SAR Test Report

FOR:

Manufacturer: Honeywell International Inc.
Model Name: 70eLG0
FCC ID: HD570ELG0
IC ID: 1693B-70E2

Test Report #: SAR_Honey-095-12001_eLG0_FCC_IC

Date of Report: 2013-05-20

ilac-MRA
A2LA ACCREDITED TESTING LABORATORY Certificate #2135.01
CTIA Authorized Test Lab LAB CODE 20020328-00

FCC Listed #: A2LA Accredited

IC Recognized # 3462B-1

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1. Assessment

The following device was evaluated against the limits for general population uncontrolled exposure specified in FCC 2.1093 and RSS 102, Issue 4 according to measurement procedures specified in FCC OET Bulletin 65, Supplement C (Edition 01-01), additional FCC regulation as listed in chapter 5, and IEEE 1528:2003 and no deviations were ascertained during the course of the tests performed.

Company	Description	Model #
Honeywell International Inc.	Dolphin 70e Black Enterprise Digital Assistant (EDA)	70eLG0

Responsible for Testing Laboratory:

Date	Section	Name	Signature
2013-05-20	Compliance	Franz Engert (Compliance Manager)	Digitally signed by Franz Engert DN: cn=Franz Engert, c=US, o=CETECOM, ou=Complience, email=franz.engert@cetecom.com Date: 2013.05.21 14:27:08 -07'00'

Responsible for the Report:

Date	Section	Name	Signature
2013-05-20	Compliance	Zack Gray (Project Engineer)	2013.05.20 18:00:37 -07'00'

The test results of this test report relate exclusively to the test item specified in Section 3.
CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM Inc. USA.

2. Administrative Data

2.1. Identification of the Testing Laboratory Issuing the SAR Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Address:	411 Dixon Landing Road Milpitas, CA 95035 U.S.A.
Telephone:	+1 (408) 586 6200
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Test Lab Manager:	Sajay Jose
Responsible Project Leader:	Zack Gray

2.2. Identification of the Client

Applicant's Name:	Honeywell International Inc
Street Address:	700 Visions Drive
City/Zip Code	Skaneateles Falls, NY 13153
Country	USA
Contact Person:	Michael Robinson
Phone No.	315-554-6387
Fax:	315-554-6393
e-mail:	michael.robinson3@honeywell.com

2.3. Identification of the Manufacturer

Same as above client.

3. Equipment under Test (EUT)

3.1. General Specification of the Equipment under Test

Product Type:	Portable
Prototype/Production:	Pre-Production
RF Exposure Environment:	General / Uncontrolled
Dimensions:	w/ Extended Battery: 133mm x 73mm x 24mm w/ Standard Battery: 133mm x 73mm x 17mm
Exposure Conditions:	Held next to the ear Body-worn accessory
Marketing Name:	Dolphin 70e Black
Model No:	70eLG0
FCC ID:	HD570ELG0
IC ID:	1693B-70E2
Antenna Type:	Tx/Rx Cellular Antenna: Internal Gain: 0 dbi - low band; 2.1 dbi - high band Rx Cellular Antenna: Internal WLAN/Bluetooth Antenna: Internal Gain: 0.7 dbi - 2.4GHz; 3.1 dbi - 5 GHz
Operating Voltage Range:	Vmin: 3.3V/ Vnom: 3.6V/ Vmax: 4.3V
Operating Temperature Range:	–30°C ~ +70°C
Supported Radios:	GSM/GPRS MS Class 10/EGPRS MS Class 12, Power Class 4/1, Mobile Class B WCDMA/HSDPA/HSUPA HSDPA Category 10 data rate - 14.4 Mbps HSUPA Category 6 data rate - 5.76 Mbps CDMA EVDO, Rev A data rate – 3.1 Mbps Bluetooth v2.1 + EDR 802.11 a/b/g/n, HT20 GPS receiver
Dates of Testing:	1/15/2013 – 5/02/2013

3.2. Technical Specification of Supported Radios

Technology	Duty Cycle	Type(s) of Modulation	Band	Transmit Frequency Range (MHz)	Measured Maximum Conducted Output Power (dBm)
GSM	12.5%	GMSK	GSM 850	824.2 – 848.8	33.2
			PCS 1900	1850.2 – 1909.8	30.1
(E)GPRS	1 uplink timeslot: 12.5% 2 uplink timeslots: 25% 3 uplink timeslots: 37.5% 4 uplink timeslots: 50%	GMSK, 8PSK	GSM 850	824.2 – 848.8	33.1
			PCS 1900	1850.2 – 1909.8	30.1
WCDMA	100%	QPSK, 16 QAM	FDD II	1852.4 – 1907.6	23.39
			FDD V	826.4 – 846.6	23.25
CDMA	100%	QPSK, HPSK	Band Class 0	824.7 – 848.31	23.59
			Band Class 1	1851.25 – 1908.75	24.32
Bluetooth	46%	GFSK, π/4 DQPSK, 8DPSK	N/A	2402 – 2480	1.5
802.11 b/g/n	100%	BPSK, QPSK, 16-QAM, 64-QAM	N/A	2412 – 2462	16.92
802.11 a/n	100%	BPSK, QPSK, 16-QAM, 64-QAM	Sub-Band 1	5180 – 5240	15.01
			Sub-Band 2	5260 – 5320	14.81
			Sub-Band 3	5500 – 5700	14.46
			Sub-Band 4	5745 – 5825	14.01

3.3. Identification of the Equipment Under Test (EUT)

EUT #	Serial Number	Model Number	HW Version	SW Version	Comments
1	12359J003B	eLGN[1]	3	40.00	Radiated sample
2	12359J0003	eLGN[1]	3	40.00	Radiated sample
3	12359J003C	eLGN[1]	3	40.00	Radiated sample
4	12359J0015	eLGN[1]	3	40.00	Conducted sample
5	12357J0010	eLG0	3	40.00	No NFC Radiated sample
6	12357J0014	eLG0	3	40.00	No NFC Radiated sample
7	12357J0009	eLG0	3	40.00	No NFC Radiated sample

[1] Results for model elGN are included in this report since full testing was done on that model. The worst-case configurations from those results for each band were tested on the model which this report covers, eLG0.

3.4. Identification of Accessory equipment

AE #	Type	Manufacturer	Model	Comments
1	Holster	Honeywell International Inc.	6000-Holster	Provides approx. 10-15mm separation, Identified as Holster A in Test Results Will not be marketed with EUT, but tests using this accessory can be considered worst case.
2	Holster	Honeywell International Inc.	Holster-1	Provides approx. 20mm separation, identified as Holster #4 in Test Plots
3	6.179 Whr Lithium Ion Battery	Honeywell International Inc.	N/A	Standard Battery
4	12.358 Whr Lithium Ion Battery	Honeywell International Inc.	N/A	Extended Battery

3.5. Maximum SAR values

Band	Exposure Condition	Measured 1g SAR	Maximum Extrapolated 1g SAR[1]
GSM 850	Head	0.311	0.419
	Body-worn Accessory	0.676	1.04
PCS 1900	Head	0.112	0.158
	Body-worn Accessory	0.533	0.788
CDMA BC0	Head	0.24	0.352
	Body-worn Accessory	0.418	0.583
CDMA BC1	Head	0.2	0.264
	Body-worn Accessory	0.666	0.904
WCDMA FDD II	Head	0.195	0.283
	Body-worn Accessory	0.495	0.78
WCDMA FDD V	Head	0.217	0.345
	Body-worn Accessory	0.37	0.553
WLAN	Head	0.128	0.235
	Body-worn Accessory	0.147	0.27
Simultaneous Transmission	Head		0.719
	Body-worn Accessory		1.31

NOTES:
1. Measured 1g SAR extrapolated to manufacturer stated output power upper tolerance limit.

4. Subject of Investigation

The objective of the measurements done by CETECOM Inc. was the dosimetric assessment of the EUT described in section 3. The tests were performed in configurations for devices operated next to a person's body. The examinations were carried out with the dosimetric assessment system DASY52 described in Section 6.

4.1. The IEEE Standard C95.1 , FCC Exposure Criteria, and IC Exposure Criteria

The FCC limits are set by CFR 47 FCC rule parts 1.1307 and 2.1093. The IC limits are set by RSS 102, Issue 4. The limits are derived from the recommendations in IEEE C95.1-1999 (ANSI/IEEE C95.1-1999), "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz."

4.2. SAR Limit

In this report the comparison between the exposure limits and the SAR data is made using the spatial peak SAR.

Having in mind a worst case consideration, the SAR limit is valid for uncontrolled environment and portable transmitters. The SAR values have to be averaged over a mass of 1g (SAR_{1g}) and/or 10g (SAR_{10g}) with the shape of a cube.

