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SAR TEST REPORT

Applicant Name:	**Date of Issue:**06. 29, 2018
LG Electronics MobileComm USA, Inc.	**Test Report No.:**HCT-SR-1806-FC002-R1
1000 Sylvan Avenue, Englewood Cliffs NJ 07632	**Test Site: HCT CO., LTD.**

FCC ID: ZNFX210JM

Equipment Type:	**GSM/WCDMA/LTE Phone with Bluetooth4.2LE, WIFI802.11 b/g/n**
Application Type	**Certification**
FCC Rule Part(s):	**CFR §2.1093**
Model Name:	**LM-X210JM**
Additional FCC Model(s):	**LMX210JM, X210JM**
Date of Test:	**05/29/2018 ~ 05/31/2018**

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

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

Tested By	**Reviewed By**
Jee-Ill, Lee	**Yun-Jeang, Heo**
Test Engineer	**Technical Manager**
SAR Team	**SAR Team**
Certification Division	**Certification Division**

DOCUMENT HISTORY

Version	DATE	DESCRIPTION
HCT-SR-1806-FC002	06. 08, 2018	First Approval Report
HCT-SR-1806-FC002-1	06. 29, 2018	Sec.15, Page 7,10 Plot #8, #16, #19 were revised.

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1. Attestation of Test Result of Device Under Test

Test Laboratory	
Company Name:	HCT Co., LTD
Address	74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of Korea
Telephone	+82 31 645 6300
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Attestation of SAR test result					
Trade Name:	LG Electronics, MobileComm U.S.A., Inc.				
FCC ID:	ZNFX210JM				
Model:	LM-X210JM				
Additional FCC Model(s):	LMX210JM, X210JM				
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth4.2LE, WIFI802.11 b/g/n				
Application Type:	Certification				
The Highest Reported SAR (W/Kg)					
Band	**Tx. Frequency (MHz)**	**Equipment Class**	**Reported 1g SAR (W/kg)**		
			Head	**Body-Worn**	**Hotspot**
GSM/GPRS/EDGE 850	824.2 ~ 848.8	PCE	**0.91**	**1.17**	**1.17**
GSM/GPRS/EDGE 1900	1 850.2 ~ 1 909.8	PCE	0.60	0.61	0.70
UMTS 850	826.4 ~ 846.6	PCE	0.63	0.35	0.35
UMTS 1900	1 852.4 ~ 1 907.6	PCE	0.88	0.91	1.04
LTE Band 5 (Cell)	824.7 ~ 848.3	PCE	0.57	1.07	1.07
802.11b	2 412 ~ 2 472	DTS	**1.03**	0.17	0.20
Bluetooth	2 402 ~ 2 480	DSS/DTS	N/A	N/A	N/A
Simultaneous SAR per KDB 690783 D01v01r03			**1.59**	1.35	1.37
Date(s) of Tests:	05/29/2018 ~ 05/31/2018				

2. Device Under Test Description

2.1 DUT specification

Device Wireless specification overview		
Band & Mode	**Operating Mode**	**Tx Frequency**
GSM/GPRS/EDGE 850	Voice / Data	824.2 – 848.8 MHz
GSM/GPRS/EDGE 1900	Voice / Data	1 850.2 – 1 909.8 MHz
UMTS 850	Voice / Data	826.4 – 846.6 MHz
UMTS 1900	Voice / Data	1 852.4 – 1 907.6 MHz
LTE Band 5 (Cell)	Voice / Data	824.7 – 848.3 MHz
2.4 GHz WLAN	Voice / Data	2 412 – 2 472 MHz
Bluetooth	Data	2 402 – 2 480 MHz

Device Description		
Device Dimension:	Overall (Length x Width): 70.17 mm x 144.08 mm Overall diagonal dimension: 160.26 mm	
Back Cover:	Normal Battery cover	
Battery Options:	Standard (Li-ion Battery)	
	Battery Model Name:EAC63321601	
	Manufacturer: BYD Lithium Battery CO.,LTD.	
Device Serial Numbers:	**Mode**	**Serial Number**
	GSM 850/ GSM 1900/ UMTS 850/ UMTS 1900/ LTE Band 5/ 2.4 GHz WLAN	712WIVH000263 712WILC000272
	Several samples with identical hardware were used to SAR testing. The manufacturer has confirmed that the devices tested have the same physical, mechanical and thermal characteristics are within operational tolerances expected for production units.	

2.2 Nominal and Maximum Output Power Specifications

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

2.2.1 Maximum Power

Mode / Band		Voice (dBm)	Burst Average GMSK GPRS (dBm)				Burst Average 8-PSK EGPRS (dBm)			
		1 Tx Slot	1 Tx Slot	2 Tx Slot	3 Tx Slot	4 Tx Slot	1 Tx Slot	2 Tx Slot	3 Tx Slot	4 Tx Slot
GSM/GPRS/EDGE 850	Maximum	34.0	34.0	33.0	31.0	30.0	27.0	26.0	24.0	23.0
	Nominal	33.5	33.5	32.5	30.5	29.5	26.5	25.5	23.5	22.5
GSM/GPRS/EDGE 1900	Maximum	31.0	31.0	30.0	28.0	27.0	26.5	25.5	23.5	22.5
	Nominal	30.5	30.5	29.5	27.5	26.5	26.0	25.0	23.0	22.0

Mode/Band		Modulated Average (dBm)			
		3GPP WCDMA	3GPP HSDPA	3GPP HSUPA	3GPP DC-HSDPA
UMTS Band 5 (850 MHz)	Maximum	25.5	24.5	24.5	24.5
	Nominal	25.0	24.0	24.0	24.0
UMTS Band 2 (1900 MHz)	Maximum	24.0	23.0	23.0	23.0
	Nominal	23.5	22.5	22.5	22.5

Mode / Band		Modulated Average (dBm)
LTE Band 5 (Cell)	Maximum	25.5
	Nominal	25.0

Mode / Band	CH.	Modulated Average (dBm)	
		Maximum	Nominal
IEEE 802.11b (2.4 GHz)	1-2	15.0	14.0
	3-9	15.0	14.0
	10-11	15.0	14.0
	12	-2	-3
	13	-2	-3
IEEE 802.11g (2.4 GHz)	1	9.0	8.0
	2-9	14.0	13.0
	10	12.0	11.0
	11	10.0	9.0
	12	-4.5	-5.5
	13	-4.5	-5.5
IEEE 802.11n (2.4 GHz) HT20	1	9.0	8.0
	2-9	14.0	13.0
	10	12.0	11.0
	11	10.0	9.0
	12	-4.5	-5.5
	13	-4.5	-5.5

Mode / Band			Modulated Average Power (dBm)
Bluetooth	1Mbps(GFSK)	Maximum	9.0
		Nominal	8.0
	2Mbps (π/4DPSK)	Maximum	8.0
		Nominal	7.0
	3Mbps(8DPSK)	Maximum	8.0
		Nominal	7.0
	LE	Maximum	0.0
		Nominal	-1.0

2.3 DUT Antenna Locations

Device Edges / Sides for SAR Testing						
Mode	Rear	Front	Left	Right	Bottom	Top
GSM/GPRS 850	Yes	Yes	Yes	Yes	Yes	No
GSM/GPRS 1900	Yes	Yes	Yes	Yes	Yes	No
UMTS 850	Yes	Yes	Yes	Yes	Yes	No
UMTS 1900	Yes	Yes	Yes	Yes	Yes	No
LTE Band 5	Yes	Yes	Yes	Yes	Yes	No
2.4 GHz WLAN	Yes	Yes	No	Yes	No	Yes
Bluetooth	Yes	Yes	No	Yes	No	Yes

Particular EUT edges were not required to be evaluated for Wireless Router SAR if the edges were > 25 mm from the transmitting antenna according to FCC KDB 941225 D06v02r01 on page 2. The distance between the transmit antennas and the edges of the device are included in the filing. The overall dimensions of this device are > 9 X 5 cm. A diagram showing device antenna can be found in SAR_setup_photos. Since the diagonal dimension of this device is > 160 mm and < 200 mm, it is considered a “phablet”.

Note; All test configurations are based on front view.

2.4 SAR Summation Scenario

According to FCC KDB 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 EUT are shown below paths and are mode in same rectangle to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.

Simultaneous transmission paths

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

Simultaneous Transmission Scenarios				
Applicable Combination	Head	Body-Worn	Wireless Router	Extremity
GSM Voice + WLAN 2.4GHz	Yes	Yes	N/A	Yes
GSM Voice + Bluetooth 2.4GHz	^Yes	Yes	N/A	Yes
GPRS/EDGE + WLAN 2.4GHz	*Yes	*Yes	Yes	Yes
GPRS/EDGE + Bluetooth 2.4GHz	*^Yes	*Yes	^Yes	Yes
UMTS + WLAN 2.4GHz	Yes	Yes	Yes	Yes
UMTS + Bluetooth 2.4GHz	^Yes	Yes	^Yes	Yes
LTE + WLAN 2.4GHz	Yes	Yes	Yes	Yes
LTE + Bluetooth 2.4GHz	^Yes	Yes	^Yes	Yes

1. WLAN 2.4 GHz and Bluetooth share antenna path and cannot transmit simultaneously.
2. All licensed modes share the same antenna path and cannot transmit simultaneously.
3. UMTS +WLAN scenario also represents the UMTS Voice/DATA + WLAN 2.4GHz hotspot scenario.
4. GPRS/EDGE is considered pre-installed VOIP applications.
5. The highest reported SAR for each exposure condition is used for SAR summation purpose.
6. Wi-Fi Hotspot and WiFi Direct are supported for WLAN 2.4GHz
7. ^ Bluetooth tethering is considered.
8. * Pre-installed VoIP applications are considered.
9. This device supports VoLTE and VoWIFI

2.5 SAR Test Considerations

2.5.1 BT & LE

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

$$\frac{MaxPowerofChannel(mW)}{TestSeparationDistance(mm)} * \sqrt{Frequency(GHz)} \leq 3.0(1g\ \ SAR), 7.5(10g\ \ SAR)$$

Mode	Configuration	Frequency [MHz]	Maximum Allowed Power [mW]	Separation Distance [mm]	≤ 3.0 1-g SAR	≤ 7.5 10-g SAR
Bluetooth	Head SAR	2 480	8	5	2.5	
	Body SAR			10	1.3	
	Extremity SAR			5		2.5
Bluetooth LE	Head SAR		1	5	0.3	
	Body SAR			10	0.2	
	Extremity SAR			5		0.3

Based on the maximum conducted power of Bluetooth and antenna to use separation distance, Bluetooth SAR was not required [(8/5)*√2.480] = 2.5<3.0, [(8/10)*√2.480] = 1.3<3.0 for 1-g SAR, [(8/5)*√2.480] = 2.5≤ 7.5 for 10-g SAR.
Based on the maximum conducted power of Bluetooth LE and antenna to use separation distance, Bluetooth LE SAR was not required [(1/5)*√2.480] = 0.3≤ 3.0, [(1/10)*√2.480] = 0.2≤ 3.0 for 1-g SAR, [(1/5)*√2.480] = 0.3≤ 7.5 for 10-g SAR.

This device contains transmitters that may operate simultaneously. Therefore simultaneous transmission analysis is required. Per FCC KDB 447498 D01v06 IV.C.1iii, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is ≤ 1.6W/kg. When standalone SAR is not required to be measured per FCC KDB 447498 D01v06 4.3.22, the following equation must be used to estimate the standalone 1-g SAR for simultaneous transmission assessment involving that transmitter

$$Estimated\ \ SAR = \frac{\sqrt{f(GHZ)}}{x} * \frac{(Max\ \ Power\ \ of\ \ channel\ \ mW)}{Min\ \ Seperation\ \ Distance}.$$

for *test separation distances* ≤ 50 mm; where *x* = 7.5 for 1-g SAR and *x* = 18.75 for 10-g SAR

Mode	Configuration	Frequency [MHz]	Maximum Allowed Power [mW]	Separation Distance [mm]	Estimated SAR Head (1-g SAR) [W/kg]	Estimated SAR Body (1-g SAR) [W/kg]	Estimated SAR Extremity (10-g SAR) [W/kg]
Bluetooth	Head SAR	2 480	8	5	0.336		-
	Body SAR			10		0.168	-
	Extremity SAR			5			0.134
Bluetooth LE	Head SAR		1	5	0.042		-
	Body SAR			10		0.021	-
	Extremity SAR			5		-	0.017

Note:
1) The Estimated SAR results were determined according to FCC KDB447498 D01v06.
2) The frequency of Bluetooth and Bluetooth LE using for estimated SAR was selected highest channel of Bluetooth and Bluetooth LE for highest estimated SAR.

2.5.2 Licensed Transmitter(s)

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

This device is only capable of QPSK HSUPA in the uplink. Therefore, no additional SAR tests are required beyond that described for devices with HSUPA in KDB 941225 D01v03r01.

LTE SAR for the higher modulations and lower bandwidths were not tested since the maximum average output power of all required channels and configurations was not more than 0.5 dB higher than the highest bandwidth; and the reported LTE SAR for the highest bandwidth was less than 1.45 W/kg for all configurations according to FCC KDB 941225 D05v02r05.

Per FCC KDB 648474 D04v01r03, this device is considered a “Phablet” since the diagonal dimension is greater than 160 mm and less than 200 mm. Therefore, extremity SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR >1.2 W/kg. When hotspot mode applies, 10g SAR required only for the surfaces and edges with hotspot mode scaled to the maximum output power (including tolerance) is 1g SAR > 1.2 W/kg.

.

This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB 447498 D01v06.
FCC KDB 447498 D01v06 General RF Exposure Guidance introduces a new formula for calculating the SAR a Peak Location Ratio(SPLSR) between pairs of simultaneously transmitting antennas:

$SPLSR = (SAR_1 + SAR_2)^{1.5}/R_i$

Where:

SAR_1 is the highest measured or estimated SAR for the first of a pair of simultaneous transmitting antennas, in a specific test operating mode and exposure condition

SAR_2 is the highest measured of estimated SAR for the second of a pair of simultaneous transmitting antennas, in the same test operating mode and exposure condition as the first

R_i is the separation distance between the pair of simultaneous transmitting antennas, When the SAR is measured, for both antennas in the pair, it is determined by the actual x, y and z coordinates in the 1-g SAR for each SAR peak location, based on the extrapolated and interpolated result in the zoom scan measurement, using the formula of $\sqrt{[(X_1 - X_2)^2 + (Y_1 - Y_2)^2]}$

In order for a pair of simultaneous transmitting antennas with the sum of 1-g SAR> 1.6 W/kg to qualify for exemption from Simultaneous Transmission SAR measurements, it has to satisfy the condition of:
$(SAR_1 + SAR_2)^{1.5}/R_i \leq 0.04$

2.6 TEST METHODOLOGY and Procedures

- IEEE 1528-2013
- FCC KDB Publication 941225 D01 3G SAR Procedures v03r01
- FCC KDB Publication 941225 D06 Hot Spot SAR v02r01
- FCC KDB Publication 941225 D05 SAR for LTE Devices v02r05
- FCC KDB Publication 941225 D05A LTE Rel.10 KDB Inquiry sheet v01r02
- FCC KDB Publication 248227 D01 802.11 Wi-Fi SAR v02r02
- FCC KDB Publication 447498 D01 General SAR Guidance v06
- FCC KDB Publication 648474 D04 Handset SAR v01r03
- FCC KDB Publication 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- FCC KDB Publication 865664 D02 SAR Reporting v01r02
- October 2013 TCB Workshop Notes (GPRS testing criteria)
- April 2015 TCB Workshop Notes (Simultaneous transmission summation clarified)

2.7 LTE information

Item.		Description		
Frequency Rang	LTE Band 5 (Cell)	824.7 MHz ~ 848.3 MHz		
Channel Bandwidths	LTE Band 5 (Cell)	1.4 MHz, 3 MHz, 5 MHz, 10 MHz		
Channel Numbers& Freq. (MHz)		Low	Mid	High
LTE Band 5 (Cell)	1.4 MHz	824.7 (20407)	836.5 (20525)	848.3 (20643)
	3 MHz	825.5 (20415)	836.5 (20525)	847.5 (20635)
	5 MHz	826.5 (20425)	836.5 (20525)	846.5 (20625)
	10 MHz	829.0 (20450)	836.5 (20525)	844.0 (20600)
UE Category	LTE Rel. 10, Category 4			
Modulations Supported in UL	QPSK, 16QAM			
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3	Yes			
A-MPR disabled for SAR Testing.	Yes			
LTE Carrier Aggregation	This device does not support downlink and uplink Carrier Aggregation for US region.			
LTE Release 10 information	This device does not support full CA features on 3GPP Release 10. The following LTE Release 10 features are not supported. Uplink and Downlink Carrier aggregations, Relay, HetNet, Enhanced MIMO, eICI, WiFi offloading, MDH, eMBMA, Cross-Carrier Scheduling, Enhanced SC-FDMA.			

3. INTRODUCTION

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. 1992 by the Institute of Electrical and Electronics Engineers, Inc., , New York 10017. The measurement procedure described in IEEE/ANSI C95.3-1992 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 of the incremental electromagnetic energy (d*W*)absorbed by (dissipated in) an incremental mass (d*m*) contained in a volume element (d*V*) of a given density (*r*). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body.

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

Figure 1. SAR Mathematical Equation

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

$$SAR = \sigma E^2 / \rho$$

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

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

4. DESCRIPTION OF TEST EQUIPMENT

4.1 SAR MEASUREMENT SETUP

These measurements are performed using the DASY4 & DASY5 automated dosimetric assessment system. It is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland. It consists of high precision robotics system (Staubli), robot controller, Pentium III 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 Figure.2).

A cell controller system contains the power supply, robot controller, teach pendant (Joystick),and remote control, is used to drive the robot motors. The PC with Windows XP or Windows 7is working with SAR Measurement system DASY4 & DASY5, A/D interface card, monitor, mouse, and keyboard. The Staubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE)circuit 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.

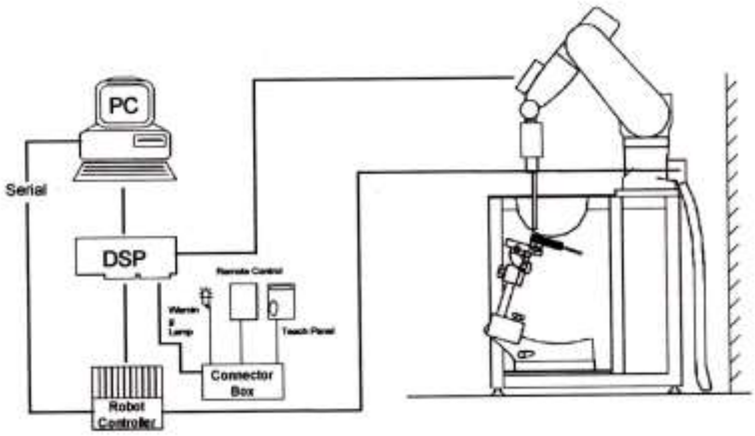

Figure 2. HCT SAR Lab. Test Measurement Set-up

The DAE 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 in.

5. SAR MEASUREMENT PROCEDURE

The evaluation was performed with the following procedure:

1. The SAR distribution at the exposed side of the head or body was measured at a distance no more than 5.0mm from the inner surface of the shell. The area covered the entire dimension of the DUT's head and body area and the horizontal grid resolution was depending on the FCC KDB 865664 D01v01r04 table 4-1 & IEEE 1528-2013.

2. Based on step, the area of the maximum absorption was determined by sophisticated interpolations routines implemented in DASY software. When an Area Scan has measured all reachable point. DASY system computes the field maximal found in the scanned are, within a range of the maximum. SAR at this fixed point was measured and used as a reference value.

3. Around this point, a volume was assessed according to the measurement resolution and volume size requirements of FCC KDB 865664 D01v01r04 table 4-1 and IEEE 1528-2013. On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure (reference from the DASY manual.)

   a. The data at the surface were extrapolated, since the center of the dipoles is no more than 2.7mm away from the tip of the probe (it is different from the probe type) and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

   b. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 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 integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.

   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. If the value changed by more than 5%, the SAR evaluation and drift measurements were repeated.

Area scan and zoom scan resolution setting follow KDB 865664 D01v01r04 quoted below.

<table>
<tr><td colspan="3"></td><td>≤3 GHz</td><td>>3 GHz</td></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5±1 mm</td><td>$\frac{1}{2}\cdot\delta\cdot\ln(2)\pm0.5$ mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30°±1°</td><td>20°±1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan Spatial resolution: Δx_{Area}, Δy_{Area}</td><td>≤2 GHz: ≤15 mm
2-3 GHz: ≤12 mm</td><td>3-4 GHz: ≤12 mm
4-6 GHz: ≤10 mm</td></tr>
<tr><td colspan="2">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.</td></tr>
<tr><td colspan="3">Maximum zoom scan Spatial resolution: Δx_{zoom}, Δy_{zoom}</td><td>≤ 2 GHz: ≤8mm
2-3 GHz: ≤5mm*</td><td>3-4 GHz: ≤5 mm*
4-6 GHz: ≤4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan Spatial resolution normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{zoom}(n)$</td><td>≤ 5 mm</td><td>3-4 GHz: ≤4 mm
4-5 GHz: ≤3 mm
5-6 GHz: ≤2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{zoom}(1)$: between 1st two Points closest to phantom surface</td><td>≤ 4 mm</td><td>3-4 GHz: ≤3 mm
4-5 GHz: ≤2.5 mm
5-6 GHz: ≤2 mm</td></tr>
<tr><td>$\Delta z_{zoom}(n>1)$:between subsequent Points</td><td colspan="2">$\leq1.5\cdot\Delta z_{zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3-4 GHz: ≥28 mm
4-5 GHz: ≥25 mm
5-6 GHz: ≥22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.
* When zoom scan is required and the reported SAR from the area scan based 1-g SAR estimation procedures of KDB 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.</td></tr>
</table>

6. DESCRIPTION OF TEST POSITION

6.1 EAR REFERENCE POINT

Figure 6-2 shows the front, back and side views of the SAM phantom. The center-of-mouth reference point is labeled “M”, the left ear reference point (ERP) is marked “LE”, and the right ERP is marked “RE.” Each ERP is on the B-M (back-mouth) line located 15 mm behind the entrance-to-ear-canal (EEC) point, as shown in Figure6-1.The Reference Plane is defined as passing through the two ear reference point and point M. The line N-F (Neck-Front), also called the Reference Pivoting Line, is not perpendicular to the reference plane (See Figure 5-1), Line B-M is perpendicular to the N-F line. Both N-F and B-M lines are marked on the external phantom shell to facilitate handset positioning.

