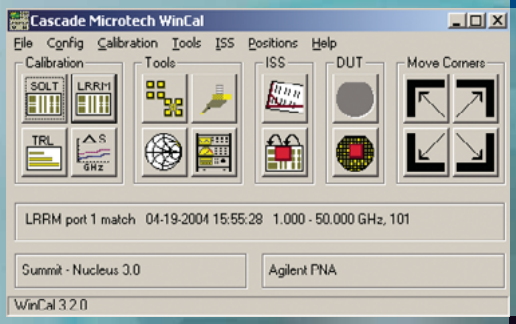
WinCal™ Calibration Software





Increase Measurement Accuracy and Repeatability for Significant Productivity Improvement

Cascade Microtech offers a complete high frequency measurement solution for those doing device characterization and modeling that consists of a probe station, probes, software, calibration substrates and other accessories. WinCal is the calibration software that guides you through the error-prone process of VNA calibration and gives you valuable tools for making measurements and ensuring their accuracy.

CASCADE® MICROTECH

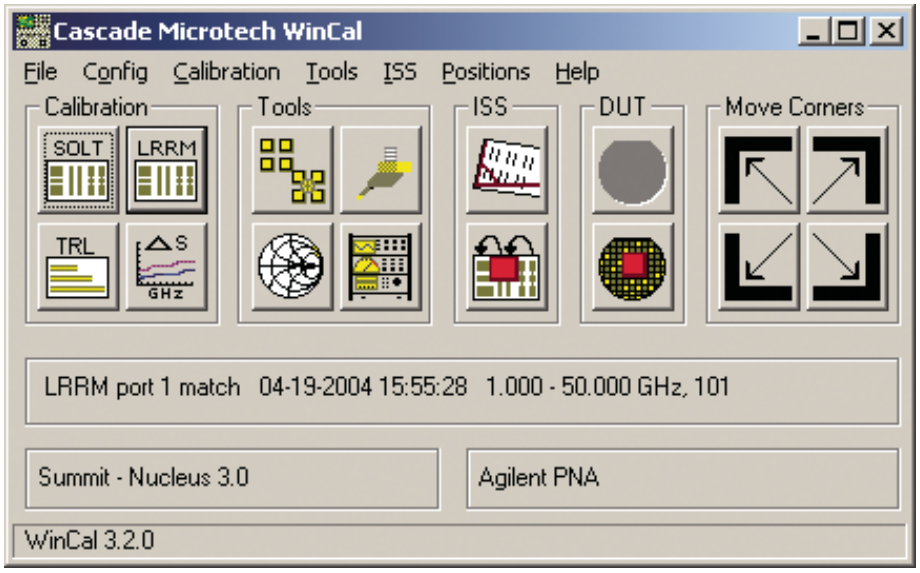
Innovating Test Technologies®

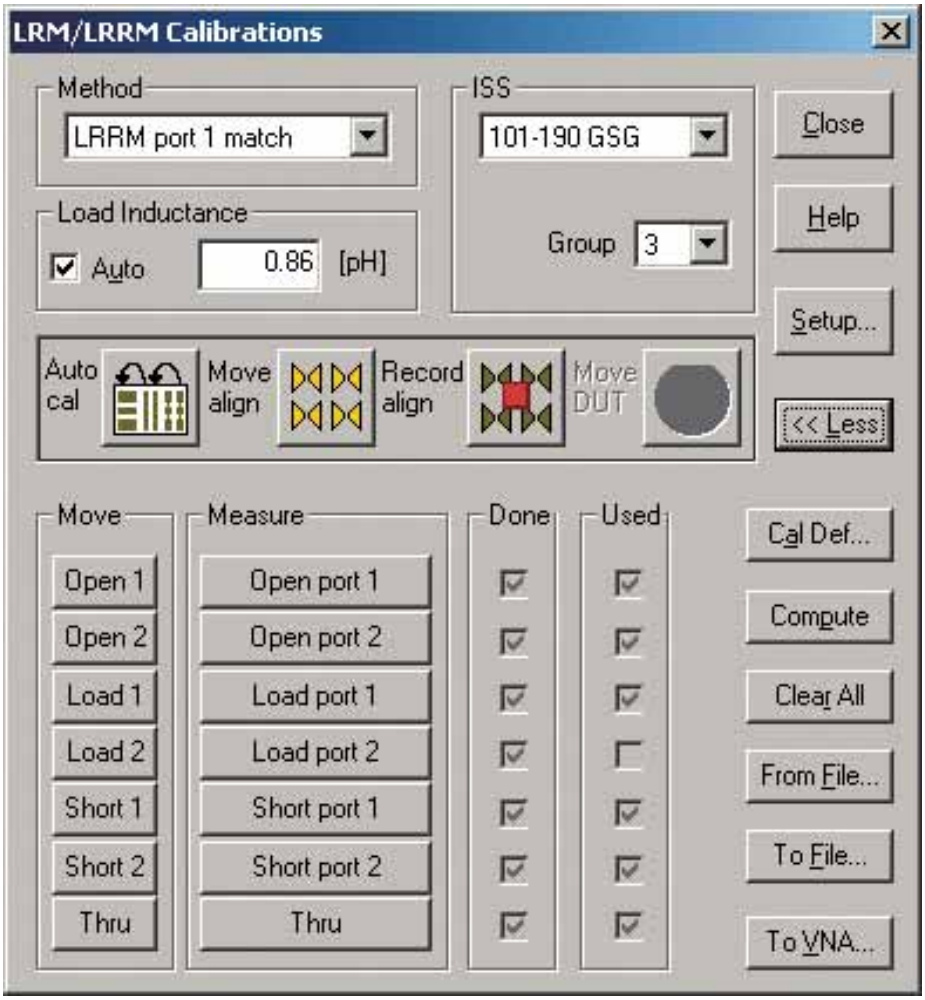
Calibration to give you confidence in your S-Parameter measurements

