PS21 RF Autoprober



Cascade Microtech, the inventor of high-frequency on-wafer measurements, introduces the world's first automatic RF prober. Precision RF/microwave measurements - noise free and over full temperature range - are now possible without wafer loss.

CASCADE™ MICROTECH

Cascade Microtech, the inventor of high-frequency on-wafer measurements, introduces the PS21-RF, the worlds first shielded automatic RF prober. Precision RF/microwave measurements - noise free and over full temperature - are now possible on a fully automatic prober.

Cascade Microtech probe products coupled with Hewlett-Packard instrumentation provide all the tools needed for complete RF probing solutions through 110 GHz.

Total on-wafer RF test system

A complete microwave test solution goes far beyond simply connecting the probes, probe station, and test instrumentation. With Cascade Microtech you not only get precision tools, but the RF test experience you need to make accurate, repeatable, on-wafer measurements. Cascade's close association with other HP Channel Partners such as ATN Microwave, ensures that the full potential of your test system extends to the probe tips.

A typical Cascade Microtech RF/Microwave test system includes the PS21 -RF automatic prober, with integral NT computer and prober control software, ACP series probes, NIST-verified Impedance Standard Substrates, WinCal™ VNA calibration software, as well as complete accessories.

Handles thinned GaAs wafers



The PS21-RF is designed to handle 3 or 4 inch GaAs wafers thinned to 100 microns or less. The unique PS21-RF chuck system is designed with zone-controlled vacuum holes instead of hold-down rings. Not only does this vacuum system eliminate the possibility of wafer breakage it ensures the best possible heat sinking for thermally sensitive parts.



A fully integrated chuck includes separate auxiliary stages for Impedance Standard Substrates.

Patented MicroChamber™ with double wall EMI/RFI shielding

The MicroChamber with internal ground plane (IGP) provides the probing area with two completely metal EMI/RFI shields for greater noise immunity. The outer shield protects the probing area from light while shunting interference to chassis ground. The IGP can be switch selected to chassis ground or be floated to quiet ground.

The IGP also provides a "Faraday Cage" that functions as a purge box for frost-free thermal measurements. The -40 dB typical shielding reduces the need for expensive, external screen-room environments.

Patented auxiliary stages

Two auxiliary stages with separate vacuum control are incorporated into the chuck. These thermally isolated stages provide convenient platforms for commonly needed tools such as probe-tip planarizer or cleaner and impedance standard substrates (ISS) for vector network analyzer (VNA) calibration.

Thermal gradients on the probes and cables degrade over-temperature S-parameters accuracy at 20 GHz by 5% for every 10°C change. The auxiliary stage allows quick access to ISSs for automatic VNA calibrations and verifications at each test temperature.

Powerful software

Windows NT provides a solid embedded multitasking operating system with an easy-to-use graphical user interface (GUI). The GUI provides leading-edge multimedia displays. Full wafer mapping capability is provided for custom test plans. Optional optical character recognition (OCR) can be used for wafer/test identification. DDE and OLE provide easy links to other popular software programs such as WinCal, IC-CAP Labview, etc.

