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POWER DENSITY SUPPLEMENTAL EVALUATION REPORT

Applicant Name:
Samsung Electronics Co., Ltd.
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Gyeonggi-do, 16677, Korea

Date of Testing:
03/12/2018 – 04/02/2018
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Document Serial No.:
1M1712270335-05-R1.A3L

FCC ID:	**A3LSFG-D0100**
APPLICANT:	**SAMSUNG ELECTRONICS CO., LTD.**

DUT Type:	Indoor Customer Premise Equipment (CPE)
Application Type:	Certification
FCC Rule Part(s):	CFR §2.1091
Model:	SFG-D0100
Test Device Serial No.:	*Pre-Production Sample* [S/N: 0054]

Note: This revised Test Report (S/N: 1M1712270335-05-R1.A3L) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them. Test results reported herein relate only to the item(s) tested.

Randy Ortanez
President

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1 DEVICE UNDER TEST

1.1 Device Overview

This device is categorized as a desktop transmitter under 2.1091(d) and an MPE report has been filed for this device. Per FCC Guidance, distances under 20 cm were additionally tested for power density to determine a minimum distance for compliance per 2.1091(d)(4) to supplement the MPE evaluation. **It was determined that separation of at least 14 cm is needed to ensure RF Exposure compliance.**

Band & Mode	Operating Modes	Tx Frequency
5G mmWave	Data	27500 – 28350 MHz
Bluetooth LE	Data	2402 – 2480 MHz

1.2 DUT Antenna Arrays

This device uses directional antennas to achieve high-bandwidth communication. It has two cross-polarized antenna arrays (denoted Antenna A and Antenna B) where each array consists of 32 radiating elements. The 32 elements cannot be controlled individually but are rather controlled by a set of pre-programmed manufacturer's Beam IDs. Each antenna array can be configured to a beam ID based on the best signal given the environmental conditions.

The front side of the DUT was evaluated since the maximum energy is directed from this side.

A diagram showing the location of the device antennas can be found in Appendix D.

1.3 Simultaneous Transmission Capabilities

This device contains two antenna arrays operating simultaneously, and therefore, additional analysis was performed to evaluate the cases where the exposure from beams from each antenna array may overlap. Several beam configurations were identified based on distances between the beam centers and the estimated MPE for each configuration. The two antenna arrays do not transmit coherently.

This device also supports Bluetooth LE, which can transmit simultaneously with the two mmWave antenna arrays. Due to the maximum allowed output power of the Bluetooth LE transmitter, no additional evaluation was required to confirm that simultaneous transmission cases with mmWave would remain compliant to the RF Exposure Limits, per FCC Guidance.

1.4 Guidance Applied

- November 2017 TCBC Workshop Notes
- SPEAG Application Note – 5G Compliance Testing with DASY6 (5G Module V1.0)
- IEC Draft TR 63170
- FCC KDB 865664 D02 v01r04
- FCC KDB 447498 D01 v02r01

2 RF EXPOSURE LIMITS FOR POWER DENSITY

2.1 Uncontrolled Environment

UNCONTROLLED ENVIRONMENTS are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

2.2 Controlled Environment

CONTROLLED ENVIRONMENTS are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

2.3 RF Exposure Limits for Frequencies Above 6 GHz

Per §1.1310, (d)(3), the MPE limits are applied for frequencies above 6 GHz. Power Density is expressed in units of W/m^2 or mW/cm^2.

Power density was spatially averaged over a circular area of 1 cm^2 per interim FCC Guidance for near-field power density evaluations.

Table 2-1
Human Exposure Limits Specified in FCC 47 CFR §1.1310

Human Exposure to Radiofrequency (RF) Radiation Limits		
Frequency Range [MHz]	**Power Density [mW/cm^2]**	**Average Time [Minutes]**
(A) Limits For Occupational / Controlled Environments (f = frequency)		
1,500 – 100,000	5.0	6
(B) Limits For General Population / Uncontrolled Environments (f = frequency)		
1,500 – 100,000	1.0	30

Note: 1.0 mW/cm^2 is 10 W/m^2

3 MEASUREMENT SYSTEM

3.1 Measurement Setup

Power Density measurements for mmWave operations were performed using the cDASY6 5G module. The DASY6 is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland and consists of a high precision robotics system (Staubli), robot controller, desktop computer, near-field probe, probe alignment sensor, and the 5G phantom. The robot is a six-axis industrial robot, performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF).

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and a remote control used to drive the robot motors. The PC consists of the cDASY6 5G Measurement Software, A/D interface card, monitor, mouse, and keyboard. The Staubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit that performs the signal amplification, signal multiplexing, A/D conversion, offset measurements, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal from the DAE and transfers data to the PC card.

The DAE consists of a highly sensitive electrometer-grade auto-zeroing preamplifier, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

3.2 SPEAG EUmmWV2 Probe / E-Field 5G Probe

The EUmmWV2 probe consists of two dipoles optimally arranged to obtain pseudo-vector information.

Frequency Range	750 MHz – 110 GHz
Dynamic Range	< 20 V/m – 10,000 V/m with PRE-10 (min < 50 V/m – 3,000 V/m)
Position Precision	< 0.2 mm (DASY6)
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: encapsulation 8 mm (internal sensor < 1mm) Distance from probe tip to dipole centers: < 2 mm Sensor displacement to probe's calibration point: < 0.3 mm
Applications	E-field measurements of 5G devices and other mm-wave transmitters operating above 10GHz in < 2 mm distance from device (free-space) Power density, H-field and far-field analysis using total field reconstruction
Compatibility	cDASY6 + 5G-Module SW1.0

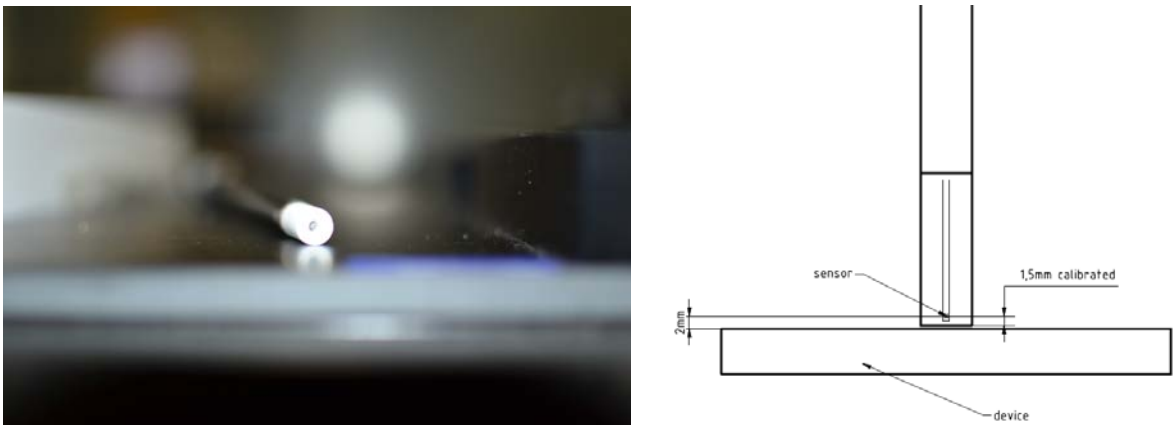


Figure 3-1
EUmmWV2 Probe

3.3 Power Density Assessment Based on E-field Measurements

Within a short distance from the transmitting source, power density is determined based on both electric and magnetic fields. Generally, the magnitude and phase of two components of either the E-field or H-field are needed on a sufficiently large surface to fully characterize the total E-field and H-field distributions. Nevertheless, solutions based on direct measurement of E-field and H-field can be used to compute power density. The general measurement approach used for this device is summarized here:

a) Measure the local E field on the measurement surface at a reference location where the field is well above the noise level. This reference level will be used at the end of this procedure to assess output power drift of the DUT during the measurement.

b) Scan the electric field on the measurement surface. Measurements are conducted according to the instructions provided by the measurement system manufacturer.

c) Measurement spatial resolution can depend on the measured field characteristic and measurement methodology used by the system. Planar scanners typically require a step size of less than $\lambda/2$.

d) For this measurement system, H- field is calculated from the measured field using a reconstruction algorithm. As the power density calculation requires knowledge of both amplitude and phase, reconstruction algorithms can also be used to obtain field information from the measured E-field data (e.g. the phase from the amplitude if only the amplitude is measured). H-field and phase data was reconstructed from repeated measurements (three per measurement point) on two measurement planes separated by $\lambda/4$.

e) The spatial-average power density distribution on the evaluation surface is determined per the IEC Draft TR 63170. The spatial averaging area, *A*, is specified by the applicable exposure limits or regulatory requirements. A circular shape was used.

$$S_{\text{av}} = \frac{1}{2A}\Re\left(\int \mathbf{E}\times\mathbf{H}^{*}\cdot\hat{\mathbf{n}}\,\mathrm{d}A\right)$$

f) The maximum spatial-average and/or local power density on the evaluation surface is the final quantity to determine compliance against applicable limits.

3.4 Reconstruction Algorithm

Computation of the power density in general requires knowledge of the electric (E-) and magnetic (H-) field amplitudes and phases in the plane of incidence. Reconstruction of these quantities from pseudo-vector E-field measurements is feasible, as they are constrained by Maxwell's equations. As such, the SPEAG reconstruction approach was based on the Gerchberg-Saxton algorithm, which benefits from the availability of the E-field polarization ellipse information obtained with the EUmmWV2 probe.

4 SYSTEM CHECK

4.1 Test System Verification

System check was performed before each series of continuous measurement and at least weekly.

The system was verified to ±10% of the power density targets according to the calibration facility measurements on the reference verification source. The same spatial resolution and measurement region used in the source calibration was applied during the system check. The measured power density distribution of verification source was also confirmed through visual inspection to have no noticeable differences, both spatially (shape) and numerically (level) from the distribution provided by the manufacturer, per November 2017 TCBC Workshop Notes.

Table 4-1
System Check Results

System Verification TARGET & MEASURED								
Frequency (GHz)	**Date:**	**Source SN**	**Probe SN**	**Averaging Area (cm^2)**	**Distance (mm)**	**Measured Power Density (W/m^2)**	**Target Power Density (W/m^2)**	**Deviation (%)**
30	03/12/2018	1002	9364	1.0	10.0	109.0	104.0	4.81%
30	03/29/2018	1002	9364	1.0	10.0	105.0	104.0	0.96%

Note: The 10 mm distance from includes a 4.5 mm separation from the horn aperture to surface of the verification source. Therefore, the evaluation distance in the software was configured as “5.5 mm”.

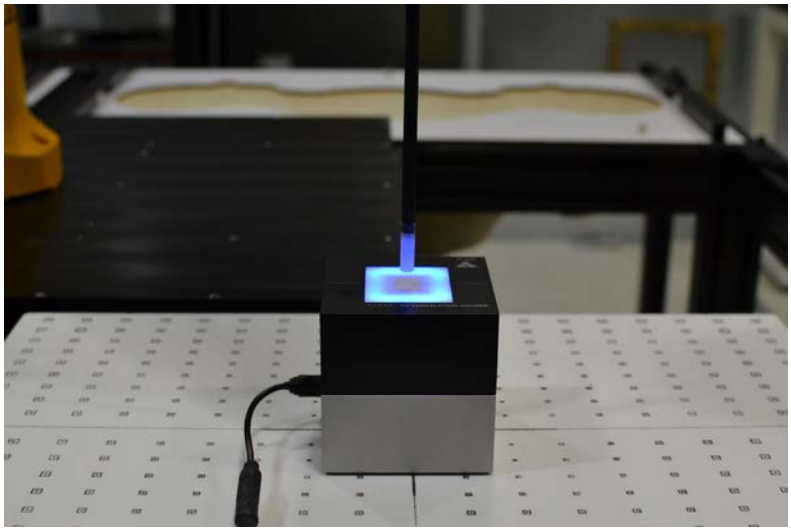


Figure 4-1
System Verification Setup Photo

5 POWER DENSITY DATA SUMMARY

5.1 Measurement Software Test Configuration

Table 5-1
Measurement Settings

Software	cDASY6 5G Module
Software Version	V1.0.0.12565
Averaging Area	1 cm^2
Averaging Shape	Circular
Evaluation Distance	140 mm
Measured Planes	140 mm, 140 mm + λ/4 mm
Tx Frequency	27900 MHz
X, Y Scan Resolution	dx, dy = λ/4 mm
X-Y Scan Extents	162 mm x 162 mm

5.2 Power Density Results for 0° Boresight Beams (Standalone)

Table 5-2
Boresight Condition Results for Antenna A and Antenna B

MEASUREMENT RESULTS																
FREQUENCY		Antenna Configuration	Ant A Beam ID	Ant B Beam ID	Active Component Carriers	Device Serial Number	Modulation	Evaluation Distance	Side	Averaging Area (cm^2)	Measured S ($1cm^2$) (W/m^2)	Test Duty Cycle	Production Duty Cycle	Scaling Factor Due to Duty Cycle	S ($1cm^2$) (W/m^2)	Plot #
MHz	Ch.															
27900	Low	A	0	-	1	0054	QPSK	140 mm	Front	1.0	31.3	82.3%	18.9%	0.230	7.199	A1
27900	Low	B	-	0	1	0054	QPSK	140mm	Front	1.0	29.0	82.3%	18.9%	0.230	6.670	A2
47 CFR §1.1310 - SAFETY LIMIT Spatial-Average Uncontrolled Exposure/General Population							Power Density (S) 10 W/m^2 averaged over 1 cm^2									

5.3 Power Density Results for Overlapping Beam Conditions (Simultaneous)

Table 5-3
Results for Antenna A and Antenna B Configurations with Overlapping Beams

MEASUREMENT RESULTS																
FREQUENCY		Antenna Configuration	Ant A Beam ID	Ant B Beam ID	Active Component Carriers	Device Serial Number	Modulation	Evaluation Distance	Side	Averaging Area (cm^2)	Measured S ($1cm^2$) (W/m^2)	Test Duty Cycle	Production Duty Cycle	Scaling Factor Due to Duty Cycle	S ($1cm^2$) (W/m^2)	Plot #
MHz	Ch.															
27900	Low	A + B	0	39	1	0054	QPSK	140 mm	Front	1.0	42.5	82.3%	18.9%	0.230	9.775	A3
27900	Low	A + B	78	0	1	0054	QPSK	140 mm	Front	1.0	42.2	82.3%	18.9%	0.230	9.706	A4
47 CFR §1.1310 - SAFETY LIMIT Spatial-Average Uncontrolled Exposure/General Population							Power Density (S) 10 W/m^2 averaged over 1 cm^2									

