RXM25 Series: 25 GHz Amplified Photoreceivers

Features

- Self-Contained 25 GHz Photoreceivers
- Single Mode and Multimode Models
  - **RXM25AF**: SMF-28 SM Fiber, InGaAs, 1250 - 1650 nm
  - **RXM25BF**: 50 µm MM Fiber, InGaAs, 750 - 1650 nm
  - **RXM25DF**: 50 µm MM Fiber, GaAs, 700 - 870 nm
- USB Power Supply Included
- PIN/TIA/VGA Configuration
- AC-Coupled Differential Outputs
- FC/PC Input Connector

Applications

- Test and Measurement
- High-Speed Communications



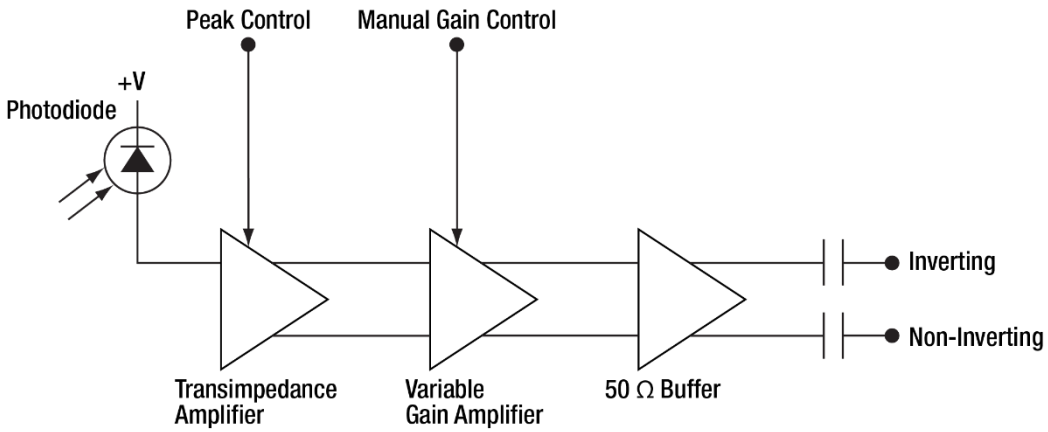
RXM25AF

Description of Models

The RXM25 comes in three versions: the **RXM25AF** is for long-wavelength, single mode applications, the **RXM25BF** is designed for broad wavelength, multimode applications, and the **RXM25DF** is designed for short wavelength, multimode applications. These are easy-to-use, fully integrated, 25 GHz amplified photoreceivers for general laboratory use. Each unit comes with a mini-B USB power supply and full photocurrent monitoring capability via an analog output as well as a digital display. The unit also provides variable gain control and frequency response shape control via the peaking control. Optical input is through an FC/PC narrow key (2.0 mm) 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.

- **RXM25AF** 25 GHz Photoreceiver Instrument, Single Mode Input Fiber, 1250 - 1650 nm, FC/PC Connector
- **RXM25BF** 25 GHz Photoreceiver Instrument, 50 µm Multimode Input Fiber, 750 - 1650 nm, FC/PC Connector
- **RXM25DF** 25 GHz Photoreceiver Instrument, 50 µm Multimode Input Fiber, 700 - 870 nm, FC/PC Connector

Block Diagram



Operating Conditions

Parameter	Min	Typ.	Max	Unit	Note
Operating Temperature	10	-	50	°C	-
Storage Temperature	0	-	70	°C	-
Relative Humidity	-	-	85	%	Non-Condensing
Optical Input Power	-	-	1 1 3	dBm	RXM25AF (4 dBm Peak at 50% Duty Cycle) RXM25BF (4 dBm Peak at 50% Duty Cycle) RXM25DF (6 dBm Peak at 50% Duty Cycle)
Abs. Max Input Power	-	-	10	dBm	-

