

# NAVIO DIGITAL MATCHING NETWORK

QUICK, ACCURATE, AND REPEATABLE DIGITAL IMPEDANCE MATCHING



## Power Ranges

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1 kW, 3 kW, and 5 kW

## Input Frequencies

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13.56 MHz, 27.12 MHz, 40.68 MHz,  
and 60 MHz

## RF Input Options

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C, N, HN, 7-16, LC, and SQS

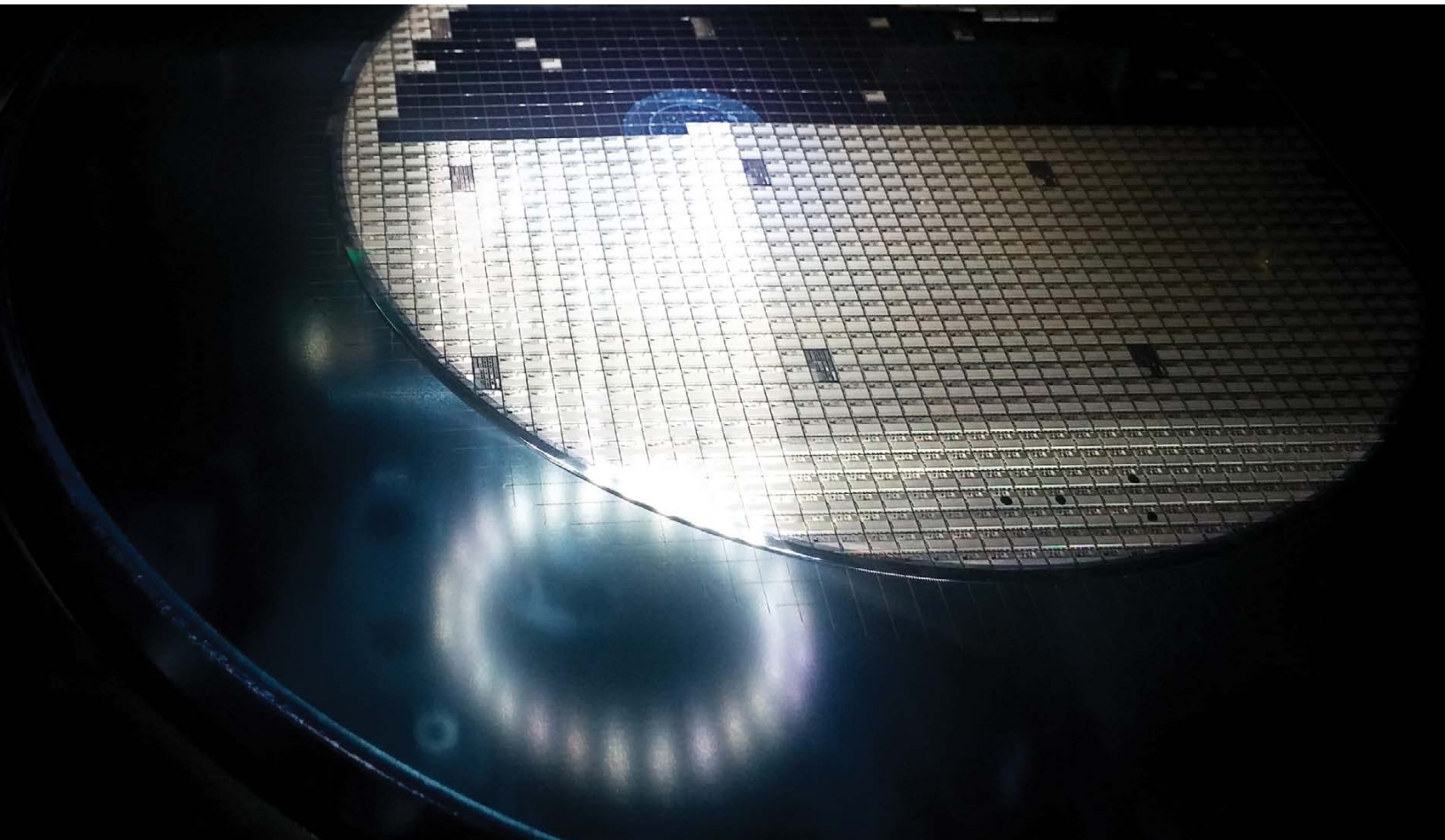
## Typical Tune Time

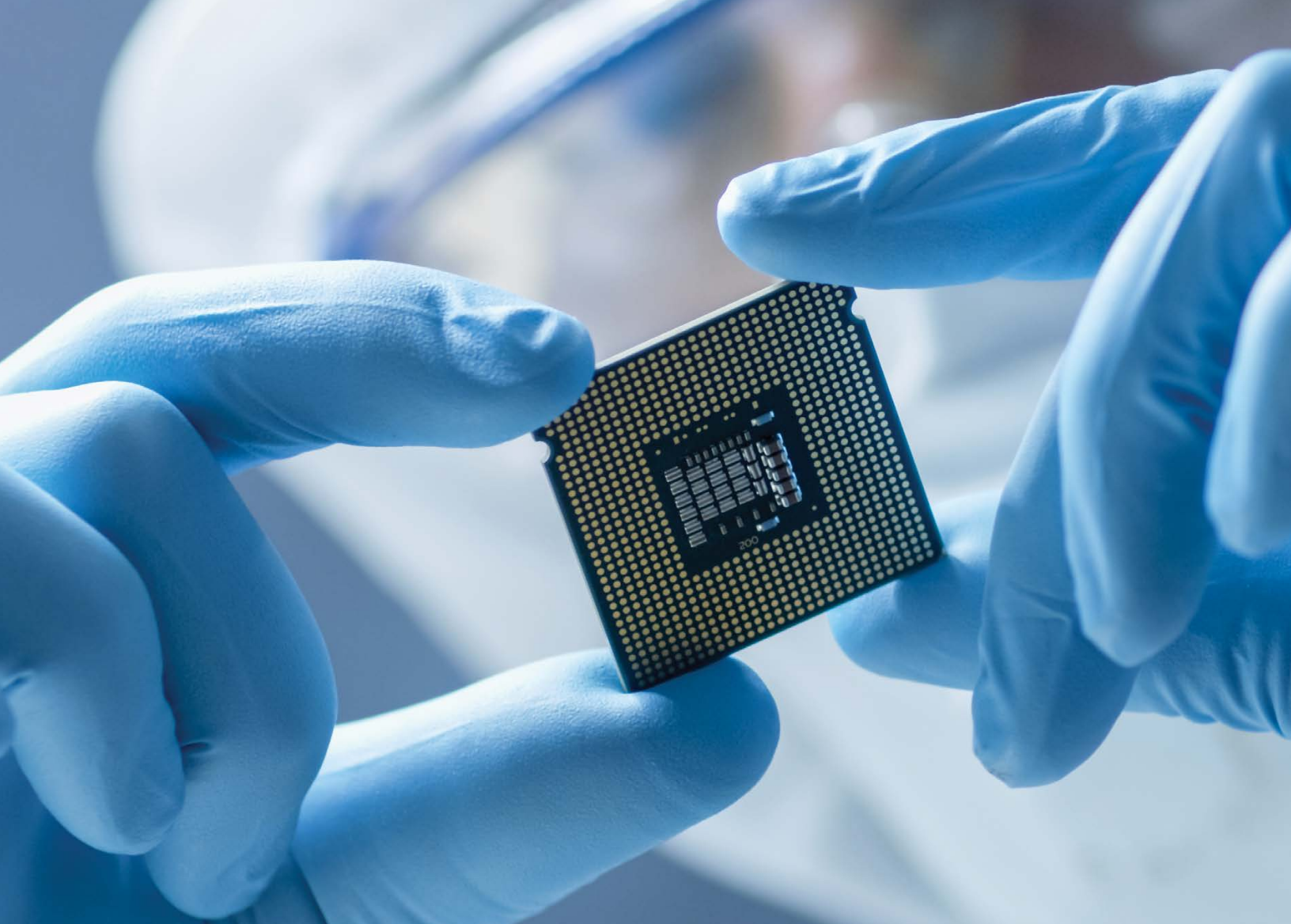
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Two to three seconds

## Economical, Configurable Matching Network Solution

Experience simplicity and high reliability in a single, affordable package. The Navio™ matching network leverages Advanced Energy's power expertise to precisely match complex plasma impedance to your tuning range. It's quick, accurate, and repeatable. Available in multiple power ranges and frequencies, choose from a standard offering or a configurable design. Installation is virtually plug-and-play with Advanced Energy's RF power supplies. Virtual front panel software is available for monitoring. The compact, air-cooled unit — available in a standard package or a slim version — offers extreme flexibility with pre-engineered configurability to support most thin-film applications.





