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SAR TEST REPORT

Applicant Name:	**Date of Issue: 05. 31, 2018**
LG Electronics MobileComm USA, Inc.	**Test Report No.: HCT-SR-1805-FC007**
1000 Sylvan Avenue, Englewood Cliffs NJ 07632	**Test Site: HCT CO., LTD.**

FCC ID: ZNFW319

Equipment Type:	**Portable Wrist Device**
Application Type	**Certification**
FCC Rule Part(s):	**CFR §2.1093**
Model Name:	**LM-W319**
Additional FCC Model(s):	**LMW319, W319**
Date of Test:	**05/25/2018**

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-1805-FC007	05. 31, 2018	First Approval Report

Table of Contents

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
Fax.	+82 31 645 6401

Attestation of SAR test result				
Trade Name:	LG Electronics, MobileComm U.S.A., Inc.			
FCC ID:	ZNFW319			
Model:	LM-W319			
Additional FCC Model(s):	LMW319, W319			
EUT Type:	Portable Wrist Device			
Application Type:	Certification			
The Highest Reported SAR (W/Kg)				
Band	Tx. Frequency (MHz)	Equipment Class	Reported SAR (W/kg) 1g Next-to-Mouth	Reported SAR (W/kg) 10g Extremity
802.11b	2 412 ~ 2 462	DTS	0.20	0.30
Bluetooth	2 402 ~ 2 480	DSS/DTS	N/A	
Date(s) of Tests:	05/25/2018			

2. Device Under Test Description

2.1 DUT specification

<table>
<tr><th colspan="3">Device Wireless specification overview</th></tr>
<tr><th>Band & Mode</th><th>Operating Mode</th><th>Tx Frequency</th></tr>
<tr><td>2.4 GHz WLAN</td><td>Data</td><td>2 412 – 2 462 MHz</td></tr>
<tr><td>Bluetooth</td><td>Data</td><td>2 402 – 2 480 MHz</td></tr>
</table>

<table>
<tr><th colspan="3">Device Description</th></tr>
<tr><td>Device Dimension</td><td colspan="2">Overall Diameter: 53.8 mm
Inner Diameter: 40.9 mm</td></tr>
<tr><td>Battery Information</td><td colspan="2">EAC63381601</td></tr>
<tr><td rowspan="3">Device Serial Numbers</td><th>Mode</th><th>Serial Number</th></tr>
<tr><td>2.4 GHz WLAN</td><td>3D262_3
3D261_3</td></tr>
<tr><td colspan="2">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 and are within operational tolerances expected for production units.</td></tr>
</table>

2.2 DUT Wireless mode

<table>
<tr><th>Wireless Modulation</th><th>Band</th><th colspan="2">Operating Mode</th><th>Duty Cycle</th></tr>
<tr><td colspan="2">2.4 GHz WLAN</td><td>Data</td><td>802.11 b, 802.11 g, 802.11 n (HT20)</td><td>98.92 %</td></tr>
<tr><td colspan="2">Bluetooth</td><td>Data</td><td>4.2 LE</td><td>N/A</td></tr>
</table>

2.3 Nominal and Maximum Output Power Specifications

Mode / Band	CH.	Modulated Average (dBm)	
		Maximum	Nominal
IEEE 802.11b (2.4 GHz)	1 ~ 2	16.0	15.0
	3 ~ 9	16.0	15.0
	10 ~ 11	16.0	15.0
IEEE 802.11g (2.4 GHz)	1 ~ 2	15.0	14.0
	3 ~ 9	15.0	14.0
	10 ~ 11	15.0	14.0
IEEE 802.11n(2.4 GHz)	1 ~ 2	14.0	13.0
	3 ~ 9	14.0	13.0
	10 ~ 11	14.0	13.0

Modulation/ Data rate			Average power (dBm)
Bluetooth	GFSK / 1Mbps	Maximum	10.0
		Nominal	9.0
	π/4DQPSK / 2Mbps	Maximum	6.5
		Nominal	5.5
	8DPSK/ 3Mbps	Maximum	6.5
		Nominal	5.5
	GFSK / 1Mbps (BT LE)	Peak	10.0

2.4 DUT Antenna Locations

A diagram showing the location of the DUT antenna can be found in SAR _ Setup_ photos.

2.5 SAR Test Considerations

2.5.1 BT & 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	10	10	1.6	
	Extremity SAR			5		3.1
Bluetooth LE	Head SAR		10	10	1.6	
	Extremity SAR			5		3.1

Based on the maximum conducted power of Bluetooth and antenna to use separation distance, Bluetooth SAR was not required [(10/10)*√2.480] = 1.6 <3.0 for 1-g SAR, [(10/5)*√2.480] = 3.1 ≤ 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 [(10/10)*√2.480] = 1.6 ≤ 3.0 for 1-g SAR, [(10/5)*√2.480] = 3.1 ≤ 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	Maximum Allowed Power	Separation Distance	Estimated SAR	
					Head (1-g SAR)	Extremity (10-g SAR)
		[MHz]	[mW]	[mm]	[W/kg]	[W/kg]
Bluetooth	Head SAR	2 480	10	10	0.210	-
	Extremity SAR			5	-	0.168
Bluetooth LE	Head SAR		10	10	0.210	-
	Extremity SAR			5	-	0.168

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.

