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SAR EVALUATION REPORT

Applicant Name:
Samsung Electronics, Co. Ltd.
129, Samsung-ro, Maetan dong,
Yeongtong-gu, Suwon-si
Gyeonggi-do, 16677, Korea

Date of Testing:
09/08/15 - 09/28/15
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Document Serial No.:
0Y1509211832-R1.A3L

FCC ID: **A3LSMT377R4**

APPLICANT: **SAMSUNG ELECTRONICS, CO. LTD.**

DUT Type: Portable Tablet
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model(s): SM-T377R4

Equipment Class	Band & Mode	Tx Frequency	SAR 1 gm Body (W/kg)
PCB	Cell. CDMA/EVDO	824.70 - 848.31 MHz	1.08
PCB	PCS CDMA/EVDO	1851.25 - 1908.75 MHz	1.04
PCB	LTE Band 12	699.7 - 715.3 MHz	0.59
PCB	LTE Band 17	706.5 - 713.5 MHz	
PCB	LTE Band 5 (Cell)	824.7 - 848.3 MHz	0.87
PCB	LTE Band 4 (AWS)	1710.7 - 1754.3 MHz	0.90
PCB	LTE Band 25 (PCS)	1850.7 - 1914.3 MHz	1.10
PCB	LTE Band 2 (PCS)	1850.7 - 1909.3 MHz	
DTS	2.4 GHz WLAN	2412 - 2462 MHz	0.69
NII	U-NII-1	5180 - 5240 MHz	
NII	U-NII-2A	5260 - 5320 MHz	0.48
NII	U-NII-2C	5500 - 5720 MHz	0.71
NII	U-NII-3	5745 - 5825 MHz	0.33
DSS/DTS	Bluetooth	2402 - 2480 MHz	0.20
Simultaneous SAR per KDB 690783 D01v01r03:			1.59

Note: This revised Test Report (S/N: 0Y1509211832-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.

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 1.5 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

The SAR Tick is an initiative of the Mobile Manufacturers Forum (MMF). While a product may be considered eligible, use of the SAR Tick logo requires an agreement with the MMF. Further details can be obtained by emailing: sartick@mmfai.info.

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1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Operating Modes	Tx Frequency
Cell. CDMA/EVDO	Data	824.70 - 848.31 MHz
PCS CDMA/EVDO	Data	1851.25 - 1908.75 MHz
LTE Band 12	Data	699.7 - 715.3 MHz
LTE Band 17	Data	706.5 - 713.5 MHz
LTE Band 5 (Cell)	Data	824.7 - 848.3 MHz
LTE Band 4 (AWS)	Data	1710.7 - 1754.3 MHz
LTE Band 25 (PCS)	Data	1850.7 - 1914.3 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

1.2 Power Reduction for SAR

This device uses a power reduction mechanism for PCB SAR compliance. The power reduction mechanism is activated when the device is used in close proximity to the user's body. FCC KDB Publication 616217 D04 Section 6 was used as a guideline for selecting SAR test distances for this

1.1 device.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.

Main Antenna Maximum Power

Mode / Band		Modulated Average (dBm)
Cell. CDMA/EVDO	Maximum	**25.0**
	Nominal	**24.5**
PCS CDMA/EVDO	Maximum	**25.0**
	Nominal	**24.5**

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Mode / Band		Modulated Average (dBm)
LTE Band 17	Maximum	**24.5**
	Nominal	**24.0**
LTE Band 12	Maximum	**24.5**
	Nominal	**24.0**
LTE Band 5 (Cell)	Maximum	**24.0**
	Nominal	**23.5**
LTE Band 4 (AWS)	Maximum	**23.5**
	Nominal	**23.0**
LTE Band 25 (PCS)	Maximum	**23.5**
	Nominal	**23.0**
LTE Band 2 (PCS)	Maximum	**23.5**
	Nominal	**23.0**

Main Antenna Reduced Power – Body at 0.0 cm

Mode / Band		Modulated Average (dBm)
Cell. CDMA/EVDO	Maximum	**19.0**
	Nominal	**18.5**
PCS CDMA/EVDO	Maximum	**12.0**
	Nominal	**11.5**
Mode / Band		Modulated Average (dBm)
LTE Band 17	Maximum	**20.5**
	Nominal	**20.0**
LTE Band 12	Maximum	**20.5**
	Nominal	**20.0**
LTE Band 5 (Cell)	Maximum	**20.0**
	Nominal	**19.5**
LTE Band 4 (AWS)	Maximum	**12.5**
	Nominal	**12.0**
LTE Band 25 (PCS)	Maximum	**12.5**
	Nominal	**12.0**
LTE Band 2 (PCS)	Maximum	**12.5**
	Nominal	**12.0**

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WLAN/BT Antenna Power

Mode / Band		Modulated Average (dBm)
IEEE 802.11b (2.4 GHz)	Maximum	**13.5**
	Nominal	**13.0**
IEEE 802.11g (2.4 GHz)	Maximum	**12.0**
	Nominal	**11.5**
IEEE 802.11n (2.4 GHz)	Maximum	**12.0**
	Nominal	**11.5**
Bluetooth	Maximum	**14.0**
	Nominal	**13.5**
Bluetooth LE	Maximum	**3.0**
	Nominal	**2.5**

Mode / Band		Modulated Average (dBm)	
		20 MHz Bandwidth	40 MHz Bandwidth
IEEE 802.11a (5 GHz)	Maximum	**11.5**	
	Nominal	**11.0**	
IEEE 802.11n (5 GHz)	Maximum	**11.5**	**11.5**
	Nominal	**11.0**	**11.0**

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1.2 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
Device Edges/Sides for SAR Testing

Mode	Back	Top	Bottom	Right	Left
Cell. EVDO	Yes	Yes	No	No	Yes
PCS EVDO	Yes	Yes	No	No	Yes
LTE Band 12	Yes	Yes	No	No	Yes
LTE Band 5 (Cell)	Yes	Yes	No	No	Yes
LTE Band 4 (AWS)	Yes	Yes	No	No	Yes
LTE Band 25 (PCS)	Yes	Yes	No	No	Yes
2.4 GHz WLAN	Yes	Yes	No	No	No
Bluetooth	Yes	Yes	No	No	No
5 GHz WLAN	Yes	Yes	No	No	No

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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1.3 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.

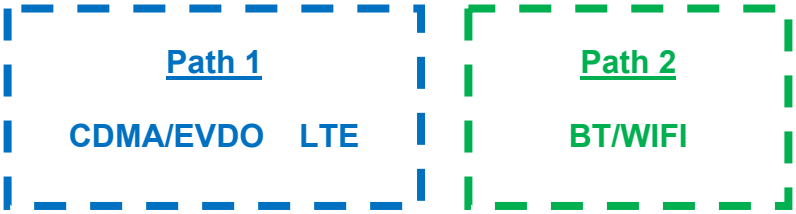

Figure 1-1
Simultaneous Transmission Paths

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	LTE + 2.4 GHz WI-FI	Yes
2	LTE + 5 GHz WI-FI	Yes
3	LTE + 2.4 GHz Bluetooth	Yes
4	CDMA/EVDO data + 2.4 GHz WI-FI	Yes
5	CDMA/EVDO data + 5 GHz WI-FI	Yes
6	CDMA/EVDO data + 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.

1.4 Miscellaneous SAR Test Considerations

(A) WIFI

Since U-NII-1 and U-NII-2A bands have the same maximum output power and the highest reported SAR for U-NII-2A is less than 1.2 W/kg, SAR is not required for U-NII-1 band according to FCC KDB 248227 D01v02.

(B) Licensed Transmitter(s)

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 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.

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This device supports both LTE Band 25 (PCS) and LTE Band 2 (PCS). Since the supported frequency span for LTE Band 2 (PCS) falls completely within the supported frequency span for LTE Band 25 (PCS), both LTE bands have the same max and reduced target powers, and both LTE bands share the same transmission path, SAR was only assessed for LTE Band 25 (PCS).

This device supports both LTE Band 12 and LTE Band 17. Since the supported frequency span for LTE Band 17 falls completely within the supported frequency span for LTE Band 12, both LTE bands have the same max and reduced target powers, and both LTE bands share the same transmission path, SAR was only assessed for LTE Band 12.

1.5 Guidance Applied

- FCC KDB Publication 941225 D01v03, D05v02r03 (3G/4G)
- FCC KDB Publication 248227 D01v02r01 (SAR Considerations for 802.11 Devices)
- 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)

1.6 Device Serial Numbers

Several samples with identical hardware were used to support SAR testing. 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 Power Serial Number	Reduced Power Serial Number
Cell. CDMA/EVDO	52709	52713
PCS CDMA/EVDO	52709	52713
LTE Band 12	52694	52694
LTE Band 5 (Cell)	52711	52723
LTE Band 4 (AWS)	52710	52720
LTE Band 25 (PCS)	52695	52695
2.4 GHz WLAN	52726	-
Bluetooth	52728	-
5 GHz WLAN	52728	-

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2 LTE INFORMATION

LTE Information			
FCC ID	**A3LSMT377R4**		
Form Factor	Portable Tablet		
Frequency Range of each LTE transmission band	LTE Band 12 (699.7 - 715.3 MHz)		
	LTE Band 17 (706.5 - 713.5 MHz)		
	LTE Band 5 (Cell) (824.7 - 848.3 MHz)		
	LTE Band 4 (AWS) (1710.7 - 1754.3 MHz)		
	LTE Band 25 (PCS) (1850.7 - 1914.3 MHz)		
	LTE Band 2 (PCS) (1850.7 - 1909.3 MHz)		
Channel Bandwidths	LTE Band 12: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz		
	LTE Band 17: 5 MHz, 10 MHz		
	LTE Band 5 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz		
	LTE Band 4 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz		
	LTE Band 25 (PCS): 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 12: 1.4 MHz	699.7 (23017)	707.5 (23095)	715.3 (23173)
LTE Band 12: 3 MHz	700.5 (23025)	707.5 (23095)	714.5 (23165)
LTE Band 12: 5 MHz	701.5 (23035)	707.5 (23095)	713.5 (23155)
LTE Band 12: 10 MHz	704 (23060)	707.5 (23095)	711 (23130)
LTE Band 17: 5 MHz	706.5 (23755)	710 (23790)	713.5 (23825)
LTE Band 17: 10 MHz	709 (23780)	710 (23790)	711 (23800)
LTE Band 5 (Cell): 1.4 MHz	824.7 (20407)	836.5 (20525)	848.3 (20643)
LTE Band 5 (Cell): 3 MHz	825.5 (20415)	836.5 (20525)	847.5 (20635)
LTE Band 5 (Cell): 5 MHz	826.5 (20425)	836.5 (20525)	846.5 (20625)
LTE Band 5 (Cell): 10 MHz	829 (20450)	836.5 (20525)	844 (20600)
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 25 (PCS): 1.4 MHz	1850.7 (26047)	1882.5 (26365)	1914.3 (26683)
LTE Band 25 (PCS): 3 MHz	1851.5 (26055)	1882.5 (26365)	1913.5 (26675)
LTE Band 25 (PCS): 5 MHz	1852.5 (26065)	1882.5 (26365)	1912.5 (26665)
LTE Band 25 (PCS): 10 MHz	1855 (26090)	1882.5 (26365)	1910 (26640)
LTE Band 25 (PCS): 15 MHz	1857.5 (26115)	1882.5 (26365)	1907.5 (26615)
LTE Band 25 (PCS): 20 MHz	1860 (26140)	1882.5 (26365)	1905 (26590)
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		

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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/m^3)
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:

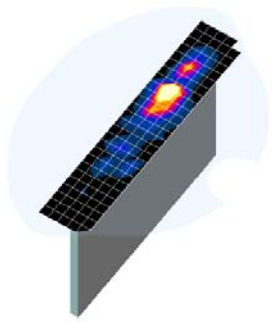

Figure 4-1
Sample SAR Area Scan

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.

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

Frequency	Maximum Area Scan Resolution (mm) (Δx_{area}, Δy_{area})	Maximum Zoom Scan Resolution (mm) (Δx_{zoom}, Δy_{zoom})	Maximum Zoom Scan Spatial Resolution (mm)			Minimum Zoom Scan Volume (mm) (x,y,z)
			Uniform Grid	Graded Grid		
			$\Delta z_{zoom}(n)$	$\Delta z_{zoom}(1)$*	$\Delta z_{zoom}(n>1)$*	
≤ 2 GHz	≤ 15	≤ 8	≤ 5	≤ 4	≤ 1.5*$\Delta z_{zoom}(n-1)$	≥ 30
2-3 GHz	≤ 12	≤ 5	≤ 5	≤ 4	≤ 1.5*$\Delta z_{zoom}(n-1)$	≥ 30
3-4 GHz	≤ 12	≤ 5	≤ 4	≤ 3	≤ 1.5*$\Delta z_{zoom}(n-1)$	≥ 28
4-5 GHz	≤ 10	≤ 4	≤ 3	≤ 2.5	≤ 1.5*$\Delta z_{zoom}(n-1)$	≥ 25
5-6 GHz	≤ 10	≤ 4	≤ 2	≤ 2	≤ 1.5*$\Delta z_{zoom}(n-1)$	≥ 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 a power reduction mechanism to reduce powers in certain use conditions for PCB operations when the device is used close the user's body.

When the device's antenna is within a certain distance of the user, the sensor activates and reduces the maximum allowed output power. 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, additional evaluation 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 Publication 616217 D04 Section 6 was used as a guideline for selecting SAR test distances for this device at these additional test positions. 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 *General Population* (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT *Occupational* (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.

7.4 SAR Measurement Conditions for CDMA2000

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

7.4.1 Output Power Verification

See 3GPP2 C.S0011/TIA-98-E as recommended by FCC KDB Publication 941225 D01v03 “3G SAR Measurement Procedures.” Maximum output power is verified on the High, Middle and Low

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channels according to procedures in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E. SO55 tests were measured with power control bits in the "All Up" condition.

1. If the mobile station (MS) supports Reverse TCH RC 1 and Forward TCH RC 1, set up a call using Fundamental Channel Test Mode 1 (RC=1/1) with 9600 bps data rate only.
2. Under RC1, C.S0011 Table 4.4.5.2-1, Table 7-1 parameters were applied.
3. If the MS supports the RC 3 Reverse FCH, RC3 Reverse SCH_0 and demodulation of RC 3,4, or 5, set up a call using Supplemental Channel Test Mode 3 (RC 3/3) with 9600 bps Fundamental Channel and 9600 bps SCH0 data rate.
4. Under RC3, C.S0011 Table 4.4.5.2-2, Table 7-2 was applied.

Table 7-1
Parameters for Max. Power for RC1

Parameter	Units	Value
I_{or}	dBm/1.23 MHz	-104
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

Table 7-2
Parameters for Max. Power for RC3

Parameter	Units	Value
I_{or}	dBm/1.23 MHz	-86
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

5. FCHs were configured at full rate for maximum SAR with "All Up" power control bits.

7.4.2 Body SAR Measurements for EVDO Devices

Body SAR is measured using Subtype 0/1 Physical Layer configurations for Rev. 0. The 3G SAR test reduction procedure is applied to Rev. A, Subtype 2 Physical layer configuration, with Rev. 0 as the primary mode; otherwise, SAR is measured for Rev. A using the highest reported SAR configuration for body-worn accessory exposure in Rev. 0. The AT is tested with a Reverse Data Channel rate of 153.6 kbps in Subtype 0/1 Physical Layer configurations; and a Reverse Data Channel payload size of 4096 bits and Termination Target of 16 slots in Subtype 2 Physical Layer configurations.

For Ev-Do data devices that also support 1x RTT voice and/or data operations, the 3G SAR test reduction procedure is applied to 1x RTT RC3 and RC1 with Ev-Do Rev. 0 and Rev. A as the respective primary modes.

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.

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.

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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 ½ dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is <1.45 W/kg.

7.6 SAR Testing with 802.11 Transmitters

The normal network operating configurations of 802.11 transmitters are not suitable for SAR measurements. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable. See KDB Publication 248227 D01v02r01 for more details.

7.6.1 General Device Setup

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters.

A periodic duty factor is required for current generation SAR systems to measure SAR. When 802.11 frame gaps are accounted for in the transmission, a maximum transmission duty factor of 92 - 96% is typically achievable in most test mode configurations. A minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR scaling. The reported SAR is scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

7.6.2 U-NII-1 and U-NII-2A

For devices that operate in both U-NII-1 and U-NII-2A bands, when the same maximum output power is specified for both bands, SAR measurement using OFDM SAR test procedures is not required for

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U-NII-1 unless the highest reported SAR for U-NII-2A is > 1.2 W/kg. When different maximum output powers are specified for the bands, SAR measurement for the U-NII band with the lower maximum output power is not required unless the highest reported SAR for the U-NII band with the higher maximum output power, adjusted by the ratio of lower to higher specified maximum output power for the two bands, is > 1.2 W/kg.

7.6.3 U-NII-2C and U-NII-3

The frequency range covered by U-NII-2C and U-NII-3 is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. When Terminal Doppler Weather Radar (TDWR) restriction applies, the channels at 5.60 – 5.65 GHz in U-NII-2C band must be disabled with acceptable mechanisms and documented in the equipment certification.

Unless band gap channels are permanently disabled, SAR must be considered for these channels. When band gap channels are disabled, each band is tested independently according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

7.6.4 2.4 GHz SAR Test Requirements

SAR is measured for 2.4 GHz 802.11b DSSS using either the fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:

1) When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.

2) When the reported SAR is > 0.8 W/kg, SAR is required for that position using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

2.4 GHz 802.11 g/n OFDM are additionally evaluated for SAR if the highest reported SAR for 802.11b, adjusted by the ratio of the OFDM to DSSS specified maximum output power, is › 1.2 W/kg. When SAR is required for OFDM modes in 2.4 GHz band, the Initial Test Configuration Procedures should be followed.

7.6.5 OFDM Transmission Mode and SAR Test Channel Selection

For the 2.4 GHz and 5 GHz bands, when the same maximum output power was specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration with the largest channel bandwidth, lowest order modulation and lowest data rate. When the maximum output power of a channel is the same for equivalent OFDM configurations; for example, 802.11a, 802.11n and 802.11ac or 802.11g and 802.11n with the same channel bandwidth, modulation and data rate etc., the lower order 802.11 mode i.e., 802.11a, then 802.11n and 802.11ac or 802.11g then 802.11n, is used for SAR measurement. When the maximum output power are the same for multiple test channels, either according to the default or additional power measurement requirements, SAR is measured using the channel closest to the middle of the frequency band or aggregated band. When there are multiple channels with the same maximum output power, SAR is measured using the higher number channel.

7.6.6 Initial Test Configuration Procedure

For OFDM, in both 2.4 and 5 GHz bands, an initial test configuration is determined for each frequency band and aggregated band, according to the transmission mode with the highest maximum output power specified for SAR measurements. When the same maximum output power is specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is

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measured using the configuration(s) with the largest channel bandwidth, lowest order modulation, lowest data rate, and lowest order 802.11 a/g/n/ac. If the average RF output powers of the highest identical transmission modes are within 0.25 dB of each other, mid channel of the transmission mode with highest average RF output power is the initial test channel. Otherwise, the channel of the transmission mode with the highest average RF output conducted power will be the initial test configuration.

When the reported SAR is ≤ 0.8 W/kg, no additional measurements on other test channels are required. Otherwise, SAR is evaluated using the subsequent highest average RF output channel until the reported SAR result is ≤ 1.2 W/kg or all channels are measured. When there are multiple untested channels having the same subsequent highest average RF output power, the channel with higher frequency from the lowest 802.11 mode is considered for SAR measurements (See Section 7.6.5).

7.6.7 Subsequent Test Configuration Procedures

For OFDM configurations in each frequency band and aggregated band, SAR is evaluated for initial test configuration using the fixed test position or the initial test position procedure. When the highest reported SAR (for the initial test configuration), adjusted by the ratio of the specified maximum output power of the subsequent test configuration to initial test configuration, is ≤ 1.2 W/kg, no additional SAR tests for the subsequent test configurations are required.

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8 RF CONDUCTED POWERS

8.1 CDMA Conducted Powers

Table 8-1
Maximum Average RF Output Powers

Band	Channel	Frequency	TDSO SO32 [dBm]	TDSO SO32 [dBm]	1x EvDO Rev. 0 [dBm]	1x EvDO Rev. A [dBm]
	F-RC	MHz	FCH+SCH	FCH	(RTAP)	(RETAP)
Cellular	1013	824.7	24.61	24.65	24.67	24.64
	384	836.52	24.55	24.60	24.61	24.62
	777	848.31	24.64	24.67	24.68	24.69
PCS	25	1851.25	24.56	24.61	24.74	24.67
	600	1880	24.67	24.69	24.88	24.84
	1175	1908.75	24.72	24.77	24.92	24.90

Table 8-2
Reduced Average RF Output Powers – Body at 0.0 cm

Band	Channel	Frequency	TDSO SO32 [dBm]	TDSO SO32 [dBm]	1x EvDO Rev. 0 [dBm]	1x EvDO Rev. A [dBm]
	F-RC	MHz	FCH+SCH	FCH	(RTAP)	(RETAP)
Cellular	1013	824.7	18.50	18.47	18.44	18.45
	384	836.52	18.49	18.46	18.43	18.44
	777	848.31	18.48	18.45	18.45	18.41
PCS	25	1851.25	11.35	11.42	11.50	11.53
	600	1880	11.62	11.73	11.76	11.84
	1175	1908.75	11.43	11.51	11.51	11.58

Figure 8-1
Power Measurement Setup

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8.2 LTE Conducted Powers

8.2.1 LTE Band 12

Table 8-3
LTE Band 12 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	707.5	23095	10	QPSK	1	0	**24.50**	0	0
	707.5	23095	10	QPSK	1	25	24.49	0	0
	707.5	23095	10	QPSK	1	49	24.46	0	0
	707.5	23095	10	QPSK	25	0	23.38	0-1	1
	707.5	23095	10	QPSK	25	12	**23.45**	0-1	1
	707.5	23095	10	QPSK	25	25	23.44	0-1	1
	707.5	23095	10	QPSK	50	0	23.40	0-1	1
	707.5	23095	10	16QAM	1	0	23.06	0-1	1
	707.5	23095	10	16QAM	1	25	23.46	0-1	1
	707.5	23095	10	16QAM	1	49	23.33	0-1	1
	707.5	23095	10	16QAM	25	0	22.18	0-2	2
	707.5	23095	10	16QAM	25	12	22.20	0-2	2
	707.5	23095	10	16QAM	25	25	22.34	0-2	2
	707.5	23095	10	16QAM	50	0	22.22	0-2	2

Note: LTE Band 12 at 10 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 8-4
LTE Band 12 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	701.5	23035	5	QPSK	1	0	24.29	0	0
	701.5	23035	5	QPSK	1	12	24.49	0	0
	701.5	23035	5	QPSK	1	24	24.50	0	0
	701.5	23035	5	QPSK	12	0	23.25	0-1	1
	701.5	23035	5	QPSK	12	6	23.20	0-1	1
	701.5	23035	5	QPSK	12	13	23.21	0-1	1
	701.5	23035	5	QPSK	25	0	23.20	0-1	1
	701.5	23035	5	16-QAM	1	0	23.36	0-1	1
	701.5	23035	5	16-QAM	1	12	23.31	0-1	1
	701.5	23035	5	16-QAM	1	24	23.50	0-1	1
	701.5	23035	5	16-QAM	12	0	22.12	0-2	2
	701.5	23035	5	16-QAM	12	6	22.21	0-2	2
	701.5	23035	5	16-QAM	12	13	22.23	0-2	2
	701.5	23035	5	16-QAM	25	0	22.21	0-2	2
Mid	707.5	23095	5	QPSK	1	0	24.50	0	0
	707.5	23095	5	QPSK	1	12	24.47	0	0
	707.5	23095	5	QPSK	1	24	24.47	0	0
	707.5	23095	5	QPSK	12	0	23.27	0-1	1
	707.5	23095	5	QPSK	12	6	23.26	0-1	1
	707.5	23095	5	QPSK	12	13	23.26	0-1	1
	707.5	23095	5	QPSK	25	0	23.34	0-1	1
	707.5	23095	5	16-QAM	1	0	23.47	0-1	1
	707.5	23095	5	16-QAM	1	12	23.50	0-1	1
	707.5	23095	5	16-QAM	1	24	23.44	0-1	1
	707.5	23095	5	16-QAM	12	0	22.23	0-2	2
	707.5	23095	5	16-QAM	12	6	22.16	0-2	2
	707.5	23095	5	16-QAM	12	13	22.18	0-2	2
	707.5	23095	5	16-QAM	25	0	22.26	0-2	2
High	713.5	23155	5	QPSK	1	0	24.50	0	0
	713.5	23155	5	QPSK	1	12	24.40	0	0
	713.5	23155	5	QPSK	1	24	24.50	0	0
	713.5	23155	5	QPSK	12	0	23.26	0-1	1
	713.5	23155	5	QPSK	12	6	23.26	0-1	1
	713.5	23155	5	QPSK	12	13	23.34	0-1	1
	713.5	23155	5	QPSK	25	0	23.22	0-1	1
	713.5	23155	5	16-QAM	1	0	23.39	0-1	1
	713.5	23155	5	16-QAM	1	12	23.47	0-1	1
	713.5	23155	5	16-QAM	1	24	23.50	0-1	1
	713.5	23155	5	16-QAM	12	0	22.12	0-2	2
	713.5	23155	5	16-QAM	12	6	22.09	0-2	2
	713.5	23155	5	16-QAM	12	13	22.34	0-2	2
	713.5	23155	5	16-QAM	25	0	22.24	0-2	2

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Table 8-5
LTE Band 12 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	700.5	23025	3	QPSK	1	0	24.47	0	0
	700.5	23025	3	QPSK	1	7	24.50	0	0
	700.5	23025	3	QPSK	1	14	24.44	0	0
	700.5	23025	3	QPSK	8	0	23.36	0-1	1
	700.5	23025	3	QPSK	8	4	23.32	0-1	1
	700.5	23025	3	QPSK	8	7	23.30	0-1	1
	700.5	23025	3	QPSK	15	0	23.30	0-1	1
	700.5	23025	3	16-QAM	1	0	23.44	0-1	1
	700.5	23025	3	16-QAM	1	7	23.50	0-1	1
	700.5	23025	3	16-QAM	1	14	23.42	0-1	1
	700.5	23025	3	16-QAM	8	0	22.50	0-2	2
	700.5	23025	3	16-QAM	8	4	22.45	0-2	2
	700.5	23025	3	16-QAM	8	7	22.47	0-2	2
	700.5	23025	3	16-QAM	15	0	22.49	0-2	2
Mid	707.5	23095	3	QPSK	1	0	24.49	0	0
	707.5	23095	3	QPSK	1	7	24.50	0	0
	707.5	23095	3	QPSK	1	14	24.50	0	0
	707.5	23095	3	QPSK	8	0	23.37	0-1	1
	707.5	23095	3	QPSK	8	4	23.36	0-1	1
	707.5	23095	3	QPSK	8	7	23.34	0-1	1
	707.5	23095	3	QPSK	15	0	23.27	0-1	1
	707.5	23095	3	16-QAM	1	0	23.40	0-1	1
	707.5	23095	3	16-QAM	1	7	23.48	0-1	1
	707.5	23095	3	16-QAM	1	14	23.50	0-1	1
	707.5	23095	3	16-QAM	8	0	22.30	0-2	2
	707.5	23095	3	16-QAM	8	4	22.24	0-2	2
	707.5	23095	3	16-QAM	8	7	22.20	0-2	2
	707.5	23095	3	16-QAM	15	0	22.36	0-2	2
High	714.5	23165	3	QPSK	1	0	24.30	0	0
	714.5	23165	3	QPSK	1	7	24.46	0	0
	714.5	23165	3	QPSK	1	14	24.47	0	0
	714.5	23165	3	QPSK	8	0	23.35	0-1	1
	714.5	23165	3	QPSK	8	4	23.31	0-1	1
	714.5	23165	3	QPSK	8	7	23.35	0-1	1
	714.5	23165	3	QPSK	15	0	23.24	0-1	1
	714.5	23165	3	16-QAM	1	0	23.50	0-1	1
	714.5	23165	3	16-QAM	1	7	23.49	0-1	1
	714.5	23165	3	16-QAM	1	14	23.47	0-1	1
	714.5	23165	3	16-QAM	8	0	22.20	0-2	2
	714.5	23165	3	16-QAM	8	4	22.21	0-2	2
	714.5	23165	3	16-QAM	8	7	22.25	0-2	2
	714.5	23165	3	16-QAM	15	0	22.41	0-2	2

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Table 8-6
LTE Band 12 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	699.7	23017	1.4	QPSK	1	0	23.91	0	0
	699.7	23017	1.4	QPSK	1	2	23.85	0	0
	699.7	23017	1.4	QPSK	1	5	23.84	0	0
	699.7	23017	1.4	QPSK	3	0	23.73	0	0
	699.7	23017	1.4	QPSK	3	2	23.76	0	0
	699.7	23017	1.4	QPSK	3	3	23.67	0	0
	699.7	23017	1.4	QPSK	6	0	22.76	0-1	1
	699.7	23017	1.4	16-QAM	1	0	22.93	0-1	1
	699.7	23017	1.4	16-QAM	1	2	22.98	0-1	1
	699.7	23017	1.4	16-QAM	1	5	22.98	0-1	1
	699.7	23017	1.4	16-QAM	3	0	22.88	0-1	1
	699.7	23017	1.4	16-QAM	3	2	22.86	0-1	1
	699.7	23017	1.4	16-QAM	3	3	22.63	0-1	1
	699.7	23017	1.4	16-QAM	6	0	21.87	0-2	2
Mid	707.5	23095	1.4	QPSK	1	0	24.50	0	0
	707.5	23095	1.4	QPSK	1	2	24.20	0	0
	707.5	23095	1.4	QPSK	1	5	24.17	0	0
	707.5	23095	1.4	QPSK	3	0	23.97	0	0
	707.5	23095	1.4	QPSK	3	2	23.88	0	0
	707.5	23095	1.4	QPSK	3	3	23.83	0	0
	707.5	23095	1.4	QPSK	6	0	22.77	0-1	1
	707.5	23095	1.4	16-QAM	1	0	22.87	0-1	1
	707.5	23095	1.4	16-QAM	1	2	22.93	0-1	1
	707.5	23095	1.4	16-QAM	1	5	22.80	0-1	1
	707.5	23095	1.4	16-QAM	3	0	22.76	0-1	1
	707.5	23095	1.4	16-QAM	3	2	22.73	0-1	1
	707.5	23095	1.4	16-QAM	3	3	22.68	0-1	1
	707.5	23095	1.4	16-QAM	6	0	21.95	0-2	2
High	715.3	23173	1.4	QPSK	1	0	23.85	0	0
	715.3	23173	1.4	QPSK	1	2	23.92	0	0
	715.3	23173	1.4	QPSK	1	5	24.13	0	0
	715.3	23173	1.4	QPSK	3	0	23.84	0	0
	715.3	23173	1.4	QPSK	3	2	23.82	0	0
	715.3	23173	1.4	QPSK	3	3	23.71	0	0
	715.3	23173	1.4	QPSK	6	0	22.71	0-1	1
	715.3	23173	1.4	16-QAM	1	0	22.52	0-1	1
	715.3	23173	1.4	16-QAM	1	2	22.74	0-1	1
	715.3	23173	1.4	16-QAM	1	5	22.52	0-1	1
	715.3	23173	1.4	16-QAM	3	0	22.60	0-1	1
	715.3	23173	1.4	16-QAM	3	2	22.87	0-1	1
	715.3	23173	1.4	16-QAM	3	3	22.96	0-1	1
	715.3	23173	1.4	16-QAM	6	0	21.92	0-2	2

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Table 8-7
LTE Band 12 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	707.5	23095	10	QPSK	1	0	20.45	0	0
	707.5	23095	10	QPSK	1	25	**20.47**	0	0
	707.5	23095	10	QPSK	1	49	20.47	0	0
	707.5	23095	10	QPSK	25	0	20.31	0-1	0
	707.5	23095	10	QPSK	25	12	20.35	0-1	0
	707.5	23095	10	QPSK	25	25	**20.37**	0-1	0
	707.5	23095	10	QPSK	50	0	20.29	0-1	0
	707.5	23095	10	16QAM	1	0	20.20	0-1	0
	707.5	23095	10	16QAM	1	25	20.21	0-1	0
	707.5	23095	10	16QAM	1	49	20.30	0-1	0
	707.5	23095	10	16QAM	25	0	20.11	0-2	0
	707.5	23095	10	16QAM	25	12	20.07	0-2	0
	707.5	23095	10	16QAM	25	25	20.11	0-2	0
	707.5	23095	10	16QAM	50	0	20.11	0-2	0

