

# TEST REPORT



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1. Report No : DRRFCC1902-0012(1)

2. Customer

- Name : BLUEBIRD INC.
- Address : (Dogok-dong, SEI Tower 13,14) 39, Eonjuro30-gil, Gangnam-gu, Seoul South Korea

3. Use of Report : FCC Original Grant

4. Product Name / Model Name : Enterprise Full Touch Handheld Computer / EF501  
FCC ID : SS4EF501X

5. Test Method Used : IEEE 1528-2013, FCC SAR KDB Publications (Details in test report)  
Test Specification : CFR §2.1093

6. Date of Test : 2018.12.06 ~ 2019.01.28

7. Testing Environment : Refer to appended test report.

8. Test Result : Refer to attached test report.

Affirmation	Tested by Name : HoSik Sim 	Reviewed by Name : HakMin Kim 
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## **Test Report Version**

<b>Test Report No.</b>	<b>Date</b>	<b>Description</b>
DRRFCC1902-0012	Feb. 12, 2019	Initial issue
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## 1. DESCRIPTION OF DEVICE

### 1.1 General Information

EUT type	Enterprise Full Touch Handheld Computer			
FCC ID	SS4EF501X			
Equipment model name	EF501			
Equipment add model name	EF501R			
Equipment serial no.	Identical prototype			
SW version	R1.12			
Mode(s) of Operation	WCDMA 850, WCDMA 1700, WCDMA 1900, LTE Band 71, 12, 13, 14, 5, 66, 4, 2, 2.4 G W-LAN (802.11b/g/n-HT20/n-HT40), 5 G W-LAN (802.11a/n-HT20/n-HT40/ac-VHT20/ac-VHT40/ac-VHT80), Bluetooth			
	Band	Mode	Operating Modes	Bandwidth
TX Frequency Range	WCDMA 850	WCDMA	Voice/Data	-
	WCDMA 1700	WCDMA	Voice/Data	-
	WCDMA 1900	WCDMA	Voice/Data	-
	LTE Band 71	LTE	Voice/Data	5/10/15/20MHz
	LTE Band 12	LTE	Voice/Data	1.4/3/5/10MHz
	LTE Band 13	LTE	Voice/Data	5/10MHz
	LTE Band 14	LTE	Voice/Data	5/10MHz
	LTE Band 5	LTE	Voice/Data	1.4/3/5/10MHz
	LTE Band 66	LTE	Voice/Data	1.4/3/5/10/15/20MHz
	LTE Band 4	LTE	Voice/Data	1.4/3/5/10/15/20MHz
	LTE Band 2	LTE	Voice/Data	1.4/3/5/10/15/20MHz
	2.4 GHz W-LAN	802.11b/g/n	Voice/Data	HT20/ HT40
		802.11a/n/ac	Voice/Data	HT20/VHT20
	5.2 GHz W-LAN	802.11n/ac	Voice/Data	HT40/VHT40
		802.11ac	Voice/Data	VHT80
		802.11a/n/ac	Voice/Data	HT20/VHT20
	5.3 GHz W-LAN	802.11n/ac	Voice/Data	HT40/VHT40
		802.11ac	Voice/Data	VHT80
		802.11a/n/ac	Voice/Data	HT20/VHT20
	5.6 GHz W-LAN	802.11n/ac	Voice/Data	HT40/VHT40
		802.11ac	Voice/Data	VHT80
		802.11a/n/ac	Voice/Data	HT20/VHT20
	5.8 GHz W-LAN	802.11n/ac	Voice/Data	HT40/VHT40
		802.11ac	Voice/Data	VHT80
		Bluetooth	Data	-
RX Frequency Range	WCDMA 850	WCDMA	Voice/Data	-
	WCDMA 1700	WCDMA	Voice/Data	-
	WCDMA 1900	WCDMA	Voice/Data	-
	LTE Band 71	LTE	Voice/Data	5/10/15/20MHz
	LTE Band 12	LTE	Voice/Data	1.4/3/5/10MHz
	LTE Band 13	LTE	Voice/Data	5/10MHz
	LTE Band 14	LTE	Voice/Data	5/10MHz
	LTE Band 5	LTE	Voice/Data	1.4/3/5/10MHz
	LTE Band 66	LTE	Voice/Data	1.4/3/5/10/15/20MHz
	LTE Band 4	LTE	Voice/Data	1.4/3/5/10/15/20MHz
	LTE Band 2	LTE	Voice/Data	1.4/3/5/10/15/20MHz
	2.4 GHz W-LAN	802.11b/g/n	Voice/Data	HT20/ HT40
		802.11a/n/ac	Voice/Data	HT20/VHT20
	5.2 GHz W-LAN	802.11n/ac	Voice/Data	HT40/VHT40
		802.11ac	Voice/Data	VHT80
		802.11a/n/ac	Voice/Data	HT20/VHT200
	5.3 GHz W-LAN	802.11n/ac	Voice/Data	HT40/VHT40
		802.11ac	Voice/Data	VHT80
		802.11a/n/ac	Voice/Data	HT20/VHT20
	5.6 GHz W-LAN	802.11n/ac	Voice/Data	HT40/VHT40
		802.11ac	Voice/Data	VHT80
		802.11a/n/ac	Voice/Data	HT20/VHT20
	5.8 GHz W-LAN	802.11n/ac	Voice/Data	HT40/VHT40
		802.11ac	Voice/Data	VHT80
		Bluetooth	Data	-

**SAR Summary Table**

Equipment Class	Band	Reported SAR			
		1g SAR (W/kg)			10g SAR (W/kg)
		Head	Body-Worn	Hotspot	
PCE	WCDMA 850	0.45	0.47	0.47	-
PCE	WCDMA 1700	0.14	0.86	1.02	-
PCE	WCDMA 1900	0.33	0.69	0.69	-
PCE	LTE Band 71	0.11	0.22	0.22	-
PCE	LTE Band 12	0.14	0.28	0.28	-
PCE	LTE Band 13	0.29	0.56	0.56	-
PCE	LTE Band 14	0.37	0.59	0.59	-
PCE	LTE Band 5	0.44	0.48	0.48	-
PCE	LTE Band 66	0.16	1.05	1.13	-
PCE	LTE Band 4	-	-	-	-
PCE	LTE Band 2	0.28	0.43	0.60	-
DTS	2.4 GHz W-LAN	0.14	< 0.1	0.15	-
U-NII-1	5.2 GHz W-LAN	-	-	-	-
U-NII-2A	5.3 GHz W-LAN	< 0.1	0.26	-	0.19
U-NII-2C	5.6 GHz W-LAN	< 0.1	0.14	-	0.14
U-NII-3	5.8 GHz W-LAN	< 0.1	0.20	-	0.27
Simultaneous SAR per KDB 690783 D01v01r03		1.04	1.34	1.42	-
FCC Equipment Class	Licensed Portable Transmitter Held to Ear (PCE) Part 15 Spread Spectrum Transmitter(DSS) Digital Transmission System(DTS) Unlicensed National Information Infrastructure (UNII)				
Date(s) of Tests	2018.12.06 ~ 2019.01.28				
Antenna Type	Internal Antenna				
Functions	<ul style="list-style-type: none"> <li>● No simultaneous transmission between BT &amp; 2.4GHz WLAN</li> <li>● Simultaneous transmission between [WCDMA voice &amp; WLAN], [WCDMA &amp; WLAN], [LTE &amp; WLAN].</li> <li>● VoIP is supported.</li> <li>● WLAN 2.4GHz is supported Hotspot.</li> <li>● WLAN 5 GHz is not supported Hotspot.</li> </ul>				

## 1.2 Power Reduction for SAR

There is no power reduction used for any band mode implemented in this device for SAR purposes.

## 1.3 Nominal and Maximum Output Power Specifications

The Nominal and Maximum Output Power Specifications are in section 9 of this test report.

## 1.4 DUT Antenna Locations

The overall dimensions of this device are > 9 x 5 cm. A diagram showing the location of the device of the device antenna can be found in SS4EF501X\_Antenna Location. Since the diagonal dimension of this device is > 160 mm and < 200 mm, it is considered a "phablet".

Mode	Device Sides for SAR Testing					
	Top	Bottom	Front	Rear	Right	Left
WCDMA 850	X	O	O	O	O	O
WCDMA 1700	X	O	O	O	O	O
WCDMA 1900	X	O	O	O	O	O
LTE Band 71	X	O	O	O	O	O
LTE Band 12	X	O	O	O	O	O
LTE Band 13	X	O	O	O	O	O
LTE Band 14	X	O	O	O	O	O
LTE Band 5	X	O	O	O	O	O
LTE Band 66	X	O	O	O	O	O
LTE Band 4	X	O	O	O	O	O
LTE Band 2	X	O	O	O	O	O
2.4G W-LAN	X	X	O	O	O	X
5G W-LAN	X	X	O	O	X	X
Bluetooth	X	X	O	O	O	X

Note 1: Particular DUT edges were not required to be evaluated for Hotspot SAR or Phablet SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 648474 D04v01r03. The antenna document shows the distances between the transmit antennas and the edges of the device.

Note 2: W-LAN 5 GHz is not supported Hotspot.

Note 3: O - Test / X - Not test.

Note 4: This DUT has NFC operations. The NFC antenna is integrated into the back side.

The SAR tests were performed with NFC antenna already incorporated.

A diagram showing the location of the device antenna can be found in SS4EF501X \_Antenna Location.

## 1.5 Simultaneous Transmission Capabilities

The Simultaneous Transmission Capabilities are in section 12 of this test report.

## 1.6 Miscellaneous SAR Test Considerations

### (A) WIFI/BT

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 publication 248227 D01v02r02.

Since Wireless Router operations are not allowed by the chipset firmware using U-NII-1, U-NII-2A, U-NII-2C and U-NII-3 WIFI, only 2.4GHz WIFI Hotspot SAR tests and combinations are considered for SAR with respect to Wireless Router configurations according to FCC KDB 941225 D06v02r01.

Per FCC KDB 447498 D01v06, the 1g SAR exclusion threshold for distances < 50 mm is defined by the following equation:

$$\frac{\text{Max Power of Channel (mW)}}{\text{Test Separation Dist (mm)}} * \sqrt{\text{Frequency(GHz)}} \leq 3.0$$

Based on the maximum conducted power of Bluetooth (rounded to the nearest mW) and the antenna to user separation distance, body-worn and hotspot **Bluetooth SAR were not required; [(14/10)\*\sqrt{2.441}] = 2.2 (< 3.0)**. Per KDB Publication 447498 D01 v06, the maximum power of the channel was rounded to the nearest mW before calculation.

Per FCC KDB 447498 D01v06, the 10g SAR exclusion threshold for distance < 50 mm is defined by the following equation:

$$\frac{\text{Max Power of Channel (mW)}}{\text{Test Separation Dist (mm)}} * \sqrt{\text{Frequency(GHz)}} \leq 7.5$$

Based on the maximum conducted power of Bluetooth (rounded to the nearest mW) and the antenna to user separation distance, phablet **Bluetooth SAR was not required; [(14/5)\*\sqrt{2.441}] = 4.4 (< 7.5)**. Per KDB Publication 447498 D01v06, the maximum power of the channel was rounded to the nearest mW before calculation.

Per FCC KDB Publication 648474 D04v01r03, this device is considered a “phablet” since the diagonal dimension is greater than 160 mm and less than 200 mm. Phablet SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR > 1.2 W/kg. Because wireless router operations are not supported for U-NII-1, U-NII-2A, U-NII-2C and U-NII-3, phablet SAR tests were performed. Phablet SAR was not evaluated for 2.4 GHz WLAN operations since wireless router 1g SAR was < 1.2 W/kg.

## (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 D05v02r04.

Per FCC KDB Publication 648474 D04 v01r03, this device is considered a “phablet” since the diagonal dimension is greater than 160 mm and less than 200 mm. Therefore, phablet SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR > 1.2 W/kg.

This device supports LTE capabilities with overlapping transmission frequency ranges. When the supported frequency range of an LTE Band falls completely within an LTE band with a larger transmission frequency range, both LTE bands have the same target power (or the band with the larger transmission frequency range has a higher target power), and both LTE bands share the same transmission path and signal characteristics, SAR was only assessed for the band with the larger transmission frequency range.

## 1.7 Guidance Applied

- IEEE 1528-2013
- FCC KDB Publication 941225 D01v03r01 (3G SAR Procedures)
- FCC KDB Publication 941225 D05v02r05 (SAR for LTE Devices)
- FCC KDB Publication 941225 D05Av01r02 (LTE Rel.10 KDB Inquiry Sheet)
- FCC KDB Publication 941225 D06v02r01(Hotspot Mode)
- FCC KDB Publication 248227 D01v02r02 (802.11 Wi-Fi SAR)
- FCC KDB Publication 447498 D01v06 (General RF Exposure Guidance)
- FCC KDB Publication 648474 D04v01r03 (Handset SAR)
- FCC KDB Publication 690783 D01v01r03 (SAR Listings on Grants)
- FCC KDB Publication 865664 D01v01r04 (SAR Measurement 100 MHz to 6 GHz)
- FCC KDB Publication 865664 D02v01r02 (RF Exposure Reporting)
- April 2015 TCB Workshop Notes (Simultaneous transmission summation clarified)
- October 2016 TCB Workshop Notes (Bluetooth Duty Factor)

## 1.8 Device Serial Numbers

The serial numbers used for each test are indicated alongside the results in Section 11.

## 2. LTE INFORMATION

LTE Information					
FCC ID	SS4EF501X				
Form Factor	Enterprise Full Touch Handheld Computer				
Frequency Range of each LTE transmission Band	LTE Band 71 (665.5 ~ 695.5 MHz) LTE Band 12 (699.7 ~ 715.3 MHz) LTE Band 13 (779.5 ~ 784.5 MHz) LTE Band 14 (790.5 ~ 795.5 MHz) LTE Band 5 (Cell) (824.7 ~ 848.3 MHz) LTE Band 66 (AWS) (1710.7 ~ 1779.3 MHz) LTE Band 4 (AWS) (1710.7 ~ 1754.3 MHz) LTE Band 2 (PCS) (1850.7 ~ 1909.3 MHz)				
Channel Bandwidths	LTE Band 71: 5 MHz, 10 MHz, 15 MHz, 20 MHz LTE Band 12 : 1.4 MHz, 3 MHz, 5 MHz, 10 MHz LTE Band 13 : 5 MHz, 10 MHz LTE Band 14 : 5 MHz, 10 MHz LTE Band 5 : 1.4 MHz, 3 MHz, 5 MHz, 10 MHz LTE Band 66 : 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz LTE Band 4 : 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz LTE Band 2 : 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
Channel Number and Frequencies(MHz)	Low	Low-Mid	Mid	Mid-High	High
LTE Band 71: 5 MHz	665.5 (133147)	N/A	680.5 (133297)	N/A	695.5 (133447)
LTE Band 71: 10 MHz	668.0 (133172)	N/A	680.5 (133297)	N/A	693.0 (133422)
LTE Band 71: 15 MHz	670.5 (133197)	N/A	680.5 (133297) <sup>Note1</sup>	N/A	690.5 (133397)
LTE Band 71: 20 MHz	673.0 (133222)	N/A	680.5 (133297) <sup>Note1</sup>	N/A	688.0 (133372)
LTE Band 12: 1.4 MHz	699.7 (23017)	N/A	707.5 (23095)	N/A	715.3 (23173)
LTE Band 12: 3 MHz	700.5 (23025)	N/A	707.5 (23095)	N/A	714.5 (23165)
LTE Band 12: 5 MHz	701.5 (23035)	N/A	707.5 (23095)	N/A	713.5 (23155)
LTE Band 12: 10 MHz	704.0 (23060)	N/A	707.5 (23095) <sup>Note2</sup>	N/A	711.0 (23130)
LTE Band 13: 5 MHz	779.5(23205)	N/A	782.0(23230) <sup>Note3</sup>	N/A	784.5(23255)
LTE Band 13: 10 MHz	N/A	N/A	782.0(23230)	N/A	N/A
LTE Band 14: 5 MHz	790.5(23305)	N/A	793.0(23330) <sup>Note4</sup>	N/A	795.5(23355)
LTE Band 14: 10 MHz	N/A	N/A	793.0(23330)	N/A	N/A
LTE Band 5 (Cell): 1.4 MHz	824.7 (20407)	N/A	836.5 (20525)	N/A	848.3 (20643)
LTE Band 5 (Cell): 3 MHz	825.5 (20415)	N/A	836.5 (20525)	N/A	847.5 (20635)
LTE Band 5 (Cell): 5 MHz	826.5 (20425)	N/A	836.5 (20525)	N/A	846.5 (20625)
LTE Band 5 (Cell): 10 MHz	829.0 (20450)	N/A	836.5 (20525) <sup>Note5</sup>	N/A	844.0 (20600)
LTE Band 66 (AWS): 1.4 MHz	1710.7 (131979)	N/A	1745.0 (132322)	N/A	1779.3 (132665)
LTE Band 66 (AWS): 3 MHz	1711.5 (131987)	N/A	1745.0 (132322)	N/A	1778.5 (132657)
LTE Band 66 (AWS): 5 MHz	1712.5 (131997)	N/A	1745.0 (132322)	N/A	1777.5 (132647)
LTE Band 66 (AWS): 10 MHz	1715.0 (132022)	N/A	1745.0 (132322)	N/A	1775.0 (132622)
LTE Band 66 (AWS): 15 MHz	1717.5 (132047)	N/A	1745.0 (132322)	N/A	1772.5 (132597)
LTE Band 66 (AWS): 20 MHz	1720.0 (132072)	N/A	1745.0 (132322)	N/A	1770.0 (132572)
LTE Band 4 (AWS): 1.4 MHz	1710.7 (19957)	N/A	1732.5 (20175)	N/A	1754.3 (20393)
LTE Band 4 (AWS): 3 MHz	1711.5 (19965)	N/A	1732.5 (20175)	N/A	1753.5 (20385)
LTE Band 4 (AWS): 5 MHz	1712.5 (19975)	N/A	1732.5 (20175)	N/A	1752.5 (20375)
LTE Band 4 (AWS): 10 MHz	1715.0 (20000)	N/A	1732.5 (20175)	N/A	1750.0 (20350)
LTE Band 4 (AWS): 15 MHz	1717.5 (20025)	N/A	1732.5 (20175)	N/A	1747.5 (20325)
LTE Band 4 (AWS): 20 MHz	1720.0 (20050)	N/A	1732.5 (20175) <sup>Note6</sup>	N/A	1745.0 (20300)
LTE Band 2 (PCS): 1.4 MHz	1850.7 (18607)	N/A	1880.0 (18900)	N/A	1909.3 (19193)
LTE Band 2 (PCS): 3 MHz	1851.5 (18615)	N/A	1880.0 (18900)	N/A	1908.5 (19185)
LTE Band 2 (PCS): 5 MHz	1852.5 (18625)	N/A	1880.0 (18900)	N/A	1907.5 (19175)
LTE Band 2 (PCS): 10 MHz	1855.0 (18650)	N/A	1880.0 (18900)	N/A	1905.0 (19150)
LTE Band 2 (PCS): 15 MHz	1857.5 (18675)	N/A	1880.0 (18900)	N/A	1902.5 (19125)
LTE Band 2 (PCS): 20 MHz	1860.0 (18700)	N/A	1880.0 (18900)	N/A	1900.0 (19100)
UE Category	LTE Rel.11, UE Cat 4				
Modulations Supported in UL	QPSK, 16QAM				
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3-6.2.5? (manufacturer attestation to be provided)	Yes				
A-MPR (Additional MPR) disabled for SAR Testing?	Yes				
LTE Carrier Aggregation Possible Combinations	LTE Carrier Aggregation is not support.				
LTE Additional Information	This device does not support full CA features on 3GPP Release 11. All uplink communications are identical to the Release 8 Specifications. The following LTE Release 11 Features are not supported: Relay, HetNet, Enhanced MIMO, eICIC, WIFI Offloading, MDH, eMBMS, Cross-Carrier Scheduling, Enhanced SC-FDMA.				

Note(s)

- LTE B71 can not contain three non-overlapping channels of 15 MHz & 20 MHz bandwidth.  
Per KDB 941225 D05v02r05, 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.
- LTE B12 can not contain three non-overlapping channels of 10 MHz bandwidth.  
Per KDB 941225 D05v02r05, 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.
- LTE B13 can not contain three non-overlapping channels of 5 MHz bandwidth.  
Per KDB 941225 D05v02r05, 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.
- LTE B14 can not contain three non-overlapping channels of 5 MHz bandwidth.  
Per KDB 941225 D05v02r05, 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.
- LTE B5(Cell) can not contain three non-overlapping channels of 10 MHz bandwidth.  
Per KDB 941225 D05v02r05, 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.
- LTE B66(AWS) can not contain three non-overlapping channels of 20 MHz bandwidth.  
Per KDB 941225 D05v02r05, 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.
- LTE B4 (AWS) can not contain three non-overlapping channels of 20 MHz bandwidth.  
Per KDB 941225 D05v02r05, 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.

### 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.

The FCC has adopted the guidelines for evaluating the environmental effects of radio frequency radiation in ET Docket 93-62 on Aug. 6, 1996 to protect the public and workers from the potential hazards of RF emissions due to FCC-regulated portable devices. 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. The measurement procedure described in IEEE/ANSI C95.3-2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave is used for guidance in measuring 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 National Council on Radiation Protection and Measurements (NCRP) in Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields," NCRP Report No. 86 NCRP, 1986, Bethesda, MD 20814. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

#### SAR Definition

Specific Absorption Rate (SAR) 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 ( $\rho$ ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Fig. 3.1)

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

Fig. 3.1 SAR Mathematical Equation

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

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

where:

- $\sigma$  = conductivity of the tissue-simulating material (S/m)
- $\rho$  = mass density of the tissue-simulating material (kg/m<sup>3</sup>)
- E = Total RMS electric field strength (V/m)

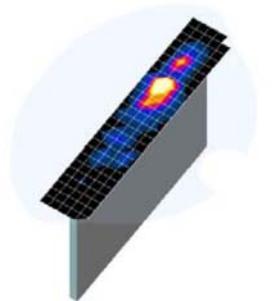
NOTE: The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relations to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces,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

## 4. DOSIMETRIC ASSESSMENT

### 4.1 Measurement Procedure

The evaluation was performed using the following procedure compliant to FCC KDB Publication 865664 D01v01r04 and IEEE 1528-2013:

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head and body interface and the horizontal grid resolution was determined per FCC KDB Publication 865664 D01v01r04 (See Table 4.1) and IEEE1528-2013.
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 D01v01r04 (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 ( $10 \times 10 \times 10$ ) were obtained through interpolation, in order to calculate the averaged SAR.
  - c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.



**Figure 4.1**  
**Sample SAR Area Scan**

		$\leq 3 \text{ GHz}$	$> 3 \text{ GHz}$
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface		$5 \text{ mm} \pm 1 \text{ mm}$	$\frac{1}{2} \cdot \delta \cdot \ln(2) \text{ mm} \pm 0.5 \text{ mm}$
Maximum probe angle from probe axis to phantom surface normal at the measurement location		$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
		$\leq 2 \text{ GHz}: \leq 15 \text{ mm}$ $2 - 3 \text{ GHz}: \leq 12 \text{ mm}$	$3 - 4 \text{ GHz}: \leq 12 \text{ mm}$ $4 - 6 \text{ GHz}: \leq 10 \text{ mm}$
Maximum area scan spatial resolution: $\Delta x_{\text{Area}}, \Delta y_{\text{Area}}$		When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: $\Delta x_{\text{Zoom}}, \Delta y_{\text{Zoom}}$		$\leq 2 \text{ GHz}: \leq 8 \text{ mm}$ $2 - 3 \text{ GHz}: \leq 5 \text{ mm}^*$	$3 - 4 \text{ GHz}: \leq 5 \text{ mm}^*$ $4 - 6 \text{ GHz}: \leq 4 \text{ mm}^*$
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{\text{Zoom}}(n)$	$\leq 5 \text{ mm}$	$3 - 4 \text{ GHz}: \leq 4 \text{ mm}$ $4 - 5 \text{ GHz}: \leq 3 \text{ mm}$ $5 - 6 \text{ GHz}: \leq 2 \text{ mm}$
	graded grid	$\Delta z_{\text{Zoom}}(1): \text{between 1}^{\text{st}} \text{ two points closest to phantom surface}$ $\Delta z_{\text{Zoom}}(n>1): \text{between subsequent points}$	$\leq 4 \text{ mm}$ $\leq 1.5 \cdot \Delta z_{\text{Zoom}}(n-1) \text{ mm}$
Minimum zoom scan volume	x, y, z	$\geq 30 \text{ mm}$	$3 - 4 \text{ GHz}: \geq 28 \text{ mm}$ $4 - 5 \text{ GHz}: \geq 25 \text{ mm}$ $5 - 6 \text{ GHz}: \geq 22 \text{ mm}$

Note:  $\delta$  is the penetration depth of a plane-wave at normal incidence to the tissue medium; see IEEE Std 1528-2013 for details.

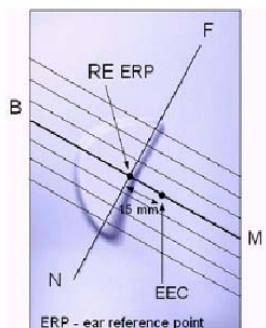
\* When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB Publication 447498 is  $\leq 1.4 \text{ W/kg}$ ,  $\leq 8 \text{ mm}$ ,  $\leq 7 \text{ mm}$  and  $\leq 5 \text{ mm}$  zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

Table 4.1 Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v01r04\*

## 5. DEFINITION OF REFERENCE POINTS

### 5.1 Ear Reference Point

Figure 5.1 shows the front, back and side views of the SAM Twin Phantom. The point "M" is the reference point for the center of the mouth, "LE" is the left ear reference point(ERP), and "RE" is the right ERP. The ERPs are 15 mm posterior to the entrance to the Ear canal (EEC) along the B-M line (Back-Mouth), as shown in Figure 5.1. The plane Passing, through the two ear canals and M is defined as the Reference Plane. The line N-F (Neck- Front) is perpendicular to the reference plane and passing through the RE (or LE) is called the Reference Pivoting Line (see Figure 5.1). Line B-M is perpendicular to the N-F line. Both N-F and B-M lines are marked on the external phantom shell to facilitate handset positioning.



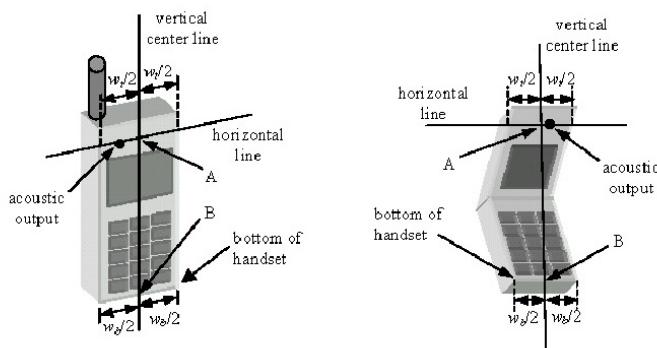
**Figure 5.1**  
Close-up side view  
of ERP

### 5.2 Handset Reference Points

Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The test device was placed in a normal operating position with the "test device reference point" located along the "vertical centerline" on the front of the device aligned to the "ear reference point" (See Fig. 5.3). The "test device reference point" was than located at the same level as the center of the ear reference point. The test device was positioned so that the "vertical centerline" was bisecting the front surface of the handset at it's top and bottom edges, positioning the "ear reference point" on the outer surface of the both the left and right head phantoms on the ear reference point.



**Figure 5.2** Front, back and side view SAM Twin Phantom



**Figure 5.3** Handset Vertical Center & Horizontal Line Reference Points

## 6. TEST CONFIGURATION POSITIONS FOR HANDSETS

### 6.1 Device Holder

The device holder is made out of low-loss POM material having the following dielectric parameters: relative permittivity  $\epsilon = 3$  and loss tangent  $\delta = 0.02$ .

### 6.2 Positioning for Cheek/Touch

1. The test device was positioned with the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 6.1), such that the plane defined by the vertical center line and the horizontal line of the phone is approximately parallel to the sagittal plane of the phantom.



Figure 6.1 Front, Side and Top View of Cheek/Touch Position

2. The handset was translated towards the phantom along the line passing through RE & LE until the handset touches the ear.
3. While maintaining the handset in this plane, the handset was rotated around the LE-RE line until the vertical centerline was in the plane normal to MB-NF including the line MB (reference plane).
4. The phone was then rotated around the vertical centerline until the phone (horizontal line) was symmetrical with respect to the line NF.
5. While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE, and maintaining the phone contact with the ear, the handset was rotated about the line NF until any point on the handset made contact with a phantom point below the ear (cheek). (See Figure 6.2)

### 6.3 Positioning for Ear / 15 ° Tilt

With the test device aligned in the "Cheek/Touch Position":

1. While maintaining the orientation of the phone, the phone was retracted parallel to the reference plane far enough to enable a rotation of the phone by 15 degree.
2. The phone was then rotated around the horizontal line by 15 degree.
3. While maintaining the orientation of the phone, the phone was moved parallel to the reference plane until any part of the phone touches the head. (In this position, point A was located on the line RE-LE). The tilted position is obtained when the contact is on the pinna. If the contact was at any location other than the pinna, the angle of the phone would then be reduced. The tilted position was obtained when any part of the phone was in contact of the ear as well as a second part of the phone was in contact with the head (see Figure 6.3).

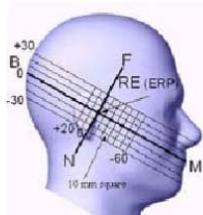


Figure 6.2 Side view w/relevant markings

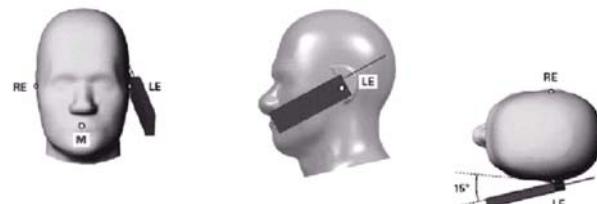


Figure 6.3 Front, Side and Top View of Ear/15° Position

## 6.4 Body-Worn Accessory Configurations

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 6.4). Per FCC KDB Publication 648474 D04v01r03, Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB Publication 447498 D01v06 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is  $> 1.2 \text{ W/kg}$ , the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

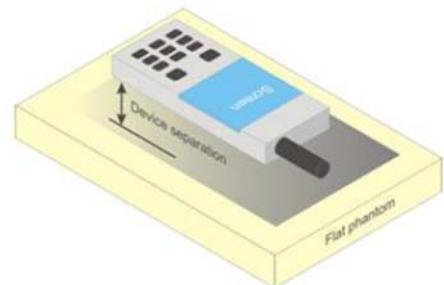


Figure 6.4 Sample Body-Worn Diagram

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are tested with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

Body-worn accessories may not always be supplied or available as options for some devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used. Test position spacing was documented.

Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom in head fluid. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessories, including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

## 6.5 Extremity Exposure Configurations

Devices that are designed or intended for use on extremities or mainly operated in extremity only exposure conditions; i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation. When the device also operates in close proximity to the user's body, SAR compliance for the body is also required. The 1-g body and 10-g extremity SAR Exclusion Thresholds found in KDB Publication 447498 D01v06 should be applied to determine SAR test requirements.

Per KDB Publication 447498 D01v06, Cell phones (handsets) are not normally designed to be used on extremities or operated in extremity only exposure conditions. The maximum output power levels of handsets generally do not require extremity SAR testing to show compliance. Therefore, extremity SAR was not evaluated for this device.

## 6.6 Wireless Router Configurations

Some battery-operated handsets have the capability to transmit and receive user data through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06v02r01 where SAR test considerations for handsets ( $L \times W \geq 9 \text{ cm} \times 5 \text{ cm}$ ) are based on a composite test separation distance of 10 mm from the front the front, rear and edges of the device containing transmitting antennas within 2.5 cm of their edges, determined from general mixed use conditions for this type of devices. When the same wireless transmission configuration is used for testing body-worn accessory and hotspot mode SAR, respectively, in voice and data mode, SAR results for the most conservative test separation distance configuration may be used to support both SAR conditions.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitter often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each KDB Publication 447498 D01v06 procedures. The "Portable Hotspot" feature on the handset was not activated during SAR assessment, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.

## 6.7 Phablet Configurations

For smart phones with a display diagonal  $> 150 \text{ mm}$  or an overall diagonal dimension  $> 160 \text{ mm}$  that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that support voice calls next to the ear, the phablets procedures outlined in KDB Publication 648474 D04v01r03 should be applied to evaluate SAR compliance. A device marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance. In addition to the normally required head and body-worn accessory SAR test procedures required for handsets, the UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna  $\leq 25\text{mm}$  from that surface or edge, in direct contact with the phantom, for 10g SAR. The UMPC mini-tablet 1g SAR at 5 mm is not required. When hotspot mode applies, 10g SAR is required only for the surfaces and edges with hotspot mode 1g SAR  $> 1.2 \text{ W/kg}$ .

## 7. RF EXPOSURE LIMITS

### 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.

### 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 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 7.1.SAR Human Exposure Specified in ANSI/IEEE C95.1-1992**

<b>HUMAN EXPOSURE LIMITS</b>		
	General Public Exposure (W/kg) or (mW/g)	Occupational Exposure (W/kg) or (mW/g)
SPATIAL PEAK SAR * (Brain)	1.60	8.00
SPATIAL AVERAGE SAR ** (Whole Body)	0.08	0.40
SPATIAL PEAK SAR *** (Hands / Feet / Ankle / Wrist)	4.00	20.0

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.

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

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).

## 8. FCC MEASUREMENT PROCEDURES

Power measurements were performed using a base station simulator under digital average power.

### 8.1 Measured and Reported SAR

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

### 8.2 Procedures Used to Establish RF Signal for SAR

The following procedures are according to FCC KDB Publication 941225 D01v03r01.

The device was 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 were 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 was 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 deviated by more than 5%, the SAR test and drift measurements were repeated.

### 8.3 SAR Measurement Conditions for WCDMA (UMTS)

#### 8.3.1 Output Power Verification

Maximum output power is measured on the High, Middle and Low channels for each applicable transmission band according to the general descriptions in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all “1s”.

Maximum output power is verified on the High, Middle and Low channels according to the general, descriptions in section 5.2 of 3GPP TS 34.121 (release 5), using the appropriate RMC with TPC,(transmit power control) set to all “1s” or applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Results for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HS-DPCCH etc) are tabulated in this test report. All configurations that are not supported by the DUT or cannot be measured due to technical or equipment limitations are identified.

#### 8.3.2 Head SAR Measurements for Handsets

SAR for head exposure configurations is measured using the 12.2 kbps RMC with TPC bits configured to all “1s”. SAR in AMR configurations is not required when the maximum average output of each RF channel for 12.2 kbps AMR is less than 0.25 dB higher than that measured in 12.2 kbps RMC. Otherwise, SAR is measured on the maximum output channel in 12.2 AMR with a 3.4 kbps SRB (signaling radio bearer) using the exposure configuration that resulted in the highest SAR for that RF channel in the 12.2 kbps RMC mode.

