SAR TEST REPORT

Number 14-030828-01-02

Be based on

Part 2.1093, IEEE 1528-2003

For

Applicant	**POINTMOBILE CO.,LTD**
Manufacturer	**POINTMOBILE CO.,LTD**
Model or Type	**PM60**
	Mobile Computer
Final HW Version	**Rev02**
Final SW Version	**62.00 C2**
Test result	**Pass**

Issue To: **POINTMOBILE CO.,Ltd** Gasan-dong, B-9F Kabul Great Valley 32, Digital-ro9-gil, Geumcheon-gu, Seoul, Korea	**Date of Application**	**2014-06-01**
	Date of Report	**2014-12-12**
	Date of Issue	**2014-12-15**

This Test Report consists of 33 pages with Appendix A,B,C

The above test certificate is the accredited test results by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA.

Korea Testing Laboratory

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Test Report revision History

Revision	Date	Comments
00	2014-10-28	Initial Version
01	2014-11-27	SKUs revised on page 6
02	2014-12-15	Added 5GHz body results

Signature

This Test Report is issued under the authority as below

Date : 15 December, 2014

Test Engineer : Jong-gon Ban

Reviewed/Approved by : Tae-Seung Song

T. S. Song

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1. Administrative Information

1.1. Applicant Data

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1.2. Manufacturer Data (only if different from Applicant)

Company Name	
Address	
Contact Person	
Name	
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1.3. Testing Laboratory Data

The following list shows all places and laboratories involved for test result generation.

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2. EUT Information

2.1. General Description of the EUT

The following section lists all specifications of EUT (Equipment Under Test) involved in test. Additionally, KTL has received sufficient documentation from the client and/or manufacturer to perform the tests

General Information		
FCC ID & Model Number		FCC ID: **V2X-PM60-P**, Model Number: **PM60**
PM60	**PM60GP74356E0T**	Wifi/BT, 2D Scanner, Camera, QWERTY, WEH6.5 : **Test sample selected**
	PM60GP52356E0T	Wifi/BT, 1D Scanner, Camera, Numeric, WEH6.5
	PM60GP54356E0T	Wifi/BT, 1D Scanner, Camera, QWERTY, WEH6.5
	PM60GP72356E0T	Wifi/BT, 2D Scanner, Camera, Numeric, WEH6.5
S canner/Decode Capabilities		1D Laser model: N4313 laser engine. 2D engine model: N560X 2D Imager.
Antenna Type		Internal Antenna
WLAN Specification		802.11 b/g/n (HT20)
WLAN VoIP		Supported
Bluetooth Specification		V2.1+EDR
Mobile Hotspot		Not supported
Battery options		Li-ion, 3.7 V (4000mAh)
Device Dimension		Overall (Length x width) : 154 mm x 75 mm Overall Diagonal :158mm Display Diagonal : 89 mm

2.2. SAR Results Summaries

Band & Mode	Tx Frequency	SAR	
		1 g Head (W/kg)	1g Body (W/kg)
2.4 GHz WLAN	2412 ~ 2462 MHz	0.343	0.064
5.2 GHz WLAN	5180 ~ 5240 MHz	0.343	0.064
5.3 GHz WLAN	5260 ~ 5320 MHz	0.315	0.065
5.5 GHz WLAN	5500 ~ 5700 MHz	0.182	0.072
5.8 GHz WLAN	5745 ~ 5825 MHz	0.176	0.090

3. SAR DEFINITION

Specific Absorption Rate (SAR) is defined as the time derivative (rate) of the incremental energy (dU) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density(p). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body. (see Figure.1)

$$\boxed{SAR = \frac{d}{dt}\left(\frac{dU}{dm}\right) = \frac{d}{dt}\left(\frac{dU}{pdv}\right)}$$

Figure 1 SAR Mathematical Equation

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

$$\mathrm{SAR} = \sigma E^2 / p$$

Where :

σ = conductivity of the tissue-simulant material (S/m)

p = mass density of the tissue-simulant material (kg/m^3)

E = Total RMS electric field strength (V/m)

Note: The primary factors that control rate or energy absorption were found to be the wavelength of the incident field in relations to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.[4]

4. TEST METHODOLOGY

The tests documented in this report were performed in accordance with IEEE Standard 1528-2003 and the following published KDB procedures.

- FCC KDB Publication 941225 D01 SAR test for 3G devices v02
- FCC KDB Publication 447498 D01v05r02 (General SAR Guidance)
- FCC KDB Publication 648474 D04 Handset SAR v01r02
- FCC KDB Publication 865664 D01 SAR measurement 100 MHz to 6 GHz v01r03
- FCC KDB Publication 865664 D02 SAR Reporting v01r01

5. DESCRIPTION OF SAR MEASUREMENT SYSTEM

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

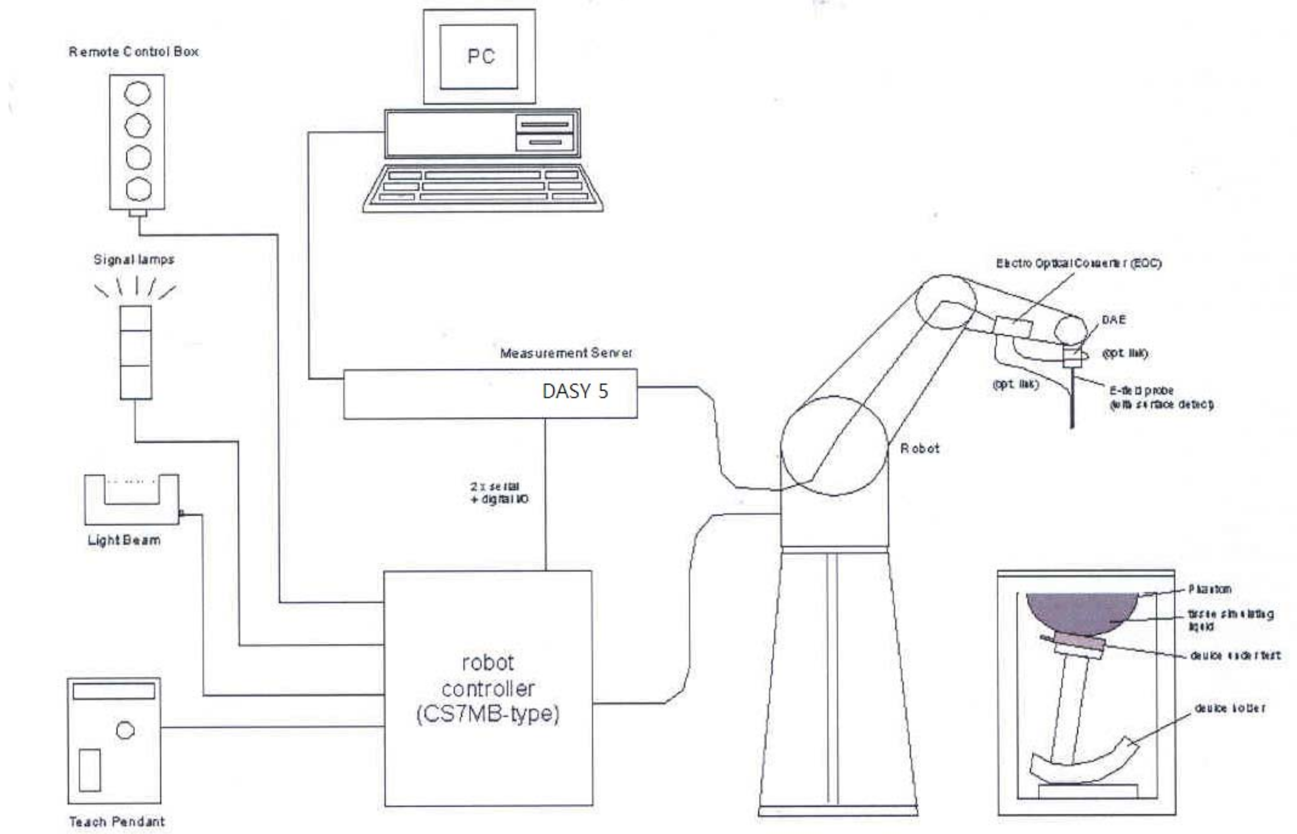


Figure 2 SAR Measurement System

- A standard high precision 6-axis robot with controller, teach pendant and software.
- Data acquisition electronics, DAE4 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 PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines.
- The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts.
- The robot uses its own controller with a built in VME-bus computer. Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

6. SYSTEM VERIFICATION

6.1. Tissue Simulating Mixture Characterization

The mixture is characterized to obtain proper dielectric constant (permittivity) and conductivity of the tissue of interest. The tissue dielectric parameters recommended in IEEE 1528 have been used as targets for the compositions, and are to match within 5%, per the FC recommendations.

Ingredients (% by weight)	Frequency (MHz)							
	835		1900		2450		5200-5800	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body
Water	41.45	52.4	54.9	40.4	62.7	73.2	62.52	78.66
Salt (NaCl)	1.45	1.4	0.18	0.5	0.5	0.04	0.0	0.0
Sugar	56.0	45.0	0.0	58.0	0.0	0.0	0.0	0.0
HEC	1.0	1.0	0.0	1.0	0.0	0.0	0.0	0.0
Bactericide	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	36.8	0.0	17.24	10.67
DGBE	0.0	0.0	44.92	0.0	0.0	26.7	0.0	0.0
Diethylene glycol hexyl ether	-	-	-	-	-	-	17.24	10.67

Table 1 Composition of the Tissue Equivalent Materials

-Salt: 99+% Pure Sodium Chloride Sugar: 98+% Pure Sucrose
-Water: De-ionized, 16 MΩ+ 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

6.2. Tissue Verification

The dielectric parameters of the brain and muscle simulating liquid were measured prior to SAR assessment using the SPEAG DAK-3.5 dielectric probe kit and Agilent 8753D Network Analyzer. The actual dielectric parameters are shown in the following table. The below measured tissue parameters were used in DASY software.

Freq. [MHz]	Liquid	Date	Liquid Temp [℃]	Parameters	Target Value	Measured Value	Dev. (%)	Limit (%)
2450	Head	07/11/2014	22.6	εr	39.2	37.6	-4.1	± 5
				σ	1.80	1.82	+1.1	± 5
2450	Body	07/14/2014	22.8	εr	52.7	50.6	-4.0	± 5
				σ	1.95	1.88	-3.6	± 5
5200	Head	07/16/2014	22.4	εr	36.0	36.6	+1.7	± 5
				σ	4.66	4.73	+1.5	± 5
5200	Body	12/11/2014	21.5	εr	49.0	46.9	-4.3	± 5
				σ	5.30	5.43	+2.5	± 5
5500	Head	07/18/2014	22.2	εr	35.7	35.8	+0.3	± 5
				σ	4.97	5.05	+1.6	± 5
5500	Body	07/21/2014	22.3	εr	48.6	47.6	-2.1	± 5
				σ	5.7	5.78	+1.4	± 5
5800	Head	07/23/2014	22.5	εr	35.3	35.2	-0.3	± 5
				σ	5.27	5.5	+4.3	± 5
5800	Body	12/11/2014	21.0	εr	48.2	47.4	-1.7	± 5
				σ	6.00	5.94	-1.0	± 5

Table 2 Measured Simulating Liquid Dielectric Values

The humidity and dielectric/ambient temperatures are recorded during the assessment of the tissue material dielectric parameters. The difference between the ambient temperature of the liquid during the dielectric measurement and the temperature during tests was less than |2|°C.

6.3. System Validation

Prior to the SAR assessment, the system validation kit was used to verify that the DASY5 was operating within its specifications. The validation dipoles are highly symmetric and matched at the centre frequency for the specified liquid and distance to the phantom. The accurate distance between the liquid surface and the dipole centre is achieved with a distance holder that snaps onto the dipole. System validation is performed by feeding a known power level into a reference dipole, set at a known distance from the phantom. The measured SAR is compared to the theoretically derived level.

The same SAR probe(s) and tissue-equivalent media combinations used with each specific SAR system for system verification must be used for device testing. When multiple probe calibration points are required to cover substantially large transmission bands, independent system verifications are required for each probe calibration point. A system verification must be performed before each series of SAR measurements using the same probe calibration point and tissue-equivalent medium. Additional system verification should be considered according to the conditions of the tissue-equivalent medium and measured tissue dielectric parameters typically every three to four days when the liquid parameters are re-measured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

The measured 1g(10g) SAR should be within 10 % of the expected target reference values at the time of calibration by the calibration facility.

