TEST REPORT

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1. Report No : DRRFCC1803-0015(3)
2. Customer
   - Name : LG Electronics MobileComm USA, Inc.
   - Address : 1000 Sylvan Ave., Englewood Cliffs, New Jersey, United States, 07632
3. Use of Report : FCC Original Grant
4. Product Name / Model Name : Mobile Phone / DS1803
   FCC ID : ZNFDS1803
5. Test Method Used : IEEE 1528-2013, FCC SAR KDB Publications (Details in test report)
   Test Specification : CFR §2.1093
6. Date of Test : 2018.02.12 ~ 2018.02.28, 2018.03.21
7. Testing Environment : Refer to appended test report.
8. Test Result : Refer to the attached test result.

Affirmation	Tested by Name : BumJun Park (Signature)	Reviewed by Name : HakMin Kim (Signature)

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DT&C Co., Ltd.

If this report is required to confirmation of authenticity, please contact to report@dtnc.net

Test Report Version

Test Report No.	Date	Description
DRRFCC1803-0015	Mar. 12, 2018	Initial issue
DRRFCC1803-0015(1)	Mar. 22, 2018	Add WiFi 5GHz hotspot SAR test
DRRFCC1803-0015(2)	Mar. 26, 2018	Add WiFi 5GHz simultaneous transmission evaluation
DRRFCC1803-0015(3)	Mar. 28, 2018	BT Tune-up Revision

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1. DESCRIPTION OF DEVICE

Environmental evaluation measurements of specific absorption rate (SAR) distributions in emulated human head and body tissues exposed to radio frequency (RF) radiation from wireless portable devices for compliance with the rules and regulations of the U.S. Federal Communications Commission (FCC).

General Information

EUT type	Mobile Phone				
FCC ID	ZNFDS1803				
Equipment model name	DS1803				
Equipment add model name	N/A				
Equipment serial no.	Identical prototype				
Mode(s) of Operation	GSM 850, GSM 1900, WCDMA 850, LTE Band 12, 17, 5, 2.4 G W-LAN (802.11b/g/n-HT20), 5 G W-LAN (802.11a/n-HT20/n-HT40/ac-VHT20/ac-VHT40/ac-VHT80), Bluetooth				
TX Frequency Range	**Band**	**Mode**	**Operating Modes**	**Bandwidth**	**Frequency**
	GSM 850	GSM/GPRS	Voice/Data	-	824.2 ~ 848.8 MHz
	GSM 1900	GSM/GPRS	Voice/Data	-	1850.2 ~ 1909.8 MHz
	WCDMA 850	WCDMA	Voice/Data	-	826.4 ~ 846.6 MHz
	LTE Band 12	LTE	Voice/Data	1.4/3/5/10MHz	699.7 ~ 715.3 MHz
	LTE Band 17	LTE	Voice/Data	5/10MHz	706.5 ~ 713.5 MHz
	LTE Band 5	LTE	Voice/Data	1.4/3/5/10MHz	824.7 ~ 848.3 MHz
	2.4 GHz W-LAN	802.11b/g/n	Voice/Data	HT20	2412 ~ 2462 MHz
	5.2 GHz W-LAN	802.11a/n/ac	Voice/Data	HT20/VHT20	5180 ~ 5240 MHz
		802.11n/ac	Voice/Data	HT40/VHT40	5190 ~ 5230 MHz
		802.11ac	Voice/Data	VHT80	5210 MHz
	5.3 GHz W-LAN	802.11a/n/ac	Voice/Data	HT20/VHT20	5260 ~ 5320 MHz
		802.11n/ac	Voice/Data	HT40/VHT40	5270 ~ 5310 MHz
		802.11ac	Voice/Data	VHT80	5290 MHz
	5.6 GHz W-LAN	802.11a/n/ac	Voice/Data	HT20/VHT20	5500 ~ 5700 MHz
		802.11n/ac	Voice/Data	HT40/VHT40	5510 ~ 5670 MHz
		802.11ac	Voice/Data	VHT80	5530 ~ 5610 MHz
	5.8 GHz W-LAN	802.11a/n/ac	Voice/Data	HT20/VHT20	5745 ~ 5825 MHz
		802.11n/ac	Voice/Data	HT40/VHT40	5755 ~ 5795 MHz
		802.11ac	Voice/Data	VHT80	5775 MHz
	Bluetooth	-	Data	-	2402 ~ 2480 MHz
RX Frequency Range	GSM 850	GSM/GPRS	Voice/Data	-	869.2 ~ 893.8 MHz
	GSM 1900	GSM/GPRS	Voice/Data	-	1930.2 ~ 1989.8 MHz
	WCDMA 850	WCDMA	Voice/Data	-	871.4 ~ 891.6 MHz
	LTE Band 12	LTE	Voice/Data	1.4/3/5/10MHz	729.7 ~ 745.3 MHz
	LTE Band 17	LTE	Voice/Data	5/10MHz	736.5 ~ 743.5 MHz
	LTE Band 5	LTE	Voice/Data	1.4/3/5/10MHz	869.7 ~ 893.3 MHz
	2.4 GHz W-LAN	802.11b/g/n	Voice/Data	HT20	2412 ~ 2462 MHz
	5.2 GHz W-LAN	802.11a/n/ac	Voice/Data	HT20/VHT20	5180 ~ 5240 MHz
		802.11n/ac	Voice/Data	HT40/VHT40	5190 ~ 5230 MHz
		802.11ac	Voice/Data	VHT80	5210 MHz
	5.3 GHz W-LAN	802.11a/n/ac	Voice/Data	HT20/VHT20	5260 ~ 5320 MHz
		802.11n/ac	Voice/Data	HT40/VHT40	5270 ~ 5310 MHz
		802.11ac	Voice/Data	VHT80	5290 MHz
	5.6 GHz W-LAN	802.11a/n/ac	Voice/Data	HT20/VHT20	5500 ~ 5700 MHz
		802.11n/ac	Voice/Data	HT40/VHT40	5510 ~ 5670 MHz
		802.11ac	Voice/Data	VHT80	5530 ~ 5610 MHz
	5.8 GHz W-LAN	802.11a/n/ac	Voice/Data	HT20/VHT20	5745 ~ 5825 MHz
		802.11n/ac	Voice/Data	HT40/VHT40	5755 ~ 5795 MHz
		802.11ac	Voice/Data	VHT80	5775 MHz
	Bluetooth	-	Data	-	2402 ~ 2480 MHz

Equipment Class	Band	Reported SAR		
		1g SAR (W/kg)		
		Head	Body-Worn	Hotspot
PCE	GSM 850	0.16	0.42	-
PCE	GPRS 850	0.19	0.51	0.51
PCE	GSM 1900	< 0.1	0.26	-
PCE	GPRS 1900	< 0.1	0.32	0.32
PCE	WCDMA 850	0.26	0.69	0.69
PCE	LTE Band 12	< 0.1	0.49	0.49
PCE	LTE Band 17	-	-	-
PCE	LTE Band 5	0.26	0.67	0.67
DTS	2.4 GHz W-LAN	0.43	< 0.1	0.12
U-NII-1	5.2 GHz W-LAN	-	-	0.15
U-NII-2A	5.3 GHz W-LAN	0.13	0.17	-
U-NII-2C	5.6 GHz W-LAN	0.16	0.45	-
U-NII-3	5.8 GHz W-LAN	0.12	0.77	0.77
DSS	Bluetooth	0.18	< 0.1	< 0.1
Simultaneous SAR per KDB 690783 D01v01r03		0.61	1.44	1.44
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	2018.02.12 ~ 2018.02.28, 2018.03.21			
Antenna Type	Internal Type Antenna			
Functions	● GSM/GPRS (GPRS Class: 12) supported. * DTM not supported. ● No simultaneous transmission between BT & 2.4GHz WLAN ● Simultaneous transmission between GSM, WCDMA voice & WLAN / GPRS, WCDMA & WLAN / LTE & WLAN. ● VoIP is supported. ● W-LAN 2.4GHz is supported Hotspot. ● W-LAN 5 GHz is not supported Hotspot. (UNII 1, UNII 3 supports WiFi direct GC,GO)			

1.1 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)
- October 2013 TCB Workshop Notes (GPRS testing criteria)
- April 2015 TCB Workshop Notes (Simultaneous transmission summation clarified)
- October 2016 TCB Workshop Notes (Bluetooth Duty Factor)

1.2 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 ZNFDS1803_Antenna_Location.pdf. Since the diagonal dimension of this device is < 160 mm and the diagonal display is < 150 mm, it is not considered a “phablet”.

Mode	Device Sides for SAR Testing					
	Top	Bottom	Front	Rear	Right	Left
GSM 850	X	O	O	O	O	O
GSM 1900	X	O	O	O	X	O
WCDMA 850	X	O	O	O	O	O
LTE Band 12	X	O	O	O	O	O
LTE Band 5	X	O	O	O	O	O
2.4G W-LAN	O	X	O	O	X	O
5G W-LAN	O	X	O	O	X	O
Bluetooth	O	X	O	O	X	O

Note 1: Particular DUT edges were not required to be evaluated for Hotspot SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06v02r01. 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. (UNII 1, UNII 3 supports WiFi direct GC,GO)

1.3 Near Field Communications (NFC) Antenna

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 ZNFDS1803_Antenna_Location.pdf.

1.4 SAR Test Exclusions Applied

(A) Licensed Transmitter(s)

GSM/GPRS DTM is not supported for US bands. Therefore, the GSM Voice modes in this report do not transmit simultaneously with GPRS Data.

This device supports both LTE Band 12 and LTE Band 17. Since the supported frequency span for LTE Band 17 falls completely within the supported frequency span for LTE Band 12, LTE Band 17 target power is equal to LTE Band 12 target power, and both LTE bands share the same transmission path, SAR was only assessed for LTE Band 12.

1.5 Power Reduction for SAR

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

1.6 Device Serial Numbers

Band & Mode	Head Serial Number	Body Serial Number	Hotspot Serial Number
GSM/GPRS 850	FCC #1	FCC #1	FCC #1
GSM/GPRS 1900	FCC #1	FCC #1	FCC #1
WCDMA 850	FCC #1	FCC #1	FCC #1
LTE Band 12	FCC #1	FCC #1	FCC #1
LTE Band 5	FCC #1	FCC #1	FCC #1
2.4 GHz WLAN	FCC #2	FCC #2	FCC #2
5 GHz WLAN	FCC #2	FCC #2	-
Bluetooth	FCC #2	FCC #2	FCC #2

1.7 LTE Information

LTE Information					
FCC ID	**ZNFDS1803**				
Form Factor	Mobile Phone				
Frequency Range of each LTE transmission Band	LTE Band 12 (699.7 ~ 715.3 MHz) LTE Band 17 (706.5 ~ 713.5 MHz) LTE Band 5 (Cell) (824.7 ~ 848.3 MHz)				
Channel Bandwidths	LTE Band 12 (699.7 ~ 715.3 MHz): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz LTE Band 17 (706.5 ~ 713.5 MHz): 5 MHz, 10 MHz LTE Band 5: (Cell) (824.7 ~ 848.3 MHz): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
Channel Number and Frequencies(MHz)	Low	Low-Mid	Mid	Mid-High	High
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)Note1	N/A	711.0 (23130)
LTE Band 17: 5 MHz	706.5(23755)	N/A	710.0(23790)	N/A	713.5(23825)
LTE Band 17: 10 MHz	709.0(23780)	N/A	710.0(23790)	N/A	711.0(23800)
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)Note2	N/A	844.0 (20600)
UE Category	LTE Rel.10, UE Category 6				
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				
Power reduction explanation	This device doesn't implements power reduction.				
LTE Carrier Aggregation Possible Combinations	LTE Carrier Aggregation is not supported.				
LTE Additional Information	This device does not support CA features on 3GPP Release 10. All uplink communications are identical to the Release 8 Specifications. The following LTE Release 10 Features are not supported: Relay, HetNet, Enhanced MIMO, eICIC, WIFI Offloading, MDH, eMBMS, Cross-Carrier Scheduling, Enhanced SC-FDMA.				

Note(s)

1. LTE Band 12 at 10 MHz bandwidth does not support three non-overlapping channels.
   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.
2. LTE Band 5 (Cell) at 10 MHz bandwidth does not support three non-overlapping channels.
   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.

2. INTROCUCTION

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 (ρ) It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Fig. 2.1)

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

Fig. 2.1 SAR Mathematical Equation

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

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

where:

σ = conductivity of the tissue-simulating material (S/m)
ρ = mass density of the tissue-simulating material (kg/m^3)
E = Total RMS electric field strength (V/m)

NOTE: The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in 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.

3. DESCRIPTION OF TEST EQUIPMENT

3.1 SAR MEASUREMENT SETUP

Measurements are performed using the DASY5 automated dosimetric assessment system. The DASY5 is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland and consists of high precision robotics system (Staubli), robot controller, desktop computer, near-field probe, probe alignment sensor, and the generic twin phantom containing the brain equivalent material. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF) (see Fig. 3.1).

A cell controller system contains the power supply, robot controller each pendant (Joystick), and a remote control used to drive the robot motors. The PC consists of the Intel Core i7-3770 3.40 GHz desktop computer with Windows 7 system and SAR Measurement Software DASY5,A/D interface card, monitor, mouse, and keyboard. The Staubli Robotis connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit that performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.

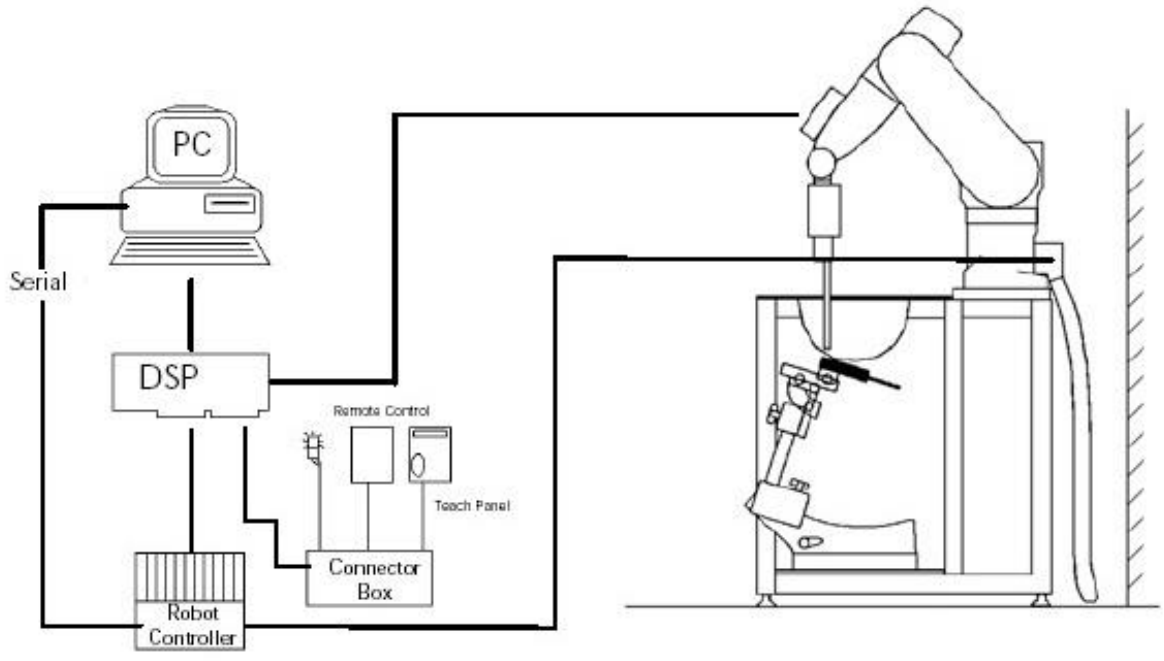

Figure 3.1 SAR Measurement System Setup

The DAE4 consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer. The system is described in detail.

3.2 ES3DV3/EX3DV4 Probe Specification

Calibration	In air from 10 MHz to 4 GHz/10 MHz to 6 GHz In brain and muscle simulating tissue at Frequencies of 750 MHz, 835 MHz, 900 MHz, 1750 MHz, 1900 MHz, 2450 MHz, 2600 MHz / 835 MHz, 900 MHz, 1750 MHz, 1900 MHz, 2450 MHz, 2600 MHz, 5200 MHz, 5300 MHz, 5500 MHz, 5600 MHz, 5800 MHz
Frequency	10 MHz to 4 GHz/10 MHz to 6 GHz
Linearity	± 0.2 dB(30 MHz to 4 GHz/30 MHz to 6 GHz)
Dynamic	10 μW/g to > 100 mW/g
Range	Linearity : ±0.2dB
Dimensions	Overall length : 337 mm
Tip length	20 mm
Body diameter	12 mm
Tip diameter	3.9 mm/2.5 mm
Distance from probe tip to sensor center	2.0 mm/1.0 mm
Application	SAR Dosimetry Testing Compliance tests of mobile phones

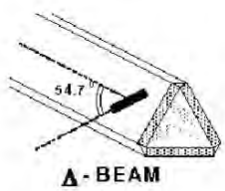

Figure 3.2 Triangular Probe Configurations

Figure 3.3 Probe Thick-Film Technique

DAE System

The SAR measurements were conducted with the dosimetric probe ES3DV3 and EX3DV4 designed in the classical triangular configuration(see Fig. 3.2) and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multitier line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY5 software reads the reflection during a software approach and looks for the maximum using a 2nd order fitting. The approach is stopped at reaching the maximum.

3.3 Probe Calibration Process

3.3.1 E-Probe Calibration

Dosimetric Assessment Procedure

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than +/- 10%. The spherical isotropy was evaluated with the procedure and found to be better than +/-0.25dB. The sensitivity parameters (Norm X, Norm Y, Norm Z), the diode compression parameter (DCP) and the conversion factor (Conv F) of the probe is tested.

Free Space Assessment

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies below 1 GHz, and in a waveguide above 1GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity at the proper orientation with the field. The probe is then rotated 360 degrees.

Temperature Assessment *

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium, correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent the remits or based temperature probe is used in conjunction with the E-field probe.

$$SAR = C\frac{\Delta T}{\Delta t}$$

where:

Δt = exposure time (30 seconds),

C = heat capacity of tissue (brain or muscle),

ΔT = temperature increase due to RF exposure.

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

where:

σ = simulated tissue conductivity,

ρ = Tissue density (1.25 g/cm^3 for brain tissue)

SAR is proportional to ΔT / Δt , the initial rate of tissue heating, before thermal diffusion takes place. Now it's possible to quantify the electric field in the simulated tissue by equating the thermally derived SAR to the E- field;

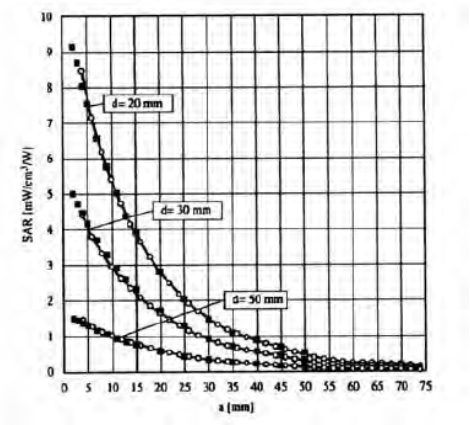

Figure 3.4 E-Field and Temperature Measurements at 900MHz

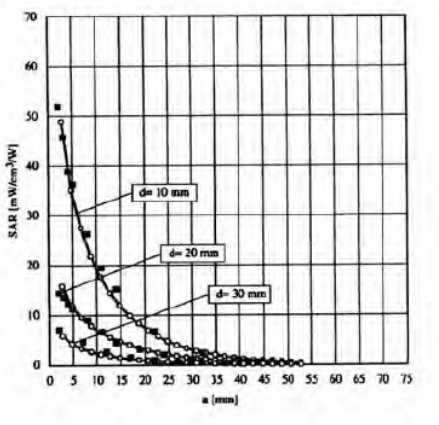

Figure 3.5 E-Field and Temperature Measurements at 1800MHz

3.4 Data Extrapolation

The DASY5 software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given like below;

$$V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}$$

with V_i = compensated signal of channel i (i=x,y,z)
U_i = input signal of channel i (i=x,y,z)
cf = crest factor of exciting field (DASY parameter)
dcp_i = diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes:

$$E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$

with V_i = compensated signal of channel i (i = x,y,z)
$Norm_i$ = sensor sensitivity of channel i (i = x,y,z)
$\mu V/(V/m)^2$ for E-field probes
ConvF = sensitivity of enhancement in solution
E_i = electric field strength of channel i in V/m

The RSS value of the field components gives the total field strength (Hermetian magnitude):

$$E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

The primary field data are used to calculate the derived field units.

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1000}$$

with SAR = local specific absorption rate in W/g
E_{tot} = total field strength in V/m
σ = conductivity in [mho/m] or [Siemens/m]
ρ = equivalent tissue density in g/cm^3

The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = \frac{E_{tot}^2}{3770}$$

with P_{pwe} = equivalent power density of a plane wave in W/cm^2
E_{tot} = total electric field strength in V/m

3.5 SAM Twin PHANTOM

The SAM Twin Phantom V5.0 is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90% of all users. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents the evaporation of the liquid.

Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot. (see Fig. 3.6)

Figure 3.6 SAM Twin Phantom

SAM Twin Phantom Specification:

Construction	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot. Twin SAM V5.0 has the same shell geometry and is manufactured from the same material as Twin SAM V4.0, but has reinforced top structure.
Shell Thickness	2 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Length: 1000 mm Width: 500 mm Height: adjustable feet

Specific Anthropomorphic Mannequin (SAM) Specifications:

The phantom for handset SAR assessment testing is a low-loss dielectric shell, with shape and dimensions derived from the anthropometric data of the 90th percentile adult male head dimensions as tabulated by the US Army. The SAM Twin Phantom shell is bisected along the mid-sagittal plane into right and left halves (see Fig. 3.7). The perimeter sidewalls of each phantom halves are extended to allow filling with liquid to a depth that is sufficient to minimized reflections from the upper surface. The liquid depth is maintained at a minimum depth of 15cm to minimize reflections from the upper surface.

Figure 3.7 Sam Twin Phantom shell

3.6 Device Holder for Transmitters

In combination with the Twin SAM Phantom V4.0/V4.0c, V5.0 or ELI4, the Mounting Device enables the rotation of the mounted transmitter device in spherical coordinates. Rotation point is the ear opening point. Transmitter devices can be easily and accurately positioned according to IEC, IEEE, FCC or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat).

Note: A simulating human hand is not used due to the complex anatomical and geometrical structure of the hand that may produce infinite number of configurations. To produce the worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.

Figure 3.8 Mounting Device

3.7 Brain & Muscle Simulation Mixture Characterization

The brain and muscle mixtures consist of a viscous gel using hydrox-ethylcellulose (HEC) gelling agent and saline solution (see Table 3.1). Preservation with a bactericide is added and visual inspection is made to make sure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. The mixture characterizations used for the brain and muscle tissue simulating liquids are according to the data by C. Gabriel and G. Harts grove.