Easy to use, allows automation of the calibration that leads to increased productivity and superior measurement accuracy and repeatability.

WinCal automates all of the popular calibration techniques so they don't have to be performed on the VNA front panel. This includes SOL, SOLT, TRL and LRM.

Advanced calibration techniques such as LRRM and SOLR that cannot be performed from the front panel of the VNA are also available in WinCal.





LRRM Calibration

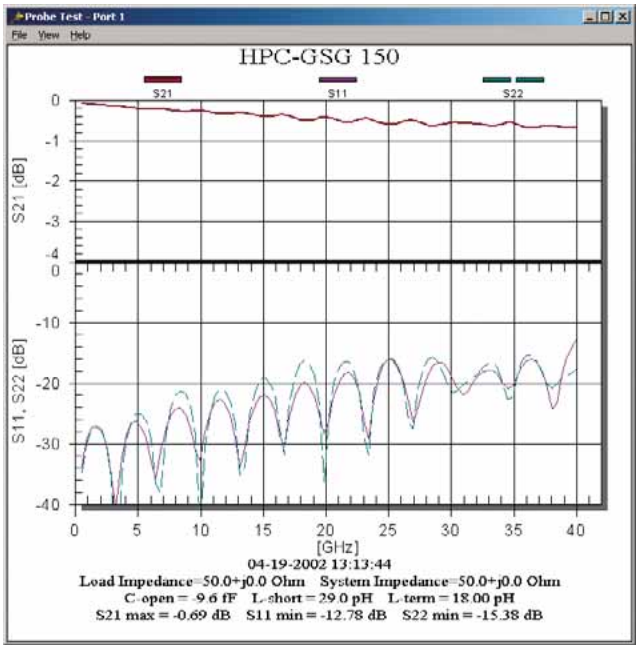
The LRRM calibration technique with auto load inductance compensation [1] is only available in WinCal. This technique has been demonstrated to be the most accurate calibration allowing fixed probe spacing for all of the standards to 110 GHz [2].

