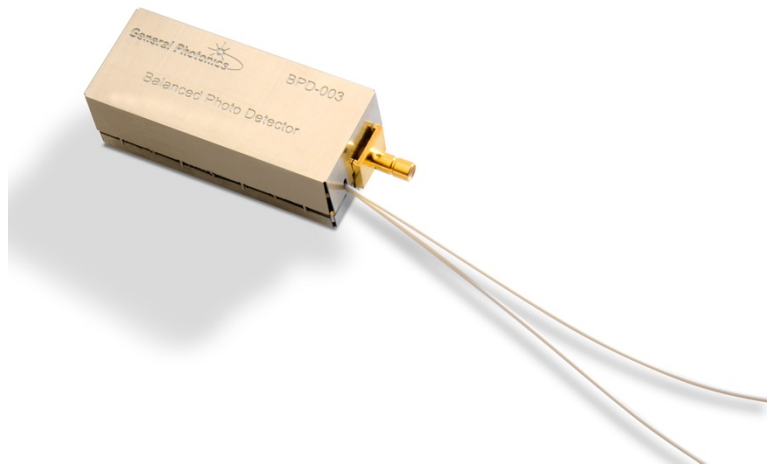




BPD-003

OEM Balanced Photodetector

Instruction Note



November 13, 2023

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Section 1. Specifications:

Photodetector:	
Operating Wavelengths	1060, 1310 or 1550±50 nm
Photodetector Type	InGaAs
PD Responsivity ¹	> 0.8 mA/mW at 1550 nm > 0.7 mA/mW at 1310 nm > 0.5 mA/mW at 1060 nm
PDL	< 0.2 dB
Return Loss	> 45 dB
Maximum Input Power	10 mW
RF Output:	
RF Output Bandwidth (3dB) ^{2,3}	DC to 230 MHz
Transimpedance Gain (at 50Ω) ⁴	50 × 10 ³ V/A (TIA + post amplifier)
Conversion Gain (at 50Ω) ³	> 40 × 10 ³ mV / mW at 1550nm > 35 × 10 ³ mV / mW at 1310nm > 25 × 10 ³ mV / mW at 1060nm
CW Balanced Saturation Power ⁵	36 μW at 1550 nm 42 μW at 1310 nm 58 μW at 1060 nm
Common Mode Rejection Ratio	> 35 dB (DC to 40MHz) > 15 dB (40 to 230MHz)
NEP (DC to 100 MHz)	< 6 pW/√Hz
RF Output Voltage (Linear Range)	±1.75V at 50Ω load ±3.5V at high impedance load
RF Output Impedance	50 Ω
RF Output Connector	SMB
Power Supply Input Connector	6 - pin connector header with 0.08" pitch or 7 - pin SATA connector
Power Supply	±5 V/200 mA
General:	
Fiber type	SMF-28 for 1310 or 1550 nm HI1060 for 1060 nm
Pigtail Length	100 cm ± 10 cm
Operating Temperature	10 to 50 °C
Storage Temperature	-40 °C to 85 °C
Dimensions	1.95" (L) × 0.85" (W) × 0.65" (H)

Notes: Values are referenced without connectors.

1. Includes the coupling loss of fiber to photodiode.
2. Tolerance =20%.
3. Other bandwidths may be available.
4. Other gains are available.
5. For other transimpedance gains and wavelengths, CW Saturation Power is specified by (3.5V/Transimpedance gain) x Responsivity.

Section 2. Overview:

OCT and sensor systems require high-performance balanced photodetectors to boost system signal-to-noise ratio. The BPD-003 is specially designed for OEM applications in such fields, engineered for low cost and small size as well as high performance. The device consists of an optical head and a post-amplification board with an SMA or SMB RF output. The optical head has two input fibers aligned with a pair of balanced photodetectors, followed by an integrated ultra-low noise transimpedance amplifier (TIA) placed immediately after the photodetectors to amplify received signals with low noise and enhanced CMRR. The post-amplification circuit further conditions and amplifies the signal to a range of ± 3.5 V maximum. With a bandwidth of up to 230 MHz and a high conversion gain, the BPD-003 is ideal for integration into OCT, fiber sensors, and high-performance optical measurement systems.