Note: LTE Band 12 at 10 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 12 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	701.5	23035	5	QPSK	1	0	20.34	0	0
	701.5	23035	5	QPSK	1	12	20.40	0	0
	701.5	23035	5	QPSK	1	24	20.42	0	0
	701.5	23035	5	QPSK	12	0	20.18	0-1	0
	701.5	23035	5	QPSK	12	6	20.16	0-1	0
	701.5	23035	5	QPSK	12	13	20.21	0-1	0
	701.5	23035	5	QPSK	25	0	20.02	0-1	0
	701.5	23035	5	16-QAM	1	0	20.17	0-1	0
	701.5	23035	5	16-QAM	1	12	20.43	0-1	0
	701.5	23035	5	16-QAM	1	24	20.50	0-1	0
	701.5	23035	5	16-QAM	12	0	20.09	0-2	0
	701.5	23035	5	16-QAM	12	6	20.08	0-2	0
	701.5	23035	5	16-QAM	12	13	20.11	0-2	0
	701.5	23035	5	16-QAM	25	0	20.07	0-2	0
Mid	707.5	23095	5	QPSK	1	0	20.03	0	0
	707.5	23095	5	QPSK	1	12	20.39	0	0
	707.5	23095	5	QPSK	1	24	20.27	0	0
	707.5	23095	5	QPSK	12	0	20.14	0-1	0
	707.5	23095	5	QPSK	12	6	20.24	0-1	0
	707.5	23095	5	QPSK	12	13	20.25	0-1	0
	707.5	23095	5	QPSK	25	0	20.28	0-1	0
	707.5	23095	5	16-QAM	1	0	20.50	0-1	0
	707.5	23095	5	16-QAM	1	12	20.48	0-1	0
	707.5	23095	5	16-QAM	1	24	20.46	0-1	0
	707.5	23095	5	16-QAM	12	0	20.06	0-2	0
	707.5	23095	5	16-QAM	12	6	20.11	0-2	0
	707.5	23095	5	16-QAM	12	13	20.12	0-2	0
	707.5	23095	5	16-QAM	25	0	20.06	0-2	0
High	713.5	23155	5	QPSK	1	0	20.47	0	0
	713.5	23155	5	QPSK	1	12	20.35	0	0
	713.5	23155	5	QPSK	1	24	20.39	0	0
	713.5	23155	5	QPSK	12	0	20.19	0-1	0
	713.5	23155	5	QPSK	12	6	20.20	0-1	0
	713.5	23155	5	QPSK	12	13	20.28	0-1	0
	713.5	23155	5	QPSK	25	0	20.14	0-1	0
	713.5	23155	5	16-QAM	1	0	20.38	0-1	0
	713.5	23155	5	16-QAM	1	12	20.36	0-1	0
	713.5	23155	5	16-QAM	1	24	20.50	0-1	0
	713.5	23155	5	16-QAM	12	0	20.07	0-2	0
	713.5	23155	5	16-QAM	12	6	20.06	0-2	0
	713.5	23155	5	16-QAM	12	13	20.13	0-2	0
	713.5	23155	5	16-QAM	25	0	20.25	0-2	0

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Table 8-9
LTE Band 12 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	700.5	23025	3	QPSK	1	0	20.19	0	0
	700.5	23025	3	QPSK	1	7	20.28	0	0
	700.5	23025	3	QPSK	1	14	20.18	0	0
	700.5	23025	3	QPSK	8	0	20.16	0-1	0
	700.5	23025	3	QPSK	8	4	20.18	0-1	0
	700.5	23025	3	QPSK	8	7	20.18	0-1	0
	700.5	23025	3	QPSK	15	0	20.19	0-1	0
	700.5	23025	3	16-QAM	1	0	20.38	0-1	0
	700.5	23025	3	16-QAM	1	7	20.47	0-1	0
	700.5	23025	3	16-QAM	1	14	20.42	0-1	0
	700.5	23025	3	16-QAM	8	0	20.07	0-2	0
	700.5	23025	3	16-QAM	8	4	20.01	0-2	0
	700.5	23025	3	16-QAM	8	7	20.00	0-2	0
	700.5	23025	3	16-QAM	15	0	20.12	0-2	0
Mid	707.5	23095	3	QPSK	1	0	20.36	0	0
	707.5	23095	3	QPSK	1	7	20.40	0	0
	707.5	23095	3	QPSK	1	14	20.29	0	0
	707.5	23095	3	QPSK	8	0	20.21	0-1	0
	707.5	23095	3	QPSK	8	4	20.19	0-1	0
	707.5	23095	3	QPSK	8	7	20.27	0-1	0
	707.5	23095	3	QPSK	15	0	20.19	0-1	0
	707.5	23095	3	16-QAM	1	0	20.39	0-1	0
	707.5	23095	3	16-QAM	1	7	20.42	0-1	0
	707.5	23095	3	16-QAM	1	14	20.44	0-1	0
	707.5	23095	3	16-QAM	8	0	20.14	0-2	0
	707.5	23095	3	16-QAM	8	4	20.03	0-2	0
	707.5	23095	3	16-QAM	8	7	20.10	0-2	0
	707.5	23095	3	16-QAM	15	0	20.34	0-2	0
High	714.5	23165	3	QPSK	1	0	20.16	0	0
	714.5	23165	3	QPSK	1	7	20.27	0	0
	714.5	23165	3	QPSK	1	14	20.29	0	0
	714.5	23165	3	QPSK	8	0	20.18	0-1	0
	714.5	23165	3	QPSK	8	4	20.14	0-1	0
	714.5	23165	3	QPSK	8	7	20.27	0-1	0
	714.5	23165	3	QPSK	15	0	20.18	0-1	0
	714.5	23165	3	16-QAM	1	0	20.44	0-1	0
	714.5	23165	3	16-QAM	1	7	20.19	0-1	0
	714.5	23165	3	16-QAM	1	14	20.35	0-1	0
	714.5	23165	3	16-QAM	8	0	19.81	0-2	0
	714.5	23165	3	16-QAM	8	4	19.87	0-2	0
	714.5	23165	3	16-QAM	8	7	19.90	0-2	0
	714.5	23165	3	16-QAM	15	0	20.26	0-2	0

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Table 8-10
LTE Band 12 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	699.7	23017	1.4	QPSK	1	0	20.50	0	0
	699.7	23017	1.4	QPSK	1	2	20.44	0	0
	699.7	23017	1.4	QPSK	1	5	20.50	0	0
	699.7	23017	1.4	QPSK	3	0	20.13	0	0
	699.7	23017	1.4	QPSK	3	2	20.36	0	0
	699.7	23017	1.4	QPSK	3	3	20.17	0	0
	699.7	23017	1.4	QPSK	6	0	20.24	0-1	0
	699.7	23017	1.4	16-QAM	1	0	20.24	0-1	0
	699.7	23017	1.4	16-QAM	1	2	20.30	0-1	0
	699.7	23017	1.4	16-QAM	1	5	20.33	0-1	0
	699.7	23017	1.4	16-QAM	3	0	20.22	0-1	0
	699.7	23017	1.4	16-QAM	3	2	20.18	0-1	0
	699.7	23017	1.4	16-QAM	3	3	20.18	0-1	0
	699.7	23017	1.4	16-QAM	6	0	20.26	0-2	0
Mid	707.5	23095	1.4	QPSK	1	0	20.10	0	0
	707.5	23095	1.4	QPSK	1	2	20.12	0	0
	707.5	23095	1.4	QPSK	1	5	20.00	0	0
	707.5	23095	1.4	QPSK	3	0	20.22	0	0
	707.5	23095	1.4	QPSK	3	2	20.20	0	0
	707.5	23095	1.4	QPSK	3	3	20.16	0	0
	707.5	23095	1.4	QPSK	6	0	20.14	0-1	0
	707.5	23095	1.4	16-QAM	1	0	20.36	0-1	0
	707.5	23095	1.4	16-QAM	1	2	20.50	0-1	0
	707.5	23095	1.4	16-QAM	1	5	20.46	0-1	0
	707.5	23095	1.4	16-QAM	3	0	20.24	0-1	0
	707.5	23095	1.4	16-QAM	3	2	20.17	0-1	0
	707.5	23095	1.4	16-QAM	3	3	20.24	0-1	0
	707.5	23095	1.4	16-QAM	6	0	20.28	0-2	0
High	715.3	23173	1.4	QPSK	1	0	20.44	0	0
	715.3	23173	1.4	QPSK	1	2	20.50	0	0
	715.3	23173	1.4	QPSK	1	5	20.40	0	0
	715.3	23173	1.4	QPSK	3	0	20.03	0	0
	715.3	23173	1.4	QPSK	3	2	20.26	0	0
	715.3	23173	1.4	QPSK	3	3	20.18	0	0
	715.3	23173	1.4	QPSK	6	0	20.25	0-1	0
	715.3	23173	1.4	16-QAM	1	0	19.75	0-1	0
	715.3	23173	1.4	16-QAM	1	2	19.81	0-1	0
	715.3	23173	1.4	16-QAM	1	5	20.34	0-1	0
	715.3	23173	1.4	16-QAM	3	0	20.03	0-1	0
	715.3	23173	1.4	16-QAM	3	2	20.31	0-1	0
	715.3	23173	1.4	16-QAM	3	3	20.48	0-1	0
	715.3	23173	1.4	16-QAM	6	0	20.26	0-2	0

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8.2.2 LTE Band 5 (Cell)

Table 8-11
LTE Band 5 (Cell) 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	836.5	20525	10	QPSK	1	0	**24.00**	0	0
	836.5	20525	10	QPSK	1	25	23.87	0	0
	836.5	20525	10	QPSK	1	49	23.98	0	0
	836.5	20525	10	QPSK	25	0	**22.88**	0-1	1
	836.5	20525	10	QPSK	25	12	22.84	0-1	1
	836.5	20525	10	QPSK	25	25	22.80	0-1	1
	836.5	20525	10	QPSK	50	0	22.87	0-1	1
	836.5	20525	10	16QAM	1	0	23.00	0-1	1
	836.5	20525	10	16QAM	1	25	22.99	0-1	1
	836.5	20525	10	16QAM	1	49	22.97	0-1	1
	836.5	20525	10	16QAM	25	0	21.81	0-2	2
	836.5	20525	10	16QAM	25	12	21.78	0-2	2
	836.5	20525	10	16QAM	25	25	21.78	0-2	2
	836.5	20525	10	16QAM	50	0	21.87	0-2	2

Note: LTE Band 5 (Cell) at 10 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 8-12
LTE Band 5 (Cell) 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	826.5	20425	5	QPSK	1	0	23.51	0	0
	826.5	20425	5	QPSK	1	12	23.51	0	0
	826.5	20425	5	QPSK	1	24	23.55	0	0
	826.5	20425	5	QPSK	12	0	22.79	0-1	1
	826.5	20425	5	QPSK	12	6	22.85	0-1	1
	826.5	20425	5	QPSK	12	13	22.80	0-1	1
	826.5	20425	5	QPSK	25	0	22.70	0-1	1
	826.5	20425	5	16-QAM	1	0	22.84	0-1	1
	826.5	20425	5	16-QAM	1	12	22.60	0-1	1
	826.5	20425	5	16-QAM	1	24	22.84	0-1	1
	826.5	20425	5	16-QAM	12	0	21.82	0-2	2
	826.5	20425	5	16-QAM	12	6	21.69	0-2	2
	826.5	20425	5	16-QAM	12	13	21.70	0-2	2
	826.5	20425	5	16-QAM	25	0	21.88	0-2	2
Mid	836.5	20525	5	QPSK	1	0	23.58	0	0
	836.5	20525	5	QPSK	1	12	23.44	0	0
	836.5	20525	5	QPSK	1	24	23.53	0	0
	836.5	20525	5	QPSK	12	0	22.80	0-1	1
	836.5	20525	5	QPSK	12	6	22.81	0-1	1
	836.5	20525	5	QPSK	12	13	22.73	0-1	1
	836.5	20525	5	QPSK	25	0	22.87	0-1	1
	836.5	20525	5	16-QAM	1	0	22.58	0-1	1
	836.5	20525	5	16-QAM	1	12	22.36	0-1	1
	836.5	20525	5	16-QAM	1	24	22.60	0-1	1
	836.5	20525	5	16-QAM	12	0	21.77	0-2	2
	836.5	20525	5	16-QAM	12	6	21.83	0-2	2
	836.5	20525	5	16-QAM	12	13	21.95	0-2	2
	836.5	20525	5	16-QAM	25	0	21.75	0-2	2
High	846.5	20625	5	QPSK	1	0	23.92	0	0
	846.5	20625	5	QPSK	1	12	23.73	0	0
	846.5	20625	5	QPSK	1	24	23.93	0	0
	846.5	20625	5	QPSK	12	0	22.79	0-1	1
	846.5	20625	5	QPSK	12	6	22.82	0-1	1
	846.5	20625	5	QPSK	12	13	22.83	0-1	1
	846.5	20625	5	QPSK	25	0	22.84	0-1	1
	846.5	20625	5	16-QAM	1	0	23.00	0-1	1
	846.5	20625	5	16-QAM	1	12	22.90	0-1	1
	846.5	20625	5	16-QAM	1	24	22.91	0-1	1
	846.5	20625	5	16-QAM	12	0	21.66	0-2	2
	846.5	20625	5	16-QAM	12	6	21.72	0-2	2
	846.5	20625	5	16-QAM	12	13	21.69	0-2	2
	846.5	20625	5	16-QAM	25	0	21.81	0-2	2

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Table 8-13
LTE Band 5 (Cell) 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	825.5	20415	3	QPSK	1	0	23.70	0	0
	825.5	20415	3	QPSK	1	7	24.00	0	0
	825.5	20415	3	QPSK	1	14	23.76	0	0
	825.5	20415	3	QPSK	8	0	22.86	0-1	1
	825.5	20415	3	QPSK	8	4	22.77	0-1	1
	825.5	20415	3	QPSK	8	7	22.74	0-1	1
	825.5	20415	3	QPSK	15	0	22.80	0-1	1
	825.5	20415	3	16-QAM	1	0	22.78	0-1	1
	825.5	20415	3	16-QAM	1	7	22.80	0-1	1
	825.5	20415	3	16-QAM	1	14	22.72	0-1	1
	825.5	20415	3	16-QAM	8	0	21.59	0-2	2
	825.5	20415	3	16-QAM	8	4	21.74	0-2	2
	825.5	20415	3	16-QAM	8	7	21.61	0-2	2
	825.5	20415	3	16-QAM	15	0	21.87	0-2	2
Mid	836.5	20525	3	QPSK	1	0	23.90	0	0
	836.5	20525	3	QPSK	1	7	23.97	0	0
	836.5	20525	3	QPSK	1	14	23.99	0	0
	836.5	20525	3	QPSK	8	0	22.82	0-1	1
	836.5	20525	3	QPSK	8	4	22.68	0-1	1
	836.5	20525	3	QPSK	8	7	22.83	0-1	1
	836.5	20525	3	QPSK	15	0	22.84	0-1	1
	836.5	20525	3	16-QAM	1	0	23.00	0-1	1
	836.5	20525	3	16-QAM	1	7	22.99	0-1	1
	836.5	20525	3	16-QAM	1	14	23.00	0-1	1
	836.5	20525	3	16-QAM	8	0	21.80	0-2	2
	836.5	20525	3	16-QAM	8	4	21.81	0-2	2
	836.5	20525	3	16-QAM	8	7	21.82	0-2	2
	836.5	20525	3	16-QAM	15	0	21.94	0-2	2
High	847.5	20635	3	QPSK	1	0	23.77	0	0
	847.5	20635	3	QPSK	1	7	23.90	0	0
	847.5	20635	3	QPSK	1	14	23.93	0	0
	847.5	20635	3	QPSK	8	0	22.78	0-1	1
	847.5	20635	3	QPSK	8	4	22.72	0-1	1
	847.5	20635	3	QPSK	8	7	22.76	0-1	1
	847.5	20635	3	QPSK	15	0	22.85	0-1	1
	847.5	20635	3	16-QAM	1	0	22.66	0-1	1
	847.5	20635	3	16-QAM	1	7	22.89	0-1	1
	847.5	20635	3	16-QAM	1	14	22.55	0-1	1
	847.5	20635	3	16-QAM	8	0	21.72	0-2	2
	847.5	20635	3	16-QAM	8	4	21.90	0-2	2
	847.5	20635	3	16-QAM	8	7	21.88	0-2	2
	847.5	20635	3	16-QAM	15	0	21.93	0-2	2

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Table 8-14
LTE Band 5 (Cell) 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	824.7	20407	1.4	QPSK	1	0	23.92	0	0
	824.7	20407	1.4	QPSK	1	2	23.87	0	0
	824.7	20407	1.4	QPSK	1	5	23.89	0	0
	824.7	20407	1.4	QPSK	3	0	23.76	0	0
	824.7	20407	1.4	QPSK	3	2	23.74	0	0
	824.7	20407	1.4	QPSK	3	3	23.69	0	0
	824.7	20407	1.4	QPSK	6	0	22.71	0-1	1
	824.7	20407	1.4	16-QAM	1	0	22.83	0-1	1
	824.7	20407	1.4	16-QAM	1	2	22.92	0-1	1
	824.7	20407	1.4	16-QAM	1	5	22.84	0-1	1
	824.7	20407	1.4	16-QAM	3	0	22.99	0-1	1
	824.7	20407	1.4	16-QAM	3	2	22.82	0-1	1
	824.7	20407	1.4	16-QAM	3	3	22.67	0-1	1
	824.7	20407	1.4	16-QAM	6	0	21.96	0-2	2
Mid	836.5	20525	1.4	QPSK	1	0	23.74	0	0
	836.5	20525	1.4	QPSK	1	2	23.77	0	0
	836.5	20525	1.4	QPSK	1	5	23.87	0	0
	836.5	20525	1.4	QPSK	3	0	23.65	0	0
	836.5	20525	1.4	QPSK	3	2	23.75	0	0
	836.5	20525	1.4	QPSK	3	3	23.72	0	0
	836.5	20525	1.4	QPSK	6	0	22.82	0-1	1
	836.5	20525	1.4	16-QAM	1	0	22.99	0-1	1
	836.5	20525	1.4	16-QAM	1	2	23.00	0-1	1
	836.5	20525	1.4	16-QAM	1	5	22.97	0-1	1
	836.5	20525	1.4	16-QAM	3	0	22.80	0-1	1
	836.5	20525	1.4	16-QAM	3	2	22.92	0-1	1
	836.5	20525	1.4	16-QAM	3	3	22.76	0-1	1
	836.5	20525	1.4	16-QAM	6	0	21.94	0-2	2
High	848.3	20643	1.4	QPSK	1	0	23.85	0	0
	848.3	20643	1.4	QPSK	1	2	23.96	0	0
	848.3	20643	1.4	QPSK	1	5	23.88	0	0
	848.3	20643	1.4	QPSK	3	0	23.90	0	0
	848.3	20643	1.4	QPSK	3	2	24.00	0	0
	848.3	20643	1.4	QPSK	3	3	23.99	0	0
	848.3	20643	1.4	QPSK	6	0	22.91	0-1	1
	848.3	20643	1.4	16-QAM	1	0	22.44	0-1	1
	848.3	20643	1.4	16-QAM	1	2	22.39	0-1	1
	848.3	20643	1.4	16-QAM	1	5	22.53	0-1	1
	848.3	20643	1.4	16-QAM	3	0	22.69	0-1	1
	848.3	20643	1.4	16-QAM	3	2	22.77	0-1	1
	848.3	20643	1.4	16-QAM	3	3	22.78	0-1	1
	848.3	20643	1.4	16-QAM	6	0	21.80	0-2	2

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Table 8-15
LTE Band 5 (Cell) 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	836.5	20525	10	QPSK	1	0	**20.00**	0	0
	836.5	20525	10	QPSK	1	25	19.92	0	0
	836.5	20525	10	QPSK	1	49	19.99	0	0
	836.5	20525	10	QPSK	25	0	**19.94**	0-1	0
	836.5	20525	10	QPSK	25	12	19.86	0-1	0
	836.5	20525	10	QPSK	25	25	19.85	0-1	0
	836.5	20525	10	QPSK	50	0	19.88	0-1	0
	836.5	20525	10	16QAM	1	0	20.00	0-1	0
	836.5	20525	10	16QAM	1	25	19.98	0-1	0
	836.5	20525	10	16QAM	1	49	19.86	0-1	0
	836.5	20525	10	16QAM	25	0	19.89	0-2	0
	836.5	20525	10	16QAM	25	12	19.80	0-2	0
	836.5	20525	10	16QAM	25	25	19.71	0-2	0
	836.5	20525	10	16QAM	50	0	19.98	0-2	0

Note: LTE Band 5 (Cell) at 10 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 8-16
LTE Band 5 (Cell) 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	826.5	20425	5	QPSK	1	0	19.63	0	0
	826.5	20425	5	QPSK	1	12	19.50	0	0
	826.5	20425	5	QPSK	1	24	19.66	0	0
	826.5	20425	5	QPSK	12	0	19.78	0-1	0
	826.5	20425	5	QPSK	12	6	19.67	0-1	0
	826.5	20425	5	QPSK	12	13	19.76	0-1	0
	826.5	20425	5	QPSK	25	0	19.82	0-1	0
	826.5	20425	5	16-QAM	1	0	19.39	0-1	0
	826.5	20425	5	16-QAM	1	12	19.44	0-1	0
	826.5	20425	5	16-QAM	1	24	19.58	0-1	0
	826.5	20425	5	16-QAM	12	0	19.62	0-2	0
	826.5	20425	5	16-QAM	12	6	19.61	0-2	0
	826.5	20425	5	16-QAM	12	13	19.61	0-2	0
	826.5	20425	5	16-QAM	25	0	19.90	0-2	0
Mid	836.5	20525	5	QPSK	1	0	19.66	0	0
	836.5	20525	5	QPSK	1	12	20.00	0	0
	836.5	20525	5	QPSK	1	24	19.97	0	0
	836.5	20525	5	QPSK	12	0	19.90	0-1	0
	836.5	20525	5	QPSK	12	6	19.81	0-1	0
	836.5	20525	5	QPSK	12	13	19.81	0-1	0
	836.5	20525	5	QPSK	25	0	19.91	0-1	0
	836.5	20525	5	16-QAM	1	0	19.50	0-1	0
	836.5	20525	5	16-QAM	1	12	19.83	0-1	0
	836.5	20525	5	16-QAM	1	24	19.89	0-1	0
	836.5	20525	5	16-QAM	12	0	19.76	0-2	0
	836.5	20525	5	16-QAM	12	6	19.74	0-2	0
	836.5	20525	5	16-QAM	12	13	19.77	0-2	0
	836.5	20525	5	16-QAM	25	0	19.70	0-2	0
High	846.5	20625	5	QPSK	1	0	19.67	0	0
	846.5	20625	5	QPSK	1	12	19.63	0	0
	846.5	20625	5	QPSK	1	24	19.98	0	0
	846.5	20625	5	QPSK	12	0	19.76	0-1	0
	846.5	20625	5	QPSK	12	6	19.81	0-1	0
	846.5	20625	5	QPSK	12	13	19.79	0-1	0
	846.5	20625	5	QPSK	25	0	19.85	0-1	0
	846.5	20625	5	16-QAM	1	0	19.94	0-1	0
	846.5	20625	5	16-QAM	1	12	19.64	0-1	0
	846.5	20625	5	16-QAM	1	24	19.85	0-1	0
	846.5	20625	5	16-QAM	12	0	19.49	0-2	0
	846.5	20625	5	16-QAM	12	6	19.74	0-2	0
	846.5	20625	5	16-QAM	12	13	19.82	0-2	0
	846.5	20625	5	16-QAM	25	0	19.93	0-2	0

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Table 8-17
LTE Band 5 (Cell) 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	825.5	20415	3	QPSK	1	0	19.76	0	0
	825.5	20415	3	QPSK	1	7	19.90	0	0
	825.5	20415	3	QPSK	1	14	20.00	0	0
	825.5	20415	3	QPSK	8	0	19.85	0-1	0
	825.5	20415	3	QPSK	8	4	19.72	0-1	0
	825.5	20415	3	QPSK	8	7	19.71	0-1	0
	825.5	20415	3	QPSK	15	0	19.81	0-1	0
	825.5	20415	3	16-QAM	1	0	19.88	0-1	0
	825.5	20415	3	16-QAM	1	7	19.78	0-1	0
	825.5	20415	3	16-QAM	1	14	19.77	0-1	0
	825.5	20415	3	16-QAM	8	0	19.66	0-2	0
	825.5	20415	3	16-QAM	8	4	19.48	0-2	0
	825.5	20415	3	16-QAM	8	7	19.55	0-2	0
	825.5	20415	3	16-QAM	15	0	19.69	0-2	0
Mid	836.5	20525	3	QPSK	1	0	19.90	0	0
	836.5	20525	3	QPSK	1	7	20.00	0	0
	836.5	20525	3	QPSK	1	14	19.98	0	0
	836.5	20525	3	QPSK	8	0	19.84	0-1	0
	836.5	20525	3	QPSK	8	4	19.73	0-1	0
	836.5	20525	3	QPSK	8	7	19.84	0-1	0
	836.5	20525	3	QPSK	15	0	19.85	0-1	0
	836.5	20525	3	16-QAM	1	0	19.89	0-1	0
	836.5	20525	3	16-QAM	1	7	20.00	0-1	0
	836.5	20525	3	16-QAM	1	14	19.98	0-1	0
	836.5	20525	3	16-QAM	8	0	19.81	0-2	0
	836.5	20525	3	16-QAM	8	4	19.98	0-2	0
	836.5	20525	3	16-QAM	8	7	19.95	0-2	0
	836.5	20525	3	16-QAM	15	0	19.93	0-2	0
High	847.5	20635	3	QPSK	1	0	19.98	0	0
	847.5	20635	3	QPSK	1	7	19.99	0	0
	847.5	20635	3	QPSK	1	14	20.00	0	0
	847.5	20635	3	QPSK	8	0	19.76	0-1	0
	847.5	20635	3	QPSK	8	4	19.82	0-1	0
	847.5	20635	3	QPSK	8	7	19.72	0-1	0
	847.5	20635	3	QPSK	15	0	19.83	0-1	0
	847.5	20635	3	16-QAM	1	0	19.69	0-1	0
	847.5	20635	3	16-QAM	1	7	19.58	0-1	0
	847.5	20635	3	16-QAM	1	14	19.61	0-1	0
	847.5	20635	3	16-QAM	8	0	19.84	0-2	0
	847.5	20635	3	16-QAM	8	4	19.79	0-2	0
	847.5	20635	3	16-QAM	8	7	19.38	0-2	0
	847.5	20635	3	16-QAM	15	0	19.61	0-2	0

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Table 8-18
LTE Band 5 (Cell) 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	824.7	20407	1.4	QPSK	1	0	19.96	0	0
	824.7	20407	1.4	QPSK	1	2	20.00	0	0
	824.7	20407	1.4	QPSK	1	5	19.97	0	0
	824.7	20407	1.4	QPSK	3	0	19.86	0	0
	824.7	20407	1.4	QPSK	3	2	19.99	0	0
	824.7	20407	1.4	QPSK	3	3	19.93	0	0
	824.7	20407	1.4	QPSK	6	0	19.83	0-1	0
	824.7	20407	1.4	16-QAM	1	0	19.87	0-1	0
	824.7	20407	1.4	16-QAM	1	2	19.88	0-1	0
	824.7	20407	1.4	16-QAM	1	5	19.63	0-1	0
	824.7	20407	1.4	16-QAM	3	0	19.92	0-1	0
	824.7	20407	1.4	16-QAM	3	2	19.81	0-1	0
	824.7	20407	1.4	16-QAM	3	3	19.82	0-1	0
	824.7	20407	1.4	16-QAM	6	0	19.98	0-2	0
Mid	836.5	20525	1.4	QPSK	1	0	19.73	0	0
	836.5	20525	1.4	QPSK	1	2	19.75	0	0
	836.5	20525	1.4	QPSK	1	5	19.69	0	0
	836.5	20525	1.4	QPSK	3	0	19.65	0	0
	836.5	20525	1.4	QPSK	3	2	19.90	0	0
	836.5	20525	1.4	QPSK	3	3	19.75	0	0
	836.5	20525	1.4	QPSK	6	0	19.83	0-1	0
	836.5	20525	1.4	16-QAM	1	0	19.99	0-1	0
	836.5	20525	1.4	16-QAM	1	2	20.00	0-1	0
	836.5	20525	1.4	16-QAM	1	5	19.91	0-1	0
	836.5	20525	1.4	16-QAM	3	0	19.79	0-1	0
	836.5	20525	1.4	16-QAM	3	2	19.83	0-1	0
	836.5	20525	1.4	16-QAM	3	3	19.74	0-1	0
	836.5	20525	1.4	16-QAM	6	0	19.97	0-2	0
High	848.3	20643	1.4	QPSK	1	0	19.76	0	0
	848.3	20643	1.4	QPSK	1	2	19.83	0	0
	848.3	20643	1.4	QPSK	1	5	19.79	0	0
	848.3	20643	1.4	QPSK	3	0	19.83	0	0
	848.3	20643	1.4	QPSK	3	2	19.89	0	0
	848.3	20643	1.4	QPSK	3	3	19.76	0	0
	848.3	20643	1.4	QPSK	6	0	19.81	0-1	0
	848.3	20643	1.4	16-QAM	1	0	19.35	0-1	0
	848.3	20643	1.4	16-QAM	1	2	19.78	0-1	0
	848.3	20643	1.4	16-QAM	1	5	19.94	0-1	0
	848.3	20643	1.4	16-QAM	3	0	19.31	0-1	0
	848.3	20643	1.4	16-QAM	3	2	19.92	0-1	0
	848.3	20643	1.4	16-QAM	3	3	20.00	0-1	0
	848.3	20643	1.4	16-QAM	6	0	19.80	0-2	0

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8.2.3 LTE Band 4 (AWS)

Table 8-19
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	23.16	0	0
	1732.5	20175	20	QPSK	1	50	**23.20**	0	0
	1732.5	20175	20	QPSK	1	99	22.90	0	0
	1732.5	20175	20	QPSK	50	0	**21.85**	0-1	1
	1732.5	20175	20	QPSK	50	25	21.60	0-1	1
	1732.5	20175	20	QPSK	50	50	21.58	0-1	1
	1732.5	20175	20	QPSK	100	0	21.61	0-1	1
	1732.5	20175	20	16QAM	1	0	22.10	0-1	1
	1732.5	20175	20	16QAM	1	50	22.01	0-1	1
	1732.5	20175	20	16QAM	1	99	22.00	0-1	1
	1732.5	20175	20	16QAM	50	0	20.82	0-2	2
	1732.5	20175	20	16QAM	50	25	20.78	0-2	2
	1732.5	20175	20	16QAM	50	50	20.69	0-2	2
	1732.5	20175	20	16QAM	100	0	20.72	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 8-20
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	23.33	0	0
	1717.5	20025	15	QPSK	1	36	23.38	0	0
	1717.5	20025	15	QPSK	1	74	23.21	0	0
	1717.5	20025	15	QPSK	36	0	22.29	0-1	1
	1717.5	20025	15	QPSK	36	18	22.27	0-1	1
	1717.5	20025	15	QPSK	36	37	22.20	0-1	1
	1717.5	20025	15	QPSK	75	0	22.27	0-1	1
	1717.5	20025	15	16QAM	1	0	22.48	0-1	1
	1717.5	20025	15	16QAM	1	36	22.41	0-1	1
	1717.5	20025	15	16QAM	1	74	22.45	0-1	1
	1717.5	20025	15	16QAM	36	0	21.29	0-2	2
	1717.5	20025	15	16QAM	36	18	21.25	0-2	2
	1717.5	20025	15	16QAM	36	37	21.28	0-2	2
	1717.5	20025	15	16QAM	75	0	21.34	0-2	2
Mid	1732.5	20175	15	QPSK	1	0	23.32	0	0
	1732.5	20175	15	QPSK	1	36	23.16	0	0
	1732.5	20175	15	QPSK	1	74	23.22	0	0
	1732.5	20175	15	QPSK	36	0	22.09	0-1	1
	1732.5	20175	15	QPSK	36	18	22.26	0-1	1
	1732.5	20175	15	QPSK	36	37	22.26	0-1	1
	1732.5	20175	15	QPSK	75	0	22.26	0-1	1
	1732.5	20175	15	16QAM	1	0	22.46	0-1	1
	1732.5	20175	15	16QAM	1	36	22.29	0-1	1
	1732.5	20175	15	16QAM	1	74	22.37	0-1	1
	1732.5	20175	15	16QAM	36	0	21.37	0-2	2
	1732.5	20175	15	16QAM	36	18	21.36	0-2	2
	1732.5	20175	15	16QAM	36	37	21.46	0-2	2
	1732.5	20175	15	16QAM	75	0	21.48	0-2	2
High	1747.5	20325	15	QPSK	1	0	23.39	0	0
	1747.5	20325	15	QPSK	1	36	23.37	0	0
	1747.5	20325	15	QPSK	1	74	23.27	0	0
	1747.5	20325	15	QPSK	36	0	22.21	0-1	1
	1747.5	20325	15	QPSK	36	18	22.13	0-1	1
	1747.5	20325	15	QPSK	36	37	22.05	0-1	1
	1747.5	20325	15	QPSK	75	0	22.14	0-1	1
	1747.5	20325	15	16QAM	1	0	22.47	0-1	1
	1747.5	20325	15	16QAM	1	36	22.23	0-1	1
	1747.5	20325	15	16QAM	1	74	22.42	0-1	1
	1747.5	20325	15	16QAM	36	0	21.34	0-2	2
	1747.5	20325	15	16QAM	36	18	21.35	0-2	2
	1747.5	20325	15	16QAM	36	37	21.27	0-2	2
	1747.5	20325	15	16QAM	75	0	21.40	0-2	2