5.4 Power Density Test Notes

1. The manufacturer has confirmed that the device tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
2. Power density was calculated by repeated E-field measurements on two measurement planes separated by $\lambda/4$. Please see Section 3.3 for more details of the evaluation process.
3. For the boresight condition, Beam ID=0 was evaluation for each antenna independently. The antenna arrays are highly directional and all other beam ID configurations result in lower EIRP. Therefore, additional evaluations of other beam configurations were not considered.
4. For simultaneous transmission analysis, two cases were identified as possible worst-case combinations based on the distance between the beam centers and estimated MPE. All possible beam combinations were considered for distances between 14 cm and 20 cm. The beam configurations that minimized the distance between the centers of the beams (at the evaluation plane) and maximized the estimated MPE were selected for evaluation. These cases selected were:
    a. Antenna A with Beam ID = 0 and Antenna B with Beam ID = 39
    b. Antenna A with Beam ID = 78 and Antenna B with Beam ID = 0
5. DUT was configured to transmit with a manufacturer provided test software. Transmission of a specific antenna(s) and Beam ID(s) was established and remained constant for the entire evaluation. Per FCC Guidance, the device was configured to the signal configuration (channel, modulation, component carriers, etc) that gave the highest EIRP.
6. The 5G mmWave operates with a radio frame length of 10ms (50 subframes per 10ms frame) and this device operates using an approximate 4:1 Tx ratio (1 Tx for every 4 Rx). The ratio is fixed and cannot be changed by the end user. Within each 10ms frame there are 700 symbols, of which 568 symbols are downlink (AU) and the remaining 132 symbols are uplink (CPE). Thus, the exact Tx duty is 132/700 = 18.9% for the CPE.
7. Power density results were scaled down from the test software duty cycle to the final duty cycle to demonstrate compliance. The test Duty cycle was 82.3% to facilitate test measurements only. It was confirmed by the manufacturer that the device was not over driven at this test duty cycle, to facilitate linear scaling in the test report.
8. It was confirmed that fields at the measurement region boundary were greater than 20 dB below the peaks. The antenna array locations on the CPE were marked and each scan was centered over the relevant antenna array.
9. Based on the current methodology proposed in IEC TR 63170 Draft, power density was evaluated solely in the normal direction of the Poynting vector. At a far distance of 14 cm from the device under test, it is assumed that there would not be a significant underestimation in power density assessed in the normal direction compared with the total surface integral of the vector. The power density measurement agrees closely with the MPE analysis at this distance to support this assumption to justify the evaluation based on the IEC TR 631170 draft.
10. **Based on the power density evaluations per 2.1091(d)(4), the minimum distance to ensure compliance was determined to be 14 cm.**

6 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	WL25-1	Conducted Cable Set (25GHz)	6/14/2017	Annual	6/14/2018	WL25-1
-	WL40-1	Conducted Cable Set (40GHz)	6/14/2017	Annual	6/14/2018	WL40-1
Agilent	E4448A	PSA (3Hz-50GHz) Spectrum Analyzer	5/5/2017	Annual	5/5/2018	US42510244
Agilent	N9038A	MXE EMI Receiver	4/26/2017	Annual	4/26/2018	MY51210133
Emco	3116	Horn Antenna (18 - 40GHz)	4/27/2015	Triennial	4/27/2018	9203-2178
EMCO	3160-10	Small Horn (26.5 - 40GHz)	8/23/2016	Biennial	8/23/2018	130993
Espec	ESX-2CA	Environmental Chamber	4/11/2017	Annual	4/11/2018	17620
Espec	SCP-220	Controller	4/11/2017	Annual	4/11/2018	OCPS5H06121505
Huber+Suhner	Sucoflex 102A	40GHz Radiated Cable	5/19/2017	Annual	5/19/2018	251425001
OML	M08RH	Horn Antenna + Multiplier Source Module	11/16/2017	Annual	11/16/2018	17111701
OML	M12RH	Horn Antenna + Multiplier Source Module	11/16/2017	Annual	11/16/2018	17111701
OML	M19RH	Horn Antenna + Multiplier Source Module	11/16/2017	Annual	11/16/2018	17111701
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/3/2017	Annual	7/3/2018	102133
Rohde & Schwarz	TS-PR40	26.5-40 GHz Pre-Amplifier	5/11/2017	Annual	5/11/2018	100037
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	8/11/2017	Annual	8/11/2018	103200
SPEAG	EUmmWV2	E-field probe	4/20/2017	Annual	4/20/2018	9364
SPEAG	5G Verification Source 30GHz	30GHz System Verification Antenna	1/8/2018	Annual	1/8/2019	1002
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/21/2017	Annual	6/21/2018	1333
Sunol Sciences	JB6	JB6 Antenna	9/27/2016	Biennial	9/27/2018	A082816

7 CONCLUSION

7.1 Measurement Conclusion

The power density measurements are supplemental to the MPE calculations and they indicate that the DUT complies with the RF radiation exposure limits of the FCC, with respect to all parameters subject to this test. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested.

Please note that the RF Exposure and distribution of electromagnetic energy in the body are very complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because various factors may interact with one another to vary the specific biological outcome of an exposure to electromagnetic fields, any protection guide should consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables.

8 REFERENCES

[1] ANSI/IEEE C95.1-1992, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3kHz to 300GHz, New York: IEEE, Sept. 1992.

[2] IEC TR 63170 ED1 Draft, Measurement Procedure for the Evaluation of Power Density Related to Human Exposure to Radiofrequency Fields from Wireless Communication Devices Operating between 6 GHz and 100 GHz

[3] IEC TR 62630 : 2010, Guidance for Evaluating Exposure from Multiple Electromagnetic Sources

[4] K. Pokovic, T. Schmid, J. Frohlich, and N. Kuster. Novel Probes and Evaluation Procedures to Assess Field Magnitude and Polarization. IEEE Transactions on Electromagnetic Compatibility 42(2): 240 -244, 2000

[5] R. W. Gerchberg and W. O. Saxton. A Practical Algorithm for the Determination of Phase from Image and Diffraction Plane Pictures. Optik 35(2): 237 – 246, 1972

[6] A. P. Anderson and S. Sali. New Possibilities for Phaseless Microwave Diagnostics. Part 1: Error Reduction Techniques. IEE Proceedings H – Microwaves, Antennas and Propagation 132(5): 290 – 298, 1985

[7] FCC KDB 865664 D02 v01r04: SAR Measurement Requirements for 100 MHz to 6 GHz. Federal Communications Commission – Office of Engineering and Technology, Laboratory Division.

[8] FCC KDB 447498 D01 v02r01: RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices. Federal Communications Commission – Office of Engineering and Technology, Laboratory Division.

[9] November 2017 Telecommunications Certification Body Council (TCBC) Workshop Notes

[10] SPEAG Application Note – 5G Compliance Testing with DASY6 (5G Module V1.0)

PCTEST ENGINEERING LABORATORY, INC.

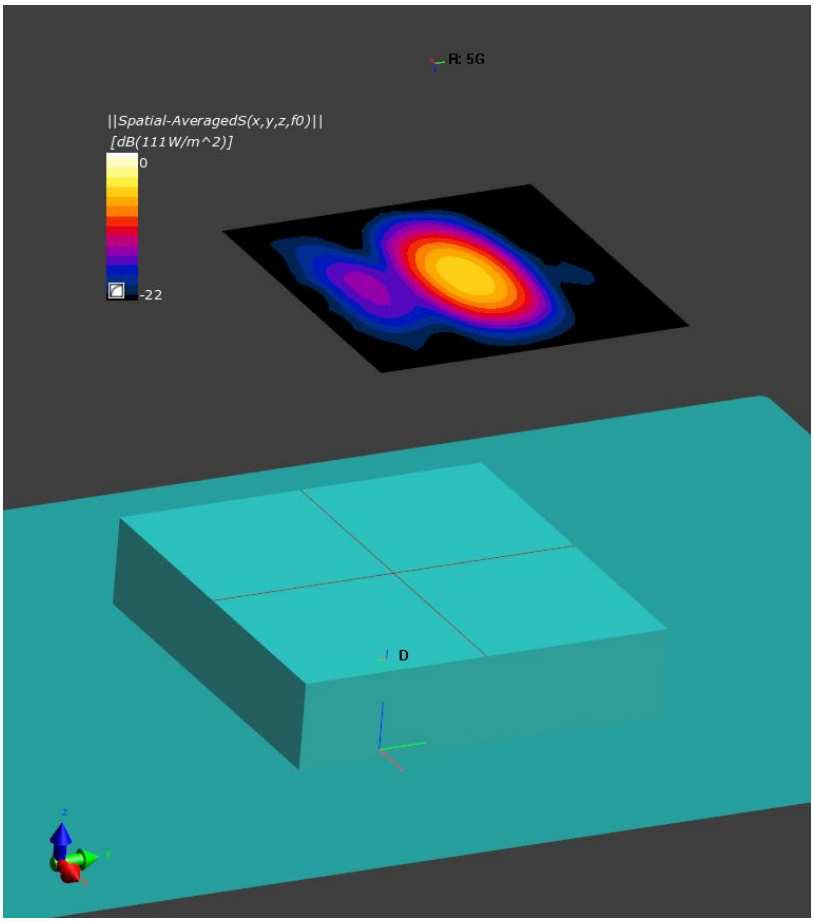
DUT: A3LSFG-D0100; Type: Indoor Customer Premise Equipment (CPE); Serial: 0054

Test Date: 03-14-2018
Communication System: UID 0

Probe: EUmmWV2 – SN9364; Calibrated: 4/20/2017;
Measured Planes: 140mm, 140 mm + λ/4
Electronics: DAE4 Sn1333; Calibrated: 6/21/2017
Phantom: 5G Phantom V0.1
Measurement SW: cDASY6 5G Module V1.0.0.12565

Mode: 27900 MHz mmWave, QPSK, 1 CC, Ant A, Beam ID = 0, Front Side

Measurement Area: x=162.0 mm, y=162.0 mm
Grid Resolution: dx = λ/4, dy = λ/4
Reference Value = 108.1 V/m; Power Drift = -0.18 dB
S (1 cm^2) = 31.3 W/m^2



PCTEST ENGINEERING LABORATORY, INC.

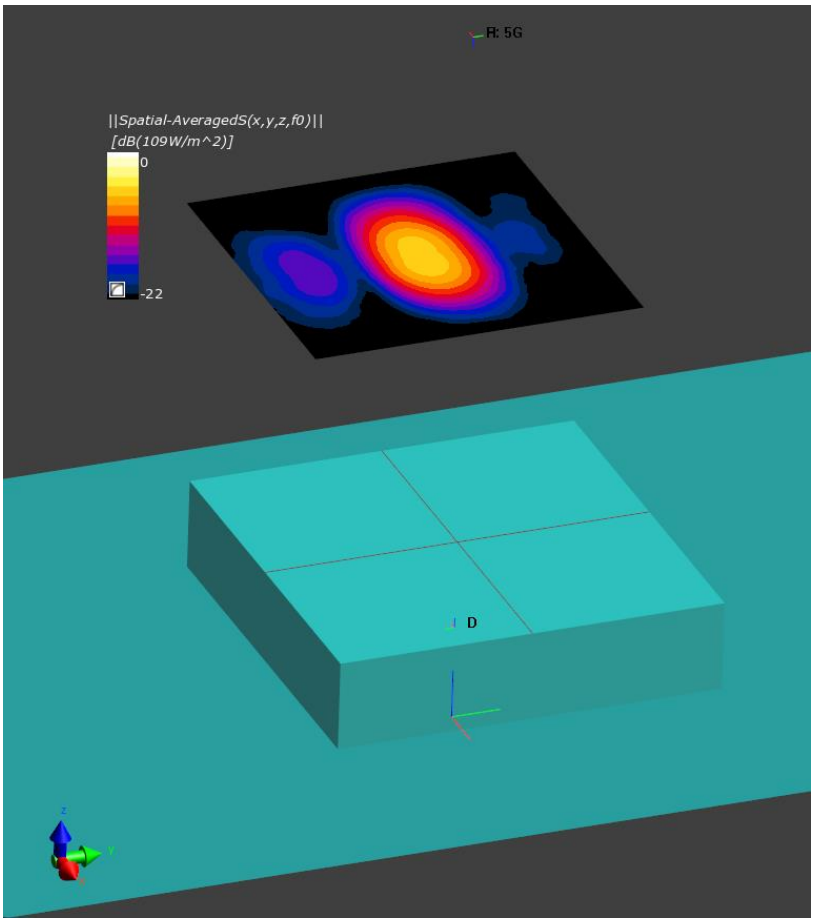
DUT: A3LSFG-D0100; Type: Indoor Customer Premise Equipment (CPE); Serial: 0054

Test Date: 03-29-2018
Communication System: UID 0

Probe: EUmmWV2 – SN9364; Calibrated: 4/20/2017;
Measured Planes: 140mm, 140 mm + λ/4
Electronics: DAE4 Sn1333; Calibrated: 6/21/2017
Phantom: 5G Phantom V0.1
Measurement SW: cDASY6 5G Module V1.0.0.12565

Mode: 27900 MHz mmWave, QPSK, 1 CC, Ant B, Beam ID = 0, Front Side

Measurement Area: x=162.0 mm, y=162.0 mm
Grid Resolution: dx = λ/4, dy = λ/4
Reference Value = 103.0 V/m; Power Drift = 0.14 dB
S (1 cm^2) = 29.0 W/m^2



PCTEST ENGINEERING LABORATORY, INC.

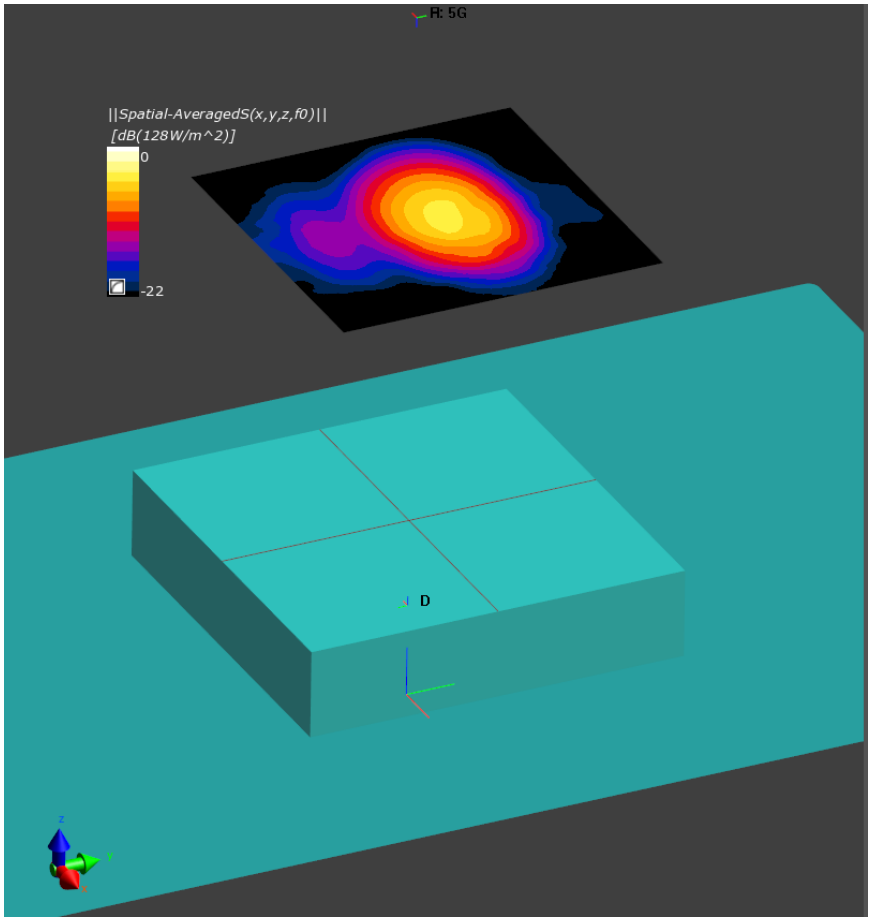
DUT: A3LSFG-D0100; Type: Indoor Customer Premise Equipment (CPE); Serial: 0054

Test Date: 04-01-2018
Communication System: UID 0

Probe: EUmmWV2 – SN9364; Calibrated: 4/20/2017;
Measured Planes: 140mm, 140 mm + λ/4
Electronics: DAE4 Sn1333; Calibrated: 6/21/2017
Phantom: 5G Phantom V0.1
Measurement SW: cDASY6 5G Module V1.0.0.12565

Mode: 27900 MHz mmWave, QPSK, 1 CC, Ant A Beam ID = 0, Ant B Beam ID = 39, Front Side

Measurement Area: x=162.0 mm, y=162.0 mm
Grid Resolution: dx = λ/4, dy = λ/4
Reference Value = 123.2 V/m; Power Drift = 0.06 dB
S (1 cm^2) = 42.5 W/m^2



PCTEST ENGINEERING LABORATORY, INC.