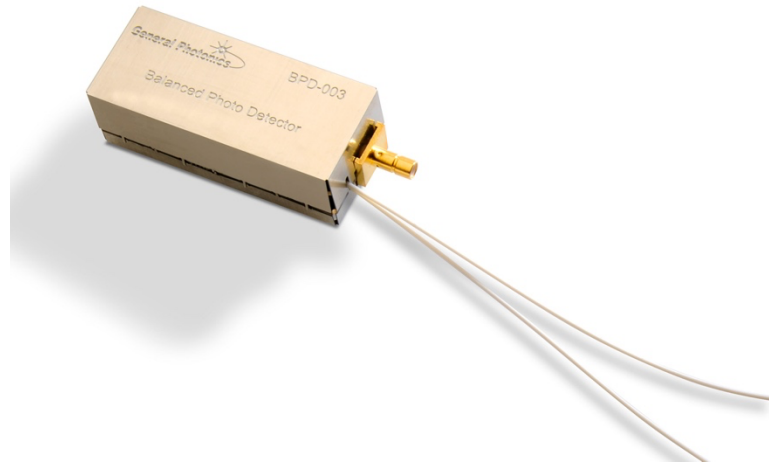


Figure 1 BPD-003 OEM balanced photodetector.

Section 3. Device Description:

3.1 General Description

The BPD-003 is a compact module packaged in a shielding box. Physical and electrical features are described below.

3.1.1 Dimensions

Dimensions and mounting holes are shown in Figure 2.

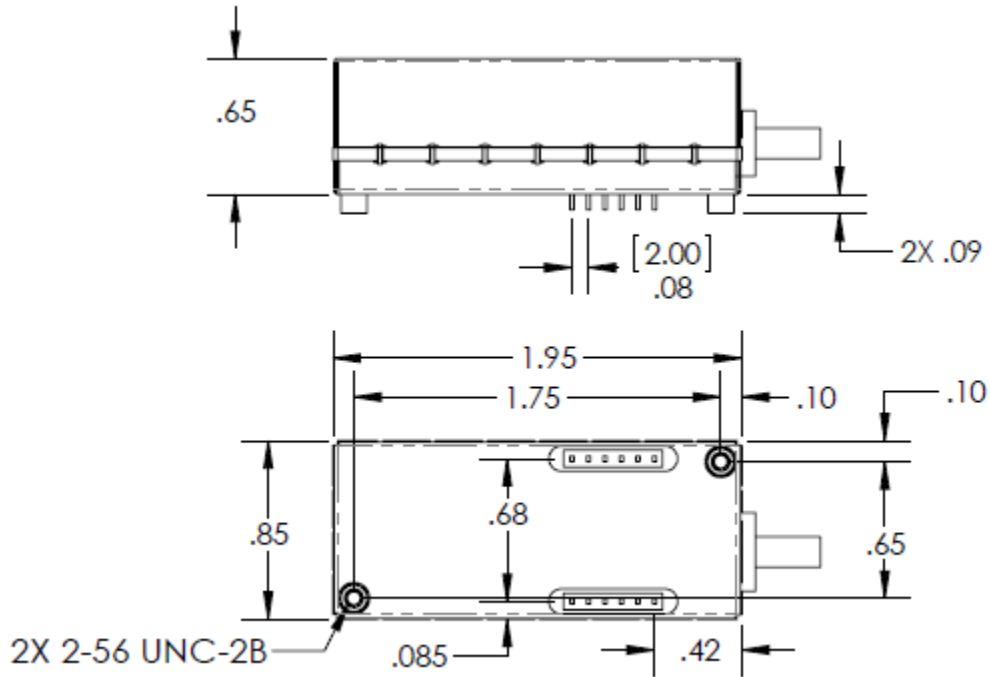


Figure 2 Package dimensions (in inches)

Electrical and optical interfaces are shown in Figure 3.