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Table 8-21
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	23.21	0	0
	1715	20000	10	QPSK	1	25	23.17	0	0
	1715	20000	10	QPSK	1	49	23.16	0	0
	1715	20000	10	QPSK	25	0	22.32	0-1	1
	1715	20000	10	QPSK	25	12	22.32	0-1	1
	1715	20000	10	QPSK	25	25	22.32	0-1	1
	1715	20000	10	QPSK	50	0	22.25	0-1	1
	1715	20000	10	16QAM	1	0	22.37	0-1	1
	1715	20000	10	16QAM	1	25	22.42	0-1	1
	1715	20000	10	16QAM	1	49	22.43	0-1	1
	1715	20000	10	16QAM	25	0	21.27	0-2	2
	1715	20000	10	16QAM	25	12	21.29	0-2	2
	1715	20000	10	16QAM	25	25	21.44	0-2	2
	1715	20000	10	16QAM	50	0	21.41	0-2	2
Mid	1732.5	20175	10	QPSK	1	0	23.39	0	0
	1732.5	20175	10	QPSK	1	25	23.32	0	0
	1732.5	20175	10	QPSK	1	49	23.37	0	0
	1732.5	20175	10	QPSK	25	0	22.09	0-1	1
	1732.5	20175	10	QPSK	25	12	22.22	0-1	1
	1732.5	20175	10	QPSK	25	25	22.23	0-1	1
	1732.5	20175	10	QPSK	50	0	22.26	0-1	1
	1732.5	20175	10	16QAM	1	0	22.46	0-1	1
	1732.5	20175	10	16QAM	1	25	22.35	0-1	1
	1732.5	20175	10	16QAM	1	49	22.46	0-1	1
	1732.5	20175	10	16QAM	25	0	21.38	0-2	2
	1732.5	20175	10	16QAM	25	12	21.50	0-2	2
	1732.5	20175	10	16QAM	25	25	21.48	0-2	2
	1732.5	20175	10	16QAM	50	0	21.42	0-2	2
High	1750	20350	10	QPSK	1	0	23.27	0	0
	1750	20350	10	QPSK	1	25	23.24	0	0
	1750	20350	10	QPSK	1	49	23.29	0	0
	1750	20350	10	QPSK	25	0	22.19	0-1	1
	1750	20350	10	QPSK	25	12	22.07	0-1	1
	1750	20350	10	QPSK	25	25	22.06	0-1	1
	1750	20350	10	QPSK	50	0	22.09	0-1	1
	1750	20350	10	16QAM	1	0	22.42	0-1	1
	1750	20350	10	16QAM	1	25	22.23	0-1	1
	1750	20350	10	16QAM	1	49	22.42	0-1	1
	1750	20350	10	16QAM	25	0	21.48	0-2	2
	1750	20350	10	16QAM	25	12	21.48	0-2	2
	1750	20350	10	16QAM	25	25	21.27	0-2	2
	1750	20350	10	16QAM	50	0	21.40	0-2	2

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Table 8-22
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	23.13	0	0
	1712.5	19975	5	QPSK	1	12	23.27	0	0
	1712.5	19975	5	QPSK	1	24	23.00	0	0
	1712.5	19975	5	QPSK	12	0	22.30	0-1	1
	1712.5	19975	5	QPSK	12	6	22.21	0-1	1
	1712.5	19975	5	QPSK	12	13	22.27	0-1	1
	1712.5	19975	5	QPSK	25	0	22.21	0-1	1
	1712.5	19975	5	16-QAM	1	0	22.33	0-1	1
	1712.5	19975	5	16-QAM	1	12	22.08	0-1	1
	1712.5	19975	5	16-QAM	1	24	22.22	0-1	1
	1712.5	19975	5	16-QAM	12	0	21.26	0-2	2
	1712.5	19975	5	16-QAM	12	6	21.36	0-2	2
	1712.5	19975	5	16-QAM	12	13	21.48	0-2	2
	1712.5	19975	5	16-QAM	25	0	21.47	0-2	2
Mid	1732.5	20175	5	QPSK	1	0	23.06	0	0
	1732.5	20175	5	QPSK	1	12	23.33	0	0
	1732.5	20175	5	QPSK	1	24	23.20	0	0
	1732.5	20175	5	QPSK	12	0	22.04	0-1	1
	1732.5	20175	5	QPSK	12	6	21.90	0-1	1
	1732.5	20175	5	QPSK	12	13	22.08	0-1	1
	1732.5	20175	5	QPSK	25	0	22.01	0-1	1
	1732.5	20175	5	16-QAM	1	0	22.13	0-1	1
	1732.5	20175	5	16-QAM	1	12	22.21	0-1	1
	1732.5	20175	5	16-QAM	1	24	22.13	0-1	1
	1732.5	20175	5	16-QAM	12	0	20.91	0-2	2
	1732.5	20175	5	16-QAM	12	6	20.95	0-2	2
	1732.5	20175	5	16-QAM	12	13	21.04	0-2	2
	1732.5	20175	5	16-QAM	25	0	20.95	0-2	2
High	1752.5	20375	5	QPSK	1	0	23.02	0	0
	1752.5	20375	5	QPSK	1	12	22.81	0	0
	1752.5	20375	5	QPSK	1	24	22.92	0	0
	1752.5	20375	5	QPSK	12	0	22.10	0-1	1
	1752.5	20375	5	QPSK	12	6	22.31	0-1	1
	1752.5	20375	5	QPSK	12	13	22.16	0-1	1
	1752.5	20375	5	QPSK	25	0	22.20	0-1	1
	1752.5	20375	5	16-QAM	1	0	22.17	0-1	1
	1752.5	20375	5	16-QAM	1	12	22.21	0-1	1
	1752.5	20375	5	16-QAM	1	24	22.36	0-1	1
	1752.5	20375	5	16-QAM	12	0	21.50	0-2	2
	1752.5	20375	5	16-QAM	12	6	21.39	0-2	2
	1752.5	20375	5	16-QAM	12	13	21.45	0-2	2
	1752.5	20375	5	16-QAM	25	0	21.42	0-2	2

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Table 8-23
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	23.17	0	0
	1711.5	19965	3	QPSK	1	7	23.35	0	0
	1711.5	19965	3	QPSK	1	14	23.38	0	0
	1711.5	19965	3	QPSK	8	0	22.23	0-1	1
	1711.5	19965	3	QPSK	8	4	22.25	0-1	1
	1711.5	19965	3	QPSK	8	7	22.28	0-1	1
	1711.5	19965	3	QPSK	15	0	22.20	0-1	1
	1711.5	19965	3	16-QAM	1	0	22.45	0-1	1
	1711.5	19965	3	16-QAM	1	7	22.31	0-1	1
	1711.5	19965	3	16-QAM	1	14	22.18	0-1	1
	1711.5	19965	3	16-QAM	8	0	21.37	0-2	2
	1711.5	19965	3	16-QAM	8	4	21.27	0-2	2
	1711.5	19965	3	16-QAM	8	7	21.31	0-2	2
	1711.5	19965	3	16-QAM	15	0	21.29	0-2	2
Mid	1732.5	20175	3	QPSK	1	0	23.31	0	0
	1732.5	20175	3	QPSK	1	7	23.34	0	0
	1732.5	20175	3	QPSK	1	14	23.38	0	0
	1732.5	20175	3	QPSK	8	0	22.24	0-1	1
	1732.5	20175	3	QPSK	8	4	22.25	0-1	1
	1732.5	20175	3	QPSK	8	7	22.22	0-1	1
	1732.5	20175	3	QPSK	15	0	22.24	0-1	1
	1732.5	20175	3	16-QAM	1	0	22.40	0-1	1
	1732.5	20175	3	16-QAM	1	7	22.44	0-1	1
	1732.5	20175	3	16-QAM	1	14	22.11	0-1	1
	1732.5	20175	3	16-QAM	8	0	21.44	0-2	2
	1732.5	20175	3	16-QAM	8	4	21.49	0-2	2
	1732.5	20175	3	16-QAM	8	7	21.46	0-2	2
	1732.5	20175	3	16-QAM	15	0	21.48	0-2	2
High	1753.5	20385	3	QPSK	1	0	23.21	0	0
	1753.5	20385	3	QPSK	1	7	23.34	0	0
	1753.5	20385	3	QPSK	1	14	23.20	0	0
	1753.5	20385	3	QPSK	8	0	22.08	0-1	1
	1753.5	20385	3	QPSK	8	4	22.04	0-1	1
	1753.5	20385	3	QPSK	8	7	21.99	0-1	1
	1753.5	20385	3	QPSK	15	0	22.03	0-1	1
	1753.5	20385	3	16-QAM	1	0	22.21	0-1	1
	1753.5	20385	3	16-QAM	1	7	22.35	0-1	1
	1753.5	20385	3	16-QAM	1	14	22.16	0-1	1
	1753.5	20385	3	16-QAM	8	0	21.19	0-2	2
	1753.5	20385	3	16-QAM	8	4	21.13	0-2	2
	1753.5	20385	3	16-QAM	8	7	21.11	0-2	2
	1753.5	20385	3	16-QAM	15	0	21.07	0-2	2

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Table 8-24
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	23.02	0	0
	1710.7	19957	1.4	QPSK	1	2	23.06	0	0
	1710.7	19957	1.4	QPSK	1	5	22.83	0	0
	1710.7	19957	1.4	QPSK	3	0	23.21	0	0
	1710.7	19957	1.4	QPSK	3	2	22.99	0	0
	1710.7	19957	1.4	QPSK	3	3	22.95	0	0
	1710.7	19957	1.4	QPSK	6	0	22.10	0-1	1
	1710.7	19957	1.4	16-QAM	1	0	22.15	0-1	1
	1710.7	19957	1.4	16-QAM	1	2	22.48	0-1	1
	1710.7	19957	1.4	16-QAM	1	5	22.23	0-1	1
	1710.7	19957	1.4	16-QAM	3	0	22.02	0-1	1
	1710.7	19957	1.4	16-QAM	3	2	22.05	0-1	1
	1710.7	19957	1.4	16-QAM	3	3	22.31	0-1	1
	1710.7	19957	1.4	16-QAM	6	0	21.15	0-2	2
Mid	1732.5	20175	1.4	QPSK	1	0	23.22	0	0
	1732.5	20175	1.4	QPSK	1	2	23.40	0	0
	1732.5	20175	1.4	QPSK	1	5	23.24	0	0
	1732.5	20175	1.4	QPSK	3	0	23.25	0	0
	1732.5	20175	1.4	QPSK	3	2	23.26	0	0
	1732.5	20175	1.4	QPSK	3	3	23.22	0	0
	1732.5	20175	1.4	QPSK	6	0	22.34	0-1	1
	1732.5	20175	1.4	16-QAM	1	0	22.32	0-1	1
	1732.5	20175	1.4	16-QAM	1	2	22.13	0-1	1
	1732.5	20175	1.4	16-QAM	1	5	22.11	0-1	1
	1732.5	20175	1.4	16-QAM	3	0	22.17	0-1	1
	1732.5	20175	1.4	16-QAM	3	2	22.25	0-1	1
	1732.5	20175	1.4	16-QAM	3	3	22.23	0-1	1
	1732.5	20175	1.4	16-QAM	6	0	21.19	0-2	2
High	1754.3	20393	1.4	QPSK	1	0	23.22	0	0
	1754.3	20393	1.4	QPSK	1	2	23.47	0	0
	1754.3	20393	1.4	QPSK	1	5	23.41	0	0
	1754.3	20393	1.4	QPSK	3	0	23.19	0	0
	1754.3	20393	1.4	QPSK	3	2	23.22	0	0
	1754.3	20393	1.4	QPSK	3	3	23.23	0	0
	1754.3	20393	1.4	QPSK	6	0	22.14	0-1	1
	1754.3	20393	1.4	16-QAM	1	0	22.20	0-1	1
	1754.3	20393	1.4	16-QAM	1	2	22.12	0-1	1
	1754.3	20393	1.4	16-QAM	1	5	21.69	0-1	1
	1754.3	20393	1.4	16-QAM	3	0	21.65	0-1	1
	1754.3	20393	1.4	16-QAM	3	2	21.70	0-1	1
	1754.3	20393	1.4	16-QAM	3	3	21.85	0-1	1
	1754.3	20393	1.4	16-QAM	6	0	21.24	0-2	2

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Table 8-25
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	**11.83**	0	0
	1732.5	20175	20	QPSK	1	50	11.70	0	0
	1732.5	20175	20	QPSK	1	99	11.69	0	0
	1732.5	20175	20	QPSK	50	0	**11.65**	0-1	0
	1732.5	20175	20	QPSK	50	25	11.63	0-1	0
	1732.5	20175	20	QPSK	50	50	11.58	0-1	0
	1732.5	20175	20	QPSK	100	0	11.54	0-1	0
	1732.5	20175	20	16QAM	1	0	11.74	0-1	0
	1732.5	20175	20	16QAM	1	50	11.81	0-1	0
	1732.5	20175	20	16QAM	1	99	11.51	0-1	0
	1732.5	20175	20	16QAM	50	0	11.62	0-2	0
	1732.5	20175	20	16QAM	50	25	11.63	0-2	0
	1732.5	20175	20	16QAM	50	50	11.54	0-2	0
	1732.5	20175	20	16QAM	100	0	11.53	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 8-26
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	11.74	0	0
	1717.5	20025	15	QPSK	1	36	11.57	0	0
	1717.5	20025	15	QPSK	1	74	11.59	0	0
	1717.5	20025	15	QPSK	36	0	11.61	0-1	0
	1717.5	20025	15	QPSK	36	18	11.52	0-1	0
	1717.5	20025	15	QPSK	36	37	11.55	0-1	0
	1717.5	20025	15	QPSK	75	0	11.51	0-1	0
	1717.5	20025	15	16QAM	1	0	11.84	0-1	0
	1717.5	20025	15	16QAM	1	36	11.77	0-1	0
	1717.5	20025	15	16QAM	1	74	11.75	0-1	0
	1717.5	20025	15	16QAM	36	0	11.59	0-2	0
	1717.5	20025	15	16QAM	36	18	11.52	0-2	0
	1717.5	20025	15	16QAM	36	37	11.55	0-2	0
	1717.5	20025	15	16QAM	75	0	11.50	0-2	0
Mid	1732.5	20175	15	QPSK	1	0	11.68	0	0
	1732.5	20175	15	QPSK	1	36	11.54	0	0
	1732.5	20175	15	QPSK	1	74	11.59	0	0
	1732.5	20175	15	QPSK	36	0	11.64	0-1	0
	1732.5	20175	15	QPSK	36	18	11.61	0-1	0
	1732.5	20175	15	QPSK	36	37	11.58	0-1	0
	1732.5	20175	15	QPSK	75	0	11.69	0-1	0
	1732.5	20175	15	16QAM	1	0	11.74	0-1	0
	1732.5	20175	15	16QAM	1	36	11.76	0-1	0
	1732.5	20175	15	16QAM	1	74	11.65	0-1	0
	1732.5	20175	15	16QAM	36	0	11.54	0-2	0
	1732.5	20175	15	16QAM	36	18	11.52	0-2	0
	1732.5	20175	15	16QAM	36	37	11.63	0-2	0
	1732.5	20175	15	16QAM	75	0	11.58	0-2	0
High	1747.5	20325	15	QPSK	1	0	11.59	0	0
	1747.5	20325	15	QPSK	1	36	11.54	0	0
	1747.5	20325	15	QPSK	1	74	11.65	0	0
	1747.5	20325	15	QPSK	36	0	11.67	0-1	0
	1747.5	20325	15	QPSK	36	18	11.58	0-1	0
	1747.5	20325	15	QPSK	36	37	11.53	0-1	0
	1747.5	20325	15	QPSK	75	0	11.56	0-1	0
	1747.5	20325	15	16QAM	1	0	11.77	0-1	0
	1747.5	20325	15	16QAM	1	36	11.81	0-1	0
	1747.5	20325	15	16QAM	1	74	11.75	0-1	0
	1747.5	20325	15	16QAM	36	0	11.65	0-2	0
	1747.5	20325	15	16QAM	36	18	11.65	0-2	0
	1747.5	20325	15	16QAM	36	37	11.57	0-2	0
	1747.5	20325	15	16QAM	75	0	11.52	0-2	0

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Table 8-27
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	11.88	0	0
	1715	20000	10	QPSK	1	25	11.69	0	0
	1715	20000	10	QPSK	1	49	11.68	0	0
	1715	20000	10	QPSK	25	0	11.53	0-1	0
	1715	20000	10	QPSK	25	12	11.55	0-1	0
	1715	20000	10	QPSK	25	25	11.59	0-1	0
	1715	20000	10	QPSK	50	0	11.59	0-1	0
	1715	20000	10	16QAM	1	0	11.69	0-1	0
	1715	20000	10	16QAM	1	25	11.74	0-1	0
	1715	20000	10	16QAM	1	49	11.75	0-1	0
	1715	20000	10	16QAM	25	0	11.79	0-2	0
	1715	20000	10	16QAM	25	12	11.72	0-2	0
	1715	20000	10	16QAM	25	25	11.62	0-2	0
	1715	20000	10	16QAM	50	0	11.66	0-2	0
Mid	1732.5	20175	10	QPSK	1	0	11.65	0	0
	1732.5	20175	10	QPSK	1	25	11.54	0	0
	1732.5	20175	10	QPSK	1	49	11.52	0	0
	1732.5	20175	10	QPSK	25	0	11.66	0-1	0
	1732.5	20175	10	QPSK	25	12	11.66	0-1	0
	1732.5	20175	10	QPSK	25	25	11.62	0-1	0
	1732.5	20175	10	QPSK	50	0	11.64	0-1	0
	1732.5	20175	10	16QAM	1	0	11.76	0-1	0
	1732.5	20175	10	16QAM	1	25	11.73	0-1	0
	1732.5	20175	10	16QAM	1	49	11.74	0-1	0
	1732.5	20175	10	16QAM	25	0	11.73	0-2	0
	1732.5	20175	10	16QAM	25	12	11.64	0-2	0
	1732.5	20175	10	16QAM	25	25	11.66	0-2	0
	1732.5	20175	10	16QAM	50	0	11.66	0-2	0
High	1750	20350	10	QPSK	1	0	11.56	0	0
	1750	20350	10	QPSK	1	25	11.58	0	0
	1750	20350	10	QPSK	1	49	11.65	0	0
	1750	20350	10	QPSK	25	0	11.69	0-1	0
	1750	20350	10	QPSK	25	12	11.64	0-1	0
	1750	20350	10	QPSK	25	25	11.54	0-1	0
	1750	20350	10	QPSK	50	0	11.59	0-1	0
	1750	20350	10	16QAM	1	0	11.68	0-1	0
	1750	20350	10	16QAM	1	25	11.64	0-1	0
	1750	20350	10	16QAM	1	49	11.71	0-1	0
	1750	20350	10	16QAM	25	0	11.59	0-2	0
	1750	20350	10	16QAM	25	12	11.61	0-2	0
	1750	20350	10	16QAM	25	25	11.68	0-2	0
	1750	20350	10	16QAM	50	0	11.65	0-2	0

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Table 8-28
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	11.58	0	0
	1712.5	19975	5	QPSK	1	12	11.54	0	0
	1712.5	19975	5	QPSK	1	24	11.50	0	0
	1712.5	19975	5	QPSK	12	0	11.62	0-1	0
	1712.5	19975	5	QPSK	12	6	11.52	0-1	0
	1712.5	19975	5	QPSK	12	13	11.54	0-1	0
	1712.5	19975	5	QPSK	25	0	11.51	0-1	0
	1712.5	19975	5	16-QAM	1	0	11.58	0-1	0
	1712.5	19975	5	16-QAM	1	12	11.55	0-1	0
	1712.5	19975	5	16-QAM	1	24	11.59	0-1	0
	1712.5	19975	5	16-QAM	12	0	11.61	0-2	0
	1712.5	19975	5	16-QAM	12	6	11.51	0-2	0
	1712.5	19975	5	16-QAM	12	13	11.53	0-2	0
	1712.5	19975	5	16-QAM	25	0	11.60	0-2	0
Mid	1732.5	20175	5	QPSK	1	0	11.68	0	0
	1732.5	20175	5	QPSK	1	12	11.51	0	0
	1732.5	20175	5	QPSK	1	24	11.60	0	0
	1732.5	20175	5	QPSK	12	0	11.56	0-1	0
	1732.5	20175	5	QPSK	12	6	11.59	0-1	0
	1732.5	20175	5	QPSK	12	13	11.54	0-1	0
	1732.5	20175	5	QPSK	25	0	11.62	0-1	0
	1732.5	20175	5	16-QAM	1	0	11.68	0-1	0
	1732.5	20175	5	16-QAM	1	12	11.57	0-1	0
	1732.5	20175	5	16-QAM	1	24	11.54	0-1	0
	1732.5	20175	5	16-QAM	12	0	11.61	0-2	0
	1732.5	20175	5	16-QAM	12	6	11.59	0-2	0
	1732.5	20175	5	16-QAM	12	13	11.58	0-2	0
	1732.5	20175	5	16-QAM	25	0	11.65	0-2	0
High	1752.5	20375	5	QPSK	1	0	11.69	0	0
	1752.5	20375	5	QPSK	1	12	11.56	0	0
	1752.5	20375	5	QPSK	1	24	11.51	0	0
	1752.5	20375	5	QPSK	12	0	11.53	0-1	0
	1752.5	20375	5	QPSK	12	6	11.56	0-1	0
	1752.5	20375	5	QPSK	12	13	11.64	0-1	0
	1752.5	20375	5	QPSK	25	0	11.58	0-1	0
	1752.5	20375	5	16-QAM	1	0	11.66	0-1	0
	1752.5	20375	5	16-QAM	1	12	11.61	0-1	0
	1752.5	20375	5	16-QAM	1	24	11.68	0-1	0
	1752.5	20375	5	16-QAM	12	0	11.56	0-2	0
	1752.5	20375	5	16-QAM	12	6	11.61	0-2	0
	1752.5	20375	5	16-QAM	12	13	11.61	0-2	0
	1752.5	20375	5	16-QAM	25	0	11.54	0-2	0

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Table 8-29
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	11.57	0	0
	1711.5	19965	3	QPSK	1	7	11.54	0	0
	1711.5	19965	3	QPSK	1	14	11.51	0	0
	1711.5	19965	3	QPSK	8	0	11.57	0-1	0
	1711.5	19965	3	QPSK	8	4	11.52	0-1	0
	1711.5	19965	3	QPSK	8	7	11.58	0-1	0
	1711.5	19965	3	QPSK	15	0	11.56	0-1	0
	1711.5	19965	3	16-QAM	1	0	11.78	0-1	0
	1711.5	19965	3	16-QAM	1	7	11.72	0-1	0
	1711.5	19965	3	16-QAM	1	14	11.73	0-1	0
	1711.5	19965	3	16-QAM	8	0	11.78	0-2	0
	1711.5	19965	3	16-QAM	8	4	11.77	0-2	0
	1711.5	19965	3	16-QAM	8	7	11.82	0-2	0
	1711.5	19965	3	16-QAM	15	0	11.79	0-2	0
Mid	1732.5	20175	3	QPSK	1	0	11.54	0	0
	1732.5	20175	3	QPSK	1	7	11.52	0	0
	1732.5	20175	3	QPSK	1	14	11.57	0	0
	1732.5	20175	3	QPSK	8	0	11.63	0-1	0
	1732.5	20175	3	QPSK	8	4	11.61	0-1	0
	1732.5	20175	3	QPSK	8	7	11.53	0-1	0
	1732.5	20175	3	QPSK	15	0	11.54	0-1	0
	1732.5	20175	3	16-QAM	1	0	11.68	0-1	0
	1732.5	20175	3	16-QAM	1	7	11.74	0-1	0
	1732.5	20175	3	16-QAM	1	14	11.59	0-1	0
	1732.5	20175	3	16-QAM	8	0	11.56	0-2	0
	1732.5	20175	3	16-QAM	8	4	11.64	0-2	0
	1732.5	20175	3	16-QAM	8	7	11.69	0-2	0
	1732.5	20175	3	16-QAM	15	0	11.72	0-2	0
High	1753.5	20385	3	QPSK	1	0	11.73	0	0
	1753.5	20385	3	QPSK	1	7	11.61	0	0
	1753.5	20385	3	QPSK	1	14	11.56	0	0
	1753.5	20385	3	QPSK	8	0	11.68	0-1	0
	1753.5	20385	3	QPSK	8	4	11.72	0-1	0
	1753.5	20385	3	QPSK	8	7	11.65	0-1	0
	1753.5	20385	3	QPSK	15	0	11.60	0-1	0
	1753.5	20385	3	16-QAM	1	0	11.76	0-1	0
	1753.5	20385	3	16-QAM	1	7	11.75	0-1	0
	1753.5	20385	3	16-QAM	1	14	11.79	0-1	0
	1753.5	20385	3	16-QAM	8	0	11.69	0-2	0
	1753.5	20385	3	16-QAM	8	4	11.72	0-2	0
	1753.5	20385	3	16-QAM	8	7	11.76	0-2	0
	1753.5	20385	3	16-QAM	15	0	11.64	0-2	0

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Table 8-30
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	11.55	0	0
	1710.7	19957	1.4	QPSK	1	2	11.57	0	0
	1710.7	19957	1.4	QPSK	1	5	11.51	0	0
	1710.7	19957	1.4	QPSK	3	0	11.53	0	0
	1710.7	19957	1.4	QPSK	3	2	11.73	0	0
	1710.7	19957	1.4	QPSK	3	3	11.69	0	0
	1710.7	19957	1.4	QPSK	6	0	11.62	0-1	0
	1710.7	19957	1.4	16-QAM	1	0	11.85	0-1	0
	1710.7	19957	1.4	16-QAM	1	2	11.83	0-1	0
	1710.7	19957	1.4	16-QAM	1	5	11.77	0-1	0
	1710.7	19957	1.4	16-QAM	3	0	11.60	0-1	0
	1710.7	19957	1.4	16-QAM	3	2	11.71	0-1	0
	1710.7	19957	1.4	16-QAM	3	3	11.58	0-1	0
	1710.7	19957	1.4	16-QAM	6	0	11.76	0-2	0
Mid	1732.5	20175	1.4	QPSK	1	0	11.69	0	0
	1732.5	20175	1.4	QPSK	1	2	11.73	0	0
	1732.5	20175	1.4	QPSK	1	5	11.69	0	0
	1732.5	20175	1.4	QPSK	3	0	11.67	0	0
	1732.5	20175	1.4	QPSK	3	2	11.70	0	0
	1732.5	20175	1.4	QPSK	3	3	11.58	0	0
	1732.5	20175	1.4	QPSK	6	0	11.68	0-1	0
	1732.5	20175	1.4	16-QAM	1	0	11.88	0-1	0
	1732.5	20175	1.4	16-QAM	1	2	11.81	0-1	0
	1732.5	20175	1.4	16-QAM	1	5	11.70	0-1	0
	1732.5	20175	1.4	16-QAM	3	0	11.74	0-1	0
	1732.5	20175	1.4	16-QAM	3	2	11.79	0-1	0
	1732.5	20175	1.4	16-QAM	3	3	11.75	0-1	0
	1732.5	20175	1.4	16-QAM	6	0	11.81	0-2	0
High	1754.3	20393	1.4	QPSK	1	0	11.75	0	0
	1754.3	20393	1.4	QPSK	1	2	11.74	0	0
	1754.3	20393	1.4	QPSK	1	5	11.66	0	0
	1754.3	20393	1.4	QPSK	3	0	11.56	0	0
	1754.3	20393	1.4	QPSK	3	2	11.66	0	0
	1754.3	20393	1.4	QPSK	3	3	11.64	0	0
	1754.3	20393	1.4	QPSK	6	0	11.55	0-1	0
	1754.3	20393	1.4	16-QAM	1	0	11.82	0-1	0
	1754.3	20393	1.4	16-QAM	1	2	11.87	0-1	0
	1754.3	20393	1.4	16-QAM	1	5	11.78	0-1	0
	1754.3	20393	1.4	16-QAM	3	0	11.72	0-1	0
	1754.3	20393	1.4	16-QAM	3	2	11.73	0-1	0
	1754.3	20393	1.4	16-QAM	3	3	11.59	0-1	0
	1754.3	20393	1.4	16-QAM	6	0	11.74	0-2	0

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8.2.4 LTE Band 25 (PCS)

Table 8-31
LTE Band 25 (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	26140	20	QPSK	1	0	22.75	0	0
	1860	26140	20	QPSK	1	50	22.56	0	0
	1860	26140	20	QPSK	1	99	22.56	0	0
	1860	26140	20	QPSK	50	0	21.54	0-1	1
	1860	26140	20	QPSK	50	25	21.51	0-1	1
	1860	26140	20	QPSK	50	50	21.50	0-1	1
	1860	26140	20	QPSK	100	0	21.51	0-1	1
	1860	26140	20	16QAM	1	0	22.11	0-1	1
	1860	26140	20	16QAM	1	50	21.70	0-1	1
	1860	26140	20	16QAM	1	99	21.50	0-1	1
	1860	26140	20	16QAM	50	0	20.64	0-2	2
	1860	26140	20	16QAM	50	25	20.65	0-2	2
	1860	26140	20	16QAM	50	50	20.68	0-2	2
	1860	26140	20	16QAM	100	0	20.62	0-2	2
Mid	1882.5	26365	20	QPSK	1	0	22.76	0	0
	1882.5	26365	20	QPSK	1	50	**22.77**	0	0
	1882.5	26365	20	QPSK	1	99	22.76	0	0
	1882.5	26365	20	QPSK	50	0	**21.55**	0-1	1
	1882.5	26365	20	QPSK	50	25	21.54	0-1	1
	1882.5	26365	20	QPSK	50	50	21.53	0-1	1
	1882.5	26365	20	QPSK	100	0	21.51	0-1	1
	1882.5	26365	20	16QAM	1	0	21.94	0-1	1
	1882.5	26365	20	16QAM	1	50	21.94	0-1	1
	1882.5	26365	20	16QAM	1	99	21.84	0-1	1
	1882.5	26365	20	16QAM	50	0	20.59	0-2	2
	1882.5	26365	20	16QAM	50	25	20.64	0-2	2
	1882.5	26365	20	16QAM	50	50	20.67	0-2	2
	1882.5	26365	20	16QAM	100	0	20.57	0-2	2
High	1905	26590	20	QPSK	1	0	22.75	0	0
	1905	26590	20	QPSK	1	50	22.76	0	0
	1905	26590	20	QPSK	1	99	22.74	0	0
	1905	26590	20	QPSK	50	0	21.51	0-1	1
	1905	26590	20	QPSK	50	25	21.53	0-1	1
	1905	26590	20	QPSK	50	50	21.54	0-1	1
	1905	26590	20	QPSK	100	0	21.52	0-1	1
	1905	26590	20	16QAM	1	0	22.37	0-1	1
	1905	26590	20	16QAM	1	50	22.50	0-1	1
	1905	26590	20	16QAM	1	99	22.00	0-1	1
	1905	26590	20	16QAM	50	0	20.91	0-2	2
	1905	26590	20	16QAM	50	25	20.83	0-2	2
	1905	26590	20	16QAM	50	50	20.77	0-2	2
	1905	26590	20	16QAM	100	0	20.74	0-2	2

