SAR EVALUATION REPORT

PERMISSIVE CHANGE

IC RSS-102 Issue 5
IEEE Std 1528-2013
IEC 62209-2:2010

For
802.11a/b/g/n Portable Touch Screen Device

IC Certification ID: 7848A-C4TT10
Model Name: C4-TT10

Report Number: 12016469-S2V2
Issue Date: 1/3/2018

Prepared for
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NVLAP LAB CODE 200065-0

REVISION HISTORY

Rev.	Date	Revisions	Revised By
V1	12/20/2017	Initial Issue	--
V2	1/3/2018	Section 6.3: Updated Maximum Output power levels	Coltyce Sanders

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1. Attestation of Test Results

Applicant Name	CONTROL4 CORP.			
IC Certification ID	7848A-C4TT10			
Model Name	C4-TT10			
Exposure Category	General Population/Uncontrolled Exposure			
Applicable Standards	Specific FCC Published RF exposure KDB procedures IC RSS-102 Issue 5 IEEE Std 1528-2013 IEC 62209-2:2010			
Exposure Category	SAR Limits (W/Kg)			
	Peak spatial-average(1g of tissue)		Extremities (hands, wrists, ankles, etc.) (10g of tissue)	
General population/ Uncontrolled exposure	1.6		4	
RF Exposure Conditions	Equipment Class - Highest Reported SAR (W/kg)			
	PCB	DTS	U-NII	DSS
Standalone	N/A	N/A	1.367	N/A
Date Tested	11/27/2014 to 12/7/2017			
Test Results	Pass			

Note: The proposed Permissive Change requires SAR testing for the enabled U-NII band 5.2GHz. The SAR measurement results from the original filing can be found in IC SAR report 7848A-C4TT7. This report only contains the SAR values for the added U-NII Band.

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:
	
Dave Weaver Operations Leader UL Verification Services Inc.	AJ Newcomer Laboratory Engineer UL Verification Services Inc.

2. Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with IC RSS-102 Issue 5, IEEE STD 1528:2013, the following Specific FCC Published RF exposure KDB procedures:

List of accepted KDB procedures for SAR measurements:

- KDB 865664 D01 (Section 3.5): SAR Measurement 100 MHz to 6 GHz v01r04
- KDB 248227 D01: 802.11 Wi-Fi SAR v02r02
- KDB 616217 D04: SAR for Laptops and Tablets v01r02
- KDB 447498 D01: General RF exposure Guidance v06 (see Notice 2012-DRS1203 for exceptions)

In addition to the above, the following standards/procedures were used:

- IEC 62209-2:2010
  Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body.
- ISED Notice 2016 – DRS001

