



SAR EVALUATION REPORT

Applicant Name:

Samsung Electronics, Co. Ltd.
129, Samsung-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do
16677, Rep. of Korea

Date of Testing:

08/10/15 - 08/17/15

Test Site/Location:

PCTEST Lab, Columbia, MD, USA

Document Serial No.:

0Y1508031457-R1.A3L

FCC ID:

A3LSMT567V

APPLICANT:

SAMSUNG ELECTRONICS, CO. LTD.

DUT Type:

Portable Tablet

Application Type:

Class II Permission Change

FCC Rule Part(s):

CFR §2.1093

Model(s):

SM-T567V

Permissive Change(s):

See FCC Change Document

Date of Original Certification:

08/05/2015

Equipment Class	Band & Mode	Tx Frequency	SAR
			1 gm Body (W/kg)
PCB	UMTS 850	826.40 - 846.60 MHz	0.49
PCB	UMTS 1900	1852.4 - 1907.6 MHz	0.78
PCB	LTE Band 13	779.5 - 784.5 MHz	1.00
PCB	LTE Band 4 (AWS)	1710.7 - 1754.3 MHz	1.07
PCB	LTE Band 2 (PCS)	1850.7 - 1909.3 MHz	0.57
Simultaneous SAR per KDB 690783 D01v01r03:			1.56

Note: This revised Test Report (S/N: 0Y1508031457-R1.A3L) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

Note: The table above shows test data evaluated for the current test report. Please refer to RF Exposure Technical Report S/N: 0Y1506241339-R3.A3L for original compliance evaluation.

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE C95.1-1992 and has been tested in accordance with the measurement procedures specified in Section 1.7 of this report; for North American frequency bands only.

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


Randy Ortanez
President



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1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Operating Modes	Tx Frequency
UMTS 850	Data	826.40 - 846.60 MHz
UMTS 1900	Data	1852.4 - 1907.6 MHz
LTE Band 13	Data	779.5 - 784.5 MHz
LTE Band 4 (AWS)	Data	1710.7 - 1754.3 MHz
LTE Band 2 (PCS)	Data	1850.7 - 1909.3 MHz
2.4 GHz WLAN	Data	2412 - 2462 MHz
U-NII-1	Data	5180 - 5240 MHz
U-NII-2A	Data	5260 - 5320 MHz
U-NII-2C	Data	5500 - 5720 MHz
U-NII-3	Data	5745 - 5825 MHz
Bluetooth	Data	2402 - 2480 MHz
Ant+	Data	2402 - 2480 MHz

1.2 Power Reduction for SAR

This device uses independent power reduction mechanisms for PCB and WLAN SAR compliance. The power reduction mechanisms are activated when the device is used in close proximity to the user's body.

Since the device is a full sized tablet, the Body SAR was evaluated per FCC KDB Publication 616217 D04 for full sized tablets.

1.3 Nominal and Maximum Output Power Specifications

This device operates using the following maximum and nominal output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v05.

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Main Antenna Maximum Power

Mode / Band		Modulated Average (dBm)		
		3GPP WCDMA	3GPP HSDPA	3GPP HSUPA
UMTS Band 5 (850 MHz)	Maximum	23.5	22.5	22.5
	Nominal	23.0	22.0	22.0
UMTS Band 2 (1900 MHz)	Maximum	23.5	22.5	22.0
	Nominal	23.0	22.0	21.5
Mode / Band		Modulated Average (dBm)		
LTE Band 13	Maximum	24.0		
	Nominal	23.5		
LTE Band 4 (AWS)	Maximum	24.0		
	Nominal	23.5		
LTE Band 2 (PCS)	Maximum	24.0		
	Nominal	23.5		

Main Antenna Reduced Power – Body at 0.0 cm

Mode / Band		Modulated Average (dBm)		
		3GPP WCDMA	3GPP HSDPA	3GPP HSUPA
UMTS Band 5 (850 MHz)	Maximum	20.5	20.5	20.0
	Nominal	20.0	20.0	19.5
UMTS Band 2 (1900 MHz)	Maximum	13.5	13.5	13.0
	Nominal	13.0	13.0	12.5
Mode / Band		Modulated Average (dBm)		
LTE Band 13	Maximum	22.5		
	Nominal	22.0		
LTE Band 4 (AWS)	Maximum	13.0		
	Nominal	12.5		
LTE Band 2 (PCS)	Maximum	12.5		
	Nominal	12.0		

1.4 DUT Antenna Locations

The overall diagonal dimension of the device is > 200 mm. A diagram showing the locations of the device antennas can be found in Appendix F. Exact antenna dimensions and separation distances are shown in the Technical Descriptions in the FCC filing.

**Table 1-1
Sides for SAR Testing**

Mode	Back	Top	Bottom	Right	Left
UMTS 850	Yes	Yes	No	No	Yes
UMTS 1900	Yes	Yes	No	No	Yes
LTE Band 13	Yes	Yes	No	No	Yes
LTE Band 4 (AWS)	Yes	Yes	No	No	Yes
LTE Band 2 (PCS)	Yes	Yes	No	No	Yes

Note: Per FCC KDB 616217 D04v01r01, particular DUT edges were not required to be evaluated for SAR based on the SAR exclusion threshold in KDB 447498 D01v05r01.

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1.5 Simultaneous Transmission Capabilities

According to FCC KDB Publication 447498 D05v01, transmitters are considered to be transmitting simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds. Possible transmission paths for the DUT are shown in Figure 1-1 and are color-coded to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.



Figure 1-1
Simultaneous Transmission Paths

This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB Publication 447498 D01v05 3) procedures.

Table 1-2
Simultaneous Transmission Scenarios

No.	Capable Transmit Configuration	Body
1	UMTS + 2.4 GHz WI-FI	Yes
2	UMTS + 5 GHz WI-FI	Yes
3	UMTS + 2.4 GHz Bluetooth	Yes
4	LTE + 2.4 GHz WI-FI	Yes
5	LTE + 5 GHz WI-FI	Yes
6	LTE + 2.4 GHz Bluetooth	Yes

1. 2.4 GHz WLAN, 5 GHz WLAN, and 2.4 GHz Bluetooth share the same antenna path and cannot transmit simultaneously.
2. All licensed modes share the same antenna path and cannot transmit simultaneously.

1.6 Miscellaneous SAR Test Considerations

(A) WIFI

It was confirmed that the change in the device did not affect the SAR for Bluetooth/WLAN operations. Please refer to RF Exposure Technical Report 0Y1506241339-R3.A3L for complete SAR evaluation for these operations.

(B) Licensed Transmitter(s)

This device is only capable of QPSK HSUPA in the uplink. Therefore, no additional SAR tests are required beyond that described for devices with HSUPA in KDB 941225 D01v03.

LTE SAR for the higher modulations and lower bandwidths were not tested since the maximum average output power of all required channels and configurations was not more than 0.5 dB higher

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than the highest bandwidth; and the reported LTE SAR for the highest bandwidth was less than 1.45 W/kg for all configurations according to FCC KDB 941225 D05v02r03.

1.7 Guidance Applied

- FCC KDB Publication 941225 D01v03, D05v02r03 (3G/4G)
- FCC KDB Publication 447498 D01v05r02 (General SAR Guidance)
- FCC KDB Publication 865664 D01v01r03, D02v01r01 (SAR Measurements up to 6 GHz)
- FCC KDB Publication 616217 D04v01r01 (Tablet SAR Considerations)

1.8 Device Serial Numbers

Several samples with identical hardware were used to support SAR testing. Power level was configured for testing via software only available to the manufacturer (end user cannot control power level) per KDB 616217. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.

	Maximum Serial Number	Reduced Serial Number
UMTS 850	31435	31435
UMTS 1900	32136	32136
LTE Band 13	31435	31435
LTE Band 4 (AWS)	31435	31435
LTE Band 2 (PCS)	32136	32136

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LTE INFORMATION

LTE Information			
FCC ID	A3LSMT567V		
Form Factor	Portable Tablet		
Frequency Range of each LTE transmission band	LTE Band 13 (779.5 - 784.5 MHz)		
	LTE Band 4 (AWS) (1710.7 - 1754.3 MHz)		
	LTE Band 2 (PCS) (1850.7 - 1909.3 MHz)		
Channel Bandwidths	LTE Band 13: 5 MHz, 10 MHz		
	LTE Band 4 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz		
	LTE Band 2 (PCS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz		
Channel Numbers and Frequencies (MHz)	Low	Mid	High
LTE Band 13: 5 MHz	779.5 (23205)	782 (23230)	784.5 (23255)
LTE Band 13: 10 MHz	782 (23230)	782 (23230)	782 (23230)
LTE Band 4 (AWS): 1.4 MHz	1710.7 (19957)	1732.5 (20175)	1754.3 (20393)
LTE Band 4 (AWS): 3 MHz	1711.5 (19965)	1732.5 (20175)	1753.5 (20385)
LTE Band 4 (AWS): 5 MHz	1712.5 (19975)	1732.5 (20175)	1752.5 (20375)
LTE Band 4 (AWS): 10 MHz	1715 (20000)	1732.5 (20175)	1750 (20350)
LTE Band 4 (AWS): 15 MHz	1717.5 (20025)	1732.5 (20175)	1747.5 (20325)
LTE Band 4 (AWS): 20 MHz	1720 (20050)	1732.5 (20175)	1745 (20300)
LTE Band 2 (PCS): 1.4 MHz	1850.7 (18607)	1880 (18900)	1909.3 (19193)
LTE Band 2 (PCS): 3 MHz	1851.5 (18615)	1880 (18900)	1908.5 (19185)
LTE Band 2 (PCS): 5 MHz	1852.5 (18625)	1880 (18900)	1907.5 (19175)
LTE Band 2 (PCS): 10 MHz	1855 (18650)	1880 (18900)	1905 (19150)
LTE Band 2 (PCS): 15 MHz	1857.5 (18675)	1880 (18900)	1902.5 (19125)
LTE Band 2 (PCS): 20 MHz	1860 (18700)	1880 (18900)	1900 (19100)
UE Category	4		
Modulations Supported in UL	QPSK, 16QAM		
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided)	YES		
A-MPR (Additional MPR) disabled for SAR Testing?	YES		
LTE Release 10 Additional Information	This device does not support full LTE Release 10 operations in the US. The following LTE Release 10 features are not supported: Carrier Aggregation, Relay, HetNet, Enhanced MIMO, EICI, WIFI Offloading, MDH, eMBMA, Cross-Carrier Scheduling,, Enhanced SCC-FDMA.		

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3 INTRODUCTION

The FCC and Industry Canada have adopted the guidelines for evaluating the environmental effects of radio frequency (RF) radiation in ET Docket 93-62 on Aug. 6, 1996 and Health Canada Safety Code 6 to protect the public and workers from the potential hazards of RF emissions due to FCC-regulated portable devices. [1]

The safety limits used for the environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (SAR) in IEEE/ANSI C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz [3] and Health Canada RF Exposure Guidelines Safety Code 6 [22]. The measurement procedure described in IEEE/ANSI C95.3-2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave [4] is used for guidance in measuring the Specific Absorption Rate (SAR) due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the International Committee for Non-Ionizing Radiation Protection (ICNIRP) in Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields,” Report No. Vol 74. 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.

3.1 SAR Definition

Specific Absorption Rate is defined as the time derivative (rate) of the incremental energy (dU) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density (ρ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Equation 3-1).

Equation 3-1
SAR Mathematical Equation

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

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

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

where:

- σ = conductivity of the tissue-simulating material (S/m)
- ρ = mass density of the tissue-simulating material (kg/m³)
- E = Total RMS electric field strength (V/m)

NOTE: The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relation to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.[6]

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4 DOSIMETRIC ASSESSMENT

4.1 Measurement Procedure

The evaluation was performed using the following procedure compliant to FCC KDB Publication 865664 D01v01 and IEEE 1528-2013:

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head and body interface and the horizontal grid resolution was determined per FCC KDB Publication 865664 D01v01 (See Table 4-1) and IEEE 1528-2013.
2. The point SAR measurement was taken at the maximum SAR region determined from Step 1 to enable the monitoring of SAR fluctuations/drifts during the 1g/10g cube evaluation. SAR at this fixed point was measured and used as a reference value.
3. Based on the area scan data, the peak of the region with maximum SAR was determined by spline interpolation. Around this point, a volume was assessed according to the measurement resolution and volume size requirements of FCC KDB Publication 865664 D01v01 (See Table 4-1) and IEEE 1528-2013. On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual online for more details):
 - a. SAR values at the inner surface of the phantom are extrapolated from the measured values along the line away from the surface with spacing no greater than that in Table 4-1. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).
 - b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.
 - c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.

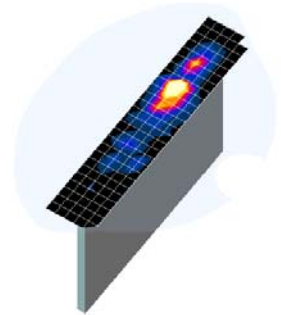


Figure 4-1
Sample SAR Area Scan

Table 4-1
Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v01*

Frequency	Maximum Area Scan Resolution (mm) ($\Delta x_{\text{area}}, \Delta y_{\text{area}}$)	Maximum Zoom Scan Resolution (mm) ($\Delta x_{\text{zoom}}, \Delta y_{\text{zoom}}$)	Maximum Zoom Scan Spatial Resolution (mm)			Minimum Zoom Scan Volume (mm) (x,y,z)
			Uniform Grid	Graded Grid		
			$\Delta z_{\text{zoom}}(n)$	$\Delta z_{\text{zoom}}(1)^*$	$\Delta z_{\text{zoom}}(n>1)^*$	
≤ 2 GHz	≤ 15	≤ 8	≤ 5	≤ 4	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 30
2-3 GHz	≤ 12	≤ 5	≤ 5	≤ 4	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 30
3-4 GHz	≤ 12	≤ 5	≤ 4	≤ 3	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 28
4-5 GHz	≤ 10	≤ 4	≤ 3	≤ 2.5	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 25
5-6 GHz	≤ 10	≤ 4	≤ 2	≤ 2	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 22

*Also compliant to IEEE 1528-2013 Table 6

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5 SAR TESTING PROCEDURES

5.1 SAR Testing for Tablet per KDB Publication 616217 D04v01

This device can be used also in full sized tablet exposure conditions, due to its size. Per FCC KDB 616217, the back surface and edges of the tablet should be tested for SAR compliance with the tablet touching the phantom. The SAR Exclusion Threshold in KDB 447498 D01v05 can be applied to determine SAR test exclusion for adjacent edge configurations. The closest distance from the antenna to an adjacent tablet edge is used to determine if SAR testing is required for the adjacent edges, with the adjacent edge positioned against the phantom and the edge containing the antenna positioned perpendicular to the phantom.

5.2 Proximity Sensor Considerations

This device uses independent power reduction mechanisms to reduce powers in certain use conditions for PCB operations when the device is used close the user's body.

While the device's antenna is within a certain distance of the user, the sensor activates and reduces the maximum output power allowed. However, the sensor is not active when the device is moved beyond the sensor triggering distance and the maximum output power is no longer limited. Therefore, an additional exposure condition is needed in the vicinity of the triggering distance to ensure SAR is compliant when the device is allowed to operate at a non-reduced output power level.

FCC KDB 616217 D04 Section 6 was used as a guideline for selecting SAR test distances for this device at these additional exposure conditions. Since the sensor activation distance for the back side of the device is 25 mm, a conservative distance of 24 mm was tested for SAR on the back side at maximum power for UMTS and LTE. Since the sensor activation distance for the top edge of the device is 18 mm, a conservative distance of 17 mm was tested for SAR on the top edge at maximum power for UMTS and LTE. Since the sensor activation distance for the left edge of the device is 12 mm, a conservative distance of 11 mm was tested for SAR on the left edge at maximum power for UMTS and LTE. Sensor triggering distance summary data is included in Appendix G.

The sensor is designed to support sufficient detection range and sensitivity to cover regions of the sensors in all applicable directions since the sensor entirely covers the antennas.

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6 RF EXPOSURE LIMITS

6.1 Uncontrolled Environment

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

6.2 Controlled Environment

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

Table 6-1
SAR Human Exposure Specified in ANSI/IEEE C95.1-1992 and Health Canada Safety Code 6

HUMAN EXPOSURE LIMITS		
	UNCONTROLLED ENVIRONMENT <i>General Population</i> (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT <i>Occupational</i> (W/kg) or (mW/g)
Peak Spatial Average SAR Head	1.6	8.0
Whole Body SAR	0.08	0.4
Peak Spatial Average SAR Hands, Feet, Ankle, Wrists, etc.	4.0	20

1. The Spatial Peak value of the SAR averaged over any 1 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.

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7 FCC MEASUREMENT PROCEDURES

Power measurements for licensed transmitters are performed using a base station simulator under digital average power.

7.1 Measured and Reported SAR

Per FCC KDB Publication 447498 D01v05, 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. The highest *reported* SAR results are identified on the grant of equipment authorization according to procedures in KDB 690783 D01v01r02.

7.2 3G SAR Test Reduction Procedure

In FCC KDB Publication 941225 D01v03, certain transmission modes within a frequency band and wireless mode evaluated for SAR are defined as primary modes. The equivalent modes considered for SAR test reduction are denoted as secondary modes. When the maximum output power including tune-up tolerance specified for production units in a secondary mode is ≤ 0.25 dB higher than the primary mode or when the highest reported SAR of the primary mode, scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode, is ≤ 1.2 W/kg, SAR measurements are not required for the secondary mode. These criteria are referred to as the 3G SAR test reduction procedure. When the 3G SAR test reduction procedure is not satisfied, SAR measurements are additionally required for the secondary mode.

7.3 Procedures Used to Establish RF Signal for SAR

The following procedures are according to FCC KDB Publication 941225 D01v03 “3G SAR Measurement Procedures.”

The device is placed into a simulated call using a base station simulator in a RF shielded chamber. Establishing connections in this manner ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. Devices under test are evaluated prior to testing, with a fully charged battery and were configured to operate at maximum output power. In order to verify that the device is tested throughout the SAR test at maximum output power, the SAR measurement system measures a “point SAR” at an arbitrary reference point at the start and end of the 1 gram SAR evaluation, to assess for any power drifts during the evaluation. If the power drift deviates by more than 5%, the SAR test and drift measurements are repeated.

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7.4 SAR Measurement Conditions for UMTS

7.4.1 Output Power Verification

Maximum output power is verified on the High, Middle and Low channels according to the general descriptions in section 5.2 of 3GPP TS 34.121, using the appropriate RMC with TPC (transmit power control) set to all “1s” or applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Results for all applicable physical channel configurations (DPCCH, DPDCH_n and spreading codes, HS-DPCCH etc) are tabulated in this test report. All configurations that are not supported by the DUT or cannot be measured due to technical or equipment limitations are identified.

7.4.2 Body SAR Measurements

SAR for body exposure configurations is measured using the 12.2 kbps RMC with the TPC bits all “1s”. The 3G SAR test reduction procedure is applied to other spreading codes and multiple DPDCH_n configurations supported by the handset with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured using an applicable RMC configuration with the corresponding spreading code or DPDCH_n, for the highest reported SAR configuration in 12.2 kbps RMC.

7.4.3 SAR Measurements with Rel 5 HSDPA

The 3G SAR test reduction procedure is applied to HSDPA body configurations with 12.2 kbps RMC as the primary mode. Otherwise, Body SAR for HSDPA is measured using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, for the highest reported SAR configuration in 12.2 kbps RMC without HSDPA. Handsets with both HSDPA and HSUPA are tested according to Release 6 HSPA test procedures.

7.4.4 SAR Measurements with Rel 6 HSUPA

The 3G SAR test reduction procedure is applied to HSPA (HSUPA/HSDPA with RMC) body configurations with 12.2 kbps RMC as the primary mode. Otherwise, Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 and power control algorithm 2, according to the highest reported body SAR configuration in 12.2 kbps RMC without HSPA.

When VOIP applies to head exposure, the 3G SAR test reduction procedure is applied with 12.2 kbps RMC as the primary mode; otherwise, the same HSPA configuration used for body SAR measurements are applied to head exposure testing.

7.5 SAR Measurement Conditions for LTE

LTE modes are tested according to FCC KDB 941225 D05v02r03 publication. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The R&S CMW500 or Anritsu MT8820C simulators are used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

7.5.1 Spectrum Plots for RB Configurations

A properly configured base station simulator was used for SAR tests and power measurements. Therefore, spectrum plots for RB configurations were not required to be included in this report.

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7.5.2 MPR

MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.

7.5.3 A-MPR

A-MPR (Additional MPR) has been disabled for all SAR tests by setting NS=01 on the base station simulator.

7.5.4 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05v02r03:

- a. Per Section 4.2.1, SAR is required for QPSK 1 RB Allocation for the largest bandwidth
 - i. The required channel and offset combination with the highest maximum output power is required for SAR.
 - ii. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel.
 - iii. When the reported SAR for a required test channel is > 1.45 W/kg, SAR is required for all RB offset configurations for that channel.
- b. Per Section 4.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Section 4.2.1.
- c. Per Section 4.2.3, QPSK SAR is not required for the 100% allocation when the highest maximum output power for the 100% allocation is less than the highest maximum output power of the 1 RB and 50% RB allocations and the reported SAR for the 1 RB and 50% RB allocations is < 0.8 W/kg.
- d. Per Section 4.2.4 and 4.3, SAR tests for higher order modulations and lower bandwidths configurations are not required when the conducted power of the required test configurations determined by Sections 4.2.1 through 4.2.3 is less than or equal to $\frac{1}{2}$ dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is < 1.45 W/kg.

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8 RF CONDUCTED POWERS

8.1 UMTS Conducted Powers

Table 8-1
Maximum Average RF Output Powers

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			PCS Band [dBm]			3GPP MPR [dB]
			4132	4183	4233	9262	9400	9538	
99	WCDMA	12.2 kbps RMC	22.83	22.79	22.74	22.45	22.43	22.46	-
6	HSDPA	Subtest 1	21.88	21.82	21.79	21.48	21.59	21.44	0
6		Subtest 2	21.86	21.81	21.84	21.51	21.68	21.48	0
6		Subtest 3	20.85	20.76	20.80	20.45	20.53	20.48	0.5
6		Subtest 4	20.78	20.85	20.82	20.48	20.61	20.46	0.5
6	HSUPA	Subtest 1	21.73	21.42	21.55	21.65	21.32	21.46	0
6		Subtest 2	20.10	19.99	20.00	19.62	19.66	19.64	2
6		Subtest 3	19.54	19.30	19.51	19.43	19.23	19.36	1
6		Subtest 4	20.73	20.59	20.60	20.70	20.31	20.61	2
6		Subtest 5	21.39	21.52	21.54	21.64	21.30	21.61	0

Table 8-2
Reduced Average RF Output Powers

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			PCS Band [dBm]			3GPP MPR [dB]
			4132	4183	4233	9262	9400	9538	
99	WCDMA	12.2 kbps RMC	20.34	20.32	20.37	12.99	13.01	12.82	-
6	HSDPA	Subtest 1	19.68	19.64	19.68	12.68	12.35	11.81	0
6		Subtest 2	19.73	19.70	19.61	12.67	12.36	11.79	0
6		Subtest 3	18.69	18.65	18.70	11.72	11.33	11.02	0.5
6		Subtest 4	18.68	18.63	18.68	11.70	11.30	11.00	0.5
6	HSUPA	Subtest 1	19.02	19.48	19.10	12.03	11.79	11.22	0
6		Subtest 2	17.64	17.65	17.60	10.83	10.28	10.06	2
6		Subtest 3	17.15	17.01	17.10	10.55	10.08	9.73	1
6		Subtest 4	18.00	18.06	18.11	11.15	11.17	10.40	2
6		Subtest 5	19.09	19.08	18.99	12.31	11.65	12.09	0

This model does not support DC-HSDPA.

It is expected by the manufacturer that MPR for some HSPA subtests may be up to 2 dB more than specified by 3GPP, but also as low as 0 dB according to the chipset implementation in this model.

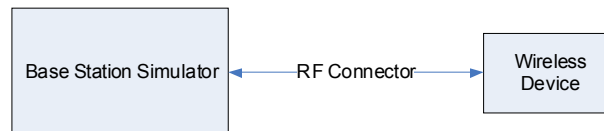


Figure 8-1
Power Measurement Setup

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8.2 LTE Conducted Powers

8.2.1 LTE Band 13

Table 8-3
LTE Band 13 Conducted Powers - 10 MHz Bandwidth
Maximum Power

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Mid	782.0	23230	10	QPSK	1	0	23.83	0	0
	782.0	23230	10	QPSK	1	25	23.98	0	0
	782.0	23230	10	QPSK	1	49	23.91	0	0
	782.0	23230	10	QPSK	25	0	22.86	0-1	1
	782.0	23230	10	QPSK	25	12	22.78	0-1	1
	782.0	23230	10	QPSK	25	25	22.82	0-1	1
	782.0	23230	10	QPSK	50	0	22.83	0-1	1
	782.0	23230	10	16QAM	1	0	22.99	0-1	1
	782.0	23230	10	16QAM	1	25	22.95	0-1	1
	782.0	23230	10	16QAM	1	49	22.86	0-1	1
	782.0	23230	10	16QAM	25	0	21.92	0-2	2
	782.0	23230	10	16QAM	25	12	21.81	0-2	2
	782.0	23230	10	16QAM	25	25	21.74	0-2	2
	782.0	23230	10	16QAM	50	0	21.80	0-2	2

Table 8-4
LTE Band 13 Conducted Powers - 5 MHz Bandwidth
Maximum Power

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Mid	782.0	23230	5	QPSK	1	0	23.95	0	0
	782.0	23230	5	QPSK	1	12	23.98	0	0
	782.0	23230	5	QPSK	1	24	23.90	0	0
	782.0	23230	5	QPSK	12	0	22.93	0-1	1
	782.0	23230	5	QPSK	12	6	22.89	0-1	1
	782.0	23230	5	QPSK	12	13	22.94	0-1	1
	782.0	23230	5	QPSK	25	0	22.96	0-1	1
	782.0	23230	5	16-QAM	1	0	22.93	0-1	1
	782.0	23230	5	16-QAM	1	12	22.97	0-1	1
	782.0	23230	5	16-QAM	1	24	22.96	0-1	1
	782.0	23230	5	16-QAM	12	0	21.85	0-2	2
	782.0	23230	5	16-QAM	12	6	21.74	0-2	2
	782.0	23230	5	16-QAM	12	13	21.90	0-2	2
	782.0	23230	5	16-QAM	25	0	21.92	0-2	2

Note: LTE Band 13 at 5 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

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Table 8-5
LTE Band 13 Conducted Powers - 10 MHz Bandwidth
Reduced Power – Body at 0.0 cm

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Mid	782.0	23230	10	QPSK	1	0	22.50	0	0
	782.0	23230	10	QPSK	1	25	22.43	0	0
	782.0	23230	10	QPSK	1	49	22.47	0	0
	782.0	23230	10	QPSK	25	0	22.36	0-1	0
	782.0	23230	10	QPSK	25	12	22.32	0-1	0
	782.0	23230	10	QPSK	25	25	22.27	0-1	0
	782.0	23230	10	QPSK	50	0	22.32	0-1	0
	782.0	23230	10	16QAM	1	0	22.34	0-1	0
	782.0	23230	10	16QAM	1	25	22.48	0-1	0
	782.0	23230	10	16QAM	1	49	22.46	0-1	0
	782.0	23230	10	16QAM	25	0	21.95	0-2	0.5
	782.0	23230	10	16QAM	25	12	21.74	0-2	0.5
	782.0	23230	10	16QAM	25	25	21.88	0-2	0.5
	782.0	23230	10	16QAM	50	0	21.81	0-2	0.5

Table 8-6
LTE Band 13 Conducted Powers - 5 MHz Bandwidth
Reduced Power – Body at 0.0 cm

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Mid	782.0	23230	5	QPSK	1	0	22.43	0	0
	782.0	23230	5	QPSK	1	12	22.50	0	0
	782.0	23230	5	QPSK	1	24	22.46	0	0
	782.0	23230	5	QPSK	12	0	22.39	0-1	0
	782.0	23230	5	QPSK	12	6	22.40	0-1	0
	782.0	23230	5	QPSK	12	13	22.43	0-1	0
	782.0	23230	5	QPSK	25	0	22.46	0-1	0
	782.0	23230	5	16-QAM	1	0	22.48	0-1	0
	782.0	23230	5	16-QAM	1	12	22.41	0-1	0
	782.0	23230	5	16-QAM	1	24	22.50	0-1	0
	782.0	23230	5	16-QAM	12	0	21.72	0-2	0.5
	782.0	23230	5	16-QAM	12	6	21.74	0-2	0.5
	782.0	23230	5	16-QAM	12	13	21.71	0-2	0.5
	782.0	23230	5	16-QAM	25	0	21.99	0-2	0.5

Note: LTE Band 13 at 5 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

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8.2.2

LTE Band 4 (AWS)

Table 8-7
LTE Band 4 (AWS) Conducted Powers - 20 MHz Bandwidth
Maximum Power

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Mid	1732.5	20175	20	QPSK	1	0	23.97	0	0
	1732.5	20175	20	QPSK	1	50	23.82	0	0
	1732.5	20175	20	QPSK	1	99	23.73	0	0
	1732.5	20175	20	QPSK	50	0	22.61	0-1	1
	1732.5	20175	20	QPSK	50	25	22.52	0-1	1
	1732.5	20175	20	QPSK	50	50	22.49	0-1	1
	1732.5	20175	20	QPSK	100	0	22.59	0-1	1
	1732.5	20175	20	16QAM	1	0	23.00	0-1	1
	1732.5	20175	20	16QAM	1	50	22.79	0-1	1
	1732.5	20175	20	16QAM	1	99	22.74	0-1	1
	1732.5	20175	20	16QAM	50	0	21.70	0-2	2
	1732.5	20175	20	16QAM	50	25	21.59	0-2	2
	1732.5	20175	20	16QAM	50	50	21.56	0-2	2
	1732.5	20175	20	16QAM	100	0	21.50	0-2	2

Note: LTE Band 4 (AWS) at 20 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

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Table 8-8
LTE Band 4 (AWS) Conducted Powers - 15 MHz Bandwidth
Maximum Power

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1717.5	20025	15	QPSK	1	0	23.84	0	0
	1717.5	20025	15	QPSK	1	36	23.73	0	0
	1717.5	20025	15	QPSK	1	74	23.48	0	0
	1717.5	20025	15	QPSK	36	0	22.59	0-1	1
	1717.5	20025	15	QPSK	36	18	22.58	0-1	1
	1717.5	20025	15	QPSK	36	37	22.39	0-1	1
	1717.5	20025	15	QPSK	75	0	22.53	0-1	1
	1717.5	20025	15	16QAM	1	0	22.81	0-1	1
	1717.5	20025	15	16QAM	1	36	22.57	0-1	1
	1717.5	20025	15	16QAM	1	74	22.56	0-1	1
	1717.5	20025	15	16QAM	36	0	21.68	0-2	2
	1717.5	20025	15	16QAM	36	18	21.66	0-2	2
	1717.5	20025	15	16QAM	36	37	21.42	0-2	2
Mid	1732.5	20175	15	QPSK	1	0	23.55	0	0
	1732.5	20175	15	QPSK	1	36	23.46	0	0
	1732.5	20175	15	QPSK	1	74	23.58	0	0
	1732.5	20175	15	QPSK	36	0	22.40	0-1	1
	1732.5	20175	15	QPSK	36	18	22.38	0-1	1
	1732.5	20175	15	QPSK	36	37	22.33	0-1	1
	1732.5	20175	15	QPSK	75	0	22.36	0-1	1
	1732.5	20175	15	16QAM	1	0	22.64	0-1	1
	1732.5	20175	15	16QAM	1	36	22.19	0-1	1
	1732.5	20175	15	16QAM	1	74	22.30	0-1	1
	1732.5	20175	15	16QAM	36	0	21.38	0-2	2
	1732.5	20175	15	16QAM	36	18	21.32	0-2	2
	1732.5	20175	15	16QAM	36	37	21.36	0-2	2
	1732.5	20175	15	16QAM	75	0	21.46	0-2	2
High	1747.5	20325	15	QPSK	1	0	23.75	0	0
	1747.5	20325	15	QPSK	1	36	23.80	0	0
	1747.5	20325	15	QPSK	1	74	23.78	0	0
	1747.5	20325	15	QPSK	36	0	22.63	0-1	1
	1747.5	20325	15	QPSK	36	18	22.55	0-1	1
	1747.5	20325	15	QPSK	36	37	22.52	0-1	1
	1747.5	20325	15	QPSK	75	0	22.57	0-1	1
	1747.5	20325	15	16QAM	1	0	22.84	0-1	1
	1747.5	20325	15	16QAM	1	36	22.72	0-1	1
	1747.5	20325	15	16QAM	1	74	22.82	0-1	1
	1747.5	20325	15	16QAM	36	0	21.67	0-2	2
	1747.5	20325	15	16QAM	36	18	21.72	0-2	2
	1747.5	20325	15	16QAM	36	37	21.72	0-2	2
	1747.5	20325	15	16QAM	75	0	21.63	0-2	2

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Table 8-9
LTE Band 4 (AWS) Conducted Powers - 10 MHz Bandwidth
Maximum Power

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1715	20000	10	QPSK	1	0	23.81	0	0
	1715	20000	10	QPSK	1	25	23.80	0	0
	1715	20000	10	QPSK	1	49	23.78	0	0
	1715	20000	10	QPSK	25	0	22.61	0-1	1
	1715	20000	10	QPSK	25	12	22.59	0-1	1
	1715	20000	10	QPSK	25	25	22.54	0-1	1
	1715	20000	10	QPSK	50	0	22.50	0-1	1
	1715	20000	10	16QAM	1	0	22.84	0-1	1
	1715	20000	10	16QAM	1	25	22.61	0-1	1
	1715	20000	10	16QAM	1	49	22.58	0-1	1
	1715	20000	10	16QAM	25	0	21.56	0-2	2
	1715	20000	10	16QAM	25	12	21.70	0-2	2
	1715	20000	10	16QAM	25	25	21.54	0-2	2
	1715	20000	10	16QAM	50	0	21.56	0-2	2
Mid	1732.5	20175	10	QPSK	1	0	23.60	0	0
	1732.5	20175	10	QPSK	1	25	23.68	0	0
	1732.5	20175	10	QPSK	1	49	23.43	0	0
	1732.5	20175	10	QPSK	25	0	22.41	0-1	1
	1732.5	20175	10	QPSK	25	12	22.37	0-1	1
	1732.5	20175	10	QPSK	25	25	22.29	0-1	1
	1732.5	20175	10	QPSK	50	0	22.39	0-1	1
	1732.5	20175	10	16QAM	1	0	22.56	0-1	1
	1732.5	20175	10	16QAM	1	25	22.20	0-1	1
	1732.5	20175	10	16QAM	1	49	22.34	0-1	1
	1732.5	20175	10	16QAM	25	0	21.48	0-2	2
	1732.5	20175	10	16QAM	25	12	21.44	0-2	2
	1732.5	20175	10	16QAM	25	25	21.27	0-2	2
	1732.5	20175	10	16QAM	50	0	21.40	0-2	2
High	1750	20350	10	QPSK	1	0	23.94	0	0
	1750	20350	10	QPSK	1	25	23.83	0	0
	1750	20350	10	QPSK	1	49	23.89	0	0
	1750	20350	10	QPSK	25	0	22.65	0-1	1
	1750	20350	10	QPSK	25	12	22.58	0-1	1
	1750	20350	10	QPSK	25	25	22.58	0-1	1
	1750	20350	10	QPSK	50	0	22.54	0-1	1
	1750	20350	10	16QAM	1	0	22.86	0-1	1
	1750	20350	10	16QAM	1	25	22.75	0-1	1
	1750	20350	10	16QAM	1	49	22.60	0-1	1
	1750	20350	10	16QAM	25	0	21.60	0-2	2
	1750	20350	10	16QAM	25	12	21.62	0-2	2
	1750	20350	10	16QAM	25	25	21.63	0-2	2
	1750	20350	10	16QAM	50	0	21.73	0-2	2

