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SAR TEST REPORT

Applicant Name: **SAMSUNG Electronics Co., Ltd.** 129, Samsung-ro, Yeongtong-gu, Suwon-Si, Gyeonggi-do, 16677 Rep. of Korea	**Date of Issue:** 01. 18, 2019 **Test Report No.:** HCT-SR-1901-FC002 **Test Site: HCT CO., LTD.**

FCC ID: A3LSMM205FN

Equipment Type:	**Mobile Phone**
Application Type	**Class II Permissive change**
FCC Rule Part(s):	**CFR §2.1093**
Model Name:	**SM-M205FN/DS**
Date of Test:	**01/15/2019 ~01/16/2019**

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 FCC KDB procedures and had been tested in accordance with the measurement procedures specified in FCC KDB procedures.

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**
Da-sol, Lee **Test Engineer** **SAR Team** **Certification Division**	**Yun-jeang, Heo** **Technical Manager** **SAR Team** **Certification Division**

DOCUMENT HISTORY

Rev.	DATE	DESCRIPTION
HCT-SR-1901-FC002	01. 18, 2019	First Approval Report

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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						
Applicant Name:	SAMSUNG Electronics Co., Ltd.					
FCC ID:	A3LSMM205FN					
Model:	SM-M205FN/DS					
EUT Type:	Mobile Phone					
Application Type:	Class II Permissive change					
The Highest Reported SAR						
Band	**Tx. Frequency**	**Equipment Class**	**SAR (W/kg)**			
			1g Head	**1g Body-Worn**	**1g Hotspot**	**10g Extremity**
	(MHz)		**(W/Kg)**	**(W/Kg)**	**(W/Kg)**	**(W/Kg)**
GSM/GPRS/EDGE 850	824.2 ~ 848.8	PCE	0.10	0.24	0.63	N/A
GSM/GPRS/EDGE 1900	1 850.2 ~ 1 909.8	PCE	0.05	0.25	0.72	N/A
UMTS 850	826.4 ~ 846.6	PCE	0.16	0.16	0.48	N/A
UMTS 1900	1 852.4 ~ 1 907.6	PCE	0.07	0.54	**0.65**	N/A
LTE Band 5 (Cell)	824.7 ~ 848.3	PCE	0.18	0.11	0.20	N/A
LTE TDD Band 41	2 498.5 ~ 2 687.5	PCE	0.14	0.47	**1.15**	**0.87**
802.11b	2 412 ~ 2 462	DTS	0.12	<0.10	0.16	N/A
Bluetooth	2 402 ~ 2 480	DSS	<0.10	<0.10	<0.10	N/A
Simultaneous SAR per KDB 690783 D01v01r03			0.30	0.59	**1.31**	N/A
Date(s) of Tests:	01/15/2019 ~ 01/16/2019					

2. DEVICE UNDER TEST DESCRIPTION

2.1 DUT specification

Device Wireless specification overview		
Band & Mode	**Operating Mode**	**Tx Frequency**
GSM850	Voice / Data	824.2 ~ 848.8 MHz
GSM1900	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
LTE TDD Band 41	Voice / Data	2 498.5 ~ 2 687.5 MHz
2.4 GHz WLAN	Voice / Data	2 412 ~ 2 462 MHz
Bluetooth / LE 5.0	Data	2 402 ~ 2 480 MHz
NFC	Data	13.56 MHz
Device Description		
Device Dimension	Overall (Length x Width): 156.4 mm x 74.5 mm Overall Diagonal: 160 mm Display Diagonal: 155.9 mm	
Battery Options	Standard (Li-ion Polymer Battery)	
	Battery Model Name: EB-BG580ABU (SDI)	
Device Serial Numbers	Mode	Serial Number
	UMTS 1900	R38KB0KXQWT
	LTE TDD Band 41	R38KB0KXRNA
	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 Power Reduction for SAR

This device utilizes a power reduction mechanism for WCDMA 2 and LTE 41 band for SAR compliance under hotspot conditions and under some conditions when the device is being used in close proximity to the user's hand. All hotspot SAR evaluations for this device were performed at the maximum allowed output power when Hotspot is enabled. FCC KDB Publication 616217 D04v01r02 Sec.6 was used as a guideline for selecton SAR test distances for device when being used in phablet use conditions.

The reduced powers for the power reduction mechanisms were conformed via conducted power measurements at the RF Port .

2.3 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.

2.3.1 Maximum PCE Output Power

Mode/Band		Modulated Average (dBm)				
		3GPP WCDMA	AMR	3GPP HSDPA	3GPP HSUPA	DC-HSDPA
UMTS Band 2 (1900 MHz)	Maximum	24.0	23.5	23.5	23.8	23.5
	Nominal	23.0	22.5	22.5	22.8	22.5

Mode / Band		Modulated Average (dBm)
LTE TDD Band 41	Maximum	21.7
	Nominal	20.7

2.3.2 Reduced PCE Power

Mode/Band		Modulated Average (dBm)				
		3GPP WCDMA	AMR	3GPP HSDPA	3GPP HSUPA	DC-HSDPA
UMTS Band 2(1900 MHz) Hotspot mode, Grip sensor	Maximum	22.0	21.5	21.5	21.8	21.5
	Nominal	21.0	20.5	20.5	20.8	20.5

Mode / Band		Modulated Average (dBm)
LTE Band 41 Hotspot mode, Grip sensor	Maximum	19.7
	Nominal	18.7

2.4 LTE information

Item.			Description			
Frequency Range	LTE Band 5 (Cell)		824.7 ~ 848.3 MHz			
	LTE TDD Band 41		2 498.5 ~ 2 687.5 MHz			
Channel Bandwidths	LTE Band 5 (Cell)		1.4 MHz, 3 MHz, 5 MHz, 10 MHz			
	LTE TDD Band 41		5 MHz, 10 MHz, 15 MHz, 20 MHz			
Channel Numbers & Freq.(MHz)			Low		Mid	High
LTE Band 5	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)
LTE Band 41	5 MHz	2 498.5(39675)	2 545.8(40148)	2 593.0(40620)	2 640.3(41093)	2 687.5(41565)
	10 MHz	2 501.0(39700)	2 547.0(40160)	2 593.0(40620)	2 639.0(41080)	2 685.0(41540)
	15 MHz	2 503.5(39725)	2 548.3(41073)	2 593.0(40620)	2 637.8(41068)	2 682.5(41515)
	20 MHz	2 506.0(39750)	2 549.5(40185)	2 593.0(40620)	2 636.5(41055)	2 680.0(41490)
UE Category			LTE Rel. 10, Category 4			
Modulations Supported in UL			QPSK, 16 QAM			
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.			

2.5 Test Methodology and Procedures

The tests documented in this report were performed in accordance with IEEE Standard 1528-2013 and the following published KDB procedures.

- 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)

2.6 DUT Antenna Locations

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”.

This model allows users to exchange data or media files with other Bluetooth enabled devices using Bluetooth, which means they can connect to other Bluetooth enabled devices via Bluetooth tethering. Therefore, SAR test was performed for additional simultaneous transmissions.
Head and Bluetooth Tethering SAR were evaluated for BT BR tethering applications.

Mode	Rear	Front	Left	Right	Bottom	Top
GSM/GPRS/EDGE 850	Yes	Yes	Yes	No	Yes	No
GSM/GPRS/EDGE 1900	Yes	Yes	Yes	No	Yes	No
UMTS 850	Yes	Yes	Yes	No	Yes	No
LTE Band 5	Yes	Yes	Yes	No	Yes	No
LTE Band 41	Yes	Yes	Yes	No	Yes	No
2.4 GHz WLAN	Yes	Yes	Yes	No	No	Yes
Bluetooth	Yes	Yes	Yes	No	No	Yes

Particular EUT edges were not required to be evaluated for Bluetooth Tethering and Hotspot 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.

* Note: All test configurations are based on front view position.

2.7 Near Field Communications (NFC) Antenna

This EUT has NFC operations. The NFC antenna is integrated into the device for this model. Therefore, all SAR tests were performed with the device which already incorporates the NFC antenna. A diagram showing the location of the NFC antenna can be found in SAR_ Setup_ photos.

2.8 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	Hotspot	Extremity
UMTS + 2.4 GHz WiFi	Yes	Yes	Yes	Yes
UMTS + 2.4 GHz Bluetooth	Yes*	Yes	Yes^	Yes
LTE + 2.4 GHz WiFi	Yes	Yes	Yes	Yes
LTE+ 2.4 GHz Bluetooth	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. 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. This device supports VOLTE and VoWIFI.

2.9 SAR Test Considerations

2.9.1 Bluetooth LE

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

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

Mode		Frequency	Maximum Allowed Power	Separation Distance	≤ 3.0	≤ 7.5
		[MHz]	[mW]	[mm]	1-g SAR	10-g SAR
Bluetooth LE	Head SAR	2 480	4.0	5	1.3	
	Body Worn SAR		4.0	15	0.4	
	Tethering SAR		4.0	10	0.6	
	Extremity SAR		4.0	5		1.3

Based on the maximum conducted power of Bluetooth LE and antenna to use separation distance, Bluetooth LE SAR was not required [(4/5)*√2.480] = 1.3≤3.0, [(4/15)*√2.480] = 0.4≤3.0 for 1-g SAR, [(4/10)*√2.480] = 0.6≤3.0 for 1-g SAR, [(4/5)*√2.480] = 1.3≤7.5 for 10-g SAR.

The Reported SAR for WLAN and Bluetooth

The Reported SAR = The Measured SAR *- $\frac{Maximum\ tune{-}up\ (mW)}{Measured\ Conducted\ Power(mW)}$ * Duty factor

2.9.2 Licensed Transmitter(s)

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

Per FCC KDB 941225 D01v03r01, 12.2 kbps RMC is the primary mode and HSPA (HSUPA/HSDPA with RMC) is the secondary mode.

Per FCC KDB 941225 D01v03r01, The SAR test exclusion is applied to the secondary mode by the following equation.

$$Adjusted\ SAR = Highest\ Reported\ SAR * \frac{Secondary\ Max\ tune-up\ (mW)}{Primary\ Max\ tune\ tune-up(mW)} \leq 1.2\ \text{W/kg.}$$

Based on the highest Reported SAR, the secondary mode is not required.

