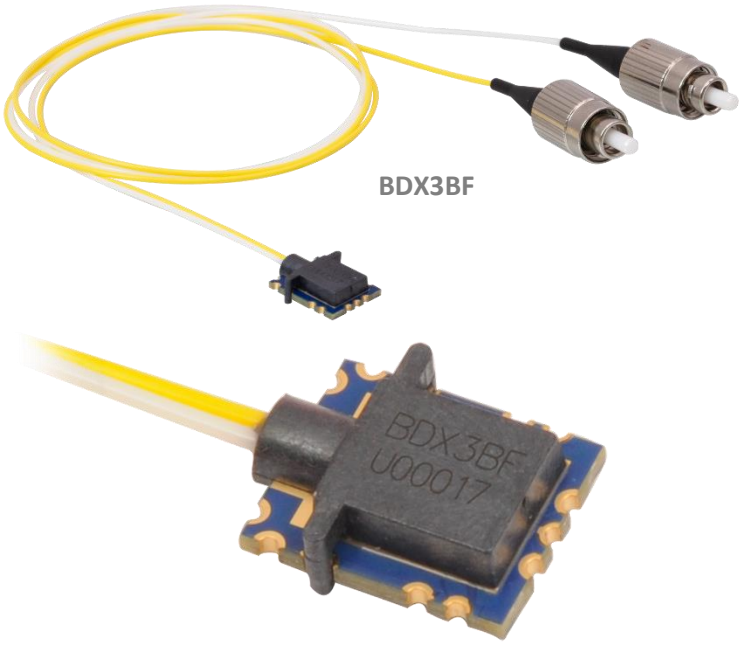
BDX3 Series: 5 GHz Balanced Photodetectors

Features

- DC - 5 GHz Typical Bandwidth
- 70 ps Impulse Response
- Two Wavelength Options:
  - 980 - 1260 nm with HI1060 Fibers
  - 1260 - 1625 nm with SMF-28 Ultra Fibers
- Compact Surface Mount Package
- Dimensions: 13.0 mm x 11.2 mm x 3.3 mm
- Optimized for OCT Applications
- Matched Length Fibers

Applications

- OEM Balanced Detection
- OCT Systems
- LIDAR Systems
- Compact Detection Systems



Close-Up View of the BDX3BF
Surface Mount Package

Description of Models

The BDX3 series of high-speed, InGaAs, balanced detectors are designed for demanding OEM applications in the 980 - 1625 nm wavelength range. The detectors come in surface mount package with FC/APC, FC/PC, or LC/PC connectors on two loose-tube buffered input fibers (HI1060 or SMF-28 Ultra). The modules are designed to be an optical daughter board with all connections made by soldering the half-vias around the perimeter. The optical design effectively prevents internal reflections, allowing for nearly artifact-free operation when used in OCT systems. Signal output is provided through a GSG arrangement of the output connections.

The BDX1EVB evaluation board is also available for soldering a BDX series detector in place so that power and output connections can be made with common cables and connectors.

- **BDX3CA** 5 GHz Module with HI1060 Input Fiber, Ø900 µm Buffer, FC/APC Connectors
- **BDX3CF** 5 GHz Module with HI1060 Input Fiber, Ø900 µm Buffer, FC/PC Connectors
- **BDX3CL** 5 GHz Module with HI1060 Input Fiber, Ø900 µm Buffer, LC/PC Connectors
- **BDX3BA** 5 GHz Module with SMF-28 Ultra Input Fiber, Ø900 µm Buffer, FC/APC Connectors
- **BDX3BF** 5 GHz Module with SMF-28 Ultra Input Fiber, Ø900 µm Buffer, FC/PC Connectors
- **BDX3BL** 5 GHz Module with SMF-28 Ultra Input Fiber, Ø900 µm Buffer, LC/PC Connectors
- **BDX1EVB** Evaluation Board for BDX Series Detectors

Absolute Maximum Ratings

All ratings are specified at 25 °C.

Parameter	Min	Typ.	Max	Unit	Note
Optical Input Power, Avg.	-	-	10	dBm	-
Photodiode Bias Voltage (PD+)	-	-	+10	V	Negative Voltage for PD-
Fiber Bend Radius	15	-	-	mm	Breakage

Operating Conditions

Parameter	Min	Typ.	Max	Unit	Note
Operating Temperature	10	-	40	°C	-
Storage Temperature	0	-	50	°C	-
Relative Humidity	-	-	50	%	Non-Condensing
Photodiode Bias Voltage (PD+)	+3	+5	+7	V	Negative Voltage for PD-

Specifications

All specifications are typical at 25 °C.