### Product Highlights

- Improve throughput, increase yield, and reduce production costs
- Quick, accurate, and repeatable impedance matching
- Optimized, off-the-shelf functionality for many applications
- Generous menu of configuration options for more sophisticated processes
- Wide power and frequency ranges
- Virtual Front Panel (VFP) software for real-time process power and impedance measurement and analysis

### Market Application

- Solar PV
- Industrial
- Flat panel display
- MEMS manufacturing

### Capacitively and Inductively Coupled Plasma Process Applications

- PECVD
- Etch/clean
- PVD



## Improve Throughput, Increase Yield, and Reduce Production Costs

The Navio matching network automatically tunes the complex impedance of a plasma to 50  $\Omega$  or your desired impedance. The digital tuning algorithm and stepper motor drive produce a quicker, more accurate, and repeatable response compared to traditional analog tuning methods — for improved throughput, increased yield, and reduced production costs.

The Navio matching network is fast and highly accurate, designed to always tune to the desired impedance point. Its repeatable response minimizes delivered power deviations between matches and run to run—even under varying operating conditions — for an extremely high level of process stability and uniform deposition.

### Choose a Standard Model or Configure a Unit That Meets Your System Specifications

Choosing the right matching network has never been easier. With three decades of power expertise, we've engineered a cost-effective solution with performance advantages that are sure to satisfy. The Navio matching network features off-the-shelf functionality for those looking for a simple solution. Standard units are optimized for applications that have well understood impedances yet require fast, reliable auto-tuning.

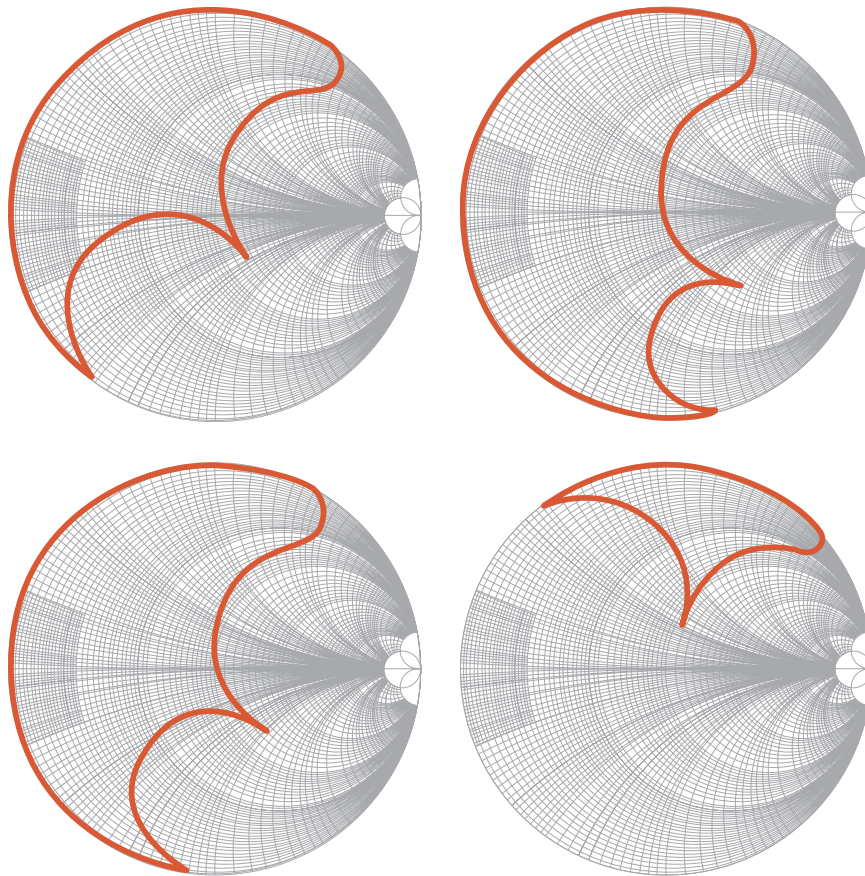
For more sophisticated processes, a generous menu of configuration options are available, including:

- Broad power ranges—1 kW, 3 kW, and 5 kw
- Wide input frequencies—13.56 MHz, 27.12 MHz, 40.68 MHz, and 60 MHz
- Multiple RF input and output connector options
- Multiple tuning ranges

## Multiple Tuning Ranges

Figure 1 highlights the pre-defined tuning ranges available for 13.56 MHz Navio matching networks. If necessary, tuning ranges can be adjusted during your development phase; our field service engineers will work with you to pinpoint the range that's right for your application and quickly reconfigure your unit in the field.