O-E Specifications

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

Parameter	Min	Typ.	Max	Unit	Note
Wavelength Range	1250 750 700	-	1650 1650 870	nm	RXM25AF RXM25BF RXM25DF
-3 dB Bandwidth	22	25	-	GHz	RXM25AF at 1550 nm, Gain = 8, Peak = 4 RXM25BF at 1550 nm, Gain = 4, Peak = 4 RXM25DF at 850 nm, Gain = 8, Peak = 8
Low Frequency Cutoff	-	500	-	kHz	AC Coupled
Responsivity	0.65 0.65 0.4	0.75 0.75 0.5	-	A/W	RXM25AF at 1550 nm RXM25BF at 1310 nm RXM25DF at 850 nm
Conversion Gain (Differential, Adjustable)	110 110 75	-	7200 7200 4800	V/W	RXM25AF at 1550 nm RXM25BF at 1310 nm RXM25DF at 850 nm
Noise-Equivalent Power	-	15 15 24	-	pW/√Hz	RXM25AF at Max Gain and 1550 nm RXM25BF at Max Gain and 1310 nm RXM25DF at Max Gain and 850 nm
Optical Return Loss	-	-	-28 -12 -14	dB	RXM25AF at 1550 nm RXM25BF at 1310 nm RXM25DF at 850 nm
Output Swing (Differential)	-	-	1800	mV	Linear to 600 mV, THD = 2%
Electrical Return Loss	-	-10	-	dB	To 20 GHz
Current Monitor Output	-	200	-	mV/mA	DC Level Proportional to Avg. Photocurrent

Mechanical Specifications

Parameter	Value
Fiber Connector	2.0 mm Narrow Key FC/PC (FC/APC Available Upon Request)
Internal Fiber Type	RXM25AF: SMF-28 RXM25BF & RXM25DF: 50 µm MM OM4
Unit Dimensions	106.4 x 61.4 x 48.7 mm
RF Output Connectors	Dual 2.92 mm (K) Jacks; 8 in-lbs Torque Spec.
Current Monitor Connector	SMA Jack; 5 in-lbs Torque Spec.