Per FCC KDB 690783 D01 SAR Listings on Grants v01r03 and KDB 447498 D01 General RF Exposure Guidance v06 The SAR numbers listed must be consistent with the highest reported test results required by the published RF exposure KDB procedures. When the measured SAR is not at the maximum tune-up tolerance limit or maximum output power allowed for production units, the measured results are scaled to the maximum conditions to determine compliance; the scaled results are referred to as the reported SAR.

$$\text{The Reported SAR} = \text{The Measured SAR} *\text{-}\frac{Maximum\ tune\text{–}up\ (mW)}{Measured\ Conducted\ Power(mW)}$$

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 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 7 is 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.

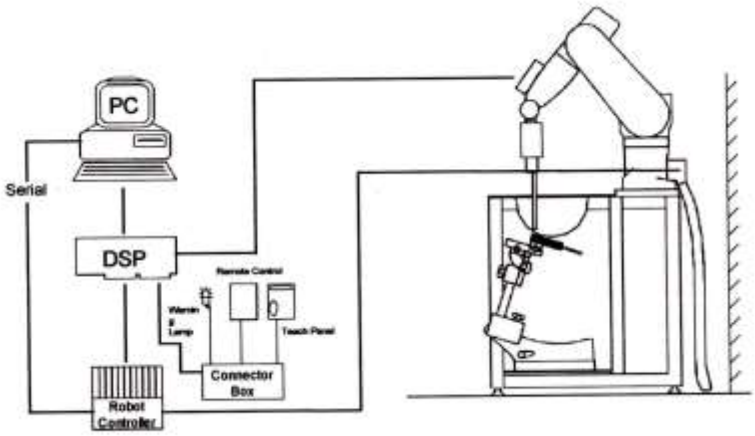


Figure 2. HCT SAR Lab. Test Measurement Set-up

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 using the following procedure compliant to FCC KDB Publication 865664 D01v01r04 and IEEE 1528-2013

1. The SAR distribution at the exposed side of the head or body was measured at a distance no more than 5.0 mm 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 2.7 mm 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 (1 g or 10 g) 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">$\leq 1.5\cdot\Delta z_{zoom}(n-1)$</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 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 6-6). 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.. 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 6-6
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.

6.2 Wireless Router Configurations

Some battery-operated handsets have the capability to transmit and receive user data through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06v02r01 where SAR test considerations for handsets (L x W ≥ 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.

6.3 Extremity Exposure Configurations

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

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 v01r03 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.

6.4 Additional Test Positions due to Proximity Conditions

This device uses a sensor to reduce output powers in extremity (hand-held) use conditions.

When the sensor detects a user is touching the device on or near to the antenna the device reduces the maximum allowed output power However, the proximity sensor is not active when the device is moved beyond the sensor triggering distance and the maximum output power is no longer limited. Therefore, an additional exposure condition is needed in the vicinity of the triggering distance to ensure SAR is compliant when the device is allowed to operate at a non-reduced output power level.

FCC KDB 616217 D04 v01r02 Section 8 was used as a guideline for selecting SAR test distances for this device at these additional exposure conditions. The smallest separation distance determined by the sensor triggering and sensor coverage for each applicable edge, minus 1 mm. was used as the test separation distance for SAR testing. Sensor triggering distance summary data is included in below table.

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

6.5 Bluetooth tethering Configurations

Per May 2017 TCBC Workshop documents When Bluetooth tethering applies ,simultaneous transmission SAR needs consideration

This model allows users to exchange data or media files with other Bluetooth enabled devices using Bluetooth, which means they can connect to other Bluetooth enabled devices via Bluetooth tethering.
Therefore, SAR test was performed for additional simultaneous transmissions.
Head and Bluetooth tethering SAR were evaluated for BT BR tethering applications

7. 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 * (Head)	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 SAR Measurement Conditions for UMTS

8.2.1 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 spreading codes, HS-DPCCH etc) are tabulated in this test report. All configurations that are not supported by the DUT or cannot be measured due to technical or equipment limitations are identified.

8.2.2 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.

8.2.3 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.

8.2.4 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.

8.2.5 SAR Measurements with Rel. 6 HSUPA

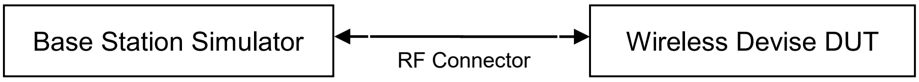
The 3G SAR test reduction procedure is applied to HSPA (HSUPA/HSDPA with RMC) body configurations with 12.2 kbps RMC as the primary mode. Otherwise, Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 and power control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

8.2.6 DC-HSDPA

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.

DC-HSDPA Considerations:

- 3GPP Specification 34.121-1 Release 8 Ver 8.10.0 was used for DC-HSDPA guidance
- H-Set 12(QPSK) was confirmed to be used during DC-HSDPA measurements
- Measured maximum output powers for DC-HSDPA were not greater than 1/4 dB higher than the WCDMA 12.2 kbps RMC maximum output and as a result, SAR is not required for DC-HSDPA
- The DUT supports UE category 24 for HSDPA.



8.3 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).

8.3.1 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.

8.3.2 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.

8.3.3 A-MPR

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

8.3.4 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.

8.3.5 LTE(TDD) Considerations

According to KDB 941225 D05v02r05, for Time-Division Duplex (TDD) systems, SAR must be tested using a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by the defined 3GPP LTE TDD configurations.

SAR was tested with the highest transmission duty factor (63.33 %) using Uplink-downlink configuration 0 and Special subframe configuration 6.

LTE TDD Band 41 supports 3GPP TS 36.211 section 4.2 for Type 2 Frame and Table 4.2-2 for uplink-downlink configurations and Table 4.2-1 for Special sub frame configurations.

Table 4.2-1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS).

<table>
<tr><th rowspan="3">Special subframe configuration</th><th colspan="3">Normal cyclic prefix in downlink</th><th colspan="3">Extended cyclic prefix in downlink</th></tr>
<tr><th rowspan="2">DwPTS</th><th colspan="2">UpPTS</th><th rowspan="2">DwPTS</th><th colspan="2">UpPTS</th></tr>
<tr><th>Normal cyclic prefix in uplink</th><th>Extended cyclic prefix in uplink</th><th>Normal cyclic prefix in uplink</th><th>Extended cyclic prefix in uplink</th></tr>
<tr><td>0</td><td>$6592 \cdot T_s$</td><td rowspan="5">$2192 \cdot T_s$</td><td rowspan="5">$2560 \cdot T_s$</td><td>$7680 \cdot T_s$</td><td rowspan="4">$2192 \cdot T_s$</td><td rowspan="4">$2560 \cdot T_s$</td></tr>
<tr><td>1</td><td>$19760 \cdot T_s$</td><td>$20480 \cdot T_s$</td></tr>
<tr><td>2</td><td>$21952 \cdot T_s$</td><td>$23040 \cdot T_s$</td></tr>
<tr><td>3</td><td>$24144 \cdot T_s$</td><td>$25600 \cdot T_s$</td></tr>
<tr><td>4</td><td>$26336 \cdot T_s$</td><td>$7680 \cdot T_s$</td><td rowspan="4">$4384 \cdot T_s$</td><td rowspan="4">$5120 \cdot T_s$</td></tr>
<tr><td>5</td><td>$6592 \cdot T_s$</td><td rowspan="5">$4384 \cdot T_s$</td><td rowspan="5">$5120 \cdot T_s$</td><td>$20480 \cdot T_s$</td></tr>
<tr><td>6</td><td>$19760 \cdot T_s$</td><td>$23040 \cdot T_s$</td></tr>
<tr><td>7</td><td>$21952 \cdot T_s$</td><td>$12800 \cdot T_s$</td></tr>
<tr><td>8</td><td>$24144 \cdot T_s$</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>9</td><td>$13168 \cdot T_s$</td><td>-</td><td>-</td><td>-</td></tr>
</table>

Table 4.2-2: Uplink-downlink configurations.

Uplink-downlink configuration	Downlink-to-Uplink Switch-point periodicity	Subframe number									
		0	1	2	3	4	5	6	7	8	9
0	5 ms	D	S	U	U	U	D	S	U	U	U
1	5 ms	D	S	U	U	D	D	S	U	U	D
2	5 ms	D	S	U	D	D	D	S	U	D	D
3	10 ms	D	S	U	U	U	D	D	D	D	D
4	10 ms	D	S	U	U	D	D	D	D	D	D
5	10 ms	D	S	U	D	D	D	D	D	D	D
6	5 ms	D	S	U	U	U	D	S	U	U	D

Calculated Duty Cycle – Extended cyclic prefix in uplink x (T_s) x # of S + # of U
Example for calculated Duty Cycle for Uplink-Downlink Configuration 0:
Calculated Duty Cycle = (5120 x [1/(15000 x 2048)] x 2 + 0.006)/0.01 = 63.33 %
Where
T_s = 1/(15000 x 2048) seconds

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 UMTS Maximum Conducted Output Power

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.