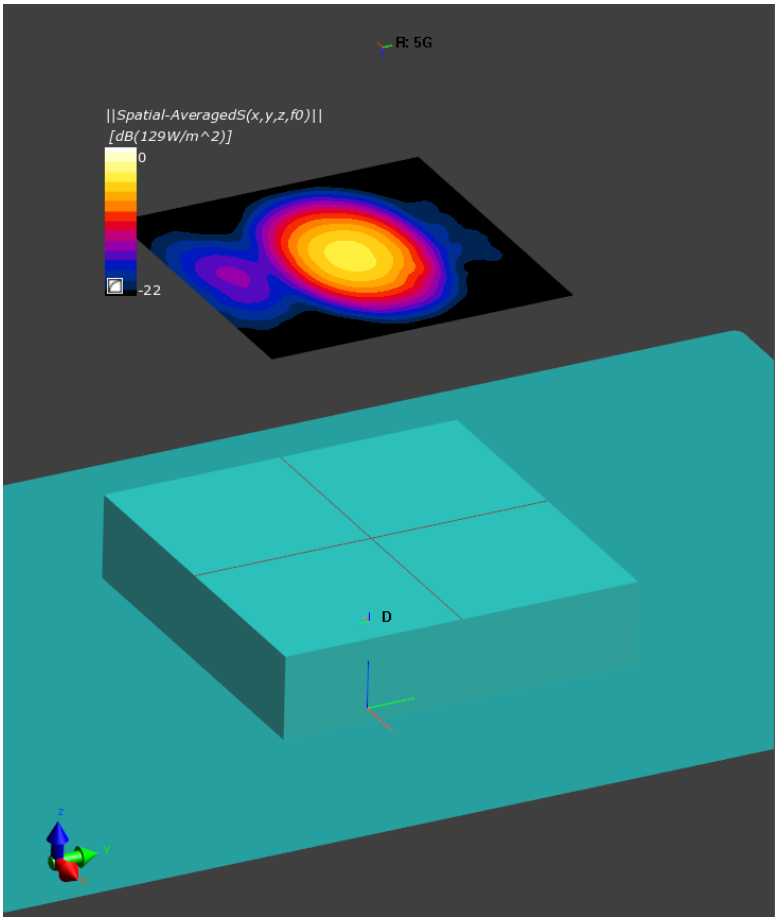
DUT: A3LSFG-D0100; Type: Indoor Customer Premise Equipment (CPE); Serial: 0054

Test Date: 04-02-2018
Communication System: UID 0

Probe: EUmmWV2 – SN9364; Calibrated: 4/20/2017;
Measured Planes: 140mm, 140 mm + λ/4
Electronics: DAE4 Sn1333; Calibrated: 6/21/2017
Phantom: 5G Phantom V0.1
Measurement SW: cDASY6 5G Module V1.0.0.12565

Mode: 27900 MHz mmWave, QPSK, 1 CC, Ant A Beam ID = 78, Ant B Beam ID = 0, Front Side

Measurement Area: x=162.0 mm, y=162.0 mm
Grid Resolution: dx = λ/4, dy = λ/4
Reference Value = 134.1 V/m; Power Drift = -0.16 dB
S (1 cm^2) = 42.2 W/m^2



PCTEST ENGINEERING LABORATORY, INC.

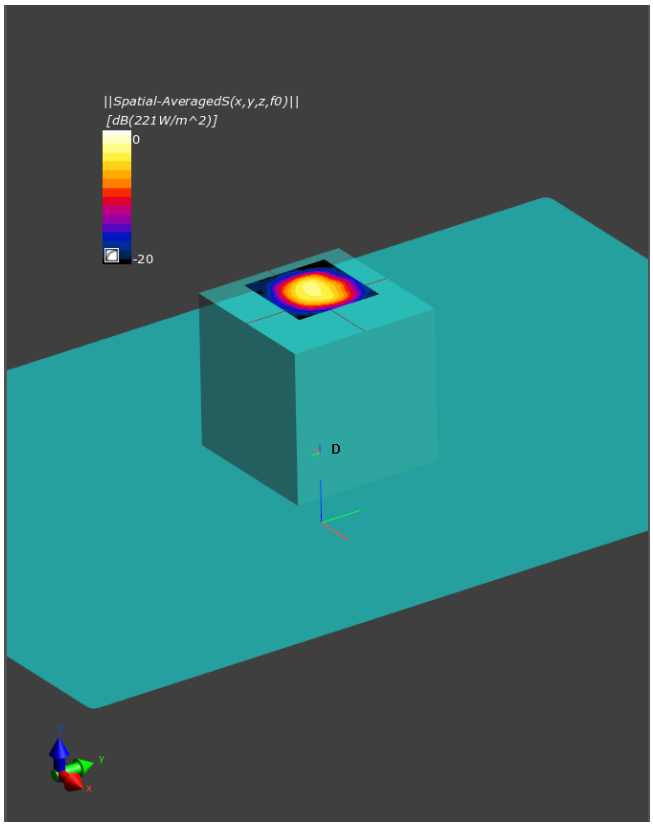
DUT: SPEAG Verification Source; Type: 30 GHz, Serial: 1002

Test Date: 03-12-2018
Communication System: UID 0

Probe: EUmmWV2 – SN9364; Calibrated: 4/20/2017;
Measured Planes: 5.5 mm, 5.5 mm + λ/4
Electronics: DAE4 Sn1333; Calibrated: 6/21/2017
Phantom: 5G Phantom V0.1
Measurement SW: cDASY6 5G Module V1.0.0.12565

30000 MHz System Check

Measurement Area: x=60.0 mm, y=60.0 mm
Grid Resolution: dx = λ/4, dy = λ/4
S (1 cm^2) = 109.0 W/m^2
Deviation = 4.81%



PCTEST ENGINEERING LABORATORY, INC.

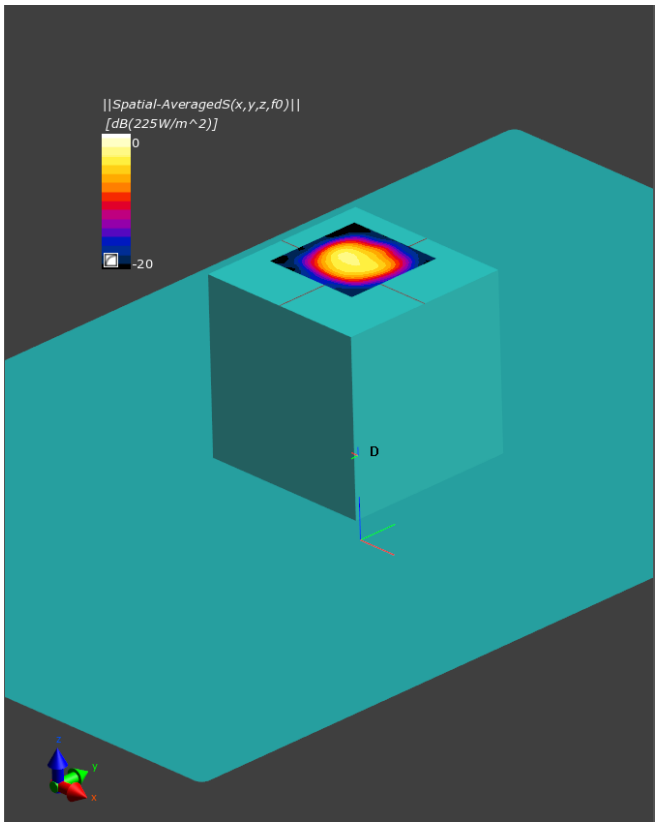
DUT: SPEAG Verification Source; Type: 30 GHz, Serial: 1002

Test Date: 03-29-2018
Communication System: UID 0

Probe: EUmmWV2 – SN9364; Calibrated: 4/20/2017;
Measured Planes: 5.5 mm, 5.5 mm + λ/4
Electronics: DAE4 Sn1333; Calibrated: 6/21/2017
Phantom: 5G Phantom V0.1
Measurement SW: cDASY6 5G Module V1.0.0.12565

30000 MHz System Check

Measurement Area: x=60.0 mm, y=60.0 mm
Grid Resolution: dx = λ/4, dy = λ/4
S (1 cm^2) = 105.0 W/m^2
Deviation = 0.96%



Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: EUmmWV2-9364_Apr17

CALIBRATION CERTIFICATE

Object: EUmmWV2 - SN:9364

Calibration procedure(s): QA CAL-02.v8, QA CAL-25.v6, QA CAL-42.v2
Calibration procedure for E-field probes optimized for close near field evaluations in air

BN ✓

Calibration date: April 20, 2017

05-22-2017

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02525)	Apr-18
Reference 20 dB Attenuator	SN: S5277 (20x)	07-Apr-17 (No. 217-02528)	Apr-18
Reference Probe ER3DV6	SN: 2328	14-Oct-16 (No. ER3-2328_Oct16)	Oct-17
DAE4	SN: 789	11-Nov-16 (No. DAE4-789_Nov16)	Nov-17
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-16)	In house check: Jun-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-16)	In house check: Oct-17

	Name	Function	Signature
Calibrated by:	Fin Bomholt	Deputy Manager	F. Bomholt
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 4, 2017

Glossary:

NORMx,y,z	sensitivity in free space
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system
Sensor Angles	sensor deviation from the probe axis, used to calculate the field orientation and polarization
k	is the wave propagation direction

Calibration is Performed According to the Following Standards:

a) IEEE Std 1309-2005, " IEEE Standard for calibration of electromagnetic field sensors and probes, excluding antennas, from 9 kHz to 40 GHz", December 2005

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 for XY sensors and ϑ = 90 for Z sensor (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). For frequencies > 3 GHz, the far field in front of waveguide horn antennas is measured for a set of frequencies in various waveguide bands up to 90 GHz. The frequency dependency is fitted using a sensor model involving resistors R, R_p, inductance L and capacitors C, C_p.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *Sensor Offset*: The sensor offset corresponds to the mechanical from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).
- *Equivalent Sensor Angle*: The two probe sensors are mounted in the same plane at different angles. The angles are assessed using the information gained by determining the *NORMx* (no uncertainty required).
- *Spherical isotropy (3D deviation from isotropy)*: in a locally homogeneous field realized using an open waveguide / horn setup.

Probe EUmmWV2

SN:9364

Manufactured: February 9, 2017
Calibrated: April 20, 2017

Calibrated for DASY Systems
(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: EUmmWV2 - SN:9364

Basic Calibration Parameters (300 MHz – 3 GHz)

	Sensor X	Sensor Y	Unc (k=2)
Norm ($\mu V/(V/m)^2$)	0.02336	0.02389	± 10.1 %
DCP (mV)[B]	106.0	106.0	
Equivalent Sensor Angle	-57.2	32.1	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	138.9	±3.0 %
		Y	0.0	0.0	1.0		64.7	

Note: For details on UID parameters see Appendix.

Sensor Model Parameters

	C1 fF	C2 fF	α V^{-1}	T1 $ms.V^{-2}$	T2 $ms.V^{-1}$	T3 ms	T4 V^{-2}	T5 V^{-1}	T6
X	35.7	266.3	35.57	0.916	5.053	4.966	0.005	0.001	1
Y	46.34	345.8	35.55	0.916	2.644	5.036	0	1.256	1.001

Other Probe Parameters (300 MHz – 3 GHz)

Sensor Arrangement	Rectangular
Connector Angle (°)	-17.9
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	320 mm
Probe Body Diameter	10 mm
Tip Length	23 mm
Tip Diameter	8.0 mm
Probe Tip to Sensor X Calibration Point	1.5 mm
Probe Tip to Sensor Y Calibration Point	1.5 mm

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Appendix (Additional assessments outside the scope of SCS 0108)

DASY - Parameters of Probe: EUmmWV2 - SN:9364

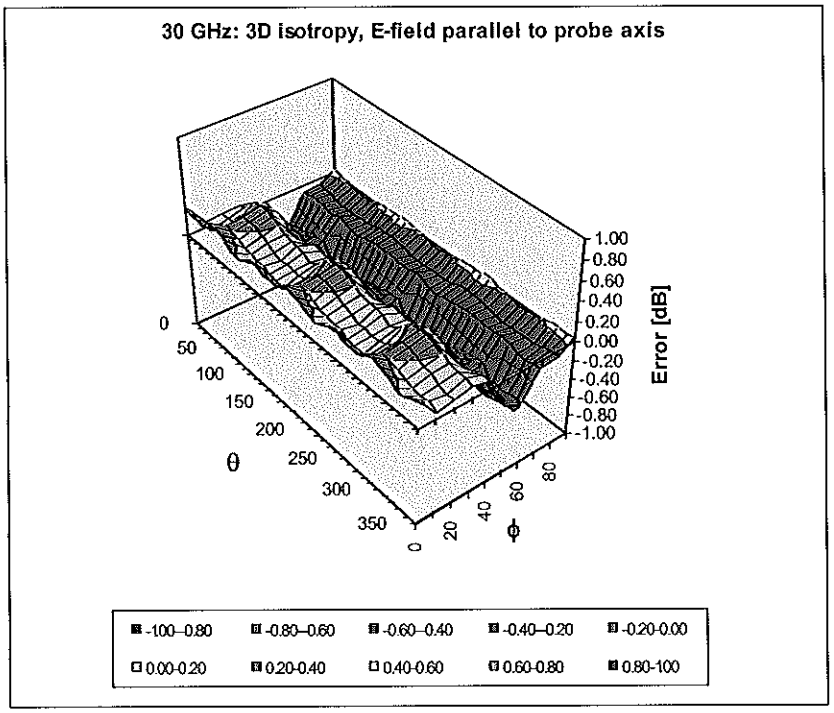
Sensor Frequency Model Parameters for f > 3 GHz [z]

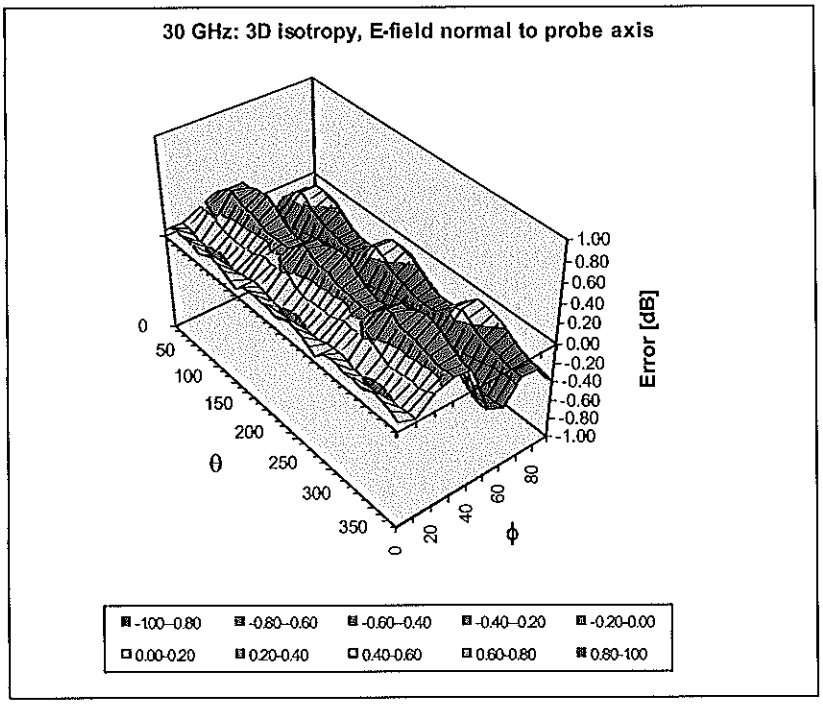
	Sensor X	Sensor Y
R (Ω)	55.42	54.46
R_p (Ω)	108.24	104.04
L (nH)	0.03440	0.03455
C (pF)	0.2570	0.2797
C_p (pF)	0.1249	0.1260

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[z] Uncertainty is the probe model uncertainty including *Norm*, expressed as normal distribution, which is < 1 dB.