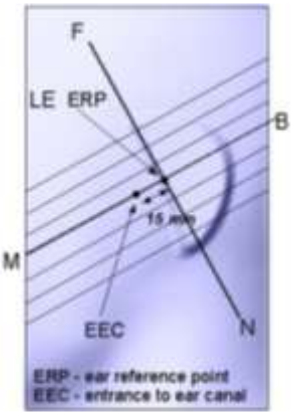

Figure 6-1
Close-up side view of ERP

6.2 HANDSET REFERENCE POINTS

Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The device under test was placed in a normal operating position with the acoustic output located along the “vertical centerline” on the front of the device aligned to the “ear reference point”(see Figure 6-3). The acoustic output was than located at the same level as the center of the ear reference point. The device under test was positioned so that the “vertical centerline” was bisecting the front surface of the handset at its 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 views of SAM Twin Phantom

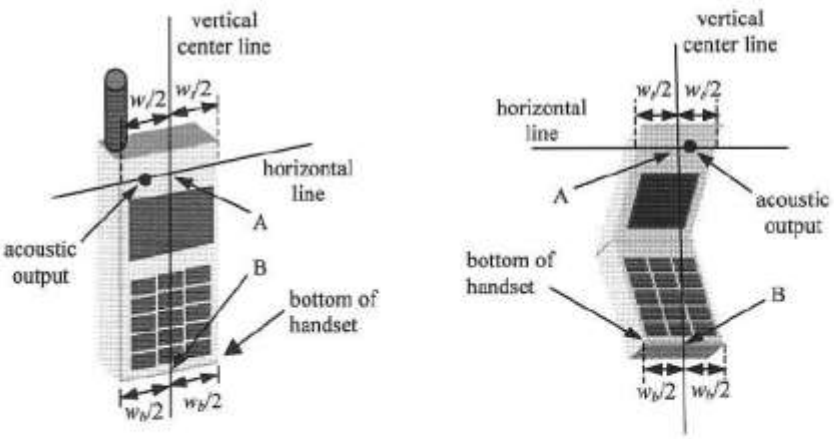

Figure 6-3. Handset vertical and horizontal reference lines

6.3 Device Holder

The device holder is made out of low-loss POM material having the following dielectric parameter; relative permittivity ε=3 and loss tangent σ =0.02

6.4 Position for cheek

Figure 6.4. shows cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

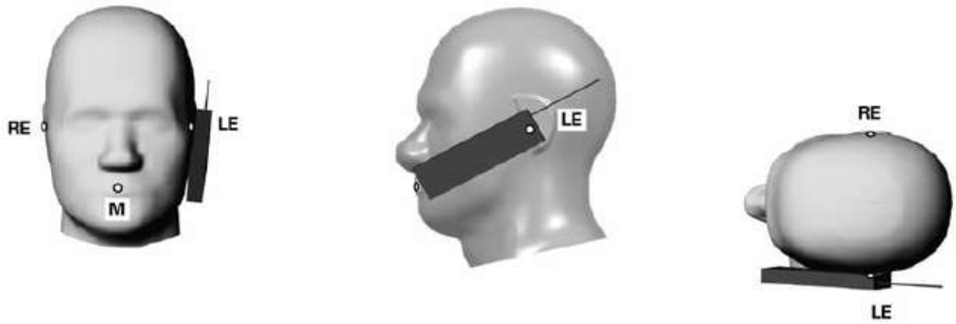

Figure 6.4 Cheek/ Touch position of the wireless device

6.5 Definition of the "tilted" position

Figure 6.5. shows tilted position. Place the device in the cheek position. Then while maintaining the orientation of the device, retract the device parallel to the reference plane far enough away from the phantom to enable a rotation of the device by 15˚

Figure 6.5. Tilt 15˚ position of the wireless device

6.6 Body-Worn Accessory Configurations

Body-Worn operating configurations are tested with the belt-dips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 6-4). Per FCC KDB Publication 648474 D04v01r03 Body-Worn accessory exposure is typically related to voice mode operations when handsets are carried in body-Worn accessories. The body-Worn accessory procedures in FCC KDB Publication 447498 D01v06 should be used to test for body-Worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-Worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for a body- Worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body- Worn accessory with a headset attached to the handset.

Figure 6-4
Sample Body-Worn Diagram

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

Body-Worn accessories may not always be supplied or available as options for some devices intended to be authorized for body-Worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used. Test position spacing was documented. Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom in head fluid. For devices that are carried next to the body such as a shoulder, waist or chest-Worn transmitters. SAR compliance is tested with the accessories, including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

6.7 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 (LxW≥9cmx5 cm) are based on *a* composite test separation distance of 10 mm from the front back 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 transmitters 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 frequency transmission and mode separately and spatially summed with the WIFI transmitter according to FCC KDB Publication 447498 D01v06 publication procedures. The "Portable Hotspot* feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.

6.8 Extremity Exposure Configurations

Devices that are designed or intended for use on extremities or mainly operated in extremity only exposure conditions: i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation. When the device also operates in close proximity to the user's body, SAR compliance for the body is also required. The 1-g body and 10-g extremity SAR Exclusion Thresholds found in KDB Publication 447498 D01v05 should be applied to determine SAR test requirements.

For smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that support voice calls next to the ear. the phablets procedures outlined in KDB Publication 648474 D04 v01r02 should be applied to evaluate SAR compliance. A device marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance. In addition to the normally required head and body-worm accessory SAR test procedures required for handsets, the UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna ≤25 mm from that surface or edge, in direct contact with the phantom, for 10-g SAR. The UMPC mini-tablet 1-g SAR at 5 mm is not required. When hotspot mode applies, 10-g SAR is required only for the surfaces and edges with hotspot mode scaled to the maximum output power (including tolerance) is 1-g SAR > 1.2 W/kg.

7. ANSI/ IEEE C95.1 - 1992 RF EXPOSURE LIMITS

HUMAN EXPOSURE	UNCONTROLLED ENVIRONMENT General Population	CONTROLLED ENVIRONMENT Occupational
	(W/kg) or (mW/g)	(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	20.00

NOTES:

* The Spatial Peak value of the SAR averaged over any 1 g of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

** The Spatial Average value of the SAR averaged over the whole-body.

******* The Spatial Peak value of the SAR averaged over any 10 g 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. 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 mad 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 Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e.as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

8. FCC SAR GENERAL MEASUREMENT PROCEDURES

Power Measurements for licensed transmitters are performed using a base simulator under digital average power

8.1 Measured and Reported SAR

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

8.2 3G SAR Test Reduction Procedure

8.2.1 GSM, GPRS AND EDGE

The following procedures may be considered for each frequency band to determine SAR test reduction for devices operating in GSM/GPRS/EDGE modes to demonstrate RF exposure compliance. GSM voice mode transmits with 1 time slot. GPRS and EDGE may transmit up to 4 time slots in the 8 time-slot frame according to the multi-slot class implemented in a device.

8.2.2 SAR Test Reduction

In FCC KDB 941225 D01v03r01, certain transmission modes within a frequency band and wireless mode evaluated for SAR are defined as primary modes. The equivalent modes considered for SAR test reduction are denoted as secondary modes. When the maximum output power including tune-up tolerance specified for production units in a secondary mode is ≤ 0.25 dB higher than the primary mode or when the highest reported SAR of the primary mode, scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode, is ≤ 1.2 W/kg, SAR measurements are not required for the secondary mode. These criteria are referred to as the 3G SAR test reduction procedure. When the 3G SAR test reduction procedure is not satisfied, SAR measurements are additionally required for the secondary mode.

SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power specified for production units, including tune-up tolerance. The data mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested

8.3 Procedures Used to Establish RF Signal for SAR

The following procedures are according to FCC KDB 941225 D01v03r01 - 3G SAR Measurement Procedures The handset was placed into a simulated call using a base station simulator in a shielded chamber. Such test signals offer a consistent means for testing SAR and are recommended for evaluation SAR measurements were taken with a fully charged battery. In order to verify that the device was tested and maintained at full power, this was configured with the base station simulator. The SAR measurement Software calculates a reference point at the start and end of the test to check for power drifts. If conducted Power deviations of more than 5 % occurred, the tests were repeated.

8.4 SAR Measurement Conditions for UMTS

8.4.1 Output Power Verification

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

8.4.2 Head SAR Measurements

SAR for next to the ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all "1's". The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for 12.2 kbps AMR in 3.4 kbps SRB (signaling radio bearer) using the highest reported SAR configuration in 12.2 kbps RMC for head exposure.

8.4.3 Body SAR measurements

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

8.4.4 SAR Measurements with Rel. 5 HSDPA

The 3G SAR test reduction procedure is applied to HSDPA body configurations with 12.2 kbps RMC as the primary mode. Otherwise, Body SAR for HSDPA is measured using and FRC with H-SET 1 in Sub-test and a 12.2 kbps RMC without HSDPA. Handsets with both HSDPA and HSUPA are tested according to release 6 HSPA test procedures.8.4.5 SAR Measurement with Rel.6 HSUPA The 3G SAR test Reduction Procedure is applied to HSPA (HSUPA/HSDPA with RMC) body configurations with 12.2 kbps RMC as the primary mode. Otherwise, Body SAR for HSPA is measured with E-DCH Sub-test 5, Using H-Set 1 and QPSK for FRC and a 12.2kbps RMC configured in Test Loop Mode 1 and Power Control algorithm 2, according to the highest reported body SAR configuration in 12.2 kbps RMC without HSPA. When VOIP applies to head exposure, the 3G SAR test reduction procedure is applied with 12.2 kbps RMC as the primary mode; otherwise, the same HSPA configuration used for body SAR measurements are applied to head exposure testing.

8.4.5 SAR Measurements with Rel. 6 HSUPA

The 3G SAR test reduction procedure is applied to HSPA (HSUPA/HSDPA with RMC) body configurations with 12.2 kbps RMC as the primary mode. Otherwise, Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 and power control algorithm 2, according to the highest reported body SAR configuration in 12.2 kbps RMC without HSPA.

8.4.6 DC-HSDPA

SAR is required for Rel.8 DC-HSDPA when SAR is required for Rel.5 HSDPA; otherwise, the 3G SAR test reduction procedure is applied to DC-HSDPA with 12.2 kbps RMC as the primary mode. Power is measured for DC-HSDPA according to the H-Set 12, FRC configuration in table C.8.1.12 of 3GPP TS34.121-1 to determine SAR test reduction. Primary and secondary serving HS-DSCH Cell are required to perform the power measurement and for the results to be acceptable.

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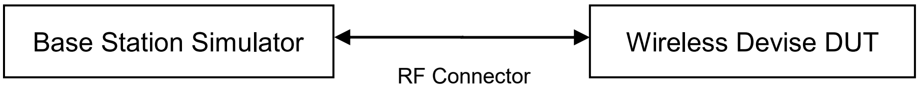


8.5 SAR Measurement Conditions for LTE

LTE modes are tested according to FCC KDB 941225 D05v02r05 publication. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluation SAR [4]. The R&S CMW500 or Anritsu MT8820C simulators are used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

8.5.1 Spectrum Plots for RB Configurations

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

8.5.2 MPR

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

8.5.3 A-MPR

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

8.5.4 Required RB Size and RB offsets for SAR testing

According to FCC KDB 941225 D05v02r05

a. Per sec 4.2.1, SAR is required for QPSK 1 RB Allocation for the largest bandwidth
    i. The required channel and offset combination with the highest maximum output power is required for SAR.
    ii. When the reported SAR is ≤ 0.8 W/Kg, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel.
    iii. When the reported SAR for a required test channel is > 1.45 W/kg, SAR is required for all RB offset configurations for that channel.
b. Per Sec 4.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Sec 4.2.1.
c. Per Sec. 4.2.3, QPSK SAR is not required for the 100% all0cation 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 Sec. 4.2.4 and 4.3, SAR test for higher order modulations and lower bandwidths configurations are not required when the conducted power of the required test configurations determined by Sec. 4.2.1 through 4.2.3 is less than or equal to 1/2 dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is < 1.45 W/Kg.

8.6 SAR Testing with 802.11 Transmitters

The normal network operating configurations of 802.11 transmitters are not suitable for SAR measurements. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable. See KDB Publication 248227 D01v02r02 for more details.

8.6.1 General Device Setup

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters.
A periodic duty factor is required for current generation SAR system to measure SAR. When 802.11 frame gaps are accounted for in the transmission, a maximum transmission duty factor of 92-96% is typically achievable in most test mode configurations. A minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR scaling. The reported SAR is scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

8.6.2 Initial Test Position Procedure

For exposure conditions with multiple test positions, such as handset operating nest 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 positions 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 for 1g SAR and ≤ 1.0 W/kg for 10g SAR, no additional testing for the remaining test position is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg for 1g SAR and ≤ 2.0 W/kg for 10g SAR or all test positions are measured.

8.6.3 2.4 GHz SAR test Requirements

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

1) When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS is that exposure configuration.
2) When the reported SAR is > 0.8 W/kg, SAR is required for that position using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

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

8.6.4 OFDM Transmission Mode and SAR Test Channel Selection

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

8.6.5 Initial Test Configuration Procedure

For OFDM, in both 2.4 GHZ, an initial test configuration is determined for each frequency band and aggregated band, according to the transmission mode with the highest maximum output power specified for SAR measurements. When the same maximum output power is specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration(s) with the largest channel bandwidth, lowest order modulation, and lowest data rate. If the average RF output powers of the highest identical transmission modes are within 0.25 dB of each other, mid channel of the transmission mode with highest average RF output power is the initial test channel. Otherwise, the channel of the transmission mode with the highest average RF output conducted power will be the initial test configuration.

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

8.6.6 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 on procedure. When the highest reported SAR (for the initial test configuration), adjusted by the ratio of the specified maximum output power of the subsequent test configuration to initial test configuration, is ≤ 1.2 W/kg for 1g SAR and ≤ 3.0 W/kg for 10g SAR, no additional SAR tests for the subsequent test configurations are required.

9. Output Power Specifications

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

9.1 GSM

GSM Conducted output powers (Burst-Average)

Band	Channel	Voice	GPRS(GMSK) Data – CS1				EDGE Data			
		GSM (dBm)	GPRS 1 TX Slot (dBm)	GPRS 2 TX Slot (dBm)	GPRS 3 TX Slot (dBm)	GPRS 4 TX Slot (dBm)	EDGE 1 TX Slot (dBm)	EDGE 2 TX Slot (dBm)	EDGE 3 TX Slot (dBm)	EDGE 4 TX Slot (dBm)
Maximum Tune-up		34.00	34.00	33.00	31.00	30.00	27.00	26.00	24.00	23.00
Nominal Tune-up		33.50	33.50	32.50	30.50	29.50	26.50	25.50	23.50	22.50
GSM 850	128	33.74	33.78	32.55	30.49	29.60	25.80	25.69	23.95	22.72
	190	33.86	33.86	32.77	30.62	29.65	25.68	25.44	23.75	22.58
	251	33.99	33.98	32.89	30.86	29.60	25.70	25.50	23.79	22.55
Maximum Tune-up		31.00	31.00	30.00	28.00	27.00	26.50	25.50	23.50	22.50
Nominal Tune-up		30.50	30.50	29.50	27.50	26.50	26.00	25.00	23.00	22.00
GSM 1900	512	30.55	30.59	29.45	27.56	26.81	25.61	24.89	23.42	22.47
	661	30.71	30.70	29.63	27.78	26.71	25.57	24.79	23.34	22.45
	810	30.72	30.73	29.62	27.75	26.66	25.52	24.74	23.28	22.32

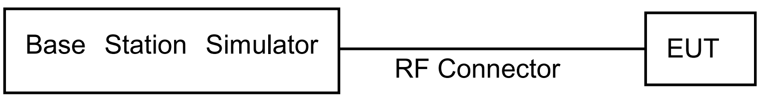
GSM Conducted output powers (Frame-Average)

Band	Channel	Voice	GPRS(GMSK) Data – CS1				EDGE Data			
		GSM (dBm)	GPRS 1 TX Slot (dBm)	GPRS 2 TX Slot (dBm)	GPRS 3 TX Slot (dBm)	GPRS 4 TX Slot (dBm)	EDGE 1 TX Slot (dBm)	EDGE 2 TX Slot (dBm)	EDGE 3 TX Slot (dBm)	EDGE 4 TX Slot (dBm)
Maximum Tune-up		24.97	24.97	26.98	26.74	26.99	17.97	19.98	19.74	19.99
Nominal Tune-up		24.47	24.47	26.48	26.24	26.49	17.47	19.48	19.24	19.49
GSM 850	128	24.71	24.75	26.53	26.23	26.59	16.77	19.67	19.69	19.71
	190	24.83	24.83	26.75	26.36	26.64	16.65	19.42	19.49	19.57
	251	24.96	24.95	26.87	26.60	26.59	16.67	19.48	19.53	19.54
Maximum Tune-up		21.97	21.97	23.98	23.74	23.99	17.47	19.48	19.24	19.49
Nominal Tune-up		21.47	21.47	23.48	23.24	23.49	16.97	18.98	18.74	18.99
GSM 1900	512	21.52	21.56	23.43	23.30	23.80	16.58	18.87	19.16	19.46
	661	21.68	21.67	23.61	23.52	23.70	16.54	18.77	19.08	19.44
	810	21.69	21.70	23.60	23.49	23.65	16.49	18.72	19.02	19.31

Note:

Time slot average factor is as follows:
1 Tx slot = 9.03 dB, Frame-Average output power = Burst-Average output power – 9.03 dB
2 Tx slot = 6.02 dB, Frame-Average output power = Burst-Average output power – 6.02 dB
3 Tx slot = 4.26 dB, Frame-Average output power = Burst-Average output power – 4.26 dB
4 Tx slot = 3.01 dB, Frame-Average output power = Burst-Average output power – 3.01 dB

GSM Class: B
GPRS Multi-slotclass33: (Max 4Tx Uplink slots)
EDGE Multi-slot class33: (Max 4Tx Uplink slots)
DTM Multi-slot class: N/A



9.2 UMTS

HSPA+

This DUT is only capable of QPSK HSPA+ in uplink. Therefore, the RF conducted power is not measured according to 941225 D01 3G SAR.

9.2.1 WCDMA Band 5

3GPP Release Version	Mode	3GPP 34.121	WCDMA Band 5[dBm]			
		Subtest	UL 4132 DL 4357	UL 4183 DL 4408	UL 4233 DL 4458	3GPP MPR [dB]
99	WCDMA	12.2 kbps RMC	25.29	25.28	25.15	-
99		12.2 kbps AMR	25.27	25.27	25.15	-
5	HSDPA	Subtest 1	24.31	24.10	24.11	0
5		Subtest 2	24.29	24.11	24.09	0
5		Subtest 3	23.77	23.62	23.52	0.5
5		Subtest 4	23.78	23.63	23.53	0.5
6	HSUPA	Subtest 1	23.68	24.05	23.77	0
6		Subtest 2	23.02	22.61	22.80	2
6		Subtest 3	22.71	22.40	22.49	1
6		Subtest 4	23.21	23.00	23.00	2
6		Subtest 5	24.13	23.72	23.18	0
8	DC-HSDPA	Subtest 1	24.30	23.97	23.86	0
8		Subtest 2	24.30	24.03	23.94	0
8		Subtest 3	23.86	23.57	23.42	0.5
8		Subtest 4	23.85	23.57	23.42	0.5

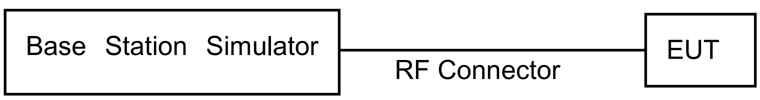
WCDMA Average Conducted output powers

9.2.2 WCDMA Band 2

3GPP Release Version	Mode	3GPP 34.121	WCDMA Band 2[dBm]			
		Subtest	UL 9262 DL 9662	UL 9400 DL 9800	UL 9538 DL 9938	3GPP MPR [dB]
99	WCDMA	12.2 kbps RMC	23.94	23.83	23.65	-
99		12.2 kbps AMR	23.90	23.83	23.63	-
5	HSDPA	Subtest 1	22.82	22.82	22.66	0
5		Subtest 2	22.82	22.81	22.68	0
5		Subtest 3	22.34	22.34	22.14	0.5
5		Subtest 4	22.35	22.35	22.14	0.5
6	HSUPA	Subtest 1	22.67	22.76	21.78	0
6		Subtest 2	21.66	21.30	21.00	2
6		Subtest 3	21.11	21.60	21.39	1
6		Subtest 4	21.67	22.31	21.44	2
6		Subtest 5	22.52	22.54	22.31	0
8	DC-HSDPA	Subtest 1	22.33	22.79	22.71	0
8		Subtest 2	22.35	22.78	22.82	0
8		Subtest 3	21.89	22.32	22.24	0.5
8		Subtest 4	21.90	22.32	22.25	0.5

WCDMA Average Conducted output powers

It is expected by the manufacturer that MPR for some HSPA Subtests may be up to 1dB more than specified by 3GPP, But also as low as 1 dB according to the chipset implementation in this model to match manufacturer



9.3 LTE

LTE Band 5 Maximum Conducted Power

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power (dBm)			MPR Allowed Per 3GPP	MPR
				20407 824.7 MHz	20525 836.5 MHz	20643 848.3 MHz	[dB]	[dB]
1.4 MHz	QPSK	1	0	24.90	25.00	24.87	0	0
		1	3	25.00	25.07	24.98	0	0
		1	5	24.93	25.10	25.01	0	0
		3	0	24.85	24.91	24.62	0	0
		3	1	25.05	24.97	24.63	0	0
		3	3	24.98	24.99	24.65	0	0
		6	0	24.09	24.17	23.92	0-1	1
	16QAM	1	0	23.90	23.75	23.75	0-1	1
		1	3	23.96	23.84	23.82	0-1	1
		1	5	23.85	23.49	23.61	0-1	1
		3	0	23.83	24.08	23.93	0-1	1
		3	1	23.75	24.13	23.87	0-1	1
		3	3	23.73	24.12	23.74	0-1	1
		6	0	22.91	23.02	22.70	0-2	2

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power (dBm)			MPR Allowed Per 3GPP	MPR
				20415 825.5 MHz	20525 836.5 MHz	20635 847.5 MHz	[dB]	[dB]
3 MHz	QPSK	1	0	24.88	24.96	24.98	0	0
		1	7	25.11	25.14	25.06	0	0
		1	14	24.99	24.89	24.80	0	0
		8	0	24.25	24.13	24.27	0-1	1
		8	3	24.24	24.27	24.18	0-1	1
		8	7	24.21	24.19	24.05	0-1	1
		15	0	24.28	24.15	24.11	0-1	1
	16QAM	1	0	24.40	23.41	24.39	0-1	1
		1	7	24.16	23.62	24.35	0-1	1
		1	14	24.03	23.33	23.40	0-1	1
		8	0	23.17	23.15	23.11	0-2	2
		8	3	23.16	23.28	23.11	0-2	2
		8	7	23.23	23.27	23.00	0-2	2
		15	0	23.29	23.15	22.99	0-2	2

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power (dBm)			MPR Allowed Per 3GPP [dB]	MPR [dB]
				20425	20525	20625	[dB]	[dB]
				826.5 MHz	836.5 MHz	846.5 MHz		
5 MHz	QPSK	1	0	24.94	24.69	24.61	0	0
		1	12	25.16	25.08	25.07	0	0
		1	24	24.93	24.77	24.61	0	0
		12	0	24.20	24.11	24.10	0-1	1
		12	6	24.21	24.10	24.10	0-1	1
		12	11	24.20	24.09	24.06	0-1	1
		25	0	24.14	24.11	24.03	0-1	1
	16QAM	1	0	24.34	23.48	23.87	0-1	1
		1	12	24.54	23.72	24.22	0-1	1
		1	24	23.93	23.49	23.76	0-1	1
		12	0	22.95	22.88	22.90	0-2	2
		12	6	23.20	22.94	22.92	0-2	2
		12	11	23.20	22.94	22.83	0-2	2
		25	0	23.15	22.94	23.00	0-2	2

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power (dBm)	MPR Allowed Per 3GPP	MPR
				20525	[dB]	[dB]
				836.5 MHz		
10 MHz	QPSK	1	0	24.90	0	0
		1	24	25.20	0	0
		1	49	24.94	0	0
		25	0	24.21	0-1	1
		25	12	24.20	0-1	1
		25	24	24.09	0-1	1
		50	0	24.16	0-1	1
	16QAM	1	0	23.67	0-1	1
		1	24	23.58	0-1	1
		1	49	23.58	0-1	1
		25	0	23.15	0-2	2
		25	12	23.07	0-2	2
		25	24	23.02	0-2	2
		50	0	22.99	0-2	2

Note: LTE Band 5 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 mid channel of the group of overlapping channels should be selected for testing.

