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	Report No.: KR20-SPF0038 Page (1) of (117)	KCTL

1. Client

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
- Date of Receipt : 2020-07-08

2. Use of Report : Certification

3. Name of Product and Model : Tablet PC
- Model Number : SM-T570
- Manufacturer and Country of Origin : Samsung Electronics Co., Ltd./ Vietnam

4. FCC ID : A3LSMT570

5. Date of Test : 2020-08-26 ~ 2020-08-29

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	Technical Manager
	Name : Choongki Lee (Signature)	Name : Jongwon Ma (Signature)

2020-09-02

KCTL Inc.

REPORT REVISION HISTORY

Date	Revision	Page No
2020-09-02	Originally issued	-

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

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 Vietnam Thai Nguyen Co., Ltd (SEVT)
Address	:	Yen Binh Industrial Park, Dong Tien Ward, Pho Yen Town Thai Nguyen Province, Vietnam
Contact Person	:	Hyunje Choi/ chj5630.choi@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		Tablet PC		
Product Model Number		SM-T570		
Product Manufacturer		Samsung Electronics Co., Ltd.		
Product Serial Number	Radiation	R32N600ZWXV		
	Conduction	R32N600Z9BF		
Device Overview		Band & Mode	Operating Modes	Tx Frequency (㎒)
		2.4 ㎓ WLAN	Voice/Data	2 412.0 ~ 2 472.0
		U-NII-1	Voice/Data	5 180.0 ~ 5 240.0
		U-NII-2A	Voice/Data	5 260.0 ~ 5 320.0
		U-NII-2C	Voice/Data	5 500.0 ~ 5 720.0
		U-NII-3	Voice/Data	5 745.0 ~ 5 825.0
		Bluetooth	Data	2 402.0 ~ 2 480.0
		NFC	Data	13.56
TDWR Information		5.60 ㎓~ 5.65 ㎓ band (TDWR) is supported by the device.		

2.2 Summary of SAR Test Results

Band	Equipment Class	Highest Reported 1g SAR (W/kg) Body
2.4 ㎓ WLAN	DTS	0.43
U-NII-1	NII	N/A
U-NII-2A	NII	0.51
U-NII-2C	NII	0.35
U-NII-3	NII	0.42
Bluetooth	DSS	**0.68**
Simultaneous SAR per KDB 690783 D01v01r03		1.37

2.3 Power Reduction for SAR

This device utilizes a power reduction mechanism for some wireless modes and bands for SAR compliance under some conditions when the device is being used in close proximity to the user's hand. FCC KDB Publication 616217 D04v01r02 Section 6 was used as a guideline for selecting SAR test distances for this device when being used in Tablet use conditions. Detailed descriptions of the power reduction mechanism are included in the operational description.

2.4 #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.

2.4.1 Maximum WLAN Output Power
2.4.1.1 Maximum WLAN Output Power(Maximum Tune-up Power)

Band	Ant.	Mode	Channel	Output Power (dB m)		
				Target	Max. Allowed	SAR Test
WLAN 2.4 GHz	Ant.1, Ant.2	802.11b	1 ~ 11	18.00	**19.00**	Yes
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		802.11g	1 ~ 11	14.00	**15.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		802.11n(HT20)	1 ~ 11	13.50	**14.50**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		802.11ac(VHT20)	1 ~ 11	13.50	**14.50**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		SU 20 MHz	1 ~ 11	13.50	**14.50**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		RU 26T_20 MHz	1 ~ 11	15.00	**16.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		RU 52T_20 MHz	1 ~ 11	15.00	**16.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		RU 106T_20 MHz	1 ~ 11	15.00	**16.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		RU 242T_20 MHz	1 ~ 11	13.00	**14.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
WLAN 2.4 GHz	MIMO	802.11g	1 ~ 11	17.00	**18.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		802.11n(HT20)	1 ~ 11	16.50	**17.50**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		802.11ac(VHT20)	1 ~ 11	16.50	**17.50**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		SU 20 MHz	1 ~ 11	16.50	**17.50**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		RU 26T_20 MHz	1 ~ 11	18.00	**19.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		RU 52T_20 MHz	1 ~ 11	18.00	**19.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		RU 106T_20 MHz	1 ~ 11	18.00	**19.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		RU 242T_20 MHz	1 ~ 11	16.00	**17.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	

Band	Ant.	Mode	Channel	Output Power (dB m)		
				Target	Max. Allowed	SAR Test
U-NII	Ant.1, Ant.2	802.11a	All Channel	14.00	**15.00**	Yes
		802.11n(HT20)	All Channel	14.00	**15.00**	No
		802.11n(HT40)	All Channel	13.00	**14.00**	No
		802.11ac(VHT20)	All Channel	14.00	**15.00**	No
		802.11ac(VHT40)	All Channel	13.00	**14.00**	No
		802.11ac(VHT80)	All Channel	12.00	**13.00**	No
		SU 20 MHz	All Channel	14.00	**15.00**	No
		RU 26T_20 MHz	All Channel	10.00	**11.00**	No
		RU 52T_20 MHz	All Channel	10.00	**11.00**	No
		RU 106T_20 MHz	All Channel	10.00	**11.00**	No
		RU 242T_20 MHz	All Channel	10.00	**11.00**	No
		SU 40 MHz	All Channel	13.00	**14.00**	No
		RU 26T_40 MHz	All Channel	10.00	**11.00**	No
		RU 52T_40 MHz	All Channel	10.00	**11.00**	No
		RU 106T_40 MHz	All Channel	10.00	**11.00**	No
		RU 242T_40 MHz	All Channel	10.00	**11.00**	No
		RU 484T_40 MHz	All Channel	10.00	**11.00**	No
		SU 80 MHz	All Channel	12.00	**13.00**	No
		RU 26T_80 MHz	All Channel	10.00	**11.00**	No
		RU 52T_80 MHz	All Channel	10.00	**11.00**	No
		RU 106T_80 MHz	All Channel	10.00	**11.00**	No
		RU 242T_80 MHz	All Channel	10.00	**11.00**	No
		RU 484T_80 MHz	All Channel	10.00	**11.00**	No
		RU 996T_80 MHz	All Channel	10.00	**11.00**	No

Band	Ant.	Mode	Channel	Output Power (dB m)		
				Target	Max. Allowed	SAR Test
U-NII	MIMO	802.11a	All Channel	17.00	**18.00**	No
		802.11n(HT20)	All Channel	17.00	**18.00**	No
		802.11n(HT40)	All Channel	16.00	**17.00**	No
		802.11ac(VHT20)	All Channel	17.00	**18.00**	No
		802.11ac(VHT40)	All Channel	16.00	**17.00**	No
		802.11ac(VHT80)	All Channel	15.00	**16.00**	No
		SU 20 MHz	All Channel	17.00	**18.00**	No
		RU 26T_20 MHz	All Channel	13.00	**14.00**	No
		RU 52T_20 MHz	All Channel	13.00	**14.00**	No
		RU 106T_20 MHz	All Channel	13.00	**14.00**	No
		RU 242T_20 MHz	All Channel	13.00	**14.00**	No
		SU 40 MHz	All Channel	16.00	**17.00**	No
		RU 26T_40 MHz	All Channel	13.00	**14.00**	No
		RU 52T_40 MHz	All Channel	13.00	**14.00**	No
		RU 106T_40 MHz	All Channel	13.00	**14.00**	No
		RU 242T_40 MHz	All Channel	13.00	**14.00**	No
		RU 484T_40 MHz	All Channel	13.00	**14.00**	No
		SU 80 MHz	All Channel	15.00	**16.00**	No
		RU 26T_80 MHz	All Channel	13.00	**14.00**	No
		RU 52T_80 MHz	All Channel	13.00	**14.00**	No
		RU 106T_80 MHz	All Channel	13.00	**14.00**	No
		RU 242T_80 MHz	All Channel	13.00	**14.00**	No
		RU 484T_80 MHz	All Channel	13.00	**14.00**	No
		RU 996T_80 MHz	All Channel	13.00	**14.00**	No

2.4.1.2 Reduced WLAN Output Power(Grip Sensor)

Band	Ant.	Mode	Channel	Output Power (dB m)		
				Target	Max. Allowed	SAR Test
WLAN 2.4 GHz	Ant.1, Ant.2	802.11b	1 ~ 11	8.00	**9.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		802.11g	1 ~ 11	8.00	**9.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		802.11n(HT20)	1 ~ 11	8.00	**9.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		802.11ac(VHT20)	1 ~ 11	8.00	**9.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		SU 20 MHz	1 ~ 11	8.00	**9.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		RU 26T_20 MHz	1 ~ 11	5.00	**6.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		RU 52T_20 MHz	1 ~ 11	5.00	**6.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		RU 106T_20 MHz	1 ~ 11	5.00	**6.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		RU 242T_20 MHz	1 ~ 11	5.00	**6.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
	MIMO	802.11g	1 ~ 11	11.00	**12.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		802.11n(HT20)	1 ~ 11	11.00	**12.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		802.11ac(VHT20)	1 ~ 11	11.00	**12.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		SU 20 MHz	1 ~ 11	11.00	**12.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		RU 26T_20 MHz	1 ~ 11	8.00	**9.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		RU 52T_20 MHz	1 ~ 11	8.00	**9.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		RU 106T_20 MHz	1 ~ 11	8.00	**9.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		RU 242T_20 MHz	1 ~ 11	8.00	**9.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	

Band	Ant.	Mode	Channel	Output Power (dB m)		
				Target	Max. Allowed	SAR Test
U-NII	Ant.1, Ant.2	802.11a	All Channel	2.90	**3.90**	No
		802.11n(HT20)	All Channel	2.90	**3.90**	No
		802.11n(HT40)	All Channel	2.90	**3.90**	No
		802.11ac(VHT20)	All Channel	2.90	**3.90**	No
		802.11ac(VHT40)	All Channel	2.90	**3.90**	No
		802.11ac(VHT80)	All Channel	2.90	**3.90**	No
		SU 20 MHz	All Channel	2.90	**3.90**	No
		RU 26T_20 MHz	All Channel	2.90	**3.90**	No
		RU 52T_20 MHz	All Channel	2.90	**3.90**	No
		RU 106T_20 MHz	All Channel	2.90	**3.90**	No
		RU 242T_20 MHz	All Channel	2.90	**3.90**	No
		SU 40 MHz	All Channel	2.90	**3.90**	No
		RU 26T_40 MHz	All Channel	2.90	**3.90**	No
		RU 52T_40 MHz	All Channel	2.90	**3.90**	No
		RU 106T_40 MHz	All Channel	2.90	**3.90**	No
		RU 242T_40 MHz	All Channel	2.90	**3.90**	No
		RU 484T_40 MHz	All Channel	2.90	**3.90**	No
		SU 80 MHz	All Channel	2.90	**3.90**	No
		RU 26T_80 MHz	All Channel	2.90	**3.90**	No
		RU 52T_80 MHz	All Channel	2.90	**3.90**	No
		RU 106T_80 MHz	All Channel	2.90	**3.90**	No
		RU 242T_80 MHz	All Channel	2.90	**3.90**	No
		RU 484T_80 MHz	All Channel	2.90	**3.90**	No
		RU 996T_80 MHz	All Channel	2.90	**3.90**	No

Band	Ant.	Mode	Channel	Output Power (dB m)		
				Target	Max. Allowed	SAR Test
U-NII	MIMO	802.11a	All Channel	5.90	**6.90**	No
		802.11n(HT20)	All Channel	5.90	**6.90**	No
		802.11n(HT40)	All Channel	5.90	**6.90**	No
		802.11ac(VHT20)	All Channel	5.90	**6.90**	No
		802.11ac(VHT40)	All Channel	5.90	**6.90**	No
		802.11ac(VHT80)	All Channel	5.90	**6.90**	No
		SU 20 MHz	All Channel	5.90	**6.90**	No
		RU 26T_20 MHz	All Channel	5.90	**6.90**	No
		RU 52T_20 MHz	All Channel	5.90	**6.90**	No
		RU 106T_20 MHz	All Channel	5.90	**6.90**	No
		RU 242T_20 MHz	All Channel	5.90	**6.90**	No
		SU 40 MHz	All Channel	5.90	**6.90**	No
		RU 26T_40 MHz	All Channel	5.90	**6.90**	No
		RU 52T_40 MHz	All Channel	5.90	**6.90**	No
		RU 106T_40 MHz	All Channel	5.90	**6.90**	No
		RU 242T_40 MHz	All Channel	5.90	**6.90**	No
		RU 484T_40 MHz	All Channel	5.90	**6.90**	No
		SU 80 MHz	All Channel	5.90	**6.90**	No
		RU 26T_80 MHz	All Channel	5.90	**6.90**	No
		RU 52T_80 MHz	All Channel	5.90	**6.90**	No
		RU 106T_80 MHz	All Channel	5.90	**6.90**	No
		RU 242T_80 MHz	All Channel	5.90	**6.90**	No
		RU 484T_80 MHz	All Channel	5.90	**6.90**	No
		RU 996T_80 MHz	All Channel	5.90	**6.90**	No