WinCal guides you through the error-prone process of VNA calibration and gives you valuable tools for making measurements and ensuring their accuracy.

WinCal functions are unobtrusive, allowing you to maintain control with maximum flexibility and adaptability. Easy access to all of the calibration types and tools such as Pad Parasitic Removal and measurement window are shown here on the WinCal main window.

Graph at right compares the worst case measurement uncertainty of the LRM, SOLT and LRRM calibration technique. The NIST multi-line calibration technique is shown as the baseline for comparison. The LRRM calibration provides calibration comparable to the reference NIST calibration with variation comparable to the variations due to system drift (repeatability limit).

WinCal saves time and improves measurements.



Probe Test

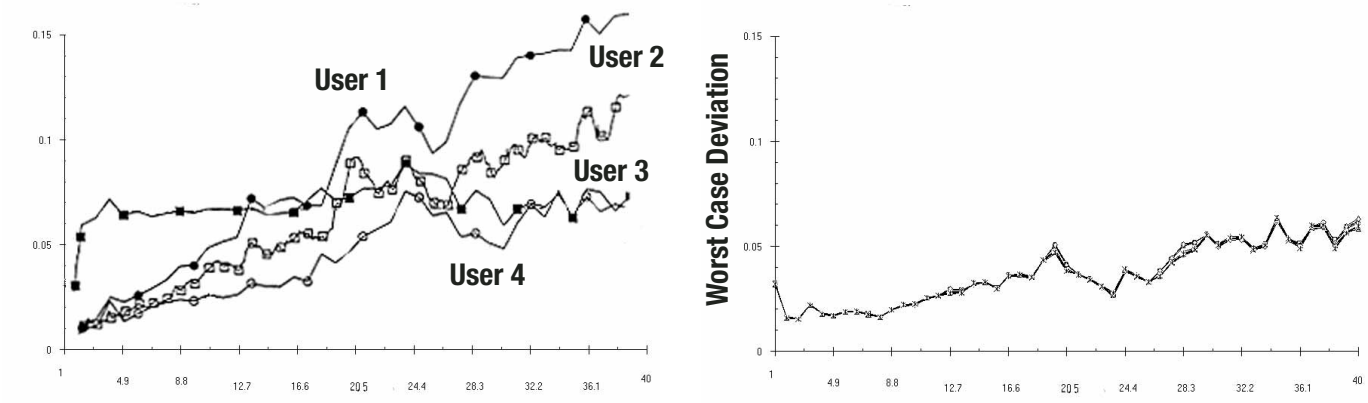
WinCal's Probe Test can be used to de-embed, display and store the S-parameters of the wafer probes.

Subsequently, this tool can be used to verify the electrical performance of the probe.

Calibration Type	Typical Calibration Time	Calibration Repeatability Worst Case Deviation of S-Parameters @ 40 GHz	Calibration Accuracy Worst Case Deviation of S-Parameters @ 40 GHz
VNA Front Panel Manual Prober SOLT Calibration	5 minutes	15%	18%
WinCal LRRM Summit Automatic Prober Calibration	45 Seconds	3%	3%