9.4 WiFi

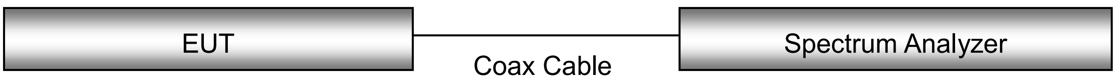
IEEE 802.11 Average RF Power

Mode	Freq. [MHz]	Channel	IEEE 802.11 (2.4 GHz) Conducted Power [dBm]
802.11b	2 412	1	14.40
	2 437	6	14.57
	2 462	11	14.08
	2 467	12	-2.99
	2472	13	-3.18
802.11g	2 412	1	8.54
	2 437	6	13.65
	2 462	11	8.22
	2 467	12	-5.15
	2472	13	-5.25
802.11n (HT20)	2 412	1	8.61
	2 437	6	13.69
	2 462	11	8.22
	2 467	12	-5.16
	2472	13	-5.27

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

Test Configuration



9.5 Bluetooth

The averaged-conducted Power

Mode	Channel	Average conducted Power [dBm]
1Mbps (GFSK)	0	7.55
	39	7.44
	78	6.73
2Mbps (π/4DPSK)	0	6.93
	39	6.82
	78	6.12
3Mbps (8DPSK))	0	6.94
	39	6.83
	78	6.13

10. SYSTEM VERIFICATION

10.1 Tissue Verification

The Head /Body simulating material is calibrated by HCT using the DAKS 3.5 to determine the conductivity and permittivity.

Table for Head Tissue Verification

Date of Tests	Tissue Temp. (°C)	Tissue Type	Freq. (MHz)	Measured Conductivity σ (S/m)	Measured Dielectric Constant, ε	Target Conductivity σ (S/m)	Target Dielectric Constant, ε	% dev σ	% dev ε
05/29/2018	20.9	835H	820	0.892	41.583	0.899	41.578	-0.78%	0.01%
			835	0.909	41.320	0.900	41.500	1.00%	-0.43%
			850	0.922	41.109	0.916	41.500	0.66%	-0.94%
05/30/2018	20.4	835H	820	0.889	41.349	0.899	41.578	-1.11%	-0.55%
			835	0.906	41.078	0.900	41.500	0.67%	-1.02%
			850	0.918	41.850	0.916	41.500	0.22%	0.84%
05/29/2018	19.9	1900H	1 850	1.362	39.239	1.400	40.000	-2.71%	-1.90%
			1 900	1.408	39.094	1.400	40.000	0.57%	-2.27%
			1 910	1.415	39.080	1.400	40.000	1.07%	-2.30%
05/31/2018	21.6	2450H	2 400	1.773	39.836	1.756	39.290	0.97%	1.39%
			2 450	1.833	39.555	1.800	39.200	1.83%	0.91%
			2 500	1.893	39.311	1.855	39.140	2.05%	0.44%

Table for Body Tissue Verification

Date of Tests	Tissue Temp. (°C)	Tissue Type	Freq. (MHz)	Measured Conductivity σ (S/m)	Measured Dielectric Constant, ε	Target Conductivity σ (S/m)	Target Dielectric Constant, ε	% dev σ	% dev ε
05/30/2018	21.0	835B	820	0.933	53.484	0.969	55.258	-3.72%	-3.21%
			835	0.950	53.386	0.970	55.200	-2.06%	-3.29%
			850	0.962	53.150	0.988	55.154	-2.63%	-3.63%
05/29/2018	20.8	1900B	1 850	1.511	52.092	1.520	53.300	-0.59%	-2.27%
			1 900	1.558	51.930	1.520	53.300	2.50%	-2.57%
			1 910	1.566	51.896	1.520	53.300	3.03%	-2.63%
05/31/2018	21.5	2450B	2 400	1.876	51.713	1.902	52.770	-1.37%	-2.00%
			2 450	1.944	51.662	1.950	52.700	-0.31%	-1.97%
			2 500	2.008	51.599	2.021	52.640	-0.64%	-1.98%

10.2 System Verification

Prior to assessment, the system is verified to the ± 10 % of the specifications at 835 MHz / 1 900 MHz / 2 450 MHz by using the system Verification kit. (Graphic Plots Attached)

System Verification Results

* Input Power: 50 mW

Freq.	Date	Probe (S/N)	Dipole (S/N)	Liquid	Amb. Temp.	Liquid Temp.	1 W Target SAR_{1g} (SPEAG)	Measured SAR_{1g}	1 W Normalized SAR_{1g}	Deviation	Limit [%]
[MHz]					[°C]	[°C]	[W/kg]	[W/kg]	[W/kg]	[%]	[%]
835	05/29/2018	3797	441	Head	21.1	20.9	9.38	0.465	9.3	- 0.85	± 10
835	05/30/2018	3863		Head	20.7	20.4	9.38	0.452	9.04	- 3.62	± 10
835	05/30/2018	3967		Body	21.3	21.0	9.41	0.485	9.7	+ 3.08	± 10
1 900	05/29/2018	3903	5d061	Head	20.1	19.9	40.1	1.97	39.4	- 1.75	± 10
1 900	05/29/2018	3863		Body	21.1	20.8	39.6	2.01	40.2	+ 1.52	± 10
2 450	05/31/2018	3903	965	Head	21.9	21.6	51.1	2.46	49.2	- 3.72	± 10
2 450	05/31/2018	3903		Body	21.9	21.5	50.2	2.43	48.6	- 3.19	± 10

10.3 System Verification Procedure

SAR measurement was prior to assessment, the system is verified to the ± 10 % of the specifications at each frequency band by using the system Verification kit. (Graphic Plots Attached)

- Cabling the system, using the Verification kit equipment
- Generate about 50 mW Input Level from the Signal generator to the Dipole Antenna.
- Dipole Antenna was placed below the Flat phantom.
- The measured one-gram SAR at the surface of the phantom above the dipole feed-point should be within 10 % of the target reference value.
- The results are normalized to 1 W input power.

NOTE;
SAR Verification was performed according to the FCC KDB 865664 D01v01r04.

11. SAR TEST DATA SUMMARY

11.1 HEAD SAR Measurement Results

GSM 850 Head SAR

Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(W/kg)		(W/kg)	
836.6	190	GSM	34.0	33.86	-0.10	Left Cheek	1:8.3	0.347	1.033	0.358	-
836.6	190	GSM	34.0	33.86	0.18	Left Tilt	1:8.3	0.219	1.033	0.226	-
836.6	190	GSM	34.0	33.86	-0.14	Right Cheek	1:8.3	0.368	1.033	0.380	1
836.6	190	GSM	34.0	33.86	0.04	Right Tilt	1:8.3	0.181	1.033	0.187	-
836.6	190	GPRS 4Tx	30.0	29.65	-0.14	Left Cheek	1:2.075	0.715	1.084	0.775	-
836.6	190	GPRS 4Tx	30.0	29.65	0.02	Left Tilt	1:2.075	0.435	1.084	0.472	-
824.2	128	GPRS 4Tx	30.0	29.60	0.03	Right Cheek	1:2.075	0.726	1.096	0.796	-
836.6	190	GPRS 4Tx	30.0	29.65	-0.19	Right Cheek	1:2.075	0.842	1.084	**0.913**	2
848.8	251	GPRS 4Tx	30.0	29.60	-0.05	Right Cheek	1:2.075	0.788	1.096	0.864	-
836.6	190	GPRS 4Tx	30.0	29.65	-0.01	Right Tilt	1:2.075	0.376	1.084	0.408	-
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 1.6 W/kg Averaged over 1 gram					

GSM 1900 Head SAR

Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(W/kg)		(W/kg)	
1 880.0	661	GSM	31.0	30.71	-0.10	Left Cheek	1:8.3	0.353	1.069	0.377	3
1 880.0	661	GSM	31.0	30.71	-0.14	Left Tilt	1:8.3	0.169	1.069	0.181	-
1 880.0	661	GSM	31.0	30.71	-0.10	Right Cheek	1:8.3	0.213	1.069	0.228	-
1 880.0	661	GSM	31.0	30.71	-0.10	Right Tilt	1:8.3	0.188	1.069	0.201	-
1 880.0	661	GPRS 4Tx	27.0	26.71	0.16	Left Cheek	1:2.075	0.563	1.069	**0.602**	4
1 880.0	661	GPRS 4Tx	27.0	26.71	-0.07	Left Tilt	1:2.075	0.258	1.069	0.276	-
1 880.0	661	GPRS 4Tx	27.0	26.71	-0.14	Right Cheek	1:2.075	0.337	1.069	0.360	-
1 880.0	661	GPRS 4Tx	27.0	26.71	0.17	Right Tilt	1:2.075	0.257	1.069	0.275	-
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 1.6 W/kg Averaged over 1 gram					

UMTS 850 Head SAR											
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(W/kg)		(W/kg)	
836.6	4183	RMC	25.5	25.28	0.09	Left Cheek	1:1	0.536	1.052	0.564	-
836.6	4183	RMC	25.5	25.28	0.10	Left Tilt	1:1	0.326	1.052	0.343	-
836.6	4183	RMC	25.5	25.28	0.17	Right Cheek	1:1	0.594	1.052	**0.625**	5
836.6	4183	RMC	25.5	25.28	0.04	Right Tilt	1:1	0.297	1.052	0.312	-
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 1.6 W/kg Averaged over 1 gram					

UMTS 1900 Head SAR											
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(W/kg)		(W/kg)	
1 852.4	9262	RMC	24.0	23.94	0.15	Left Cheek	1:1	0.822	1.014	0.834	-
1 880.0	9400	RMC	24.0	23.83	-0.18	Left Cheek	1:1	0.845	1.040	**0.879**	6
1 907.6	9538	RMC	24.0	23.65	0.11	Left Cheek	1:1	0.800	1.084	0.867	-
1 880.0	9400	RMC	24.0	23.83	0.01	Left Tilt	1:1	0.403	1.040	0.419	-
1 880.0	9400	RMC	24.0	23.83	-0.13	Right Cheek	1:1	0.526	1.040	0.547	-
1 880.0	9400	RMC	24.0	23.83	0.01	Right Tilt	1:1	0.414	1.040	0.431	-
ANSI/ IEEE C95.1 - 1992 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram					

LTE Band 5 (Cell) Head SAR															
Frequency		Mode	Band width	Tune-Up Limit	Meas. Power	Power Drift	Test Position	MPR	RB Size	RB offset	Duty Cycle	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(dBm)	(dBm)	(dB)		(dB)				(W/kg)		(W/kg)	
836.5	20525	QPSK	10	25.5	25.20	-0.13	Left Cheek	0	1	24	1:1	0.492	1.072	0.527	-
836.5	20525	QPSK	10	24.5	24.21	-0.04	Left Cheek	1	25	0	1:1	0.450	1.069	0.481	-
836.5	20525	QPSK	10	25.5	25.20	-0.17	Left Tilt	0	1	24	1:1	0.310	1.072	0.332	-
836.5	20525	QPSK	10	24.5	24.21	0.05	Left Tilt	1	25	0	1:1	0.266	1.069	0.284	-
836.5	20525	QPSK	10	25.5	25.20	-0.17	Right Cheek	0	1	24	1:1	0.527	1.072	**0.565**	7
836.5	20525	QPSK	10	24.5	24.21	-0.11	Right Cheek	1	25	0	1:1	0.445	1.069	0.476	-
836.5	20525	QPSK	10	25.5	25.20	-0.12	Right Tilt	0	1	24	1:1	0.276	1.072	0.296	-
836.5	20525	QPSK	10	24.5	24.21	0.19	Right Tilt	1	25	0	1:1	0.243	1.069	0.260	-
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Head 1.6 W/kg Averaged over 1 gram								

DTS Head SAR															
Frequency		Mode	Band width	Data Rate	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Area Scan Peak SAR	Meas. SAR	Scaling Factor	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(Mbps)	(dBm)	(dBm)	(dB)			(W/kg)	(W/kg)		(Duty)	(W/kg)	
2 412	1	802.11b	22	1	15.0	14.40	0.08	Left Cheek	99.8	1.33	0.711	1.148	1.002	0.818	-
2 437	6	802.11b	22	1	15.0	14.57	-0.11	Left Cheek	99.8	1.79	0.929	1.104	1.002	**1.028**	8
2 437	6	802.11b	22	1	15.0	14.57	-0.03	Left Tilt	99.8	1.03	0.531	1.104	1.002	0.587	-
2 437	6	802.11b	22	1	15.0	14.57	-0.05	Right Cheek	99.8	0.517	0.303	1.104	1.002	0.335	-
2 437	6	802.11b	22	1	15.0	14.57	-0.06	Right Tilt	99.8	0.497	0.314	1.104	1.002	0.347	-
2 437	6	802.11b	22	1	15.0	14.57	-0.14	Left Cheek	99.8	1.47	0.861	1.104	1.002	0.952	**
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population								Head 1.6 W/kg Averaged over 1 gram							

Note:**Data entry indicate Variability measurement.

11.2 Body-worn SAR Measurement Results

GSM/UMTS Body-Worn SAR

Frequency		Mode		Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.			(dB)	(dB)	(dB)			(mm)	(W/kg)		(W/kg)	
836.6	190	GSM 850	GSM	34.0	33.86	0.05	Rear	1:8.3	10	0.625	1.033	0.646	9
824.2	128	GSM 850	GPRS 4Tx	30.0	29.60	-0.10	Rear	1:2.075	10	0.947	1.096	1.038	-
836.6	190	GSM 850	GPRS 4Tx	30.0	29.65	0.01	Rear	1:2.075	10	1.01	1.084	1.095	-
848.8	251	GSM 850	GPRS 4Tx	30.0	29.60	0.05	Rear	1:2.075	10	1.07	1.096	**1.173**	10
1 880.0	661	GSM 1900	GSM	31.0	30.71	-0.06	Rear	1:8.3	10	0.414	1.069	0.443	11
1 880.0	661	GSM 1900	GPRS 4Tx	27.0	26.71	-0.11	Rear	1:2.075	10	0.571	1.069	**0.610**	12
836.6	4183	UMTS 850	RMC	25.5	25.28	-0.13	Rear	1:1	10	0.329	1.052	**0.346**	13
1 852.4	9262	UMTS 1900	RMC	24.0	23.94	-0.08	Rear	1:1	10	0.893	1.014	**0.906**	14
1 880.0	9400	UMTS 1900	RMC	24.0	23.83	0.04	Rear	1:1	10	0.848	1.040	0.882	-
1 907.6	9538	UMTS 1900	RMC	24.0	23.65	-0.04	Rear	1:1	10	0.760	1.084	0.824	-
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Body 1.6 W/kg Averaged over 1 gram						

LTE Body-Worn SAR

Frequency		Mode	Band width	Tune-Up Limit	Meas. Power	Power Drift	Test Position	MPR	RB Size	RB offset	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(dBm)	(dBm)	(dB)		(dB)				(mm)	(W/kg)		(W/kg)	
836.5	20525	LTE 5 QPSK	10	25.5	25.20	0.15	Rear	0	1	24	1:1	10	1.000	1.072	**1.072**	15
836.5	20525		10	24.5	24.21	-0.05	Rear	1	25	0	1:1	10	0.789	1.069	0.843	-
836.5	20525		10	24.5	24.16	-0.06	Rear	1	50	0	1:1	10	0.803	1.081	0.868	-
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Body 1.6 W/kg Averaged over 1 gram									

DTS Body-Worn SAR

Frequency		Mode	Band width	Data Rate	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Area Scan Peak SAR	Meas. SAR	Scaling Factor	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(Mbps)	(dBm)	(dBm)	(dB)			(mm)	(W/kg)	(W/kg)		(Duty)	(W/kg)	
2 437	6	802.11b	22	1	15.0	14.57	-0.12	Rear	99.8	10	0.255	0.157	1.104	1.002	**0.174**	16
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population								Body 1.6 W/kg Averaged over 1 gram								

11.3 Hotspot SAR Measurement Results

GSM 850 Hotspot SAR												
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(mm)	(W/kg)		(W/kg)	
824.2	128	GPRS 4Tx	30.0	29.60	-0.10	Rear	1:2.075	10	0.947	1.096	1.038	-
836.6	190	GPRS 4Tx	30.0	29.65	0.01	Rear	1:2.075	10	1.01	1.084	1.095	-
848.8	251	GPRS 4Tx	30.0	29.60	0.05	Rear	1:2.075	10	1.07	1.096	**1.173**	10
824.2	128	GPRS 4Tx	30.0	29.60	-0.03	Front	1:2.075	10	0.758	1.096	0.831	-
836.6	190	GPRS 4Tx	30.0	29.65	-0.04	Front	1:2.075	10	0.855	1.084	0.927	-
848.8	251	GPRS 4Tx	30.0	29.60	0.14	Front	1:2.075	10	0.915	1.096	1.003	-
836.6	190	GPRS 4Tx	30.0	29.65	-0.08	Left	1:2.075	10	0.588	1.084	0.637	-
836.6	190	GPRS 4Tx	30.0	29.65	-0.04	Right	1:2.075	10	0.733	1.084	0.795	-
836.6	190	GPRS 4Tx	30.0	29.65	0.06	Bottom	1:2.075	10	0.099	1.084	0.107	-
848.8	251	GPRS 4Tx	30.0	29.60	-0.01	Rear	1:2.075	10	1.05	1.096	1.151	**
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg Averaged over 1 gram						

Note:**Data entry indicate Variability measurement.

GSM 1900 Hotspot SAR												
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(mm)	(W/kg)		(W/kg)	
1 880	661	GPRS 4Tx	27.0	26.71	-0.11	Rear	1:2.075	10	0.571	1.069	0.610	-
1 880	661	GPRS 4Tx	27.0	26.71	-0.01	Front	1:2.075	10	0.615	1.069	0.657	-
1 880	661	GPRS 4Tx	27.0	26.71	-0.02	Left	1:2.075	10	0.287	1.069	0.307	-
1 880	661	GPRS 4Tx	27.0	26.71	-0.19	Right	1:2.075	10	0.159	1.069	0.170	-
1 880	661	GPRS 4Tx	27.0	26.71	-0.13	Bottom	1:2.075	10	0.656	1.069	**0.701**	17
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg Averaged over 1 gram						

UMTS 850 Hotspot SAR												
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(mm)	(W/kg)		(W/kg)	
836.6	4183	RMC	25.5	25.28	-0.13	Rear	1:1	10	0.329	1.052	**0.346**	13
836.6	4183	RMC	25.5	25.28	-0.01	Front	1:1	10	0.307	1.052	0.323	-
836.6	4183	RMC	25.5	25.28	-0.02	Left	1:1	10	0.200	1.052	0.210	-
836.6	4183	RMC	25.5	25.28	-0.06	Right	1:1	10	0.094	1.052	0.099	-
836.6	4183	RMC	25.5	25.28	0.11	Bottom	1:1	10	0.262	1.052	0.276	-
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg Averaged over 1 gram						

UMTS 1900 Hotspot SAR												
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(mm)	(W/kg)		(W/kg)	
1 852.4	9262	RMC	24.0	23.94	-0.08	Rear	1:1	10	0.893	1.014	0.906	-
1 880.0	9400	RMC	24.0	23.83	0.04	Rear	1:1	10	0.848	1.040	0.882	-
1 907.6	9538	RMC	24.0	23.65	-0.04	Rear	1:1	10	0.760	1.084	0.824	-
1 852.4	9262	RMC	24.0	23.94	-0.05	Front	1:1	10	0.917	1.014	0.930	-
1 880.0	9400	RMC	24.0	23.83	-0.01	Front	1:1	10	0.854	1.040	0.888	-
1 907.6	9538	RMC	24.0	23.65	0.01	Front	1:1	10	0.795	1.084	0.862	-
1 880.0	9400	RMC	24.0	23.83	-0.07	Left	1:1	10	0.422	1.040	0.439	-
1 880.0	9400	RMC	24.0	23.83	0.07	Right	1:1	10	0.269	1.040	0.280	-
1 852.4	9262	RMC	24.0	23.94	-0.08	Bottom	1:1	10	1.03	1.014	**1.044**	18
1 880.0	9400	RMC	24.0	23.83	-0.07	Bottom	1:1	10	0.982	1.040	1.021	-
1 907.6	9538	RMC	24.0	23.65	-0.03	Bottom	1:1	10	0.910	1.084	0.986	-
1 852.4	9262	RMC	24.0	23.94	-0.11	Bottom	1:1	10	1.03	1.014	1.044	**
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg Averaged over 1 gram						

Note:**Data entry indicate Variability measurement.