2.4.1.3 Reduced WLAN Output Power(RSDB)

Band	Ant.	Mode	Channel	Output Power (dB m)		
				Target	Max. Allowed	SAR Test
WLAN 2.4 GHz	Ant.1, Ant.2	802.11b	1 ~ 11	14.00	**15.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		802.11g	1 ~ 11	14.00	**15.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		802.11n(HT20)	1 ~ 11	13.50	**14.50**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		802.11ac(VHT20)	1 ~ 11	13.50	**14.50**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		SU 20 MHz	1 ~ 11	13.50	**14.50**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		RU 26T_20 MHz	1 ~ 11	14.00	**15.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		RU 52T_20 MHz	1 ~ 11	14.00	**15.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		RU 106T_20 MHz	1 ~ 11	14.00	**15.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		RU 242T_20 MHz	1 ~ 11	13.00	**14.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
	MIMO	802.11g	1 ~ 11	17.00	**18.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		802.11n(HT20)	1 ~ 11	16.50	**17.50**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		802.11ac(VHT20)	1 ~ 11	16.50	**17.50**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		SU 20 MHz	1 ~ 11	16.50	**17.50**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		RU 26T_20 MHz	1 ~ 11	17.00	**18.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		RU 52T_20 MHz	1 ~ 11	17.00	**18.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		RU 106T_20 MHz	1 ~ 11	17.00	**18.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		RU 242T_20 MHz	1 ~ 11	16.00	**17.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	

Band	Ant.	Mode	Channel	Output Power (dB m)		
				Target	Max. Allowed	SAR Test
U-NII	Ant.1, Ant.2	802.11a	All Channel	10.00	**11.00**	No
		802.11n(HT20)	All Channel	10.00	**11.00**	No
		802.11n(HT40)	All Channel	10.00	**11.00**	No
		802.11ac(VHT20)	All Channel	10.00	**11.00**	No
		802.11ac(VHT40)	All Channel	10.00	**11.00**	No
		802.11ac(VHT80)	All Channel	10.00	**11.00**	No
		SU 20 MHz	All Channel	10.00	**11.00**	No
		RU 26T_20 MHz	All Channel	10.00	**11.00**	No
		RU 52T_20 MHz	All Channel	10.00	**11.00**	No
		RU 106T_20 MHz	All Channel	10.00	**11.00**	No
		RU 242T_20 MHz	All Channel	10.00	**11.00**	No
		SU 40 MHz	All Channel	10.00	**11.00**	No
		RU 26T_40 MHz	All Channel	10.00	**11.00**	No
		RU 52T_40 MHz	All Channel	10.00	**11.00**	No
		RU 106T_40 MHz	All Channel	10.00	**11.00**	No
		RU 242T_40 MHz	All Channel	10.00	**11.00**	No
		RU 484T_40 MHz	All Channel	10.00	**11.00**	No
		SU 80 MHz	All Channel	10.00	**11.00**	No
		RU 26T_80 MHz	All Channel	10.00	**11.00**	No
		RU 52T_80 MHz	All Channel	10.00	**11.00**	No
		RU 106T_80 MHz	All Channel	10.00	**11.00**	No
		RU 242T_80 MHz	All Channel	10.00	**11.00**	No
		RU 484T_80 MHz	All Channel	10.00	**11.00**	No
		RU 996T_80 MHz	All Channel	10.00	**11.00**	No

Band	Ant.	Mode	Channel	Output Power (dB m)		
				Target	Max. Allowed	SAR Test
U-NII	MIMO	802.11a	All Channel	13.00	**14.00**	No
		802.11n(HT20)	All Channel	13.00	**14.00**	No
		802.11n(HT40)	All Channel	13.00	**14.00**	No
		802.11ac(VHT20)	All Channel	13.00	**14.00**	No
		802.11ac(VHT40)	All Channel	13.00	**14.00**	No
		802.11ac(VHT80)	All Channel	13.00	**14.00**	No
		SU 20 MHz	All Channel	13.00	**14.00**	No
		RU 26T_20 MHz	All Channel	13.00	**14.00**	No
		RU 52T_20 MHz	All Channel	13.00	**14.00**	No
		RU 106T_20 MHz	All Channel	13.00	**14.00**	No
		RU 242T_20 MHz	All Channel	13.00	**14.00**	No
		SU 40 MHz	All Channel	13.00	**14.00**	No
		RU 26T_40 MHz	All Channel	13.00	**14.00**	No
		RU 52T_40 MHz	All Channel	13.00	**14.00**	No
		RU 106T_40 MHz	All Channel	13.00	**14.00**	No
		RU 242T_40 MHz	All Channel	13.00	**14.00**	No
		RU 484T_40 MHz	All Channel	13.00	**14.00**	No
		SU 80 MHz	All Channel	13.00	**14.00**	No
		RU 26T_80 MHz	All Channel	13.00	**14.00**	No
		RU 52T_80 MHz	All Channel	13.00	**14.00**	No
		RU 106T_80 MHz	All Channel	13.00	**14.00**	No
		RU 242T_80 MHz	All Channel	13.00	**14.00**	No
		RU 484T_80 MHz	All Channel	13.00	**14.00**	No
		RU 996T_80 MHz	All Channel	13.00	**14.00**	No

2.4.1.4 Reduced WLAN Output Power(RSDB+Grip Sensor)

Band	Ant.	Mode	Channel	Output Power (dB m)		
				Target	Max. Allowed	SAR Test
WLAN 2.4 GHz	Ant.1, Ant.2	802.11b	1 ~ 11	5.00	**6.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		802.11g	1 ~ 11	5.00	**6.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		802.11n(HT20)	1 ~ 11	5.00	**6.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		802.11ac(VHT20)	1 ~ 11	5.00	**6.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		SU 20 MHz	1 ~ 11	5.00	**6.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		RU 26T_20 MHz	1 ~ 11	5.00	**6.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		RU 52T_20 MHz	1 ~ 11	5.00	**6.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		RU 106T_20 MHz	1 ~ 11	5.00	**6.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
		RU 242T_20 MHz	1 ~ 11	5.00	**6.00**	No
			12	5.00	**6.00**	
			13	-3.00	**-2.00**	
	MIMO	802.11g	1 ~ 11	8.00	**9.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		802.11n(HT20)	1 ~ 11	8.00	**9.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		802.11ac(VHT20)	1 ~ 11	8.00	**9.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		SU 20 MHz	1 ~ 11	8.00	**9.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		RU 26T_20 MHz	1 ~ 11	8.00	**9.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		RU 52T_20 MHz	1 ~ 11	8.00	**9.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		RU 106T_20 MHz	1 ~ 11	8.00	**9.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	
		RU 242T_20 MHz	1 ~ 11	8.00	**9.00**	No
			12	8.00	**9.00**	
			13	0.00	**1.00**	

Band	Ant.	Mode	Channel	Output Power (dB m)		
				Target	Max. Allowed	SAR Test
U-NII	Ant.1, Ant.2	802.11a	All Channel	1.00	**2.00**	No
		802.11n(HT20)	All Channel	1.00	**2.00**	No
		802.11n(HT40)	All Channel	1.00	**2.00**	No
		802.11ac(VHT20)	All Channel	1.00	**2.00**	No
		802.11ac(VHT40)	All Channel	1.00	**2.00**	No
		802.11ac(VHT80)	All Channel	1.00	**2.00**	No
		SU 20 MHz	All Channel	1.00	**2.00**	No
		RU 26T_20 MHz	All Channel	1.00	**2.00**	No
		RU 52T_20 MHz	All Channel	1.00	**2.00**	No
		RU 106T_20 MHz	All Channel	1.00	**2.00**	No
		RU 242T_20 MHz	All Channel	1.00	**2.00**	No
		SU 40 MHz	All Channel	1.00	**2.00**	No
		RU 26T_40 MHz	All Channel	1.00	**2.00**	No
		RU 52T_40 MHz	All Channel	1.00	**2.00**	No
		RU 106T_40 MHz	All Channel	1.00	**2.00**	No
		RU 242T_40 MHz	All Channel	1.00	**2.00**	No
		RU 484T_40 MHz	All Channel	1.00	**2.00**	No
		SU 80 MHz	All Channel	1.00	**2.00**	No
		RU 26T_80 MHz	All Channel	1.00	**2.00**	No
		RU 52T_80 MHz	All Channel	1.00	**2.00**	No
		RU 106T_80 MHz	All Channel	1.00	**2.00**	No
		RU 242T_80 MHz	All Channel	1.00	**2.00**	No
		RU 484T_80 MHz	All Channel	1.00	**2.00**	No
		RU 996T_80 MHz	All Channel	1.00	**2.00**	No

Band	Ant.	Mode	Channel	Output Power (dB m)		
				Target	Max. Allowed	SAR Test
U-NII	MIMO	802.11a	All Channel	4.00	**5.00**	No
		802.11n(HT20)	All Channel	4.00	**5.00**	No
		802.11n(HT40)	All Channel	4.00	**5.00**	No
		802.11ac(VHT20)	All Channel	4.00	**5.00**	No
		802.11ac(VHT40)	All Channel	4.00	**5.00**	No
		802.11ac(VHT80)	All Channel	4.00	**5.00**	No
		SU 20 MHz	All Channel	4.00	**5.00**	No
		RU 26T_20 MHz	All Channel	4.00	**5.00**	No
		RU 52T_20 MHz	All Channel	4.00	**5.00**	No
		RU 106T_20 MHz	All Channel	4.00	**5.00**	No
		RU 242T_20 MHz	All Channel	4.00	**5.00**	No
		SU 40 MHz	All Channel	4.00	**5.00**	No
		RU 26T_40 MHz	All Channel	4.00	**5.00**	No
		RU 52T_40 MHz	All Channel	4.00	**5.00**	No
		RU 106T_40 MHz	All Channel	4.00	**5.00**	No
		RU 242T_40 MHz	All Channel	4.00	**5.00**	No
		RU 484T_40 MHz	All Channel	4.00	**5.00**	No
		SU 80 MHz	All Channel	4.00	**5.00**	No
		RU 26T_80 MHz	All Channel	4.00	**5.00**	No
		RU 52T_80 MHz	All Channel	4.00	**5.00**	No
		RU 106T_80 MHz	All Channel	4.00	**5.00**	No
		RU 242T_80 MHz	All Channel	4.00	**5.00**	No
		RU 484T_80 MHz	All Channel	4.00	**5.00**	No
		RU 996T_80 MHz	All Channel	4.00	**5.00**	No

2.4.2 Maximum Bluetooth Output Power

Band	Ant.	Mode	Channel	Output Power (dB m)		
				Target	Max. Allowed	SAR Test
Bluetooth	Ant.1	BDR	All Channel	11.50	**12.50**	**Yes**
		EDR	All Channel	11.00	**12.00**	No
		LE 1M(GFSK)	All Channel	6.50	**7.00**	No
		LE 2M(GFSK)	All Channel	7.00	**8.00**	No

2.5 SAR Test Configurations

2.5.1 #DUT Antenna Locations

The overall dimensions of this device are > 20 cm. A diagram showing the location of the device antennas can be found in Appendix D.

2.5.2 Body SAR Test Exclusion Considerations_(Maximum Tune-up Power)

Band / Ant.	Freq. [MHz]	Output Power		Separation distances [mm]					SAR Exemption				
		dBm	㎽	Rear	Left	Right	Top	Bot.	Rear	Left	Right	Top	Bot.
2.4 ㎓ Ant.1	2 480.0	19.00	79	5	5	113	26	162	24.88 Measure	24.88 Measure	725mW EXEMPT	4.78 Measure	1215mW EXEMPT
5.3 ㎓ Ant.1	5 320.0	15.00	32	5	5	113	26	162	14.76 Measure	14.76 Measure	695mW EXEMPT	2.84 EXEMPT	1185mW EXEMPT
5.6 ㎓ Ant.1	5 720.0	15.00	32	5	5	113	26	162	15.31 Measure	15.31 Measure	693mW EXEMPT	2.94 EXEMPT	1183mW EXEMPT
5.8 ㎓ Ant.1	5 825.0	15.00	32	5	5	113	26	162	15.45 Measure	15.45 Measure	692mW EXEMPT	2.97 EXEMPT	1182mW EXEMPT
2.4 ㎓ Ant.2	2 480.0	19.00	79	5	25	89	5	198	24.88 Measure	4.98 Measure	485mW EXEMPT	24.88 Measure	1575mW EXEMPT
5.3 ㎓ Ant.2	5 320.0	15.00	32	5	25	89	5	198	14.76 Measure	2.95 EXEMPT	455mW EXEMPT	14.76 Measure	1545mW EXEMPT
5.6 ㎓ Ant.2	5 720.0	15.00	32	5	25	89	5	198	15.31 Measure	3.06 Measure	453mW EXEMPT	15.31 Measure	1543mW EXEMPT
5.8 ㎓ Ant.2	5 825.0	15.00	32	5	25	89	5	198	15.45 Measure	3.09 Measure	452mW EXEMPT	15.45 Measure	1542mW EXEMPT
Bluetooth	2 480.0	12.50	18	5	5	113	26	162	5.67 Measure	5.67 Measure	725mW EXEMPT	1.09 EXEMPT	1215mW EXEMPT

Note 1: For distances < 5mm, a distance of 5mm is used to determine SAR exclusion and estimated SAR value.
Note 2: Output power is the maximum rated power (including tune-up or manufacturing tolerances) and includes source-based averaging.
Note 3: If the antenna separation distance is > 50mm then the value listed is the output power threshold, above which SAR measurement is required. For separation <= 50mm the value is the KDB 447498 calculated value and must be less than 3.0 for SAR exemption.
Note 4: Formulas round separation distance to nearest mm and power to nearest ㎽ before calculating thresholds or exemption values.

