



CERTIFICATE OF ACCREDITATION

ANSI-ASQ National Accreditation Board

500 Montgomery Street, Suite 625, Alexandria, VA 22314, 877-344-3044

This is to certify that

Keysight Technologies, Inc. Service Centers
494 Gallimore Dairy Road.
Greensboro, NC 27409

has been assessed by ANAB and meets the requirements of international standard

ISO/IEC 17025:2005

and national standards

ANSI/NCSL Z540-1-1994 AND
ANSI/NCSL Z540.3-2006

while demonstrating technical competence in the field of

CALIBRATION

Refer to the accompanying Scope of Accreditation for information regarding the types of calibrations to which this accreditation applies.

AC-1498.18
Certificate Number


ANAB Approval

Certificate Valid: 01/05/2017-11/16/2018
Version No. 001 Issued: 01/05/2017



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated January 2009).



ANSI-ASQ National Accreditation Board

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005, ANSI/NCSL Z540-1-1994, AND ANSI/NCSL Z540.3-2006

Keysight Technologies, Inc. Service Centers

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CALIBRATION

Valid to: November 16, 2018

Certificate Number: AC-1498.18

Electromagnetic - DC/Low Frequency

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
DC Voltage - Source	Up to 220 mV 220 mV to 2.2 V (2.2 to 11) V (11 to 22) V (22 to 220) V 220 V to 1.1 kV	4 μ V/V + 2.6 μ V 7.2 μ V/V + 1.7 μ V 6.7 μ V/V + 4.6 μ V 6 μ V/V + 37 μ V 8.5 μ V/V + 53 μ V 9.4 μ V/V + 0.57 mV	Fluke 5700A with Fluke 5725A
DC Voltage - Measure	Up to 100 mV 100 mV to 1 V (1 to 10) V (10 to 100) V 100 V to 1 kV	5.6 μ V/V + 1.5 μ V 5.2 μ V/V + 1.2 μ V 4.7 μ V/V + 2.5 μ V 6.6 μ V/V + 45 μ V 19 μ V/V + 0.16 mV	Keysight 3458A/100 PLC Option 002
DC Voltage Transfer – Measure	0 to 0.1 V 0.1 to 1 V 1 to 10 V 10 to 100 V 100 to 1000 V	0.62 μ V/V + 62 nV 0.37 μ V/V + 124 nV 62 nV/V + 0.62 μ V 0.62 μ V/V + 12.4 μ V 1.9 μ V/V + 63 μ V	3458A
DC Current - Source	Up to 220 μ A 220 μ A to 2.2 mA (2.2 to 22) mA (22 to 100) mA (100 to 220) mA 220 mA to 1 A	46 μ A/A + 10 nA 50 μ A/A + 9 nA 51 μ A/A + 83 nA 59 μ A/A + 84 nA 74 μ A/A – 0.73 μ A 80 μ A/A + 25 μ A	Fluke 5700A
	(1 to 2.2) A (2.2 to 11) A	0.15 mA/A + 46 μ A 0.3 mA/A + 0.4 mA	Fluke 5700A with Fluke 5725A



Electromagnetic - DC/Low Frequency

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
DC Current - Measure	(10 to 100) μ A 100 μ A to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1.1 A	20 μ A/A 20 μ A/A + 0.10 μ A 20 μ A/A + 60 nA 35 μ A/A + 0.6 μ A 0.11 mA/A + 11 μ A	Keysight 3458A
DC Dissipated Power - 300 mA to Full Power	Shunt 15 A 100 m Ω , 25 W	0.14 m Ω / Ω	Guildline 9230-15
	Shunt 100A 10 m Ω , 100 W	0.14 m Ω / Ω	Guildline 9230-100
	Shunt 300A 10 m Ω , 90 W	0.12 m Ω / Ω	Guildline 9230-300
	Shunt 1 000A 100 μ Ω , 100 W	0.36 m Ω / Ω	Guildline 9230-1000
Resistance - Source Fixed Points	0 Ω 1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω 1 k Ω 1.9 k Ω 10 k Ω 19 k Ω 100 k Ω 190 k Ω 1 M Ω 1.9 M Ω	0.25 m Ω 0.27 m Ω 0.31 m Ω 0.37 m Ω 2.6 m Ω 3 m Ω 4.1 m Ω 13 m Ω 36 m Ω 0.13 Ω 0.25 Ω 1.4 Ω 2.7 Ω 20 Ω 42 Ω	Fluke 5700A
Resistance - Source Fixed Points	10 M Ω 19 M Ω 100 M Ω	0.4 k Ω 1.5 k Ω 13 k Ω	Fluke 5700A

Electromagnetic - DC/Low Frequency

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
Resistance – Source	0 to 11 Ω 11 to 110 Ω 110 Ω to 1.1 k Ω 1.1 to 3.3 k Ω 3.3 to 11 k Ω 11 to 110 k Ω 110 k Ω to 1.1 M Ω 1.1 to 3.3 M Ω 3.3 to 11 M Ω 11 to 33 M Ω 33 to 110 M Ω 110 to 330 M Ω 330 to 1100 M Ω	33 $\mu\Omega/\Omega + 8.3$ m Ω 25 $\mu\Omega/\Omega + 12.5$ m Ω 23 $\mu\Omega/\Omega + 17$ m Ω 23 $\mu\Omega/\Omega + 170$ m Ω 23 $\mu\Omega/\Omega + 84$ m Ω 23 $\mu\Omega/\Omega + 0.84$ Ω 27 $\mu\Omega/\Omega + 8$ Ω 50 $\mu\Omega/\Omega + 125$ Ω 0.11 m $\Omega/\Omega + 0.2$ k Ω 0.21 m $\Omega/\Omega + 2$ k Ω 0.41 m $\Omega/\Omega + 2.8$ k Ω 2.5 m $\Omega/\Omega + 83$ k Ω 13 m $\Omega/\Omega + 0.4$ M Ω	Fluke 5520A
Resistance – Measure	0 to 10 Ω 10 to 100 Ω 100 Ω to 1 k Ω 1 to 10 k Ω 10 to 100 k Ω 100 k Ω to 1 M Ω 1 to 10 M Ω 10 to 100 M Ω 100 M Ω to 1 G Ω	22 $\mu\Omega/\Omega + 90$ $\mu\Omega$ 19 $\mu\Omega/\Omega + 0.88$ m Ω 16 $\mu\Omega/\Omega + 0.95$ m Ω 16 $\mu\Omega/\Omega + 9.5$ m Ω 16 $\mu\Omega/\Omega + 95$ m Ω 22 $\mu\Omega/\Omega + 3$ Ω 65 $\mu\Omega/\Omega + 132$ Ω 0.62 m $\Omega/\Omega + 4.5$ k Ω 6.2 m $\Omega/\Omega + 0.35$ M Ω	3458A