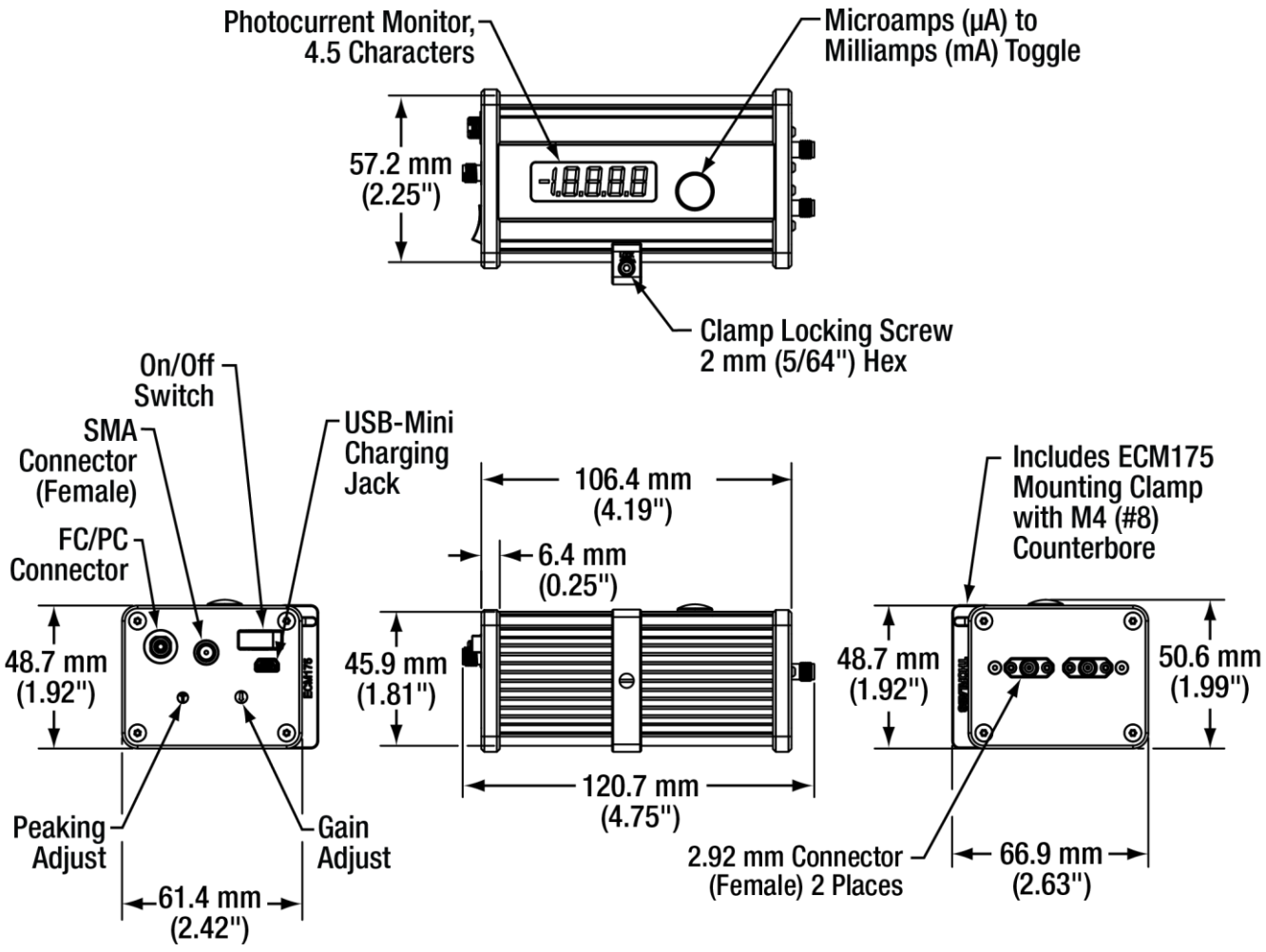


RXM25 Series Input Panel



RXM25 Series 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. We suggest using the TQW8A torque wrench.
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. During operation, adjust the input level, gain, and peaking as necessary.
5. To power down, remove optical input first, then turn the switch OFF.



TQW8A

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 for single mode detectors should be SMF-28 or equivalent. Input fiber for multimode detectors should be OM4 or SMF-28 or equivalent. Ensure the average input optical power does not exceed the absolute maximum of 10 dBm.
- See the graphs on the next page of this data sheet to see how the controls affect the output response.
- Peaking the frequency response of the photoreceiver can be useful if other components in the signal chain have excess high-frequency roll-off.
- 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. Note that adjustment of the gain also affects the shape of the frequency response, so the peaking controls can be used in combination to optimize the signal.
- 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 600 mV differential (for <2% THD).
  Output swing can be calculated by multiplying the peak-peak input power by the conversion gain.



