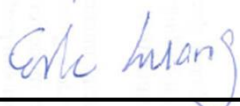


FCC SAR Test Report

APPLICANT : DT Research Inc.
EQUIPMENT : Mobile Tablet
BRAND NAME : DT Research Inc.
MODEL NAME : DT398H
FCC ID : YE3800C
STANDARD : FCC 47 CFR Part 2 (2.1093)
ANSI/IEEE C95.1-1992
IEEE 1528-2003

We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and had been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.



Reviewed by: Eric Huang / Deputy Manager



Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.



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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA491670	Rev. 01	Initial issue of report	Jan. 16, 2015

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **DT Research Inc., Mobile Tablet, DT398H**, are as follows.

Equipment Class	Frequency Band	Highest SAR Summary	
		Body 1g SAR (W/kg)	Simultaneous Transmission 1g SAR (W/kg)
PCB	CDMA 2000 BC0	0.30	1.27
	CDMA 2000 BC1	0.38	
	LTE Band 13	0.57	
	LTE Band 4	1.20	
Date of Testing:		2014/11/11~2014/11/12	

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2003.

2. Administration Data

Testing Laboratory	
Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978

Applicant	
Company Name	DT Research Inc.
Address	6F, NO.1 ,NingPo E. St., Taipei, 100 Taiwan, R.O.C.

Manufacturer	
Company Name	DT Research Inc.
Address	6F, NO.1 ,NingPo E. St., Taipei, 100 Taiwan, R.O.C.

3. Guidance Standard

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards:

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2003
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03
- FCC KDB 865664 D02 SAR Reporting v01r01
- FCC KDB 447498 D01 General RF Exposure Guidance v05r02
- FCC KDB 616217 D04 SAR for laptop and tablets v01r01
- FCC KDB 941225 D01 3G SAR Procedures v03
- FCC KDB 941225 D05 SAR for LTE Devices v02r03

4. Equipment Under Test (EUT)

4.1 General Information

Product Feature & Specification	
Equipment Name	Mobile Tablet
Brand Name	DT Research Inc.
Model Name	DT398H
FCC ID	YE3800C
Integrated Module	Brand Name: Sierra Wireless AirPrime Model Name: MC7355
Wireless Technology and Frequency Range	CDMA2000 BC0: 824.7 MHz ~ 848.31 MHz CDMA 2000 BC1: 1851.25 MHz ~ 1908.75 MHz LTE Band 13: 779.5 MHz ~ 784.5 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz
Mode	• CDMA2000 : 1xRTT/1xEv-Do(Rev.0)/1xEv-Do(Rev.A) • LTE: QPSK, 16QAM
EUT Stage	Production Unit
Remark: <ol style="list-style-type: none"> The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description. The WLAN/BT module, Brand Name: DT Research Inc., Model Name: 600C, FCC ID: YE3600C is also integrated into this host and the WLAN SAR testing results are also used to perform transmission simultaneous analysis which can be referred to Sporton SAR Test Report, Report No:FA491670-01 	

4.2 Maximum Tune-up Limit

Mode / Band	Average Power (dBm)	
	CDMA BC0	CDMA BC1
1xRTT RC1 SO55	24.50	24.50
1xRTT RC3 SO55	24.50	24.50
1xEV-DO Rev 0	24.50	24.50
1xEV-DO Rev A	24.50	24.50

LTE Band 13				
Modulation	BW (MHz)	RB size	MPR	Average Power (dBm)
QPSK	10	≤ 12	0	24.0
QPSK	10	> 12	1	23.0
16QAM	10	≤ 12	1	23.0
16QAM	10	> 12	2	22.0
QPSK	5	≤ 8	0	24.0
QPSK	5	> 8	1	23.0
16QAM	5	≤ 8	1	23.0
16QAM	5	> 8	2	22.0

LTE Band 4				
Modulation	BW (MHz)	RB size	MPR	Average Power (dBm)
QPSK	20	≤ 18	0	24.0
QPSK	20	> 18	1	23.0
16QAM	20	≤ 18	1	23.0
16QAM	20	> 18	2	22.0
QPSK	15	≤ 16	0	24.0
QPSK	15	> 16	1	23.0
16QAM	15	≤ 16	1	23.0
16QAM	15	> 16	2	22.0
QPSK	10	≤ 12	0	24.0
QPSK	10	> 12	1	23.0
16QAM	10	≤ 12	1	23.0
16QAM	10	> 12	2	22.0
QPSK	5	≤ 8	0	24.0
QPSK	5	> 8	1	23.0
16QAM	5	≤ 8	1	23.0
16QAM	5	> 8	2	22.0

4.3 General LTE SAR Test and Reporting Considerations

Summarized necessary items addressed in KDB 941225 D05 v02r03												
FCC ID			YE3800C									
Equipment Name			Mobile Tablet									
Operating Frequency Range of each LTE transmission band			LTE Band 13: 779.5 MHz ~ 784.5 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz									
Channel Bandwidth			LTE Band 13: 5MHz, 10MHz LTE Band 4: 5MHz, 10MHz, 15MHz, 20MHz									
Release and category			Rel8, Cat3									
uplink modulations used			QPSK, and 16QAM									
LTE Voice / Data requirements			Data only									
LTE MPR permanently built-in by design			Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3									
			Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)		
				1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz			
				QPSK	> 5	> 4	> 8	> 12	> 16		> 18	≤ 1
				16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16		≤ 18	≤ 1
			16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2		
LTE A-MPR			In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI)									
Spectrum plots for RB configuration			A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.									
Transmission (H, M, L) channel numbers and frequencies in each LTE band												
LTE Band 13												
	Bandwidth 5 MHz						Bandwidth 10 MHz					
	Channel #		Freq.(MHz)				Channel #		Freq.(MHz)			
L	23205		779.5									
M	23230		782				23230		782			
H	23255		784.5									
LTE Band 4												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	19957	1710.7	19965	1711.5	19975	1712.5	20000	1715	20025	1717.5	20050	1720
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5
H	20393	1754.3	20385	1753.5	20375	1752.5	20350	1750	20325	1747.5	20300	1745