Convenient wafer loading



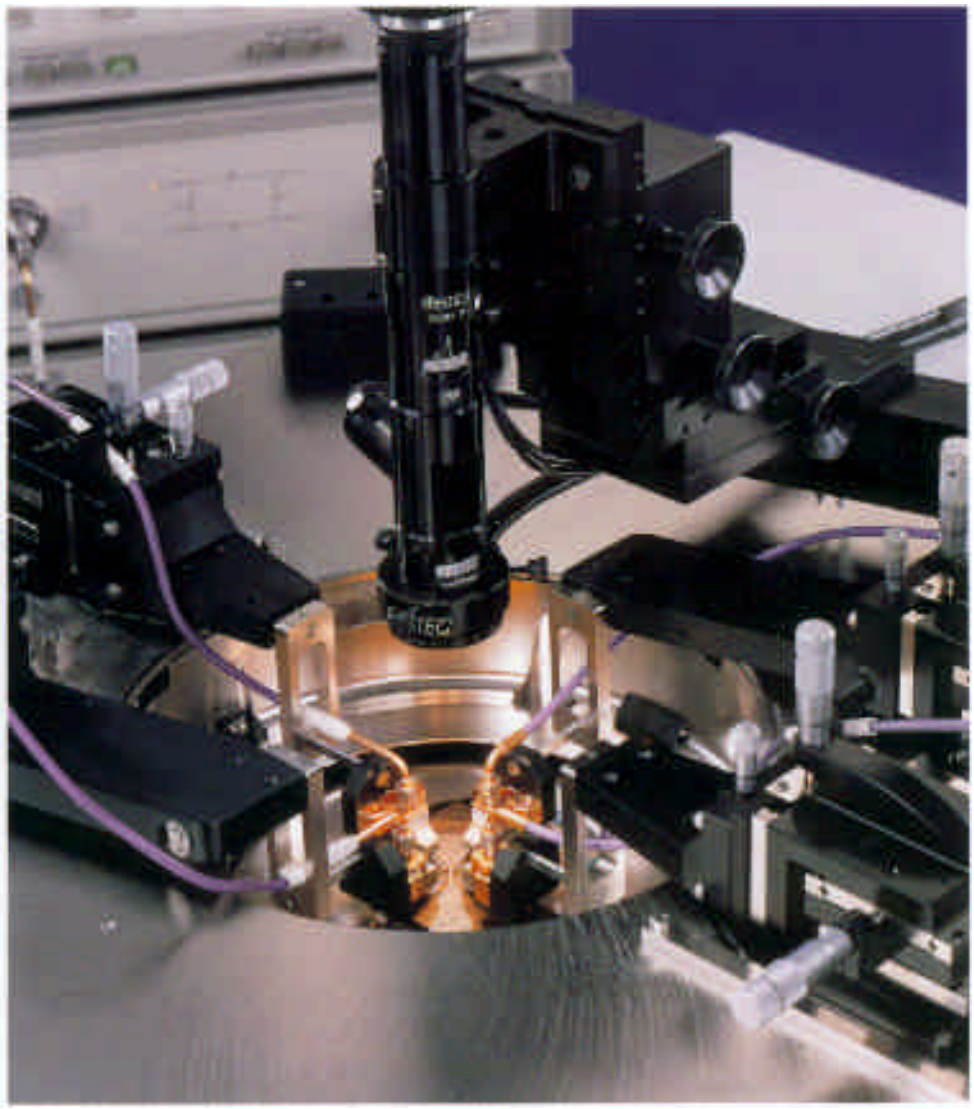
Access to the cassette for device/wafer loading is through a hinged front door. The standard cassette for up to 25 wafers - from 3 inches to 8 inches - or an optional customer-specified material cassette is mounted on a slide-out tray for easy loading and unloading. The PS21-RF offers two cassette capacity with an optional SMIF (Standard Machine Interface). Single wafer load/unload is provided through a MicroChamber front-access door.

Easy user interface

The standard system has a 17 in. CRT monitor with easy-to-use acoustic wave touch screen. An optional flat panel display is also available. Manual operation is available through a joystick which can be positioned on the left or right side of the keyboard. A full-color video camera provides on-screen display for setting and verifying probe to pad alignment.

Superior machine vision

Automatic device alignment is provided using an off-axis camera with pattern recognition software, assuring accurate and repeatable device positioning for high-frequency measurements. It also allows repeatable contact to ISS for automatic VNA calibrations.



Patented Air Coplanar Probes enable over-temperature probing with the lowest insertion loss in the industry.

Precision material handler and pre-aligner



The material handler and pre-aligner ensure that all thinned wafers are loaded onto the chuck consistently. It accommodates standard 3 in. to 8 in. wafers or can be modified for custom devices. Cross-slot detection is provided using a laser based sensor to prevent device damage. The low-inertia design allows rapid motion with no sensitivity loss and has very few moving parts to provide maintenance free life. Ejector pins on the chuck lift the device/wafer for automatic handling.