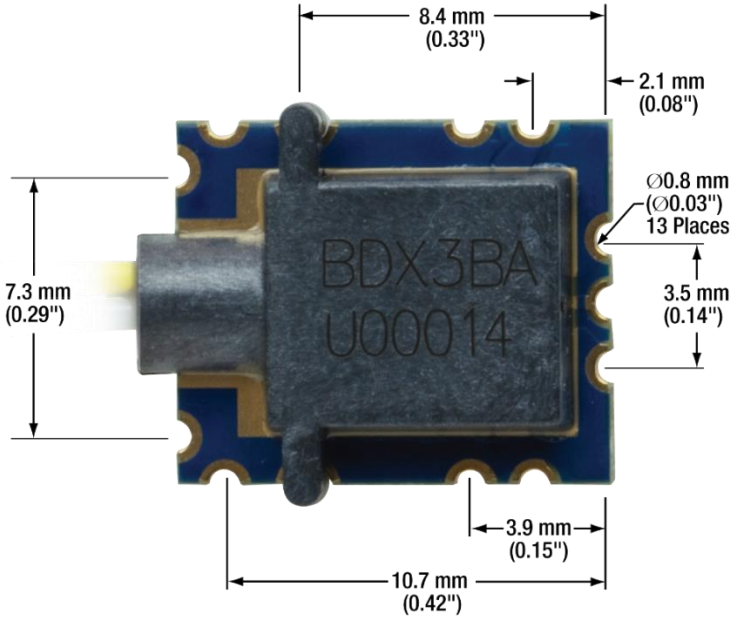
Parameter	Min	Typ.	Max	Unit	Note
Wavelength Range	980 1260	-	1260 1625	nm	BDX3C Detectors BDX3B Detectors
-3 dB Bandwidth	4	5	-	GHz	-
Low Frequency Cutoff	-	DC	-	-	-
Impulse Response	-	70	-	ps	FWHM
Responsivity	0.5 0.7 0.8	0.6 0.8 0.9	-	A/W	at 1060 nm (BDX3C Detectors) at 1310 nm (BDX3B Detectors) at 1550 nm (BDX3B Detectors)
Responsivity Matching	-	-	5	%	Depends on Connector Alignment
Optical Return Loss	-	-45	-40	dB	Each Fiber
Crosstalk	-	-	-40	dB	Between Detectors
Common Mode Rejection Ratio	-	>20	-	dB	Depends on Fiber Length Matching and Signal Level Matching
Dark Current	-	<10	50	nA	Each PD
Photodiode Diameter	-	65	-	µm	-
Capacitance (per PD)	-	260	300	fF	Each PD

