verify No.288497798850

위변조방지/진위확인
www.docugr.com

TEST REPORT

KCTL Inc.
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

1. Client

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
- Date of Receipt : 2020-10-08

2. Use of Report : Class II Permissive change

3. Name of Product and Model : Smart Wearable
- Model Number : SM-R835U
- Manufacturer and Country of Origin : Samsung Electronics Co., Ltd./ Vietnam

4. FCC ID : A3LSMR835

5. Date of Test : 2020-11-26 ~ 2020-12-02

6. Location of Test : ■ Permanent Testing Lab □ On Site Testing (Address: Address of testing location)

7. Test Standards : IEEE 1528-2013, ANSI/IEEE C95.1, KDB Publication

8. Test Results : Refer to the test result in the test report

Affirmation	Tested by Name : Mungi Jeong (Signature)	Technical Manager Name : Jongwon Ma (Signature)

2020-12-08

KCTL Inc.

As a test result of the sample which was submitted from the client, this report does not guarantee the whole product quality. This test report should not be used and copied without a written agreement by KCTL Inc.

REPORT REVISION HISTORY

Date	Revision	Page No
2020-12-01	Originally issued	-
2020-12-07	Updated Additional WLAN and Bluetooth test	-
2020-12-08	Updated Equipment Class of Bluetooth: Section 2.2 Simultaneous Transmission: Section 2.4, Section 10	- 6 7,18

Note: The Report No. KR20-SPF0053-A is superseded by the report No. KR20-SPF0053-B

This report shall not be reproduced except in full, without the written approval of KCTL Inc. This document may be altered or revised by KCTL Inc. personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by KCTL Inc. will constitute fraud and shall nullify the document. This test report is a general report that does not use the KOLAS accreditation mark and is not related to KS Q ISO/IEC 17025 and KOLAS accreditation.

General remarks for test reports

1. Identification when information is provided by the customer: Information marked "#" is provided by the customer.
- Disclaimer: This information is provided by the customer and can affect the validity of results.

CONTENTS

1. General information 4
2. Device information 5
3. Specific Absorption Rate 8
4. SAR Measurement Procedures 9
5. SAR Measurement Configurations 10
6. RF Exposure Limits 11
7. RF Average Conducted Output Power 12
8. System Verification 14
9. SAR Test Results 16
10. #Simultaneous Transmission 18
11. Measurement Uncertainty 19
12. Test Equipment Information 20
13. Test System Verification Results 21
14. Test Results 23
Appendixes List 29
Appendix A. Calibration certificate 30
Appendix B. SAR Tissue Specification 84
Appendix C. #Antenna Location & Distance 85
Appendix D. EUT Photo 86
Appendix E. Test Setup Photo 89
End of test report 89

1. General information

Client	:	Samsung Electronics Co., Ltd.
Address	:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Manufacturer	:	Samsung Electronics Co., Ltd.
Address	:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Factory	:	Samsung Electronics Co., Ltd.
Address	:	Yenphong 1 - I.P Yentrung Commune, Yenphong Dist., Bac Ninh Province, Vietnam
Contact Person		Jaehyeon Kwon / j0518.kwon@samsung.com
Laboratory	:	KCTL Inc.
Address	:	65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
Accreditations	:	FCC Site Designation No: KR0040, FCC Site Registration No: 687132
		VCCI Registration No. : R-3327, G-198, C-3706, T-1849
		Industry Canada Registration No. : 8035A
		KOLAS No.: KT231

1.1 Report Overview

This report details the results of testing carried out on the samples listed in section 2, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this test report is used in any configuration other than that detailed in the test report, the manufacturer must ensure the new configuration complies with all relevant standards and certification requirements. Any mention of KCTL Inc. Wireless lab or testing done by KCTL Inc. Wireless lab made in connection with the distribution or use of the tested product must be approved in writing by KCTL Inc. Wireless lab.

2. Device information

2.1 Basic description

Product Name		Smart Wearable		
Product Model Number		SM-R835U		
Derivative Model		SM-R835F		
Product Manufacturer		Samsung Electronics Co., Ltd		
Product Serial Number	Radiation	R3AM8002B0R		
	WWAN Conduction	R3AM8001MTR		
Mode of Operation		WCDMA II/ IV/ V, LTE Band 2/4/5/12/13/25/26/66 WLAN 2.4 ㎓, Bluetooth		
Tx Freq. Range		Band & Mode	Operating Modes	Tx Frequency(㎒)
		WCDMA II	Voice/Data	1 852.4 ~ 1 907.6
		WCDMA IV	Voice/Data	1 712.4 ~ 1 752.6
		WCDMA V	Voice/Data	826.4 ~ 846.6
		LTE Band 2	Voice/Data	1 850.7 ~ 1 909.3
		LTE Band 4	Voice/Data	1 710.7 ~ 1 754.3
		LTE Band 5	Voice/Data	824.7 ~ 848.3
		LTE Band 12	Voice/Data	699.7 ~ 715.3
		LTE Band 13	Voice/Data	779.5 ~ 784.5
		LTE Band 25	Voice/Data	1 850.7 ~ 1 914.3
		LTE Band 26	Voice/Data	814.7 ~ 848.3
		LTE Band 66	Voice/Data	1 710.7 ~ 1 777.3
		WLAN 2.4 ㎓	Voice/Data	2 412.0 ~ 2 472.0
		Bluetooth	Data	2 402.0 ~ 2 480.0

Note: This C2PC Report is intended to verify changes to the original model SM-R835U.
Please refer to the FCC filing(Product Equality Declaration) document for differences between the original and changed models.

2.2 Summary of SAR Test Results

Band	Equipment Class	Highest Reported	
		1g SAR (W/kg)	10g SAR (W/kg)
		Next to Mouth	Extremity
WCDMA II	Licensed	**0.14**	**0.49**
WLAN 2.4 GHz	DTS	0.10	0.13
Bluetooth	DSS	<0.1	<0.1
Simultaneous SAR per KDB 690783 D01v01r03		0.24	0.63

2.3 #Maximum Tune-up power

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 Tune-up Power

Band	Mode	Output Power (dBm)		
		Target	Max. Allowed	SAR Test
WCDMA II	RMC	22.00	**23.00**	Yes
	HSDPA	22.00	**23.00**	No
	HSUPA	22.00	**23.00**	No
	DC-HSDPA	22.00	**23.00**	No

Band	Mode	Channel	Output Power (dB m)		
			Target	Max. Allowed	SAR Test
WLAN 2.4 GHz	802.11b	Except 12,13	17.50	**18.50**	Yes
		12	12.00	**13.00**	No
		13	9.00	**10.00**	No
	802.11g	Except 12,13	16.50	**17.50**	No
		12	12.00	**13.00**	No
		13	9.00	**10.00**	No
	802.11n(HT20)	Except 12,13	15.00	**16.00**	No
		12	12.00	**13.00**	No
		13	9.00	**10.00**	No
Bluetooth	BDR(GFSK)	All Channel	14.50	**15.50**	Yes
	EDR (π/4DQPSK)	All Channel	14.50	**15.50**	No
	EDR(8DPSK)	All Channel	14.50	**15.50**	No
	LE(GFSK)	All Channel	7.50	**8.50**	No

2.4 #Simultaneous Transmission Configurations

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.
This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB Publication 447498 D01v06 4.3.2 procedures.

