TEST REPORT

KCTL Inc. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82 70 5008 1021 FAX: 82 505 299 8311	Report No.: KCTL16-SFA0001 Page(1) / (23) Pages	KCTL http://www.kctl.co.kr

1. Applicant

Name:	Samsung Electronics Co., Ltd.
Address:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

2. Manufacturer

Name:	Samsung Electronics Co., Ltd.
Address:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

3. Sample Description:

Type of equipment:	Smart Control
Model:	RMCSPK1AP2

4. Date of Receipt:	March 22, 2016
5. Date of Test:	March 22, 2016
6. FCC ID:	A3LRMCSPK1AP2
7. IC ID	649E-RMCSPK1AP2
8. FCC Rule Part:	CFR §2.1093
9. IC Rule Part	RSS-102 Issue 5 2015
10. Test method used:	IEEE 1528-2013, ANSI/IEEE C95.1, KDB Publication, IEC 62209-2:2010
11. Testing Environment:	Temperature:(22 ± 2) ℃

12. Test Results

Result:	Complied (Refer to page 21)

This result shown in this report refer only to the sample(s) tested unless otherwise stated.

Affirmation	Tested by Name: KIM, DONG KYU	Technical Manager Name: CHOI, CHEON SIG

2016. 03. 22

KCTL Inc. Testing Laboratory

Contents

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1. Applicant information

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Contact name:	Min-Hyeong Jo

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2. Laboratory information

Address

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TEL: 82 70 5008 1021 FAX: 82 505 299 8311

