Single-Mode Ultrafast Detector

DXM30AF



Description

The DXM30AF Ultrafast Detector is a DC - 30 GHz, single mode fiber-coupled, InGaAs-based photodetector designed for applications in the 750 nm - 1650 nm wavelength range. The core element of the detector is the fiber-coupled, hermetically sealed, microwave detector module. For convenience and simplicity of use, the module is mounted inside a rugged housing that includes a rechargeable battery, current monitor circuitry, and a digital display of the DC photocurrent.

Optical input from a single mode fiber (e.g. SMF-28) is coupled to the DXM30AF detector through a FC/PC bulkhead connector. Signal output is provided via a female 2.92 mm RF connector, which may be connected to a measurement instrument with suitable adapters or cables. An SMA jack on the input panel provides analog output of the current monitor signal.

Included with each DXM30AF unit is a USB-style power adapter for charging the battery and a mounting bracket (ECM100) that snaps onto the side of the housing. The ECM100 bracket has a #8 (M4) counterbore, which allows easy mounting to any object with an 8-32 (M4) threaded hole.

Specifications

All specifications are typical for 1550 nm and 25 °C operation, unless otherwise noted.

Operation Parameter	Typical Value	Additional Information
Wavelength Range[a]	750 – 1650 nm	
Impulse Response	15 ps	Typical FWHM at 1560 nm
Frequency Response	DC – 30 GHz	At 1560 nm
Conversion Gain	19 V/W	Into 50 Ω Load
Photodiode Material	InGaAs	
Responsivity	0.45 A/W (at 850 nm) 0.8 A/W (at 1310 nm) 0.75 A/W (at 1550 nm)	Typical Values at the FC/PC Connector
Optical Return Loss	-19 dB (at 850 nm) -21 dB (at 1310 nm)	
Average Optical Input Power (Abs. Max)[b]	+10 dBm (10 mW)	CW Damage Threshold
Peak Optical Input Power (Max)[b]	+13 dBm (20 mW)	50% Duty Cycle
Dark Current (Max)	50 nA	
NEP	32 pW/ √Hz	50 Ω Load Limited
RF Output Voltage (Max)	1 V	Into 50 Ω Load
Reverse Termination Impedance	50 Ω	RF Output

a. Responsivity is usable, but limited, at wavelengths shorter than 750 nm. See spectral response graph.
b. Both average and peak optical input power specifications must be met to avoid damage to the detector. The average is specified over any 1 s time period.

Specifications (Continued)

Connector Parameter	Typical Value	Additional Information
Fiber Connector	FC/PC	As Labeled
Fiber Type (Internal)	SMF-28 Type	
RF Output Connector	Female 2.92 mm, 50 Ω	
Current Monitor Connector	Female SMA	
Current Monitor Parameter	**Typical Value**	**Additional Information**
Accuracy	±3%	
Analog Output Transimpedance Gain	200 mV/mA	Voltage Output via SMA
Analog Output (Max Linear)	3.5 V	Voltage Output via SMA
Analog Output Impedance	High-Impedance	Voltage Output via SMA
Digital Display Output (Max)	20 mA	
Digital Display Output Resolution	1 nA	
Mechanical Parameter	**Typical Value**	**Additional Information**
Dimensions (without ECM1000)	103.0 mm x 61.4 mm x 29.6 mm (4.05" x 2.42" x 1.17")	
Power Supply[a,b]	+5 VDC Mini-USB Type-B	500 mA (Max)
Battery Capacity	500 mA·h	
Battery Charging Time[b]	2 h (Typical)	For Full Charge
Operating Temperature Range	10 °C to 40 °C	
Storage Temperature Range	0 °C to 50 °C	
Relative Humidity (Max)	85%	

a. Input Voltage Range as Specified by USB Standards
b. USB chargers for phones, tablets, or similar products may be used and will charge at a maximum rate of 500mA. Non-dedicated charging USB ports (e.g. those on a PC) will charge at a lower 100 mA rate.

Precautions

Caution: ESD Sensitive Component



The components inside the DXM30AF units are ESD sensitive. Take all appropriate precautions to discharge personnel and equipment before making any electrical connections to the unit. This especially applies to coaxial connecting cables that can accumulate capacitive charge.

Shielded Connections: Connection cables attached to the RF output and SMA monitor ports of the DXM30AF units must be properly shielded.

Electromagnetic Interference: Mobile telephones, cellular phones or other radio transmitters are not to be used within the range of 3 meters of this unit since the electromagnetic field intensity may then exceed the maximum allowed disturbance values according to IEC 61326-1. This

product has been tested and found to comply with the limits according to IEC 61326-1 for using connection cables shorter than 3 meters (9.8 feet).

Fiber Cleaning: Fiber connector tips should be cleaned properly before making any connections.

External Cleaning: Use soft cloth moistened with mild glass cleaner. Do not spray directly onto unit.

Operating Guide

Please reference the figures on the back of this page. Unpack the unit carefully. It arrives with the battery partially charged. The battery can be fully charged using the included charger and USB adapter cable. The yellow indicator LED on the input panel illuminates to confirm it is charging properly, and the green LED illuminates when the unit is fully charged.

1. Mount the unit using the included ECM100 bracket, if desired. Attach the bracket to the mounting surface first, then snap the detector into the bracket and tighten the set screw.
2. Attach the RF output of the DXM30AF to the measurement instrument using suitable cables or adapters. The measurement instrument must have a 50 Ω input and adequate bandwidth to resolve the high-speed signal from the DXM30AF ultrafast detector.
3. Turn on the DXM30AF using the power switch on the input panel.
4. Couple the optical input signal to the detector via the FC/PC bulkhead connector. **Ensure the input optical power does not exceed +10 dBm.**
5. The DC photocurrent can be monitored using most voltmeters via the high-impedance SMA jack. The transimpedance gain of the current monitor provides 200 mV per 1 mA of photocurrent.
6. The DC photocurrent can also be viewed directly on the built-in digital display. There may be a small discrepancy (within specification) between the screen and SMA monitor output signal.