No.	RF Exposure Condition	Scenario	Operation
1.	Next to Mouth	WCDMA + WLAN 2.4 ㎓	**Yes**
2.		WCDMA + Bluetooth	**Yes**
3.	Extremity	WCDMA + WLAN 2.4 ㎓	**Yes**
4.		WCDMA + Bluetooth	**Yes**

Notes

- It does not to transmit simultaneously the Bluetooth and 2.4 ㎓ WLAN.
- It is to use the Bluetooth and WLAN same antenna path.

2.5 SAR Test Methods and Procedures

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

- IEEE 1528-2013
- 248227 D01 802.11 Wi-Fi SAR v02r02
- 447498 D01 General RF Exposure Guidance v06
- 865664 D01 SAR measurement 100 ㎒ to 6 ㎓ v01r04
- 865664 D02 RF Exposure Reporting v01r02
- 941225 D01 3G SAR Procedures v03r01
- 178919 D01 Permissive Change Policy v06
- April 2019 TCB Workshop Notes (Tissue Simulating Liquids)
- October 2016 TCB Workshop Notes (Bluetooth Duty Factor)

3. Specific Absorption Rate

3.1 Introduction

The SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational / controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

3.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

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

SAR is expressed in units of Watts per kilogram (W/kg)
SAR measurement can be either related to the temperature elevation in tissue by

$$\mathbf{SAR} = \mathbf{C}\left(\frac{\boldsymbol{\delta}\mathbf{T}}{\boldsymbol{\delta}\mathbf{t}}\right)$$

Where: C is the specific head capacity, δT is the temperature rise and δt is the exposure duration, or related to the electrical field in the tissue by

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

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength. However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

4. SAR Measurement Procedures

4.1 SAR Scan Procedures

Step 1: Power Reference Measurement
The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The Minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 1.4 mm. This distance cannot be smaller than the Distance of sensor calibration points to probe tip as defined in the probe properties.
Step 2: Area Scan & Zoom Scan
The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot and Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing1 g and 10 g of simulated tissue. If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly. Area Scan & Zoom Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04.

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 mm ± 1 mm	½·δ·ln(2) mm 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}			≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
			When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$ mm	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see IEEE Std 1528-2013 for details. * When zoom scan is required and the reported SAR from the area scan based 1-g SAR estimation procedures of KDB Publication 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

Step 3: Power drift measurement
The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

5. SAR Measurement Configurations

5.1 Watch-Device

Transmitters that are built-in within a wrist watch or similar wrist-worn devices typically operate in speaker mode for voice communication, with the device worn on the wrist and positioned next to mouth. Next to the mouth exposure requires 1g SAR, and the wrist-worn condition requires 10g extremity SAR. Next to the mouth use is evaluated with the front of the device positioned at 10 mm from a flat phantom filled with head tissue-equivalent medium. SAR for wrist exposure is evaluated with the back of the devices positioned in direct contact against a flat phantom fill with head tissue-equivalent medium.

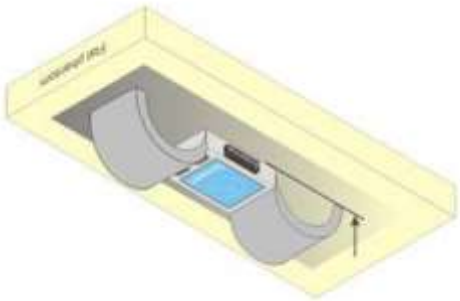


Figure 1
Test position for extremity

5.2 Device Holder

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

6. RF Exposure Limits

UNCONTROLLED ENVIRONMENTS are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

CONTROLLED 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.

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Partial Peak SAR [1] (Partial)	1.60 mW/g	8.00 mW/g
Partial Average SAR [2] (Whole Body)	0.08 mW/g	0.40 mW/g
Partial Peak SAR [3] (Hands/Feet/Ankle/Wrist)	4.00 mW/g	20.00 mW/g

1) The spatial Peak value of the SAR averaged over any 1g gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
2) The spatial Average value of the SAR averaged over the whole body.
3) The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

7. RF Average Conducted Output Power

7.1 WCDMA Average Conducted Output Power (Maximum Average Power)

Band	Mode	Average Conducted Power (dBm)			3GPP MPR [dB]
		Channel			
		9 262	9 400	9 538	
WCDMA II	RMC	22.84	22.86	22.84	-
	HSDPA-Subtest 1	22.83	22.79	22.77	0
	HSDPA-Subtest 2	22.42	22.36	22.34	0
	HSDPA-Subtest 3	21.49	21.46	21.37	0.5
	HSDPA-Subtest 4	21.48	21.70	21.63	0.5
	HSUPA-Subtest 1	20.26	20.27	20.22	2
	HSUPA-Subtest 2	18.19	18.20	18.17	3
	HSUPA-Subtest 3	21.87	21.84	21.75	1
	HSUPA-Subtest 4	18.23	18.21	18.15	3
	HSUPA-Subtest 5	22.77	22.64	22.80	0
	DC-HSDPA-Subtest 1	22.62	22.54	22.63	0
	DC-HSDPA-Subtest 2	22.44	22.45	22.66	0
	DC-HSDPA-Subtest 3	21.47	21.51	21.81	0.5
	DC-HSDPA-Subtest 4	21.62	21.49	21.69	0.5

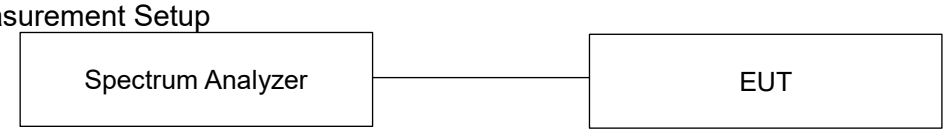
7.2 WLAN Average Conducted Output Power (Maximum Average Power)

Band	Freq. [MHz]	Channel	Mode		
			802.11b	802.11g	802.11n
WLAN 2.4 GHz	2 412.0	1	16.51	15.50	14.08
	2 437.0	6	16.62	16.41	15.21
	2 462.0	11	16.54	15.79	14.82
	2 467.0	12	11.64	11.57	12.05
	2 472.0	13	9.00	8.99	8.88