Standard	Exposure Condition	Average SAR (W/kg)	Mass Average (g)
OET Bulletin 65C	Partial-Body	1.6	1
RSS 102, Issue 4	Localized Head and Trunk	1.6	1

5. Measurement Procedure

The Federal Communications Commission (FCC) requires routine dosimetric assessment of mobile telecom-communications devices, either by laboratory measurement techniques or by computational modeling, prior to equipment authorization or use. In 2001 the Commission's Office of Engineering and Technology has released Edition 01-01 of Supplement C to OET Bulletin 65. This revised edition, which replaces Edition 97-01, provides additional guidance and information for evaluating compliance of mobile and portable devices with FCC limits for human exposure to radiofrequency emissions. The following KDB Publications have also been used:

447498 D01 V05 – Mobile and portable device RF Exposure Procedures
648474 D04 v01 – SAR Handsets Multi Xmiter and Ant
865664 D01 v01 – SAR Measurement Requirements for 100 MHz to 6 GHz
248227 D01 V01R02 – SAR Measurement Procedures for 802.11 a/b/g Transmitters
941225 D01 V02 – SAR Measurement Procedures for 3G Devices
941225 D03 v01 – Recommended SAR Test Reduction Procedures for GSM/GPRS/EDGE
865664 D02 v01 – SAR Reporting

The Industry Canada (IC) measurement procedure follows RSS-102, Issue 4, March 2010. IC follows many of the same procedures as the FCC regarding EUT specific technologies and form factors. The above FCC KDBs are applied to the IC SAR measurements.

5.1. General Requirements

SAR evaluation was performed in a laboratory with an environment which avoids influence on SAR measurements by ambient EM sources and any reflection from the environment itself. The ambient temperature was in the range of 20°C to 26°C and 30-70% humidity. Simulating liquid temperature did not deviate more than +/- 2°C throughout SAR evaluation.

5.2. Body-worn and Other Configurations

Phantom Requirements
For body-worn and other configurations a flat phantom shall be used which is comprised of material with electrical properties similar to the corresponding tissues.

Test Position
The body-worn configurations shall be tested with the supplied accessories (belt-clips, holsters, etc.) attached to the device in normal use configuration. Devices with a headset output shall be tested with a connected headset.

Test to be Performed
For purpose of determining test requirements, accessories may be divided into two categories: those that do not contain metallic components and those that do. For multiple accessories that do not contain

metallic components, the device may be tested only with that accessory which provides the closest spacing to the body. For multiple accessories that contain metallic components, the device must be tested with each accessory that contains a unique metallic component. If multiple accessories share an identical metallic component, only the accessory that provides the closest spacing to the body must be tested. If the manufacturer provides none body-worn accessories a separation distance of 1.5 cm between the back of the device and the flat phantom is recommended. Other separation distances may be used, but they shall not exceed 2.5 cm. In these cases, the device may use body-worn accessories that provide a separation distance greater than that tested for the device provided however that the accessory contains no metallic components.

For devices with retractable antenna the SAR test shall be performed with the antenna fully extended and fully retracted. Other factors that may affect the exposure shall also be tested. For example, optional antennas or optional battery packs which may significantly change the volume, lengths, flip open/closed, etc. of the device, or any other accessories which might have the potential to considerably increase the peak spatial-average SAR value.

5.3. Procedure for assessing the peak spatial-average SAR

Step 1*:* Power reference measurement:

Prior to the SAR test, a local SAR measurement should be taken at a user-selected spatial reference point to monitor power variations during testing.

Step 2: Area scan

The measurement procedures for evaluating SAR associated with wireless handsets typically start with a coarse measurement grid in order to determine the approximate location of the local peak SAR values. This is referred to as the "area scan" procedure. The SAR distribution is scanned along the inside surface of typically half of the head of the phantom but at least larger than the areas projected (normal to the phantom's surface) by the handset and antenna. An example grid is given in Figure 4. The distance between the measured points and phantom surface should be less than 8 mm, and should remain constant (variation less than ± 1 mm) during the entire scan in order to determine the locations of the local peak SAR with sufficient precision. The distance between the measurement points should enable the detection of the location of local maximum with an accuracy of better than half the linear dimension of the tissue cube after interpolation. The resolution can also be tested using the functions in Annex E (see E.5.2). The approximate locations of the peak SARs should be determined from area scan. Since a given amplitude local peak with steep gradients may produce lower spatial-average SAR than slightly lower amplitude peaks with less steep gradients, it is necessary to evaluate the other peaks as well. However, since the spatial gradients of local SAR peaks are a function of wavelength inside the tissue simulating liquid and incident magnetic field strength, it is not necessary to evaluate peaks that are less than –2dB of the local maximum. Two-dimensional spline algorithms [Press, et al, 1996], [Brishoual, 2001] are typically used to determine the peaks and gradients within the scanned area. If the peak is closer than one-half of the linear dimension of the 1 g or 10 g tissue cube to the scan border, the measurement area should be enlarged if possible, e.g., by tilting the probe or the phantom (see Figure 5).

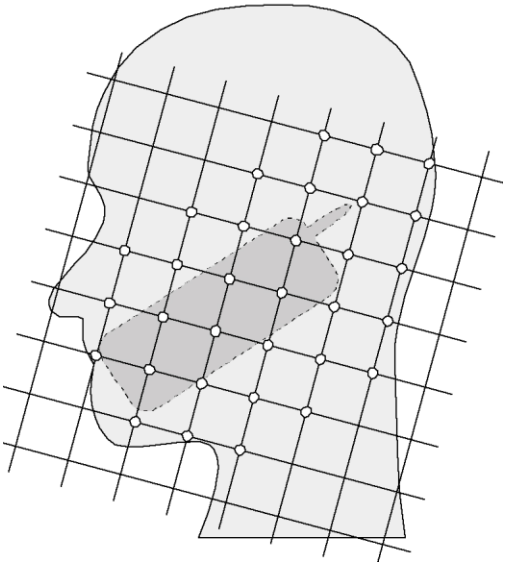

Figure 4 – Example of an area scan including the position of the handset. The scanned area (white dots) should be larger than the area projected by the handset and antenna.

Step 3: Zoom scan

In order to assess the peak spatial SAR values averaged over a 1 g and 10 g cube, fine resolution volume scans, called "zoom scans", are performed at the peak SAR locations determined during the "area scan." The zoom scan volume should have at least 1.5 times the linear dimension of either a 1 g or a 10 g tissue cube for whichever peak spatial-average SAR is being evaluated. The peak local SAR locations that were determined in the area scan (interpolated value) should be on the centerline of the zoom scans. The centerline is the line that is normal to the surface and in the center of the volume scan. If this is not possible, the zoom scan can be shifted but not by more than half the dimension of the 1 g or a 10 g tissue cube.

The maximum spatial-average SAR is determined by a numerical analysis of the SAR values obtained in the volume of the zoom scan, whereby interpolation (between measured points) and extrapolation (between surface and closest measured points) routines should be applied. A 3-D-spline algorithm [Press, et al, 1996], [Kreyszig, 1983], [Brishoual, 2001] can be used for interpolation and a trapezoidal algorithm for the integration (averaging). Scan resolutions of larger than 2 mm can be used provided the uncertainty is evaluated according to E (see E.5).

In some areas of the phantom, such as the jaw and upper head region, the angle of the probe with respect to the line normal to the surface might become large, e.g., at angles larger than ± 30º (see Figure 5), which may increase the boundary effect to an unacceptable level. In these cases, a change in the orientation of the probe and/or the phantom is recommended during the zoom scan so that the angle between the probe housing tube and the line normal to the surface is significantly reduced (<30º).

Step 4: Power reference measurement

The local SAR should be measured at exactly the same location as in Step 1. The absolute value of the measurement drift (the difference between the SAR measured in Step 4 and Step 1) should be recorded in the uncertainty budget. It is recommended that the drift be kept within ± 5%. If this is not possible, even with repeat testing, additional information may be used to demonstrate the power stability during the test. Power reference measurements can be taken after each zoom scan, if more than one zoom scan is needed. However, the drift should always be referred to the initial state with fully charged battery.

5.4. Determination of the largest peak spatial-average SAR

In order to determine the largest value of the peak spatial-average SAR of a handset, all device positions, configurations and operational modes should be tested for each frequency band according to steps 1 to 3 below.

Step 1: The tests of 6.4 should be conducted at the channel that is closest to the center of the transmit frequency band (*fc*) for:

a) all device positions (cheek and tilt, for both left and right sides of the SAM phantom,

b) all configurations for each device position in (a), e.g. antenna extended and retracted, and

c) all operational modes for each device position in (a) and configuration in (b) in each frequency band, e.g. analog and digital.

If more than three frequencies need to be tested, (i.e., Nc > 3), then all frequencies, configurations and modes must be tested for all of the above positions.