Electromagnetic - DC/Low Frequency

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
AC Voltage - Source	Up to 22 mV		Fluke 5700A
	(10 to 20) Hz	0.55 mV/V + 4.5 μ V	
	(20 to 40) Hz	0.25 mV/V + 4.7 μ V	
	40 Hz to 20 kHz	0.17 mV/V + 4.6 μ V	
	(20 to 50) kHz	0.42 mV/V + 4.7 μ V	
	(50 to 100) kHz	0.82 mV/V + 6.9 μ V	
	(100 to 300) kHz	1.1 mV/V + 13 μ V	
	(300 to 500) kHz	1.8 mV/V + 27 μ V	
	500 kHz to 1 MHz	4.1 mV/V + 35 μ V	
	(22 to 220) mV		
	(10 to 20) Hz	0.51 mV/V + 14 μ V	
	(20 to 40) Hz	0.21 mV/V + 8.5 μ V	
	40 Hz to 20 kHz	90 μ V/V + 9.3 μ V	
	(20 to 50) kHz	0.30 mV/V + 10 μ V	
	(50 to 100) kHz	0.76 mV/V + 26 μ V	
	(100 to 300) kHz	0.93 mV/V + 26 mV	
	(300 to 500) kHz	1.6 mV/V + 39 mV	
	500 kHz to 1 MHz	3 mV/V + 88 mV	
	220 mV to 2.2 V		
	(10 to 20) Hz	0.51 mV/V + 83 μ V	
	(20 to 40) Hz	0.16 mV/V + 24 μ V	
	40 Hz to 20 kHz	88 μ V/V + 4.4 μ V	
	(20 to 50) kHz	0.13 mV/V + 14 μ V	
	(50 to 100) kHz	0.24 mV/V + 66 μ V	
(100 to 300) kHz	0.41 mV/V + 0.13 mV		
(300 to 500) kHz	1 mV/V + 0.35 mV		
500 kHz to 1 MHz	2 mV/V + 0.85 mV		
(2.2 to 22) V			
(10 to 20) Hz	0.51 mV/V + 0.83 mV		
(20 to 40) Hz	0.1 mV/V + 0.17 mV		
40 Hz to 20 kHz	87 μ V/V + 51 μ V		
(20 to 50) kHz	0.13 mV/V + 0.16 mV		
(50 to 100) kHz	0.25 mV/V + 0.33 mV		
(100 to 300) kHz	0.50 mV/V + 1.5 mV		
(300 to 500) kHz	1.2 mV/V + 4.2 mV		
500 kHz to 1 MHz	2.5 mV/V + 7.6 mV		
(22 to 100) V			
(10 to 20) Hz	0.51 mV/V + 8.4 mV		
(20 to 40) Hz	0.16 mV/V + 2.4 mV		
40 Hz to 20 kHz	90 μ V/V + 0.74 mV		
(20 to 50) kHz	0.22 mV/V + 3 mV		
(50 to 100) kHz	0.51 mV/V + 8.4 mV		
(100 to 300) kHz	1.3 mV/V + 95 mV		
(300 to 500) kHz	4.5 mV/V + 93 mV		
500 kHz to 1 MHz	1.1 mV/V + 0.18 V		

Electromagnetic - DC/Low Frequency

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
AC Voltage - Source	(100 to 220) V (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz (220 to 250) V (15 to 50) Hz 50 Hz to 1 kHz (1 to 20) kHz (20 to 30) kHz (250 to 750) V (30 to 50) kHz (50 to 100) kHz	0.51 mV/V + 8.4 mV 0.16 mV/V + 2.4 mV 90 μ V/V + 0.74 mV 0.25 mV/V + 3.5 mV 0.52 mV/V + 8.7 mV 1.3 mV/V + 95 mV 4.5 mV/V + 93 mV 1.1 mV/V + 0.18 V 0.39 mV/V + 17 mV 92 μ V/V + 3 mV 92 μ V/V + 2.9 mV 0.51 mV/V + 8.9 mV 0.53 mV/V + 8.9 mV 2 mV/V + 30 mV	Fluke 5700A
AC Voltage Flatness - Source	300 μV to 3.5 V (10 to 30) Hz 30 Hz to 120 kHz 300 μV to 1.1 mV 120 kHz to 2 MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz 1.1 μV to 3 mV 120 kHz to 2 MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz 3 mV to 3.5 V 120 kHz to 2 MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	2.7 mV/V 1.4 mV/V 4.6 mV/V 6.2 mV/V 8 mV/V 24 mV/V 2.2 mV/V 3.7 mV/V 5.5 mV/V 14 mV/V 1.2 mV/V 2.1 mV/V 3.8 mV/V 8.6 mV/V	Fluke 5720A, Fluke 5700A, or Fluke 5700A-03 (referenced to 1 kHz)
AC Voltage Flatness - Measure	Up to 3 V 10 Hz 100 Hz (10, 30) kHz 100 kHz 300 kHz 1 MHz 3 MHz 8 MHz 10 MHz 20 MHz 30 MHz 50 MHz 70 MHz 80 MHz 100 MHz	0.2 mV/V + 6.9 μ V 80 μ V/V + 5.5 μ V 80 μ V/V + 3.2 μ V 0.1 mV/V + 8 μ V 0.1 mV/V + 5.2 μ V 0.1 mV/V + 6.5 μ V 1.3 mV/V + 59 μ V 1.3 mV/V + 0.11 mV 1.3 mV/V + 91 μ V 2.5 mV/V + 0.21 mV 2.5 mV/V + 0.24 mV 6.1 mV/V + 0.34 mV 9 mV/V + 0.24 mV 11 mV/V + 0.79 mV 13 mV/V + 0.94 mV	Agilent 11049A, Agilent 11050A, Agilent 11051A Thermal Voltage Converters

