ANSI/IEEE Std. C95.1-1992

in accordance with the requirements of
FCC Report and Order: ET Docket 93-62, and OET Bulletin 65 Supplement C

FCC TEST REPORT

For

Wireless LAN ,Bluetooth Combo Module

(Test inside of Portable Computer, Model: T05G)

Trade Name: MITSUMI

Model: DWM-W091

Issued to

MITSUMI ELECTRIC CO.,LTD.
1601,SAKAI,ATSUGI-SHI,KANAGAWA,243-8533 JAPAN

Issued by

Compliance Certification Services Inc.
No. 11, Wugong 6th Rd., Wugu Industrial Park,
Taipei Hsien 248, Taiwan.
http://www.ccsrf.com
service@ccsrf.com.

Testing Laboratory
1309

Issued Date: September 14, 2012

Revision History

Rev.		Issue Date		Revisions	Effect Page	Revised By
00		September 14, 2012		Initial Issue	ALL	Anson Lu
01		November 06, 2012		Add test for 5GHz Rear Side SAR	Page 4, 21, 23, 24, 34, 35, 36, 37, 38, 40	Anson Lu

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1. CERTIFICATE OF COMPLIANCE (SAR EVALUATION)

Applicant:	MITSUMI ELECTRIC CO.,LTD. 1601,SAKAI,ATSUGI-SHI,KANAGAWA,243-8533 JAPAN
Equipment Under Test:	Wireless LAN ,Bluetooth Combo Module
Trade Name:	MITSUMI
Model Number:	DWM-W091
Date of Test:	September 01 ~ November 06, 2012
Device Category:	PORTABLE DEVICES
Exposure Category:	GENERAL POPULATION/UNCONTROLLED EXPOSURE

APPLICABLE STANDARDS	
STANDARD	
FCC	FCC OET 65 Supplement C IEEE 1528 2003 KDB 447498 D01 KDB 248227 D01
Deviation from Applicable Standard	
None	
TEST RESULT	
No non-compliance noted	
The device was tested by Compliance Certification Services Inc. in accordance with the measurement methods and procedures specified in OET Bulletin 65 Supplement C (Edition 01-01). The test results in this report apply only to the tested sample of the stated device/equipment. Other similar device/equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.	

Approved by:

Alex Wu
Section Manager
Compliance Certification Services Inc.

Tested by:

Anson Lu
Test Engineer
Compliance Certification Services Inc.

2. EUT DESCRIPTION

Product	Wireless LAN ,Bluetooth Combo Module
Trade Name	MITSUMI
Model Number	DWM-W091
EUT Description	Wireless LAN ,Bluetooth Combo Module (Test inside of Portable Computer, Model: T05G)
Received Date	July 23, 2012
Frequency Range	802.11a: 5180 ~ 5240 MHz / 5260 ~ 5320 MHz / 5500 ~ 5700 MHz / 5745 ~ 5825 MHz 802.11n HT20: 5180 ~ 5240 MHz / 5260 ~ 5320 MHz / 5500 ~ 5700 MHz / 5745 ~ 5825 MHz 802.11b: 2412 ~ 2462 MHz 802.11g: 2412 ~ 2462 MHz 802.11n HT20: 2412 ~ 2462 MHz 802.11n HT40: 2422 ~ 2452 MHz Bluetooth: 2402 ~ 2480 MHz
Maximum Output Power (Average):	802.11a: 12.35 dBm 802.11n HT20: 12.10 dBm 802.11b: 16.68 dBm 802.11g: 16.72 dBm 802.11n HT20: 16.77 dBm Bluetooth: 9.80 dBm
Maximum SAR (1g):	DTS Band: 0.770 W/kg UNII Band: 1.030 W/kg
Modulation Technique	802.11a: Orthogonal Frequency Division Multiplexing (OFDM) 802.11b: Direct Sequence Spread Spectrum (DSSS) 802.11g: Orthogonal Frequency Division Multiplexing (OFDM) 802.11n: Orthogonal Frequency Division Multiplexing (OFDM) Bluetooth: GFSK for 1Mbps; π/4-DQPSK for 2Mbps; 8DPSK for 3Mbps
Antenna Specification	Antenna Type: WLAN Main Antenna: PIFA Antenna WLAN Aux Antenna: PIFA Antenna
Rechargeable Li-polymer Battery–alternate	Sample 1: FWRM8 / 7.4V; 29 Wh, Thickness: 5.7mm Sample 2: PPNPH / 7.4V; 59 Wh, Thickness: 10mm

Remark: *The sample selected for test was prototype that approximated to production product and was provided by manufacturer.*

3. REQUIREMENTS FOR COMPLIANCE TESTING DEFINED

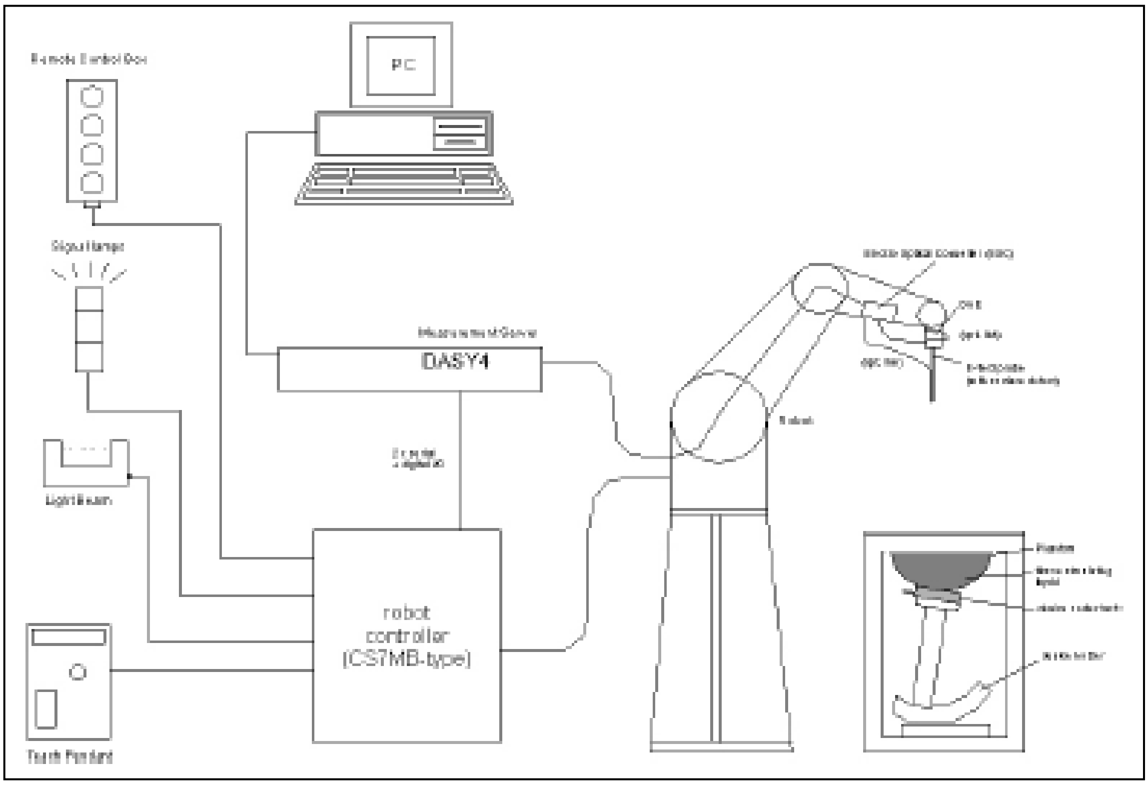
3.1 REQUIREMENTS FOR COMPLIANCE TESTING DEFINED BY THE FCC

