



FCC SAR Report

Report No. : SESF1410135
Client/Manufacturer : Broadcom Corporation
Address : 190 Mathilda Place Sunnyvale CA 94086 U.S.A.
Product : 802.11 a/b/g/n/ac WLAN+ Bluetooth PCI-E Mini Card
Brand : Broadcom
Model : BCM94352Z
FCC ID : QDS-BRCM1076
Standards : FCC 47 CFR Part 2 (2.1093) / IEEE C95.1:1992 /
IEEE 1528-2013/IEEE 1528a-2005 / KDB 865664 D01 v01r03
KDB 248227 D01 v01r02 / KDB 447498 D01 v05r02 /
KDB 616217 D04 v01r01
Test Date : December 06st, 2014~December 09th, 2014


Statement of Compliance:

The SAR values measured for the test sample are below the maximum recommended level of 1.6W/kg averaged over any 1g tissue according to FCC Acknowledge Data Base/ FCC 47CFR Part 2 (2.1093) / IEEE Std.1528-2013.

The test result only corresponds to the tested sample. It is not permitted to copy this report, in part or in full, without the permission of the test laboratory.

The testing described in this report has been carried out to the best of our knowledge and ability, and our responsibility is limited to the exercise of reasonable care. This certification is not intended to believe the sellers from their legal and/or contractual obligations.

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Release Version

Report No.	Issue Date	Description
SESF1410135	2014-12-11	Initial release



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1. Summary of Maximum SAR Value

Equipment Class	Mode	Highest Reported SAR _{1-g} (W/kg)
DTS	2.4GHz WIFI	0.216
	5.8GHz WIFI	1.34
UNII	5.2GHz WIFI	0.577
	5.3GHz WIFI	0.691
	5.6GHz WIFI	1.11
DSS	Bluetooth	N/A
Highest Simultaneous Transmission SAR		Body
2.4GHz WLAN (Main + Aux)		0.319
5.2GHz WLAN (Main + Aux)		1.984
5.3GHz WLAN (Main + Aux)		1.017
5.6GHz WLAN (Main + Aux)		1.008
5.8GHz WLAN (Main + Aux)		1.512
DTS+DSS		1.479
UNII+DSS		1.249



2. Description of Equipment under Test

Product Name	802.11 a/b/g/n/ac WLAN+ Bluetooth PCI-E Mini Card
Model No.	BCM94352Z
Brand Name	Broadcom
Product Type	WLAN (2TX, 2RX)
Antenna Type	PIFA
Antenna Peak Gain	2400- 2500MHz: 0.95dBi 5150- 5850MHz: 1.55dBi
Device Category	Portable
RF Exposure Environment	Uncontrolled
Bluetooth	
Bluetooth Frequency	2402~2480MHz
Channel separation	1MHz
Modulation technology	BLE4.0 (GFSK), V3.0+EDR(GFSK), V3.0+EDR(8-DPSK)
Wi-Fi	
Tx Rate	802.11b: up to 11Mbps, 802.11a/g: up to 54Mbps 802.11n : up to 400Mbps, 802.11ac: up to 866.7Mbps
Wi-Fi Frequency	For 15.247: 2.4GHz: 2.412 ~ 2.462GHz, 5GHz: 5.745 ~ 5.825GHz For 15.407: 802.11a: 5.18 ~ 5.24GHz, 5.26 ~ 5.32GHz, 5.5~5.72GHz
Channel Separation	For 15.247(2.4GHz): 11 for 802.11b, 802.11g, 802.11n (HT20) For 15.247(5GHz): 5 for 802.11a, 802.11n (HT20)/ 2 for 802.11n (HT40)/ 1 for 802.11ac (VHT80) For 15.407: 20 for 802.11a, 802.11n (HT20)/ 10 for 802.11n (HT40)/ 5 for 802.11ac (VHT80)

Note:

Antenna information,

Manufacturer	Part Number
HongLin Electronics Co., Ltd	Tx1 Antenna: DC33001DB00 / Tx2 Antenna: DC33001DB10
LUXSHARE-ICT	Tx1 Antenna: DC33001D900 / Tx2 Antenna: DC33001D910



3. General Information

Host Details,

Host Manufacture	Host Type	Host Model
Lenovo	Notebook Computer	Lenovo Yoga 3 14xxxx; 80JHxxxx; 80KQxxxx The "x" can be 0- 9, A- Z, a-z, any symbol or blank for marketing use only

Our Lab,

Test Site	Cerpas Technology (Suzhou) Co.,Ltd
Test Site Location	No.66,Tangzhuang Road, Suzhou Industrial Park, Jiangsu 215006, China



4. Basic restrictions and Standards

4.1. Test Standards

1. IEEE 1528-2013
2. FCC KDB Publication 447498 D01 General RF Exposure Guidance v05r02
3. FCC KDB Publication 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03
4. FCC KDB Publication 616217 D04 SAR for laptop and tablets v01r01
5. FCC KDB Publication 248227 D01 SAR measurement for 802 11 a b g v01r02

4.2. Environment Condition

Item	Target	Measured
Ambient Temperature(°C)	18~25	21.5±2
Temperature of Simulant(°C)	20~22	21±2
Relative Humidity(%RH)	30~70	52

4.3. RF Exposure Limits

Human Exposure	Basic restrictions for electric, magnetic and electromagnetic fields. (Unit in mW/g or W/kg)
Spatial Peak SAR ¹ (Head and Body)	1.60
Spatial Average SAR ² (Whole Body)	0.08
Spatial Peak SAR ³ (Arms and Legs)	4.00

Notes:

1. The Spatial Peak value of the SAR averaged over any 1gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
2. The Spatial Average value of the SAR averaged over the whole body.
3. The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over appropriate averaging time.



5. DASY5 Measurement System

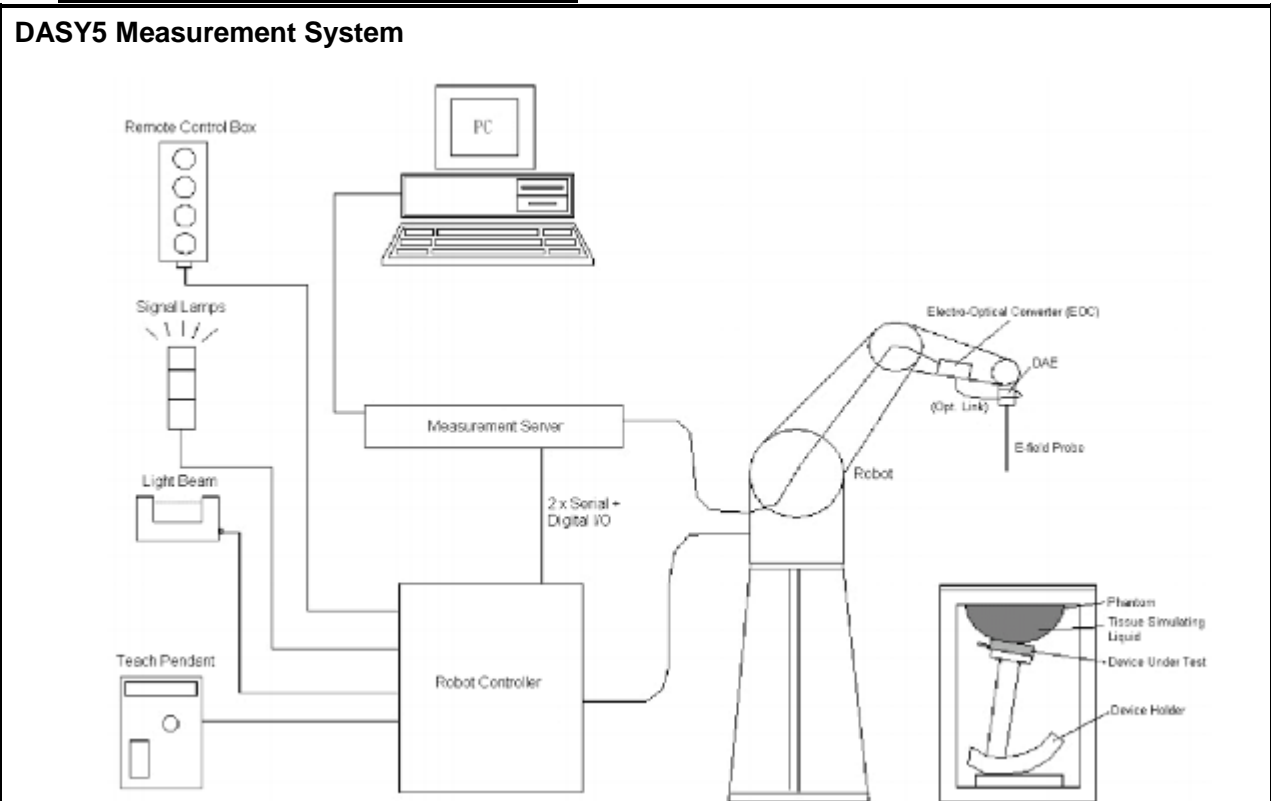


Figure 2.1 SPEAG DASY5 System Configurations

The DASY5 system for performance compliance tests is illustrated above graphically. This system consists of the following items:

- A standard high precision 6-axis robot with controller, a teach pendant and software
- A data acquisition electronic(DAE)attached to the robot arm extension
- A dosimetric probe equipped with an optical surface detector system
- The electro-optical converter(ECO)performs the conversion between optical and electrical signals
- A measurement server performs the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the accuracy of the probe positioning
- A computer operating Windows 7
- DASY5 software
- Remove control with teach pendant additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom
- A device holder
- Tissue simulating liquid
- Dipole for evaluating the proper functioning of the system



5.1. Uncertainty of Inter-/Extrapolation and Averaging

In order to evaluate the uncertainty of the interpolation, extrapolation and averaged SAR calculation algorithms of the Postprocessor, DASY5 allows the generation of measurement grids which are artificially predefined by analytically based test functions. Therefore, the grids of area scans and zoom scans can be filled with uncertainty test data, according to the SAR benchmark functions of IEEE 1528. The three analytical functions shown in equations as below are used to describe the possible range of the expected SAR distributions for the tested handsets. The field gradients are covered by the spatially flat distribution f1, the spatially steep distribution f3 and f2 accounts for H-field cancellation on the phantom/tissue surface.

$$f_1(x, y, z) = Ae^{-\frac{z}{2a}} \cos^2 \left(\frac{\pi \sqrt{x'^2 + y'^2}}{5a} \right)$$


$$f_2(x, y, z) = Ae^{-\frac{z}{a}} \frac{a^2}{a^2 + x'^2} \left(3 - e^{-\frac{2z}{a}} \right) \cos^2 \left(\frac{\pi y'}{2 \cdot 3a} \right)$$

$$f_3(x, y, z) = A \frac{a^2}{\frac{a^2}{4} + x'^2 + y'^2} \left(e^{-\frac{2z}{a}} + \frac{a^2}{2(a + 2z)^2} \right)$$

5.2. DASY5 E-Field Probe

The SAR measurement is conducted with the dosimetric probe manufactured by SPEAG. The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency.

SPEAG conducts the probe calibration in compliance with international and national standards (e.g. IEEE 1528, EN 62209-1, IEC 62209, etc.) under ISO 17025. The calibration data are in Appendix D.

Model	EX3DV4	
Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	10 MHz to 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)	
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)	
Dynamic Range	10 μ W/g to 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 μ W/g)	
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.	

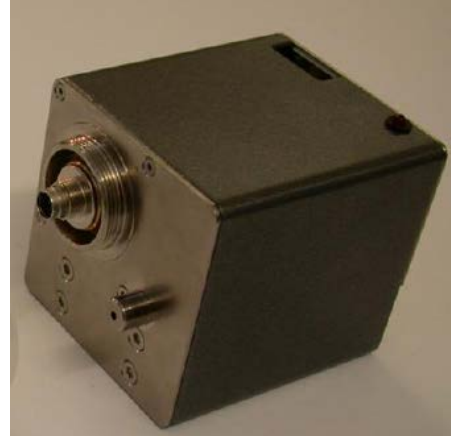


5.3. Data Acquisition Electronics (DAE)

The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit.

Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.

The input impedance of the DAE4 is 200M Ohm; the inputs are symmetrical and floating. Common mode rejection is above 80dB.



5.4. Robot

The DASY5 system uses the high precision robots TX90 XL type out of the newer series from Stäubli SA (France). For the 6-axis controller DASY5 system, the CS8C robot controller version from Stäubli is used.

The XL robot series have many features that are important for our application:

- High precision (repeatability 0.02 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)
- 6-axis controller



5.5. Light Beam Unit

The light beam switch allows automatic "tooling" of the probe. During the process, the actual position of the probe tip with respect to the robot arm is measured, as well as the probe length and the horizontal probe offset. The software then corrects all movements, such that the robot coordinates are valid for the probe tip.

The repeatability of this process is better than 0.1 mm. If a position has been taught with an aligned probe, the same position will be reached with another aligned probe within 0.1 mm, even if the other probe has different dimensions. During probe rotations, the probe tip will keep its actual position.





5.6. Measurement Server

The DASY5 measurement server is based on a PC/104 CPU board with a 400MHz intel ULV Celeron, 128MB chipdisk and 128MB RAM. The necessary circuits for communication with the DAE electronics box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY5 I/O board, which is directly connected to the PC/104 bus of the CPU board.



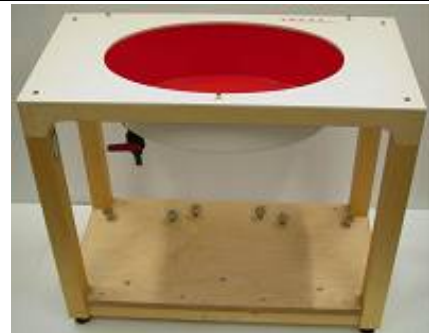
5.7. SAM Phantom

The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region where shell thickness increases to 6mm). It has three measurement areas:

- Left head
- Right head
- Flat phantom



The ELI4 Phantom also is a fiberglass shell phantom with 2mm shell thickness. It has 30 liters filling volume, and with a dimension of 600mm for major ellipse axis, 400mm for minor axis. It is intended for compliance testing of handheld and body-mounted wireless devices in frequency range of 30 MHz to 6GHz. ELI4 is fully compatible with standard and all known tissue simulating liquids.



The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

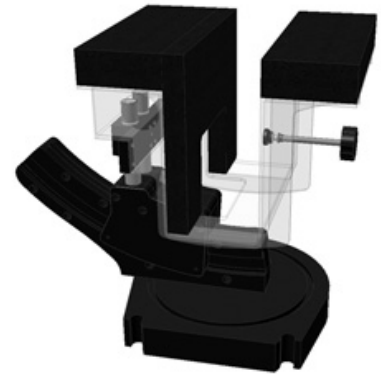


5.8. Device Holder

The DASY5 device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (EPR). Thus the device needs no repositioning when changing the angles. The DASY5 device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity $\epsilon_r = 3$ and loss tangent $\delta = 0.02$. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.



The laptop extension is lightweight and made of POM, acrylic glass and foam. It fits easily on upper part of the mounting device in place of the phone positioned. The extension is fully compatible with the SAM Twin and ELI phantoms.





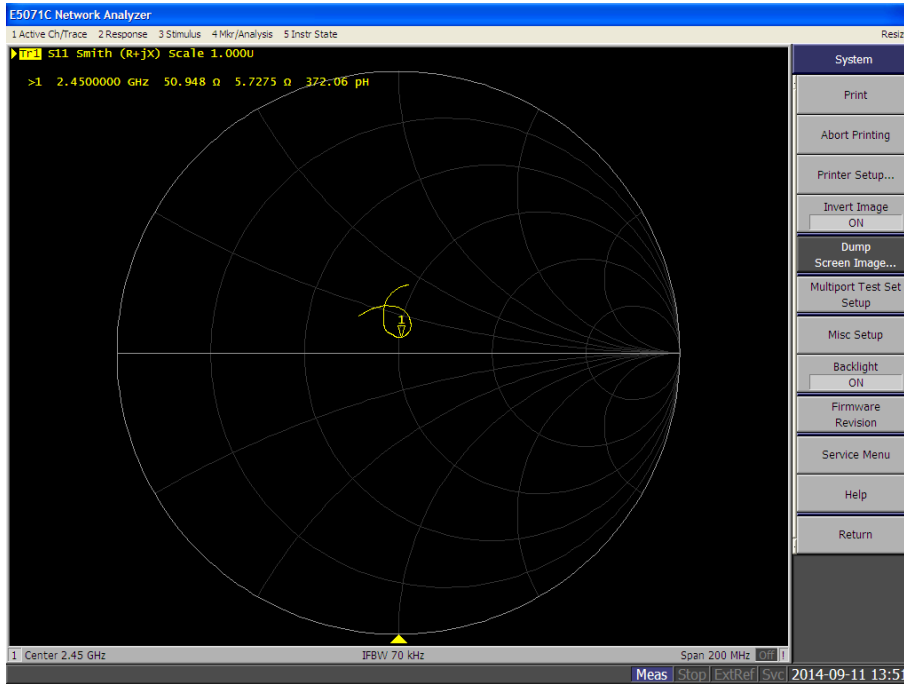
5.9. Test Equipment List

Instrument	Manufacturer	Model No.	Serial No.	Cali. Due Date
Stäubli Robot TX60L	Stäubli	TX60L	5P6VA1/A/01	only once
Robot Controller	Stäubli	CS8C	5P6VA1/C/01	only once
Dipole Validation Kits	Speag	D2450V2	914	2015.06.06
Dipole Validation Kits	Speag	D5GHzV2	1156	2015.06.19
SAM ELI Phantom	Speag	SAM	1211	N/A
Laptop Holder	Speag	SM LH1 001CD	N/A	N/A
Data Acquisition Electronic	Speag	DAE4	1379	2015.05.18
E-Field Probe	Speag	EX3DV4	3927	2015.05.22
SAR Software	Speag	DASY5	V5.2 Build 162	N/A
Power Amplifier	Mini-Circuit	ZVA-183W-S+	MN136701248	2015.09.03
Directional Coupler	Agilent	772D	MY52180104	2015.09.03
Spectrum Analyzer	R&S	FSP40	100324	2015.03.23
Vector Network	Agilent	E5071C	MY4631693	2015.01.15
Signal Generator	R&S	SML	103287	2015.03.09
Power Meter	BONN	BLWA0830-160/100/40D	76659	2015.11.10
AUG Power Sensor	R&S	NRP-Z91	100384	2015.03.09

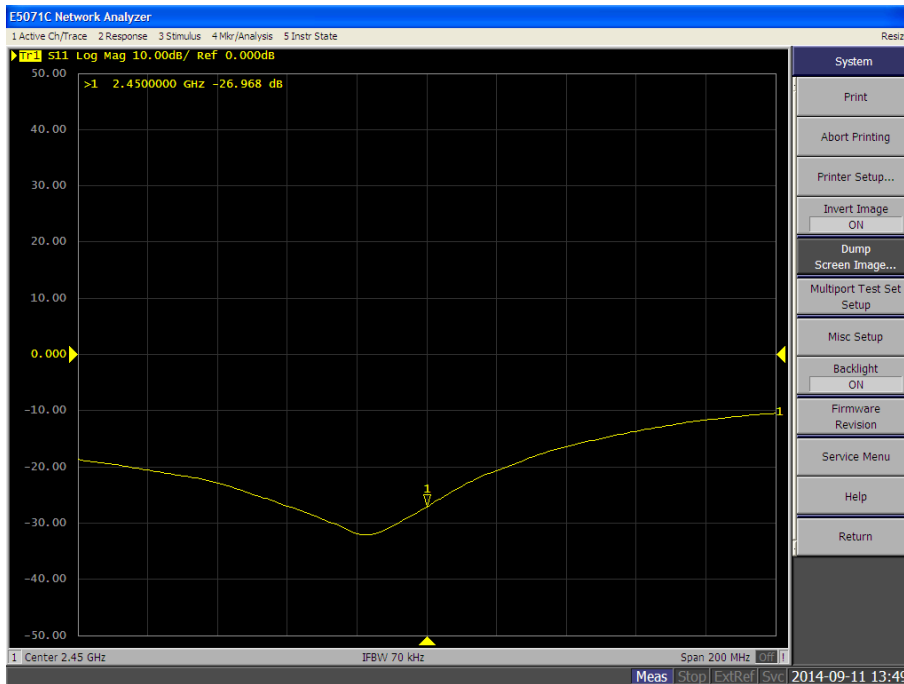


5.10. Annul Internal Check of Impedance and Return Loss

2450MHz Body calibrated impedance 52.051Ω; measured impedance: 50.948Ω (within 5Ω)

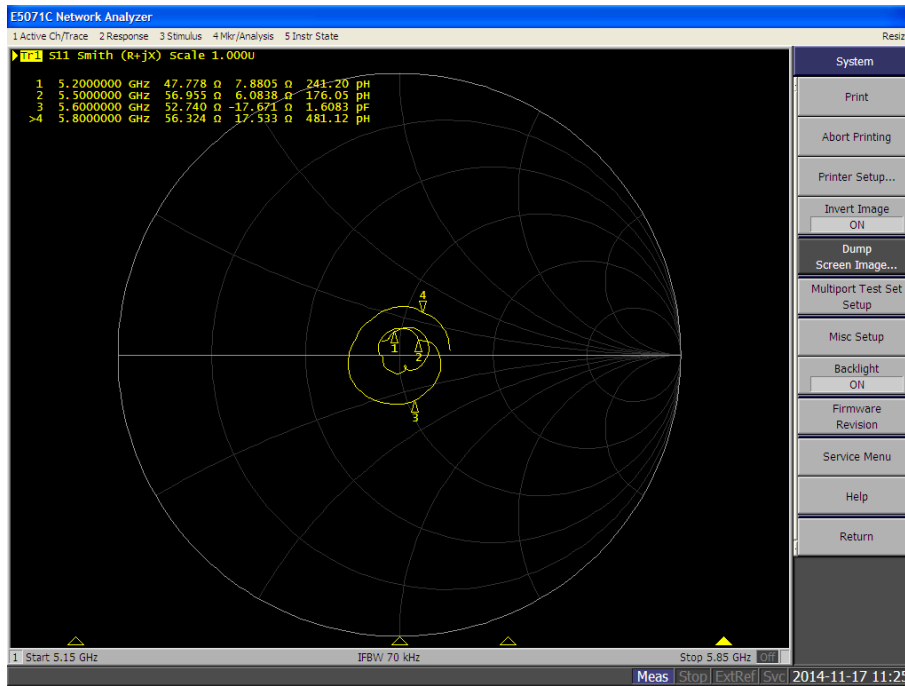


2450MHz Body calibrated return loss: -28.024 dB; Measured return loss: -26.968dB (within 20%)

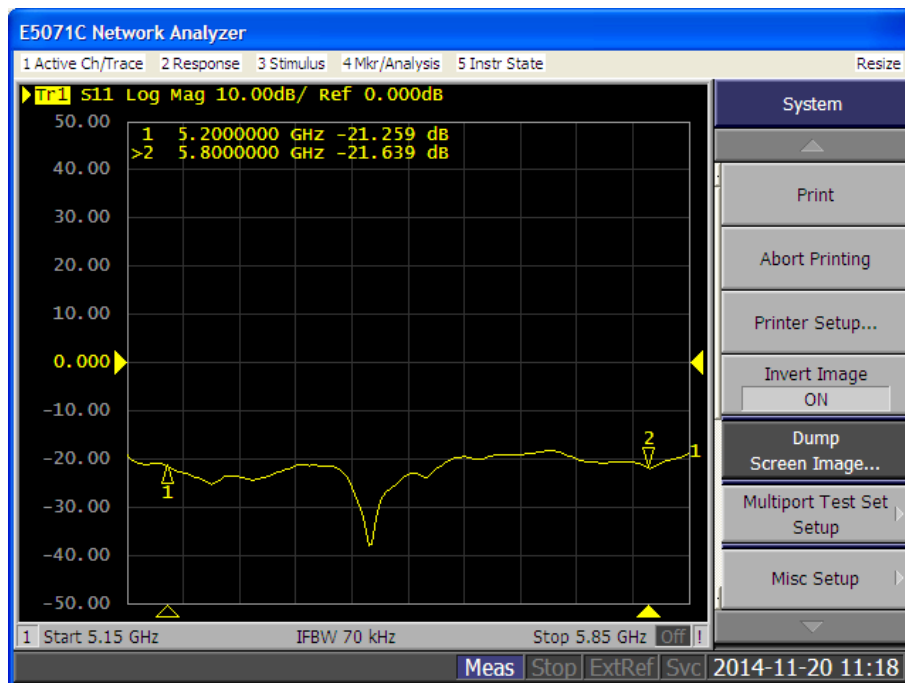




5200MHz Body calibrated impedance 49.105Ω; measured impedance: 47.778Ω (within 5Ω)
5800MHz Body calibrated impedance 58.912Ω; measured impedance: 56.324Ω (within 5Ω)



5200MHz Body calibrated return loss: -25.074 dB; Measured return loss: -21.259dB (within 20%)
5800MHz Body calibrated return loss: -21.232 dB; Measured return loss: -21.639dB (within 20%)





6. The SAR Measurement Procedure

6.1. System Performance Check

6.1.1 Purpose

1. To verify the simulating liquids are valid for testing.
2. To verify the performance of testing system is valid for testing.