Figure 3.9 Simulated Tissue

Table 3.1 Composition of the Tissue Equivalent Matter

Ingredients (% by weight)	Frequency (MHz)							
	835		1900		2450		5200 ~ 5800	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body
Water	40.19	50.75	55.24	70.23	71.88	73.40	65.52	80.00
Salt (NaCl)	1.480	0.940	0.310	0.290	0.160	0.060	-	-
Sugar	57.90	48.21	-	-	-	-	-	-
HEC	0.250	-	-	-	-	-	-	-
Bactericide	0.180	0.100	-	-	-	-	-	-
Triton X-100	-	-	-	-	19.97	-	17.24	-
DGBE	-	-	44.45	29.48	7.990	26.54	-	-
Diethylene glycol hexyl ether	-	-	-	-	-	-	17.24	-
Polysorbate (Tween) 80	-	-	-	-	-	-		20.00
Target for Dielectric Constant	41.5	55.2	40.0	53.3	39.2	52.7	-	-
Target for Conductivity (S/m)	0.90	0.97	1.40	1.52	1.80	1.95	-	-

Salt:	99 % Pure Sodium Chloride	Sugar:	98 % Pure Sucrose
Water:	De-ionized, 16M resistivity	HEC:	Hydroxyethyl Cellulose
DGBE:	99 % Di(ethylene glycol) butyl ether,[2-(2-butoxyethoxy) ethanol]		
Triton X-100(ultra pure):	Polyethylene glycol mono[4-(1,1,3,3-tetramethylbutyl)phenyl] ether		

Table 3.2 HSL/MSL750 (Head and Body liquids for 700 – 800 MHz)

Item	Head Tissue Simulation Liquids HSL750 Muscle (body) Tissue Simulation Liquids MSL750
Type No	SL AAH 075, SL AAM 075
Manufacturer	SPEAG
The item is composed of the following ingredients:	
H^2O	Water, 35 – 58%
Sucrose	Sucrose, 40 – 60%
NaCl	Sodium Chloride, 0 – 6%
Hydroxyethyl-cellulose	Medium Viscosity (CAS# 9004-62-0), < 0.3%
Preventol-D7	Preservative: aqueous preparation, (CAS# 55965-84-9), containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyyl-3(2H)-isothiazolone, 0.1 – 0.6%

3.8 SAR TEST EQUIPMENT

Table 3.2 Test Equipment Calibration

	Type	Manufacturer	Model	Cal.Date	Next.Cal.Date	S/N
☒	SEMITEC Engineering	SEMITEC	N/A	N/A	N/A	Shield Room
☒	SEMITEC Engineering	SEMITEC	N/A	N/A	N/A	Shield Room
☒	Robot	SCHMID	TX90XL	N/A	N/A	F13/5P9GA1/A/01
☒	Robot	SCHMID	TX90XL	N/A	N/A	F13/5RR2A1/A/01
☒	Robot Controller	SCHMID	CS8C	N/A	N/A	F13/5P9GA1/C/01
☒	Robot Controller	SCHMID	CS8C	N/A	N/A	F13/5RR2A1/C/01
☒	Joystick	SCHMID	N/A	N/A	N/A	S-12450905
☒	Joystick	SCHMID	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
☒	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
☒	Probe Alignment Unit LB	N/A	N/A	N/A	N/A	SE UKS 030 AA
☒	Device Holder	SCHMID	Holder	N/A	N/A	SD000H01HA
☒	Device Holder	SCHMID	Holder	N/A	N/A	SD000H01HA
☒	Twin SAM Phantom	SCHMID	QD000P40CD	N/A	N/A	1783
☒	Twin SAM Phantom	SCHMID	QD000P40CD	N/A	N/A	1782
☒	Twin SAM Phantom	SCHMID	QD000P40CD	N/A	N/A	1786
☒	Data Acquisition Electronics	SCHMID	DAE4V1	2017-07-24	2018-07-24	1335
☒	Data Acquisition Electronics	SCHMID	DAE4V1	2017-03-16	2018-03-16	1394
☒	Dosimetric E-Field Probe	SCHMID	ES3DV3	2017-03-21	2018-03-21	3328
☒	Dosimetric E-Field Probe	SCHMID	EX3DV4	2017-11-28	2018-11-28	7337
☒	750MHz SAR Dipole	SCHMID	D750V3	2018-01-18	2020-01-18	1049
☒	835MHz SAR Dipole	SCHMID	D835V2	2017-09-21	2019-09-21	464
☒	1900MHz SAR Dipole	SCHMID	D1900V2	2017-09-20	2019-09-20	5d029
☒	2450MHz SAR Dipole	SCHMID	D2450V2	2017-09-19	2019-09-19	726
☒	5GHz SAR Dipole	SCHMID	D5GHzV2	2017-03-17	2019-03-17	1103
☒	5GHz SAR Dipole	SCHMID	D5GHzV2	2018-02-15	2020-02-15	1212
☒	Network Analyzer	Agilent	E5071C	2018-02-02	2019-02-02	MY46111534
☒	Signal Generator	Agilent	E4438C	2017-09-05	2018-09-05	US41461520
☒	Amplifier	RFBAY.Inc	MPA-40-40	2017-12-28	2018-12-28	21151801
☒	Amplifier	EMPOWER	BBS3Q7ELU	2017-09-06	2018-09-06	1020
☒	High Power RF Amplifier	EMPOWER	BBS3Q8CCJ	2017-09-05	2018-09-05	1005
☒	Power Meter	HP	EPM-442A	2017-12-27	2018-12-27	GB37170267
☒	Power Meter	HP	EPM-442A	2017-12-27	2018-12-27	GB37170413
☒	Power Sensor	HP	8481A	2017-12-27	2018-12-27	US37294267
☒	Power Sensor	HP	8481A	2017-12-27	2018-12-27	3318A96566
☒	Power Sensor	HP	8481A	2017-12-27	2018-12-27	2702A65976
☒	Dual Directional Coupler	Agilent	778D-012	2017-12-27	2018-12-27	50228
☒	Directional Coupler	HP	772D	2017-07-13	2018-07-13	2889A01064
☒	Low Pass Filter 1GHz	Wainwright Instruments	WLK6-1000-1400-9000-60SS	2017-09-05	2018-09-05	165
☒	Low Pass Filter 1.5GHz	Micro LAB	LA-15N	2017-12-27	2018-12-27	N/A
☒	Low Pass Filter 3.0GHz	Micro LAB	LA-30N	2017-09-05	2018-09-05	N/A
☒	Low Pass Filter 6.0GHz	Micro LAB	LA-60N	2017-12-27	2018-12-27	03942
☒	Attenuators(3 dB)	Agilent	8491B	2017-12-27	2018-12-27	MY39260700
☒	Attenuators(10 dB)	WEINSCHEL	23-10-34	2017-12-27	2018-12-27	BP4387
☒	Dielectric Probe kit	SCHMID	DAK-3.5	2017-11-21	2018-11-21	1092
☒	Dielectric Probe kit	SCHMID	DAK-3.5	2017-07-18	2018-07-18	1046
☒	8960 Series 10 Wireless Comms. Test Set	Agilent	E5515C	2017-09-05	2018-09-05	GB41321164
☒	Wideband Radio Communication Tester	Rohde Schwarz	CMW500	2018-02-05	2019-02-05	101414
☒	Power Splitter	Anritsu	K241B	2017-12-27	2018-12-27	1301183
☒	Bluetooth Tester	TESCOM	TC-3000B	2017-12-26	2018-12-26	3000B770243

NOTE: The E-field probe was calibrated by SPEAG, by temperature measurement procedure. Dipole Verification measurement is performed by DT&Cbefore each test. The brain and muscle simulating material are calibrated byDT&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.

4. TEST SYSTEM SPECIFICATIONS

Automated TEST SYSTEM SPECIFICATIONS:

Positioner

Robot	Stäubli Unimation Corp. Robot Model: TX90XL
Repeatability	0.02 mm
No. of axis	6

Data Acquisition Electronic (DAE) System

Cell Controller

Processor	Intel Core i7-3770
Clock Speed	3.40 GHz
Operating System	Windows 7 Professional
Data Card	DASY5 PC-Board

Data Converter

Features	Signal, multiplexer, A/D converter. & control logic
Software	DASY5
Connecting Lines	Optical downlink for data and status info Optical uplink for commands and clock

PC Interface Card

Function	24 bit (64 MHz) DSP for real time processing Link to DAE 4 16 bit A/D converter for surface detection system serial link to robot direct emergency stop output for robot

E-Field Probes

Model	ES3DV3 S/N: 3328/ EX3DV4 S/N: 7337
Construction	Triangular core fiber optic detection system
Frequency	10 MHz to 4 GHz/10 MHz to 6 GHz
Linearity	± 0.2 dB (30 MHz to 4 GHz/30 MHz to 6 GHz)

Phantom

Phantom	SAM Twin Phantom (V5.0)
Shell Material	Composite
Thickness	2.0 ± 0.2 mm

Figure 4.1 DASY5 Test System

5. SAR MEASUREMENT PROCEDURE

5.1 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 5.1) 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.

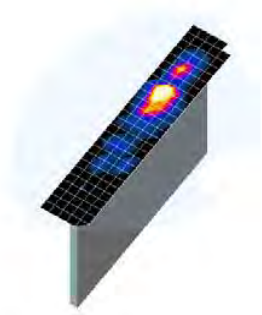

Figure 5.1
Sample SAR Area Scan

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 5.1) 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 5.1. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).

   b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.

   c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 mm ± 1 mm	½·δ·ln(2) mm ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}			≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
			When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ 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: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$ mm	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ 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 ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 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 5.1 Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v01r04*

6. DEFINITION OF REFERENCE POINTS

6.1 Ear Reference Point

Figure 6.1 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 15mm posterior to the entrance to the Ear canal (EEC) along the B-M line (Back-Mouth), as shown in Figure 6.1. 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 6.1). 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.

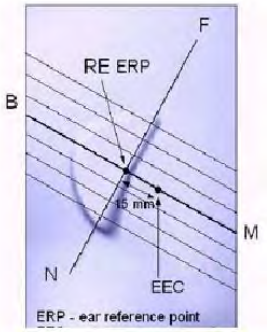

Figure 6.1
Close-up side view of ERP

6.2 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. 6.3). 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 6.2 Front, back and side view SAM Twin Phantom

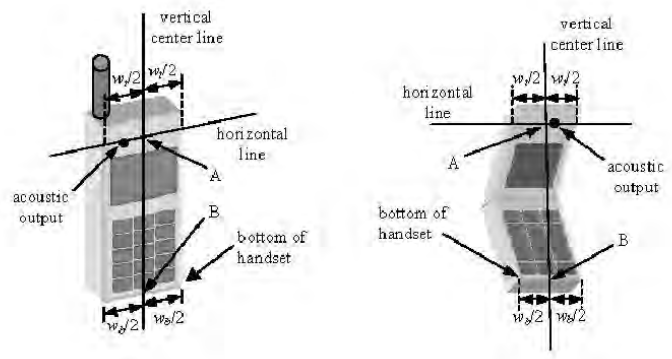

Figure 6.3 Handset Vertical Center & Horizontal Line Reference Points

7. TEST CONFIGURATION POSITIONS FOR HANDSETS

7.1 Device Holder

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

7.2 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 7.1), 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 7.1 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 hen rotated around the vertical centerline until the phone (horizontal line) was symmetrical was 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 7.2)

7.3 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 15degree.
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 7.3).

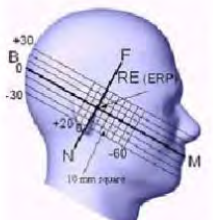

Figure 7.2 Side view w/relevant markings

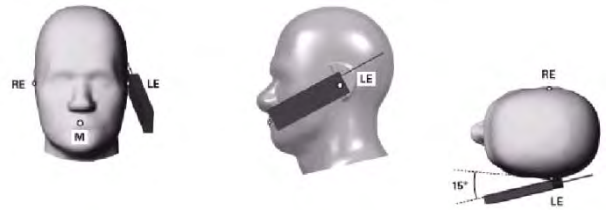

Figure 7.3 Front, Side and Top View of Ear/15°Position

7.4 Body-Worn Accessory Configurations

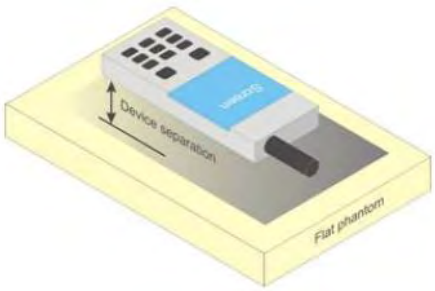

Figure 7.4 Sample Body-Worn Diagram

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 7.4). 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 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.

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.

7.5 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 x W ≥ 9 cm x 5 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. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

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.

8. 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 8.1.SAR Human Exposure Specified in ANSI/IEEE C95.1-1992

	HUMAN EXPOSURE LIMITS	
	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).

9. FCC MEASUREMENT PROCEDURES

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

9.1 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.

9.2 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.

9.3 SAR Measurement Conditions for WCDMA (UMTS)

9.3.1 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.

9.3.2 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 in12.2 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.

9.3.3 Body SAR Measurements

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

9.3.4 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	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	CM (dB) (2)
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15 (3)	15/15 (3)	64	12/15 (3)	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: Δ_{ACK}, Δ_{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 β_c/β_d =12/15, β_{hs}/β_c=24/15.
Note 3: For subtest 2 the β_c/β_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 β_c = 11/15 and β_d = 15/15.

Figure 9.1 Table 1

9.3.5 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	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs}[1]	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM[2] (dB)	MPR (dB)	AG[4] Index	E-TFCI
1	11/15[3]	15/15[3]	64	11/15[3]	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	β_{ed1}: 47/15 β_{ed2}: 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[4]	15/15[4]	64	15/15[4]	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{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 β_c/β_d =12/15, β_{hs}/β_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 β_c/β_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 β_c = 10/15 and β_d = 15/15.
Note 4: For subtest 5 the β_c/β_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 β_c = 14/15 and β_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: β_{ed} cannot be set directly; it is set by Absolute Grant Value.

Figure 9.2 Table 2

9.4 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 R&S CMW500 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).

9.4.1 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.

9.4.2 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.

9.4.3 A-MPR

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

9.4.4 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05v02r05:

a. Per Section 4.2.1, SAR is required for QPSK 1 RB Allocation for the largest bandwidth
   i. The required channel and offset combination with the highest maximum output power is required for SAR.
   ii. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test 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.
   iii. When the reported SAR for a required test channel is > 1.45 W/kg, SAR is required for all RB offset configurations for that channel.
b. Per Section 4.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Section 4.2.1.
c. Per Section 4.2.3, QPSK SAR is not required for the 100% allocation when the highest maximum output power for the 100% allocation is less than the highest maximum output power of the 1 RB and 50% RB allocations and the reported SAR for the 1 RB and 50% RB allocations is < 0.8 W/kg.
d. Per Section 4.2.4 and 4.3, SAR tests for higher order modulations and lower bandwidths configurations are not required when the conducted power of the required test configurations determined by Sections 4.2.1 through 4.2.3 is less than or equal to 0.5 dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is < 1.45 W/kg.

9.5 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.

9.5.1 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 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.

9.5.2 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 ≤ 1.2 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 ≤ 1.2 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.

9.5.3 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.

9.5.4 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 ≤ 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 ≤ 0.8 W/kg or all test position are measured.

9.5.5 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 ≤ 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.

9.5.6 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 80211n or 802.11g then 802.11n is used for SAR measurement. When the maximum output power ware 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.

9.5.7 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 ≤ 0.8 W/kg, no additional measurements on other test channels are required.
Otherwise, SAR is evaluated using the subsequent highest average RF output channel until the reported SAR result is ≤ 1.2 W/kg or all channels are measured.

9.5.8 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 ≤ 1.2 W/kg, no additional SAR testing for the subsequent test configurations is required.

10. Nominal and Maximum Output Power Spec and 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

10.1 GSM Nominal and Maximum Output Power Spec and Conducted Powers

Band & Mode		Voice[dBm]	Burst Average GMSK [dBm]			
		1 TX Slot	1 TX Slot	2 TX Slot	3 TX Slot	4 TX Slot
GSM/GPRS 850	Maximum	33.7	33.7	32.7	30.7	29.2
	Nominal	33.2	33.2	32.2	30.2	28.7
GSM/GPRS 1900	Maximum	30.7	30.7	29.7	27.7	26.2
	Nominal	30.2	30.2	29.2	27.2	25.7

Table 10.1.1 GSM Nominal and Maximum Output Power Spec

Band	Channel	Maximum Burst-Averaged Output Power(dBm)				
		Voice	GPRS Data (GMSK)			
		GSM CS 1 Slot	GPRS 1 TX Slot	GPRS 2 TX Slot	GPRS 3 TX Slot	GPRS 4 TX Slot
GSM850	128	33.3	33.3	32.4	30.4	28.8
	190	33.4	33.4	32.4	30.4	28.7
	251	33.1	33.1	32.2	30.2	28.7
PCS 1900	512	30.5	30.5	29.5	27.6	25.8
	661	30.4	30.4	29.4	27.4	25.8
	810	30.7	30.7	29.7	27.7	26.0
Band	**Channel**	**Calculated Maximum Frame-Averaged Output Power(dBm)**				
		Voice	GPRS Data (GMSK)			
		GSM CS 1 Slot	GPRS 1 TX Slot	GPRS 2 TX Slot	GPRS 3 TX Slot	GPRS 4 TX Slot
GSM850	128	24.27	24.27	26.38	**26.14**	25.79
	190	24.37	24.37	26.38	**26.14**	25.69
	251	24.07	24.07	26.18	**25.94**	25.69
PCS 1900	512	21.47	21.47	23.48	**23.34**	22.79
	661	21.37	21.37	23.38	**23.14**	22.79
	810	21.67	21.67	23.68	**23.44**	22.99
GSM850	**Frame Avg. Targets:**	24.17	24.17	26.18	**25.94**	25.69
PCS 1900		21.17	21.17	23.18	**22.94**	22.69

Table 10.1.2 GSM Conducted Power

Note:

1. Both burst-averaged and calculated frame-averaged powers are included. Frame-averaged power was calculated from the measured burst-averaged power by converting the slot powers into linear units and calculating the energy over 8 timeslots.
2. GPRS (GMSK) output powers were measured with coding scheme setting of 1 (CS1) on the base station simulator. CS1 was configured to measure GPRS output power measurements and SAR to ensure GMSK modulation in the signal. Our Investigation has shown that CS1 - CS4 settings do not have any impact on the output levels or modulation in the GPRS modes.

GPRS Multislot class: 12 (max 4 TX Uplink slots)
DTM Multislot Class: N/A

Figure 10.1 Power Measurement Setup

10.2 WCDMA Nominal and Maximum Output Power Spec and Conducted Powers

Band & Mode		Modulated Average [dBm]									
		3GPP WCDMA	3GPP HSDPA				3GPP HSUPA				
		Rel. 99	Subtest 1	Subtest 2	Subtest 3	Subtest 4	Subtest 1	Subtest 2	Subtest 3	Subtest 4	Subtest 5
WCDMA 850	Maximum	25.2	25.2	25.2	24.7	24.7	25.2	23.2	24.2	23.2	25.2
	Nominal	24.7	24.7	24.7	24.2	24.2	24.7	22.7	23.7	22.7	24.7

Table 10.2.1 WCDMA Nominal and Maximum Output Power Spec

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band (dBm)			3GPP MPR (dB)
			4132	4183	4233	
99	WCDMA	12.2 kbps RMC	24.90	24.76	24.68	-
99		12.2 kbps AMR	24.88	24.75	24.67	-
5	HSDPA	Subtest 1	24.89	24.65	24.68	0
5		Subtest 2	24.89	24.72	24.65	0
5		Subtest 3	24.39	24.33	24.15	0.5
5		Subtest 4	24.38	24.27	24.15	0.5
6	HSUPA	Subtest 1	24.81	24.72	24.64	0
6		Subtest 2	22.90	22.77	22.64	2
6		Subtest 3	23.89	23.75	23.63	1
6		Subtest 4	22.86	22.79	22.63	2
6		Subtest 5	24.88	24.75	24.67	0

Table 10.2.2 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.

Figure 10.2 Power Measurement Setup

10.3 LTE Nominal and Maximum Output Power Spec and Conducted Powers

Band & Mode		Modulated Average[dBm]
LTE Band 12	Maximum	25.2
	Nominal	24.7

Table 10.3.1 Nominal and Maximum Output Power Spec

1) LTE Band 12

LTE Band 12 Conducted Power– 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 23095 (707.5 MHz) Conducted Power (dBm)	MPR Allowed Per 3GPP(dB)	MPR (dB)
QPSK	1	0	**25.00**	0	0
	1	25	24.88		
	1	49	24.85		
	25	0	**23.94**	0-1	1
	25	12	23.91		
	25	25	23.88		
	50	0	23.85	0-1	1
16QAM	1	0	24.05	0-1	1
	1	25	23.95		
	1	49	23.91		
	25	0	23.05	0-2	2
	25	12	23.01		
	25	25	22.97		
	50	0	22.95	0-2	2

Table 10.3.2 LTE Conducted Power

Note 1: LTE Band 12 at 10 MHz bandwidth does not support three non-overlapping channels.
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.

Note 2: The applicant declared that MPR transmission power will not exceed the non MPR maximum transmit power in devices and this device is applied MPR based on 3GPP standard.

LTE Band 12 Conducted Power– 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed Per 3GPP(dB)	MPR (dB)
			23035 (701.5 MHz)	23095 (707.5 MHz)	23155 (713.5 MHz)		
			Conducted Power (dBm)				
QPSK	1	0	24.71	24.72	24.78	0	0
	1	12	24.75	24.77	24.73		
	1	24	24.75	24.78	24.78		
	12	0	23.77	23.73	23.74	0-1	1
	12	6	23.73	23.74	23.72		
	12	13	23.72	23.79	23.77		
	25	0	23.71	23.78	23.79	0-1	1
16QAM	1	0	23.74	23.75	23.72	0-1	1
	1	12	23.89	23.71	23.83		
	1	24	23.72	23.71	23.86		
	12	0	22.71	22.73	22.87	0-2	2
	12	6	22.71	22.73	22.73		
	12	13	22.77	22.78	22.80		
	25	0	22.74	22.79	22.84	0-2	2

Table 10.3.3 LTE Conducted Power

LTE Band 12 Conducted Power– 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed Per 3GPP(dB)	MPR (dB)
			23025 (700.5 MHz)	23095 (707.5 MHz)	23165 (714.5 MHz)		
			Conducted Power (dBm)				
QPSK	1	0	24.85	24.79	24.75	0	0
	1	7	24.85	24.81	24.77		
	1	14	24.80	24.76	24.80		
	8	0	23.78	23.72	23.71	0-1	1
	8	4	23.71	23.77	23.80		
	8	7	23.71	23.72	23.86		
	15	0	23.73	23.78	23.87	0-1	1
16QAM	1	0	23.75	23.89	23.71	0-1	1
	1	7	23.84	23.88	23.74		
	1	14	23.79	23.83	23.84		
	8	0	22.71	22.78	22.76	0-2	2
	8	4	22.77	22.77	22.79		
	8	7	22.75	22.71	22.83		
	15	0	22.75	22.73	22.74	0-2	2

Table 10.3.4 LTE Conducted Power

LTE Band 12 Conducted Power– 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed Per 3GPP(dB)	MPR (dB)
			23017 (699.7 MHz)	23095 (707.5 MHz)	23173 (715.3 MHz)		
			Conducted Power (dBm)				
QPSK	1	0	24.78	24.75	24.87	0	0
	1	2	24.99	24.77	24.85		
	1	5	24.93	24.73	24.86		
	3	0	24.82	24.85	24.88	0	0
	3	2	24.85	24.76	24.86		
	3	3	24.86	24.77	24.80		
	6	0	23.87	23.85	23.86	0-1	1
16QAM	1	0	23.87	23.81	23.87	0-1	1
	1	2	24.05	23.82	23.82		
	1	5	24.03	23.71	23.86		
	3	0	23.84	23.87	23.87	0-1	1
	3	2	23.89	23.80	23.83		
	3	3	23.73	23.85	23.82		
	6	0	22.75	22.83	22.83	0-2	2

Table 10.3.5 LTE Conducted Power

Band & Mode		Modulated Average[dBm]
LTE Band 5(Cell)	Maximum	25.5
	Nominal	25.0

Table 10.3.6 Nominal and Maximum Output Power Spec

2) LTE Band 5 (Cell)

LTE Band 5 (Cell) Conducted Power– 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 20525 (836.5 MHz) Conducted Power (dBm)	MPR Allowed Per 3GPP(dB)	MPR (dB)
QPSK	1	0	**25.48**	0	0
	1	25	25.34		
	1	49	25.42		
	25	0	**24.25**	0-1	1
	25	12	24.20		
	25	25	24.24		
	50	0	24.35	0-1	1
16QAM	1	0	24.49	0-1	1
	1	25	24.24		
	1	49	24.44		
	25	0	23.25	0-2	2
	25	12	23.31		
	25	25	23.33		
	50	0	23.33	0-2	2

Table 10.3.7 LTE Conducted Power

Note 1: LTE Band 5(Cell) at 10 MHz bandwidth does not support three non-overlapping channels.
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.

