SAR EVALUATION REPORT

For

Dynamics Hong Kong Limited

Room F, 16/F, Block1, Golden Dragon Industrial Center, 152-160 Tai Lin Pai Road,Kwai Chung, N.T.

FCC ID: C89-G8

Report Type:	Product Type:
Original Report	MID

Test Engineer: Rocky Xiao

Report Number: RDG150423001-20

Report Date: 2015-05-10

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RF Leader

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Attestation of Test Results		
EUT Information	**Company Name:**	Dynamics Hong Kong Limited
	EUT Description:	MID
	FCC ID:	C89-G8
	Model Number:	G8
	Serial Number:	150423001
	Test Date:	2015-05-08

Frequency	Max. SAR Level(s) Reported	Limit(W/Kg)
GSM 850	0.029 W/kg 1g Head SAR 0.767 W/kg 1g Body SAR	**1. 6**
PCS 1900	0.046 W/kg 1g Head SAR 0.462 W/kg 1g Body SAR	
WCDMA 850	0.084 W/kg 1g Head SAR 0.651 W/kg 1g Body SAR	
WCDMA 1900	0.170 W/kg 1g Head SAR 0.748 W/kg 1g Body SAR	
Wi-Fi	0.129 W/kg 1g Head SAR 0.418 W/kg 1g Body SAR	
Simultaneous	0.299 W/kg 1g Head SAR 1.166 W/kg 1g Body SAR	

Applicable Standards	**ANSI / IEEE C95.1 : 2005** IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fileds,3 kHz to 300 GHz.
	ANSI / IEEE C95.3 : 2002 IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to SuchFields,100 kHz—300 GHz.
	FCC 47 CFR part 2.1093 Radiofrequency radiation exposure evaluation: portable devices
	IEEE1528:2013 IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
	IEC 62209-2: 2010 Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices-Human models, instrumentation, and procedures-Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)
	KDB procedures KDB 447498 D01 General RF Exposure Guidance v05r02. KDB 648474 D04 Handset SAR v01r02. KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r03 KDB 865664 D02 RF Exposure Reporting v01r01 KDB 941225 D01 3G SAR Procedures v03 KDB 941225 D06 Hotspot Mode v02 KDB 616217 D04 SAR for laptop and tablets v01r01

Note: This wireless device has been shown to be capable of compliance for localized specific absorption rate (SAR) for General Population/Uncontrolled Exposure limits specified in ANSI/IEEE Standards and has been tested in accordance with the measurement procedures specified in IEEE 1528-2013 and RF exposure KDB procedures.

The results and statements contained in this report pertain only to the device(s) evaluated.

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	RDG150423001-20	Original Report	2015-05-10

EUT DESCRIPTION

This report has been prepared on behalf of Dynamics Hong Kong Limited and their product, Model: G8 or the EUT (Equipment under Test) as referred to in the rest of this report.

Technical Specification

Product Type	Portable
Exposure Category:	Population / Uncontrolled
Antenna Type(s):	Internal Antenna
Body-Worn Accessories:	Headset
Face-Head Accessories:	None
Multi-slot Class:	Class12
Operation Mode :	GSM Voice, GPRS/EGPRS Data, UMTS Rel 99 (Voice & Data), HSDPA (Rel 6), HSUPA (Rel 6), WiFi Bluetooth
Frequency Band:	GSM 850 : 824-849 MHz(TX) ; 869-894 MHz(RX) PCS 1900: 1850-1910 MHz(TX) ; 1930-1990 MHz(RX) WCDMA850: 824-849 MHz(TX) ; 869-894 MHz(RX) WCDMA1900: 1850-1910 MHz(TX) ; 1930-1990 MHz(RX) WiFi: 2412MHz-2462MHz Bluetooth : 2402MHz-2480MHz
Conducted RF Power:	GSM 850 : 32.92dBm PCS 1900: 30.18 dBm WCDMA 850: 22.27 dBm WCDMA 1900: 22.42 dBm WiFi: 16.74 dBm Bluetooth: 2.52dBm
Dimensions (L*W*H):	189 mm (L) × 112 mm (W) × 14 mm (H)
Power Source:	3.7 V_{DC} Rechargeable Battery
Normal Operation:	Head and Body-worn

Note: the overall diagonal dimension of the EUT is 210mm＞200mm, so test procedures in KDB616217 should be applicable.

REFERENCE, STANDARDS, AND GUILDELINES

FCC:

The Report and Order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 1.6 mW/g as recommended by the ANSI/IEEE standard C95.1-1992 [6] for an uncontrolled environment (Paragraph 65). According to the Supplement C of OET Bulletin 65 “Evaluating Compliance with FCC Guide-lines for Human Exposure to Radio frequency Electromagnetic Fields", released on Jun 29, 2001 by the FCC, the device should be evaluated at maximum output power (radiated from the antenna) under “worst-case” conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

This report describes the methodology and results of experiments performed on wireless data terminal. The objective was to determine if there is RF radiation and if radiation is found, what is the extent of radiation with respect to safety limits. SAR (Specific Absorption Rate) is the measure of RF exposure determined by the amount of RF energy absorbed by human body (or its parts) – to determine how the RF energy couples to the body or head which is a primary health concern for body worn devices. The limit below which the exposure to RF is considered safe by regulatory bodies in North America is 1.6 mW/g average over 1 gram of tissue mass.

CE:

The order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 2 mW/g as recommended by EN62209-1 for an uncontrolled environment. According to the Standard, the device should be evaluated at maximum output power (radiated from the antenna) under “worst-case” conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

This report describes the methodology and results of experiments performed on wireless data terminal. The objective was to determine if there is RF radiation and if radiation is found, what is the extent of radiation with respect to safety limits. SAR (Specific Absorption Rate) is the measure of RF exposure determined by the amount of RF energy absorbed by human body (or its parts) – to determine how the RF energy couples to the body or head which is a primary health concern for body worn devices. The limit below which the exposure to RF is considered safe by regulatory bodies in Europe is 2 mW/g average over 10 gram of tissue mass.

The test configurations were laid out on a specially designed test fixture to ensure the reproducibility of measurements. Each configuration was scanned for SAR. Analysis of each scan was carried out to characterize the above effects in the device.

SAR Limits

FCC Limit (1g Tissue)

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 1 g of tissue)	1.60	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0

CE Limit (10g Tissue)

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 10 g of tissue)	2.0	10
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0

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

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

General Population/Uncontrolled environments Spatial Peak limit 1.6W/kg (FCC) & 2 W/kg (CE) applied to the EUT.

FACILITIES

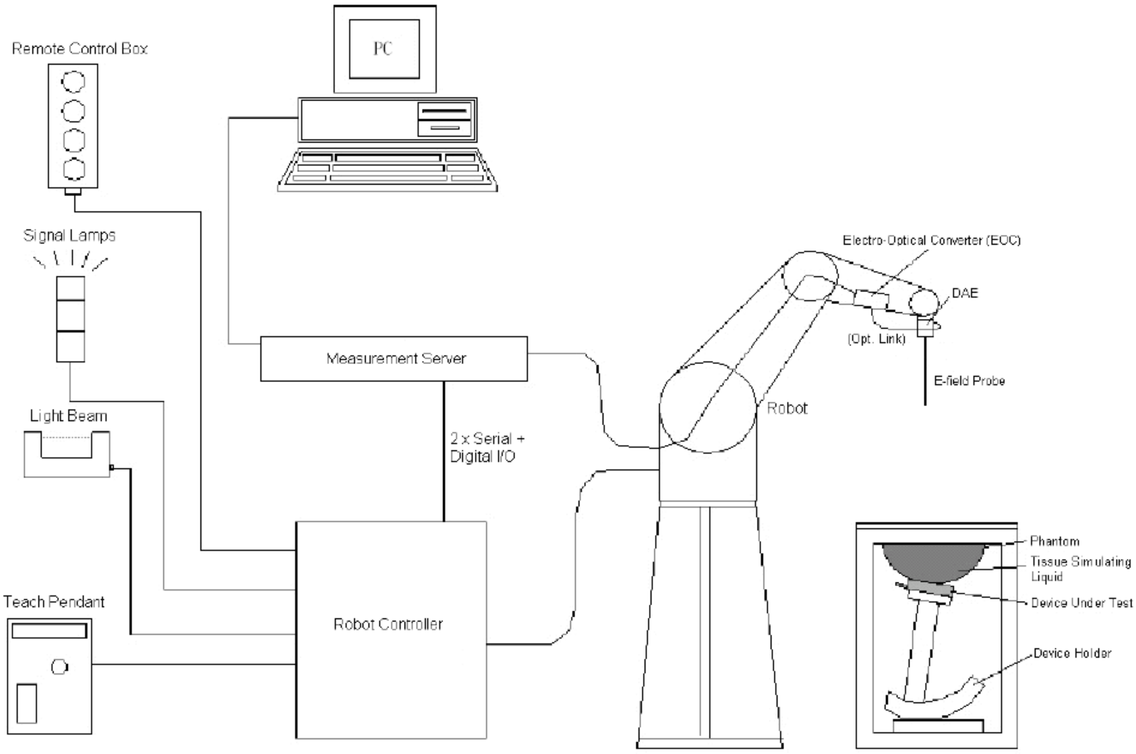
The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

DESCRIPTION OF TEST SYSTEM

These measurements were performed with the automated near-field scanning system DASY5 from Schmid & Partner Engineering AG (SPEAG) which is the Fifth generation of the system shown in the figure hereinafter:

DASY5 System Description

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



- A standard high precision 6-axis robot (Staubli TX=RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplication, 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 from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted 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.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win7 profesional operating system and the DASY52 software.
- 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.

DASY5 Measurement Server

The DASY5 measurement server is based on a PC/104 CPU board with a 400MHz intel ULV Celeron, 128MB chip-disk and 128MB RAM. The necessary circuits for communication with the DAE4 (or DAE3) electronics box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY5 I/O board, which is directly connected to the PC/104 bus of the CPU board.

The measurement server performs all real-time data evaluation of field measurements and surface detection, controls robot movements and handles safety operation. The PC operating system cannot interfere with these time critical processes. All connections are supervised by a watchdog, and disconnection of any of the cables to the measurement server will automatically disarm the robot and disable all program-controlled robot movements. Furthermore, the measurement server is equipped with an expansion port which is reserved for future applications. Please note that this expansion port does not have a standardized point out, and therefore only devices provided by SPEAG can be connected. Devices from any other supplier could seriously damage the measurement server.

Data Acquisition Electronics

The data acquisition electronics (DAE4) consist of a highly sensitive electrometer-grade preamplifer with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock.

The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

The input impedance of both the DAE4 as well as of the DAE3 box is 200MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

EX3DV4 E-Field Probes

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

SAM Twin Phantom

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

_ Left hand
_ Right hand
_ Flat phantom

The phantom table for the DASY systems based on the TX90XL and RX160L robots have the size of 100 x 50 x 85 cm (L xWx H). The phantom table for the compact DASY systems based on the RX60L robot have the size of 100 x 75 x 91 cm (L xWx H); these tables are reinforced for mounting of the robot onto the table. For easy dislocation these tables have fork lift cut outs at the bottom.
The bottom plate contains three pairs of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. Only one device holder is necessary if two phantoms are used (e.g., for different liquids)
A white cover is provided to cover the phantom during o_-periods to prevent water evaporation and changes in the liquid parameters. Free space scans of devices on top of this phantom cover are possible.
Three reference marks are provided on the phantom counter. These reference marks are used to teach the absolute phantom position relative to the robot.

Device Holder for SAM Twin Phantom

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source in 5mm distance, a positioning uncertainty of ±0.5 mm would produce a SAR uncertainty of ±20%. An accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions, in which the devices must be measured, are defined by the standards.

The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation centers for both scales are the ear reference point ERP). Thus the device needs no repositioning when changing the angles.

The DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity "=3 and loss tangent _=0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

Robots

The DASY5 system uses the high precision industrial robots TX90XL from Staubli SA (France). The TX robot family is the successor of the well known RX robot family and offers the same features important for our application:

- High precision (repeatability 0.02mm)
- High reliability (industrial design)
- Low maintenance costs (virtually maintenance free due to direct drive gears; no belt drives)
- Jerk-free straight movements (brushless synchron motors; no stepper motors)
- Low ELF interference (motor control fields shielded via the closed metallic construction shields)

The above mentioned robots are controlled by the Staubli CS8c robot controllers. All information regarding the use and maintenance of the robot arm and the robot controller is contained on the CDs delivered along with the robot. Paper manuals are available upon request direct from Staubli.

Area Scans

Area scans are defined prior to the measurement process being executed with a user defined variable spacing between each measurement point (integral) allowing low uncertainty measurements to be conducted. Scans defined for FCC applications utilize a 10mm2 step integral, with 1mm interpolation used to locate the peak SAR area used for zoom scan assessments.

Where the system identifies multiple SAR peaks (which are within 25% of peak value) the system will provide the user with the option of assessing each peak location individually for zoom scan averaging.

Zoom Scan (Cube Scan Averaging)

The averaging zoom scan volume utilized in the DASY5 software is in the shape of a cube and the side dimension of a 1 g or 10 g mass is dependent on the density of the liquid representing the simulated tissue. A density of 1000 kg/m3 is used to represent the head and body tissue density and not the phantom liquid density, in order to be consistent with the definition of the liquid dielectric properties, i.e. the side length of the 1 g cube is 10mm,with the side length of the 10 g cube 21,5mm.

When the cube intersects with the surface of the phantom, it is oriented so that 3 vertices touch the surface of the shell or the center of a face is tangent to the surface. The face of the cube closest to the surface is modified in order to conform to the tangent surface.

The zoom scan integer steps can be user defined so as to reduce uncertainty, but normal practice for typical test applications (including FCC) utilize a physical step of 5x5x8 (8mmx8mmx5mm) providing a volume of 32mm in the X & Y axis, and 35mm in the Z axis.

Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in P1528.

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

Recommended Tissue Dielectric Parameters for Head and Body

Frequency (MHz)	Head Tissue		Body Tissue	
	εr	σ (S/m)	εr	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800-2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

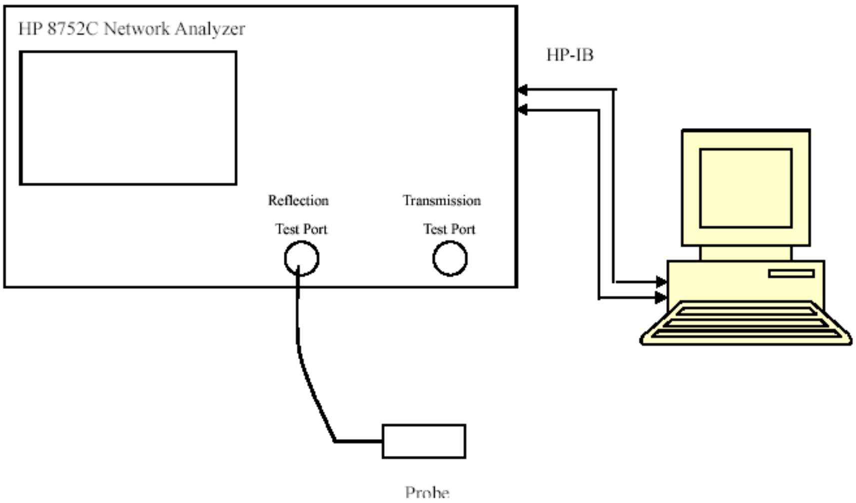
EQUIPMENT LIST AND CALIBRATION

Equipments List & Calibration Information

Equipment	Model	S/N	Calibration Date	Calibration Due Date
Robot	RX90	D03636	N/A	N/A
DASY5 Test Software	DASY52.8	N/A	N/A	N/A
DASY5 Measurement Server	DASY5 4.5.12	1470	N/A	N/A
Data Acquistion Electronics	DAE4	1459	2015-01-26	2016-01-26
E-Field Probe	EX3DV4	7329	2015-02-05	2016-02-05
Dipole, 835MHz	ALS-D-835-S-2	180-00558	2014-10-08	2017-10-08
Dipole,1900MHz	ALS-D-1900-S-2	210-00710	2013-10-09	2016-10-09
Dipole,2450MHz	ALS-D-2450-S-2	220-00758	2013-10-09	2016-10-09
R&S, universal Radio Communication Tester	CMU200	105047	2014-11-20	2015-11-20
Device Holder	MD4HHTV5	SD 000 H01 KA	N/A	N/A
Twin SAM	Twin SAM V5.0	1874	N/A	N/A
Simulated Tissue 835 MHz Head	TS-835-H	201504	Each Time	/
Simulated Tissue 835 MHz Body	TS-835-B	201505	Each Time	/
Simulated Tissue 1900 MHz Head	TS-1900-H	201506	Each Time	/
Simulated Tissue 1900 MHz Body	TS-1900-B	201507	Each Time	/
Simulated Tissue 2450 MHz Head	TS-2450-H	201509	Each Time	/
Simulated Tissue 2450 MHz Body	TS-2450-B	201509	Each Time	/
Network Analyzer	8752C	3140A02356	2014-06-03	2015-06-03
Dielectric probe kit	85070B	US33020324	N/A	N/A
Signal Generator	E4422B	MY41000355	2014-10-27	2015-10-27
Power Meter	EPM-441A	GB37481494	2014-11-03	2015-11-03
Power Meter Sensor	8481A	T-03-EM-127	2014-11-03	2015-11-03
Power Amplifier	5205PE	1015	N/A	N/A
Directional Coupler	488Z	N/A	N/A	N/A
attenuator	20dB, 100W	N/A	N/A	N/A

SAR MEASUREMENT SYSTEM VERIFICATION

Liquid Verification



Liquid Verification Setup Block Diagram

Liquid Verification Results

Frequency	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	Ơ (S/m)	ε_r	Ơ (S/m)	$\Delta\varepsilon_r$	ΔƠ (S/m)	
824.2	Head	42.92	0.88	41.6	0.9	3.17	-2.22	±5
	Body	55.15	0.96	55.2	0.97	-0.09	-1.03	±5
826.4	Head	42.89	0.88	41.5	0.9	3.35	-2.22	±5
	Body	55.13	0.97	55.2	0.97	-0.13	0	±5
836.6	Head	42.86	0.89	41.5	0.9	3.28	-1.11	±5
	Body	55.11	0.98	55.2	0.97	-0.16	1.03	±5
846.6	Head	42.82	0.9	41.5	0.91	3.18	-1.1	±5
	Body	55.02	0.99	55.2	0.97	-0.33	2.06	±5
848.8	Head	42.71	0.9	41.5	0.92	2.92	-2.17	±5
	Body	55	0.99	55.2	0.97	-0.36	2.06	±5
1850.2	Head	39.84	1.36	40	1.4	-0.4	-2.86	±5
	Body	55.28	1.48	53.3	1.52	3.71	-2.63	±5
1852.4	Head	39.86	1.36	40	1.4	-0.35	-2.86	±5
	Body	55.22	1.48	53.3	1.52	3.6	-2.63	±5
1880	Head	39.75	1.39	40	1.4	-0.63	-0.71	±5
	Body	53.72	1.54	53.3	1.52	0.79	1.32	±5
1907.6	Head	39.58	1.41	40	1.4	-1.05	0.71	±5
	Body	53.58	1.49	53.3	1.52	0.53	-1.97	±5
1909.8	Head	39.59	1.41	40	1.4	-1.02	0.71	±5
	Body	53.37	1.49	53.3	1.52	0.13	-1.97	±5
2412	Head	39.36	1.84	39.3	1.77	0.15	3.95	±5
	Body	53.23	1.94	52.8	1.91	0.81	1.57	±5
2437	Head	39.18	1.87	39.2	1.8	-0.05	3.89	±5
	Body	51.66	1.98	52.7	1.94	-1.97	2.06	±5
2462	Head	39.03	1.89	39.2	1.81	-0.43	4.42	±5
	Body	52.18	1.98	52.7	1.97	-0.99	0.51	±5

Liquid Verification was performed on 2015-05-08.

