



**AE PRODUCT & SERVICES PORTFOLIO**  
PRECISION POWER & CONTROL



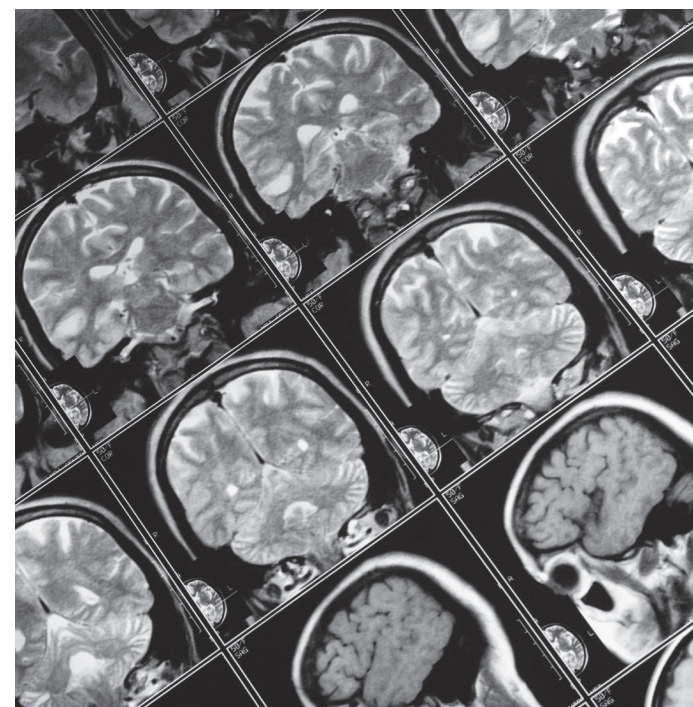
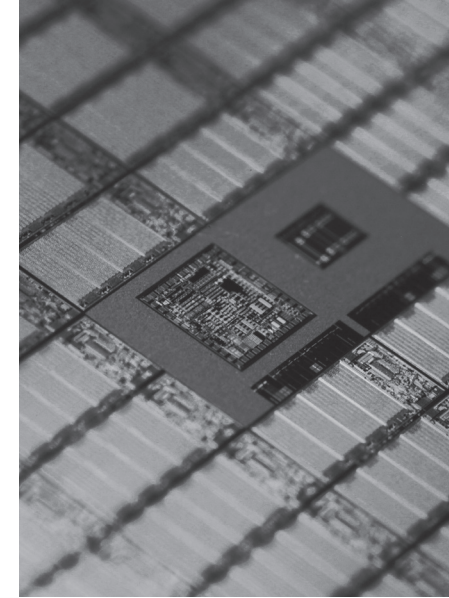
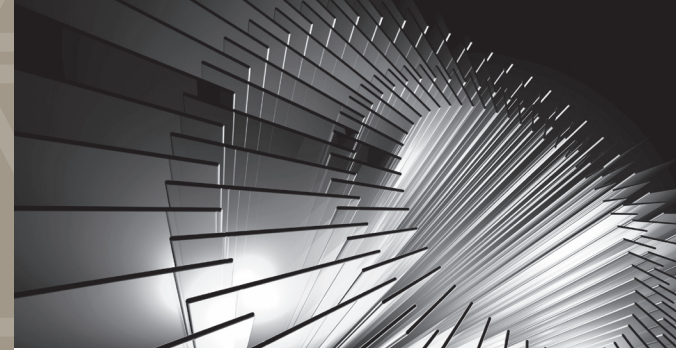


# AE is a leader in global high- technology applications.

- › Semiconductor
- › Glass
- › Flat panel display

- › Thin-film solar
- › Industrial coatings
- › Mass spectrometry

- › X-ray
- › Instrumentation
- › Other key markets







With a focus on power conversion and control that spans more than three decades, we build industry-specific expertise into every solution and deliver manufacturing solutions that create an advantage for our customers.