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Table 8-32
LTE Band 25 (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	26115	15	QPSK	1	0	22.57	0	0
	1857.5	26115	15	QPSK	1	36	22.77	0	0
	1857.5	26115	15	QPSK	1	74	23.03	0	0
	1857.5	26115	15	QPSK	36	0	21.58	0-1	1
	1857.5	26115	15	QPSK	36	18	21.54	0-1	1
	1857.5	26115	15	QPSK	36	37	21.54	0-1	1
	1857.5	26115	15	QPSK	75	0	21.53	0-1	1
	1857.5	26115	15	16QAM	1	0	21.52	0-1	1
	1857.5	26115	15	16QAM	1	36	21.53	0-1	1
	1857.5	26115	15	16QAM	1	74	21.69	0-1	1
	1857.5	26115	15	16QAM	36	0	20.57	0-2	2
	1857.5	26115	15	16QAM	36	18	20.72	0-2	2
	1857.5	26115	15	16QAM	36	37	20.86	0-2	2
	1857.5	26115	15	16QAM	75	0	20.63	0-2	2
Mid	1882.5	26365	15	QPSK	1	0	22.60	0	0
	1882.5	26365	15	QPSK	1	36	22.86	0	0
	1882.5	26365	15	QPSK	1	74	22.73	0	0
	1882.5	26365	15	QPSK	36	0	21.63	0-1	1
	1882.5	26365	15	QPSK	36	18	21.58	0-1	1
	1882.5	26365	15	QPSK	36	37	21.55	0-1	1
	1882.5	26365	15	QPSK	75	0	21.56	0-1	1
	1882.5	26365	15	16QAM	1	0	21.54	0-1	1
	1882.5	26365	15	16QAM	1	36	22.13	0-1	1
	1882.5	26365	15	16QAM	1	74	21.59	0-1	1
	1882.5	26365	15	16QAM	36	0	20.58	0-2	2
	1882.5	26365	15	16QAM	36	18	20.77	0-2	2
	1882.5	26365	15	16QAM	36	37	20.77	0-2	2
	1882.5	26365	15	16QAM	75	0	20.76	0-2	2
High	1907.5	26615	15	QPSK	1	0	22.83	0	0
	1907.5	26615	15	QPSK	1	36	23.00	0	0
	1907.5	26615	15	QPSK	1	74	23.16	0	0
	1907.5	26615	15	QPSK	36	0	21.79	0-1	1
	1907.5	26615	15	QPSK	36	18	21.71	0-1	1
	1907.5	26615	15	QPSK	36	37	21.72	0-1	1
	1907.5	26615	15	QPSK	75	0	21.72	0-1	1
	1907.5	26615	15	16QAM	1	0	21.79	0-1	1
	1907.5	26615	15	16QAM	1	36	22.03	0-1	1
	1907.5	26615	15	16QAM	1	74	21.86	0-1	1
	1907.5	26615	15	16QAM	36	0	20.95	0-2	2
	1907.5	26615	15	16QAM	36	18	20.83	0-2	2
	1907.5	26615	15	16QAM	36	37	20.81	0-2	2
	1907.5	26615	15	16QAM	75	0	20.83	0-2	2

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Table 8-33
LTE Band 25 (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	26090	10	QPSK	1	0	22.62	0	0
	1855	26090	10	QPSK	1	25	22.79	0	0
	1855	26090	10	QPSK	1	49	22.87	0	0
	1855	26090	10	QPSK	25	0	21.55	0-1	1
	1855	26090	10	QPSK	25	12	21.50	0-1	1
	1855	26090	10	QPSK	25	25	21.51	0-1	1
	1855	26090	10	QPSK	50	0	21.52	0-1	1
	1855	26090	10	16QAM	1	0	21.96	0-1	1
	1855	26090	10	16QAM	1	25	21.57	0-1	1
	1855	26090	10	16QAM	1	49	21.52	0-1	1
	1855	26090	10	16QAM	25	0	20.61	0-2	2
	1855	26090	10	16QAM	25	12	20.59	0-2	2
	1855	26090	10	16QAM	25	25	20.51	0-2	2
	1855	26090	10	16QAM	50	0	20.61	0-2	2
Mid	1882.5	26365	10	QPSK	1	0	22.52	0	0
	1882.5	26365	10	QPSK	1	25	22.65	0	0
	1882.5	26365	10	QPSK	1	49	23.26	0	0
	1882.5	26365	10	QPSK	25	0	21.53	0-1	1
	1882.5	26365	10	QPSK	25	12	21.54	0-1	1
	1882.5	26365	10	QPSK	25	25	21.55	0-1	1
	1882.5	26365	10	QPSK	50	0	21.53	0-1	1
	1882.5	26365	10	16QAM	1	0	21.85	0-1	1
	1882.5	26365	10	16QAM	1	25	21.64	0-1	1
	1882.5	26365	10	16QAM	1	49	21.79	0-1	1
	1882.5	26365	10	16QAM	25	0	20.60	0-2	2
	1882.5	26365	10	16QAM	25	12	20.56	0-2	2
	1882.5	26365	10	16QAM	25	25	20.62	0-2	2
	1882.5	26365	10	16QAM	50	0	20.60	0-2	2
High	1910	26640	10	QPSK	1	0	22.89	0	0
	1910	26640	10	QPSK	1	25	23.12	0	0
	1910	26640	10	QPSK	1	49	22.94	0	0
	1910	26640	10	QPSK	25	0	21.78	0-1	1
	1910	26640	10	QPSK	25	12	21.72	0-1	1
	1910	26640	10	QPSK	25	25	21.68	0-1	1
	1910	26640	10	QPSK	50	0	21.67	0-1	1
	1910	26640	10	16QAM	1	0	21.91	0-1	1
	1910	26640	10	16QAM	1	25	21.71	0-1	1
	1910	26640	10	16QAM	1	49	21.82	0-1	1
	1910	26640	10	16QAM	25	0	20.90	0-2	2
	1910	26640	10	16QAM	25	12	20.75	0-2	2
	1910	26640	10	16QAM	25	25	20.72	0-2	2
	1910	26640	10	16QAM	50	0	20.69	0-2	2

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Table 8-34
LTE Band 25 (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	26065	5	QPSK	1	0	22.50	0	0
	1852.5	26065	5	QPSK	1	12	22.52	0	0
	1852.5	26065	5	QPSK	1	24	22.58	0	0
	1852.5	26065	5	QPSK	12	0	21.59	0-1	1
	1852.5	26065	5	QPSK	12	6	21.58	0-1	1
	1852.5	26065	5	QPSK	12	13	21.50	0-1	1
	1852.5	26065	5	QPSK	25	0	21.50	0-1	1
	1852.5	26065	5	16-QAM	1	0	21.52	0-1	1
	1852.5	26065	5	16-QAM	1	12	21.68	0-1	1
	1852.5	26065	5	16-QAM	1	24	21.51	0-1	1
	1852.5	26065	5	16-QAM	12	0	20.97	0-2	2
	1852.5	26065	5	16-QAM	12	6	20.70	0-2	2
	1852.5	26065	5	16-QAM	12	13	20.73	0-2	2
	1852.5	26065	5	16-QAM	25	0	20.66	0-2	2
Mid	1882.5	26365	5	QPSK	1	0	22.56	0	0
	1882.5	26365	5	QPSK	1	12	22.52	0	0
	1882.5	26365	5	QPSK	1	24	22.78	0	0
	1882.5	26365	5	QPSK	12	0	21.53	0-1	1
	1882.5	26365	5	QPSK	12	6	21.54	0-1	1
	1882.5	26365	5	QPSK	12	13	21.51	0-1	1
	1882.5	26365	5	QPSK	25	0	21.50	0-1	1
	1882.5	26365	5	16-QAM	1	0	21.56	0-1	1
	1882.5	26365	5	16-QAM	1	12	21.58	0-1	1
	1882.5	26365	5	16-QAM	1	24	21.54	0-1	1
	1882.5	26365	5	16-QAM	12	0	20.73	0-2	2
	1882.5	26365	5	16-QAM	12	6	20.72	0-2	2
	1882.5	26365	5	16-QAM	12	13	20.77	0-2	2
	1882.5	26365	5	16-QAM	25	0	20.67	0-2	2
High	1912.5	26665	5	QPSK	1	0	22.65	0	0
	1912.5	26665	5	QPSK	1	12	22.88	0	0
	1912.5	26665	5	QPSK	1	24	22.50	0	0
	1912.5	26665	5	QPSK	12	0	21.69	0-1	1
	1912.5	26665	5	QPSK	12	6	21.71	0-1	1
	1912.5	26665	5	QPSK	12	13	21.68	0-1	1
	1912.5	26665	5	QPSK	25	0	21.68	0-1	1
	1912.5	26665	5	16-QAM	1	0	21.66	0-1	1
	1912.5	26665	5	16-QAM	1	12	21.60	0-1	1
	1912.5	26665	5	16-QAM	1	24	21.52	0-1	1
	1912.5	26665	5	16-QAM	12	0	20.92	0-2	2
	1912.5	26665	5	16-QAM	12	6	20.90	0-2	2
	1912.5	26665	5	16-QAM	12	13	20.86	0-2	2
	1912.5	26665	5	16-QAM	25	0	20.71	0-2	2

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Table 8-35
LTE Band 25 (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	26055	3	QPSK	1	0	22.54	0	0
	1851.5	26055	3	QPSK	1	7	22.74	0	0
	1851.5	26055	3	QPSK	1	14	23.00	0	0
	1851.5	26055	3	QPSK	8	0	21.55	0-1	1
	1851.5	26055	3	QPSK	8	4	21.51	0-1	1
	1851.5	26055	3	QPSK	8	7	21.51	0-1	1
	1851.5	26055	3	QPSK	15	0	21.50	0-1	1
	1851.5	26055	3	16-QAM	1	0	21.52	0-1	1
	1851.5	26055	3	16-QAM	1	7	21.50	0-1	1
	1851.5	26055	3	16-QAM	1	14	21.78	0-1	1
	1851.5	26055	3	16-QAM	8	0	20.54	0-2	2
	1851.5	26055	3	16-QAM	8	4	20.69	0-2	2
	1851.5	26055	3	16-QAM	8	7	20.83	0-2	2
	1851.5	26055	3	16-QAM	15	0	20.60	0-2	2
Mid	1882.5	26365	3	QPSK	1	0	22.57	0	0
	1882.5	26365	3	QPSK	1	7	22.83	0	0
	1882.5	26365	3	QPSK	1	14	22.70	0	0
	1882.5	26365	3	QPSK	8	0	21.60	0-1	1
	1882.5	26365	3	QPSK	8	4	21.54	0-1	1
	1882.5	26365	3	QPSK	8	7	21.50	0-1	1
	1882.5	26365	3	QPSK	15	0	21.53	0-1	1
	1882.5	26365	3	16-QAM	1	0	21.51	0-1	1
	1882.5	26365	3	16-QAM	1	7	22.08	0-1	1
	1882.5	26365	3	16-QAM	1	14	21.56	0-1	1
	1882.5	26365	3	16-QAM	8	0	20.55	0-2	2
	1882.5	26365	3	16-QAM	8	4	20.74	0-2	2
	1882.5	26365	3	16-QAM	8	7	20.74	0-2	2
	1882.5	26365	3	16-QAM	15	0	20.73	0-2	2
High	1913.5	26675	3	QPSK	1	0	22.80	0	0
	1913.5	26675	3	QPSK	1	7	22.98	0	0
	1913.5	26675	3	QPSK	1	14	23.13	0	0
	1913.5	26675	3	QPSK	8	0	21.76	0-1	1
	1913.5	26675	3	QPSK	8	4	21.68	0-1	1
	1913.5	26675	3	QPSK	8	7	21.69	0-1	1
	1913.5	26675	3	QPSK	15	0	21.69	0-1	1
	1913.5	26675	3	16-QAM	1	0	21.71	0-1	1
	1913.5	26675	3	16-QAM	1	7	22.25	0-1	1
	1913.5	26675	3	16-QAM	1	14	21.83	0-1	1
	1913.5	26675	3	16-QAM	8	0	20.92	0-2	2
	1913.5	26675	3	16-QAM	8	4	20.82	0-2	2
	1913.5	26675	3	16-QAM	8	7	20.78	0-2	2
	1913.5	26675	3	16-QAM	15	0	20.87	0-2	2

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Table 8-36
LTE Band 25 (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	26047	1.4	QPSK	1	0	22.62	0	0
	1850.7	26047	1.4	QPSK	1	2	22.86	0	0
	1850.7	26047	1.4	QPSK	1	5	22.88	0	0
	1850.7	26047	1.4	QPSK	3	0	22.74	0	0
	1850.7	26047	1.4	QPSK	3	2	22.61	0	0
	1850.7	26047	1.4	QPSK	3	3	22.61	0	0
	1850.7	26047	1.4	QPSK	6	0	21.57	0-1	1
	1850.7	26047	1.4	16-QAM	1	0	21.86	0-1	1
	1850.7	26047	1.4	16-QAM	1	2	21.96	0-1	1
	1850.7	26047	1.4	16-QAM	1	5	22.08	0-1	1
	1850.7	26047	1.4	16-QAM	3	0	21.84	0-1	1
	1850.7	26047	1.4	16-QAM	3	2	21.76	0-1	1
	1850.7	26047	1.4	16-QAM	3	3	21.61	0-1	1
	1850.7	26047	1.4	16-QAM	6	0	20.65	0-2	2
Mid	1882.5	26365	1.4	QPSK	1	0	22.67	0	0
	1882.5	26365	1.4	QPSK	1	2	22.92	0	0
	1882.5	26365	1.4	QPSK	1	5	22.76	0	0
	1882.5	26365	1.4	QPSK	3	0	22.63	0	0
	1882.5	26365	1.4	QPSK	3	2	22.68	0	0
	1882.5	26365	1.4	QPSK	3	3	22.59	0	0
	1882.5	26365	1.4	QPSK	6	0	21.50	0-1	1
	1882.5	26365	1.4	16-QAM	1	0	21.66	0-1	1
	1882.5	26365	1.4	16-QAM	1	2	22.14	0-1	1
	1882.5	26365	1.4	16-QAM	1	5	21.85	0-1	1
	1882.5	26365	1.4	16-QAM	3	0	21.90	0-1	1
	1882.5	26365	1.4	16-QAM	3	2	21.74	0-1	1
	1882.5	26365	1.4	16-QAM	3	3	21.50	0-1	1
	1882.5	26365	1.4	16-QAM	6	0	20.72	0-2	2
High	1914.3	26683	1.4	QPSK	1	0	22.79	0	0
	1914.3	26683	1.4	QPSK	1	2	23.06	0	0
	1914.3	26683	1.4	QPSK	1	5	23.03	0	0
	1914.3	26683	1.4	QPSK	3	0	22.69	0	0
	1914.3	26683	1.4	QPSK	3	2	22.78	0	0
	1914.3	26683	1.4	QPSK	3	3	22.76	0	0
	1914.3	26683	1.4	QPSK	6	0	21.71	0-1	1
	1914.3	26683	1.4	16-QAM	1	0	22.04	0-1	1
	1914.3	26683	1.4	16-QAM	1	2	22.02	0-1	1
	1914.3	26683	1.4	16-QAM	1	5	22.27	0-1	1
	1914.3	26683	1.4	16-QAM	3	0	21.89	0-1	1
	1914.3	26683	1.4	16-QAM	3	2	22.01	0-1	1
	1914.3	26683	1.4	16-QAM	3	3	21.84	0-1	1
	1914.3	26683	1.4	16-QAM	6	0	20.83	0-2	2

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Table 8-37
LTE Band 25 (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	26140	20	QPSK	1	0	12.00	0	0
	1860	26140	20	QPSK	1	50	12.05	0	0
	1860	26140	20	QPSK	1	99	12.00	0	0
	1860	26140	20	QPSK	50	0	11.87	0-1	0
	1860	26140	20	QPSK	50	25	11.85	0-1	0
	1860	26140	20	QPSK	50	50	11.86	0-1	0
	1860	26140	20	QPSK	100	0	11.80	0-1	0
	1860	26140	20	16QAM	1	0	12.03	0-1	0
	1860	26140	20	16QAM	1	50	12.00	0-1	0
	1860	26140	20	16QAM	1	99	11.99	0-1	0
	1860	26140	20	16QAM	50	0	11.89	0-2	0
	1860	26140	20	16QAM	50	25	11.87	0-2	0
	1860	26140	20	16QAM	50	50	11.84	0-2	0
	1860	26140	20	16QAM	100	0	11.89	0-2	0
Mid	1882.5	26365	20	QPSK	1	0	12.20	0	0
	1882.5	26365	20	QPSK	1	50	**12.21**	0	0
	1882.5	26365	20	QPSK	1	99	12.18	0	0
	1882.5	26365	20	QPSK	50	0	**11.89**	0-1	0
	1882.5	26365	20	QPSK	50	25	11.84	0-1	0
	1882.5	26365	20	QPSK	50	50	11.88	0-1	0
	1882.5	26365	20	QPSK	100	0	11.78	0-1	0
	1882.5	26365	20	16QAM	1	0	12.03	0-1	0
	1882.5	26365	20	16QAM	1	50	12.00	0-1	0
	1882.5	26365	20	16QAM	1	99	11.99	0-1	0
	1882.5	26365	20	16QAM	50	0	12.03	0-2	0
	1882.5	26365	20	16QAM	50	25	12.00	0-2	0
	1882.5	26365	20	16QAM	50	50	12.05	0-2	0
	1882.5	26365	20	16QAM	100	0	12.01	0-2	0
High	1905	26590	20	QPSK	1	0	12.18	0	0
	1905	26590	20	QPSK	1	50	12.20	0	0
	1905	26590	20	QPSK	1	99	12.17	0	0
	1905	26590	20	QPSK	50	0	11.82	0-1	0
	1905	26590	20	QPSK	50	25	11.85	0-1	0
	1905	26590	20	QPSK	50	50	11.88	0-1	0
	1905	26590	20	QPSK	100	0	11.84	0-1	0
	1905	26590	20	16QAM	1	0	12.03	0-1	0
	1905	26590	20	16QAM	1	50	12.07	0-1	0
	1905	26590	20	16QAM	1	99	12.01	0-1	0
	1905	26590	20	16QAM	50	0	12.03	0-2	0
	1905	26590	20	16QAM	50	25	12.10	0-2	0
	1905	26590	20	16QAM	50	50	12.20	0-2	0
	1905	26590	20	16QAM	100	0	12.12	0-2	0

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Table 8-38
LTE Band 25 (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	26115	15	QPSK	1	0	12.16	0	0
	1857.5	26115	15	QPSK	1	36	12.40	0	0
	1857.5	26115	15	QPSK	1	74	12.42	0	0
	1857.5	26115	15	QPSK	36	0	12.09	0-1	0
	1857.5	26115	15	QPSK	36	18	11.99	0-1	0
	1857.5	26115	15	QPSK	36	37	12.00	0-1	0
	1857.5	26115	15	QPSK	75	0	11.98	0-1	0
	1857.5	26115	15	16QAM	1	0	12.16	0-1	0
	1857.5	26115	15	16QAM	1	36	12.18	0-1	0
	1857.5	26115	15	16QAM	1	74	12.13	0-1	0
	1857.5	26115	15	16QAM	36	0	12.32	0-2	0
	1857.5	26115	15	16QAM	36	18	12.30	0-2	0
	1857.5	26115	15	16QAM	36	37	12.15	0-2	0
	1857.5	26115	15	16QAM	75	0	12.19	0-2	0
Mid	1882.5	26365	15	QPSK	1	0	12.21	0	0
	1882.5	26365	15	QPSK	1	36	12.46	0	0
	1882.5	26365	15	QPSK	1	74	12.30	0	0
	1882.5	26365	15	QPSK	36	0	11.90	0-1	0
	1882.5	26365	15	QPSK	36	18	11.98	0-1	0
	1882.5	26365	15	QPSK	36	37	12.00	0-1	0
	1882.5	26365	15	QPSK	75	0	12.00	0-1	0
	1882.5	26365	15	16QAM	1	0	12.20	0-1	0
	1882.5	26365	15	16QAM	1	36	12.13	0-1	0
	1882.5	26365	15	16QAM	1	74	12.10	0-1	0
	1882.5	26365	15	16QAM	36	0	12.31	0-2	0
	1882.5	26365	15	16QAM	36	18	12.28	0-2	0
	1882.5	26365	15	16QAM	36	37	12.04	0-2	0
	1882.5	26365	15	16QAM	75	0	12.26	0-2	0
High	1907.5	26615	15	QPSK	1	0	12.01	0	0
	1907.5	26615	15	QPSK	1	36	12.28	0	0
	1907.5	26615	15	QPSK	1	74	12.25	0	0
	1907.5	26615	15	QPSK	36	0	11.91	0-1	0
	1907.5	26615	15	QPSK	36	18	11.93	0-1	0
	1907.5	26615	15	QPSK	36	37	11.98	0-1	0
	1907.5	26615	15	QPSK	75	0	11.94	0-1	0
	1907.5	26615	15	16QAM	1	0	12.33	0-1	0
	1907.5	26615	15	16QAM	1	36	12.16	0-1	0
	1907.5	26615	15	16QAM	1	74	12.10	0-1	0
	1907.5	26615	15	16QAM	36	0	12.12	0-2	0
	1907.5	26615	15	16QAM	36	18	12.15	0-2	0
	1907.5	26615	15	16QAM	36	37	12.15	0-2	0
	1907.5	26615	15	16QAM	75	0	12.11	0-2	0

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Table 8-39
LTE Band 25 (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	26090	10	QPSK	1	0	12.07	0	0
	1855	26090	10	QPSK	1	25	12.31	0	0
	1855	26090	10	QPSK	1	49	12.33	0	0
	1855	26090	10	QPSK	25	0	12.19	0-1	0
	1855	26090	10	QPSK	25	12	12.06	0-1	0
	1855	26090	10	QPSK	25	25	12.06	0-1	0
	1855	26090	10	QPSK	50	0	12.00	0-1	0
	1855	26090	10	16QAM	1	0	12.19	0-1	0
	1855	26090	10	16QAM	1	25	12.23	0-1	0
	1855	26090	10	16QAM	1	49	12.04	0-1	0
	1855	26090	10	16QAM	25	0	12.23	0-2	0
	1855	26090	10	16QAM	25	12	12.16	0-2	0
	1855	26090	10	16QAM	25	25	12.06	0-2	0
	1855	26090	10	16QAM	50	0	12.10	0-2	0
Mid	1882.5	26365	10	QPSK	1	0	12.12	0	0
	1882.5	26365	10	QPSK	1	25	12.25	0	0
	1882.5	26365	10	QPSK	1	49	12.21	0	0
	1882.5	26365	10	QPSK	25	0	12.08	0-1	0
	1882.5	26365	10	QPSK	25	12	12.13	0-1	0
	1882.5	26365	10	QPSK	25	25	12.04	0-1	0
	1882.5	26365	10	QPSK	50	0	11.98	0-1	0
	1882.5	26365	10	16QAM	1	0	12.03	0-1	0
	1882.5	26365	10	16QAM	1	25	12.22	0-1	0
	1882.5	26365	10	16QAM	1	49	12.30	0-1	0
	1882.5	26365	10	16QAM	25	0	12.35	0-2	0
	1882.5	26365	10	16QAM	25	12	12.19	0-2	0
	1882.5	26365	10	16QAM	25	25	12.03	0-2	0
	1882.5	26365	10	16QAM	50	0	12.17	0-2	0
High	1910	26640	10	QPSK	1	0	11.92	0	0
	1910	26640	10	QPSK	1	25	12.19	0	0
	1910	26640	10	QPSK	1	49	12.16	0	0
	1910	26640	10	QPSK	25	0	11.82	0-1	0
	1910	26640	10	QPSK	25	12	11.91	0-1	0
	1910	26640	10	QPSK	25	25	12.03	0-1	0
	1910	26640	10	QPSK	50	0	12.01	0-1	0
	1910	26640	10	16QAM	1	0	12.24	0-1	0
	1910	26640	10	16QAM	1	25	12.07	0-1	0
	1910	26640	10	16QAM	1	49	12.01	0-1	0
	1910	26640	10	16QAM	25	0	12.03	0-2	0
	1910	26640	10	16QAM	25	12	12.14	0-2	0
	1910	26640	10	16QAM	25	25	12.29	0-2	0
	1910	26640	10	16QAM	50	0	12.28	0-2	0

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Table 8-40
LTE Band 25 (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	26065	5	QPSK	1	0	12.10	0	0
	1852.5	26065	5	QPSK	1	12	12.34	0	0
	1852.5	26065	5	QPSK	1	24	12.36	0	0
	1852.5	26065	5	QPSK	12	0	12.22	0-1	0
	1852.5	26065	5	QPSK	12	6	12.09	0-1	0
	1852.5	26065	5	QPSK	12	13	12.09	0-1	0
	1852.5	26065	5	QPSK	25	0	12.00	0-1	0
	1852.5	26065	5	16-QAM	1	0	12.34	0-1	0
	1852.5	26065	5	16-QAM	1	12	12.26	0-1	0
	1852.5	26065	5	16-QAM	1	24	12.07	0-1	0
	1852.5	26065	5	16-QAM	12	0	12.26	0-2	0
	1852.5	26065	5	16-QAM	12	6	12.24	0-2	0
	1852.5	26065	5	16-QAM	12	13	12.09	0-2	0
	1852.5	26065	5	16-QAM	25	0	12.13	0-2	0
Mid	1882.5	26365	5	QPSK	1	0	12.15	0	0
	1882.5	26365	5	QPSK	1	12	12.40	0	0
	1882.5	26365	5	QPSK	1	24	12.24	0	0
	1882.5	26365	5	QPSK	12	0	12.11	0-1	0
	1882.5	26365	5	QPSK	12	6	12.16	0-1	0
	1882.5	26365	5	QPSK	12	13	11.96	0-1	0
	1882.5	26365	5	QPSK	25	0	11.98	0-1	0
	1882.5	26365	5	16-QAM	1	0	12.14	0-1	0
	1882.5	26365	5	16-QAM	1	12	12.13	0-1	0
	1882.5	26365	5	16-QAM	1	24	12.33	0-1	0
	1882.5	26365	5	16-QAM	12	0	12.38	0-2	0
	1882.5	26365	5	16-QAM	12	6	12.22	0-2	0
	1882.5	26365	5	16-QAM	12	13	11.98	0-2	0
	1882.5	26365	5	16-QAM	25	0	12.20	0-2	0
High	1912.5	26665	5	QPSK	1	0	12.13	0	0
	1912.5	26665	5	QPSK	1	12	12.22	0	0
	1912.5	26665	5	QPSK	1	24	12.19	0	0
	1912.5	26665	5	QPSK	12	0	11.85	0-1	0
	1912.5	26665	5	QPSK	12	6	11.80	0-1	0
	1912.5	26665	5	QPSK	12	13	11.98	0-1	0
	1912.5	26665	5	QPSK	25	0	11.95	0-1	0
	1912.5	26665	5	16-QAM	1	0	12.11	0-1	0
	1912.5	26665	5	16-QAM	1	12	12.10	0-1	0
	1912.5	26665	5	16-QAM	1	24	12.04	0-1	0
	1912.5	26665	5	16-QAM	12	0	12.06	0-2	0
	1912.5	26665	5	16-QAM	12	6	12.06	0-2	0
	1912.5	26665	5	16-QAM	12	13	12.09	0-2	0
	1912.5	26665	5	16-QAM	25	0	12.08	0-2	0

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Table 8-41
LTE Band 25 (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	26055	3	QPSK	1	0	12.08	0	0
	1851.5	26055	3	QPSK	1	7	12.32	0	0
	1851.5	26055	3	QPSK	1	14	12.34	0	0
	1851.5	26055	3	QPSK	8	0	12.20	0-1	0
	1851.5	26055	3	QPSK	8	4	12.11	0-1	0
	1851.5	26055	3	QPSK	8	7	12.07	0-1	0
	1851.5	26055	3	QPSK	15	0	12.03	0-1	0
	1851.5	26055	3	16-QAM	1	0	12.32	0-1	0
	1851.5	26055	3	16-QAM	1	7	12.24	0-1	0
	1851.5	26055	3	16-QAM	1	14	12.05	0-1	0
	1851.5	26055	3	16-QAM	8	0	12.24	0-2	0
	1851.5	26055	3	16-QAM	8	4	12.22	0-2	0
	1851.5	26055	3	16-QAM	8	7	12.07	0-2	0
	1851.5	26055	3	16-QAM	15	0	12.11	0-2	0
Mid	1882.5	26365	3	QPSK	1	0	12.13	0	0
	1882.5	26365	3	QPSK	1	7	12.38	0	0
	1882.5	26365	3	QPSK	1	14	12.22	0	0
	1882.5	26365	3	QPSK	8	0	12.09	0-1	0
	1882.5	26365	3	QPSK	8	4	12.14	0-1	0
	1882.5	26365	3	QPSK	8	7	12.05	0-1	0
	1882.5	26365	3	QPSK	15	0	12.00	0-1	0
	1882.5	26365	3	16-QAM	1	0	12.12	0-1	0
	1882.5	26365	3	16-QAM	1	7	12.05	0-1	0
	1882.5	26365	3	16-QAM	1	14	12.02	0-1	0
	1882.5	26365	3	16-QAM	8	0	12.23	0-2	0
	1882.5	26365	3	16-QAM	8	4	12.20	0-2	0
	1882.5	26365	3	16-QAM	8	7	12.11	0-2	0
	1882.5	26365	3	16-QAM	15	0	12.18	0-2	0
High	1913.5	26675	3	QPSK	1	0	12.00	0	0
	1913.5	26675	3	QPSK	1	7	12.20	0	0
	1913.5	26675	3	QPSK	1	14	12.19	0	0
	1913.5	26675	3	QPSK	8	0	12.12	0-1	0
	1913.5	26675	3	QPSK	8	4	12.00	0-1	0
	1913.5	26675	3	QPSK	8	7	11.90	0-1	0
	1913.5	26675	3	QPSK	15	0	12.17	0-1	0
	1913.5	26675	3	16-QAM	1	0	12.25	0-1	0
	1913.5	26675	3	16-QAM	1	7	12.08	0-1	0
	1913.5	26675	3	16-QAM	1	14	12.02	0-1	0
	1913.5	26675	3	16-QAM	8	0	12.03	0-2	0
	1913.5	26675	3	16-QAM	8	4	12.09	0-2	0
	1913.5	26675	3	16-QAM	8	7	12.07	0-2	0
	1913.5	26675	3	16-QAM	15	0	12.03	0-2	0

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Table 8-42
LTE Band 25 (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	26047	1.4	QPSK	1	0	12.09	0	0
	1850.7	26047	1.4	QPSK	1	2	12.33	0	0
	1850.7	26047	1.4	QPSK	1	5	12.35	0	0
	1850.7	26047	1.4	QPSK	3	0	12.21	0	0
	1850.7	26047	1.4	QPSK	3	2	12.08	0	0
	1850.7	26047	1.4	QPSK	3	3	12.08	0	0
	1850.7	26047	1.4	QPSK	6	0	12.04	0-1	0
	1850.7	26047	1.4	16-QAM	1	0	12.33	0-1	0
	1850.7	26047	1.4	16-QAM	1	2	12.25	0-1	0
	1850.7	26047	1.4	16-QAM	1	5	12.11	0-1	0
	1850.7	26047	1.4	16-QAM	3	0	12.25	0-1	0
	1850.7	26047	1.4	16-QAM	3	2	12.23	0-1	0
	1850.7	26047	1.4	16-QAM	3	3	12.13	0-1	0
	1850.7	26047	1.4	16-QAM	6	0	12.15	0-2	0
Mid	1882.5	26365	1.4	QPSK	1	0	12.14	0	0
	1882.5	26365	1.4	QPSK	1	2	12.39	0	0
	1882.5	26365	1.4	QPSK	1	5	12.23	0	0
	1882.5	26365	1.4	QPSK	3	0	12.10	0	0
	1882.5	26365	1.4	QPSK	3	2	12.15	0	0
	1882.5	26365	1.4	QPSK	3	3	12.06	0	0
	1882.5	26365	1.4	QPSK	6	0	12.00	0-1	0
	1882.5	26365	1.4	16-QAM	1	0	12.13	0-1	0
	1882.5	26365	1.4	16-QAM	1	2	12.06	0-1	0
	1882.5	26365	1.4	16-QAM	1	5	12.03	0-1	0
	1882.5	26365	1.4	16-QAM	3	0	12.24	0-1	0
	1882.5	26365	1.4	16-QAM	3	2	12.21	0-1	0
	1882.5	26365	1.4	16-QAM	3	3	12.23	0-1	0
	1882.5	26365	1.4	16-QAM	6	0	12.19	0-2	0
High	1914.3	26683	1.4	QPSK	1	0	11.94	0	0
	1914.3	26683	1.4	QPSK	1	2	12.03	0	0
	1914.3	26683	1.4	QPSK	1	5	12.01	0	0
	1914.3	26683	1.4	QPSK	3	0	11.84	0	0
	1914.3	26683	1.4	QPSK	3	2	11.93	0	0
	1914.3	26683	1.4	QPSK	3	3	11.91	0	0
	1914.3	26683	1.4	QPSK	6	0	11.90	0-1	0
	1914.3	26683	1.4	16-QAM	1	0	12.26	0-1	0
	1914.3	26683	1.4	16-QAM	1	2	12.09	0-1	0
	1914.3	26683	1.4	16-QAM	1	5	12.03	0-1	0
	1914.3	26683	1.4	16-QAM	3	0	12.05	0-1	0
	1914.3	26683	1.4	16-QAM	3	2	12.08	0-1	0
	1914.3	26683	1.4	16-QAM	3	3	12.08	0-1	0
	1914.3	26683	1.4	16-QAM	6	0	12.04	0-2	0

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8.3 WLAN/BT Conducted Powers

Table 8-43
2.4 GHz Average RF Power

Freq [MHz]	Channel	2.4GHz Conducted Power [dBm]		
		IEEE Transmission Mode		
		802.11b	802.11g	802.11n
2412	1	13.29	11.67	11.78
2437	6	13.30	11.71	11.76
2462	11	**13.47**	11.00	11.04

Table 8-44
5 GHz Average RF Power

Freq [MHz]	Channel	5GHz (40MHz) Conducted Power [dBm]
		IEEE Transmission Mode
		802.11n
5190	38	10.65
5230	46	11.16
5270	54	11.25
5310	62	**11.35**
5510	102	10.50
5590	118	11.06
5630	126	**11.15**
5710	142	10.54
5755	151	**11.24**
5795	159	11.02

Justification for test configurations for WLAN per KDB Publication 248227 D01v02r01:

- Power measurements were performed for the transmission mode configuration with the highest maximum output power specified for production units.
- For transmission modes with the same maximum output power specification, powers were measured for the largest channel bandwidth, lowest order modulation and lowest data rate.
- For transmission modes with identical maximum specified output power, channel bandwidth, modulation and data rates, power measurements were required for all identical configurations.
- For each transmission mode configuration, powers were measured for the highest and lowest channels; and at the mid-band channel(s) when there were at least 3 channels supported. For configurations with multiple mid-band channels, due to an even number of channels, both channels were measured.
- The bolded data rate and channel above were tested for SAR.