Note 2: The applicant declared that MPR transmission power will not exceed the non MPR maximum transmit power in devices and this device is applied MPR based on 3GPP standard.

LTE Band 5 (Cell) Conducted Power– 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed Per 3GPP(dB)	MPR (dB)
			20425 (826.5 MHz)	20525 (836.5 MHz)	20625 (846.5 MHz)		
			Conducted Power (dBm)				
QPSK	1	0	25.09	25.03	25.07	0	0
	1	12	25.40	25.44	25.14		
	1	24	25.08	25.08	25.34		
	12	0	24.25	24.18	24.22	0-1	1
	12	6	24.22	24.18	24.30		
	12	13	24.24	24.19	24.16		
	25	0	24.17	24.23	24.19	0-1	1
16QAM	1	0	24.16	24.10	24.04	0-1	1
	1	12	24.34	24.44	24.21		
	1	24	24.00	24.11	24.44		
	12	0	23.20	23.22	23.29	0-2	2
	12	6	23.30	23.24	23.18		
	12	13	23.28	23.24	23.24		
	25	0	23.23	23.25	23.34	0-2	2

Table 10.3.8 LTE Conducted Power

LTE Band 5 (Cell) Conducted Power– 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed Per 3GPP(dB)	MPR (dB)
			20415 (825.5 MHz)	20525 (836.5 MHz)	20635 (847.5 MHz)		
			Conducted Power (dBm)				
QPSK	1	0	25.42	25.13	25.11	0	0
	1	7	25.03	25.15	25.47		
	1	14	25.06	25.28	25.04		
	8	0	24.08	24.12	24.10	0-1	1
	8	4	24.20	24.23	24.27		
	8	7	24.21	24.17	24.21		
	15	0	24.17	24.19	24.29	0-1	1
16QAM	1	0	24.29	24.04	24.25	0-1	1
	1	7	24.17	24.11	24.46		
	1	14	24.13	24.24	24.14		
	8	0	23.21	23.18	23.19	0-2	2
	8	4	23.32	23.30	23.41		
	8	7	23.26	23.23	23.29		
	15	0	23.17	23.26	23.26	0-2	2

Table 10.3.9 LTE Conducted Power

LTE Band 5 (Cell) Conducted Power– 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed Per 3GPP(dB)	MPR (dB)
			20407 (824.7 MHz)	20525 (836.5 MHz)	20643 (848.3 MHz)		
			Conducted Power (dBm)				
QPSK	1	0	25.12	25.24	25.12	0	0
	1	2	25.22	25.28	25.09		
	1	5	25.15	25.09	25.13		
	3	0	25.26	25.22	25.20	0	0
	3	2	25.19	25.24	25.35		
	3	3	25.47	25.28	25.27		
	6	0	24.19	24.19	24.13	0-1	1
16QAM	1	0	24.02	24.11	24.12	0-1	1
	1	2	24.17	24.17	24.15		
	1	5	24.12	24.05	24.14		
	3	0	24.20	24.18	24.31	0-1	1
	3	2	24.14	24.29	24.26		
	3	3	24.38	24.31	24.22		
	6	0	23.24	23.28	23.24	0-2	2

Table 10.3.10 LTE Conducted Power

10.4 WLAN Nominal and Maximum Output Power Spec and Conducted Powers

Band (GHz)	Mode	Ch	Modulated Average[dBm]	
			Maximum	Nominal
2.4	802.11b	1	17.5	16.5
		6	17.5	16.5
		11	17.5	16.5
	802.11g	1	16.5	15.5
		6	16.5	15.5
		11	16.5	15.5
	802.11n	1	15.5	14.5
		6	15.5	14.5
		11	15.5	14.5

Table 10.4.1 WLAN 2.4GHz Nominal and Maximum Output Power Spec

Mode	Freq. (MHz)	Channel	IEEE 802.11 (2.4 GHz) Conducted Power (dBm)
802.11b	2412	1	17.14
	2437	6	17.20
	2462	11	**17.25**
802.11g	2412	1	15.62
	2437	6	15.84
	2462	11	15.54
802.11n (HT-20)	2412	1	14.92
	2437	6	15.08
	2462	11	14.97

Table 10.4.2 IEEE 802.11 Average RF Power

Band (GHz)	Mode	Ch	Modulated Average[dBm]	
			Maximum	Nominal
5	802.11a	36	16.5	15.5
		40-48	16.5	15.5
		52-60	16.5	15.5
		64	16.5	15.5
		100	16.5	15.5
		104-140	16.5	15.5
		149-165	16.5	15.5
	802.11n (20MHz)	36	15.5	14.5
		40-48	15.5	14.5
		52-60	15.5	14.5
		64	15.5	14.5
		100	15.5	14.5
		104-140	15.5	14.5
		149-165	15.5	14.5
	802.11ac (20MHz)	36	14.5	13.5
		40-48	14.5	13.5
		52-60	14.5	13.5
		64	14.5	13.5
		100	14.5	13.5
		104-140	14.5	13.5
		149-165	14.5	13.5
	802.11n/ac (40MHz)	38	13.5	12.5
		46	13.5	12.5
		54	13.5	12.5
		62	13.5	12.5
		102	13.5	12.5
		110~134	13.5	12.5
		151~159	13.5	12.5
	802.11ac (80MHz)	42	12.5	11.5
		58	12.5	11.5
		106	12.5	11.5
		122	12.5	11.5
		155	12.5	11.5

Table 10.4.3 WLAN 5GHz Nominal and Maximum Output Power Spec

Mode	Freq. (MHz)	Channel	IEEE 802.11a (5 GHz) Conducted Power (dBm)
802.11a	5180	36	**15.89**
	5200	40	15.87
	5220	44	15.83
	5240	48	15.88
	5260	52	15.79
	5280	56	15.77
	5300	60	15.83
	5320	64	**15.85**
	5500	100	**15.99**
	5580	116	15.78
	5660	132	15.77
	5700	140	15.82
	5745	149	15.61
	5785	157	15.92
	5825	165	**16.04**

Table 10.4.4 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	14.97
	5200	40	14.97
	5220	44	14.99
	5240	48	14.92
	5260	52	14.77
	5280	56	14.74
	5300	60	14.89
	5320	64	14.95
	5500	100	14.92
	5580	116	14.82
	5660	132	14.95
	5700	140	14.84
	5745	149	14.94
	5785	157	14.92
	5825	165	14.93

Table 10.4.5 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	13.89
	5200	40	13.67
	5220	44	13.72
	5240	48	13.77
	5260	52	13.59
	5280	56	13.35
	5300	60	13.68
	5320	64	13.80
	5500	100	13.88
	5580	116	13.77
	5660	132	13.95
	5700	140	14.11
	5745	149	13.85
	5785	157	13.98
	5825	165	14.10

Table 10.4.6 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	13.14
	5230	46	12.91
	5270	54	12.70
	5310	62	12.86
	5510	102	13.05
	5590	118	12.91
	5670	134	13.01
	5755	151	13.05
	5795	159	13.35

Table 10.4.7 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	12.83
	5230	46	12.75
	5270	54	12.46
	5310	62	12.71
	5510	102	12.63
	5590	118	12.70
	5670	134	12.83
	5755	151	12.87
	5795	159	13.01

Table 10.4.8 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	11.79
	5290	58	11.58
	5530	106	11.67
	5610	122	11.68
	5775	155	11.88

Table 10.4.9 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, duo to an even number of channels, both channels were measured.
- Output Power and SAR is not required for 802.11 g/n HT20 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 ≤ 1.2 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.

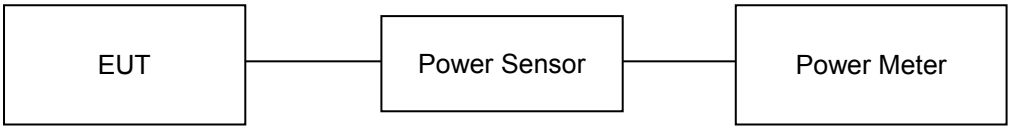

Figure 10.4 Power Measurement Setup

10.5 Bluetooth Nominal and Maximum Output Power Spec and Conducted Powers

Modulated Average[dBm]		
Bluetooth 1 Mbps	Maximum	11.5
	Nominal	10.5
Bluetooth 2 Mbps	Maximum	11.0
	Nominal	10.0
Bluetooth 3 Mbps	Maximum	11.0
	Nominal	10.0
Bluetooth LE	Maximum	2.0
	Nominal	1.0

Table 10.5.1 Bluetooth Nominal and Maximum Output Power Spec

Channel	Frequency	Burst AVG Output Power (1Mbps)	Frame AVG Output Power (1Mbps)	Burst AVG Output Power (2Mbps)	Frame AVG Output Power (2Mbps)	Burst AVG Output Power (3Mbps)	Frame AVG Output Power (3Mbps)
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)
Low	2402	9.97	8.82	9.74	8.59	9.74	8.59
Mid	2441	10.80	9.65	10.43	9.28	10.43	9.28
High	2480	9.84	8.69	9.22	8.07	9.23	8.08

Table 10.5.2 Bluetooth Average RF Power

Channel	Frequency	Burst AVG Output Power(LE)	Frame AVG Output Power(LE)
	(MHz)	(dBm)	(dBm)
Low	2402	1.01	-1.03
Mid	2440	1.44	-0.60
High	2480	0.48	-1.56

Table 10.5.3 Bluetooth LE Average RF Power

- **Bluetooth Conducted Powers procedures**

1. Bluetooth (BDR, EDR)
   1) Enter DUT mode in EUT and operate it.
      When it operating, The EUT is transmitting at maximum power level and duty cycle fixed.
   2) Instruments and EUT were connected like Figure 10.5.1(A).
   3) The maximum output powers of BDR(1 Mbps), EDR(2, 3 Mbps) and each frequency were set by a Bluetooth Tester.
   4) Power levels were measured by a Power Meter.

2. Bluetooth (LE)
   1) Enter LE mode in EUT and operate it.
      When it operating, The EUT is transmitting at maximum power level and duty cycle fixed.
   2) Instruments and EUT were connected like Figure 10.5.1(B).
   3) The average conducted output powers of LE and each frequency can measurement according to setting program in EUT.
   4) Power levels were measured by a Power Meter.

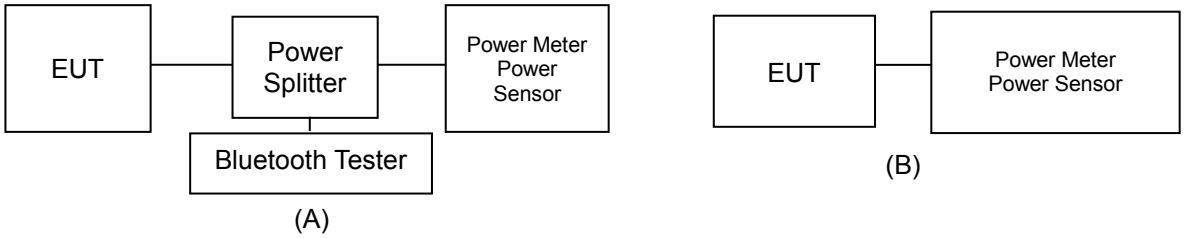

Figure 10.5.1 Average Power Measurement Setup

The average conducted output powers of Bluetooth were measured using above test setup and a wideband gated RF power meter when the EUT is transmitting at its maximum power level.

- **Bluetooth Transmission Plot**

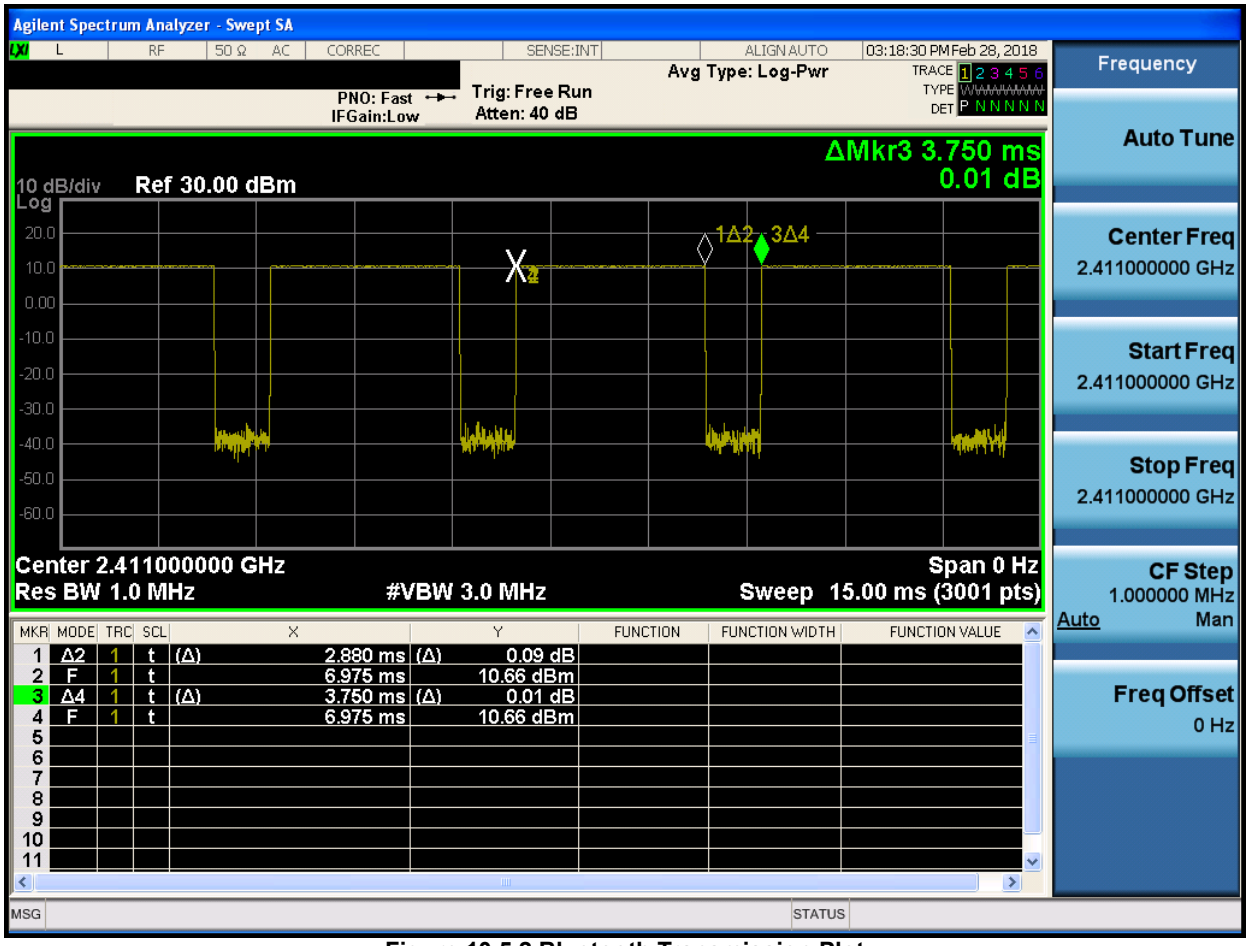

Figure 10.5.2 Bluetooth Transmission Plot

- **Bluetooth Duty Cycle Calculation**

Duty Cycle = Pulse/Period * 100% = (2.880/3.750) * 100 = 76.8%

11. SYSTEM VERIFICATION

11.1 Tissue Verification

MEASURED TISSUE PARAMETERS										
Date(s)	Tissue Type	Ambient Temp.[°C]	Liquid Temp.[°C]	Measured Frequency [MHz]	Target Dielectric Constant, εr	Target Conductivity, σ (S/m)	Measured Dielectric Constant, εr	Measured Conductivity, σ (S/m)	Er Deviation [%]	σ Deviation [%]
Feb. 27. 2018	750 Head	20.7	20.5	707.5	42.129	0.887	42.204	0.871	0.18	-1.80
				750.0	41.900	0.890	41.608	0.911	-0.70	2.36
Feb. 26. 2018	750 Body	20.2	20.3	707.5	55.699	0.960	57.450	0.937	3.14	-2.40
				750.0	55.531	0.963	56.957	0.975	2.57	1.25
Feb. 21. 2018	835 Head	21.0	20.7	824.2	41.552	0.899	42.494	0.913	2.27	1.56
				826.4	41.542	0.899	42.469	0.915	2.23	1.78
				835.0	41.500	0.900	42.378	0.923	2.12	2.56
				836.5	41.500	0.901	42.369	0.925	2.09	2.66
				836.6	41.500	0.901	42.367	0.925	2.09	2.66
				846.6	41.500	0.912	42.258	0.935	1.83	2.52
				848.8	41.500	0.914	42.238	0.937	1.78	2.52
Feb.22. 2018	835 Body	20.9	20.5	824.2	55.243	0.969	53.481	0.955	-3.19	-1.44
				826.4	55.235	0.969	53.468	0.956	-3.20	-1.34
				835.0	55.200	0.970	53.398	0.964	-3.26	-0.62
				836.5	55.197	0.971	53.383	0.965	-3.29	-0.62
				836.6	55.197	0.971	53.383	0.965	-3.29	-0.62
				846.6	55.166	0.984	53.300	0.973	-3.38	-1.12
				848.8	55.160	0.986	53.280	0.975	-3.41	-1.12
Feb. 13. 2018	1900 Head	20.7	20.6	1850.2	40.000	1.400	38.933	1.367	-2.67	-2.36
				1880.0	40.000	1.400	38.877	1.396	-2.81	-0.29
				1900.0	40.000	1.400	38.827	1.415	-2.93	1.07
				1909.8	40.000	1.400	38.802	1.425	-3.00	1.79
Feb. 12. 2018	1900 Body	21.1	21.3	1850.2	53.300	1.520	54.339	1.529	1.95	0.59
				1880.0	53.300	1.520	54.241	1.551	1.77	2.04
				1900.0	53.300	1.520	54.177	1.567	1.65	3.09
				1909.8	53.300	1.520	54.142	1.575	1.58	3.62
Feb. 22. 2018	2450 Head	21.6	21.8	2402.0	39.282	1.757	40.289	1.801	2.56	2.50
				2412.0	39.265	1.766	40.263	1.817	2.54	2.89
				2437.0	39.222	1.788	40.203	1.853	2.50	3.64
				2441.0	39.215	1.792	40.189	1.859	2.48	3.74
				2450.0	39.200	1.800	40.163	1.871	2.46	3.94
				2462.0	39.184	1.813	40.137	1.885	2.43	3.97
				2480.0	39.160	1.832	40.072	1.904	2.33	3.93
Feb. 22. 2018	2450 Body	21.6	21.5	2402.0	52.764	1.904	52.102	1.934	-1.25	1.58
				2412.0	52.751	1.914	52.094	1.949	-1.25	1.83
				2437.0	52.717	1.938	52.075	1.983	-1.22	2.32
				2441.0	52.712	1.941	52.066	1.988	-1.23	2.42
				2450.0	52.700	1.950	52.053	1.998	-1.23	2.46
				2462.0	52.685	1.967	52.036	2.010	-1.23	2.19
				2480.0	52.662	1.993	51.979	2.027	-1.30	1.71

MEASURED TISSUE PARAMETERS										
Date(s)	Tissue Type	Ambient Temp.[°C]	Liquid Temp.[°C]	Measured Frequ0ency [MH0z]	Target Dielectric Constant, εr	Target Conductivity, σ (S/m)	Measured Dielectric Constant, εr	Measured Conductivity, σ (S/m)	Er Deviation [%]	σ Deviation [%]
Feb. 23. 2018	5300 Head	21.6	21.4	5260.0	35.940	4.720	35.152	4.902	-2.19	3.86
				5270.0	35.930	4.730	35.131	4.915	-2.22	3.91
				5280.0	35.920	4.740	35.122	4.927	-2.22	3.95
				5290.0	35.910	4.750	35.115	4.935	-2.21	3.89
				5300.0	35.900	4.760	35.094	4.942	-2.25	3.82
				5310.0	35.890	4.770	35.064	4.955	-2.30	3.88
				5320.0	35.880	4.780	35.040	4.968	-2.34	3.93
Feb. 23. 2018	5300 Body	21.6	21.7	5260.0	48.933	5.369	49.448	5.382	1.05	0.24
				5270.0	48.919	5.381	49.424	5.399	1.03	0.33
				5280.0	48.906	5.393	49.412	5.416	1.03	0.43
				5290.0	48.892	5.404	49.399	5.429	1.04	0.46
				5300.0	48.879	5.416	49.380	5.443	1.02	0.50
				5310.0	48.865	5.428	49.358	5.458	1.01	0.55
				5320.0	48.851	5.439	49.343	5.474	1.01	0.64
Feb. 26. 2018	5600 Head	21.8	2.14	5500.0	35.650	4.965	34.626	5.152	-2.87	3.77
				5510.0	35.635	4.976	34.624	5.160	-2.84	3.70
				5530.0	35.605	4.997	34.575	5.181	-2.89	3.68
				5550.0	35.575	5.018	34.544	5.206	-2.90	3.75
				5580.0	35.530	5.049	34.483	5.239	-2.95	3.76
				5600.0	35.500	5.070	34.446	5.269	-2.97	3.93
				5610.0	35.490	5.080	34.444	5.281	-2.95	3.96
				5660.0	35.440	5.130	34.359	5.335	-3.05	4.00
				5670.0	35.430	5.140	34.345	5.344	-3.06	3.97
				5700.0	35.400	5.170	34.274	5.380	-3.18	4.06
Feb. 26. 2018	5600 Body	21.8	21.6	5500.0	48.607	5.650	48.478	5.805	-0.27	2.74
				5510.0	48.594	5.661	48.466	5.812	-0.26	2.67
				5530.0	48.566	5.685	48.445	5.836	-0.25	2.66
				5550.0	48.539	5.708	48.428	5.866	-0.23	2.77
				5580.0	48.499	5.743	48.351	5.907	-0.31	2.86
				5600.0	48.471	5.766	48.342	5.940	-0.27	3.02
				5610.0	48.458	5.778	48.324	5.953	-0.28	3.03
				5660.0	48.390	5.836	48.247	6.019	-0.30	3.14
				5670.0	48.376	5.848	48.244	6.032	-0.27	3.15
				5700.0	48.336	5.883	48.169	6.075	-0.35	3.26
Feb. 27. 2018	5800 Head	22.1	22.5	5745.0	35.355	5.215	34.373	5.393	-2.78	3.41
				5755.0	35.345	5.225	34.350	5.408	-2.82	3.50
				5775.0	35.325	5.245	34.322	5.431	-2.84	3.55
				5785.0	35.315	5.255	34.302	5.440	-2.87	3.52
				5795.0	35.305	5.265	34.279	5.453	-2.91	3.57
				5800.0	35.300	5.270	34.267	5.460	-2.93	3.61
				5825.0	35.275	5.296	34.233	5.493	-2.95	3.72
Feb. 27. 2018	5800 Body	22.1	22.2	5745.0	48.275	5.936	48.157	6.135	-0.24	3.35
				5755.0	48.261	5.947	48.142	6.151	-0.25	3.43
				5775.0	48.234	5.971	48.125	6.175	-0.23	3.42
				5785.0	48.220	5.982	48.109	6.187	-0.23	3.43
				5795.0	48.207	5.994	48.087	6.201	-0.25	3.45
				5800.0	48.200	6.000	48.078	6.209	-0.25	3.48
				5825.0	48.166	6.029	48.041	6.247	-0.26	3.62

MEASURED TISSUE PARAMETERS										
Date(s)	Tissue Type	Ambient Temp.[°C]	Liquid Temp.[°C]	Measured Frequ0ency [MH0z]	Target Dielectric Constant, εr	Target Conductivity, σ (S/m)	Measured Dielectric Constant, εr	Measured Conductivity, σ (S/m)	Er Deviation [%]	σ Deviation [%]
Mar. 21. 2018	5200 Body	21.0	22.0	5180.0	49.041	5.276	50.113	5.363	2.19	1.65
				5190.0	49.028	5.288	50.090	5.374	2.17	1.63
				5200.0	49.014	5.299	50.062	5.387	2.14	1.66
				5210.0	49.001	5.311	50.040	5.402	2.12	1.71
				5220.0	48.987	5.323	50.021	5.417	2.11	1.77
				5230.0	48.974	5.334	50.002	5.430	2.10	1.80
				5240.0	48.960	5.346	49.978	5.442	2.08	1.80
Mar. 21. 2018	5800 Body	21.0	22.0	5745.0	48.275	5.936	49.831	6.135	3.22	3.35
				5755.0	48.261	5.947	49.813	6.153	3.22	3.46
				5775.0	48.234	5.971	49.783	6.183	3.21	3.55
				5785.0	48.220	5.982	49.766	6.196	3.21	3.58
				5795.0	48.207	5.994	49.748	6.211	3.20	3.62
				5800.0	48.200	6.000	49.737	6.219	3.19	3.65
				5825.0	48.166	6.029	49.700	6.258	3.18	3.80

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.

