RXM33BF: 33 GHz Amplified Photoreceiver

Features

- Self-Contained 33 GHz Photoreceiver
- 750 - 1650 nm InGaAs Detector
- USB Power Supply Included
- PIN/TIA/VGA Configuration
- AC-Coupled Differential Outputs
- OM4 Fiber with FC/PC Input Connector
- Linear Response

Applications

- Test and Measurement
- High-Speed Communications
- Instrumentation O-E Front End



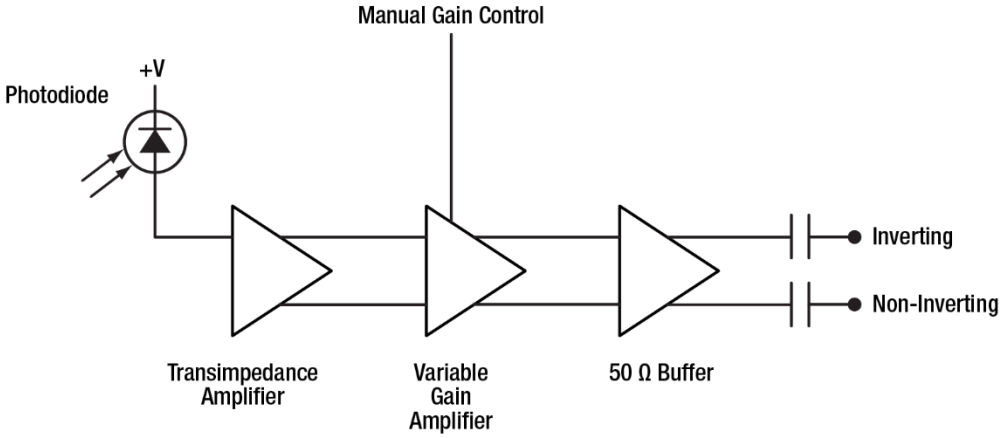
RXM33BF

Description of Model

The RXM33BF provides an easy to use 33 GHz amplified photoreceiver with OM4 fiber input for general laboratory use. The self-contained unit comes with a USB-type power supply and full photocurrent monitoring capability via an analog output as well as a digital display. The unit also provides variable gain with a consistent response across gain. Optical input is through an FC/PC bulkhead-type connector, while the differential outputs are AC-coupled through 2.92 mm coaxial connectors (K). Custom units with FC/APC connectors also available upon request.

- **RXM33BF** 33 GHz Photoreceiver Instrument, Multimode Input Fiber, OM4, 750-1650nm, FC/PC

Block Diagram



Operating Conditions

Parameter	Min	Typ.	Max	Unit	Note
Operating Temperature	0	-	50	°C	-
Storage Temperature	0	-	50	°C	-
Relative Humidity	-	-	85	%	Non-Condensing
Optical Input Power (Avg.)	-	-	0	dBm	3 dBm Peak at 50% Duty Cycle
Abs. Max Input Power (Avg.)	-	-	10	dBm	13 dBm Peak at 50% Duty Cycle

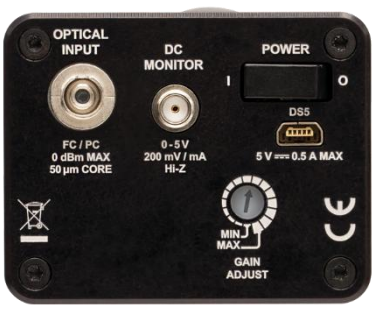
O-E Specifications

All specifications are typical at 25 °C, at 1550 nm, and into 50 Ω unless noted.

