Bird®

Vip System

The **RF** Experts

The Bird VIP System is a tool for measuring voltage, current and the phase angle between these parameters in complex applications. The VIP System is Bird Technologies' solution to the semiconductor market to provide more information than traditional VI probe instruments . Each calibrated 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 data cable that connects the sensor to the receiver.

Using a streamlined architecture, the VIP System 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 VIP System an incredible tool for repeating high precision processes.

PROBLEMS/SOLUTIONS

Simultaneous Measurements of Multiple RF Generators

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

Complex Waveform Plot

- Proprietary architecture maintains correct phase angle information between the fundamental and harmonics. This feature helps to ensure that a repeatable and identical RF spectrum is delivered to the wafer.

APPLICATIONS

- Chamber to Chamber Matching.
- Waveform Reconstruction enables chamber comparisons to identify large and small changes.
- Harmonic Levels up to 150 MHz are available for analysis.
- V, I, Phase and Delivered Power Comparison.

VIP System

PARAMETER SPECIFICATIONS

Frequency Range	307 kHz - 150 MHz (Sensor Dependent)
Frequency Resolution	100 Hz
Frequency Accuracy	± 1 kHz
Harmonics	10 maximum, up to 150 MHz (Sensor Dependent)
Number of fundamentals (F0)	Maximum of 3 simultaneously
Digital	> Voltage, current, phase, frequency, impedance, power at frequencies selected by user
Analog	5 Outputs, 0-10Vdc, 1000Ω-source
Update Rates	60 Hz typical for 1 fundamental (Note 1)
Network Protocol	DeviceNet, Ethernet
RF Power, Max	10 kW or maximum power limit of RF connector
RF Connector	Custom or QC
Receiver Operating	+20 to +40 °C (68 to 104 °F)
Receiver Storage	-20 to +80 °C (-4 to +176 °F)
Cable Operating	0 to +100 °C (32 to 212 °F)
Cable Storage	-20 to +100 °C (-4 to 212 °F)
Sensor Operating/Storage	Refer to Sensor Specification
Humidity, Max	85% Non-condensing
Air Pressure, min	745 mbar (equivalent to 2,500 m / 8,200 ft. max altitude)
Operating Power	11-24 Vdc, 1.4-3A input to receiver

PARAMETER	VOLTAGE	CURRENT	PHASE ANGLE
Measurement	RF: 1 to 3000Vrms (Note 2)	0.1 to 100 Arms (Note 2)	-180° to + 180°
Resolution	IEEE 754 Single Precision Floating Point		
Uncertainty 307 kHz-1 MHz (Note 3)	for F_o, ± 0.5 V or 1% of reading whichever is greater for Fn , ± 0.1 V or 2% of reading, whichever is greater (95% confidence intreval)	for F_o, ± 0.05 A or 1% of reading whichever is greater for Fn , ± 0.10 A or 2% of reading, whichever is greater (95% confidence intreval)	Absolute Angle: for F_o, ≥ 10 V, 1A:, ±1° for F_o, < 10 V, 1A:, ±4° for Fn , ≥ 10 V, 1A:, ±2° for Fn , < 10 V, 1A:, ±6° (95% confidence intreval)
Uncertainty 1-100 MHz (Note 3)	for F_o, ± 0.1 V or 1% of reading whichever is greater for Fn , ± 0.2 V or 2% of reading, whichever is greater (95% confidence intreval)	for F_o, ± 0.01A or 1% of reading whichever is greater for Fn , ± 0.02 A or 2% of reading, whichever is greater (95% confidence intreval)	Absolute Angle: for F_o, ≥ 10 V, 1A:, ±1° for F_o, < 10 V, 1A:, ±4° for Fn , ≥ 10 V, 1A:, ±2° for Fn , < 10 V, 1A:, ±6° (95% confidence intreval)
Uncertainty 100-150 MHz (Note 3)	for F_o, ± 0.2 V or 2% of reading whichever is greater for Fn , ± 0.4 V or 4% of reading, whichever is greater (95% confidence intreval)	for F_o, ± 0.02 A or 2% of reading whichever is greater for Fn , ± 0.04 A or 4% of reading, whichever is greater (95% confidence intreval)	Absolute Angle: for F_o, ≥ 10 V, 1A:, ±2° for F_o, < 10 V, 1A:, ±8° for Fn , ≥ 10 V, 1A:, ±4° for Fn , < 10 V, 1A:, ±12° (95% confidence intreval)
Receiver Temperature Derating - From 25 °C	± 0.05% / °C	± 0.05% / °C	± 0.1% / °C

Note 1: Typical data rate for 1 fundamental, 10 harmonics, auto-ADC mode, and no averaging is 60 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.