Data Sheet

RF Power Meter
RFM3000 Series

GPIB model option | LAN

The RFM3000 Series of meters work in combination with B&K Precision's RFP3000 Series of USB RF Peak Power Sensors to extend their capabilities and eliminate the need for a remote computer. This benchtop solution supports capturing, displaying, and analyzing peak and average RF power in both the time and statistical domains through an intuitive, multi-touch touchscreen display.

Two on-screen markers can be dragged over a waveform for greater measurement details. A selection of useful trigger options and channel synchronization settings provide the perfect tool set for working with multiple channel measurements.

Model	RFM3002	RFM3004	RFM3002-GPIB	RFM3004-GPIB
Configuration	2 Channels	4 Channels	2 Channels with GPIB	4 Channels with GPIB

Features and benefits

- Compatible with RFP3000 Series USB RF Peak Power Sensors
- Capture/display/analyze peak and average power
- Independent or synchronous multi-channel measurements (up to 4 channels)
- Trigger synchronization
- Test source for sensor verification
- Display 16 common power measurements
- Ethernet:10/100/1000 BaseT; HiSLIP
- Supports SCPI-1999.0
- HDMI output for mirror display
- Sensors can be used as standalone instruments

Measurement modes

Measurement modes can be quickly changed form Continuous to Pulse or Statistical modes with one touch.

Cont. Mode

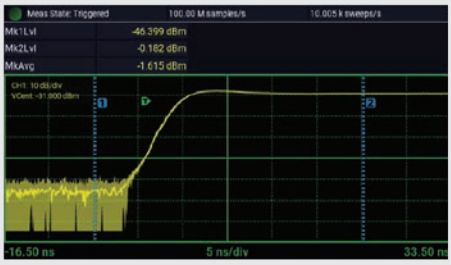
Continuous mode

For simple, intuitive measurements of repetitive waveforms, the RFM3000 Series Continuous Mode of operation provides a numeric display of average, maximum and minimum signal powers.

Pulse Mode

Pulsed mode

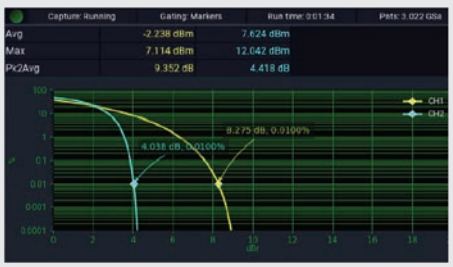
Analysis of fast-rising single pulses or pulses with short pulse repetition intervals (PRIs) requires an instrument with sophisticated trigger and data acquisition capability. Within Pulsed Mode, more than 16 pulse parameters can be measured.



Stat. Mode

Statistical mode

Complementary Cumulative Distribution Function or CCDF plot shows the rate of occurrence of a specific crest factor for signals, such as those used in 5G, 4G/LTE, and Wi-Fi applications.



Technical data subject to change
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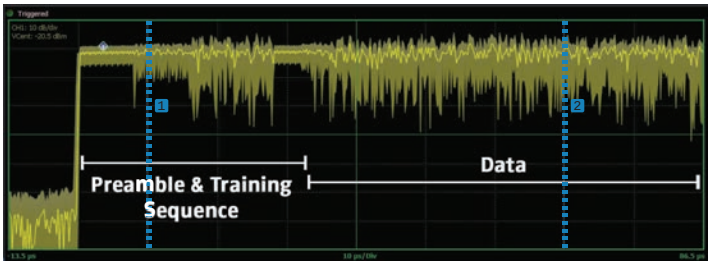
Addressing RF communications and radar measurement challenges

Wi-Fi and wireless communication signal analysis

Characterization and compliance testing of Wi-Fi and LTE chipsets and devices involves significant challenges for design and test engineers. With multiple-input, multiple-output (MIMO) architectures and channel bandwidths up to I60 MHz,testing is complex, especially when measuring RF power per channel and time alignment between channels. The RFM3000 Series enables packet power measurements to be performed independently on multiple synchronous or asynchronous transmit chains with a common timebase shared among sensors.