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

Power Measurement Setup



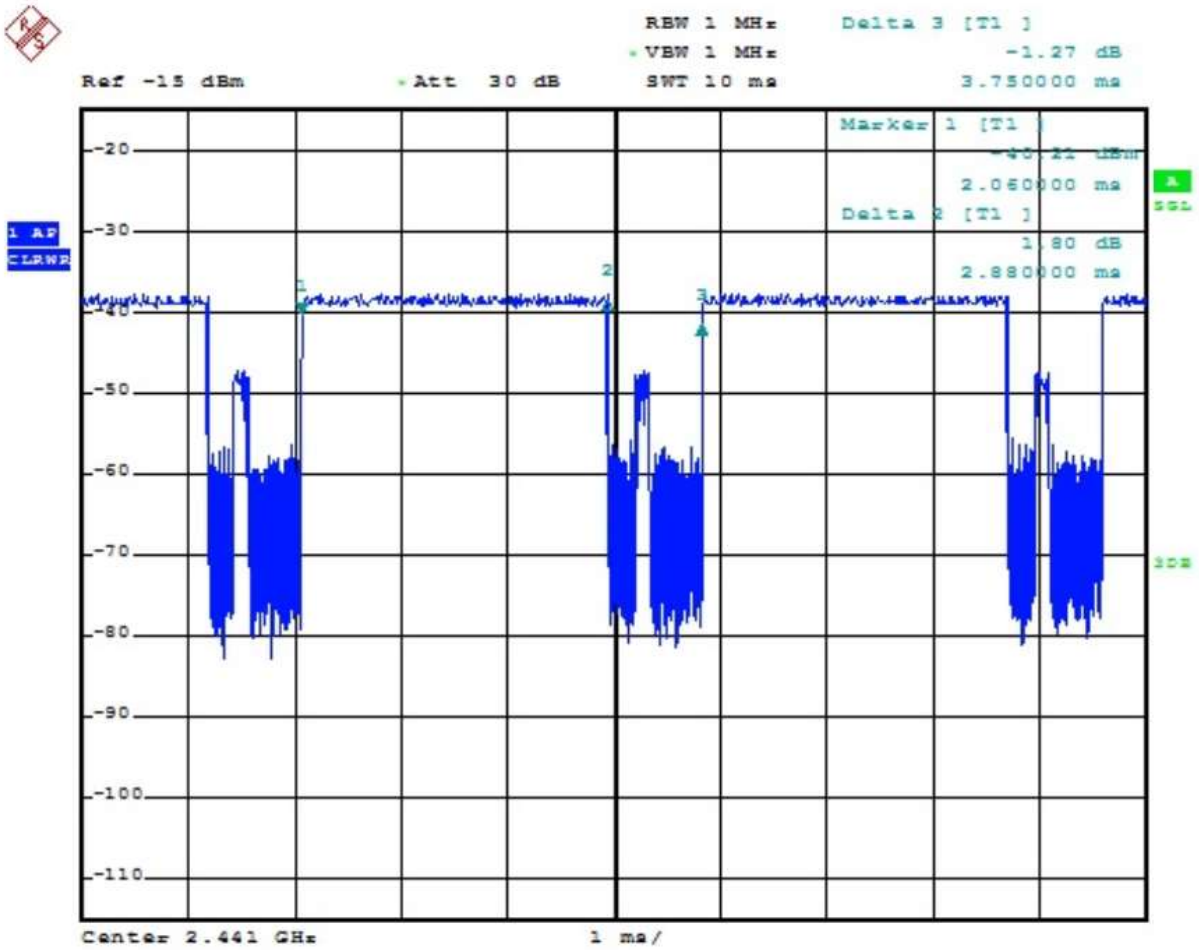
7.3 Bluetooth Average Conducted Output Power

Mode	Freq. [MHz]	Channel	Conducted Powers (dBm)
BDR_DH5 (1 Mbps)	2 402.0	0	13.67
	2 441.0	39	15.08
	2 480.0	78	14.18

7.4 Wireless Band Duty Cycle

Wireless Bands	Frequency Bands	Mode	Duty Cycle (%)
WCDMA	Band II	RMC, HSDPA, HSUPA, DC-HSDPA	100
WLAN	2.4 GHz	802.11b	98.7

Wireless Bands	Frequency Bands		Mode		Duty Cycle (%)	
	Mode	Packet	On Time (ms)	On-Off Time (ms)	Duty Cycle (%)	Duty Cycle Compensate Factor
Bluetooth	BDR(GFSK)	DH5	2.88	3.75	76.80	1.302



8. System Verification

8.1 Tissue Verification

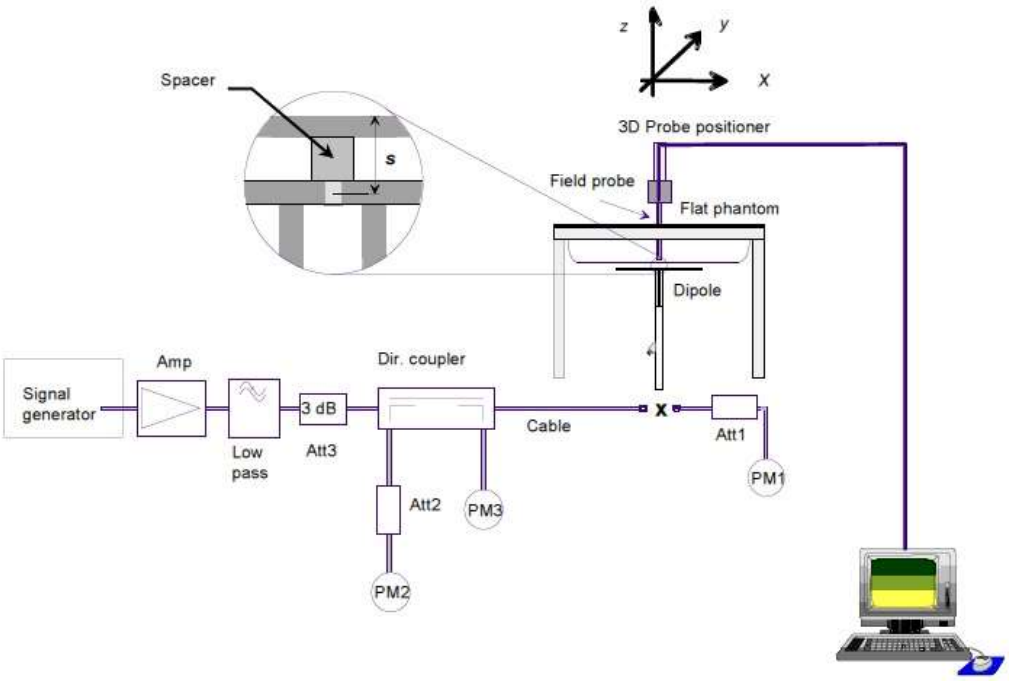
The dielectric properties for this Tissue Simulant Liquids were measured by using the SPEAG Model DAK3.5 Dielectric Probe in conjunction with Agilent E5071B Network Analyzer (300 kHz – 8 500 ㎒). The Conductivity (σ) and Permittivity (ρ) are listed in Table 1.For the SAR measurement given in this report. The temperature variation of the Tissue Simulant Liquids was (22 ± 2) ℃.

