SAR EVALUATION REPORT

FCC 47 CFR § 2.1093
IEEE Std 1528-2013

For
Bardcode reader with RFID and Bluetooth

Contains FCC ID: YRWINFINEAX-M
Model Name: InfineaX-M

Report Number: 11477761-S1V2
Issue Date: 3/7/2017

Prepared for
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Date	Revisions	Revised By
V1	12/23/2016	Initial Issue	--
V2	3/7/2017	Report revised based on reviewer's comments: 1. Sec. nos. 2, 7, and 9: Updated.	Ray Su

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1. Attestation of Test Results

Applicant Name	DATECS Ltd.			
Contains FCC ID	YRWINFINEAX-M			
Model Name	InfineaX-M			
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			
RF Exposure Conditions	Equipment Class – Highest Reported SAR (W/kg)			
	PCB	DTS	NII	**DSS**
Standalone	N/A	< 0.001	0.26	0.07
Simultaneous TX	N/A	0.17	0.42	0.42
Date Tested	12/8/2016 to 12/14/2016			
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.	Ray Su 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 v02r02
- 447498 D01 General RF Exposure Guidance v06
- 447498 D03 Supplement C Cross-Reference v01
- 616217 D04 SAR for laptop and tablets v01r02
- 648474 D04 Handset SAR v01r03
- 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- 865664 D02 RF Exposure Reporting v01r02

In addition to the above, the following information was used:

- Guidance provided in a KDB enquiry to support the testing.

3. Facilities and Accreditation

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

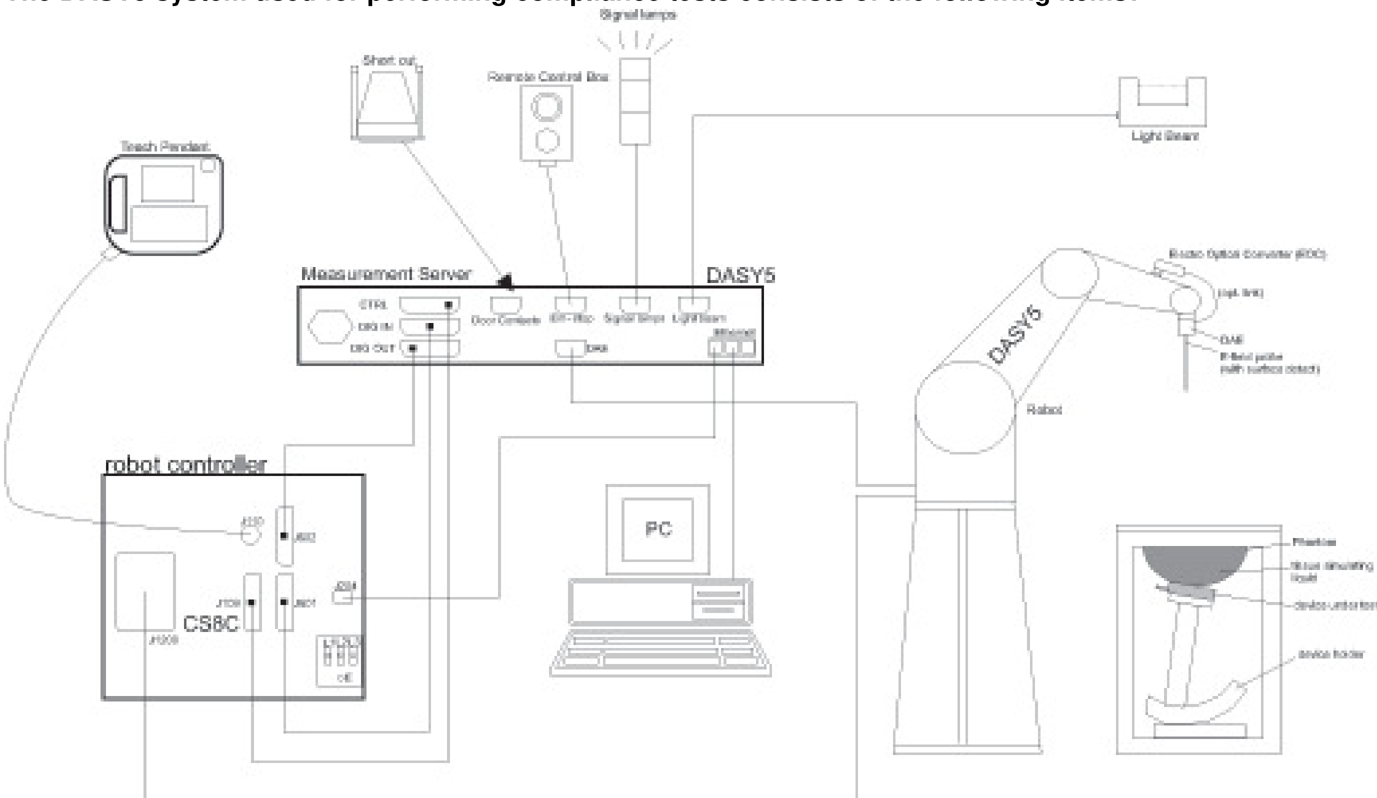
47173 Benicia Street	47266 Benicia Street
SAR Lab A	SAR Lab 1
SAR Lab B	SAR Lab 2
SAR Lab C	
SAR Lab D	
SAR Lab E	
SAR Lab F	
SAR Lab G	
SAR Lab H	