Deviation from Isotropy in Air
f = 30 GHz





Probe isotropy for E_{tot}: probe rotated φ = 0° to 360°, tilted from field propagation direction $\vec{k}$
Parallel to the field propagation (ψ =0° - 90°): deviation within ± 0.41 dB
Normal to field orientation (ϑ =0° - 90°): deviation within ± 0.40 dB

Appendix: Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Max Unc[E] (k=2)
0	CW	X	0.00	0.00	1.00	0.00	300.0	± 3.0 %
		Y	0.00	0.00	1.00		300.0	
10010-CAA	SAR Validation (Square, 100ms, 10ms)	X	6.15	72.88	17.15	10.00	6.0	± 9.6 %
		Y	5.10	72.26	15.42		6.0	
10011-CAB	UMTS-FDD (WCDMA)	X	0.94	66.54	14.63	0.00	34.0	± 9.6 %
		Y	0.89	65.84	14.02		34.0	
10012-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	X	1.18	63.53	14.72	0.41	42.0	± 9.6 %
		Y	1.09	63.01	14.47		42.0	
10013-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	X	4.84	66.88	16.86	1.46	10.0	± 9.6 %
		Y	4.85	66.63	16.89		10.0	
10021-DAC	GSM-FDD (TDMA, GMSK)	X	7.45	76.46	19.97	9.39	7.0	± 9.6 %
		Y	16.00	91.36	24.19		7.0	
10023-DAC	GPRS-FDD (TDMA, GMSK, TN 0)	X	7.35	75.84	19.71	9.57	7.0	± 9.6 %
		Y	12.93	87.61	22.96		7.0	
10024-DAC	GPRS-FDD (TDMA, GMSK, TN 0-1)	X	5.80	76.83	18.86	6.56	13.0	± 9.6 %
		Y	100.00	119.62	30.16		13.0	
10025-DAC	EDGE-FDD (TDMA, 8PSK, TN 0)	X	4.62	60.00	17.26	12.57	4.0	± 9.6 %
		Y	6.90	60.00	15.61		4.0	
10026-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1)	X	7.52	77.64	24.84	9.56	7.0	± 9.6 %
		Y	7.13	80.32	26.60		7.0	
10027-DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	X	5.38	79.41	19.10	4.80	19.0	± 9.6 %
		Y	100.00	120.70	29.41		19.0	
10028-DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	X	5.68	83.58	20.04	3.55	25.0	± 9.6 %
		Y	100.00	122.53	29.14		25.0	
10029-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	X	5.65	74.03	22.62	7.80	11.0	± 9.6 %
		Y	5.08	75.10	23.73		11.0	
10030-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH1)	X	4.59	75.37	17.61	5.30	17.0	± 9.6 %
		Y	100.00	118.75	28.96		17.0	
10031-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH3)	X	2.33	78.28	17.19	1.88	37.0	± 9.6 %
		Y	100.00	120.12	26.14		37.0	
10032-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	X	1.56	79.25	17.43	1.17	43.0	± 9.6 %
		Y	100.00	118.86	24.34		43.0	
10033-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH1)	X	4.05	70.98	16.40	5.30	11.0	± 9.6 %
		Y	4.76	77.81	19.80		11.0	
10034-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH3)	X	1.94	68.09	13.53	1.88	23.0	± 9.6 %
		Y	1.98	71.07	15.69		23.0	
10035-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH5)	X	1.54	67.26	12.83	1.17	27.0	± 9.6 %
		Y	1.49	68.74	14.32		27.0	
10036-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH1)	X	4.17	71.58	16.72	5.30	11.0	± 9.6 %
		Y	5.36	79.93	20.69		11.0	

10037-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH3)	X	1.86	67.61	13.31	1.88	22.0	± 9.6 %
		Y	1.88	70.42	15.38		22.0	
10038-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH5)	X	1.54	67.36	12.97	1.17	26.0	± 9.6 %
		Y	1.49	68.96	14.53		26.0	
10039-CAB	CDMA2000 (1xRTT, RC1)	X	1.34	69.11	13.14	0.00	25.0	± 9.6 %
		Y	1.48	69.49	14.01		25.0	
10042-CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Halfrate)	X	6.61	76.78	18.85	7.78	10.0	± 9.6 %
		Y	23.94	97.13	24.30		10.0	
10044-CAA	IS-91/EIA/TIA-553 FDD (FDMA, FM)	X	0.00	104.60	8.17	0.00	55.0	± 9.6 %
		Y	0.05	119.09	6.34		55.0	
10048-CAA	DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)	X	8.76	73.46	20.35	13.80	3.0	± 9.6 %
		Y	9.84	77.76	20.81		3.0	
10049-CAA	DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)	X	8.01	75.57	19.96	10.79	5.0	± 9.6 %
		Y	9.90	81.56	21.09		5.0	
10056-CAA	UMTS-TDD (TD-SCDMA, 1.28 Mcps)	X	7.00	73.80	18.78	9.03	5.0	± 9.6 %
		Y	7.99	79.24	20.75		5.0	
10058-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	X	4.58	71.70	21.14	6.55	14.0	± 9.6 %
		Y	4.05	72.01	21.87		14.0	
10059-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)	X	1.24	64.31	15.02	0.61	39.0	± 9.6 %
		Y	1.12	63.79	14.90		39.0	
10060-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)	X	1.74	73.54	17.40	1.30	32.0	± 9.6 %
		Y	1.91	78.58	19.55		32.0	
10061-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	X	2.12	70.32	17.09	2.04	28.0	± 9.6 %
		Y	1.95	72.55	18.70		28.0	
10062-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	X	4.55	66.73	16.33	0.49	12.0	± 9.6 %
		Y	4.61	66.54	16.31		12.0	
10063-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	X	4.58	66.84	16.40	0.72	12.0	± 9.6 %
		Y	4.64	66.64	16.40		12.0	
10064-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	X	4.83	67.04	16.59	0.86	11.0	± 9.6 %
		Y	4.93	66.92	16.64		11.0	
10065-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)	X	4.74	66.94	16.65	1.21	11.0	± 9.6 %
		Y	4.81	66.83	16.73		11.0	
10066-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	X	4.79	66.99	16.79	1.46	10.0	± 9.6 %
		Y	4.84	66.87	16.89		10.0	
10067-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	X	5.13	67.35	17.27	2.04	8.0	± 9.6 %
		Y	5.15	67.10	17.35		8.0	
10068-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	X	5.23	67.39	17.44	2.55	8.0	± 9.6 %
		Y	5.23	67.19	17.57		8.0	
10069-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	X	5.32	67.45	17.63	2.67	8.0	± 9.6 %
		Y	5.32	67.21	17.76		8.0	
10071-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps)	X	4.99	67.04	17.14	1.99	9.0	± 9.6 %
		Y	4.97	66.76	17.20		9.0	

10072-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	X	5.00	67.36	17.33	2.30	9.0	± 9.6 %
		Y	4.97	67.09	17.41		9.0	
10073-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)	X	5.16	67.68	17.66	2.83	9.0	± 9.6 %
		Y	5.06	67.31	17.73		9.0	
10074-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps)	X	5.25	67.78	17.85	3.30	8.0	± 9.6 %
		Y	5.08	67.28	17.90		8.0	
10075-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps)	X	5.38	68.00	18.14	3.82	7.0	± 9.6 %
		Y	5.16	67.48	18.23		7.0	
10076-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps)	X	5.49	68.03	18.36	4.15	7.0	± 9.6 %
		Y	5.20	67.35	18.37		7.0	
10077-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	X	5.55	68.17	18.48	4.30	7.0	± 9.6 %
		Y	5.24	67.44	18.47		7.0	
10081-CAB	CDMA2000 (1xRTT, RC3)	X	0.65	64.17	10.35	0.00	27.0	± 9.6 %
		Y	0.68	64.06	10.85		27.0	
10082-CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Fullrate)	X	0.95	57.68	6.42	4.77	19.0	± 9.6 %
		Y	0.88	60.00	5.99		19.0	
10090-DAC	GPRS-FDD (TDMA, GMSK, TN 0-4)	X	5.77	76.72	18.83	6.56	13.0	± 9.6 %
		Y	100.00	119.69	30.21		13.0	
10097-CAB	UMTS-FDD (HSDPA)	X	1.77	67.95	15.41	0.00	28.0	± 9.6 %
		Y	1.70	66.88	14.98		28.0	
10098-CAB	UMTS-FDD (HSUPA, Subtest 2)	X	1.73	67.86	15.36	0.00	28.0	± 9.6 %
		Y	1.66	66.79	14.93		28.0	
10099-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-4)	X	7.52	77.61	24.82	9.56	7.0	± 9.6 %
		Y	7.14	80.33	26.60		7.0	
10100-CAC	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	2.91	69.70	16.47	0.00	21.0	± 9.6 %
		Y	2.93	69.47	16.10		21.0	
10101-CAC	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	X	3.08	67.19	15.74	0.00	18.0	± 9.6 %
		Y	3.11	67.04	15.53		18.0	
10102-CAC	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	X	3.19	67.26	15.88	0.00	17.0	± 9.6 %
		Y	3.23	67.10	15.68		17.0	
10103-CAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	2.41	60.00	13.63	3.98	9.0	± 9.6 %
		Y	1.92	60.00	14.55		9.0	
10104-CAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	X	6.13	70.85	18.59	3.98	8.0	± 9.6 %
		Y	5.75	71.17	19.06		8.0	
10105-CAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	X	3.02	60.00	14.08	3.98	8.0	± 9.6 %
		Y	5.84	68.63	17.62		8.0	
10108-CAD	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	2.51	69.04	16.29	0.00	20.0	± 9.6 %
		Y	2.55	68.72	15.91		20.0	
10109-CAD	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	X	2.73	67.16	15.61	0.00	18.0	± 9.6 %
		Y	2.77	66.89	15.41		18.0	
10110-CAD	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	X	2.00	68.19	15.74	0.00	20.0	± 9.6 %
		Y	2.05	67.72	15.41		20.0	

10111-CAD	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	X	2.48	68.52	15.95	0.00	18.0	± 9.6 %
		Y	2.50	67.82	15.73		18.0	
10112-CAD	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	X	2.86	67.27	15.71	0.00	17.0	± 9.6 %
		Y	2.90	66.95	15.51		17.0	
10113-CAD	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	X	2.64	68.77	16.13	0.00	17.0	± 9.6 %
		Y	2.66	68.04	15.92		17.0	
10114-CAB	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	X	4.96	67.11	16.38	0.00	13.0	± 9.6 %
		Y	5.05	67.05	16.25		13.0	
10115-CAB	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	X	5.21	67.19	16.42	0.00	12.0	± 9.6 %
		Y	5.33	67.17	16.32		12.0	
10116-CAB	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	X	5.04	67.30	16.40	0.00	13.0	± 9.6 %
		Y	5.14	67.22	16.27		13.0	
10117-CAB	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	X	4.95	67.06	16.37	0.00	13.0	± 9.6 %
		Y	5.01	66.91	16.20		13.0	
10118-CAB	IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)	X	5.28	67.37	16.51	0.00	12.0	± 9.6 %
		Y	5.41	67.36	16.42		12.0	
10119-CAB	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	X	5.04	67.29	16.41	0.00	13.0	± 9.6 %
		Y	5.12	67.17	16.25		13.0	
10140-CAC	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	X	3.21	67.26	15.78	0.00	18.0	± 9.6 %
		Y	3.26	67.09	15.59		18.0	
10141-CAC	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	X	3.34	67.46	16.00	0.00	18.0	± 9.6 %
		Y	3.39	67.24	15.79		18.0	
10142-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	X	1.77	68.19	15.12	0.00	20.0	± 9.6 %
		Y	1.82	67.63	14.98		20.0	
10143-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	X	2.30	69.04	15.19	0.00	18.0	± 9.6 %
		Y	2.34	68.42	15.32		18.0	
10144-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	X	1.95	65.85	13.05	0.00	17.0	± 9.6 %
		Y	2.09	65.90	13.55		17.0	
10145-CAD	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	X	0.80	61.62	8.34	0.00	19.0	± 9.6 %
		Y	1.03	63.47	10.40		19.0	
10146-CAD	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	X	0.80	60.00	6.17	0.00	17.0	± 9.6 %
		Y	1.77	63.45	9.72		17.0	
10147-CAD	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	X	0.81	60.00	6.24	0.00	16.0	± 9.6 %
		Y	1.91	64.31	10.28		16.0	
10149-CAC	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	X	2.74	67.24	15.67	0.00	18.0	± 9.6 %
		Y	2.78	66.97	15.47		18.0	
10150-CAC	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	X	2.87	67.34	15.77	0.00	17.0	± 9.6 %
		Y	2.91	67.02	15.56		17.0	
10151-CAC	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	5.70	72.60	18.71	3.98	9.0	± 9.6 %
		Y	5.59	74.14	19.73		9.0	
10152-CAC	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	X	5.61	70.43	17.99	3.98	8.0	± 9.6 %
		Y	5.25	70.84	18.61		8.0	