### 8.3.3 Body SAR Measurements

SAR for body exposure configurations is measured using the 12.2 kbps RMC with the TPC bits all “1s”.

### 8.3.4 Release 5 HSDPA Data Devices

The following procedures are applicable to HSDPA data devices operating under 3GPP Release 5. SAR is required for devices in body-worn accessory and other body exposure conditions, including handsets and data modems operating in various electronic devices. HSDPA operates in conjunction with WCDMA and requires an active DPCCH. The default test configuration is to measure SAR in WCDMA with HSDPA remain inactive, to establish a radio link between the test device and a communication test set using a 12.2 kbps RMC configured in Test Loop Mode 1. SAR for HSDPA is selectively measured using the highest reported SAR configuration in WCDMA, with an FRC in H-set 1 and a 12.2 kbps RMC. SAR is selectively confirmed for other physical channel configurations (DPCCH & DPDCHn) according to exposure conditions, device operating capabilities and maximum output power specified for production units, including tune-up tolerance by applying the 3G SAR test reduction procedures. Maximum output power is verified according to the applicable versions of 3GPP TS 34.121. SAR must be measured based on these maximum output conditions and requirements in KDB Publication 447498, with respect to the UE Categories, and explained in the SAR report. When Maximum Power Reduction (MPR) applies, the implementations must be clearly identified in the SAR report to support test results according to Cubic Metric (CM) and, as appropriate, Enhanced MPR (E-MPR) requirements.

Sub-test	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c/\beta_d$	$\beta_{hs}^{(1)}$	CM (dB) <sup>(2)</sup>
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15 <sup>(3)</sup>	15/15 <sup>(3)</sup>	64	12/15 <sup>(3)</sup>	24/15	1.0
3	15/15	8/15	64	15/8	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5

Note 1:  $\Delta_{ACK}, \Delta_{NACK}$  and  $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$   
Note 2: CM = 1 for  $\beta_c/\beta_d = 12/15, \beta_{hs}/\beta_c = 24/15$ .  
Note 3: For subtest 2 the  $\beta_c/\beta_d$  ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to  $\beta_c = 11/15$  and  $\beta_d = 15/15$ .

Figure 8.1 Table 1

### 8.3.5 Release 6 HSUPA Data Devices

The following procedures are applicable to HSPA (HSUPA/HSDPA) data devices operating under 3GPP Release 6. SAR is required for devices in body-worn accessory and other body exposure conditions, including handsets and data modems operating in various electronic devices. HSUPA operates in conjunction with WCDMA and HSDPA. SAR is initially measured in WCDMA test configurations with HSPA remain inactive. The default test configuration is to establish a radio link between the test device and a communication test set to configure a 12.2 kbps RMC in Test Loop Mode 1. SAR for HSPA is selectively measured with HS-DPCCH, E-DPCCH and E-DPDCH, all enabled, along with a 12.2 kbps RMC using the highest reported SAR configuration in WCDMA with 12.2 kbps RMC only.

An FRC is configured according to HS-DPCCH Sub-test 1 using H-set 1 and QPSK. HSPA is configured according to E-DCH Sub-test 5 requirements. SAR for other HSPA sub-test configurations is confirmed selectively according to exposure conditions, E-DCH UE Category and maximum output power of production units, including tune-up tolerance by applying the 3G SAR test reduction procedure. Maximum output power is verified according to procedures in applicable versions of 3GPP TS 34.121. SAR must be measured based on these maximum output conditions and requirements in KDB Publication 447498, with respect to the UE Categories for HS-DPCCH and HSPA, and explained in the SAR report. When Maximum Power Reduction (MPR) applies, the implementations must be clearly identified in the SAR report to support test results according to Cubic Metric (CM) and, as appropriate, Enhanced MPR (E-MPR) requirements.

Sub-test	$\beta_c$	$\beta_d$	$\beta_a$ (SF)	$\beta_e/\beta_d$	$\beta_{hs}^{(1)}$	$\beta_{ec}$	$\beta_{ed}$	$\beta_{ed}$ (SF)	$\beta_{ed}$ (codes)	CM <sup>(2)</sup>	MPR (dB)	AG <sup>(4)</sup> Index	E-TFCI
1	11/15 <sup>(3)</sup>	15/15 <sup>(3)</sup>	64	11/15 <sup>(3)</sup>	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed}: 47/15$ $\beta_{ec}: 47/15$	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 <sup>(4)</sup>	15/15 <sup>(4)</sup>	64	15/15 <sup>(4)</sup>	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1:  $\Delta_{ACK}$ ,  $\Delta_{NACK}$  and  $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$ .  
Note 2: CM = 1 for  $\beta_e/\beta_d = 12/15$ ,  $\beta_{hs}/\beta_c = 24/15$ . For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.  
Note 3: For subtest 1 the  $\beta_e/\beta_d$  ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to  $\beta_e = 10/15$  and  $\beta_d = 15/15$ .  
Note 4: For subtest 5 the  $\beta_e/\beta_d$  ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to  $\beta_e = 14/15$  and  $\beta_d = 15/15$ .  
Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g.  
Note 6:  $\beta_{ed}$  cannot be set directly; it is set by Absolute Grant Value.

Figure 8.2 Table 2

## 8.4 SAR Measurement Conditions for LTE

LTE modes were tested according to FCC KDB 941225 D05v02r05 publication. Please see notes after the tabulated SAR data for required test configurations. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR. The call simulator was used for LTE output power measurement 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).

### 8.4.1 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.

### 8.4.2 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.

### 8.4.3 A-MPR

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

### 8.4.4 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05v02r05:

- Per Section 5.2.1, SAR is required for QPSK 1 RB Allocation for the largest bandwidth
  - The required channel and offset combination with the highest maximum output power is required for SAR.
  - When the reported SAR is  $\leq 0.8$  W/kg, testing of the remaining RB offset configurations and required test channel 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.
  - 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.
- Per Section 5.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Section 5.2.1.
- Per Section 5.2.3, 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. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is  $> 1.45$  W/kg, the remaining required test channels must also be tested.
- Per Section 5.2.4 and 5.3, 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 5.2.1 through 5.2.3 is less than or equal to 0.5 dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is  $< 1.45$  W/kg.

## 8.5 SAR Testing with 802.11 Transmitters

The normal network operating configurations are not suitable for measuring the SAR of 802.11 b/g/n transmitters. 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 248227D01v02r02 for more details.

### 8.5.1 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. The test frequencies should correspond to actual channel frequencies defined for domestic use. SAR for devices with switched diversity should be measured with only one antenna transmitting at a time during each SAR measurement, according to a fixed modulation and data rate. The same data pattern should be used for all measurements.

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.

### 8.5.2 U-NII and U-NII-2A

For devices that operate in only one of the U-NII-1 and U-NII-2A bands, the normally required SAR procedures for OFDM configurations are applied. For devices that operate in both U-NII bands using the same transmitter and antenna(s), SAR test reduction is determined according to the following, with respect to the highest reported SAR and maximum output power specified for production units. The procedures are applied independently to each exposure configuration; for example, head, body, hotspot mode etc.

- 1) When the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest reported SAR for a test configuration is  $\leq 1.2 \text{ W/kg}$ , SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition); otherwise, each band is tested independently for SAR.
- 2) When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest reported SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is  $\leq 1.2 \text{ W/kg}$ , SAR is not required for the band with lower maximum output power in that test configuration; otherwise, each band is tested independently for SAR.

### 8.5.3 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 Rader (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 measurements and probe calibration frequency points requirements.

### 8.5.4 Initial Test Position Procedure

For exposure conditions with multiple test positions, such as handset operating next to the ear, devices with hotspot mode or UMPC mini-tablet, procedures for initial test position can be applied. Using the transmission mode determined by the DSSS procedure or initial test configuration, area scans are measured for all position in an exposure condition. The test position with the highest extrapolated (peak) SAR is used as the initial test position. When reported SAR for the initial test position is  $\leq 0.4$  W/kg, no additional testing for the remaining test positions is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR position until the reported SAR result is  $\leq 0.8$  W/kg or all test position are measured.

### 8.5.5 2.4 GHz SAR Test Requirements

SAR is measured for 2.4 GHz 802.11b DSSS using either a 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  $\leq 0.8$  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 exposure configuration 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.

### 8.5.6 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 and 802.11n 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 or 802.11g then 802.11n is used for SAR measurement. When the maximum output power were 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.

### **8.5.7 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 is specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration(s) with the largest channel bandwidth, lowest order modulation, and lowest data rate. 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  $\leq 0.8$  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  $\leq 1.2$  W/kg or all channels are measured.

### **8.5.8 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 applicable. When the highest reported SAR for the initial test configuration, adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power is  $\leq 1.2$  W/kg, no additional SAR testing for the subsequent test configurations is required.

## 9. RF CONDUCTED POWERS

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 D01v06

### 9.1 WCDMA Nominal and Maximum Output Power Spec and Conducted Powers

3GPP Release Version	Mode		Cellular Band (dBm)		AWS Band (dBm)		PCS Band (dBm)		3GPP MPR (dB)	
99	WCDMA	Voice	Maximum	23.0	21.0		22.0		-	
			Nominal	22.5	20.5		21.5			
5	HSDPA	Subtest 1	Maximum	23.0	21.0		22.0		0	
			Nominal	22.5	20.5		21.5			
5		Subtest 2	Maximum	23.0	21.0		22.0		0	
			Nominal	22.5	20.5		21.5			
5		Subtest 3	Maximum	22.5	20.5		21.5		0.5	
			Nominal	22.0	20.0		21.0			
5		Subtest 4	Maximum	22.5	20.5		21.5		0.5	
			Nominal	22.0	20.0		21.0			
6	HSUPA	Subtest 1	Maximum	23.0	21.0		22.0		0	
			Nominal	22.5	20.5		21.5			
6		Subtest 2	Maximum	21.0	19.0		20.0		2	
			Nominal	20.5	18.5		19.5			
6		Subtest 3	Maximum	22.0	20.0		21.0		1	
			Nominal	21.5	19.5		20.5			
6		Subtest 4	Maximum	21.0	19.0		20.0		2	
			Nominal	20.5	18.5		19.5			
6		Subtest 5	Maximum	23.0	21.0		22.0		0	
			Nominal	22.5	20.5		21.5			

Table 9.1.1 WCDMA Nominal and Maximum Output Power Spec

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band (dBm)			AWS Band (dBm)			PCS Band (dBm)		3GPP MPR (dB)
			4132	4183	4233	1312	1412	1513	9262	9400	
99	WCDMA	12.2 kbps RMC	22.59	22.50	22.55	20.87	20.91	20.95	21.27	21.49	-
		12.2 kbps AMR	22.55	22.48	22.53	20.84	20.89	20.90	21.25	21.45	
5	HSDPA	Subtest 1	21.54	21.50	21.56	19.88	19.79	19.77	20.29	20.48	20.42
		Subtest 2	21.52	21.48	21.52	19.84	20.07	19.97	20.26	20.50	20.47
		Subtest 3	21.04	20.92	21.03	19.58	19.59	19.52	19.77	19.93	19.88
		Subtest 4	21.01	21.00	21.02	19.57	19.60	19.51	19.76	19.93	19.93
6	HSUPA	Subtest 1	21.27	21.25	21.59	20.04	19.73	19.76	20.05	20.08	20.40
		Subtest 2	20.31	20.47	20.34	18.85	18.95	18.75	19.24	19.40	19.26
		Subtest 3	20.18	20.30	20.42	19.03	18.96	18.89	19.22	19.11	19.46
		Subtest 4	20.94	20.83	20.61	18.85	18.85	18.83	19.45	19.67	19.52
		Subtest 5	21.55	21.49	21.53	20.09	19.98	19.90	20.32	20.50	20.47

Table 9.1.2 WCDMA Conducted Power

WCDMA SAR was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01v03r01. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.

The manufacturer declares that the HSDPA and HSUPA transmitter's power will not exceed the R99 maximum transmit power in devices based on Qualcomm's HSPA chipset solutions.

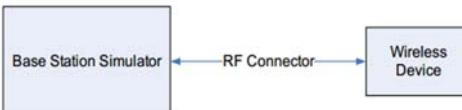


Figure 9.1 Power Measurement Setup

## 9.2 LTE Nominal and Maximum Output Power Spec and Conducted Powers

Band & Mode			Modulated Average[dBm]
LTE Band 71	Maximum	Nominal	23.5
			23.0

Table 9.2.1.1 Nominal and Maximum Output Power Spec

### 1) LTE Band 71

Modulation	RB Size	RB Offset	LTE Band 71 Conducted Power- 20 MHz Bandwidth		
			Mid Channel		MPR Allowed Per 3GPP(dB)
			133297 (680.5 MHz)	Conducted Power (dBm)	
QPSK	1	0	23.35		0
	1	50	23.48		
	1	99	23.23		
	50	0	22.06		0-1
	50	25	22.24		
	50	50	22.10		
	100	0	22.17		1
16QAM	1	0	22.17		0-1
	1	50	22.32		
	1	99	22.08		
	50	0	21.17		0-2
	50	25	21.26		
	50	50	21.11		
	100	0	21.28		2

Table 9.2.1.2 LTE Conducted Power

Note : LTE B71 can not contain three non-overlapping channels of 20 MHz bandwidth. Per KDB 941225 D05v02r05, 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.

Modulation	RB Size	RB Offset	LTE Band 71 Conducted Power- 15 MHz Bandwidth		
			Mid Channel		MPR Allowed Per 3GPP(dB)
			133297 (680.5 MHz)	Conducted Power (dBm)	
QPSK	1	0	23.23		0
	1	36	23.26		
	1	74	23.24		
	36	0	22.18		0-1
	36	18	22.21		
	36	37	22.24		
	75	0	22.23		1
16QAM	1	0	22.19		0-1
	1	36	22.08		
	1	74	22.11		
	36	0	21.32		0-2
	36	18	21.17		
	36	37	21.31		
	75	0	21.30		2

Table 9.2.1.3 LTE Conducted Power

Note : LTE B71 can not contain three non-overlapping channels of 15 MHz bandwidth. Per KDB 941225 D05v02r05, 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.

Modulation	RB Size	RB Offset	LTE Band 71 Conducted Power- 10 MHz Bandwidth		
			Low Channel	Mid Channel	MPR Allowed Per 3GPP(dB)
			133172 (668.0 MHz)	133297 (680.5 MHz)	
QPSK	1	0	23.25	23.34	0
	1	25	23.44	23.38	
	1	49	23.19	23.16	
	25	0	22.23	22.18	0-1
	25	12	22.19	22.15	
	25	25	22.15	22.14	
	50	0	22.19	22.16	1
16QAM	1	0	22.07	22.18	0-1
	1	25	22.28	22.30	
	1	49	22.04	22.33	
	25	0	21.42	21.35	0-2
	25	12	21.38	21.16	
	25	25	21.25	21.26	
	50	0	21.30	21.28	2

Table 9.2.1.4 LTE Conducted Power

Modulation	RB Size	RB Offset	LTE Band 71 Conducted Power- 5 MHz Bandwidth		
			Low Channel	Mid Channel	MPR Allowed Per 3GPP(dB)
			133147 (665.5 MHz)	133297 (680.5 MHz)	
QPSK	1	0	23.33	23.27	0
	1	12	23.35	23.18	
	1	24	23.20	23.23	
	12	0	22.23	22.24	0
	12	6	22.30	22.23	
	12	13	22.27	22.25	
	25	0	22.19	22.25	1
16QAM	1	0	22.16	22.08	0-1
	1	12	22.17	22.05	
	1	24	22.08	22.06	
	12	0	21.11	21.17	0-2
	12	6	21.25	21.26	
	12	13	21.22	21.18	
	15	0	21.27	21.26	2

Table 9.2.1.5 LTE Conducted Power

Band & Mode			Modulated Average[dBm]
LTE Band 12		Maximum	23.5
		Nominal	23.0

Table 9.2.2.1 Nominal and Maximum Output Power Spec

## 2) LTE Band 12

Modulation	RB Size	RB Offset	LTE Band 12 Conducted Power- 10 MHz Bandwidth			MPR Allowed Per 3GPP(dB)	MPR (dB)		
			Mid Channel		Conducted Power (dBm)				
			23095 (707.5 MHz)	2347					
QPSK	1	0	23.15	23.47	23.47	0	0		
	1	25	23.44	23.47	23.47				
	1	49	22.29	22.33	22.33				
	25	0	22.29	22.31	22.31	0-1	1		
	25	12	21.18	21.28	21.28				
	25	25	21.25	21.25	21.25	0-2	2		
	50	0	21.17	21.17	21.17				

Table 9.2.2.2 LTE Conducted Power

Note : LTE B12 can not contain three non-overlapping channels of 10 MHz bandwidth. Per KDB 941225 D05v02r05, 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.

Modulation	RB Size	RB Offset	LTE Band 12 Conducted Power- 5 MHz Bandwidth			MPR Allowed Per 3GPP(dB)	MPR (dB)
			Low Channel		Mid Channel		
			23035 (701.5 MHz)	23095 (707.5 MHz)	23155 (713.5 MHz)		
QPSK	1	0	23.11	23.13	23.16	0	0
	1	12	23.30	23.25	23.16		
	1	24	23.21	23.08	23.36		
	12	0	22.24	22.14	22.24	0-1	1
	12	6	22.29	22.20	22.24		
	12	13	22.24	22.13	22.15	0-2	2
	25	0	22.24	22.09	22.24		
16QAM	1	0	21.93	21.97	21.97	0-1	1
	1	12	22.11	22.06	21.98		
	1	24	22.03	21.93	22.18		
	12	0	21.14	21.13	21.13	0-2	2
	12	6	21.17	21.10	21.19		
	12	13	21.22	21.11	21.05	0-2	2
	25	0	21.21	21.26	21.37		

Table 9.2.2.3 LTE Conducted Power

Modulation	RB Size	RB Offset	LTE Band 12 Conducted Power- 3 MHz Bandwidth			MPR Allowed Per 3GPP(dB)	MPR (dB)
			Low Channel		Mid Channel		
			23025 (700.5 MHz)	23095 (707.5 MHz)	23165 (714.5 MHz)		
QPSK	1	0	23.10	23.17	23.18	0	0
	1	7	23.40	23.19	23.09		
	1	14	23.37	23.09	23.30		
	8	0	22.19	22.20	22.20	0-1	1
	8	4	22.28	22.17	22.26		
	8	7	22.26	22.19	22.23	0-1	1
	15	0	22.18	22.10	22.21		
16QAM	1	0	21.94	21.98	22.09	0-1	1
	1	7	22.21	22.00	21.96		
	1	14	22.18	22.19	22.24		
	8	0	21.35	21.21	21.28	0-2	2
	8	4	21.42	21.35	21.34		
	8	7	21.41	21.37	21.41	0-2	2
	15	0	21.29	21.03	21.35		

Table 9.2.2.4 LTE Conducted Power

Modulation	RB Size	RB Offset	LTE Band 12 Conducted Power- 1.4 MHz Bandwidth			MPR Allowed Per 3GPP(dB)	MPR (dB)
			Low Channel		Mid Channel		
			23017 (699.7 MHz)	23095 (707.5 MHz)	23173 (715.3 MHz)		
QPSK	1	0	22.97	23.20	23.33	0	0
	1	2	23.30	23.45	23.31		
	1	5	23.29	23.32	23.36		
	3	0	23.08	23.23	23.16	0	0
	3	2	23.23	23.32	23.21		
	3	3	23.31	23.20	23.25	0-1	1
	6	0	22.36	22.19	22.17		
16QAM	1	0	21.80	22.05	22.23	0-1	1
	1	2	22.11	22.27	22.46		
	1	5	22.12	22.14	22.43		
	3	0	22.15	22.12	22.19	0-1	1
	3	2	22.29	22.22	22.38		
	3	3	22.23	22.11	22.37	0-2	2
	6	0	21.18	21.05	21.24		

Table 9.2.2.5 LTE Conducted Power

Band & Mode			Modulated Average[dBm]	
LTE Band 13			Maximum	23.5
		Nominal		23.0

Table 9.2.3.1 Nominal and Maximum Output Power Spec

### 3) LTE Band 13

LTE Band 13 Conducted Power- 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel	MPR Allowed Per 3GPP(dB)	MPR (dB)
			23230 (782.0 MHz)		
			Conducted Power (dBm)		
QPSK	1	0	23.22	0	0
	1	25	23.39		
	1	49	23.29		
	25	0	22.25	0-1	1
	25	12	22.37		
	25	25	22.34		
	50	0	22.32		
16QAM	1	0	22.06	0-1	1
	1	25	22.33		
	1	49	22.13		
	25	0	21.20	0-2	2
	25	12	21.35		
	25	25	21.33		
	50	0	21.32		

Table 9.2.3.2 LTE Conducted Power

Note : LTE B13 can not contain three non-overlapping channels of 10 MHz bandwidth. Per KDB 941225 D05v02r05, 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.

LTE Band 13 Conducted Power- 5 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel	MPR Allowed Per 3GPP(dB)	MPR (dB)
			23230 (782.0 MHz)		
			Conducted Power (dBm)		
QPSK	1	0	23.19	0	0
	1	12	23.28		
	1	24	23.26		
	12	0	22.21	0-1	1
	12	6	22.31		
	12	13	22.33		
	25	0	22.28		
16QAM	1	0	22.04	0-1	1
	1	12	22.31		
	1	24	22.11		
	12	0	21.18	0-2	2
	12	6	21.27		
	12	13	21.29		
	25	0	21.27		

Table 9.2.3.3 LTE Conducted Power

Note : LTE B13 can not contain three non-overlapping channels of 5 MHz bandwidth. Per KDB 941225 D05v02r05, 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.

Band & Mode			Modulated Average[dBm]	
LTE Band 14			Maximum	23.5
		Nominal		23.0

Table 9.2.4.1 Nominal and Maximum Output Power Spec

### 4) LTE Band 14

LTE Band 14 Conducted Power- 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel	MPR Allowed Per 3GPP(dB)	MPR (dB)
			23330 (793.0 MHz)		
			Conducted Power (dBm)		
QPSK	1	0	23.39	0	0
	1	25	23.47		
	1	49	23.22		
	25	0	22.31	0-1	1
	25	25	22.12		
	50	0	22.30		
	12	0	22.24	0-1	1
16QAM	1	25	22.33		
	1	49	22.05		
	25	0	21.25	0-2	2
	25	12	21.25		
	25	25	21.22		
	50	0	21.30		

Table 9.2.4.2 LTE Conducted Power

Note : LTE B14 can not contain three non-overlapping channels of 10 MHz bandwidth. Per KDB 941225 D05v02r05, 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.

LTE Band 14 Conducted Power- 5 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel	MPR Allowed Per 3GPP(dB)	MPR (dB)
			23330 (793.0 MHz)		
			Conducted Power (dBm)		
QPSK	1	0	23.33	0	0
	1	12	23.38		
	1	24	23.15		
	12	0	22.22	0-1	1
	12	6	22.18		
	12	13	22.09		
	25	0	22.16		
16QAM	1	0	22.18	0-1	1
	1	12	22.19		
	1	24	22.04		
	12	0	21.21	0-2	2
	12	6	21.11		
	12	13	21.11		
	25	0	21.10		

Table 9.2.4.3 LTE Conducted Power

Note : LTE B14 can not contain three non-overlapping channels of 5 MHz bandwidth. Per KDB 941225 D05v02r05, 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.

Band & Mode			Modulated Average[dBm]	
LTE Band 5			Maximum	23.5
		Nominal		23.0

Table 9.2.5.1 Nominal and Maximum Output Power Spec

### 5) LTE Band 5 (Cell)

Modulation	RB Size	RB Offset	LTE Band 5 (Cell) Conducted Power- 10 MHz Bandwidth		
			Mid Channel		MPR Allowed Per 3GPP(dB)
			20525 (836.5 MHz)	Conducted Power (dBm)	
QPSK	1	0		23.44	0
	1	25		23.26	
	1	49		23.32	
	25	0		22.18	0-1
	25	12		22.11	
	25	25		22.15	
	50	0		22.13	
16QAM	1	0		22.30	0-1
	1	25		22.19	
	1	49		22.13	
	25	0		21.13	0-2
	25	12		21.28	
	25	25		21.09	
	50	0		21.17	

Table 9.2.5.2 LTE Conducted Power

Note : LTE B5(Cell) can not contain three non-overlapping channels of 10 MHz bandwidth. Per KDB 941225 D05v02r05, 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.

Modulation	RB Size	RB Offset	LTE Band 5 (Cell) Conducted Power- 5 MHz Bandwidth			
			Low Channel	Mid Channel	High Channel	
			20425 (826.5 MHz)	20525 (836.5 MHz)	20625 (846.5 MHz)	
QPSK	1	0	23.06	23.04	23.03	0
	1	12	23.21	23.17	23.08	
	1	24	23.16	23.09	23.11	
	12	0	22.00	22.10	22.03	0-1
	12	6	22.14	22.09	22.03	
	12	13	22.16	22.12	22.12	
	25	0	22.09	22.10	22.09	
16QAM	1	0	21.96	21.91	21.95	0-1
	1	12	22.02	21.98	21.98	
	1	24	21.97	21.94	21.97	
	12	0	20.94	21.14	21.01	0-2
	12	6	21.09	21.04	21.06	
	12	13	21.01	21.15	21.13	
	25	0	21.11	21.05	21.11	

Table 9.2.5.3 LTE Conducted Power

Modulation	RB Size	RB Offset	LTE Band 5 (Cell) Conducted Power- 3 MHz Bandwidth			
			Low Channel	Mid Channel	High Channel	
			20415 (825.5 MHz)	20525 (836.5 MHz)	20635 (847.5 MHz)	
QPSK	1	0	23.17	23.42	23.13	0
	1	7	23.06	23.21	23.26	
	1	14	23.23	23.16	23.25	
	8	0	22.18	22.19	22.17	0-1
	8	4	22.12	22.21	22.19	
	8	7	22.24	22.21	22.16	
	15	0	22.08	22.15	22.10	
16QAM	1	0	22.00	22.23	22.00	0-1
	1	7	21.94	22.07	22.08	
	1	14	22.07	21.97	22.08	
	8	0	21.07	21.09	21.14	0-2
	8	4	21.17	21.31	21.28	
	8	7	21.38	21.33	21.18	
	15	0	21.09	21.14	20.96	

Table 9.2.5.4 LTE Conducted Power

Modulation	RB Size	RB Offset	LTE Band 5 (Cell) Conducted Power- 1.4 MHz Bandwidth			
			Low Channel	Mid Channel	High Channel	
			20407 (824.7 MHz)	20525 (836.5 MHz)	20643 (848.3 MHz)	
QPSK	1	0	23.08	23.19	23.24	0
	1	2	23.20	23.24	23.43	
	1	5	23.06	23.08	23.19	
	3	0	23.04	23.13	23.21	0
	3	2	23.05	23.08	23.20	
	3	3	23.07	23.16	23.22	
	6	0	22.00	22.19	22.07	
16QAM	1	0	21.91	22.08	22.05	0-1
	1	2	22.09	22.06	22.26	
	1	5	21.97	21.98	22.05	
	3	0	22.04	22.06	22.28	0-1
	3	2	22.18	22.14	22.40	
	3	3	22.12	22.11	22.34	
	6	0	20.95	21.01	20.98	

Table 9.2.5.5 LTE Conducted Power

Band & Mode			Modulated Average[dBm]	
LTE Band 66 (AWS)			Maximum	22.5
		Nominal		22.0

Table 9.2.6.1 Nominal and Maximum Output Power Spec

### 6) LTE Band 66 (AWS)

Modulation	RB Size	RB Offset	LTE Band 66 (AWS) Conducted Power- 20 MHz Bandwidth			MPR Allowed Per 3GPP(dB)	MPR (dB)
			Low Channel	Mid Channel	High Channel		
			132072 (1720.0 MHz)	132322 (1745.0 MHz)	132572 (1770.0 MHz)		
Conducted Power (dBm)							
QPSK	1	0	22.14	22.44	22.40	0	0
	1	50	21.99	22.29	22.22		
	1	99	21.98	22.06	22.12		
	50	0	21.08	21.37	21.31	0-1	1
	50	25	21.05	21.31	21.27		
	50	50	21.01	21.05	21.24		
	100	0	21.04	21.21	21.16	0-1	1
16QAM	1	0	20.99	21.32	21.27		
	1	50	20.82	21.18	21.08	0-1	1
	1	99	20.81	20.89	20.93		
	50	0	20.08	20.43	20.38	0-2	2
	50	25	20.07	20.38	20.31		
	50	50	20.02	20.14	20.25		
	100	0	20.00	20.28	20.22	0-2	2

Table 9.2.6.2 LTE Conducted Power

Modulation	RB Size	RB Offset	LTE Band 66 (AWS) Conducted Power- 15 MHz Bandwidth			MPR Allowed Per 3GPP(dB)	MPR (dB)
			Low Channel	Mid Channel	High Channel		
			132047 (1717.5 MHz)	132322 (1745.0 MHz)	132597 (1772.5 MHz)		
Conducted Power (dBm)							
QPSK	1	0	22.09	22.40	22.16	0	0
	1	36	21.96	22.27	22.28		
	1	74	21.94	22.13	21.87		
	36	0	20.86	21.37	21.12	0-1	1
	36	18	20.84	21.27	21.16		
	36	37	20.83	20.99	21.07		
	75	0	20.82	21.15	21.11	0-1	1
16QAM	1	0	21.14	21.22	21.02		
	1	36	20.93	21.08	21.11	0-1	1
	1	74	20.80	20.94	20.89		
	36	0	19.82	20.32	20.08	0-2	2
	36	18	19.82	20.23	20.24		
	36	37	19.81	20.07	20.16		
	75	0	19.81	20.20	20.18	0-2	2

Table 9.2.6.3 LTE Conducted Power

Modulation	RB Size	RB Offset	LTE Band 66 (AWS) Conducted Power- 10 MHz Bandwidth			MPR Allowed Per 3GPP(dB)	MPR (dB)
			Low Channel	Mid Channel	High Channel		
			132022 (1715.0 MHz)	132322 (1745.0 MHz)	132622 (1775.0 MHz)		
Conducted Power (dBm)							
QPSK	1	0	22.02	22.40	22.23	0	0
	1	25	21.88	22.35	22.33		
	1	49	21.91	22.10	22.18		
	25	0	20.80	21.39	21.21	0-1	1
	25	12	20.85	21.19	21.19		
	25	25	20.82	21.10	21.12		
	50	0	20.87	21.20	21.21	0-1	1
16QAM	1	0	20.85	21.21	21.04	0-1	1
	1	25	20.91	21.17	21.19		
	1	49	20.85	20.91	21.01		
	25	0	19.93	20.45	20.23	0-2	2
	25	12	19.95	20.35	20.23		
	25	25	19.91	20.15	20.02		
	50	0	19.84	20.26	20.18	0-2	2

Table 9.2.6.4 LTE Conducted Power

Modulation	RB Size	RB Offset	LTE Band 66 (AWS) Conducted Power- 5 MHz Bandwidth			MPR Allowed Per 3GPP(dB)	MPR (dB)
			Low Channel	Mid Channel	High Channel		
			131997 (1712.5 MHz)	132322 (1745.0 MHz)	132647 (1777.5 MHz)		
Conducted Power (dBm)							
QPSK	1	0	21.97	22.25	22.19	0	0
	1	12	21.86	22.23	22.15		
	1	24	21.80	22.08	22.10		
	12	0	20.91	21.25	21.20	0-1	1
	12	6	20.89	21.21	21.15		
	12	13	20.82	21.05	21.05		
	25	0	20.86	21.01	21.13	0-1	1
16QAM	1	0	20.83	21.16	21.07	0-1	1
	1	12	20.82	21.04	20.98		
	1	24	20.81	20.89	20.95		
	12	0	20.04	20.30	20.17	0-2	2
	12	6	20.00	20.17	20.22		
	12	13	19.87	20.10	20.22		
	25	0	20.00	20.13	20.28	0-2	2

Table 9.2.6.5 LTE Conducted Power

Modulation	RB Size	RB Offset	LTE Band 66 (AWS) Conducted Power- 3 MHz Bandwidth			MPR Allowed Per 3GPP(dB)	MPR (dB)
			Low Channel 131987 (1711.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132657 (1778.5 MHz)		
			Conducted Power (dBm)				
QPSK	1	0	22.06	22.38	22.29	0-1	0
	1	7	21.97	22.28	22.10		
	1	14	21.95	22.10	22.17		
	8	0	20.99	21.27	21.22		
	8	4	21.05	21.33	21.18		
	8	7	21.05	21.12	21.17		
	15	0	21.02	21.20	21.16		
16QAM	1	0	21.12	21.19	21.12	0-2	1
	1	7	21.06	21.10	20.93		
	1	14	21.10	21.00	21.06		
	8	0	20.13	20.25	20.33		
	8	4	20.12	20.40	20.30		
	8	7	20.10	20.28	20.36		
	15	0	19.85	20.22	20.24		

Table 9.2.6.6 LTE Conducted Power

Modulation	RB Size	RB Offset	LTE Band 66 (AWS) Conducted Power- 1.4 MHz Bandwidth			MPR Allowed Per 3GPP(dB)	MPR (dB)
			Low Channel 131979 (1710.7 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132665 (1779.3 MHz)		
			Conducted Power (dBm)				
QPSK	1	0	21.91	22.16	22.16	0-1	0
	1	2	21.99	22.39	22.27		
	1	5	21.95	22.04	22.15		
	3	0	21.95	22.15	22.20		
	3	2	21.92	22.19	22.08		
	3	3	21.89	22.16	22.16		
	6	0	21.00	21.25	21.26		
16QAM	1	0	20.99	20.97	21.03	0-2	1
	1	2	21.11	21.28	21.19		
	1	5	20.95	20.87	21.12		
	3	0	20.81	21.30	21.14		
	3	2	20.89	21.31	21.22		
	3	3	20.87	21.28	21.13		
	6	0	19.87	20.27	20.17		

Table 9.2.6.7 LTE Conducted Power

Band & Mode			Modulated Average[dBm]	
LTE Band 2(PCS)			Maximum	23.5
		Nominal		23.0

Table 9.2.7.1 Nominal and Maximum Output Power Spec

### 7) LTE Band 2 (PCS)

Modulation	RB Size	RB Offset	LTE Band 2 (PCS) Conducted Power- 20 MHz Bandwidth			MPR Allowed Per 3GPP(dB)	MPR (dB)
			Low Channel	Mid Channel	High Channel		
			18700 (1860.0 MHz)	18900 (1880.0 MHz)	19100 (1900.0 MHz)		
Conducted Power (dBm)							
QPSK	1	0	23.32	23.19	23.12	0	0
	1	50	23.32	23.49	23.21		
	1	99	23.19	23.22	23.15		
	50	0	22.24	22.19	22.20	0-1	1
	50	25	22.17	22.29	22.27		
	50	50	22.24	22.27	22.24	0-1	1
	100	0	22.14	22.24	22.11		
16QAM	1	0	22.36	22.23	22.18	0-1	1
	1	50	22.20	22.35	22.39		
	1	99	22.39	22.14	22.11		
	50	0	21.14	21.33	21.21	0-2	2
	50	25	21.14	21.35	21.24		
	50	50	21.15	21.33	21.17		
	100	0	21.27	21.13	21.14		

