



Better technology. Better results.



## Ovation™ VHF Power Delivery System

Leading power  
technology to enable  
advanced dielectric etch  
and PVD processes

## Benefits

- Broadens process windows
  - Expands process capabilities
  - Improves plasma characteristics
  - Increases etch rate, selectivity, and uniformity
  - Reduces CoO
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## Features

- 2760 W, 60 MHz (contact factory for higher power requirements)
- Sweep frequency
- Non-50  $\Omega$  measurement capability
- Analog, RS-232, and Ethernet control options
- Smaller footprint—half-rack option for power up to 2.7 kW
- Highly stable and reliable
- Expert applications support

*The Ovation™ fully integrated, VHF power delivery system enables faster, higher precision for demanding narrow-linewidth dielectric etch processes. It is the first to accurately deliver power into a non-50- $\Omega$  environment without an external sensor, reacting faster than traditional power supplies. The 60-MHz power delivery reduces voltage potential across the plasma sheath, minimizing ion etch damage, and thus improving film quality and yields. Its embedded measurement technology enables previously unavailable insight into chamber plasma parameters and performance.*

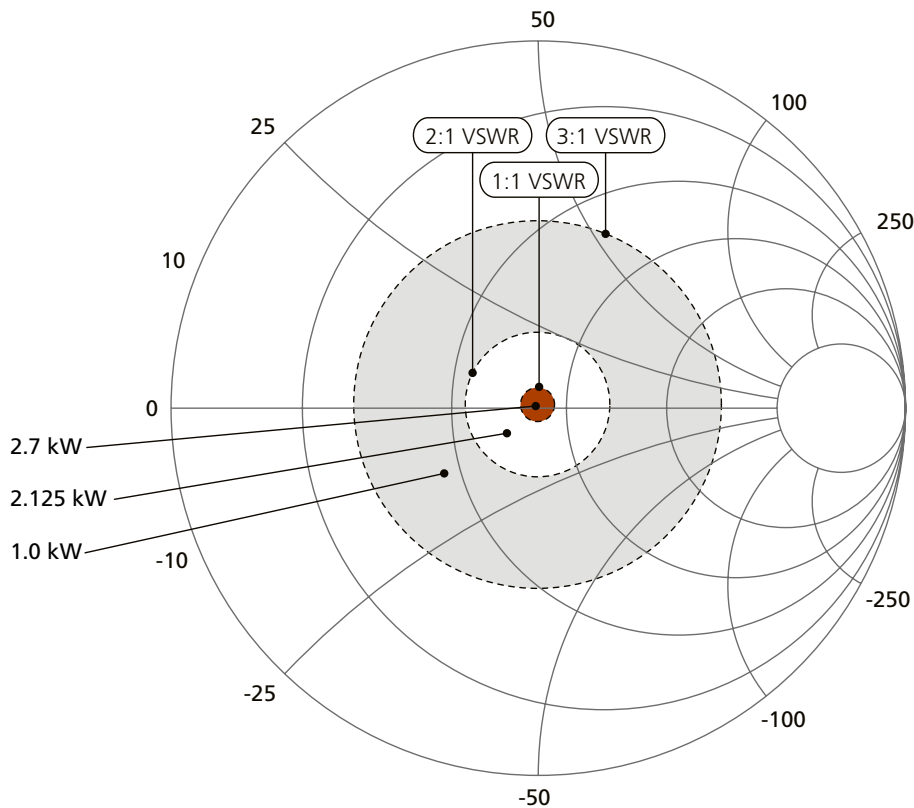
## Improves Film Quality and Yields

As process geometries continue to shrink with decreasing metal widths and line spaces, the Advanced Energy® Ovation VHF power-delivery system offers an innovative solution to help you achieve desirable properties in sub-90-nm dielectric etch, HDP-CVD, and PECVD processes. Critical dimensions and narrow linewidths require stable and accurate power-delivery systems with higher-than-traditional frequencies. The unique technology in the Ovation power-delivery system allows you to optimize your processes with enhanced VHF power delivery and measurement. Further, 60-MHz technology reduces voltage potential across the plasma sheath, minimizing ion etch damage and thus improving film quality and yields.

## Broadens Process Windows

This advanced, very high frequency power technology enables you to expand your process window over a wide VSWR load range with output powers up to 4.5 kW at frequencies of 60 MHz.

Developed to meet the demanding requirements of advanced etch processes, the Ovation VHF power-delivery system accurately and efficiently delivers the optimal power required into a wide VSWR window, up to 3:1. The system's unique power-delivery scheme offers the highest power efficiency and power density commercially available—in a compact, half-rack unit—nearly half the size of competing systems for power requirements up to 2.7 kW.



Ovation™ typical operating range

## Expands Process Capabilities

The Ovation system’s power platform ensures stable performance, reliable operation, improved overall film characteristics, and increased yields—even at the 65-nm range.