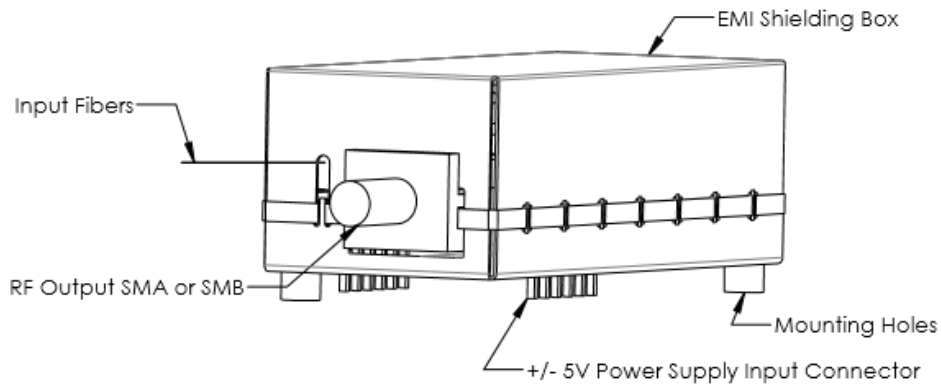


Figure 3 BPD-003 with electrical and optical interfaces labeled.

Optical interface:

Input 1: upper pigtail

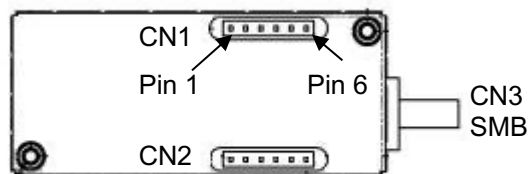
Input 2: lower pigtail

Electrical interfaces:

SMB connector CN3: RF signal output (50Ω)

6-pin connector CN1: power supply connector

6-pin connector CN2: not used electrically; can be used for physical support



Bottom view of BPD-003

Connector CN1 pinout:

Pin #	Description
1	GND
2	+5V \pm 5%
3	GND
4	-5V \pm 5%
5	GND
6	NC (Can be reconfigured for signal output)

Connector CN2 pinout:

Pin #	Description
1	GND
2	GND
3	GND
4	GND
5	GND
6	NC (Can be reconfigured for signal output)

CN1 and CN2:

Manufacturer: 3M

Part #: 951106-8622-AR

Mating connector for CN1 and CN2:

Manufacturer: 3M

Part #: 950506-6102-AR

Section 4. Device Operation:

Electrical and optical connections are required during setup of the BPD-003. Follow safety precautions when making these connections.

4.1. Getting Started

Unpacking

Be careful when unpacking the BPD-003 from its original packaging.

Avoid applying any force to optical fiber pigtailed, and do not let any free-drop of fiber connectors occur at any time. Excessive force to fiber pigtailed may degrade device performance or damage the variable optical delay module.

Observe standard electrical safety and antistatic precautions when handling the BPD-003 and making electrical connections.

Operation

Follow the steps below to operate the BPD-003

1. Connect the $\pm 5V$ power supplies to 6-pin connector CN1.
2. Connect RF output connector (SMB, 50Ω impedance).
3. Connect optical inputs to the 2 input pigtailed.

Section 5. Technical Support:

Luna Innovations is committed to high quality standards and customer satisfaction. For any questions regarding the quality and use of the BPD-003, or future suggestions, please contact Luna Innovations Inc. at (909)-590-5473, or by e-mail at support@lunainc.com. Luna Innovations will respond to all customer questions within 24-48 hours during regular business hours.