Electromagnetic - DC/Low Frequency

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
AC Voltage - Measure	<p>Up to 10 mV (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 4) MHz (4 to 8) MHz</p> <p>(10 to 100) mV (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz (2 to 4) MHz (4 to 8) MHz (8 to 10) MHz</p> <p>100 mV to 1 V (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz (2 to 4) MHz (4 to 8) MHz (8 to 10) MHz</p> <p>(1 to 10) V (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz (2 to 4) MHz (4 to 8) MHz (8 to 10) MHz</p>	<p>0.3 mV/V + 3.1 μV 0.2 mV/V + 1.2 μV 0.3 mV/V + 1.7 μV 1 mV/V + 1.6 μV 5 mV/V + 1.3 μV 40 mV/V + 2.1 μV 12 mV/V + 6.6 μV 70 mV/V + 7.5 μV 20 mV/V + 8.2 μV</p> <p>70 μV/V + 4.1 μV 70 μV/V + 2.1 μV 0.14 mV/V + 2.3 μV 0.3 V/V + 2.6 μV 0.8 mV/V + 2.3 μV 3 mV/V + 15 μV 10 mV/V + 28 μV 15 mV/V + 20 μV 40 mV/V + 74 μV 40 mV/V + 83 μV 0.15 V/V + 0.11 mV</p> <p>70 μV/V + 41 μV 70 μV/V + 21 μV 0.14 mV/V + 22 μV 0.3 mV/V + 22 μV 0.8 mV/V + 22 μV 3 mV/V + 0.12 mV 10 mV/V + 0.30 mV 15 mV/V + 0.21 mV 40 mV/V + 0.73 mV 40 mV/V + 0.83 mV 0.15 V/V + 1 mV</p> <p>70 μV/V + 0.42 mV 70 μV/V + 0.22 mV 0.14 mV/V + 0.24 mV 0.3 mV/V + 0.25 mV 0.8 mV/V + 0.22 mV 3 mV/V + 1.1 mV 10 mV/V + 1.1 mV 15 mV/V + 1.1 mV 40 mV/V + 7.1 mV 40 mV/V + 8.1 mV 0.15 mV/V + 11 mV</p>	Keysight 3458A

Electromagnetic - DC/Low Frequency

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
AC Voltage - Measure	(10 to 100) V (1 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (100 to 750) V (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.20 mV/V + 4.1 mV 0.20 mV/V + 2.6 mV 0.35 mV/V + 2.4 mV 1.2 mV/V + 2.1 mV 4 mV/V + 11 mV 15 mV/V + 50 mV 0.4 mV/V + 31 mV 0.4 mV/V + 16 mV 0.6 mV/V + 16 mV 1.2 mV/V + 16 mV 3 mV/V + 15 mV	Keysight 3458A
	Up to 1 mV 0.02 Hz to 100 kHz 100 kHz to 1 MHz (1 to 3) MHz (3 to 10) MHz (10 to 20) MHz (1 to 3) mV 0.02 Hz to 100 kHz 100 kHz to 1 MHz (1 to 3) MHz (3 to 10) MHz (10 to 20) MHz (3 to 10) mV 0.02 Hz to 100 kHz 100 kHz to 1 MHz (1 to 3) MHz (3 to 10) MHz (10 to 20) MHz	6 mV/V + 90 nV 16 mV/V + 2 μ V 30 mV/V + 9 μ V 90 mV/V + 7 μ V 0.22 V/V + 20 μ V 6 mV/V + 30 nV 7 mV/V + 5 μ V 33 mV/V + 10 μ V 93 mV/V + 8 μ V 0.24 V/V + 5 μ V 6 mV/V + 10 nV 8 mV/V + 8 μ V 16 mV/V + 20 μ V 26 mV/V + 50 μ V 65 mV/V + 90 μ V	URE3
	Up to 220 μA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz 220 μA to 2.2 mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (2.2 to 22) mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.54 mA/A + 0.64 μ A 0.25 mA/A + 0.64 μ A 80 μ A/A + 0.64 μ A 0.59 mA/A + 0.42 μ A 1.4 mA/A + 0.10 μ A 0.68 mA/A + 51 nA 0.37 mA/A + 47 nA 0.17 mA/A + 52 nA 0.6 mA/A + 0.42 μ A 1.5 mA/A + 0.84 μ A 0.68 mA/A + 0.51 μ A 0.37 mA/A + 0.47 μ A 0.17 mA/A + 0.51 μ A 0.6 mA/A + 4.2 μ A 1.5 mA + 8.5 μ A	Fluke 5700

Electromagnetic - DC/Low Frequency

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
AC Current - Source	(22 to 220) mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz 220 mA to 1 A 20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (1 to 2.2) A 20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (2.2 to 11) A 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.68 mA/A + 4.2 μ A 0.37 mA/A + 3.2 μ A 0.2 mA/A + 3 μ A 0.6 mA/A + 42 μ A 1.5 mA/A + 80 μ A 0.64 mA/A + 35 μ A 0.72 mA/A + 87 μ A 0.84 mA/A + 76 μ A 0.67 mA/A + 30 μ A 0.87 mA/A + 76 μ A 8.4 mA/A + 76 μ A 0.44 mA/A + 0.13 mA 0.88 mA/A + 0.3 mA 3.1 mA/A + 0.63 mA	Fluke 5700A
AC Current - Measure	Up to 100 μA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz 100 μA to 1 mA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 10) mA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (10 to 100) mA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz 100 mA to 1.05 A (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz	4 mA/A + 31 nA 1.5 mA/A + 31 nA 0.6 mA/A + 31 nA 4 mA/A + 0.31 μ A 0.15 mA/A + 0.21 μ A 0.6 mA/A + 0.21 μ A 4 mA/A + 3.1 μ A 1.5 mA/A + 2.1 μ A 0.6 mA/A + 2.1 μ A 4 mA/A + 31 μ A 1.5 mA/A + 21 μ A 0.6 mA/A + 21 μ A 4 mA/A + 0.22 mA 1.6 mA/A + 0.22 mA 0.8 mA/A + 0.22 mA 1 mA/A + 0.22 mA	Keysight 3458A
Resistance - Source DC to 1 MHz, Direct Measurement	0.1 Ω (1, 10) Ω 100 Ω (1, 10, 100) k Ω	10 m Ω / Ω 1 m Ω / Ω 0.3 m Ω / Ω 0.3 m Ω / Ω	Agilent 16074A
Electrical Simulation of Thermocouples	Type B 600 to 800) $^{\circ}$ C (800 to 1 000) $^{\circ}$ C (1 000 to 1 550) $^{\circ}$ C (1 550 to 1 820) $^{\circ}$ C	0.47 $^{\circ}$ C 0.36 $^{\circ}$ C 0.32 $^{\circ}$ C 0.35 $^{\circ}$ C	Fluke 5520A, Fluke 5522A

