

FCC SAR TEST REPORT

Test File No : F690501/RF-SAR002491-A2

Equipment Under Test	LED View Cover
Model Name	EF-NN950
Applicant	SAMSUNG ELECTRONICS Co., Ltd.
Address of Applicant	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677 Republic of Korea
FCC ID	A3L-EFNN950
Cell Phone FCC ID	A3LSMN950U
Exposure Category	General Population/Uncontrolled Exposure
Standards	FCC 47 CFR Part 2 (2.1093) IEEE 1528, 2013 ANSI/IEEE C95.1, C95.3
Date of Test(s)	2017-07-26 ~ 2017-07-28
Date of Issue	2017-09-07

In the configuration tested, the EUT complied with the standards specified above.

This test report does not assure KOLAS accreditation.

Remarks:

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS Korea Co., Ltd. or testing done by SGS Korea Co., Ltd. in connection with distribution or use of the product described in this report must be approved by SGS Korea Co., Ltd. in writing.



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Revision history

Revision	Date of issue	Revisions	Revised By
-	August 02, 2017	Initial issue	-
A1	September 04, 2017	Revision Update - Revised FCC ID	Jaehyeok Lee
A2	September 07, 2017	Revision Update - Updated to KDB version. - Changed SAR test data of LTE Band 66	Jaehyeok Lee

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1 Testing Laboratory

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2 Details of Manufacturer

Applicant	SAMSUNG ELECTRONICS Co., Ltd. Co., Ltd
Address	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677 Republic of Korea
Email	J-man.kim@samsung.com
Phone No.	+82-10-4933-6633

3 Description of EUT(s)

EUT Type	LED View Cover
Model Name	EF-NN950
Serial Number	#1
Mode of Operation	NFC
Tx Frequency Range	NFC (13.56 MHz)

4 Information of Attached Cell Phone

EUT Type	Portable Handset
Model Name	SM-N950U
Additional Model	SM-N950U1, SM-N950XU, SM-N950W
Serial Number	R38J507YB2N
Mode of Operation	LTE Band 66/ LTE Band 25 / Bluetooth
Tx Frequency Range	LTE Band 66 (1710.7 MHz ~ 1779.3 MHz) LTE Band 25 (1850.7 MHz ~ 1914.3 MHz) Bluetooth (2402.0 MHz ~ 2480.0 MHz)

5 The Highest Reported SAR Values

Equipment Class	Band	Highest Reported SAR			
		Head 1g (W/kg)	Body Worn 1g (W/kg)	Hotspot 1g (W/kg)	Phablet 10g (W/kg)
PCE	Original LTE Band 66	-	0.68	-	2.53
	Attached LED Cover LTE Band 66	-	0.46	-	2.29
	Original LTE Band 25	-	-	0.85	-
	Attached LED Cover LTE Band 25	-	-	0.83	-
DSS/DTS	Original Bluetooth	0.55	-	-	-
	Attached LED Cover Bluetooth	0.35	-	-	-
Simultaneous SAR per KDB 690783 D01v01r03		N/A			

6 Test Methodology

ANSI C95.1-1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz. It specifies the maximum exposure limit of 1.6 W/kg as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

Test tests documented in this report were performed in accordance with IEEE Standard 1528-2013 and the following published KDB procedures.

In additions;

☒	KDB 865664 D01v01r04	SAR Measurement Requirements for 100 MHz to 6 GHz
☒	KDB 447498 D01v06	Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies
☐	KDB 447498 D02v02r01	SAR Measurement Procedures for USB Dongle Transmitters
☐	KDB 248227 D01v02r02	SAR Guidance For IEEE 802.11 (Wi-Fi) Transmitters
☐	KDB 615223 D01v01r01	802.16e/WiMax SAR Measurement Guidance
☐	KDB 616217 D04v01r02	SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers
☐	KDB 643646 D01v01r03	SAR Test Reduction Considerations for Occupational PTT Radios
☒	KDB 648474 D03v01r04	Evaluation and Approval Considerations for Handsets with Specific Wireless Charging Battery Covers
☒	KDB 648474 D04v01r03	SAR Evaluation Considerations for Wireless Handsets
☐	KDB 680106 D01v02	RF Exposure Considerations for Low Power Consumer Wireless Power Transfer Applications
☐	KDB 941225 D01v03r01	3G SAR Measurement Procedures
☒	KDB 941225 D05v02r05	SAR Evaluation Considerations for LTE Devices
☒	KDB 941225 D06v02r01	SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities
☐	KDB 941225 D07v01r02	SAR Evaluation Procedures for UMPC Mini-Tablet Devices

7 Testing Environment

Ambient temperature	: 18°C ~ 25°C
Relative humidity	: 30% ~ 70%
Liquid temperature of during the test	: <± 2°C
Ambient noise & Reflection	: < 0.012 W/kg

8 Specific Absorption Rate (SAR)

8.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled

8.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

$$\text{SAR} = \frac{d}{dt} \left(\frac{dW}{dm} \right) = \frac{d}{dt} \left(\frac{dW}{\rho dv} \right)$$

SAR is expressed in units of Watts per kilogram (W/kg)

SAR measurement can be either related to the temperature elevation in tissue by

$$\text{SAR} = C \left(\frac{\delta T}{\delta t} \right)$$

Where: C is the specific heat capacity, δT is the temperature rise and δt is the exposure duration, or related to the electrical field in the tissue by

$$\text{SAR} = \frac{\sigma |E|^2}{\rho}$$

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength.

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

8.3 Test Standards and Limits

According to FCC 47CFR §2.1093(d) The limits to be used for evaluation are based generally on criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate ("SAR") in Section 4.2 of "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz," ANSI/IEEE C95.3-2003, Copyright 2003 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017. These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in "Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields," NCRP Report No. 86, Section 17.4.5. Copyright NCRP, 1986, Bethesda, Maryland 20814. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting

source. SAR values have been related to threshold levels for potential biological hazards. The criteria to be used are specified in paragraphs (d)(1) and (d)(2) of this section and shall apply for portable devices transmitting in the frequency range from 100 kHz to 6 GHz. Portable devices that transmit at frequencies above 6 GHz are to be evaluated in terms of the MPE limits specified in § 1.1310 of this chapter. Measurements and calculations to demonstrate compliance with MPE field strength or power density limits for devices operating above 6 GHz should be made at a minimum distance of 5 cm from the radiating source.

(1) Limits for Occupational/Controlled exposure: 0.4 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 8 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 20 W/kg, as averaged over an 10 grams of tissue (defined as a tissue volume in the shape of a cube). Occupational/Controlled limits apply when persons are exposed as a consequence of their employment provided these persons are fully aware of and exercise control over their exposure. Awareness of exposure can be accomplished by use of warning labels or by specific training or education through appropriate means, such as an RF safety program in a work environment.

(2) Limits for General Population/Uncontrolled exposure: 0.08 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 4 W/kg, as averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). General Population/Uncontrolled limits apply when the general public may be exposed, or when persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or do not exercise control over their exposure. Warning labels placed on consumer devices such as cellular telephones will not be sufficient reason to allow these devices to be evaluated subject to limits for occupational/controlled exposure in paragraph (d)(1) of this section.

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Partial Peak SAR (Partial)	1.60 m W/g	8.00 m W/g
Partial Average SAR (Whole Body)	0.08 m W/g	0.40 m W/g
Partial Peak SAR (Hands/Feet/Ankle/Wrist)	4.00 m W/g	20.00 m W/g

1. The spatial Peak value of the SAR averaged over any 1g gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
2. The spatial Average value of the SAR averaged over the whole body.
3. The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

9 The SAR Measurement System

A block diagram of the SAR measurement System is given in Fig. 1. This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY5 professional system). The model EX3DV4 field probe is used to determine the internal electric fields. The SAR can be obtained from the equation $SAR = \sigma (|E_i|^2) / \rho$ where σ and ρ are the conductivity and mass density of the tissue-simulant.

The DASY 5 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Staubli TX family) with controller, teach pendant and software. An arm extension is for accommodating the data acquisition electronics (DAE).
- A dosimeter probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- Data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

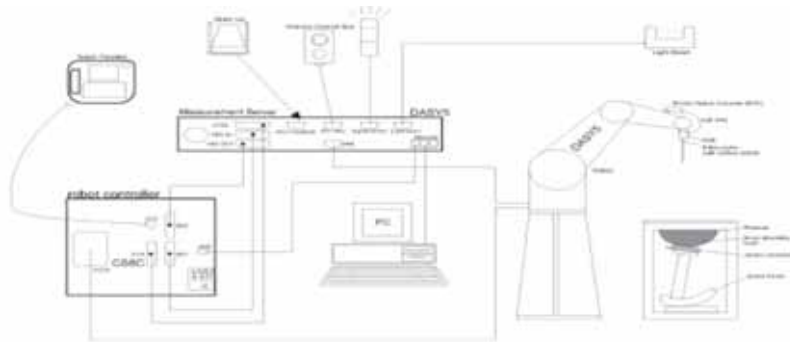


Fig a. The microwave circuit arrangement used for SAR system verification

- The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 7.
- DASY5 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Verification dipole kits allowing to validate the proper functioning of the system.

10 System Components

10.1 Probe

- Construction** : Symmetrical design with triangular core.
Built-in shielding against static charges.
PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
- Calibration** : Basic Broad Band Calibration in air Conversion Factors (CF) for HSL 835 and HSL1900.
Additional CF-Calibration for other liquids and frequencies upon request.
- Frequency** : 10 MHz to 6 GHz; Linearity: ± 0.2 dB (30 MHz to 6 GHz)
- Directivity** : ± 0.3 dB in HSL (rotation around probe axis)
 ± 0.5 dB in tissue material (rotation normal to probe axis)
- Dynamic Range** : $10\mu\text{W/g}$ to > 100 m W/g;
Linearity: ± 0.2 dB(noise: typically $< 1\mu\text{W/g}$)
- Dimensions** : Overall length: 337 mm (Tip length: 20 mm)
Tip diameter: 2.5 mm (Body diameter: 12 mm)
Distance from probe tip to dipole centers: 1 mm
- Application** : High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%



EX3DV4 E-Field Probe

NOTE:

- The Probe parameters have been calibrated by the SPEAG. Please reference "APPENDIX C" for the Calibration Certification Report.

10.2 SAM Phantom

- Construction** : The SAM Phantom is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90 % of all users. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents the evaporation of the liquid. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot

ELI V5.0 has the same shell geometry and is manufactured from the same material as ELI4, but has reinforced top structure



SAM Phantom

- Shell Thickness** : $2.0\text{ mm} \pm 0.1\text{ mm}$
- Filling Volume** : Approx. 25 liters

10.3 Device Holder

Construction: : In combination with the Twin SAM PhantomV4.0/V4.0C or Twin SAM, the Mounting Device (made from POM) enables the rotation of the mounted transmitter in spherical coordinates, whereby the rotation point is the ear opening. The devices can be easily and accurately positioned according to IEC, IEEE, CENELEC, FCC or other specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).



Device Holder

11 SAR Measurement Procedures

11.1 Normal SAR Measurement Procedure

Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The Minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 1.4 mm. This distance cannot be smaller than the Distance of sensor calibration points to probe tip as defined in the probe properties.

Step 2 and 3: Area Scan & Zoom Scan Procedures

The entire evaluation of the spatial peak values is performed within the Post-processing engine (SEMCAD). The system always gives the maximum values for the 1 g and 10 g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

1. The extraction of the measured data (grid and values) from the Zoom Scan.
2. The calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
3. The generation of a high-resolution mesh within the measured volume
4. The interpolation of all measured values from the measurement grid to the high-resolution grid
5. The extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
6. The calculation of the averaged SAR within masses of 1 g and 10 g.

Step 4: Power drift measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

< Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v01r04 >

			$\leq 3\text{ GHz}$	$> 3\text{ GHz}$
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			$5 \pm 1\text{ mm}$	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5\text{ mm}$
Maximum probe angle from probe axis to phantom surface normal at the measurement location			$30^{\circ} \pm 1^{\circ}$	$20^{\circ} \pm 1^{\circ}$
Maximum area scan spatial resolution: $\Delta x_{\text{Area}}, \Delta y_{\text{Area}}$			$\leq 2\text{ GHz: } \leq 15\text{ mm}$ $2 - 3\text{ GHz: } \leq 12\text{ mm}$	$3 - 4\text{ GHz: } \leq 12\text{ mm}$ $4 - 6\text{ GHz: } \leq 10\text{ mm}$
			When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: $\Delta x_{\text{Zoom}}, \Delta y_{\text{Zoom}}$			$\leq 2\text{ GHz: } \leq 8\text{ mm}$ $2 - 3\text{ GHz: } \leq 5\text{ mm}^*$	$3 - 4\text{ GHz: } \leq 5\text{ mm}^*$ $4 - 6\text{ GHz: } \leq 4\text{ mm}^*$
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{\text{Zoom}}(n)$		$\leq 5\text{ mm}$	$3 - 4\text{ GHz: } \leq 4\text{ mm}$ $4 - 5\text{ GHz: } \leq 3\text{ mm}$ $5 - 6\text{ GHz: } \leq 2\text{ mm}$
	graded grid	$\Delta z_{\text{Zoom}}(1)$: between 1 st two points closest to phantom surface	$\leq 4\text{ mm}$	$3 - 4\text{ GHz: } \leq 3\text{ mm}$ $4 - 5\text{ GHz: } \leq 2.5\text{ mm}$ $5 - 6\text{ GHz: } \leq 2\text{ mm}$
		$\Delta z_{\text{Zoom}}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{\text{Zoom}}(n-1)$	
Minimum zoom scan volume	x, y, z		$\geq 30\text{ mm}$	$3 - 4\text{ GHz: } \geq 28\text{ mm}$ $4 - 5\text{ GHz: } \geq 25\text{ mm}$ $5 - 6\text{ GHz: } \geq 22\text{ mm}$
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.				
* When zoom scan is required and the <u>reported</u> SAR from the area scan based <i>1-g SAR estimation</i> procedures of KDB 447498 is $\leq 1.4\text{ W/kg}$, $\leq 8\text{ mm}$, $\leq 7\text{ mm}$ and $\leq 5\text{ mm}$ zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

12 SAR System Verification

The microwave circuit arrangement for system verification is sketched in Fig. 1. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within $\pm 10\%$ from the target SAR values. These tests were done at 1750 / 1900 / 2450 MHz. The tests were conducted on the same days as the measurement of the DUT. The obtained results from the system accuracy verification are displayed in the table 1. (SAR values are normalized to 1W forward power delivered to the dipole). During the tests, the ambient temperature of the laboratory was in the range $(22 \pm 2)^\circ\text{C}$, the relative humidity was in the range $(55 \pm 5)\%$ R.H and the liquid depth above the ear reference points was $\geq 15\text{ cm} \pm 5\text{ mm}$ (frequency $\leq 3\text{ GHz}$) or $\geq 10\text{ cm} \pm 5\text{ mm}$ (frequency $> 3\text{ GHz}$) in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.

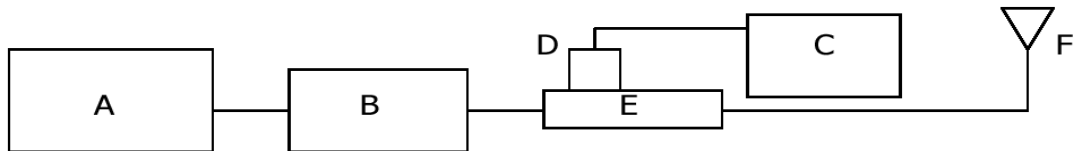


Fig 1. The microwave circuit arrangement used for SAR system verification

- A. Agilent Model E8247C Signal Generator
- B. Bonn Elektronik Model BLMA1060-10 RF Power Amplifier
- C. Agilent Model E4419B / E4416A Power Meter
- D. Agilent Model E9300H / E9327A Power Sensor
- E. Agilent Model 772D / 778D Dual Directional Coupler
- F. Reference dipole Antenna



Photo of the dipole Antenna

Verification Kit	Probe S/N	Tissue	Target SAR 1 g from Calibration Certificate (1 W)	Measured SAR 1 g (0.1 W)	Normalized SAR 1 g (1 W)	Deviation (%)	Date	Liquid Temp. (°C)
D1750V2 SN:1070	7412	1750 Body	37.00	3.60	36.00	-2.70	2017-07-26	22.5
D1900V2 SN:5d158	7412	1900 Body	40.40	4.11	41.10	1.73	2017-07-28	22.6
D2450V2 SN:892	7412	2450 Head	50.60	5.09	50.90	0.59	2017-07-26	22.5

Table1. Results system verification

13 Tissue Simulant Fluid for the Frequency Band

The dielectric properties for this simulant fluid were measured by using the Speag Model DAK-3.5 Dielectric Probe in conjunction with Agilent E5071C Network Analyzer(300 kHz - 6 GHz) by using a procedure detailed in Section V.

f (MHz)	Tissue type	Limits / Measured	Dielectric Parameters		
			Permittivity	Conductivity	Simulated Tissue Temp(°C)
1750.0	Body	Measured, 2017-07-26	52.39	1.46	22.5
		Target Tissue	53.40	1.49	
		Deviation (%)	-1.89	-2.01	
1710.7		Measured, 2017-07-26	52.51	1.42	
		Deviation (%)	-1.67	-4.70	
1779.3		Measured, 2017-07-26	52.26	1.49	
		Deviation (%)	-2.13	0.00	
1900.0	Body	Measured, 2017-07-28	54.36	1.55	22.6
		Target Tissue	53.30	1.52	
		Deviation (%)	1.99	1.97	
1850.7		Measured, 2017-07-28	54.48	1.49	
		Deviation (%)	2.21	-1.97	
1914.3		Measured, 2017-07-28	54.32	1.56	
		Deviation (%)	1.91	2.63	
2450.0	Head	Measured, 2017-07-26	38.00	1.84	22.5
		Target Tissue	39.20	1.80	
		Deviation (%)	-3.06	2.22	
2402.0		Measured, 2017-07-26	38.15	1.78	
		Deviation (%)	-2.68	-1.11	
2480.0		Measured, 2017-07-26	37.90	1.88	
		Deviation (%)	-3.32	4.44	

The composition of the brain & muscle tissue simulating liquid

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Ingredients (% by weight)	Frequency (MHz)									
	450		835		900		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.91	46.21	40.29	50.75	40.29	50.75	55.24	70.17	55.00	68.64
Salt (NaCl)	3.79	2.34	1.38	0.94	1.38	0.94	0.31	0.39	-	-
Sugar	56.93	51.17	57.90	-	57.90	-	-	-	-	-
HEC	0.25	0.15	0.24	0.10	0.24	0.10	-	-	-	-
Bactericide	0.12	0.08	0.18	-	0.18	-	-	-	-	-
Triton X-100	-	-	-	-	-	-	-	-	-	-
DGBE	-	-	-	-	-	-	44.45	70.17	45.00	31.37
Dielectric Constant	43.5	56.7	41.5	55.2	41.5	55.0	40.0	53.3	39.2	52.7
Conductivity (S/m)	0.87	0.94	0.90	0.97	0.97	1.05	1.40	1.52	1.80	1.95

Salt: 99 +% Pure Sodium Chloride

Sugar: 98 +% Pure Sucrose

Water: De-ionized, 16 MΩ⁺ resistivity

HEC: Hydroxyethyl Cellulose

DGBE: 99 +% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]

Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether

14. Instruments List

Test Platform	SPEAG DASY5 Professional				
Location	SGS Korea Co., Ltd. 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, E&E Lab				
Manufacture	SPEAG				
Description	SAR Test System (Frequency range 300 MHz – 6 GHz)				
Software Reference	DASY52: 52.10.0(1446) SEMCAD X: 14.6.10(7417)				
Equipment	Type	Serial Number	Cal Date	Cal Interval	Cal Due
Robot	TX90X L	F13/5S7KC1/A/01	N/A	N/A	N/A
Phantom	SAM Phantom	TP-1821	N/A	N/A	N/A
Phantom	SAM Phantom	TP-1843	N/A	N/A	N/A
Verification Dipole	D1750V2	1070	2016-07-21	Biennial	2018-07-21
Verification Dipole	D1900V2	5d158	2017-04-20	Biennial	2019-04-20
Verification Dipole	D2450V2	892	2017-04-21	Biennial	2019-04-21
Dielectric Assessment Kit	DAK-3.5	1228	2016-11-17	Annual	2017-11-17
DAE	DAE4	1340	2017-05-23	Annual	2018-05-23
E-Field Probe	EX3DV4	7412	2017-04-28	Annual	2018-04-28
Network Analyzer	E5071C	MY46111535	2017-05-23	Annual	2018-05-23
Power Meter	E4419B	GB43311125	2017-06-25	Annual	2018-06-25
Power Meter	E4416A	GB41292123	2016-12-16	Annual	2017-12-16
Power Sensor	E9300H	MY41495307	2017-06-25	Annual	2018-06-25
Power Sensor	E9300H	MY41495314	2017-06-25	Annual	2018-06-25
Power Sensor	E9327A	US40441371	2016-12-16	Annual	2017-12-16
Signal Generator	E8247C	MY43321024	2017-06-14	Annual	2018-06-14
RF Power Amplifier	BLMA1060-10	1711221	2017-06-10	Annual	2018-06-10
Dual Directional Coupler	778D	MY52180497	2017-06-18	Annual	2018-06-18
Dual Directional Coupler	772D	MY52180226	2017-06-18	Annual	2018-06-18
LP Filter	LA-30N	LF03	2017-06-18	Annual	2018-06-18
Attenuator	05AS102-K03	A1	2016-12-15	Annual	2017-12-15
Attenuator	05AS102-K20	A3	2016-12-15	Annual	2017-12-15
Attenuator	05AS102-K20	A4	2016-12-15	Annual	2017-12-15
Hygro-Thermometer	98585	130188	2017-06-13	Annual	2018-06-13
Digital Thermometer	DTM3000	3027	2017-06-24	Annual	2018-06-24
Communication Tester	MT8821C	6201502996	2016-09-21	Annual	2017-09-21
Bluetooth Tester	TC-3000C	3000C000495	2017-04-27	Annual	2018-04-27

Report File No : F690501/RF-SAR002491-A2

Date of Issue : 2017-09-07

(All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>.)

15 FCC Power Measurement Procedures

The SAR measurement Software calculates a reference point at the start and end of the test to check for power drifts. If conducted power deviations of more than 5 % occurred, the tests were repeated.

16 Measured and Reported SAR

Per FCC KDB Publication 447498 D01v06, When SAR is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance. For simultaneous transmission, the measured aggregate SAR must be scaled according to the sum of the differences between the maximum tune-up tolerance and actual power used to test each transmitter. When SAR is measured at or scaled to the maximum tune-up tolerance limit, the results are referred to as reported SAR. Test highest reported SAR results are identified on the grant of equipment authorization according to procedures in KDB 690783 D01v01r03.