The US Federal Communications Commission has released the report and order "Guidelines for Evaluating the Environmental Effects of RF Radiation", ET Docket No. 93-62 in August 1996 [1]. The order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 1.6 mW/g for an uncontrolled environment and 8.0 mW/g for an occupational/controlled environment as recommended by the ANSI/IEEE standard C95.1-1992 [6]. According to the Supplement C of OET Bulletin 65 "Evaluating Compliance with FCC Guide-lines for Human Exposure to Radio frequency Electromagnetic Fields", released on Jun 29, 2001 by the FCC, the device should be evaluated at maximum output power (radiated from the antenna) under "worst-case" conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

4. DOSIMETRIC ASSESSMENT SYSTEM

These measurements were performed with the automated near-field scanning system DASY4/DAST5 from Schmid & Partner Engineering AG (SPEAG). The system is based on a high precision robot (working range greater than 0.9 m) which positions the probes with a positional repeatability of better than ± 0.02 mm. Special E- and H-field probes have been developed for measurements close to material discontinuity, the sensors of which are directly loaded with a Schottky diode and connected via highly resistive lines to the data acquisition unit. The SAR measurements were conducted with the dosimetric probe EX3DV4-SN: 3554 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe has been calibrated according to the procedure with accuracy of better than ±10%. The spherical isotropy was evaluated with the procedure and found to be better than ±0.25 dB. The phantom used was the SAM Twin Phantom as described in FCC supplement C, IEEE P1528

4.1 MEASUREMENT SYSTEM DIAGRAM



The DASY4/DASY5 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (St¨aubli RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 2000 or Windows XP.
- DASY4/DAST5 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing validating the proper functioning of the system.

4.2 SYSTEM COMPONENTS

DASY4/DASY5 Measurement Server

The DASY4/DASY5 measurement server is based on a PC/104 CPU board with a 166MHz low-power Pentium, 32MB chip disk and 64MB RAM. The necessary circuits for communication with either the DAE3 electronic box as well as the 16-bit AD-converter system for optical detection and digital I/O interface are contained on the DASY4/DASY5 I/O-board, which is directly connected to the PC/104 bus of the CPU board.

The measurement server performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation.

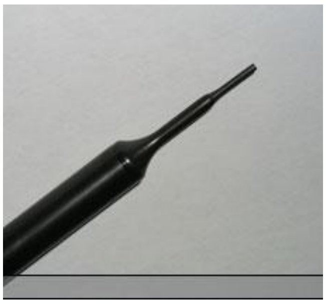
The PC-operating system cannot interfere with these time critical processes. All connections are supervised by a watchdog, and disconnection of any of the cables to the measurement server will automatically disarm the robot and disable all program-controlled robot movements. Furthermore, the measurement server is equipped with two expansion slots which are reserved for future applications. Please note that the expansion slots do not have a standardized pinout and therefore only the expansion cards provided by SPEAG can be inserted. Expansion cards from any other supplier could seriously damage the measurement server. Calibration: No calibration required.

Data Acquisition Electronics (DAE)

The data acquisition electronics (DAE3) 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 mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection. The input impedance of the DAE3 box is 200MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

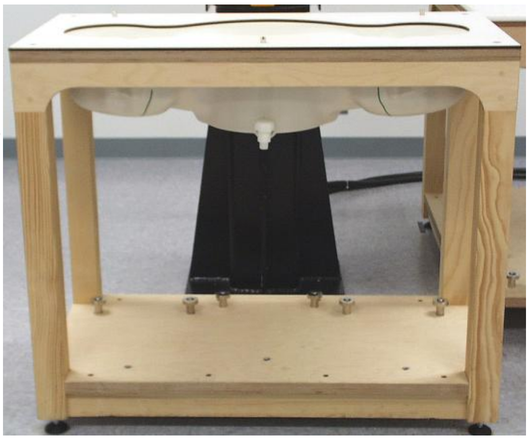
EX3DV4 Isotropic E-Field Probe for Dosimetric Measurements

Construction:	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration:	Basic Broad Band Calibration in air: 10-3000 MHz. Conversion Factors (CF) for HSL 900 and HSL 1800 CF-Calibration for other liquids and frequencies upon request.
Frequency:	10 MHz to > 6 GHz; Linearity: ± 0.2 dB (30 MHz to 3 GHz)
Directivity:	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in HSL (rotation normal to probe axis)
Dynamic Range:	10 μW/g to > 100 mW/g; Linearity: ± 0.2 dB (noise: typically < 1 μW/g)
Dimensions:	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) 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%.



Interior of probe

SAM Phantom (V4.0)



Construction: The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-200X and IEC 62209. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points with the robot.

Shell Thickness: 2 ±0.2 mm

Filling Volume: Approx. 25 liters

Dimensions: Height: 810mm; Length: 1000mm; Width: 500mm

SAM Phantom (ELI4)

Description

Construction: Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with the latest draft of the standard IEC 62209 Part II and all known tissue simulating liquids. ELI4 has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is supported by software version DASY4/DASY5.5 and higher and is compatible with all SPEAG dosimetric probes and dipoles

Shell Thickness: 2.0 ± 0.2 mm (sagging: <1%)

Filling Volume: Approx. 25 liters
Dimensions: Major ellipse axis: 600 mm
Minor axis: 400 mm 500mm

Device Holder for SAM Twin Phantom

Construction: In combination with the Twin SAM Phantom V4.0 or Twin SAM, the Mounting Device (made from POM) enables the rotation of the mounted transmitter in spherical coordinates, whereby the rotation point is the ear opening. The devices can be easily and accurately positioned according to IEC, IEEE, CENELEC, FCC or other specifications. The device holder can be locked at different phantom locations (left head, right head, and flat phantom).

System Validation Kits for SAM Phantom (V4.0)

Construction: Symmetrical dipole with l/4 balun Enables measurement of feedpoint impedance with NWA Matched for use near flat phantoms filled with brain simulating solutions Includes distance holder and tripod adaptor.

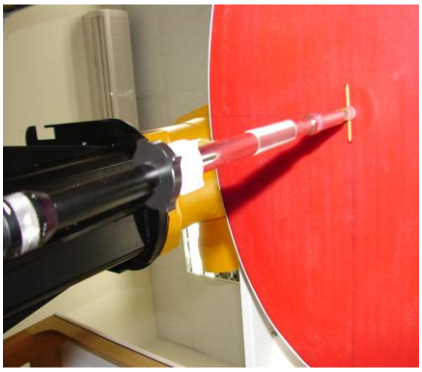
Frequency: 450, 900, 1800, 2450, 5800 MHz

Return loss: > 20 dB at specified validation position

Power capability: > 100 W (f < 1GHz); > 40 W (f > 1GHz)

Dimensions:
D450V2: dipole length: 270 mm; overall height: 330 mm
D835V2: dipole length: 161 mm; overall height: 340 mm
D900V2: dipole length: 148.5 mm; overall height: 340 mm
D1800V2: dipole length: 72.5 mm; overall height: 300 mm
D1900V2: dipole length: 67.7 mm; overall height: 300 mm
D1900V3: dipole length: 67.0 mm; overall height: 300 mm
D2450V2: dipole length: 51.5 mm; overall height: 290 mm
D5GHzV2: dipole length: 20.6 mm; overall height: 300 mm

System Validation Kits for ELI4 phantom



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D1900V3: dipole length: 67.0 mm; overall height: 300 mm
D2450V2: dipole length: 51.5 mm; overall height: 290 mm
D5GHzV2: dipole length: 20.6 mm; overall height: 300 mm

5. EVALUATION PROCEDURES

DATA EVALUATION

The DASY4/DAST5 post processing software (SEMCAD) automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters:	- Sensitivity	$Norm_i$, a_{i0}, a_{i1}, a_{i2}
	- Conversion factor	$ConvF_i$
	- Diode compression point	dcp_i
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	σ
	- Density	ρ

These parameters must be set correctly in the software. They can be found in the component documents or be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multi-meter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}$$

with
V_i = Compensated signal of channel i (i = x, y, z)
U_i = Input signal of channel i (i = x, y, z)
cf = Crest factor of exciting field (DASY parameter)
dcp_i = Diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes: $$E_i = \sqrt{\frac{V_i}{Norm_i \bullet ConvF}}$$

H-field probes: $$H_i = \sqrt{Vi} \cdot \frac{a_{i10} + a_{i11} f + a_{i12} f^2}{f}$$

with
V_i = Compensated signal of channel i (i = x, y, z)
$Norm_i$ = Sensor sensitivity of channel i (i = x, y, z)
$\mu V/(V/m)^2$ for E0field Probes
$ConvF$ = Sensitivity enhancement in solution
aij = Sensor sensitivity factors for H-field probes
f = Carrier frequency (GHz)
Ei = Electric field strength of channel i in V/m
Hi = Magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

The primary field data are used to calculate the derived field units.