Electromagnetic - DC/Low Frequency

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment	
Electrical Simulation of Thermocouples	Type C			
	(0 to 150) °C	0.32 °C		
	(150 to 650) °C	0.28 °C		
	(650 to 1 000) °C	0.33 °C		
	(1 000 to 1800) °C	0.53 °C		
	(1 800 to 2316) °C	0.88 °C		
	Type E			
	(-250 to -100) °C	0.53 °C		
	(-100 to -25) °C	0.18 °C		
	(-25 to 350) °C	0.16 °C		
	(350 to 650) °C	0.18 °C		
	(650 1000) °C	0.23 °C		
	Type J			
	(-210 to -100) °C	0.29 °C		
	(-100 to -30) °C	0.18 °C		
	(-30 to 150) °C	0.16 °C		
	(150 to 760) °C	0.19 °C		
	(760 to 1 200) °C	0.25 °C		
	Type K			
	(-200 to -100) °C	0.35 °C		
	(-100 to -25) °C	0.2 °C		
	(-25 to 120) °C	0.18 °C		
	(120 to 1 000) °C	0.28 °C		
	(1 000 to 1 372) °C	0.42 °C		
	Type L			
	(-200 to -100) °C	0.39 °C		
	(-100 to 800) °C	0.28 °C		
	(800 to 900) °C	0.19 °C		
	Type N			
	(-200 to -100) °C	0.42 °C		
	(-100 to -25) °C	0.24 °C		
	(-25 to 120) °C	0.21 °C		
	(120 to 410) °C	0.2 °C		
	(410 to 1 300) °C	0.29 °C		
	Type R			
	(0 to 250) °C	0.6 °C		
(250 to 400) °C	0.37 °C			
(400 to 1 000) °C	0.35 °C			
(1 000 to 1 767) °C	0.42 °C			
Type S				
(0 to 250) °C	0.50 °C			
(250 to 1 000) °C	0.38 °C			
(1 000 to 1 400) °C	0.39 °C			
(1 400 to 1 767) °C	0.49 °C			
Type T				
(-250 to -150) °C	0.66 °C			
(-150 to 0) °C	0.26 °C			
(0 to 120) °C	0.18 °C			
(120 to 400) °C	0.16 °C			
Type U				
(-200 to 0) °C	0.59 °C			
(0 to 600) °C	0.29 °C			

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
Amplitude Modulation - Measure rate: 50 Hz to 10 kHz, depth: 5 % to 99 %	150 kHz to 10 MHz (5 to 10) % (10 to 99) %	0.025AM + 0.03 % 0.025AM + 0.14 %	HP 8902
rate: 20 Hz to 10 kHz, depth: to 99 %	150 kHz to 10 MHz (5 to 10) % (10 to 99) %	0.038AM + 0.03 % 0.038AM + 0.13 %	
rate: 50 Hz to 50 kHz, depth: 5 % to 99 %	10 MHz to 1.3 GHz (5 to 10) % (10 to 99) %	0.012AM + 0.033 % 0.012AM + 0.17 %	
rate: 20 Hz to 100 kHz, depth: to 99 %	10 MHz to 1.3 GHz (5 to 10) % (10 to 99) %	0.038AM + 0.03 % 0.037AM + 0.16 %	
rate: 50 Hz to 10 kHz, depth: 5 % to 99 %	(1.3 to 26.5) GHz (5 to 10) % (10 to 99) %	0.019AM + 0.029 % 0.019AM + 0.14 %	with HP 11793A
rate: 20 Hz to 10 kHz, depth: to 99 %	10 MHz to 26.5 GHz (5 to 10) % (10 to 99) %	0.038AM + 0.03 % 0.038AM + 0.11 %	
Frequency Modulation - Measure rate: 20 Hz to 10 kHz, \leq 40 kHz	250 kHz to 10 MHz (0 to 4) kHz _{Peak} FM (4 to 40) kHz _{Peak} FM	0.024FM + 2.6 Hz _{Peak} 0.024FM + 10 Hz _{Peak}	
rate: 50 Hz to 100 kHz, \leq 400 kHz	10 MHz to 1.3 GHz (0 to 4) kHz _{Peak} FM (4 to 40) kHz _{Peak} FM (40 to 400) kHz _{Peak} FM	0.012FM + 2.6 Hz _{Peak} 0.012FM + 12 Hz _{Peak} 0.012FM + 110 Hz _{Peak}	
rate: 50 Hz to 100 kHz, \leq 400 kHz	(1.3 to 6.2) GHz (0 to 4) kHz _{Peak} FM (4 to 40) kHz _{Peak} FM (40 to 400) kHz _{Peak} FM	0.0099FM + 10 Hz _{Peak} 0.012FM + 12 Hz _{Peak} 0.012FM + 100 Hz _{Peak}	HP 8902
rate: 50 Hz to 100 kHz, \leq 400 kHz	(6.2 to 12.4) GHz (0 to 4) kHz _{Peak} FM (4 to 40) kHz _{Peak} FM (40 to 400) kHz _{Peak} FM	0.0075FM + 24 Hz _{Peak} 0.012FM + 12 Hz _{Peak} 0.012FM + 85 Hz _{Peak}	
rate: 50 Hz to 100 kHz, \leq 400 kHz	(12.4 to 18.6) GHz (0 to 4) kHz _{Peak} FM (4 to 40) kHz _{Peak} FM (40 to 400) kHz _{Peak} FM	0.0049FM + 52 Hz _{Peak} 0.011FM + 36 Hz _{Peak} 0.012FM + 110 Hz _{Peak}	

