



Better technology. Better results.



## E-Wave<sup>®</sup>

Power Supply  
0 to 5 kHz Bipolar Pulsed  
DC Power Supply

Superior surface  
uniformity for the  
copper-plating phase  
of dual-damascene  
process flow applications



## Benefits

- Excellent gap fill
  - Superior surface uniformity
  - Reduced additive consumption
  - Powerful control and monitoring
  - Reduced cleanroom space requirements
  - Extensive placement options
- 

## Features

- Bipolar pulsed DC output, 0 to 5 kHz
- Versatile waveform construction
- Up to three independently-controlled channels
- High-current capability
- Four-terminal control and measurement of voltage at the wafer
- Host port interface
- Compact package

*The Advanced Energy (AE) E-Wave® bipolar pulsed DC power supply improves surface uniformity and reduces additive consumption for the copper-plating phase of dual-damascene process flow (DDPF) applications, giving you a competitive edge whether you're electroplating wafers in a production environment or developing new copper processes. The E-Wave power supply offers up to three channels, each of which has an independently driven bipolar power source and is capable of producing, storing, and running up to 15 current-controlled or voltage-controlled waveforms.*

## High Yield and Throughput

The E-Wave power supply ensures excellent film-property control for an extremely uniform surface—time after time. Its DC pulsing technology deposits copper equally at the top and bottom of a trench to even out non-uniformities that are typical of PVD seed layers. Further, high-current capability ensures swift, thorough bulk fill to maximize production efficiency. This current capability also means that the E-Wave power supply suits even the smallest feature sizes, enabling you to include more devices per wafer.

## Lower Cost of Ownership

With the E-Wave power supply, you don't have to choose between excellent gap fill and economical operation. Comparatively, conventional methods require far greater volumes of costly process additives to perform well with small feature sizes. Without compromising performance, the E-Wave supply can save money by consuming fewer additives. This capability, housed in a compact package that conserves valuable cleanroom space, makes the E-Wave power supply the economical choice.

## Easy Process Optimization

The E-Wave power supply's sophisticated monitoring and control features put process optimization at your fingertips. Dynamic Host port control gives you the power to program customized waveforms. Optional Virtual Front Panel (VFP) control adds additional ease through its intuitive computer interface.

Each channel stores as many as 15 current- or voltage-controlled waveforms, any combination of which can be used in the course of operation. Exceptional monitoring capabilities also give you immediate access to a wide range of operating parameters, including average current, peak voltage, and waveform status.

## Superior Flexibility and Reliability

The E-Wave unit's small size allows installation next to the copper bath, which ensures consistency between output voltage and voltage at the wafer. However, for additional cleanroom space savings, you can place the power supply far from the bath with no loss of voltage regulation. The E-Wave supply's four-terminal control not only gives voltage readings with utmost accuracy by taking measurements right at the wafer, but also virtually eliminates the voltage drop problems that typically occur when the copper bath is located a considerable distance from the power supply.

## Specification

Subject to change. Please contact AE for full product specifications.

Physical	
Size	127 mm (H) x 432 mm (W) x 660 mm (D); 5" (H) x 17" (W) x 26" (D)
Weight	30 kg (66 lb)
Mounting	Rack-mounting ears for standard 19-inch instrumentation rack