Tissue Frequency (MHz)	Tissue Type	Date	Probe SN	Dipole SN	Measured SAR 1g (W/kg)	Target SAR 1g (W/kg)	Deviation (%)	Limit (%)
2450	Head	07/11/2014	3020	746	54.8	52.8	+3.8	±10
2450	Body	07/14/2014	3020	746	52.4	50.0	+4.8	±10
5200	Head	07/16/2014	3905	1147	81.2	80.4	+0.1	±10
5200	Body	12/11/2014	3905	1147	76.0	82.8	+8.9	±10
5500	Head	07/18/2014	3905	1147	89.6	83.9	+6.8	±10
5500	Body	07/21/2014	3905	1147	85.0	78.0	+9.0	±10
5800	Head	07/23/2014	3905	1147	82.3	79.5	+3.5	±10
5800	Body	12/11/2014	3905	1147	75.1	75.2	+0.1	±10

Table 3 Deviation from Reference Validation Values

7. SAR MEASUREMENT PROCEDURE USING DASY5

The SAR evaluation is performed with the SPEAG DASY5 system as following;

Step 1: Power Reference Measurement

A measurement of the SAR value at a fixed location is used as a reference value for assessing the power drop of the EUT. The SAR at this point is measured at the start of the test and then again at the end of the test.

Step 2: Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine scanning 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 2dB range is required in IEEE Standards 1528 and IEC 62209 standards. 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 are as below table from KDB 865664 D01 SAR Measurement 100MHz to 6GHz v01r01.

	$\leq$ 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}	$\leq$ 2 GHz: $\leq$ 15 mm 2 – 3 GHz: $\leq$ 12 mm	3 – 4 GHz: $\leq$ 12 mm 4 – 6 GHz: $\leq$ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

Step 3: Zoom Scan

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1g and 10g of simulated tissue. The Zoom Scan measures points (refer to table below) within a cube shoes 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 1g and 10g and displays these values next to the job's label.

Zoom Scan Parameters are as below table from KDB 865664 D01 SAR Measurement 100MHz to 6GHz v01r01.

<table>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>$\leq$ 2 GHz: $\leq$ 8 mm
2 – 3 GHz: $\leq$ 5 mm*</td><td>3 – 4 GHz: $\leq$ 5 mm*
4 – 6 GHz: $\leq$ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>$\leq$ 5 mm</td><td>3 – 4 GHz: $\leq$ 4 mm
4 – 5 GHz: $\leq$ 3 mm
5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>$\leq$ 4 mm</td><td>3 – 4 GHz: $\leq$ 3 mm
4 – 5 GHz: $\leq$ 2.5 mm
5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>$\geq$ 30 mm</td><td>3 – 4 GHz: $\geq$ 28 mm
4 – 5 GHz: $\geq$ 25 mm
5 – 6 GHz: $\geq$ 22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.
* When zoom scan is required and the reported SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is $\leq$ 1.4 W/kg, $\leq$ 8 mm, $\leq$ 7 mm and $\leq$ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

Step 4: Power drift measurement

The Power drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings.

Step 5: Z-Scan (FCC only)

The Z Scan measures points along a vertical straight line. The line runs along the Z-axis of a one-dimensional grid. In order to get a reasonable extrapolation the extrapolated distance should not lager than the step size in Z-direction.

8. DESCRIPTION OF TEST POSITION

SAR measurements were performed in the “cheek” and “tilted” positions on left and right sides of the phantom according to IEEE 1528. Both were measured in the head section of the SAM Twin Phantom.

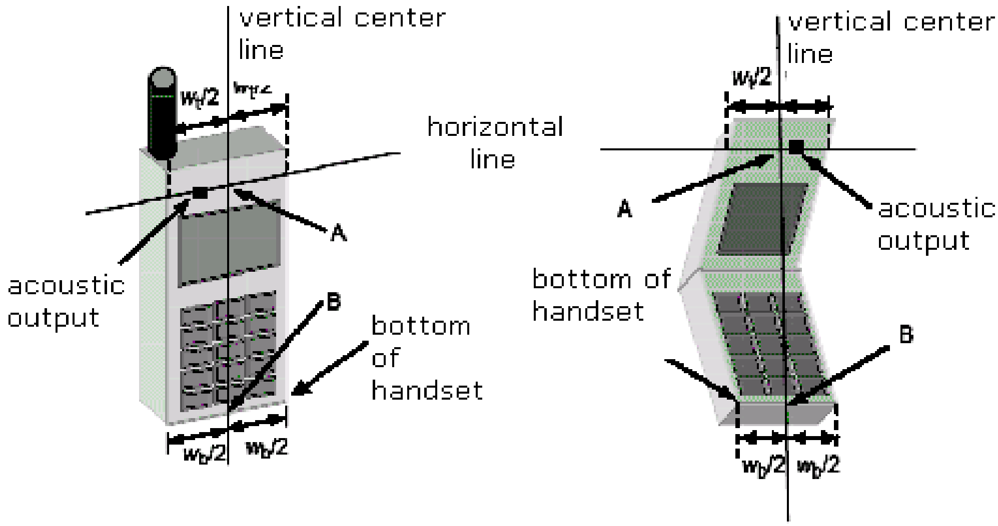


Figure 3 Handset vertical and horizontal reference line

8.1. Cheek Position

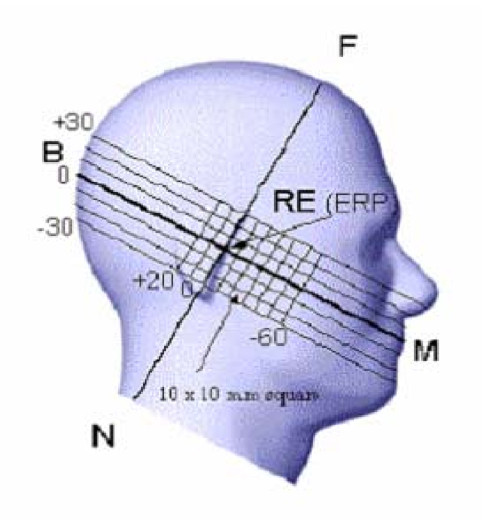


Figure 4 Side view of SAM phantom

The device was positioned with the vertical center line of the body of the device and the horizontal line crossing the center (see Figure 3) of the ear piece in a plane parallel to the sagittal plane of the phantom(see Figure 4). While maintaining the device in this plane, it was aligned the vertical center line with the reference plane containing the three ear and mouth reference points(M, RE and LE) and aligned the center of the ear piece with the line RE-LE. Then device was translated towards the phantom with the ear piece aligned with the line LE-RE until it touched the ear. While maintaining the device in the reference plane and maintaining the device contact with the ear, the bottom of the device was moved until any point on the front side is in contact with the cheek of the phantom.(see Figure 5)

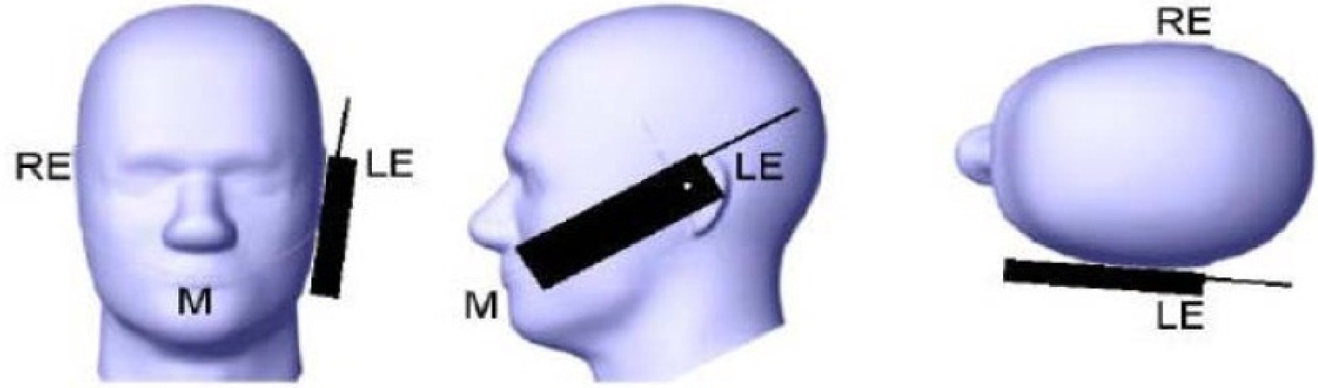


Figure 5 Cheek/Touch Position

8.2. Tilt Position

The device was positioned in the “Cheek” position. While maintaining the device in the reference plane described above cheek position and pivoting against the ear, device was moved outward away from the mouth by an angle of 15 degrees. (see Figure 6)

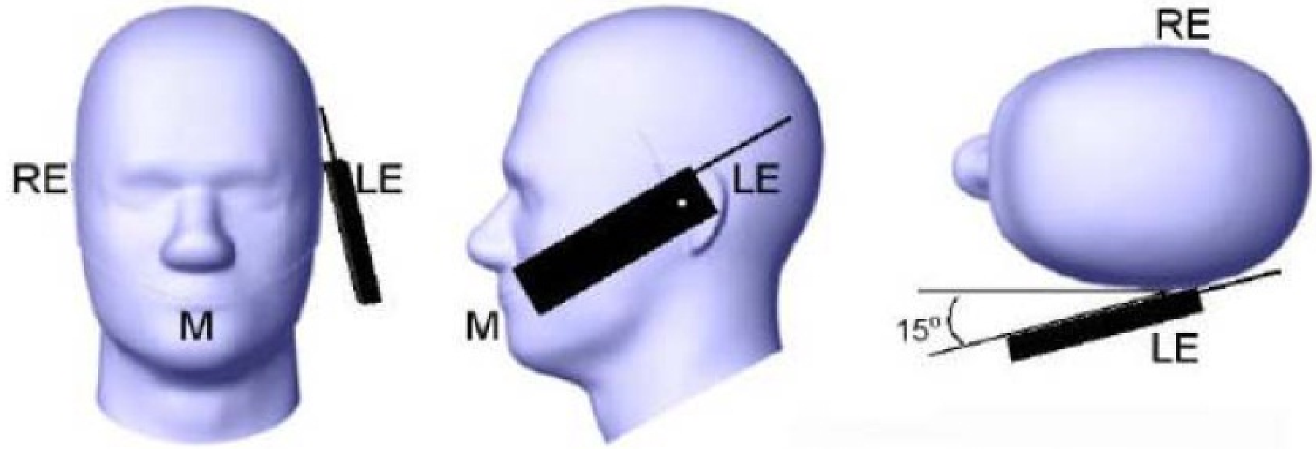


Figure 6 Ear/Tilt Position

Body-worn operating configurations are tested without the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration.

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are tested with the device with each accessory. If multiple accessories share an identical metallic component(i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

8.3. Body Holster/ Belt Clip Configurations

Body-worn accessories may not always be supplied or available as options for some devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the device and the flat phantom is used. Test position spacing was documented.

Transmitters that are designed to operate in front of a person's face, as the push-to-talk configurations, are test for SAR compliance with the front of the device positioned to face the flat phantom in brain fluid. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessories, including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

In all cases SAR measurements are performed to investigate the worst-case positioning. Worst-case positioning is then documented and used to perform Body SAR testing.