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Table 8-10
LTE Band 4 (AWS) Conducted Powers - 5 MHz Bandwidth
Maximum Power

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1712.5	19975	5	QPSK	1	0	23.64	0	0
	1712.5	19975	5	QPSK	1	12	23.76	0	0
	1712.5	19975	5	QPSK	1	24	23.67	0	0
	1712.5	19975	5	QPSK	12	0	22.65	0-1	1
	1712.5	19975	5	QPSK	12	6	22.57	0-1	1
	1712.5	19975	5	QPSK	12	13	22.47	0-1	1
	1712.5	19975	5	QPSK	25	0	22.41	0-1	1
	1712.5	19975	5	16-QAM	1	0	22.81	0-1	1
	1712.5	19975	5	16-QAM	1	12	22.76	0-1	1
	1712.5	19975	5	16-QAM	1	24	22.72	0-1	1
	1712.5	19975	5	16-QAM	12	0	21.44	0-2	2
	1712.5	19975	5	16-QAM	12	6	21.48	0-2	2
	1712.5	19975	5	16-QAM	12	13	21.53	0-2	2
Mid	1732.5	20175	5	QPSK	1	0	23.42	0	0
	1732.5	20175	5	QPSK	1	12	23.54	0	0
	1732.5	20175	5	QPSK	1	24	23.56	0	0
	1732.5	20175	5	QPSK	12	0	22.38	0-1	1
	1732.5	20175	5	QPSK	12	6	22.35	0-1	1
	1732.5	20175	5	QPSK	12	13	22.29	0-1	1
	1732.5	20175	5	QPSK	25	0	22.40	0-1	1
	1732.5	20175	5	16-QAM	1	0	22.63	0-1	1
	1732.5	20175	5	16-QAM	1	12	22.54	0-1	1
	1732.5	20175	5	16-QAM	1	24	22.65	0-1	1
	1732.5	20175	5	16-QAM	12	0	21.39	0-2	2
	1732.5	20175	5	16-QAM	12	6	21.27	0-2	2
	1732.5	20175	5	16-QAM	12	13	21.24	0-2	2
	1732.5	20175	5	16-QAM	25	0	21.51	0-2	2
High	1752.5	20375	5	QPSK	1	0	23.66	0	0
	1752.5	20375	5	QPSK	1	12	23.86	0	0
	1752.5	20375	5	QPSK	1	24	23.80	0	0
	1752.5	20375	5	QPSK	12	0	22.66	0-1	1
	1752.5	20375	5	QPSK	12	6	22.53	0-1	1
	1752.5	20375	5	QPSK	12	13	22.59	0-1	1
	1752.5	20375	5	QPSK	25	0	22.66	0-1	1
	1752.5	20375	5	16-QAM	1	0	22.70	0-1	1
	1752.5	20375	5	16-QAM	1	12	22.55	0-1	1
	1752.5	20375	5	16-QAM	1	24	22.80	0-1	1
	1752.5	20375	5	16-QAM	12	0	21.61	0-2	2
	1752.5	20375	5	16-QAM	12	6	21.55	0-2	2
	1752.5	20375	5	16-QAM	12	13	21.55	0-2	2
	1752.5	20375	5	16-QAM	25	0	21.58	0-2	2

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Table 8-11
LTE Band 4 (AWS) Conducted Powers - 3 MHz Bandwidth
Maximum Power

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1711.5	19965	3	QPSK	1	0	23.69	0	0
	1711.5	19965	3	QPSK	1	7	23.73	0	0
	1711.5	19965	3	QPSK	1	14	23.61	0	0
	1711.5	19965	3	QPSK	8	0	22.64	0-1	1
	1711.5	19965	3	QPSK	8	4	22.56	0-1	1
	1711.5	19965	3	QPSK	8	7	22.48	0-1	1
	1711.5	19965	3	QPSK	15	0	22.48	0-1	1
	1711.5	19965	3	16-QAM	1	0	22.87	0-1	1
	1711.5	19965	3	16-QAM	1	7	22.75	0-1	1
	1711.5	19965	3	16-QAM	1	14	22.72	0-1	1
	1711.5	19965	3	16-QAM	8	0	21.58	0-2	2
	1711.5	19965	3	16-QAM	8	4	21.46	0-2	2
Mid	1711.5	19965	3	16-QAM	8	7	21.40	0-2	2
	1711.5	19965	3	16-QAM	15	0	21.48	0-2	2
	1732.5	20175	3	QPSK	1	0	23.42	0	0
	1732.5	20175	3	QPSK	1	7	23.53	0	0
	1732.5	20175	3	QPSK	1	14	23.45	0	0
	1732.5	20175	3	QPSK	8	0	22.43	0-1	1
	1732.5	20175	3	QPSK	8	4	22.35	0-1	1
	1732.5	20175	3	QPSK	8	7	22.36	0-1	1
	1732.5	20175	3	QPSK	15	0	22.33	0-1	1
	1732.5	20175	3	16-QAM	1	0	22.54	0-1	1
	1732.5	20175	3	16-QAM	1	7	22.42	0-1	1
	1732.5	20175	3	16-QAM	1	14	22.56	0-1	1
High	1732.5	20175	3	16-QAM	8	0	21.59	0-2	2
	1732.5	20175	3	16-QAM	8	4	21.42	0-2	2
	1732.5	20175	3	16-QAM	8	7	21.23	0-2	2
	1732.5	20175	3	16-QAM	15	0	21.44	0-2	2
	1753.5	20385	3	QPSK	1	0	23.74	0	0
	1753.5	20385	3	QPSK	1	7	23.85	0	0
	1753.5	20385	3	QPSK	1	14	23.78	0	0
	1753.5	20385	3	QPSK	8	0	22.72	0-1	1
	1753.5	20385	3	QPSK	8	4	22.69	0-1	1
	1753.5	20385	3	QPSK	8	7	22.64	0-1	1
	1753.5	20385	3	QPSK	15	0	22.63	0-1	1
	1753.5	20385	3	16-QAM	1	0	22.86	0-1	1
	1753.5	20385	3	16-QAM	1	7	22.82	0-1	1
	1753.5	20385	3	16-QAM	1	14	22.71	0-1	1
	1753.5	20385	3	16-QAM	8	0	21.81	0-2	2
	1753.5	20385	3	16-QAM	8	4	21.50	0-2	2
	1753.5	20385	3	16-QAM	8	7	21.55	0-2	2
	1753.5	20385	3	16-QAM	15	0	21.72	0-2	2

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Table 8-12
LTE Band 4 (AWS) Conducted Powers -1.4 MHz Bandwidth
Maximum Power

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1710.7	19957	1.4	QPSK	1	0	23.62	0	0
	1710.7	19957	1.4	QPSK	1	2	23.79	0	0
	1710.7	19957	1.4	QPSK	1	5	23.75	0	0
	1710.7	19957	1.4	QPSK	3	0	23.65	0	0
	1710.7	19957	1.4	QPSK	3	2	23.64	0	0
	1710.7	19957	1.4	QPSK	3	3	23.55	0	0
	1710.7	19957	1.4	QPSK	6	0	22.59	0-1	1
	1710.7	19957	1.4	16-QAM	1	0	22.73	0-1	1
	1710.7	19957	1.4	16-QAM	1	2	22.67	0-1	1
	1710.7	19957	1.4	16-QAM	1	5	22.60	0-1	1
	1710.7	19957	1.4	16-QAM	3	0	22.62	0-1	1
	1710.7	19957	1.4	16-QAM	3	2	22.67	0-1	1
	1710.7	19957	1.4	16-QAM	3	3	22.52	0-1	1
Mid	1710.7	19957	1.4	16-QAM	6	0	21.70	0-2	2
	1732.5	20175	1.4	QPSK	1	0	23.26	0	0
	1732.5	20175	1.4	QPSK	1	2	23.43	0	0
	1732.5	20175	1.4	QPSK	1	5	23.39	0	0
	1732.5	20175	1.4	QPSK	3	0	23.36	0	0
	1732.5	20175	1.4	QPSK	3	2	23.32	0	0
	1732.5	20175	1.4	QPSK	3	3	23.34	0	0
	1732.5	20175	1.4	QPSK	6	0	22.36	0-1	1
	1732.5	20175	1.4	16-QAM	1	0	22.53	0-1	1
	1732.5	20175	1.4	16-QAM	1	2	22.42	0-1	1
	1732.5	20175	1.4	16-QAM	1	5	22.55	0-1	1
	1732.5	20175	1.4	16-QAM	3	0	22.67	0-1	1
	1732.5	20175	1.4	16-QAM	3	2	22.74	0-1	1
High	1732.5	20175	1.4	16-QAM	3	3	22.37	0-1	1
	1732.5	20175	1.4	16-QAM	6	0	21.51	0-2	2
	1754.3	20393	1.4	QPSK	1	0	23.59	0	0
	1754.3	20393	1.4	QPSK	1	2	23.77	0	0
	1754.3	20393	1.4	QPSK	1	5	23.75	0	0
	1754.3	20393	1.4	QPSK	3	0	23.66	0	0
	1754.3	20393	1.4	QPSK	3	2	23.65	0	0
	1754.3	20393	1.4	QPSK	3	3	23.60	0	0
	1754.3	20393	1.4	QPSK	6	0	22.51	0-1	1
	1754.3	20393	1.4	16-QAM	1	0	22.77	0-1	1
	1754.3	20393	1.4	16-QAM	1	2	22.75	0-1	1
	1754.3	20393	1.4	16-QAM	1	5	22.66	0-1	1
	1754.3	20393	1.4	16-QAM	3	0	22.58	0-1	1
	1754.3	20393	1.4	16-QAM	3	2	22.62	0-1	1
	1754.3	20393	1.4	16-QAM	3	3	22.51	0-1	1
	1754.3	20393	1.4	16-QAM	6	0	21.73	0-2	2

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Table 8-13
LTE Band 4 (AWS) Conducted Powers - 20 MHz Bandwidth
Reduced Power – Body at 0.0 cm

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Mid	1732.5	20175	20	QPSK	1	0	13.00	0	0
	1732.5	20175	20	QPSK	1	50	12.91	0	0
	1732.5	20175	20	QPSK	1	99	12.99	0	0
	1732.5	20175	20	QPSK	50	0	12.73	0-1	0
	1732.5	20175	20	QPSK	50	25	12.63	0-1	0
	1732.5	20175	20	QPSK	50	50	12.62	0-1	0
	1732.5	20175	20	QPSK	100	0	12.68	0-1	0
	1732.5	20175	20	16QAM	1	0	12.95	0-1	0
	1732.5	20175	20	16QAM	1	50	12.65	0-1	0
	1732.5	20175	20	16QAM	1	99	12.60	0-1	0
	1732.5	20175	20	16QAM	50	0	12.78	0-2	0
	1732.5	20175	20	16QAM	50	25	12.66	0-2	0
	1732.5	20175	20	16QAM	50	50	12.73	0-2	0
	1732.5	20175	20	16QAM	100	0	12.69	0-2	0

Note: LTE Band 4 (AWS) at 20 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

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Table 8-14
LTE Band 4 (AWS) Conducted Powers - 15 MHz Bandwidth
Reduced Power – Body at 0.0 cm

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1717.5	20025	15	QPSK	1	0	12.88	0	0
	1717.5	20025	15	QPSK	1	36	12.75	0	0
	1717.5	20025	15	QPSK	1	74	12.67	0	0
	1717.5	20025	15	QPSK	36	0	12.59	0-1	0
	1717.5	20025	15	QPSK	36	18	12.52	0-1	0
	1717.5	20025	15	QPSK	36	37	12.35	0-1	0
	1717.5	20025	15	QPSK	75	0	12.41	0-1	0
	1717.5	20025	15	16QAM	1	0	12.90	0-1	0
	1717.5	20025	15	16QAM	1	36	12.53	0-1	0
	1717.5	20025	15	16QAM	1	74	12.42	0-1	0
	1717.5	20025	15	16QAM	36	0	12.50	0-2	0
	1717.5	20025	15	16QAM	36	18	12.52	0-2	0
	1717.5	20025	15	16QAM	36	37	12.41	0-2	0
Mid	1732.5	20175	15	QPSK	1	0	12.56	0	0
	1732.5	20175	15	QPSK	1	36	12.42	0	0
	1732.5	20175	15	QPSK	1	74	12.46	0	0
	1732.5	20175	15	QPSK	36	0	12.33	0-1	0
	1732.5	20175	15	QPSK	36	18	12.21	0-1	0
	1732.5	20175	15	QPSK	36	37	12.28	0-1	0
	1732.5	20175	15	QPSK	75	0	12.36	0-1	0
	1732.5	20175	15	16QAM	1	0	12.47	0-1	0
	1732.5	20175	15	16QAM	1	36	12.09	0-1	0
	1732.5	20175	15	16QAM	1	74	12.29	0-1	0
	1732.5	20175	15	16QAM	36	0	12.28	0-2	0
	1732.5	20175	15	16QAM	36	18	12.22	0-2	0
	1732.5	20175	15	16QAM	36	37	12.30	0-2	0
	1732.5	20175	15	16QAM	75	0	12.37	0-2	0
High	1747.5	20325	15	QPSK	1	0	12.57	0	0
	1747.5	20325	15	QPSK	1	36	12.47	0	0
	1747.5	20325	15	QPSK	1	74	12.61	0	0
	1747.5	20325	15	QPSK	36	0	12.58	0-1	0
	1747.5	20325	15	QPSK	36	18	12.53	0-1	0
	1747.5	20325	15	QPSK	36	37	12.58	0-1	0
	1747.5	20325	15	QPSK	75	0	12.55	0-1	0
	1747.5	20325	15	16QAM	1	0	12.77	0-1	0
	1747.5	20325	15	16QAM	1	36	12.67	0-1	0
	1747.5	20325	15	16QAM	1	74	12.70	0-1	0
	1747.5	20325	15	16QAM	36	0	12.56	0-2	0
	1747.5	20325	15	16QAM	36	18	12.52	0-2	0
	1747.5	20325	15	16QAM	36	37	12.45	0-2	0
	1747.5	20325	15	16QAM	75	0	12.63	0-2	0

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Table 8-15
LTE Band 4 (AWS) Conducted Powers - 10 MHz Bandwidth
Reduced Power – Body at 0.0 cm

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1715	20000	10	QPSK	1	0	12.77	0	0
	1715	20000	10	QPSK	1	25	12.69	0	0
	1715	20000	10	QPSK	1	49	12.57	0	0
	1715	20000	10	QPSK	25	0	12.44	0-1	0
	1715	20000	10	QPSK	25	12	12.49	0-1	0
	1715	20000	10	QPSK	25	25	12.44	0-1	0
	1715	20000	10	QPSK	50	0	12.43	0-1	0
	1715	20000	10	16QAM	1	0	12.70	0-1	0
	1715	20000	10	16QAM	1	25	12.56	0-1	0
	1715	20000	10	16QAM	1	49	12.73	0-1	0
	1715	20000	10	16QAM	25	0	12.38	0-2	0
	1715	20000	10	16QAM	25	12	12.57	0-2	0
	1715	20000	10	16QAM	25	25	12.48	0-2	0
Mid	1732.5	20175	10	QPSK	1	0	12.42	0	0
	1732.5	20175	10	QPSK	1	25	12.44	0	0
	1732.5	20175	10	QPSK	1	49	12.43	0	0
	1732.5	20175	10	QPSK	25	0	12.37	0-1	0
	1732.5	20175	10	QPSK	25	12	12.26	0-1	0
	1732.5	20175	10	QPSK	25	25	12.29	0-1	0
	1732.5	20175	10	QPSK	50	0	12.34	0-1	0
	1732.5	20175	10	16QAM	1	0	12.47	0-1	0
	1732.5	20175	10	16QAM	1	25	12.32	0-1	0
	1732.5	20175	10	16QAM	1	49	12.23	0-1	0
	1732.5	20175	10	16QAM	25	0	12.23	0-2	0
	1732.5	20175	10	16QAM	25	12	12.33	0-2	0
	1732.5	20175	10	16QAM	25	25	12.25	0-2	0
	1732.5	20175	10	16QAM	50	0	12.30	0-2	0
High	1750	20350	10	QPSK	1	0	12.65	0	0
	1750	20350	10	QPSK	1	25	12.77	0	0
	1750	20350	10	QPSK	1	49	12.74	0	0
	1750	20350	10	QPSK	25	0	12.65	0-1	0
	1750	20350	10	QPSK	25	12	12.49	0-1	0
	1750	20350	10	QPSK	25	25	12.48	0-1	0
	1750	20350	10	QPSK	50	0	12.50	0-1	0
	1750	20350	10	16QAM	1	0	12.65	0-1	0
	1750	20350	10	16QAM	1	25	12.63	0-1	0
	1750	20350	10	16QAM	1	49	12.57	0-1	0
	1750	20350	10	16QAM	25	0	12.54	0-2	0
	1750	20350	10	16QAM	25	12	12.57	0-2	0
	1750	20350	10	16QAM	25	25	12.49	0-2	0
	1750	20350	10	16QAM	50	0	12.48	0-2	0

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Table 8-16
LTE Band 4 (AWS) Conducted Powers - 5 MHz Bandwidth
Reduced Power – Body at 0.0 cm

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1712.5	19975	5	QPSK	1	0	12.64	0	0
	1712.5	19975	5	QPSK	1	12	12.60	0	0
	1712.5	19975	5	QPSK	1	24	12.49	0	0
	1712.5	19975	5	QPSK	12	0	12.55	0-1	0
	1712.5	19975	5	QPSK	12	6	12.37	0-1	0
	1712.5	19975	5	QPSK	12	13	12.38	0-1	0
	1712.5	19975	5	QPSK	25	0	12.42	0-1	0
	1712.5	19975	5	16-QAM	1	0	12.61	0-1	0
	1712.5	19975	5	16-QAM	1	12	12.70	0-1	0
	1712.5	19975	5	16-QAM	1	24	12.71	0-1	0
	1712.5	19975	5	16-QAM	12	0	12.38	0-2	0
	1712.5	19975	5	16-QAM	12	6	12.29	0-2	0
	1712.5	19975	5	16-QAM	12	13	12.32	0-2	0
Mid	1732.5	20175	5	QPSK	1	0	12.34	0	0
	1732.5	20175	5	QPSK	1	12	12.45	0	0
	1732.5	20175	5	QPSK	1	24	12.44	0	0
	1732.5	20175	5	QPSK	12	0	12.26	0-1	0
	1732.5	20175	5	QPSK	12	6	12.29	0-1	0
	1732.5	20175	5	QPSK	12	13	12.21	0-1	0
	1732.5	20175	5	QPSK	25	0	12.24	0-1	0
	1732.5	20175	5	16-QAM	1	0	12.37	0-1	0
	1732.5	20175	5	16-QAM	1	12	12.48	0-1	0
	1732.5	20175	5	16-QAM	1	24	12.31	0-1	0
	1732.5	20175	5	16-QAM	12	0	12.19	0-2	0
	1732.5	20175	5	16-QAM	12	6	12.30	0-2	0
	1732.5	20175	5	16-QAM	12	13	12.10	0-2	0
	1732.5	20175	5	16-QAM	25	0	12.19	0-2	0
High	1752.5	20375	5	QPSK	1	0	12.57	0	0
	1752.5	20375	5	QPSK	1	12	12.69	0	0
	1752.5	20375	5	QPSK	1	24	12.55	0	0
	1752.5	20375	5	QPSK	12	0	12.49	0-1	0
	1752.5	20375	5	QPSK	12	6	12.58	0-1	0
	1752.5	20375	5	QPSK	12	13	12.50	0-1	0
	1752.5	20375	5	QPSK	25	0	12.52	0-1	0
	1752.5	20375	5	16-QAM	1	0	12.67	0-1	0
	1752.5	20375	5	16-QAM	1	12	12.67	0-1	0
	1752.5	20375	5	16-QAM	1	24	12.84	0-1	0
	1752.5	20375	5	16-QAM	12	0	12.40	0-2	0
	1752.5	20375	5	16-QAM	12	6	12.44	0-2	0
	1752.5	20375	5	16-QAM	12	13	12.43	0-2	0
	1752.5	20375	5	16-QAM	25	0	12.53	0-2	0

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Table 8-17
LTE Band 4 (AWS) Conducted Powers - 3 MHz Bandwidth
Reduced Power – Body at 0.0 cm

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1711.5	19965	3	QPSK	1	0	12.57	0	0
	1711.5	19965	3	QPSK	1	7	12.62	0	0
	1711.5	19965	3	QPSK	1	14	12.60	0	0
	1711.5	19965	3	QPSK	8	0	12.58	0-1	0
	1711.5	19965	3	QPSK	8	4	12.42	0-1	0
	1711.5	19965	3	QPSK	8	7	12.38	0-1	0
	1711.5	19965	3	QPSK	15	0	12.41	0-1	0
	1711.5	19965	3	16-QAM	1	0	12.62	0-1	0
	1711.5	19965	3	16-QAM	1	7	12.63	0-1	0
	1711.5	19965	3	16-QAM	1	14	12.70	0-1	0
	1711.5	19965	3	16-QAM	8	0	12.41	0-2	0
	1711.5	19965	3	16-QAM	8	4	12.28	0-2	0
Mid	1711.5	19965	3	16-QAM	8	7	12.25	0-2	0
	1711.5	19965	3	16-QAM	15	0	12.46	0-2	0
	1732.5	20175	3	QPSK	1	0	12.49	0	0
	1732.5	20175	3	QPSK	1	7	12.49	0	0
	1732.5	20175	3	QPSK	1	14	12.48	0	0
	1732.5	20175	3	QPSK	8	0	12.26	0-1	0
	1732.5	20175	3	QPSK	8	4	12.32	0-1	0
	1732.5	20175	3	QPSK	8	7	12.23	0-1	0
	1732.5	20175	3	QPSK	15	0	12.24	0-1	0
	1732.5	20175	3	16-QAM	1	0	12.53	0-1	0
	1732.5	20175	3	16-QAM	1	7	12.50	0-1	0
	1732.5	20175	3	16-QAM	1	14	12.43	0-1	0
High	1732.5	20175	3	16-QAM	8	0	12.26	0-2	0
	1732.5	20175	3	16-QAM	8	4	12.16	0-2	0
	1732.5	20175	3	16-QAM	8	7	12.08	0-2	0
	1732.5	20175	3	16-QAM	15	0	12.45	0-2	0
	1753.5	20385	3	QPSK	1	0	12.76	0	0
	1753.5	20385	3	QPSK	1	7	12.74	0	0
	1753.5	20385	3	QPSK	1	14	12.78	0	0
	1753.5	20385	3	QPSK	8	0	12.68	0-1	0
	1753.5	20385	3	QPSK	8	4	12.57	0-1	0
	1753.5	20385	3	QPSK	8	7	12.59	0-1	0
	1753.5	20385	3	QPSK	15	0	12.50	0-1	0
	1753.5	20385	3	16-QAM	1	0	12.83	0-1	0
	1753.5	20385	3	16-QAM	1	7	12.90	0-1	0
	1753.5	20385	3	16-QAM	1	14	12.70	0-1	0
	1753.5	20385	3	16-QAM	8	0	12.50	0-2	0
	1753.5	20385	3	16-QAM	8	4	12.44	0-2	0
	1753.5	20385	3	16-QAM	8	7	12.42	0-2	0
	1753.5	20385	3	16-QAM	15	0	12.79	0-2	0

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Table 8-18
LTE Band 4 (AWS) Conducted Powers -1.4 MHz Bandwidth
Reduced Power – Body at 0.0 cm

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1710.7	19957	1.4	QPSK	1	0	12.58	0	0
	1710.7	19957	1.4	QPSK	1	2	12.68	0	0
	1710.7	19957	1.4	QPSK	1	5	12.66	0	0
	1710.7	19957	1.4	QPSK	3	0	12.48	0	0
	1710.7	19957	1.4	QPSK	3	2	12.51	0	0
	1710.7	19957	1.4	QPSK	3	3	12.43	0	0
	1710.7	19957	1.4	QPSK	6	0	12.47	0-1	0
	1710.7	19957	1.4	16-QAM	1	0	12.63	0-1	0
	1710.7	19957	1.4	16-QAM	1	2	12.55	0-1	0
	1710.7	19957	1.4	16-QAM	1	5	12.60	0-1	0
	1710.7	19957	1.4	16-QAM	3	0	12.53	0-1	0
	1710.7	19957	1.4	16-QAM	3	2	12.65	0-1	0
	1710.7	19957	1.4	16-QAM	3	3	12.47	0-1	0
Mid	1732.5	20175	1.4	QPSK	1	0	12.30	0	0
	1732.5	20175	1.4	QPSK	1	2	12.65	0	0
	1732.5	20175	1.4	QPSK	1	5	12.41	0	0
	1732.5	20175	1.4	QPSK	3	0	12.28	0	0
	1732.5	20175	1.4	QPSK	3	2	12.27	0	0
	1732.5	20175	1.4	QPSK	3	3	12.19	0	0
	1732.5	20175	1.4	QPSK	6	0	12.18	0-1	0
	1732.5	20175	1.4	16-QAM	1	0	12.57	0-1	0
	1732.5	20175	1.4	16-QAM	1	2	12.47	0-1	0
	1732.5	20175	1.4	16-QAM	1	5	12.38	0-1	0
	1732.5	20175	1.4	16-QAM	3	0	12.26	0-1	0
	1732.5	20175	1.4	16-QAM	3	2	12.41	0-1	0
	1732.5	20175	1.4	16-QAM	3	3	12.23	0-1	0
	1732.5	20175	1.4	16-QAM	6	0	12.32	0-2	0
High	1754.3	20393	1.4	QPSK	1	0	12.64	0	0
	1754.3	20393	1.4	QPSK	1	2	12.65	0	0
	1754.3	20393	1.4	QPSK	1	5	12.64	0	0
	1754.3	20393	1.4	QPSK	3	0	12.56	0	0
	1754.3	20393	1.4	QPSK	3	2	12.55	0	0
	1754.3	20393	1.4	QPSK	3	3	12.51	0	0
	1754.3	20393	1.4	QPSK	6	0	12.46	0-1	0
	1754.3	20393	1.4	16-QAM	1	0	12.68	0-1	0
	1754.3	20393	1.4	16-QAM	1	2	12.60	0-1	0
	1754.3	20393	1.4	16-QAM	1	5	12.81	0-1	0
	1754.3	20393	1.4	16-QAM	3	0	12.49	0-1	0
	1754.3	20393	1.4	16-QAM	3	2	12.71	0-1	0
	1754.3	20393	1.4	16-QAM	3	3	12.43	0-1	0
	1754.3	20393	1.4	16-QAM	6	0	12.69	0-2	0

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LTE Band 2 (PCS)

Table 8-19
LTE Band 2 (PCS) Conducted Powers - 20 MHz Bandwidth
Maximum Power

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1860	18700	20	QPSK	1	0	23.63	0	0
	1860	18700	20	QPSK	1	50	23.74	0	0
	1860	18700	20	QPSK	1	99	23.99	0	0
	1860	18700	20	QPSK	50	0	22.69	0-1	1
	1860	18700	20	QPSK	50	25	22.67	0-1	1
	1860	18700	20	QPSK	50	50	22.58	0-1	1
	1860	18700	20	QPSK	100	0	22.63	0-1	1
	1860	18700	20	16QAM	1	0	22.21	0-1	1
	1860	18700	20	16QAM	1	50	22.38	0-1	1
	1860	18700	20	16QAM	1	99	22.12	0-1	1
	1860	18700	20	16QAM	50	0	21.61	0-2	2
	1860	18700	20	16QAM	50	25	21.60	0-2	2
Mid	1860	18700	20	16QAM	50	50	21.67	0-2	2
	1860	18700	20	16QAM	100	0	21.65	0-2	2
	1880.0	18900	20	QPSK	1	0	23.98	0	0
	1880.0	18900	20	QPSK	1	50	23.94	0	0
	1880.0	18900	20	QPSK	1	99	23.97	0	0
	1880.0	18900	20	QPSK	50	0	22.76	0-1	1
	1880.0	18900	20	QPSK	50	25	22.64	0-1	1
	1880.0	18900	20	QPSK	50	50	22.63	0-1	1
	1880.0	18900	20	QPSK	100	0	22.68	0-1	1
	1880.0	18900	20	16QAM	1	0	23.00	0-1	1
	1880.0	18900	20	16QAM	1	50	22.63	0-1	1
	1880.0	18900	20	16QAM	1	99	22.51	0-1	1
High	1880.0	18900	20	16QAM	50	0	21.59	0-2	2
	1880.0	18900	20	16QAM	50	25	21.58	0-2	2
	1880.0	18900	20	16QAM	50	50	21.59	0-2	2
	1880.0	18900	20	16QAM	100	0	21.65	0-2	2
	1900	19100	20	QPSK	1	0	23.74	0	0
	1900	19100	20	QPSK	1	50	23.98	0	0
	1900	19100	20	QPSK	1	99	24.00	0	0
	1900	19100	20	QPSK	50	0	22.74	0-1	1
	1900	19100	20	QPSK	50	25	22.77	0-1	1
	1900	19100	20	QPSK	50	50	22.82	0-1	1
	1900	19100	20	QPSK	100	0	22.81	0-1	1
	1900	19100	20	16QAM	1	0	22.96	0-1	1
	1900	19100	20	16QAM	1	50	22.66	0-1	1
	1900	19100	20	16QAM	1	99	22.92	0-1	1
	1900	19100	20	16QAM	50	0	21.56	0-2	2
	1900	19100	20	16QAM	50	25	21.55	0-2	2
	1900	19100	20	16QAM	50	50	21.61	0-2	2
	1900	19100	20	16QAM	100	0	21.85	0-2	2
	1900	19100	20	16QAM	100	0	21.85	0-2	2

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Table 8-20
LTE Band 2 (PCS) Conducted Powers - 15 MHz Bandwidth
Maximum Power

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1857.5	18675	15	QPSK	1	0	23.97	0	0
	1857.5	18675	15	QPSK	1	36	23.55	0	0
	1857.5	18675	15	QPSK	1	74	23.87	0	0
	1857.5	18675	15	QPSK	36	0	22.68	0-1	1
	1857.5	18675	15	QPSK	36	18	22.63	0-1	1
	1857.5	18675	15	QPSK	36	37	22.66	0-1	1
	1857.5	18675	15	QPSK	75	0	22.62	0-1	1
	1857.5	18675	15	16QAM	1	0	23.00	0-1	1
	1857.5	18675	15	16QAM	1	36	22.95	0-1	1
	1857.5	18675	15	16QAM	1	74	22.99	0-1	1
	1857.5	18675	15	16QAM	36	0	21.58	0-2	2
	1857.5	18675	15	16QAM	36	18	21.55	0-2	2
Mid	1857.5	18675	15	16QAM	36	37	21.73	0-2	2
	1857.5	18675	15	16QAM	75	0	21.63	0-2	2
	1880.0	18900	15	QPSK	1	0	23.70	0	0
	1880.0	18900	15	QPSK	1	36	23.84	0	0
	1880.0	18900	15	QPSK	1	74	23.75	0	0
	1880.0	18900	15	QPSK	36	0	22.70	0-1	1
	1880.0	18900	15	QPSK	36	18	22.65	0-1	1
	1880.0	18900	15	QPSK	36	37	22.59	0-1	1
	1880.0	18900	15	QPSK	75	0	22.59	0-1	1
	1880.0	18900	15	16QAM	1	0	22.52	0-1	1
	1880.0	18900	15	16QAM	1	36	22.74	0-1	1
	1880.0	18900	15	16QAM	1	74	22.81	0-1	1
High	1880.0	18900	15	16QAM	36	0	21.70	0-2	2
	1880.0	18900	15	16QAM	36	18	21.62	0-2	2
	1880.0	18900	15	16QAM	36	37	21.62	0-2	2
	1880.0	18900	15	16QAM	75	0	21.66	0-2	2
	1902.5	19125	15	QPSK	1	0	23.88	0	0
	1902.5	19125	15	QPSK	1	36	23.73	0	0
	1902.5	19125	15	QPSK	1	74	23.79	0	0
	1902.5	19125	15	QPSK	36	0	22.77	0-1	1
	1902.5	19125	15	QPSK	36	18	22.66	0-1	1
	1902.5	19125	15	QPSK	36	37	22.71	0-1	1
	1902.5	19125	15	QPSK	75	0	22.66	0-1	1
	1902.5	19125	15	16QAM	1	0	22.47	0-1	1
	1902.5	19125	15	16QAM	1	36	22.53	0-1	1
	1902.5	19125	15	16QAM	1	74	22.32	0-1	1
	1902.5	19125	15	16QAM	36	0	21.72	0-2	2
	1902.5	19125	15	16QAM	36	18	21.42	0-2	2
	1902.5	19125	15	16QAM	36	37	21.76	0-2	2
	1902.5	19125	15	16QAM	75	0	21.83	0-2	2
	1902.5	19125	15	16QAM	75	0	21.83	0-2	2

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Table 8-21
LTE Band 2 (PCS) Conducted Powers - 10 MHz Bandwidth
Maximum Power

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1855	18650	10	QPSK	1	0	23.93	0	0
	1855	18650	10	QPSK	1	25	24.00	0	0
	1855	18650	10	QPSK	1	49	23.92	0	0
	1855	18650	10	QPSK	25	0	22.71	0-1	1
	1855	18650	10	QPSK	25	12	22.63	0-1	1
	1855	18650	10	QPSK	25	25	22.66	0-1	1
	1855	18650	10	QPSK	50	0	22.66	0-1	1
	1855	18650	10	16QAM	1	0	22.97	0-1	1
	1855	18650	10	16QAM	1	25	22.82	0-1	1
	1855	18650	10	16QAM	1	49	22.80	0-1	1
	1855	18650	10	16QAM	25	0	21.71	0-2	2
	1855	18650	10	16QAM	25	12	21.70	0-2	2
Mid	1855	18650	10	16QAM	25	25	21.69	0-2	2
	1855	18650	10	16QAM	50	0	21.67	0-2	2
	1880.0	18900	10	QPSK	1	0	23.90	0	0
	1880.0	18900	10	QPSK	1	25	23.89	0	0
	1880.0	18900	10	QPSK	1	49	23.86	0	0
	1880.0	18900	10	QPSK	25	0	22.72	0-1	1
	1880.0	18900	10	QPSK	25	12	22.68	0-1	1
	1880.0	18900	10	QPSK	25	25	22.67	0-1	1
	1880.0	18900	10	QPSK	50	0	22.66	0-1	1
	1880.0	18900	10	16QAM	1	0	22.26	0-1	1
	1880.0	18900	10	16QAM	1	25	22.33	0-1	1
	1880.0	18900	10	16QAM	1	49	22.38	0-1	1
High	1880.0	18900	10	16QAM	25	0	21.78	0-2	2
	1880.0	18900	10	16QAM	25	12	21.75	0-2	2
	1880.0	18900	10	16QAM	25	25	21.73	0-2	2
	1880.0	18900	10	16QAM	50	0	21.73	0-2	2
	1905	19150	10	QPSK	1	0	23.99	0	0
	1905	19150	10	QPSK	1	25	24.00	0	0
	1905	19150	10	QPSK	1	49	23.79	0	0
	1905	19150	10	QPSK	25	0	22.64	0-1	1
	1905	19150	10	QPSK	25	12	22.58	0-1	1
	1905	19150	10	QPSK	25	25	22.60	0-1	1
	1905	19150	10	QPSK	50	0	22.71	0-1	1
	1905	19150	10	16QAM	1	0	22.81	0-1	1
	1905	19150	10	16QAM	1	25	22.92	0-1	1
	1905	19150	10	16QAM	1	49	22.70	0-1	1
	1905	19150	10	16QAM	25	0	21.58	0-2	2
	1905	19150	10	16QAM	25	12	21.45	0-2	2
	1905	19150	10	16QAM	25	25	21.63	0-2	2
	1905	19150	10	16QAM	50	0	21.76	0-2	2

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Table 8-22
LTE Band 2 (PCS) Conducted Powers - 5 MHz Bandwidth
Maximum Power