LTE Band 5 Hotspot SAR															
Frequency		Mode	Band width	Tune-Up Limit	Meas. Power	Power Drift	Test Position	MPR	RB Size	RB offset	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(dBm)	(dBm)	(dB)		(dB)				(mm)	(W/kg)		(W/kg)	
836.5	20525	QPSK	10	25.5	25.20	0.15	Rear	0	1	24	1:1	10	1.000	1.072	**1.072**	15
836.5	20525	QPSK	10	24.5	24.21	-0.05	Rear	1	25	0	1:1	10	0.789	1.069	0.843	-
836.5	20525	QPSK	10	24.5	24.16	-0.06	Rear	1	50	0	1:1	10	0.803	1.081	0.868	-
836.5	20525	QPSK	10	25.5	25.20	0.13	Front	0	1	24	1:1	10	0.780	1.072	0.836	-
836.5	20525	QPSK	10	24.5	24.21	0.01	Front	1	25	0	1:1	10	0.616	1.069	0.659	-
836.5	20525	QPSK	10	24.5	24.16	0.04	Front	1	50	0	1:1	10	0.615	1.081	0.665	-
836.5	20525	QPSK	10	25.5	25.20	0.07	Left	0	1	24	1:1	10	0.506	1.072	0.542	-
836.5	20525	QPSK	10	24.5	24.21	0.06	Left	1	25	0	1:1	10	0.401	1.069	0.429	-
836.5	20525	QPSK	10	25.5	25.20	0.02	Right	0	1	24	1:1	10	0.564	1.072	0.605	-
836.5	20525	QPSK	10	24.5	24.21	-0.02	Right	1	25	0	1:1	10	0.450	1.069	0.481	-
836.5	20525	QPSK	10	25.5	25.20	0.15	Bottom	0	1	24	1:1	10	0.077	1.072	0.083	-
836.5	20525	QPSK	10	24.5	24.21	0.07	Bottom	1	25	0	1:1	10	0.059	1.069	0.063	-
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Body 1.6 W/kg Averaged over 1 gram									

DTS Hotspot SAR																
Frequency		Mode	Band width	Data Rate	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Area Scan Peak SAR	Meas. SAR	Scaling Factor	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(Mbps)	(dBm)	(dBm)	(dB)			(mm)	(W/kg)	(W/kg)		(Duty)	(W/kg)	
2 437	6	802.11b	22	1	15.0	14.57	-0.12	Rear	99.8	10	0.255	0.157	1.104	1.002	0.174	-
2 437	6	802.11b	22	1	15.0	14.57	0.19	Front	99.8	10	0.267	0.179	1.104	1.002	**0.198**	19
2 437	6	802.11b	22	1	15.0	14.57	0.06	Right	99.8	10	0.274	0.175	1.104	1.002	0.194	-
2 437	6	802.11b	22	1	15.0	14.57		Top	99.8	10	0.115		1.104	1.002		-
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population								Body 1.6 W/kg Averaged over 1 gram								

11.4 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, FCC KDB Procedure.
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 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 648474 D04v01r03, SAR was evaluated without a headset connected to the device. Since the standalone reported SAR was ≤ 1.2 W/kg, no additional SAR evaluation using a headset cable were required.
8. Per KDB 648474 D04v01r03, this device is considered a “Phablet” since the diagonal dimension is > 160 mm and < 200 mm. When hotspot mode applies, extremity SAR is required only for the surfaces and edges with hotspot mode scaled to the maximum output power (with tolerance) is 1 g SAR > 1.2 W/kg.
9. Per FCC KDB 865664 D01v01r04, variability SAR tests were performed when the measured SAR results for a frequency band were greater than or equal to 0.8 W/Kg. Please see Section 13.

GSM/GPRS Test Notes:

1. This EUT’S GSM and GPRS device class is B.
2. This device supports GPRS VOIP in the head and the body-worn configurations therefore GPRS was additionally evaluated for head and body-worn compliance.
3. Body-Worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn SAR.
4. Justification for reduced test configurations per KDB 941225 D01v03r01: The source-based time-averaged output power was evaluated for all multi-slot operations. The multi-slot configuration with the highest frame averaged output power including tolerance was evaluated for SAR.
5. Per FCC KDB 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 1/2 dB, instead of the middle channel, the highest output power channel must be used.
6. 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/EDGE 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.

UMTS Notes:

1. The 12.2 kbps RMC mode is the primary mode per KDB 941225 D01v03r01.
2. UMTS mode in Body SAR was tested under RMC 12.2 kbps with HSPA inactive per KDB 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 Adjusted SAR value was less than 1.2 W/kg.
3. Per FCC KDB 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 channel highest output power channel was used.
4. UMTS 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.

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Consideration for LTE Devices in FCC KDB 941225 D05v02r05.
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 1RB, 50%RB and 100%RB allocation with highest output power for that channel.
   Only one channel, and as reported SAR values for 1RB allocation and 50%RB allocation were less than 1.45W/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. A-MPR was disabled for all SAR tests by setting NS=01 on the base station simulator.

WLAN Notes:

1. For held-to-ear and hotspot operations, the initial test position procedures were applied. For initial test position, the highest extrapolated peak SAR will be used. When reported SAR for the initial test position is ≤ 0.4 W/kg for 1g SAR and ≤ 1.0 W/kg for 10g SAR, 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 results is ≤ 0.8 W/kg for 1g SAR and ≤ 2.0 W/kg for 10g SAR or all test position are measured.
2. Per KDB 248227 D01v02r02 justification for test configurations of 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 802.11 g/n) was not required due to the maximum allowed powers and the highest reported DSSS SAR.
3. When the maximum reported 1g averaged SAR is ≤ 0.8 W/kg, SAR testing on additional channels was not required. Otherwise, SAR for the next highest output power channel was required until the reported SAR result was ≤ 1.20 W/kg or all test channels were measured.
4. The device was configured to transmit continuously at the required data rated, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools. The reported SAR was scaled to the 100% transmission duty factor to determine compliance. Procedures used to measure the duty factor are identical to that in the associated WLAN test reports.

12. Simultaneous SAR Analysis

12.1 Simultaneous Transmission Summation for Head

Simultaneous Transmission Summation Scenario with 2.4 GHz WLAN						
Exposure condition	Band		WWAN SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	∑ 1-g SAR (W/kg)	SPLSR (Yes/No)
Head SAR	GSM 850	Left Cheek	0.358	1.028	1.386	No
		Left Tilt	0.226	0.587	0.813	No
		Right Cheek	0.380	0.335	0.715	No
		Right Tilt	0.187	0.347	0.534	No
	GPRS 850	Left Cheek	0.775	1.028	1.803	Yes
		Left Tilt	0.472	0.587	1.059	No
		Right Cheek	0.913	0.335	1.248	No
		Right Tilt	0.408	0.347	0.755	No
	GSM 1900	Left Cheek	0.377	1.028	1.405	No
		Left Tilt	0.181	0.587	0.768	No
		Right Cheek	0.228	0.335	0.563	No
		Right Tilt	0.201	0.347	0.548	No
	GPRS 1900	Left Cheek	0.602	1.028	1.630	Yes
		Left Tilt	0.276	0.587	0.863	No
		Right Cheek	0.360	0.335	0.695	No
		Right Tilt	0.275	0.347	0.622	No
	UMTS 850	Left Cheek	0.564	1.028	**1.592**	No
		Left Tilt	0.343	0.587	0.930	No
		Right Cheek	0.625	0.335	0.960	No
		Right Tilt	0.312	0.347	0.659	No
	UMTS 1900	Left Cheek	0.879	1.028	1.907	Yes
		Left Tilt	0.419	0.587	1.006	No
		Right Cheek	0.547	0.335	0.882	No
		Right Tilt	0.431	0.347	0.778	No
	LTE Band 5	Left Cheek	0.527	1.028	1.555	No
		Left Tilt	0.332	0.587	0.919	No
		Right Cheek	0.565	0.335	0.900	No
		Right Tilt	0.296	0.347	0.643	No

Simultaneous Transmission Summation Scenario with 2.4 GHz Bluetooth				
Exposure condition	Band	WWAN SAR (W/kg)	Bluetooth SAR (W/kg)	∑ 1-g SAR (W/kg)
Head SAR	GSM 850	0.380	0.336	0.716
	GPRS 850	0.913	0.336	1.249
	GSM 1900	0.377	0.336	0.713
	GPRS 1900	0.602	0.336	0.938
	UMTS 850	0.625	0.336	0.961
	UMTS 1900	0.879	0.336	1.215
	LTE Band 5	0.565	0.336	0.901

Note: Bluetooth SAR were not required to be measured per FCC KDB 447498 D01v06.Estimated SAR results were used for SAR summation for Head SAR configuration at 5 mm to determine simultaneous transmission SAR test exclusion.

12.2 Simultaneous Transmission Summation for Body-Worn

Simultaneous Transmission Summation Scenario with 2.4 GHz WLAN					
Exposure condition	Distance (mm)	Band	WWAN SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	∑ 1-g SAR (W/kg)
Body-worn	10	GSM 850	0.646	0.174	0.820
		GPRS 850	1.173	0.174	**1.347**
		GSM 1900	0.443	0.174	0.617
		GPRS 1900	0.610	0.174	0.784
		UMTS 850	0.346	0.174	0.520
		UMTS 1900	0.906	0.174	1.080
		LTE Band 5	1.072	0.174	1.246

Simultaneous Transmission Summation Scenario with Bluetooth					
Exposure condition	Distance (mm)	Band	WWAN SAR (W/kg)	Bluetooth SAR (W/kg)	∑ 1-g SAR (W/kg)
Body-worn	10	GSM 850	0.646	0.168	0.814
		GPRS 850	1.173	0.168	1.341
		GSM 1900	0.443	0.168	0.611
		GPRS 1900	0.610	0.168	0.778
		UMTS 850	0.346	0.168	0.514
		UMTS 1900	0.906	0.168	1.074
		LTE Band 5	1.072	0.168	1.240

Note: Bluetooth SAR was not required to be measured per FCC KDB 447498 D01v06.Estimated SAR results were used for SAR summation for body-worn back side at 10 mm to determine simultaneous transmission SAR test exclusion.

12.3 Simultaneous Transmission Summation for Hotspot

Simultaneous Transmission Summation Scenario with 2.4 GHz WLAN					
Exposure condition	Distance (mm)	Band	WWAN SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	∑ 1-g SAR (W/kg)
Hotspot	10	GSM 850	1.173	0.198	**1.371**
		GSM 1900	0.701	0.198	0.899
		UMTS 850	0.346	0.198	0.544
		UMTS 1900	1.044	0.198	1.242
		LTE Band 5	1.072	0.198	1.270

Simultaneous Transmission Summation Scenario with Bluetooth					
Exposure condition	Distance (mm)	Band	WWAN SAR (W/kg)	Bluetooth SAR (W/kg)	∑ 1-g SAR (W/kg)
Hotspot	10	GSM 850	1.173	0.168	1.341
		GSM 1900	0.701	0.168	0.869
		UMTS 850	0.346	0.168	0.514
		UMTS 1900	1.044	0.168	1.212
		LTE Band 5	1.072	0.168	1.240

Note: Bluetooth SAR was not required to be measured per FCC KDB 447498 D01v06.Estimated SAR results were used for SAR summation for body back side at 10 mm to determine simultaneous transmission SAR test exclusion.

12.4 SAR to Peak Location Separation Ratio (SPLSR)

FCC KDB 447498 D01v06 General RF Exposure Guidance introduces a new formula for calculating the SAR a Peak Location Separation Ratio(SPLSR) between pairs of simultaneously transmitting antennas:

$\boldsymbol{SPLSR} = (\boldsymbol{SAR_1} + \boldsymbol{SAR_2})^{1.5}/\boldsymbol{R_i}$

Where:

$\boldsymbol{SAR_1}$ is the highest measured or estimated SAR for the first of a pair of simultaneous transmitting antennas, in a specific test operating mode and exposure condition

$\boldsymbol{SAR_2}$ is the highest measured of estimated SAR for the second of a pair of simultaneous transmitting antennas, in the same test operating mode and exposure condition as the first

$\boldsymbol{R_i}$ is the separation distance between the pair of simultaneous transmitting antennas, When the SAR is measured, for both antennas in the pair, it is determined by the actual x, y and z coordinates in the 1-g SAR for each SAR peak location, based on the extrapolated and interpolated result in the zoom scan measurement, using the formula of $\sqrt{[(\mathbf{X_1} - \mathbf{X_2})^2 + (\mathbf{Y_1} - \mathbf{Y_2})^2]}$

In order for a pair of simultaneous transmitting antennas with the sum of 1-g SAR> 1.6 W/kg to qualify for exemption from Simultaneous Transmission SAR measurements, it has to satisfy the condition of:
$(\boldsymbol{SAR_1} + \boldsymbol{SAR_2})^{1.5}/\boldsymbol{R_i} \leq \mathbf{0.04}$

Per Sec. 12, below simultaneous transmission summations need to be calculated SPLSR.

12.4.1 Head Left touch SPLSR Evaluation

Peak location for Head Left touch

Mode/Band	X(mm)	Y(mm)	Z(mm)
GSM GPRS 850 Left Touch	0.0651	0.267	-0.173
GSM GPRS 1900 Left Touch	0.0592	0.256	-0.176
UMTS 1900 Left Touch	0.0591	0.256	-0.176
2.4GHz WLAN Left touch	0.0296	0.337	-0.176

Head Left Touch SAR to Peak Location Separation Ratio Calculations

Plot No.	GSM GPRS 850	2.4GHz WLAN	Sum SAR 1+2	Peak SAR Separation Distance (mm)	SPLSR
	SAR (W/kg)	SAR (W/kg)			
	1	2			
#1	0.775	1.028	1.803	78.487	0.03085

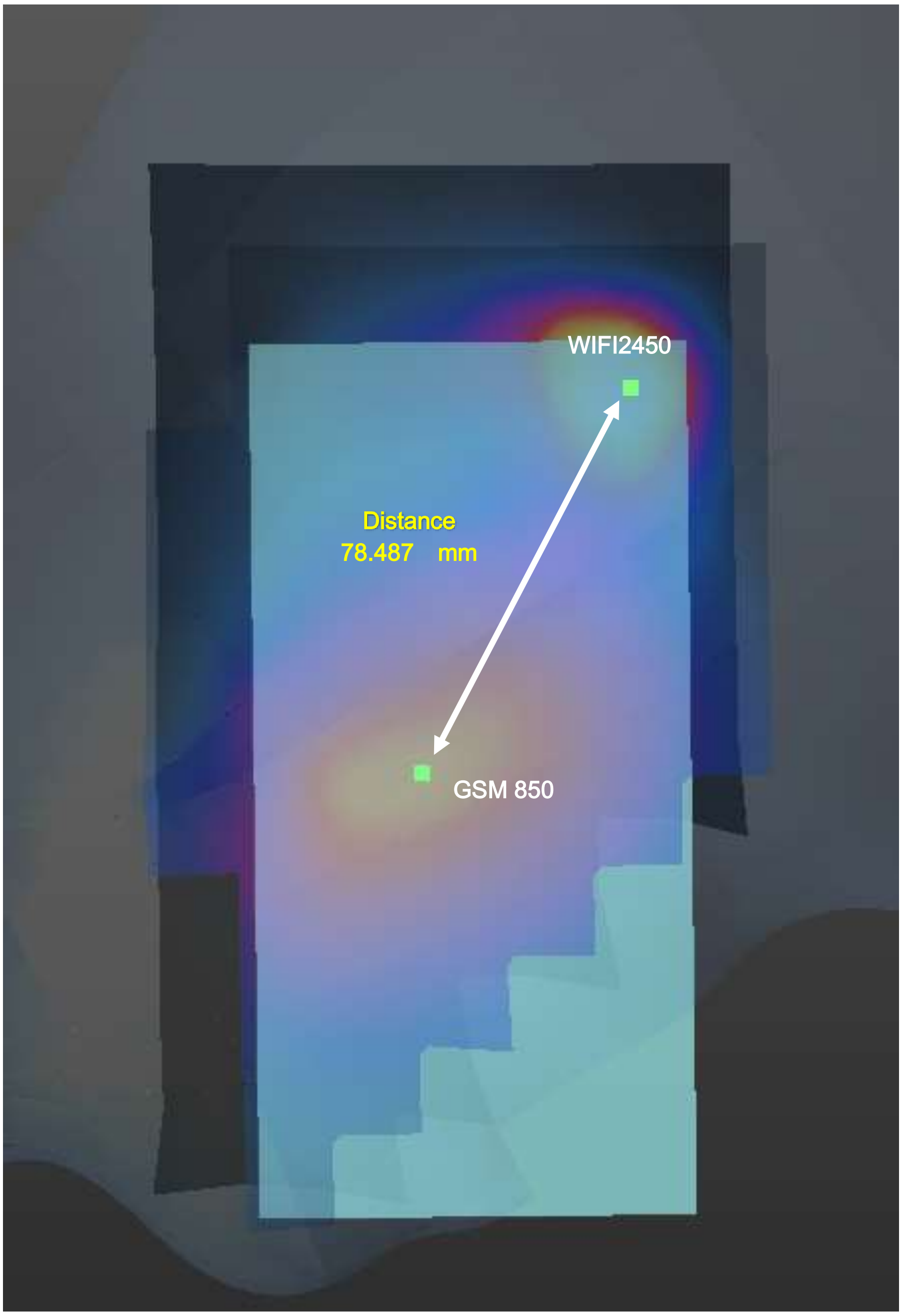
Plot No.	GSM GPRS 1900	2.4GHz WLAN	Sum SAR 1+2	Peak SAR Separation Distance (mm)	SPLSR
	SAR (W/kg)	SAR (W/kg)			
	1	2			
#2	0.602	1.028	1.630	86.239	0.02413

Plot No.	UMTS 1900	2.4GHz WLAN	Sum SAR 1+2	Peak SAR Separation Distance (mm)	SPLSR
	SAR (W/kg)	SAR (W/kg)			
	1	2			
#3	0.879	1.028	1.907	86.205	0.03055

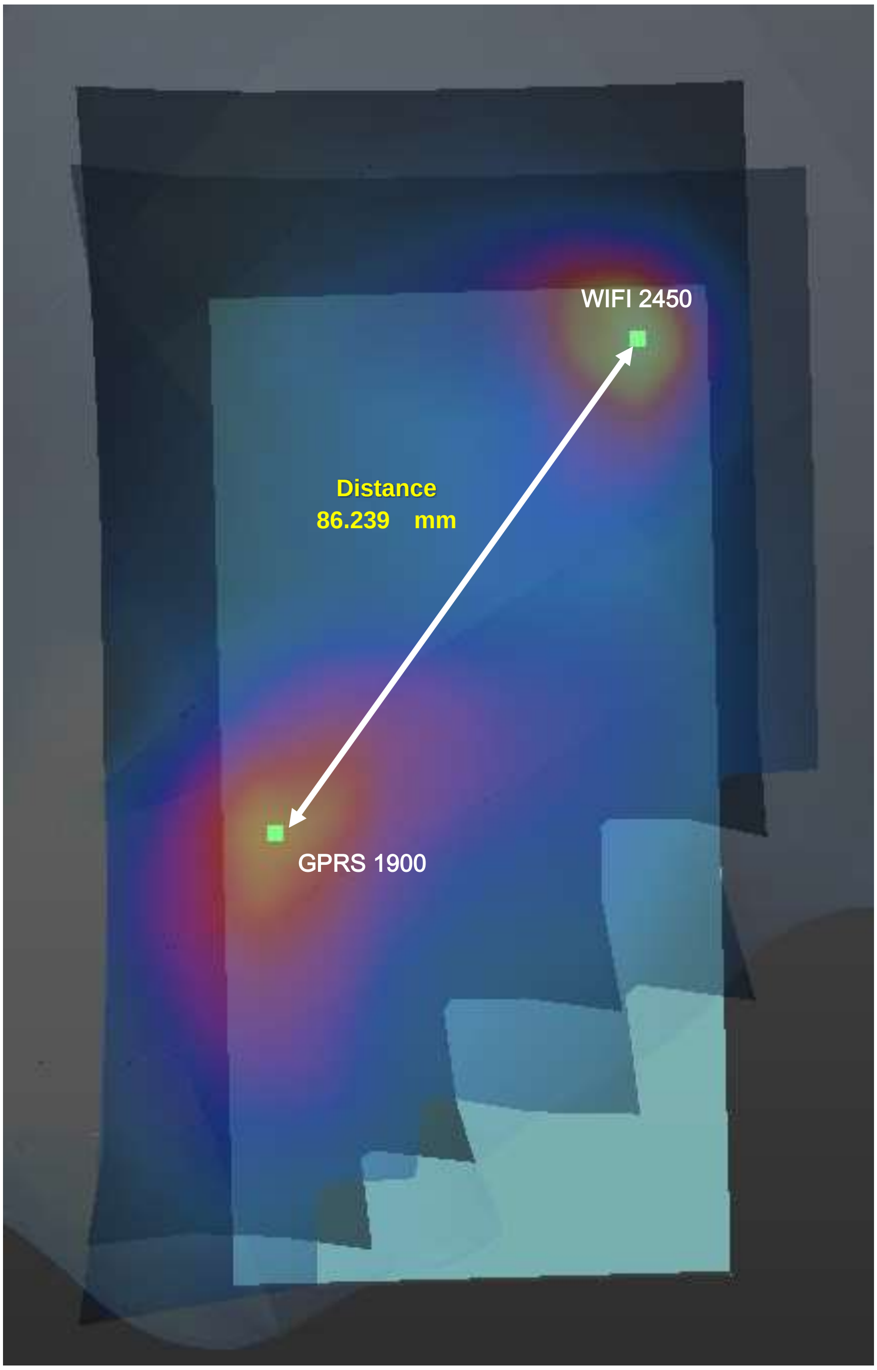
SPLSR Conclusion
Simultaneous transmission SAR measurement (Volume Scan) is not required because the either sum of the 1-g SAR is < 1.6 W/kg or the SPLSR is ≤ 0.04 for all circumstances that require SPLSR calculation.