2.6 TEST METHODOLOGY and Procedures

- FCC KDB Publication 248227 D01 802.11 Wi-Fi SAR v02r02
- FCC KDB Publication 447498 D01 General SAR Guidance v06
- FCC KDB Publication 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- FCC KDB Publication 865664 D02 SAR Reporting v01r02

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 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.

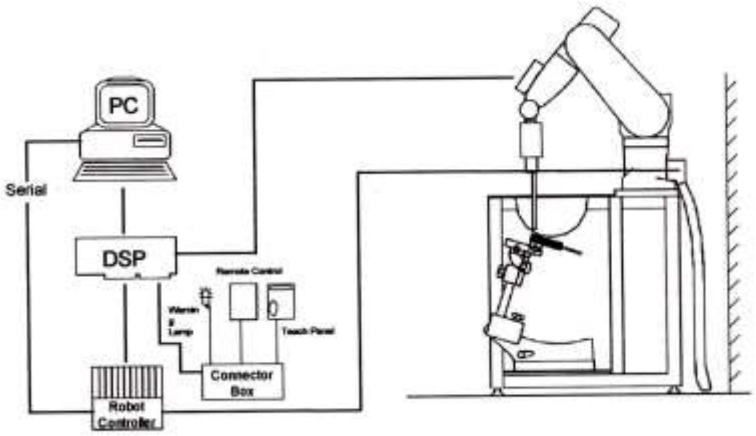

Figure 2. HCT SAR Lab. Test Measurement Set-up

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 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 5.0 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 WRIST WORN DEVICES

6.1 Wrist watch and wrist-worn transmitters

6.1.1 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

6.1.2 Positioning for Head

Devices that are designed to be worn on the wrist may operate in speaker mode for voice communication, with the device worn on the wrist and positioned next to the mouth. When next-to-mouth SAR evaluation is required, the device is positioned at 10mm from a flat phantom filled with head tissue-equivalent medium. The device is evaluated with wrist bands strapped together to represent normal use conditions. The 1-g head SAR Exclusion Threshold in KDB Publication 447498D01v06 should be applied to determine SAR test requirements.

6.1.3 Extremity Exposure Configurations.

Devices that are designed or intended for use on extremities or mainly operated in extremity only exposure conditions; i.e., hand, wrist, 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. When extremity SAR evaluation is required, the device is evaluated with the back of the device touching the flat phantom, which is filled with body tissue-equivalent medium. The device is evaluated with wrist band un strapped and touching the phantom; the space between the device and phantom must represent actual use conditions. The 10g extremity SAR exclusion Thresholds found in KDB Publication 447498 D01v06 should be applied to determine SAR test requirements

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 MEASUREMENT PROCEDURES

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 SA. The highest reported SAR results are identified on the grant of equipment authorization according to procedure in KDB 690783 D01r03.

8.1 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.

8.1.1 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.

8.1.2 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.

8.1.3 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.

9. Conducted Output Powers

9.1 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	15.31
	2 437	6	15.63
	2 462	11	15.61
802.11g	2 412	1	14.64
	2 437	6	14.79
	2 462	11	14.94
802.11n (HT20)	2 412	1	13.54
	2 437	6	13.75
	2 462	11	13.87

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

9.2 Bluetooth

The Burst averaged-conducted Power

Mode	Channel	Bluetooth Power [dBm]
DH5	0	9.32
	39	9.44
	78	9.26
2-DH5	0	5.33
	39	5.48
	78	5.50
3-DH5	0	5.33
	39	5.48
	78	5.51

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
05/25/2018	21.2	2450H	2400	1.764	37.761	1.756	39.290	0.46%	-3.89%
			2450	1.828	37.463	1.800	39.200	1.56%	-4.43%
			2500	1.883	37.194	1.855	39.140	1.51%	-4.97%

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
05/25/2018	20.5	2450B	2400	1.880	52.082	1.902	52.770	-1.16%	-1.30%
			2450	1.946	51.929	1.950	52.700	-0.21%	-1.46%
			2500	2.008	51.927	2.021	52.640	-0.64%	-1.35%

10.2 System Verification

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

System Verification Results – 1g SAR

*** Input Power: 50mW**

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]	[%]	[%]
2 450	05/25/2018	3863	965	Head	21.4	21.2	51.1	2.53	50.6	- 0.98	± 10

System Verification Results 10g SAR

*** Input Power: 50mW**

Freq.	Date	Probe (S/N)	Dipole (S/N)	Liquid	Amb. Temp.	Liquid Temp.	1 W Target SAR_{10g} (SPEAG)	Measured SAR_{10g}	1 W Normalized SAR_{10g}	Deviation	Limit [%]
[MHz]					[°C]	[°C]	[W/kg]	[W/kg]	[W/kg]	[%]	[%]
2 450	05/25/2018	3903	965	Body	20.8	20.5	23.6	1.15	23.0	- 2.54	± 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 Standalone Head SAR Results