Table 9.2.7.2 LTE Conducted Power

Modulation	RB Size	RB Offset	LTE Band 2 (PCS) Conducted Power- 15 MHz Bandwidth			MPR Allowed Per 3GPP(dB)	MPR (dB)
			Low Channel	Mid Channel	High Channel		
			18675 (1857.5 MHz)	18900 (1880.0 MHz)	19125 (1902.5 MHz)		
Conducted Power (dBm)							
QPSK	1	0	23.27	23.12	23.11	0	0
	1	36	23.17	23.23	23.18		
	1	74	23.31	23.11	23.23		
	36	0	22.25	22.24	22.14	0-1	1
	36	18	22.24	22.23	22.23		
	36	37	22.24	22.25	22.18	0-1	1
	75	0	22.16	22.19	22.19		
16QAM	1	0	22.15	22.14	22.24		
	1	36	22.18	22.11	22.19	0-1	1
	1	74	22.18	22.12	22.21		
	36	0	21.31	21.14	21.21	0-2	2
	36	18	21.31	21.21	21.20		
	36	37	21.20	21.14	21.25		
	75	0	21.30	21.15	21.16		

Table 9.2.7.3 LTE Conducted Power

Modulation	RB Size	RB Offset	LTE Band 2 (PCS) Conducted Power- 10 MHz Bandwidth			MPR Allowed Per 3GPP(dB)	MPR (dB)
			Low Channel	Mid Channel	High Channel		
			18650 (1855.0 MHz)	18900 (1880.0 MHz)	19150 (1905.0 MHz)		
Conducted Power (dBm)							
QPSK	1	0	23.11	23.18	23.23	0	0
	1	25	23.14	23.14	23.21		
	1	49	23.17	23.11	23.24		
	25	0	22.15	22.33	22.32	0-1	1
	25	12	22.12	22.15	22.35		
	25	25	22.16	22.22	22.30	0-1	1
	50	0	22.18	22.22	22.31		
16QAM	1	0	22.14	22.34	22.18		
	1	25	22.20	22.33	22.29	0-1	1
	1	49	22.17	22.27	22.22		
	25	0	21.18	21.21	21.33	0-2	2
	25	12	21.18	21.22	21.32		
	25	25	21.24	21.20	21.41		
	50	0	21.23	21.20	21.32		

Table 9.2.7.4 LTE Conducted Power

Modulation	RB Size	RB Offset	LTE Band 2 (PCS) Conducted Power- 5 MHz Bandwidth			MPR Allowed Per 3GPP(dB)	MPR (dB)
			Low Channel	Mid Channel	High Channel		
			18625 (1852.5 MHz)	18900 (1880.0 MHz)	19175 (1907.5 MHz)		
Conducted Power (dBm)							
QPSK	1	0	23.18	23.10	23.13	0	0
	1	12	23.31	23.15	23.11		
	1	24	23.18	23.11	23.30		
	12	0	22.33	22.13	22.26	0-1	1
	12	6	22.35	22.22	22.37		
	12	13	22.29	22.22	22.30	0-1	1
	25	0	22.32	22.23	22.25		
16QAM	1	0	22.16	22.12	22.18		
	1	12	22.16	22.20	22.13	0-1	1
	1	24	22.21	22.16	22.11		
	12	0	21.33	21.12	21.31	0-2	2
	12	6	21.30	21.11	21.26		
	12	13	21.35	21.21	21.22		
	25	0	21.28	21.29	21.26		

Table 9.2.7.5 LTE Conducted Power

Modulation	RB Size	RB Offset	LTE Band 2 (PCS) Conducted Power- 3 MHz Bandwidth			MPR Allowed Per 3GPP(dB)	MPR (dB)
			Low Channel 18615 (1851.5 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19185 (1908.5 MHz)		
			Conducted Power (dBm)				
QPSK	1	0	23.20	23.15	23.24	0	0
	1	7	23.20	23.24	23.24		
	1	14	23.17	23.15	23.31		
	8	0	22.16	22.24	22.30	0-1	1
	8	4	22.18	22.22	22.33		
	8	7	22.15	22.28	22.32	0-1	1
	15	0	22.18	22.19	22.30		
16QAM	1	0	22.13	22.13	22.23	0-1	1
	1	7	22.20	22.14	22.25		
	1	14	22.20	22.19	22.26		
	8	0	21.10	21.41	21.47	0-2	2
	8	4	21.25	21.34	21.41		
	8	7	21.24	21.37	21.48	0-2	2
	15	0	21.23	21.20	21.36		

Table 9.2.7.6 LTE Conducted Power

Modulation	RB Size	RB Offset	LTE Band 2 (PCS) Conducted Power- 1.4 MHz Bandwidth			MPR Allowed Per 3GPP(dB)	MPR (dB)
			Low Channel 18607 (1850.7 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19193 (1909.3 MHz)		
			Conducted Power (dBm)				
QPSK	1	0	23.18	23.13	23.18	0	0
	1	2	23.32	23.18	23.30		
	1	5	23.23	23.10	23.16		
	3	0	23.11	23.14	23.40	0	0
	3	2	23.15	23.18	23.38		
	3	3	23.11	23.25	23.39	0-1	1
	6	0	22.18	22.18	22.34		
16QAM	1	0	22.17	22.12	22.10	0-1	1
	1	2	22.15	22.16	22.20		
	1	5	22.17	22.12	22.19		
	3	0	22.18	22.21	22.22	0-1	1
	3	2	22.16	22.38	22.23		
	3	3	22.22	22.38	22.23	0-2	2
	6	0	21.15	21.17	21.15		

Table 9.2.7.7 LTE Conducted Power

### 9.3 WLAN Nominal and Maximum Output Power Spec and Conducted Powers

Band (GHz)	Mode	Ch	Modulated Average[dBm]	
			Maximum	Nominal
2.4	802.11b	1~11	17.0	16.5
	802.11g	1~11	14.0	13.5
	802.11n HT20	1~11	12.0	11.5
	802.11n HT40	1~11	12.0	11.5

Table 9.3.1 Nominal and Maximum Output Power Spec

Mode	Freq. (MHz)	Channel	IEEE 802.11 (2.4 GHz) Conducted Power	
			[dBm]	
802.11b	2412	1	16.96	
	2437	6	16.79	
	2462	11	16.97	
802.11g	2412	1	13.70	
	2437	6	13.70	
	2462	11	13.90	
802.11n (HT-20)	2412	1	11.97	
	2437	6	11.91	
	2462	11	11.94	
802.11n (HT-40)	2422	3	11.97	
	2437	6	11.76	
	2452	9	11.91	

Table 9.3.2 IEEE 802.11 Average RF Power

Band (GHz)	Mode	Ch	Modulated Average[dBm]	
			Maximum	Nominal
5 (UNII)	802.11a	36~165	12.2	11.7
	802.11n (20MHz)	36~165	12.0	11.5
	802.11ac (20MHz)	36~165	10.0	9.5
	802.11n (40MHz)	38~159	12.0	11.5
	802.11ac (40MHz)	38~159	10.0	9.5
	802.11ac (80MHz)	42~155	10.0	9.5

Table 9.3.3 Nominal and Maximum Output Power Spec

Mode	Freq. (MHz)	Channel	IEEE 802.11a (5 GHz) Conducted Power	
			[dBm]	
802.11a	5180	36	11.97	
	5200	40	11.87	
	5220	44	11.85	
	5240	48	11.84	
	<b>5260</b>	<b>52</b>	<b>11.83</b>	
	5280	56	11.79	
	5300	60	11.78	
	5320	64	11.80	
	<b>5500</b>	<b>100</b>	<b>11.96</b>	
	5580	116	11.74	
	5660	132	11.68	
	5700	140	11.63	
	<b>5745</b>	<b>149</b>	<b>11.98</b>	
	5785	157	11.75	
	5825	165	11.68	

Table 9.3.4 IEEE 802.11a Average RF Power

Mode	Freq. (MHz)	Channel	IEEE 802.11n HT20 (5 GHz) Conducted Power	
			[dBm]	
802.11n (HT-20)	5180	36	11.94	
	5200	40	11.84	
	5220	44	11.82	
	5240	48	11.90	
	5260	52	11.84	
	5280	56	11.79	
	5300	60	11.81	
	5320	64	11.77	
	5500	100	11.96	
	5580	116	11.77	
	5660	132	11.74	
	5700	140	11.72	
	5745	149	11.98	
	5785	157	11.76	
	5825	165	11.68	

Table 9.3.5 IEEE 802.11n HT20 Average RF Power

Mode	Freq. (MHz)	Channel	IEEE 802.11ac VHT20 (5 GHz) Conducted Power	
			[dBm]	
802.11ac (VHT-20)	5180	36	9.46	
	5200	40	9.50	
	5220	44	9.55	
	5240	48	9.65	
	5260	52	9.65	
	5280	56	9.62	
	5300	60	9.66	
	5320	64	9.54	
	5500	100	9.82	
	5580	116	9.87	
	5660	132	9.77	
	5700	140	9.68	
	5745	149	9.78	
	5785	157	9.50	
	5825	165	9.60	

**Table 9.3.6 IEEE 802.11ac VHT20 Average RF Power**

Mode	Freq. (MHz)	Channel	IEEE 802.11n HT40 (5 GHz) Conducted Power	
			[dBm]	
802.11n (HT-40)	5190	38	11.85	
	5230	46	11.83	
	5270	54	11.83	
	5310	62	11.76	
	5510	102	11.93	
	5550	110	11.94	
	5670	134	11.75	
	5755	151	11.95	
	5795	159	11.76	

**Table 9.3.7 IEEE 802.11n HT40 Average RF Power**

Mode	Freq. (MHz)	Channel	IEEE 802.11ac VHT40 (5 GHz) Conducted Power	
			[dBm]	
802.11ac (VHT-40)	5190	38	9.57	
	5230	46	9.48	
	5270	54	9.62	
	5310	62	9.58	
	5510	102	9.80	
	5550	110	9.75	
	5670	134	9.85	
	5755	151	9.83	
	5795	159	9.56	

**Table 9.3.8 IEEE 802.11ac VHT40 Average RF Power**

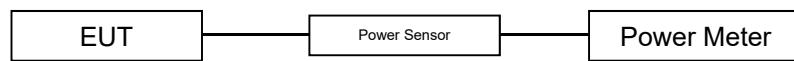
Mode	Freq. (MHz)	Channel	IEEE 802.11ac VHT80 (5 GHz) Conducted Power	
			[dBm]	
802.11ac (VHT-80)	5210	42	9.70	
	5290	58	9.73	
	5530	106	9.58	
	5775	155	9.69	

**Table 9.3.9 IEEE 802.11ac VHT80 Average RF Power**

Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v02r02:

- 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.
- Output Power and SAR is not required for 802.11 g/n HT20/ac VHT20 channels when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjust SAR is  $\leq 1.2 \text{ W/kg}$ .
- The underlined data rate and channel above were tested for SAR.

The average output powers of this device were tested by below configuration.

**Figure 9.3 Power Measurement Setup**

## 9.4 Bluetooth Conducted Powers

Burst Modulated Average[dBm]		Ch. Low	CH. Mid	Ch. High
Bluetooth 1 Mbps	Maximum	10.0	11.5	10.0
	Nominal	9.5	11.0	9.5
Bluetooth 2 Mbps	Maximum	8.0	9.5	8.0
	Nominal	7.5	9.0	7.5
Bluetooth 3 Mbps	Maximum	8.0	9.5	8.0
	Nominal	7.5	9.0	7.5
Bluetooth LE	Maximum	0.0	1.5	0.0
	Nominal	-0.5	1.0	-0.5

Table 9.4.1 Nominal and Maximum Output Power Spec (Frame)

Channel	Frequency (MHz)	Frame AVG Output Power (1Mbps)	Frame AVG Output Power (2Mbps)	Frame AVG Output Power (3Mbps)
		(dBm)	(dBm)	(dBm)
Low	2402	9.79	7.67	7.68
Mid	2441	11.46	9.29	9.30
High	2480	8.80	6.68	6.69

Table 9.4.2 Bluetooth Frame Average RF Power

Channel	Frequency (MHz)	Frame AVG Output Power(LE / 1Mbps)
		(dBm)
Low	2402	-0.40
Mid	2440	1.05
High	2480	-1.10

Table 9.4.3 Bluetooth LE Frame Average RF Power

- Bluetooth Conducted Powers procedures

1. Bluetooth (BDR, EDR)

- Enter DUT mode in EUT and operate it.

When it operating, The EUT is transmitting at maximum power level and duty cycle fixed.

- Instruments and EUT were connected like Figure 9.4.1(A).

- The maximum output powers of BDR(1 Mbps), EDR(2, 3 Mbps) and each frequency were set by a Bluetooth Tester.

- Power levels were measured by a Power Meter.

2. Bluetooth (LE)

- Enter LE mode in EUT and operate it.

When it operating, The EUT is transmitting at maximum power level and duty cycle fixed.

- Instruments and EUT were connected like Figure 9.4.1(B).

- The average conducted output powers of LE and each frequency can measurement according to setting program in EUT.

- Power levels were measured by a Power Meter.

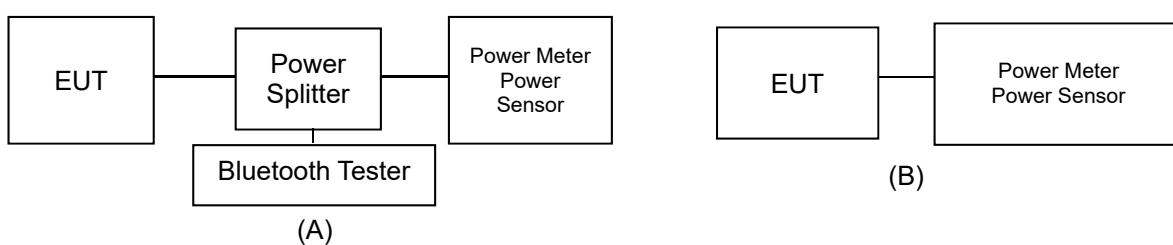


Figure 9.4.1 Average Power Measurement Setup

## 10. SYSTEM VERIFICATION

### 10.1 Tissue Verification

MEASURED TISSUE PARAMETERS										
Date(s)	Tissue Type	Ambient Temp.[°C]	Liquid Temp.[°C]	Measured Frequency [MHz]	Target Dielectric Constant, $\epsilon_r$	Target Conductivity, $\sigma$ (S/m)	Measured Dielectric Constant, $\epsilon_r$	Measured Conductivity, $\sigma$ (S/m)	$\epsilon_r$ Deviation [%]	$\sigma$ Deviation [%]
Jan. 10. 2019	750 Head	21.1	22.0	680.5	42.273	0.885	43.936	0.851	3.93	-3.84
				750.0	41.900	0.890	43.024	0.918	2.68	3.15
Jan. 10. 2019	750 Body	21.1	21.9	680.5	55.804	0.958	57.702	0.925	3.40	-3.44
				750.0	55.531	0.963	56.917	0.991	2.50	2.91
Jan. 07. 2019	750 Head	20.6	21.6	707.5	42.129	0.887	41.865	0.861	-0.63	-2.93
				750.0	41.900	0.890	41.258	0.898	-1.53	0.90
Jan. 07. 2019	750 Body	20.6	21.5	707.5	55.699	0.960	55.529	0.926	-0.31	-3.54
				750.0	55.531	0.963	55.136	0.968	-0.71	0.52
Jan. 08. 2019	750 Head	20.3	21.5	750.0	41.900	0.890	42.609	0.896	1.69	0.67
				782.0	41.749	0.894	42.225	0.924	1.14	3.36
Jan. 08. 2019	750 Body	20.3	21.3	750.0	55.531	0.963	55.271	0.971	-0.47	0.83
				782.0	55.406	0.966	54.956	1.003	-0.81	3.83
Jan. 09. 2019	750 Head	20.7	21.8	750.0	41.900	0.890	42.282	0.883	0.91	-0.79
				793.0	41.698	0.895	41.777	0.921	0.19	2.91
Jan. 09. 2019	750 Body	20.7	21.7	750.0	55.531	0.963	55.098	0.955	-0.78	-0.83
				793.0	55.364	0.967	54.667	0.998	-1.26	3.21
Dec. 07. 2018	835 Head	21.1	22.0	826.4	41.542	0.899	41.401	0.868	-0.34	-3.45
				835.0	41.500	0.900	41.309	0.875	-0.46	-2.78
				836.6	41.500	0.901	41.291	0.877	-0.50	-2.66
				846.6	41.500	0.912	41.177	0.885	-0.78	-2.96
Dec. 07. 2018	835 Body	21.1	22.1	826.4	55.235	0.969	54.163	0.986	-1.94	1.75
				835.0	55.200	0.970	54.085	0.993	-2.02	2.37
				836.6	55.197	0.971	54.074	0.994	-2.03	2.37
				846.6	55.166	0.984	53.979	1.003	-2.15	1.93
Dec. 11. 2018	835 Head	20.7	21.5	829.0	41.528	0.899	41.526	0.872	0.00	-3.00
				835.0	41.500	0.900	41.458	0.877	-0.10	-2.56
				836.5	41.500	0.901	41.437	0.878	-0.15	-2.55
				844.0	41.500	0.910	41.350	0.883	-0.36	-2.97
Dec. 11. 2018	835 Body	20.7	21.2	829.0	55.223	0.970	53.941	0.972	-2.32	0.21
				835.0	55.200	0.970	53.883	0.977	-2.39	0.72
				836.5	55.197	0.971	53.869	0.978	-2.41	0.72
				844.0	55.172	0.981	53.810	0.985	-2.47	0.41
Jan. 14. 2019	1800 Head	21.3	22.0	1712.4	40.126	1.350	41.051	1.299	2.31	-3.78
				1732.4	40.097	1.361	40.975	1.319	2.19	-3.09
				1752.6	40.069	1.373	40.881	1.338	2.03	-2.55
				1800.0	40.000	1.400	40.644	1.382	1.61	-1.29
Jan. 14. 2019	1800 Body	21.3	22.1	1712.4	53.596	1.464	52.771	1.422	-1.54	-2.87
				1732.4	53.556	1.477	52.737	1.441	-1.53	-2.44
				1752.6	53.516	1.489	52.687	1.459	-1.55	-2.01
				1800.0	53.300	1.520	52.550	1.501	-1.41	-1.25
Jan. 28. 2019	1800 Head	21.0	21.8	1720.0	40.114	1.354	41.247	1.307	2.82	-3.47
				1745.0	40.079	1.369	41.142	1.331	2.65	-2.78
				1770.0	40.043	1.383	41.023	1.354	2.45	-2.10
				1800.0	40.000	1.400	40.866	1.382	2.17	-1.29
Jan. 28. 2019	1800 Body	21.0	21.6	1720.0	53.580	1.469	52.762	1.419	-1.53	-3.40
				1745.0	53.530	1.485	52.713	1.443	-1.53	-2.83
				1770.0	53.480	1.501	52.651	1.466	-1.55	-2.33
				1800.0	53.300	1.520	52.566	1.493	-1.38	-1.78

MEASURED TISSUE PARAMETERS										
Date(s)	Tissue Type	Ambient Temp.[°C]	Liquid Temp.[°C]	Measured Frequency [MHz]	Target Dielectric Constant, $\epsilon_r$	Target Conductivity, $\sigma$ (S/m)	Measured Dielectric Constant, $\epsilon_r$	Measured Conductivity, $\sigma$ (S/m)	$\epsilon_r$ Deviation [%]	$\sigma$ Deviation [%]
Dec. 06. 2018	1900 Head	20.1	21.2	1852.4	40.000	1.400	39.637	1.365	-0.91	-2.50
				1880.0	40.000	1.400	39.554	1.396	-1.11	-0.29
				1900.0	40.000	1.400	39.470	1.416	-1.33	1.14
				1907.6	40.000	1.400	39.436	1.423	-1.41	1.64
Dec. 06. 2018	1900 Body	20.1	21.0	1852.4	53.300	1.520	51.859	1.503	-2.70	-1.12
				1880.0	53.300	1.520	51.659	1.538	-3.08	1.18
				1900.0	53.300	1.520	51.417	1.563	-3.53	2.83
				1907.6	53.300	1.520	51.311	1.575	-3.73	3.62
Dec. 10. 2018	1900 Head	20.3	21.1	1860.0	40.000	1.400	39.670	1.375	-0.82	-1.79
				1880.0	40.000	1.400	39.598	1.396	-1.01	-0.29
				1900.0	40.000	1.400	39.513	1.416	-1.22	1.14
Dec. 10. 2018	1900 Body	20.3	20.9	1860.0	53.300	1.520	51.828	1.514	-2.76	-0.39
				1880.0	53.300	1.520	51.676	1.538	-3.05	1.18
				1900.0	53.300	1.520	51.433	1.564	-3.50	2.89
Jan. 15. 2019	2450 Head	21.1	21.9	2402.0	39.282	1.757	40.646	1.732	3.47	-1.42
				2412.0	39.265	1.766	40.618	1.745	3.45	-1.19
				2437.0	39.222	1.788	40.558	1.778	3.41	-0.56
				2441.0	39.215	1.792	40.546	1.783	3.39	-0.50
				2450.0	39.200	1.800	40.522	1.795	3.37	-0.28
				2462.0	39.184	1.813	40.497	1.810	3.35	-0.17
				2472.0	39.171	1.823	40.465	1.821	3.30	-0.11
				2480.0	39.160	1.832	40.436	1.830	3.26	-0.11
				2402.0	52.764	1.904	54.639	1.891	3.55	-0.68
Jan. 15. 2019	2450 Body	21.1	22.1	2412.0	52.751	1.914	54.611	1.904	3.53	-0.52
				2437.0	52.717	1.938	54.549	1.937	3.48	-0.05
				2441.0	52.712	1.941	54.537	1.942	3.46	0.05
				2450.0	52.700	1.950	54.513	1.954	3.44	0.21
				2462.0	52.685	1.967	54.486	1.969	3.42	0.10
				2472.0	52.672	1.981	54.458	1.982	3.39	0.05
				2480.0	52.662	1.993	54.437	1.992	3.37	-0.05
Jan. 16. 2019	5300 Head	21.5	22.2	5260.0	35.940	4.720	36.332	4.600	1.09	-2.54
				5270.0	35.930	4.730	36.318	4.615	1.08	-2.43
				5280.0	35.920	4.740	36.304	4.628	1.07	-2.36
				5290.0	35.910	4.750	36.283	4.635	1.04	-2.42
				5300.0	35.900	4.760	36.257	4.642	0.99	-2.48
				5310.0	35.890	4.770	36.235	4.654	0.96	-2.43
				5320.0	35.880	4.780	36.205	4.667	0.91	-2.36
Jan. 16. 2019	5300 Body	21.5	22.0	5260.0	48.933	5.369	48.377	5.324	-1.14	-0.84
				5270.0	48.919	5.381	48.355	5.340	-1.15	-0.76
				5280.0	48.906	5.393	48.344	5.355	-1.15	-0.70
				5290.0	48.892	5.404	48.334	5.366	-1.14	-0.70
				5300.0	48.879	5.416	48.308	5.377	-1.17	-0.72
				5310.0	48.865	5.428	48.279	5.391	-1.20	-0.68
				5320.0	48.851	5.439	48.256	5.408	-1.22	-0.57

MEASURED TISSUE PARAMETERS										
Date(s)	Tissue Type	Ambient Temp.[°C]	Liquid Temp.[°C]	Measured Frequency [MHz]	Target Dielectric Constant, $\epsilon_r$	Target Conductivity, $\sigma$ (S/m)	Measured Dielectric Constant, $\epsilon_r$	Measured Conductivity, $\sigma$ (S/m)	Er Deviation [%]	$\sigma$ Deviation [%]
Jan. 17. 2019	5600 Head	21.0	22.0	5500.0	35.650	4.965	36.322	4.924	1.88	-0.83
				5510.0	35.635	4.976	36.313	4.931	1.90	-0.90
				5530.0	35.605	4.997	36.254	4.953	1.82	-0.88
				5550.0	35.575	5.018	36.219	4.981	1.81	-0.74
				5580.0	35.530	5.049	36.164	5.019	1.78	-0.59
				5600.0	35.500	5.070	36.131	5.048	1.78	-0.43
				5660.0	35.440	5.130	36.022	5.116	1.64	-0.27
				5670.0	35.430	5.140	36.005	5.127	1.62	-0.25
				5690.0	35.410	5.160	35.965	5.154	1.57	-0.12
				5700.0	35.400	5.170	35.949	5.169	1.55	-0.02
Jan. 17. 2019	5600 Body	21.0	21.8	5500.0	48.607	5.650	47.733	5.566	-1.80	-1.49
				5510.0	48.594	5.661	47.713	5.577	-1.81	-1.48
				5530.0	48.566	5.685	47.648	5.607	-1.89	-1.37
				5550.0	48.539	5.708	47.613	5.643	-1.91	-1.14
				5580.0	48.499	5.743	47.543	5.680	-1.97	-1.10
				5600.0	48.471	5.766	47.505	5.708	-1.99	-1.01
				5660.0	48.390	5.836	47.396	5.795	-2.05	-0.70
				5670.0	48.376	5.848	47.380	5.810	-2.06	-0.65
				5690.0	48.349	5.872	47.319	5.835	-2.13	-0.63
				5700.0	48.336	5.883	47.300	5.848	-2.14	-0.59
Jan. 18. 2019	5800 Head	21.3	22.1	5745.0	35.355	5.215	35.408	5.153	0.15	-1.19
				5755.0	35.345	5.225	35.384	5.166	0.11	-1.13
				5775.0	35.325	5.245	35.352	5.188	0.08	-1.09
				5785.0	35.315	5.255	35.330	5.199	0.04	-1.07
				5795.0	35.305	5.265	35.305	5.212	0.00	-1.01
				5800.0	35.300	5.270	35.294	5.219	-0.02	-0.97
Jan. 18. 2019	5800 Body	21.3	22.0	5825.0	35.275	5.296	35.265	5.258	-0.03	-0.72
				5745.0	48.275	5.936	46.755	6.156	-3.15	3.71
				5755.0	48.261	5.947	46.740	6.174	-3.15	3.82
				5775.0	48.234	5.971	46.677	6.199	-3.23	3.82
				5785.0	48.220	5.982	46.668	6.213	-3.22	3.86
				5795.0	48.207	5.994	46.658	6.230	-3.21	3.94
				5800.0	48.200	6.000	46.643	6.237	-3.23	3.95
				5825.0	48.166	6.029	46.575	6.274	-3.30	4.06

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 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.

#### Measurement Procedure for Tissue verification:

- 1) The network analyzer and probe system was configured and calibrated.
- 2) The probe was immersed in the sample which was placed in a nonmetallic container. Trapped air bubbles beneath the flange were minimized by placing the probe at a slight angle.
- 3) The complex admittance with respect to the probe aperture was measured
- 4) The complex relative permittivity  $\epsilon_r$ , for example from the below equation (Pournaropoulos and Misra):

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

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

## 10.2 Test System Verification

Prior to assessment, the system is verified to the  $\pm 10\%$  of the specifications at using the SAR Dipole kit(s). (Graphic Plots Attached)

**Table 10.2.1 System Verification Results (1g)**

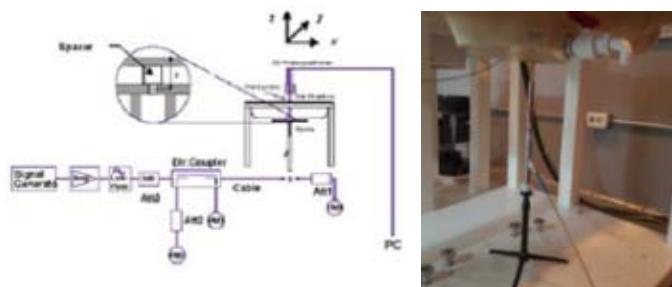
SYSTEM DIPOLE VERIFICATION TARGET & MEASURED												
SAR System #	Freq. [MHz]	SAR Dipole kits	Date(s)	Tissue Type	Ambient Temp. [°C]	Liquid Temp. [°C]	Probe S/N	Input Power (mW)	1 W Target SAR <sub>1g</sub> (W/kg)	Measured SAR <sub>1g</sub> (W/kg)	1 W Normalized SAR <sub>1g</sub> (W/kg)	Deviation [%]
D	750	D750V3, SN:1049	Jan. 10. 2019	Head	21.1	22.0	3933	250	8.32	2.11	8.44	1.44
D	750	D750V3, SN:1049	Jan. 10. 2019	Body	21.1	21.9	3933	250	8.70	2.24	8.96	2.99
D	750	D750V3, SN:1049	Jan. 07. 2019	Head	20.6	21.6	3933	250	8.32	1.96	7.84	-5.77
D	750	D750V3, SN:1049	Jan. 07. 2019	Body	20.6	21.5	3933	250	8.70	2.19	8.76	0.69
D	750	D750V3, SN:1049	Jan. 08. 2019	Head	20.3	21.5	3933	250	8.32	2.04	8.16	-1.92
D	750	D750V3, SN:1049	Jan. 08. 2019	Body	20.3	21.3	3933	250	8.70	2.25	9.00	3.45
D	750	D750V3, SN:1049	Jan. 09. 2019	Head	20.7	21.8	3933	250	8.32	1.98	7.92	-4.81
D	750	D750V3, SN:1049	Jan. 09. 2019	Body	20.7	21.7	3933	250	8.70	2.16	8.64	-0.69
D	835	D835V2, SN:4d159	Dec. 07. 2018	Head	21.1	22.0	7337	250	9.36	2.42	9.68	3.42
D	835	D835V2, SN:4d159	Dec. 07. 2018	Body	21.1	22.1	7337	250	9.56	2.38	9.52	-0.42
D	835	D835V2, SN:4d159	Dec. 11. 2018	Head	20.7	21.5	7337	250	9.36	2.36	9.44	0.85
D	835	D835V2, SN:4d159	Dec. 11. 2018	Body	20.7	21.2	3933	250	9.56	2.34	9.36	-2.09
D	1800	D1800V2, SN:2d202	Jan. 14. 2019	Head	21.3	22.0	7337	100	38.7	3.79	37.90	-2.07
D	1800	D1800V2, SN:2d202	Jan. 14. 2019	Body	21.3	22.1	3933	100	38.8	4.07	40.70	4.90
D	1800	D1800V2, SN:2d202	Jan. 28. 2019	Head	21.0	21.8	7337	100	38.7	3.80	38.00	-1.81
D	1800	D1800V2, SN:2d202	Jan. 28. 2019	Body	21.0	21.6	3933	100	38.8	3.81	38.10	-1.80
D	1900	D1900V2, SN:5d176	Dec. 06. 2018	Head	20.1	21.2	7337	100	40.7	3.99	39.90	-1.97
D	1900	D1900V2, SN:5d176	Dec. 06. 2018	Body	20.1	21.0	7337	100	39.7	4.10	41.00	3.27
D	1900	D1900V2, SN:5d176	Dec. 10. 2018	Head	20.3	21.1	7337	100	40.7	3.89	38.90	-4.42
D	1900	D1900V2, SN:5d176	Dec. 10. 2018	Body	20.3	20.9	3933	100	39.7	3.76	37.60	-5.29
D	2450	D2450V2, SN: 920	Jan. 15. 2019	Head	21.1	21.9	3933	100	51.9	5.43	54.30	4.62
D	2450	D2450V2, SN: 920	Jan. 15. 2019	Body	21.1	22.1	3933	100	52.1	5.04	50.40	-3.26
D	5300	D5GHzV2, SN:1212	Jan. 16. 2019	Head	21.5	22.2	3933	100	81.1	7.71	77.10	-4.93
D	5300	D5GHzV2, SN:1212	Jan. 16. 2019	Body	21.5	22.0	3933	100	75.2	7.26	72.60	-3.46
D	5500	D5GHzV2, SN:1212	Jan. 17. 2019	Head	21.0	22.0	3933	100	85.4	8.44	84.40	-1.17
D	5500	D5GHzV2, SN:1212	Jan. 17. 2019	Body	21.0	21.8	3933	100	79.9	7.96	79.60	-0.38
D	5800	D5GHzV2, SN:1212	Jan. 18. 2019	Head	21.3	22.1	3933	100	79.5	8.41	84.10	5.79
D	5800	D5GHzV2, SN:1212	Jan. 18. 2019	Body	21.3	22.0	3933	100	75.7	7.75	77.50	2.38

**Table 10.2.2 System Verification Results (10g)**

SYSTEM DIPOLE VERIFICATION TARGET & MEASURED												
SAR System #	Freq. [MHz]	SAR Dipole kits	Date(s)	Tissue Type	Ambient Temp. [°C]	Liquid Temp. [°C]	Probe S/N	Input Power (mW)	1 W Target SAR <sub>10g</sub> (W/kg)	Measured SAR <sub>10g</sub> (W/kg)	1 W Normalized SAR <sub>10g</sub> (W/kg)	Deviation [%]
D	5300	D5GHzV2, SN:1212	Jan. 16. 2019	Body	21.5	22.0	3933	100	20.9	2.02	20.20	-3.35
D	5500	D5GHzV2, SN:1212	Jan. 17. 2019	Body	21.0	21.8	3933	100	22.0	2.28	22.80	3.64
D	5800	D5GHzV2, SN:1212	Jan. 18. 2019	Body	21.3	22.0	3933	100	20.8	2.14	21.40	2.88

Note1 : System Verification was measured with input 250 mW, 100 mW and normalized to 1W.

Note2 : Full system validation status and results can be found in Attachment 3.


**Figure 10.1 Dipole Verification Test Setup Diagram & Photo**

## 11. SAR TEST RESULTS

### 11.1 Head SAR Results

Table 11.1.1 WCDMA 850 Head SAR

MEASUREMENT RESULTS													
FREQUENCY		Mode/ Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	Duty Cycle	1g SAR (W/kg)	Scaling Factor	1g Scaled SAR (W/kg)	Plots #
MHz	Ch												
836.6	4183	WCDMA 850	RMC	23.00	22.50	-0.180	Left Touch	FCC #1	1:1	0.306	1.122	0.343	
836.6	4183	WCDMA 850	RMC	23.00	22.50	0.180	Right Touch	FCC #1	1:1	0.402	1.122	0.451	A1
836.6	4183	WCDMA 850	RMC	23.00	22.50	-0.000	Left Tilt	FCC #1	1:1	0.184	1.122	0.206	
836.6	4183	WCDMA 850	RMC	23.00	22.50	0.130	Right Tilt	FCC #1	1:1	0.180	1.122	0.202	
836.6	4183	WCDMA 850	RMC	23.00	22.50	0.040	Right Touch	FCC #1	1:1	0.302	1.122	0.339	
836.6	4183	WCDMA 850	RMC	23.00	22.50	0.030	Right Touch	FCC #1	1:1	0.373	1.122	0.419	
ANSI / IEEE C95.1-1992– SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure								Head 1.6 W/kg (mW/g) averaged over 1 gram					

Note(s):

1. Blue entries represent the extended battery measurement on the worst case for standard battery measurement.
2. Green entries represent the SIM2 measurement on the worst case for SIM1 measurement.