Parameter	Min	Typ.	Max	Unit	Note
Wavelength Range	750	-	1650	nm	-
-3 dB Bandwidth	-	33	-	GHz	Gain = 3, Bandwidth may be decreased for shorter wavelengths
Low Frequency Cutoff	-	45	-	kHz	AC Coupled
Responsivity	-	0.7	-	A/W	At 1310 nm, Multimode
Conversion Gain (Differential, Adjustable)	95	-	3150	V/W	-
Input Ref. Noise (at Amplifier)	-	14	-	pA/√Hz	Into 40 GHz, At Max Gain
Noise-Equivalent Power	-	22	-	pW/√Hz	At Maximum Gain Setting, 1310 nm
Optical Return Loss	-	-13 -10	-8 -8	dB	At 1310 nm, Multimode At 850 nm, Multimode
Output Swing (Differential)	-	-	600	mV	Differential, Linear to 450 mV, THD = 3%
Electrical Return Loss	-	-10	-	dB	To 40 GHz
Current Monitor Output	0	-	5	V	DC Level Proportional to Avg. Photocurrent
Current Monitor Output Slope	-	200	-	mV/mA	Output Only Linear Until 3.5 V

Mechanical Specifications

Parameter	Value
Fiber Connector	2.0 mm Narrow Key FC/PC (FC/APC Available Upon Request)
Internal Fiber Type	Ø50 µm OM4
Unit Dimensions	106.4 x 61.4 x 48.7 mm
RF Output Connectors	Dual 2.92 mm (K) Jacks; 8 in·lb Torque Spec.
Current Monitor Connector	SMA Jack; 5 in·lb Torque Spec.