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1852.5	18625	5	QPSK	1	0	23.76	0	0
	1852.5	18625	5	QPSK	1	12	24.00	0	0
	1852.5	18625	5	QPSK	1	24	23.85	0	0
	1852.5	18625	5	QPSK	12	0	22.75	0-1	1
	1852.5	18625	5	QPSK	12	6	22.67	0-1	1
	1852.5	18625	5	QPSK	12	13	22.69	0-1	1
	1852.5	18625	5	QPSK	25	0	22.70	0-1	1
	1852.5	18625	5	16-QAM	1	0	22.79	0-1	1
	1852.5	18625	5	16-QAM	1	12	22.91	0-1	1
	1852.5	18625	5	16-QAM	1	24	22.72	0-1	1
	1852.5	18625	5	16-QAM	12	0	21.67	0-2	2
	1852.5	18625	5	16-QAM	12	6	21.61	0-2	2
Mid	1852.5	18625	5	16-QAM	12	13	21.59	0-2	2
	1852.5	18625	5	16-QAM	25	0	21.63	0-2	2
	1880.0	18900	5	QPSK	1	0	23.61	0	0
	1880.0	18900	5	QPSK	1	12	24.00	0	0
	1880.0	18900	5	QPSK	1	24	23.67	0	0
	1880.0	18900	5	QPSK	12	0	22.68	0-1	1
	1880.0	18900	5	QPSK	12	6	22.59	0-1	1
	1880.0	18900	5	QPSK	12	13	22.61	0-1	1
	1880.0	18900	5	QPSK	25	0	22.64	0-1	1
	1880.0	18900	5	16-QAM	1	0	22.38	0-1	1
	1880.0	18900	5	16-QAM	1	12	22.43	0-1	1
	1880.0	18900	5	16-QAM	1	24	22.46	0-1	1
High	1880.0	18900	5	16-QAM	12	0	21.54	0-2	2
	1880.0	18900	5	16-QAM	12	6	21.64	0-2	2
	1880.0	18900	5	16-QAM	12	13	21.58	0-2	2
	1880.0	18900	5	16-QAM	25	0	21.65	0-2	2
	1907.5	19175	5	QPSK	1	0	23.34	0	0
	1907.5	19175	5	QPSK	1	12	23.77	0	0
	1907.5	19175	5	QPSK	1	24	23.48	0	0
	1907.5	19175	5	QPSK	12	0	22.69	0-1	1
	1907.5	19175	5	QPSK	12	6	22.68	0-1	1
	1907.5	19175	5	QPSK	12	13	22.74	0-1	1
	1907.5	19175	5	QPSK	25	0	22.73	0-1	1
	1907.5	19175	5	16-QAM	1	0	22.25	0-1	1
	1907.5	19175	5	16-QAM	1	12	22.68	0-1	1
	1907.5	19175	5	16-QAM	1	24	22.45	0-1	1
	1907.5	19175	5	16-QAM	12	0	21.55	0-2	2
	1907.5	19175	5	16-QAM	12	6	21.53	0-2	2
	1907.5	19175	5	16-QAM	12	13	21.72	0-2	2
	1907.5	19175	5	16-QAM	25	0	21.73	0-2	2

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Table 8-23
LTE Band 2 (PCS) Conducted Powers - 3 MHz Bandwidth
Maximum Power

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1851.5	18615	3	QPSK	1	0	23.70	0	0
	1851.5	18615	3	QPSK	1	7	23.96	0	0
	1851.5	18615	3	QPSK	1	14	23.77	0	0
	1851.5	18615	3	QPSK	8	0	22.67	0-1	1
	1851.5	18615	3	QPSK	8	4	22.69	0-1	1
	1851.5	18615	3	QPSK	8	7	22.65	0-1	1
	1851.5	18615	3	QPSK	15	0	22.75	0-1	1
	1851.5	18615	3	16-QAM	1	0	22.82	0-1	1
	1851.5	18615	3	16-QAM	1	7	22.97	0-1	1
	1851.5	18615	3	16-QAM	1	14	22.77	0-1	1
	1851.5	18615	3	16-QAM	8	0	21.76	0-2	2
	1851.5	18615	3	16-QAM	8	4	21.89	0-2	2
Mid	1851.5	18615	3	16-QAM	8	7	21.83	0-2	2
	1851.5	18615	3	16-QAM	15	0	21.83	0-2	2
	1880.0	18900	3	QPSK	1	0	23.86	0	0
	1880.0	18900	3	QPSK	1	7	24.00	0	0
	1880.0	18900	3	QPSK	1	14	23.86	0	0
	1880.0	18900	3	QPSK	8	0	22.70	0-1	1
	1880.0	18900	3	QPSK	8	4	22.74	0-1	1
	1880.0	18900	3	QPSK	8	7	22.79	0-1	1
	1880.0	18900	3	QPSK	15	0	22.73	0-1	1
	1880.0	18900	3	16-QAM	1	0	22.71	0-1	1
	1880.0	18900	3	16-QAM	1	7	22.76	0-1	1
	1880.0	18900	3	16-QAM	1	14	22.90	0-1	1
High	1880.0	18900	3	16-QAM	8	0	21.73	0-2	2
	1880.0	18900	3	16-QAM	8	4	21.85	0-2	2
	1880.0	18900	3	16-QAM	8	7	21.73	0-2	2
	1880.0	18900	3	16-QAM	15	0	21.63	0-2	2
	1908.5	19185	3	QPSK	1	0	24.00	0	0
	1908.5	19185	3	QPSK	1	7	24.00	0	0
	1908.5	19185	3	QPSK	1	14	23.95	0	0
	1908.5	19185	3	QPSK	8	0	22.76	0-1	1
	1908.5	19185	3	QPSK	8	4	22.75	0-1	1
	1908.5	19185	3	QPSK	8	7	22.78	0-1	1
	1908.5	19185	3	QPSK	15	0	22.76	0-1	1
	1908.5	19185	3	16-QAM	1	0	22.80	0-1	1
	1908.5	19185	3	16-QAM	1	7	23.00	0-1	1
	1908.5	19185	3	16-QAM	1	14	22.91	0-1	1
	1908.5	19185	3	16-QAM	8	0	21.53	0-2	2
	1908.5	19185	3	16-QAM	8	4	21.51	0-2	2
	1908.5	19185	3	16-QAM	8	7	21.52	0-2	2
	1908.5	19185	3	16-QAM	15	0	21.61	0-2	2

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Table 8-24
LTE Band 2 (PCS) Conducted Powers -1.4 MHz Bandwidth
Maximum Power

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1850.7	18607	1.4	QPSK	1	0	23.54	0	0
	1850.7	18607	1.4	QPSK	1	2	23.67	0	0
	1850.7	18607	1.4	QPSK	1	5	23.59	0	0
	1850.7	18607	1.4	QPSK	3	0	23.51	0	0
	1850.7	18607	1.4	QPSK	3	2	23.52	0	0
	1850.7	18607	1.4	QPSK	3	3	23.56	0	0
	1850.7	18607	1.4	QPSK	6	0	22.47	0-1	1
	1850.7	18607	1.4	16-QAM	1	0	22.65	0-1	1
	1850.7	18607	1.4	16-QAM	1	2	22.42	0-1	1
	1850.7	18607	1.4	16-QAM	1	5	22.59	0-1	1
	1850.7	18607	1.4	16-QAM	3	0	22.75	0-1	1
	1850.7	18607	1.4	16-QAM	3	2	22.78	0-1	1
	1850.7	18607	1.4	16-QAM	3	3	22.73	0-1	1
Mid	1850.7	18607	1.4	16-QAM	6	0	21.78	0-2	2
	1880.0	18900	1.4	QPSK	1	0	23.84	0	0
	1880.0	18900	1.4	QPSK	1	2	23.92	0	0
	1880.0	18900	1.4	QPSK	1	5	24.00	0	0
	1880.0	18900	1.4	QPSK	3	0	23.69	0	0
	1880.0	18900	1.4	QPSK	3	2	23.67	0	0
	1880.0	18900	1.4	QPSK	3	3	23.66	0	0
	1880.0	18900	1.4	QPSK	6	0	22.66	0-1	1
	1880.0	18900	1.4	16-QAM	1	0	22.77	0-1	1
	1880.0	18900	1.4	16-QAM	1	2	22.82	0-1	1
	1880.0	18900	1.4	16-QAM	1	5	22.87	0-1	1
	1880.0	18900	1.4	16-QAM	3	0	22.66	0-1	1
	1880.0	18900	1.4	16-QAM	3	2	22.65	0-1	1
High	1880.0	18900	1.4	16-QAM	3	3	22.61	0-1	1
	1880.0	18900	1.4	16-QAM	6	0	21.84	0-2	2
	1909.3	19193	1.4	QPSK	1	0	23.75	0	0
	1909.3	19193	1.4	QPSK	1	2	23.81	0	0
	1909.3	19193	1.4	QPSK	1	5	23.64	0	0
	1909.3	19193	1.4	QPSK	3	0	23.95	0	0
	1909.3	19193	1.4	QPSK	3	2	23.86	0	0
	1909.3	19193	1.4	QPSK	3	3	23.71	0	0
	1909.3	19193	1.4	QPSK	6	0	22.68	0-1	1
	1909.3	19193	1.4	16-QAM	1	0	22.88	0-1	1
	1909.3	19193	1.4	16-QAM	1	2	23.00	0-1	1
	1909.3	19193	1.4	16-QAM	1	5	22.91	0-1	1
	1909.3	19193	1.4	16-QAM	3	0	22.49	0-1	1
	1909.3	19193	1.4	16-QAM	3	2	22.56	0-1	1
	1909.3	19193	1.4	16-QAM	3	3	22.95	0-1	1
	1909.3	19193	1.4	16-QAM	6	0	21.42	0-2	2

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Table 8-25
LTE Band 2 (PCS) Conducted Powers - 20 MHz Bandwidth
Reduced Power – Body at 0.0 cm

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1860	18700	20	QPSK	1	0	12.00	0	0
	1860	18700	20	QPSK	1	50	11.59	0	0
	1860	18700	20	QPSK	1	99	11.98	0	0
	1860	18700	20	QPSK	50	0	11.81	0-1	0
	1860	18700	20	QPSK	50	25	11.82	0-1	0
	1860	18700	20	QPSK	50	50	11.80	0-1	0
	1860	18700	20	QPSK	100	0	11.82	0-1	0
	1860	18700	20	16QAM	1	0	12.46	0-1	0
	1860	18700	20	16QAM	1	50	12.00	0-1	0
	1860	18700	20	16QAM	1	99	12.45	0-1	0
	1860	18700	20	16QAM	50	0	11.84	0-2	0
	1860	18700	20	16QAM	50	25	11.87	0-2	0
Mid	1860	18700	20	16QAM	50	50	11.89	0-2	0
	1860	18700	20	16QAM	100	0	11.79	0-2	0
	1880.0	18900	20	QPSK	1	0	12.02	0	0
	1880.0	18900	20	QPSK	1	50	11.79	0	0
	1880.0	18900	20	QPSK	1	99	11.50	0	0
	1880.0	18900	20	QPSK	50	0	11.75	0-1	0
	1880.0	18900	20	QPSK	50	25	11.77	0-1	0
	1880.0	18900	20	QPSK	50	50	11.73	0-1	0
	1880.0	18900	20	QPSK	100	0	11.78	0-1	0
	1880.0	18900	20	16QAM	1	0	12.17	0-1	0
	1880.0	18900	20	16QAM	1	50	12.09	0-1	0
	1880.0	18900	20	16QAM	1	99	12.20	0-1	0
High	1880.0	18900	20	16QAM	50	0	11.78	0-2	0
	1880.0	18900	20	16QAM	50	25	11.72	0-2	0
	1880.0	18900	20	16QAM	50	50	11.70	0-2	0
	1880.0	18900	20	16QAM	100	0	11.72	0-2	0
	1900	19100	20	QPSK	1	0	12.14	0	0
	1900	19100	20	QPSK	1	50	11.81	0	0
	1900	19100	20	QPSK	1	99	12.40	0	0
	1900	19100	20	QPSK	50	0	11.83	0-1	0
	1900	19100	20	QPSK	50	25	11.79	0-1	0
	1900	19100	20	QPSK	50	50	11.75	0-1	0
	1900	19100	20	QPSK	100	0	11.81	0-1	0
	1900	19100	20	16QAM	1	0	12.48	0-1	0
	1900	19100	20	16QAM	1	50	12.00	0-1	0
	1900	19100	20	16QAM	1	99	12.48	0-1	0
	1900	19100	20	16QAM	50	0	12.00	0-2	0
	1900	19100	20	16QAM	50	25	11.81	0-2	0
	1900	19100	20	16QAM	50	50	11.79	0-2	0
	1900	19100	20	16QAM	100	0	11.79	0-2	0

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Table 8-26
LTE Band 2 (PCS) Conducted Powers - 15 MHz Bandwidth
Reduced Power – Body at 0.0 cm

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1857.5	18675	15	QPSK	1	0	11.42	0	0
	1857.5	18675	15	QPSK	1	36	11.38	0	0
	1857.5	18675	15	QPSK	1	74	11.56	0	0
	1857.5	18675	15	QPSK	36	0	11.44	0-1	0
	1857.5	18675	15	QPSK	36	18	11.42	0-1	0
	1857.5	18675	15	QPSK	36	37	11.44	0-1	0
	1857.5	18675	15	QPSK	75	0	11.44	0-1	0
	1857.5	18675	15	16QAM	1	0	11.56	0-1	0
	1857.5	18675	15	16QAM	1	36	11.74	0-1	0
	1857.5	18675	15	16QAM	1	74	11.88	0-1	0
	1857.5	18675	15	16QAM	36	0	11.53	0-2	0
	1857.5	18675	15	16QAM	36	18	11.43	0-2	0
Mid	1857.5	18675	15	16QAM	36	37	11.42	0-2	0
	1857.5	18675	15	16QAM	75	0	11.41	0-2	0
	1880.0	18900	15	QPSK	1	0	11.55	0	0
	1880.0	18900	15	QPSK	1	36	11.65	0	0
	1880.0	18900	15	QPSK	1	74	11.58	0	0
	1880.0	18900	15	QPSK	36	0	11.39	0-1	0
	1880.0	18900	15	QPSK	36	18	11.37	0-1	0
	1880.0	18900	15	QPSK	36	37	11.35	0-1	0
	1880.0	18900	15	QPSK	75	0	11.33	0-1	0
	1880.0	18900	15	16QAM	1	0	11.36	0-1	0
	1880.0	18900	15	16QAM	1	36	11.01	0-1	0
	1880.0	18900	15	16QAM	1	74	11.50	0-1	0
High	1880.0	18900	15	16QAM	36	0	11.29	0-2	0
	1880.0	18900	15	16QAM	36	18	11.28	0-2	0
	1880.0	18900	15	16QAM	36	37	11.32	0-2	0
	1880.0	18900	15	16QAM	75	0	11.28	0-2	0
	1902.5	19125	15	QPSK	1	0	11.33	0	0
	1902.5	19125	15	QPSK	1	36	11.61	0	0
	1902.5	19125	15	QPSK	1	74	11.55	0	0
	1902.5	19125	15	QPSK	36	0	11.49	0-1	0
	1902.5	19125	15	QPSK	36	18	11.42	0-1	0
	1902.5	19125	15	QPSK	36	37	11.45	0-1	0
	1902.5	19125	15	QPSK	75	0	11.50	0-1	0
	1902.5	19125	15	16QAM	1	0	11.72	0-1	0
	1902.5	19125	15	16QAM	1	36	11.33	0-1	0
	1902.5	19125	15	16QAM	1	74	11.58	0-1	0
	1902.5	19125	15	16QAM	36	0	11.38	0-2	0
	1902.5	19125	15	16QAM	36	18	11.25	0-2	0
	1902.5	19125	15	16QAM	36	37	11.27	0-2	0
	1902.5	19125	15	16QAM	75	0	11.38	0-2	0
	1902.5	19125	15	16QAM	75	0	11.38	0-2	0

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Table 8-27
LTE Band 2 (PCS) Conducted Powers - 10 MHz Bandwidth
Reduced Power – Body at 0.0 cm

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1855	18650	10	QPSK	1	0	11.63	0	0
	1855	18650	10	QPSK	1	25	11.39	0	0
	1855	18650	10	QPSK	1	49	11.54	0	0
	1855	18650	10	QPSK	25	0	11.43	0-1	0
	1855	18650	10	QPSK	25	12	11.38	0-1	0
	1855	18650	10	QPSK	25	25	11.38	0-1	0
	1855	18650	10	QPSK	50	0	11.41	0-1	0
	1855	18650	10	16QAM	1	0	11.66	0-1	0
	1855	18650	10	16QAM	1	25	11.50	0-1	0
	1855	18650	10	16QAM	1	49	11.64	0-1	0
	1855	18650	10	16QAM	25	0	11.47	0-2	0
	1855	18650	10	16QAM	25	12	11.32	0-2	0
Mid	1855	18650	10	16QAM	25	25	11.24	0-2	0
	1855	18650	10	16QAM	50	0	11.33	0-2	0
	1880.0	18900	10	QPSK	1	0	11.70	0	0
	1880.0	18900	10	QPSK	1	25	11.85	0	0
	1880.0	18900	10	QPSK	1	49	11.66	0	0
	1880.0	18900	10	QPSK	25	0	11.42	0-1	0
	1880.0	18900	10	QPSK	25	12	11.39	0-1	0
	1880.0	18900	10	QPSK	25	25	11.40	0-1	0
	1880.0	18900	10	QPSK	50	0	11.45	0-1	0
	1880.0	18900	10	16QAM	1	0	11.56	0-1	0
	1880.0	18900	10	16QAM	1	25	11.60	0-1	0
	1880.0	18900	10	16QAM	1	49	11.64	0-1	0
High	1880.0	18900	10	16QAM	25	0	11.34	0-2	0
	1880.0	18900	10	16QAM	25	12	11.31	0-2	0
	1880.0	18900	10	16QAM	25	25	11.36	0-2	0
	1880.0	18900	10	16QAM	50	0	11.34	0-2	0
	1905	19150	10	QPSK	1	0	11.61	0	0
	1905	19150	10	QPSK	1	25	11.40	0	0
	1905	19150	10	QPSK	1	49	11.55	0	0
	1905	19150	10	QPSK	25	0	11.42	0-1	0
	1905	19150	10	QPSK	25	12	11.41	0-1	0
	1905	19150	10	QPSK	25	25	11.42	0-1	0
	1905	19150	10	QPSK	50	0	11.49	0-1	0
	1905	19150	10	16QAM	1	0	11.79	0-1	0
	1905	19150	10	16QAM	1	25	11.51	0-1	0
	1905	19150	10	16QAM	1	49	11.68	0-1	0
	1905	19150	10	16QAM	25	0	11.47	0-2	0
	1905	19150	10	16QAM	25	12	11.34	0-2	0
	1905	19150	10	16QAM	25	25	11.44	0-2	0
	1905	19150	10	16QAM	50	0	11.40	0-2	0

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Table 8-28
LTE Band 2 (PCS) Conducted Powers - 5 MHz Bandwidth
Reduced Power – Body at 0.0 cm

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1852.5	18625	5	QPSK	1	0	11.54	0	0
	1852.5	18625	5	QPSK	1	12	11.68	0	0
	1852.5	18625	5	QPSK	1	24	11.50	0	0
	1852.5	18625	5	QPSK	12	0	11.34	0-1	0
	1852.5	18625	5	QPSK	12	6	11.33	0-1	0
	1852.5	18625	5	QPSK	12	13	11.39	0-1	0
	1852.5	18625	5	QPSK	25	0	11.41	0-1	0
	1852.5	18625	5	16-QAM	1	0	11.75	0-1	0
	1852.5	18625	5	16-QAM	1	12	11.50	0-1	0
	1852.5	18625	5	16-QAM	1	24	11.39	0-1	0
	1852.5	18625	5	16-QAM	12	0	11.33	0-2	0
	1852.5	18625	5	16-QAM	12	6	11.28	0-2	0
Mid	1852.5	18625	5	16-QAM	12	13	11.39	0-2	0
	1852.5	18625	5	16-QAM	25	0	11.36	0-2	0
	1880.0	18900	5	QPSK	1	0	11.73	0	0
	1880.0	18900	5	QPSK	1	12	11.42	0	0
	1880.0	18900	5	QPSK	1	24	11.49	0	0
	1880.0	18900	5	QPSK	12	0	11.42	0-1	0
	1880.0	18900	5	QPSK	12	6	11.39	0-1	0
	1880.0	18900	5	QPSK	12	13	11.41	0-1	0
	1880.0	18900	5	QPSK	25	0	11.36	0-1	0
	1880.0	18900	5	16-QAM	1	0	11.49	0-1	0
	1880.0	18900	5	16-QAM	1	12	11.35	0-1	0
	1880.0	18900	5	16-QAM	1	24	11.40	0-1	0
High	1880.0	18900	5	16-QAM	12	0	11.26	0-2	0
	1880.0	18900	5	16-QAM	12	6	11.29	0-2	0
	1880.0	18900	5	16-QAM	12	13	11.35	0-2	0
	1880.0	18900	5	16-QAM	25	0	11.47	0-2	0
	1907.5	19175	5	QPSK	1	0	11.26	0	0
	1907.5	19175	5	QPSK	1	12	11.33	0	0
	1907.5	19175	5	QPSK	1	24	11.31	0	0
	1907.5	19175	5	QPSK	12	0	11.35	0-1	0
	1907.5	19175	5	QPSK	12	6	11.41	0-1	0
	1907.5	19175	5	QPSK	12	13	11.44	0-1	0
	1907.5	19175	5	QPSK	25	0	11.47	0-1	0
	1907.5	19175	5	16-QAM	1	0	11.27	0-1	0
	1907.5	19175	5	16-QAM	1	12	11.24	0-1	0
	1907.5	19175	5	16-QAM	1	24	11.22	0-1	0
	1907.5	19175	5	16-QAM	12	0	11.37	0-2	0
	1907.5	19175	5	16-QAM	12	6	11.34	0-2	0
	1907.5	19175	5	16-QAM	12	13	11.46	0-2	0
	1907.5	19175	5	16-QAM	25	0	11.63	0-2	0

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Table 8-29
LTE Band 2 (PCS) Conducted Powers - 3 MHz Bandwidth
Reduced Power – Body at 0.0 cm

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1851.5	18615	3	QPSK	1	0	11.40	0	0
	1851.5	18615	3	QPSK	1	7	11.50	0	0
	1851.5	18615	3	QPSK	1	14	11.41	0	0
	1851.5	18615	3	QPSK	8	0	11.38	0-1	0
	1851.5	18615	3	QPSK	8	4	11.33	0-1	0
	1851.5	18615	3	QPSK	8	7	11.30	0-1	0
	1851.5	18615	3	QPSK	15	0	11.30	0-1	0
	1851.5	18615	3	16-QAM	1	0	11.36	0-1	0
	1851.5	18615	3	16-QAM	1	7	11.34	0-1	0
	1851.5	18615	3	16-QAM	1	14	11.38	0-1	0
	1851.5	18615	3	16-QAM	8	0	11.25	0-2	0
	1851.5	18615	3	16-QAM	8	4	11.28	0-2	0
Mid	1880.0	18900	3	QPSK	1	0	11.51	0	0
	1880.0	18900	3	QPSK	1	7	11.50	0	0
	1880.0	18900	3	QPSK	1	14	11.47	0	0
	1880.0	18900	3	QPSK	8	0	11.35	0-1	0
	1880.0	18900	3	QPSK	8	4	11.33	0-1	0
	1880.0	18900	3	QPSK	8	7	11.35	0-1	0
	1880.0	18900	3	QPSK	15	0	11.42	0-1	0
	1880.0	18900	3	16-QAM	1	0	11.55	0-1	0
	1880.0	18900	3	16-QAM	1	7	11.34	0-1	0
	1880.0	18900	3	16-QAM	1	14	11.28	0-1	0
	1880.0	18900	3	16-QAM	8	0	11.32	0-2	0
	1880.0	18900	3	16-QAM	8	4	11.43	0-2	0
High	1908.5	19185	3	QPSK	1	0	11.81	0	0
	1908.5	19185	3	QPSK	1	7	11.74	0	0
	1908.5	19185	3	QPSK	1	14	11.83	0	0
	1908.5	19185	3	QPSK	8	0	11.54	0-1	0
	1908.5	19185	3	QPSK	8	4	11.50	0-1	0
	1908.5	19185	3	QPSK	8	7	11.51	0-1	0
	1908.5	19185	3	QPSK	15	0	11.42	0-1	0
	1908.5	19185	3	16-QAM	1	0	11.59	0-1	0
	1908.5	19185	3	16-QAM	1	7	11.46	0-1	0
	1908.5	19185	3	16-QAM	1	14	11.40	0-1	0
	1908.5	19185	3	16-QAM	8	0	11.32	0-2	0
	1908.5	19185	3	16-QAM	8	4	11.33	0-2	0
	1908.5	19185	3	16-QAM	8	7	11.44	0-2	0
	1908.5	19185	3	16-QAM	15	0	11.54	0-2	0

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Table 8-30
LTE Band 2 (PCS) Conducted Powers -1.4 MHz Bandwidth
Reduced Power – Body at 0.0 cm

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1850.7	18607	1.4	QPSK	1	0	11.39	0	0
	1850.7	18607	1.4	QPSK	1	2	11.58	0	0
	1850.7	18607	1.4	QPSK	1	5	11.51	0	0
	1850.7	18607	1.4	QPSK	3	0	11.44	0	0
	1850.7	18607	1.4	QPSK	3	2	11.47	0	0
	1850.7	18607	1.4	QPSK	3	3	11.50	0	0
	1850.7	18607	1.4	QPSK	6	0	11.42	0-1	0
	1850.7	18607	1.4	16-QAM	1	0	11.59	0-1	0
	1850.7	18607	1.4	16-QAM	1	2	11.81	0-1	0
	1850.7	18607	1.4	16-QAM	1	5	11.74	0-1	0
	1850.7	18607	1.4	16-QAM	3	0	11.66	0-1	0
	1850.7	18607	1.4	16-QAM	3	2	11.67	0-1	0
	1850.7	18607	1.4	16-QAM	3	3	11.40	0-1	0
Mid	1880.0	18900	1.4	QPSK	6	0	11.48	0-2	0
	1880.0	18900	1.4	QPSK	1	0	11.74	0	0
	1880.0	18900	1.4	QPSK	1	2	11.69	0	0
	1880.0	18900	1.4	QPSK	1	5	11.60	0	0
	1880.0	18900	1.4	QPSK	3	0	11.15	0	0
	1880.0	18900	1.4	QPSK	3	2	11.40	0	0
	1880.0	18900	1.4	QPSK	3	3	11.27	0	0
	1880.0	18900	1.4	QPSK	6	0	11.35	0-1	0
	1880.0	18900	1.4	16-QAM	1	0	11.41	0-1	0
	1880.0	18900	1.4	16-QAM	1	2	11.47	0-1	0
	1880.0	18900	1.4	16-QAM	1	5	11.49	0-1	0
	1880.0	18900	1.4	16-QAM	3	0	11.39	0-1	0
	1880.0	18900	1.4	16-QAM	3	2	11.38	0-1	0
High	1880.0	18900	1.4	16-QAM	3	3	11.37	0-1	0
	1880.0	18900	1.4	16-QAM	6	0	11.63	0-2	0
	1909.3	19193	1.4	QPSK	1	0	11.36	0	0
	1909.3	19193	1.4	QPSK	1	2	11.47	0	0
	1909.3	19193	1.4	QPSK	1	5	11.45	0	0
	1909.3	19193	1.4	QPSK	3	0	11.52	0	0
	1909.3	19193	1.4	QPSK	3	2	11.46	0	0
	1909.3	19193	1.4	QPSK	3	3	11.41	0	0
	1909.3	19193	1.4	QPSK	6	0	11.40	0-1	0
	1909.3	19193	1.4	16-QAM	1	0	11.63	0-1	0
	1909.3	19193	1.4	16-QAM	1	2	11.77	0-1	0
	1909.3	19193	1.4	16-QAM	1	5	11.65	0-1	0
	1909.3	19193	1.4	16-QAM	3	0	11.45	0-1	0
	1909.3	19193	1.4	16-QAM	3	2	11.49	0-1	0
	1909.3	19193	1.4	16-QAM	3	3	11.41	0-1	0
	1909.3	19193	1.4	16-QAM	6	0	11.58	0-2	0

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9 SYSTEM VERIFICATION

9.1 Tissue Verification

Table 9-1
Measured Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (C°)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ϵ	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ϵ	% dev σ	% dev ϵ
8/17/2015	750B	21.5	725	0.941	54.601	0.961	55.629	-2.08%	-1.85%
			740	0.955	54.447	0.963	55.570	-0.83%	-2.02%
			755	0.969	54.263	0.964	55.512	0.52%	-2.25%
			770	0.984	54.086	0.965	55.453	1.97%	-2.47%
			785	0.998	53.949	0.966	55.395	3.31%	-2.61%
8/10/2015	835B	21.7	820	0.990	53.760	0.969	55.258	2.17%	-2.71%
			835	1.005	53.595	0.970	55.200	3.61%	-2.91%
			850	1.020	53.423	0.988	55.154	3.24%	-3.14%
8/17/2015	1750B	22.2	1710	1.433	52.690	1.463	53.537	-2.05%	-1.58%
			1750	1.479	52.542	1.488	53.432	-0.60%	-1.67%
			1790	1.526	52.399	1.514	53.326	0.79%	-1.74%
8/12/2015	1900B	22.3	1850	1.468	51.516	1.520	53.300	-3.42%	-3.35%
			1880	1.505	51.362	1.520	53.300	-0.99%	-3.64%
			1910	1.536	51.313	1.520	53.300	1.05%	-3.73%

The above measured tissue parameters were used in the DASY software. The DASY software was used to perform interpolation to determine the dielectric parameters at the SAR test device frequencies (per KDB Publication 865664 and IEEE 1528-2013 6.6.1.2). The tissue parameters listed in the SAR test plots may slightly differ from the table above due to significant digit rounding in the software.

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9.2 Test System Verification

Prior to SAR assessment, the system is verified to $\pm 10\%$ of the SAR measurement on the reference dipole at the time of calibration by the calibration facility. Full system validation status and result summary can be found in Appendix E.

Table 9-2
System Verification Results

System Verification TARGET & MEASURED												
SAR System #	Tissue Frequency (MHz)	Tissue Type	Date:	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Dipole SN	Probe SN	Measured SAR _{1g} (W/kg)	1 W Target SAR _{1g} (W/kg)	1 W Normalized SAR _{1g} (W/kg)	Deviation _{1g} (%)
B	750	BODY	08/17/2015	22.6	21.5	0.200	1046	3334	1.770	8.290	8.850	6.76%
J	835	BODY	08/10/2015	20.9	21.7	0.200	4d119	3319	1.960	9.200	9.800	6.52%
I	1750	BODY	08/17/2015	23.3	22.0	0.100	1051	3213	3.710	37.100	37.100	0.00%
I	1900	BODY	08/12/2015	22.7	22.3	0.100	5d141	3213	3.810	40.000	38.100	-4.75%

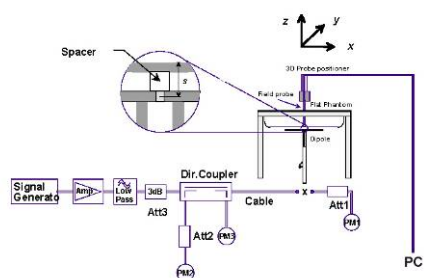


Figure 9-1
System Verification Setup Diagram



Figure 9-2
System Verification Setup Photo

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10 SAR DATA SUMMARY

10.1 Standalone Body SAR Data

Table 10-1
UMTS Body SAR Data

MEASUREMENT RESULTS														
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Duty Cycle	Side	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
836.60	4183	UMTS 850	RMC	23.5	22.79	0.01	24 mm	31435	1:1	back	0.083	1.178	0.098	
836.60	4183	UMTS 850	RMC	23.5	22.79	-0.04	17 mm	31435	1:1	top	0.148	1.178	0.174	
836.60	4183	UMTS 850	RMC	23.5	22.79	0.01	11 mm	31435	1:1	left	0.083	1.178	0.097	
836.60	4183	UMTS 850	RMC	20.5	20.32	-0.03	0 mm	31435	1:1	back	0.473	1.042	0.493	A1
836.60	4183	UMTS 850	RMC	20.5	20.32	0.01	0 mm	31435	1:1	top	0.390	1.042	0.406	
836.60	4183	UMTS 850	RMC	20.5	20.32	0.10	0 mm	31435	1:1	left	0.242	1.042	0.252	
1880.00	9400	UMTS 1900	RMC	23.5	22.43	-0.02	24 mm	32136	1:1	back	0.250	1.279	0.320	
1880.00	9400	UMTS 1900	RMC	23.5	22.43	0.05	17 mm	32136	1:1	top	0.422	1.279	0.540	
1880.00	9400	UMTS 1900	RMC	23.5	22.43	0.03	11 mm	32136	1:1	left	0.128	1.279	0.164	
1880.00	9400	UMTS 1900	RMC	13.5	13.01	0.01	0 mm	32136	1:1	back	0.701	1.119	0.784	A2
1880.00	9400	UMTS 1900	RMC	13.5	13.01	-0.12	0 mm	32136	1:1	top	0.315	1.119	0.352	
1880.00	9400	UMTS 1900	RMC	13.5	13.01	0.02	0 mm	32136	1:1	left	0.072	1.119	0.080	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram							

Table 10-2
LTE Band 13 Body SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #	
MHz	Ch.														(W/kg)		(W/kg)		
782.00	23230	Mid	LTE Band 13	10	24.0	23.98	0.00	0	31435	QPSK	1	25	24 mm	back	1:1	0.200	1.005	0.201	
782.00	23230	Mid	LTE Band 13	10	23.0	22.86	0.03	1	31435	QPSK	25	0	24 mm	back	1:1	0.165	1.033	0.170	
782.00	23230	Mid	LTE Band 13	10	24.0	23.98	0.01	0	31435	QPSK	1	25	17 mm	top	1:1	0.217	1.005	0.218	
782.00	23230	Mid	LTE Band 13	10	23.0	22.86	0.00	1	31435	QPSK	25	0	17 mm	top	1:1	0.163	1.033	0.168	
782.00	23230	Mid	LTE Band 13	10	24.0	23.98	-0.16	0	31435	QPSK	1	25	11 mm	left	1:1	0.041	1.005	0.041	
782.00	23230	Mid	LTE Band 13	10	23.0	22.86	0.07	1	31435	QPSK	25	0	11 mm	left	1:1	0.033	1.033	0.034	
782.00	23230	Mid	LTE Band 13	10	22.5	22.50	-0.02	0	31435	QPSK	1	0	0 mm	back	1:1	0.995	1.000	0.995	A3
782.00	23230	Mid	LTE Band 13	10	22.5	22.36	-0.02	0	31435	QPSK	25	0	0 mm	back	1:1	0.962	1.033	0.994	
782.00	23230	Mid	LTE Band 13	10	22.5	22.32	0.16	0	31435	QPSK	50	0	0 mm	back	1:1	0.920	1.042	0.959	
782.00	23230	Mid	LTE Band 13	10	22.5	22.50	0.10	0	31435	QPSK	1	0	0 mm	top	1:1	0.701	1.000	0.701	
782.00	23230	Mid	LTE Band 13	10	22.5	22.36	0.00	0	31435	QPSK	25	0	0 mm	top	1:1	0.698	1.033	0.721	
782.00	23230	Mid	LTE Band 13	10	22.5	22.50	0.01	0	31435	QPSK	1	0	0 mm	left	1:1	0.576	1.000	0.576	
782.00	23230	Mid	LTE Band 13	10	22.5	22.36	0.11	0	31435	QPSK	25	0	0 mm	left	1:1	0.569	1.033	0.588	
782.00	23230	Mid	LTE Band 13	10	22.5	22.50	-0.02	0	31435	QPSK	1	0	0 mm	back	1:1	0.962	1.000	0.962	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak								Body 1.6 W/kg (mW/g) averaged over 1 gram											
Uncontrolled Exposure/General Population																			

Note: Blue entries represent variability measurements

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Table 10-3
LTE Band 4 (AWS) Body SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #	
MHz	Ch.														(W/kg)		(W/kg)		
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.0	23.97	0.04	0	31435	QPSK	1	0	24 mm	back	1:1	0.591	1.007	0.595	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.0	22.61	0.02	1	31435	QPSK	50	0	24 mm	back	1:1	0.408	1.094	0.446	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.0	23.97	0.12	0	31435	QPSK	1	0	17 mm	top	1:1	1.050	1.007	1.057	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.0	22.61	0.05	1	31435	QPSK	50	0	17 mm	top	1:1	0.717	1.094	0.784	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.0	22.59	0.00	1	31435	QPSK	100	0	17 mm	top	1:1	0.687	1.099	0.755	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.0	23.97	-0.02	0	31435	QPSK	1	0	11 mm	left	1:1	0.247	1.007	0.249	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.0	22.61	0.18	1	31435	QPSK	50	0	11 mm	left	1:1	0.151	1.094	0.165	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	13.0	13.00	0.05	0	31435	QPSK	1	0	0 mm	back	1:1	1.040	1.000	1.040	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	13.0	12.73	-0.01	0	31435	QPSK	50	0	0 mm	back	1:1	0.985	1.064	1.048	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	13.0	12.68	-0.06	0	31435	QPSK	100	0	0 mm	back	1:1	0.945	1.076	1.017	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	13.0	13.00	-0.04	0	31435	QPSK	1	0	0 mm	top	1:1	0.809	1.000	0.809	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	13.0	12.73	0.01	0	31435	QPSK	50	0	0 mm	top	1:1	0.782	1.064	0.832	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	13.0	12.68	0.11	0	31435	QPSK	100	0	0 mm	top	1:1	0.763	1.076	0.821	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	13.0	13.00	0.06	0	31435	QPSK	1	0	0 mm	left	1:1	0.078	1.000	0.078	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	13.0	12.73	0.07	0	31435	QPSK	50	0	0 mm	left	1:1	0.069	1.064	0.073	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.0	23.97	0.04	0	31435	QPSK	1	0	17 mm	top	1:1	1.060	1.007	1.067	A4
ANSI / IEEE C95.1 1992 - SAFETY LIMIT								Body											
Spatial Peak								1.6 W/kg (mW/g)											
Uncontrolled Exposure/General Population								averaged over 1 gram											

Note: Blue entries represent variability measurements

Table 10-4
LTE Band 2 (PCS) Body SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.	(W/kg)														(W/kg)			
1900.00	19100	High	LTE Band 2 (PCS)	20	24.0	24.00	0.03	0	32136	QPSK	1	99	24 mm	back	1:1	0.291	1.000	0.291	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.0	22.82	0.10	1	32136	QPSK	50	50	24 mm	back	1:1	0.215	1.042	0.224	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.0	24.00	0.01	0	32136	QPSK	1	99	17 mm	top	1:1	0.574	1.000	0.574	A5
1900.00	19100	High	LTE Band 2 (PCS)	20	23.0	22.82	0.05	1	32136	QPSK	50	50	17 mm	top	1:1	0.435	1.042	0.453	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.0	24.00	0.08	0	32136	QPSK	1	99	11 mm	left	1:1	0.224	1.000	0.224	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.0	22.82	-0.03	1	32136	QPSK	50	50	11 mm	left	1:1	0.171	1.042	0.178	
1900.00	19100	High	LTE Band 2 (PCS)	20	12.5	12.40	-0.21	0	32136	QPSK	1	99	0 mm	back	1:1	0.404	1.023	0.413	
1900.00	19100	High	LTE Band 2 (PCS)	20	12.5	11.83	-0.02	0	32136	QPSK	50	0	0 mm	back	1:1	0.452	1.167	0.527	
1900.00	19100	High	LTE Band 2 (PCS)	20	12.5	12.40	-0.07	0	32136	QPSK	1	99	0 mm	top	1:1	0.290	1.023	0.297	
1900.00	19100	High	LTE Band 2 (PCS)	20	12.5	11.83	-0.13	0	32136	QPSK	50	0	0 mm	top	1:1	0.311	1.167	0.363	
1900.00	19100	High	LTE Band 2 (PCS)	20	12.5	12.40	-0.11	0	32136	QPSK	1	99	0 mm	left	1:1	0.089	1.023	0.091	
1900.00	19100	High	LTE Band 2 (PCS)	20	12.5	11.83	0.02	0	32136	QPSK	50	0	0 mm	left	1:1	0.078	1.167	0.091	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT								Body											
Spatial Peak								1.6 W/kg (mW/g)											
Uncontrolled Exposure/General Population								averaged over 1 gram											

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10.2 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in FCC KDB Publication 616217 D04v01r01 and FCC KDB Publication 447498 D01v05.
2. Batteries are fully charged at the beginning of the SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v05.
6. Per FCC KDB 865664 D01 v01, variability SAR tests were performed when the measured SAR results for a frequency band were greater than 0.8 W/kg. Repeated SAR measurements are highlighted in the tables above for clarity. Please see Section 12 for variability analysis.
7. Per FCC KDB 616217 D04 Section 4.3, SAR tests are required for the back surface and edges of the tablet with the tablet touching the phantom. The SAR Exclusion Threshold in FCC KDB 447498 D01v05 was applied to determine SAR test exclusion for adjacent edge configurations.

