

# NAVIGATOR® II DIGITAL MATCHING NETWORKS

Fully digitally tuned matching over a wide range of load impedances enables new levels of process optimization and repeatability.



The versatile Navigator® II matching network's advanced technology provides rapid, accurate, and reliable matching across a wide range of power requirements up to 30 kW and frequencies up to 60 MHz. Equipped with microprocessor-controlled stepper motor drives and advanced tuning algorithms, the Navigator II matching network provides greater consistency and accuracy than traditional analog-based tuning methods. The result is optimized RF power to semiconductor, solar, FPD, and MEMs manufacturing plasma processes, including etch, PECVD, PVD, and chamber clean applications.

## PRODUCT FEATURES

- Digital architecture with enhanced tuning algorithms
  - Pulsed RF power delivery
  - Sweep frequency operation
  - Intermodulation distortion (IMD) immunity for multi-frequency applications
- Real-time process power and impedance measurement

## BENEFITS

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

## APPLICATIONS

### Market Applications

- Semiconductor
- Solar
- Flat Panel Display
- MEMS Manufacturing
- Industrial

### Process Applications

- Etch
- PECVD
- PVD
- Chamber Clean
- HDP-CVD
- PEALD

**SWIFT, ACCURATE, AND REPEATABLE RESPONSE**

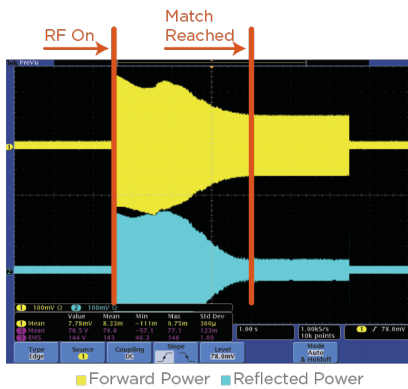
The Navigator® II matching network’s advanced digital tuning algorithms and motor drive produce a much quicker, more accurate, and repeatable response compared to what is currently offered in the market segment today. The Navigator II matching network is designed to AE’s strict product performance standards, which include a low annualized failure rate (AFR) guideline. Additionally, integrated enhanced tuning algorithms reduce unnecessary cycling, further increasing reliability. An optional internal Z’Scan® II RF sensor provides realtime measurement and analysis of process power and impedance, enabling you to identify and significantly reduce process variability. In addition, optional Virtual Front Panel (VFP) software enables you to monitor and command the matching network through a user’s computer.

**REAL-TIME MEASUREMENT AND ANALYSIS**

The optional Z’Scan® II RF sensor provides realtime measurement and analysis of process power and impedance. With this data, you can make quick, accurate decisions when establishing, assessing, and troubleshooting tool, process, and product states. The Z’Scan II sensor also enables you to significantly reduce process variability by gathering and using RF data as a multi-variate indication of system problems (e.g., plasma striking, mis-tuned network, etc.).

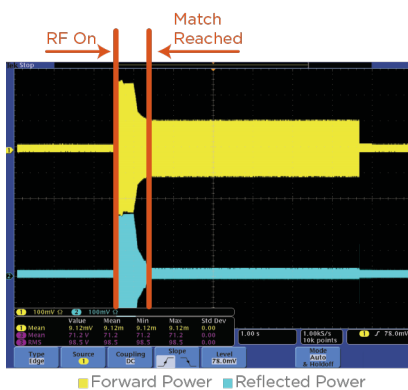
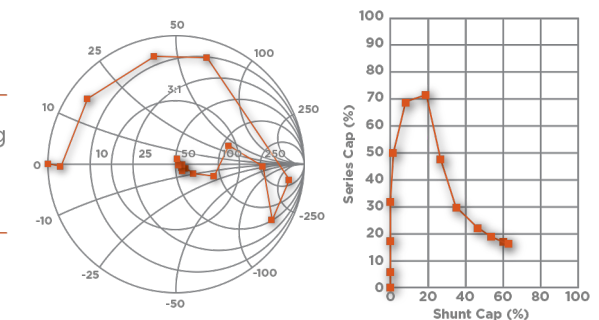
**ENHANCED TUNING ALGORITHMS IMPROVE TUNE TIME**

Process repeatability and accuracy have long been challenges of variable matching networks. The Navigator II enhanced tuning algorithms have dramatically improved tune time, minimizing match dithering while converging on a tune point.