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	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

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

<table>
<tr><th colspan="3"></th><th>≤ 3 GHz</th><th>> 3 GHz</th></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>≤ 2 GHz: ≤ 8 mm
2 – 3 GHz: ≤ 5 mm*</td><td>3 – 4 GHz: ≤ 5 mm*
4 – 6 GHz: ≤ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>≤ 5 mm</td><td>3 – 4 GHz: ≤ 4 mm
4 – 5 GHz: ≤ 3 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>≤ 4 mm</td><td>3 – 4 GHz: ≤ 3 mm
4 – 5 GHz: ≤ 2.5 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3 – 4 GHz: ≥ 28 mm
4 – 5 GHz: ≥ 25 mm
5 – 6 GHz: ≥ 22 mm</td></tr>
<tr><td colspan="5">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 reported 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.</td></tr>
</table>

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	MY40000980	4/27/2017
Dielectric Probe kit	SPEAG	DAK-3.5	1103	2/23/2017
Shorting block	SPEAG	DAK-3.5 Short	SM DAK 200 BA	N/A
Thermometer	Traceable Calibration Control Co.	4242	140493798	8/9/2017

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Synthesized Signal Generator	Agilent	N5181A	MY50140610	5/9/2017
Power Meter	Keysight	N1912A	MY55196008	5/3/2017
Power Sensor	Agilent	N1912A	MY52200012	10/17/2017
Power Sensor	Agilent	E9323A	MY53070009	6/13/2017
Amplifier	MITEQ	AMF-4D-00400600-50-30P	1795093	N/A
Directional coupler	Werlatone	C8060-102	2149	N/A
DC Power Supply	BK PRECISION	1161	215-02292	N/A
Synthesized Signal Generator	Agilent	N5181A	MY50140630	5/9/2017
Power Meter	Keysight	N1912A	MY55196009	5/3/2017
Power Sensor	Agilent	N1912A	MY53260001	10/17/2017
Power Sensor	Agilent	E9323A	MY53070002	3/22/2017
Amplifier	MITEQ	AMF-4D-00400600-50-30P	1795092	N/A
Directional coupler	Werlatone	C8060-102	2141	N/A
DC Power Supply	HP	6296A	2841A-05955	N/A

Lab Equipment

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
E-Field Probe (SAR Lab A)	SPEAG	EX3DV4	3751	11/17/2017
E-Field Probe (SAR Lab H)	SPEAG	EX3DV4	3989	2/23/2017
Data Acquisition Electronics (SAR Lab A)	SPEAG	DAE4	1439	7/25/2017
Data Acquisition Electronics (SAR Lab H)	SPEAG	DAE4	1357	2/19/2017
System Validation Dipole	SPEAG	D2450V2	899	3/15/2017
System Validation Dipole	SPEAG	D5GHzV2	1003	2/25/2017