6.1.2 Tissue Dielectric Parameters for Head and Body Phantoms

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
850	41.5	0.92	55.2	0.99
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
5200	36.0	4.66	49.0	5.30
5600	35.5	5.07	48.5	5.77
5800	35.3	5.27	48.2	6.00

(ϵ_r = relative permittivity, σ = conductivity and $\rho = 1000 \text{ kg/m}^3$)

**6.1.3 Tissue Calibration Result**

- The dielectric parameters of the liquids were verified prior to the SAR evaluation using DASY5 Dielectric Assessment Kit and Agilent Vector Network Analyzer E5071C.

Body Tissue Simulant Measurement				
Frequency [MHz]	Description	Dielectric Parameters		Tissue Temp. [°C]
		ϵ_r	σ [s/m]	
2450MHz	Reference result ± 5% window	52.7 50.07 to 55.34	1.95 1.85 to 2.05	N/A
	06-12-2014	52.76	1.95	21.0
5200MHz	Reference result ± 5% window	49.0 46.55 to 51.45	5.30 5.035 to 5.565	N/A
	07-12-2014	49.11	5.27	21.0
5600MHz	Reference result ± 5% window	48.5 46.075 to 50.925	5.77 5.48 to 6.06	N/A
	08-12-2014	48.5	5.73	21.0
5800MHz	Reference result ± 5% window	48.2 45.79 to 50.61	6.00 5.7 to 6.3	N/A
	09-12-2014	48.24	5.98	21.0

- Refer to KDB 865664 D01 v01r03, The depth of body tissue-equivalent liquid in a phantom must be ≥ 15.0 cm with $\leq \pm 0.5$ cm variation for SAR measurements ≤ 3 GHz and ≥ 10.0 cm with $\leq \pm 0.5$ cm variation for measurements > 3 GHz.



6.1.4 System Performance Check Procedure

The DASY5 installation includes predefined files with recommended procedures for measurements and the system performance check. They are read-only document files and destined as fully defined but unmeasured masks, so the finished system performance check must be saved under a different name. The system performance check document requires the SAM Twin Phantom or ELI4 Phantom, so the phantom must be properly installed in your system. (User defined measurement procedures can be created by opening a new document or editing an existing document file). Before you start the system performance check, you need only to tell the system with which components (probe, medium, and device) you are performing the system performance check; the system will take care of all parameters.

■ **The Power Reference Measurement and Power Drift Measurement** jobs are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the Dipole output power. If it is too high (above ± 0.2 dB), the system performance check should be repeated;

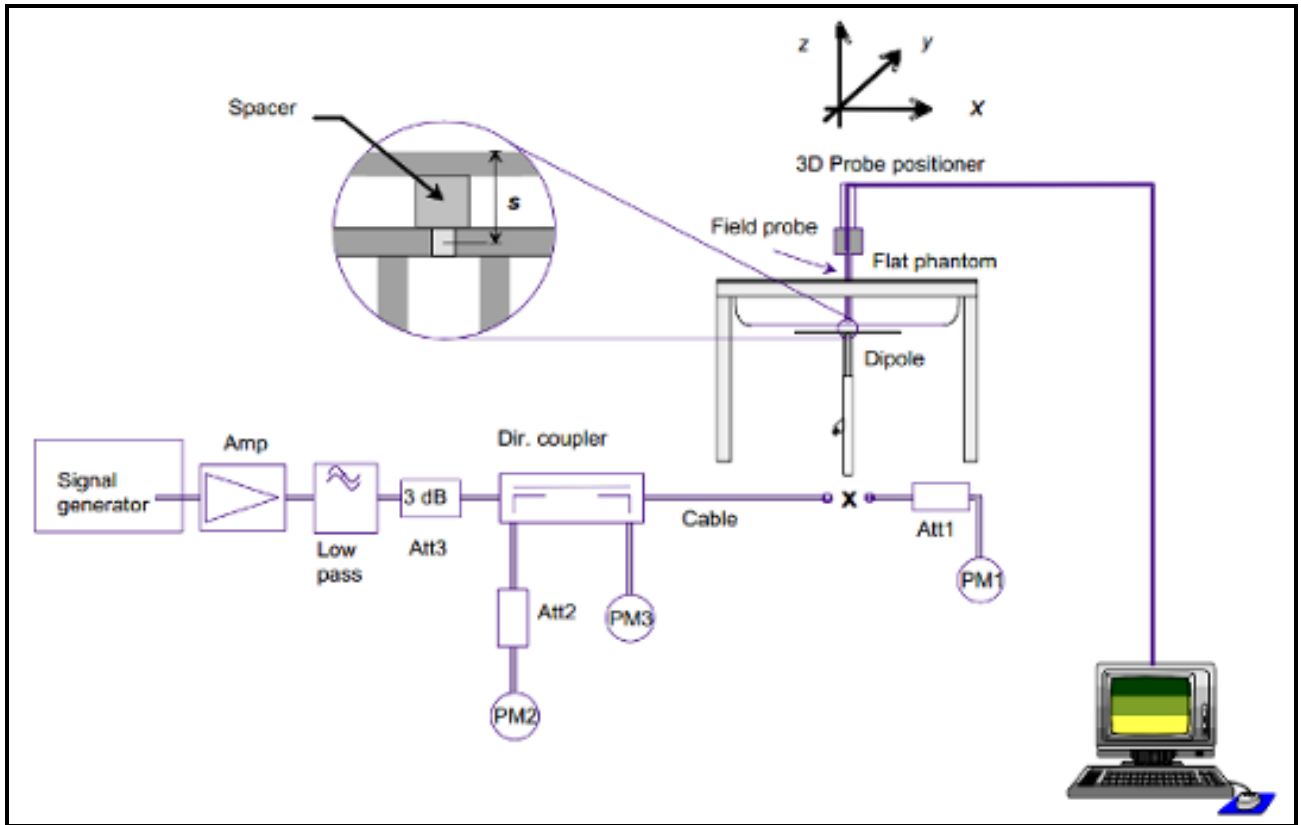
■ **The Surface Check** job tests the optical surface detection system of the DASY5 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ± 0.1 mm). In that case it is better to abort the system performance check and stir the liquid;

■ **The Area Scan** job measures the SAR above the dipole on a plane parallel to the surface. It is used to locate the approximate location of the peak SAR. The proposed scan uses large grid spacing for faster measurement; due to the symmetric field, the peak detection is reliable;

■ **The Zoom Scan** job measures the field in a volume around the peak SAR value assessed in the previous Area Scan job (for more information see the application note on SAR evaluation). If the system performance check gives reasonable results. The dipole input power (forward power) was 250mW, 1 g and 10 g spatial average SAR values normalized to 1W dipole input power give reference data for comparisons and it's equal to $10 \times$ (dipole forward power). The next sections analyze the expected uncertainties of these values, as well as additional checks for further information or troubleshooting.

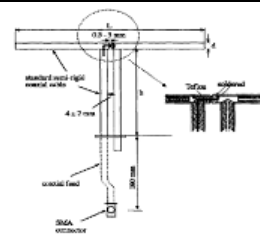


6.1.5 System Performance Check Setup



6.1.6 Validation Dipoles

The dipoles use is based on the IEEE Std.1528-2013 and FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03standard, and is complied with mechanical and electrical specifications in line with the requirements of both EN62209-1 and EN62209-2. The table below provides details for the mechanical and electrical specifications for the dipoles.



**6.1.7 Result of System Performance Check: Valid Result****System Performance Check at 2450MHz, 5200MHz, 5600MHz and 5800MHz for Body.****Validation Dipole: D2450V2-SN 914**

Frequency [MHz]	Description	SAR [w/kg] 1g	SAR [w/kg] 10g	Tissue Temp. [°C]
2450 MHz	Reference result ± 10% window	51.5 46.35 to 56.65	23.9 21.51 to 26.29	21.0
	06-12-2014	51.6	23.68	

Validation Dipole: D5GHzV2-SN1156

Frequency [MHz]	Description	SAR [w/kg] 1g	SAR [w/kg] 10g	Tissue Temp. [°C]
5200MHz	Reference result ± 10% window	73.7 66.33 to 81.07	20.6 18.54 to 22.66	21.0
	07-12-2014	74.4	20.8	
Frequency [MHz]	Description	SAR [w/kg] 1g	SAR [w/kg] 10g	Tissue Temp. [°C]
5600MHz	Reference result ± 10% window	82.8 74.52 to 91.08	22.9 20.61 to 25.19	21.0
	08-12-2014	83	23.1	
Frequency [MHz]	Description	SAR [w/kg] 1g	SAR [w/kg] 10g	Tissue Temp. [°C]
5800MHz	Reference result ± 10% window	73.1 65.79 to 80.41	20.1 18.09 to 22.11	21.0
	09-12-2014	72.3	20.1	

Note: All SAR values are normalized to 1W forward power.



6.2. Test Requirements

6.2.1 Test Procedures

Step 1 Setup a Connection

First, engineer should record the conducted power before the test. Then establish a call in handset at the maximum power level with a base station simulator via air interface, or make the EUT estimate by itself in testing band. Place the EUT to the specific test location. After the testing, must export SAR test data by SEMCAD. Then writing down the conducted power of the EUT into the report, also the SAR values tested.

Step 2 Power Reference Measurements

To measure the local E-field value at a fixed location which value will be taken as a reference value for calculating a possible power drift.

Step 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 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 D01v01r01

	≤ 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° ± 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 4 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 v01r03

		≤ 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 1 st two points closest to phantom surface	≤ 4 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$
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 <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.			

Step 5 Power Drift Measurements

Repetition of the E-field measurement at the fixed location mentioned in Step 1 to make sure the two results differ by less than ± 0.2 dB.