Freq. (㎒)	Limit/Measured		Permittivity (ρ)	Conductivity (σ)	Temp. (°C)
1 900.0	Recommended Limit		40.00 ± 5 % (38.00 ~ 42.00)	1.40 ± 5 % (1.33 ~ 1.47)	22 ± 2
	Measured	2020-11-26	39.40	1.44	20.52
2 450.0	Recommended Limit		39.20 ± 5 % (37.24 ~ 41.16)	1.80 ± 5 % (1.71 ~ 1.89)	22 ± 2
	Measured	2020-12-02	38.02	1.82	20.38

<Table 1.Measurement result of Tissue electric parameters>

8.2 Test System Verification

The microwave circuit arrangement for system verification is sketched below picture.
The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within ± 10% from the t arget SAR values. The tests were conducted on the same days as the measurement of the EUT. The obtained results from the system accuracy verification are displayed in the Table 2. During the tests, the ambient temperature of the laboratory was in the range (22 ± 2) ℃, th e relative humidity was in the range(50 ± 20)% and the liquid depth Above the ear/grid refer ence points was above 15 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.



Verification Kit	Probe S/N	Frequency (MHz)	Tissue Type	Limit/Measured (Normalized to 1 W)		
D1900V2 SN: 5d160	EX3DV4 SN: 7541	1 900.0	HSL	Recommended Limit 1g (Normalized)		39.40 ± 10 % (35.46 ~ 43.34)
				Measured	2020-11-26	42.00
				Recommended Limit 10g (Normalized)		20.50 ± 10 % (18.45 ~ 22.55)
				Measured	2020-11-26	21.12
D2450V2 SN:895	EX3DV4 SN: 7541	2 450.0	HSL	Recommended Limit 1g (Normalized)		52.40 ± 10 % (47.16 ~ 57.64)
				Measured	2020-12-02	51.40
				Recommended Limit 10g (Normalized)		24.30 ± 10 % (21.87 ~ 26.73)
				Measured	2020-12-02	22.90

<Table 1. System Verification 1g/10g Result>

9. SAR Test Results

9.1 WCDMA Band II SAR Test Results

Stainless Cover: Next to Mouth RMC								
EUT Position	**Distance (mm)**	**Frequency (MHz)**	**Measured Conducted Power (dB m)**	**Max. Tune-up Power (dB m)**	**Power Scaling Factor**	**Measured 1 g SAR (W/kg)**	**Scaled 1 g SAR (W/kg)**	**Plot No.**
Original model worst configuration								
Front	10	1 880.0	22.38	23.00	1.153	0.373	0.430	-
C2PC Changed model								
Front	10	1 880.0	22.86	23.00	1.033	0.138	**0.143**	1
Stainless Cover: Extremity RMC								
EUT Position	**Distance (mm)**	**Frequency (MHz)**	**Measured Conducted Power (dB m)**	**Max. Tune-up Power (dB m)**	**Power Scaling Factor**	**Measured 10 g SAR (W/kg)**	**Scaled 10 g SAR (W/kg)**	**Plot No.**
Original model worst configuration								
Rear	0	1 880.0	22.38	23.00	1.153	0.975	1.125	-
C2PC Changed model								
Rear	0	1 880.0	22.86	23.00	1.033	0.475	**0.491**	2

Original Report No. KR19-SPF0019-A

9.2 WLAN 2.4 GHz SAR Test Results

Stainless Cover: Next to Mouth 802.11b									
EUT Position	**Distance (mm)**	**Frequency (MHz)**	**Measured Conducted Power (dB m)**	**Max. Tune-up Power (dB m)**	**Power Scaling Factor**	**Duty Cycle Compensate Factor**	**Measured 1g SAR (W/kg)**	**Scaled 1 g SAR (W/kg)**	**Plot No.**
Original model worst configuration									
Front	10	2 437.0	16.96	18.50	1.426	1.014	0.071	0.103	-
C2PC Changed model									
Front	10	2 437.0	16.62	18.50	1.542	1.014	0.063	**0.099**	3
Stainless Cover: Extremity 802.11b									
EUT Position	**Distance (mm)**	**Frequency (MHz)**	**Measured Conducted Power (dB m)**	**Max. Tune-up Power (dB m)**	**Power Scaling Factor**	**Duty Cycle Compensate Factor**	**Measured 10g SAR (W/kg)**	**Scaled 10 g SAR (W/kg)**	**Plot No.**
Original model worst configuration									
Rear	0	2 437.0	16.96	18.50	1.426	1.014	0.096	0.139	-
C2PC Changed model									
Rear	0	2 437.0	16.62	18.50	1.542	1.014	0.086	**0.134**	4

Original Report No. KR19-SPF0019-A

9.3 Bluetooth SAR Test Results

Stainless Cover: Next to Mouth BDR									
EUT Position	**Distance (mm)**	**Frequency (MHz)**	**Measured Conducted Power (dB m)**	**Max. Tune-up Power (dB m)**	**Power Scaling Factor**	**Duty Cycle Compensate Factor**	**Measured 1g SAR (W/kg)**	**Scaled 1 g SAR (W/kg)**	**Plot No.**
Original model worst configuration									
Front	10	2 441.0	15.11	15.50	1.094	1.302	0.019	**0.027**	-
C2PC Changed model									
Front	10	2 441.0	15.08	15.50	1.102	1.302	0.020	**0.029**	5
Stainless Cover: Extremity BDR									
EUT Position	**Distance (mm)**	**Frequency (MHz)**	**Measured Conducted Power (dB m)**	**Max. Tune-up Power (dB m)**	**Power Scaling Factor**	**Duty Cycle Compensate Factor**	**Measured 10g SAR (W/kg)**	**Scaled 10 g SAR (W/kg)**	**Plot No.**
Original model worst configuration									
Rear	0	2 441.0	15.11	15.50	1.094	1.302	0.028	**0.040**	-
C2PC Changed model									
Rear	0	2 441.0	15.08	15.50	1.102	1.302	0.021	**0.030**	6

Original Report No. KR19-SPF0019-A

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in FCC KDB Publication 447498 D01v06.
2. Battery is fully charged for all readings and the standard batteries are the only options.
3. Liquid tissue depth was at least 15 cm.
4. The EUT is tested 2nd hot-spot peak, if it is less than 2 dB below the highest peak.
5. 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.
6. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v06.
7. This is the C2PC test report to verify changed model, SM-R835U as documented in the C2PC letter. The SAR test was performed in the worst configuration by each exposure condition (Next to Mouth, Extremity) of the original model, and the WIFI/BT was additional tested due to the filter changes(Refer to PED document)

10. #Simultaneous Transmission

The following procedures adopted from FCC KDB Publication 447498 D01v06 are applicable to devices with built in unlicensed transmitters such as 802.11 and Bluetooth devices which may simultaneously transmit with the licensed transmitter.
This device contains transmitters that may operate simultaneously. Therefore, simultaneous transmission analysis is required. Per FCC KDB Publication 447498 D01v06 4.3.2 and IEEE 1528-2013 Section 6.3.4.1.2, simultaneous transmission SAR test exclusion may be applied when the sum of the 1g or 10g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is within SAR limits. The different test positions in an exposure condition may be considered collectively to determine SAR test exclusion according to the sum of 1g or 10g SAR.