10153-CAC	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	X	5.96	71.40	18.78	3.98	8.0	± 9.6 %
		Y	5.63	71.97	19.52		8.0	
10154-CAD	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	2.06	68.68	16.04	0.00	20.0	± 9.6 %
		Y	2.11	68.26	15.75		20.0	
10155-CAD	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	X	2.49	68.55	15.98	0.00	18.0	± 9.6 %
		Y	2.50	67.81	15.74		18.0	
10156-CAD	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	X	1.59	68.00	14.60	0.00	20.0	± 9.6 %
		Y	1.66	67.62	14.69		20.0	
10157-CAD	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	X	1.76	66.07	12.76	0.00	17.0	± 9.6 %
		Y	1.91	66.30	13.47		17.0	
10158-CAD	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	X	2.65	68.88	16.20	0.00	17.0	± 9.6 %
		Y	2.67	68.12	15.98		17.0	
10159-CAD	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	X	1.84	66.46	13.00	0.00	17.0	± 9.6 %
		Y	2.02	66.81	13.79		17.0	
10160-CAC	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	X	2.56	68.44	16.11	0.00	20.0	± 9.6 %
		Y	2.58	67.92	15.75		20.0	
10161-CAC	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	X	2.76	67.32	15.65	0.00	18.0	± 9.6 %
		Y	2.81	66.97	15.49		18.0	
10162-CAC	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	X	2.87	67.56	15.80	0.00	17.0	± 9.6 %
		Y	2.92	67.13	15.61		17.0	
10166-CAD	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	X	2.68	66.33	17.40	3.01	20.0	± 9.6 %
		Y	3.83	69.42	18.30		20.0	
10167-CAD	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	X	2.70	67.28	17.14	3.01	17.0	± 9.6 %
		Y	4.92	71.75	18.44		17.0	
10168-CAD	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	X	3.02	69.88	18.90	3.01	16.0	± 9.6 %
		Y	5.57	74.39	19.96		16.0	
10169-CAC	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	1.91	63.35	16.05	3.01	19.0	± 9.6 %
		Y	3.64	69.55	18.12		19.0	
10170-CAC	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	1.88	65.72	17.49	3.01	16.0	± 9.6 %
		Y	5.19	74.34	19.88		16.0	
10171-AAC	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	X	1.62	62.86	14.71	3.01	16.0	± 9.6 %
		Y	4.22	70.09	17.15		16.0	
10172-CAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	1.79	60.00	14.30	6.02	9.0	± 9.6 %
		Y	1.84	60.00	14.97		9.0	
10173-CAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	3.74	72.05	18.43	6.02	8.0	± 9.6 %
		Y	7.68	79.43	21.37		8.0	
10174-CAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	X	1.81	60.00	12.48	6.02	7.0	± 9.6 %
		Y	1.84	60.00	13.76		7.0	
10175-CAD	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	1.89	63.12	15.80	3.01	19.0	± 9.6 %
		Y	3.58	69.14	17.82		19.0	
10176-CAD	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	1.89	65.74	17.50	3.01	16.0	± 9.6 %
		Y	5.20	74.36	19.89		16.0	

10177-CAF	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	1.90	63.23	15.89	3.01	19.0	± 9.6 %
		Y	3.62	69.35	17.95		19.0	
10178-CAD	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	1.87	65.58	17.38	3.01	16.0	± 9.6 %
		Y	5.13	74.05	19.73		16.0	
10179-CAD	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	X	1.73	64.09	15.88	3.01	16.0	± 9.6 %
		Y	4.60	71.81	18.26		16.0	
10180-CAD	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	X	1.62	62.83	14.68	3.01	16.0	± 9.6 %
		Y	4.21	70.01	17.10		16.0	
10181-CAC	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	1.90	63.22	15.88	3.01	19.0	± 9.6 %
		Y	3.61	69.33	17.94		19.0	
10182-CAC	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	1.87	65.56	17.37	3.01	16.0	± 9.6 %
		Y	5.12	74.03	19.72		16.0	
10183-AAB	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	X	1.62	62.82	14.67	3.01	16.0	± 9.6 %
		Y	4.21	70.00	17.09		16.0	
10184-CAD	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	X	1.90	63.25	15.90	3.01	19.0	± 9.6 %
		Y	3.63	69.38	17.96		19.0	
10185-CAD	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	X	1.88	65.62	17.41	3.01	16.0	± 9.6 %
		Y	5.14	74.10	19.75		16.0	
10186-AAD	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	X	1.63	62.86	14.70	3.01	16.0	± 9.6 %
		Y	4.22	70.04	17.12		16.0	
10187-CAD	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	X	1.91	63.30	15.97	3.01	19.0	± 9.6 %
		Y	3.63	69.41	18.01		19.0	
10188-CAD	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	X	1.93	66.16	17.83	3.01	16.0	± 9.6 %
		Y	5.35	74.92	20.21		16.0	
10189-AAD	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	X	1.65	63.11	14.94	3.01	16.0	± 9.6 %
		Y	4.30	70.42	17.36		16.0	
10193-CAB	IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)	X	4.36	66.75	16.08	0.00	13.0	± 9.6 %
		Y	4.44	66.46	15.94		13.0	
10194-CAB	IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)	X	4.51	66.99	16.21	0.00	13.0	± 9.6 %
		Y	4.60	66.77	16.07		13.0	
10195-CAB	IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)	X	4.54	67.01	16.22	0.00	13.0	± 9.6 %
		Y	4.65	66.80	16.09		13.0	
10196-CAB	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	X	4.35	66.75	16.07	0.00	13.0	± 9.6 %
		Y	4.44	66.52	15.96		13.0	
10197-CAB	IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)	X	4.51	67.00	16.21	0.00	13.0	± 9.6 %
		Y	4.62	66.79	16.08		13.0	
10198-CAB	IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	X	4.53	67.01	16.23	0.00	13.0	± 9.6 %
		Y	4.65	66.81	16.10		13.0	
10219-CAB	IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)	X	4.30	66.79	16.04	0.00	13.0	± 9.6 %
		Y	4.39	66.52	15.92		13.0	
10220-CAB	IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)	X	4.51	66.96	16.20	0.00	13.0	± 9.6 %
		Y	4.61	66.76	16.07		13.0	

10221-CAB	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)	X	4.55	66.95	16.22	0.00	13.0	± 9.6 %
		Y	4.66	66.75	16.09		13.0	
10222-CAB	IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)	X	4.92	67.04	16.35	0.00	13.0	± 9.6 %
		Y	4.99	66.92	16.20		13.0	
10223-CAB	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	X	5.19	67.24	16.46	0.00	12.0	± 9.6 %
		Y	5.29	67.12	16.32		12.0	
10224-CAB	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	X	4.96	67.16	16.34	0.00	13.0	± 9.6 %
		Y	5.03	67.02	16.18		13.0	
10225-CAB	UMTS-FDD (HSPA+)	X	2.63	66.15	14.86	0.00	20.0	± 9.6 %
		Y	2.69	65.79	14.94		20.0	
10226-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	X	3.84	72.52	18.71	6.02	8.0	± 9.6 %
		Y	7.95	80.09	21.70		8.0	
10227-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	X	3.80	71.94	18.00	6.02	7.0	± 9.6 %
		Y	7.70	78.95	20.88		7.0	
10228-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	X	3.98	73.11	20.18	6.02	9.0	± 9.6 %
		Y	6.81	81.21	23.46		9.0	
10229-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	X	3.76	72.11	18.46	6.02	8.0	± 9.6 %
		Y	7.72	79.50	21.41		8.0	
10230-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	X	3.71	71.52	17.76	6.02	7.0	± 9.6 %
		Y	7.47	78.40	20.61		7.0	
10231-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	X	3.90	72.70	19.94	6.02	9.0	± 9.6 %
		Y	6.57	80.47	23.10		9.0	
10232-CAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	3.76	72.10	18.46	6.02	8.0	± 9.6 %
		Y	7.71	79.48	21.40		8.0	
10233-CAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	X	3.70	71.51	17.76	6.02	7.0	± 9.6 %
		Y	7.46	78.39	20.60		7.0	
10234-CAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	3.83	72.32	19.68	6.02	9.0	± 9.6 %
		Y	6.36	79.77	22.73		9.0	
10235-CAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	3.76	72.10	18.46	6.02	8.0	± 9.6 %
		Y	7.71	79.49	21.40		8.0	
10236-CAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	X	3.72	71.56	17.77	6.02	7.0	± 9.6 %
		Y	7.49	78.43	20.62		7.0	
10237-CAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	3.89	72.70	19.94	6.02	9.0	± 9.6 %
		Y	6.56	80.47	23.10		9.0	
10238-CAC	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	3.75	72.08	18.45	6.02	8.0	± 9.6 %
		Y	7.70	79.46	21.39		8.0	
10239-CAC	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	X	3.69	71.49	17.75	6.02	7.0	± 9.6 %
		Y	7.45	78.37	20.60		7.0	
10240-CAC	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	3.89	72.69	19.93	6.02	9.0	± 9.6 %
		Y	6.55	80.45	23.09		9.0	
10241-CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	X	6.05	74.10	21.38	6.98	8.0	± 9.6 %
		Y	8.33	77.85	23.01		8.0	

10242-CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	X	2.61	60.00	15.09	6.98	8.0	± 9.6 %
		Y	3.36	62.36	16.50		8.0	
10243-CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	X	2.78	60.00	15.51	6.98	8.0	± 9.6 %
		Y	2.93	60.30	16.05		8.0	
10244-CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	X	3.79	66.78	13.23	3.98	8.0	± 9.6 %
		Y	4.87	70.60	15.90		8.0	
10245-CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	X	3.78	66.56	13.07	3.98	8.0	± 9.6 %
		Y	4.84	70.28	15.70		8.0	
10246-CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	X	3.80	69.00	14.96	3.98	9.0	± 9.6 %
		Y	4.16	72.86	17.49		9.0	
10247-CAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	X	4.41	68.73	15.30	3.98	8.0	± 9.6 %
		Y	4.39	70.69	17.07		8.0	
10248-CAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	X	4.43	68.46	15.15	3.98	8.0	± 9.6 %
		Y	4.41	70.25	16.84		8.0	
10249-CAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	X	4.51	71.44	16.97	3.98	9.0	± 9.6 %
		Y	4.90	75.30	19.35		9.0	
10250-CAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	X	5.40	71.56	18.31	3.98	8.0	± 9.6 %
		Y	5.24	73.04	19.66		8.0	
10251-CAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	X	5.25	70.17	17.33	3.98	8.0	± 9.6 %
		Y	5.02	71.03	18.35		8.0	
10252-CAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	5.27	73.03	18.68	3.98	9.0	± 9.6 %
		Y	5.38	75.66	20.35		9.0	
10253-CAC	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	X	5.56	70.20	17.81	3.98	8.0	± 9.6 %
		Y	5.19	70.47	18.43		8.0	
10254-CAC	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	X	5.87	71.03	18.48	3.98	8.0	± 9.6 %
		Y	5.52	71.47	19.21		8.0	
10255-CAC	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	X	5.58	72.33	18.70	3.98	9.0	± 9.6 %
		Y	5.40	73.62	19.69		9.0	
10256-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	X	3.18	64.59	11.18	3.98	8.0	± 9.6 %
		Y	4.00	67.81	13.69		8.0	
10257-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	X	3.17	64.33	10.95	3.98	8.0	± 9.6 %
		Y	3.97	67.42	13.42		8.0	
10258-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	X	3.22	66.49	12.93	3.98	9.0	± 9.6 %
		Y	3.37	69.56	15.23		9.0	
10259-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	X	4.77	69.75	16.36	3.98	8.0	± 9.6 %
		Y	4.71	71.50	17.97		8.0	
10260-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	X	4.83	69.66	16.31	3.98	8.0	± 9.6 %
		Y	4.76	71.35	17.90		8.0	
10261-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	X	4.73	71.77	17.50	3.98	9.0	± 9.6 %
		Y	4.91	74.79	19.49		9.0	
10262-CAC	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	X	5.39	71.51	18.26	3.98	8.0	± 9.6 %
		Y	5.23	72.97	19.61		8.0	

10263-CAC	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	X	5.25	70.16	17.33	3.98	8.0	± 9.6 %
		Y	5.01	71.01	18.35		8.0	
10264-CAC	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	X	5.24	72.92	18.61	3.98	9.0	± 9.6 %
		Y	5.33	75.48	20.25		9.0	
10265-CAC	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	X	5.60	70.43	18.00	3.98	8.0	± 9.6 %
		Y	5.25	70.84	18.62		8.0	
10266-CAC	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	X	5.96	71.39	18.77	3.98	8.0	± 9.6 %
		Y	5.63	71.95	19.51		8.0	
10267-CAC	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	5.69	72.58	18.70	3.98	9.0	± 9.6 %
		Y	5.58	74.11	19.71		9.0	
10268-CAC	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	X	6.32	70.98	18.74	3.98	8.0	± 9.6 %
		Y	5.93	71.18	19.18		8.0	
10269-CAC	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	X	6.36	70.80	18.70	3.98	8.0	± 9.6 %
		Y	5.94	70.88	19.09		8.0	
10270-CAC	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	X	6.07	71.84	18.58	3.98	9.0	± 9.6 %
		Y	5.79	72.59	19.20		9.0	
10274-CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)	X	2.46	66.65	14.87	0.00	24.0	± 9.6 %
		Y	2.47	66.04	14.78		24.0	
10275-CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)	X	1.48	67.47	15.07	0.00	28.0	± 9.6 %
		Y	1.46	66.76	14.64		28.0	
10277-CAA	PHS (QPSK)	X	5.29	67.70	13.51	9.03	5.0	± 9.6 %
		Y	3.76	64.87	10.80		5.0	
10278-CAA	PHS (QPSK, BW 884MHz, Rolloff 0.5)	X	5.98	69.78	15.72	9.03	5.0	± 9.6 %
		Y	5.57	71.71	16.29		5.0	
10279-CAA	PHS (QPSK, BW 884MHz, Rolloff 0.38)	X	6.02	69.82	15.75	9.03	4.0	± 9.6 %
		Y	5.66	71.85	16.37		4.0	
10290-AAB	CDMA2000, RC1, SO55, Full Rate	X	1.01	65.69	11.24	0.00	28.0	± 9.6 %
		Y	1.19	66.55	12.36		28.0	
10291-AAB	CDMA2000, RC3, SO55, Full Rate	X	0.64	63.98	10.23	0.00	30.0	± 9.6 %
		Y	0.67	63.88	10.74		30.0	
10292-AAB	CDMA2000, RC3, SO32, Full Rate	X	0.90	68.76	12.94	0.00	31.0	± 9.6 %
		Y	0.83	67.31	12.84		31.0	
10293-AAB	CDMA2000, RC3, SO3, Full Rate	X	2.39	80.96	18.14	0.00	30.0	± 9.6 %
		Y	1.34	73.63	16.12		30.0	
10295-AAB	CDMA2000, RC1, SO3, 1/8th Rate 25 fr.	X	8.22	75.46	19.44	9.03	4.0	± 9.6 %
		Y	7.79	77.82	20.79		4.0	
10297-AAB	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	2.53	69.16	16.37	0.00	20.0	± 9.6 %
		Y	2.57	68.83	15.99		20.0	
10298-AAC	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	X	1.18	65.33	11.79	0.00	20.0	± 9.6 %
		Y	1.36	66.20	12.91		20.0	
10299-AAC	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	X	1.09	61.70	8.51	0.00	17.0	± 9.6 %
		Y	2.31	66.09	11.96		17.0	