17 Maximum Output Power Specifications (Attached Cell Phone)

This device operates using the following maximum output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v06

Maximum Power

Mode / Band		Modulated Average
Bluetooth	Maximum	15.0
	Nominal	14.5
LTE Band 66(AWS)	Maximum	25.0
	Nominal	24.5

Reduced Power

Mode / Band		Modulated Average
LTE Band 25(PCS)	Maximum	20.0
	Nominal	19.5
LTE Band 66(AWS)	Maximum	21.0
	Nominal	20.5

18 RF Conducted Power Measurement (Attached Cell Phone)

Mode	Frequency (MHz)	Channel	GFSK (dB m)
Bluetooth	2441.0	39	15.05

Maximum Power

Band	Bandwidth (MHz)	Frequency (MHz)	Channel	Modulation	RB Size	RB Offset	Conducted Power (dBm)
LTE Band 66	20	1745.0	132322	QPSK	1	0	24.32

Reduced Power

Band	Bandwidth (MHz)	Frequency (MHz)	Channel	Modulation	RB Size	RB Offset	Conducted Power (dBm)
LTE Band 25	20	1882.5	26365	QPSK	50	0	19.42
LTE Band 66	20	1745.0	132322	QPSK	100	0	20.39

19. SAR Data Summary

Original Cell Phone Worst Case Mode Test Bluetooth Head	Ambient Temperature (°C)	23.6
	Liquid Temperature (°C)	22.5
	Date	2017-07-26

EUT Position	Mode	Traffic Channel		Power(dBm)		Peak SAR of Area Scan(W/kg)	1-g SAR (W/kg)	Scaling Factor (Power)	Scaling Factor (Duty cycle)	1-g Scaled SAR (W/kg)	Plot No
		Frequency (MHz)	Channel	Conducted Power	Tune-Up Limit						
Right Touch	Bluetooth	2441	39	15.05	15.50	0.690	0.381	1.109	1.294	0.547	A4

Cell Phone + LED Cover Worst Case Mode Test Bluetooth Head	Ambient Temperature (°C)	23.6
	Liquid Temperature (°C)	22.5
	Date	2017-07-26

EUT Position	Mode	Traffic Channel		Power(dBm)		Peak SAR of Area Scan(W/kg)	1-g SAR (W/kg)	Scaling Factor (Power)	Scaling Factor (Duty cycle)	1-g Scaled SAR (W/kg)	Plot No
		Frequency (MHz)	Channel	Conducted Power	Tune-Up Limit						
Right Touch	Bluetooth	2441	39	15.05	15.50	0.339	0.243	1.109	1.294	0.349	A5

Original Cell Phone Worst Case Mode Test LTE Band 66 Body-Worn	Ambient Temperature (°C)	23.6
	Liquid Temperature (°C)	22.5
	Date	2017-07-26

EUT Position	Mode	Bandwidth (MHz)	Distance (mm)	Traffic Channel		Ant State	Modulation	RB Size	RB Offset	Power(dBm)		Peak SAR of Area Scan(W/kg)	1-g SAR (W/kg)	Scaling Factor (Power)	1-g Scaled SAR (W/kg)	Plot No
				Frequency (MHz)	Channel					Conducted Power	Tune-Up Limit					
Rear	LTE Band 66	20	15	1745.0	132322	31	QPSK	1	0	24.32	25.00	0.782	0.580	1.169	0.678	A6

Cell Phone + LED Cover Worst Case Mode Test LTE Band 66 Body-Worn	Ambient Temperature (°C)	23.6
	Liquid Temperature (°C)	22.5
	Date	2017-07-26

EUT Position	Mode	Bandwidth (MHz)	Distance (mm)	Traffic Channel		Ant State	Modulation	RB Size	RB Offset	Power(dBm)		Peak SAR of Area Scan(W/kg)	1-g SAR (W/kg)	Scaling Factor (Power)	1-g Scaled SAR (W/kg)	Plot No
				Frequency (MHz)	Channel					Conducted Power	Tune-Up Limit					
Rear	LTE Band 66	20	15	1745.0	132322	31	QPSK	1	0	24.32	25.00	0.543	0.390	1.169	0.456	A7

Original Cell Phone Worst Case Mode Test LTE Band 25 Hotspot	Ambient Temperature (°C)	23.9
	Liquid Temperature (°C)	22.6
	Date	2017-07-28

EUT Position	Mode	Bandwidth (MHz)	Distance (mm)	Traffic Channel		Ant State	Modulation	RB Size	RB Offset	Power(dBm)		Peak SAR of Area Scan(W/kg)	1-g SAR (W/kg)	Scaling Factor (Power)	1-g Scaled SAR (W/kg)	Plot No
				Frequency (MHz)	Channel					Conducted Power	Tune-Up Limit					
Bottom	LTE Band 25	20	10	1882.5	26365	31	QPSK	50	0	19.42	20.00	1.080	0.740	1.143	0.846	A8

Cell Phone + LED Cover Worst Case Mode Test LTE Band 25 Hotspot	Ambient Temperature (°C)	23.9
	Liquid Temperature (°C)	22.6
	Date	2017-07-28

EUT Position	Mode	Bandwidth (MHz)	Distance (mm)	Traffic Channel		Ant State	Modulation	RB Size	RB Offset	Power(dBm)		Peak SAR of Area Scan(W/kg)	1-g SAR (W/kg)	Scaling Factor (Power)	1-g Scaled SAR (W/kg)	Plot No
				Frequency (MHz)	Channel					Conducted Power	Tune-Up Limit					
Bottom	LTE Band 25	20	10	1882.5	26365	31	QPSK	50	0	19.42	20.00	1.050	0.727	1.143	0.831	A9

Original Cell Phone Worst Case Mode Test LTE Band 66 Phablet	Ambient Temperature (°C)	23.6
	Liquid Temperature (°C)	22.5
	Date	2017-07-26

EUT Position	Mode	Bandwidth (MHz)	Distance (mm)	Traffic Channel		Ant State	Modulation	RB Size	RB Offset	Power(dBm)		Peak SAR of Area Scan(W/kg)	10-g SAR (W/kg)	Scaling Factor (Power)	10-g Scaled SAR (W/kg)	Plot No
				Frequency (MHz)	Channel					Conducted Power	Tune-Up Limit					
Bottom	LTE Band 66	20	0	1745.0	132322	31	QPSK	100	0	20.39	21.00	7.980	2.200	1.151	2.532	A10

Cell Phone + LED Cover Worst Case Mode Test LTE Band 66 Phablet	Ambient Temperature (°C)	23.6
	Liquid Temperature (°C)	22.5
	Date	2017-07-26

EUT Position	Mode	Bandwidth (MHz)	Distance (mm)	Traffic Channel		Ant State	Modulation	RB Size	RB Offset	Power(dBm)		Peak SAR of Area Scan(W/kg)	10-g SAR (W/kg)	Scaling Factor (Power)	10-g Scaled SAR (W/kg)	Plot No
				Frequency (MHz)	Channel					Conducted Power	Tune-Up Limit					
Bottom	LTE Band 66	20	0	1745.0	132322	31	QPSK	100	0	20.39	21.00	8.600	1.990	1.151	2.291	A11

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Appendix A.1 Verification Test Plots for 1750 MHz

Date: 2017-07-26

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: [1750MHz_Verification_da53-0](#)

Ambient Temp : 23.6 °C Tissue Temp : 22.5 °C

DUT: Dipole 1750 MHz D1750V2; Type: D1750V2; Serial: D1750V2 - SN:1070

Communication System: UID 0, CW (0); Frequency: 1750 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1750$ MHz; $\sigma = 1.462$ S/m; $\epsilon_r = 52.385$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

DASY52 Configuration:

- Probe: EX3DV4 - SN7412; ConvF(8.37, 8.37, 8.37); Calibrated: 2017-04-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1340; Calibrated: 2017-05-23
- Phantom: SAM 1821 (20deg probe tilt); Type: QD000P40CD; Serial: TP:1821
- DASY52 52.10.0(144)SEMCAD X 14.6.10(7417)

Verification/1750MHz Verification/Area Scan (61x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm
Maximum value of SAR (interpolated) = 5.49 W/kg

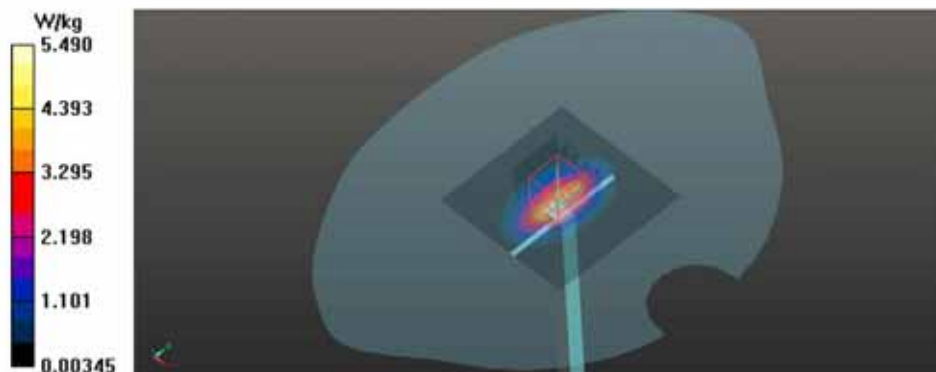
Verification/1750MHz Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 63.84 V/m; Power Drift = -0.17 dB

Peak SAR (extrapolated) = 6.44 W/kg

SAR(1 g) = 3.6 W/kg; SAR(10 g) = 1.91 W/kg

Maximum value of SAR (measured) = 5.50 W/kg



Appendix A.2 Verification Test Plots for 1900 MHz

Date: 2017-07-28

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: [1900MHz_Verification_da53-0](#)

Ambient Temp : 23.9 °C Tissue Temp : 22.6 °C

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2; Serial: D1900V2 - SN:5d158

Communication System: UID 0, CW (0); Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1900$ MHz; $\sigma = 1.547$ S/m; $\epsilon_r = 54.355$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

DASY52 Configuration:

- Probe: EX3DV4 - SN7412; ConvF(7.94, 7.94, 7.94); Calibrated: 2017-04-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1340; Calibrated: 2017-05-23
- Phantom: SAM 1843 (20deg probe tilt); Type: QD000P40CD; Serial: TP1843
- DASY52 52.10.0(144)SEMCAD X 14.6.10(7417)

Verification/1900MHz Verification/Area Scan (61x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm
Maximum value of SAR (interpolated) = 6.08 W/kg

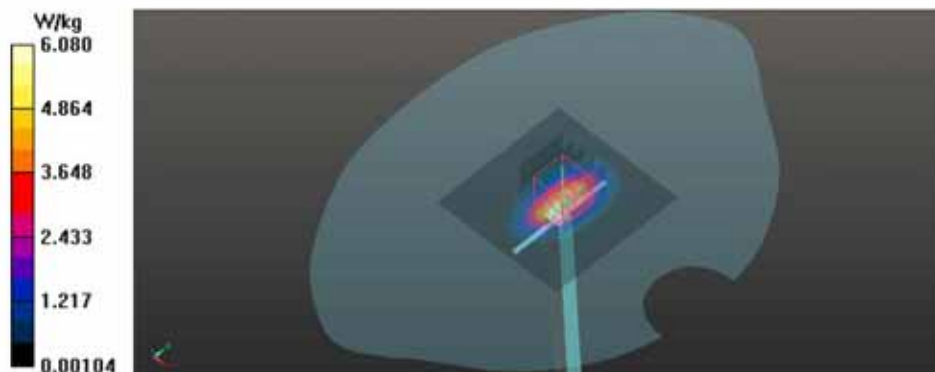
Verification/1900MHz Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 63.19 V/m; Power Drift = -0.17 dB

Peak SAR (extrapolated) = 7.30 W/kg

SAR(1 g) = 4.11 W/kg; SAR(10 g) = 2.16 W/kg

Maximum value of SAR (measured) = 6.27 W/kg



Appendix A.3 Verification Test Plots for 2450 MHz

Date: 2017-07-26

Test Laboratory : SGS Korea (Gunpo Laboratory)
File Name: [2450MHz_Verification_da53-0](#)

Ambient Temp : 23.6 °C Tissue Temp : 22.5 °C

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:892

Communication System: UID 0, CW (0); Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2450$ MHz; $\sigma = 1.839$ S/m; $\epsilon_r = 37.997$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY52 Configuration:

- Probe: EX3DV4 - SN7412; ConvF(7.62, 7.62, 7.62); Calibrated: 2017-04-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1340; Calibrated: 2017-05-23
- Phantom: SAM 1843 (20deg probe tilt); Type: QD000P40CD; Serial: TP1843
- DASY52 52.10.0(144)SEMCAD X 14.6.10(7417)

Verification/2450MHz Verification/Area Scan (101x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 8.60 W/kg

Verification/2450MHz Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

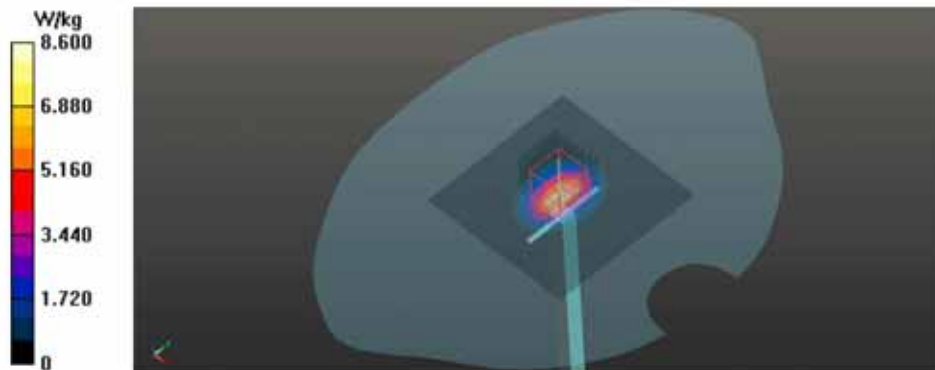
Reference Value = 70.85 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 10.8 W/kg

SAR(1 g) = 5.09 W/kg; SAR(10 g) = 2.34 W/kg

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 8.69 W/kg



Appendix A.4 SAR Test Plots for Original Worst Case Bluetooth Head

Date: 2017-07-26

Test Laboratory : SGS Korea (Gunpo Laboratory)

File Name: [Bluetooth_GFSK_Right Touch_CH39_Original Cell Phone.da53:0](#)

Ambient Temp : 23.6 °C Tissue Temp : 22.5 °C

DUT: SM-N950U; Type: Portable Handset; Serial: R38J507YB2N

Communication System: UID 0, Bluetooth 3.0 (0); Frequency: 2441 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2441$ MHz; $\sigma = 1.827$ S/m; $\epsilon_r = 38.026$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY52 Configuration:

- Probe: EX3DV4 - SN7412; ConvF(7.62, 7.62, 7.62); Calibrated: 2017-04-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1340; Calibrated: 2017-05-23
- Phantom: SAM 1843 (20deg probe til); Type: QD000P40CD; Serial: TP1843
- DASY52 52.10.0(1446)SEMCAD X 14.6.10(7417)

Head/Bluetooth_GFSK_Right Touch_CH39_Original Cell Phone/Area Scan (121x121x1): Interpolated
grid: $dx=1.000$ mm, $dy=1.000$ mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 0.690 W/kg

Head/Bluetooth_GFSK_Right Touch_CH39_Original Cell Phone/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

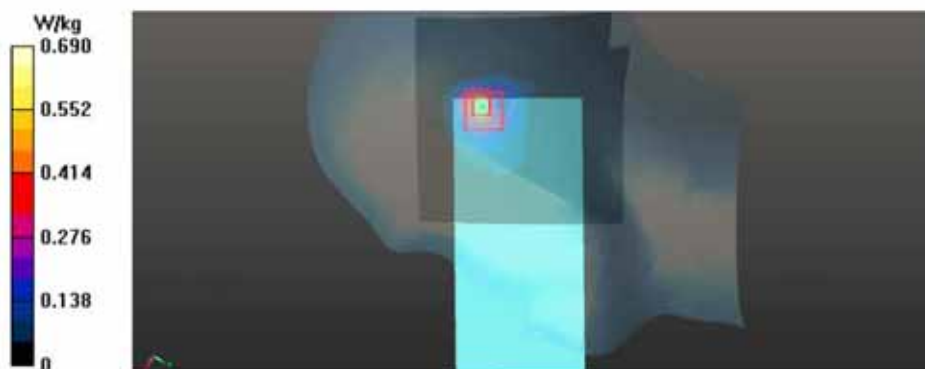
Reference Value = 9.413 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 0.930 W/kg

SAR(1 g) = 0.381 W/kg; SAR(10 g) = 0.142 W/kg

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.678 W/kg



Appendix A.5 SAR Test Plots for Cell Phone + LED Cover Bluetooth Head

Date: 2017-07-26

Test Laboratory : SGS Korea (Gunpo Laboratory)

File Name: [Bluetooth_GFSK_Right Touch_CH39_Cell Phone + LED Cover.da53:0](#)

Ambient Temp : 23.6 °C Tissue Temp : 22.5 °C

DUT: SM-N950U & EF-NN950; Type: Portable Handset & LED Cover; Serial: R38J507YB2N & #1

Communication System: UID 0, Bluetooth 3.0 (0); Frequency: 2441 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2441$ MHz; $\sigma = 1.827$ S/m; $\epsilon_r = 38.026$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY52 Configuration:

- Probe: EX3DV4 - SN7412; ConvF(7.62, 7.62, 7.62); Calibrated: 2017-04-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1340; Calibrated: 2017-05-23
- Phantom: SAM 1843 (20deg probe til); Type: QD000P40CD; Serial: TP1843
- DASY52 52.10.0(1446)SEMCAD X 14.6.10(7417)

Head/Bluetooth_GFSK_Right Touch_CH39_Cell Phone + LED Cover/Area Scan (71x111x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 0.339 W/kg

Head/Bluetooth_GFSK_Right Touch_CH39_Cell Phone + LED Cover/Zoom Scan (6x6x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.186 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.574 W/kg

SAR(1 g) = 0.243 W/kg; SAR(10 g) = 0.095 W/kg

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.384 W/kg



Appendix A.6 SAR Test Plots for Original Worst Case LTE Band 66 Body-Worn

Date: 2017-07-26

Test Laboratory : SGS Korea (Gunpo Laboratory)

File Name: LTE Band 66_20MHz_1RB_0 Offset_QPSK_Rear_CH132322_Body Worn Original Cell Phone.da53:0

Ambient Temp : 23.6 °C Tissue Temp : 22.5 °C

DUT: SM-N950U; Type: Portable Handset; Serial: R38J507YB2N

Communication System: UID 0, LTE Band 66 (0); Frequency: 1745 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1745$ MHz; $\sigma = 1.456$ S/m; $\epsilon_r = 52.403$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY52 Configuration:

- Probe: EX3DV4 - SN7412; ConvF(8.37, 8.37, 8.37); Calibrated: 2017-04-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1340; Calibrated: 2017-05-23
- Phantom: SAM 1821 (20deg probe til0); Type: QD000P40CD; Serial: TP:1821
- DASY52 52.10.0(1446)SEMCAD X 14.6.10(7417)

Body/LTE Band 66_20MHz_1RB_0 Offset_QPSK_Rear_CH132322_Body Worn Original Cell Phone/Area Scan (91x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 0.782 W/kg

Body/LTE Band 66_20MHz_1RB_0 Offset_QPSK_Rear_CH132322_Body Worn Original Cell Phone/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

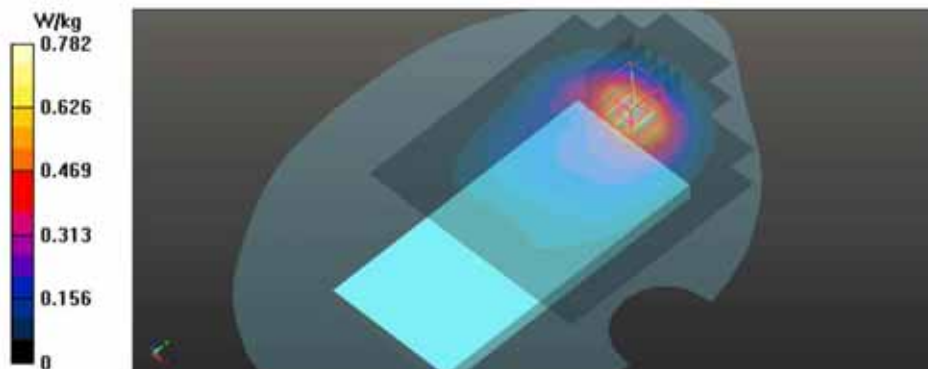
Reference Value = 7.055 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 0.926 W/kg

SAR(1 g) = 0.580 W/kg; SAR(10 g) = 0.347 W/kg

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.805 W/kg



Appendix A.7 SAR Test Plots for Cell Phone + LED Cover LTE Band 66 Body-Worn

Date: 2017-07-26

Test Laboratory : SGS Korea (Gunpo Laboratory)

File Name: [LTE Band 66_20MHz_1RB_0 Offset_QPSK_Rear_CH132322_Body Worn Cell Phone+LED Cover.da53:0](#)

Ambient Temp : 23.6 °C Tissue Temp : 22.5 °C

DUT: SM-N950U & EF-NG950; Type: Portable Handset & LED Cover; Serial: R38J507YB2N & #1

Communication System: UID 0, LTE Band 66 (0); Frequency: 1745 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1745$ MHz; $\sigma = 1.456$ S/m; $\epsilon_r = 52.403$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY52 Configuration:

- Probe: EX3DV4 - SN7412; ConvF(8.37, 8.37, 8.37); Calibrated: 2017-04-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1340; Calibrated: 2017-05-23
- Phantom: SAM 1821 (20deg probe tilt); Type: QD000P40CD; Serial: TP:1821
- DASY52 52.10.0(1446)SEMCAD X 14.6.10(7417)

Body/LTE Band 66_20MHz_1RB_0 Offset_QPSK_Rear_CH132322_Body Worn Cell Phone+LED Cover/Area Scan (91x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 0.543 W/kg

Body/LTE Band 66_20MHz_1RB_0 Offset_QPSK_Rear_CH132322_Body Worn Cell Phone+LED Cover/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

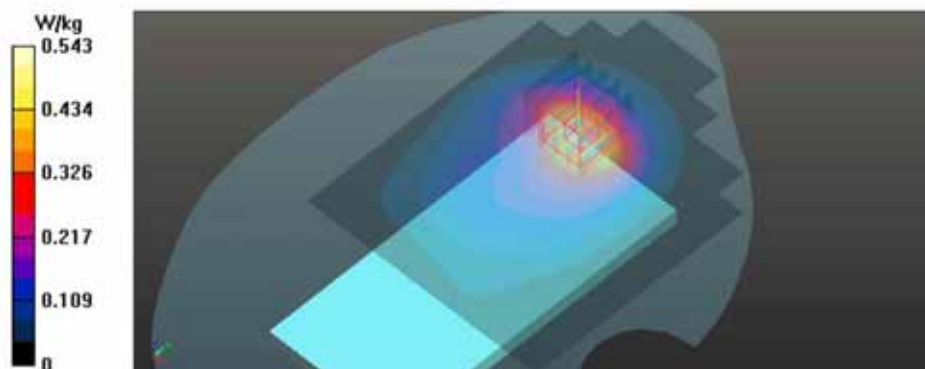
Reference Value = 7.719 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.613 W/kg

SAR(1 g) = 0.390 W/kg; SAR(10 g) = 0.238 W/kg

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.538 W/kg



Appendix A.8 SAR Test Plots for Original Worst Case LTE Band 25 Hotspot

Date: 2017-07-28

Test Laboratory : SGS Korea (Gunpo Laboratory)

File Name: [LTE Band 25_20MHz_50RB_0 Offset_QPSK_Bottom_CH26365_Hotspot Original Cell Phone.da53:0](#)

Ambient Temp : 23.9 °C Tissue Temp : 22.6 °C

DUT: SM-N950U; Type: Portable Handset; Serial: R38J507YB2N

Communication System: UID 0, LTE Band 25 (0); Frequency: 1882.5 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1882.5$ MHz; $\sigma = 1.526$ S/m; $\epsilon_r = 54.378$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY52 Configuration:

- Probe: EX3DV4 - SN7412; ConvF(7.94, 7.94, 7.94); Calibrated: 2017-04-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1340; Calibrated: 2017-05-23
- Phantom: SAM 1843 (20deg probe tilt); Type: QD000P40CD; Serial: TP1843
- DASY52 52.10.0(1446)SEMCAD X 14.6.10(7417)

Body/LTE Band 25_20MHz_50RB_0 Offset_QPSK_Bottom_CH26365_Hotspot Original Cell Phone/Area Scan (61x91x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 1.08 W/kg

Body/LTE Band 25_20MHz_50RB_0 Offset_QPSK_Bottom_CH26365_Hotspot Original Cell Phone/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

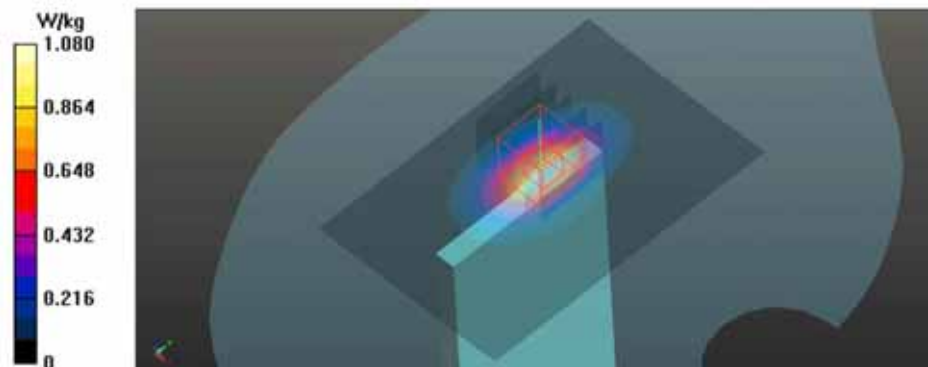
Reference Value = 8.772 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 1.26 W/kg

SAR(1 g) = 0.740 W/kg; SAR(10 g) = 0.398 W/kg

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.09 W/kg



Appendix A.9 SAR Test Plots for Cell Phone + LED Cover LTE Band 25 Hotspot

Date: 2017-07-28

Test Laboratory : SGS Korea (Gunpo Laboratory)

File Name: [LTE Band 25_20MHz_50RB_0 Offset_QPSK_Bottom_CH26365_Hotspot Cell Phone + LED.da53.0](#)

Ambient Temp : 23.9 °C Tissue Temp : 22.6 °C

DUT: SM-N950U & EF-NG950; Type: Portable Handset & LED Cover; Serial: R38J507YB2N & #1

Communication System: UID 0, LTE Band 25 (0); Frequency: 1882.5 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1882.5$ MHz; $\sigma = 1.526$ S/m; $\epsilon_r = 54.378$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY52 Configuration:

- Probe: EX3DV4 - SN7412; ConvF(7.94, 7.94, 7.94); Calibrated: 2017-04-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1340; Calibrated: 2017-05-23
- Phantom: SAM 1843 (20deg probe tilt); Type: QD000P40CD; Serial: TP1843
- DASY52 52.10.0(1446)SEMCAD X 14.6.10(7417)

Body/LTE Band 25_20MHz_50RB_0 Offset_QPSK_Bottom_CH26365_Hotspot Cell Phone + LED/Area Scan (61x91x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 1.05 W/kg

Body/LTE Band 25_20MHz_50RB_0 Offset_QPSK_Bottom_CH26365_Hotspot Cell Phone + LED/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

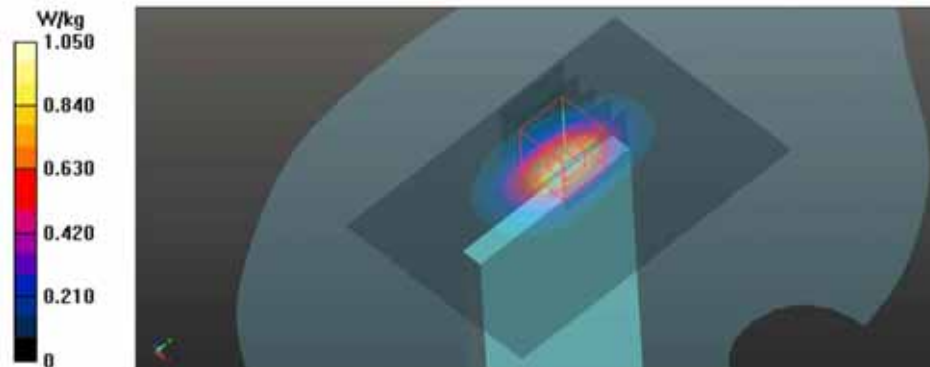
Reference Value = 6.689 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 1.25 W/kg

SAR(1 g) = 0.727 W/kg; SAR(10 g) = 0.386 W/kg

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.08 W/kg



Appendix A.10 SAR Test Plots for Original Worst Case LTE Band 66 Phablet

Date: 2017-07-26

Test Laboratory : SGS Korea (Gunpo Laboratory)

File Name: [LTE Band 66_20MHz_100RB_0 Offset_QPSK_Bottom_CH132322_Phablet Original Cell Phone.da53:0](#)

Ambient Temp : 23.6 °C Tissue Temp : 22.5 °C

DUT: SM-N950U; Type: Portable Handset; Serial: R38J507YB2N

Communication System: UID 0, LTE Band 66 (0); Frequency: 1745 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1745$ MHz; $\sigma = 1.456$ S/m; $\epsilon_r = 52.403$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY52 Configuration:

- Probe: EX3DV4 - SN7412; ConvF(8.37, 8.37, 8.37); Calibrated: 2017-04-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1340; Calibrated: 2017-05-23
- Phantom: SAM 1821 (20deg probe tilt); Type: QD000P40CD; Serial: TP:1821
- DASY52 52.10.0(1446)SEMCAD X 14.6.10(7417)

Body/LTE Band 66_20MHz_100RB_0 Offset_QPSK_Bottom_CH132322_Phablet Original Cell Phone/Area Scan (61x91x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 7.98 W/kg

Body/LTE Band 66_20MHz_100RB_0 Offset_QPSK_Bottom_CH132322_Phablet Original Cell Phone/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

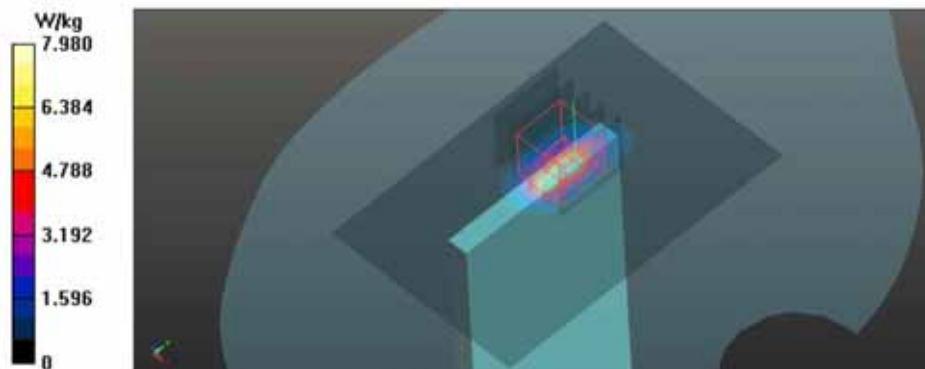
Reference Value = 8.712 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 10.5 W/kg

SAR(1 g) = 4.71 W/kg; SAR(10 g) = 2.2 W/kg

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 8.95 W/kg



Appendix A.11 SAR Test Plots for Cell Phone + LED Cover LTE Band 66 Phablet

Date: 2017-07-26

Test Laboratory : SGS Korea (Gunpo Laboratory)

File Name: [LTE Band 66_20MHz_100RB_0 Offset_QPSK_Bottom_CH132322_Phablet Cell Phone + LED Cover.da53:0](#)

Ambient Temp : 23.6 °C Tissue Temp : 22.5 °C

DUT: SM-N950U & EF-NG950; Type: Portable Handset & LED; Serial: R38J507YB2N & #1

Communication System: UID 0, LTE Band 66 (0); Frequency: 1745 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1745$ MHz; $\sigma = 1.456$ S/m; $\epsilon_r = 52.403$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY52 Configuration:

- Probe: EX3DV4 - SN7412; ConvF(8.37, 8.37, 8.37); Calibrated: 2017-04-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1340; Calibrated: 2017-05-23
- Phantom: SAM 1821 (20deg probe tilt); Type: QD000P40CD; Serial: TP:1821
- DASY52 52.10.0(1446)SEMCAD X 14.6.10(7417)

Body/LTE Band 66_20MHz_100RB_0 Offset_QPSK_Bottom_CH132322_Phablet Cell Phone + LED Cover/Area Scan (61x91x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 8.60 W/kg

Body/LTE Band 66_20MHz_100RB_0 Offset_QPSK_Bottom_CH132322_Phablet Cell Phone + LED Cover/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

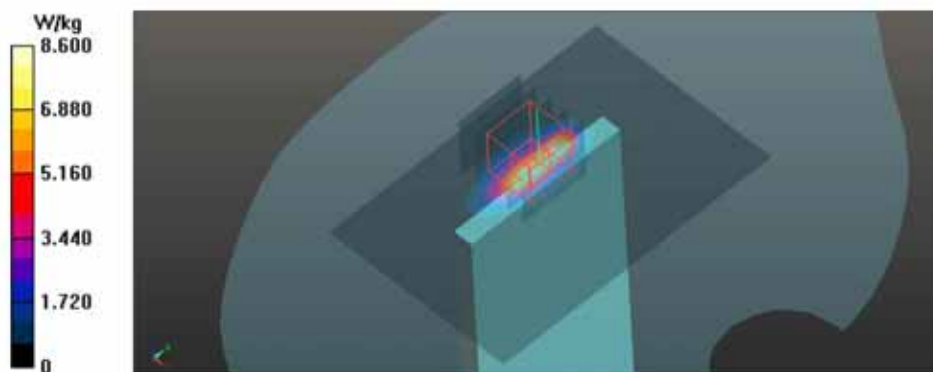
Reference Value = 1.608 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 9.88 W/kg

SAR(1 g) = 4.44 W/kg; SAR(10 g) = 1.99 W/kg

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 8.28 W/kg



B.1 Uncertainty Analysis

Measurement uncertainty for 300 MHz to 6 GHz averaged over 1 gram

a	b	c	d	e = f(d,k)	f	g	h	i	k
							cx/f/e	cx/g/e	
Uncertainty Component	IEEE 1528	Tol	Prob .	Div.	Ci	Ci	lg	10g	Vi
	2013	(%)	Dist.		(1g)	(10g)	ui (%)	ui (%)	(Veff)
Probe calibration	E.2.1	6.55	N	1	1	1	6.55	6.55	∞
Axial Isotropy	E.2.2	4.7	R	1.73	0.71	0.71	1.92	1.92	∞
Hemispherical Isotropy	E.2.2	9.6	R	1.73	0.71	0.71	3.92	3.92	∞
Boundary Effects	E.2.3	1	R	1.73	1	1	0.58	0.58	∞
Modulation Response	E.2.5	2.4	R	1.73	1	1	1.39	1.39	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.71	2.71	∞
System Detection Limits	E.2.4	0.3	R	1.73	1	1	0.17	0.17	∞
Reabout Electronics	E.2.6	0.3	N	1	1	1	0.3	0.3	∞
Response Time	E.2.7	0.5	R	1.73	1	1	0.29	0.29	∞
Integration Time	E.2.8	2.6	R	1.73	1	1	1.5	1.5	∞
RF Ambient Noise	E.6.1	3	R	1.73	1	1	1.73	1.73	∞
RF Ambient Reflections	E.6.1	3	R	1.73	1	1	1.73	1.73	∞
Probe Positiones	E.6.2	1.5	R	1.73	1	1	0.87	0.87	∞
Probe Positioning	E.6.3	2.9	R	1.73	1	1	1.67	1.67	∞
Max SAR evaluation	E.5	1	R	1.73	1	1	0.58	0.58	∞
Test sample positioning	E.4.2	3.34/3.30	N	1	1	1	3.34	3.30	9
Device holder uncertainty	E.4.1	3.28	N	1	1	1	3.28	3.28	4
Output power variation -SAR drift measurement	E.2.9	5	R	1.73	1	1	2.89	2.89	∞
Phantom uncertainty	E.3.1	4	R	1.73	1	1	2.31	2.31	∞
Correcting SAR for deviations in permittivity and conductivity	E.3.2	1.2	R	1.73	1	0.84	0.69	0.58	∞
Liquid conductivity- measurement	E.3.3	1.76	N	1	0.78	0.71	1.37	1.25	5
Liquid permittivity- measurement	E.3.3	1.72	N	1	0.23	0.26	0.4	0.45	9
Liquid conductivity-temperature	E.3.4	2.86	R	1.73	0.23	0.26	0.25	0.28	∞
Liquid permittivity - temperature	E.3.4	1.86	R	1.73	0.78	0.71	1.29	1.17	∞
Combined standard uncertainty				RSS			11.12	11.08	355/357
Expanded uncertainty				k=2			22.24	22.16	

Appendix C.1 Calibration certificate for Probe (S/N : 7412)

**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
S 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 **SGS Korea (Dymstec)**

Certificate No: **EX3-7412_Apr17/2**

CALIBRATION CERTIFICATE (Replacement of No: EX3-7412_Apr17)

Object **EX3DV4 - SN:7412**

Calibration procedure(s) **QA CAL-01.v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6
Calibration procedure for dosimetric E-field probes**

Calibration date: **April 28, 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 ES3DV2	SN: 3013	31-Dec-16 (No. ES3-3013_Dec16)	Dec-17
DAE4	SN: 660	7-Dec-16 (No. DAE4-660_Dec16)	Dec-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:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			Issued: June 28, 2017

Certificate No: EX3-7412_Apr17/2

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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
S 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**

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
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., $\theta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}:** Assessed for E-field polarization $\theta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z} = NORM_{x,y,z} * frequency_response** (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP_{x,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
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; D_{x,y,z}; VR_{x,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.
- ConvF and Boundary Effect Parameters:** Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy):** in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset:** The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle:** The angle is assessed using the information gained by determining the NORM_x (no uncertainty required).

EX3DV4 – SN:7412

April 28, 2017

Probe EX3DV4

SN:7412

Manufactured: November 24, 2015
Calibrated: April 28, 2017

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

EX3DV4- SN:7412

April 28, 2017

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7412

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.42	0.36	0.43	$\pm 10.1 \%$
DCP (mV) ^B	97.9	99.9	97.7	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB/ μV	C	D dB	VR mV	Unc ^C (k=2)
0	CW	X	0.0	0.0	1.0	0.00	130.0	$\pm 3.0 \%$
		Y	0.0	0.0	1.0		135.3	
		Z	0.0	0.0	1.0		143.0	

Note: For details on UID parameters see Appendix.

Sensor Model Parameters

	C1 fF	C2 fF	α V^{-1}	T1 $\text{ms} \cdot \text{V}^{-2}$	T2 $\text{ms} \cdot \text{V}^{-1}$	T3 ms	T4 V^{-2}	T5 V^{-1}	T6
X	49.16	369.8	36.32	12.07	0.824	4.966	1.276	0.194	1.005
Y	34.49	259.9	36.33	8.877	0.841	4.964	0.544	0.218	1.001
Z	55.39	421.6	36.92	11.63	0.998	4.990	1.144	0.290	1.005

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%.

^A The uncertainties of Norm X,Y,Z do not affect the E^2 -field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

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

EX3DV4- SN:7412

April 28, 2017

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7412

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^c	Relative Permittivity ^e	Conductivity (S/m) ^e	ConvF X	ConvF Y	ConvF Z	Alpha ^d	Depth ^d (mm)	Unc (k=2)
750	41.9	0.89	10.68	10.68	10.68	0.56	0.88	± 12.0 %
835	41.5	0.90	10.20	10.20	10.20	0.40	1.01	± 12.0 %
900	41.5	0.97	9.98	9.98	9.98	0.50	0.80	± 12.0 %
1750	40.1	1.37	8.59	8.59	8.59	0.42	0.84	± 12.0 %
1900	40.0	1.40	8.39	8.39	8.39	0.43	0.80	± 12.0 %
1950	40.0	1.40	8.11	8.11	8.11	0.35	0.80	± 12.0 %
2300	39.5	1.67	7.99	7.99	7.99	0.39	0.80	± 12.0 %
2450	39.2	1.80	7.62	7.62	7.62	0.37	0.86	± 12.0 %
2600	39.0	1.96	7.50	7.50	7.50	0.42	0.80	± 12.0 %
5200	36.0	4.66	5.70	5.70	5.70	0.35	1.80	± 13.1 %
5300	35.9	4.76	5.41	5.41	5.41	0.35	1.80	± 13.1 %
5600	35.5	5.07	4.78	4.78	4.78	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.98	4.98	4.98	0.40	1.80	± 13.1 %

^c Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

^d At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

^e Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

EX3DV4- SN:7412

April 28, 2017

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7412

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) ^c	Relative Permittivity ^f	Conductivity (S/m) ^f	ConvF X	ConvF Y	ConvF Z	Alpha ^g	Depth ^g (mm)	Unc (k=2)
750	55.5	0.96	10.20	10.20	10.20	0.31	1.06	± 12.0 %
835	55.2	0.97	10.01	10.01	10.01	0.46	0.80	± 12.0 %
1750	53.4	1.49	8.37	8.37	8.37	0.43	0.80	± 12.0 %
1900	53.3	1.52	7.94	7.94	7.94	0.42	0.80	± 12.0 %
2450	52.7	1.95	7.66	7.66	7.66	0.42	0.88	± 12.0 %
2600	52.5	2.16	7.34	7.34	7.34	0.39	0.85	± 12.0 %
5200	49.0	5.30	4.99	4.99	4.99	0.40	1.90	± 13.1 %
5300	48.9	5.42	4.79	4.79	4.79	0.40	1.90	± 13.1 %
5600	48.5	5.77	4.24	4.24	4.24	0.40	1.90	± 13.1 %
5800	48.2	6.00	4.39	4.39	4.39	0.45	1.90	± 13.1 %

^c Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

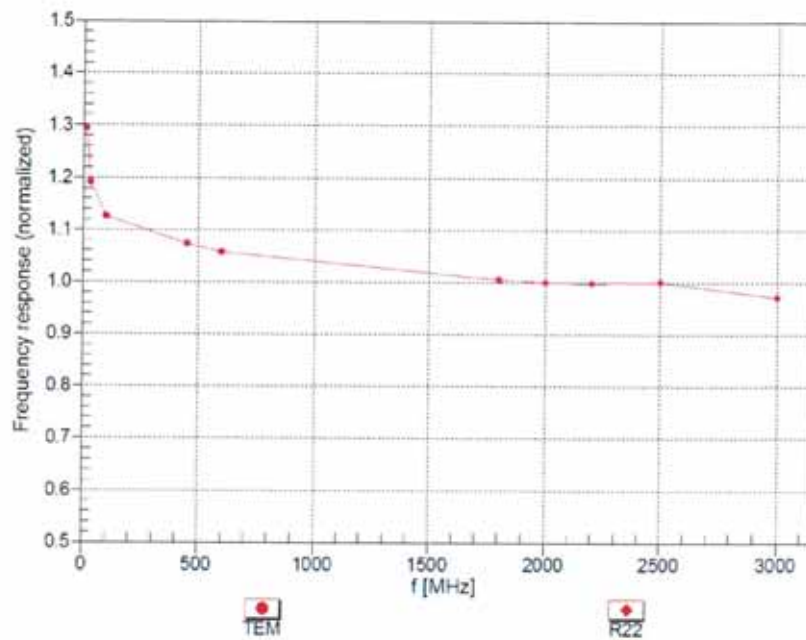
^f At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

^g Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

EX3DV4- SN:7412

April 28, 2017

Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)

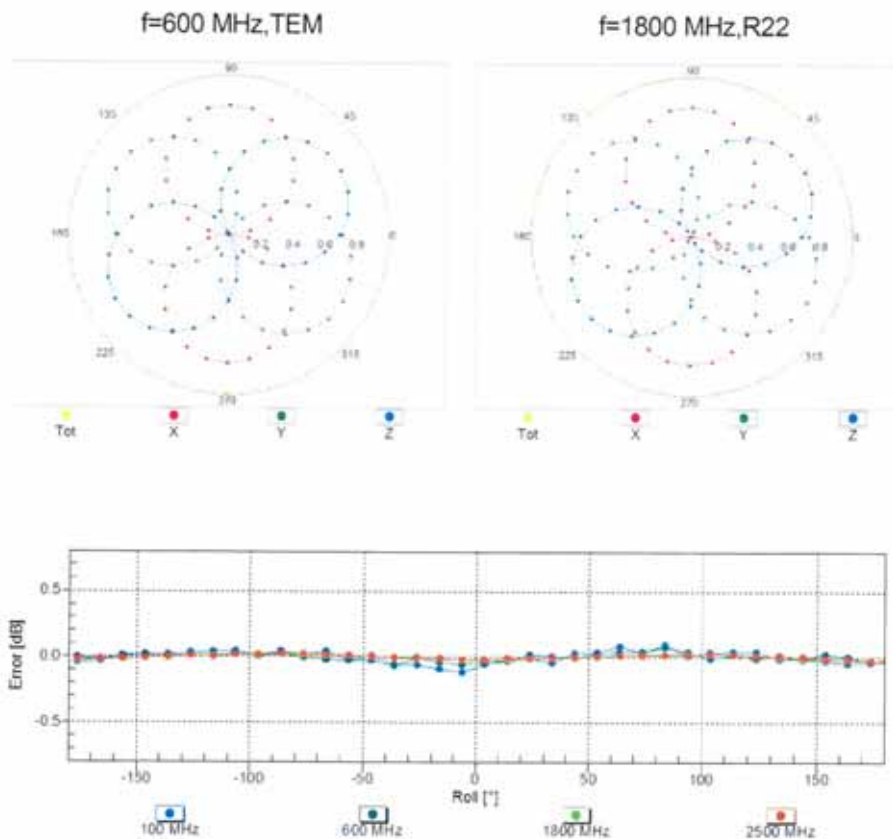


Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

EX3DV4- SN:7412

April 28, 2017

Receiving Pattern (ϕ), $\theta = 0^\circ$

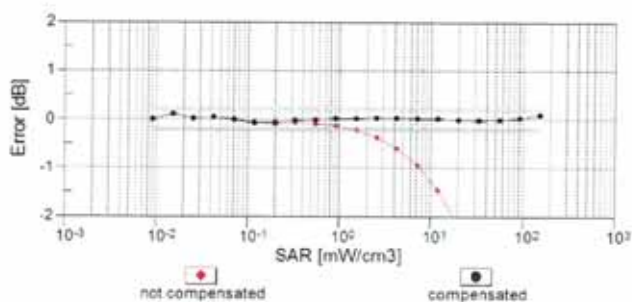
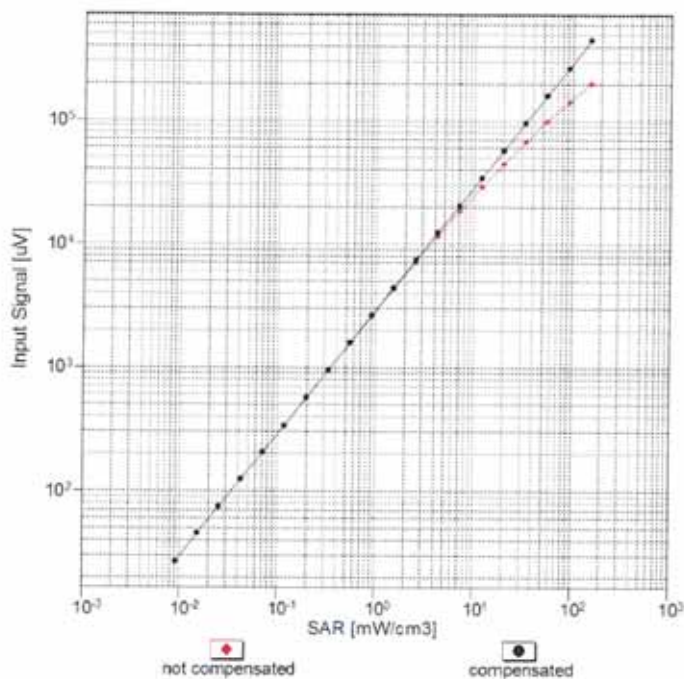


Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

EX3DV4- SN:7412

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Dynamic Range $f(\text{SAR}_{\text{head}})$
 (TEM cell, $f_{\text{eval}} = 1900 \text{ MHz}$)

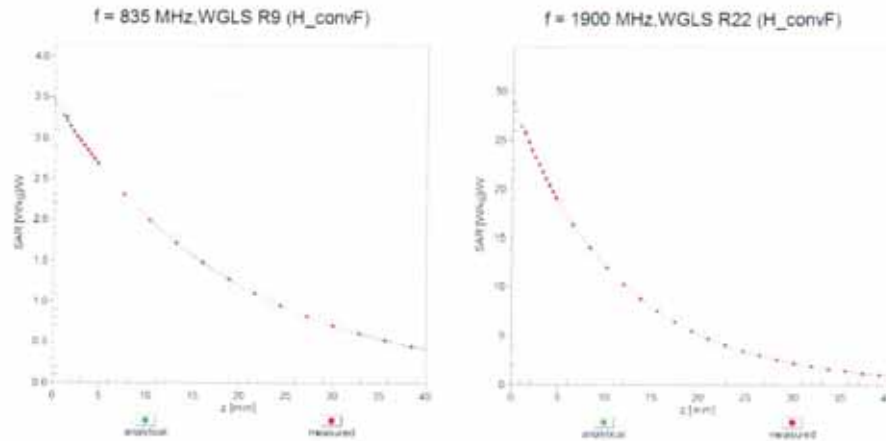


Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

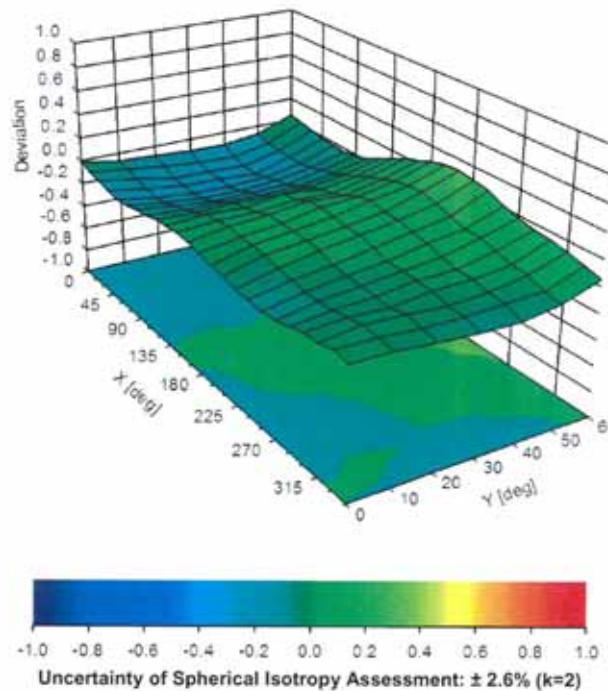
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Conversion Factor Assessment



Deviation from Isotropy in Liquid Error (ϕ , θ), f = 900 MHz



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DASY/EASY - Parameters of Probe: EX3DV4 - SN:7412

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	123.7
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