Step 2: For the condition providing highest spatial peak SAR determined in Step 1 conduct all tests of 6.4 at all other test frequencies, e.g. lowest and highest frequencies. In addition, for all other conditions (device position, configuration and operational mode) where the spatial peak SAR value determined in Step 1 is within 3dB of the applicable SAR limit, it is recommended that all other test frequencies should be tested as well[1].

Step 3: Examine all data to determine the largest value of the peak spatial-average SAR found in Steps 1 to 2.

6. The Measurement System

6.1. Robot system specification

The SAR measurement system being used is the SPEAG DASY52 system, which consists of a Stäubli TX90XL 6-axis robot arm and CS8c controller, SPEAG SAR Probe, Data Acquisition Electronics, and SAM Twin Phantom. The robot is used to articulate the probe to programmed positions inside the phantom to obtain the SAR readings from the EUT.

The system is controlled remotely from a PC, which contains the software to control the robot and data acquisition equipment. The software also displays the data obtained from test scans.

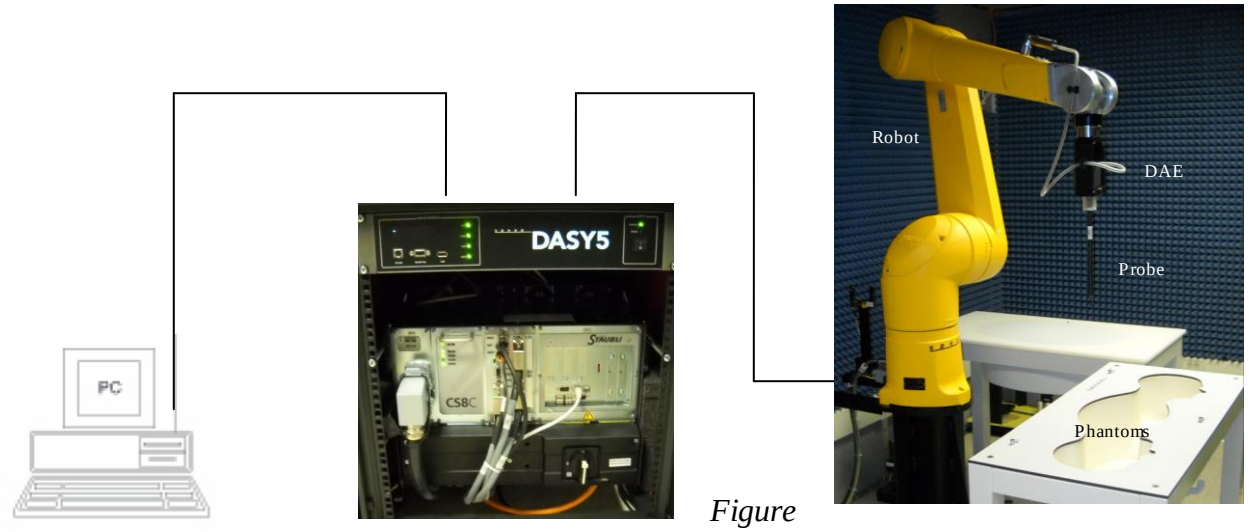

Figure 5: Schematic diagram of the SAR measurement system

In operation, the system first does an area (2D) scan at a fixed depth within the liquid from the inside wall of the phantom. When the maximum SAR point has been found, the system will then carry out a 3D scan centered at that point to determine volume averaged SAR level.

6.2. Isotropic E-Field Probe for Dosimetric Measurements

The probes are constructed using three orthogonal dipole sensors arranged on an interlocking, triangular prism core. The probes have built-in shielding against static charges and are contained within a PEEK cylindrical enclosure material at the tip. Probe calibration is described in the probe's calibration certificate.

6.3. Data Acquisition Electronics

The DAE contains a signal amplifier, multiplexer, 16bit A/D converter and control logic. It uses an optical link for communication with the DASY5 system. The DAE has a dynamic range of -100 to 300 mV. It also contains a two step probe touch detector for mechanical surface detection and emergency robot stop.

6.4. Phantoms

The Twin SAM V4.0 Phantom is designed to specifications 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.

Additionally, the Oval Flat ELI V4.0 Phantom is designed to specification defined in IEEE 1528, and IEC 62209-2. It enables the dosimetric evaluation of body mounted usage.

6.5. Interpolation and Extrapolation schemes

The interpolation, extrapolation and maximum search routines are all based on the modifed Quadratic Shepard's method. The interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation. The routines construct a once-continuously differentiable function that interpolates the measurement values.

7. Uncertainty Assessment

Measurement uncertainty values were evaluated for SAR measurements performed by Cetecom Inc. The uncertainty values for components specified in *FCC Supplement C (01-01) to OET Bulletin 65 (97-01)* were evaluated according to the procedures of *IEEE 1528-200X December 29, 2002, NIST 1297 1994 edition and ISO Guide to the Expression of Uncertainty in Measurements (GUM)*.

7.1. Measurement Uncertainty Budget

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g = c x f / e*	*k*
Uncertainty Component	**Sec.**	**Tol. (± %)**	**Prob. Dist.**	**Div.**	**c_i (1-g)**	**1-g u_i (±%)**	**v_i**
Measurement System							
Probe Calibration	E2.1	5.5	N	1	1	5.5	∞
Axial Isotropy	E2.2	4.7	R	√3	0.7	1.9	∞
Hemispherical Isotropy	E2.2	9.6	R	√3	0.7	3.9	∞
Boundary Effect	E2.3	1.0	R	√3	1	0.6	∞
Linearity	E2.4	4.7	R	√3	1	2.7	∞
System Detection Limits	E2.5	1.0	R	√3	1	0.6	∞
Readout Electronics	E2.6	0.3	N	1	1	0.3	∞
Response Time	E2.7	0.8	R	√3	1	0.5	∞
Integration Time	E2.8	2.6	R	√3	1	1.5	∞
RF Ambient Noise	E6.1	3.0	R	√3	1	1.7	∞
RF Ambient Reflections	E6.1	3.0	R	√3	1	1.7	∞
Probe Positioner Mechanical Tolerance	E6.2	0.4	R	√3	1	0.2	∞
Probe Positioning with respect to Phantom Shell	E6.3	2.9	R	√3	1	1.7	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E5.2	1.0	R	√3	1	0.6	∞
Test sample Related							
Test Sample Positioning	E4.2	2.9	N	1	1	2.9	*145*
Device Holder Uncertainty	E4.1	3.6	N	1	1	3.6	*5*
Output Power Variation - SAR drift measurement	6.6.2	5.0	R	√3	1	2.9	∞
Phantom and Tissue Parameters							
Phantom Uncertainty (shape and thickness tolerances)	E3.1	4.0	R	√3	1	2.3	∞
Liquid Conductivity Target - tolerance	E3.2	5.0	R	√3	0.7	1.8	∞
Liquid Conductivity - measurement uncertainty	E3.3	2.5	N	1	0.7	1.6	∞
Liquid Permittivity Target tolerance	E3.2	5.0	R	√3	0.6	1.7	∞
Liquid Permittivity - measurement uncertainty	E3.3	2.5	N	1	0.6	1.5	∞
Combined Standard Uncertainty			RSS			**± 10.7%**	
Expanded Uncertainty (95% CONFIDENCE INTERVAL)			*k*= 2.00705			**± 21.4%**	

8. Test results summary

8.1. Conducted Average Output Power

Measurement uncertainty for conducted measurements is ±0.5dB

Bluetooth

Average power measured using an average power meter.

Channel	Frequency [MHz]	Average Power [dBm]		
		GFSK	π/4 DQPSK	8-DPSK
0	2402	1.1	-3.9	-3.9
39	2441	0.8	-4.2	-4.2
78	2480	1.5	-3.5	-3.5

WLAN 2.4 GHz

Average power measured using an average power meter.

Channel	Frequency [MHz]	Average Power [dBm]		
		802.11b, 1 Mbps	802.11g, 6 Mbps	802.11n, HT20, 6.5 Mbps
1	2412	16.59	14.95	14.86
6	2437	16.82	15.14	15.02
11	2462	16.92	15.32	15.22
Upper Tolerance [dBm]		19	18	18

WLAN UNII

Average power measured using an average power meter.

Channel	Frequency [MHz]	Average Power [dBm]	
		802.11a, 6 Mbps	802.11n, HT20, 6.5 Mbps
36	5180	15.01	14.89
40	5200	14.93	14.83
44	5220	14.94	14.81
48	5240	14.93	14.81
52	5260	14.81	14.68
56	5280	14.73	14.58
60	5300	14.76	14.63
64	5320	14.72	14.52
100	5500	14.46	14.31
104	5520	14.36	14.12
108	5540	14.23	14.12
112	5560	14.14	14.04
116	5580	14.08	13.96
120	5600	13.94	13.78
124	5620	13.93	13.72
128	5640	13.92	13.76
132	5660	13.94	13.81
136	5680	13.91	13.82
140	5700	14.01	13.82
149	5745	13.99	13.79
153	5765	14.01	13.81
157	5785	13.98	13.87
161	5805	13.94	13.81
165	5825	13.81	13.67
Upper Tolerance [dBm]		17	17

GSM

Average power measured using a Rhode and Schwarz CMU 200.