WinCal Benefits

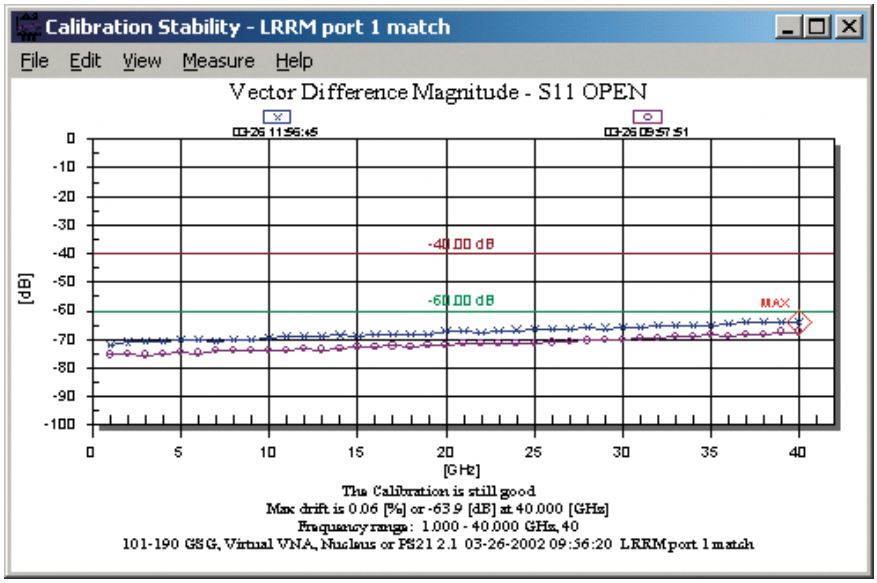
The benefits of WinCal are evident in the time required to perform a typical VNA calibration as shown in this table. Also shown is a comparison of the resultant accuracy for typical users performing either a front panel calibration or using WinCal for the LRRM calibration.



Graphs compare repeatability of manual calibration versus automatic LRRM calibrations.

The y-axis is the fractional worst-case S-parameter variation calculated for the passive device that would cause the greatest measurement difference. WinCal's automatic calibration makes far more repeatable and consistent on-wafer VNA measurements. Small variations in probe placement from individual operators or from operator-to-operator can cause significant measurement differences.

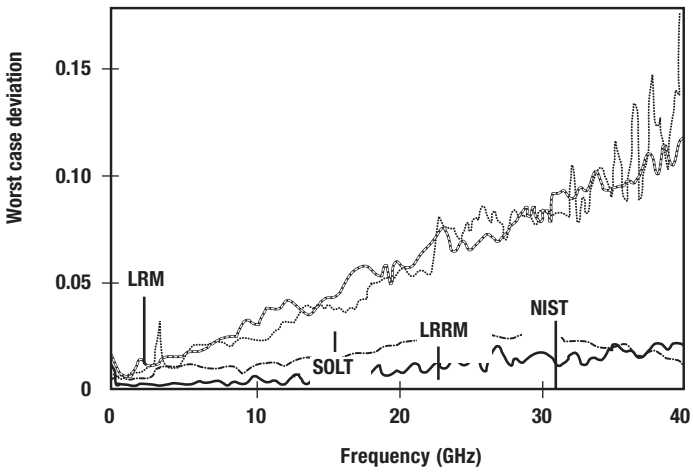
WinCal provides the ultimate in calibration convenience – the one button calibration.



Calibration Stability Tracking

As time passes, measurement system drift will reduce the accuracy of the calibration. WinCal's stability check feature allows convenient re-measurement of the open standard which is then compared with the data stored at the time of the calibration. The magnitude difference between the original and the current measurements indicates the calibration quality: good, acceptable, or time to make a new calibration.

Calibration Accuracy of LRRM



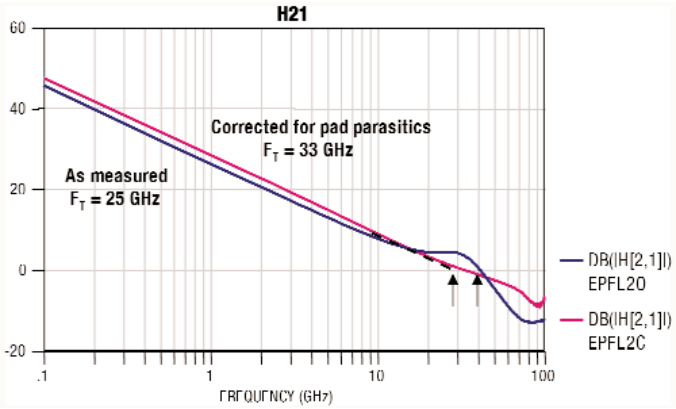
SOLR Calibration

The SOLR technique [3] is in many ways similar to the SOLT calibration – although the requirements on the 'Thru' standard are greatly relaxed. The 'Thru' needs only be reciprocal (S12 = S21). For example, SOLR is particularly well suited to situations where the DUT terminals are oriented at a 90 degree angle.