3GPP Release Version	Mode	3GPP 34.121	WCDMA Band 2 [dBm]			3GPP MPR
		Subtest	UL 9262 DL 9662	UL 9400 DL 9800	UL 9538 DL 9938	
99	WCDMA	12.2 kbps RMC	23.98	23.93	23.86	-
99	WCDMA	12.2 kbps AMR	23.24	23.04	22.93	-
5	HSDPA	Subtest 1	21.88	21.77	21.72	0
5		Subtest 2	22.15	22.08	22.00	0
5		Subtest 3	22.08	22.09	22.03	0.5
5		Subtest 4	21.32	21.17	21.10	0.5
6	HSUPA	Subtest 1	22.14	22.08	22.03	0
6		Subtest 2	20.26	20	19.95	2
6		Subtest 3	21.32	21.13	20.80	1
6		Subtest 4	20.26	20.02	19.61	2
6		Subtest 5	22.10	22.05	21.98	0
8	DC-HSDPA	Subtest 1	22.33	22.36	22.55	0
8		Subtest 2	22.39	22.18	21.66	0
8		Subtest 3	21.48	21.24	20.83	0.5
8		Subtest 4	21.49	21.23	20.82	0.5

9.1.1 Reduced PCE Power

WCDMA Band 2 (Hotspot)

3GPP Release Version	Mode	3GPP 34.121	WCDMA Band 2 [dBm]			3GPP MPR
		Subtest	UL 9262 DL 9662	UL 9400 DL 9800	UL 9538 DL 9938	
99	WCDMA	12.2 kbps RMC	21.24	21.13	21.10	-
99	WCDMA	12.2 kbps AMR	21.24	21.13	21.10	-
5	HSDPA	Subtest 1	21.18	21.09	21.12	0
5		Subtest 2	21.23	21.17	21.18	0
5		Subtest 3	20.80	20.76	20.73	0.5
5		Subtest 4	20.80	20.75	20.72	0.5
6	HSUPA	Subtest 1	19.56	19.46	19.47	0
6		Subtest 2	18.52	18.42	18.46	2
6		Subtest 3	18.84	18.75	18.68	1
6		Subtest 4	18.55	18.48	18.41	2
6		Subtest 5	19.55	19.46	19.46	0
8	DC-HSDPA	Subtest 1	21.42	21.12	21.30	0
8		Subtest 2	21.49	21.20	21.46	0
8		Subtest 3	20.54	20.32	20.43	0.5
8		Subtest 4	20.53	20.31	20.42	0.5

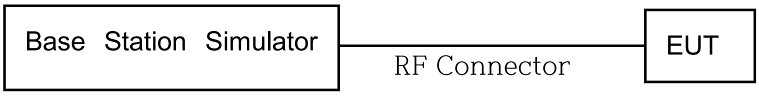
WCDMA Average Conducted output powers

WCDMA Band 2 (Grip Sensor)

3GPP Release Version	Mode	3GPP 34.121	WCDMA Band 2 [dBm]			3GPP MPR
		Subtest	UL 9262 DL 9662	UL 9400 DL 9800	UL 9538 DL 9938	
99	WCDMA	12.2 kbps RMC	21.24	21.14	21.11	-
99	WCDMA	12.2 kbps AMR	21.24	21.14	21.11	-
5	HSDPA	Subtest 1	21.18	21.10	21.13	0
5		Subtest 2	21.23	21.18	21.19	0
5		Subtest 3	20.80	20.76	20.73	0.5
5		Subtest 4	20.80	20.75	20.73	0.5
6	HSUPA	Subtest 1	19.57	19.46	19.46	0
6		Subtest 2	18.52	18.45	18.47	2
6		Subtest 3	18.85	18.75	18.69	1
6		Subtest 4	18.56	18.50	18.42	2
6		Subtest 5	19.55	19.47	19.46	0
8	DC-HSDPA	Subtest 1	21.43	21.13	21.30	0
8		Subtest 2	21.48	21.21	21.46	0
8		Subtest 3	20.53	20.32	20.43	0.5
8		Subtest 4	20.54	20.32	20.42	0.5

WCDMA Average Conducted output powers

It is expected by the manufacturer that MPR for some HSPA Subtests may be up to 2 dB more than specified by 3GPP, But also as low as 1 dB according to the chipset implementation in this model to match manufacturer.



9.2 LTE Maximum Conducted Output Power

9.3.1 Maximum Output Power

- LTE TDD Band 41_ 5 Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power (dBm)					MPR Allowed Per 3GPP	MPR
				39675 2498.5 MHz	40148 2545.8 MHz	40620 2593.0 MHz	41093 2640.3 MHz	41565 2687.5 MHz	[dB]	[dB]
5 MHz	QPSK	1	0	21.22	21.60	21.53	21.41	21.24	0	0
		1	12	21.23	21.61	21.49	21.38	21.24	0	0
		1	24	21.21	21.60	21.49	21.35	21.19	0	0
		12	0	20.28	20.60	20.52	20.48	20.33	0-1	1
		12	6	20.26	20.60	20.51	20.44	20.32	0-1	1
		12	11	20.26	20.60	20.49	20.44	20.30	0-1	1
		25	0	20.27	20.61	20.49	20.43	20.29	0-1	1
	16QAM	1	0	20.21	20.67	20.48	20.33	20.22	0-1	1
		1	12	20.29	20.65	20.50	20.32	20.20	0-1	1
		1	24	20.23	20.64	20.50	20.25	20.16	0-1	1
		12	0	19.27	19.56	19.46	19.41	19.30	0-2	2
		12	6	19.27	19.57	19.44	19.46	19.28	0-2	2
		12	11	19.26	19.54	19.44	19.43	19.28	0-2	2
		25	0	19.34	19.68	19.58	19.39	19.38	0-2	2

- LTE TDD Band 41_ 10 Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power (dBm)					MPR Allowed Per 3GPP	MPR
				39700 2501MHz	40160 2547MHz	40620 2593MHz	41080 2639MHz	41540 2685MHz	[dB]	[dB]
10 MHz	QPSK	1	0	21.52	21.59	21.51	21.11	21.33	0	0
		1	24	21.47	21.58	21.45	21.06	21.26	0	0
		1	49	21.44	21.60	21.40	21.00	21.21	0	0
		25	0	20.54	20.61	20.52	20.15	20.38	0-1	1
		25	12	20.54	20.62	20.49	20.11	20.33	0-1	1
		25	24	20.53	20.60	20.48	20.10	20.30	0-1	1
		50	0	20.53	20.61	20.50	20.12	20.35	0-1	1
	16QAM	1	0	20.36	20.48	20.48	20.11	20.39	0-1	1
		1	24	20.33	20.48	20.40	20.11	20.35	0-1	1
		1	49	20.39	20.41	20.34	20.04	20.29	0-1	1
		25	0	19.59	19.66	19.56	19.22	19.48	0-2	2
		25	12	19.56	19.65	19.52	19.19	19.42	0-2	2
		25	24	19.58	19.65	19.49	19.18	19.40	0-2	2
		50	0	19.61	19.66	19.55	19.16	19.42	0-2	2

- LTE TDD Band 41_ 15 Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power (dBm)					MPR Allowed Per 3GPP	MPR
				39725 2503.5 MHz	40173 2548.3 MHz	40620 2593.0 MHz	41068 2637.8 MHz	41515 2682.5 MHz	[dB]	[dB]
15 MHz	QPSK	1	0	21.47	21.52	21.47	21.10	21.35	0	0
		1	36	21.42	21.51	21.41	21.04	21.25	0	0
		1	74	21.31	21.49	21.31	20.98	21.19	0	0
		36	0	20.53	20.61	20.54	20.15	20.41	0-1	1
		36	18	20.50	20.60	20.50	20.12	20.36	0-1	1
		36	39	20.45	20.60	20.45	20.10	20.32	0-1	1
		75	0	20.51	20.61	20.50	20.11	20.36	0-1	1
	16QAM	1	0	20.39	20.39	20.32	20.13	20.27	0-1	1
		1	36	20.35	20.40	20.28	20.05	20.17	0-1	1
		1	74	20.26	20.39	20.22	20.00	20.11	0-1	1
		36	0	19.54	19.61	19.54	19.15	19.41	0-2	2
		36	18	19.50	19.61	19.49	19.12	19.38	0-2	2
		36	39	19.46	19.59	19.45	19.10	19.34	0-2	2
		75	0	19.56	19.65	19.55	19.15	19.40	0-2	2

- LTE TDD Band 41_ 20 Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power (dBm)					MPR Allowed Per 3GPP	MPR
				39750 2506.0 MHz	40185 2549.5 MHz	40620 2593.0 MHz	41055 2636.5 MHz	41490 2680.0 MHz	[dB]	[dB]
20 MHz	QPSK	1	0	21.45	21.60	21.53	21.14	21.37	0	0
		1	49	21.42	21.60	21.44	21.05	21.24	0	0
		1	99	21.41	21.58	21.27	20.96	21.10	0	0
		50	0	20.53	20.64	20.55	20.16	20.37	0-1	1
		50	25	20.52	20.62	20.47	20.11	20.31	0-1	1
		50	49	20.54	20.62	20.45	20.07	20.25	0-1	1
		100	0	20.53	20.65	20.50	20.13	20.31	0-1	1
	16QAM	1	0	20.25	20.44	20.47	20.15	20.33	0-1	1
		1	49	20.23	20.44	20.39	20.07	20.21	0-1	1
		1	99	20.24	20.41	20.25	19.95	20.10	0-1	1
		50	0	19.58	19.69	19.58	19.20	19.42	0-2	2
		50	25	19.56	19.68	19.51	19.14	19.35	0-2	2
		50	49	19.57	19.66	19.45	19.12	19.31	0-2	2
		100	0	19.57	19.67	19.51	19.15	19.36	0-2	2

Note;

LTE Band 41 has 5 required test channels per FCC KDB 447498 D01v06.