Table 11.1.2 WCDMA 1700 Head SAR

MEASUREMENT RESULTS													
FREQUENCY		Mode/ Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	Duty Cycle	1g SAR (W/kg)	Scaling Factor	1g Scaled SAR (W/kg)	Plots #
MHz	Ch												
1732.4	1412	WCDMA 1700	RMC	21.00	20.91	0.100	Left Touch	FCC #1	1:1	0.133	1.021	0.136	
1732.4	1412	WCDMA 1700	RMC	21.00	20.91	0.160	Right Touch	FCC #1	1:1	0.141	1.021	0.144	A2
1732.4	1412	WCDMA 1700	RMC	21.00	20.91	0.130	Left Tilt	FCC #1	1:1	0.095	1.021	0.097	
1732.4	1412	WCDMA 1700	RMC	21.00	20.91	0.020	Right Tilt	FCC #1	1:1	0.094	1.021	0.096	
1732.4	1412	WCDMA 1700	RMC	21.00	20.91	0.070	Right Touch	FCC #1	1:1	0.101	1.021	0.103	
1732.4	1412	WCDMA 1700	RMC	21.00	20.91	0.060	Right Touch	FCC #1	1:1	0.132	1.021	0.135	
ANSI / IEEE C95.1-2005– SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure								Head 1.6 W/kg (mW/g) averaged over 1 gram					

Note(s):

1. Blue entries represent the extended battery measurement on the worst case for standard battery measurement.
2. Green entries represent the SIM2 measurement on the worst case for SIM1 measurement.

Table 11.1.3 WCDMA 1900 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/ Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	Duty Cycle	1g SAR (W/kg)	Scaling Factor	1g Scaled SAR (W/kg)	Plots #	
MHz	Ch													
1880.0	9400	WCDMA 1900	RMC	22.00	21.49	-0.020	Left Touch	FCC #1	1:1	0.290	1.125	0.326	A3	
1880.0	9400	WCDMA 1900	RMC	22.00	21.49	-0.070	Right Touch	FCC #1	1:1	0.177	1.125	0.199		
1880.0	9400	WCDMA 1900	RMC	22.00	21.49	0.070	Left Tilt	FCC #1	1:1	0.110	1.125	0.124		
1880.0	9400	WCDMA 1900	RMC	22.00	21.49	0.110	Right Tilt	FCC #1	1:1	0.142	1.125	0.160		
1880.0	9400	WCDMA 1900	RMC	22.00	21.49	0.000	Left Touch	FCC #1	1:1	0.202	1.125	0.227		
1880.0	9400	WCDMA 1900	RMC	22.00	21.49	0.090	Left Touch	FCC #1	1:1	0.281	1.125	0.316		
ANSI / IEEE C95.1-1992- SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure								Head 1.6 W/kg (mW/g) averaged over 1 gram						

Note(s):

- Blue entries represent the extended battery measurement on the worst case for standard battery measurement.
- Green entries represent the SIM2 measurement on the worst case for SIM1 measurement.

Table 11.1.4 LTE Band 71 Head SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode/ Band	BW [MHz]	Max Allowed Power [dBm]	Cond. PWR [dBm]	Drift Power [dB]	MPR	Position	Device Serial Number	Mod.	RB Size	RB Offs.	Duty Cycle	1g SAR (W/kg)	Scaling Factor	1g Scaled SAR (W/kg)	Plots #
MHz	Ch																
680.5	133297	LTE B71	20	23.50	23.48	0.060	0	Left Touch	FCC #1	QPSK	1	50	1:1	0.109	1.005	0.110	A4
680.5	133297	LTE B71	20	22.50	22.24	-0.160	1	Left Touch	FCC #1	QPSK	50	25	1:1	0.098	1.062	0.104	
680.5	133297	LTE B71	20	23.50	23.48	0.180	0	Right Touch	FCC #1	QPSK	1	50	1:1	0.096	1.005	0.096	
680.5	133297	LTE B71	20	22.50	22.24	-0.150	1	Right Touch	FCC #1	QPSK	50	25	1:1	0.076	1.062	0.081	
680.5	133297	LTE B71	20	23.50	23.48	0.090	0	Left Tilt	FCC #1	QPSK	1	50	1:1	0.059	1.005	0.059	
680.5	133297	LTE B71	20	22.50	22.24	-0.140	1	Left Tilt	FCC #1	QPSK	50	25	1:1	0.046	1.062	0.049	
680.5	133297	LTE B71	20	23.50	23.48	-0.050	0	Right Tilt	FCC #1	QPSK	1	50	1:1	0.043	1.005	0.043	
680.5	133297	LTE B71	20	22.50	22.24	-0.130	1	Right Tilt	FCC #1	QPSK	50	25	1:1	0.035	1.062	0.037	
680.5	133297	LTE B71	20	23.50	23.48	-0.180	0	Left Touch	FCC #1	QPSK	1	50	1:1	0.087	1.005	0.087	
680.5	133297	LTE B71	20	23.50	23.48	0.060	0	Left Touch	FCC #1	QPSK	1	50	1:1	0.098	1.005	0.098	
ANSI / IEEE C95.1-1992- SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure								Head 1.6 W/kg (mW/g) averaged over 1 gram									

Note(s):

- Blue entries represent the extended battery measurement on the worst case for standard battery measurement.
- Green entries represent the SIM2 measurement on the worst case for SIM1 measurement.

**Table 11.1.5 LTE Band 12 Head SAR**

MEASUREMENT RESULTS																	
FREQUENCY		Mode/ Band	BW [MHz]	Max Allowed Power [dBm]	Cond. PWR [dBm]	Drift Power [dB]	MPR	Position	Device Serial Number	Mod.	RB Size	RB Offs.	Duty Cycle	1g SAR (W/kg)	Scaling Factor	1g Scaled SAR (W/kg)	Plots #
MHz	Ch																
707.5	23095	LTE B12	10	23.50	23.47	0.150	0	Left Touch	FCC #1	QPSK	1	25	1:1	0.129	1.007	0.130	
707.5	23095	LTE B12	10	22.50	22.33	-0.030	1	Left Touch	FCC #1	QPSK	25	12	1:1	0.104	1.040	0.108	
707.5	23095	LTE B12	10	23.50	23.47	-0.030	0	Right Touch	FCC #1	QPSK	1	25	1:1	0.137	1.007	0.138	A5
707.5	23095	LTE B12	10	22.50	22.33	0.190	1	Right Touch	FCC #1	QPSK	25	12	1:1	0.127	1.040	0.132	
707.5	23095	LTE B12	10	23.50	23.47	0.140	0	Left Tilt	FCC #1	QPSK	1	25	1:1	0.084	1.007	0.085	
707.5	23095	LTE B12	10	22.50	22.33	0.100	1	Left Tilt	FCC #1	QPSK	25	12	1:1	0.071	1.040	0.074	
707.5	23095	LTE B12	10	23.50	23.47	0.090	0	Right Tilt	FCC #1	QPSK	1	25	1:1	0.097	1.007	0.098	
707.5	23095	LTE B12	10	22.50	22.33	0.170	1	Right Tilt	FCC #1	QPSK	25	12	1:1	0.075	1.040	0.078	
707.5	23095	LTE B12	10	23.50	23.47	0.120	0	Right Touch	FCC #1	QPSK	1	25	1:1	0.119	1.007	0.120	
707.5	23095	LTE B12	10	23.50	23.47	0.070	0	Right Touch	FCC #1	QPSK	1	25	1:1	0.124	1.007	0.125	
<b>ANSI / IEEE C95.1-1992– SAFETY LIMIT</b> <b>Spatial Peak</b> <b>Uncontrolled Exposure/General Population Exposure</b>									<b>Head</b> <b>1.6 W/kg (mW/g)</b> averaged over 1 gram								

Note(s):

1. Blue entries represent the extended battery measurement on the worst case for standard battery measurement.
2. Green entries represent the SIM2 measurement on the worst case for SIM1 measurement.

**Table 11.1.6 LTE Band 13 Head SAR**

MEASUREMENT RESULTS																	
FREQUENCY		Mode/ Band	BW [MHz]	Max Allowed Power [dBm]	Cond. PWR [dBm]	Drift Power [dB]	MPR	Position	Device Serial Number	Mod.	RB Size	RB Offs.	Duty Cycle	1g SAR (W/kg)	Scaling Factor	1g Scaled SAR (W/kg)	Plots #
MHz	Ch																
782.0	23230	LTE B13	10	23.50	23.39	0.120	0	Left Touch	FCC #1	QPSK	1	25	1:1	0.257	1.026	0.264	
782.0	23230	LTE B13	10	22.50	22.37	0.150	1	Left Touch	FCC #1	QPSK	25	12	1:1	0.222	1.030	0.229	
782.0	23230	LTE B13	10	23.50	23.39	0.120	0	Right Touch	FCC #1	QPSK	1	25	1:1	0.279	1.026	0.286	A6
782.0	23230	LTE B13	10	22.50	22.37	-0.050	1	Right Touch	FCC #1	QPSK	25	12	1:1	0.239	1.030	0.246	
782.0	23230	LTE B13	10	23.50	23.39	-0.010	0	Left Tilt	FCC #1	QPSK	1	25	1:1	0.187	1.026	0.192	
782.0	23230	LTE B13	10	22.50	22.37	0.010	1	Left Tilt	FCC #1	QPSK	25	12	1:1	0.155	1.030	0.160	
782.0	23230	LTE B13	10	23.50	23.39	0.040	0	Right Tilt	FCC #1	QPSK	1	25	1:1	0.164	1.026	0.168	
782.0	23230	LTE B13	10	22.50	22.37	0.070	1	Right Tilt	FCC #1	QPSK	25	12	1:1	0.138	1.030	0.142	
782.0	23230	LTE B13	10	23.50	23.39	0.120	0	Right Touch	FCC #1	QPSK	1	25	1:1	0.234	1.026	0.240	
782.0	23230	LTE B13	10	23.50	23.39	0.010	0	Right Touch	FCC #1	QPSK	1	25	1:1	0.275	1.026	0.282	
<b>ANSI / IEEE C95.1-1992– SAFETY LIMIT</b> <b>Spatial Peak</b> <b>Uncontrolled Exposure/General Population Exposure</b>									<b>Head</b> <b>1.6 W/kg (mW/g)</b> averaged over 1 gram								

Note(s):

1. Blue entries represent the extended battery measurement on the worst case for standard battery measurement.
2. Green entries represent the SIM2 measurement on the worst case for SIM1 measurement.

Table 11.1.7 LTE Band 14 Head SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode/ Band	BW [MHz]	Max Allowed Power [dBm]	Cond. PWR [dBm]	Drift Power [dB]	MPR	Position	Device Serial Number	Mod.	RB Size	RB Offs.	Duty Cycle	1g SAR (W/kg)	Scaling Factor	1g Scaled SAR (W/kg)	Plots #
MHz	Ch																
793.0	23330	LTE B14	10	23.50	23.47	0.170	0	Left Touch	FCC #1	QPSK	1	25	1:1	0.292	1.007	0.294	
793.0	23330	LTE B14	10	22.50	22.34	0.190	1	Left Touch	FCC #1	QPSK	25	12	1:1	0.217	1.038	0.225	
793.0	23330	LTE B14	10	23.50	23.47	0.170	0	Right Touch	FCC #1	QPSK	1	25	1:1	0.371	1.007	0.374	A7
793.0	23330	LTE B14	10	22.50	22.34	-0.060	1	Right Touch	FCC #1	QPSK	25	12	1:1	0.302	1.038	0.313	
793.0	23330	LTE B14	10	23.50	23.47	-0.070	0	Left Tilt	FCC #1	QPSK	1	25	1:1	0.206	1.007	0.207	
793.0	23330	LTE B14	10	22.50	22.34	-0.020	1	Left Tilt	FCC #1	QPSK	25	12	1:1	0.153	1.038	0.159	
793.0	23330	LTE B14	10	23.50	23.47	-0.130	0	Right Tilt	FCC #1	QPSK	1	25	1:1	0.185	1.007	0.186	
793.0	23330	LTE B14	10	22.50	22.34	-0.020	1	Right Tilt	FCC #1	QPSK	25	12	1:1	0.153	1.038	0.159	
793.0	23330	LTE B14	10	23.50	23.47	0.000	0	Right Touch	FCC #1	QPSK	1	25	1:1	0.313	1.007	0.315	
793.0	23330	LTE B14	10	23.50	23.47	-0.130	0	Right Touch	FCC #1	QPSK	1	25	1:1	0.330	1.007	0.332	
ANSI / IEEE C95.1-1992- SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure									Head 1.6 W/kg (mW/g) averaged over 1 gram								

Note(s):

1. Blue entries represent the extended battery measurement on the worst case for standard battery measurement.
2. Green entries represent the SIM2 measurement on the worst case for SIM1 measurement.

Table 11.1.8 LTE Band 5 (Cell) Head SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode/ Band	BW [MHz]	Max Allowed Power [dBm]	Cond. PWR [dBm]	Drift Power [dB]	MPR	Position	Device Serial Number	Mod.	RB Size	RB Offs.	Duty Cycle	1g SAR (W/kg)	Scaling Factor	1g Scaled SAR (W/kg)	Plots #
MHz	Ch																
836.5	20525	LTE B5	10	23.50	23.44	-0.120	0	Left Touch	FCC #1	QPSK	1	0	1:1	0.347	1.014	0.352	
836.5	20525	LTE B5	10	22.50	22.18	0.020	1	Left Touch	FCC #1	QPSK	25	0	1:1	0.278	1.076	0.299	
836.5	20525	LTE B5	10	23.50	23.44	0.020	0	Right Touch	FCC #1	QPSK	1	0	1:1	0.437	1.014	0.443	A8
836.5	20525	LTE B5	10	22.50	22.18	0.090	1	Right Touch	FCC #1	QPSK	25	0	1:1	0.332	1.076	0.357	
836.5	20525	LTE B5	10	23.50	23.44	-0.110	0	Left Tilt	FCC #1	QPSK	1	0	1:1	0.194	1.014	0.197	
836.5	20525	LTE B5	10	22.50	22.18	0.150	1	Left Tilt	FCC #1	QPSK	25	0	1:1	0.152	1.076	0.164	
836.5	20525	LTE B5	10	23.50	23.44	-0.060	0	Right Tilt	FCC #1	QPSK	1	0	1:1	0.203	1.014	0.206	
836.5	20525	LTE B5	10	22.50	22.18	-0.060	1	Right Tilt	FCC #1	QPSK	25	0	1:1	0.159	1.076	0.171	
836.5	20525	LTE B5	10	23.50	23.44	-0.060	0	Right Touch	FCC #1	QPSK	1	0	1:1	0.354	1.014	0.359	
836.5	20525	LTE B5	10	23.50	23.44	0.060	0	Right Touch	FCC #1	QPSK	1	0	1:1	0.407	1.014	0.413	
ANSI / IEEE C95.1-1992- SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure									Head 1.6 W/kg (mW/g) averaged over 1 gram								

Note(s):

1. Blue entries represent the extended battery measurement on the worst case for standard battery measurement.
2. Green entries represent the SIM2 measurement on the worst case for SIM1 measurement.

Table 11.1.9 LTE Band 66 (AWS) Head SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode/ Band	BW [MHz]	Max Allowed Power [dBm]	Cond. PWR [dBm]	Drift Power [dB]	MPR	Position	Device Serial Number	Mod.	RB Size	RB Offs.	Duty Cycle	1g SAR (W/kg)	Scaling Factor	1g Scaled SAR (W/kg)	Plots #
MHz	Ch																
1745.0	132322	LTE B66	20	22.50	22.44	-0.180	0	Left Touch	FCC #1	QPSK	1	0	1:1	0.155	1.014	0.157	A9
1745.0	132322	LTE B66	20	21.50	21.37	0.060	1	Left Touch	FCC #1	QPSK	50	0	1:1	0.125	1.030	0.129	
1745.0	132322	LTE B66	20	22.50	22.44	0.120	0	Right Touch	FCC #1	QPSK	1	0	1:1	0.153	1.014	0.155	
1745.0	132322	LTE B66	20	21.50	21.37	0.150	1	Right Touch	FCC #1	QPSK	50	0	1:1	0.129	1.030	0.133	
1745.0	132322	LTE B66	20	22.50	22.44	-0.070	0	Left Tilt	FCC #1	QPSK	1	0	1:1	0.127	1.014	0.129	
1745.0	132322	LTE B66	20	21.50	21.37	0.020	1	Left Tilt	FCC #1	QPSK	50	0	1:1	0.093	1.030	0.096	
1745.0	132322	LTE B66	20	22.50	22.44	0.080	0	Right Tilt	FCC #1	QPSK	1	0	1:1	0.112	1.014	0.114	
1745.0	132322	LTE B66	20	21.50	21.37	0.090	1	Right Tilt	FCC #1	QPSK	50	0	1:1	0.087	1.030	0.090	
1745.0	132322	LTE B66	20	22.50	22.44	0.190	0	Left Touch	FCC #1	QPSK	1	0	1:1	0.133	1.014	0.135	
1745.0	132322	LTE B66	20	22.50	22.44	0.060	0	Left Touch	FCC #1	QPSK	1	0	1:1	0.139	1.014	0.141	
ANSI / IEEE C95.1-1992– SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure									Head 1.6 W/kg (mW/g) averaged over 1 gram								

Note(s):

1. Blue entries represent the extended battery measurement on the worst case for standard battery measurement.
2. Green entries represent the SIM2 measurement on the worst case for SIM1 measurement.

Table 11.1.10 LTE Band 2 (PCS) Head SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode/ Band	BW [MHz]	Max Allowed Power [dBm]	Cond. PWR [dBm]	Drift Power [dB]	MPR	Position	Device Serial Number	Mod.	RB Size	RB Offs.	Duty Cycle	1g SAR (W/kg)	Scaling Factor	1g Scaled SAR (W/kg)	Plots #
MHz	Ch																
1880.0	18900	LTE B2	20	23.50	23.49	0.180	0	Left Touch	FCC #1	QPSK	1	50	1:1	0.283	1.002	0.284	A10
1880.0	18900	LTE B2	20	22.50	22.29	0.040	1	Left Touch	FCC #1	QPSK	50	25	1:1	0.218	1.050	0.229	
1880.0	18900	LTE B2	20	23.50	23.49	0.090	0	Right Touch	FCC #1	QPSK	1	50	1:1	0.177	1.002	0.177	
1880.0	18900	LTE B2	20	22.50	22.29	0.160	1	Right Touch	FCC #1	QPSK	50	25	1:1	0.143	1.050	0.150	
1880.0	18900	LTE B2	20	23.50	23.49	0.120	0	Left Tilt	FCC #1	QPSK	1	50	1:1	0.117	1.002	0.117	
1880.0	18900	LTE B2	20	22.50	22.29	0.080	1	Left Tilt	FCC #1	QPSK	50	25	1:1	0.086	1.050	0.090	
1880.0	18900	LTE B2	20	23.50	23.49	0.150	0	Right Tilt	FCC #1	QPSK	1	50	1:1	0.142	1.002	0.142	
1880.0	18900	LTE B2	20	22.50	22.29	0.160	1	Right Tilt	FCC #1	QPSK	50	25	1:1	0.120	1.050	0.126	
1880.0	18900	LTE B2	20	23.50	23.49	0.140	0	Left Touch	FCC #1	QPSK	1	50	1:1	0.224	1.002	0.224	
1880.0	18900	LTE B2	20	23.50	23.49	0.190	0	Left Touch	FCC #1	QPSK	1	50	1:1	0.252	1.002	0.253	
ANSI / IEEE C95.1-1992– SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure									Head 1.6 W/kg (mW/g) averaged over 1 gram								

Note(s):

1. Blue entries represent the extended battery measurement on the worst case for standard battery measurement.
2. Green entries represent the SIM2 measurement on the worst case for SIM1 measurement.

Table 11.1.11 DTS Head SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode (Antenna)	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	Peak SAR of Area Scan	Data Rate [Mbps]	Duty Cycle	1g SAR (W/kg)	Scaling Factor	Scaling Factor (Duty Cycle)	1g Scaled SAR (W/kg)	Plot s #		
MHz	Ch																
2462.0	11	802.11b	17.00	16.97	-0.190	Left Touch	FCC #1	0.076	1	97.6	0.072	1.007	1.025	0.074			
2462.0	11	802.11b	17.00	16.97	0.160	Right Touch	FCC #1	0.139	1	97.6	0.134	1.007	1.025	0.138		A11	
2462.0	11	802.11b	17.00	16.97	-0.150	Left Tilt	FCC #1	0.023	1	97.6	0.013	1.007	1.025	0.013			
2462.0	11	802.11b	17.00	16.97	0.080	Right Tilt	FCC #1	0.020	1	97.6	0.014	1.007	1.025	0.014			
2462.0	11	802.11b	17.00	16.97	0.130	Right Touch	FCC #1	0.119	1	97.6	0.120	1.007	1.025	0.124			
ANSI / IEEE C95.1-1992– SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure									Head 1.6 W/kg (mW/g) averaged over 1 gram								

Note(s):

1. Blue entries represent the extended battery measurement on the worst case for standard battery measurement.

Adjusted SAR results for OFDM SAR																	
FREQUENCY		Mode/ Antenna	Service	Maximum Allowed Power [dBm]	1g Scaled SAR (W/kg)	FREQUENCY [MHz]	Mode	Service	Maximum Allowed Power [dBm]	Ratio of OFDM to DSSS	1g Adjusted SAR (W/kg)	Determine OFDM SAR					
MHz	Ch																
2462.0	11	802.11b	DSSS	17.0	0.138	2437	802.11g	OFDM	14.0	0.501	0.069		X				
2462.0	11	802.11b	DSSS	17.0	0.138	2437	802.11n (HT-20)	OFDM	12.0	0.316	0.044		X				
2462.0	11	802.11b	DSSS	17.0	0.138	2437	802.11n (HT-40)	OFDM	12.0	0.316	0.044		X				
ANSI / IEEE C95.1-1992– SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure									Head 1.6 W/kg (mW/g) averaged over 1 gram								

Note: SAR is not required for the following 2.4 GHz OFDM conditions. When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

**Table 11.1.12 UNII Head SAR**
**MEASUREMENT RESULTS**

FREQUENCY		Mode (Antenna)	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	Peak SAR of Area Scan	Data Rate [Mbps]	Duty Cycle	1g SAR (W/kg)	Scaling Factor	Scaling Factor (Duty Cycle)	1g Scaled SAR (W/kg)	Plots #
MHz	Ch														
5260.0	52	802.11a	12.20	11.83	0.000	Left Touch	FCC #1	0.035	6	86.6	0.021	1.089	1.155	0.026	
5260.0	52	802.11a	12.20	11.83	0.000	Right Touch	FCC #1	0.060	6	86.6	0.043	1.089	1.155	0.054	A12
5260.0	52	802.11a	12.20	11.83	0.000	Left Tilt	FCC #1	0.009	6	86.6	0.008	1.089	1.155	0.011	
5260.0	52	802.11a	12.20	11.83	0.000	Right Tilt	FCC #1	0.007	6	86.6	0.005	1.089	1.155	0.007	
5260.0	52	802.11a	12.20	11.83	0.000	Right Touch	FCC #1	0.029	6	86.6	0.030	1.089	1.155	0.038	
ANSI / IEEE C95.1-1992- SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure								Head 1.6 W/kg (mW/g) averaged over 1 gram							

Note(s):

1. Blue entries represent the extended battery measurement on the worst case for standard battery measurement.

**Adjusted SAR results for UNII-1 and UNII-2A SAR**

FREQUENCY		Mode/ Antenna	Service	Maximum Allowed Power [dBm]	1g Scaled SAR (W/kg)	FREQUENCY [MHz]	Mode	Service	Maximum Allowed Power [dBm]	Adjusted Factor	1g Adjusted SAR (W/kg)	SAR for the band with lower maximum output power
MHz	Ch											
5260.0	52	802.11a	OFDM	12.2	0.054	5180	802.11a	OFDM	12.2	1.000	0.054	X
ANSI / IEEE C95.1-1992- SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure						Head 1.6 W/kg (mW/g) averaged over 1 gram						

Note(s):

1. U-NII-1 and U-NII-2A Bands: When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest reported SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is
- $\leq 1.2$
- W/kg, SAR is not required for the band with lower maximum output power in that test configuration.

**Table 11.1.13 UNII Head SAR**

MEASUREMENT RESULTS															
FREQUENCY		Mode (Antenna)	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	Peak SAR of Area Scan	Data Rate [Mbps]	Duty Cycle	1g SAR (W/kg)	Scaling Factor	Scaling Factor (Duty Cycle)	1g Scaled SAR (W/kg)	Plots #
MHz	Ch														
5500.0	100	802.11a	12.20	11.96	0.000	Left Touch	FCC #1	0.040	6	86.6	0.024	1.057	1.155	0.029	
5500.0	100	802.11a	12.20	11.96	0.000	Right Touch	FCC #1	0.066	6	86.6	0.046	1.057	1.155	0.056	A13
5500.0	100	802.11a	12.20	11.96	0.000	Left Tilt	FCC #1	0.009	6	86.6	0.009	1.057	1.155	0.011	
5500.0	100	802.11a	12.20	11.96	0.000	Right Tilt	FCC #1	0.003	6	86.6	0.005	1.057	1.155	0.006	
5500.0	100	802.11a	12.20	11.96	0.000	Right Touch	FCC #1	0.030	6	86.6	0.033	1.057	1.155	0.040	
5745.0	149	802.11a	12.20	11.98	0.000	Left Touch	FCC #1	0.033	6	86.6	0.025	1.052	1.155	0.030	
5745.0	149	802.11a	12.20	11.98	0.000	Right Touch	FCC #1	0.069	6	86.6	0.048	1.052	1.155	0.058	A14
5745.0	149	802.11a	12.20	11.98	0.000	Left Tilt	FCC #1	0.005	6	86.6	0.005	1.052	1.155	0.007	
5745.0	149	802.11a	12.20	11.98	0.000	Right Tilt	FCC #1	0.004	6	86.6	0.006	1.052	1.155	0.007	
5745.0	149	802.11a	12.20	11.98	0.000	Right Touch	FCC #1	0.035	6	86.6	0.034	1.052	1.155	0.041	
ANSI / IEEE C95.1-1992- SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure								Head 1.6 W/kg (mW/g) averaged over 1 gram							

Note(s):

1. Blue entries represent the extended battery measurement on the worst case for standard battery measurement.

## 11.2 Standalone Body-Worn SAR Worn SAR Results

Table 11.2.1 WCDMA Body-Worn SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/ Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Spacing [Side]	Device Serial Number	# of Time Slot s	Duty Cycle	1g SAR (W/kg)	Scaling Factor	1g Scaled SAR (W/kg)	Plots #
MHz	Ch													
836.6	4183	WCDMA 850	RMC	23.00	22.50	-0.000	10 mm [Front]	FCC #1	N/A	1:1	0.315	1.122	0.353	
836.6	4183	WCDMA 850	RMC	23.00	22.50	-0.020	10 mm [Rear]	FCC #1	N/A	1:1	0.421	1.122	0.472	A15
836.6	4183	WCDMA 850	RMC	23.00	22.50	0.020	10 mm [Rear]	FCC #1	N/A	1:1	0.343	1.122	0.385	
1732.4	1412	WCDMA 1700	RMC	21.00	20.91	-0.060	10 mm [Front]	FCC #1	N/A	1:1	0.187	1.021	0.191	
1712.4	1312	WCDMA 1700	RMC	21.00	20.87	-0.040	10 mm [Rear]	FCC #1	N/A	1:1	0.724	1.030	0.746	
1732.4	1412	WCDMA 1700	RMC	21.00	20.91	-0.010	10 mm [Rear]	FCC #1	N/A	1:1	0.842	1.021	0.860	A16
1752.6	1513	WCDMA 1700	RMC	21.00	20.95	0.070	10 mm [Rear]	FCC #1	N/A	1:1	0.786	1.012	0.795	
1732.4	1412	WCDMA 1700	RMC	21.00	20.91	-0.010	10 mm [Rear]	FCC #1	N/A	1:1	0.437	1.021	0.446	
1880.0	9400	WCDMA 1900	RMC	22.00	21.49	0.160	10 mm [Front]	FCC #1	N/A	1:1	0.323	1.125	0.363	
1880.0	9400	WCDMA 1900	RMC	22.00	21.49	0.000	10 mm [Rear]	FCC #1	N/A	1:1	0.616	1.125	0.693	A17
1880.0	9400	WCDMA 1900	RMC	22.00	21.49	-0.020	10 mm [Rear]	FCC #1	N/A	1:1	0.305	1.125	0.343	
ANSI / IEEE C95.1-1992– SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure								Body 1.6 W/kg (mW/g) averaged over 1 gram						

Note(s):

1. Blue entries represent the extended battery measurement on the worst case for standard battery measurement.

**Table 11.2.2 LTE B71, B12, B13, B14, B5, B66 Body-Worn SAR**
**MEASUREMENT RESULTS**

FREQUENCY		Mode/ Band	BW [MHz]	Max Allowed Power [dBm]	Cond. PWR [dBm]	Drift Power [dB]	MPR	Position	Device Serial Number	Mod.	RB Size	RB Offs.	Duty Cycle	1g SAR (W/kg)	Scaling Factor	1g Scaled SAR (W/kg)	Plots #
MHz	Ch																
680.5	133297	LTE B71	20	23.50	23.48	0.110	0	10 mm [Front]	FCC #1	QPSK	1	50	1:1	0.112	1.005	0.113	
680.5	133297	LTE B71	20	22.50	22.24	0.070	1	10 mm [Front]	FCC #1	QPSK	50	25	1:1	0.095	1.062	0.101	
680.5	133297	LTE B71	20	23.50	23.48	-0.080	0	10 mm [Rear]	FCC #1	QPSK	1	50	1:1	0.215	1.005	0.216	A18
680.5	133297	LTE B71	20	22.50	22.24	0.050	1	10 mm [Rear]	FCC #1	QPSK	50	25	1:1	0.166	1.062	0.176	
680.5	133297	LTE B71	20	23.50	23.48	-0.010	0	10 mm [Rear]	FCC #1	QPSK	1	50	1:1	0.133	1.005	0.134	
707.5	23095	LTE B12	10	23.50	23.47	-0.080	0	10 mm [Front]	FCC #1	QPSK	1	25	1:1	0.162	1.007	0.163	
707.5	23095	LTE B12	10	22.50	22.33	0.110	1	10 mm [Front]	FCC #1	QPSK	25	12	1:1	0.134	1.040	0.139	
707.5	23095	LTE B12	10	23.50	23.47	-0.110	0	10 mm [Rear]	FCC #1	QPSK	1	25	1:1	0.279	1.007	0.281	A19
707.5	23095	LTE B12	10	22.50	22.33	0.020	1	10 mm [Rear]	FCC #1	QPSK	25	12	1:1	0.241	1.040	0.251	
707.5	23095	LTE B12	10	23.50	23.47	0.030	0	10 mm [Rear]	FCC #1	QPSK	1	25	1:1	0.217	1.007	0.219	
782.0	23230	LTE B13	10	23.50	23.39	0.030	0	10 mm [Front]	FCC #1	QPSK	1	25	1:1	0.361	1.026	0.370	
782.0	23230	LTE B13	10	22.50	22.37	-0.110	1	10 mm [Front]	FCC #1	QPSK	25	12	1:1	0.284	1.030	0.293	
782.0	23230	LTE B13	10	23.50	23.39	-0.050	0	10 mm [Rear]	FCC #1	QPSK	1	25	1:1	0.546	1.026	0.560	A20
782.0	23230	LTE B13	10	22.50	22.37	0.010	1	10 mm [Rear]	FCC #1	QPSK	25	12	1:1	0.437	1.030	0.450	
782.0	23230	LTE B13	10	23.50	23.39	-0.070	0	10 mm [Rear]	FCC #1	QPSK	1	25	1:1	0.456	1.026	0.468	
793.0	23330	LTE B14	10	23.50	23.47	-0.150	0	10 mm [Front]	FCC #1	QPSK	1	25	1:1	0.395	1.007	0.398	
793.0	23330	LTE B14	10	22.50	22.34	0.020	1	10 mm [Front]	FCC #1	QPSK	25	12	1:1	0.313	1.038	0.325	
793.0	23330	LTE B14	10	23.50	23.47	-0.100	0	10 mm [Rear]	FCC #1	QPSK	1	25	1:1	0.585	1.007	0.589	A21
793.0	23330	LTE B14	10	22.50	22.34	0.000	1	10 mm [Rear]	FCC #1	QPSK	25	12	1:1	0.461	1.038	0.479	
793.0	23330	LTE B14	10	23.50	23.47	-0.020	0	10 mm [Rear]	FCC #1	QPSK	1	25	1:1	0.452	1.007	0.455	
836.5	20525	LTE B5	10	23.50	23.44	-0.100	0	10 mm [Front]	FCC #1	QPSK	1	0	1:1	0.387	1.014	0.392	
836.5	20525	LTE B5	10	22.50	22.18	-0.030	1	10 mm [Front]	FCC #1	QPSK	25	0	1:1	0.296	1.076	0.318	
836.5	20525	LTE B5	10	23.50	23.44	-0.100	0	10 mm [Rear]	FCC #1	QPSK	1	0	1:1	0.476	1.014	0.483	A22
836.5	20525	LTE B5	10	22.50	22.18	0.000	1	10 mm [Rear]	FCC #1	QPSK	25	0	1:1	0.383	1.076	0.412	
836.5	20525	LTE B5	10	23.50	23.44	0.050	0	10 mm [Rear]	FCC #1	QPSK	1	0	1:1	0.369	1.014	0.374	
<b>ANSI / IEEE C95.1-1992– SAFETY LIMIT</b> <b>Spatial Peak</b> <b>Uncontrolled Exposure/General Population Exposure</b>									<b>Body</b> <b>1.6 W/kg (mW/g)</b> averaged over 1 gram								

Note(s):

1. Blue entries represent the extended battery measurement on the worst case for standard battery measurement.

Table 11.2.3 LTE B66/B2 Body-Worn SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode/ Band	BW [MHz]	Max Allowed Power [dBm]	Cond. PWR [dBm]	Drift Power [dB]	MPR	Position	Device Serial Number	Mod.	RB Size	RB Offs.	Duty Cycle	1g SAR (W/kg)	Scaling Factor	1g Scaled SAR (W/kg)	Plots #
MHz	Ch																
1745.0	132322	LTE B66	20	22.50	22.44	-0.110	0	10 mm [Front]	FCC #1	QPSK	1	0	1:1	0.432	1.014	0.438	
1745.0	132322	LTE B66	20	21.50	21.37	0.100	1	10 mm [Front]	FCC #1	QPSK	50	0	1:1	0.334	1.030	0.344	
1720.0	132072	LTE B66	20	22.50	22.14	-0.140	0	10 mm [Rear]	FCC #1	QPSK	1	0	1:1	0.966	1.086	1.049	A23
1745.0	132322	LTE B66	20	22.50	22.44	-0.170	0	10 mm [Rear]	FCC #1	QPSK	1	0	1:1	1.030	1.014	1.044	
1745.0	132322	LTE B66	20	21.50	21.37	-0.010	1	10 mm [Rear]	FCC #1	QPSK	50	0	1:1	0.770	1.030	0.793	
1745.0	132322	LTE B66	20	21.50	21.21	-0.010	1	10 mm [Rear]	FCC #1	QPSK	100	0	1:1	0.746	1.069	0.797	
1770.0	132572	LTE B66	20	22.50	22.40	0.070	0	10 mm [Rear]	FCC #1	QPSK	1	50	1:1	1.020	1.023	1.043	
1720.0	132072	LTE B66	20	22.50	22.14	0.070	0	10 mm [Rear]	FCC #1	QPSK	1	0	1:1	0.512	1.086	0.556	
1880.0	18900	LTE B2	20	23.50	23.49	0.080	0	10 mm [Front]	FCC #1	QPSK	1	50	1:1	0.366	1.002	0.367	
1880.0	18900	LTE B2	20	22.50	22.29	-0.010	1	10 mm [Front]	FCC #1	QPSK	50	25	1:1	0.296	1.050	0.311	
1880.0	18900	LTE B2	20	23.50	23.49	-0.000	0	10 mm [Rear]	FCC #1	QPSK	1	50	1:1	0.425	1.002	0.426	A24
1880.0	18900	LTE B2	20	22.50	22.29	-0.030	1	10 mm [Rear]	FCC #1	QPSK	50	25	1:1	0.385	1.050	0.404	
1880.0	18900	LTE B2	20	23.50	23.49	-0.020	0	10 mm [Rear]	FCC #1	QPSK	1	50	1:1	0.285	1.002	0.286	
ANSI / IEEE C95.1-1992– SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure									Body 1.6 W/kg (mW/g) averaged over 1 gram								

Note(s):

- Blue entries represent the extended battery measurement on the worst case for standard battery measurement.