Clean measurement environment



Air flow throughout the station is controlled to maintain a clean measurement environment and to provide the purge for temperature testing. The cassette load area is purged with dry air separately from the MicroChamber to eliminate probe area contamination and down time during temperature tests. The PS21-RF is rated for frost-free temperature measurements from +2OO°C down to -55°C.

HEWLETT PACKARD
Channel Partner



- **Handles thin wafers without breakage**
  Accepts 3 in. GaAs through 8 in. silicon wafers. Increase yield and revenue by reducing wafer loss.

- **Fast, frost-free to -55°C, measurements, purge <15 min.**
  VNA system stability is monitored to provide error-free S-parameters over-temperature.

- **Patented auxiliary chucks**
  Two separately controlled vacuum stages provide instant access to ISSs for VNA calibration and system verification.

- **Fully compatible with HP instruments**
  Cascade's close association with HP ensures that the full potential of your test instrumentation extends to the probe tip.

- **Replaceable top plate**
  Handles up to 4 positioners, designed to accommodate RF tuners and accessories through 110 GHz. Converts to probe card in minutes.

- **Patented MicroChamber™**
  Double shielded, dark, electrically quiet measurement area eliminates unwanted interference. MicroChamber door provides easy access to load auxiliary chuck tools.

- **Easy access to built-in computer system**
  Built-in industrial grade computer running Windows NT multitasking operating system for auto-prober control.



Experience laboratory grade measurements without wafer loss



- **Full color video**
  Align device using off-axis camera with pattern recognition software that assures accurate and repeatable positioning.

- **Advanced PS21 Control Software on Windows NT**
  Powerful Z-bit O/S provides stable platform for PS21 control software. Also use the built-in computer for local test management.

- **Easy user interface**
  Graphical user interface (GUI) provides leading-edge multimedia displays setup wizards and on-line help.

- **WinCal VNA Calibration Software**
  Provides the simplest, most accurate, repeatable network analyzer calibrations for precision on-wafer measurements.

- **Emulation mode for EG and TEL Probers**
  Use your existing test software without modification.

- **Wafer mapping**
  Custom test plans and Optical Character Recognition (OCR) software is available for wafer/test identification.

- **Extensive test software support**
  Use IEEE 488.2 remote commands with IC-CAP SILVACO, etc. Achieve fast data transfer using DDE/OLE with HP VEE, Labview, etc.

- **Convenient cassette loading**
  Accepts standard 25 wafer cassette through a hinged door on a slide-out tray for easy loading and unloading.

- **Precision material handler and pre-aligner**
  Ensures that all devices are loaded onto chuck consistently.



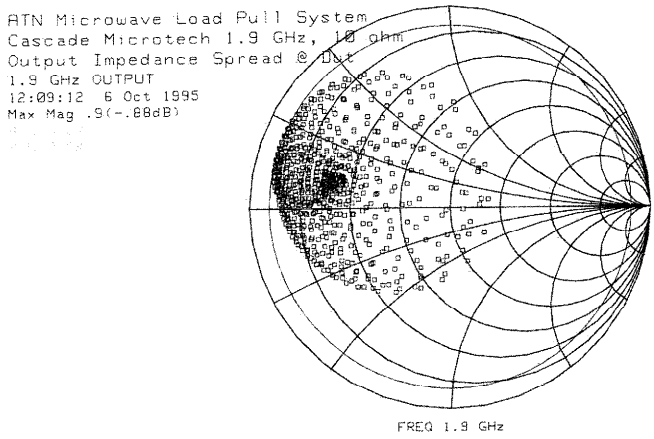
- **Patented Air Coplanar Probe Accessories**
  Highly compliant, rugged probes with the lowest insertion loss in the industry and superior calibration accuracy for probing over a broad temperature range up to 110 GHz.

- **UPS (Uninterruptible Power Supply)**
  Maintains computer system integrity and protects against power outs.