Extremity SAR was tested using body-equivalent tissue dielectric parameters found in KDB Publication 648474D04v01r03.

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 , for example from the below equation (Pournaropoulos and Misra):

$$Y = \frac{j2\omega\varepsilon_r\varepsilon_0}{[\ln(b/a)]^2}\int_a^b\int_a^b\int_0^\pi \cos\phi'\frac{\exp\left[-j\omega r(\mu_0\varepsilon_r\varepsilon_0)^{1/2}\right]}{r}d\phi'd\rho'd\rho$$

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

11.2 Test System Verification

Prior to assessment, the system is verified to the ± 10 % of the specifications at 750 MHz, 835 MHz, 1900 MHz, 2450 MHz and 5GHz by using the SAR Dipole kit(s). (Graphic Plots Attached)

Table 11.2.1 System Verification Results

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_{1g} (W/kg)	Measured SAR_{1g} (W/kg)	1 W Normalized SAR_{1g} (W/kg)	Deviation [%]
C	750	D750V3, SN:1049	Feb. 27. 2018	Head	20.7	20.5	3328	250	8.32	2.11	8.44	1.44
C	750	D750V3, SN:1049	Feb. 26. 2018	Body	20.2	20.3	3328	250	8.70	2.25	9.00	3.45
C	835	D835V2, SN:464	Feb. 21. 2018	Head	21.0	20.7	3328	250	9.38	2.51	10.04	7.04
C	835	D835V2, SN:464	Feb. 22. 2018	Body	20.9	20.5	3328	250	9.45	2.37	9.48	0.32
C	1900	D1900V2, SN:5d029	Feb. 13. 2018	Head	20.7	20.6	7337	100	39.2	3.90	39.00	-0.51
C	1900	D1900V2, SN: 5d029	Feb. 12. 2018	Body	21.1	21.3	7337	100	39.6	4.17	41.70	5.30
D	2450	D2450V2, SN: 726	Feb. 22. 2018	Head	21.6	21.8	7337	100	51.9	5.16	51.60	-0.58
D	2450	D2450V2, SN: 726	Feb. 22. 2018	Body	21.6	21.5	7337	100	50.3	5.17	51.70	2.78
D	5300	D5GHzV2, SN:1103	Feb. 23. 2018	Head	21.6	21.4	7337	100	84.1	8.89	88.90	5.71
D	5300	D5GHzV2, SN:1103	Feb. 23. 2018	Body	21.6	21.7	7337	100	76.7	7.78	77.80	1.43
D	5500	D5GHzV2, SN:1103	Feb. 26. 2018	Head	21.8	21.4	7337	100	83.2	8.29	82.90	-0.36
D	5500	D5GHzV2, SN:1103	Feb. 26. 2018	Body	21.8	21.6	7337	100	81.0	8.38	83.80	3.46
D	5800	D5GHzV2, SN:1103	Feb. 27. 2018	Head	22.1	22.5	7337	100	81.1	8.24	82.40	1.60
D	5800	D5GHzV2, SN:1103	Feb. 27. 2018	Body	22.1	22.2	7337	100	77.5	7.92	79.20	2.19
D	5200	D5GHzV2, SN:1212	Mar. 21. 2018	Body	21.0	22.0	7337	100	72.7	7.29	72.9	0.28
D	5800	D5GHzV2, SN:1212	Mar. 21. 2018	Body	21.0	22.0	7337	100	75.7	7.94	79.4	4.89

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

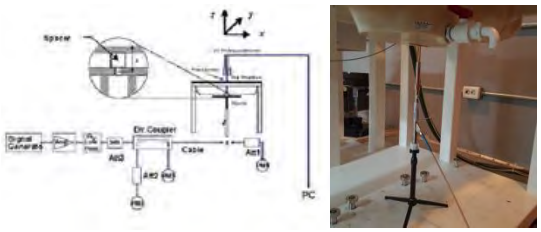

Figure 11.1 Dipole Verification Test Setup Diagram & Photo

12. SAR TEST RESULTS

12.1 Head SAR Results

Table 12.1.1 GSM/GPRS 850 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/ Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	# of Time Slots	Duty Cycle	1g SAR (W/kg)	Scaling Factor	1g Scaled SAR (W/kg)	Plots #
MHz	Ch													
836.6	190	GSM850	GSM	33.7	33.4	0.180	Left Touch	FCC #1	1	1:8.3	0.148	1.072	**0.159**	A1
836.6	190	GSM850	GSM	33.7	33.4	0.160	Right Touch	FCC #1	1	1:8.3	0.088	1.072	0.094	
836.6	190	GSM850	GSM	33.7	33.4	0.120	Left Tilt	FCC #1	1	1:8.3	0.065	1.072	0.070	
836.6	190	GSM850	GSM	33.7	33.4	0.030	Right Tilt	FCC #1	1	1:8.3	0.063	1.072	0.068	
836.6	190	GSM850	GPRS	30.7	30.4	0.150	Left Touch	FCC #1	3	1:2.77	0.180	1.072	**0.193**	A2
836.6	190	GSM850	GPRS	30.7	30.4	0.000	Right Touch	FCC #1	3	1:2.77	0.108	1.072	0.116	
836.6	190	GSM850	GPRS	30.7	30.4	0.120	Left Tilt	FCC #1	3	1:2.77	0.065	1.072	0.070	
836.6	190	GSM850	GPRS	30.7	30.4	0.140	Right Tilt	FCC #1	3	1:2.77	0.085	1.072	0.091	
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**						

Table 12.1.2 PCS/GPRS 1900 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/ Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	# of Time Slots	Duty Cycle	1g SAR (W/kg)	Scaling Factor	1g Scaled SAR (W/kg)	Plots #
MHz	Ch													
1880.0	661	PCS1900	PCS	30.7	30.4	0.030	Left Touch	FCC #1	1	1:8.3	0.051	1.072	0.055	
1880.0	661	PCS1900	PCS	30.7	30.4	-0.170	Right Touch	FCC #1	1	1:8.3	0.054	1.072	**0.058**	A3
1880.0	661	PCS1900	PCS	30.7	30.4	-0.100	Left Tilt	FCC #1	1	1:8.3	0.045	1.072	0.048	
1880.0	661	PCS1900	PCS	30.7	30.4	0.110	Right Tilt	FCC #1	1	1:8.3	0.033	1.072	0.035	
1880.0	661	PCS1900	GPRS	27.7	27.4	0.090	Left Touch	FCC #1	3	1:2.77	0.060	1.072	0.064	
1880.0	661	PCS1900	GPRS	27.7	27.4	0.130	Right Touch	FCC #1	3	1:2.77	0.067	1.072	**0.072**	A4
1880.0	661	PCS1900	GPRS	27.7	27.4	-0.120	Left Tilt	FCC #1	3	1:2.77	0.048	1.072	0.051	
1880.0	661	PCS1900	GPRS	27.7	27.4	0.180	Right Tilt	FCC #1	3	1:2.77	0.038	1.072	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**						

Table 12.1.3 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	25.2	24.76	0.160	Left Touch	FCC #1	1:1	0.236	1.107	**0.261**	A5
836.6	4183	WCDMA 850	RMC	25.2	24.76	-0.110	Right Touch	FCC #1	1:1	0.146	1.107	0.162	
836.6	4183	WCDMA 850	RMC	25.2	24.76	0.160	Left Tilt	FCC #1	1:1	0.105	1.107	0.116	
836.6	4183	WCDMA 850	RMC	25.2	24.76	0.030	Right Tilt	FCC #1	1:1	0.105	1.107	0.116	
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**					

Table 12.1.4 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	25.2	25.00	0.040	0	Left Touch	FCC #1	QPSK	1	0	1:1	0.085	1.047	**0.089**	A6
707.5	23095	LTE B12	10	24.2	23.94	0.060	1	Left Touch	FCC #1	QPSK	25	0	1:1	0.069	1.062	0.073	
707.5	23095	LTE B12	10	25.2	25.00	-0.060	0	Right Touch	FCC #1	QPSK	1	0	1:1	0.082	1.047	0.086	
707.5	23095	LTE B12	10	24.2	23.94	0.070	1	Right Touch	FCC #1	QPSK	25	0	1:1	0.062	1.062	0.066	
707.5	23095	LTE B12	10	25.2	25.00	0.000	0	Left Tilt	FCC #1	QPSK	1	0	1:1	0.035	1.047	0.037	
707.5	23095	LTE B12	10	24.2	23.94	0.020	1	Left Tilt	FCC #1	QPSK	25	0	1:1	0.032	1.062	0.034	
707.5	23095	LTE B12	10	25.2	25.00	-0.000	0	Right Tilt	FCC #1	QPSK	1	0	1:1	0.048	1.047	0.050	
707.5	23095	LTE B12	10	24.2	23.94	-0.010	1	Right Tilt	FCC #1	QPSK	25	0	1:1	0.032	1.062	0.034	
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**								

Table 12.1.5 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	25.5	25.48	-0.010	0	Left Touch	FCC #1	QPSK	1	0	1:1	0.255	1.005	**0.256**	A7
836.5	20525	LTE B5	10	24.5	24.25	0.140	1	Left Touch	FCC #1	QPSK	25	0	1:1	0.201	1.059	0.213	
836.5	20525	LTE B5	10	25.5	25.48	0.070	0	Right Touch	FCC #1	QPSK	1	0	1:1	0.178	1.005	0.179	
836.5	20525	LTE B5	10	24.5	24.25	0.150	1	Right Touch	FCC #1	QPSK	25	0	1:1	0.131	1.059	0.139	
836.5	20525	LTE B5	10	25.5	25.48	0.050	0	Left Tilt	FCC #1	QPSK	1	0	1:1	0.084	1.005	0.084	
836.5	20525	LTE B5	10	24.5	24.25	-0.030	1	Left Tilt	FCC #1	QPSK	25	0	1:1	0.067	1.059	0.071	
836.5	20525	LTE B5	10	25.5	25.48	-0.050	0	Right Tilt	FCC #1	QPSK	1	0	1:1	0.115	1.005	0.116	
836.5	20525	LTE B5	10	24.5	24.25	0.130	1	Right Tilt	FCC #1	QPSK	25	0	1:1	0.088	1.059	0.093	
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**								

Table 12.1.6 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)	Plots #
MHz	Ch														
2462	11	802.11b	17.5	17.25	0.100	Left Touch	FCC #2	0.227	1	99.8	0.227	1.059	1.002	0.241	
2462	11	802.11b	17.5	17.25	0.010	Right Touch	FCC #2	0.428	1	99.8	0.402	1.059	1.002	**0.427**	A8
2462	11	802.11b	17.5	17.25	-0.010	Left Tilt	FCC #2	0.148	1	99.8	0.175	1.059	1.002	0.186	
2462	11	802.11b	17.5	17.25	0.000	Right Tilt	FCC #2	0.261	1	99.8	0.292	1.059	1.002	0.310	
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. Highest reported SAR is ≤ 0.4 W/kg. Therefore, further SAR measurements within this exposure condition are not required.
2. Highest reported SAR is > 0.4 W/kg. Due to the highest reported SAR for this test position, other test position is Head exposure condition were evaluated until a SAR ≤ 0.8 W/kg was reported.

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	11	802.11b	DSSS	17.5	0.427	2437	802.11g	OFDM	16.5	0.794	**0.339**	X
2462	11	802.11b	DSSS	17.5	0.427	2437	802.11n	OFDM	15.5	0.631	**0.269**	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 12.1.7 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														
5320	64	802.11a	16.5	15.85	-0.120	Left Touch	FCC #2	0.059	6	99.9	0.040	1.161	1.010	0.047	
5320	64	802.11a	16.5	15.85	-0.120	Right Touch	FCC #2	0.151	6	99.9	0.114	1.161	1.010	**0.134**	A9
5320	64	802.11a	16.5	15.85	-0.180	Left Tilt	FCC #2	0.053	6	99.9	0.043	1.161	1.010	0.050	
5320	64	802.11a	16.5	15.85	-0.160	Right Tilt	FCC #2	0.079	6	99.9	0.081	1.161	1.010	0.095	
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. Highest reported SAR is ≤ 0.4 W/kg. Therefore, further SAR measurements within this exposure condition are not required.
2. U-NII-1 and U-NII-2A Bands: 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 ≤ 1.2 W/kg, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition).

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											
5320	64	802.11a	OFDM	16.5	0.134	5180	802.11a	OFDM	16.5	1.000	**0.134**	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 ≤ 1.2 W/kg, SAR is not required for the band with lower maximum output power in that test configuration.

Table 12.1.8 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	100	802.11a	16.5	15.99	0.000	Left Touch	FCC #2	0.085	6	99.9	0.065	1.125	1.010	0.074	
5500	100	802.11a	16.5	15.99	-0.020	Right Touch	FCC #2	0.137	6	99.9	0.144	1.125	1.010	**0.164**	A10
5500	100	802.11a	16.5	15.99	0.000	Left Tilt	FCC #2	0.068	6	99.9	0.060	1.125	1.010	0.068	
5500	100	802.11a	16.5	15.99	0.070	Right Tilt	FCC #2	0.123	6	99.9	0.139	1.125	1.010	0.158	
5825	165	802.11a	16.5	16.04	0.000	Left Touch	FCC #2	0.059	6	99.9	0.048	1.112	1.010	0.054	
5825	165	802.11a	16.5	16.04	0.000	Right Touch	FCC #2	0.110	6	99.9	0.094	1.112	1.010	0.106	
5825	165	802.11a	16.5	16.04	0.000	Left Tilt	FCC #2	0.078	6	99.9	0.062	1.112	1.010	0.070	
5825	165	802.11a	16.5	16.04	0.000	Right Tilt	FCC #2	0.094	6	99.9	0.104	1.112	1.010	**0.117**	A11
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. Highest reported SAR is ≤ 0.4 W/kg. Therefore, further SAR measurements within this exposure condition are not required.

Table 12.1.9 Bluetooth Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	Rate [Mbps]	Duty Cycle (%)	1g SAR (W/kg)	Scaling Factor	Scaling Factor (Duty Cycle)	1g Scaled SAR (W/kg)	Plots #
MHz	Ch													
2441	39	Bluetooth	11.5	9.65	0.110	Left Touch	FCC #2	1	76.8	0.048	1.531	1.302	0.096	
2441	39	Bluetooth	11.5	9.65	-0.070	Right Touch	FCC #2	1	76.8	0.091	1.531	1.302	**0.181**	A12
2441	39	Bluetooth	11.5	9.65	0.020	Left Tilt	FCC #2	1	76.8	0.032	1.531	1.302	0.064	
2441	39	Bluetooth	11.5	9.65	-0.080	Right Tilt	FCC #2	1	76.8	0.056	1.531	1.302	0.112	
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**						

12.2 Standalone Body-Worn SAR Worn SAR Results

Table 12.2.1 GSM/PCS/GPRS/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 Slots	Duty Cycle	1g SAR (W/kg)	Scaling Factor	1g Scaled SAR (W/kg)	Plots #
MHz	Ch													
836.6	190	GSM850	GSM	33.7	33.4	0.070	10 mm [Front]	FCC #1	1	1:8.3	0.395	1.072	**0.423**	A13
836.6	190	GSM850	GSM	33.7	33.4	-0.010	10 mm [Rear]	FCC #1	1	1:8.3	0.370	1.072	0.397	
836.6	190	GSM850	GPRS	30.7	30.4	-0.010	10 mm [Front]	FCC #1	3	1:2.77	0.472	1.072	**0.506**	A14
836.6	190	GSM850	GPRS	30.7	30.4	0.040	10 mm [Rear]	FCC #1	3	1:2.77	0.460	1.072	0.493	
1880.0	661	PCS1900	PCS	30.7	30.4	0.020	10 mm [Front]	FCC #1	1	1:8.3	0.215	1.072	0.230	
1880.0	661	PCS1900	PCS	30.7	30.4	-0.060	10 mm [Rear]	FCC #1	1	1:8.3	0.239	1.072	**0.256**	A15
1880.0	661	PCS1900	GPRS	27.7	27.4	-0.040	10 mm [Front]	FCC #1	3	1:2.77	0.255	1.072	0.273	
1880.0	661	PCS1900	GPRS	27.7	27.4	-0.120	10 mm [Rear]	FCC #1	3	1:2.77	0.294	1.072	**0.315**	A16
836.6	4183	WCDMA 850	RMC	25.2	24.76	0.010	10 mm [Front]	FCC #1	N/A	1:1	0.624	1.107	**0.691**	A17
836.6	4183	WCDMA 850	RMC	25.2	24.76	-0.020	10 mm [Rear]	FCC #1	N/A	1:1	0.583	1.107	0.645	
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**						

Table 12.2.2 LTE B12, LTE B5 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																
707.5	23095	LTE B12	10	25.2	25.00	-0.130	0	10 mm [Front]	FCC #1	QPSK	1	0	1:1	0.368	1.047	0.385	
707.5	23095	LTE B12	10	24.2	23.94	0.120	1	10 mm [Front]	FCC #1	QPSK	25	0	1:1	0.294	1.062	0.312	
707.5	23095	LTE B12	10	25.2	25.00	-0.070	0	10 mm [Rear]	FCC #1	QPSK	1	0	1:1	0.465	1.047	**0.487**	A18
707.5	23095	LTE B12	10	24.2	23.94	0.060	1	10 mm [Rear]	FCC #1	QPSK	25	0	1:1	0.361	1.062	0.383	
836.5	20525	LTE B5	10	25.5	25.48	-0.010	0	10 mm [Front]	FCC #1	QPSK	1	0	1:1	0.665	1.005	**0.668**	A19
836.5	20525	LTE B5	10	24.5	24.25	0.000	1	10 mm [Front]	FCC #1	QPSK	25	0	1:1	0.537	1.059	0.569	
836.5	20525	LTE B5	10	25.5	25.48	0.030	0	10 mm [Rear]	FCC #1	QPSK	1	0	1:1	0.639	1.005	0.642	
836.5	20525	LTE B5	10	24.5	24.25	-0.020	1	10 mm [Rear]	FCC #1	QPSK	25	0	1:1	0.507	1.059	0.537	
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**								

Table 12.2.3 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	11	802.11b	17.5	17.25	-0.130	10 mm [Front]	FCC #2	0.079	1	99.8	0.082	1.059	1.002	**0.087**	A20
2462	11	802.11b	17.5	17.25	-0.110	10 mm [Rear]	FCC #2	0.055	1	99.8	0.057	1.059	1.002	0.060	
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. Highest reported SAR is ≤ 0.4 W/kg. Therefore, further SAR measurements within this exposure condition are not required.

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	11	802.11b	DSSS	17.5	0.087	2437	802.11g	OFDM	16.5	0.794	**0.069**	X
2462	11	802.11b	DSSS	17.5	0.087	2437	802.11n	OFDM	15.5	0.631	**0.055**	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 12.2.4 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														
5320	64	802.11a	16.5	15.85	-0.020	10 mm [Front]	FCC #2	0.021	6	99.9	0.015	1.161	1.010	0.018	
5320	64	802.11a	16.5	15.85	-0.040	10 mm [Rear]	FCC #2	0.134	6	99.9	0.142	1.161	1.010	**0.167**	A21
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. Highest reported SAR is ≤ 0.4 W/kg. Therefore, further SAR measurements within this exposure condition are not required.
2. U-NII-1 and U-NII-2A Bands: 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 ≤ 1.2 W/kg, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition).

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											
5320	64	802.11a	OFDM	16.5	0.167	5180	802.11a	OFDM	16.5	1.000	**0.167**	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 ≤ 1.2 W/kg, SAR is not required for the band with lower maximum output power in that test configuration.

Table 12.2.5 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														
5500	100	802.11a	16.5	15.99	-0.180	10 mm [Front]	FCC #2	0.030	6	99.9	0.024	1.125	1.010	0.027	
5500	100	802.11a	16.5	15.99	-0.140	10 mm [Rear]	FCC #2	0.342	6	99.9	0.399	1.125	1.010	**0.453**	A22
5825	165	802.11a	16.5	16.04	-0.050	10 mm [Front]	FCC #2	0.029	6	99.9	0.023	1.112	1.010	0.026	
5825	165	802.11a	16.5	16.04	0.180	10 mm [Rear]	FCC #2	0.612	6	99.9	0.687	1.112	1.010	**0.772**	A23
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. Highest reported SAR is ≤ 0.4 W/kg. Therefore, further SAR measurements within this exposure condition are not required.
2. Highest reported SAR is > 0.4 W/kg. Due to the highest reported SAR for this test position, other test position is Head exposure condition were evaluated until a SAR ≤ 0.8 W/kg was reported.

Table 12.2.6 Bluetooth Body-Worn SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	Rate [Mbps]	Duty Cycle (%)	1g SAR (W/kg)	Scaling Factor	Scaling Factor (Duty Cycle)	1g Scaled SAR (W/kg)	Plots #
MHz	Ch													
2441	39	Bluetooth	11.5	9.65	0.080	10 mm [Front]	FCC #2	1	76.8	0.017	1.531	1.302	**0.034**	A24
2441	39	Bluetooth	11.5	9.65	-0.180	10 mm [Rear]	FCC #2	1	76.8	0.012	1.531	1.302	0.024	
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**						

12.3 Standalone Hotspot SAR Results

Table 12.3.1 GPRS 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 Slots	Duty Cycle	1g SAR (W/kg)	Scaling Factor	1g Scaled SAR (W/kg)	Plots #
MHz	Ch													
836.6	190	GSM850	GPRS	30.7	30.4	-0.170	10 mm [Bottom]	FCC #1	3	1:2.77	0.292	1.072	0.313	
836.6	190	GSM850	GPRS	30.7	30.4	-0.010	10 mm [Front]	FCC #1	3	1:2.77	0.472	1.072	**0.506**	A14
836.6	190	GSM850	GPRS	30.7	30.4	0.040	10 mm [Rear]	FCC #1	3	1:2.77	0.460	1.072	0.493	
836.6	190	GSM850	GPRS	30.7	30.4	-0.010	10 mm [Right]	FCC #1	3	1:2.77	0.073	1.072	0.078	
836.6	190	GSM850	GPRS	30.7	30.4	-0.100	10 mm [Left]	FCC #1	3	1:2.77	0.319	1.072	0.342	
1880.0	661	PCS1900	GPRS	27.7	27.4	0.000	10 mm [Bottom]	FCC #1	3	1:2.77	0.151	1.072	0.162	
1880.0	661	PCS1900	GPRS	27.7	27.4	-0.040	10 mm [Front]	FCC #1	3	1:2.77	0.255	1.072	0.273	
1880.0	661	PCS1900	GPRS	27.7	27.4	-0.120	10 mm [Rear]	FCC #1	3	1:2.77	0.294	1.072	**0.315**	A16
1880.0	661	PCS1900	GPRS	27.7	27.4	-0.100	10 mm [Left]	FCC #1	3	1:2.77	0.106	1.072	0.114	
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**						

Table 12.3.2 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 Slots	Duty Cycle	1g SAR (W/kg)	Scaling Factor	1g Scaled SAR (W/kg)	Plots #
MHz	Ch													
836.6	4183	WCDMA 850	RMC	25.2	24.76	-0.060	10 mm [Bottom]	FCC #1	N/A	1:1	0.274	1.107	0.303	
836.6	4183	WCDMA 850	RMC	25.2	24.76	0.010	10 mm [Front]	FCC #1	N/A	1:1	0.624	1.107	**0.691**	A17
836.6	4183	WCDMA 850	RMC	25.2	24.76	-0.020	10 mm [Rear]	FCC #1	N/A	1:1	0.583	1.107	0.645	
836.6	4183	WCDMA 850	RMC	25.2	24.76	-0.010	10 mm [Right]	FCC #1	N/A	1:1	0.109	1.107	0.121	
836.6	4183	WCDMA 850	RMC	25.2	24.76	-0.050	10 mm [Left]	FCC #1	N/A	1:1	0.394	1.107	0.436	
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 variability measurements.