Other

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Power Meter	Agilent	N1912A	MY55196004	7/1/2017

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

The InfineaX-M is a handheld barcode reader with RFID and Bluetooth. This terminal is designed to operate with an iPad Mini.	
Device Dimension	Overall (Length x Width x Depth): 230 mm x 160 mm x 36 mm Overall Diagonal: 260 mm Display Diagonal: 205 mm
Battery Options	Standard – Lithium-polymer battery, Rating 3.7 Vdc, 1900 mAh

6.2. Wireless Technologies

InfineaX-M Device

Wireless technologies	Frequency bands	Operating mode	Duty Cycle used for SAR testing
Bluetooth	2.4 GHz	Version 2.0 + EDR Basic Rate	N/A
RFID	13.56 MHz	ASK Type A (100%) or ASK Type B (10%)	N/A

Host Device

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 channel(s)? ☒ Yes ☐ No		
Bluetooth	2.4 GHz	Version 4.1 LE	77.5% (DH5)

6.3. Maximum Output Power

InfineaX Device

Upper limit (dB):	1.0	Max. RF Output Power (dBm)	
RF Air interface	Mode	Target	Max. tune-up tolerance limit
Bluetooth		2.0	**3.0**

Host Device

All nominal and maximum output power measurements for WLAN are as documented in report 14U19186-S1A.

7. RF Exposure Conditions (Test Configurations)

Baseline measurements are performed on the worse case positions for all bands on the host device and compared to the results reported in the original granted SAR report.

Per KDB 648474 D04, Sec. 8, the highest SAR configuration among the different wireless modes in each frequency band and any SAR configuration in the original report > 75% of the SAR limit; should be measured separately for head, body-worn accessories and hotspot modes when applicable on the host device. When the measured SAR values of the highest SAR configurations are identical (before rounding up), select the configuration with the highest maximum output power. The SAR results should be scaled with respect to the power level tested in order to determine compliance.

After completing the baseline measurements on the host device, the tests are repeated with the sleeve attached. Section 10 contains the SAR test results obtained with and without the sleeve attached, as well as, the deviation in the results with respect to the results in the original report 14U19186-S1A.

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 ± 2°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.

The dielectric constant (εr) and conductivity (σ) of typical tissue-equivalent media recipes are expected to be within ± 5% of the required target values; but for SAR measurement systems that have implemented the SAR error compensation algorithms documented in IEEE Std 1528-2013, to automatically compensate the measured SAR results for deviations between the measured and required tissue dielectric parameters, the tolerance for εr and σ may be relaxed to ± 10%. This is limited to frequencies ≤ 3 GHz.

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	Date	Tissue Type	Band (MHz)	Frequency (MHz)	Relative Permittivity (εr)			Conductivity (σ)		
					Measured	Target	Delta (%)	Measured	Target	Delta (%)
A	12/8/2016	Body	5600	5600	48.59	48.48	0.23	5.84	5.76	1.28
				5500	48.63	48.61	0.03	5.69	5.64	0.86
				5725	48.32	48.31	0.02	6.02	5.91	1.93
A	12/12/2016	Body	5800	5800	46.38	48.20	-3.78	6.18	6.00	2.98
				5700	46.57	48.34	-3.67	6.07	5.88	3.21
				5850	46.21	48.20	-4.13	6.25	6.00	4.20
A	12/12/2016	Body	2450	2450	50.16	52.70	-4.82	1.99	1.95	2.21
				2400	50.17	52.77	-4.93	1.93	1.90	1.74
				2480	50.09	52.66	-4.88	2.03	1.99	1.65
H	12/8/2016	Body	5200	5200	48.25	49.02	-1.57	5.42	5.29	2.35
				5150	48.26	49.09	-1.69	5.36	5.24	2.36
				5350	47.98	48.82	-1.71	5.60	5.47	2.42

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.