2.4GHz WLAN Head SAR

Metal Watch Band															
Frequency		Mode	Band width	Data Rate	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Meas. 1g SAR	Scaling Factor	Scaling Factor	Reported SAR	Plot No.
MHz	Ch.		(MHz)	(Mbps)	(dBm)	(dBm)	(dB)			(mm)	(W/kg)	(Power)	(Duty)	(W/kg)	
2 437	6	802.11b	22	1	16.0	15.63	-0.13	Front	98.92	10	0.173	1.089	1.011	0.190	1
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population								Head 1.6 W/kg Averaged over 1 gram							

2.4GHz WLAN Head SAR

Rubber Watch Band															
Frequency		Mode	Band width	Data Rate	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Meas. 1g SAR	Scaling Factor	Scaling Factor	Reported SAR	Plot No.
MHz	Ch.		(MHz)	(Mbps)	(dBm)	(dBm)	(dB)			(mm)	(W/kg)	(Power)	(Duty)	(W/kg)	
2 437	6	802.11b	22	1	16.0	15.63	-0.10	Front	98.92	10	0.177	1.089	1.011	**0.195**	2
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population								Head 1.6 W/kg Averaged over 1 gram							

11.2 Standalone Extremity SAR Results

2.4GHz WLAN Extremity SAR

Metal Watch Band															
Frequency		Mode	Band width	Data Rate	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Meas. 10g SAR	Scaling Factor	Scaling Factor	Scaled 10g SAR	Plot No.
MHz	Ch.		(MHz)	(Mbps)	(dBm)	(dBm)	(dB)			(mm)	(W/kg)	(Power)	(Duty)	(W/kg)	
2 437	6	802.11b	22	1	16.0	15.63	-0.17	Back	98.92	0	0.269	1.089	1.011	**0.296**	3
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak(Hands / Feet / Ankle / Wrist) Uncontrolled Exposure/ General Population								Extremity SAR 4.0 W/kg Averaged over 10 gram							

2.4GHz WLAN Extremity SAR

Rubber Watch Band															
Frequency		Mode	Band width	Data Rate	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Meas. 10g SAR	Scaling Factor	Scaling Factor	Scaled 10g SAR	Plot No.
MHz	Ch.		(MHz)	(Mbps)	(dBm)	(dBm)	(dB)			(mm)	(W/kg)	(Power)	(Duty)	(W/kg)	
2 437	6	802.11b	22	1	16.0	15.63	0.05	Back	98.92	0	0.199	1.089	1.011	0.219	4
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak(Hands / Feet / Ankle / Wrist) Uncontrolled Exposure/ General Population								Extremity SAR 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, 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. Per FCC KDB865664 D02v01, variability SAR test were not performed when the measured SAR results for a frequency band were greater than 0.8 W/Kg for 1g SAR and 2.0 W/kg for 10g SAR. Please see section 13 for variability analysis.
6. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB 447498 D01v06.
7. 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 for 1g SAR/ ≤ 2W/kg for 10g SAR 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.

WLAN Notes:

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1. 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. .
2. 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.
3. 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. SAR Measurement Variability

Per FCC KDB Publication 865664 D01v01, SAR measurement variability is assessed when measured 1g SAR is >0.8W/kg or 10g SAR is >2.0W/kg. Since Highest measured SAR for this device was below these limits, measurement variability was not assessed

13. MEASUREMENT UNCERTAINTY

The measured SAR was <1.5 W/kg for 1g SAR and <3.75W/kg for 10g SAR for all frequency bands. Therefore, per KDB Publication 865664 D01v01r04 the extended measurement uncertainty analysis per IEEE1528-2013 was not required.