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1000}$$

with *SAR* = local specific absorption rate in mW/g
E_{tot} = total field strength in V/m
σ = conductivity in [mho/m] or [Siemens/m]
ρ = equivalent tissue density in g/cm^3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid.

The power flow density is calculated assuming the excitation field as a free space field.

$$P_{pwe} = \frac{E_{tot}^2}{3770} \quad \text{or} \quad P_{pwe} = H_{tot}^2 \cdot 37.7$$

with P_{pwe} = Equivalent power density of a plane wave in mW/cm^2
E_{tot} = total electric field strength in V/m
H_{tot} = total magnetic field strength in A/m

SAR MEASUREMENT PROCEDURES

The procedure for assessing the peak spatial-average SAR value consists of the following steps:

- **Power Reference Measurement**

  The reference and drift jobs are useful jobs for monitoring the power drift of the device under test in the batch process. Both jobs measure the field at a specified reference position, at a selectable distance from the phantom surface. The reference position can be either the selected section's grid reference point or a user point in this section. The reference job projects the selected point onto the phantom surface, orients the probe perpendicularly to the surface, and approaches the surface using the selected detection method.

- **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 finer measurement around the hot spot. The sophisticated interpolation routines implemented in DASY4/DAST5 software can find the maximum locations even in relatively coarse grids. The scan area is defined by an editable grid. This grid is anchored at the grid reference point of the selected section in the phantom. When the area scan's property sheet is brought-up, grid was at to **15 mm by 15 mm** and can be edited by a user.

- **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 default zoom scan measures 7x7x9 points within a cube whose base faces are centered around the maximum found in a preceding area scan job within the same procedure. If the preceding Area Scan job indicates more then one maximum, the number of Zoom Scans has to be enlarged accordingly (The default number inserted is 1).

- **Power Drift measurement**

  The drift job measures the field at the same location as the most recent reference job within the same procedure, and with the same settings. The drift measurement gives the field difference in dB from the reading conducted within the last reference measurement. Several drift measurements are possible for one reference measurement. This allows a user to monitor the power drift of the device under test within a batch process. In the properties of the Drift job, the user can specify a limit for the drift and have DASY4/DAST5 software stop the measurements if this limit is exceeded.

- **Z-Scan**

  The Z Scan job measures points along a vertical straight line. The line runs along the Z-axis of a one-dimensional grid. A user can anchor the grid to the current probe location. As with any other grids, the local Z-axis of the anchor location establishes the Z-axis of the grid.

SPATIAL PEAK SAR EVALUATION

The procedure for spatial peak SAR evaluation has been implemented according to the IEEE1529 standard. It can be conducted for 1 g and 10 g.

The DASY4/DAST5 system allows evaluations that combine measured data and robot positions, such as:

- maximum search
- extrapolation
- boundary correction
- peak search for averaged SAR

During a maximum search, global and local maximum searches are automatically performed in 2-D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard's method. The algorithm will find the global maximum and all local maxima within -2 dB of the global maxima for all SAR distributions.

Extrapolation

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation.

Extrapolation routines require at least 10 measurement points in 3-D space. They are used in the Cube Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard's method for extrapolation. For a grid using 7x7x9 measurement points with 5mm resolution amounting to 441 measurement points, the uncertainty of the extrapolation routines is less than 1% for 1 g and 10 g cubes.

Boundary effect

For measurements in the immediate vicinity of a phantom surface, the field coupling effects between the probe and the boundary influence the probe characteristics. Boundary effect errors of different dosimetric probe types have been analyzed by measurements and using a numerical probe model. As expected, both methods showed an enhanced sensitivity in the immediate vicinity of the boundary. The effect strongly depends on the probe dimensions and disappears with increasing distance from the boundary. The sensitivity can be approximately given as:

$$S \approx S_o + S_b exp(-\frac{z}{a}) cos(\pi \frac{z}{\lambda})$$

Since the decay of the boundary effect dominates for small probes ($a<<\lambda$), the cos-term can be omitted. Factors *Sb* (parameter Alpha in the DASY4/DAST5 software) and *a* (parameter Delta in the DASY4/DAST5 software) are assessed during probe calibration and used for numerical compensation of the boundary effect. Several simulations and measurements have confirmed that the compensation is valid for different field and boundary configurations.

This simple compensation procedure can largely reduce the probe uncertainty near boundaries. It works well as long as:

- the boundary curvature is small
- the probe axis is angled less than 30_ to the boundary normal
- the distance between probe and boundary is larger than 25% of the probe diameter
- the probe is symmetric (all sensors have the same offset from the probe tip)

Since all of these requirements are fulfilled in a DASY4/DAST5 system, the correction of the probe boundary effect in the vicinity of the phantom surface is performed in a fully automated manner via the measurement data extraction during postprocessing.

6. MEASUREMENT UNCERTAINTY

DASY4:

UNCERTAINTY BUDGE ACCORDING TO IEEE P1528						
Error Description	**Uncertainty Value ±%**	**Probability distribution**	**Divisor**	**C_1 1g**	**Standard unc.(1g/10g) ±%**	**V_1 or V_{eff}**
Measurement System						
Probe calibration	±4.8	normal	1	1	±4.8	∞
Axial isotropy of probe	±4.6	rectangular	√3	$(1\text{-}Cp)^{1/2}$	±1.9	∞
Sph. Isotropy of probe	±9.7	rectangular	√3	$(Cp)^{1/2}$	±3.9	∞
Probe linearity	±4.5	rectangular	√3	1	±2.7	∞
Detection Limit	±0.9	rectangular	√3	1	±0.6	∞
Boundary effects	±8.5	rectangular	√3	1	±4.8	∞
Readoutelectronics	±1.0	normal	1	1	±1.0	∞
Response time	±0.9	rectangular	√3	1	±0.5	∞
Integration time	±1.2	rectangular	√3	1	±0.8	∞
Mech Constrains of robot	±0.5	rectangular	√3	1	±0.2	∞
Probe positioning	±2.7	rectangular	√3	1	±1.7	∞
Extrap. And integration	±4.0	rectangular	√3	1	±2.3	∞
RF ambient conditiona	±0.54	rectangular	√3	1	±0.43	∞
Test Sample Related						
Device positioning	±2.2	normal	1	1	±2.23	11
Device holder uncertainty	±5	normal	1	1	±5.0	7
Power drift	±5	rectangular	√3	1	±2.9	∞
Phantom and Set up						
Phantom uncertainty	±4	rectangular	√3	1	±2.3	∞
Liquid conductivity	±5	rectangular	√3	0.6	±1.7	∞
Liquid conductivity	±5	rectangular	√3	0.6	±3.5/1.7	∞
Liquid permittivity	±5	rectangular	√3	0.6	±1.7	∞
Liquid permittivity	±5	rectangular	√3	0.6	±1.7	∞
Combined Standard Uncertainty					±12.14/11.76	
Coverage Factor for 95%		kp=2				
Expanded Standard Uncertainty					±24.29/23.51	

Table: Worst-case uncertainty for DASY4 assessed according to IEEE P1528.
The budge is valid for the frequency range 300 MHz to 6G Hz and represents a worst-case analysis.

