

LB480A Pulse Profiling USB PowerSensor+™

Data Sheet



Key PowerSensor+™ Specifications

50 MHz to 8 GHz (functional to 10 GHz)

- 60 dBm to +20 dBm

1.95% Total Error*

1.09:1 VSWR (-27 dB Return Loss)

* Measuring a well matched DUT (-20 dBm @ 1 GHz)

No Zero – No Cal™ 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 Power, Crest Factor*

Statistical Measurements: *CDF, CCDF, PDF*

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

Description

The LB480A is an easy to use, high-performance, pulse-profiling, pulse (modulation), and average power meter and sensor in one. When ordered with option 004, it features a 10 MHz video bandwidth for pulse profiling applications. It measures a -60 dBm signal compared to others that only measure down to -35 dBm, and provides superior in-class performance with high speed measurements and temperature compensated accuracy. Traditional user zero and user reference calibration have been eliminated.

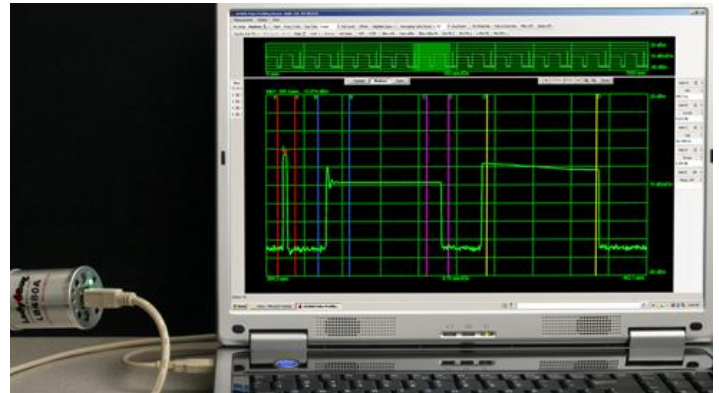
Get up and running quickly with the Pulse Profiling power panel. Use the supplied drivers and programming examples for ATE applications. Easily integrate the power sensor(s) into Lab View, C, VB and other environments.

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, N, and 3.5 mm. Contact LadyBug Technologies for TNC connectors.

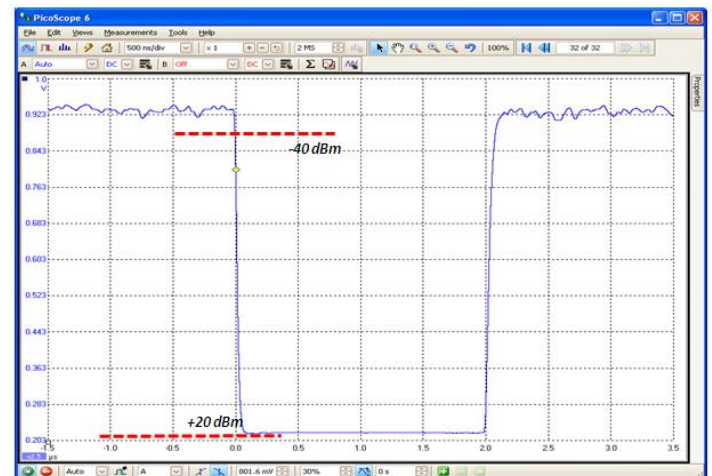
Option 004 provides selectable video bandwidth filters up to 10 MHz for pulse profiling applications. Option 001 provides a <3 Hz bandwidth 0 to 1V analog recorder output signal. Option 0W2 provides a wideband, calibrated analog, negative detector video output signal ~ 1 to 0 Volts (requires option 004).

Features

- Superior in-class price and performance: Measure 10 MHz signals at -60 dBm (25 dB lower than others)
- 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
- No Zero – No Cal™ - Fully calibrated over temperature



Pulse Profiling Panel Test Setup for One Sensor Measurements



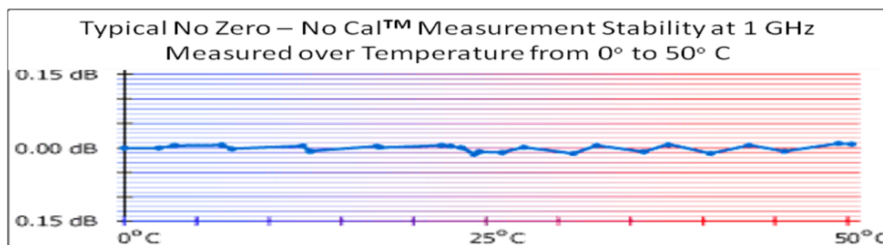
Measuring Opt 0W2 Wideband, Negative Detector, Analog Video Output Signal