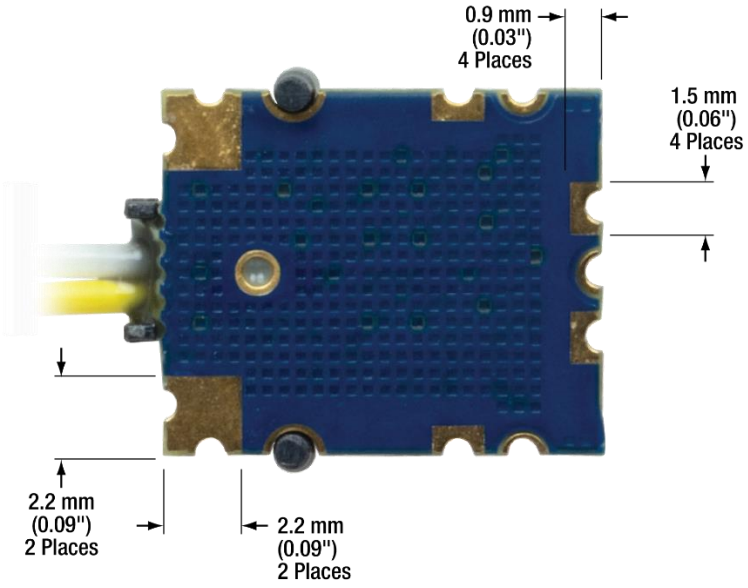
Mechanical

Item #	BDX3CA	BDX3BA	BDX3CF	BDX3BF	BDX3CL	BDX3BL
Fiber Connector	2.0 mm Narrow-Key FC/APC		2.0 mm Narrow-Key FC/PC		LC/PC	
Fiber Type	HI1060	SMF-28 Ultra	HI1060	SMF-28 Ultra	HI1060	SMF-28 Ultra
Fiber Length & Match	50 cm ± 10 cm; Length Matched to <1 mm (with Connectors)					
Fiber Buffer	Ø900 µm Loose-Tube, Yellow on PD+, White on PD-					
RF Output Connector	Solderable Half-Vias in GSG Configuration					
Soldering[a]	Max 5 seconds at 250 °C per Location					

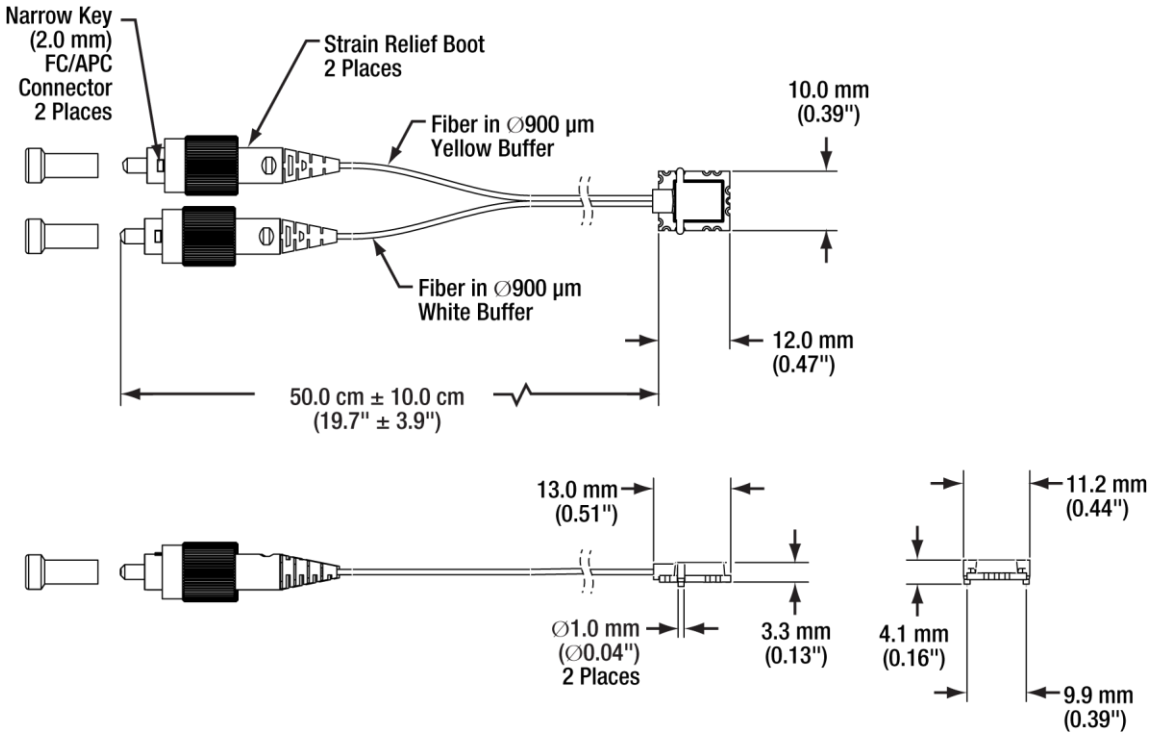
a. All soldering must be done by hand; a reflow oven will damage the device.