Please refer to the following tables.

835 MHz Head			**835 MHz Body**		
Frequency (MHz)	**e'**	**e''**	**Frequency (MHz)**	**e'**	**e''**
824	42.8961	19.1643	824	55.1388	21.0542
824.5	42.9676	19.1325	824.5	55.1669	20.9472
825	42.9556	19.1375	825	55.1441	21.0086
825.5	42.9151	19.2006	825.5	55.2006	20.971
826	42.9115	19.1389	826	55.1084	21.0416
826.5	42.879	19.1552	826.5	55.1384	21.0232
827	42.9109	19.166	827	55.0254	20.9963
827.5	42.8938	19.1682	827.5	55.164	20.974
828	42.9686	19.2147	828	55.1272	20.9906
828.5	42.9191	19.1821	828.5	55.1849	21.016
829	42.949	19.2356	829	55.1161	20.9332
829.5	42.9273	19.1533	829.5	55.0747	20.9166
830	43	19.1843	830	55.1112	20.9544
830.5	42.9379	19.2105	830.5	55.1094	20.9715
831	42.9382	19.1875	831	55.1098	20.9594
831.5	42.88	19.1802	831.5	55.1522	20.9801
832	42.9625	19.1884	832	55.2012	20.9558
832.5	42.9338	19.2344	832.5	55.0953	20.9287
833	42.9778	19.1969	833	55.1301	20.9286
833.5	42.9182	19.2299	833.5	55.1276	20.9588
834	42.9022	19.2157	834	55.1561	21.0351
834.5	42.8877	19.1994	834.5	55.1029	20.9409
835	42.9608	19.2245	835	55.0951	20.9545
835.5	42.9353	19.1606	835.5	55.0865	20.9949
836	42.9289	19.16	836	55.1208	21.0163
836.5	42.8682	19.1659	836.5	55.1136	20.9774
837	42.8506	19.191	837	55.088	20.9899
837.5	42.8767	19.1882	837.5	55.0273	20.9228
838	42.8653	19.2205	838	55.0965	20.9835
838.5	42.8949	19.1955	838.5	55.1453	21.0042
839	42.9235	19.2051	839	55.0795	20.9679
839.5	42.9142	19.1464	839.5	55.09	21.0198
840	42.922	19.1178	840	55.044	21.0099
840.5	42.8798	19.0849	840.5	55.1667	20.9747
841	42.9024	19.1907	841	55.057	21.0039
841.5	42.8867	19.1351	841.5	55.034	20.973
842	42.8823	19.1014	842	55.0823	20.9611
842.5	42.8158	19.1431	842.5	55	20.9692
843	42.8155	19.0758	843	55.0516	20.9715
843.5	42.8083	19.0805	843.5	55.0144	20.9423
844	42.7999	19.0728	844	55.0752	20.9206
844.5	42.8577	19.0152	844.5	55.0709	21.0242
845	42.7724	19.0743	845	55.0973	20.9617
845.5	42.8262	19.0838	845.5	55.0257	20.9197
846	42.8567	19.0181	846	55.0314	20.9737
846.5	42.8321	19.0106	846.5	55.0175	20.9202
847	42.7516	19.0883	847	55.0143	20.9659
847.5	42.7395	18.9839	847.5	55.0536	20.9833
848	42.7967	19.0065	848	55.0071	20.9954
848.5	42.7151	19.0128	848.5	54.988	20.9148
849	42.7064	18.9598	849	55.0105	20.929

1900 MHz Head			1900 MHz Body		
Frequency (MHz)	e'	e''	Frequency (MHz)	e'	e''
1850	39.8325	13.2123	1850	55.2483	14.3822
1851	39.8792	13.2044	1851	55.3861	14.3577
1852	39.8601	13.1624	1852	55.2493	14.3803
1853	39.8526	13.1506	1853	55.1643	14.2842
1854	39.8799	13.1687	1854	55.0501	14.1531
1855	39.8727	13.2015	1855	55.0792	14.264
1856	39.8551	13.1818	1856	54.924	14.2477
1857	39.9008	13.2032	1857	54.7475	14.165
1858	39.8434	13.1946	1858	54.6447	14.1253
1859	39.8148	13.2024	1859	54.5627	14.0669
1860	39.8244	13.2279	1860	54.4334	14.2001
1861	39.8617	13.2207	1861	54.517	14.0782
1862	39.8913	13.2152	1862	54.3613	14.1149
1863	39.8259	13.1564	1863	54.215	14.1184
1864	39.8233	13.1846	1864	54.1341	14.153
1865	39.8499	13.2108	1865	54.0643	14.1635
1866	39.8002	13.2134	1866	53.9965	14.1512
1867	39.8072	13.2036	1867	53.8845	14.1522
1868	39.8016	13.2236	1868	53.8537	14.214
1869	39.8517	13.2962	1869	53.7179	14.204
1870	39.8521	13.2446	1870	53.7044	14.2835
1871	39.8281	13.2065	1871	53.6563	14.3111
1872	39.7976	13.2006	1872	53.6963	14.3382
1873	39.8068	13.1885	1873	53.6658	14.4295
1874	39.7221	13.257	1874	53.5913	14.4391
1875	39.7797	13.2175	1875	53.6058	14.4863
1876	39.7463	13.2378	1876	53.6339	14.5464
1877	39.7963	13.241	1877	53.6765	14.6488
1878	39.7634	13.2228	1878	53.6046	14.7114
1879	39.7438	13.2363	1879	53.6741	14.6787
1880	39.7478	13.2576	1880	53.7182	14.7567
1881	39.7353	13.2265	1881	53.7584	14.7774
1882	39.7452	13.2699	1882	53.752	14.7996
1883	39.7297	13.2749	1883	53.8197	14.8106
1884	39.7558	13.255	1884	53.8748	14.7764
1885	39.7091	13.3018	1885	53.9724	14.8161
1886	39.692	13.3058	1886	54.1026	14.8038
1887	39.6671	13.2803	1887	54.1433	14.7949
1888	39.6718	13.2667	1888	54.2315	14.8038
1889	39.6833	13.3214	1889	54.2282	14.7068
1890	39.6787	13.3164	1890	54.2634	14.7362
1891	39.6915	13.3027	1891	54.3126	14.7124
1892	39.6881	13.2902	1892	54.3712	14.7144
1893	39.6587	13.3076	1893	54.3807	14.6582
1894	39.6732	13.2921	1894	54.3437	14.6353
1895	39.6217	13.2963	1895	54.3294	14.6178
1896	39.6686	13.3051	1896	54.4592	14.4853
1897	39.6553	13.2951	1897	54.413	14.4766
1898	39.6452	13.3028	1898	54.3975	14.4463
1899	39.6496	13.2794	1899	54.2484	14.387
1900	39.6642	13.3462	1900	54.1987	14.319

1900 MHz Head			1900 MHz Body		
Frequency (MHz)	e'	e''	Frequency (MHz)	e'	e''
1901	39.6626	13.3042	1901	54.1389	14.2787
1902	39.6072	13.3399	1902	54.0503	14.2293
1903	39.6199	13.2716	1903	53.9773	14.2092
1904	39.648	13.341	1904	53.9049	14.1218
1905	39.6477	13.3229	1905	53.8044	14.124
1906	39.5916	13.3622	1906	53.6901	14.1074
1907	39.5625	13.3144	1907	53.6278	14.122
1908	39.5838	13.3109	1908	53.5537	14.0192
1909	39.5781	13.3364	1909	53.4413	14.0126
1910	39.5952	13.306	1910	53.3501	14.0739

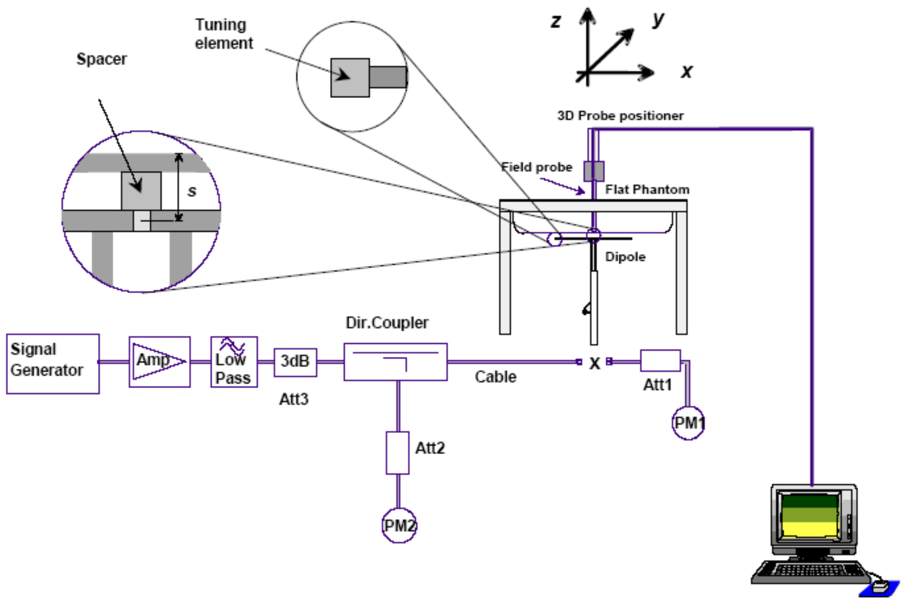
2450 MHz Head					
Frequency (MHz)	e'	e''	Frequency (MHz)	e'	e''
2412	39.3567	13.7383	2443	39.1939	13.8267
2413	39.3037	13.7563	2444	39.1603	13.8193
2414	39.339	13.7104	2445	39.1845	13.8629
2415	39.3258	13.7286	2446	39.1412	13.8289
2416	39.2912	13.7366	2447	39.1306	13.7933
2417	39.3364	13.7495	2448	39.1383	13.8263
2418	39.3401	13.7613	2449	39.1425	13.7959
2419	39.3405	13.7519	2450	39.0999	13.7872
2420	39.3289	13.7646	2451	39.1106	13.8031
2421	39.2595	13.8501	2452	39.1371	13.7841
2422	39.2116	13.8189	2453	39.0956	13.7713
2423	39.2224	13.8594	2454	39.1129	13.7811
2424	39.2007	13.8487	2455	39.0842	13.7914
2425	39.18	13.8476	2456	39.0794	13.8249
2426	39.2072	13.8617	2457	39.0784	13.7715
2427	39.205	13.8526	2458	39.0347	13.8111
2428	39.19	13.8606	2459	39.0708	13.7748
2429	39.1353	13.8636	2460	39.0515	13.8276
2430	39.233	13.8318	2461	39.0728	13.7945
2431	39.2251	13.8701	2462	39.0316	13.8379
2432	39.2404	13.8833	2463	39.0083	13.8162
2433	39.2342	13.8639	2464	38.9976	13.8717
2434	39.2063	13.8738	2465	39.0209	13.8272
2435	39.1968	13.882	2466	38.9878	13.8783
2436	39.1637	13.847	2467	39.0077	13.8565
2437	39.1761	13.8256	2468	38.9895	13.8756
2438	39.1553	13.8502	2469	39.0099	13.883
2439	39.181	13.8697	2470	39.0028	13.9006
2440	39.1834	13.8093	2471	39.0011	13.9329
2441	39.1567	13.8135	2472	38.9538	13.9255
2442	39.1918	13.8075	/	/	/

2450 MHz Body					
Frequency (MHz)	**e'**	**e''**	**Frequency (MHz)**	**e'**	**e''**
2412	53.2337	14.4959	2443	51.7372	14.8633
2413	53.3981	14.4824	2444	51.7997	14.8848
2414	53.2601	14.4393	2445	51.8435	14.9257
2415	53.1537	14.4147	2446	51.863	14.899
2416	53.057	14.3057	2447	51.9864	14.928
2417	53.0482	14.3709	2448	52.0898	14.8871
2418	52.9529	14.4147	2449	52.1248	14.8595
2419	52.776	14.3047	2450	52.2461	14.8869
2420	52.6449	14.2843	2451	52.2229	14.8528
2421	52.5777	14.185	2452	52.2905	14.8479
2422	52.4757	14.3003	2453	52.3326	14.8328
2423	52.4974	14.2576	2454	52.3384	14.8156
2424	52.349	14.2696	2455	52.3514	14.7633
2425	52.1744	14.2756	2456	52.3128	14.7595
2426	52.1561	14.2739	2457	52.3392	14.7652
2427	52.0782	14.3066	2458	52.4426	14.5935
2428	51.9518	14.2443	2459	52.3534	14.6327
2429	51.9103	14.3061	2460	52.4046	14.5486
2430	51.8439	14.3629	2461	52.2553	14.5386
2431	51.7161	14.3173	2462	52.1785	14.4779
2432	51.6816	14.3716	2463	52.1222	14.3998
2433	51.6408	14.432	2464	52.0383	14.3815
2434	51.693	14.4585	2465	51.9889	14.3387
2435	51.6384	14.5425	2466	51.8916	14.2503
2436	51.6087	14.5652	2467	51.8067	14.2803
2437	51.661	14.5904	2468	51.7203	14.2227
2438	51.6256	14.6368	2469	51.6488	14.2312
2439	51.6474	14.6926	2470	51.5453	14.2029
2440	51.5959	14.7925	2471	51.4757	14.157
2441	51.6335	14.7625	2472	51.3523	14.1829
2442	51.7384	14.8529	/	/	/

System Accuracy Verification

Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of ±10%. The validation results are tabulated below. And also the corresponding SAR plot is attached as well in the SAR plots files.

System Verification Setup Block Diagram



System Accuracy Check Results

Date	Frequency Band	Liquid Type	Measured SAR (W/Kg)		Target Value (W/Kg)	Delta (%)	Tolerance (%)
2015/5/8	835	Head	1g	9.87	9.773	0.99	±10
		Body	1g	9.5	9.736	-2.42	±10
	1900	Head	1g	41.8	39.481	5.87	±10
		Body	1g	38.4	39.715	-3.31	±10
	2450	Head	1g	53.8	54.916	-2.03	±10
		Body	1g	49.9	52.418	-4.80	±10

*All SAR values are normalized to 1 Watt forward power.

