Anritsu

3658x Series AutoCal®

VNA and VNMS 2-Port Automatic Calibrators

Fast, Accurate and Repeatable Vector Network Analyzer Calibrations

TWO-PORT AUTOCAL® PERFORMANCE HIGHLIGHTS

- Ideal for the manufacturing environment
- Eliminates unreliable measurements due to inaccurate manual calibrations
- Increases throughput with fast 1 or 2 port calibrations in less than 2 minutes
- Standard built in control available for both the Lightning VNAs and Scorpion VNMSs
- Accuracy that exceeds OSLT Calibration, with broadband loads
- Characterized modules traceable to NIST
- Characterized module ranges:
  - 10 MHz to 9 GHz
  - 40 MHz to 20 GHz
  - 40 MHz to 40 GHz
- Single module coverage from 40 MHz to 20 GHz and 40 GHz
- Inexpensive solution for non-insertable devices, waveguide connectors

Overview

The 3658x series AutoCal® modules are automatic calibrators that provide fast, repeatable, and high-quality coaxial calibrations up to 40 GHz. These modules contain precisely characterized calibration standards that aid in the removal of normal systematic errors of Vector Network Analyzers.

AutoCal is available in several models:

.01 to 9 GHz, with N or K connectors
.04 to 18 GHz, with N(m) to N(f) connectors
.04 to 20 GHz, with K(m) to K(f) connectors
.04 to 40 GHz, with K(m) to K(f) connectors

For the Lightning 37000 series and Scorpion MS462xx series VNAs, AutoCal is controlled directly by the VNA's built-in serial port. No external controller is required.

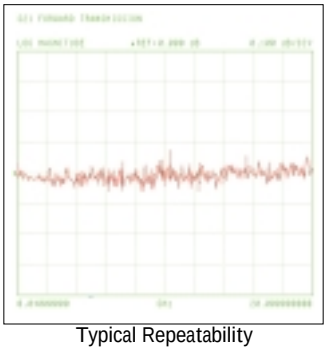
Do You Want to Know More?

Contact Anritsu for these AutoCal related publications:
2-Port AutoCal Automatic Calibrator Application Note (p/n: 11410-00258)
4-Port Automatic Calbrators Brochure (p/n: 11410-00294)
4-Port AutoCal Automatic Calibrator Application Note (p/n: 11410-00298)
Measurement Accuracy Application Note (p/n: 11410-00270)

Characterization Data

AutoCal modules come with a data file characterizing each standard in the calibrator module. Each module is guaranteed to perform to its specifications for six months without re-characterization. Following this period, re-characterization can be performed by the customer, or by sending the module to the nearest service center.

Thru measurement using a six month old characterization file shows AutoCal's excellent repeatability.



Typical Repeatability

Test Port Converter Sets

Test Port Cable Converter Sets aid the user in calibrating a VNA for testing non-insertable devices and devices with SMA or 3.5 mm connectors. Test Port Converter Test Sets are available for K Connector®, SMA and 3.5 mm connectors. Adapter removal calibration is required for N type non-insertable device testing.

KEY FEATURES

Calibration Types: 1-port S_{11} and S_{22} calibration, and full 2-port OSLT calibrations can be performed with AutoCal®.

True Thru: Inherently, the internal calibrator thru is not as accurate as an external direct thru connection. The True Thru Mode offers the choice of manually removing the AutoCal module for a true thru calibration.

Isolation Cal: Isolation Cal is offered as part of a full 2-port calibration. The user is given the option of skipping Isolation, using the default Averaging Factor during Isolation, or entering a custom Averaging Factor.

