

Keysight Technologies
Layout of Calibration Certificates
And Measurement Reports

Application Note

Overview

When Keysight Technologies performs calibration service, we always provide a calibration certificate along with a report containing all measurement results. We measure the actual performance of your instrument for all warranted specifications, for all installed options. The measurement report is your physical proof of measurements/work performed, and is generally available online for up to 7 years to support audits or for any reason you wish to review previous calibration results.

Changes to Calibration Certificates

Beginning March 2014 you will notice changes on calibration certificates corresponding to:

- A new "Action Taken" field on calibration certificates
- An improved calibration certificates layout
- New pass/fail statements of conformance

Note: Keysight uses a number of systems and program environments for generating calibration certificates and measurement reports. It will take 12 to 18 months before all reports are produced in the new format described here.

New "Action Taken" Field on Calibration Certificates

To provide clarity regarding actions performed during a calibration, a new field, "Action Taken", has been added to calibration certificates. The most common entries for this new field are:

- Cal factors were updated (i.e. for a power sensor)
- The equipment was adjusted
- The equipment firmware was updated (with customer approval)
- Service note recommendations performed

As Received Conditions

One or more measured values of the equipment were observed OUT OF SPECIFICATION at the points tested.

Action Taken

- The equipment was adjusted.

As Completed Conditions

The measured values of the equipment were observed IN SPECIFICATION at the points tested.

Figure 1. Example of new "Action Taken" field

Improved Calibration Certificates Layout

The presentation of information on Calibration Certificates has been rearranged for improved readability and clarity. An example follows.

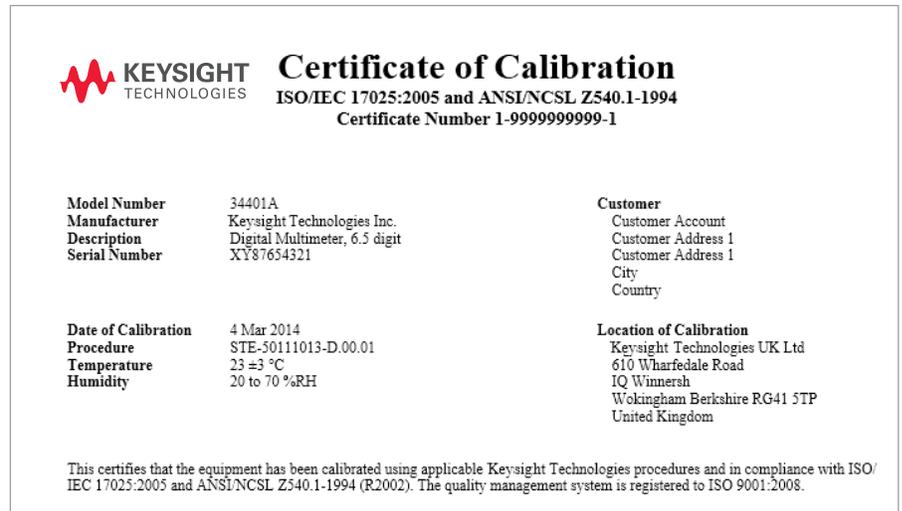


Figure 2. Example of Improved Cal Certificate layout

“Keysight Cal + Uncertainties” Service New Pass/Fail statements of conformance

Keysight Technologies offers several calibration services with measurement uncertainties reported. Measurement Uncertainty is simply the official metrology term that most engineers understand as “accuracy”, but is in conformance with ISO/IEC Guide 98-3:2008¹. The major requirements standard for calibration laboratories, ISO/IEC 17025:2005², only provides ambiguous guidance how to assess Pass or Fail conformance to a specification. Par. 5.10.4.2 simply states “When statements of compliance are made, the uncertainty of measurement shall be taken into account.” ILAC-G8:03/2009³ provides additional guidance. After a thorough review of key international calibration standards and consultations with multiple Accreditation Bodies, Keysight Technologies has adopted the conformance definitions in Figure 2.

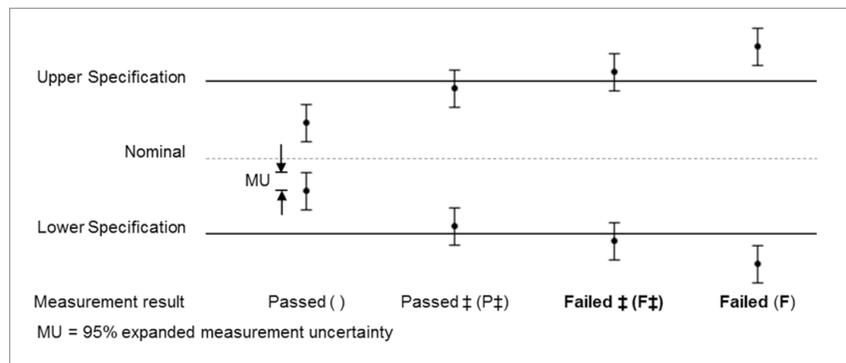


Figure 2. Conformance Reporting for “Keysight Calibration + Uncertainties” Service

1. ISO/IEC Guide 98-3:2008, Guide for Expression of Uncertainty of Measurements
2. ISO/IEC 17025: 2005, General Requirements for the Competence of Testing and Calibration Laboratories
3. ILAC-G8:03/2009, Guidelines on the Reporting of Compliance with Specification [https://www.ilac.org/documents/ILAC_G8_03_2009.pdf]

Measurement results are reported as:

Passed	The measured values of the equipment were observed in specification at the points tested. Additionally, the expanded measurement uncertainty intervals about the measured values were in specification.
Passed † (P†)	The measured values of the equipment were observed in specification at the points tested. However, a portion of the expanded measurement uncertainty intervals about one or more measured values exceeded specification. Consequently, compliance with specification cannot be declared based on the stated coverage probability.
Failed † (F†)	One or more measured values of the equipment were observed out of specification at the points tested. However, a portion of the expanded measurement uncertainty intervals about one or more measured values were in specification. Consequently, non-compliance with specification cannot be declared based on the stated coverage probability.
Failed (F)	One or more measured values of the equipment were observed out of specification at the points tested. Additionally, the expanded measurement uncertainty intervals about one or more measured values were entirely outside the specification.