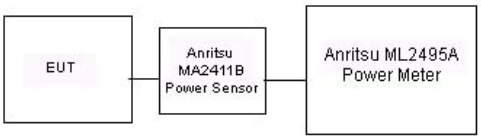

Figure 8-2
Power Measurement Setup

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Table 8-45
Bluetooth Average RF Power

Frequency [MHz]	Data Rate [Mbps]	Channel No.	Avg Conducted Power	
			[dBm]	[mW]
2402	1.0	0	13.30	21.363
2441	1.0	39	12.87	19.359
2480	1.0	78	**13.94**	24.758
2402	2.0	0	11.05	12.737
2441	2.0	39	10.67	11.677
2480	2.0	78	11.64	14.601
2402	3.0	0	11.11	12.919
2441	3.0	39	10.76	11.918
2480	3.0	78	11.74	14.919

Note: The bolded data rate and channel above was tested for SAR.

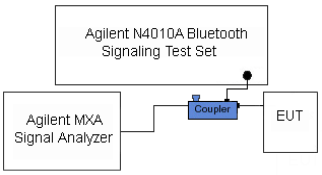

Figure 8-3
Power Measurement Setup

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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
9/28/2015	750B	22.2	700	0.921	54.650	0.959	55.726	-3.96%	-1.93%
			710	0.934	54.581	0.960	55.687	-2.71%	-1.99%
			740	0.957	54.184	0.963	55.57	-0.62%	-2.49%
			755	0.975	54.028	0.964	55.512	1.14%	-2.67%
9/11/2015	835B	22.4	820	0.968	53.104	0.969	55.258	-0.10%	-3.90%
			835	0.986	52.960	0.970	55.200	1.65%	-4.06%
			850	1.004	52.805	0.988	55.154	1.62%	-4.26%
9/8/2015	1750B	22.4	1710	1.423	50.971	1.463	53.537	-2.73%	-4.79%
			1750	1.467	50.900	1.488	53.432	-1.41%	-4.74%
			1790	1.506	50.724	1.514	53.326	-0.53%	-4.88%
9/10/2015	1900B	22.4	1850	1.489	51.887	1.520	53.300	-2.04%	-2.65%
			1880	1.520	51.829	1.520	53.300	0.00%	-2.76%
			1910	1.550	51.735	1.520	53.300	1.97%	-2.94%
9/21/2015	1900B	22.1	1850	1.526	51.760	1.520	53.300	0.39%	-2.89%
			1880	1.559	51.661	1.520	53.300	2.57%	-3.08%
			1910	1.595	51.550	1.520	53.300	4.93%	-3.28%
9/9/2015	2450B	23.6	2400	1.943	51.027	1.902	52.767	1.78%	-3.40%
			2450	2.013	50.839	1.950	52.700	1.58%	-3.65%
			2500	2.076	50.618	2.021	52.636	1.34%	-3.90%
9/21/2015	2450B	23.1	2400	1.930	51.606	1.902	52.767	1.89%	-3.29%
			2450	2.000	51.438	1.950	52.700	2.82%	-3.42%
			2500	2.071	51.252	2.021	52.636	2.28%	-3.73%
09/14/2015	5200B-5800B	21.4	5300	5.386	47.039	5.416	48.879	-0.55%	-3.76%
			5320	5.456	46.980	5.439	48.851	0.31%	-3.83%
			5600	5.784	46.522	5.766	48.471	0.31%	-4.02%
			5620	5.806	46.489	5.790	48.444	0.28%	-4.04%
			5640	5.842	46.449	5.813	48.417	0.50%	-4.06%
			5745	5.956	46.234	5.936	48.275	0.34%	-4.23%
			5765	6.021	46.344	5.959	48.248	1.04%	-3.95%
			5800	6.058	46.230	6.000	48.200	0.97%	-4.09%

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 ±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)	$Deviation_{1g}$ (%)
I	750	BODY	09/28/2015	23.3	22.2	0.200	1054	3213	1.710	8.530	8.550	0.23%
C	835	BODY	09/11/2015	23.6	22.4	0.200	4d132	3333	1.960	9.140	9.800	7.22%
B	1750	BODY	09/08/2015	23.1	22.6	0.100	1008	3334	3.970	38.000	39.700	4.47%
I	1900	BODY	09/10/2015	22.5	22.4	0.100	5d141	3213	3.740	40.000	37.400	-6.50%
I	1900	BODY	09/21/2015	22.3	22.1	0.100	5d141	3213	4.160	40.000	41.600	4.00%
B	2450	BODY	09/09/2015	23.9	23.6	0.100	797	3334	5.170	50.400	51.700	2.58%
E	2450	BODY	09/21/2015	22.7	21.2	0.100	882	3351	5.150	50.700	51.500	1.58%
A	5300	BODY	09/14/2015	23.5	21.7	0.050	1120	3914	3.950	75.200	79.000	5.05%
A	5600	BODY	09/14/2015	23.5	21.7	0.050	1120	3914	4.080	77.400	81.600	5.43%
A	5800	BODY	09/14/2015	23.5	21.7	0.050	1120	3914	4.050	76.300	81.000	6.16%

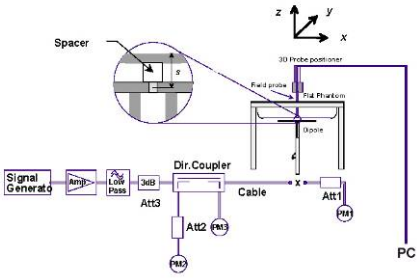

Figure 9-1
System Verification Setup Diagram

Figure 9-2
System Verification Setup Photo

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10 SAR DATA SUMMARY

10.1 Standalone Body SAR Data

Table 10-1
CDMA Body SAR Data

MEASUREMENT RESULTS													
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Side	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.									(W/kg)		(W/kg)	
824.70	1013	Cell. CDMA	EVDO Rev. 0	25.0	24.67	0.00	15 mm	52709	back	0.788	1.079	0.850	
836.52	384	Cell. CDMA	EVDO Rev. 0	25.0	24.61	0.01	15 mm	52709	back	0.741	1.094	0.811	
848.31	777	Cell. CDMA	EVDO Rev. 0	25.0	24.68	0.00	15 mm	52709	back	0.686	1.076	0.738	
824.70	1013	Cell. CDMA	EVDO Rev. 0	19.0	18.44	0.01	0 mm	52713	back	0.950	1.138	1.081	A1
836.52	384	Cell. CDMA	EVDO Rev. 0	19.0	18.43	0.01	0 mm	52713	back	0.893	1.140	1.018	
848.31	777	Cell. CDMA	EVDO Rev. 0	19.0	18.45	-0.03	0 mm	52713	back	0.819	1.135	0.930	
836.52	384	Cell. CDMA	EVDO Rev. 0	25.0	24.61	-0.04	8 mm	52709	top	0.636	1.094	0.696	
836.52	384	Cell. CDMA	EVDO Rev. 0	19.0	18.43	0.01	0 mm	52713	top	0.317	1.140	0.361	
824.70	1013	Cell. CDMA	EVDO Rev. 0	25.0	24.67	0.01	5 mm	52709	left	0.711	1.079	0.767	
836.52	384	Cell. CDMA	EVDO Rev. 0	25.0	24.61	0.00	5 mm	52709	left	0.857	1.094	0.938	
848.31	777	Cell. CDMA	EVDO Rev. 0	25.0	24.68	-0.08	5 mm	52709	left	0.884	1.076	0.951	
836.52	384	Cell. CDMA	EVDO Rev. 0	19.0	18.43	0.01	0 mm	52713	left	0.616	1.140	0.702	
824.70	1013	Cell. CDMA	EVDO Rev. 0	19.0	18.44	-0.06	0 mm	52713	back	0.949	1.138	1.080	
1851.25	25	PCS CDMA	EVDO Rev. 0	25.0	24.74	-0.07	15 mm	52709	back	0.828	1.062	0.879	
1880.00	600	PCS CDMA	EVDO Rev. 0	25.0	24.88	-0.04	15 mm	52709	back	0.798	1.028	0.820	
1908.75	1175	PCS CDMA	EVDO Rev. 0	25.0	24.92	-0.02	15 mm	52709	back	0.781	1.019	0.796	
1880.00	600	PCS CDMA	EVDO Rev. 0	12.0	11.76	-0.03	0 mm	52713	back	0.669	1.057	0.707	
1851.25	25	PCS CDMA	EVDO Rev. 0	25.0	24.74	0.16	8 mm	52709	top	0.876	1.062	0.930	
1880.00	600	PCS CDMA	EVDO Rev. 0	25.0	24.88	-0.17	8 mm	52709	top	0.877	1.028	0.902	
1908.75	1175	PCS CDMA	EVDO Rev. 0	25.0	24.92	-0.19	8 mm	52709	top	1.020	1.019	1.039	A2
1880.00	600	PCS CDMA	EVDO Rev. 0	12.0	11.76	-0.03	0 mm	52713	top	0.341	1.057	0.360	
1880.00	600	PCS CDMA	EVDO Rev. 0	25.0	24.88	-0.04	5 mm	52709	left	0.733	1.028	0.754	
1880.00	600	PCS CDMA	EVDO Rev. 0	12.0	11.76	0.01	0 mm	52713	left	0.172	1.057	0.182	
1908.75	1175	PCS CDMA	EVDO Rev. 0	25.0	24.92	0.17	8 mm	52709	top	0.996	1.019	1.015	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram						

Blue entries represent variability measurement

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Table 10-2
LTE Band 12 Body SAR Data

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	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.														(W/kg)		(W/kg)	
707.50	23095	Mid	LTE Band 12	10	24.5	24.50	-0.04	0	52694	QPSK	1	0	15 mm	back	0.333	1.000	0.333	
707.50	23095	Mid	LTE Band 12	10	23.5	23.45	0.02	1	52694	QPSK	25	12	15 mm	back	0.247	1.012	0.250	
707.50	23095	Mid	LTE Band 12	10	24.5	24.50	-0.17	0	52694	QPSK	1	0	8 mm	top	0.374	1.000	0.374	
707.50	23095	Mid	LTE Band 12	10	23.5	23.45	0.10	1	52694	QPSK	25	12	8 mm	top	0.282	1.012	0.285	
707.50	23095	Mid	LTE Band 12	10	24.5	24.50	0.07	0	52694	QPSK	1	0	5 mm	left	0.245	1.000	0.245	
707.50	23095	Mid	LTE Band 12	10	23.5	23.45	0.10	1	52694	QPSK	25	12	5 mm	left	0.189	1.012	0.191	
707.50	23095	Mid	LTE Band 12	10	20.5	20.47	0.01	0	52694	QPSK	1	25	0 mm	back	0.587	1.007	0.591	A3
707.50	23095	Mid	LTE Band 12	10	20.5	20.37	-0.03	0	52694	QPSK	25	25	0 mm	back	0.575	1.030	0.592	
707.50	23095	Mid	LTE Band 12	10	20.5	20.47	-0.02	0	52694	QPSK	1	25	0 mm	top	0.507	1.007	0.511	
707.50	23095	Mid	LTE Band 12	10	20.5	20.37	0.03	0	52694	QPSK	25	25	0 mm	top	0.486	1.030	0.501	
707.50	23095	Mid	LTE Band 12	10	20.5	20.47	-0.12	0	52694	QPSK	1	25	0 mm	left	0.361	1.007	0.364	
707.50	23095	Mid	LTE Band 12	10	20.5	20.37	-0.14	0	52694	QPSK	25	25	0 mm	left	0.349	1.030	0.359	
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 10-3
LTE Band 5 Body SAR Data

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	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.														(W/kg)		(W/kg)	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.0	24.00	-0.18	0	52711	QPSK	1	0	15 mm	back	0.428	1.000	0.428	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.0	22.88	0.00	1	52711	QPSK	25	0	15 mm	back	0.366	1.028	0.376	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.0	24.00	0.09	0	52711	QPSK	1	0	8 mm	top	0.419	1.000	0.419	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.0	22.88	-0.09	1	52711	QPSK	25	0	8 mm	top	0.366	1.028	0.376	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.0	24.00	0.11	0	52711	QPSK	1	0	5 mm	left	0.517	1.000	0.517	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.0	22.88	-0.02	1	52711	QPSK	25	0	5 mm	left	0.374	1.028	0.384	
836.50	20525	Mid	LTE Band 5 (Cell)	10	20.0	20.00	0.04	0	52723	QPSK	1	0	0 mm	back	0.872	1.000	0.872	A4
836.50	20525	Mid	LTE Band 5 (Cell)	10	20.0	19.94	0.02	0	52723	QPSK	25	0	0 mm	back	0.831	1.014	0.843	
836.50	20525	Mid	LTE Band 5 (Cell)	10	20.0	19.88	0.05	0	52723	QPSK	50	0	0 mm	back	0.849	1.028	0.873	
836.50	20525	Mid	LTE Band 5 (Cell)	10	20.0	20.00	-0.13	0	52723	QPSK	1	0	0 mm	top	0.302	1.000	0.302	
836.50	20525	Mid	LTE Band 5 (Cell)	10	20.0	19.94	-0.03	0	52723	QPSK	25	0	0 mm	top	0.309	1.014	0.313	
836.50	20525	Mid	LTE Band 5 (Cell)	10	20.0	20.00	0.11	0	52723	QPSK	1	0	0 mm	left	0.485	1.000	0.485	
836.50	20525	Mid	LTE Band 5 (Cell)	10	20.0	19.94	0.04	0	52723	QPSK	25	0	0 mm	left	0.589	1.014	0.597	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram										

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Table 10-4
LTE Band 4 Body SAR Data

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	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.														(W/kg)		(W/kg)	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	23.20	0.05	0	52710	QPSK	1	50	15 mm	back	0.787	1.072	0.844	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.85	0.03	1	52710	QPSK	50	0	15 mm	back	0.552	1.161	0.641	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.61	-0.04	1	52710	QPSK	100	0	15 mm	back	0.570	1.227	0.699	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	23.20	-0.01	0	52710	QPSK	1	50	8 mm	top	0.731	1.072	0.784	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.85	0.05	1	52710	QPSK	50	0	8 mm	top	0.573	1.161	0.665	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	23.20	-0.13	0	52710	QPSK	1	50	5 mm	left	0.827	1.072	0.887	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.85	-0.08	1	52710	QPSK	50	0	5 mm	left	0.669	1.161	0.777	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.61	0.06	1	52710	QPSK	100	0	5 mm	left	0.656	1.227	0.805	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	12.5	11.83	-0.17	0	52720	QPSK	1	0	0 mm	back	0.471	1.167	0.550	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	12.5	11.65	-0.01	0	52720	QPSK	50	0	0 mm	back	0.477	1.216	0.580	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	12.5	11.83	0.02	0	52720	QPSK	1	0	0 mm	top	0.171	1.167	0.200	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	12.5	11.65	0.02	0	52720	QPSK	50	0	0 mm	top	0.171	1.216	0.208	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	12.5	11.83	-0.16	0	52720	QPSK	1	0	0 mm	left	0.159	1.167	0.186	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	12.5	11.65	0.05	0	52720	QPSK	50	0	0 mm	left	0.158	1.216	0.192	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	23.20	-0.02	0	52710	QPSK	1	50	5 mm	left	0.838	1.072	0.898	A5
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram										

Blue entry represents variability measurement

Table 10-5
LTE Band 25 Body SAR Data

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	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.														(W/kg)		(W/kg)	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.5	22.77	0.11	0	52695	QPSK	1	50	15 mm	back	0.577	1.183	0.683	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	22.5	21.55	-0.01	1	52695	QPSK	50	0	15 mm	back	0.467	1.245	0.581	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.5	22.75	0.19	0	52695	QPSK	1	0	8 mm	top	0.796	1.189	0.946	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.5	22.77	0.01	0	52695	QPSK	1	50	8 mm	top	0.913	1.183	1.080	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.5	22.76	0.04	0	52695	QPSK	1	50	8 mm	top	0.923	1.186	**1.095**	A6
1882.50	26365	Mid	LTE Band 25 (PCS)	20	22.5	21.55	0.03	1	52695	QPSK	50	0	8 mm	top	0.579	1.245	0.721	
1905.00	26590	High	LTE Band 25 (PCS)	20	22.5	21.52	0.00	1	52695	QPSK	100	0	8 mm	top	0.655	1.253	0.821	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.5	22.75	0.20	0	52695	QPSK	1	0	5 mm	left	0.732	1.189	0.870	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.5	22.77	-0.09	0	52695	QPSK	1	50	5 mm	left	0.717	1.183	0.848	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.5	22.76	0.14	0	52695	QPSK	1	50	5 mm	left	0.600	1.186	0.712	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	22.5	21.55	0.00	1	52695	QPSK	50	0	5 mm	left	0.565	1.245	0.703	
1905.00	26590	High	LTE Band 25 (PCS)	20	22.5	21.52	0.08	1	52695	QPSK	100	0	5 mm	left	0.457	1.253	0.573	
1860.00	26140	Low	LTE Band 25 (PCS)	20	12.5	12.05	0.00	0	52695	QPSK	1	50	0 mm	back	0.701	1.109	0.777	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	12.5	12.21	0.01	0	52695	QPSK	1	50	0 mm	back	0.821	1.069	0.878	
1905.00	26590	High	LTE Band 25 (PCS)	20	12.5	12.20	0.13	0	52695	QPSK	1	50	0 mm	back	0.875	1.072	0.938	
1860.00	26140	Low	LTE Band 25 (PCS)	20	12.5	11.87	0.00	0	52695	QPSK	50	0	0 mm	back	0.820	1.156	0.948	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	12.5	11.89	-0.06	0	52695	QPSK	50	0	0 mm	back	0.807	1.151	0.929	
1905.00	26590	High	LTE Band 25 (PCS)	20	12.5	11.88	-0.01	0	52695	QPSK	50	50	0 mm	back	0.832	1.153	0.959	
1905.00	26590	High	LTE Band 25 (PCS)	20	12.5	11.84	0.00	0	52695	QPSK	100	0	0 mm	back	0.836	1.164	0.973	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	12.5	12.21	-0.13	0	52695	QPSK	1	50	0 mm	top	0.245	1.069	0.262	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	12.5	11.89	-0.02	0	52695	QPSK	50	0	0 mm	top	0.207	1.151	0.238	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	12.5	12.21	-0.03	0	52695	QPSK	1	50	0 mm	left	0.173	1.069	0.185	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	12.5	11.89	-0.01	0	52695	QPSK	50	0	0 mm	left	0.169	1.151	0.195	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram										

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Table 10-6
WLAN Body SAR Data

MEASUREMENT RESULTS																	
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Scaled SAR (1g)	Plot #
MHz	Ch.												(W/kg)			(W/kg)	
2462	11	802.11b	DSSS	22	13.5	13.47	0.07	0 mm	52726	1	back	99.8	0.683	1.007	1.002	**0.689**	A7
2462	11	802.11b	DSSS	22	13.5	13.47	0.01	0 mm	52726	1	top	99.8	0.237	1.007	1.002	0.239	
5310	62	802.11n	OFDM	40	11.5	11.35	0.18	0 mm	52728	13.5	back	95.5	0.417	1.035	1.047	0.452	
5310	62	802.11n	OFDM	40	11.5	11.35	0.11	0 mm	52728	13.5	top	95.5	0.444	1.035	1.047	0.482	
5630	126	802.11n	OFDM	40	11.5	11.15	-0.05	0 mm	52728	13.5	back	95.5	0.627	1.084	1.047	**0.712**	A8
5630	126	802.11n	OFDM	40	11.5	11.15	0.05	0 mm	52728	13.5	top	95.5	0.602	1.084	1.047	0.684	
5755	151	802.11n	OFDM	40	11.5	11.24	0.19	0 mm	52728	13.5	back	95.5	0.293	1.062	1.047	0.326	
5755	151	802.11n	OFDM	40	11.5	11.24	0.14	0 mm	52728	13.5	top	95.5	0.183	1.062	1.047	0.203	
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 10-7
Bluetooth Body SAR Data

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
2480	78	Bluetooth	FHSS	14.0	13.94	0.17	0 mm	52728	1	back	1:1	0.199	1.014	**0.202**	A9
2480	78	Bluetooth	FHSS	14.0	13.94	0.08	0 mm	52728	1	top	1:1	0.103	1.014	0.104	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Body 1.6 W/kg (mW/g) averaged over 1 gram									

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 D01v01, 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 considerations. SAR tests were required for top and left edges for the CDMA Cell/PCS, LTE B12/5/4/25; and for top edge for the WLAN/BT antenna.

CDMA Notes:

1. CDMA Body SAR is measured using Subtype 0/1 Physical Layer configurations for Rev. 0 according to KDB 941225 D01v03 procedures for data devices. Body SAR tests for Subtype 2 of Rev.A and 1x RTT configurations were not required per the 3G SAR Test Reduction Policy in KDB Publication 941225 D01v03.

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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 > ½ 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).

WLAN Notes:

1. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r01 for 2.4 GHz WIFI single transmission chain operations, the highest measured maximum output power channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4 GHz 802.11g/n) was not required due to the maximum allowed powers and the highest reported DSSS SAR. See Section 7.6.4 for more information.
2. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r01 for 5 GHz WIFI single transmission chain operations, the initial test configuration was selected according to the transmission mode with the highest maximum allowed powers. Other transmission modes were not investigated since the highest reported SAR for initial test configuration adjusted by the ratio of maximum output powers is less than 1.2 W/kg. See Section 7.6.5 for more information.
3. When the maximum reported 1g averaged SAR is ≤0.8 W/kg, SAR testing on additional channels was not required. Otherwise, SAR for the next highest output power channel was required until the reported SAR result was ≤ 1.20 W/kg or all test channels were measured.
4. The device was configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools. The reported SAR was scaled to the 100% transmission duty factor to determine compliance. Procedures used to measure the duty factor are identical to that in the associated EMC test reports.

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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 a 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

Configuration	Cell. EVDO SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Back	1.081	0.689	See Note 1	0.04
Top	0.696	0.239	0.935	N/A
Bottom	0.400	0.400	0.800	N/A
Right	0.400	0.400	0.800	N/A
Left	0.951	0.400	**1.351**	N/A

Configuration	PCS EVDO SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Back	0.879	0.689	**1.568**	N/A
Top	1.039	0.239	1.278	N/A
Bottom	0.400	0.400	0.800	N/A
Right	0.400	0.400	0.800	N/A
Left	0.754	0.400	1.154	N/A

Configuration	LTE Band 12 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Back	0.592	0.689	**1.281**	N/A
Top	0.511	0.239	0.750	N/A
Bottom	0.400	0.400	0.800	N/A
Right	0.400	0.400	0.800	N/A
Left	0.364	0.400	0.764	N/A

Configuration	LTE Band 5 (Cell) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Back	0.873	0.689	**1.562**	N/A
Top	0.419	0.239	0.658	N/A
Bottom	0.400	0.400	0.800	N/A
Right	0.400	0.400	0.800	N/A
Left	0.597	0.400	0.997	N/A

Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Back	0.844	0.689	**1.533**	N/A
Top	0.784	0.239	1.023	N/A
Bottom	0.400	0.400	0.800	N/A
Right	0.400	0.400	0.800	N/A
Left	0.898	0.400	1.298	N/A

Configuration	LTE Band 25 (PCS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Back	0.973	0.689	See Note 1	0.04
Top	1.095	0.239	**1.334**	N/A
Bottom	0.400	0.400	0.800	N/A
Right	0.400	0.400	0.800	N/A
Left	0.870	0.400	1.270	N/A

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Table 11-2
Simultaneous Transmission Scenario with 5 GHz WLAN

Configuration	Cell. EVDO SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Back	1.081	0.712	See Note 1	0.04
Top	0.696	0.684	**1.380**	N/A
Bottom	0.400	0.400	0.800	N/A
Right	0.400	0.400	0.800	N/A
Left	0.951	0.400	1.351	N/A

Configuration	PCS EVDO SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Back	0.879	0.712	**1.591**	N/A
Top	1.039	0.684	See Note 1	0.04
Bottom	0.400	0.400	0.800	N/A
Right	0.400	0.400	0.800	N/A
Left	0.754	0.400	1.154	N/A

Configuration	LTE Band 12 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Back	0.592	0.712	**1.304**	N/A
Top	0.511	0.684	1.195	N/A
Bottom	0.400	0.400	0.800	N/A
Right	0.400	0.400	0.800	N/A
Left	0.364	0.400	0.764	N/A

Configuration	LTE Band 5 (Cell) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Back	0.873	0.712	**1.585**	N/A
Top	0.419	0.684	1.103	N/A
Bottom	0.400	0.400	0.800	N/A
Right	0.400	0.400	0.800	N/A
Left	0.597	0.400	0.997	N/A

Configuration	LTE Band 4 (AWS) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Back	0.844	0.712	**1.556**	N/A
Top	0.784	0.684	1.468	N/A
Bottom	0.400	0.400	0.800	N/A
Right	0.400	0.400	0.800	N/A
Left	0.898	0.400	1.298	N/A

Configuration	LTE Band 25 (PCS) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Back	0.973	0.712	See Note 1	0.04
Top	1.095	0.684	See Note 1	0.04
Bottom	0.400	0.400	0.800	N/A
Right	0.400	0.400	0.800	N/A
Left	0.870	0.400	**1.270**	N/A

Table 11-3
Simultaneous Transmission Scenario with Bluetooth

Configuration	Cell. EVDO SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Back	1.081	0.202	1.283	N/A
Top	0.696	0.104	0.800	N/A
Bottom	0.400	0.400	0.800	N/A
Right	0.400	0.400	0.800	N/A
Left	0.951	0.400	**1.351**	N/A

Configuration	PCS EVDO SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Back	0.879	0.202	1.081	N/A
Top	1.039	0.104	1.143	N/A
Bottom	0.400	0.400	0.800	N/A
Right	0.400	0.400	0.800	N/A
Left	0.754	0.400	**1.154**	N/A

Configuration	LTE Band 12 SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Back	0.592	0.202	0.794	N/A
Top	0.511	0.104	0.615	N/A
Bottom	0.400	0.400	**0.800**	N/A
Right	0.400	0.400	**0.800**	N/A
Left	0.364	0.400	0.764	N/A

Configuration	LTE Band 5 (Cell) SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Back	0.873	0.202	**1.075**	N/A
Top	0.419	0.104	0.523	N/A
Bottom	0.400	0.400	0.800	N/A
Right	0.400	0.400	0.800	N/A
Left	0.597	0.400	0.997	N/A

Configuration	LTE Band 4 (AWS) SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Back	0.844	0.202	1.046	N/A
Top	0.784	0.104	0.888	N/A
Bottom	0.400	0.400	0.800	N/A
Right	0.400	0.400	0.800	N/A
Left	0.898	0.400	**1.298**	N/A

Configuration	LTE Band 25 (PCS) SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Back	0.973	0.202	1.175	N/A
Top	1.095	0.104	1.199	N/A
Bottom	0.400	0.400	0.800	N/A
Right	0.400	0.400	0.800	N/A
Left	0.870	0.400	**1.270**	N/A

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Notes:

1. No evaluation was performed to determine the aggregate 1g SAR for these configurations as the SPLS ratio between the antenna pairs was not greater than 0.04 per FCC KDB 447498 D01v05. See Section 11.4 for detailed SPLS ratio analysis.
2. 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.

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.

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

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

Table 11-4
Peak SAR Locations for Body Back Side

Mode/Band	x (mm)	y (mm)	Reported SAR (W/kg)
2.4 GHz WLAN	-22.40	96.40	0.689
5 GHz WLAN	-23.00	98.00	0.712
Cell CDMA	27.97	76.97	1.081
LTE Band 25	28.00	93.00	0.973

Table 11-5
Peak SAR Locations for Body Top Edge

Mode/Band	x (mm)	y (mm)	Reported SAR (W/kg)
5 GHz WLAN	-17.00	14.00	0.684
PCS CDMA	-8.50	-45.00	1.039
LTE Band 25	-14.50	-45.00	1.095

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Table 11-6
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}	$(a+b)^{1.5}/D_{a-b}$	
2.4 GHz WLAN Back	Cell CDMA Back	0.689	1.081	1.770	53.99	0.04	1
2.4 GHz WLAN Back	LTE Band 25 Back	0.689	0.973	1.662	50.52	0.04	2
5 GHz WLAN Back	Cell CDMA Back	0.712	1.081	1.793	55.14	0.04	3
5 GHz WLAN Top	PCS CDMA Top	0.684	1.039	1.723	59.61	0.04	4
5 GHz WLAN Back	LTE Band 25 Back	0.712	0.973	1.685	51.25	0.04	5
5 GHz WLAN Top	LTE Band 25 Top	0.684	1.095	1.779	59.05	0.04	6

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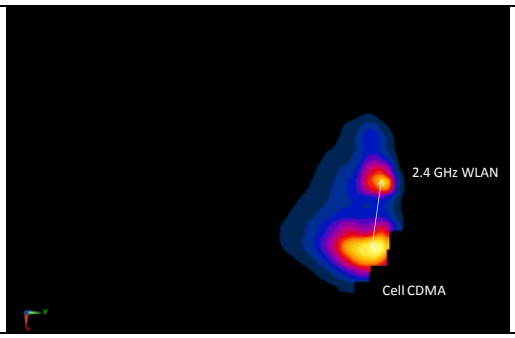

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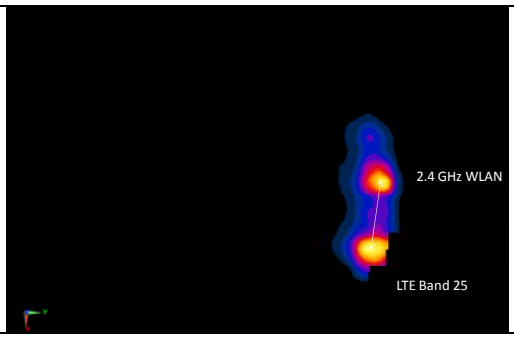

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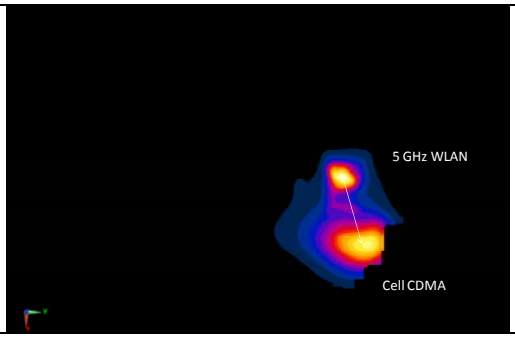

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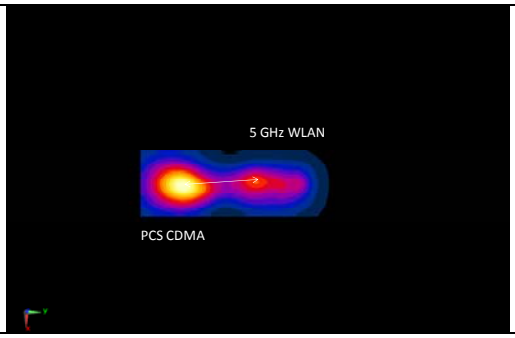
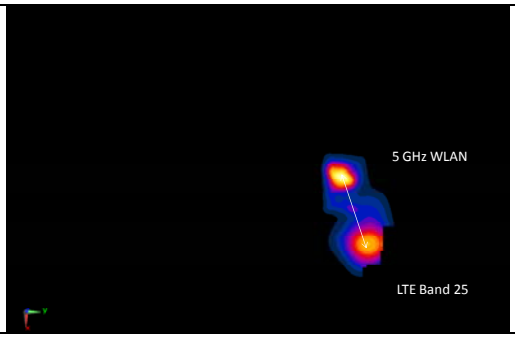
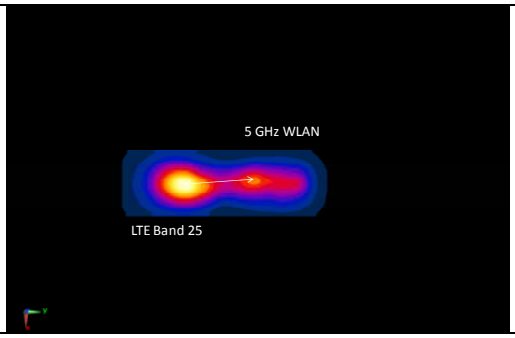