12.4.2 SAR to Peak Location Ratio (SPLSR) Figures

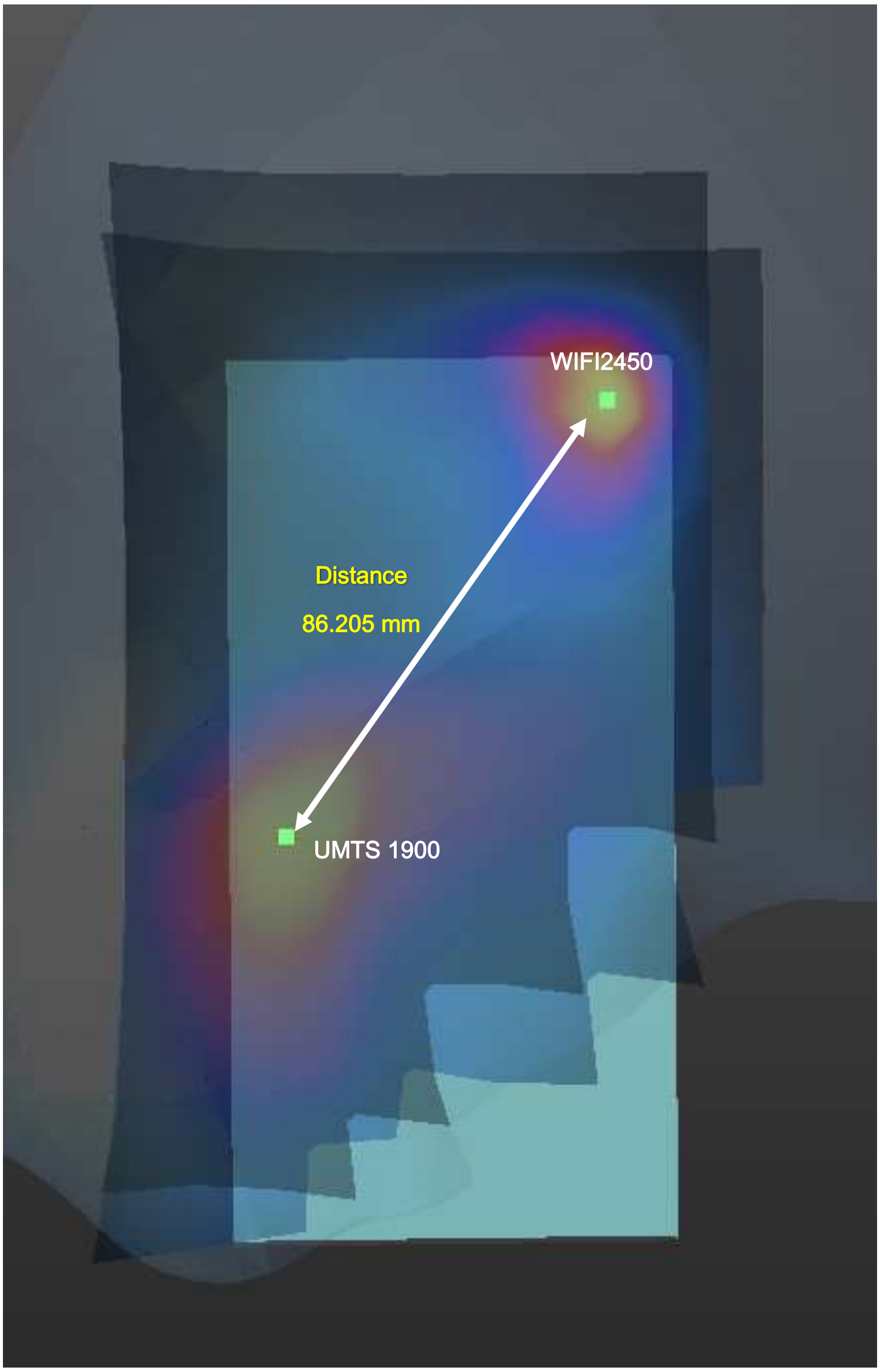
Plot: #1 Head Left touch: GSM/GPRS850 4Tx & 2.4GHz WLAN



Plot: #2 Head Left touch: GSM/GPRS1900 4Tx & 2.4GHz WLAN



Plot: #3 Head Left touch: UMTS 1900 & 2.4GHz WLAN



12.5 Simultaneous Transmission Conclusion

The above numerical summed SAR Results and SPLSR analysis are sufficient to determine that simultaneous transmission cases will not exceed the SAR Limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v06 and IEEE1528-2013.

13. SAR Measurement Variability and Uncertainty

In accordance with KDB procedure 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz, SAR additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

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

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg for 1g SAR or < 2.0 W/kg for 10g SAR; steps 2) through 4) do not apply.

2) When the original highest measured 1g SAR is ≥ 0.80 W/kg or 10g SAR ≥ 2.0W/kg, repeat that measurement once.

3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg for 1g SAR or ≥ 3.625 W/kg for 10g SAR (~ 10% from the 1-g SAR limit).

4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg for 1g SAR or ≥3.75 W/kg for 10g SAR and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

Frequency		Modulation	Battery	Configuration	Measured SAR	Repeated SAR	SAR Ratio
MHz	Channel				(W/kg)	(W/kg)	
848.8	251	GSM 850 / GPRS 4Tx	Standard	Rear	1.07	1.05	1.02
1 852.4	9262	UMTS 1900	Standard	Bottom	1.03	1.03	1.00
2437	6	802.11b	Standard	Left Cheek	0.929	0.861	1.08

14. MEASUREMENT UNCERTAINTY

The measured SAR was <1.5 W/Kg for all frequency bands. Therefore, per KDB Publication 865664 D01v01r04,the extended measurement uncertainty analysis per IEEE1528-2013 was not required.

15. SAR TEST EQUIPMENT

Manufacturer	Type / Model	S/N	Calib. Date	Calib.Interval	Calib.Due
SPEAG	SAM Phantom	-	N/A	N/A	N/A
SPEAG	Triple Modular Phantom	-	N/A	N/A	N/A
HP	SAR System Control PC	-	N/A	N/A	N/A
Staubli	TX90 XLspeag	F10/5D1CA1/A/01	N/A	N/A	N/A
Staubli	TX90 XLspeag	F17/59CHA1/A/01	N/A	N/A	N/A
Staubli	TX90 XLspeag	F13/5R4XF1/A/01	N/A	N/A	N/A
Staubli	CS8Cspeag-TX90	F10/5D1CA1/C/01	N/A	N/A	N/A
Staubli	CS8Cspeag-TX90	F17/59CHA1/C/01	N/A	N/A	N/A
Staubli	CS8Cspeag-TX90	F13/5R4XF1/C/01	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	D21142106	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	D21142606B	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	D21142605	N/A	N/A	N/A
SPEAG	DAE3	466	08/29/2017	Annual	08/29/2018
SPEAG	DAE4	1417	01/16/2018	Annual	01/16/2019
SPEAG	DAE4	869	09/20/2017	Annual	09/20/2018
SPEAG	DAE4	652	04/20/2018	Annual	04/20/2019
SPEAG	E-Field Probe EX3DV4	3967	01/24/2018	Annual	01/24/2019
SPEAG	E-Field Probe EX3DV4	3797	11/22/2017	Annual	11/22/2018
SPEAG	E-Field Probe EX3DV4	3863	04/25/2018	Annual	04/25/2019
SPEAG	E-Field Probe EX3DV4	3903	09/28/2017	Annual	09/28/2018
SPEAG	Dipole D835V2	441	09/21/2017	Annual	09/21/2018
SPEAG	Dipole D1900V2	5d061	03/15/2018	Annual	03/15/2019
SPEAG	Dipole D2450V2	965	02/16/2018	Annual	02/16/2019
Agilent	Power Meter N1911A	MY45101406	09/15/2017	Annual	09/15/2018
HP	Power Sensor N1921A	MY55220026	09/01/2017	Annual	09/01/2018
SPEAG	DAKS 3.5	1031	04/17/2018	Annual	04/17/2019
Agilent	Directional Bridge 86205A	3140A02490	06/09/2017	Annual	06/09/2018
Agilent	Base Station E5515C	GB44400269	02/02/2018	Annual	02/02/2019
HP	Signal Generator E4433B	US40052109	03/06/2018	Annual	03/06/2019
Agilent	Signal Generator N5182A	MY47070230	05/10/2018	Annual	05/10/2019
HP	11636B/Power Divider	58698	03/06/2018	Annual	03/06/2019
TESTO	175-H1/Thermometer	40331936309	02/06/2018	Annual	02/06/2019
TESTO	175-H1/Thermometer	40331915309	02/06/2018	Annual	02/06/2019
TESTO	175-H1/Thermometer	40332651310	02/06/2018	Annual	02/06/2019
EMPOWER	RF Power amplifier	1084	06/09/2017	Annual	06/09/2018
MICRO LAB	LP Filter / LA-15N	10453	10/12/2017	Annual	10/12/2018
MICRO LAB	LP Filter / LA-30N	-	10/12/2017	Annual	10/12/2018
Agilent	Attenuator (3dB) 8491B	MY39270622	06/29/2017	Annual	06/29/2018
Agilent	Attenuator (20dB) 33340C	13311	05/10/2018	Annual	05/10/2019
HP	Dielectric Probe Kit 85070C	00721521	N/A	N/A	N/A
HP	Dual Directional Coupler	16072	10/12/2017	Annual	10/12/2018
R&S	Wideband Radio Communication Tester CMW500	100990	11/16/2017	Annual	11/16/2018
Anritsu	Radio Communication Tester MT8820C	6200628628	07/04/2017	Annual	07/04/2018
Anritsu	Radio Communication Tester MT8821C	6201502997	08/10/2017	Annual	08/10/2018

1. The E-field probe was calibrated by SPEAG, by the waveguide technique procedure. Dipole Verification measurement is performed by HCT Lab. before each test. The brain/body simulating material is calibrated by HCT using the DAKS 3.5 to determine the conductivity and permittivity (dielectric constant) of the brain/body-equivalent material.

16. CONCLUSION

The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the ANSI/ IEEE C95.1 1992.

These measurements were taken to simulate the RF effects exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested.

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

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Attachment 1.– SAR Test Plots

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth4.2LE, WIFI802.11 b/g/n
Liquid Temperature:	20.9℃
Ambient Temperature:	21.1℃
Test Date:	05/29/2018
Plot No.:	1

DUT: LM-X210JM; Type: Bar

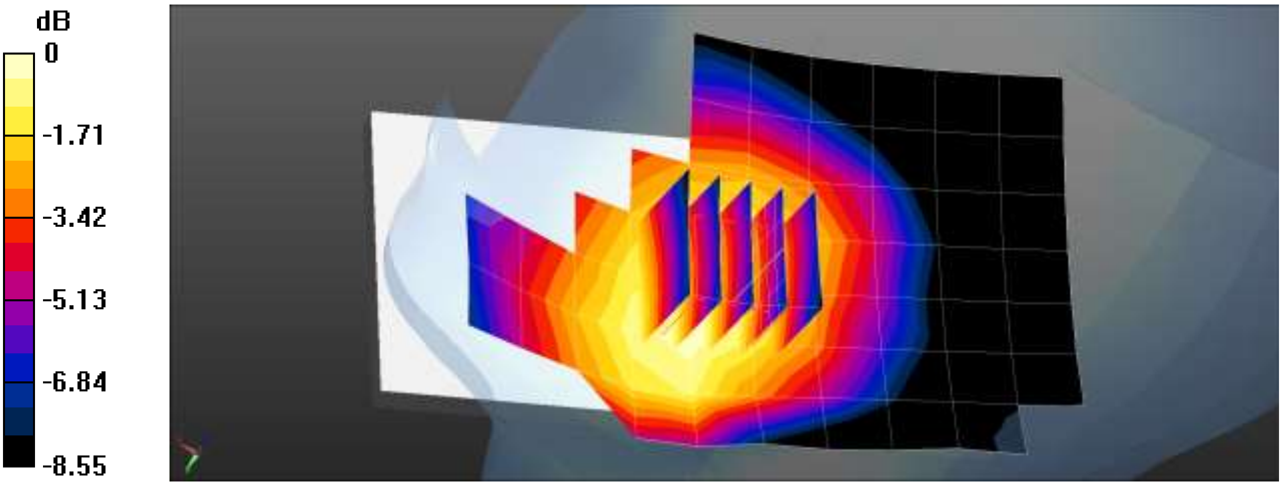
Communication System: UID 0, GSM 850 (0); Frequency: 836.6 MHz;Duty Cycle: 1:8.30042
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.911 S/m; ε_r = 41.302; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY Configuration:

- Probe: EX3DV4 - SN3797; ConvF(9.27, 9.27, 9.27); Calibrated: 2017-11-22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2017-09-20
- Phantom: SAM
- Measurement SW: DASY52, Version 52.8 (8);

LM-X210JM/GSM850 Head Right touch Voice 190ch/Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.436 W/kg

LM-X210JM/GSM850 Head Right touch Voice 190ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.042 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 0.485 W/kg
SAR(1 g) = 0.368 W/kg; SAR(10 g) = 0.277 W/kg
Maximum value of SAR (measured) = 0.441 W/kg



0 dB = 0.441 W/kg = -3.56 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth4.2LE, WIFI802.11 b/g/n
Liquid Temperature:	20.9 ℃
Ambient Temperature:	21.1 ℃
Test Date:	05/29/2018
Plot No.:	2

DUT: LM-X210JM; Type: Bar

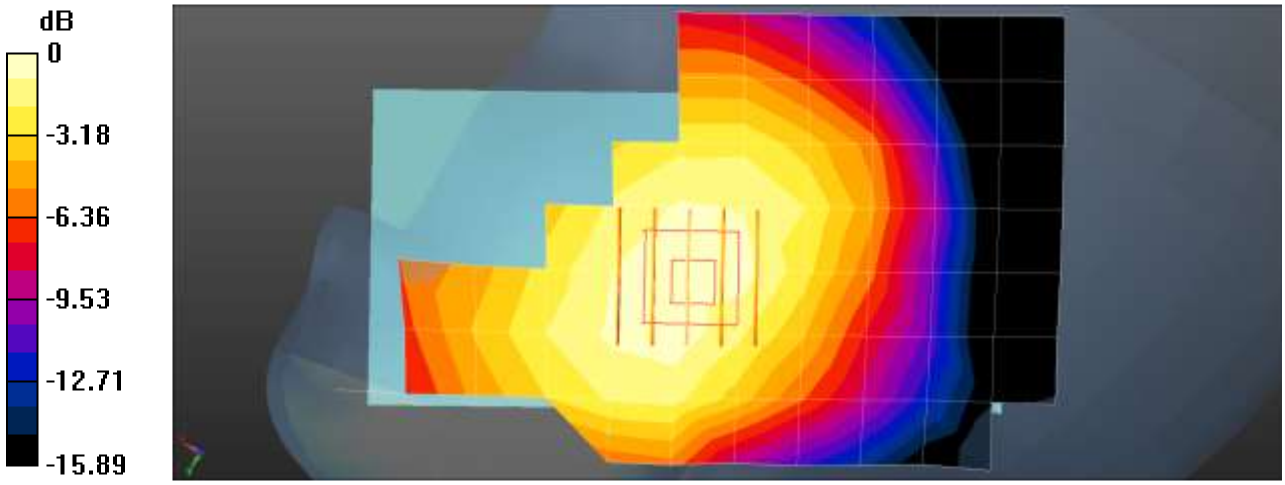
Communication System: UID 0, GSM850 GPRS 4TX (0); Frequency: 836.6 MHz;Duty Cycle: 1:2.07491
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.911 S/m; ε_r = 41.302; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY Configuration:

- Probe: EX3DV4 - SN3797; ConvF(9.27, 9.27, 9.27); Calibrated: 2017-11-22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2017-09-20
- Phantom: SAM
- Measurement SW: DASY52, Version 52.8 (8);

LM-X210JM/GSM850 Head Right touch 4Tx 190ch/Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.974 W/kg

LM-X210JM/GSM850 Head Right touch 4Tx 190ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.219 V/m; Power Drift = -0.19 dB
Peak SAR (extrapolated) = 1.09 W/kg
SAR(1 g) = 0.842 W/kg; SAR(10 g) = 0.637 W/kg
Maximum value of SAR (measured) = 1.00 W/kg



0 dB = 1.00 W/kg = 0.00 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth4.2LE, WIFI802.11 b/g/n
Liquid Temperature:	19.9 ℃
Ambient Temperature:	20.1 ℃
Test Date:	05/29/2018
Plot No.:	3

DUT: LM-X210JM; Type: Bar

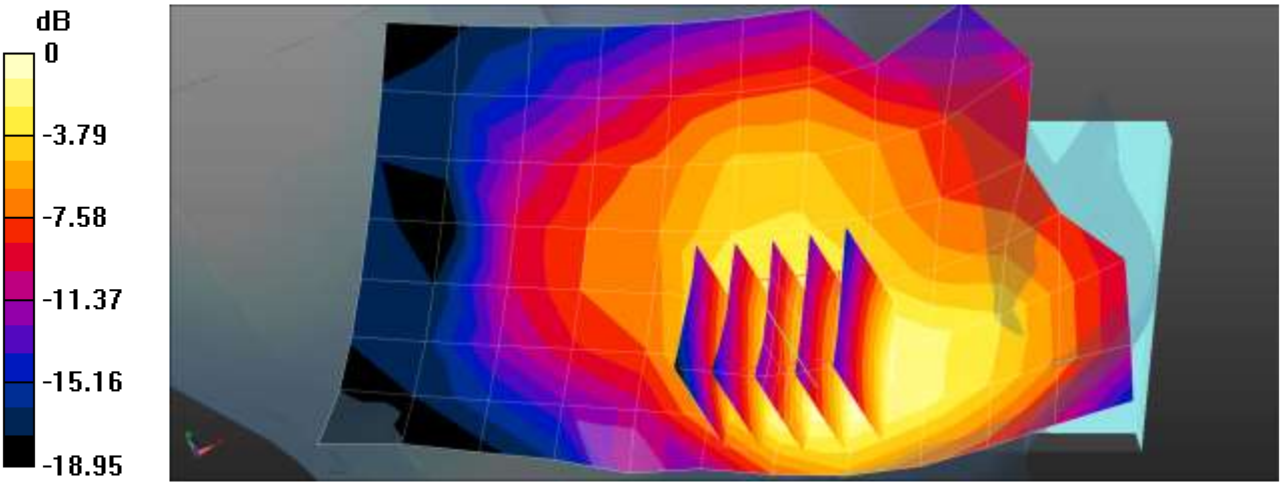
Communication System: UID 0, GSM 1900 (0); Frequency: 1880 MHz;Duty Cycle: 1:8.30042
Medium parameters used: f = 1880 MHz; σ = 1.387 S/m; ε_r = 39.145; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY Configuration:

- Probe: EX3DV4 - SN3903; ConvF(8.44, 8.44, 8.44); Calibrated: 2017-09-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2017-08-29
- Phantom: SAM
- Measurement SW: DASY52, Version 52.8 (8);

LM-X210JM/GSM1900 Head Left touch Voice 661ch/Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.480 W/kg

LM-X210JM/GSM1900 Head Left touch Voice 661ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.560 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.568 W/kg
SAR(1 g) = 0.353 W/kg; SAR(10 g) = 0.216 W/kg
Maximum value of SAR (measured) = 0.489 W/kg



0 dB = 0.489 W/kg = -3.11 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth4.2LE, WIFI802.11 b/g/n
Liquid Temperature:	19.9 ℃
Ambient Temperature:	20.1 ℃
Test Date:	05/29/2018
Plot No.:	4

DUT: LM-X210JM; Type: Bar

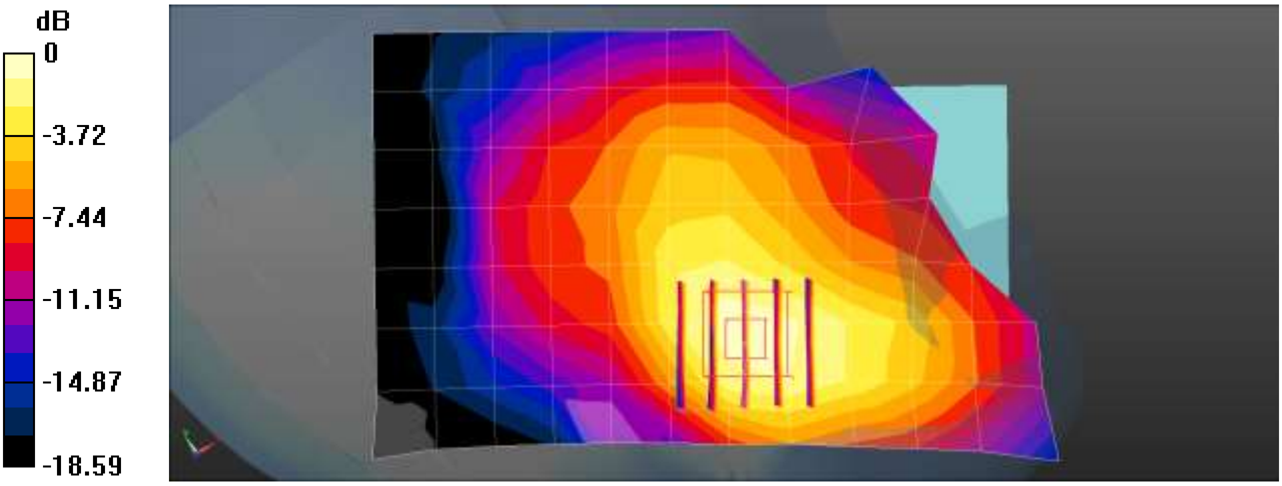
Communication System: UID 0, GSM 1900 4TX (0); Frequency: 1880 MHz;Duty Cycle: 1:2.07491
Medium parameters used: f = 1880 MHz; σ = 1.387 S/m; ε_r = 39.145; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY Configuration:

- Probe: EX3DV4 - SN3903; ConvF(8.44, 8.44, 8.44); Calibrated: 2017-09-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2017-08-29
- Phantom: SAM
- Measurement SW: DASY52, Version 52.8 (8);

LM-X210JM/GSM1900 Head Left touch 4Tx 661ch/Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.714 W/kg

LM-X210JM/GSM1900 Head Left touch 4Tx 661ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.413 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 0.916 W/kg
SAR(1 g) = 0.563 W/kg; SAR(10 g) = 0.342 W/kg
Maximum value of SAR (measured) = 0.793 W/kg



0 dB = 0.793 W/kg = -1.01 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth4.2LE, WIFI802.11 b/g/n
Liquid Temperature:	20.9 ℃
Ambient Temperature:	21.1 ℃
Test Date:	05/29/2018
Plot No.:	5