## WE DELIVER



*Solutions as dependable as they are innovative*



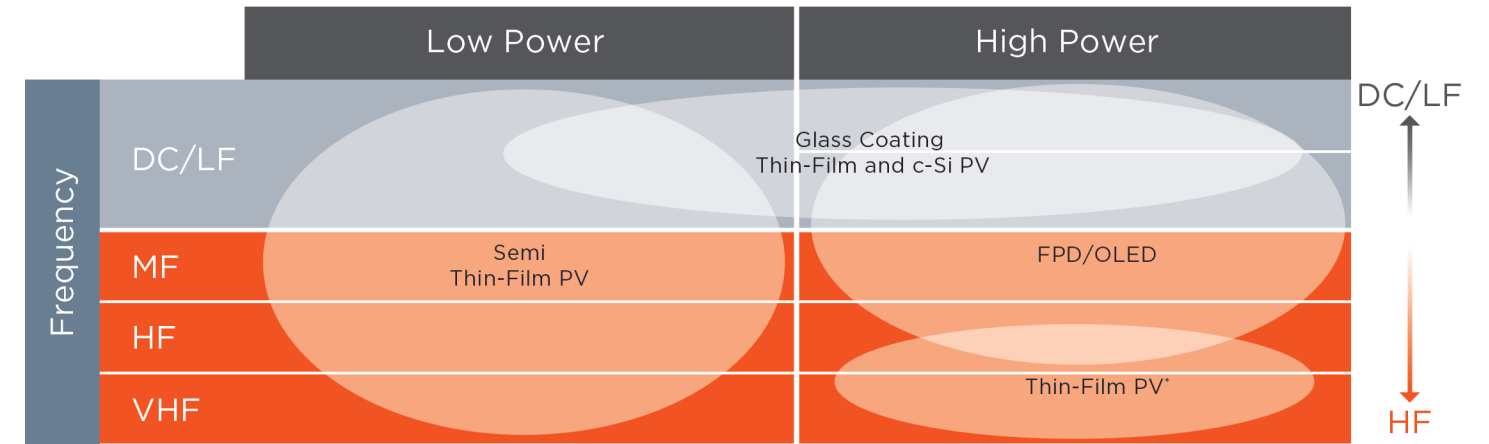
*Proven products that deliver today and adapt to your needs tomorrow*



*Rapid-response service and support, worldwide*

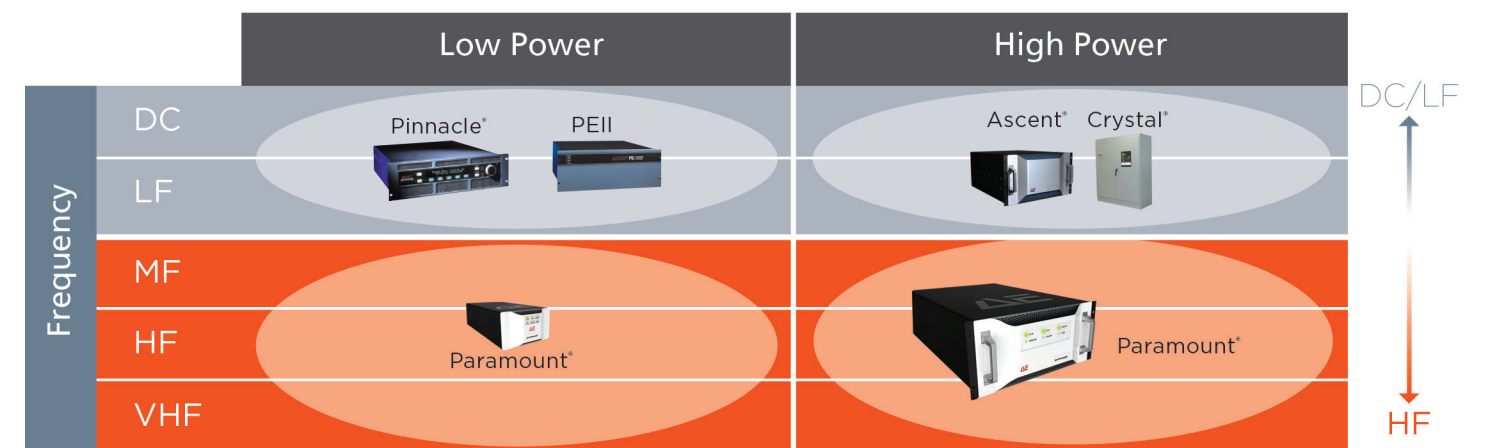


## THIN-FILM PROCESSES REQUIRE DIVERSE POWER TECHNOLOGIES



\*Thin-Film PV includes a-Si, CdTe, and CIGS.