Certificate

KOLAS No.: KT231

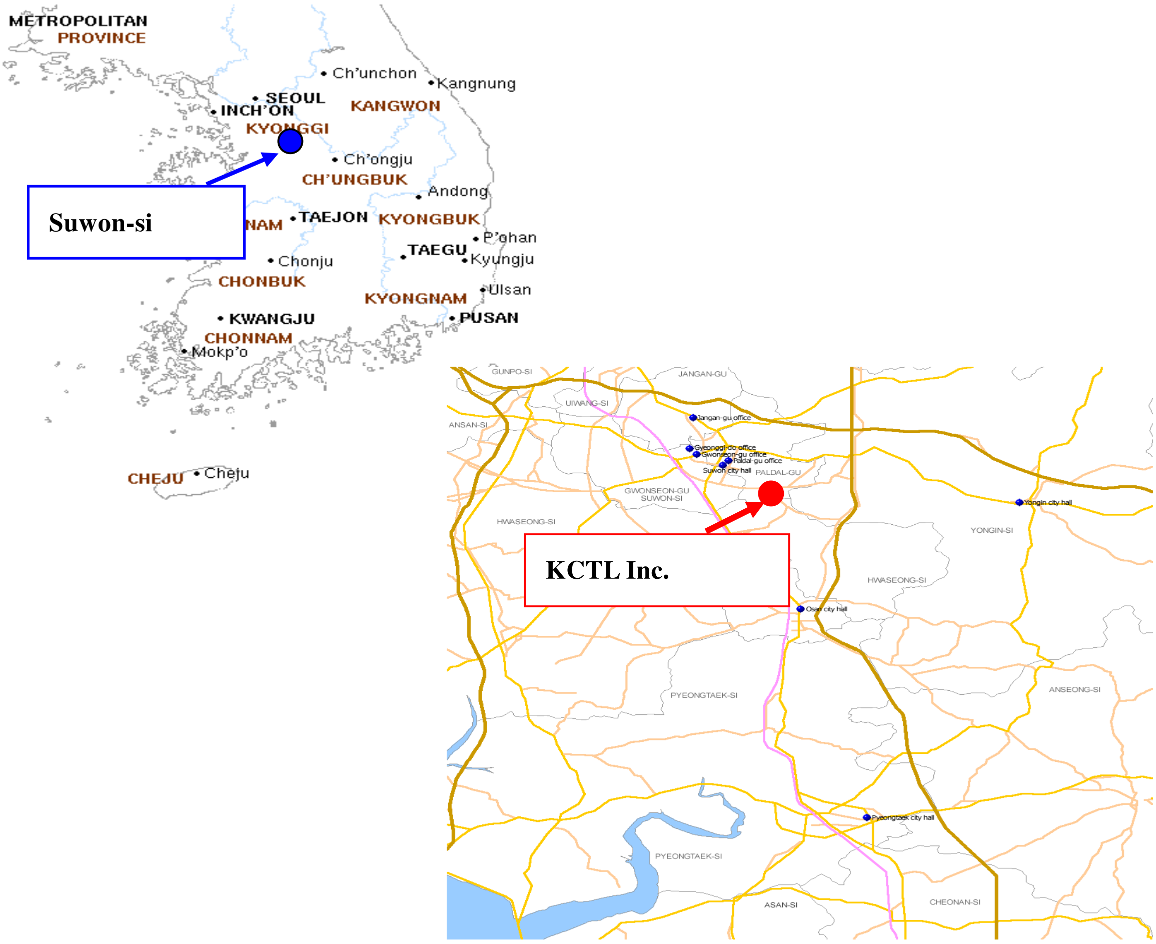
FCC Site Designation No.: KR0040

FCC Site Registration No.: 687132

VCCI Site Registration No.: R-3327, G-198, C-3706, T-1849

IC Site Registration No.: 8035A-2

SITE MAP



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3. Identification of Sample

EUT Type	Smart Control
Brand Name	Samsung Electronics Co., Ltd.
Mode of Operation	GFSK
Model Number	RMCSPK1AP2
Serial Number	N/A
Max. Power	11 dBm
Tx Freq.Range	2 402 ㎒ ~ 2 480 ㎒
Rx Freq.Range	2 402 ㎒ ~ 2 480 ㎒
Antenna Type	Chip Antenna
Normal Voltage	DC 3 V
H/W Version	A0
S/W Version	BCM20735B0

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4.Test Result Summary

4.1 BLE Body SAR

Frequency		Average Power (dBm)	Max. tune up power (dBm)	Scaling Factor	EUT Position	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	1 g SAR Limit (W/kg)
MHz	Channel							
2 440	19	10.69	11.00	1.074	Front	0.237	**0.255**	1.6

* Contain the results of the worst test SAR including battery.

5. Report Overview

This report details the results of testing carried out on the samples listed in section 3, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this test report is used in any configuration other than that detailed in the test report, the manufacturer must ensure the new configuration complies with all relevant standards and certification requirements. Any mention of KCTL Inc. Wireless lab or testing done by KCTL Inc. Wireless lab made in connection with the distribution or use of the tested product must be approved in writing by KCTL Inc. Wireless lab.

6. Test Lab Declaration or Comments

None

7. Applicant Declaration or Comments

None

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8. Measurement Uncertainty

All measurements and results are recorded and maintained at the laboratory performing the tests and measurement uncertainties are taken into account when comparing measurements to pass/ fail criteria.

A	b	c	D	e = f(d,k)	g	i = c x g / e	k
Source of Uncertainty	**Description** IEEE P1528 (0.3 ~ 3 GHz)	**Tolerance/ Uncertainty value** ± %	**Probability Distribution**	**Div.**	**Ci** (1 g)	**Standard uncertainty** ± %, (1 g)	**Vi or Veff**
Measurement System							
Probe calibration(k=1)	E.2.1	6.30	N	1	1	6.30	∞
Axial isotropy	E.2.2	0.50	R	1.73	0.71	0.20	∞
Hemispherical isotropy	E.2.2	2.60	R	1.73	0.71	1.06	∞
Linearity	E.2.4	0.60	R	1.73	1	0.35	∞
Boundary effect	E.2.3	1.00	R	1.73	1	0.58	∞
System detection limits	E.2.5	1.00	R	1.73	1	0.58	∞
Readout electronics	E.2.6	0.30	N	1	1	0.30	∞
Response time	E.2.7	0.80	R	1.73	1	0.46	∞
Integration time	E.2.8	2.60	R	1.73	1	1.50	∞
RF ambient conditions–noise	E.6.1	3.00	R	1.73	1	1.73	∞
RF ambient conditions–reflections	E.6.1	3.00	R	1.73	1	1.73	∞
Probe positioner mechanical tolerance	E.6.2	0.40	R	1.73	1	0.23	∞
Probe positioning with respect to phantom shell	E.6.3	2.90	R	1.73	1	1.67	∞
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	E.5	2.00	R	1.73	1	1.15	∞
Test Sample Related							
Test sample positioning	E.4.2	4.71	N	1	1	4.71	9
Device holder uncertainty	E.4.1	3.60	N	1	1	3.60	5
Output power variation—SAR drift measurement	6.6.2	5.00	R	1.73	1	2.89	∞
Phantom and Tissue Parameters							
Phantom uncertainty (shape and thickness tolerances)	E.3.1	7.50	R	1.73	1	4.33	∞
Liquid conductivity (meas.)	E.3.3	1.53	N	1	0.64	0.98	5
Liquid permittivity (meas.)	E.3.3	3.07	N	1	0.6	1.84	5
Liquid conductivity(target)	E.3.2	5.00	R	1.73	0.64	1.85	∞
Liquid permittivity(target)	E.3.2	5.00	R	1.73	0.6	1.73	∞
Combined standard uncertainty				RSS		11.29	183
Expanded uncertainty (95% CONFIDENCE INTERVAL)				K=2		22.57	