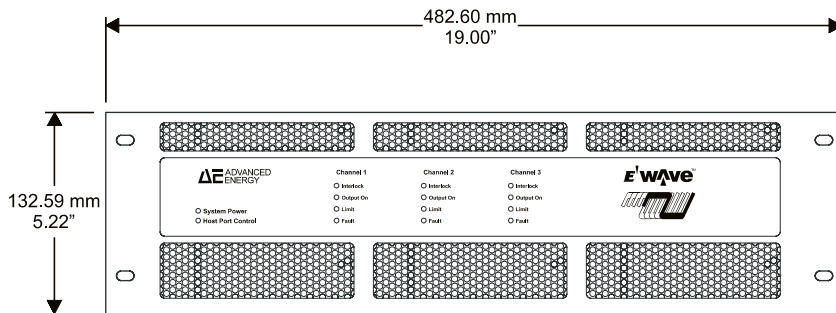
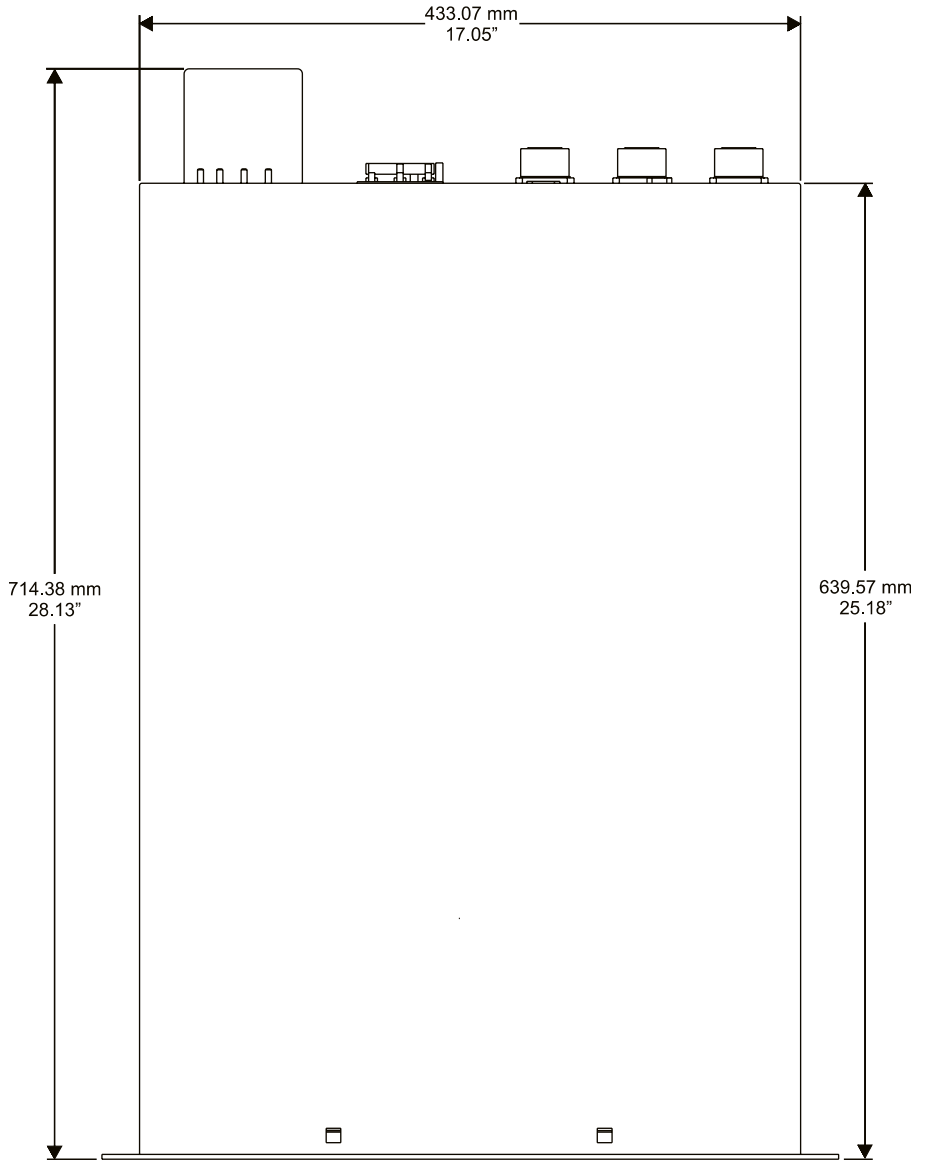
Connector/Cable	
Output Connections	6-pin, military-style
AC Input Power	M4 studs on back panel
Communications	9-pin, female, subminiature-D connector

Timing	
Output Power Rise	< 0.1 msecond into a 0.4-Ω load

Electrical Per Channel	
Input Power Specifications	
Line Voltage	180 to 230 VAC (nominal 208 V, 3 φ), delta connection
Line Frequency	47 to 63 Hz
Output Specifications	
Output Power	2400 W peak, 2000 W continuous
Current Regulation	< ±0.5% of set point or 50 mA, whichever is greater (20 mA below 5 A)
Steady State Current	±40 A
Peak Current	±100 A
Steady State Voltage	±48 V

Environmental	
Atmospheric Pressure	80 to 106 kPa (800 to 1060 mbar)
Air Cooling Requirements	
Temperature	0° to +30°C (+32° to +86°F), non-recirculating air
Relative Humidity	5% to 95%, non-condensing

# Dimensional Drawing



Advanced Energy Industries, Inc. • 1625 Sharp Point Drive • Fort Collins, Colorado 80525  
 T: 800.446.9167 or 970.221.4670 • F: 970.221.5583 • support@aei.com • www.advanced-energy.com

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 SL-EWAVE-230-02 0M 2/06

United Kingdom  
 T: 44.1869.320022  
 F: 44.1869.325004

Germany  
 T: 49.711.779270  
 F: 49.711.7778700

Korea  
 T: 82.31.777.9191  
 F: 82.31.777.9195

Japan  
 T: 81.3.32351511  
 F: 81.3.32353580

Taiwan  
 T: 886.2.82215599  
 F: 886.2.82215050

China  
 T: 86.21.58579011  
 F: 86.21.58579003