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
Frequency Modulation - Measure rate: 50 Hz to 100 kHz, \leq 400 kHz rate: 20 Hz to 200 kHz, \leq 400 kHz rate: 20 Hz to 200 kHz, \leq 400 kHz rate: 20 Hz to 200 kHz, \leq 400 kHz	(18.6 to 26.5) GHz (0 to 4) kHz _{Peak} FM (4 to 40) kHz _{Peak} FM (40 to 400) kHz _{Peak} FM 10 MHz to 1.3 GHz (0 to 4) kHz _{Peak} FM (4 to 40) kHz _{Peak} FM (40 to 400) kHz _{Peak} FM (1.3 to 6.2) GHz (0 to 4) kHz _{Peak} FM (4 to 40) kHz _{Peak} FM (40 to 400) kHz _{Peak} FM (6.2 to 12.4) GHz (0 to 4) kHz _{Peak} FM (4 to 40) kHz _{Peak} FM (40 to 400) kHz _{Peak} FM	0.0035FM + 80 Hz _{Peak} 0.011FM + 46 Hz _{Peak} 0.012FM + 100 Hz _{Peak} 0.059FM + 2.8 Hz _{Peak} 0.059FM + 14 Hz _{Peak} 0.059FM + 120 Hz _{Peak} 0.058FM + 5.2 Hz _{Peak} 0.059FM + 14 Hz _{Peak} 0.059FM + 120 Hz _{Peak} 0.055FM + 15 Hz _{Peak} 0.059FM + 14 Hz _{Peak} 0.059FM + 120 Hz _{Peak}	HP 8902
Frequency Modulation - Measure rate: 20 Hz to 200 kHz, \leq 400 kHz rate: 20 Hz to 200 kHz, \leq 400 kHz	(12.4 to 18.6) GHz (0 to 4) kHz _{Peak} FM (4 to 40) kHz _{Peak} FM (40 to 400) kHz _{Peak} FM (18.6 to 26.5) GHz (0 to 4) kHz _{Peak} FM (4 to 40) kHz _{Peak} FM (40 to 400) kHz _{Peak} FM	0.05FM + 37 Hz _{Peak} 0.059FM + 15 Hz _{Peak} 0.059FM + 120 Hz _{Peak} 0.045FM + 60 Hz _{Peak} 0.059FM + 16 Hz _{Peak} 0.059FM + 120 Hz _{Peak}	HP 8902 with HP 11793A

DIGITAL MODULATION RF QUALITY

PARAMETER/ EQUIPMENT	MODULATION TYPES	FREQUENCY RANGE
Digital Modulation RF Quality Measure – Carrier 2 MHz to 44 GHz	TETRA, PDC, NADC, PHS, EDGE, CDMA 200A/C, WCDMA, 3GPP, QPSK, BPSK, PI/4 DQPSK, 16QAM, 256QAM, DECT, PHP, GSM, 2FSK, 4FSK, GMSK, MSK, DQPSK, 8PSK, 32QAM FSK	2 MHz to 2.65 GHz using the VSA directly (2.65 to 44) GHz. The digitally modulated RF signal needs to be down-converted with an external Mixer and a Local Oscillator L.O. center frequency = (RF-150 MHz)

Electromagnetic - RF/Microwave

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (±)]	Reference Standard or Equipment
Error Vector Magnitude (EVM)	Mod Frequency Span: f ≤ 100kHz 100kHz ≤ f ≤ 1MHz f > 1MHz	0.43 % 0.48 % 0.82 %	HP 89441A Vector Signal Analyzer
Phase Error	Mod Frequency Span: f ≤ 100kHz 100kHz ≤ f ≤ 1MHz f > 1MHz	0.17 ° rms 0.34 ° rms 0.57 ° rms	HP 89441A Vector Signal Analyzer
Frequency Error	Mod Frequency 1 GHz 2 GHz 3 GHz 4 GHz 5 GHz 6 GHz	0.063 % 0.068 % 0.079 % 0.099 % 0.33 % 0.39 %	
Modulation Accuracy (Rho)	Mod Frequency Span: f ≤ 100kHz 0.9999 ≤ ρ ≤ 1 0.9975 ≤ ρ < 0.9999 0.9936 ≤ ρ < 0.9975 0.99 ≤ ρ < 0.9936 0.978 ≤ ρ < 0.99 0.96 ≤ ρ < 0.978	8.6 E-5 ρ 0.00043 ρ 0.00068 ρ 0.00084 ρ 0.0012 ρ 0.0016 ρ	
	Mod Frequency Span: 100 kHz ≤ f ≤ 1 MHz 0.9999 ≤ ρ ≤ 1 0.9975 ≤ ρ < 0.9999 0.9936 ≤ ρ < 0.9975 0.99 ≤ ρ < 0.9936 0.978 ≤ ρ < 0.99 0.96 ≤ ρ < 0.978	9.6 E-5 ρ 0.00048 ρ 0.00076 ρ 0.00094 ρ 0.0014 ρ 0.0018 ρ	
	Mod Frequency Span: f > 1MHz 0.9999 ≤ ρ ≤ 1 0.9975 ≤ ρ < 0.9999 0.9936 ≤ ρ < 0.9975 0.99 ≤ ρ < 0.9936 0.978 ≤ ρ < 0.99 0.96 ≤ ρ < 0.978	1.6 E-4 ρ 0.00082 ρ 0.0013 ρ 0.0016 ρ 0.0024 ρ 0.003 ρ	

Electromagnetic - RF/Microwave

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
Tuned RF Power - Absolute - Measure 2.5 MHz to 26.5 GHz	(-22 to +10) dBm (-42 to -22) dBm (-50 to -42) dBm (-60 to -50) dBm (-72 to -60) dBm (-80 to -72) dBm (-92 to -80) dBm (-102 to -92) dBm (-110 to -102) dBm (-120 to -110) dBm (-127 to -120) dBm	0.17 dB 0.18 dB 0.2 dB 0.21 dB 0.22 dB 0.23 dB 0.24 dB 0.27 dB 0.28 dB 0.31 dB 0.34 dB	HP 8902A with HP 11722A or with HP 11792A and HP 11793A
Tuned RF Power - Relative – Measure 2.5 MHz to 26.5 GHz	(+2 to +10) dBm (-12 to +2) dBm (-22 to -12) dBm (-31 to -22) dBm (-40 to -31) dBm (-50 to -40) dBm (-61 to -50) dBm (-71 to -61) dBm (-80 to -71) dBm (-90 to -80) dBm (-100 to -90) dBm (-110 to -100) dBm (-120 to -110) dBm (-127 to -120) dBm	0.08 dB 0.07 dB 0.08 dB 0.09 dB 0.1 dB 0.12 dB 0.15 dB 0.16 dB 0.17 dB 0.19 dB 0.22 dB 0.23 dB 0.27 dB 0.3 dB	HP 8902A with HP 11722A or with HP 11792A and HP 11793A
RF Absolute Power - Source 50 MHz	-1 dB to -11 dB -10 dB to -30 dB -40 dB to -50 dB -60 dB -70 dB to -90 dB -100 dB -110 dB	0.025 dB 0.025 dB 0.027 dB 0.028 dB 0.033 dB 0.04 dB 0.048 dB	Signal Source and Step Attenuators PSG, ESG, 8496G/H and 8494G/H
RF Absolute Power - Source	0.02 V \leq V < 7 V f < 10 MHz 10 MHz \leq f \leq 50 MHz 50 MHz \leq f \leq 80 MHz V \leq 10mV 20 Hz \leq f \leq 20 kHz 20 kHz < f \leq 50 kHz 50 kHz < f \leq 100 kHz 100 kHz < f \leq 300 kHz 10 mV < V \leq 100 mV 20 Hz \leq f \leq 40 Hz 40 Hz \leq f \leq 1 kHz 1 kHz < f \leq 20 kHz 20 kHz < f \leq 50 kHz 50 kHz < f \leq 100 kHz 100 kHz < f \leq 300 kHz	0.082 dB 0.16 dB 0.4 dB 0.017 mV 0.021 mV 0.050 mV 0.38 mV 0.029 mV 0.028 mV 0.032 mV 0.045 mV 0.08 mV 0.30 mV	Function Generator and DVM Agilent 33250A, Agilent 33120A, Agilent 3458A