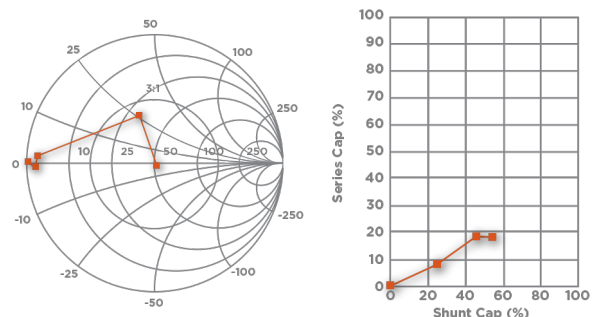
Classic matching network tuning

- Tune time: 6 sec
- Hunting for a tune



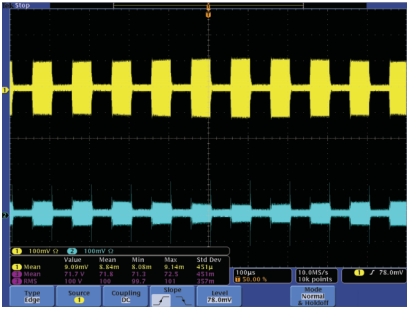
Navigator® II matching network tuning

- Tune time: 1 sec
- Minimal hunting, taking a nearly straight line to 50 ohms

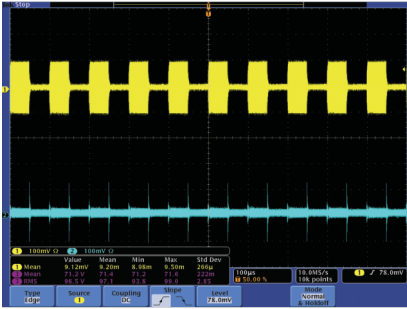
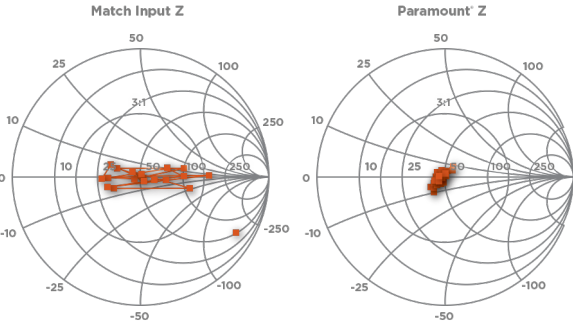


ADVANCED TUNE-WHILE-PULSE CAPABILITIES

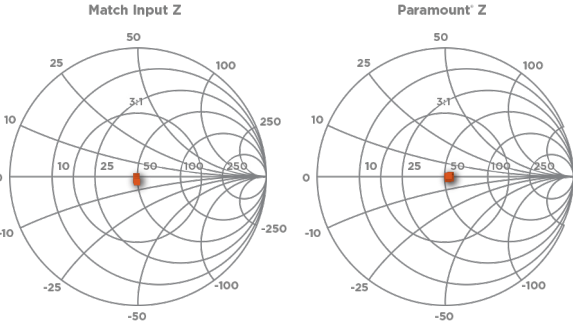
The emergence of pulsing the RF plasma as a method of controlling ion energy is quickly becoming integral in the development of precise, state-of-the-art etch and deposition processes. Until now, match technology has lagged behind the generator’s capability and the process engineer’s needs. The new input sensor and corresponding tune algorithm within the Navigator II matching network allow precision tuning during pulsed RF conditions up to 20 kHz and with duty cycles between 10 and 90%.



