

Key PowerSensor+™ Specifications

50 MHz to 20 GHz

- 40 dBm to +20 dBm

2.8% Total Error*

1.20:1 VSWR (-21 dB Return Loss)

* Measuring a well matched DUT (-20 dBm @ 2 GHz)

Measurement Capability

Time Gated Measurements: *Pulse, Peak and Average Power, Overshoot, Crest Factor; Rise and Fall Time, Pulse Width; Pulse Repetition Frequency, Duty Cycle*

Pulse (Modulation) Power Measurements: *Duty Cycle, Measured Pulse Power, Peak Envelope Power, Crest Factor*

Statistical Measurements: *CDF, CCDF, PDF*

CW and Average Measurements: *Average Power, Duty Cycle-Corrected Pulse Power, Data Logging*

Description

The LB680A is an easy to use, high performance, pulse profiling, pulse (modulation), and CW power meter and sensor in one. When ordered with option 004, it features a 10 MHz video bandwidth for repetitive pulse profiling applications and provides superior in-class performance with high speed measurements and temperature compensated accuracy.

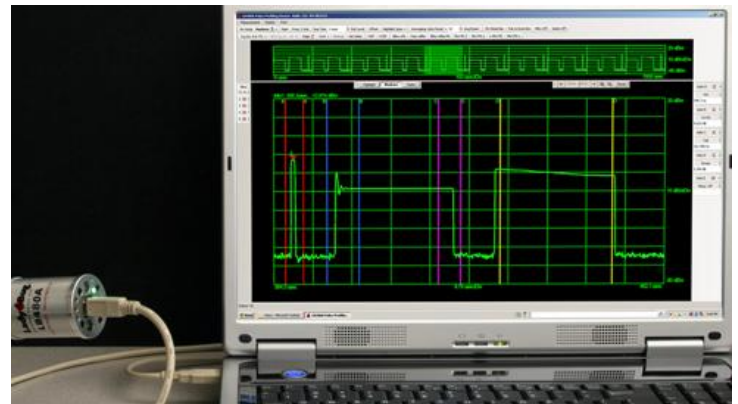
Get up and running quickly with the Pulse Profiling power panel. Use the supplied drivers and programming examples for ATE applications. Easily integrate the power sensor(s) into Lab View, C, VB and other environments.

Integration and usability are further simplified because calibration and zeroing are not required before use and, you have the flexibility of selecting from a variety of connector types including SMA, 3.5 mm, and N.

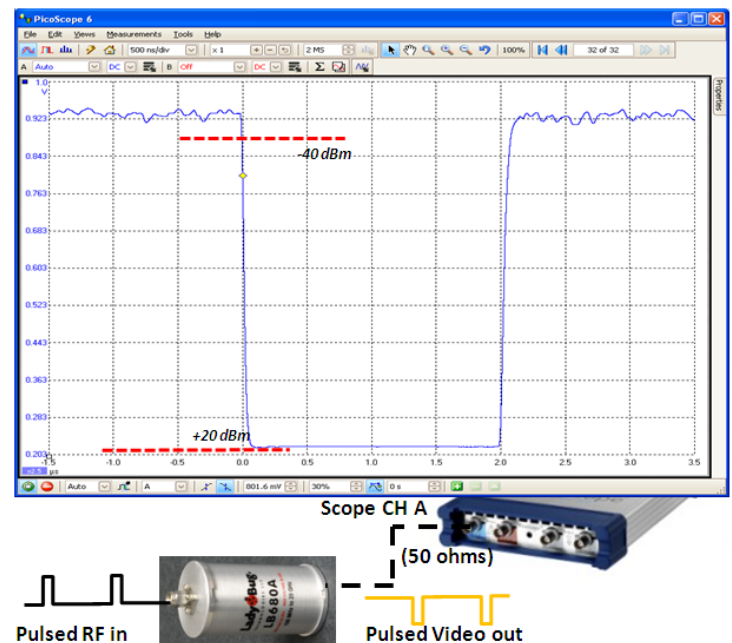
Option 004 provides selectable video bandwidth filters up to 10 MHz, for pulse profiling applications. Option 001 provides a <3 Hz bandwidth 0 to 1V analog recorder output signal and option 0W2 provides a wideband, calibrated analog detector video output signal ~ 1 to 0 Volts (requires option 004).