10.1 Simultaneous Transmission Analysis

Position		WCDMA	WLAN 2.4 GHz	Bluetooth	Summation	
		[①]	[②]	[③]	[①+②]	[①+③]
Next to Mouth	Front	0.143	0.099	0.029	0.242	0.172
Extremity	Rear	0.491	0.134	0.030	0.625	0.521

Notes:

- Simultaneous transmission SAR test exclusion considerations
  Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneously transmitting antenna. When the sum of 1-g or 10-g SAR of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit, SAR test exclusion applies to that simultaneous transmission configuration. Per KDB Publication 447498 D01v06.
- When the sum of SAR1g of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit (SAR1g 1.6 W/kg), the SPLSR procedures is not required. When the sum of SAR1g is greater than the SAR limit (SAR1g 1.6 W/kg), SAR test exclusion is determined by the SPLSR.

11. Measurement Uncertainty

Per KDB 865664 D01 SAR measurement 100㎒ to 6㎓, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be ≤ 30%, for a confidence interval of *k* = 2. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Standard 1528-2013 is not required in SAR reports submitted for equipment approval. For this device, the highest measured 1-g SAR is less 1.5W/kg and highest measured 10-g SAR is less 3.75W/kg. Therefore, the measurement uncertainty table is not required in this report.

12. Test Equipment Information

Test Platform	SPEAG DASY5 System			
Version	DASY52: 52.10.4.1527 / SEMCAD: 14.6.14 (7483)			
Location	KCTL Inc, 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea			
Manufacture	SPEAG			
Hardware Reference				
Equipment	Model	Serial Number	Date of Calibration	Due date of next Calibration
Shield Room	-	8F - 1	-	-
Shield Room	-	8F - 2	-	-
DASY5 Robot	TX90XL speag	F07/554JA1/A/01	-	-
DASY5 Robot	TX90XL	F12/5L7FA1/A/01	-	-
Phantom	Twin SAM Phantom	1363	-	-
Phantom	Twin SAM Phantom	1728	-	-
Mounting Device	Mounting Device	-	-	-
DAE	DAE4	1567	2020-03-20	2021-03-20
DAE	DAE4	1586	2020-04-22	2021-04-22
Probe	EX3DV4	3697	2020-03-26	2021-03-26
Probe	EX3DV4	7541	2020-07-30	2021-07-30
ESG Vector Signal Generator	E4438C	MY42080486	2020-05-11	2021-05-11
Dual Power Meter	E4419B	GB43312301	2020-05-12	2021-05-12
Power Sensor	8481H	3318A 19379	2020-05-12	2021-05-12
Power Sensor	8481H	3318A 19377	2020-05-12	2021-05-12
Attenuator	8491B 3dB	17387	2020-05-12	2021-05-12
Attenuator	8491B-6dB	MY39270294	2020-05-12	2021-05-12
Attenuator	8491B 10dB	29425	2020-05-12	2021-05-12
Power Amplifier	2055-BBS3Q7E9I	1005D/C0521	2020-03-12	2021-03-12
Dual Directional Coupler	772D	2839A00719	2020-05-12	2021-05-12
Dual Directional Coupler	778D	16059	2020-05-12	2021-05-12
Low Pass Filter	LA-30N	40058	2020-05-12	2021-05-12
Dipole Validation Kits	D1900V2	5d160	2020-04-22	2022-04-22
Dipole Validation Kits	D2450V2	895	2020-07-21	2022-07-21
Network Analyzer	E5071B	MY42403524	2020-02-27	2021-02-27
Dielectric Assessment Kit	DAK-3.5	1078	2020-05-19	2021-05-19
Humidity/Temp	MHB-382SD	73871	2020-05-14	2021-05-14
Humidity/Temp	MHB-382SD	23107	2020-05-14	2021-05-14
Wideband Radio Communication Tester	CMW500	132120	2020-05-11	2021-05-11
Wideband Radio Communication Tester	CMW500	137524	2020-05-11	2021-05-11

13. Test System Verification Results

Date: 2020-11-26

Test Laboratory: KCTL Inc.
File Name: 1900 MHz Verification Input Power 250 mW 2020-11-26.da52:0

DUT: Dipole 1900 MHz D1900V2, Type: D1900V2, Serial: D1900V2 - SN:5d160

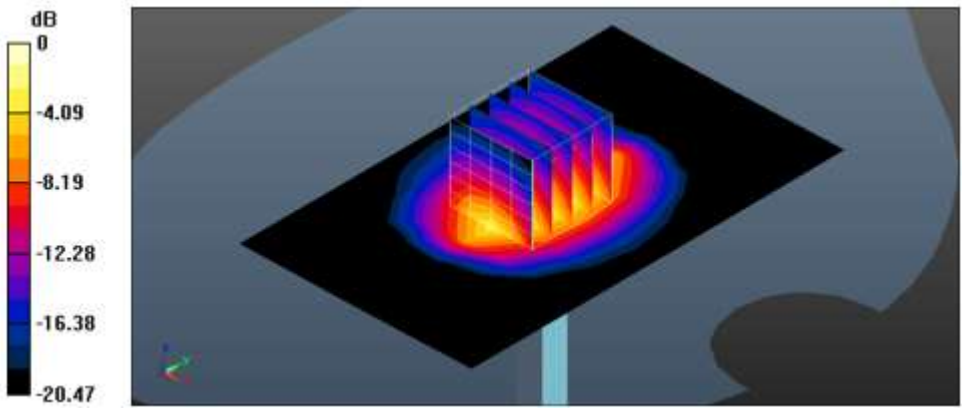
Communication System: UID 0, CW (0); Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.436 S/m; ε_r = 39.396; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7541; ConvF(8.27, 8.27, 8.27) @ 1900 MHz; ; Calibrated: 2020-07-30
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1586; Calibrated: 2020-04-22
- Phantom: SAM twin 1728; Type: QD000P40CD; Serial: TP:1728
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/1900 MHz Verification Input Power 250 mW 2020-11-26/Area Scan (7x11x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 17.1 W/kg