Band	Channel	Frequency [MHz]	Average Power [dBm]	Upper Tolerance [dBm]
GSM 850	128	824.2	33.2	34.5
	190	836.6	33.2	
	251	848.8	32.6	
PCS 1900	512	1850.2	30.1	31.5
	661	1880	30.1	
	810	1909.8	30	

GSM 850 Band – (E)GPRS

Average power measured using a Rhode and Schwarz CMU 200.

Mode of Operation		Modulation	Channel / Frequency [MHz]						Upper Tolerance [dBm]
			128 / 824.2		190 / 836.6		251 / 848.8		
			Measured Burst Average Power [dBm]	Calculated Time Average Power [dBm]	Measured Burst Average Power [dBm]	Calculated Time Average Power [dBm]	Measured Burst Average Power [dBm]	Calculated Time Average Power [dBm]	
GPRS	1 Uplink Timeslot	GMSK	33.1	24.1	33.2	24.2	32.7	23.6	34.5
GPRS	2 Uplink Timeslots	GMSK	33	27	33	27	32.6	26.5	34.5
GPRS	3 Uplink Timeslots[1]	GMSK	-	-	-	-	-	-	
GPRS	4 Uplink Timeslots[1]	GMSK	-	-	-	-	-	-	
EGPRS	1 Uplink Timeslot	GMSK	33.1	24.1	33.1	24.1	32.6	23.5	34.5
EGPRS	2 Uplink Timeslots	GMSK	33	27	32.9	26.9	32.5	26.4	34.5
EGPRS	3 Uplink Timeslots	GMSK	30.5	26.25	30.2	25.95	30.1	25.85	31.5
EGPRS	4 Uplink Timeslots	GMSK	29.5	26.5	29.1	26.1	29.3	26.3	31
EGPRS	1 Uplink Timeslot	8PSK	27.6	18.6	27.6	18.6	27.5	18.5	28.5
EGPRS	2 Uplink Timeslots	8PSK	27.5	21.5	27.5	21.5	27.5	21.5	28.5
EGPRS	3 Uplink Timeslots	8PSK	27.2	22.95	27.3	23.05	27.2	22.95	28.5
EGPRS	4 Uplink Timeslots	8PSK	27.4	24.3	27.3	24.3	27.3	24.3	28.5

NOTES:

[1] Three and four uplink timeslot configurations are only supported for EGPRS since the EUT supports class 10 GPRS and class 12 EGPRS.

PCS 1900 Band - (E)GPRS

Average power measured using a Rhode and Schwarz CMU 200.

	Mode of Operation	Modulation	Channel / Frequency [MHz]						Upper Tolerance [dBm]
			512 / 1850.2		661 / 1880		810 / 1909.8		
			Measured Burst Average Power [dBm]	Calculated Time Average Power [dBm]	Measured Burst Average Power [dBm]	Calculated Time Average Power [dBm]	Measured Burst Average Power [dBm]	Calculated Time Average Power [dBm]	
GPRS	1 Uplink Timeslot	GMSK	30.1	21.1	30	21	30	21	31.5
GPRS	2 Uplink Timeslots	GMSK	29.9	23.9	29.8	23.8	29.8	23.8	31.5
GPRS	3 Uplink Timeslots[1]	GMSK	-	-	-	-	-	-	
GPRS	4 Uplink Timeslots[1]	GMSK	-	-	-	-	-	-	
EGPRS	1 Uplink Timeslot	GMSK	30.1	21.1	30	21	30	21	31.5
EGPRS	2 Uplink Timeslots	GMSK	29.9	23.9	29.8	23.8	29.8	23.8	31.5
EGPRS	3 Uplink Timeslots	GMSK	28.2	23.95	27.5	23.15	28.1	23.85	29.5
EGPRS	4 Uplink Timeslots	GMSK	26.5	23.5	26.0	23.0	26.4	23.4	28
EGPRS	1 Uplink Timeslot	8PSK	26	17	26	17	26.3	17.3	27.5
EGPRS	2 Uplink Timeslots	8PSK	25.8	19.8	25.9	19.9	26.2	20.2	27.5
EGPRS	3 Uplink Timeslots	8PSK	25.8	21.55	25.7	21.45	25.9	21.65	27.5
EGPRS	4 Uplink Timeslots	8PSK	25.7	22.7	25.7	22.7	25.9	22.9	27.5

NOTES:
[1] Three and four uplink timeslot configurations are only supported for EGPRS since the EUT supports class 10 GPRS and class 12 EGPRS.

WCDMA

Average power measured using a Rhode and Schwarz CMU 200.

Band	Channel	Frequency [MHz]	Average Power [dBm]		
			12.2kbps AMR, 3.4kb SRB	12.2kbps RMC	Upper Tolerance
FDD II	9262	1852.4	23.35	23.39	25
	9400	1880	23.03	23.02	
	9538	1907.6	23.34	23.37	
FDD V	4132	826.4	23.08	23.13	
	4183	836.6	23.04	23.08	
	4233	846.6	23.16	23.25	

HSDPA

Settings are according to FCC KDB 941225 D01, "SAR Measurement Procedures for 3G Devices" section "Release 5 HSDPA Data Devices"

Average power measured using a Rhode and Schwarz CMU 200. Reference Rhode and Schwarz application note 1CM72: Operation Guide for HSDPA Test Setup according to 3GPP TS 34.121, section 2.2.

Band	Channel	Frequency [MHz]	Average Power [dBm]			
			Sub-test 1	Sub-test 2	Sub-test 3	Sub-test 4
WCDMA FDD V	4132	826.4	22.72	22.71	22.25	22.24
	4183	836.6	22.45	22.46	22.02	22.09
	4233	846.6	22.64	22.72	22.21	22.26
WCDMA FDD II	9262	1852.4	22.67	22.27	22.27	22.36
	9400	1880	22.36	22.41	22.04	22.01
	9538	1907.6	22.52	22.68	22.21	22.29

HSUPA

Settings are according to FCC KDB 941225 D01, "SAR Measurement Procedures for 3G Devices" section "Release 6 HSPA Data Devices"

Average power measured using a Rhode and Schwarz CMU 200. Reference Rhode and Schwarz application note 1CM73: Operation Guide for HSUPA Test Setup according to 3GPP TS 34.121, section 2.1 and 2.2.

Band	Channel	Frequency [MHz]	Average Power [dBm]				
			Sub-test 1	Sub-test 2	Sub-test 3	Sub-test 4	Sub-test 5
WCDMA FDD V	4132	826.4	22.57	20.49	21.55	20.51	22.55
	4183	836.6	22.38	20.48	21.34	20.47	22.42
	4233	846.6	22.59	20.53	21.45	20.54	22.57
WCDMA FDD II	9262	1852.4	22.56	20.46	21.44	20.44	22.59
	9400	1880	22.15	20.22	21.40	20.28	22.21
	9538	1907.6	22.56	20.59	21.48	20.54	22.57

CDMA

Average power measured using a Rhode and Schwarz CMU 200.

Band	Channel	Frequency [MHz]	Average Power [dBm]		
			RC3/3, SO55	SO32, SCH0 Disabled	Upper Tolerance
BC0	1013	824.7	23.57	23.59	25
	384	836.6	23.33	23.36	
	777	848.31	23.57	23.55	
BC1	25	1851.25	24.3	24.18	
	600	1880	23.79	23.69	
	1175	1908.75	23.8	23.73	

EVDO

Average power measured using a Rhode and Schwarz CMU 200

Band	Channel	Frequency [MHz]	Average Power [dBm]	
			Rev 0	Rev A
BC0	1013	824.7	23.70	23.72
	384	836.6	23.52	23.51
	777	848.31	23.75	23.71
BC1	25	1851.25	24.15	22.95
	600	1880	23.93	23.26
	1175	1908.75	24.02	23.3