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A	b	c	D	e = f(d,k)	g	i = c x g / e	k
Source of Uncertainty	**Description** 62209-2	**Tolerance/ Uncertainty value**	**Probability Distribution**	**Div.**	**Ci**	**Standard uncertainty**	**Vi or Veff**
	(0.3 ~ 3 GHz)	± %			(10 g)	± %, (10 g)	
Measurement System							
Probe calibration	7.2.2.1	6.30	N	1	1	6.30	∞
Isotropy	7.2.2.2	1.87	R	1.73	1	1.08	∞
Linearity	7.2.1.3	0.60	R	1.73	1	0.35	∞
Probe modulation response	7.2.2.4	2.40	R	1.73	1	1.39	∞
Detection limits	7.2.2.6	1.00	R	1.73	1	0.58	∞
Boundary effect	7.2.2.6	1.00	R	1.73	1	0.58	∞
Readout electronics	7.2.2.7	0.30	N	1	1	0.30	∞
Response time	7.2.2.8	0.80	R	1.73	1	0.46	∞
Integration time	7.2.2.9	2.60	R	1.73	1	1.50	∞
RF ambient conditions–noise	7.2.4.5	3.00	R	1.73	1	1.73	∞
RF ambient conditions–reflections	7.2.4.5	3.00	R	1.73	1	1.73	∞
Probe positioner mech. restrictions	7.2.3.1	0.40	R	1.73	1	0.23	∞
Probe positioning with respect to phantom shell	7.2.3.3	2.90	R	1.73	1	1.67	∞
Post-processing	7.2.5	2.00	R	1.73	1	1.15	∞
Test Sample Related							
Device holder uncertainty	7.2.3.4.2	3.60	N	1	1	3.60	5
Test sample positioning	7.2.3.4.3	4.11	N	1	1	4.11	9
Power scaling	L.3	0.00	R	1.73	1	0.00	∞
Drift of output power (measured SAR drift)	7.2.2.10	5.00	R	1.73	1	2.89	∞
Phantom and Setup							
Phantom uncertainty (shape and thickness tolerances)	7.2.3.2	7.50	R	1.73	1	4.33	∞
Algorithm for correcting SAR for deviations in permittivity and conductivity	7.2.4.3	1.90	N	1	0.84	1.60	∞
Liquid conductivity (meas.)	7.2.4.3	1.53	N	1	0.71	1.09	5
Liquid permittivity (meas.)	7.2.4.3	3.07	N	1	0.26	0.80	5
Liquid conductivity–temperature uncertainty	7.2.4.4	3.36	R	1.73	0.71	1.38	∞
Liquid permittivity–temperature uncertainty	7.2.4.4	0.40	R	1.73	0.26	0.06	∞
Combined standard uncertainty	7.3.1			RSS		10.93	218
Expanded uncertainty (95% CONFIDENCE INTERVAL)	7.3.2			K=2		21.86	