9.3.2 Reduced PCE Power

- LTE TDD Band 41 (Hotspot) _ 5 Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Backoff Power (dBm)					MPR
				39675 2498.5 MHz	40148 2545.8 MHz	40620 2593.0 MHz	41093 2640.3 MHz	41565 2687.5 MHz	[dB]
5 MHz	QPSK	1	0	18.62	18.96	18.43	18.51	18.30	0
		1	12	18.65	18.96	18.47	18.52	18.29	0
		1	24	18.67	18.93	18.42	18.49	18.22	0
		12	0	18.60	18.91	18.39	18.48	18.23	0
		12	6	18.60	18.89	18.38	18.44	18.22	0
		12	11	18.61	18.89	18.38	18.44	18.20	0
		25	0	18.61	18.90	18.39	18.46	18.20	0
	16QAM	1	0	18.56	19.04	18.43	18.36	18.15	0
		1	12	18.64	19.09	18.46	18.39	18.17	0
		1	24	18.65	19.08	18.42	18.36	18.14	0
		12	0	18.56	18.92	18.33	18.41	18.19	0
		12	6	18.57	18.90	18.33	18.4	18.16	0
		12	11	18.58	18.90	18.3	18.37	18.17	0
		25	0	18.68	18.96	18.44	18.55	18.31	0

- LTE TDD Band 41 (Hotspot) _ 10 Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Backoff Power (dBm)					MPR
				39700 2501MHz	40160 2547MHz	40620 2593MHz	41080 2639MHz	41540 2685MHz	[dB]
10 MHz	QPSK	1	0	18.66	18.94	18.44	18.53	18.28	0
		1	24	18.68	18.88	18.39	18.5	18.23	0
		1	49	18.74	18.87	18.33	18.43	18.17	0
		25	0	18.75	18.89	18.37	18.48	18.23	0
		25	12	18.76	18.87	18.35	18.43	18.19	0
		25	24	18.77	18.85	18.33	18.44	18.18	0
		50	0	18.76	18.86	18.36	18.44	18.20	0
	16QAM	1	0	18.57	18.96	18.42	18.42	18.22	0
		1	24	18.62	18.94	18.39	18.37	18.21	0
		1	49	18.65	18.85	18.32	18.31	18.14	0
		25	0	18.80	18.96	18.47	18.53	18.31	0
		25	12	18.81	18.94	18.44	18.5	18.28	0
		25	24	18.82	18.91	18.42	18.48	18.27	0
		50	0	18.82	18.91	18.4	18.48	18.25	0

- LTE TDD Band 41 (Hotspot) _ 15 Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Backoff Power (dBm)					MPR
				39725 2503.5 MHz	40173 2548.3 MHz	40620 2593.0 MHz	41068 2637.8 MHz	41515 2682.5 MHz	[dB]
15 MHz	QPSK	1	0	18.72	18.91	18.43	18.51	18.22	0
		1	36	18.79	18.88	18.39	18.46	18.17	0
		1	74	18.81	18.80	18.31	18.39	18.08	0
		36	0	18.72	18.88	18.37	18.48	18.18	0
		36	18	18.76	18.84	18.36	18.42	18.14	0
		36	39	18.78	18.81	18.32	18.38	18.11	0
		75	0	18.74	18.85	18.35	18.42	18.15	0
	16QAM	1	0	18.70	18.99	18.4	18.5	18.18	0
		1	36	18.77	18.95	18.37	18.41	18.09	0
		1	74	18.84	18.88	18.34	18.35	18.04	0
		36	0	18.72	18.87	18.33	18.46	18.18	0
		36	18	18.75	18.83	18.32	18.43	18.14	0
		36	39	18.78	18.80	18.31	18.4	18.09	0
		75	0	18.80	18.89	18.38	18.47	18.19	0

- LTE TDD Band 41 (Hotspot) _ 20 Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Backoff Power (dBm)					MPR
				39750 2506.0 MHz	40185 2549.5 MHz	40620 2593.0 MHz	41055 2636.5 MHz	41490 2680.0 MHz	[dB]
20 MHz	QPSK	1	0	18.74	18.91	18.4	18.47	18.42	0
		1	49	18.80	18.85	18.35	18.36	18.33	0
		1	99	18.86	18.70	18.26	18.26	18.29	0
		50	0	18.75	18.84	18.37	18.48	18.35	0
		50	25	18.76	18.79	18.31	18.43	18.24	0
		50	49	18.82	18.75	18.29	18.39	18.33	0
		100	0	18.78	18.81	18.31	18.43	18.27	0
	16QAM	1	0	18.60	18.87	18.36	18.51	18.45	0
		1	49	18.67	18.76	18.18	18.42	18.4	0
		1	99	18.74	18.69	18.11	18.35	18.36	0
		50	0	18.79	18.88	18.41	18.52	18.39	0
		50	25	18.81	18.84	18.36	18.47	18.4	0
		50	49	18.83	18.80	18.34	18.44	18.33	0
		100	0	18.81	18.81	18.33	18.46	18.29	0

- LTE TDD Band 41 (Grip Sensor) _ 5 Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Backoff Power (dBm)					MPR
				39675 2498.5 MHz	40148 2545.8 MHz	40620 2593.0 MHz	41093 2640.3 MHz	41565 2687.5 MHz	[dB]
5 MHz	QPSK	1	0	18.43	18.91	18.3	18.35	18.23	0
		1	12	18.42	18.92	18.29	18.39	18.27	0
		1	24	18.46	18.86	18.24	18.34	18.22	0
		12	0	18.53	18.85	18.23	18.32	18.23	0
		12	6	18.56	18.84	18.23	18.34	18.22	0
		12	11	18.55	18.82	18.22	18.32	18.19	0
		25	0	18.54	18.84	18.22	18.32	18.21	0
	16QAM	1	0	18.48	19.04	18.42	18.34	18.14	0
		1	12	18.52	19.05	18.42	18.32	18.14	0
		1	24	18.55	19.07	18.37	18.32	18.11	0
		12	0	18.53	18.79	18.2	18.28	18.16	0
		12	6	18.53	18.76	18.15	18.24	18.16	0
		12	11	18.54	18.76	18.15	18.24	18.15	0
		25	0	18.62	18.91	18.29	18.38	18.28	0

- LTE TDD Band 41 (Grip Sensor) _ 10 Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Backoff Power (dBm)					MPR
				39700 2501MHz	40160 2547MHz	40620 2593MHz	41080 2639MHz	41540 2685MHz	[dB]
10 MHz	QPSK	1	0	18.75	18.90	18.3	18.42	18.26	0
		1	24	18.79	18.87	18.27	18.37	18.22	0
		1	49	18.80	18.80	18.21	18.3	18.15	0
		25	0	18.74	18.86	18.23	18.34	18.21	0
		25	12	18.75	18.84	18.22	18.33	18.19	0
		25	24	18.76	18.82	18.19	18.3	18.17	0
		50	0	18.74	18.84	18.21	18.32	18.20	0
	16QAM	1	0	18.63	18.84	18.25	18.33	18.24	0
		1	24	18.65	18.82	18.28	18.29	18.18	0
		1	49	18.73	18.79	18.17	18.24	18.13	0
		25	0	18.83	18.94	18.3	18.42	18.33	0
		25	12	18.86	18.91	18.3	18.39	18.28	0
		25	24	18.87	18.89	18.28	18.38	18.25	0
		50	0	18.79	18.89	18.26	18.37	18.25	0

- LTE TDD Band 41 (Grip Sensor) _ 15 Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Backoff Power (dBm)					MPR
				39725 2503.5 MHz	40173 2548.3 MHz	40620 2593.0 MHz	41068 2637.8 MHz	41515 2682.5 MHz	[dB]
15 MHz	QPSK	1	0	18.71	18.88	18.28	18.31	18.08	0
		1	36	18.77	18.82	18.26	18.21	18.03	0
		1	74	18.81	18.76	18.19	18.17	17.96	0
		36	0	18.72	18.85	18.24	18.35	18.15	0
		36	18	18.72	18.83	18.22	18.31	18.11	0
		36	39	18.77	18.80	18.19	18.29	18.08	0
		75	0	18.74	18.84	18.22	18.31	18.12	0
	16QAM	1	0	18.65	19.02	18.41	18.28	18.13	0
		1	36	18.72	18.94	18.37	18.24	18.09	0
		1	74	18.77	18.89	18.35	18.17	18.03	0
		36	0	18.71	18.84	18.22	18.33	18.16	0
		36	18	18.74	18.80	18.19	18.29	18.12	0
		36	39	18.77	18.77	18.17	18.25	18.08	0
		75	0	18.80	18.87	18.25	18.35	18.18	0

- LTE TDD Band 41 (Grip Sensor) _ 20 Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Backoff Power (dBm)					MPR
				39750 2506.0 MHz	40185 2549.5 MHz	40620 2593.0 MHz	41055 2636.5 MHz	41490 2680.0 MHz	[dB]
20 MHz	QPSK	1	0	18.29	18.72	18.23	18.31	18.41	0
		1	49	18.28	18.76	18.16	18.23	18.35	0
		1	99	18.31	18.61	18.02	18.12	18.24	0
		50	0	18.71	18.84	18.26	18.36	18.49	0
		50	25	18.75	18.80	18.21	18.3	18.42	0
		50	49	18.76	18.76	18.19	18.27	18.38	0
		100	0	18.72	18.78	18.21	18.3	18.42	0
	16QAM	1	0	18.38	18.67	18.19	18.23	18.58	0
		1	49	18.78	18.76	18.17	18.16	18.48	0
		1	99	18.41	18.64	18.06	18.06	18.4	0
		50	0	18.76	18.84	18.31	18.37	18.5	0
		50	25	18.79	18.81	18.28	18.34	18.46	0
		50	49	18.82	18.77	18.22	18.3	18.43	0
		100	0	18.79	18.81	18.26	18.35	18.48	0

Note;

LTE Band 41 has 5 required test channels per FCC KDB 447498 D01v06.
The EUT enables maximum power reduction in accordance with 3GPP 36.101. The MPR settings are configured during the manufacture process and are not configurable by the network, carrier, or end user.