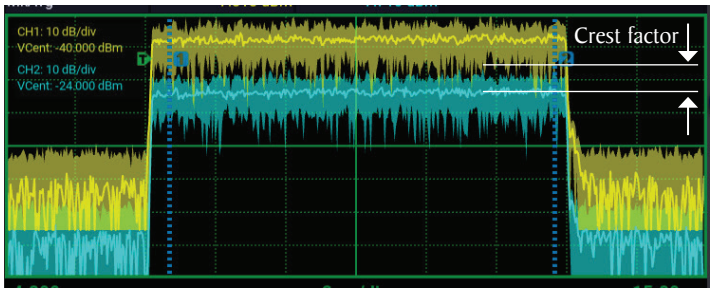
Between marker measurements

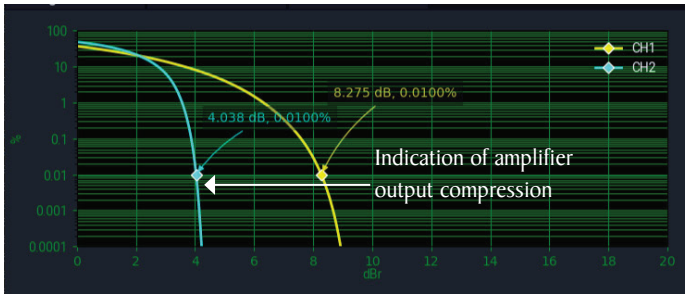
Use markers to define a portion of the waveform on which to make measurements. "Between Marker" measurements are ideal for monitoring specific portions of a packet over long intervals.



Peak-to-average power

By comparing the peak-to-average power ratio, or crest factor (CF), of input and output signals of an RF transmission chain, engineers can assess circuit linearity. Additional insight can be provided with the RFM3000 Series statistical mode Complementary Cumulative Distribution Function (CCDF) plot displaying the rate of occurrence of a specific CF. As an amplifier output compresses, the CF will reduce and the CCDF plot will move left.





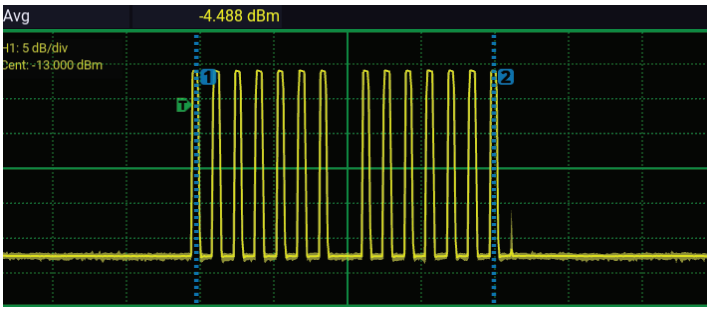
Addressing radar measurement challenges

Secondary Surveillance Radar (SSR)

Design, verification, troubleshooting and maintenance of secondary surveillance radar (e.g. IFF-based radar) has never been more demanding.

Secondary Surveillance Radar (SSR)

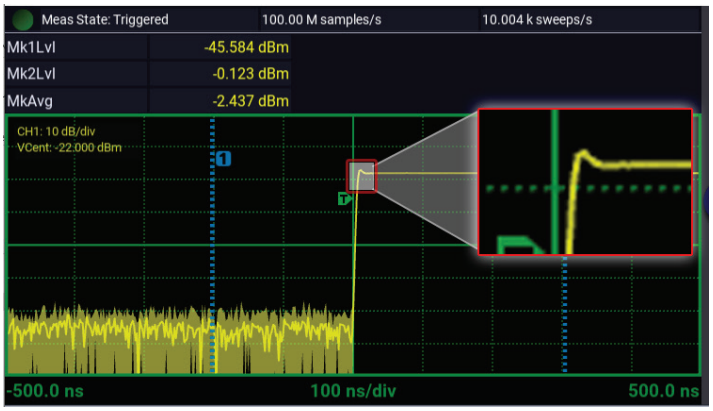
Proper design and operation of SSR systems is critical to the safety and security of aviation. The RFM3000 Series can be used to easily and accurately capture SSR waveforms. Markers enable measurements on specific portions of the waveform.



Rise time and resolution

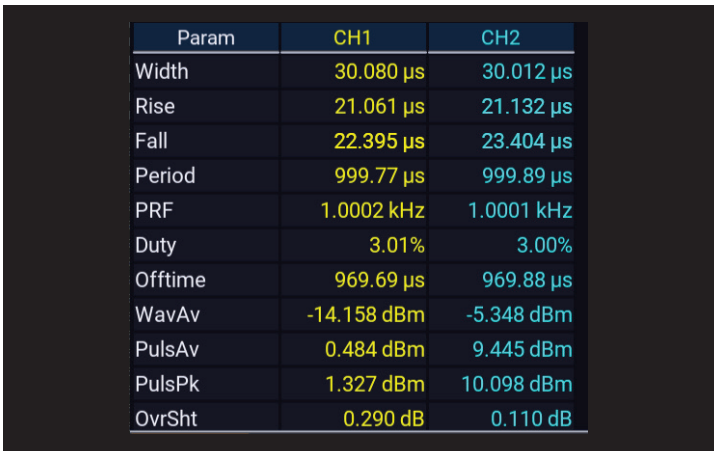
Industry-leading rise time (< 3 ns) enables characterization of the most demanding radar signals.