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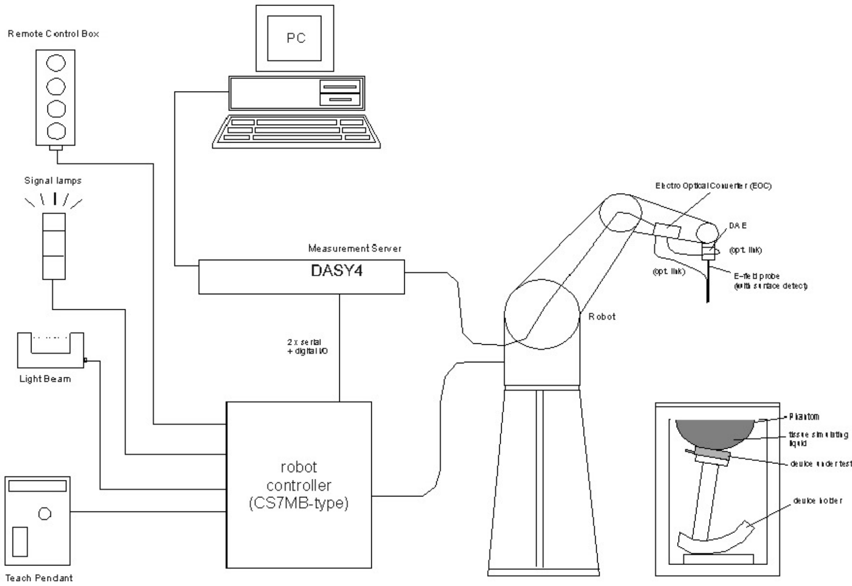
9. The SAR Measurement System



<SAR System Configuration>

- A standard high precision 6-axis robot (Staubli 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 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 to validate the proper functioning of the system.

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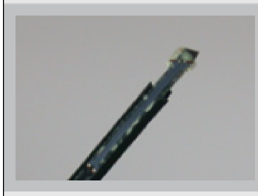
9.1 Isotropic E-field Probe

ES3DV3 Isotropic E-Field Probe for Dosimetric Measurements	
	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to 4 GHz; Linearity: ± 0.2 dB (30 MHz to 4 GHz)
Directivity	± 0.2 dB in TSL (rotation around probe axis) ± 0.3 dB in TSL (rotation normal to probe axis)
Dynamic Range	5 μW/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 3.9 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm
Application	General dosimetry up to 4 GHz Dosimetry in strong gradient fields Compliance tests of mobile phones
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

EX3DV4 Smallest Isotropic E-Field Probe for Dosimetric Measurements (Preliminary Specifications)	
	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in TSL (rotation around probe axis) ± 0.5 dB in TSL (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: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better 30%.
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

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9.2 Phantom

Twin SAM	
	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. 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 teaching three points with the robot. Twin SAM V5.0 has the same shell geometry and is manufactured from the same material as Twin SAM V4.0, but has reinforced top structure.
Material	Vinylester, glass fiber reinforced (VE-GF)
Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)
Shell Thickness	2 ± 0.2 mm (6 ± 0.2 mm at ear point)
Dimensions **(incl. Wooden Support)**	Length: 1000 mm Width: 500 mm Height: adjustable feet
Filling Volume	approx. 25 liters
Wooden Support	SPEAG standard phantom table
Accessories	Mounting Device and Adaptors

ELI	
	Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI 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 compatible with all SPEAG dosimetric probes and dipoles. ELI V5.0 has the same shell geometry and is manufactured from the same material as ELI4, but has reinforced top structure. ELI V6.0, released in August 2014, has the same shell geometry as ELI4 but offers increased longterm stability.
Material	Vinylester, glass fiber reinforced (VE-GF)
Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)
Shell Thickness	2.0 ± 0.2 mm (bottom plate)
Dimensions	Major axis: 600 mm Minor axis: 400 mm
Filling Volume	approx. 30 liters
Wooden Support	SPEAG standard phantom table
Accessories	Mounting Device and Adaptors

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9.3 Device Holder for Transmitters

Mounting Devices and Adaptors

Mounting Device for Hand-Held Transmitters

MD4HHTV5 - Mounting Device for Hand-Held Transmitters

In combination with the Twin SAM V5.0/V5.0c or ELI Phantoms, the Mounting Device for Hand-Held Transmitters enables rotation of the mounted transmitter device to specified spherical coordinates. At the heads, the rotation axis is at the ear opening. Transmitter devices can be easily and accurately positioned according to IEC 62209-1, IEEE 1528, FCC, or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat).

Material: Polyoxymethylene (POM)

Mounting Device for Laptops

MD4LAPV5 - Mounting Device for Laptops and other Body-Worn Transmitters

In combination with the Twin SAM V5.0/V5.0c or ELI Phantoms, the Mounting Device (Body-Worn) enables testing of ransmitter devices according to IEC 62209-2 specifications. The device holder can be locked for positioning at flat phantom section.