5. RF Exposure Limits

5.1 Uncontrolled Environment

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

5.2 Controlled Environment

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. The exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	20.0

Limits for General Population/Uncontrolled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	1.6	4.0

1. Whole-Body SAR is averaged over the entire body, partial-body SAR is averaged over any 1gram of tissue defined as a tissue volume in the shape of a cube. SAR for hands, wrists, feet and ankles is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

6. Specific Absorption Rate (SAR)

6.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

6.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

$$SAR = \frac{d}{dt} \left(\frac{dW}{dm} \right) = \frac{d}{dt} \left(\frac{dW}{\rho dv} \right)$$

SAR is expressed in units of Watts per kilogram (W/kg)

$$SAR = \frac{\sigma |E|^2}{\rho}$$

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength.

8. Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

- (a) For WWAN power measurement, use base station simulator to configure EUT WWAN transmission in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.
- (b) Read the WWAN RF power level from the base station simulator.
- (c) For WLAN/BT power measurement, use engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power in each supported wireless interface and frequency band
- (d) Connect EUT RF port through RF cable to the power meter, and measure WLAN/BT output power

<SAR measurement>

- (a) Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power, in the highest power channel.
- (b) Place the EUT in the positions as Appendix D demonstrates.
- (c) Set scan area, grid size and other setting on the DASY software.
- (d) Measure SAR results for the highest power channel on each testing position.
- (e) Find out the largest SAR result on these testing positions of each band
- (f) Measure SAR results for other channels in worst SAR testing position if the reported SAR of highest power channel is larger than 0.8 W/kg

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

- (a) Power reference measurement
- (b) Area scan
- (c) Zoom scan
- (d) Power drift measurement

8.1 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine (SEMCAD). The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

- (a) Extraction of the measured data (grid and values) from the Zoom Scan
- (b) Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
- (c) Generation of a high-resolution mesh within the measured volume
- (d) Interpolation of all measured values from the measurement grid to the high-resolution grid
- (e) Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
- (f) Calculation of the averaged SAR within masses of 1g and 10g

8.2 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. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

8.3 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 found in the scanned area, within a range of the global maximum. The range (in dB0) 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 FCC KDB 865664 D01v01r03 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: 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 \leq the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

8.4 Zoom Scan

Zoom scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 gram and 10 gram 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 gram and 10 gram and displays these values next to the job's label.

Zoom scan parameters extracted from FCC KDB 865664 D01v01r03 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 <i>area scan based 1-g SAR estimation</i> procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

8.5 Volume Scan Procedures

The volume scan is used to assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

8.6 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASy measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drifts more than 5%, the SAR will be retested.

9. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	1078	Jun. 23, 2014	Jun. 22, 2015
SPEAG	835MHz System Validation Kit	D835V2	4d092	Jun. 23, 2014	Jun. 22, 2015
SPEAG	1750MHz System Validation Kit	D1750V2	1023	Jun. 17, 2014	Jun. 16, 2015
SPEAG	1900MHz System Validation Kit	D1900V2	5d018	Jun. 18, 2014	Jun. 17, 2015
SPEAG	Data Acquisition Electronics	DAE3	577	Oct. 06, 2014	Oct. 05, 2015
SPEAG	Dosimetric E-Field Probe	EX3DV4	3931	Sep. 25, 2014	Sep. 24, 2015
Wisewind	Thermometer	ETP-101	TM685	Oct. 21, 2014	Oct. 20, 2015
Anritsu	Radio Communication Analyzer	MT8820C	6201074414	Feb. 11, 2014	Feb. 10, 2015
Agilent	Wireless Communication Test Set	E5515C	MY50266977	May. 27, 2014	May. 26, 2015
SPEAG	Device Holder	N/A	N/A	NCR	NCR
R&S	Signal Generator	SMU200A	102502	Jul. 07, 2014	Jul. 06, 2015
SPEAG	Dielectric Probe Kit	DAKS-3.5	0004	Mar. 04, 2014	Mar. 03, 2015
Agilent	ENA Network Analyzer	E5071C	MY46101588	May. 31, 2014	May. 30, 2015
Anritsu	Power Meter	ML2495A	1036004	Aug. 09, 2014	Aug. 08, 2015
Anritsu	Power Sensor	MA2411B	1027253	Aug. 11, 2014	Aug. 10, 2015
R&S	Spectrum Analyzer	FSP 30	101329	Jun. 14, 2014	Jun. 13, 2015
Agilent	Dual Directional Coupler	778D	50422	Note1	
Woken	Attenuator 1	WK0602-XX	N/A	Note1	
PE	Attenuator 2	PE7005-10	N/A	Note1	
PE	Attenuator 3	PE7005- 3	N/A	Note1	
AR	Power Amplifier	5S1G4M2	0328767	Note1	
Mini-Circuits	Power Amplifier	ZVE-3W	162601250	Note1	
Mini-Circuits	Power Amplifier	ZHL-42W+	13440021344	Note1	

General Note:

1. Prior to system verification and validation, the path loss from the signal generator to the system check source and the power meter, which includes the amplifier, cable, attenuator and directional coupler, was measured by the network analyzer. The reading of the power meter was offset by the path loss difference between the path to the power meter and the path to the system check source to monitor the actual power level fed to the system check source.