6.2.2 Test Channel

Mode	GHz	Channel	Turbo Channel	“Default Test Channels”				
				§15.247		UNII		
				802.11b	802.11g			
802.11 b/g	2.412	1 [#]		√	∇			
	2.437	6	6	√	∇			
	2.462	11 [#]		√	∇			
802.11a	5.18	36				√		
	5.20	40	42 (5.21 GHz)				*	
	5.22	44					*	
	5.24	48	50 (5.25 GHz)			√		
	5.26	52				√		
	5.28	56	58 (5.29 GHz)				*	
	5.30	60					*	
	5.32	64				√		
	UNII	5.500	100	Unknown				*
		5.520	104				√	
		5.540	108					*
		5.560	112					*
		5.580	116				√	
		5.600	120					*
		5.620	124				√	
		5.640	128					*
		5.660	132					*
		5.680	136				√	
	5.700	140				*		
	UNII or §15.247	5.745	149		√		√	
5.765		153	152 (5.76 GHz)		*		*	
5.785		157		√			*	
§15.247	5.805	161	160 (5.80 GHz)		*	√		
	5.825	165		√				

Table 1: “Default Test Channels”

- √ = “default test channels”
- * = possible 802.11a channels with maximum average output > the “default test channels”
- ∇ = possible 802.11g channels with maximum average output ¼ dB ≥ the “default test channels”
- # = when output power is reduced for channel 1 and/or 11 to meet restricted band requirements the highest output channels closest to each of these channels should be tested

1. Per KDB 248227 D01v01r02, SAR is not required for 802.11g/HT20 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.
2. SAR is not required for Channels 12 and 13, if the tune-up limit and the measured output power for these two channels are no greater than those for the default test channels.



7. Wi-Fi/Bluetooth SAR Exclusion and Results

7.1. Maximum Tune-up Conducted Average Power

<BCM94352Z _WIFI 2x2Tx_Final Singal Chain Power> (Unite: dBm)

Ch./Modes	11b	11g(legacy)& 11n 20MHz 1x1 mode	11a(legacy)& 11n 20MHz 1x1 mode	11n 20MHz mode 2x2	11n 20MHz mode 2x2 STBC/SDM	11n 40MHz mode SISO	11n 40MHz mode 2x2 CDD/SDM/STBC	11ac 80MHz mode SISO	11ac 80MHz mode 2x2 CDD/SDM/STBC
1	16.0	16.0		15.0	15.0				
3 to10	16.0	16.0		16.0	16.0				
11	16.0	16.0		14.5	14.5				
36			14.0	12.5	13.5				
38						14.0	13.5		
40			14.0	12.5	13.5				
42								14.0	13.5
44			14.0	12.5	13.5				
46						14.0	13.5		
48			14.0	12.5	13.5				
52			14.0	14.0	14.0				
54						14.0	14.0		
56			14.0	14.0	14.0				
58								14.0	12.5
60			14.0	14.0	14.0				
62						14.0	14.0		
64			14.0	14.0	14.0				
100			16.0	16.0	16.0				
102						15.0	14.0		
104			16.0	16.0	16.0				
106								15.0	13.5
110						16.0	16.0		
122								15.0	13.5
126						16.0	16.0		
134						16.0	16.0		
136			16.0	16.0	16.0				
138								16.0	16.0
140			16.0	15.5	16.0				
142						16.0	16.0		
144			16.0	16.0	16.0				
149			18.0	18.0	18.0				
151						18.0	14.0		
153			18.0	18.0	18.0				
155								17.5	13.5
157			18.0	18.0	18.0				
159						18.0	18.0		
161			18.0	18.0	18.0				
165			18.0	18.0	18.0				

Note: As declared by applicant, two chains transmit the same power level when WIFI 2x2Tx is on. Meanwhile, according to the power above, 2x2 Tx mode power is lower than 1x1 Tx mode, so only 1x1 Tx mode for SAR testing is carried out.



<BCM94352Z _Bluetooth > (Unite: dBm)

Max. Bluetooth Power	5.2
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7.2. Measured Conducted Average Power

<BCM94352Z_Chian1_Main> (Unite: dBm)

Configurations	Mode			
	Channel / Frequency (MHz)			
2.4GHz WLAN Average Power (Chain1)	802.11b			
	1/2412	6/2437	11/2462	
	15.90	15.93	15.95	
	802.11g			
	1/2412	6/2437	11/2462	
	15.89	15.87	15.88	
	802.11n(HT20)			
	1/2412	6/2437	11/2462	
	15.71	15.76	15.67	
5.2GHz WLAN Average Power (Chain1)	802.11a			
	36/5180	40/5200	44/5220	48/5240
	13.86	13.85	13.87	13.88
	802.11n(HT20)			
	36/5180	40/5200	44/5220	48/5240
	13.84	13.81	13.85	13.84
	802.11n(HT40)			
	38/5190		46/5230	
	13.77		13.81	
	802.11ac(VHT80)			
42/5210				
13.16				



Configurations	Mode					
	Channel / Frequency (MHz)					
5.3GHz WLAN Average Power (Chain1)	802.11a					
	52/5260	56/5280	60/5300	64/5320		
	13.96	13.89	13.83	13.75		
	802.11n(HT20)					
	52/5260	56/5280	60/5300	64/5320		
	13.95	13.88	13.82	13.74		
	802.11n(HT40)					
	54/5270			62/5310		
	13.79			13.71		
	802.11ac(VHT80)					
	58/5290					
	12.23					
5.6GHz WLAN Average Power (Chain1)	802.11a					
	100/5500	104/5520	116/5580	124/5620	136/5680	140/5700
	15.91	15.96	15.92	15.93	15.91	15.89
	802.11n(HT20)					
	100/5500	104/5520	116/5580	124/5620	136/5680	140/5700
	15.91	15.95	15.91	15.93	15.90	15.88
	802.11n(HT40)					
	102/5510			134/5670		
	14.89			15.84		
	802.11ac(VHT80)					
	106/5530		124/5610		138/5690	
	13.40		13.39		15.68	



Configurations	Mode				
	Channel / Frequency (MHz)				
5.8GHz WLAN Average Power (Chain1)	802.11a				
	149/5745	153/5765	157/5785	161/5805	165/5825
	17.59	17.55	17.61	17.34	17.37
	802.11n(HT20)				
	149/5745	153/5765	157/5785	161/5805	165/5825
	17.56	17.51	17.59	17.31	17.36
	802.11n(HT40)				
	151/5755		159/5795		
	17.53		17.29		
	802.11ac(VHT80)				
	155/5775				
	17.26				



<BCM94352Z_Chian0_Aux> (Unite: dBm)

Configurations	Mode			
	Channel / Frequency (MHz)			
2.4GHz WLAN Average Power (Chain0)	802.11b			
	1/2412	6/2437	11/2462	
	15.92	15.92	15.91	
	802.11g			
	1/2412	6/2437	11/2462	
	15.91	15.87	15.88	
	802.11n(HT20)			
	1/2412	6/2437	11/2462	
	15.88	15.84	15.89	
5.2GHz WLAN Average Power (Chain0)	802.11a			
	36/5180	40/5200	44/5220	48/5240
	13.82	13.81	13.86	13.89
	802.11n(HT20)			
	36/5180	40/5200	44/5220	48/5240
	13.80	13.81	13.87	13.88
	802.11n(HT40)			
	38/5190		46/5230	
	13.84		13.81	
	802.11ac(VHT80)			
	42/5210			
	13.18			



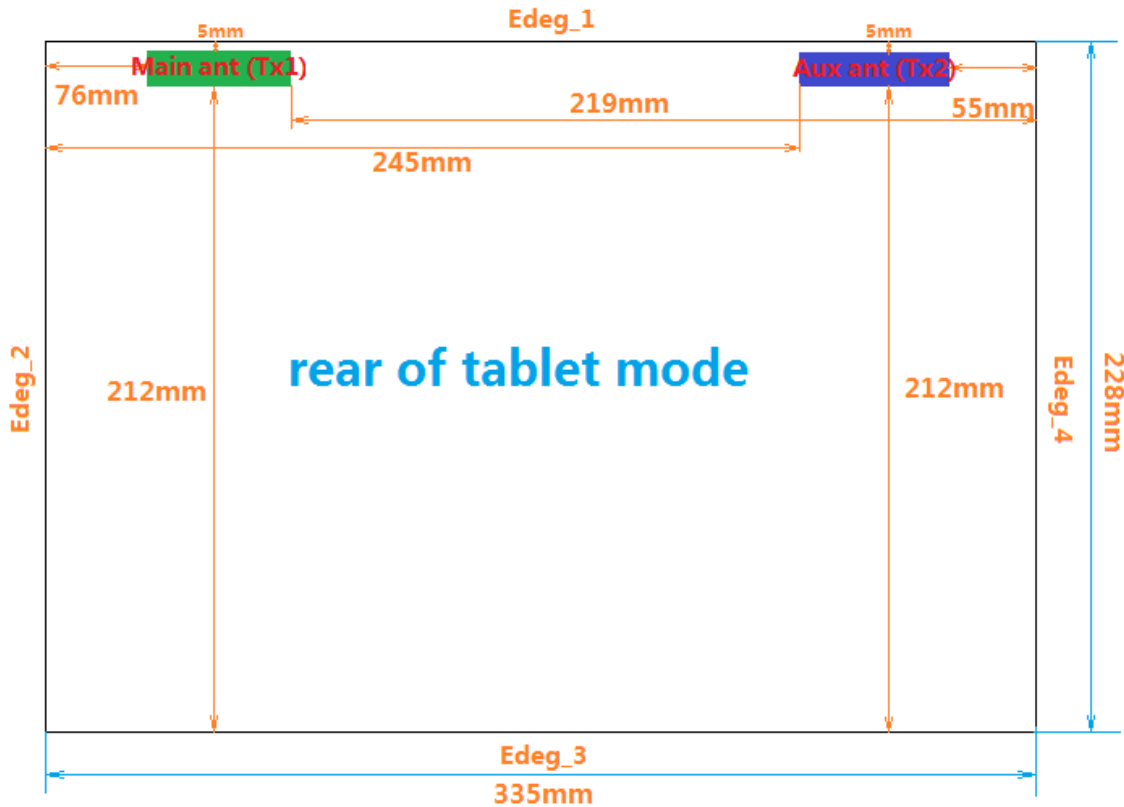
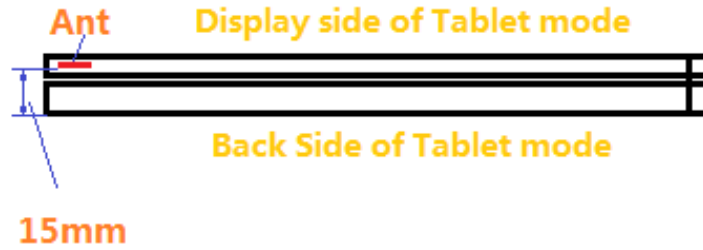
Configurations	Mode					
	Channel / Frequency (MHz)					
5.3GHz WLAN Average Power (Chain0)	802.11a					
	52/5260	56/5280	60/5300	64/5320		
	13.71	13.69	13.91	13.74		
	802.11n(HT20)					
	52/5260	56/5280	60/5300	64/5320		
	13.70	13.66	13.89	13.71		
	802.11n(HT40)					
	54/5270			62/5310		
	13.94			13.89		
	802.11ac(VHT80)					
	58/5290					
	12.41					
5.6GHz WLAN Average Power (Chain0)	802.11a					
	100/5500	104/5520	116/5580	124/5620	136/5680	140/5700
	15.81	15.93	15.61	15.87	15.52	15.51
	802.11n(HT20)					
	100/5500	104/5520	116/5580	124/5620	136/5680	140/5700
	15.80	15.85	15.61	15.86	15.52	15.50
	802.11n(HT40)					
	102/5510			134/5670		
	14.78			15.63		
	802.11ac(VHT80)					
	106/5530		124/5610		138/5690	
	13.38		13.33		15.82	



Configurations	Mode				
	Channel / Frequency (MHz)				
5.8GHz WLAN Average Power (Chain0)	802.11a				
	149/5745	153/5765	157/5785	161/5805	165/5825
	17.59	17.49	17.53	17.51	17.52
	802.11n(HT20)				
	149/5745	153/5765	157/5785	161/5805	165/5825
	17.48	17.44	17.47	17.50	17.52
	802.11n(HT40)				
	151/5755		159/5795		
	17.53		17.51		
	802.11ac(VHT80)				
	155/5775				
	17.19				