Figure 1. Pre-defined tuning range options for the 13.56 MHz Navio™ matching network. Similar options are available for 27.12 MHz, 40.68 MHz, and 60 MHz models.



### Install and Operate with Ease

The Navio matching network can be paired with any RF generator but communicates directly with the Cesar® power supply. Installation is easy, and operation is virtually automatic with no manual configuration required. Microprocessor control through the Virtual Front Panel (VFP) software enables you to monitor and command the system using a personal computer. VFP software also passively monitors many power functions and actively controls tuning parameters, providing intuitive, broad-ranging functionality. It features event monitoring, readbacks, Smith® charting, and password-controlled access.

## Product Specifications

Physical Specifications		Standard	Flat Pack
Dimensions		15.0 cm (H) x 24.5 cm (W) x 37.4 cm (D)	11.2 cm (H) x 30.0 cm (W) x 39.4 cm (D)
		5.9" (H) x 9.6" (W) x 14.7" (D)	4.4" (H) x 11.8" (W) x 15.5" (D)
Weight		6.6 kg (14.5 lb)	7.1 kg (15.6 lb)
Mounting	Mounting holes on bottom, rear, and sides of unit		
Connector and Cable Specifications			
RF Input Connector	Available connectors: C, N, HN, 7-16, LC, SQS		
RF Output Connector	Available connectors:		
	CF 2 ¼" flange mount		
	7-16 (female)		
	B20N with 6 mm threaded stud, 6 mm socket, 6 mm pin, 6 mm tapped hole only (no stud)		
AC Power Input Connector	IEC320		
DC Power Input Connector	9-pin CPC series connector, male (Tyco/Amp PN: 206486-1 or equivalent)		
Communication	RS232, 9-pin, female, subminiature-D		
	Analog, 15-pin, female, subminiature-D		
	PROFIBUS, 9-pin, female, subminiature-D		
Electrical Specifications			
Frequency	13.56 MHz, 27.12 MHz, 40.68 MHz, 60 MHz		
Input Power	1 kW, 3 kW, 5 kW		
Reflected Power	Depends on input power:		
	1 kW units: 4 W or 1% maximum of forward power at 20 W to 1000 W, whichever is greater		
	3 kW units: 5 W or 1% maximum of forward power at 30 W to 3000 W, whichever is greater		
	5 kW units: 5 W or 1% maximum of forward power at 50 W to 5000 W, whichever is greater		
Tuning Time	< 3 sec end-to-end		
	< 2 sec from proper pre-set point to matched condition		
Tuning Range	Depends on unit frequency and on the tuning coil installed		
Settling Time	≤ 1 sec, defined as the time for the matching network to re-establish a return loss ≤ -20 dB when the load reactance is shifted sufficiently to introduce an instantaneous rise in the return loss to -10 dB		
Stability	No oscillation of capacitor position for any stable load		
DC Bias Scaling	For units with detection of bipolar plasma bias, the output voltage is scaled down 400:1 V/V, with an accuracy of ± 1% full range		