SAR SYSTEM VALIDATION DATA

Test Laboratory:Bay Area Compliance Labs Corp.(Dongguan)

System Performance 835MHz Head

DUT: Dipole 835 MHz; Type: ALS-D-835-S-2; S/N:180-00558

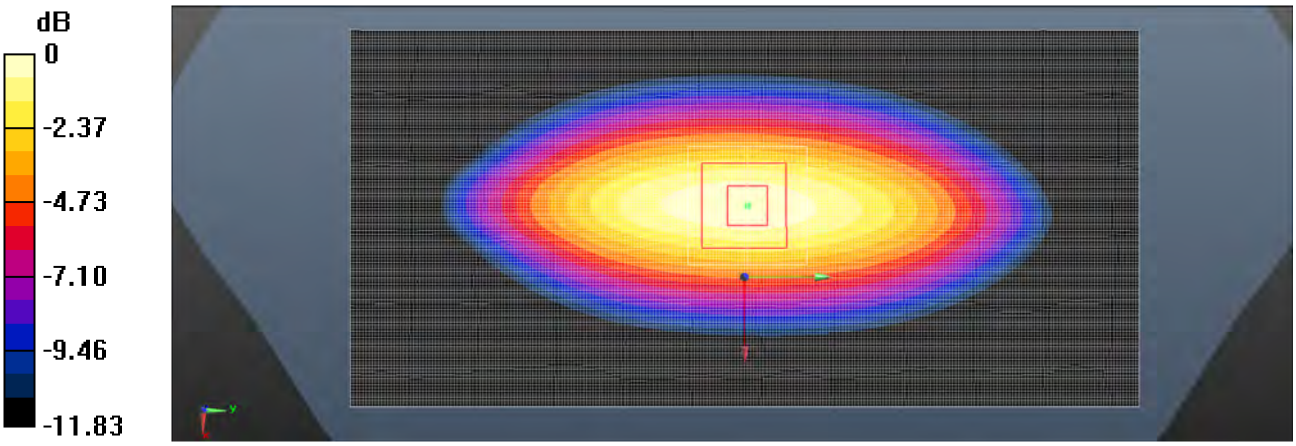
Communication System: CW; Communication System Band: D835 (835.0 MHz); Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.892 S/m; ε_r = 42.961; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.52, 9.52, 9.52); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = -19.0, 31.0
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- DASY52 52.8.8(1222);

SYSTEM CHECK_835 HEAD/Area Scan (121x251x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 10.7 W/kg

SYSTEM CHECK_835 HEAD/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 108.9 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 17.0 W/kg
SAR(1 g) = 9.87 W/kg; SAR(10 g) = 5.91 W/kg
Maximum value of SAR (measured) = 10.9 W/kg



0 dB = 10.9 W/kg = 10.37 dBW/kg

Test Laboratory:Bay Area Compliance Labs Corp.（Dongguan）

System Performance 835MHz Body

DUT: Dipole 835 MHz; Type: ALS-D-835-S-2; S/N:180-00558

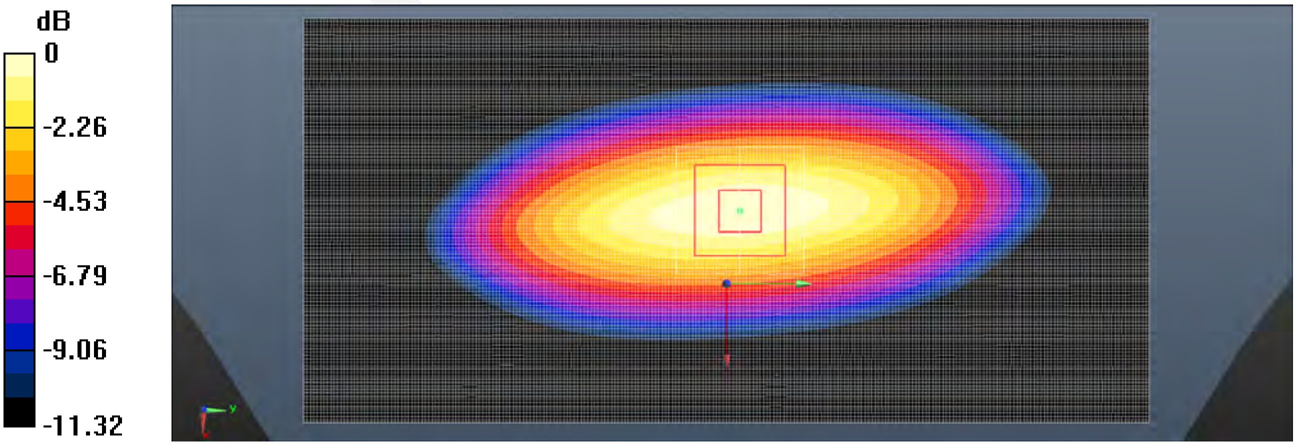
Communication System: CW; Communication System Band: D835 (835.0 MHz); Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.973 S/m; ε_r = 55.095; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.17, 9.17, 9.17); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = -19.0, 31.0
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1745
- DASY52 52.8.8(1222);

SYSTEM CHECK_835 BODY/Area Scan (121x251x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 10.3 W/kg

SYSTEM CHECK_835 BODY/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 102.9 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 16.0 W/kg
SAR(1 g) = 9.5 W/kg; SAR(10 g) = 5.76 W/kg
Maximum value of SAR (measured) = 10.4 W/kg



0 dB = 10.4 W/kg = 10.17 dBW/kg

Test Laboratory:Bay Area Compliance Labs Corp.(Dongguan)

System Performance 1900MHz Head

DUT: Dipole 1900 MHz; Type: ALS-D-1900-S-2; S/N:210-00710

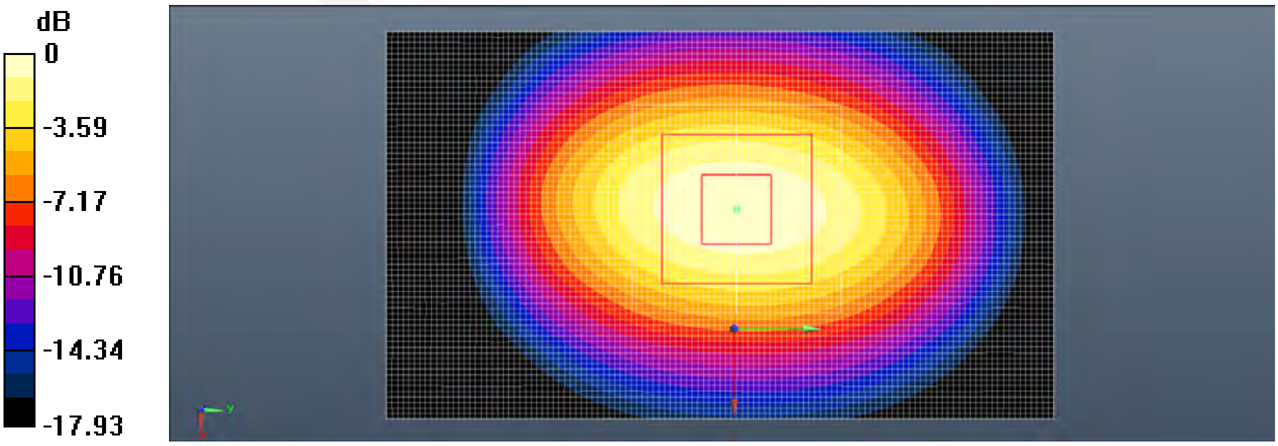
Communication System: CW; Communication System Band: D1900 (1900.0 MHz); Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.396 S/m; ε_r = 39.664; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- DASY52 52.8.8(1222);

SYSTEM CHECK_1900 HEAD/Area Scan (71x121x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 46.8 W/kg

SYSTEM CHECK_1900 HEAD/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 182.9 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 79.9 W/kg
SAR(1 g) = 41.8 W/kg; SAR(10 g) = 21.3 W/kg
Maximum value of SAR (measured) = 47.0 W/kg



0 dB = 47.0 W/kg = 16.72 dBW/kg

Test Laboratory:Bay Area Compliance Labs Corp.（Dongguan）

System Performance 1900MHz Body

DUT: Dipole 1900 MHz; Type: ALS-D-1900-S-2; S/N:210-00710

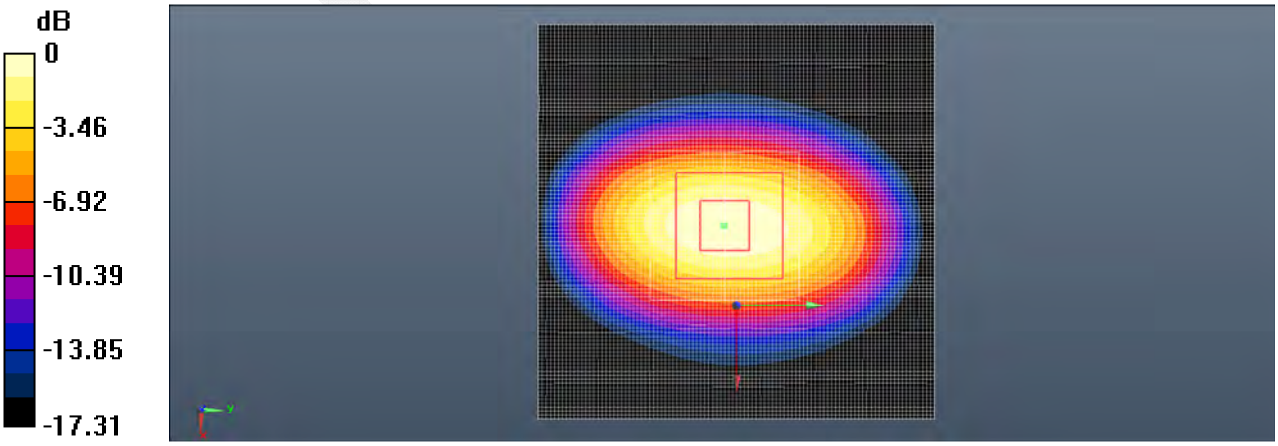
Communication System: CW; Communication System Band: D1900 (1900.0 MHz); Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.515 S/m; ε_r = 54.199; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.56, 7.56, 7.56); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = -19.0, 31.0
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- DASY52 52.8.8(1222);

SYSTEM CHECK_1900 Body /Area Scan (101x101x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 44.1 W/kg

SYSTEM CHECK_1900 Body /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 174.0 V/m; Power Drift = -0.21 dB
Peak SAR (extrapolated) = 72.2 W/kg
SAR(1 g) = 38.4 W/kg; SAR(10 g) = 19.5 W/kg
Maximum value of SAR (measured) = 43.7 W/kg



0 dB = 43.7 W/kg = 16.40 dBW/kg

Test Laboratory:Bay Area Compliance Labs Corp.（Dongguan）

System Performance 2450MHz Head

DUT: Dipole 2450 MHz; Type: ALS-D-2450-S-2; S/N:220-00758

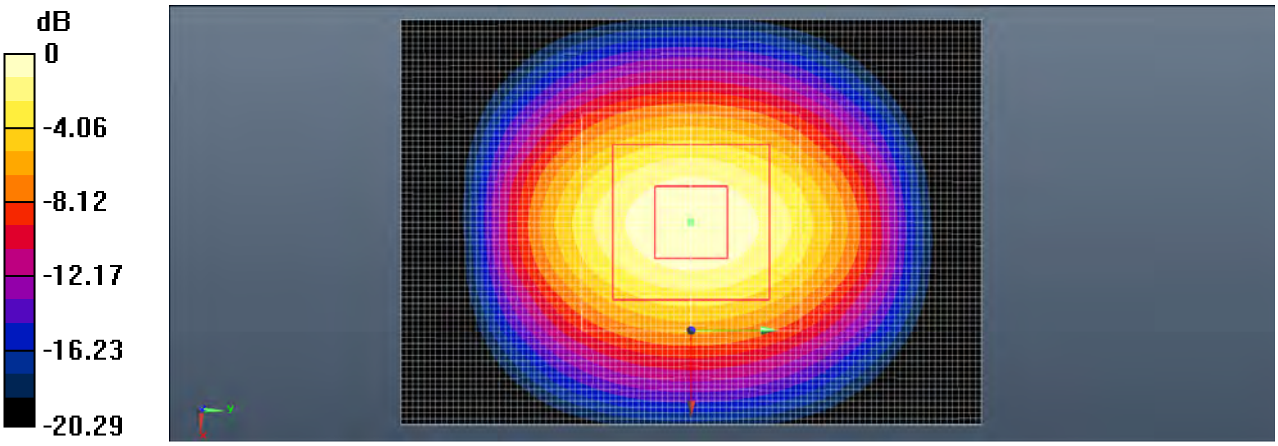
Communication System: CW; Communication System Band: D2450 (2450.0 MHz); Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.881 S/m; ε_r = 39.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.06, 7.06, 7.06); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1745
- DASY52 52.8.8(1222);

SYSTEM CHECK_2450 HEAD/HEAD 2 2 2/Area Scan (71x101x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 62.7 W/kg

SYSTEM CHECK_2450 HEAD/HEAD 2 2 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 178.9 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 116 W/kg
SAR(1 g) = 53.8 W/kg; SAR(10 g) = 24.5 W/kg
Maximum value of SAR (measured) = 62.6 W/kg



0 dB = 62.6 W/kg = 17.97 dBW/kg

Test Laboratory:Bay Area Compliance Labs Corp.（Dongguan）

System Performance 2450MHz Body

DUT: Dipole 2450 MHz; Type: ALS-D-2450-S-2; S/N:220-00758

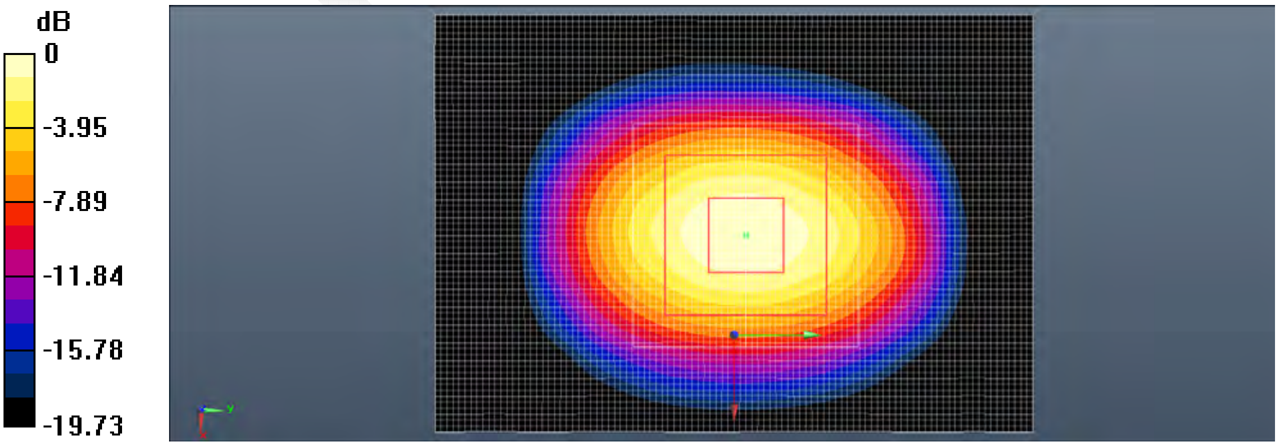
Communication System: CW; Communication System Band: D2450 (2450.0 MHz); Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 2.03 S/m; ε_r = 52.246; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.2, 7.2, 7.2); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- DASY52 52.8.8(1222);

SYSTEM CHECK 2450 BODY/ Area Scan (71x101x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 58.7 W/kg

SYSTEM CHECK 2450 BODY/ Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 159.5 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 108 W/kg
SAR(1 g) = 49.9 W/kg; SAR(10 g) = 22.2 W/kg
Maximum value of SAR (measured) = 59.5 W/kg



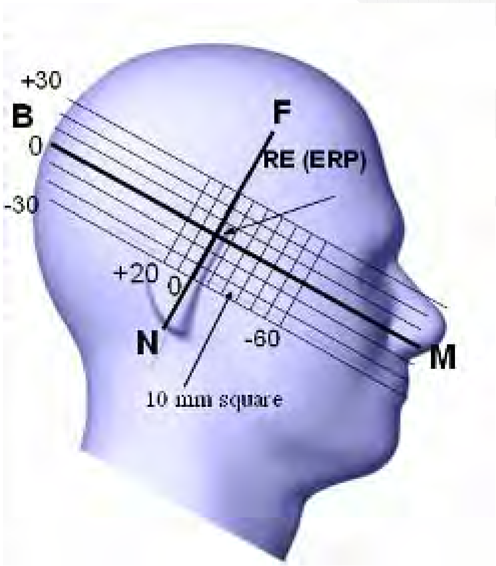
0 dB = 59.5 W/kg = 17.75 dBW/kg

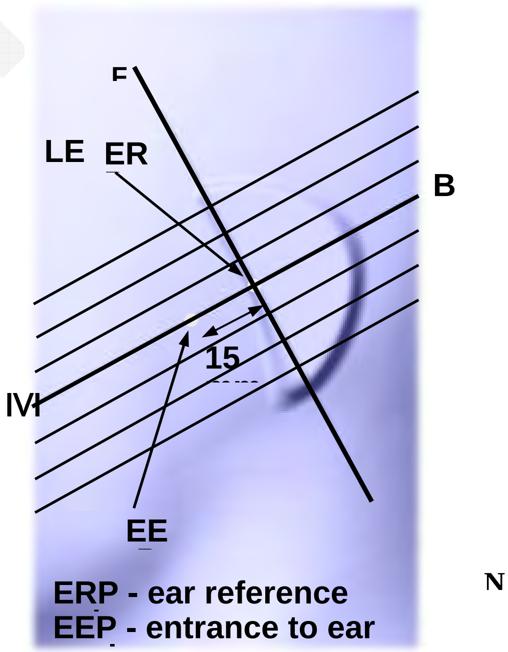
EUT TEST STRATEGY AND METHODOLOGY

Test Positions for Device Operating Next to a Person's Ear

This category includes most wireless handsets with fixed, retractable or internal antennas located toward the top half of the device, with or without a foldout, sliding or similar keypad cover. The handset should have its earpiece located within the upper ¼ of the device, either along the centerline or off-centered, as perceived by its users. This type of handset should be positioned in a normal operating position with the "test device reference point" located along the "vertical centerline" on the front of the device aligned to the "ear reference point". The "test device reference point" should be located at the same level as the center of the earpiece region. The "vertical centerline" should bisect the front surface of the handset at its top and bottom edges. A "ear reference point" is located on the outer surface of the head phantom on each ear spacer. It is located 1.5 cm above the center of the ear canal entrance in the "phantom reference plane" defined by the three lines joining the center of each "ear reference point" (left and right) and the tip of the mouth.

A handset should be initially positioned with the earpiece region pressed against the ear spacer of a head phantom. For the SCC-34/SC-2 head phantom, the device should be positioned parallel to the "N-F" line defined along the base of the ear spacer that contains the "ear reference point". For interim head phantoms, the device should be positioned parallel to the cheek for maximum RF energy coupling. The "test device reference point" is aligned to the "ear reference point" on the head phantom and the "vertical centerline" is aligned to the "phantom reference plane". This is called the "initial ear position". While maintaining these three alignments, the body of the handset is gradually adjusted to each of the following positions for evaluating SAR:





Cheek/Touch Position

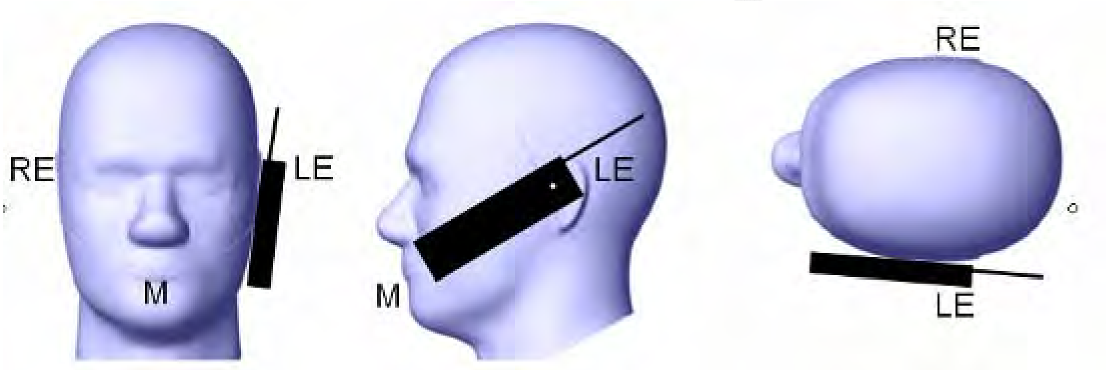
The device is brought toward the mouth of the head phantom by pivoting against the "ear reference point" or along the "N-F" line for the SCC-34/SC-2 head phantom.