2.5.3 Body SAR Test Exclusion Considerations_(Reduced Tune-up Power)

<Grip Sensor>

Band / Ant.	Freq. [㎒]	Output Power		Separation distances [mm]					SAR Exemption				
		dBm	㎽	Rear	Left	Right	Top	Bot.	Rear	Left	Right	Top	Bot.
2.4 ㎓ Ant.1	2 480.0	9.00	8	5	5	113	26	162	2.52 EXEMPT	2.52 EXEMPT	Non-Power-Back-off	Non-Power-Back-off	Non-Power-Back-off
5.3 ㎓ Ant.1	5 320.0	3.90	2	5	5	113	26	162	0.92 EXEMPT	0.92 EXEMPT			
5.6 ㎓ Ant.1	5 720.0	3.90	2	5	5	113	26	162	0.96 EXEMPT	0.96 EXEMPT			
5.8 ㎓ Ant.1	5 825.0	3.90	2	5	5	113	26	162	0.97 EXEMPT	0.97 EXEMPT			
2.4 ㎓ Ant.2	2 480.0	9.00	8	5	25	89	5	198	2.52 EXEMPT	Non-Power-Back-off	Non-Power-Back-off	2.52 EXEMPT	Non-Power-Back-off
5.3 ㎓ Ant.2	5 320.0	3.90	2	5	25	89	5	198	0.92 EXEMPT			0.92 EXEMPT	
5.6 ㎓ Ant.2	5 720.0	3.90	2	5	25	89	5	198	0.96 EXEMPT			0.96 EXEMPT	
5.8 ㎓ Ant.2	5 825.0	3.90	2	5	25	89	5	198	0.97 EXEMPT			0.97 EXEMPT	

Note 1: For distances < 5mm, a distance of 5mm is used to determine SAR exclusion and estimated SAR value.
Note 2: Output power is the maximum rated power (including tune-up or manufacturing tolerances) and includes source-based averaging.
Note 3: If the antenna separation distance is > 50mm then the value listed is the output power threshold, above which SAR measurement is required. For separation <= 50mm the value is the KDB 447498 calculated value and must be less than 3.0 for SAR exemption.
Note 4: Formulas round separation distance to nearest mm and power to nearest ㎽ before calculating thresholds or exemption values.
Note 5: Non-power back-off means Grip Sensor is not applied. (This is calculated as the maximum output power in section 2.5.2)

SAR Test Exclusion (Maximum Tune-up Power)

Mode	Device Edge for SAR Testing (Front View)					
	Front	Rear	Left Edge	Right Edge	Top	Bottom
2.4 ㎓ WLAN (Ant.1)	No	Yes	Yes	Note)Yes	Yes	No
U-NII-2A (Ant.1)	No	Yes	Yes	Note)Yes	No	No
U-NII-2C (Ant.1)	No	Yes	Yes	Note)Yes	No	No
U-NII-3 (Ant.1)	No	Yes	Yes	Note)Yes	No	No
2.4 ㎓ WLAN (Ant.2)	No	Yes	Yes	Note)Yes	Yes	No
U-NII-2A (Ant.2)	No	Yes	No	Note)Yes	Yes	No
U-NII-2C (Ant.2)	No	Yes	Yes	Note)Yes	Yes	No
U-NII-3 (Ant.2)	No	Yes	Yes	Note)Yes	Yes	No
Bluetooth (Ant.1)	No	Yes	Yes	Note)Yes	No	No

Note : The conservative estimated SAR was measured to exclude the simultaneous transmission SAR test.

SAR Test Exclusion (Reduced Tune-up Power - Grip Sensor)

Mode	Device Edge for SAR Testing (Front View)					
	Front	Rear	Left Edge	Right Edge	Top	Bottom
2.4 ㎓ WLAN (Ant.1)	No	No	No	N/A	N/A	N/A
U-NII-2A (Ant.1)	No	No	No			
U-NII-2C (Ant.1)	No	No	No			
U-NII-3 (Ant.1)	No	No	No			
2.4 ㎓ WLAN (Ant.2)	No	No	N/A	N/A	No	N/A
U-NII-2A (Ant.2)	No	No			No	
U-NII-2C (Ant.2)	No	No			No	
U-NII-3 (Ant.2)	No	No			No	

2.6 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
- 616217 D04 SAR for laptop and tablets v01r02 (Proximity Sensor)
- 865664 D01 SAR measurement 100 ㎒ to 6 ㎓ v01r04
- 865664 D02 RF Exposure Reporting v01r02
- October 2016 TCB Workshop Notes (Bluetooth Duty Factor)
- April 2019 TCB Workshop Notes (Tissue Simulation Liquids)

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 Body-Worn Accessory Configurations

Figure 7
Sample Body-Worn Diagram

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 7). Per FCC KDB Publication 648474 D04v01r03, Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB Publication 447498 D01v06 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are tested with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.
Body-worn accessories may not always be supplied or available as options for some devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used. Test position spacing was documented. Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom in head fluid. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessories, including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

5.2 Proximity Sensor Considerations

This device uses a power reduction mechanism to reduce output powers in certain use conditions when the device is used close to the user's body.
When the device's antenna is within a certain distance of the user, the sensor activates and reduces the maximum allowed output power. However, the sensor is not active when the device is moved beyond the sensor triggering distance and the maximum output power is no longer limited. Therefore, additional evaluation is needed in the vicinity of the triggering distance to ensure SAR is compliant when the device is allowed to operate at a non-reduced output power level. FCC KDB Publication 616217 D04v01r02 Section 6 was used as a guideline for selecting SAR test distances for this device at these additional test positions.

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. FCC SAR General Measurement Procedures

7.1 Measured and Reported SAR

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

7.2 SAR Testing with 802.11 Transmitters

The normal network operating configurations are not suitable for measuring the SAR of 802.11 a/b/g transmitters. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable.

7.2.1 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 systems 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.

7.2.2 U-NII-1 and U-NII-2A

For devices that operate in both U-NII-1 and U-NII-2A bands, when the same maximum output power is specified for both bands, SAR measurement using OFDM SAR test procedures is not required for U-NII-1 unless the highest reported SAR for U-NII-2A is > 1.2 W/kg. When different maximum output powers is not required unless the highest reported SAR for the U-NII band with the higher maximum output power, adjusted by the ratio of lower to higher specified maximum output power for the two bands, is > 1.2 W/kg. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

7.2.3 U-NII-2C and U-NII-3

The frequency range covered by U-NII-2C and U-NII-3 is 380 ㎒ (5.47 – 5.85 ㎓), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. When Terminal Doppler Weather Radar (TDWR) restriction applies, the channels at 5.60 – 5.65 ㎓ in U-NII-2C band must be disabled with acceptable mechanisms and documented in the equipment certification. Unless band gap channels are permanently disabled, SAR must be considered for these channels. When band gap channels are disabled, each band is tested independently according to the normally required OFDM SAR measurement and probe calibration frequency point requirements.

7.2.4 Initial Test Position Procedure

For exposure conditions with multiple test positions, such as handset operating next to the ear, devices with hotspot mode or UMPC mini-tablet, procedures for initial test position can be applied. Using the transmission mode determined by the DSSS procedure or initial test configuration, area scans are measured for all positions in an exposure condition. The test position with the highest extrapolated (peak) SAR is used as the initial test position. When reported SAR for the initial test position is ≤ 0.4 W/kg, no additional testing for the remaining test positions is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured.

7.2.5 2.4 ㎓ SAR Test Requirement

SAR is measured for 2.4 ㎓ 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 in 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; i.e., all channels require testing.

2.4 ㎓ 802.11g/n OFDM are additionally evaluated for SAR if 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 ㎓ band, the Initial Test Configuration Procedures should be followed.

7.2.6 OFDM Transmission Mode and SAR Test Channel Selection

For the 2.4 ㎓ and 5 ㎓ band, when the same maximum output power was specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration with the largest channel bandwidth, lowest order modulation and lowest data rate. When the maximum output power of a channel is the same for equivalent OFDM configurations; for example, 802.11a, 802.11n and 802.11ac or 802.11g and 802.11n with the same channel band width, modulation and data rate etc., the lower order 802.11 mode i.e., 802.11a, then 802.11n and 802.11ac or 802.11g then 802.11n, is used for SAR measurement. When 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.

7.2.7 Initial Test Configuration Procedure

For OFDM, in both 2.4 and 5 ㎓ bands, an initial test configuration is determined for each frequency band and aggregated band, according to the transmission mode with the highest maximum output power specified for SAR measurements. When the same maximum output power is specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration(s) with the largest channel bandwidth, lowest order modulation, and lowest data rate. If the average RF output powers of the highest identical transmission modes are within 0.25 ㏈ of each other, mid channel of the transmission mode with highest average RF output power is the initial test channel. Otherwise, the channel of the transmission mode with the highest average RF output conducted power will be the initial test configuration.

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

7.2.8 Subsequent Test Configuration Procedures

For OFDM configurations in each frequency band and aggregated band, SAR is evaluated for initial test configuration using the fixed test position or the initial test position procedure. When the highest reported SAR (for the initial test configuration), adjusted by the ratio of the specified maximum output power of the subsequent test configuration to initial test configuration, is ≤ 1.2 W/kg, no additional SAR tests for the subsequent test configurations are required. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

8. RF Average Conducted Output Power

8.1 WLAN Average Conducted Output Power(Maximum Average Power)

8.1.1 WLAN Average Conducted Output Power_Ant.1

Band	Freq. [MHz]	Channel	Mode			
			802.11b	802.11g	802.11n	802.11ac
WLAN 2.4 GHz	2 412.0	1	17.91	13.70	13.93	13.95
	2 437.0	6	17.89	14.34	14.32	14.41
	2 462.0	11	17.22	13.63	14.15	14.21
	2 467.0	12	5.11	5.03	5.46	5.55
	2 472.0	13	-2.81	-2.99	-3.13	-3.05

Band	Freq. [MHz]	Channel	Mode		
			802.11a	802.11n	802.11ac
WLAN 5 GHz (20 MHz)	5 180.0	36	14.45	14.56	14.54
	5 200.0	40	14.60	14.49	14.45
	5 220.0	44	14.08	14.11	14.17
	5 240.0	48	14.81	14.62	14.70
	5 260.0	52	14.87	14.85	14.72
	5 280.0	56	14.75	14.75	14.67
	5 300.0	60	14.25	14.23	14.22
	5 320.0	64	14.32	14.39	14.35
	5 500.0	100	14.18	14.28	14.36
	5 580.0	116	14.28	14.50	14.32
	5 600.0	120	13.67	13.54	13.58
	5 620.0	124	13.71	13.48	13.59
	5 700.0	140	14.32	14.03	14.28
	5 720.0	144	14.27	14.07	14.21
	5 745.0	149	14.19	14.16	14.18
	5 785.0	157	14.53	14.48	14.26
	5 825.0	165	14.52	14.52	14.71

Band	Freq. [MHz]	Channel	Mode	
			802.11n	802.11ac
WLAN 5 GHz (40 MHz)	5 190.0	38	13.50	13.58
	5 230.0	46	13.78	13.77
	5 270.0	54	13.79	13.82
	5 310.0	62	13.69	13.80
	5 510.0	102	13.58	13.32
	5 590.0	118	13.33	13.37
	5 630.0	126	12.43	12.86
	5 670.0	134	13.15	13.11
	5 710.0	142	13.04	13.01
	5 755.0	151	13.59	13.68
	5 795.0	159	13.83	13.60

Band	Freq. [MHz]	Channel	Mode
			802.11ac
WLAN 5 GHz (80 MHz)	5 210.0	42	12.66
	5 290.0	58	12.64
	5 530.0	106	12.23
	5 610.0	122	12.11
	5 690.0	138	12.10
	5 775.0	155	12.54

8.1.2 WLAN Average Conducted Output Power_Ant.2

Band	Freq. [MHz]	Channel	Mode			
			802.11b	802.11g	802.11n	802.11ac
WLAN 2.4 GHz	2 412.0	1	17.90	14.38	13.93	13.95
	2 437.0	6	17.40	14.74	13.62	13.62
	2 462.0	11	17.72	14.05	13.69	13.63
	2 467.0	12	5.12	5.54	5.20	5.51
	2 472.0	13	-3.02	-2.32	-2.63	-2.75