Expanded process capabilities include:

- *Quick power system compensation for plasma load changes due to process step transitions*
- *Accurate measurement and power delivery outside of 50 Ω*

The Ovation power system is specifically designed to expand the tight process windows constraining advanced etch processes by providing the capabilities for users to drive higher plasma densities, with a wide operating range and unmatched transient response.

## Improves Plasma Characteristics

To avoid device damage, as smaller gate structures become the norm, processes must run at lower-than-traditional voltages. High-frequency power systems readily enable these low-voltage processes. Process developers who contend with these issues have found that high-frequency systems provide such tangible benefits as:

- *Increased plasma density for etch and CVD applications*
- *Reduced process-induced damage in etch applications*

## Higher Etch Selectivity and Etch Rates

Today’s demanding, narrow-linewidth, dielectric etch processes require rapid power supply responses to transitions between process steps. The Ovation power-delivery solution ensures consistent and repeatable performance. Its VHF power-delivery system is the first to accurately deliver power into a non-50-Ω environment, allowing the Ovation generator to react faster than traditional power supplies.

This fully integrated power-delivery system enables faster, higher-precision processes such as those required for sub-90- and sub-65-nm etch applications, through the implementation of a unique power-delivery scheme. This scheme results in:

- *Higher etch rates*
- *Higher yields and film quality on processes with precision control between transition process steps*
- *More efficient power transfer*

## Enhanced Power Measurement System

The Ovation power-delivery solution features embedded advanced measurement technology, including internal impedance measurement. A non-50-Ω measurement capability facilitates previously unavailable insights into chamber plasma parameters and performance. The system also offers embedded power instrumentation for real-time data mining.

## Optional Equipment Compact and Versatile for Any Process Environment

The Ovation system is compact in size for easy installation and seamless integration into your new or existing processes. The small product footprint maximizes your chamber design flexibility.

## Communication Options

This power-delivery system offers an array of interfacing options, including analog and RS-232 (AE Bus) interfaces. RS-232 interfaces, when used with the optional AE® Virtual Front Panel (VFP) software package, allow data visualization of many internal source parameters and fault conditions.

## Reliability & Compliance

The Ovation power-delivery system has received the following safety certifications:

- *CE 73/23/EEC & 89/336/EEC*
- *IEC/EN 61010-1*
- *CSA C22.2 No. 1010.1*
- *ANSI/ISA-82.02.01*
- *NRTL/C*
- *SEMI F47*
- *EN 55011, EN61326, and 47 CFR*

## Value-Added Options Virtual Front Panel

AE's optional VFP graphical computer interface gives you the ability to perform critical functions dynamically, and in real time, including:

- *Process setup*
- *Troubleshooting*
- *Operational control*
- *Data visualization*

## Navigator™ Matching Network

Advanced Energy's Navigator™ matching network provides advanced match technology for rapid, accurate, and reliable matching from an RF generator to the processing tool across a wide range of load impedances. This versatile matching network optimizes delivered power to semiconductor, flat panel display, and MEMs manufacturing processes, including CVD, HDP-CVD, and chamber clean applications. Equipped with microprocessor-controlled stepper motor circuitry and digital, user-selectable tuning algorithms, the Navigator matching network minimizes reflected power by automatically tuning the complex impedance of a coupled plasma. The network's digital scheme delivers superior performance over traditional analog-based tuning methods, which are less consistent and accurate. An optional, internal Z'Scan® RF sensor provides real-time measurement and analysis of process power and impedance, enabling process engineers to identify and significantly

reduce process variability—a competitive advantage over other matching networks without real-time monitoring capability. In addition, the Navigator matching network features embedded instrumentation that permits process engineers to exercise a level of electrostatic chuck control and a level of process-recipe optimization not possible with non-embedded, separate instrumentation. Moreover, with AE's VFP software, process engineers can monitor and command the matching network through a personal computer—enabling a level of control not previously available.

## Sweep Frequency

The Ovation 3060 sweep frequency incorporates direct digital synthesis (DDS) technology for control of its operating frequency when the power system is mismatched. This field-proven, robust technology has been incorporated into AE products since 1996. The frequency can be programmed to dither over a pre-determined range, enable plasma ignition, and minimize the mismatch to the power system during plasma processing. The DDS operating parameters can be set via an RS-232 or Ethernet port and are stored indefinitely in non-volatile RAM.