This test position is established:

- When any point on the display, keypad or mouthpiece portions of the handset is in contact with the phantom.
- (or) When any portion of a foldout, sliding or similar keypad cover opened to its intended self-adjusting normal use position is in contact with the cheek or mouth of the phantom.

For existing head phantoms – when the handset loses contact with the phantom at the pivoting point, rotation should continue until the device touches the cheek of the phantom or breaks its last contact from the ear spacer.

Cheek /Touch Position



Ear/Tilt Position

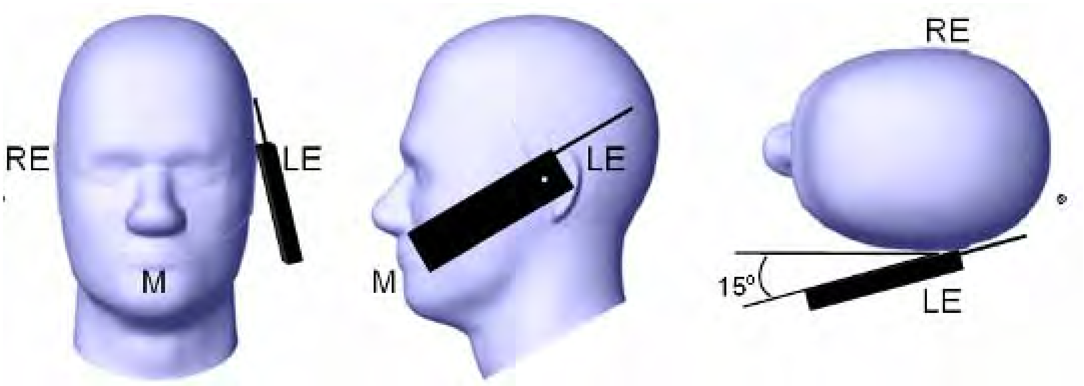
With the handset aligned in the "Cheek/Touch Position":

1) If the earpiece of the handset is not in full contact with the phantom's ear spacer (in the "Cheek/Touch position") and the peak SAR location for the "Cheek/Touch" position is located at the ear spacer region or corresponds to the earpiece region of the handset, the device should be returned to the "initial ear position" by rotating it away from the mouth until the earpiece is in full contact with the ear spacer.

2) (otherwise) The handset should be moved (translated) away from the cheek perpendicular to the line passes through both "ear reference points" (note: one of these ear reference points may not physically exist on a split head model) for approximate 2-3 cm. While it is in this position, the device handset is tilted away from the mouth with respect to the "test device reference point" until the inside angle between the vertical centerline on the front surface of the phone and the horizontal line passing through the ear reference point isby 15 80°. After the tilt, it is then moved (translated) back toward the head perpendicular to the line passes through both "ear reference points" until the device touches the phantom or the ear spacer. If the antenna touches the head first, the positioning process should be repeated with a tilt angle less than 15° so that the device and its antenna would touch the phantom simultaneously. This test position may require a device holder or positioner to achieve the translation and tilting with acceptable positioning repeatability.

If a device is also designed to transmit with its keypad cover closed for operating in the head position, such positions should also be considered in the SAR evaluation. The device should be tested on the left and right side of the head phantom in the "Cheek/Touch" and "Ear/Tilt" positions. When applicable, each configuration should be tested with the antenna in its fully extended and fully retracted positions. These test configurations should be tested at the high, middle and low frequency channels of each operating mode; for example, AMPS, CDMA, and TDMA. If the SAR measured at the middle channel for each test configuration (left, right, Cheek/Touch, Tilt/Ear, extended and retracted) is at least 2.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s). If the transmission band of the test device is less than 10 MHz, testing at the high and low frequency channels is optional.

Ear /Tilt 15° Position



Test positions for body-worn and other configurations

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations. Devices with a headset output should be tested with a headset connected to the device. When multiple accessories that do not contain metallic components are supplied with the device, the device may be tested with only the accessory that dictates the closest spacing to the body. When multiple accessories that contain metallic components are supplied with the device, the device must be tested with each accessory that contains a unique metallic component. If multiple accessories share an identical metallic component (e.g., 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 must be tested.

Body-worn accessories may not always be supplied or available as options for some devices that are intended to be authorized for body-worn use. A separation distance of 1.5 cm between the back of the device and a flat phantom is recommended for testing body-worn SAR compliance under such circumstances. Other separation distances may be used, but they should 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.

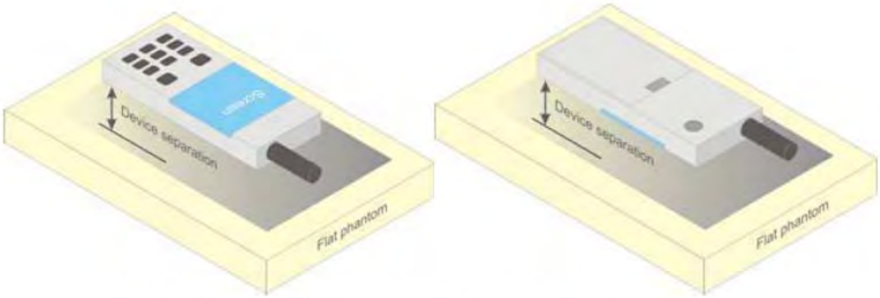


Figure 5 – Test positions for body-worn devices

SAR Evaluation Procedure

The evaluation was performed with the following procedure:

Step 1: Measurement of the SAR value at a fixed location above the ear point or central position was used as a reference value for assessing the power drop. The SAR at this point is measured at the start of the test and then again at the end of the testing.

Step 2: The SAR distribution at the exposed side of the head was measured at a distance of 4 mm from the inner surface of the shell. The area covered the entire dimension of the head or EUT and the horizontal grid spacing was 10 mm x 10 mm. Based on these data, the area of the maximum absorption was determined by spline interpolation. The first Area Scan covers the entire dimension of the EUT to ensure that the hotspot was correctly identified.

Step 3: Around this point, a volume of 35 mm x 35 mm x 35 mm was assessed by measuring 7x 7 x 7 points. On the basis of this data set, the spatial peak SAR value was evaluated under the following procedure:

1) The data at the surface were extrapolated, since the center of the dipoles is 1.2 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.3 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

2) The maximum interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed by the 3D-Spline interpolation algorithm. The 3D-Spline is composed of three one dimensional splines with the “Not a knot"-condition (in x, y and z-directions). The volume was integrated with the trapezoidal-algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the averages.

All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

Step 4: Re-measurement of the SAR value at the same location as in Step 1. If the value changed by more than 5%, the evaluation was repeated.

Test methodology

KDB 447498 D01 General RF Exposure Guidance v05r02.
KDB 648474 D04 Handset SAR v01r02.
KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r03
KDB 865664 D02 RF Exposure Reporting v01r01
KDB 941225 D01 3G SAR Procedures v03
KDB 941225 D06 Hotspot Mode v02

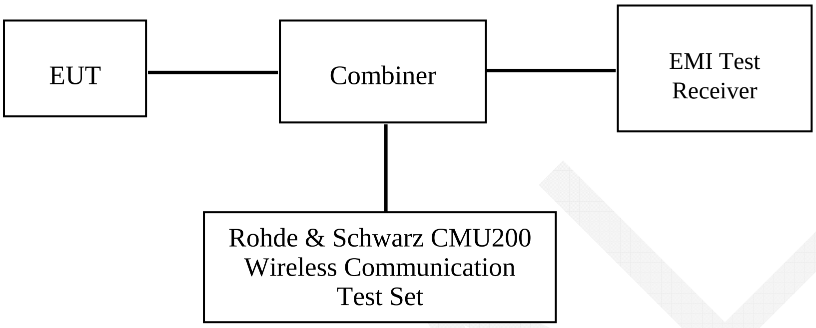
CONDUCTED OUTPUT POWER MEASUREMENT

Provision Applicable

The measured peak output power should be greater and within 5% than EMI measurement.

Test Procedure

The RF output of the transmitter was connected to the input of the EMI Test Receiver through sufficient attenuation.



GSM/ WCDMA

Maximum Output Power among production units

Max Target Power for Production Unit (dBm)			
Mode/Band	Channel		
	Low	Middle	High
GSM 850	33	33	33
GPRS 1 slot	33	33	33
GPRS 2 slot	32	32	32
GPRS 3 slot	30	30	30
GPRS 4 slot	29	29	29
EGPRS 1 slot	26	26	26
EGPRS 2 slot	24	24	24
EGPRS 3 slot	23	23	23
EGPRS 4 slot	22	22	22
PCS 1900	31	31	31
GPRS 1 slot	30	30	30
GPRS 2 slot	29	29	29
GPRS 3 slot	27	27	27
GPRS 4 slot	26	26	26
EGPRS 1 slot	26	26	26
EGPRS 2 slot	24	24	24
EGPRS 3 slot	23	23	23
EGPRS 4 slot	22	22	22
WCDMA Band V	23	23	23
Band V HSDPA	22.5	22.5	22.5
Band V HSUPA	22.5	22.5	22.5
WCDMA Band II	23	23	23
Band II HSDPA	22.5	22.5	22.5
Band II HSUPA	22.5	22.5	22.5
WiFi	17	17	17
Bluetooth	3	3	3

Test Results:

GSM:

Band	Frequency (MHz)	Conducted Output Power	
		Meas. Power (dBm)	Meas. Power (W)
GSM 850	824.2	32.87	1.936
	836.6	**32.92**	**1.959**
	848.8	32.89	1.945
PCS 1900	1850.2	30.13	1.030
	1880	**30.18**	**1.042**
	1909.8	30.04	1.009

GPRS:

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			1 slot	2 slot	3 slots	4 slots
GSM 850	128	824.2	32.26	31.22	29.65	28.73
	190	836.6	32.17	31.09	29.71	28.92
	251	848.8	32.21	31.04	29.52	28.51
PCS 1900	512	1850.2	29.14	28.23	26.44	25.61
	661	1880	29.42	28.58	26.67	25.73
	810	1909.8	29.08	28.07	26.11	25.49

EGPRS:

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			1 slot	2 slot	3 slots	4 slots
GSM 850	128	824.2	25.76	23.64	22.41	21.36
	190	836.6	25.68	23.66	22.53	21.41
	251	848.8	25.72	23.71	22.36	21.13
PCS 1900	512	1850.2	25.37	23.48	22.32	21.19
	661	1880	25.41	23.52	22.33	21.26
	810	1909.8	25.39	23.42	22.20	21.09

For SAR, the time based average power is relevant, the difference in between depends on the duty cycle of the TDMA signal.

Number of Time slot	1	2	3	4
Duty Cycle	1:8	1:4	1:2.66	1:2
Time based Ave. power compared to slotted Ave. power	-9 dB	-6 dB	-4.25 dB	-3 dB
Crest Factor	8	4	2.66	2

The time based average power for GPRS

Band	Channel No.	Frequency (MHz)	Time based average Power (dBm)			
			1 slot	2 slot	3 slots	4 slots
GSM 850	128	824.2	23.26	25.22	25.4	25.73
	190	836.6	23.17	25.09	25.46	**25.92**
	251	848.8	23.21	25.04	25.27	25.51
PCS 1900	512	1850.2	20.14	22.23	22.19	22.61
	661	1880	20.42	22.58	22.42	**22.73**
	810	1909.8	20.08	22.07	21.86	22.49

The time based average power for EGPRS

Band	Channel No.	Frequency (MHz)	Time based average Power (dBm)			
			1 slot	2 slot	3 slots	4 slots
GSM 850	128	824.2	16.76	17.64	18.16	18.36
	190	836.6	16.68	17.66	18.28	18.41
	251	848.8	16.72	17.71	18.11	18.13
PCS 1900	512	1850.2	16.37	17.48	18.07	18.19
	661	1880	16.41	17.52	18.08	18.26
	810	1909.8	16.39	17.42	17.95	18.09

Note:
1. Rohde & Schwarz Radio Communication Tester (CMU200) was used for the measurement of GSM peak and average output power for active timeslots.
2. For GSM voice, 1 timeslot has been activated with power level 5 (850 MHz band) and 0 (1900 MHz band).
3. For GPRS, 1, 2, 3 and 4 timeslots has been activated separately with power level 3(850 MHz band) and 3(1900 MHz band).

WCDMA-Release 99

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification. The EUT has a nominal maximum output power of 24dBm (+1.7/-3.7).

WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	βc / βd	8/15

WCDMA HSDPA

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification.

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subset	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	βd (SF)	64			
	βc/ βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR(dB)	0	0	0.5	0.5
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	Ahs=βhs/ βc	30/15			

WCDMA HSUPA

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification.

	Mode	HSUPA	HSUPA	HSUPA	HSUPA	HSUPA
	Subset	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	βc	11/15	6/15	15/15	2/15	15/15
	βd	15/15	15/15	9/15	15/15	0
	βec	209/225	12/15	30/15	2/15	5/15
	βc/ βd	11/15	6/15	15/9	2/15	-
	βhs	22/15	12/15	30/15	4/15	5/15
	CM(dB)	1.0	3.0	2.0	3.0	1.0
	MPR(dB)	0	2	1	2	0
HSDPA Specific Settings	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback	4ms				
	CQI Repetition Factor	2				
	Ahs=βhs/ βc	30/15				
HSUPA Specific Settings	DE-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E_FCls	E-TFCI 11 E E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO23 E-TFCI 75 E-TFCI PO26 E-TFCI 81 E-TFCI PO 27		E-TFCI 11 E-TFCI PO4 E-TFCI 92 E-TFCI PO 18	E-TFCI 11 E E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO23 E-TFCI 75 E-TFCI PO26 E-TFCI 81 E-TFCI PO 27	

Results (12.2kbps RMC)

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)	RF Output Power (Watt)
WCDMA 850	4132	826.4	22.14	0.164
	4183	836.6	**22.27**	0.169
	4233	846.6	22.09	0.162
WCDMA 1900	9262	1852.4	**22.42**	0.175
	9400	1880	22.41	0.174
	9538	1907.6	22.12	0.163

Results (HSDPA)

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			Subset 1	Subset 2	Subset 3	Subset 4
WCDMA 850	4132	826.4	21.94	21.83	21.67	21.89
	4183	836.6	21.81	21.79	21.83	21.81
	4233	846.6	21.75	21.71	21.62	21.69
WCDMA 1900	9262	1852.4	22.19	22.23	22.28	22.31
	9400	1880	22.12	22.14	22.15	22.11
	9538	1907.6	21.86	21.93	21.81	21.85

Results (HSUPA)

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)				
			Subset 1	Subset 2	Subset 3	Subset 4	Subset 5
WCDMA 850	4132	826.4	21.76	21.81	21.83	21.79	21.84
	4183	836.6	21.79	21.73	21.75	21.71	21.74
	4233	846.6	21.76	21.53	21.56	21.67	21.71
WCDMA 1900	9262	1852.4	22.26	22.00	22.07	22.01	22.05
	9400	1880	22.07	22.09	22.10	22.13	22.11
	9538	1907.6	21.96	21.83	21.92	21.93	21.89

Note:

1. The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2 kbps RMC (reference measurement Channel) Configured in Test Loop Model 1.
2. KDB 941225 D01-Body SAR is not required for HSDPA when the maximum average output of each RF channel with HSDPA active is less than ¼ dB higher than measured without HSDPA using 12.2kbps RMC or the maximum SAR for 12.2kbps RMC is < 75% of SAR limit.
3. KDB 941225 D01-Body SAR is not required for HSUPA when the maximum average output of each RF channel with HSUPA active is less than ¼ dB higher than measured without HSUPA using 12.2kbps RMC and the maximum SAR for 12.2kbps RMC is < 75% of SAR limit.

Bluetooth:

Mode	Channel frequency (MHz)	RF Output Power	
		(dBm)	(mW)
BDR(GFSK)	2402	2.52	1.786
	2441	2.04	1.600
	2480	1.40	1.380
EDR(4-DQPSK)	2402	1.65	1.462
	2441	1.13	1.297
	2480	0.61	1.151
EDR-8DPSK	2402	0.69	1.172
	2441	0.57	1.140
	2480	0.37	1.089
BLE	2402	-5.14	0.306
	2440	-5.21	0.301
	2480	-5.96	0.254

WiFi:

Mode	Channel frequency (MHz)	RF Output Power	
		(dBm)	(mW)
802.11b	2412	16.74	47.206
	2437	16.71	46.881
	2462	16.67	46.452
802.11g	2412	13.85	24.266
	2437	14.19	26.242
	2462	14.09	25.645
802.11n HT20	2412	13.64	23.121
	2437	13.79	23.933
	2462	13.52	22.491
802.11n HT40	2422	11.21	13.213
	2437	11.35	13.646
	2452	11.14	13.002

Note:

1. The output power was tested under data rate 1Mbps for 802.11b, 6Mbps for 802.11g, 6.5Mbps for 802.11n HT20, 13.5Mbps for 802.11n HT40.

SAR MEASUREMENT RESULTS

This page summarizes the results of the performed dosimetric evaluation.

