



# bds 2 System

Bird Diagnostic System



## The RF Experts

The Bird Diagnostic System (BDS) is a revolutionary tool for measuring voltage and current in complex applications. Where repeatability of sensitive RF measurements is important, such as during the processing of silicon wafers, the BDS 2 provides never-before seen data. Each system is comprised of a sensor that attaches in-situ in the RF feed line, a receiver that performs the data conversion and communicates to your workstation, and a calibrated data cable that connects the sensor and receiver. With the ability to make measurements post-matchbox, the BDS 2 uncovers signal characteristics that are not visible to traditional test equipment pre-matchbox.

Using sophisticated parallel signal processing, the BDS 2 is able to simultaneously measure and report voltage, current, and phase angle at multiple fundamental, harmonic and intermodulation frequencies. A robust frequency tracking algorithm is employed to guarantee accurate measurements are made under very dynamic signal conditions. With this data, power and impedance are calculated at each frequency, giving users the ability to identify small discrepancies that may make the difference between a successful and a failed process. This makes the BDS 2 an incredible tool for researching new RF technologies and repeating high precision processes. The BDS 2 is compatible with existing BDS sensor and cable installations.

### PROBLEMS/SOLUTIONS

Simultaneous Measurements of Multiple RF Generators.

- Up to 3 fundamental frequencies can be measured simultaneously with a single BDS 2 system. This feature aids in developing repeatable processes, troubleshooting components and identifying process drifts.

Complex Pulse Measurement.

- High-speed pulse tracking enables the BDS 2 to make measurements under simple or complex pulse conditions, providing unprecedented visibility into process performance.

BDS already installed in your system?

- BDS 2 receiver is compatible with existing BDS cables and sensors.

Standard BDS sensor will not fit in your system?

- Bird will custom design a unique sensor to meet your specific installation requirements.

### APPLICATIONS

- Chamber to Chamber Matching.
- Impedance Matching can reveal problems such as poor RF connections, worn electrodes and changes in the process gas mixture.
- Harmonic Levels up to 252 MHz are available for analysis.
- V, I, Phase and Delivered Power Comparison.



## Improved Frequency and Pulse Tracking Capabilities!

**PARAMETER SPECIFICATIONS**

<b>Frequency Range</b>	307 kHz - 252 MHz (Sensor Dependent)
<b>Frequency Resolution</b>	100 Hz
<b>Frequency Accuracy</b>	± 1 kHz
<b>Number of fundamentals*</b>	Up to 3 simultaneously, chosen from the following: 400kHz, 1MHz, 2MHz, 13.56MHz, 27.12MHz, 60MHz (only certain combinations allowed)
<b>Harmonics</b>	4 harmonics per fundamental, 6 intermodulation products per pair of fundamentals, up to 252 MHz. Limited by maximum number of measurement channels (12).
<b>Measurements</b>	Voltage, current, phase, frequency, impedance, power at frequencies selected by user
<b>Update Rates</b>	100 Hz typical
<b>Network Protocol (Future Enhancements)</b>	Ethernet (DeviceNet, EtherCAT)
<b>RF Power, Max</b>	Determined by RF sensor (Typically 10kW or higher)
<b>RF Connector</b>	Custom or QC
<b>Operating Modes</b>	Tracking Mode, Spectral Search Mode
<b>Tracking Characteristics</b>	
<b>Frequency Slew Rate</b>	2 GHz/sec
<b>Minimum Pulse Width</b>	5 µsec

**GENERAL SPECIFICATIONS**

<b>Receiver Operating</b>	+20 to +40 °C (68 to 104 °F)
<b>Receiver Storage</b>	-20 to +80 °C (-4 to +176 °F)
<b>Cable Operating</b>	0 to +100 °C (32 to 212 °F)
<b>Cable Storage</b>	-20 to +100 °C (-4 to 212 °F)
<b>Sensor Operating/Storage</b>	Refer to Sensor Specification
<b>Humidity, Max</b>	85% Non-condensing
<b>Air Pressure, min</b>	745 mbar (equivalent to 2,500 m / 8,200 ft. max altitude)
<b>Operating Power</b>	15VDC, 2.5A nominal