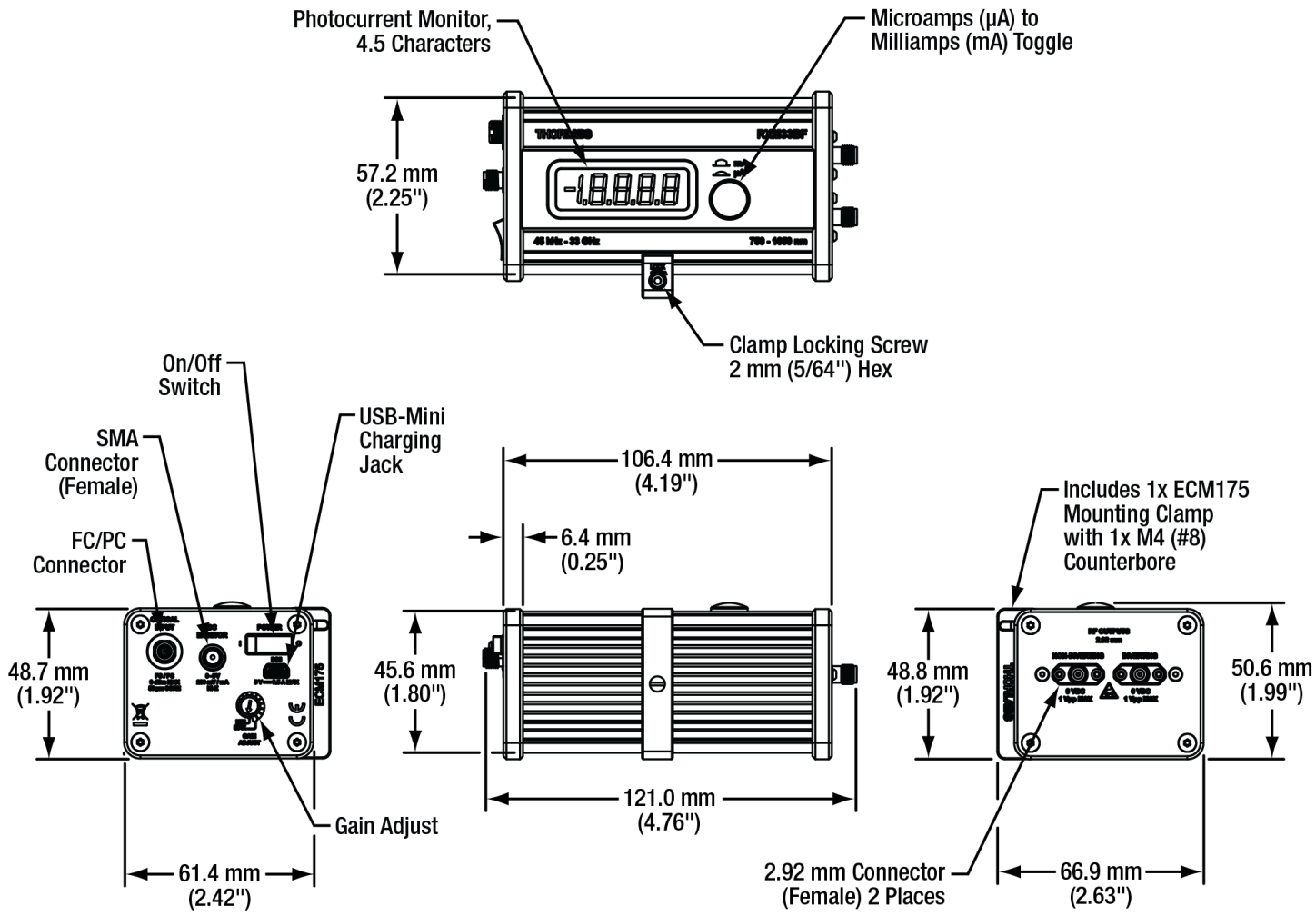


Input Panel



Output Panel

MECHANICAL DRAWING



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

Operational Sequence

1. Make sure device is mounted firmly as desired and the RF outputs are connected. Do not over torque the RF connectors. Thorlabs offers an 8 in·lb, 5/16" hex torque wrench suitable for securing this connection.
2. Connect the USB power cable and switch the unit ON.
3. Couple the optical input signal to the unit via the FC connector.
   NOTE: Be sure to not exceed the maximum optical input power rating.
4. Operate the device, then adjust the input level and gain as necessary.
5. To power down, remove optical input first, then turn the switch OFF.

Additional Considerations

- **Optical Input Connector**: Clean the FC input connector before every connection. This is the number one source of reduced sensitivity. Keep the FC connector capped when not in use. Input fiber should be SMF-28 or equivalent. Ensure the average input optical power does not exceed the absolute maximum of 10 dBm.
- **Mounting the Detector:** The included mounting clamp, also available separately below, has a single counterbore that accepts an 8-32 (M4) cap screw (not included). Screw the clamp to the desired base or post before snapping it to the side of the detector housing and securing it using the integrated 5/64" (2 mm) locking screw.
- **RF and Photocurrent Monitor Output:** Connection cables attached to the RF output ports and SMA photocurrent monitor port must be properly shielded. Attach the RF output of the unit to the measurement instrument using suitable cables or adapters, such as Thorlabs' microwave cables and adapters. If only one RF port is used on the differential output devices, cap the unused port with a 50 Ω terminator; two are included with each unit. The measurement instrument must have a 50 Ω input and adequate bandwidth to resolve the high-speed signal from the RXM series ultrafast receiver.

