



# Wideband Power Sensor

## 5012D, 5016D, 5017D, 5018D, 5019D



### The RF Experts

Bird's® Wideband Power Sensor (WPS) never requires field calibration, only requires factory calibration once per year and is traceable to National Institute of Standards and Technology (NIST). The WPS measures True Average Power, Peak Power, and Duty Cycle directly with exceptional accuracy and uses these precise measurements to calculate a wide range of other important factors, such as VSWR, Return Loss, Reflection Coefficient, Crest Factor, Average Burst Power, and CCDF.

### PROBLEMS AND SOLUTIONS

Downtime is necessary

- Monitor and perform maintenance for monitoring while DUT is in-service.
- Measure forward and reflected power to troubleshoot system failures.

Have analog, digital, and multi-carrier signals to measure

- Modulation independent measurements.

Tight budgets

- USB connectivity, no meter required.

Varying field tech skill levels

- Sensor plugs and plays with 5000-XT meter.

Need greater confidence in measurement

- No field calibration required.
- NIST traceable calibration



**Works with the  
Bird RF Meter App!**

Free download from Google Play Store

### APPLICATIONS

**WPS measures:** Analog Cellular, Digital Cellular, 3G, 4G, Tetra, DMR, MOTOTRBO, APCO/P25 Phase 1 & 2, Trunking, CDMA, TDMA, WCDMA, GSM, Transportation, Tactical Military, Radar, Avionics, Marine, LMR, Analog Broadcast, Digital Broadcast, GSM, GPRS, EDGE, UMTS, HSDPA, Bluetooth, Fire, GPS, NPSPAC, Paging, Public Safety, Telematics, Utilites, WIMAX and WLAN.

**Measurements performed:** Peak power, true average power and Duty Cycle.

**Calculations Performed:** VSWR, Return Loss, Reflection Co-efficient, Crest Factor, Average Burst Power and CCDF.

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## GENERAL SPECIFICATIONS

<b>Connector</b>	N Female (Both)
<b>Power Supply</b>	USB Port: Less than one low-power USB load DC Input Connector: 7-18 VDC at less than 0.1A
<b>Impedance</b>	50 Ohms (nominal)
<b>Weight</b>	1.2 lb. maximum
<b>Dimensions HxWxD</b>	4.8" x 4.6" x 1.3"
<b>[inches (mm)]</b>	(122 mm x 117 mm x 33 mm)
<b>Data Logging</b>	Requires 5000-XT or VPM3
<b>Operating Temps [°C(°F)]</b>	-10° to 50°C (+14° to +122°F)
<b>Storage Temps [°C(°F)]</b>	-40° to +80°C (-40° to +176°F)
<b>Mechanical Shock &amp; Vibration</b>	IAQ MIL-PRF-28800F class3
<b>CE</b>	EMC EN 61326-1-2006
<b>INTERFACES</b>	
<b>DPM</b>	DB9 proprietary interface
<b>PC Interface (1)</b>	RS-232, 9600 Baud, no parity, 8 data bits, 1 stop bit, DB9
<b>PC Interface (2)</b>	USB 2.0 Type B