SAR Test Data

Environmental Conditions

Temperature:	21-24 ℃
Relative Humidity:	52-55 %
ATM Pressure:	1000-1001 mbar

Testing was performed by Rocky Xiao on 2015-05-08

GSM 850:

EUT Position	Frequency (MHz)	Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/Kg)			
						Scaled Factor	Meas. SAR	Scaled SAR	Plot
Head-Cheek	824.2	GSM	0.11	32.87	33	1.03	0.024	0.025	/
	836.6	GSM	0.51	32.92	33	1.019	0.028	**0.029**	**1#**
	848.8	GSM	1.14	32.89	33	1.026	0.026	0.027	/
Body-Back-Headset (0mm)	824.2	GSM	/	/	/	/	/	/	/
	836.6	GSM	1.538	32.92	33	1.019	0.328	0.334	/
	848.8	GSM	/	/	/	/	/	/	/
Body-worn-Bottom (0mm)	824.2	GPRS	/	/	/	/	/	/	/
	836.6	GPRS	0.984	28.92	29	1.019	0.374	0.381	/
	848.8	GPRS	/	/	/	/	/	/	/
Body-worn-Right (0mm)	824.2	GPRS	/	/	/	/	/	/	/
	836.6	GPRS	3.577	28.92	29	1.019	0.335	0.341	/
	848.8	GPRS	/	/	/	/	/	/	/
Body-worn-Back (0mm)	824.2	GPRS	1.68	28.73	29	1.064	0.712	0.758	/
	836.6	GPRS	1.77	28.92	29	1.019	0.753	**0.767**	**2#**
	848.8	GPRS	2.34	28.51	29	1.119	0.683	0.765	/

Note:
1. When the 1-g SAR is ≤ 0.8W/Kg, testing for other channels are optional.
2. The EUT transmit and receive through the same GSM antenna while testing SAR.
3. When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance.
4. KDB648474--Since the antenna located the bottom side edge, SAR probe access is not feasible with a horizontally configured SAM phantom and a flat phantom is replaced. When using a flat phantom, rectangular shaped phones should be positioned with its bottom edge positioned from the flat phantom with the same distance provided by the cheek touching position using SAM. The ear reference point (ERP, as defined for SAM) of the phone should be positioned ½ cm from the flat phantom shell.
5. The Multi-slot Classes of EUT is Class 12 which has maximum 4 Downlink slots and 4 Uplink slots, the maximum active slots is 5, when perform the multiple slots scan, 1DL+4UL is the worst case.
6. According to KDB941225D06-SAR for EGPRS mode are not required when the source-based time-averaged output power for data mode is lower than GPRS mode

PCS Band:

EUT Position	Frequency (MHz)	Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/Kg)			
						Scaled Factor	Meas. SAR	Scaled SAR	Plot
Head-Cheek	1852.4	GSM	0.326	30.13	31	1.222	0.036	0.044	/
	1880	GSM	0.436	30.18	31	1.208	0.038	**0.046**	**3#**
	1907.6	GSM	1.256	30.04	31	1.247	0.033	0.041	/
Body-Back-Headset (0mm)	1852.4	GSM	/	/	/	/	/	/	/
	1880	GSM	2.36	30.18	31	1.208	0.175	0.211	/
	1907.6	GSM	/	/	/	/	/	/	/
Body-worn-Bottom (0mm)	1852.4	GPRS	/	/	/	/	/	/	/
	1880	GPRS	-1.772	25.73	26	1.064	0.242	0.258	/
	1907.6	GPRS	/	/	/	/	/	/	/
Body-worn-Right (0mm)	1852.4	GPRS	/	/	/	/	/	/	/
	1880	GPRS	-0.928	25.73	26	1.064	0.195	0.208	/
	1907.6	GPRS	/	/	/	/	/	/	/
Body-worn-Back (0mm)	1852.4	GPRS	2.34	25.61	26	1.094	0.412	0.451	/
	1880	GPRS	1.324	25.73	26	1.064	0.434	**0.462**	**4#**
	1907.6	GPRS	0.927	25.49	26	1.125	0.41	0.461	/

Note:
1. When the 1-g SAR is ≤ 0.8W/Kg, testing for other channels are optional.
2. The EUT transmit and receive through the same GSM antenna while testing SAR.
3. When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance.
4. KDB648474--Since the antenna located the bottom side edge, SAR probe access is not feasible with a horizontally configured SAM phantom and a flat phantom is replaced. When using a flat phantom, rectangular shaped phones should be positioned with its bottom edge positioned from the flat phantom with the same distance provided by the cheek touching position using SAM. The ear reference point (ERP, as defined for SAM) of the phone should be positioned ½ cm from the flat phantom shell.
5. The Multi-slot Classes of EUT is Class 12 which has maximum 4 Downlink slots and 4 Uplink slots, the maximum active slots is 5, when perform the multiple slots scan, 1DL+4UL is the worst case.
6. According to KDB941225D06-SAR for EGPRS mode are not required when the source-based time-averaged output power for data mode is lower than GPRS mode

WCDMA 850 Band:

EUT Position	Frequency (MHz)	Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/Kg)			
						Scaled Factor	Meas. SAR	Scaled SAR	Plot
Head-Cheek	824.2	WCDMA	/	/	/	/	/	/	/
	836.6	WCDMA	-1.36	22.27	23	1.183	0.071	**0.084**	**5#**
	848.8	WCDMA	/	/	/	/	/	/	/
Body-Back-Headset (0mm)	824.2	WCDMA	/	/	/	/	/	/	/
	836.6	WCDMA	3.646	22.27	23	1.183	0.246	0.291	/
	848.8	WCDMA	/	/	/	/	/	/	/
Body-worn-Bottom (0mm)	824.2	WCDMA	/	/	/	/	/	/	/
	836.6	WCDMA	-1.951	22.27	23	1.183	0.293	0.347	/
	848.8	WCDMA	/	/	/	/	/	/	/
Body-worn-Right (0mm)	824.2	WCDMA	/	/	/	/	/	/	/
	836.6	WCDMA	2.841	22.27	23	1.183	0.233	0.276	/
	848.8	WCDMA	/	/	/	/	/	/	/
Body-worn-Back (0mm)	824.2	WCDMA	/	/	/	/	/	/	/
	836.6	WCDMA	-0.751	22.27	23	1.183	0.55	**0.651**	**6#**
	848.8	WCDMA	/	/	/	/	/	/	/

Note:

1. When the 1-g SAR is≤ 0.8W/Kg, testing for other channels are optional.
2. The EUT transmit and receive through the same antenna while testing SAR.
3. The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2 kbps RMC (reference measurement Channel) Configured in Test Loop Model.
4. KDB 941225 D01-Body SAR is not required for HSDPA when the maximum average output of each RF channel with HSDPA active is less than ¼ dB higher than measured without HSDPA using 12.2kbps RMC or the maximum SAR for 12.2kbps RMC is < 75% of SAR limit.
5. KDB 941225 D01-Body SAR is not required for HSUPA when the maximum average output of each RF channel with HSUPA active is less than ¼ dB higher than measured without HSUPA using 12.2kbps RMC and the maximum SAR for 12.2kbps RMC is < 75% of SAR limit.
6. When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance.
7. KDB648474--Since the antenna located the bottom side edge, SAR probe access is not feasible with a horizontally configured SAM phantom and a flat phantom is replaced. When using a flat phantom, rectangular shaped phones should be positioned with its bottom edge positioned from the flat phantom with the same distance provided by the cheek touching position using SAM. The ear reference point (ERP, as defined for SAM) of the phone should be positioned ½ cm from the flat phantom shell.

WCDMA 1900 BAND:

EUT Position	Frequency (MHz)	Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/Kg)			
						Scaled Factor	Meas. SAR	Scaled SAR	Plot
Head-Cheek	1852.4	WCDMA	1.0213	22.42	23	1.143	0.145	0.166	/
	1880	WCDMA	1.783	22.41	23	1.146	0.148	**0.170**	**7#**
	1907.6	WCDMA	0.234	22.12	23	1.225	0.136	0.167	/
Body-Back-Headset (0mm)	1852.4	WCDMA	/	/	/	/	/	/	/
	1880	WCDMA	2.114	22.41	23	1.146	0.306	0.351	/
	1907.6	WCDMA	/	/	/	/	/	/	/
Body-worn-Bottom (0mm)	1852.4	WCDMA	/	/	/	/	/	/	/
	1880	WCDMA	-1.353	22.41	23	1.146	0.393	0.450	/
	1907.6	WCDMA	/	/	/	/	/	/	/
Body-worn-Right (0mm)	1852.4	WCDMA	/	/	/	/	/	/	/
	1880	WCDMA	-0.892	22.41	23	1.146	0.311	0.356	/
	1907.6	WCDMA	/	/	/	/	/	/	/
Body-worn-Back (0mm)	1852.4	WCDMA	/	/	/	/	/	/	/
	1880	WCDMA	-1.215	22.41	23	1.146	0.653	**0.748**	**8#**
	1907.6	WCDMA	/	/	/	/	/	/	/

Note:

1. When the 1-g SAR is≤ 0.8W/Kg, testing for other channels are optional.
2. The EUT transmit and receive through the same antenna while testing SAR.
3. The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2 kbps RMC (reference measurement Channel) Configured in Test Loop Model.
4. KDB 941225 D01-Body SAR is not required for HSDPA when the maximum average output of each RF channel with HSDPA active is less than ¼ dB higher than measured without HSDPA using 12.2kbps RMC or the maximum SAR for 12.2kbps RMC is < 75% of SAR limit.
5. KDB 941225 D01-Body SAR is not required for HSUPA when the maximum average output of each RF channel with HSUPA active is less than ¼ dB higher than measured without HSUPA using 12.2kbps RMC and the maximum SAR for 12.2kbps RMC is < 75% of SAR limit.
6. When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance.
7. KDB648474--Since the antenna located the bottom side edge, SAR probe access is not feasible with a horizontally configured SAM phantom and a flat phantom is replaced. When using a flat phantom, rectangular shaped phones should be positioned with its bottom edge positioned from the flat phantom with the same distance provided by the cheek touching position using SAM. The ear reference point (ERP, as defined for SAM) of the phone should be positioned ½ cm from the flat phantom shell.

WIFI:

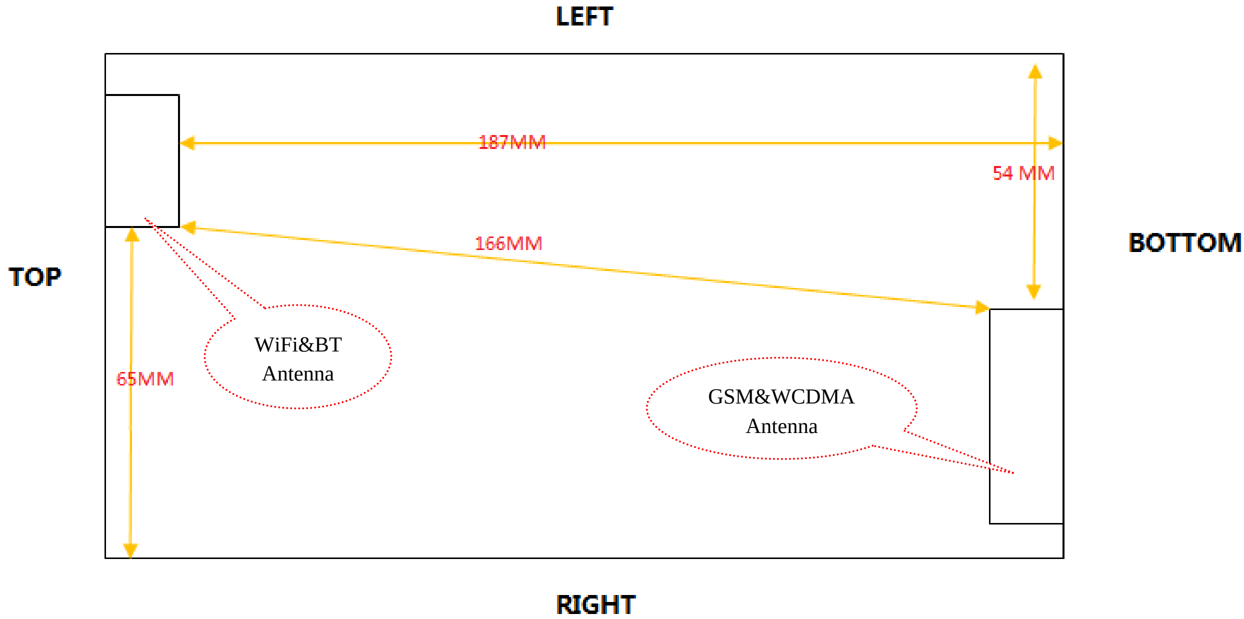
EUT Position	Frequency (MHz)	Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/Kg)			
						Scaled Factor	Meas. SAR	Scaled SAR	Plot
Head-Cheek	2412	802.11b	2.802	16.74	17	1.062	0.121	**0.129**	**9#**
	2437	802.11b	2.234	16.71	17	1.069	0.109	0.117	/
	2462	802.11b	1.012	16.67	17	1.079	0.113	0.122	/
Body-Back-Headset (0mm)	2412	802.11b	3.646	16.74	17	1.062	0.179	0.19	/
	2437	802.11b	/	/	/	/	/	/	/
	2462	802.11b	/	/	/	/	/	/	/
Body-worn-Top (0mm)	2412	802.11b	-1.951	16.74	17	1.062	0.216	0.229	/
	2437	802.11b	/	/	/	/	/	/	/
	2462	802.11b	/	/	/	/	/	/	/
Body-worn-Left (0mm)	2412	802.11b	2.841	16.74	17	1.062	0.166	0.176	/
	2437	802.11b	/	/	/	/	/	/	/
	2462	802.11b	/	/	/	/	/	/	/
Body-worn-Back (0mm)	2412	802.11b	-2.392	16.74	17	1.062	0.394	**0.418**	**10#**
	2437	802.11b	-1.022	16.71	17	1.069	0.376	0.402	/
	2462	802.11b	0.236	16.67	17	1.079	0.323	0.349	/

Note:

1. When the 1-g SAR is≤ 0.8W/Kg, testing for other channels are optional.
2. When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance.
3. KDB248227-SAR is not required for 802.11g and 802.11n channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.

SAR SIMULTANEOUS TRANSMISSION DESCRIPTION

BT&WiFi and GSM&3G Antennas Location:



Simultaneous Transmission:

Description of Simultaneous Transmit Capabilities			Antennas Distance (mm)
Transmitter Combination	Simultaneous?	Hotspot?	
GSM + WCDMA	×	×	0
GSM + Bluetooth	√	×	166
GSM + WiFi	√	×	166
GPRS + WCDMA	×	×	0
GPRS + Bluetooth	√	×	166
GPRS + WiFi	√	√	166
WCDMA + Bluetooth	√	×	166
WCDMA + WiFi	√	√	166

Standalone SAR test exclusion considerations

Mode	Frequency (MHz)	Pavg (dBm)	Pavg (mW)	Distance (mm)	Calculated value	Threshold (1-g)	SAR Test Exclusion
GSM 850	850	23.92	246.6	0	45.47	3.0	NO
GPRS 850	850	25.92	293.09	0	72.07	3.0	NO
GSM 1900	1900	21.18	246.6	0	36.17	3.0	NO
GPRS 1900	1900	22.73	174.18	0	51.69	3.0	NO
WCDMA 850	850	22.27	168.66	0	31.10	3.0	NO
WCDMA 1900	1900	22.42	174.58	0	48.13	3.0	NO
WiFi	2450	16.74	47.21	0	14.78	3.0	NO
Bluetooth	2450	3.0	2.0	0	0.62	3.0	YES

NOTE:

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√ f(GHz)] ≤ 3.0 for 1-g SAR and ≤7.5 for 10-g extremity SAR, where
1. f(GHz) is the RF channel transmit frequency in GHz.
2. Power and distance are rounded to the nearest mW and mm before calculation.
3. The result is rounded to one decimal place for comparison.
4. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion.

Standalone SAR estimation:

Mode	Frequency (MHz)	Pavg (dBm)	Pavg (mW)	Distance (mm)	Estimated 1-g (W/kg)
BT Head	2450	3.0	2.0	0	0.0833
BT Body	2450	3.0	2.0	0	0.0833

When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:
[(max. power of channel, including tune-up tolerance , mW)/(min. test separation distance,mm)] · [√ f(GHz)/x]
W/kg for test separation distances ≤50 mm;
where x = 7.5 for 1-g SAR.
When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion

Simultaneous SAR test exclusion considerations:

GSM with BT:

Mode	Position	Reported SAR (W/kg)		ΣSAR < 1.6W/kg
		GSM	BT	
GSM 850	Head Cheek	0.029	0.0833	0.1123
	Body-worn- Back	0.381	0.0833	0.4643
	Body-worn-Right	0.341	0.0833	0.4243
	Body-worn-Bottom	0.767	0.0833	0.8503
PCS 1900	Head Cheek	0.046	0.0833	0.1293
	Body-worn- Back	0.258	0.0833	0.3413
	Body-worn-Right	0.208	0.0833	0.2913
	Body-worn-Bottom	0.462	0.0833	0.5453

GSM with Wi-Fi:

Mode	Position	Reported SAR (W/kg)		ΣSAR < 1.6W/kg
		GSM	WiFi	
GSM 850	Head Cheek	0.029	0.129	0.158
	Body-worn- Back	0.381	0.229	0.61
	Body-worn-Right	0.341	0.176	0.517
	Body-worn-Bottom	0.767	0.418	1.185
PCS 1900	Head Cheek	0.046	0.129	0.175
	Body-worn- Back	0.258	0.229	0.487
	Body-worn-Right	0.208	0.176	0.384
	Body-worn-Bottom	0.462	0.418	0.88

WCDMA with BT:

Mode	**Position**	**Reported SAR (W/kg)**		**ΣSAR < 1.6W/kg**
		WCDMA	**BT**	
WCDMA 850	Head Cheek	0.084	0.0833	0.1673
	Body-worn- Back	0.347	0.0833	0.4303
	Body-worn-Right	0.276	0.0833	0.3593
	Body-worn-Bottom	0.651	0.0833	0.7343
WCDMA 1900	Head Cheek	0.170	0.0833	0.2533
	Body-worn- Back	0.450	0.0833	0.5333
	Body-worn-Right	0.356	0.0833	0.4393
	Body-worn-Bottom	0.748	0.0833	0.8313

WCDMA with Wi-Fi:

Mode	**Position**	**Reported SAR (W/kg)**		**ΣSAR < 1.6W/kg**
		WCDMA	**WiFi**	
GSM 850	Head Cheek	0.084	0.129	0.213
	Body-worn- Back	0.347	0.229	0.576
	Body-worn-Right	0.276	0.176	0.452
	Body-worn-Bottom	0.651	0.418	1.069
PCS 1900	Head Cheek	0.170	0.129	0.299
	Body-worn- Back	0.450	0.229	0.679
	Body-worn-Right	0.356	0.176	0.532
	Body-worn-Bottom	0.748	0.418	1.166

Conclusion:

Σ **SAR < 1.6 W/kg** therefore simultaneous transmission SAR with Volume Scans is **not** required.