Utilize the superior 100 ps time resolution to zoom and uncover signal characteristics that might otherwise be missed.



Pulse measurements

Users can take advantage of the RFM3000 Series automated pulse measurement feature to measure and calculate 16 common power and timing parameters and display the parameters of interest: rise-time, fall time, pulse width, off-time, period, pulse repetition frequency, duty cycle, pulse peak, pulse overshoot, pulse average, waveform average, top level power, droop, bottom level power, edge delay, and pulse edge skew between channels.



Param	CH1	CH2
Width	30.080 µs	30.012 µs
Rise	21.061 µs	21.132 µs
Fall	22.395 µs	23.404 µs
Period	999.77 µs	999.89 µs
PRF	1.0002 kHz	1.0001 kHz
Duty	3.01%	3.00%
Offtime	969.69 µs	969.88 µs
WavAv	-14.158 dBm	-5.348 dBm
PulsAv	0.484 dBm	9.445 dBm
PulsPk	1.327 dBm	10.098 dBm
OvrSht	0.290 dB	0.110 dB

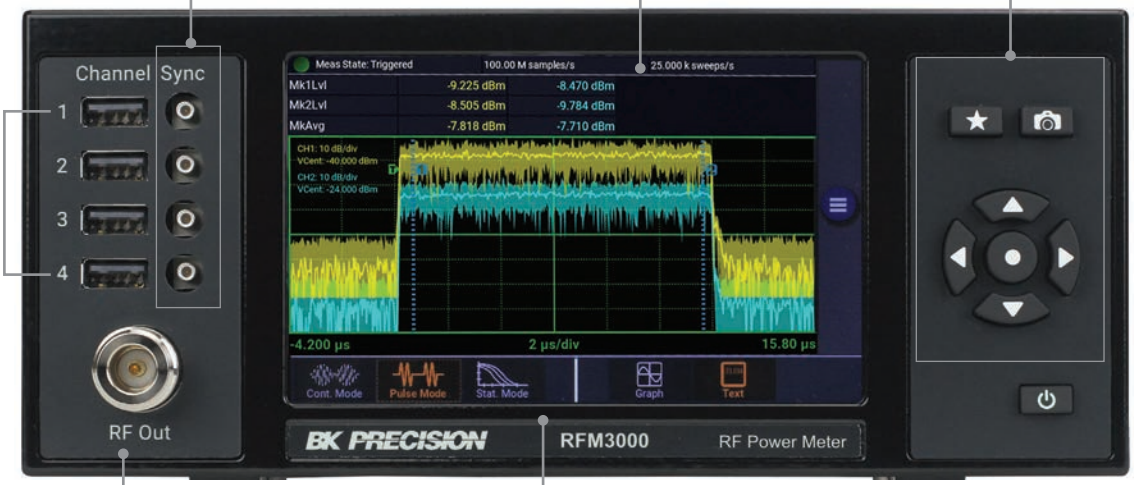
Front panel

Sync port
Sync ports to source or receive triggers for timing and synchronization

5-inch WVGA touch display
Multi-touch display with intuitive user interface

Intuitive control
One touch to quickly access presets and favorite functions

USB host
Connect up to 4 USB sensors for multi-channel measurements



RF out
Test source to verify sensor operation

Measurement modes
Touch to select Continuous, Pulse or Statistical mode, and select between Graph and Text