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	Date	Tissue Type	Dipole Type _Serial #	Dipole Cal. Due Data	Measured Results for 1g SAR				Measured Results for 10g SAR				Plot No.
					Zoom Scan to 100 mW	Normalize to 1 W	Target (Ref. Value)	Delta ±10 %	Zoom Scan to 100 mW	Normalize to 1 W	Target (Ref. Value)	Delta ±10 %	
A	12/8/2016	Body	D5GHzV2 SN:1003 (5.6 GHz)	2/25/2017	7.970	79.70	79.80	-0.13	2.200	22.00	22.40	-1.79	
A	12/12/2016	Body	D5GHzV2 SN:1003 (5.8 GHz)	2/25/2017	7.570	75.70	75.50	0.26	2.090	20.90	21.00	-0.48	1,2
A	12/12/2016	Body	D2450V2 SN:899	3/15/2017	5.370	53.70	49.60	8.27	2.430	24.30	23.40	3.85	3,4
H	12/8/2016	Body	D5GHzV2 SN:1138 (5.2 GHz)	9/22/2017	7.690	76.90	74.20	3.64	2.170	21.70	20.90	3.83	5,6

9. Conducted Output Power Measurements

Please refer to Sec. 10 for the measured output power results alongside SAR measurement results.

10. Measured and Reported (Scaled) SAR Results

SAR Test Reduction criteria are as follows:

KDB 447498 D01 General RF Exposure Guidance:

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

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

KDB 248227 D01 SAR meas for 802.11 v02r01:

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.
  - 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*.

KDB 941225 D07 UMPC Mini Tablet v01r02:

UMPC mini-tablet devices must be tested for 1-g SAR on all surfaces and side edges with a transmitting antenna located at ≤ 25 mm from that surface or edge, at 5 mm separation from a flat phantom, for the data modes, wireless technologies and frequency bands supported by the device to determine SAR compliance.

10.1. Measured and Reported (Scaled) SAR Results

Technology / Band	Test Configuration		Mode	Antenna	Ch. No.	Freq. (MHz)	Original Values		Baseline with Host Device				Host Device + Sleeve		Final 1g SAR Reported (W/kg)*	Plot No.
							Tune-up Limit (dBm)	Highest 1g Reported SAR (W/kg)	Measured Power (dBm)	1g SAR Meas. (W/kg)	Scaled 1g SAR Reported (W/kg)	Scaled Baseline vs Orig. Reported SAR (W/kg)	1g SAR Meas. (W/kg)	Scaled 1g SAR Reported (W/kg)*		
Wi-Fi 2.4 GHz	Body	Edge 3	802.11b	A	11	2462.0	15.00	1.152	15.0	1.180	1.18	2%	< 0.001	< 0.001	< 0.001	1
Wi-Fi 5 GHz	Body	Edge 3	802.11n HT40	A	46	5230.0	17.00	1.180	17.0	0.955	0.96	-19%	0.003	0.003	0.004	2
		Edge 3	802.11ac VHT80	B	122	5610.0	15.00	1.180	15.0	1.170	1.17	-1%	0.147	0.147	0.148	3
		Edge 3	802.11a	A	161	5805.0	17.50	1.183	17.5	1.090	1.09	-8%	0.236	0.236	0.256	4
Bluetooth	Body	Edge 1	GFSK	B	78	2480.0	12.00	0.392	11.8	0.314	0.33	-16%	0.054	0.057	0.068	5

Note(s):

*Scaled 1g Reported SAR is calculated based on the following KDB inquiry response:

1. When the *reported* SAR of the test sample measured without accessory (sleeve) attached is equal to or higher than the *reported* SAR of the same test configuration in the original equipment certification filing, the measured SAR of the test sample with accessory (sleeve) attached is used as the reported SAR result of the test configuration.

2. When the *reported* SAR of the test sample measured without accessory (sleeve) attached is lower than the *reported* SAR of the same test configuration in the original equipment certification filing, adjust the *reported* SAR of the test sample with accessory (sleeve) attached by the ration of *reported* SAR in the original filing to the *reported* SAR of the test sample without the accessory (sleeve) attached as the SAR result of the test configuration.

3. When the original and baseline SAR values differ by more than 15% the SAR distribution and peak location were compared to ensure that they were similar. The baseline SAR plots for these situations are provided in Appendix G. The SAR distributions and peak locations were considered similar.