Material: Polyoxymethylene (POM), PET-G, Foam

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10. System Verification

10.1 Tissue Verification

The dielectric properties for this Tissue Simulant Liquids were measured by using the SPEAG Model DAK3.5 Dielectric Probe in conjunction with Agilent E5071B Network Analyzer (300 kHz – 8 500 MHz). The Conductivity (σ) and Permittivity (ρ) are listed in Table 1.For the SAR measurement given in this report.

Freq. (MHz)	Tissue Type	Limit/Measured	Permittivity (ρ)	Conductivity (σ)	Temp (℃)
2 402	MSL	Recommended Limit	52.76 ± 5 % (50.12 ~ 55.40)	1.90 ± 5 % (1.81 ~ 2.00)	22 ± 2
		Measured, 2016-03-22	51.58	1.84	20.07
2 440	MSL	Recommended Limit	52.71 ± 5 % (50.07 ~ 55.35)	1.94 ± 5 % (1.84 ~ 2.04)	22 ± 2
		Measured, 2016-03-22	51.61	1.89	20.07
2 450	MSL	Recommended Limit	52.70 ± 5 % (50.07 ~ 55.34)	1.95 ± 5 % (1.85 ~ 2.05)	22 ± 2
		Measured, 2016-03-22	51.59	1.91	20.07
2 480	MSL	Recommended Limit	52.66 ± 5 % (50.03 ~ 55.29)	1.99 ± 5 % (1.81 ~ 2.01)	22 ± 2
		Measured, 2016-03-22	51.43	1.98	20.07

<Table 1.Measurement result of Tissue electric parameters>

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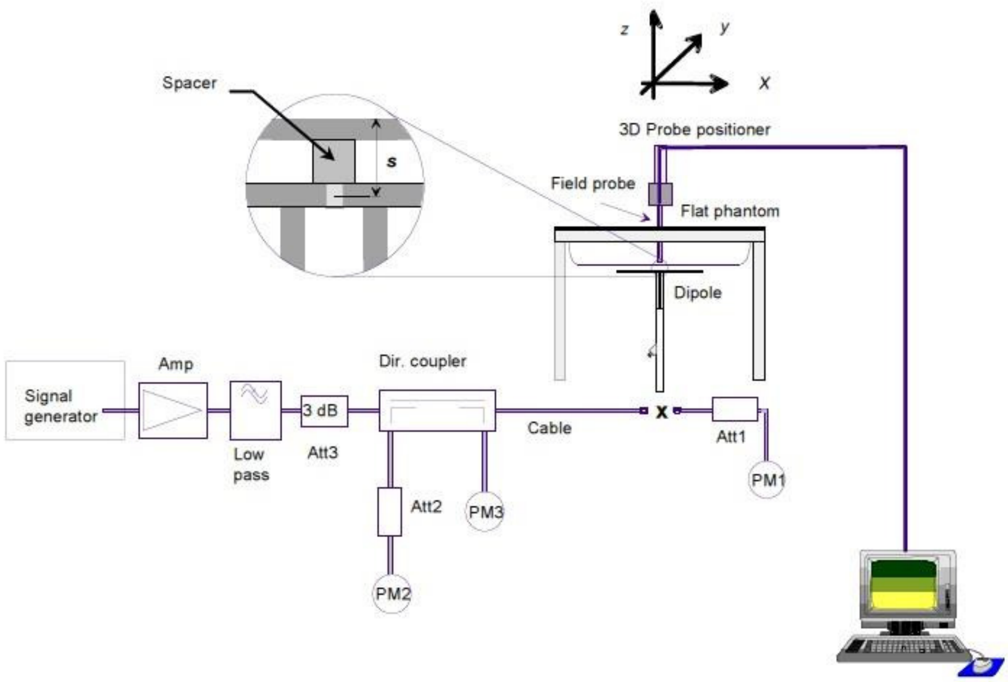
10.2 Test System Verification

The microwave circuit arrangement for system verification is sketched below picture. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within ± 10% from the target SAR values. These tests were done at 2 450 MHz. The tests were conducted on the samedays as the measurement of the EUT. The obtained results from the system accuracy verification are displayed in the table Table 2 (A power level of 250㎽ was input to the dipole antenna). During the tests, the ambient temperature of the laboratory was in the range (22 ± 2) ℃,the relative humidity was in the range (50 ± 20)% and the liquid depth above the ear/grid reference points was above 15 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.



