE3x |
|                            | -40  |     | 85   | °C   | SBD53020FE2x, SBD53020FE5x |
| Relative Humidity          | 5    |     | 95   | %    | Non condensing             |
| Power Supply Voltage       | 3.15 | 3.3 | 3.45 | V    |                            |
| Power Supply Current       |      |     | 300  | mA   |                            |

### 5.2. Transmitter Optical Specifications

| Parameter                | Min  | Typ  | Max  | Unit | Notes |
|--------------------------|------|------|------|------|-------|
| Average Output Power     | -15  |      | -8   | dBm  | 5     |
| Centre Wavelength        | 1480 | 1550 | 1580 | nm   |       |
| Optical Extinction Ratio | 8.2  |      |      | dB   |       |
| Spectral Width (RMS)     |      |      | 4    | nm   |       |

5. Output power coupled into a 9/125 µm single-mode fibre

### 5.3. Receiver Optical Specifications

| Parameter               | Min  | Typ | Max  | Unit | Notes |
|-------------------------|------|-----|------|------|-------|
| Sensitivity             |      |     | -29  | dBm  | 6     |
| Receiver Overload       | -3   |     |      | dBm  | 6     |
| Wavelength of Operation | 1260 |     | 1360 | nm   |       |

6. Measured with 1.25Gbps PRBS 2<sup>7</sup>-1, ER=9dB, BER≤10<sup>-12</sup>

## 6. Transceiver Electrical Pad Layout

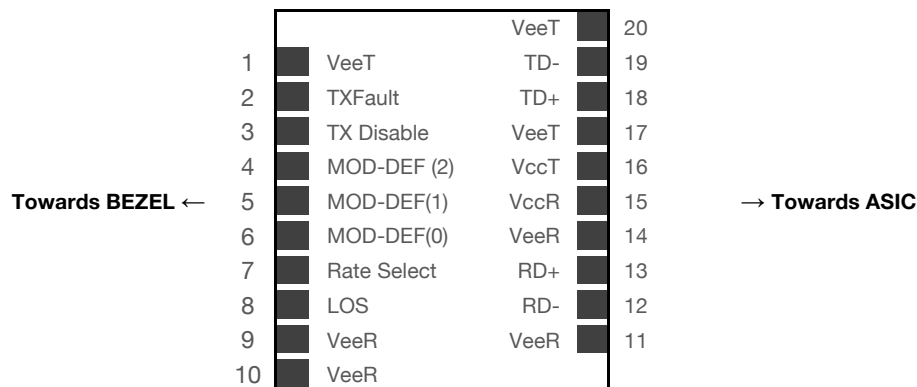


Figure 2. Transceiver Electrical Pad Layout

## 7. Module Electrical Pin Definition

SFP MSA (INF-8074i)

| Pin Number | Name        | Function                      |
|------------|-------------|-------------------------------|
| 1          | VeeT        | Transmitter Ground            |
| 2          | TX Fault    | Transmitter Fault Indication  |
| 3          | TX_Disable  | Transmitter Disable           |
| 4          | MOD-DEF2    | 2-Wire Serial Interface Data  |
| 5          | MOD-DEF1    | 2-Wire Serial Interface Clock |
| 6          | MOD-DEF0    | Grounded in Module            |
| 7          | Rate Select | Not Connected                 |
| 8          | LOS         | Loss of Signal                |
| 9          | VeeR        | Receiver Ground               |
| 10         | VeeR        | Receiver Ground               |
| 11         | VeeR        | Receiver Ground               |
| 12         | RD-         | Inverted Received Data Out    |
| 13         | RD+         | Received Data Out             |
| 14         | VeeR        | Receiver Ground               |
| 15         | VccR        | Receiver Power                |
| 16         | VccT        | Transmitter Power             |
| 17         | VeeT        | Transmitter Ground            |
| 18         | TD+         | Transmit Data In              |
| 19         | TD-         | Inverted Transmit Data In     |
| 20         | VeeT        | Transmitter Ground            |