SAR Plots (Summary of the Highest SAR Values)

Test Laboratory:Bay Area Compliance Labs Corp.(Dongguan)

Test Plot 1: GSM 850 Head-Check Middle Channel

DUT: MID; Type: G8

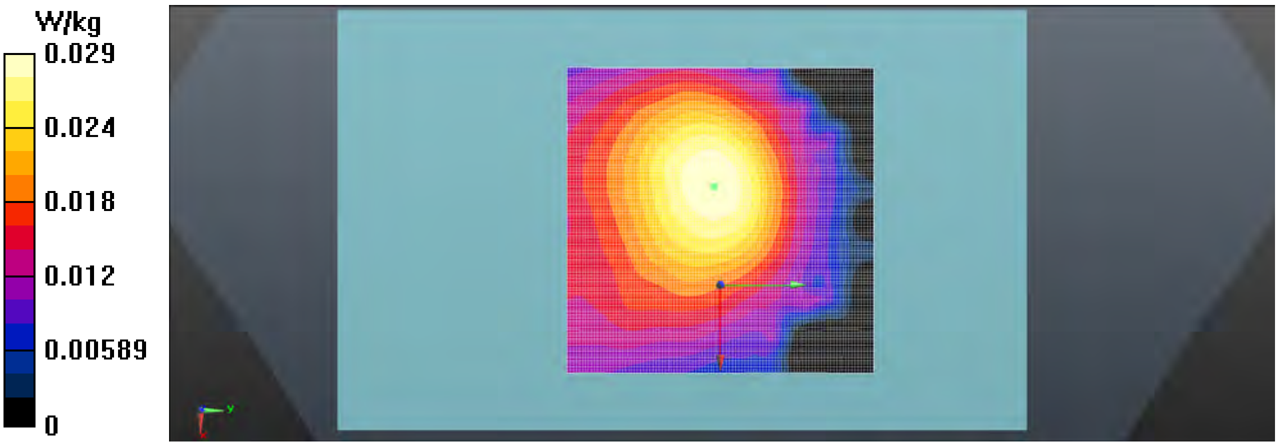
Communication System: GSM 850; Communication System Band: GSM 850 (824.0 - 849.0 MHz); Frequency: 836.6 MHz; Duty Cycle: 1:8
Medium parameters used: f = 836.6 MHz; σ = 0.893 S/m; ε_r = 42.877; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.52, 9.52, 9.52); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = -19.0
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- DASY52 52.8.8(1222);

GSM 850/Head_MID/Area Scan (101x101x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 0.0295 W/kg

GSM 850/Head_MID/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.522 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.0390 W/kg
SAR(1 g) = 0.028 W/kg; SAR(10 g) = 0.019 W/kg
Maximum value of SAR (measured) = 0.0293 W/kg



Test Laboratory:Bay Area Compliance Labs Corp.(Dongguan)

Test Plot 2: GPRS 850 Body-Worn-Back Middle Channel

DUT: MID; Type: G8

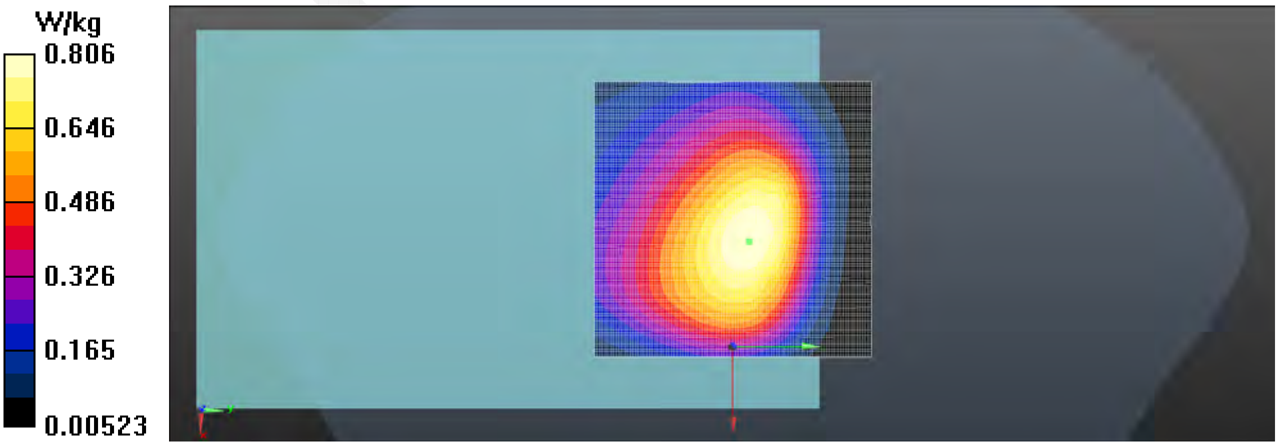
Communication System: GPRS 850 4 Slots; Communication System Band: GSM 850 (824.0 - 849.0 MHz);
Frequency: 836.6 MHz; Duty Cycle: 1:2
Medium parameters used: f = 836.6 MHz; σ = 0.985 S/m; ε_r = 54.999; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.17, 9.17, 9.17); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 21.0
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- DASY52 52.8.8(1222);

GPRS 850/Body_Mid/Area Scan (101x101x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 0.806 W/kg

GPRS 850/Body_Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 26.62 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 1.321W/kg
SAR(1 g) = 0.753W/kg; SAR(10 g) =0.510 W/kg
Maximum value of SAR (measured) = 0.812W/kg



Test Laboratory:Bay Area Compliance Labs Corp.(Dongguan)

Test Plot 3: PCS1900 Head-Check Middle Channel

DUT: MID; Type: G8

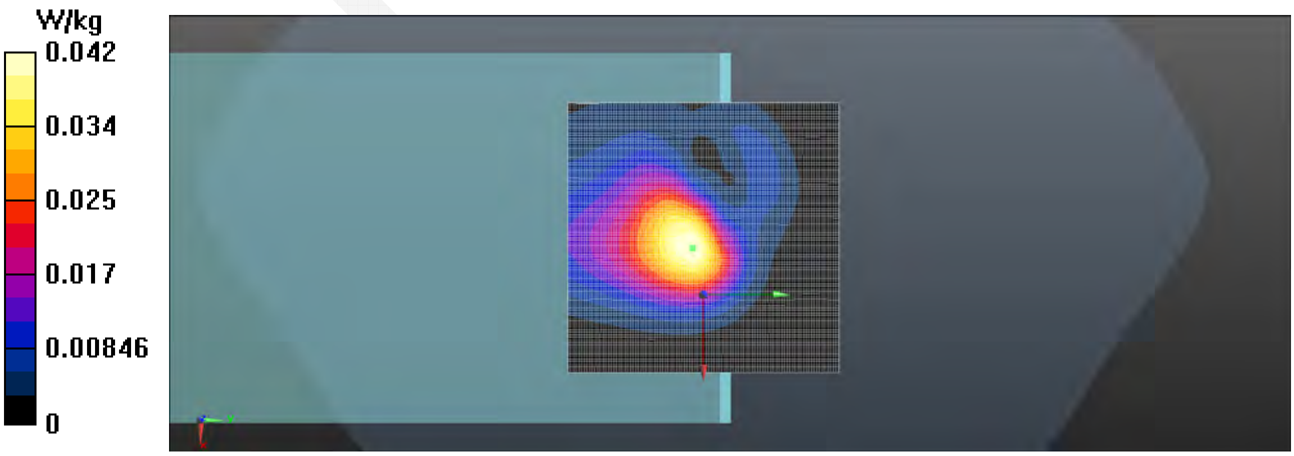
Communication System: GSM 1900; Communication System Band: PCS 1900 (1850.0 - 1910.0 MHz); Frequency: 1880 MHz; Duty Cycle: 1:8
Medium parameters used: f = 1880 MHz; σ = 1.384 S/m; ε_r = 39.71; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = -19.0
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- DASY52 52.8.8(1222);

GSM 1900/Head_MID/Area Scan (101x101x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 0.042W/kg

GSM 1900/Head_MID/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.37 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.929 W/kg
SAR(1 g) = 0.038 W/kg; SAR(10 g) = 0.022 W/kg
Maximum value of SAR (measured) = 0.045 W/kg



Test Laboratory:Bay Area Compliance Labs Corp.(Dongguan)

Test Plot 4: GPRS 1900 Body-Worn-Back Middle Channel

DUT: MID; Type: G8

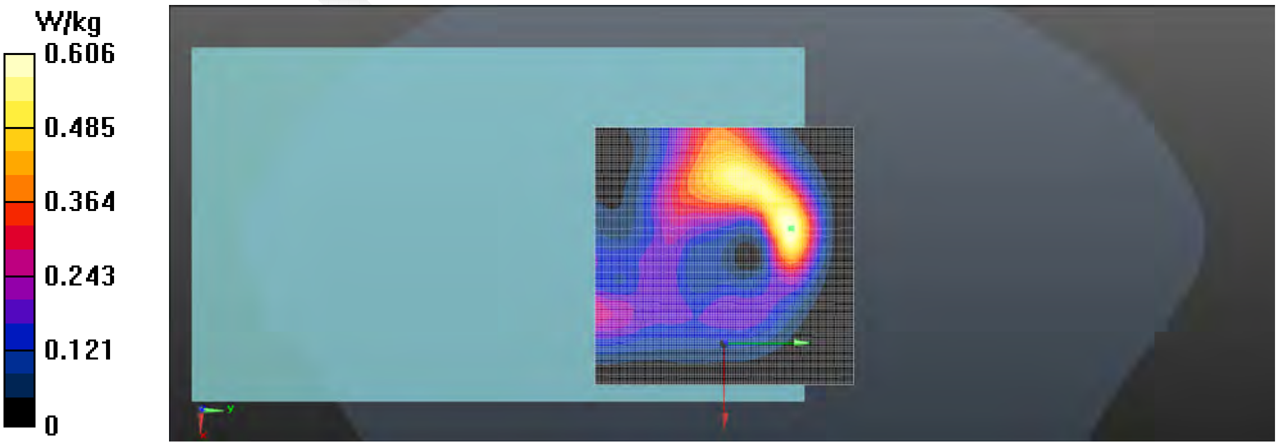
Communication System: GPRS 1900 4 Slots; Communication System Band: PCS 1900 (1850.0 - 1910.0 MHz);
Frequency: 1880 MHz; Duty Cycle: 1:2
Medium parameters used: f = 1880 MHz; σ = 1.542 S/m; ε_r = 53.72; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.56, 7.56, 7.56); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 21.0
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- DASY52 52.8.8(1222);

GPRS 1900/Body_MID/Area Scan (101x101x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 0.523 W/kg

GPRS 1900/Body_MID/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.242 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 1.11 W/kg
SAR(1 g) = 0.434 W/kg; SAR(10 g) = 0.196 W/kg
Maximum value of SAR (measured) = 0.528 W/kg



Test Laboratory:Bay Area Compliance Labs Corp.(Dongguan)

Test Plot 5: WCDMA850 Head-Check Middle Channel

DUT: MID; Type: G8

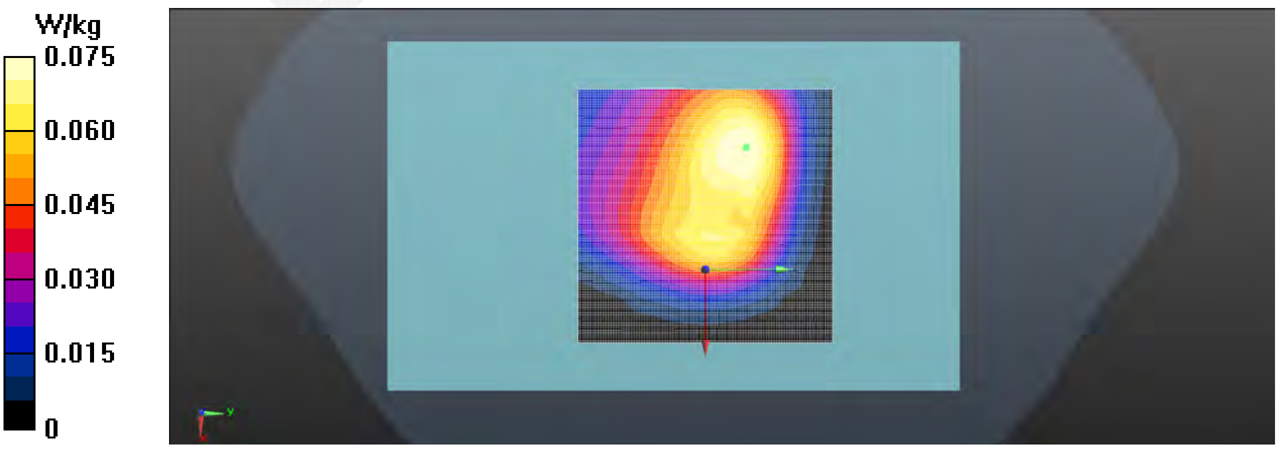
Communication System: WCDMA BAND V; Communication System Band: WCDMA 850 (824.0 - 849.0 MHz); Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium parameters used: f = 836.6 MHz; σ = 0.893 S/m; ε_r = 42.877; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.52, 9.52, 9.52); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 51.0
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- DASY52 52.8.8(1222);

WCDMA 850/HEAD_MID/Area Scan (101x131x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 0.0750 W/kg

WCDMA850/HEAD_MID/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.026 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.0900 W/kg
SAR(1 g) = 0.071 W/kg; SAR(10 g) = 0.055 W/kg
Maximum value of SAR (measured) = 0.0747 W/kg



Test Laboratory:Bay Area Compliance Labs Corp.(Dongguan)

Test Plot 6: WCDMA 850 Body-Worn-Back Middle Channel

DUT: MID; Type: G8

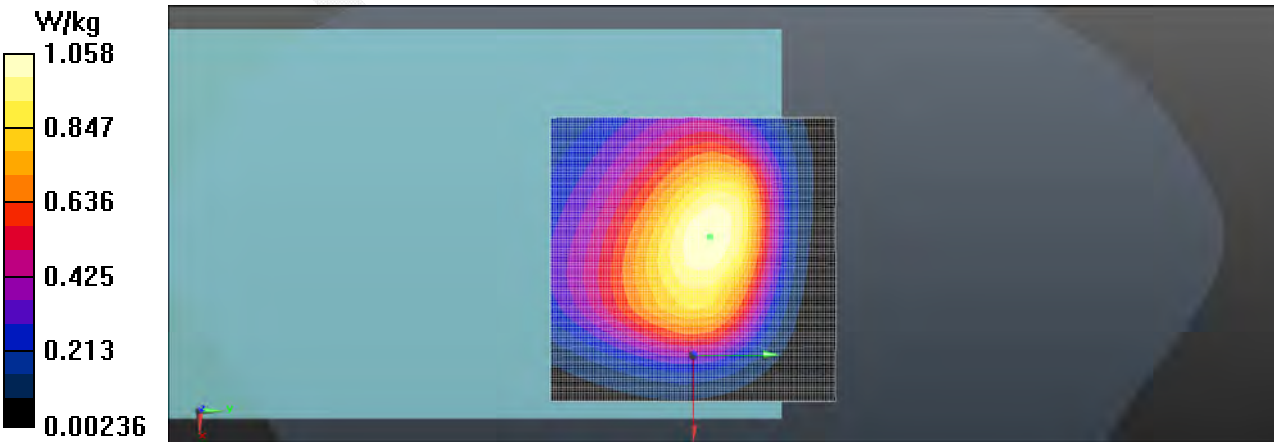
Communication System: WCDMA BAND V; Communication System Band: WCDMA 850 (824.0 - 849.0 MHz);
Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium parameters used: f = 836.6 MHz; σ = 0.896 S/m; ε_r = 42.81; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.52, 9.52, 9.52); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 21.0
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- DASY52 52.8.8(1222);

WCDMA 850/BODY_HIGH/Area Scan (101x101x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 1.06 W/kg

WCDMA 850/BODY_HIGH/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 23.54 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.162W/kg
SAR(1 g) = 0.550W/kg; SAR(10 g) = 0.373W/kg
Maximum value of SAR (measured) = 1.06W/kg



Test Laboratory:Bay Area Compliance Labs Corp.(Dongguan)

Test Plot 7: WCDMA1900 Head-Check Middle Channel

DUT: MID; Type: G8

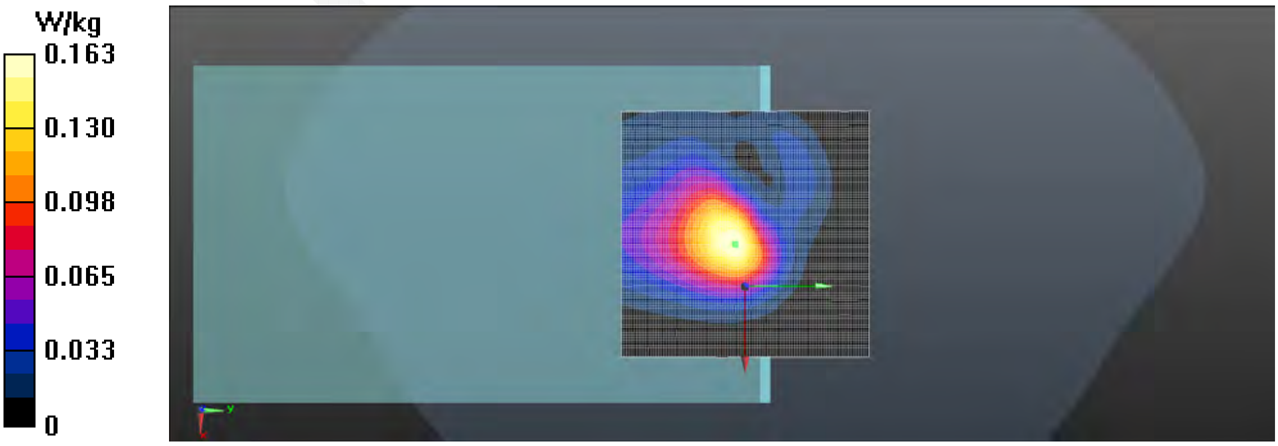
Communication System: WCDMA BAND II; Communication System Band: Band 2, WCDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.384 S/m; ε_r = 39.71; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 21.0
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1745
- DASY52 52.8.8(1222);