Pad Parasitic Removal

WinCal's Pad Parasitic Removal function can be used to remove the parasitic influence of the pads and the interconnections to a transistor.

Pad parasitics are a complex combination of capacitances and inductances. These effects are undesirable if you are trying to accurately model an intrinsic device that will be used without bond pads as a building block of an integrated circuit.

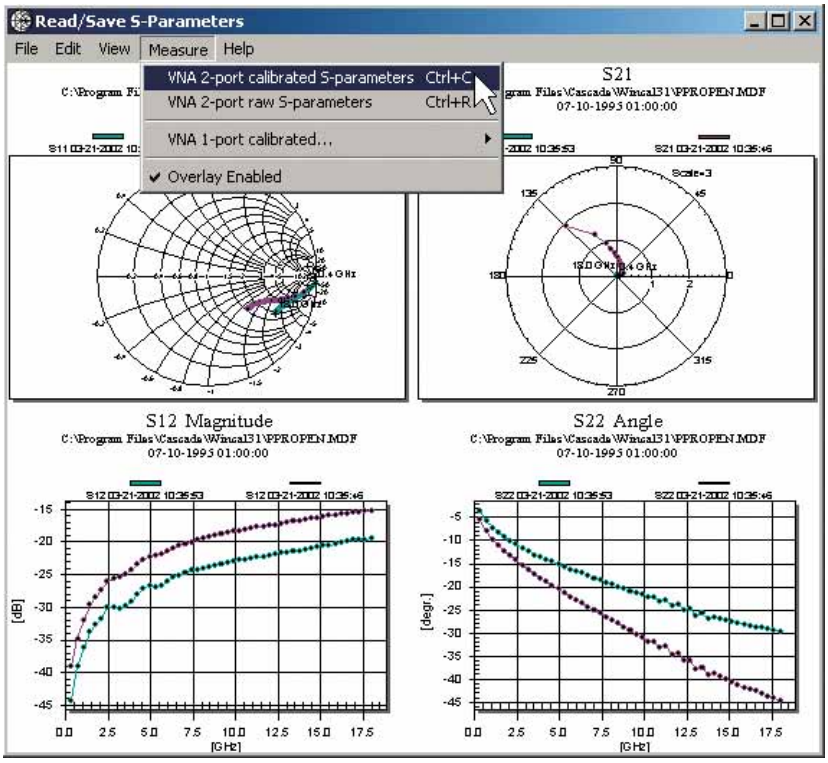


Multi-Trace Display

WinCal's Multi-Trace measurement capability lets you compare up to six S-Parameter measurements at once.

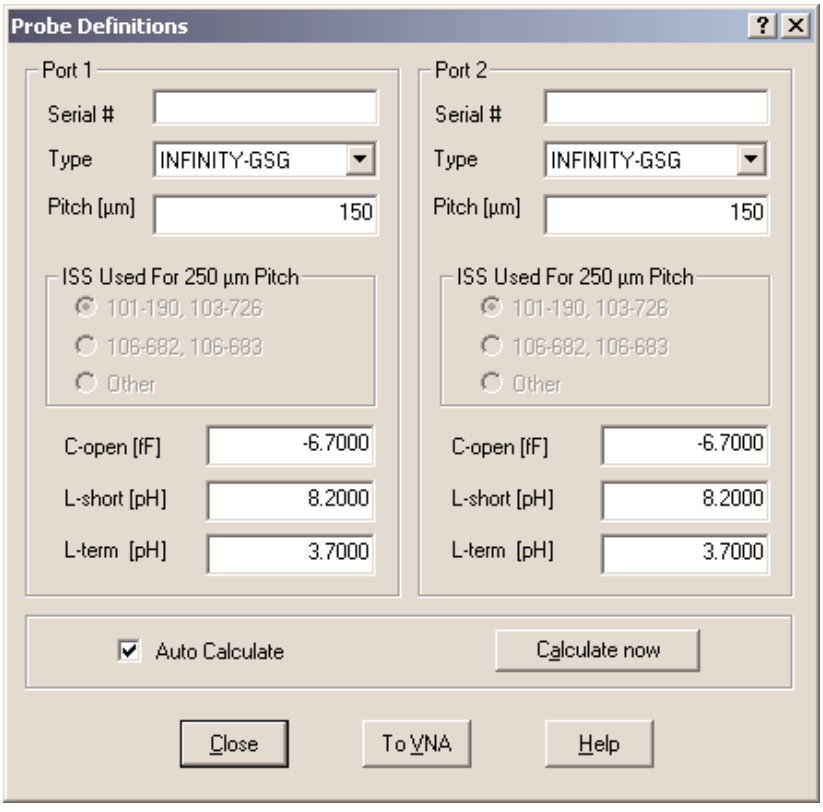
Trigger the instrument to take a measurement and display it. You can then save it to an S2P or MDF file and import it into a modeling tool such as Agilent IC-CAP.