Table 11.2.4 DTS Body-Worn SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	Peak SAR of Area Scan	Data Rate [Mbps]	Duty Cycle	1g SAR (W/kg)	Scaling Factor	Scaling Factor (Duty Cycle)	SAR (W/kg)	Plots #		
MHz	Ch																
2462.0	11	802.11b	17.00	16.97	0.010	10 mm [Front]	FCC #1	0.046	1	97.6	0.045	1.007	1.025	0.046			
2462.0	11	802.11b	17.00	16.97	-0.090	10 mm [Rear]	FCC #1	0.091	1	97.6	0.087	1.007	1.025	0.090	A25		
2462.0	11	802.11b	17.00	16.97	0.190	10 mm [Rear]	FCC #1	0.044	1	97.6	0.044	1.007	1.025	0.045			
ANSI / IEEE C95.1-1992– SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure									Body 1.6 W/kg (mW/g) averaged over 1 gram								

Note(s):

- Blue entries represent the extended battery measurement on the worst case for standard battery measurement.

Adjusted SAR results for OFDM SAR

Adjusted SAR results for OFDM SAR													
FREQUENCY		Mode/ Antenna	Service	Maximum Allowed Power [dBm]	1g Scaled SAR (W/kg)	FREQUENCY [MHz]	Mode	Service	Maximum Allowed Power [dBm]	Ratio of OFDM to DSSS	1g Adjusted SAR (W/kg)	Determine OFDM SAR	
MHz	Ch												
2462.0	11	802.11b	DSSS	17.0	0.090	2437	802.11g	OFDM	14.0	0.501	0.045	X	
2462.0	11	802.11b	DSSS	17.0	0.090	2437	802.11n (HT-20)	OFDM	12.0	0.316	0.028	X	
2462.0	11	802.11b	DSSS	17.0	0.090	2437	802.11n (HT-40)	OFDM	12.0	0.316	0.028	X	
ANSI / IEEE C95.1-1992– SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure						Body 1.6 W/kg (mW/g) averaged over 1 gram							

Note: SAR is not required for the following 2.4 GHz OFDM conditions. When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

**Table 11.2.5 UNII Body-Worn SAR**

MEASUREMENT RESULTS															
FREQUENCY		Mode	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	Peak SAR of Area Scan	Data Rate [Mbps]	Duty Cycle	1g SAR (W/kg)	Scaling Factor	Scaling Factor (Duty Cycle)	1g Scaled SAR (W/kg)	Plots #
MHz	Ch														
5260.0	52	802.11a	12.20	11.83	0.000	10 mm [Front]	FCC #1	0.003	6	86.6	0.005	1.089	1.155	0.006	
5260.0	52	802.11a	12.20	11.83	-0.130	10 mm [Rear]	FCC #1	0.231	6	86.6	0.208	1.089	1.155	0.262	A26
5260.0	52	802.11a	12.20	11.83	0.010	10 mm [Rear]	FCC #1	0.074	6	86.6	0.064	1.089	1.155	0.080	
ANSI / IEEE C95.1-2005– SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure								Body 1.6 W/kg (mW/g) averaged over 1 gram							

Note(s):

1. Blue entries represent the extended battery measurement on the worst case for standard battery measurement.

Adjusted SAR results for UNII-1 and UNII-2A SAR

FREQUENCY		Mode/ Antenna	Service	Maximum Allowed Power [dBm]	1g Scaled SAR (W/kg)	FREQUENCY [MHz]	Mode	Service	Maximum Allowed Power [dBm]	Adjusted Factor	1g Adjusted SAR (W/kg)	SAR for the band with lower maximum output power
MHz	Ch											
5260.0	52	802.11a	OFDM	12.2	0.262	5180	802.11a	OFDM	12.2	1.000	0.262	X
ANSI / IEEE C95.1-1992– SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure								Body 1.6 W/kg (mW/g) averaged over 1 gram				

Note(s):

1. U-NII-1 and U-NII-2A Bands: When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest reported SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is
- $\leq 1.2$
- W/kg, SAR is not required for the band with lower maximum output power in that test configuration.

**Table 11.2.6 UNII Body-Worn SAR**

MEASUREMENT RESULTS															
FREQUENCY		Mode	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	Peak SAR of Area Scan	Data Rate [Mbps]	Duty Cycle	1g SAR (W/kg)	Scaling Factor	Scaling Factor (Duty Cycle)	1g Scaled SAR (W/kg)	Plots #
MHz	Ch														
5500.0	100	802.11a	12.20	11.96	0.190	10 mm [Front]	FCC #1	0.018	6	86.6	0.011	1.057	1.155	0.013	
5500.0	100	802.11a	12.20	11.96	-0.010	10 mm [Rear]	FCC #1	0.131	6	86.6	0.113	1.057	1.155	0.138	A27
5500.0	100	802.11a	12.20	11.96	0.150	10 mm [Rear]	FCC #1	0.048	6	86.6	0.037	1.057	1.155	0.045	
5745.0	149	802.11a	12.20	11.98	-0.040	10 mm [Front]	FCC #1	0.016	6	86.6	0.010	1.052	1.155	0.012	
5745.0	149	802.11a	12.20	11.98	-0.070	10 mm [Rear]	FCC #1	0.183	6	86.6	0.161	1.052	1.155	0.196	A28
5745.0	149	802.11a	12.20	11.98	0.050	10 mm [Rear]	FCC #1	0.059	6	86.6	0.036	1.052	1.155	0.044	
ANSI / IEEE C95.1-1992– SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure								Body 1.6 W/kg (mW/g) averaged over 1 gram							

Note(s):

1. Blue entries represent the extended battery measurement on the worst case for standard battery measurement.

### 11.3 Standalone Hotspot SAR Results

Table 11.3.1 WCDMA Hotspot SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/ Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Spacing [Side]	Device Serial Number	# of Time Slot s	Duty Cycle	1g SAR (W/kg)	Scaling Factor	1g Scaled SAR (W/kg)	Plots #
MHz	Ch													
836.6	4183	WCDMA 850	RMC	23.00	22.50	-0.080	10 mm [Bottom]	FCC #1	N/A	1:1	0.196	1.122	0.220	
836.6	4183	WCDMA 850	RMC	23.00	22.50	-0.000	10 mm [Front]	FCC #1	N/A	1:1	0.315	1.122	0.353	
836.6	4183	WCDMA 850	RMC	23.00	22.50	-0.020	10 mm [Rear]	FCC #1	N/A	1:1	0.421	1.122	0.472	A15
836.6	4183	WCDMA 850	RMC	23.00	22.50	0.050	10 mm [Right]	FCC #1	N/A	1:1	0.374	1.122	0.420	
836.6	4183	WCDMA 850	RMC	23.00	22.50	0.110	10 mm [Left]	FCC #1	N/A	1:1	0.219	1.122	0.246	
836.6	4183	WCDMA 850	RMC	23.00	22.50	0.020	10 mm [Rear]	FCC #1	N/A	1:1	0.343	1.122	0.385	
836.6	4183	WCDMA 850	RMC	23.00	22.50	-0.080	10 mm [Rear]	FCC #1	N/A	1:1	0.418	1.122	0.469	
1712.4	1312	WCDMA 1700	RMC	21.00	20.87	-0.020	10 mm [Bottom]	FCC #1	N/A	1:1	0.906	1.030	0.933	
1732.4	1412	WCDMA 1700	RMC	21.00	20.91	-0.140	10 mm [Bottom]	FCC #1	N/A	1:1	1.000	1.021	1.021	A29
1752.6	1513	WCDMA 1700	RMC	21.00	20.95	-0.020	10 mm [Bottom]	FCC #1	N/A	1:1	0.936	1.012	0.947	
1732.4	1412	WCDMA 1700	RMC	21.00	20.91	-0.060	10 mm [Front]	FCC #1	N/A	1:1	0.187	1.021	0.191	
1712.4	1312	WCDMA 1700	RMC	21.00	20.87	-0.040	10 mm [Rear]	FCC #1	N/A	1:1	0.724	1.030	0.746	
1732.4	1412	WCDMA 1700	RMC	21.00	20.91	-0.010	10 mm [Rear]	FCC #1	N/A	1:1	0.842	1.021	0.860	
1752.6	1513	WCDMA 1700	RMC	21.00	20.95	0.070	10 mm [Rear]	FCC #1	N/A	1:1	0.786	1.012	0.795	
1732.4	1412	WCDMA 1700	RMC	21.00	20.91	0.100	10 mm [Right]	FCC #1	N/A	1:1	0.062	1.021	0.063	
1732.4	1412	WCDMA 1700	RMC	21.00	20.91	0.070	10 mm [Left]	FCC #1	N/A	1:1	0.172	1.021	0.176	
1732.4	1412	WCDMA 1700	RMC	21.00	20.91	-0.040	10 mm [Bottom]	FCC #1	N/A	1:1	0.944	1.021	0.964	
1732.4	1412	WCDMA 1700	RMC	21.00	20.91	-0.040	10 mm [Bottom]	FCC #1	N/A	1:1	0.917	1.021	0.936	
1732.4	1412	WCDMA 1700	RMC	21.00	20.91	-0.080	10 mm [Bottom]	FCC #1	N/A	1:1	0.890	1.021	0.909	
1880.0	9400	WCDMA 1900	RMC	22.00	21.49	-0.020	10 mm [Bottom]	FCC #1	N/A	1:1	0.056	1.125	0.063	
1880.0	9400	WCDMA 1900	RMC	22.00	21.49	0.160	10 mm [Front]	FCC #1	N/A	1:1	0.323	1.125	0.363	
1880.0	9400	WCDMA 1900	RMC	22.00	21.49	0.000	10 mm [Rear]	FCC #1	N/A	1:1	0.616	1.125	0.693	A17
1880.0	9400	WCDMA 1900	RMC	22.00	21.49	-0.040	10 mm [Right]	FCC #1	N/A	1:1	0.147	1.125	0.165	
1880.0	9400	WCDMA 1900	RMC	22.00	21.49	0.020	10 mm [Left]	FCC #1	N/A	1:1	0.154	1.125	0.173	
1880.0	9400	WCDMA 1900	RMC	22.00	21.49	-0.020	10 mm [Rear]	FCC #1	N/A	1:1	0.305	1.125	0.343	
1880.0	9400	WCDMA 1900	RMC	22.00	21.49	-0.060	10 mm [Rear]	FCC #1	N/A	1:1	0.576	1.125	0.648	
ANSI / IEEE C95.1-1992– SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure										Body 1.6 W/kg (mW/g) averaged over 1 gram				

Note(s):

1. Blue entries represent the extended battery measurement on the worst case for standard battery measurement.
2. Yellow entries represent variability measurements.
3. Green entries represent the SIM2 measurement on the worst case for SIM1 measurement.

Table 11.3.2 LTE B71, B12 Hotspot SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode/ Band	BW [MHz]	Max Allowed Power [dBm]	Cond. PWR [dBm]	Drift Power [dB]	MPR	Position	Device Serial Number	Mod.	RB Size	RB Offs.	Duty Cycle	1g SAR (W/kg)	Scaling Factor	1g Scaled SAR (W/kg)	Plots #
MHz	Ch																
680.5	133297	LTE B71	20	23.50	23.48	0.110	0	10 mm [Bottom]	FCC #1	QPSK	1	50	1:1	0.043	1.005	0.043	
680.5	133297	LTE B71	20	22.50	22.24	0.050	1	10 mm [Bottom]	FCC #1	QPSK	50	25	1:1	0.037	1.062	0.039	
680.5	133297	LTE B71	20	23.50	23.48	0.110	0	10 mm [Front]	FCC #1	QPSK	1	50	1:1	0.112	1.005	0.113	
680.5	133297	LTE B71	20	22.50	22.24	0.070	1	10 mm [Front]	FCC #1	QPSK	50	25	1:1	0.095	1.062	0.101	
680.5	133297	LTE B71	20	23.50	23.48	-0.080	0	10 mm [Rear]	FCC #1	QPSK	1	50	1:1	0.215	1.005	0.216	A18
680.5	133297	LTE B71	20	22.50	22.24	0.050	1	10 mm [Rear]	FCC #1	QPSK	50	25	1:1	0.166	1.062	0.176	
680.5	133297	LTE B71	20	23.50	23.48	-0.100	0	10 mm [Right]	FCC #1	QPSK	1	50	1:1	0.125	1.005	0.126	
680.5	133297	LTE B71	20	22.50	22.24	-0.030	1	10 mm [Right]	FCC #1	QPSK	50	25	1:1	0.112	1.062	0.119	
680.5	133297	LTE B71	20	23.50	23.48	0.050	0	10 mm [Left]	FCC #1	QPSK	1	50	1:1	0.156	1.005	0.157	
680.5	133297	LTE B71	20	22.50	22.24	0.040	1	10 mm [Left]	FCC #1	QPSK	50	25	1:1	0.138	1.062	0.147	
680.5	133297	LTE B71	20	23.50	23.48	-0.010	0	10 mm [Rear]	FCC #1	QPSK	1	50	1:1	0.133	1.005	0.134	
680.5	133297	LTE B71	20	23.50	23.48	-0.020	0	10 mm [Rear]	FCC #1	QPSK	1	50	1:1	0.181	1.005	0.182	
707.5	23095	LTE B12	10	23.50	23.47	-0.160	0	10 mm [Bottom]	FCC #1	QPSK	1	25	1:1	0.044	1.007	0.044	
707.5	23095	LTE B12	10	22.50	22.33	0.080	1	10 mm [Bottom]	FCC #1	QPSK	25	12	1:1	0.038	1.040	0.040	
707.5	23095	LTE B12	10	23.50	23.47	-0.080	0	10 mm [Front]	FCC #1	QPSK	1	25	1:1	0.162	1.007	0.163	
707.5	23095	LTE B12	10	22.50	22.33	0.110	1	10 mm [Front]	FCC #1	QPSK	25	12	1:1	0.134	1.040	0.139	
707.5	23095	LTE B12	10	23.50	23.47	-0.110	0	10 mm [Rear]	FCC #1	QPSK	1	25	1:1	0.279	1.007	0.281	A19
707.5	23095	LTE B12	10	22.50	22.33	0.020	1	10 mm [Rear]	FCC #1	QPSK	25	12	1:1	0.241	1.040	0.251	
707.5	23095	LTE B12	10	23.50	23.47	-0.010	0	10 mm [Right]	FCC #1	QPSK	1	25	1:1	0.201	1.007	0.202	
707.5	23095	LTE B12	10	22.50	22.33	-0.010	1	10 mm [Right]	FCC #1	QPSK	25	12	1:1	0.168	1.040	0.175	
707.5	23095	LTE B12	10	23.50	23.47	-0.140	0	10 mm [Left]	FCC #1	QPSK	1	25	1:1	0.175	1.007	0.176	
707.5	23095	LTE B12	10	22.50	22.33	-0.170	1	10 mm [Left]	FCC #1	QPSK	25	12	1:1	0.158	1.040	0.164	
707.5	23095	LTE B12	10	23.50	23.47	0.030	0	10 mm [Rear]	FCC #1	QPSK	1	25	1:1	0.217	1.007	0.219	
707.5	23095	LTE B12	10	23.50	23.47	0.060	0	10 mm [Rear]	FCC #1	QPSK	1	25	1:1	0.240	1.007	0.242	
ANSI / IEEE C95.1-1992– SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure										Body 1.6 W/kg (mW/g) averaged over 1 gram							

Note(s):

1. Blue entries represent the extended battery measurement on the worst case for standard battery measurement.
2. Green entries represent the SIM2 measurement on the worst case for SIM1 measurement.

Table 11.3.3 LTE B13, B14 Hotspot SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode/ Band	BW [MHz]	Max Allowed Power [dBm]	Cond. PWR [dBm]	Drift Power [dB]	MPR	Position	Device Serial Number	Mod.	RB Size	RB Offs.	Duty Cycle	1g SAR (W/kg)	Scaling Factor	1g Scaled SAR (W/kg)	Plots #
MHz	Ch																
782.0	23230	LTE B13	10	23.50	23.39	0.030	0	10 mm [Bottom]	FCC #1	QPSK	1	25	1:1	0.110	1.026	0.113	
782.0	23230	LTE B13	10	22.50	22.37	-0.070	1	10 mm [Bottom]	FCC #1	QPSK	25	12	1:1	0.093	1.030	0.096	
782.0	23230	LTE B13	10	23.50	23.39	0.030	0	10 mm [Front]	FCC #1	QPSK	1	25	1:1	0.361	1.026	0.370	
782.0	23230	LTE B13	10	22.50	22.37	-0.110	1	10 mm [Front]	FCC #1	QPSK	25	12	1:1	0.284	1.030	0.293	
782.0	23230	LTE B13	10	23.50	23.39	-0.050	0	10 mm [Rear]	FCC #1	QPSK	1	25	1:1	0.546	1.026	0.560	A20
782.0	23230	LTE B13	10	22.50	22.37	0.010	1	10 mm [Rear]	FCC #1	QPSK	25	12	1:1	0.437	1.030	0.450	
782.0	23230	LTE B13	10	23.50	23.39	-0.050	0	10 mm [Right]	FCC #1	QPSK	1	25	1:1	0.468	1.026	0.480	
782.0	23230	LTE B13	10	22.50	22.37	0.000	1	10 mm [Right]	FCC #1	QPSK	25	12	1:1	0.361	1.030	0.372	
782.0	23230	LTE B13	10	23.50	23.39	-0.100	0	10 mm [Left]	FCC #1	QPSK	1	25	1:1	0.327	1.026	0.336	
782.0	23230	LTE B13	10	22.50	22.37	-0.030	1	10 mm [Left]	FCC #1	QPSK	25	12	1:1	0.253	1.030	0.261	
782.0	23230	LTE B13	10	23.50	23.39	-0.070	0	10 mm [Rear]	FCC #1	QPSK	1	25	1:1	0.456	1.026	0.468	
782.0	23230	LTE B13	10	23.50	23.39	-0.110	0	10 mm [Rear]	FCC #1	QPSK	1	25	1:1	0.538	1.026	0.552	
793.0	23330	LTE B14	10	23.50	23.47	-0.090	0	10 mm [Bottom]	FCC #1	QPSK	1	25	1:1	0.148	1.007	0.149	
793.0	23330	LTE B14	10	22.50	22.34	-0.090	1	10 mm [Bottom]	FCC #1	QPSK	25	12	1:1	0.113	1.038	0.117	
793.0	23330	LTE B14	10	23.50	23.47	-0.150	0	10 mm [Front]	FCC #1	QPSK	1	25	1:1	0.395	1.007	0.398	
793.0	23330	LTE B14	10	22.50	22.34	0.020	1	10 mm [Front]	FCC #1	QPSK	25	12	1:1	0.313	1.038	0.325	
793.0	23330	LTE B14	10	23.50	23.47	-0.100	0	10 mm [Rear]	FCC #1	QPSK	1	25	1:1	0.585	1.007	0.589	A21
793.0	23330	LTE B14	10	22.50	22.34	0.000	1	10 mm [Rear]	FCC #1	QPSK	25	12	1:1	0.461	1.038	0.479	
793.0	23330	LTE B14	10	23.50	23.47	-0.030	0	10 mm [Right]	FCC #1	QPSK	1	25	1:1	0.520	1.007	0.524	
793.0	23330	LTE B14	10	22.50	22.34	0.000	1	10 mm [Right]	FCC #1	QPSK	25	12	1:1	0.415	1.038	0.431	
793.0	23330	LTE B14	10	23.50	23.47	0.070	0	10 mm [Left]	FCC #1	QPSK	1	25	1:1	0.340	1.007	0.342	
793.0	23330	LTE B14	10	22.50	22.34	0.010	1	10 mm [Left]	FCC #1	QPSK	25	12	1:1	0.269	1.038	0.279	
793.0	23330	LTE B14	10	23.50	23.47	-0.020	0	10 mm [Rear]	FCC #1	QPSK	1	25	1:1	0.452	1.007	0.455	
793.0	23330	LTE B14	10	23.50	23.47	0.170	0	10 mm [Rear]	FCC #1	QPSK	1	25	1:1	0.555	1.007	0.559	
ANSI / IEEE C95.1-1992- SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure										Body 1.6 W/kg (mW/g) averaged over 1 gram							

Note(s):

1. Blue entries represent the extended battery measurement on the worst case for standard battery measurement.
2. Green entries represent the SIM2 measurement on the worst case for SIM1 measurement.

**Table 11.3.4 LTE B5 Hotspot SAR**

MEASUREMENT RESULTS																	
FREQUENCY		Mode/ Band	BW [MHz]	Max Allowed Power [dBm]	Cond. PWR [dBm]	Drift Power [dB]	MPR	Position	Device Serial Number	Mod.	RB Size	RB Offs.	Duty Cycle	1g SAR (W/kg)	Scaling Factor	1g Scaled SAR (W/kg)	Plots #
MHz	Ch																
836.5	20525	LTE B5	10	23.50	23.44	-0.080	0	10 mm [Bottom]	FCC #1	QPSK	1	0	1:1	0.248	1.014	0.251	
836.5	20525	LTE B5	10	22.50	22.18	-0.050	1	10 mm [Bottom]	FCC #1	QPSK	25	0	1:1	0.200	1.076	0.215	
836.5	20525	LTE B5	10	23.50	23.44	-0.100	0	10 mm [Front]	FCC #1	QPSK	1	0	1:1	0.387	1.014	0.392	
836.5	20525	LTE B5	10	22.50	22.18	-0.030	1	10 mm [Front]	FCC #1	QPSK	25	0	1:1	0.296	1.076	0.318	
836.5	20525	LTE B5	10	23.50	23.44	-0.100	0	10 mm [Rear]	FCC #1	QPSK	1	0	1:1	0.476	1.014	0.483	A22
836.5	20525	LTE B5	10	22.50	22.18	0.000	1	10 mm [Rear]	FCC #1	QPSK	25	0	1:1	0.383	1.076	0.412	
836.5	20525	LTE B5	10	23.50	23.44	0.070	0	10 mm [Right]	FCC #1	QPSK	1	0	1:1	0.454	1.014	0.460	
836.5	20525	LTE B5	10	22.50	22.18	0.020	1	10 mm [Right]	FCC #1	QPSK	25	0	1:1	0.355	1.076	0.382	
836.5	20525	LTE B5	10	23.50	23.44	-0.020	0	10 mm [Left]	FCC #1	QPSK	1	0	1:1	0.250	1.014	0.254	
836.5	20525	LTE B5	10	22.50	22.18	0.030	1	10 mm [Left]	FCC #1	QPSK	25	0	1:1	0.201	1.076	0.216	
836.5	20525	LTE B5	10	23.50	23.44	0.050	0	10 mm [Rear]	FCC #1	QPSK	1	0	1:1	0.369	1.014	0.374	
836.5	20525	LTE B5	10	23.50	23.44	0.010	0	10 mm [Rear]	FCC #1	QPSK	1	0	1:1	0.441	1.014	0.447	
<b>ANSI / IEEE C95.1-1992– SAFETY LIMIT</b> <b>Spatial Peak</b> <b>Uncontrolled Exposure/General Population Exposure</b>									<b>Body</b> <b>1.6 W/kg (mW/g)</b> averaged over 1 gram								

Note(s):

1. Blue entries represent the extended battery measurement on the worst case for standard battery measurement.
2. Green entries represent the SIM2 measurement on the worst case for SIM1 measurement.

Table 11.3.5 LTE B66 Hotspot SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode/ Band	BW [MHz]	Max Allowed Power [dBm]	Cond. PWR [dBm]	Drift Power [dB]	MPR	Position	Device Serial Number	Mod.	RB Size	RB Offs.	Duty Cycle	1g SAR (W/kg)	Scaling Factor	1g Scaled SAR (W/kg)	Plots #
MHz	Ch																
1720.0	132072	LTE B66	20	22.50	22.14	-0.140	0	10 mm [Bottom]	FCC #1	QPSK	1	0	1:1	0.951	1.086	1.033	
1720.0	132072	LTE B66	20	21.50	21.08	-0.040	1	10 mm [Bottom]	FCC #1	QPSK	50	0	1:1	0.820	1.102	0.904	
1745.0	132322	LTE B66	20	22.50	22.44	0.060	0	10 mm [Bottom]	FCC #1	QPSK	1	0	1:1	1.110	1.014	1.126	A30
1745.0	132322	LTE B66	20	21.50	21.37	-0.020	1	10 mm [Bottom]	FCC #1	QPSK	50	0	1:1	0.859	1.030	0.885	
1745.0	132322	LTE B66	20	21.50	21.21	-0.140	1	10 mm [Bottom]	FCC #1	QPSK	100	0	1:1	0.843	1.069	0.901	
1770.0	132572	LTE B66	20	22.50	22.22	0.050	0	10 mm [Bottom]	FCC #1	QPSK	1	50	1:1	0.875	1.067	0.934	
1770.0	132572	LTE B66	20	21.50	21.27	-0.020	1	10 mm [Bottom]	FCC #1	QPSK	50	25	1:1	0.838	1.054	0.883	
1745.0	132322	LTE B66	20	22.50	22.44	-0.110	0	10 mm [Front]	FCC #1	QPSK	1	0	1:1	0.432	1.014	0.438	
1745.0	132322	LTE B66	20	21.50	21.37	0.100	1	10 mm [Front]	FCC #1	QPSK	50	0	1:1	0.334	1.030	0.344	
1720.0	132072	LTE B66	20	22.50	22.14	-0.140	0	10 mm [Rear]	FCC #1	QPSK	1	0	1:1	0.966	1.086	1.049	
1745.0	132322	LTE B66	20	22.50	22.44	-0.170	0	10 mm [Rear]	FCC #1	QPSK	1	0	1:1	1.030	1.014	1.044	
1745.0	132322	LTE B66	20	21.50	21.37	-0.010	1	10 mm [Rear]	FCC #1	QPSK	50	0	1:1	0.770	1.030	0.793	
1745.0	132322	LTE B66	20	21.50	21.21	-0.010	1	10 mm [Rear]	FCC #1	QPSK	100	0	1:1	0.746	1.069	0.797	
1770.0	132572	LTE B66	20	22.50	22.22	0.070	0	10 mm [Rear]	FCC #1	QPSK	1	50	1:1	1.020	1.067	1.088	
1745.0	132322	LTE B66	20	22.50	22.44	0.110	0	10 mm [Right]	FCC #1	QPSK	1	0	1:1	0.100	1.014	0.101	
1745.0	132322	LTE B66	20	21.50	21.37	0.060	1	10 mm [Right]	FCC #1	QPSK	50	0	1:1	0.088	1.030	0.091	
1745.0	132322	LTE B66	20	22.50	22.44	-0.080	0	10 mm [Left]	FCC #1	QPSK	1	0	1:1	0.244	1.014	0.247	
1745.0	132322	LTE B66	20	21.50	21.37	-0.090	1	10 mm [Left]	FCC #1	QPSK	50	0	1:1	0.199	1.030	0.205	
1745.0	132322	LTE B66	20	22.50	22.44	-0.050	0	10 mm [Bottom]	FCC #1	QPSK	1	0	1:1	1.050	1.014	1.065	
1745.0	132322	LTE B66	20	22.50	22.44	-0.090	0	10 mm [Bottom]	FCC #1	QPSK	1	0	1:1	1.090	1.014	1.105	
1745.0	132322	LTE B66	20	22.50	22.44	0.030	0	10 mm [Bottom]	FCC #1	QPSK	1	0	1:1	1.000	1.014	1.014	
ANSI / IEEE C95.1-1992– SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure									Body 1.6 W/kg (mW/g) averaged over 1 gram								

Note(s):

1. Blue entries represent the extended battery measurement on the worst case for standard battery measurement.
2. Yellow entries represent variability measurements.
3. Green entries represent the SIM2 measurement on the worst case for SIM1 measurement.

**Table 11.3.6 LTE B2 Hotspot SAR**

MEASUREMENT RESULTS																	
FREQUENCY		Mode/ Band	BW [MHz]	Max Allowed Power [dBm]	Cond. PWR [dBm]	Drift Power [dB]	MPR	Position	Device Serial Number	Mod.	RB Size	RB Offs.	Duty Cycle	1g SAR (W/kg)	Scaling Factor	1g Scaled SAR (W/kg)	Plots #
MHz	Ch																
1880.0	18900	LTE B2	20	23.50	23.49	-0.030	0	10 mm [Bottom]	FCC #1	QPSK	1	50	1:1	0.597	1.002	0.598	A31
1880.0	18900	LTE B2	20	22.50	22.29	-0.040	1	10 mm [Bottom]	FCC #1	QPSK	50	25	1:1	0.546	1.050	0.573	
1880.0	18900	LTE B2	20	23.50	23.49	0.080	0	10 mm [Front]	FCC #1	QPSK	1	50	1:1	0.366	1.002	0.367	
1880.0	18900	LTE B2	20	22.50	22.29	-0.010	1	10 mm [Front]	FCC #1	QPSK	50	25	1:1	0.296	1.050	0.311	
1880.0	18900	LTE B2	20	23.50	23.49	-0.000	0	10 mm [Rear]	FCC #1	QPSK	1	50	1:1	0.425	1.002	0.426	
1880.0	18900	LTE B2	20	22.50	22.29	-0.030	1	10 mm [Rear]	FCC #1	QPSK	50	25	1:1	0.385	1.050	0.404	
1880.0	18900	LTE B2	20	23.50	23.49	-0.180	0	10 mm [Right]	FCC #1	QPSK	1	50	1:1	0.160	1.002	0.160	
1880.0	18900	LTE B2	20	22.50	22.29	-0.050	1	10 mm [Right]	FCC #1	QPSK	50	25	1:1	0.127	1.050	0.133	
1880.0	18900	LTE B2	20	23.50	23.49	-0.000	0	10 mm [Left]	FCC #1	QPSK	1	50	1:1	0.197	1.002	0.197	
1880.0	18900	LTE B2	20	22.50	22.29	-0.020	1	10 mm [Left]	FCC #1	QPSK	50	25	1:1	0.147	1.050	0.154	
1880.0	18900	LTE B2	20	23.50	23.49	0.040	0	10 mm [Bottom]	FCC #1	QPSK	1	50	1:1	0.578	1.002	0.579	
1880.0	18900	LTE B2	20	23.50	23.49	-0.010	0	10 mm [Bottom]	FCC #1	QPSK	1	50	1:1	0.527	1.002	0.528	
ANSI / IEEE C95.1-1992– SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure									Body 1.6 W/kg (mW/g) averaged over 1 gram								

Note(s):

- Blue entries represent the extended battery measurement on the worst case for standard battery measurement.
- Green entries represent the SIM2 measurement on the worst case for SIM1 measurement.

**Table 11.3.7 DTS Hotspot SAR**

MEASUREMENT RESULTS																	
FREQUENCY		Mode	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	Peak SAR of Area Scan	Data Rate [Mbps]	Duty Cycle	1g SAR (W/kg)	Scaling Factor	Scaling Factor (Duty Cycle)	SAR (W/kg)	Plots #		
MHz	Ch																
2462.0	11	802.11b	17.00	16.97	0.010	10 mm [Front]	FCC #1	0.046	1	97.6	0.045	1.007	1.025	0.046			
2462.0	11	802.11b	17.00	16.97	-0.090	10 mm [Rear]	FCC #1	0.091	1	97.6	0.087	1.007	1.025	0.090			
2462.0	11	802.11b	17.00	16.97	-0.080	10 mm [Right]	FCC #1	0.164	1	97.6	0.145	1.007	1.025	0.150	A32		
2462.0	11	802.11b	17.00	16.97	0.160	10 mm [Right]	FCC #1	0.067	1	97.6	0.068	1.007	1.025	0.070			
ANSI / IEEE C95.1-1992– SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure									Body 1.6 W/kg (mW/g) averaged over 1 gram								

Note(s):

- Blue entries represent the extended battery measurement on the worst case for standard battery measurement.

Adjusted SAR results for OFDM SAR

FREQUENCY		Mode/ Antenna	Service	Maximum Allowed Power [dBm]	1g Scaled SAR (W/kg)	FREQUENCY [MHz]	Mode	Service	Maximum Allowed Power [dBm]	Ratio of OFDM to DSSS	1g Adjusted SAR (W/kg)	Determine OFDM SAR
MHz	Ch											
2462.0	11	802.11b	DSSS	17.0	0.150	2437	802.11g	OFDM	14.0	0.501	0.075	X
2462.0	11	802.11b	DSSS	17.0	0.150	2437	802.11n (HT-20)	OFDM	12.0	0.316	0.047	X
2462.0	11	802.11b	DSSS	17.0	0.150	2437	802.11n (HT-40)	OFDM	12.0	0.316	0.047	X
ANSI / IEEE C95.1-1992– SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure									Body 1.6 W/kg (mW/g) averaged over 1 gram			

Note: SAR is not required for the following 2.4 GHz OFDM conditions. When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

## 11.4 Standalone Phablet SAR Results

Per FCC KDB Publication 648474 D04 Handset SAR, Phablet SAR tests were not required when Hotspot 1g SAR (scaled to maximum output power including tolerance) < 1.2 W/kg.

**Table 11.4.1 UNII Phablet SAR**

MEASUREMENT RESULTS															
FREQUENCY		Mode	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	Peak SAR of Area Scan	Data Rate [Mbps]	Duty Cycle	10g SAR (W/kg)	Scaling Factor	Scaling Factor (Duty Cycle)	10g Scaled SAR (W/kg)	Plots #
MHz	Ch														
5260.0	52	802.11a	12.20	11.83	0.150	0 mm [Front]	FCC #1	0.022	6	97.6	0.021	1.089	1.025	0.023	
5260.0	52	802.11a	12.20	11.83	-0.170	0 mm [Rear]	FCC #1	0.091	6	97.6	0.099	1.089	1.025	0.110	
5260.0	52	802.11a	12.20	11.83	0.030	0 mm [Right]	FCC #1	0.151	6	97.6	0.166	1.089	1.025	0.185	A33
5260.0	52	802.11a	12.20	11.83	-0.050	0 mm [Right]	FCC #1	0.133	6	97.6	0.141	1.089	1.025	0.157	
ANSI / IEEE C95.1-1992- SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure								Phablet 4.0 W/kg (mW/g) averaged over 10 gram							

Note(s):

- Blue entries represent the extended battery measurement on the worst case for standard battery measurement.