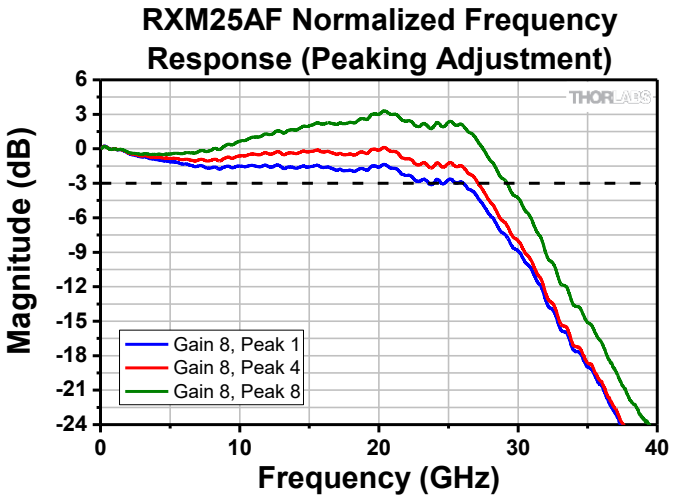
RXM25DF
Output Panel

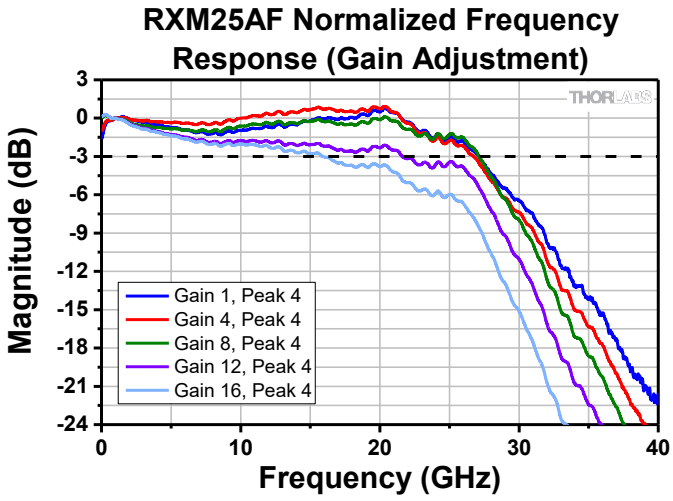
Typical Performance Graphs

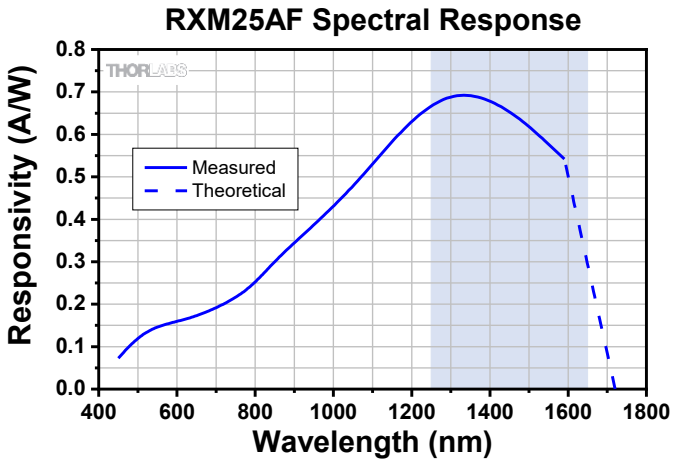
The dashed line in these graphs indicates the -3 dB bandwidth for the module. The amplifier gain graph shows the total gain of the combined internal stages. The performance of each detector is factory tested. Please contact Tech Support if you would like to receive a data file containing these test results. Contact information can be found at http://www.thorlabs.com/locations.cfm.

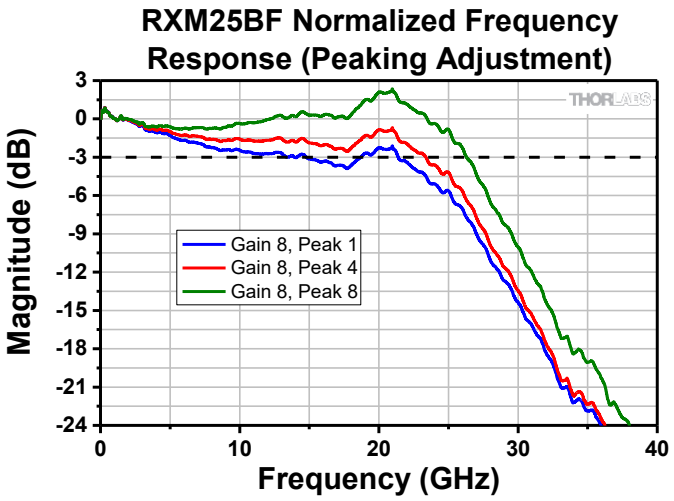
The adjustment pots on the input panel of the instrument directly control the internal voltages that affect the gain and the peaking performance.

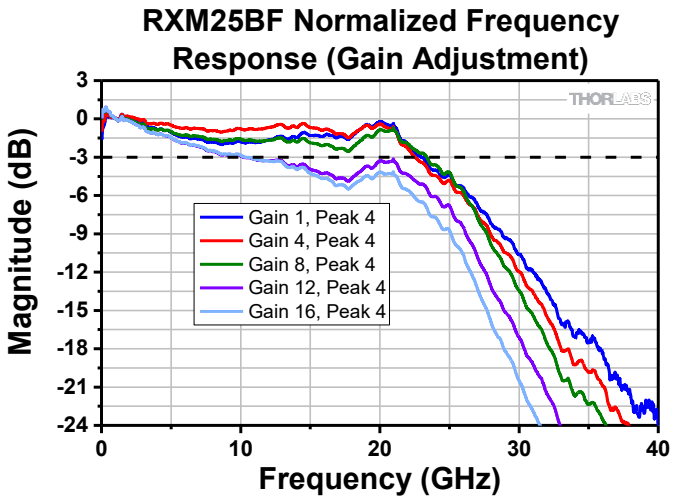
RXM25AF Photoreceiver, Single Mode Input Fiber, 1250 - 1650 nm