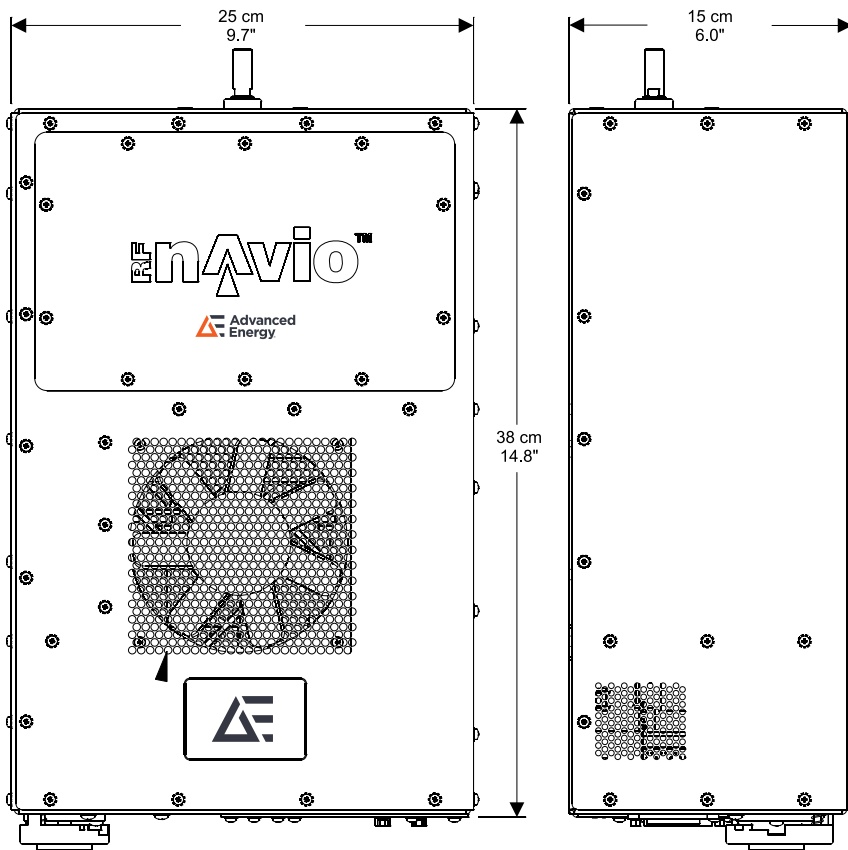


Figure 2: Navio™ standard dimensions

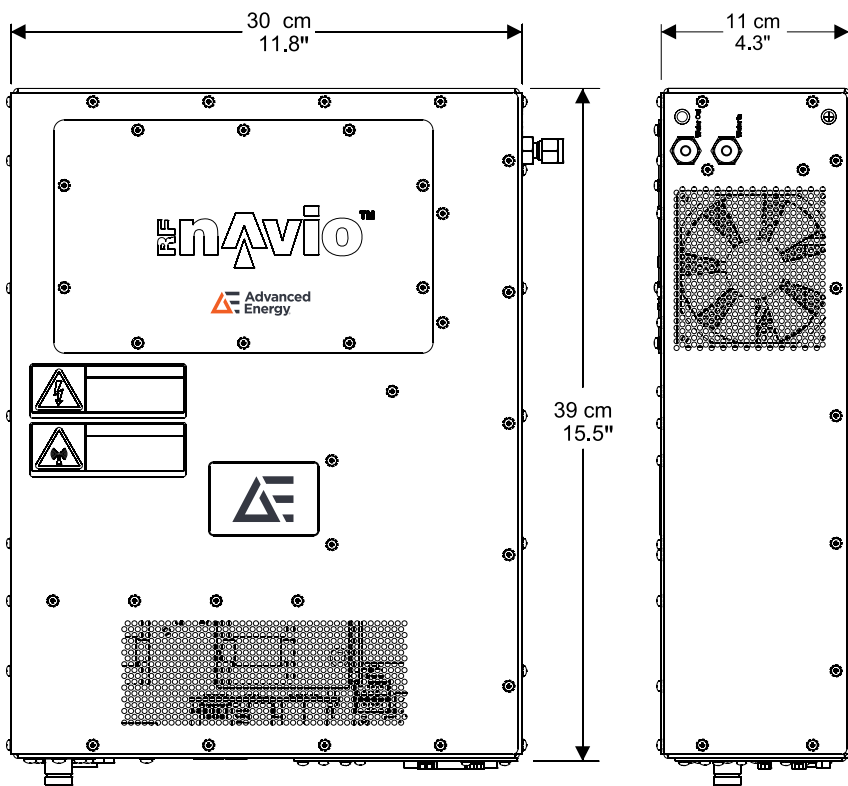


Figure 3: Navio™ flat pack dimensions



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## ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than three decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

AE's power solutions enable customer innovation in complex semiconductor and industrial thin film plasma manufacturing processes, demanding high and low voltage applications, and temperature-critical thermal processes.

With deep applications know-how and responsive service and support across the globe, AE builds collaborative partnerships to meet rapid technological developments, propel growth for its customers and power the future of technology.

PRECISION | POWER | PERFORMANCE

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