Band	Freq. [MHz]	Channel	Mode		
			802.11a	802.11n	802.11ac
WLAN 5 GHz (20 MHz)	5 180.0	36	14.08	14.00	14.02
	5 200.0	40	14.08	14.00	14.15
	5 220.0	44	13.65	13.81	13.73
	5 240.0	48	14.12	14.28	14.28
	5 260.0	52	14.19	14.24	14.24
	5 280.0	56	14.10	14.24	14.12
	5 300.0	60	13.68	13.77	13.66
	5 320.0	64	13.73	13.87	13.90
	5 500.0	100	14.35	14.44	14.28
	5 580.0	116	14.27	14.45	14.46
	5 600.0	120	13.79	13.75	13.81
	5 620.0	124	13.83	13.63	13.81
	5 700.0	140	14.31	14.25	14.29
	5 720.0	144	14.26	14.19	14.29
	5 745.0	149	14.38	14.36	14.44
	5 785.0	157	14.67	14.69	14.74
	5 825.0	165	14.62	14.66	14.63

Band	Freq. [MHz]	Channel	Mode	
			802.11n	802.11ac
WLAN 5 GHz (40 MHz)	5 190.0	38	13.01	12.89
	5 230.0	46	13.14	13.29
	5 270.0	54	13.15	13.27
	5 310.0	62	13.21	13.19
	5 510.0	102	13.64	13.59
	5 590.0	118	13.47	13.52
	5 630.0	126	12.89	13.06
	5 670.0	134	13.33	13.45
	5 710.0	142	13.32	13.41
	5 755.0	151	13.65	13.90
	5 795.0	159	13.78	13.87

Band	Freq. [MHz]	Channel	Mode
			802.11ac
WLAN 5 GHz (80 MHz)	5 210.0	42	11.94
	5 290.0	58	12.00
	5 530.0	106	12.26
	5 610.0	122	12.13
	5 690.0	138	12.09
	5 775.0	155	12.54

8.1.3 WLAN Average Conducted Output Power_MIMO

Band	Freq. [MHz]	Channel	Mode			
			802.11b	802.11g	802.11n	802.11ac
WLAN 2.4 GHz	2 412.0	1	N/A	17.30	16.32	16.46
	2 437.0	6		17.81	16.23	16.25
	2 462.0	11		17.26	16.19	16.27
	2 467.0	12		8.01	8.13	8.29
	2 472.0	13		-0.34	-0.28	-0.23

Band	Freq. [MHz]	Channel	Mode		
			802.11a	802.11n	802.11ac
WLAN 5 GHz (20 MHz)	5 180.0	36	16.64	16.70	16.97
	5 200.0	40	16.90	16.73	16.96
	5 220.0	44	17.10	17.00	17.20
	5 240.0	48	17.11	17.04	17.25
	5 260.0	52	16.85	17.00	17.37
	5 280.0	56	16.96	16.98	17.47
	5 300.0	60	16.84	16.84	17.46
	5 320.0	64	16.69	16.51	16.93
	5 500.0	100	16.82	16.92	17.28
	5 580.0	116	16.92	16.97	17.30
	5 600.0	120	16.68	16.63	17.40
	5 620.0	124	16.57	16.49	17.00
	5 700.0	140	16.65	16.78	17.12
	5 720.0	144	16.59	16.74	17.08
	5 745.0	149	16.87	17.02	16.32
	5 785.0	157	17.12	17.17	16.58
	5 825.0	165	17.18	17.20	16.60

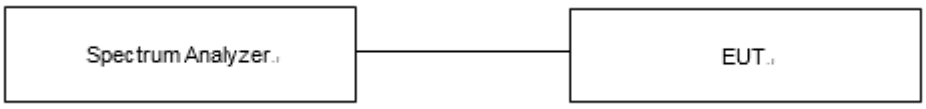
Band	Freq. [MHz]	Channel	Mode	
			802.11n	802.11ac
WLAN 5 GHz (40 MHz)	5 190.0	38	15.76	15.82
	5 230.0	46	15.99	16.01
	5 270.0	54	15.91	16.05
	5 310.0	62	15.86	15.97
	5 510.0	102	15.96	16.07
	5 590.0	118	15.99	15.97
	5 630.0	126	15.64	15.83
	5 670.0	134	15.78	15.85
	5 710.0	142	15.70	15.76
	5 755.0	151	16.15	16.15
	5 795.0	159	16.39	16.29

Band	Freq. [MHz]	Channel	Mode
			802.11ac
WLAN 5 GHz (80 MHz)	5 210.0	42	14.80
	5 290.0	58	14.96
	5 530.0	106	15.01
	5 610.0	122	14.64
	5 690.0	138	14.73
	5 775.0	155	15.09

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



8.2 Bluetooth Average Conducted Output Power(Maximum Average Power)

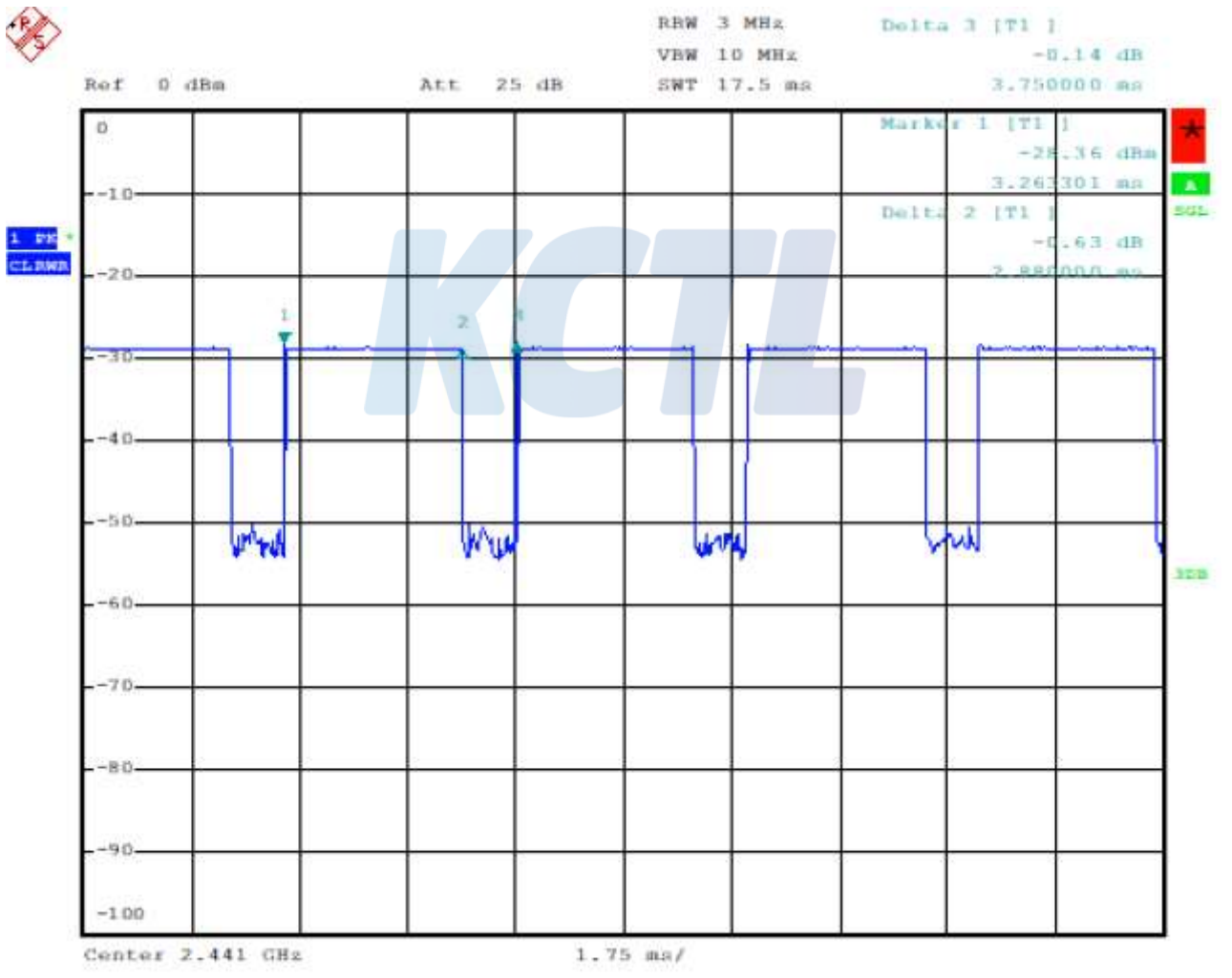
8.2.1 Bluetooth Average Conducted Output Power

Mode	Freq. [㎒]	Channel	Conducted Powers
			(dBm)
BDR_DH5 (1 Mbps)	2 402.0	0	11.51
	2 441.0	39	12.13
	2 480.0	78	11.44
EDR_2-DH5 (2 Mbps)	2 402.0	0	10.88
	2 441.0	39	11.71
	2 480.0	78	10.66
EDR_3-DH5 (3 Mbps)	2 402.0	0	10.91
	2 441.0	39	11.70
	2 480.0	78	10.72
LE (1 Mbps-37)	2 402.0	0	6.17
	2 440.0	19	7.01
	2 480.0	39	6.80
LE (1 Mbps-255)	2 402.0	0	6.14
	2 440.0	19	7.08
	2 480.0	39	6.74
LE (2 Mbps-37)	2 402.0	0	7.44
	2 440.0	19	7.86
	2 480.0	39	7.70
LE (2 Mbps-255)	2 402.0	0	7.35
	2 440.0	19	7.77
	2 480.0	39	7.62

8.3 Wireless Band Duty Cycle

Wireless Bands	Frequency Bands	Mode	Ant.	Duty Cycle (%)
WLAN	2.4 GHz	802.11b	Ant.1	98.60
			Ant.2	99.00
	5 GHz	802.11a	Ant.1	94.10
			Ant.2	94.10

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



9. System Verification

9.1 Tissue Verification

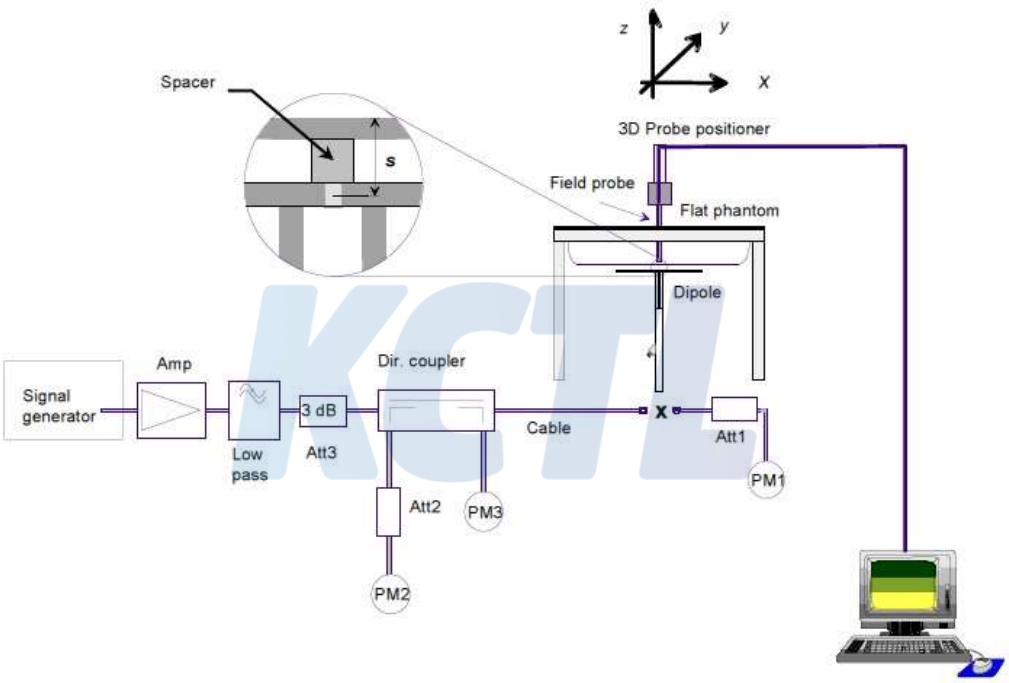
The dielectric properties for this Tissue Simulant Liquids were measured by using the SPEAG Model DAK3.5 Dielectric Probe in conjunction with Agilent E5071B Network Analyzer (300 kHz – 8 500 ㎒). The Conductivity (σ) and Permittivity (ρ) are listed in Table 1.For the SAR measurement given in this report.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

Freq. (㎒)	Limit/Measured		Permittivity (ρ)	Conductivity (σ)	Temp. (°C)
2 450.0	Recommended Limit		39.20 ± 5 % (37.24 ~ 41.16)	1.80 ± 5 % (1.71 ~ 1.89)	22 ± 2
	Measured	2020-08-29	38.52	1.82	20.97
5 300.0	Recommended Limit		35.90 ± 5 % (34.11 ~ 37.70)	4.76 ± 5 % (4.52 ~ 5.00)	22 ± 2
	Measured	2020-08-26	35.29	4.70	20.95
5 600.0	Recommended Limit		35.50 ± 5 % (33.73 ~ 37.28)	5.07 ± 5 % (4.82 ~ 5.32)	22 ± 2
	Measured	2020-08-27	35.37	5.03	21.03
5 800.0	Recommended Limit		35.30 ± 5 % (33.54 ~ 37.07)	5.27 ± 5 % (5.01 ~ 5.53)	22 ± 2
	Measured	2020-08-28	35.55	5.27	20.87