10. SYSTEM VERIFICATION

10.1 Tissue Verification

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

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
01/15/2019	19.3	1900B	1 850	1.494	52.655	1.520	53.300	-1.71%	-1.21%
			1 900	1.537	52.511	1.520	53.300	1.12%	-1.48%
			1 910	1.546	52.478	1.520	53.300	1.71%	-1.54%
01/16/2019	23.5	2600B	2500	2.090	52.365	2.021	52.640	3.41%	-0.52%
			2600	2.205	52.041	2.163	52.510	1.94%	-0.89%
			2700	2.315	51.845	2.305	52.380	0.43%	-1.02%
01/16/2019	21.9	2600B	2500	2.060	52.359	2.021	52.640	1.93%	-0.53%
			2600	2.170	52.043	2.163	52.510	0.32%	-0.89%
			2700	2.274	51.875	2.305	52.380	-1.34%	-0.96%

10.2 System Verification

Prior to assessment, the system is verified to the ± 10 % of the specifications at 1 900 MHz / 2 600 MHz by using the system Verification kit. (Graphic Plots Attached)

Freq.	Date	Probe (S/N)	Dipole (S/N)	Liquid	Amb. Temp.	Liquid Temp.	1 W Target SAR_{1g} (SPEAG)	50 mW Measured SAR_{1g}	1 W Normalized SAR_{1g}	Deviation	Limit [%]
[MHz]					[°C]	[°C]	[W/kg]	[W/kg]	[W/kg]	[%]	[%]
1 900	01/15/2019	3863	5d061	Body	19.5	19.3	39.6	1.89	37.8	- 4.55	± 10
2 600	01/16/2019	7370	1015	Body	23.7	23.5	54.8	2.66	53.2	- 2.92	± 10
2 600	01/16/2019	3863	1015	Body	22.1	21.9	54.8	2.65	53.0	- 3.28	± 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 equipments.
- 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 Hotspot SAR Measurement Results

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)	
1 880.0	9400	RMC	22.0	21.13	-0.16	Rear	1:1	10	0.534	1.222	**0.653**	1
1 880.0	9400	RMC	22.0	21.13	-0.03	Front	1:1	10	0.137	1.222	0.167	-
1 880.0	9400	RMC	22.0	21.13	-0.02	Left	1:1	10	0.069	1.222	0.084	-
1 880.0	9400	RMC	22.0	21.13	0.09	Bottom	1:1	10	0.464	1.222	0.567	
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg Averaged over 1 gram						

LTE TDD Band 41 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)	
2 506.0	39750	QPSK	20	19.7	18.86	-0.16	Rear	0	1	99	1:1.58	10	0.947	1.213	**1.149**	2
2 549.5	40185	QPSK	20	19.7	18.91	0.18	Rear	0	1	0	1:1.58	10	0.729	1.199	0.874	-
2 593.0	40620	QPSK	20	19.7	18.4	0.12	Rear	0	1	0	1:1.58	10	0.576	1.349	0.777	-
2 636.5	41055	QPSK	20	19.7	18.47	0.02	Rear	0	1	0	1:1.58	10	0.407	1.327	0.540	-
2 680.0	41490	QPSK	20	19.7	18.42	-0.16	Rear	0	1	0	1:1.58	10	0.317	1.343	0.426	-
2 506.0	39750	QPSK	20	19.7	18.82	-0.15	Rear	0	50	49	1:1.58	10	0.709	1.225	0.869	-
2 549.5	40185	QPSK	20	19.7	18.84	0.06	Rear	0	50	0	1:1.58	10	0.631	1.219	0.769	-
2 593.0	40620	QPSK	20	19.7	18.37	0.07	Rear	0	50	0	1:1.58	10	0.518	1.358	0.703	-
2 636.5	41055	QPSK	20	19.7	18.48	-0.16	Rear	0	50	0	1:1.58	10	0.358	1.324	0.474	-
2 680.0	41490	QPSK	20	19.7	18.35	-0.10	Rear	0	50	0	1:1.58	10	0.240	1.365	0.328	-
2 549.5	40185	QPSK	20	19.7	18.81	-0.15	Rear	0	100	0	1:1.58	10	0.628	1.227	0.771	-
2 549.5	40185	QPSK	20	19.7	18.91	-0.08	Front	0	1	0	1:1.58	10	0.138	1.199	0.165	-
2 549.5	40185	QPSK	20	19.7	18.84	-0.08	Front	0	50	0	1:1.58	10	0.105	1.219	0.128	-
2 549.5	40185	QPSK	20	19.7	18.91	-0.03	Left	0	1	0	1:1.58	10	0.190	1.199	0.228	-
2 549.5	40185	QPSK	20	19.7	18.84	-0.01	Left	0	50	0	1:1.58	10	0.148	1.219	0.180	-
2 549.5	40185	QPSK	20	19.7	18.91	0.19	Bottom	0	1	0	1:1.58	10	0.476	1.199	0.571	-
2 549.5	40185	QPSK	20	19.7	18.84	0.14	Bottom	0	50	0	1:1.58	10	0.366	1.219	0.446	-
2 506.0	39750	QPSK	20	19.7	18.86	0.09	Rear	0	1	99	1:1.58	10	0.834	1.213	1.012	**
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Body 1.6 W/kg Averaged over 1 gram									

Note:**Data entry indicate Variability measurement.

11.2 Phablet SAR Measurement Results

LTE TDD Band 41 Phablet SAR																	
Frequency		Mode	Band width	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Sensor	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)	
2549.5	40185	QPSK	20	21.7	21.60	-0.17	Rear	OFF	0	1	0	1:1	9	0.326	1.023	0.333	-
2549.5	40185	QPSK	20	20.7	20.64	0.13	Rear	OFF	1	50	0	1:1	9	0.269	1.014	0.273	-
2549.5	40185	QPSK	20	21.7	21.60	0.01	Front	OFF	0	1	0	1:1	0	0.233	1.023	0.238	-
2549.5	40185	QPSK	20	20.7	20.64	0.01	Front	OFF	1	50	0	1:1	0	0.181	1.014	0.184	-
2549.5	40185	QPSK	20	21.7	21.60	0.12	Bottom	OFF	0	1	0	1:1	5	0.396	1.023	0.405	-
2549.5	40185	QPSK	20	20.7	20.64	0.13	Bottom	OFF	1	50	0	1:1	5	0.324	1.014	0.329	-
2549.5	40185	QPSK	20	21.7	21.60	-0.17	Left	N/A	0	1	0	1:1	0	0.315	1.023	0.322	-
2549.5	40185	QPSK	20	20.7	20.64	-0.01	Left	N/A	1	50	0	1:1	0	0.248	1.014	0.251	-
2549.5	40185	QPSK	20	19.7	18.76	-0.01	Rear	ON	0	1	49	1:1	0	0.558	1.242	0.693	-
2549.5	40185	QPSK	20	19.7	18.84	-0.05	Rear	ON	0	50	0	1:1	0	0.587	1.219	0.716	-
2549.5	40185	QPSK	20	19.7	18.76	0.17	Bottom	ON	0	1	49	1:1	0	0.693	1.242	0.861	-
2549.5	40185	QPSK	20	19.7	18.84	0.16	Bottom	ON	0	50	0	1:1	0	0.716	1.219	**0.873**	3
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Hand 4.0 W/kg Averaged over 10 gram										

11.3 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. 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.
7. 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.
8. Per FCC KDB 865664 D01v01r04, variability SAR measurement were performed when the measured SAR results for all frequency bands were less than 0.8 W/kg. Please see Section 13 for variability analysis information..

UMTS Notes:

1. The 12.2 kbps RMC mode is the primary mode per KDB 941225 D01v03r01.
2. UMTS SAR was tested under RMC 12.2 kbps with HSPA inactive per KDB publication 941225 D01v03r01. AMR and HSPA SAR was not required per the 3G Test Reduction Procedure in KDB Publication 941225 D01v03r01.
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.

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 1.45 W/Kg only the highest power RB offset for each allocation was required.
3. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to target MPR is indicated alongside the SAR results.
4. A-MPR was disabled for all SAR tests by setting NS=01 on the base station simulator.
5. Per FCC KDB Publication 447498 D01v06, if the reported (scaled) LTE TDD Band 41 SAR measured at the highest output power channel for each test configuration is ≤ 0.6 W/kg then testing at the other channels is not required for such test configurations.
6. TDD LTE was tested using UL-DL configuration 0 with 6 UL sub frames and 2S subframes using extended cyclic prefix only and special sub frame configuration 6. SAR tests were performed at maximum output power and worst-case transmission duty factor in extended cyclic prefix. Per 3GPP 36.211 Sec. 4, the duty factor using extended cyclic prefix is 0.633(cf=1.58).
7. SAR test reduction is applied using the following criteria:
   Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB, and 50% RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is >0.8 W/kg, testing for other Channels is performed at the highest output power level for 1RB, and 50% RB configuration for that channel. Testing for 100% RB configuration is performed at the highest output power level for 100% RB configuration across the Low, Mid and High Channel when the highest reported SAR for 1 RB and 50% RB are >0.8 W/kg, testing for the remaining required channels is not needed because the reported SAR for 100% RB Allocation <1.45 W/kg. Testing for 16-QAM modulation is not required because the reported SAR for QPSK is <1.45 W/kg and its output power is not more than 0.5 dB higher than that a QPSK. Testing for the other channel bandwidths is not required because the reported SAR for the highest channel bandwidth is <1.45 W/kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.

12. SIMULTANEOUS SAR ANALYSIS

12.1 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	0.653	0.164	0.817
		GSM 1900	1.149	0.164	**1.313**

Simultaneous Transmission Summation Scenario with Bluetooth					
Exposure condition	Distance (mm)	Band	WWAN SAR (W/kg)	Bluetooth SAR (W/kg)	∑ 1-g SAR (W/kg)
Bluetooth Tethering	10	GSM 850	0.653	0.016	0.669
		GSM 1900	1.149	0.016	1.165

For the simultaneous Transmission analysis evaluation, the report of the basic model Report No: HCT-SR-1901-FC001 :were referenced

12.4 Simultaneous Transmission Conclusion

The above numerical summed SAR Results 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.

