

BIRD DIAGNOSTIC SYSTEM

Inline Voltage & Current Probe

P-CVD BDS2 SENSOR

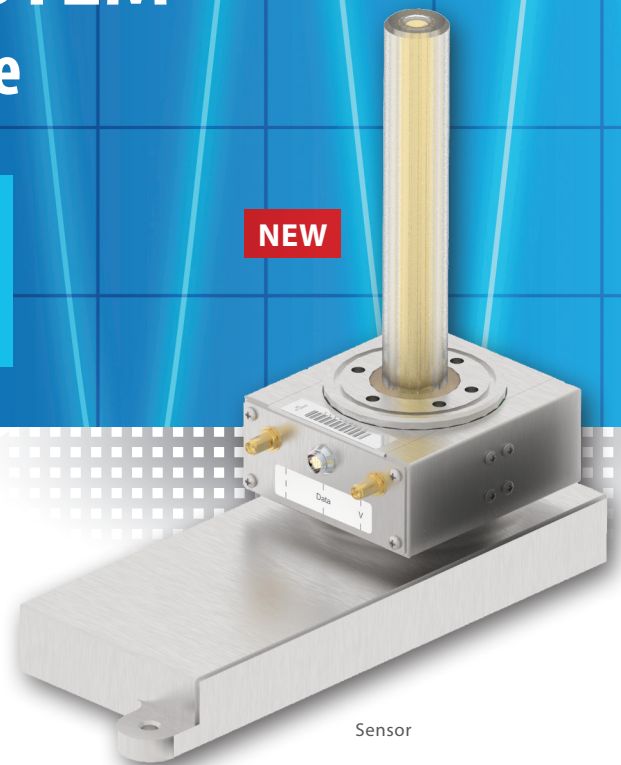
Delivering RF Performance Insights for Applied Materials Producer® Systems

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

Measurements	Voltage, current, phase, frequency, impedance, power at frequencies selected by user
Frequency Range	307 kHz to 252 MHz
Frequency Resolution	100 Hz
Frequency Accuracy	± 1 kHz
Number of Fundamentals	Up to 3 simultaneously. For more than 1 fundamental, choose from the following (or contact the factory for custom combinations): - 0.4, 13.56, 160 MHz - 0.4, 60 MHz - 1, 13.56 MHz - 2, 27.12, 60 MHz - 3.2, 40.68 MHz - 3.2, 60 MHz - 12.88, 40.68 MHz - 13.56, 100 MHz
Tracking Frequency Slew Rate	2 GHz/sec

Tracking Minimum Pulse Width	5 µsec
Number of Harmonics	4 harmonics per fundamental, 6 intermodulation products per pair of fundamentals up to 252 MHz. Limited by the maximum number of measurement channels Tracking & Spectral search mode: 12 harmonics standard mode 6 in time domain mode
Update Rates	100 Hz typical
Network Protocol	Ethernet
RF Power Max	Determined by RF sensor, (Typically 10kW or higher)
RF Connector	Custom or QC
Operating Modes	Tracking Mode, Spectral Search Mode

SYSTEM PROFILES

Parameter	Voltage	Current	Phase Angle
Measurement Range	RF: 1 to 3000V _{rms} (Note 1)	0.1 to 100 A _{rms} (Note 1)	-180° to +180°
Uncertainty 307 kHz - 1 MHz Locked System (Note 2)	for F _n , ± 0.5 V or 1% of reading whichever is greater for F _n , ± 1.0 V or 2% of reading, whichever is greater (95% confidence interval)	for F _n , ± 0.05 A or 1% of reading whichever is greater for F _n , ± 0.1 A or 2% of reading, whichever is greater (95% confidence interval)	Absolute Angle: F _n ≥ 10 V, 1A: ±1° F _n < 10 V, 1A: ±4°
Uncertainty 1-252 MHz Locked System (Note 2)	for F _n , ± 0.1 V or 1% of reading whichever is greater for F _n , ± 0.2 V or 2% of reading, whichever is greater (95% confidence interval)	for F _n , ± 0.01 A or 1% of reading whichever is greater for F _n , ± 0.02 A or 2% of reading, whichever is greater (95% confidence interval)	F _n ≥ 10 V, 1A: ±2° F _n < 10 V, 1A: ±6° (95% confidence interval)
Uncertainty 307 kHz - 1 MHz Unlocked System (Note 2)	for F _n , ± 1.0 V or 2% of reading whichever is greater for F _n , ± 2.0 V or 4% of reading, whichever is greater (95% confidence interval)	for F _n , ± 0.1 A or 2% of reading whichever is greater for F _n , ± 0.2 A or 4% of reading, whichever is greater (95% confidence interval)	Absolute Angle: F _n ≥ 10 V, 1A: ±1° F _n < 10 V, 1A: ±4°
Uncertainty 1-252 MHz Unlocked System (Note 2)	for F _n , ± 0.2 V or 2% of reading whichever is greater for F _n , ± 0.4 V or 4% of reading, whichever is greater (95% confidence interval)	for F _n , ± 0.02 A or 2% of reading whichever is greater for F _n , ± 0.04 A or 4% of reading, whichever is greater (95% confidence interval)	F _n ≥ 10 V, 1A: ±2° F _n < 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

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

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