9. MEASUREMENT UNCERTAINTY

Applicable for frequencies up to 6GHz

Uncertainty Component	Tol. (%)	Prob Dist	Div	c_i 1g	c_i 10g	u_i(%) 1g	u_i(%) 10g	v_i
Measurement System								
Probe Calibration	± 6.55	N	1	1	1	± 6.55	± 6.55	∞
Axial Isotropy	± 4.70	R	$\sqrt{3}$	0.7	0.7	± 1.90	± 1.90	∞
Hemispherical Isotropy	± 9.60	R	$\sqrt{3}$	0.7	0.7	± 3.38	± 3.38	∞
Linearity	± 4.70	R	$\sqrt{3}$	1	1	± 2.71	± 2.71	∞
System Detection Limits	± 1.00	R	$\sqrt{3}$	1	1	± 0.58	± 0.58	∞
Boundary Effect	± 1.00	R	$\sqrt{3}$	1	1	± 0.58	± 0.58	∞
Response Time	± 0.80	R	$\sqrt{3}$	1	1	± 0.46	± 0.46	∞
RF Ambient conditions	± 3.00	R	$\sqrt{3}$	1	1	± 1.73	± 1.73	∞
Readout Electronics	± 1.00	N	1	1	1	± 1.00	± 1.00	∞
Integration time	± 2.60	R	$\sqrt{3}$	1	1	± 1.50	± 1.50	∞
Probe Positioner	± 0.40	R	$\sqrt{3}$	1	1	± 0.23	± 0.23	∞
Probe Positioning	± 2.90	R	$\sqrt{3}$	1	1	± 1.67	± 1.67	∞
Max. SAR evaluation	± 1.00	R	$\sqrt{3}$	1	1	± 0.58	± 0.58	∞
Test Sample Related								
Device Positioning	± 2.90	N	1	1	1	± 2.90	± 2.90	145
Device Holder	± 3.60	N	1	1	1	± 3.60	± 3.60	5
Power Drift	± 5.00	R	$\sqrt{3}$	1	1	± 2.89	± 2.89	∞
Phantom and Setup								
Phantom Uncertainty	± 4.00	R	$\sqrt{3}$	1	1	± 2.31	± 2.31	∞
Liquid Conductivity (target)	± 5.00	R	$\sqrt{3}$	0.64	0.43	± 1.85	± 1.24	∞
Liquid Conductivity (meas.)	± 2.07	N	1	0.78	0.71	± 1.61	± 1.47	9
Liquid Permittivity (target)	± 5.00	R	$\sqrt{3}$	0.60	0.49	1.73	1.43	∞
Liquid Permittivity (meas.)	± 3.07	N	1	0.26	0.26	± 0.80	± 0.80	9
Combined Std. Uncertainty (k=1)		RSS				10.43	10.33	
Expanded STD Uncertainty (95% CONFIDENCE LEVEL)		**k=2**				20.87	20.66	

Table 4 Uncertainty Budget

10. FCC RF Exposure Limits

HUMAN EXPOSURE	UNCONTROLLED ENVIRONMENT General Population (W/Kg) or (mW/g)	CONTROLLED ENVIRONMENT Occupational (W/Kg) or (mW/g)
SPATIAL PEAK SAR (Brain)	1.60	8.00
SPATIAL AVERAGE SAR (Whole Body)	0.08	0.40
SPATIAL PEAK SAR (Hand / Feet / Ankle / Wrist)	4.00	20.00

Table 5 Safety Limits for Partial Body Exposure

NOTE :

* 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 the appropriate averaging time.

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

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

11. RF CONDUCTED POWERS

11.1. Nominal and Maximum Output Power Specifications

This device operates using the following maximum and nominal output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v05.

Mode		Modulated Average Power (dBm)
IEEE 802.11b (2.4G)	Maximum	16
	Nominal	14.5
IEEE 802.11g (2.4G)	Maximum	16
	Nominal	14.5
IEEE 802.11n (2.4G)	Maximum	15
	Nominal	13.5
IEEE 802.11a (5G)	Maximum	15
	Nominal	13.5
IEEE 802.11n (5G)	Maximum	14
	Nominal	12.5

***Output Power Tolerance**:

- WLAN 2.4 GHz: [- 2.5 dB / +1.5 dB]
- WLAN 5 GHz: [-2.5 dB / +1.5 dB]

11.2. SAR scaling factors sample calculation

Scaled SAR results are derived after scaling factors are applied to the measured values as below. Scaling for maximum tune-up tolerance must be considered separately.

SAR Section	Test Position	Mode	Scan	Dist. (mm)	Freq. (MHz)	CH #	Power (dBm)		SAR 1g (W/kg)	Scaling Factor	Scaled SAR 1g (W/kg)	Plot. No.
							Max. allowed	Mea-sured				
Head	Left Tilt	802.11a	2D N560x	15	5240	48	15.00	10.76	0.246	1.394	0.343	1

*Scaled SAR = Measured SAR x Scaling Factor

0.343 = 0.246 x 1.394

11.3. 802.11b/g/n (2.4GHz) Conducted Output Powers

Required Test channels

Mode	Band	Frequency (GHz)	Channel	"Default Test Channels"	
				802.11b	802.11g
802.11b	2.4 GHz	2.412	1#	√	▽
		2.437	6	√	▽
		2.462	11#	√	▽

Notes:
√ = "default test channels"
▽ = possible 802.11g channels with maximum average output 1/4 dB higher than 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.

Conducted Output Powers

WLAN mode	Worst Power Data Rate [Mbps]	Conducted Powers (dBm)		
		2412MHz	2437MHz	2462MHz
802.11b	1	13.93	**14.12**	14.03
	2	14.01	13.95	13.93
	5.5	13.90	13.82	14.08
	11	13.95	13.96	14.08
802.11g	6	14.08	14.08	14.09
	9	13.94	14.20	13.95
	12	13.96	14.71	14.16
	18	14.12	**14.97**	14.25
	24	13.95	13.99	14.32
	36	14.08	14.28	14.06
	48	13.88	13.87	13.87
	54	13.51	13.80	13.71
802.11n	MCS0	13.61	13.82	13.80
	MCS1	13.96	13.98	13.98
	MCS2	13.85	13.97	13.85
	MCS3	13.61	14.25	13.90
	MCS4	13.94	13.87	13.99
	MCS5	13.47	13.33	13.54
	MCS6	13.53	13.35	13.36
	MCS7	12.50	12.75	12.62

Note: Per KDB 248227 D01, SAR is not required for 802.11n mode when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b mode.

11.4. 802.11a/n(5GHz) Conducted Output Powers

Required Test channels

WLAN mode		Band	Frequency (GHz)	Channel	"Default Test Channels" 802.11a	
802.11a	UNII (15.407)	5.2 GHz	5.180	36		
			5.200	40		*
			5.220	44		*
			5.240	48	√	
		5.3 GHz	5.260	52		
			5.280	56		*
			5.300	60	√	*
			5.320	64		
		5.5 GHz	5.500	100	√	*
			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		*
	DTS (15.247)	5.8 GHz	5.745	149	√	
			5.765	153		*
			5.785	157		
			5.805	161		*
			5.825	165		

Note :
√ = "default test channels"
* = possible 802.11a channels with maximum average output > the "default test channels"

802.11a Conducted Output Powers

Mode	Freq. (MHz)	Channel	802.11a (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
			6	9	12	18	24	36	48	54
802.11a	5180	36	10.44	10.51	10.38	10.37	10.66	10.51	10.41	10.35
802.11a	5220	42	10.49	10.44	10.41	10.47	10.53	10.52	10.53	10.46
802.11a	5240	**48** √	**10.76**	10.71	10.70	10.67	10.73	10.74	10.71	10.66
802.11a	5260	52	10.64	10.59	10.60	10.56	10.62	10.60	10.62	10.59
802.11a	5280	56	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5300	**60** √	11.24	11.20	**11.29**	11.18	11.22	11.22	11.19	11.19
802.11a	5320	64	11.23	11.20	11.18	11.18	11.19	11.17	11.21	11.17
802.11a	5500	**100***	12.48	12.39	12.30	12.41	**13.11**	12.43	12.42	12.39
802.11a	5520	104	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5540	108	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5560	112	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5580	116	12.02	11.99	11.94	11.99	11.96	11.96	11.99	11.94
802.11a	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5620	124	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5660	132	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5680	136	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5700	140	10.11	10.03	10.09	10.05	10.03	10.01	10.05	9.99
802.11a	5745	**149** √	9.93	9.84	9.83	9.88	**9.96**	9.90	9.80	9.73
802.11a	5765	153	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5785	157	8.71	8.66	8.64	8.65	8.61	8.60	8.64	8.66
802.11a	5805	161	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5825	165	7.95	7.88	7.84	7.85	7.92	7.90	7.83	7.84

Note:

Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02.

- For 5GHz, highest average RF output power channels for the lowest data rate for IEEE 802.11a were selected for SAR evaluation.
- When the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is <1.6 W/kg and the reported 1g averaged SAR I <0.8 W/kg, SAR testing on other channels is not required.

√ = SAR Measured default test channels

* = SAR Measured channel which has higher output power than default test channels

802.11n Conducted Output Powers

Mode	Freq. (MHz)	Channel	802.11n (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
			6.5	13	19.5	26	39	52	58.5	65
802.11n	5180	36	10.27	10.41	10.34	10.41	10.37	10.35	10.30	10.39
802.11n	5200	40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5220	44	9.98	10.41	10.40	10.36	10.41	10.38	10.37	10.38
802.11n	5240	48	10.33	10.68	10.63	10.72	10.61	10.63	10.60	10.57
802.11n	5260	52	10.64	10.58	10.59	10.61	10.51	10.55	10.55	10.52
802.11n	5280	56	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5300	60	11.17	11.17	11.13	11.12	11.18	11.11	11.11	11.17
802.11n	5320	64	10.83	11.15	11.17	11.15	11.08	11.11	11.15	11.11
802.11n	5500	100	12.94	12.42	12.40	12.37	12.44	12.35	12.44	12.39
802.11n	5520	104	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5540	108	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5560	112	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5580	116	12.94	12.42	12.40	12.37	12.44	12.35	12.44	12.39
802.11n	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5620	124	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5660	132	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5680	136	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5700	140	10.55	10.03	10.03	10.00	10.01	10.03	9.97	9.99
802.11n	5745	149	9.43	9.85	9.80	9.80	9.81	9.84	9.80	9.84
802.11n	5765	153	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5785	157	9.17	8.50	8.65	8.62	8.61	8.62	8.57	8.67
802.11n	5805	161	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5825	165	8.93	7.82	7.83	7.82	7.81	7.83	7.85	7.87

Note:

Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02.

- For 5GHz, highest average RF output power channels for the lowest data rate for IEEE 802.11a were selected for SAR evaluation.

11.5. Bluetooth Conducted Output Powers

Modulation	Max Allowed Output Power (mW)
Bluetooth (GFSK, 8-DPSK)	2.52 (4dBm)

Per FCC KDB 447498 D01v05, the SAR exclusion threshold for distance <50mm is defined by the following equation:

$$\frac{Max\ Power\ of\ Channel\ (mW)}{Test\ Separation\ Dist\ (mm)} * \sqrt{Frequency(GHz)} \leq 3.0$$

Based on the maximum conducted power of Bluetooth (rounded to the nearest mW) and the antenna to user separation distance, **Bluetooth body-worn accessory SAR was not required**. [(2.52/15)*√ 2.441] = 0.26 < 3.0

12. SAR TEST CONDITIONS & ANTENNA INFORMATION

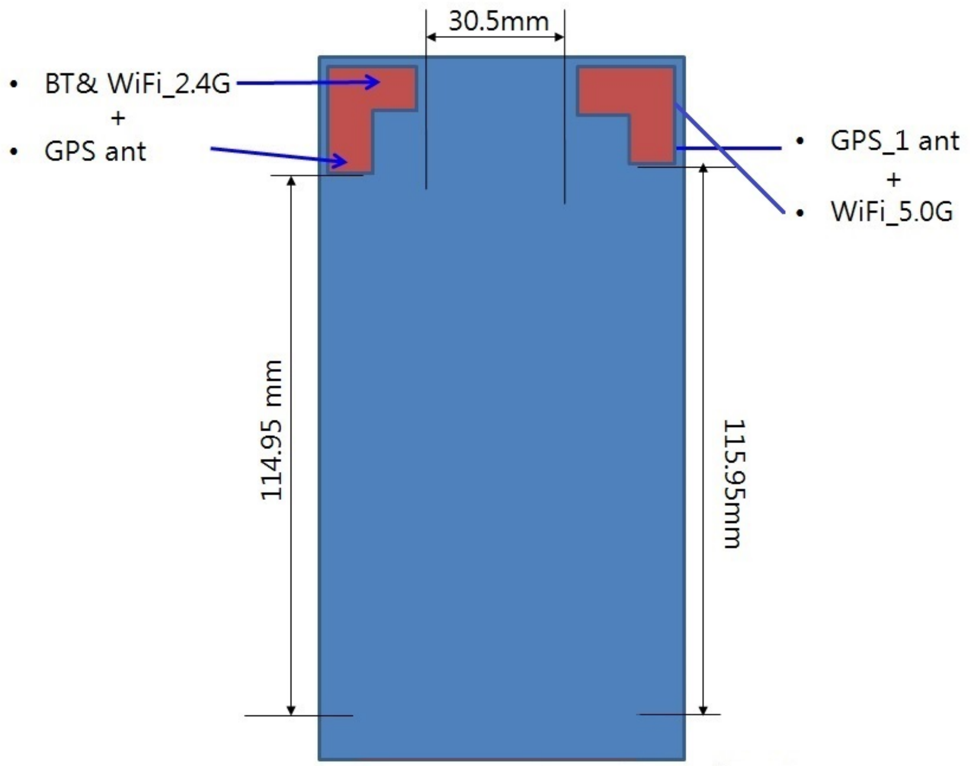
12.1. Standalone SAR Measurements

Test Modes	Head SAR	Body SAR	Note
2.4 GHz WLAN	Yes	Yes	
5.0 GHz WLAN	Yes	Yes	
Bluetooth	No	No	SAR is not required according to the KDB 447498 D01 - 1g SAR test Exclusion thresholds conditions.