**Adjusted SAR results for UNII-1 and UNII-2A SAR**

FREQUENCY		Mode/ Antenna	Service	Maximum Allowed Power [dBm]	10g Scaled SAR (W/kg)	FREQUENCY [MHz]	Mode	Service	Maximum Allowed Power [dBm]	Adjusted Factor	10g Adjusted SAR (W/kg)	SAR for the band with lower maximum output power
MHz	Ch											
5260.0	52	802.11a	OFDM	12.2	0.185	5180	802.11a	OFDM	12.2	1.000	0.185	X
ANSI / IEEE C95.1-1992- SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure								Head 1.6 W/kg (mW/g) averaged over 1 gram				

Note(s):

- U-NII-1 and U-NII-2A Bands: When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest reported SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is ≤ 3.0 W/kg, SAR is not required for the band with lower maximum output power in that test configuration.

**Table 11.4.2 UNII Phablet SAR**

MEASUREMENT RESULTS															
FREQUENCY		Mode	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	Peak SAR of Area Scan	Data Rate [Mbps]	Duty Cycle	10g SAR (W/kg)	Scaling Factor	Scaling Factor (Duty Cycle)	10g Scaled SAR (W/kg)	Plots #
MHz	Ch														
5500.0	100	802.11a	12.20	11.96	0.170	0 mm [Front]	FCC #1	0.017	6	86.6	0.015	1.057	1.019	0.016	
5500.0	100	802.11a	12.20	11.96	-0.100	0 mm [Rear]	FCC #1	0.094	6	86.6	0.104	1.057	1.019	0.112	
5500.0	100	802.11a	12.20	11.96	-0.090	0 mm [Right]	FCC #1	0.123	6	86.6	0.131	1.057	1.019	0.141	A34
5500.0	100	802.11a	12.20	11.96	-0.090	0 mm [Right]	FCC #1	0.097	6	86.6	0.104	1.057	1.019	0.112	
ANSI / IEEE C95.1-1992- SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure								Phablet 4.0 W/kg (mW/g) averaged over 10 gram							

Note(s):

- Blue entries represent the extended battery measurement on the worst case for standard battery measurement.

**Table 11.4.3 UNII Phablet SAR**

MEASUREMENT RESULTS															
FREQUENCY		Mode	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	Peak SAR of Area Scan	Data Rate [Mbps]	Duty Cycle	10g SAR (W/kg)	Scaling Factor	Scaling Factor (Duty Cycle)	10g Scaled SAR (W/kg)	Plots #
MHz	Ch														
5745.0	149	802.11a	12.20	11.98	-0.160	0 mm [Front]	FCC #1	0.015	6	86.6	0.016	1.052	1.155	0.019	
5745.0	149	802.11a	12.20	11.98	-0.140	0 mm [Rear]	FCC #1	0.167	6	86.6	0.183	1.052	1.155	0.222	
5745.0	149	802.11a	12.20	11.98	-0.170	0 mm [Right]	FCC #1	0.202	6	86.6	0.222	1.052	1.155	0.270	A35
5745.0	149	802.11a	12.20	11.98	0.070	0 mm [Right]	FCC #1	0.157	6	86.6	0.167	1.052	1.155	0.203	
ANSI / IEEE C95.1-1992- SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure								Phablet 4.0 W/kg (mW/g) averaged over 10 gram							

Note(s):

- Blue entries represent the extended battery measurement on the worst case for standard battery measurement.
- UNII-3 Band CH 165 (5825 MHz) is not support Hotspot mode as described on operational description of this device, so phablet SAR is tested on this CH.

## 11.5 SAR Test Notes

### General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2013, and FCC KDB Publication 447498 D01v06.
2. Batteries are fully charged at the beginning of the SAR measurements. A standard battery was used for all 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 D01v06.
6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 10 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. Per FCC KDB Publication 648474 D04v01r03, body-worn SAR was evaluated without a headset connected to the device. Since the standalone reported boy-worn SAR was not > 1.2 W/kg, no additional body-worn SAR evaluations using a headset cable were performed.
8. During SAR Testing for the Wireless Router conditions per FCC KDB Publication 941225 D06v02r01, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated.
9. SAR measurements were performed using the DASY5 automated system. The procedure for spatial peak SAR evaluation has been implemented according to the IEEE 1528 standard. During a maximum search, global and local maxima searches are automatically performed in 2-D after each area scan measurement. The algorithm will find the global maximum and all local maxima within 2 dB of the global maxima for all SAR distributions. All local maxima within 2 dB of the global maximum were searched and passed for the Zoom Scan measurement.

### WCDMA (UMTS) Notes:

1. WCDMA (UMTS) mode in was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01v03r01. AMR and HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.
2. Per FCC KDB Publication 447498 D01v06, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is  $\leq 0.8$  W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is  $> \frac{1}{2}$  dB, instead of the middle channel, the highest output power channel was used.

**LTE Notes:**

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r05. The general test procedures used for testing can be found in Section 8.4.4.
2. According to FCC KDB 941225 D05v02r05, when the reported SAR is  $\leq 0.8 \text{ W/kg}$ , testing of the 100% RB allocation and required test channels is not required.

Otherwise, SAR is required for the remaining required test channels using the 1 RB, 50% RB and 100% RB allocation with highest output power for that channel.

Only one channel, and as reported SAR values for 1 RB allocation and 50% RB allocation were less than 1.45 W/kg only the highest power RB offset for each allocation was required.

3. 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.
4. A-MPR was disabled for all SAR tests by setting NS=1 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).
5. SAR test reduction is applied using the following criteria:

Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB, and 50% RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is  $> 0.8 \text{ W/kg}$ , testing for other channels is performed at the highest output power level for 1 RB, and 50% RB configuration for that channel. Testing for 100% RB configuration is performed at the highest output power level for 100% RB configuration across the Low, Mid and High channel when the highest reported SAR for 1 RB and 50% RB are  $> 0.8 \text{ W/kg}$ . Testing for the remaining required channels is not needed because the reported SAR for 100% RB Allocation  $< 1.45 \text{ W/kg}$ . Testing for 16QAM modulation is not required because the reported SAR for QPSK is  $< 1.45 \text{ W/kg}$  and its output power is not more than 0.5 dB higher than that of a QPSK. Testing for the other channel bandwidths is not required because the reported SAR for the highest channel bandwidth is  $< 1.45 \text{ W/kg}$  and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.

**WLAN Notes:**

1. The initial test position procedures were applied. The test position with the highest extrapolated peak SAR will be used as the initial test position. When reported SAR for the initial test position is  $\leq 0.4$  W/kg, no additional testing for the remaining test positions was required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is  $\leq 0.8$  W/kg or all test positions are measured.
2. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 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 when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output and the adjust SAR is  $\leq 1.2$  W/kg.
3. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 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.
4. When the maximum reported 1g averaged SAR  $\leq 0.8$  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  $\leq 1.20$  W/kg or all test channels were measured.
5. The device was configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor to determine compliance.

**Bluetooth Notes:**

1. Bluetooth SAR was measured with the device connected to a call with hopping disabled with DH5 operation.  
Per October 2016 TCB Workshop Notes, the reported SAR was scaled to the 100% transmission duty factor to determine compliance. Refer to section 9.5 for the time-domain plot and calculation for the duty factor of the device.

## 12. FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

### 12.1 Introduction

The following procedures adopted from FCC KDB Publication 447498 D01v06 are applicable to handsets with built-in unlicensed transmitters such as 802.11b/g/n and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

### 12.2 Simultaneous Transmission Procedures

This device contains transmitters that may operate simultaneously. Therefore simultaneous transmission analysis is required. Per FCC KDB 447498 D01v06 4.3.2 and IEEE 1528-2013 Section 6.3.4.1.2, simultaneous transmission SAR test exclusion may be applied when the sum of the sum 1-g SAR for all the simultaneous transmitting antennas in a specific physical test configuration is  $\leq 1.6 \text{ W/kg}$ . The different test position in an exposure condition may be considered collectively to determine SAR test exclusion according to the sum of 1-g or 10-g SAR.

**Table 12.2.1 Estimated SAR (Head)**

Mode	Frequency	Maximum Allowed Power		Separation Distance (Hand)	Estimated SAR (Body) [W/kg]
		[MHz]	[dBm]	[mW]	
Bluetooth	2441		11.5	14	5

**Table 12.2.2 Estimated SAR (Body)**

Mode	Frequency	Maximum Allowed Power		Separation Distance (Hand)	Estimated SAR (Body) [W/kg]
		[MHz]	[dBm]	[mW]	
Bluetooth	2441		11.5	14	10

### 12.3 Simultaneous Transmission Capabilities

According to FCC KDB Publication 447498 D01v06, 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.

This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB Publication 447498 D01v06.

**Table 12.3.1 Simultaneous Transmission Scenarios**

No.	Capable TX Configuration	WCDMA B5/B4/B2 (Voice)	WCDMA B5/B4/B2 (Data)	LTE B71/B12/B13/B14/B5/B66/B4/B2	WIFI 2.4GHz 802.11b/g/n	WIFI 5GHz 802.11a/n/ac	Bluetooth 2.4GHz
1	WCDMA B5/B4/B2 (Voice)		No	No	Yes	Yes	Yes
2	WCDMA B5/B4/B2 (Data)	No		No	Yes	Yes	Yes
3	LTE B71/B12/B13/B14/B5/B66/B4/B2	No	No		Yes	Yes	Yes
4	WIFI 2.4GHz 802.11b/g/n	Yes	Yes	Yes		No	No
5	WIFI 5GHz 802.11a/n/ac	Yes	Yes	Yes	No		No
6	Bluetooth 2.4GHz	Yes	Yes	Yes	No		No

**Table 12.3.2 Simultaneous SAR Cases**

No.	Capable Transmit Configuration	Head SAR	Body-Worn SAR	Hotspot SAR	Phablet SAR	Note
1	WCDMA + Wi-Fi 2.4 GHz	Yes	Yes	Yes	Yes	
2	WCDMA + Wi-Fi 5 GHz	Yes	Yes	No	Yes	
3	WCDMA + Bluetooth 2.4 GHz	Yes	Yes	Yes	Yes	
4	LTE + Wi-Fi 2.4 GHz	Yes	Yes	Yes	Yes	
5	LTE + Wi-Fi 5 GHz	Yes	Yes	No	Yes	
6	LTE + Bluetooth 2.4 GHz	Yes	Yes	Yes	Yes	

## Notes:

1. WiFi 2.4GHz is supported Hotspot and WiFi-Direct(GO/GC).
2. WiFi 5GHz is not supported Hotspot.
3. LTE, WCDMA is supported Hotspot.
4. VoIP is supported in LTE, WCDMA.
5. Bluetooth and WiFi can not transmit simultaneously at 2.4G band.
6. WCDMA and LTE can not transmit simultaneously since they share the same chip.
7. When the user utilizes multiple services in UMTS 3G mode it uses multi-Radio Access Bearer or multi-RAB. The power control is based on a physical control channel (Dedicated Physical Control Channel [DPCCH]) and power control will be adjusted to meet the needs of both services. Therefore, the UMTS+WLAN scenario also represents the UMTS Voice/DATA + WLAN Hotspot scenario.
8. Per the manufacturer, WIFI Direct is expected to be used in conjunction with a held-to-ear or body-worn accessory voice call. Simultaneous transmission scenarios involving WIFI direct are included in the above table.

## 12.4 Head SAR Simultaneous Transmission Analysis

**Table 12.4.1 Simultaneous Transmission Scenario : 3G/4G + 2.4 GHz W-LAN (Held to Ear)**

Exposure Condition	Mode	Configuration	3G/4G SAR (W/kg)	2.4G W-LAN SAR (W/kg)	$\Sigma$ SAR (W/kg)
			1	2	1+2
Head SAR	WCDMA 850	Left Touch	0.343	0.074	0.417
		Right Touch	0.451	0.138	<b>0.589</b>
		Left Tilt	0.206	0.013	0.219
		Right Tilt	0.202	0.014	0.216
	WCDMA 1700	Left Touch	0.136	0.074	0.210
		Right Touch	0.144	0.138	<b>0.282</b>
		Left Tilt	0.097	0.013	0.110
		Right Tilt	0.096	0.014	0.110
	WCDMA 1900	Left Touch	0.326	0.074	<b>0.400</b>
		Right Touch	0.199	0.138	0.337
		Left Tilt	0.124	0.013	0.137
		Right Tilt	0.160	0.014	0.174
	LTE Band 71	Left Touch	0.110	0.074	0.184
		Right Touch	0.096	0.138	<b>0.234</b>
		Left Tilt	0.059	0.013	0.072
		Right Tilt	0.043	0.014	0.057
	LTE Band 12	Left Touch	0.130	0.074	0.204
		Right Touch	0.138	0.138	<b>0.276</b>
		Left Tilt	0.085	0.013	0.098
		Right Tilt	0.098	0.014	0.112
	LTE Band 13	Left Touch	0.264	0.074	0.338
		Right Touch	0.286	0.138	<b>0.424</b>
		Left Tilt	0.192	0.013	0.205
		Right Tilt	0.168	0.014	0.182
	LTE Band 14	Left Touch	0.294	0.074	0.368
		Right Touch	0.374	0.138	<b>0.512</b>
		Left Tilt	0.207	0.013	0.220
		Right Tilt	0.186	0.014	0.200
	LTE Band 5	Left Touch	0.352	0.074	0.426
		Right Touch	0.443	0.138	<b>0.581</b>
		Left Tilt	0.197	0.013	0.210
		Right Tilt	0.206	0.014	0.220
	LTE Band 66	Left Touch	0.157	0.074	0.231
		Right Touch	0.155	0.138	<b>0.293</b>
		Left Tilt	0.129	0.013	0.142
		Right Tilt	0.114	0.014	0.128
	LTE Band 2	Left Touch	0.284	0.074	<b>0.358</b>
		Right Touch	0.177	0.138	0.315
		Left Tilt	0.117	0.013	0.130
		Right Tilt	0.142	0.014	0.156

**Table 12.4.2 Simultaneous Transmission Scenario : 3G/4G + 5.3 GHz W-LAN (Held to Ear)**

Exposure Condition	Mode	Configuration	3G/4G SAR (W/kg)	5.3G W-LAN SAR (W/kg)	$\Sigma$ SAR (W/kg)
			1	2	1+2
Head SAR	WCDMA 850	Left Touch	0.343	0.026	0.369
		Right Touch	0.451	0.054	<b>0.505</b>
		Left Tilt	0.206	0.011	0.217
		Right Tilt	0.202	0.007	0.209
	WCDMA 1700	Left Touch	0.136	0.026	0.162
		Right Touch	0.144	0.054	<b>0.198</b>
		Left Tilt	0.097	0.011	0.108
		Right Tilt	0.096	0.007	0.103
	WCDMA 1900	Left Touch	0.326	0.026	<b>0.352</b>
		Right Touch	0.199	0.054	0.253
		Left Tilt	0.124	0.011	0.135
		Right Tilt	0.160	0.007	0.167
	LTE Band 71	Left Touch	0.110	0.026	0.136
		Right Touch	0.096	0.054	<b>0.150</b>
		Left Tilt	0.059	0.011	0.070
		Right Tilt	0.043	0.007	0.050
	LTE Band 12	Left Touch	0.130	0.026	0.156
		Right Touch	0.138	0.054	<b>0.192</b>
		Left Tilt	0.085	0.011	0.096
		Right Tilt	0.098	0.007	0.105
	LTE Band 13	Left Touch	0.264	0.026	0.290
		Right Touch	0.286	0.054	<b>0.340</b>
		Left Tilt	0.192	0.011	0.203
		Right Tilt	0.168	0.007	0.175
	LTE Band 14	Left Touch	0.294	0.026	0.320
		Right Touch	0.374	0.054	<b>0.428</b>
		Left Tilt	0.207	0.011	0.218
		Right Tilt	0.186	0.007	0.193
	LTE Band 5	Left Touch	0.352	0.026	0.378
		Right Touch	0.443	0.054	<b>0.497</b>
		Left Tilt	0.197	0.011	0.208
		Right Tilt	0.206	0.007	0.213
	LTE Band 66	Left Touch	0.157	0.026	0.183
		Right Touch	0.155	0.054	<b>0.209</b>
		Left Tilt	0.129	0.011	0.140
		Right Tilt	0.114	0.007	0.121
	LTE Band 2	Left Touch	0.284	0.026	<b>0.310</b>
		Right Touch	0.177	0.054	0.231
		Left Tilt	0.117	0.011	0.128
		Right Tilt	0.142	0.007	0.149

**Table 12.4.3 Simultaneous Transmission Scenario : 3G/4G + 5.6 GHz W-LAN (Held to Ear)**

Exposure Condition	Mode	Configuration	3G/4G SAR (W/kg)	5.6G W-LAN SAR (W/kg)	$\Sigma$ SAR (W/kg)
			1	2	1+2
Head SAR	WCDMA 850	Left Touch	0.343	0.029	0.372
		Right Touch	0.451	0.056	<b>0.507</b>
		Left Tilt	0.206	0.011	0.217
		Right Tilt	0.202	0.006	0.208
	WCDMA 1700	Left Touch	0.136	0.029	0.165
		Right Touch	0.144	0.056	<b>0.200</b>
		Left Tilt	0.097	0.011	0.108
		Right Tilt	0.096	0.006	0.102
	WCDMA 1900	Left Touch	0.326	0.029	<b>0.355</b>
		Right Touch	0.199	0.056	0.255
		Left Tilt	0.124	0.011	0.135
		Right Tilt	0.160	0.006	0.166
	LTE Band 71	Left Touch	0.110	0.029	0.139
		Right Touch	0.096	0.056	<b>0.152</b>
		Left Tilt	0.059	0.011	0.070
		Right Tilt	0.043	0.006	0.049
	LTE Band 12	Left Touch	0.130	0.029	0.159
		Right Touch	0.138	0.056	<b>0.194</b>
		Left Tilt	0.085	0.011	0.096
		Right Tilt	0.098	0.006	0.104
	LTE Band 13	Left Touch	0.264	0.029	0.293
		Right Touch	0.286	0.056	<b>0.342</b>
		Left Tilt	0.192	0.011	0.203
		Right Tilt	0.168	0.006	0.174
	LTE Band 14	Left Touch	0.294	0.029	0.323
		Right Touch	0.374	0.056	<b>0.430</b>
		Left Tilt	0.207	0.011	0.218
		Right Tilt	0.186	0.006	0.192
	LTE Band 5	Left Touch	0.352	0.029	0.381
		Right Touch	0.443	0.056	<b>0.499</b>
		Left Tilt	0.197	0.011	0.208
		Right Tilt	0.206	0.006	0.212
	LTE Band 66	Left Touch	0.157	0.029	0.186
		Right Touch	0.155	0.056	<b>0.211</b>
		Left Tilt	0.129	0.011	0.140
		Right Tilt	0.114	0.006	0.120
	LTE Band 2	Left Touch	0.284	0.029	<b>0.313</b>
		Right Touch	0.177	0.056	0.233
		Left Tilt	0.117	0.011	0.128
		Right Tilt	0.142	0.006	0.148

**Table 12.4.4 Simultaneous Transmission Scenario : 3G/4G + 5.8 GHz W-LAN (Held to Ear)**

Exposure Condition	Mode	Configuration	3G/4G SAR (W/kg)	5.8G W-LAN SAR (W/kg)	$\Sigma$ SAR (W/kg)
			1	2	1+2
Head SAR	WCDMA 850	Left Touch	0.343	0.030	0.373
		Right Touch	0.451	0.058	<b>0.509</b>
		Left Tilt	0.206	0.007	0.213
		Right Tilt	0.202	0.007	0.209
	WCDMA 1700	Left Touch	0.136	0.030	0.166
		Right Touch	0.144	0.058	<b>0.202</b>
		Left Tilt	0.097	0.007	0.104
		Right Tilt	0.096	0.007	0.103
	WCDMA 1900	Left Touch	0.326	0.030	<b>0.356</b>
		Right Touch	0.199	0.058	0.257
		Left Tilt	0.124	0.007	0.131
		Right Tilt	0.160	0.007	0.167
	LTE Band 71	Left Touch	0.110	0.030	0.140
		Right Touch	0.096	0.058	<b>0.154</b>
		Left Tilt	0.059	0.007	0.066
		Right Tilt	0.043	0.007	0.050
	LTE Band 12	Left Touch	0.130	0.030	0.160
		Right Touch	0.138	0.058	<b>0.196</b>
		Left Tilt	0.085	0.007	0.092
		Right Tilt	0.098	0.007	0.105
	LTE Band 13	Left Touch	0.264	0.030	0.294
		Right Touch	0.286	0.058	<b>0.344</b>
		Left Tilt	0.192	0.007	0.199
		Right Tilt	0.168	0.007	0.175
	LTE Band 14	Left Touch	0.294	0.030	0.324
		Right Touch	0.374	0.058	<b>0.432</b>
		Left Tilt	0.207	0.007	0.214
		Right Tilt	0.186	0.007	0.193
	LTE Band 5	Left Touch	0.352	0.030	0.382
		Right Touch	0.443	0.058	<b>0.501</b>
		Left Tilt	0.197	0.007	0.204
		Right Tilt	0.206	0.007	0.213
	LTE Band 66	Left Touch	0.157	0.030	0.187
		Right Touch	0.155	0.058	<b>0.213</b>
		Left Tilt	0.129	0.007	0.136
		Right Tilt	0.114	0.007	0.121
	LTE Band 2	Left Touch	0.284	0.030	<b>0.314</b>
		Right Touch	0.177	0.058	0.235
		Left Tilt	0.117	0.007	0.124
		Right Tilt	0.142	0.007	0.149

**Table 12.4.5 Simultaneous Transmission Scenario : 3G/4G + Bluetooth (Held to Ear)**

Exposure Condition	Mode	Configuration	3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	$\Sigma$ SAR (W/kg)
			1	2	1+2
Head SAR	WCDMA 850	Left Touch	0.343	0.589	0.932
		Right Touch	<b>0.451</b>	<b>0.589</b>	<b>1.040</b>
		Left Tilt	0.206	0.589	0.795
		Right Tilt	0.202	0.589	0.791
	WCDMA 1700	Left Touch	0.136	0.589	0.725
		Right Touch	0.144	0.589	0.733
		Left Tilt	0.097	0.589	0.686
		Right Tilt	0.096	0.589	0.685
	WCDMA 1900	Left Touch	0.326	0.589	0.915
		Right Touch	0.199	0.589	0.788
		Left Tilt	0.124	0.589	0.713
		Right Tilt	0.160	0.589	0.749
	LTE Band 71	Left Touch	0.110	0.589	0.699
		Right Touch	0.096	0.589	0.685
		Left Tilt	0.059	0.589	0.648
		Right Tilt	0.043	0.589	0.632
	LTE Band 12	Left Touch	0.130	0.589	0.719
		Right Touch	0.138	0.589	0.727
		Left Tilt	0.085	0.589	0.674
		Right Tilt	0.098	0.589	0.687
	LTE Band 13	Left Touch	0.264	0.589	0.853
		Right Touch	0.286	0.589	0.875
		Left Tilt	0.192	0.589	0.781
		Right Tilt	0.168	0.589	0.757
	LTE Band 14	Left Touch	0.294	0.589	0.883
		Right Touch	0.374	0.589	0.963
		Left Tilt	0.207	0.589	0.796
		Right Tilt	0.186	0.589	0.775
	LTE Band 5	Left Touch	0.352	0.589	0.941
		Right Touch	0.443	0.589	1.032
		Left Tilt	0.197	0.589	0.786
		Right Tilt	0.206	0.589	0.795
	LTE Band 66	Left Touch	0.157	0.589	0.746
		Right Touch	0.155	0.589	0.744
		Left Tilt	0.129	0.589	0.718
		Right Tilt	0.114	0.589	0.703
	LTE Band 2	Left Touch	0.284	0.589	0.873
		Right Touch	0.177	0.589	0.766
		Left Tilt	0.117	0.589	0.706
		Right Tilt	0.142	0.589	0.731

## 12.5 Body-Worn Simultaneous Transmission Analysis

**Table 12.5.1 Simultaneous Transmission Scenario : 3G/4G + 2.4 GHz W-LAN (Body-Worn at 10 mm)**

Exposure Condition	Mode	Configuration	3G/4G SAR (W/kg)	2.4G W-LAN SAR (W/kg)	$\Sigma$ SAR (W/kg)
			1	2	1+2
Body-Worn SAR	WCDMA 850	Front	0.353	0.046	0.399
	WCDMA 850	Rear	0.472	0.090	0.562
	WCDMA 1700	Front	0.191	0.046	0.237
	WCDMA 1700	Rear	0.860	0.090	0.950
	WCDMA 1900	Front	0.363	0.046	0.409
	WCDMA 1900	Rear	0.693	0.090	0.783
	LTE Band 71	Front	0.113	0.046	0.159
	LTE Band 71	Rear	0.216	0.090	0.306
	LTE Band 12	Front	0.163	0.046	0.209
	LTE Band 12	Rear	0.281	0.090	0.371
	LTE Band 13	Front	0.370	0.046	0.416
	LTE Band 13	Rear	0.560	0.090	0.650
	LTE Band 14	Front	0.398	0.046	0.444
	LTE Band 14	Rear	0.589	0.090	0.679
	LTE Band 5	Front	0.392	0.046	0.438
	LTE Band 5	Rear	0.483	0.090	0.573
	LTE Band 66	Front	0.438	0.046	0.484
	LTE Band 66	Rear	1.049	0.090	1.139
	LTE Band 2	Front	0.367	0.046	0.413
	LTE Band 2	Rear	0.426	0.090	0.516

**Table 12.5.2 Simultaneous Transmission Scenario : 3G/4G + 5.3 GHz W-LAN (Body-Worn at 10 mm)**

Exposure Condition	Mode	Configuration	3G/4G SAR (W/kg)	5.3G W-LAN SAR (W/kg)	$\Sigma$ SAR (W/kg)
			1	2	1+2
Body-Worn SAR	WCDMA 850	Front	0.353	0.006	0.359
	WCDMA 850	Rear	0.472	0.262	0.734
	WCDMA 1700	Front	0.191	0.006	0.197
	WCDMA 1700	Rear	0.860	0.262	1.122
	WCDMA 1900	Front	0.363	0.006	0.369
	WCDMA 1900	Rear	0.693	0.262	0.955
	LTE Band 71	Front	0.113	0.006	0.119
	LTE Band 71	Rear	0.216	0.262	0.478
	LTE Band 12	Front	0.163	0.006	0.169
	LTE Band 12	Rear	0.281	0.262	0.543
	LTE Band 13	Front	0.370	0.006	0.376
	LTE Band 13	Rear	0.560	0.262	0.822
	LTE Band 14	Front	0.398	0.006	0.404
	LTE Band 14	Rear	0.589	0.262	0.851
	LTE Band 5	Front	0.392	0.006	0.398
	LTE Band 5	Rear	0.483	0.262	0.745
	LTE Band 66	Front	0.438	0.006	0.444
	LTE Band 66	Rear	1.049	0.262	1.311
	LTE Band 2	Front	0.367	0.006	0.373
	LTE Band 2	Rear	0.426	0.262	0.688

**Table 12.5.3 Simultaneous Transmission Scenario : 3G/4G + 5.6 GHz W-LAN (Body-Worn at 10 mm)**

Exposure Condition	Mode	Configuration	3G/4G SAR (W/kg)	5.6G W-LAN SAR (W/kg)	$\Sigma$ SAR (W/kg)
			1	2	1+2
Body-Worn SAR	WCDMA 850	Front	0.353	0.013	0.366
	WCDMA 850	Rear	0.472	0.138	0.610
	WCDMA 1700	Front	0.191	0.013	0.204
	WCDMA 1700	Rear	0.860	0.138	0.998
	WCDMA 1900	Front	0.363	0.013	0.376
	WCDMA 1900	Rear	0.693	0.138	0.831
	LTE Band 71	Front	0.113	0.013	0.126
	LTE Band 71	Rear	0.216	0.138	0.354
	LTE Band 12	Front	0.163	0.013	0.176
	LTE Band 12	Rear	0.281	0.138	0.419
	LTE Band 13	Front	0.370	0.013	0.383
	LTE Band 13	Rear	0.560	0.138	0.698
	LTE Band 14	Front	0.398	0.013	0.411
	LTE Band 14	Rear	0.589	0.138	0.727
	LTE Band 5	Front	0.392	0.013	0.405
	LTE Band 5	Rear	0.483	0.138	0.621
	LTE Band 66	Front	0.438	0.013	0.451
	LTE Band 66	Rear	1.049	0.138	1.187
	LTE Band 2	Front	0.367	0.013	0.380
	LTE Band 2	Rear	0.426	0.138	0.564

**Table 12.5.4 Simultaneous Transmission Scenario : 3G/4G + 5.8 GHz W-LAN (Body-Worn at 10 mm)**

Exposure Condition	Mode	Configuration	3G/4G SAR (W/kg)	5.8G W-LAN SAR (W/kg)	$\Sigma$ SAR (W/kg)
			1	2	1+2
Body-Worn SAR	WCDMA 850	Front	0.353	0.012	0.365
		Rear	0.472	0.196	<b>0.668</b>
	WCDMA 1700	Front	0.191	0.012	0.203
		Rear	0.860	0.196	<b>1.056</b>
	WCDMA 1900	Front	0.363	0.012	0.375
		Rear	0.693	0.196	<b>0.889</b>
	LTE Band 71	Front	0.113	0.012	0.125
		Rear	0.216	0.196	<b>0.412</b>
	LTE Band 12	Front	0.163	0.012	0.175
		Rear	0.281	0.196	<b>0.477</b>
	LTE Band 13	Front	0.370	0.012	0.382
		Rear	0.560	0.196	<b>0.756</b>
	LTE Band 14	Front	0.398	0.012	0.410
		Rear	0.589	0.196	<b>0.785</b>
	LTE Band 5	Front	0.392	0.012	0.404
		Rear	0.483	0.196	<b>0.679</b>
	LTE Band 66	Front	0.438	0.012	0.450
		Rear	1.049	0.196	<b>1.245</b>
	LTE Band 2	Front	0.367	0.012	0.379
		Rear	0.426	0.196	<b>0.622</b>

**Table 12.5.5 Simultaneous Transmission Scenario : 3G/4G + Bluetooth (Body-Worn at 10 mm)**

Exposure Condition	Mode	Configuration	3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	$\Sigma$ SAR (W/kg)
			1	2	1+2
Body-Worn SAR	WCDMA 850	Front	0.353	0.294	0.647
		Rear	0.472	0.294	<b>0.766</b>
	WCDMA 1700	Front	0.191	0.294	0.485
		Rear	0.860	0.294	<b>1.154</b>
	WCDMA 1900	Front	0.363	0.294	0.657
		Rear	0.693	0.294	<b>0.987</b>
	LTE Band 71	Front	0.113	0.294	0.407
		Rear	0.216	0.294	<b>0.510</b>
	LTE Band 12	Front	0.163	0.294	0.457
		Rear	0.281	0.294	<b>0.575</b>
	LTE Band 13	Front	0.370	0.294	0.664
		Rear	0.560	0.294	<b>0.854</b>
	LTE Band 14	Front	0.398	0.294	0.692
		Rear	0.589	0.294	<b>0.883</b>
	LTE Band 5	Front	0.392	0.294	0.686
		Rear	0.483	0.294	<b>0.777</b>
	LTE Band 66	Front	0.438	0.294	0.732
		Rear	<b>1.049</b>	<b>0.294</b>	<b>1.343</b>
	LTE Band 2	Front	0.367	0.294	0.661
		Rear	0.426	0.294	0.720

## 12.6 Hotspot SAR Simultaneous Transmission Analysis

Per FCC KDB Publication 941225 D06v02r01, the device edges with antennas more than 2.5 cm from edge are not required to be evaluated for SAR ("").