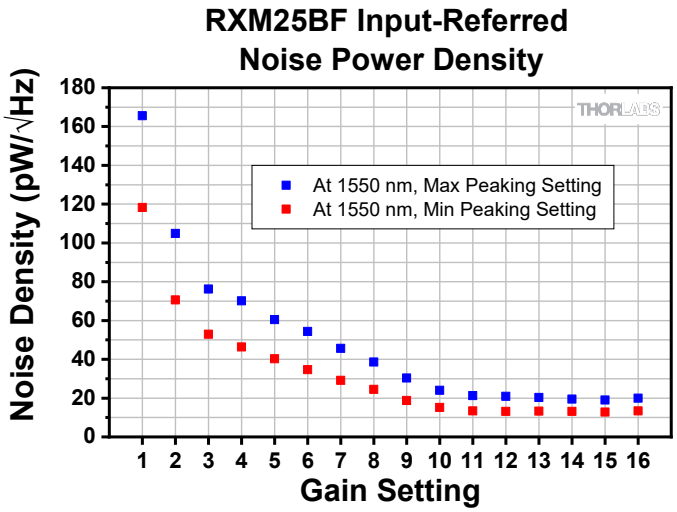


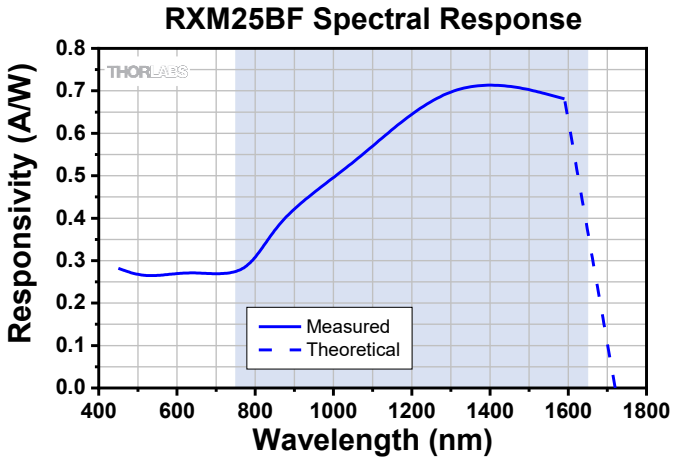


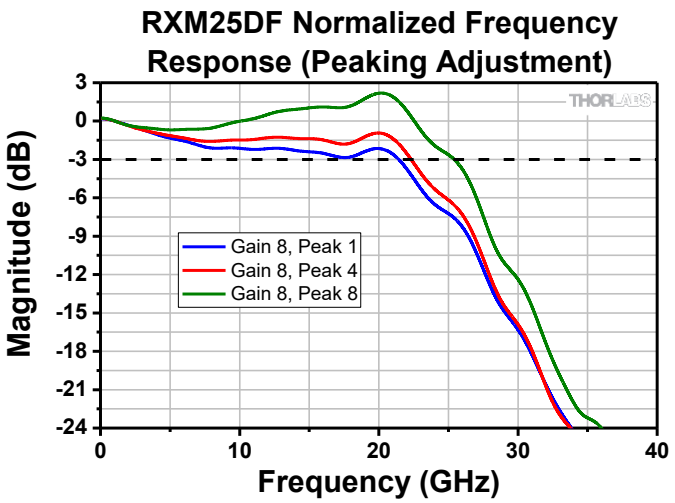


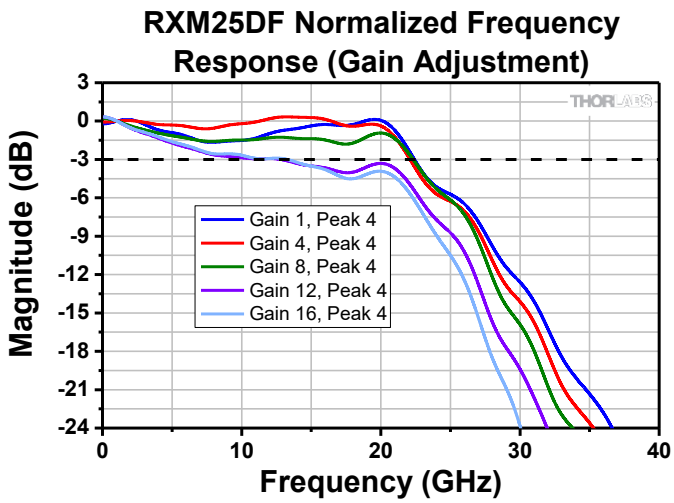

RXM25BF Normalized Frequency Response (Peaking Adjustment)
Magnitude (dB)
Frequency (GHz)
Gain 8, Peak 1
Gain 8, Peak 4
Gain 8, Peak 8
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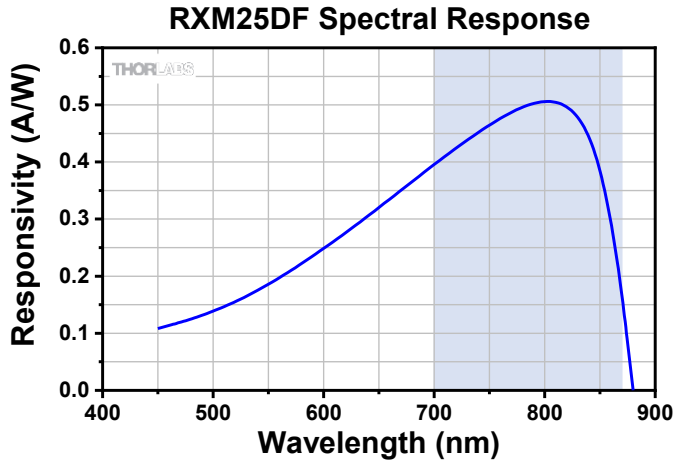

RXM25BF Normalized Frequency Response (Gain Adjustment)
Magnitude (dB)
Frequency (GHz)
Gain 1, Peak 4
Gain 4, Peak 4
Gain 8, Peak 4
Gain 12, Peak 4
Gain 16, Peak 4
THORLABS

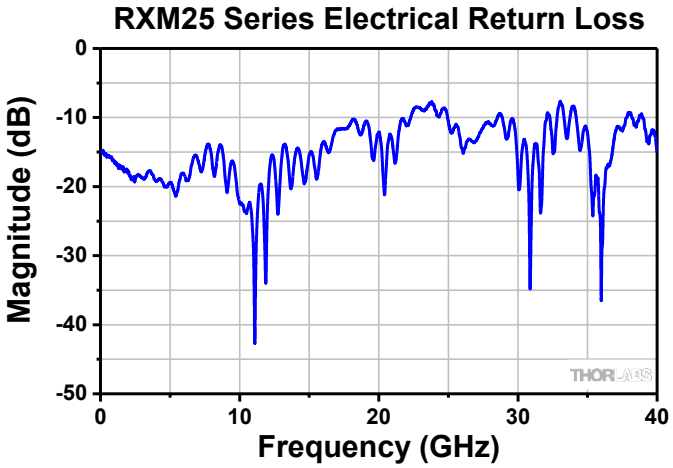

RXM25BF Input-Referred Noise Power Density
Noise Density (pW/√Hz)
Gain Setting
At 1550 nm, Max Peaking Setting