Electromagnetic - RF/Microwave

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (±)]	Reference Standard or Equipment
RF Absolute Power - Source	$100 \text{ mV} < V \leq 1 \text{ V}$ $20 \text{ Hz} \leq f \leq 1 \text{ kHz}$ $1 \text{ kHz} < f \leq 20 \text{ kHz}$ $20 \text{ kHz} < f \leq 50 \text{ kHz}$ $50 \text{ kHz} < f \leq 100 \text{ kHz}$ $100 \text{ kHz} < f \leq 300 \text{ kHz}$ $1 \text{ V} < V \leq 3.5 \text{ V}$ $20 \text{ Hz} \leq f \leq 40 \text{ Hz}$ $40 \text{ Hz} \leq f \leq 1 \text{ kHz}$ $1 \text{ kHz} < f \leq 20 \text{ kHz}$ $20 \text{ kHz} < f \leq 50 \text{ kHz}$ $50 \text{ kHz} < f \leq 100 \text{ kHz}$ $100 \text{ kHz} < f \leq 300 \text{ kHz}$	0.7 mV 0.72 mV 0.79 mV 1.3 mV 3.7 mV 2.2 mV 2.1 mV 2.2 mV 2.5 mV 4.0 mV 13 mV	Function Generator and DVM Agilent 33250A, Agilent 33120A, Agilent 3458A
RF Absolute Power - Source	$7 \text{ dBm} \geq P \geq 0 \text{ dBm}$ $0.3 \text{ MHz} \leq f \leq 1.1 \text{ GHz}$ $1.1 \text{ GHz} \leq f \leq 2.985 \text{ GHz}$ $2.985 \text{ GHz} < f \leq 4 \text{ GHz}$ $4 \text{ GHz} < f \leq 6 \text{ GHz}$ $0 \text{ dBm} > P \geq -25 \text{ dBm}$ $0.3 \text{ MHz} \leq f \leq 1.1 \text{ GHz}$ $1.1 \text{ GHz} \leq f \leq 2.985 \text{ GHz}$ $2.985 \text{ GHz} < f \leq 4 \text{ GHz}$ $4 \text{ GHz} < f \leq 6 \text{ GHz}$ $-25 \text{ dBm} > P \geq -70 \text{ dBm}$ $0.3 \text{ MHz} \leq f \leq 1.1 \text{ GHz}$ $1.1 \text{ GHz} \leq f \leq 2.985 \text{ GHz}$ $2.985 \text{ GHz} < f \leq 4 \text{ GHz}$ $4 \text{ GHz} < f \leq 6 \text{ GHz}$ $-70 \text{ dBm} > P \geq -95 \text{ dBm}$ $0.3 \text{ MHz} \leq f \leq 1.1 \text{ GHz}$ $1.1 \text{ GHz} \leq f \leq 2.985 \text{ GHz}$ $2.985 \text{ GHz} < f \leq 4 \text{ GHz}$ $4 \text{ GHz} < f \leq 6 \text{ GHz}$	0.49 dB 0.58 dB 0.69 dB 0.79 dB 0.49 dB 0.59 dB 0.69 dB 0.80 dB 0.50 dB 0.59 dB 0.69 dB 0.80 dB 0.50 dB 0.60 dB 0.7 dB 0.8 dB	Signal Source PSG, ESG
RF Absolute Power - Source	$-95 \text{ dBm} > P \geq -125 \text{ dBm}$ $0.3 \text{ MHz} \leq f \leq 1.1 \text{ GHz}$ $1.1 \text{ GHz} \leq f \leq 2.985 \text{ GHz}$ $2.985 \text{ GHz} < f \leq 4 \text{ GHz}$ $4 \text{ GHz} < f \leq 6 \text{ GHz}$	0.51 dB 0.6 dB 0.7 dB 1.5 dB	Signal Source PSG, ESG

Electromagnetic - RF/Microwave

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
Phase Noise for Signal Sources ($L_{REF} - L_{DUT}$) \geq 10dB Offset Frequency \leq 100 kHz \leq 100 kHz \leq 1 MHz \leq 10 MHz < 100 MHz 10dB > ($L_{REF} - L_{DUT}$) \geq 5dB Offset Frequency \leq 100 kHz \leq 100 kHz \leq 1 MHz \leq 10 MHz < 100 MHz 5dB > ($L_{REF} - L_{DUT}$) \geq 3dB Offset Frequency \leq 100 kHz \leq 100 kHz \leq 1 MHz \leq 10 MHz < 100 MHz 3dB > ($L_{REF} - L_{DUT}$) \geq 0dB Offset Frequency \leq 100 kHz \leq 100 kHz \leq 1 MHz \leq 10 MHz < 100 MHz	\leq 100 MHz 100 MHz < f \leq 26.5 GHz 50 kHz < f \leq 26.5 GHz 50 kHz < f \leq 26.5 GHz 50 kHz < f \leq 26.5 GHz \leq 100 MHz 100 MHz < f \leq 26.5 MHz 50 kHz < f \leq 26.5 GHz 50 kHz < f \leq 26.5 GHz 50 kHz < f \leq 26.5 GHz \leq 100 MHz 100 MHz < f \leq 26.5G Hz 50 kHz < f \leq 26.5 GHz 50 kHz < f \leq 26.5 GHz 50 kHz < f \leq 26.5 GHz \leq 100 MHz 100 MHz < f \leq 26.5 GHz 50 kHz < f \leq 26.5 GHz 50 kHz < f \leq 26.5 GHz 50 kHz < f \leq 26.5 GHz	\pm 2.3 dB \pm 2.3 dB \pm 2.3 dB \pm 4.6 dB \pm 4.6 dB \pm 2.8 dB \pm 2.9 dB \pm 2.9 dB \pm 5.2 dB \pm 5.3 dB \pm 3.2 dB \pm 3.3 dB \pm 3.3 dB \pm 5.4 dB \pm 5.5 dB \pm 4.3 dB \pm 4.3 dB \pm 4.3 dB \pm 6.1 dB \pm 6.2 dB	E5500 System
Phase Noise for Signal Sources 3 dB > ($L_{REF} - L_{DUT}$) \geq 0 dB Offset Frequency \leq 100 kHz \leq 100 kHz \leq 100 kHz \leq 100 kHz \leq 100 kHz \leq 100 kHz \leq 100 kHz \leq 100 kHz \leq 1 MHz \leq 10 MHz < 100 MHz	\leq 100 MHz 100 MHz < f \leq 255 MHz 255 MHz < f \leq 600 MHz 600 MHz < f \leq 1.8 GHz 1.8 GHz < f \leq 3.2 GHz 3.2 GHz < f \leq 10 GHz 10 GHz < f \leq 20 GHz 20 GHz < f \leq 26.5 GHz 50 kHz < f \leq 26.5 GHz 50 kHz < f \leq 26.5 GHz 50 kHz < f \leq 26.5 GHz	\pm 4.3 dB \pm 4.6 dB \pm 4.6 dB \pm 4.5 dB \pm 4.5 dB \pm 4.8 dB \pm 4.8 dB \pm 4.5 dB \pm 4.7 dB \pm 6.2 dB \pm 6.2 dB	E5500 System