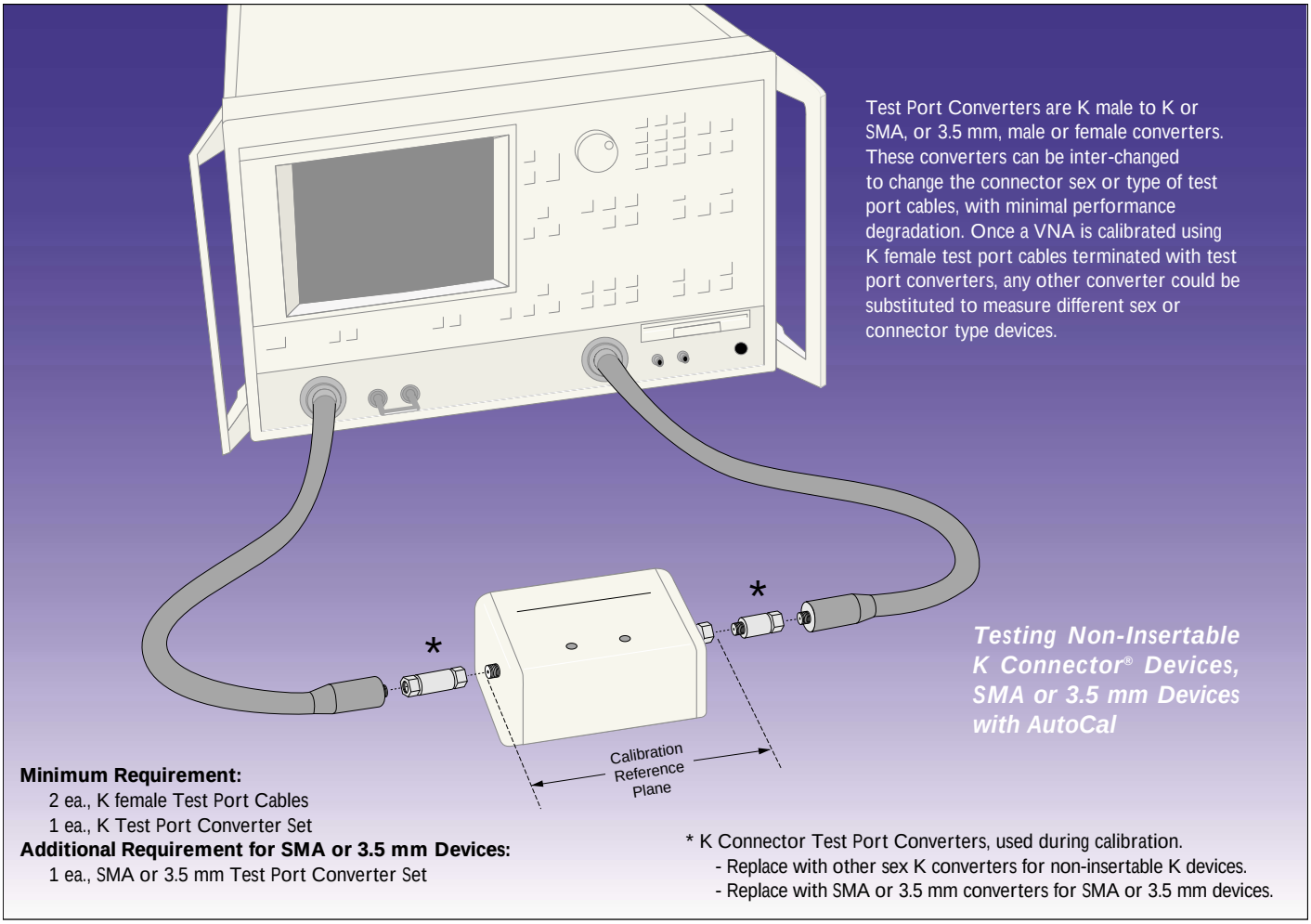
Switch Averaging: The mechanical module uses an electromechanical switch to select the calibration standards. Switch Averaging is offered to reduce the effects of the electromechanical switch's non-repeatability. A 6 dB reduction of non-repeatability can be achieved by increasing Switch Averaging by a factor of four, at the expense of the overall calibration time.

Thru Update: Due to cable movements and aging, periodically updating the thru portion of a full, 12-term calibration is recommended. Thru Update mode offers the choice of simply performing a direct manual thru step to update a current calibration. This is easily performed without having to invoke the AutoCal module.

Manual Control: Manual Control offers the ability to connect any of the internal standards to the test ports of the VNA. This feature could be used to manually verify a calibration.

Adapter Removal: VNA calibration for testing non-insertable devices, requires phase equal insertables. If this is not possible or undesirable, Adapter Removal Calibration is the solution. Adapter Removal requires two full 12-term calibrations, moving an adapter from one test port cable to the other between cals (a job AutoCal makes quick and easy). Internal software mathematically subtracts the effect of the adapter, yielding the desired adapterless measurement.

