



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 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.

Using a streamlined architecture, the BDS is able to measure and report voltage, current, and phase angle at multiple fundamental, harmonic and intermodulation frequencies. 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 an incredible tool for researching new RF technologies and repeating high precision processes.

## PROBLEMS ▶ SOLUTIONS

Simultaneous Measurements of Multiple RF Generators

- ▶ Up to 5 fundamental frequencies can be measured simultaneously with a single BDS system. This feature aids in developing repeatable processes, troubleshooting components and identifying process drifts.

Complex Waveform Plot

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## APPLICATIONS

Chamber to Chamber Matching.

Waveform Reconstruction enables chamber comparisons to identify large and small changes.

Impedance Matching can reveal problems such as poor RF connections, worn electrodes and changes in the process gas mixture.

Harmonic Levels up to 150 MHz are available for analysis.

V, I, Phase and Delivered Power Comparison.



## PARAMETER SPECIFICATIONS

<b>Frequency Range</b>	1 MHz - 500 MHz (Sensor Dependent)
<b>Frequency Resolution</b>	100 Hz
<b>Frequency Accuracy</b>	± 1 kHz
<b>Harmonics</b>	15 maximum, up to 500 MHz (Sensor Dependent)
<b>Number of fundamentals (F0)</b>	Maximum of 5 simultaneously
<b>Digital</b>	> Voltage, current, phase, frequency, impedance, power at frequencies selected by user
<b>Analog</b>	5 Outputs, 0-10Vdc, 1000Ω-source
<b>Update Rates</b>	60 Hz typical for 1 fundamental (Note 1)
<b>Network Protocol</b>	DeviceNet, Ethernet
<b>RF Power, Max</b>	10 kW or maximum power limit of RF connector
<b>RF Connector</b>	Custom or QC
<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>	11-24 Vdc, 1.4-3A input to receiver

## SYSTEM COMPONENTS

### Receiver

7001B200-1 BDS Single Ch. Receiver w/DeviceNet

### Calibrated Data Cable Options

7001A040-SS-2M BDS RF/Data Cable Set 2M straight

7001A040-SS-5M BDS RF/Data Cable Set 5M straight

### Sensor Options\*

7001A050-1 Sensor, QC Interface (Specify Connectors)

7001A050-1-DF-DM Sensor, BDS, DIN(f) Input, DIN(m) Output

7001A050-1-NF-NF Sensor, BDS, N(f)-N(f)

7001A050-1-NM-NF Sensor, BDS, N(m)-N(f)

\*Contact factory for a custom designed sensor.

## PARAMETER

## VOLTAGE

## CURRENT

## PHASE ANGLE

<b>Measurement</b>	RF: 1 to 3000V <sub>rms</sub> (Note 2)	0.1 to 100 A <sub>rms</sub> (Note 2)	-180° to + 180°
<b>Resolution</b>	IEEE 754 Single Precision Floating Point		
<b>Uncertainty 1-100 MHz (Note 3)</b>	for F <sub>o</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>o</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>o</sub> , ≥ 10 V, 1A; ±1° for F <sub>o</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 1-500 MHz (Note 3)</b>	for F <sub>o</sub> , ± 0.3 V or 3% of reading whichever is greater for F <sub>n</sub> , ± 0.6 V or 6% of reading, whichever is greater (95% confidence interval)	for F <sub>o</sub> , ± 0.03 A or 3% of reading whichever is greater for F <sub>n</sub> , ± 0.06 A or 6% of reading, whichever is greater (95% confidence interval)	Absolute Angle: for F <sub>o</sub> , ≥ 10 V, 1A; ±2° for F <sub>o</sub> , < 10 V, 1A; ±8° for F <sub>n</sub> , ≥ 10 V, 1A; ±4° for F <sub>n</sub> , < 10 V, 1A; ±12° (95% confidence interval)
<b>Receiver Temperature Derating - From 25 °C</b>	± 0.05% / °C	± 0.05% / °C	± 0.1% / °C

**Note 1:** Typical data rate for 1 fundamental, 15 harmonics, auto-ADC mode, and no averaging is 60 Hz. Typical data rate for 3 fundamentals, 45 harmonics, auto-ADC mode, and no averaging is 24 Hz. Data rate can vary significantly depending on configuration, network traffic, and host performance.

**Note 2:** Maximum power is limited by the size of the sensor line section and connectors. See sensor specification document.

**Note 3:** At customer specified frequencies.



**Bird Technologies®**



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