## AE'S BROAD PRODUCT PORTFOLIO MEETS YOUR NEEDS





## AE POWER DELIVERY SYSTEMS AND CONTROLS

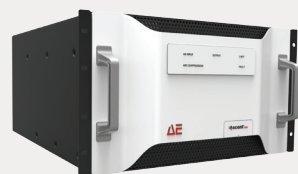
PRODUCT	POWER/MAX DATA RATE	PERFORMANCE RANGE	APPLICATION								
			SPUTTERING		ETCH/CLEAN	CVD	ALD	ABATEMENT	HEATING, MELTING, AND MOULDING	OTHER	
			METAL	INSULATIVE							
Direct Current/ Low Frequency	DC Suite: Ascent®, Pinnacle®, and Solvix® Series	3 to 480 kW	—	X							X
	Pulsed-DC Suite: Pinnacle® Plus+ and Solvix® Series	3 to 60 kW	5 to 350 kHz	X	X						X
	Solvix® Arc Series	0 to 400 A	1 to 200 Hz (optional)	X	X						X
	Solvix® Bias Series	3 to 30 kW	1 to 350 kHz (optional)	X	X						X
	PEII Series	5 to 10 kW	40 kHz	X	X	X	X				X
	Ascent® DMS Accessory for Ascent® AMS DC	30 to 180 kW	500 Hz to 50 kHz	X	X						X
	Crystal® Series	60 to 180 kW	Up to 100 kHz	X	X		X				X
Mid Frequency	Paramount® MF Series	2 to 8 kW	330 to 460 kHz			X	X				X
		5 to 15 kW	2 MHz			X	X				X
	PDX® Series	900 W to 8 kW	235 to 460 kHz			X	X				X
	Cesar® Series	300 W to 5 kW	400 kHz to 4 MHz			X	X				X
High Frequency	Paramount® HF Series	1.5 to 6 kW	13 MHz	X	X	X	X	X			X
	Apex® Series	1.5 to 10 kW	13 MHz			X	X				X
	Cesar® Series	300 W to 5 kW	13 to 40 MHz			X	X				X
Very High Frequency	Paramount® VHF	3 to 7 kW	27 to 60 MHz	X		X	X	X			X
	Cesar® Series	300 W to 4 kW	13 to 40 MHz			X					X
Matching Networks	Navigator® II Matching Networks	Up to 50 kW	Up to 60 MHz			X	X	X			X
	Navigator® Matching Networks	1 to 15 kW	2 to 60 MHz			X	X				X
	Navio™ Matching Networks	1 to 5 kW	13 to 60 MHz				X				X
Source Technology	Quanta™ Remote Plasma Sources	3 and 6 kW	60 MHz			X		X			X
	Litmas® RPS 1501 and 3001 Remote Plasma Sources	1.5 and 3 kW	1.7 to 3 MHz			X	X				X
	Litmas® RPS for Foreline Abatement	1.5 and 3 kW	1.7 to 3 MHz						X		X
Optical Temperature Pyrometers and Reflectometers	Sekidenko MXE with Reflectance	10 kHz	945, 1075 nm	X	X	X	X				X
	Sekidenko MXE Reflectometer	10 kHz	405, 605 nm	X	X	X	X				X
	Sekidenko OR4000T Multi-Channel	2 kHz	919, 950, 1020, 1500 nm	X	X	X	X			X	X
	Sekidenko OR4000E with Reflectance	1 kHz	919, 1020 nm	X	X	X	X			X	X
	Sekidenko OR400M	250 Hz	3.3, 5.2 μm	X	X	X	X			X	X
	Sekidenko OR400T	20 Hz	919, 950, 1020, 1500 nm	X	X	X	X			X	X
Thyristor Power Controllers	Thyro-A® Digital Thyristor Power Controllers	1.8 kW to 1.55 MW	8 to 1500 A 230, 400, 500, or 600 V							X	
	Thyro-AX® Digital Thyristor Power Controllers with Touchscreen Display	0.3 kW to 1.55 MW	16 to 1500 A 24 to 600 V							X	
	Thyro-PX™ High-Precision Digital Thyristor Power Controllers for Industrial Applications with Touchscreen Display	3.6 kW to 3.4 MW	16 to 2900 A 230 to 500, or 690 V							X	
	Thyro-S® Digital Thyristor Switches	3.6 to 140 kW	16 to 280 A 230, 400, or 500 V							X	

\* High voltage power supplies also are available for semiconductor implantation and inspection, x-ray, mass spectrometry, scientific, industrial, and medical applications.