10300-AAC	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	X	0.94	60.00	6.80	0.00	16.0	± 9.6 %
		Y	1.93	63.42	9.99		16.0	
10301-AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC)	X	3.18	60.00	14.58	4.17	5.0	± 9.6 %
		Y	3.77	60.00	14.29		5.0	
10302-AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC, 3 CTRL symbols)	X	6.51	71.12	20.14	4.96	5.0	± 9.6 %
		Y	5.64	67.71	18.74		5.0	
10303-AAA	IEEE 802.16e WiMAX (31:15, 5ms, 10MHz, 64QAM, PUSC)	X	6.51	71.66	20.33	4.96	5.0	± 9.6 %
		Y	5.45	67.66	18.72		5.0	
10304-AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, 64QAM, PUSC)	X	5.99	70.58	19.42	4.17	6.0	± 9.6 %
		Y	5.16	67.19	18.06		6.0	
10305-AAA	IEEE 802.16e WiMAX (31:15, 10ms, 10MHz, 64QAM, PUSC, 15 symbols)	X	16.08	90.20	26.88	6.02	3.0	± 9.6 %
		Y	6.11	73.09	21.42		3.0	
10306-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 64QAM, PUSC, 18 symbols)	X	9.10	79.16	23.63	6.02	3.0	± 9.6 %
		Y	5.74	70.03	20.32		3.0	
10307-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, PUSC, 18 symbols)	X	9.79	80.72	24.03	6.02	3.0	± 9.6 %
		Y	5.77	70.60	20.43		3.0	
10308-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, PUSC)	X	10.29	81.86	24.47	6.02	3.0	± 9.6 %
		Y	5.81	70.98	20.62		3.0	
10309-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, AMC 2x3, 18 symbols)	X	9.10	79.20	23.71	6.02	3.0	± 9.6 %
		Y	5.80	70.20	20.43		3.0	
10310-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, AMC 2x3, 18 symbols)	X	9.44	79.95	23.86	6.02	3.0	± 9.6 %
		Y	5.75	70.28	20.36		3.0	
10311-AAB	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	X	2.89	68.45	16.06	0.00	19.0	± 9.6 %
		Y	2.92	68.19	15.71		19.0	
10313-AAA	iDEN 1:3	X	3.56	68.79	15.29	6.99	6.0	± 9.6 %
		Y	2.84	68.97	15.00		6.0	
10314-AAA	iDEN 1:6	X	4.88	71.67	18.60	10.00	3.0	± 9.6 %
		Y	6.66	80.69	21.93		3.0	
10315-AAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle)	X	1.08	63.54	14.77	0.17	43.0	± 9.6 %
		Y	1.00	62.96	14.43		43.0	
10316-AAB	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	X	4.42	66.68	16.10	0.17	12.0	± 9.6 %
		Y	4.50	66.49	16.05		12.0	
10317-AAB	IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle)	X	4.42	66.68	16.10	0.17	12.0	± 9.6 %
		Y	4.50	66.49	16.05		12.0	
10400-AAC	IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle)	X	4.46	66.96	16.16	0.00	12.0	± 9.6 %
		Y	4.59	66.78	16.03		12.0	
10401-AAC	IEEE 802.11ac WiFi (40MHz, 64-QAM, 99pc duty cycle)	X	5.13	66.79	16.19	0.00	12.0	± 9.6 %
		Y	5.30	66.97	16.20		12.0	
10402-AAC	IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc duty cycle)	X	5.48	67.38	16.38	0.00	12.0	± 9.6 %
		Y	5.55	67.30	16.25		12.0	
10403-AAB	CDMA2000 (1xEV-DO, Rev. 0)	X	1.01	65.69	11.24	0.00	29.0	± 9.6 %
		Y	1.19	66.55	12.36		29.0	

10404-AAB	CDMA2000 (1xEV-DO, Rev. A)	X	1.01	65.69	11.24	0.00	29.0	± 9.6 %
		Y	1.19	66.55	12.36		29.0	
10406-AAB	CDMA2000, RC3, SO32, SCH0, Full Rate	X	2.43	81.07	18.19	0.00	22.0	± 9.6 %
		Y	5.36	76.45	17.41		22.0	
10410-AAB	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	1.71	67.84	13.57	3.23	12.0	± 9.6 %
		Y	4.12	75.27	16.87		12.0	
10415-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)	X	0.99	62.89	14.41	0.00	45.0	± 9.6 %
		Y	0.93	62.36	13.97		45.0	
10416-AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle)	X	4.36	66.74	16.14	0.00	13.0	± 9.6 %
		Y	4.44	66.50	16.01		13.0	
10417-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 99pc duty cycle)	X	4.36	66.74	16.14	0.00	13.0	± 9.6 %
		Y	4.44	66.50	16.01		13.0	
10418-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Long preambule)	X	4.35	66.94	16.20	0.00	13.0	± 9.6 %
		Y	4.43	66.66	16.03		13.0	
10419-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Short preambule)	X	4.37	66.87	16.18	0.00	13.0	± 9.6 %
		Y	4.45	66.61	16.03		13.0	
10422-AAA	IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)	X	4.48	66.85	16.20	0.00	13.0	± 9.6 %
		Y	4.57	66.61	16.05		13.0	
10423-AAA	IEEE 802.11n (HT Greenfield, 43.3 Mbps, 16-QAM)	X	4.60	67.11	16.28	0.00	12.0	± 9.6 %
		Y	4.72	66.91	16.16		12.0	
10424-AAA	IEEE 802.11n (HT Greenfield, 72.2 Mbps, 64-QAM)	X	4.53	67.06	16.26	0.00	12.0	± 9.6 %
		Y	4.65	66.86	16.13		12.0	
10425-AAA	IEEE 802.11n (HT Greenfield, 15 Mbps, BPSK)	X	5.16	67.26	16.45	0.00	12.0	± 9.6 %
		Y	5.25	67.15	16.31		12.0	
10426-AAA	IEEE 802.11n (HT Greenfield, 90 Mbps, 16-QAM)	X	5.18	67.34	16.49	0.00	12.0	± 9.6 %
		Y	5.26	67.19	16.33		12.0	
10427-AAA	IEEE 802.11n (HT Greenfield, 150 Mbps, 64-QAM)	X	5.14	67.14	16.38	0.00	12.0	± 9.6 %
		Y	5.27	67.17	16.31		12.0	
10430-AAA	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1)	X	4.64	74.14	19.32	0.00	12.0	± 9.6 %
		Y	4.51	72.59	18.99		12.0	
10431-AAA	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1)	X	3.97	67.30	16.01	0.00	12.0	± 9.6 %
		Y	4.10	66.99	15.95		12.0	
10432-AAA	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1)	X	4.29	67.15	16.18	0.00	12.0	± 9.6 %
		Y	4.41	66.89	16.06		12.0	
10433-AAA	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1)	X	4.55	67.10	16.28	0.00	12.0	± 9.6 %
		Y	4.66	66.90	16.15		12.0	
10434-AAA	W-CDMA (BS Test Model 1, 64 DPCH)	X	4.89	75.39	19.24	0.00	11.0	± 9.6 %
		Y	4.71	73.74	19.02		11.0	
10435-AAB	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	1.70	67.70	13.47	3.23	12.0	± 9.6 %
		Y	4.06	75.02	16.74		12.0	

10447-AAA	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	X	3.20	67.07	14.87	0.00	14.0	± 9.6 %
		Y	3.37	66.86	15.13		14.0	
10448-AAA	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1, Clippin 44%)	X	3.83	67.09	15.88	0.00	15.0	± 9.6 %
		Y	3.94	66.77	15.81		15.0	
10449-AAA	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1, Cliping 44%)	X	4.13	66.98	16.09	0.00	15.0	± 9.6 %
		Y	4.23	66.72	15.96		15.0	
10450-AAA	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	X	4.35	66.87	16.14	0.00	15.0	± 9.6 %
		Y	4.43	66.66	16.00		15.0	
10451-AAA	W-CDMA (BS Test Model 1, 64 DPCH, Clipping 44%)	X	3.00	66.83	14.13	0.00	14.0	± 9.6 %
		Y	3.23	66.92	14.66		14.0	
10456-AAA	IEEE 802.11ac WiFi (160MHz, 64-QAM, 99pc duty cycle)	X	6.08	67.77	16.60	0.00	12.0	± 9.6 %
		Y	6.12	67.72	16.48		12.0	
10457-AAA	UMTS-FDD (DC-HSDPA)	X	3.71	65.49	15.87	0.00	18.0	± 9.6 %
		Y	3.72	65.16	15.72		18.0	
10458-AAA	CDMA2000 (1xEV-DO, Rev. B, 2 carriers)	X	2.70	65.51	12.93	0.00	17.0	± 9.6 %
		Y	3.04	66.16	13.97		17.0	
10459-AAA	CDMA2000 (1xEV-DO, Rev. B, 3 carriers)	X	2.69	60.00	12.53	0.00	13.0	± 9.6 %
		Y	3.39	60.00	12.64		13.0	
10460-AAA	UMTS-FDD (WCDMA, AMR)	X	0.83	67.36	15.48	0.00	37.0	± 9.6 %
		Y	0.76	66.33	14.65		37.0	
10461-AAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	1.16	63.59	12.26	3.29	12.0	± 9.6 %
		Y	2.89	71.69	16.03		12.0	
10462-AAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	0.81	60.00	7.65	3.23	11.0	± 9.6 %
		Y	1.96	63.47	10.81		11.0	
10463-AAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	0.82	60.00	7.15	3.23	10.0	± 9.6 %
		Y	1.71	61.81	9.66		10.0	
10464-AAA	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	1.04	62.46	11.27	3.23	12.0	± 9.6 %
		Y	2.47	69.56	14.79		12.0	
10465-AAA	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	0.81	60.00	7.60	3.23	11.0	± 9.6 %
		Y	1.89	63.00	10.54		11.0	
10466-AAA	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	0.82	60.00	7.11	3.23	10.0	± 9.6 %
		Y	1.67	61.48	9.45		10.0	
10467-AAB	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	1.04	62.59	11.37	3.23	12.0	± 9.6 %
		Y	2.52	69.88	14.95		12.0	
10468-AAB	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	0.81	60.00	7.62	3.23	11.0	± 9.6 %
		Y	1.90	63.12	10.61		11.0	
10469-AAB	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	0.82	60.00	7.10	3.23	10.0	± 9.6 %
		Y	1.66	61.49	9.46		10.0	
10470-AAB	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	1.04	62.58	11.36	3.23	12.0	± 9.6 %
		Y	2.51	69.86	14.94		12.0	
10471-AAB	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	0.81	60.00	7.60	3.23	11.0	± 9.6 %
		Y	1.90	63.10	10.59		11.0	

10472-AAB	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	0.82	60.00	7.09	3.23	10.0	± 9.6 %
		Y	1.66	61.47	9.44		10.0	
10473-AAB	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	1.04	62.57	11.35	3.23	12.0	± 9.6 %
		Y	2.51	69.84	14.93		12.0	
10474-AAB	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	0.81	60.00	7.60	3.23	11.0	± 9.6 %
		Y	1.89	63.08	10.59		11.0	
10475-AAB	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	0.82	60.00	7.09	3.23	10.0	± 9.6 %
		Y	1.66	61.46	9.44		10.0	
10477-AAB	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	0.81	60.00	7.58	3.23	11.0	± 9.6 %
		Y	1.88	62.98	10.52		11.0	
10478-AAB	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	0.82	60.00	7.08	3.23	10.0	± 9.6 %
		Y	1.66	61.44	9.42		10.0	
10479-AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	2.19	67.17	14.46	3.23	12.0	± 9.6 %
		Y	3.56	71.87	16.96		12.0	
10480-AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	1.68	62.86	10.83	3.23	11.0	± 9.6 %
		Y	3.62	68.57	14.37		11.0	
10481-AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	1.52	61.61	9.87	3.23	11.0	± 9.6 %
		Y	3.30	67.12	13.47		11.0	
10482-AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	1.86	63.88	12.03	2.23	13.0	± 9.6 %
		Y	2.21	67.48	14.61		13.0	
10483-AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	1.70	60.96	9.58	2.23	11.0	± 9.6 %
		Y	2.73	65.59	12.93		11.0	
10484-AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	1.71	60.78	9.47	2.23	11.0	± 9.6 %
		Y	2.70	65.22	12.76		11.0	
10485-AAB	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	2.36	66.44	14.32	2.23	13.0	± 9.6 %
		Y	2.59	69.21	16.31		13.0	
10486-AAB	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	2.45	64.47	12.77	2.23	11.0	± 9.6 %
		Y	2.71	66.79	14.73		11.0	
10487-AAB	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	2.47	64.28	12.65	2.23	11.0	± 9.6 %
		Y	2.73	66.53	14.60		11.0	
10488-AAB	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	2.91	67.63	15.87	2.23	13.0	± 9.6 %
		Y	3.00	69.31	17.07		13.0	
10489-AAB	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.16	66.33	15.21	2.23	12.0	± 9.6 %
		Y	3.15	67.17	16.16		12.0	
10490-AAB	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.24	66.30	15.21	2.23	11.0	± 9.6 %
		Y	3.25	67.10	16.14		11.0	
10491-AAB	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	3.31	67.45	16.07	2.23	13.0	± 9.6 %
		Y	3.34	68.58	16.91		13.0	
10492-AAB	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.60	66.36	15.71	2.23	11.0	± 9.6 %
		Y	3.54	66.80	16.33		11.0	

10493-AAB	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.66	66.31	15.70	2.23	11.0	± 9.6 %
		Y	3.61	66.73	16.31		11.0	
10494-AAB	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	3.43	68.14	16.30	2.23	13.0	± 9.6 %
		Y	3.53	69.69	17.25		13.0	
10495-AAB	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.62	66.56	15.89	2.23	12.0	± 9.6 %
		Y	3.56	67.11	16.50		12.0	
10496-AAB	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.72	66.50	15.90	2.23	11.0	± 9.6 %
		Y	3.65	66.95	16.47		11.0	
10497-AAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	1.38	60.80	9.38	2.23	13.0	± 9.6 %
		Y	1.64	63.90	11.96		13.0	
10498-AAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	1.43	60.00	7.94	2.23	11.0	± 9.6 %
		Y	1.42	60.14	8.97		11.0	
10499-AAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	1.45	60.00	7.80	2.23	10.0	± 9.6 %
		Y	1.42	60.00	8.76		10.0	
10500-AAA	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	2.58	66.91	14.94	2.23	13.0	± 9.6 %
		Y	2.73	69.06	16.55		13.0	
10501-AAA	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	2.76	65.37	13.77	2.23	11.0	± 9.6 %
		Y	2.91	67.03	15.32		11.0	
10502-AAA	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	2.80	65.28	13.67	2.23	11.0	± 9.6 %
		Y	2.97	66.95	15.23		11.0	
10503-AAB	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	2.89	67.49	15.79	2.23	13.0	± 9.6 %
		Y	2.97	69.12	16.97		13.0	
10504-AAB	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.14	66.24	15.15	2.23	12.0	± 9.6 %
		Y	3.13	67.07	16.10		12.0	
10505-AAB	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.23	66.22	15.15	2.23	11.0	± 9.6 %
		Y	3.23	66.99	16.08		11.0	
10506-AAB	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	3.41	68.03	16.24	2.23	13.0	± 9.6 %
		Y	3.50	69.54	17.17		13.0	
10507-AAB	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.61	66.51	15.85	2.23	12.0	± 9.6 %
		Y	3.54	67.04	16.46		12.0	
10508-AAB	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.71	66.44	15.86	2.23	11.0	± 9.6 %
		Y	3.64	66.88	16.42		11.0	
10509-AAB	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	3.89	67.89	16.28	2.23	12.0	± 9.6 %
		Y	3.93	68.97	16.96		12.0	
10510-AAB	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	4.12	66.61	16.13	2.23	11.0	± 9.6 %
		Y	4.04	67.01	16.57		11.0	
10511-AAB	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	4.20	66.54	16.14	2.23	11.0	± 9.6 %
		Y	4.11	66.84	16.54		11.0	