UMTS Notes:

1. UMTS mode was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01v03. HSPA SAR was not required per 3G Test Reduction Procedures.
2. Per FCC KDB Publication 447498 D01v05, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is $> \frac{1}{2}$ dB, instead of the middle channel, the highest output power channel was used.

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r03. The general test procedures used for testing can be found in Section 7.5.4.
2. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.
3. A-MPR was disabled for all SAR tests by setting NS=01 on the base station simulator. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

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11 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

11.1 Introduction

The following procedures adopted from FCC KDB Publication 447498 D01v05r02 are applicable to devices with built-in unlicensed transmitters such as 802.11 and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

11.2 Simultaneous Transmission Procedures

This device contains transmitters that may operate simultaneously. Therefore simultaneous transmission analysis is required. Per FCC KDB 447498 D01v05 IV.C.1.iii and IEEE 1528-2013 Section 6.3.4.1.2, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR for all the simultaneous transmitting antennas in a specific physical test configuration is ≤ 1.6 W/kg. The different test positions in an exposure condition may be considered collectively to determine SAR test exclusion according to the sum of 1-g or 10-g SAR.

11.3 Body SAR Simultaneous Transmission Analysis

Table 11-1
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body Back Side)

Exposure Condition	Mode	3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Back Side	UMTS 850	0.493	0.913	1.406	N/A
Back Side	UMTS 1900	0.784	0.913	See Note 1	0.02
Back Side	LTE Band 13	0.995	0.913	See Note 1	0.02
Back Side	LTE Band 4 (AWS)	1.048	0.913	See Note 1	0.02
Back Side	LTE Band 2 (PCS)	0.527	0.913	1.440	N/A

Table 11-2
Simultaneous Transmission Scenario with 5 GHz WLAN (Body Back Side)

Exposure Condition	Mode	3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Back Side	UMTS 850	0.493	1.032	1.525	N/A
Back Side	UMTS 1900	0.784	1.032	See Note 1	0.02
Back Side	LTE Band 13	0.995	1.032	See Note 1	0.02
Back Side	LTE Band 4 (AWS)	1.048	1.032	See Note 1	0.02
Back Side	LTE Band 2 (PCS)	0.527	1.032	1.559	N/A

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Table 11-3
Simultaneous Transmission Scenario with Bluetooth (Body Back Side)

Exposure Condition	Mode	3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Back Side	UMTS 850	0.493	0.000	0.493	N/A
Back Side	UMTS 1900	0.784	0.000	0.784	N/A
Back Side	LTE Band 13	0.995	0.000	0.995	N/A
Back Side	LTE Band 4 (AWS)	1.048	0.000	1.048	N/A
Back Side	LTE Band 2 (PCS)	0.527	0.000	0.527	N/A

Table 11-4
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body Top Side)

Exposure Condition	Mode	3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Top Side	UMTS 850	0.406	0.000	0.406	N/A
Top Side	UMTS 1900	0.540	0.000	0.540	N/A
Top Side	LTE Band 13	0.721	0.000	0.721	N/A
Top Side	LTE Band 4 (AWS)	1.067	0.000	1.067	N/A
Top Side	LTE Band 2 (PCS)	0.574	0.000	0.574	N/A

Table 11-5
Simultaneous Transmission Scenario with 5 GHz WLAN (Body Top Side)

Exposure Condition	Mode	3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Top Side	UMTS 850	0.406	0.000	0.406	N/A
Top Side	UMTS 1900	0.540	0.000	0.540	N/A
Top Side	LTE Band 13	0.721	0.000	0.721	N/A
Top Side	LTE Band 4 (AWS)	1.067	0.000	1.067	N/A
Top Side	LTE Band 2 (PCS)	0.574	0.000	0.574	N/A

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Table 11-6
Simultaneous Transmission Scenario with Bluetooth (Body Top Side)

Exposure Condition	Mode	3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Top Side	UMTS 850	0.406	0.000	0.406	N/A
Top Side	UMTS 1900	0.540	0.000	0.540	N/A
Top Side	LTE Band 13	0.721	0.000	0.721	N/A
Top Side	LTE Band 4 (AWS)	1.067	0.000	1.067	N/A
Top Side	LTE Band 2 (PCS)	0.574	0.000	0.574	N/A

Table 11-7
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body Left Side)

Exposure Condition	Mode	3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Left Side	UMTS 850	0.252	0.400	0.652	N/A
Left Side	UMTS 1900	0.164	0.400	0.564	N/A
Left Side	LTE Band 13	0.588	0.400	0.988	N/A
Left Side	LTE Band 4 (AWS)	0.249	0.400	0.649	N/A
Left Side	LTE Band 2 (PCS)	0.224	0.400	0.624	N/A

Table 11-8
Simultaneous Transmission Scenario with 5 GHz WLAN (Body Left Side)

Exposure Condition	Mode	3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Left Side	UMTS 850	0.252	0.400	0.652	N/A
Left Side	UMTS 1900	0.164	0.400	0.564	N/A
Left Side	LTE Band 13	0.588	0.400	0.988	N/A
Left Side	LTE Band 4 (AWS)	0.249	0.400	0.649	N/A
Left Side	LTE Band 2 (PCS)	0.224	0.400	0.624	N/A

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Table 11-9
Simultaneous Transmission Scenario with Bluetooth (Body Left Side)

Exposure Condition	Mode	3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Left Side	UMTS 850	0.252	0.400	0.652	N/A
Left Side	UMTS 1900	0.164	0.400	0.564	N/A
Left Side	LTE Band 13	0.588	0.400	0.988	N/A
Left Side	LTE Band 4 (AWS)	0.249	0.400	0.649	N/A
Left Side	LTE Band 2 (PCS)	0.224	0.400	0.624	N/A

Table 11-10
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body Right Side)

Exposure Condition	Mode	3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Right Side	UMTS 850	0.400	0.502	0.902	N/A
Right Side	UMTS 1900	0.400	0.502	0.902	N/A
Right Side	LTE Band 13	0.400	0.502	0.902	N/A
Right Side	LTE Band 4 (AWS)	0.400	0.502	0.902	N/A
Right Side	LTE Band 2 (PCS)	0.400	0.502	0.902	N/A

Table 11-11
Simultaneous Transmission Scenario with 5 GHz WLAN (Body Right Side)

Exposure Condition	Mode	3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Right Side	UMTS 850	0.400	0.646	1.046	N/A
Right Side	UMTS 1900	0.400	0.646	1.046	N/A
Right Side	LTE Band 13	0.400	0.646	1.046	N/A
Right Side	LTE Band 4 (AWS)	0.400	0.646	1.046	N/A
Right Side	LTE Band 2 (PCS)	0.400	0.646	1.046	N/A

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Table 11-12
Simultaneous Transmission Scenario with Bluetooth (Body Right Side)

Exposure Condition	Mode	3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Right Side	UMTS 850	0.400	0.000	0.400	N/A
Right Side	UMTS 1900	0.400	0.000	0.400	N/A
Right Side	LTE Band 13	0.400	0.000	0.400	N/A
Right Side	LTE Band 4 (AWS)	0.400	0.000	0.400	N/A
Right Side	LTE Band 2 (PCS)	0.400	0.000	0.400	N/A

Notes:

1. No evaluation was performed to determine the aggregate 1g SAR for these configurations as the SPLS ratio between the antenna pairs was less than 0.04 per FCC KDB 447498 D01v05. See Section 11.4 for detailed SPLS ratio analysis.
2. When the test separation distance was > 50 mm, an estimated SAR of 0.4 W/kg was used to determine simultaneous transmission SAR exclusion, for configurations excluded per FCC KDB Publication 447498 D01v05.
3. For SAR summation the highest reported SAR across all test distances was used as the most conservative evaluation for simultaneous transmission analysis for each device edge.

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11.4 SPLSR Evaluation and Analysis

Per FCC KDB Publication 447498 D01v05, when the sum of the standalone transmitters is more than 1.6 W/kg, the SAR sum to peak locations can be analyzed to determine SAR distribution overlaps. When the SAR peak to location ratio (shown below) for each pair of antennas is ≤ 0.04 , simultaneous SAR evaluation is not required. The distance between the transmitters was calculated using the following formula.

$$\text{Distance}_{\text{Tx1} - \text{Tx2}} = R_i = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

$$\text{SPLS Ratio} = \frac{(SAR_1 + SAR_2)^{1.5}}{R_i}$$

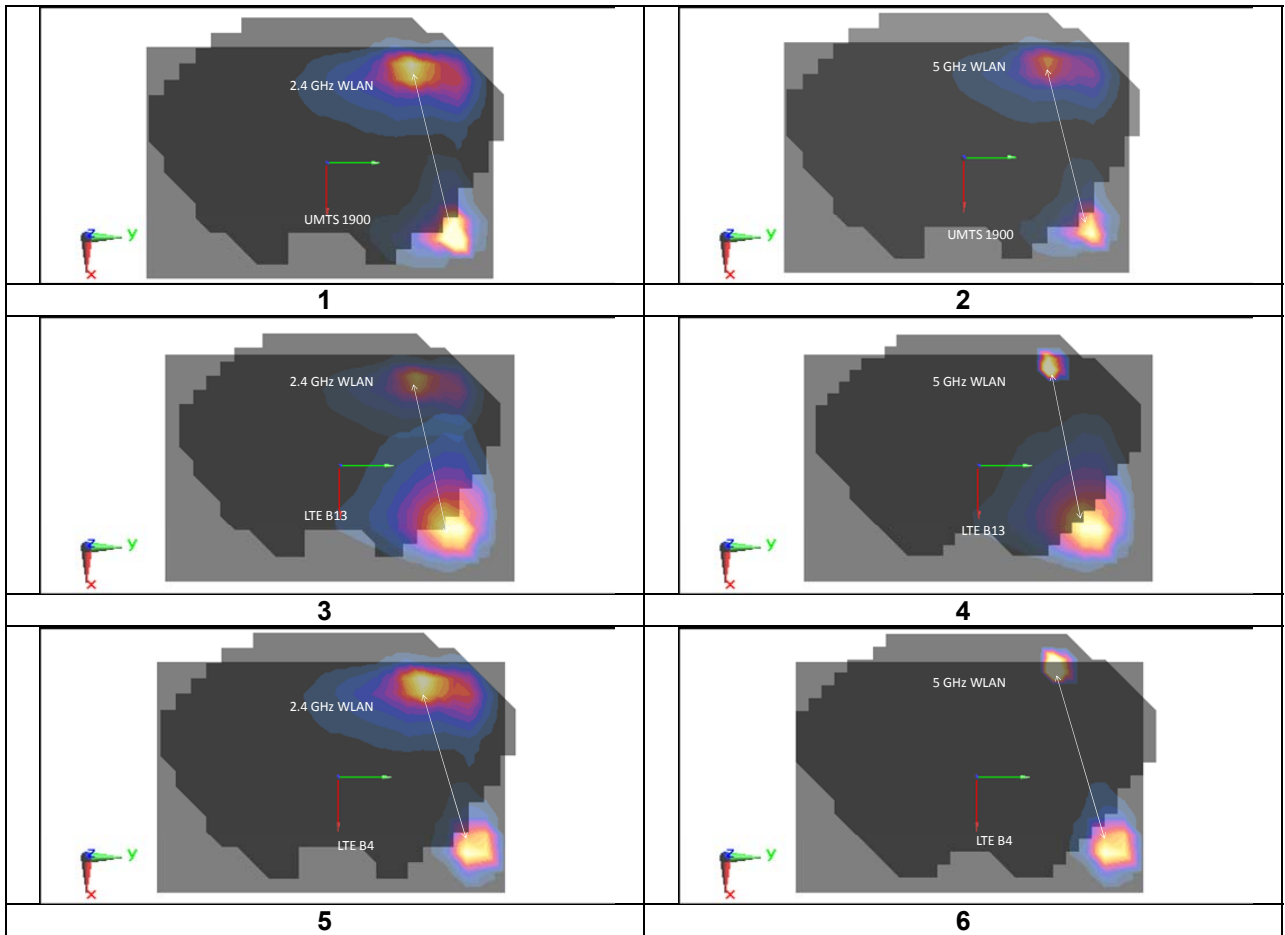
Table 11-13
Peak SAR Locations for Body Back Side

Mode/Band	x (mm)	y (mm)	Reported SAR (W/kg)
2.4 GHz WLAN	-78.40	66.00	0.913
5 GHz WLAN	-86.00	64.00	1.032
UMTS 1900	38.50	106.50	0.784
LTE B13	34.50	99.00	0.995
LTE B4	35.00	108.00	1.048

Table 11-14
SAR Sum to Peak Location Separation Ratio Calculations

Antenna Pair		Standalone 1g SAR (W/kg)		Standalone SAR Sum (W/kg)	Peak SAR Separation Distance (mm)	SPLS Ratio	Plot Number
Ant "a"	Ant "b"	a	b	a+b	D _{a-b}	(a+b) ^{1.5} /D _{a-b}	
UMTS 1900	2.4 GHz WLAN	0.784	0.913	1.697	123.72	0.02	1
UMTS 1900	5 GHz WLAN	0.784	1.032	1.816	131.55	0.02	2
LTE B13	2.4 GHz WLAN	0.995	0.913	1.908	117.62	0.02	3
LTE B13	5 GHz WLAN	0.995	1.032	2.027	125.48	0.02	4
LTE B4	2.4 GHz WLAN	1.048	0.913	1.961	120.93	0.02	5
LTE B4	5 GHz WLAN	1.048	1.032	2.080	128.75	0.02	6

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11.5 Simultaneous Transmission Conclusion

The above numerical summed SAR results and SPLSR for all the worst-case simultaneous transmission conditions were below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v05 and IEEE 1528-2013 Section 6.3.4.1.2.

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12 SAR MEASUREMENT VARIABILITY

12.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR Measurement Variability was assessed using the following procedures for each frequency band:

- 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.
- 2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
- 3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .
- 4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

Table 12-1
Body SAR Measurement Variability Results

BODY VARIABILITY RESULTS													
Band	FREQUENCY		Mode	Service	Side	Spacing	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	Ratio	3rd Repeated SAR (1g)	Ratio
	MHz	Ch.					(W/kg)	(W/kg)		(W/kg)		(W/kg)	
750	782.00	23230	LTE Band 13	QPSK, 1 RB, 0 RB Offset	back	0 mm	0.995	0.962	1.03	N/A	N/A	N/A	N/A
1750	1732.50	20175	LTE Band 4 (AWS)	QPSK, 1 RB, 0 RB Offset	top	17 mm	1.050	1.060	1.01	N/A	N/A	N/A	N/A
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram						

12.2 Measurement Uncertainty

The measured SAR was < 1.5 W/kg for all frequency bands. Therefore, per KDB Publication 865664 D01v01, the extended measurement uncertainty analysis per IEEE 1528-2003 was not required.

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13 EQUIPMENT LIST

Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
E4438C	ESG Vector Signal Generator	4/1/2014	Biennial	4/1/2016	MY47270002
8753E	(30kHz-6GHz) Network Analyzer	12/30/2014	Annual	12/30/2015	JP38020182
8753ES	S-Parameter Network Analyzer	3/12/2015	Annual	3/12/2016	MY40000670
E8257D	(250kHz-20GHz) Signal Generator	3/15/2015	Annual	3/15/2016	MY45470194
8648D	(9kHz-4GHz) Signal Generator	3/15/2015	Annual	3/15/2016	3629U00687
E4432B	ESG-D Series Signal Generator	3/16/2015	Annual	3/16/2016	US40053896
N5182A	MXG Vector Signal Generator	3/16/2015	Annual	3/16/2016	MY47420651
8753ES	Network Analyzer	3/20/2015	Annual	3/20/2016	MY40001472
E5515C	Wireless Communications Test Set	6/18/2015	Biennial	6/18/2017	GB41450275
15S1G6	Amplifier	CBT	N/A	CBT	433978
ML2495A	Power Meter	10/31/2013	Biennial	10/31/2015	941001
ML2495A	Power Meter	10/31/2013	Biennial	10/31/2015	1039008
MA2411B	Pulse Power Sensor	11/17/2014	Annual	11/17/2015	1126066
MA2481A	Power Sensor	3/10/2015	Annual	3/10/2016	2400
MA2481A	Power Sensor	3/11/2015	Annual	3/11/2016	5318
ML2438A	Power Meter	3/13/2015	Annual	3/13/2016	1190013
ML2438A	Power Meter	3/13/2015	Annual	3/13/2016	1070030
ML2496A	Power Meter	3/13/2015	Annual	3/13/2016	1351001
ML2496A	Power Meter	3/13/2015	Annual	3/13/2016	1306009
MA2411B	Pulse Power Sensor	3/13/2015	Annual	3/13/2016	1207470
MA24106A	USB Power Sensor	5/29/2015	Annual	5/29/2016	1248508
MT8820C	Radio Communication Analyzer	7/24/2015	Annual	7/24/2016	6200901190
MA24106A	USB Power Sensor	5/29/2015	Annual	5/29/2016	1231535
AR85729-5	Solid State Amplifier	CBT	N/A	CBT	M155A00-009
4353	Long Stem Thermometer	3/5/2015	Biennial	3/5/2017	150149565
4040	Digital Thermometer	3/18/2015	Biennial	3/18/2017	150194896
80701A	(0.05-18GHz) Power Sensor	10/30/2014	Annual	10/30/2015	1833460
8651A	Universal Power Meter	10/30/2014	Annual	10/30/2015	8650319
772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
SLP-2400+	Low Pass Filter	CBT	N/A	CBT	R8979500903
BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
NLP-1200+	Low Pass Filter DC to 1000 MHz	CBT	N/A	CBT	N/A
BW-N20W5	Power Attenuator	CBT	N/A	CBT	1226
CD-6"CSX	Digital Caliper	5/8/2014	Biennial	5/8/2016	13264165
4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
CMU200	Base Station Simulator	6/3/2015	Annual	6/3/2016	109892
CMW500	Radio Communication Tester	7/21/2015	Annual	7/21/2016	116743
NC-100	Torque Wrench	3/18/2014	Biennial	3/18/2016	N/A
NC-100	Torque Wrench 5/16", 8" lbs	3/18/2014	Biennial	3/18/2016	N/A
DAE4	Dasy Data Acquisition Electronics	12/12/2014	Annual	12/12/2015	1415
ES3DV3	SAR Probe	12/16/2014	Annual	12/16/2015	3334
ES3DV3	SAR Probe	1/20/2015	Annual	1/20/2016	3213
D750V3	750 MHz Dipole	2/19/2015	Annual	2/19/2016	1046
DAE4	Dasy Data Acquisition Electronics	3/13/2015	Annual	3/13/2016	1368
ES3DV3	SAR Probe	3/19/2015	Annual	3/19/2016	3319
D835V2	835 MHz SAR Dipole	4/13/2015	Annual	4/13/2016	4d119
D1900V2	1900 MHz SAR Dipole	4/14/2015	Annual	4/14/2016	5d141
D1750V2	1750 MHz SAR Dipole	4/15/2015	Annual	4/15/2016	1051
DAE4	Dasy Data Acquisition Electronics	4/20/2015	Annual	4/20/2016	1407
DAK-3.5	Dielectric Assessment Kit	5/12/2015	Annual	5/12/2016	1070
DAKS-3.5	Portable Dielectric Assessment Kit	7/14/2015	Annual	7/14/2016	1039
36934-158	Wall-Mounted Thermometer	4/29/2014	Biennial	4/29/2016	111859332

Notes:

1. CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, amplifier, attenuator, coupler or filter were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path. The power meter offset was then adjusted to compensate for the measurement system losses. This level offset is stored within the power meter before measurements are made. This calibration verification procedure applies to the system verification and output power measurements. The calibrated reading is then taken directly from the power meter after compensation of the losses for all final power measurements.
2. All equipment was used within the respective calibration dates.

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14 MEASUREMENT UNCERTAINTIES

Applicable for frequencies less than 3000 MHz.

a	b	c	d	e= f(d,k)	f	g	h = c x f/e	i = c x g/e	k
Uncertainty Component	IEEE 1528 Sec.	Tol. (± %)	Prob. Dist.	Div.	c _i 1gm	c _i 10 gms	1gm u _i (± %)	10gms u _i (± %)	v _i
Measurement System									
Probe Calibration	E.2.1	6.0	N	1	1.0	1.0	6.0	6.0	∞
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E.2.2	1.3	N	1	1.0	1.0	1.3	1.3	∞
Boundary Effect	E.2.3	0.4	N	1	1.0	1.0	0.4	0.4	∞
Linearity	E.2.4	0.3	N	1	1.0	1.0	0.3	0.3	∞
System Detection Limits	E.2.5	5.1	N	1	1.0	1.0	5.1	5.1	∞
Readout Electronics	E.2.6	1.0	N	1	1.0	1.0	1.0	1.0	∞
Response Time	E.2.7	0.8	R	1.73	1.0	1.0	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.73	1.0	1.0	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1.0	1.0	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1.0	1.0	0.2	0.2	∞
Probe Positioning w/ respect to Phantom	E.6.3	2.9	R	1.73	1.0	1.0	1.7	1.7	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E.5	1.0	R	1.73	1.0	1.0	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	6.0	N	1	1.0	1.0	6.0	6.0	287
Device Holder Uncertainty	E.4.1	3.32	R	1.73	1.0	1.0	1.9	1.9	∞
Output Power Variation - SAR drift measurement	6.6.2	5.0	R	1.73	1.0	1.0	2.9	2.9	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E.3.1	4.0	R	1.73	1.0	1.0	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E.3.3	3.8	N	1	0.64	0.43	2.4	1.6	6
Liquid Permittivity - deviation from target values	E.3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Liquid Permittivity - measurement uncertainty	E.3.3	4.5	N	1	0.60	0.49	2.7	2.2	6
Combined Standard Uncertainty (k=1)							RSS	12.1	11.7
Expanded Uncertainty (95% CONFIDENCE LEVEL)							k=2	24.2	23.5

The above measurement uncertainties are according to IEEE Std. 1528-2003

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15 CONCLUSION

15.1 Measurement Conclusion

The SAR evaluation indicates that the EUT complies with the RF radiation exposure limits of the FCC and Industry Canada, with respect to all parameters subject to this test. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested.

Please note that the absorption and distribution of electromagnetic energy in the body are very complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because various factors may interact with one another to vary the specific biological outcome of an exposure to electromagnetic fields, any protection guide should consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables. [3]

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APPENDIX A: SAR TEST DATA

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMT567V; Type: Portable Tablet; Serial: 31435

Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$; $\sigma = 1.007 \text{ S/m}$; $\epsilon_r = 53.577$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 0.0 cm

Test Date: 08-10-2015; Ambient Temp: 20.9°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3319; ConvF(6.07, 6.07, 6.07); Calibrated: 3/19/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1368; Calibrated: 3/13/2015

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1226

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: UMTS 850, Body SAR, Back side, Mid.ch

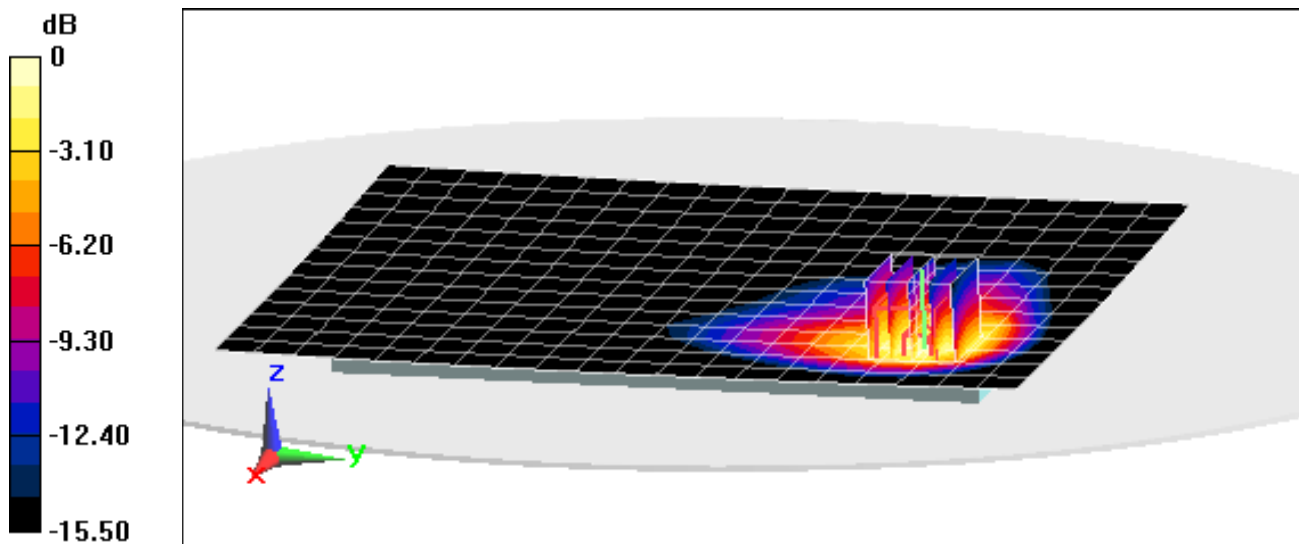
Area Scan (15x21x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 22.49 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.779 W/kg

SAR(1 g) = 0.473 W/kg



0 dB = 0.567 W/kg = -2.46 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMT567V; Type: Portable Tablet; Serial: 32136

Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.505 \text{ S/m}$; $\epsilon_r = 51.362$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 0.0 cm

Test Date: 08-12-2015; Ambient Temp: 22.7°C; Tissue Temp: 22.3°C

Probe: ES3DV3 - SN3213; ConvF(4.72, 4.72, 4.72); Calibrated: 1/20/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1407; Calibrated: 4/20/2015

Phantom: ELI Left v6.0; Type: QDOVA001BB; Serial: TP:1202

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: UMTS 1900, Body SAR, Back side, Mid.ch

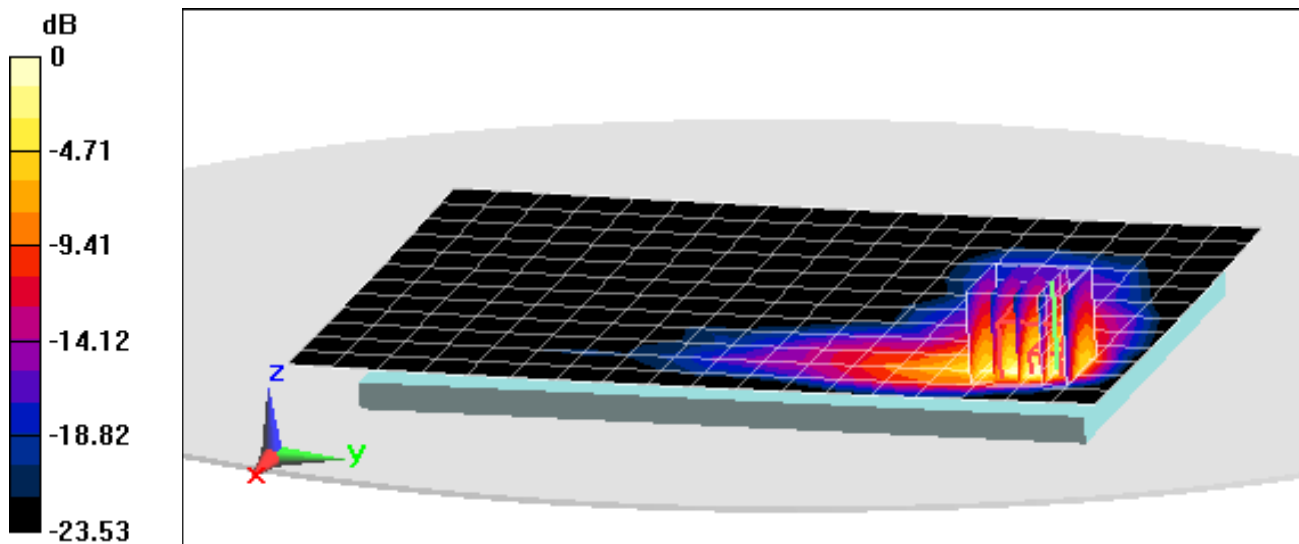
Area Scan (13x19x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 27.47 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 1.50 W/kg

SAR(1 g) = 0.701 W/kg



0 dB = 0.939 W/kg = -0.27 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMT567V; Type: Portable Tablet; Serial: 31435

Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1

Medium: 750 Body Medium parameters used (interpolated):

$f = 782 \text{ MHz}$; $\sigma = 0.995 \text{ S/m}$; $\epsilon_r = 53.976$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 0.0 cm

Test Date: 08-17-2015; Ambient Temp: 22.6°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3334; ConvF(6.09, 6.09, 6.09); Calibrated: 12/16/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1415; Calibrated: 12/12/2014

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1158

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 13, Body SAR, Back side, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

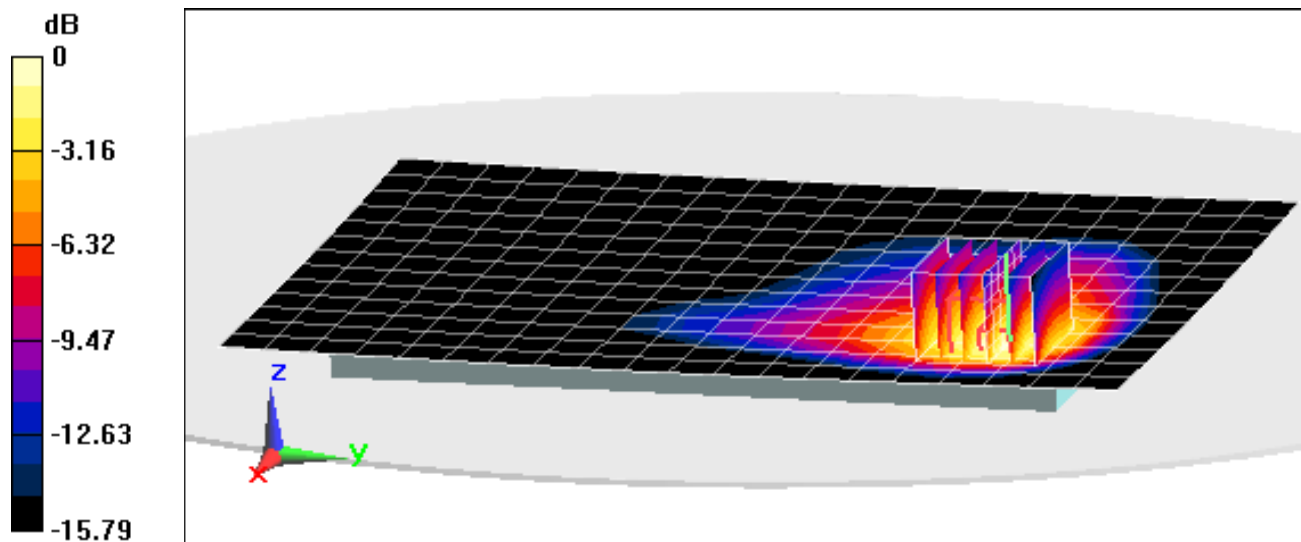
Area Scan (14x21x1): Measurement grid: dx=15mm, dy=15mm

Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 32.68 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 1.55 W/kg

SAR(1 g) = 0.995 W/kg



0 dB = 1.15 W/kg = 0.61 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMT567V; Type: Portable Tablet; Serial: 31435

Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1

Medium: 1750 Body Medium parameters used (interpolated):

$f = 1732.5 \text{ MHz}$; $\sigma = 1.459 \text{ S/m}$; $\epsilon_r = 52.607$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.7 cm

Test Date: 08-17-2015; Ambient Temp: 23.3°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3213; ConvF(4.93, 4.93, 4.93); Calibrated: 1/20/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1407; Calibrated: 4/20/2015

Phantom: ELI Left v6.0; Type: QDOVA001BB; Serial: TP:1202

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 4 (AWS), Body SAR, Top Edge, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

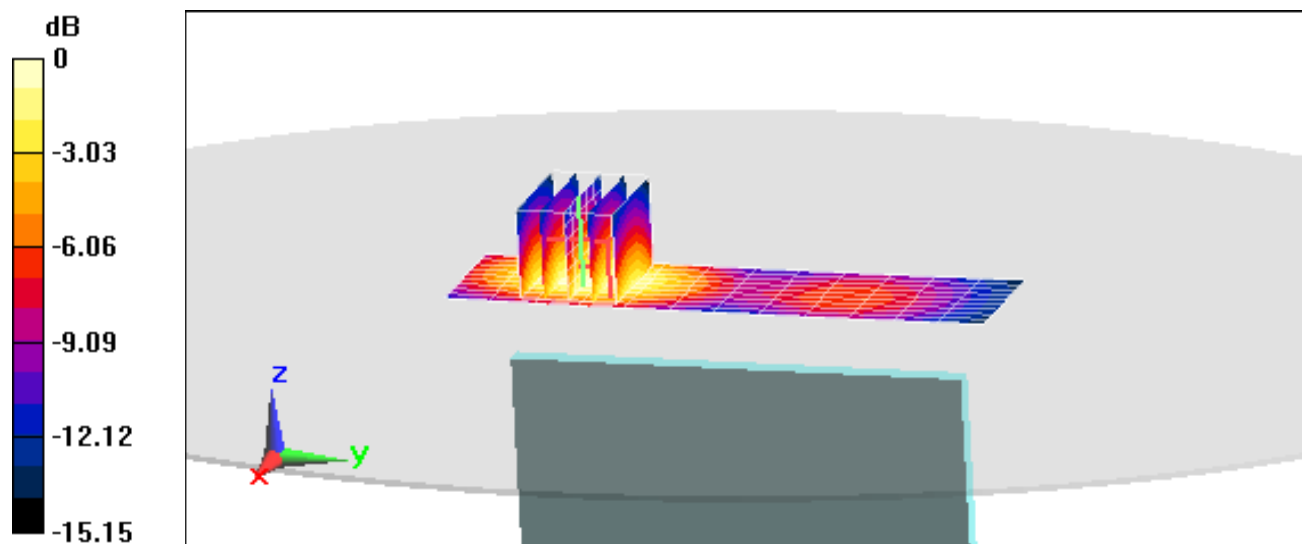
Area Scan (10x13x1): Measurement grid: dx=5mm, dy=15mm

Zoom Scan (6x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.947 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 1.63 W/kg

SAR(1 g) = 1.06 W/kg



0 dB = 1.23 W/kg = 0.90 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMT567V; Type: Portable Tablet; Serial: 32136

Communication System: UID 0, LTE Band 2 (PCS); Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.526 \text{ S/m}$; $\epsilon_r = 51.329$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.7 cm

Test Date: 08-12-2015; Ambient Temp: 22.7°C; Tissue Temp: 22.3°C

Probe: ES3DV3 - SN3213; ConvF(4.72, 4.72, 4.72); Calibrated: 1/20/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1407; Calibrated: 4/20/2015

Phantom: ELI Left v6.0; Type: QDOVA001BB; Serial: TP:1202

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 2 (PCS), Body SAR, Top Edge, High.ch,
20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset**

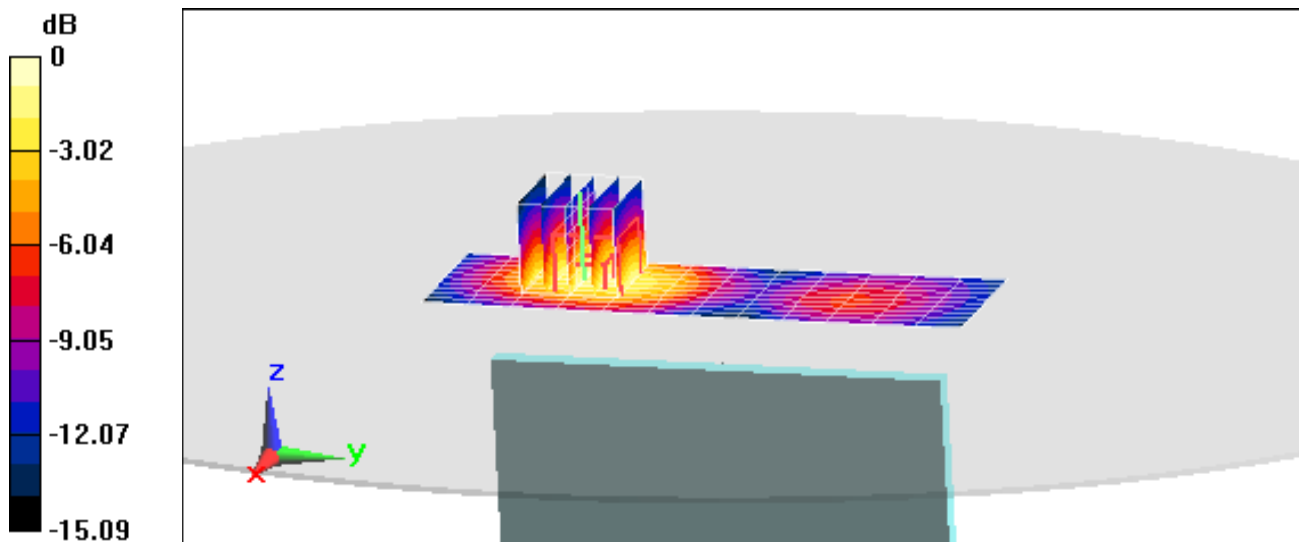
Area Scan (11x13x1): Measurement grid: dx=5mm, dy=15mm

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

Reference Value = 20.40 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.914 W/kg

SAR(1 g) = 0.574 W/kg



0 dB = 0.674 W/kg = -1.71 dBW/kg

APPENDIX B: SYSTEM VERIFICATION

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1046

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium: 750 Body Medium parameters used (interpolated):

$f = 750 \text{ MHz}$; $\sigma = 0.964 \text{ S/m}$; $\epsilon_r = 54.324$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.5 cm

Test Date: 08-17-2015; Ambient Temp: 22.6°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3334; ConvF(6.09, 6.09, 6.09); Calibrated: 12/16/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1415; Calibrated: 12/12/2014

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1158

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

750 MHz System Verification

Area Scan (7x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

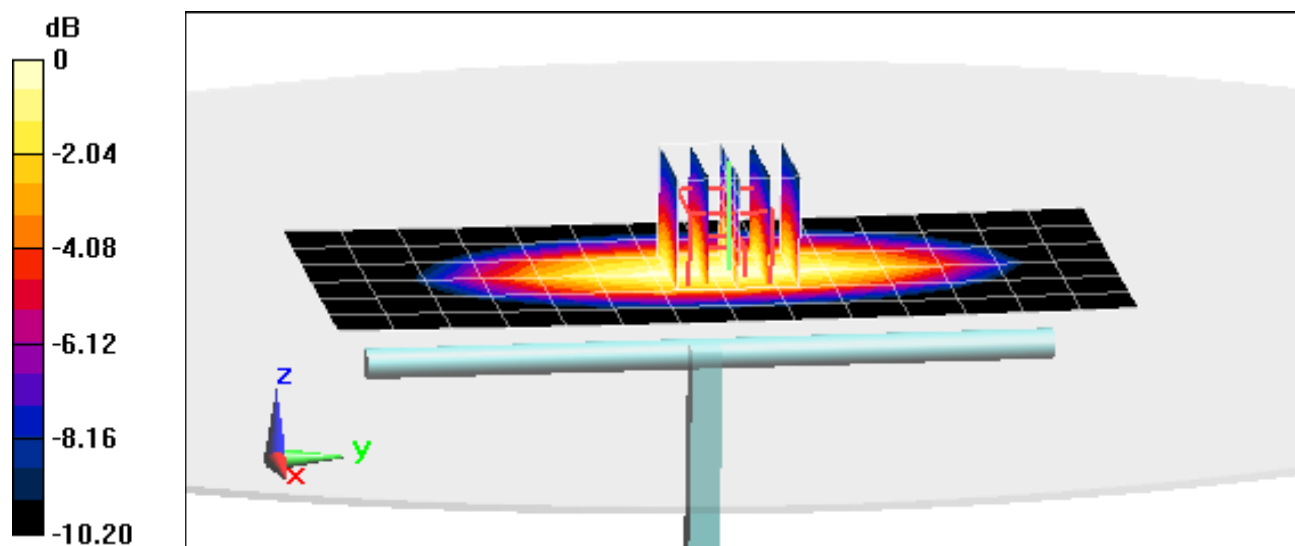
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 23 dBm (200 mW)

Peak SAR (extrapolated) = 2.60 W/kg

SAR(1 g) = 1.77 W/kg

Deviation = 6.76%



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d119

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used:

$f = 835 \text{ MHz}$; $\sigma = 1.005 \text{ S/m}$; $\epsilon_r = 53.595$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.5 cm

Test Date: 08-10-2015; Ambient Temp: 20.9°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3319; ConvF(6.07, 6.07, 6.07); Calibrated: 3/19/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1368; Calibrated: 3/13/2015

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1226

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

835 MHz System Verification

Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

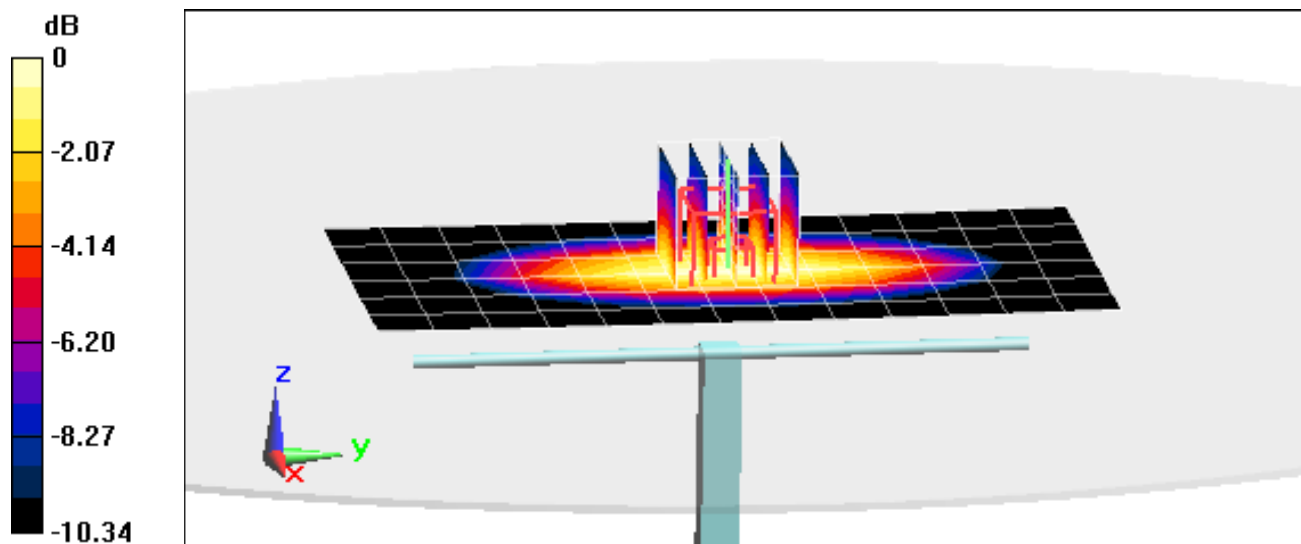
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 23 dBm (200 mW)

Peak SAR (extrapolated) = 2.84 W/kg

SAR(1 g) = 1.96 W/kg

Deviation = 6.52%



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1051

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium: 1750 Body Medium parameters used:

$f = 1750 \text{ MHz}$; $\sigma = 1.479 \text{ S/m}$; $\epsilon_r = 52.542$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-17-2015; Ambient Temp: 23.3°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3213; ConvF(4.93, 4.93, 4.93); Calibrated: 1/20/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1407; Calibrated: 4/20/2015

Phantom: ELI Left v6.0; Type: QDOVA001BB; Serial: TP:1202

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1750 MHz System Verification

Area Scan (7x9x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

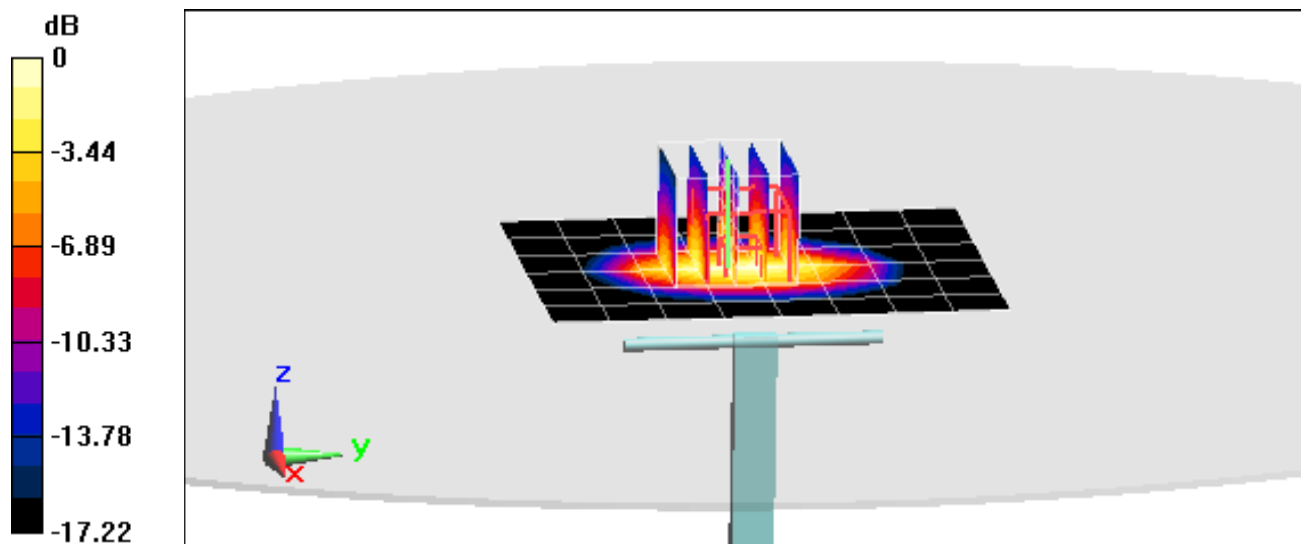
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 6.54 W/kg

SAR(1 g) = 3.71 W/kg

Deviation = 0.00%



0 dB = 4.60 W/kg = 6.63 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d141

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.526 \text{ S/m}$; $\epsilon_r = 51.329$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-12-2015; Ambient Temp: 22.7°C; Tissue Temp: 22.3°C

Probe: ES3DV3 - SN3213; ConvF(4.72, 4.72, 4.72); Calibrated: 1/20/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1407; Calibrated: 4/20/2015

Phantom: ELI Left v6.0; Type: QDOVA001BB; Serial: TP:1202

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1900 MHz System Verification

Area Scan (7x10x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

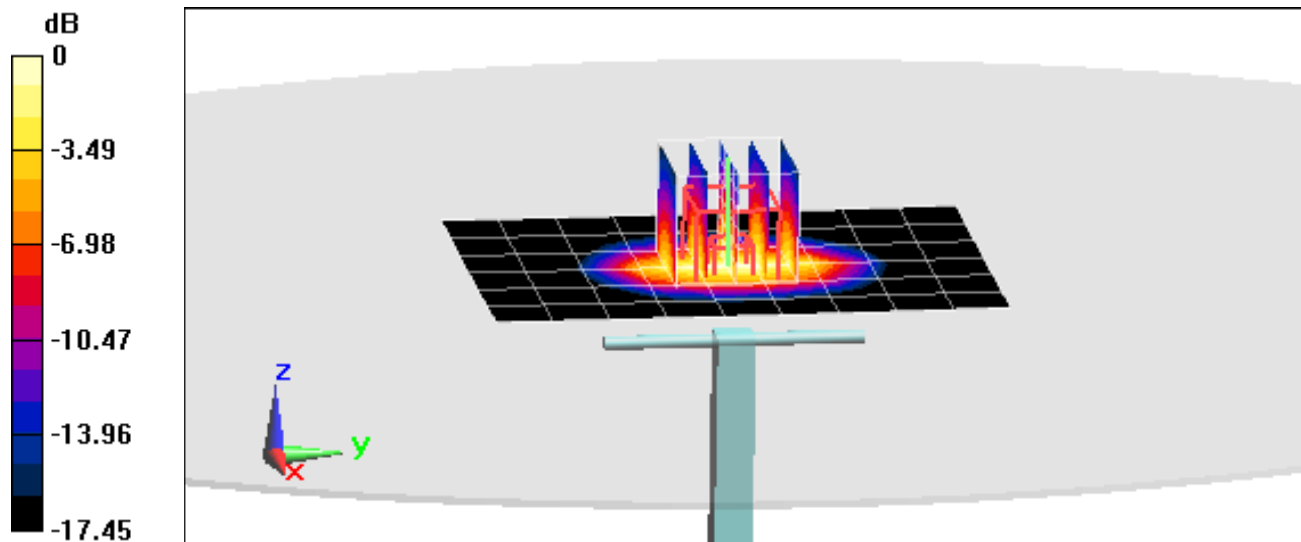
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 6.86 W/kg

SAR(1 g) = 3.81 W/kg

Deviation = -4.75%



0 dB = 4.82 W/kg = 6.83 dBW/kg

APPENDIX C: PROBE CALIBRATION



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

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D750V3-1046_Feb15**

CALIBRATION CERTIFICATE

Object **D750V3 - SN: 1046**

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

BN ✓
 3/6/2015

Calibration date: **February 19, 2015**

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 $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-14 (No. ES3-3205_Dec14)	Dec-15
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 19, 2015

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



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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
- 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	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	41.6 $\pm$ 6 %	0.90 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.03 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	8.04 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.28 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	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	53.9 $\pm$ 6 %	0.98 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.12 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	8.29 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.39 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	5.47 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$55.8 \Omega + 1.5 j\Omega$
Return Loss	- 24.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$51.4 \Omega - 1.3 j\Omega$
Return Loss	- 34.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.038 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	September 02, 2011

DASY5 Validation Report for Head TSL

Date: 18.02.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1046

Communication System: UID 0 - CW; Frequency: 750 MHz

Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.9 \text{ S/m}$; $\epsilon_r = 41.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.44, 6.44, 6.44); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head Tissue/ $P_{in}=250 \text{ mW}$, $d=15\text{mm}$ /Zoom Scan (7x7x7)/Cube 0:

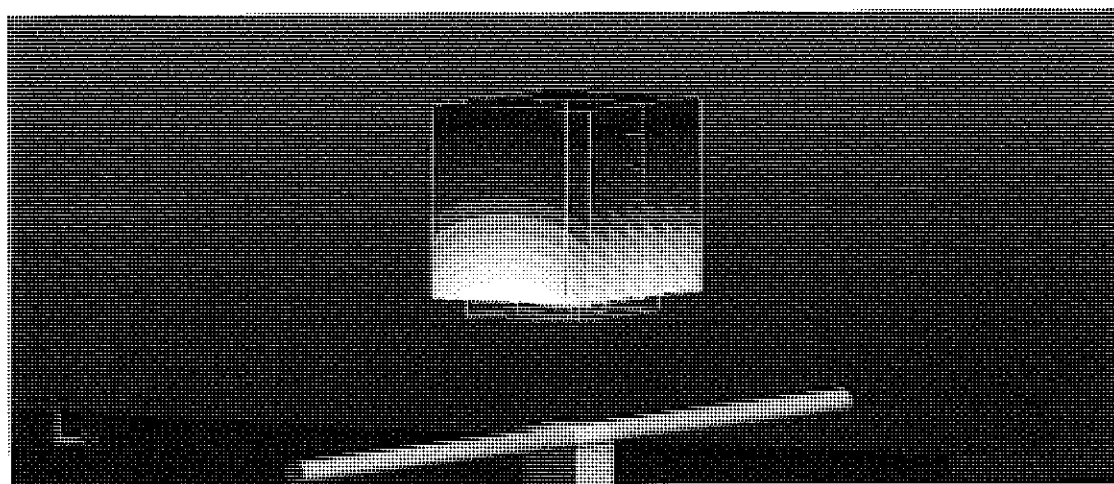
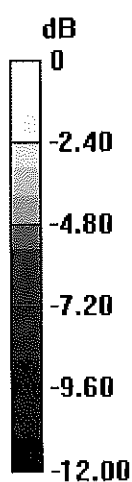
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 52.99 V/m ; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.02 W/kg

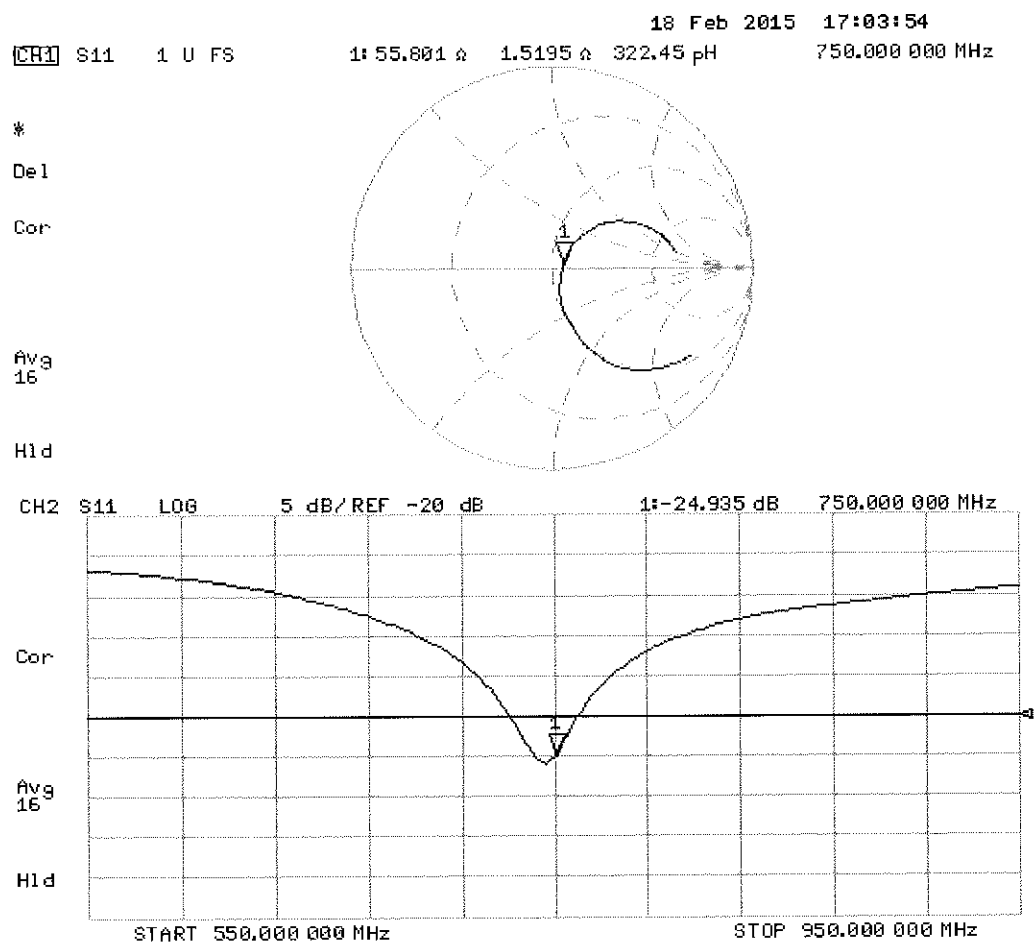
SAR(1 g) = 2.03 W/kg ; SAR(10 g) = 1.33 W/kg

Maximum value of SAR (measured) = 2.37 W/kg



0 dB = 2.37 W/kg = 3.75 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 19.02.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1046

Communication System: UID 0 - CW; Frequency: 750 MHz

Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.98 \text{ S/m}$; $\epsilon_r = 53.9$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.21, 6.21, 6.21); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Body Tissue/ $P_{in}=250 \text{ mW}$, $d=15\text{mm}$ /Zoom Scan (7x7x7)/Cube 0:

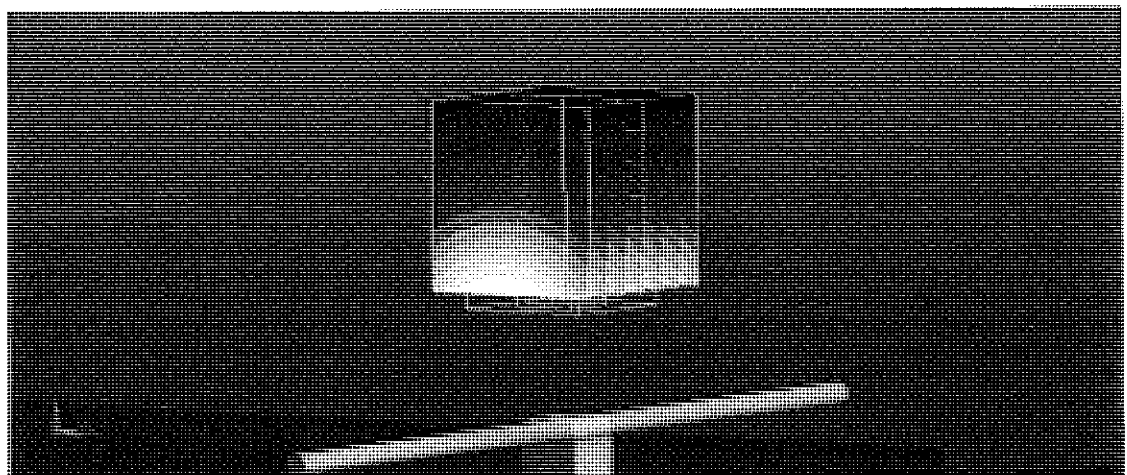
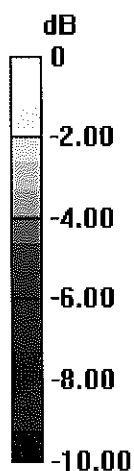
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 52.00 V/m ; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 3.10 W/kg

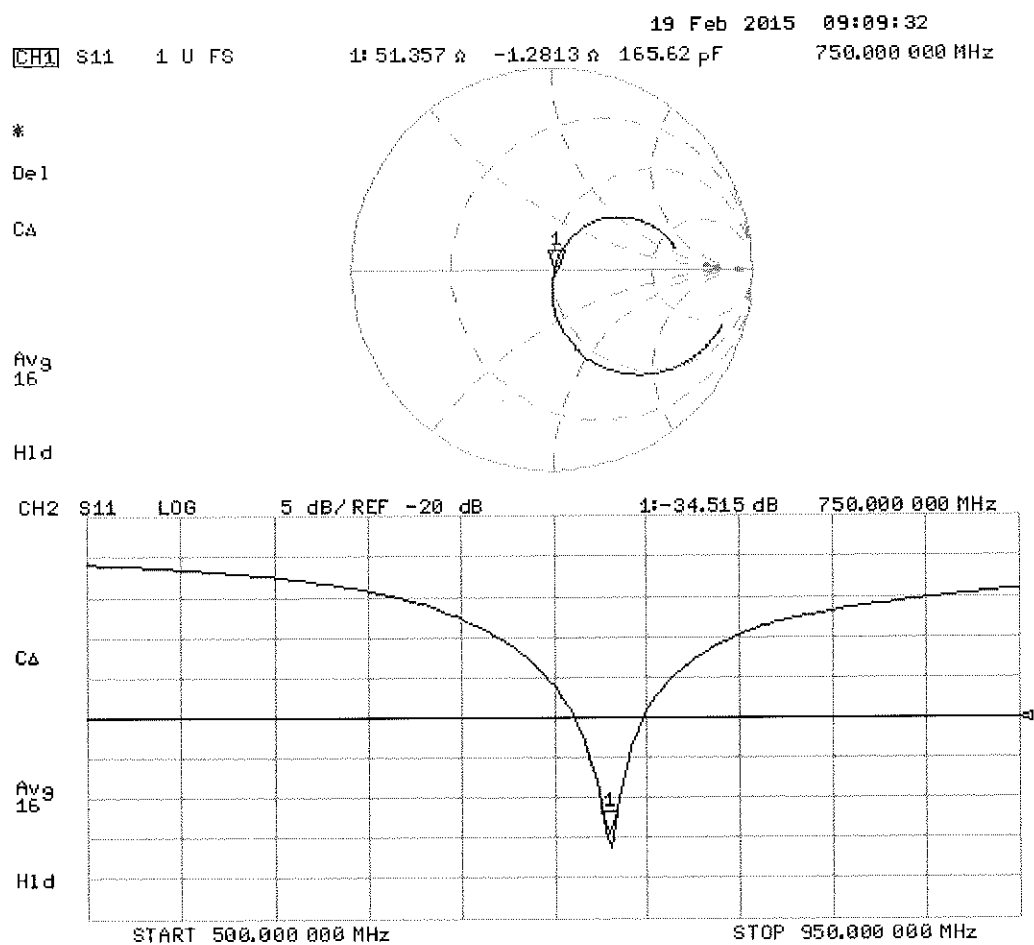
SAR(1 g) = 2.12 W/kg ; SAR(10 g) = 1.39 W/kg

Maximum value of SAR (measured) = 2.46 W/kg



0 dB = 2.46 W/kg = 3.91 dBW/kg

Impedance Measurement Plot for Body TSL





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Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D835V2-4d119_Apr15**

CALIBRATION CERTIFICATE

Object **D835V2 - SN:4d119**

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

Calibration date: **April 13, 2015**

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 EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
Reference Probe ES3DV3	SN: 3205	30-Dec-14 (No. ES3-3205_Dec14)	Dec-15
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

Calibrated by: **Israe Elnaouq** **Laboratory Technician**

Signature

Approved by: **Katja Pokovic** **Technical Manager**

Issued: April 13, 2015

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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
- 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	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	40.9 $\pm$ 6 %	0.94 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	2.43 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.38 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	1.57 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	6.11 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	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	55.4 $\pm$ 6 %	1.01 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	2.37 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	9.20 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	1.55 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	6.06 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	50.2 Ω - 2.2 j Ω
Return Loss	- 33.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.7 Ω - 4.9 j Ω
Return Loss	- 25.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.386 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 29, 2010

DASY5 Validation Report for Head TSL

Date: 13.04.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d119

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.94 \text{ S/m}$; $\epsilon_r = 40.9$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.2, 6.2, 6.2); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head Tissue/Pin=250 mW, $d=15\text{mm}$ /Zoom Scan (7x7x7)/Cube 0:

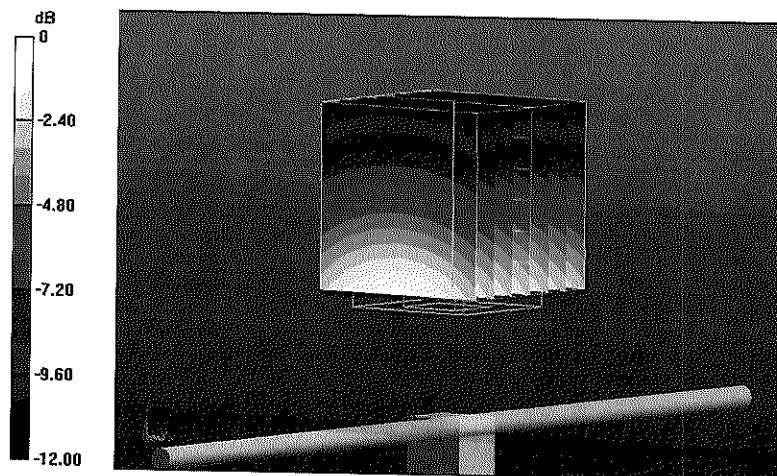
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 56.77 V/m ; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.64 W/kg

SAR(1 g) = 2.43 W/kg ; SAR(10 g) = 1.57 W/kg

Maximum value of SAR (measured) = 2.85 W/kg



0 dB = 2.85 W/kg = 4.55 dBW/kg

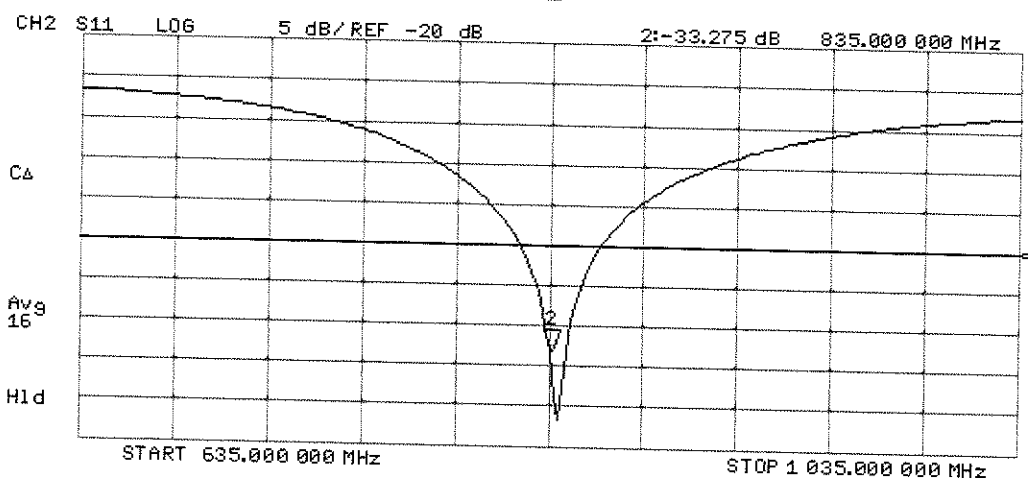
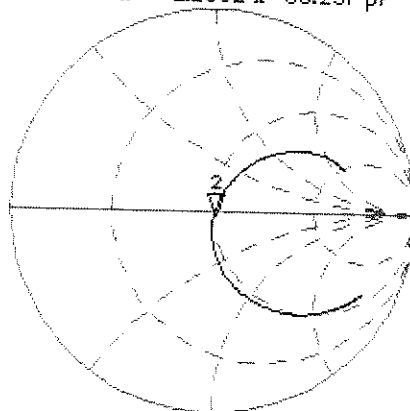
Impedance Measurement Plot for Head TSL

CH1 S11 1 U FS 13 Apr 2015 13:42:59
 2: 50.213 Ω -2.1602 Ω 88.237 pF 835.000 000 MHz

*
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 CA

Avg
 16

H1d



DASY5 Validation Report for Body TSL

Date: 13.04.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d119

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 1.01 \text{ S/m}$; $\epsilon_r = 55.4$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.17, 6.17, 6.17); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Body Tissue/Pin=250 mW, $d=15\text{mm}$ /Zoom Scan (7x7x7)/Cube 0:

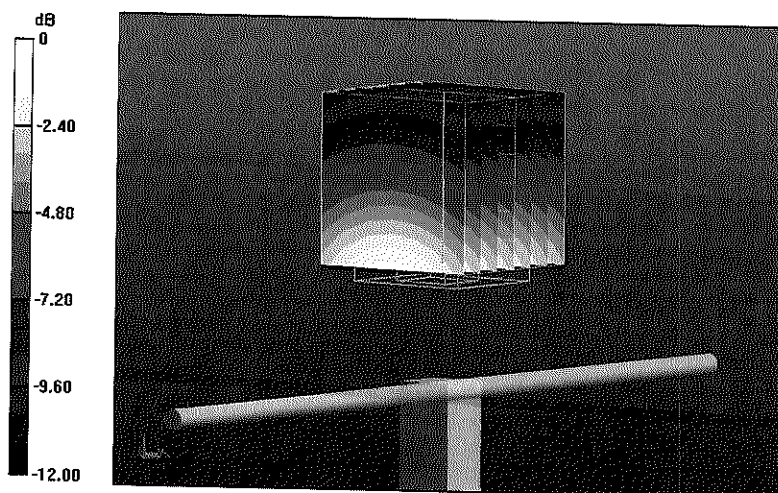
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 54.44 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 3.52 W/kg