3. Facilities and Accreditation

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

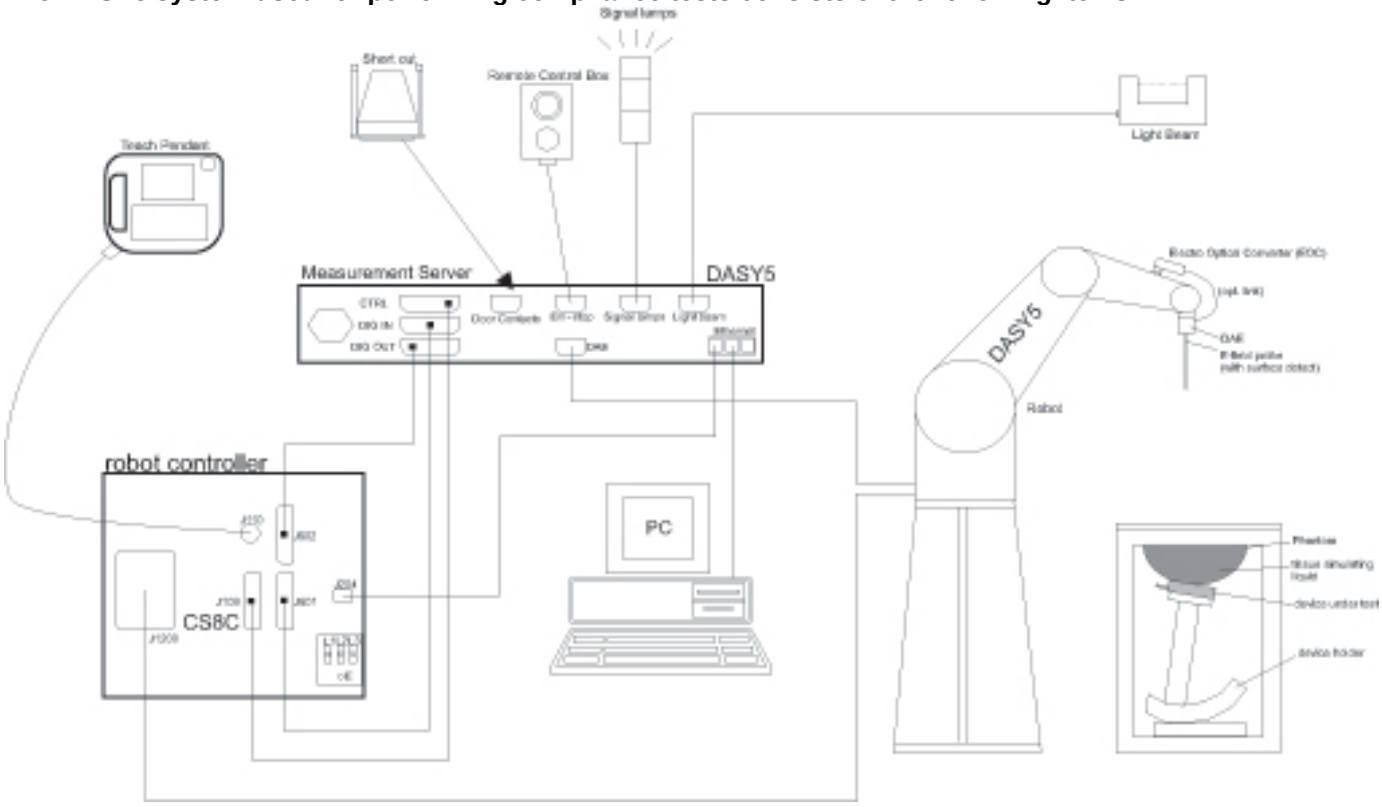
47173 Benicia Street	47266 Benicia Street
SAR Lab A	SAR Lab 1
SAR Lab B	SAR Lab 2
SAR Lab C	SAR Lab 3
SAR Lab D	SAR Lab 4
SAR Lab E	
SAR Lab F	
SAR Lab G	
SAR Lab H	

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

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

			≤ 3 GHz	> 3 GHz
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
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 *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.

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	9/15/2018
Dielectric Probe kit	SPEAG	DAK-3.5	1103	2/16/2018
Shorting block	SPEAG	DAK-3.5 Short	SM DAK 200 BA	11/8/2018
Thermometer	Traceable Calibration Control Co.	4242	150378159	5/26/2018

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Synthesized Signal Generator	Agilent	N5181A	MY50140610	5/31/2018
Power Meter	Keysight	N1912A	MY55196008	5/12/2018
Power Sensor	Agilent	N1921A	MY52260009	1/5/2018
Power Sensor	Agilent	N1921A	MY55570C22	12/17/2017
DC Power Supply	BK PRECISION	E3610A	215-02292	N/A
Amplifier	MITEQ	AMF-4D-00400600-50-30P	1795093	N/A
Directional coupler	Werlatone	C8060-102	2149	N/A

Lab Equipment

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
E-Field Probe (SAR Lab F)	SPEAG	EX3DV4	3773	4/21/2018
Data Acquisition Electronics (SAR Lab F)	SPEAG	DAE4	1259	1/20/2018
System Validation Dipole	SPEAG	D5GHzV2	1138	10/26/2018

Other

Name of Equipment	Manufacturer	Type/Model	T Number	Serial No.	Cal. Due Date
Power Sensor	Agilent	N1921A	T 748	MY53020038	4/13/2018
Power Meter	Agilent	N1912A	T 733	MY50001018	10/17/2019