Measurement Uncertainty for DUT SAR test

a	*c*	*d*	*e*	*f*	*g*	*h* = *c x f / e*	*i* = *c x g / e*	*k*
Source of uncertainty	**Uncertainty ± %**	**Probability distribution**	**Div.**	c_i (1 g)	c_i (10 g)	**Standard Uncertainty ± % (1 g)**	**Standard Uncertainty ± % (10 g)**	v_i or v_{eff}
Measurement system								
Probe calibration	6.65	N	1	1	1	6.65	6.65	∞
Axial isotropy	4.70	R	1.73	0.71	0.71	1.92	1.92	∞
Hemispherical isotropy	9.60	R	1.73	0.71	0.71	3.92	3.92	∞
Boundary effect	2.00	R	1.73	1	1	1.15	1.15	∞
Linearity	4.70	R	1.73	1	1	2.71	2.71	∞
Detection limits	1.00	R	1.73	1	1	0.58	0.58	∞
Readout electronics	0.30	N	1	1	1	0.30	0.30	∞
Response time	0.80	R	1.73	1	1	0.46	0.46	∞
Integration time	2.60	R	1.73	1	1	1.50	1.50	∞
RF ambient conditions - noise	3.00	R	1.73	1	1	1.73	1.73	∞
RF ambient conditions - reflections	3.00	R	1.73	1	1	1.73	1.73	∞
Probe positioner mechanical tolerance	0.80	R	1.73	1	1	0.46	0.46	∞
Probe positioning with respect to phantom shell	6.70	R	1.73	1	1	3.87	3.87	∞
Max. SAR Evaluation	4.00	R	1.73	1	1	2.31	2.31	∞
Test sample related								
Test sample positioning	5.51	N	1	1	1	5.51	5.51	47
Device holder uncertainity	2.99	N	1	1	1	2.99	2.99	5
SAR drift measurement	5.00	R	1.73	1	1	2.89	2.89	∞
SAR scaling	0.00	R	1.73	1	1	0.00	0.00	∞
Phantom and set-up								
Phantom uncertainty (shape and thickness uncertainty)	7.60	R	1.73	1	1	4.39	4.39	∞
Liquid conductivity (measured)	1.54	N	1	0.78	0.71	1.20	1.09	∞
Liquid permittivity (measured)	1.17	N	1	0.23	0.26	0.22	0.25	∞
Liquid conductivity (temperature uncert	2.93	R	1.73	0.78	0.71	1.32	1.20	∞
Liquid permittivity (temperature uncerta	0.95	R	1.73	0.23	0.26	0.13	0.14	∞
Liquid conductivity - deviation from targ	5.00	R	1.73	0.64	0.43	1.85	1.24	∞
Liquid permittivity - deviation from targe	5.00	R	1.73	0.6	0.49	1.73	1.41	∞
Combined standard uncertainty		RSS				13.34	13.21	∞
Expanded uncertainty (95% confidence interval)		*k = 2*				**26.68**	**26.42**	

14. 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	F12/5K9GA1/A/01	N/A	N/A	N/A
Staubli	TX90 Xlspeag	F17/59CHA1/A/01	N/A	N/A	N/A
Staubli	Robot ControllerCS8Cspeag-TX90	F12/5K9GA1/C/01	N/A	N/A	N/A
Staubli	Robot ControllerCS8Cspeag-TX90	F17/59CHA1/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
SPEAG	DAE4	652	04/20/2018	Annual	04/20/2019
SPEAG	DAE3	466	08/29/2017	Annual	08/29/2018
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 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
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	40331915309	02/06/2018	Annual	02/06/2019
EMPOWER	RF Power amplifier	1011	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
MICRO LAB	LP Filter / LA-30N	-	10/12/2017	Annual	10/12/2018
HP	Dielectric Probe Kit 85070C	00721521	N/A	N/A	N/A
HP	Dual Directional Coupler	16072	10/12/2017	Annual	10/12/2018

NOTE:
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.

15. 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.

16. REFERENCES

[1] Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects of Radio frequency Radiation, Aug. 1996.

[2] ANSI/IEEE C95.1 - 1992, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 300 kHz to 300 GHz, New York: IEEE, Sept. 1992

[3] ANSI/IEEE C 95.1 - 2005, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3 kHz to 300 GHz, New York: IEEE, 2006

[4 ANSI/IEEE C95.3 - 2002, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave, New York: December 2002.

[5] IEEE Standards Coordinating Committee 34 – IEEE Std. 1528-2013, IEEE Recommended Practice or Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body from Wireless Communications Devices

[6] NCRP, National Council on Radiation Protection and Measurements, Biological Effects and Exposure Criteria for Radio Frequency Electromagnetic Fields, NCRP Report No. 86, 1986. Reprinted Feb. 1995.

[7] T. Schmid, O. Egger, N. Kuster, Automated E-field scanning system for dosimetric assessments, IEEE Transaction on Microwave Theory and Techniques, vol. 44, Jan. 1996, pp. 105-113.

[8] K. Pokovic, T. Schmid, N. Kuster, Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies, ICECOM97, Oct. 1997, pp. 120-124.

[9] K. Pokovic, T. Schmid, and N. Kuster, E-field Probe with improved isotropy in brain simulating liquids, Proceedings of the ELMAR, Zadar, Croatia, June 23-25, 1996, pp. 172-175.

[10] Schmid & Partner Engineering AG, Application Note: Data Storage and Evaluation, June 1998, p2.

[11] V. Hombach, K. Meier, M. Burkhardt, E. Kuhn, N. Kuster, The Dependence of EM Energy Absorption upon Human Head Modeling at 900 MHz, IEEE Transaction on Microwave Theory and Techniques, vol. 44 no. 10, Oct. 1996, pp. 1865-1873.

[12] N. Kuster and Q. Balzano, Energy absorption mechanism by biological bodies in the near field of dipole antennas above 300 MHz, IEEE Transaction on Vehicular Technology, vol. 41, no. 1, Feb. 1992, pp. 17-23.

[13] G. Hartsgrove, A. Kraszewski, A. Surowiec, Simulated Biological Materials for Electromagnetic Radiation Absorption Studies, University of Ottawa, Bioelectro magnetics, Canada: 1987, pp. 29-36.

[14] Q. Balzano, O. Garay, T. Manning Jr., Electromagnetic Energy Exposure of Simulated Users of Portable Cellular Telephones, IEEE Transactions on Vehicular Technology, vol. 44, no.3, Aug. 1995.