<Table 1. Measurement result of Tissue electric parameters>

9.2 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 (㎒)	Tissue Type	Limit/Measured (Normalized to 1 W)		
D2450V2 SN: 895	EX3DV4 SN: 3928	2450.0	HSL	Recommended Limit 1g (Normalized)		52.40 ± 10 % (47.16 ~ 57.64)
				Measured	2020-08-29	50.80
D5GHzV2 SN: 1134	EX3DV4 SN: 3928	5300.0	HSL	Recommended Limit 1g (Normalized)		82.30 ± 10 % (74.07 ~ 90.53)
				Measured	2020-08-26	80.90
D5GHzV2 SN: 1134	EX3DV4 SN: 3928	5600.0	HSL	Recommended Limit 1g (Normalized)		84.10 ± 10 % (75.69 ~ 92.51)
				Measured	2020-08-27	88.20
D5GHzV2 SN: 1134	EX3DV4 SN: 3928	5800.0	HSL	Recommended Limit 1g (Normalized)		81.50 ± 10 % (73.35 ~ 89.65)
				Measured	2020-08-28	82.30

<Table 2. System Verification Result>

10. SAR Test Results

10.1 Standalone Body Test Results

WLAN 2.4 GHz Ant.1										
Mode	EUT Position	Distance (mm)	Frequency (MHz)	Measured Conducted Power (dBm)	Max. Tune-up Power (dBm)	Power Scaling Factor	Duty Cycle Compensate Factor	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Plot No.
802.11b	Grip Sensor off									
	Rear	12	2 412.0	17.91	19.00	1.285	1.014	0.157	0.205	
	Left	5	2 412.0	17.91	19.00	1.285	1.014	0.167	**0.218**	1
	Right	0	2 412.0	17.91	19.00	1.285	1.014	0.010	0.013	
	Top	0	2 412.0	17.91	19.00	1.285	1.014	0.074	0.096	
	Protective Cover (with S-pen)									
	Left	5	2 412.0	17.91	19.00	1.285	1.014	0.152	0.198	

WLAN 2.4 GHz Ant.2										
Mode	EUT Position	Distance (mm)	Frequency (MHz)	Measured Conducted Power (dBm)	Max. Tune-up Power (dBm)	Power Scaling Factor	Duty Cycle Compensate Factor	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Plot No.
802.11b	Grip Sensor off									
	Rear	12	2 412.0	17.90	19.00	1.288	1.010	0.331	**0.431**	2
	Left	0	2 412.0	17.90	19.00	1.288	1.010	0.299	0.389	
	Right	0	2 412.0	17.90	19.00	1.288	1.010	0.120	0.156	
	Top	7	2 412.0	17.90	19.00	1.288	1.010	0.139	0.181	
	Protective Cover (with S-pen)									
	Rear	12	2 412.0	17.90	19.00	1.288	1.010	0.135	0.176	

U-NII-2A Ant.1										
Mode	EUT Position	Distance (mm)	Frequency (MHz)	Measured Conducted Power (dBm)	Max. Tune-up Power (dBm)	Power Scaling Factor	Duty Cycle Compensate Factor	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	Plot No.
802.11a	Grip Sensor off									
	Rear	12	5 260.0	14.87	15.00	1.030	1.062	0.464	**0.508**	3
	Left	5	5 260.0	14.87	15.00	1.030	1.062	0.276	0.302	
	Right	0	5 260.0	14.87	15.00	1.030	1.062	0.000	0.000	
	Protective Cover (with S-pen)									
	Rear	12	5 260.0	14.87	15.00	1.030	1.062	0.426	0.466	

U-NII-2A Ant.2										
Mode	**EUT Position**	**Distance (mm)**	**Frequency (㎒)**	**Measured Conducted Power (dBm)**	**Max. Tune-up Power (dBm)**	**Power Scaling Factor**	**Duty Cycle Compensate Factor**	**Measured 1 g SAR (W/kg)**	**Scaled 1 g SAR (W/kg)**	**Plot No.**
802.11a	Grip Sensor off									
	Rear	12	5 260.0	14.19	15.00	1.205	1.062	0.085	0.109	
	Right	0	5 260.0	14.19	15.00	1.205	1.062	0.000	0.000	
	Top	7	5 260.0	14.19	15.00	1.205	1.062	0.204	**0.261**	4
	Protective Cover (with S-pen)									
	Top	7	5 260.0	14.19	15.00	1.205	1.062	0.043	0.055	

U-NII-2C Ant.1										
Mode	**EUT Position**	**Distance (mm)**	**Frequency (㎒)**	**Measured Conducted Power (dBm)**	**Max. Tune-up Power (dBm)**	**Power Scaling Factor**	**Duty Cycle Compensate Factor**	**Measured 1 g SAR (W/kg)**	**Scaled 1 g SAR (W/kg)**	**Plot No.**
802.11a	Grip Sensor off									
	Rear	12	5 700.0	14.32	15.00	1.169	1.062	0.279	**0.346**	5
	Left	5	5 700.0	14.32	15.00	1.169	1.062	0.130	0.161	
	Right	0	5 700.0	14.32	15.00	1.169	1.062	0.001	0.001	
	Protective Cover (with S-pen)									
	Rear	12	5 700.0	14.32	15.00	1.169	1.062	0.254	0.315	

U-NII-2C Ant.2										
Mode	**EUT Position**	**Distance (mm)**	**Frequency (㎒)**	**Measured Conducted Power (dBm)**	**Max. Tune-up Power (dBm)**	**Power Scaling Factor**	**Duty Cycle Compensate Factor**	**Measured 1 g SAR (W/kg)**	**Scaled 1 g SAR (W/kg)**	**Plot No.**
802.11a	Grip Sensor off									
	Rear	12	5 500.0	14.31	15.00	1.172	1.062	0.149	0.185	
	Left	0	5 500.0	14.31	15.00	1.172	1.062	0.015	0.019	
	Right	0	5 500.0	14.31	15.00	1.172	1.062	0.000	0.000	
	Top	7	5 500.0	14.31	15.00	1.172	1.062	0.227	**0.283**	6
	Protective Cover (with S-pen)									
	Top	7	5 500.0	14.31	15.00	1.172	1.062	0.070	0.087	

U-NII-3 Ant.1										
Mode	**EUT Position**	**Distance (mm)**	**Frequency (㎒)**	**Measured Conducted Power (dBm)**	**Max. Tune-up Power (dBm)**	**Power Scaling Factor**	**Duty Cycle Compensate Factor**	**Measured 1 g SAR (W/kg)**	**Scaled 1 g SAR (W/kg)**	**Plot No.**
802.11a	Grip Sensor off									
	Rear	12	5 785.0	14.53	15.00	1.114	1.062	0.352	**0.416**	7
	Left	5	5 785.0	14.53	15.00	1.114	1.062	0.166	0.196	
	Right	0	5 785.0	14.53	15.00	1.114	1.062	0.000	0.000	
	Protective Cover (with S-pen)									
	Rear	12	5 785.0	14.53	15.00	1.114	1.062	0.142	0.168	

U-NII-3 Ant.2										
Mode	**EUT Position**	**Distance (mm)**	**Frequency (㎒)**	**Measured Conducted Power (dBm)**	**Max. Tune-up Power (dBm)**	**Power Scaling Factor**	**Duty Cycle Compensate Factor**	**Measured 1 g SAR (W/kg)**	**Scaled 1 g SAR (W/kg)**	**Plot No.**
802.11a	Grip Sensor off									
	Rear	12	5 785.0	14.67	15.00	1.079	1.062	0.120	0.138	
	Left	0	5 785.0	14.67	15.00	1.079	1.062	0.023	0.026	
	Right	0	5 785.0	14.67	15.00	1.079	1.062	0.000	0.000	
	Top	7	5 785.0	14.67	15.00	1.079	1.062	0.121	**0.139**	8
	Protective Cover (with S-pen)									
	Top	7	5 785.0	14.67	15.00	1.079	1.062	0.052	0.060	

Bluetooth										
Mode	**EUT Position**	**Distance (mm)**	**Frequency (㎒)**	**Measured Conducted Power (dBm)**	**Max. Tune-up Power (dBm)**	**Power Scaling Factor**	**Duty Cycle Compensate Factor**	**Measured 1 g SAR (W/kg)**	**Scaled 1 g SAR (W/kg)**	**Plot No.**
BDR_ DH5	Grip Sensor off									
	Rear	0	2 441.0	12.13	12.50	1.089	1.302	0.480	**0.681**	9
	Left	0	2 441.0	12.13	12.50	1.089	1.302	0.084	0.119	
	Right	0	2 441.0	12.13	12.50	1.089	1.302	0.000	0.000	
	Protective Cover (with S-pen)									
	Rear	0	2 441.0	12.13	12.50	1.089	1.302	0.256	0.363	

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2013, and FCC KDB Publication 447498 D01v06.
2. All modes of operation were investigated, and worst-case results are reported.
3. Battery is fully charged for all readings and the standard batteries are the only options.
4. Liquid tissue depth was at least 15 cm.
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 device utilizes power reduction for some wireless modes, as outlined in Section 2.3. The maximum output power allowed for each transmitter and exposure condition was evaluated for SAR compliance based on expected use conditions and simultaneous transmission scenarios.

WLAN & Bluetooth Notes:

1. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 for 2.4㎓ WIFI operations, the highest measured maximum output power channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4㎓ 802.11g/n) was not required due to the maximum allowed powers and the highest reported DSSS SAR.
2. The device was configured to transmit continuously at the required data rate, 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.
3. When the same transmission mode configurations have the same maximum output power on the same channel for the 802.11 a/g/n/ac modes, the channel in the lower order/sequence 802.11 mode (i.e. a, g, n then ac) is selected.
4. When the specified maximum output power is the same for both UNII Band1 and UNII Band 2A, begins SAR measurement in UNII band 2A; and if the highest reported SAR for UNII band 2A is ≤ 1.2W/kg, SAR is not required for UNII band1 > 1.2W/kg, both bands should be tested independently for SAR.
5. 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 for 1g evaluations or all test channels were measured.

11. 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.

11.1 Estimated SAR

When standalone SAR is not required to be measured, per FCC KDB 447498 D01v06 4.3.2 b), the following equation must be used to estimate the standalone 1g SAR for simultaneous transmission assessment involving that transmitter.

1) For Test separation distances ≤ 50 mm

$$\text{Estimated SAR} = \frac{\sqrt{f(\text{GHz})}}{7.5} \times \frac{(\text{Max Power of channel, mW})}{\text{Min. Separation Distance, mm}}$$

2) When the minimum test separation distance is > 50mm, the estimated SAR Value is 0.4 W/kg

3) For distances < 5mm, a distance of 5mm is used to determine SAR exclusion and estimated SAR value.

4) Output power is the maximum rated power (including tune-up or manufacturing tolerances) and includes source-based averaging.

< Body Configuration – Maximum Power>

Band / Ant.	Freq. [MHz]	Output Power		Separation distances [mm]					Estimated SAR Value [W/kg]				
		dBm	mW	Rear	Left	Right	Top	Bot.	Rear	Left	Right	Top	Bottom
2.4 GHz Ant.1	2 462.0	19.00	79	5	5	113	26	162	Measure	Measure	Measure	Measure	EXEMPT
U-NII-2A Ant.1	5 320.0	15.00	32	5	5	113	26	162	Measure	Measure	Measure	0.379	EXEMPT
U-NII-2C Ant.1	5 720.0	15.00	32	5	5	113	26	162	Measure	Measure	Measure	0.392	EXEMPT
U-NII-3 Ant.1	5 825.0	15.00	32	5	5	113	26	162	Measure	Measure	Measure	0.396	EXEMPT
2.4 GHz Ant.2	2 462.0	19.00	79	5	25	89	5	198	Measure	Measure	Measure	Measure	EXEMPT
U-NII-2A Ant.2	5 320.0	15.00	32	5	25	89	5	198	Measure	0.394	Measure	Measure	EXEMPT
U-NII-2C Ant.2	5 720.0	15.00	32	5	25	89	5	198	Measure	Measure	Measure	Measure	EXEMPT
U-NII-3 Ant.2	5 825.0	15.00	32	5	25	89	5	198	Measure	Measure	Measure	Measure	EXEMPT
Bluetooth	2 480.0	12.50	18	5	5	113	26	161	Measure	Measure	Measure	0.145	EXEMPT