Configuration/1900 MHz Verification Input Power 250 mW 2020-11-26/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 111.9 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 20.6 W/kg
SAR(1 g) = 10.5 W/kg; SAR(10 g) = 5.28 W/kg
Smallest distance from peaks to all points 3 dB below = 9.6 mm
Ratio of SAR at M2 to SAR at M1 = 50.6%
Maximum value of SAR (measured) = 16.6 W/kg



0 dB = 16.6 W/kg = 12.20 dBW/kg

Date: 2020-12-02

Test Laboratory: KCTL Inc.
File Name: 2450 MHz Verification Input Power 100 mW 2020-12-02.da5:0

DUT: Dipole 2450 MHz D2450V2, Type: D2450V2, Serial: D2450V2 - SN:895

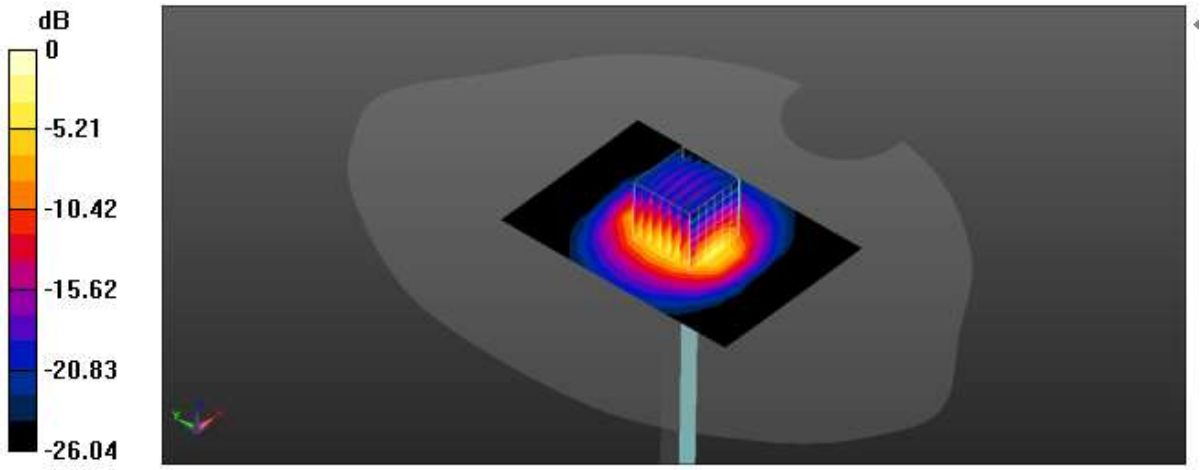
Communication System: UID 0, CW (0); Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2450 MHz; σ = 1.824 S/m; ε_r = 38.018; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3697;ConvF(7.08, 7.08, 7.08) @ 2450 MHz; Calibrated: 2020-03-26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1567; Calibrated: 2020-03-20
- Phantom: Twin-SAM V4.0 -1; Type: QD 000 P40 CC; Serial: 1363
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/2450 MHz Verification Input Power 100 mW 2020-12-02/Area Scan (8x11x1):
Measurement grid: dx=12mm, dy=12mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 6.79 W/kg
Configuration/2450 MHz Verification Input Power 100 mW 2020-12-02/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 71.65 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 11.8 W/kg
SAR(1 g) = 5.14 W/kg; SAR(10 g) = 2.29 W/kg
Smallest distance from peaks to all points 3 dB below = 10 mm
Ratio of SAR at M2 to SAR at M1 = 42.8%
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 9.07 W/kg



0 dB = 9.07 W/kg = 9.58 dBW/kg

14. Test Results

1)

Date: 2020-11-26

Test Laboratory: KCTL Inc.
File Name: 1.WCDMA_FDD II.da53:0

DUT: SM-R835U, Type: Wrist, Serial: R3AM8002B0R

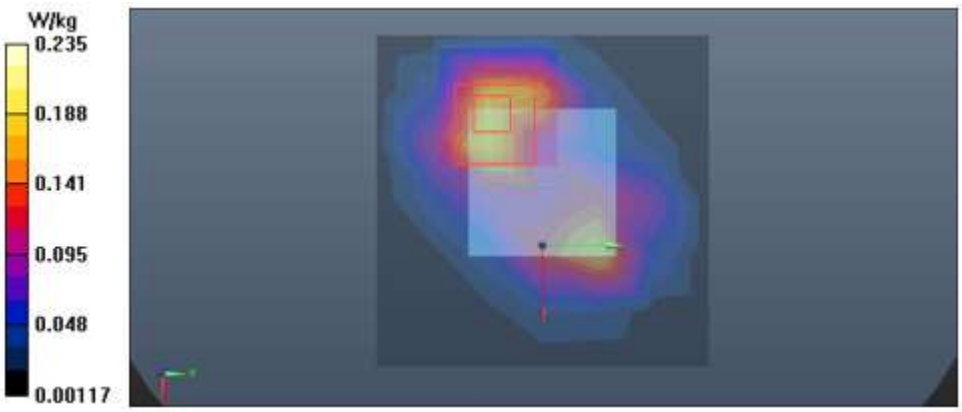
Communication System: UID 0, W-CDMA 1900 (Band 2) (0); Frequency: 1880 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.416 S/m; ε_r = 39.469; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7541; ConvF(8.27, 8.27, 8.27) @ 1880 MHz; ; Calibrated: 2020-07-30
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1586; Calibrated: 2020-04-22
- Phantom: SAM twin 1728; Type: QD000P40CD; Serial: TP:1728
- Measurement SW: DASY52, Version 52.10 (4);

Next to Mouth/WCDMA_FDD II_CH9400_Front_10 mm/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.183 W/kg

Next to Mouth/WCDMA_FDD II_CH9400_Front_10 mm/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.958 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 0.301 W/kg
SAR(1 g) = 0.138 W/kg; SAR(10 g) = 0.070 W/kg
Smallest distance from peaks to all points 3 dB below = 10.7 mm
Ratio of SAR at M2 to SAR at M1 = 45.1%
Maximum value of SAR (measured) = 0.235 W/kg



2)

