



SAR EVALUATION REPORT

**FCC 47 CFR § 2.1093
IEEE Std 1528-2013**

The model FCC ID: A3LSMP355 shares the same enclosure and circuit board as model FCC ID: A3LSMP350. The WLAN/Bluetooth circuitry and layout, including antenna, are almost identical between the two units. The WLAN/Bluetooth antenna and surrounding circuitry is the same between these two units, and tune up power targets are identical for WLAN (with the addition of Wi-Fi 2.4GHz channel 12 & 13) and Bluetooth operations. For these reasons, the SAR data for the WLAN, and Bluetooth operations for FCC ID: A3LSMP355 is considered representative for FCC ID: A3LSMP350.

For
BT/BLE, DTS/UNII a/b/g/n and ANT+

**FCC ID: A3LSMP350
Model Name: SM-P350**

**Report Number: 15I19963-S1A
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Table of Contents

1.	Attestation of Test Results	5
2.	Test Specification, Methods and Procedures.....	6
3.	Facilities and Accreditation	6
4.	SAR Measurement System & Test Equipment	7
4.1.	<i>SAR Measurement System.....</i>	7
4.2.	<i>SAR Scan Procedures.....</i>	8
4.3.	<i>Test Equipment.....</i>	10
5.	Measurement Uncertainty.....	11
6.	Device Under Test (DUT) Information	12
6.1.	<i>DUT Description</i>	12
6.2.	<i>Wireless Technologies.....</i>	12
6.3.	<i>Nominal and Maximum Output Power.....</i>	12
6.4.	<i>Power Reduction by Proximity Sensing</i>	13
6.4.1.	<i>Proximity Sensor Triggering Distance (KDB 616217 §6.2).....</i>	13
6.4.2.	<i>Proximity Sensor Triggering Distance Measurement Results.....</i>	14
6.4.3.	<i>Proximity Sensor Coverage (KDB 616217 §6.3)</i>	15
6.4.1.	<i>Resulting test positions for SAR measurements</i>	15
7.	RF Exposure Conditions (Test Configurations)	16
7.1.	<i>Standalone SAR Test Exclusion Considerations.....</i>	16
7.2.	<i>Required Test Configurations</i>	18
8.	Dielectric Property Measurements & System Check	19
8.1.	<i>Dielectric Property Measurements</i>	19
8.2.	<i>System Check.....</i>	21
9.	Conducted Output Power Measurements.....	24
9.1.	<i>Wi-Fi 2.4GHz</i>	24
9.2.	<i>Wi-Fi 5GHz.....</i>	25
9.3.	<i>Bluetooth</i>	26
10.	Measured and Reported (Scaled) SAR Results.....	27
10.1.	<i>Wi-Fi (DTS Band).....</i>	28
10.2.	<i>Wi-Fi (U-NII Band).....</i>	28
10.3.	<i>Bluetooth.....</i>	28
11.	SAR Measurement Variability.....	29

12. Simultaneous Transmission SAR Analysis	30
12.1. Sum of the SAR for Wi-Fi & BT	30
Appendixes	31
A_15I19963v0 SAR Photos & Ant. Locations	31
B_15I19963v0 SAR System Check Plots	31
C_15I19963v0 SAR SAR Highest Test Plots.....	31
D_15I19963v0 SAR Tissue Ingredients.....	31
E_15I19963v0 SAR Probe Cal. Certificates.....	31
F_15I19963v0 SAR Dipole Cal. Certificates	31

1. Attestation of Test Results

Applicant Name	SAMSUNG ELECTRONICS CO., LTD.			
FCC ID	A3LSMP350			
Model Name	SM-P350			
Applicable Standards	FCC 47 CFR § 2.1093 Published RF exposure KDB procedures IEEE Std 1528-2013			
SAR Limits (W/Kg)				
Exposure Category	Peak spatial-average(1g of tissue)			
General population / Uncontrolled exposure	1.6			
The Highest Reported SAR (W/kg)				
RF Exposure Conditions	Equipment Class			
	Licensed	DTS	U-NII	DSS (BT)
Body	N/A	0.367	0.489	0.426
Simultaneous Tx Body		N/A	0.836	0.836
Date Tested	2/16/2015 to 2/26/2015			
Test Results	Pass			
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. Note: 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.				
Approved & Released By:		Prepared By:		
				
Bobby Bayani Senior Engineer UL Verification Services Inc.		Krishelle Aurelio Laboratory Technician UL Verification Services Inc.		

2. Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093, IEEE STD 1528-2013, the following FCC Published RF exposure [KDB](#) procedures:

- o 248227 D01 SAR meas for 802.11 v02
- o 447498 D01 General RF Exposure Guidance v05r02
- o 447498 D03 Supplement C Cross-Reference
- o 616217 D04 SAR for laptop and tablets v01r01
- o 690783 D01 SAR Listings on Grants v01r03
- o 865664 D01 SAR measurement 100 MHz to 6 GHz v01r03
- o 865664 D02 RF Exposure Reporting v01r01

3. Facilities and Accreditation

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

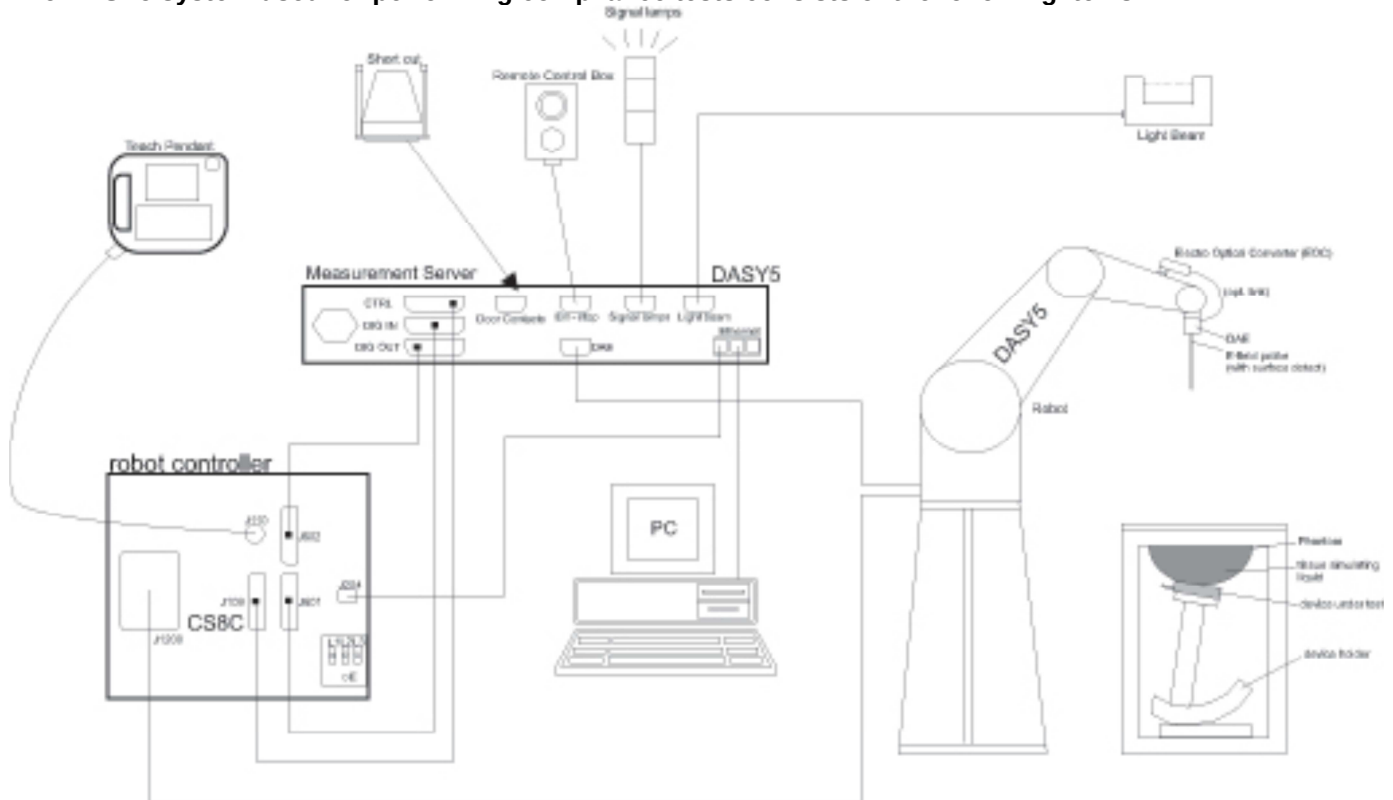
47173 Benicia Street	47266 Benicia Street
SAR Lab A	SAR Lab 1
SAR Lab B	SAR Lab 2
SAR Lab C	SAR Lab 3
SAR Lab D	SAR Lab 4
SAR Lab E	SAR Lab 5
SAR Lab F	
SAR Lab G	
SAR Lab H	

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0.

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. SAR Scan Procedures

Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 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

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 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: $\Delta x_{\text{Area}}, \Delta y_{\text{Area}}$	≤ 2 GHz: ≤ 15 mm $2 - 3$ GHz: ≤ 12 mm	$3 - 4$ GHz: ≤ 12 mm $4 - 6$ GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be $\leq$ 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: $\Delta x_{\text{Zoom}}, \Delta y_{\text{Zoom}}$			≤ 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: $\Delta z_{\text{Zoom}}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{\text{Zoom}}(1)$: between 1 st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{\text{Zoom}}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{\text{Zoom}}(n-1)$	
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: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.				
* When zoom scan is required and the <i>reported</i> SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

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.

4.3. 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	8753ES	MY40001647	7/17/2015
Dielectronic Probe kit	SPEAG	DAK-3.5	1087	11/11/2015
Dielectronic Probe kit	SPEAG	DAK-3.5 Short	SM DAK 200 BA	N/A
Thermometer	Traceable Calibration Control Co.	4242	122529162	10/8/2015

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 15-4	1319A02778	N/A
Synthesized Signal Generator	HP	8665B	3744A01155	3/12/2015
Power Meter	HP	437B	3125U11364	8/27/2015
Power Meter	HP	437B	3125U12345	8/15/2015
Power Sensor	HP	8481A	1926A27048	8/15/2015
Power Sensor	HP	8481A	2702A76223	9/17/2015
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 (SAR Lab B)	SPEAG	EX3DV4	3751	11/14/2015
E-Field Probe (SAR Lab F)	SPEAG	EX3DV4	3936	7/24/2015
E-Field Probe (SAR Lab G)	SPEAG	EX3DV4	3990	4/15/2015
Data Acquisition Electronics (SAR Lab B)	SPEAG	DAE3	500	5/15/2015
Data Acquisition Electronics (SAR Lab F)	SPEAG	DAE4	1239	4/15/2015
Data Acquisition Electronics (SAR Lab G)	SPEAG	DAE3	1434	4/14/2015
System Validation Dipole	SPEAG	D2450V2	706	5/20/2015
System Validation Dipole	SPEAG	D5GHzV2	1168	12/4/2015

Other

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Power Sensor	Agilent	N1921A	MY52200012	9/26/2015
Power Meter	Agilent	N1911A	MY53060009	5/5/2015
Power Sensor	Agilent	E9323A	MY53070003	5/1/2015

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

Device Dimension	Overall (Length x Width): 209 mm x 139 mm Overall Diagonal: 242 mm Display Diagonal: 205 mm
Battery Back Cover	☒ The rechargeable battery is not user accessible.
Battery Options	☒ The rechargeable battery is not user accessible.
Wireless Router (Hotspot)	Wi-Fi Hotspot mode permits the device to share its cellular data connection with other Wi-Fi-enabled devices. ☒ Mobile Hotspot (Wi-Fi 2.4 GHz) ☐ Mobile Hotspot (Wi-Fi 5 GHz)
Wi-Fi Direct	Wi-Fi Direct enabled devices transfer data directly between each other ☒ Wi-Fi Direct (Wi-Fi 2.4 GHz) ☒ Wi-Fi Direct (Wi-Fi 5 GHz)

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)	100%
	Does this device support TDWR (Terminal Doppler Weather Radar)? ☐ Yes ☒ No		
	Does this device support Band gap channel? ☐ Yes ☒ No		
Bluetooth	2.4 GHz	Version 4.1 LE	77.5% (DH5)

6.3. Nominal and Maximum Output Power

KDB 447498 sec.4.1.(3) at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit

Upper limit (dB): 0.5		Max. RF Output Power (dBm)		Reduced RF Output Power (dBm)	
RF Air interface	Mode	Target	Max. tune-up tolerance limit	Target	Max. tune-up tolerance limit
WiFi 2.4 GHz	802.11b	16.0	16.5	11.0	11.5
	802.11g	13.0	13.5	11.0	11.5
	802.11n HT20	12.0	12.5	11.0	11.5
WiFi 5 GHz	802.11a	11.0	11.5	6.0	6.5
	802.11n HT20	11.0	11.5	6.0	6.5
	802.11n HT40	9.0	9.5	6.0	6.5
Bluetooth		10.0	10.5	N/A	
Bluetooth LE		0.5	1.0	N/A	

6.4. Power Reduction by Proximity Sensing

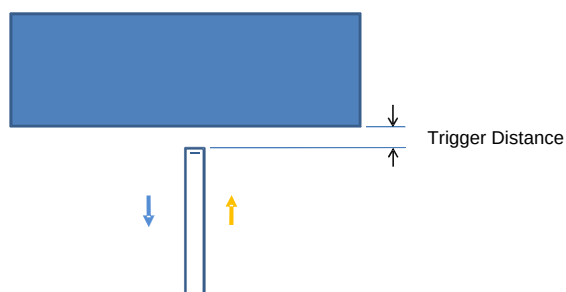
6.4.1. Proximity Sensor Triggering Distance (KDB 616217 §6.2)

Edge 1 of the DUT was placed directly below the flat phantom. The DUT was moved toward the phantom in accordance with the steps outlined in KDB 616217 §6.2 to determine the trigger distance for enabling power reduction. The DUT was moved away from the phantom to determine the trigger distance for resuming full power.

The measurement was then repeated for the Rear surface.

The DUT featured a visual indicator on its display that showed the status of the proximity sensor (Triggered or not triggered). This was used to determine the status of the sensor during the proximity sensor assessment as monitoring the output power directly was not practical without affecting the measurement.

It was confirmed separately that the output power was altered according to the proximity sensor status indication. This was achieved by observing the proximity sensor status at the same time as monitoring the conducted power. Section 9 contains both the full and reduced conducted power measurements.



Proximity Sensor Trigger Distance Assessment
KDB 616217 §6.2, **Edge 1, 2**



Proximity Sensor Trigger Distance Assessment
KDB 616217 §6.2, **Rear**

LEGEND

- ➡ Direction of DUT travel for determination of power reduction triggering point
- ➡ Direction of DUT travel for determination of full power resumption triggering point

Summary of Trigger Distances for Wi-Fi

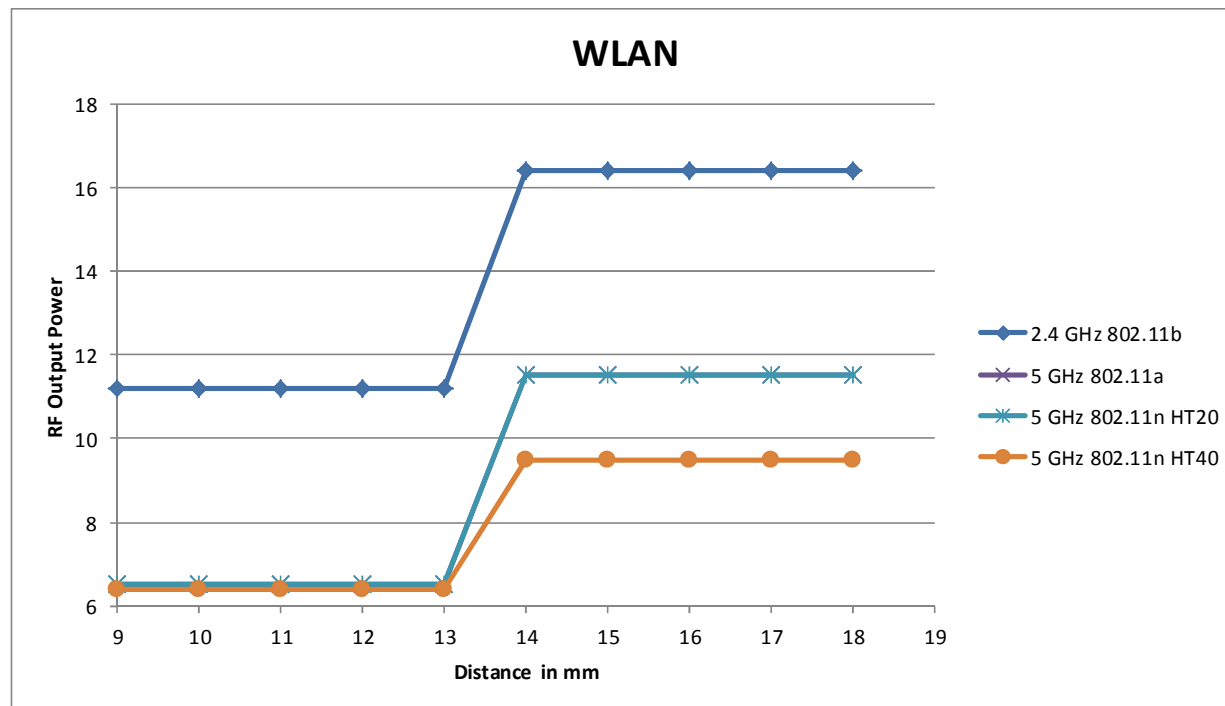
Tissue simulating liquid	Trigger distance - Rear		Trigger distance – Edge 1	
	Moving toward phantom	Moving from phantom	Moving from phantom	Moving toward phantom
2450 muscle	13mm	13mm	11mm	11mm
5000 muscle	13mm	13mm	11mm	11mm

6.4.2. Proximity Sensor Triggering Distance Measurement Results

Wi-Fi 2.4GHz and 5GHz

Rear, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

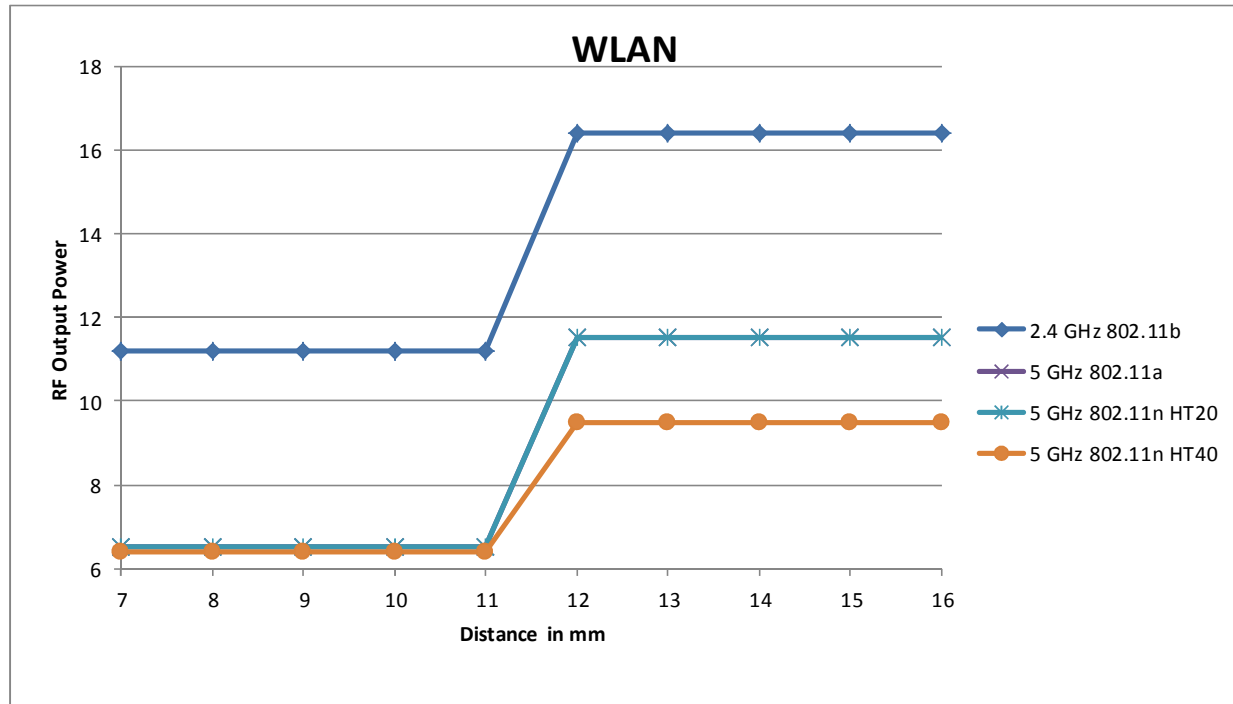
Distance to DUT vs. Output Power in dBm										
Distance	9	10	11	12	13	14	15	16	17	18
2.4 GHz 802.11b	11.20	11.20	11.20	11.20	11.20	16.40	16.40	16.40	16.40	16.40
5 GHz 802.11a	6.50	6.50	6.50	6.50	6.50	11.50	11.50	11.50	11.50	11.50
5 GHz 802.11n HT20	6.50	6.50	6.50	6.50	6.50	11.50	11.50	11.50	11.50	11.50
5 GHz 802.11n HT40	6.40	6.40	6.40	6.40	6.40	9.50	9.50	9.50	9.50	9.50



Wi-Fi 2.4GHz and 5GHz

Edge 1, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance	7	8	9	10	11	12	13	14	15	16
2.4 GHz 802.11b	11.20	11.20	11.20	11.20	11.20	16.40	16.40	16.40	16.40	16.40
5 GHz 802.11a	6.50	6.50	6.50	6.50	6.50	11.50	11.50	11.50	11.50	11.50
5 GHz 802.11n HT20	6.50	6.50	6.50	6.50	6.50	11.50	11.50	11.50	11.50	11.50
5 GHz 802.11n HT40	6.40	6.40	6.40	6.40	6.40	9.50	9.50	9.50	9.50	9.50



6.4.3. Proximity Sensor Coverage (KDB 616217 §6.3)

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

6.4.1. Resulting test positions for SAR measurements

Wireless technologies	Position	§6.2 Triggering Distance	§6.3 Coverage	§6.4 Tilt Angle	Worst case distance for SAR
WLAN	Rear	14 mm	N/A	N/A	13 mm
	Edge 1	12 mm	N/A	11 mm	11 mm
	Edge 2	0 mm	N/A	8 mm	0 mm

7. RF Exposure Conditions (Test Configurations)

Refer to "SAR Photos and Ant locations" Appendix for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.

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:

- o 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.
- o 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.

SAR Test Exclusion Calculations for WLAN

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	Rear	Edge 1	Edge 2	Edge 3	Edge 4
Full Power													
Wi-Fi 2.4 GHz	2462	16.50	45	13	23	14.5	190	98	5.4 -MEASURE-	3.1 -MEASURE-	4.7 -MEASURE-	> 50 mm	> 50 mm
Wi-Fi 5.2 GHz	5240	11.50	14	13	23	14.5	190	98	2.5 -EXEMPT-	14 -EXEMPT-	2.1 -EXEMPT-	> 50 mm	> 50 mm
Wi-Fi 5.3 GHz	5320	11.50	14	13	23	14.5	190	98	2.5 -EXEMPT-	14 -EXEMPT-	2.2 -EXEMPT-	> 50 mm	> 50 mm
Wi-Fi 5.5 GHz	5680	11.50	14	13	23	14.5	190	98	2.6 -EXEMPT-	15 -EXEMPT-	2.2 -EXEMPT-	> 50 mm	> 50 mm
Wi-Fi 5.8 GHz	5825	11.50	14	13	23	14.5	190	98	2.6 -EXEMPT-	15 -EXEMPT-	2.3 -EXEMPT-	> 50 mm	> 50 mm
Bluetooth	2480	10.50	11	5	12	14.5	190	98	3.5 -MEASURE-	14 -EXEMPT-	12 -EXEMPT-	> 50 mm	> 50 mm
Power Back Off													
Wi-Fi 2.4 GHz	2462	11.50	14	5	12				4.4 -MEASURE-	18 -EXEMPT-			
Wi-Fi 5.2 GHz	5240	6.50	4	5	12				18 -EXEMPT-	0.8 -EXEMPT-			
Wi-Fi 5.3 GHz	5300	6.50	4	5	12				18 -EXEMPT-	0.8 -EXEMPT-			
Wi-Fi 5.5 GHz	5600	6.50	4	5	12				19 -EXEMPT-	0.8 -EXEMPT-			
Wi-Fi 5.8 GHz	5825	6.50	4	5	12				19 -EXEMPT-	0.8 -EXEMPT-			

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
Full Power														
Wi-Fi 2.4 GHz	2462	16.50	45	13	23	14.5	190	98		< 50 mm	< 50 mm	< 50 mm	1495.6 mW -EXEMPT-	575.6 mW -EXEMPT-
Wi-Fi 5.2 GHz	5240	11.50	14	13	23	14.5	190	98		< 50 mm	< 50 mm	< 50 mm	1465.5 mW -EXEMPT-	545.5 mW -EXEMPT-
Wi-Fi 5.3 GHz	5320	11.50	14	13	23	14.5	190	98		< 50 mm	< 50 mm	< 50 mm	1465 mW -EXEMPT-	545 mW -EXEMPT-
Wi-Fi 5.5 GHz	5680	11.50	14	13	23	14.5	190	98		< 50 mm	< 50 mm	< 50 mm	1462.9 mW -EXEMPT-	542.9 mW -EXEMPT-
Wi-Fi 5.8 GHz	5825	11.50	14	13	23	14.5	190	98		< 50 mm	< 50 mm	< 50 mm	1462.2 mW -EXEMPT-	542.2 mW -EXEMPT-
Bluetooth	2480	10.50	11	5	12	14.5	190	98		< 50 mm	< 50 mm	< 50 mm	1495.3 mW -EXEMPT-	575.3 mW -EXEMPT-
Power Back Off														
Wi-Fi 2.4 GHz	2462	11.50	14	5	12					< 50 mm	< 50 mm			
Wi-Fi 5.2 GHz	5240	6.50	4	5	12					< 50 mm	< 50 mm			
Wi-Fi 5.3 GHz	5300	6.50	4	5	12					< 50 mm	< 50 mm			
Wi-Fi 5.5 GHz	5600	6.50	4	5	12					< 50 mm	< 50 mm			
Wi-Fi 5.8 GHz	5825	6.50	4	5	12					< 50 mm	< 50 mm			

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

The table below identifies the standalone test configurations required for this device according to the findings in Section 7.1:

Test Configurations	Rear	Edge 1	Edge 2	Edge 3	Edge 4
		(Top Edge)	(Right Edge)	(Bottom Edge)	(Left Edge)
Wi-Fi 2.4 GHz Full Power	Yes	Yes	Yes	No	No
Wi-Fi 2.4 GHz Reduced Power	Yes	No	No	No	No
Wi-Fi 5 GHz Full Power	No	No	No	No	No
Wi-Fi 5 GHz Reduced Power	No	No	No	No	No
Bluetooth	Yes	No	No	No	No

Note(s):

1. Yes = Testing is required.
2. No = Testing is not required.

8. Dielectric Property Measurements & System Check

8.1. 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.

Tissue Dielectric Parameters

FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

Target Frequency (MHz)	Body	
	ϵ_r	σ (S/m)
150	61.9	0.80
300	58.2	0.92
450	56.7	0.94
835	55.2	0.97
900	55.0	1.05
915	55.0	1.06
1450	54.0	1.30
1610	53.8	1.40
1800 – 2000	53.3	1.52
2450	52.7	1.95
3000	52.0	2.73
5000	49.3	5.07
5100	49.1	5.18
5200	49.0	5.30
5300	48.9	5.42
5400	48.7	5.53
5500	48.6	5.65
5600	48.5	5.77
5700	48.3	5.88
5800	48.2	6.00

IEEE Std 1528-2013

Refer to Table 3 within the IEEE Std 1528-2013

Dielectric Property Measurements Results:**SAR Lab B**

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
2/20/2015	Body 2450	e'	51.2000	Relative Permittivity (ϵ_r):	51.20	52.70	-2.85	5
		e"	14.3200	Conductivity (σ):	1.95	1.95	0.04	5
	Body 2410	e'	51.2800	Relative Permittivity (ϵ_r):	51.28	52.76	-2.80	5
		e"	14.2500	Conductivity (σ):	1.91	1.91	0.11	5
	Body 2475	e'	51.1700	Relative Permittivity (ϵ_r):	51.17	52.67	-2.85	5
		e"	14.3100	Conductivity (σ):	1.97	1.99	-0.80	5

SAR Lab F

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
2/18/2015	Head 5180	e'	35.8000	Relative Permittivity (ϵ_r):	35.80	36.01	-0.59	5
		e"	15.5700	Conductivity (σ):	4.48	4.63	-3.15	5
	Head 5200	e'	35.7600	Relative Permittivity (ϵ_r):	35.76	35.99	-0.64	5
		e"	15.5900	Conductivity (σ):	4.51	4.65	-3.08	5
	Head 5600	e'	35.4500	Relative Permittivity (ϵ_r):	35.45	35.53	-0.24	5
		e"	15.7300	Conductivity (σ):	4.90	5.06	-3.21	5
	Head 5800	e'	35.3200	Relative Permittivity (ϵ_r):	35.32	35.30	0.06	5
		e"	15.5500	Conductivity (σ):	5.01	5.27	-4.84	5
	Head 5825	e'	35.2900	Relative Permittivity (ϵ_r):	35.29	35.30	-0.03	5
		e"	15.5500	Conductivity (σ):	5.04	5.27	-4.43	5
2/18/2015	Body 5180	e'	49.0500	Relative Permittivity (ϵ_r):	49.05	49.05	0.01	5
		e"	17.6200	Conductivity (σ):	5.07	5.27	-3.73	5
	Body 5200	e'	49.0700	Relative Permittivity (ϵ_r):	49.07	49.02	0.10	5
		e"	17.6200	Conductivity (σ):	5.09	5.29	-3.78	5
	Body 5600	e'	48.4600	Relative Permittivity (ϵ_r):	48.46	48.48	-0.04	5
		e"	18.0000	Conductivity (σ):	5.60	5.76	-2.71	5
	Body 5800	e'	48.3100	Relative Permittivity (ϵ_r):	48.31	48.20	0.23	5
		e"	18.1100	Conductivity (σ):	5.84	6.00	-2.66	5
	Body 5825	e'	48.2700	Relative Permittivity (ϵ_r):	48.27	48.20	0.15	5
		e"	18.2000	Conductivity (σ):	5.89	6.00	-1.75	5
2/25/2015	Body 5180	e'	47.6800	Relative Permittivity (ϵ_r):	47.68	49.05	-2.79	5
		e"	18.3400	Conductivity (σ):	5.28	5.27	0.21	5
	Body 5200	e'	47.6700	Relative Permittivity (ϵ_r):	47.67	49.02	-2.75	5
		e"	18.3600	Conductivity (σ):	5.31	5.29	0.26	5
	Body 5600	e'	47.0300	Relative Permittivity (ϵ_r):	47.03	48.48	-2.99	5
		e"	18.6800	Conductivity (σ):	5.82	5.76	0.96	5
	Body 5800	e'	46.7300	Relative Permittivity (ϵ_r):	46.73	48.20	-3.05	5
		e"	18.8400	Conductivity (σ):	6.08	6.00	1.26	5
	Body 5825	e'	46.7200	Relative Permittivity (ϵ_r):	46.72	48.20	-3.07	5
		e"	18.8600	Conductivity (σ):	6.11	6.00	1.81	5

SAR Lab G

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
2/16/2015	Head 2450	e'	40.5100	Relative Permittivity (ϵ_r):	40.51	39.20	3.34	5
		e"	13.7500	Conductivity (σ):	1.87	1.80	4.06	5
	Head 2410	e'	40.6600	Relative Permittivity (ϵ_r):	40.66	39.28	3.52	5
		e"	13.6200	Conductivity (σ):	1.83	1.76	3.67	5
	Head 2475	e'	40.4100	Relative Permittivity (ϵ_r):	40.41	39.17	3.17	5
		e"	13.7700	Conductivity (σ):	1.89	1.83	3.72	5
2/16/2015	Body 2450	e'	51.6700	Relative Permittivity (ϵ_r):	51.67	52.70	-1.95	5
		e"	14.8300	Conductivity (σ):	2.02	1.95	3.60	5
	Body 2410	e'	51.8100	Relative Permittivity (ϵ_r):	51.81	52.76	-1.80	5
		e"	14.6800	Conductivity (σ):	1.97	1.91	3.13	5
	Body 2475	e'	51.5500	Relative Permittivity (ϵ_r):	51.55	52.67	-2.12	5
		e"	14.9100	Conductivity (σ):	2.05	1.99	3.36	5

8.2. 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 re-measured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

System Performance Check Measurement Conditions:

- The measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness: 2.0 ± 0.2 mm (bottom plate) filled with Body or Head simulating liquid of the following parameters.
- The depth of tissue-equivalent liquid in a phantom must be ≥ 15.0 cm for SAR measurements ≤ 3 GHz and ≥ 10.0 cm for measurements > 3 GHz.
- The DASY system with an E-Field Probe was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 (below 3 GHz) and/or 8x8x7 (above 3 GHz) fine cube was chosen for the cube.
- Distance between probe sensors and phantom surface was set to 3 mm.
For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5 mm
- The dipole input power (forward power) was 100 mW.
- The results are normalized to 1 W input power.

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	1168	12/12/2013	5200	1g	79.3	76.0
				10g	22.5	21.1
			5600	1g	81.7	82.0
				10g	23.2	22.7
			5800	1g	78.0	76.2
				10g	22.1	21

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 $\pm 10\%$	Plot No.
	Type	Serial #			Zoom Scan to 100 mW	Normalize to 1 W			
2/20/2015	D2450V2	706	Body	1g	4.98	49.8	50.2	-0.80	1, 2
				10g	2.31	23.1	23.4	-1.28	

SAR Lab F

Date Tested	System Dipole		T.S. Liquid		Measured Results		Target (Ref. Value)	Delta $\pm 10\%$	Plot No.
	Type	Serial #			Zoom Scan to 100 mW	Normalize to 1 W			
2/18/2015	D5GHzV2 (5200)	1168	Body	1g	7.14	71.4	76.0	-6.05	3, 4
				10g	2.06	20.6	21.1	-2.37	
2/18/2015	D5GHzV2 (5600)	1168	Body	1g	7.90	79.0	82.0	-3.66	
				10g	2.23	22.3	22.7	-1.76	
2/18/2015	D5GHzV2 (5800)	1168	Body	1g	7.67	76.7	76.2	0.66	
				10g	2.18	21.8	21	3.81	
2/26/2015	D5GHzV2 (5200)	1168	Body	1g	7.54	75.4	76.0	-0.79	
				10g	2.15	21.5	21.1	1.90	
2/26/2015	D5GHzV2 (5600)	1168	Body	1g	8.41	84.1	82.0	2.56	
				10g	2.36	23.6	22.7	3.96	
2/26/2015	D5GHzV2 (5800)	1168	Body	1g	7.29	72.9	76.2	-4.33	
				10g	2.05	20.5	21.0	-2.38	

SAR Lab G

Date Tested	System Dipole		T.S. Liquid		Measured Results		Target (Ref. Value)	Delta $\pm 10\%$	Plot No.
	Type	Serial #			Zoom Scan to 100 mW	Normalize to 1 W			
2/16/2015	D2450V2	706	Body	1g	4.85	48.5	50.2	-3.39	5, 6
				10g	2.24	22.4	23.4	-4.27	

9. Conducted Output Power Measurements

9.1. Wi-Fi 2.4GHz

Max Power

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Avg Pwr (dBm)	Max Output Power (dBm)	SAR Test (Yes/No)	Note(s)
2.4	802.11b	1 Mbps	1	2412	16.4	16.5	Yes	
			6	2437	16.1			
			11	2462	16.2			
			12	2467	Not Required	10.5	No	2
			13	2472		0.5		
	802.11g	6 Mbps	1	2412	Not Required	13.5	No	1
			6	2437				
			11	2462		10.5	No	2
			12	2467				
			13	2472		0.5		
	802.11n (HT20)	MCS0	1	2412		12.5	No	1
			6	2437				
			11	2462		10.5	No	2
			12	2467				
			13	2472		0.5		

With Power Back-Off

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Avg Pwr (dBm)	Max Output Power (dBm)	SAR Test (Yes/No)	Note(s)
2.4	802.11b	1 Mbps	1	2412	11.2	11.5	Yes	
			6	2437	11.0			
			11	2462	11.0			
			12	2467	Not Required	10.5	No	2
			13	2472		0.5		
	802.11g	6 Mbps	1	2412	Not Required	11.5	No	1
			6	2437				
			11	2462		10.5	No	2
			12	2467				
			13	2472		0.5		
	802.11n (HT20)	MCS0	1	2412		11.5	No	1
			6	2437				
			11	2462		10.5	No	2
			12	2467				
			13	2472		0.5		

Note(s):

Per KDB 248227 D01 v02:

- Output Power and SAR is not required for 802.11g/n HT20 channels when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.
- 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.

9.2. Wi-Fi 5GHz

Max Power

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Avg Pwr (dBm)	Max Output Power (dBm)	SAR Test (Yes/No)	Note(s)
5.2 (U-NII 1)	802.11a	6 Mbps	36	5180	11.2	11.5	No	3
			40	5200	11.3			
			44	5220	11.4			
			48	5240	10.9			
	802.11n (HT20)	6.5 Mbps	36	5180	11.2	11.5	No	3
			40	5200	11.3			
			44	5220	11.3			
			48	5240	10.9			
	802.11n (HT40)	13.5 Mbps	38-46	5190 - 5230	Not Required	9.5	No	1
5.3 (U-NII 2A)	802.11a	6 Mbps	52	5260	11.1	11.5	Yes	
			56	5280	11.5			
			60	5300	10.8			
			64	5320	10.7			
	802.11n (HT20)	6.5 Mbps	52	5260	11.2	11.5	No	2
			56	5280	11.4			
			60	5300	10.8			
			64	5320	10.9			
	802.11n (HT40)	13.5 Mbps	54-62	5270 - 5310	Not Required	9.5	No	1
5.5 (U-NII 2C)	802.11a	6 Mbps	100	5500	11.3	11.5	Yes	
			116	5580	11.3			
			140	5700	10.7			
	802.11n (HT20)	6.5 Mbps	100	5500	11.0	11.5	No	2
			116	5580	11.0			
			140	5700	10.8			
	802.11n (HT40)	13.5 Mbps	102-134	5510-5670	Not Required	9.5	No	1
5.8 (U-NII 3)	802.11a	6 Mbps	149	5745	11.1	11.5	Yes	
			157	5785	11.2			
			165	5825	11.5			
	802.11n (HT20)	6.5 Mbps	149	5745	11.5	11.5	No	2
			157	5785	11.1			
			165	5825	11.2			
	802.11n (HT40)	13.5 Mbps	151-159	5755-5795	Not Required	9.5	No	1

Note(s):

- Output Power and SAR is not required for 802.11n HT20/HT40 channels when the specified tune-up tolerances for 802.11n HT20/HT40 are lower than 802.11a by more than ½ dB and the measured SAR is ≤ 1.2 W/Kg.
- When the same transmission mode configurations have the same maximum output power on the same channel for the 802.11 a/g/n/ac modes, the channel in the lower order/sequence 802.11 mode (i.e. a, g, n then ac) is selected.
- When the specified maximum output power is the same for both UNII band I and UNII band 2A, begin SAR measurement in UNII band 2A; and if the highest reported SAR for UNII band 2A is
 - ≤ 1.2 W/kg, SAR is not required for UNII band I
 - > 1.2 W/kg, both bands should be tested independently for SAR.

With Power Back-Off

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Avg Pwr (dBm)	Max Output Power (dBm)	SAR Test (Yes/No)	Note(s)
5.2 (U-NII 1)	802.11a	6 Mbps	36-48	5180-5240	Not Required	6.5	No	1
	802.11n (HT20)	6.5 Mbps	36-48	5180 - 5240		6.5	No	1
	802.11n (HT40)	13.5 Mbps	38	5190		6.5	No	2
			46	5230				
5.3 (U-NII 2A)	802.11a	6 Mbps	52-64	5260-5320	Not Required	6.5	No	1
	802.11n (HT20)	6.5 Mbps	52-64	5260 - 5320		6.5	No	1
	802.11n (HT40)	13.5 Mbps	54	5270	6.5	6.5	Yes	
			62	5310	6.5			
5.5 (U-NII 2C)	802.11a	6 Mbps	100-140	5500-5700	Not Required	6.5	No	1
	802.11n (HT20)	6.5 Mbps	100-140	5500-5700		6.5	No	1
	802.11n (HT40)	13.5 Mbps	102	5510	6.5	6.5	Yes	
			110	5550	6.5			
			134	5670	6.5			
5.8 (U-NII 3)	802.11a	6 Mbps	149-165	5745-5825	Not Required	6.5	No	1
	802.11n (HT20)	6.5 Mbps	149-165	5745-5825		6.5	No	1
	802.11n (HT40)	13.5 Mbps	151	5755	6.5	6.5	Yes	
			159	5795	6.5			

Note(s):

- Output Power and SAR is not required for 802.11a and 802.11n HT20 channels because the specified tune-up tolerances for 802.11a and 802.11n HT20 are lower than or equal to 802.11n HT40 and the measured SAR is ≤ 1.2 W/Kg.
- When the specified maximum output power is the same for both UNII band I and UNII band 2A, begin SAR measurement in UNII band 2A; and if the highest reported SAR for UNII band 2A is
 - ≤ 1.2 W/kg, SAR is not required for UNII band I
 - > 1.2 W/kg, both bands should be tested independently for SAR.

9.3. Bluetooth

Band (GHz)	Mode	Ch #	Freq. (MHz)	Avg Pwr (dBm)
2.4	V3.0 + EDR, GFSK	0	2402	9.5
		39	2441	9.5
		78	2480	9.8
	V3.0 + EDR, $\pi/4$ DQPSK	0	2402	6.0
		39	2441	6.3
		78	2480	6.8
	V3.0 + EDR, 8-DPSK	0	2402	6.2
		39	2441	6.3
		78	2480	6.9
	V4.0 LE, GFSK	0	2402	0.9
		19	2440	0.9
		39	2480	0.8

10. Measured and Reported (Scaled) SAR Results

SAR Test Reduction criteria are as follows:

KDB 248227 D01 SAR meas for 802.11 v02:

SAR test reduction for 802.11 Wi-Fi transmission mode configurations are considered separately for DSSS and OFDM. An initial test position is determined to reduce the number of tests required for certain exposure configurations with multiple test positions. An initial test configuration is determined for each frequency band and aggregated band according to maximum output power, channel bandwidth, wireless mode configurations and other operating parameters to streamline the measurement requirements. For 2.4 GHz DSSS, either the initial test position or DSSS procedure is applied to reduce the number of SAR tests; these are mutually exclusive. For OFDM, an initial test position is only applicable to next to the ear, UMPC mini-tablet and hotspot mode configurations, which is tested using the initial test configuration to facilitate test reduction. For other exposure conditions with a fixed test position, SAR test reduction is determined using only the initial test configuration.

The multiple test positions require SAR measurements in head, hotspot mode or UMPC mini-tablet configurations may be reduced according to the highest reported SAR determined using the initial test position(s) by applying the DSSS or OFDM SAR measurement procedures in the required wireless mode test configuration(s). The initial test position(s) is measured using the highest measured maximum output power channel in the required wireless mode test configuration(s). When the reported SAR for the initial test position is:

- ≤ 0.4 W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and wireless mode combination within the frequency band or aggregated band. DSSS and OFDM configurations are considered separately according to the required SAR procedures.
- > 0.4 W/kg, SAR is repeated using the same wireless mode test configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position, on the highest maximum output power channel, until the reported SAR is ≤ 0.8 W/kg or all required test positions are tested.
 - o For subsequent test positions with equivalent test separation distance or when exposure is dominated by coupling conditions, the position for maximum coupling condition should be tested.
 - o When it is unclear, all equivalent conditions must be tested.
- For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, measure the SAR for these positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required test channels are considered.
 - o The additional power measurements required for this step should be limited to those necessary for identifying subsequent highest output power channels to apply the test reduction.
- When the specified maximum output power is the same for both UNII 1 and UNII 2A, begin SAR measurements in UNII 2A with the channel with the highest measured output power. If the reported SAR for UNII 2A is ≤ 1.2 W/kg, SAR is not required for UNII 1; otherwise treat the remaining bands separately and test them independently for SAR.
- When the specified maximum output power is different between UNII 1 and UNII 2A, begin SAR with the band that has the higher specified maximum output. If the highest reported SAR for the band with the highest specified power is ≤ 1.2 W/kg, testing for the band with the lower specified output power is not required; otherwise test the remaining bands independently for SAR.

To determine the initial test position, Area Scans were performed to determine the position with the *Maximum Value of SAR (measured)*. The position that produced the highest *Maximum Value of SAR* is considered the worst case position; thus used as the initial test position.

10.1. Wi-Fi (DTS Band)

Frequency Band	Mode	Pwr Back Off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		Notes	Plot No.
								Tune-up limit	Meas.	Meas.	Scaled		
2.4GHz	802.11b 1 Mbps	Off	13	Rear	1	2412	0.440	16.5	16.4	0.359	0.367	1	1
			11	Edge 1	1	2412	0.062	16.5	16.4				
			0	Edge 2	1	2412	0.382	16.5	16.4				
		On	0	Rear	1	2412	0.531	11.5	11.2	0.340	0.364	1	
				Edge 1	1	2412	0.054	11.5	11.2				

Note(s):

1. Highest reported SAR is ≤ 0.4 W/kg. Therefore, further SAR measurements within this exposure condition are not required.
2. Highest reported SAR is > 0.4 W/kg. Due to the highest reported SAR for this test position, other test positions in this exposure condition were evaluated until a SAR ≤ 0.8 W/kg was reported.
3. Testing for a second channel was required because the reported SAR for this test position was > 0.8 W/kg.
4. Additional testing required in order satisfying FCC simultaneous transmission limit criteria.

10.2. Wi-Fi (U-NII Band)

Frequency Band	Mode	Pwr Back Off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		Notes	Plot No.
								Tune-up limit	Meas.	Meas.	Scaled		
5.3 GHz U-NII 2A	802.11a 6 Mbps	Off	13	Rear	56	5280	0.279	11.5	11.4				
			11	Edge 1	56	5280	0.411	11.5	11.4	0.245	0.251	1	
			0	Edge 2	56	5280	0.100	11.5	11.4				
	802.11n (HT40)	On	0	Rear	54	5270	0.826	6.5	6.4	0.384	0.393	1	2
				Edge 1	54	5270	0.238	6.5	6.4				
Frequency Band	Mode	Pwr Back Off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		Notes	Plot No.
								Tune-up limit	Meas.	Meas.	Scaled		
5.5 GHz U-NII 2C	802.11a 6 Mbps	Off	13	Rear	116	5580	0.670	11.5	11.3	0.392	0.410	1	
			11	Edge 1	116	5580	0.844	11.5	11.3	0.467	0.489	2	3
			0	Edge 2	116	5580	0.391	11.5	11.3				
	802.11n (HT40)	On	0	Rear	110	5550	0.676	6.5	6.4	0.362	0.370	1	
				Edge 1	110	5550	0.233	6.5	6.4				
Frequency Band	Mode	Pwr Back Off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		Notes	Plot No.
								Tune-up limit	Meas.	Meas.	Scaled		
5.8 GHz U-NII 3	802.11a 6 Mbps	Off	13	Rear	165	5825	0.260	11.5	11.5				
			11	Edge 1	165	5825	0.596	11.5	11.5	0.346	0.346	1	
			0	Edge 2	165	5825	0.343	11.5	11.5				
	802.11n (HT40)	On	0	Rear	151	5755	0.807	6.5	6.4	0.351	0.359	1	4
				Edge 1	151	5755	0.259	6.5	6.4				

Note(s):

1. Highest reported SAR is ≤ 0.4 W/kg. Therefore, further SAR measurements within this exposure condition are not required.
2. Highest reported SAR is > 0.4 W/kg. Due to the highest reported SAR for this test position, other test positions in this exposure condition were evaluated until a SAR ≤ 0.8 W/kg was reported.
3. Testing for a second channel was required because the reported SAR for this test position was > 0.8 W/kg.
4. Additional testing required in order satisfying FCC simultaneous transmission limit criteria.

10.3. Bluetooth

Frequency Band	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		10-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	Meas.	Scaled	
2.4 GHz	GFSK	0	Rear	39	2441.0	10.5	9.5	0.338	0.426	0.130	0.164	5

11. SAR Measurement Variability

In accordance with published RF Exposure KDB 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 ≥ 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 ≥ 1.45 W/kg ($\sim 10\%$ from the 1-g SAR limit).
- 4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .

Frequency Band (MHz)	Air Interface	RF Exposure Conditions	Test Position	Repeated SAR (Yes/No)	Highest Measured SAR (W/kg)	Repeated Measured SAR (W/kg)	Largest to Smallest SAR Ratio
2400	Wi-Fi 802.11b/g/n	Standalone	Rear	No	0.359	N/A	N/A
5300	Wi-Fi 802.11a/n	Standalone	Rear	No	0.523	N/A	N/A
5600	Wi-Fi 802.11a/n	Standalone	Rear	No	0.508	N/A	N/A
5800	Wi-Fi 802.11a/n	Standalone	Rear	No	0.687	N/A	N/A

Note(s):

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 .

12. 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:

SAR₁ 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

SAR₂ 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 $[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$

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:

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

Simultaneous Transmission Condition

RF Exposure Condition	Item	Capable Transmit Configurations
Standalone	1	U-NII + BT
Notes:		
1. DTS Radio cannot transmit simultaneously with Bluetooth Radio.		
2. U-NII Radio can transmit simultaneously with Bluetooth Radio.		

Estimated SAR for WLAN

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	Rear	Edge 1	Edge 2	Edge 3	Edge 4
Full Power													
Wi-Fi 2.4 GHz	2462	16.50	45	13	23	14.5	190	98	-MEASURE-	-MEASURE-	-MEASURE-	0.400	0.400
Wi-Fi 5.2 GHz	5180	11.50	14	13	23	14.5	190	98	0.327	0.185	0.283	0.400	0.400
Wi-Fi 5.3 GHz	5260	11.50	14	13	23	14.5	190	98	0.329	0.186	0.285	0.400	0.400
Wi-Fi 5.5 GHz	5580	11.50	14	13	23	14.5	190	98	0.339	0.192	0.294	0.400	0.400
Wi-Fi 5.8 GHz	5825	11.50	14	13	23	14.5	190	98	0.347	0.196	0.300	0.400	0.400
Bluetooth	2480	9.20	8	13	23	14.5	190	98	0.129	0.073	0.112	0.400	0.400
Power Back Off													
Wi-Fi 2.4 GHz	2462	11.50	14	5	12				-MEASURE-	0.244			
Wi-Fi 5.2 GHz	5180	6.50	4	5	12				0.243	0.101			
Wi-Fi 5.3 GHz	5260	6.50	4	5	12				0.245	0.102			
Wi-Fi 5.5 GHz	5580	6.50	4	5	12				0.252	0.105			
Wi-Fi 5.8 GHz	5825	6.50	4	5	12				0.257	0.107			

12.1. Sum of the SAR for Wi-Fi & BT

RF Exposure conditions	① U-NII	② BT	① + ③ U-NII + BT	
			Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Rear	0.410	0.426	0.836	No

Appendixes

Refer to separated files for the following appendixes.

A_15I19963v0 SAR Photos & Ant. Locations

B_15I19963v0 SAR System Check Plots

C_15I19963v0 SAR SAR Highest Test Plots

D_15I19963v0 SAR Tissue Ingredients

E_15I19963v0 SAR Probe Cal. Certificates

F_15I19963v0 SAR Dipole Cal. Certificates

END OF REPORT