Rear panel

Optional GPIB interface

External trigger input

Auxiliary sensor and Sync inputs

HDMI interface
HDMI output for remote front panel display

LAN interface
LAN connectivity to ethernet

Specifications

RFM3000 Series	
Channels	2 or 4 channels
Display	
Display Size	5-inch WVGA multi-touch display with intuitive graphical user interface
Display Modes	Graph (power vs time) - Numeric (numeric data) - Statistical measurements - CCDF
	Automatic measurements (pulse, statistical, and marker measurements)
Marker Measurements (in Graph view)	
Markers (vertical cursors)	Settable in time relative to the trigger position
Marker Independently	Avg, Min and Max Power at a specified time offset
Interval Between Markers	Avg, Min and Max Power over the defined interval
Pair of Markers	Ratio of power values at each marker
Pulse Mode	
Automatic Measurements	Pulse rise-time - Pulse fall-time - Pulse width - Pulse off-time - Pulse period - Pulse repetition frequency Pulse duty cycle - Waveform average - Pulse peak - Pulse average - Pulse overshoot - Pulse droop Top level power - Bottom level power - Edge delay - Pulse edge skew between channels
Statistical Mode	
Automatic Measurements	Peak power - Average power - Minimum power - Peak to average ratio - Dynamic range Percent at cursor - Crest factor at cursor - Crest factor at various percents
Trigger	
Synchronization	Internal trig distribution
Mode	Normal, Auto, Auto Pk-to-Pk, Free Run
Source	Any connected RTP Series sensor (via SMB's) or rear panel external trigger
Internal Level Range	-40 dBm to +20 dBm (sensor dependent)
External Level Range	± 5 volts or TTL
Slope	+ or -
Hold-off, Min Pulse Width, Max Trigger Rate	Sensor and timebase dependent
Time Base	
Time Base Resolution, Range, Accuracy	Sensor dependent
Time Base Display	Sweeping or roll mode
Trigger Delay Range	Sensor dependent
Trigger Delay Resolution	0.02 divisions

Specifications (cont.)

Note: All specifications apply to the unit after a temperature stabilization time of 15 minutes over an ambient temperature range of 23 °C ± 5 °C. Specifications are valid for single unit operation only.

RFM3000 Series		
Inputs/Outputs (front panel)		
USB with SMB trigger port	4 ports USB2.0: Type A receptacle, 4 ports SMB(f)	
Test Source (optional rear panel placement)	50 MHz	1.00 mW (0 dBm) ± 2.3% (0.1 dB) typical
Inputs/Outputs (rear panel)		
LAN	10/100 Ethernet: RJ-45 modular socket	
USB with SMB trigger port	4 ports USB2.0: Type A receptacle, 4 ports SMB(f)	
Multi I/O Connector	User Selectable	Status, trigger, or voltage output
	Range	0 to 10 V (Analog unipolar)
		-10 V to +10 V (Analog bipolar)
		0 or 5 V (Logic)
	Accuracy	±200 mV (±100 mV typical)
	Linearity	0.4% typical
Remote Control		
Command Set	SCPI-1999.0	
LAN	Ethernet: 10/100/1000 BaseT; HiSLIP	
GPIB	Optional	
Regulatory Compliance		
CE compliance with the following European Union directives	Low Voltage Directive: 2014/35/EU, RoHS Directive: 2011/65/EU, WEEE Directive 2012/19/EU, Electromagnetic Compatibility Directive (EMC): 2014/30/EU and Environmental: MIL-PRF-28800F, Class 3	
General		
Power Requirements	90 to 260 VAC, 47 to 60 Hz; 90 to 135 VAC, 47 to 400 Hz; 30 W (35 VA) max	
Operating Temperature	0 to 50 °C (32 to 122 °F)	
Storage Temperature	-40 to +70 °C (-40 to 158 °F)	
Humidity	95% maximum, non-condensing	
Altitude Operation	up to 15,000 feet (4600 m)	
Shock Withstands	± 30 G, 11 ms impulse in X, Y, and Z axes	
Vibration Withstands	2 G sine, 5 to 55 Hz; 2 G random, 5 to 500 Hz	
Warranty	3 Years	
Dimensions (excluding connectors) (H x W x D)	3.5" x 8.3" x 11.2" (89 x 211 x 284 mm)	
Weight	4.8 lbs (2.2 kg)	
Included Accessories	Power cord	

Specifications

Ordering Information

RFM3000 Series

RFM3002	RF Power Meter with 2 active channels
RFM3004	RF Power Meter with 4 active channels
RFM3002-GPIB	RF Power Meter with 2 active channels and GPIB
RFM3004-GPIB	RF Power Meter with 4 active channels and GPIB

High-performance USB power sensors

The RFM3000 Series Power Meter utilizes RFP power sensors with industry leading performance and capabilities. All RFP sensors incorporate Real-Time Power Processing technology, which virtually eliminates gaps in measurement suffered by other power sensors and enables industry leading measurement speeds. In terms of RF performance, the RFP3000 Series Real-Time Peak Power Sensors are the fastest responding sensors with 3 ns rise times and 195 MHz of video bandwidth.

RFP3000 Series real-time peak power sensors

- 50 MHz to 6 GHz, 18 GHz and 40 GHz peak power RF sensors
- Up to 195 MHz video bandwidth with 3 ns rise time
- Crest factor and statistical measurements (e.g., CCDF)
- 10 GS/s effective sample rate
- Real-Time Power Processing technology with virtually zero measurement latency
- 100,000 measurements per second
- 80 dB dynamic range
- Synchronized multi-channel measurements

For more information on the RF sensors see the RFP3000 Series data sheet

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