Dasy5:

UNCERTAINTY BUDGE ACCORDING TO IEEE P1528						
Error Description	**Uncertainty Value ±%**	**Probability distribution**	**Divisor**	**C_1 1g**	**Standard unc.(1g/10g) ±%**	**V_1 or V_{eff}**
Measurement System						
Probe calibration	±5.9	normal	1	1	±5.9	∞
Axial isotropy of probe	±4.7	rectangular	√3	$(1\text{-Cp})^{1/2}$	±1.9	∞
Sph. Isotropy of probe	±9.6	rectangular	√3	$(\text{Cp})^{1/2}$	±3.9	∞
Probe linearity	±4.7	rectangular	√3	1	±2.7	∞
Detection Limit	±1.0	rectangular	√3	1	±0.6	∞
Boundary effects	±1.0	rectangular	√3	1	±0.6	∞
Readoutelectronics	±0.3	normal	1	1	±0.3	∞
Response time	±0.8	rectangular	√3	1	±0.5	∞
Integration time	±2.6	rectangular	√3	1	±1.5	∞
Probe positioning	±0.4	rectangular	√3	1	±0.2	∞
Extrap. And integration	±4.0	rectangular	√3	1	±2.3	∞
RF ambient conditiona	±3.0	rectangular	√3	1	±1.7	∞
RF ambient conditiona	±3.0	rectangular	√3	1	±1.7	∞
Test Sample Related						
Device positioning	±2.9	normal	1	1	±2.9	145
Device holder uncertainty	±3.6	normal	1	1	±3.6	5
Power drift	±5.0	rectangular	√3	1	±2.9	∞
Phantom and Set up						
Phantom uncertainty	±4.0	rectangular	√3	1	±2.3	∞
Liquid conductivity	±5.0	rectangular	√3	0.6	±1.8/1.2	∞
Liquid conductivity	±1.5	rectangular	√3	0.6	±0.6	∞
Liquid permittivity	±5.0	rectangular	√3	0.6	±1.7/1.4	∞
Liquid permittivity	±1.0	rectangular	√3	0.6	±0.4	∞
Combined Standard Uncertainty					±10.375	
Coverage Factor for 95%		kp=2				
Expanded Standard Uncertainty					±20.75	

Table: Worst-case uncertainty for DASY5 assessed according to IEEE P1528.
The budge is valid for the frequency range 300 MHz to 6GHz and represents a worst-case analysis.

7. EXPOSURE LIMIT

(A). Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	2.0

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

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

NOTE: ***Whole-Body SAR*** is averaged over the entire body, ***partial-body SAR*** is averaged over any 1 gram 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.

Population/Uncontrolled Environments:

are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

Occupational/Controlled Environments:

are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

NOTE
GENERAL POPULATION/UNCONTROLLED EXPOSURE
PARTIAL BODY LIMIT
1.6 W/kg

8. TYPICAL COMPOSITION OF INGREDIENTS FOR LIQUID TISSUE PHANTOMS

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.

Ingredients (% by weight)	**Frequency (MHz)**									
	450		**835**		**915**		**1900**		**2450**	
Tissue Type	**Head**	**Body**	**Head**	**Body**	**Head**	**Body**	**Head**	**Body**	**Head**	**Body**
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (S/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78

Salt: 99^{+}% Pure Sodium Chloride
Sugar: 98^{+}% Pure Sucrose
Water: De-ionized, 16 $M\Omega^{+}$ resistivity
HEC: Hydroxyethyl Cellulose
DGBE: 99^{+}% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1, 1, 3, 3-tetramethylbutyl)phenyl]ether

9. MEASUREMENT RESULTS

9.1 TEST LIQUID CONFIRMATION

SIMULATING LIQUIDS PARAMETER CHECK

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine of the dielectric parameters are within the tolerances of the specified target values

The relative permittivity and conductivity of the tissue material should be within ± 5% of the values given in the table below. 5% may not be easily achieved at certain frequencies. Under such circumstances, 10% tolerance may be used until more precise tissue recipes are available

IEEE SCC-34/SC-2 P1528 RECOMMENDED TISSUE DIELECTRIC PARAMETERS

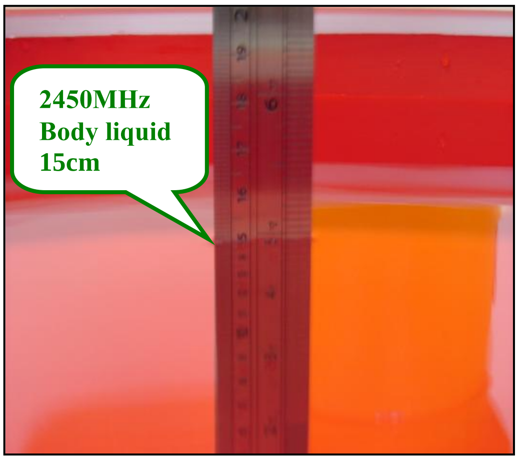
The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations and extrapolated according to the head parameters specified in P1528

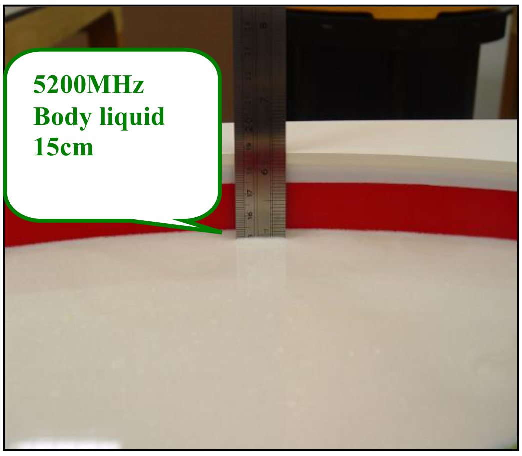
Target Frequency (MHz)	Head		Body	
	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800-2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	45.3	5.27	48.2	6.00

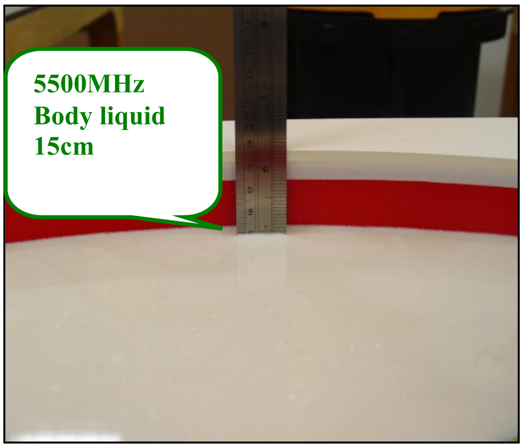
SIMULATING LIQUIDS PARAMETER CHECK RESULTS

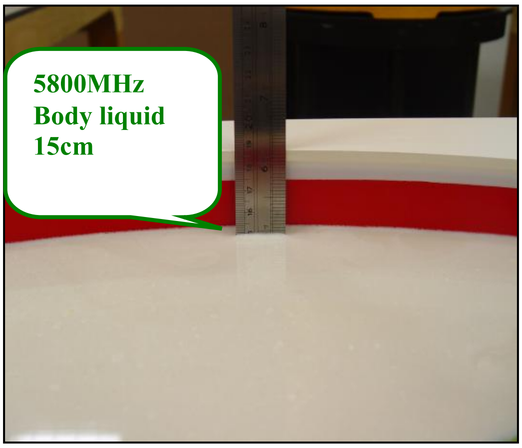
Date: September 04, 2012 **Ambient condition:** Temperature 24.2°C; Relative humidity: 52%

Body Simulating Liquid			Parameters	Target	Measured	Deviation[%]	Limited[%]
f (MHz)	Temp. [°C]	Depth (cm)					
2412.00	23.20	15.00	Permitivity:	52.75	51.90	-1.61	± 5
			Conductivity:	1.91	1.92	0.42	± 5
2437.00	23.20	15.00	Permitivity:	52.72	51.90	-1.56	± 5
			Conductivity:	1.94	1.95	0.31	± 5
2450.00	23.20	15.00	Permitivity:	52.70	51.80	-1.71	± 5
			Conductivity:	1.95	1.96	0.51	± 5
2462.00	23.20	15.00	Permitivity:	52.68	51.80	-1.67	± 5
			Conductivity:	1.97	1.97	0.20	± 5