4



5



6

11.5 Simultaneous Transmission Conclusion

The above numerical summed SAR results and SPLSR analysis are 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 preformed 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	Bandwidth [MHz]	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)	
835	824.70	1013	Cell. CDMA	N/A	EVDO Rev. 0	back	0 mm	0.950	0.949	1.00	N/A	N/A	N/A	N/A
1900	1908.75	1175	PCS CDMA	N/A	EVDO Rev. 0	top	8 mm	1.020	0.996	1.02	N/A	N/A	N/A	N/A
1750	1732.50	20175	LTE Band 4 (AWS)	20	QPSK, 1 RB, 50 RB Offset	left	5 mm	0.827	0.838	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

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	E8257D	(250kHz-20GHz) Signal Generator	3/15/2015	Annual	3/15/2016	MY45470194
Agilent	8753E	(30kHz-6GHz) Network Analyzer	12/30/2014	Annual	12/30/2015	JP38020182
Agilent	8594A	(9kHz-2.9GHz) Spectrum Analyzer	N/A	N/A	N/A	3051A00187
Agilent	8648D	(9kHz-4GHz) Signal Generator	3/15/2015	Annual	3/15/2016	3629U00687
Agilent	E4438C	ESG Vector Signal Generator	4/1/2014	Biennial	4/1/2016	MY47270002
Agilent	E4432B	ESG-D Series Signal Generator	3/16/2015	Annual	3/16/2016	US40053896
Agilent	N9020A	MXA Signal Analyzer	10/27/2014	Annual	10/27/2015	US46470561
Agilent	N5182A	MXG Vector Signal Generator	10/27/2014	Annual	10/27/2015	MY47420603
Agilent	8753ES	Network Analyzer	3/20/2015	Annual	3/20/2016	MY40001472
Agilent	8753ES	S-Parameter Network Analyzer	1/20/2015	Annual	1/20/2016	US39170122
Agilent	8753ES	S-Parameter Network Analyzer	3/12/2015	Annual	3/12/2016	MY40000670
Agilent	E5515C	Wireless Communications Test Set	11/5/2013	Biennial	11/5/2015	GB46310798
Agilent	N4010A	Wireless Connectivity Test Set	N/A	N/A	N/A	GB46170464
Amplifier Research	15S1G6	Amplifier	CBT	N/A	N/A	433971
Anritsu	ML2438A	Power Meter	3/13/2015	Annual	3/13/2016	1190013
Anritsu	ML2495A	Power Meter	10/31/2013	Biennial	10/31/2015	1039008
Anritsu	ML2496A	Power Meter	3/13/2015	Annual	3/13/2016	1306009
Anritsu	MA2481A	Power Sensor	3/10/2015	Annual	3/10/2016	5821
Anritsu	MA2481A	Power Sensor	3/10/2015	Annual	3/10/2016	5605
Anritsu	MA2411B	Pulse Power Sensor	11/13/2014	Annual	11/13/2015	1339018
Anritsu	MA2411B	Pulse Power Sensor	11/17/2014	Annual	11/17/2015	1207364
Anritsu	MT8820C	Radio Communication Analyzer	9/19/2014	Annual	10/19/2015	6201144418
Anritsu	MA24106A	USB Power Sensor	3/2/2015	Annual	3/2/2016	1344555
Anritsu	MA24106A	USB Power Sensor	3/2/2015	Annual	3/2/2016	1344556
COMTech	AR85729-5	Solid State Amplifier	CBT	N/A	N/A	M1S5A00-009
COMTECH	AR85729-5/5759B	Solid State Amplifier	CBT	N/A	N/A	M3W1A00-1002
Control Company	4040	Digital Thermometer	3/15/2015	Biennial	3/15/2017	150194929
Control Company	4353	Long Stem Thermometer	1/22/2015	Biennial	1/22/2017	150053081
Fisher Scientific	S407993	Long Stem Thermometer	11/4/2013	Biennial	11/4/2015	130671826
Gigatronics	80701A	(0.05-18GHz) Power Sensor	10/30/2014	Annual	10/30/2015	1833460
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	N/A	1139
MiniCircuits	SLP-2400+	Low Pass Filter	CBT	N/A	N/A	R8979500903
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	N/A	N/A
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	N/A	N/A
Mini-Circuits	NLP-1200+	Low Pass Filter DC to 1000 MHz	CBT	N/A	N/A	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	N/A	N/A
Mini-Circuits	BW-N20W5	Power Attenuator	CBT	N/A	N/A	1226
Mitutoyo	CD-6"CSX	Digital Caliper	5/8/2014	Biennial	5/8/2016	13264162
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	N/A	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	N/A	9406
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	N/A	N/A
Pasternack	NC-100	Torque Wrench	5/21/2015	Biennial	5/21/2017	N/A
Rohde & Schwarz	NRVD	Dual Channel Power Meter	CBT	N/A	N/A	101695
Rohde & Schwarz	NRV-Z32	Peak Power Sensor	CBT	N/A	N/A	836019/013
Rohde & Schwarz	CMW500	Radio Communication Tester	10/3/2014	Annual	10/3/2015	100976
Rohde & Schwarz	SME06	Signal Generator	CBT	N/A	N/A	832026
Rohde & Schwarz	SMIQ03B	Signal Generator	CBT	N/A	N/A	DE27259
Seekonk	NC-100	Torque Wrench	3/18/2014	Biennial	3/18/2016	N/A
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	3/18/2014	Biennial	3/18/2016	N/A
SPEAG	D1765V2	1765 MHz SAR Dipole	5/13/2015	Annual	5/13/2016	1008
SPEAG	D1900V2	1900 MHz SAR Dipole	4/14/2015	Annual	4/14/2016	5d141
SPEAG	D2450V2	2450 MHz SAR Dipole	1/15/2015	Annual	1/15/2016	797
SPEAG	D2450V2	2450 MHz SAR Dipole	2/18/2015	Annual	2/18/2016	882
SPEAG	D5GHzV2	5 GHz SAR Dipole	2/17/2015	Annual	2/17/2016	1120
SPEAG	D750V3	750 MHz Dipole	3/11/2015	Annual	3/11/2016	1054
SPEAG	D835V2	835 MHz SAR Dipole	1/16/2015	Annual	1/16/2016	4d132
SPEAG	DAE4	Dasy Data Acquisition Electronics	10/23/2014	Annual	10/23/2015	1408
SPEAG	DAE4	Dasy Data Acquisition Electronics	10/31/2014	Annual	10/31/2015	1333
SPEAG	DAE4	Dasy Data Acquisition Electronics	12/12/2014	Annual	12/12/2015	1415
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/20/2015	Annual	4/20/2016	1407
SPEAG	DAE4	Dasy Data Acquisition Electronics	8/24/2015	Annual	8/24/2016	1322
SPEAG	DAK-3.5	Dielectric Assessment Kit	10/21/2014	Annual	10/21/2015	1091
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/12/2015	Annual	5/12/2016	1070
SPEAG	ES3DV3	SAR Probe	10/24/2014	Annual	10/24/2015	3333
SPEAG	ES3DV3	SAR Probe	12/16/2014	Annual	12/16/2015	3334
SPEAG	ES3DV3	SAR Probe	1/20/2015	Annual	1/20/2016	3213
SPEAG	ES3DV3	SAR Probe	6/22/2015	Annual	6/22/2016	3351
SPEAG	EX3DV4	SAR Probe	2/10/2015	Annual	2/10/2016	3914

Note: 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.

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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	299
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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Applicable for frequencies up to 6 GHz.

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	6.55	N	1	1.0	1.0	6.6	6.6	∞
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				12.4	12.0	299
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				24.7	24.0	

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

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PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMT377R4; Type: Portable Tablet; Serial: 52713

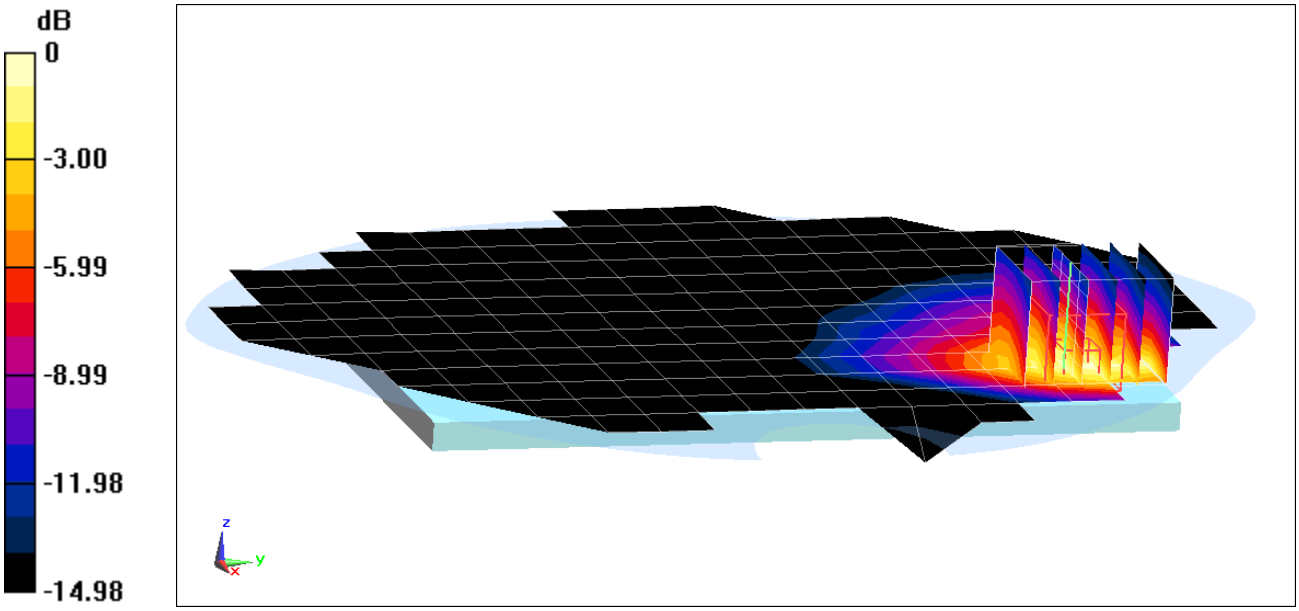
Communication System: UID 0, CDMA; Frequency: 824.7 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used (interpolated):
f = 824.7 MHz; σ = 0.974 S/m; ε_r = 53.059; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space = 0.0 cm

Test Date: 09-11-2015; Ambient Temp: 23.6°C; Tissue Temp: 22.4°C

Probe: ES3DV3 - SN3333; ConvF(6.12, 6.12, 6.12); Calibrated: 10/24/2014;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 10/23/2014
Phantom: Sub TWIN SAM; Type: QD000P40CC; Serial: TP-1357
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: Cell. EVDO, Body SAR, Back side, Low.ch

Area Scan (15x19x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 32.35 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.77 W/kg
SAR(1 g) = 0.950 W/kg



0 dB = 1.14 W/kg = 0.57 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMT377R4; Type: Portable Tablet; Serial: 52709

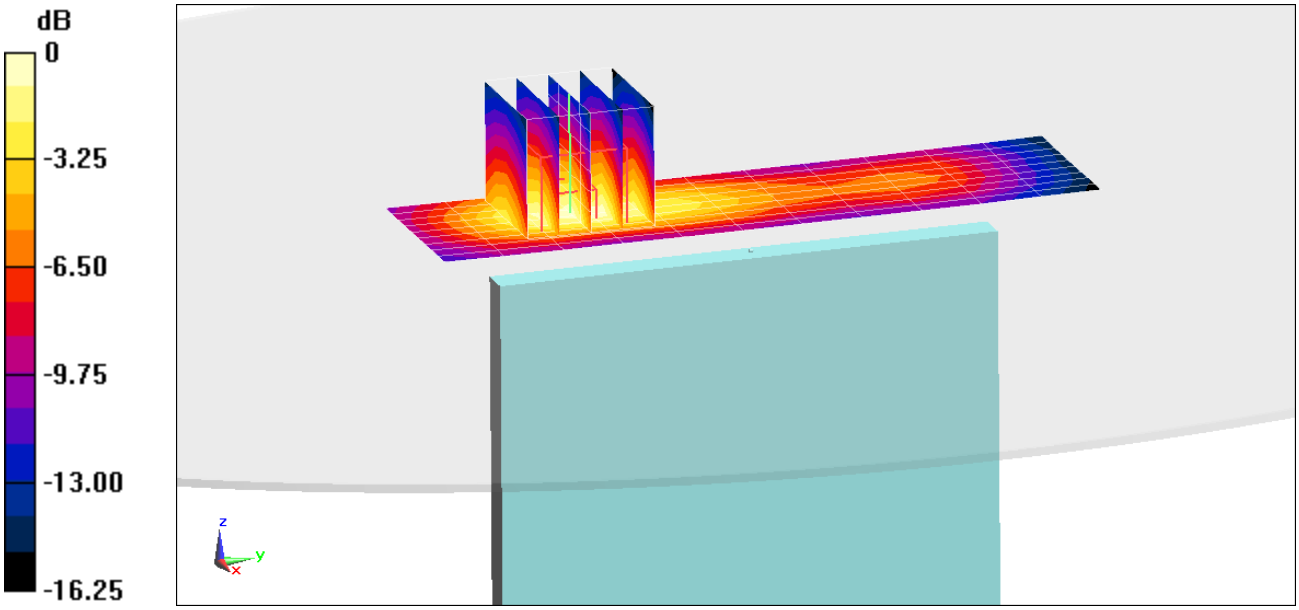
Communication System: UID 0, CDMA; Frequency: 1908.75 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used (interpolated):
f = 1908.75 MHz; σ = 1.549 S/m; ε_r = 51.739; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space = 0.8 cm

Test Date: 09-10-2015; Ambient Temp: 22.5°C; Tissue Temp: 22.4°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 v5.0 Left; Type: QD0VA001BB; Serial: TP:1202
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: PCS EVDO, Body SAR, Top Edge, High.ch

Area Scan (10x11x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (7x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.87 V/m; Power Drift = -0.19 dB
Peak SAR (extrapolated) = 1.70 W/kg
SAR(1 g) = 1.02 W/kg



0 dB = 0.914 W/kg = -0.39 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMT377R4; Type: Portable Tablet; Serial: 52694

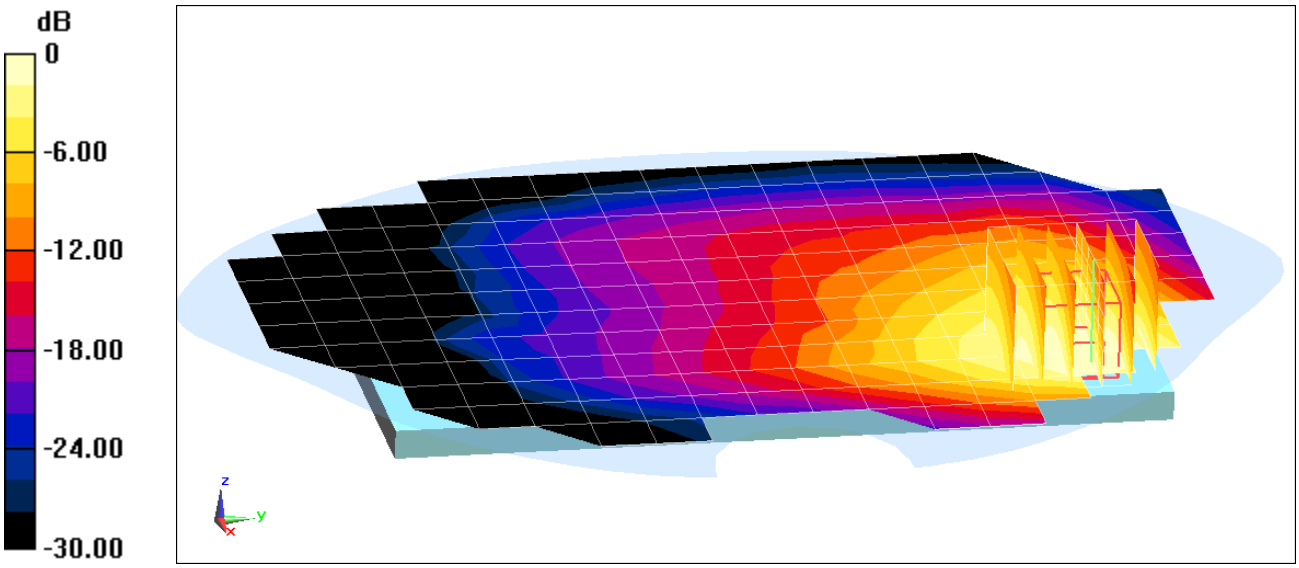
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Body; Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.931 S/m; ε_r = 54.598; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space = 0.0 cm

Test Date: 09-28-2003; Ambient Temp: 23.3°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3213; ConvF(6.11, 6.11, 6.11); Calibrated: 1/20/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/20/2015
Phantom: SAM Front; Type: QD000P40CD; Serial: TP:1758
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 12, Body SAR, Back side, Mid.ch, 10 MHz Bandwidth QPSK, 1 RB, 25 RB Offset

Area Scan (13x18x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.96 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.08 W/kg
SAR(1 g) = 0.587 W/kg



0 dB = 0.680 W/kg = -1.67 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMT377R4; Type: Portable Tablet; Serial: 52723

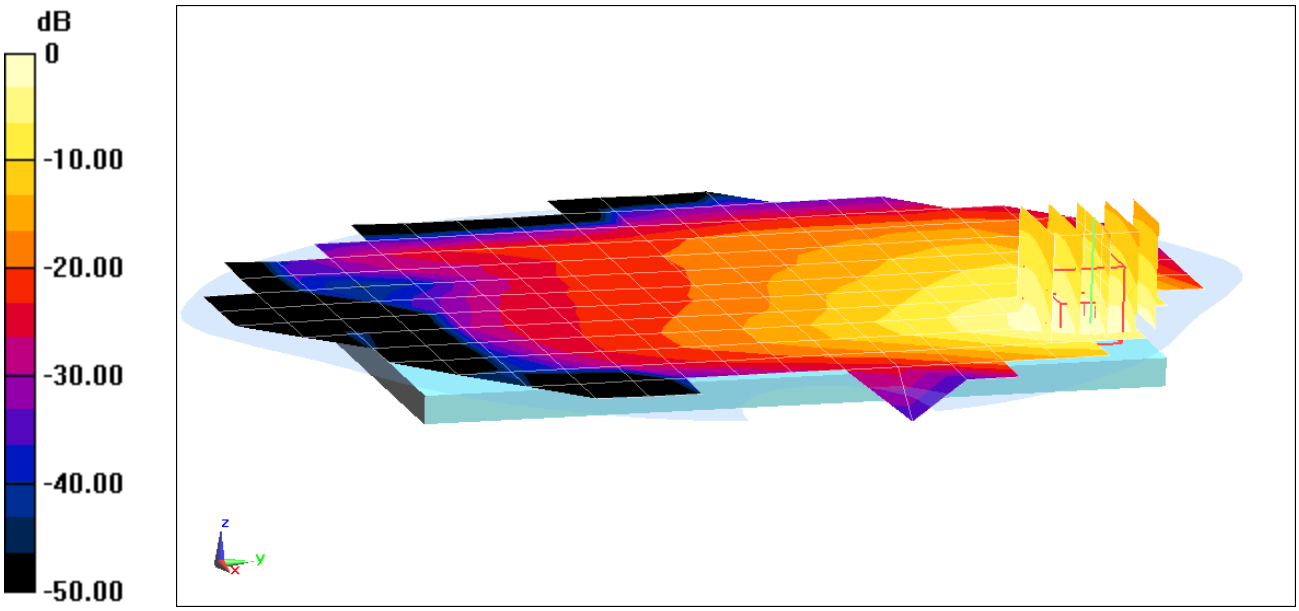
Communication System: UID 0, LTE Band 5 (Cell); Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used (interpolated):
f = 836.5 MHz; σ = 0.988 S/m; ε_r = 52.944; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space = 0.0 cm

Test Date: 09-11-2015; Ambient Temp: 23.6°C; Tissue Temp: 22.4°C

Probe: ES3DV3 - SN3333; ConvF(6.12, 6.12, 6.12); Calibrated: 10/24/2014;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 10/23/2014
Phantom: Sub TWIN SAM; Type: QD000P40CC; Serial: TP-1357
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 5 (Cell.), Body SAR, Back side, Mid.ch, 10 MHz Bandwidth QPSK, 1 RB, 0 RB Offset

Area Scan (15x19x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.71 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.58 W/kg
SAR(1 g) = 0.872 W/kg



0 dB = 1.03 W/kg = 0.13 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMT377R4; Type: Portable Tablet; Serial: 52710

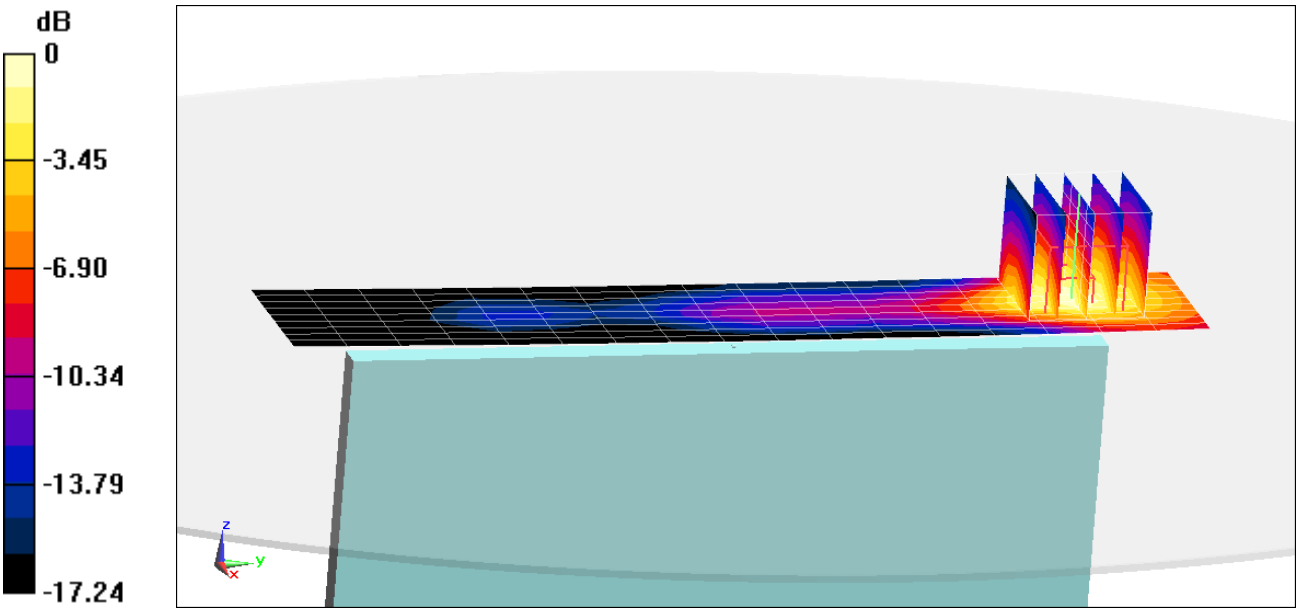
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body; Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.448 S/m; ε_r = 50.931; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space = 0.5 cm

Test Date: 09-08-2015; Ambient Temp: 23.1°C; Tissue Temp: 22.6°C

Probe: ES3DV3 - SN3334; ConvF(4.94, 4.94, 4.94); 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 4 (AWS), Body SAR, Left Edge, Mid.ch, 20 MHz Bandwidth QPSK, 1 RB, 50 RB Offset

Area Scan (10x18x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.99 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.43 W/kg
SAR(1 g) = 0.838 W/kg



0 dB = 1.02 W/kg = 0.09 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMT377R4; Type: Portable Tablet; Serial: 52695

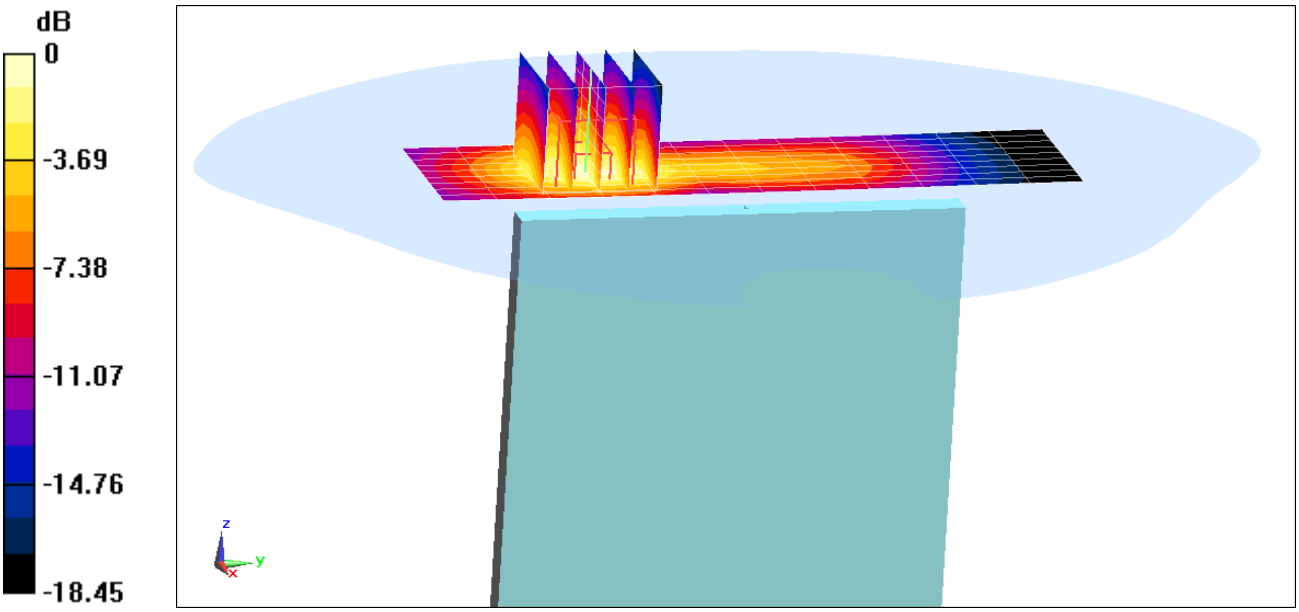
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1905 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used (interpolated):
f = 1905 MHz; σ = 1.589 S/m; ε_r = 51.569; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space = 0.8 cm

Test Date: 09-21-2015; Ambient Temp: 22.3°C; Tissue Temp: 22.1°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: SAM Front; Type: QD000P40CD; Serial: TP:1758
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 25 (PCS), Body SAR, Top Edge, High.ch, 20 MHz Bandwidth QPSK, 1 RB, 50 RB Offset

Area Scan (10x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.91 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.56 W/kg
SAR(1 g) = 0.923 W/kg



0 dB = 1.14 W/kg = 0.57 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMT377R4; Type: Portable Tablet; Serial: 52726

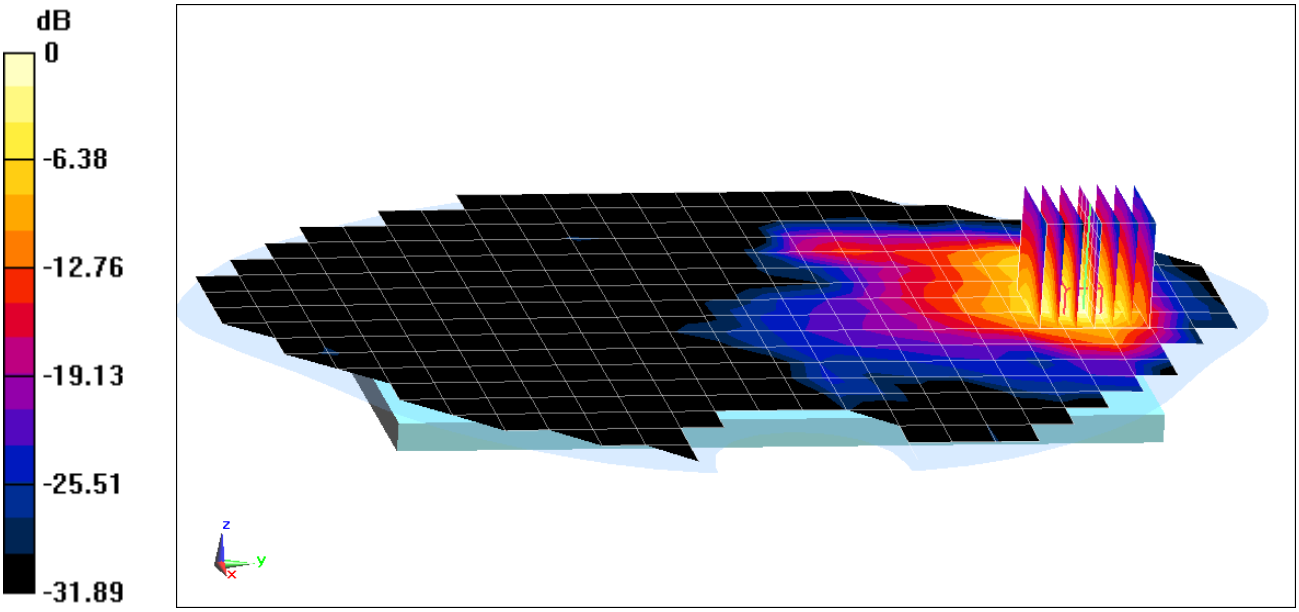
Communication System: UID 0, IEEE 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used (interpolated):
f = 2462 MHz; σ = 2.017 S/m; ε_r = 51.393; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space = 0.0 cm

Test Date: 09-21-2015; Ambient Temp: 22.7°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3351; ConvF(4.3, 4.3, 4.3); Calibrated: 6/22/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/24/2015
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11b, 22 MHz Bandwidth, Body SAR, Ch 11, 1 Mbps, Back Side

Area Scan (18x24x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.33 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 1.81 W/kg
SAR(1 g) = 0.683 W/kg



0 dB = 0.976 W/kg = -0.11 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMT377R4; Type: Portable Tablet; Serial: 52728

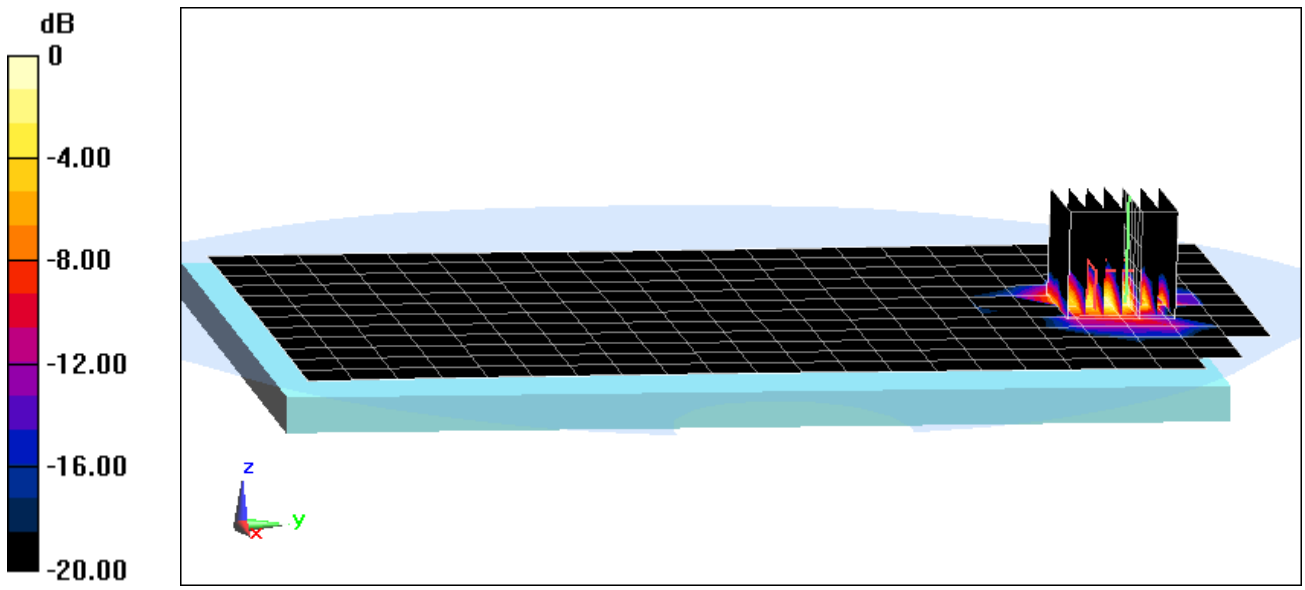
Communication System: UID 0, IEEE 802.11n; Frequency: 5630 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body; Medium parameters used (interpolated):
f = 5630 MHz; σ = 5.824 S/m; ε_r = 46.469; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 09-14-2015; Ambient Temp: 23.5°C; Tissue Temp: 21.7°C

Probe: EX3DV4 - SN3914; ConvF(3.89, 3.89, 3.89); Calibrated: 2/10/2015;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 10/31/2014
Phantom: SAM Sub; Type: QD000P40CC; Serial: TP:1357
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11n U-NII-2C, 40 MHz Bandwidth
Body SAR, Ch 126, 13.5 Mbps, Back Side

Area Scan (17x25x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 9.031 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 3.14 W/kg
SAR(1 g) = 0.627 W/kg



0 dB = 0.738 W/kg = -1.32 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMT377R4; Type: Portable Tablet; Serial: 52728