Hotspot SAR measurement variability Results

Frequency		Mode/Band	Configuration	Measured SAR	Repeated SAR	SAR Ratio
MHz	Channel			(W/kg)	(W/kg)	
2 506.0	39750	LTE TDD 41	Rear (1RB, 99offset)	0.947	0.834	1.14

14. MEASUREMENT UNCERTAINTY

The measured SAR was <1.5 W/Kg for 1g SAR and <3.75 W/KgFor 10g SAR 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	CS8Cspeag-TX90	F12/ 5K9GA1/C/01	N/A	N/A	N/A
Staubli	CS8Cspeag-TX90	F13/ 5R4XF1/C/01	N/A	N/A	N/A
Staubli	TX90 XLspeag	F12/ 5K9GA1/A/01	N/A	N/A	N/A
Staubli	TX90 XLspeag	F13/ 5R4XF1/A/01	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	S-1206 0513	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	S-1338 1332	N/A	N/A	N/A
SPEAG	DAE4	652	04/20/2018	Annual	04/20/2019
SPEAG	DAE3	466	08/22/2018	Annual	08/22/2019
SPEAG	E-Field Probe EX3DV4	3863	04/25/2018	Annual	04/25/2019
SPEAG	E-Field Probe EX3DV4	7370	08/30/2018	Annual	08/30/2019
SPEAG	Dipole D1900V2	5d061	03/15/2018	Annual	03/15/2019
SPEAG	Dipole D2600V2	1015	11/20/2018	Annual	11/20/2019
Agilent	Power Meter E4419B	MY40511244	04/25/2018	Annual	04/25/2019
Agilent	Power Meter E4419B	MY40511243	03/30/2018	Annual	03/30/2019
Agilent	Power Sensor 8481A	SG1091286	10/11/2018	Annual	10/11/2019
Agilent	Power Sensor 8481A	MY41090873	10/11/2018	Annual	10/11/2019
SPEAG	DAKS 3.5	1038	05/29/2018	Annual	05/29/2019
SPEAG	VNA-R140	0141013	05/29/2018	Annual	05/29/2019
Agilent	Base Station E5515C	GB44400269	02/02/2018	Annual	02/02/2019
HP	Signal Generator E4433B	US40052109	03/06/2018	Annual	03/06/2019
HP	11636B/Power Divider	58698	03/06/2018	Annual	03/06/2019
TESTO	175-H1/Thermometer	40331939309	02/06/2018	Annual	02/06/2019
TESTO	175-H1/Thermometer	40332651310	02/06/2018	Annual	02/06/2019
EMPOWER	RF Power Amplifier	1084	06/11/2018	Annual	06/11/2019
MICRO LAB	LP Filter / LA-15N	10453	10/11/2018	Annual	10/11/2019
MICRO LAB	LP Filter / LA-30N	-	10/11/2018	Annual	10/11/2019
Apitech	Attenuator (3dB) 18B-03	1	06/07/2018	Annual	06/07/2019
Agilent	Attenuator (20dB) 33340C	13311	05/10/2018	Annual	05/10/2019
HP	Dielectric Probe Kit 85070C	00721521	N/A	N/A	N/A
Agilent	Directional Bridge	3140A03878	06/11/2018	Annual	06/11/2019
HP	Dual Directional Coupler	16072	10/11/2018	Annual	10/11/2019
Anritsu	Radio Communication Tester MT8820C	6200628628	07/19/2018	Annual	07/19/2019
Anritsu	Radio Communication Tester MT8821C	6201502997	08/13/2018	Annual	08/13/2019
Agilent	MXA Signal Analyzer N9020A	MY50510407	10/31/2018	Annual	10/31/2019

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 - 2005.

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: Mobile Phone
Liquid Temperature: 19.3 ℃
Ambient Temperature: 19.5 ℃
Test Date: 01/15/2019
Plot No.: 1

DUT: SM-M205FN/DS; Type: Bar

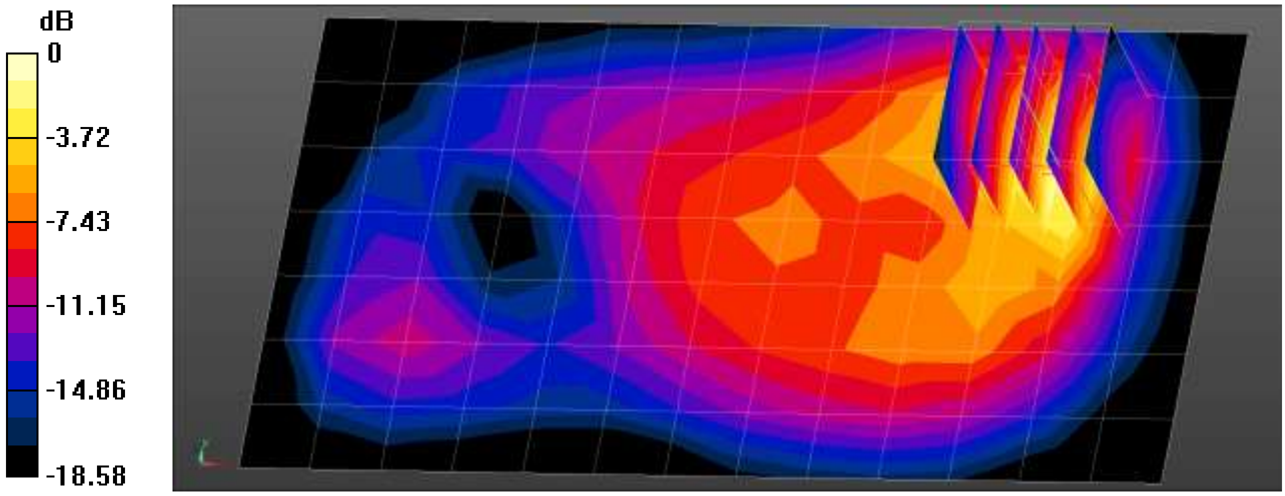
Communication System: UID 0, WCDMA1900 (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.52 S/m; ε_r = 52.551; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(7.84, 7.84, 7.84); Calibrated: 2018-04-25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2018-08-22
- Phantom: Triple Flat Phantom 5.1C
- Measurement SW: DASY52, Version 52.8 (8);

WCDMA Band 2 Body Rear 9400ch/Area Scan (8x14x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.625 W/kg

WCDMA Band 2 Body Rear 9400ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.335 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 0.940 W/kg
SAR(1 g) = 0.534 W/kg; SAR(10 g) = 0.277 W/kg
Maximum value of SAR (measured) = 0.809 W/kg



0 dB = 0.809 W/kg = -0.92 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Mobile Phone
Liquid Temperature:	23.5 ℃
Ambient Temperature:	23.7 ℃
Test Date:	01/16/2019
Plot No.:	2

DUT: SM-M205FN/DS; Type: Bar

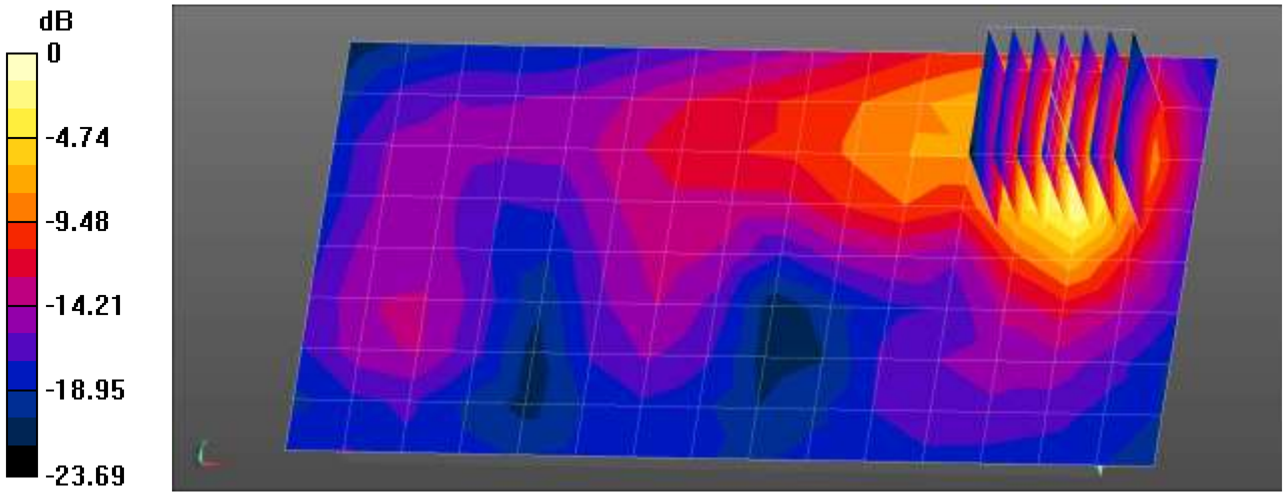
Communication System: UID 0, LTE TDD Band (0); Frequency: 2506 MHz;Duty Cycle: 1:1.58052
Medium parameters used (interpolated): f = 2506 MHz; σ = 2.102 S/m; ε_r = 52.307; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(7.33, 7.33, 7.33); Calibrated: 2018-08-30;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2018-04-20
- Phantom: Triple Flat Phantom 5.1C
- Measurement SW: DASY52, Version 52.8 (8);

LTEband 41 Body Rear QPSK 20MHz 1RB 99offset 39750ch/Area Scan (9x16x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 1.43 W/kg

LTEband 41 Body Rear QPSK 20MHz 1RB 99offset 39750ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.383 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 1.92 W/kg
SAR(1 g) = 0.947 W/kg; SAR(10 g) = 0.417 W/kg
Maximum value of SAR (measured) = 1.54 W/kg



0 dB = 1.54 W/kg = 1.88 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 21.9 ℃
Ambient Temperature: 22.1 ℃
Test Date: 01/16/2019
Plot No.: 3

DUT: SM-M205FN/DS; Type: Bar

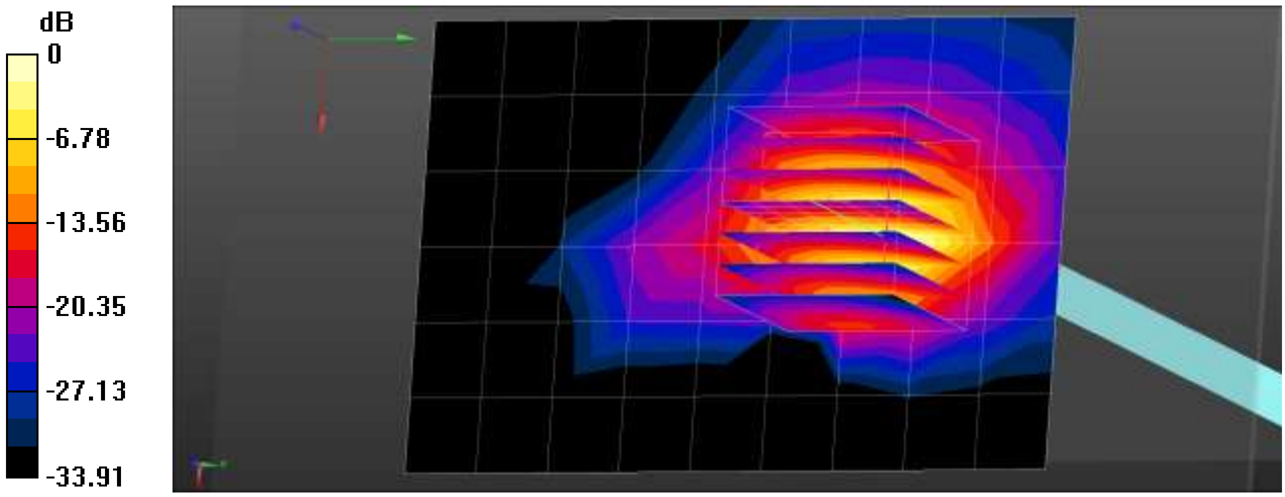
Communication System: UID 0, LTE Band 41 (FCC) (0); Frequency: 2549.5 MHz;Duty Cycle: 1:1.58052
Medium parameters used: f = 2550 MHz; σ = 2.104 S/m; ε_r = 52.166; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(7.27, 7.27, 7.27); Calibrated: 2018-04-25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2018-08-22
- Phantom: Triple Flat Phantom 5.1C
- Measurement SW: DASY52, Version 52.8 (8);