Electromagnetic - RF/Microwave

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
Phase Noise for Signal Analyzers Carrier 1 GHz Offsets: 100 kHz 1 MHz 9.9 and 10 MHz	Phase Noise (PN) Measurement dBc/Hz -102 \geq PN \leq -131 -131 $<$ PN \leq -132 -132 $<$ PN \leq -136 -136 $<$ PN \leq -139 -139 $<$ PN \leq -142 -142 $<$ PN \leq -145 -145 $<$ PN \leq -146 -146 $<$ PN \leq -149 -120 \geq PN \leq -139 -139 $<$ PN \leq -142 -142 $<$ PN \leq -145 -143 $<$ PN \leq -148 -148 $<$ PN \leq -150 -150 $<$ PN \leq -152 -152 $<$ PN \leq -155 -155 $<$ PN \leq -158 -131 \geq PN \leq -136 -136 $<$ PN \leq -156 -156 $<$ PN \leq -158 -158 $<$ PN \leq -159 -159 $<$ PN \leq -162 -162 $<$ PN \leq -165	0.55 dB 0.56 dB 0.58 dB 0.64 dB 0.81 dB 1.3 dB 1.5 dB 2.1 dB 0.55 dB 0.56 dB 0.58 dB 0.64 dB 0.74 dB 0.93 dB 1.5 dB 2.1 dB 0.69 dB 0.79 dB 0.91 dB 1.0 dB 1.5 dB 2.1 dB	Wenzel 500-13438C
Attenuation - Source Coaxial, 1 dB Steps (0 to 11) dB	0 dB 50 MHz to 2 GHz (2 to 4) GHz 1 dB 50 MHz to 2 GHz (2 to 4) GHz 2 dB 50 MHz to 2 GHz (2 to 4) GHz 3 dB 50 MHz to 2 GHz (2 to 4) GHz 4 dB 50 MHz to 2 GHz (2 to 4) GHz 5 dB 50 MHz to 2 GHz (2 to 4) GHz 6 dB 50 MHz to 2 GHz (2 to 4) GHz 7 dB 50 MHz to 2 GHz (2 to 4) GHz	0.03 dB 0.03 dB 0.03 dB 0.03 dB 0.03 dB 0.03 dB 0.03 dB 0.03 dB 0.03 dB 0.03 dB 0.03 dB 0.03 dB	HP 8496G w/ Type-N(f)

Electromagnetic - RF/Microwave

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
Attenuation - Source Coaxial, 1 dB Steps (0 to 11) dB	8 dB 50 MHz to 2 GHz (2 to 4) GHz	0.03 dB 0.03 dB	HP 8496G With Type-N(f)
	9 dB 50 MHz to 2 GHz (2 to 4) GHz	0.03 dB 0.03 dB	
	10 dB 50 MHz to 2 GHz (2 to 4) GHz	0.03 dB 0.03 dB	
	11 dB 50 MHz to 2 GHz (2 to 4) GHz	0.03 dB 0.03 dB	
	Attenuation – Source Coaxial, 10 dB Steps	0 dB 50 MHz to 2 GHz (2 to 4) GHz	
10 dB 50 MHz to 2 GHz (2 to 4) GHz		0.03 dB 0.03 dB	
20 dB 50 MHz to 2 GHz (2 to 4) GHz		0.03 dB 0.03 dB	
30 dB 50 MHz to 2 GHz (2 to 4) GHz		0.04 dB 0.04 dB	
40 dB 50 MHz to 2 GHz (2 to 4) GHz		0.06 dB 0.05 dB	
50 dB 50 MHz to 2 GHz (2 to 4) GHz		0.06 dB 0.06 dB	
60 dB 50 MHz to 2 GHz (2 to 4) GHz		0.07 dB 0.06 dB	
70 dB 50 MHz to 2 GHz (2 to 4) GHz		0.07 dB 0.06 dB	
80 dB 50 MHz to 2 GHz (2 to 4) GHz		0.09 dB 0.07 dB	
90 dB 50 MHz to 2 GHz (2 to 4) GHz		0.09 dB 0.08 dB	
100 dB 50 MHz to 2 GHz (2 to 4) GHz		0.1 dB 0.08 dB	
110 dB 50 MHz to 2 GHz (2 to 4) GHz		0.11 dB 0.08 dB	

Electromagnetic - RF/Microwave

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
Attenuation - Source Coaxial, Fixed	3 dB DC to 2 GHz, SWR < 1.25:1 (2 to 4) GHz, SWR < 1.2:1 (4 to 18) GHz, SWR < 1.2:1	0.03 dB 0.03 dB 0.06 dB	HP 8491A/B With Type-N
	6 dB DC to 2 GHz, SWR < 1.25:1 (2 to 4) GHz, SWR < 1.2:1 (4 to 18) GHz, SWR < 1.2:1	0.03 dB 0.03 dB 0.06 dB	
	10 dB DC to 2 GHz, SWR < 1.25:1 (2 to 4) GHz, SWR < 1.2:1 (4 to 18) GHz, SWR < 1.2:1	0.03 dB 0.03 dB 0.06 dB	
	20 dB DC to 2 GHz, SWR < 1.25:1 (2 to 4) GHz, SWR < 1.2:1 (4 to 18) GHz, SWR < 1.2:1	0.03 dB 0.03 dB 0.06 dB	