7.3. Antenna Location



Antenna	Antenna Distance to Edges(mm)				
	Back	Edge_1	Edge_2	Edge_3	Edge_4
Main(Tx1)	15	5	76	212	219
Aux(Tx2)	15	5	245	212	55



7.4. SAR exclusion

Per FCC KDB 447498 D01v05r02 for 100MHz~6GHz:

1) The SAR exclusion threshold for distances < 50mm is defined by the following equation:

$$\frac{\text{Max Power of Channel(mW)}}{\text{Test Separation Distance(mm)}} \times \sqrt{\text{Frequency(GHz)}} \leq 3.0 \text{ for 1-g SAR}$$

2) At test separation distances > 50 mm, the SAR test exclusion threshold is determined according to the following:

a. [Power allowed at numeric threshold for 50 mm in step 1) + (test separation distance - 50mm) · (f (MHz)/150)] mW, at 100 MHz to 1500 MHz

b. [Power allowed at numeric threshold for 50 mm in step 1) + (test separation distance - 50 mm) · 10] mW at > 1500 MHz and ≤ 6 GHz

Test Mode	Test Separation (mm)	Thresholds (mW)	Max. Tune-up power(dBm)	Max. Tune-up power(mW)	SAR Test (Y/N)
2.45GHz WIFI	5	10	16.0	39.81	Y
	15	29	16.0	39.81	Y
5.2GHz WIFI	5	7	14.0	25.12	Y
	15	20	14.0	25.12	Y
5.3GHz WIFI	5	7	14.0	25.12	Y
	15	20	14.0	25.12	Y
5.6GHz WIFI	5	6	16.0	39.81	Y
	15	19	16.0	39.81	Y
5.8GHz WIFI	5	6	18.0	63.10	Y
	15	19	18.0	63.10	Y
Bluetooth	5	10	5.2	3.31	N
	15	29	5.2	3.31	N

Note: Refer to the formula above and the Max. Tune-up power, EUT SAR test is not required for test separation >50mm.

**7.5. Required Edges for SAR Testing**

Test Mode	Antenna	Back	Edge_1	Edge_2	Edge_3	Edge_4
2.45GHz WIFI	Main	Yes	Yes	No	No	No
	Aux	Yes	Yes	No	No	No
5.2GHz WIFI	Main	Yes	Yes	No	No	No
	Aux	Yes	Yes	No	No	No
5.3GHz WIFI	Main	Yes	Yes	No	No	No
	Aux	Yes	Yes	No	No	No
5.6GHz WIFI	Main	Yes	Yes	No	No	No
	Aux	Yes	Yes	No	No	No
5.8GHz WIFI	Main	Yes	Yes	No	No	No
	Aux	Yes	Yes	No	No	No
Bluetooth	Main	N/A	N/A	N/A	N/A	N/A
	Aux	N/A	N/A	N/A	N/A	N/A

7.6. Estimated SAR

This device contains transmitters that may operate simultaneously. Therefore simultaneous transmission analysis is required. Per FCC KDB 447498 D01v05r02, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is $\leq 1.6\text{W/kg}$. When standalone SAR is not required to be measured, per FCC KDB 447498 D01v05r02 4.3.2 2, the following equation must be used to estimate the standalone 1g SAR for simultaneous transmission assessment involving that transmitter.

$$\text{Estimated SAR} = \frac{\sqrt{f(\text{GHz})} * (\text{Max Power of channel, mW})}{7.5 \text{ Min. Separation, mm}}$$

Bluetooth

Mode	Test Position	Frequency	Maximum Power	Separation Distance	Estimated SAR
Bluetooth	Tablet Body-Back	[MHz]	[dBm]	[mm]	[W/kg]
		2480	5.2	5	0.139
			5.2	15	0.046



7.7. SAR Test Results Summary

■ DTS- WLAN 2.4GHz

Plot No.	Ant	Band	Mode	Test Position	Dist. mm	Ch.	Fre.	Max. Tune-up Power(dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift(dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
01	main	802.11b	CCK	Edge_1	0	1	2412	16.0	15.90	1.01	-0.11	0.215	0.216
	main	802.11b	CCK	Edge_1	0	6	2437	16.0	15.93	1.00	-0.15	0.188	0.189
	main	802.11b	CCK	Edge_1	0	11	2462	16.0	15.95	1.00	0.16	0.184	0.185
	main	802.11b	CCK	Back	0	1	2412	16.0	15.90	1.01	0.01	0.0359	0.0361
02	aux	802.11b	CCK	Edge_1	0	1	2412	16.0	15.92	1.01	0.16	0.102	0.103
	aux	802.11b	CCK	Edge_1	0	6	2437	16.0	15.92	1.01	0.12	0.0941	0.095
	aux	802.11b	CCK	Edge_1	0	11	2462	16.0	15.91	1.01	-0.19	0.0899	0.0904
	aux	802.11b	CCK	Back	0	1	2412	16.0	15.92	1.01	0.19	0.0309	0.0311

■ DTS- WLAN 5.8GHz

Plot No.	Ant	Band	Mode	Test Position	Dist. mm	Ch.	Fre.	Max. Tune-up Power(dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift(dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
03	main	802.11a	OFDM	Edge_1	0	149	5745	18.0	17.59	1.02	0.17	1.23	1.26
	main	802.11a	OFDM	Edge_1	0	157	5785	18.0	17.61	1.02	-0.17	1.31	1.34
	main	802.11a*	OFDM	Edge_1	0	157	5785	18.0	17.61	1.02	0.04	1.31	1.34
	main	802.11a	OFDM	Edge_1	0	165	5825	18.0	17.37	1.04	-0.05	1.08	1.12
	main	802.11a	OFDM	Back	0	157	5785	18.0	17.61	1.02	0.03	0.0958	0.0979
04	main	802.11ac	VHT80	Edge_1	0	155	5775	17.5	17.26	1.01	0.07	1.17	1.19
	aux	802.11a	OFDM	Edge_1	0	149	5745	18.0	17.59	1.02	0.09	0.524	0.536
	aux	802.11a	OFDM	Edge_1	0	157	5785	18.0	17.53	1.03	0.04	0.604	0.620
	aux	802.11a	OFDM	Edge_1	0	165	5825	18.0	17.52	1.03	0.19	0.627	0.644
	aux	802.11a	OFDM	Back	0	165	5825	18.0	17.52	1.03	0.11	0.0668	0.0686
	aux	802.11ac	VHT80	Edge_1	0	155	5775	17.5	17.19	1.02	0.12	0.574	0.584

Note:

1. According to KDB 248227, when the extrapolated maximum peak SAR for the maximum output power channel is ≤ 1.6 W/kg and the 1g averaged SAR is ≤ 0.8 W/kg, WLAN SAR testing for other channels is not required.
2. SAR testing for 802.11g/n is not required when its maximum power is less than 1/4 dB higher than 802.11b.
3. SAR testing for 802.11n is not required when its maximum power is less than 1/4 dB higher than 802.11a.
4. According to April 2013 TCB Workshop, 802.11ac SAR testing is not required when its maximum power is less than 1/4 dB higher than 802.11a. 802.11ac SAR is required for the highest 802.11a configuration in each 5 GHz band and each exposure condition.
5. Repeated measurements are required only when the measured SAR is ≥ 0.80 W/kg. If the measured SAR value of the initial repeated measurement is < 1.45 W/kg with $\leq 20\%$ variation, only one repeated measurement is required per KDB865664 D01 r01v03.



■ UNII- WLAN 5.2GHz

Plot No.	Ant	Band	Mode	Test Position	Dist. mm	Ch.	Fre.	Max.Tune-up Power(dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift(dB)	Measured SAR-1g(W/kg)	Scaled SAR-1g(W/kg)
05	main	802.11a	OFDM	Edge_1	0	36	5180	14.0	13.86	1.01	-0.06	0.571	0.577
	main	802.11a	OFDM	Edge_1	0	48	5240	14.0	13.88	1.01	0.14	0.499	0.503
	main	802.11a	OFDM	Back	0	36	5180	14.0	13.86	1.01	0.08	0.0376	0.0380
	main	802.11ac	VHT80	Edge_1	0	42	5210	14.0	13.16	1.06	0.10	0.498	0.530
06	aux	802.11a	OFDM	Edge_1	0	36	5180	14.0	13.82	1.01	-0.13	0.434	0.440
	aux	802.11a	OFDM	Edge_1	0	48	5240	14.0	13.89	1.01	0.17	0.306	0.308
	aux	802.11a	OFDM	Back	0	36	5180	14.0	13.82	1.01	-0.15	0.0345	0.0349
	aux	802.11ac	VHT80	Edge_1	0	42	5210	14.0	13.18	1.06	0.17	0.362	0.385

■ UNII- WLAN 5.3GHz

Plot No.	Ant	Band	Mode	Test Position	Dist. mm	Ch.	Fre.	Max.Tune-up Power(dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift(dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
07	main	802.11a	OFDM	Edge_1	0	52	5260	14.0	13.96	1.00	0.18	0.643	0.645
	main	802.11a	OFDM	Edge_1	0	60	5300	14.0	13.83	1.01	0.07	0.683	0.691
	main	802.11a	OFDM	Back	0	52	5260	14.0	13.83	1.01	0.11	0.0408	0.0413
	main	802.11ac	VHT80	Edge_1	0	58	5290	14.0	12.23	1.14	0.08	0.365	0.418
08	aux	802.11a	OFDM	Edge_1	0	52	5260	14.0	13.71	1.02	0.06	0.245	0.250
	aux	802.11a	OFDM	Edge_1	0	60	5300	14.0	13.91	1.01	0.14	0.315	0.317
	aux	802.11a	OFDM	Back	0	52	5260	14.0	13.91	1.01	0.15	0.0246	0.0248
	aux	802.11ac	VHT80	Edge_1	0	58	5290	14.0	12.41	1.13	0.19	0.236	0.266

■ UNII- WLAN 5.6GHz

Plot No.	Ant	Band	Mode	Test Position	Dist. mm	Ch.	Fre.	Max. Tune-up Power(dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift(dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
09	main	802.11a	OFDM	Edge_1	0	104	5520	16.0	15.96	1.00	-0.12	0.977	0.979
	main	802.11a	OFDM	Edge_1	0	116	5580	16.0	15.92	1.01	0.07	0.887	0.891
	main	802.11a	OFDM	Edge_1	0	124	5620	16.0	15.93	1.00	0.12	0.93	0.93
	main	802.11a	OFDM	Edge_1	0	136	5680	16.0	15.91	1.01	-0.09	1.1	1.11
	main	802.11a*	OFDM	Edge_1	0	136	5680	16.0	15.91	1.01	0.04	1.09	1.10
	main	802.11a	OFDM	Back	0	136	5680	16.0	15.91	1.01	0.05	0.0701	0.0705
	main	802.11ac	VHT80	Edge_1	0	138	5690	16.0	15.68	1.02	-0.13	1.02	1.04
	aux	802.11a	OFDM	Edge_1	0	104	5520	16.0	15.93	1.00	0.09	0.383	0.385
	aux	802.11a	OFDM	Edge_1	0	116	5580	16.0	15.61	1.02	0.08	0.392	0.402
	aux	802.11a	OFDM	Edge_1	0	124	5620	16.0	15.87	1.01	0.07	0.395	0.398
10	aux	802.11a	OFDM	Edge_1	0	136	5680	16.0	15.52	1.03	0.13	0.307	0.316
	aux	802.11a	OFDM	Back	0	124	5620	16.0	15.87	1.01	0.05	0.0681	0.0687
	aux	802.11ac	VHT80	Edge_1	0	138	5690	16.0	15.82	1.01	0.16	0.379	0.383

Note:

1. According to KDB 248227, when the extrapolated maximum peak SAR for the maximum output power channel is ≤ 1.6 W/kg and the 1g averaged SAR is ≤ 0.8 W/kg, WLAN SAR testing for other channels is not required.
2. SAR testing for 802.11g/n is not required when its maximum power is less than 1/4 dB higher than 802.11b.
3. SAR testing for 802.11n is not required when its maximum power is less than 1/4 dB higher than 802.11a.