8.2. Stand-Alone SAR Evaluation Exclusion

Antenna	Operation Mode	SAR Evaluation Exclusion Reason
WLAN	802.11g 802.11n HT20	According to KDB 248227, 802.11g and/or 802.11n HT20 is not required when the maximum average output power is < ¼ dB higher than that measured on the corresponding 802.11b channels.
Bluetooth	GFSK π/4 DQPSK 8DPSK	According to KDB 447498, SAR evaluation can be excluded if the following equation is satisfied: [(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] · [$\sqrt{f_{(GHz)}}$] ≤ 3.0 The maximum average output power is 7.08 mW. SAR evaluation is excluded when the minimum separation distance is at least 5mm.
Cellular	GSM 850 band, 8PSK Modulation	According to KDB 941225 and IEEE 1528-2003 footnote 11, SAR evaluation for low-power modes are required for devices that produced a peak SAR larger than one half of the compliance limit. The highest SAR value for GMSK is less than one half of the 1.6 W/kg limit.
Cellular	PCS 1900 band, 8PSK Modulation	According to KDB 941225 and IEEE 1528-2003 footnote 11, SAR evaluation for low-power modes are required for devices that produced a peak SAR larger than one half of the compliance limit. The highest SAR value for GMSK is less than one half of the 1.6 W/kg limit.
Cellular	HSDPA	According to KDB 941225, SAR evaluation is not required when the maximum average output power is < ¼ dB higher than that measured on the corresponding channels without HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2 kbps RMC is less than 1.2 W/kg.
Cellular	HSUPA	According to KDB 941225, SAR evaluation is not required when the maximum average output power is < ¼ dB higher than that measured on the corresponding channels without HSPA using 12.2 kbps RMC and the maximum SAR for 12.2 kbps RMC is less than 1.2 W/kg.
Cellular	EVDO Rev 0	According to KDB 941225, SAR evaluation for EVDO Rev 0 is not required when the maximum average output power is less than ¼ dB higher than in CDMA RC3.
Cellular	EVDO Rev A	According to KDB 941225, SAR evaluation for EVDO Rev A is not required when the maximum average output power is less than ¼ dB higher than in CDMA RC3 or EVDO Rev 0.

8.3. Test Positions and Configurations

Exposure Condition	Distance	Position	Positioning Photo (Appendix B)
Head SAR	0 mm	Left Touch	Photo 3
		Left 15° Tilt	Photo 4
		Right Touch	Photo 5
		Right 15° Tilt	Photo 6
Body-Worn SAR	0 mm	Front of EUT in Holster A (Extended Battery)	Photo 7
		Front of EUT in Holster A (Standard Battery)	Photo 8
		Front of EUT in Holster-1 (Extended Battery)	Photo 9
		Front of EUT in Holster-1 (Standard Battery)	Photo 10
		Back of EUT in Holster A (Extended Battery)	Photo 11
		Back of EUT in Holster A (Standard Battery)	Photo 12
		Back of EUT in Holster-1 (Extended Battery)	Photo 13
		Back of EUT in Holster-1 (Standard Battery)	Photo 14

Three different models were tested. The units are identical aside from the following differences:

-eLGN contains all identified radios and full testing was performed on this unit.
-eLG0 contains all identified radios other than NFC. Spot checks were performed on this unit for the worst-case configurations in all bands.
-eL00 contains only WLAN and Bluetooth radios. Spot checks were performed on this unit for the worst-case configurations in the WLAN bands only.

Body worn accessory SAR testing was initially applied with a Holster labeled in this report as 'Holster-A', providing a distance to body of approx 10-15mm. To reach SAR compliance in certain critical device to body positions (back side towards body, thinner of 2 optional batteries/battery covers) Holster-A was replaced by 'Holster-1' keeping a greater distance to body of approx 20mm,but having an identical metallic spring clip incorporated, at the same position. Since Holster-A with smaller distance to body comprises the more conservative case, re-test of some less critical configurations has been skipped and results overtaken. Full body-worn testing was performed with Holster-1 on the PCS and cellular bands with the highest SAR values (CDMA BC1, GSM 850), with spot checks on the worst case configurations being done in all other bands. Only Holster-1 is being marketed with the EUT.

The device can be equipped with a standard battery and with a higher capacity extended battery, both using different battery covers. Photos 1 and 2 demonstrate the different thickness of the battery covers, and that the standard battery/cover comprises the worst case for the back side to body position, providing less antenna - body distance. Due to its location on the backside and the unchanged position of the antennas it is assumed that the battery options do not have critical impact on the front side to body configuration, nor to head use positions. Consequently, the backside of the device equipped with the thinner standard battery was tested in all bands for body worn accessory.

WLAN is tested with 100% duty cycle. According to SPEAG user manual section 27.2, CW can be assumed which results in crest factor 1.

High and low channels are evaluated for the worst case positions for each band and exposure condition regardless of the SAR value on the middle channel, according to guidance in Industry Canada Notice 2012-DRS1203. FCC only requires high and low channels be evaluated when the SAR value on the middle channel is more than 3 dB below the limit.

For GSM bands, the uplink timeslot configuration with the highest source-based time-averaged output power is used for full SAR evaluation at the middle channel for body exposure positions. Spot check measurements for other uplink timeslot configurations are performed on the position with the highest measured SAR value. Low and high channels are evaluated for the uplink timeslot configuration with the highest SAR value at middle channel.

8.4. SAR Results for Head

GSM 850

Operation Mode	Model	Channel	Frequency (MHz)	Position	SAR 1g (W/kg)	Measured Burst Average Power [dBm]	Upper Tolerance [dBm]	Extrapolated SAR 1g (W/kg)	Results (Appendix A)
GSM	ELGN	190	836.6	Right Touch	0.256	33.2	34.5	0.345	Plot 1
				Right 15° Tilt	0.181	33.2	34.5	0.244	Plot 2
				Left Touch	0.25	33.2	34.5	0.337	Plot 3
				Left 15° Tilt	0.187	33.2	34.5	0.252	Plot 4
	ELGN	128	824.2	Right Touch	0.202	33.2	34.5	0.272	Plot 5
	ELGN	251	848.8	Right Touch	0.268	32.6	34.5	0.415	Plot 6
	ELG0	190	836.6	Right Touch	0.311	33.2	34.5	0.419	Plot 7

GSM 1900

Operation Mode	Model	Channel	Frequency (MHz)	Position	SAR 1g (W/kg)	Measured Burst Average Power [dBm]	Upper Tolerance [dBm]	Extrapolated SAR 1g (W/kg)	Results (Appendix A)
GSM	ELGN	661	1880	Right Touch	0.064	30.1	31.5	0.087	Plot 8
				Right 15° Tilt	0.028	30.1	31.5	0.038	Plot 9
				Left Touch	0.051	30.1	31.5	0.070	Plot 10
				Left 15° Tilt	0.032	30.1	31.5	0.043	Plot 11
	ELGN	512	1850.2	Right Touch	0.054	30.1	31.5	0.074	Plot 12
	ELGN	810	1909.8	Right Touch	0.079	30	31.5	0.111	Plot 13
	ELG0	810	1909.8	Right Touch	0.112	30	31.5	0.158	Plot 14

WCDMA FDD II

Operation Mode	Model	Channel	Frequency (MHz)	Position	SAR 1g (W/kg)	Measured Burst Average Power [dBm]	Upper Tolerance [dBm]	Extrapolated SAR 1g (W/kg)	Results (Appendix A)
12.2 kbps RMC	ELGN	9400	1880	Right Touch	0.161	23.02	25	0.253	Plot 15
				Right 15° Tilt	0.068	23.02	25	0.107	Plot 16
				Left Touch	0.157	23.02	25	0.247	Plot 17
				Left 15° Tilt	0.069	23.02	25	0.108	Plot 18
	ELGN	9262	1850.4	Right Touch	0.16	23.39	25	0.231	Plot 19
	ELGN	9538	1907.6	Right Touch	0.173	23.37	25	0.251	Plot 20
	ELG0	9538	1907.6	Right Touch	0.195	23.37	25	0.283	Plot 21

WCDMA FDD V

Operation Mode	Model	Channel	Frequency (MHz)	Position	SAR 1g (W/kg)	Measured Burst Average Power [dBm]	Upper Tolerance [dBm]	Extrapolated SAR 1g (W/kg)	Results (Appendix A)
12.2 kbps RMC	ELGN	4183	836.6	Right Touch	0.197	23.08	25	0.313	Plot 22
				Right 15° Tilt	0.152	23.08	25	0.242	Plot 23
				Left Touch	0.206	23.08	25	0.327	Plot 24
				Left 15° Tilt	0.151	23.08	25	0.240	Plot 25
	ELGN	4132	826.4	Right Touch	0.267	23.13	25	0.410	Plot 26
	ELGN	4233	846.6	Right Touch	0.264	23.25	25	0.395	Plot 27
	ELG0	4183	836.6	Right Touch	0.217	23.25	25	0.345	Plot 28