[15] W. Gander, Computer mathematick, Birkhaeuser, Basel, 1992.

[16] W.H. Press, S.A. Teukolsky, W.T. Vetterling, and B.P. Flannery, Numerical Recepies in C, The Art of Scientific Computing, Second edition, Cambridge University Press, 1992.

[17] N. Kuster, R. Kastle, T. Schmid, Dosimetric evaluation of mobile communications equipment with known precision, IEEE Transaction on Communications, vol. E80-B, no. 5, May 1997, pp. 645-652.

[18] CENELEC CLC/SC111B, European Prestandard (prENV 50166-2), Human Exposure to Electromagnetic Fields High-frequency: 10 kHz-300 GHz, Jan. 1995.

[19] Prof. Dr. Niels Kuster, ETH, EidgenØssische Technische Hoschschule Zòrich, Dosimetric Evaluation of the Cellular Phone.

[20] IEC 62209-1, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation and procedures – Part 1:Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 6 GHz), July. 2016.

[21] IEC 62209-2, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures – Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz) Mar. 2010.

[22] Industry Canada RSS-102 Radio Frequency Exposure Compliance of Radio communication Apparatus (All Frequency Band) Issue 5, March 2015.

[23] Health Canada Safety Code 6 Limits of Human Exposure to Radio Frequency Electromagnetic Fields in the Frequency Rage from 3 kHz – 300 GHz, 2015

[24] FCC SAR Test procedures for 2G-3G Devices, Mobile Hotspot and UMPC Device KDB 941225 D01-D07.

[25] SAR Measurement Guidance for IEEE 802.11 transmitters, KDB 248227 D01.

[26] SAR Evaluation of Handsets with Multiple Transmitters and Antennas KDB 648474 D03, D04.

[27] SAR Evaluation for Laptop, Notebook, Netbook and Tablet computers KDB 616217 D04.

[28] SAR Measurement and Reporting Requirements for 100 MHz – 6 GHz, KDB 865664 D01, D02.

[29] FCC General RF Exposure Guidance and SAR procedures for Dongles, KDB 447498 D01, D02.

Attachment 1. – SAR Test Plots

Test Laboratory:	HCT CO., LTD
EUT Type:	Portable Wrist Device
Liquid Temperature:	21.2 ℃
Ambient Temperature:	21.4 ℃
Test Date:	05/25/2018
Plot No.:	1

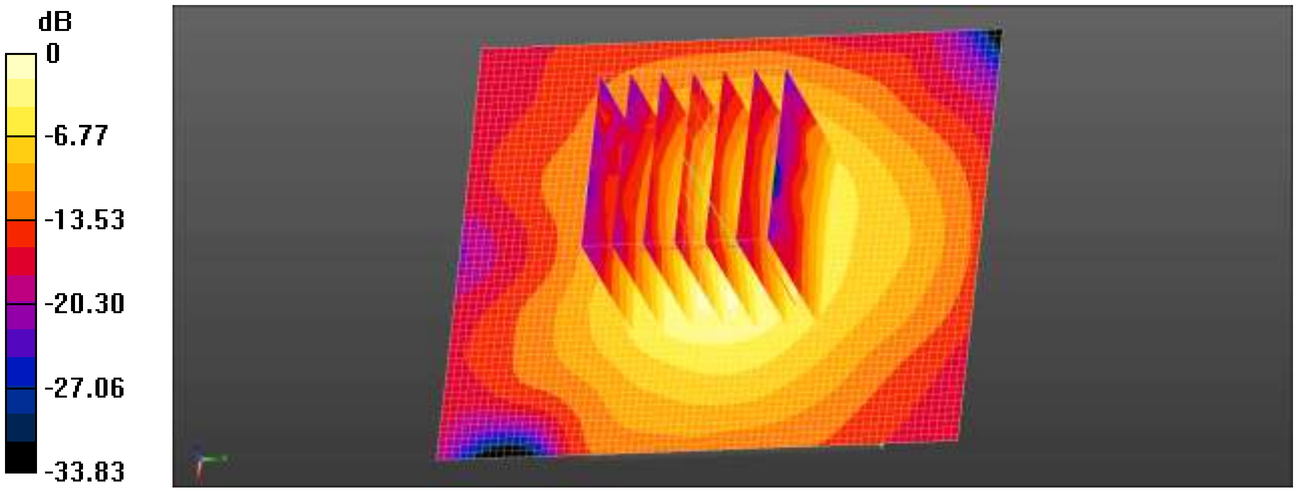
DUT: LM-W319

Communication System: UID 0, 2450MHz FCC (0); Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.813 S/m; ε_r = 37.537; ρ = 1000 kg/m^3

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(7.62, 7.62, 7.62); Calibrated: 2018-04-25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2018-04-20
- Phantom: Twin-SAM
- Measurement SW: DASY52, Version 52.8 (8);