SAR(1 g) = 2.37 W/kg; SAR(10 g) = 1.55 W/kg

Maximum value of SAR (measured) = 2.77 W/kg

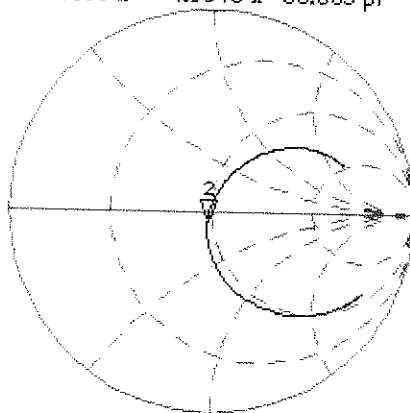


0 dB = 2.77 W/kg = 4.42 dBW/kg

Impedance Measurement Plot for Body TSL

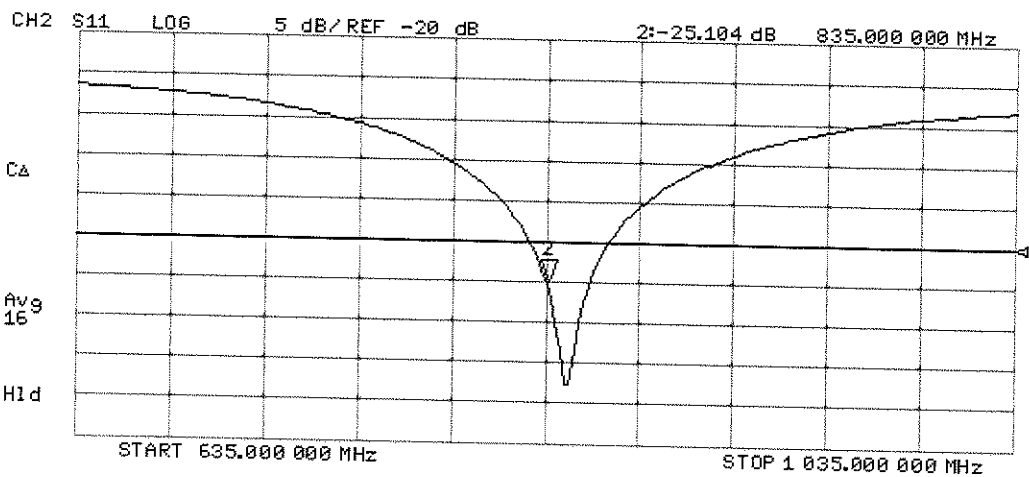
CH1 S11 1 U FS 13 Apr 2015 10:53:33
 2: 47.658 Ω -4.9043 Ω 38.865 pF 835.000 000 MHz

*
 Del
 CA



Avg
 16

H1d





Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 0108**

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 Multilateral Agreement for the recognition of calibration certificates

Client **PC Test**

Certificate No: **D1750V2-1051_Apr15**

CALIBRATION CERTIFICATE

Object **D1750V2 - SN:1051**

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

PM ✓
 4/29/15

Calibration date: **April 15, 2015**

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 $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
Reference Probe ES3DV3	SN: 3205	30-Dec-14 (No. ES3-3205_Dec14)	Dec-15
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

Calibrated by: **Jeton Kastrati** **Laboratory Technician**

Signature

Approved by: **Katja Pokovic** **Technical Manager**

Issued: April 15, 2015

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



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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
- 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	V52.8.8
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	38.9 $\pm$ 6 %	1.35 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	9.04 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	36.2 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	4.80 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	19.2 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	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	51.5 $\pm$ 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	9.32 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	37.1 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	5.01 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	20.0 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 - 0.2 j Ω
Return Loss	- 37.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.9 Ω + 0.3 j Ω
Return Loss	- 29.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.221 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	February 19, 2010

DASY5 Validation Report for Head TSL

Date: 15.04.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1051

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

Medium parameters used: $f = 1750 \text{ MHz}$; $\sigma = 1.35 \text{ S/m}$; $\epsilon_r = 38.9$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.2, 5.2, 5.2); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

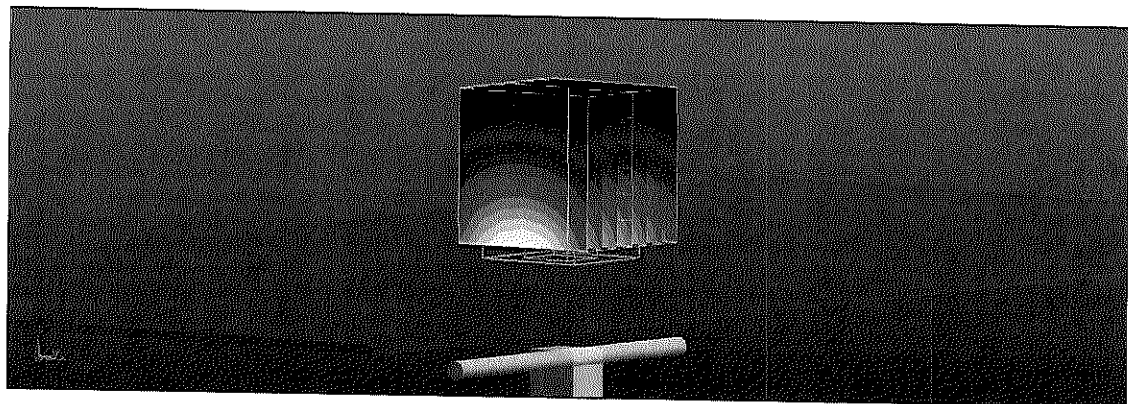
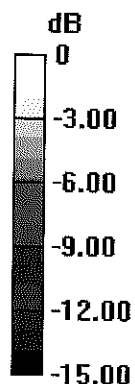
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 94.99 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 16.3 W/kg

SAR(1 g) = 9.04 W/kg; SAR(10 g) = 4.8 W/kg

Maximum value of SAR (measured) = 11.5 W/kg

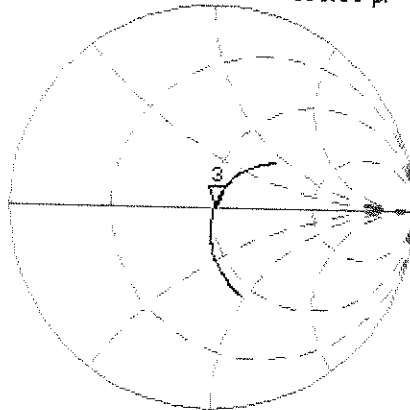


0 dB = 11.5 W/kg = 10.61 dBW/kg

Impedance Measurement Plot for Head TSL

CH1 S11 1 U FS 15 Apr 2015 12:25:31
 3: 51.330 Ω -248.05 m Ω 365.65 pF 1 750.000 000 MHz

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 C Δ



Avg
 15

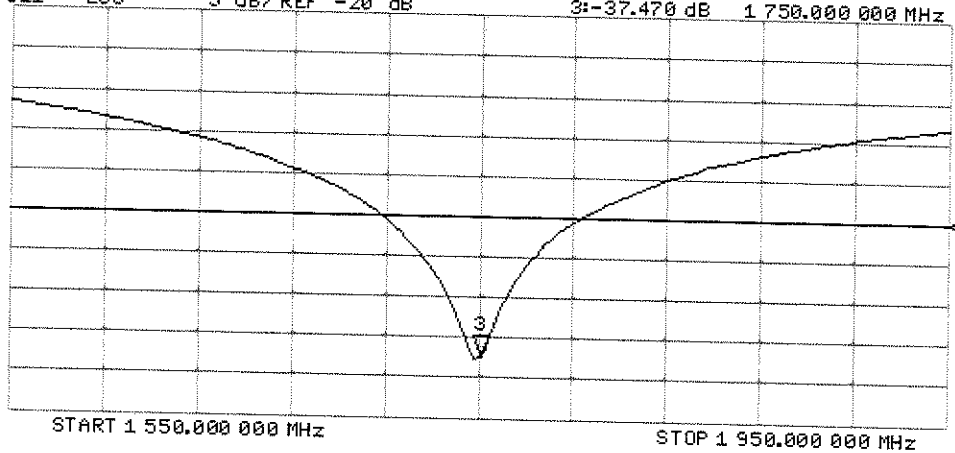
H1d

CH2 S11 LOG 5 dB/REF -20 dB 3:-37.470 dB 1 750.000 000 MHz

C Δ

Avg
 15

H1d



DASY5 Validation Report for Body TSL

Date: 15.04.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1051

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

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.48$ S/m; $\epsilon_r = 51.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.88, 4.88, 4.88); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

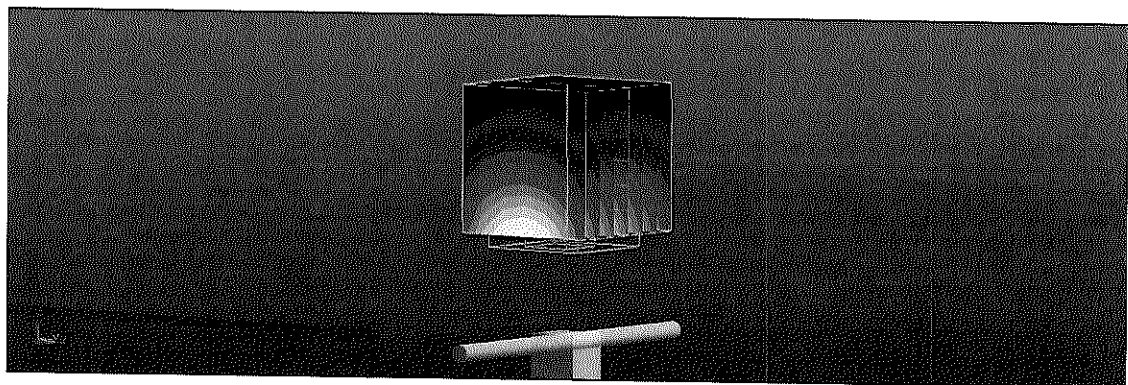
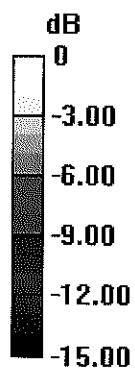
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 92.87 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 16.0 W/kg

SAR(1 g) = 9.32 W/kg; SAR(10 g) = 5.01 W/kg

Maximum value of SAR (measured) = 11.7 W/kg

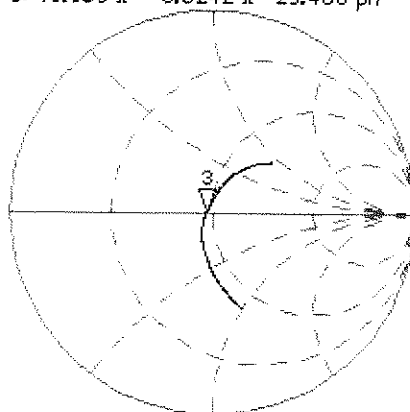


0 dB = 11.7 W/kg = 10.68 dBW/kg

Impedance Measurement Plot for Body TSL

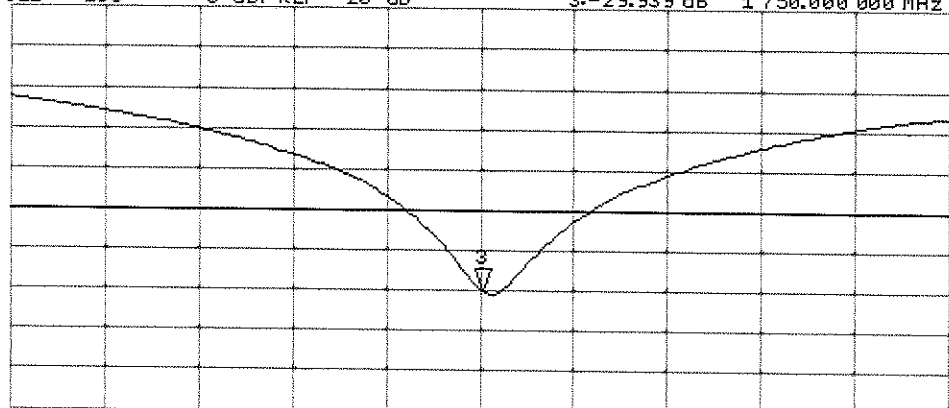
15 Apr 2015 12:23:57
 [CH1] S11 1 U FS 3: 46.930 Ω 0.3242 Ω 29.486 pH 1 750.000 000 MHz

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 Del
 Ca
 Avg
 16
 H1d



CH2 S11 LOG 5 dB/REF -20 dB 3:-29.939 dB 1 750.000 000 MHz

Ca
 Avg
 16
 H1d



START 1 550.000 000 MHz

STOP 1 950.000 000 MHz



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Accreditation No.: **SCS 0108**

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 Multilateral Agreement for the recognition of calibration certificates

Client **PC Test**

Certificate No: **D1900V2-5d141_Apr15**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN:5d141**

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

Calibration date: **April 14, 2015**

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 $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
Reference Probe ES3DV3	SN: 3205	30-Dec-14 (No. ES3-3205_Dec14)	Dec-15
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

Calibrated by: **Name** Claudio Leubler **Function** Laboratory Technician

Signature

Approved by: **Name** Katja Pokovic **Function** Technical Manager

Issued: April 14, 2015

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



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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
- 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	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	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	38.6 $\pm$ 6 %	1.37 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	9.93 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	39.9 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	5.20 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.9 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	52.8 $\pm$ 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	9.94 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	40.0 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	5.29 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	21.2 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	$53.0 \Omega + 4.6 j\Omega$
Return Loss	- 25.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$48.2 \Omega + 5.6 j\Omega$
Return Loss	- 24.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.198 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	March 11, 2011

DASY5 Validation Report for Head TSL

Date: 14.04.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d141

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

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.37$ S/m; $\epsilon_r = 38.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5, 5, 5); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

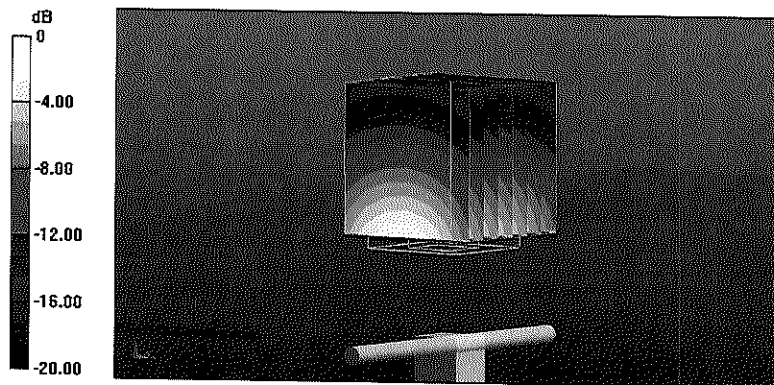
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.18 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 18.2 W/kg

SAR(1 g) = 9.93 W/kg; SAR(10 g) = 5.2 W/kg

Maximum value of SAR (measured) = 12.5 W/kg

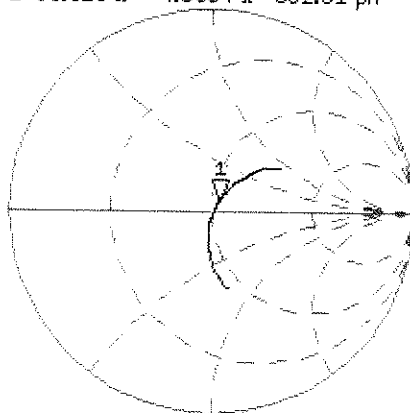


0 dB = 12.5 W/kg = 10.97 dBW/kg

Impedance Measurement Plot for Head TSL

14 Apr 2015 13:39:53
 [CH1] S11 1 U FS 1: 53.010 Ω 4.5664 Ω 382.51 pF 1 900.000 000 MHz

*
 De1
 CA



Avg
 16

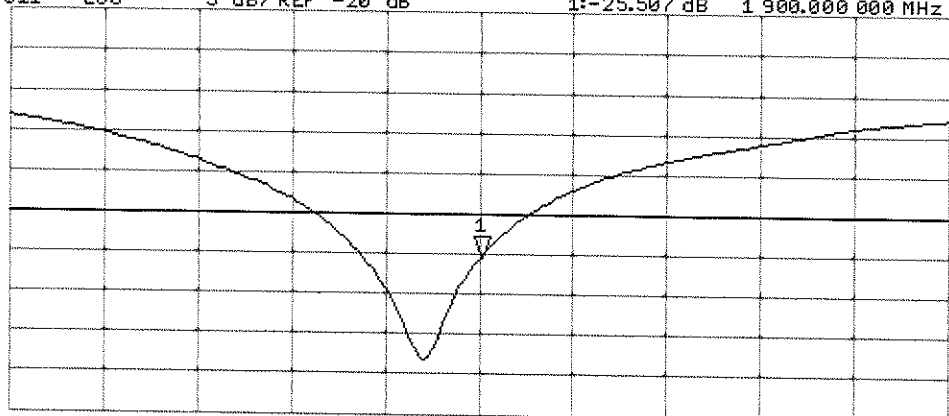
H1d

CH2 S11 LOG 5 dB/REF -20 dB 1:-25.507 dB 1 900.000 000 MHz

CA

Avg
 16

H1d



START 1 700.000 000 MHz

STOP 2 100.000 000 MHz

DASY5 Validation Report for Body TSL

Date: 14.04.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d141

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

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.5$ S/m; $\epsilon_r = 52.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.65, 4.65, 4.65); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

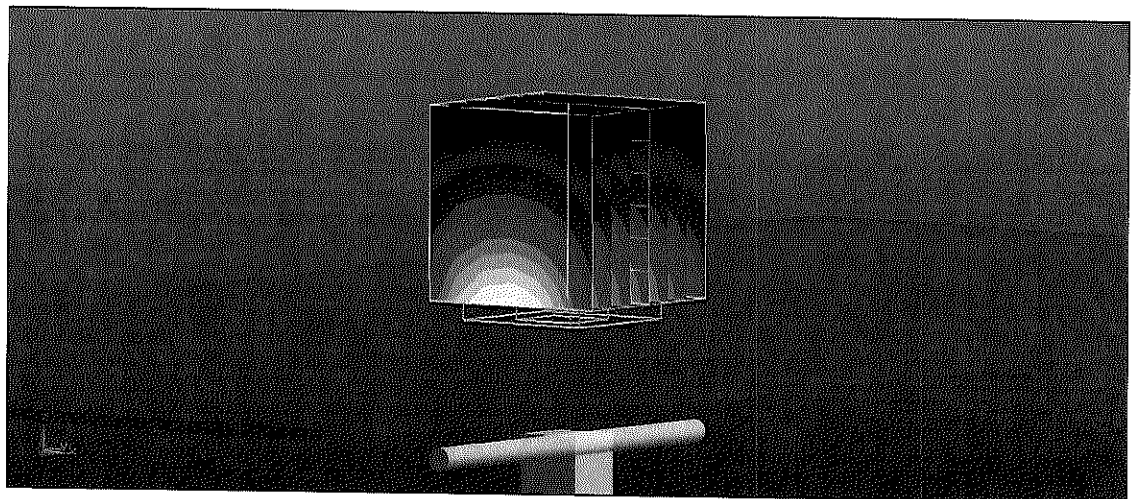
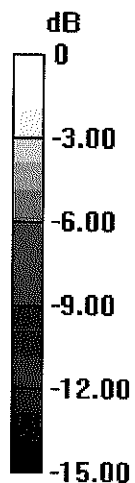
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.73 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 16.9 W/kg

SAR(1 g) = 9.94 W/kg; SAR(10 g) = 5.29 W/kg

Maximum value of SAR (measured) = 12.5 W/kg

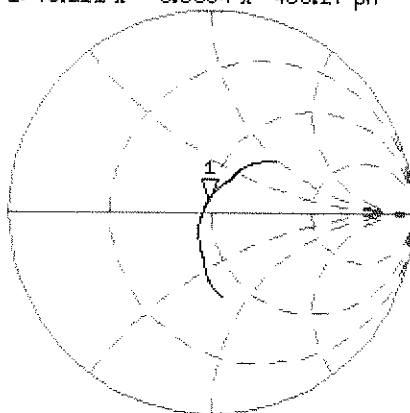


0 dB = 12.5 W/kg = 10.97 dBW/kg

Impedance Measurement Plot for Body TSL

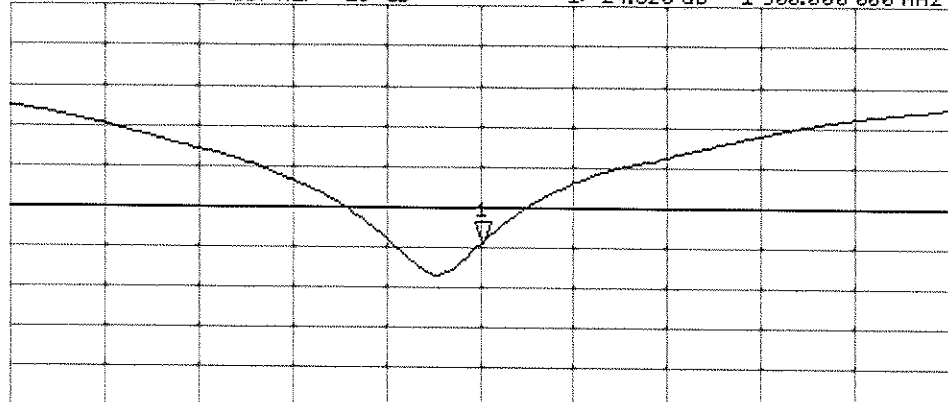
14 Apr 2015 13:39:04
 CH1 S11 1 U FS 1: 48.211 Ω 5.5664 Ω 466.27 pF 1 900.000 000 MHz

*
 Del
 CA
 Avg
 16
 H1d



CH2 S11 LOG 5 dB/REF -20 dB 1:-24,520 dB 1 900.000 000 MHz

CA
 Avg
 16
 H1d



START 1 700.000 000 MHz

STOP 2 100.000 000 MHz

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



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

Accredited by the Swiss Accreditation Service (SAS)
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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **ES3-3334_Dec14**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3334**

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

CC
 12/31/14

Calibration date: **December 16, 2014**

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 E4419B	GB41293874	03-Apr-14 (No. 217-01911)	Apr-15
Power sensor E4412A	MY41498087	03-Apr-14 (No. 217-01911)	Apr-15
Reference 3 dB Attenuator	SN: S5054 (3c)	03-Apr-14 (No. 217-01915)	Apr-15
Reference 20 dB Attenuator	SN: S5277 (20x)	03-Apr-14 (No. 217-01919)	Apr-15
Reference 30 dB Attenuator	SN: S5129 (30b)	03-Apr-14 (No. 217-01920)	Apr-15
Reference Probe ES3DV2	SN: 3013	30-Dec-13 (No. ES3-3013_Dec13)	Dec-14
DAE4	SN: 789	30-Apr-14 (No. DAE4-789_Apr14)	Apr-15
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

Calibrated by:	Name Lelf Klysner	Function Laboratory Technician	Signature
Approved by:	Katja Pokovic	Technical Manager	
Issued: December 16, 2014			

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



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

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., $\vartheta = 0$ 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, "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

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ 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).

Probe ES3DV3

SN:3334

Manufactured:	January 24, 2012
Repaired:	December 9, 2014
Calibrated:	December 16, 2014

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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3334

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	1.04	1.05	1.01	$\pm 10.1 \%$
DCP (mV) ^B	106.5	105.0	105.6	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	188.0	$\pm 3.0 \%$
		Y	0.0	0.0	1.0		183.2	
		Z	0.0	0.0	1.0		181.8	
10010-CAA	SAR Validation (Square, 100ms, 10ms)	X	4.61	67.2	13.7	10.00	38.4	$\pm 1.4 \%$
		Y	20.36	82.7	18.7		38.0	
		Z	17.55	80.3	17.6		37.0	
10011-CAB	UMTS-FDD (WCDMA)	X	3.56	68.4	19.1	2.91	148.4	$\pm 0.7 \%$
		Y	3.44	68.1	19.2		146.9	
		Z	3.52	68.3	19.1		144.7	
10012-CAB	IEEE 802.11b WIFI 2.4 GHz (DSSS, 1 Mbps)	X	3.54	71.9	20.0	1.87	148.0	$\pm 0.7 \%$
		Y	3.51	72.2	20.5		148.9	
		Z	3.80	73.3	20.6		144.6	
10013-CAB	IEEE 802.11g WIFI 2.4 GHz (DSSS-OFDM, 6 Mbps)	X	11.39	71.1	23.3	9.46	149.8	$\pm 3.8 \%$
		Y	11.54	71.8	24.0		149.5	
		Z	11.11	70.5	23.0		141.6	
10021-DAB	GSM-FDD (TDMA, GMSK)	X	15.29	91.3	25.0	9.39	131.9	$\pm 1.7 \%$
		Y	24.16	100.0	28.4		142.8	
		Z	13.05	89.2	24.5		126.5	
10023-DAB	GPRS-FDD (TDMA, GMSK, TN 0)	X	16.07	91.7	25.1	9.57	144.0	$\pm 2.2 \%$
		Y	19.00	95.3	26.8		136.4	
		Z	13.93	89.8	24.6		141.0	
10024-DAB	GPRS-FDD (TDMA, GMSK, TN 0-1)	X	19.98	91.0	22.4	6.56	134.2	$\pm 1.9 \%$
		Y	34.78	99.7	25.5		145.0	
		Z	29.89	96.8	24.1		129.8	
10027-DAB	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	X	56.30	99.7	22.8	4.80	125.2	$\pm 1.9 \%$
		Y	41.16	99.6	23.9		131.2	
		Z	50.78	99.8	23.1		147.6	
10028-DAB	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	X	49.35	99.7	22.5	3.55	133.2	$\pm 2.2 \%$
		Y	46.49	99.6	22.9		139.2	
		Z	58.21	99.7	22.0		129.4	
10032-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	X	56.54	100.0	20.2	1.16	128.0	$\pm 1.7 \%$
		Y	20.03	99.3	22.4		130.3	
		Z	84.01	100.0	19.4		141.0	
10100-CAB	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	6.44	67.6	19.6	5.67	138.5	$\pm 1.4 \%$
		Y	6.50	67.9	20.0		142.1	
		Z	6.31	67.2	19.4		129.4	

10103-CAB	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	9.77	73.6	24.6	9.29	129.6	±3.3 %
		Y	10.52	76.0	26.3		132.1	
		Z	10.21	75.0	25.4		147.7	
10108-CAC	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	6.36	67.2	19.6	5.80	136.8	±1.4 %
		Y	6.31	67.3	19.8		137.2	
		Z	6.20	66.7	19.3		128.8	
10117-CAB	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	X	9.96	68.3	20.8	8.07	126.5	±2.5 %
		Y	10.12	68.8	21.3		126.6	
		Z	10.22	69.0	21.2		143.7	
10151-CAB	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	9.29	73.0	24.4	9.28	125.3	±3.3 %
		Y	9.65	74.5	25.6		124.4	
		Z	9.65	74.3	25.2		141.1	
10154-CAC	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	6.03	66.7	19.3	5.75	132.7	±1.4 %
		Y	5.97	66.7	19.5		132.7	
		Z	6.17	67.3	19.7		148.3	
10160-CAB	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	X	6.47	67.2	19.5	5.82	138.1	±1.4 %
		Y	6.44	67.3	19.8		138.2	
		Z	6.27	66.6	19.2		126.8	
10169-CAB	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	5.03	66.9	19.6	5.73	137.2	±1.2 %
		Y	4.97	67.0	19.9		135.7	
		Z	4.91	66.5	19.5		127.1	
10172-CAB	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	8.53	77.4	26.9	9.21	142.4	±2.7 %
		Y	9.59	81.3	29.3		142.3	
		Z	7.78	75.0	25.7		126.7	
10175-CAC	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	5.02	67.0	19.7	5.72	131.8	±1.2 %
		Y	4.98	67.0	19.9		136.1	
		Z	4.95	66.8	19.6		128.1	
10181-CAB	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	4.99	66.8	19.6	5.72	131.2	±1.2 %
		Y	4.99	67.1	20.0		136.2	
		Z	4.92	66.6	19.5		127.9	
10196-CAB	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	X	9.98	68.8	21.2	8.10	141.7	±2.5 %
		Y	10.14	69.5	21.8		147.2	
		Z	9.85	68.6	21.1		137.5	
10225-CAB	UMTS-FDD (HSPA+)	X	7.17	67.5	19.6	5.97	146.0	±1.4 %
		Y	7.13	67.7	19.9		149.9	
		Z	7.12	67.5	19.6		142.9	
10237-CAB	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	8.29	76.6	26.5	9.21	136.1	±2.7 %
		Y	9.60	81.4	29.3		142.3	
		Z	7.98	75.8	26.1		132.9	
10252-CAB	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	9.27	74.1	25.1	9.24	139.1	±3.3 %
		Y	10.25	77.5	27.4		146.3	
		Z	9.07	73.7	25.0		135.8	
10267-CAB	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	9.95	74.9	25.4	9.30	147.0	±3.3 %
		Y	9.80	75.0	25.9		125.9	
		Z	9.74	74.6	25.4		143.8	

10275-CAB	UMTS-FDD (HSUPA, Sublest 5, 3GPP Rel8.4)	X	4.63	67.6	19.0	3.96	147.5	±0.7 %
		Y	4.41	66.9	18.9		129.5	
		Z	4.61	67.6	19.1		148.1	
10291-AAB	CDMA2000, RC3, SO55, Full Rate	X	3.83	67.7	19.0	3.46	133.7	±0.7 %
		Y	3.71	67.4	19.0		139.0	
		Z	3.86	68.1	19.2		133.7	
10292-AAB	CDMA2000, RC3, SO32, Full Rate	X	3.85	68.2	19.2	3.39	136.7	±0.5 %
		Y	3.67	67.5	19.1		141.3	
		Z	3.75	67.8	19.0		136.2	
10297-AAA	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	6.31	67.1	19.5	5.81	130.6	±1.4 %
		Y	6.32	67.3	19.8		135.1	
		Z	6.24	66.9	19.4		129.2	
10311-AAA	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	X	6.85	67.5	19.8	6.06	135.1	±1.4 %
		Y	6.90	67.9	20.2		141.5	
		Z	6.82	67.5	19.8		135.1	
10403-AAB	CDMA2000 (1xEV-DO, Rev. 0)	X	5.04	69.1	19.1	3.76	126.0	±0.5 %
		Y	4.90	69.0	19.3		129.6	
		Z	5.11	69.7	19.4		125.8	
10404-AAB	CDMA2000 (1xEV-DO, Rev. A)	X	5.05	69.6	19.4	3.77	147.1	±0.7 %
		Y	4.84	69.2	19.5		127.8	
		Z	5.15	70.1	19.6		143.3	
10415-AAA	IEEE 802.11b WIFI 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)	X	3.13	71.2	19.9	1.54	144.5	±0.5 %
		Y	2.93	70.4	19.9		149.8	
		Z	3.18	71.6	20.1		141.4	
10416-AAA	IEEE 802.11g WIFI 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle)	X	10.11	69.0	21.4	8.23	144.3	±2.5 %
		Y	10.21	69.6	21.9		148.3	
		Z	9.99	68.9	21.3		141.1	

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 NormX,Y,Z do not affect the E^2 -field uncertainty inside TSL (see Pages 7 and 8).

^B Numerical linearization parameter: uncertainty not required.

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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3334

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^c	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unct. (k=2)
750	41.9	0.89	6.51	6.51	6.51	0.80	1.17	± 12.0 %
835	41.5	0.90	6.25	6.25	6.25	0.38	1.58	± 12.0 %
1750	40.1	1.37	5.21	5.21	5.21	0.43	1.63	± 12.0 %
1900	40.0	1.40	5.03	5.03	5.03	0.53	1.45	± 12.0 %
2450	39.2	1.80	4.51	4.51	4.51	0.80	1.26	± 12.0 %
2600	39.0	1.96	4.31	4.31	4.31	0.79	1.27	± 12.0 %

^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.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3334

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 ^d (mm)	Unct. (k=2)
750	55.5	0.96	6.09	6.09	6.09	0.49	1.47	± 12.0 %
835	55.2	0.97	6.14	6.14	6.14	0.69	1.27	± 12.0 %
1750	53.4	1.49	4.94	4.94	4.94	0.80	1.24	± 12.0 %
1900	53.3	1.52	4.73	4.73	4.73	0.62	1.44	± 12.0 %
2450	52.7	1.95	4.28	4.28	4.28	0.80	1.13	± 12.0 %
2600	52.5	2.16	4.16	4.16	4.16	0.75	1.25	± 12.0 %

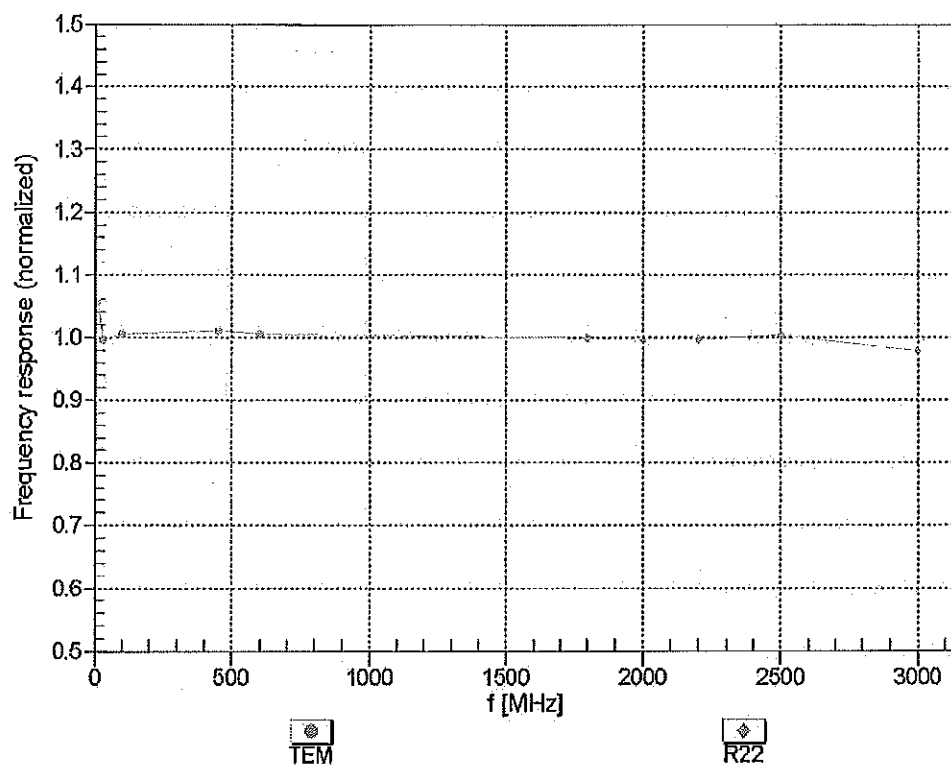
^c Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 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.