Table 12.3.3 LTE B12, 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																
707.5	23095	LTE B12	10	25.2	25.00	-0.010	0	10 mm [Bottom]	FCC #1	QPSK	1	0	1:1	0.159	1.047	0.166	
707.5	23095	LTE B12	10	24.2	23.94	-0.030	1	10 mm [Bottom]	FCC #1	QPSK	25	0	1:1	0.130	1.062	0.138	
707.5	23095	LTE B12	10	25.2	25.00	-0.130	0	10 mm [Front]	FCC #1	QPSK	1	0	1:1	0.368	1.047	0.385	
707.5	23095	LTE B12	10	24.2	23.94	0.120	1	10 mm [Front]	FCC #1	QPSK	25	0	1:1	0.294	1.062	0.312	
707.5	23095	LTE B12	10	25.2	25.00	-0.070	0	10 mm [Rear]	FCC #1	QPSK	1	0	1:1	0.465	1.047	**0.487**	A18
707.5	23095	LTE B12	10	24.2	23.94	0.060	1	10 mm [Rear]	FCC #1	QPSK	25	0	1:1	0.361	1.062	0.383	
707.5	23095	LTE B12	10	25.2	25.00	-0.130	0	10 mm [Right]	FCC #1	QPSK	1	0	1:1	0.150	1.047	0.157	
707.5	23095	LTE B12	10	24.2	23.94	-0.080	1	10 mm [Right]	FCC #1	QPSK	25	0	1:1	0.120	1.062	0.127	
707.5	23095	LTE B12	10	25.2	25.00	0.030	0	10 mm [Left]	FCC #1	QPSK	1	0	1:1	0.078	1.047	0.082	
707.5	23095	LTE B12	10	24.2	23.94	-0.020	1	10 mm [Left]	FCC #1	QPSK	25	0	1:1	0.062	1.062	0.066	
836.5	20525	LTE B5	10	25.5	25.48	0.090	0	10 mm [Bottom]	FCC #1	QPSK	1	0	1:1	0.381	1.005	0.383	
836.5	20525	LTE B5	10	24.5	24.25	-0.070	1	10 mm [Bottom]	FCC #1	QPSK	25	0	1:1	0.287	1.059	0.304	
836.5	20525	LTE B5	10	25.5	25.48	-0.010	0	10 mm [Front]	FCC #1	QPSK	1	0	1:1	0.665	1.005	**0.668**	A19
836.5	20525	LTE B5	10	24.5	24.25	0.000	1	10 mm [Front]	FCC #1	QPSK	25	0	1:1	0.537	1.059	0.569	
836.5	20525	LTE B5	10	25.5	25.48	0.030	0	10 mm [Rear]	FCC #1	QPSK	1	0	1:1	0.639	1.005	0.642	
836.5	20525	LTE B5	10	24.5	24.25	-0.020	1	10 mm [Rear]	FCC #1	QPSK	25	0	1:1	0.507	1.059	0.537	
836.5	20525	LTE B5	10	25.5	25.48	-0.040	0	10 mm [Right]	FCC #1	QPSK	1	0	1:1	0.129	1.005	0.130	
836.5	20525	LTE B5	10	24.5	24.25	0.000	1	10 mm [Right]	FCC #1	QPSK	25	0	1:1	0.100	1.059	0.106	
836.5	20525	LTE B5	10	25.5	25.48	-0.070	0	10 mm [Left]	FCC #1	QPSK	1	0	1:1	0.429	1.005	0.431	
836.5	20525	LTE B5	10	24.5	24.25	-0.010	1	10 mm [Left]	FCC #1	QPSK	25	0	1:1	0.335	1.059	0.355	
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**							

Table 12.3.4 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	11	802.11b	17.5	17.25	0.110	10 mm [Top]	FCC #2	0.060	1	99.8	0.066	1.059	1.002	0.070	
2462	11	802.11b	17.5	17.25	-0.130	10 mm [Front]	FCC #2	0.079	1	99.8	0.082	1.059	1.002	0.087	
2462	11	802.11b	17.5	17.25	-0.110	10 mm [Rear]	FCC #2	0.055	1	99.8	0.057	1.059	1.002	0.060	
2462	11	802.11b	17.5	17.25	0.020	10 mm [Left]	FCC #2	0.107	1	99.8	0.111	1.059	1.002	**0.118**	A25
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. Highest reported SAR is ≤ 0.4 W/kg. Therefore, further SAR measurements within this exposure condition are not required.

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	11	802.11b	DSSS	17.5	0.118	2437	802.11g	OFDM	16.5	0.794	**0.094**	X
2462	11	802.11b	DSSS	17.5	0.118	2437	802.11n	OFDM	15.5	0.631	**0.074**	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 12.3.5 Bluetooth Hotspot SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	Rate [Mbps]	Duty Cycle (%)	1g SAR (W/kg)	Scaling Factor	Scaling Factor (Duty Cycle)	1g Scaled SAR (W/kg)	Plots #
MHz	Ch													
2441	39	Bluetooth	11.5	9.65	0.140	10 mm [Top]	FCC #2	1	76.8	0.014	1.531	1.302	0.028	
2441	39	Bluetooth	11.5	9.65	0.080	10 mm [Front]	FCC #2	1	76.8	0.017	1.531	1.302	0.034	
2441	39	Bluetooth	11.5	9.65	-0.180	10 mm [Rear]	FCC #2	1	76.8	0.012	1.531	1.302	0.024	
2441	39	Bluetooth	11.5	9.65	-0.060	10 mm [Left]	FCC #2	1	76.8	0.022	1.531	1.302	**0.044**	A26
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**						

Table 12.3.6 UNII Hotspot 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														
5180	36	802.11a	16.5	15.89	-0.000	10 mm [Top]	FCC #2	0.013	6	99.9	0.00796	1.151	1.010	0.009	
5180	36	802.11a	16.5	15.89	-0.020	10 mm [Front]	FCC #2	0.020	6	99.9	0.014	1.151	1.010	0.016	
5180	36	802.11a	16.5	15.89	-0.040	10 mm [Rear]	FCC #2	0.128	6	99.9	0.132	1.151	1.010	**0.153**	A27
5180	36	802.11a	16.5	15.89	-0.180	10 mm [Left]	FCC #2	0.047	6	99.9	0.041	1.151	1.010	0.048	
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. Highest reported SAR is ≤ 0.4 W/kg. Therefore, further SAR measurements within this exposure condition are not required.

Table 12.3.7 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														
5825	165	802.11a	16.5	16.04	0.050	10 mm [Top]	FCC #2	0.045	6	99.9	0.039	1.112	1.010	0.044	
5825	165	802.11a	16.5	16.04	-0.050	10 mm [Front]	FCC #2	0.029	6	99.9	0.023	1.112	1.010	0.026	
5825	165	802.11a	16.5	16.04	0.180	10 mm [Rear]	FCC #2	0.612	6	99.9	0.687	1.112	1.010	**0.772**	A23
5825	165	802.11a	16.5	16.04	0.090	10 mm [Left]	FCC #2	0.199	6	99.9	0.197	1.112	1.010	0.221	
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. Highest reported SAR is ≤ 0.4 W/kg. Therefore, further SAR measurements within this exposure condition are not required.

12.4 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.

GSM Notes:

1. Body-Worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn SAR.
2. This device supports GSM VOIP in the head and body-worn configurations; therefore GPRS was additionally evaluated for head and body-worn compliance.
3. Justification for reduced test configurations per KDB Publication 941225 D01v03r01 and October 2013 TCB Workshop Notes: The source-based frame-averaged output power was evaluated for all GPRS slot configurations. The configuration with the highest target frame averaged output power was evaluated for hotspot SAR. When the maximum frame-averaged powers are equivalent across two or more slots (within 0.25 dB), the configuration with the most number of time slots was tested.
4. 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 ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). Since the maximum output power variation across the required test channels is not > ½ dB, the middle channel was used for testing.

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 ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel was used.

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r05. The general test procedures used for testing can be found in Section 5.
2. According to FCC KDB 941225 D05v02r05.
   When the reported SAR is ≤ 0.8 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 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 W/kg, Testing for the remaining required channels is not needed because the reported SAR for 100% RB Allocation < 1.45 W/kg. Testing for 16QAM modulation is not required because the reported SAR for QPSK is < 1.45 W/kg and its output power is not more than 0.5 dB higher than that a QPSK. Testing for the other channel bandwidths is not required because the reported SAR for the highest channel bandwidth is < 1.45 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 ≤ 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 ≤ 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 duo 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 ≤ 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 ≤ 0.8 W/kg, SAR testing on additional channels was not required. Otherwise, SAR for the next highest output power channel was required until the reported SAR result was ≤ 1.20 W/kg or all test channels were measured.
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 10.5 for the time-domain plot and calculation for the duty factor of the device.

13. FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

13.1 Introduction

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

13.2 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 a physical test configuration is ≤ 1.6 W/kg. The different test positon in an exposure condition may be considered collectively to determine SAR test exclusion according to the sum of 1-g or 10-g SAR.

13.3 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. Possible transmission paths for the DUT are shown in Figure 13.1 and are color-coded to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.

Figure 13.1 Simultaneous Transmission Paths

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

Table 13.3.1 Simultaneous Transmission Scenarios

No.	Capable TX Configuration	GSM850/1900 voice	GPRS 850/1900 (data)	WCDMA 850 Voice	WCDMA 850 data (HSDPA,HSUPA)	LTE B12,B17,B5	WIFI 2.4GHz 802.11b/g/n	WIFI 5GHz 802.11a/n/ac	Bluetooth 2.4GHz
1	GSM850/1900 voice		No	No	No	No	Yes	Yes	Yes
2	GPRS 850/1900(data)	No		No	No	No	Yes	Yes	Yes
3	WCDMA 850 Voice	No	No		No	No	Yes	Yes	Yes
4	WCDMA 850 data (HSDPA,HSUPA)	No	No	No		No	Yes	Yes	Yes
5	LTE B12,B17,B5	No	No	No	No		Yes	Yes	Yes
6	WIFI 2.4GHz 802.11b/g/n	Yes	Yes	Yes	Yes	Yes		No	No
7	WIFI 5GHz 802.11a/n/ac	Yes	Yes	Yes	Yes	Yes	No		Yes
8	Bluetooth 2.4GHz	Yes	Yes	Yes	Yes	Yes	No	Yes	

Table 13.3.2 Simultaneous SAR Cases

No.	Capable Transmit Configuration	Head SAR	Body-Worn SAR	Hotspot SAR	Note
1	GSM 850/1900 Voice + WiFi 2.4GHz	Yes	Yes	N/A	
2	GSM 850/1900 Voice + WiFi 5GHz	Yes	Yes	N/A	
3	GSM 850/1900 Voice + Bluetooth 2.4GHz	Yes	Yes	N/A	
4	GSM 850/1900 Voice + Bluetooth 2.4GHz + WiFi 5GHz	Yes	Yes	N/A	
5	GSM 850/1900 GPRS + WiFi 2.4GHz	Yes	Yes	Yes	
6	GSM 850/1900 GPRS + WiFi 5GHz	Yes	Yes	Yes*	* WiFi-Direct (GC / GO) of UNII1 & UNII3 can be operated simultaneous transmission.
7	GSM 850/19000 GPRS + Bluetooth 2.4GHz	Yes	Yes	Yes	
8	GSM 850/1900 GPRS + Bluetooth 2.4GHz + WiFi 5GHz	Yes	Yes	Yes*	* WiFi-Direct (GC / GO) of UNII1 & UNII3 can be operated simultaneous transmission.
9	WCDMA 850 + WiFi 2.4GHz	Yes	Yes	Yes	
10	WCDMA 850 + WiFi 5GHz	Yes	Yes	Yes*	* WiFi-Direct (GC / GO) of UNII1 & UNII3 can be operated simultaneous transmission.
11	WCDMA 850 + Bluetooth 2.4GHz	Yes	Yes	Yes	
12	WCDMA 850 + Bluetooth 2.4GHz + WiFi 5GHz	Yes	Yes	Yes*	* WiFi-Direct (GC / GO) of UNII1 & UNII3 can be operated simultaneous transmission.
13	LTE B5/B12/B17 + WiFi 2.4GHz	Yes	Yes	Yes	
14	LTE B5/B12/B17 + WiFi 5GHz	Yes	Yes	Yes*	* WiFi-Direct (GC / GO) of UNII1 & UNII3 can be operated simultaneous transmission.
15	LTE B5/B12/B17 + Bluetooth 2.4GHz	Yes	Yes	Yes	
16	LTE B5/B12/B17 + Bluetooth 2.4GHz + WiFi 5GHz	Yes	Yes	Yes*	* WiFi-Direct (GC / GO) of UNII1 & UNII3 can be operated simultaneous transmission.

Notes:

1. WiFi 2.4Ghz is supported Hotspot and WiFi-Direct(GC/GO).
2. WiFi-Direct(GC/GO in UNII-1 UNII-3 5GHz).
3. LTE, WCDMA, and GPRS is supported Hotspot.
4. VoIP is supported in LTE, WCDMA, GSM
5. Bluetooth and 2.4G WiFi can not transmit simultaneously since they share the same chip.
6. GSM, 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.

13.4 Head SAR Simultaneous Transmission Analysis

Table 13.4.1 Simultaneous Transmission Scenario for 2G/3G/4G with 2.4 GHz W-LAN (Held to Ear)

Simul Tx	Configuration	GSM 850 SAR (W/kg)	2.4G W-LAN SAR (W/kg)	ΣSAR (W/kg)
		1	2	1+2
Head SAR	Left Touch	0.159	0.241	0.400
	Right Touch	0.094	0.427	**0.521**
	Left Tilt	0.070	0.186	0.256
	Right Tilt	0.068	0.310	0.378
Simul Tx	**Configuration**	**GPRS 850 SAR (W/kg)**	**2.4G W-LANSAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.193	0.241	0.434
	Right Touch	0.116	0.427	**0.543**
	Left Tilt	0.070	0.186	0.256
	Right Tilt	0.091	0.310	0.401
Simul Tx	**Configuration**	**GSM 1900 SAR (W/kg)**	**2.4G W-LANSAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.055	0.241	0.296
	Right Touch	0.058	0.427	**0.485**
	Left Tilt	0.048	0.186	0.234
	Right Tilt	0.035	0.310	0.345
Simul Tx	**Configuration**	**GPRS 1900 SAR (W/kg)**	**2.4G W-LANSAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.064	0.241	0.305
	Right Touch	0.072	0.427	**0.499**
	Left Tilt	0.051	0.186	0.237
	Right Tilt	0.041	0.310	0.351
Simul Tx	**Configuration**	**WCDMA 850 SAR (W/kg)**	**2.4G W-LANSAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.261	0.241	0.502
	Right Touch	0.162	0.427	**0.589**
	Left Tilt	0.116	0.186	0.302
	Right Tilt	0.116	0.310	0.426
Simul Tx	**Configuration**	**LTE Band 12 SAR (W/kg)**	**2.4G W-LANSAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.089	0.241	0.330
	Right Touch	0.086	0.427	**0.513**
	Left Tilt	0.037	0.186	0.223
	Right Tilt	0.050	0.310	0.360
Simul Tx	**Configuration**	**LTE Band 5 SAR (W/kg)**	**2.4G W-LANSAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.256	0.241	0.497
	Right Touch	0.179	0.427	**0.606**
	Left Tilt	0.084	0.186	0.270
	Right Tilt	0.116	0.310	0.426

Table 13.4.2 Simultaneous Transmission Scenario for 2G/3G/4G with 5.3 GHz W-LAN (Held to Ear)

Simul Tx	Configuration	GSM 850 SAR (W/kg)	5.3G W-LAN SAR (W/kg)	ΣSAR (W/kg)
		1	2	1+2
Head SAR	Left Touch	0.159	0.047	0.206
	Right Touch	0.094	0.134	**0.228**
	Left Tilt	0.070	0.050	0.120
	Right Tilt	0.068	0.095	0.163
Simul Tx	**Configuration**	**GPRS 850 SAR (W/kg)**	**5.3G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.193	0.047	0.240
	Right Touch	0.116	0.134	**0.250**
	Left Tilt	0.070	0.050	0.120
	Right Tilt	0.091	0.095	0.186
Simul Tx	**Configuration**	**GSM 1900 SAR (W/kg)**	**5.3G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.055	0.047	0.102
	Right Touch	0.058	0.134	**0.192**
	Left Tilt	0.048	0.050	0.098
	Right Tilt	0.035	0.095	0.130
Simul Tx	**Configuration**	**GPRS 1900 SAR (W/kg)**	**5.3G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.064	0.047	0.111
	Right Touch	0.072	0.134	**0.206**
	Left Tilt	0.051	0.050	0.101
	Right Tilt	0.041	0.095	0.136
Simul Tx	**Configuration**	**WCDMA 850 SAR (W/kg)**	**5.3G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	**Left Touch**	0.261	0.047	**0.308**
	Right Touch	0.162	0.134	0.296
	Left Tilt	0.116	0.050	0.166
	Right Tilt	0.116	0.095	0.211
Simul Tx	**Configuration**	**LTE Band 12 SAR (W/kg)**	**5.3G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.089	0.047	0.136
	Right Touch	0.086	0.134	**0.220**
	Left Tilt	0.037	0.050	0.087
	Right Tilt	0.050	0.095	0.145
Simul Tx	**Configuration**	**LTE Band 5 SAR (W/kg)**	**5.3G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.256	0.047	0.303
	Right Touch	0.179	0.134	**0.313**
	Left Tilt	0.084	0.050	0.134
	Right Tilt	0.116	0.095	0.211

Table 13.4.3 Simultaneous Transmission Scenario for 2G/3G/4G with 5.6 GHz W-LAN (Held to Ear)

Simul Tx	Configuration	GSM 850 SAR (W/kg)	5.6G W-LAN SAR (W/kg)	ΣSAR (W/kg)
		1	2	1+2
Head SAR	Left Touch	0.159	0.074	0.233
	Right Touch	0.094	0.164	**0.258**
	Left Tilt	0.070	0.068	0.138
	Right Tilt	0.068	0.158	0.226
Simul Tx	**Configuration**	**GPRS 850 SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.193	0.074	0.267
	Right Touch	0.116	0.164	**0.280**
	Left Tilt	0.070	0.068	0.138
	Right Tilt	0.091	0.158	0.249
Simul Tx	**Configuration**	**GSM 1900 SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.055	0.074	0.129
	Right Touch	0.058	0.164	**0.222**
	Left Tilt	0.048	0.068	0.116
	Right Tilt	0.035	0.158	0.193
Simul Tx	**Configuration**	**GPRS 1900 SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.064	0.074	0.138
	Right Touch	0.072	0.164	**0.236**
	Left Tilt	0.051	0.068	0.119
	Right Tilt	0.041	0.158	0.199
Simul Tx	**Configuration**	**WCDMA 850 SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	**Left Touch**	0.261	0.074	**0.335**
	Right Touch	0.162	0.164	0.326
	Left Tilt	0.116	0.068	0.184
	Right Tilt	0.116	0.158	0.274
Simul Tx	**Configuration**	**LTE Band 12 SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.089	0.074	0.163
	Right Touch	0.086	0.164	**0.250**
	Left Tilt	0.037	0.068	0.105
	Right Tilt	0.050	0.158	0.208
Simul Tx	**Configuration**	**LTE Band 5 SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.256	0.074	0.330
	Right Touch	0.179	0.164	**0.343**
	Left Tilt	0.084	0.068	0.152
	Right Tilt	0.116	0.158	0.274

Table 13.4.4 Simultaneous Transmission Scenario for 2G/3G/4G with 5.8 GHz W-LAN (Held to Ear)

Simul Tx	Configuration	GSM 850 SAR (W/kg)	5.8G W-LAN SAR (W/kg)	ΣSAR (W/kg)
		1	2	1+2
Head SAR	**Left Touch**	0.159	0.054	**0.213**
	Right Touch	0.094	0.106	0.200
	Left Tilt	0.070	0.070	0.140
	Right Tilt	0.068	0.117	0.185
Simul Tx	**Configuration**	**GPRS 850 SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	**Left Touch**	0.193	0.054	**0.247**
	Right Touch	0.116	0.106	0.222
	Left Tilt	0.070	0.070	0.140
	Right Tilt	0.091	0.117	0.208
Simul Tx	**Configuration**	**GSM 1900 SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.055	0.054	0.109
	Right Touch	0.058	0.106	**0.164**
	Left Tilt	0.048	0.070	0.118
	Right Tilt	0.035	0.117	0.152
Simul Tx	**Configuration**	**GPRS 1900 SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.064	0.054	0.118
	Right Touch	0.072	0.106	**0.178**
	Left Tilt	0.051	0.070	0.121
	Right Tilt	0.041	0.117	0.158
Simul Tx	**Configuration**	**WCDMA 850 SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	**Left Touch**	0.261	0.054	**0.315**
	Right Touch	0.162	0.106	0.268
	Left Tilt	0.116	0.070	0.186
	Right Tilt	0.116	0.117	0.233
Simul Tx	**Configuration**	**LTE Band 12 SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.089	0.054	0.143
	Right Touch	0.086	0.106	**0.192**
	Left Tilt	0.037	0.070	0.107
	Right Tilt	0.050	0.117	0.167
Simul Tx	**Configuration**	**LTE Band 5 SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	**Left Touch**	0.256	0.054	**0.310**
	Right Touch	0.179	0.106	0.285
	Left Tilt	0.084	0.070	0.154
	Right Tilt	0.116	0.117	0.233

Table 13.4.5 Simultaneous Transmission Scenario for 2G/3G/4G with Bluetooth (Held to Ear)

Simul Tx	Configuration	GSM 850 SAR (W/kg)	Bluetooth SAR (W/kg)	ΣSAR (W/kg)
		1	2	1+2
Head SAR	Left Touch	0.159	0.096	0.255
	Right Touch	0.094	0.181	**0.275**
	Left Tilt	0.070	0.064	0.134
	Right Tilt	0.068	0.112	0.180
Simul Tx	**Configuration**	**GPRS 850 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.193	0.096	0.289
	Right Touch	0.116	0.181	**0.297**
	Left Tilt	0.070	0.064	0.134
	Right Tilt	0.091	0.112	0.203
Simul Tx	**Configuration**	**GSM 1900 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.055	0.096	0.151
	Right Touch	0.058	0.181	**0.239**
	Left Tilt	0.048	0.064	0.112
	Right Tilt	0.035	0.112	0.147
Simul Tx	**Configuration**	**GPRS 1900 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.064	0.096	0.160
	Right Touch	0.072	0.181	**0.253**
	Left Tilt	0.051	0.064	0.115
	Right Tilt	0.041	0.112	0.153
Simul Tx	**Configuration**	**WCDMA 850 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	**Left Touch**	0.261	0.096	**0.357**
	Right Touch	0.162	0.181	0.343
	Left Tilt	0.116	0.064	0.180
	Right Tilt	0.116	0.112	0.228
Simul Tx	**Configuration**	**LTE Band 12 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.089	0.096	0.185
	Right Touch	0.086	0.181	**0.267**
	Left Tilt	0.037	0.064	0.101
	Right Tilt	0.050	0.112	0.162
Simul Tx	**Configuration**	**LTE Band 5 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.256	0.096	0.352
	Right Touch	0.179	0.181	**0.360**
	Left Tilt	0.084	0.064	0.148
	Right Tilt	0.116	0.112	0.228