802.11b Head Front 1Mbps 6ch Metal Watch band/Area Scan (61x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.266 W/kg
802.11b Head Front 1Mbps 6ch With Metal Watch band I/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.55 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.312 W/kg
SAR(1 g) = 0.173 W/kg; SAR(10 g) = 0.080 W/kg
Maximum value of SAR (measured) = 0.264 W/kg



0 dB = 0.264 W/kg = -5.78 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Portable Wrist Device
Liquid Temperature:	21.2 ℃
Ambient Temperature:	21.4 ℃
Test Date:	05/25/2018
Plot No.:	2

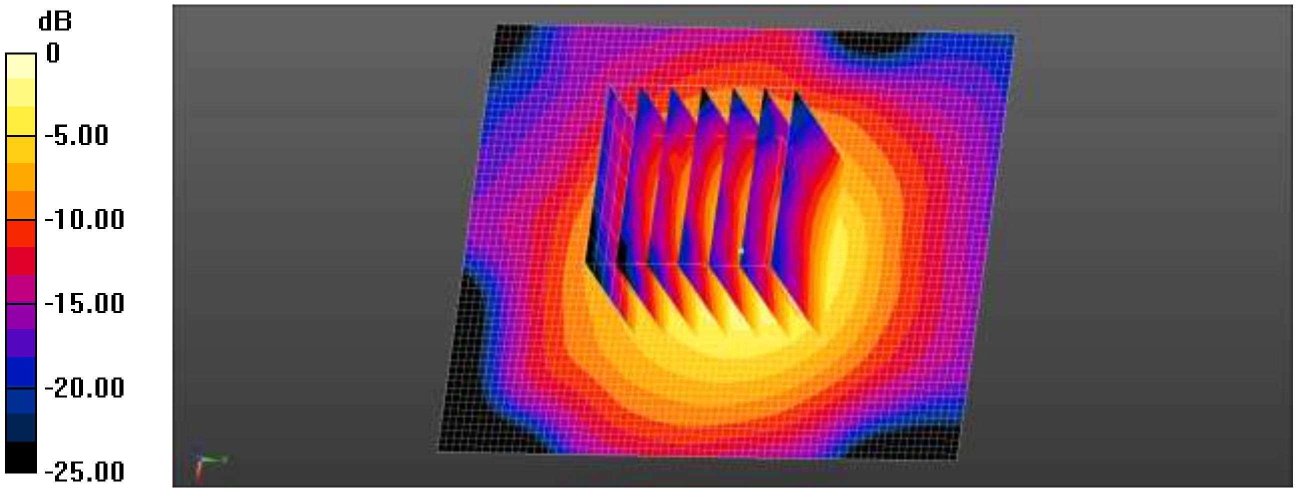
DUT: LM-W319

Communication System: UID 0, 2450MHz FCC (0); Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.813 S/m; ε_r = 37.537; ρ = 1000 kg/m^3

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(7.62, 7.62, 7.62); Calibrated: 2018-04-25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2018-04-20
- Phantom: Twin-SAM
- Measurement SW: DASY52, Version 52.8 (8);

802.11b Head Front 1Mbps 6ch Rubber Watch band /Area Scan (61x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.274 W/kg
802.11b Head Front 1Mbps 6ch Rubber Watch band /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.58 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.319 W/kg
SAR(1 g) = 0.177 W/kg; SAR(10 g) = 0.084 W/kg
Maximum value of SAR (measured) = 0.268 W/kg



0 dB = 0.268 W/kg = -5.72 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Portable Wrist Device
Liquid Temperature:	20.5 ℃
Ambient Temperature:	20.8 ℃
Test Date:	05/25/2018
Plot No.:	3

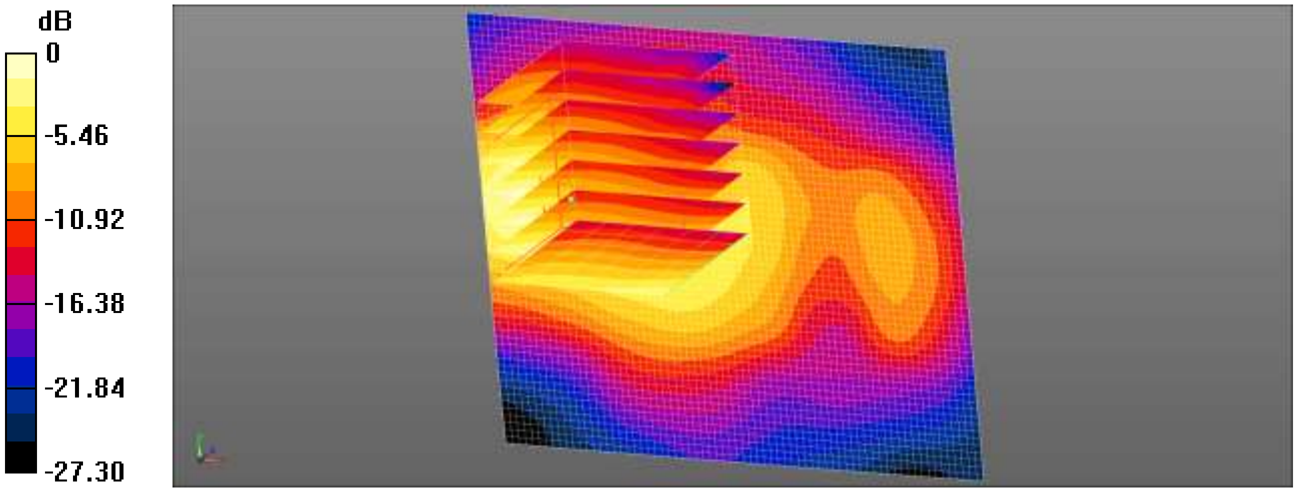
DUT: LM-W319

Communication System: UID 0, 2450MHz FCC; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.922 S/m; ε_r = 52; ρ = 1000 kg/m^3