MOUNTING DIMENSIONS

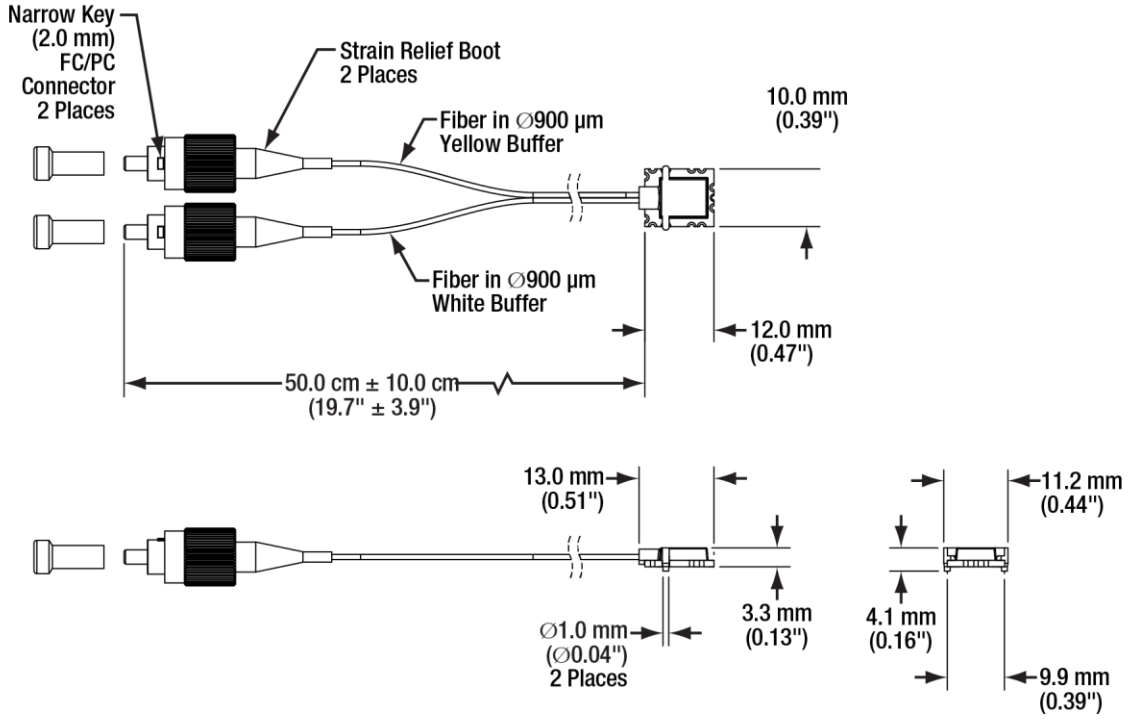




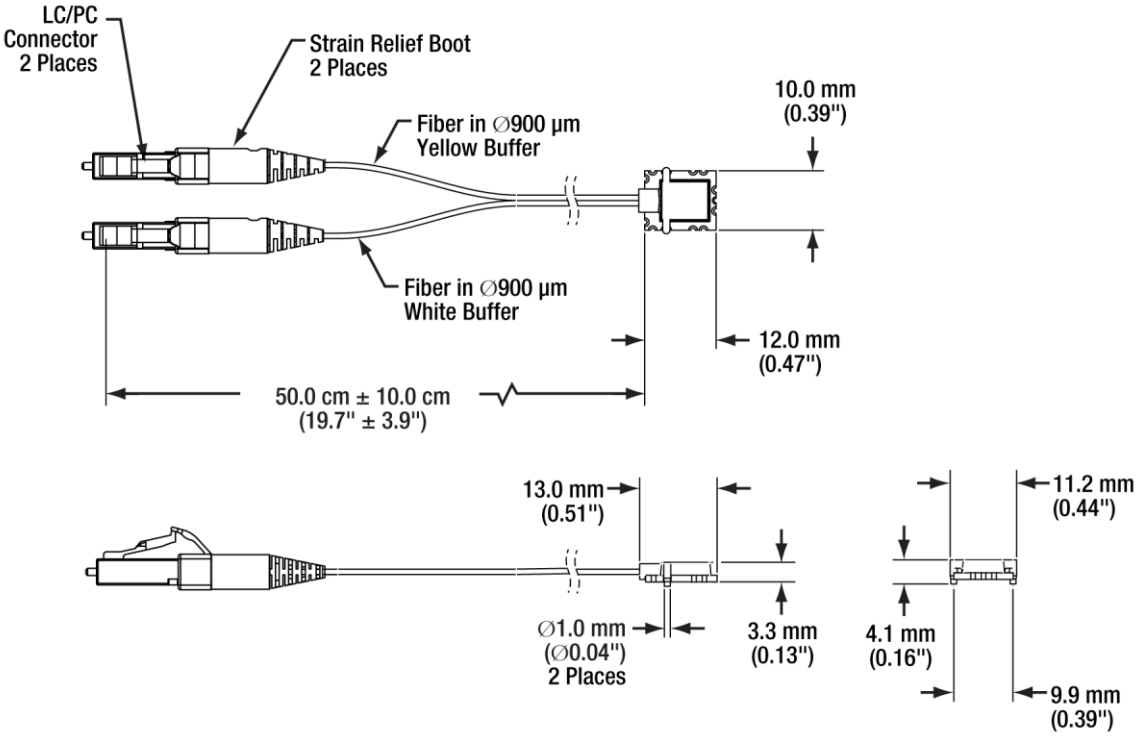
MECHANICAL DRAWINGS



Drawing of a BDX3CA or BDX3BA Detector

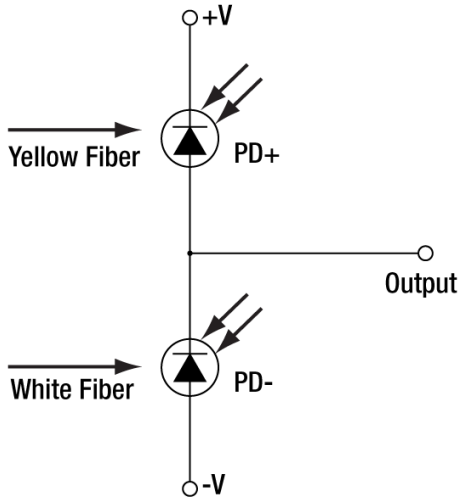


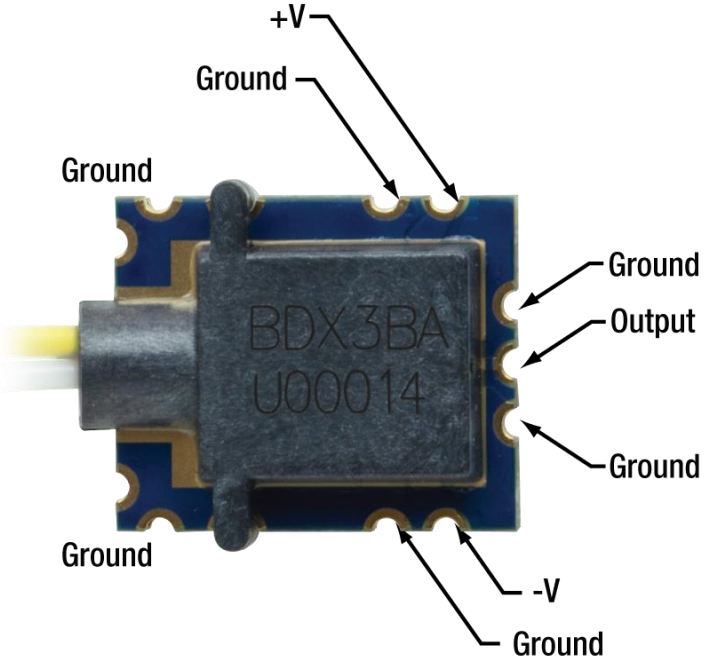
Drawing of a BDX3CF or BDX3BF Detector