< Body Configuration – Grip Sensor On>

Band / Ant.	Freq. [MHz]	Output Power		Separation distances [mm]					Estimated SAR Value [W/kg]				
		dBm	mW	Rear	Left	Right	Top	Bot.	Rear	Left	Right	Top	Bottom
2.4 GHz Ant.1	2 462.0	9.00	8	5	5	113	26	162	0.335	0.335	N/A	N/A	N/A
U-NII-2A Ant.1	5 320.0	3.90	2	5	5	113	26	162	0.123	0.123	N/A	N/A	N/A
U-NII-2C Ant.1	5 720.0	3.90	2	5	5	113	26	162	0.128	0.128	N/A	N/A	N/A
U-NII-3 Ant.1	5 825.0	3.90	2	5	5	113	26	162	0.129	0.129	N/A	N/A	N/A
2.4 GHz Ant.2	2 462.0	9.00	8	5	25	89	5	198	0.335	N/A	N/A	0.335	N/A
U-NII-2A Ant.2	5 320.0	3.90	2	5	25	89	5	198	0.123	N/A	N/A	0.123	N/A
U-NII-2C Ant.2	5 720.0	3.90	2	5	25	89	5	198	0.128	N/A	N/A	0.128	N/A
U-NII-3 Ant.2	5 825.0	3.90	2	5	25	89	5	198	0.129	N/A	N/A	0.129	N/A

11.2 #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.	Scenario	RF Exposure Condition
		Body
Non-RSDB		
1	WLAN 2.4G Ant.1 + WLAN 2.4G Ant.2	Yes
2	WLAN 5G Ant.1 + Bluetooth	Yes
3	WLAN 5G Ant.2 + Bluetooth	Yes
4	WLAN 5G MIMO + Bluetooth	Yes
RSDB		
5	WLAN 2.4G Ant.1 + WLAN 5G Ant.1	Yes
6	WLAN 2.4G Ant.1 + WLAN 5G Ant.2	Yes
7	WLAN 2.4G Ant.2 + WLAN5G Ant.1	Yes
8	WLAN 2.4G Ant.2 + WLAN 5G Ant.2	Yes
9	WLAN 2.4G Ant.1 + WLAN 5G MIMO	Yes
10	WLAN 2.4G Ant.2 + WLAN 5G MIMO	Yes
11	WLAN 2.4G MIMO + WLAN 5G Ant.1	Yes
12	WLAN 2.4G MIMO + WLAN 5G Ant.2	Yes
13	WLAN 2.4G MIMO + WLAN 5G MIMO	Yes

11.2.1 Simultaneous Transmission Analysis

Body: Sensor Off (Maximum Power)

Exposure Condition /Position		WLAN				Bluetooth
		2.4 GHz Ant.1	2.4 GHz Ant.2	5 GHz Ant.1	5 GHz Ant.2	Ant.1
		[①]	[②]	[③]	[④]	[⑤]
Body	Rear	0.205	0.431	0.508	0.185	0.681
	Left	0.218	0.389	0.302	0.394	0.119
	Right	0.013	0.156	0.001	0.000	0.000
	Top	0.096	0.181	0.396	0.283	0.145
Summation						
-		[①] + [②]	[③] + [⑤]	[④] + [⑤]	[③] + [④] + [⑤]	
Body	Rear	0.636	1.189	0.866	1.374	
	Left	0.607	0.421	0.513	0.815	
	Right	0.169	0.001	0.000	0.001	
	Top	0.277	0.541	0.428	0.824	

Summation (RSDB)										
-		[①]+[③]	[①]+[④]	[②]+[③]	[②]+[④]	[①]+[③]+[④]	[②]+[③]+[④]	[①]+[②]+[③]	[①]+[②]+[④]	[①]+[②]+[③]+[④]
Body	Rear	0.713	0.390	0.939	0.616	0.898	1.124	1.144	0.821	1.329
	Left	0.520	0.612	0.691	0.783	0.914	1.085	0.909	1.001	1.303
	Right	0.014	0.013	0.157	0.156	0.014	0.157	0.170	0.169	0.170
	Top	0.492	0.379	0.577	0.464	0.775	0.860	0.673	0.560	0.956

Body: Sensor On (Power Reduction)

Exposure Condition /Position		WLAN				Bluetooth
		2.4 GHz Ant.1	2.4 GHz Ant.2	5 GHz Ant.1	5 GHz Ant.2	Ant.1
		[①]	[②]	[③]	[④]	[⑤]
Body	Rear	0.335	0.335	0.129	0.129	0.681
	Left	0.335	0.389	0.129	0.394	0.119
	Right	0.013	0.156	0.001	0.000	0.000
	Top	0.096	0.335	0.396	0.129	0.145
Summation						
-		[①] + [②]	[③] + [⑤]	[④] + [⑤]	[③] + [④] + [⑤]	
Body	Rear	0.670	0.810	0.810	0.939	
	Left	0.724	0.248	0.513	0.642	
	Right	0.169	0.001	0.000	0.001	
	Top	0.431	0.541	0.274	0.670	

Summation (RSDB)										
-		[①]+[③]	[①]+[④]	[②]+[③]	[②]+[④]	[①]+[③]+[④]	[②]+[③]+[④]	[①]+[②]+[③]	[①]+[②]+[④]	[①]+[②]+[③]+[④]
Body	Rear	0.464	0.464	0.464	0.464	0.593	0.593	0.799	0.799	0.928
	Left	0.464	0.729	0.518	0.783	0.858	0.912	0.853	1.118	1.247
	Right	0.014	0.013	0.157	0.156	0.014	0.157	0.170	0.169	0.170
	Top	0.492	0.225	0.731	0.464	0.621	0.860	0.827	0.560	0.956

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.

12. SAR Measurement Variability

Per FCC KDB Publication 865664 D01v01r04, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

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

1) **Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg.**
2) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.
3) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
4) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

Band	Mode	Ant.	Frequency (㎒)	EUT Position	Separation Distance (㎜)	Measured 1 g SAR (W/kg)	Repeated 1 g SAR (W/kg)	Ratio
-	-	-	-	-	-	-	-	-

13. 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.

14. 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 - 3	-	-
Shield Room	-	8F - 4	-	-
DASY6 Robot	TX90XL speag	F/18/0004968/A/001	-	-
DASY6 Robot	TX60 Lspeag	F/19/0007289/A/001	-	-
Phantom	2mm Oval Phantom ELI5	2097	-	-
Phantom	2mm Oval Phantom ELI5	2098	-	-
Mounting Device	Mounting Device	-	-	-
DAE	DAE4	666	2020-01-24	2021-01-24
Probe	EX3DV4	3928	2020-01-30	2021-01-30
ESG Vector Signal Generator	E4438C	MY42080845	2020-03-12	2021-03-12
Dual Power Meter	EPM-442A	GB37480680	2020-05-12	2021-05-12
Power Sensor	8481H	2703A11902	2020-05-12	2021-05-12
Power Sensor	8481H	3318A18090	2020-05-12	2021-05-12
Attenuator	8491A	21552	2020-05-12	2021-05-12
Attenuator	8491A	35560	2020-05-12	2021-05-12
Attenuator	8491A	35934	2020-05-12	2021-05-12
Power Amplifier	AMP2027	10010	2020-05-12	2021-05-12
Dual Directional Coupler	778D-012	50136	2020-05-12	2021-05-12
Low Pass Filter	VLF-3000+	31831	2020-05-12	2021-05-12
Low Pass Filter	VLF-6000+	31838	2020-05-12	2021-05-12
Dipole Validation Kits	D2450V2	895	2020-07-21	2022-07-21
Dipole Validation Kits	D5GHzV2	1134	2020-05-20	2022-05-20
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	46301	2020-03-21	2021-03-21
Humidity/Temp	MHB-382SD	46307	2020-03-27	2021-03-27
Wideband Radio Communication Tester	CMW500	132120	2020-05-11	2021-05-11

15. Test System Verification Results

Date: 8/29/2020

Test Laboratory: KCTL Inc.
File Name: 2450 MHz Verification Input Power 100 mW 2020-08-29.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 = 1.822 S/m; ε_r = 38.518; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

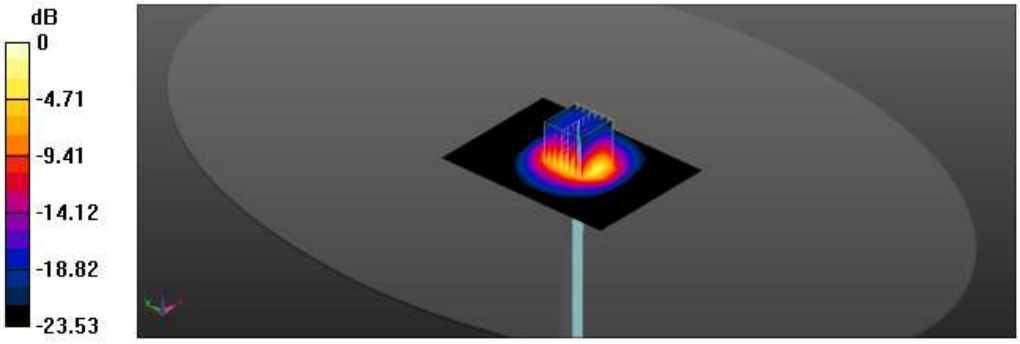
- Probe: EX3DV4 - SN3928;ConvF(7.33, 7.33, 7.33) @ 2450 MHz; Calibrated: 1/30/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 1/24/2020
- Phantom: Front_Left_ELI V8.0; Type: QD OVA 004 AA; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/2450 MHz Verification Input Power 100 mW 2020-08-29/Area Scan (9x12x1):
Measurement grid: dx=12mm, dy=12mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 7.01 W/kg

Configuration/2450 MHz Verification Input Power 100 mW 2020-08-29/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 66.19 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 11.0 W/kg
SAR(1 g) = 5.08 W/kg; SAR(10 g) = 2.31 W/kg
Smallest distance from peaks to all points 3 dB below = 9 mm
Ratio of SAR at M2 to SAR at M1 = 45.5%

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 8.77 W/kg



0 dB = 8.77 W/kg = 9.43 dBW/kg

Date: 8/26/2020

Test Laboratory: KCTL Inc.
File Name: 5300 MHz Verification Input Power 100 mW 2020-08-26.da5:0

DUT: Dipole D5GHzV2, Type: D5GHzV2, Serial: D5GHzV2 - SN:1134

Communication System: UID 0, CW (0); Frequency: 5300 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5300 MHz; σ = 4.699 S/m; ε_r = 35.285; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

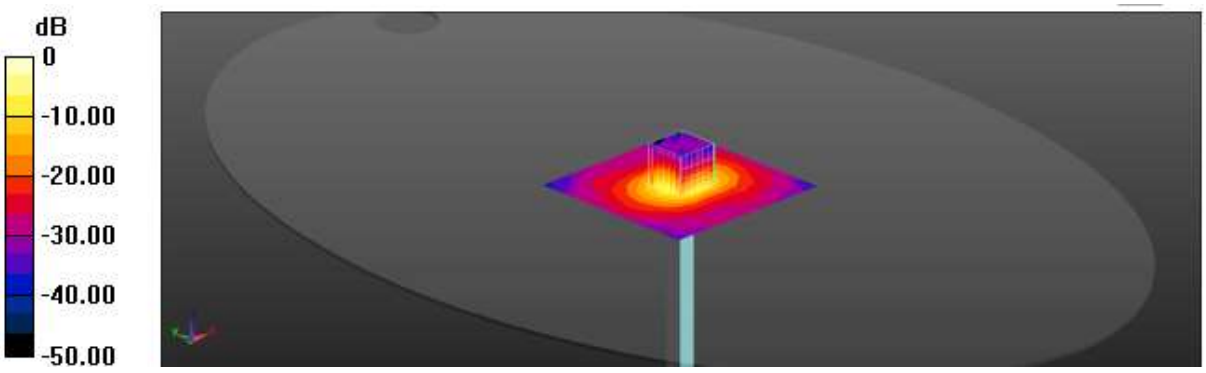
- Probe: EX3DV4 - SN3928; ConvF(4.94, 4.94, 4.94) @ 5300 MHz; ; Calibrated: 1/30/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 1/24/2020
- Phantom: ELI V8.0_Left; Type: QD OVA 004 AA; Serial: 2098
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/5300 MHz Verification Input Power 100 mW 2020-08-26/Area Scan (11x11x1):
Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 19.3 W/kg

Configuration/5300 MHz Verification Input Power 100 mW 2020-08-26/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 70.85 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 35.0 W/kg
SAR(1 g) = 8.09 W/kg; SAR(10 g) = 2.31 W/kg
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 62.4%

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 20.8 W/kg



0 dB = 20.8 W/kg = 13.18 dBW/kg

Date: 8/27/2020

Test Laboratory: KCTL Inc.
File Name: 5600 MHz Verification Input Power 100 mW 2020-08-27.da5:0