10.2. Bluetooth (Sleeve)

Standalone SAR Test Exclusion Considerations & Estimated SAR

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)]·[√f(GHz)] ≤ 3.0, for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- $f_{(GHz)}$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

When the standalone SAR test exclusion is applied to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

- *(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)]·[√$f_{(GHz)}$/x]* W/kg for test separation distances ≤ 50 mm;
  where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR.
- 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distances is > 50 mm.

Max. tune-up tolerance limit		Min. test separation distance (mm)	Frequency (GHz)	SAR test exclusion Result*	Test Configuration	Estimated 1-g SAR (W/kg)
(dBm)	(mW)					
3.0	2	5	2.480	0.6	Body	0.1

Conclusion:

*: The computed value is ≤ 3; therefore, Bluetooth qualifies for Standalone SAR test exclusion.

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 <1.6 or 2 W/kg (1-g or 10-g respectively); steps 2) through 4) do not apply.
2) When the original highest measured SAR is ≥ 0.8 or 2 W/kg (1-g or 10-g respectively), 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 3 (1-g or 10-g respectively) or when the original or repeated measurement is ≥ 1.45 or 3.6 W/kg (~ 10% from the 1-g or 10-g respective SAR limit).
4) Perform a third repeated measurement only if the original, first, or second repeated measurement is ≥ 1.5 or 3.75 W/kg (1-g or 10-g respectively) and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 or 3 (1-g or 10-g respectively).

Frequency Band (MHz)	Air Interface	RF Exposure Conditions	Test Position	Repeated SAR (Yes/No)	Highest Measured SAR (W/kg)	First Repeated		Second Repeated		Third Repeated
						Measured SAR (W/kg)	Largest to Smallest SAR Ratio	Measured SAR (W/kg)	Largest to Smallest SAR Ratio	Measured SAR (W/kg)
2400	Wi-Fi 802.11b/g/n	Body	Edge 3	No	< 0.001	N/A	N/A	N/A	N/A	N/A
	BT	Body	Edge 1	No	0.054	N/A	N/A	N/A	N/A	N/A
5200	Wi-Fi 802.11a/n/ac	Body	Edge 3	No	0.003	N/A	N/A	N/A	N/A	N/A
5500	Wi-Fi 802.11a/n/ac	Body	Edge 3	No	0.147	N/A	N/A	N/A	N/A	N/A
5800	Wi-Fi 802.11a/n/ac	Body	Edge 3	No	0.236	N/A	N/A	N/A	N/A	N/A

12. Simultaneous Transmission SAR Analysis

Sum of the SAR for WWAN, Wi-Fi DTS and BT

RF Exposure conditions	Host Device with Sleeve Attached				Sleeve		
	① DTS	② BT	① + ② DTS + BT		③ BT	① + ② + ③ DTS + BT + BT	
			∑ 1-g SAR (mW/g)	SPLSR (Yes/No)		∑ 1-g SAR (mW/g)	SPLSR (Yes/No)
Worst case standalone	0.000	0.068	0.068	No	0.1	0.168	No

Sum of the SAR for WWAN, Wi-Fi U-NII and BT

RF Exposure conditions	Host Device with Sleeve Attached				Sleeve		
	① U-NII	② BT	① + ② U-NII + BT		③ BT	① + ② + ③ U-NII + BT + BT	
			∑ 1-g SAR (mW/g)	SPLSR (Yes/No)		∑ 1-g SAR (mW/g)	SPLSR (Yes/No)
Worst case standalone	0.256	0.068	0.324	No	0.1	0.424	No

Note(s):

1. DTS Radio can transmit simultaneously with Bluetooth Radio.
2. U-NII Radio can transmit simultaneously with Bluetooth Radio.

Appendixes

Refer to separated files for the following appendixes.

11477761-S1V1 SAR_App A Setup Photos

11477761-S1V1 SAR_App B System Check Plots

11477761-S1V1 SAR_App C Highest SAR Test Plots

11477761-S1V1 SAR_App D Tissue Ingredients

11477761-S1V1 SAR_App E Probe Cal. Certificates

11477761-S1V1 SAR_App F Dipole Cal. Certificates

11477761-S1V1 SAR_App G Baseline SAR Test Plots

END OF REPORT