## 8. EEPROM

SFP MSA (SFF-8472)

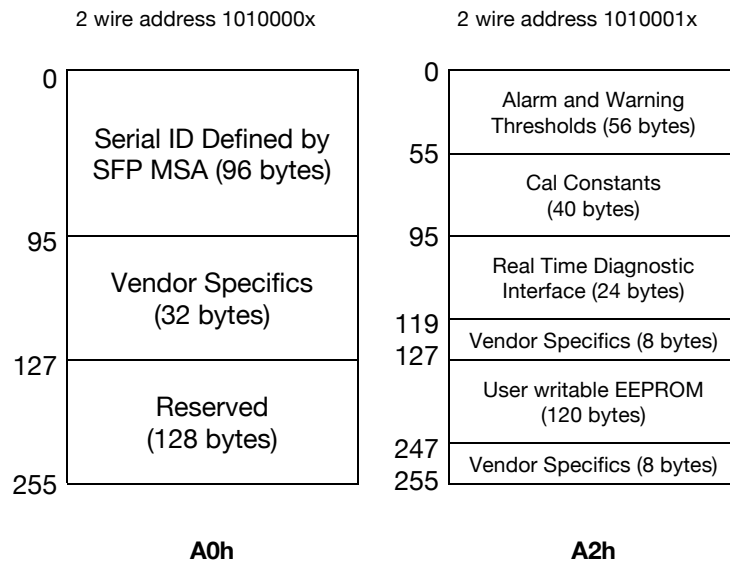


Figure 3. EEPROM of a an SFP

## 9. Ordering Information

| Part Number  | Description   |
|--------------|---|
| SBD53020FE00 | SFP single fibre downstream, Tx 1550nm (FP) , Rx 1310nm (PIN), maximum distance 20km, power budget 14dB, Fast Ethernet, <b>LC connector, 0°C to 70°C</b>        |
| SBD53020FE0D | SFP single fibre downstream, Tx 1550nm (FP) , Rx 1310nm (PIN), maximum distance 20km, power budget 14dB, Fast Ethernet, <b>LC connector, 0°C to 70°C, DDM</b>   |
| SBD53020FE20 | SFP single fibre downstream, Tx 1550nm (FP) , Rx 1310nm (PIN), maximum distance 20km, power budget 14dB, Fast Ethernet, <b>LC connector, -40°C to 85°C</b>      |
| SBD53020FE2D | SFP single fibre downstream, Tx 1550nm (FP) , Rx 1310nm (PIN), maximum distance 20km, power budget 14dB, Fast Ethernet, <b>LC connector, -40°C to 85°C, DDM</b> |
| SBD53020FE30 | SFP single fibre downstream, Tx 1550nm (FP) , Rx 1310nm (PIN), maximum distance 20km, power budget 14dB, Fast Ethernet, <b>SC connector, 0°C to 70°C</b>        |
| SBD53020FE3D | SFP single fibre downstream, Tx 1550nm (FP) , Rx 1310nm (PIN), maximum distance 20km, power budget 14dB, Fast Ethernet, <b>SC connector, 0°C to 70°C, DDM</b>   |
| SBD53020FE50 | SFP single fibre downstream, Tx 1550nm (FP) , Rx 1310nm (PIN), maximum distance 20km, power budget 14dB, Fast Ethernet, <b>SC connector, -40°C to 85°C</b>      |
| SBD53020FE5D | SFP single fibre downstream, Tx 1550nm (FP) , Rx 1310nm (PIN), maximum distance 20km, power budget 14dB, Fast Ethernet, <b>SC connector, -40°C to 85°C, DDM</b> |

## 10. Document Revision Information

| Revision | Description     |
|----------|-----------------|
| A        | Initial release |

Skylane Optics supplies a broad range of optical transceivers. Our engineers work closely with our customers to find the best solutions for every application. We are committed to provide high quality products and services to our customers.

For questions on this product please contact:  
[support@skylaneoptics.com](mailto:support@skylaneoptics.com)

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