You can also capture the graphic image for use in characterization reports.



Cal Kits are Easy to Set Up

Calibration kits for probes are easy to set up with WinCal because it provides a complete Cal Kit database with coefficients for all Cascade Microtech microwave probes. Using WinCal to set up the Cal Kit removes one of the most common sources of calibration error.



Now supports Agilent PNA Series Analyzers: 8356, 8357, 8358 and 836x.

System Requirements

WinCal-supported VNAs:

- Agilent PNA (firmware version 3.23 or later required)
- Agilent 8510 B/C
- Agilent 8753 (SOLT only)
- Agilent 8719, Agilent 8720,Agilent 8722 (Model D or ES option 400 required for LRM, LRRM, SOLR, TRL)
- Anritsu 372xxA Series (firmware version 2.03 or later required)
- Anritsu 360B Series (firmware version 4.02 or later required)
- Rohde and Schwarz ZVK and ZVM (firmware version 3.52 or later required)
- Supports: Summit 12000-Series Semiautomatic Probe Stations (running Nucleus)
- Supports Summit 9000-Series and 11000-Series Manual Probe Stations

For automated TRL calibrations on semiautomatic stations, MS1-8-Series programmable micropositioners are needed.

Computer Requirements

Processor: Pentium® II, 150 MHz
Memory: 128 MB min.
Hard Drive: 50 MB free space required
Monitor: SVGA
Software: Windows XP/2000/NT/98
Expansion Slots: National Instruments GPIB IEEE-488.2 PC interface card and VISA Layer software driver or Agilent HPIB interface and VISA layer driver
Cascade Microtech's Nucleus version 2.5 (or later, only on S300 and 12000-Series probe stations, not required for manual probing systems)

Ordering Information

WinCal VNA calibration software for Summit semiautomatic probe stations. 125-190
WinCal VNA calibration software for manual probe stations 125-191
WinCal VNA calibration software upgrade from all previous versions 125-192
WinCal VNA calibration software demo (free) 125-189

For ISS information refer to the Impedance Standard Substrates data sheet (ISS-DS-0602). For a microwave probing configuration using programmable micropositioners mounted on a Semiautomatic Summit Station, refer to the MS1-8 Programmable Positioner data sheet.

OLE Automation

Allows you to access WinCal S-Parameter functions from other Windows Programs. For example, an external program can command WinCal to perform a Cal Stability Check to determine if a new calibration is required.

Available from the Cascade Microtech Web Site:

References: [1] A. Davidson et al, "LRM and LRRM Calibrations with Automatic Determination of Load Inductance," 36th ARFTG Conference, Nov. 1990.
References: [3] S. Basu and L. Hayden, "An SOLR for Accurate Measurements of Orthogonal On-Wafer DUTs," IEEE MTT-S International Microwave Symposium, Denver, 1997.

CASCADE® MICROTECH

Innovating Test Technologies® for better measurements faster

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