Date: September 01, 2012 **Ambient condition:** Temperature 24.2°C; Relative humidity: 53%

Body Simulating Liquid			Parameters	Target	Measured	Deviation[%]	Limited[%]
f (MHz)	Temp. [℃]	Depth (cm)					
5180.00	23.20	15.00	Permitivity:	49.03	48.66	-0.75	± 5
			Conductivity:	5.28	5.29	0.19	± 5
5200.00	23.20	15.00	Permitivity:	49.00	48.62	-0.78	± 5
			Conductivity:	5.30	5.32	0.38	± 5
5320.00	23.20	15.00	Permitivity:	48.85	48.37	-0.98	± 5
			Conductivity:	5.43	5.50	1.29	± 5
5500.00	23.20	15.00	Permitivity:	48.60	48.01	-1.21	± 5
			Conductivity:	5.65	5.77	2.12	± 5
5800.00	23.20	15.00	Permitivity:	48.20	47.42	-1.62	± 5
			Conductivity:	6.00	6.18	3.00	± 5
5825.00	23.20	15.00	Permitivity:	48.16	47.37	-1.64	± 5
			Conductivity:	6.03	6.22	3.15	± 5

Date: November 05, 2012 **Ambient condition:** Temperature 24.2°C; Relative humidity: 53%

Body Simulating Liquid			Parameters	Target	Measured	Deviation[%]	Limited[%]
f (MHz)	Temp. [℃]	Depth (cm)					
5180.00	23.20	15.00	Permitivity:	49.03	48.30	-1.49	± 5
			Conductivity:	5.28	5.37	1.70	± 5
5200.00	23.20	15.00	Permitivity:	49.00	48.24	-1.55	± 5
			Conductivity:	5.30	5.40	1.89	± 5
5320.00	23.20	15.00	Permitivity:	48.85	47.99	-1.76	± 5
			Conductivity:	5.43	5.57	2.58	± 5
5500.00	23.20	15.00	Permitivity:	48.60	47.67	-1.91	± 5
			Conductivity:	5.65	5.83	3.19	± 5
5800.00	23.20	15.00	Permitivity:	48.20	47.06	-2.37	± 5
			Conductivity:	6.00	6.27	4.50	± 5
5825.00	23.20	15.00	Permitivity:	48.16	46.72	-2.99	± 5
			Conductivity:	6.03	6.31	4.64	± 5

9.2 SYSTEM PERFORMANCE CHECK

The system performance check is performed prior to any usage of the system in order to guarantee reproducible results. The system performance check verifies that the system operates within its specifications. The system performance check results are tabulated below. And also the corresponding SAR plot is attached as well in the SAR plots files.

SYSTEM PERFORMANCE CHECK MEASUREMENT CONDITIONS

- The measurements were performed in the flat section of the SAM twin phantom filled with Body simulating liquid of the following parameters.
- The DASY4 system with an E-field probe EX3DV4 SN:3554 was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 15 mm (below 1 GHz) and 10 mm (above 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 10mm was aligned with the dipole.
- Special 7x7x7 fine cube was chosen for cube integration (dx= 5 mm, dy= 5 mm, dz= 5 mm).
- Distance between probe sensors and phantom surface was set to 2.5 mm.
- The dipole input power (forward power) was 250 mW±3%.
- The results are normalized to 1 W input power.

SYSTEM PERFORMANCE CHECK RESULTS

Dipole: D2450V2 SN: 728
Date: September 04, 2012 **Ambient condition:** Temperature 24.2°C; Relative humidity: 52%

Body Simulating Liquid			Parameters	Target	Measured	Deviation[%]	Limited[%]
f(MHz)	Temp. [°C]	Depth [cm]					
2450.00	23.20	15.00	Permitivity:	52.70	51.80	-1.71	± 5
			Conductivity:	1.95	1.96	0.51	± 5
			1g SAR:	51.20	55.60	8.59	± 10

Ps. 1g SAR is equal 4x13.2(250mW forward power SAR value)

Dipole: D5GMHz SN:1004
Date: September 01, 2012 **Ambient condition:** Temperature 24.2°C; Relative humidity: 53%

Body Simulating Liquid			Parameters	Target	Measured	Deviation[%]	Limited[%]
f(MHz)	Temp. [°C]	Depth [cm]					
5200.00	23.20	15.00	Permitivity:	49.00	48.62	-0.78	± 5
			Conductivity:	5.30	5.32	0.38	± 5
			1g SAR:	75.80	78.80	3.96	± 5

Ps. 1g SAR is equal 10x7.88 (100mW forward power SAR value)

Dipole: D5GMHz SN:1004
Date: September 01, 2012 **Ambient condition:** Temperature 24.2°C; Relative humidity: 53%

Body Simulating Liquid			Parameters	Target	Measured	Deviation[%]	Limited[%]
f(MHz)	Temp. [°C]	Depth [cm]					
5500.00	23.20	15.00	Permitivity:	48.60	48.01	-1.21	± 5
			Conductivity:	5.65	5.77	2.12	± 5
			1g SAR:	81.80	85.50	4.52	± 5

Ps. 1g SAR is equal 10x8.55 (100mW forward power SAR value)

Dipole: D5GMHz SN:1004
Date: September 01, 2012 **Ambient condition:** Temperature 24.2°C; Relative humidity: 53%

Body Simulating Liquid			Parameters	Target	Measured	Deviation[%]	Limited[%]
f(MHz)	Temp. [°C]	Depth [cm]					
5800.00	23.20	15.00	Permitivity:	48.20	47.42	-1.62	± 5
			Conductivity:	6.00	6.18	3.00	± 5
			1g SAR:	77.30	81.30	5.17	± 10

Ps. 1g SAR is equal 10x8.13 (100mW forward power SAR value)

Dipole: D5GMHz SN:1004
Date: November 05, 2012 **Ambient condition:** Temperature 24.2°C; Relative humidity: 53%

Body Simulating Liquid			Parameters	Target	Measured	Deviation[%]	Limited[%]
f(MHz)	Temp. [°C]	Depth [cm]					
5200.00	23.20	15.00	Permitivity:	49.00	48.24	-1.55	± 5
			Conductivity:	5.30	5.40	1.89	± 5
			1g SAR:	75.80	72.50	-4.35	± 5

Ps. 1g SAR is equal 10x7.25 (100mW forward power SAR value)

Dipole: D5GMHz SN:1004
Date: November 05, 2012 **Ambient condition:** Temperature 24.2°C; Relative humidity: 53%

Body Simulating Liquid			Parameters	Target	Measured	Deviation[%]	Limited[%]
f(MHz)	Temp. [°C]	Depth [cm]					
5500.00	23.20	15.00	Permitivity:	48.60	47.67	-1.91	± 5
			Conductivity:	5.65	5.83	3.19	± 5
			1g SAR:	81.80	83.40	1.96	± 5

Ps. 1g SAR is equal 10x8.34 (100mW forward power SAR value)

Dipole: D5GMHz SN:1004
Date: November 06, 2012 **Ambient condition:** Temperature 24.2°C; Relative humidity: 53%

Body Simulating Liquid			Parameters	Target	Measured	Deviation[%]	Limited[%]
f(MHz)	Temp. [°C]	Depth [cm]					
5800.00	23.20	15.00	Permitivity:	48.20	47.06	-2.37	± 5
			Conductivity:	6.00	6.27	4.50	± 5
			1g SAR:	77.30	76.50	-1.03	± 10

Ps. 1g SAR is equal 10x7.65 (100mW forward power SAR value)

9.3 EUT TUNE-UP PROCEDURES AND TEST MODE

- Software used to control the EUT for staying in continuous transmitting mode was programmed.
- The output power(dBm) we measured before and after SAR test in different channel
- The EUT screen can be rotated and it could be operated at 0˚, 90˚, 180˚, 270˚, four scenarios.
- If the SAR measured on the highest output channel is < 50% of the SAR limit, SAR evaluation for the other required channels is unnecessary.