5. Measurement Uncertainty

Measurement uncertainty for 3 GHz to 6 GHz

a	b	c	d	e f(d,k)	f	g	h = *c×f/e*	l = *c×g/e*
Uncertainty component	Reference	Tol. (±%)	Prob. Dist.	Div.	*ci* (1 g)	*ci* (10 g)	1 g *ui* (± %)	10 g *ui* (± %)
Measurement System								
Probe Calibration	E.2.1	6.55	Normal	1	1	1	6.55	6.55
Axial Isotropy	E.2.2	1.15	Rectangular	1.732	0.7	0.7	0.46	0.46
Hemispherical Isotropy	E.2.2	2.30	Rectangular	1.732	0.7	0.7	0.93	0.93
Boundary Effect	E.2.3	0.90	Rectangular	1.732	1	1	0.52	0.52
Linearity	E.2.4	3.45	Rectangular	1.732	1	1	1.99	1.99
System Detection Limits	E.2.4	1.00	Rectangular	1.732	1	1	0.58	0.58
Modulation Response	E.2.5	2.40	Rectangular	1.732	1	1	1.39	1.39
Readout Electronics	E.2.6	0.30	Normal	1	1	1	0.30	0.30
Response Time	E.2.7	0.80	Rectangular	1.732	1	1	0.46	0.46
Integration Time	E.2.8	2.60	Rectangular	1.732	1	1	1.50	1.50
RF Ambient Conditions—noise	E.6.1	3.00	Rectangular	1.732	1	1	1.73	1.73
RF Ambient Conditions—reflections	E.6.1	3.00	Rectangular	1.732	1	1	1.73	1.73
Probe Positioner Mechanical Tolerance	E.6.2	0.80	Rectangular	1.732	1	1	0.46	0.46
Probe Positioning with Respect to Phantom shell	E.6.3	6.70	Rectangular	1.732	1	1	3.87	3.87
Extrapolation, Interpolation, and Integration Algorithms for max. SAR Evaluation	E.5	4.00	Rectangular	1.732	1	1	2.31	2.31
Test Sample Related								
Test Sample Positioning	E.4.2	2.90	Normal	1	1	1	2.90	2.90
Device Holder Uncertainty	E.4.1	3.60	Normal	1	1	1	3.60	3.60
Output Power Variation—SAR drift measurement	E.2.9	5.00	Rectangular	1.732	1	1	2.89	2.89
SAR Scaling	E.6.5	0.00	Rectangular	1.732	1	1	0.00	0.00
Phantom and Tissue Parameters								
Phantom Uncertainty—shape, thickness and permittivity	E.3.1	7.90	Rectangular	1.732	1	1	4.56	4.56
Uncertainty in SAR Correction for Deviations in Permittivity and Conductivity	E.3.2	1.90	Normal	1	1	0.84	1.90	1.60
Liquid Conductivity - measurement	E.3.3	**2.27**	Normal	1	0.78	0.71	1.77	1.61
Liquid Permittivity - measurement	E.3.3	**-1.94**	Normal	1	0.23	0.26	-0.45	-0.50
Liquid Conductivity - temperature uncertainty	E.3.4	3.40	Rectangular	1.732	0.78	0.71	1.53	1.39
Liquid Permittivity - temperature uncertainty	E.3.4	0.40	Rectangular	1.732	0.23	0.26	0.05	0.06
Combined Standard Uncertainty Uc(y) =			RSS				11.65	11.61
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =							23.30	23.22

6. Device Under Test (DUT) Information

6.1. DUT Description

Device Dimension	Overall (Length x Width): 245.76 mm x 172.66 mm Overall Diagonal: 293 mm Display Diagonal: 257 mm		
Back Cover	☒ The rechargeable battery is not user accessible.		
Battery Options	☒ The rechargeable battery is not user accessible.		
Test sample information	**S/N**	**IMEI**	**Notes**
	000FFF80757C	N/A	Radiated
	00FFF809DFD	N/A	Conducted
Hardware Version	RK3188		
Software Version	4.4.2		

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)	N/A
	5 GHz	802.11a 802.11n (HT20)	97.01% 96.96%

6.3. Maximum Output Power from Tune-up Procedure

RF Air interface	Mode	Max. RF Output Power (dBm)
WiFi 2.4 GHz	802.11b	**11.5**
	802.11g	**13.5**
	802.11n HT20	**12.5**
WiFi 5 GHz	802.11a	**14.5**
	802.11n HT20	**12.5**

7. RF Exposure Conditions (Test Configurations)

Refer to Appendix A for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.

7.1. Standalone SAR Test Exclusion Considerations

The standalone SAR test exclusion procedure in RSS-102 Issue 5 § 2.5.1 is applied to determine test positions.