10. System Verification

10.1 Tissue Verification

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (ϵ_r)
For Head								
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
900	40.3	57.9	0.2	1.4	0.2	0	0.97	41.5
1800, 1900, 2000	55.2	0	0	0.3	0	44.5	1.40	40.0
2450	55.0	0	0	0	0	45.0	1.80	39.2
2600	54.8	0	0	0.1	0	45.1	1.96	39.0
For Body								
750	51.7	47.2	0	0.9	0.1	0	0.96	55.5
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
900	50.8	48.2	0	0.9	0.1	0	1.05	55.0
1800, 1900, 2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0	0	31.4	1.95	52.7
2600	68.1	0	0	0.1	0	31.8	2.16	52.5

Simulating Liquid for 5GHz, Manufactured by SPEAG

Ingredients	(% by weight)
Water	64~78%
Mineral oil	11~18%
Emulsifiers	9~15%
Additives and Salt	2~3%

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Tissue Type	Liquid Temp. (°C)	Conductivity (σ)	Permittivity (ϵ_r)	Conductivity Target (σ)	Permittivity Target (ϵ_r)	Delta (σ) (%)	Delta (ϵ_r) (%)	Limit (%)	Date
750	MSL	22.5	0.963	54.233	0.96	55.50	0.31	-2.28	±5	2014/11/11
835	MSL	22.4	0.963	54.557	0.97	55.20	-0.72	-1.16	±5	2014/11/12
1750	MSL	22.3	1.510	52.098	1.49	53.40	1.34	-2.44	±5	2014/11/12
1900	MSL	22.3	1.530	52.859	1.52	53.30	0.66	-0.83	±5	2014/11/12

10.2 System Performance Check Results

Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10 %. Below table shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion and the plots can be referred to Appendix A of this report.

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
2014/11/11	750	MSL	250	D750V3-1078	EX3DV4 - SN3931	DAE3 Sn577	2.00	8.63	8.00	-7.30
2014/11/12	835	MSL	250	D835V2-4d092	EX3DV4 - SN3931	DAE3 Sn577	2.27	9.47	9.08	-4.12
2014/11/12	1750	MSL	250	D1750V2-1023	EX3DV4 - SN3931	DAE3 Sn577	9.51	37.90	38.04	0.37
2014/11/12	1900	MSL	250	D1900V2-5d018	EX3DV4 - SN3931	DAE3 Sn577	9.43	39.80	37.72	-5.23

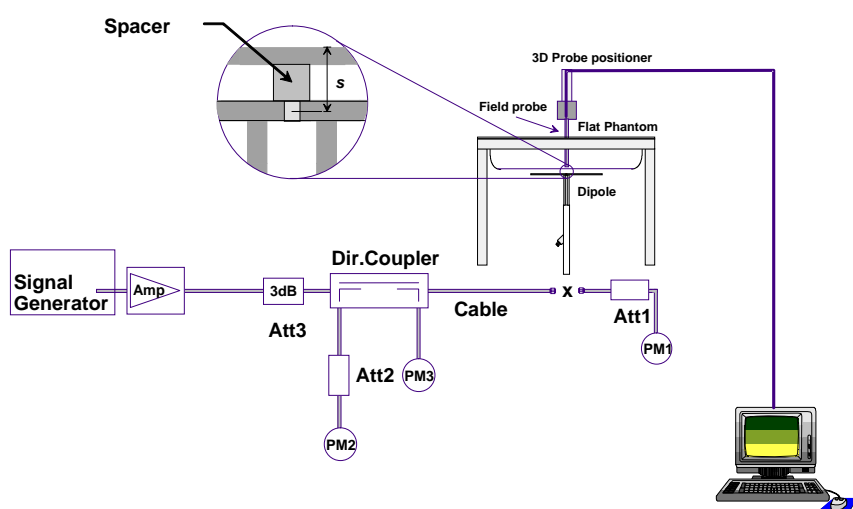


Fig 8.3.1 System Performance Check Setup



Fig 8.3.2 Setup Photo

11. RF Exposure Positions

11.1 SAR Testing for Tablet

This device can be used also in full sized tablet exposure conditions, due to its size. Per FCC KDB 616217, the back surface and edges of the tablet should be tested for SAR compliance with the tablet touching the phantom. The SAR exclusion threshold in KDB 447498 D01v05r02 can be applied to determine SAR test exclusion for adjacent edge configurations. The closest distance from the antenna to an adjacent tablet edge is used to determine if SAR testing is required for the adjacent edges, with the adjacent edge positioned against the phantom and the edge containing the antenna positioned perpendicular to the phantom.

12. Conducted RF Output Power (Unit: dBm)

<CDMA2000 Conducted Power>

General Note:

1. Per KDB 941225 D01v03, the EUT is treated as data device and SAR is tested with Ev-Do Rev 0 (RTAP 153.6kbps) as the primary mode.