# Solve manufacturing challenges, elevate productivity, and push the limits of innovation.

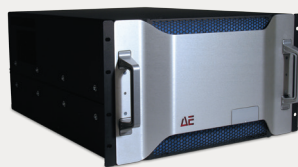
## DC MAGNETRON SPUTTERING PRODUCTS

Largest install base and broadest array of DC products to meet the most demanding applications



### ASCENT® DC POWER SYSTEMS

- › Ensures maximum field reliability
- › Effectively manages arcs for improved film quality, productivity, throughput, and yield
- › Simplifies power supply integration in sputtering processes
- › Reduces arc-caused contamination and damage



### ASCENT® DMS ACCESSORIES

- › Unprecedented power delivery ease and control for dual-magnetron sputtering
- › Precise tuning of film characteristics
- › Selectable frequency, regulation mode, and duty cycle
- › Simplified, modular system configuration

**Independent power regulation to each cathode**

## MISSION-CRITICAL HIGH VOLTAGE PRODUCTS FOR EXACTING APPLICATION REQUIREMENTS



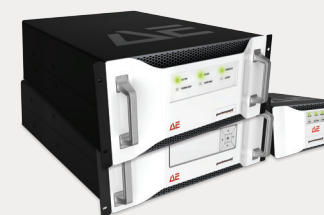
Merging more than 30 years of precision power design with the high voltage expertise and technology of UltraVolt® and Hitek Power®, Advanced Energy® offers a comprehensive portfolio of standard and custom high voltage components to precisely match system specifications and provide unparalleled energy quality.

- › 54 product lines
  - High voltage modules, racks, and systems
  - 50 VDC to 500 kV and 0 to 100 μW to 120 kW
  - DC power, capacitor charging, and pulse/waveform generation

**For complete HV products and applications, visit [www.advanced-energy.com/en/High\\_Voltage.html](http://www.advanced-energy.com/en/High_Voltage.html).**

## NEXT-GENERATION RF POWER SOLUTIONS

Digital Architecture and Industry-Leading RF Plasma Control



### PARAMOUNT® RF POWER SYSTEMS

- › Optimizes film uniformity and throughput with unprecedented power delivery accuracy
- › Enables faster, seamless process transitions
- › Provides advanced pulsing and pulse synchronization
- › Reduces RF delivery system complexity
- › Reduces arc-caused contamination and damage



### NAVIGATOR® II DIGITAL MATCHING NETWORKS

- › Speeds matching response time
- › Tightens process control
- › Helps increase tool throughput and product yield
- › Improves reliability and cost of ownership

Innovative technologies, premier service solutions, and well-established direct support

DRIVING QUALITY IN EVERY ASPECT OF OUR BUSINESS



SUPPORTING YOUR SUCCESS THROUGH THE ENTIRE PRODUCT LIFECYCLE





PROVIDING HIGHLY RESPONSIVE SALES, SERVICE, AND TECHNICAL SUPPORT



## Americas

- Vancouver, WA, U.S.A.
- San Jose, CA, U.S.A.
- ★ ● Fort Collins, CO, U.S.A.
- Georgetown, MA, U.S.A.
- Ronkonkoma, NY, U.S.A.



## EMEA

- Littlehampton, West Sussex, U.K.
- Villaz-St-Pierre, Switzerland
- Warstein-Belecke, Germany
- Metzingen, Germany



## APAC

- Seoul, Korea
- Tokyo, Japan
- Shanghai, China
- New Taipei City, Taiwan
- Shenzhen, China
- Singapore
- Pune, India

- Design and Launch
- Sales and Service
- Manufacturing
- ★ World Headquarters



For international contact information, visit  
[advanced-energy.com](http://advanced-energy.com).