DUT: LM-X210JM; Type: Bar

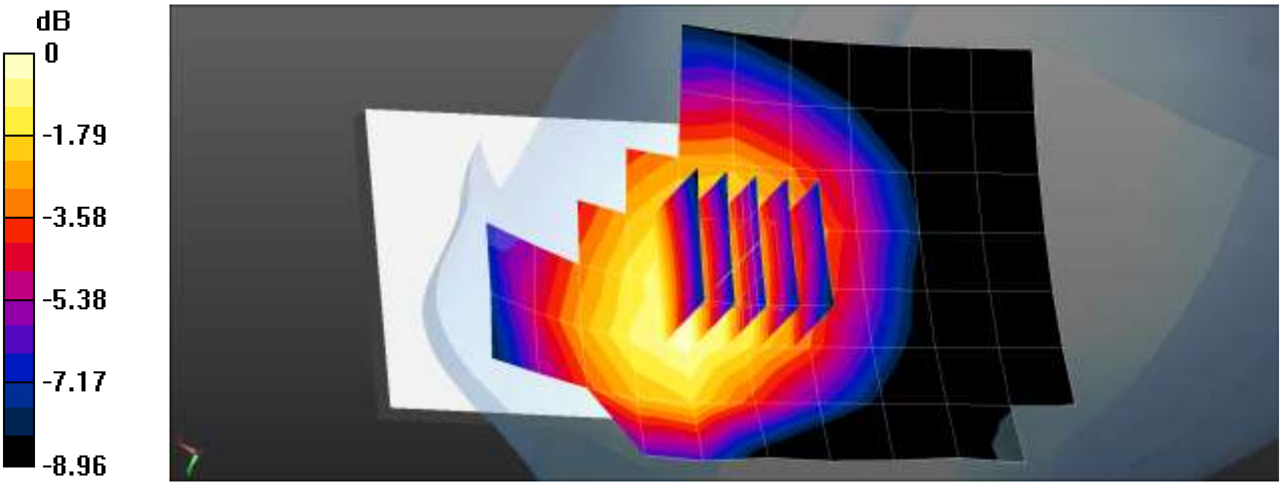
Communication System: UID 0, WCDMA850 (0); Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.911 S/m; ε_r = 41.302; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY Configuration:

- Probe: EX3DV4 - SN3797; ConvF(9.27, 9.27, 9.27); Calibrated: 2017-11-22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2017-09-20
- Phantom: SAM
- Measurement SW: DASY52, Version 52.8 (8);

LM-X210JM/WCDMA850 Head Right touch 4183ch/Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.684 W/kg

LM-X210JM/WCDMA850 Head Right touch 4183ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.727 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 0.800 W/kg
SAR(1 g) = 0.594 W/kg; SAR(10 g) = 0.438 W/kg
Maximum value of SAR (measured) = 0.726 W/kg



0 dB = 0.726 W/kg = -1.39 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth4.2LE, WIFI802.11 b/g/n
Liquid Temperature:	19.9 ℃
Ambient Temperature:	20.1 ℃
Test Date:	05/29/2018
Plot No.:	6

DUT: LM-X210JM; Type: Bar

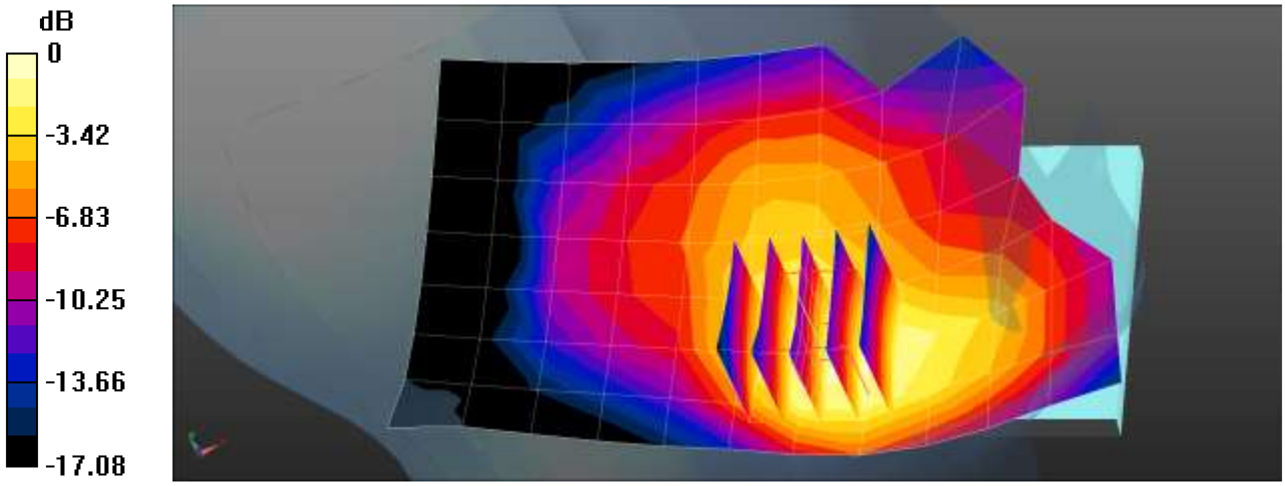
Communication System: UID 0, WCDMA1900 (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.387 S/m; ε_r = 39.145; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY Configuration:

- Probe: EX3DV4 - SN3903; ConvF(8.44, 8.44, 8.44); Calibrated: 2017-09-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2017-08-29
- Phantom: SAM
- Measurement SW: DASY52, Version 52.8 (8);

LM-X210JM/WCDMA1900 Head Left touch 9400ch/Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.07 W/kg

LM-X210JM/WCDMA1900 Head Left touch 9400ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.045 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 1.35 W/kg
SAR(1 g) = 0.845 W/kg; SAR(10 g) = 0.517 W/kg
Maximum value of SAR (measured) = 1.17 W/kg



0 dB = 1.17 W/kg = 0.68 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth4.2LE, WIFI802.11 b/g/n
Liquid Temperature:	20.4℃
Ambient Temperature:	20.7℃
Test Date:	05/30/2018
Plot No.:	7

DUT: LM-X210JM; Type: Bar

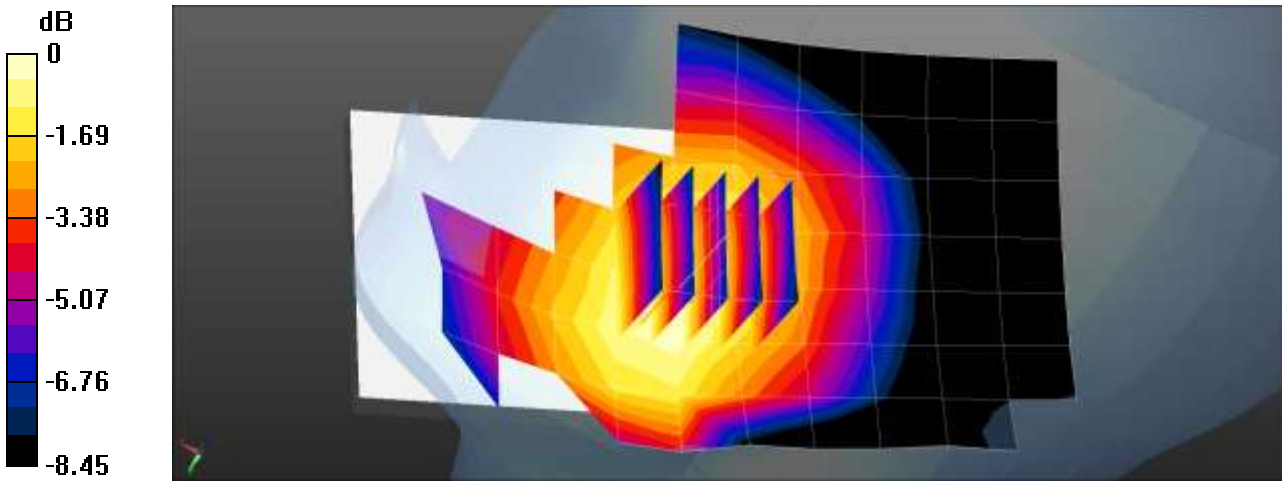
Communication System: UID 0, LTE Band 5 (0); Frequency: 836.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.5 MHz; σ = 0.908 S/m; ε_r = 41.055; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(9.95, 9.95, 9.95); Calibrated: 2018-04-25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2018-04-20
- Phantom: SAM
- Measurement SW: DASY52, Version 52.8 (8);

LM-X210JM/LTE Band5 Head Right touch QPSK 10MHz 1RB 24offset 20525ch/Area Scan (8x12x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.625 W/kg

LM-X210JM/LTE Band5 Head Right touch QPSK 10MHz 1RB 24offset 20525ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.446 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 0.682 W/kg
SAR(1 g) = 0.527 W/kg; SAR(10 g) = 0.397 W/kg
Maximum value of SAR (measured) = 0.627 W/kg



0 dB = 0.627 W/kg = -2.03 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth4.2LE, WIFI802.11 b/g/n
Liquid Temperature:	21.6℃
Ambient Temperature:	21.9℃
Test Date:	05/31/2018
Plot No.:	8

DUT: LM-X210JM; Type: Bar

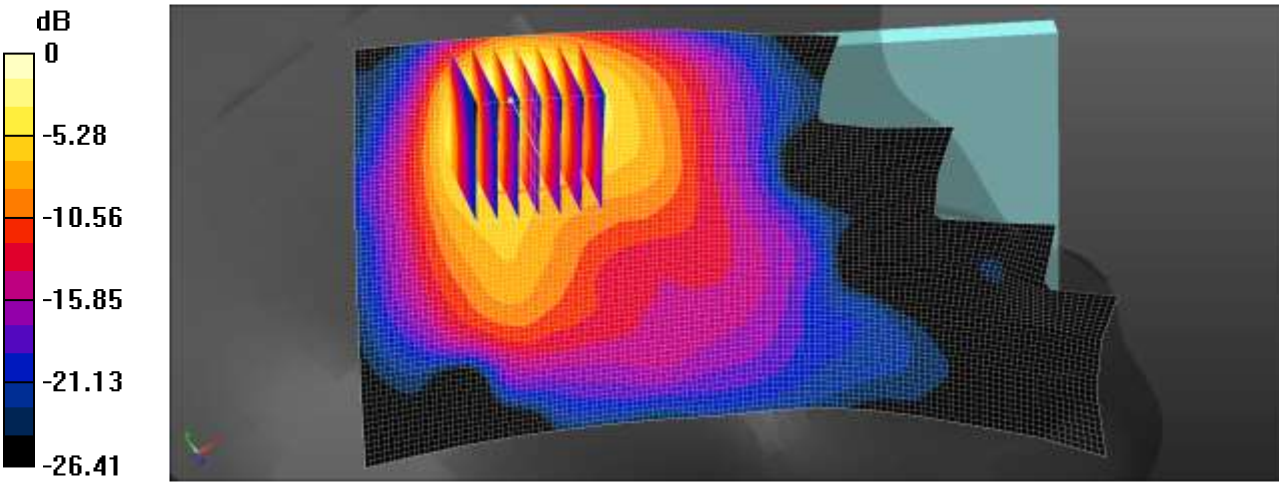
Communication System: UID 0, 2450MHz FCC (0); Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.819 S/m; ε_r = 39.616; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY Configuration:

- Probe: EX3DV4 - SN3903; ConvF(7.56, 7.56, 7.56); Calibrated: 2017-09-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2017-08-29
- Phantom: Twin-SAM
- Measurement SW: DASY52, Version 52.8 (8);

LM-X210JM/802.11b Head Left Touch 1Mbps 6ch/Area Scan (81x141x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 1.79 W/kg

LM-X210JM/802.11b Head Left Touch 1Mbps 6ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.49 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 2.02 W/kg
SAR(1 g) = 0.929 W/kg; SAR(10 g) = 0.423 W/kg
Maximum value of SAR (measured) = 1.57 W/kg



0 dB = 1.57 W/kg = 1.96 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth4.2LE, WIFI802.11 b/g/n
Liquid Temperature:	21.0℃
Ambient Temperature:	21.3℃
Test Date:	05/30/2018
Plot No.:	9

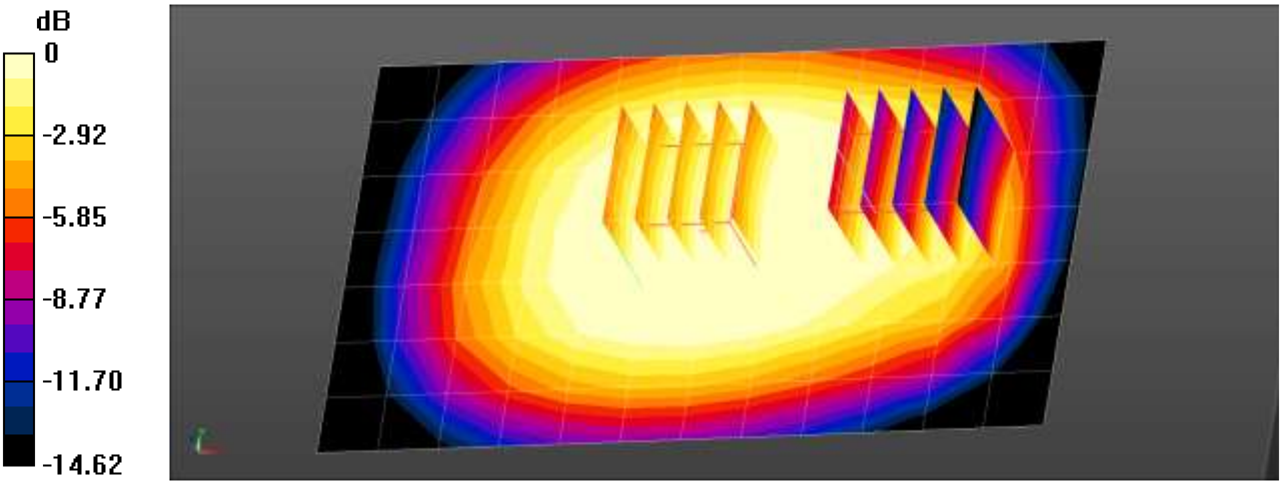
DUT: LM-X210JM; Type: Bar

Communication System: UID 0, GSM 850 (0); Frequency: 836.6 MHz;Duty Cycle: 1:8.30042
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.951 S/m; ε_r = 53.362; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3967; ConvF(9.58, 9.58, 9.58); Calibrated: 2018-01-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2018-01-16
- Phantom: MFP
- Measurement SW: DASY52, Version 52.8 (8);

LM-X210JM/GSM850 Body Rear Voice 190ch/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.739 W/kg
LM-X210JM/GSM850 Body Rear Voice 190ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.03 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.811 W/kg
SAR(1 g) = 0.625 W/kg; SAR(10 g) = 0.485 W/kg
Maximum value of SAR (measured) = 0.743 W/kg
LM-X210JM/GSM850 Body Rear Voice 190ch/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.03 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.567 W/kg
SAR(1 g) = 0.376 W/kg; SAR(10 g) = 0.248 W/kg
Maximum value of SAR (measured) = 0.501 W/kg



0 dB = 0.501 W/kg = -3.00 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth4.2LE, WIFI802.11 b/g/n
Liquid Temperature:	21.0℃
Ambient Temperature:	21.3℃
Test Date:	05/30/2018
Plot No.:	10

DUT: LM-X210JM; Type: Bar

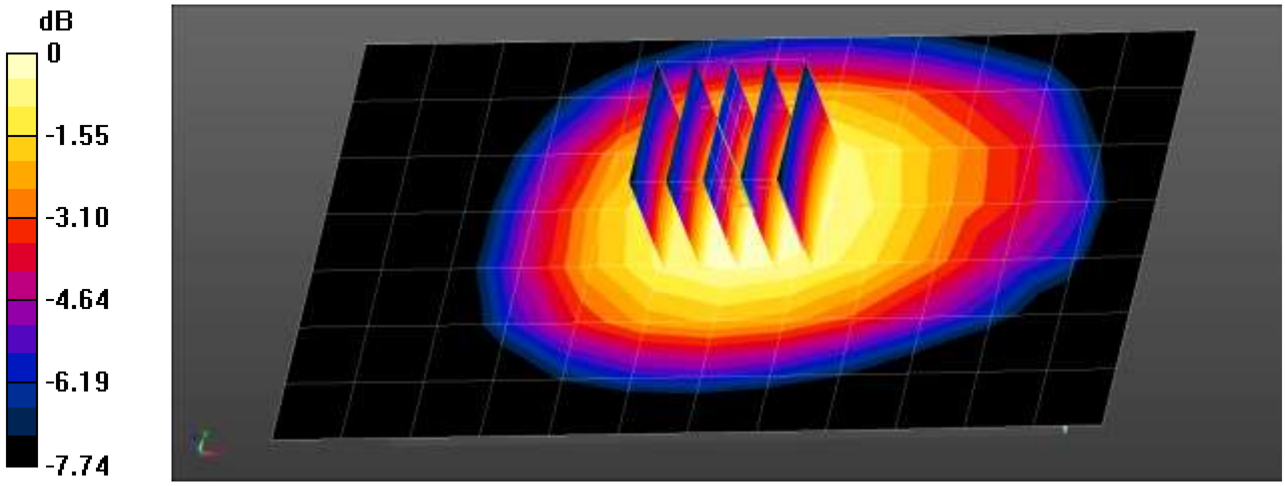
Communication System: UID 0, GSM850 GPRS 4TX (0); Frequency: 848.8 MHz;Duty Cycle: 1:2.07491
Medium parameters used (interpolated): f = 848.8 MHz; σ = 0.962 S/m; ε_r = 53.169; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3967; ConvF(9.58, 9.58, 9.58); Calibrated: 2018-01-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2018-01-16
- Phantom: MFP
- Measurement SW: DASY52, Version 52.8 (8);

LM-X210JM/GSM850 Body Rear 4Tx 251ch/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.27 W/kg

LM-X210JM/GSM850 Body Rear 4Tx 251ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 36.99 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 1.41 W/kg
SAR(1 g) = 1.07 W/kg; SAR(10 g) = 0.818 W/kg
Maximum value of SAR (measured) = 1.29 W/kg



0 dB = 1.29 W/kg = 1.11 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth4.2LE, WIFI802.11 b/g/n
Liquid Temperature:	20.8℃
Ambient Temperature:	21.1 ℃
Test Date:	05/29/2018
Plot No.:	11

DUT: LM-X210JM; Type: Bar

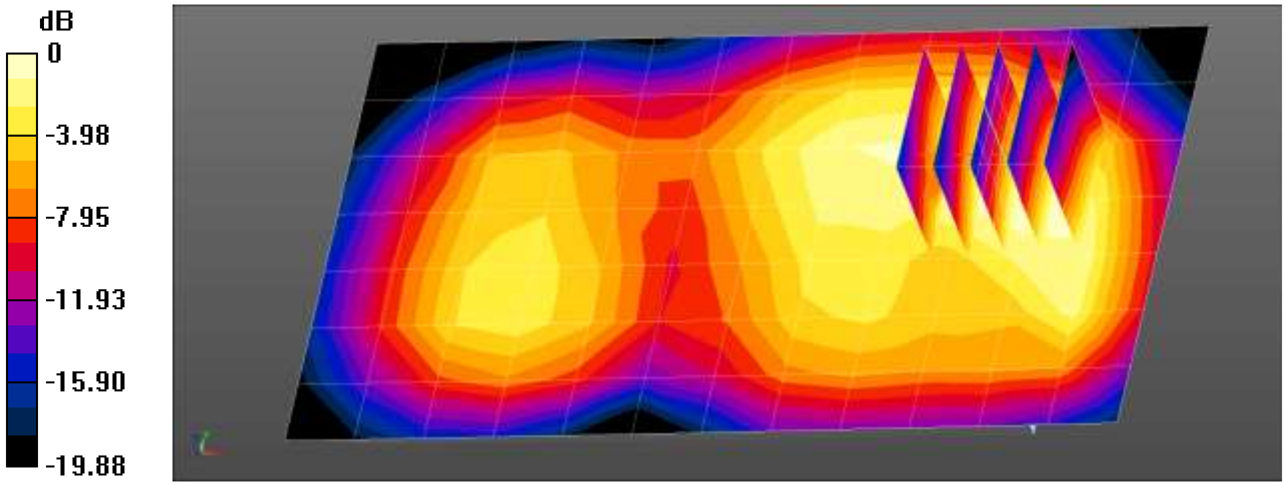
Communication System: UID 0, GSM 1900 (0); Frequency: 1880 MHz;Duty Cycle: 1:8.30042
Medium parameters used: f = 1880 MHz; σ = 1.541 S/m; ε_r = 51.955; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(7.84, 7.84, 7.84); Calibrated: 2018-04-25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2018-04-20
- Phantom: Triple Flat Phantom
- Measurement SW: DASY52, Version 52.8 (8);

LM-X210JM/GSM1900 Body Rear Voice 661ch/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.603 W/kg

LM-X210JM/GSM1900 Body Rear Voice 661ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.436 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.748 W/kg
SAR(1 g) = 0.414 W/kg; SAR(10 g) = 0.240 W/kg
Maximum value of SAR (measured) = 0.592 W/kg



0 dB = 0.592 W/kg = -2.28 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth4.2LE, WIFI802.11 b/g/n
Liquid Temperature:	20.8℃
Ambient Temperature:	21.1 ℃
Test Date:	05/29/2018
Plot No.:	12

DUT: LM-X210JM; Type: Bar

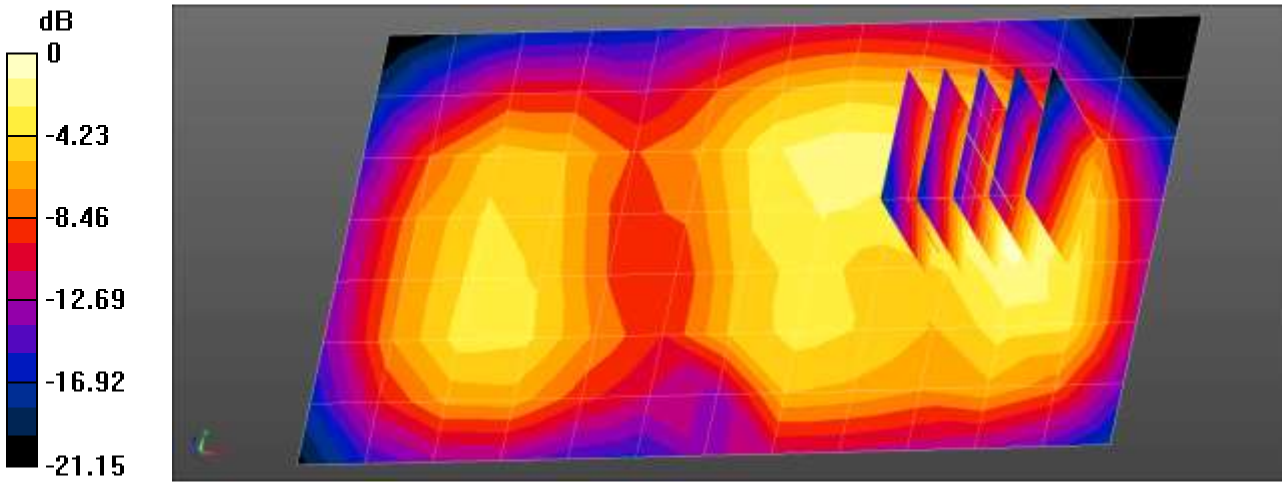
Communication System: UID 0, GSM 1900 4TX (0); Frequency: 1880 MHz;Duty Cycle: 1:2.07491
Medium parameters used: f = 1880 MHz; σ = 1.541 S/m; ε_r = 51.955; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(7.84, 7.84, 7.84); Calibrated: 2018-04-25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2018-04-20
- Phantom: Triple Flat Phantom
- Measurement SW: DASY52, Version 52.8 (8);