12.2. Simultaneous SAR Measurements

RF Exposure Condition	Capable Transmit Configurations
802.11a/b/g/n+ BT	Not supported

12.3. Antenna Information



13. SAR MEASUREMENT RESULTS

13.1. WLAN (2.4GHz) SAR Measurements Results

SAR Section	Test Position	Mode	Scanner	Keypad Type	Dist. (mm)	Freq. (MHz)	CH #	Power (dBm)		SAR 1g (W/kg)	Scaling Factor	Scaled SAR 1g (W/kg)	Plot. No.
								Max. allowed	Mea-sured				
Head	Right Touch	802.11b	2D N560x	QWERTY	N/A	2437	6	16.00	14.12	0.132	1.531	0.202	-
	Right Tilt	802.11b	2D N560x	QWERTY	N/A	2437	6	16.00	14.12	0.154	1.531	0.236	-
	Left Touch	802.11b	2D N560x	QWERTY	N/A	2437	6	16.00	14.12	0.224	1.531	**0.343**	**1**
	Left Tilt	802.11b	2D N560x	QWERTY	N/A	2437	6	16.00	14.12	0.192	1.531	0.294	-
	Left Touch	802.11b	2D N560x	NUMERIC	N/A	2437	6	16.00	14.12	0.175	1.531	0.268	-
	Left Touch	802.11b	1D N4313	NUMERIC	N/A	2437	6	16.00	14.12	0.218	1.531	0.334	-
	Right Touch	802.11g	2D N560x	QWERTY	N/A	2437	6	16.00	14.97	0.045	1.267	0.057	
	Right Tilt	802.11g	2D N560x	QWERTY	N/A	2437	6	16.00	14.97	0.051	1.267	0.065	
	Left Touch	802.11g	2D N560x	QWERTY	N/A	2437	6	16.00	14.97	0.079	1.267	0.100	
	Left Tilt	802.11g	2D N560x	QWERTY	N/A	2437	6	16.00	14.97	0.069	1.267	0.087	
	Left Touch	802.11g	2D N560x	NUMERIC	N/A	2437	6	16.00	14.97	0.059	1.267	0.075	
	Left Touch	802.11g	1D N4313	NUMERIC	N/A	2437	6	16.00	14.97	0.075	1.267	0.095	
Body	Front	802.11b	2D N560x	QWERTY	15	2437	6	16.00	14.12	0.042	1.531	**0.064**	**2**
	Rear	802.11b	2D N560x	QWERTY	15	2437	6	16.00	14.12	0.022	1.531	0.034	-
	Front	802.11b	2D N560x	NUMERIC	15	2437	6	16.00	14.12	0.030	1.531	0.046	
	Front	802.11b	1D N4313	NUMERIC	15	2437	6	16.00	14.12	0.035	1.531	0.054	-
	Front	802.11g	2D N560x	QWERTY	15	2437	6	16.00	14.97	0.013	1.267	0.016	
	Rear	802.11g	2D N560x	QWERTY	15	2437	6	16.00	14.97	0.007	1.267	0.009	
	Front	802.11g	2D N560x	NUMERIC	15	2437	6	16.00	14.97	0.010	1.267	0.013	
	Front	802.11g	1D N4313	NUMERIC	15	2437	6	16.00	14.97	0.011	1.267	0.014	
	ANSI/IEEE C95.1 – 1992-Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							**1.6 W/kg (mW/g)** Averaged over 1 gram					

13.2. WLAN (5GHz) SAR Measurements Results

SAR Section	Test Position	Mode	Scanner	Keypad Type	Dist. (mm)	Freq. (MHz)	CH #	Power (dBm)		SAR 1g (W/kg)	Scaling Factor	Scaled SAR 1g (W/kg)	Plot. No.
								Max. allowed	Mea-sured				
Head	Right Touch	802.11a	2D N560x	QWERTY	N/A	5240	48	15.00	10.76	0.203	1.394	0.283	-
	Right Tilt	802.11a	2D N560x	QWERTY	N/A	5240	48	15.00	10.76	0.223	1.394	0.310	-
	Left Touch	802.11a	2D N560x	QWERTY	N/A	5240	48	15.00	10.76	0.223	1.394	0.310	-

	Left Tilt	802.11a	2D N560x	QWERTY	N/A	5240	48	15.00	10.76	0.246	1.394	**0.343**	**3**
	Left Tilt	802.11a	2D N560x	NUMERIC	N/A	5240	48	15.00	10.76	0.162	1.394	0.225	-
	Left Tilt	802.11a	1D N4313	NUMERIC	N/A	5240	48	15.00	10.76	0.179	1.394	0.250	-
	Left Touch	802.11a	2D N560x	QWERTY	N/A	5300	60	15.00	11.29	0.203	1.329	0.270	-
	Left Tilt	802.11a	2D N560x	QWERTY	N/A	5300	60	15.00	11.29	0.229	1.329	0.304	-
	Right Touch	802.11a	2D N560x	QWERTY	N/A	5300	60	15.00	11.29	0.204	1.329	0.271	-
	Right Tilt	802.11a	2D N560x	QWERTY	N/A	5300	60	15.00	11.29	0.237	1.329	0.315	-
	Right Tilt	802.11a	2D N560x	NUMERIC	N/A	5300	60	15.00	11.29	0.163	1.329	0.217	-
	Right Tilt	802.11a	1D N4313	NUMERIC	N/A	5300	60	15.00	11.29	0.163	1.329	0.217	-
	Right Touch	802.11a	2D N560x	QWERTY	N/A	5500	100	15.00	13.11	0.075	1.541	0.116	-
	Right Tilt	802.11a	2D N560x	QWERTY	N/A	5500	100	15.00	13.11	0.093	1.541	0.143	-
	Left Touch	802.11a	2D N560x	QWERTY	N/A	5500	100	15.00	13.11	0.083	1.541	0.128	-
	Left Tilt	802.11a	2D N560x	QWERTY	N/A	5500	100	15.00	13.11	0.100	1.541	0.154	-
	Left Tilt	802.11a	2D N560x	NUMERIC	N/A	5500	100	15.00	13.11	0.056	1.541	0.086	-
	Left Tilt	802.11a	1D N4313	NUMERIC	N/A	5500	100	15.00	13.11	0.118	1.541	0.182	-
	Right Touch	802.11a	2D N560x	QWERTY	N/A	5745	149	15.00	9.96	0.091	1.506	0.137	-
	Right Tilt	802.11a	2D N560x	QWERTY	N/A	5745	149	15.00	9.96	0.114	1.506	0.172	-
	Left Touch	802.11a	2D N560x	QWERTY	N/A	5745	149	15.00	9.96	0.102	1.506	0.154	-
	Left Tilt	802.11a	2D N560x	QWERTY	N/A	5745	149	15.00	9.96	0.116	1.506	0.175	-
	Left Tilt	802.11a	2D N560x	NUMERIC	N/A	5745	149	15.00	9.96	0.113	1.506	0.170	-
	Left Tilt	802.11a	1D N4313	NUMERIC	N/A	5745	149	15.00	9.96	0.117	1.506	0.176	-
Body	Front	802.11a	2D N560x	QWERTY	15	5240	48	15.00	10.76	0.045	1.394	0.063	-
	Rear	802.11a	2D N560x	QWERTY	15	5240	48	15.00	10.76	0.010	1.394	0.014	-
	Front	802.11a	2D N560x	NUMERIC	15	5240	48	15.00	10.76	0.044	1.394	0.061	-
	Front	802.11a	1D N4313	NUMERIC	15	5240	48	15.00	10.76	0.046	1.394	0.064	-
	Front	802.11a	2D N560x	QWERTY	15	5300	60	15.00	11.29	0.049	1.329	0.065	-
	Rear	802.11a	2D N560x	QWERTY	15	5300	60	15.00	11.29	0.032	1.329	0.043	-
	Front	802.11a	2D N560x	NUMERIC	15	5300	60	15.00	11.29	0.048	1.329	0.064	-
	Front	802.11a	1D N4313	NUMERIC	15	5300	60	15.00	11.29	0.048	1.329	0.064	-
	Front	802.11a	2D N560x	QWERTY	15	5500	100	15.00	13.11	0.028	1.541	0.043	-
	Rear	802.11a	2D N560x	QWERTY	15	5500	100	15.00	13.11	0.044	1.541	0.068	-
	Rear	802.11a	2D N560x	NUMERIC	15	5500	100	15.00	13.11	0.047	1.541	0.072	-
	Rear	802.11a	1D N4313	NUMERIC	15	5500	100	15.00	13.11	0.034	1.541	0.052	-
	Front	802.11a	2D N560x	QWERTY	15	5745	149	15.00	9.96	0.021	1.506	0.032	-

	Rear	802.11a	2D N560x	QWERTY	15	5745	149	15.00	9.96	0.060	1.506	0.090	**4**
	Rear	802.11a	2D N560x	NUMERIC	15	5745	149	15.00	9.96	0.030	1.506	0.045	-
	Rear	802.11a	1D N4313	NUMERIC	15	5745	149	15.00	9.96	0.048	1.506	0.072	-
	ANSI/IEEE C95.1 – 1992-Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							**1.6 W/kg (mW/g)** Averaged over 1 gram					

13.3. SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2003, FCC KDB Procedure.
2. Batteries are fully charged at the beginning of the SAR measurements.
3. 2D scanner(N560x) base model was fully tested. And 1D scanners (N4313) base model were tested at the worst configurations.
4. Liquid tissue depth was at least 15.0 cm for all frequencies.
5. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
6. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB 447498 D01v05.
7. Per FCC KDB 648474 D04v01, SAR was evaluated without a headset connected to the device. Since the standalone reported SAR was less than 1.2 W/kg, no additional SAR evaluation using a headset cable were required.
8. Per FCC KDB 865664 D01v01, variability SAR tests were not performed since the measured SAR results for all frequency bands were less than 0.8 W/kg. Please see Section 13 for variability analysis information.

WLAN Test Notes:

1. Justification for reduced test configurations for WIFI channels per KDB 248227 D01v01r02 and Oct. 2012 FCC/TCB Meeting Notes for 2.4 GHz WIFI: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11b. Other IEEE 802.11 modes (including 802.11 g/n) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11b mode.
2. Justification for reduced test configurations for WIFI channels per KDB 248227 D01v01r02 and Oct. 2012 FCC/TCB Meeting Notes for 5 GHz WIFI: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11a. Other IEEE 802.11n modes were not investigated since the average output power over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data of IEEE 802.11a mode.
3. Since the maximum extrapolated peak SAR of the zoom scan for the maximum output channel was ≤ 1.6 W/kg and the reported 1g averaged SAR was ≤ 0.8 W/kg, SAR testing on other default channels was not required.

14. FCC MULTI-TX CONSIDERATION

14.1. Introduction

The following procedures adopted from FCC KDB Publication 447498 D01v05 are applicable to handsets with built-in unlicensed transmitters such as 802.11a/b/g/n/ac and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

But this device doesn’t have any licensed transmitter. So There is no need consideration for Multi-Tx consideration

15. SAR MEASUREMENT VARIABILITY

15.1. Measurement Variability

Per FCC KDB Publication 865864 D01v01, SAR measurement variability was assessed when measured 1g SAR is > 0.80 W/kg or when measured 10g SAR is >2.00 W/kg. Since all measured 1g SAR values were <0.8 W/kg SAR measurement variability was not assessed.

15.2. Measurement Uncertainty

The measured SAR was <1.5 W/kg for all frequency bands. Therefore, per KDB Publication 865664 D01v01, the extended measurement uncertainty analysis per IEEE 1528-2003 was not required.