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

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Data Sheet



LB480A PowerSensor+™ Specifications

Parameter	LB480A
Frequency Range	50 MHz to 8 GHz (functional to 10 GHz)
Dynamic Range	
50 MHz to 6 GHz	-60 dBm to +20 dBm
6 GHz to 8 GHz	-50 dBm to +20 dBm
Accuracy	Total Error (RSS) = $\sqrt{(Mm^2 + CF^2 + L^2 + N^2 + T^2 + Z^2)}$ <i>Note 1</i>
Calibration Factor	NIST traceable
(Type N male)	
50 MHz to 500 MHz	4.0%
500 MHz to 8 GHz	1.7%
(SMA & Type N Female)	
50 MHz to 500 MHz	4.0%
500 MHz to 8 GHz	2.5%
(3.5 mm)	
50 MHz to 500 MHz	4.0%
500 MHz to 8 GHz	2.5%
Linearity <i>Note 3</i>	
(50 MHz to 100 MHz)	
+15 to +20 dBm	7.00%
+10 to +15 dBm	5.00%
-60 to +10 dBm	4.00%
(100 MHz to 2 GHz)	
+15 to +20 dBm	7.00%
+10 to +15 dBm	5.00%
-60 to +10 dBm	3.00%
(2 GHz to 8 GHz)	
+15 to +20 dBm	5.00%
+10 to +15 dBm	3.00%
-60 to +10 dBm	2.00%
Noise	1 second integration
(-30 to +20 dBm)	0.22%
50 MHz – 100 MHz	0.22%
100 MHz - 6 GHz	0.04%
6 GHz - 8 GHz	0.04%
(-50 to -30 dBm)	
50 MHz – 100 MHz	0.22%
100 MHz - 6 GHz	0.04%
6 GHz - 8 GHz	0.15%
(-60 to -50 dBm)	
50 MHz – 100 MHz	0.44%
100 MHz - 6 GHz	0.15%
Zero Offset <i>Note 3</i>	$\{[(0.35 \text{ nW @ } 25^\circ\text{C}) + \Delta T \times (0.025 \text{ nW / } ^\circ\text{C})] \pm 0.005 \text{ nW / month}\}$ <i>Note 2</i>

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 measured as a combined specification as LadyBug sensors require no meter zeroing or reference calibration before use.

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Data Sheet



LB480A PowerSensor+™ Specifications (continued)

Parameter	LB480A
Accuracy (continued)	
Match	
(Type N)	
50 MHz – 100 MHz	1.5:1 VSWR (14 dB Return Loss)
100 MHz to 250 MHz	1.18:1 VSWR (21.7 dB Return Loss)
250 MHz to 500 MHz	1.15:1 VSWR (23 dB Return Loss)
500 MHz to 8 GHz	1.15:1 VSWR (23 dB Return Loss)
(super SMA)	
50 MHz – 100 MHz	1.5:1 VSWR (14 dB Return Loss)
100 MHz to 250 MHz	1.18:1 VSWR (21.7 dB Return Loss)
250 MHz to 500 MHz	1.09:1 VSWR (27 dB Return Loss)
500 MHz to 8 GHz	1.09:1 VSWR (27 dB Return Loss)
(3.5 mm)	
50 MHz – 100 MHz	1.5:1 VSWR (14 dB Return Loss)
100 MHz to 250 MHz	1.18:1 VSWR (21.7 dB Return Loss)
250 MHz to 500 MHz	1.09:1 VSWR (27 dB Return Loss)
500 MHz to 8 GHz	1.09:1 VSWR (27 dB Return Loss)
Temperature (°C)	
40 - 50	1.00% (plus 1%, 0 dBm to 10 dBm; plus 3%, 10 dBm to 20 dBm)
30 - 40	0.75% (plus 1%, 0 dBm to 10 dBm; plus 3%, 10 dBm to 20 dBm)
20 - 30	0.00%
10 - 20	0.75% (plus 1%, 0 dBm to 10 dBm; plus 3%, 10 dBm to 20 dBm)
0 - 10	1.00% (plus 1%, 0 dBm to 10 dBm; plus 3%, 10 dBm to 20 dBm)
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 6 GHz	80 dB
6 GHz to 8 GHz	70 dB
Internal Video Bandwidth	
Power Meter Measurements	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 (-70 to -20 dBm pulse measured @ 4 GHz)
10 % to 90% Fall Time (option 004)	44 ns (-70 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