Characterization Flexibility: For users measuring devices with coaxial connectors other than K, SMA, 3.5 mm, or N, or with waveguide connectors, both the Lightning and Scorpion VNAs have built-in characterization software. This allows the users to characterize the Autocal module with appropriate adapters and subsequently calibrate the VNA. Users measuring waveguide, TNC, or 7/16 devices now have a convenient, inexpensive solution to their calibration needs.



SPECIFICATIONS

All specifications are guaranteed over the ambient temperature range of 23 ±3°C.

Directivity:	**AutoCal Module**	**AutoCal with 36583x**
0.01 to 2 GHz	38 dB	36 dB
2 to 20 GHz	36 dB	34 dB
20 to 40 GHz	34 dB	32 dB
Source Match:		
0.01 to 2 GHz	34 dB	32 dB
2 to 18 GHz (N)	31 dB	29 dB
2 to 20 GHz (K)	34 dB	32 dB
20 to 40 GHz	26 dB	24 dB
Reflection Tracking:		
0.01 to 2 GHz	±0.15 dB	±0.20 dB
2 to 20 GHz	±0.20 dB	±0.25 dB
20 to 40 GHz	±0.25 dB	±0.30 dB
Transmission Tracking: (Internal Thru Mode)		
0.01 to 2 GHz	±0.15 dB	±0.20 dB
2 to 20 GHz	±0.20 dB	±0.25 dB
20 to 40 GHz	±0.25 dB	±0.30 dB
Transmission Tracking: (True Thru Mode)		
0.01 to 2 GHz	±0.10 dB	±0.15 dB
2 to 20 GHz	±0.10 dB	±0.15 dB
20 to 40 GHz	±0.20 dB	±0.25 dB

GENERAL

Serial Input Connector: 9 pin D-sub allowing PC or VNA control. (Serial Cable supplied)

Power Supply Input Connector: +5V, ±15V for the electronic modules, and +5V, +24V for the electromechanical module. The modules are keyed against plugging the wrong supply. The appropriate DC supply is supplied with each AutoCal® module. These universal supplies will operate at either 110V or 220V input voltages.

Power LED: On when the DC supply is plugged in.

Operate LED: On when the module's internal temperature has stabilized at an optimum temperature for accurate calibrations.

Two-Port Dimensions: 65 H x 155 W x 90 D mm (2.5 H x 6 W x 3.5 D in.)

ENVIRONMENTAL

Operating Temperature: 18 to 28°C

Storage Temperature: –20 to 70°C

Relative Humidity: 5% to 95% at 40°C

EMC: Conforms to the EMC Directive, 89/336/EEC per EN61326

EN55011:1991
EN61000-3-2:1995
EN61000-3-3:1995

Immunity-

EN61000-4-2:1995
EN61000-4-3:1995
EN61000-4-4:1995
EN61000-4-5:1995
EN61000-4-6:1995
EN61000-4-11:1995

Ordering Information

AutoCal Modules:

36581NNF	N type, 40 MHz to 18 GHz
36581NNF/2	N type, 10 MHz to 9 GHz
36581KKF	K type, 40 MHz to 20 GHz
36581KKF/2	K type, 10 MHz to 9 GHz
36582KKF	K type, 40 MHz to 40 GHz

Test Port Converter Sets:

36583S	SMA type
36583L	3.5 mm type
36583K	K type

Service:

2300-228	Re-characterization Software (for 360B's and 37000's prior to serial number 992001)

AutoCal may be sent to the nearest service center for re-characterization, or a service engineer may perform the task at the customer's site. To minimizing down-time, the customer can re-characterize his own AutoCal module with a Lightning or Scorpion family VNA and a traditional cal kit.

Sales Centers:
US (800) ANRITSU
Canada (800) ANRITSU
South America 55 (21) 286-9141

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Sales Centers:
Europe 44 (0)1582-433433
Japan 81 (03) 3446-1111
Canada 65-2822400

Microwave Measurements Division • 490 Jarvis Drive • Morgan Hill, CA 95037-2809
http://www.us.anritsu.com • FAX (408) 778-0239