Validation Kit	Dipole Ant. S/N	Frequency (MHz)	Tissue Type	Limit/Measurement (Normalized to 1 W)		
					1 g	10 g
D2450V2	895	2 450	MSL	Recommended Limit (Normalized)	50.90 ± 10 % (45.81 ~ 55.99)	23.60 ± 10 % (21.24 ~ 25.96)
				Measured, 2016-03-22	47.20	22.08

<Table 2.Test System Verification Result>

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10.3 Justification for Extended SAR Dipole Calibrations

Instead of the typical annual calibration recommended by measurement standards, longer calibration intervals of up to three years may be considered when it is demonstrated that the SAR target, impedance and return loss of a dipole have remain stable according to the following requirements

KDB 865664 D01v01r04 requirements

a) return loss : < - 20 dB, within 20 % of previous measurement

b) impedance : within 5Ω from previous measurement.

Dipole Antenna	Head/Body	Date of Measurement	Return Loss (dB)	Δ %	Impedance (Ω)	Δ Ω
D2450V2 SN 895	Body	July 24, 2014	-28.7	4.5	50.6	1.9
		July 23, 2015	-27.4		52.5	

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11. Operation Configurations

Measurements were performed at the lowest, middle and highest channels of the operating band. The EUT was set to maximum power level during all tests and at the beginning of each test the battery was fully charged.

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12. SAR Measurement Procedures

Step 1: Power Reference Measurement
The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift ofthe device under test in the batch process. The Minimum distance of probe sensors to surfacedetermines the closest measurement point to phantom surface. The minimum distance of probe sensorsto surface is 2 mm. This distance cannot be smaller than the Distance of sensor calibration points toprobe tip as defined in the probe properties.

Step 2: Area Scan
The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doinga fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASYsoftware can find the maximum locations even in relatively coarse grids. When an Area Scan hasmeasured all reachable points, it computes the field maximal found in the scanned area, within a rangeof the global maximum. The range (in dB) is specified in the standards for compliance testing. Forexample, a 2 dB range is required in IEEE Standard 1528 and IEC 62209 standards, whereby 3 dB is arequirement when compliance is assessed in accordance with the ARIB standard (Japan). If only oneZoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. Forcases where multiple maximums are detected, the number of Zoom Scans has to be increasedaccordingly.

Area Scan Parameters extracted from KDB 865664 D01 SAR Measument 100 MHz to 6 GHz v01r04.

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

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Step 3: Zoom Scan
Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing1 g and 10 g of simulated tissue. The Zoom Scan measures 5x5x7 points within a cube whose base faces are centered on the maxima found in a preceding area scanjob within the same procedure. When the measurement is done, the Zoom Scan evaluates theaveraged SAR for 1 g and 10 g and displays these values next to the job's label.

Zoom Scan Parameters extracted from KDB 865664 D01 SAR Measument 100 MHz to 6 GHz v01r04.

<table>
<tr><th colspan="3"></th><th>≤ 3 GHz</th><th>> 3 GHz</th></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>≤ 2 GHz: ≤ 8 mm
2 – 3 GHz: ≤ 5 mm*</td><td>3 – 4 GHz: ≤ 5 mm*
4 – 6 GHz: ≤ 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>≤ 5 mm</td><td>3 – 4 GHz: ≤ 4 mm
4 – 5 GHz: ≤ 3 mm
5 – 6 GHz: ≤ 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>≤ 4 mm</td><td>3 – 4 GHz: ≤ 3 mm
4 – 5 GHz: ≤ 2.5 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">≤ 1.5·$\Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3 – 4 GHz: ≥ 28 mm
4 – 5 GHz: ≥ 25 mm
5 – 6 GHz: ≥ 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 <u>reported</u> SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

Step 4: Power drift measurement
The Power Drift Measurement measures the field at the same location as the most recent powerreference measurement within the same procedure, and with the same settings. The Power DriftMeasurement gives the field difference in dB from the reading conducted within the last PowerReference Measurement. This allows a user to monitor the power drift of the device under test within abatch process. The measurement procedure is the same as Step 1.