**Table 12.6.1 Simultaneous Transmission Scenario : 3G/4G + 2.4 GHz W-LAN (Hotspot at 10 mm)**

Exposure Condition	Mode	Configuration	3G/4G SAR (W/kg)	2.4G W-LAN SAR (W/kg)	ΣSAR (W/kg)
			1	2	1+2
Hotspot SAR	WCDMA 850	Top	-	-	-
		Bottom	0.220	-	0.220
		Front	0.353	0.046	0.399
		Rear	0.472	0.090	0.562
		Right	0.420	0.150	0.570
	WCDMA 1700	Left	0.246	-	0.246
		Top	-	-	-
		Bottom	1.021	-	1.021
		Front	0.191	0.046	0.237
		Rear	0.860	0.090	0.950
	WCDMA 1900	Right	0.063	0.150	0.213
		Left	0.176	-	0.176
		Top	-	-	-
		Bottom	0.063	-	0.063
		Front	0.363	0.046	0.409
	LTE Band 71	Rear	0.693	0.090	0.783
		Right	0.165	0.150	0.315
		Left	0.173	-	0.173
		Top	-	-	-
		Bottom	0.043	-	0.043
	LTE Band 12	Front	0.113	0.046	0.159
		Rear	0.216	0.090	0.306
		Right	0.126	0.150	0.276
		Left	0.157	-	0.157
		Top	-	-	-
	LTE Band 13	Bottom	0.044	-	0.044
		Front	0.163	0.046	0.209
		Rear	0.281	0.090	0.371
		Right	0.202	0.150	0.352
		Left	0.176	-	0.176
	LTE Band 14	Top	-	-	-
		Bottom	0.113	-	0.113
		Front	0.370	0.046	0.416
		Rear	0.560	0.090	0.650
		Right	0.480	0.150	0.630
	LTE Band 5	Left	0.336	-	0.336
		Top	-	-	-
		Bottom	0.149	-	0.149
		Front	0.398	0.046	0.444
		Rear	0.589	0.090	0.679
	LTE Band 66	Right	0.524	0.150	0.674
		Left	0.342	-	0.342
		Top	-	-	-
		Bottom	0.251	-	0.251
		Front	0.392	0.046	0.438
	LTE Band 2	Rear	0.483	0.090	0.573
		Right	0.460	0.150	0.610
		Left	0.254	-	0.254
		Top	-	-	-
		Bottom	1.126	-	1.126
	LTE Band 2	Front	0.438	0.046	0.484
		Rear	1.088	0.090	1.178
		Right	0.101	0.150	0.251
		Left	0.247	-	0.247
		Top	-	-	-
	LTE Band 2	Bottom	0.598	-	0.598
		Front	0.367	0.046	0.413
		Rear	0.426	0.090	0.516
		Right	0.160	0.150	0.310
		Left	0.197	-	0.197

Table 12.6.2 Simultaneous Transmission Scenario : 3G/4G + Bluetooth (Hotspot at 10 mm)

Exposure Condition	Mode	Configuration	3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	$\Sigma$ SAR (W/kg)
			1	2	1+2
Hotspot SAR	WCDMA 850	Top	-	0.294	0.294
		Bottom	0.220	0.294	0.514
		Front	0.353	0.294	0.647
		Rear	0.472	0.294	<b>0.766</b>
		Right	0.420	0.294	0.714
	WCDMA 1700	Left	0.246	0.294	0.540
		Top	-	0.294	0.294
		Bottom	1.021	0.294	<b>1.315</b>
		Front	0.191	0.294	0.485
		Rear	0.860	0.294	1.154
	WCDMA 1900	Right	0.063	0.294	0.357
		Left	0.176	0.294	0.470
		Top	-	0.294	0.294
		Bottom	0.063	0.294	0.357
		Front	0.363	0.294	0.657
	LTE Band 71	Rear	0.693	0.294	<b>0.987</b>
		Right	0.165	0.294	0.459
		Left	0.173	0.294	0.467
		Top	-	0.294	0.294
		Bottom	0.043	0.294	0.337
	LTE Band 12	Front	0.113	0.294	0.407
		Rear	0.216	0.294	<b>0.510</b>
		Right	0.126	0.294	0.420
		Left	0.157	0.294	0.451
		Top	-	0.294	0.294
	LTE Band 13	Bottom	0.044	0.294	0.338
		Front	0.163	0.294	0.457
		Rear	0.281	0.294	<b>0.575</b>
		Right	0.202	0.294	0.496
		Left	0.176	0.294	0.470
	LTE Band 14	Top	-	0.294	0.294
		Bottom	0.113	0.294	0.407
		Front	0.370	0.294	0.664
		Rear	0.560	0.294	<b>0.854</b>
		Right	0.480	0.294	0.774
	LTE Band 5	Left	0.336	0.294	0.630
		Top	-	0.294	0.294
		Bottom	0.149	0.294	0.443
		Front	0.398	0.294	0.692
		Rear	0.589	0.294	<b>0.883</b>
	LTE Band 66	Right	0.524	0.294	0.818
		Left	0.342	0.294	0.636
		Top	-	0.294	0.294
		Bottom	0.251	0.294	0.545
		Front	0.392	0.294	0.686
	LTE Band 2	Rear	0.483	0.294	<b>0.777</b>
		Right	0.460	0.294	0.754
		Left	0.254	0.294	0.548
		Top	-	0.294	0.294
		Bottom	<b>1.126</b>	<b>0.294</b>	<b>1.420</b>
	LTE Band 2	Front	0.438	0.294	0.732
		Rear	1.088	0.294	1.382
		Right	0.101	0.294	0.395
		Left	0.247	0.294	0.541
		Top	-	0.294	0.294
	LTE Band 2	Bottom	0.598	0.294	<b>0.892</b>
		Front	0.367	0.294	0.661
		Rear	0.426	0.294	0.720
		Right	0.160	0.294	0.454
		Left	0.197	0.294	0.491

## 12.7 Phablet SAR Simultaneous Transmission Analysis

Per FCC KDB Publication 648474 D04 Handset SAR, Phablet SAR tests were not required of Hotspot 1g SAR (scaled to maximum output power, including tolerance) < 1.2 W/kg. Therefore no further analysis was required to for Phablet Simultaneous Transmission Analysis.

## 12.8 Simultaneous Transmission Conclusion

The above numerical summed SAR results for all the worst-case simultaneous transmission conditions were below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v06 and IEEE 1528-2013 Section 6.3.4.1.2.

## 13. SAR MEASUREMENT VARIABILITY

### 13.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01r04, 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  $\geq 0.80$  W/kg, the measurement was repeated once.
2. A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was  $> 1.20$  or when the original or repeated measurement was  $\geq 1.45$  W/kg ( $\sim 10\%$  from the 1-g SAR limit).
3. A third repeated measurement was performed only if the original, first or second repeated measurement was  $\geq 1.5$  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
5. The same procedures should be adapted for measurements according to extremity exposure limits by applying a factor of 2.5 for extremity exposure to the corresponding SAR thresholds.

**Table 13.1 Body SAR Measurement Variability Results**

Frequency		Mode	Service	# of Time Slots	Spacing [Side]	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)	
1732.4	1412	WCDMA 1700	RMC	-	10 mm [Bottom]	1.000	0.917	1.09	-	-	-	-
1745.0	132322	LTE B66	-	-	10 mm [Bottom]	1.110	1.090	1.02	-	-	-	-
ANSI / IEEE C95.1-1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure						Head 1.6 W/kg (mW/g) averaged over 1 gram						

### 13.2 Measurement Uncertainty

The measured SAR was  $< 1.5$  W/kg for 1g and  $< 3.75$  W/kg for 10g for all frequency bands. Therefore, per KDB Publication 865664 D01v01r04, the extended measurement uncertainty analysis per IEEE 1528-2013 was not required.

## 14. EQUIPMENT LIST

Table 14.1.1 Test Equipment Calibration

	Type	Manufacturer	Model	Cal.Date	Next.Cal.Date	S/N
☒	SEMITEC Engineering	SEMITEC	N/A	N/A	N/A	Shield Room
☒	Robot	SPEAG	TX90XL	N/A	N/A	F13/5RR2A1/A/01
☒	Robot Controller	SPEAG	CS8C	N/A	N/A	F13/5RR2A1/C/01
☒	Joystick	SPEAG	N/A	N/A	N/A	S-13200990
☒	IntelCorei7-3770 3.40 GHz Windows 7 Professional	N/A	N/A	N/A	N/A	N/A
☒	Probe Alignment Unit LB	N/A	N/A	N/A	N/A	SE UKS 030 AA
☒	Device Holder	SPEAG	Holder	N/A	N/A	SD000H01HA
☒	Twin SAM Phantom	SPEAG	QD000P40CD	N/A	N/A	1786
☒	Data Acquisition Electronics	SPEAG	DAE4V1	2018-08-22	2019-08-22	1396
☒	Dosimetric E-Field Probe	SPEAG	EX3DV4	2018-09-25	2019-09-25	3933
☒	Dosimetric E-Field Probe	SPEAG	EX3DV4	2018-11-22	2019-11-22	7337
☒	750MHz SAR Dipole	SPEAG	D750V3	2018-01-18	2020-01-18	1049
☒	835MHz SAR Dipole	SPEAG	D835V2	2018-08-23	2020-08-23	4d159
☒	1800MHz SAR Dipole	SPEAG	D1800V2	2018-04-26	2020-04-26	2d202
☒	1900MHz SAR Dipole	SPEAG	D1900V2	2018-08-27	2020-08-27	5d176
☒	2450MHz SAR Dipole	SPEAG	D2450V2	2018-08-24	2020-08-24	920
☒	5GHz SAR Dipole	SPEAG	D5GHzV2	2018-02-15	2020-02-15	1212
☒	Network Analyzer	Agilent	E5071C	2018-02-02	2019-02-02	MY46111534
☒	Signal Generator	Agilent	E4438C	2018-07-04	2019-07-04	US41461520
☒	Amplifier	RFBAY.Inc	MPA-40-40	2018-12-20	2019-12-20	21151801
☒	Amplifier	EMPOWER	BBS3Q7ELU	2018-07-10	2019-07-10	1020
☒	High Power RF Amplifier	EMPOWER	BBS3Q8CCJ	2018-07-06	2019-07-06	1005
☒	Power Meter	HP	EPM-442A	2018-12-19	2019-12-19	GB37170267
☒	Power Meter	HP	EPM-442A	2018-12-18	2019-12-18	GB37170413
☒	Power Meter	Anritsu	ML2495A	2018-07-04	2019-07-04	1435003
☒	Power Sensor	Anritsu	MA2490A	2018-07-04	2019-07-04	1409034
☒	Power Sensor	HP	8481A	2018-12-18	2019-12-18	US37294267
☒	Power Sensor	HP	8481A	2018-12-19	2019-12-19	3318A96566
☒	Power Sensor	HP	8481A	2018-12-19	2019-12-19	2702A65976
☒	Dual Directional Coupler	Agilent	778D-012	2018-12-19	2019-12-19	50228
☒	Directional Coupler	HP	772D	2018-07-03	2019-07-03	2889A01064
☒	Low Pass Filter 1GHz	Wainwright Instruments	WLK6-1000-1400-9000-60SS	2018-07-05	2019-07-05	165
☒	Low Pass Filter 1.5GHz	Micro LAB	LA-15N	2018-07-05	2019-07-05	2
☒	Low Pass Filter 3.0GHz	Micro LAB	LA-30N	2018-07-05	2019-07-05	2
☒	Low Pass Filter 6.0GHz	Micro LAB	LA-60N	2018-12-19	2019-12-19	03942
☒	Attenuators(3 dB)	Agilent	8491B	2018-12-19	2019-12-19	MY39260700
☒	Attenuators(10 dB)	WEINSCHEL	23-10-34	2018-12-19	2019-12-19	BP4387
☒	Dielectric Probe kit	SPEAG	DAK-3.5	2018-07-24	2019-07-24	1046
☒	8960 Series 10 Wireless Comms. Test Set	Agilent	E5515C	2018-07-04	2019-07-04	GB41321164
☒	Wideband Radio Communication Tester	Rohde Schwarz	CMW500	2018-02-05	2019-02-05	101414
☒	Power Splitter	Anritsu	K241B	2018-12-18	2019-12-18	1301183
☒	Bluetooth Tester	TESCOM	TC-3000B	2018-12-18	2019-12-18	3000B70243

**NOTE(S):**

1. The E-field probe was calibrated by SPEAG, by temperature measurement procedure. Dipole Verification measurement is performed by DT&C before each test. The brain and muscle simulating material are calibrated by DT&C using the dielectric probe system and network analyzer to determine the conductivity and permittivity (dielectric constant) of the brain and muscle-equivalent material. Each equipment item was used solely within its respective calibration period.

2. 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. 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.

## 15. MEASUREMENT UNCERTAINTIES

### 750 MHz Head (SN: 3933)

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	(Ci) 10g	Standard (1g)	Standard (10g)	vi 2 or Veff
<b>Measurement System</b>								
Probe calibration	± 6.0	Normal	1	1	1	± 6.0 %	± 6.0 %	∞
Isotropy	± 1.3	Normal	1	1	1	± 1.3 %	± 1.3 %	∞
Boundary Effects	± 2.0	Rectangular	$\sqrt{3}$	1	1	± 1.2 %	± 1.2 %	∞
Probe Linearity	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Probe modulation response	± 0.0	Rectangular	$\sqrt{3}$	1	1	± 0.0 %	± 0.0 %	∞
Detection limits	± 0.25	Rectangular	$\sqrt{3}$	1	1	± 0.14 %	± 0.14 %	∞
Readout Electronics	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8	Rectangular	$\sqrt{3}$	1	1	± 0.46 %	± 0.46 %	∞
Integration time	± 2.6	Rectangular	$\sqrt{3}$	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	$\sqrt{3}$	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	$\sqrt{3}$	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	± 0.8	Rectangular	$\sqrt{3}$	1	1	± 0.46 %	± 0.46 %	∞
Probe Positioning	± 6.7	Rectangular	$\sqrt{3}$	1	1	± 3.9 %	± 3.9 %	∞
Algorithms for Max. SAR Eval.	± 4.0	Rectangular	$\sqrt{3}$	1	1	± 2.3 %	± 2.3 %	∞
<b>Test Sample Related</b>								
Device Positioning	± 2.9	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power Drift	± 5.0	Rectangular	$\sqrt{3}$	1	1	± 2.9 %	± 2.9 %	∞
SAR Scaling	± 0.0	Rectangular	$\sqrt{3}$	1	1	± 0.0 %	± 0.0 %	∞
<b>Physical Parameters</b>								
Phantom Shell	± 7.6	Rectangular	$\sqrt{3}$	1	1	± 4.4 %	± 4.4 %	∞
SAR correction	± 0.0	Normal	1	1	0.84	± 0.0 %	± 0.0 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	$\sqrt{3}$	0.64	0.43	± 1.8 %	± 1.2 %	∞
Liquid conductivity (Meas.)	± 4.2	Normal	1	0.78	0.71	± 3.3 %	± 3.0 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	$\sqrt{3}$	0.60	0.49	± 1.7 %	± 1.4 %	∞
Liquid permittivity (Meas.)	± 4.0	Normal	1	0.23	0.26	± 0.9 %	± 1.0 %	10
Temp. unc. - Conductivity	± 1.8	Rectangular	$\sqrt{3}$	0.78	0.71	± 0.8 %	± 0.7 %	∞
Temp. unc. - Permittivity	± 1.9	Rectangular	$\sqrt{3}$	0.23	0.26	± 0.3 %	± 0.3 %	∞
<b>Combined Standard Uncertainty</b>							± 11.7 %	± 11.5 %
<b>Expanded Uncertainty (k=2)</b>							± 23.4 %	± 23.0 %

The above measurement uncertainties are according to IEEE Std 1528

**750 MHz Body (SN: 3933)**

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	(Ci) 10g	Standard (1g)	Standard (10g)	vi 2 or Veff
<b>Measurement System</b>								
Probe calibration	± 6.0	Normal	1	1	1	± 6.0 %	± 6.0 %	∞
Isotropy	± 1.3	Normal	1	1	1	± 1.3 %	± 1.3 %	∞
Boundary Effects	± 2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %	∞
Probe Linearity	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Probe modulation response	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
Detection limits	± 0.25	Rectangular	√3	1	1	± 0.14 %	± 0.14 %	∞
Readout Electronics	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Probe Positioning	± 6.7	Rectangular	√3	1	1	± 3.9 %	± 3.9 %	∞
Algorithms for Max. SAR Eval.	± 4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %	∞
<b>Test Sample Related</b>								
Device Positioning	± 2.9	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %	∞
SAR Scaling	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
<b>Physical Parameters</b>								
Phantom Shell	± 7.6	Rectangular	√3	1	1	± 4.4 %	± 4.4 %	∞
SAR correction	± 0.0	Normal	1	1	0.84	± 0.0 %	± 0.0 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %	∞
Liquid conductivity (Meas.)	± 4.1	Normal	1	0.78	0.71	± 3.2 %	± 2.9 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.60	0.49	± 1.7 %	± 1.4 %	∞
Liquid permittivity (Meas.)	± 3.7	Normal	1	0.23	0.26	± 0.9 %	± 1.0 %	10
Temp. unc. - Conductivity	± 1.8	Rectangular	√3	0.78	0.71	± 0.8 %	± 0.7 %	∞
Temp. unc. - Permittivity	± 1.8	Rectangular	√3	0.23	0.26	± 0.2%	± 0.3 %	∞
<b>Combined Standard Uncertainty</b>								
<b>Expanded Uncertainty (k=2)</b>								
						<b>± 11.6 %</b>	<b>± 11.4 %</b>	330
						<b>± 23.2 %</b>	<b>± 22.8 %</b>	

The above measurement uncertainties are according to IEEE Std 1528

**835 MHz Head (SN: 7337)**

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	(Ci) 10g	Standard (1g)	Standard (10g)	vi 2 or Veff
<b>Measurement System</b>								
Probe calibration	± 6.0	Normal	1	1	1	± 6.0 %	± 6.0 %	∞
Isotropy	± 1.3	Normal	1	1	1	± 1.3 %	± 1.3 %	∞
Boundary Effects	± 2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %	∞
Probe Linearity	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Probe modulation response	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
Detection limits	± 0.25	Rectangular	√3	1	1	± 0.14 %	± 0.14 %	∞
Readout Electronics	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Probe Positioning	± 6.7	Rectangular	√3	1	1	± 3.9 %	± 3.9 %	∞
Algorithms for Max. SAR Eval.	± 4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %	∞
<b>Test Sample Related</b>								
Device Positioning	± 2.9	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %	∞
SAR Scaling	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
<b>Physical Parameters</b>								
Phantom Shell	± 7.6	Rectangular	√3	1	1	± 4.4 %	± 4.4 %	∞
SAR correction	± 0.0	Normal	1	1	0.84	± 0.0 %	± 0.0 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %	∞
Liquid conductivity (Meas.)	± 3.7	Normal	1	0.78	0.71	± 2.9 %	± 2.6 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.60	0.49	± 1.7 %	± 1.4 %	∞
Liquid permittivity (Meas.)	± 4.2	Normal	1	0.23	0.26	± 1.0 %	± 1.1 %	10
Temp. unc. - Conductivity	± 1.8	Rectangular	√3	0.78	0.71	± 0.8 %	± 0.7 %	∞
Temp. unc. - Permittivity	± 1.9	Rectangular	√3	0.23	0.26	± 0.3 %	± 0.3 %	∞
<b>Combined Standard Uncertainty</b>								
<b>Expanded Uncertainty (k=2)</b>								
						± 11.6 %	± 11.4 %	330
						± 23.2 %	± 22.8 %	

The above measurement uncertainties are according to IEEE Std 1528

**835 MHz Body (SN: 7337)**

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	(Ci) 10g	Standard (1g)	Standard (10g)	vi 2 or Veff
<b>Measurement System</b>								
Probe calibration	± 6.0	Normal	1	1	1	± 6.0 %	± 6.0 %	∞
Isotropy	± 1.3	Normal	1	1	1	± 1.3 %	± 1.3 %	∞
Boundary Effects	± 2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %	∞
Probe Linearity	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Probe modulation response	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
Detection limits	± 0.25	Rectangular	√3	1	1	± 0.14 %	± 0.14 %	∞
Readout Electronics	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Probe Positioning	± 6.7	Rectangular	√3	1	1	± 3.9 %	± 3.9 %	∞
Algorithms for Max. SAR Eval.	± 4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %	∞
<b>Test Sample Related</b>								
Device Positioning	± 2.9	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %	∞
SAR Scaling	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
<b>Physical Parameters</b>								
Phantom Shell	± 7.6	Rectangular	√3	1	1	± 4.4 %	± 4.4 %	∞
SAR correction	± 0.0	Normal	1	1	0.84	± 0.0 %	± 0.0 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %	∞
Liquid conductivity (Meas.)	± 4.0	Normal	1	0.78	0.71	± 3.1 %	± 2.8 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.60	0.49	± 1.7 %	± 1.4 %	∞
Liquid permittivity (Meas.)	± 3.7	Normal	1	0.23	0.26	± 0.9 %	± 1.0 %	10
Temp. unc. - Conductivity	± 1.8	Rectangular	√3	0.78	0.71	± 0.8 %	± 0.7 %	∞
Temp. unc. - Permittivity	± 1.8	Rectangular	√3	0.23	0.26	± 0.2 %	± 0.3 %	∞
<b>Combined Standard Uncertainty</b>								
<b>Expanded Uncertainty (k=2)</b>								
						± 11.6 %	± 11.4 %	330
						± 23.2 %	± 22.8 %	

The above measurement uncertainties are according to IEEE Std 1528

**835 MHz Body (SN: 3933)**

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	(Ci) 10g	Standard (1g)	Standard (10g)	vi 2 or Veff
<b>Measurement System</b>								
Probe calibration	± 6.0	Normal	1	1	1	± 6.0 %	± 6.0 %	∞
Isotropy	± 1.3	Normal	1	1	1	± 1.3 %	± 1.3 %	∞
Boundary Effects	± 2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %	∞
Probe Linearity	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Probe modulation response	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
Detection limits	± 0.25	Rectangular	√3	1	1	± 0.14 %	± 0.14 %	∞
Readout Electronics	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Probe Positioning	± 6.7	Rectangular	√3	1	1	± 3.9 %	± 3.9 %	∞
Algorithms for Max. SAR Eval.	± 4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %	∞
<b>Test Sample Related</b>								
Device Positioning	± 2.9	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %	∞
SAR Scaling	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
<b>Physical Parameters</b>								
Phantom Shell	± 7.6	Rectangular	√3	1	1	± 4.4 %	± 4.4 %	∞
SAR correction	± 0.0	Normal	1	1	0.84	± 0.0 %	± 0.0 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %	∞
Liquid conductivity (Meas.)	± 3.9	Normal	1	0.78	0.71	± 3.0 %	± 2.8 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.60	0.49	± 1.7 %	± 1.4 %	∞
Liquid permittivity (Meas.)	± 4.1	Normal	1	0.23	0.26	± 0.9 %	± 1.1 %	10
Temp. unc. - Conductivity	± 1.9	Rectangular	√3	0.78	0.71	± 0.9 %	± 0.8 %	∞
Temp. unc. - Permittivity	± 1.8	Rectangular	√3	0.23	0.26	± 0.2 %	± 0.3 %	∞
<b>Combined Standard Uncertainty</b>								
						± 11.6 %	± 11.4 %	330
<b>Expanded Uncertainty (k=2)</b>								
						± 23.2 %	± 22.8 %	

The above measurement uncertainties are according to IEEE Std 1528

**1800 MHz Head (SN: 7337)**

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	(Ci) 10g	Standard (1g)	Standard (10g)	vi 2 or Veff
<b>Measurement System</b>								
Probe calibration	± 6.0	Normal	1	1	1	± 6.0 %	± 6.0 %	∞
Isotropy	± 1.3	Normal	1	1	1	± 1.3 %	± 1.3 %	∞
Boundary Effects	± 2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %	∞
Probe Linearity	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Probe modulation response	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
Detection limits	± 0.25	Rectangular	√3	1	1	± 0.14 %	± 0.14 %	∞
Readout Electronics	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Probe Positioning	± 6.7	Rectangular	√3	1	1	± 3.9 %	± 3.9 %	∞
Algorithms for Max. SAR Eval.	± 4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %	∞
<b>Test Sample Related</b>								
Device Positioning	± 2.9	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %	∞
SAR Scaling	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
<b>Physical Parameters</b>								
Phantom Shell	± 7.6	Rectangular	√3	1	1	± 4.4 %	± 4.4 %	∞
SAR correction	± 0.0	Normal	1	1	0.84	± 0.0 %	± 0.0 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %	∞
Liquid conductivity (Meas.)	± 4.0	Normal	1	0.78	0.71	± 3.1 %	± 2.8 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.60	0.49	± 1.7 %	± 1.4 %	∞
Liquid permittivity (Meas.)	± 4.1	Normal	1	0.23	0.26	± 0.9 %	± 1.1 %	10
Temp. unc. - Conductivity	± 1.8	Rectangular	√3	0.78	0.71	± 0.8 %	± 0.7 %	∞
Temp. unc. - Permittivity	± 1.9	Rectangular	√3	0.23	0.26	± 0.3 %	± 0.3 %	∞
<b>Combined Standard Uncertainty</b>							<b>± 11.6 %</b>	<b>± 11.4 %</b>
<b>Expanded Uncertainty (k=2)</b>							<b>± 23.2 %</b>	<b>± 22.8 %</b>

The above measurement uncertainties are according to IEEE Std 1528

**1800 MHz Body (SN: 3933)**

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	(Ci) 10g	Standard (1g)	Standard (10g)	vi 2 or Veff
<b>Measurement System</b>								
Probe calibration	± 6.0	Normal	1	1	1	± 6.0 %	± 6.0 %	∞
Isotropy	± 1.3	Normal	1	1	1	± 1.3 %	± 1.3 %	∞
Boundary Effects	± 2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %	∞
Probe Linearity	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Probe modulation response	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
Detection limits	± 0.25	Rectangular	√3	1	1	± 0.14 %	± 0.14 %	∞
Readout Electronics	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Probe Positioning	± 6.7	Rectangular	√3	1	1	± 3.9 %	± 3.9 %	∞
Algorithms for Max. SAR Eval.	± 4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %	∞
<b>Test Sample Related</b>								
Device Positioning	± 2.9	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %	∞
SAR Scaling	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
<b>Physical Parameters</b>								
Phantom Shell	± 7.6	Rectangular	√3	1	1	± 4.4 %	± 4.4 %	∞
SAR correction	± 0.0	Normal	1	1	0.84	± 0.0 %	± 0.0 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %	∞
Liquid conductivity (Meas.)	± 3.8	Normal	1	0.78	0.71	± 3.0 %	± 2.7 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.60	0.49	± 1.7 %	± 1.4 %	∞
Liquid permittivity (Meas.)	± 4.0	Normal	1	0.23	0.26	± 0.9 %	± 1.0 %	10
Temp. unc. - Conductivity	± 1.8	Rectangular	√3	0.78	0.71	± 0.8 %	± 0.7 %	∞
Temp. unc. - Permittivity	± 1.8	Rectangular	√3	0.23	0.26	± 0.2 %	± 0.3 %	∞
<b>Combined Standard Uncertainty</b>								
<b>Expanded Uncertainty (k=2)</b>								

The above measurement uncertainties are according to IEEE Std 1528

**1900 MHz Head (SN: 7337)**

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	(Ci) 10g	Standard (1g)	Standard (10g)	vi 2 or Veff
<b>Measurement System</b>								
Probe calibration	± 6.0	Normal	1	1	1	± 6.0 %	± 6.0 %	∞
Isotropy	± 1.3	Normal	1	1	1	± 1.3 %	± 1.3 %	∞
Boundary Effects	± 2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %	∞
Probe Linearity	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Probe modulation response	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
Detection limits	± 0.25	Rectangular	√3	1	1	± 0.14 %	± 0.14 %	∞
Readout Electronics	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Probe Positioning	± 6.7	Rectangular	√3	1	1	± 3.9 %	± 3.9 %	∞
Algorithms for Max. SAR Eval.	± 4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %	∞
<b>Test Sample Related</b>								
Device Positioning	± 2.9	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %	∞
SAR Scaling	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
<b>Physical Parameters</b>								
Phantom Shell	± 7.6	Rectangular	√3	1	1	± 4.4 %	± 4.4 %	∞
SAR correction	± 0.0	Normal	1	1	0.84	± 0.0 %	± 0.0 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %	∞
Liquid conductivity (Meas.)	± 4.0	Normal	1	0.78	0.71	± 3.1 %	± 2.8 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.60	0.49	± 1.7 %	± 1.4 %	∞
Liquid permittivity (Meas.)	± 4.2	Normal	1	0.23	0.26	± 1.0 %	± 1.1 %	10
Temp. unc. - Conductivity	± 1.9	Rectangular	√3	0.78	0.71	± 0.9 %	± 0.8 %	∞
Temp. unc. - Permittivity	± 1.8	Rectangular	√3	0.23	0.26	± 0.2 %	± 0.3 %	∞
<b>Combined Standard Uncertainty</b>							<b>± 11.6 %</b>	<b>± 11.4 %</b>
<b>Expanded Uncertainty (k=2)</b>							<b>± 23.2 %</b>	<b>± 22.8 %</b>

The above measurement uncertainties are according to IEEE Std 1528

**1900 MHz Body (SN: 7337)**

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	(Ci) 10g	Standard (1g)	Standard (10g)	vi 2 or Veff
<b>Measurement System</b>								
Probe calibration	± 6.0	Normal	1	1	1	± 6.0 %	± 6.0 %	∞
Isotropy	± 1.3	Normal	1	1	1	± 1.3 %	± 1.3 %	∞
Boundary Effects	± 2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %	∞
Probe Linearity	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Probe modulation response	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
Detection limits	± 0.25	Rectangular	√3	1	1	± 0.14 %	± 0.14 %	∞
Readout Electronics	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Probe Positioning	± 6.7	Rectangular	√3	1	1	± 3.9 %	± 3.9 %	∞
Algorithms for Max. SAR Eval.	± 4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %	∞
<b>Test Sample Related</b>								
Device Positioning	± 2.9	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %	∞
SAR Scaling	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
<b>Physical Parameters</b>								
Phantom Shell	± 7.6	Rectangular	√3	1	1	± 4.4 %	± 4.4 %	∞
SAR correction	± 0.0	Normal	1	1	0.84	± 0.0 %	± 0.0 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %	∞
Liquid conductivity (Meas.)	± 3.8	Normal	1	0.78	0.71	± 3.0 %	± 2.7 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.60	0.49	± 1.7 %	± 1.4 %	∞
Liquid permittivity (Meas.)	± 4.1	Normal	1	0.23	0.26	± 0.9 %	± 1.1 %	10
Temp. unc. - Conductivity	± 1.9	Rectangular	√3	0.78	0.71	± 0.9 %	± 0.8 %	∞
Temp. unc. - Permittivity	± 1.9	Rectangular	√3	0.23	0.26	± 0.3 %	± 0.3 %	∞
<b>Combined Standard Uncertainty</b>								
<b>Expanded Uncertainty (k=2)</b>								

The above measurement uncertainties are according to IEEE Std 1528

**1900 MHz Body (SN: 3933)**

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	(Ci) 10g	Standard (1g)	Standard (10g)	vi 2 or Veff
<b>Measurement System</b>								
Probe calibration	± 6.0	Normal	1	1	1	± 6.0 %	± 6.0 %	∞
Isotropy	± 1.3	Normal	1	1	1	± 1.3 %	± 1.3 %	∞
Boundary Effects	± 2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %	∞
Probe Linearity	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Probe modulation response	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
Detection limits	± 0.25	Rectangular	√3	1	1	± 0.14 %	± 0.14 %	∞
Readout Electronics	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Probe Positioning	± 6.7	Rectangular	√3	1	1	± 3.9 %	± 3.9 %	∞
Algorithms for Max. SAR Eval.	± 4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %	∞
<b>Test Sample Related</b>								
Device Positioning	± 2.9	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %	∞
SAR Scaling	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
<b>Physical Parameters</b>								
Phantom Shell	± 7.6	Rectangular	√3	1	1	± 4.4 %	± 4.4 %	∞
SAR correction	± 0.0	Normal	1	1	0.84	± 0.0 %	± 0.0 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %	∞
Liquid conductivity (Meas.)	± 4.1	Normal	1	0.78	0.71	± 3.2 %	± 2.9 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.60	0.49	± 1.7 %	± 1.4 %	∞
Liquid permittivity (Meas.)	± 3.9	Normal	1	0.23	0.26	± 0.9 %	± 1.0 %	10
Temp. unc. - Conductivity	± 1.8	Rectangular	√3	0.78	0.71	± 0.8 %	± 0.7 %	∞
Temp. unc. - Permittivity	± 1.8	Rectangular	√3	0.23	0.26	± 0.2 %	± 0.3 %	∞
<b>Combined Standard Uncertainty</b>								
<b>Expanded Uncertainty (k=2)</b>								
						± 11.6 %	± 11.4 %	330
						± 23.2 %	± 22.8 %	

The above measurement uncertainties are according to IEEE Std 1528

**2450 MHz Head (SN: 3933)**

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	(Ci) 10g	Standard (1g)	Standard (10g)	vi 2 or Veff
<b>Measurement System</b>								
Probe calibration	± 6.0	Normal	1	1	1	± 6.0 %	± 6.0 %	∞
Isotropy	± 1.3	Normal	1	1	1	± 1.3 %	± 1.3 %	∞
Boundary Effects	± 2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %	∞
Probe Linearity	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Probe modulation response	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
Detection limits	± 0.25	Rectangular	√3	1	1	± 0.14 %	± 0.14 %	∞
Readout Electronics	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Probe Positioning	± 6.7	Rectangular	√3	1	1	± 3.9 %	± 3.9 %	∞
Algorithms for Max. SAR Eval.	± 4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %	∞
<b>Test Sample Related</b>								
Device Positioning	± 2.9	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %	∞
SAR Scaling	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
<b>Physical Parameters</b>								
Phantom Shell	± 7.6	Rectangular	√3	1	1	± 4.4 %	± 4.4 %	∞
SAR correction	± 0.0	Normal	1	1	0.84	± 0.0 %	± 0.0 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %	∞
Liquid conductivity (Meas.)	± 3.8	Normal	1	0.78	0.71	± 3.0 %	± 2.7 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.60	0.49	± 1.7 %	± 1.4 %	∞
Liquid permittivity (Meas.)	± 4.0	Normal	1	0.23	0.26	± 0.9 %	± 1.0 %	10
Temp. unc. - Conductivity	± 1.9	Rectangular	√3	0.78	0.71	± 0.9 %	± 0.8 %	∞
Temp. unc. - Permittivity	± 1.8	Rectangular	√3	0.23	0.26	± 0.2 %	± 0.3 %	∞
<b>Combined Standard Uncertainty</b>							<b>± 11.6 %</b>	<b>± 11.4 %</b>
<b>Expanded Uncertainty (k=2)</b>							<b>± 23.2 %</b>	<b>± 22.8 %</b>

The above measurement uncertainties are according to IEEE Std 1528

**2450 MHz Body (SN: 3933)**

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	(Ci) 10g	Standard (1g)	Standard (10g)	vi 2 or Veff
<b>Measurement System</b>								
Probe calibration	± 6.0	Normal	1	1	1	± 6.0 %	± 6.0 %	∞
Isotropy	± 1.3	Normal	1	1	1	± 1.3 %	± 1.3 %	∞
Boundary Effects	± 2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %	∞
Probe Linearity	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Probe modulation response	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
Detection limits	± 0.25	Rectangular	√3	1	1	± 0.14 %	± 0.14 %	∞
Readout Electronics	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Probe Positioning	± 6.7	Rectangular	√3	1	1	± 3.9 %	± 3.9 %	∞
Algorithms for Max. SAR Eval.	± 4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %	∞
<b>Test Sample Related</b>								
Device Positioning	± 2.9	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %	∞
SAR Scaling	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
<b>Physical Parameters</b>								
Phantom Shell	± 7.6	Rectangular	√3	1	1	± 4.4 %	± 4.4 %	∞
SAR correction	± 0.0	Normal	1	1	0.84	± 0.0 %	± 0.0 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %	∞
Liquid conductivity (Meas.)	± 3.7	Normal	1	0.78	0.71	± 2.9 %	± 2.6 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.60	0.49	± 1.7 %	± 1.4 %	∞
Liquid permittivity (Meas.)	± 4.2	Normal	1	0.23	0.26	± 1.0 %	± 1.1 %	10
Temp. unc. - Conductivity	± 1.9	Rectangular	√3	0.78	0.71	± 0.9 %	± 0.8 %	∞
Temp. unc. - Permittivity	± 1.9	Rectangular	√3	0.23	0.26	± 0.3 %	± 0.3 %	∞
<b>Combined Standard Uncertainty</b>								
<b>Expanded Uncertainty (k=2)</b>								

The above measurement uncertainties are according to IEEE Std 1528

### 5200 MHz Head (SN: 3933)

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	(Ci) 10g	Standard (1g)	Standard (10g)	vi 2 or Veff
<b>Measurement System</b>								
Probe calibration	± 6.55	Normal	1	1	1	± 6.6 %	± 6.6 %	∞
Isotropy	± 1.3	Normal	1	1	1	± 1.3 %	± 1.3 %	∞
Boundary Effects	± 2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %	∞
Probe Linearity	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Probe modulation response	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
Detection limits	± 0.25	Rectangular	√3	1	1	± 0.14 %	± 0.14 %	∞
Readout Electronics	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Probe Positioning	± 6.7	Rectangular	√3	1	1	± 3.9 %	± 3.9 %	∞
Algorithms for Max. SAR Eval.	± 4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %	∞
<b>Test Sample Related</b>								
Device Positioning	± 2.9	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %	∞
SAR Scaling	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
<b>Physical Parameters</b>								
Phantom Shell	± 7.6	Rectangular	√3	1	1	± 4.4 %	± 4.4 %	∞
SAR correction	± 0.0	Normal	1	1	0.84	± 0.0 %	± 0.0 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %	∞
Liquid conductivity (Meas.)	± 4.1	Normal	1	0.78	0.71	± 3.2 %	± 2.9 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.60	0.49	± 1.7 %	± 1.4 %	∞
Liquid permittivity (Meas.)	± 3.9	Normal	1	0.23	0.26	± 0.9 %	± 1.0 %	10
Temp. unc. - Conductivity	± 2.0	Rectangular	√3	0.78	0.71	± 0.9 %	± 0.8 %	∞
Temp. unc. - Permittivity	± 1.8	Rectangular	√3	0.23	0.26	± 0.2 %	± 0.3 %	∞
<b>Combined Standard Uncertainty</b>							<b>± 11.9 %</b>	<b>± 11.7 %</b>
<b>Expanded Uncertainty (k=2)</b>							<b>± 23.8 %</b>	<b>± 23.4 %</b>