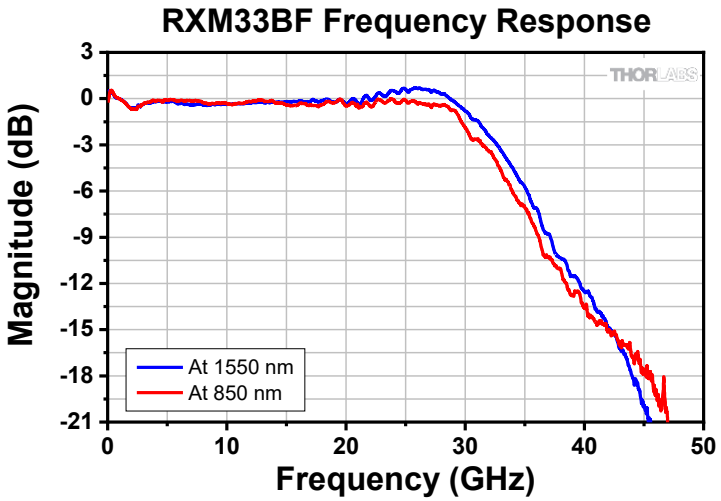


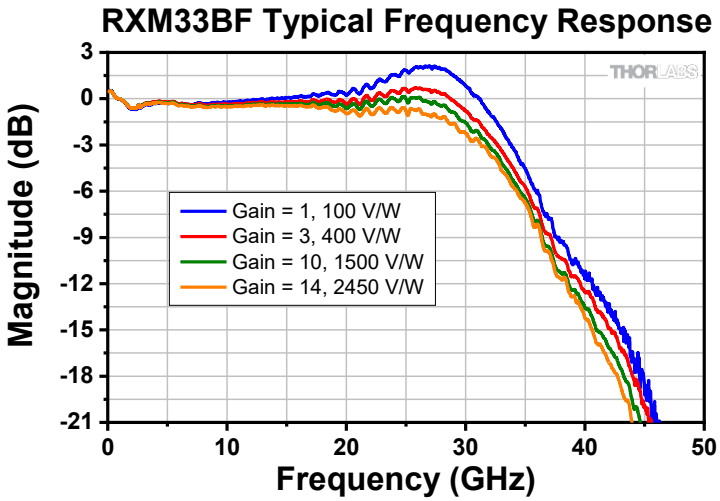
RXM33BF Output Panel

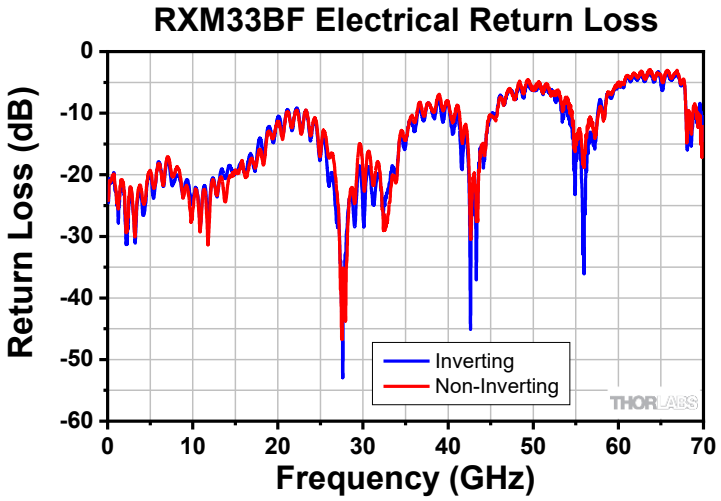
- **DC Photocurrent Monitor:** The DC photocurrent can be monitored directly by viewing the built-in digital display as well as by using most voltmeters to read the analog voltage signal output via the high-impedance SMA jack located on the input panel. The units on the displayed digital current measurement can be toggled between µA and mA using the button on the front panel. There may be a small discrepancy (within specification) between the screen and SMA monitor output signal. The digital display reports a wide range of current values, up to 20 mA with a resolution of 1 nA, with the display automatically changing range in response to the signal magnitude. The analog voltage signal sent to the SMA connector has a linear relationship with the measured DC photocurrent up to 3.5 V: the transimpedance gain of the current monitor provides 200 mV per 1 mA of photocurrent. This linear relationship limits the current range reported by the analog SMA output signal, so that the range is smaller than that provided by the digital display.
- See the graphs on the next page of this data sheet to see how the controls affect the output response.
- Adjusting the gain allows the output swing to be matched to the next device in the signal chain and optimize the signal-to-noise ratio.
- The Monitor Output provides a DC signal level that is proportional to the photocurrent. Use any standard, high impedance voltmeter to measure this voltage.
- Note that the linear response of the device is limited to an output swing 450 mV differential (for < 3% THD). Output swing can be calculated by multiplying the peak-peak input power by the conversion gain.