SAR Test Exclusion Calculations for WLAN

Tx Interface	Frequency (MHz)	Output Power		Antenna Gain (dBi)	E.I.R.P		Separation Distances (mm)						Exemption Limit (mW)						Result					
		dBm	mW		dBm	mW	Rear	Edge 1	Edge 1 Slant	Edge 2	Edge 3	Edge 4	Rear	Edge 1	Edge 1 Slant	Edge 2	Edge 3	Edge 4	Rear	Edge 1	Edge 1 Slant	Edge 2	Edge 3	Edge 4
Wi-Fi 5.2 GHz	5240.0	14.50	28.18	2.37	16.87	48.64	18.86	5	5	194.29	152.12	30.24	28.0	1.0	1.0	154.0	154.0	64.0	Measure SAR	Measure SAR	Measure SAR	Estimate SAR	Estimate SAR	Estimate SAR

Note(s):

Exemption Limits not listed in Table 1 of RSS 102 issue 5 §2.5.1 are calculated using linear interpolation per RSS 102 Issue 5 §2.5.1.

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 (Top Edge)	Edge 1 Slant (Top Edge)	Edge 2 (Right Edge)	Edge 3 (Bottom Edge)	Edge 4 (Left Edge)
Wi-Fi 5.2 GHz	Yes	Yes	Yes	No	No	No

Note(s):

Yes = Testing is required.

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 ± 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

IC RSS-102 Issue 5

Refer to Annex D - Body Tissue Equivalent Liquid

Dielectric Property Measurements Results:

SAR Lab	Date	Band (MHz)	Tissue Type	Frequency (MHz)	Relative Permittivity (εr)			Conductivity (σ)		
					Measured	Target	Delta (%)	Measured	Target	Delta (%)
F	11/28/2017	5200	Body	5200	49.23	49.02	0.43	5.20	5.29	-1.86
				5150	49.31	49.09	0.45	5.13	5.24	-2.01
				5350	49.02	48.82	0.42	5.43	5.47	-0.81
F	12/4/2017	5200	Body	5200	48.15	49.02	-1.77	5.39	5.29	1.74
				5150	48.23	49.09	-1.75	5.31	5.24	1.41
				5350	47.87	48.82	**-1.94**	5.59	5.47	**2.27**

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 %	
F	11/28/2017	Body	D5GHzV2 SN:1138 (5.2 GHz)	10/26/2018	7.270	72.70	73.40	-0.95	2.060	20.60	20.60	0.00	1,2
F	12/4/2017	Body	D5GHzV2 SN:1138 (5.2 GHz)	10/26/2018	7.820	78.20	73.40	6.54	2.220	22.20	20.60	7.77	3,4

9. Conducted Output Power Measurements

9.1. Wi-Fi 2.4 GHz (DTS Band)

Refer to the original filling, IC SAR report 7848A-C4TT7, for DTS conducted output power measurements.

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

Measured Results

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Meas. Avg Pwr (dBm)	Max Output Power (dBm)	SAR Test (Yes/No)
5.2 (U-NII 1)	802.11a	6 Mbps	36	5180	13.3	14.5	Yes
			40	5200	13.1		
			48	5240	12.9		
	802.11n (HT20)	6.5 Mbps	36	5180	11.9	12.5	No
			40	5200	11.9		
			48	5240	11.4		

Note(s):

When 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 for testing per KDB 248227.

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:

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***.

10.1. Wi-Fi (DTS Band)

Refer to the original filling, IC SAR report 7848A-C4TT7, for DTS SAR Test Results.

10.2. Wi-Fi (U-NII Band)

Frequency Band	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
5.2 GHz U-NII 1	802.11a 6 Mbps	0	Edge 1	40	5200.0	14.5	13.1	0.613	0.840	
			Edge 1 Slant	36	5180.0	14.5	13.3	0.641	0.855	
				40	5200.0	14.5	13.1	0.678	0.929	
				48	5240.0	14.5	12.9	0.939	**1.367**	1
			Rear	40	5200.0	14.5	13.1	0.037	0.051	

11. Simultaneous Transmission SAR Analysis

Device does not support simultaneous transmission.

Appendixes

Refer to separated files for the following appendixes.

12016469-S2V1 Appendix A: SAR Setup Photos

12016469-S2V1 Appendix B: SAR System Check Plots

12016469-S2V1 Appendix C: Highest SAR Test Plots

12016469-S2V1 Appendix D: SAR Liquid Tissue Ingredients

12016469-S2V1 Appendix E: SAR Probe Calibration Certificates

12016469-S2V1 Appendix F: SAR Dipole Calibration Certificates

END OF REPORT