DUT: Dipole D5GHzV2, Type: D5GHzV2, Serial: D5GHzV2 - SN:1134

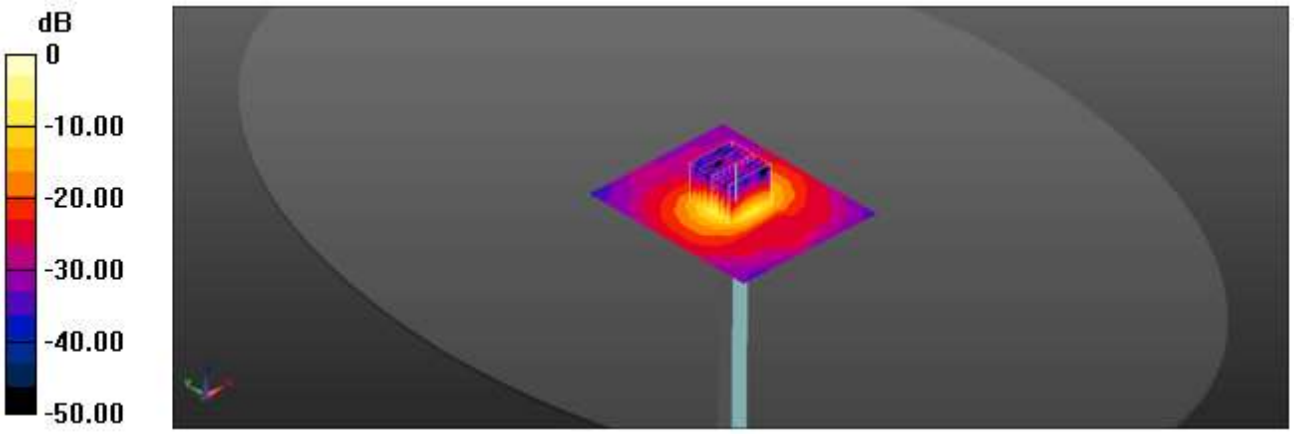
Communication System: UID 0, CW (0); Frequency: 5600 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; σ = 5.025 S/m; ε_r = 35.368; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928;ConvF(4.69, 4.69, 4.69) @ 5600 MHz; Calibrated: 1/30/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 1/24/2020
- Phantom: Front_Left_ELI V8.0; Type: QD OVA 004 AA; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/5600 MHz Verification Input Power 100 mW 2020-08-27/Area Scan (10x12x1):
Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 15.5 W/kg

Configuration/5600 MHz Verification Input Power 100 mW 2020-08-27/Zoom Scan (8x8x7)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 72.81 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 37.9 W/kg
SAR(1 g) = 8.82 W/kg; SAR(10 g) = 2.55 W/kg
Smallest distance from peaks to all points 3 dB below = 7.5 mm
Ratio of SAR at M2 to SAR at M1 = 62.5%
Maximum value of SAR (measured) = 22.6 W/kg



0 dB = 22.6 W/kg = 13.54 dBW/kg

Date: 8/28/2020

Test Laboratory: KCTL Inc.
File Name: 5800 MHz Verification Input Power 100 mW 2020-08-28.da5:0

DUT: Dipole D5GHzV2, Type: D5GHzV2, Serial: D5GHzV2 - SN:1134

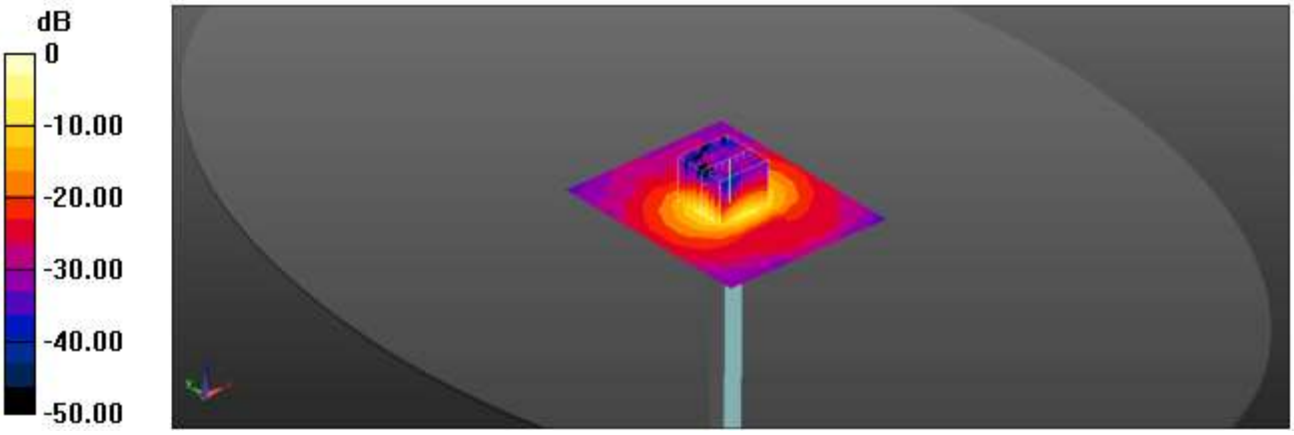
Communication System: UID 0, CW (0); Frequency: 5800 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; σ = 5.265 S/m; ε_r = 35.548; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928;ConvF(4.65, 4.65, 4.65) @ 5800 MHz; Calibrated: 1/30/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 1/24/2020
- Phantom: Front_Left_ELI V8.0; Type: QD OVA 004 AA; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/5800 MHz Verification Input Power 100 mW 2020-08-28/Area Scan (10x12x1):
Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 16.0 W/kg

Configuration/5800 MHz Verification Input Power 100 mW 2020-08-28/Zoom Scan (8x8x7)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 68.68 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 35.3 W/kg
SAR(1 g) = 8.23 W/kg; SAR(10 g) = 2.38 W/kg
Smallest distance from peaks to all points 3 dB below = 7.9 mm
Ratio of SAR at M2 to SAR at M1 = 62.7%
Maximum value of SAR (measured) = 21.2 W/kg



0 dB = 21.2 W/kg = 13.26 dBW/kg

16. Test Results

1)

Date: 8/29/2020

Test Laboratory: KCTL Inc.
File Name: 1.2.4G_802.11 _Body.da53:1

DUT: SM-T570, Type: Tablet, Serial: R32N600ZWXV

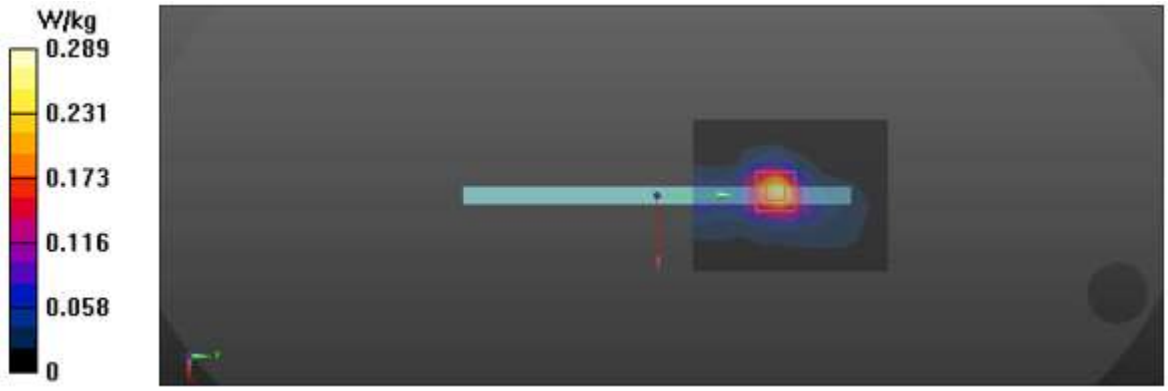
Communication System: UID 0, 2.4GWLAN (0); Frequency: 2412 MHz; Duty Cycle: 1:1
Medium parameters used: f = 2412 MHz; σ = 1.778 S/m; ε_r = 38.571; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928;ConvF(7.33, 7.33, 7.33) @ 2412 MHz; Calibrated: 1/30/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 1/24/2020
- Phantom: Front_Left_ELI V8.0; Type: QD OVA 004 AA; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration 2/802.11 b_Ant.1_CH1_Left_5 mm Grip Sensor Off/Area Scan (8x10x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.256 W/kg

Configuration 2/802.11 b_Ant.1_CH1_Left_5 mm Grip Sensor Off/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.970 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.371 W/kg
SAR(1 g) = 0.167 W/kg; SAR(10 g) = 0.075 W/kg
Smallest distance from peaks to all points 3 dB below = 10.4 mm
Ratio of SAR at M2 to SAR at M1 = 45.4%
Maximum value of SAR (measured) = 0.289 W/kg



2)

Date: 8/29/2020

Test Laboratory: KCTL Inc.
File Name: 1.2.4G_802.11_Body.da53:0

DUT: SM-T570, Type: Tablet, Serial: R32N600ZWXV

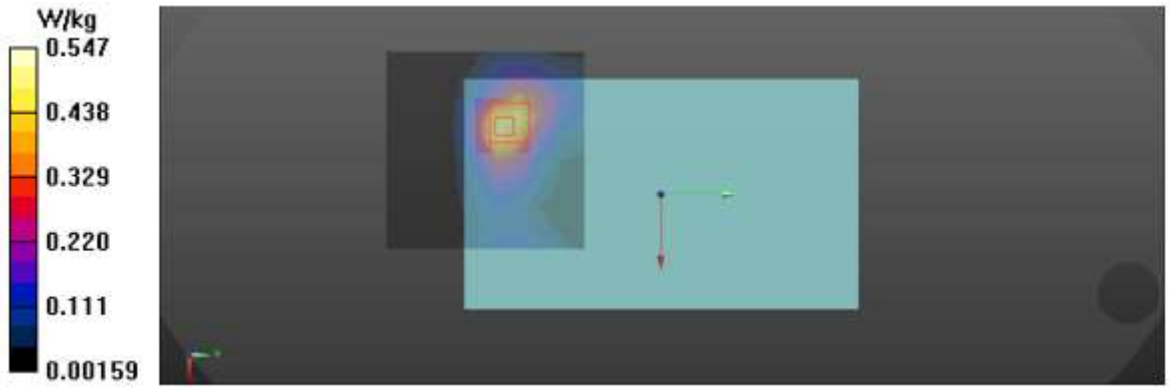
Communication System: UID 0, 2.4GWLAN (0); Frequency: 2412 MHz; Duty Cycle: 1:1
Medium parameters used: f = 2412 MHz; σ = 1.778 S/m; ε_r = 38.571; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928;ConvF(7.33, 7.33, 7.33) @ 2412 MHz; Calibrated: 1/30/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 1/24/2020
- Phantom: Front_Left_ELI V8.0; Type: QD OVA 004 AA; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/802.11 b_Ant.2_CH1_Rear_12 mm Grip Sensor Off/Area Scan (10x10x1):
Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.476 W/kg

Configuration/802.11 b_Ant.2_CH1_Rear_12 mm Grip Sensor Off/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.35 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.698 W/kg
SAR(1 g) = 0.331 W/kg; SAR(10 g) = 0.171 W/kg
Smallest distance from peaks to all points 3 dB below = 14.1 mm
Ratio of SAR at M2 to SAR at M1 = 46%
Maximum value of SAR (measured) = 0.547 W/kg



3)

Date: 8/26/2020

Test Laboratory: KCTL Inc.
File Name: 1.5.3G_802.11 _Body.da53:0

DUT: SM-T570, Type: Tablet, Serial: R32N600ZWXV

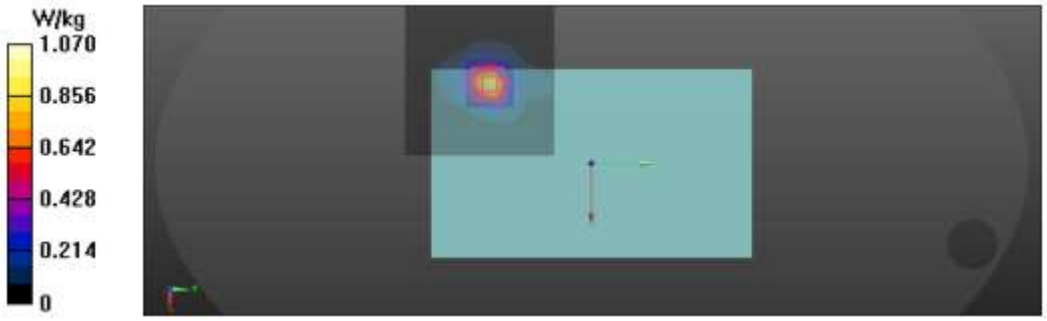
Communication System: UID 0, 5GWLAN (0); Frequency: 5260 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5260 MHz; σ = 4.667 S/m; ε_r = 35.319; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928; ConvF(4.94, 4.94, 4.94) @ 5260 MHz; ; Calibrated: 1/30/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 1/24/2020
- Phantom: ELI V8.0_Left; Type: QD OVA 004 AA; Serial: 2098
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/802.11 a_Ant.1_CH52_Rear_12 mm Grip Sensor Off/Area Scan (11x11x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.937 W/kg

Configuration/802.11 a_Ant.1_CH52_Rear_12 mm Grip Sensor Off/Zoom Scan (9x9x7)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 16.67 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.75 W/kg
SAR(1 g) = 0.464 W/kg; SAR(10 g) = 0.160 W/kg
Smallest distance from peaks to all points 3 dB below = 10 mm
Ratio of SAR at M2 to SAR at M1 = 63.9%
Maximum value of SAR (measured) = 1.07 W/kg



4)