Safety Information

General: All statements regarding safe operation and technical data in this user guide will only apply when the unit is operated correctly. Additional support documentation for this particular product is available at www.thorlabs.com.

Applying Power: Each DXM30AF unit is supplied with an external, USB-style, +5 V power adapter for the purpose of charging the internal battery. Observe the LED indicators on the input panel for charging status.

Covers and Service: Do not remove the cover of the DXM30AF detector. There are no user serviceable parts in these products. If service is required, please contact Thorlabs Tech Support at one of the region-specific contact numbers given at the bottom of the opposite side of this page.

Explosive Environments: Do not operate this device in explosive environments.

Manufactured by: Thorlabs Inc., Ann Arbor, MI 48103 USA
EU Importer: Thorlabs GmbH, Hans-Boeckler-Str.6, Dachau, D-85521 Germany

Housing Panel Features

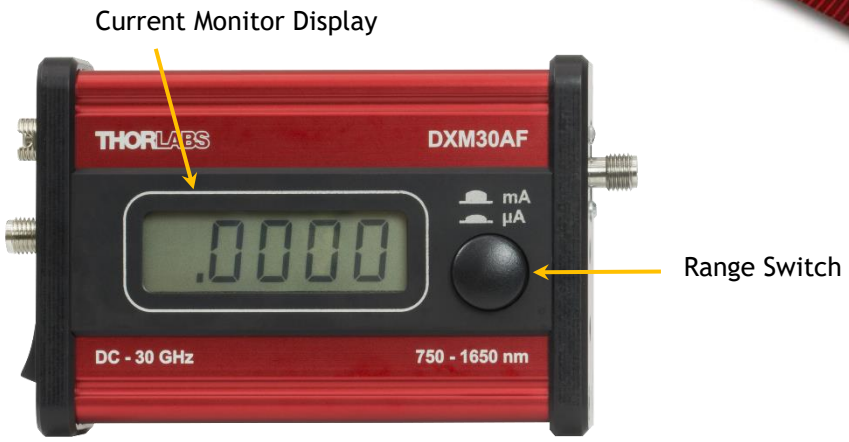


Figure 1: Features Located on the Top of the DXM30AF Housing

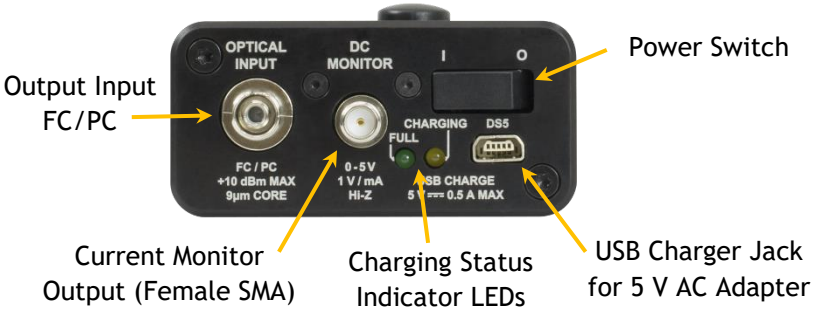


Figure 2: Features Located on the Input Panel of the DXM30AF Housing

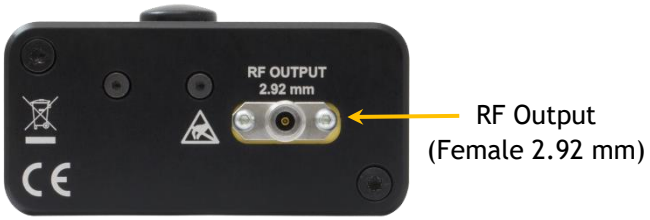
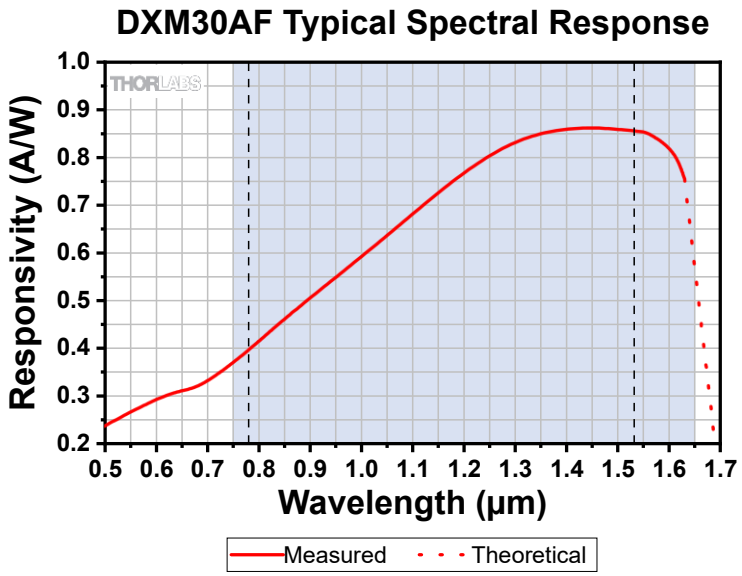


Figure 3: Features Located on the Output Panel of the DXM30AF Housing

Spectral Response Graph



The operating range is shown by the blue shaded region. Impulse and frequency responses are measured at 780 and 1560 nm, marked by the vertical dotted lines.