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Appendix: Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB μ V	C	D dB	VR mV	Max Unc ^E (k=2)
0	CW	X	0.00	0.00	1.00	0.00	130.0	$\pm 3.0 \%$
		Y	0.00	0.00	1.00		135.3	
		Z	0.00	0.00	1.00		143.0	
10010- CAA	SAR Validation (Square, 100ms, 10ms)	X	11.00	70.00	30.00	10.00	20.0	$\pm 9.6 \%$
		Y	2.41	65.30	10.13		20.0	
		Z	2.84	67.03	11.34		20.0	
10011- CAB	UMTS-FDD (WCDMA)	X	1.45	73.91	19.13	0.00	150.0	$\pm 9.6 \%$
		Y	1.16	70.48	17.08		150.0	
		Z	1.15	68.80	16.33		150.0	
10012- CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	X	1.23	65.17	16.50	0.41	150.0	$\pm 9.6 \%$
		Y	1.18	64.45	15.75		150.0	
		Z	1.19	63.95	15.51		150.0	
10013- CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	X	4.87	66.66	17.14	1.46	150.0	$\pm 9.6 \%$
		Y	4.68	66.76	17.01		150.0	
		Z	4.93	66.45	17.02		150.0	
10021- DAC	GSM-FDD (TDMA, GMSK)	X	9.87	81.77	17.68	9.39	50.0	$\pm 9.6 \%$
		Y	11.65	84.17	18.61		50.0	
		Z	23.28	93.72	22.12		50.0	
10023- DAC	GPRS-FDD (TDMA, GMSK, TN 0)	X	8.12	79.29	16.88	9.57	50.0	$\pm 9.6 \%$
		Y	8.24	79.76	17.16		50.0	
		Z	16.73	89.40	20.91		50.0	
10024- DAC	GPRS-FDD (TDMA, GMSK, TN 0-1)	X	54.06	99.96	21.31	6.56	60.0	$\pm 9.6 \%$
		Y	68.26	103.36	22.26		60.0	
		Z	100.00	109.98	24.69		60.0	
10025- DAC	EDGE-FDD (TDMA, 8PSK, TN 0)	X	9.01	92.19	35.78	12.57	50.0	$\pm 9.6 \%$
		Y	3.86	66.43	22.91		50.0	
		Z	8.04	87.79	33.90		50.0	
10026- DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1)	X	10.58	94.56	33.08	9.56	60.0	$\pm 9.6 \%$
		Y	6.68	83.66	28.82		60.0	
		Z	10.31	93.21	32.64		60.0	
10027- DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	X	100.00	105.76	21.83	4.80	80.0	$\pm 9.6 \%$
		Y	100.00	107.28	22.35		80.0	
		Z	100.00	109.85	23.83		80.0	
10028- DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	X	100.00	106.95	21.72	3.55	100.0	$\pm 9.6 \%$
		Y	100.00	108.97	22.42		100.0	
		Z	100.00	110.96	23.64		100.0	
10029- DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	X	6.19	82.60	27.50	7.80	80.0	$\pm 9.6 \%$
		Y	4.57	76.01	24.68		80.0	
		Z	6.22	82.00	27.27		80.0	
10030- CAA	IEEE 802.15.1 Bluetooth (GFSK, DH1)	X	60.05	99.73	20.49	5.30	70.0	$\pm 9.6 \%$
		Y	17.94	89.13	17.93		70.0	
		Z	100.00	108.54	23.56		70.0	
10031- CAA	IEEE 802.15.1 Bluetooth (GFSK, DH3)	X	100.00	107.91	20.94	1.88	100.0	$\pm 9.6 \%$
		Y	100.00	108.05	20.80		100.0	
		Z	100.00	111.21	22.46		100.0	

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10032-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	X	100.00	123.16	26.14	1.17	100.0	± 9.6 %
		Y	100.00	120.81	25.02		100.0	
		Z	100.00	119.80	25.03		100.0	
10033-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH1)	X	7.56	86.16	22.05	5.30	70.0	± 9.6 %
		Y	4.08	76.14	17.42		70.0	
		Z	6.89	85.38	22.44		70.0	
10034-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH3)	X	3.64	80.05	19.29	1.88	100.0	± 9.6 %
		Y	2.07	71.47	14.38		100.0	
		Z	2.59	75.08	17.85		100.0	
10035-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH5)	X	2.84	78.19	18.64	1.17	100.0	± 9.6 %
		Y	1.72	70.72	13.96		100.0	
		Z	1.96	72.43	16.68		100.0	
10036-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH1)	X	9.75	90.12	23.39	5.30	70.0	± 9.6 %
		Y	4.69	78.21	18.25		70.0	
		Z	8.45	88.77	23.64		70.0	
10037-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH3)	X	3.35	79.02	18.89	1.88	100.0	± 9.6 %
		Y	1.88	70.47	13.96		100.0	
		Z	2.47	74.54	17.60		100.0	
10038-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH5)	X	2.92	78.86	19.01	1.17	100.0	± 9.6 %
		Y	1.74	71.10	14.25		100.0	
		Z	1.98	72.80	16.94		100.0	
10039-CAB	CDMA2000 (1xRTT, RC1)	X	6.02	89.89	22.80	0.00	150.0	± 9.6 %
		Y	2.77	78.32	16.89		150.0	
		Z	2.32	74.97	17.64		150.0	
10042-CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Halfrate)	X	6.77	77.72	15.24	7.78	50.0	± 9.6 %
		Y	7.11	78.72	15.68		50.0	
		Z	22.33	91.99	20.28		50.0	
10044-CAA	IS-91/EIA/TIA-553 FDD (FDMA, FM)	X	0.00	109.89	1.54	0.00	150.0	± 9.6 %
		Y	0.00	100.35	0.86		150.0	
		Z	0.00	98.19	0.06		150.0	
10048-CAA	DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)	X	5.74	71.68	15.47	13.80	25.0	± 9.6 %
		Y	5.92	71.67	15.52		25.0	
		Z	8.22	76.88	18.19		25.0	
10049-CAA	DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)	X	5.97	74.53	15.41	10.79	40.0	± 9.6 %
		Y	6.06	74.70	15.55		40.0	
		Z	8.99	80.47	18.32		40.0	
10056-CAA	UMTS-TDD (TD-SCDMA, 1.28 Mcps)	X	10.71	85.69	21.86	9.03	50.0	± 9.6 %
		Y	7.60	79.89	19.20		50.0	
		Z	11.52	87.51	23.15		50.0	
10058-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	X	4.66	77.08	24.55	6.55	100.0	± 9.6 %
		Y	3.72	72.49	22.49		100.0	
		Z	4.70	76.64	24.34		100.0	
10059-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)	X	1.27	66.34	17.04	0.61	110.0	± 9.6 %
		Y	1.20	65.28	16.13		110.0	
		Z	1.22	64.93	16.00		110.0	
10060-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)	X	100.00	139.54	36.30	1.30	110.0	± 9.6 %
		Y	6.39	97.76	26.01		110.0	
		Z	9.12	101.70	27.02		110.0	

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10061-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	X	3.27	82.71	22.99	2.04	110.0	± 9.6 %
		Y	2.12	75.46	19.95		110.0	
		Z	2.56	77.70	21.00		110.0	
10062-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	X	4.72	66.84	16.75	0.49	100.0	± 9.6 %
		Y	4.51	66.87	16.59		100.0	
		Z	4.77	66.56	16.56		100.0	
10063-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	X	4.72	66.89	16.81	0.72	100.0	± 9.6 %
		Y	4.51	66.92	16.64		100.0	
		Z	4.77	66.62	16.64		100.0	
10064-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	X	5.01	67.13	17.00	0.86	100.0	± 9.6 %
		Y	4.75	67.08	16.80		100.0	
		Z	5.09	66.92	16.87		100.0	
10065-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)	X	4.86	66.97	17.05	1.21	100.0	± 9.6 %
		Y	4.61	66.89	16.83		100.0	
		Z	4.94	66.78	16.93		100.0	
10066-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	X	4.87	66.94	17.16	1.46	100.0	± 9.6 %
		Y	4.61	66.83	16.93		100.0	
		Z	4.95	66.78	17.07		100.0	
10067-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	X	5.14	67.02	17.52	2.04	100.0	± 9.6 %
		Y	4.89	67.07	17.35		100.0	
		Z	5.23	66.84	17.44		100.0	
10068-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	X	5.18	67.05	17.70	2.55	100.0	± 9.6 %
		Y	4.91	66.93	17.46		100.0	
		Z	5.29	66.97	17.67		100.0	
10069-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	X	5.25	67.02	17.87	2.67	100.0	± 9.6 %
		Y	4.98	66.95	17.63		100.0	
		Z	5.36	66.92	17.84		100.0	
10071-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps)	X	4.95	66.69	17.38	1.99	100.0	± 9.6 %
		Y	4.77	66.77	17.24		100.0	
		Z	5.02	66.50	17.28		100.0	
10072-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	X	4.92	66.98	17.55	2.30	100.0	± 9.6 %
		Y	4.72	66.97	17.38		100.0	
		Z	5.00	66.83	17.47		100.0	
10073-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)	X	4.97	67.08	17.81	2.83	100.0	± 9.6 %
		Y	4.78	67.11	17.66		100.0	
		Z	5.05	66.93	17.75		100.0	
10074-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps)	X	4.94	66.93	17.91	3.30	100.0	± 9.6 %
		Y	4.78	67.05	17.78		100.0	
		Z	5.02	66.80	17.87		100.0	
10075-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps)	X	4.98	67.05	18.20	3.82	90.0	± 9.6 %
		Y	4.81	67.05	17.99		90.0	
		Z	5.07	66.98	18.20		90.0	
10076-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps)	X	4.98	66.81	18.28	4.15	90.0	± 9.6 %
		Y	4.85	66.93	18.15		90.0	
		Z	5.06	66.69	18.27		90.0	
10077-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	X	5.00	66.86	18.37	4.30	90.0	± 9.6 %
		Y	4.88	67.03	18.26		90.0	
		Z	5.08	66.74	18.35		90.0	

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10081-CAB	CDMA2000 (1xRTT, RC3)	X	1.72	76.80	18.07	0.00	150.0	± 9.6 %
		Y	0.90	68.37	12.61		150.0	
		Z	1.03	68.21	14.40		150.0	
10082-CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Fullrate)	X	0.76	60.00	4.46	4.77	80.0	± 9.6 %
		Y	0.49	57.53	2.88		80.0	
		Z	0.79	60.00	4.78		80.0	
10090-DAC	GPRS-FDD (TDMA, GMSK, TN 0-4)	X	47.89	98.74	21.04	6.56	60.0	± 9.6 %
		Y	59.02	101.87	21.93		60.0	
		Z	100.00	110.00	24.71		60.0	
10097-CAB	UMTS-FDD (HSDPA)	X	2.14	70.76	17.69	0.00	150.0	± 9.6 %
		Y	2.03	70.57	16.95		150.0	
		Z	1.92	68.16	16.26		150.0	
10098-CAB	UMTS-FDD (HSUPA, Subtest 2)	X	2.10	70.77	17.69	0.00	150.0	± 9.6 %
		Y	1.99	70.52	16.94		150.0	
		Z	1.89	68.14	16.24		150.0	
10099-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-4)	X	10.64	94.65	33.10	9.56	60.0	± 9.6 %
		Y	6.71	83.74	28.84		60.0	
		Z	10.36	93.29	32.66		60.0	
10100-CAC	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	3.58	72.88	18.22	0.00	150.0	± 9.6 %
		Y	3.16	71.33	17.53		150.0	
		Z	3.34	71.06	17.17		150.0	
10101-CAC	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	X	3.42	68.62	16.79	0.00	150.0	± 9.6 %
		Y	3.19	67.96	16.37		150.0	
		Z	3.37	67.85	16.25		150.0	
10102-CAC	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	X	3.51	68.51	16.83	0.00	150.0	± 9.6 %
		Y	3.29	67.97	16.47		150.0	
		Z	3.47	67.77	16.32		150.0	
10103-CAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	6.11	74.85	19.89	3.98	65.0	± 9.6 %
		Y	5.41	73.61	19.42		65.0	
		Z	5.91	73.84	19.50		65.0	
10104-CAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	X	6.21	73.36	20.12	3.98	65.0	± 9.6 %
		Y	5.52	71.87	19.38		65.0	
		Z	6.24	73.02	20.02		65.0	
10105-CAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	X	5.80	71.92	19.78	3.98	65.0	± 9.6 %
		Y	5.32	70.97	19.26		65.0	
		Z	5.76	71.31	19.54		65.0	
10108-CAD	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	3.12	72.13	18.10	0.00	150.0	± 9.6 %
		Y	2.74	70.80	17.44		150.0	
		Z	2.93	70.26	17.01		150.0	
10109-CAD	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	X	3.09	68.67	16.82	0.00	150.0	± 9.6 %
		Y	2.84	68.14	16.34		150.0	
		Z	3.04	67.71	16.20		150.0	
10110-CAD	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	X	2.57	71.53	17.93	0.00	150.0	± 9.6 %
		Y	2.23	70.34	17.08		150.0	
		Z	2.40	69.37	16.69		150.0	
10111-CAD	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	X	2.89	70.18	17.49	0.00	150.0	± 9.6 %
		Y	2.69	70.17	16.97		150.0	
		Z	2.76	68.52	16.57		150.0	

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10112-CAD	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	X	3.20	68.56	16.82	0.00	150.0	± 9.6 %
		Y	2.97	68.19	16.41		150.0	
		Z	3.16	67.65	16.23		150.0	
10113-CAD	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	X	3.03	70.18	17.54	0.00	150.0	± 9.6 %
		Y	2.84	70.33	17.08		150.0	
		Z	2.91	68.60	16.67		150.0	
10114-CAB	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	X	5.22	67.55	16.82	0.00	150.0	± 9.6 %
		Y	5.01	67.38	16.69		150.0	
		Z	5.23	67.22	16.57		150.0	
10115-CAB	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	X	5.51	67.67	16.88	0.00	150.0	± 9.6 %
		Y	5.24	67.43	16.71		150.0	
		Z	5.59	67.53	16.73		150.0	
10116-CAB	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	X	5.32	67.77	16.86	0.00	150.0	± 9.6 %
		Y	5.09	67.56	16.71		150.0	
		Z	5.35	67.48	16.63		150.0	
10117-CAB	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	X	5.18	67.41	16.77	0.00	150.0	± 9.6 %
		Y	4.99	67.31	16.67		150.0	
		Z	5.22	67.16	16.56		150.0	
10118-CAB	IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)	X	5.60	67.90	17.00	0.00	150.0	± 9.6 %
		Y	5.33	67.65	16.82		150.0	
		Z	5.66	67.71	16.83		150.0	
10119-CAB	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	X	5.29	67.71	16.84	0.00	150.0	± 9.6 %
		Y	5.09	67.57	16.72		150.0	
		Z	5.32	67.41	16.61		150.0	
10140-CAC	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	X	3.55	68.50	16.74	0.00	150.0	± 9.6 %
		Y	3.31	67.98	16.38		150.0	
		Z	3.52	67.78	16.24		150.0	
10141-CAC	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	X	3.67	68.55	16.88	0.00	150.0	± 9.6 %
		Y	3.44	68.16	16.58		150.0	
		Z	3.64	67.83	16.39		150.0	
10142-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	X	2.43	72.31	17.99	0.00	150.0	± 9.6 %
		Y	2.05	70.97	16.70		150.0	
		Z	2.19	69.48	16.52		150.0	
10143-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	X	2.92	71.99	17.70	0.00	150.0	± 9.6 %
		Y	2.64	71.51	16.49		150.0	
		Z	2.66	69.45	16.50		150.0	
10144-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	X	2.52	68.69	15.63	0.00	150.0	± 9.6 %
		Y	2.08	67.10	13.81		150.0	
		Z	2.43	67.21	14.94		150.0	
10145-CAD	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	X	1.79	70.69	15.02	0.00	150.0	± 9.6 %
		Y	0.84	62.38	8.80		150.0	
		Z	1.52	67.49	13.83		150.0	
10146-CAD	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	X	2.39	69.14	13.14	0.00	150.0	± 9.6 %
		Y	0.91	60.09	6.33		150.0	
		Z	2.42	68.68	13.44		150.0	
10147-CAD	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	X	3.37	73.36	15.07	0.00	150.0	± 9.6 %
		Y	0.95	60.40	6.59		150.0	
		Z	2.99	71.49	14.85		150.0	

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10149-CAC	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	X	3.10	68.75	16.87	0.00	150.0	± 9.6 %
		Y	2.86	68.22	16.40		150.0	
		Z	3.05	67.77	16.24		150.0	
10150-CAC	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	X	3.21	68.63	16.87	0.00	150.0	± 9.6 %
		Y	2.98	68.27	16.46		150.0	
		Z	3.17	67.70	16.27		150.0	
10151-CAC	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	6.46	77.35	20.98	3.98	65.0	± 9.6 %
		Y	5.60	75.90	20.35		65.0	
		Z	6.28	76.32	20.62		65.0	
10152-CAC	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	X	5.73	73.25	19.78	3.98	65.0	± 9.6 %
		Y	5.01	71.62	18.79		65.0	
		Z	5.77	72.89	19.71		65.0	
10153-CAC	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	X	6.09	74.19	20.56	3.98	65.0	± 9.6 %
		Y	5.41	72.85	19.73		65.0	
		Z	6.09	73.69	20.43		65.0	
10154-CAD	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	2.65	72.14	18.27	0.00	150.0	± 9.6 %
		Y	2.29	70.89	17.40		150.0	
		Z	2.46	69.85	16.99		150.0	
10155-CAD	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	X	2.89	70.19	17.50	0.00	150.0	± 9.6 %
		Y	2.69	70.22	17.00		150.0	
		Z	2.76	68.53	16.58		150.0	
10156-CAD	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	X	2.37	73.31	18.21	0.00	150.0	± 9.6 %
		Y	1.92	71.24	16.36		150.0	
		Z	2.06	69.82	16.51		150.0	
10157-CAD	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	X	2.47	70.16	16.12	0.00	150.0	± 9.6 %
		Y	1.93	67.70	13.68		150.0	
		Z	2.29	68.01	15.16		150.0	
10158-CAD	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	X	3.04	70.26	17.59	0.00	150.0	± 9.6 %
		Y	2.85	70.45	17.16		150.0	
		Z	2.91	68.65	16.71		150.0	
10159-CAD	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	X	2.63	70.81	16.47	0.00	150.0	± 9.6 %
		Y	2.04	68.18	13.95		150.0	
		Z	2.41	68.51	15.47		150.0	
10160-CAC	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	X	3.03	70.64	17.63	0.00	150.0	± 9.6 %
		Y	2.76	70.03	17.16		150.0	
		Z	2.90	69.11	16.71		150.0	
10161-CAC	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	X	3.11	68.64	16.84	0.00	150.0	± 9.6 %
		Y	2.88	68.32	16.37		150.0	
		Z	3.06	67.63	16.22		150.0	
10162-CAC	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	X	3.22	68.74	16.92	0.00	150.0	± 9.6 %
		Y	2.99	68.56	16.52		150.0	
		Z	3.17	67.72	16.30		150.0	
10166-CAD	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	X	3.64	70.34	19.74	3.01	150.0	± 9.6 %
		Y	3.05	68.44	18.70		150.0	
		Z	3.68	69.56	19.19		150.0	
10167-CAD	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	X	4.63	74.17	20.55	3.01	150.0	± 9.6 %
		Y	3.50	70.97	19.02		150.0	
		Z	4.63	72.90	19.85		150.0	

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10168-CAD	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	X	5.30	77.09	22.15	3.01	150.0	± 9.6 %
		Y	4.01	74.04	20.83		150.0	
		Z	5.15	75.21	21.19		150.0	
10169-CAC	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	3.00	70.25	19.82	3.01	150.0	± 9.6 %
		Y	2.42	66.59	17.88		150.0	
		Z	3.11	69.95	19.42		150.0	
10170-CAC	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	4.68	79.28	23.39	3.01	150.0	± 9.6 %
		Y	3.00	71.89	20.26		150.0	
		Z	4.64	77.57	22.36		150.0	
10171-AAC	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	X	3.55	73.36	19.86	3.01	150.0	± 9.6 %
		Y	2.46	67.70	17.18		150.0	
		Z	3.65	72.51	19.24		150.0	
10172-CAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	7.31	88.53	27.01	6.02	65.0	± 9.6 %
		Y	3.53	75.92	22.15		65.0	
		Z	7.09	86.46	26.22		65.0	
10173-CAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	17.26	99.36	28.20	6.02	65.0	± 9.6 %
		Y	4.89	80.09	21.91		65.0	
		Z	14.79	95.61	27.20		65.0	
10174-CAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	X	10.30	89.53	24.59	6.02	65.0	± 9.6 %
		Y	3.09	72.34	18.42		65.0	
		Z	9.29	86.73	23.83		65.0	
10175-CAD	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	2.96	69.88	19.54	3.01	150.0	± 9.6 %
		Y	2.39	66.31	17.62		150.0	
		Z	3.07	69.60	19.15		150.0	
10176-CAD	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	4.69	79.31	23.40	3.01	150.0	± 9.6 %
		Y	3.01	71.92	20.27		150.0	
		Z	4.65	77.60	22.38		150.0	
10177-CAF	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	2.98	70.06	19.65	3.01	150.0	± 9.6 %
		Y	2.41	66.43	17.70		150.0	
		Z	3.10	69.78	19.26		150.0	
10178-CAD	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	4.61	78.96	23.23	3.01	150.0	± 9.6 %
		Y	2.98	71.75	20.17		150.0	
		Z	4.58	77.27	22.22		150.0	
10179-CAD	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	X	4.06	76.15	21.47	3.01	150.0	± 9.6 %
		Y	2.69	69.63	18.56		150.0	
		Z	4.09	74.85	20.64		150.0	
10180-CAD	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	X	3.54	73.25	19.80	3.01	150.0	± 9.6 %
		Y	2.45	67.66	17.15		150.0	
		Z	3.64	72.41	19.18		150.0	
10181-CAC	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	2.98	70.04	19.64	3.01	150.0	± 9.6 %
		Y	2.40	66.41	17.69		150.0	
		Z	3.09	69.76	19.25		150.0	
10182-CAC	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	4.60	78.93	23.22	3.01	150.0	± 9.6 %
		Y	2.98	71.72	20.16		150.0	
		Z	4.57	77.24	22.20		150.0	
10183-AAB	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	X	3.53	73.22	19.78	3.01	150.0	± 9.6 %
		Y	2.45	67.64	17.14		150.0	
		Z	3.63	72.39	19.17		150.0	

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10184-CAD	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	X	2.99	70.09	19.66	3.01	150.0	± 9.6 %
		Y	2.41	66.45	17.72		150.0	
		Z	3.11	69.80	19.27		150.0	
10185-CAD	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	X	4.63	79.03	23.27	3.01	150.0	± 9.6 %
		Y	2.99	71.80	20.20		150.0	
		Z	4.59	77.33	22.25		150.0	
10186-AAD	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	X	3.55	73.31	19.83	3.01	150.0	± 9.6 %
		Y	2.46	67.70	17.17		150.0	
		Z	3.65	72.46	19.21		150.0	
10187-CAD	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	X	3.00	70.15	19.73	3.01	150.0	± 9.6 %
		Y	2.42	66.53	17.80		150.0	
		Z	3.11	69.85	19.33		150.0	
10188-CAD	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	X	4.85	80.04	23.77	3.01	150.0	± 9.6 %
		Y	3.08	72.45	20.61		150.0	
		Z	4.79	78.20	22.70		150.0	
10189-AAD	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	X	3.66	73.91	20.18	3.01	150.0	± 9.6 %
		Y	2.51	68.08	17.45		150.0	
		Z	3.75	72.99	19.53		150.0	
10193-CAB	IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)	X	4.61	67.00	16.57	0.00	150.0	± 9.6 %
		Y	4.41	67.10	16.42		150.0	
		Z	4.64	66.63	16.32		150.0	
10194-CAB	IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)	X	4.78	67.32	16.69	0.00	150.0	± 9.6 %
		Y	4.55	67.32	16.55		150.0	
		Z	4.82	66.98	16.44		150.0	
10195-CAB	IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)	X	4.83	67.35	16.70	0.00	150.0	± 9.6 %
		Y	4.58	67.33	16.56		150.0	
		Z	4.87	67.00	16.45		150.0	
10196-CAB	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	X	4.61	67.07	16.59	0.00	150.0	± 9.6 %
		Y	4.39	67.09	16.41		150.0	
		Z	4.65	66.72	16.35		150.0	
10197-CAB	IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)	X	4.80	67.34	16.70	0.00	150.0	± 9.6 %
		Y	4.56	67.32	16.55		150.0	
		Z	4.84	67.00	16.45		150.0	
10198-CAB	IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	X	4.83	67.37	16.71	0.00	150.0	± 9.6 %
		Y	4.58	67.33	16.56		150.0	
		Z	4.87	67.02	16.46		150.0	
10219-CAB	IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)	X	4.57	67.10	16.56	0.00	150.0	± 9.6 %
		Y	4.35	67.14	16.39		150.0	
		Z	4.60	66.73	16.32		150.0	
10220-CAB	IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)	X	4.79	67.31	16.69	0.00	150.0	± 9.6 %
		Y	4.55	67.28	16.54		150.0	
		Z	4.84	66.98	16.45		150.0	
10221-CAB	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)	X	4.83	67.28	16.69	0.00	150.0	± 9.6 %
		Y	4.59	67.27	16.55		150.0	
		Z	4.88	66.95	16.45		150.0	
10222-CAB	IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)	X	5.16	67.42	16.77	0.00	150.0	± 9.6 %
		Y	4.97	67.30	16.66		150.0	
		Z	5.19	67.18	16.56		150.0	