Table 13.4.6 Simultaneous Transmission Scenario for 2G/3G/4G with Bluetooth and 5.3 GHz W-LAN (Held to Ear)

Simul Tx	Configuration	GSM 850 SAR (W/kg)	Bluetooth SAR (W/kg)	5.3G W-LAN SAR (W/kg)	ΣSAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Head SAR	Left Touch	0.159	0.096	0.047	0.255	0.206	0.302
	Right Touch	0.094	0.181	0.134	0.275	0.228	**0.409**
	Left Tilt	0.070	0.064	0.050	0.134	0.120	0.184
	Right Tilt	0.068	0.112	0.095	0.180	0.163	0.275
Simul Tx	**Configuration**	**GPRS 850 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.3G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Head SAR	Left Touch	0.193	0.096	0.047	0.289	0.240	0.336
	Right Touch	0.116	0.181	0.134	0.297	0.250	**0.431**
	Left Tilt	0.070	0.064	0.050	0.134	0.120	0.184
	Right Tilt	0.091	0.112	0.095	0.203	0.186	0.298
Simul Tx	**Configuration**	**GSM 1900 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.3G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Head SAR	Left Touch	0.055	0.096	0.047	0.151	0.102	0.198
	Right Touch	0.058	0.181	0.134	0.239	0.192	**0.373**
	Left Tilt	0.048	0.064	0.050	0.112	0.098	0.162
	Right Tilt	0.035	0.112	0.095	0.147	0.130	0.242
Simul Tx	**Configuration**	**GPRS 1900 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.3G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Head SAR	Left Touch	0.064	0.096	0.047	0.160	0.111	0.207
	Right Touch	0.072	0.181	0.134	0.253	0.206	**0.387**
	Left Tilt	0.051	0.064	0.050	0.115	0.101	0.165
	Right Tilt	0.041	0.112	0.095	0.153	0.136	0.248
Simul Tx	**Configuration**	**WCDMA 850 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.3G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Head SAR	Left Touch	0.261	0.096	0.047	0.357	0.308	0.404
	Right Touch	0.162	0.181	0.134	0.343	0.296	**0.477**
	Left Tilt	0.116	0.064	0.050	0.180	0.166	0.230
	Right Tilt	0.116	0.112	0.095	0.228	0.211	0.323
Simul Tx	**Configuration**	**LTE Band 12 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.3G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Head SAR	Left Touch	0.089	0.096	0.047	0.185	0.136	0.232
	Right Touch	0.086	0.181	0.134	0.267	0.220	**0.401**
	Left Tilt	0.037	0.064	0.050	0.101	0.087	0.151
	Right Tilt	0.050	0.112	0.095	0.162	0.145	0.257
Simul Tx	**Configuration**	**LTE Band 5 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.3G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Head SAR	Left Touch	0.256	0.096	0.047	0.352	0.303	0.399
	Right Touch	0.179	0.181	0.134	0.360	0.313	**0.494**
	Left Tilt	0.084	0.064	0.050	0.148	0.134	0.198
	Right Tilt	0.116	0.112	0.095	0.228	0.211	0.323

Table 13.4.7 Simultaneous Transmission Scenario for 2G/3G/4G with Bluetooth and 5.6 GHz W-LAN (Held to Ear)

Simul Tx	Configuration	GSM 850 SAR (W/kg)	Bluetooth SAR (W/kg)	5.6G W-LAN SAR (W/kg)	ΣSAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Head SAR	Left Touch	0.159	0.096	0.074	0.255	0.233	0.329
	Right Touch	0.094	0.181	0.164	0.275	0.258	**0.439**
	Left Tilt	0.070	0.064	0.068	0.134	0.138	0.202
	Right Tilt	0.068	0.112	0.158	0.180	0.226	0.338
Simul Tx	**Configuration**	**GPRS 850 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Head SAR	Left Touch	0.193	0.096	0.074	0.289	0.267	0.363
	Right Touch	0.116	0.181	0.164	0.297	0.280	**0.461**
	Left Tilt	0.070	0.064	0.068	0.134	0.138	0.202
	Right Tilt	0.091	0.112	0.158	0.203	0.249	0.361
Simul Tx	**Configuration**	**GSM 1900 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Head SAR	Left Touch	0.055	0.096	0.074	0.151	0.129	0.225
	Right Touch	0.058	0.181	0.164	0.239	0.222	**0.403**
	Left Tilt	0.048	0.064	0.068	0.112	0.116	0.180
	Right Tilt	0.035	0.112	0.158	0.147	0.193	0.305
Simul Tx	**Configuration**	**GPRS 1900 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Head SAR	Left Touch	0.064	0.096	0.074	0.160	0.138	0.234
	Right Touch	0.072	0.181	0.164	0.253	0.236	**0.417**
	Left Tilt	0.051	0.064	0.068	0.115	0.119	0.183
	Right Tilt	0.041	0.112	0.158	0.153	0.199	0.311
Simul Tx	**Configuration**	**WCDMA 850 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Head SAR	Left Touch	0.261	0.096	0.074	0.357	0.335	0.431
	Right Touch	0.162	0.181	0.164	0.343	0.326	**0.507**
	Left Tilt	0.116	0.064	0.068	0.180	0.184	0.248
	Right Tilt	0.116	0.112	0.158	0.228	0.274	0.386
Simul Tx	**Configuration**	**LTE Band 12 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Head SAR	Left Touch	0.089	0.096	0.074	0.185	0.163	0.259
	Right Touch	0.086	0.181	0.164	0.267	0.250	**0.431**
	Left Tilt	0.037	0.064	0.068	0.101	0.105	0.169
	Right Tilt	0.050	0.112	0.158	0.162	0.208	0.320
Simul Tx	**Configuration**	**LTE Band 5 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Head SAR	Left Touch	0.256	0.096	0.074	0.352	0.330	0.426
	Right Touch	0.179	0.181	0.164	0.360	0.343	**0.524**
	Left Tilt	0.084	0.064	0.068	0.148	0.152	0.216
	Right Tilt	0.116	0.112	0.158	0.228	0.274	0.386

Table 13.4.8 Simultaneous Transmission Scenario for 2G/3G/4G with Bluetooth and 5.8 GHz W-LAN (Held to Ear)

Simul Tx	Configuration	GSM 850 SAR (W/kg)	Bluetooth SAR (W/kg)	5.8G W-LAN SAR (W/kg)	ΣSAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Head SAR	Left Touch	0.159	0.096	0.054	0.255	0.213	0.309
	Right Touch	0.094	0.181	0.106	0.275	0.200	**0.381**
	Left Tilt	0.070	0.064	0.070	0.134	0.140	0.204
	Right Tilt	0.068	0.112	0.117	0.180	0.185	0.297
Simul Tx	**Configuration**	**GPRS 850 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Head SAR	Left Touch	0.193	0.096	0.054	0.289	0.247	0.343
	Right Touch	0.116	0.181	0.106	0.297	0.222	**0.403**
	Left Tilt	0.070	0.064	0.070	0.134	0.140	0.204
	Right Tilt	0.091	0.112	0.117	0.203	0.208	0.320
Simul Tx	**Configuration**	**GSM 1900 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Head SAR	Left Touch	0.055	0.096	0.054	0.151	0.109	0.205
	Right Touch	0.058	0.181	0.106	0.239	0.164	**0.345**
	Left Tilt	0.048	0.064	0.070	0.112	0.118	0.182
	Right Tilt	0.035	0.112	0.117	0.147	0.152	0.264
Simul Tx	**Configuration**	**GPRS 1900 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Head SAR	Left Touch	0.064	0.096	0.054	0.160	0.118	0.214
	Right Touch	0.072	0.181	0.106	0.253	0.178	**0.359**
	Left Tilt	0.051	0.064	0.070	0.115	0.121	0.185
	Right Tilt	0.041	0.112	0.117	0.153	0.158	0.270
Simul Tx	**Configuration**	**WCDMA 850 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Head SAR	Left Touch	0.261	0.096	0.054	0.357	0.315	0.411
	Right Touch	0.162	0.181	0.106	0.343	0.268	**0.449**
	Left Tilt	0.116	0.064	0.070	0.180	0.186	0.250
	Right Tilt	0.116	0.112	0.117	0.228	0.233	0.345
Simul Tx	**Configuration**	**LTE Band 12 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Head SAR	Left Touch	0.089	0.096	0.054	0.185	0.143	0.239
	Right Touch	0.086	0.181	0.106	0.267	0.192	**0.373**
	Left Tilt	0.037	0.064	0.070	0.101	0.107	0.171
	Right Tilt	0.050	0.112	0.117	0.162	0.167	0.279
Simul Tx	**Configuration**	**LTE Band 5 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Head SAR	Left Touch	0.256	0.096	0.054	0.352	0.310	0.406
	Right Touch	0.179	0.181	0.106	0.360	0.285	**0.466**
	Left Tilt	0.084	0.064	0.070	0.148	0.154	0.218
	Right Tilt	0.116	0.112	0.117	0.228	0.233	0.345

Table 13.4.9 Simultaneous Transmission Scenario for Bluetooth and 5 GHz W-LAN (Held to Ear)

Simul Tx	Configuration	Bluetooth SAR (W/kg)	5.3G W-LAN SAR (W/kg)	ΣSAR (W/kg)
		1	2	1+2
Head SAR	Left Touch	0.096	0.047	0.143
	Right Touch	0.181	0.134	**0.315**
	Left Tilt	0.064	0.050	0.114
	Right Tilt	0.112	0.095	0.207
Simul Tx	**Configuration**	**Bluetooth SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.096	0.074	0.170
	Right Touch	0.181	0.164	**0.345**
	Left Tilt	0.064	0.068	0.132
	Right Tilt	0.112	0.158	0.270
Simul Tx	**Configuration**	**Bluetooth SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Head SAR	Left Touch	0.096	0.054	0.150
	Right Touch	0.181	0.106	**0.287**
	Left Tilt	0.064	0.070	0.134
	Right Tilt	0.112	0.117	0.229

13.5 Body-Worn Simultaneous Transmission Analysis

Table 13.5.1 Simultaneous Transmission Scenario for 2G/3G/4G with 2.4 GHz W-LAN (Body-Worn at 10 mm)

Simul Tx	Configuration	GSM 850 SAR (W/kg)	2.4G W-LAN SAR (W/kg)	ΣSAR (W/kg)
		1	2	1+2
Body-Worn SAR	**Front**	0.423	0.087	**0.510**
	Rear	0.397	0.060	0.457
Simul Tx	**Configuration**	**GPRS 850 SAR (W/kg)**	**2.4G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	**Front**	0.506	0.087	**0.593**
	Rear	0.493	0.060	0.553
Simul Tx	**Configuration**	**GSM 1900 SAR (W/kg)**	**2.4G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	**Front**	0.230	0.087	**0.317**
	Rear	0.256	0.060	0.316
Simul Tx	**Configuration**	**GPRS 1900 SAR (W/kg)**	**2.4G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.273	0.087	0.360
	Rear	0.315	0.060	**0.375**
Simul Tx	**Configuration**	**WCDMA 850 SAR (W/kg)**	**2.4G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	**Front**	0.691	0.087	**0.778**
	Rear	0.645	0.060	0.705
Simul Tx	**Configuration**	**LTE Band 12 SAR (W/kg)**	**2.4G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.385	0.087	0.472
	Rear	0.487	0.060	**0.547**
Simul Tx	**Configuration**	**LTE Band 5 SAR (W/kg)**	**2.4G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	**Front**	0.668	0.087	**0.755**
	Rear	0.642	0.060	0.702

Table 13.5.2 Simultaneous Transmission Scenario for 2G/3G/4G with 5.3 GHz W-LAN (Body-Worn at 10 mm)

Simul Tx	Configuration	GSM 850 SAR (W/kg)	5.3G W-LAN SAR (W/kg)	ΣSAR (W/kg)
		1	2	1+2
Body-Worn SAR	Front	0.423	0.018	0.441
	Rear	0.397	0.167	**0.564**
Simul Tx	**Configuration**	**GPRS 850 SAR (W/kg)**	**5.3G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.506	0.018	0.524
	Rear	0.493	0.167	**0.660**
Simul Tx	**Configuration**	**GSM 1900 SAR (W/kg)**	**5.3G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.230	0.018	0.248
	Rear	0.256	0.167	**0.423**
Simul Tx	**Configuration**	**GPRS 1900 SAR (W/kg)**	**5.3G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.273	0.018	0.291
	Rear	0.315	0.167	**0.482**
Simul Tx	**Configuration**	**WCDMA 850 SAR (W/kg)**	**5.3G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.691	0.018	0.709
	Rear	0.645	0.167	**0.812**
Simul Tx	**Configuration**	**LTE Band 12 SAR (W/kg)**	**5.3G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.385	0.018	0.403
	Rear	0.487	0.167	**0.654**
Simul Tx	**Configuration**	**LTE Band 5 SAR (W/kg)**	**5.3G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.668	0.018	0.686
	Rear	0.642	0.167	**0.809**

Table 13.5.3 Simultaneous Transmission Scenario for 2G/3G/4G with 5.6 GHz W-LAN (Body-Worn at 10 mm)

Simul Tx	Configuration	GSM 850 SAR (W/kg)	5.6G W-LAN SAR (W/kg)	ΣSAR (W/kg)
		1	2	1+2
Body-Worn SAR	Front	0.423	0.027	0.450
	Rear	0.397	0.453	**0.850**
Simul Tx	**Configuration**	**GPRS 850 SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.506	0.027	0.533
	Rear	0.493	0.453	**0.946**
Simul Tx	**Configuration**	**GSM 1900 SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.230	0.027	0.257
	Rear	0.256	0.453	**0.709**
Simul Tx	**Configuration**	**GPRS 1900 SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.273	0.027	0.300
	Rear	0.315	0.453	**0.768**
Simul Tx	**Configuration**	**WCDMA 850 SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.691	0.027	0.718
	Rear	0.645	0.453	**1.098**
Simul Tx	**Configuration**	**LTE Band 12 SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.385	0.027	0.412
	Rear	0.487	0.453	**0.940**
Simul Tx	**Configuration**	**LTE Band 5 SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.668	0.027	0.695
	Rear	0.642	0.453	**1.095**

Table 13.5.4 Simultaneous Transmission Scenario for 2G/3G/4G with 5.8 GHz W-LAN (Body-Worn at 10 mm)

Simul Tx	Configuration	GSM 850 SAR (W/kg)	5.8G W-LAN SAR (W/kg)	ΣSAR (W/kg)
		1	2	1+2
Body-Worn SAR	Front	0.423	0.026	0.449
	Rear	0.397	0.772	**1.169**
Simul Tx	**Configuration**	**GPRS 850 SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.506	0.026	0.532
	Rear	0.493	0.772	**1.265**
Simul Tx	**Configuration**	**GSM 1900 SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.230	0.026	0.256
	Rear	0.256	0.772	**1.028**
Simul Tx	**Configuration**	**GPRS 1900 SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.273	0.026	0.299
	Rear	0.315	0.772	**1.087**
Simul Tx	**Configuration**	**WCDMA 850 SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.691	0.026	0.717
	Rear	0.645	0.772	**1.417**
Simul Tx	**Configuration**	**LTE Band 12 SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.385	0.026	0.411
	Rear	0.487	0.772	**1.259**
Simul Tx	**Configuration**	**LTE Band 5 SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.668	0.026	0.694
	Rear	0.642	0.772	**1.414**

Table 13.5.5 Simultaneous Transmission Scenario for 2G/3G/4G with Bluetooth (Body-Worn at 10 mm)

Simul Tx	Configuration	GSM 850 SAR (W/kg)	Bluetooth SAR (W/kg)	ΣSAR (W/kg)
		1	2	1+2
Body-Worn SAR	**Front**	0.423	0.034	**0.457**
	Rear	0.397	0.024	0.421
Simul Tx	**Configuration**	**GPRS 850 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	**Front**	0.506	0.034	**0.540**
	Rear	0.493	0.024	0.517
Simul Tx	**Configuration**	**GSM 1900 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.230	0.034	0.264
	Rear	0.256	0.024	**0.280**
Simul Tx	**Configuration**	**GPRS 1900 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.273	0.034	0.307
	Rear	0.315	0.024	**0.339**
Simul Tx	**Configuration**	**WCDMA 850 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	**Front**	0.691	0.034	**0.725**
	Rear	0.645	0.024	0.669
Simul Tx	**Configuration**	**LTE Band 12 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.385	0.034	0.419
	Rear	0.487	0.024	**0.511**
Simul Tx	**Configuration**	**LTE Band 5 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	**Front**	0.668	0.034	**0.702**
	Rear	0.642	0.024	0.666

Table 13.5.6 Simultaneous Transmission Scenario for 2G/3G/4G with Bluetooth and 5.3 GHz W-LAN (Body-Worn at 10 mm)

Simul Tx	Configuration	GSM 850 SAR (W/kg)	Bluetooth SAR (W/kg)	5.3G W-LAN SAR (W/kg)	ΣSAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body-Worn SAR	Front	0.423	0.034	0.018	0.457	0.441	0.471
	Rear	0.397	0.024	0.167	0.421	0.564	**0.585**
Simul Tx	**Configuration**	**GPRS 850 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.3G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Body-Worn SAR	Front	0.506	0.034	0.018	0.540	0.524	0.558
	Rear	0.493	0.024	0.167	0.517	0.660	**0.684**
Simul Tx	**Configuration**	**GSM 1900 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.3G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Body-Worn SAR	Front	0.230	0.034	0.018	0.264	0.248	0.282
	Rear	0.256	0.024	0.167	0.280	0.423	**0.447**
Simul Tx	**Configuration**	**GPRS 1900 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.3G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Body-Worn SAR	Front	0.273	0.034	0.018	0.307	0.291	0.325
	Rear	0.315	0.024	0.167	0.339	0.482	**0.506**
Simul Tx	**Configuration**	**WCDMA 850 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.3G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Body-Worn SAR	Front	0.691	0.034	0.018	0.725	0.709	0.743
	Rear	0.645	0.024	0.167	0.669	0.812	**0.836**
Simul Tx	**Configuration**	**LTE Band 12 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.3G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Body-Worn SAR	Front	0.385	0.034	0.018	0.419	0.403	0.437
	Rear	0.487	0.024	0.167	0.511	0.654	**0.678**
Simul Tx	**Configuration**	**LTE Band 5 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.3G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Body-Worn SAR	Front	0.668	0.034	0.018	0.702	0.686	0.720
	Rear	0.642	0.024	0.167	0.666	0.809	**0.833**

Table 13.5.7 Simultaneous Transmission Scenario for 2G/3G/4G with Bluetooth and 5.6 GHz W-LAN (Body-Worn at 10 mm)

Simul Tx	Configuration	GSM 850 SAR (W/kg)	Bluetooth SAR (W/kg)	5.6G W-LAN SAR (W/kg)	ΣSAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body-Worn SAR	Front	0.423	0.034	0.027	0.457	0.450	0.484
	Rear	0.397	0.024	0.453	0.421	0.850	**0.874**
Simul Tx	**Configuration**	**GPRS 850 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Body-Worn SAR	Front	0.506	0.034	0.027	0.540	0.533	0.567
	Rear	0.493	0.024	0.453	0.517	0.946	**0.970**
Simul Tx	**Configuration**	**GSM 1900 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Body-Worn SAR	Front	0.230	0.034	0.027	0.264	0.257	0.291
	Rear	0.256	0.024	0.453	0.280	0.709	**0.733**
Simul Tx	**Configuration**	**GPRS 1900 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Body-Worn SAR	Front	0.273	0.034	0.027	0.307	0.300	0.334
	Rear	0.315	0.024	0.453	0.339	0.768	**0.792**
Simul Tx	**Configuration**	**WCDMA 850 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Body-Worn SAR	Front	0.691	0.034	0.027	0.725	0.718	0.752
	Rear	0.645	0.024	0.453	0.669	1.098	**1.122**
Simul Tx	**Configuration**	**LTE Band 12 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Body-Worn SAR	Front	0.385	0.034	0.027	0.419	0.412	0.446
	Rear	0.487	0.024	0.453	0.511	0.940	**0.964**
Simul Tx	**Configuration**	**LTE Band 5 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Body-Worn SAR	Front	0.668	0.034	0.027	0.702	0.695	0.729
	Rear	0.642	0.024	0.453	0.666	1.095	**1.119**

Table 13.5.8 Simultaneous Transmission Scenario for 2G/3G/4G with Bluetooth and 5.8 GHz W-LAN (Body-Worn at 10 mm)

Simul Tx	Configuration	GSM 850 SAR (W/kg)	Bluetooth SAR (W/kg)	5.8G W-LAN SAR (W/kg)	ΣSAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body-Worn SAR	Front	0.423	0.034	0.026	0.457	0.449	0.483
	Rear	0.397	0.024	0.772	0.421	1.169	**1.193**
Simul Tx	**Configuration**	**GPRS 850 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Body-Worn SAR	Front	0.506	0.034	0.026	0.540	0.532	0.566
	Rear	0.493	0.024	0.772	0.517	1.265	**1.289**
Simul Tx	**Configuration**	**GSM 1900 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Body-Worn SAR	Front	0.230	0.034	0.026	0.264	0.256	0.290
	Rear	0.256	0.024	0.772	0.280	1.028	**1.052**
Simul Tx	**Configuration**	**GPRS 1900 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Body-Worn SAR	Front	0.273	0.034	0.026	0.307	0.299	0.333
	Rear	0.315	0.024	0.772	0.339	1.087	**1.111**
Simul Tx	**Configuration**	**WCDMA 850 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Body-Worn SAR	Front	0.691	0.034	0.026	0.725	0.717	0.751
	Rear	0.645	0.024	0.772	0.669	1.417	**1.441**
Simul Tx	**Configuration**	**LTE Band 12 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Body-Worn SAR	Front	0.385	0.034	0.026	0.419	0.411	0.445
	Rear	0.487	0.024	0.772	0.511	1.259	**1.283**
Simul Tx	**Configuration**	**LTE Band 5 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Body-Worn SAR	Front	0.668	0.034	0.026	0.702	0.694	0.728
	Rear	0.642	0.024	0.772	0.666	1.414	**1.438**

Table 13.5.9 Simultaneous Transmission Scenario for Bluetooth and 5 GHz W-LAN (Body-Worn at 10 mm)

Simul Tx	Configuration	Bluetooth SAR (W/kg)	5.3G W-LAN SAR (W/kg)	ΣSAR (W/kg)
		1	2	1+2
Body-Worn SAR	Front	0.034	0.018	0.052
	Rear	0.024	0.167	**0.191**
Simul Tx	**Configuration**	**Bluetooth SAR (W/kg)**	**5.6G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.034	0.027	0.061
	Rear	0.024	0.453	**0.477**
Simul Tx	**Configuration**	**Bluetooth SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Body-Worn SAR	Front	0.034	0.026	0.060
	Rear	0.024	0.772	**0.796**

13.6 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 13.6.1 Simultaneous Transmission Scenario for 2G/3G/4G with 2.4 GHz W-LAN (Hotspot at 10 mm)