4. According to April 2013 TCB Workshop, 802.11ac SAR testing is not required when its maximum power is less than 1/4 dB higher than 802.11a. 802.11ac SAR is required for the highest 802.11a configuration in each 5 GHz band and each exposure condition.
5. The average power of Ch.60 is higher than "Default Test Channel" Ch.64, so Ch.60 has been chosen test.
6. Repeated measurements are required only when the measured SAR is ≥ 0.80 W/kg. If the measured SAR value of the initial repeated measurement is < 1.45 W/kg with $\leq 20\%$ variation, only one repeated measurement is required per KDB865664 D01 r01v03.



8. Simultaneous Transmission Analysis

8.1. Max. Simultaneous SAR

■ WLAN1 + WLAN2(Main Ant+ Aux Ant)

No.	Configurations	Test Position	WLAN1 SAR(W/kg)	WLAN1 SAR(W/kg)	ΣSAR(W/kg)
1	2.4GHz WLAN 802.11b	Body-Edge_1	0.216	0.103	0.319
2	5.2GHz WLAN 802.11a	Body-Edge_1	0.577	0.440	1.017
3	5.3GHz WLAN 802.11a	Body-Edge_1	0.691	0.317	1.008
4	5.6GHz WLAN 802.11a	Body-Edge_1	1.11	0.402	1.512
5	5.8GHz WLAN 802.11a	Body-Edge_1	1.34	0.644	1.984

Edge1 of Tablet Mode Peak SAR Location Separation Ratio

$$(x_1, y_1, z_1)=(2, 74, -3.9); (x_2, y_2, z_2)=(7, -113, -3.5), \text{ in mm};$$

$$R_i = \text{square root of } [(2-7)^2 + (74+113)^2 + (-3.9+3.5)^2] \approx 187.07\text{mm};$$

$$\text{Ratio} = (SAR_1+SAR_2)^{1.5} / R_i = (1.34\text{W/kg}+0.644\text{W/kg})^{1.5} / 187.07\text{mm} \approx 0.0149 < 0.04.$$

Note:

1. For configurations excluded per KDB 447498 D01v05r01, an estimated SAR of 0.4 W/kg was used to determine simultaneous transmission SAR exclusion since the test separation distance was >50 mm.
2. When the sum of SAR is larger than the limit, SAR test exclusion is determined by the SAR to peak location separation ratio per KDB 447498 D01v05r01; $\text{Ratio} = (SAR_1+SAR_2)^{1.5} / R_i \leq 0.04$ for all antenna pairs in the configuration to qualify for 1-g SAR test exclusion. The peak separation distance R_i is determined from the square root of $[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$, where (x_1, y_1, z_1) and (x_2, y_2, z_2) are the coordinates of the extrapolated and interpolated peak SAR locations in the zoom scan.



■ WLAN+ Bluetooth

No.	Configurations	Test Position	WLAN SAR(W/kg)	BT SAR(W/kg)	∑ SAR(W/kg)
1	WLAN(DTS) + BT(DSS)	Body-Back	0.0979	0.046	0.144
		Body-Edge_1	1.34	0.139	1.479
		Body-Edge_2	0.4	0.4	0.8
		Body-Edge_3	0.4	0.4	0.8
		Body-Edge_4	0.4	0.4	0.8
2	WLAN(UNII) + BT(DSS)	Body-Back	0.0705	0.046	0.117
		Body-Edge_1	1.11	0.139	1.249
		Body-Edge_2	0.4	0.4	0.8
		Body-Edge_3	0.4	0.4	0.8
		Body-Edge_4	0.4	0.4	0.8

Note: An estimated SAR of 0.4 W/kg was used to determine simultaneous transmission SAR for test separation distances >50mm per 447498 D01v05r02.

8.2. Simultaneous Transmission Conclusion

The above numerical summed SAR results for all the worst-case simultaneous transmission conditions were below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v05r02.

**9. Measurement Uncertainty**

Error Description	Uncert. value	Prob. Dist.	Div.	(ci) 1g	(ci) 10g	Std.Unc. (1g)	Std. nc. (10g)	(vi) v _{eff}
Measurement System								
Probe Calibration	±6.0%	N	1	1	1	±6.0%	±6.0%	∞
Axial Isotropy	±4.7%	R	$\sqrt{3}$	0.7	0.7	±1.9%	±1.9%	∞
Hemispherical Isotropy	±9.6%	R	$\sqrt{3}$	0.7	0.7	±3.9%	±3.9%	∞
Boundary Effects	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%	∞
System Detection Limits	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Modulation Response	±2.4%	R	$\sqrt{3}$	1	1	±1.4%	±1.4%	∞
Readout Electronics	±0.3%	N	1	1	1	±0.3%	±0.3%	∞
Response Time	±0.8%	R	$\sqrt{3}$	1	1	±0.5%	±0.5%	∞
Integration Time	±2.6%	R	$\sqrt{3}$	1	1	±1.5%	±1.5%	∞
RF Ambient Noise	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
RF Ambient Reflections	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Probe Positioner	±0.4%	R	$\sqrt{3}$	1	1	±0.2%	±0.2%	∞
Probe Positioning	±2.9%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Max.SAR Eval.	±2.0%	R	$\sqrt{3}$	1	1	±1.2%	±1.2%	∞
Test Sample Related								
Device Positioning	±2.9%	N	1	1	1	±2.9%	±2.9%	145
Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%	5
Power Drift	±5.0%	R	$\sqrt{3}$	1	1	±2.9%	±2.9%	∞
Power Scalingp	±0%	R	$\sqrt{3}$	0	0	±0%	±0%	∞
Phantom and Setup								
Phantom Uncertainty	±6.1%	R	$\sqrt{3}$	1	1	±3.5%	±3.5%	∞
SAR correction	±1.9%	R	$\sqrt{3}$	1	0.84	±1.1%	±0.9%	∞
Liquid Conductivity (mea.)DAK	±2.5%	R	$\sqrt{3}$	0.78	0.71	±1.1%	±1.0%	∞
Liquid Permittivity (mea.)DAK	±2.5%	R	$\sqrt{3}$	0.26	0.26	±0.3%	±0.4%	∞
Temp. unc. –ConductivityBB	±3.4%	R	$\sqrt{3}$	0.78	0.71	±1.5%	±1.4%	∞
Temp. unc. – PermittivityBB	±0.4%	R	$\sqrt{3}$	0.23	0.26	±0.1%	±0.1%	∞
Combined Std. Uncertainty						±11.2%	±11.1%	361
Expanded STD Uncertainty(k=2)						±22.3%	±22.2%	

DASY5 Uncertainty Budget, according to IEEE 1528/2011 and IEC 62209-1/2011(0.3-3GHz)



Error Description	Uncert. value	Prob. Dist.	Div.	(ci) 1g	(ci) 10g	Std.Unc. (1g)	Std. nc. (10g)	(vi) v _{eff}
Measurement System								
Probe Calibration	±6.55%	N	1	0	0			
Axial Isotropy	±4.7%	R	$\sqrt{3}$	0.7	0.7	±1.9%	±1.9%	∞
Hemispherical Isotropy	±9.6%	R	$\sqrt{3}$	0.7	0.7	±3.9%	±3.9%	∞
Boundary Effects	±2.0%	R	$\sqrt{3}$	1	1	±1.2%	±1.2%	∞
Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%	∞
System Detection Limits	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Modulation Response ^m	±2.4%	R	$\sqrt{3}$	1	1	±1.4%	±1.4%	∞
Readout Electronics	±0.3%	N	1	1	1	±0.3%	±0.3%	∞
Response Time	±0.8%	R	$\sqrt{3}$	1	1	±0.5%	±0.5%	∞
Integration Time	±2.6%	R	$\sqrt{3}$	1	1	±1.5%	±1.5%	∞
RF Ambient Noise	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
RF Ambient Reflections	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Probe Positioner	±0.8%	R	$\sqrt{3}$	1	1	±0.5%	±0.5%	∞
Probe Positioning	±6.7%	R	$\sqrt{3}$	1	1	±3.9%	±3.9%	∞
Max.SAR Eval.	±2.0%	R	$\sqrt{3}$	1	1	±1.2%	±1.2%	∞
Test Sample Related								
Device Positioning	±2.9%	N	1	1	1	±2.9%	±2.9%	145
Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%	5
Power Drift	±5.0%	R	$\sqrt{3}$	1	1	±2.9%	±2.9%	∞
Power Scaling ^p	±0%	R	$\sqrt{3}$	0	0	±0%	±0%	∞
Phantom and Setup								
Phantom Uncertainty	±6.6%	R	$\sqrt{3}$	1	1	±3.8%	±3.8%	∞
SAR correction	±1.9%	R	$\sqrt{3}$	1	0.84	±1.1%	±0.9%	∞
Liquid Conductivity (mea.) ^{DAK}	±2.5%	R	$\sqrt{3}$	0.78	0.71	±1.1%	±1.0%	∞
Liquid Permittivity (mea.) ^{DAK}	±2.5%	R	$\sqrt{3}$	0.26	0.26	±0.3%	±0.4%	∞
Temp. unc. – Conductivity ^{BB}	±3.4%	R	$\sqrt{3}$	0.78	0.71	±1.5%	±1.4%	∞
Temp. unc. – Permittivity ^{BB}	±0.4%	R	$\sqrt{3}$	0.23	0.26	±0.1%	±0.1%	∞
Combined Std. Uncertainty						±12.3%	±12.2%	748
Expanded STD Uncertainty(Coverage factor=2)						±24.6%	±24.5%	

DASY5 Uncertainty Budget, according to IEEE 1528/2011 and IEC 62209-1/2011(3-6GHz)

--END--

APPENDIX A. SAR System Verification Data

The plots for system verification with largest deviation for each SAR system combination are shown as follows.

Date/Time: 06/12/2014

Test Laboratory: Cerpass Lab

Dipole Calibration for Body Tissue Pin=250mW, dist=10mm, f=2450 MHz

DUT: Dipole 2450 MHz D2450V2; Type: SA AAD 245 BB

Communication System: CW; Frequency: 2450 MHz

Medium parameters used: f = 2450 MHz; $\sigma = 1.95$ S/m; $\epsilon_r = 52.76$; $\rho = 1000$ kg/m³

Phantom section: Flat Section; Meas. Ambient Temp (celsius) -22°C; Input power-250mW

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY Configuration:

- Probe: EX3DV4 - SN3927; ConvF(7.63, 7.63, 7.63); Calibrated: 2014/5/23;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn1379; Calibrated: 2014/5/19
- Phantom: SAM (30deg probe tilt) with CRP v5.0; Type: QD000P40CD
- DASYS 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Dipole Calibration for Body Tissue/ Pin=250mW, dist=10mm, f=2450MHz/Area Scan (4x6x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 10.5 W/kg

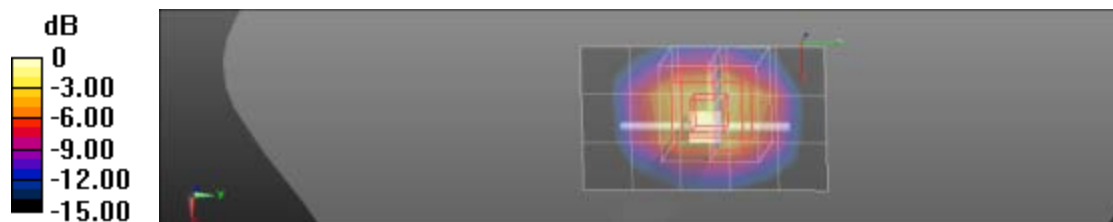
Configuration/Dipole Calibration for Body Tissue/ Pin=250mW, dist=10mm, f=2450MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 89.29 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 27.8 W/kg