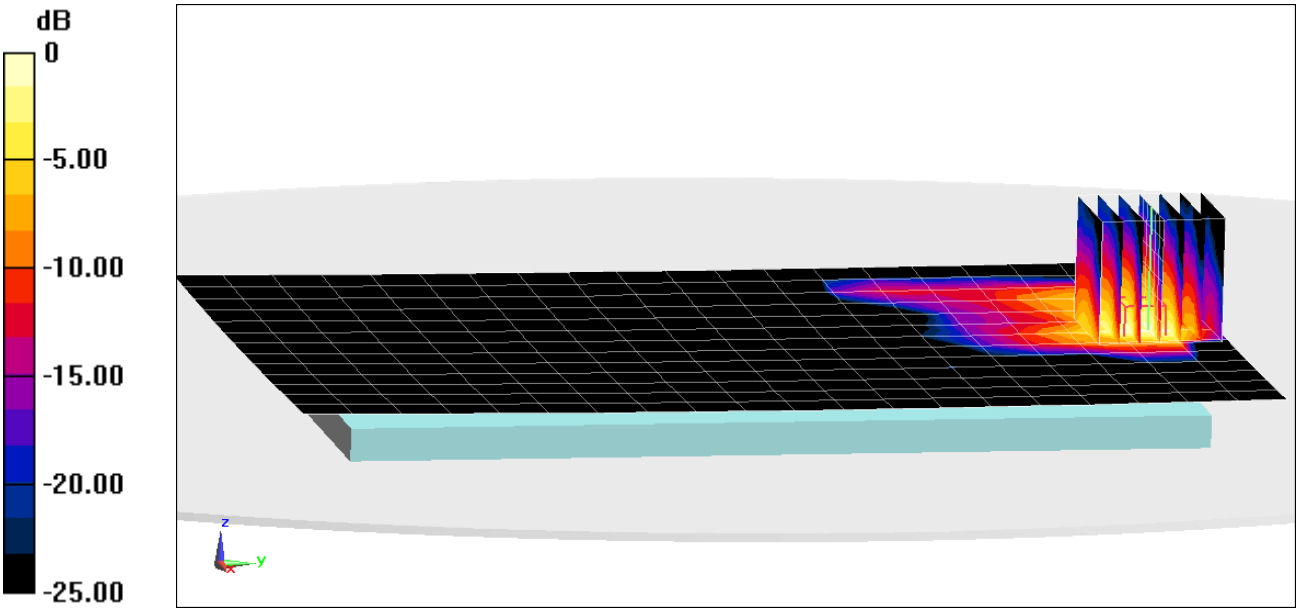
Communication System: UID 0, Bluetooth; Frequency: 2480 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used (interpolated):
f = 2480 MHz; σ = 2.051 S/m; ε_r = 50.706; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space = 0.0 cm

Test Date: 09-09-2015; Ambient Temp: 23.9°C; Tissue Temp: 23.6°C

Probe: ES3DV3 - SN3334; ConvF(4.28, 4.28, 4.28); 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: Bluetooth, Body SAR, Ch 78, 1 Mbps, Back Side

Area Scan (14x21x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.51 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 0.539 W/kg
SAR(1 g) = 0.199 W/kg



0 dB = 0.265 W/kg = -5.77 dBW/kg

APPENDIX B: SYSTEM VERIFICATION

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PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1054

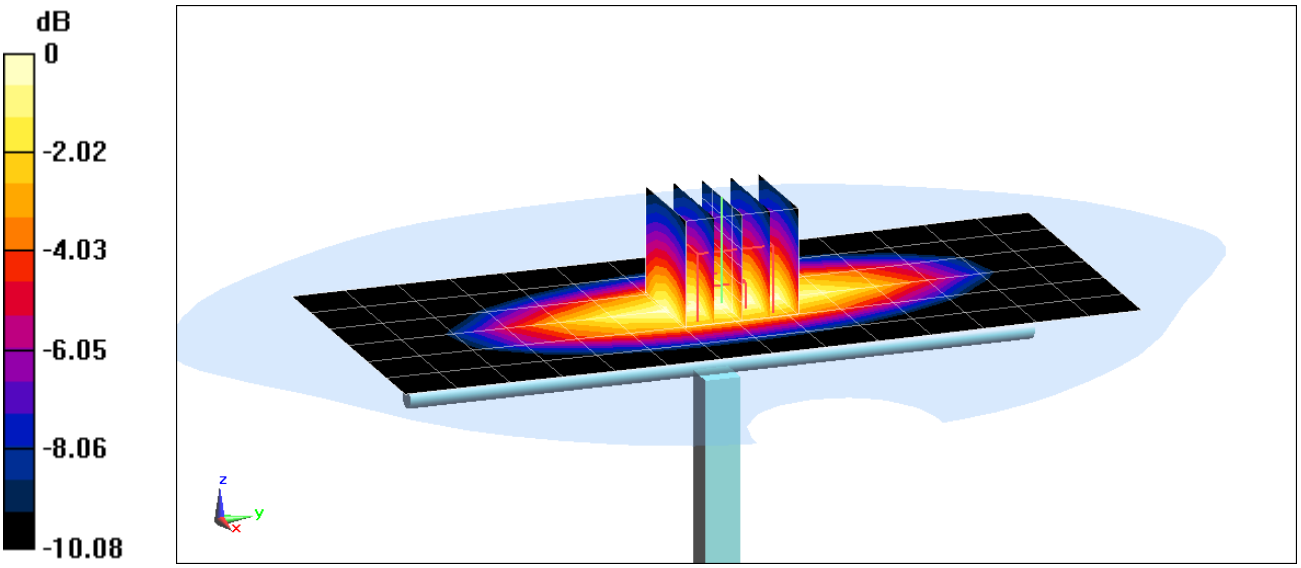
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 750 MHz; σ = 0.969 S/m; ε_r = 54.08; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 09-28-2015; Ambient Temp: 23.3°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3213; ConvF(6.11, 6.11, 6.11); Calibrated: 1/20/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/20/2015
Phantom: SAM Front; Type: QD000P40CD; Serial: TP:1758
Measurement SW: DASY52, Version 52.8 (8);SEMCAD X Version 14.6.10 (7331)

750 MHz System Verification

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 23.0 dBm (200 mW)
Peak SAR (extrapolated) = 2.50 W/kg
SAR(1 g) = 1.71 W/kg
Deviation(1 g) = 0.23%



0 dB = 2.00 W/kg = 3.01 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d132

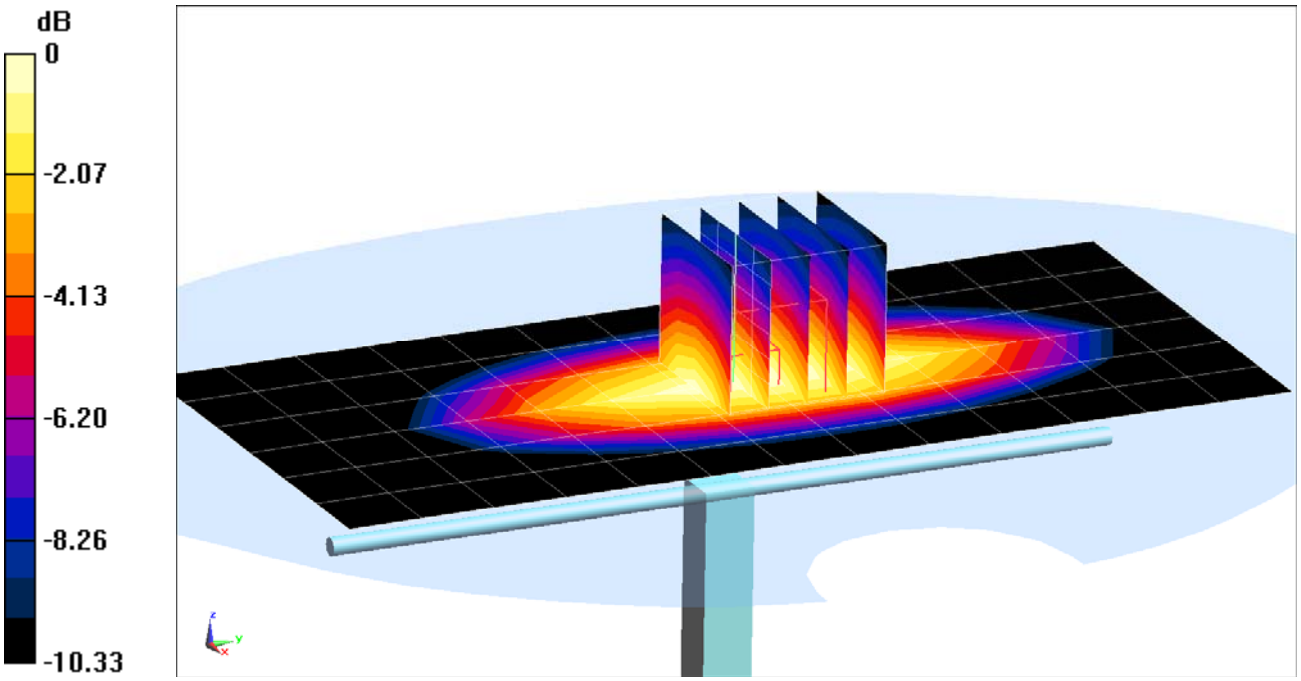
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body, Medium parameters used:
f = 835 MHz; σ = 0.986 S/m; ε_r = 52.96; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 09-11-2015; Ambient Temp: 23.6°C; Tissue Temp: 22.4°C

Probe: ES3DV3 - SN3333; ConvF(6.12, 6.12, 6.12); Calibrated: 10/24/2014;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 10/23/2014
Phantom: Sub TWIN SAM; Type: QD000P40CC; Serial: TP-1357
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

835 MHz System Verification

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Inpur Power = 23.0 dBm (200 mW)
Peak SAR (extrapolated) = 2.80 W/kg
SAR(1 g) = 1.96 W/kg
Deviation (1g) = 7.22%



0 dB = 2.29 W/kg = 3.60 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1750 MHz; Type: D1765V2; Serial: 1008

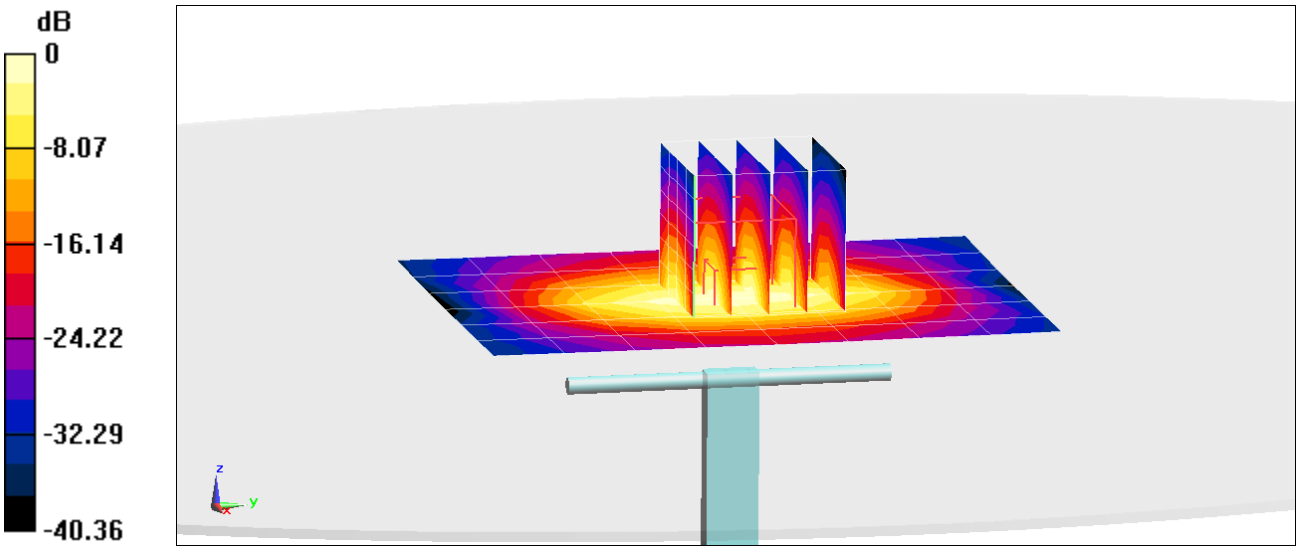
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body; Medium parameters used:
f = 1750 MHz; σ = 1.467 S/m; ε_r = 50.9; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-08-2015; Ambient Temp: 23.1°C; Tissue Temp: 22.6°C

Probe: ES3DV3 - SN3334; ConvF(4.94, 4.94, 4.94); 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)

1750 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 7.04 W/kg
SAR(1 g) = 3.97 W/kg
Deviation (1g) = 4.47 %



0 dB = 4.90 W/kg = 6.90 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

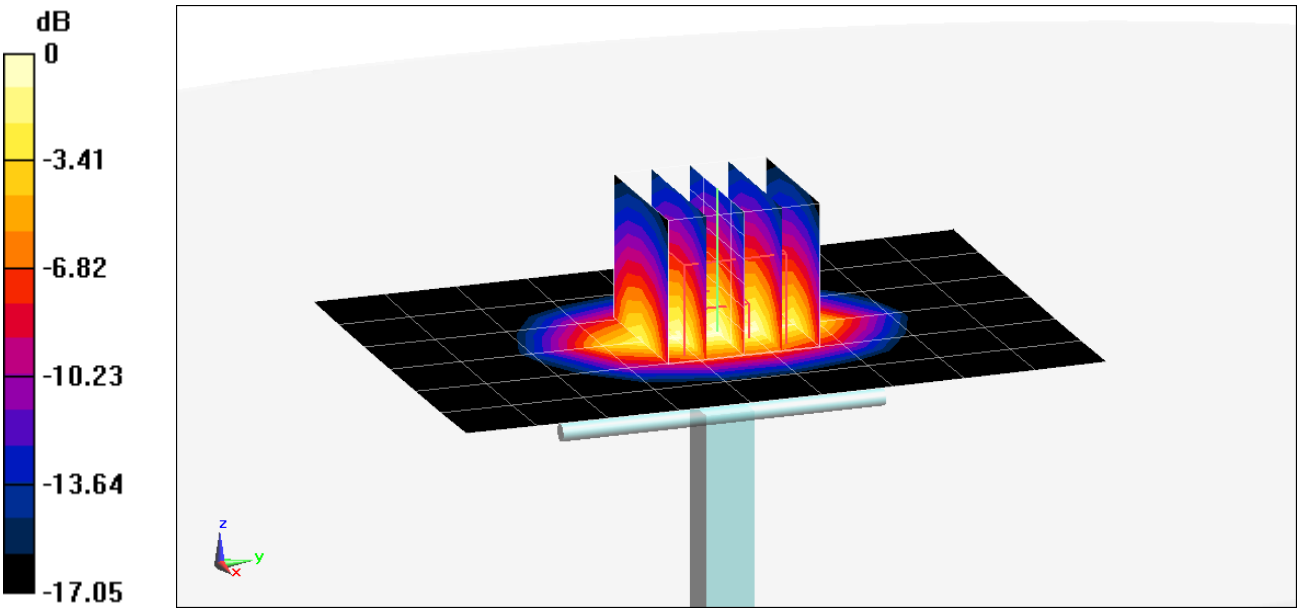
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.54 S/m; ε_r = 51.766; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-10-2015; Ambient Temp: 22.5°C; Tissue Temp: 22.4°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 v5.0 Left; Type: QD0VA001BB; 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=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 6.65 W/kg
SAR(1 g) = 3.74 W/kg
Deviation(1 g) = -6.50%



0 dB = 4.65 W/kg = 6.67 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 797

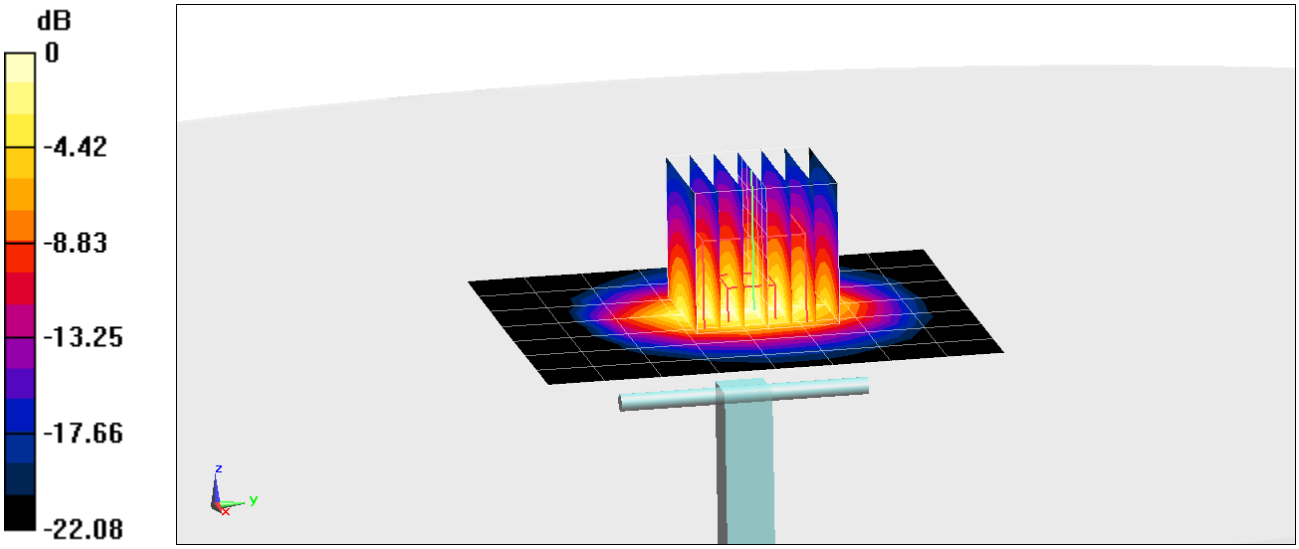
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2450 MHz; σ = 2.013 S/m; ε_r = 50.839; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-09-2015; Ambient Temp: 23.9°C; Tissue Temp: 23.6°C

Probe: ES3DV3 - SN3334; ConvF(4.28, 4.28, 4.28); 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)

2450 MHz System Verification

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 11.2 W/kg
SAR(1 g) = 5.17 W/kg
Deviation (1 g) = 2.58 %



0 dB = 6.70 W/kg = 8.26 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 882

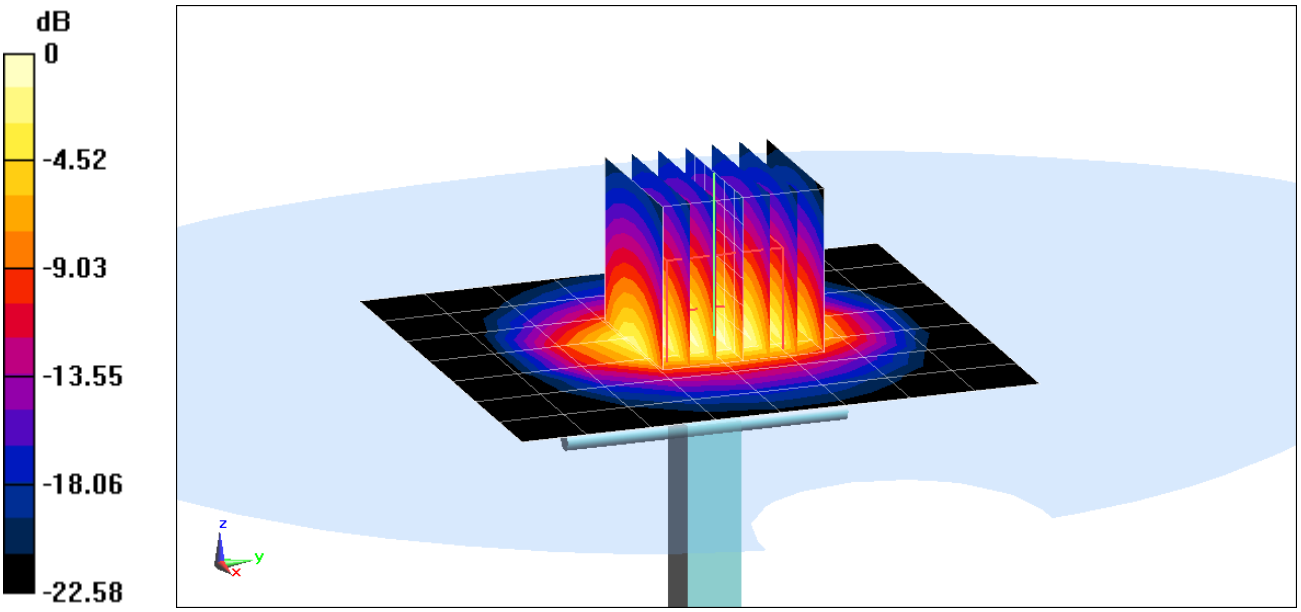
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2450 MHz; σ = 2 S/m; ε_r = 51.438; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-21-2015; Ambient Temp: 22.7°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3351; ConvF(4.3, 4.3, 4.3); Calibrated: 6/22/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/24/2015
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

2450 MHz System Verification

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 11.0 W/kg
SAR(1 g) = 5.15 W/kg
Deviation(1 g) = 1.58%



0 dB = 6.83 W/kg = 8.34 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1120

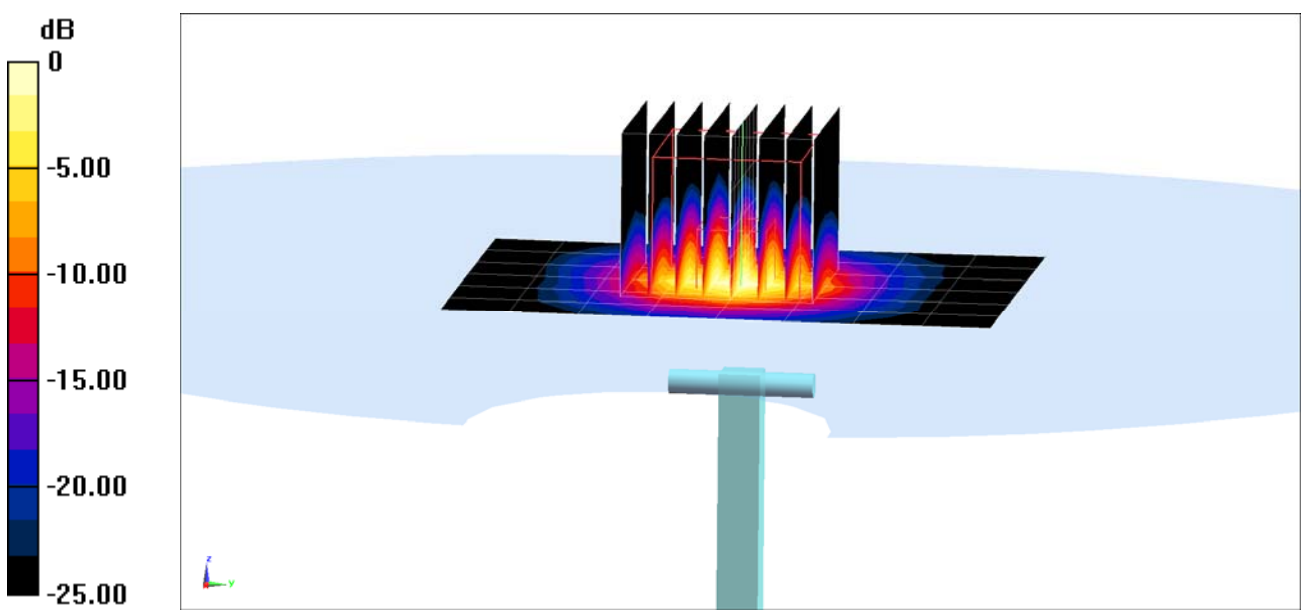
Communication System: UID 0, CW; Frequency: 5300 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body; Medium parameters used:
f = 5300 MHz; σ = 5.386 S/m; ε_r = 47.039; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-14-2015; Ambient Temp: 23.5°C; Tissue Temp: 21.7°C

Probe: EX3DV4 - SN3914; ConvF(4.33, 4.33, 4.33); Calibrated: 2/10/2015;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 10/31/2014
Phantom: SAM Sub ; Type: QD000P40CC; Serial: TP:1357
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5300 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power = 17.0 dBm (50 mW)
Peak SAR (extrapolated) = 17.3 W/kg
SAR(1 g) = 3.95 W/kg
Deviation(1 g) = 5.05%



0 dB = 9.59 W/kg = 9.82 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1120

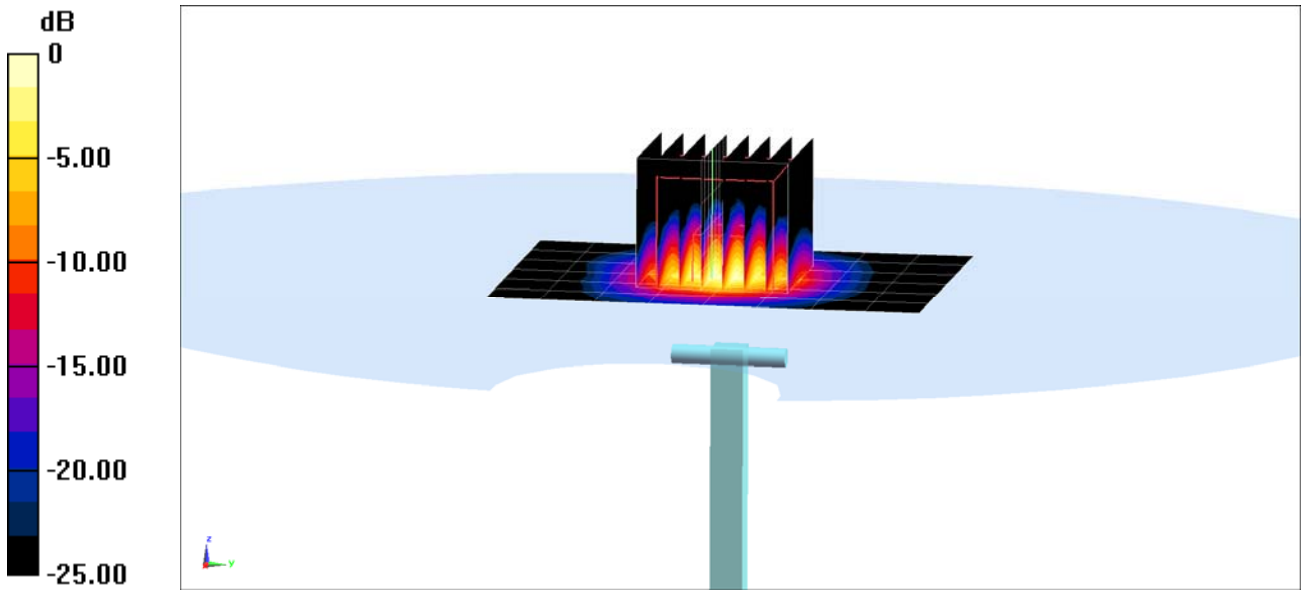
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body; Medium parameters used:
f = 5600 MHz; σ = 5.784 S/m; ε_r = 46.522; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-14-2015; Ambient Temp: 23.5°C; Tissue Temp: 21.7°C

Probe: EX3DV4 - SN3914; ConvF(3.89, 3.89, 3.89); Calibrated: 2/10/2015;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 10/31/2014
Phantom: SAM Sub ; Type: QD000P40CC; Serial: TP:1357
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5600 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power = 17.0 dBm (50 mW)
Peak SAR (extrapolated) = 18.8 W/kg
SAR(1 g) = 4.08 W/kg
Deviation(1 g) = 5.43%



0 dB = 10.1 W/kg = 10.04 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1120

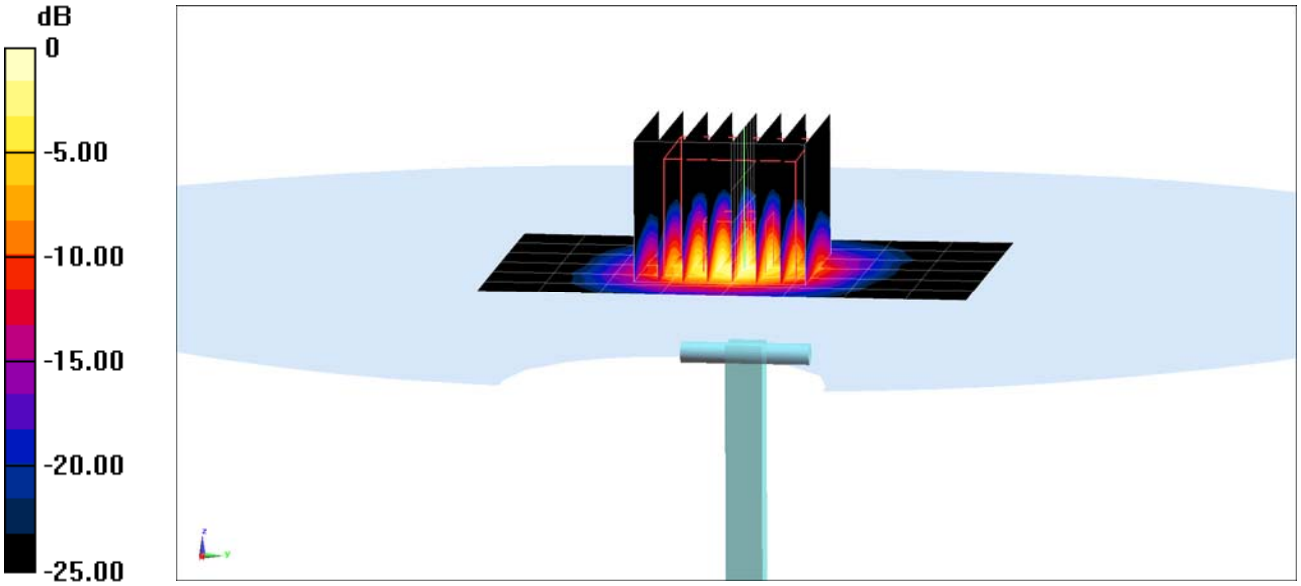
Communication System: UID 0, CW; Frequency: 5800 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body; Medium parameters used:
f = 5800 MHz; σ = 6.058 S/m; ε_r = 46.23; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-14-2015; Ambient Temp: 23.5°C; Tissue Temp: 21.7°C

Probe: EX3DV4 - SN3914; ConvF(4.01, 4.01, 4.01); Calibrated: 2/10/2015;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 10/31/2014
Phantom: SAM Sub ; Type: QD000P40CC; Serial: TP:1357
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5800 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (9x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power = 17.0 dBm (50 mW)
Peak SAR (extrapolated) = 18.6 W/kg
SAR(1 g) = 4.05 W/kg
Deviation(1 g) = 6.16%



0 dB = 10.5 W/kg = 10.21 dBW/kg

APPENDIX C: PROBE CALIBRATION

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

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

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

Accreditation No.: SCS 0108

Client **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
Calibration date:	January 20, 2015

CC 1/30/15

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

	Name	Function	Signature
Calibrated by:	Israe Elnaouq	Laboratory Technician	
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.