**SYSTEM COMPONENTS**

<b>Receiver</b>	
7001A900-2	BDS 2 Single Ch. Receiver w/Ethernet
<b>Calibrated Data Cable Options</b>	
7001B040-5M	RF/Data Cable Set 5M straight
<b>Sensor Options*</b>	
7001A550-1-XX YY	Choose XX YY connector options: <u>Input (XX) &amp; output (YY) connector options:</u> 01 – QC N(f)    02 – QC N(m)    12 – QC HN(f) 13 – QC HN(m)    14 – QC 7/16(f)    15 – QC 7/16(m) <i>Other connector options available upon request</i>
7001A550-2	Sensor, BDS2, Protruding Dielectric

PARAMETER	VOLTAGE	CURRENT	PHASE ANGLE
<b>Measurement</b>	RF: 1 to 3000V <sub>rms</sub> (Note 1)	0.1 to 100 A <sub>rms</sub> (Note 1)	-180° to + 180°
<b>Resolution</b>	IEEE 754 Single Precision Floating Point		
<b>Uncertainty 307 kHz - 1 MHz Unlocked System (Note 2)</b>	for F <sub>s</sub> , ± 1.0 V or 2% of reading whichever is greater for F <sub>n</sub> , ± 2.0 V or 4% of reading, whichever is greater (95% confidence interval)	for F <sub>s</sub> , ± 0.1 A or 2% of reading whichever is greater for F <sub>n</sub> , ± 0.2 A or 4% of reading, whichever is greater (95% confidence interval)	Absolute Angle: for F <sub>s</sub> , ≥ 10 V, 1A; ±1° for F <sub>s</sub> , < 10 V, 1A; ±4° for F <sub>n</sub> , ≥ 10 V, 1A; ±2° for F <sub>n</sub> , < 10 V, 1A; ±6° (95% confidence interval)
<b>Uncertainty 1-252 MHz Unlocked System (Note 2)</b>	for F <sub>s</sub> , ± 0.2 V or 2% of reading whichever is greater for F <sub>n</sub> , ± 0.4 V or 4% of reading, whichever is greater (95% confidence interval)	for F <sub>s</sub> , ± 0.02 A or 2% of reading whichever is greater for F <sub>n</sub> , ± 0.04 A or 4% of reading, whichever is greater (95% confidence interval)	Absolute Angle: for F <sub>s</sub> , ≥ 10 V, 1A; ±1° for F <sub>s</sub> , < 10 V, 1A; ±4° for F <sub>n</sub> , ≥ 10 V, 1A; ±2° for F <sub>n</sub> , < 10 V, 1A; ±6° (95% confidence interval)
<b>Uncertainty 307 kHz - 1 MHz Locked System (Note 2)</b>	for F <sub>s</sub> , ± 0.5 V or 1% of reading whichever is greater for F <sub>n</sub> , ± 1.0 V or 2% of reading, whichever is greater (95% confidence interval)	for F <sub>s</sub> , ± 0.05 A or 1% of reading whichever is greater for F <sub>n</sub> , ± 0.1 A or 2% of reading, whichever is greater (95% confidence interval)	Absolute Angle: for F <sub>s</sub> , ≥ 10 V, 1A; ±1° for F <sub>s</sub> , < 10 V, 1A; ±4° for F <sub>n</sub> , ≥ 10 V, 1A; ±2° for F <sub>n</sub> , < 10 V, 1A; ±6° (95% confidence interval)
<b>Uncertainty 1-252 MHz Locked System (Note 2)</b>	for F <sub>s</sub> , ± 0.1 V or 1% of reading whichever is greater for F <sub>n</sub> , ± 0.2 V or 2% of reading, whichever is greater (95% confidence interval)	for F <sub>s</sub> , ± 0.01 A or 1% of reading whichever is greater for F <sub>n</sub> , ± 0.02 A or 2% of reading, whichever is greater (95% confidence interval)	Absolute Angle: for F <sub>s</sub> , ≥ 10 V, 1A; ±1° for F <sub>s</sub> , < 10 V, 1A; ±4° for F <sub>n</sub> , ≥ 10 V, 1A; ±2° for F <sub>n</sub> , < 10 V, 1A; ±6° (95% confidence interval)

\*Contact factory for a custom designed sensor and custom frequency combinations.  
 Note 1: Maximum power is limited by the size of the sensor line section and connectors. See sensor specification document.  
 Note 2: At customer specified frequencies.