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10223-CAB	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	X	5.46	67.60	16.87	0.00	150.0	± 9.6 %
		Y	5.22	67.47	16.75		150.0	
		Z	5.52	67.40	16.69		150.0	
10224-CAB	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	X	5.20	67.54	16.75	0.00	150.0	± 9.6 %
		Y	5.01	67.42	16.65		150.0	
		Z	5.24	67.28	16.54		150.0	
10225-CAB	UMTS-FDD (HSPA+)	X	2.94	67.12	16.17	0.00	150.0	± 9.6 %
		Y	2.72	66.97	15.45		150.0	
		Z	2.92	66.28	15.70		150.0	
10226-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	X	19.16	101.31	28.88	6.02	65.0	± 9.6 %
		Y	5.16	81.08	22.37		65.0	
		Z	15.99	97.09	27.76		65.0	
10227-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	X	15.78	96.20	26.65	6.02	65.0	± 9.6 %
		Y	4.99	79.62	21.19		65.0	
		Z	13.45	92.61	25.74		65.0	
10228-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	X	10.12	94.85	29.17	6.02	65.0	± 9.6 %
		Y	4.04	78.63	23.30		65.0	
		Z	9.75	92.73	28.43		65.0	
10229-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	X	17.42	99.49	28.25	6.02	65.0	± 9.6 %
		Y	4.93	80.18	21.95		65.0	
		Z	14.90	95.72	27.25		65.0	
10230-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	X	14.45	94.67	26.11	6.02	65.0	± 9.6 %
		Y	4.74	78.74	20.79		65.0	
		Z	12.61	91.45	25.30		65.0	
10231-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	X	9.57	93.67	28.70	6.02	65.0	± 9.6 %
		Y	3.91	77.93	22.94		65.0	
		Z	9.31	91.76	28.03		65.0	
10232-CAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	17.39	99.48	28.24	6.02	65.0	± 9.6 %
		Y	4.92	80.16	21.95		65.0	
		Z	14.88	95.71	27.24		65.0	
10233-CAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	X	14.42	94.65	26.10	6.02	65.0	± 9.6 %
		Y	4.72	78.71	20.78		65.0	
		Z	12.59	91.44	25.29		65.0	
10234-CAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	9.11	92.56	28.21	6.02	65.0	± 9.6 %
		Y	3.80	77.34	22.59		65.0	
		Z	8.93	90.80	27.59		65.0	
10235-CAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	17.43	99.54	28.26	6.02	65.0	± 9.6 %
		Y	4.92	80.18	21.96		65.0	
		Z	14.90	95.75	27.26		65.0	
10236-CAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	X	14.63	94.84	26.15	6.02	65.0	± 9.6 %
		Y	4.76	78.82	20.81		65.0	
		Z	12.74	91.60	25.34		65.0	
10237-CAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	9.60	93.77	28.73	6.02	65.0	± 9.6 %
		Y	3.90	77.94	22.95		65.0	
		Z	9.34	91.84	28.06		65.0	
10238-CAC	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	17.35	99.45	28.23	6.02	65.0	± 9.6 %
		Y	4.91	80.14	21.94		65.0	
		Z	14.84	95.68	27.23		65.0	

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10239- CAC	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	X	14.38	94.62	26.09	6.02	65.0	± 9.6 %
		Y	4.71	78.68	20.77		65.0	
		Z	12.56	91.42	25.29		65.0	
10240- CAC	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	9.56	93.71	28.71	6.02	65.0	± 9.6 %
		Y	3.89	77.92	22.94		65.0	
		Z	9.30	91.78	28.04		65.0	
10241- CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	X	7.84	80.69	24.93	6.98	65.0	± 9.6 %
		Y	6.24	77.78	23.48		65.0	
		Z	7.86	79.73	24.64		65.0	
10242- CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	X	6.95	78.17	23.80	6.98	65.0	± 9.6 %
		Y	5.72	76.07	22.67		65.0	
		Z	6.92	76.98	23.38		65.0	
10243- CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	X	5.60	74.55	23.14	6.98	65.0	± 9.6 %
		Y	4.88	73.14	22.25		65.0	
		Z	5.64	73.69	22.80		65.0	
10244- CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	X	5.14	73.22	17.01	3.98	65.0	± 9.6 %
		Y	3.11	66.52	12.40		65.0	
		Z	5.47	73.96	17.89		65.0	
10245- CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	X	5.05	72.70	16.73	3.98	65.0	± 9.6 %
		Y	3.08	66.18	12.19		65.0	
		Z	5.42	73.56	17.67		65.0	
10246- CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	X	5.05	76.38	18.68	3.98	65.0	± 9.6 %
		Y	3.18	69.96	14.75		65.0	
		Z	5.07	76.25	19.10		65.0	
10247- CAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	X	4.81	72.81	17.93	3.98	65.0	± 9.6 %
		Y	3.70	69.24	15.17		65.0	
		Z	4.89	72.75	18.30		65.0	
10248- CAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	X	4.82	72.35	17.72	3.98	65.0	± 9.6 %
		Y	3.68	68.75	14.94		65.0	
		Z	4.95	72.40	18.13		65.0	
10249- CAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	X	6.27	79.95	20.99	3.98	65.0	± 9.6 %
		Y	4.52	75.31	18.34		65.0	
		Z	5.93	78.67	20.82		65.0	
10250- CAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	X	5.75	75.46	20.69	3.98	65.0	± 9.6 %
		Y	4.97	73.70	19.42		65.0	
		Z	5.69	74.75	20.56		65.0	
10251- CAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	X	5.51	73.48	19.50	3.98	65.0	± 9.6 %
		Y	4.67	71.44	18.01		65.0	
		Z	5.54	73.05	19.51		65.0	
10252- CAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	6.61	79.97	21.97	3.98	65.0	± 9.6 %
		Y	5.45	77.68	20.78		65.0	
		Z	6.25	78.45	21.50		65.0	
10253- CAC	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	X	5.60	72.71	19.54	3.98	65.0	± 9.6 %
		Y	4.95	71.29	18.53		65.0	
		Z	5.63	72.31	19.49		65.0	
10254- CAC	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	X	5.95	73.60	20.24	3.98	65.0	± 9.6 %
		Y	5.29	72.33	19.32		65.0	
		Z	5.95	73.10	20.14		65.0	

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10255- CAC	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	X	6.17	76.74	20.97	3.98	65.0	± 9.6 %
		Y	5.38	75.37	20.26		65.0	
		Z	6.01	75.72	20.62		65.0	
10256- CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	X	3.87	69.04	14.08	3.98	65.0	± 9.6 %
		Y	2.32	63.20	9.49		65.0	
		Z	4.41	70.75	15.53		65.0	
10257- CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	X	3.80	68.48	13.73	3.98	65.0	± 9.6 %
		Y	2.31	62.91	9.24		65.0	
		Z	4.36	70.24	15.22		65.0	
10258- CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	X	3.72	71.57	15.81	3.98	65.0	± 9.6 %
		Y	2.25	65.17	11.32		65.0	
		Z	4.07	72.75	16.93		65.0	
10259- CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	X	5.19	73.84	18.95	3.98	65.0	± 9.6 %
		Y	4.19	70.99	16.76		65.0	
		Z	5.21	73.50	19.12		65.0	
10260- CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	X	5.22	73.59	18.85	3.98	65.0	± 9.6 %
		Y	4.22	70.75	16.64		65.0	
		Z	5.27	73.32	19.06		65.0	
10261- CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	X	6.09	79.15	21.11	3.98	65.0	± 9.6 %
		Y	4.74	75.73	19.09		65.0	
		Z	5.81	77.88	20.86		65.0	
10262- CAC	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	X	5.74	75.41	20.65	3.98	65.0	± 9.6 %
		Y	4.95	73.61	19.36		65.0	
		Z	5.68	74.71	20.53		65.0	
10263- CAC	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	X	5.50	73.45	19.50	3.98	65.0	± 9.6 %
		Y	4.66	71.42	18.00		65.0	
		Z	5.53	73.03	19.50		65.0	
10264- CAC	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	X	6.55	79.78	21.87	3.98	65.0	± 9.6 %
		Y	5.39	77.47	20.66		65.0	
		Z	6.21	78.30	21.42		65.0	
10265- CAC	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	X	5.73	73.25	19.78	3.98	65.0	± 9.6 %
		Y	5.01	71.63	18.80		65.0	
		Z	5.77	72.89	19.72		65.0	
10266- CAC	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	X	6.09	74.18	20.55	3.98	65.0	± 9.6 %
		Y	5.41	72.84	19.72		65.0	
		Z	6.09	73.68	20.42		65.0	
10267- CAC	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	6.45	77.31	20.96	3.98	65.0	± 9.6 %
		Y	5.59	75.86	20.33		65.0	
		Z	6.27	76.28	20.60		65.0	
10268- CAC	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	X	6.35	73.20	20.18	3.98	65.0	± 9.6 %
		Y	5.70	71.95	19.50		65.0	
		Z	6.39	72.85	20.07		65.0	
10269- CAC	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	X	6.33	72.80	20.07	3.98	65.0	± 9.6 %
		Y	5.72	71.66	19.40		65.0	
		Z	6.36	72.46	19.97		65.0	
10270- CAC	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	X	6.35	74.86	20.14	3.98	65.0	± 9.6 %
		Y	5.70	73.86	19.73		65.0	
		Z	6.28	74.21	19.89		65.0	

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10274-CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)	X	2.75	67.77	16.25	0.00	150.0	± 9.6 %
		Y	2.60	67.79	15.63		150.0	
		Z	2.68	66.62	15.60		150.0	
10275-CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)	X	1.98	71.91	18.01	0.00	150.0	± 9.6 %
		Y	1.73	70.34	16.81		150.0	
		Z	1.74	68.78	16.28		150.0	
10277-CAA	PHS (QPSK)	X	2.29	61.54	7.17	9.03	50.0	± 9.6 %
		Y	2.01	60.53	6.08		50.0	
		Z	2.60	62.58	8.31		50.0	
10278-CAA	PHS (QPSK, BW 884MHz, Rolloff 0.5)	X	4.05	69.28	13.75	9.03	50.0	± 9.6 %
		Y	3.07	65.13	10.79		50.0	
		Z	5.04	72.65	16.00		50.0	
10279-CAA	PHS (QPSK, BW 884MHz, Rolloff 0.38)	X	4.17	69.58	13.93	9.03	50.0	± 9.6 %
		Y	3.13	65.30	10.93		50.0	
		Z	5.19	72.96	16.17		50.0	
10290-AAB	CDMA2000, RC1, SO55, Full Rate	X	2.94	79.25	18.88	0.00	150.0	± 9.6 %
		Y	1.35	69.48	13.13		150.0	
		Z	1.79	71.08	15.72		150.0	
10291-AAB	CDMA2000, RC3, SO55, Full Rate	X	1.63	76.03	17.75	0.00	150.0	± 9.6 %
		Y	0.87	67.94	12.40		150.0	
		Z	1.00	67.90	14.24		150.0	
10292-AAB	CDMA2000, RC3, SO32, Full Rate	X	8.00	100.77	26.37	0.00	150.0	± 9.6 %
		Y	4.22	87.88	20.06		150.0	
		Z	1.40	73.72	17.29		150.0	
10293-AAB	CDMA2000, RC3, SO3, Full Rate	X	100.00	141.24	36.83	0.00	150.0	± 9.6 %
		Y	100.00	130.10	31.23		150.0	
		Z	2.38	82.00	21.00		150.0	
10295-AAB	CDMA2000, RC1, SO3, 1/8th Rate 25 fr.	X	7.80	80.68	21.55	9.03	50.0	± 9.6 %
		Y	10.00	82.57	20.80		50.0	
		Z	7.49	80.32	22.07		50.0	
10297-AAB	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	3.14	72.27	18.19	0.00	150.0	± 9.6 %
		Y	2.75	70.95	17.53		150.0	
		Z	2.95	70.36	17.07		150.0	
10298-AAC	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	X	2.25	73.56	17.32	0.00	150.0	± 9.6 %
		Y	1.38	67.70	13.10		150.0	
		Z	1.83	69.36	15.51		150.0	
10299-AAC	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	X	3.53	74.03	16.31	0.00	150.0	± 9.6 %
		Y	1.39	63.42	9.56		150.0	
		Z	3.05	71.31	15.50		150.0	
10300-AAC	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	X	2.14	66.54	12.22	0.00	150.0	± 9.6 %
		Y	1.13	61.01	7.52		150.0	
		Z	2.25	66.35	12.50		150.0	
10301-AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC)	X	4.67	65.28	17.61	4.17	50.0	± 9.6 %
		Y	4.28	64.92	17.05		50.0	
		Z	4.79	65.09	17.49		50.0	
10302-AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC, 3 CTRL symbols)	X	5.15	65.92	18.33	4.96	50.0	± 9.6 %
		Y	4.88	65.99	17.98		50.0	
		Z	5.29	65.86	18.29		50.0	

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10303-AAA	IEEE 802.16e WiMAX (31:15, 5ms, 10MHz, 64QAM, PUSC)	X	4.89	65.53	18.16	4.96	50.0	± 9.6 %
		Y	4.68	65.96	17.99		50.0	
		Z	5.05	65.52	18.16		50.0	
10304-AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, 64QAM, PUSC)	X	4.71	65.45	17.69	4.17	50.0	± 9.6 %
		Y	4.47	65.66	17.38		50.0	
		Z	4.84	65.33	17.61		50.0	
10305-AAA	IEEE 802.16e WiMAX (31:15, 10ms, 10MHz, 64QAM, PUSC, 15 symbols)	X	4.31	67.08	19.65	6.02	35.0	± 9.6 %
		Y	4.21	67.82	19.02		35.0	
		Z	4.50	67.30	19.89		35.0	
10306-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 64QAM, PUSC, 18 symbols)	X	4.63	66.09	19.18	6.02	35.0	± 9.6 %
		Y	4.47	66.67	18.75		35.0	
		Z	4.80	66.24	19.34		35.0	
10307-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, PUSC, 18 symbols)	X	4.53	66.29	19.18	6.02	35.0	± 9.6 %
		Y	4.36	66.76	18.69		35.0	
		Z	4.72	66.51	19.37		35.0	
10308-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, PUSC)	X	4.50	66.48	19.32	6.02	35.0	± 9.6 %
		Y	4.35	66.99	18.84		35.0	
		Z	4.68	66.67	19.49		35.0	
10309-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, AMC 2x3, 18 symbols)	X	4.68	66.32	19.33	6.02	35.0	± 9.6 %
		Y	4.48	66.72	18.83		35.0	
		Z	4.88	66.52	19.51		35.0	
10310-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, AMC 2x3, 18 symbols)	X	4.58	66.16	19.16	6.02	35.0	± 9.6 %
		Y	4.43	66.76	18.76		35.0	
		Z	4.75	66.31	19.32		35.0	
10311-AAB	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	X	3.53	71.32	17.68	0.00	150.0	± 9.6 %
		Y	3.13	70.01	17.08		150.0	
		Z	3.31	69.62	16.69		150.0	
10313-AAA	iDEN 1:3	X	3.12	70.95	14.92	6.99	70.0	± 9.6 %
		Y	2.73	70.05	14.76		70.0	
		Z	3.10	70.81	15.15		70.0	
10314-AAA	iDEN 1:6	X	4.52	77.57	20.25	10.00	30.0	± 9.6 %
		Y	4.50	78.03	20.63		30.0	
		Z	4.14	75.97	19.92		30.0	
10315-AAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle)	X	1.15	65.36	16.67	0.17	150.0	± 9.6 %
		Y	1.11	64.70	15.94		150.0	
		Z	1.11	63.94	15.52		150.0	
10316-AAB	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	X	4.63	66.91	16.58	0.17	150.0	± 9.6 %
		Y	4.41	66.90	16.40		150.0	
		Z	4.68	66.60	16.37		150.0	
10317-AAB	IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle)	X	4.63	66.91	16.58	0.17	150.0	± 9.6 %
		Y	4.41	66.90	16.40		150.0	
		Z	4.68	66.60	16.37		150.0	
10400-AAC	IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle)	X	4.78	67.38	16.69	0.00	150.0	± 9.6 %
		Y	4.50	67.30	16.51		150.0	
		Z	4.83	67.04	16.44		150.0	
10401-AAC	IEEE 802.11ac WiFi (40MHz, 64-QAM, 99pc duty cycle)	X	5.48	67.50	16.79	0.00	150.0	± 9.6 %
		Y	5.16	66.99	16.46		150.0	
		Z	5.49	67.17	16.55		150.0	

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10402-AAC	IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc duty cycle)	X	5.72	67.78	16.78	0.00	150.0	± 9.6 %
		Y	5.52	67.59	16.66		150.0	
		Z	5.77	67.60	16.61		150.0	
10403-AAB	CDMA2000 (1xEV-DO, Rev. 0)	X	2.94	79.25	18.88	0.00	115.0	± 9.6 %
		Y	1.35	69.48	13.13		115.0	
		Z	1.79	71.08	15.72		115.0	
10404-AAB	CDMA2000 (1xEV-DO, Rev. A)	X	2.94	79.25	18.88	0.00	115.0	± 9.6 %
		Y	1.35	69.48	13.13		115.0	
		Z	1.79	71.08	15.72		115.0	
10406-AAB	CDMA2000, RC3, SQ32, SCH0, Full Rate	X	100.00	122.34	30.33	0.00	100.0	± 9.6 %
		Y	100.00	118.96	27.97		100.0	
		Z	100.00	121.63	30.34		100.0	
10410-AAB	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	118.09	28.15	3.23	80.0	± 9.6 %
		Y	2.79	75.98	16.42		80.0	
		Z	23.70	100.27	24.37		80.0	
10415-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)	X	1.08	64.69	16.30	0.00	150.0	± 9.6 %
		Y	1.05	64.17	15.62		150.0	
		Z	1.04	63.31	15.12		150.0	
10416-AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle)	X	4.61	67.04	16.64	0.00	150.0	± 9.6 %
		Y	4.40	67.07	16.48		150.0	
		Z	4.64	66.67	16.38		150.0	
10417-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 99pc duty cycle)	X	4.61	67.04	16.64	0.00	150.0	± 9.6 %
		Y	4.40	67.07	16.48		150.0	
		Z	4.64	66.67	16.38		150.0	
10418-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Long preamble)	X	4.61	67.22	16.67	0.00	150.0	± 9.6 %
		Y	4.40	67.30	16.56		150.0	
		Z	4.63	66.82	16.39		150.0	
10419-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Short preamble)	X	4.62	67.16	16.66	0.00	150.0	± 9.6 %
		Y	4.42	67.22	16.53		150.0	
		Z	4.65	66.78	16.39		150.0	
10422-AAA	IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)	X	4.74	67.14	16.66	0.00	150.0	± 9.6 %
		Y	4.52	67.17	16.53		150.0	
		Z	4.77	66.78	16.41		150.0	
10423-AAA	IEEE 802.11n (HT Greenfield, 43.3 Mbps, 16-QAM)	X	4.91	67.46	16.77	0.00	150.0	± 9.6 %
		Y	4.64	67.43	16.62		150.0	
		Z	4.96	67.13	16.53		150.0	
10424-AAA	IEEE 802.11n (HT Greenfield, 72.2 Mbps, 64-QAM)	X	4.83	67.42	16.75	0.00	150.0	± 9.6 %
		Y	4.57	67.38	16.60		150.0	
		Z	4.87	67.07	16.50		150.0	
10425-AAA	IEEE 802.11n (HT Greenfield, 15 Mbps, BPSK)	X	5.43	67.67	16.88	0.00	150.0	± 9.6 %
		Y	5.20	67.51	16.75		150.0	
		Z	5.47	67.42	16.67		150.0	
10426-AAA	IEEE 802.11n (HT Greenfield, 90 Mbps, 16-QAM)	X	5.44	67.70	16.89	0.00	150.0	± 9.6 %
		Y	5.23	67.63	16.80		150.0	
		Z	5.47	67.42	16.67		150.0	

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10427-AAA	IEEE 802.11n (HT Greenfield, 150 Mbps, 64-QAM)	X	5.45	67.67	16.87	0.00	150.0	± 9.6 %
		Y	5.18	67.38	16.67		150.0	
		Z	5.48	67.40	16.66		150.0	
10430-AAA	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1)	X	4.54	72.27	19.17	0.00	150.0	± 9.6 %
		Y	4.74	74.68	19.63		150.0	
		Z	4.38	70.70	18.41		150.0	
10431-AAA	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1)	X	4.32	67.77	16.74	0.00	150.0	± 9.6 %
		Y	4.03	67.80	16.43		150.0	
		Z	4.35	67.26	16.43		150.0	
10432-AAA	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1)	X	4.61	67.53	16.74	0.00	150.0	± 9.6 %
		Y	4.34	67.54	16.55		150.0	
		Z	4.65	67.13	16.47		150.0	
10433-AAA	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1)	X	4.85	67.46	16.77	0.00	150.0	± 9.6 %
		Y	4.59	67.42	16.62		150.0	
		Z	4.89	67.11	16.53		150.0	
10434-AAA	W-CDMA (BS Test Model 1, 64 DPCH)	X	4.77	73.56	19.32	0.00	150.0	± 9.6 %
		Y	5.07	76.22	19.65		150.0	
		Z	4.50	71.58	18.44		150.0	
10435-AAB	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	94.37	117.09	27.86	3.23	80.0	± 9.6 %
		Y	2.69	75.43	16.17		80.0	
		Z	21.49	98.86	23.95		80.0	
10447-AAA	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	X	3.66	68.13	16.27	0.00	150.0	± 9.6 %
		Y	3.29	67.82	15.37		150.0	
		Z	3.67	67.36	15.91		150.0	
10448-AAA	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1, Clipping 44%)	X	4.16	67.56	16.61	0.00	150.0	± 9.6 %
		Y	3.90	67.61	16.31		150.0	
		Z	4.18	67.04	16.29		150.0	
10449-AAA	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1, Clipping 44%)	X	4.42	67.38	16.66	0.00	150.0	± 9.6 %
		Y	4.19	67.38	16.47		150.0	
		Z	4.44	66.96	16.37		150.0	
10450-AAA	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	X	4.61	67.25	16.65	0.00	150.0	± 9.6 %
		Y	4.40	67.21	16.49		150.0	
		Z	4.63	66.88	16.38		150.0	
10451-AAA	W-CDMA (BS Test Model 1, 64 DPCH, Clipping 44%)	X	3.59	68.49	15.97	0.00	150.0	± 9.6 %
		Y	3.09	67.58	14.60		150.0	
		Z	3.59	67.64	15.63		150.0	
10456-AAA	IEEE 802.11ac WiFi (160MHz, 64-QAM, 99pc duty cycle)	X	6.29	68.15	16.97	0.00	150.0	± 9.6 %
		Y	6.13	67.97	16.85		150.0	
		Z	6.33	67.97	16.82		150.0	
10457-AAA	UMTS-FDD (DC-HSDPA)	X	3.85	65.66	16.36	0.00	150.0	± 9.6 %
		Y	3.76	65.82	16.22		150.0	
		Z	3.85	65.30	16.09		150.0	
10458-AAA	CDMA2000 (1xEV-DO, Rev. B, 2 carriers)	X	3.39	67.73	15.33	0.00	150.0	± 9.6 %
		Y	2.73	65.92	13.18		150.0	
		Z	3.41	66.96	15.10		150.0	
10459-AAA	CDMA2000 (1xEV-DO, Rev. B, 3 carriers)	X	4.55	66.08	16.27	0.00	150.0	± 9.6 %
		Y	4.02	65.49	15.07		150.0	
		Z	4.61	65.56	16.09		150.0	