Band	CDMA2000 BC0			CDMA2000 BC1		
TX Channel	1013	384	777	25	600	1175
Frequency (MHz)	824.7	836.52	848.31	1851.25	1880	1908.75
1xRTT RC1 SO55	23.73	23.93	23.71	23.84	23.79	23.74
1xRTT RC3 SO55	23.61	23.85	23.61	23.87	23.80	23.78
1xEVDO RTAP 153.6Kbps	23.59	23.85	23.60	23.91	23.79	23.79
1xEVDO RETAP 4096Bits	23.58	23.83	23.57	23.85	23.82	23.77

<LTE Conducted Power>

General Note:

1. Anritsu MT8820C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r03, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r03, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r03, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r03, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05v02r03, 16QAM output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r03, Smaller bandwidth output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, smaller bandwidth SAR testing is not required.

<LTE Band 13>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune up Limit (dBm)	MPR (dB)
Channel					23230			
Frequency (MHz)					782			
10	QPSK	1	0		22.88		24	0
10	QPSK	1	24		22.41			
10	QPSK	1	49		22.49			
10	QPSK	25	0		21.75		23	1
10	QPSK	25	12		21.71			
10	QPSK	25	24		21.74			
10	QPSK	50	0		21.64		23	1
10	16QAM	1	0		21.50			
10	16QAM	1	24		21.76			
10	16QAM	1	49		21.58		22	2
10	16QAM	25	0		20.57			
10	16QAM	25	12		20.77			
10	16QAM	25	24		20.78		22	2
10	16QAM	50	0		20.68			
Channel				23205	23230	23255	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				779.5	782	784.5		
5	QPSK	1	0	22.40	22.62	22.68	24	0
5	QPSK	1	12	22.50	22.68	22.63		
5	QPSK	1	24	22.87	22.75	22.43		
5	QPSK	12	0	21.56	21.77	21.84	23	1
5	QPSK	12	6	21.60	21.83	21.79		
5	QPSK	12	11	21.79	21.81	21.69		
5	QPSK	25	0	21.56	21.76	21.68	23	1
5	16QAM	1	0	21.48	21.68	21.76		
5	16QAM	1	12	21.60	21.77	21.68		
5	16QAM	1	24	21.88	21.85	21.50	22	2
5	16QAM	12	0	20.59	20.84	20.90		
5	16QAM	12	6	20.67	20.88	20.88		
5	16QAM	12	11	20.85	20.87	20.79	22	2
5	16QAM	25	0	20.56	20.73	20.70		