10512-AAB	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	3.86	68.44	16.38	2.23	13.0	± 9.6 %
		Y	3.98	70.01	17.26		13.0	
10513-AAB	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	4.00	66.65	16.14	2.23	12.0	± 9.6 %
		Y	3.91	67.17	16.62		12.0	
10514-AAB	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	4.06	66.48	16.12	2.23	11.0	± 9.6 %
		Y	3.96	66.87	16.55		11.0	
10515-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 99pc duty cycle)	X	0.95	63.04	14.45	0.00	45.0	± 9.6 %
		Y	0.89	62.49	13.99		45.0	
10516-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 99pc duty cycle)	X	0.53	68.18	16.09	0.00	43.0	± 9.6 %
		Y	0.45	67.26	14.86		43.0	
10517-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 99pc duty cycle)	X	0.79	64.54	14.88	0.00	44.0	± 9.6 %
		Y	0.73	63.90	14.24		44.0	
10518-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 99pc duty cycle)	X	4.35	66.84	16.14	0.00	13.0	± 9.6 %
		Y	4.43	66.57	15.99		13.0	
10519-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 99pc duty cycle)	X	4.49	67.01	16.22	0.00	12.0	± 9.6 %
		Y	4.61	66.79	16.10		12.0	
10520-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 99pc duty cycle)	X	4.35	66.94	16.14	0.00	13.0	± 9.6 %
		Y	4.46	66.74	16.02		13.0	
10521-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 99pc duty cycle)	X	4.28	66.90	16.12	0.00	13.0	± 9.6 %
		Y	4.39	66.73	16.00		13.0	
10522-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 99pc duty cycle)	X	4.33	67.02	16.21	0.00	12.0	± 9.6 %
		Y	4.45	66.84	16.10		12.0	
10523-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 99pc duty cycle)	X	4.26	67.03	16.14	0.00	13.0	± 9.6 %
		Y	4.34	66.71	15.94		13.0	
10524-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 99pc duty cycle)	X	4.28	66.98	16.20	0.00	13.0	± 9.6 %
		Y	4.40	66.75	16.06		13.0	
10525-AAA	IEEE 802.11ac WiFi (20MHz, MCS0, 99pc duty cycle)	X	4.32	66.10	15.83	0.00	12.0	± 9.6 %
		Y	4.39	65.80	15.66		12.0	
10526-AAA	IEEE 802.11ac WiFi (20MHz, MCS1, 99pc duty cycle)	X	4.44	66.37	15.94	0.00	12.0	± 9.6 %
		Y	4.55	66.14	15.79		12.0	
10527-AAA	IEEE 802.11ac WiFi (20MHz, MCS2, 99pc duty cycle)	X	4.37	66.34	15.88	0.00	13.0	± 9.6 %
		Y	4.47	66.10	15.73		13.0	
10528-AAA	IEEE 802.11ac WiFi (20MHz, MCS3, 99pc duty cycle)	X	4.38	66.35	15.91	0.00	12.0	± 9.6 %
		Y	4.48	66.12	15.76		12.0	
10529-AAA	IEEE 802.11ac WiFi (20MHz, MCS4, 99pc duty cycle)	X	4.38	66.35	15.91	0.00	12.0	± 9.6 %
		Y	4.48	66.12	15.76		12.0	
10531-AAA	IEEE 802.11ac WiFi (20MHz, MCS6, 99pc duty cycle)	X	4.35	66.37	15.89	0.00	12.0	± 9.6 %
		Y	4.47	66.20	15.76		12.0	
10532-AAA	IEEE 802.11ac WiFi (20MHz, MCS7, 99pc duty cycle)	X	4.23	66.23	15.82	0.00	13.0	± 9.6 %
		Y	4.33	66.05	15.69		13.0	

10533-AAA	IEEE 802.11ac WiFi (20MHz, MCS8, 99pc duty cycle)	X	4.39	66.43	15.92	0.00	12.0	± 9.6 %
		Y	4.49	66.17	15.75		12.0	
10534-AAA	IEEE 802.11ac WiFi (40MHz, MCS0, 99pc duty cycle)	X	4.95	66.36	15.99	0.00	12.0	± 9.6 %
		Y	5.03	66.24	15.84		12.0	
10535-AAA	IEEE 802.11ac WiFi (40MHz, MCS1, 99pc duty cycle)	X	4.99	66.48	16.05	0.00	12.0	± 9.6 %
		Y	5.09	66.41	15.92		12.0	
10536-AAA	IEEE 802.11ac WiFi (40MHz, MCS2, 99pc duty cycle)	X	4.88	66.48	16.02	0.00	13.0	± 9.6 %
		Y	4.96	66.35	15.87		13.0	
10537-AAA	IEEE 802.11ac WiFi (40MHz, MCS3, 99pc duty cycle)	X	4.94	66.48	16.03	0.00	12.0	± 9.6 %
		Y	5.02	66.32	15.86		12.0	
10538-AAA	IEEE 802.11ac WiFi (40MHz, MCS4, 99pc duty cycle)	X	5.01	66.44	16.05	0.00	12.0	± 9.6 %
		Y	5.11	66.34	15.91		12.0	
10540-AAA	IEEE 802.11ac WiFi (40MHz, MCS6, 99pc duty cycle)	X	4.94	66.40	16.04	0.00	12.0	± 9.6 %
		Y	5.04	66.34	15.92		12.0	
10541-AAA	IEEE 802.11ac WiFi (40MHz, MCS7, 99pc duty cycle)	X	4.93	66.33	15.99	0.00	12.0	± 9.6 %
		Y	5.01	66.23	15.86		12.0	
10542-AAA	IEEE 802.11ac WiFi (40MHz, MCS8, 99pc duty cycle)	X	5.08	66.43	16.06	0.00	12.0	± 9.6 %
		Y	5.17	66.31	15.92		12.0	
10543-AAA	IEEE 802.11ac WiFi (40MHz, MCS9, 99pc duty cycle)	X	5.16	66.51	16.12	0.00	12.0	± 9.6 %
		Y	5.24	66.35	15.96		12.0	
10544-AAA	IEEE 802.11ac WiFi (80MHz, MCS0, 99pc duty cycle)	X	5.30	66.44	15.98	0.00	12.0	± 9.6 %
		Y	5.35	66.36	15.85		12.0	
10545-AAA	IEEE 802.11ac WiFi (80MHz, MCS1, 99pc duty cycle)	X	5.47	66.86	16.15	0.00	12.0	± 9.6 %
		Y	5.52	66.73	15.98		12.0	
10546-AAA	IEEE 802.11ac WiFi (80MHz, MCS2, 99pc duty cycle)	X	5.33	66.56	16.01	0.00	13.0	± 9.6 %
		Y	5.40	66.53	15.90		13.0	
10547-AAA	IEEE 802.11ac WiFi (80MHz, MCS3, 99pc duty cycle)	X	5.41	66.67	16.06	0.00	12.0	± 9.6 %
		Y	5.47	66.58	15.92		12.0	
10548-AAA	IEEE 802.11ac WiFi (80MHz, MCS4, 99pc duty cycle)	X	5.54	67.24	16.32	0.00	13.0	± 9.6 %
		Y	5.67	67.31	16.24		13.0	
10550-AAA	IEEE 802.11ac WiFi (80MHz, MCS6, 99pc duty cycle)	X	5.39	66.74	16.11	0.00	13.0	± 9.6 %
		Y	5.43	66.57	15.93		13.0	
10551-AAA	IEEE 802.11ac WiFi (80MHz, MCS7, 99pc duty cycle)	X	5.32	66.53	15.97	0.00	12.0	± 9.6 %
		Y	5.43	66.60	15.90		12.0	
10552-AAA	IEEE 802.11ac WiFi (80MHz, MCS8, 99pc duty cycle)	X	5.30	66.56	15.99	0.00	12.0	± 9.6 %
		Y	5.36	66.43	15.83		12.0	
10553-AAA	IEEE 802.11ac WiFi (80MHz, MCS9, 99pc duty cycle)	X	5.36	66.51	15.99	0.00	12.0	± 9.6 %
		Y	5.44	66.46	15.87		12.0	
10554-AAA	IEEE 1602.11ac WiFi (160MHz, MCS0, 99pc duty cycle)	X	5.72	66.77	16.06	0.00	12.0	± 9.6 %
		Y	5.75	66.71	15.93		12.0	
10555-AAA	IEEE 1602.11ac WiFi (160MHz, MCS1, 99pc duty cycle)	X	5.81	66.99	16.15	0.00	12.0	± 9.6 %
		Y	5.87	66.98	16.04		12.0	

10556-AAA	IEEE 1602.11ac WiFi (160MHz, MCS2, 99pc duty cycle)	X	5.85	67.09	16.19	0.00	12.0	± 9.6 %
		Y	5.89	67.03	16.06		12.0	
10557-AAA	IEEE 1602.11ac WiFi (160MHz, MCS3, 99pc duty cycle)	X	5.80	66.97	16.15	0.00	12.0	± 9.6 %
		Y	5.86	66.94	16.04		12.0	
10558-AAA	IEEE 1602.11ac WiFi (160MHz, MCS4, 99pc duty cycle)	X	5.81	67.03	16.19	0.00	12.0	± 9.6 %
		Y	5.90	67.09	16.12		12.0	
10560-AAA	IEEE 1602.11ac WiFi (160MHz, MCS6, 99pc duty cycle)	X	5.83	66.96	16.20	0.00	12.0	± 9.6 %
		Y	5.90	66.96	16.10		12.0	
10561-AAA	IEEE 1602.11ac WiFi (160MHz, MCS7, 99pc duty cycle)	X	5.76	66.94	16.22	0.00	12.0	± 9.6 %
		Y	5.82	66.92	16.12		12.0	
10562-AAA	IEEE 1602.11ac WiFi (160MHz, MCS8, 99pc duty cycle)	X	5.81	67.10	16.30	0.00	12.0	± 9.6 %
		Y	5.93	67.24	16.27		12.0	
10563-AAA	IEEE 1602.11ac WiFi (160MHz, MCS9, 99pc duty cycle)	X	5.92	67.08	16.26	0.00	12.0	± 9.6 %
		Y	6.07	67.27	16.24		12.0	
10564-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 99pc duty cycle)	X	4.67	66.82	16.22	0.46	13.0	± 9.6 %
		Y	4.75	66.61	16.11		13.0	
10565-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 99pc duty cycle)	X	4.87	67.28	16.58	0.46	12.0	± 9.6 %
		Y	4.98	67.11	16.48		12.0	
10566-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 99pc duty cycle)	X	4.70	67.05	16.35	0.46	13.0	± 9.6 %
		Y	4.81	66.90	16.26		13.0	
10567-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 99pc duty cycle)	X	4.75	67.57	16.81	0.46	13.0	± 9.6 %
		Y	4.86	67.40	16.70		13.0	
10568-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 99pc duty cycle)	X	4.59	66.72	16.03	0.46	12.0	± 9.6 %
		Y	4.72	66.61	15.97		12.0	
10569-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 99pc duty cycle)	X	4.75	67.83	16.96	0.46	13.0	± 9.6 %
		Y	4.83	67.56	16.80		13.0	
10570-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 99pc duty cycle)	X	4.74	67.56	16.82	0.46	13.0	± 9.6 %
		Y	4.85	67.34	16.68		13.0	
10571-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 90pc duty cycle)	X	1.18	63.80	14.77	0.46	41.0	± 9.6 %
		Y	1.07	63.26	14.58		41.0	
10572-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 90pc duty cycle)	X	1.19	64.28	15.08	0.46	41.0	± 9.6 %
		Y	1.07	63.74	14.90		41.0	
10573-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 90pc duty cycle)	X	1.01	72.30	17.70	0.46	39.0	± 9.6 %
		Y	0.88	72.63	17.66		39.0	
10574-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 90pc duty cycle)	X	1.22	68.70	17.44	0.46	40.0	± 9.6 %
		Y	1.10	68.39	17.38		40.0	
10575-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 90pc duty cycle)	X	4.47	66.59	16.19	0.46	12.0	± 9.6 %
		Y	4.55	66.41	16.15		12.0	
10576-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 90pc duty cycle)	X	4.51	66.82	16.29	0.46	12.0	± 9.6 %
		Y	4.58	66.60	16.24		12.0	
10577-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 90pc duty cycle)	X	4.67	67.06	16.45	0.46	12.0	± 9.6 %
		Y	4.77	66.90	16.41		12.0	

10578-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 90pc duty cycle)	X	4.58	67.25	16.59	0.46	12.0	± 9.6 %
		Y	4.68	67.09	16.55		12.0	
10579-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 90pc duty cycle)	X	4.32	66.28	15.72	0.46	12.0	± 9.6 %
		Y	4.42	66.19	15.71		12.0	
10580-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 90pc duty cycle)	X	4.35	66.31	15.72	0.46	11.0	± 9.6 %
		Y	4.47	66.23	15.73		11.0	
10581-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 90pc duty cycle)	X	4.49	67.31	16.55	0.46	12.0	± 9.6 %
		Y	4.57	67.10	16.47		12.0	
10582-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 90pc duty cycle)	X	4.24	66.00	15.46	0.46	11.0	± 9.6 %
		Y	4.36	65.91	15.46		11.0	
10583-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 90pc duty cycle)	X	4.47	66.59	16.19	0.46	12.0	± 9.6 %
		Y	4.55	66.41	16.15		12.0	
10584-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 90pc duty cycle)	X	4.51	66.82	16.29	0.46	12.0	± 9.6 %
		Y	4.58	66.60	16.24		12.0	
10585-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 90pc duty cycle)	X	4.67	67.06	16.45	0.46	12.0	± 9.6 %
		Y	4.77	66.90	16.41		12.0	
10586-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 90pc duty cycle)	X	4.58	67.25	16.59	0.46	12.0	± 9.6 %
		Y	4.68	67.09	16.55		12.0	
10587-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 90pc duty cycle)	X	4.32	66.28	15.72	0.46	12.0	± 9.6 %
		Y	4.42	66.19	15.71		12.0	
10588-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 90pc duty cycle)	X	4.35	66.31	15.72	0.46	11.0	± 9.6 %
		Y	4.47	66.23	15.73		11.0	
10589-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 90pc duty cycle)	X	4.49	67.31	16.55	0.46	12.0	± 9.6 %
		Y	4.57	67.10	16.47		12.0	
10590-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 90pc duty cycle)	X	4.24	66.00	15.46	0.46	11.0	± 9.6 %
		Y	4.36	65.91	15.46		11.0	
10591-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS0, 90pc duty cycle)	X	4.63	66.72	16.34	0.46	12.0	± 9.6 %
		Y	4.71	66.52	16.29		12.0	
10592-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS1, 90pc duty cycle)	X	4.75	67.00	16.46	0.46	11.0	± 9.6 %
		Y	4.85	66.85	16.42		11.0	
10593-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS2, 90pc duty cycle)	X	4.66	66.85	16.30	0.46	12.0	± 9.6 %
		Y	4.77	66.72	16.27		12.0	
10594-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS3, 90pc duty cycle)	X	4.72	67.06	16.49	0.46	11.0	± 9.6 %
		Y	4.83	66.92	16.45		11.0	
10595-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS4, 90pc duty cycle)	X	4.69	67.02	16.39	0.46	11.0	± 9.6 %
		Y	4.79	66.85	16.33		11.0	
10596-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS5, 90pc duty cycle)	X	4.62	66.96	16.36	0.46	11.0	± 9.6 %
		Y	4.72	66.82	16.32		11.0	
10597-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS6, 90pc duty cycle)	X	4.57	66.81	16.20	0.46	11.0	± 9.6 %
		Y	4.67	66.70	16.18		11.0	
10598-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS7, 90pc duty cycle)	X	4.57	67.13	16.53	0.46	12.0	± 9.6 %
		Y	4.67	67.01	16.50		12.0	