Frequency Response of E-Field

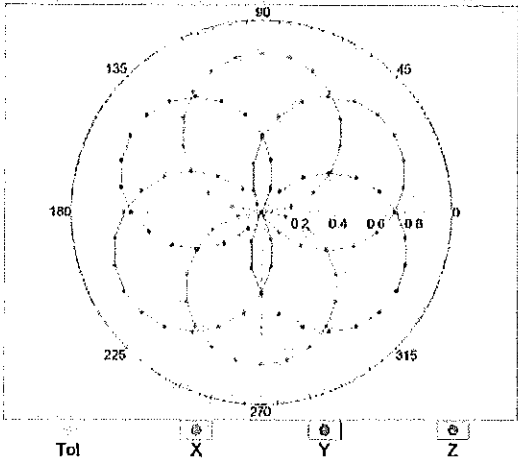
(TEM-Cell: Ifi110 EXX, Waveguide: R22)



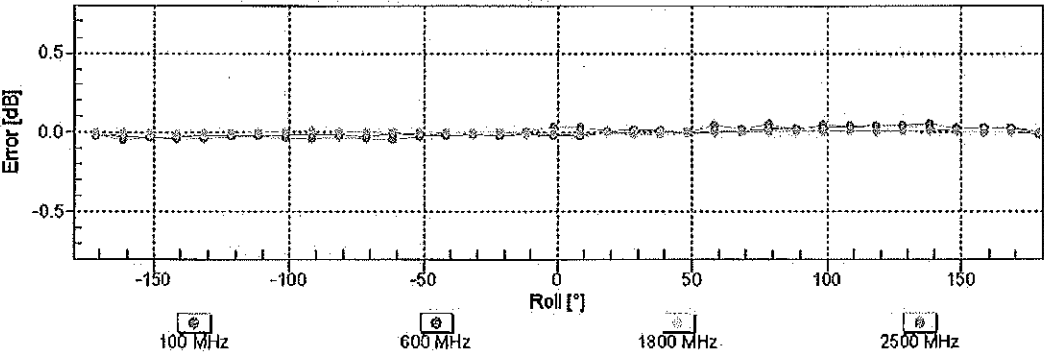
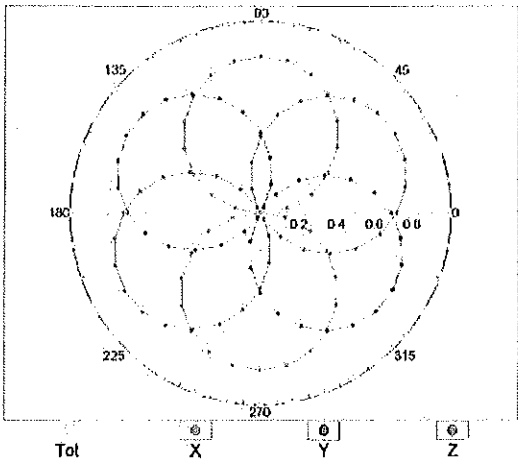
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

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

f=600 MHz,TEM

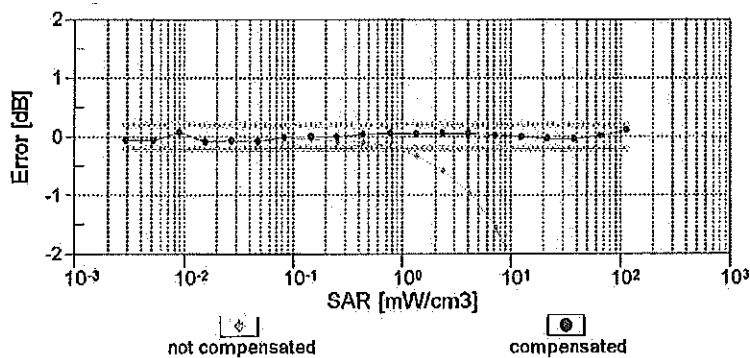
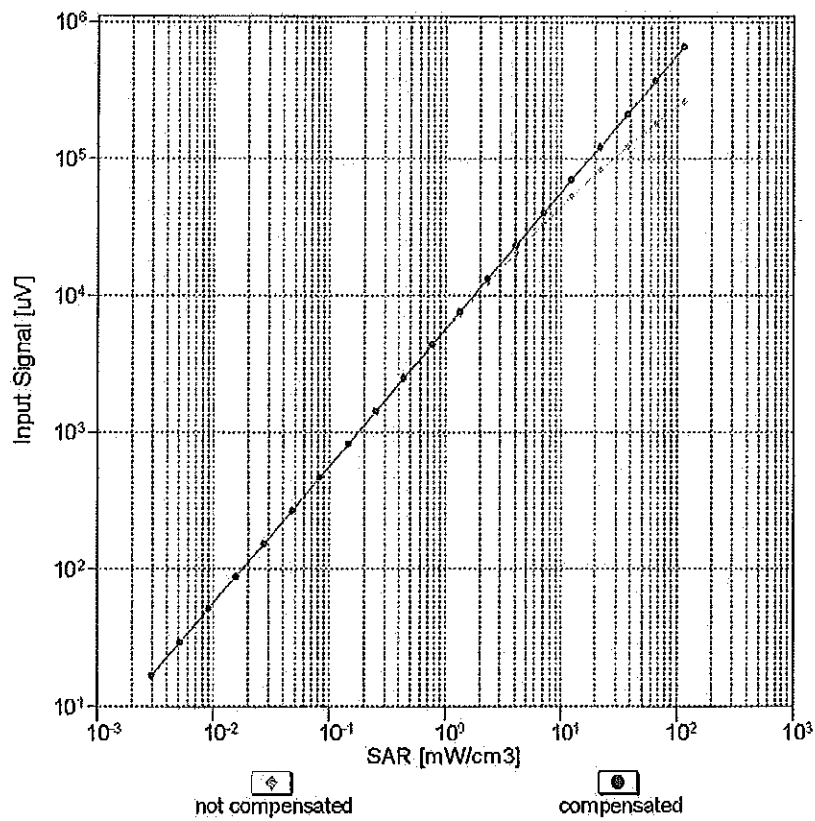


f=1800 MHz,R22



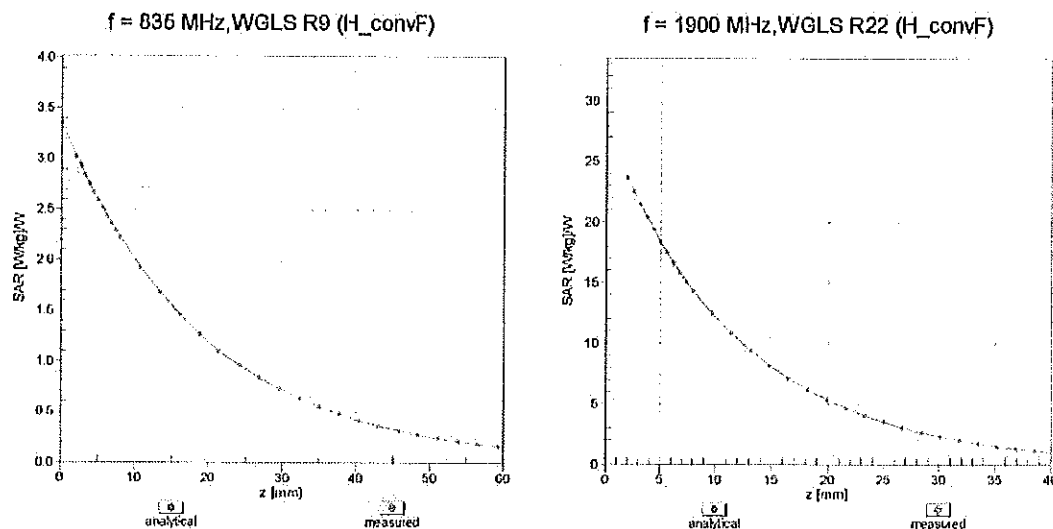
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

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



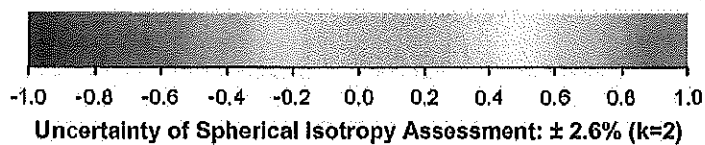
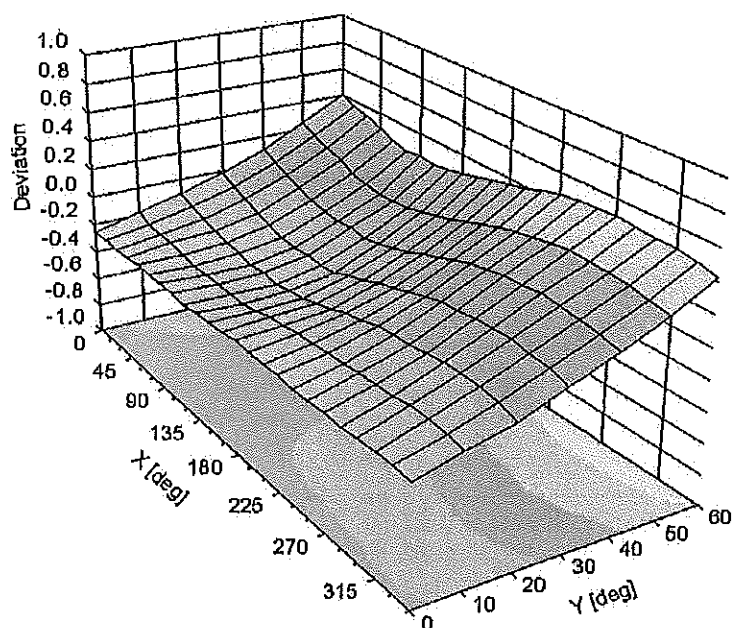
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ , θ), $f = 900 \text{ MHz}$



DASY/EASY - Parameters of Probe: ES3DV3 - SN:3334**Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle (°)	18.5
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm



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

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **ES3-3319_Mar15**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3319**

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

Calibration date: **March 19, 2015**

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 E4419B	GB41293874	03-Apr-14 (No. 217-01911)	Apr-15
Power sensor E4412A	MY41498087	03-Apr-14 (No. 217-01911)	Apr-15
Reference 3 dB Attenuator	SN: S5054 (3c)	03-Apr-14 (No. 217-01915)	Apr-15
Reference 20 dB Attenuator	SN: S5277 (20x)	03-Apr-14 (No. 217-01919)	Apr-15
Reference 30 dB Attenuator	SN: S5129 (30b)	03-Apr-14 (No. 217-01920)	Apr-15
Reference Probe ES3DV2	SN: 3013	30-Dec-14 (No. ES3-3013_Dec14)	Dec-15
DAE4	SN: 660	14-Jan-15 (No. DAE4-660_Jan15)	Jan-16
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

Calibrated by:	Name Israe Elnaouq	Function Laboratory Technician	Signature
Approved by:	Katja Pokovic	Technical Manager	

Issued: March 19, 2015

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



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 0108**

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 Multilateral Agreement for the recognition of calibration certificates

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., $\vartheta = 0$ 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, "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

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ 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).

Probe ES3DV3

SN:3319

Manufactured: January 10, 2012
Calibrated: March 19, 2015

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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3319

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$) ^A	1.12	1.08	1.15	$\pm 10.1 \%$
DCP (mV) ^B	104.4	106.0	104.4	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu V}$	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	176.1	$\pm 3.3 \%$
		Y	0.0	0.0	1.0		192.7	
		Z	0.0	0.0	1.0		174.6	
10010-CAA	SAR Validation (Square, 100ms, 10ms)	X	3.26	64.8	13.4	10.00	41.7	$\pm 1.9 \%$
		Y	2.66	62.2	11.7		39.5	
		Z	3.51	64.8	13.2		42.1	
10011-CAB	UMTS-FDD (WCDMA)	X	3.47	68.1	19.1	2.91	142.9	$\pm 0.5 \%$
		Y	3.37	67.9	19.1		133.0	
		Z	3.57	68.7	19.4		138.6	
10012-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	X	3.48	71.8	20.2	1.87	143.9	$\pm 0.7 \%$
		Y	3.23	70.9	19.9		134.6	
		Z	3.68	72.8	20.6		140.5	
10013-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	X	11.18	70.5	23.1	9.46	143.4	$\pm 3.3 \%$
		Y	10.98	70.5	23.2		129.9	
		Z	11.19	70.6	23.1		138.8	
10021-DAB	GSM-FDD (TDMA, GMSK)	X	15.55	92.7	26.1	9.39	126.5	$\pm 1.7 \%$
		Y	21.21	98.0	27.2		142.0	
		Z	19.50	96.1	27.0		125.4	
10023-DAB	GPRS-FDD (TDMA, GMSK, TN 0)	X	23.54	100.0	28.4	9.57	142.6	$\pm 2.2 \%$
		Y	23.24	99.9	28.0		137.4	
		Z	23.57	99.6	28.2		139.7	
10024-DAB	GPRS-FDD (TDMA, GMSK, TN 0-1)	X	17.00	90.2	22.7	6.56	128.9	$\pm 2.2 \%$
		Y	35.20	99.7	24.9		148.2	
		Z	33.12	99.6	25.4		123.8	
10027-DAB	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	X	44.20	99.6	23.6	4.80	146.0	$\pm 1.9 \%$
		Y	49.99	99.9	23.0		136.6	
		Z	41.43	99.6	23.9		141.4	
10028-DAB	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	X	46.56	99.7	22.7	3.55	127.7	$\pm 2.2 \%$
		Y	58.11	99.8	21.9		145.3	
		Z	55.65	99.6	22.2		124.3	
10032-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	X	34.25	99.4	21.1	1.16	140.3	$\pm 1.7 \%$
		Y	40.72	100.0	20.6		135.7	
		Z	45.39	100.0	20.8		136.4	
10100-CAB	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	6.30	67.1	19.5	5.67	127.4	$\pm 1.4 \%$
		Y	6.58	68.4	20.3		149.0	
		Z	6.55	68.0	19.9		146.3	

10103-CAB	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	10.47	75.6	25.8	9.29	146.6	±3.0 %
		Y	10.18	75.8	26.3		136.2	
		Z	10.38	75.3	25.6		140.8	
10108-CAC	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	6.18	66.6	19.4	5.80	126.9	±1.4 %
		Y	6.40	67.8	20.1		147.0	
		Z	6.44	67.6	19.9		145.7	
10117-CAB	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	X	10.24	69.0	21.3	8.07	142.7	±2.5 %
		Y	10.25	69.2	21.5		136.7	
		Z	10.16	68.8	21.2		136.6	
10151-CAB	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	9.85	74.8	25.6	9.28	140.8	±3.0 %
		Y	9.49	74.7	25.9		130.5	
		Z	9.90	74.8	25.6		136.8	
10154-CAC	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	6.13	67.1	19.7	5.75	146.6	±1.4 %
		Y	6.11	67.4	19.9		147.7	
		Z	6.12	67.1	19.7		142.3	
10160-CAB	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	X	6.33	66.7	19.4	5.82	128.9	±1.4 %
		Y	6.33	67.1	19.7		128.7	
		Z	6.57	67.6	19.9		147.4	
10169-CAB	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	4.89	66.4	19.5	5.73	127.5	±1.2 %
		Y	4.99	67.5	20.2		149.3	
		Z	5.09	67.3	20.0		145.1	
10172-CAB	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	7.99	75.8	26.3	9.21	127.6	±2.7 %
		Y	9.29	81.7	29.6		149.8	
		Z	8.04	75.8	26.3		123.6	
10175-CAC	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	5.08	67.3	20.0	5.72	149.3	±1.4 %
		Y	5.00	67.6	20.3		145.0	
		Z	5.09	67.3	20.0		145.0	
10181-CAB	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	5.08	67.3	20.0	5.72	148.5	±1.4 %
		Y	5.06	67.9	20.4		147.1	
		Z	5.11	67.4	20.0		144.8	
10196-CAB	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	X	9.89	68.7	21.2	8.10	134.6	±2.2 %
		Y	9.84	68.9	21.4		130.4	
		Z	9.82	68.5	21.1		130.4	
10225-CAB	UMTS-FDD (HSPA+)	X	7.02	67.1	19.5	5.97	138.0	±1.4 %
		Y	6.88	67.0	19.5		133.2	
		Z	7.01	67.1	19.5		134.6	
10237-CAB	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	8.01	75.9	26.4	9.21	128.0	±2.7 %
		Y	9.39	82.1	29.9		149.7	
		Z	8.34	76.9	26.9		129.1	
10252-CAB	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	9.05	73.6	25.1	9.24	130.6	±3.0 %
		Y	8.76	73.7	25.5		123.6	
		Z	9.10	73.6	25.1		127.8	
10267-CAB	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	9.81	74.7	25.6	9.30	139.3	±3.0 %
		Y	9.50	74.8	25.9		130.7	
		Z	9.81	74.6	25.5		135.0	

10275-CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)	X	4.49	67.1	18.9	3.96	140.1	±0.7 %
		Y	4.46	67.2	19.0		137.6	
		Z	4.52	67.1	18.9		137.1	
10291-AAB	CDMA2000, RC3, SO55, Full Rate	X	3.68	67.0	18.8	3.46	129.3	±0.7 %
		Y	3.64	67.3	19.0		130.3	
		Z	3.84	67.9	19.2		148.6	
10292-AAB	CDMA2000, RC3, SO32, Full Rate	X	3.64	67.2	18.8	3.39	131.8	±0.5 %
		Y	3.60	67.4	19.1		128.2	
		Z	3.71	67.5	19.0		128.0	
10297-AAA	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	6.43	67.5	19.9	5.81	147.2	±1.7 %
		Y	6.39	67.7	20.0		145.4	
		Z	6.42	67.5	19.8		143.2	
10311-AAA	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	X	6.73	67.1	19.7	6.06	129.7	±1.4 %
		Y	6.75	67.5	19.9		130.8	
		Z	6.75	67.3	19.7		126.2	
10400-AAB	IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle)	X	10.14	68.9	21.5	8.37	136.7	±2.5 %
		Y	10.23	69.5	22.0		136.5	
		Z	10.13	68.9	21.5		132.8	
10403-AAB	CDMA2000 (1xEV-DO, Rev. 0)	X	4.97	69.2	19.3	3.76	143.5	±0.5 %
		Y	4.87	69.3	19.4		141.0	
		Z	5.02	69.2	19.3		139.6	
10404-AAB	CDMA2000 (1xEV-DO, Rev. A)	X	4.91	69.3	19.4	3.77	139.8	±0.7 %
		Y	4.67	68.9	19.1		138.9	
		Z	4.89	69.1	19.3		137.1	
10415-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)	X	2.93	70.1	19.6	1.54	137.8	±0.7 %
		Y	2.84	69.8	19.6		138.2	
		Z	3.04	70.8	19.9		134.2	
10416-AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle)	X	9.94	68.7	21.3	8.23	134.6	±2.2 %
		Y	10.00	69.1	21.7		134.1	
		Z	9.89	68.5	21.2		130.1	

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 NormX,Y,Z do not affect the E^2 -field uncertainty inside TSL (see Pages 7 and 8).

^B Numerical linearization parameter: uncertainty not required.

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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3319

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unct. (k=2)
750	41.9	0.89	6.69	6.69	6.69	0.40	1.70	± 12.0 %
835	41.5	0.90	6.41	6.41	6.41	0.43	1.62	± 12.0 %
1750	40.1	1.37	5.29	5.29	5.29	0.80	1.16	± 12.0 %
1900	40.0	1.40	5.10	5.10	5.10	0.80	1.24	± 12.0 %
2300	39.5	1.67	4.77	4.77	4.77	0.64	1.38	± 12.0 %
2450	39.2	1.80	4.55	4.55	4.55	0.80	1.29	± 12.0 %
2600	39.0	1.96	4.39	4.39	4.39	0.80	1.31	± 12.0 %

^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.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3319

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 (mm) ^G	Unct. (k=2)
750	55.5	0.96	6.10	6.10	6.10	0.34	1.80	± 12.0 %
835	55.2	0.97	6.07	6.07	6.07	0.47	1.56	± 12.0 %
1750	53.4	1.49	4.83	4.83	4.83	0.70	1.36	± 12.0 %
1900	53.3	1.52	4.53	4.53	4.53	0.71	1.39	± 12.0 %
2300	52.9	1.81	4.24	4.24	4.24	0.80	1.26	± 12.0 %
2450	52.7	1.95	4.11	4.11	4.11	0.80	1.10	± 12.0 %
2600	52.5	2.16	3.90	3.90	3.90	0.80	1.11	± 12.0 %

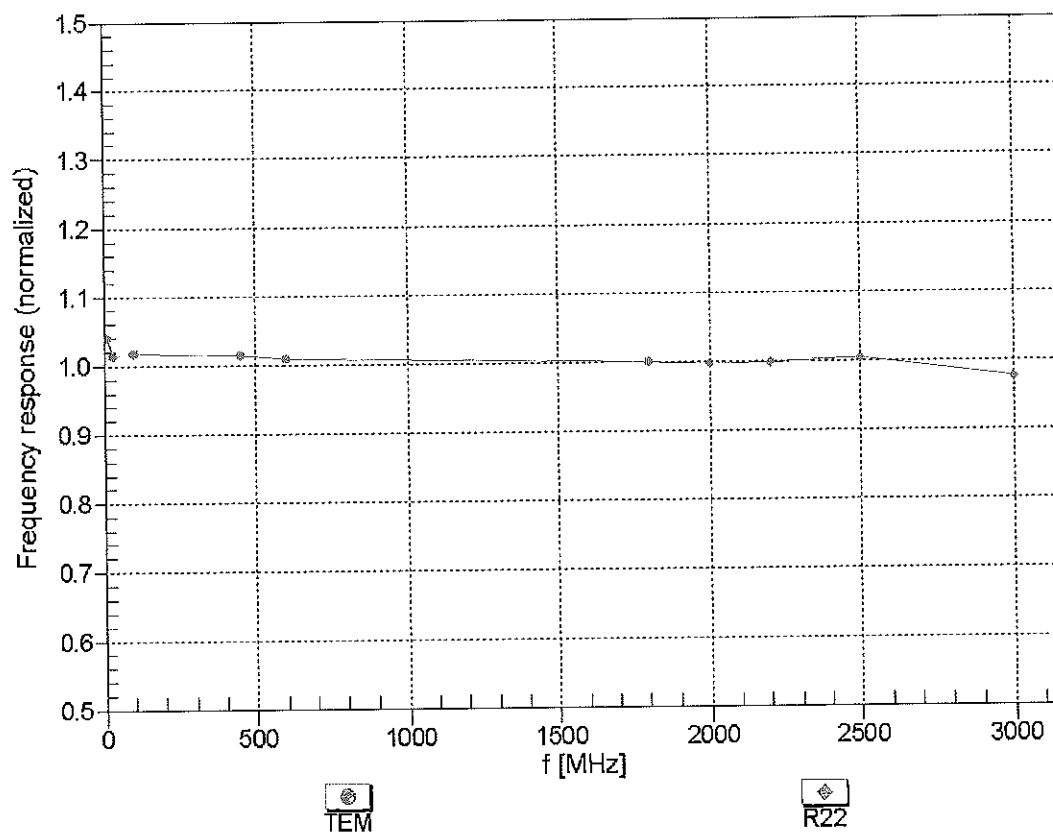
^C Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 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.

Frequency Response of E-Field

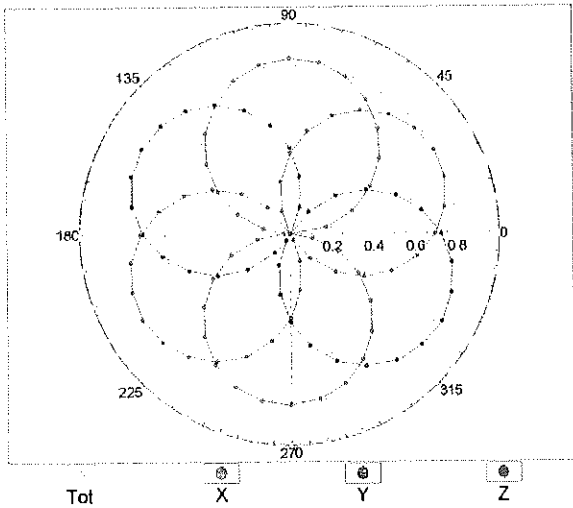
(TEM-Cell:ifi110 EXX, Waveguide: R22)



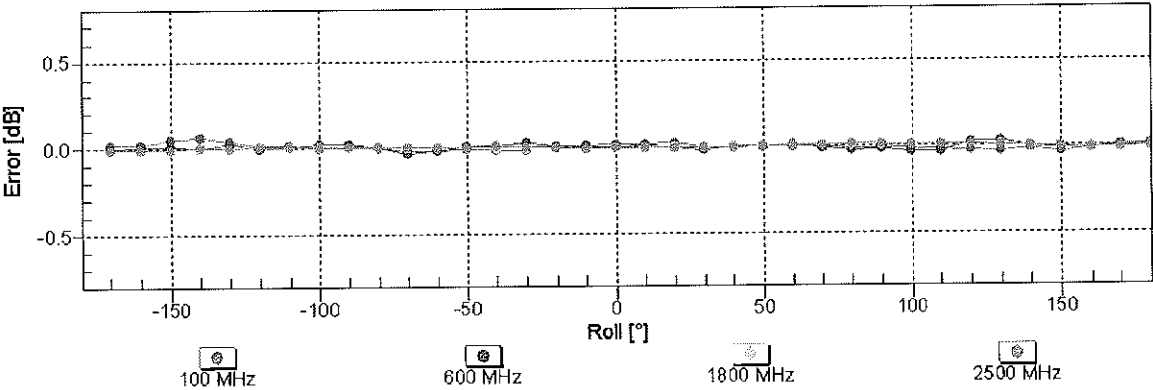
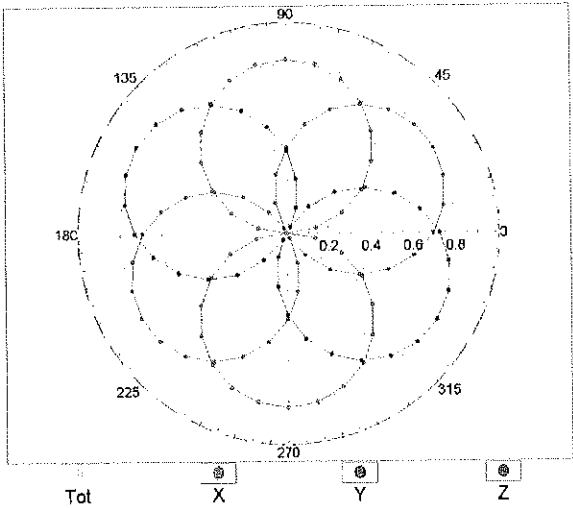
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

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

f=600 MHz,TEM

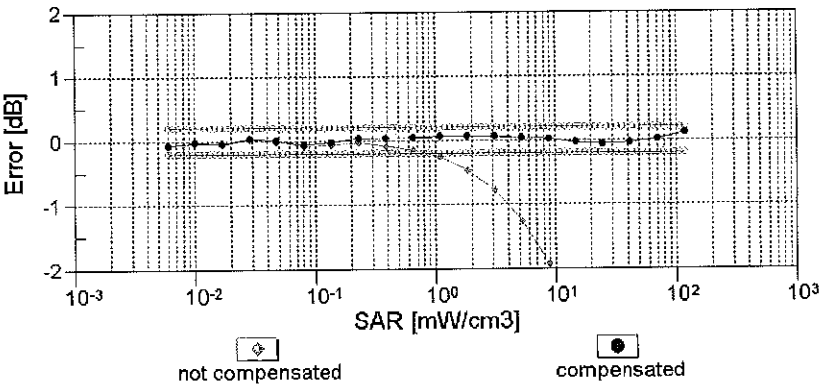
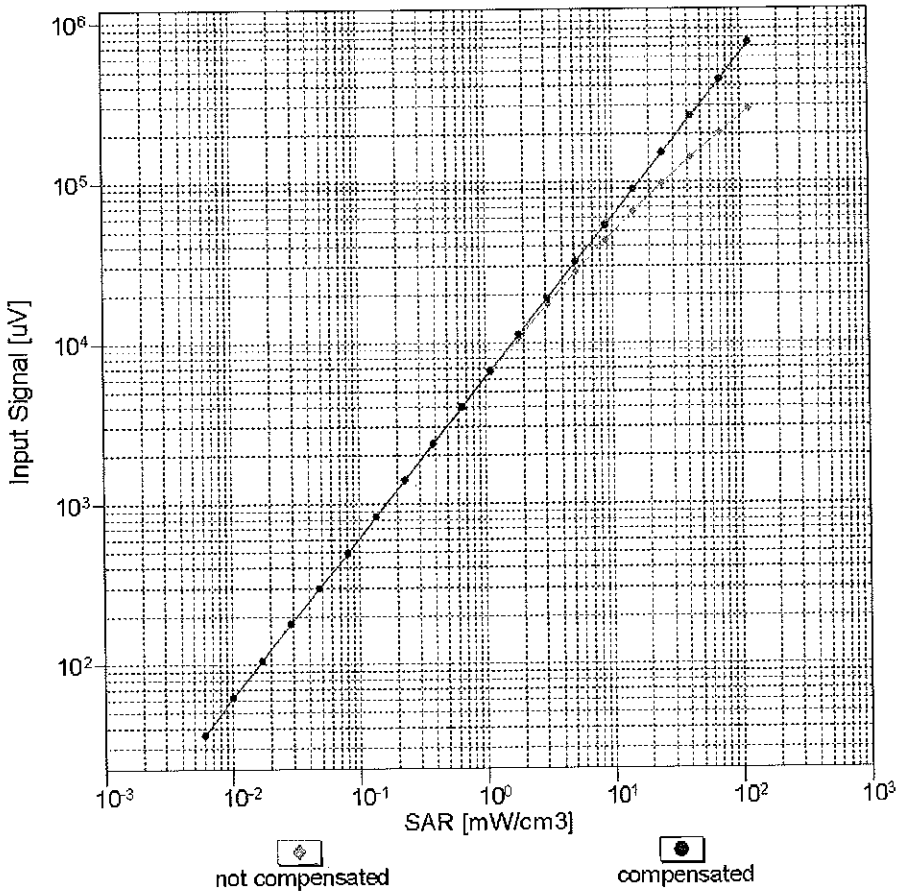


f=1800 MHz,R22



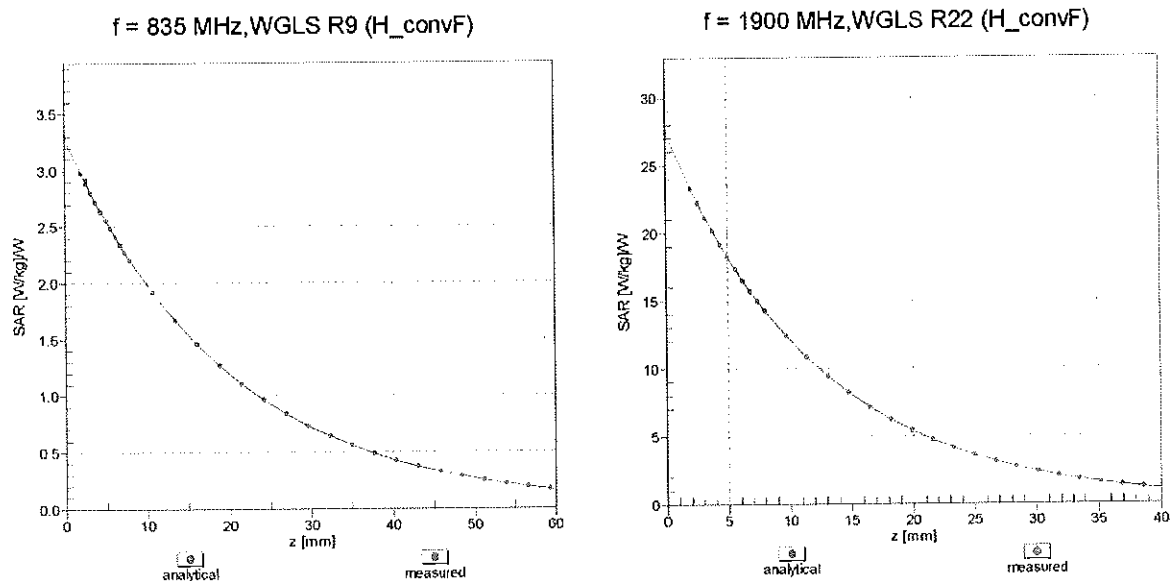
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range f(SAR_{head})
(TEM cell , f_{eval}= 1900 MHz)



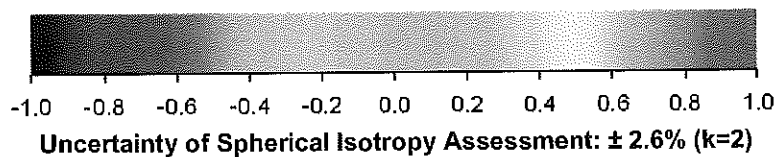
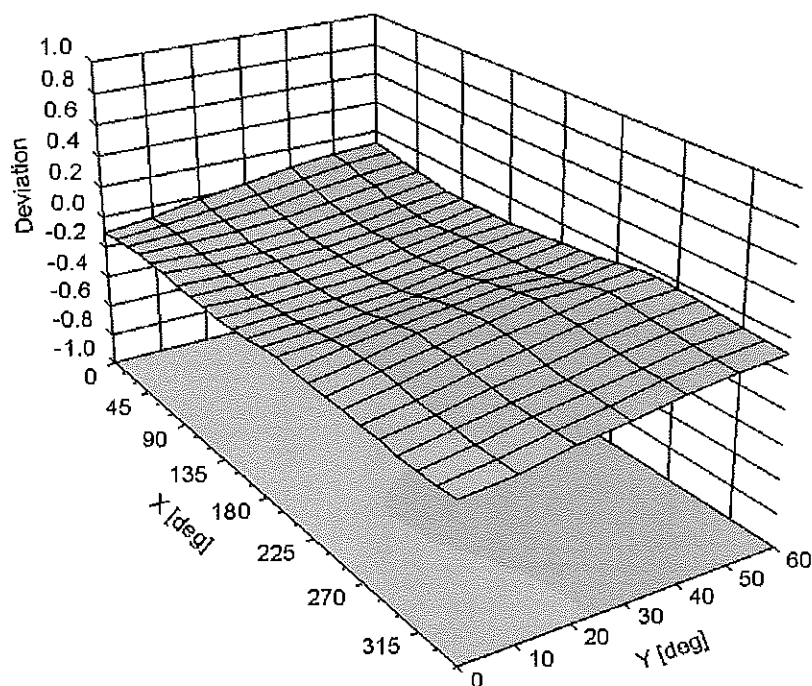
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, θ), $f = 900 \text{ MHz}$



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ ($k=2$)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3319**Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle (°)	-120.2
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm



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

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **ES3-3213_Jan15**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3213**

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

CC
 1/30/15

Calibration date: **January 20, 2015**

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 E4419B	GB41293874	03-Apr-14 (No. 217-01911)	Apr-15
Power sensor E4412A	MY41498087	03-Apr-14 (No. 217-01911)	Apr-15
Reference 3 dB Attenuator	SN: S5054 (3c)	03-Apr-14 (No. 217-01915)	Apr-15
Reference 20 dB Attenuator	SN: S5277 (20x)	03-Apr-14 (No. 217-01919)	Apr-15
Reference 30 dB Attenuator	SN: S5129 (30b)	03-Apr-14 (No. 217-01920)	Apr-15
Reference Probe ES3DV2	SN: 3013	30-Dec-14 (No. ES3-3013_Dec14)	Dec-15
DAE4	SN: 660	14-Jan-15 (No. DAE4-660_Jan15)	Jan-16
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

Calibrated by:	Name Israe Elnaouq	Function Laboratory Technician	Signature
Approved by:	Katja Pokovic	Technical Manager	
Issued: January 22, 2015 This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 0108**

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 Multilateral Agreement for the recognition of calibration certificates

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., $\vartheta = 0$ 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, "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

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ 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 E^2 -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).