CDMA BC0

Operation Mode	Model	Channel	Frequency (MHz)	Position	SAR 1g (W/kg)	Measured Burst Average Power [dBm]	Upper Tolerance [dBm]	Extrapolated SAR 1g (W/kg)	Results (Appendix A)
RC 3/3, SO55	ELGN	384	836.6	Right Touch	0.246	23.33	25	0.361	Plot 29
				Right 15° Tilt	0.201	23.33	25	0.295	Plot 30
				Left Touch	0.249	23.33	25	0.365	Plot 31
				Left 15° Tilt	0.181	23.33	25	0.265	Plot 32
	ELGN	1013	824.7	Right Touch	0.31	23.57	25	0.430	Plot 33
	ELGN	777	848.31	Right Touch	0.323	23.57	25	0.448	Plot 34
	ELG0	384	836.6	Right Touch	0.24	23.33	25	0.352	Plot 35

CDMA BC1

Operation Mode	Model	Channel	Frequency (MHz)	Position	SAR 1g (W/kg)	Measured Burst Average Power [dBm]	Upper Tolerance [dBm]	Extrapolated SAR 1g (W/kg)	Results (Appendix A)
RC 3/3, SO55	ELGN	600	1880	Right Touch	0.216	23.79	25	0.285	Plot 36
				Right 15° Tilt	0.061	23.79	25	0.080	Plot 37
				Left Touch	0.198	23.79	25	0.261	Plot 38
				Left 15° Tilt	0.096	23.79	25	0.126	Plot 39
	ELGN	25	1851.25	Right Touch	0.175	24.3	25	0.205	Plot 40
	ELGN	1175	1908.75	Right Touch	0.187	23.8	25	0.246	Plot 41
	ELG0	600	1880	Right Touch	0.2	23.79	25	0.264	Plot 42

WLAN 802.11b

Operation Mode	Model	Channel	Frequency (MHz)	Position	SAR 1g (W/kg)	Measured Burst Average Power [dBm]	Upper Tolerance [dBm]	Extrapolated SAR 1g (W/kg)	Results (Appendix A)
DSSS with CCK, 1 Mbit/s	ELGN	6	2437	Right Touch	0.037	16.82	19	0.061	Plot 43[1]
				Right 15° Tilt	0.037	16.82	19	0.061	Plot 44[1]
				Left Touch	0.067	16.82	19	0.111	Plot 45[1]
				Left 15° Tilt	0.062	16.82	19	0.102	Plot 46[1]
	ELGN	1	2412	Left Touch	0.055	16.59	19	0.096	Plot 47[1]
	ELGN	11	2462	Left Touch	0.086	16.92	19	0.139	Plot 48[1]
	ELG0	11	2462	Left Touch	0.082	16.92	19	0.132	Plot 49[1]

NOTE:
[1]Area scan based 1-g SAR estimation is used in the indicated plots in accordance with KDB 447498 for configurations which had an estimated SAR value much less than 0.8 W/kg.

WLAN 802.11a

Operation Mode	Model	Channel	Frequency (MHz)	Position	SAR 1g (W/kg)	Measured Burst Average Power [dBm]	Upper Tolerance [dBm]	Extrapolated SAR 1g (W/kg)	Results (Appendix A)
BPSK, 6 Mbit/s	ELGN	36	5180	Right Touch	0.043	15.01	17	0.067	Plot 50[1]
				Right 15° Tilt	0.044	15.01	17	0.07	Plot 51[1]
				Left Touch	0.059	15.01	17	0.093	Plot 52[1]
				Left 15° Tilt	0.056	15.01	17	0.089	Plot 53[1]
	ELGN	48	5240	Left Touch	0.075	14.93	17	0.121	Plot 54[1]
	ELG0	48	5240	Left Touch	0.084	14.93	17	0.135	Plot 55[1]
	ELGN	52	5260	Right Touch	0.061	14.81	17	0.101	Plot 56[1]
				Right 15° Tilt	0.074	14.81	17	0.123	Plot 57[1]
				Left Touch	0.078	14.81	17	0.129	Plot 58[1]
				Left 15° Tilt	0.077	14.81	17	0.127	Plot 59[1]
	ELGN	60	5300	Left Touch	0.097	14.76	17	0.163	Plot 60[1]
	ELG0	60	5300	Left Touch	0.106	14.76	17	0.178	Plot 61[1]
	ELGN	104	5520	Right Touch	0.102	14.36	17	0.187	Plot 62[1]
				Right 15° Tilt	0.112	14.36	17	0.206	Plot 63[1]
				Left Touch	0.12	14.36	17	0.22	Plot 64[1]
				Left 15° Tilt	0.124	14.36	17	0.228	Plot 65[1]
	ELGN	116	5580	Left 15° Tilt	0.099	14.08	17	0.194	Plot 66[1]
	ELGN	140	5700	Left 15° Tilt	0.056	14.01	17	0.111	Plot 67[1]
	ELG0	104	5520	Left 15° Tilt	0.128	14.36	17	0.235	Plot 68[1]
	ELGN	149	5745	Right Touch	0.049	13.99	17	0.098	Plot 69[1]
				Right 15° Tilt	0.047	13.99	17	0.094	Plot 70[1]
				Left Touch	0.079	13.99	17	0.158	Plot 71[1]
				Left 15° Tilt	0.036	13.99	17	0.071	Plot 72[1]
	ELGN	161	5805	Left Touch	0.059	13.94	17	0.12	Plot 73[1]
	ELG0	149	5745	Left Touch	0.097	13.99	17	0.195	Plot 74[1]

NOTE:
[1]Area scan based 1-g SAR estimation is used in the indicated plots in accordance with KDB 447498 for configurations which had an estimated SAR value much less than 0.8 W/kg.

8.5. SAR Results for Body-Worn

GSM 850

Operation Mode is in GPRS using GMSK modulation unless otherwise indicated.

Model / Battery Option	Operation Mode	Channel	Frequency (MHz)	Position	SAR 1g (W/kg)	Measured Burst Average Power [dBm]	Upper Tolerance [dBm]	Extrapolated SAR 1g (W/kg)	Results (Appendix A)
ELGN / Extended	2 Uplink Timeslots	190	836.6	EUT Front in Holster-1, 0mm	0.67	33	34.5	0.946	Plot 75
				EUT Back in Holster-1, 0mm	0.607	33	34.5	0.857	Plot 76
ELGN / Standard	2 Uplink Timeslots	190	836.6	EUT Front in Holster-1, 0mm	0.661	33	34.5	0.933	Plot 77
				EUT Back in Holster-1, 0mm	0.692	33	34.5	0.977	Plot 78
	EGPRS 4 Uplink Timeslots, GMSK	190	836.6	EUT Back in Holster-1, 0mm	0.732	29.1	31	1.13	Plot 79
	EGPRS 3 Uplink Timeslots, GMSK	190	836.6	EUT Back in Holster-1, 0mm	0.518	30.2	31.5	0.698	Plot 80
	1 Uplink Timeslot	190	836.6	EUT Back in Holster-1, 0mm	0.305	33.2	34.5	0.411	Plot 81
	2 Uplink Timeslots	128	824.2	EUT Back in Holster-1, 0mm	0.68	33	34.5	0.960	Plot 82
		251	848.8	EUT Back in Holster-1, 0mm	0.711	32.6	34.5	1.10	Plot 83
ELG0 / Standard	2 Uplink Timeslots	251	848.8	EUT Back in Holster-1, 0mm	0.676	32.6	34.5	1.04	Plot 84

PCS 1900

Operation Mode is in GPRS using GMSK modulation unless otherwise indicated.

Model / Battery Option	Operation Mode	Channel	Frequency (MHz)	Position	SAR 1g (W/kg)	Measured Burst Average Power [dBm]	Upper Tolerance [dBm]	Extrapolated SAR 1g (W/kg)	Results (Appendix A)
ELGN / Extended	2 Uplink Timeslots	661	1880	EUT Front in Holster A, 0mm	0.081	29.8	31.5	0.120	Plot 85
				EUT Back in Holster-1, 0mm	0.325	29.8	31.5	0.481	Plot 86
		512	1850.2	EUT Back in Holster-1, 0mm	0.324	29.9	31.5	0.468	Plot 87
		810	1909.8	EUT Back in Holster-1, 0mm	0.386	29.8	31.5	0.571	Plot 88
	EGPRS 4 Uplink Timeslots, GMSK	661	1880	EUT Back in Holster-1, 0mm	0.324	26.0	28	0.514	Plot 89
	EGPRS 3 Uplink Timeslots, GMSK	661	1880	EUT Back in Holster-1, 0mm	0.32	27.5	29.5	0.507	Plot 90
	1 Uplink Timeslot	661	1880	EUT Back in Holster-1, 0mm	0.167	30	31.5	0.236	Plot 91
ELG0 / Extended	2 Uplink Timeslots	810	1909.8	EUT Back in Holster-1, 0mm	0.348	29.8	31.5	0.515	Plot 92
ELGN / Standard	2 Uplink Timeslots	810	1909.8	EUT Back in Holster-1, 0mm	0.596	29.8	31.5	0.881	Plot 93
ELG0 / Standard		810	1909.8	EUT Back in Holster-1, 0mm	0.533	29.8	31.5	0.788	Plot 94