LTE Band 41 PhabletSAR Bottom QPSK 20MHz 50RB 0offset 40185ch B/O/Area Scan (10x7x1):
Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 3.44 W/kg

LTE Band 41 PhabletSAR Bottom QPSK 20MHz 50RB 0offset 40185ch B/O/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.536 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 6.67 W/kg
SAR(1 g) = 2.22 W/kg; SAR(10 g) = 0.716 W/kg
Maximum value of SAR (measured) = 4.92 W/kg



0 dB = 4.92 W/kg = 6.92 dBW/kg

Attachment 2. – Dipole Verification Plots

■ Verification Data (1 900 MHz Body)

Test Laboratory:	HCT CO., LTD
Input Power:	0.05 W
Liquid Temp:	19.3 ℃
Test Date:	01/15/2019

DUT: Dipole 1900 MHz; Type: D1900V2

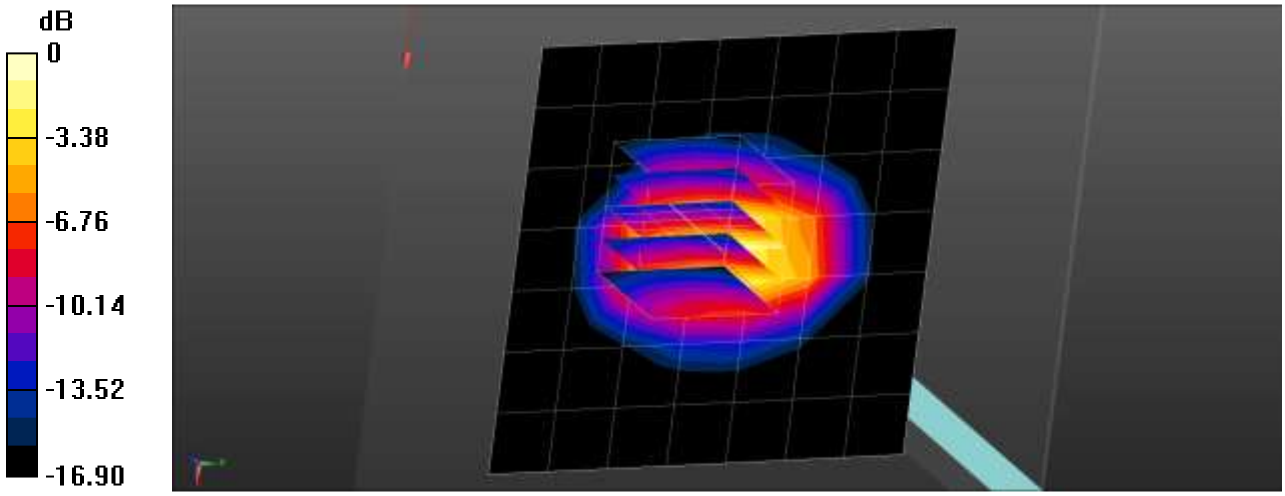
Communication System: UID 0, CW (0); Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.537 S/m; ε_r = 52.511; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(7.84, 7.84, 7.84); Calibrated: 2018-04-25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2018-08-22
- Phantom: Triple Flat Phantom 5.1C
- Measurement SW: DASY52, Version 52.8 (8);

1900MHz Body Verification/Area Scan (8x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.80 W/kg

1900MHz Body Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 43.73 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.39 W/kg
SAR(1 g) = 1.89 W/kg; SAR(10 g) = 1 W/kg
Maximum value of SAR (measured) = 2.89 W/kg



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

■ Verification Data (2 600 MHz Body)

Test Laboratory:	HCT CO., LTD
Input Power:	0.05 W
Liquid Temp:	23.5 ℃
Test Date:	01/16/2019

DUT: Dipole 2600 MHz; Type: D2600V2

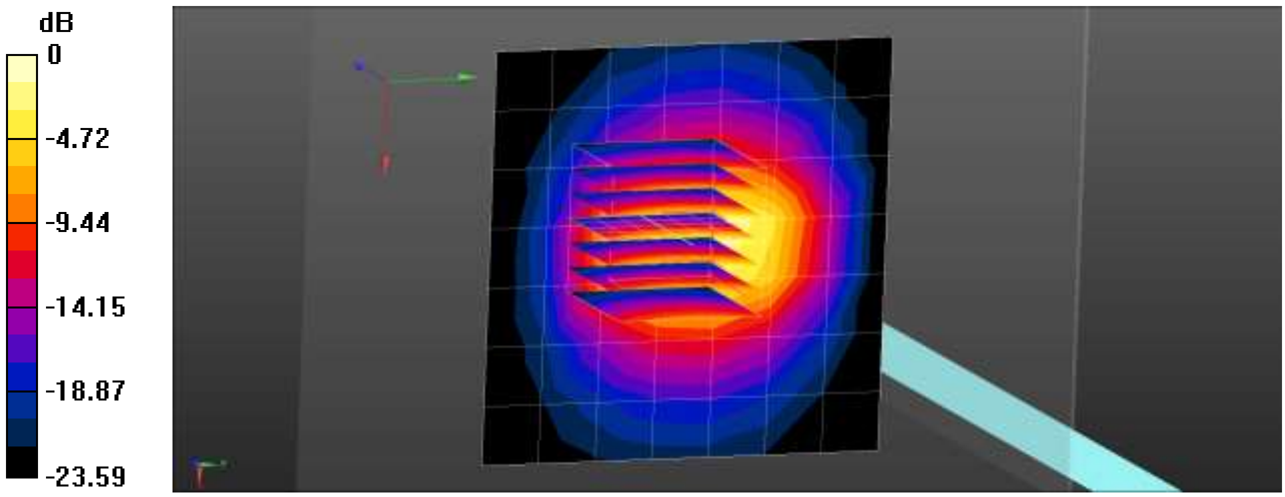
Communication System: UID 0, CW (0); Frequency: 2600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2600 MHz; σ = 2.205 S/m; ε_r = 52.041; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(7.33, 7.33, 7.33); Calibrated: 2018-08-30;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2018-04-20
- Phantom: Triple Flat Phantom 5.1C
- Measurement SW: DASY52, Version 52.8 (8);

2600MHz Body Verification/Area Scan (8x8x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 3.57 W/kg

2600MHz Body Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 45.92 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 5.85 W/kg
SAR(1 g) = 2.66 W/kg; SAR(10 g) = 1.17 W/kg
Maximum value of SAR (measured) = 4.59 W/kg



0 dB = 4.59 W/kg = 6.62 dBW/kg

■ Verification Data (2 600 MHz Body)

Test Laboratory:	HCT CO., LTD
Input Power:	0.05 W
Liquid Temp:	21.9 ℃
Test Date:	01/16/2019

DUT: Dipole 2600 MHz; Type: D2600V2

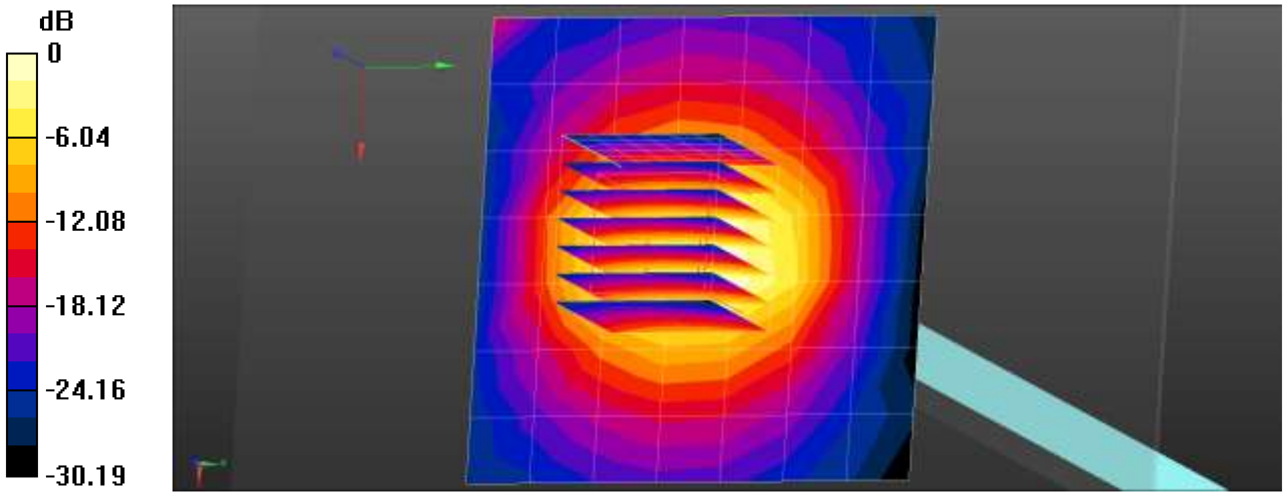
Communication System: UID 0, CW (0); Frequency: 2600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2600 MHz; σ = 2.17 S/m; ε_r = 52.043; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(7.27, 7.27, 7.27); Calibrated: 2018-04-25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2018-08-22
- Phantom: Triple Flat Phantom 5.1C
- Measurement SW: DASY52, Version 52.8 (8);

2600MHz Body Verification/Area Scan (8x8x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 3.20 W/kg

2600MHz Body Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 47.18 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 5.85 W/kg
SAR(1 g) = 2.65 W/kg; SAR(10 g) = 1.17 W/kg
Maximum value of SAR (measured) = 4.58 W/kg



0 dB = 3.20 W/kg = 5.05 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 bacteriacide 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	Frequency (MHz)			
(% by weight)	1 900		2 450 – 2 700	
Tissue Type	Head	Body	Head	Body
Water	54.9	70.17	71.88	73.2
Salt (NaCl)	0.18	0.39	0.16	0.1
Sugar	0.0	0	0.0	0.0
HEC	0.0	0	0.0	0.0
Bactericide	0.0	0	0.0	0.0
Triton X-100	0.0	0.0	19.97	0.0
DGBE	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
1	3863	EX3DV4	Body	1900	5d061	2018-05-14	53.5	1.52	PASS	PASS	PASS	GMSK	PASS	N/A
12	7370	EX3DV4	Body	2600	1015	2018-12-03	52.4	2.16	PASS	PASS	PASS	TDD	PASS	N/A
1	3863	EX3DV4	Body	2600	1015	2018-12-03	52.4	2.16	PASS	PASS	PASS	TDD	PASS	N/A

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.