WCDMA 1900/Head_MID/Area Scan (101x101x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 0.163 W/kg

WCDMA 1900/Head_MID/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.943 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) =0.313 W/kg
SAR(1 g) = 0.148 W/kg; SAR(10 g) = 0.085 W/kg
Maximum value of SAR (measured) = 0.163W/kg



Test Laboratory:Bay Area Compliance Labs Corp.(Dongguan)

Test Plot 8: WCDMA 1900 Body-Worn-Back Middle Channel

DUT: MID; Type: G8

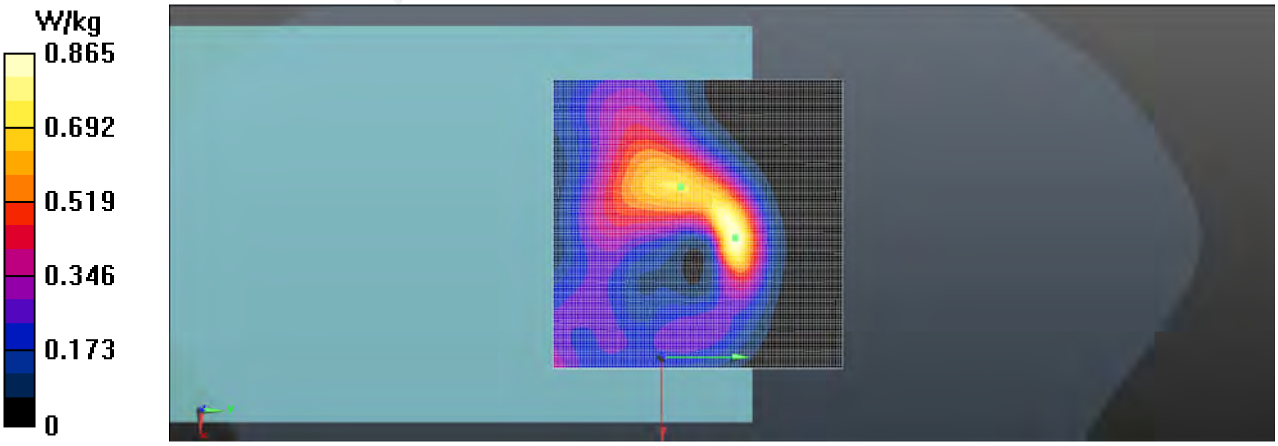
Communication System: WCDMA BAND II; Communication System Band: Band 2, WCDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.359 S/m; ε_r = 39.889; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 21.0
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1745
- DASY52 52.8.8(1222);

WCDMA 1900/Body _MID/Area Scan (101x101x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 0.865 W/kg

WCDMA 1900/Body _MID /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.01 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) =1.203 W/kg
SAR(1 g) = 0.653 W/kg; SAR(10 g) = 0.344 W/kg
Maximum value of SAR (measured) = 0.782W/kg



Test Laboratory:Bay Area Compliance Labs Corp.(Dongguan)

Test Plot 9: Wifi Head-Check Low Channel

DUT: MID; Type: G8

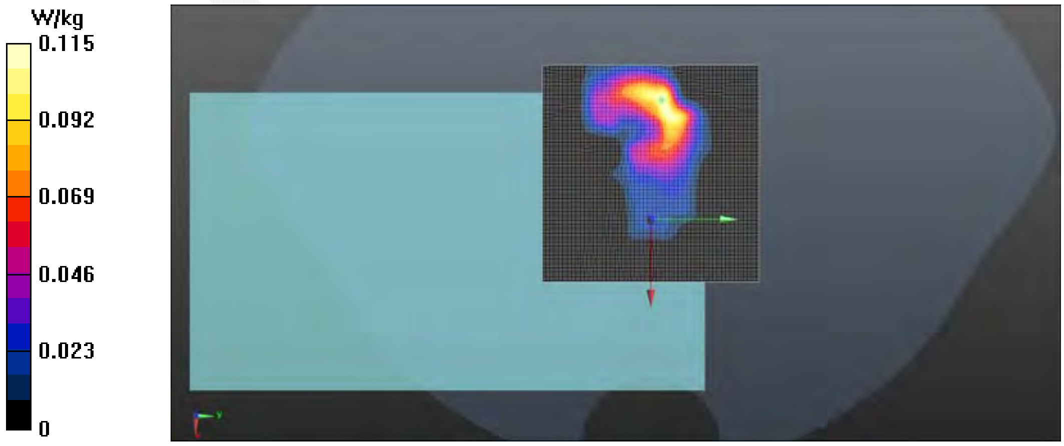
Communication System: 802.11b; Communication System Band: 2.4GHz WIFI; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium parameters used: f = 2412 MHz; σ = 1.841 S/m; ε_r = 39.336; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.06, 7.06, 7.06); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = -19.0
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- DASY52 52.8.8(1222);

WiFi/Head_LOW/Area Scan (101x101x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 0.115 W/kg

WiFi/ Head_LOW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.231 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) =0.272 W/kg
SAR(1 g) = 0.121 W/kg; SAR(10 g) = 0.063 W/kg
Maximum value of SAR (measured) = 0.173 W/kg



Test Laboratory:Bay Area Compliance Labs Corp.(Dongguan)

Test Plot 8: Wifi Body-Worn-Back Low Channel

DUT: MID; Type: G8

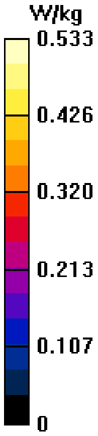
Communication System: 802.11b; Communication System Band: 2.4GHz WIFI; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium parameters used: f = 2412 MHz; σ = 1.841 S/m; ε_r = 39.336; ρ = 1000 kg/m^3
Phantom section: Flat Section

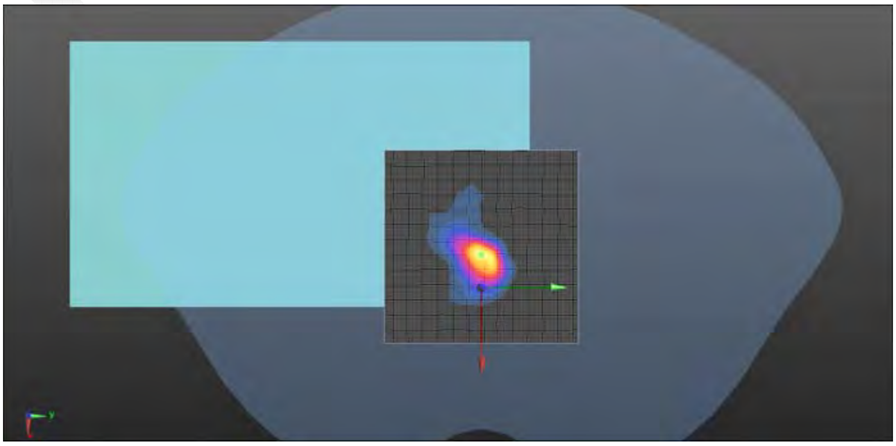
DASY Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.06, 7.06, 7.06); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = -19.0, 31.0
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- DASY52 52.8.8(1222);

WiFi/Body_LOW/Area Scan (101x101x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 0.483 W/kg

WiFi/Body_LOW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.13 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 1.08 W/kg
SAR(1 g) = 0.394 W/kg; SAR(10 g) = 0.120 W/kg
Maximum value of SAR (measured) = 0.533 W/kg





APPENDIX A MEASUREMENT UNCERTAINTY

The uncertainty budget has been determined for the measurement system and is given in the following Table.

Measurement uncertainty evaluation for IEEE1528-2013 SAR test

Source of uncertainty	Tolerance/ uncertainty ± %	Probability distribution	Disisor	ci (1 g)	ci (10 g)	Standard uncertainty ± %, (1 g)	Standard uncertainty ± %, (10 g)
Measurement system							
Probe calibration	6.55	N	1	1	1	6.6	6.6
Axial Isotropy	4.7	R	√3	1	1	2.7	2.7
Hemispherical Isotropy	9.6	R	√3	0	0	0.0	0.0
Boundary effect	1.0	R	√3	1	1	0.6	0.6
Linearity	4.7	R	√3	1	1	2.7	2.7
Detection limits	1.0	R	√3	1	1	0.6	0.6
Readout electronics	0.3	N	1	1	1	0.3	0.3
Response time	0.0	R	√3	1	1	0.0	0.0
Integration time	0.0	R	√3	1	1	0.0	0.0
RF ambientconditions – noise	1.0	R	√3	1	1	0.6	0.6
RF ambient conditions–reflections	1.0	R	√3	1	1	0.6	0.6
Probe positioner mech. Restrictions	0.8	R	√3	1	1	0.5	0.5
Probe positioning with respect to phantom shell	6.7	R	√3	1	1	3.9	3.9
Post-processing	2.0	R	√3	1	1	1.2	1.2
Test sample related							
Test sample positioning	2.8	N	1	1	1	2.8	2.8
Device holder uncertainty	6.3	N	1	1	1	6.3	6.3
Drift of output power	5.0	R	√3	1	1	2.9	2.9
Phantom and set-up							
Phantom uncertainty (shape and thickness tolerances)	4.0	R	√3	1	1	2.3	2.3
Liquid conductivity target)	5.0	R	√3	0.64	0.43	1.8	1.2
Liquid conductivity meas.)	2.5	N	1	0.64	0.43	1.6	1.1
Liquid permittivity target)	5.0	R	√3	0.6	0.49	1.7	1.4
Liquid permittivity meas.)	2.5	N	1	0.6	0.49	1.5	1.2
Combined standard uncertainty		RSS				12.2	12.0
Expanded uncertainty 95 % confidence interval)						24.3	23.9

Measurement uncertainty evaluation for IEC62209-2 SAR test

Source of uncertainty	Tolerance/ uncertainty ± %	Probability distribution	Disisor	ci (1 g)	ci (10 g)	Standard uncertainty ± %, (1 g)	Standard uncertainty ± %, (10 g)
Measurement system							
Probe calibration	6.55	N	1	1	1	6.6	6.6
Axial Isotropy	4.7	R	√3	1	1	2.7	2.7
Hemispherical Isotropy	9.6	R	√3	0	0	0.0	0.0
Linearity	4.7	R	√3	1	1	2.7	2.7
Modulation Response	0.0	R	√3	1	1	0.0	0.0
Detection limits	1.0	R	√3	1	1	0.6	0.6
Boundary effect	1.0	R	√3	1	1	0.6	0.6
Readout electronics	0.3	N	1	1	1	0.3	0.3
Response time	0.0	R	√3	1	1	0.0	0.0
Integration time	0.0	R	√3	1	1	0.0	0.0
RF ambientconditions – noise	1.0	R	√3	1	1	0.6	0.6
RF ambient conditions–reflections	1.0	R	√3	1	1	0.6	0.6
Probe positioner mech. Restrictions	0.8	R	√3	1	1	0.5	0.5
Probe positioning with respect to phantom shell	6.7	R	√3	1	1	3.9	3.9
Post-processing	2.0	R	√3	1	1	1.2	1.2
Test sample related							
Device holder Uncertainty	6.3	N	1	1	1	6.3	6.3
Test sample positioning	2.8	N	1	1	1	2.8	2.8
Power scaling	4.5	R	√3	1	1	2.6	2.6
Drift of output power	5.0	R	√3	1	1	2.9	2.9
Phantom and set-up							
Phantom uncertainty (shape and thickness tolerances)	4.0	R	√3	1	1	2.3	2.3
Algorithm for correcting SAR for deviations in permittivity and conductivity	1.9	N	1	1	0.84	1.1	0.9
Liquid conductivity (meas.)	2.5	N	1	0.64	0.43	1.6	1.1
Liquid permittivity (meas.)	2.5	N	1	0.6	0.49	1.5	1.2
Temp. unc. - Conductivity	1.7	R	√3	0.78	0.71	0.8	0.7
Temp. unc. - Permittivity	0.3	R	√3	0.23	0.26	0.0	0.0
Combined standard uncertainty		RSS				12.2	12.1
Expanded uncertainty 95 % confidence interval)						24.5	24.2

APPENDIX B – PROBE CALIBRATION CERTIFICATES

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **BACL China (Vitec)**

Certificate No: **EX3-7329_Feb15**

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:7329

Calibration procedure(s): QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v6
Calibration procedure for dosimetric E-field probes

Calibration date: February 5, 2015

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	03-Apr-14 (No. 217-01911)	Apr-15
Power sensor E4412A	MY41498087	03-Apr-14 (No. 217-01911)	Apr-15
Reference 3 dB Attenuator	SN: S5054 (3c)	03-Apr-14 (No. 217-01915)	Apr-15
Reference 20 dB Attenuator	SN: S5277 (20x)	03-Apr-14 (No. 217-01919)	Apr-15
Reference 30 dB Attenuator	SN: S5129 (30b)	03-Apr-14 (No. 217-01920)	Apr-15
Reference Probe ES3DV2	SN: 3013	30-Dec-14 (No. ES3-3013_Dec14)	Dec-15
DAE4	SN: 660	14-Jan-15 (No. DAE4-660_Jan15)	Jan-16
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	(signature)
Approved by:	Katja Pokovic	Technical Manager	(signature)

Issued: February 9, 2015

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z*: Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z*: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR*: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

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Probe EX3DV4

SN:7329

Manufactured: December 11, 2014
Calibrated: February 5, 2015

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7329

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.48	0.43	0.46	± 10.1 %
DCP (mV)[B]	96.7	97.6	94.2	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	137.9	±3.0 %
		Y	0.0	0.0	1.0		147.0	
		Z	0.0	0.0	1.0		150.5	

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7329

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unct. (k=2)
900	41.5	0.97	9.52	9.52	9.52	0.40	0.86	± 12.0 %
1750	40.1	1.37	8.12	8.12	8.12	0.29	0.90	± 12.0 %
1900	40.0	1.40	7.88	7.88	7.88	0.68	0.61	± 12.0 %
2450	39.2	1.80	7.06	7.06	7.06	0.33	0.84	± 12.0 %

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

EX3DV4– SN:7329 February 5, 2015

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7329

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unct. (k=2)
900	55.0	1.05	9.17	9.17	9.17	0.41	0.90	± 12.0 %
1750	53.4	1.49	7.85	7.85	7.85	0.70	0.64	± 12.0 %
1900	53.3	1.52	7.56	7.56	7.56	0.56	0.70	± 12.0 %
2450	52.7	1.95	7.20	7.20	7.20	0.78	0.59	± 12.0 %

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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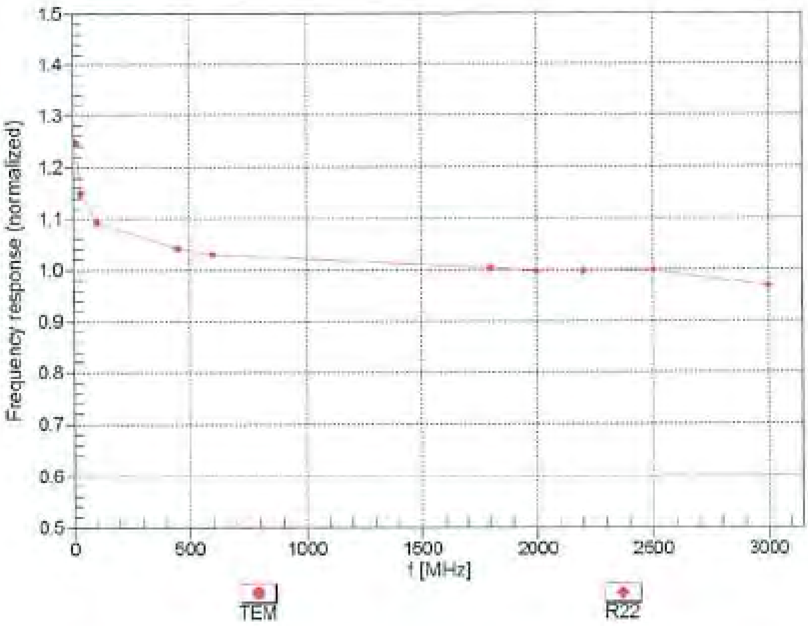
EX3DV4– SN:7329 February 5, 2015

Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

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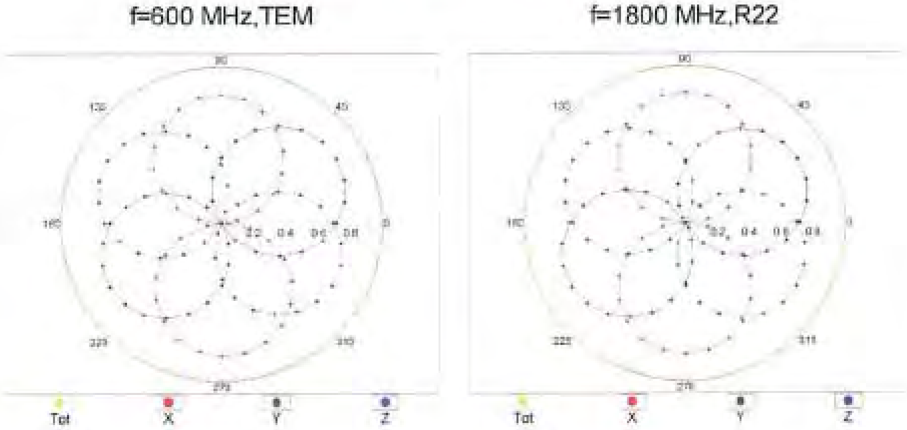
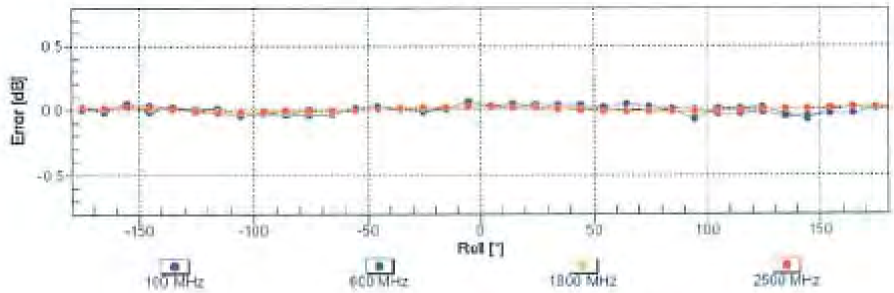
EX3DV4– SN:7329 February 5, 2015