<b>Frequency Range</b>	<b>5012D</b>	350 MHz - 4.0 GHz
	<b>5016D</b>	350 MHz - 4.0 GHz
	<b>5017D</b>	25 MHz - 1.0 GHz
	<b>5018D</b>	150 MHz - 4.0 GHz
	<b>5019D</b>	25 MHz - 1.0 GHz
<b>Power Range</b>	<b>5012D</b>	150 mW - 150 Watts Avg, 400 Watts Peak
	<b>5016D</b>	25 mW - 25 Watts Avg, 60 Watts Peak
	<b>5017D</b>	500mW - 500 Watts Avg, 1300 Watts Peak**
	<b>5018D</b>	100 mW - 25 Watts Avg, 60 Watts Peak
	<b>5019D</b>	100 mW - 100 Watts, 260 Watts Peak
<b>Insertion VSWR</b>	<b>5012D</b>	<1.05 from 0.35 to 2.5 GHz, <1.10 from 2.5 to 4 GHz
	<b>5016D</b>	<1.05 from 0.35 to 2.5 GHz, <1.10 from 2.5 to 4 GHz
	<b>5017D</b>	<1.05
	<b>5018D</b>	<1.05 from 0.35 to 2.5 GHz, <1.10 from 2.5 to 4 GHz
	<b>5019D</b>	<1.05
<b>Insertion Loss</b>	<b>5012D</b>	<0.05 dB from 0.35 to 1.0 GHz, <0.1 dB from 1 to 4 GHz
	<b>5016D</b>	<0.05 dB from 0.35 to 1.0 GHz, <0.1 dB from 1 to 4 GHz
	<b>5017D</b>	<0.05 dB
	<b>5018D</b>	<0.05 dB from 0.35 to 1.0 GHz, <0.1 dB from 1 to 4 GHz
	<b>5019D</b>	<0.05 dB
<b>Directivity</b>	<b>5012D</b>	30 dB up to 3.0 GHz, 28 dB from 3.0 to 4.0 GHz
	<b>5016D</b>	30 dB up to 3.0 GHz, 28 dB from 3.0 to 4.0 GHz
	<b>5017D</b>	28 dB up to 100 MHz, 30 dB from 100 to 1000 MHz
	<b>5018D</b>	30 dB up to 3.0 GHz, 28 dB from 3.0 to 4.0 GHz
	<b>5019D</b>	28 dB up to 100 MHz, 30 dB from 100 to 1000 MHz
<b>AVERAGE POWER</b>		
<b>Average Forward Power Range</b>	<b>5012D</b>	150 mW - 150 Watts Avg, 400 Watts Peak
	<b>5016D</b>	25 mW - 25 Watts Avg, 60 Watts Peak
	<b>5017D</b>	500 mW - 500 Watts Avg, 1300 Watts Peak**
	<b>5018D</b>	100 mW - 25 Watts Avg, 60 Watts Peak
	<b>5019D</b>	100 mW - 100 Watts, 260 Watts Peak
<b>*Accuracy, Average Forward Power</b>	<b>5012D</b>	± 4% of reading, + 0.05 W
	<b>5016D</b>	± 4% of reading, + 0.008 W
	<b>5017D</b>	± 4% of reading, + 0.17 W
	<b>5018D</b>	± 4% of reading, + 0.008 W
	<b>5019D</b>	± 4% of reading, + 0.04 W
<b>Minimum Forward Power for Reflected Measurement</b>	<b>5012D</b>	0.5 W
	<b>5016D</b>	0.1 W
	<b>5017D</b>	0.5 W
	<b>5018D</b>	0.1 W
	<b>5019D</b>	0.3 W
<b>Return Loss</b>	<b>5012D</b>	0.0 to 23 dB
	<b>5016D</b>	0.0 to 23 dB
	<b>5017D</b>	0.0 to 23 dB
	<b>5018D</b>	0.0 to 23 dB
	<b>5019D</b>	0.0 to 23 dB
<b>VSWR</b>	<b>5012D</b>	1.15 to 99.9
	<b>5016D</b>	1.15 to 99.9
	<b>5017D</b>	1.15 to 99.9
	<b>5018D</b>	1.15 to 99.9
	<b>5019D</b>	1.15 to 99.9

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## 5012D, 5016D, 5017D, 5018D, 5019D

### BURST AVERAGE POWER

<b>Burst Average Power Range</b>	<b>5012D</b>	4W - 150 Watts Avg
	<b>5016D</b>	.7W - 25 Watts Avg
	<b>5017D</b>	13.5W - 500 Watts Avg
	<b>5018D</b>	.7 W - 25 Watts Avg
	<b>5019D</b>	2.7 W - 100 Watts Avg
<b>Burst Width</b>	<b>5012D</b>	1 $\mu$ s to 5 ms
	<b>5016D</b>	1 $\mu$ s to 5 ms
	<b>5017D</b>	1 $\mu$ s to 5 ms
	<b>5018D</b>	1 $\mu$ s to 5 ms
	<b>5019D</b>	1 $\mu$ s to 5 ms
<b>Repetitions Rate</b>	<b>5012D</b>	5 Hz, Min
	<b>5016D</b>	5 Hz, Min
	<b>5017D</b>	5 Hz, Min
	<b>5018D</b>	5 Hz, Min
	<b>5019D</b>	5 Hz, Min
<b>Duty Cycle (D)</b>	<b>5012D</b>	.002 to 1.0
	<b>5016D</b>	.002 to 1.0
	<b>5017D</b>	.002 to 1.0
	<b>5018D</b>	.002 to 1.0
	<b>5019D</b>	.002 to 1.0
<b>*Accuracy, Burst Average Power</b>	<b>5012D</b>	$\pm$ 6% of reading, + 0.05 W
	<b>5016D</b>	$\pm$ 6% of reading, + 0.008 W
	<b>5017D</b>	$\pm$ 6% of reading, + 0.17W
	<b>5018D</b>	$\pm$ 6% of reading, + 0.008 W
	<b>5019D</b>	$\pm$ 6% of reading, + 0.04 W

### PEAK ENVELOPE POWER

<b>Peak Envelope Power Range</b>	<b>5012D</b>	4.0 - 400 W
	<b>5016D</b>	0.7 - 60 W
	<b>5017D</b>	13.5 - 1300 W
	<b>5018D</b>	0.7 - 60 W
	<b>5019D</b>	2.7 - 260 W