10599-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS0, 90pc duty cycle)	X	5.31	67.16	16.59	0.46	11.0	± 9.6 %
		Y	5.37	67.02	16.49		11.0	
10600-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS1, 90pc duty cycle)	X	5.40	67.46	16.71	0.46	11.0	± 9.6 %
		Y	5.49	67.37	16.63		11.0	
10601-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS2, 90pc duty cycle)	X	5.31	67.28	16.64	0.46	11.0	± 9.6 %
		Y	5.39	67.17	16.55		11.0	
10602-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS3, 90pc duty cycle)	X	5.39	67.27	16.54	0.46	11.0	± 9.6 %
		Y	5.49	67.21	16.47		11.0	
10603-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS4, 90pc duty cycle)	X	5.47	67.62	16.87	0.46	11.0	± 9.6 %
		Y	5.57	67.52	16.78		11.0	
10604-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS5, 90pc duty cycle)	X	5.35	67.24	16.65	0.46	12.0	± 9.6 %
		Y	5.41	67.10	16.55		12.0	
10605-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS6, 90pc duty cycle)	X	5.38	67.33	16.68	0.46	11.0	± 9.6 %
		Y	5.48	67.28	16.63		11.0	
10606-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS7, 90pc duty cycle)	X	5.17	66.76	16.25	0.46	11.0	± 9.6 %
		Y	5.22	66.60	16.14		11.0	
10607-AAA	IEEE 802.11ac WiFi (20MHz, MCS0, 90pc duty cycle)	X	4.47	66.02	15.97	0.46	12.0	± 9.6 %
		Y	4.54	65.81	15.90		12.0	
10608-AAA	IEEE 802.11ac WiFi (20MHz, MCS1, 90pc duty cycle)	X	4.60	66.34	16.11	0.46	11.0	± 9.6 %
		Y	4.71	66.19	16.06		11.0	
10609-AAA	IEEE 802.11ac WiFi (20MHz, MCS2, 90pc duty cycle)	X	4.50	66.14	15.91	0.46	12.0	± 9.6 %
		Y	4.60	66.00	15.87		12.0	
10610-AAA	IEEE 802.11ac WiFi (20MHz, MCS3, 90pc duty cycle)	X	4.55	66.35	16.10	0.46	11.0	± 9.6 %
		Y	4.65	66.20	16.06		11.0	
10611-AAA	IEEE 802.11ac WiFi (20MHz, MCS4, 90pc duty cycle)	X	4.46	66.12	15.92	0.46	11.0	± 9.6 %
		Y	4.57	65.97	15.88		11.0	
10612-AAA	IEEE 802.11ac WiFi (20MHz, MCS5, 90pc duty cycle)	X	4.45	66.20	15.93	0.46	11.0	± 9.6 %
		Y	4.57	66.09	15.90		11.0	
10613-AAA	IEEE 802.11ac WiFi (20MHz, MCS6, 90pc duty cycle)	X	4.44	66.02	15.78	0.46	11.0	± 9.6 %
		Y	4.57	65.95	15.77		11.0	
10614-AAA	IEEE 802.11ac WiFi (20MHz, MCS7, 90pc duty cycle)	X	4.43	66.34	16.10	0.46	12.0	± 9.6 %
		Y	4.53	66.22	16.07		12.0	
10615-AAA	IEEE 802.11ac WiFi (20MHz, MCS8, 90pc duty cycle)	X	4.44	65.88	15.64	0.46	11.0	± 9.6 %
		Y	4.56	65.74	15.61		11.0	
10616-AAA	IEEE 802.11ac WiFi (40MHz, MCS0, 90pc duty cycle)	X	5.10	66.33	16.17	0.46	11.0	± 9.6 %
		Y	5.19	66.28	16.11		11.0	
10617-AAA	IEEE 802.11ac WiFi (40MHz, MCS1, 90pc duty cycle)	X	5.14	66.43	16.19	0.46	11.0	± 9.6 %
		Y	5.25	66.43	16.15		11.0	
10618-AAA	IEEE 802.11ac WiFi (40MHz, MCS2, 90pc duty cycle)	X	5.06	66.52	16.25	0.46	12.0	± 9.6 %
		Y	5.14	66.46	16.19		12.0	
10619-AAA	IEEE 802.11ac WiFi (40MHz, MCS3, 90pc duty cycle)	X	5.07	66.31	16.07	0.46	11.0	± 9.6 %
		Y	5.15	66.22	15.99		11.0	

10620-AAA	IEEE 802.11ac WiFi (40MHz, MCS4, 90pc duty cycle)	X	5.14	66.31	16.12	0.46	11.0	± 9.6 %
		Y	5.24	66.27	16.07		11.0	
10621-AAA	IEEE 802.11ac WiFi (40MHz, MCS5, 90pc duty cycle)	X	5.16	66.50	16.36	0.46	12.0	± 9.6 %
		Y	5.26	66.49	16.32		12.0	
10622-AAA	IEEE 802.11ac WiFi (40MHz, MCS6, 90pc duty cycle)	X	5.15	66.58	16.39	0.46	12.0	± 9.6 %
		Y	5.26	66.63	16.38		12.0	
10623-AAA	IEEE 802.11ac WiFi (40MHz, MCS7, 90pc duty cycle)	X	5.02	66.07	15.98	0.46	11.0	± 9.6 %
		Y	5.13	66.09	15.96		11.0	
10624-AAA	IEEE 802.11ac WiFi (40MHz, MCS8, 90pc duty cycle)	X	5.22	66.35	16.19	0.46	11.0	± 9.6 %
		Y	5.33	66.32	16.15		11.0	
10625-AAA	IEEE 802.11ac WiFi (40MHz, MCS9, 90pc duty cycle)	X	5.31	66.50	16.33	0.46	11.0	± 9.6 %
		Y	5.64	67.13	16.60		11.0	
10626-AAA	IEEE 802.11ac WiFi (80MHz, MCS0, 90pc duty cycle)	X	5.43	66.35	16.12	0.46	11.0	± 9.6 %
		Y	5.49	66.34	16.07		11.0	
10627-AAA	IEEE 802.11ac WiFi (80MHz, MCS1, 90pc duty cycle)	X	5.65	66.92	16.37	0.46	11.0	± 9.6 %
		Y	5.71	66.85	16.29		11.0	
10628-AAA	IEEE 802.11ac WiFi (80MHz, MCS2, 90pc duty cycle)	X	5.41	66.29	15.98	0.46	12.0	± 9.6 %
		Y	5.50	66.35	15.96		12.0	
10629-AAA	IEEE 802.11ac WiFi (80MHz, MCS3, 90pc duty cycle)	X	5.52	66.46	16.06	0.46	11.0	± 9.6 %
		Y	5.58	66.40	15.98		11.0	
10630-AAA	IEEE 802.11ac WiFi (80MHz, MCS4, 90pc duty cycle)	X	5.74	67.33	16.50	0.46	12.0	± 9.6 %
		Y	5.93	67.60	16.56		12.0	
10631-AAA	IEEE 802.11ac WiFi (80MHz, MCS5, 90pc duty cycle)	X	5.74	67.51	16.82	0.46	11.0	± 9.6 %
		Y	5.90	67.72	16.86		11.0	
10632-AAA	IEEE 802.11ac WiFi (80MHz, MCS6, 90pc duty cycle)	X	5.66	67.17	16.66	0.46	12.0	± 9.6 %
		Y	5.70	67.03	16.54		12.0	
10633-AAA	IEEE 802.11ac WiFi (80MHz, MCS7, 90pc duty cycle)	X	5.45	66.41	16.09	0.46	11.0	± 9.6 %
		Y	5.58	66.57	16.11		11.0	
10634-AAA	IEEE 802.11ac WiFi (80MHz, MCS8, 90pc duty cycle)	X	5.48	66.62	16.26	0.46	11.0	± 9.6 %
		Y	5.56	66.63	16.21		11.0	
10635-AAA	IEEE 802.11ac WiFi (80MHz, MCS9, 90pc duty cycle)	X	5.32	65.74	15.50	0.46	11.0	± 9.6 %
		Y	5.42	65.83	15.50		11.0	
10636-AAA	IEEE 1602.11ac WiFi (160MHz, MCS0, 90pc duty cycle)	X	5.85	66.68	16.20	0.46	11.0	± 9.6 %
		Y	5.90	66.69	16.15		11.0	
10637-AAA	IEEE 1602.11ac WiFi (160MHz, MCS1, 90pc duty cycle)	X	5.97	66.97	16.33	0.46	12.0	± 9.6 %
		Y	6.05	67.04	16.31		12.0	
10638-AAA	IEEE 1602.11ac WiFi (160MHz, MCS2, 90pc duty cycle)	X	5.99	67.03	16.33	0.46	11.0	± 9.6 %
		Y	6.05	67.01	16.27		11.0	
10639-AAA	IEEE 1602.11ac WiFi (160MHz, MCS3, 90pc duty cycle)	X	5.95	66.92	16.33	0.46	11.0	± 9.6 %
		Y	6.02	66.98	16.30		11.0	
10640-AAA	IEEE 1602.11ac WiFi (160MHz, MCS4, 90pc duty cycle)	X	5.90	66.78	16.19	0.46	11.0	± 9.6 %
		Y	6.02	66.93	16.21		11.0	

10641-AAA	IEEE 1602.11ac WiFi (160MHz, MCS5, 90pc duty cycle)	X	6.00	66.85	16.25	0.46	11.0	± 9.6 %
		Y	6.07	66.87	16.20		11.0	
10642-AAA	IEEE 1602.11ac WiFi (160MHz, MCS6, 90pc duty cycle)	X	6.04	67.13	16.58	0.46	11.0	± 9.6 %
		Y	6.12	67.21	16.56		11.0	
10643-AAA	IEEE 1602.11ac WiFi (160MHz, MCS7, 90pc duty cycle)	X	5.87	66.75	16.25	0.46	11.0	± 9.6 %
		Y	5.95	66.80	16.23		11.0	
10644-AAA	IEEE 1602.11ac WiFi (160MHz, MCS8, 90pc duty cycle)	X	5.93	66.94	16.37	0.46	11.0	± 9.6 %
		Y	6.08	67.22	16.46		11.0	
10645-AAA	IEEE 1602.11ac WiFi (160MHz, MCS9, 90pc duty cycle)	X	6.06	66.99	16.36	0.46	11.0	± 9.6 %
		Y	6.28	67.40	16.50		11.0	
10646-AAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,7)	X	6.88	78.71	24.07	9.30	5.0	± 9.6 %
		Y	9.51	86.60	27.42		5.0	
10647-AAB	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,7)	X	6.61	78.52	24.06	9.30	5.0	± 9.6 %
		Y	8.95	86.04	27.32		5.0	
10648-AAA	CDMA2000 (1x Advanced)	X	0.51	61.65	8.39	0.00	30.0	± 9.6 %
		Y	0.56	61.89	9.08		30.0	

[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Calibration Laboratory of
Schmid & Partner
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Client **PC Test**

Certificate No: 5G-Veri30-1002_Jan18/2

CALIBRATION CERTIFICATE (Replacement of No: 5G-Veri30-1002_Jan18)

Object	5G Verification Source 30 GHz – SN: 1002
Calibration procedure(s)	QA CAL-45.v1 Calibration procedure for 5G Verification and Validation Sources
Calibration date:	January 08, 2018

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Reference Probe EUmmWV2	SN: 9363	20-Apr-17 (No. EUmmWV2-9363_Apr17)	Apr-18
DAE4	SN: 1215	02-Feb-17 (No. DAE4-1215_Feb17)	Feb-18
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**

	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 9, 2018

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

Glossary

CW Continuous wave

Calibration is Performed According to the Following Standards

- Internal procedure QA CAL-45-5Gsources
- IEC TR-63170 ED1, "Measurement procedure for the evaluation of power density related to human exposure to radio frequency fields from wireless communication devices operating between 6 GHz and 100 GHz", November 2017
- DASY6 Handbook

Methods Applied and Interpretation of Parameters

- *Coordinate System:* z-axis in the waveguide horn boresight, x-axis is in the direction of the E-field, y-axis normal to the others in the field scanning plane parallel to the horn flare and horn flange.
- *Measurement Conditions: (1) 10 GHz:* The forward power to the horn antenna is measured prior and after the measurement with a power sensor. During the measurements, the horn is directly mounted to the waveguide source and the reflected power is monitored and adjusted. (2) 30, 60 and 90 GHz: The verification sources are switched on for at least 30 minutes. Absorbers are used around the probe cup to minimize reflections.
- *Horn Positioning:* The waveguide horn is mounted vertically on the flange of the waveguide source to allow vertical positioning of the EUmmW probe during the scan. The plane is parallel to the phantom surface (plane height defined by teaching the point at the surface of the flare of the horn).
- *E- field distribution:* E field is measured in four x-y-planes (10mm, 10mm + $\lambda/4$, 150mm; 150mm+ $\lambda/4$) with a vectorial E-field probe. The results at 150 mm are used to derive radiated power P_{rad} using numerically determined values. The E-field value stated as calibration value represents the E-field-maxima and the averaged (1cm^2 and 4cm^2) power density values at 10mm in front of the horn.
- *E-field polarization:* Above the open horn, linear polarization of the field is expected.

Calibrated Quantity

- Local peak E-field and spatial-averaged power density S (1 cm^2 and 4cm^2) at 10, 30, 60 or 90 GHz.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	cDASY6 5G module	V1.0.0.12565
Phantom	5G Phantom	
Distance Horn Aperture - plane	10 mm and 150 mm	
XY Scan Resolution	dx, dy = λ/4	
Number of measured planes	4 (10mm, 10mm + λ/4, 150mm; 150mm+ λ/4)	
Frequency	30 GHz ± 10 MHz	

Calibration Parameters, 30 GHz

Distance Horn Aperture to Measured Plane	P_{rad}[1] ***(dBm)***	**Max E-field (V/m)**	Uncertainty E ($k = 2$)	Avg Power Density (W/m^2)		Uncertainty S ($k = 2$)
				1 cm^2	**4** cm^2	
10 mm	18.9	**218.0**	1.2 dB	**104.0**	**89.6**	1.4 dB
150 mm	18.9	**78.3**	1.2 dB	**15.3**	**14.8**	1.4 dB

[1] derived from far-field E-field data