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: Triple Flat Phantom 5.1C
- Measurement SW: DASY52, Version 52.8 (8);

802.11b Extremity SAR 1Mbps 6ch Metal Watch band /Area Scan (61x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 1.12 W/kg
802.11b Extremity SAR 1Mbps 6ch Metal Watch band /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.20 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 1.19 W/kg
SAR(1 g) = 0.561 W/kg; SAR(10 g) = 0.269 W/kg
Maximum value of SAR (measured) = 0.901 W/kg



0 dB = 1.12 W/kg = 0.48 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Portable Wrist Device
Liquid Temperature:	20.5 ℃
Ambient Temperature:	20.8 ℃
Test Date:	05/25/2018
Plot No.:	4

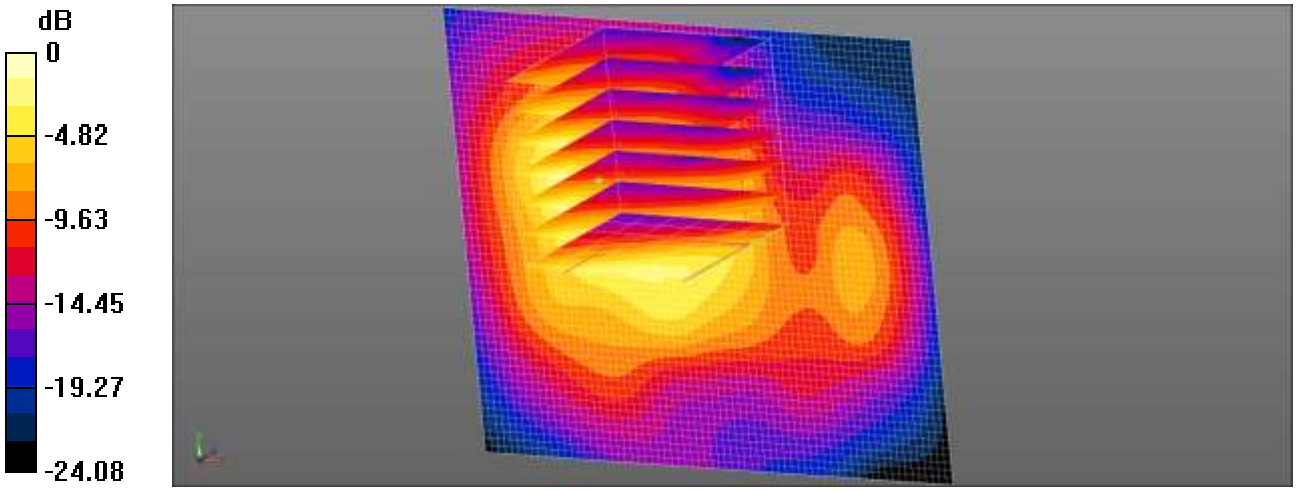
DUT: LM-W319

Communication System: UID 0, 2450MHz FCC; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.922 S/m; ε_r = 52; ρ = 1000 kg/m^3

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: Triple Flat Phantom 5.1C
- Measurement SW: DASY52, Version 52.8 (8);

802.11b Extremity SAR 1Mbps 6ch Rubber Watch band /Area Scan (61x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.819 W/kg
802.11b Extremity SAR 1Mbps 6ch Rubber Watch band /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.88 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 1.09 W/kg
SAR(1 g) = 0.424 W/kg; SAR(10 g) = 0.199 W/kg
Maximum value of SAR (measured) = 0.750 W/kg



0 dB = 0.819 W/kg = -0.87 dBW/kg

Attachment 2. – Dipole Verification Plots

■ Verification 2450 MHz Head

Test Laboratory: HCT CO., LTD
Input Power 50 mW
Liquid Temp: 21.2 ℃
Test Date: 05/25/2018

