

# BIRD DIAGNOSTIC SYSTEM

## Inline Voltage & Current Probe

### P-CVD BDS2 SENSOR

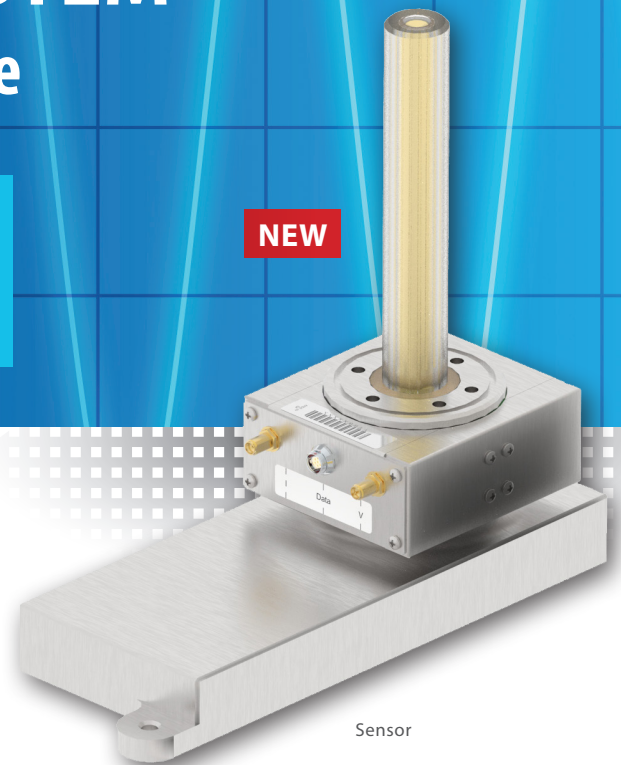
#### Delivering RF Performance Insights for Applied Materials Producer® Systems

The P-CVD BDS2 Sensor is a custom-designed drop-in Voltage & Current Probe for Applied Materials Producer CVD systems. For semiconductor engineers who are optimizing their system's performance, the BDS2 provides insights into plasma chamber operations during recipe development, process improvement analysis, failure investigations and system fingerprinting. By measuring voltage, current and phase at the input to a plasma chamber, the BDS2 provides unprecedented insight into chamber characteristics during each processing step.

The BDS2 is indispensable in capturing process excursions such as arc events. In addition, end point detection is simplified by the system's monitoring of the changing impedance of a plasma chamber. System fingerprinting can also be accomplished to ensure chamber-to-chamber matching and for early failure detection. Further, the optional Time-Domain mode displays the shape of pulsed RF waveforms at the input of the plasma chamber to provide data points during the generation of new process recipes.

#### PRODUCT FEATURES

- Up to 1% accuracy for V and I readings
- Drop-in installation into Applied Materials Producer CVD systems.
- Measures V, I and Phase into complex impedances:
  - Up to 3 fundamental frequencies
  - Up to 4 harmonics per fundamental frequency
  - Up to 6 intermodulation products
- Time domain analysis of waveform details
- Detection of arc events



Sensor



Cable



Receiver

The BDS2 system includes the custom sensor, cable and receiver.

#### APPLICATIONS

- Arcing, transient event detection
- Process end-point indication
- Chamber-to-chamber matching
- Recipe development
- Sub-system drift indication
- Delivery path failure analysis

# P-CVD BDS2 SENSOR

## Specifications

### MEASUREMENT

<b>Measurements</b>	Voltage, current, phase, frequency, impedance, power	<b>Number of Harmonics</b>	4 harmonics per fundamental, 6 intermodulation products per pair of fundamentals up to 252 MHz.
<b>Frequency Range</b>	307 kHz to 252 MHz		Limited by the maximum number of measurement channels: 12 in standard mode, 6 in time domain mode
<b>Frequency Resolution</b>	100 Hz	<b>Update Rates</b>	100 Hz typical
<b>Frequency Accuracy</b>	± 1 kHz	<b>Network Protocol</b>	Ethernet
<b>Number of Fundamentals</b>	Up to 3 simultaneously.	<b>Operating Modes</b>	Tracking Mode, Spectral Search Mode
<b>Tracking Frequency Slew Rate</b>	2 GHz/sec		
<b>Tracking Minimum Pulse Width</b>	5 µsec		

### SYSTEM PROFILES

Parameter	Voltage	Current	Phase Angle
<b>Measurement Range</b>	RF: 1 to 3000V <sub>rms</sub> (Note 1)	0.1 to 100 A <sub>rms</sub> (Note 1)	-180° to + 180°
<b>Uncertainty 307 kHz - 1 MHz Locked System</b> (Note 2)	for F <sub>n</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>n</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)	<b>Absolute Angle:</b> F <sub>n</sub> ≥ 10 V, 1A: ±1° F <sub>n</sub> < 10 V, 1A: ±4°
<b>Uncertainty 1-252 MHz Locked System</b> (Note 2)	for F <sub>n</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>n</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)	F <sub>n</sub> ≥ 10 V, 1A: ±2° F <sub>n</sub> < 10 V, 1A: ±6° (95% confidence interval)
<b>Uncertainty 307 kHz - 1 MHz Unlocked System</b> (Note 2)	for F <sub>n</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>n</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)	<b>Absolute Angle:</b> F <sub>n</sub> ≥ 10 V, 1A: ±1° F <sub>n</sub> < 10 V, 1A: ±4°
<b>Uncertainty 1-252 MHz Unlocked System</b> (Note 2)	for F <sub>n</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>n</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)	F <sub>n</sub> ≥ 10 V, 1A: ±2° 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 RF frequency (25 kW max average power at 13.56 MHz).  
 Note 2: At customer specified frequencies.

### SYSTEM COMPONENTS

<b>7001A660</b>	P-CVD BDS2 Sensor
<b>7001B040-5M</b>	RF/Data Cable Set 5M
<b>7001A900-2</b>	BDS2 Single Channel Receiver with Ethernet
<b>7001A900-3</b>	BDS2 Single Channel Receiver with Ethernet and RS-232

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