How to interpret the new conformance statements:

Passed	A clean "Pass".
Passed †	As measured the instrument complies with the specification. However, if you are counting on this specification as part of a production accuracy analysis, you may want to investigate further as your yield may be eroding.
Failed †	As received the instrument was observed out-of-specification. Adjustments were performed. Although not as urgent as the "Failed" condition, you should probably perform an impact analysis to determine if this failure resulted in end product being shipped that could be out-of-specification.
Failed	As received, the instrument was observed out-of-specification by an amount larger than 2 standard deviations of measurement uncertainty. Although the instrument was adjusted, you should perform an immediate impact analysis to determine if this failure resulted in end product being shipped that could be out-of-specification.

Adjustment Limits for "Keysight Cal + Uncertainties"

Note:

For "Keysight cal + Uncertainties" service, the instrument is adjusted whenever the measured result is observed out-of-specification. The instrument is not adjusted for the As Received condition "Passed †". If you need a tighter acceptance limit for triggering adjustments, please order the "Keysight Cal + Uncertainties + Guardbanding" service.

“Keysight Cal + Uncertainties + Guardbanding” Service

The new certificate layout and “Action Taken” field are the same on this service. While there are no changes to conformance reporting to “Keysight Cal + Uncertainties + Guardbanding”, sometimes there are comparison questions regarding “Keysight Cal + Uncertainties”. Please find below the conformance reporting summary for “Keysight Cal + Uncertainties + Guardbanding”.

Acceptance limit

The “Keysight Cal + Uncertainties + Guardbanding” service employs a guardband in the amount of the 95% expanded measurement uncertainty (MU). The resulting acceptance limit applied for Pass or Fail decisions, and for performing adjustments, is the difference of the specification and the guardband.

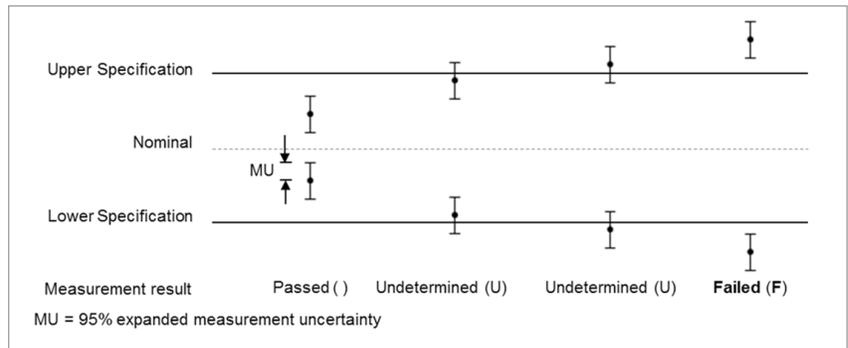


Figure 3. Conformance Reporting for “Keysight Calibration + Uncertainties + Guardbanding” Service

Measurement results are reported as:

Passed ()	The measured values of the equipment were observed in specification at the points tested. Additionally, the expanded measurement uncertainty intervals about the measured values were in specification.
Undetermined (U)	The expanded measurement uncertainty intervals about one or more measured values were in as well as out of specification. Consequently, neither compliance nor non-compliance with specification can be declared based on the stated coverage probability.
Failed (F)	One or more measured values of the equipment were observed out of specification at the points tested. Additionally, the expanded measurement uncertainty intervals about one or more measured values were entirely outside the specification.



myKeysight

www.keysight.com/find/mykeysight

A personalized view into the information most relevant to you.

Three-Year Warranty

www.keysight.com/find/ThreeYearWarranty

Keysight's commitment to superior product quality and lower total cost of ownership. The only test and measurement company with three-year warranty standard on all instruments, worldwide.



Keysight Assurance Plans

www.keysight.com/find/AssurancePlans

Up to five years of protection and no budgetary surprises to ensure your instruments are operating to specification so you can rely on accurate measurements.



www.keysight.com/quality

Keysight Technologies, Inc.
DEKRA Certified ISO 9001:2008
Quality Management System



Keysight Channel Partners

www.keysight.com/find/channelpartners

Get the best of both worlds: Keysight's measurement expertise and product breadth, combined with channel partner convenience.

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

Americas

Canada	(877) 894 4414
Brazil	55 11 3351 7010
Mexico	001 800 254 2440
United States	(800) 829 4444

Asia Pacific

Australia	1 800 629 485
China	800 810 0189
Hong Kong	800 938 693
India	1 800 112 929
Japan	0120 (421) 345
Korea	080 769 0800
Malaysia	1 800 888 848
Singapore	1 800 375 8100
Taiwan	0800 047 866
Other AP Countries	(65) 6375 8100

Europe & Middle East

Austria	0800 001122
Belgium	0800 58580
Finland	0800 523252
France	0805 980333
Germany	0800 6270999
Ireland	1800 832700
Israel	1 809 343051
Italy	800 599100
Luxembourg	+32 800 58580
Netherlands	0800 0233200
Russia	8800 5009286
Spain	0800 000154
Sweden	0200 882255
Switzerland	0800 805353
	Opt. 1 (DE)
	Opt. 2 (FR)
	Opt. 3 (IT)
United Kingdom	0800 0260637

For other unlisted countries:
www.keysight.com/find/contactus
(BP-07-01-14)