DUT: Dipole 2450 MHz D2450V2

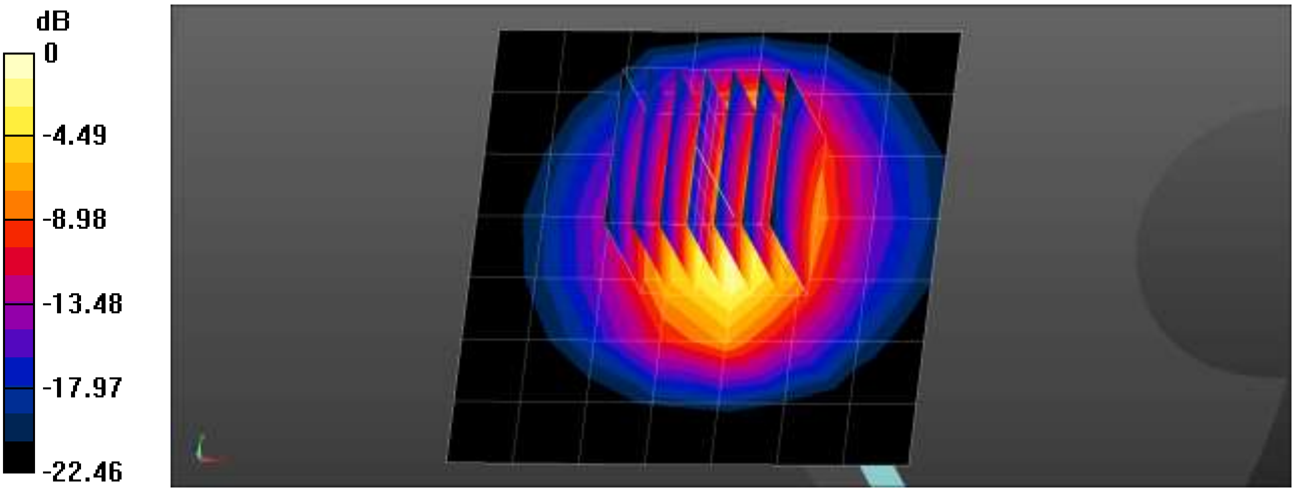
Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.828 S/m; ε_r = 37.463; ρ = 1000 kg/m^3

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(7.62, 7.62, 7.62); Calibrated: 2018-04-25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2018-04-20
- Phantom: Twin-SAM
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/2 450 MHz Head Verification/Area Scan (8x8x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 4.32 W/kg

Dipole/2 450 MHz Head Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 48.86 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 5.46 W/kg
SAR(1 g) = 2.53 W/kg; SAR(10 g) = 1.15 W/kg
Maximum value of SAR (measured) = 4.35 W/kg



0 dB = 4.35 W/kg = 6.38 dBW/kg

Verification 2 450 MHz Body

Test Laboratory:	HCT CO., LTD
Input Power	50 mW
Liquid Temp:	20.5 ℃
Test Date:	05/25/2018

DUT: Dipole 2450 MHz D2450V2

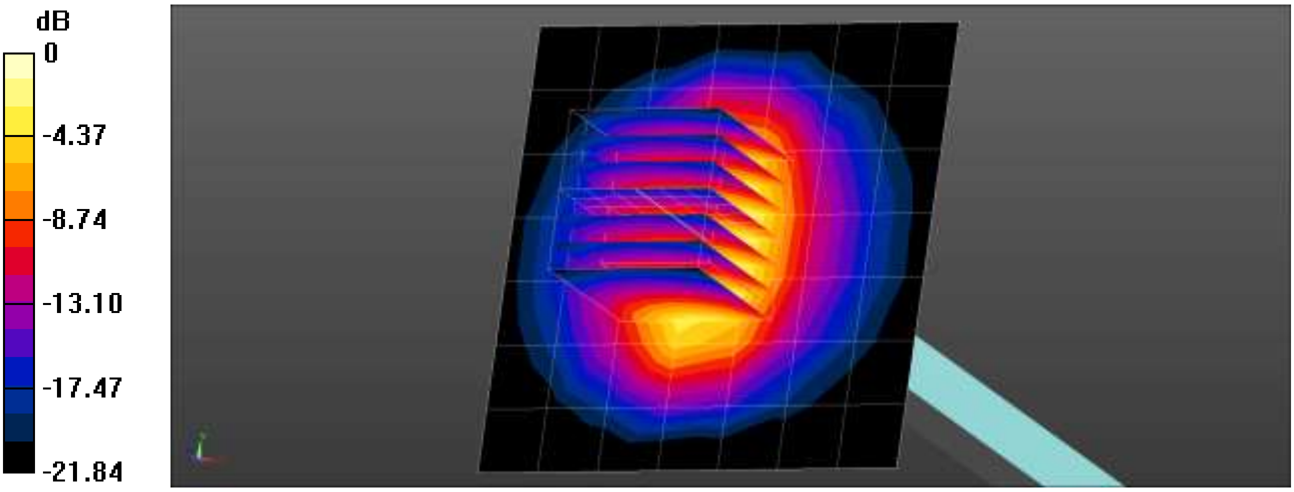
Communication System: UID 0, CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.946 S/m; ε_r = 51.929; ρ = 1000 kg/m^3

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: Triple Flat Phantom 5.1C
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/2450MHz Body Verification/Area Scan (8x8x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 3.29 W/kg

Dipole/2450MHz Body Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 47.88 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 5.25 W/kg
SAR(1 g) = 2.49 W/kg; SAR(10 g) = 1.15 W/kg
Maximum value of SAR (measured) = 4.19 W/kg



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