16. CONCLUSION

The SAR evaluation indicates that PM60 complies with the RF radiation exposure limits of the FCC. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested.

17. EQUIPMENT LIST AND CALIBRATION DETAILS

Equipment Type	Manufacturer	Model Number	Serial Number	Calibration Due	Used For this Test
Robot - Six Axes	Staubli	TX90XL	N/A	N/A	☒
Robot Remote Control	SPEAG	CS7MB	F13/55D0A1 /A/01	N/A	☒
SAM Twin Phantom V5.0	SPEAG	TP-1809	1809	N/A	☒
SAM Twin Phantom V5.0	SPEAG	TP-1810	1810	N/A	☒
ELI Phantom V5.0	SPEAG	TP-1228	1228	N/A	☐
Data Acquisition Electronics	SPEAG	DAE4	1422	2015.01.14	☒
Probe E-Field	SPEAG	ES3DV2	3020	2015.02.25	☒
Probe E-Field	SPEAG	EX3DV4	3905	2015.02.26	☒
Probe E-Field	SPEAG	EX3DV4	3972	2015.01.28	☐
Antenna Dipole 835 MHz	SPEAG	D835V2	481	2015.04.25	☐
Antenna Dipole 900 MHz	SPEAG	D900V2	194	2015.11.20	☐
Antenna Dipole 1800 MHz	SPEAG	D1800V2	2d066	2016.01.23	☐
Antenna Dipole 1900 MHz	SPEAG	D1900V2	5d038	2015.05.29	☐
Antenna Dipole 1950 MHz	SPEAG	D1950V2	1027	2016.01.22	☐
Antenna Dipole 2450 MHz	SPEAG	D2450V2	746	2016.01.21	☒
Antenna Dipole 5000 MHz	SPEAG	D5GHzV2	1147	2016.02.26	☒
High power RF Amplifier	EMPOWER	2057-BBS3Q5KCK	1002D/C0321	2015.03.06	☒
Digital Communication Tester	R&S	CMU200	111356	2015.01.15	☐
Digital Communication Tester	Agilent	E5515C	G44400380	2014.10.28	☐
Signal Generator	Hewlett Packard	8648C	3629U00868	2015.02.18	☒
Signal Generator	R&S	SMBV100A	1407.6004k02-259341-Ez	2014.10.10	☒
RF Power Meter Dual	Hewlett Packard	EPM-442A	GG37170495	2015.03.04	☒
RF Power Sensor 0.01 - 18 GHz	Hewlett Packard	8481A	US37299851	2015.03.14	☒
RF Power Sensor 0.01 - 18 GHz	Hewlett Packard	8481A	3318A92872	2015.03.14	☒
S-Parameter Network Analyzer	Agilent	8753D	3410A07251	2015.03.07	☒
Dual Directional Coupler	Hewlett Packard	778D	1144AO4576	2015.03.04	☐
Directional Coupler	Agilent	773D	MY28390213	2015.03.04	☒

APPENDIX A. SAR PLOTS

Plot No.1

- Test Laboratory: KTL

- Model: PM60

- Position: 802.11b 2437 LEFT CHEEK TOUCH_6CH_2D N560x_QWERTY

- Test Date: 07/11/2014

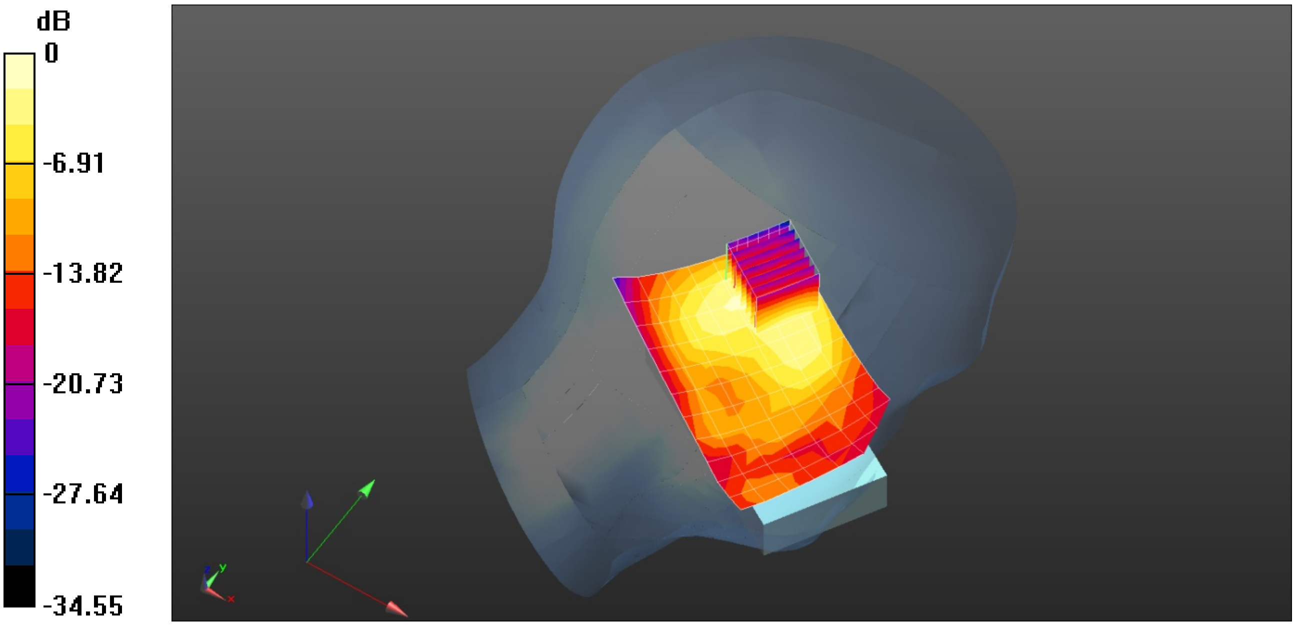
- Measured Liquid Temperature: 22.6 ℃, Ambient Temperature: 21.0 ℃

Communication System: UID 0, WLAN (0); Communication System Band: Exported from older format (data unavailable - please correct).; Frequency: 2437 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 2437 MHz; σ = 1.823 S/m; ε_r = 37.59; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: ES3DV2 - SN3020; ConvF(4.18, 4.18, 4.18); Calibrated: 25.02.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection), z = 2.0, 32.0
- Electronics: DAE4 Sn1422; Calibrated: 13.01.2014
- Phantom: SAM with CRP v5.0(Right)_2014_03_05; Type: QD000P40CD; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Left/Touch/Area Scan (8x12x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.284 W/kg
Left/Touch/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.154 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.512 W/kg
SAR(1 g) = 0.224 W/kg; SAR(10 g) = 0.104 W/kg
Maximum value of SAR (measured) = 0.299 W/kg



0 dB = 0.299 W/kg = -5.24 dBW/kg

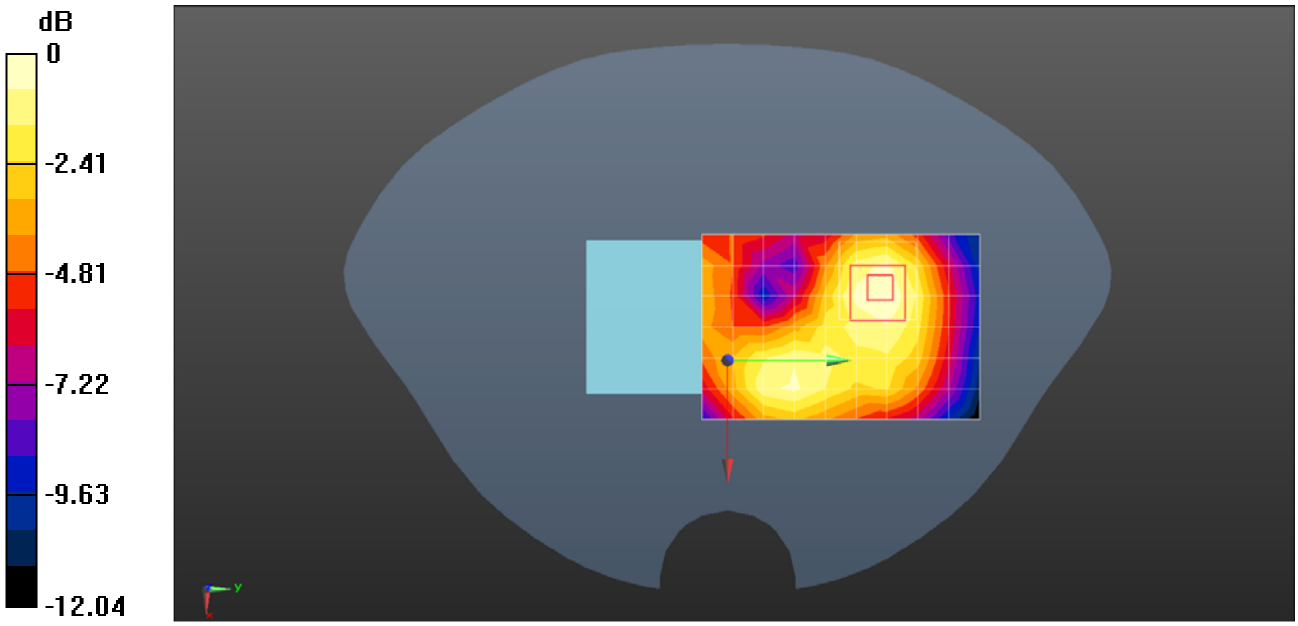
- Test Laboratory: KTL
- Model: PM60
- Position: 802.11b 2437 BODY FRONT 1.5cm_6CH_2D N560x_QWERTY
- Test Date: 07/14/2014
- Measured Liquid Temperature: 22.8 ℃, Ambient Temperature: 23.0 ℃

Communication System: UID 0, WLAN (0); Communication System Band: Exported from older format (data unavailable - please correct).; Frequency: 2437 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.881 S/m; ε_r = 50.548; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: ES3DV2 - SN3020; ConvF(3.78, 3.78, 3.78); Calibrated: 25.02.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection), z = 2.0, 32.0
- Electronics: DAE4 Sn1422; Calibrated: 13.01.2014
- Phantom: SAM with CRP v5.0(Left)_2014_03_05; Type: QD000P40CD; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Body/Front/Area Scan (7x10x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.0500 W/kg
Body/Front/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.151 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 0.0750 W/kg
SAR(1 g) = 0.042 W/kg; SAR(10 g) = 0.024 W/kg
Maximum value of SAR (measured) = 0.0501 W/kg



0 dB = 0.0500 W/kg = -13.01 dBW/kg

- Test Laboratory: KTL

- Model: PM60

- Position: 802.11a 5240 LEFT TILT_48CH_2D N560x_QWERTY

- Test Date: 07/16/2014

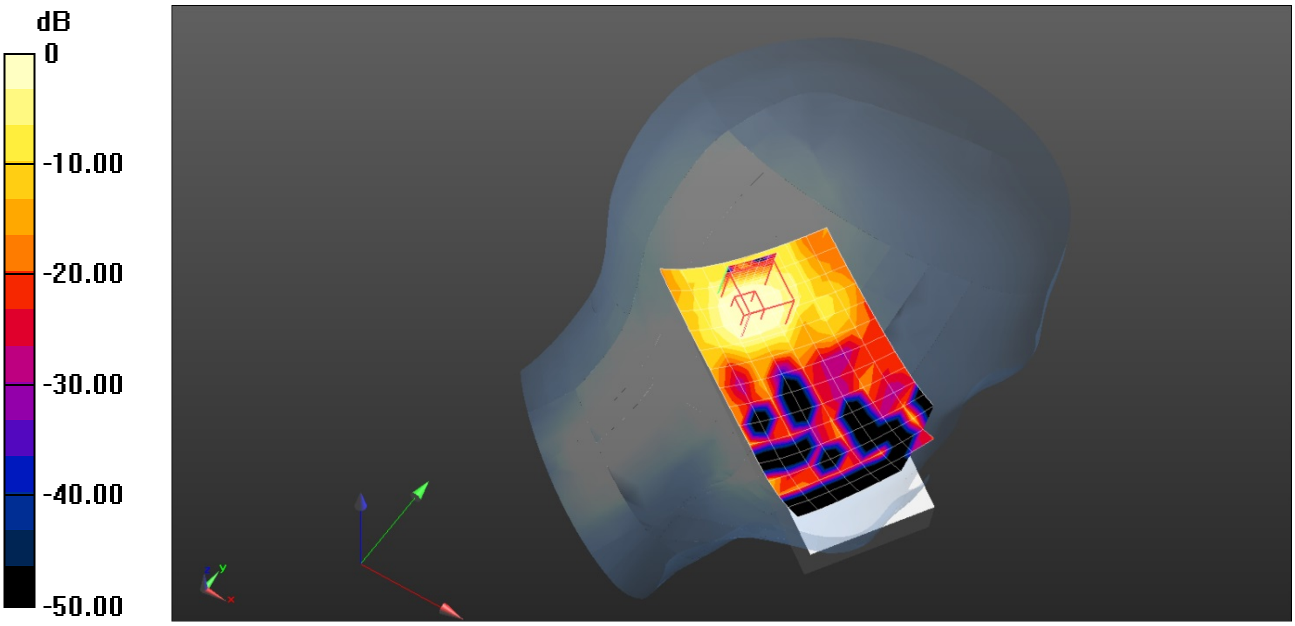
- Measured Liquid Temperature: 22.4 ℃, Ambient Temperature: 23.0 ℃