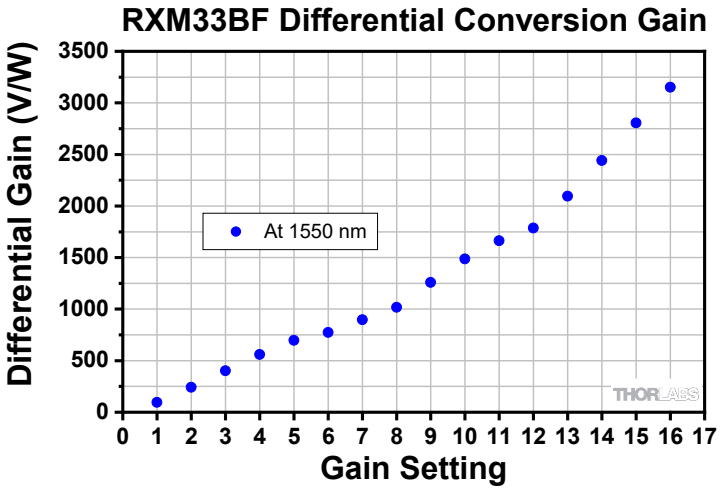
Typical Performance Graphs

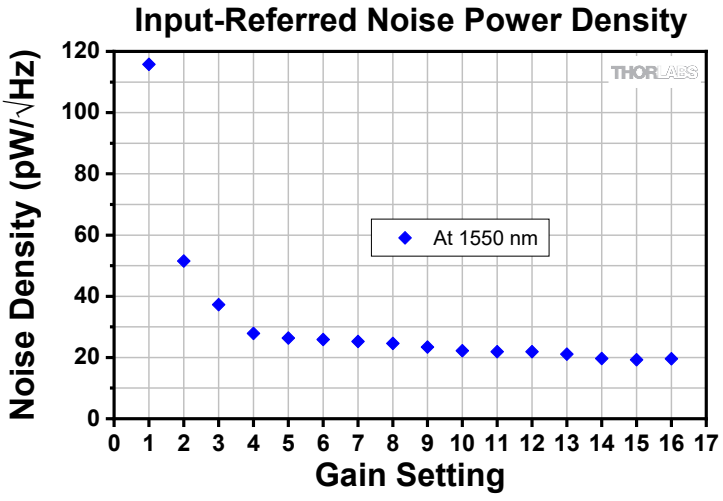
The amplifier gain graph shows the total gain of the combined internal stages. The performance of each detector is factory tested. The adjustment potentiometer on the input panel of the instrument directly controls the internal voltages that affect the gain performance.

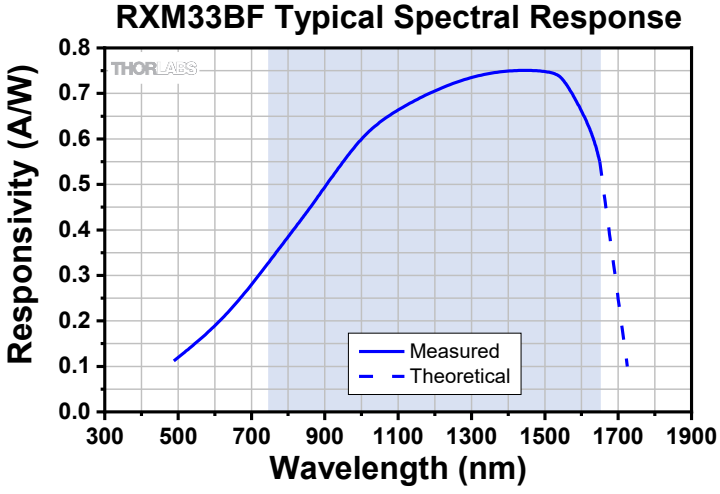












PRECAUTIONS



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MANUFACTURING AND COMPLIANCE

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

All specifications are subject to change without notice.