PARAMETER	RF Absolute Power Measure										
REFERENCE STANDARD OR EQUIPMENT	8482A, 8485A, 8487A, V8486A, N8481B, N8482B, N9030A, E444xA, E9300A, E9304A, N8485A										
	Frequency Ranges (uncertainties in dB)										
Frequency Range	9 KHz $\leq f < 100$ KHz	100 KHz $\leq f < 10$ MHz	10 MHz $\leq f < 30$ MHz	30 MHz $\leq f < 500$ MHz	500 MHz $\leq f < 1.2$ GHz	1.2 GHz $\leq f < 2$ GHz	2 GHz $\leq f < 6$ GHz	6 GHz $\leq f < 8$ GHz	8 GHz $\leq f < 12.4$ GHz	12.4 GHz $\leq f < 14$ GHz	14 GHz $\leq f < 18$ GHz
-140 dBm $\leq P < -130$ dBm	0.15	0.15	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
-130 dBm $\leq P < -110$ dBm	0.13	0.13	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
-110 dBm $\leq P < -90$ dBm	0.12	0.12	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07
-90 dBm $\leq P < -30$ dBm	0.12	0.12	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06
-30 dBm $\leq P < -20$ dBm	0.11	0.11	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05
-20 dBm $\leq P < -10$ dBm	0.11	0.09	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05
-10 dBm $\leq P < 0$ dBm	0.11	0.08	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
-1 dBm $\leq P < 2$ dBm	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05
2 dBm $\leq P < 10$ dBm	0.1	0.08	0.06	0.06	0.06	0.09	0.09	0.09	0.09	0.09	0.1
10 dBm $\leq P < 15$ dBm	0.1	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15 dBm $\leq P < 20$ dBm	0.1	0.1	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20 dBm $\leq P < 30$ dBm	0.16	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.11	0.12	0.12
30 dBm $\leq P < 35$ dBm		0.08	0.08	0.08	0.08	0.1	0.1	0.1	0.11	0.12	0.12
35 dBm $\leq P < 44$ dBm		0.09	0.08	0.08	0.08	0.09	0.09	0.1	0.1	0.1	0.11

PARAMETER	RF Absolute Power Measure										
REFERENCE STANDARD OR EQUIPMENT	8482A, 8485A, 8487A, V8486A, N8481B, N8482B, N9030A, E444xA, E9300A, E9304A, N8485A										
	Frequencies / Frequency Ranges (uncertainties in dB)										
Frequency Range	18 GHz $\leq f \leq 26.5$ GHz	26.5 GHz $\leq f \leq 33$ GHz	33 GHz $\leq f < 40$ GHz	40 GHz $\leq f < 45$ GHz	45 GHz $\leq f \leq 50$ GHz	f = 51 GHz	52 GHz $\leq f \leq 54$ GHz	f = 55 GHz	56 GHz $\leq f \leq 59$ GHz	f = 60 GHz	f = 61 GHz
-140 dBm $\leq P < -130$ dBm	0.1	0.1	0.1	0.12	0.12						
-130 dBm $\leq P < -110$ dBm	0.1	0.09	0.09	0.09	0.09						
-110 dBm $\leq P < -90$ dBm	0.08	0.08	0.08	0.08	0.08						
-90 dBm $\leq P < -30$ dBm	0.07	0.06	0.06	0.06	0.06						
-30 dBm $\leq P < -20$ dBm	0.07	0.05	0.05	0.06	0.06	0.34	0.33	0.29	0.34	0.3	0.34
-20 dBm $\leq P < -10$ dBm	0.07	0.05	0.05	0.06	0.06	0.34	0.33	0.29	0.34	0.3	0.34
-10 dBm $\leq P < 0$ dBm	0.07	0.06	0.06	0.06	0.06	0.34	0.33	0.29	0.34	0.3	0.34
-1 dBm $\leq P < 2$ dBm	0.07	0.05	0.05	0.06	0.06	0.34	0.33	0.29	0.34	0.3	0.34
2 dBm $\leq P < 10$ dBm	0.13	0.15	0.15	0.21	0.23	0.34	0.33	0.29	0.34	0.3	0.34
10 dBm $\leq P < 15$ dBm	0.07	0.06	0.06	0.06	0.06	0.34	0.34	0.3	0.34	0.3	0.35
15 dBm $\leq P < 20$ dBm	0.08	0.07	0.07	0.07	0.07	0.34	0.34	0.3	0.34	0.3	0.35
20 dBm $\leq P < 30$ dBm	0.172										



PARAMETER	RF Absolute Power Measure				
REFERENCE STANDARD OR EQUIPMENT	8482A, 8485A, 8487A, V8486A, N8481B, N8482B, N9030A, E444xA, E9300A, E9304A, N8485A				
Frequency Range	Frequencies / Frequency Ranges (uncertainties in dB)				
	f = 62 GHz	63 GHz ≤ f ≤ 64 GHz	f = 65 GHz	f = 66 GHz	f = 67 GHz
-30 dBm ≤ P < -20 dBm	0.34	0.33	0.29	0.35	0.36
-20 dBm ≤ P < -10 dBm	0.34	0.33	0.29	0.35	0.36
-10 dBm ≤ P < 0 dBm	0.34	0.33	0.29	0.35	0.36
-1 dBm ≤ P < 2 dBm	0.34	0.33	0.29	0.35	0.36
2 dBm ≤ P < 10 dBm	0.34	0.33	0.29	0.35	0.36
10 dBm ≤ P < 15 dBm	0.34	0.34	0.2	0.36	0.36
15 dBm ≤ P < 20 dBm	0.34	0.34	0.2	0.36	0.36

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (±)]	Reference Standard or Equipment
Frequency - Source	5 MHz, 10 MHz	50 pHz/Hz	Datum 8040
Frequency - Measure	1 Hz to 40 GHz	50 pHz/Hz	HP 53132A, HP 5352B

Notes:

1. Calibration and Measurement Capabilities (CMC) (Expanded Uncertainties) are based on approximately a 95% confidence interval, using a coverage of k=2.
2. This scope is formatted as part of a single document including the Certificate of Accreditation No. AC-1498.18.



 Vice President