The above measurement uncertainties are according to IEEE Std 1528

**5200 MHz Body (SN: 3933)**

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	(Ci) 10g	Standard (1g)	Standard (10g)	vi 2 or Veff
<b>Measurement System</b>								
Probe calibration	± 6.55	Normal	1	1	1	± 6.6 %	± 6.6 %	∞
Isotropy	± 1.3	Normal	1	1	1	± 1.3 %	± 1.3 %	∞
Boundary Effects	± 2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %	∞
Probe Linearity	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Probe modulation response	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
Detection limits	± 0.25	Rectangular	√3	1	1	± 0.14 %	± 0.14 %	∞
Readout Electronics	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Probe Positioning	± 6.7	Rectangular	√3	1	1	± 3.9 %	± 3.9 %	∞
Algorithms for Max. SAR Eval.	± 4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %	∞
<b>Test Sample Related</b>								
Device Positioning	± 2.9	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %	∞
SAR Scaling	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
<b>Physical Parameters</b>								
Phantom Shell	± 7.6	Rectangular	√3	1	1	± 4.4 %	± 4.4 %	∞
SAR correction	± 0.0	Normal	1	1	0.84	± 0.0 %	± 0.0 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %	∞
Liquid conductivity (Meas.)	± 3.8	Normal	1	0.78	0.71	± 3.0 %	± 2.7 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.60	0.49	± 1.7 %	± 1.4 %	∞
Liquid permittivity (Meas.)	± 4.3	Normal	1	0.23	0.26	± 1.0 %	± 1.1 %	10
Temp. unc. - Conductivity	± 1.9	Rectangular	√3	0.78	0.71	± 0.9 %	± 0.8 %	∞
Temp. unc. - Permittivity	± 1.8	Rectangular	√3	0.23	0.26	± 0.2 %	± 0.3 %	∞
<b>Combined Standard Uncertainty</b>								
<b>Expanded Uncertainty (k=2)</b>								

The above measurement uncertainties are according to IEEE Std 1528

### 5300 MHz Head (SN: 3933)

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	(Ci) 10g	Standard (1g)	Standard (10g)	vi 2 or Veff
<b>Measurement System</b>								
Probe calibration	± 6.55	Normal	1	1	1	± 6.6 %	± 6.6 %	∞
Isotropy	± 1.3	Normal	1	1	1	± 1.3 %	± 1.3 %	∞
Boundary Effects	± 2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %	∞
Probe Linearity	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Probe modulation response	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
Detection limits	± 0.25	Rectangular	√3	1	1	± 0.14 %	± 0.14 %	∞
Readout Electronics	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Probe Positioning	± 6.7	Rectangular	√3	1	1	± 3.9 %	± 3.9 %	∞
Algorithms for Max. SAR Eval.	± 4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %	∞
<b>Test Sample Related</b>								
Device Positioning	± 2.9	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %	∞
SAR Scaling	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
<b>Physical Parameters</b>								
Phantom Shell	± 7.6	Rectangular	√3	1	1	± 4.4 %	± 4.4 %	∞
SAR correction	± 0.0	Normal	1	1	0.84	± 0.0 %	± 0.0 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %	∞
Liquid conductivity (Meas.)	± 3.7	Normal	1	0.78	0.71	± 2.9 %	± 2.6 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.60	0.49	± 1.7 %	± 1.4 %	∞
Liquid permittivity (Meas.)	± 4.2	Normal	1	0.23	0.26	± 1.0 %	± 1.1 %	10
Temp. unc. - Conductivity	± 1.9	Rectangular	√3	0.78	0.71	± 0.9 %	± 0.8 %	∞
Temp. unc. - Permittivity	± 1.9	Rectangular	√3	0.23	0.26	± 0.3 %	± 0.3 %	∞
<b>Combined Standard Uncertainty</b>								
<b>Expanded Uncertainty (k=2)</b>								

The above measurement uncertainties are according to IEEE Std 1528

### 5300 MHz Body (SN: 3933)

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	(Ci) 10g	Standard (1g)	Standard (10g)	vi 2 or Veff
<b>Measurement System</b>								
Probe calibration	± 6.55	Normal	1	1	1	± 6.6 %	± 6.6 %	∞
Isotropy	± 1.3	Normal	1	1	1	± 1.3 %	± 1.3 %	∞
Boundary Effects	± 2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %	∞
Probe Linearity	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Probe modulation response	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
Detection limits	± 0.25	Rectangular	√3	1	1	± 0.14 %	± 0.14 %	∞
Readout Electronics	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Probe Positioning	± 6.7	Rectangular	√3	1	1	± 3.9 %	± 3.9 %	∞
Algorithms for Max. SAR Eval.	± 4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %	∞
<b>Test Sample Related</b>								
Device Positioning	± 2.9	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %	∞
SAR Scaling	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
<b>Physical Parameters</b>								
Phantom Shell	± 7.6	Rectangular	√3	1	1	± 4.4 %	± 4.4 %	∞
SAR correction	± 0.0	Normal	1	1	0.84	± 0.0 %	± 0.0 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %	∞
Liquid conductivity (Meas.)	± 3.9	Normal	1	0.78	0.71	± 3.0 %	± 2.8 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.60	0.49	± 1.7 %	± 1.4 %	∞
Liquid permittivity (Meas.)	± 4.1	Normal	1	0.23	0.26	± 0.9 %	± 1.1 %	10
Temp. unc. - Conductivity	± 1.8	Rectangular	√3	0.78	0.71	± 0.8 %	± 0.7 %	∞
Temp. unc. - Permittivity	± 1.9	Rectangular	√3	0.23	0.26	± 0.3 %	± 0.3 %	∞
<b>Combined Standard Uncertainty</b>							± 11.9 %	± 11.7 %
<b>Expanded Uncertainty (k=2)</b>							± 23.8 %	± 23.4 %

The above measurement uncertainties are according to IEEE Std 1528

**5500 MHz Head (SN: 3933)**

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	(Ci) 10g	Standard (1g)	Standard (10g)	vi 2 or Veff
<b>Measurement System</b>								
Probe calibration	± 6.55	Normal	1	1	1	± 6.6 %	± 6.6 %	∞
Isotropy	± 1.3	Normal	1	1	1	± 1.3 %	± 1.3 %	∞
Boundary Effects	± 2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %	∞
Probe Linearity	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Probe modulation response	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
Detection limits	± 0.25	Rectangular	√3	1	1	± 0.14 %	± 0.14 %	∞
Readout Electronics	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Probe Positioning	± 6.7	Rectangular	√3	1	1	± 3.9 %	± 3.9 %	∞
Algorithms for Max. SAR Eval.	± 4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %	∞
<b>Test Sample Related</b>								
Device Positioning	± 2.9	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %	∞
SAR Scaling	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
<b>Physical Parameters</b>								
Phantom Shell	± 7.6	Rectangular	√3	1	1	± 4.4 %	± 4.4 %	∞
SAR correction	± 0.0	Normal	1	1	0.84	± 0.0 %	± 0.0 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %	∞
Liquid conductivity (Meas.)	± 3.7	Normal	1	0.78	0.71	± 2.9 %	± 2.6 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.60	0.49	± 1.7 %	± 1.4 %	∞
Liquid permittivity (Meas.)	± 4.3	Normal	1	0.23	0.26	± 1.0 %	± 1.1 %	10
Temp. unc. - Conductivity	± 1.8	Rectangular	√3	0.78	0.71	± 0.8 %	± 0.7 %	∞
Temp. unc. - Permittivity	± 1.9	Rectangular	√3	0.23	0.26	± 0.3 %	± 0.3 %	∞
<b>Combined Standard Uncertainty</b>								
± 11.9 %								
<b>Expanded Uncertainty (k=2)</b>								
± 23.8 %								

The above measurement uncertainties are according to IEEE Std 1528

**5500 MHz Body (SN: 3933)**

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	(Ci) 10g	Standard (1g)	Standard (10g)	vi 2 or Veff
<b>Measurement System</b>								
Probe calibration	± 6.55	Normal	1	1	1	± 6.6 %	± 6.6 %	∞
Isotropy	± 1.3	Normal	1	1	1	± 1.3 %	± 1.3 %	∞
Boundary Effects	± 2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %	∞
Probe Linearity	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Probe modulation response	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
Detection limits	± 0.25	Rectangular	√3	1	1	± 0.14 %	± 0.14 %	∞
Readout Electronics	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Probe Positioning	± 6.7	Rectangular	√3	1	1	± 3.9 %	± 3.9 %	∞
Algorithms for Max. SAR Eval.	± 4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %	∞
<b>Test Sample Related</b>								
Device Positioning	± 2.9	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %	∞
SAR Scaling	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
<b>Physical Parameters</b>								
Phantom Shell	± 7.6	Rectangular	√3	1	1	± 4.4 %	± 4.4 %	∞
SAR correction	± 0.0	Normal	1	1	0.84	± 0.0 %	± 0.0 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %	∞
Liquid conductivity (Meas.)	± 3.8	Normal	1	0.78	0.71	± 3.0 %	± 2.7 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.60	0.49	± 1.7 %	± 1.4 %	∞
Liquid permittivity (Meas.)	± 4.3	Normal	1	0.23	0.26	± 1.0 %	± 1.1 %	10
Temp. unc. - Conductivity	± 1.9	Rectangular	√3	0.78	0.71	± 0.9 %	± 0.8 %	∞
Temp. unc. - Permittivity	± 1.9	Rectangular	√3	0.23	0.26	± 0.3 %	± 0.3 %	∞
<b>Combined Standard Uncertainty</b>								
<b>Expanded Uncertainty (k=2)</b>								

The above measurement uncertainties are according to IEEE Std 1528

### 5600 MHz Head (SN: 3933)

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	(Ci) 10g	Standard (1g)	Standard (10g)	vi 2 or Veff
<b>Measurement System</b>								
Probe calibration	± 6.55	Normal	1	1	1	± 6.6 %	± 6.6 %	∞
Isotropy	± 1.3	Normal	1	1	1	± 1.3 %	± 1.3 %	∞
Boundary Effects	± 2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %	∞
Probe Linearity	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Probe modulation response	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
Detection limits	± 0.25	Rectangular	√3	1	1	± 0.14 %	± 0.14 %	∞
Readout Electronics	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Probe Positioning	± 6.7	Rectangular	√3	1	1	± 3.9 %	± 3.9 %	∞
Algorithms for Max. SAR Eval.	± 4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %	∞
<b>Test Sample Related</b>								
Device Positioning	± 2.9	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %	∞
SAR Scaling	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
<b>Physical Parameters</b>								
Phantom Shell	± 7.6	Rectangular	√3	1	1	± 4.4 %	± 4.4 %	∞
SAR correction	± 0.0	Normal	1	1	0.84	± 0.0 %	± 0.0 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %	∞
Liquid conductivity (Meas.)	± 3.9	Normal	1	0.78	0.71	± 3.0 %	± 2.8 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.60	0.49	± 1.7 %	± 1.4 %	∞
Liquid permittivity (Meas.)	± 4.2	Normal	1	0.23	0.26	± 1.0 %	± 1.1 %	10
Temp. unc. - Conductivity	± 1.8	Rectangular	√3	0.78	0.71	± 0.8 %	± 0.7 %	∞
Temp. unc. - Permittivity	± 1.9	Rectangular	√3	0.23	0.26	± 0.3 %	± 0.3 %	∞
<b>Combined Standard Uncertainty</b>								
<b>Expanded Uncertainty (k=2)</b>								
						± 11.9 %	± 11.7 %	330
						± 23.8 %	± 23.4 %	

The above measurement uncertainties are according to IEEE Std 1528

**5600 MHz Body (SN: 3933)**

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	(Ci) 10g	Standard (1g)	Standard (10g)	vi 2 or Veff
<b>Measurement System</b>								
Probe calibration	± 6.55	Normal	1	1	1	± 6.6 %	± 6.6 %	∞
Isotropy	± 1.3	Normal	1	1	1	± 1.3 %	± 1.3 %	∞
Boundary Effects	± 2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %	∞
Probe Linearity	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Probe modulation response	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
Detection limits	± 0.25	Rectangular	√3	1	1	± 0.14 %	± 0.14 %	∞
Readout Electronics	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Probe Positioning	± 6.7	Rectangular	√3	1	1	± 3.9 %	± 3.9 %	∞
Algorithms for Max. SAR Eval.	± 4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %	∞
<b>Test Sample Related</b>								
Device Positioning	± 2.9	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %	∞
SAR Scaling	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
<b>Physical Parameters</b>								
Phantom Shell	± 7.6	Rectangular	√3	1	1	± 4.4 %	± 4.4 %	∞
SAR correction	± 0.0	Normal	1	1	0.84	± 0.0 %	± 0.0 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %	∞
Liquid conductivity (Meas.)	± 4.0	Normal	1	0.78	0.71	± 3.1 %	± 2.8 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.60	0.49	± 1.7 %	± 1.4 %	∞
Liquid permittivity (Meas.)	± 4.1	Normal	1	0.23	0.26	± 0.9 %	± 1.1 %	10
Temp. unc. - Conductivity	± 1.9	Rectangular	√3	0.78	0.71	± 0.9 %	± 0.8 %	∞
Temp. unc. - Permittivity	± 1.9	Rectangular	√3	0.23	0.26	± 0.3 %	± 0.3 %	∞
<b>Combined Standard Uncertainty</b>								
<b>Expanded Uncertainty (k=2)</b>								
						± 11.9 %	± 11.7 %	330
						± 23.8 %	± 23.4 %	

The above measurement uncertainties are according to IEEE Std 1528

5800 MHz Head (SN: 3933)

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	(Ci) 10g	Standard (1g)	Standard (10g)	vi 2 or Veff
<b>Measurement System</b>								
Probe calibration	± 6.55	Normal	1	1	1	± 6.6 %	± 6.6 %	∞
Isotropy	± 1.3	Normal	1	1	1	± 1.3 %	± 1.3 %	∞
Boundary Effects	± 2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %	∞
Probe Linearity	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Probe modulation response	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
Detection limits	± 0.25	Rectangular	√3	1	1	± 0.14 %	± 0.14 %	∞
Readout Electronics	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Probe Positioning	± 6.7	Rectangular	√3	1	1	± 3.9 %	± 3.9 %	∞
Algorithms for Max. SAR Eval.	± 4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %	∞
<b>Test Sample Related</b>								
Device Positioning	± 2.9	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %	∞
SAR Scaling	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
<b>Physical Parameters</b>								
Phantom Shell	± 7.6	Rectangular	√3	1	1	± 4.4 %	± 4.4 %	∞
SAR correction	± 0.0	Normal	1	1	0.84	± 0.0 %	± 0.0 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %	∞
Liquid conductivity (Meas.)	± 4.3	Normal	1	0.78	0.71	± 3.4 %	± 3.1 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.60	0.49	± 1.7 %	± 1.4 %	∞
Liquid permittivity (Meas.)	± 4.0	Normal	1	0.23	0.26	± 0.9 %	± 1.0 %	10
Temp. unc. - Conductivity	± 1.8	Rectangular	√3	0.78	0.71	± 0.8 %	± 0.7 %	∞
Temp. unc. - Permittivity	± 2.0	Rectangular	√3	0.23	0.26	± 0.3 %	± 0.3 %	∞
<b>Combined Standard Uncertainty</b>							± 12.0 %	± 11.8 %
<b>Expanded Uncertainty (k=2)</b>							± 24.0 %	± 23.6 %

The above measurement uncertainties are according to IEEE Std 1528

**5800 MHz Body (SN: 3933)**

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	(Ci) 10g	Standard (1g)	Standard (10g)	vi 2 or Veff
<b>Measurement System</b>								
Probe calibration	± 6.55	Normal	1	1	1	± 6.6 %	± 6.6 %	∞
Isotropy	± 1.3	Normal	1	1	1	± 1.3 %	± 1.3 %	∞
Boundary Effects	± 2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %	∞
Probe Linearity	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Probe modulation response	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
Detection limits	± 0.25	Rectangular	√3	1	1	± 0.14 %	± 0.14 %	∞
Readout Electronics	± 0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	± 0.8	Rectangular	√3	1	1	± 0.46 %	± 0.46 %	∞
Probe Positioning	± 6.7	Rectangular	√3	1	1	± 3.9 %	± 3.9 %	∞
Algorithms for Max. SAR Eval.	± 4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %	∞
<b>Test Sample Related</b>								
Device Positioning	± 2.9	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %	∞
SAR Scaling	± 0.0	Rectangular	√3	1	1	± 0.0 %	± 0.0 %	∞
<b>Physical Parameters</b>								
Phantom Shell	± 7.6	Rectangular	√3	1	1	± 4.4 %	± 4.4 %	∞
SAR correction	± 0.0	Normal	1	1	0.84	± 0.0 %	± 0.0 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %	∞
Liquid conductivity (Meas.)	± 4.2	Normal	1	0.78	0.71	± 3.3 %	± 3.0 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.60	0.49	± 1.7 %	± 1.4 %	∞
Liquid permittivity (Meas.)	± 3.8	Normal	1	0.23	0.26	± 0.9 %	± 1.0 %	10
Temp. unc. - Conductivity	± 1.9	Rectangular	√3	0.78	0.71	± 0.9 %	± 0.8 %	∞
Temp. unc. - Permittivity	± 2.0	Rectangular	√3	0.23	0.26	± 0.3 %	± 0.3 %	∞
<b>Combined Standard Uncertainty</b>							± 11.9 %	± 11.8 %
<b>Expanded Uncertainty (k=2)</b>							± 23.8 %	± 23.6 %

The above measurement uncertainties are according to IEEE Std 1528

## **16. CONCLUSION**

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### **Measurement Conclusion**

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

Please note that the absorption and distribution of electromagnetic energy in the body are every 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 impossible biological effect 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 innumerable factors may interact to determine the specific biological outcome of an exposure to electromagnetic fields, any protection guide shall consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables.

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## APPENDIX A. – Probe Calibration Data

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



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

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

Accreditation No.: SCS 0108

Client DT&amp;C (Dymstec)

Certificate No: EX3-3933\_Sep18

## CALIBRATION CERTIFICATE

Object EX3DV4 - SN:3933

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

Calibration date: September 25, 2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-18 (No. 217-02682)	Apr-19
Reference Probe ES3DV2	SN: 3013	30-Dec-17 (No. ES3-3013_Dec17)	Dec-18
DAE4	SN: 660	21-Dec-17 (No. DAE4-660_Dec17)	Dec-18
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-18)	In house check: Jun-20
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-17)	In house check: Oct-18

Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature 
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 27, 2018

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

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



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

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

Accreditation No.: SCS 0108

**Glossary:**

TS	tissue simulating liquid
NORM $x,y,z$	sensitivity in free space
ConvF	sensitivity in TSL / NORM $x,y,z$
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization $\phi$	$\phi$ rotation around probe axis
Polarization $\theta$	$\theta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\theta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

**Calibration is Performed According to the Following Standards:**

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

**Methods Applied and Interpretation of Parameters:**

- $NORMx,y,z$ : Assessed for E-field polarization  $\theta = 0$  ( $f \leq 900$  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  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to  $NORMx,y,z * ConvF$  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  $\pm 50$  MHz to  $\pm 100$  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).

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September 25, 2018

# Probe EX3DV4

## SN:3933

Manufactured: July 24, 2013  
Calibrated: September 25, 2018

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

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**DASY/EASY - Parameters of Probe: EX3DV4 - SN:3933****Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup>	0.50	0.52	0.19	$\pm 10.1 \%$
DCP (mV) <sup>B</sup>	104.5	98.7	93.5	

**Modulation Calibration Parameters**

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Unc <sup>E</sup> (k=2)
0	CW	X	0.0	0.0	1.0	0.00	144.0	$\pm 2.7 \%$
		Y	0.0	0.0	1.0		147.5	
		Z	0.0	0.0	1.0		142.5	

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%.

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

<sup>B</sup> Numerical linearization parameter: uncertainty not required.

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

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**DASY/EASY - Parameters of Probe: EX3DV4 - SN:3933****Calibration Parameter Determined in Head Tissue Simulating Media**

f (MHz) <sup>c</sup>	Relative Permittivity <sup>f</sup>	Conductivity (S/m) <sup>f</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>g</sup>	Depth <sup>g</sup> (mm)	Unc (k=2)
750	41.9	0.89	10.76	10.76	10.76	0.35	1.00	± 12.0 %
835	41.5	0.90	10.26	10.26	10.26	0.46	0.83	± 12.0 %
900	41.5	0.97	9.91	9.91	9.91	0.43	0.80	± 12.0 %
1750	40.1	1.37	8.83	8.83	8.83	0.34	0.83	± 12.0 %
1900	40.0	1.40	8.54	8.54	8.54	0.25	0.80	± 12.0 %
2300	39.5	1.67	7.90	7.90	7.90	0.41	0.80	± 12.0 %
2450	39.2	1.80	7.61	7.61	7.61	0.21	1.16	± 12.0 %
2600	39.0	1.96	7.41	7.41	7.41	0.25	1.00	± 12.0 %
3500	37.9	2.91	7.30	7.30	7.30	0.27	1.20	± 13.1 %
3700	37.7	3.12	7.13	7.13	7.13	0.25	1.20	± 13.1 %
5200	36.0	4.66	5.24	5.24	5.24	0.40	1.80	± 13.1 %
5300	35.9	4.76	5.02	5.02	5.02	0.40	1.80	± 13.1 %
5500	35.6	4.96	4.87	4.87	4.87	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.71	4.71	4.71	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.77	4.77	4.77	0.40	1.80	± 13.1 %

<sup>c</sup> 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.

<sup>f</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) 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 ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>g</sup> 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.

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## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3933

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) <sup>c</sup>	Relative Permittivity <sup>f</sup>	Conductivity (S/m) <sup>f</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>g</sup>	Depth <sup>g</sup> (mm)	Unc (k=2)
750	55.5	0.96	10.43	10.43	10.43	0.32	1.02	± 12.0 %
835	55.2	0.97	10.27	10.27	10.27	0.44	0.80	± 12.0 %
900	55.0	1.05	10.20	10.20	10.20	0.42	0.80	± 12.0 %
1750	53.4	1.49	8.62	8.62	8.62	0.31	0.88	± 12.0 %
1900	53.3	1.52	8.21	8.21	8.21	0.38	0.80	± 12.0 %
2300	52.9	1.81	7.86	7.86	7.86	0.34	0.88	± 12.0 %
2450	52.7	1.95	7.75	7.75	7.75	0.34	0.95	± 12.0 %
2600	52.5	2.16	7.63	7.63	7.63	0.31	0.95	± 12.0 %
3500	51.3	3.31	7.13	7.13	7.13	0.30	1.25	± 13.1 %
3700	51.0	3.55	7.08	7.08	7.08	0.30	1.25	± 13.1 %
5200	49.0	5.30	4.67	4.67	4.67	0.50	1.90	± 13.1 %
5300	48.9	5.42	4.51	4.51	4.51	0.50	1.90	± 13.1 %
5500	48.6	5.65	4.14	4.14	4.14	0.50	1.90	± 13.1 %
5600	48.5	5.77	4.01	4.01	4.01	0.50	1.90	± 13.1 %
5800	48.2	6.00	4.10	4.10	4.10	0.50	1.90	± 13.1 %

<sup>c</sup> 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.

<sup>f</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) 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 ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

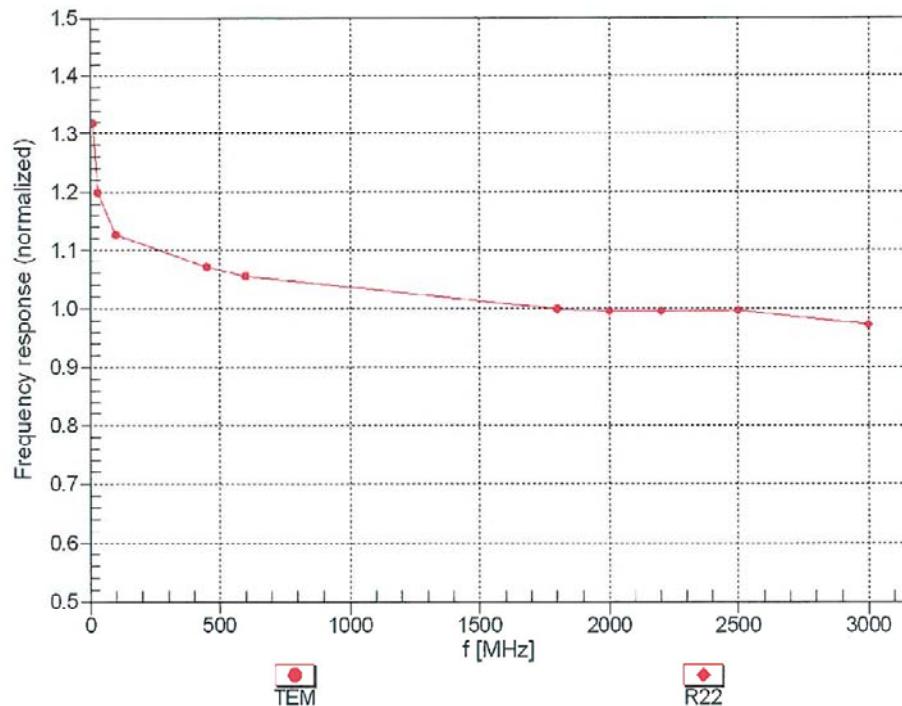
<sup>g</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter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

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## Frequency Response of E-Field

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



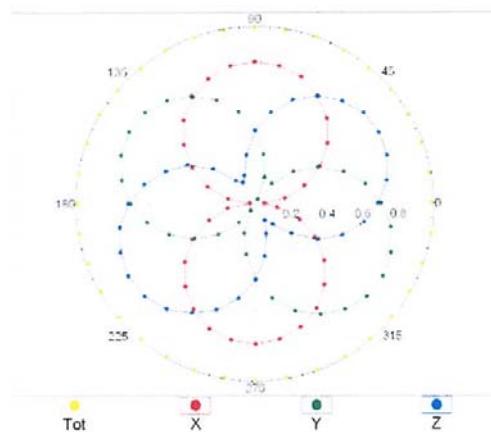
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

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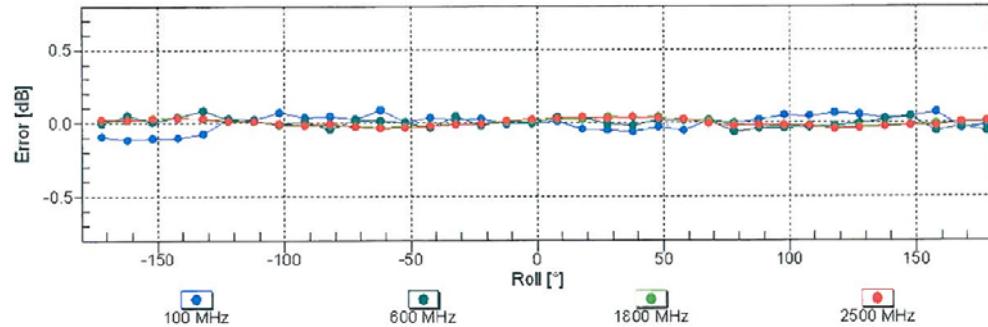
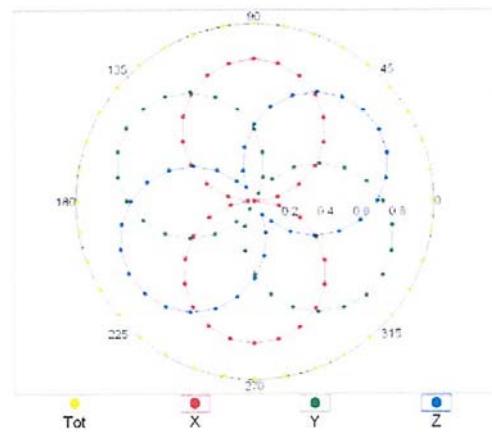
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**Receiving Pattern ( $\phi$ ),  $\theta = 0^\circ$** 

f=600 MHz, TEM

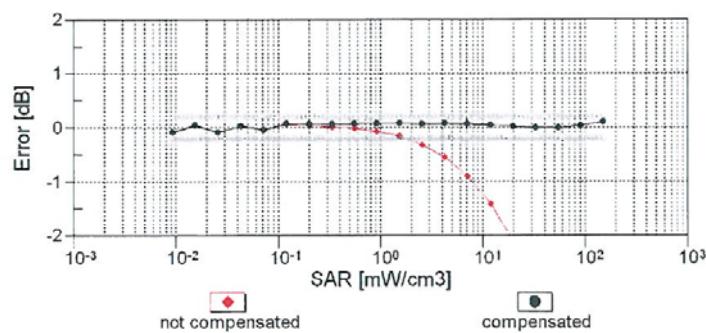
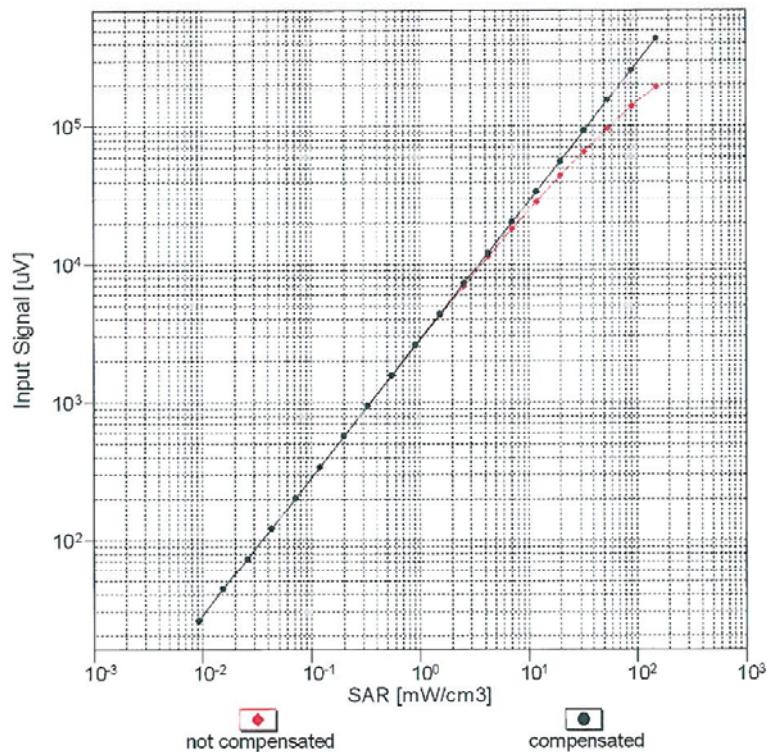


f=1800 MHz, R22

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

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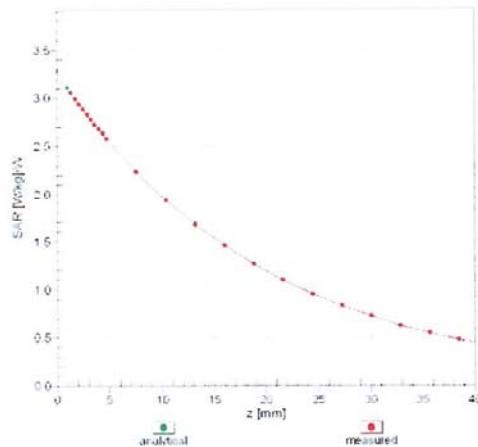
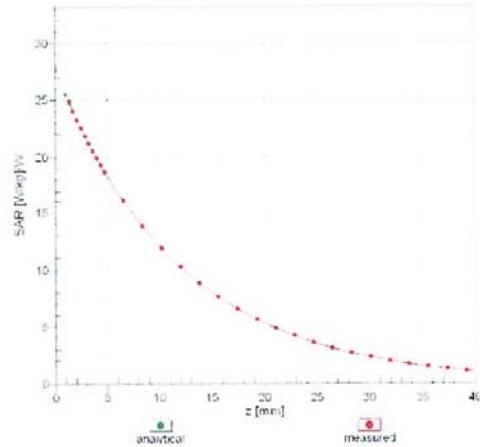
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**Dynamic Range f(SAR<sub>head</sub>)**  
(TEM cell , f<sub>eval</sub>= 1900 MHz)**Uncertainty of Linearity Assessment: ± 0.6% (k=2)**

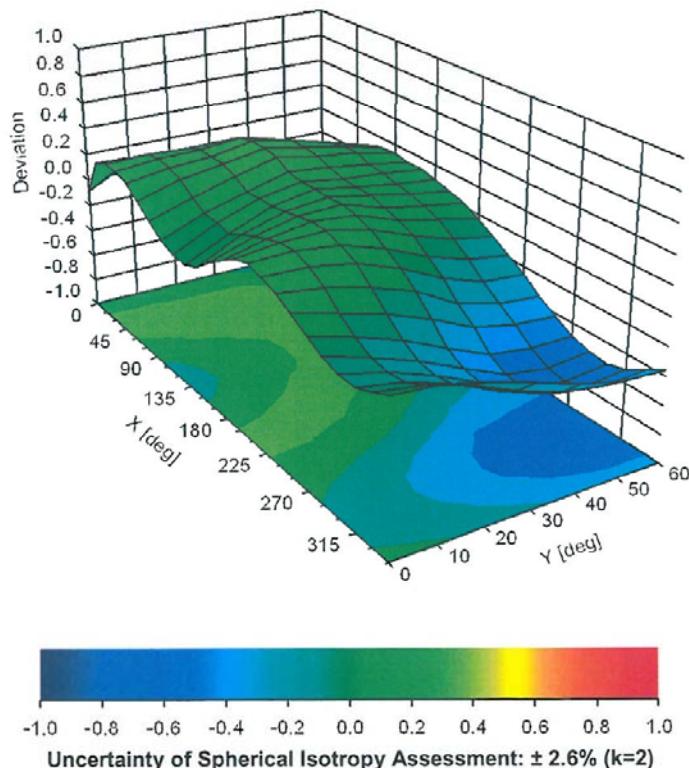
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## Conversion Factor Assessment

 $f = 835 \text{ MHz}, \text{WGLS R9 (H\_convF)}$  $f = 1900 \text{ MHz}, \text{WGLS R22 (H\_convF)}$ 

## Deviation from Isotropy in Liquid Error ( $\phi, \theta$ ), $f = 900 \text{ MHz}$



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**DASY/EASY - Parameters of Probe: EX3DV4 - SN:3933****Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle (°)	77.9
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm