



SAR EVALUATION REPORT

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

The model FCC ID: PY7-TM0061 shares the same enclosure and circuit board as model FCC ID: PY7-TS0050. The WLAN/Bluetooth circuitry and layout, including antenna, are identical between the two units. The WLAN/Bluetooth antenna and surrounding circuitry are the same between these two units, and tune up power targets are identical for WLAN and Bluetooth operations. For this reason the SAR data for the WLAN and Bluetooth operations for FCC ID: PY7-TM0061 is considered representative for FCC ID: PY7-TS0050.

For
BLUETOOTH & DTS/UNII a/b/g/n/ac & ANT+
FCC ID: PY7-TS0050

**Report Number: 15J20363-S1B
Issue Date: 4/27/2015**

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Revision History

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A	4/23/2015	Section 1: Updated Highest Reported SAR Table Section 6.1: Removed Unchecked Hotspot Items Section 6.3: Updated Power Table Section 12: Updated Simultaneous Transmission Table	Coltyce Sanders
B	4/27/2015	Updated Section 6.2 Updated Section 12	Coltyce Sanders

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1. Attestation of Test Results

Applicant Name	SONY MOBILE COMMUNICATIONS, INC.			
FCC ID	PY7-TS0050			
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)
Standalone	N/A	0.789	0.820	0.354
Simultaneous Tx		N/A	1.174	
Date Tested	3/5/2015 to 3/19/2015			
Test Results	Pass			
Note: The Wi-Fi (DTS/U-NII) and Bluetooth SAR measurement results from the original filing can be found in SAR test report 15U20030-S1B, FCC ID: PY7-TM0061. Both models contain identical Wi-Fi/BT modules and antennas. Spot checks for 802.11b/n/ac were performed to ensure that the SAR measurements for both devices are the same. 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:		
				
Devin Chang Senior Engineer UL Verification Services Inc.		Nathan Sousa Laboratory Engineer 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:

- 248227 D01 802.11 Wi-Fi SAR v02
- 447498 D01 General RF Exposure Guidance v05r02
- 616217 D04 SAR for laptop and tablets v01r01
- 690783 D01 SAR Listings on Grants v01r03
- 865664 D01 SAR measurement 100 MHz to 6 GHz v01r03
- 865664 D02 RF Exposure Reporting v01r01

3. Facilities and Accreditation

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

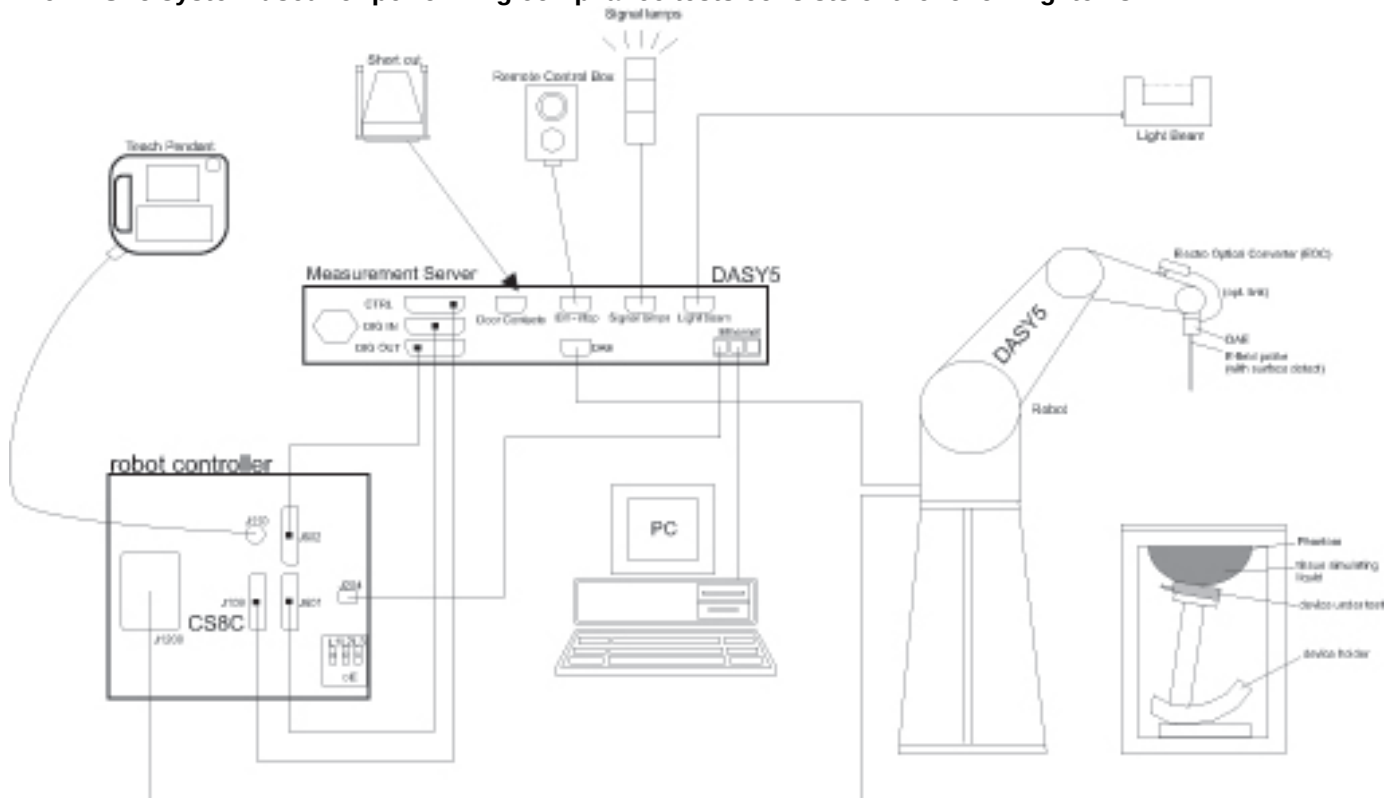
47173 Benicia Street	47266 Benicia Street
SAR Lab A	SAR Lab 1
SAR Lab B	SAR Lab 2
SAR Lab C	SAR Lab 3
SAR Lab D	SAR Lab 4
SAR Lab E	SAR Lab 5
SAR Lab F	
SAR Lab G	
SAR Lab H	

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/2000650.htm>

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	E753ES	MY40000980	4/7/2015
Dielectronic Probe kit	SPEAG	DAK-3.5	1082	9/16/2015
Dielectronic Probe kit	SPEAG	DAK-3.5 Short	SM DAK 200 BA	N/A
Thermometer	Control Company	Traceable	122529163	10/8/2015

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
HP Signal Generator	HP	8665B	3546A00784	6/23/2015
Power Meter	HP	437B	3125U09516	10/6/2015
Power Meter	Agilent	N1911A	MY53060016	8/7/2015
Power Sensor	Agilent	E9323A	MY53070003	5/1/2015
Power Sensor	Agilent	8481A	3318A95392	10/6/2015
Amplifier	MITEQ	AMF-4D-00400600-50-30P	1622052	N/A
Bi-directional coupler	Werlatone, Inc.	C8060-102	2711	N/A
DC Power Supply	Sorensen Ametek	XT20-3	1318A00530	N/A
Synthesized Signal Generator	Agilent	8665B	3438A00633	7/10/2015
Power Meter	HP	437B	3125U11347	8/27/2015
Power Meter	HP	437B	3125U16345	6/16/2015
Power Sensor	HP	8481A	2702A60780	6/16/2015
Power Sensor	HP	8481A	1926A16917	10/10/2015
Amplifier	MITEQ	AMF-4D-00400600-50-30P	1808938	N/A
Bi-directional coupler	Werlatone, Inc.	C8060-102	2710	N/A
DC Power Supply	HP	6296A	2841A-05955	N/A
E-Field Probe (SAR Lab 1)	SPEAG	EX3DV4	3902	5/19/2015
E-Field Probe (SAR Lab 4)	SPEAG	EX3DV4	3929	5/9/2015
Data Acquisition Electronics (SAR Lab 1)	SPEAG	DAE4	1352	11/7/2015
Data Acquisition Electronics (SAR Lab 4)	SPEAG	DAE4	1377	8/27/2015
System Validation Dipole	SPEAG	D2450V2	706	9/10/2015
System Validation Dipole	SPEAG	D2450V2	748	2/20/2016
System Validation Dipole	SPEAG	D5GHzV2	1168	12/4/2015
Thermometer (SAR Lab 1)	EXTECH	445703	CCS-205	3/20/2016
Thermometer (SAR Lab 4)	EXTECH	445703	CCS-238	6/3/2015

Other

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Power Meter	Agilent	N1912A	MY52310061	12/6/2015
Power Sensor	Agilent	N1921A	MY52020011	5/6/2015
Power Sensor	Agilent	N1921A	MY53020038	3/6/2016

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

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 is not supported
Wi-Fi Direct	Wi-Fi Direct enabled devices transfer data directly between each other ☒ Wi-Fi Direct (Wi-Fi 2.4 GHz) ☐ Mobile Hotspot (Wi-Fi 5 GHz)
Accessory(ies)	FCC ID: PY7-RD0101

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 (VHT20) 802.11ac (VHT40) 802.11ac (VHT80)	100%
	Does this device support bands 5.60 ~ 5.65 GHz? ☒ Yes ☐ No		
	Does this device support Band gap channels? ☒ 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

RF Air interface	Mode	Channel	Main Ant	Sub Ant
			Max. Tune-up Limit (dBm)	
Wi-Fi 2.4 GHz	802.11b	1 ~ 11	11.5	10.0
		12	11.5	10.0
		13	11.5	10.0
	802.11g	1 ~ 11	11.5	10.0
		12	11.5	10.0
		13	7.0	7.2
	802.11n HT20	1 ~ 11	11.5	10.0
		12	9.4	9.4
		13	6.5	6.5
Wi-Fi 5 GHz	802.11a	All	9.8	9.0
	802.11n HT20	All	9.8	9.0
	802.11n HT40	All	9.8	9.0
	802.11ac VHT20	All	9.8	9.0
	802.11ac VHT40	All	9.8	9.0
	802.11ac VHT80	All	9.7	8.9
Bluetooth	BDR	Low	8.0	NA
		Mid	10.0	NA
		High	7.8	NA
	EDR	Low	5.6	NA
		Mid	7.3	NA
		High	4.8	NA
	BLE	Low	3.5	NA
		Mid	5.9	NA
		High	4.5	NA

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:

- 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.

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	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
Wi-Fi Main Antenna															
Wi-Fi 2.4 GHz	2462	11.50	14	3.165	5.2	203.2	155.25	30.35		4.4 -MEASURE-	4.4 -MEASURE-	> 50 mm	> 50 mm	0.7 -EXEMPT-	
Wi-Fi 5.2 GHz	5240	9.80	10	3.165	5.2	203.2	155.25	30.35		4.6 -MEASURE-	4.6 -MEASURE-	> 50 mm	> 50 mm	0.8 -EXEMPT-	
Wi-Fi 5.3 GHz	5320	9.80	10	3.165	5.2	203.2	155.25	30.35		4.6 -MEASURE-	4.6 -MEASURE-	> 50 mm	> 50 mm	0.8 -EXEMPT-	
Wi-Fi 5.5 GHz	5700	9.80	10	3.165	5.2	203.2	155.25	30.35		4.8 -MEASURE-	4.8 -MEASURE-	> 50 mm	> 50 mm	0.8 -EXEMPT-	
Wi-Fi 5.8 GHz	5825	9.80	10	3.165	5.2	203.2	155.25	30.35		4.8 -MEASURE-	4.8 -MEASURE-	> 50 mm	> 50 mm	0.8 -EXEMPT-	
Bluetooth	2480	10.00	10	3.165	5.2	203.2	155.25	30.35		3.1 -MEASURE-	3.1 -MEASURE-	> 50 mm	> 50 mm	0.5 -EXEMPT-	
Wi-Fi Sub Antenna															
Wi-Fi 2.4 GHz	2462	10.00	10	3.165	5.2	148.55	155.25	89.3		3.1 -MEASURE-	3.1 -MEASURE-	> 50 mm	> 50 mm	> 50 mm	
Wi-Fi 5.2 GHz	5240	9.00	8	3.165	5.2	148.55	155.25	89.3		3.7 -MEASURE-	3.7 -MEASURE-	> 50 mm	> 50 mm	> 50 mm	
Wi-Fi 5.3 GHz	5320	9.00	8	3.165	5.2	148.55	155.25	89.3		3.7 -MEASURE-	3.7 -MEASURE-	> 50 mm	> 50 mm	> 50 mm	
Wi-Fi 5.5 GHz	5700	9.00	8	3.165	5.2	148.55	155.25	89.3		3.8 -MEASURE-	3.8 -MEASURE-	> 50 mm	> 50 mm	> 50 mm	
Wi-Fi 5.8 GHz	5825	9.00	8	3.165	5.2	148.55	155.25	89.3		3.9 -MEASURE-	3.9 -MEASURE-	> 50 mm	> 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
Wi-Fi Main Antenna															
Wi-Fi 2.4 GHz	2462	11.50	14	3.165	5.2	203.2	155.25	30.35		< 50 mm	< 50 mm	1627.6 mW -EXEMPT-	1148.1mW -EXEMPT-	< 50 mm	
Wi-Fi 5.2 GHz	5240	9.80	10	3.165	5.2	203.2	155.25	30.35		< 50 mm	< 50 mm	1597.5 mW -EXEMPT-	1118 mW -EXEMPT-	< 50 mm	
Wi-Fi 5.3 GHz	5320	9.80	10	3.165	5.2	203.2	155.25	30.35		< 50 mm	< 50 mm	1597 mW -EXEMPT-	1117.5 mW -EXEMPT-	< 50 mm	
Wi-Fi 5.5 GHz	5700	9.80	10	3.165	5.2	203.2	155.25	30.35		< 50 mm	< 50 mm	1594.8 mW -EXEMPT-	1115.3 mW -EXEMPT-	< 50 mm	
Wi-Fi 5.8 GHz	5825	9.80	10	3.165	5.2	203.2	155.25	30.35		< 50 mm	< 50 mm	1594.2 mW -EXEMPT-	1114.7 mW -EXEMPT-	< 50 mm	
Bluetooth	2480	10.00	10	3.165	5.2	203.2	155.25	30.35		< 50 mm	< 50 mm	1627.3 mW -EXEMPT-	1147.8 mW -EXEMPT-	< 50 mm	
Wi-Fi Sub Antenna															
Wi-Fi 2.4 GHz	2462	10.00	10	3.165	5.2	203.2	155.25	30.35		< 50 mm	< 50 mm	1627.6 mW -EXEMPT-	1148.1mW -EXEMPT-	< 50 mm	
Wi-Fi 5.2 GHz	5240	9.00	8	3.165	5.2	203.2	155.25	30.35		< 50 mm	< 50 mm	1597.5 mW -EXEMPT-	1118 mW -EXEMPT-	< 50 mm	
Wi-Fi 5.3 GHz	5320	9.00	8	3.165	5.2	203.2	155.25	30.35		< 50 mm	< 50 mm	1597 mW -EXEMPT-	1117.5 mW -EXEMPT-	< 50 mm	
Wi-Fi 5.5 GHz	5700	9.00	8	3.165	5.2	203.2	155.25	30.35		< 50 mm	< 50 mm	1594.8 mW -EXEMPT-	1115.3 mW -EXEMPT-	< 50 mm	
Wi-Fi 5.8 GHz	5825	9.00	8	3.165	5.2	203.2	155.25	30.35		< 50 mm	< 50 mm	1594.2 mW -EXEMPT-	1114.7 mW -EXEMPT-	< 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 SISO (Main Antenna)	Yes	Yes	No	No	No
Wi-Fi 2.4 GHz SISO (Sub Antenna)	Yes	Yes	No	No	No
Wi-Fi 2.4 GHz MIMO	Yes	Yes	No	No	No
Wi-Fi 5 GHz SISO (Main Antenna)	Yes	Yes	No	No	No
Wi-Fi 5 GHz SISO (Sub Antenna)	Yes	Yes	No	No	No
Wi-Fi 5 GHz MIMO	Yes	Yes	No	No	No
Bluetooth	Yes	Yes	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)	Head		Body	
	ϵ_r	σ (S/m)	ϵ_r	σ (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 within the IEEE Std 1528-2013

Dielectric Property Measurements Results:**SAR Lab 1**

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
3/5/3015	Body 2450	e'	51.1200	Relative Permittivity (ϵ_r):	51.12	52.70	-3.00	5
		e''	14.5700	Conductivity (σ):	1.98	1.95	1.79	5
	Body 2410	e'	51.3200	Relative Permittivity (ϵ_r):	51.32	52.76	-2.73	5
		e''	14.3500	Conductivity (σ):	1.92	1.91	0.81	5
	Body 2475	e'	51.0300	Relative Permittivity (ϵ_r):	51.03	52.67	-3.11	5
		e''	14.6600	Conductivity (σ):	2.02	1.99	1.63	5

SAR Lab 4

Date	Freq. (MHz)		Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)
3/14/22015	Body 5180	e'	49.1100	Relative Permittivity (ϵ_r):	49.11	49.05	-1.30	5
		e"	17.9100	Conductivity (σ):	5.16	5.27	1.08	5
	Body 5200	e'	48.9800	Relative Permittivity (ϵ_r):	48.98	49.02	-1.08	5
		e"	18.0800	Conductivity (σ):	5.23	5.29	0.43	5
	Body 5600	e'	48.4200	Relative Permittivity (ϵ_r):	48.42	48.48	-1.50	5
		e"	18.5400	Conductivity (σ):	5.77	5.76	0.75	5
	Body 5800	e'	48.1800	Relative Permittivity (ϵ_r):	48.18	48.20	-1.99	5
		e"	18.3300	Conductivity (σ):	5.91	6.00	0.30	5
	Body 5825	e'	48.3000	Relative Permittivity (ϵ_r):	48.30	48.20	-1.76	5
		e"	18.5300	Conductivity (σ):	6.00	6.00	1.38	5
3/16/2015	Body 2450	e'	53.3600	Relative Permittivity (ϵ_r):	53.36	52.70	1.25	5
		e"	14.8500	Conductivity (σ):	2.02	1.95	3.74	5
	Body 2410	e'	53.5400	Relative Permittivity (ϵ_r):	53.54	52.76	1.48	5
		e"	14.7200	Conductivity (σ):	1.97	1.91	3.41	5
	Body 2475	e'	53.4600	Relative Permittivity (ϵ_r):	53.46	52.67	1.50	5
		e"	15.0500	Conductivity (σ):	2.07	1.99	4.33	5
3/18/2015	Body 5180	e'	48.4100	Relative Permittivity (ϵ_r):	48.41	49.05	-1.30	5
		e"	18.5000	Conductivity (σ):	5.33	5.27	1.08	5
	Body 5200	e'	48.4900	Relative Permittivity (ϵ_r):	48.49	49.02	-1.08	5
		e"	18.3900	Conductivity (σ):	5.32	5.29	0.43	5
	Body 5600	e'	47.7500	Relative Permittivity (ϵ_r):	47.75	48.48	-1.50	5
		e"	18.6400	Conductivity (σ):	5.80	5.76	0.75	5
	Body 5800	e'	47.2400	Relative Permittivity (ϵ_r):	47.24	48.20	-1.99	5
		e"	18.6600	Conductivity (σ):	6.02	6.00	0.30	5
	Body 5825	e'	47.3500	Relative Permittivity (ϵ_r):	47.35	48.20	-1.76	5
		e"	18.7800	Conductivity (σ):	6.08	6.00	1.38	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 $\pm$ 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 $\geq$ 15.0 cm for SAR measurements $\leq$ 3 GHz and $\geq$ 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	9/10/2014	2450	1g	53.0	50.2
				10g	24.5	23.4
D2450V2	748	2/20/2015	2450	1g	52.7	50.3
				10g	24.6	23.5
D5GHzV2	1168	12/4/2014	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	21.0

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 1

Date Tested	System Dipole		T.S. Liquid	Measured Results		Target (Ref. Value)	Delta ±10 %	Plot No.
	Type	Serial #		Zoom Scan to 100 mW	Normalize to 1 W			
3/5/2015	D2450V2	706	Body	1g	4.97	49.7	50.2	-1.00
				10g	2.29	22.9	23.4	-2.14

SAR Lab 4

Date Tested	System Dipole		T.S. Liquid	Measured Results		Target (Ref. Value)	Delta ±10 %	Plot No.
	Type	Serial #		Zoom Scan to 100 mW	Normalize to 1 W			
3/14/2015	D5GHzV2 (5.2 GHz)	1168	Body	1g	7.75	77.5	76.00	1.97
				10g	2.20	22.0	21.10	4.27
3/14/2015	D5GHzV2 (5.6 GHz)	1168	Body	1g	8.64	86.4	82.00	5.37
				10g	2.43	24.3	22.70	7.05
3/14/2015	D5GHzV2 (5.8 GHz)	1168	Body	1g	7.73	77.3	76.20	1.44
				10g	2.18	21.8	21.00	3.81
3/16/2015	D2450V2	748	Body	1g	5.50	55.0	50.3	9.34
				10g	2.52	25.2	23.5	7.23
3/18/2015	D5GHzV2 (5.2 GHz)	1168	Body	1g	7.61	76.1	76.00	0.13
				10g	2.17	21.7	21.10	2.84
3/18/2015	D5GHzV2 (5.6 GHz)	1168	Body	1g	7.98	79.8	82.00	-2.68
				10g	2.24	22.4	22.70	-1.32

9. Conducted Output Power Measurements

9.1. Wi-Fi 2.4GHz (DTS Band)

The initial test configuration for 2.4 GHz and 5 GHz OFDM transmission modes is determined by the 802.11 configuration with the highest maximum output power specified for production units, including tune-up tolerance, in each standalone and aggregated frequency band. SAR for the initial test configuration is measured using the highest maximum output power channel determined by the default power measurement procedures (section 4). When multiple configurations in a frequency band have the same specified maximum output power, the initial test configuration is determined according to the following steps applied sequentially.

- 1) The largest channel bandwidth configuration is selected among the multiple configurations with the same specified maximum output power.
- 2) If multiple configurations have the same specified maximum output power and largest channel bandwidth, the lowest order modulation among the largest channel bandwidth configurations is selected.
- 3) If multiple configurations have the same specified maximum output power, largest channel bandwidth and lowest order modulation, the lowest data rate configuration among these configurations is selected.
- 4) When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected; i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n.

SISO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Main Ant Avg Pwr (dBm)	Sub Ant Avg Pwr (dBm)	Max Output Power (dBm)		SAR Test (Yes/No)
							Main Ant	Sub Ant	
2.4	802.11b	1 Mbps	1	2412	11.0	9.4	11.5	10.0	Yes
			6	2437	10.8	9.0			
			11	2462	10.7	9.0			
	802.11g	6 Mbps	1	2412	10.5	9.0	11.5	10.0	No
			6	2437	10.7	9.0			
			11	2462	10.3	9.0			
	802.11n (HT20)	6.5 Mbps	1	2412	10.1	9.0	11.5	10.0	No
			6	2437	10.9	8.7			
			11	2462	10.6	9.0			

MIMO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Main Ant Avg Pwr (dBm)	Sub Ant Avg Pwr (dBm)	Max Output Power (dBm)		SAR Test (Yes/No)
							Main Ant	Sub Ant	
2.4	802.11g	6 Mbps	1	2412	10.5	9.5	11.5	10.0	Yes
			6	2437	10.6	9.0			
			11	2462	10.3	9.1			
	802.11n (HT20)	6.5 Mbps	1	2412	10.3	8.7	11.5	10.0	No
			6	2437	10.7	9.0			
			11	2462	10.5	9.0			

Note(s):

1. 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.

9.2. Wi-Fi 5GHz (U-NII Bands)

SISO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Main Ant Avg Pwr (dBm)	Sub Ant Avg Pwr (dBm)	Max Output Power (dBm)		SAR Test (Yes/No)
							Main Ant	Sub Ant	
5.3 (U-NII 2A)	802.11a	6 Mbps	52	5260	Not Required		9.8	9.0	No
			56	5280					
			60	5300					
			64	5320					
	802.11n (HT20)	6.5 Mbps	52	5260	Not Required		9.8	9.0	No
			56	5280					
			60	5300					
			64	5320					
	802.11n (HT40)	13.5 Mbps	54	5270	9.1	8.6	9.8	9.0	No
			62	5310	9.0	8.7			
	802.11ac (VHT20)	6.5 Mbps	52	5260	Not Required		9.8	9.0	No
			56	5280					
			60	5300					
			64	5320					
802.11ac (VHT40)	13.5 Mbps	54	5270	Not Required		9.8	9.0	No	
		62	5310						
802.11ac (VHT80)	29.3 Mbps	58	5290	Not Required		9.7	8.9	No	
5.5 (UNII-2C)	802.11a	6 Mbps	100	5500	Not Required		9.8	9.0	No
			104	5520					
			108	5540					
			112	5560					
			116	5580					
			120	5600					
			124	5620					
			128	5640					
	802.11n (HT20)	6.5 Mbps	100	5500	Not Required		9.8	9.0	No
			104	5520					
			108	5540					
			112	5560					
			116	5580					
			120	5600					
			124	5620					
			128	5640					
	802.11n (HT40)	13.5 Mbps	102	5510	8.9	8.3	9.8	9.0	No
			110	5550	8.8	8.3			
			118	5590	9.0	8.3			
			126	5630	8.9	8.2			
	802.11ac (VHT20)	6.5 Mbps	100	5500	Not Required		9.8	9.0	No
			104	5520					
			108	5540					
			112	5560					
			116	5580					
			120	5600					
			124	5620					
			128	5640					
	802.11ac (VHT40)	13.5 Mbps	102	5510	Not Required		9.8	9.0	Mo
			110	5550					
118			5590						
126			5630						
802.11ac (VHT80)	29.3 Mbps	106	5530	Not Required		9.7	8.9	No	
		122	5610						

SISO (continued)

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Main Ant Avg Pwr (dBm)	Sub Ant Avg Pwr (dBm)	Max Output Power (dBm)		SAR Test (Yes/No)
							Main Ant	Sub Ant	
5.8 (UNII-3)	802.11a	6 Mbps	132	5660	Not Required		9.8	9.0	No
			136	5680					
			140	5700					
			144	5720					
			149	5745					
			153	5765					
			157	5785					
			161	5805					
	165	5825							
	802.11n (HT20)	6.5 Mbps	132	5660	Not Required		9.8	9.0	No
			136	5680					
			140	5700					
			144	5720					
			149	5745					
			153	5765					
			157	5785					
			161	5805					
	165	5825							
	802.11n (HT40)	13.5 Mbps	134	5670	8.6	8.3	9.8	9.0	No
			142	5710	8.7	8.3			
			151	5755	8.7	8.2			
			159	5795	9.0	8.0			
	802.11ac (VHT20)	6.5 Mbps	132	5660	Not Required		9.8	9.0	No
			136	5680					
			140	5700					
			144	5720					
			149	5745					
			153	5765					
			157	5785					
			161	5805					
	165	5825							
	802.11ac (VHT40)	13.5 Mbps	134	5670	Not Required		9.8	9.0	No
			142	5710					
			151	5755					
			159	5795					
	802.11ac (VHT80)	29.3 Mbps	138	5690	Not required		9.7	8.9	No
			155	5775					

Note(s):

- Output Power and SAR measurement 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 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.

MIMO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Main Ant Avg Pwr (dBm)	Sub Ant Avg Pwr (dBm)	Max Output Power (dBm)		SAR Test (Yes/No)
							Main Ant	Sub Ant	
5.3 (U-NII 2A)	802.11a	6 Mbps	52	5260	Not Required		9.8	9.0	No
			56	5280					
			60	5300					
			64	5320					
	802.11n (HT20)	6.5 Mbps	52	5260	Not Required		9.8	9.0	No
			56	5280					
			60	5300					
			64	5320					
	802.11n (HT40)	13.5 Mbps	54	5270	9.3	8.2	9.8	9.0	Yes
			62	5310	9.2	8.2			
	802.11ac (VHT20)	6.5 Mbps	52	5260	Not Required		9.8	9.0	No
			56	5280					
			60	5300					
			64	5320					
	802.11ac (VHT40)	13.5 Mbps	54	5270	Not Required		9.8	9.0	No
			62	5310					
802.11ac (VHT80)	29.3 Mbps	58	5290	Not Required		9.7	8.9	No	
5.5 (UNII-2C)	802.11a	6 Mbps	100	5500	Not Required		9.8	9.0	No
			104	5520					
			108	5540					
			112	5560					
			116	5580					
			120	5600					
			124	5620					
			128	5640					
	802.11n (HT20)	6.5 Mbps	100	5500	Not Required		9.8	9.0	No
			104	5520					
			108	5540					
			112	5560					
			116	5580					
			120	5600					
			124	5620					
			128	5640					
	802.11n (HT40)	13.5 Mbps	102	5510	8.8	7.8	9.8	9.0	Yes
			110	5550	8.8	8.0			
			118	5590	9.0	8.1			
			126	5630	9.2	8.1			
	802.11ac (VHT20)	6.5 Mbps	100	5500	Not Required		9.8	9.0	No
			104	5520					
			108	5540					
			112	5560					
			116	5580					
			120	5600					
			124	5620					
			128	5640					
	802.11ac (VHT40)	13.5 Mbps	102	5510	Not Required		9.8	9.0	Mo
			110	5550					
			118	5590					
			126	5630					
	802.11ac (VHT80)	29.3 Mbps	106	5530	Not Required		9.7	8.9	No
			122	5610					

MIMO (continued)

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Main Ant Avg Pwr (dBm)	Sub Ant Avg Pwr (dBm)	Max Output Power (dBm)		SAR Test (Yes/No)
							Main Ant	Sub Ant	
5.8 (UNII-3)	802.11a	6 Mbps	132	5660	Not Required		9.8	9.0	No
			136	5680					
			140	5700					
			144	5720					
			149	5745					
			153	5765					
			157	5785					
			161	5805					
			165	5825					
	802.11n (HT20)	6.5 Mbps	132	5660	Not Required		9.8	9.0	No
			136	5680					
			140	5700					
			144	5720					
			149	5745					
			153	5765					
			157	5785					
			161	5805					
			165	5825					
	802.11n (HT40)	13.5 Mbps	134	5670	9.2	8.2	9.8	9.0	Yes
			142	5710	8.9	7.9			
			151	5755	9.3	8.3			
			159	5795	9.2	8.2			
	802.11ac (VHT20)	6.5 Mbps	132	5660	Not Required		9.8	9.0	No
			136	5680					
			140	5700					
			144	5720					
			149	5745					
			153	5765					
			157	5785					
			161	5805					
			165	5825					
	802.11ac (VHT40)	13.5 Mbps	134	5670	Not Required		9.8	9.0	No
			142	5710					
			151	5755					
			159	5795					
	802.11ac (VHT80)	29.3 Mbps	138	5690	Not required		9.7	8.9	No
			155	5775					

Note(s):

- Output Power and SAR measurement 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 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.

9.3. Bluetooth

Band (GHz)	Mode	Ch #	Freq. (MHz)	Avg Pwr (dBm)
2.4	V3.0 + EDR, GFSK	0	2402	6.4
		39	2441	8.9
		78	2480	6.1
	V3.0 + EDR, $\pi/4$ DQPSK	0	2402	4.7
		39	2441	5.9
		78	2480	2.9
	V3.0 + EDR, 8-DPSK	0	2402	4.7
		39	2441	5.8
		78	2480	2.9
	V4.0 LE, GFSK	0	2402	2.7
		19	2440	5.4
		39	2480	3.4

10. Measured and Reported (Scaled) SAR Results

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 closest/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.
 - 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.
 - 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.
 - 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	Dist. (mm)	Antenna	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		10-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	Meas.	Scaled	
2.4GHz	802.11b 1 Mbps	0	SISO Main	Rear	1	2412	0.658	11.5	11.0	0.410	0.460	0.147	0.165	
				Edge 1	1	2412	0.059	11.5	11.0	0.067	0.075	0.025	0.028	
			SISO Aux	Rear	1	2412	0.290	10.0	9.4	0.249	0.286	0.082	0.094	
				Edge 1	1	2412	0.069	10.0	9.4	0.055	0.063	0.021	0.024	
	802.11g 6 Mbps	0	MIMO (Main)	Rear	6	2437	1.020	11.5	10.6	0.641	0.789	0.238	0.293	1
				Edge 1	6	2437	0.121	11.5	10.6	0.094	0.115	0.038	0.047	
			MIMO (Aux)	Rear	6	2437	0.508	10.0	9.0	0.286	0.360	0.103	0.130	1
				Edge 1	6	2437	0.177	10.0	9.0	0.123	0.155	0.038	0.048	

Additional Tests with Keyboard Accessory

Frequency Band	Mode	Dist. (mm)	Antenna	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	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	802.11g 6 Mbps	0	MIMO (Main)	Rear	6	2437	0.275	11.5	10.6	0.186	0.229	0.076	0.094	
				Edge 1	6	2437	0.018	11.5	10.6	0.016	0.020	0.004	0.005	
			MIMO (Aux)	Rear	6	2437	0.275	10.0	9.0	0.064	0.081	0.028	0.035	
				Edge 1	6	2437	0.018	10.0	9.0	<0.001	<0.001	<0.001	<0.001	

10.2. Wi-Fi (U-NII Band)

Frequency Band	Mode	Dist. (mm)	Antenna	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		10-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	Meas.	Scaled	
5.3 GHz U-NII 2A	802.11n (HT40) 13.5 Mbps	0	MIMO (Main)	Rear	54	5270	0.649	9.8	9.3	0.457	0.513	0.104	0.117	
				Edge 1	54	5270	0.757	9.8	9.3	0.566	0.635	0.146	0.164	2
			MIMO (Aux)	Rear	54	5270	0.649	9.0	8.2	0.332	0.399	0.083	0.100	
				Edge 1	54	5270	0.757	9.0	8.2	0.184	0.221	0.047	0.057	2
Frequency Band	Mode	Dist. (mm)	Antenna	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		10-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	Meas.	Scaled	
5.5 GHz U-NII 2C	802.11n (HT40) 13.5 Mbps	0	MIMO (Main)	Rear	126	5630	0.756	9.8	9.2	0.455	0.522	0.096	0.110	3
				Edge 1	126	5630	0.553	9.8	9.2	0.385	0.442	0.095	0.109	
			MIMO (Aux)	Rear	126	5630	0.756	9.0	8.1	0.349	0.433	0.082	0.102	3
				Edge 1	126	5630	0.553	9.0	8.1	0.158	0.194	0.041	0.050	
Frequency Band	Mode	Dist. (mm)	Antenna	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		10-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	Meas.	Scaled	
5.8 GHz U-NII 3	802.11n (HT40) 13.5 Mbps	0	MIMO (Main)	Rear	151	5755		9.8	9.3	0.420	0.471	0.094	0.105	
					159	5795	0.943	9.8	9.2	0.380	0.434	0.084	0.096	4
				Edge 1	159	5795	0.598	9.8	9.2	0.346	0.397	0.086	0.099	
					151	5755		9.0	8.3	0.652	0.766	0.150	0.176	
			MIMO (Aux)	Rear	159	5795	0.943	9.0	8.2	0.682	0.820	0.163	0.196	4
					159	5795	0.598	9.0	8.2	0.317	0.381	0.091	0.110	
				Edge 1	159	5795	0.598	9.0	8.2	0.317	0.381	0.091	0.110	
					159	5795	0.598	9.0	8.2	0.317	0.381	0.091	0.110	

Additional Tests with Keyboard Accessory

Frequency Band	Mode	Dist. (mm)	Antenna	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		10-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	Meas.	Scaled	
5.3 GHz U-NII 2A	802.11n (HT40) 13.5 Mbps	0	MIMO (Main)	Rear	54	5270	0.239	9.8	9.3	0.108	0.121	0.028	0.032	
				Edge 1	54	5270	0.000	9.8	9.3	<0.001	<0.001	<0.001	<0.001	
			MIMO (Aux)	Rear	54	5270	0.239	9.0	8.2	0.118	0.142	0.033	0.039	
				Edge 1	54	5270	0.000	9.0	8.2	<0.001	<0.001	<0.001	<0.001	
Frequency Band	Mode	Dist. (mm)	Antenna	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		10-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	Meas.	Scaled	
5.5 GHz U-NII 2C	802.11n (HT40) 13.5 Mbps	0	MIMO (Main)	Rear	126	5630	0.216	9.8	9.2	0.099	0.114	0.025	0.029	
				Edge 1	126	5630	<0.001	9.8	9.2	<0.001	<0.001	<0.001	<0.001	
			MIMO (Aux)	Rear	126	5630	0.216	9.0	8.1	0.055	0.069	0.015	0.019	
				Edge 1	126	5630	<0.001	9.0	8.1	<0.001	<0.001	<0.001	<0.001	
Frequency Band	Mode	Dist. (mm)	Antenna	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		10-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	Meas.	Scaled	
5.8 GHz U-NII 3	802.11n (HT40) 13.5 Mbps	0	MIMO (Main)	Rear	159	5795	0.258	9.8	9.2	0.143	0.163	0.040	0.045	
				Edge 1	159	5795	<0.001	9.8	9.2	<0.001	<0.001	<0.001	<0.001	
			MIMO (Aux)	Rear	159	5795	0.258	9.0	7.9	0.149	0.192	0.042	0.054	
				Edge 1	159	5795	<0.001	9.0	7.9	<0.001	<0.001	<0.001	<0.001	

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	10.0	8.9	0.275	0.354	0.100	0.129	5
			Edge 1	39	2441	10.0	8.9	0.041	0.053	0.015	0.019	

Additional Tests with Keyboard Accessory

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	10.0	8.9	0.086	0.111	0.027	0.035	
			Edge 1	39	2441	10.0	8.9	<0.001	<0.001	<0.001	<0.001	

Note(s):

The model FCC ID: PY7-TM0061 shares the same enclosure and circuit board as model FCC ID: PY7-TS0050. The WLAN/Bluetooth circuitry and layout, including antenna, are identical between the two units. The WLAN/Bluetooth antenna and surrounding circuitry are the same between these two units, and tune up power targets are identical for WLAN and Bluetooth operations. For this reason the SAR data for the WLAN and Bluetooth operations for FCC ID: PY7-TM0061 is considered representative for FCC ID: PY7-TS0050. The Wi-Fi (DTS/U-NII) and Bluetooth SAR measurement results from the original filling can be found in SAR test report 15U20030-S1B, FCC ID: PY7-TM0061.

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	0.641	N/A	N/A
2400	Bluetooth	Standalone	Rear	No	0.275	N/A	N/A
5300	Wi-Fi 802.11a/n/ac	Standalone	Edge 1	No	0.566	N/A	N/A
5500	Wi-Fi 802.11a/n/ac	Standalone	Rear	No	0.455	N/A	N/A
5800	Wi-Fi 802.11a/n/ac	Standalone	Rear	No	0.682	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

Simultaneous Transmission Condition

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

Estimated SAR for Simultaneous Transmission SAR Analysis

Considerations for SAR estimation

- When standalone SAR test exclusion applies, standalone SAR must also be estimated to determine simultaneous transmission SAR test exclusion.
- Dedicated Host Approach criteria for SAR test exclusion is likewise applied to SAR estimation, with certain distinctions between test exclusion and SAR estimation:
 - 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.
 - 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.
 - When the minimum test separation distance is > 50 mm, the estimated SAR value is 0.4 W/kg
- Please refer to Estimated SAR Tables to see which test positions are inherently compliant as they consist of only estimated SAR values for all applicable transmitters and consequently will always have sum of SAR values < 1.2 W/kg. Simultaneous transmission SAR analysis was therefore not performed for these test positions.

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
Wi-Fi Main Antenna															
Wi-Fi 2.4 GHz	2462	11.50	14	3.165	5.2	203.2	155.25	30.35		-MEASURE	-MEASURE	0.400	0.400	0.098	
Wi-Fi 5.2 GHz	5240	9.80	10	3.165	5.2	203.2	155.25	30.35		-MEASURE	-MEASURE	0.400	0.400	0.102	
Wi-Fi 5.3 GHz	5320	9.80	10	3.165	5.2	203.2	155.25	30.35		-MEASURE	-MEASURE	0.400	0.400	0.103	
Wi-Fi 5.5 GHz	5700	9.80	10	3.165	5.2	203.2	155.25	30.35		-MEASURE	-MEASURE	0.400	0.400	0.106	
Wi-Fi 5.8 GHz	5825	9.80	10	3.165	5.2	203.2	155.25	30.35		-MEASURE	-MEASURE	0.400	0.400	0.107	
Bluetooth	2480	10.00	10	3.165	5.2	203.2	155.25	30.35		-MEASURE	-MEASURE	0.400	0.400	0.070	
Wi-Fi Sub Antenna															
Wi-Fi 2.4 GHz	2462	10.00	10	3.165	5.2	148.55	155.25	89.3		-MEASURE	-MEASURE	0.400	0.400	0.400	
Wi-Fi 5.2 GHz	5240	9.00	8	3.165	5.2	148.55	155.25	89.3		-MEASURE	-MEASURE	0.400	0.400	0.400	
Wi-Fi 5.3 GHz	5320	9.00	8	3.165	5.2	148.55	155.25	89.3		-MEASURE	-MEASURE	0.400	0.400	0.400	
Wi-Fi 5.5 GHz	5700	9.00	8	3.165	5.2	148.55	155.25	89.3		-MEASURE	-MEASURE	0.400	0.400	0.400	
Wi-Fi 5.8 GHz	5825	9.00	8	3.165	5.2	148.55	155.25	89.3		-MEASURE	-MEASURE	0.400	0.400	0.400	

12.1. Sum of SAR for Wi-Fi 5 GHz and Bluetooth

Test Position	① U-NII (Sub Ant)	② BT (Main Ant)	① + ② U-NII + BT	
			Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Rear	0.820	0.354	1.174	No
Edge 1	0.397	0.053	0.450	No

Conclusion:

Simultaneous transmission SAR measurement (Volume Scan) is not required because either the sum of the 1-g SAR is < 1.6 W/kg or the SPLSR is < 0.04 for all circumstances that require SPLSR calculation.

Appendixes

Refer to separated files for the following appendixes.

A_15J20363v0 SAR Photos & Ant. Locations

B_15J20363v0 SAR System Check Plots

C_15J20363v0 SAR Highest Test Plots

D_15J20363v0 SAR Tissue Ingredients

E_15J20363v0 SAR Probe Cal. Certificates

F_15J20363v0 SAR Dipole Cal. Certificates

END OF REPORT