Step 5: Z-Scan
The Z Scan measures points along a vertical straight line. The line runs along the Z-axis of a onedimensionalgrid. In order to get a reasonable extrapolation, the extrapolated distance should not belarger than the step size in Z-direction.

* Z Scan Report on Liquid Measure the height Annex A.4 Liquid Depth photo to replace

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13. Test Equipment Information

Test Platform	SPEAG DASY4 System			
Description	SAR Test System			
Software Reference	DASY4: V4.7,Build80 SEMCAD: V1.8,Build 186			
Hardware Reference				
Equipment	Model	Serial Number	Date of Calibration	Due date of next Calibration
Shield Room	Shield Room	None	N/A	N/A
DASY4 Robot	RX90BL Speag	F05/51E0A1/A01	N/A	N/A
DASY4 Controller	RX90BL Speag	F05/51E0A1/C/01	N/A	N/A
Phantom	2mm Oval Phantom ELI 5	1220	N/A	N/A
Mounting Device	Mounting Device	None	N/A	N/A
DAE	DAE4	666	2015-04-28	2016-04-28
Probe	ES3DV3	3302	2015-05-26	2016-05-26
Dipole Validation Kits	D2450V2	895	2014-07-24	2016-07-24
Network Analyzer	E5071B	MY42403524	2016-02-11	2017-02-11
Dual Directional Coupler	772D	2839A00719	2015-07-14	2016-07-14
Signal Generator	E4438C	MY42080486	2016-01-08	2017-01-08
Power Amplifier	2055BBS3Q7E9I	1005D/C0521	2015-05-22	2016-05-22
LP Filter	LA-30N	40058	2015-07-14	2016-07-14
Dual Power Meter	E4419B	GB43312301	2015-07-14	2016-07-14
Power Sensor	8481H	3318A19377	2015-07-15	2016-07-15
Power Sensor	8481H	3318A19379	2015-07-15	2016-07-15
Dielectric Assessment Kit	DAK-3.5	1078	2015-08-19	2016-08-19
Humidity/Baro/Temp. Data Recorder	MHB-382SD	14036	2015-05-22	2016-05-22

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14. RF Average Conducted Output Power

14.1 Average Conducted Output Power

Channel	0	19	39
Frequency(MHz)	2 402	2 440	2 480
BLE(GFSK)	10.54	10.69	10.50

14.2 Max. tune up power

Mode	Target Power	Tolerance	Max. Allowed Power
BLE(GFSK)	10 dBm	± 1 dB	11 dBm

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15. SAR Test Results

15.1 BLE Body SAR Test Results

Frequency		Average Power (dBm)	Max. tune up power (dBm)	Scaling Factor	EUT Position	Separation Distance (mm)	Measured 1 g SAR (W/kg)	Scaled 1 g SAR (W/kg)	1 g SAR Limit (W/kg)
MHz	Ch.								
2 440	19	10.69	11.00	1.074	Front	0	0.237	**0.255**	1.6
2 440	19	10.69	11.00	1.074	Rear	0	0.097	0.104	
2 440	19	10.69	11.00	1.074	Left	0	0.143	0.154	
2 440	19	10.69	11.00	1.074	Right	0	0.023	0.025	
2 440	19	10.69	11.00	1.074	Top	0	0.015	0.016	
2 440	19	10.69	11.00	1.074	Bottom	0	0.002	0.002	
2 402	0	10.54	11.00	1.112	Front	0	0.223	0.248	
2 480	39	10.50	11.00	1.122	Front	0	0.129	0.145	

<Note>

* SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v06.

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16. Test System Verification Results

