



**FCC 47 CFR Parts 1 & 2  
Published RF Exposure KDB Procedures  
IEEE Std 1528-2013**

**SAR EVALUATION REPORT**

*For*  
**Tablet Device**

**Model: A1566  
FCC ID: BCGA1566**

**Report Number: 14U18207-S1  
Issue Date: 9/5/2014**

*Prepared for*  
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NVLAP LAB CODE 200065-0

## REVISION HISTORY


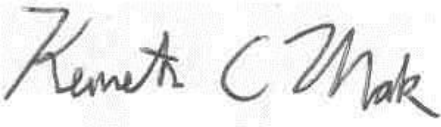
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--	9/5/2014	Initial Issue	--

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### 1. Attestation of Test Results

Applicant Name	APPLE INC.			
FCC ID	BCGA1566			
DUT Description	Tablet Device			
Exposure Category	General Population/Uncontrolled Exposure (1g SAR limit: 1.6 W/kg)			
The highest reported SAR	RF Exposure Conditions	Equipment Class		
		Licensed	DTS	UNII
	Stand-alone	N/A W/kg	1.187 W/kg	1.190 W/kg
Simultaneous Transmission	N/A W/kg	N/A W/kg	1.555 W/kg	
Applicable Standards	FCC 47 CFR § 2.1093 Published RF exposure KDB procedures IEEE Std 1528-2013			
Test Results	Pass			
Date tested	7/30/2014 – 8/25/2014			
<p>UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.</p> <p><b>Note:</b> The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government (NIST Handbook 150, Annex A). This report is written to support regulatory compliance of the applicable standards stated above.</p>				
Approved & Released By:		Prepared By:		
				
Bobby Bayani Senior Engineer UL Verification Services Inc.		Kenneth Mak Laboratory Engineer UL Verification Services Inc.		

## 2. Test Methodology

The tests documented in this report were performed in accordance with FCC 47 CFR Parts 1 & 2, IEEE STD 1528-2013, the following FCC Published RF exposure KDB procedures, and TCB workshop updates:

- 447498 D01 General RF Exposure Guidance v05r02
- 616217 D04 SAR for Laptop and Tablets v01r01
- 248227 D01 SAR Meas for 802 11abg v01r02
- 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03
- 865664 D02 SAR Reporting v01r01
- 690783 D01 SAR Listings on Grants v01r02

## 3. Facilities and Accreditation

The test sites and measurement facilities used to collect data are located at

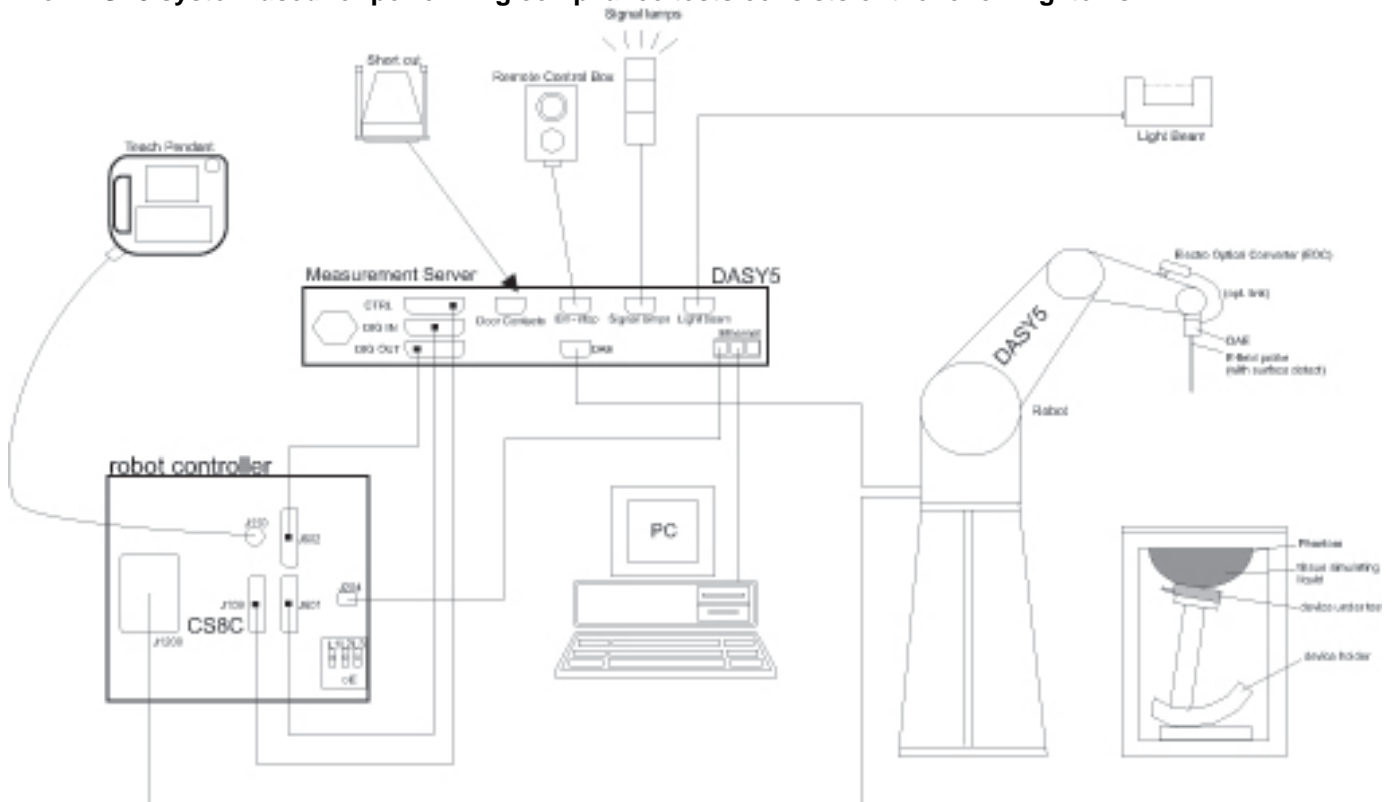
47173 Benicia Street	47266 Benicia Street
SAR Lab A	SAR Lab 1
SAR Lab B	SAR Lab 2
SAR Lab C	SAR Lab 3
SAR Lab D	SAR Lab 4
SAR Lab E	
SAR Lab F	
SAR Lab G	
SAR Lab H	

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

## 4. SAR Measurement System & Test Equipment

### 4.1. SAR Measurement System

The DASY5 system used for performing compliance tests consists of the following items:



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP or Win7 and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

## 4.2. Test Equipment

The measuring equipment used to perform the tests documented in this report has been calibrated in accordance with the manufacturers' recommendations, and is traceable to recognized national standards.

### Dielectric Property Measurements

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Network Analyzer	Agilent	E8363C	1391298J	12/3/2014
Dielectronic Probe kit	SPEAG	DAK-3.5	1082	9/10/2014
Dielectronic Probe kit	SPEAG	DAK-3.5 Short	SM DAK 200 BA	N/A
Thermometer	Control Company	4242	122529162	9/19/2014

### System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Synthesized Signal Generator	HP	8665B	3744A01084	5/20/2015
Power Meter	Agilent	N1912A	MY53040016	5/5/2015
Power Sensor	Agilent	E9323A	MY53070005	5/1/2015
Power Sensor	Agilent	E9323A	MY53070009	5/28/2015
Amplifier	MITEQ	AMF-4D-00400600-50-30P	1795093	N/A
Directional coupler	Werlatone	C8060-102	2149	N/A
DC Power Supply	AMETEK	XT 20-3	1318A00530	N/A
Synthesized Signal Generator	HP	8665B	3744A01155	3/12/2015
Power Meter	Agilent	N1912A	MY52310061	12/12/2014
Power Sensor	Agilent	N1921A	MY52270022	12/12/2014
Power Sensor	Agilent	N1921A	MY52260009	12/12/2014
Amplifier	MITEQ	AMF-4D-00400600-50-30P	1795092	N/A
Directional coupler	Werlatone	C8060-102	2141	N/A
DC Power Supply	BK PRECISION	1611	215-02292	N/A
E-Field Probe	SPEAG	EX3DV4	3885	9/18/2014
E-Field Probe	SPEAG	EX3DV4	3751	11/21/2014
E-Field Probe	SPEAG	EX3DV4	3749	1/29/2015
E-Field Probe	SPEAG	EX3DV4	3901	2/25/2015
E-Field Probe	SPEAG	EX3DV4	3686	3/18/2015
E-Field Probe	SPEAG	EX3DV4	3989	4/15/2015
E-Field Probe	SPEAG	EX3DV4	3990	4/15/2015
Data Acquisition Electronics	SPEAG	DAE4	1357	2/17/2015
Data Acquisition Electronics	SPEAG	DAE4	1360	3/17/2015
Data Acquisition Electronics	SPEAG	DAE4	1433	4/14/2015
Data Acquisition Electronics	SPEAG	DAE4	1434	4/14/2015
Data Acquisition Electronics	SPEAG	DAE4	1239	4/15/2015
Data Acquisition Electronics	SPEAG	DAE3	500	5/15/2015
Data Acquisition Electronics	SPEAG	DAE4	1258	5/15/2015
System Validation Dipole	SPEAG	D2450V2	706	5/20/2015
System Validation Dipole	SPEAG	D5GHzV2	1003	2/26/2015
System Validation Dipole	SPEAG	D5GHzV2	1168	12/12/2014

### Others

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Power Meter	R & S	NRP2	103076-TJ	9/3/2015
Power Sensor	R & S	NRP-Z11	112141-BE	4/26/2015
Power Meter	R & S	NRP2	102820-FG	4/24/2015
Power Sensor	R & S	NRP-Z11	112140-JZ	4/26/2015



## 5. Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval.

## 6. Device Under Test (DUT) Information

### 6.1. DUT Description

Model A1566 is a tablet with multimedia functions (music, application support, and video), IEEE 802.11a/b/g/n/ac, MIMO 2x2, Bluetooth radio

There are two vendors of the Wi-Fi/Bluetooth radio modules to support the production volumes of the device. The two variants are referenced in this report as:

Variant 1 = Wi-Fi/BT module vendor 1

Variant 2 = Wi-Fi/BT module vendor 2

The Wi-Fi/Bluetooth radio modules have the same mechanical outline (e.g., the same package dimension and pin-out layout), use the same on-board antenna matching circuit, have an identical antenna structure, and are built and tested to conform to the same specifications and to operate within the same tolerances.

Complete SAR evaluation is performed on the device with one Wi-Fi/Bluetooth radio module and then, the test is repeated on the device with the other Wi-Fi/Bluetooth module at the highest peak SAR value.

Device dimension	Overall (Length x Width): 240mm x 169.5mm Overall Diagonal: 286.5mm Display Diagonal: 248mm
AirPlay	AirPlay mode enabled devices transfer data directly between each other <input checked="" type="checkbox"/> AirPlay (WiFi 2.4 GHz) <input checked="" type="checkbox"/> AirPlay (WiFi 5 GHz)
RF Exposure Condition(s)	Body Exposure with all surfaces and edges

### 6.2. Wireless Technologies

Wireless technologies	Frequency bands	Operating mode	Duty Cycle used for SAR testing
Wi-Fi	2.4 GHz	802.11b 802.11g 802.11n (HT20)	100%
	5 GHz	802.11a 802.11n (HT20) 802.11n (HT40) 802.11ac (HT20) 802.11ac (HT40) 802.11ac (VHT80)	100%
Bluetooth	2.4 GHz	Version 4.0 LE	77.52% (DH5)

### 6.3. Maximum Output Power

Band (GHz)	Mode	No. of Transmitters	Ch #	Freq. (MHz)	Maximum Output Power (dBm)	
					Ant. A	Ant. B
2.4	802.11b	1 Tx	1	2412	15.5	
			6	2437	15.5	
			11	2462	15.5	
			12	2467	15.5	
			13	2472	13.0	
			1	2412		15.5
			6	2437		15.5
			11	2462		15.5
			12	2467		15.5
			13	2472		13.0
	802.11g	1 Tx	1	2412	15.0	
			2	2417	15.5	
			6	2437	15.5	
			10	2457	15.5	
			11	2462	14.0	
			12	2467	10.0	
			13	2472	1.5	
			1	2412		15.0
			2	2417		15.5
			6	2437		15.5
		10	2457		15.5	
		11	2462		14.0	
		12	2467		10.0	
		13	2472		1.5	
		2 Tx CDD	1	2412	12.0	12.0
			2	2417	15.5	15.5
			6	2437	15.5	15.5
9	2452		15.5	15.5		
10	2457		15.0	15.0		
11	2462		11.0	11.0		
12	2467		9.0	9.0		
13	2472	0.0	0.0			

Band (GHz)	Mode	No. of Transmitters	Ch #	Freq. (MHz)	Maximum Output Power (dBm)			
					Ant. A	Ant. B		
2.4	802.11n	1 Tx HT20	1	2412	15.0			
			2	2417	15.5			
			6	2437	15.5			
			10	2457	15.5			
			11	2462	14.0			
			12	2467	10.0			
			13	2472	1.5			
			1	2412		15.0		
			2	2417		15.5		
			6	2437		15.5		
			10	2457		15.5		
			11	2462		14.0		
			12	2467		10.0		
		13	2472		1.5			
				2 Tx HT20 CDD	1	2412	12.0	12.0
					2	2417	15.5	15.5
					6	2437	15.5	15.5
					9	2452	15.5	15.5
					10	2457	15.0	15.0
					11	2462	11.0	11.0
					12	2467	9.0	9.0
				13	2472	0.0	0.0	
				2 Tx HT20 STBC	1	2412	12.0	12.0
					2	2417	15.5	15.5
					6	2437	15.5	15.5
					9	2452	15.5	15.5
					10	2457	15.0	15.0
					11	2462	11.0	11.0
					12	2467	9.0	9.0
				13	2472	0.0	0.0	
				2 Tx HT20 SDM	1	2412	12.0	12.0
					2	2417	15.5	15.5
					6	2437	15.5	15.5
					9	2452	15.5	15.5
					10	2457	15.0	15.0
					11	2462	11.0	11.0
					12	2467	9.0	9.0
				13	2472	0.0	0.0	

Band (GHz)	Mode	No. of Transmitters	Ch #	Freq. (MHz)	Maximum Output Power (dBm)		
					Ant. A	Ant. B	
5.2	802.11a	1 Tx	36	5180	16.0		
			40	5200	18.0		
			44	5220	18.0		
			48	5240	18.0		
			36	5180		16.0	
			40	5200		16.5	
			44	5220		16.5	
			48	5240		16.5	
		2 Tx CDD	36	5180	15.0	15.0	
			40	5200	15.0	15.0	
			44	5220	15.0	15.0	
			48	5240	15.0	15.0	
		802.11n	1 Tx HT20	36	5180	16.0	
				40	5200	18.0	
	48			5240	18.0		
	36			5180		16.0	
	40			5200		16.5	
	48			5240		16.5	
	1 Tx HT40		38	5180	13.0		
			46	5230	18.0		
			38	5180		13.0	
			46	5230		16.5	
	2 Tx HT20 CDD		36	5180	15.0	15.0	
			40	5200	15.0	15.0	
			48	5240	15.0	15.0	
	2 Tx HT20 STBC		36	5180	15.5	15.5	
			40	5200	17.0	16.5	
			48	5240	17.0	16.5	
	2 Tx HT20 SDM		36	5180	15.5	15.5	
			40	5200	17.0	16.5	
			48	5240	17.0	16.5	
	2 Tx HT40 CDD		38	5190	12.0	12.0	
			46	5230	17.5	16.5	
	2 Tx HT40 STBC		38	5190	12.0	12.0	
			46	5230	18.0	16.5	
	2 Tx HT40 SDM		38	5190	12.0	12.0	
46			5230	18.0	16.5		

Band (GHz)	Mode	No. of Transmitters	Ch #	Freq. (MHz)	Maximum Output Power (dBm)	
					Ant. A	Ant. B
5.2	802.11ac	1 Tx HT20	36	5180	16.0	
			40	5200	18.0	
			48	5240	18.0	
			36	5180		16.0
			40	5200		16.5
			48	5240		16.5
		1 Tx HT40	38	5180	13.0	
			46	5230	18.0	
			38	5180		13.0
			46	5230		16.5
		1 Tx VHT80	42	5210	12.5	
			42	5210		12.5
		2 Tx HT20 CDD	36	5180	15.0	15.0
			40	5200	15.0	15.0
			48	5240	15.0	15.0
		2 Tx HT20 STBC	36	5180	15.5	15.5
			40	5200	17.0	16.5
			48	5240	17.0	16.5
		2 Tx HT20 SDM	36	5180	15.5	15.5
			40	5200	17.0	16.5
			48	5240	17.0	16.5
		2 Tx HT40 CDD	38	5190	12.0	12.0
			46	5230	17.5	16.5
		2 Tx HT40 STBC	38	5190	12.0	12.0
			46	5230	18.0	16.5
		2 Tx HT40 SDM	38	5190	12.0	12.0
			46	5230	18.0	16.5
		2 Tx VHT80 CDD	42	5210	11.0	11.0
		2 Tx VHT80 STBC	42	5210	11.0	11.0
		2 Tx VHT80 SDM	42	5210	11.0	11.0

Band (GHz)	Mode	No. of Transmitters	Ch #	Freq. (MHz)	Maximum Output Power (dBm)		
					Ant. A	Ant. B	
5.3	802.11a	1 Tx	52	5260	18.0		
			56	5280	18.0		
			60	5300	18.0		
			64	5320	16.0		
			52	5260		16.5	
			56	5280		16.5	
			60	5300		16.5	
			64	5320		16.0	
		2 Tx CDD	52	5260	15.0	15.0	
			56	5280	15.0	15.0	
			60	5300	15.0	15.0	
			64	5320	15.0	15.0	
		802.11n	1 Tx HT20	52	5260	18.0	
				60	5300	18.0	
	64			5320	16.0		
	52			5260		16.5	
	60			5300		16.5	
	64			5320		16.0	
	1 Tx HT40		54	5270	18.0		
			62	5310	15.0		
			54	5270		16.5	
			62	5310		15.0	
	2 Tx HT20 CDD		52	5260	15.0	15.0	
			56	5280	15.0	15.0	
			60	5300	15.0	15.0	
			64	5320	15.0	15.0	
	2 Tx HT20 STBC		52	5260	17.0	16.5	
			56	5280	17.0	16.5	
			60	5300	17.0	16.5	
			64	5320	15.0	15.0	
	2 Tx HT20 SDM		52	5260	17.0	16.5	
			56	5280	17.0	16.5	
60			5300	17.0	16.5		
64			5320	15.0	15.0		
2 Tx HT40 CDD	54		5270	17.5	16.5		
	62		5310	13.5	13.5		
2 Tx HT40 STBC	54	5270	18.0	16.5			
	62	5310	13.5	13.5			
2 Tx HT40 SDM	54	5270	18.0	16.5			
	62	5310	13.5	13.5			

Band (GHz)	Mode	No. of Transmitters	Ch #	Freq. (MHz)	Maximum Output Power (dBm)	
					Ant. A	Ant. B
5.3	802.11ac	1 Tx HT20	52	5260	18.0	
			60	5300	18.0	
			64	5320	16.0	
			52	5260		16.5
			60	5300		16.5
			64	5320		16.0
		1 Tx HT40	54	5270	18.0	
			62	5310	15.0	
			54	5270		16.5
			62	5310		15.0
		1 Tx VHT80	58	5290	13.5	
			58	5290		13.5
		2 Tx HT20 CDD	52	5260	15.0	15.0
			56	5280	15.0	15.0
			60	5300	15.0	15.0
			64	5320	15.0	15.0
		2 Tx HT20 STBC	52	5260	17.0	16.5
			56	5280	17.0	16.5
			60	5300	17.0	16.5
			64	5320	15.0	15.0
		2 Tx HT20 SDM	52	5260	17.0	16.5
			56	5280	17.0	16.5
			60	5300	17.0	16.5
			64	5320	15.0	15.0
		2 Tx HT40 CDD	54	5270	17.0	16.5
			62	5310	13.5	13.5
		2 Tx HT40 STBC	54	5270	18.0	16.5
			62	5310	13.5	13.5
		2 Tx HT40 SDM	54	5270	18.0	16.5
			62	5310	13.5	13.5
2 Tx VHT80 CDD	58	5290	12.0	12.0		
2 Tx VHT80 STBC	58	5290	12.0	12.0		
2 Tx VHT80 SDM	58	5290	12.0	12.0		



Band (GHz)	Mode	No. of Transmitters	Ch #	Freq. (MHz)	Maximum Output Power (dBm)			
					Ant. A	Ant. B		
5.5	802.11a	1 Tx	100	5500	16.0			
			104	5520	17.5			
			108	5540	17.5			
			112	5560	17.5			
			116	5580	17.5			
			120	5600	17.5			
			124	5620	17.5			
			128	5640	17.5			
			132	5660	17.5			
			136	5680	17.5			
			140	5700	15.0			
			100	5500		16.0		
			104	5520		18.0		
			108	5540		18.0		
		112	5560		18.0			
		116	5580		18.0			
		120	5600		18.0			
		124	5620		18.0			
		128	5640		18.0			
		132	5660		18.0			
		136	5680		18.0			
		140	5700		15.0			
				2 Tx CDD	100	5500	14.5	14.5
					104	5520	14.5	14.5
					108	5540	14.5	14.5
					112	5560	14.5	14.5
		116	5580		14.5	14.5		
		120	5600		14.5	14.5		
		124	5620		14.5	14.5		
		128	5640		14.5	14.5		
		132	5660		14.5	14.5		
		136	5680		14.5	14.5		
		140	5700	14.0	14.0			

Band (GHz)	Mode	No. of Transmitters	Ch #	Freq. (MHz)	Maximum Output Power (dBm)	
					Ant. A	Ant. B
5.5	802.11n	1 Tx HT20	100	5500	16.0	
			104	5520	17.5	
			120	5600	17.5	
			136	5680	17.5	
			140	5700	15.0	
			100	5500		16.0
			104	5520		18.0
			120	5600		18.0
			136	5680		18.0
			140	5700		15.0
		1 Tx HT40	102	5510	14.0	
			110	5550	17.5	
			134	5670	14.0	
			102	5510		14.0
			110	5550		18.0
			134	5670		14.0
		2 Tx HT20 CDD	100	5500	14.5	14.5
			104	5520	14.5	14.5
			120	5600	14.5	14.5
			136	5680	14.5	14.5
			140	5700	14.0	14.0
		2 Tx HT20 STBC	100	5500	15.5	15.5
			104	5520	17.0	17.0
			120	5600	17.0	17.0
			136	5680	17.0	17.0
			140	5700	14.0	14.0
		2 Tx HT20 SDM	100	5500	15.5	15.5
			104	5520	17.0	17.0
			120	5600	17.0	17.0
			136	5680	17.0	17.0
			140	5700	14.0	14.0
		2 Tx HT40 CDD	102	5510	13.0	13.0
			110	5550	17.0	17.0
			134	5670	13.0	13.0
		2 Tx HT40 STBC	102	5510	13.0	13.0
			110	5550	17.5	18.0
134	5670		13.0	13.0		
2 Tx HT40 SDM	102	5510	13.0	13.0		
	110	5550	17.5	18.0		
	134	5670	13.0	13.0		

Band (GHz)	Mode	No. of Transmitters	Ch #	Freq. (MHz)	Maximum Output Power (dBm)	
					Ant. A	Ant. B
5.5	802.11ac	1 Tx HT20	100	5500	16.0	
			104	5520	17.5	
			120	5600	17.5	
			136	5680	17.5	
			140	5700	15.0	
			100	5500		16.0
			104	5520		18.0
			120	5600		18.0
			136	5680		18.0
			140	5700		15.0
		1 Tx HT40	102	5510	14.0	
			110	5550	17.5	
			134	5670	14.0	
			102	5510		14.0
			110	5550		18.0
			134	5670		14.0
		1 Tx VHT80	106	5530	13.5	
			122	5610	17.5	
			138	5690	17.5	
			106	5530		13.5
			122	5610		18
			138	5690		18
		2 Tx HT20 CDD	100	5500	14.5	14.5
			104	5520	14.5	14.5
			120	5600	14.5	14.5
			136	5680	14.5	14.5
			140	5700	14.0	14.0
		2 Tx HT20 STBC	100	5500	15.5	15.5
			104	5520	17.0	17.0
			120	5600	17.0	17.0
			136	5680	17.0	17.0
			140	5700	14.0	14.0
		2 Tx HT20 SDM	100	5500	15.5	15.5
			104	5520	17.0	17.0
			120	5600	17.0	17.0
			136	5680	17.0	17.0
			140	5700	14.0	14.0
		2 Tx HT40 CDD	102	5510	13.0	13.0
			110	5550	17.0	17.0
			134	5670	13.0	13.0
		2 Tx HT40 STBC	102	5510	13.0	13.0
			110	5550	17.5	18.0
			134	5670	13.0	13.0
		2 Tx HT40 SDM	102	5510	13.0	13.0
			110	5550	17.5	18.0
			134	5670	13.0	13.0
		2 Tx VHT80 CDD	106	5530	13.0	13.0
			122	5610	17.0	17.0
138	5690		17.5	18.0		
2 Tx VHT80 STBC	106	5530	13.0	13.0		
	122	5610	17.0	17.0		
	138	5690	17.5	18.0		
2 Tx VHT80 SDM	106	5530	13.0	13.0		
	122	5610	17.0	17.0		
	138	5690	17.5	18.0		

Band (GHz)	Mode	No. of Transmitters	Ch #	Freq. (MHz)	Maximum Output Power (dBm)		
					Ant. A	Ant. B	
5.8	802.11a	1 Tx	149	5745	15.0		
			153	5765	17.0		
			157	5785	17.0		
			161	5805	17.0		
			165	5825	16.0		
		2 Tx CDD	149	5745	14.0	14.0	
			153	5765	17.0	18.0	
			157	5785	17.0	18.0	
			161	5805	17.0	18.0	
			165	5825	15.0	15.0	
	802.11n	1 Tx HT20	149	5745	15.0		
			153	5765	17.0		
			157	5785	17.0		
			161	5805	17.0		
			165	5825	16.0		
			1 Tx HT40	149	5745		15.0
				153	5765		18.0
				157	5785		18.0
				161	5805		18.0
				165	5825		16.0
		2 Tx HT20 CDD	151	5755	14.0		
			159	5795	16.0		
			151	5755		14.0	
			159	5795		16.0	
			2 Tx HT20 STBC	149	5745	14.0	14.0
		153		5765	17.0	18.0	
		157		5785	17.0	18.0	
		161		5805	17.0	18.0	
		165		5825	15.0	15.0	
		2 Tx HT20 SDM	149	5745	14.0	14.0	
			153	5765	17.0	18.0	
			157	5785	17.0	18.0	
			161	5805	17.0	18.0	
			165	5825	15.0	15.0	
		2 Tx HT40 CDD	151	5755	13.0	13.0	
			159	5795	15.0	15.0	
		2 Tx HT40 STBC	151	5755	13.0	13.0	
			159	5795	15.0	15.0	
		2 Tx HT40 SDM	151	5755	13.0	13.0	
			159	5795	15.0	15.0	

Band (GHz)	Mode	No. of Transmitters	Ch #	Freq. (MHz)	Maximum Output Power (dBm)	
					Ant. A	Ant. B
5.8	802.11ac	1 Tx HT20	149	5745	15.0	
			153	5765	17.0	
			157	5785	17.0	
			161	5805	17.0	
			165	5825	16.0	
			149	5745		15.0
			153	5765		18.0
			157	5785		18.0
			161	5805		18.0
			165	5825		16.0
		1 Tx HT40	151	5755	14.0	
			159	5795	16.0	
			151	5755		14.0
			159	5795		16.0
		1 Tx VHT80	155	5775	13.5	
			155	5775		13.5
		2 Tx HT20 CDD	149	5745	14.0	14.0
			153	5765	17.0	18.0
			157	5785	17.0	18.0
			161	5805	17.0	18.0
			165	5825	15.0	15.0
		2 Tx HT20 STBC	149	5745	14.0	14.0
			153	5765	17.0	18.0
			157	5785	17.0	18.0
			161	5805	17.0	18.0
			165	5825	15.0	15.0
		2 Tx HT20 SDM	149	5745	14.0	14.0
			153	5765	17.0	18.0
			157	5785	17.0	18.0
			161	5805	17.0	18.0
			165	5825	15.0	15.0
		2 Tx HT40 CDD	151	5755	13.0	13.0
			159	5795	15.0	15.0
		2 Tx HT40 STBC	151	5755	13.0	13.0
			159	5795	15.0	15.0
		2 Tx HT40 SDM	151	5755	13.0	13.0
159	5795		15.0	15.0		
2 Tx VHT80 CDD	155	5775	13.0	13.0		
2 Tx VHT80 STBC	155	5775	13.0	13.0		
2 Tx VHT80 SDM	155	5775	13.0	13.0		

## 6.4. Simultaneous Transmission Condition

RF Exposure Condition	Capable Transmit Configurations
Body	SISO (1TX) 1. 5GHz (Ant. A) + BT (Ant. B) 2. 5GHz (Ant. B) + BT (Ant. B) MIMO (2TX) 3. 5GHz (Ant. A + Ant. B) + BT (Ant. B)
<b>Notes:</b> 1. Wi-Fi 2.4 GHz Radio cannot transmit simultaneously with Bluetooth Radio.	

## **6.5. Antenna Dimensions and Separation Distances**

Refer to separate filing document.

## 7. RF Exposure Conditions (Test Configurations)

Refer to the Appendix “Antenna Locations and Separation Distances” for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.

The EUT implements the power reduction scheme for SAR compliance, for specific device configuration and orientations, as described below. The complete description of the implementation and functionality is provided in the “Operational Description of Power Reduction” exhibit.

### 7.1. Standalone SAR Test Exclusion Considerations

Since the *Dedicated Host Approach* is applied, the standalone SAR test exclusion procedure in KDB 447498 § 4.3.1 is applied in conjunction with KDB 616217 § 4.3 to determine the minimum test separation distance:

- When the separation distance from the antenna to an adjacent edge is ≤ 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.
- When the separation distance from the antenna to an adjacent edge is > 5 mm, the actual antenna-to-edge separation distance is applied to determine SAR test exclusion.

#### 7.1.1. SAR Test Exclusion Calculations for Wi-Fi SISO (1 Tx) Transmit Conditions

##### Antennas < 50mm to adjacent edges

Tx Interface	Frequency (M Hz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
		dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
<b>Antenna A</b>															
Wi-Fi 2.4 GHz	2462	15.5	35	5	3.1	916	224.2	22.5		11	11	> 50 mm	> 50 mm	2.4	
Wi-Fi 5.2 GHz	5240	18.0	63	5	3.1	916	224.2	22.5		-MEASURE-	-MEASURE-	> 50 mm	> 50 mm	6.3	
Wi-Fi 5.3 GHz	5300	18.0	63	5	3.1	916	224.2	22.5		29	29	> 50 mm	> 50 mm	6.3	
Wi-Fi 5.5 GHz	5680	17.5	56	5	3.1	916	224.2	22.5		26.7	26.7	> 50 mm	> 50 mm	5.8	
Wi-Fi 5.8 GHz	5825	17.0	50	5	3.1	916	224.2	22.5		24.1	24.1	> 50 mm	> 50 mm	5.2	
<b>Antenna B</b>															
Wi-Fi 2.4 GHz	2462	15.5	35	5	3.1	23	224.2	916		11	11	2.4	> 50 mm	> 50 mm	
Wi-Fi 5.2 GHz	5240	16.5	45	5	3.1	23	224.2	916		-MEASURE-	-MEASURE-	4.5	> 50 mm	> 50 mm	
Wi-Fi 5.3 GHz	5300	16.5	45	5	3.1	23	224.2	916		20.6	20.6	4.5	> 50 mm	> 50 mm	
Wi-Fi 5.5 GHz	5680	18.0	63	5	3.1	23	224.2	916		20.7	20.7	4.5	> 50 mm	> 50 mm	
Wi-Fi 5.8 GHz	5825	18.0	63	5	3.1	23	224.2	916		30	30	6.5	> 50 mm	> 50 mm	
Bluetooth	2480	12.0	16	5	3.1	23	224.2	916		5	5	1.1	> 50 mm	> 50 mm	

**Note(s):**

1. According to KDB 447498, if the calculated threshold value is >3 then SAR testing is required.

##### Antennas > 50mm to adjacent edges

Tx Interface	Frequency (M Hz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
		dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
<b>Antenna A</b>															
Wi-Fi 2.4 GHz	2462	15.50	35	5	3.1	916	224.2	22.5		< 50 mm	< 50 mm	5116 mW	1837.6 mW	< 50 mm	
Wi-Fi 5.2 GHz	5240	18.00	63	5	3.1	916	224.2	22.5		< 50 mm	< 50 mm	4815 mW	1807.5 mW	< 50 mm	
Wi-Fi 5.3 GHz	5300	18.00	63	5	3.1	916	224.2	22.5		< 50 mm	< 50 mm	4812 mW	1807.2 mW	< 50 mm	
Wi-Fi 5.5 GHz	5680	17.50	56	5	3.1	916	224.2	22.5		< 50 mm	< 50 mm	478.9 mW	1804.9 mW	< 50 mm	
Wi-Fi 5.8 GHz	5825	17.00	50	5	3.1	916	224.2	22.5		< 50 mm	< 50 mm	478.2 mW	1804.2 mW	< 50 mm	
<b>Antenna B</b>															
Wi-Fi 2.4 GHz	2462	15.50	35	5	3.1	23	224.2	916		< 50 mm	< 50 mm	< 50 mm	1837.6 mW	5116 mW	
Wi-Fi 5.2 GHz	5240	16.50	45	5	3.1	23	224.2	916		< 50 mm	< 50 mm	< 50 mm	1807.5 mW	4815 mW	
Wi-Fi 5.3 GHz	5300	16.50	45	5	3.1	23	224.2	916		< 50 mm	< 50 mm	< 50 mm	1807.2 mW	4812 mW	
Wi-Fi 5.5 GHz	5680	18.00	63	5	3.1	23	224.2	916		< 50 mm	< 50 mm	< 50 mm	1804.9 mW	478.9 mW	
Wi-Fi 5.8 GHz	5825	18.00	63	5	3.1	23	224.2	916		< 50 mm	< 50 mm	< 50 mm	1804.2 mW	478.2 mW	
Bluetooth	2480	12.00	16	5	3.1	23	224.2	916		< 50 mm	< 50 mm	< 50 mm	1837.3 mW	5113 mW	

**Note(s):**

1. According to KDB 447498, if the calculated Power threshold is less than the output power then SAR testing is required.



### 7.1.2. SAR Test Exclusion Calculations for Wi-Fi MIMO (2 Tx) Transmit Conditions

#### Antennas < 50mm to adjacent edges

Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)					Calculated Threshold Value						
		dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
<b>Antenna A</b>															
Wi-Fi 2.4 GHz	2457	15.5	35	5	3.1	916	224.2	22.5		11	11	>50 mm	>50 mm	2.4	
Wi-Fi 5.2 GHz	5230	18.0	63	5	3.1	916	224.2	22.5		-MEASURE- 28.8	-MEASURE- 28.8	>50 mm	>50 mm	6.3	
Wi-Fi 5.3 GHz	5300	18.0	63	5	3.1	916	224.2	22.5		29	29	>50 mm	>50 mm	6.3	
Wi-Fi 5.5 GHz	5680	17.5	56	5	3.1	916	224.2	22.5		-MEASURE- 26.7	-MEASURE- 26.7	>50 mm	>50 mm	5.8	
Wi-Fi 5.8 GHz	5825	17.0	50	5	3.1	916	224.2	22.5		-MEASURE- 24.1	-MEASURE- 24.1	>50 mm	>50 mm	5.2	
<b>Antenna B</b>															
Wi-Fi 2.4 GHz	2457	15.5	35	5	3.1	23	224.2	916		11	11	2.4	>50 mm	>50 mm	
Wi-Fi 5.2 GHz	5230	16.5	45	5	3.1	23	224.2	916		-MEASURE- 20.6	-MEASURE- 20.6	4.5	>50 mm	>50 mm	
Wi-Fi 5.3 GHz	5300	16.5	45	5	3.1	23	224.2	916		20.7	20.7	4.5	>50 mm	>50 mm	
Wi-Fi 5.5 GHz	5680	18.0	63	5	3.1	23	224.2	916		-MEASURE- 30	-MEASURE- 30	6.5	>50 mm	>50 mm	
Wi-Fi 5.8 GHz	5825	18.0	63	5	3.1	23	224.2	916		-MEASURE- 30.4	-MEASURE- 30.4	6.6	>50 mm	>50 mm	

**Note(s):**

1. According to KDB 447498, if the calculated threshold value is >3 then SAR testing is required.

#### Antennas > 50mm to adjacent edges

Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)					Calculated Threshold Value						
		dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
<b>Antenna A</b>															
Wi-Fi 2.4 GHz	2457	15.50	35	5	3.1	916	224.2	22.5		<50 mm	<50 mm	511.7 mW -EXEMPT-	1837.7 mW -EXEMPT-	<50 mm	
Wi-Fi 5.2 GHz	5230	18.00	63	5	3.1	916	224.2	22.5		<50 mm	<50 mm	481.6 mW -EXEMPT-	1807.6 mW -EXEMPT-	<50 mm	
Wi-Fi 5.3 GHz	5300	18.00	63	5	3.1	916	224.2	22.5		<50 mm	<50 mm	481.2 mW -EXEMPT-	1807.2 mW -EXEMPT-	<50 mm	
Wi-Fi 5.5 GHz	5680	17.50	56	5	3.1	916	224.2	22.5		<50 mm	<50 mm	478.9 mW -EXEMPT-	1804.9 mW -EXEMPT-	<50 mm	
Wi-Fi 5.8 GHz	5825	17.00	50	5	3.1	916	224.2	22.5		<50 mm	<50 mm	478.2 mW -EXEMPT-	1804.2 mW -EXEMPT-	<50 mm	
<b>Antenna B</b>															
Wi-Fi 2.4 GHz	2457	15.50	35	5	3.1	23	224.2	916		<50 mm	<50 mm	<50 mm	1837.7 mW -EXEMPT-	511.7 mW -EXEMPT-	
Wi-Fi 5.2 GHz	5230	16.50	45	5	3.1	23	224.2	916		<50 mm	<50 mm	<50 mm	1807.6 mW -EXEMPT-	481.6 mW -EXEMPT-	
Wi-Fi 5.3 GHz	5300	16.50	45	5	3.1	23	224.2	916		<50 mm	<50 mm	<50 mm	1807.2 mW -EXEMPT-	481.2 mW -EXEMPT-	
Wi-Fi 5.5 GHz	5680	18.00	63	5	3.1	23	224.2	916		<50 mm	<50 mm	<50 mm	1804.9 mW -EXEMPT-	478.9 mW -EXEMPT-	
Wi-Fi 5.8 GHz	5825	18.00	63	5	3.1	23	224.2	916		<50 mm	<50 mm	<50 mm	1804.2 mW -EXEMPT-	478.2 mW -EXEMPT-	

**Note(s):**

1. According to KDB 447498, if the calculated Power threshold is less than the output power then SAR testing is required.

### 7.2. Required Test Configurations

Based on Section 7.1, the test configurations required for this device were determined to be as follows:

Test Configurations	Ant. A (SISO)	Ant. B (SISO)	Ant. A (MIMO)	Ant. B (MIMO)
Rear	Yes	Yes	Yes	Yes
Edge 1 (Top)	Yes	Yes	Yes	Yes
Edge 2 (Right)	No	Yes	No	Yes
Edge 3 (Bottom)	No	No	No	No
Edge 4 (Left)	Yes	No	Yes	No

## 8. RF Output Power Measurement

### 8.1. WiFi (2.4 GHz Band)

Required Test Channels per KDB 248227 D01

Mode	Band	GHz	Channel	"Default Test Channels"	
				802.11b	802.11g
802.11b/g	2.4 GHz	2.412	1 <sup>#</sup>	√	∇
		2.437	6	√	∇
		2.462	11 <sup>#</sup>	√	∇

**Notes:**  
 √ = "default test channels"  
 ∇ = possible 802.11g channels with maximum average output ¼ dB ≥ the "default test channels"  
<sup>#</sup> = when output power is reduced for channel 1 and /or 11 to meet restricted band requirements the highest output channels closest to each of these channels should be tested.

### Measured Results

Band (GHz)	Mode	No. of Transmitters	Ch #	Freq. (MHz)	Avg Pwr (dBm)		SAR Test (Yes/No)
					Ant. A	Ant. B	
2.4	802.11b	1 Tx	1	2412	15.5		Yes
			6	2437	15.5		
			11	2462	15.4		
			12	2467	15.5		
			13	2472	13.0		
			1	2412		15.4	
			6	2437		15.5	
			11	2462		15.4	
			12	2467		15.4	
			13	2472		12.9	
	802.11g	1 Tx	1	2412	15.0		No
			2	2417	15.5		
			6	2437	15.5		
			10	2457	15.5		
			11	2462	13.9		
			12	2467	10.0		
			13	2472	1.5		
			1	2412		15.0	
			2	2417		15.3	
			6	2437		15.5	
			10	2457		15.5	
			11	2462		13.9	
			12	2467		10.0	
			13	2472		1.5	
	2 Tx CDD	1	2412	12.0	12.0	Yes	
		2	2417	15.2	15.5		
		6	2437	15.2	15.5		
		9	2452	15.2	15.5		
		10	2457	15.0	15.0		
		11	2462	11.0	11.0		
		12	2467	9.0	9.0		
13	2472	0.0	0.0				

**Note(s):**

- Per KDB 248227 D01, SAR is not required for 802.11g/HT20 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.
- Additionally, SAR is not required for Channels 12 and 13 because the tune-up limit and the measured output power for these two channels are no greater than those for the default test channels.

Band (GHz)	Mode	No. of Transmitters	Ch #	Freq. (MHz)	Avg Pwr (dBm)		SAR Test (Yes/No)		
					Ant. A	Ant. B			
2.4	802.11n	1 Tx HT20	1	2412	14.9		No		
			2	2422	15.5				
			6	2437	15.5				
			10	2457	15.4				
			11	2462	14.0				
			12	2467	10.0				
			13	2472	1.5				
			1	2412		14.9			
			2	2422		15.5			
			6	2437		15.5			
			10	2457		15.5			
			11	2462		14.0			
			12	2467		10.0			
			13	2472		1.5			
				2 Tx HT20 CDD	1	2412	11.9	11.9	No
					2	2417	15.5	15.5	
					6	2437	15.5	15.5	
					9	2452	15.5	15.5	
					10	2457	15.0	15.0	
					11	2462	11.0	11.0	
					12	2467	9.0	9.0	
				2 Tx HT20 STBC	1	2412	11.9	11.9	No
					2	2417	15.4	15.5	
					6	2437	15.4	15.5	
					9	2452	15.4	15.5	
					10	2457	15.0	15.0	
					11	2462	11.0	11.0	
					12	2467	9.0	9.0	
				2 Tx HT20 SDM	1	2412	11.9	11.9	No
					2	2417	15.4	15.5	
					6	2437	15.4	15.5	
					9	2452	15.4	15.5	
					10	2457	15.0	15.0	
					11	2462	11.0	11.0	
					12	2467	9.0	9.0	
					13	2472	0.0	0.0	

**Note(s):**

1. Per KDB 248227 D01, SAR is not required for 802.11g/HT20 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.
2. Additionally, SAR is not required for Channels 12 and 13 because the tune-up limit and the measured output power for these two channels are no greater than those for the default test channels.

**Power measurements to determine worst-case data rates**

Mode	Ch #	Freq. (MHz)	Data Rate	Avg Pwr		SAR test (Yes/No)
				Ant. A	Ant. B	
802.11b	6	2437	1 Mbps	15.5	15.5	Yes
			2 Mbps	15.5	15.5	No
			5.5 Mbps	15.5	15.5	No
			11 Mbps	15.4	15.4	No

## 8.2. WiFi (5 GHz Bands)

### WiFi 5 GHz Bands Measured Results

Band (GHz)	Mode	No. of Transmitters	Ch #	Freq. (MHz)	Avg Pwr (dBm)		SAR Test (Yes/No)	
					Ant. A	Ant. B		
5.2	802.11a	1 Tx	36	5180	16.0		Yes	
			40	5200	17.3			
			44	5220	17.3			
			48	5240	17.3			
			36	5180		16.0		
			40	5200		16.5		
			44	5220		16.5		
		48	5240		16.5			
		2 Tx CDD	36	5180	15.0	14.9	Yes	
			40	5200	15.0	14.9		
			44	5220	15.0	14.9		
			48	5240	15.0	14.9		
		802.11n	1 Tx HT20	36	5180	16.0		No
				40	5200	17.5		
	48			5240	17.5			
	36			5180		16.0		
	40			5200		16.5		
	48			5240		16.5		
	1 Tx HT40		38	5180	13.0		No	
			46	5230	17.5			
			38	5180		13.0		
			46	5230		16.4		
	2 Tx HT20 CDD		36	5180	15.0	15.0	No	
			40	5200	15.0	15.0		
			48	5240	15.0	15.0		
	2 Tx HT20 STBC		36	5180	15.5	15.5	No	
			40	5200	17.0	16.4		
			48	5240	17.0	16.4		
	2 Tx HT20 SDM		36	5180	15.5	15.5	No	
			40	5200	17.0	16.4		
48			5240	17.0	16.4			
2 Tx HT40 CDD	38		5190	12.0	12.0	No		
	46	5230	17.5	16.4				
2 Tx HT40 STBC	38	5190	12.0	12.0	Yes			
	46	5230	17.7	16.2				
2 Tx HT40 SDM	38	5190	12.0	12.0	No			
	46	5230	17.7	16.2				

**Note(s):**

Per KDB 248227, SAR is not required for 802.11n HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11a/b channels.

**Wi-Fi 5 GHz Bands Measured Results continued**

Band (GHz)	Mode	No. of Transmitters	Ch #	Freq. (MHz)	Avg Pwr (dBm)		SAR Test (Yes/No)
					Ant. A	Ant. B	
5.2	802.11ac	1 Tx HT20	36	5180	16.0		Yes
			40	5200	17.5		
			48	5240	17.5		
			36	5180		16.0	
			40	5200		16.5	
			48	5240		16.5	
		1 Tx HT40	38	5180	13.0		No
			46	5230	17.5		
			38	5180		13.0	
			46	5230		16.4	
		1 Tx VHT80	42	5210	12.5		No
			42	5210		12.5	
		2 Tx HT20 CDD	36	5180	15.0	15.0	No
			40	5200	15.0	15.0	
			48	5240	15.0	15.0	
		2 Tx HT20 STBC	36	5180	15.5	15.5	No
			40	5200	17.0	16.4	
			48	5240	17.0	16.4	
		2 Tx HT20 SDM	36	5180	15.5	15.5	No
			40	5200	17.0	16.4	
			48	5240	17.0	16.4	
		2 Tx HT40 CDD	38	5190	12.0	12.0	No
			46	5230	17.5	16.4	
		2 Tx HT40 STBC	38	5190	12.0	12.0	No
46	5230		17.7	16.4			
2 Tx HT40 SDM	38	5190	12.0	12.0	No		
	46	5230	17.7	16.4			
2 Tx VHT80 CDD	42	5210	11.0	11.0	No		
2 Tx VHT80 STBC	42	5210	11.0	11.0	No		
2 Tx VHT80 SDM	42	5210	11.0	11.0	No		

**Note(s):**

Per KDB 248227, SAR is not required for 802.11n HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11a channels.

**Wi-Fi 5 GHz Bands Measured Results continued**

Band (GHz)	Mode	No. of Transmitters	Ch #	Freq. (MHz)	Avg Pwr (dBm)		SAR Test (Yes/No)	
					Ant. A	Ant. B		
5.3	802.11a	1 Tx	52	5260	17.9		Yes	
			56	5280	17.9			
			60	5300	17.8			
			64	5320	16.0			
		52	5260		16.3			
		56	5280		16.3			
		60	5300		16.3			
		64	5320		16.0			
	52	5260	15.0	15.0	Yes			
	56	5280	15.0	15.0				
	60	5300	15.0	15.0				
	64	5320	15.0	15.0				
	802.11n	1 Tx HT20	52	5260	18.0		No	
			60	5300	18.0			
			64	5320	16.0			
			52	5260		16.5		
			60	5300		16.5		
			64	5320		16.0		
		1 Tx HT40	54	5270	18.0		No	
			62	5310	14.9			
			54	5270		16.5	No	
			62	5310		15.0		
		2 Tx HT20 CDD	52	5260	15.0	15.0	No	
			56	5280	15.0	15.0		
			60	5300	15.0	15.0		
			64	5320	15.0	15.0		
		2 Tx HT20 STBC	52	5260	17.0	16.5	No	
			56	5280	17.0	16.5		
			60	5300	17.0	16.5		
			64	5320	15.0	15.0		
		2 Tx HT20 SDM	52	5260	16.9	16.5	No	
			56	5280	17.0	16.5		
60	5300		17.0	16.4				
64	5320		15.0	14.9				
2 Tx HT40 CDD	54	5270	17.5	16.5	No			
	62	5310	13.5	13.5				
2 Tx HT40 STBC	54	5270	18.0	16.5	Yes			
	62	5310	13.5	13.5				
2 Tx HT40 SDM	54	5270	18.0	16.4	No			
	62	5310	13.4	13.4				

**Note(s):**

Per KDB 248227, SAR is not required for 802.11n HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11a channels.

**Wi-Fi 5 GHz Bands Measured Results continued**

Band (GHz)	Mode	No. of Transmitters	Ch #	Freq. (MHz)	Avg Pwr (dBm)		SAR Test (Yes/No)
					Ant. A	Ant. B	
5.3	802.11ac	1 Tx HT20	52	5260	18.0		No
			60	5300	18.0		
			64	5320	16.0		
			52	5260		16.5	
			60	5300		16.5	
			64	5320		16.0	
		1 Tx HT40	54	5270	18.0		No
			62	5310	14.9		
			54	5270		16.5	
			62	5310		15.0	
		1 Tx VHT80	58	5290	13.5		No
			58	5290		13.4	
		2 Tx HT20 CDD	52	5260	15.0	15.0	No
			56	5280	15.0	15.0	
			60	5300	15.0	15.0	
			64	5320	15.0	15.0	
		2 Tx HT20 STBC	52	5260	17	16.5	No
			56	5280	17	16.5	
			60	5300	17	16.5	
			64	5320	15.0	15.0	
		2 Tx HT20 SDM	52	5260	16.9	16.5	No
			56	5280	17.0	16.5	
			60	5300	17.0	16.4	
			64	5320	15.0	14.9	
2 Tx HT40 CDD	54	5270	16.9	16.5	No		
	62	5310	13.5	13.5			
2 Tx HT40 STBC	54	5270	18.0	16.5	Yes		
	62	5310	13.5	13.5			
2 Tx HT40 SDM	54	5270	18.0	16.4	No		
	62	5310	13.4	13.4			
2 Tx VHT80 CDD	58	5290	12.0	12.0	No		
2 Tx VHT80 STBC	58	5290	12.0	12.0	No		
2 Tx VHT80 SDM	58	5290	12.0	12.0	No		

**Note(s):**

Per KDB 248227, SAR is not required for 802.11n HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11a channels.

**Wi-Fi 5 GHz Bands Measured Results continued**

Band (GHz)	Mode	No. of Transmitters	Ch #	Freq. (MHz)	Avg Pwr (dBm)		SAR Test (Yes/No)			
					Ant. A	Ant. B				
5.5	802.11a	1 Tx	100	5500	16.0		Yes			
			104	5520	17.5					
			108	5540	17.5					
			112	5560	17.5					
			116	5580	17.5					
			120	5600	17.5					
			124	5620	17.5					
			128	5640	17.5					
			132	5660	17.5					
			136	5680	17.5					
			140	5700	15.0					
			100	5500		16.0				
			104	5520		18.0				
			108	5540		18.0				
		112	5560		18.0					
		116	5580		18.0					
		120	5600		18.0					
		124	5620		18.0					
		128	5640		18.0					
		132	5660		18.0					
		136	5680		18.0					
		140	5700		15.0					
				2 Tx CDD	100	5500		14.5	14.5	Yes
					104	5520		14.5	14.5	
		108	5540		14.5	14.5				
		112	5560		14.5	14.5				
		116	5580		14.5	14.5				
		120	5600		14.5	14.5				
		124	5620		14.5	14.5				
		128	5640		14.5	14.5				
		132	5660		14.5	14.5				
		136	5680		14.5	14.5				
		140	5700	14.0	14.0					

**Note(s):**

Per KDB 248227, SAR is not required for 802.11n HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11a channels.



**Wi-Fi 5 GHz Bands Measured Results continued**

Band (GHz)	Mode	No. of Transmitters	Ch #	Freq. (MHz)	Avg Pwr (dBm)		SAR Test (Yes/No)
					Ant. A	Ant. B	
5.5	802.11n	1 Tx HT20	100	5500	16.0		No
			104	5520	17.4		
			120	5600	17.4		
			136	5680	17.4		
			140	5700	15.0		
			100	5500		16.0	
			104	5520		18.0	
			120	5600		18.0	
			136	5680		18.0	
			140	5700		15.0	
		1 Tx HT40	102	5510	14.0		No
			110	5550	17.5		
			134	5670	14.0		
			102	5510		14.0	
			110	5550		18.0	
			134	5670		14.0	
		2 Tx HT20 CDD	100	5500	14.4	14.5	No
			104	5520	14.5	14.5	
			120	5600	14.5	14.5	
			136	5680	14.5	14.5	
			140	5700	14.0	13.9	
		2 Tx HT20 STBC	100	5500	15.5	15.5	No
			104	5520	17.0	17.0	No
			120	5600	17.0	17.0	No
			136	5680	17.0	17.0	No
			140	5700	14.0	13.9	No
		2 Tx HT20 SDM	100	5500	15.4	15.5	No
			104	5520	17.0	16.9	
			120	5600	17.0	16.9	
			136	5680	17.0	17.0	
140	5700		14.0	14.0			
2 Tx HT40 CDD	102	5510	13.0	13.0	No		
	110	5550	17.0	17.0			
	134	5670	13.0	13.0			
2 Tx HT40 STBC	102	5510	12.9	12.9	Yes		
	110	5550	17.3	18.0			
	134	5670	13.0	13.0			
2 Tx HT40 SDM	102	5510	13.0	13.0	No		
	110	5550	17.3	17.5			
	134	5670	13.0	13.0			

**Note(s):**

Per KDB 248227, SAR is not required for 802.11n HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11a channels.

**Wi-Fi 5 GHz Bands Measured Results continued**

Band (GHz)	Mode	No. of Transmitters	Ch #	Freq. (MHz)	Avg Pwr (dBm)		SAR Test (Yes/No)
					Ant. A	Ant. B	
5.5	802.11ac	1 Tx HT20	100	5500	16.0		No
			104	5520	17.4		
			120	5600	17.4		
			136	5680	17.4		
			140	5700	15.0		
			100	5500		16.0	
			104	5520		18.0	
			120	5600		18.0	
			136	5680		18.0	
			140	5700		15.0	
		1 Tx HT40	102	5510	14.0		No
			110	5550	17.5		
			134	5670	14.0		
			102	5510		14.0	
			110	5550		17.5	
		1 Tx VHT80	134	5670		14.0	No
			106	5530	13.5		
			122	5610	17.5		
			106	5530		13.5	
			122	5610		18.0	
		2 Tx HT20 CDD	138	5690	17.5		No
			100	5500	14.4	14.5	
			104	5520	14.5	14.5	
			120	5600	14.5	14.5	
			136	5680	14.5	14.5	
		2 Tx HT20 STBC	140	5700	14.0	14.0	No
			100	5500	15.5	15.5	
			104	5520	17.0	17.0	
			120	5600	17.0	17.0	
			136	5680	17.0	17.0	
		2 Tx HT20 SDM	140	5700	14.0	14.0	No
			100	5500	15.4	15.5	
			104	5520	17.0	16.9	
			120	5600	17.0	16.9	
			136	5680	17.0	17.0	
		2 Tx HT40 CDD	140	5700	14.0	14.0	No
102	5510		13.0	13.0			
110	5550		17.0	17.0			
2 Tx HT40 STBC	134	5670	13.0	13.0	No		
	102	5510	12.9	12.9			
	110	5550	17.5	18.0			
2 Tx HT40 SDM	134	5670	13.0	13.0	No		
	102	5510	13.0	13.0			
	110	5550	17.5	17.5			
2 Tx VHT80 CDD	134	5670	13.0	13.0	No		
	106	5530	13.0	13.0			
	122	5610	17.0	17.0			
2 Tx VHT80 STBC	138	5690	17.5	18.0	No		
	106	5530	13.0	13.0			
	122	5610	17.0	17.0			
2 Tx VHT80 SDM	138	5690	17.5	18.0	No		
	106	5530	12.9	12.9			
	122	5610	16.9	17.0			
			138	5690	17.4	18.0	

**Note(s):**

Per KDB 248227, SAR is not required for 802.11n HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11a channels.

**Wi-Fi 5 GHz Bands Measured Results continued**

Band (GHz)	Mode	No. of Transmitters	Ch #	Freq. (MHz)	Avg Pwr (dBm)		SAR Test (Yes/No)			
					Ant. A	Ant. B				
5.8	802.11a	1 Tx	149	5745	15.0		Yes			
			153	5765	16.8					
			157	5785	16.9					
			161	5805	16.8					
			165	5825	16.0					
			149	5745		15.0				
			153	5765		18.0				
			157	5785		18.0				
			161	5805		18.0				
			165	5825		16.0				
	802.11a	2 Tx CDD	149	5745	14.0	14.0	Yes			
			153	5765	16.8	18.0				
			157	5785	16.8	18.0				
			161	5805	16.8	18.0				
			165	5825	15.0	15.0				
			802.11n	1 Tx HT20	149	5745		15.0		No
					153	5765		17.0		
					157	5785		17.0		
					161	5805		17.0		
					165	5825		16.0		
	149	5745				15.0				
	153	5765				18.0				
	157	5785				18.0				
	161	5805				18.0				
	165	5825				15.9				
	1 Tx HT40	151		5755	14.0		No			
		159		5795	16.0					
		151		5755		14.0				
		159		5795		16.0				
	2 Tx HT20 CDD	149		5745	14.0	14.0	No			
		153		5765	17.0	18.0				
		157		5785	17.0	18.0				
		161		5805	17.0	18.0				
		165	5825	15.0	15.0					
	2 Tx HT20 STBC	149	5745	14.0	14.0	No				
		153	5765	17.0	17.9					
157		5785	17.0	17.9						
161		5805	17.0	17.9						
165		5825	14.9	14.9						
2 Tx HT20 SDM	149	5745	14.0	14.0	No					
	153	5765	17.0	17.9						
	157	5785	17.0	17.9						
	161	5805	17.0	17.9						
	165	5825	14.9	14.9						
2 Tx HT40 CDD	151	5755	13.0	13.0	No					
	159	5795	15.0	14.9						
2 Tx HT40 STBC	151	5755	13.0	13.0	No					
	159	5795	15.0	14.9						
2 Tx HT40 SDM	151	5755	13.0	13.0	No					
	159	5795	15.0	14.9						

**Note(s):**

Per KDB 248227, SAR is not required for 802.11n HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11a channels.

**Wi-Fi 5 GHz Bands Measured Results continued**

Band (GHz)	Mode	No. of Transmitters	Ch #	Freq. (MHz)	Avg Pwr (dBm)		SAR Test (Yes/No)
					Ant. A	Ant. B	
5.8	802.11ac	1 Tx HT20	149	5745	15.0		No
			153	5765	17.0		
			157	5785	17.0		
			161	5805	17.0		
			165	5825	16.0		
			149	5745		15.0	
			153	5765		18.0	
			157	5785		18.0	
			161	5805		18.0	
			165	5825		15.9	
		1 Tx HT40	151	5755	14.0		No
			159	5795	16.0		
			151	5755		14.0	
			159	5795		16.0	
		1 Tx HT80	155	5775	13.5		No
			155	5775		13.5	
		2 Tx HT20 CDD	149	5745	14.0	14.0	Yes
			153	5765	17.0	18.0	
			157	5785	17.0	18.0	
			161	5805	17.0	18.0	
			165	5825	15.0	15.0	
		2 Tx HT20 STBC	149	5745	14.0	14.0	No
			153	5765	17.0	17.9	
			157	5785	17.0	17.9	
			161	5805	17.0	17.9	
			165	5825	14.9	14.9	
		2 Tx HT20 SDM	149	5745	14.0	14.0	No
			153	5765	17.0	17.9	
			157	5785	17.0	17.9	
			161	5805	17.0	17.9	
165	5825		14.9	14.9			
2 Tx HT40 CDD	151	5755	13.0	13.0	No		
	159	5795	15.0	14.9			
2 Tx HT40 STBC	151	5755	13.0	13.0	No		
	159	5795	15.0	14.9			
2 Tx HT40 SDM	151	5755	13.0	13.0	No		
	159	5795	15.0	14.9			
2 Tx VHT80 CDD	155	5775	13.0	13.0	No		
2 Tx VHT80 STBC	155	5775	13.0	13.0	No		
2 Tx VHT80 SDM	155	5775	13.0	13.0	No		

**Note(s):**

Per KDB 248227, SAR is not required for 802.11n HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11a channels.

**Power measurements to determine worst-case data rates**

Band	Mode	Ch #	Freq. (MHz)	Data Rate	Avg Pwr (dBm)		SAR test (Yes/No)
					Ant. A	Ant. B	
5.2 GHz	802.11a	40	5200	6 Mbps	17.3	16.5	Yes
				9 Mbps	17.3	16.5	No
				12 Mbps	17.3	16.5	No
				18 Mbps	17.3	16.5	No
				24 Mbps	17.3	16.5	No
				36 Mbps	17.3	16.5	No
				48 Mbps	17.2	16.4	No
				54 Mbps	17.3	16.5	No
5.3 GHz	802.11a	52	5260	6 Mbps	17.9	16.3	Yes
				9 Mbps	17.9	16.3	No
				12 Mbps	17.9	16.3	No
				18 Mbps	17.9	16.3	No
				24 Mbps	17.9	16.3	No
				36 Mbps	17.9	16.3	No
				48 Mbps	17.9	16.3	No
				54 Mbps	17.8	16.2	No
5.5 GHz	802.11a	104	5520	6 Mbps	17.5	18.0	Yes
				9 Mbps	17.5	18.0	No
				12 Mbps	17.5	18.0	No
				18 Mbps	17.5	18.0	No
				24 Mbps	17.5	18.0	No
				36 Mbps	17.5	18.0	No
				48 Mbps	17.5	18.0	No
				54 Mbps	17.4	17.9	No
5.8 GHz	802.11a	157	5785	6 Mbps	16.9	18.0	Yes
				9 Mbps	16.9	18.0	No
				12 Mbps	16.9	18.0	No
				18 Mbps	16.9	18.0	No
				24 Mbps	16.9	18.0	No
				36 Mbps	16.9	18.0	No
				48 Mbps	16.9	18.0	No
				54 Mbps	16.8	18.0	No

### 8.3. Bluetooth

Band (GHz)	Mode	Ch #	Freq. (MHz)	Avg Power (dBm)
2.4	V3.0 + EDR, GFSK	0	2402	11.6
		39	2441	11.6
		78	2480	11.6
	V3.0 + EDR, 8-DPSK	0	2402	9.0
		39	2441	9.5
		78	2480	9.8
	V4.0 LE, GFSK	0	2402	8.0
		19	2440	8.0
		39	2480	8.0

## 9. Dielectric Property Measurements

The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within  $\pm 2^\circ\text{C}$  of the temperature when the tissue parameters are characterized.

The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 3 – 4 days of use; or earlier if the dielectric parameters can become out of tolerance; for example, when the parameters are marginal at the beginning of the measurement series.

Tissue dielectric parameters were measured at the low, middle and high frequency of each operating frequency range of the test device.

### 9.1. Tissue Dielectric Parameters

#### FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

Target Frequency (MHz)	Head		Body	
	$\epsilon_r$	$\sigma$ (S/m)	$\epsilon_r$	$\sigma$ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5000	36.2	4.45	49.3	5.07
5100	36.1	4.55	49.1	5.18
5200	36.0	4.66	49.0	5.30
5300	35.9	4.76	48.9	5.42
5400	35.8	4.86	48.7	5.53
5500	35.6	4.96	48.6	5.65
5600	35.5	5.07	48.5	5.77
5700	35.4	5.17	48.3	5.88
5800	35.3	5.27	48.2	6.00

#### IEEE Std 1528-2013

Refer to Table 3

## 9.2. Dielectric Property Measurements Results

### SAR Lab B

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit $\pm$ (%)	
8/4/2014	Body 2450	e'	50.8300	Relative Permittivity ( $\epsilon_r$ ):	50.83	52.70	-3.55	5
		e"	14.9800	Conductivity ( $\sigma$ ):	2.04	1.95	4.65	5
	Body 2410	e'	50.9000	Relative Permittivity ( $\epsilon_r$ ):	50.90	52.76	-3.52	5
		e"	14.9200	Conductivity ( $\sigma$ ):	2.00	1.91	4.82	5
	Body 2475	e'	50.7600	Relative Permittivity ( $\epsilon_r$ ):	50.76	52.67	-3.62	5
		e"	15.0100	Conductivity ( $\sigma$ ):	2.07	1.99	4.06	5
8/7/2014	Body 2450	e'	51.7100	Relative Permittivity ( $\epsilon_r$ ):	51.71	52.70	-1.88	5
		e"	13.7400	Conductivity ( $\sigma$ ):	1.87	1.95	-4.01	5
	Body 2410	e'	51.8400	Relative Permittivity ( $\epsilon_r$ ):	51.84	52.76	-1.74	5
		e"	13.5600	Conductivity ( $\sigma$ ):	1.82	1.91	-4.74	5
	Body 2475	e'	51.6400	Relative Permittivity ( $\epsilon_r$ ):	51.64	52.67	-1.95	5
		e"	13.7700	Conductivity ( $\sigma$ ):	1.89	1.99	-4.54	5
8/11/2014	Body 2450	e'	51.7500	Relative Permittivity ( $\epsilon_r$ ):	51.75	52.70	-1.80	5
		e"	13.6600	Conductivity ( $\sigma$ ):	1.86	1.95	-4.57	5
	Body 2410	e'	51.8100	Relative Permittivity ( $\epsilon_r$ ):	51.81	52.76	-1.80	5
		e"	13.6500	Conductivity ( $\sigma$ ):	1.83	1.91	-4.11	5
	Body 2475	e'	51.6500	Relative Permittivity ( $\epsilon_r$ ):	51.65	52.67	-1.93	5
		e"	13.7100	Conductivity ( $\sigma$ ):	1.89	1.99	-4.96	5
8/14/2014	Body 2450	e'	51.3400	Relative Permittivity ( $\epsilon_r$ ):	51.34	52.70	-2.58	5
		e"	14.4700	Conductivity ( $\sigma$ ):	1.97	1.95	1.09	5
	Body 2410	e'	51.4300	Relative Permittivity ( $\epsilon_r$ ):	51.43	52.76	-2.52	5
		e"	14.3800	Conductivity ( $\sigma$ ):	1.93	1.91	1.02	5
	Body 2475	e'	51.2600	Relative Permittivity ( $\epsilon_r$ ):	51.26	52.67	-2.67	5
		e"	14.5100	Conductivity ( $\sigma$ ):	2.00	1.99	0.59	5
8/18/2014	Body 2450	e'	51.4500	Relative Permittivity ( $\epsilon_r$ ):	51.45	52.70	-2.37	5
		e"	13.7800	Conductivity ( $\sigma$ ):	1.88	1.95	-3.73	5
	Body 2410	e'	51.5300	Relative Permittivity ( $\epsilon_r$ ):	51.53	52.76	-2.33	5
		e"	13.9500	Conductivity ( $\sigma$ ):	1.87	1.91	-2.00	5
	Body 2475	e'	51.2700	Relative Permittivity ( $\epsilon_r$ ):	51.27	52.67	-2.66	5
		e"	13.7800	Conductivity ( $\sigma$ ):	1.90	1.99	-4.47	5
8/21/2014	Body 2450	e'	52.8600	Relative Permittivity ( $\epsilon_r$ ):	52.86	52.70	0.30	5
		e"	14.7100	Conductivity ( $\sigma$ ):	2.00	1.95	2.76	5
	Body 2410	e'	53.0000	Relative Permittivity ( $\epsilon_r$ ):	53.00	52.76	0.46	5
		e"	14.5900	Conductivity ( $\sigma$ ):	1.96	1.91	2.50	5
	Body 2475	e'	52.7900	Relative Permittivity ( $\epsilon_r$ ):	52.79	52.67	0.23	5
		e"	14.7400	Conductivity ( $\sigma$ ):	2.03	1.99	2.18	5



**SAR Lab C**

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
8/4/2014	Body 5180	e'	48.8700	Relative Permittivity ( $\epsilon_r$ ):	48.87	49.05	-0.36	5
		e"	18.1400	Conductivity ( $\sigma$ ):	5.22	5.27	-0.88	5
	Body 5200	e'	48.8400	Relative Permittivity ( $\epsilon_r$ ):	48.84	49.02	-0.37	5
		e"	18.2300	Conductivity ( $\sigma$ ):	5.27	5.29	-0.45	5
	Body 5600	e'	48.2300	Relative Permittivity ( $\epsilon_r$ ):	48.23	48.48	-0.51	5
		e"	18.6300	Conductivity ( $\sigma$ ):	5.80	5.76	0.69	5
	Body 5800	e'	47.9800	Relative Permittivity ( $\epsilon_r$ ):	47.98	48.20	-0.46	5
		e"	18.6800	Conductivity ( $\sigma$ ):	6.02	6.00	0.40	5
	Body 5825	e'	47.9000	Relative Permittivity ( $\epsilon_r$ ):	47.90	48.20	-0.62	5
		e"	18.8200	Conductivity ( $\sigma$ ):	6.10	6.00	1.59	5
8/7/2014	Body 5180	e'	48.5100	Relative Permittivity ( $\epsilon_r$ ):	48.51	49.05	-1.09	5
		e"	17.8700	Conductivity ( $\sigma$ ):	5.15	5.27	-2.36	5
	Body 5200	e'	48.4400	Relative Permittivity ( $\epsilon_r$ ):	48.44	49.02	-1.18	5
		e"	17.8800	Conductivity ( $\sigma$ ):	5.17	5.29	-2.36	5
	Body 5600	e'	47.8400	Relative Permittivity ( $\epsilon_r$ ):	47.84	48.48	-1.32	5
		e"	18.2900	Conductivity ( $\sigma$ ):	5.70	5.76	-1.14	5
	Body 5800	e'	47.5400	Relative Permittivity ( $\epsilon_r$ ):	47.54	48.20	-1.37	5
		e"	18.4400	Conductivity ( $\sigma$ ):	5.95	6.00	-0.89	5
	Body 5825	e'	47.5400	Relative Permittivity ( $\epsilon_r$ ):	47.54	48.20	-1.37	5
		e"	18.5400	Conductivity ( $\sigma$ ):	6.00	6.00	0.08	5
8/11/2014	Body 5180	e'	48.2400	Relative Permittivity ( $\epsilon_r$ ):	48.24	49.05	-1.64	5
		e"	18.5400	Conductivity ( $\sigma$ ):	5.34	5.27	1.30	5
	Body 5200	e'	48.2200	Relative Permittivity ( $\epsilon_r$ ):	48.22	49.02	-1.63	5
		e"	18.5900	Conductivity ( $\sigma$ ):	5.38	5.29	1.52	5
	Body 5600	e'	47.5600	Relative Permittivity ( $\epsilon_r$ ):	47.56	48.48	-1.89	5
		e"	19.0200	Conductivity ( $\sigma$ ):	5.92	5.76	2.80	5
	Body 5800	e'	47.2200	Relative Permittivity ( $\epsilon_r$ ):	47.22	48.20	-2.03	5
		e"	19.1100	Conductivity ( $\sigma$ ):	6.16	6.00	2.72	5
	Body 5825	e'	47.2000	Relative Permittivity ( $\epsilon_r$ ):	47.20	48.20	-2.07	5
		e"	19.2100	Conductivity ( $\sigma$ ):	6.22	6.00	3.70	5
8/14/2014	Body 5180	e'	49.3500	Relative Permittivity ( $\epsilon_r$ ):	49.35	49.05	0.62	5
		e"	17.8400	Conductivity ( $\sigma$ ):	5.14	5.27	-2.52	5
	Body 5200	e'	49.3500	Relative Permittivity ( $\epsilon_r$ ):	49.35	49.02	0.67	5
		e"	17.8900	Conductivity ( $\sigma$ ):	5.17	5.29	-2.31	5
	Body 5600	e'	48.8400	Relative Permittivity ( $\epsilon_r$ ):	48.84	48.48	0.75	5
		e"	18.1600	Conductivity ( $\sigma$ ):	5.65	5.76	-1.85	5
	Body 5800	e'	48.4900	Relative Permittivity ( $\epsilon_r$ ):	48.49	48.20	0.60	5
		e"	18.3200	Conductivity ( $\sigma$ ):	5.91	6.00	-1.53	5
	Body 5825	e'	48.5100	Relative Permittivity ( $\epsilon_r$ ):	48.51	48.20	0.64	5
		e"	18.4600	Conductivity ( $\sigma$ ):	5.98	6.00	-0.35	5
8/18/2014	Body 5180	e'	48.1900	Relative Permittivity ( $\epsilon_r$ ):	48.19	49.05	-1.75	5
		e"	18.3800	Conductivity ( $\sigma$ ):	5.29	5.27	0.43	5
	Body 5200	e'	48.0400	Relative Permittivity ( $\epsilon_r$ ):	48.04	49.02	-2.00	5
		e"	18.4000	Conductivity ( $\sigma$ ):	5.32	5.29	0.48	5
	Body 5600	e'	47.2500	Relative Permittivity ( $\epsilon_r$ ):	47.25	48.48	-2.53	5
		e"	19.1200	Conductivity ( $\sigma$ ):	5.95	5.76	3.34	5
	Body 5800	e'	47.0200	Relative Permittivity ( $\epsilon_r$ ):	47.02	48.20	-2.45	5
		e"	18.9900	Conductivity ( $\sigma$ ):	6.12	6.00	2.07	5
	Body 5825	e'	46.8600	Relative Permittivity ( $\epsilon_r$ ):	46.86	48.20	-2.78	5
		e"	19.2900	Conductivity ( $\sigma$ ):	6.25	6.00	4.13	5
8/21/2014	Body 5180	e'	49.0700	Relative Permittivity ( $\epsilon_r$ ):	49.07	49.05	0.05	5
		e"	18.4000	Conductivity ( $\sigma$ ):	5.30	5.27	0.54	5
	Body 5200	e'	49.0400	Relative Permittivity ( $\epsilon_r$ ):	49.04	49.02	0.04	5
		e"	18.4100	Conductivity ( $\sigma$ ):	5.32	5.29	0.53	5
	Body 5600	e'	48.4000	Relative Permittivity ( $\epsilon_r$ ):	48.40	48.48	-0.16	5
		e"	18.9200	Conductivity ( $\sigma$ ):	5.89	5.76	2.26	5
	Body 5800	e'	48.0700	Relative Permittivity ( $\epsilon_r$ ):	48.07	48.20	-0.27	5
		e"	19.0000	Conductivity ( $\sigma$ ):	6.13	6.00	2.12	5
	Body 5825	e'	48.0400	Relative Permittivity ( $\epsilon_r$ ):	48.04	48.20	-0.33	5
		e"	19.1300	Conductivity ( $\sigma$ ):	6.20	6.00	3.27	5

**SAR Lab D**

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)		
8/4/2014	Body 5180	e'	49.3300	Relative Permittivity ( $\epsilon_r$ ):	49.33	49.05	0.58	5	
		e"	18.7000	Conductivity ( $\sigma$ ):	5.39	5.27	2.18	5	
	Body 5200	e'	49.3300	Relative Permittivity ( $\epsilon_r$ ):	49.33	49.02	0.63	5	
		e"	18.7400	Conductivity ( $\sigma$ ):	5.42	5.29	2.34	5	
	Body 5600	e'	48.6400	Relative Permittivity ( $\epsilon_r$ ):	48.64	48.48	0.33	5	
		e"	19.1100	Conductivity ( $\sigma$ ):	5.95	5.76	3.29	5	
	Body 5800	e'	48.3400	Relative Permittivity ( $\epsilon_r$ ):	48.34	48.20	0.29	5	
		e"	19.3200	Conductivity ( $\sigma$ ):	6.23	6.00	3.84	5	
	Body 5825	e'	48.3400	Relative Permittivity ( $\epsilon_r$ ):	48.34	48.20	0.29	5	
		e"	19.3600	Conductivity ( $\sigma$ ):	6.27	6.00	4.51	5	
	8/6/2014	Body 5180	e'	46.8400	Relative Permittivity ( $\epsilon_r$ ):	46.84	49.05	-4.50	5
			e"	17.8200	Conductivity ( $\sigma$ ):	5.13	5.27	-2.63	5
Body 5200		e'	46.8000	Relative Permittivity ( $\epsilon_r$ ):	46.80	49.02	-4.53	5	
		e"	17.8800	Conductivity ( $\sigma$ ):	5.17	5.29	-2.36	5	
Body 5600		e'	46.2200	Relative Permittivity ( $\epsilon_r$ ):	46.22	48.48	-4.66	5	
		e"	18.2700	Conductivity ( $\sigma$ ):	5.69	5.76	-1.25	5	
Body 5800		e'	45.9000	Relative Permittivity ( $\epsilon_r$ ):	45.90	48.20	-4.77	5	
		e"	18.4300	Conductivity ( $\sigma$ ):	5.94	6.00	-0.94	5	
Body 5825		e'	45.8800	Relative Permittivity ( $\epsilon_r$ ):	45.88	48.20	-4.81	5	
		e"	18.5500	Conductivity ( $\sigma$ ):	6.01	6.00	0.14	5	
8/11/2014		Body 5180	e'	47.4100	Relative Permittivity ( $\epsilon_r$ ):	47.41	49.05	-3.34	5
			e"	18.4200	Conductivity ( $\sigma$ ):	5.31	5.27	0.65	5
	Body 5200	e'	47.3500	Relative Permittivity ( $\epsilon_r$ ):	47.35	49.02	-3.41	5	
		e"	18.4200	Conductivity ( $\sigma$ ):	5.33	5.29	0.59	5	
	Body 5600	e'	46.6600	Relative Permittivity ( $\epsilon_r$ ):	46.66	48.48	-3.75	5	
		e"	18.8100	Conductivity ( $\sigma$ ):	5.86	5.76	1.67	5	
	Body 5800	e'	46.3500	Relative Permittivity ( $\epsilon_r$ ):	46.35	48.20	-3.84	5	
		e"	19.0000	Conductivity ( $\sigma$ ):	6.13	6.00	2.12	5	
	Body 5825	e'	46.3400	Relative Permittivity ( $\epsilon_r$ ):	46.34	48.20	-3.86	5	
		e"	19.0000	Conductivity ( $\sigma$ ):	6.15	6.00	2.56	5	
	8/14/2014	Body 5180	e'	48.7400	Relative Permittivity ( $\epsilon_r$ ):	48.74	49.05	-0.63	5
			e"	17.4500	Conductivity ( $\sigma$ ):	5.03	5.27	-4.65	5
Body 5200		e'	48.7500	Relative Permittivity ( $\epsilon_r$ ):	48.75	49.02	-0.55	5	
		e"	17.5400	Conductivity ( $\sigma$ ):	5.07	5.29	-4.22	5	
Body 5600		e'	48.2800	Relative Permittivity ( $\epsilon_r$ ):	48.28	48.48	-0.41	5	
		e"	17.8500	Conductivity ( $\sigma$ ):	5.56	5.76	-3.52	5	
Body 5800		e'	47.9800	Relative Permittivity ( $\epsilon_r$ ):	47.98	48.20	-0.46	5	
		e"	17.9700	Conductivity ( $\sigma$ ):	5.80	6.00	-3.41	5	
Body 5825		e'	47.9700	Relative Permittivity ( $\epsilon_r$ ):	47.97	48.20	-0.48	5	
		e"	18.1200	Conductivity ( $\sigma$ ):	5.87	6.00	-2.19	5	
8/18/2014		Body 5180	e'	48.3400	Relative Permittivity ( $\epsilon_r$ ):	48.34	49.05	-1.44	5
			e"	18.4300	Conductivity ( $\sigma$ ):	5.31	5.27	0.70	5
	Body 5200	e'	48.3000	Relative Permittivity ( $\epsilon_r$ ):	48.30	49.02	-1.47	5	
		e"	18.4400	Conductivity ( $\sigma$ ):	5.33	5.29	0.70	5	
	Body 5600	e'	47.6800	Relative Permittivity ( $\epsilon_r$ ):	47.68	48.48	-1.65	5	
		e"	18.7800	Conductivity ( $\sigma$ ):	5.85	5.76	1.50	5	
	Body 5800	e'	47.4600	Relative Permittivity ( $\epsilon_r$ ):	47.46	48.20	-1.54	5	
		e"	19.0400	Conductivity ( $\sigma$ ):	6.14	6.00	2.34	5	
	Body 5825	e'	47.3900	Relative Permittivity ( $\epsilon_r$ ):	47.39	48.20	-1.68	5	
		e"	19.0700	Conductivity ( $\sigma$ ):	6.18	6.00	2.94	5	

**SAR Lab D (continued)**

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)		
8/21/2014	Body 5180	e'	47.8600	Relative Permittivity ( $\epsilon_r$ ):	47.86	49.05	-2.42	5	
		e"	18.7700	Conductivity ( $\sigma$ ):	5.41	5.27	2.56	5	
	Body 5200	e'	47.8900	Relative Permittivity ( $\epsilon_r$ ):	47.89	49.02	-2.30	5	
		e"	18.7800	Conductivity ( $\sigma$ ):	5.43	5.29	2.55	5	
	Body 5600	e'	47.2700	Relative Permittivity ( $\epsilon_r$ ):	47.27	48.48	-2.49	5	
		e"	18.9400	Conductivity ( $\sigma$ ):	5.90	5.76	2.37	5	
	Body 5800	e'	46.9000	Relative Permittivity ( $\epsilon_r$ ):	46.90	48.20	-2.70	5	
		e"	19.2800	Conductivity ( $\sigma$ ):	6.22	6.00	3.63	5	
	Body 5825	e'	46.8400	Relative Permittivity ( $\epsilon_r$ ):	46.84	48.20	-2.82	5	
		e"	19.2500	Conductivity ( $\sigma$ ):	6.23	6.00	3.91	5	
	8/25/2014	Body 5180	e'	47.7500	Relative Permittivity ( $\epsilon_r$ ):	47.75	49.05	-2.64	5
			e"	18.3300	Conductivity ( $\sigma$ ):	5.28	5.27	0.15	5
Body 5200		e'	47.6600	Relative Permittivity ( $\epsilon_r$ ):	47.66	49.02	-2.77	5	
		e"	18.3700	Conductivity ( $\sigma$ ):	5.31	5.29	0.32	5	
Body 5600		e'	47.0400	Relative Permittivity ( $\epsilon_r$ ):	47.04	48.48	-2.97	5	
		e"	18.8700	Conductivity ( $\sigma$ ):	5.88	5.76	1.99	5	
Body 5800		e'	46.7000	Relative Permittivity ( $\epsilon_r$ ):	46.70	48.20	-3.11	5	
		e"	18.9600	Conductivity ( $\sigma$ ):	6.11	6.00	1.91	5	
Body 5825		e'	46.6800	Relative Permittivity ( $\epsilon_r$ ):	46.68	48.20	-3.15	5	
		e"	19.1000	Conductivity ( $\sigma$ ):	6.19	6.00	3.10	5	

**SAR Lab E**

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)		
8/4/2014	Body 5180	e'	48.2100	Relative Permittivity (ε <sub>r</sub> ):	48.21	49.05	-1.71	5	
		e"	18.4300	Conductivity (σ):	5.31	5.27	0.70	5	
	Body 5200	e'	48.1800	Relative Permittivity (ε <sub>r</sub> ):	48.18	49.02	-1.71	5	
		e"	18.5300	Conductivity (σ):	5.36	5.29	1.19	5	
	Body 5600	e'	47.5700	Relative Permittivity (ε <sub>r</sub> ):	47.57	48.48	-1.87	5	
		e"	18.8400	Conductivity (σ):	5.87	5.76	1.83	5	
	Body 5800	e'	47.3200	Relative Permittivity (ε <sub>r</sub> ):	47.32	48.20	-1.83	5	
		e"	18.9500	Conductivity (σ):	6.11	6.00	1.86	5	
	Body 5825	e'	47.3000	Relative Permittivity (ε <sub>r</sub> ):	47.30	48.20	-1.87	5	
		e"	19.0400	Conductivity (σ):	6.17	6.00	2.78	5	
	8/7/2014	Body 5180	e'	49.0200	Relative Permittivity (ε <sub>r</sub> ):	49.02	49.05	-0.05	5
			e"	17.8500	Conductivity (σ):	5.14	5.27	-2.47	5
Body 5200		e'	48.9200	Relative Permittivity (ε <sub>r</sub> ):	48.92	49.02	-0.20	5	
		e"	17.9100	Conductivity (σ):	5.18	5.29	-2.20	5	
Body 5600		e'	49.2800	Relative Permittivity (ε <sub>r</sub> ):	49.28	48.48	1.65	5	
		e"	19.3500	Conductivity (σ):	6.03	5.76	4.58	5	
Body 5800		e'	48.3800	Relative Permittivity (ε <sub>r</sub> ):	48.38	48.20	0.37	5	
		e"	18.4400	Conductivity (σ):	5.95	6.00	-0.89	5	
Body 5825		e'	48.0600	Relative Permittivity (ε <sub>r</sub> ):	48.06	48.20	-0.29	5	
		e"	18.6900	Conductivity (σ):	6.05	6.00	0.89	5	
8/11/2014		Body 5180	e'	50.3700	Relative Permittivity (ε <sub>r</sub> ):	50.37	49.05	2.70	5
			e"	17.7900	Conductivity (σ):	5.12	5.27	-2.80	5
	Body 5200	e'	50.1500	Relative Permittivity (ε <sub>r</sub> ):	50.15	49.02	2.31	5	
		e"	17.9400	Conductivity (σ):	5.19	5.29	-2.03	5	
	Body 5600	e'	49.5200	Relative Permittivity (ε <sub>r</sub> ):	49.52	48.48	2.15	5	
		e"	18.7800	Conductivity (σ):	5.85	5.76	1.50	5	
	Body 5800	e'	49.2600	Relative Permittivity (ε <sub>r</sub> ):	49.26	48.20	2.20	5	
		e"	18.4500	Conductivity (σ):	5.95	6.00	-0.83	5	
	Body 5825	e'	49.1800	Relative Permittivity (ε <sub>r</sub> ):	49.18	48.20	2.03	5	
		e"	18.8500	Conductivity (σ):	6.11	6.00	1.75	5	
	8/14/2014	Body 5180	e'	49.3800	Relative Permittivity (ε <sub>r</sub> ):	49.38	49.05	0.68	5
			e"	17.7900	Conductivity (σ):	5.12	5.27	-2.80	5
Body 5200		e'	49.4000	Relative Permittivity (ε <sub>r</sub> ):	49.40	49.02	0.78	5	
		e"	17.8300	Conductivity (σ):	5.16	5.29	-2.63	5	
Body 5600		e'	48.9200	Relative Permittivity (ε <sub>r</sub> ):	48.92	48.48	0.91	5	
		e"	18.1800	Conductivity (σ):	5.66	5.76	-1.74	5	
Body 5800		e'	48.5700	Relative Permittivity (ε <sub>r</sub> ):	48.57	48.20	0.77	5	
		e"	18.3200	Conductivity (σ):	5.91	6.00	-1.53	5	
Body 5825		e'	48.5700	Relative Permittivity (ε <sub>r</sub> ):	48.57	48.20	0.77	5	
		e"	18.4500	Conductivity (σ):	5.98	6.00	-0.40	5	
8/18/2014		Body 5180	e'	48.1900	Relative Permittivity (ε <sub>r</sub> ):	48.19	49.05	-1.75	5
			e"	18.3600	Conductivity (σ):	5.29	5.27	0.32	5
	Body 5200	e'	48.1600	Relative Permittivity (ε <sub>r</sub> ):	48.16	49.02	-1.75	5	
		e"	18.3300	Conductivity (σ):	5.30	5.29	0.10	5	
	Body 5600	e'	47.5500	Relative Permittivity (ε <sub>r</sub> ):	47.55	48.48	-1.91	5	
		e"	18.6300	Conductivity (σ):	5.80	5.76	0.69	5	
	Body 5800	e'	47.3400	Relative Permittivity (ε <sub>r</sub> ):	47.34	48.20	-1.78	5	
		e"	18.8400	Conductivity (σ):	6.08	6.00	1.26	5	
	Body 5825	e'	47.2900	Relative Permittivity (ε <sub>r</sub> ):	47.29	48.20	-1.89	5	
		e"	18.8600	Conductivity (σ):	6.11	6.00	1.81	5	

**SAR Lab E (continued)**

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)		
8/21/2014	Body 5180	e'	50.3800	Relative Permittivity ( $\epsilon_r$ ):	50.38	49.05	2.72	5	
		e"	17.4500	Conductivity ( $\sigma$ ):	5.03	5.27	-4.65	5	
	Body 5200	e'	50.4300	Relative Permittivity ( $\epsilon_r$ ):	50.43	49.02	2.88	5	
		e"	17.5200	Conductivity ( $\sigma$ ):	5.07	5.29	-4.33	5	
	Body 5600	e'	49.9800	Relative Permittivity ( $\epsilon_r$ ):	49.98	48.48	3.10	5	
		e"	17.6200	Conductivity ( $\sigma$ ):	5.49	5.76	-4.77	5	
	Body 5800	e'	47.7800	Relative Permittivity ( $\epsilon_r$ ):	47.78	48.20	-0.87	5	
		e"	17.8300	Conductivity ( $\sigma$ ):	5.75	6.00	-4.16	5	
	Body 5825	e'	49.7300	Relative Permittivity ( $\epsilon_r$ ):	49.73	48.20	3.17	5	
		e"	17.8900	Conductivity ( $\sigma$ ):	5.79	6.00	-3.43	5	
	8/25/2014	Body 5180	e'	47.6300	Relative Permittivity ( $\epsilon_r$ ):	47.63	49.05	-2.89	5
			e"	18.5900	Conductivity ( $\sigma$ ):	5.35	5.27	1.57	5
Body 5200		e'	47.5800	Relative Permittivity ( $\epsilon_r$ ):	47.58	49.02	-2.94	5	
		e"	18.6300	Conductivity ( $\sigma$ ):	5.39	5.29	1.74	5	
Body 5600		e'	46.9500	Relative Permittivity ( $\epsilon_r$ ):	46.95	48.48	-3.15	5	
		e"	18.9800	Conductivity ( $\sigma$ ):	5.91	5.76	2.59	5	
Body 5800		e'	46.6300	Relative Permittivity ( $\epsilon_r$ ):	46.63	48.20	-3.26	5	
		e"	19.1300	Conductivity ( $\sigma$ ):	6.17	6.00	2.82	5	
Body 5825		e'	46.6000	Relative Permittivity ( $\epsilon_r$ ):	46.60	48.20	-3.32	5	
		e"	19.1800	Conductivity ( $\sigma$ ):	6.21	6.00	3.54	5	

**SAR Lab F**

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)		
7/30/2014	Body 5180	e'	49.6100	Relative Permittivity ( $\epsilon_r$ ):	49.61	49.05	1.15	5	
		e"	18.1700	Conductivity ( $\sigma$ ):	5.23	5.27	-0.72	5	
	Body 5200	e'	49.5900	Relative Permittivity ( $\epsilon_r$ ):	49.59	49.02	1.16	5	
		e"	18.1900	Conductivity ( $\sigma$ ):	5.26	5.29	-0.67	5	
	Body 5600	e'	49.0200	Relative Permittivity ( $\epsilon_r$ ):	49.02	48.48	1.12	5	
		e"	18.6200	Conductivity ( $\sigma$ ):	5.80	5.76	0.64	5	
	Body 5800	e'	48.7000	Relative Permittivity ( $\epsilon_r$ ):	48.70	48.20	1.04	5	
		e"	18.8300	Conductivity ( $\sigma$ ):	6.07	6.00	1.21	5	
	Body 5825	e'	48.7100	Relative Permittivity ( $\epsilon_r$ ):	48.71	48.20	1.06	5	
		e"	18.8800	Conductivity ( $\sigma$ ):	6.12	6.00	1.92	5	
	8/4/2014	Body 5180	e'	48.9600	Relative Permittivity ( $\epsilon_r$ ):	48.96	49.05	-0.18	5
			e"	18.5000	Conductivity ( $\sigma$ ):	5.33	5.27	1.08	5
Body 5200		e'	48.9200	Relative Permittivity ( $\epsilon_r$ ):	48.92	49.02	-0.20	5	
		e"	18.5700	Conductivity ( $\sigma$ ):	5.37	5.29	1.41	5	
Body 5600		e'	48.2600	Relative Permittivity ( $\epsilon_r$ ):	48.26	48.48	-0.45	5	
		e"	18.9300	Conductivity ( $\sigma$ ):	5.89	5.76	2.31	5	
Body 5800		e'	48.0300	Relative Permittivity ( $\epsilon_r$ ):	48.03	48.20	-0.35	5	
		e"	19.1000	Conductivity ( $\sigma$ ):	6.16	6.00	2.66	5	
Body 5825		e'	47.9900	Relative Permittivity ( $\epsilon_r$ ):	47.99	48.20	-0.44	5	
		e"	19.1600	Conductivity ( $\sigma$ ):	6.21	6.00	3.43	5	
8/7/2014		Body 5180	e'	50.2300	Relative Permittivity ( $\epsilon_r$ ):	50.23	49.05	2.41	5
			e"	18.4500	Conductivity ( $\sigma$ ):	5.31	5.27	0.81	5
	Body 5200	e'	50.2100	Relative Permittivity ( $\epsilon_r$ ):	50.21	49.02	2.43	5	
		e"	18.4800	Conductivity ( $\sigma$ ):	5.34	5.29	0.92	5	
	Body 5600	e'	49.5900	Relative Permittivity ( $\epsilon_r$ ):	49.59	48.48	2.29	5	
		e"	18.9600	Conductivity ( $\sigma$ ):	5.90	5.76	2.48	5	
	Body 5800	e'	49.2500	Relative Permittivity ( $\epsilon_r$ ):	49.25	48.20	2.18	5	
		e"	19.0600	Conductivity ( $\sigma$ ):	6.15	6.00	2.45	5	
	Body 5825	e'	49.2500	Relative Permittivity ( $\epsilon_r$ ):	49.25	48.20	2.18	5	
		e"	19.2300	Conductivity ( $\sigma$ ):	6.23	6.00	3.81	5	
	8/11/2014	Body 5180	e'	48.6900	Relative Permittivity ( $\epsilon_r$ ):	48.69	49.05	-0.73	5
			e"	18.5500	Conductivity ( $\sigma$ ):	5.34	5.27	1.36	5
Body 5200		e'	48.6000	Relative Permittivity ( $\epsilon_r$ ):	48.60	49.02	-0.86	5	
		e"	18.6400	Conductivity ( $\sigma$ ):	5.39	5.29	1.79	5	
Body 5600		e'	47.7700	Relative Permittivity ( $\epsilon_r$ ):	47.77	48.48	-1.46	5	
		e"	19.1800	Conductivity ( $\sigma$ ):	5.97	5.76	3.67	5	
Body 5800		e'	47.4300	Relative Permittivity ( $\epsilon_r$ ):	47.43	48.20	-1.60	5	
		e"	19.1500	Conductivity ( $\sigma$ ):	6.18	6.00	2.93	5	
Body 5825		e'	47.3900	Relative Permittivity ( $\epsilon_r$ ):	47.39	48.20	-1.68	5	
		e"	19.3400	Conductivity ( $\sigma$ ):	6.26	6.00	4.40	5	
8/14/2014		Body 5180	e'	49.2500	Relative Permittivity ( $\epsilon_r$ ):	49.25	49.05	0.41	5
			e"	17.7100	Conductivity ( $\sigma$ ):	5.10	5.27	-3.23	5
	Body 5200	e'	49.2900	Relative Permittivity ( $\epsilon_r$ ):	49.29	49.02	0.55	5	
		e"	17.7600	Conductivity ( $\sigma$ ):	5.14	5.29	-3.02	5	
	Body 5600	e'	48.7600	Relative Permittivity ( $\epsilon_r$ ):	48.76	48.48	0.58	5	
		e"	18.1000	Conductivity ( $\sigma$ ):	5.64	5.76	-2.17	5	
	Body 5800	e'	48.4600	Relative Permittivity ( $\epsilon_r$ ):	48.46	48.20	0.54	5	
		e"	18.2000	Conductivity ( $\sigma$ ):	5.87	6.00	-2.18	5	
	Body 5825	e'	48.4500	Relative Permittivity ( $\epsilon_r$ ):	48.45	48.20	0.52	5	
		e"	18.3500	Conductivity ( $\sigma$ ):	5.94	6.00	-0.94	5	

**SAR Lab F (continued)**

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)		
8/18/2014	Body 5180	e'	49.2500	Relative Permittivity ( $\epsilon_r$ ):	49.25	49.05	0.41	5	
		e"	17.7000	Conductivity ( $\sigma$ ):	5.10	5.27	-3.29	5	
	Body 5200	e'	49.1300	Relative Permittivity ( $\epsilon_r$ ):	49.13	49.02	0.23	5	
		e"	17.8100	Conductivity ( $\sigma$ ):	5.15	5.29	-2.74	5	
	Body 5600	e'	48.5700	Relative Permittivity ( $\epsilon_r$ ):	48.57	48.48	0.19	5	
		e"	18.5500	Conductivity ( $\sigma$ ):	5.78	5.76	0.26	5	
	Body 5800	e'	48.3000	Relative Permittivity ( $\epsilon_r$ ):	48.30	48.20	0.21	5	
		e"	18.2900	Conductivity ( $\sigma$ ):	5.90	6.00	-1.69	5	
	Body 5825	e'	48.2000	Relative Permittivity ( $\epsilon_r$ ):	48.20	48.20	0.00	5	
		e"	18.7200	Conductivity ( $\sigma$ ):	6.06	6.00	1.05	5	
	8/21/2014	Body 5180	e'	48.2200	Relative Permittivity ( $\epsilon_r$ ):	48.22	49.05	-1.69	5
			e"	17.7900	Conductivity ( $\sigma$ ):	5.12	5.27	-2.80	5
Body 5200		e'	48.2500	Relative Permittivity ( $\epsilon_r$ ):	48.25	49.02	-1.57	5	
		e"	17.8500	Conductivity ( $\sigma$ ):	5.16	5.29	-2.52	5	
Body 5600		e'	47.7100	Relative Permittivity ( $\epsilon_r$ ):	47.71	48.48	-1.58	5	
		e"	17.9800	Conductivity ( $\sigma$ ):	5.60	5.76	-2.82	5	
Body 5800		e'	47.4700	Relative Permittivity ( $\epsilon_r$ ):	47.47	48.20	-1.51	5	
		e"	18.2100	Conductivity ( $\sigma$ ):	5.87	6.00	-2.12	5	
Body 5825		e'	47.4400	Relative Permittivity ( $\epsilon_r$ ):	47.44	48.20	-1.58	5	
		e"	18.2400	Conductivity ( $\sigma$ ):	5.91	6.00	-1.54	5	
8/25/2014		Body 5180	e'	48.3000	Relative Permittivity ( $\epsilon_r$ ):	48.30	49.05	-1.52	5
			e"	18.1700	Conductivity ( $\sigma$ ):	5.23	5.27	-0.72	5
	Body 5200	e'	48.1700	Relative Permittivity ( $\epsilon_r$ ):	48.17	49.02	-1.73	5	
		e"	18.3200	Conductivity ( $\sigma$ ):	5.30	5.29	0.04	5	
	Body 5600	e'	47.6400	Relative Permittivity ( $\epsilon_r$ ):	47.64	48.48	-1.73	5	
		e"	18.9000	Conductivity ( $\sigma$ ):	5.89	5.76	2.15	5	
	Body 5800	e'	47.2900	Relative Permittivity ( $\epsilon_r$ ):	47.29	48.20	-1.89	5	
		e"	18.7300	Conductivity ( $\sigma$ ):	6.04	6.00	0.67	5	
	Body 5825	e'	47.1800	Relative Permittivity ( $\epsilon_r$ ):	47.18	48.20	-2.12	5	
		e"	19.0800	Conductivity ( $\sigma$ ):	6.18	6.00	3.00	5	

**SAR Lab G**

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
8/22/2014	Body 5180	e'	47.8000	Relative Permittivity ( $\epsilon_r$ ):	47.80	49.05	-2.54	5
		e"	17.8400	Conductivity ( $\sigma$ ):	5.14	5.27	-2.52	5
	Body 5200	e'	47.7900	Relative Permittivity ( $\epsilon_r$ ):	47.79	49.02	-2.51	5
		e"	17.8500	Conductivity ( $\sigma$ ):	5.16	5.29	-2.52	5
	Body 5600	e'	47.1900	Relative Permittivity ( $\epsilon_r$ ):	47.19	48.48	-2.66	5
		e"	18.1900	Conductivity ( $\sigma$ ):	5.66	5.76	-1.68	5
	Body 5800	e'	46.9300	Relative Permittivity ( $\epsilon_r$ ):	46.93	48.20	-2.63	5
		e"	18.3400	Conductivity ( $\sigma$ ):	5.91	6.00	-1.42	5
	Body 5825	e'	46.8800	Relative Permittivity ( $\epsilon_r$ ):	46.88	48.20	-2.74	5
		e"	18.4100	Conductivity ( $\sigma$ ):	5.96	6.00	-0.62	5

**SAR Lab H**

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)		
8/4/2014	Body 5180	e'	48.4900	Relative Permittivity ( $\epsilon_r$ ):	48.49	49.05	-1.14	5	
		e"	18.1400	Conductivity ( $\sigma$ ):	5.22	5.27	-0.88	5	
	Body 5200	e'	48.4000	Relative Permittivity ( $\epsilon_r$ ):	48.40	49.02	-1.26	5	
		e"	18.1100	Conductivity ( $\sigma$ ):	5.24	5.29	-1.10	5	
	Body 5600	e'	47.6500	Relative Permittivity ( $\epsilon_r$ ):	47.65	48.48	-1.71	5	
		e"	18.5800	Conductivity ( $\sigma$ ):	5.79	5.76	0.42	5	
	Body 5800	e'	47.4700	Relative Permittivity ( $\epsilon_r$ ):	47.47	48.20	-1.51	5	
		e"	18.7400	Conductivity ( $\sigma$ ):	6.04	6.00	0.73	5	
	Body 5825	e'	47.3800	Relative Permittivity ( $\epsilon_r$ ):	47.38	48.20	-1.70	5	
		e"	18.7200	Conductivity ( $\sigma$ ):	6.06	6.00	1.05	5	
	8/7/2014	Body 5180	e'	48.9900	Relative Permittivity ( $\epsilon_r$ ):	48.99	49.05	-0.12	5
			e"	17.6800	Conductivity ( $\sigma$ ):	5.09	5.27	-3.40	5
Body 5200		e'	48.9500	Relative Permittivity ( $\epsilon_r$ ):	48.95	49.02	-0.14	5	
		e"	17.6900	Conductivity ( $\sigma$ ):	5.11	5.29	-3.40	5	
Body 5600		e'	48.3700	Relative Permittivity ( $\epsilon_r$ ):	48.37	48.48	-0.22	5	
		e"	18.1200	Conductivity ( $\sigma$ ):	5.64	5.76	-2.06	5	
Body 5800		e'	48.0800	Relative Permittivity ( $\epsilon_r$ ):	48.08	48.20	-0.25	5	
		e"	18.2200	Conductivity ( $\sigma$ ):	5.88	6.00	-2.07	5	
Body 5825		e'	48.0600	Relative Permittivity ( $\epsilon_r$ ):	48.06	48.20	-0.29	5	
		e"	18.3800	Conductivity ( $\sigma$ ):	5.95	6.00	-0.78	5	
8/11/2014		Body 5180	e'	47.7100	Relative Permittivity ( $\epsilon_r$ ):	47.71	49.05	-2.73	5
			e"	18.4200	Conductivity ( $\sigma$ ):	5.31	5.27	0.65	5
	Body 5200	e'	47.6200	Relative Permittivity ( $\epsilon_r$ ):	47.62	49.02	-2.86	5	
		e"	18.3300	Conductivity ( $\sigma$ ):	5.30	5.29	0.10	5	
	Body 5600	e'	46.7700	Relative Permittivity ( $\epsilon_r$ ):	46.77	48.48	-3.52	5	
		e"	18.8900	Conductivity ( $\sigma$ ):	5.88	5.76	2.10	5	
	Body 5800	e'	46.5500	Relative Permittivity ( $\epsilon_r$ ):	46.55	48.20	-3.42	5	
		e"	18.9800	Conductivity ( $\sigma$ ):	6.12	6.00	2.02	5	
	Body 5825	e'	46.4300	Relative Permittivity ( $\epsilon_r$ ):	46.43	48.20	-3.67	5	
		e"	19.0000	Conductivity ( $\sigma$ ):	6.15	6.00	2.56	5	
	8/14/2014	Body 5180	e'	48.8000	Relative Permittivity ( $\epsilon_r$ ):	48.80	49.05	-0.50	5
			e"	17.7300	Conductivity ( $\sigma$ ):	5.11	5.27	-3.12	5
Body 5200		e'	48.8200	Relative Permittivity ( $\epsilon_r$ ):	48.82	49.02	-0.41	5	
		e"	17.7400	Conductivity ( $\sigma$ ):	5.13	5.29	-3.12	5	
Body 5600		e'	48.2300	Relative Permittivity ( $\epsilon_r$ ):	48.23	48.48	-0.51	5	
		e"	18.0700	Conductivity ( $\sigma$ ):	5.63	5.76	-2.33	5	
Body 5800		e'	47.9600	Relative Permittivity ( $\epsilon_r$ ):	47.96	48.20	-0.50	5	
		e"	18.2200	Conductivity ( $\sigma$ ):	5.88	6.00	-2.07	5	
Body 5825		e'	47.9300	Relative Permittivity ( $\epsilon_r$ ):	47.93	48.20	-0.56	5	
		e"	18.3100	Conductivity ( $\sigma$ ):	5.93	6.00	-1.16	5	
8/18/2014		Body 5180	e'	47.9700	Relative Permittivity ( $\epsilon_r$ ):	47.97	49.05	-2.20	5
			e"	18.4000	Conductivity ( $\sigma$ ):	5.30	5.27	0.54	5
	Body 5200	e'	47.7400	Relative Permittivity ( $\epsilon_r$ ):	47.74	49.02	-2.61	5	
		e"	18.3500	Conductivity ( $\sigma$ ):	5.31	5.29	0.21	5	
	Body 5600	e'	46.8100	Relative Permittivity ( $\epsilon_r$ ):	46.81	48.48	-3.44	5	
		e"	19.1400	Conductivity ( $\sigma$ ):	5.96	5.76	3.45	5	
	Body 5800	e'	46.6700	Relative Permittivity ( $\epsilon_r$ ):	46.67	48.20	-3.17	5	
		e"	19.0300	Conductivity ( $\sigma$ ):	6.14	6.00	2.29	5	
	Body 5825	e'	46.4300	Relative Permittivity ( $\epsilon_r$ ):	46.43	48.20	-3.67	5	
		e"	19.2400	Conductivity ( $\sigma$ ):	6.23	6.00	3.86	5	



**SAR Lab H (continued)**

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)		
8/20/2014	Body 5180	e'	47.5800	Relative Permittivity ( $\epsilon_r$ ):	47.58	49.05	-2.99	5	
		e"	18.5000	Conductivity ( $\sigma$ ):	5.33	5.27	1.08	5	
	Body 5200	e'	47.5300	Relative Permittivity ( $\epsilon_r$ ):	47.53	49.02	-3.04	5	
		e"	18.5000	Conductivity ( $\sigma$ ):	5.35	5.29	1.03	5	
	Body 5600	e'	46.8800	Relative Permittivity ( $\epsilon_r$ ):	46.88	48.48	-3.30	5	
		e"	18.8500	Conductivity ( $\sigma$ ):	5.87	5.76	1.88	5	
	Body 5800	e'	46.5900	Relative Permittivity ( $\epsilon_r$ ):	46.59	48.20	-3.34	5	
		e"	19.0500	Conductivity ( $\sigma$ ):	6.14	6.00	2.39	5	
	Body 5825	e'	46.4900	Relative Permittivity ( $\epsilon_r$ ):	46.49	48.20	-3.55	5	
		e"	19.0700	Conductivity ( $\sigma$ ):	6.18	6.00	2.94	5	
	8/21/2014	Body 5180	e'	47.9300	Relative Permittivity ( $\epsilon_r$ ):	47.93	49.05	-2.28	5
			e"	17.5600	Conductivity ( $\sigma$ ):	5.06	5.27	-4.05	5
Body 5200		e'	47.9600	Relative Permittivity ( $\epsilon_r$ ):	47.96	49.02	-2.16	5	
		e"	17.6200	Conductivity ( $\sigma$ ):	5.09	5.29	-3.78	5	
Body 5600		e'	47.5200	Relative Permittivity ( $\epsilon_r$ ):	47.52	48.48	-1.98	5	
		e"	17.6800	Conductivity ( $\sigma$ ):	5.51	5.76	-4.44	5	
Body 5800		e'	47.3000	Relative Permittivity ( $\epsilon_r$ ):	47.30	48.20	-1.87	5	
		e"	17.8400	Conductivity ( $\sigma$ ):	5.75	6.00	-4.11	5	
Body 5825		e'	47.2500	Relative Permittivity ( $\epsilon_r$ ):	47.25	48.20	-1.97	5	
		e"	17.8900	Conductivity ( $\sigma$ ):	5.79	6.00	-3.43	5	

## 10. System Check

SAR system verification is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device. The same SAR probe(s) and tissue-equivalent media combinations used with each specific SAR system for system verification must be used for device testing. When multiple probe calibration points are required to cover substantially large transmission bands, independent system verifications are required for each probe calibration point. A system verification must be performed before each series of SAR measurements using the same probe calibration point and tissue-equivalent medium. Additional system verification should be considered according to the conditions of the tissue-equivalent medium and measured tissue dielectric parameters, typically every three to four days when the liquid parameters are remeasured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

### 10.1. Reference Target SAR Values

The reference SAR values can be obtained from the calibration certificate of system validation dipoles

System Dipole	Serial No.	Cal. Date	Freq. (MHz)	Target SAR Values (W/kg)		
				1g/10g	Head	Body
D2450V2	706	5/20/2014	2450	1g	53.0	50.2
				10g	24.5	23.4
D5GHzV2	1003	2/26/2014	5200	1g	77.7	73.5
				10g	22.2	20.5
			5600	1g	81.8	79.6
				10g	23.2	22.1
			5800	1g	78.3	73.8
				10g	22.1	20.4
D5GHzV2	1168	12/12/2013	5200	1g	79.3	75.2
				10g	22.7	21.0
			5600	1g	85.3	80.6
				10g	24.3	22.3
			5800	1g	81.0	75.7
				10g	22.9	20.9

## 10.2. System Check Results

The 1-g and 10-g SAR measured with a reference dipole, using the required tissue-equivalent medium at the test frequency, must be within 10% of the manufacturer calibrated dipole SAR target.

### SAR Lab B

Date Tested	System Dipole		T.S. Liquid	Measured Results			Target (Ref. Value)	Delta $\pm 10\%$	Est./Zoom Ratio	Plot No.	
	Type	Serial #		Area Scan	Zoom Scan	Normalize to 1 W					
8/4/2017	D2450V2	706	Body	1g	5.15	5.21	52.1	50.2	3.78	-1.17	
				10g	2.22	2.39	23.9	23.4	2.14		
8/7/2014	D2450V2	706	Body	1g	4.79	4.94	49.4	50.2	-1.59	-3.13	
				10g	2.09	2.28	22.8	23.4	-2.56		
8/11/2014	D2450V2	706	Body	1g	5.07	5.01	50.1	50.2	-0.20	1.18	
				10g	2.19	2.30	23.0	23.4	-1.71		
8/14/2014	D2450V2	706	Body	1g	5.42	5.08	50.8	50.2	1.20	6.27	
				10g	2.34	2.35	23.5	23.4	0.43		
8/18/2014	D2450V2	706	Body	1g	5.08	5.03	50.3	50.2	0.20	0.98	
				10g	2.13	2.32	23.2	23.4	-0.85		
8/21/2014	D2450V2	706	Body	1g	5.10	5.34	53.4	50.2	6.37	-4.71	1,2
				10g	2.15	2.46	24.6	23.4	5.13		

### SAR Lab C

Date Tested	System Dipole		T.S. Liquid	Measured Results			Target (Ref. Value)	Delta $\pm 10\%$	Est./Zoom Ratio	Plot No.	
	Type	Serial #		Area Scan	Zoom Scan	Normalize to 1 W					
8/4/2014	D5GHzV2 (5.2GHz)	1003	Body	1g	6.88	7.19	71.9	73.5	-2.18	-4.51	
				10g	1.88	2.04	20.4	20.5	-0.49		
8/7/2014	D5GHzV2 (5.2GHz)	1003	Body	1g	7.22	7.35	73.5	73.5	0.00	-1.80	
				10g	1.96	2.07	20.7	20.5	0.98		
8/11/2014	D5GHzV2 (5.2GHz)	1168	Body	1g	7.03	7.49	74.9	75.2	-0.40	-6.54	
				10g	1.91	2.11	21.1	21.0	0.48		
8/14/2014	D5GHzV2 (5.2GHz)	1003	Body	1g	7.11	7.81	78.1	73.5	6.26	-9.85	3,4
				10g	1.94	2.19	21.9	20.5	6.83		
8/18/2014	D5GHzV2 (5.2GHz)	1168	Body	1g	7.39	7.77	77.7	75.2	3.32	-5.14	5,6
				10g	2.00	2.18	21.8	21.0	3.81		
8/21/2014	D5GHzV2 (5.2GHz)	1003	Body	1g	6.79	7.12	71.2	73.5	-3.13	-4.86	
				10g	1.85	2.01	20.1	20.5	-1.95		

### SAR Lab D

Date Tested	System Dipole		T.S. Liquid	Measured Results			Target (Ref. Value)	Delta $\pm 10\%$	Est./Zoom Ratio	Plot No.	
	Type	Serial #		Area Scan	Zoom Scan	Normalize to 1 W					
8/4/2014	D5GHzV2 (5.2GHz)	1003	Body	1g	6.63	7.07	70.7	73.5	-3.81	-6.64	
				10g	1.82	2.00	20.0	20.5	-2.44		
8/6/2014	D5GHzV2 (5.2GHz)	1003	Body	1g	7.05	7.43	74.3	73.5	1.09	-5.39	
				10g	1.94	2.10	21.0	20.5	2.44		
8/11/2014	D5GHzV2 (5.2GHz)	1003	Body	1g	6.74	7.15	71.5	73.5	-2.72	-6.08	
				10g	1.87	2.03	20.3	20.5	-0.98		
8/14/2014	D5GHzV2 (5.2GHz)	1003	Body	1g	7.07	7.50	75.0	73.5	2.04	-6.08	
				10g	1.97	2.11	21.1	20.5	2.93		
8/18/2014	D5GHzV2 (5.2GHz)	1003	Body	1g	7.38	7.91	79.1	73.5	7.62	-7.18	7,8
				10g	2.07	2.24	22.4	20.5	9.27		
8/21/2014	D5GHzV2 (5.2GHz)	1003	Body	1g	6.45	7.29	72.9	73.5	-0.82	-13.02	
				10g	1.80	2.06	20.6	20.5	0.49		
8/25/2014	D5GHzV2 (5.2GHz)	1003	Body	1g	6.86	7.29	72.9	73.5	-0.82	-6.27	
				10g	1.89	2.05	20.5	20.5	0.00		

**SAR Lab E**

Date Tested	System Dipole		T.S. Liquid	Measured Results			Target (Ref. Value)	Delta ±10 %	Est./Zoom Ratio	Plot No.	
	Type	Serial #		Area Scan	Zoom Scan	Normalize to 1 W					
8/4/2014	D5GHzV2 (5.6GHz)	1168	Body	1g	7.35	7.83	78.3	80.6	-2.85	-6.53	
				10g	1.99	2.19	21.9	22.3	-1.79		
8/7/2014	D5GHzV2 (5.6GHz)	1168	Body	1g	7.50	8.11	81.1	80.6	0.62	-8.13	
				10g	2.08	2.27	22.7	22.3	1.79		
8/11/2014	D5GHzV2 (5.6GHz)	1168	Body	1g	7.74	8.21	82.1	80.6	1.86	-6.07	
				10g	2.10	2.30	23.0	22.3	3.14		
8/14/2014	D5GHzV2 (5.6GHz)	1168	Body	1g	7.77	8.28	82.8	80.6	2.73	-6.56	
				10g	2.12	2.32	23.2	22.3	4.04		
8/18/2014	D5GHzV2 (5.6GHz)	1168	Body	1g	8.02	8.47	84.70	80.6	5.09	-5.61	9,10
				10g	2.18	2.36	23.60	22.3	5.83		
8/21/2014	D5GHzV2 (5.6GHz)	1168	Body	1g	7.39	7.83	78.30	80.6	-2.85	-5.95	
				10g	2.00	2.20	22.00	22.3	-1.35		
8/25/2014	D5GHzV2 (5.6GHz)	1168	Body	1g	6.93	8.35	83.50	80.6	3.60	-20.49	
				10g	1.88	2.34	23.40	22.3	4.93		

**SAR Lab F**

Date Tested	System Dipole		T.S. Liquid	Measured Results			Target (Ref. Value)	Delta ±10 %	Est./Zoom Ratio	Plot No.	
	Type	Serial #		Area Scan	Zoom Scan	Normalize to 1 W					
7/30/2014	D5GHzV2 (5.8GHz)	1003	Body	1g	6.67	7.21	72.1	73.8	-2.30	-8.10	
				10g	1.82	2.02	20.2	20.4	-0.98		
8/4/2014	D5GHzV2 (5.8GHz)	1003	Body	1g	6.57	7.12	71.2	73.8	-3.52	-8.37	
				10g	1.79	2.00	20.0	20.4	-1.96		
8/7/2014	D5GHzV2 (5.8GHz)	1003	Body	1g	6.48	6.99	69.9	73.8	-5.28	-7.87	
				10g	1.77	1.98	19.8	20.4	-2.94		
8/11/2014	D5GHzV2 (5.8GHz)	1003	Body	1g	7.33	7.84	78.4	73.8	6.23	-6.96	11,12
				10g	2.00	2.21	22.1	20.4	8.33		
8/14/2014	D5GHzV2 (5.8GHz)	1003	Body	1g	6.55	7.64	76.4	73.8	3.52	-16.64	
				10g	1.83	2.15	21.5	20.4	5.39		
8/18/2014	D5GHzV2 (5.8GHz)	1003	Body	1g	6.84	7.74	77.4	73.8	4.88	-13.16	
				10g	1.86	2.18	21.8	20.4	6.86		
8/21/2014	D5GHzV2 (5.8GHz)	1003	Body	1g	6.78	7.17	71.7	73.8	-2.85	-5.75	
				10g	1.84	2.01	20.1	20.4	-1.47		
8/25/2014	D5GHzV2 (5.8GHz)	1003	Body	1g	6.83	7.28	72.8	73.8	-1.36	-6.59	
				10g	1.86	2.06	20.6	20.4	0.98		

**SAR Lab G**

Date Tested	System Dipole		T.S. Liquid	Measured Results			Target (Ref. Value)	Delta ±10 %	Est./Zoom Ratio	Plot No.	
	Type	Serial #		Area Scan	Zoom Scan	Normalize to 1 W					
8/22/2014	D5GHzV2 (5.6GHz)	1168	Body	1g	7.37	7.97	79.7	80.6	-1.12	-8.14	13,14
				10g	2.00	2.23	22.3	22.3	0.00		

**SAR Lab H**

Date Tested	System Dipole		T.S. Liquid	Measured Results			Target (Ref. Value)	Delta $\pm 10\%$	Est./Zoom Ratio	Plot No.	
	Type	Serial #		Area Scan	Zoom Scan	Normalize to 1 W					
8/4/2014	D5GHzV2 (5.6GHz)	1003	Body	1g	7.67	8.27	82.7	79.6	3.89	-7.82	
				10g	2.07	2.32	23.2	22.1	4.98		
8/7/2014	D5GHzV2 (5.6GHz)	1003	Body	1g	8.63	7.81	78.1	79.6	-1.88	9.50	
				10g	2.33	2.20	22.0	22.1	-0.45		
8/11/2014	D5GHzV2 (5.6GHz)	1003	Body	1g	7.23	7.70	77.0	79.6	-3.27	-6.50	
				10g	1.95	2.19	21.9	22.1	-0.90		
8/14/2014	D5GHzV2 (5.6GHz)	1003	Body	1g	7.47	8.11	81.1	79.6	1.88	-8.57	
				10g	2.04	2.29	22.9	22.1	3.62		
8/18/2014	D5GHzV2 (5.6GHz)	1003	Body	1g	8.03	8.52	85.2	79.6	7.04	-6.10	15,16
				10g	2.15	2.40	24.0	22.1	8.60		
8/20/2014	D5GHzV2 (5.2GHz)	1003	Body	1g	6.85	7.20	72.0	73.5	-2.04	-5.11	
				10g	1.90	2.07	20.7	20.5	0.98		
8/21/2014	D5GHzV2 (5.6GHz)	1168	Body	1g	7.82	8.41	84.1	80.6	4.34	-7.54	17,18
				10g	2.11	2.38	23.8	22.3	6.73		

### 10.3. SAR Scan Procedure

#### 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 2.1 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

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. The sophisticated interpolation routines implemented in DASY software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE Standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan). 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 Parameters extracted from KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

	$\leq 3$ GHz	$> 3$ GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	$5 \pm 1$ mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: $\Delta x_{Area}$ , $\Delta y_{Area}$	$\leq 2$ GHz: $\leq 15$ mm 2 – 3 GHz: $\leq 12$ mm	3 – 4 GHz: $\leq 12$ mm 4 – 6 GHz: $\leq 10$ 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 $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

**Step 3: Zoom Scan**

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures points (refer to table below) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job's label.

Zoom Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

			≤ 3 GHz	> 3 GHz
Maximum zoom scan spatial resolution: $\Delta x_{Zoom}, \Delta y_{Zoom}$			≤ 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 1 <sup>st</sup> 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 · $\Delta z_{Zoom}(n-1)$	
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: $\delta$ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details. * When zoom scan is required and the <i>reported</i> SAR from the area scan based <i>1-g SAR estimation</i> procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

**Step 4: 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.

**Step 5: Z-Scan (FCC only)**

The Z Scan measures points along a vertical straight line. The line runs along the Z-axis of a one-dimensional grid. In order to get a reasonable extrapolation the extrapolated distance should not be larger than the step size in Z-direction.

## 11. SAR Test Results

SAR Test Reduction criteria are as follows:

### **KDB 447498 D01 General RF Exposure Guidance:**

Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:

- $\leq 0.8$  W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is  $\leq 100$  MHz
- $\leq 0.6$  W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
- $\leq 0.4$  W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is  $\geq 200$  MHz

### **April 2013 TCB Workshop Updates:**

Apply usual 802.11 test exclusion considerations, but include 802.11ac SAR for highest 802.11a configuration in each frequency band and each exposure condition.



### 11.1. Wi-Fi 2.4GHz

#### Variant 1

Band (GHz)	Mode	No. of Transmitters	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)				SAR (W/kg)								Plot No.
							Ant. A		Ant. B		Ant. A				Ant. B				
							Tune-up Limit	Measured	Tune-up Limit	Measured	Measured		Scaled		Measured		Scaled		
											1-g	10-g	1-g	10-g	1-g	10-g	1-g	10-g	
2.4	802.11b	1 Tx	0	Rear	6	2437	15.5	15.5			0.076	0.032	0.076	0.032					
				Edge 1	1	2412	15.5	15.5			0.932	0.310	0.932	0.310					
					6	2437	15.5	15.5			0.895	0.300	0.895	0.300					
				Edge 4	11	2462	15.5	15.4			1.100	0.371	1.126	0.380					
					6	2437	15.5	15.5			0.064	0.030	0.064	0.030					
				0	Rear	6	2437			15.5	15.5					0.098	0.044	0.098	0.044
					Edge 1	1	2412			15.5	15.4					0.926	0.309	0.948	0.316
						6	2437			15.5	15.5					1.090	0.364	1.090	0.364
	11	2462				15.5	15.4					1.160	0.386	1.187	0.395	1			
	802.11g	2 Tx CDD	0	Rear	6	2437	15.5	15.2	15.5	15.5	0.100	0.042	0.107	0.045	0.072	0.032	0.072	0.032	
				Edge 1	2	2417	15.5	15.2	15.5	15.5	0.796	0.270	0.853	0.289	0.992	0.334	0.992	0.334	
					6	2437	15.5	15.2	15.5	15.5	0.849	0.288	0.910	0.309	1.020	0.347	1.020	0.347	
				9	2452	15.5	15.2	15.5	15.5	1.020	0.340	1.093	0.364	1.120	0.373	1.120	0.373		
				Edge 2	6	2437	15.5	15.2	15.5	15.5					0.095	0.043	0.095	0.043	
Edge 4				6	2437	15.5	15.2	15.5	15.5	0.076	0.035	0.082	0.038						

#### Variant 2

Band (GHz)	Mode	No. of Transmitters	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)				SAR (W/kg)								Plot No.
							Ant. A		Ant. B		Ant. A				Ant. B				
							Tune-up Limit	Measured	Tune-up Limit	Measured	Measured		Scaled		Measured		Scaled		
											1-g	10-g	1-g	10-g	1-g	10-g	1-g	10-g	
2.4	802.11b	1 Tx	0	Edge 1	11	2462			15.5	15.5					1.110	0.374	1.110	0.374	

## 11.2. Wi-Fi 5GHz

### 11.2.1. 5.2 GHz Band

#### Variant 1

Band (GHz)	Mode	No. of Transmitters	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)				SAR (W/kg)								Plot No.			
							Ant. A		Ant. B		Ant. A				Ant. B							
							Tune-up Limit	Measured	Tune-up Limit	Measured	Measured		Scaled		Measured		Scaled					
											1-g	10-g	1-g	10-g	1-g	10-g	1-g	10-g				
5.2	802.11a	1 Tx	0	Rear	40	5200	18.0	17.3			0.112	0.042	0.132	0.050								
				Edge 1	40	5200	18.0	17.3			0.919	0.334	1.080	0.392								
					48	5240	18.0	17.3			0.880	0.320	1.034	0.376								
				Edge 4	40	5200	18.0	17.3			0.012	0.003	0.014	0.004								
				0	Rear	40	5200			16.5	16.5							0.095	0.038	0.095	0.038	
					Edge 1	40	5200			16.5	16.5							1.190	0.436	1.190	0.436	2
		48	5240					16.5	16.5							1.140	0.425	1.140	0.425			
		Edge 2	40	5200			16.5	16.5							0.021	0.009	0.021	0.009				
		2 Tx CDD	0	Rear	36	5180	15.0	15.0	15.0	14.9	0.064	0.024	0.064	0.024	0.073	0.027	0.075	0.028				
				Edge 1	36	5180	15.0	15.0	15.0	14.9	0.609	0.217	0.609	0.217	0.765	0.217	0.783	0.222				
					48	5240	15.0	15.0	15.0	14.9	0.531	0.191	0.531	0.191	0.783	0.289	0.801	0.296				
				Edge 2	36	5180	15.0	15.0	15.0	14.9					0.022	0.008	0.023	0.008				
Edge 4	36			5180	15.0	15.0	15.0	14.9	0.020	0.006	0.020	0.006										

#### Variant 2

Band	Mode	No. of Transmitters	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)				SAR (W/kg)								Plot No.
							Ant. A		Ant. B		Ant. A				Ant. B				
							Tune-up Limit	Measured	Tune-up Limit	Measured	Measured		Scaled		Measured		Scaled		
											1-g	10-g	1-g	10-g	1-g	10-g	1-g	10-g	
5.2	802.11a	1 Tx	0	Edge 1	40	5200			16.5	16.2					0.996	0.368	1.067	0.394	

**11.2.2. 5.2 GHz Band (802.11n/ac mode)**

Band (GHz)	Mode	No. of Transmitters	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)				SAR (W/kg)								Plot No.
							Ant. A		Ant. B		Ant. A				Ant. B				
							Tune-up Limit	Measured	Tune-up Limit	Measured	Measured		Scaled		Measured		Scaled		
											1-g	10-g	1-g	10-g	1-g	10-g	1-g	10-g	
5.2	802.11n	2 Tx HT40 STBC	0	Rear	46	5230	18.0	17.7	16.5	16.2	0.113	0.046	0.121	0.049	0.118	0.048	0.126	0.051	
				Edge 1	38	5190	12.0	12.0	12.0	12.0	0.251	0.087	0.251	0.087	0.366	0.131	0.366	0.131	
					46	5230	18.0	17.7	16.5	16.2	1.020	0.370	1.093	0.396	1.090	0.403	1.168	0.432	
				Edge 2	46	5230	18.0	17.7	16.5	16.2					0.024	0.009	0.026	0.010	
				Edge 4	46	5230	18.0	17.7	16.5	16.2	0.026	0.009	0.028	0.010					
Band	Mode	No. of Transmitters	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)				SAR (W/kg)								Plot No.
							Ant. A		Ant. B		Ant. A				Ant. B				
							Tune-up Limit	Measured	Tune-up Limit	Measured	Measured		Scaled		Measured		Scaled		
											1-g	10-g	1-g	10-g	1-g	10-g	1-g	10-g	
5.2	802.11ac	1 Tx HT20	0	Edge 1	40	5200			16.5	16.5					1.090	0.398	1.090	0.398	

**11.2.3. 5.3 GHz Band**

**Variant 1**

Band (GHz)	Mode	No. of Transmitters	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)				SAR (W/kg)								Plot No.
							Ant. A		Ant. B		Ant. A				Ant. B				
							Tune-up Limit	Measured	Tune-up Limit	Measured	Measured		Scaled		Measured		Scaled		
											1-g	10-g	1-g	10-g	1-g	10-g	1-g	10-g	
5.3	802.11a	1 Tx	0	Rear	52	5260	18.0	17.9			0.103	0.040	0.105	0.041					
				Edge 1	52	5260	18.0	17.9			1.100	0.400	1.126	0.409					
					60	5300	18.0	17.8			1.100	0.403	1.152	0.422					
				Edge 4	52	5260	18.0	17.9			0.025	0.009	0.026	0.009					
				0	Rear	52	5260			16.5	16.3					0.060	0.025	0.063	0.026
					Edge 1	52	5260			16.5	16.3					1.080	0.397	1.131	0.416
		60	5300					16.5	16.3					1.030	0.381	1.079	0.399		
		Edge 2	52	5260			16.5	16.3					0.029	0.009	0.030	0.010			
		2 Tx CDD	0	Rear	52	5260	15.0	15.0	15.0	15.0	0.050	0.018	0.050	0.018	0.065	0.027	0.065	0.027	
				Edge 1	52	5260	15.0	15.0	15.0	15.0	0.525	0.187	0.525	0.187	0.692	0.253	0.692	0.253	
					64	5320	15.0	15.0	15.0	15.0	0.541	0.196	0.541	0.196	0.663	0.245	0.663	0.245	
				Edge 2	52	5260	15.0	15.0	15.0	15.0					0.017	0.006	0.017	0.006	
Edge 4	52			5260	15.0	15.0	15.0	15.0	0.016	0.004	0.016	0.004							