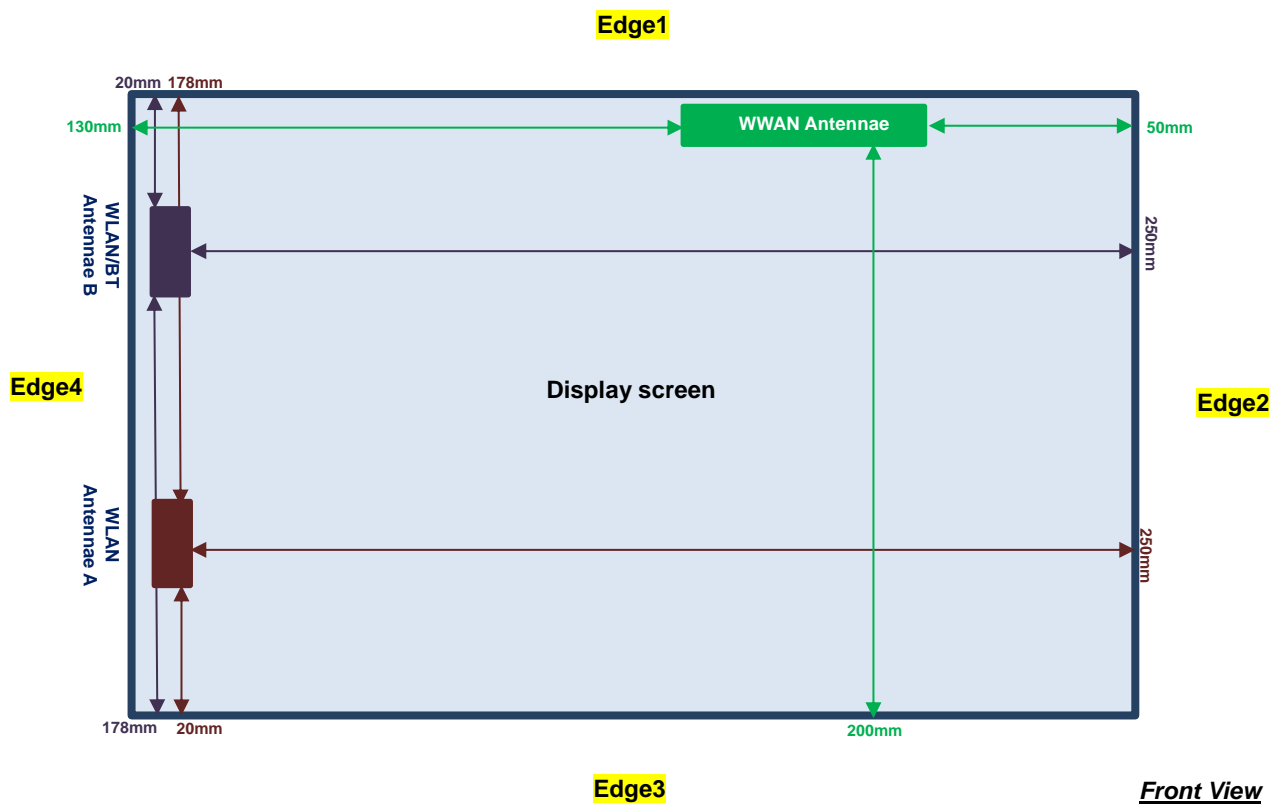
<LTE Band 4>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune up Limit (dBm)	MPR (dB)
Channel				20050	20175	20300		
Frequency (MHz)				1720	1732.5	1745		
20	QPSK	1	0	22.58	22.67	22.60	24	0
20	QPSK	1	49	22.39	22.59	22.53		
20	QPSK	1	99	22.57	22.50	22.36		
20	QPSK	50	0	21.24	21.35	21.29	23	1
20	QPSK	50	24	21.21	21.33	21.24		
20	QPSK	50	49	21.19	21.30	21.12		
20	QPSK	100	0	21.21	21.44	21.30	23	1
20	16QAM	1	0	21.43	21.54	21.66		
20	16QAM	1	49	21.44	21.66	21.49		
20	16QAM	1	99	21.59	21.55	21.41	22	2
20	16QAM	50	0	20.22	20.30	20.34		
20	16QAM	50	24	20.14	20.33	20.26		
20	16QAM	50	49	20.13	20.27	20.18	22	2
20	16QAM	100	0	20.23	20.36	20.32		
Channel				20025	20175	20325		
Frequency (MHz)				1717.5	1732.5	1747.5		
15	QPSK	1	0	22.42	22.60	22.66	24	0
15	QPSK	1	37	22.46	22.61	22.58		
15	QPSK	1	74	22.50	22.49	22.39		
15	QPSK	36	0	21.25	21.44	21.40	23	1
15	QPSK	36	18	21.27	21.44	21.34		
15	QPSK	36	37	21.28	21.35	21.24		
15	QPSK	75	0	21.29	21.38	21.26	23	1
15	16QAM	1	0	21.41	21.61	21.65		
15	16QAM	1	37	21.48	21.66	21.55		
15	16QAM	1	74	21.47	21.53	21.45	22	2
15	16QAM	36	0	20.24	20.38	20.39		
15	16QAM	36	18	20.28	20.43	20.37		
15	16QAM	36	37	20.24	20.40	20.24	22	2
15	16QAM	75	0	20.23	20.38	20.35		
Channel				20000	20175	20350		
Frequency (MHz)				1715	1732.5	1750		
10	QPSK	1	0	22.37	22.60	22.50	24	0
10	QPSK	1	24	22.40	22.64	22.45		
10	QPSK	1	49	22.50	22.54	22.41		
10	QPSK	25	0	21.27	21.44	21.40	23	1
10	QPSK	25	12	21.26	21.47	21.26		
10	QPSK	25	24	21.36	21.50	21.25		
10	QPSK	50	0	21.16	21.38	21.19	23	1
10	16QAM	1	0	21.35	21.64	21.55		
10	16QAM	1	24	21.41	21.65	21.51		
10	16QAM	1	49	21.42	21.57	21.37	22	2
10	16QAM	25	0	20.22	20.43	20.40		
10	16QAM	25	12	20.26	20.46	20.30		
10	16QAM	25	24	20.28	20.53	20.25	22	2
10	16QAM	50	0	20.13	20.33	20.19		



Channel				19975	20175	20375	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1712.5	1732.5	1752.5		
5	QPSK	1	0	22.35	22.51	22.51	24	0
5	QPSK	1	12	22.33	22.60	22.34		
5	QPSK	1	24	22.39	22.63	22.41		
5	QPSK	12	0	21.41	21.61	21.34	23	1
5	QPSK	12	6	21.35	21.58	21.33		
5	QPSK	12	11	21.40	21.61	21.37		
5	QPSK	25	0	21.22	21.44	21.29		
5	16QAM	1	0	21.40	21.61	21.55	23	1
5	16QAM	1	12	21.39	21.64	21.45		
5	16QAM	1	24	21.39	21.66	21.44		
5	16QAM	12	0	20.41	20.63	20.45	22	2
5	16QAM	12	6	20.38	20.64	20.45		
5	16QAM	12	11	20.41	20.67	20.43		
5	16QAM	25	0	20.23	20.47	20.30		

13. Antenna Location



<SAR test exclusion table>
General Note:

1. The below table, when the distance is < 50 mm exclusion threshold is "Ratio", when the distance is > 50 mm exclusion threshold is "mW"
2. Maximum power is the source-based time-average power and represents the maximum RF output power among production units
3. Per KDB 447498 D01v05r02, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.
4. Per KDB 447498 D01v05r02, standalone SAR test exclusion threshold is applied; If the test separation distance is < 5mm, 5mm is used to determine SAR exclusion threshold.
5. Per KDB 447498 D01v05r02, 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:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$$
 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR
 - 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
6. Per KDB 447498 D01v05r02, at 100 MHz to 6 GHz and for *test separation distances* > 50 mm, the SAR test exclusion threshold is determined according to the following
 - a) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm) · (f(MHz)/150)] mW, at 100 MHz to 1500 MHz
 - b) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm) · 10] mW at > 1500 MHz and ≤ 6 GHz