Simul Tx	Configuration	GPRS 850 SAR (W/kg)	2.4G W-LAN SAR (W/kg)	ΣSAR (W/kg)
		1	2	1+2
Hotspot SAR	Top	-	0.070	0.070
	Bottom	0.313	-	0.313
	Front	0.506	0.087	**0.593**
	Rear	0.493	0.060	0.553
	Right	0.078	-	0.078
	Left	0.342	0.118	0.460
Simul Tx	**Configuration**	**GPRS 1900 SAR (W/kg)**	**2.4G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Hotspot SAR	Top	-	0.070	0.070
	Bottom	0.162	-	0.162
	Front	0.273	0.087	0.360
	Rear	0.315	0.060	**0.375**
	Right	-	-	-
	Left	0.114	0.118	0.232
Simul Tx	**Configuration**	**WCDMA 850 SAR (W/kg)**	**2.4G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Hotspot SAR	Top	-	0.070	0.070
	Bottom	0.303	-	0.303
	Front	0.691	0.087	**0.778**
	Rear	0.645	0.060	0.705
	Right	0.121	-	0.121
	Left	0.436	0.118	0.554
Simul Tx	**Configuration**	**LTE Band 12 SAR (W/kg)**	**2.4G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Hotspot SAR	Top	-	0.070	0.070
	Bottom	0.166	-	0.166
	Front	0.385	0.087	0.472
	Rear	0.487	0.060	**0.547**
	Right	0.157	-	0.157
	Left	0.082	0.118	0.200
Simul Tx	**Configuration**	**LTE Band 5 SAR (W/kg)**	**2.4G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Hotspot SAR	Top	-	0.070	0.070
	Bottom	0.383	-	0.383
	Front	0.668	0.087	**0.755**
	Rear	0.642	0.060	0.702
	Right	0.130	-	0.130
	Left	0.431	0.118	0.549

Table 13.6.2 Simultaneous Transmission Scenario for 2G/3G/4G with Bluetooth (Hotspot at 10 mm)

Simul Tx	Configuration	GPRS 850 SAR (W/kg)	Bluetooth SAR (W/kg)	ΣSAR (W/kg)
		1	2	1+2
Hotspot SAR	Top	-	0.028	0.028
	Bottom	0.313	-	0.313
	Front	0.506	0.034	**0.540**
	Rear	0.493	0.024	0.517
	Right	0.078	-	0.078
	Left	0.342	0.044	0.386
Simul Tx	**Configuration**	**GPRS 1900 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Hotspot SAR	Top	-	0.028	0.028
	Bottom	0.162	-	0.162
	Front	0.273	0.034	0.307
	Rear	0.315	0.024	**0.339**
	Right	-	-	-
	Left	0.114	0.044	0.158
Simul Tx	**Configuration**	**WCDMA 850 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Hotspot SAR	Top	-	0.028	0.028
	Bottom	0.303	-	0.303
	Front	0.691	0.034	**0.725**
	Rear	0.645	0.024	0.669
	Right	0.121	-	0.121
	Left	0.436	0.044	0.480
Simul Tx	**Configuration**	**LTE Band 12 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Hotspot SAR	Top	-	0.028	0.028
	Bottom	0.166	-	0.166
	Front	0.385	0.034	0.419
	Rear	0.487	0.024	**0.511**
	Right	0.157	-	0.157
	Left	0.082	0.044	0.126
Simul Tx	**Configuration**	**LTE Band 5 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Hotspot SAR	Top	-	0.028	0.028
	Bottom	0.383	-	0.383
	Front	0.668	0.034	**0.702**
	Rear	0.642	0.024	0.666
	Right	0.130	-	0.130
	Left	0.431	0.044	0.475

Table 13.6.3 Simultaneous Transmission Scenario for 2G/3G/4G with 5.2 GHz W-LAN (Hotspot at 10 mm)

Simul Tx	Configuration	GPRS 850 SAR (W/kg)	5.2G W-LAN SAR (W/kg)	ΣSAR (W/kg)
		1	2	1+2
Hotspot SAR	Top	-	0.009	0.009
	Bottom	0.313	-	0.313
	Front	0.506	0.016	0.522
	Rear	0.493	0.153	**0.646**
	Right	0.078	-	0.078
	Left	0.342	0.048	0.390
Simul Tx	**Configuration**	**GPRS 1900 SAR (W/kg)**	**5.2G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Hotspot SAR	Top	-	0.009	0.009
	Bottom	0.162	-	0.162
	Front	0.273	0.016	0.289
	Rear	0.315	0.153	**0.468**
	Right	-	-	-
	Left	0.114	0.048	0.162
Simul Tx	**Configuration**	**WCDMA 850 SAR (W/kg)**	**5.2G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Hotspot SAR	Top	-	0.009	0.009
	Bottom	0.303	-	0.303
	Front	0.691	0.016	0.707
	Rear	0.645	0.153	**0.798**
	Right	0.121	-	0.121
	Left	0.436	0.048	0.484
Simul Tx	**Configuration**	**LTE Band 12 SAR (W/kg)**	**5.2G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Hotspot SAR	Top	-	0.009	0.009
	Bottom	0.166	-	0.166
	Front	0.385	0.016	0.401
	Rear	0.487	0.153	**0.640**
	Right	0.157	-	0.157
	Left	0.082	0.048	0.130
Simul Tx	**Configuration**	**LTE Band 5 SAR (W/kg)**	**5.2G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Hotspot SAR	Top	-	0.009	0.009
	Bottom	0.383	-	0.383
	Front	0.668	0.016	0.684
	Rear	0.642	0.153	**0.795**
	Right	0.130	-	0.130
	Left	0.431	0.048	0.479

Table 13.6.4 Simultaneous Transmission Scenario for 2G/3G/4G with 5.8 GHz W-LAN (Hotspot at 10 mm)

Simul Tx	Configuration	GPRS 850 SAR (W/kg)	5.8G W-LAN SAR (W/kg)	ΣSAR (W/kg)
		1	2	1+2
Hotspot SAR	Top	-	0.044	0.044
	Bottom	0.313	-	0.313
	Front	0.506	0.026	0.532
	Rear	0.493	0.772	**1.265**
	Right	0.078	-	0.078
	Left	0.342	0.221	0.563
Simul Tx	**Configuration**	**GPRS 1900 SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Hotspot SAR	Top	-	0.044	0.044
	Bottom	0.162	-	0.162
	Front	0.273	0.026	0.299
	Rear	0.315	0.772	**1.087**
	Right	-	-	0.000
	Left	0.114	0.221	0.335
Simul Tx	**Configuration**	**WCDMA 850 SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Hotspot SAR	Top	-	0.044	0.044
	Bottom	0.303	-	0.303
	Front	0.691	0.026	0.717
	Rear	0.645	0.772	**1.417**
	Right	0.121	-	0.121
	Left	0.436	0.221	0.657
Simul Tx	**Configuration**	**LTE Band 12 SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Hotspot SAR	Top	-	0.044	0.044
	Bottom	0.166	-	0.166
	Front	0.385	0.026	0.411
	Rear	0.487	0.772	**1.259**
	Right	0.157	-	0.157
	Left	0.082	0.221	0.303
Simul Tx	**Configuration**	**LTE Band 5 SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Hotspot SAR	Top	-	0.044	0.044
	Bottom	0.383	-	0.383
	Front	0.668	0.026	0.694
	Rear	0.642	0.772	**1.414**
	Right	0.130	-	0.130
	Left	0.431	0.221	0.652

Table 13.6.5 Simultaneous Transmission Scenario for 2G/3G/4G with Bluetooth and 5.2 GHz W-LAN (Hotspot at 10 mm)

Simul Tx	Configuration	GPRS 850 SAR (W/kg)	Bluetooth SAR (W/kg)	5.2G W-LAN SAR (W/kg)	ΣSAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Hotspot SAR	Top	-	0.028	0.009	0.028	0.009	0.037
	Bottom	0.313	-	-	0.313	0.313	0.313
	Front	0.506	0.034	0.016	0.540	0.522	0.556
	Rear	0.493	0.024	0.153	0.517	0.646	**0.670**
	Right	0.078	-	-	0.078	0.078	0.078
	Left	0.342	0.044	0.048	0.386	0.390	0.434
Simul Tx	**Configuration**	**GPRS 1900 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.2G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Hotspot SAR	Top	-	0.028	0.009	0.028	0.009	0.037
	Bottom	0.162	-	-	0.162	0.162	0.162
	Front	0.273	0.034	0.016	0.307	0.289	0.323
	Rear	0.315	0.024	0.153	0.339	0.468	**0.492**
	Right	-	-	-	-	0.000	0.000
	Left	0.114	0.044	0.048	0.158	0.162	0.206
Simul Tx	**Configuration**	**WCDMA 850 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.2G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Hotspot SAR	Top	-	0.028	0.009	0.028	0.009	0.037
	Bottom	0.303	-	-	0.303	0.303	0.303
	Front	0.691	0.034	0.016	0.725	0.707	0.741
	Rear	0.645	0.024	0.153	0.669	0.798	**0.822**
	Right	0.121	-	-	0.121	0.121	0.121
	Left	0.436	0.044	0.048	0.480	0.484	0.528
Simul Tx	**Configuration**	**LTE Band 12 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.2G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Hotspot SAR	Top	-	0.028	0.009	0.028	0.009	0.037
	Bottom	0.166	-	-	0.166	0.166	0.166
	Front	0.385	0.034	0.016	0.419	0.401	0.435
	Rear	0.487	0.024	0.153	0.511	0.640	**0.664**
	Right	0.157	-	-	0.157	0.157	0.157
	Left	0.082	0.044	0.048	0.126	0.130	0.174
Simul Tx	**Configuration**	**LTE Band 5 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.2G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Hotspot SAR	Top	-	0.028	0.009	0.028	0.009	0.037
	Bottom	0.383	-	-	0.383	0.383	0.383
	Front	0.668	0.034	0.016	0.702	0.684	0.718
	Rear	0.642	0.024	0.153	0.666	0.795	**0.819**
	Right	0.130	-	-	0.130	0.130	0.130
	Left	0.431	0.044	0.048	0.475	0.479	0.523

Table 13.6.6 Simultaneous Transmission Scenario for 2G/3G/4G with Bluetooth and 5.8 GHz W-LAN (Hotspot at 10 mm)

Simul Tx	Configuration	GPRS 850 SAR (W/kg)	Bluetooth SAR (W/kg)	5.8G W-LAN SAR (W/kg)	ΣSAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Hotspot SAR	Top	-	0.028	0.044	0.028	0.044	0.072
	Bottom	0.313	-	-	0.313	0.313	0.313
	Front	0.506	0.034	0.026	0.540	0.532	0.566
	Rear	0.493	0.024	0.772	0.517	1.265	**1.289**
	Right	0.078	-	-	0.078	0.078	0.078
	Left	0.342	0.044	0.221	0.386	0.563	0.607
Simul Tx	**Configuration**	**GPRS 1900 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Hotspot SAR	Top	-	0.028	0.044	0.028	0.044	0.072
	Bottom	0.162	-	-	0.162	0.162	0.162
	Front	0.273	0.034	0.026	0.307	0.299	0.333
	Rear	0.315	0.024	0.772	0.339	1.087	**1.111**
	Right	-	-	-	0.000	0.000	0.000
	Left	0.114	0.044	0.221	0.158	0.335	0.379
Simul Tx	**Configuration**	**WCDMA 850 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Hotspot SAR	Top	-	0.028	0.044	0.028	0.044	0.072
	Bottom	0.303	-	-	0.303	0.303	0.303
	Front	0.691	0.034	0.026	0.725	0.717	0.751
	Rear	0.645	0.024	0.772	0.669	1.417	**1.441**
	Right	0.121	-	-	0.121	0.121	0.121
	Left	0.436	0.044	0.221	0.480	0.657	0.701
Simul Tx	**Configuration**	**LTE Band 12 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Hotspot SAR	Top	-	0.028	0.044	0.028	0.044	0.072
	Bottom	0.166	-	-	0.166	0.166	0.166
	Front	0.385	0.034	0.026	0.419	0.411	0.445
	Rear	0.487	0.024	0.772	0.511	1.259	**1.283**
	Right	0.157	-	-	0.157	0.157	0.157
	Left	0.082	0.044	0.221	0.126	0.303	0.347
Simul Tx	**Configuration**	**LTE Band 5 SAR (W/kg)**	**Bluetooth SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**		
		1	**2**	**3**	**1+2**	**1+3**	**1+2+3**
Hotspot SAR	Top	-	0.028	0.044	0.028	0.044	0.072
	Bottom	0.383	-	-	0.383	0.383	0.383
	Front	0.668	0.034	0.026	0.702	0.694	0.728
	Rear	0.642	0.024	0.772	0.666	1.414	**1.438**
	Right	0.130	-	-	0.130	0.130	0.130
	Left	0.431	0.044	0.221	0.475	0.652	0.696

Table 13.6.7 Simultaneous Transmission Scenario for Bluetooth and 5 GHz W-LAN (Hotspot at 10 mm)

Simul Tx	Configuration	Bluetooth SAR (W/kg)	5.2G W-LAN SAR (W/kg)	ΣSAR (W/kg)
		1	2	1+2
Hotspot SAR	Top	0.028	0.009	0.037
	Bottom	-	-	-
	Front	0.034	0.016	0.050
	Rear	0.024	0.153	**0.177**
	Right	-	-	-
	Left	0.044	0.048	0.092
Simul Tx	**Configuration**	**Bluetooth SAR (W/kg)**	**5.8G W-LAN SAR (W/kg)**	**ΣSAR (W/kg)**
		1	**2**	**1+2**
Hotspot SAR	Top	0.028	0.044	0.072
	Bottom	-	-	-
	Front	0.034	0.026	0.060
	Rear	0.024	0.772	**0.796**
	Right	-	-	-
	Left	0.044	0.221	0.265

13.7 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.

14. MEASUREMENT UNCERTAINTIES

750 MHz Head (SN: 3328)

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	Standard (1g)	vi 2 or Veff
Measurement System						
Probe calibration	± 6.0	Normal	1	1	± 6.0 %	∞
Axial isotropy	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Hemispherical isotropy	± 9.6	Rectangular	√3	1	± 5.5 %	∞
Boundary Effects	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Probe Linearity	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Probe modulation response	± 2.4	Rectangular	√3	1	± 1.4 %	∞
Detection limits	± 0.25	Rectangular	√3	1	± 0.14 %	∞
Readout Electronics	± 1.0	Normal	1	1	± 1.0 %	∞
Response time	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	± 1.7 %	∞
Probe Positioner	± 0.4	Rectangular	√3	1	± 0.23 %	∞
Probe Positioning	± 2.9	Rectangular	√3	1	± 1.7 %	∞
Algorithms for Max. SAR Eval.	± 1.0	Rectangular	√3	1	± 0.58 %	∞
Test Sample Related						
Device Positioning	± 2.9	Normal	1	1	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	± 2.9 %	∞
SAR Scaling	± 2.0	Rectangular	√3	1	± 1.2 %	∞
Physical Parameters						
Phantom Shell	± 4.0	Rectangular	√3	1	± 2.3 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	± 2.9 %	∞
Liquid conductivity (Meas.)	± 4.5	Normal	1	0.64	± 4.5 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.6	± 2.9 %	∞
Liquid permittivity (Meas.)	± 4.0	Normal	1	0.6	± 4.0 %	10
Temp. unc. - Conductivity	± 1.8	Rectangular	√3	0.78	± 1.0 %	∞
Temp. unc. - Permittivity	± 1.9	Rectangular	√3	0.23	± 1.1 %	∞
Combined Standard Uncertainty					**± 12 %**	330
Expanded Uncertainty (k=2)					**± 24 %**	

The above measurement uncertainties are according to IEEE Std 1528

750 MHz Body (SN: 3328)

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	Standard (1g)	vi 2 or Veff
Measurement System						
Probe calibration	± 6.0	Normal	1	1	± 6.0 %	∞
Axial isotropy	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Hemispherical isotropy	± 9.6	Rectangular	√3	1	± 5.5 %	∞
Boundary Effects	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Probe Linearity	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Probe modulation response	± 2.4	Rectangular	√3	1	± 1.4 %	∞
Detection limits	± 0.25	Rectangular	√3	1	± 0.14 %	∞
Readout Electronics	± 1.0	Normal	1	1	± 1.0 %	∞
Response time	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	± 1.7 %	∞
Probe Positioner	± 0.4	Rectangular	√3	1	± 0.23 %	∞
Probe Positioning	± 2.9	Rectangular	√3	1	± 1.7 %	∞
Algorithms for Max. SAR Eval.	± 1.0	Rectangular	√3	1	± 0.58 %	∞
Test Sample Related						
Device Positioning	± 2.9	Normal	1	1	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	± 2.9 %	∞
SAR Scaling	± 2.0	Rectangular	√3	1	± 1.2 %	∞
Physical Parameters						
Phantom Shell	± 4.0	Rectangular	√3	1	± 2.3 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	± 2.9 %	∞
Liquid conductivity (Meas.)	± 4.4	Normal	1	0.64	± 4.4 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.6	± 2.9 %	∞
Liquid permittivity (Meas.)	± 4.1	Normal	1	0.6	± 4.1 %	10
Temp. unc. - Conductivity	± 2.0	Rectangular	√3	0.78	± 1.2 %	∞
Temp. unc. - Permittivity	± 1.8	Rectangular	√3	0.23	± 1.0 %	∞
Combined Standard Uncertainty					**± 12 %**	330
Expanded Uncertainty (k=2)					**± 24 %**	

The above measurement uncertainties are according to IEEE Std 1528

835 MHz Head (SN: 3328)

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	Standard (1g)	vi 2 or Veff
Measurement System						
Probe calibration	± 6.0	Normal	1	1	± 6.0 %	∞
Axial isotropy	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Hemispherical isotropy	± 9.6	Rectangular	√3	1	± 5.5 %	∞
Boundary Effects	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Probe Linearity	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Probe modulation response	± 2.4	Rectangular	√3	1	± 1.4 %	∞
Detection limits	± 0.25	Rectangular	√3	1	± 0.14 %	∞
Readout Electronics	± 1.0	Normal	1	1	± 1.0 %	∞
Response time	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	± 1.7 %	∞
Probe Positioner	± 0.4	Rectangular	√3	1	± 0.23 %	∞
Probe Positioning	± 2.9	Rectangular	√3	1	± 1.7 %	∞
Algorithms for Max. SAR Eval.	± 1.0	Rectangular	√3	1	± 0.58 %	∞
Test Sample Related						
Device Positioning	± 2.9	Normal	1	1	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	± 2.9 %	∞
SAR Scaling	± 2.0	Rectangular	√3	1	± 1.2 %	∞
Physical Parameters						
Phantom Shell	± 4.0	Rectangular	√3	1	± 2.3 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	± 2.9 %	∞
Liquid conductivity (Meas.)	± 4.0	Normal	1	0.64	± 4.0 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.6	± 2.9 %	∞
Liquid permittivity (Meas.)	± 3.8	Normal	1	0.6	± 3.8 %	10
Temp. unc. - Conductivity	± 1.7	Rectangular	√3	0.78	± 1.0 %	∞
Temp. unc. - Permittivity	± 1.8	Rectangular	√3	0.23	± 1.0 %	∞
Combined Standard Uncertainty					**± 12 %**	330
Expanded Uncertainty (k=2)					**± 24 %**	

The above measurement uncertainties are according to IEEE Std 1528

835 MHz Body (SN: 3328)

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	Standard (1g)	vi 2 or Veff
Measurement System						
Probe calibration	± 6.0	Normal	1	1	± 6.0 %	∞
Axial isotropy	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Hemispherical isotropy	± 9.6	Rectangular	√3	1	± 5.5 %	∞
Boundary Effects	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Probe Linearity	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Probe modulation response	± 2.4	Rectangular	√3	1	± 1.4 %	∞
Detection limits	± 0.25	Rectangular	√3	1	± 0.14 %	∞
Readout Electronics	± 1.0	Normal	1	1	± 1.0 %	∞
Response time	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	± 1.7 %	∞
Probe Positioner	± 0.4	Rectangular	√3	1	± 0.23 %	∞
Probe Positioning	± 2.9	Rectangular	√3	1	± 1.7 %	∞
Algorithms for Max. SAR Eval.	± 1.0	Rectangular	√3	1	± 0.58 %	∞
Test Sample Related						
Device Positioning	± 2.9	Normal	1	1	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	± 2.9 %	∞
SAR Scaling	± 2.0	Rectangular	√3	1	± 1.2 %	∞
Physical Parameters						
Phantom Shell	± 4.0	Rectangular	√3	1	± 2.3 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	± 2.9 %	∞
Liquid conductivity (Meas.)	± 4.3	Normal	1	0.64	± 4.3 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.6	± 2.9 %	∞
Liquid permittivity (Meas.)	± 3.7	Normal	1	0.6	± 3.7 %	10
Temp. unc. - Conductivity	± 1.7	Rectangular	√3	0.78	± 1.0 %	∞
Temp. unc. - Permittivity	± 1.9	Rectangular	√3	0.23	± 1.1 %	∞
Combined Standard Uncertainty					**± 12 %**	330
Expanded Uncertainty (k=2)					**± 24 %**	

The above measurement uncertainties are according to IEEE Std 1528

1900 MHz Head (SN: 7337)

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	Standard (1g)	vi 2 or Veff
Measurement System						
Probe calibration	± 6.0	Normal	1	1	± 6.0 %	∞
Axial isotropy	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Hemispherical isotropy	± 9.6	Rectangular	√3	1	± 5.5 %	∞
Boundary Effects	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Probe Linearity	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Probe modulation response	± 2.4	Rectangular	√3	1	± 1.4 %	∞
Detection limits	± 0.25	Rectangular	√3	1	± 0.14 %	∞
Readout Electronics	± 1.0	Normal	1	1	± 1.0 %	∞
Response time	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	± 1.7 %	∞
Probe Positioner	± 0.4	Rectangular	√3	1	± 0.23 %	∞
Probe Positioning	± 2.9	Rectangular	√3	1	± 1.7 %	∞
Algorithms for Max. SAR Eval.	± 1.0	Rectangular	√3	1	± 0.58 %	∞
Test Sample Related						
Device Positioning	± 2.9	Normal	1	1	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	± 2.9 %	∞
SAR Scaling	± 2.0	Rectangular	√3	1	± 1.2 %	∞
Physical Parameters						
Phantom Shell	± 4.0	Rectangular	√3	1	± 2.3 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	± 2.9 %	∞
Liquid conductivity (Meas.)	± 3.5	Normal	1	0.64	± 3.5 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.6	± 2.9 %	∞
Liquid permittivity (Meas.)	± 3.8	Normal	1	0.6	± 3.8 %	10
Temp. unc. - Conductivity	± 1.8	Rectangular	√3	0.78	± 1.0 %	∞
Temp. unc. - Permittivity	± 1.9	Rectangular	√3	0.23	± 1.1 %	∞
Combined Standard Uncertainty					**± 12 %**	330
Expanded Uncertainty (k=2)					**± 24 %**	

The above measurement uncertainties are according to IEEE Std 1528

1900 MHz Body (SN: 7337)

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	Standard (1g)	vi 2 or Veff
Measurement System						
Probe calibration	± 6.0	Normal	1	1	± 6.0 %	∞
Axial isotropy	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Hemispherical isotropy	± 9.6	Rectangular	√3	1	± 5.5 %	∞
Boundary Effects	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Probe Linearity	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Probe modulation response	± 2.4	Rectangular	√3	1	± 1.4 %	∞
Detection limits	± 0.25	Rectangular	√3	1	± 0.14 %	∞
Readout Electronics	± 1.0	Normal	1	1	± 1.0 %	∞
Response time	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	± 1.7 %	∞
Probe Positioner	± 0.4	Rectangular	√3	1	± 0.23 %	∞
Probe Positioning	± 2.9	Rectangular	√3	1	± 1.7 %	∞
Algorithms for Max. SAR Eval.	± 1.0	Rectangular	√3	1	± 0.58 %	∞
Test Sample Related						
Device Positioning	± 2.9	Normal	1	1	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	± 2.9 %	∞
SAR Scaling	± 2.0	Rectangular	√3	1	± 1.2 %	∞
Physical Parameters						
Phantom Shell	± 4.0	Rectangular	√3	1	± 2.3 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	± 2.9 %	∞
Liquid conductivity (Meas.)	± 4.0	Normal	1	0.64	± 4.0 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.6	± 2.9 %	∞
Liquid permittivity (Meas.)	± 3.7	Normal	1	0.6	± 3.7 %	10
Temp. unc. - Conductivity	± 1.8	Rectangular	√3	0.78	± 1.0 %	∞
Temp. unc. - Permittivity	± 1.8	Rectangular	√3	0.23	± 1.0 %	∞
Combined Standard Uncertainty					**± 12 %**	330
Expanded Uncertainty (k=2)					**± 24 %**	