Drawing of a BDX3CL or BDX3BL Detector

PIN-OUT DIAGRAM

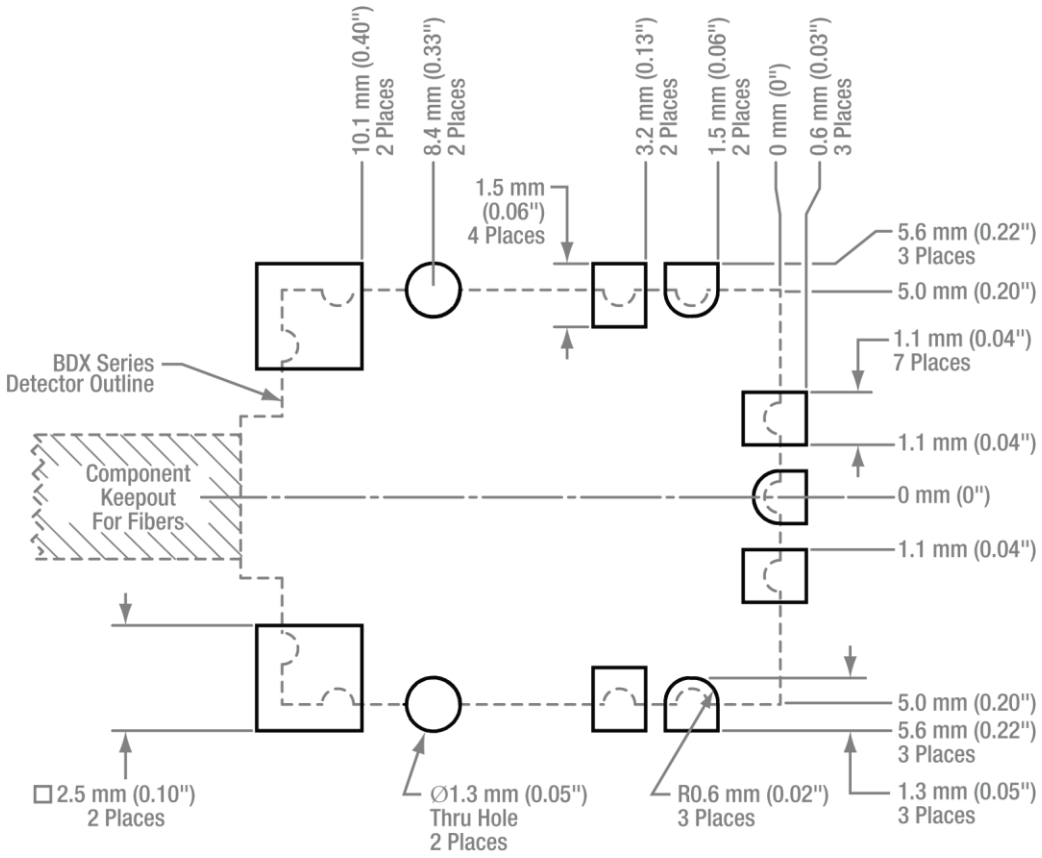




Internal Electrical Configuration

LAND PATTERN AND PCB GEOMETRY

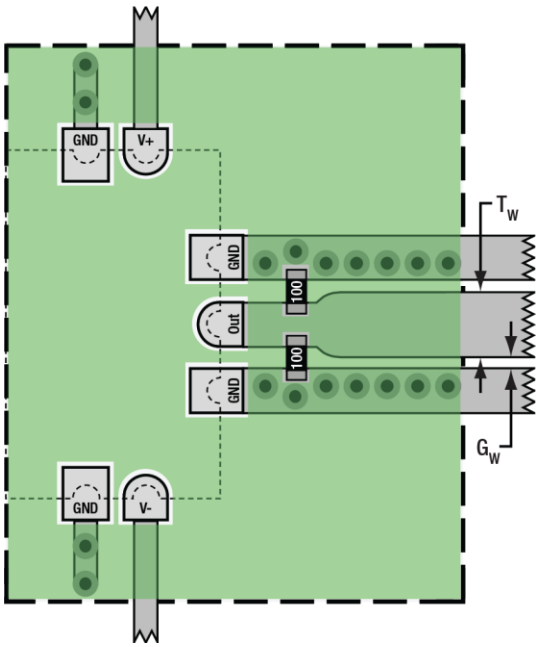
The surface mount packaging of the BDX3 series detectors makes them well-suited for incorporation into PCB assemblies. This section provides guidelines on PCB geometry.



Output Interface Example: 50 Ω Grounded Coplanar Waveguide

Top Metal: Signal
Bottom Metal: Ground

Controlled Impedance Dimensions:
- Trace Width (T_W): 70.0 mil (1.778 mm)
- Gap Width (G_W): 10.9 mil (0.277 mm)