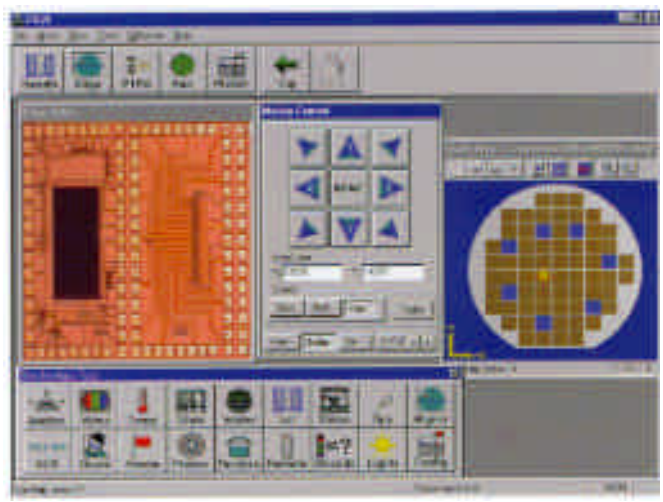
Cascade Microtech's PS21 RF Series Wafer Autoprober (shown with panels removed)

Cascade Measurement Advantage

Measurement	Common Problem	PS21 Measurement Advantage
Over-Temperature S-Parameter Measurements	• Moisture or frost accumulation on wafer. Long purge times for dry box	• Patented low-volume MicroChamber is purged in <15 min. with dry air or nitrogen allowing frost-free measurements to -55°C
	• System calibration drift is often >10% over temperature	• WinCal software checks stability of probes, cables, and VNA to user-definable limits. Auxiliary chucks holds an ISS for re-calibration and contact substrates for planarity checks
Power Amplifier	• Improper heat sinking	• Carrier-free wafers thinned ≤100 µm loaded on solid chuck ensures good heat transfer
Load Pull	• Inability to measure very low impedances with 50Ω probes	• Partial-Matching Air Coplanar Probes extend the tuning range of the load-pull system
Noise Parameter	• Probe and cable losses limit source gamma and accuracy	• Ultra-low loss ACPs and source mounting hardware can reduce losses < 0.25 dB max.
RFIC Functional Testing	• Power bypass and ground inductance too high to maintain stable device operation	• Pyramid Probe Card enables unrivaled measurement capability with minimal bypass and ground inductance
F_t Measurements	• Pad parasitics mask intrinsic silicon device parameters	• WinCal's pad-parasitic removal routines de-embed F_t, measurements to reveal intrinsic device performance
mm Wave Measurements	• Calibration accuracy, data repeatability	• WinCal and PS21 ensures highest accuracy in the industry with superior probe placement
Lightwave/OE	• Laser diode impedances are too low to use a 50Ω probe for pulsed bias measurements	• Resistive matching ACP probe allows broad band impedance matching



Load Pull Tuner impedance spread at DUT using a 50-to-10 Ω impedance matching ACP probe.



Powerful, intuitive PS21 control software integrates simply and easily with existing prober software.

Your complete RF solution

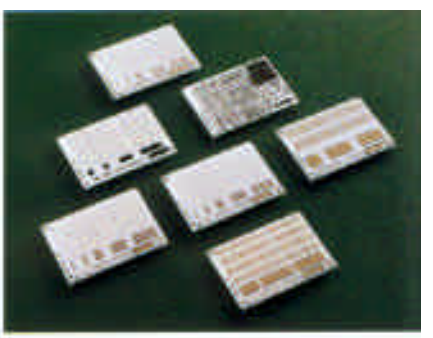
• Pyramid Probe Cards
Pyramid Probe Cards enable unrivaled RFIC measurement capability with minimal bypass and ground inductance

• Patented Air Coplanar Probes
Patented Air Coplanar Probes allow over-temperature probing from -55°C to +2OO°C with the lowest insertion loss in the industry and superior calibration accuracy. The Air Coplanar design provides low-contact force and superior tip visibility, along with extremely long probe life, for stable and repeatable high-temperature measurements.