Classic matching network  
 · Some instability could be experienced with “classic” tuning methods



Navigator® II matching network:  
 advanced algorithms allow for active tuning during a pulse  
 · Increased stability  
 · Improved reliability with less cycling  
 · Less reflected power



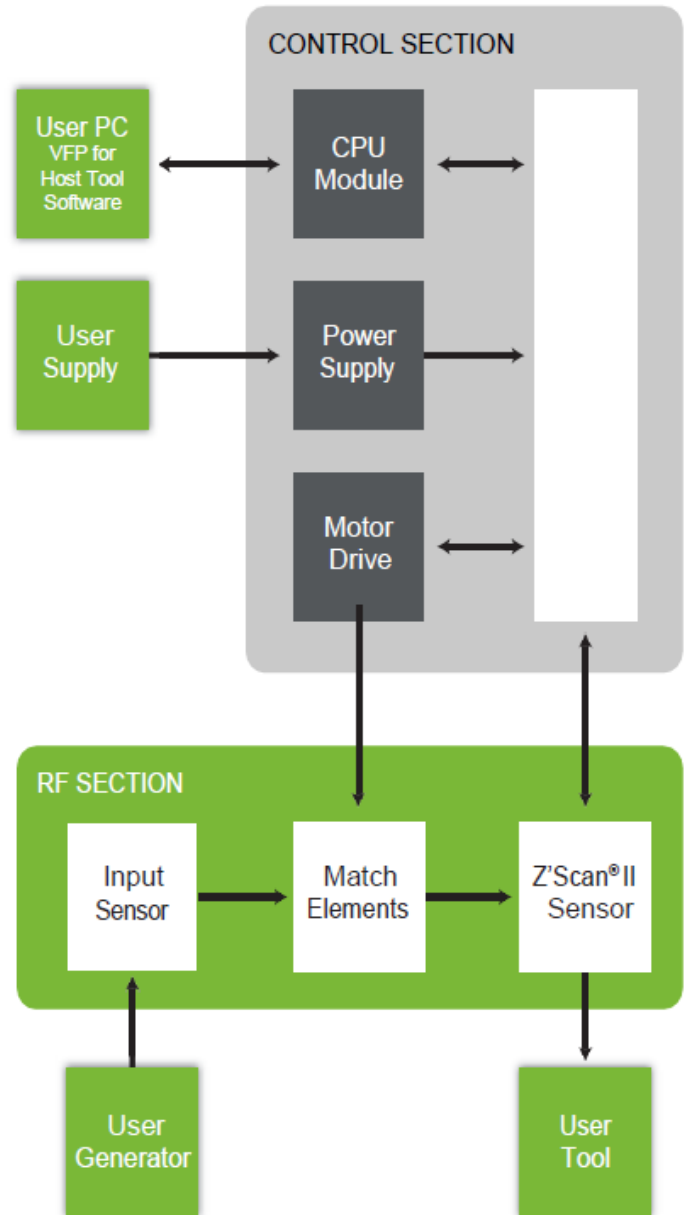
## STREAMLINED DESIGN

The Navigator II matching network's innovative design integrates the high-technology sensor with the microprocessor, and along with advanced proprietary tuning algorithms, provides developers the necessary tools to realize process-enabling benefits.

Customers gain access to critical process information through various available serial and analog I/O interfaces, including RS-232, Profibus, Ethernet, and DeviceNet® interfaces.

## AE VIRTUAL FRONT PANEL

Control through AE's Virtual Front Panel (VFP) enables you to monitor and command the system through your computer. VFP also passively monitors many matching network functions and can actively control tuning and match parameters, providing intuitive, broad-ranging functionality. The VFP features event monitoring, readbacks, Smith® charting, and password-controlled access.



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## PRECISION | POWER | PERFORMANCE

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