Fast, Accurate, Traceable

Everything RF: Interview with Jonny Hawkins Vice President of LadyBug Technologies

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everything RF recently interviewed Jonny Hawkins who is the Vice President at LadyBug Technologies. Jonny holds a B.S. degree in Electrical and Electronics Engineering from the University of Arizona, graduating in 2016. Prior to joining Ladybug Technologies, Jonny gained valuable experience in semiconductor manufacturing and testing at Micron Technologies. His background in this field provided him with valuable insights and skills that he brought to Ladybug Technologies. Ladybug Technologies is dedicated to developing First Tier NMI traceable power measurement solutions, with a focus on innovation and precision.

Q. Can you give us a brief history of Ladybug Technologies? When was the company formed and what was the objective?

Jonny Hawkins: Our company was founded in 2004 by two RF & microwave engineers with extensive development and measurement backgrounds in vector network measurement, spectrum analysis, power, and related standards laboratory metrology experience. LadyBug's startup included the launch of the world's first USB power meter. The precision USB power meter incorporated LadyBug's patented no-zero-no-cal technology. Along with LadyBug's highly successful launch and solid market share growth, the company has expanded its facilities four times. In June 2021 LadyBug relocated, doubling its floor space, and enabling increased product production as well as an expanded development team.

Q. Can you tell us more about the USB Power Sensors range? What are the different types of Power Sensors that you offer?

Jonny Hawkins: Our power sensor product range is tailored to meet customer requirements. Our top-selling products are true-RMS responding, provide reliable, and accurate measurements on any signal. Additionally, we offer pulse profiling products for visual pulse information and pulse sensors for statistical analysis. These are essential for applications such as regulatory compliance testing on digital communication signals.

Q. How do you differentiate your power sensors from those offered by other manufacturers?

Jonny Hawkins: Of course, accuracy comes first. Our 'no user zero-or-cal' feature, combined with unmatched thermal stability and accuracy down to the product's noise floor, is an important advantage to customers. Our calibration standards are Tier 1, and calibrated directly by NIST or METAS. This ensures the highest level of accuracy for our customers. Moreover, we pride ourselves on exceptional product support. We work closely with customers to address measurement questions and assist in integrating sensors into various test systems.

Q. What software is used to control your power meters? Can you tell us more about this software and its features?

Jonny Hawkins: I think it is exciting that customers can install our free software and evaluate with multiple simulated sensors. With over 100 years of combined industry experience, the software is designed to be user-friendly yet equipped with tools for complex measurements and control. Features include extensive logging capabilities, frequency-dependent offset tables (FDO), triggering control, and export to Excel, catering to automated testing needs. A significant portion of our business is in automated testing, and we provide Interactive IO products that allow customers to send measurement commands to the sensors to aid in development of customer ATE systems.

Q. When selecting a power sensor, what should a user be looking for? What are the key parameters that they should evaluate to help select the right RF power sensor?

Jonny Hawkins: A fundamental understanding of the major contributors to measurement error, the needs for the system, and the needs for the DUT must be well understood in order to make a good power sensor selection. Typically, when selecting a power sensor, users should prioritize accuracy, reliability, and traceability. For general purposes, True-RMS power sensors with wide dynamic ranges are recommended. The sensors are great for making average power measurements on pulsed signals as well as CW signals. True-RMS sensors assure accuracy regardless of the signal and they are much faster than thermal sensors. For future use, consider a frequency range that is greater than your current requirement. A wide dynamic range provides flexibility by allowing low level signal measurements and making the selection of attenuators, if needed, easier.

For pulse measurements, users should consider bandwidth and rise time requirements.

For high-speed high-sensitivity applications such as antenna testing, consider a pulse sensor such as our LB479A, that will deliver over 2,000 settled average measurements per second at its full -60dBm sensitivity.

Q. What are the different types of power sensors? Can you tell us a little about each one and what it means - True RMS, Peak and Pulse?

Jonny Hawkins: A True-RMS (Root mean square) power sensor, often referred to as an average sensor, is designed to measure power levels accurately regardless of the signal complexity driven by any modulation present. This accuracy is the defining characteristic of a TRMS sensor. This is the most common type of power sensor and is usually designed with a TRMS responding detector. To accomplish this, instrumentation manufacturers have used a variety of diode and thermally based detectors. Our

sensors use diodes operating in the square-law region. Typically, TRMS sensors are slower to respond than peak and pulse sensors.

Peak and pulse sensors are designed to measure a signal's pulse parameters. The average of the pulse top is referred to as "pulse power," and the highest reading from the pulse top (usually overshoot) is referred to as "peak power". Depending on sensor topology, users will see a reduced noise floor in step with the increased bandwidth required to view a pulse. Most competitive power sensors are advertised with their "average power" sensitivity specifications; however, when placed in pulse mode, the sensitivity is limited to -40 dBm or so-a limitation of the detector technology. Our pulse sensors deliver better than -60 dBm sensitivity in pulse mode.

Q. What is the distinction between an RF Power Meter (Talking about the old school ones with a control unit and separate sensors) and a Power Sensor? Are power meters becoming obsolete, or do they continue to serve a vital role in testing applications?

Jonny Hawkins: RF Power Meters, with separate control units and sensors, are becoming obsolete compared to modern USB/LAN power sensors. The latter offer greater accuracy, cost savings, reliability, and improved functionality, especially in manufacturing test environments.

Q. Which market segments do you cater to? Which market segment is the largest for you?

Jonny Hawkins: We serve a diverse global customer base across defense, satellite communications (Satcom), manufacturing test, and other key market segments. Our power sensors are widely used for electromagnetic compatibility (EMC) testing, product development, and general purpose applications.

Of particular importance is the growing adoption of our sensors as general-purpose test instruments. This highlights their ease of use and user-friendly interface, which has broadened their appeal beyond our core markets.

Our largest customer segments remain defense, Satcom, and manufacturing test due to the critical measurements and high performance required in those fields. However, we see significant growth potential in general-purpose testing roles across various industries

Q. What does 2024 look like for Ladybug Technologies? Are there any new products on the horizon?

Jonny Hawkins: We introduced our Waveguide product line at the end of 2023, and we'll be expanding it this year. Additionally, we're launching new power sensors with frequencies up to 110GHz, LAN connectivity for most products, and our small form factor product line. Our LAN products use HiSLIP (High-Speed LAN Instrument Protocol) for both the LB5900 series and our new small form factor line. This connectivity is widely used across our major market segments. The first product in our small form factor line is the 9GHz, LBSF09 - the world's smallest power sensor with traceability. Its compact size allows multiple sensors to fit into just 1 rack unit, enabling more compact test systems. No other sensor matches its wide connectivity options like USB, LAN, SPI, and I2C.