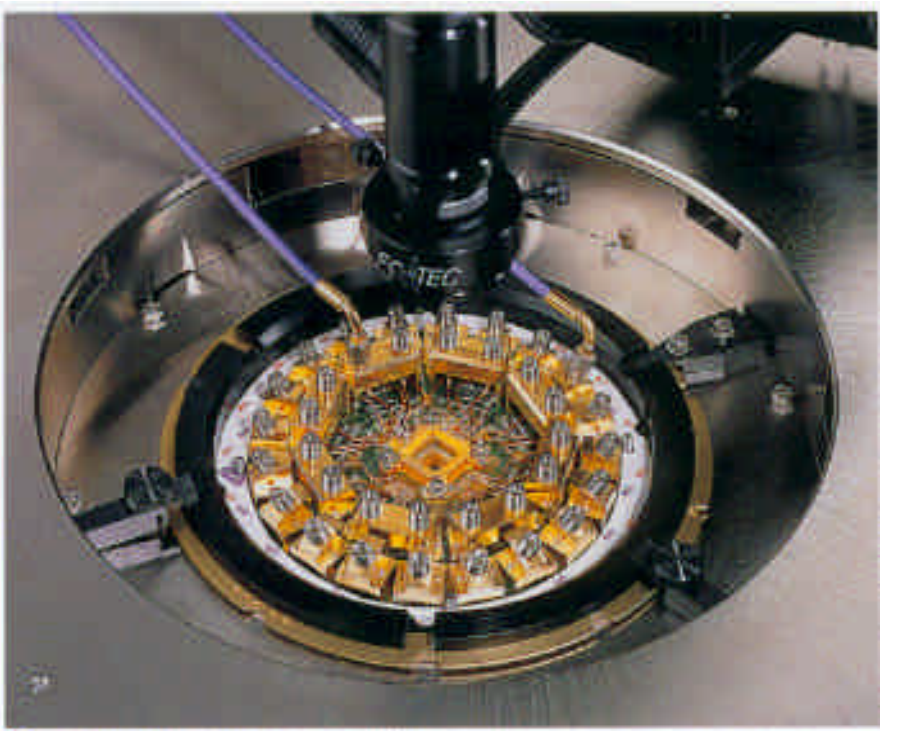
• NIST Verified ISSs
Cascade's family of impedance standard substrates support all high-frequency probing applications, including RFIC Pyramid Probe cards.

• WinCal Calibration Software
WinCal Calibration Software provides the simplest, most accurate, repeatable, network analyzer calibrations for precision on-wafer measurements. New pad parasitic removal routines incorporated into the software perform one-step corrections for device pad parasitic removal.