Output powers are measured as below:

802.11b Conducted Power (Avg)(unit: dBm):

		Frequency	Data Rate 1M	Data Rate 2M	Data Rate 5.5M	Data Rate 11M
WLAN Main Antenna	802.11b	2412	16.14			
		2442	16.68	16.30	16.18	16.08
		2462	16.62			

		Frequency	Data Rate 1M	Data Rate 2M	Data Rate 5.5M	Data Rate 11M
WLAN Aux Antenna	802.11b	2412	16.06			
		2442	16.19	15.82	15.77	15.59
		2462	16.13			

Ps. 802.11b maximum output power 16.68dBm (46.559mW) is higher than 24.620mW (60/f), so 802.11b SAR testing is required.

802.11g Conducted Power (Avg)(unit: dBm):

		Frequency	Data Rate 6M	Data Rate 9M	Data Rate 12M	Data Rate 18M	Data Rate 24M	Data Rate 27M	Data Rate 36M	Data Rate 54M
WLAN Main Antenna	802.11g	2412	16.06							
		2442	16.72	16.60	16.47	16.35	16.26	16.11	15.99	15.90
		2462	16.16							

		Frequency	Data Rate 6M	Data Rate 9M	Data Rate 12M	Data Rate 18M	Data Rate 24M	Data Rate 27M	Data Rate 36M	Data Rate 54M
WLAN Aux Antenna	802.11g	2412	16.19							
		2442	16.46	16.40	16.28	16.03	15.86	15.46	15.11	15.00
		2462	16.28							

802.11n HT20 Conducted Power (Avg)(unit: dBm):

		Frequency	Data Rate 6.5M	Data Rate 13M	Data Rate 19.5M	Data Rate 26M	Data Rate 39M	Data Rate 52M	Data Rate 58.5M	Data Rate 65M
WLAN Main Antenna	802.11n HT20	2412	16.20							
		2442	16.77	16.21	15.90	15.77	15.40	15.12	15.00	14.84
		2462	16.36							

		Frequency	Data Rate 6.5M	Data Rate 13M	Data Rate 19.5M	Data Rate 26M	Data Rate 39M	Data Rate 52M	Data Rate 58.5M	Data Rate 65M
WLAN Aux Antenna	802.11n HT20	2412	16.09							
		2442	16.36	16.10	15.90	15.74	15.36	15.03	14.91	14.77
		2462	16.10							

Ps. KDB 248227 - SAR is not required for 802.11g /802.11n HT20/802.11n HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.

Main Antenna-802.11a Conducted Power (Avg)(unit: dBm):

Channel	Frequency (MHz)	Data Rate							
		6M	9M	12M	18M	24M	36M	48M	54M
36	5180	12.05							
40	5200	11.98							
44	5220	12.23							
48	5240	12.24	11.85	11.11	10.98	10.74	10.41	10.05	9.96
52	5260	12.10	11.55	11.11	10.90	10.65	10.33	9.99	9.85
56	5280	12.02							
60	5300	11.93							
64	5320	11.95							
100	5500	11.97							
104	5520	11.95							
108	5540	12.00							
112	5560	12.05							
116	5580	11.93							
120	5600	11.81							
124	5620	12.19	11.55	11.11	10.98	10.66	10.31	9.89	9.64
128	5640	12.07							
132	5660	11.80							
136	5680	11.85							
140	5700	11.94							
149	5745	12.02							
153	5765	11.91							
157	5785	11.86							
161	5805	12.04							
165	5825	12.24	11.71	11.3	11.04	10.83	10.75	10.35	10.23

Aux Antenna-802.11a Conducted Power (Avg)(unit: dBm):

Channel	Frequency (MHz)	Data Rate							
		6M	9M	12M	18M	24M	36M	48M	54M
36	5180	12.14							
40	5200	11.95							
44	5220	12.20							
48	5240	12.31	11.95	11.49	11.17	10.88	10.46	9.95	9.68
52	5260	12.14	11.76	11.44	11.12	10.79	10.37	9.99	9.68
56	5280	12.01							
60	5300	11.79							
64	5320	11.84							
100	5500	12.03							
104	5520	12.18							
108	5540	11.81							
112	5560	11.96							
116	5580	12.07							
120	5600	12.02							
124	5620	12.33	11.95	11.49	11.09	10.92	10.62	10.19	9.88
128	5640	12.23							
132	5660	11.88							
136	5680	11.96							
140	5700	11.99							
149	5745	12.11							
153	5765	12.16							
157	5785	12.06							
161	5805	12.23							
165	5825	12.35	11.81	11.54	11.22	10.97	10.52	10.31	10.05

Main Antenna-802.11n HT20 Conducted Power (Avg)(unit: dBm):

Channel	Frequency (MHz)	Data Rate							
		6M	9M	12M	18M	24M	36M	48M	54M
36	5180	11.80							
40	5200	11.73							
44	5220	11.64							
48	5240	12.00	11.55	11.08	10.69	10.33	9.99	9.89	9.73
52	5260	12.05	11.49	11.15	10.86	10.37	10.10	9.98	9.86
56	5280	11.86							
60	5300	11.70							
64	5320	11.51							
100	5500	11.77							
104	5520	11.78							
108	5540	11.68							
112	5560	11.69							
116	5580	11.65							
120	5600	11.61							
124	5620	11.80	11.55	11.12	10.76	10.42	9.97	9.88	9.73
128	5640	11.49							
132	5660	11.67							
136	5680	11.58							
140	5700	11.49							
149	5745	11.63							
153	5765	11.62							
157	5785	11.52							
161	5805	11.77							
165	5825	11.82	11.43	11.05	10.77	10.43	10.41	10.00	9.84

Aux Antenna-802.11n HT20 Conducted Power (Avg)(unit: dBm):

Channel	Frequency (MHz)	Data Rate							
		6M	9M	12M	18M	24M	36M	48M	54M
36	5180	11.87							
40	5200	11.80							
44	5220	11.82							
48	5240	12.10	11.52	11.15	10.91	10.53	10.22	10.07	9.96
52	5260	11.95	11.43	11.06	11.02	10.58	10.18	10.07	9.85
56	5280	11.71							
60	5300	11.83							
64	5320	11.72							
100	5500	11.81							
104	5520	11.72							
108	5540	11.77							
112	5560	11.48							
116	5580	11.56							
120	5600	11.52							
124	5620	11.93	11.57	11.21	10.77	10.35	10.02	9.91	9.78
128	5640	11.77							
132	5660	11.66							
136	5680	11.72							
140	5700	11.63							
149	5745	11.71							
153	5765	11.69							
157	5785	11.55							
161	5805	11.78							
165	5825	11.97	11.59	11.21	10.85	10.51	10.20	10.09	9.92

Ps. KDB 248227 - SAR is not required for 802.11n HT20 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11a channels.