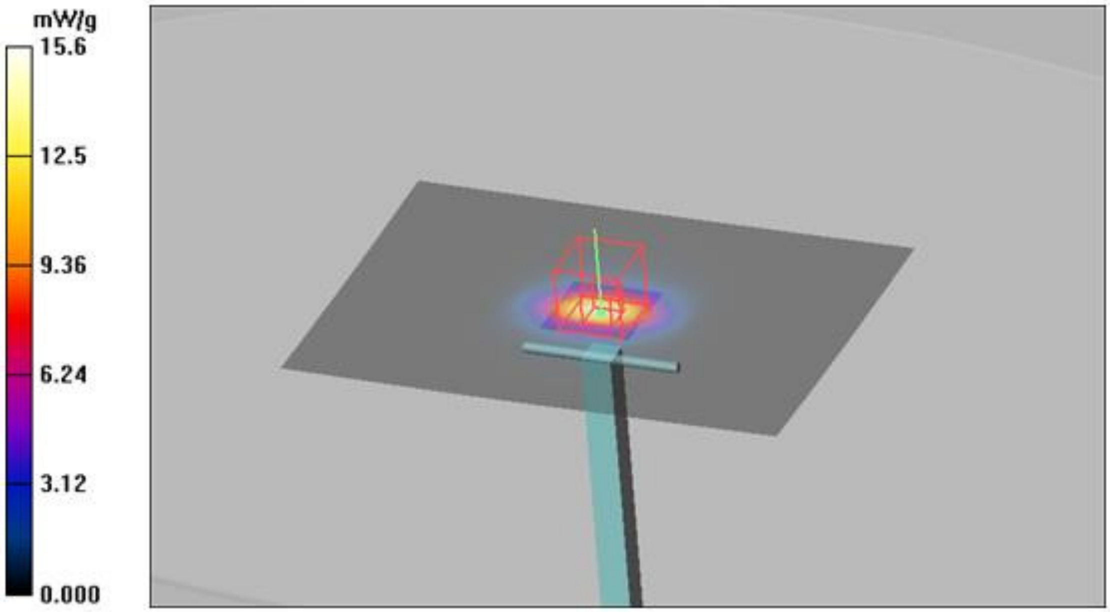
Procedure Name: d=10mm, Pin=250mW

Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.91 mho/m; ε_r = 51.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:

- Probe: ES3DV3 - SN3302; ConvF(4.04, 4.04, 4.04); Calibrated: 2015-05-26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 2015-04-28
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1220
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (101x141x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 15.6 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.2 V/m; Power Drift = 0.013 dB
Peak SAR (extrapolated) = 23.9 W/kg
SAR(1 g) = 11.8 mW/g; SAR(10 g) = 5.52 mW/g
Maximum value of SAR (measured) = 15.3 mW/g



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17. Test Results

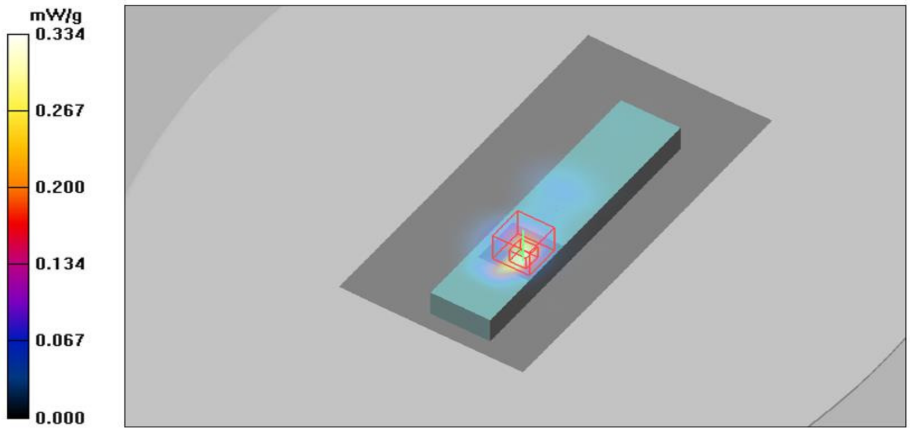
Procedure Name: BLE_f.2 440 Body_Front_0 mm

Frequency: 2440 MHz; Duty Cycle: 1:1
Medium parameters used: f = 2440 MHz; σ = 1.89 mho/m; ε_r = 51.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:

- Probe: ES3DV3 - SN3302; ConvF(4.04, 4.04, 4.04); Calibrated: 2015-05-26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 2015-04-28
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1220
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

BLE_f.2 440 Body_Front_0 mm/Area Scan (91x181x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.334 mW/g

BLE_f.2 440 Body_Front_0 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.53 V/m; Power Drift = -0.011 dB
Peak SAR (extrapolated) = 0.641 W/kg
SAR(1 g) = 0.237 mW/g; SAR(10 g) = 0.094 mW/g
Maximum value of SAR (measured) = 0.335 mW/g



- END OF REPORT -

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