**Variant 2**

Band (GHz)	Mode	No. of Transmitters	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)				SAR (W/kg)								Plot No.
							Ant. A		Ant. B		Ant. A				Ant. B				
							Tune-up Limit	Measured	Tune-up Limit	Measured	Measured		Scaled		Measured		Scaled		
											1-g	10-g	1-g	10-g	1-g	10-g	1-g	10-g	
5.3	802.11n	2 Tx HT40 STBC	0	Edge 1	54	5270	18.0	18.0	16.5	16.5	1.090	0.403	1.090	0.403	0.965	0.369	0.965	0.369	

**11.2.4. 5.3 GHz Band (802.11n/ac mode)**

Band (GHz)	Mode	No. of Transmitters	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)				SAR (W/kg)								Plot No.
							Ant. A		Ant. B		Ant. A				Ant. B				
							Tune-up Limit	Measured	Tune-up Limit	Measured	Measured		Scaled		Measured		Scaled		
											1-g	10-g	1-g	10-g	1-g	10-g	1-g	10-g	
5.3	802.11n	2 Tx HT40 STBC	0	Rear	54	5270	18.0	18.0	16.5	16.5	0.088	0.035	0.088	0.035	0.068	0.028	0.068	0.028	3
				Edge 1	54	5270	18.0	18.0	16.5	16.5	1.170	0.426	1.170	0.426	1.070	0.397	1.070	0.397	
					62	5310	13.5	13.5	13.5	13.5	0.355	0.124	0.355	0.124	0.457	0.165	0.457	0.165	
				Edge 2	54	5270	18.0	18.0	16.5	16.5					0.022	0.007	0.022	0.007	
				Edge 4	54	5270	18.0	18.0	16.5	16.5	0.029	0.009	0.029	0.009					
Band (GHz)	Mode	No. of Transmitters	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)				SAR (W/kg)								Plot No.
							Ant. A		Ant. B		Ant. A				Ant. B				
							Tune-up Limit	Measured	Tune-up Limit	Measured	Measured		Scaled		Measured		Scaled		
											1-g	10-g	1-g	10-g	1-g	10-g	1-g	10-g	
5.3	802.11ac	2 Tx HT40 STBC	0	Edge 1	54	5270	18.0	18.0	16.5	16.5	1.080	0.391	1.080	0.391	1.040	0.388	1.040	0.388	

**11.2.5. 5.5 GHz Band**

**Variant 1**

Band (GHz)	Mode	No. of Transmitters	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)				SAR (W/kg)								Plot No.		
							Ant. A		Ant. B		Ant. A				Ant. B						
							Tune-up Limit	Measured	Tune-up Limit	Measured	Measured		Scaled		Measured		Scaled				
											1-g	10-g	1-g	10-g	1-g	10-g	1-g	10-g			
5.5	802.11a	1 Tx	0	Rear	104	5520	17.5	17.5			0.084	0.038	0.084	0.038							
				Edge 1	104	5520	17.5	17.5			1.080	0.383	1.080	0.383							
					116	5580	17.5	17.5			1.160	0.410	1.160	0.410							
					124	5620	17.5	17.5			1.160	0.410	1.160	0.410							
					136	5680	17.5	17.5			1.170	0.405	1.170	0.405							
					104	5520	17.5	17.5			0.047	0.026	0.047	0.026							
				Rear	104	5520			18.0	18.0					0.126	0.038	0.126	0.038			
				Edge 1	104	5520			18.0	18.0					1.020	0.389	1.020	0.389			
					116	5580			18.0	18.0					1.090	0.417	1.090	0.417			
					124	5620			18.0	18.0					1.110	0.426	1.110	0.426			
		136	5680				18.0	18.0					1.190	0.452	1.190	0.452			4		
		104	5520				18.0	18.0					0.066	0.038	0.066	0.038					
		2 Tx CDD	0	Rear	104	5520	14.5	14.5	14.5	14.5	0.066	0.034	0.066	0.034	0.061	0.031	0.061	0.031			
				Edge 1	104	5520	14.5	14.5	14.5	14.5	0.535	0.213	0.535	0.213	0.479	0.178	0.479	0.178			
					116	5580	14.5	14.5	14.5	14.5	0.557	0.193	0.557	0.193	0.465	0.173	0.465	0.173			
					124	5620	14.5	14.5	14.5	14.5	0.565	0.196	0.565	0.196	0.497	0.186	0.497	0.186			
					136	5680	14.5	14.5	14.5	14.5	0.577	0.202	0.577	0.202	0.504	0.178	0.504	0.178			
				Edge 2	104	5520	14.5	14.5	14.5	14.5					0.041	0.020	0.041	0.020			
Edge 4	104			5520	14.5	14.5	14.5	14.5	0.035	0.017	0.035	0.017									

**Variant 2**

Band (GHz)	Mode	No. of Transmitters	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)				SAR (W/kg)								Plot No.
							Ant. A		Ant. B		Ant. A				Ant. B				
							Tune-up Limit	Measured	Tune-up Limit	Measured	Measured		Scaled		Measured		Scaled		
											1-g	10-g	1-g	10-g	1-g	10-g	1-g	10-g	
5.5	802.11a	1 Tx	0	Edge 1	136	5680			18.0	18.0					1.040	0.392	1.040	0.392	

**11.2.6. 5.5 GHz Band (802.11n/ac mode)**

Band (GHz)	Mode	No. of Transmitters	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)				SAR (W/kg)								Plot No.
							Ant. A		Ant. B		Ant. A				Ant. B				
							Tune-up Limit	Measured	Tune-up Limit	Measured	Measured		Scaled		Measured		Scaled		
											1-g	10-g	1-g	10-g	1-g	10-g	1-g	10-g	
5.5	802.11n	2 Tx HT40 STBC	0	Rear	110	5550	17.5	17.3	18.0	18.0	0.128	0.043	0.134	0.045	0.162	0.076	0.162	0.076	
				Edge 1	102	5510	13.0	12.9	13.0	12.9	0.278	0.095	0.284	0.097	0.315	0.110	0.322	0.113	
					110	5550	17.5	17.3	18.0	18.0	0.941	0.339	0.985	0.355	1.120	0.409	1.120	0.409	
				Edge 2	134	5670	13.0	13.0	13.0	13.0	0.500	0.160	0.500	0.160	0.459	0.183	0.459	0.183	
					110	5550	17.5	17.3	18.0	18.0					0.094	0.043	0.094	0.043	
				Edge 4	110	5550	17.5	17.3	18.0	18.0	0.073	0.037	0.077	0.038					
5.5	802.11ac	1 Tx HT20	0	Edge 1	136	5680	Power (dBm)				SAR (W/kg)								
							Ant. A		Ant. B		Ant. A				Ant. B				
							Tune-up Limit	Measured	Tune-up Limit	Measured	Measured		Scaled		Measured		Scaled		
											1-g	10-g	1-g	10-g	1-g	10-g	1-g	10-g	
		18.0	18.0					1.020	0.384	1.020	0.384								

**11.2.7. 5.8 GHz Band**

**Variant 1**

Band (GHz)	Mode	No. of Transmitters	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)				SAR (W/kg)								Plot No.	
							Ant. A		Ant. B		Ant. A				Ant. B					
							Tune-up Limit	Measured	Tune-up Limit	Measured	Measured		Scaled		Measured		Scaled			
											1-g	10-g	1-g	10-g	1-g	10-g	1-g	10-g		
5.8	802.11a	1 Tx	0	Rear	157	5785	17.0	16.9			0.091	0.033	0.093	0.034						
				Edge 1	153	5765	17.0	16.8			0.978	0.352	1.024	0.369						
					157	5785	17.0	16.9			1.090	0.353	1.115	0.361						
				161	5805	17.0	16.8			0.962	0.327	1.007	0.342							
		Edge 4	157	5785	17.0	16.9			0.048	0.015	0.049	0.015								
		0	Rear	157	5785			18.0	18.0					0.078	0.033	0.078	0.033			
			Edge 1	153	5765			18.0	18.0					1.170	0.449	1.170	0.449			
				157	5785			18.0	18.0					1.110	0.365	1.110	0.365			
	161		5805			18.0	18.0					1.160	0.424	1.160	0.424					
	Edge 2	157	5785			18.0	18.0					0.063	0.022	0.063	0.022					
	2 Tx CDD	0	Rear	157	5785	17.0	16.8	18.0	18.0	0.135	0.047	0.141	0.050	0.156	0.060	0.156	0.060			
			Edge 1	153	5765	17.0	16.8	18.0	18.0	1.030	0.368	1.079	0.385	1.160	0.450	1.160	0.450			
				157	5785	17.0	16.8	18.0	18.0	1.000	0.353	1.047	0.370	1.150	0.426	1.150	0.426			
			161	5805	17.0	16.8	18.0	18.0	0.987	0.347	1.034	0.363	1.170	0.438	1.170	0.438	5			
			Edge 2	157	5785	17.0	16.8	18.0	18.0					0.097	0.032	0.097	0.032			
			Edge 4	157	5785	17.0	16.8	18.0	18.0	0.059	0.019	0.062	0.020							

**Variant 2**

Band (GHz)	Mode	No. of Transmitters	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)				SAR (W/kg)								Plot No.
							Ant. A		Ant. B		Ant. A				Ant. B				
							Tune-up Limit	Measured	Tune-up Limit	Measured	Measured		Scaled		Measured		Scaled		
											1-g	10-g	1-g	10-g	1-g	10-g	1-g	10-g	
5.8	802.11a	2 Tx CDD	0	Edge 1	161	5805	17.0	16.8	18.0	17.8	0.955	0.326	1.000	0.341	1.010	0.356	1.058	0.373	

**11.2.8. 5.8 GHz Band (802.11ac mode)**

Band (GHz)	Mode	No. of Transmitters	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)				SAR (W/kg)								Plot No.
							Ant. A		Ant. B		Ant. A				Ant. B				
							Tune-up Limit	Measured	Tune-up Limit	Measured	Measured		Scaled		Measured		Scaled		
											1-g	10-g	1-g	10-g	1-g	10-g	1-g	10-g	
5.8	802.11ac	2 Tx HT20 CDD	0	Edge 1	161	5805	17.0	17.0	18.0	18.0	1.060	0.378	1.060	0.378	1.100	0.420	1.100	0.420	



### 11.3. Bluetooth

#### Variant 1

Mode	Test Position	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		SAR (W/kg)				Plot No.
					Ant. B		Ant. B				
					Tune-up Limit	Measured	Measured		Scaled		
							1-g	10-g	1-g	10-g	
GFSK	Rear	0	39	2441	12.0	11.6	0.030	0.011	0.033	0.012	6
	Edge 1	0	39	2441	12.0	11.6	0.333	0.104	0.365	0.114	
	Edge 2	0	39	2441	12.0	11.6	0.024	0.010	0.026	0.010	

#### Variant 2

Mode	Test Position	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		SAR (W/kg)				Plot No.
					Ant. B		Ant. B				
					Tune-up Limit	Measured	Measured		Scaled		
							1-g	10-g	1-g	10-g	
GFSK	Edge 1	0	39	2441	12.0	11.5	0.292	0.094	0.328	0.106	

## 12. SAR Measurement Variability

In accordance with published RF Exposure KDB procedure 865664 D01 SAR measurement 100 MHz to 6 GHz. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

- 1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
- 2) When the original highest measured SAR is  $\geq 0.80$  W/kg, repeat that measurement once.
- 3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is  $\geq 1.45$  W/kg (~ 10% from the 1-g SAR limit).
- 4) Perform a third repeated measurement only if the original, first or second repeated measurement is  $\geq 1.5$  W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

### 12.1. The Highest Measured SAR Configuration in Each Frequency Band

Frequency Band (MHz)	Air Interface	Body (W/kg)
2400	WiFi 802.11b/g/n	1.160
	Bluetooth	N/A
5200	WiFi 802.11a/n	1.190
5300	WiFi 802.11a/n	1.170
5500	WiFi 802.11a/n	1.190
5800	WiFi 802.11a/n	1.170

### 12.2. Repeated Measurement Results

Band	Test Position	Mode	No. of Transmitters	Ch. #	Freq. (MHz)	1-g SAR (W/kg)		1-g SAR (W/kg)		Largest to Smallest SAR Ratio		Note
						Original		Repeated		SAR Ratio		
						Ant. A	Ant. B	Ant. A	Ant. B	Ant. A	Ant. B	
2.4GHz	Edge 1	802.11b	1 Tx	11	2462		1.160		1.120		1.04	1
5.2GHz	Edge 1	802.11a	1 Tx	40	5180		1.190		1.170		1.02	1
5.3GHz	Edge 1	802.11.n HT40 STBC	2 Tx	54	5270	1.170	1.070	1.100	0.985	1.06	1.09	1
5.5GHz	Edge 1	802.11a	1 Tx	136	5680		1.190		1.190		1.00	1
5.8GHz	Edge 1	802.11a CDD	2 Tx	161	5805	0.987	1.170	0.940	1.120	1.05	1.04	1

#### Note(s):

1. Second Repeated Measurement is not required since the ratio of the largest to smallest SAR for the original and first repeated measurement is not > 1.20.

### 13. Simultaneous Transmission SAR Analysis

KDB 447498 D01 General RF Exposure Guidance introduces a new formula for calculating the SAR to Peak Location Ratio (SPLSR) between pairs of simultaneously transmitting antennas:

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

Where:

**SAR<sub>1</sub>** is the highest measured or estimated SAR for the first of a pair of simultaneous transmitting antennas, in a specific test operating mode and exposure condition

**SAR<sub>2</sub>** is the highest measured or estimated SAR for the second of a pair of simultaneous transmitting antennas, in the same test operating mode and exposure condition as the first

**Ri** is the separation distance between the pair of simultaneous transmitting antennas. When the SAR is measured, for both antennas in the pair, it is determined by the actual x, y and z coordinates in the 1-g SAR for each SAR peak location, based on the extrapolated and interpolated result in the zoom scan measurement, using the formula of  $[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$

A new threshold of 0.04 is also introduced in the draft KDB. Thus, in order for a pair of simultaneous transmitting antennas with the sum of 1-g SAR > 1.6 W/kg to qualify for exemption from Simultaneous Transmission SAR measurements, it has to satisfy the condition of:

$$(SAR_1 + SAR_2)^{1.5} / Ri < 0.04$$

#### 13.1. Estimated SAR for Simultaneous Transmission SAR Analysis

##### Considerations for SAR estimation

1. When standalone SAR test exclusion applies, standalone SAR must also be estimated to determine simultaneous transmission SAR test exclusion.
2. Dedicated Host Approach criteria for SAR test exclusion is likewise applied to SAR estimation, with certain distinctions between test exclusion and SAR estimation:
  - o When the separation distance from the antenna to an adjacent edge is ≤ 5 mm, a distance of 5 mm is applied for SAR estimation; this is the same between test exclusion and SAR estimation calculations.
  - o When the separation distance from the antenna to an adjacent edge is > 5 mm but ≤ 50 mm, the actual antenna-to-edge separation distance is applied for SAR estimation.
  - o When the minimum test separation distance is > 50 mm, the estimated SAR value is 0.4 W/kg

##### 13.1.1. Estimated SAR for Wi-Fi and BT

Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Estimated 1-g SAR Value (W/kg)					
		dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
<b>Antenna A</b>															
Wi-Fi 2.4 GHz	2462	15.50	35	5	3.1	916	224.2	22.5		-MEASURE-	-MEASURE-	0.400	0.400	0.38	
Wi-Fi 5.2 GHz	5230	18.00	63	5	3.1	916	224.2	22.5		-MEASURE-	-MEASURE-	0.400	0.400	-MEASURE-	
Wi-Fi 5.3 GHz	5300	18.00	63	5	3.1	916	224.2	22.5		-MEASURE-	-MEASURE-	0.400	0.400	-MEASURE-	
Wi-Fi 5.5 GHz	5680	17.50	56	5	3.1	916	224.2	22.5		-MEASURE-	-MEASURE-	0.400	0.400	-MEASURE-	
Wi-Fi 5.8 GHz	5825	17.00	50	5	3.1	916	224.2	22.5		-MEASURE-	-MEASURE-	0.400	0.400	-MEASURE-	
<b>Antenna B</b>															
Wi-Fi 2.4 GHz	2462	15.50	35	5	3.1	23	224.2	916		-MEASURE-	-MEASURE-	0.38	0.400	0.400	
Wi-Fi 5.2 GHz	5230	16.50	45	5	3.1	23	224.2	916		-MEASURE-	-MEASURE-	-MEASURE-	0.400	0.400	
Wi-Fi 5.3 GHz	5300	16.50	45	5	3.1	23	224.2	916		-MEASURE-	-MEASURE-	-MEASURE-	0.400	0.400	
Wi-Fi 5.5 GHz	5680	18.00	63	5	3.1	23	224.2	916		-MEASURE-	-MEASURE-	-MEASURE-	0.400	0.400	
Wi-Fi 5.8 GHz	5825	18.00	63	5	3.1	23	224.2	916		-MEASURE-	-MEASURE-	-MEASURE-	0.400	0.400	
Bluetooth	2480	12.00	16	5	3.1	23	224.2	916		-MEASURE-	-MEASURE-	0.46	0.400	0.400	

##### Use of WiFi estimated SAR in simultaneous transmission SAR analysis

- Edge 4 for Bluetooth: The estimated SAR value of **0.400** W/kg was used in Simultaneous Transmission Analysis, and distinguished from measured SAR values with green text.

**13.2. Sum of the SAR for Wi-Fi 5GHz & BT**

RF Exposure condition	Test Position	Simultaneous Transmission Scenario				$\Sigma$ 1-g SAR (W/kg)	SPLSR (Yes/ No)
		UNII Band			Bluetooth (Ant. B)		
		Ant. A	Ant. B	Ant. A + Ant. B			
Body	Rear	0.132			0.033	0.165	No
			0.126		0.033	0.159	No
				0.162	0.033	0.195	No
	Edge 1	1.170			0.365	1.535	No
			1.190		0.365	1.555	No
				1.170	0.365	1.535	No
	Edge 2		0.066		0.026	0.092	No
				0.097	0.026	0.123	No
	Edge 4	0.049			0.400	0.449	No
				0.062	0.400	0.462	No

**SAR to Peak Location Separation Ratio (SPLSR)**

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

## 14. Appendixes

Refer to separated files for the following appendixes.

- 14.1. Photos
- 14.2. System Check Plots
- 14.3. Highest SAR Test Plots
- 14.4. Calibration Certificate for E-Field Probe EX3DV4 - SN 3885
- 14.5. Calibration Certificate for E-Field Probe EX3DV4 - SN 3751
- 14.6. Calibration Certificate for E-Field Probe EX3DV4 - SN 3749
- 14.7. Calibration Certificate for E-Field Probe EX3DV4 - SN 3901
- 14.8. Calibration Certificate for E-Field Probe EX3DV4 - SN 3686
- 14.9. Calibration Certificate for E-Field Probe EX3DV4 - SN 3989
- 14.10. Calibration Certificate for E-Field Probe EX3DV4 - SN 3990
- 14.11. Calibration Certificate for D2450V2 - SN 706
- 14.12. Calibration Certificate for D5GHzV2 - SN 1003
- 14.13. Calibration Certificate for D5GHzV2 - SN 1168
- 14.14. Tissue Material Ingredients

**END OF REPORT**