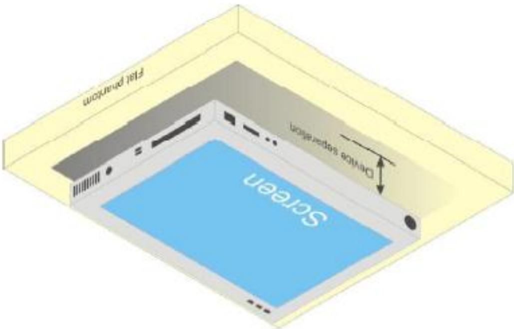
Bluetooth Conducted Power (Avg)(unit: dBm):

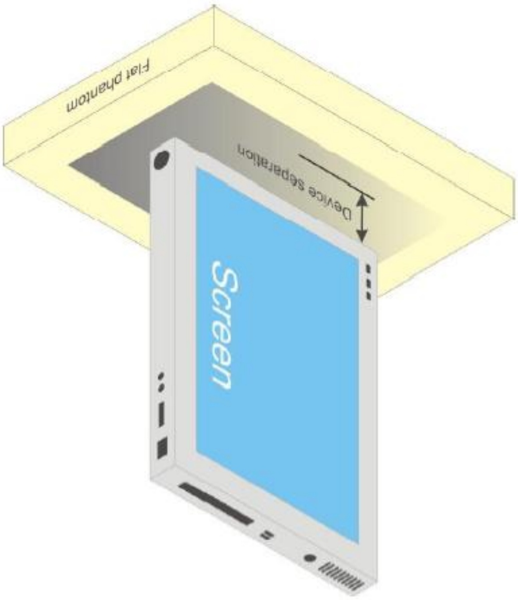
Frequency Channel	DH5	3DH5	BT 4.0
2402 MHz	8.86	9.03	-3.00
2441 MHz	9.51	9.80	-3.62
2480 MHz	9.54	9.70	-1.46

Ps. Bluetooth maximum output power 9.80dBm (9.55mW) is less than 24.580mW (60/f), so SAR isn’t required.

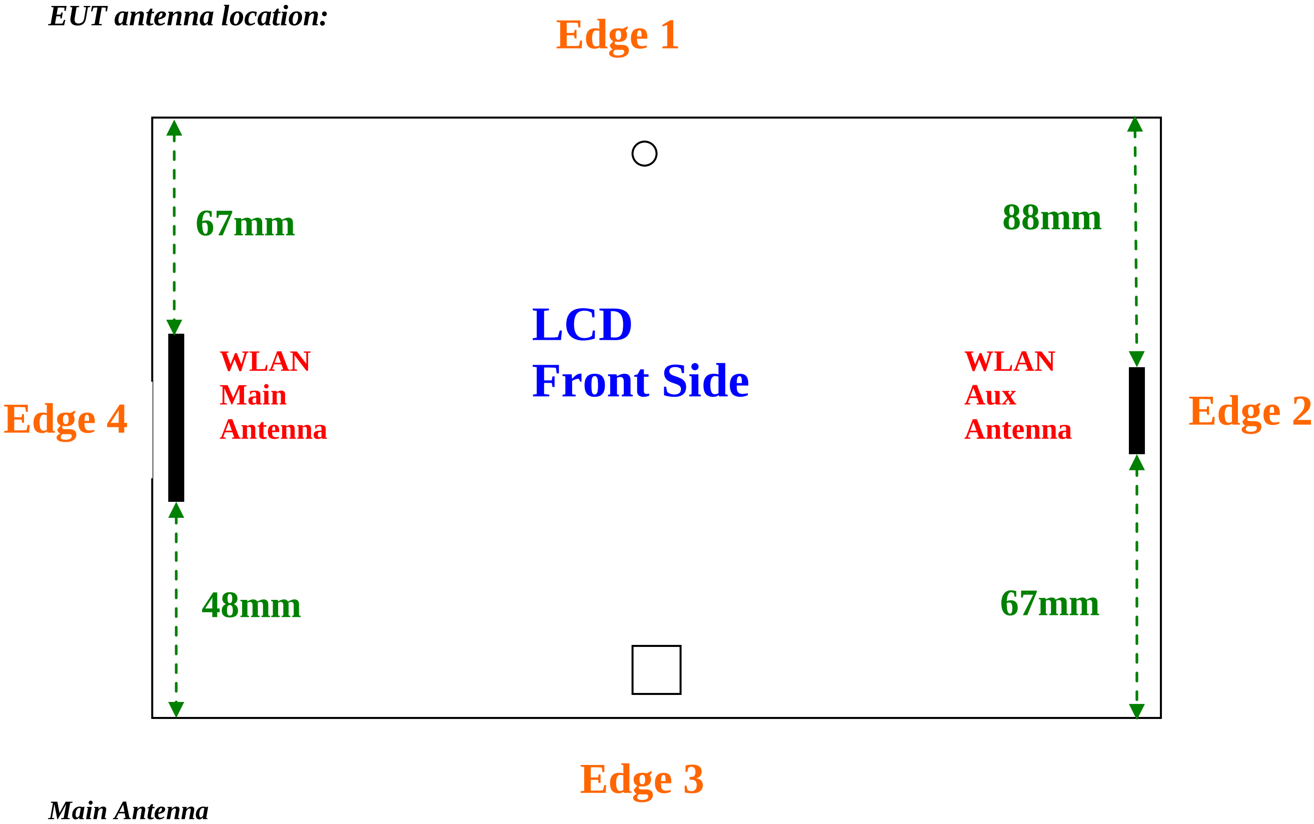
9.4 EUT TEST POSITION

This DUT was tested in three different positions. They are rear side of tablet, Edge 4 and Edge 2. In these positions, the surface of DUT is touching with phantom 0cm air gap. Please refer to Attachment (T120702I01-SF PHOTOs) for the test setup photos.





EUT antenna location:



Main Antenna

- According to KDB 447498 4)b)2)i), the separation distance from Edge 1 to WLAN Main antenna is 6.6 cm, therefore SAR is not required;
- The separation distance from Edge 3 to WLAN Main antenna is 4.8 cm more than Edge 4 to WLAN Main antenna. Therefore the Edge 4 is most conservative evaluation; therefore Edge 3 can be exempted.
- The separation distance from Edge 4 to WLAN Main antenna < 5 cm, therefore SAR is required.

Aux Antenna

- According to KDB 447498 4)b)2)i), the separation distance from Edge 1 to WLAN Aux antenna is 8.6 cm, therefore SAR is not required;
- According to KDB 447498 4)b)2)i), the separation distance from Edge 3 to WLAN Aux antenna is 6.6 cm, therefore SAR is not required;
- The separation distance from Edge 2 to WLAN Aux antenna < 5 cm, therefore SAR is required.

KDB 447498 RF Exposure Assessments:

(1) The tablet computer overall dimension is 12.2” inch and four scenarios of display could be used.
(2) The WLAN module has two transmit antennas (Main antenna and Aux antenna Diversity), and WLAN antenna and Bluetooth antenna can’t transmit simultaneously.
(3) Bluetooth maximum output power 9.80dBm (9.55mW) is less than 24.580mW (60/f), therefore SAR is not required.

9.5 SAR MEASUREMENTS RESULTS

Main Antenna

Body position for 802.11b:

Test mode: **802.11b**, Duty Cycle: 100%, Rate= 1M, Crest Factor: 1				Depth of liquid: 15.0 cm		
EUT Position	Antenna	Frequency		Conducted Power (dBm)	**SAR** (1g) (W/kg)	Limit (W/kg)
		Channel	MHz			
Edge 4	Main	7	2442	16.68	0.672	1.6
Rear Side	Main	7	2442	16.68	0.659[(2)]	
Rear Side	Main	7	2442	16.68	0.559[(2)]	

Note(s):
(1) Please refer to attachment for the result presentation in plot format.
(2) 0.659 is Using Battery Sample 1, 0.559 is Using Battery Sample 2, Battery Sample 1 is worst.

Aux Antenna
Body position for 802.11b:

Test mode: **802.11b**, Duty Cycle: 100%, Rate= 1M, Crest Factor: 1				Depth of liquid: 15.0 cm		
EUT Position	Antenna	Frequency		Conducted Power (dBm)	**SAR** (1g) (W/kg)	Limit (W/kg)
		Channel	MHz			
Edge 2	Aux	7	2442	16.19	0.551	1.6
Rear Side	Aux	7	2442	16.19	0.759[(2)]	
Rear Side	Aux	7	2442	16.19	0.435[(2)]	
Test mode: **802.11g**, Duty Cycle: 100%, Rate= 6M, Crest Factor: 1				Depth of liquid: 15.0 cm		
EUT Position	Antenna	Frequency		Conducted Power (dBm)	**SAR** (1g) (W/kg)	Limit (W/kg)
		Channel	MHz			
Edge 2	Aux	7	2442	16.46	0.549	1.6
Rear Side	Aux	7	2442	16.46	0.770	

Note(s):
(1) Please refer to attachment for the result presentation in plot format.
(2) 0.759 is Using Battery Sample 1, 0.435 is Using Battery Sample 2, Battery Sample 1 is worst.