Date: 2020-11-26

Test Laboratory: KCTL Inc.
File Name: 1.WCDMA_FDD II.da53:1

DUT: SM-R835U, Type: Wrist, Serial: R3AM8002B0R

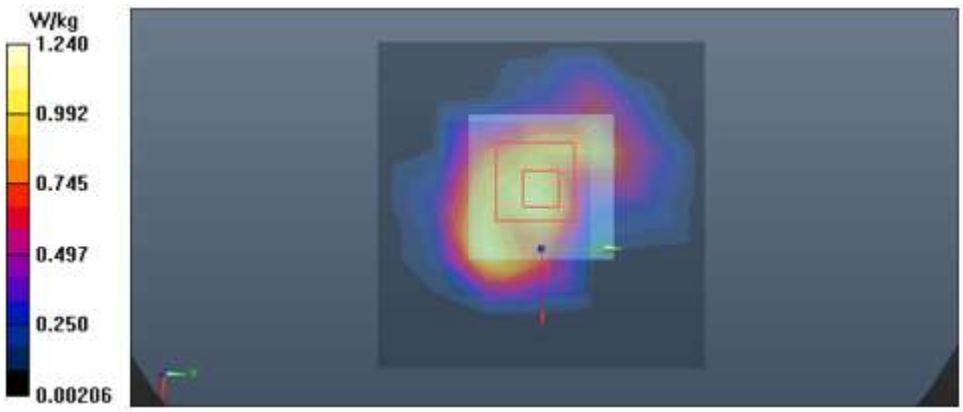
Communication System: UID 0, W-CDMA 1900 (Band 2) (0); Frequency: 1880 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.416 S/m; ε_r = 39.469; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7541; ConvF(8.27, 8.27, 8.27) @ 1880 MHz; ; Calibrated: 2020-07-30
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1586; Calibrated: 2020-04-22
- Phantom: SAM twin 1728; Type: QD000P40CD; Serial: TP:1728
- Measurement SW: DASY52, Version 52.10 (4);

Extremity/WCDMA_FDD II_CH9400_Rear_0 mm/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.16 W/kg

Extremity/WCDMA_FDD II_CH9400_Rear_0 mm/Zoom Scan (7x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 28.36 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.67 W/kg
SAR(1 g) = 0.890 W/kg; SAR(10 g) = 0.475 W/kg
Smallest distance from peaks to all points 3 dB below = 8.6 mm
Ratio of SAR at M2 to SAR at M1 = 37.9%
Maximum value of SAR (measured) = 1.24 W/kg



3)

Date: 2020-12-02

Test Laboratory: KCTL Inc.
File Name: 1.2.4G 802.11b.da53:0

DUT: SM-R835U, Type: Wrist, Serial: R3AM8002B0R

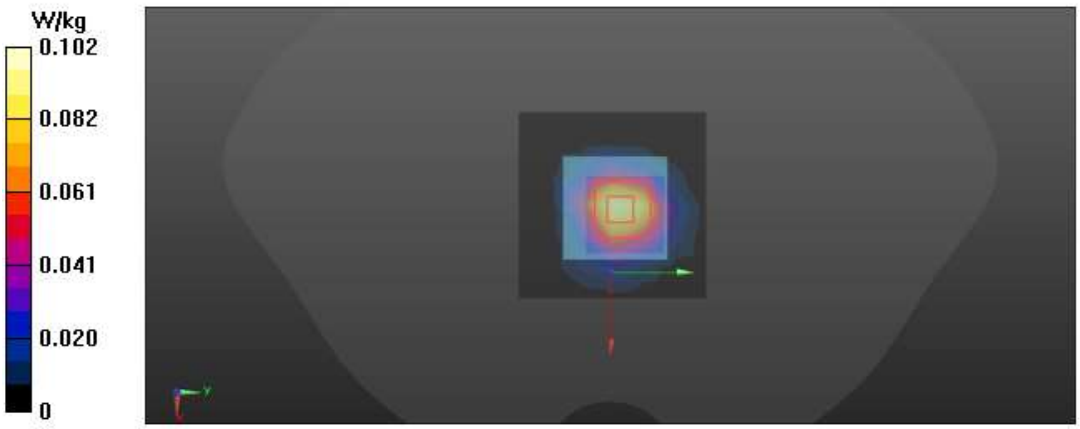
Communication System: UID 0, 2.4GWLAN (0); Frequency: 2437 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.819 S/m; ε_r = 38.05; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3697;ConvF(7.08, 7.08, 7.08) @ 2437 MHz; Calibrated: 2020-03-26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1567; Calibrated: 2020-03-20
- Phantom: Twin-SAM V4.0 -1; Type: QD 000 P40 CC; Serial: 1363
- Measurement SW: DASY52, Version 52.10 (4);

Next to Mouth/802.11b_CH6_Front_10 mm/Area Scan (7x7x1): Measurement grid: dx=12mm, dy=12mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0971 W/kg
Next to Mouth/802.11b_CH6_Front_10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.555 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.129 W/kg
SAR(1 g) = 0.063 W/kg; SAR(10 g) = 0.027 W/kg
Smallest distance from peaks to all points 3 dB below = 12.5 mm
Ratio of SAR at M2 to SAR at M1 = 48.9%
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.102 W/kg



4)

Date: 2020-12-02

Test Laboratory: KCTL Inc.
File Name: 1.2.4G 802.11b.da53:1

DUT: SM-R835U, Type: Wrist, Serial: R3AM8002B0R

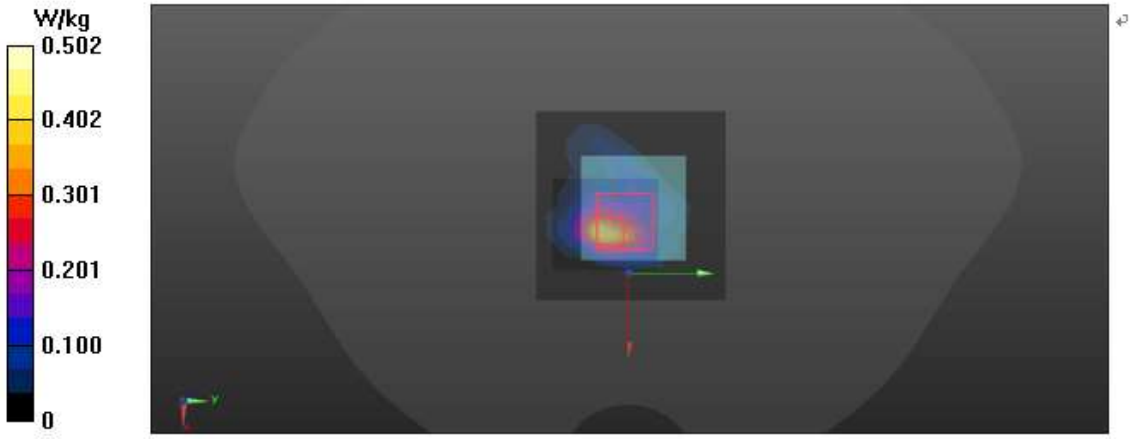
Communication System: UID 0, 2.4GWLAN (0); Frequency: 2437 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.819 S/m; ε_r = 38.05; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3697;ConvF(7.08, 7.08, 7.08) @ 2437 MHz; Calibrated: 2020-03-26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1567; Calibrated: 2020-03-20
- Phantom: Twin-SAM V4.0 -1; Type: QD 000 P40 CC; Serial: 1363
- Measurement SW: DASY52, Version 52.10 (4);