SAR(1 g) = 12.9 W/kg; SAR(10 g) = 5.92 W/kg

Maximum value of SAR (measured) = 14.7 W/kg



0 dB = 14.7 W/kg = 11.67 dBW/kg

Date/Time: 07/12/2014

Test Laboratory: Cerpass Lab

Dipole Calibration for Body Tissue Pin=100mW, dist=10mm, f=5200 MHz

DUT: Dipole 5200MHz D5GHzV2; Type: SA AAD 510 BB

Communication System: CW; Frequency: 5200 MHz

Medium parameters used: f = 5200 MHz; $\sigma = 5.27$ S/m; $\epsilon_r = 49.11$; $\rho = 1000$ kg/m³

Phantom section: Flat Section; Meas. Ambient Temp (celsius) -22°C; Input power-100mW

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3927; ConvF(4.61, 4.61, 4.61); Calibrated: 2014/5/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn1379; Calibrated: 2014/5/19
- Phantom: ELI v5.0; Type: QDOVA002AA
- DASYS 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200

MHz/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 18.8 W/kg

Configuration/Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200

MHz/Zoom Scan (9x9x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 40.72 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 31.08 W/kg

SAR(1 g) = 7.44 W/kg; SAR(10 g) = 2.08 W/kg

Maximum value of SAR (measured) = 19.0 W/kg



0 dB = 19.0 W/kg = 12.79 dBW/kg

Date/Time: 08/12/2014

Test Laboratory: Cerpass Lab

Dipole Calibration for Body Tissue Pin=100mW, dist=10mm, f=5600 MHz

DUT: Dipole 5600MHz D5GHzV2; Type: SA AAD 510 BB

Communication System: CW; Frequency: 5600 MHz

Medium parameters used: $f = 5600$ MHz; $\sigma = 5.73$ S/m; $\epsilon_r = 48.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section; Meas. Ambient Temp (celsius) -22°C; Input power-100mW

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3927; ConvF(4.23, 4.23, 4.23); Calibrated: 2014/5/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1379; Calibrated: 2014/5/19
- Phantom: ELI v5.0; Type: QDOVA002AA
- DASYS 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600

MHz/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 21.1 W/kg

Configuration/Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600

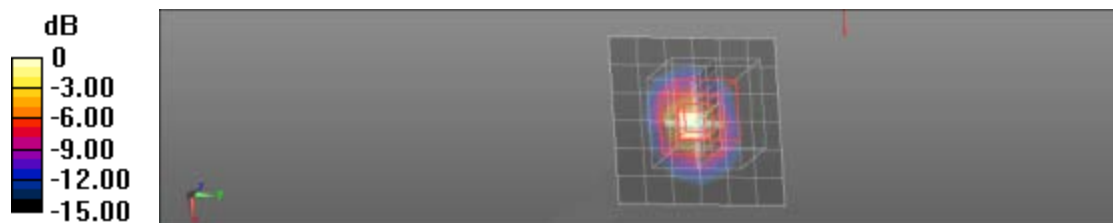
MHz/Zoom Scan (9x9x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 41.87 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 38.2 W/kg

SAR(1 g) = 8.3 W/kg; SAR(10 g) = 2.31 W/kg

Maximum value of SAR (measured) = 22.0 W/kg



0 dB = 22.0 W/kg = 13.42 dBW/kg

Date/Time: 09/12/2014

Test Laboratory: Cerpass Lab

Dipole Calibration for Body Tissue Pin=100mW, dist=10mm, f=5800 MHz

DUT: Dipole 5800MHz D5GHzV2; Type: SA AAD 510 BB

Communication System: CW; Frequency: 5800 MHz

Medium parameters used: $f = 5800$ MHz; $\sigma = 5.98$ S/m; $\epsilon_r = 48.24$; $\rho = 1000$ kg/m³

Phantom section: Flat Section; Meas. Ambient Temp (celsius) -22°C; Input power-100mW

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3927; ConvF(4.25, 4.25, 4.25); Calibrated: 2014/5/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1379; Calibrated: 2014/5/19
- Phantom: ELI v5.0; Type: QDOVA002AA
- DASYS 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800

MHz/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 18.8 W/kg

Configuration/Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800

MHz/Zoom Scan (9x9x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 37.25 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 34.1 W/kg

SAR(1 g) = 7.23 W/kg; SAR(10 g) = 2.01 W/kg

Maximum value of SAR (measured) = 19.4 W/kg



0 dB = 19.4 W/kg = 12.88 dBW/kg

APPENDIX B. SAR measurement Data

The SAR plots for highest measured SAR in each exposure configuration, wireless mode and frequency band combination, and measured SAR > 1.5 W/kg are shown as follows.

Date/Time: 06/12/2014

Test Laboratory: Cerpass Lab

DUT: 802.11 a/b/g/n/ac WLAN+ Bluetooth PCI-E Mini Card; Type: BCM94352Z

Procedure Name: 802.11b 2412MHz Mid Body-Worn_Tablet_Edge 1_0mm_Main

Communication System Band: 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.926$ S/m; $\epsilon_r = 52.842$; $\rho = 1000$ kg/m³

Phantom section: Flat Section ; Tissue Temp(celsius)- 21 °C

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3927; ConvF(7.63, 7.63, 7.63); Calibrated: 2014/5/23;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1379; Calibrated: 2014/5/19
- Phantom: SAM (30deg probe tilt) with CRP v5.0; Type: QD000P40CD
- Measurement SW: DASY52, Version 52.8 (8);

Configuration/802.11b 2412MHz Mid Body-Worn_Tablet_Edge 1_0mm_Main/Area Scan (6x12x1): Measurement grid: dx=12mm, dy=12mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.267 W/kg

Configuration/802.11b 2412MHz Mid Body-Worn_Tablet_Edge 1_0mm_Main/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 5.108 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 0.454 W/kg

SAR(1 g) = 0.215 W/kg; SAR(10 g) = 0.101 W/kg

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.327 W/kg



0 dB = 0.327 W/kg = -4.85 dBW/kg

Date/Time: 06/12/2014

Test Laboratory: Cerpass Lab

DUT: 802.11 a/b/g/n/ac WLAN+ Bluetooth PCI-E Mini Card; Type: BCM94352Z

Procedure Name: 802.11b 2412MHz Mid Body-Worn_Tablet_Edge 1_0mm_Aux

Communication System Band: 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.926$ S/m; $\epsilon_r = 52.842$; $\rho = 1000$ kg/m³

Phantom section: Flat Section ; Tissue Temp(celsius)- 21 °C

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3927; ConvF(7.63, 7.63, 7.63); Calibrated: 2014/5/23;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1379; Calibrated: 2014/5/19
- Phantom: SAM (30deg probe tilt) with CRP v5.0; Type: QD000P40CD
- Measurement SW: DASYS2, Version 52.8 (8);

Configuration/802.11b 2412MHz Mid Body-Worn_Tablet_Edge 1_0mm_Aux/Area Scan (6x12x1): Measurement grid: dx=12mm, dy=12mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.144 W/kg

Configuration/802.11b 2412MHz Mid Body-Worn_Tablet_Edge 1_0mm_Aux/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.230 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 0.225 W/kg

SAR(1 g) = 0.102 W/kg; SAR(10 g) = 0.049 W/kg

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.158 W/kg



0 dB = 0.158 W/kg = -8.01 dBW/kg

Date/Time: 09/12/2014

Test Laboratory: Cerpass Lab

DUT: 802.11 a/b/g/n/ac WLAN+ Bluetooth PCI-E Mini Card; Type: BCM94352Z

Procedure Name: 802.11a 5785MHz Body-Worn_Tablet-Edge 1_1Tx

SISO_0mm_Main

Communication System Band: 802.11a (20MHz); Frequency: 5785 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 5785$ MHz; $\sigma = 5.971$ S/m; $\epsilon_r = 48.253$; $\rho = 1000$ kg/m³

Phantom section: Flat Section ; Tissue Temp(celsius)- 21 °C

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3927; ConvF(4.25, 4.25, 4.25); Calibrated: 2014/5/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1379; Calibrated: 2014/5/19
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASYS2, Version 52.8 (8);

Configuration/802.11a 5785MHz Body-Worn_Tablet-Edge 1_1Tx

SISO_0mm_Main/Area Scan (7x13x1): Measurement grid: dx=10mm, dy=10mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.85 W/kg

Configuration/802.11a 5785MHz Body-Worn_Tablet-Edge 1_1Tx

SISO_0mm_Main/Zoom Scan (7x7x6)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=2mm

Reference Value = 1.801 V/m; Power Drift = -0.17 dB

Peak SAR (extrapolated) = 6.15 W/kg

SAR(1 g) = 1.31 W/kg; SAR(10 g) = 0.333 W/kg

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 2.85 W/kg



0 dB = 2.85 W/kg = 4.55 dBW/kg

Date/Time: 09/12/2014

Test Laboratory: Cerpass Lab

DUT: 802.11 a/b/g/n/ac WLAN+ Bluetooth PCI-E Mini Card; Type: BCM94352Z

Procedure Name: 802.11a 5825MHz Body-Worn_Tablet-Edge 1_1Tx SISO_0mm_Aux

Communication System Band: 802.11a (20MHz); Frequency: 5825 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 5825$ MHz; $\sigma = 6.029$ S/m; $\epsilon_r = 48.165$; $\rho = 1000$ kg/m³

Phantom section: Flat Section ; Tissue Temp(celsius)- 21 °C

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3927; ConvF(4.25, 4.25, 4.25); Calibrated: 2014/5/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1379; Calibrated: 2014/5/19
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASYS2, Version 52.8 (8);

Configuration/802.11a 5825MHz Body-Worn_Tablet-Edge 1_1Tx

SISO_0mm_Aux/Area Scan (7x15x1): Measurement grid: dx=10mm, dy=10mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.18 W/kg

Configuration/802.11a 5825MHz Body-Worn_Tablet-Edge 1_1Tx

SISO_0mm_Aux/Zoom Scan (7x7x6)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=2mm

Reference Value = 0 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 2.65 W/kg

SAR(1 g) = 0.627 W/kg; SAR(10 g) = 0.192 W/kg

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.31 W/kg

Configuration/802.11a 5825MHz Body-Worn_Tablet-Edge 1_1Tx

SISO_0mm_Aux/Zoom Scan (7x7x6)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=2mm

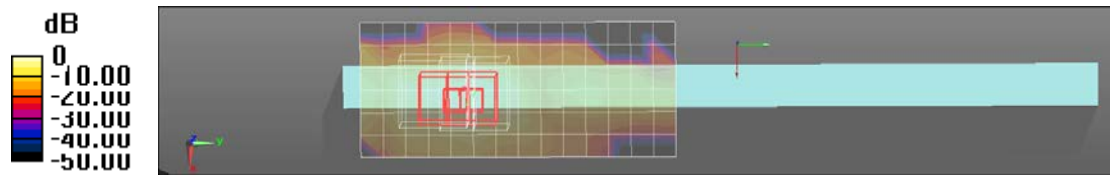
Reference Value = 0 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 2.21 W/kg

SAR(1 g) = 0.484 W/kg; SAR(10 g) = 0.153 W/kg

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.24 W/kg



0 dB = 1.24 W/kg = 0.93 dBW/kg

Date/Time: 07/12/2014

Test Laboratory: CerpPASS Lab

DUT: 802.11 a/b/g/n/ac WLAN+ Bluetooth PCI-E Mini Card; Type: BCM94352Z

Procedure Name: 802.11a 5180MHz Body-Worn_Tablet-Edge 1_1Tx

SISO_0mm_Main

Communication System Band: 802.11a (20MHz); Frequency: 5180 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 5180$ MHz; $\sigma = 5.267$ S/m; $\epsilon_r = 49.157$; $\rho = 1000$ kg/m³

Phantom section: Flat Section ; Tissue Temp(celsius)- 21 °C

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3927; ConvF(4.61, 4.61, 4.61); Calibrated: 2014/5/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1379; Calibrated: 2014/5/19
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASYS2, Version 52.8 (8);