Main Antenna
Body position for 802.11a:

Test mode: **802.11a**, Duty Cycle: 100%, Rate= 6M, Crest Factor: 1				Depth of liquid: 15.0 cm		
EUT Position	Antenna	Frequency		Conducted Power (dBm)	**SAR** (1g) (W/kg)	Limit (W/kg)
		Channel	MHz			
Edge 4	Main	36	5180	11.25	0.392	1.6
Edge 4	Main	48	5240	11.44	0.505	
Edge 4	Main	52	5260	11.31	0.412	
Edge 4	Main	64	5320	11.15	0.749	
Edge 4	Main	108	5540	11.20	0.998	
Edge 4	Main	112	5560	11.25	0.680	
Edge 4	Main	124	5620	11.39	0.637	
Edge 4	Main	140	5700	11.14	0.596	
Edge 4	Main	149	5745	11.22	0.621	
Edge 4	Main	161	5805	11.24	0.734	
Edge 4	Main	165	5825	11.44	0.639	
Note(s): (1) Please refer to attachment for the result presentation in plot format.						

Main Antenna
Body position for 802.11a:

Test mode: **802.11a**, Duty Cycle: 100%, Rate= 6M, Crest Factor: 1					Depth of liquid: 15.0 cm	
EUT Position	Antenna	Frequency		Conducted Power (dBm)	**SAR** (1g) (W/kg)	Limit (W/kg)
		Channel	MHz			
Rear Side	Main	36	5180	11.25	0.115	1.6
Rear Side	Main	48	5240	11.44	0.312	
Rear Side	Main	52	5260	11.31	0.128	
Rear Side	Main	64	5320	11.15	0.342	
Rear Side	Main	108	5540	11.20	0.472(2)	
Rear Side	Main	112	5560	11.25	0.375	
Rear Side	Main	124	5620	11.39	0.374	
Rear Side	Main	140	5700	11.14	0.269	
Rear Side	Main	149	5745	11.22	0.412	
Rear Side	Main	161	5805	11.24	0.344	
Rear Side	Main	165	5825	11.44	0.332	
Rear Side	Main	108	5540	11.20	0.323(2)	

Note(s):
(1) Please refer to attachment for the result presentation in plot format.
(2) 0.472 is Using Battery Sample 1, 0.323 is Using Battery Sample 2, Battery Sample 1 is worst.

Aux Antenna
Body position for 802.11a:

Test mode: **802.11a**, Duty Cycle: 100%, Rate= 6M, Crest Factor: 1					Depth of liquid: 15.0 cm	
EUT Position	Antenna	Frequency		Conducted Power (dBm)	**SAR** (1g) (W/kg)	Limit (W/kg)
		Channel	MHz			
Edge 2	Aux	36	5180	11.34	0.838	1.6
Edge 2	Aux	48	5240	11.51	1.030	
Edge 2	Aux	52	5260	11.35	0.962	
Edge 2	Aux	64	5320	11.04	0.640	
Edge 2	Aux	108	5540	11.01	0.694	
Edge 2	Aux	112	5560	11.16	0.302	
Edge 2	Aux	124	5620	11.53	0.671	
Edge 2	Aux	140	5700	11.19	0.545	
Edge 2	Aux	149	5745	11.31	0.543	
Edge 2	Aux	161	5805	11.43	0.539	
Edge 2	Aux	165	5825	11.55	0.687	

Note(s):
(1) Please refer to attachment for the result presentation in plot format.

Aux Antenna
Body position for 802.11a:

Test mode: **802.11a**, Duty Cycle: 100%, Rate= 6M, Crest Factor: 1				Depth of liquid: 15.0 cm		
EUT Position	Antenna	Frequency		Conducted Power (dBm)	**SAR** (1g) (W/kg)	Limit (W/kg)
		Channel	MHz			
Rear Side	Aux	36	5180	11.34	0.366	1.6
Rear Side	Aux	48	5240	11.51	0.449(2)	
Rear Side	Aux	52	5260	11.35	0.423	
Rear Side	Aux	64	5320	11.04	0.142	
Rear Side	Aux	108	5540	11.01	0.215	
Rear Side	Aux	112	5560	11.16	0.108	
Rear Side	Aux	124	5620	11.53	0.224	
Rear Side	Aux	140	5700	11.19	0.121	
Rear Side	Aux	149	5745	11.31	0.136	
Rear Side	Aux	161	5805	11.43	0.108	
Rear Side	Aux	165	5825	11.55	0.272	
Rear Side	Aux	48	5240	11.51	0.345(2)	

Note(s):
(1) Please refer to attachment for the result presentation in plot format.
(2) 0.449 is Using Battery Sample 1, 0.345 is Using Battery Sample 2, Battery Sample 1 is worst.

10. EQUIPMENT LIST & CALIBRATION STATUS

Name of Equipment	Manufacturer	Type/Model	Serial Number	Calibration Cycle(days)	Calibration Due
S-Parameter Network Analyzer	Agilent	E8358A	US40260243	365	07/14/2013
Electronic Probe kit	Hewlett Packard	85070D	N/A	N/A	N/A
Amplifier	Mini-Circuit	ZVE-8G	665500309	N/A	N/A
Amplifier	Mini-Circuit	ZHL-1724HLN	D072602#2	N/A	N/A
DC Power generator	ABM	8301HD	N/A	N/A	N/A
Attenuator	Mini-Circuit	BW-S20W5	N/A	N/A	N/A
Directional Coupler	Agilent	778D	MY48220487	N/A	N/A
Thermometer	Amarell	4046	25060	3650	10/02/2014
Signal Generator	Agilent	83630B	3844A01022	365	08/26/2013
Spectrum Analyzer	Agilent	E4446A	MY43360131	365	03/21/2013
Power Meter	Anritsu	ML2495A	1012009	365	03/27/2013
Power Sensor	Anritsu	MA2411B	0917072	365	03/08/2013
Data Acquisition Electronics (DAE)	SPEAG	DAE4	558	365	07/18/2013
Dosimetric E-Field Probe	SPEAG	EX3DV4	3554	365	09/26/2013
Dosimetric E-Field Probe	SPEAG	EX3DV4	3554	365	09/28/2012
2450 MHz System Validation Dipole	SPEAG	D2450V2	728	365	11/11/2012
5GHz System Validation Dipole	SPEAG	D5GHzV2	1004	365	11/15/2012
Probe Alignment Unit	SPEAG	LB (V2)	348	N/A	N/A
Robot	Staubli	RX90B L	F02/5T69A1/A/01	N/A	N/A
SAM Twin Phantom V4.0	SPEAG	N/A	N/A	N/A	N/A
Devices Holder	SPEAG	N/A	N/A	N/A	N/A
Muscle 2450 MHz	CCS	M2450A	N/A	N/A	N/A
Muscle 5GHz	CCS	M5200A	N/A	N/A	N/A

11. FACILITIES

All measurement facilities used to collect the measurement data are located at

☐ No.81-1, Lane 210, Bade 2nd Rd., Lujhu Township, Taoyuan County 33841, TAIWAN, R.O.C.

☒ No.11, Wu-Gong 6th Rd., Wugu Industrial Park, New Taipei City 248, Taiwan (R.O.C.)

☐ No. 199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.

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13. ATTACHMENTS

Exhibit	Content
1	System Performance Check Plots 1106 revised
2	SAR Test Plots Rev_7 1106 revised
3	SAR_Probe_EX3DV4_sn3554_20110929c
	SAR_Probe_EX3DV4_sn3554_20120927c
4	SAR_Dipole_D2450v2_sn728_20111122c
5	SAR_Dipole_D5GHz_sn1004_2011116s
6	T120702I01-SF PHOTOs
7	Thermometer

END OF REPORT