Communication System: UID 0, 5G FCC (0); Communication System Band: 5G FCC; Frequency: 5240 MHz;Communication System PAR: 0 dB; PMF: 1.12202e-005
Medium parameters used: f = 5240 MHz; σ = 4.777 S/m; ε_r = 36.735; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3905; ConvF(4.82, 4.82, 4.82); Calibrated: 26.02.2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = -3.0, 23.0
- Electronics: DAE4 Sn1422; Calibrated: 13.01.2014
- Phantom: SAM with CRP v5.0(Right)_2014_03_05; Type: QD000P40CD; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Left/TILT/Area Scan (9x15x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.405 W/kg
Left/TILT/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 4.620 V/m; Power Drift = 0.30 dB
Peak SAR (extrapolated) = 0.833 W/kg
SAR(1 g) = 0.246 W/kg; SAR(10 g) = 0.098 W/kg
Maximum value of SAR (measured) = 0.443 W/kg



0 dB = 0.405 W/kg = -3.93 dBW/kg

Plot No.4

- Test Laboratory: KTL

- Model: PM60

- Position: 802.11a 5745 BODY REAR 1.5cm_149CH_2D N560x_QWERTY

- Test Date: 12/11/2014

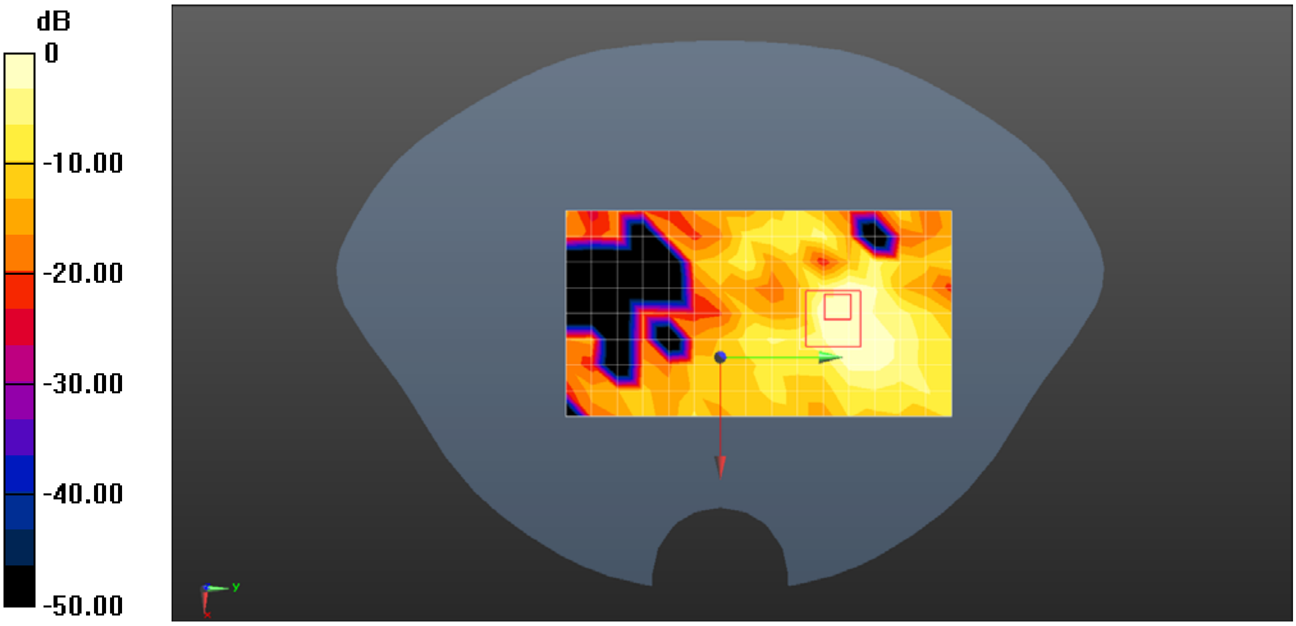
- Measured Liquid Temperature: 22.3 ℃, Ambient Temperature: 23.0 ℃

Communication System: UID 0, 5G FCC (0); Frequency: 5745 MHz
Medium parameters used: f = 5745 MHz; σ = 5.94 S/m; ε_r = 47.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3905; ConvF(4.04, 4.04, 4.04); Calibrated: 26.02.2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = -3.0, 23.0
- Electronics: DAE4 Sn1422; Calibrated: 13.01.2014
- Phantom: SAM with CRP v5.0(Left)_2014_03_05; Type: QD000P40CD; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Area Scan (9x16x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.107 W/kg
Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.755 V/m; Power Drift = 0.65 dB
Peak SAR (extrapolated) = 0.352 W/kg
SAR(1 g) = 0.060 W/kg; SAR(10 g) = 0.017 W/kg
Maximum value of SAR (measured) = 0.152 W/kg



0 dB = 0.107 W/kg = -9.71 dBW/kg

2450 MHz Head- Verification DATA (D2450V2– 746)

- Test Date: 07/11/2014

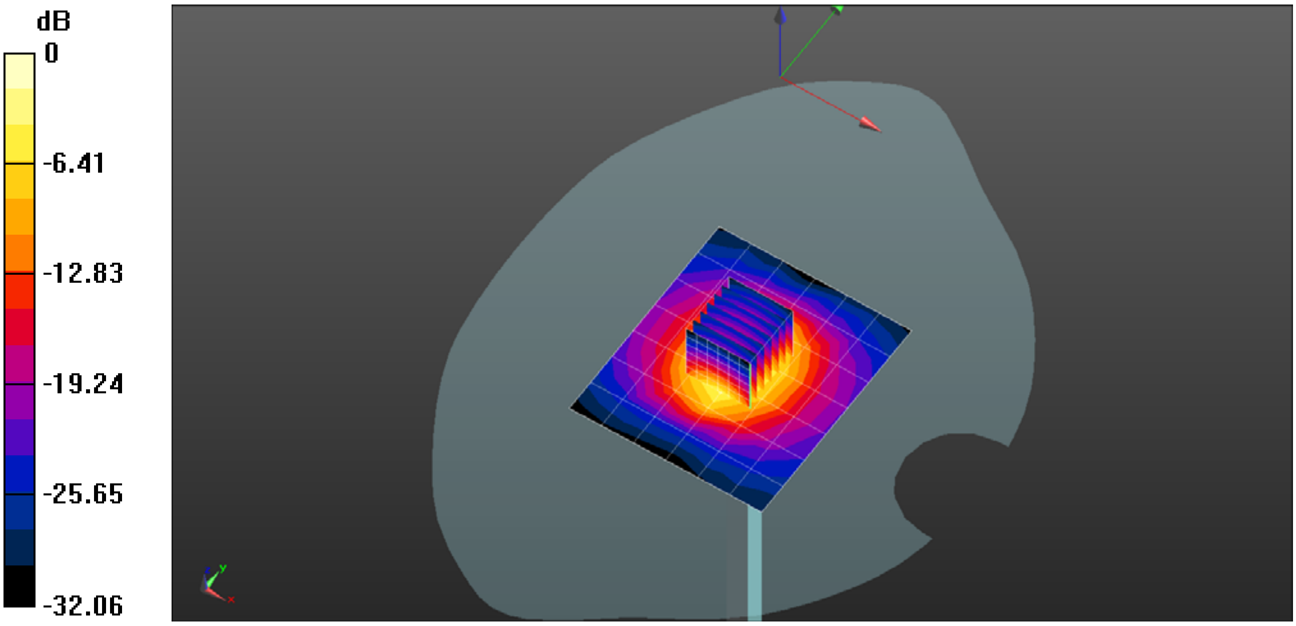
- Measured Liquid Temperature: 22.6 ℃, Ambient Temperature: 22.0 ℃

Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz);
Frequency: 2450 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 2450 MHz; σ = 1.84 S/m; ε_r = 37.547; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: ES3DV2 - SN3020; ConvF(4.18, 4.18, 4.18); Calibrated: 25.02.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection), z = 1.0, 32.0
- Electronics: DAE4 Sn1422; Calibrated: 13.01.2014
- Phantom: SAM with CRP v5.0(Right)_2014_03_05; Type: QD000P40CD; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

2450MHz/d=10mm, Pin=xx mW, dist=3.0mm (ES-Probe) 2/Area Scan (7x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 17.1 W/kg
2450MHz/d=10mm, Pin=xx mW, dist=3.0mm (ES-Probe) 2/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 101.9 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 28.2 W/kg
SAR(1 g) = 13.7 W/kg; SAR(10 g) = 6.39 W/kg
Maximum value of SAR (measured) = 18.0 W/kg



0 dB = 17.1 W/kg = 12.32 dBW/kg

2450 MHz Body- Verification DATA (D2450V2– 746)

- Test Date: 07/14/2014

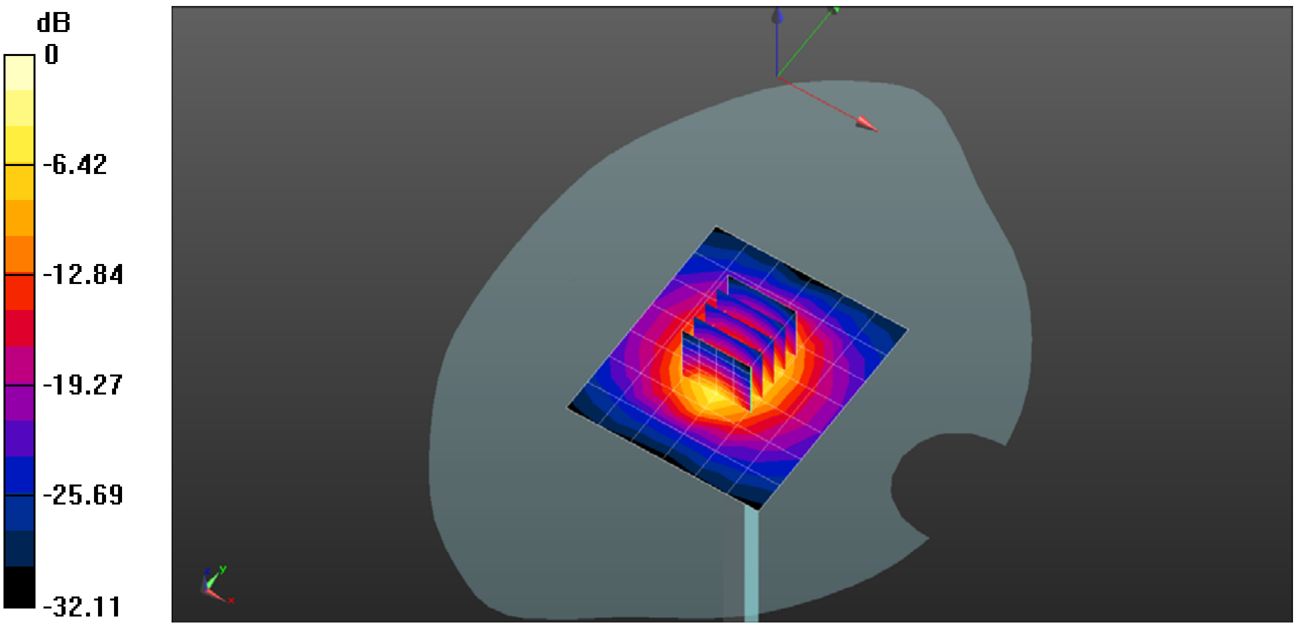
- Measured Liquid Temperature: 22.8 ℃, Ambient Temperature: 23.0 ℃

Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz);
Frequency: 2450 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 2450 MHz; σ = 1.897 S/m; ε_r = 50.545; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: ES3DV2 - SN3020; ConvF(3.78, 3.78, 3.78); Calibrated: 25.02.2014;
    - Modulation Compensation:
- Sensor-Surface: 3mm (Mechanical Surface Detection), z = 1.0, 32.0
- Electronics: DAE4 Sn1422; Calibrated: 13.01.2014
- Phantom: SAM with CRP v5.0(Left)_2014_03_05; Type: QD000P40CD; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

2450MHz/d=10mm, Pin=xx mW, dist=3.0mm (ES-Probe) 2/Area Scan (7x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 16.0 W/kg
2450MHz/d=10mm, Pin=xx mW, dist=3.0mm (ES-Probe) 2/Zoom Scan (7x7x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 96.914 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 27.3 W/kg
SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.12 W/kg
Maximum value of SAR (measured) = 17.2 W/kg



0 dB = 16.0 W/kg = 12.03 dBW/kg

5200 MHz Head- Verification DATA (D5GHzV2– 1147)

- Test Date: 07/16/2014

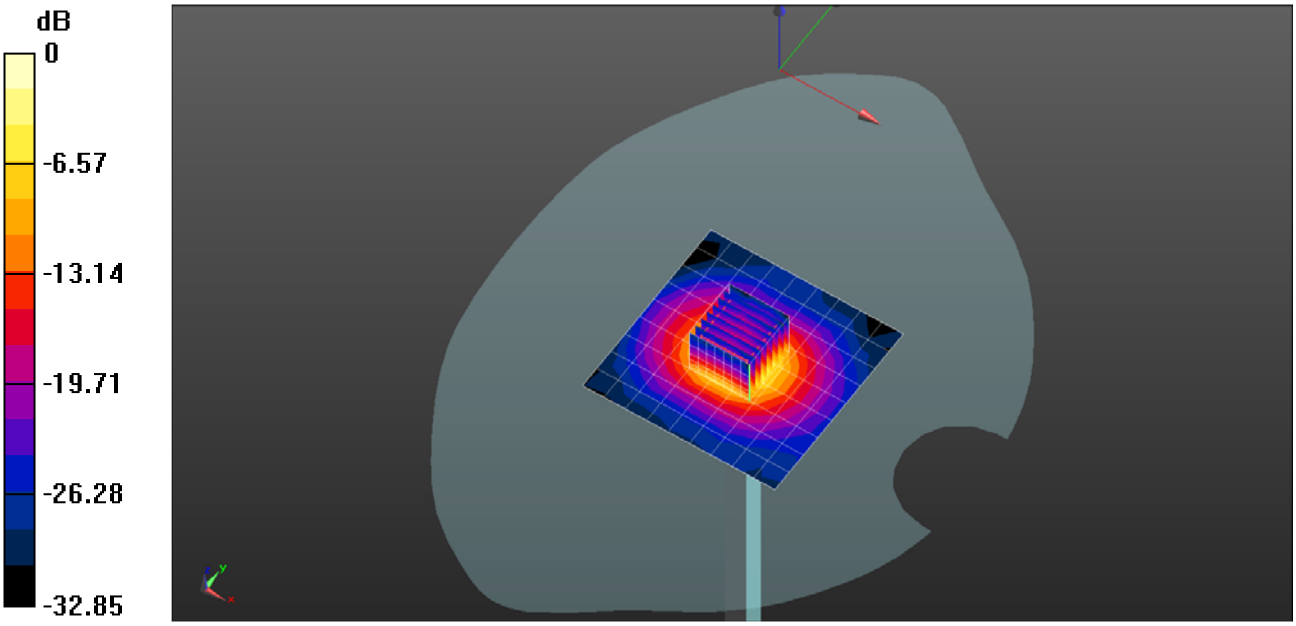
- Measured Liquid Temperature: 22.4 ℃, Ambient Temperature: 23.0 ℃

Communication System: UID 0, CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5200 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 5200 MHz; σ = 4.727 S/m; ε_r = 36.596; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3905; ConvF(4.82, 4.82, 4.82); Calibrated: 26.02.2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 1.0, 25.0
- Electronics: DAE4 Sn1422; Calibrated: 13.01.2014
- Phantom: SAM with CRP v5.0(Right)_2014_03_05; Type: QD000P40CD; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

System Performance Check with D5GHzV2 Dipole (graded grid)/d=10mm, Pin=100mW, f=5200 MHz/Area Scan (10x10x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 13.6 W/kg
System Performance Check with D5GHzV2 Dipole (graded grid)/d=10mm, Pin=100mW, f=5200 MHz/Zoom Scan (4x4x1.4mm, graded), dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 69.960 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 32.7 W/kg
SAR(1 g) = 8.12 W/kg; SAR(10 g) = 2.37 W/kg
Maximum value of SAR (measured) = 18.8 W/kg



0 dB = 13.6 W/kg = 11.34 dBW/kg

5200 MHz Body- Verification DATA (D5GHzV2– 1147)

- Test Date: 12/11/2014

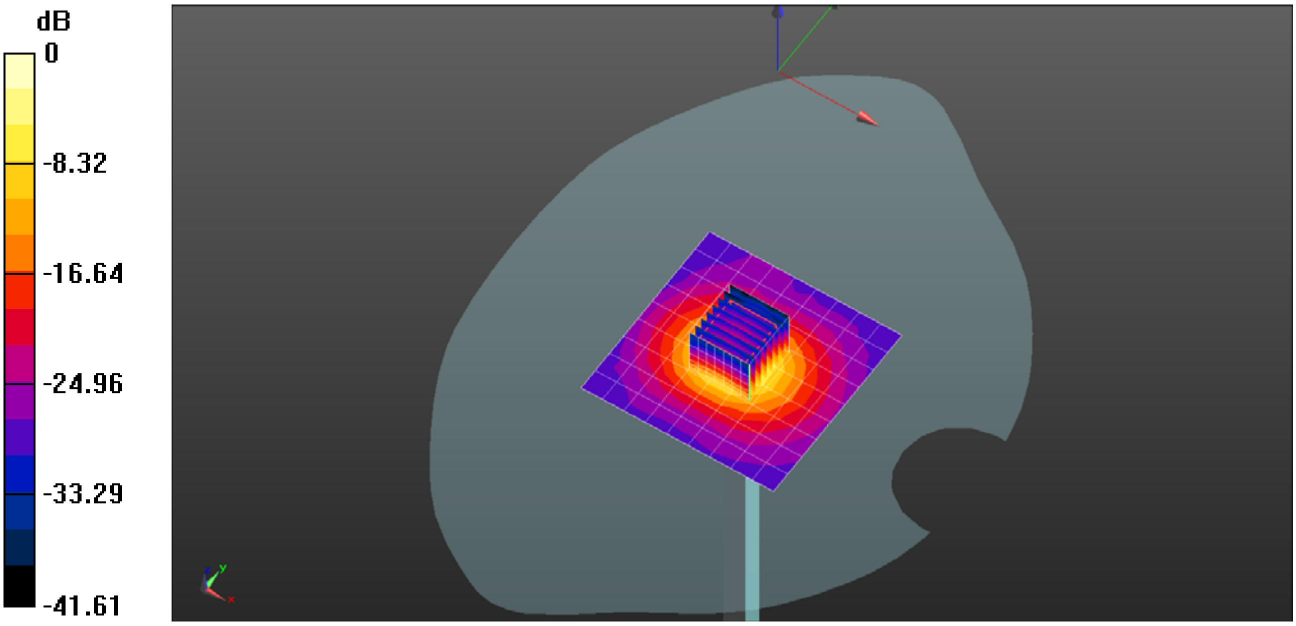
- Measured Liquid Temperature: 21.5 ℃, Ambient Temperature: 23.0 ℃

Communication System: UID 0, CW (0); Frequency: 5200 MHz
Medium parameters used: f = 5200 MHz; σ = 5.43 S/m; ε_r = 46.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3905; ConvF(4.08, 4.08, 4.08); Calibrated: 26.02.2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 1.0, 25.0
- Electronics: DAE4 Sn1422; Calibrated: 13.01.2014
- Phantom: SAM with CRP v5.0(Left)_2014_03_05; Type: QD000P40CD; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

System Performance Check with D5GHzV2 Dipole (graded grid)/d=10mm, Pin=100mW, f=5200 MHz/Area Scan (10x10x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 31.5 W/kg
System Performance Check with D5GHzV2 Dipole (graded grid)/d=10mm, Pin=100mW, f=5200 MHz/Zoom Scan (4x4x1.4mm, graded), dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 106.3 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 78.3 W/kg
SAR(1 g) = 20.7 W/kg; SAR(10 g) = 6.02 W/kg
Maximum value of SAR (measured) = 47.1 W/kg



0 dB = 47.1 W/kg = 16.73 dBW/kg

5500 MHz Head- Verification DATA (D5GHzV2– 1147)

- Test Date: 07/18/2014

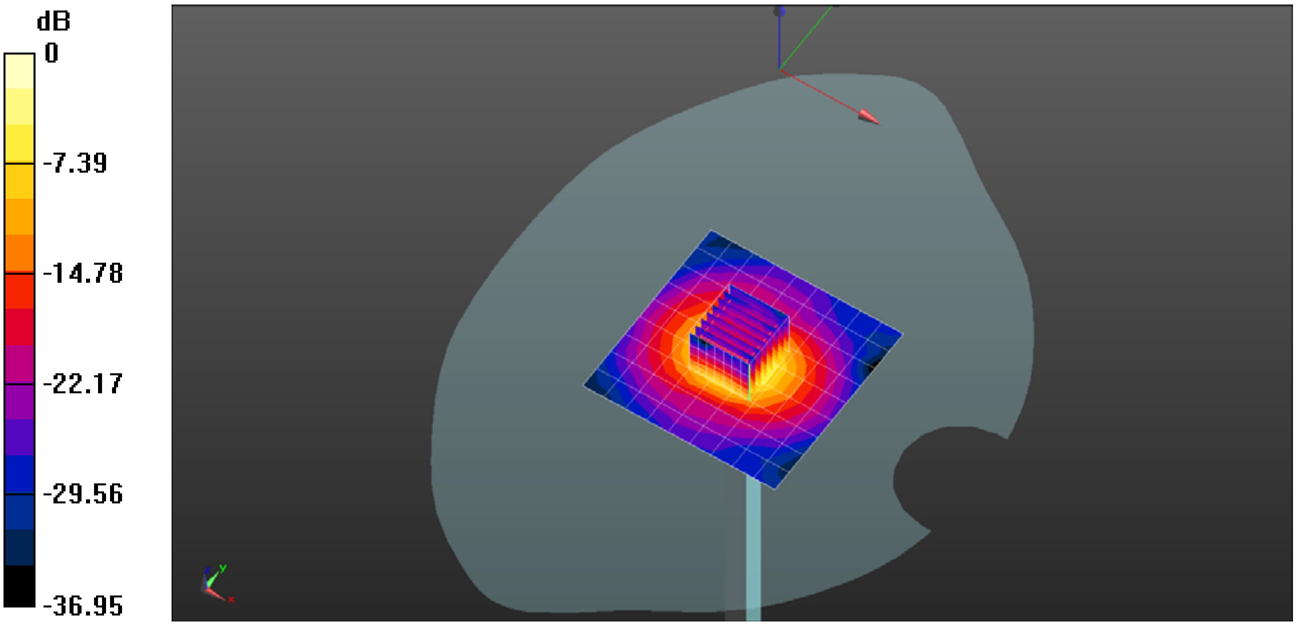
- Measured Liquid Temperature: 22.2 ℃, Ambient Temperature: 23.0 ℃

Communication System: UID 0, CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5500 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 5500 MHz; σ = 5.053 S/m; ε_r = 35.827; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3905; ConvF(4.52, 4.52, 4.52); Calibrated: 26.02.2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 1.0, 25.0
- Electronics: DAE4 Sn1422; Calibrated: 13.01.2014
- Phantom: SAM with CRP v5.0(Right)_2014_03_05; Type: QD000P40CD; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