Exposure Position	Wireless Interface	CDMA BC0	CDMA BC1	LTE Band 13	LTE Band 4
	Calculated Frequency	848MHz	1907MHz	784MHz	1754MHz
	Maximum power (dBm)	24.5	24.5	24.0	24.0
	Maximum rated power(mW)	282.0	282.0	251.0	251.0
Bottom Face	Separation distance(mm)	5.0			
	exclusion threshold	52.0	78.0	44.0	66.0
	Testing required?	Yes	Yes	Yes	Yes
Edge 1	Separation distance(mm)	5.0			
	exclusion threshold	52.0	78.0	44.0	66.0
	Testing required?	Yes	Yes	Yes	Yes
Edge 2	Separation distance(mm)	50.0			
	exclusion threshold	5.0	8.0	4.0	7.0
	Testing required?	Yes	Yes	Yes	Yes
Edge 3	Separation distance(mm)	200.0			
	exclusion threshold	1011.0	1609.0	953.0	1613.0
	Testing required?	No	No	No	No
Edge 4	Separation distance(mm)	130.0			
	exclusion threshold	615.0	909.0	588.0	913.0
	Testing required?	No	No	No	No

14. SAR Test Results

General Note:

- Per KDB 447498 D01v05r02, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
 - Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
 - For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
- Per KDB 447498 D01v05r02, for each exposure position, 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
- Per KDB 941225 D01v03, the EUT is treated as data device and SAR is tested with Ev-Do Rev 0 (RTAP 153.6kbps) as the primary mode.
- Per KDB 941225 D05v02r03, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
- Per KDB 941225 D05v02r03, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
- Per KDB 941225 D05v02r03, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
- Per KDB 941225 D05v02r03, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, 16QAM SAR testing is not required.
- Per KDB 941225 D05v02r03, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, smaller bandwidth SAR testing is not required.

14.1 Body SAR

<CDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	CDMA BC0	RTAP 153.6Kbps	Bottom Face	0cm	384	836.52	23.85	24.50	1.161	-0.07	0.084	0.098
01	CDMA BC0	RTAP 153.6Kbps	Edge1	0cm	384	836.52	23.85	24.50	1.161	-0.15	0.258	0.300
	CDMA BC0	RTAP 153.6Kbps	Edge2	0cm	384	836.52	23.85	24.50	1.161	0	0.012	0.014
	CDMA BC1	RTAP 153.6Kbps	Bottom Face	0cm	25	1851.25	23.91	24.50	1.146	-0.05	0.142	0.163
02	CDMA BC1	RTAP 153.6Kbps	Edge1	0cm	25	1851.25	23.91	24.50	1.146	0.05	0.331	0.379
	CDMA BC1	RTAP 153.6Kbps	Edge2	0cm	25	1851.25	23.91	24.50	1.146	-0.12	0.024	0.027

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 13	10M	QPSK	1RB	0offset	Bottom Face	0cm	23230	782	22.88	24.00	1.294	-0.03	0.149	0.193
	LTE Band 13	10M	QPSK	25RB	0offset	Bottom Face	0cm	23230	782	21.75	23.00	1.334	0.04	0.119	0.159
03	LTE Band 13	10M	QPSK	1RB	0offset	Edge1	0cm	23230	782	22.88	24.00	1.294	-0.1	0.437	0.566
	LTE Band 13	10M	QPSK	25RB	0offset	Edge1	0cm	23230	782	21.75	23.00	1.334	-0.16	0.324	0.432
	LTE Band 13	10M	QPSK	1RB	0offset	Edge2	0cm	23230	782	22.88	24.00	1.294	0.13	0.016	0.021
	LTE Band 13	10M	QPSK	25RB	0offset	Edge2	0cm	23230	782	21.75	23.00	1.334	0.1	0.013	0.017
	LTE Band 4	20M	QPSK	1RB	0offset	Bottom Face	0cm	20175	1732.5	22.67	24.00	1.358	0.01	0.457	0.621
	LTE Band 4	20M	QPSK	50RB	0offset	Bottom Face	0cm	20175	1732.5	21.35	23.00	1.462	0.03	0.336	0.491
	LTE Band 4	20M	QPSK	1RB	0offset	Edge1	0cm	20175	1732.5	22.67	24.00	1.358	-0.05	0.848	1.152
	LTE Band 4	20M	QPSK	1RB	0offset	Edge1	0cm	20050	1720	22.58	24.00	1.387	-0.03	0.863	1.197
	LTE Band 4	20M	QPSK	1RB	0offset	Edge1	0cm	20300	1745	22.60	24.00	1.380	-0.05	0.860	1.187
	LTE Band 4	20M	QPSK	50RB	0offset	Edge1	0cm	20175	1732.5	21.35	23.00	1.462	-0.19	0.772	1.129
04	LTE Band 4	20M	QPSK	50RB	0offset	Edge1	0cm	20050	1720	21.24	23.00	1.500	0.01	0.802	1.203
	LTE Band 4	20M	QPSK	50RB	0offset	Edge1	0cm	20300	1745	21.29	23.00	1.483	-0.04	0.690	1.023
	LTE Band 4	20M	QPSK	100RB	0offset	Edge1	0cm	20175	1732.5	21.44	23.00	1.432	-0.11	0.766	1.097
	LTE Band 4	20M	QPSK	1RB	0offset	Edge2	0cm	20175	1732.5	22.67	24.00	1.358	-0.05	0.060	0.081
	LTE Band 4	20M	QPSK	50RB	0offset	Edge2	0cm	20175	1732.5	21.35	23.00	1.462	-0.06	0.043	0.063