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10460-AAA	UMTS-FDD (WCDMA, AMR)	X	1.39	76.99	21.11	0.00	150.0	± 9.6 %
		Y	1.11	72.92	18.76		150.0	
		Z	1.00	69.78	17.31		150.0	
10461-AAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	51.63	113.86	28.33	3.29	80.0	± 9.6 %
		Y	1.46	69.53	14.98		80.0	
		Z	9.99	91.68	22.96		80.0	
10462-AAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	0.90	60.26	7.72	3.23	80.0	± 9.6 %
		Y	0.73	60.00	6.93		80.0	
		Z	1.27	62.43	9.35		80.0	
10463-AAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	0.90	60.00	7.06	3.23	80.0	± 9.6 %
		Y	0.75	60.00	6.32		80.0	
		Z	1.02	60.10	7.73		80.0	
10464-AAA	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	23.60	101.54	24.53	3.23	80.0	± 9.6 %
		Y	1.14	66.55	13.08		80.0	
		Z	7.14	86.24	20.71		80.0	
10465-AAA	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	0.87	60.00	7.52	3.23	80.0	± 9.6 %
		Y	0.73	60.00	6.87		80.0	
		Z	1.19	61.82	8.99		80.0	
10466-AAA	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	0.90	60.00	7.01	3.23	80.0	± 9.6 %
		Y	0.75	60.00	6.28		80.0	
		Z	1.01	60.00	7.63		80.0	
10467-AAB	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	31.45	105.20	25.46	3.23	80.0	± 9.6 %
		Y	1.18	66.98	13.31		80.0	
		Z	7.91	87.63	21.16		80.0	
10468-AAB	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	0.87	60.00	7.53	3.23	80.0	± 9.6 %
		Y	0.72	60.00	6.89		80.0	
		Z	1.21	61.95	9.07		80.0	
10469-AAB	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	0.90	60.00	7.01	3.23	80.0	± 9.6 %
		Y	0.75	60.00	6.28		80.0	
		Z	1.01	60.00	7.63		80.0	
10470-AAB	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	31.87	105.37	25.49	3.23	80.0	± 9.6 %
		Y	1.17	66.97	13.30		80.0	
		Z	7.91	87.65	21.16		80.0	
10471-AAB	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	0.87	60.00	7.52	3.23	80.0	± 9.6 %
		Y	0.72	60.00	6.87		80.0	
		Z	1.20	61.91	9.03		80.0	
10472-AAB	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	0.90	60.00	6.99	3.23	80.0	± 9.6 %
		Y	0.75	60.00	6.26		80.0	
		Z	1.01	60.00	7.62		80.0	
10473-AAB	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	31.54	105.21	25.44	3.23	80.0	± 9.6 %
		Y	1.17	66.94	13.29		80.0	
		Z	7.88	87.59	21.14		80.0	
10474-AAB	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	0.86	60.00	7.52	3.23	80.0	± 9.6 %
		Y	0.72	60.00	6.87		80.0	
		Z	1.20	61.89	9.02		80.0	
10475-AAB	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	0.90	60.00	6.99	3.23	80.0	± 9.6 %
		Y	0.75	60.00	6.26		80.0	
		Z	1.01	60.00	7.62		80.0	

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10477-AAB	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	0.87	60.00	7.50	3.23	80.0	± 9.6 %
		Y	0.72	60.00	6.85		80.0	
		Z	1.18	61.75	8.94		80.0	
10478-AAB	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	0.90	60.00	6.98	3.23	80.0	± 9.6 %
		Y	0.75	60.00	6.25		80.0	
		Z	1.01	60.00	7.61		80.0	
10479-AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	6.05	82.75	21.57	3.23	80.0	± 9.6 %
		Y	3.17	74.60	17.61		80.0	
		Z	4.23	76.57	19.64		80.0	
10480-AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	5.00	75.65	17.11	3.23	80.0	± 9.6 %
		Y	1.63	64.90	11.52		80.0	
		Z	4.38	73.46	16.80		80.0	
10481-AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.86	71.87	15.32	3.23	80.0	± 9.6 %
		Y	1.51	62.61	10.05		80.0	
		Z	3.80	71.14	15.56		80.0	
10482-AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	2.88	71.48	16.48	2.23	80.0	± 9.6 %
		Y	1.58	64.47	12.02		80.0	
		Z	2.64	69.67	16.05		80.0	
10483-AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.45	70.23	15.28	2.23	80.0	± 9.6 %
		Y	1.45	60.72	9.07		80.0	
		Z	3.46	69.86	15.62		80.0	
10484-AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.29	69.41	14.95	2.23	80.0	± 9.6 %
		Y	1.45	60.49	8.94		80.0	
		Z	3.38	69.29	15.39		80.0	
10485-AAB	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	3.28	73.22	18.17	2.23	80.0	± 9.6 %
		Y	2.31	69.08	15.56		80.0	
		Z	2.95	70.87	17.34		80.0	
10486-AAB	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.10	68.97	15.90	2.23	80.0	± 9.6 %
		Y	2.18	65.09	12.93		80.0	
		Z	3.01	67.91	15.69		80.0	
10487-AAB	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.09	68.57	15.71	2.23	80.0	± 9.6 %
		Y	2.19	64.76	12.74		80.0	
		Z	3.03	67.65	15.57		80.0	
10488-AAB	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	3.55	72.44	18.58	2.23	80.0	± 9.6 %
		Y	2.83	69.96	17.25		80.0	
		Z	3.35	70.72	17.83		80.0	
10489-AAB	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.42	68.81	17.10	2.23	80.0	± 9.6 %
		Y	2.95	67.53	16.00		80.0	
		Z	3.35	67.83	16.71		80.0	
10490-AAB	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.51	68.64	17.04	2.23	80.0	± 9.6 %
		Y	3.03	67.42	15.95		80.0	
		Z	3.46	67.73	16.69		80.0	
10491-AAB	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	3.76	70.88	18.08	2.23	80.0	± 9.6 %
		Y	3.15	69.04	17.15		80.0	
		Z	3.65	69.70	17.52		80.0	
10492-AAB	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.76	68.10	17.11	2.23	80.0	± 9.6 %
		Y	3.34	67.13	16.36		80.0	
		Z	3.74	67.40	16.79		80.0	

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10493-AAB	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.83	67.97	17.07	2.23	80.0	± 9.6 %
		Y	3.40	67.04	16.32		80.0	
		Z	3.82	67.31	16.77		80.0	
10494-AAB	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	4.09	72.41	18.55	2.23	80.0	± 9.6 %
		Y	3.34	70.12	17.53		80.0	
		Z	3.91	71.04	17.90		80.0	
10495-AAB	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.79	68.48	17.30	2.23	80.0	± 9.6 %
		Y	3.37	67.37	16.58		80.0	
		Z	3.77	67.76	16.97		80.0	
10496-AAB	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.87	68.22	17.23	2.23	80.0	± 9.6 %
		Y	3.46	67.23	16.55		80.0	
		Z	3.86	67.57	16.92		80.0	
10497-AAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	1.98	66.62	13.38	2.23	80.0	± 9.6 %
		Y	1.02	60.00	8.33		80.0	
		Z	2.03	66.42	13.81		80.0	
10498-AAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	1.56	61.42	9.80	2.23	80.0	± 9.6 %
		Y	1.19	60.00	7.13		80.0	
		Z	1.82	62.59	11.00		80.0	
10499-AAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	1.52	60.93	9.40	2.23	80.0	± 9.6 %
		Y	1.20	60.00	6.97		80.0	
		Z	1.80	62.19	10.66		80.0	
10500-AAA	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	3.33	72.59	18.24	2.23	80.0	± 9.6 %
		Y	2.53	69.50	16.27		80.0	
		Z	3.07	70.53	17.45		80.0	
10501-AAA	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.25	68.99	16.40	2.23	80.0	± 9.6 %
		Y	2.55	66.46	14.29		80.0	
		Z	3.17	67.90	16.09		80.0	
10502-AAA	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.31	68.84	16.28	2.23	80.0	± 9.6 %
		Y	2.58	66.27	14.12		80.0	
		Z	3.23	67.82	16.01		80.0	
10503-AAB	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	3.51	72.24	18.48	2.23	80.0	± 9.6 %
		Y	2.79	69.76	17.14		80.0	
		Z	3.32	70.56	17.75		80.0	
10504-AAB	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.40	68.72	17.04	2.23	80.0	± 9.6 %
		Y	2.93	67.42	15.93		80.0	
		Z	3.34	67.76	16.66		80.0	
10505-AAB	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.49	68.55	16.99	2.23	80.0	± 9.6 %
		Y	3.01	67.31	15.88		80.0	
		Z	3.44	67.65	16.64		80.0	
10506-AAB	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	4.06	72.27	18.47	2.23	80.0	± 9.6 %
		Y	3.31	69.98	17.45		80.0	
		Z	3.88	70.91	17.84		80.0	
10507-AAB	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.78	68.42	17.27	2.23	80.0	± 9.6 %
		Y	3.35	67.31	16.54		80.0	
		Z	3.75	67.73	16.93		80.0	

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10508-AAB	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.86	68.15	17.18	2.23	80.0	± 9.6 %
		Y	3.44	67.15	16.50		80.0	
		Z	3.85	67.51	16.88		80.0	
10509-AAB	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	4.37	70.96	17.95	2.23	80.0	± 9.6 %
		Y	3.75	69.29	17.23		80.0	
		Z	4.26	70.00	17.47		80.0	
10510-AAB	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	4.26	68.17	17.26	2.23	80.0	± 9.6 %
		Y	3.84	67.15	16.69		80.0	
		Z	4.26	67.67	17.00		80.0	
10511-AAB	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	4.32	67.92	17.20	2.23	80.0	± 9.6 %
		Y	3.92	67.02	16.66		80.0	
		Z	4.32	67.45	16.95		80.0	
10512-AAB	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	4.58	72.54	18.44	2.23	80.0	± 9.6 %
		Y	3.80	70.26	17.50		80.0	
		Z	4.39	71.35	17.87		80.0	
10513-AAB	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	4.15	68.44	17.37	2.23	80.0	± 9.6 %
		Y	3.72	67.24	16.74		80.0	
		Z	4.14	67.92	17.08		80.0	
10514-AAB	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	4.17	68.03	17.25	2.23	80.0	± 9.6 %
		Y	3.78	66.97	16.67		80.0	
		Z	4.17	67.54	16.98		80.0	
10515-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 99pc duty cycle)	X	1.05	65.06	16.49	0.00	150.0	± 9.6 %
		Y	1.02	64.45	15.75		150.0	
		Z	1.00	63.53	15.21		150.0	
10516-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 99pc duty cycle)	X	2.09	95.99	28.92	0.00	150.0	± 9.6 %
		Y	0.91	78.84	21.95		150.0	
		Z	0.73	73.76	19.36		150.0	
10517-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 99pc duty cycle)	X	0.98	69.11	18.35	0.00	150.0	± 9.6 %
		Y	0.89	67.24	16.95		150.0	
		Z	0.87	65.91	16.12		150.0	
10518-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 99pc duty cycle)	X	4.61	67.13	16.62	0.00	150.0	± 9.6 %
		Y	4.39	67.19	16.49		150.0	
		Z	4.64	66.75	16.36		150.0	
10519-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 99pc duty cycle)	X	4.79	67.35	16.73	0.00	150.0	± 9.6 %
		Y	4.54	67.34	16.56		150.0	
		Z	4.84	67.01	16.49		150.0	
10520-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 99pc duty cycle)	X	4.65	67.34	16.67	0.00	150.0	± 9.6 %
		Y	4.40	67.29	16.49		150.0	
		Z	4.69	66.99	16.42		150.0	
10521-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 99pc duty cycle)	X	4.58	67.35	16.67	0.00	150.0	± 9.6 %
		Y	4.33	67.25	16.47		150.0	
		Z	4.62	66.99	16.40		150.0	
10522-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 99pc duty cycle)	X	4.64	67.44	16.75	0.00	150.0	± 9.6 %
		Y	4.38	67.36	16.56		150.0	
		Z	4.68	67.03	16.46		150.0	

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10523-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 99pc duty cycle)	X	4.53	67.33	16.61	0.00	150.0	± 9.6 %
		Y	4.32	67.42	16.52		150.0	
		Z	4.55	66.91	16.32		150.0	
10524-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 99pc duty cycle)	X	4.58	67.36	16.72	0.00	150.0	± 9.6 %
		Y	4.33	67.35	16.57		150.0	
		Z	4.62	66.97	16.44		150.0	
10525-AAA	IEEE 802.11ac WiFi (20MHz, MCS0, 99pc duty cycle)	X	4.58	66.42	16.31	0.00	150.0	± 9.6 %
		Y	4.38	66.48	16.20		150.0	
		Z	4.59	66.00	16.03		150.0	
10526-AAA	IEEE 802.11ac WiFi (20MHz, MCS1, 99pc duty cycle)	X	4.75	66.79	16.45	0.00	150.0	± 9.6 %
		Y	4.49	66.74	16.31		150.0	
		Z	4.78	66.39	16.17		150.0	
10527-AAA	IEEE 802.11ac WiFi (20MHz, MCS2, 99pc duty cycle)	X	4.67	66.77	16.41	0.00	150.0	± 9.6 %
		Y	4.43	66.73	16.26		150.0	
		Z	4.70	66.36	16.12		150.0	
10528-AAA	IEEE 802.11ac WiFi (20MHz, MCS3, 99pc duty cycle)	X	4.69	66.78	16.44	0.00	150.0	± 9.6 %
		Y	4.44	66.74	16.29		150.0	
		Z	4.72	66.38	16.16		150.0	
10529-AAA	IEEE 802.11ac WiFi (20MHz, MCS4, 99pc duty cycle)	X	4.69	66.78	16.44	0.00	150.0	± 9.6 %
		Y	4.44	66.74	16.29		150.0	
		Z	4.72	66.38	16.16		150.0	
10531-AAA	IEEE 802.11ac WiFi (20MHz, MCS6, 99pc duty cycle)	X	4.68	66.90	16.46	0.00	150.0	± 9.6 %
		Y	4.40	66.76	16.26		150.0	
		Z	4.72	66.51	16.18		150.0	
10532-AAA	IEEE 802.11ac WiFi (20MHz, MCS7, 99pc duty cycle)	X	4.54	66.77	16.40	0.00	150.0	± 9.6 %
		Y	4.29	66.63	16.20		150.0	
		Z	4.57	66.37	16.12		150.0	
10533-AAA	IEEE 802.11ac WiFi (20MHz, MCS8, 99pc duty cycle)	X	4.70	66.84	16.43	0.00	150.0	± 9.6 %
		Y	4.45	66.83	16.29		150.0	
		Z	4.73	66.42	16.14		150.0	
10534-AAA	IEEE 802.11ac WiFi (40MHz, MCS0, 99pc duty cycle)	X	5.21	66.79	16.43	0.00	150.0	± 9.6 %
		Y	5.00	66.64	16.30		150.0	
		Z	5.24	66.50	16.20		150.0	
10535-AAA	IEEE 802.11ac WiFi (40MHz, MCS1, 99pc duty cycle)	X	5.28	66.97	16.51	0.00	150.0	± 9.6 %
		Y	5.03	66.76	16.36		150.0	
		Z	5.31	66.65	16.27		150.0	
10536-AAA	IEEE 802.11ac WiFi (40MHz, MCS2, 99pc duty cycle)	X	5.15	66.94	16.48	0.00	150.0	± 9.6 %
		Y	4.93	66.77	16.35		150.0	
		Z	5.18	66.63	16.24		150.0	
10537-AAA	IEEE 802.11ac WiFi (40MHz, MCS3, 99pc duty cycle)	X	5.21	66.89	16.46	0.00	150.0	± 9.6 %
		Y	5.00	66.79	16.36		150.0	
		Z	5.24	66.59	16.22		150.0	
10538-AAA	IEEE 802.11ac WiFi (40MHz, MCS4, 99pc duty cycle)	X	5.30	66.90	16.50	0.00	150.0	± 9.6 %
		Y	5.06	66.72	16.36		150.0	
		Z	5.34	66.64	16.29		150.0	
10540-AAA	IEEE 802.11ac WiFi (40MHz, MCS6, 99pc duty cycle)	X	5.23	66.94	16.53	0.00	150.0	± 9.6 %
		Y	4.98	66.67	16.35		150.0	
		Z	5.26	66.62	16.29		150.0	

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10541-AAA	IEEE 802.11ac WiFi (40MHz, MCS7, 99pc duty cycle)	X	5.20	66.79	16.45	0.00	150.0	± 9.6 %
		Y	4.97	66.60	16.30		150.0	
		Z	5.23	66.50	16.22		150.0	
10542-AAA	IEEE 802.11ac WiFi (40MHz, MCS8, 99pc duty cycle)	X	5.35	66.84	16.49	0.00	150.0	± 9.6 %
		Y	5.13	66.69	16.36		150.0	
		Z	5.39	66.56	16.27		150.0	
10543-AAA	IEEE 802.11ac WiFi (40MHz, MCS9, 99pc duty cycle)	X	5.43	66.86	16.52	0.00	150.0	± 9.6 %
		Y	5.21	66.80	16.44		150.0	
		Z	5.47	66.59	16.30		150.0	
10544-AAA	IEEE 802.11ac WiFi (80MHz, MCS0, 99pc duty cycle)	X	5.52	66.86	16.39	0.00	150.0	± 9.6 %
		Y	5.34	66.67	16.26		150.0	
		Z	5.54	66.60	16.18		150.0	
10545-AAA	IEEE 802.11ac WiFi (80MHz, MCS1, 99pc duty cycle)	X	5.72	67.30	16.56	0.00	150.0	± 9.6 %
		Y	5.53	67.14	16.46		150.0	
		Z	5.74	67.03	16.34		150.0	
10546-AAA	IEEE 802.11ac WiFi (80MHz, MCS2, 99pc duty cycle)	X	5.59	67.08	16.47	0.00	150.0	± 9.6 %
		Y	5.38	66.79	16.30		150.0	
		Z	5.62	66.86	16.28		150.0	
10547-AAA	IEEE 802.11ac WiFi (80MHz, MCS3, 99pc duty cycle)	X	5.66	67.11	16.47	0.00	150.0	± 9.6 %
		Y	5.47	66.94	16.37		150.0	
		Z	5.70	66.93	16.30		150.0	
10548-AAA	IEEE 802.11ac WiFi (80MHz, MCS4, 99pc duty cycle)	X	5.93	68.11	16.94	0.00	150.0	± 9.6 %
		Y	5.60	67.54	16.64		150.0	
		Z	6.00	67.99	16.80		150.0	
10550-AAA	IEEE 802.11ac WiFi (80MHz, MCS6, 99pc duty cycle)	X	5.61	67.10	16.49	0.00	150.0	± 9.6 %
		Y	5.45	67.05	16.44		150.0	
		Z	5.64	66.83	16.27		150.0	
10551-AAA	IEEE 802.11ac WiFi (80MHz, MCS7, 99pc duty cycle)	X	5.62	67.14	16.47	0.00	150.0	± 9.6 %
		Y	5.36	66.75	16.25		150.0	
		Z	5.65	66.89	16.26		150.0	
10552-AAA	IEEE 802.11ac WiFi (80MHz, MCS8, 99pc duty cycle)	X	5.53	66.94	16.38	0.00	150.0	± 9.6 %
		Y	5.36	66.80	16.28		150.0	
		Z	5.56	66.67	16.16		150.0	
10553-AAA	IEEE 802.11ac WiFi (80MHz, MCS9, 99pc duty cycle)	X	5.61	66.96	16.41	0.00	150.0	± 9.6 %
		Y	5.40	66.73	16.27		150.0	
		Z	5.65	66.72	16.22		150.0	
10554-AAA	IEEE 1602.11ac WiFi (160MHz, MCS0, 99pc duty cycle)	X	5.93	67.20	16.46	0.00	150.0	± 9.6 %
		Y	5.77	66.98	16.33		150.0	
		Z	5.94	66.97	16.27		150.0	
10555-AAA	IEEE 1602.11ac WiFi (160MHz, MCS1, 99pc duty cycle)	X	6.06	67.51	16.59	0.00	150.0	± 9.6 %
		Y	5.86	67.20	16.42		150.0	
		Z	6.08	67.29	16.40		150.0	
10556-AAA	IEEE 1602.11ac WiFi (160MHz, MCS2, 99pc duty cycle)	X	6.08	67.56	16.61	0.00	150.0	± 9.6 %
		Y	5.91	67.34	16.48		150.0	
		Z	6.10	67.33	16.42		150.0	
10557-AAA	IEEE 1602.11ac WiFi (160MHz, MCS3, 99pc duty cycle)	X	6.04	67.46	16.58	0.00	150.0	± 9.6 %
		Y	5.86	67.18	16.42		150.0	
		Z	6.07	67.25	16.40		150.0	

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10558-AAA	IEEE 1602.11ac WiFi (160MHz, MCS4, 99pc duty cycle)	X	6.09	67.62	16.68	0.00	150.0	± 9.6 %
		Y	5.85	67.21	16.45		150.0	
		Z	6.13	67.43	16.51		150.0	
10560-AAA	IEEE 1602.11ac WiFi (160MHz, MCS6, 99pc duty cycle)	X	6.09	67.46	16.63	0.00	150.0	± 9.6 %
		Y	5.88	67.15	16.46		150.0	
		Z	6.12	67.26	16.46		150.0	
10561-AAA	IEEE 1602.11ac WiFi (160MHz, MCS7, 99pc duty cycle)	X	6.01	67.44	16.66	0.00	150.0	± 9.6 %
		Y	5.82	67.15	16.49		150.0	
		Z	6.04	67.23	16.48		150.0	
10562-AAA	IEEE 1602.11ac WiFi (160MHz, MCS8, 99pc duty cycle)	X	6.14	67.83	16.85	0.00	150.0	± 9.6 %
		Y	5.86	67.29	16.56		150.0	
		Z	6.18	67.68	16.71		150.0	
10563-AAA	IEEE 1602.11ac WiFi (160MHz, MCS9, 99pc duty cycle)	X	6.35	68.06	16.92	0.00	150.0	± 9.6 %
		Y	5.98	67.32	16.54		150.0	
		Z	6.54	68.30	16.96		150.0	
10564-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 99pc duty cycle)	X	4.92	67.11	16.70	0.46	150.0	± 9.6 %
		Y	4.69	67.10	16.54		150.0	
		Z	4.96	66.81	16.49		150.0	
10565-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 99pc duty cycle)	X	5.15	67.57	17.03	0.46	150.0	± 9.6 %
		Y	4.89	67.55	16.88		150.0	
		Z	5.21	67.28	16.82		150.0	
10566-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 99pc duty cycle)	X	4.98	67.43	16.85	0.46	150.0	± 9.6 %
		Y	4.73	67.34	16.67		150.0	
		Z	5.04	67.14	16.64		150.0	
10567-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 99pc duty cycle)	X	5.02	67.84	17.22	0.46	150.0	± 9.6 %
		Y	4.77	67.82	17.10		150.0	
		Z	5.06	67.52	16.98		150.0	
10568-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 99pc duty cycle)	X	4.89	67.17	16.60	0.46	150.0	± 9.6 %
		Y	4.60	66.98	16.35		150.0	
		Z	4.94	66.88	16.39		150.0	
10569-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 99pc duty cycle)	X	4.97	67.94	17.28	0.46	150.0	± 9.6 %
		Y	4.77	68.09	17.26		150.0	
		Z	5.00	67.54	17.00		150.0	
10570-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 99pc duty cycle)	X	5.01	67.79	17.22	0.46	150.0	± 9.6 %
		Y	4.76	67.83	17.13		150.0	
		Z	5.05	67.43	16.97		150.0	
10571-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 90pc duty cycle)	X	1.21	65.64	16.70	0.46	130.0	± 9.6 %
		Y	1.16	64.75	15.85		130.0	
		Z	1.17	64.30	15.66		130.0	
10572-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 90pc duty cycle)	X	1.23	66.36	17.14	0.46	130.0	± 9.6 %
		Y	1.17	65.39	16.26		130.0	
		Z	1.18	64.86	16.00		130.0	
10573-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 90pc duty cycle)	X	23.68	131.21	37.20	0.46	130.0	± 9.6 %
		Y	2.28	89.41	25.19		130.0	
		Z	1.94	85.15	23.38		130.0	
10574-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 90pc duty cycle)	X	1.53	74.93	21.41	0.46	130.0	± 9.6 %
		Y	1.34	72.28	19.88		130.0	
		Z	1.29	70.55	18.93		130.0	