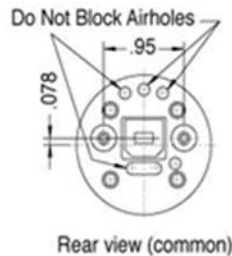
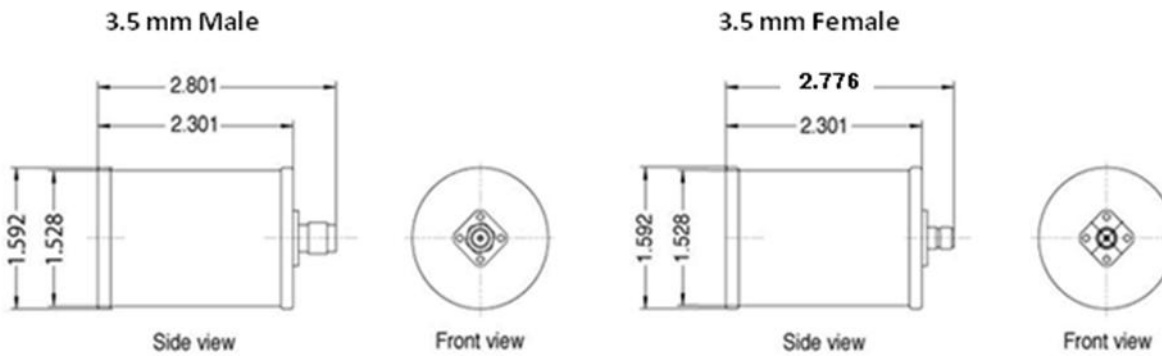
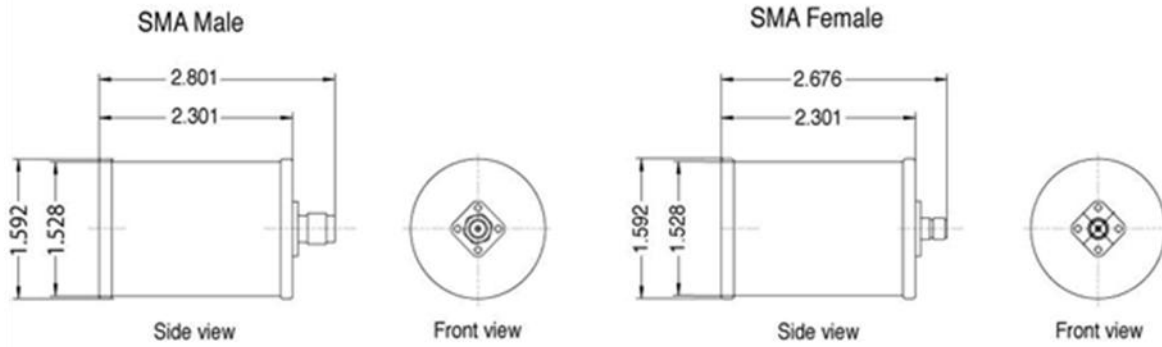
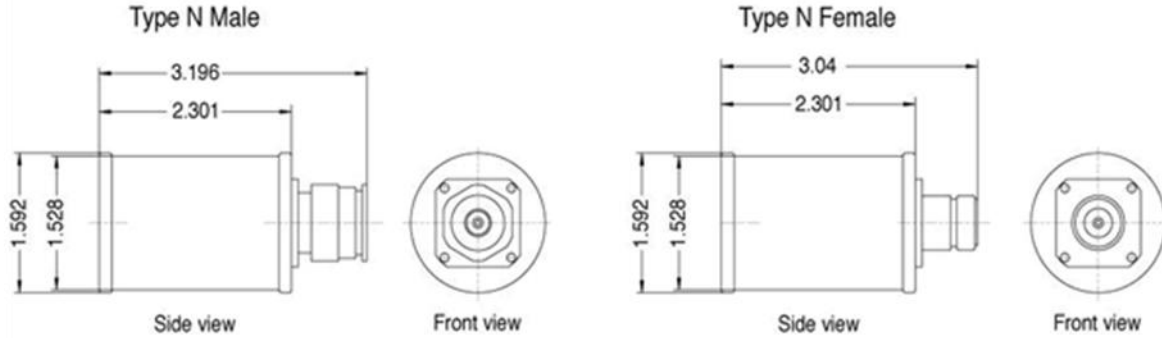
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Data Sheet

**LB480A PowerSensor+™ Specifications (continued)**

Parameter	LB480A
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 6 GHz	-45 dBm to +20 dBm
6 GHz to 8 GHz	-40 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	-45 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 Output)
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	2.9 oz (82 g), plus connector weight
Size	1.6" (40 mm) diameter by 2.3" (71 mm) long plus connector length

LB4XXA PowerSensor+ Outline Drawings
(dimensions are inches +/- 0.01)



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Revisions to data sheet by date:

06/25/10:

1. Add opt 0W2.
2. Add revision page.

06/01/2012

1. Add 3.5 mm connectors
2. Add temperature sensitivity graph

01/06/2013:

1. add 50 MHz specs