14.2 Repeated SAR Measurement

No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	LTE Band 4	20M	QPSK	1RB	0offset	Edge1	0cm	20050	1720	22.58	24.00	1.387	-0.03	0.863	-	1.197
2nd	LTE Band 4	20M	QPSK	1RB	0offset	Edge1	0cm	20050	1720	22.58	24.00	1.387	-0.01	0.838	1.03	1.162

General Note:

- Per KDB 865664 D01v01r03, for each frequency band, repeated SAR measurement is required only when the measured SAR is $\geq 0.8\text{W/kg}$
- Per KDB 865664 D01v01r03, if the ratio among the repeated measurement is ≤ 1.2 and the measured SAR $< 1.45\text{W/kg}$, only one repeated measurement is required.
- The ratio is the difference in percentage between original and repeated *measured SAR*.
- All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

15. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Tablet
		Body
1.	CDMA(Data) + WLAN2.4GHz(data)	Yes
2.	LTE(Data) + WLAN2.4GHz(data)	Yes
3.	CDMA(Data) + Bluetooth(data)	Yes
4.	LTE(Data) + Bluetooth(data)	Yes
5.	CDMA(data) + WLAN5GHz(data)	No
6.	LTE(data) + WLAN5GHz(data)	No

General Note:

- The WLAN/BT module, Brand Name: DT Research Inc., Model Name: 600C, FCC ID: YE3600C is also integrated into this host and the WLAN SAR testing results are also used perform transmission simultaneous analysis which can be referred to Sporton SAR Test Report, Report No:FA491670-01
- For co-location analysis:
 - For WWAN SAR testing was performed on bottom face, Edge1 and Edge2, according to KDB 447498 D01v05r02 exclusion thresholds which can be referred to page23.
 - The WLAN SAR testing was performed on bottom face, Edge1, Edge3 and Edge4, according to KDB 447498 D01v05r02 exclusion thresholds which can be referred to Sporton FCC SAR Report, FCC ID: YE3600C, Report No: FA491670-01 Rev.01 page33.
 - For co-location analysis was performed at the same exposure positions, which are bottom face and Edge1, where both WWAN standalone SAR and WLAN standalone SAR was assessed.
- The Scaled SAR summation is calculated based on the same configuration and test position.
- Per KDB 447498 D01v05r02, simultaneous transmission SAR is compliant if,
 - Scalar SAR summation < 1.6W/kg.
 - $SPLSR = (SAR1 + SAR2)^{1.5} / (\min. \text{ separation distance, mm})$, and the peak separation distance is determined from the square root of $[(x1-x2)^2 + (y1-y2)^2 + (z1-z2)^2]$, where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.
 - If $SPLSR \leq 0.04$, simultaneously transmission SAR measurement is not necessary.
 - Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg.
- For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01v05r02 based on the formula below.
 - $(\max. \text{ power of channel, including tune-up tolerance, mW}) / (\min. \text{ test separation distance, mm}) \cdot [\sqrt{f(\text{GHz})/x}] \text{ W/kg}$ for test separation distances $\leq 50 \text{ mm}$; where $x = 7.5$ for 1-g SAR, and $x = 18.75$ for 10-g SAR.
 - When the minimum separation distance is < 5mm, the distance is used 5mm to determine SAR test exclusion.
 - 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.
 - Bluetooth estimated SAR is conservatively determined by 5mm separation, for all applicable exposure positions.

Bluetooth Max Power	Exposure Position	All Positions
7 dBm	Estimated SAR (W/kg)	0.210 W/kg

15.1 Body Exposure Conditions

WWAN Band		Exposure Position	1	2	3	4	1+2 Summed SAR (W/kg)	1+3 Summed SAR (W/kg)	1+4 Summed SAR (W/kg)
			WWAN SAR (W/kg)	2.4GHz WLAN Antenna A SAR (W/kg)	2.4GHz WLAN Antenna B SAR (W/kg)	2.4GHz Bluetooth Estimated SAR (W/kg)			
CDMA	BC0	Bottom Face at 0cm	0.098	0.211	0.154	0.210	0.31	0.25	0.31
		Edge1 at 0cm	0.300		0.065	0.210	0.30	0.37	0.51
		Edge2 at 0cm	0.014			0.210	0.01	0.01	0.22
	BC1	Bottom Face at 0cm	0.163	0.211	0.154	0.210	0.37	0.32	0.37
		Edge1 at 0cm	0.379		0.065	0.210	0.38	0.44	0.59
		Edge2 at 0cm	0.027			0.210	0.03	0.03	0.24
LTE	Band 13	Bottom Face at 0cm	0.193	0.211	0.154	0.210	0.40	0.35	0.40
		Edge1 at 0cm	0.566		0.065	0.210	0.57	0.63	0.78
		Edge2 at 0cm	0.021			0.210	0.02	0.02	0.23
	Band 4	Bottom Face at 0cm	0.621	0.211	0.154	0.210	0.83	0.78	0.83
		Edge1 at 0cm	1.203		0.065	0.210	1.20	1.27	1.41
		Edge2 at 0cm	0.081			0.210	0.08	0.08	0.29

Test Engineer : Galen Chang, Kurt Liu and Iran Wang

16. Uncertainty Assessment

The component of uncertainty may generally be categorized according to the methods used to evaluate them. The evaluation of uncertainty by the statistical analysis of a series of observations is termed a Type A evaluation of uncertainty. The evaluation of uncertainty by means other than the statistical analysis of a series of observation is termed a Type B evaluation of uncertainty. Each component of uncertainty, however evaluated, is represented by an estimated standard deviation, termed standard uncertainty, which is determined by the positive square root of the estimated variance.