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,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., ϑ = 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:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,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*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 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 *NORMx,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 *NORMx* (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√μV	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 %

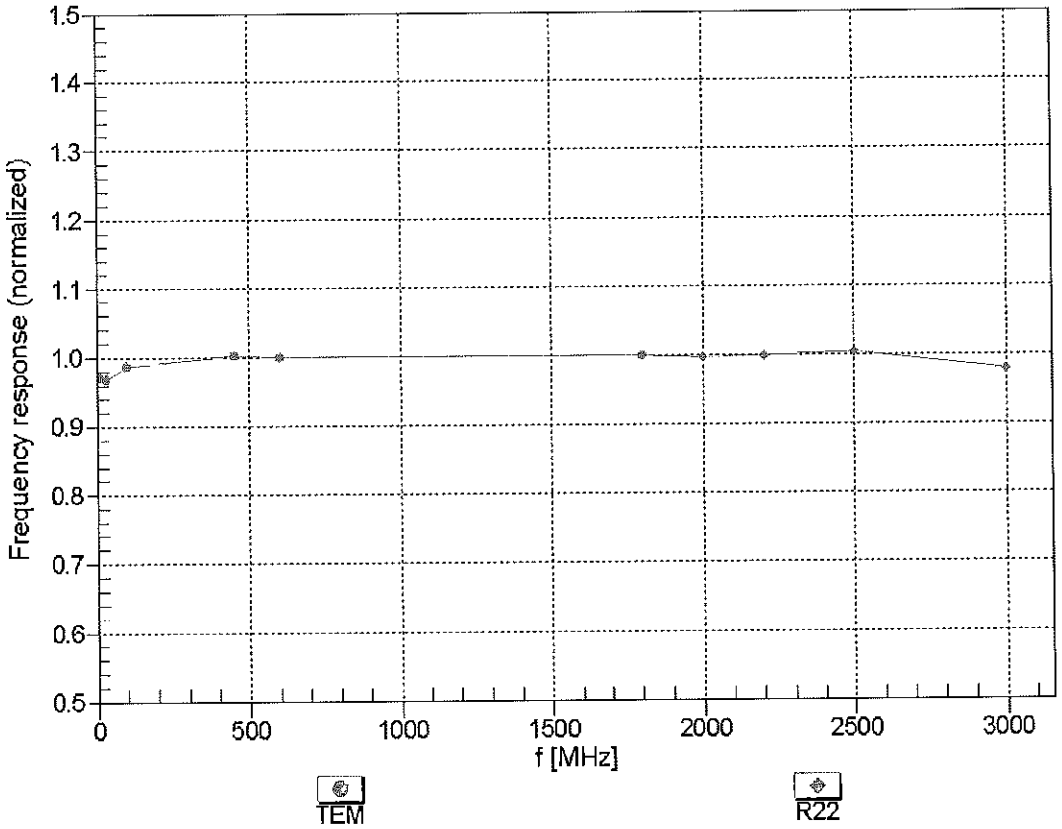
[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz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

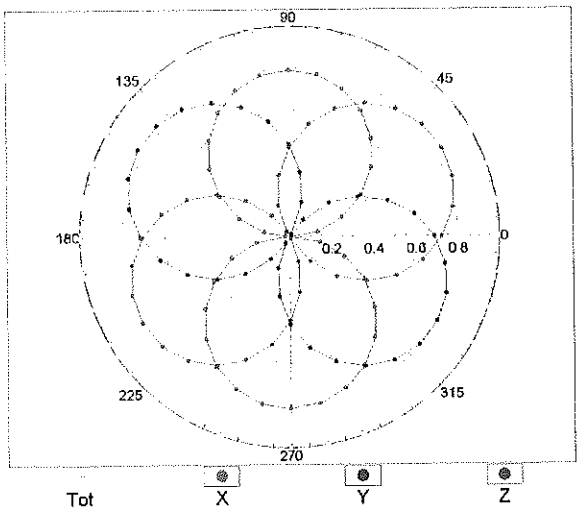
(TEM-Cell:ifi110 EXX, Waveguide: R22)



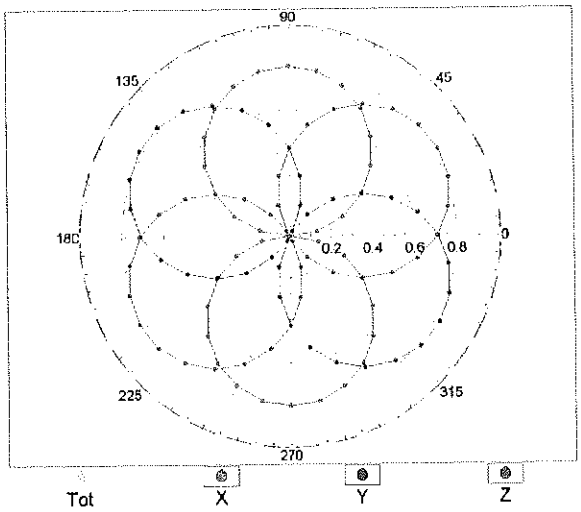
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

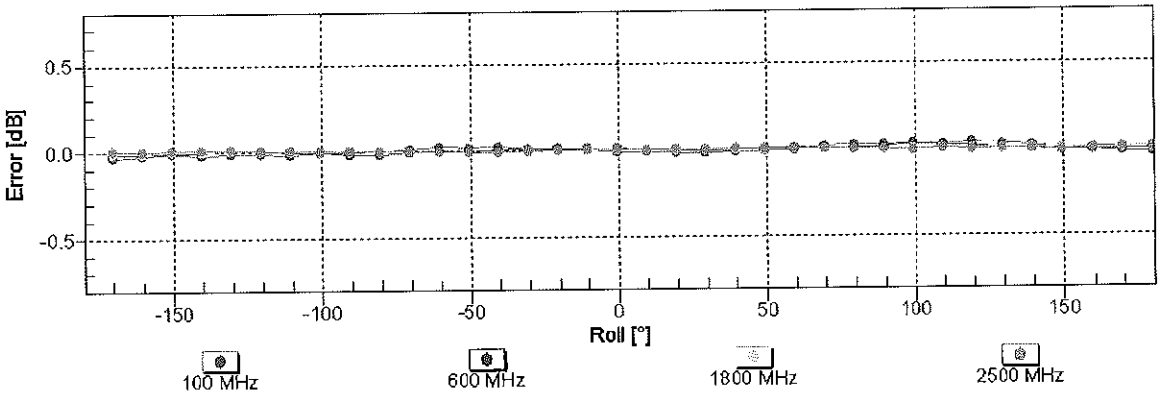
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



f=1800 MHz,R22

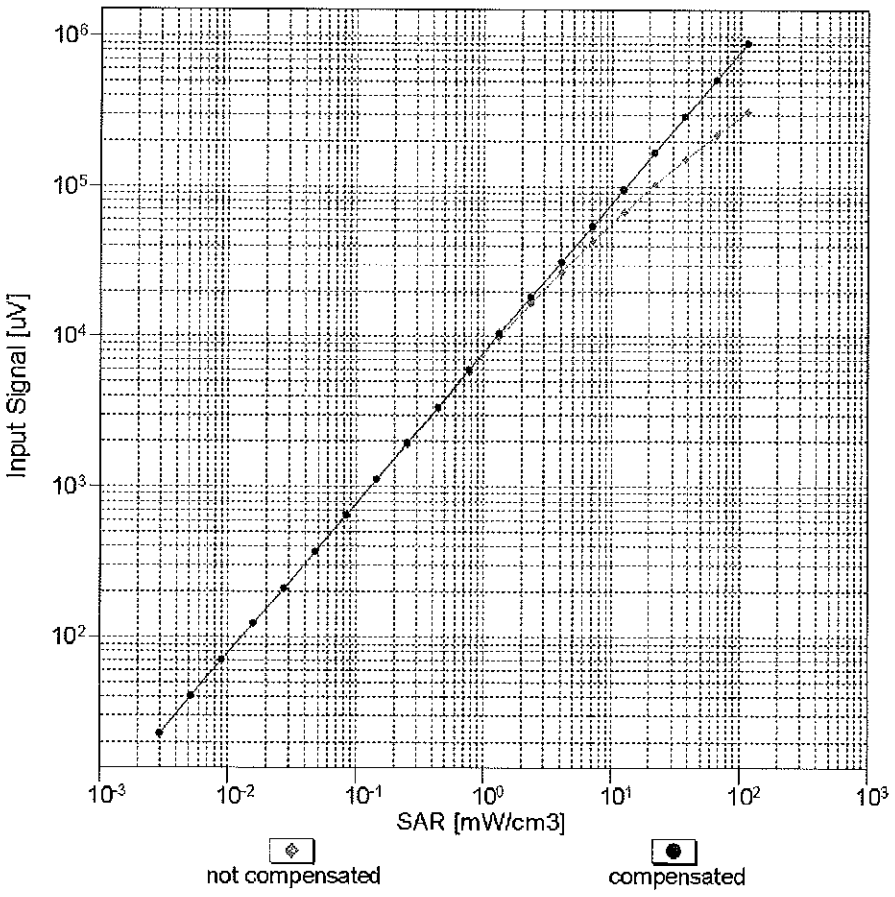


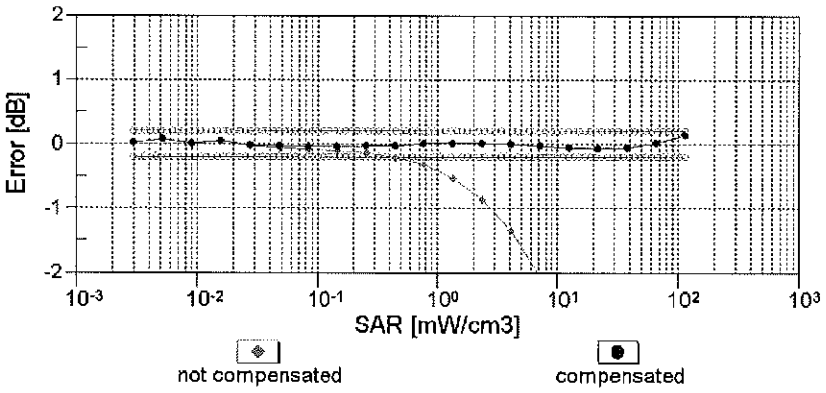


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

(TEM cell , f_{eval}= 1900 MHz)

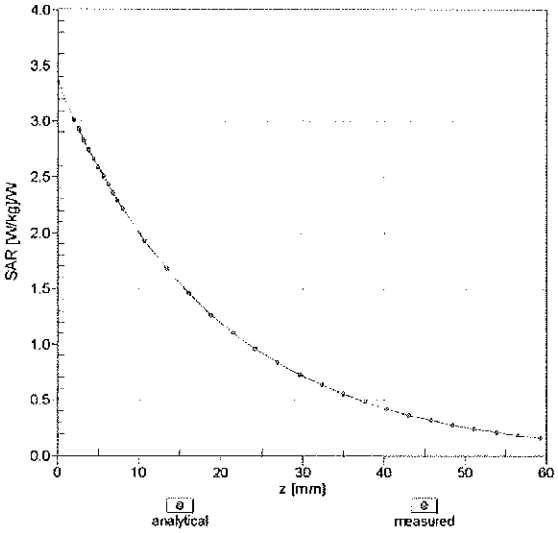




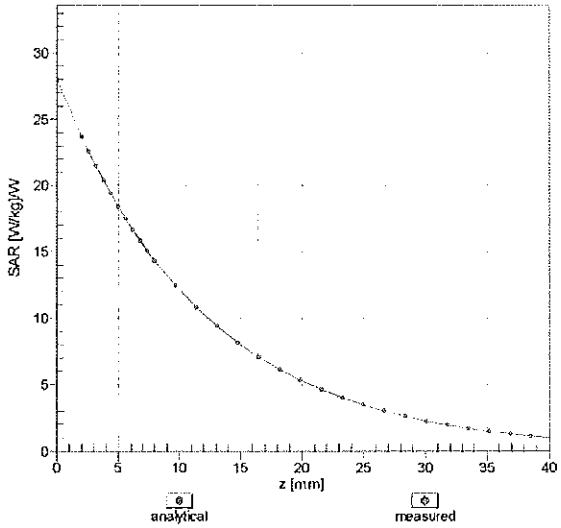
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

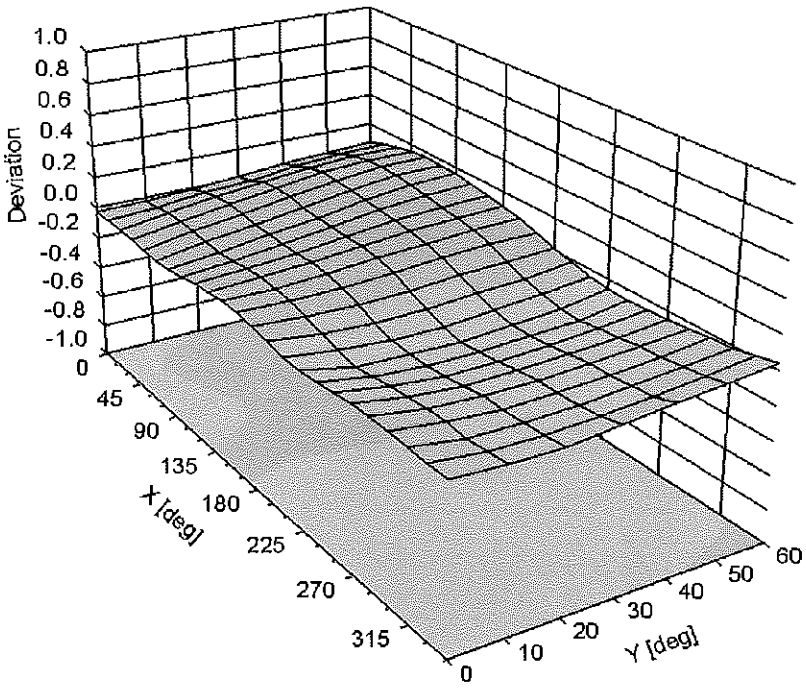


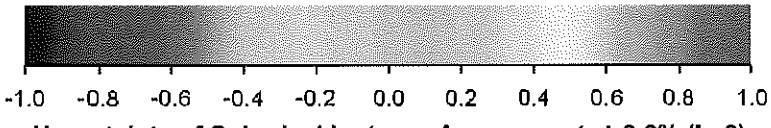
f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

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

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

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

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

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **ES3-3333_Oct14**

CALIBRATION CERTIFICATE

Object	ES3DV3 - SN:3333
Calibration procedure(s)	QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v6 Calibration procedure for dosimetric E-field probes
Calibration date:	October 24, 2014

CC 10/31/14

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: 660	13-Dec-13 (No. DAE4-660_Dec13)	Dec-14
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

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

Issued: October 24, 2014

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

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,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., ϑ = 0 is normal to proba 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:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,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*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 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 *NORMx,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 *NORMx* (no uncertainty required).

Probe ES3DV3

SN:3333

Manufactured: January 24, 2012
Calibrated: October 24, 2014

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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3333

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (μV/(V/m)^2)^A	1.08	0.90	0.88	± 10.1 %
DCP (mV)^B	102.7	107.7	106.3	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	190.7	±2.5 %
		Y	0.0	0.0	1.0		183.3	
		Z	0.0	0.0	1.0		197.9	
10010-CAA	SAR Validation (Square, 100ms, 10ms)	X	3.17	61.7	12.2	10.00	42.4	±1.9 %
		Y	3.16	63.7	12.4		38.0	
		Z	1.84	59.2	10.5		39.9	
10011-CAB	UMTS-FDD (WCDMA)	X	3.22	65.9	17.6	2.91	128.5	±0.5 %
		Y	3.60	69.3	19.8		146.7	
		Z	3.51	68.1	18.8		133.7	
10012-CAA	IEEE 802.11b WIFI 2.4 GHz (DSSS, 1 Mbps)	X	3.14	68.6	18.2	1.87	132.6	±0.7 %
		Y	3.64	73.3	21.1		127.5	
		Z	3.50	71.4	19.6		136.4	
10013-CAA	IEEE 802.11g WIFI 2.4 GHz (DSSS-OFDM, 6 Mbps)	X	11.56	70.8	23.0	9.46	135.8	±3.5 %
		Y	10.93	70.2	23.0		122.3	
		Z	10.93	70.0	22.6		132.8	
10021-DAB	GSM-FDD (TDMA, GMSK)	X	24.60	96.9	27.6	9.39	147.6	±1.9 %
		Y	19.44	94.3	26.1		148.6	
		Z	9.58	82.7	21.9		138.2	
10023-DAB	GPRS-FDD (TDMA, GMSK, TN 0)	X	20.09	93.0	26.4	9.57	141.7	±2.7 %
		Y	24.86	99.0	27.9		143.5	
		Z	11.74	86.4	23.4		134.4	
10024-DAB	GPRS-FDD (TDMA, GMSK, TN 0-1)	X	23.76	91.2	23.1	6.56	147.8	±2.5 %
		Y	37.10	99.8	25.3		149.9	
		Z	16.01	88.1	21.6		128.0	
10027-DAB	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	X	36.24	94.5	22.6	4.80	128.6	±2.5 %
		Y	47.57	99.9	23.7		133.5	
		Z	44.37	99.7	23.6		140.1	
10028-DAB	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	X	65.86	99.7	22.7	3.55	133.1	±2.7 %
		Y	55.92	100.0	22.6		142.0	
		Z	59.41	100.0	22.2		125.1	
10032-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	X	85.87	100.0	20.1	1.16	138.3	±2.2 %
		Y	14.41	99.2	23.3		130.5	
		Z	85.82	99.8	19.3		135.9	
10100-CAB	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	6.49	67.4	19.4	5.67	144.6	±1.7 %
		Y	6.49	68.0	20.1		139.9	
		Z	6.54	67.9	19.7		147.3	

10103-CAB	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	10.81	74.7	24.9	9.29	122.0	±3.0 %
		Y	10.50	75.9	26.1		131.6	
		Z	9.76	73.5	24.5		138.6	
10108-CAB	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	6.43	67.2	19.4	5.80	143.3	±1.7 %
		Y	6.37	67.7	20.0		138.0	
		Z	6.43	67.5	19.7		146.7	
10117-CAA	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	X	10.19	68.6	20.9	8.07	136.2	±2.5 %
		Y	10.15	68.9	21.4		128.3	
		Z	10.12	68.7	21.0		137.9	
10151-CAB	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	11.48	77.0	26.1	9.28	147.5	±3.3 %
		Y	9.81	74.9	25.8		125.7	
		Z	9.22	72.8	24.3		133.2	
10154-CAB	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	6.10	66.5	19.1	5.75	140.0	±1.7 %
		Y	6.04	67.1	19.8		134.8	
		Z	6.12	67.1	19.5		143.2	
10160-CAB	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	X	6.57	67.2	19.4	5.82	146.3	±1.7 %
		Y	6.47	67.6	20.0		139.6	
		Z	6.56	67.6	19.7		148.5	
10169-CAB	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	5.16	66.7	19.4	5.73	145.8	±1.4 %
		Y	5.02	67.5	20.2		137.5	
		Z	5.07	67.2	19.7		147.1	
10172-CAB	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	10.07	79.2	27.3	9.21	136.5	±3.0 %
		Y	9.70	81.5	29.3		142.5	
		Z	7.63	74.3	25.3		125.0	
10175-CAB	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	5.13	66.6	19.3	5.72	145.9	±1.4 %
		Y	5.01	67.4	20.1		137.5	
		Z	5.04	67.1	19.7		146.3	
10181-CAB	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	5.14	66.6	19.3	5.72	145.7	±1.4 %
		Y	5.03	67.5	20.3		137.4	
		Z	5.06	67.2	19.7		146.6	
10196-CAA	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	X	9.88	68.3	20.8	8.10	130.9	±2.5 %
		Y	10.13	69.6	21.8		149.0	
		Z	9.77	68.4	20.9		131.6	
10225-CAB	UMTS-FDD (HSPA+)	X	6.98	66.5	19.0	5.97	132.9	±1.7 %
		Y	7.14	67.8	20.0		149.7	
		Z	7.02	67.2	19.4		134.3	
10237-CAB	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	10.13	79.4	27.4	9.21	137.5	±3.0 %
		Y	9.73	81.6	29.3		143.3	
		Z	7.59	74.1	25.1		125.6	
10252-CAB	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	10.80	76.4	25.9	9.24	140.0	±3.3 %
		Y	10.19	77.2	27.1		147.2	
		Z	8.55	71.8	23.9		124.9	
10267-CAB	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	11.59	77.3	26.3	9.30	148.4	±3.5 %
		Y	9.87	75.1	25.9		126.0	
		Z	9.21	72.7	24.2		133.6	

10275-CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)	X	4.40	66.1	18.1	3.96	134.1	±0.7 %
		Y	4.48	67.4	19.2		129.7	
		Z	4.54	67.2	18.7		137.4	
10291-AAB	CDMA2000, RC3, SO55, Full Rate	X	3.59	65.7	17.7	3.46	127.5	±0.7 %
		Y	3.85	68.4	19.7		143.4	
		Z	3.78	67.6	18.8		129.7	
10292-AAB	CDMA2000, RC3, SO32, Full Rate	X	3.56	65.9	17.8	3.39	127.9	±0.7 %
		Y	3.81	68.6	19.8		144.2	
		Z	3.71	67.5	18.8		130.7	
10297-AAA	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	6.44	67.1	19.4	5.81	143.0	±1.7 %
		Y	6.37	67.6	20.0		137.9	
		Z	6.43	67.5	19.7		146.5	
10311-AAA	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	X	7.02	67.8	19.8	6.06	148.7	±1.9 %
		Y	6.96	68.2	20.4		143.6	
		Z	6.72	67.1	19.5		126.9	
10403-AAB	CDMA2000 (1xEV-DO, Rev. 0)	X	4.73	67.0	17.9	3.76	140.2	±0.7 %
		Y	4.96	69.4	19.5		130.7	
		Z	5.05	69.3	19.1		140.9	
10404-AAB	CDMA2000 (1xEV-DO, Rev. A)	X	4.70	67.2	18.1	3.77	138.1	±0.7 %
		Y	4.85	69.5	19.6		129.6	
		Z	5.14	70.1	19.5		139.3	
10415-AAA	IEEE 802.11b WIFI 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)	X	2.47	66.1	17.1	1.54	133.2	±0.7 %
		Y	3.15	72.2	20.9		127.9	
		Z	3.32	72.0	20.1		137.2	
10416-AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle)	X	9.99	68.4	21.0	8.23	131.6	±2.5 %
		Y	9.84	68.6	21.4		123.3	
		Z	9.89	68.6	21.1		133.4	

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:3333

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	6.55	6.55	6.55	0.34	1.74	± 12.0 %
835	41.5	0.90	6.33	6.33	6.33	0.44	1.48	± 12.0 %
1750	40.1	1.37	5.26	5.26	5.26	0.73	1.21	± 12.0 %
1900	40.0	1.40	5.11	5.11	5.11	0.66	1.32	± 12.0 %
2450	39.2	1.80	4.53	4.53	4.53	0.62	1.40	± 12.0 %
2600	39.0	1.96	4.40	4.40	4.40	0.68	1.38	± 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:3333

Calibration Parameter Determined in Body Tissue Simulating Media

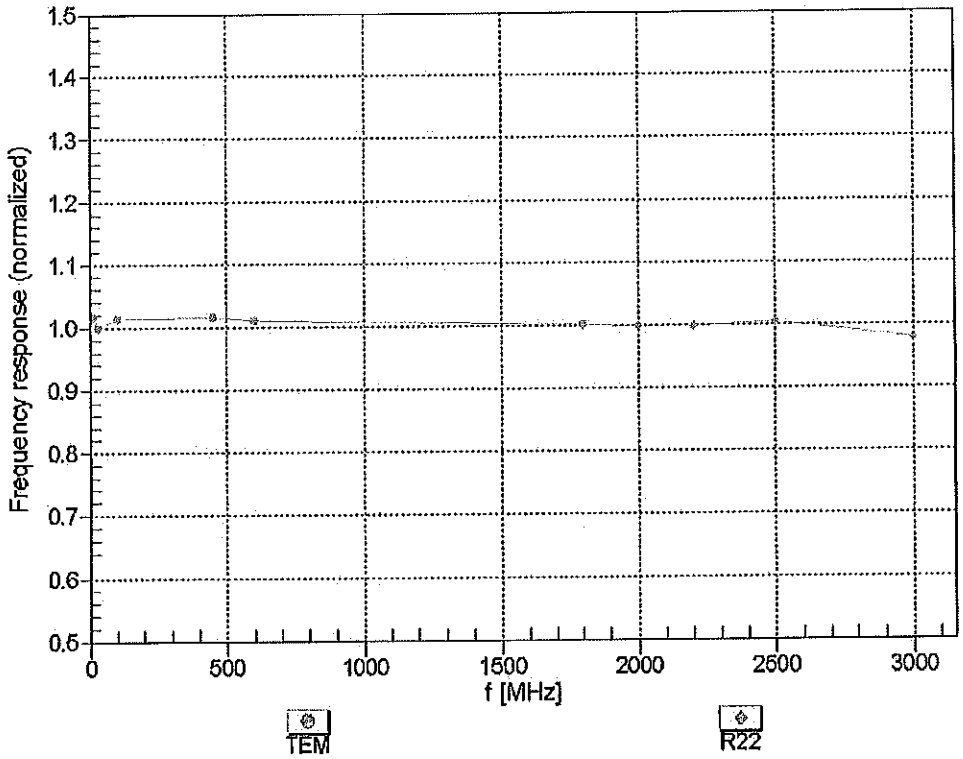
f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unct. (k=2)
750	55.5	0.96	6.14	6.14	6.14	0.35	1.76	± 12.0 %
835	55.2	0.97	6.12	6.12	6.12	0.57	1.37	± 12.0 %
1750	53.4	1.49	4.89	4.89	4.89	0.80	1.24	± 12.0 %
1900	53.3	1.52	4.67	4.67	4.67	0.75	1.29	± 12.0 %
2450	52.7	1.95	4.26	4.26	4.26	0.80	1.01	± 12.0 %
2600	52.5	2.16	4.13	4.13	4.13	0.80	0.99	± 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.

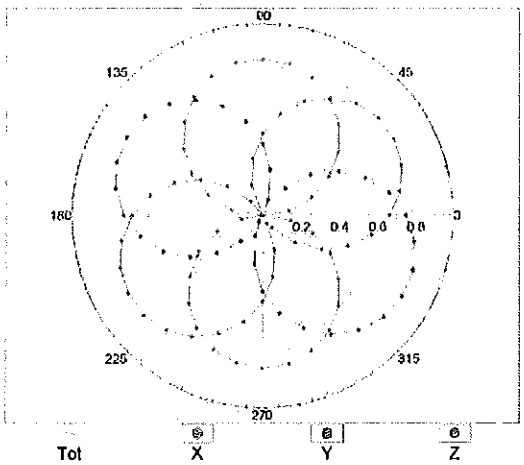
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



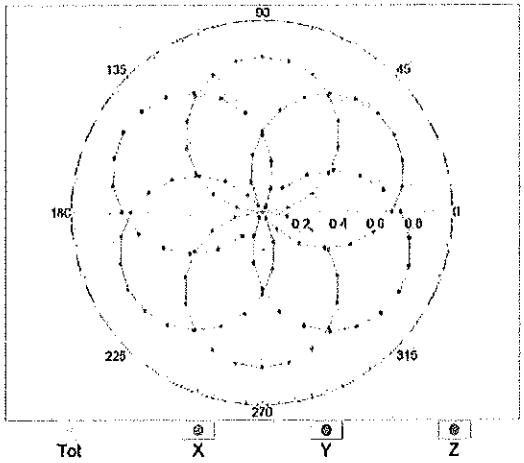
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

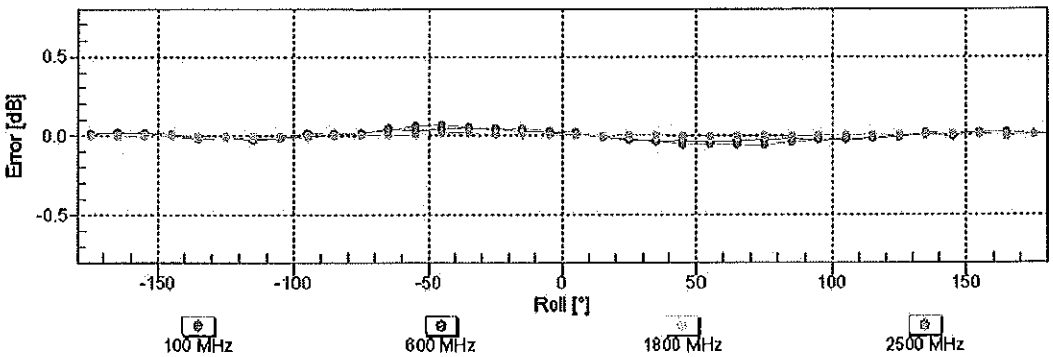
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



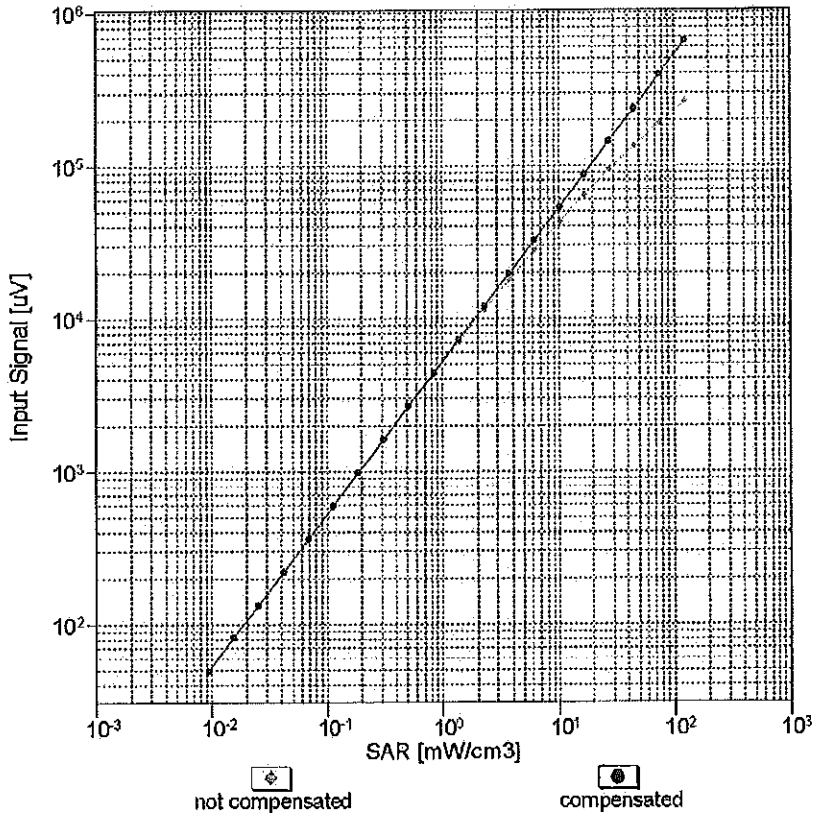
f=1800 MHz,R22

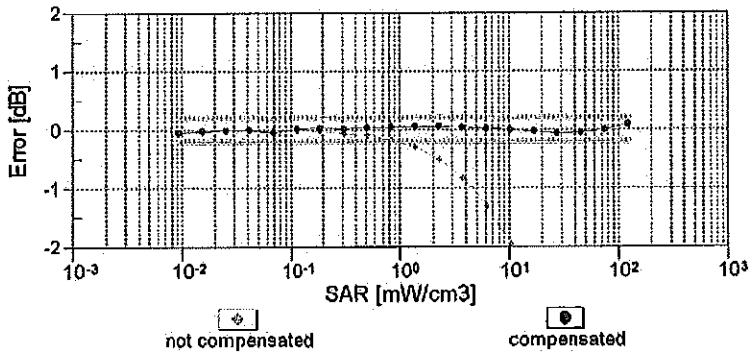




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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

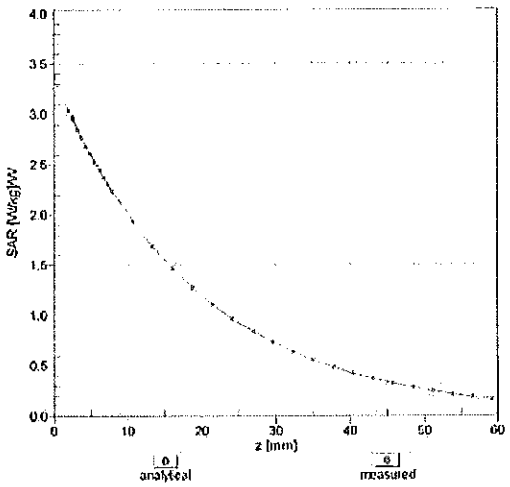




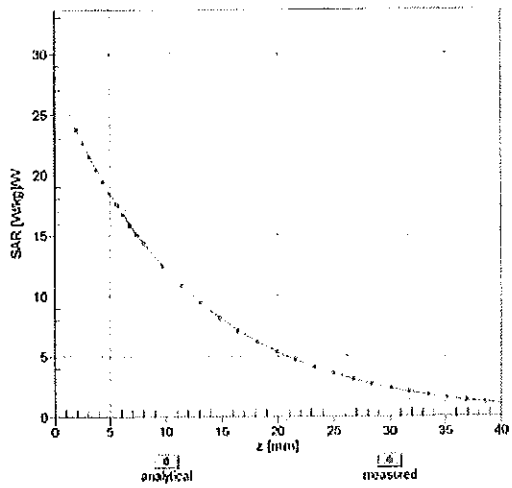
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

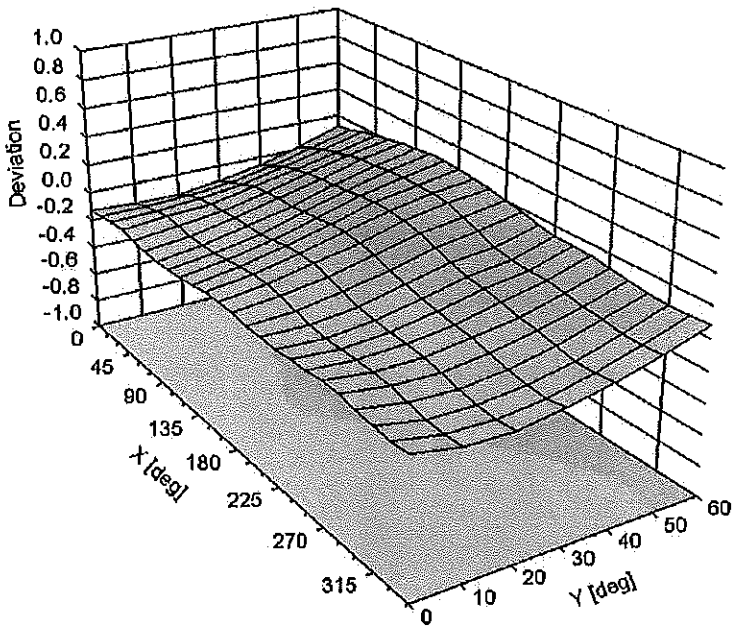


f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3333

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-34.9
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