Date: 8/26/2020

Test Laboratory: KCTL Inc.
File Name: 1.5.3G_802.11 _Body.da53:2

DUT: SM-T570, Type: Talbet, Serial: R32N600ZWXV

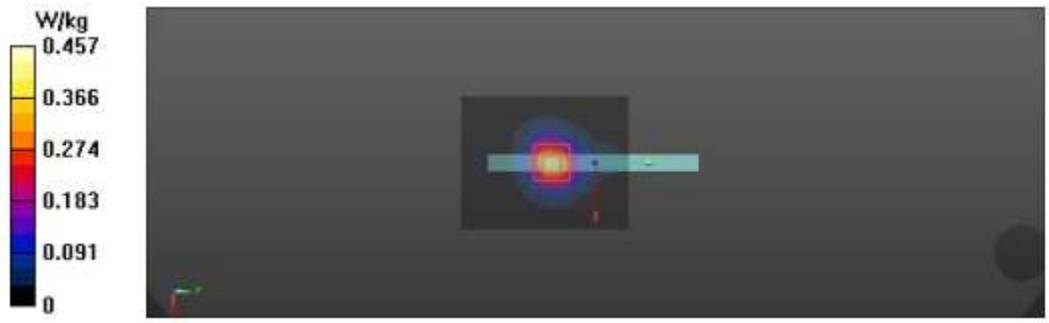
Communication System: UID 0, 5GWLAN (0); Frequency: 5260 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5260 MHz; σ = 4.667 S/m; ε_r = 35.319; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928; ConvF(4.94, 4.94, 4.94) @ 5260 MHz; ; Calibrated: 1/30/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 1/24/2020
- Phantom: ELI V8.0_Left; Type: QD OVA 004 AA; Serial: 2098
- Measurement SW: DASY52, Version 52.10 (4);

Configuration 3/802.11 a_Ant.2_CH52_Top_7 mm Grip Sensor Off/Area Scan (9x11x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.419 W/kg

Configuration 3/802.11 a_Ant.2_CH52_Top_7 mm Grip Sensor Off/Zoom Scan (8x8x7)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 7.665 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.753 W/kg
SAR(1 g) = 0.204 W/kg; SAR(10 g) = 0.072 W/kg
Smallest distance from peaks to all points 3 dB below = 10 mm
Ratio of SAR at M2 to SAR at M1 = 65.3%
Maximum value of SAR (measured) = 0.457 W/kg



5)

Date: 8/27/2020

Test Laboratory: KCTL Inc.
File Name: 1.5.6G_802.11 _Body.da53:0

DUT: SM-T570, Type: Tablet, Serial: R32N600ZWXV

Communication System: UID 0, 5GWLAN (0); Frequency: 5700 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5700 MHz; σ = 5.123 S/m; ε_r = 35.214; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

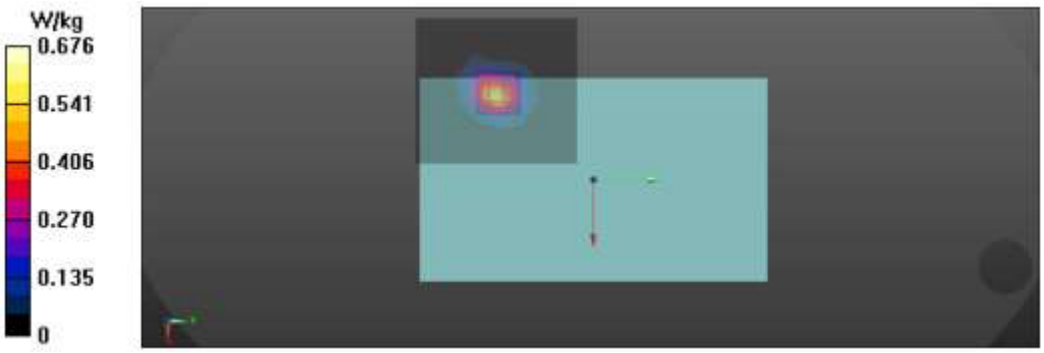
- Probe: EX3DV4 - SN3928;ConvF(4.69, 4.69, 4.69) @ 5700 MHz; Calibrated: 1/30/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 1/24/2020
- Phantom: Front_Left_ELI V8.0; Type: QD OVA 004 AA; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/802.11 a_Ant.1_CH140_Rear_12 mm Grip Sensor Off/Area Scan (10x11x1):
Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.640 W/kg

Configuration/802.11 a_Ant.1_CH140_Rear_12 mm Grip Sensor Off/Zoom Scan (8x8x7)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 12.72 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 1.17 W/kg
SAR(1 g) = 0.279 W/kg; SAR(10 g) = 0.091 W/kg
Smallest distance from peaks to all points 3 dB below = 8.8 mm
Ratio of SAR at M2 to SAR at M1 = 61.6%

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.676 W/kg



6)

Date: 8/27/2020

Test Laboratory: KCTL Inc.
File Name: 1.5.6G_802.11 _Body.da53:2

DUT: SM-T570, Type: Tablet, Serial: R32N600ZWXV

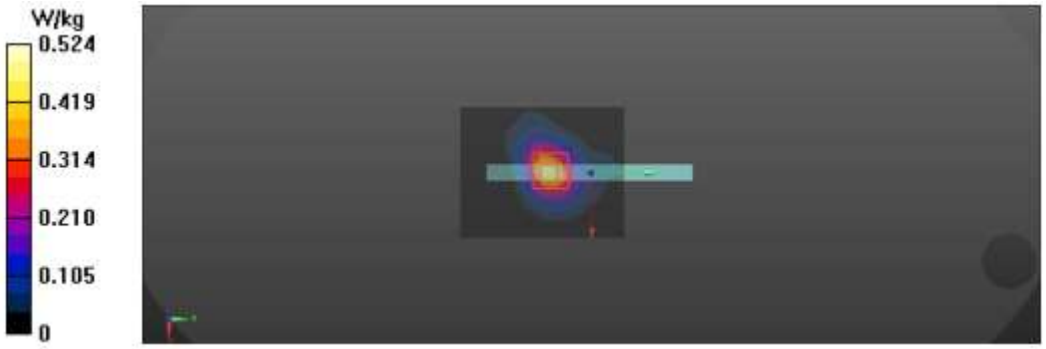
Communication System: UID 0, 5GWLAN (0); Frequency: 5500 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5500 MHz; σ = 4.921 S/m; ε_r = 35.515; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928;ConvF(4.78, 4.78, 4.78) @ 5500 MHz; Calibrated: 1/30/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 1/24/2020
- Phantom: Front_Left_ELI V8.0; Type: QD OVA 004 AA; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration 3/802.11 a_Ant.2_CH100_Top_7 mm Grip Sensor Off/Area Scan (9x11x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.476 W/kg

Configuration 3/802.11 a_Ant.2_CH100_Top_7 mm Grip Sensor Off/Zoom Scan (8x8x7)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 4.339 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.890 W/kg
SAR(1 g) = 0.227 W/kg; SAR(10 g) = 0.083 W/kg
Smallest distance from peaks to all points 3 dB below = 9.9 mm
Ratio of SAR at M2 to SAR at M1 = 62%
Maximum value of SAR (measured) = 0.524 W/kg



7)

Date: 8/28/2020

Test Laboratory: KCTL Inc.
File Name: 1.5.8G_802.11 _Body.da53:0

DUT: SM-T570, Type: Tablet, Serial: R32N600ZWXV

Communication System: UID 0, 5GWLAN (0); Frequency: 5785 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5785 MHz; σ = 5.25 S/m; ε_r = 35.612; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

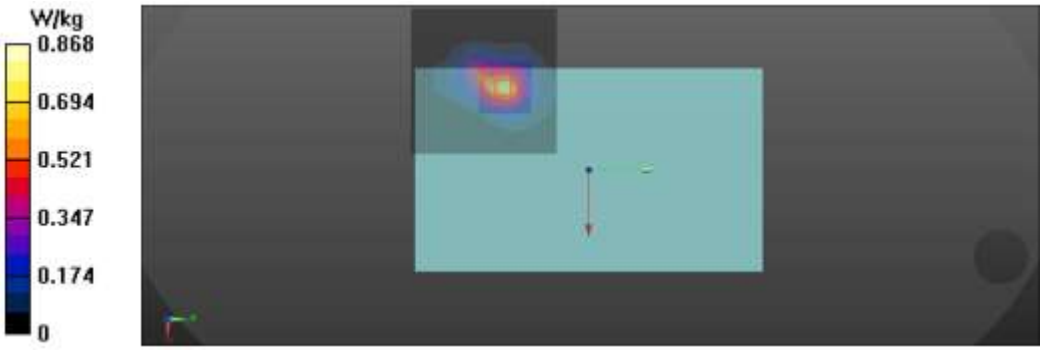
- Probe: EX3DV4 - SN3928;ConvF(4.65, 4.65, 4.65) @ 5785 MHz; Calibrated: 1/30/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 1/24/2020
- Phantom: Front_Left_ELI V8.0; Type: QD OVA 004 AA; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/802.11 a_Ant.1_CH157_Rear_12 mm Grip Sensor Off/Area Scan (10x10x1):
Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.806 W/kg

Configuration/802.11 a_Ant.1_CH157_Rear_12 mm Grip Sensor Off/Zoom Scan (9x9x7)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 8.818 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.52 W/kg
SAR(1 g) = 0.352 W/kg; SAR(10 g) = 0.118 W/kg
Smallest distance from peaks to all points 3 dB below = 8.9 mm
Ratio of SAR at M2 to SAR at M1 = 60.3%

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.868 W/kg



8)

Date: 8/28/2020

Test Laboratory: KCTL Inc.
File Name: 1.5.8G_802.11 _Body.da53:2

DUT: SM-T570, Type: Tablet, Serial: R32N600ZWXV

Communication System: UID 0, 5GWLAN (0); Frequency: 5785 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5785 MHz; σ = 5.25 S/m; ε_r = 35.612; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

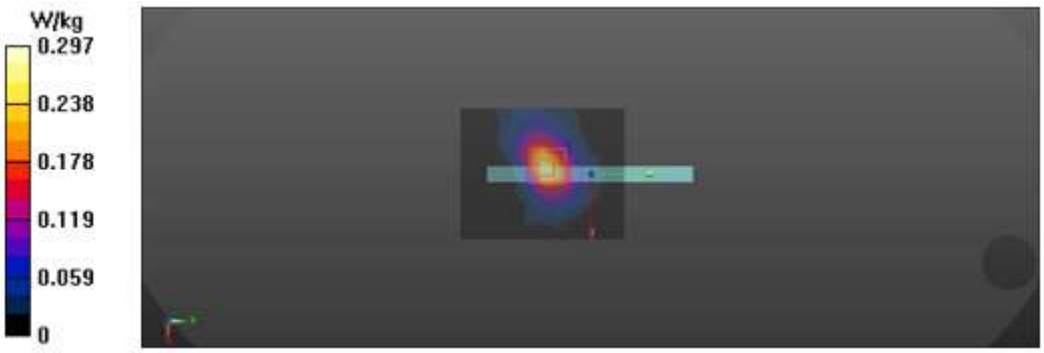
- Probe: EX3DV4 - SN3928;ConvF(4.65, 4.65, 4.65) @ 5785 MHz; Calibrated: 1/30/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 1/24/2020
- Phantom: Front_Left_ELI V8.0; Type: QD OVA 004 AA; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration 3/802.11 a_Ant.2_CH157_Top_7 mm Grip Sensor Off/Area Scan (9x11x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.265 W/kg

Configuration 3/802.11 a_Ant.2_CH157_Top_7 mm Grip Sensor Off/Zoom Scan (8x8x7)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 2.746 V/m; Power Drift = -0.19 dB
Peak SAR (extrapolated) = 0.533 W/kg
SAR(1 g) = 0.121 W/kg; SAR(10 g) = 0.043 W/kg
Smallest distance from peaks to all points 3 dB below = 8.9 mm
Ratio of SAR at M2 to SAR at M1 = 58.5%

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.297 W/kg



9)

Date: 8/29/2020

Test Laboratory: KCTL Inc.
File Name: 2.Bluetooth_GFSK_DH5_Body.da53:0

DUT: SM-T570, Type: Tablet, Serial: R32N600ZWXV

Communication System: UID 0, Bluetooth (0); Frequency: 2441 MHz; Duty Cycle: 1:1.30167
Medium parameters used (interpolated): f = 2441 MHz; σ = 1.812 S/m; ε_r = 38.523; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928;ConvF(7.33, 7.33, 7.33) @ 2441 MHz; Calibrated: 1/30/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 1/24/2020
- Phantom: Front_Left_ELI V8.0; Type: QD OVA 004 AA; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/Bluetooth_GFSK_DH5_Ant.1_CH39_Rear_0 mm Grip Sensor Off/Area Scan (11x11x1):
Measurement grid: dx=12mm, dy=12mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.696 W/kg

Configuration/Bluetooth_GFSK_DH5_Ant.1_CH39_Rear_0 mm Grip Sensor Off/Zoom Scan (8x8x8)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=1.4mm
Reference Value = 28.09 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 1.86 W/kg
SAR(1 g) = 0.480 W/kg; SAR(10 g) = 0.156 W/kg
Smallest distance from peaks to all points 3 dB below = 5.8 mm
Ratio of SAR at M2 to SAR at M1 = 70.7%

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.03 W/kg