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10575-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 90pc duty cycle)	X	4.67	66.80	16.66	0.46	130.0	± 9.6 %
		Y	4.46	66.78	16.47		130.0	
		Z	4.72	66.51	16.47		130.0	
10576-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 90pc duty cycle)	X	4.70	66.98	16.73	0.46	130.0	± 9.6 %
		Y	4.49	67.02	16.58		130.0	
		Z	4.75	66.67	16.53		130.0	
10577-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 90pc duty cycle)	X	4.91	67.27	16.90	0.46	130.0	± 9.6 %
		Y	4.65	67.25	16.73		130.0	
		Z	4.97	66.99	16.71		130.0	
10578-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 90pc duty cycle)	X	4.81	67.45	17.02	0.46	130.0	± 9.6 %
		Y	4.56	67.44	16.87		130.0	
		Z	4.86	67.15	16.81		130.0	
10579-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 90pc duty cycle)	X	4.56	66.69	16.30	0.46	130.0	± 9.6 %
		Y	4.29	66.48	16.01		130.0	
		Z	4.63	66.46	16.13		130.0	
10580-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 90pc duty cycle)	X	4.61	66.73	16.32	0.46	130.0	± 9.6 %
		Y	4.32	66.51	16.02		130.0	
		Z	4.67	66.47	16.15		130.0	
10581-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 90pc duty cycle)	X	4.71	67.50	16.97	0.46	130.0	± 9.6 %
		Y	4.48	67.54	16.85		130.0	
		Z	4.76	67.18	16.74		130.0	
10582-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 90pc duty cycle)	X	4.50	66.45	16.09	0.46	130.0	± 9.6 %
		Y	4.21	66.21	15.77		130.0	
		Z	4.58	66.23	15.93		130.0	
10583-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 90pc duty cycle)	X	4.67	66.80	16.66	0.46	130.0	± 9.6 %
		Y	4.46	66.78	16.47		130.0	
		Z	4.72	66.51	16.47		130.0	
10584-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 90pc duty cycle)	X	4.70	66.98	16.73	0.46	130.0	± 9.6 %
		Y	4.49	67.02	16.58		130.0	
		Z	4.75	66.67	16.53		130.0	
10585-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 90pc duty cycle)	X	4.91	67.27	16.90	0.46	130.0	± 9.6 %
		Y	4.65	67.25	16.73		130.0	
		Z	4.97	66.99	16.71		130.0	
10586-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 90pc duty cycle)	X	4.81	67.45	17.02	0.46	130.0	± 9.6 %
		Y	4.56	67.44	16.87		130.0	
		Z	4.86	67.15	16.81		130.0	
10587-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 90pc duty cycle)	X	4.56	66.69	16.30	0.46	130.0	± 9.6 %
		Y	4.29	66.48	16.01		130.0	
		Z	4.63	66.46	16.13		130.0	
10588-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 90pc duty cycle)	X	4.61	66.73	16.32	0.46	130.0	± 9.6 %
		Y	4.32	66.51	16.02		130.0	
		Z	4.67	66.47	16.15		130.0	
10589-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 90pc duty cycle)	X	4.71	67.50	16.97	0.46	130.0	± 9.6 %
		Y	4.48	67.54	16.85		130.0	
		Z	4.76	67.18	16.74		130.0	
10590-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 90pc duty cycle)	X	4.50	66.45	16.09	0.46	130.0	± 9.6 %
		Y	4.21	66.21	15.77		130.0	
		Z	4.58	66.23	15.93		130.0	

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A4 (210mm x 297mm)

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10591-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS0, 90pc duty cycle)	X	4.83	66.85	16.75	0.46	130.0	± 9.6 %
		Y	4.62	66.89	16.61		130.0	
		Z	4.88	66.58	16.57		130.0	
10592-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS1, 90pc duty cycle)	X	4.98	67.19	16.88	0.46	130.0	± 9.6 %
		Y	4.73	67.17	16.73		130.0	
		Z	5.04	66.92	16.70		130.0	
10593-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS2, 90pc duty cycle)	X	4.90	67.10	16.77	0.46	130.0	± 9.6 %
		Y	4.65	67.03	16.58		130.0	
		Z	4.96	66.85	16.59		130.0	
10594-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS3, 90pc duty cycle)	X	4.96	67.27	16.92	0.46	130.0	± 9.6 %
		Y	4.70	67.23	16.76		130.0	
		Z	5.02	67.00	16.73		130.0	
10595-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS4, 90pc duty cycle)	X	4.92	67.22	16.82	0.46	130.0	± 9.6 %
		Y	4.67	67.20	16.66		130.0	
		Z	4.98	66.96	16.63		130.0	
10596-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS5, 90pc duty cycle)	X	4.86	67.23	16.82	0.46	130.0	± 9.6 %
		Y	4.60	67.15	16.64		130.0	
		Z	4.92	66.95	16.63		130.0	
10597-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS6, 90pc duty cycle)	X	4.81	67.13	16.71	0.46	130.0	± 9.6 %
		Y	4.55	67.01	16.49		130.0	
		Z	4.87	66.87	16.53		130.0	
10598-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS7, 90pc duty cycle)	X	4.80	67.38	16.98	0.46	130.0	± 9.6 %
		Y	4.55	67.30	16.80		130.0	
		Z	4.85	67.11	16.79		130.0	
10599-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS0, 90pc duty cycle)	X	5.50	67.38	16.94	0.46	130.0	± 9.6 %
		Y	5.31	67.34	16.86		130.0	
		Z	5.55	67.16	16.77		130.0	
10600-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS1, 90pc duty cycle)	X	5.63	67.80	17.12	0.46	130.0	± 9.6 %
		Y	5.41	67.70	17.01		130.0	
		Z	5.72	67.70	17.02		130.0	
10601-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS2, 90pc duty cycle)	X	5.52	67.54	17.01	0.46	130.0	± 9.6 %
		Y	5.31	67.49	16.93		130.0	
		Z	5.59	67.38	16.87		130.0	
10602-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS3, 90pc duty cycle)	X	5.62	67.57	16.94	0.46	130.0	± 9.6 %
		Y	5.39	67.45	16.82		130.0	
		Z	5.67	67.37	16.78		130.0	
10603-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS4, 90pc duty cycle)	X	5.70	67.88	17.23	0.46	130.0	± 9.6 %
		Y	5.46	67.78	17.13		130.0	
		Z	5.76	67.69	17.07		130.0	
10604-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS5, 90pc duty cycle)	X	5.51	67.35	16.95	0.46	130.0	± 9.6 %
		Y	5.33	67.33	16.88		130.0	
		Z	5.55	67.12	16.78		130.0	
10605-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS6, 90pc duty cycle)	X	5.62	67.68	17.11	0.46	130.0	± 9.6 %
		Y	5.38	67.50	16.96		130.0	
		Z	5.67	67.46	16.95		130.0	
10606-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS7, 90pc duty cycle)	X	5.35	66.99	16.63	0.46	130.0	± 9.6 %
		Y	5.18	66.97	16.54		130.0	
		Z	5.43	66.89	16.53		130.0	

Certificate No: EX3-7412_Apr17/2

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Date of Issue : 2017-09-07

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RTT5041-76(2015.10.01) (2)

A4 (210mm x 297mm)

EX3DV4- SN:7412

April 28, 2017

10607-AAA	IEEE 802.11ac WiFi (20MHz, MCS0, 90pc duty cycle)	X	4.67	66.21	16.40	0.46	130.0	± 9.6 %
		Y	4.47	66.27	16.28		130.0	
		Z	4.71	65.89	16.18		130.0	
10608-AAA	IEEE 802.11ac WiFi (20MHz, MCS1, 90pc duty cycle)	X	4.86	66.62	16.57	0.46	130.0	± 9.6 %
		Y	4.60	66.58	16.42		130.0	
		Z	4.91	66.31	16.35		130.0	
10609-AAA	IEEE 802.11ac WiFi (20MHz, MCS2, 90pc duty cycle)	X	4.75	66.47	16.41	0.46	130.0	± 9.6 %
		Y	4.50	66.40	16.22		130.0	
		Z	4.80	66.16	16.20		130.0	
10610-AAA	IEEE 802.11ac WiFi (20MHz, MCS3, 90pc duty cycle)	X	4.80	66.63	16.57	0.46	130.0	± 9.6 %
		Y	4.55	66.59	16.41		130.0	
		Z	4.85	66.32	16.36		130.0	
10611-AAA	IEEE 802.11ac WiFi (20MHz, MCS4, 90pc duty cycle)	X	4.72	66.43	16.42	0.46	130.0	± 9.6 %
		Y	4.46	66.36	16.24		130.0	
		Z	4.77	66.13	16.21		130.0	
10612-AAA	IEEE 802.11ac WiFi (20MHz, MCS5, 90pc duty cycle)	X	4.72	66.59	16.46	0.46	130.0	± 9.6 %
		Y	4.44	66.46	16.26		130.0	
		Z	4.78	66.29	16.25		130.0	
10613-AAA	IEEE 802.11ac WiFi (20MHz, MCS6, 90pc duty cycle)	X	4.73	66.47	16.34	0.46	130.0	± 9.6 %
		Y	4.44	66.27	16.09		130.0	
		Z	4.79	66.20	16.15		130.0	
10614-AAA	IEEE 802.11ac WiFi (20MHz, MCS7, 90pc duty cycle)	X	4.68	66.68	16.60	0.46	130.0	± 9.6 %
		Y	4.42	66.58	16.41		130.0	
		Z	4.72	66.37	16.37		130.0	
10615-AAA	IEEE 802.11ac WiFi (20MHz, MCS8, 90pc duty cycle)	X	4.71	66.25	16.18	0.46	130.0	± 9.6 %
		Y	4.44	66.15	15.97		130.0	
		Z	4.77	65.96	15.99		130.0	
10616-AAA	IEEE 802.11ac WiFi (40MHz, MCS0, 90pc duty cycle)	X	5.32	66.65	16.57	0.46	130.0	± 9.6 %
		Y	5.11	66.51	16.44		130.0	
		Z	5.37	66.43	16.39		130.0	
10617-AAA	IEEE 802.11ac WiFi (40MHz, MCS1, 90pc duty cycle)	X	5.39	66.84	16.63	0.46	130.0	± 9.6 %
		Y	5.14	66.61	16.46		130.0	
		Z	5.43	66.56	16.42		130.0	
10618-AAA	IEEE 802.11ac WiFi (40MHz, MCS2, 90pc duty cycle)	X	5.28	66.85	16.66	0.46	130.0	± 9.6 %
		Y	5.06	66.70	16.53		130.0	
		Z	5.32	66.60	16.46		130.0	
10619-AAA	IEEE 802.11ac WiFi (40MHz, MCS3, 90pc duty cycle)	X	5.29	66.65	16.49	0.46	130.0	± 9.6 %
		Y	5.09	66.54	16.37		130.0	
		Z	5.35	66.44	16.32		130.0	
10620-AAA	IEEE 802.11ac WiFi (40MHz, MCS4, 90pc duty cycle)	X	5.38	66.68	16.55	0.46	130.0	± 9.6 %
		Y	5.15	66.50	16.40		130.0	
		Z	5.45	66.51	16.40		130.0	
10621-AAA	IEEE 802.11ac WiFi (40MHz, MCS5, 90pc duty cycle)	X	5.38	66.82	16.74	0.46	130.0	± 9.6 %
		Y	5.16	66.65	16.61		130.0	
		Z	5.43	66.58	16.55		130.0	
10622-AAA	IEEE 802.11ac WiFi (40MHz, MCS6, 90pc duty cycle)	X	5.40	66.99	16.82	0.46	130.0	± 9.6 %
		Y	5.15	66.74	16.65		130.0	
		Z	5.44	66.73	16.62		130.0	

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10623-AAA	IEEE 802.11ac WiFi (40MHz, MCS7, 90pc duty cycle)	X	5.27	66.50	16.45	0.46	130.0	± 9.6 %
		Y	5.03	66.25	16.25		130.0	
		Z	5.32	66.27	16.27		130.0	
10624-AAA	IEEE 802.11ac WiFi (40MHz, MCS8, 90pc duty cycle)	X	5.46	66.69	16.60	0.46	130.0	± 9.6 %
		Y	5.23	66.53	16.46		130.0	
		Z	5.51	66.48	16.44		130.0	
10625-AAA	IEEE 802.11ac WiFi (40MHz, MCS9, 90pc duty cycle)	X	5.83	67.68	17.15	0.46	130.0	± 9.6 %
		Y	5.32	66.67	16.60		130.0	
		Z	5.93	67.60	17.04		130.0	
10626-AAA	IEEE 802.11ac WiFi (80MHz, MCS0, 90pc duty cycle)	X	5.62	66.69	16.50	0.46	130.0	± 9.6 %
		Y	5.44	66.49	16.37		130.0	
		Z	5.64	66.48	16.34		130.0	
10627-AAA	IEEE 802.11ac WiFi (80MHz, MCS1, 90pc duty cycle)	X	5.86	67.27	16.75	0.46	130.0	± 9.6 %
		Y	5.68	67.15	16.67		130.0	
		Z	5.90	67.06	16.58		130.0	
10628-AAA	IEEE 802.11ac WiFi (80MHz, MCS2, 90pc duty cycle)	X	5.65	66.78	16.45	0.46	130.0	± 9.6 %
		Y	5.43	66.45	16.24		130.0	
		Z	5.70	66.63	16.31		130.0	
10629-AAA	IEEE 802.11ac WiFi (80MHz, MCS3, 90pc duty cycle)	X	5.73	66.84	16.46	0.46	130.0	± 9.6 %
		Y	5.55	66.70	16.36		130.0	
		Z	5.79	66.70	16.34		130.0	
10630-AAA	IEEE 802.11ac WiFi (80MHz, MCS4, 90pc duty cycle)	X	6.19	68.41	17.25	0.46	130.0	± 9.6 %
		Y	5.77	67.57	16.80		130.0	
		Z	6.32	68.46	17.21		130.0	
10631-AAA	IEEE 802.11ac WiFi (80MHz, MCS5, 90pc duty cycle)	X	6.07	68.18	17.33	0.46	130.0	± 9.6 %
		Y	5.75	67.66	17.06		130.0	
		Z	6.17	68.12	17.23		130.0	
10632-AAA	IEEE 802.11ac WiFi (80MHz, MCS6, 90pc duty cycle)	X	5.83	67.34	16.93	0.46	130.0	± 9.6 %
		Y	5.70	67.41	16.95		130.0	
		Z	5.87	67.10	16.74		130.0	
10633-AAA	IEEE 802.11ac WiFi (80MHz, MCS7, 90pc duty cycle)	X	5.71	66.94	16.56	0.46	130.0	± 9.6 %
		Y	5.45	66.54	16.33		130.0	
		Z	5.77	66.79	16.42		130.0	
10634-AAA	IEEE 802.11ac WiFi (80MHz, MCS8, 90pc duty cycle)	X	5.70	66.98	16.64	0.46	130.0	± 9.6 %
		Y	5.49	66.77	16.50		130.0	
		Z	5.75	66.81	16.49		130.0	
10635-AAA	IEEE 802.11ac WiFi (80MHz, MCS9, 90pc duty cycle)	X	5.57	66.28	16.01	0.46	130.0	± 9.6 %
		Y	5.33	65.91	15.77		130.0	
		Z	5.64	66.17	15.90		130.0	
10636-AAA	IEEE 1602.11ac WiFi (160MHz, MCS0, 90pc duty cycle)	X	6.03	67.04	16.58	0.46	130.0	± 9.6 %
		Y	5.88	66.84	16.45		130.0	
		Z	6.06	66.88	16.44		130.0	
10637-AAA	IEEE 1602.11ac WiFi (160MHz, MCS1, 90pc duty cycle)	X	6.19	67.44	16.76	0.46	130.0	± 9.6 %
		Y	6.00	67.14	16.59		130.0	
		Z	6.23	67.26	16.61		130.0	
10638-AAA	IEEE 1602.11ac WiFi (160MHz, MCS2, 90pc duty cycle)	X	6.19	67.40	16.72	0.46	130.0	± 9.6 %
		Y	6.03	67.22	16.60		130.0	
		Z	6.22	67.24	16.57		130.0	

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10639-AAA	IEEE 1602.11ac WiFi (160MHz, MCS3, 90pc duty cycle)	X	6.17	67.35	16.74	0.46	130.0	± 9.6 %
		Y	5.98	67.08	16.57		130.0	
		Z	6.21	67.22	16.61		130.0	
10640-AAA	IEEE 1602.11ac WiFi (160MHz, MCS4, 90pc duty cycle)	X	6.17	67.36	16.68	0.46	130.0	± 9.6 %
		Y	5.92	66.91	16.43		130.0	
		Z	6.23	67.26	16.58		130.0	
10641-AAA	IEEE 1602.11ac WiFi (160MHz, MCS5, 90pc duty cycle)	X	6.21	67.26	16.65	0.46	130.0	± 9.6 %
		Y	6.04	67.05	16.52		130.0	
		Z	6.24	67.07	16.50		130.0	
10642-AAA	IEEE 1602.11ac WiFi (160MHz, MCS6, 90pc duty cycle)	X	6.26	67.52	16.95	0.46	130.0	± 9.6 %
		Y	6.06	67.25	16.80		130.0	
		Z	6.30	67.37	16.81		130.0	
10643-AAA	IEEE 1602.11ac WiFi (160MHz, MCS7, 90pc duty cycle)	X	6.09	67.20	16.69	0.46	130.0	± 9.6 %
		Y	5.90	66.91	16.50		130.0	
		Z	6.13	67.05	16.56		130.0	
10644-AAA	IEEE 1602.11ac WiFi (160MHz, MCS8, 90pc duty cycle)	X	6.26	67.71	16.96	0.46	130.0	± 9.6 %
		Y	5.95	67.07	16.61		130.0	
		Z	6.34	67.68	16.89		130.0	
10645-AAA	IEEE 1602.11ac WiFi (160MHz, MCS9, 90pc duty cycle)	X	6.58	68.27	17.20	0.46	130.0	± 9.6 %
		Y	6.09	67.17	16.62		130.0	
		Z	6.81	68.61	17.30		130.0	
10646-AAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,7)	X	17.76	106.77	35.42	9.30	60.0	± 9.6 %
		Y	6.78	87.07	28.72		60.0	
		Z	16.02	103.12	34.29		60.0	
10647-AAB	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,7)	X	15.55	104.58	34.89	9.30	60.0	± 9.6 %
		Y	6.09	85.35	28.21		60.0	
		Z	14.44	101.51	33.91		60.0	
10648-AAA	CDMA2000 (1x Advanced)	X	0.97	68.69	14.00	0.00	150.0	± 9.6 %
		Y	0.58	63.40	9.56		150.0	
		Z	0.81	64.98	12.24		150.0	

⁸ Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Appendix C.2 Calibration certificate for DAE (S/N : 1340)

**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
S 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 **SGS Korea (Dymstec)**

Certificate No: **DAE4-1340_May17**

CALIBRATION CERTIFICATE

Object **DAE4 - SD 000 D04 BM - SN: 1340**

Calibration procedure(s) **QA CAL-06.v29
Calibration procedure for the data acquisition electronics (DAE)**



Calibration date: **May 23, 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%.

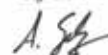
Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	09-Sep-16 (No:19065)	Sep-17
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Auto DAE Calibration Unit	SE UWS 053 AA 1001	05-Jan-17 (in house check)	In house check: Jan-18
Calibrator Box V2.1	SE UMS 006 AA 1002	05-Jan-17 (in house check)	In house check: Jan-18

Calibrated by: **Name
Adrian Gehring**

Function
Technician

Signature



Approved by: **Fin Bornholt**

Deputy Technical Manager



Issued: May 23, 2017

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

**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
S 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**

Glossary

DAE data acquisition electronics
Connector angle information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- **DC Voltage Measurement:** Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- **Connector angle:** The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
 - **DC Voltage Measurement Linearity:** Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
 - **Common mode sensitivity:** Influence of a positive or negative common mode voltage on the differential measurement.
 - **Channel separation:** Influence of a voltage on the neighbor channels not subject to an input voltage.
 - **AD Converter Values with inputs shorted:** Values on the internal AD converter corresponding to zero input voltage
 - **Input Offset Measurement:** Output voltage and statistical results over a large number of zero voltage measurements.
 - **Input Offset Current:** Typical value for information; Maximum channel input offset current, not considering the input resistance.
 - **Input resistance:** Typical value for information; DAE input resistance at the connector, during internal auto-zeroing and during measurement.
 - **Low Battery Alarm Voltage:** Typical value for information. Below this voltage, a battery alarm signal is generated.
 - **Power consumption:** Typical value for information. Supply currents in various operating modes.

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1 μ V , full range = -100...+300 mV

Low Range: 1LSB = 61nV , full range = +1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	404.464 $\pm$ 0.02% (k=2)	404.387 $\pm$ 0.02% (k=2)	404.473 $\pm$ 0.02% (k=2)
Low Range	3.98248 $\pm$ 1.50% (k=2)	3.98117 $\pm$ 1.50% (k=2)	4.01177 $\pm$ 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	255.5 $^{\circ}$ $\pm$ 1 $^{\circ}$
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Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range	Reading (μ V)	Difference (μ V)	Error (%)
Channel X + Input	199990.29	-1.62	-0.00
Channel X + Input	20002.03	1.42	0.01
Channel X - Input	-19999.93	1.66	-0.01
Channel Y + Input	199989.53	-2.10	-0.00
Channel Y + Input	19999.89	-0.77	-0.00
Channel Y - Input	-20002.49	-0.97	0.00
Channel Z + Input	199989.87	-2.14	-0.00
Channel Z + Input	19999.50	-1.14	-0.01
Channel Z - Input	-20004.20	-2.58	0.01

Low Range	Reading (μ V)	Difference (μ V)	Error (%)
Channel X + Input	2000.40	-0.54	-0.03
Channel X + Input	201.38	0.42	0.21
Channel X - Input	-198.08	0.81	-0.40
Channel Y + Input	2001.14	0.64	0.03
Channel Y + Input	200.64	-0.33	-0.16
Channel Y - Input	-199.01	-0.03	0.01
Channel Z + Input	2000.75	0.26	0.01
Channel Z + Input	200.39	-0.48	-0.24
Channel Z - Input	-199.76	-0.76	0.38

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (μ V)	Low Range Average Reading (μ V)
Channel X	200	1.50	-0.52
	- 200	1.53	-0.68
Channel Y	200	-13.22	-13.52
	- 200	12.52	12.17
Channel Z	200	-10.21	-10.51
	- 200	8.48	8.69

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (μ V)	Channel Y (μ V)	Channel Z (μ V)
Channel X	200	-	-0.95	-3.21
Channel Y	200	6.24	-	-0.31
Channel Z	200	10.36	3.54	-

4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	15823	15868
Channel Y	16213	13686
Channel Z	16017	13745

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Input 10M Ω

	Average (μ V)	min. Offset (μ V)	max. Offset (μ V)	Std. Deviation (μ V)
Channel X	-0.48	-1.63	0.44	0.35
Channel Y	-1.21	-2.14	-0.51	0.33
Channel Z	-0.90	-2.20	0.10	0.40

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

8. Low Battery Alarm Voltage (Typical values for information)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	-0.01	-8	-9

Appendix C.3 Calibration certificate for Dipole

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
S 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 **SGS Korea (Dymstec)**

Certificate No: **D1750V2-1070_Jul16**

CALIBRATION CERTIFICATE																																																																							
Object	D1750V2 - SN:1070																																																																						
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz																																																																						
Calibration date:	July 21, 2016																																																																						
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) <table border="1"> <thead> <tr> <th>Primary Standards</th> <th>ID #</th> <th>Cal Date (Certificate No.)</th> <th>Scheduled Calibration</th> </tr> </thead> <tbody> <tr> <td>Power meter NRP</td> <td>SN: 104778</td> <td>06-Apr-16 (No. 217-02288/02289)</td> <td>Apr-17</td> </tr> <tr> <td>Power sensor NRP-Z91</td> <td>SN: 103244</td> <td>06-Apr-16 (No. 217-02288)</td> <td>Apr-17</td> </tr> <tr> <td>Power sensor NRP-Z91</td> <td>SN: 103245</td> <td>06-Apr-16 (No. 217-02289)</td> <td>Apr-17</td> </tr> <tr> <td>Reference 20 dB Attenuator</td> <td>SN: 5058 (20k)</td> <td>05-Apr-16 (No. 217-02292)</td> <td>Apr-17</td> </tr> <tr> <td>Type-N mismatch combination</td> <td>SN: 5047.2 / 06327</td> <td>05-Apr-16 (No. 217-02295)</td> <td>Apr-17</td> </tr> <tr> <td>Reference Probe EX3DV4</td> <td>SN: 7349</td> <td>15-Jun-16 (No. EX3-7349_Jun16)</td> <td>Jun-17</td> </tr> <tr> <td>DAE4</td> <td>SN: 601</td> <td>30-Dec-15 (No. DAE4-601_Dec15)</td> <td>Dec-16</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Secondary Standards</th> <th>ID #</th> <th>Check Date (in house)</th> <th>Scheduled Check</th> </tr> </thead> <tbody> <tr> <td>Power meter EPM-442A</td> <td>SN: GB37480704</td> <td>07-Oct-15 (No. 217-02222)</td> <td>In house check: Oct-16</td> </tr> <tr> <td>Power sensor HP 8481A</td> <td>SN: US37292783</td> <td>07-Oct-15 (No. 217-02222)</td> <td>In house check: Oct-16</td> </tr> <tr> <td>Power sensor HP 8481A</td> <td>SN: MY41092317</td> <td>07-Oct-15 (No. 217-02223)</td> <td>In house check: Oct-16</td> </tr> <tr> <td>RF generator R&S SMT-06</td> <td>SN: 100972</td> <td>15-Jun-15 (in house check Jun-15)</td> <td>In house check: Oct-16</td> </tr> <tr> <td>Network Analyzer HP 8753E</td> <td>SN: US37390585</td> <td>18-Oct-01 (in house check Oct-15)</td> <td>In house check: Oct-16</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th></th> <th>Name</th> <th>Function</th> <th>Signature</th> </tr> </thead> <tbody> <tr> <td>Calibrated by:</td> <td>Claudio Leubler</td> <td>Laboratory Technician</td> <td></td> </tr> <tr> <td>Approved by:</td> <td>Katja Pokovic</td> <td>Technical Manager</td> <td></td> </tr> </tbody> </table> Issued: July 22, 2016 This calibration certificate shall not be reproduced except in full without written approval of the laboratory.				Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration	Power meter NRP	SN: 104778	06-Apr-16 (No. 217-02288/02289)	Apr-17	Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17	Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17	Reference 20 dB Attenuator	SN: 5058 (20k)	05-Apr-16 (No. 217-02292)	Apr-17	Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17	Reference Probe EX3DV4	SN: 7349	15-Jun-16 (No. EX3-7349_Jun16)	Jun-17	DAE4	SN: 601	30-Dec-15 (No. DAE4-601_Dec15)	Dec-16	Secondary Standards	ID #	Check Date (in house)	Scheduled Check	Power meter EPM-442A	SN: GB37480704	07-Oct-15 (No. 217-02222)	In house check: Oct-16	Power sensor HP 8481A	SN: US37292783	07-Oct-15 (No. 217-02222)	In house check: Oct-16	Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (No. 217-02223)	In house check: Oct-16	RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Jun-15)	In house check: Oct-16	Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-15)	In house check: Oct-16		Name	Function	Signature	Calibrated by:	Claudio Leubler	Laboratory Technician		Approved by:	Katja Pokovic	Technical Manager	
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Certificate No: D1750V2-1070_Jul16