WCDMA FDD II

Operation Mode	Model / Battery Option	Channel	Frequency (MHz)	Position	SAR 1g (W/kg)	Measured Burst Average Power [dBm]	Upper Tolerance [dBm]	Extrapolated SAR 1g (W/kg)	Results (Appendix A)
12.2 kbps RMC	ELGN / Extended	9400	1880	EUT Front in Holster A, 0mm	0.235	23.02	25	0.370	Plot 95
				EUT Back in Holster-1, 0mm	0.393	23.02	25	0.62	Plot 96
		9262	1850.2	EUT Back in Holster-1, 0mm	0.427	23.39	25	0.619	Plot 97
		9538	1907.6	EUT Back in Holster-1, 0mm	0.375	23.37	25	0.546	Plot 98
	ELG0 / Extended	9400	1880	EUT Back in Holster-1, 0mm	0.411	23.02	25	0.648	Plot 99
	ELGN / Standard	9400	1880	EUT Back in Holster-1, 0mm	0.605	23.02	25	0.954	Plot 100
	ELG0 / Standard	9400	1880	EUT Back in Holster-1, 0mm	0.495	23.02	25	0.780	Plot 101

WCDMA FDD V

Operation Mode	Model / Battery Option	Channel	Frequency (MHz)	Position	SAR 1g (W/kg)	Measured Burst Average Power [dBm]	Upper Tolerance [dBm]	Extrapolated SAR 1g (W/kg)	Results (Appendix A)
12.2 kbps RMC	ELGN / Extended	4183	836.6	EUT Front in Holster A, 0mm	0.236	23.08	25	0.375	Plot 102
				EUT Front in Holster-1, 0mm	0.266	23.08	25	0.423	Plot 103
				EUT Back in Holster A, 0mm	0.191	23.08	25	0.304	Plot 104
		4132	826.4	EUT Front in Holster A, 0mm	0.206	23.13	25	0.316	Plot 105
		4233	846.6	EUT Front in Holster A, 0mm	0.253	23.25	25	0.378	Plot 106
	ELG0 / Extended	4183	836.6	EUT Front in Holster A, 0mm	0.159	23.08	25	0.253	Plot 107
	ELGN / Standard	4183	836.6	EUT Back in Holster-1, 0mm	0.269	23.08	25	0.428	Plot 108
		4233	846.6	EUT Back in Holster-1, 0mm	0.383	23.25	25	0.573	Plot 109
	ELG0 / Standard	4233	846.6	EUT Back in Holster-1, 0mm	0.37	23.25	25	0.553	Plot 110

CDMA BC0

Operation Mode	Model / Battery Option	Channel	Frequency (MHz)	Position	SAR 1g (W/kg)	Measured Burst Average Power [dBm]	Upper Tolerance [dBm]	Extrapolated SAR 1g (W/kg)	Results (Appendix A)
SO32, SCH0 Disabled	ELGN / Extended	384	836.6	EUT Front in Holster A, 0mm	0.252	23.36	25	0.367	Plot 111
				EUT Back in Holster A, 0mm	0.221	23.36	25	0.322	Plot 112
		1013	824.7	EUT Front in Holster A, 0mm	0.265	23.59	25	0.366	Plot 113
		777	848.31	EUT Front in Holster A, 0mm	0.406	23.55	25	0.566	Plot 114
	ELG0 / Extended	384	836.6	EUT Front in Holster A, 0mm	0.294	23.36	25	0.428	Plot 115
	ELGN / Standard	777	848.31	EUT Back in Holster-1, 0mm	0.454	23.55	25	0.633	Plot 116
	ELG0 / Standard	777	848.31	EUT Back in Holster-1, 0mm	0.418	23.55	25	0.583	Plot 117

CDMA BC1

Operation Mode	Model / Battery Option	Channel	Frequency (MHz)	Position	SAR 1g (W/kg)	Measured Burst Average Power [dBm]	Upper Tolerance [dBm]	Extrapolated SAR 1g (W/kg)	Results (Appendix A)
SO32, SCH0 Disabled	ELGN / Extended	600	1880	EUT Front in Holster-1, 0mm	0.112	23.69	25	0.152	Plot 118
				EUT Back in Holster-1, 0mm	0.563	23.69	25	0.764	Plot 119
	ELGN / Standard	600	1880	EUT Back in Holster-1, 0mm	0.693	23.69	25	0.941	Plot 120
		25	1851.25	EUT Back in Holster-1, 0mm	0.728	24.18	25	0.879	Plot 121
		1175	1908.75	EUT Back in Holster-1, 0mm	0.589	23.73	25	0.789	Plot 122
	ELG0 / Standard	600	1880	EUT Back in Holster-1, 0mm	0.666	23.69	25	0.904	Plot 123

802.11b

Operation Mode	Model / Battery Option	Channel	Frequency (MHz)	Position	SAR 1g (W/kg)	Measured Burst Average Power [dBm]	Upper Tolerance [dBm]	Extrapolated SAR 1g (W/kg)	Results (Appendix A)
DSSS with CCK, 1 Mbit/s	ELGN / Extended	6	2437	EUT Front in Holster A, 0mm	0.048	16.82	19	0.079	Plot 124[1]
				EUT Back in Holster A, 0mm	0.051	16.82	19	0.084	Plot 125[1]
		1	2412	EUT Back in Holster A, 0mm	0.042	16.59	19	0.073	Plot 126[1]
		11	2462	EUT Back in Holster A, 0mm	0.069	16.92	19	0.111	Plot 127[1]
	ELG0 / Extended	6	2437	EUT Back in Holster A, 0mm	0.063	16.82	19	0.104	Plot 128[1]
	ELGN / Standard	6	2437	EUT Back in Holster-1, 0mm	0.033	16.82	19	0.054	Plot 129
	ELG0 / Standard	6	2437	EUT Back in Holster-1, 0mm	0.028	16.82	19	0.046	Plot 130

NOTE:
[1]Area scan based 1-g SAR estimation is used in the indicated plots in accordance with KDB 447498 for configurations which had an estimated SAR value much less than 0.8 W/kg.

802.11a

Operation Mode	Model / Battery Option	Channel	Frequency (MHz)	Position	SAR 1g (W/kg)	Measured Burst Average Power [dBm]	Upper Tolerance [dBm]	Extrapolated SAR 1g (W/kg)	Results (Appendix A)
BPSK, 6 Mbit/s	ELGN / Extended	36	5180	EUT Front in Holster A, 0mm	0.018	15.01	17	0.028	Plot 131[1]
				EUT Back in Holster A, 0mm	0.063	15.01	17	0.10	Plot 132[1]
		48	5240	EUT Back in Holster A, 0mm	0.069	14.93	17	0.111	Plot 133[1]
		52	5260	EUT Front in Holster A, 0mm	0.033	14.81	17	0.053	Plot 134[1]
				EUT Back in Holster A, 0mm	0.071	14.81	17	0.117	Plot 135[1]
		60	5300	EUT Back in Holster A, 0mm	0.087	14.76	17	0.145	Plot 136[1]
		104	5520	EUT Front in Holster A, 0mm	0.044	14.36	17	0.081	Plot 137[1]
				EUT Back in Holster A, 0mm	0.097	14.36	17	0.178	Plot 138[1]
		116	5580	EUT Back in Holster A, 0mm	0.085	14.08	17	0.167	Plot 139[1]
		140	5700	EUT Back in Holster A, 0mm	0.049	14.01	17	0.097	Plot 140[1]
		149	5745	EUT Front in Holster A, 0mm	0.030	13.99	17	0.058	Plot 141[1]
				EUT Back in Holster A, 0mm	0.048	13.99	17	0.096	Plot 142[1]
		161	5805	EUT Back in Holster A, 0mm	0.046	13.94	17	0.091	Plot 143[1]

NOTE:
[1]Area scan based 1-g SAR estimation is used in the indicated plots in accordance with KDB 447498 for configurations which had an estimated SAR value much less than 0.8 W/kg.