### \*PEAK ENVELOPE POWER ACCURACY

<b>burst width &gt; 200 <math>\mu</math>s</b>	<b>5012D</b>	$\pm$ 7% of reading, + 0.20 W
	<b>5016D</b>	$\pm$ 7% of reading, + 0.05 W
	<b>5017D</b>	$\pm$ 7% of reading, + 0.70 W
	<b>5018D</b>	$\pm$ 7% of reading, + 0.05 W
	<b>5019D</b>	$\pm$ 7% of reading, + 0.13 W
<b>1 <math>\mu</math>s &lt; burst width &lt; 200 <math>\mu</math>s</b>	<b>5012D</b>	$\pm$ 10% of reading, + 0.40 W
	<b>5016D</b>	$\pm$ 10% of reading, + 0.10 W
	<b>5017D</b>	$\pm$ 10% of reading, + 1.40 W
	<b>5018D</b>	$\pm$ 10% of reading, + 0.10 W
	<b>5019D</b>	$\pm$ 10% of reading, + 0.26 W
<b>0.5 <math>\mu</math>s &lt; burst width &lt; 1 <math>\mu</math>s</b>	<b>5012D</b>	$\pm$ 15% of reading, + 0.40 W
	<b>5016D</b>	$\pm$ 15% of reading, + 0.10 W
	<b>5017D</b>	$\pm$ 15% of reading, + 1.40 W
	<b>5018D</b>	$\pm$ 15% of reading, + 0.10 W
	<b>5019D</b>	$\pm$ 15% of reading, + 0.26 W
<b>burst width &lt; 0.5 <math>\mu</math>s</b>	<b>5012D</b>	$\pm$ 20% of reading, + 0.40 W
	<b>5016D</b>	$\pm$ 20% of reading, + 0.10 W
	<b>5017D</b>	$\pm$ 20% of reading, + 1.40 W
	<b>5018D</b>	$\pm$ 20% of reading, + 0.10 W
	<b>5019D</b>	$\pm$ 20% of reading, + 0.26 W

### CREST FACTOR

<b>Crest Factor Measurement Range</b>	<b>5012D</b>	150 mW - 150 Watts
	<b>5016D</b>	25 mW - 25 Watts
	<b>5017D</b>	500 mW - 25 Watts
	<b>5018D</b>	25 mW - 25 Watts
	<b>5019D</b>	100 mW - 100 Watts
<b>*Accuracy, Crest Factor</b>	<b>5012D</b>	Linear Sum of Peak and Average Power Accuracies
	<b>5016D</b>	
	<b>5017D</b>	
	<b>5018D</b>	
	<b>5019D</b>	

### COMPLEMENTARY CUMULATIVE DISTRIBUTION FUNCTION (CCDF)

<b>CCDF Measurement Range</b>	<b>5012D</b>	0.1 to 100%
	<b>5016D</b>	0.1 to 100%
	<b>5017D</b>	0.1 to 100%
	<b>5018D</b>	0.1 to 100%
	<b>5019D</b>	0.1 to 100%
<b>Threshold Measurement Range</b>	<b>5012D</b>	4.0 - 400 W
	<b>5016D</b>	0.7 - 25 W
	<b>5017D</b>	13.5 - 500 W
	<b>5018D</b>	0.7 - 25 W
	<b>5019D</b>	2.7 - 100 W
<b>Measurement Uncertainty</b>	<b>5012D</b>	$\pm$ 2%
	<b>5016D</b>	$\pm$ 2%
	<b>5017D</b>	$\pm$ 2%
	<b>5018D</b>	$\pm$ 2%
	<b>5019D</b>	$\pm$ 2%
<b>*Level Set Accuracy</b>	<b>5012D</b>	As Peak Envelope Power Accuracy + 2.0%
	<b>5016D</b>	
	<b>5017D</b>	
	<b>5018D</b>	
	<b>5019D</b>	

\*for temperatures above 35°C or below 15°C add 3.0% to stated accuracies

\*\* Derate maximum average power rating from 500W at 300MHz to 100W at 1GHZ using a straight line on a log-log scale

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### STANDARD ACCESSORIES

<b>5A2653-10</b>	USB Cable
<b>VPM3</b>	Virtual Power Meter
<b>920-5012S</b>	Instruction Book
<b>920-VPM3</b>	Instruction Book

### OPTIONAL ACCESSORIES

<b>PA-MNME</b>	Male N to Male 7/16 (DIN)
<b>PA-MNFE</b>	Male N to Female 7/16 (DIN)
<b>5A2226</b>	Power Supply, Intl
<b>5A2229</b>	Power Supply, US
<b>5A2264-09-MF-10</b>	DB9 Cable, 10"
<b>5A2653-OR5NL5</b>	USB Interface cable, 15 cm Long

### COMPATIBLE DEVICES

	5012D	5016D	5017D	5018D	5019D
5000-EX	YES	YES	YES	YES	YES
5000-XT	YES	YES	YES	YES	YES
VPM2	YES	YES	YES	YES	YES
VPM3	YES	YES	YES	YES	YES
SA-1700 EXP	YES	YES	YES	NO	NO
SA-2500 EX	YES	YES	YES	NO	NO
SA-6000 EX	YES	YES	YES	NO	NO
SA-3600 XT	YES	YES	YES	YES	YES
SA-6000 XT	YES	YES	YES	YES	YES
SH-36S	YES	YES	YES	YES	YES
SH-361S	YES	YES	YES	YES	YES
SH-362	YES	YES	YES	YES	YES
SH-362S	YES	YES	YES	YES	YES