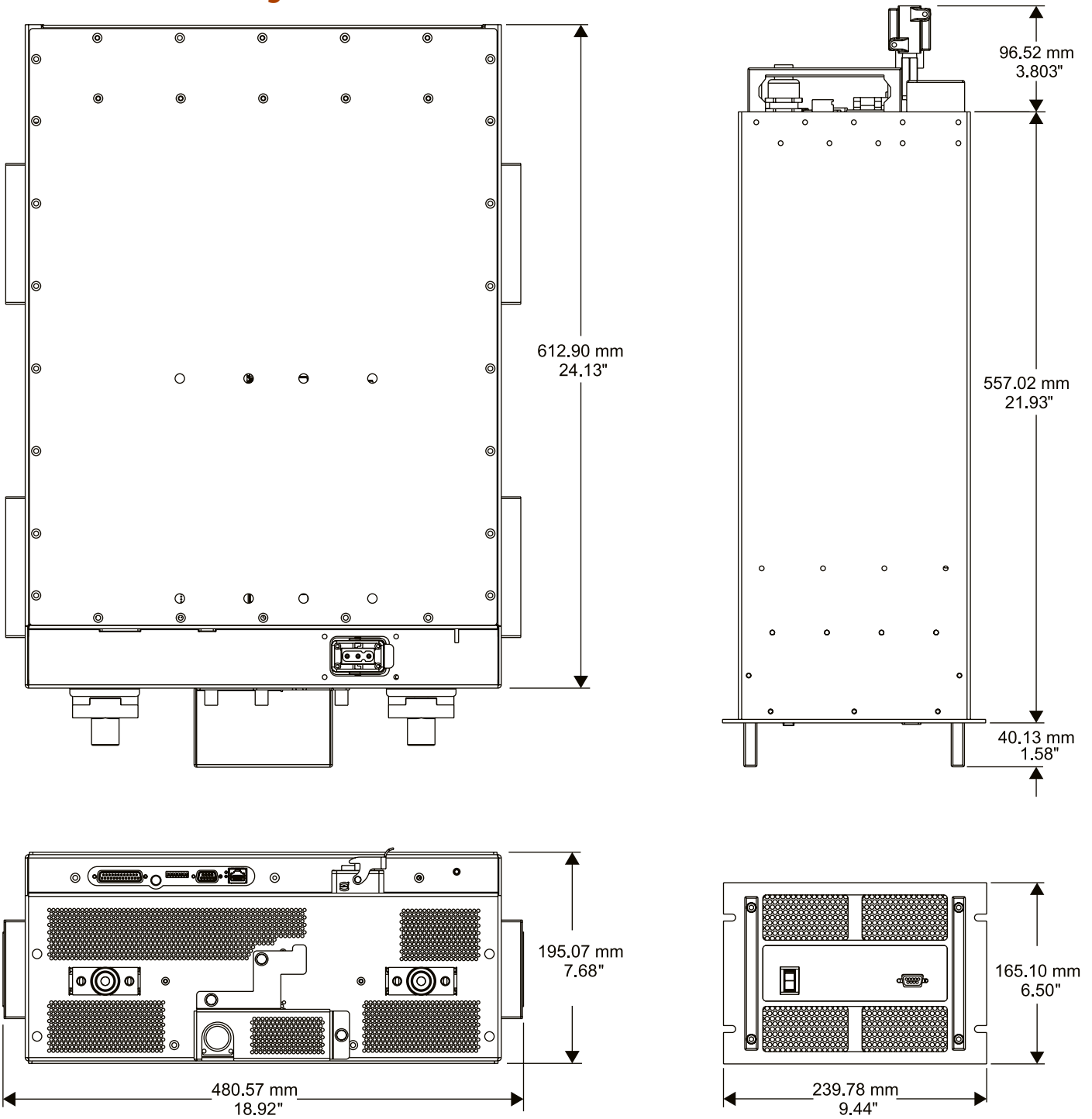
## General Specifications

Physical	
Size	
Up to 2.7 kW	16.5 cm (H) x 24.0 cm (W) x 59.7 cm (D) 6.5" (H) x 9.45" (W) x 23.5" (D) (Does not include connectors and handles)
Above 4.5 kW	19.5 cm (H) x 43.9 cm (W) x 64.4 cm (D) 7.68" (H) x 17.30"(W) x 25.35" (D) (Does not include connectors and handles)
Weight	< 29.5 kg (65 lb) max for power up to 2.7 kW < 65.9 kg (145 lb) max for powers higher than 2.7 kW
RF Output Connector	Type HN female at 2.7 kW/ QRM F for 4.5 kW
User Interface Connector	25-pin, sub-D, female
Remote Digital Interface (AE Bus)	9-pin, sub-D, female

Electrical	
Input Power	
Line Voltage	180 to 229 VAC (208 V nominal), 3 $\Phi$ , 4-wire, no neutral connection required
Line Frequency	50/60 Hz
RF Output	
Full-Rated Output Power	2.7 to 4.5 kW, depending on model
Accuracy	$\pm 3\%$ or 20 W, whichever is greater
Optional V and I Outputs	Available for non-50- $\Omega$ power measurement
Frequency	60 MHz

Note: Specifications are subject to change without notice.

# Dimensional Drawing



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