The above measurement uncertainties are according to IEEE Std 1528

2450 MHz Head (SN: 7337)

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	Standard (1g)	vi 2 or Veff
Measurement System						
Probe calibration	± 6.0	Normal	1	1	± 6.0 %	∞
Axial isotropy	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Hemispherical isotropy	± 9.6	Rectangular	√3	1	± 5.5 %	∞
Boundary Effects	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Probe Linearity	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Probe modulation response	± 2.4	Rectangular	√3	1	± 1.4 %	∞
Detection limits	± 0.25	Rectangular	√3	1	± 0.14 %	∞
Readout Electronics	± 1.0	Normal	1	1	± 1.0 %	∞
Response time	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	± 1.7 %	∞
Probe Positioner	± 0.4	Rectangular	√3	1	± 0.23 %	∞
Probe Positioning	± 2.9	Rectangular	√3	1	± 1.7 %	∞
Algorithms for Max. SAR Eval.	± 1.0	Rectangular	√3	1	± 0.58 %	∞
Test Sample Related						
Device Positioning	± 2.9	Normal	1	1	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	± 2.9 %	∞
SAR Scaling	± 2.0	Rectangular	√3	1	± 1.2 %	∞
Physical Parameters						
Phantom Shell	± 4.0	Rectangular	√3	1	± 2.3 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	± 2.9 %	∞
Liquid conductivity (Meas.)	± 3.8	Normal	1	0.64	± 3.8 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.6	± 2.9 %	∞
Liquid permittivity (Meas.)	± 3.6	Normal	1	0.6	± 3.6 %	10
Temp. unc. - Conductivity	± 1.8	Rectangular	√3	0.78	± 1.0 %	∞
Temp. unc. - Permittivity	± 1.8	Rectangular	√3	0.23	± 1.0 %	∞
Combined Standard Uncertainty					**± 12 %**	330
Expanded Uncertainty (k=2)					**± 24 %**	

The above measurement uncertainties are according to IEEE Std 1528

2450 MHz Body (SN: 7337)

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	Standard (1g)	vi 2 or Veff
Measurement System						
Probe calibration	± 6.0	Normal	1	1	± 6.0 %	∞
Axial isotropy	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Hemispherical isotropy	± 9.6	Rectangular	√3	1	± 5.5 %	∞
Boundary Effects	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Probe Linearity	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Probe modulation response	± 2.4	Rectangular	√3	1	± 1.4 %	∞
Detection limits	± 0.25	Rectangular	√3	1	± 0.14 %	∞
Readout Electronics	± 1.0	Normal	1	1	± 1.0 %	∞
Response time	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	± 1.7 %	∞
Probe Positioner	± 0.4	Rectangular	√3	1	± 0.23 %	∞
Probe Positioning	± 2.9	Rectangular	√3	1	± 1.7 %	∞
Algorithms for Max. SAR Eval.	± 1.0	Rectangular	√3	1	± 0.58 %	∞
Test Sample Related						
Device Positioning	± 2.9	Normal	1	1	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	± 2.9 %	∞
SAR Scaling	± 2.0	Rectangular	√3	1	± 1.2 %	∞
Physical Parameters						
Phantom Shell	± 4.0	Rectangular	√3	1	± 2.3 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	± 2.9 %	∞
Liquid conductivity (Meas.)	± 4.0	Normal	1	0.64	± 4.0 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.6	± 2.9 %	∞
Liquid permittivity (Meas.)	± 3.8	Normal	1	0.6	± 3.8 %	10
Temp. unc. - Conductivity	± 1.9	Rectangular	√3	0.78	± 1.1 %	∞
Temp. unc. - Permittivity	± 1.8	Rectangular	√3	0.23	± 1.0 %	∞
Combined Standard Uncertainty					**± 12 %**	330
Expanded Uncertainty (k=2)					**± 24 %**	

The above measurement uncertainties are according to IEEE Std 1528

5200 MHz Head (SN: 7337)

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	Standard (1g)	vi 2 or Veff
Measurement System						
Probe calibration	± 6.55	Normal	1	1	± 6.6 %	∞
Axial isotropy	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Hemispherical isotropy	± 9.6	Rectangular	√3	1	± 5.5 %	∞
Boundary Effects	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Probe Linearity	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Probe modulation response	± 2.4	Rectangular	√3	1	± 1.4 %	∞
Detection limits	± 0.25	Rectangular	√3	1	± 0.14 %	∞
Readout Electronics	± 1.0	Normal	1	1	± 1.0 %	∞
Response time	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	± 1.7 %	∞
Probe Positioner	± 0.4	Rectangular	√3	1	± 0.23 %	∞
Probe Positioning	± 2.9	Rectangular	√3	1	± 1.7 %	∞
Algorithms for Max. SAR Eval.	± 1.0	Rectangular	√3	1	± 0.58 %	∞
Test Sample Related						
Device Positioning	± 2.9	Normal	1	1	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	± 2.9 %	∞
SAR Scaling	± 2.0	Rectangular	√3	1	± 1.2 %	∞
Physical Parameters						
Phantom Shell	± 4.0	Rectangular	√3	1	± 2.3 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	± 2.9 %	∞
Liquid conductivity (Meas.)	± 4.2	Normal	1	0.64	± 4.2 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.6	± 2.9 %	∞
Liquid permittivity (Meas.)	± 4.4	Normal	1	0.6	± 4.4 %	10
Temp. unc. - Conductivity	± 1.9	Rectangular	√3	0.78	± 1.1 %	∞
Temp. unc. - Permittivity	± 1.8	Rectangular	√3	0.23	± 1.0 %	∞
Combined Standard Uncertainty					**± 13 %**	330
Expanded Uncertainty (k=2)					**± 26 %**	

The above measurement uncertainties are according to IEEE Std 1528

5200 MHz Body (SN: 7337)

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	Standard (1g)	vi 2 or Veff
Measurement System						
Probe calibration	± 6.55	Normal	1	1	± 6.6 %	∞
Axial isotropy	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Hemispherical isotropy	± 9.6	Rectangular	√3	1	± 5.5 %	∞
Boundary Effects	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Probe Linearity	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Probe modulation response	± 2.4	Rectangular	√3	1	± 1.4 %	∞
Detection limits	± 0.25	Rectangular	√3	1	± 0.14 %	∞
Readout Electronics	± 1.0	Normal	1	1	± 1.0 %	∞
Response time	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	± 1.7 %	∞
Probe Positioner	± 0.4	Rectangular	√3	1	± 0.23 %	∞
Probe Positioning	± 2.9	Rectangular	√3	1	± 1.7 %	∞
Algorithms for Max. SAR Eval.	± 1.0	Rectangular	√3	1	± 0.58 %	∞
Test Sample Related						
Device Positioning	± 2.9	Normal	1	1	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	± 2.9 %	∞
SAR Scaling	± 2.0	Rectangular	√3	1	± 1.2 %	∞
Physical Parameters						
Phantom Shell	± 4.0	Rectangular	√3	1	± 2.3 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	± 2.9 %	∞
Liquid conductivity (Meas.)	± 3.8	Normal	1	0.64	± 3.8 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.6	± 2.9 %	∞
Liquid permittivity (Meas.)	± 4.2	Normal	1	0.6	± 4.2 %	10
Temp. unc. - Conductivity	± 1.8	Rectangular	√3	0.78	± 1.0 %	∞
Temp. unc. - Permittivity	± 1.7	Rectangular	√3	0.23	± 1.0 %	∞
Combined Standard Uncertainty					**± 13 %**	330
Expanded Uncertainty (k=2)					**± 26 %**	

The above measurement uncertainties are according to IEEE Std 1528

5300 MHz Head (SN: 7337)

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	Standard (1g)	vi 2 or Veff
Measurement System						
Probe calibration	± 6.55	Normal	1	1	± 6.6 %	∞
Axial isotropy	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Hemispherical isotropy	± 9.6	Rectangular	√3	1	± 5.5 %	∞
Boundary Effects	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Probe Linearity	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Probe modulation response	± 2.4	Rectangular	√3	1	± 1.4 %	∞
Detection limits	± 0.25	Rectangular	√3	1	± 0.14 %	∞
Readout Electronics	± 1.0	Normal	1	1	± 1.0 %	∞
Response time	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	± 1.7 %	∞
Probe Positioner	± 0.4	Rectangular	√3	1	± 0.23 %	∞
Probe Positioning	± 2.9	Rectangular	√3	1	± 1.7 %	∞
Algorithms for Max. SAR Eval.	± 1.0	Rectangular	√3	1	± 0.58 %	∞
Test Sample Related						
Device Positioning	± 2.9	Normal	1	1	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	± 2.9 %	∞
SAR Scaling	± 2.0	Rectangular	√3	1	± 1.2 %	∞
Physical Parameters						
Phantom Shell	± 4.0	Rectangular	√3	1	± 2.3 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	± 2.9 %	∞
Liquid conductivity (Meas.)	± 3.9	Normal	1	0.64	± 3.9 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.6	± 2.9 %	∞
Liquid permittivity (Meas.)	± 4.2	Normal	1	0.6	± 4.2 %	10
Temp. unc. - Conductivity	± 1.9	Rectangular	√3	0.78	± 1.1 %	∞
Temp. unc. - Permittivity	± 2.0	Rectangular	√3	0.23	± 1.2 %	∞
Combined Standard Uncertainty					**± 13 %**	330
Expanded Uncertainty (k=2)					**± 26 %**	

The above measurement uncertainties are according to IEEE Std 1528

5300 MHz Body (SN: 7337)

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	Standard (1g)	vi 2 or Veff
Measurement System						
Probe calibration	± 6.55	Normal	1	1	± 6.6 %	∞
Axial isotropy	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Hemispherical isotropy	± 9.6	Rectangular	√3	1	± 5.5 %	∞
Boundary Effects	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Probe Linearity	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Probe modulation response	± 2.4	Rectangular	√3	1	± 1.4 %	∞
Detection limits	± 0.25	Rectangular	√3	1	± 0.14 %	∞
Readout Electronics	± 1.0	Normal	1	1	± 1.0 %	∞
Response time	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	± 1.7 %	∞
Probe Positioner	± 0.4	Rectangular	√3	1	± 0.23 %	∞
Probe Positioning	± 2.9	Rectangular	√3	1	± 1.7 %	∞
Algorithms for Max. SAR Eval.	± 1.0	Rectangular	√3	1	± 0.58 %	∞
Test Sample Related						
Device Positioning	± 2.9	Normal	1	1	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	± 2.9 %	∞
SAR Scaling	± 2.0	Rectangular	√3	1	± 1.2 %	∞
Physical Parameters						
Phantom Shell	± 4.0	Rectangular	√3	1	± 2.3 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	± 2.9 %	∞
Liquid conductivity (Meas.)	± 4.2	Normal	1	0.64	± 4.2 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.6	± 2.9 %	∞
Liquid permittivity (Meas.)	± 4.1	Normal	1	0.6	± 4.1 %	10
Temp. unc. - Conductivity	± 1.9	Rectangular	√3	0.78	± 1.1 %	∞
Temp. unc. - Permittivity	± 1.9	Rectangular	√3	0.23	± 1.1 %	∞
Combined Standard Uncertainty					**± 13 %**	330
Expanded Uncertainty (k=2)					**± 26 %**	

The above measurement uncertainties are according to IEEE Std 1528

5500 MHz Head (SN: 7337)

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	Standard (1g)	vi 2 or Veff
Measurement System						
Probe calibration	± 6.55	Normal	1	1	± 6.6 %	∞
Axial isotropy	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Hemispherical isotropy	± 9.6	Rectangular	√3	1	± 5.5 %	∞
Boundary Effects	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Probe Linearity	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Probe modulation response	± 2.4	Rectangular	√3	1	± 1.4 %	∞
Detection limits	± 0.25	Rectangular	√3	1	± 0.14 %	∞
Readout Electronics	± 1.0	Normal	1	1	± 1.0 %	∞
Response time	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	± 1.7 %	∞
Probe Positioner	± 0.4	Rectangular	√3	1	± 0.23 %	∞
Probe Positioning	± 2.9	Rectangular	√3	1	± 1.7 %	∞
Algorithms for Max. SAR Eval.	± 1.0	Rectangular	√3	1	± 0.58 %	∞
Test Sample Related						
Device Positioning	± 2.9	Normal	1	1	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	± 2.9 %	∞
SAR Scaling	± 2.0	Rectangular	√3	1	± 1.2 %	∞
Physical Parameters						
Phantom Shell	± 4.0	Rectangular	√3	1	± 2.3 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	± 2.9 %	∞
Liquid conductivity (Meas.)	± 4.0	Normal	1	0.64	± 4.0 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.6	± 2.9 %	∞
Liquid permittivity (Meas.)	± 3.7	Normal	1	0.6	± 3.7 %	10
Temp. unc. - Conductivity	± 1.8	Rectangular	√3	0.78	± 1.0 %	∞
Temp. unc. - Permittivity	± 1.8	Rectangular	√3	0.23	± 1.0 %	∞
Combined Standard Uncertainty					**± 13 %**	330
Expanded Uncertainty (k=2)					**± 26 %**	

The above measurement uncertainties are according to IEEE Std 1528

5500 MHz Body (SN: 7337)

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	Standard (1g)	vi 2 or Veff
Measurement System						
Probe calibration	± 6.55	Normal	1	1	± 6.6 %	∞
Axial isotropy	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Hemispherical isotropy	± 9.6	Rectangular	√3	1	± 5.5 %	∞
Boundary Effects	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Probe Linearity	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Probe modulation response	± 2.4	Rectangular	√3	1	± 1.4 %	∞
Detection limits	± 0.25	Rectangular	√3	1	± 0.14 %	∞
Readout Electronics	± 1.0	Normal	1	1	± 1.0 %	∞
Response time	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	± 1.7 %	∞
Probe Positioner	± 0.4	Rectangular	√3	1	± 0.23 %	∞
Probe Positioning	± 2.9	Rectangular	√3	1	± 1.7 %	∞
Algorithms for Max. SAR Eval.	± 1.0	Rectangular	√3	1	± 0.58 %	∞
Test Sample Related						
Device Positioning	± 2.9	Normal	1	1	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	± 2.9 %	∞
SAR Scaling	± 2.0	Rectangular	√3	1	± 1.2 %	∞
Physical Parameters						
Phantom Shell	± 4.0	Rectangular	√3	1	± 2.3 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	± 2.9 %	∞
Liquid conductivity (Meas.)	± 4.1	Normal	1	0.64	± 4.1 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.6	± 2.9 %	∞
Liquid permittivity (Meas.)	± 3.9	Normal	1	0.6	± 3.9 %	10
Temp. unc. - Conductivity	± 1.7	Rectangular	√3	0.78	± 1.0 %	∞
Temp. unc. - Permittivity	± 1.8	Rectangular	√3	0.23	± 1.0 %	∞
Combined Standard Uncertainty					**± 13 %**	330
Expanded Uncertainty (k=2)					**± 26 %**	

The above measurement uncertainties are according to IEEE Std 1528

5600 MHz Head (SN: 7337)

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	Standard (1g)	vi 2 or Veff
Measurement System						
Probe calibration	± 6.55	Normal	1	1	± 6.6 %	∞
Axial isotropy	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Hemispherical isotropy	± 9.6	Rectangular	√3	1	± 5.5 %	∞
Boundary Effects	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Probe Linearity	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Probe modulation response	± 2.4	Rectangular	√3	1	± 1.4 %	∞
Detection limits	± 0.25	Rectangular	√3	1	± 0.14 %	∞
Readout Electronics	± 1.0	Normal	1	1	± 1.0 %	∞
Response time	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	± 1.7 %	∞
Probe Positioner	± 0.4	Rectangular	√3	1	± 0.23 %	∞
Probe Positioning	± 2.9	Rectangular	√3	1	± 1.7 %	∞
Algorithms for Max. SAR Eval.	± 1.0	Rectangular	√3	1	± 0.58 %	∞
Test Sample Related						
Device Positioning	± 2.9	Normal	1	1	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	± 2.9 %	∞
SAR Scaling	± 2.0	Rectangular	√3	1	± 1.2 %	∞
Physical Parameters						
Phantom Shell	± 4.0	Rectangular	√3	1	± 2.3 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	± 2.9 %	∞
Liquid conductivity (Meas.)	± 3.8	Normal	1	0.64	± 3.8 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.6	± 2.9 %	∞
Liquid permittivity (Meas.)	± 3.9	Normal	1	0.6	± 3.9 %	10
Temp. unc. - Conductivity	± 1.8	Rectangular	√3	0.78	± 1.0 %	∞
Temp. unc. - Permittivity	± 1.8	Rectangular	√3	0.23	± 1.0 %	∞
Combined Standard Uncertainty					**± 13 %**	330
Expanded Uncertainty (k=2)					**± 26 %**	

The above measurement uncertainties are according to IEEE Std 1528

5600 MHz Body (SN: 7337)

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	Standard (1g)	vi 2 or Veff
Measurement System						
Probe calibration	± 6.55	Normal	1	1	± 6.6 %	∞
Axial isotropy	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Hemispherical isotropy	± 9.6	Rectangular	√3	1	± 5.5 %	∞
Boundary Effects	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Probe Linearity	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Probe modulation response	± 2.4	Rectangular	√3	1	± 1.4 %	∞
Detection limits	± 0.25	Rectangular	√3	1	± 0.14 %	∞
Readout Electronics	± 1.0	Normal	1	1	± 1.0 %	∞
Response time	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	± 1.7 %	∞
Probe Positioner	± 0.4	Rectangular	√3	1	± 0.23 %	∞
Probe Positioning	± 2.9	Rectangular	√3	1	± 1.7 %	∞
Algorithms for Max. SAR Eval.	± 1.0	Rectangular	√3	1	± 0.58 %	∞
Test Sample Related						
Device Positioning	± 2.9	Normal	1	1	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	± 2.9 %	∞
SAR Scaling	± 2.0	Rectangular	√3	1	± 1.2 %	∞
Physical Parameters						
Phantom Shell	± 4.0	Rectangular	√3	1	± 2.3 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	± 2.9 %	∞
Liquid conductivity (Meas.)	± 4.0	Normal	1	0.64	± 4.0 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.6	± 2.9 %	∞
Liquid permittivity (Meas.)	± 3.9	Normal	1	0.6	± 3.9 %	10
Temp. unc. - Conductivity	± 1.9	Rectangular	√3	0.78	± 1.1 %	∞
Temp. unc. - Permittivity	± 1.9	Rectangular	√3	0.23	± 1.1 %	∞
Combined Standard Uncertainty					**± 13 %**	330
Expanded Uncertainty (k=2)					**± 26 %**	

The above measurement uncertainties are according to IEEE Std 1528

5800 MHz Head (SN: 7337)

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	Standard (1g)	vi 2 or Veff
Measurement System						
Probe calibration	± 6.55	Normal	1	1	± 6.6 %	∞
Axial isotropy	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Hemispherical isotropy	± 9.6	Rectangular	√3	1	± 5.5 %	∞
Boundary Effects	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Probe Linearity	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Probe modulation response	± 2.4	Rectangular	√3	1	± 1.4 %	∞
Detection limits	± 0.25	Rectangular	√3	1	± 0.14 %	∞
Readout Electronics	± 1.0	Normal	1	1	± 1.0 %	∞
Response time	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	± 1.7 %	∞
Probe Positioner	± 0.4	Rectangular	√3	1	± 0.23 %	∞
Probe Positioning	± 2.9	Rectangular	√3	1	± 1.7 %	∞
Algorithms for Max. SAR Eval.	± 1.0	Rectangular	√3	1	± 0.58 %	∞
Test Sample Related						
Device Positioning	± 2.9	Normal	1	1	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	± 2.9 %	∞
SAR Scaling	± 2.0	Rectangular	√3	1	± 1.2 %	∞
Physical Parameters						
Phantom Shell	± 4.0	Rectangular	√3	1	± 2.3 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	± 2.9 %	∞
Liquid conductivity (Meas.)	± 3.7	Normal	1	0.64	± 3.7 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.6	± 2.9 %	∞
Liquid permittivity (Meas.)	± 4.2	Normal	1	0.6	± 4.2 %	10
Temp. unc. - Conductivity	± 1.8	Rectangular	√3	0.78	± 1.0 %	∞
Temp. unc. - Permittivity	± 2.0	Rectangular	√3	0.23	± 1.2 %	∞
Combined Standard Uncertainty					**± 13 %**	330
Expanded Uncertainty (k=2)					**± 26 %**	

The above measurement uncertainties are according to IEEE Std 1528

5800 MHz Body (SN: 7337)

Error Description	Uncertainty value ±%	Probability Distribution	Divisor	(Ci) 1g	Standard (1g)	vi 2 or Veff
Measurement System						
Probe calibration	± 6.55	Normal	1	1	± 6.6 %	∞
Axial isotropy	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Hemispherical isotropy	± 9.6	Rectangular	√3	1	± 5.5 %	∞
Boundary Effects	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Probe Linearity	± 4.7	Rectangular	√3	1	± 2.7 %	∞
Probe modulation response	± 2.4	Rectangular	√3	1	± 1.4 %	∞
Detection limits	± 0.25	Rectangular	√3	1	± 0.14 %	∞
Readout Electronics	± 1.0	Normal	1	1	± 1.0 %	∞
Response time	± 0.8	Rectangular	√3	1	± 0.46 %	∞
Integration time	± 2.6	Rectangular	√3	1	± 1.5 %	∞
RF Ambient Conditions – Noise	± 3.0	Rectangular	√3	1	± 1.7 %	∞
RF Ambient Conditions – Reflections	± 3.0	Rectangular	√3	1	± 1.7 %	∞
Probe Positioner	± 0.4	Rectangular	√3	1	± 0.23 %	∞
Probe Positioning	± 2.9	Rectangular	√3	1	± 1.7 %	∞
Algorithms for Max. SAR Eval.	± 1.0	Rectangular	√3	1	± 0.58 %	∞
Test Sample Related						
Device Positioning	± 2.9	Normal	1	1	± 2.9 %	145
Device Holder	± 3.6	Normal	1	1	± 3.6 %	5
Power Drift	± 5.0	Rectangular	√3	1	± 2.9 %	∞
SAR Scaling	± 2.0	Rectangular	√3	1	± 1.2 %	∞
Physical Parameters						
Phantom Shell	± 4.0	Rectangular	√3	1	± 2.3 %	∞
Liquid conductivity (Target)	± 5.0	Rectangular	√3	0.64	± 2.9 %	∞
Liquid conductivity (Meas.)	± 3.7	Normal	1	0.64	± 3.7 %	10
Liquid permittivity (Target)	± 5.0	Rectangular	√3	0.6	± 2.9 %	∞
Liquid permittivity (Meas.)	± 4.3	Normal	1	0.6	± 4.3 %	10
Temp. unc. - Conductivity	± 1.8	Rectangular	√3	0.78	± 1.0 %	∞
Temp. unc. - Permittivity	± 1.7	Rectangular	√3	0.23	± 1.0 %	∞
Combined Standard Uncertainty					**± 13 %**	330
Expanded Uncertainty (k=2)					**± 26 %**	

The above measurement uncertainties are according to IEEE Std 1528

15. CONCLUSION

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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