Configuration/802.11a 5180MHz Body-Worn_Tablet-Edge 1_1Tx

SISO_0mm_Main/Area Scan (7x13x1): Measurement grid: dx=10mm, dy=10mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.995 W/kg

Configuration/802.11a 5180MHz Body-Worn_Tablet-Edge 1_1Tx

SISO_0mm_Main/Zoom Scan (7x7x6)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=2mm

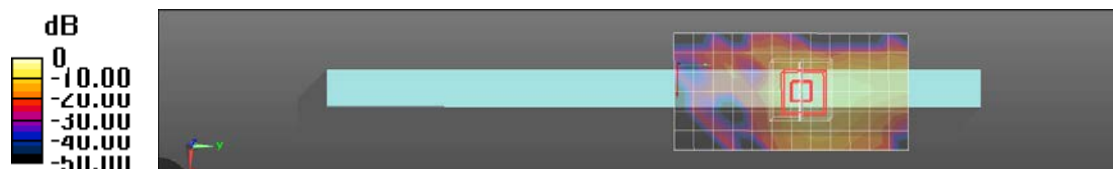
Reference Value = 0.08100 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 2.28 W/kg

SAR(1 g) = 0.571 W/kg; SAR(10 g) = 0.149 W/kg

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.29 W/kg



0 dB = 1.29 W/kg = 1.11 dBW/kg

Date/Time: 07/12/2014

Test Laboratory: CerpPASS Lab

DUT: 802.11 a/b/g/n/ac WLAN+ Bluetooth PCI-E Mini Card; Type: BCM94352Z

Procedure Name: 802.11a 5180MHz Body-Worn_Tablet-Edge 1_1Tx SISO_0mm_Aux

Communication System Band: 802.11a (20MHz); Frequency: 5180 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 5180$ MHz; $\sigma = 5.267$ S/m; $\epsilon_r = 49.157$; $\rho = 1000$ kg/m³

Phantom section: Flat Section ; Tissue Temp(celsius)- 21 °C

Measurement Standard: DASy5 (IEEE/IEC/ANSI C63.19-2011)

DASy5 Configuration:

- Probe: EX3DV4 - SN3927; ConvF(4.61, 4.61, 4.61); Calibrated: 2014/5/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1379; Calibrated: 2014/5/19
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASy52, Version 52.8 (8);

Configuration/802.11a 5180MHz Body-Worn_Tablet-Edge 1_1Tx

SISO_0mm_Aux/Area Scan (7x13x1): Measurement grid: dx=10mm, dy=10mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.870 W/kg

Configuration/802.11a 5180MHz Body-Worn_Tablet-Edge 1_1Tx

SISO_0mm_Aux/Zoom Scan (7x7x6)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=2mm

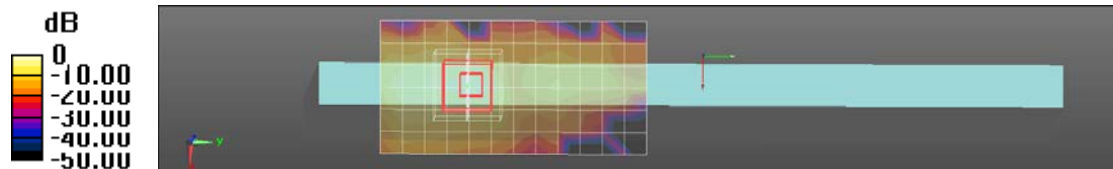
Reference Value = 0.6430 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 1.67 W/kg

SAR(1 g) = 0.434 W/kg; SAR(10 g) = 0.125 W/kg

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.872 W/kg



0 dB = 0.872 W/kg = -0.59 dBW/kg

Date/Time: 07/12/2014

Test Laboratory: CerpPASS Lab

DUT: 802.11 a/b/g/n/ac WLAN+ Bluetooth PCI-E Mini Card; Type: BCM94352Z

Procedure Name: 802.11a 5300MHz Body-Worn_Tablet-Edge 1_1Tx

SISO_0mm_Main

Communication System Band: 802.11a (20MHz); Frequency: 5300 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5300$ MHz; $\sigma = 5.408$ S/m; $\epsilon_r = 48.87$; $\rho = 1000$ kg/m³

Phantom section: Flat Section ; Tissue Temp(celsius)- 21 °C

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3927; ConvF(4.61, 4.61, 4.61); Calibrated: 2014/5/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1379; Calibrated: 2014/5/19
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASYS2, Version 52.8 (8);

Configuration/802.11a 5300MHz Body-Worn_Tablet-Edge 1_1Tx

SISO_0mm_Main/Area Scan (7x13x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 1.47 W/kg

Configuration/802.11a 5300MHz Body-Worn_Tablet-Edge 1_1Tx

SISO_0mm_Main/Zoom Scan (7x7x6)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=2mm

Reference Value = 0 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 3.04 W/kg

SAR(1 g) = 0.683 W/kg; SAR(10 g) = 0.168 W/kg

Maximum value of SAR (measured) = 1.53 W/kg



0 dB = 1.53 W/kg = 1.85 dBW/kg

Date/Time: 07/12/2014

Test Laboratory: Cerpess Lab

DUT: 802.11 a/b/g/n/ac WLAN+ Bluetooth PCI-E Mini Card; Type: BCM94352Z

Procedure Name: 802.11a 5300MHz Body-Worn_Tablet-Edge 1_1Tx SISO_0mm_Aux

Communication System Band: 802.11a (20MHz); Frequency: 5300 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5300$ MHz; $\sigma = 5.408$ S/m; $\epsilon_r = 48.87$; $\rho = 1000$ kg/m³

Phantom section: Flat Section ; Tissue Temp(celsius)- 21 °C

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3927; ConvF(4.61, 4.61, 4.61); Calibrated: 2014/5/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1379; Calibrated: 2014/5/19
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASYS2, Version 52.8 (8);

Configuration/802.11a 5300MHz Body-Worn_Tablet-Edge 1_1Tx

SISO_0mm_Aux/Area Scan (7x13x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.623 W/kg

Configuration/802.11a 5300MHz Body-Worn_Tablet-Edge 1_1Tx

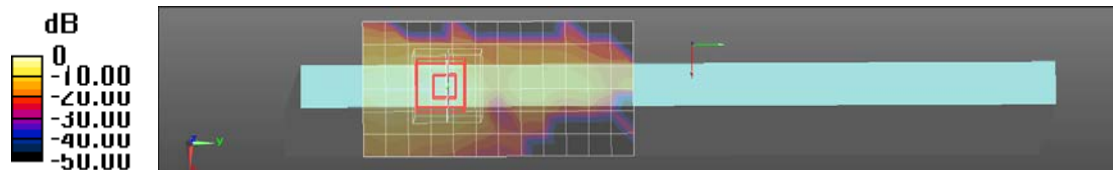
SISO_0mm_Aux/Zoom Scan (7x7x6)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=2mm

Reference Value = 0 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 1.23 W/kg

SAR(1 g) = 0.315 W/kg; SAR(10 g) = 0.089 W/kg

Maximum value of SAR (measured) = 0.700 W/kg



0 dB = 0.700 W/kg = -1.55 dBW/kg

Date/Time: 08/12/2014

Test Laboratory: Cerpess Lab

DUT: 802.11 a/b/g/n/ac WLAN+ Bluetooth PCI-E Mini Card; Type: BCM94352Z

Procedure Name: 802.11a 5680MHz Body-Worn_Tablet-Edge 1_1Tx

SISO_0mm_Main

Communication System Band: 802.11a (20MHz); Frequency: 5680 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 5680$ MHz; $\sigma = 5.86$ S/m; $\epsilon_r = 48.364$; $\rho = 1000$ kg/m³

Phantom section: Flat Section ; Tissue Temp(celsius)- 21 °C

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3927; ConvF(4.23, 4.23, 4.23); Calibrated: 2014/5/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1379; Calibrated: 2014/5/19
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASYS2, Version 52.8 (8);

Configuration/802.11a 5680MHz Body-Worn_Tablet-Edge 1_1Tx

SISO_0mm_Main/Area Scan (7x13x1): Measurement grid: dx=10mm, dy=10mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 2.05 W/kg

Configuration/802.11a 5680MHz Body-Worn_Tablet-Edge 1_1Tx

SISO_0mm_Main/Zoom Scan (7x7x6)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=2mm

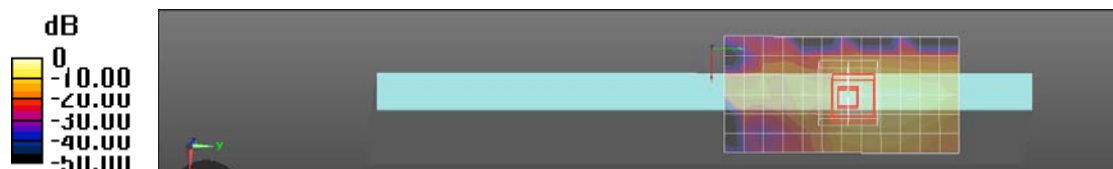
Reference Value = 1.539 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 5.43 W/kg

SAR(1 g) = 1.1 W/kg; SAR(10 g) = 0.274 W/kg

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 2.53 W/kg



0 dB = 2.53 W/kg = 4.03 dBW/kg

Date/Time: 08/12/2014

Test Laboratory: Cerpess Lab

DUT: 802.11 a/b/g/n/ac WLAN+ Bluetooth PCI-E Mini Card; Type: BCM94352Z

Procedure Name: 802.11a 5620MHz Body-Worn_Tablet-Edge 1_1Tx SISO_0mm_Aux

Communication System Band: 802.11a (20MHz); Frequency: 5620 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 5620$ MHz; $\sigma = 5.75$ S/m; $\epsilon_r = 48.442$; $\rho = 1000$ kg/m³

Phantom section: Flat Section ; Tissue Temp(celsius)- 21 °C

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3927; ConvF(4.23, 4.23, 4.23); Calibrated: 2014/5/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1379; Calibrated: 2014/5/19
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASYS2, Version 52.8 (8);

Configuration/802.11a 5620MHz Body-Worn_Tablet-Edge 1_1Tx

SISO_0mm_Aux/Area Scan (7x15x1): Measurement grid: dx=10mm, dy=10mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.771 W/kg

Configuration/802.11a 5620MHz Body-Worn_Tablet-Edge 1_1Tx

SISO_0mm_Aux/Zoom Scan (7x7x6)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=2mm

Reference Value = 0 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 1.50 W/kg

SAR(1 g) = 0.395 W/kg; SAR(10 g) = 0.131 W/kg

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.779 W/kg

Configuration/802.11a 5620MHz Body-Worn_Tablet-Edge 1_1Tx

SISO_0mm_Aux/Zoom Scan (7x7x6)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=2mm

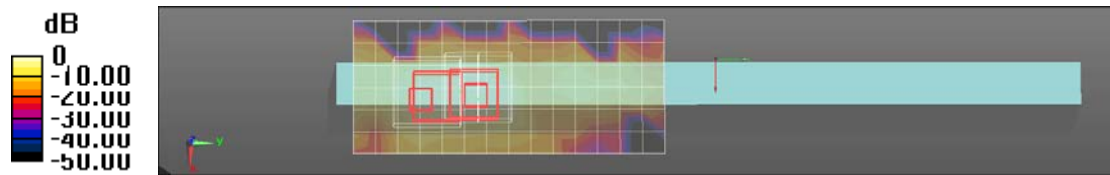
Reference Value = 0 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 1.27 W/kg

SAR(1 g) = 0.336 W/kg; SAR(10 g) = 0.108 W/kg

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.705 W/kg



0 dB = 0.705 W/kg = -1.52 dBW/kg

APPENDIX C. Calibration Data for Probe, Dipole and DAE

Please refer to attached files.

APPENDIX D. Photographs of EUT and Setup

Please refer to attached files.