802.11a (continued)

Operation Mode	Model / Battery Option	Channel	Frequency (MHz)	Position	SAR 1g (W/kg)	Measured Burst Average Power [dBm]	Upper Tolerance [dBm]	Extrapolated SAR 1g (W/kg)	Results (Appendix A)
BPSK, 6 Mbit/s	ELG0 / Extended	48	5240	EUT Back in Holster A, 0mm	0.082	14.93	17	0.13	Plot 144[1]
		60	5300	EUT Back in Holster A, 0mm	0.086	14.76	17	0.142	Plot 145[1]
		104	5520	EUT Back in Holster A, 0mm	0.147	14.36	17	0.27	Plot 146[1]
		104	5520	EUT Back in Holster A, 0mm	0.111	14.36	17	0.204	Plot 147
		149	5745	EUT Back in Holster A, 0mm	0.064	13.99	17	0.126	Plot 148[1]
	ELGN / Standard	48	5240	EUT Back in Holster-1, 0mm	0.112	14.93	17	0.18	Plot 149[1]
		60	5300	EUT Back in Holster-1, 0mm	0.105	14.76	17	0.176	Plot 150[1]
		104	5520	EUT Back in Holster-1, 0mm	0.108	14.36	17	0.198	Plot 151[1]
		149	5745	EUT Back in Holster-1, 0mm	0.061	13.99	17	0.122	Plot 152[1]
	ELG0 / Standard	104	5520	EUT Back in Holster-1, 0mm	0.125	14.36	17	0.23	Plot 153

NOTE:
[1]Area scan based 1-g SAR estimation is used in the indicated plots in accordance with KDB 447498 for configurations which had an estimated SAR value much less than 0.8 W/kg.

8.6. Simultaneous Transmission SAR Evaluation Consideration

According to KDB 648474, SAR evaluation for simultaneous transmission can be excluded when specific requirements are satisfied.

Exposure Condition	Antenna	Highest Extrapolated SAR 1g (W/kg)
Head SAR	WLAN	0.235
	Bluetooth[1]	0.30
	Cellular	0.419
Body SAR	WLAN	0.27
	Bluetooth[1]	0.074
	Cellular	1.04

1. Bluetooth SAR for simultaneous SAR evaluation is estimated according to KDB 447498 by the equation:

Estimated SAR = (max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]·[√f(GHz)/x] W/kg where x = 7.5 for 1-g SAR

A test separation distance of 5mm is used for Head SAR and 20mm is used for Body SAR. A max bluetooth frequency of f=2.48 GHz is used and a power of 7.08mW for the bluetooth upper tolerance of 8.5 dBm.

Exposure Condition	Simultaneous Transmission Antenna Combinations	SAR Peak Location Separation Distance (Ri) [mm]	Sum of SAR 1g (W/kg)	SAR to Peak Location Separation Ratio[1, 2]
Head SAR	WLAN and Cellular	N/A	0.654	N/A
	Bluetooth and Cellular	N/A	0.719	N/A
Body SAR	WLAN and Cellular	N/A	1.31	N/A
	Bluetooth and Cellular	N/A	1.11	N/A

1. SAR to Peak Location Separation Ratio is only calculated if the Sum of SAR 1g (W/kg) is equal to or greater than 1.6 W/kg.
2. SAR to Peak Location Separation Ratio is calculated as $(SAR_1 + SAR_2)^{1.5}/R_i$, where R_i is the separation distance between the peak SAR locations.

Exposure Condition	Simultaneous Transmission Antenna Combinations	Simultaneous Transmission SAR Evaluation Exclusion Reason
Head SAR	WLAN and Cellular	Sum of SAR 1g is less than 1.6 W/kg
	Bluetooth and Cellular	Sum of SAR 1g is less than 1.6 W/kg
Body SAR	WLAN and Cellular	Sum of SAR 1g is less than 1.6 W/kg
	Bluetooth and Cellular	Sum of SAR 1g is less than 1.6 W/kg

8.7. Dipole verification

Prior to formal testing at each frequency a system verification was performed in accordance with IEEE 1528. The 1 Watt reference SAR value is taken from the SPEAG dipole calibration report as required by FCC KDB 450824 D01. All of the testing described in this report was performed within 24 hours of the system verification. The following results were obtained:

Date	Liquid Type	Frequency (MHz)	CW input at dipole feed (Watts)	1g Zoom Scan SAR (W/kg)[1]	1 Watt reference SAR value (W/kg)	Difference reference SAR value to normalized SAR	1g Area Scan[2] SAR (W / kg)	Difference between Area Scan and Zoom Scan SAR	Results (Appendix A)
2013/01/22	HSL	835	1	9.97	9.47	5.3%	N/A[3]		Plot 154
2013/01/24	HSL	835	1	9.85	9.47	4.0%			Plot 155
2013/01/22	HSL	1900	1	36.6	39.1	-6.4%			Plot 156
2013/01/23	HSL	1900	1	37.1	39.1	-5.1%			Plot 157
2013/01/30	HSL	1900	1	36.9	39.1	-5.6%			Plot 158
2013/04/08	HSL	1900	1	38.7	39.1	-1.0%			Plot 159
2013/01/30	HSL	2450	1	53.5	52.8	1.3%	53.6	0%	Plot 160
2013/01/31	HSL	5200	0.1	79.7	80.3	-0.8%	78.4	-1.6%	Plot 161
2013/02/01	HSL	5800	0.1	78.7	78.9	-0.3%	76.5	-2.8%	Plot 162
2013/02/04	HSL	5200	0.1	75.9	80.3	-5.5%	73.7	-2.9%	Plot 163
2013/02/04	HSL	5800	0.1	78.5	78.9	-0.5%	76.4	-2.7%	Plot 164
2013/01/15	MSL	835	1	10.4	9.57	8.7%	N/A[3]		Plot 165
2013/01/23	MSL	835	1	10.4	9.57	8.7%			Plot 166
2013/02/06	MSL	835	1	10.2	9.57	6.6%			Plot 167
2013/02/07	MSL	835	1	9.96	9.57	4.1%			Plot 168
2013/04/05	MSL	835	1	10.3	9.57	7.6%			Plot 169
2013/01/16	MSL	1900	1	42.6	40.5	5.2%			Plot 170
2013/01/18	MSL	1900	1	42.3	40.5	4.4%			Plot 171
2013/02/07	MSL	1900	1	42.9	40.5	5.9%			Plot 172
2013/02/08	MSL	1900	1	43.5	40.5	7.4%			Plot 173
2013/04/05	MSL	1900	1	37.3	40.5	-7.9%			Plot 174
2013/05/02	MSL	1900	1	38.9	40.5	-4.0%			Plot 175

NOTE:
1. Measured 1g SAR normalized to 1 W.
2. Fast SAR algorithm using polynomial fit as described in KDB 447498 used.
3. Area scan SAR value only applicable to tests which utilize area scan based 1-g SAR estimation. According to KDB 447498, the verification area scan and zoom scan must be within 3% of each other when area scan based 1-g SAR estimation is used.

Date	Liquid Type	Frequency (MHz)	CW input at dipole feed (Watts)	1g Zoom Scan SAR (W/kg)[1]	1 Watt reference SAR value (W/kg)	Difference reference SAR value to normalized SAR	1g Area Scan[2] SAR (W / kg)	Difference between Area Scan and Zoom Scan SAR	Results (Appendix A)
2013/02/04	MSL	2450	1	53	50.9	4.1%	52	-1.9%	Plot 176
2013/04/18	MSL	2450	1	47.8	50.9	-6.1%	N/A[3]		Plot 177
2013/02/11	MSL	5200	0.1	70.0	73.7	-5.0%	68.1	-2.7%	Plot 178
2013/02/11	MSL	5800	0.1	77.0	74.3	3.6%	78.3	1.7%	Plot 179
2013/04/16	MSL	5200	0.1	69.4	73.7	-5.8%	69.6	0%	Plot 180
2013/04/16	MSL	5800	0.1	67.9	74.3	-8.6%	67.5	0%	Plot 181

NOTE:
1. Measured 1g SAR normalized to 1 W.
2. Fast SAR algorithm using polynomial fit as described in KDB 447498 used.
3. Only applicable to tests which utilize area scan based 1-g SAR estimation. According to KDB 447498, the verification area scan and zoom scan must be within 3% of each other when area scan based 1-g SAR estimation is used.

References

1. [IEEE 1999] IEEE Std C95.1-1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz, Inst. of Electrical and Electronics Engineers, Inc., December 1998.

2. [IEEE 2003] IEEE Std 1528-2003: IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head From Wireless Communications Devices: Measurement Techniques. Inst. of Electrical and Electronics Engineers, Inc., December 2003.

3. [NIST 1994] NIST: Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results, Technical Note 1297 (TN1297), United States Department of Commerce Technology Administration, National Institute of Standards and Technology, September 1994.

4. [FCC 2001] Federal Communications Commission: Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields, Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01), FCC, June 2001.

5. [IC 2010] RSS-102: Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands), Industry Canada, Issue 4, March 2010.

6. [IC 2012] Notice 2012-DRS1203: RE: APPLICABILITY OF LATEST FCC RF EXPOSURE KDB PROCEDURES (PUBLICATION DATE: OCTOBER 24, 2012) AND OTHER PROCEDURES, Industry Canada, December 2012

9. Report History

Date	Report Name	Changes to report	Report prepared by
2013-05-20	SAR_HONEY_095-12001_eLG0_FCC_IC	First Version	Z. Gray