A Type A evaluation of standard uncertainty may be based on any valid statistical method for treating data. This includes calculating the standard deviation of the mean of a series of independent observations; using the method of least squares to fit a curve to the data in order to estimate the parameter of the curve and their standard deviations; or carrying out an analysis of variance in order to identify and quantify random effects in certain kinds of measurement.

A type B evaluation of standard uncertainty is typically based on scientific judgment using all of the relevant information available. These may include previous measurement data, experience, and knowledge of the behavior and properties of relevant materials and instruments, manufacture's specification, data provided in calibration reports and uncertainties assigned to reference data taken from handbooks. Broadly speaking, the uncertainty is either obtained from an outdoor source or obtained from an assumed distribution, such as the normal distribution, rectangular or triangular distributions indicated in table below.

Uncertainty Distributions	Normal	Rectangular	Triangular	U-Shape
Multi-plying Factor ^(a)	1/ κ ^(b)	1/ $\sqrt{3}$	1/ $\sqrt{6}$	1/ $\sqrt{2}$

(a) standard uncertainty is determined as the product of the multiplying factor and the estimated range of variations in the measured quantity

(b) κ is the coverage factor

Table 16.1. Standard Uncertainty for Assumed Distribution

The combined standard uncertainty of the measurement result represents the estimated standard deviation of the result. It is obtained by combining the individual standard uncertainties of both Type A and Type B evaluation using the usual "root-sum-squares" (RSS) methods of combining standard deviations by taking the positive square root of the estimated variances.

Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed to lie. It is obtained by multiplying the combined standard uncertainty by a coverage factor. Typically, the coverage factor ranges from 2 to 3. Using a coverage factor allows the true value of a measured quantity to be specified with a defined probability within the specified uncertainty range. For purpose of this document, a coverage factor two is used, which corresponds to confidence interval of about 95 %. The DASY uncertainty Budget is shown in the following tables.

Error Description	Uncertainty Value (±%)	Probability Distribution	Divisor	Ci (1g)	Ci (10g)	Standard Uncertainty (1g)	Standard Uncertainty (10g)
Measurement System							
Probe Calibration	6.0	Normal	1	1	1	± 6.0 %	± 6.0 %
Axial Isotropy	4.7	Rectangular	√3	0.7	0.7	± 1.9 %	± 1.9 %
Hemispherical Isotropy	9.6	Rectangular	√3	0.7	0.7	± 3.9 %	± 3.9 %
Boundary Effects	1.0	Rectangular	√3	1	1	± 0.6 %	± 0.6 %
Linearity	4.7	Rectangular	√3	1	1	± 2.7 %	± 2.7 %
System Detection Limits	1.0	Rectangular	√3	1	1	± 0.6 %	± 0.6 %
Readout Electronics	0.3	Normal	1	1	1	± 0.3 %	± 0.3 %
Response Time	0.8	Rectangular	√3	1	1	± 0.5 %	± 0.5 %
Integration Time	2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %
RF Ambient Noise	3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
RF Ambient Reflections	3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
Probe Positioner	0.4	Rectangular	√3	1	1	± 0.2 %	± 0.2 %
Probe Positioning	2.9	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
Max. SAR Eval.	1.0	Rectangular	√3	1	1	± 0.6 %	± 0.6 %
Test Sample Related							
Device Positioning	2.9	Normal	1	1	1	± 2.9 %	± 2.9 %
Device Holder	3.6	Normal	1	1	1	± 3.6 %	± 3.6 %
Power Drift	5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %
Phantom and Setup							
Phantom Uncertainty	4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %
Liquid Conductivity (Target)	5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %
Liquid Conductivity (Meas.)	2.5	Normal	1	0.64	0.43	± 1.6 %	± 1.1 %
Liquid Permittivity (Target)	5.0	Rectangular	√3	0.6	0.49	± 1.7 %	± 1.4 %
Liquid Permittivity (Meas.)	2.5	Normal	1	0.6	0.49	± 1.5 %	± 1.2 %
Combined Standard Uncertainty						± 11.0 %	± 10.8 %
Coverage Factor for 95 %						K=2	
Expanded Uncertainty						± 22.0 %	± 21.5 %

Table 16.2. Uncertainty Budget for frequency range 300 MHz to 3 GHz

17. References

- [1] FCC 47 CFR Part 2 "Frequency Allocations and Radio Treaty Matters; General Rules and Regulations"
- [2] ANSI/IEEE Std. C95.1-1992, "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz", September 1992
- [3] IEEE Std. 1528-2003, "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- [4] SPEAG DASY System Handbook
- [5] FCC KDB 248227 D01 v01r02, "SAR Measurement Procedures for 802.11 a/b/g Transmitters", May 2007
- [6] FCC KDB 447498 D01 v05r02, "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies", Feb 2014
- [7] FCC KDB 941225 D01 v03, "3G SAR MEAUREMENT PROCEDURES", Oct 2014
- [8] FCC KDB 941225 D05 v02r03, "SAR Evaluation Considerations for LTE Devices", Dec 2013
- [9] FCC KDB 616217 D04 v01r01, "SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers", May 2013
- [10] FCC KDB 865664 D01 v01r03, "SAR Measurement Requirements for 100 MHz to 6 GHz", Feb 2014.
- [11] FCC KDB 865664 D02 v01r01, "RF Exposure Compliance Reporting and Documentation Considerations" May 2013.