Features

- Superior in-class price
- Superior in-class performance: Measure 50 MHz signals below -35 dBm
- Fast: 10 to 100 times faster than competitive sensors
- Compact: 1/10 the volume of competitive sensors
- Ruggedized USB connector: Does not fatigue or break like competitive sensors
- Trigger on the RF input level
- Fully calibrated over temperature



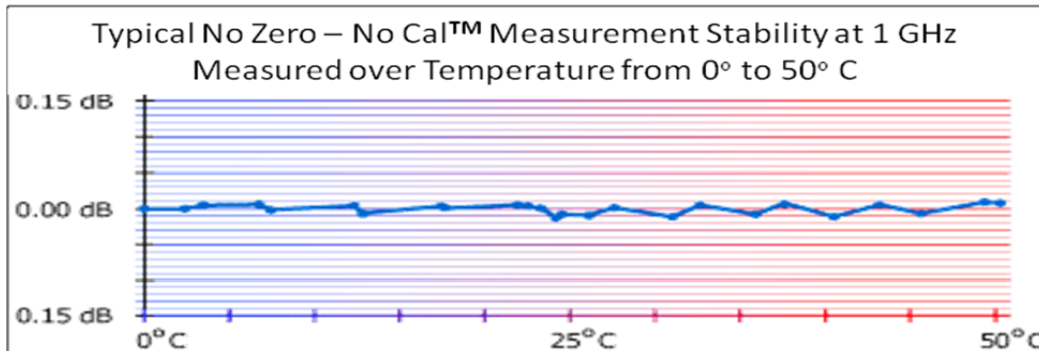
Pulse Profile Test Setup for One Sensor Measurements



Measuring Option 0W2 Wideband, Negative Detector, Analog Video Output Signal

Applications

- General purpose scalar measurements
- General average and pulse RF and microwave power measurements requiring leading edge accuracy:
 - CW & pulsed signals
 - Narrow and wide band signals: CDMA, W-CDMA, QAM, OFDM, GSM, TDMA, QPSK, FSK, AM, FM, etc.
 - Recorders, power monitoring, and ALC loops
- Research & development, and manufacturing
- Maintenance, repair, installation, and service



LB680A PowerSensor+™ Specifications

Parameter	LB680A
Frequency Range	Type N: 50 MHz to 18.6 GHz (useable to 20 GHz) SMA & 3.5 mm: 50 MHz to 20 GHz
Dynamic Range	
50 MHz to 20 GHz	-40 dBm to +20 dBm
Accuracy	Total Error (RSS) = $\sqrt{(M^2 + CF^2 + L^2 + N^2 + T^2 + Z^2)}$ <i>Note 1</i>
Calibration Factor	NIST traceable
(Type N)	
50 MHz to 500 MHz	4.0%
500 MHz to 10 GHz	1.7%
10 GHz to 18.6 GHz	1.9%
(SMA & 3.5 mm)	
50 MHz to 500 MHz	4.0%
500 MHz to 12.5 GHz	2.6%
12.5 GHz to 18 GHz	3.2%
18 GHz to 20 GHz	3.5%
Linearity <i>Note 3</i>	
(50 MHz to 100 MHz)	
+15 to +20 dBm	7.0%
+5 to +15 dBm	5.0%
-20 to +5 dBm	5.0%
-30 to -20 dBm	5.0%
-40 to -30 dBm	5.0%
(100 MHz to 2 GHz)	
+15 to +20 dBm	7.0%
+5 to +15 dBm	5.0%
-20 to +5 dBm	3.0%
-30 to -20 dBm	3.0%
-40 to -30 dBm	3.0%
(2 GHz to 20 GHz)	
+15 to +20 dBm	6.0%
+5 to +15 dBm	4.0%
-20 to +5 dBm	2.0%
-30 to -20 dBm	2.0%
-40 to -30 dBm	2.0%
Noise	5 second integration
(-30 to +20 dBm)	
50 MHz – 20 GHz	0.25%
(-40 to -30 dBm)	
50 MHz – 20 GHz	0.50%
Zero Offset <i>Note 3</i>	
50 MHz – 500 MHz	$\{[(200 \text{ nW @ } 25^\circ\text{C}) + \Delta T \times (10 \text{ nW / } ^\circ\text{C})] \pm 10 \text{ nW / month}\}$ <i>Note 2</i>
500 MHz – 20 GHz	$\{[(100 \text{ nW @ } 25^\circ\text{C}) + \Delta T \times (5 \text{ nW / } ^\circ\text{C})] \pm 5 \text{ nW / month}\}$ <i>Note 2</i>

LB680A Pulse Profiling USB PowerSensor+™

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LB680A PowerSensor+™ Specifications (continued)