Probe ES3DV3

SN:3213

Manufactured: October 14, 2008
Calibrated: January 20, 2015

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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3213

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$) ^A	1.49	1.37	1.34	± 10.1 %
DCP (mV) ^B	99.9	101.8	101.4	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu V}$	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	169.8	±3.8 %
		Y	0.0	0.0	1.0		215.4	
		Z	0.0	0.0	1.0		214.5	
10010- CAA	SAR Validation (Square, 100ms, 10ms)	X	1.84	57.8	10.2	10.00	47.4	±1.9 %
		Y	1.82	58.6	10.3		44.3	
		Z	1.65	57.3	9.2		44.2	
10011- CAB	UMTS-FDD (WCDMA)	X	3.32	66.8	18.5	2.91	135.8	±0.5 %
		Y	3.18	66.4	18.2		127.9	
		Z	3.21	66.5	18.2		128.1	
10012- CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	X	2.90	68.1	18.4	1.87	137.2	±0.7 %
		Y	2.97	69.2	19.0		130.1	
		Z	2.80	68.0	18.4		129.9	
10013- CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	X	11.40	71.2	23.7	9.46	135.1	±3.8 %
		Y	11.25	71.3	23.9		124.2	
		Z	10.96	70.3	23.2		124.8	
10021- DAB	GSM-FDD (TDMA, GMSK)	X	18.25	96.6	27.2	9.39	140.4	±1.7 %
		Y	21.48	99.9	28.2		133.3	
		Z	11.76	89.4	24.5		127.3	
10023- DAB	GPRS-FDD (TDMA, GMSK, TN 0)	X	13.12	91.7	26.0	9.57	126.4	±1.9 %
		Y	17.05	95.2	26.6		127.3	
		Z	8.91	85.2	23.3		118.8	
10024- DAB	GPRS-FDD (TDMA, GMSK, TN 0-1)	X	34.78	100.0	25.2	6.56	116.4	±1.7 %
		Y	33.37	99.5	24.8		111.7	
		Z	34.11	99.5	24.6		110.5	
10027- DAB	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	X	37.18	99.7	24.0	4.80	131.2	±1.7 %
		Y	44.91	99.8	23.3		127.4	
		Z	41.51	99.7	23.2		125.0	
10028- DAB	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	X	48.95	99.5	22.4	3.55	140.9	±1.7 %
		Y	67.41	99.8	21.5		137.8	
		Z	56.45	100.0	21.9		135.0	
10032- CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	X	20.23	99.3	22.1	1.16	111.3	±1.2 %
		Y	32.72	99.5	20.6		109.6	
		Z	48.57	100.0	20.0		108.8	
10100- CAB	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	6.60	67.9	20.0	5.67	144.6	±1.2 %
		Y	6.55	68.2	20.2		142.7	
		Z	6.50	67.8	19.9		141.5	

10103-CAB	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	10.34	75.7	26.2	9.29	133.2	±2.5 %
		Y	10.31	76.5	26.9		128.2	
		Z	9.74	74.5	25.6		127.1	
10108-CAC	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	6.50	67.6	20.0	5.80	142.8	±1.2 %
		Y	6.41	67.7	20.1		140.3	
		Z	6.41	67.6	19.9		140.2	
10117-CAB	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	X	10.36	69.2	21.6	8.07	132.8	±2.7 %
		Y	10.42	69.7	21.9		131.4	
		Z	10.22	69.1	21.4		130.0	
10151-CAB	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	9.65	74.6	25.8	9.28	127.9	±2.5 %
		Y	9.66	75.6	26.7		123.7	
		Z	9.14	73.6	25.3		122.7	
10154-CAC	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	6.14	66.9	19.6	5.75	139.3	±1.4 %
		Y	6.08	67.2	19.9		138.5	
		Z	6.05	66.9	19.6		137.3	
10160-CAB	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	X	6.58	67.5	19.9	5.82	144.3	±1.4 %
		Y	6.54	67.8	20.1		143.7	
		Z	6.50	67.5	19.8		142.1	
10169-CAB	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	4.93	66.1	19.3	5.73	120.6	±0.9 %
		Y	4.93	66.7	19.8		120.9	
		Z	4.85	66.3	19.5		118.9	
10172-CAB	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	8.93	79.5	28.6	9.21	140.8	±2.5 %
		Y	9.60	82.9	30.6		139.9	
		Z	8.30	78.2	27.9		136.6	
10175-CAC	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	4.90	66.0	19.3	5.72	118.8	±0.9 %
		Y	4.93	66.8	19.8		120.2	
		Z	4.81	66.1	19.3		116.6	
10181-CAB	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	4.92	66.1	19.3	5.72	119.0	±0.9 %
		Y	4.92	66.6	19.8		120.5	
		Z	4.77	65.8	19.2		115.8	
10196-CAB	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	X	9.93	68.7	21.4	8.10	125.0	±2.5 %
		Y	10.06	69.4	21.9		128.3	
		Z	9.78	68.5	21.2		120.5	
10225-CAB	UMTS-FDD (HSPA+)	X	6.66	65.7	18.8	5.97	106.5	±0.9 %
		Y	6.81	66.6	19.3		112.3	
		Z	6.64	66.0	18.9		108.0	
10237-CAB	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	8.91	79.4	28.5	9.21	141.4	±2.2 %
		Y	9.39	82.3	30.4		146.7	
		Z	8.40	78.5	28.2		141.2	
10252-CAB	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	8.84	73.3	25.2	9.24	119.1	±2.7 %
		Y	8.94	74.6	26.3		118.6	
		Z	8.39	72.4	24.7		114.0	
10267-CAB	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	9.62	74.6	25.8	9.30	126.2	±2.7 %
		Y	9.77	76.0	26.9		126.1	
		Z	9.10	73.4	25.2		121.4	

10275-CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)	X	4.43	66.4	18.5	3.96	132.5	±0.7 %
		Y	4.37	66.6	18.6		134.1	
		Z	4.40	66.7	18.6		130.5	
10291-AAB	CDMA2000, RC3, SO55, Full Rate	X	3.63	66.4	18.4	3.46	122.5	±0.5 %
		Y	3.54	66.5	18.5		124.9	
		Z	3.55	66.3	18.3		121.4	
10292-AAB	CDMA2000, RC3, SO32, Full Rate	X	3.49	65.9	18.1	3.39	125.1	±0.5 %
		Y	3.52	66.7	18.6		126.1	
		Z	3.51	66.5	18.4		123.8	
10297-AAA	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	6.49	67.6	19.9	5.81	143.1	±1.4 %
		Y	6.49	68.0	20.3		142.3	
		Z	6.42	67.6	19.9		144.3	
10311-AAA	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	X	7.06	68.1	20.2	6.06	147.6	±1.7 %
		Y	7.09	68.7	20.7		148.2	
		Z	7.03	68.3	20.4		149.8	
10403-AAB	CDMA2000 (1xEV-DO, Rev. 0)	X	4.66	67.4	18.4	3.76	135.3	±0.5 %
		Y	4.69	68.1	18.7		134.9	
		Z	4.72	68.2	18.7		136.5	
10404-AAB	CDMA2000 (1xEV-DO, Rev. A)	X	4.58	67.4	18.3	3.77	133.4	±0.5 %
		Y	4.68	68.4	18.9		132.8	
		Z	4.58	67.9	18.5		135.4	
10415-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)	X	2.41	65.7	17.2	1.54	131.4	±0.7 %
		Y	2.42	66.4	17.7		131.3	
		Z	2.59	67.7	18.2		134.1	
10416-AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle)	X	10.06	68.9	21.5	8.23	127.6	±2.7 %
		Y	10.12	69.5	22.0		126.3	
		Z	10.04	69.1	21.7		129.7	

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 NormX,Y,Z do not affect the E^2 -field uncertainty inside TSL (see Pages 7 and 8).

^B Numerical linearization parameter: uncertainty not required.

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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3213

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^c	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unct. (k=2)
750	41.9	0.89	6.45	6.45	6.45	0.57	1.37	± 12.0 %
835	41.5	0.90	6.26	6.26	6.26	0.65	1.26	± 12.0 %
1750	40.1	1.37	5.22	5.22	5.22	0.47	1.47	± 12.0 %
1900	40.0	1.40	5.06	5.06	5.06	0.80	1.14	± 12.0 %
2450	39.2	1.80	4.54	4.54	4.54	0.78	1.22	± 12.0 %
2600	39.0	1.96	4.33	4.33	4.33	0.80	1.28	± 12.0 %

^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.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3213

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)	Unct. (k=2)
750	55.5	0.96	6.11	6.11	6.11	0.71	1.24	± 12.0 %
835	55.2	0.97	6.07	6.07	6.07	0.35	1.86	± 12.0 %
1750	53.4	1.49	4.93	4.93	4.93	0.51	1.47	± 12.0 %
1900	53.3	1.52	4.72	4.72	4.72	0.80	1.20	± 12.0 %
2450	52.7	1.95	4.37	4.37	4.37	0.71	1.12	± 12.0 %
2600	52.5	2.16	4.20	4.20	4.20	0.66	0.95	± 12.0 %

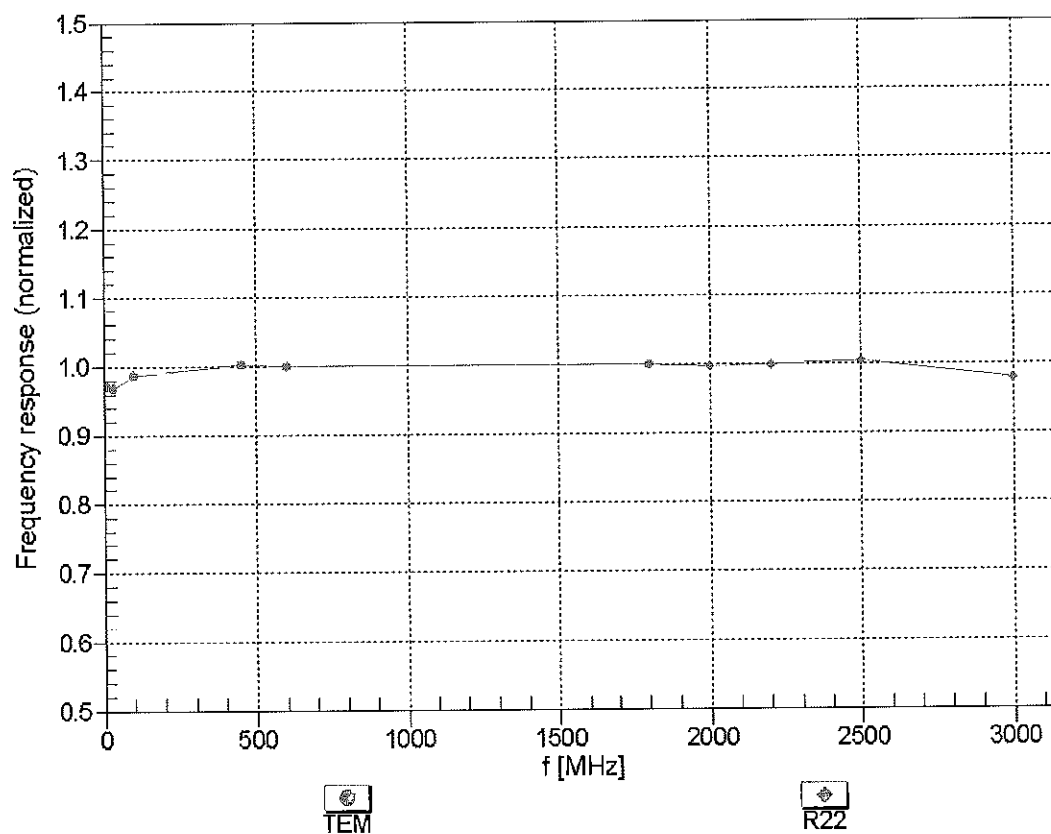
^c Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 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.

Frequency Response of E-Field

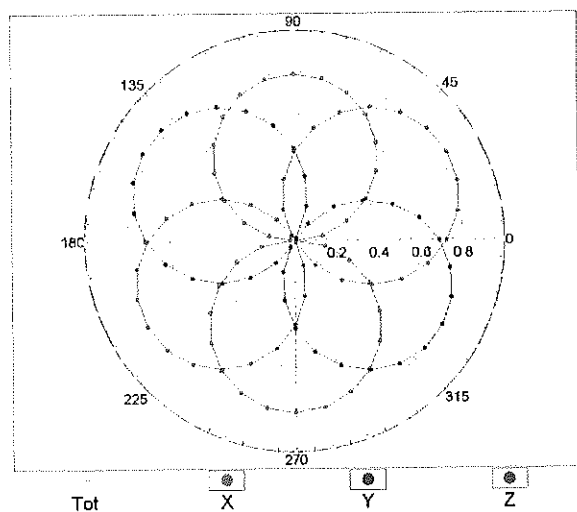
(TEM-Cell: ifi110 EXX, Waveguide: R22)



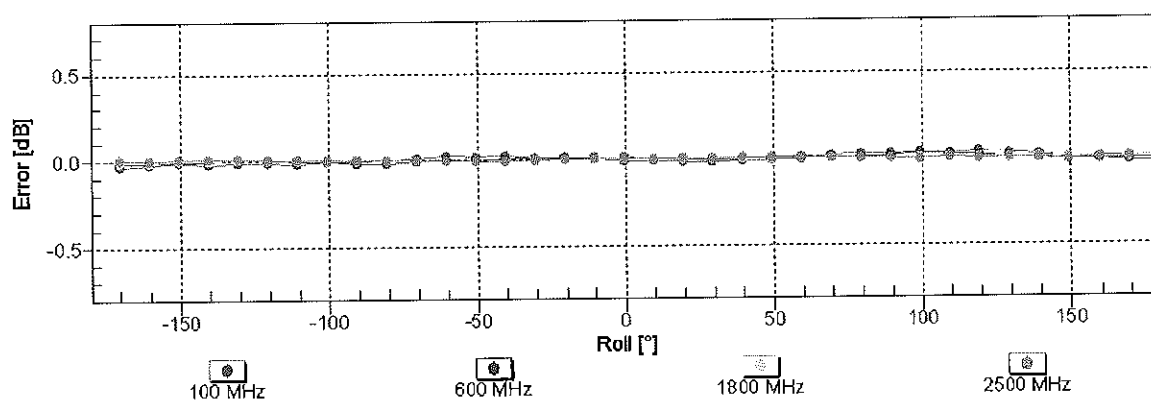
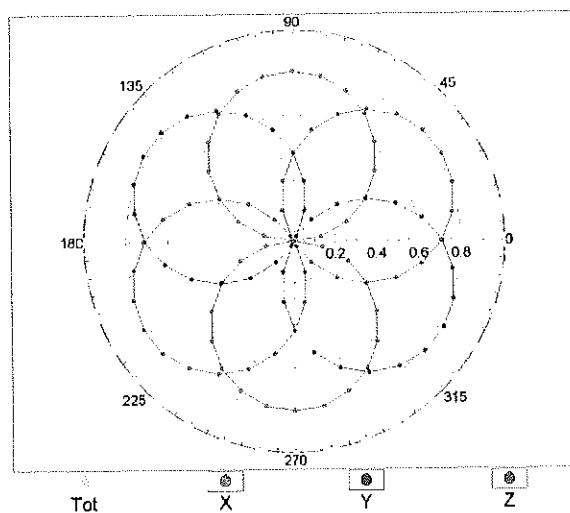
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

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

f=600 MHz,TEM

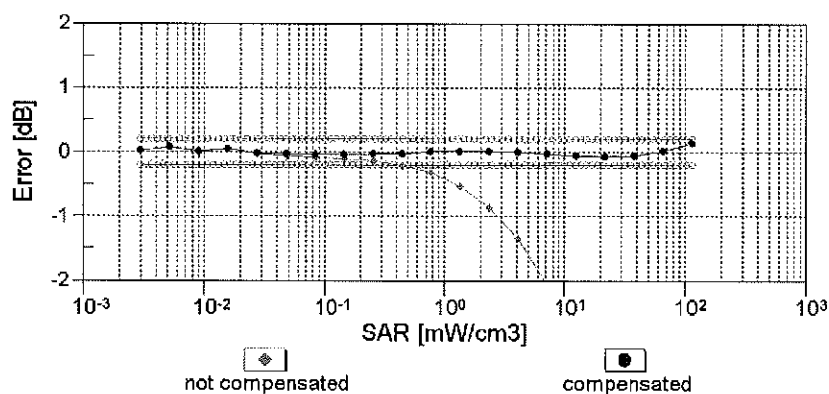
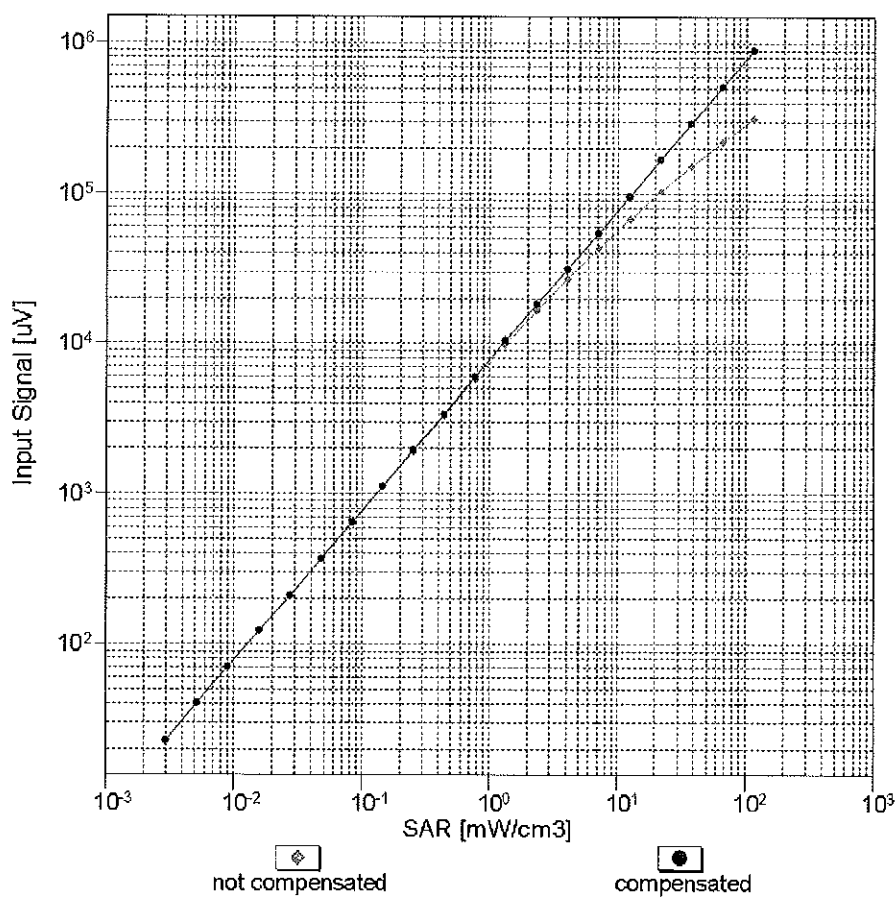


f=1800 MHz,R22



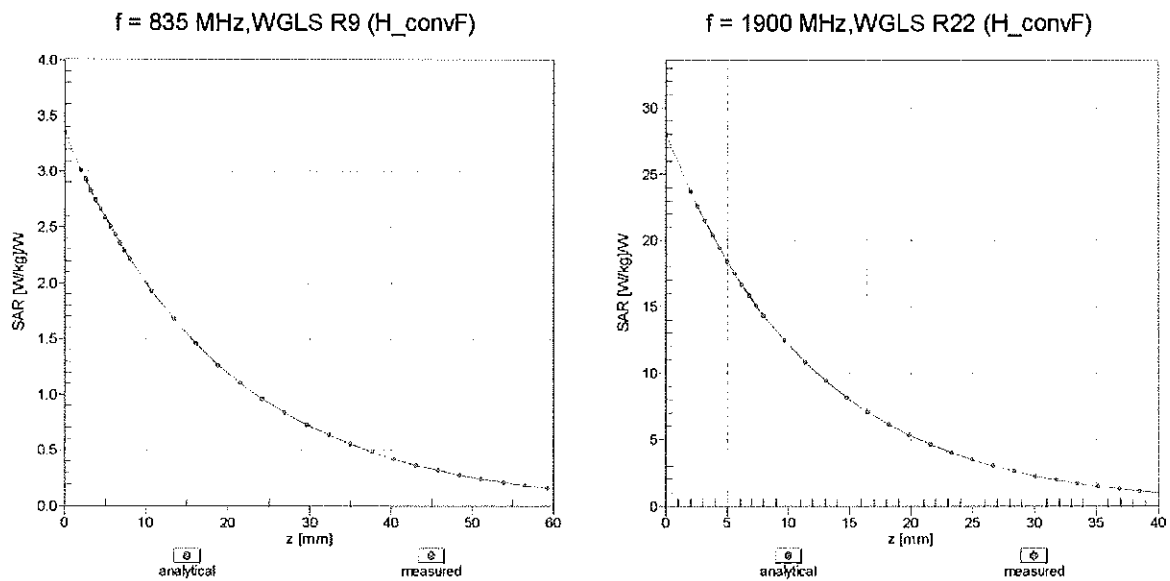
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

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



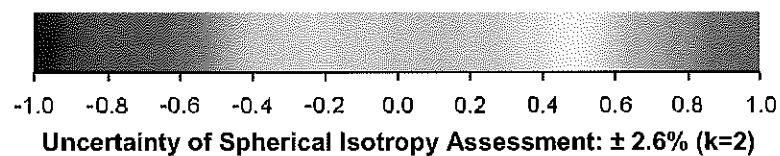
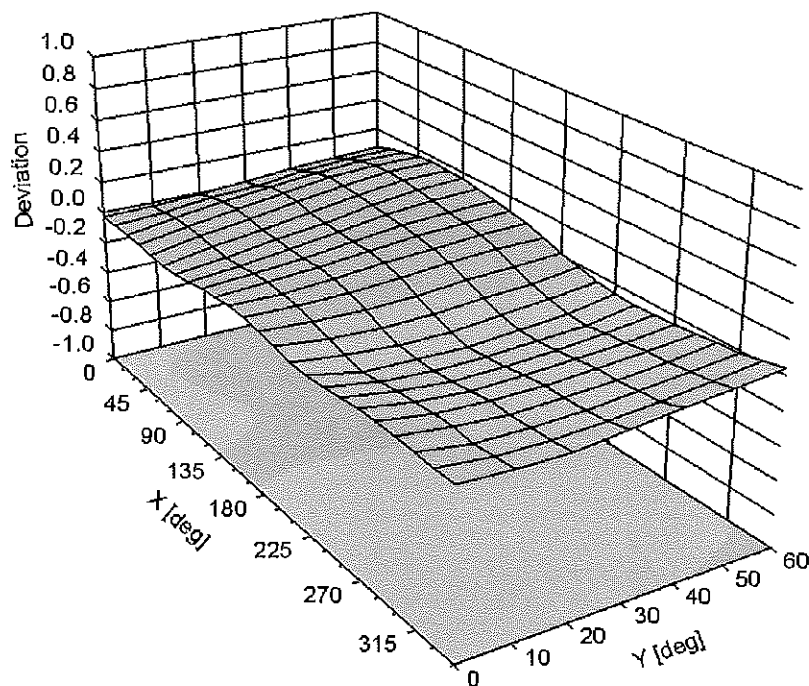
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ , θ), $f = 900 \text{ MHz}$



DASY/EASY - Parameters of Probe: ES3DV3 - SN:3213

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-70.6
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

APPENDIX D: SAR TISSUE SPECIFICATIONS

Measurement Procedure for Tissue verification:

- 1) The network analyzer and probe system was configured and calibrated.
- 2) The probe was immersed in the tissue. The tissue was placed in a nonmetallic container. Trapped air bubbles beneath the flange were minimized by placing the probe at a slight angle.
- 3) The complex admittance with respect to the probe aperture was measured
- 4) The complex relative permittivity ϵ can be calculated from the below equation (Pournaropoulos and Misra):

$$Y = \frac{j2\omega\epsilon_r\epsilon_0}{[\ln(b/a)]^2} \int_a^b \int_a^b \int_0^\pi \cos\phi' \frac{\exp[-j\omega r(\mu_0\epsilon_r'\epsilon_0)^{1/2}]}{r} d\phi' d\rho' d\rho$$

where Y is the admittance of the probe in contact with the sample, the primed and unprimed coordinates refer to source and observation points, respectively, $r^2 = \rho^2 + \rho'^2 - 2\rho\rho'\cos\phi'$, ω is the angular frequency, and $j = \sqrt{-1}$.

Table D-I
Composition of the Tissue Equivalent Matter

Frequency (MHz)	750	835	1750	1900
Tissue	Body	Body	Body	Body
Ingredients (% by weight)				
Bactericide	See Page 2	0.1		
DGBE			31	29.44
HEC		1		
NaCl		0.94	0.2	0.39
Sucrose		44.9		
Water		53.06	68.8	70.17

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2 Composition / Information on ingredients

The Item is composed of the following ingredients:

H ₂ O	Water, 35 – 58%
Sucrose	Sugar, white, refined, 40 – 60%
NaCl	Sodium Chloride, 0 – 6%
Hydroxyethyl-cellulose	Medium Viscosity (CAS# 9004-62-0), <0.3%
Preventol-D7	Preservative: aqueous preparation, (CAS# 55965-84-9), containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyl-3(2H)-isothiazolone, 0.1 – 0.7%
Relevant for safety; Refer to the respective Safety Data Sheet*.	

Figure D-1

Composition of 750 MHz Body Tissue Equivalent Matter

Note: 750MHz liquid recipes are proprietary SPEAG. Since the composition is approximate to the actual liquids utilized, the manufacturer tissue-equivalent liquid data sheets are provided below.

Measurement Certificate / Material Test

Item Name	Body Tissue Simulating Liquid (MSL750V2)
Product No.	SL AAM 075 AA (Charge: 150223-3)
Manufacturer	SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated OCP probe.

Setup Validation

Validation results were within $\pm 2.5\%$ towards the target values of Methanol.

Target Parameters

Target parameters as defined in the IEEE 1528 and IEC 62209 compliance standards.

Test Condition

Ambient	Environment temperatur (22 ± 3)°C and humidity < 70%.
TSL Temperature	22°C
Test Date	25-Feb-15
Operator	IEN

Additional Information

TSL Density	1.212 g/cm ³
TSL Heat-capacity	3.006 kJ/(kg*K)

f [MHz]	Measured			Target		Diff. to Target [%]	
	HP-e'	HP-e''	sigma	eps	sigma	Δ-eps	Δ-sigma
600	57.3	24.76	0.83	56.1	0.95	2.2	-13.2
625	57.1	24.43	0.85	56.0	0.95	1.8	-11.0
650	56.8	24.09	0.87	55.9	0.96	1.5	-8.8
675	56.5	23.80	0.89	55.8	0.96	1.2	-6.7
700	56.2	23.51	0.92	55.7	0.96	0.9	-4.6
725	56.0	23.28	0.94	55.6	0.96	0.6	-2.4
750	55.7	23.06	0.96	55.5	0.96	0.4	-0.1
775	55.5	22.87	0.99	55.4	0.97	0.1	2.1
800	55.2	22.68	1.01	55.3	0.97	-0.2	4.4
825	55.0	22.52	1.03	55.2	0.98	-0.5	5.7
838	54.9	22.44	1.05	55.2	0.98	-0.6	6.3
850	54.8	22.36	1.06	55.2	0.99	-0.7	7.0
875	54.5	22.24	1.08	55.1	1.02	-1.0	6.2
900	54.3	22.12	1.11	55.0	1.05	-1.3	5.5
925	54.1	22.01	1.13	55.0	1.06	-1.6	6.5
950	53.9	21.89	1.16	54.9	1.08	-2.0	7.6
975	53.6	21.81	1.18	54.9	1.09	-2.3	8.8
1000	53.4	21.73	1.21	54.8	1.10	-2.7	10.1

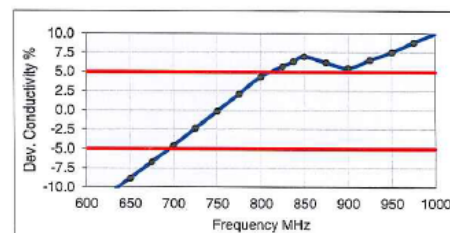
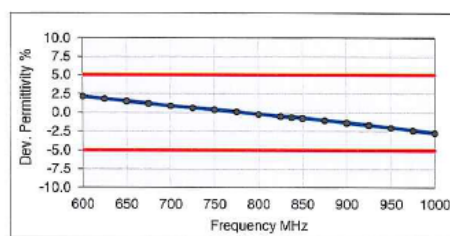


Figure D-2

750MHz Body Tissue Equivalent Matter

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APPENDIX E: SAR SYSTEM VALIDATION

Per FCC KDB 865664 D02v01, SAR system validation status should be documented to confirm measurement accuracy. The SAR systems (including SAR probes, system components and software versions) used for this device were validated against its performance specifications prior to the SAR measurements. Reference dipoles were used with the required tissue- equivalent media for system validation, according to the procedures outlined in FCC KDB 865664 D01 v01 and IEEE 1528-2013. Since SAR probe calibrations are frequency dependent, each probe calibration point was validated at a frequency within the valid frequency range of the probe calibration point, using the system that normally operates with the probe for routine SAR measurements and according to the required tissue-equivalent media.

A tabulated summary of the system validation status including the validation date(s), measurement frequencies, SAR probes and tissue dielectric parameters has been included.

Table E-I
SAR System Validation Summary

SAR SYSTEM #	FREQ. [MHz]	DATE	PROBE SN	PROBE TYPE	PROBE CAL. POINT		COND.	PERM.	CW VALIDATION			MOD. VALIDATION		
							(σ)	(ϵ_r)	SENSITIVITY	PROBE LINEARITY	PROBE ISOTROPY	MOD. TYPE	DUTY FACTOR	PAR
B	750	1/3/2015	3334	ES3DV3	750	Body	0.987	56.397	PASS	PASS	PASS	N/A	N/A	N/A
J	835	4/28/2015	3319	ES3DV3	835	Body	0.992	54.192	PASS	PASS	PASS	GMSK	PASS	N/A
I	1750	5/31/2015	3213	ES3DV3	1750	Body	1.471	51.461	PASS	PASS	PASS	N/A	N/A	N/A
I	1900	5/30/2015	3213	ES3DV3	1900	Body	1.520	52.410	PASS	PASS	PASS	GMSK	PASS	N/A

NOTE: While the probes have been calibrated for both CW and modulated signals, all measurements were performed using communication systems calibrated for CW signals only. Modulations in the table above represent test configurations for which the measurement system has been validated per FCC KDB Publication 865664 D01v01 for scenarios when CW probe calibrations are used with other signal types. SAR systems were validated for modulated signals with a periodic duty cycle, such as GMSK, or with a high peak to average ratio (>5 dB), such as OFDM according to KDB 865664.

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APPENDIX G: SENSOR TRIGGERING DATA SUMMARY

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A3LSMT567V Sensor Triggering Data Summary

Per FCC KDB Publication 616217 D04v01, this device was tested by the manufacturer to determine the proximity sensor triggering distances for the back side and top and left edges of the device. The measured output power within ± 5 mm of the triggering points (or until touching the phantom) is included for back side and each applicable edge.

To ensure all production units are compliant it is necessary to test SAR at a distance 1 mm less than the smallest distance from the device and SAR phantom (determined from these triggering tests according to the KDB 616217 D04v01) with the device at maximum output power without power reduction. These SAR Tests are included in addition to the SAR tests for the device touching the SAR phantom, with reduced power.

The operational description contains information explaining how this device remains compliant in the event of a sensor malfunction.

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Test Dates: 08/10/15 – 08/17/15	DUT Type: Portable Tablet	APPENDIX G: Page 2 of 5

Back Side

Moving device toward the phantom:

KDB 616217 6.2.6 Measured Power [dBm]											
Distance[mm]	30	29	28	27	26	25	24	23	22	21	20
WCDMA 850	23.17	23.26	23.37	23.17	23.43	20.28	20.27	20.33	20.45	20.31	20.24
WCDMA 1900	23.30	23.27	23.35	23.16	23.23	13.15	13.29	13.16	13.30	13.14	13.24
LTE B13	23.95	23.80	23.94	23.74	23.92	22.16	22.17	22.24	22.26	22.32	22.13
LTE B4	23.93	23.64	23.68	23.63	23.68	12.77	12.73	12.69	12.72	12.63	12.67
LTE B2	23.80	23.74	23.88	23.88	23.84	12.38	12.43	12.40	12.10	12.13	12.18

Moving device away from the phantom:

KDB 616217 6.2.8 Measured Power [dBm]											
Distance[mm]	30	29	28	27	26	25	24	23	22	21	20
WCDMA 850	23.14	23.23	23.28	23.19	23.39	20.30	20.12	20.38	20.25	20.43	20.27
WCDMA 1900	23.30	23.36	23.28	23.12	23.16	13.40	13.25	13.39	13.19	13.39	13.40
LTE B13	23.85	23.64	23.83	23.85	23.75	22.35	22.12	22.15	22.45	22.37	22.40
LTE B4	23.69	23.90	23.72	23.93	23.65	12.80	12.75	12.71	12.90	12.78	12.64
LTE B2	23.60	23.65	23.79	23.72	23.81	12.26	12.20	12.15	12.36	12.45	12.16

Based on the most conservative measured triggering distance of 25 mm, additional SAR measurements were required at 24 mm from the back side.

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Top Edge

Moving device toward the phantom:

KDB 616217 6.2.6 Measured Power [dBm]											
Distance[mm]	23	22	21	20	19	18	17	16	15	14	13
WCDMA 850	23.16	23.23	23.33	23.39	23.38	20.35	20.22	20.43	20.21	20.23	20.18
WCDMA 1900	23.21	23.14	23.24	23.14	23.35	13.30	13.32	13.12	13.27	13.45	13.28
LTE B13	23.84	23.77	23.92	23.94	23.69	22.38	22.45	22.29	22.44	22.12	22.22
LTE B4	23.65	23.94	23.65	23.66	23.95	12.60	12.85	12.82	12.83	12.81	12.95
LTE B2	23.95	23.66	23.82	23.83	23.81	12.28	12.21	12.16	12.22	12.19	12.32

Moving device away from the phantom:

KDB 616217 6.2.8 Measured Power [dBm]											
Distance[mm]	23	22	21	20	19	18	17	16	15	14	13
WCDMA 850	23.33	23.33	23.16	23.45	23.40	20.32	20.44	20.24	20.15	20.35	20.37
WCDMA 1900	23.40	23.34	23.18	23.10	23.26	13.16	13.28	13.42	13.25	13.44	13.34
LTE B13	23.80	23.72	23.86	23.65	23.88	22.15	22.36	22.38	22.28	22.29	22.15
LTE B4	23.82	23.60	23.63	23.81	23.88	12.91	12.62	12.60	12.82	12.85	12.65
LTE B2	23.85	23.73	23.66	23.90	23.79	12.36	12.30	12.37	12.30	12.36	12.36

Based on the most conservative measured triggering distance of 18 mm, additional SAR measurements were required at 17 mm from the top edge.

FCC ID: A3LSMT567V	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
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Left Edge

Moving device toward the phantom:

KDB 616217 6.2.6 Measured Power [dBm]											
Distance[mm]	17	16	15	14	13	12	11	10	9	8	7
WCDMA 850	23.15	23.20	23.44	23.34	23.31	20.24	20.27	20.20	20.45	20.41	20.45
WCDMA 1900	23.22	23.18	23.24	23.17	23.21	13.33	13.34	13.42	13.45	13.35	13.21
LTE B13	23.68	23.88	23.85	23.70	23.75	22.39	22.17	22.28	22.32	22.25	22.32
LTE B4	23.65	23.61	23.84	23.79	23.70	12.62	12.83	12.69	12.71	12.79	12.70
LTE B2	23.83	23.61	23.81	23.69	23.68	12.31	12.21	12.18	12.35	12.41	12.25

Moving device away from the phantom:

KDB 616217 6.2.8 Measured Power [dBm]											
Distance[mm]	17	16	15	14	13	12	11	10	9	8	7
WCDMA 850	23.11	23.11	23.13	23.17	23.11	20.33	20.38	20.35	20.10	20.27	20.40
WCDMA 1900	23.37	23.32	23.35	23.34	23.43	13.16	13.41	13.26	13.28	13.18	13.42
LTE B13	23.63	23.61	23.93	23.74	23.95	22.15	22.17	22.21	22.28	22.11	22.14
LTE B4	23.78	23.84	23.85	23.78	23.82	12.78	12.72	12.73	12.80	12.82	12.77
LTE B2	23.88	23.80	23.70	23.61	23.73	12.22	12.42	12.42	12.36	12.16	12.22

Based on the most conservative measured triggering distance of 12 mm, additional SAR measurements were required at 11 mm from the left edge.

FCC ID: A3LSMT567V	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
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