Extremity/802.11b_CH6_Rear_0 mm/Area Scan (7x7x1): Measurement grid: dx=12mm, dy=12mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.399 W/kg
Extremity/802.11b_CH6_Rear_0 mm/Zoom Scan (8x9x8)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=1.4mm
Reference Value = 9.167 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 0.818 W/kg
SAR(1 g) = 0.209 W/kg; SAR(10 g) = 0.086 W/kg
Smallest distance from peaks to all points 3 dB below = 5.4 mm
Ratio of SAR at M2 to SAR at M1 = 65.7%
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.502 W/kg



5)

Date: 2020-12-02

Test Laboratory: KCTL Inc.
File Name: 2.Bluetooth.da53:0

DUT: SM-R835U, Type: Wrist, Serial: R3AM8002B0R

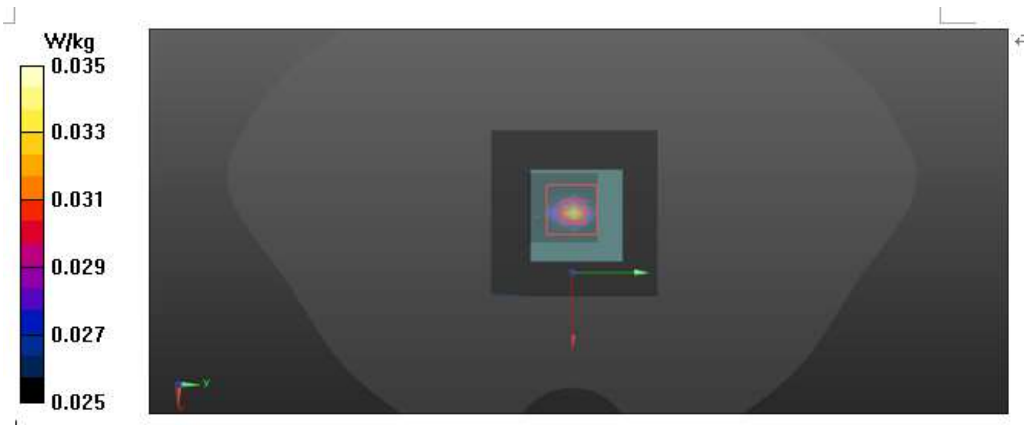
Communication System: UID 0, Bluetooth (0); Frequency: 2441 MHz; Duty Cycle: 1:1.30167
Medium parameters used (interpolated): f = 2441 MHz; σ = 1.821 S/m; ε_r = 38.041; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3697;ConvF(7.08, 7.08, 7.08) @ 2441 MHz; Calibrated: 2020-03-26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1567; Calibrated: 2020-03-20
- Phantom: Twin-SAM V4.0 -1; Type: QD 000 P40 CC; Serial: 1363
- Measurement SW: DASY52, Version 52.10 (4);

Next to Mouth/Bluetooth_GFSK_DH5_CH39_Front_10 mm/Area Scan (7x7x1): Measurement grid: dx=12mm, dy=12mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0340 W/kg
Next to Mouth/Bluetooth_GFSK_DH5_CH39_Front_10 mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.221 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.0420 W/kg
SAR(1 g) = 0.020 W/kg; SAR(10 g) = 0.00728 W/kg
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid
Ratio of SAR at M2 to SAR at M1 = 39.6%
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0343 W/kg



6)

Date: 2020-12-02

Test Laboratory: KCTL Inc.
File Name: 2.Bluetooth.da53:1

DUT: SM-R835U, Type: Wrist, Serial: R3AM8002B0R

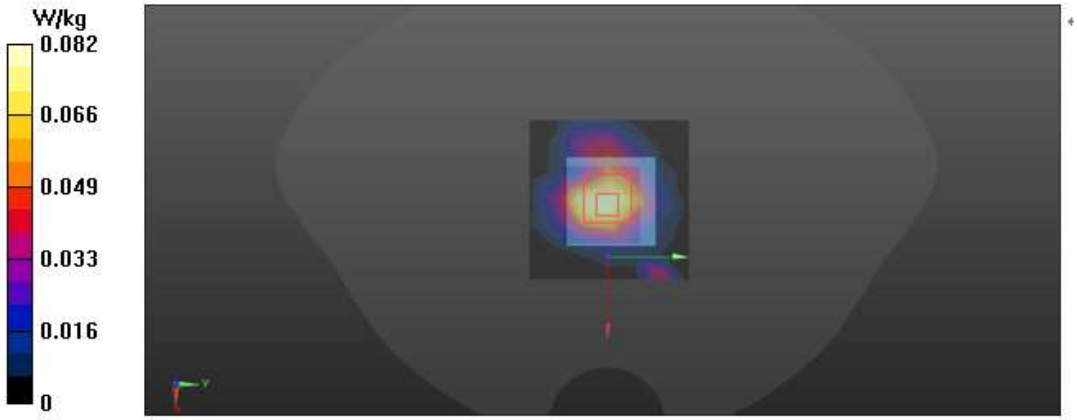
Communication System: UID 0, Bluetooth (0); Frequency: 2441 MHz; Duty Cycle: 1:1.30167
Medium parameters used (interpolated): f = 2441 MHz; σ = 1.821 S/m; ε_r = 38.041; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3697;ConvF(7.08, 7.08, 7.08) @ 2441 MHz; Calibrated: 2020-03-26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1567; Calibrated: 2020-03-20
- Phantom: Twin-SAM V4.0 -1; Type: QD 000 P40 CC; Serial: 1363
- Measurement SW: DASY52, Version 52.10 (4);

Extremity/Bluetooth_GFSK_DH5_CH39_Rear_0 mm/Area Scan (7x7x1): Measurement grid: dx=12mm, dy=12mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0946 W/kg
Extremity/Bluetooth_GFSK_DH5_CH39_Rear_0 mm/Zoom Scan (8x8x8)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=1.4mm
Reference Value = 6.457 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 0.111 W/kg
SAR(1 g) = 0.047 W/kg; SAR(10 g) = 0.021 W/kg
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid
Ratio of SAR at M2 to SAR at M1 = 73.3%
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0819 W/kg



Appendixes List

Appendix A	A.1 Probe Calibration certificate (EX3DV4_7541) A.2 Probe Calibration certificate (EX3DV4_3697) A.3 Dipole Calibration certificate (D1900V2_5d160) A.4 Dipole Calibration certificate (D2450V2_895)
Appendix B	SAR Tissue Specification
Appendix C	#Antenna Location & Distance
Appendix D	EUT Photo
Appendix E	Test Setup Photo