Parameter	LB680A
Accuracy (continued)	
Match	
(Type N)	
50 MHz to 1 GHz	1.20:1 VSWR (21 dB Return Loss)
1 GHz to 10 GHz	1.20:1 VSWR (21 dB Return Loss)
10 GHz to 18.6 GHz	1.29:1 VSWR (18 dB Return Loss)
(SMA & 3.5 mm)	
50 MHz to 1 GHz	1.20:1 VSWR (21 dB Return Loss)
1 GHz to 10 GHz	1.20:1 VSWR (21 dB Return Loss)
10 GHz to 20 GHz	1.29:1 VSWR (18 dB Return Loss)
Temperature (°C)	
40 - 50	2.50%
30 - 40	1.25%
20 - 30	0.00%
10 - 20	1.25%
0 - 10	2.50%
Maximum Average Power	+20 dBm (100 mW)
Damage Level	+23 dBm (200 mW)
Maximum Pulse Power	+20 dBm (100 mW)
Damage Level	+23 dBm (200 mW)
Maximum Peak-to-Average Ratio	
50 MHz to 20 GHz	55 dB
Internal Video Bandwidth	
Power Measurements (PM Panel Only)	10 MHz
Pulse Profiling (standard)	100 kHz
Pulse Profiling (option 004)	100 kHz, 200 kHz, 300 kHz, 500 kHz, 1 MHz, 2 MHz, 3 MHz, 5 MHz, 10 MHz
10 % to 90% Rise Time (option 004)	54 ns (-40 to -20 dBm pulse measured @ 4 GHz)
10 % to 90% Fall Time (option 004)	44 ns (-40 to -20 dBm pulse measured @ 4 GHz)
Time Base	+/- 50 ppm
Effective Sample Rate	48 MS/second
Measurements	2000/second
Pulse Profiling Power Measurements (Time Gating to Analyze Pulse Parameters)	Pulse Power, Peak Power, Average Power, Droop, Rise Time, Fall Time, Overshoot, Pulse Width, Pulse Repetition Frequency, Duty Cycle, Crest Factor (Peak-to-Average Ratio)
Pulse (Modulation) Power Measurements	Duty Cycle, Measured Pulse Power, Peak Power, Crest Factor (Peak-to-Average Ratio)
Statistical Measurements	CDF, CCDF, PDF
Average Power Measurements	Average Power, Duty Cycle-Corrected Pulse Power, Data Logging
Display & Data Processing Capability	Multiple sensors, displays, and traces
Markers	5 pairs
Gating	5 pairs
Scaling	Linear, dB
Trace	Averaging, offset, scaling, statistics

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**LB680A PowerSensor+™ Specifications (continued)**