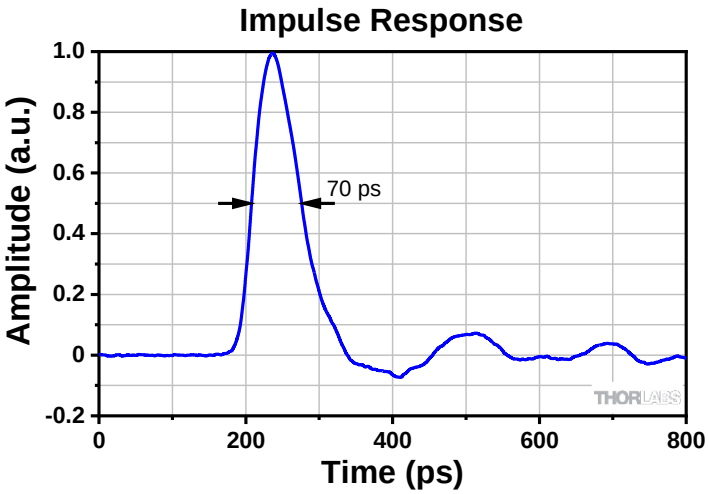


Layer	Material	Thickness	Relative Permittivity
Top Solder Mask	Solder Resist	0.40 mil (10.2 µm)	3.5
Top Metal	-	1.40 mil (35.6 µm)	-
Dielectric	FR-4	58.4 mil (1.48 µm)	4.3
Bottom Metal	-	1.40 mil (35.6 µm)	-
Bottom Solder Mask	Solder Resist	0.40 mil (10.2 µm)	3.5

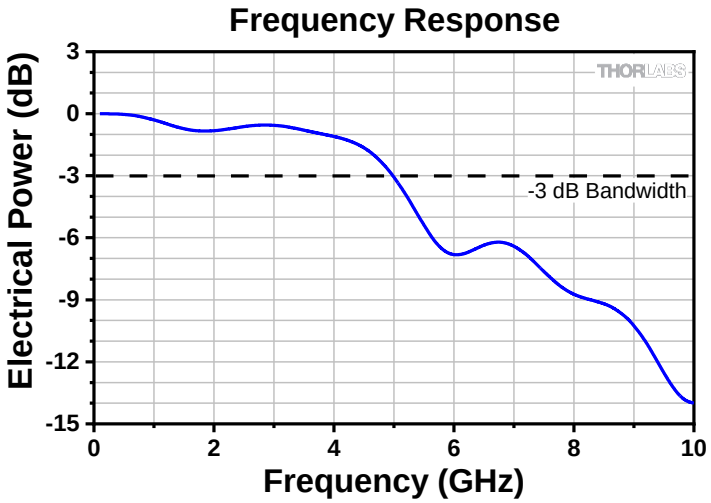
Note: Consult with you PCB vendor for recommended controlled impedance trace width and spacing consistent with the layer stack of your design.

Typical Performance Graphs

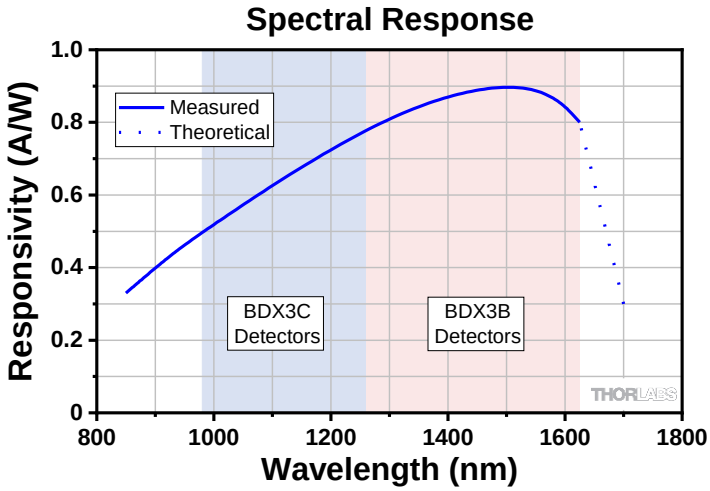
This data was collected on a BDX1EVB evaluation board with a coaxial cable and a 50 Ω load on an oscilloscope. The locations for resistors R5 and R6 on the BDX1EVB board were unpopulated. i.e. without back termination.



Typical Time Domain Pulse Response
to a 100 fs Optical Input Pulse



Typical Frequency Response



The blue shaded region indicates the wavelength range of BDX3C series detectors. The red shaded region corresponds to the BDX3B detectors.

Precautions

The components inside this module are ESD sensitive. Take all appropriate precautions to discharge personnel and equipment before making any electrical connections to the unit. This also applies to coaxial cables that easily accumulate capacitive change.

Manufacturing and Compliance

Manufactured by: Thorlabs Inc., Ann Arbor, MI 48103 USA

All specifications are subject to change without notice.