System Performance Check with D5GHzV2 Dipole (graded grid)/d=10mm, Pin=100mW, f=5500 MHz/Area Scan (10x10x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 15.2 W/kg
System Performance Check with D5GHzV2 Dipole (graded grid)/d=10mm, Pin=100mW, f=5500 MHz/Zoom Scan (4x4x1.4mm, graded), dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 73.160 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 37.6 W/kg
SAR(1 g) = 8.96 W/kg; SAR(10 g) = 2.56 W/kg
Maximum value of SAR (measured) = 21.2 W/kg



0 dB = 15.2 W/kg = 11.83 dBW/kg

5500 MHz Body- Verification DATA (D5GHzV2– 1147)

- Test Date: 07/21/2014

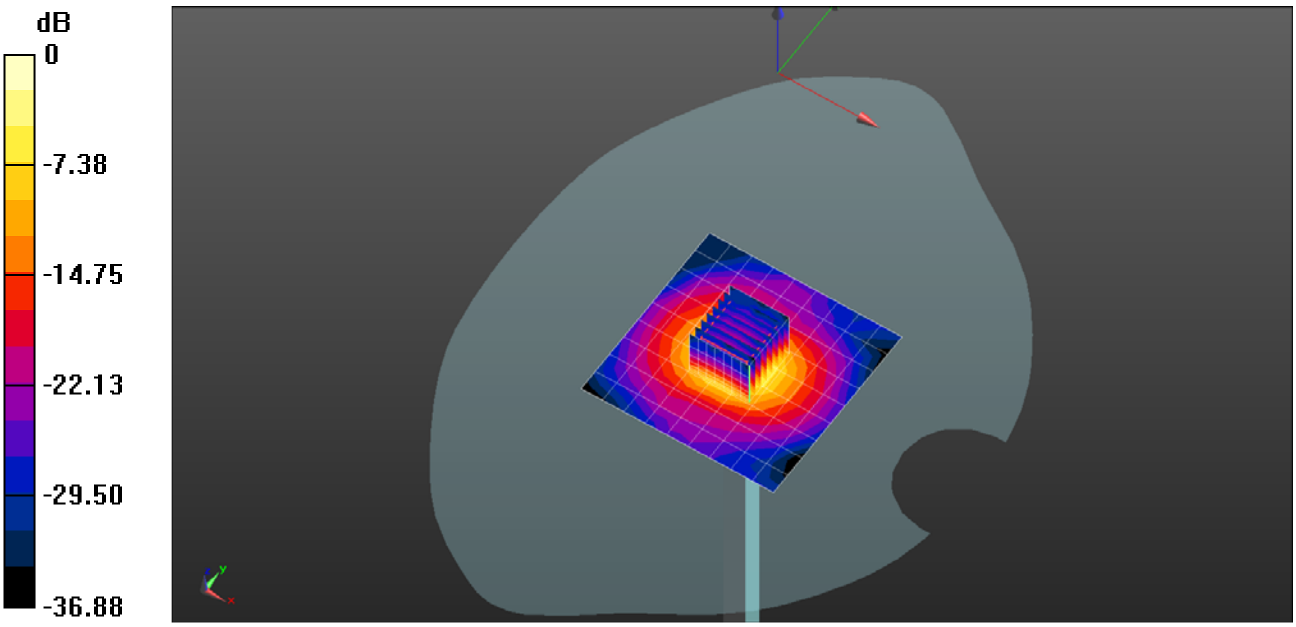
- Measured Liquid Temperature: 22.3 ℃, Ambient Temperature: 23.0 ℃

Communication System: UID 0, CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz);
Frequency: 5500 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 5500 MHz; σ = 5.78 S/m; ε_r = 47.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3905; ConvF(3.74, 3.74, 3.74); Calibrated: 26.02.2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 1.0, 25.0
- Electronics: DAE4 Sn1422; Calibrated: 13.01.2014
- Phantom: SAM with CRP v5.0(Right)_2014_03_05; Type: QD000P40CD; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

System Performance Check with D5GHzV2 Dipole (graded grid)/d=10mm, Pin=100mW, f=5500 MHz/Area Scan (10x10x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 13.3 W/kg
System Performance Check with D5GHzV2 Dipole (graded grid)/d=10mm, Pin=100mW, f=5500 MHz/Zoom Scan (4x4x1.4mm, graded), dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 68.829 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 34.2 W/kg
SAR(1 g) = 8.5 W/kg; SAR(10 g) = 2.39 W/kg
Maximum value of SAR (measured) = 19.6 W/kg



0 dB = 13.3 W/kg = 11.23 dBW/kg

5800 MHz Head- Verification DATA (D5GHzV2– 1147)

- Test Date: 07/23/2014

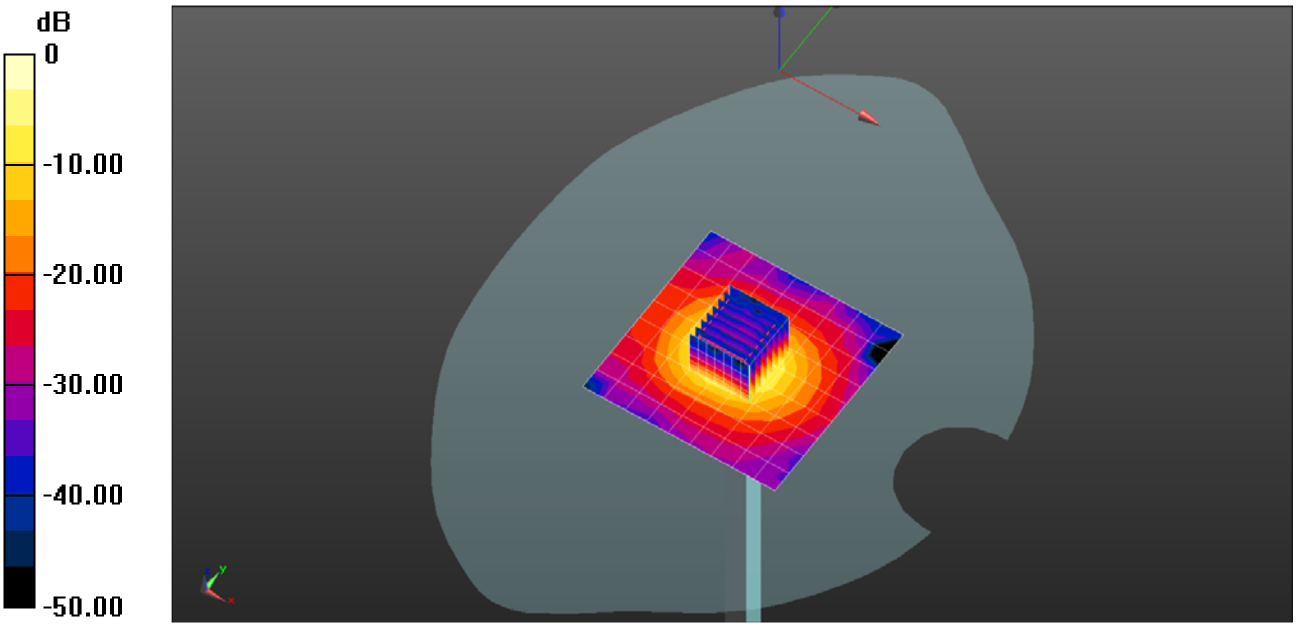
- Measured Liquid Temperature: 22.5 ℃, Ambient Temperature: 23.0 ℃

Communication System: UID 0, CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz);
Frequency: 5800 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 5800 MHz; σ = 5.464 S/m; ε_r = 35.218; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3905; ConvF(5.2, 5.2, 5.2); Calibrated: 26.02.2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 1.0, 25.0
- Electronics: DAE4 Sn1422; Calibrated: 13.01.2014
- Phantom: SAM with CRP v5.0(Right)_2014_03_05; Type: QD000P40CD; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

System Performance Check with D5GHzV2 Dipole (graded grid)/d=10mm, Pin=100mW, f=5800 MHz/Area Scan (10x10x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 14.6 W/kg
System Performance Check with D5GHzV2 Dipole (graded grid)/d=10mm, Pin=100mW, f=5800 MHz/Zoom Scan (4x4x1.4mm, graded), dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 68.354 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 37.9 W/kg
SAR(1 g) = 8.23 W/kg; SAR(10 g) = 2.34 W/kg
Maximum value of SAR (measured) = 20.3 W/kg



0 dB = 14.6 W/kg = 11.65 dBW/kg

5800 MHz Body- Verification DATA (D5GHzV2– 1147)

- Test Date: 12/11/2014

- Measured Liquid Temperature: 21.0 ℃, Ambient Temperature: 23.0 ℃

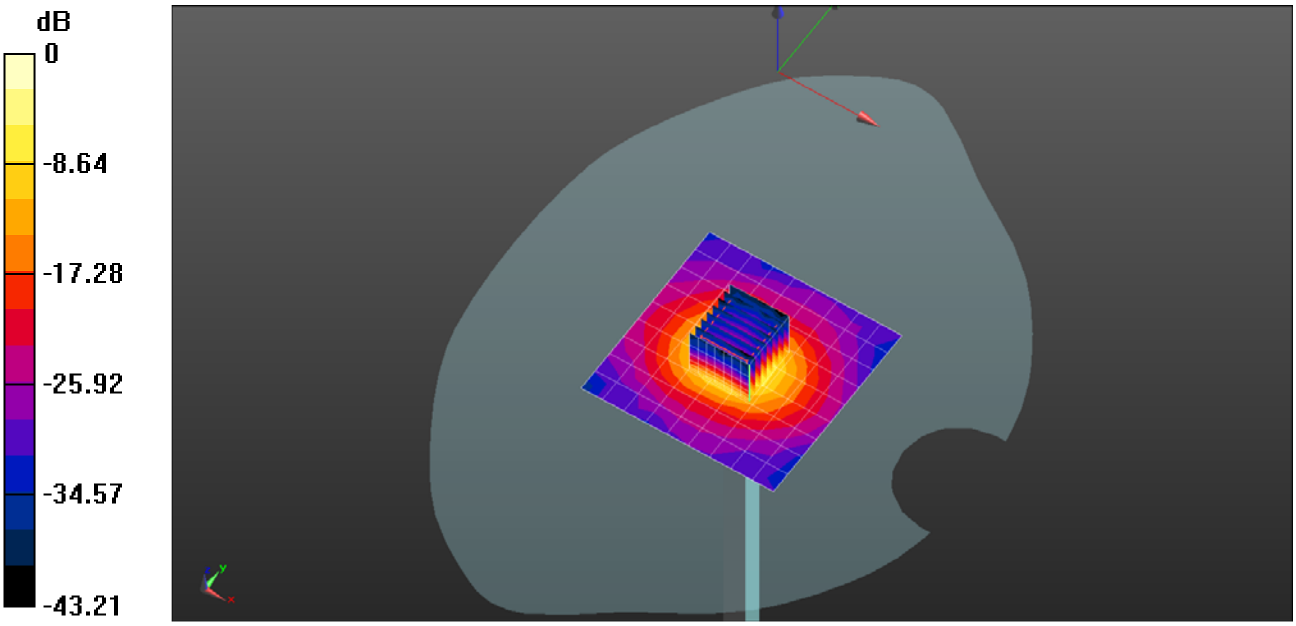
Communication System: UID 0, CW (0); Frequency: 5800 MHz
Medium parameters used: f = 5800 MHz; σ = 5.94 S/m; ε_r = 47.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3905; ConvF(4.04, 4.04, 4.04); Calibrated: 26.02.2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 1.0, 25.0
- Electronics: DAE4 Sn1422; Calibrated: 13.01.2014
- Phantom: SAM with CRP v5.0(Left)_2014_03_05; Type: QD000P40CD; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

System Performance Check with D5GHzV2 Dipole (graded grid)/d=10mm, Pin=100mW, f=5800 MHz 2/Area Scan (10x10x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 29.2 W/kg

System Performance Check with D5GHzV2 Dipole (graded grid)/d=10mm, Pin=100mW, f=5800 MHz 2/Zoom Scan (4x4x1.4mm, graded), dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 102.2 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 83.0 W/kg
SAR(1 g) = 18.8 W/kg; SAR(10 g) = 5.29 W/kg
Maximum value of SAR (measured) = 45.6 W/kg



0 dB = 45.6 W/kg = 16.59 dBW/kg