At 1550 nm, Min Peaking Setting
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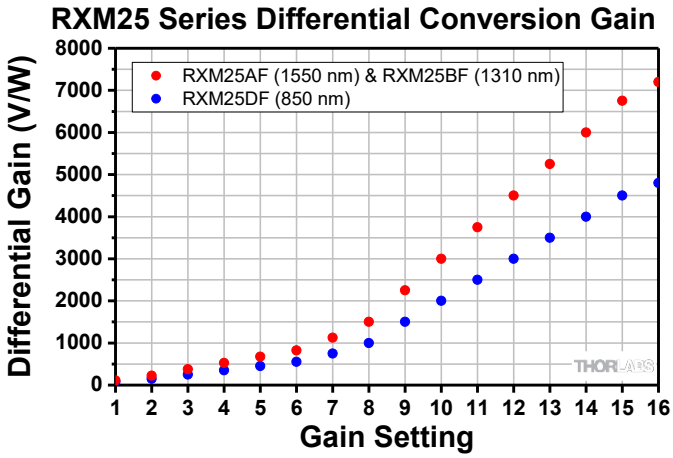

RXM25BF Spectral Response
Responsivity (A/W)
Wavelength (nm)
Measured
Theoretical
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RXM25DF Normalized Frequency Response (Peaking Adjustment)
Magnitude (dB)
Frequency (GHz)
Gain 8, Peak 1
Gain 8, Peak 4
Gain 8, Peak 8


RXM25DF Normalized Frequency Response (Gain Adjustment)
Magnitude (dB)
Frequency (GHz)
Gain 1, Peak 4
Gain 4, Peak 4
Gain 8, Peak 4
Gain 12, Peak 4
Gain 16, Peak 4


RXM25DF Spectral Response
Responsivity (A/W)
Wavelength (nm)





PRECAUTIONS



The components inside this instrument 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.