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Report File No : F690501/RF-SAR002491-A2

Date of Issue : 2017-09-07

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RTT5041-76(2015.10.01) (2)

A4 (210mm x 297mm)

**Calibration Laboratory of
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Engineering AG**
Zeughausstrasse 43, 8004 Zurich, Switzerland



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices; Measurement Techniques", June 2013
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

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	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	38.8 $\pm$ 6 %	1.36 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.15 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	36.5 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.84 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	19.3 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	53.4 $\pm$ 6 %	1.48 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.21 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	37.0 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	4.88 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	19.6 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.3 Ω + 1.3 j Ω
Return Loss	- 34.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.5 Ω + 0.3 j Ω
Return Loss	- 31.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.222 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	June 15, 2010

DASY5 Validation Report for Head TSL

Date: 21.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz D1750V2; Type: D1750V2; Serial: D1750V2 - SN:1070

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.36$ S/m; $\epsilon_r = 38.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.46, 8.46, 8.46); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

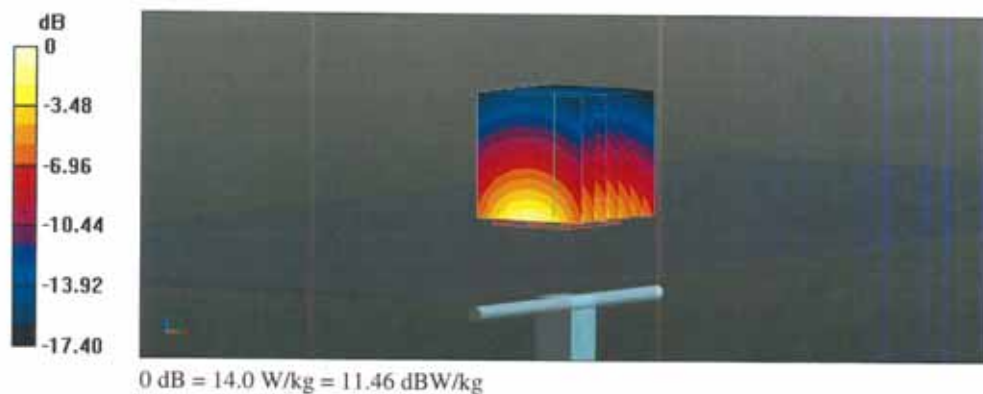
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 104.8 V/m; Power Drift = -0.01 dB

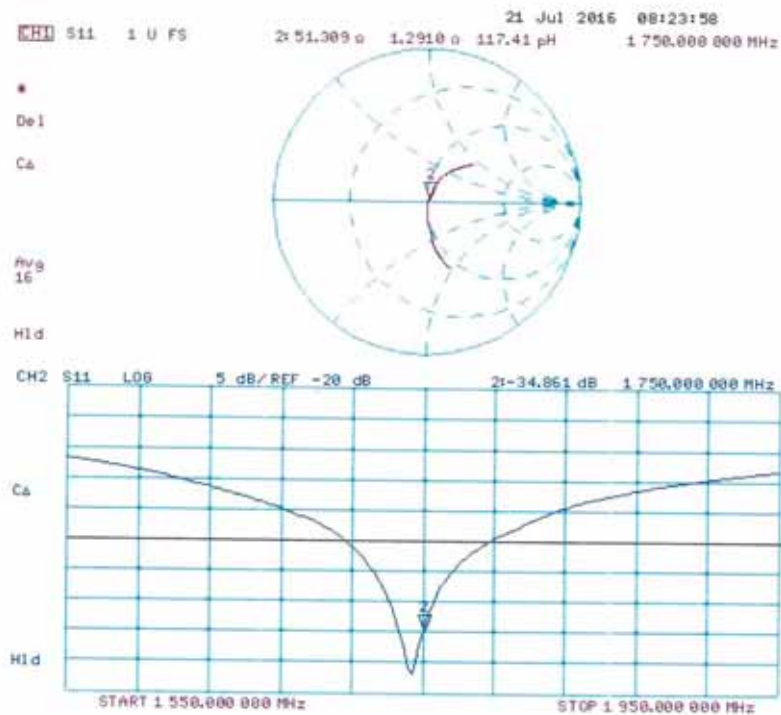
Peak SAR (extrapolated) = 16.8 W/kg

SAR(1 g) = 9.15 W/kg; SAR(10 g) = 4.84 W/kg

Maximum value of SAR (measured) = 14.0 W/kg



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 21.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz D1750V2; Type: D1750V2; Serial: D1750V2 - SN: 1070

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.48$ S/m; $\epsilon_r = 53.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.25, 8.25, 8.25); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

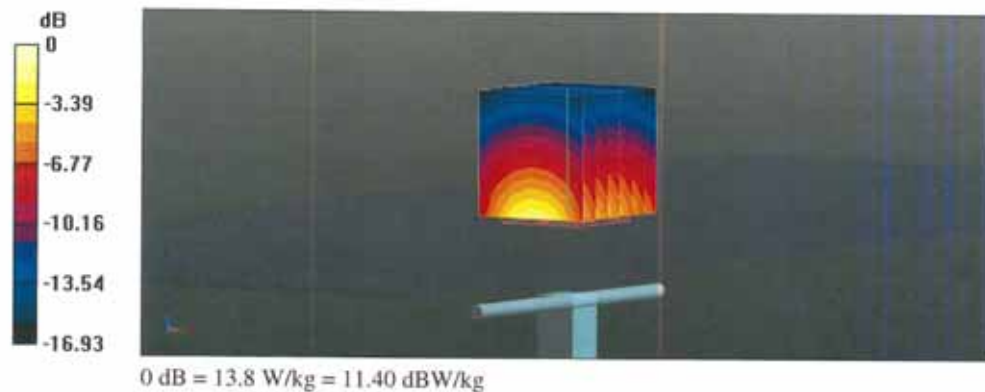
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 100.7 V/m; Power Drift = -0.03 dB

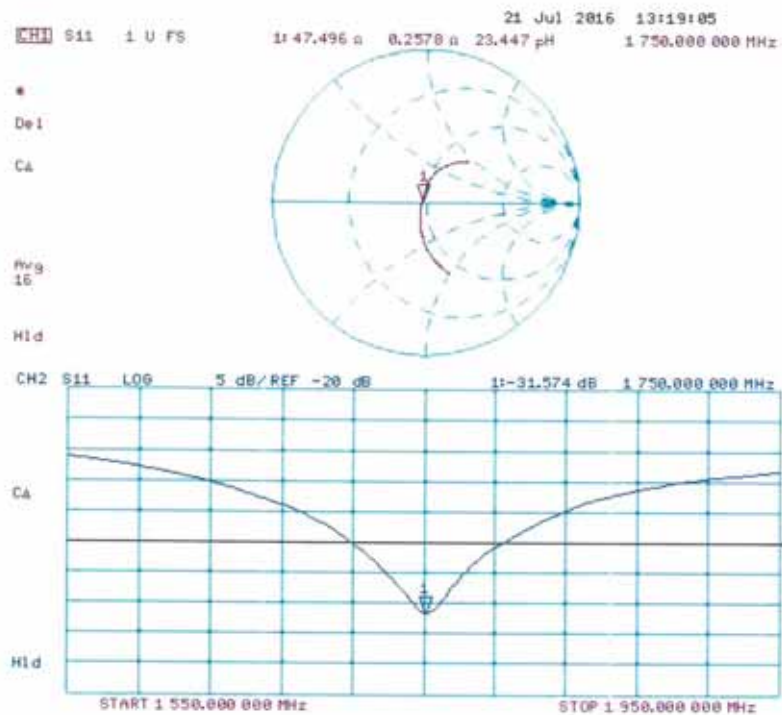
Peak SAR (extrapolated) = 16.4 W/kg

SAR(1 g) = 9.21 W/kg; SAR(10 g) = 4.88 W/kg

Maximum value of SAR (measured) = 13.8 W/kg



Impedance Measurement Plot for Body TSL



**Calibration Laboratory of
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Accreditation No.: **SCS 0108**

Client **SGS Korea (Dymstec)**

Certificate No: **D1900V2-5d158_Apr17**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN:5d158**

Calibration procedure(s) **QA CAL-05.v9**
Calibration procedure for dipole validation kits above 700 MHz



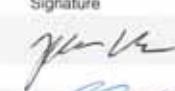
Calibration date: **April 20, 2017**

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. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Reference Probe EX3DV4	SN: 7349	31-Dec-16 (No. EX3-7349_Dec16)	Dec-17
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mar17)	Mar-18
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-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:	Johannes Kurikka	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 21, 2017

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: D1900V2-5d158_Apr17

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Report File No : F690501/RF-SAR002491-A2

Date of Issue : 2017-09-07

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RTT5041-76(2015.10.01) (2)

A4 (210mm x 297mm)

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The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Glossary:

TSL tissue simulating liquid
ConvF sensitivity in TSL / NORM x,y,z
N/A not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

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	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	40.8 $\pm$ 6 %	1.40 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.95 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	40.0 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.23 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	21.0 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	53.9 $\pm$ 6 %	1.50 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.0 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	40.4 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.33 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	21.5 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.4 Ω + 5.1 j Ω
Return Loss	- 24.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.6 Ω + 7.0 j Ω
Return Loss	- 23.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.200 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 20, 2011

DASY5 Validation Report for Head TSL

Date: 20.04.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d158

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.4$ S/m; $\epsilon_r = 40.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.12, 8.12, 8.12); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.10.0(1442); SEMCAD X 14.6.10(7413)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

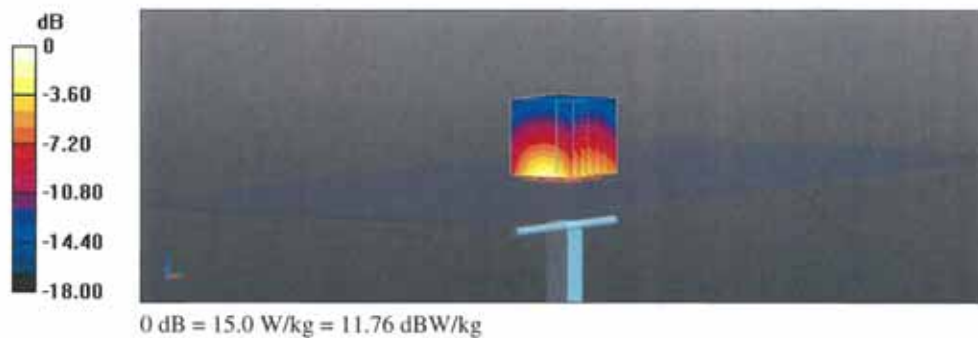
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 106.7 V/m; Power Drift = -0.05 dB

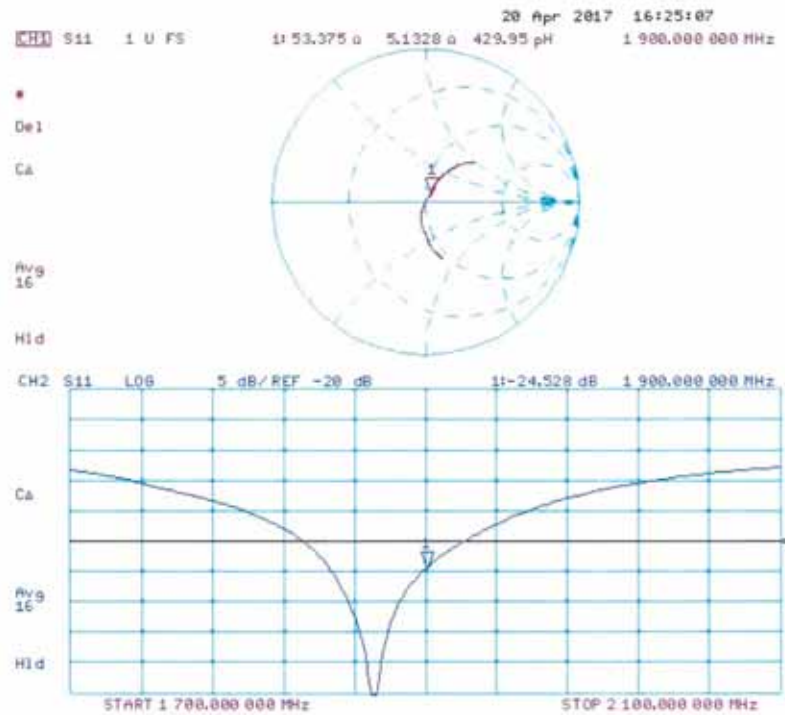
Peak SAR (extrapolated) = 18.3 W/kg

SAR(1 g) = 9.95 W/kg; SAR(10 g) = 5.23 W/kg

Maximum value of SAR (measured) = 15.0 W/kg



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 20.04.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d158

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.5$ S/m; $\epsilon_r = 53.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.03, 8.03, 8.03); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1442); SEMCAD X 14.6.10(7413)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

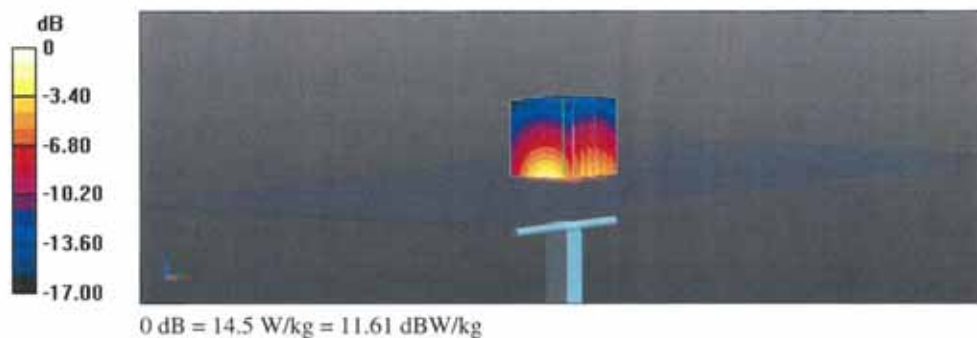
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 102.7 V/m; Power Drift = -0.07 dB

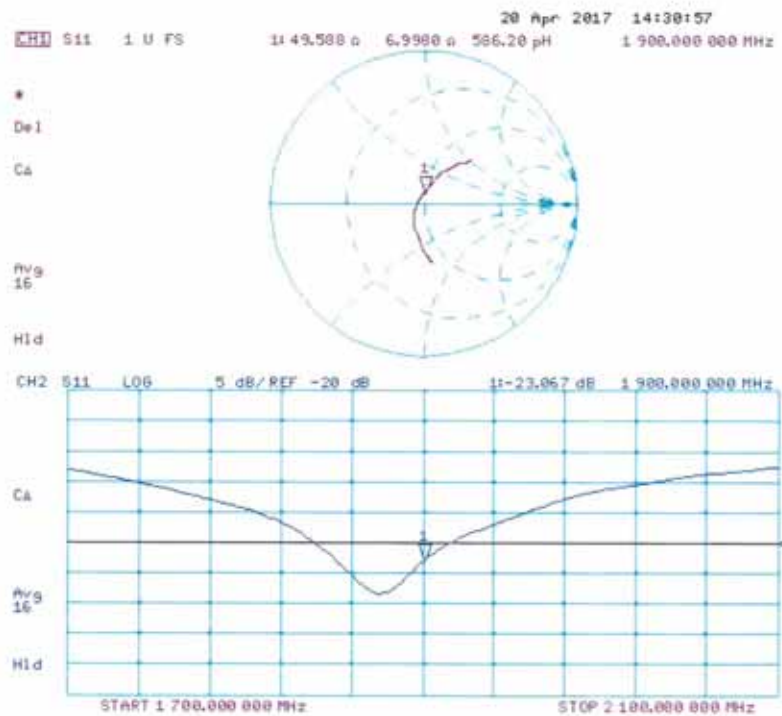
Peak SAR (extrapolated) = 17.7 W/kg

SAR(1 g) = 10 W/kg; SAR(10 g) = 5.33 W/kg

Maximum value of SAR (measured) = 14.5 W/kg



Impedance Measurement Plot for Body TSL



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



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **SGS Korea (Dymstec)**

Certificate No: **D2450V2-892_Apr17**

CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 892**

Calibration procedure(s) **QA CAL-05.v9**
Calibration procedure for dipole validation kits above 700 MHz



Calibration date: **April 21, 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. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Reference Probe EX3DV4	SN: 7349	31-Dec-16 (No. EX3-7349_Dec16)	Dec-17
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mar17)	Mar-18
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-16)	In house check: Oct-17

Calibrated by: **Michael Weber** Function: **Laboratory Technician** Signature: 

Approved by: **Katja Pokovic** Technical Manager 

Issued: April 21, 2017

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: D2450V2-892_Apr17

Page 1 of 8

Report File No : F690501/RF-SAR002491-A2

Date of Issue : 2017-09-07

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RTT5041-76(2015.10.01) (2)

A4 (210mm x 297mm)

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



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

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	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	37.7 $\pm$ 6 %	1.87 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.3 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	51.8 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.16 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.2 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	52.5 $\pm$ 6 %	2.03 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.9 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	50.6 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.03 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	23.9 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	55.4 Ω + 3.4 j Ω
Return Loss	- 24.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.5 Ω + 6.1 j Ω
Return Loss	- 24.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.161 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	October 06, 2011

DASY5 Validation Report for Head TSL

Date: 21.04.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 892

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.87$ S/m; $\epsilon_r = 37.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.72, 7.72, 7.72); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1442); SEMCAD X 14.6.10(7413)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

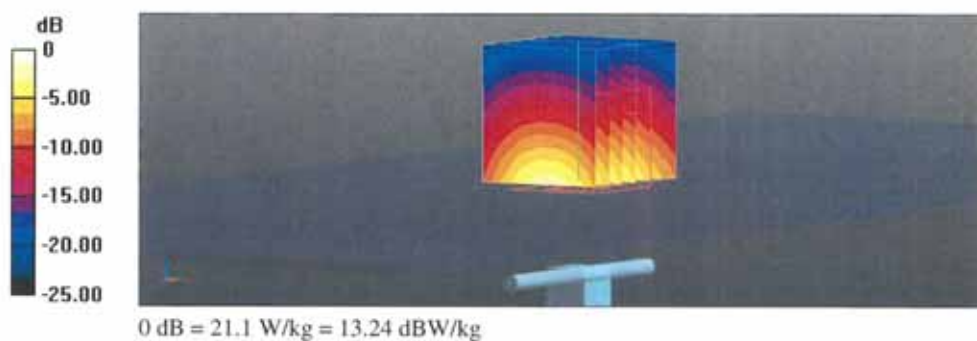
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 111.7 V/m; Power Drift = 0.01 dB

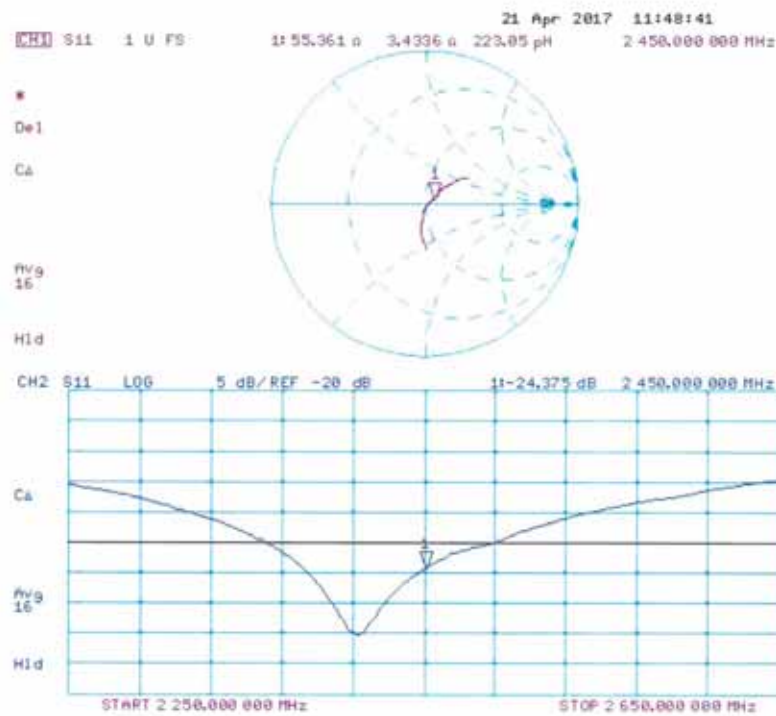
Peak SAR (extrapolated) = 27.1 W/kg

SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.16 W/kg

Maximum value of SAR (measured) = 21.1 W/kg



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 21.04.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 892

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 2.03$ S/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.79, 7.79, 7.79); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1442); SEMCAD X 14.6.10(7413)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

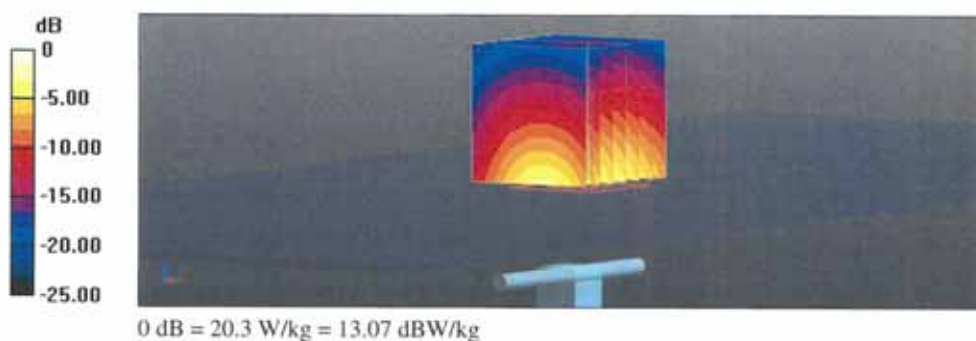
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 102.4 V/m; Power Drift = -0.02 dB

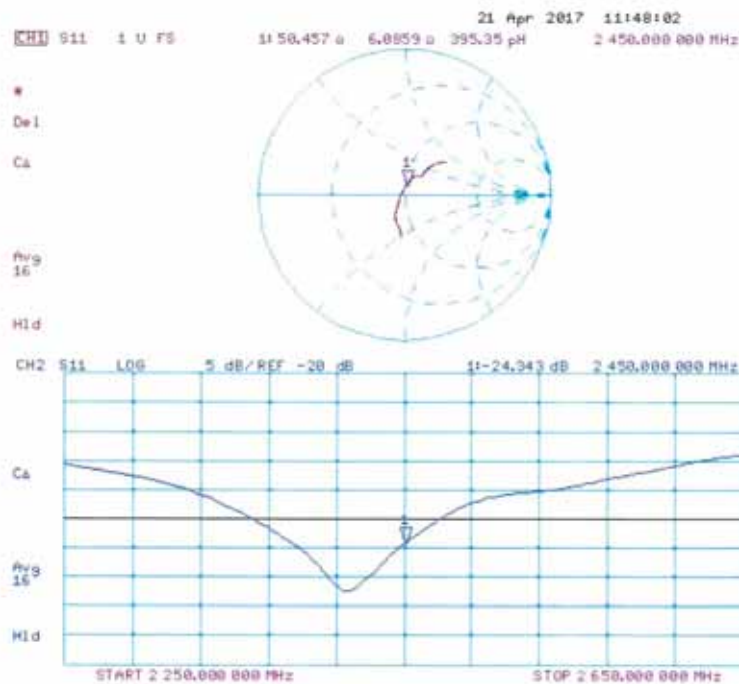
Peak SAR (extrapolated) = 25.4 W/kg

SAR(1 g) = 12.9 W/kg; SAR(10 g) = 6.03 W/kg

Maximum value of SAR (measured) = 20.3 W/kg



Impedance Measurement Plot for Body TSL



-THE END-