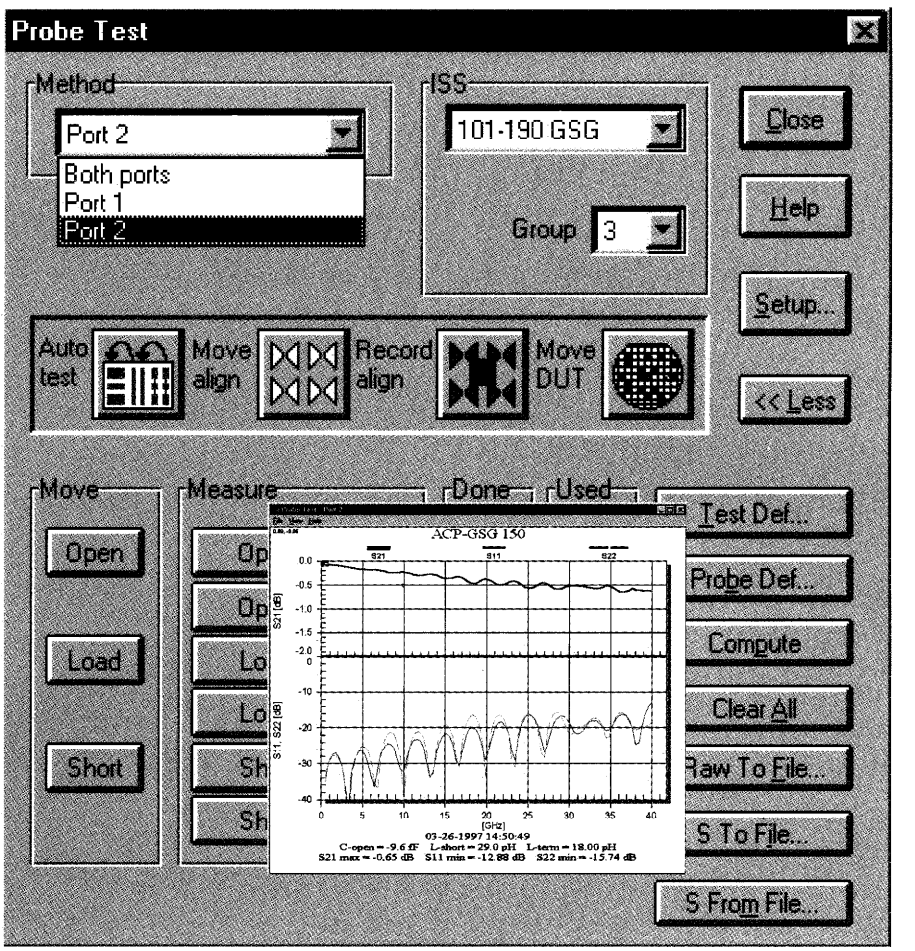
WinCal assures measurement integrity by allowing you to monitor system drift and offers the proven accuracy of NIST-verified LRRM calibration with load-inductance compensation. LRM/LRRM calibration along with Cascade's ISSs provides the highest accuracy in the industry.



NIST-verified family of Impedance Standard Substrates (ISSs) allow fast, accurate, repeatable high-frequency wafer probe calibrations.



Pyramid Probe cards allow you to do full functional test through 20 GHz over temperature.



WinCal Calibration Software is no longer just a calibration tool but can be used as an invaluable probe maintenance tool. New features allow you to verify that your probes are operational.

Specifications

X-Y Stage

Travel: 216 mm x 419 mm
(8.5 in. x 16.5 in.)
Repeatability: ≤ ±1 µm (0.04 mils)
Speed: 100 mm/sec. (4 in./sec.)

Dimensions

Base Dimensions:
120 cm (47 in.) wide by 93 cm
(37 in.) deep by 102 cm (40 in.) high
Weight: 685 kg (1,500 lbs)
Base dimensions with test head: 151 cm
(59.5 in.) wide by 93 cm (37 in.)
deep by 126 cm (49.5 in.) high
Weight with test head: 775 Kg
(1,700 lbs.)



HP8510XF positioners and ACP110 series probes on the PS21 RF Autoprober provide full automatic wafer probing through 110 GHz.



An optional SMIF interface provides 2 cassette capacity.

Ordering Information

8 in. RF Series Autoprober *PS21*

Standard nickel chuck .....
.....*PS21-OPT-001*

FemtoGuard nickel chuck, non-thermal
.....*PS21-OPT-002*

Thermal nickel chuck and
controller, -55 to 200°C .....
.....*PS21-OPT-003*

Thermal nickel chuck and controller,
5 to 200 °C *PS21-OPT-004*

Optical character recognition .....
.....*PS21-OPT-036*

2nd wafer cassette holder.....
.....*PS21-OPT-037*

3 in. wafer handling option .....
.....*SQ-PS21-3 in.*

RF Positioner, East/West .....

.....*113-361*

RF Positioner North/South .....
.....*113-362*

Platen RF Positioners .....
.....*PS21-OPT-039*

WinCal Software for PS21 .....
.....*SP-VNACAL-WIN-01*

Facility Requirements

Vacuum: 500 mm (20 in.) of Hg min.
Compressed air: 30 litre/min.
(1 SCFM) @ 5.5 kg/cm^2
Power: 115 V @ 12 A or 230 V @
6 A, 50 or 60 Hz

Regulatory Compliance

All stations conform to CE mark and are ETL listed.

Warranty

One year parts and labor.

CASCADE®

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