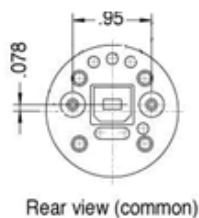
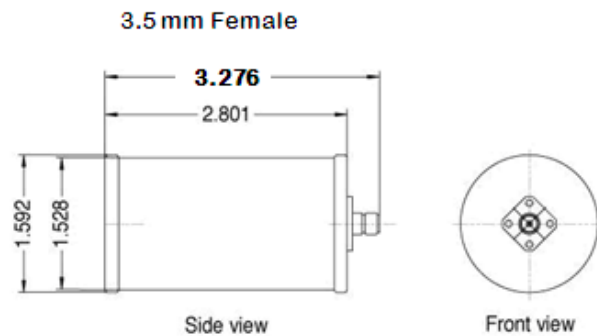
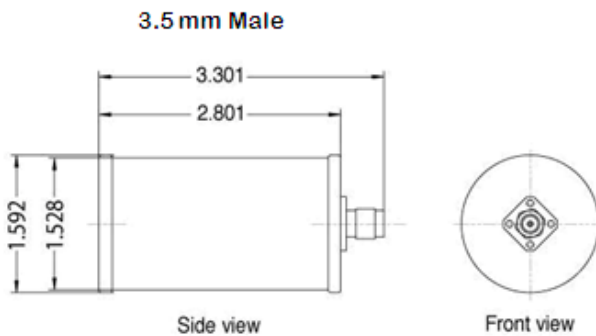
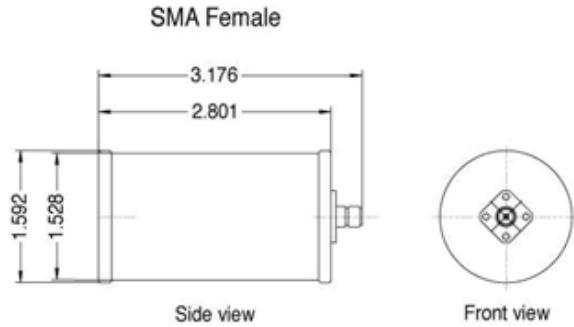
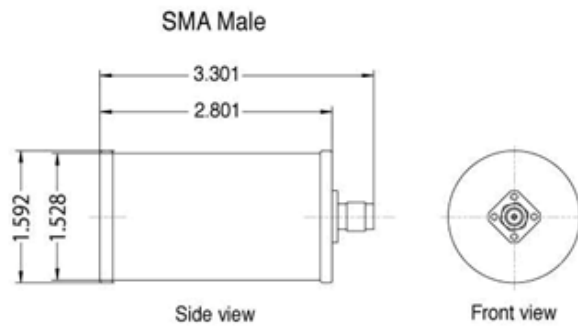
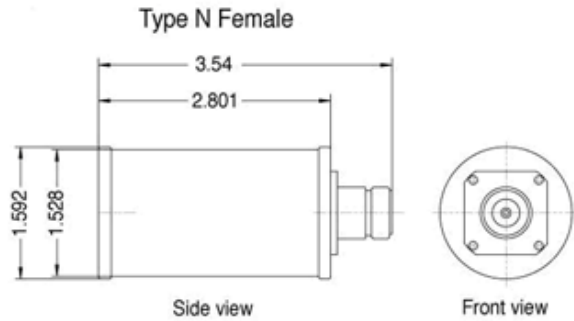
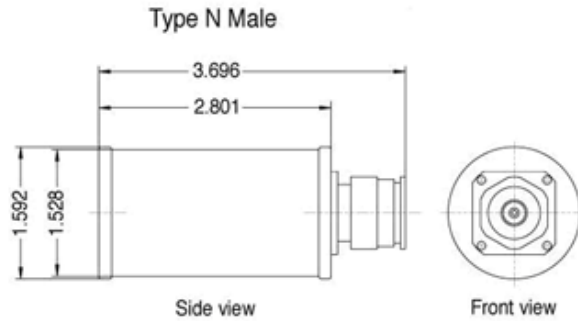
Parameter	LB680A
Trigger	Standard
Resolution	20.8 ns
Delay	10 ms
Hold off	250 ms
Modes	Single, Continuous
Source	Internal, External
Trigger Rate	1 Hz to 750 KHz
Trigger Off Time	1 us minimum
Internal Trigger	
Level Mode	Manual, Auto
Signal Level Trigger Range 50 MHz to 20 GHz	-20 dBm to 20 dBm
Input	TTL compatible, rising or falling edge
V _{IH} , minimum high-level input	2.0 V at +/- 10 uA
V _{IL} , maximum low-level input	0.8 V at +/- 10 uA
Connector type	SMB male (shared with recorder output)
Absolute maximum levels	5.5 V maximum, -0.5 V minimum
Output (Not available with opt 0W2)	TTL compatible, rising or falling edge
V _{OH} , minimum high-level output	4.6 V at 1 mA
V _{OL} , maximum low-level output	0.8 V at -1 mA
Connector type	SMB male
Absolute maximum levels	5.5 V maximum, -0.5 V minimum
Recorder Out	Option 001 (not available with Opt 0W2)
Range	
Operating	0 to 1 V typical
Maximum Output	5 V, if in trigger mode (option 003)
Output Impedance / Bandwidth	1 K ohm typical / 3 Hz typical
Sensitivity	
Scale	Linear or dB, factory default to Linear
Full Scale Value	User settable, factory default to Linear
Connector type	SMB male (shared with trigger input)
Wideband Video Detector Out	Option 0W2 (Requires Opt 004, not available with Opt 001)
Range	
Voltage Output	1 to 0 V typical (Negative Power Detecting)
Real-time Detected RF Power	-40 to + 20 dBm typical
Output impedance / Bandwidth	50 ohm typical / 10 MHz typical
Sensitivity	0.15 dB/V typical
Connector type	SMB male (replaces Trigger Out signal)
Recommended Calibration Cycle	1 year
Environment, operating	
Temperature	0 °C to 55 °C
Humidity	15% - 95% non-condensing
Altitude	10,000 feet (3,000 meters)
Environment, storage	
Temperature	-25 °C to 85 °C
Humidity	15% to 95% non-condensing
Altitude	50,000 feet (15,000 meters)
Physical	
Weight	3.3 oz (94 g), plus connector weight
Size	1.6" (40 mm) diameter by 2.8" (71 mm) long plus connector length

¹ Error term definitions: Mm (Mismatch); CF (Cal Factor); N (Noise); L (Linearity); T (Temperature); Z (Zero Offset). All error terms are converted to percentages for RSS calculation.

² Use the following formula to determine Zero Offset error (%): $Z = (\text{Zero Offset Power} / \text{Measured Power})100$.

³ Linearity and Zero Offset are a combined specification as LadyBug sensors require no meter zeroing or reference calibration before use.

LB6xxA PowerSensor+ Outline Drawings
(dimensions are inches +/- 0.01)



LB680A Pulse Profiling USB PowerSensor+™
Data Sheet



Revisions to data sheet by date:

06/25/10:

1. Final specifications.