LM-X210JM/GSM1900 Body Rear 4Tx 661ch/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.843 W/kg

LM-X210JM/GSM1900 Body Rear 4Tx 661ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.46 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 1.07 W/kg
SAR(1 g) = 0.571 W/kg; SAR(10 g) = 0.315 W/kg
Maximum value of SAR (measured) = 0.872 W/kg



0 dB = 0.872 W/kg = -0.59 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth4.2LE, WIFI802.11 b/g/n
Liquid Temperature:	21.0℃
Ambient Temperature:	21.3℃
Test Date:	05/30/2018
Plot No.:	13

DUT: LM-X210JM; Type: Bar

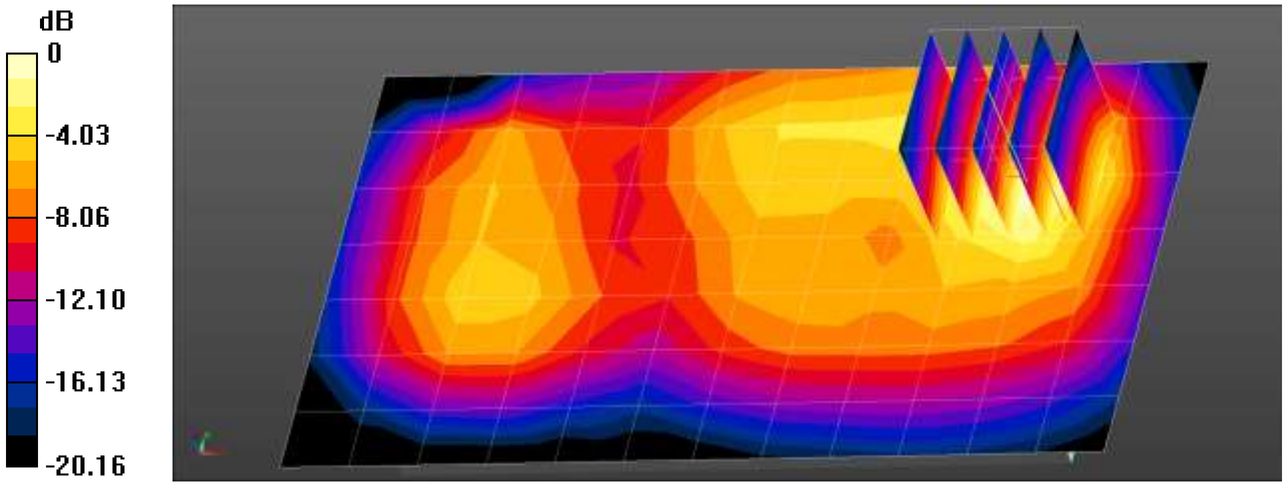
Communication System: UID 0, WCDMA850 (0); Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.951 S/m; ε_r = 53.362; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3967; ConvF(9.58, 9.58, 9.58); Calibrated: 2018-01-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2018-01-16
- Phantom: MFP
- Measurement SW: DASY52, Version 52.8 (8);

LM-X210JM/WCDMA850 Body Rear 4183ch/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.513 W/kg

LM-X210JM/WCDMA850 Body Rear 4183ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.80 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.639 W/kg
SAR(1 g) = 0.329 W/kg; SAR(10 g) = 0.173 W/kg
Maximum value of SAR (measured) = 0.504 W/kg



0 dB = 0.504 W/kg = -2.98 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth4.2LE, WIFI802.11 b/g/n
Liquid Temperature:	20.8℃
Ambient Temperature:	21.1 ℃
Test Date:	05/29/2018
Plot No.:	14

DUT: LM-X210JM; Type: Bar

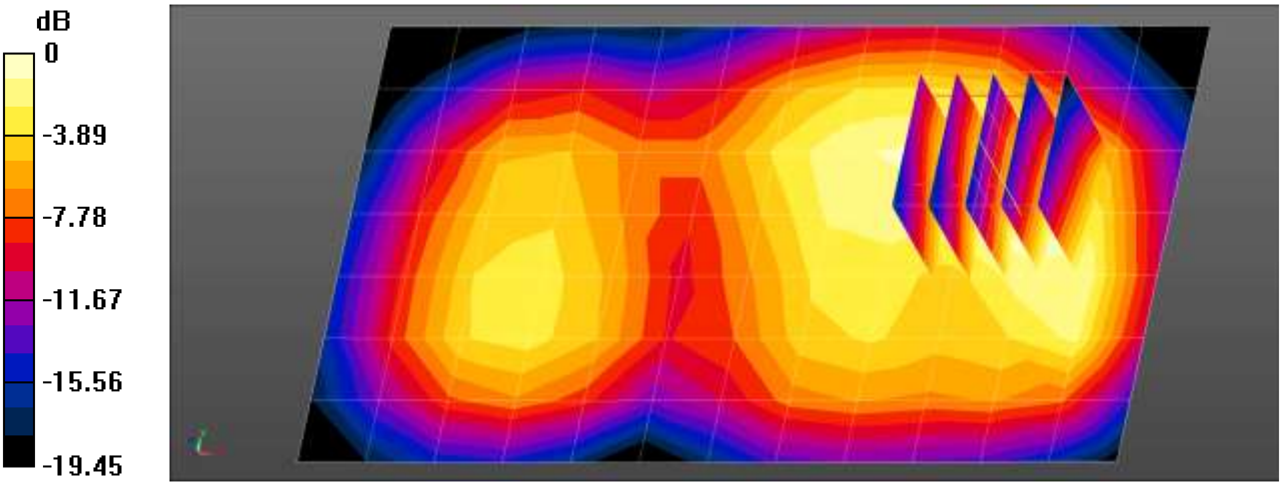
Communication System: UID 0, WCDMA1900 (0); Frequency: 1852.4 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.515 S/m; ε_r = 52.077; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(7.84, 7.84, 7.84); Calibrated: 2018-04-25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2018-04-20
- Phantom: Triple Flat Phantom
- Measurement SW: DASY52, Version 52.8 (8);

LM-X210JM/WCDMA1900 Body Rear 9262ch/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.27 W/kg

LM-X210JM/WCDMA1900 Body Rear 9262ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.71 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 1.56 W/kg
SAR(1 g) = 0.893 W/kg; SAR(10 g) = 0.525 W/kg
Maximum value of SAR (measured) = 1.29 W/kg



0 dB = 1.29 W/kg = 1.11 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth4.2LE, WIFI802.11 b/g/n
Liquid Temperature:	21.0℃
Ambient Temperature:	21.3℃
Test Date:	05/30/2018
Plot No.:	15

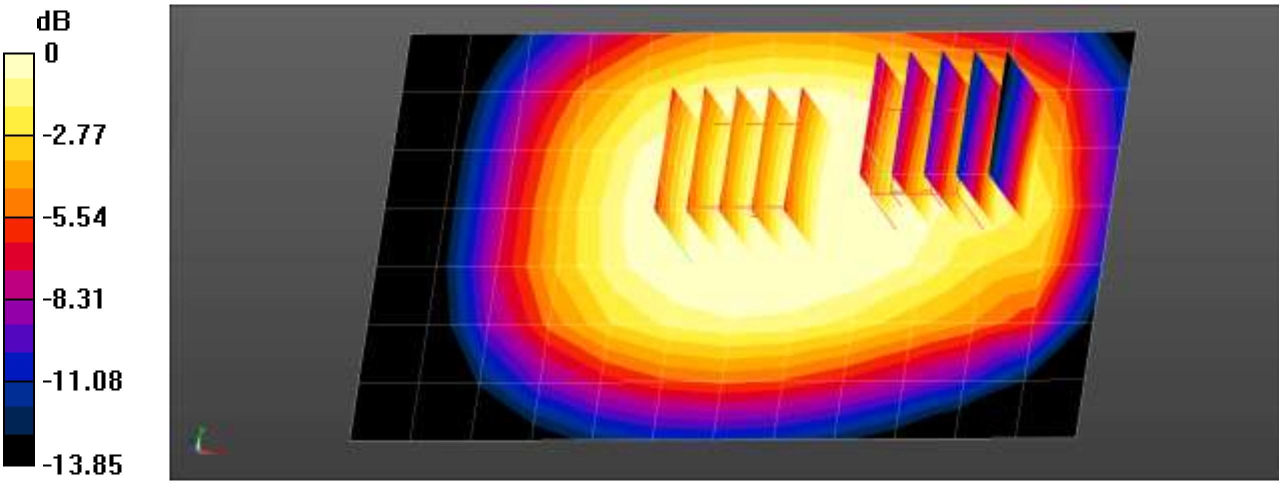
DUT: LM-X210JM; Type: Bar

Communication System: UID 0, LTE Band 5 (0); Frequency: 836.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.5 MHz; σ = 0.951 S/m; ε_r = 53.363; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3967; ConvF(9.58, 9.58, 9.58); Calibrated: 2018-01-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2018-01-16
- Phantom: MFP
- Measurement SW: DASY52, Version 52.8 (8);

LM-X210JM/LTE Band5 Body Rear QPSK 10MHz 1RB 24offset 20525ch/Area Scan (8x13x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.20 W/kg
LM-X210JM/LTE Band5 Body Rear QPSK 10MHz 1RB 24offset 20525ch/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 35.49 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 1.31 W/kg
SAR(1 g) = 1 W/kg; SAR(10 g) = 0.771 W/kg
Maximum value of SAR (measured) = 1.19 W/kg
LM-X210JM/LTE Band5 Body Rear QPSK 10MHz 1RB 24offset 20525ch/Zoom Scan (5x5x7)/Cube 1:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 35.49 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 0.984 W/kg
SAR(1 g) = 0.667 W/kg; SAR(10 g) = 0.452 W/kg
Maximum value of SAR (measured) = 0.898 W/kg



0 dB = 0.898 W/kg = -0.47 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: GSM/WCDMA/LTE Phone with Bluetooth4.2LE, WIFI802.11 b/g/n
Liquid Temperature: 21.5℃
Ambient Temperature: 21.9℃
Test Date: 05/31/2018
Plot No.: 16

DUT LM-X210JM; Type: Bar

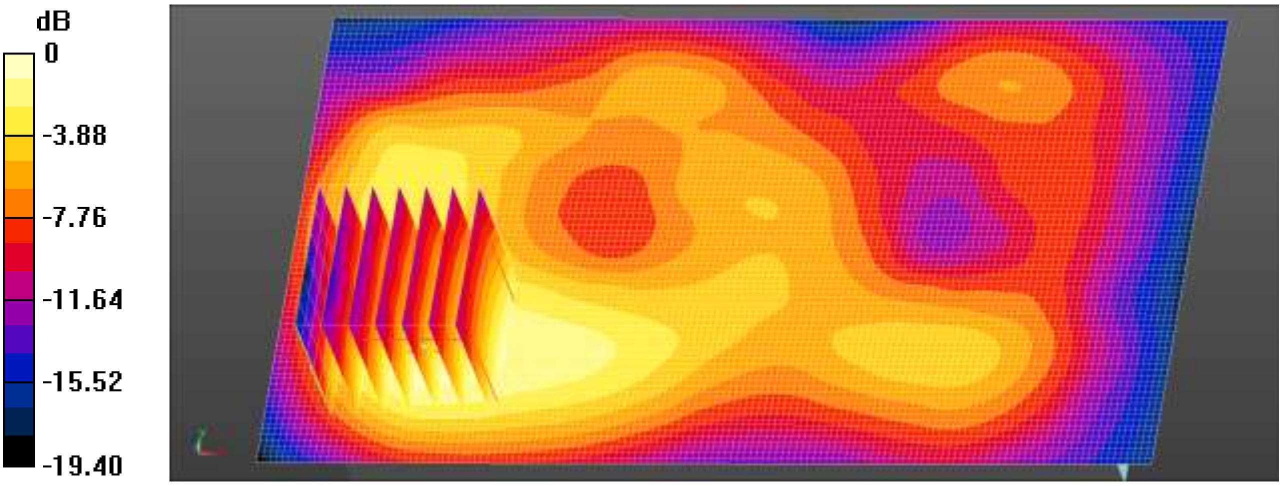
Communication System: UID 0, 2450MHz FCC (0); Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.921 S/m; ε_r = 51.706; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3903; ConvF(7.65, 7.65, 7.65); Calibrated: 2017-09-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2017-08-29
- Phantom: MFP
- Measurement SW: DASY52, Version 52.8 (8);

LM-X210JM/802.11b Body Rear 1Mbps 6ch/Area Scan (81x141x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.255 W/kg

LM-X210JM/802.11b Body Rear 1Mbps 6ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.659 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 0.292 W/kg
SAR(1 g) = 0.157 W/kg; SAR(10 g) = 0.082 W/kg
Maximum value of SAR (measured) = 0.234 W/kg



0 dB = 0.255 W/kg = -5.94 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth4.2LE, WIFI802.11 b/g/n
Liquid Temperature:	20.8℃
Ambient Temperature:	21.1 ℃
Test Date:	05/29/2018
Plot No.:	17

DUT: LM-X210JM; Type: Bar

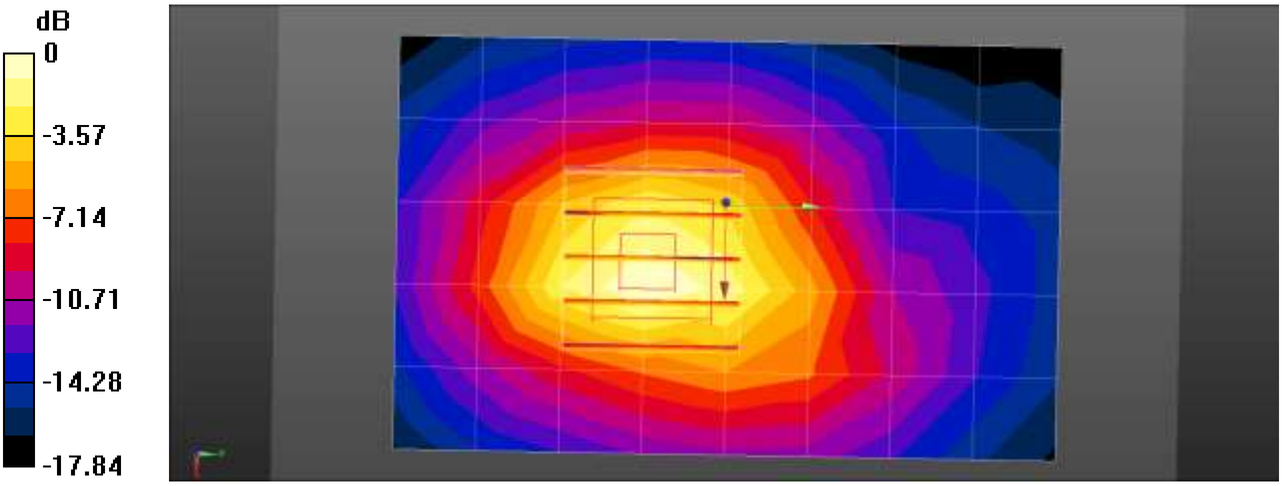
Communication System: UID 0, GSM 1900 4TX (0); Frequency: 1880 MHz;Duty Cycle: 1:2.07491
Medium parameters used: f = 1880 MHz; σ = 1.541 S/m; ε_r = 51.955; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(7.84, 7.84, 7.84); Calibrated: 2018-04-25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2018-04-20
- Phantom: Triple Flat Phantom
- Measurement SW: DASY52, Version 52.8 (8);

LM-X210JM/GSM1900 Body Bottom 4Tx 661ch/Area Scan (9x6x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.890 W/kg

LM-X210JM/GSM1900 Body Bottom 4Tx 661ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.63 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 1.17 W/kg
SAR(1 g) = 0.656 W/kg; SAR(10 g) = 0.349 W/kg
Maximum value of SAR (measured) = 0.996 W/kg



0 dB = 0.890 W/kg = -0.51 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth4.2LE, WIFI802.11 b/g/n
Liquid Temperature:	20.8℃
Ambient Temperature:	21.1 ℃
Test Date:	05/29/2018
Plot No.:	18

DUT: LM-X210JM; Type: Bar

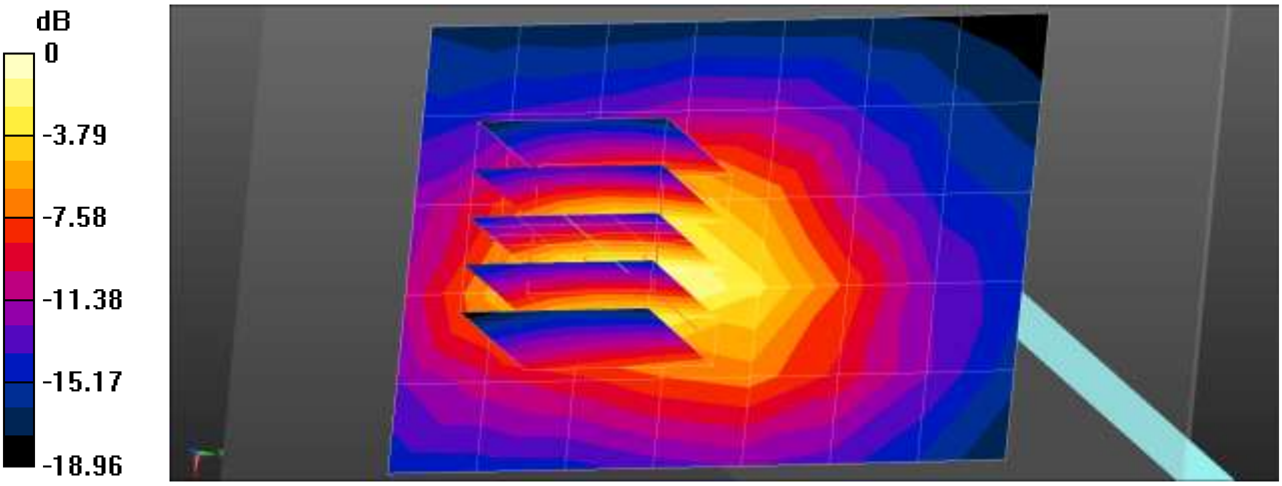
Communication System: UID 0, WCDMA1900 (0); Frequency: 1852.4 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.515 S/m; ε_r = 52.077; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(7.84, 7.84, 7.84); Calibrated: 2018-04-25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2018-04-20
- Phantom: Triple Flat Phantom
- Measurement SW: DASY52, Version 52.8 (8);

LM-X210JM/WCDMA1900 Body Bottom 9262ch/Area Scan (8x6x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.29 W/kg

LM-X210JM/WCDMA1900 Body Bottom 9262ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.40 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 1.83 W/kg
SAR(1 g) = 1.03 W/kg; SAR(10 g) = 0.534 W/kg
Maximum value of SAR (measured) = 1.56 W/kg



0 dB = 1.56 W/kg = 1.93 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: GSM/WCDMA/LTE Phone with Bluetooth4.2LE, WIFI802.11 b/g/n
Liquid Temperature: 21.5℃
Ambient Temperature: 21.9℃
Test Date: 05/31/2018
Plot No.: 19

DUT: LM-X210JM; Type: Bar

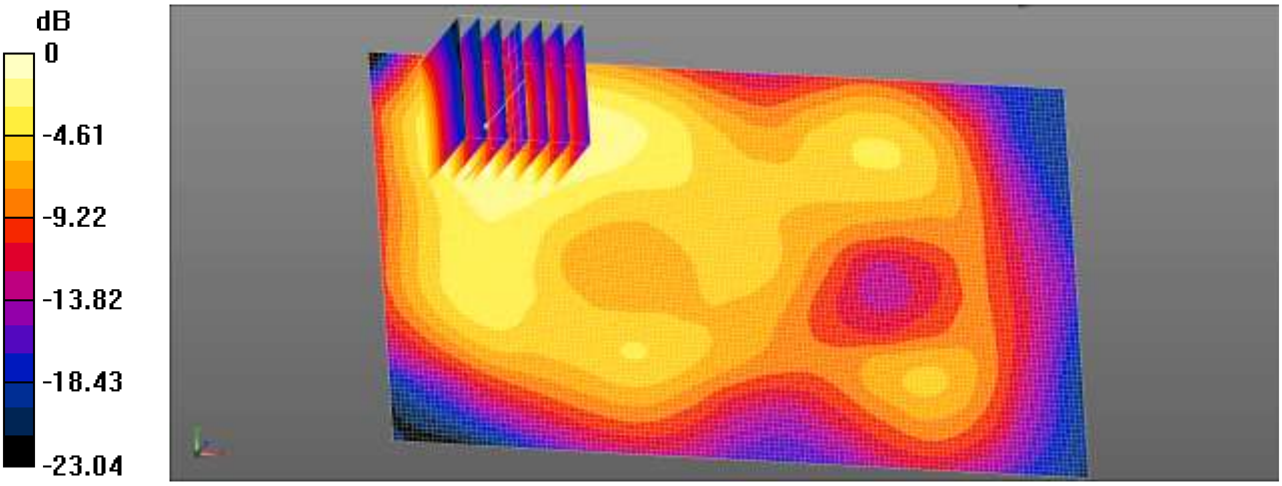
Communication System: UID 0, 2450MHz FCC (0); Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.921 S/m; ε_r = 51.706; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3903; ConvF(7.65, 7.65, 7.65); Calibrated: 2017-09-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2017-08-29
- Phantom: MFP
- Measurement SW: DASY52, Version 52.8 (8);

LM-X210JM/802.11b Body Front 1Mbps 6ch/Area Scan (81x141x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.267 W/kg

LM-X210JM/802.11b Body Front 1Mbps 6ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.362 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 0.345 W/kg
SAR(1 g) = 0.179 W/kg; SAR(10 g) = 0.094 W/kg
Maximum value of SAR (measured) = 0.277 W/kg



0 dB = 0.277 W/kg = -5.58 dBW/kg

Attachment 2. – Dipole Verification Plots

■ Verification Data (835 MHz Head)

Test Laboratory:	HCT CO., LTD
Input Power	50 mW
Liquid Temp:	20.9 ℃
Test Date:	05/29/2018