Attachment 5. – The Verification of Power reduction

Per the May 2017 TCBC Workshop notes, demonstration of proper functioning of the power reduction mechanism is required to support the corresponding SAR Configurations. The verification process was divided into two parts:
1). Evaluation of output power levels for individual triggering mechanism
2) Evaluation of the triggering distances for proximity-based sensors.

1. Power Reduction Verification for Main Antenna

This device utilizes a power reduction mechanism for some wireless modes and bands for SAR compliance under hotspot conditions and under some conditions when the device is being used in close proximity to the user's hand. The hotspot power reduction applied to this product has a higher priority than the proximity sensor, so these two conditions do not work simultaneously. and In both cases, powers were reduced to the same Power level.

All Hotspot SAR evaluations for this device were performed at the maximum allowed output Power when Hotspot is activated. FCC KDB Publication 616217D04v01r02 section 6 was used as a guideline for selection SAR test distances for this device when being used in phablet use conditions. For detailed measurement conducted power results, please refer to the Section .9.

1.1 Power Verification Procedure for Main Ant

The Power verification was performed according to the following procedure:

1) A base station simulator was used to establish a conducted RF connection and output power was monitored. The Power measurements were conformed to be within expected tolerances for all states before and after a power reduction mechanism was triggered.
2) Step 1 was repeated for all relevant modes and frequency bands for the mechanism being investigated.
3) Step 1 and 2 were repeated for all individual power reduction mechanism and combinations thereof. For the combination cases, one mechanism was switched to a "triggered" state at a time; powers were conformed to be within tolerance after each additional mechanism was activated.

Power Reduction Verification for Main Bands

Mechanism(s)	Mode/Band	Conducted Power (dBm)		
		Un-triggered (Max Power)	Triggered (Reduced Power)	Triggered (Reduced Power)
Hotspot On	WCDMA 2	23.85	21.12	
Hotspot On	LTE Band 41	21.38	18.71	
Grip	WCDMA 2	23.85	21.10	
Grip	LTE Band 41	21.38	18.74	
Hotspot On, Then Grip	WCDMA 2	23.85	21.12	21.10
Hotspot On, Then Grip	LTE Band 41	21.38	18.71	18.74
Grip, then Hotspot On	WCDMA 2	23.85	21.10	21.12
Grip, then Hotspot On	LTE Band 41	21.38	18.74	18.71

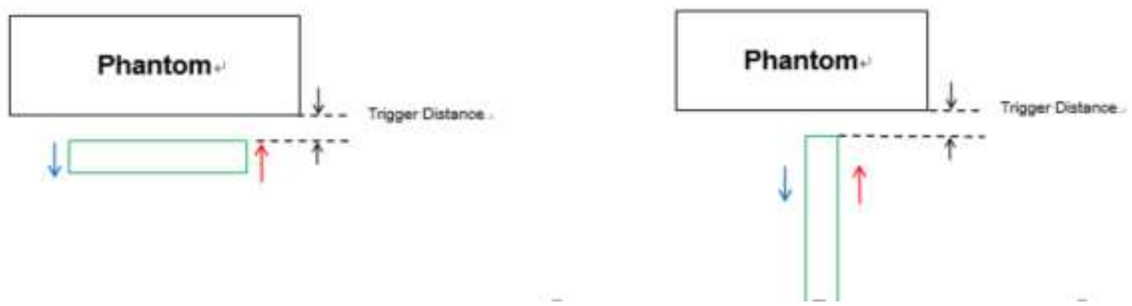
1.2 Power Verification Procedure for Main Ant

(KDB 616217 D04v01r02 §6.2)

The distance verification procedure was performed according to the following procedure:

1) A base station simulator was used to establish an RF connection and to monitor the power levels. The device being tested was placed below the relevant section of the phantom with the relevant side or edge of the device facing toward the phantom.
2) The device was moved toward and away from the phantom to determine the distance at which the mechanism triggers and the output power is reduced, per KDB Publication 616217 D04v01r02 .Each applicable test position was evaluated. The distance were conformed to be the same or larger (more conservative) than the minimum distances provided by the manufacturer.
3) Step 1 and 2 were repeated for the relevant modes, as appropriate
4) Steps1 through 3 were repeated for all distance-based power reduction mechanisms.

For detailed measurement conducted power results, please refer to the Section .9



Proximity Sensor Trigger Distance Assessment KDB 616217 D04 §6.2 (Rear /Bottom)

LEGEND

→ (red) Direction of DUT travel for determination of power reduction triggering point
→ (blue) Direction of DUT travel for determination of full power resumption triggering point

Tissue simulating liquid	Trigger distance - Rear		Trigger distance - Bottom	
	Moving toward phantom	Moving from phantom	Moving toward phantom	Moving from phantom
1900 MHz Muscle	10	15	6	10
2600 MHz Body	10	15	6	10

Distance Measurement verification for Proximity sensor

Rear side – EUT Moving toward (trigger) to the Phantom

Distance	Distance to DUT Output power (dBm)									
	15	14	13	12	11	10	9	8	7	6
WCDMA 2	23.71	23.74	23.75	23.74	23.65	21.09	21.19	21.01	21.06	21.11
LTE Band 41	21.33	21.42	21.35	21.41	21.36	18.58	18.46	18.44	18.52	18.47

Rear side – EUT Moving away (Release) from the Phantom

Distance	Distance to DUT Output power (dBm)									
	11	12	13	14	15	16	17	18	19	20
WCDMA 2	21.16	20.98	21.13	21.05	21.08	23.75	23.79	23.63	23.75	23.76
LTE Band 41	18.5	18.53	18.47	18.53	18.55	21.39	21.38	21.31	21.46	21.35

Based on the most conservative measured triggering distance of 10mm, additional Phablet SAR measurements were required at 6mm from rear side for the above modes.

Bottom side – EUT Moving toward (trigger) to the Phantom

Distance	Distance to DUT Output power (dBm)									
	11	10	9	8	7	6	5	4	3	6
WCDMA 2	23.61	23.72	23.63	23.75	23.68	21.02	21.06	21.01	21.11	21.1
LTE Band 41	21.41	21.31	21.46	21.34	21.46	18.6	18.59	18.59	18.61	18.59

Bottom side – EUT Moving away (Release) from the Phantom

Distance	Distance to DUT Output power (dBm)									
	6	7	8	9	10	11	12	13	14	15
WCDMA 2	21.13	21.18	21.13	21.14	21.14	23.79	23.65	23.75	23.63	23.71
LTE Band 41	18.57	18.48	18.44	18.54	18.56	21.28	21.32	21.42	21.44	21.44

Based on the most conservative measured triggering distance of 6mm, additional Phablet SAR measurements were required at 5mm from Bottom side for the above modes

1.3 Proximity Sensor Coverage for SAR measurements

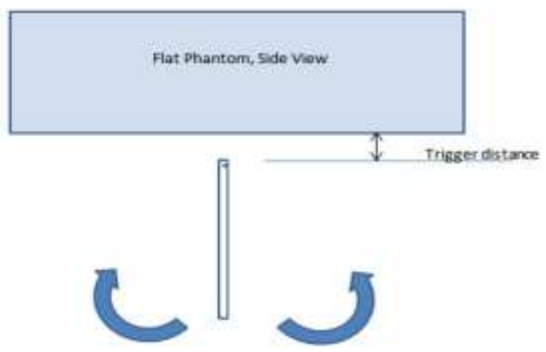
(KDB 616217 D04v01r02 §6.3)

As there is no spatial offset between the antenna and the proximity sensor element, proximity sensor coverage did not need to be assessed.

1.4 Proximity Sensor Tilt Angle Assessment

(KDB 616217 D04v01r02 §6.4)

The DUT was positioned directly below the flat phantom at the minimum measured trigger distance with Bottom side parallel to the base of the flat phantom for each band.
The EUT was rotated about Bottom side for angles up to ±45°. If the output power increased during the rotation the DUT was moved 1mm toward the phantom and the rotation repeated. This procedure was repeated until the power remained reduced for all angles up ±45°.



Proximity sensor tilt angle assessment (Bottom side) KDB 616217 §6.4

Summary of Tablet Tilt Angle influence to Proximity Sensor Triggering (Bottom side)

Band (MHz)	Minimum distance at which power reduction was maintained over-45°	Power reduction status										
		-45°	-40°	-30°	-20°	-10°	0°	10°	20°	30°	40°	45°
1900HMz Muscle	6 mm	On	On	On	On	On	On	On	On	On	On	On
2600HMz Muscle	6 mm	On	On	On	On	On	On	On	On	On	On	On

1.5 Resulting test positions for Phablet SAR measurements

Wireless technologies	Position	§6.2 Triggering Distance	§6.3 Coverage	§6.4 Tilt Angle	Worst case distance for Phablet SAR
WWAN (WCDMA2/ LTE41)	Rear	10	N/A	N/A	9
	Bottom	6	N/A	N/A	5

Note: FCC KDB Publication 616217 D04v01r02 Section 6 was used as a guideline for selecting SAR test distances for this device when being used in phablet use conditions.