DUT: Dipole 835 MHz D835V2; Type: D835V2

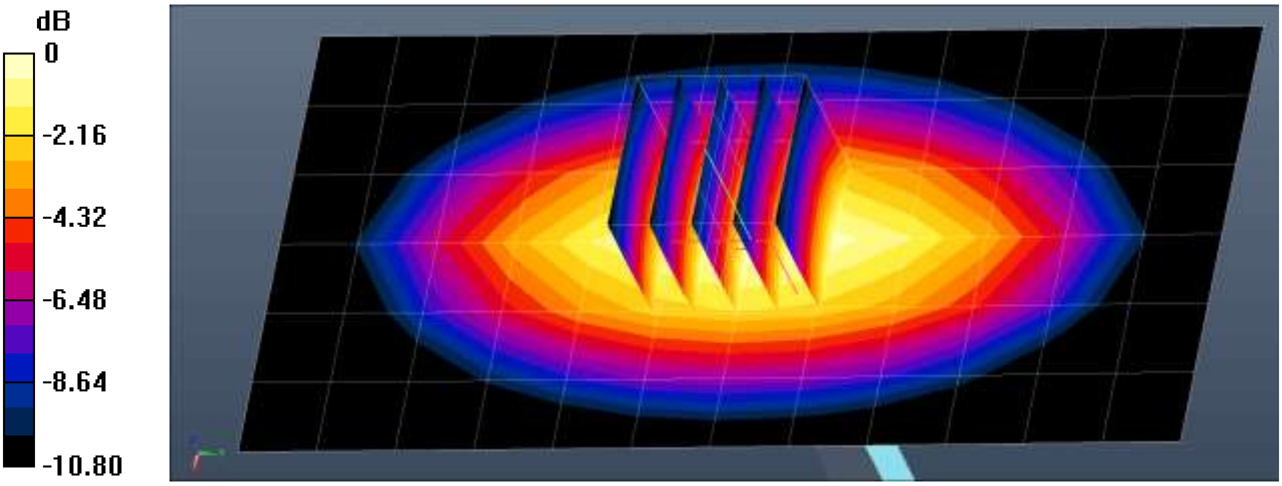
Communication System: UID 0, CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835 MHz; σ = 0.909 S/m; ε_r = 41.32; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3797; ConvF(9.27, 9.27, 9.27); Calibrated: 2017-11-22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2017-09-20
- Phantom: SAM
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/835MHz Head Verification/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.500 W/kg

Dipole/835MHz Head Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.60 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.701 W/kg
SAR(1 g) = 0.465 W/kg; SAR(10 g) = 0.301 W/kg
Maximum value of SAR (measured) = 0.501 W/kg



0 dB = 0.501 W/kg = −3.00 dBW/kg

■ Verification Data (835 MHz Head)

Test Laboratory:	HCT CO., LTD
Input Power	50 mW
Liquid Temp:	20.4℃
Test Date:	05/30/2018

DUT: Dipole 835 MHz D835V2; Type: D835V2

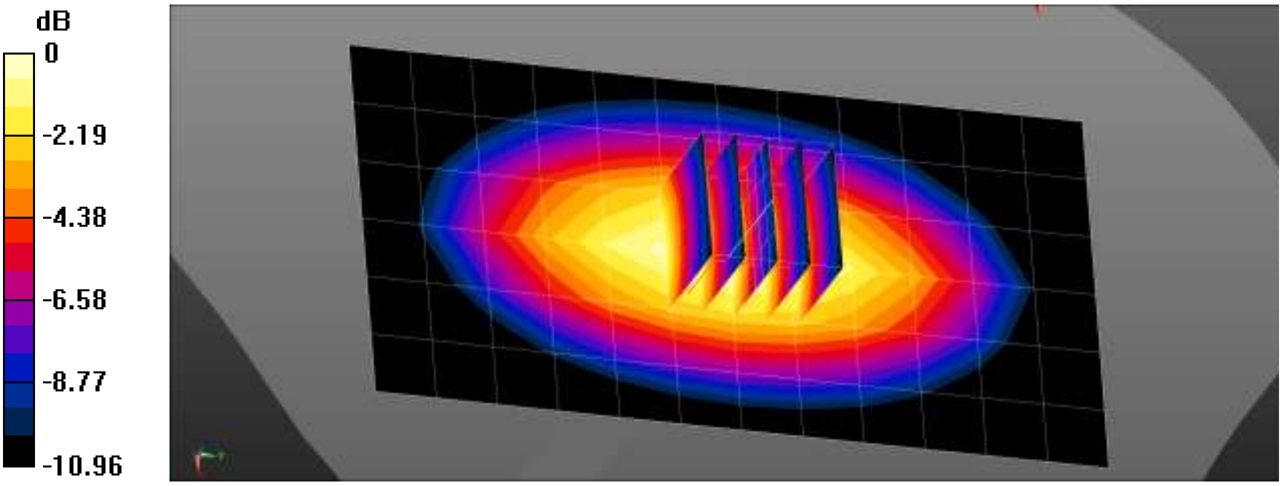
Communication System: UID 0, CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835 MHz; σ = 0.906 S/m; ε_r = 41.078; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(9.95, 9.95, 9.95); Calibrated: 2018-04-25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2018-04-20
- Phantom: SAM
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/835MHz Head Verification/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.489 W/kg

Dipole/835MHz Head Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.48 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.680 W/kg
SAR(1 g) = 0.452 W/kg; SAR(10 g) = 0.293 W/kg



0 dB = 0.489 W/kg = -3.11 dBW/kg

■ Verification Data (835 MHz Body)

Test Laboratory:	HCT CO., LTD
Input Power	50 mW
Liquid Temp:	21.0 ℃
Test Date:	05/30/2018

DUT: Dipole 835 MHz D835V2; Type: D835V2

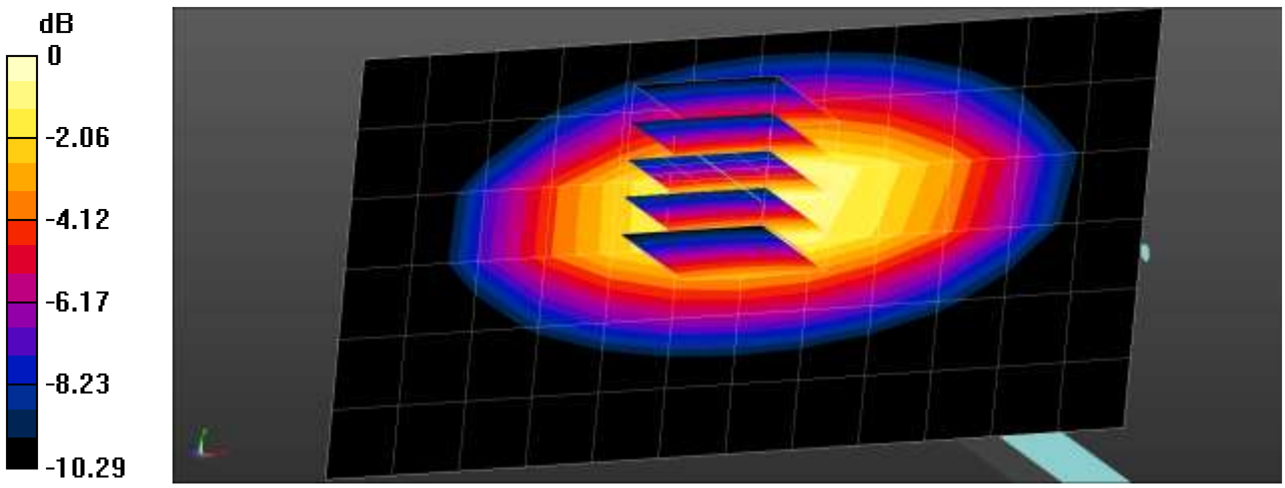
Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835 MHz; σ = 0.95 S/m; ε_r = 53.386; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3967; ConvF(9.58, 9.58, 9.58); Calibrated: 2018-01-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2018-01-16
- Phantom: MFP
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/835MHz Body Verification/Area Scan (13x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.555 W/kg

Dipole/835MHz Body Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.25 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.723 W/kg
SAR(1 g) = 0.485 W/kg; SAR(10 g) = 0.322 W/kg
Maximum value of SAR (measured) = 0.643 W/kg



0 dB = 0.643 W/kg = -1.92 dBW/kg

■ Verification Data (1900 MHz Head)

Test Laboratory:	HCT CO., LTD
Input Power	50 mW
Liquid Temp:	19.9 ℃
Test Date:	05/29/2018

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2

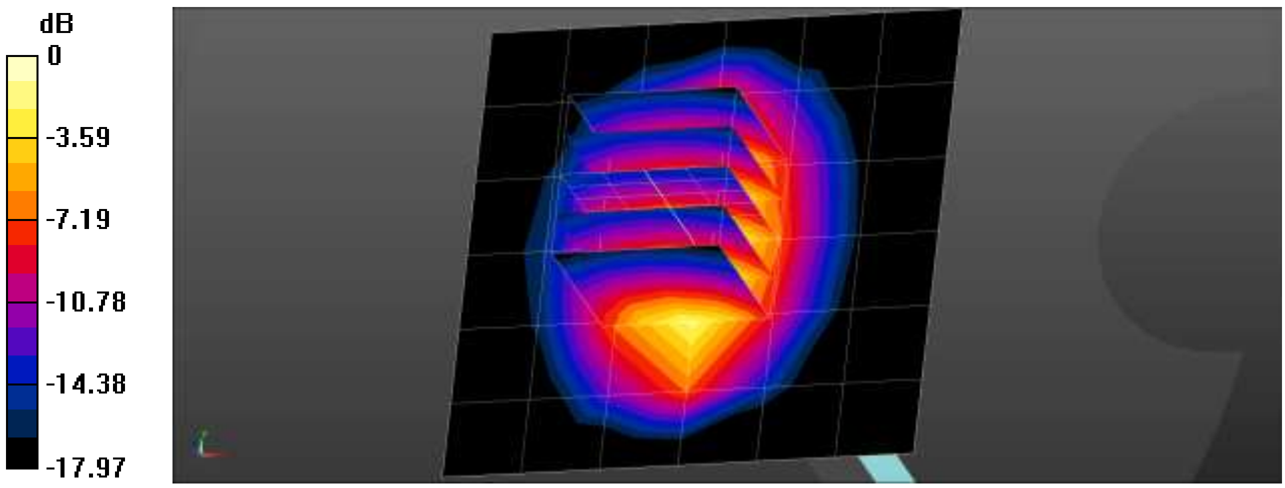
Communication System: UID 0, CW (0); Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.408 S/m; ε_r = 39.094; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3903; ConvF(8.44, 8.44, 8.44); Calibrated: 2017-09-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2017-08-29
- Phantom: SAM
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/1900MHz Head Verification/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.82 W/kg

Dipole/1900MHz Head Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 45.45 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 3.74 W/kg
SAR(1 g) = 1.97 W/kg; SAR(10 g) = 1.01 W/kg
Maximum value of SAR (measured) = 2.89 W/kg



0 dB = 2.89 W/kg = 4.61 dBW/kg

■ Verification Data (1900 MHz Body)

Test Laboratory:	HCT CO., LTD
Input Power	50 mW
Liquid Temp:	20.8 ℃
Test Date:	05/29/2018

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2

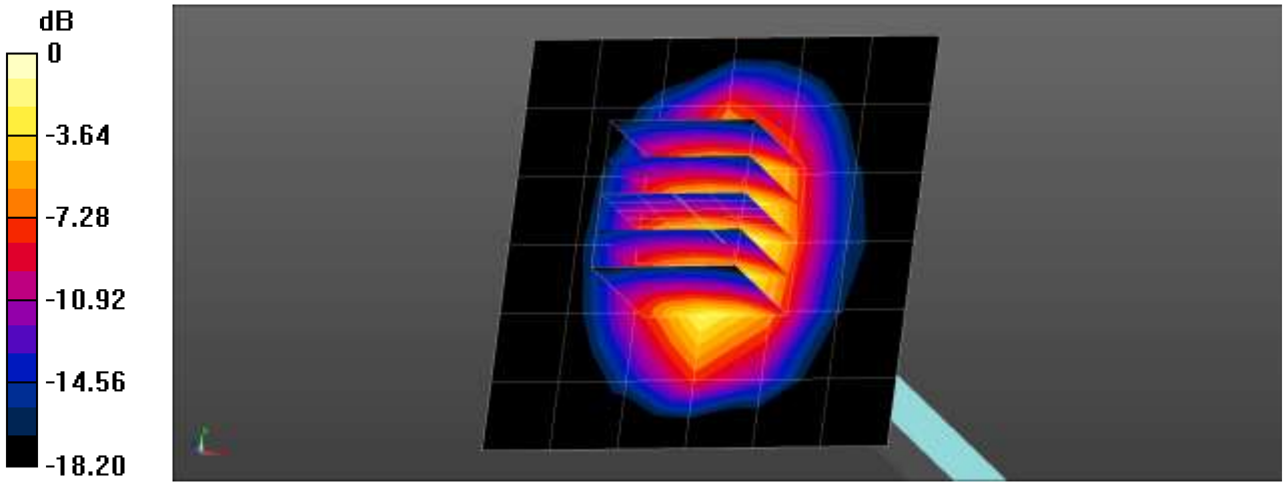
Communication System: UID 0, CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.558 S/m; ε_r = 51.93; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(7.84, 7.84, 7.84); Calibrated: 2018-04-25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2018-04-20
- Phantom: Triple Flat Phantom
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/1900MHz Body Verification/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.19 W/kg

Dipole/1900MHz Body Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 37.54 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 3.79 W/kg
SAR(1 g) = 2.01 W/kg; SAR(10 g) = 1.02 W/kg
Maximum value of SAR (measured) = 2.27 W/kg



0 dB = 2.27 W/kg = 3.56 dBW/kg

■ Verification Data (2 450 MHz Head)

Test Laboratory:	HCT CO., LTD
Input Power	50 mW
Liquid Temp:	21.6 ℃
Test Date:	05/31/2018

DUT: Dipole 2450 MHz D2450V2; Type: D2450V2

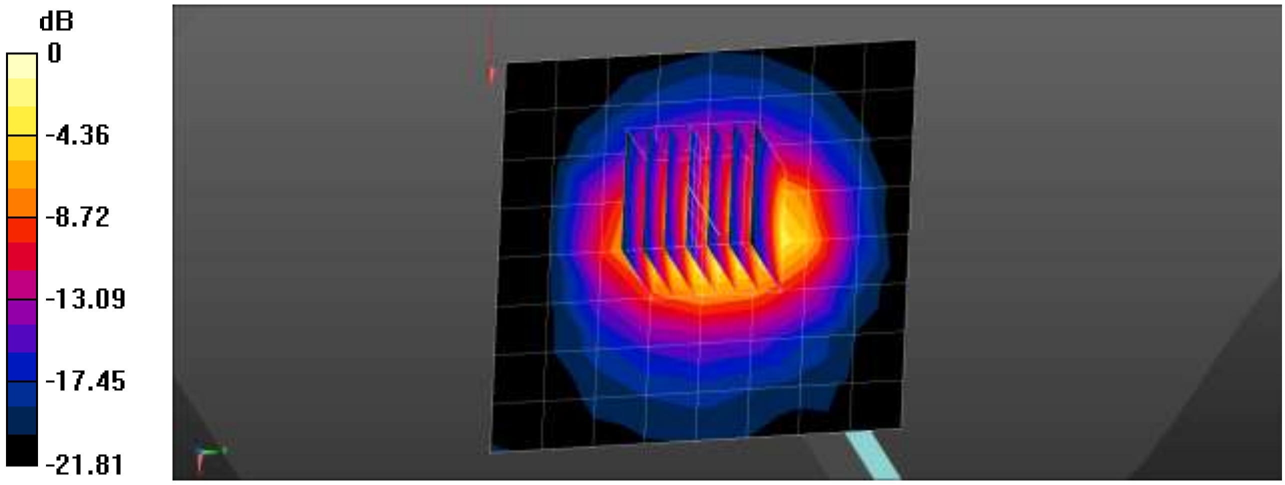
Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.833 S/m; ε_r = 39.555; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3903; ConvF(7.56, 7.56, 7.56); Calibrated: 2017-09-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2017-08-29
- Phantom: Twin-SAM
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/2450MHz Head Verification/Area Scan (9x9x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 3.78 W/kg

Dipole/2450MHz Head Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 50.00 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 5.25 W/kg
SAR(1 g) = 2.46 W/kg; SAR(10 g) = 1.14 W/kg
Maximum value of SAR (measured) = 4.19 W/kg



0 dB = 4.19 W/kg = 6.22 dBW/kg

■ Verification Data (2 450 MHz Body)

Test Laboratory:	HCT CO., LTD
Input Power	50 mW
Liquid Temp:	21.5 ℃
Test Date:	05/31/2018

DUT: Dipole 2450 MHz D2450V2; Type: D2450V2

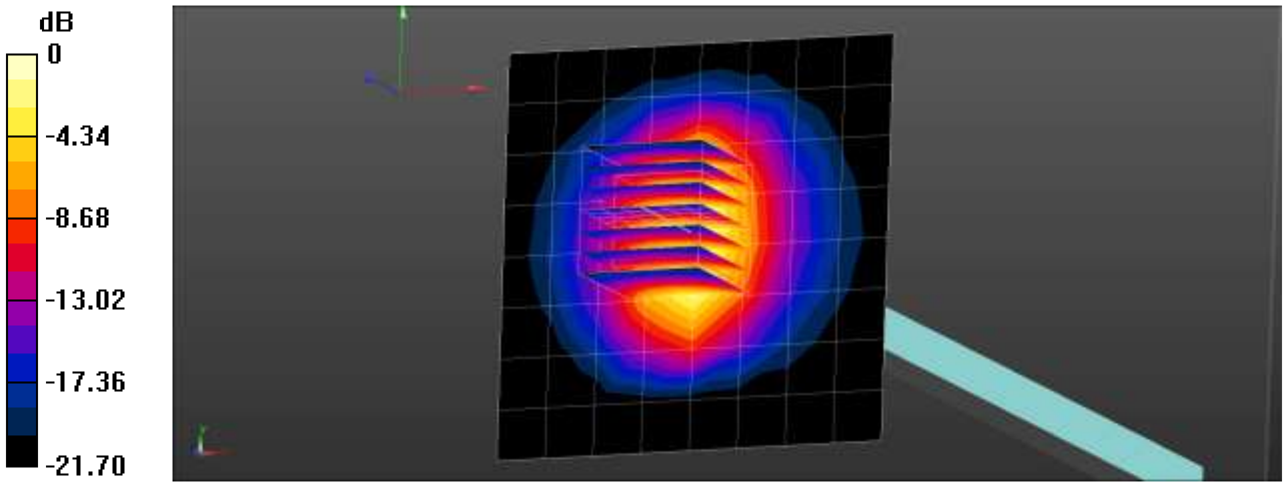
Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.944 S/m; ε_r = 51.662; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3903; ConvF(7.65, 7.65, 7.65); Calibrated: 2017-09-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2017-08-29
- Phantom: MFP
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/2450MHz Body Verification/Area Scan (9x9x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 3.76 W/kg

Dipole/2450MHz Body Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 45.72 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 4.84 W/kg
SAR(1 g) = 2.43 W/kg; SAR(10 g) = 1.13 W/kg
Maximum value of SAR (measured) = 3.92 W/kg



0 dB = 3.92 W/kg = 5.93 dBW/kg

Attachment 3.– SAR Tissue Characterization

The brain and muscle mixtures consist of a viscous gel using hydrox-ethyl cellulose (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.

Ingredients (% by weight)	Frequency (MHz)					
	835		1 900		2 450 – 2 700	
Tissue Type	Head	Body	Head	Body	Head	Body
Water	40.45	53.06	54.9	70.17	71.88	73.2
Salt (NaCl)	1.45	0.94	0.18	0.39	0.16	0.1
Sugar	57.0	44.9	0.0	0.0	0.0	0.0
HEC	1.0	1.0	0.0	0.0	0.0	0.0
Bactericide	0.1	0.1	0.0	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	19.97	0.0
DGBE	0.0	0.0	44.92	29.44	7.99	26.7
Diethylene glycol hexyl ether	-	-	-	-	-	-

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		

Composition of the Tissue Equivalent Matter

Attachment 4.– SAR SYSTEM VALIDATION

Per FCC KCB 865664 D02v01r02, SAR system validation status should be document to confirm measurement accuracy. The SAR systems (including SAR probes, system components and software versions) used for this device were validated against its performance specifications prior to the SAR measurements. Reference dipoles were used with the required tissue- equivalent media for system validation, according to the procedures outlined in IEEE 1528-2013 and FCC KDB 865664 D01v01r04. Since SAR probe calibrations are frequency dependent, each probe calibration point was validated at a frequency within the valid frequency range of the probe calibration point, using the system that normally operates with the probe for routine SAR measurements and according to the required tissue-equivalent media.

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

SAR System No.	Probe	Probe Type	Probe Calibration Point		Dipole	Date	Dielectric Parameters		CW Validation			Modulation Validation		
							Measured Permittivity	Measured Conductivity	Sensitivity	Probe Linearity	Probe Isotropy	MOD. Type	Duty Factor	PAR
3	3797	EX3DV4	Head	835	441	2017-12-04	41.6	0.90	PASS	PASS	PASS	N/A	N/A	N/A
3	3797	EX3DV4	Head	835	441	2017-12-04	41.6	0.90	PASS	PASS	PASS	GMSK	PASS	N/A
1	3863	EX3DV4	Head	835	441	2018-05-14	41.6	0.92	PASS	PASS	PASS	N/A	N/A	N/A
8	3967	EX3DV4	Body	835	441	2018-02-09	55.4	0.99	PASS	PASS	PASS	N/A	N/A	N/A
8	3967	EX3DV4	Body	835	441	2018-02-09	55.5	1.01	PASS	PASS	PASS	GMSK	PASS	N/A
5	3903	EX3DV4	Head	1900	5d061	2018-04-04	40.1	1.42	PASS	PASS	PASS	N/A	N/A	N/A
5	3903	EX3DV4	Head	1900	5d061	2018-04-04	40.1	1.42	PASS	PASS	PASS	GMSK	PASS	N/A
1	3863	EX3DV4	Body	1900	5d061	2018-05-14	53.5	1.52	PASS	PASS	PASS	GMSK	PASS	N/A
1	3863	EX3DV4	Body	1900	5d061	2018-05-14	53.5	1.52	PASS	PASS	PASS	N/A	N/A	N/A
5	3903	EX3DV4	Head	2450	965	2018-02-26	39.2	1.83	PASS	PASS	PASS	OFDM	N/A	PASS
5	3903	EX3DV4	Body	2450	965	2018-02-26	52.8	1.94	PASS	PASS	PASS	OFDM	N/A	PASS

SAR System Validation Summary 1g

Note;

All measurement were performed using probes calibrated for CW signal only. Modulations in the table above represent test configurations for which the measurement system has been validated per FCC KDB Publication 865664 D01v01r04. SAR system were validated for modulated signals with a periodic duty cycle, such as GMSK, or with a high peak to average ratio (>5 dB), such as OFDM according to KDB 865664 D01v01r04.