Receiving Pattern (ϕ), ϑ = 0°





Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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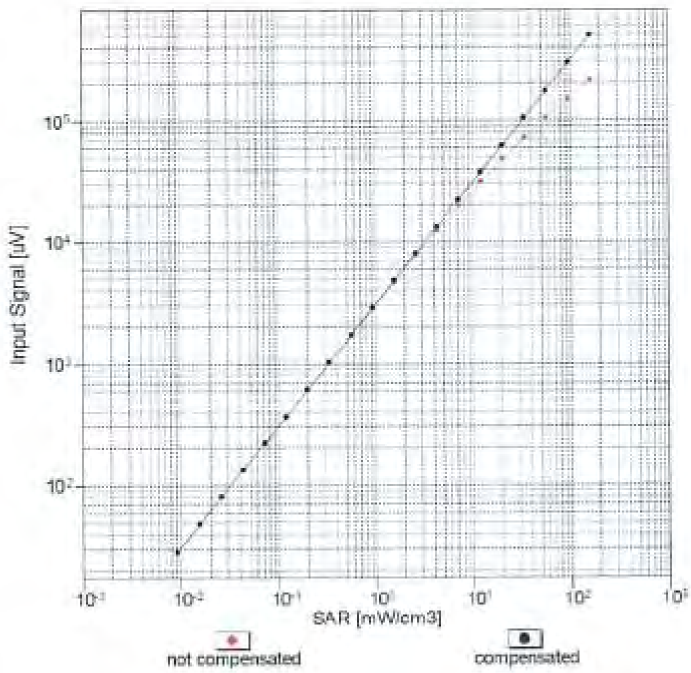
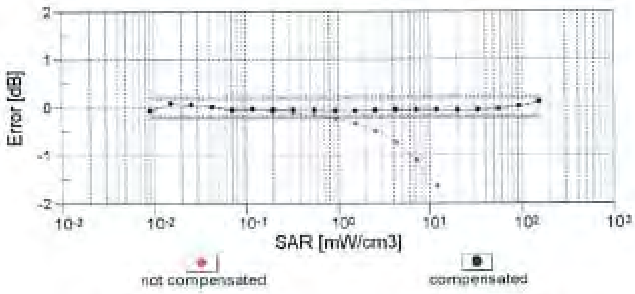
EX3DV4– SN:7329 February 5, 2015

Dynamic Range f(SAR_{head})
(TEM cell , f_{eval}= 1900 MHz)





Uncertainty of Linearity Assessment: ± 0.6% (k=2)

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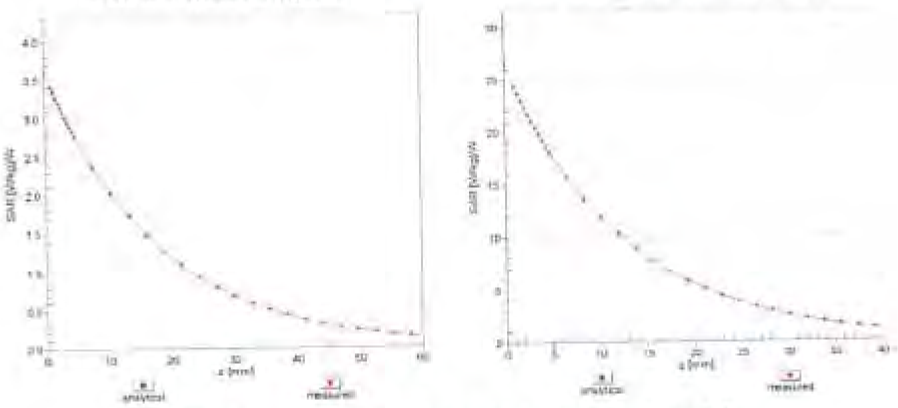
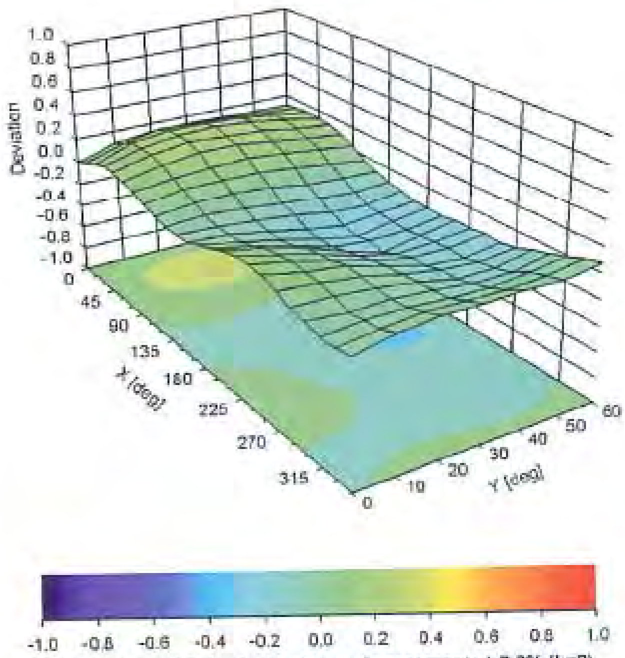
EX3DV4– SN:7329 February 5, 2015

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

Certificate No: EX3-7329_Feb15 Page 10 of 11

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7329

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	24.5
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

APPENDIX C DIPOLE CALIBRATION CERTIFICATES

NCL CALIBRATION LABORATORIES

Calibration File No: DC-1599
Project Number: BAC-dipole-cal-5779

CERTIFICATE OF CALIBRATION

It is certified that the equipment identified below has been calibrated in the **NCL CALIBRATION LABORATORIES** by qualified personnel following recognized procedures and using transfer standards traceable to NRC/NIST.

Validation Dipole(Head and Body)

Manufacturer: APREL Laboratories
Part number: ALS-D-835-S-2
Frequency: 835 MHz
Serial No: 180-00558

Customer: Bay Area Compliance Laboratory (China)

Calibrated: 8th October 2014
Released on: 8th October 2014

This Calibration Certificate is Incomplete Unless Accompanied with the Calibration Results Summary

Released By: ______________________

Art Brennan, Quality Manager

NCL CALIBRATION LABORATORIES
Suite 102, 303 Terry Fox Dr.
Kanata, ONTARIO
CANADA K2K 3J1
Division of APREL Lab.
TEL: (613) 435-8300
FAX: (613)435-8306

NCL Calibration Laboratories
Division of APREL Laboratories.

Conditions

Dipole 180-00558 was received with a damaged connection for a re-calibration.

Ambient Temperature of the Laboratory: 22 °C +/- 0.5°C
Temperature of the Tissue: 21 °C +/- 0.5°C

Attestation

The below named signatories have conducted the calibration and review of the data which is presented in this calibration report.

We the undersigned attest that to the best of our knowledge the calibration of this subject has been accurately conducted and that all information contained within the results pages have been reviewed for accuracy.

Art Brennan, Quality Manager

Maryna Nesterova Calibration Engineer

Primary Measurement Standards

Instrument	Serial Number	Cal due date
Tektronix USB Power Meter	11C940	May 14, 2015
Network Analyzer Anritsu 37347C	002106	Feb. 20, 2015

This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories

Division of APREL Laboratories.

Calibration Results Summary

The following results relate the Calibrated Dipole and should be used as a quick reference for the user.

Mechanical Dimensions

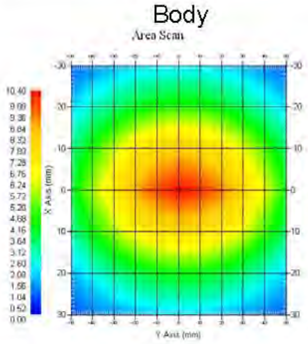
Length: 162.2 mm
Height: 89.4 mm

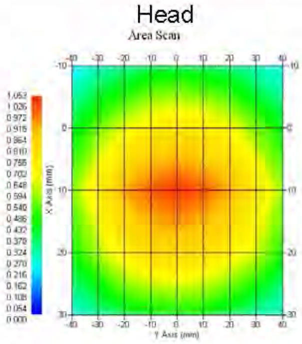
Electrical Specification

Tissue	Frequency	SWR:	Return Loss	Impedance
Head	835 MHz	1.066 U	-30.344 dB	49.001 Ω
Body	835 MHz	1.089 U	-28.118 dB	53.117 Ω

System Validation Results

Tissue	Frequency	1 Gram	10 Gram	Peak
Head	835 MHz	9.773	6.174	14.713
Body	835 MHz	9.736	6.297	14.513





This page has been reviewed for content and attested to by signature within this document. 3

Introduction

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole 180-00558. The calibration routine consisted of a three-step process. Step 1 was a mechanical verification of the dipole to ensure that it meets the mechanical specifications. Step 2 was an Electrical Calibration for the Validation Dipole, where the SWR, Impedance, and the Return loss were assessed. Step 3 involved a System Validation using the ALSAS-10U, along with APREL E-020 30 MHz to 6 GHz E-Field Probe Serial Number 225.

References

- IEC-62209 "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures"
- Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity of the ear (frequency range of 30 MHz to 6 GHz)"
- TP-D01-032-E020-V2 E-Field probe calibration procedure
- D22-012-Tissue dielectric tissue calibration procedure
- D28-002-Dipole procedure for validation of SAR system using a dipole
- IEEE 1309 Draft Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas, from 9kHz to 40GHz

Conditions

Dipole 180-00558 was repaired prior to this calibration. The repair reliability depends upon correct usage of the dipole.

Ambient Temperature of the Laboratory: 22 °C +/- 0.5°C
Temperature of the Tissue: 20 °C +/- 0.5°C

Dipole Calibration uncertainty

The calibration uncertainty for the dipole is made up of various parameters presented below.

Mechanical	1%
Positioning Error	1.22%
Electrical	1.7%
Tissue	2.2%
Dipole Validation	2.2%
TOTAL	**8.32% (16.64% K=2)**

NCL Calibration Laboratories

Division of APREL Laboratories.

Dipole Calibration Results

Mechanical Verification

APREL Length	APREL Height	Measured Length	Measured Height
161.0 mm	89.8 mm	162.2 mm	89.4 mm

Electrical Verification

Tissue Type	Return Loss:	SWR:	Impedance:
Head	-30.344 dB	1.066 U	49.001 Ω
Body	-28.118 dB	1.089 U	53.117 Ω □

Tissue Validation

	Dielectric constant, ε_r	Conductivity, σ [S/m]
Head Tissue 835MHz	43.42	0.94
Body Tissue 835MHz	55.77	1.01

This page has been reviewed for content and attested to by signature within this document. 5

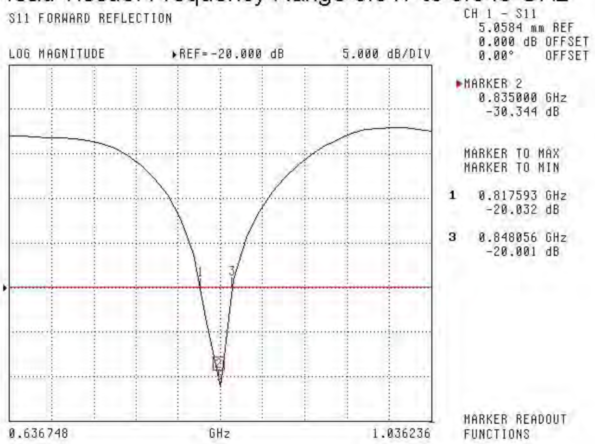
NCL Calibration Laboratories

Division of APREL Laboratories.

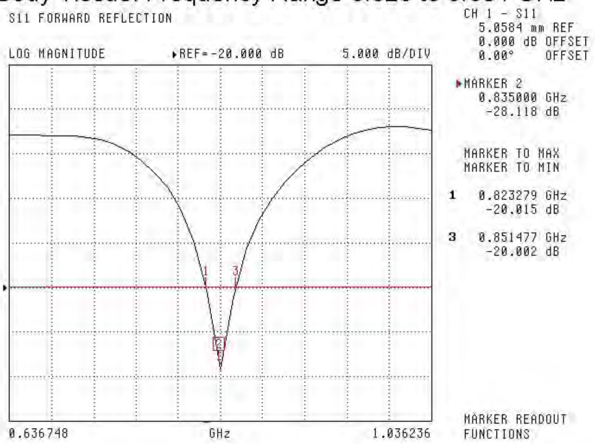
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head Tissue: Frequency Range 0.817 to 0.848 GHz



Body Tissue: Frequency Range 0.823 to 0.851 GHz



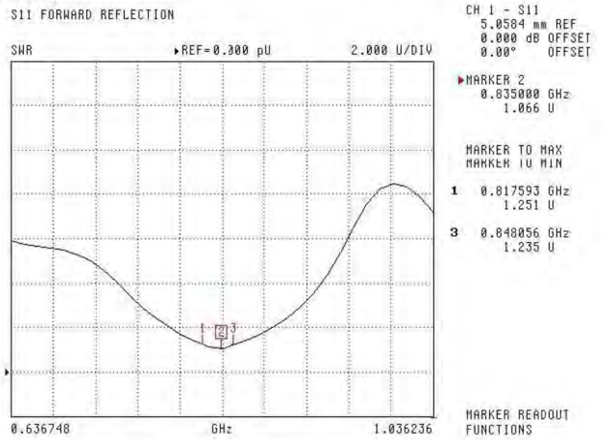
This page has been reviewed for content and attested to by signature within this document. 6

NCL Calibration Laboratories

Division of APREL Laboratories.

SWR

Head



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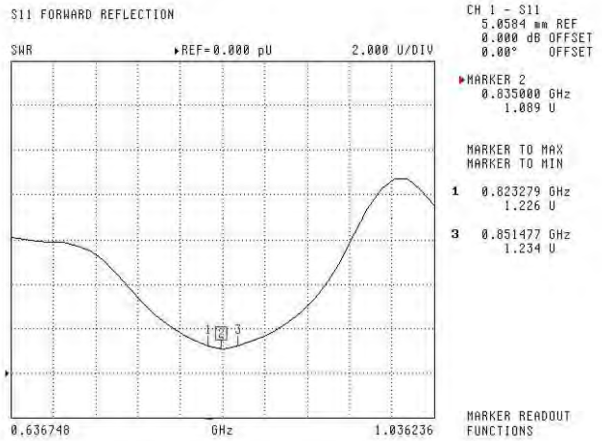

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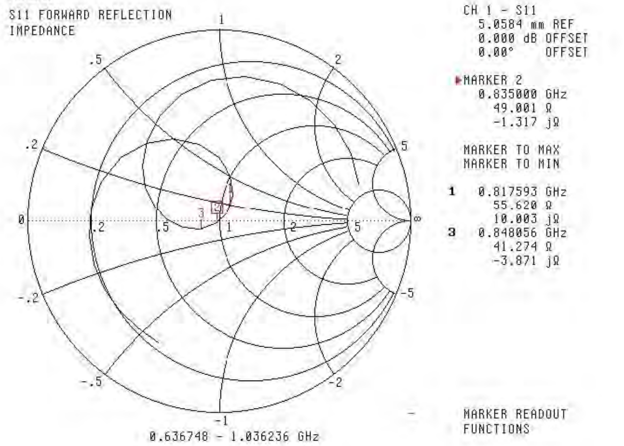
NCL Calibration Laboratories

Division of APREL Laboratories.

Smith Chart Dipole Impedance

Head



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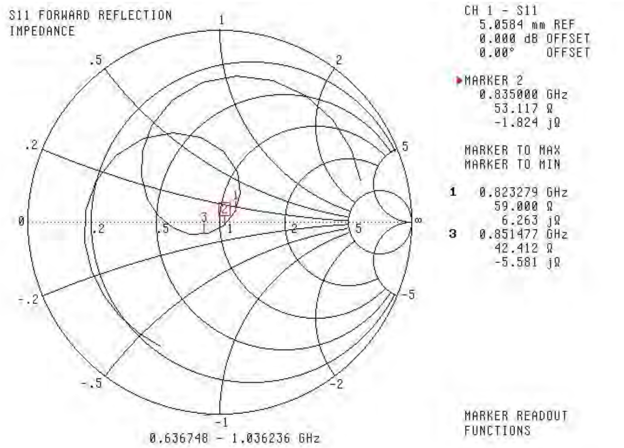


This page has been reviewed for content and attested to by signature within this document. 8

Test Equipment

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List 2014.

NCL CALIBRATION LABORATORIES

Calibration File No: DC-1601
Project Number: BAC-dipole –cal-5779

CERTIFICATE OF CALIBRATION

It is certified that the equipment identified below has been calibrated in the **NCL CALIBRATION LABORATORIES** by qualified personnel following recognized procedures and using transfer standards traceable to NRC/NIST.

Validation Dipole (Head & Body)

Manufacturer: APREL Laboratories
Part number: ALS-D-1900-S-2
Frequency: 1900 MHz
Serial No: 210-00710

Customer: Bay Area Compliance Laboratory (China)

Calibrated: 9th October, 2014
Released on: 9th October, 2014

This Calibration Certificate is Incomplete Unless Accompanied with the Calibration Results Summary

Released By: ______________________

Art Brennan, Quality Manager

NCL CALIBRATION LABORATORIES

Suite 102, 303 Terry Fox Dr.
Kanata, ONTARIO
CANADA K2K 3J1

Division of APREL Lab.
TEL: (613) 435-8300
FAX: (613)435-8306

NCL Calibration Laboratories

Division of APREL Laboratories.

Conditions

Dipole 210-00710 was received in good condition and was a re-calibration.

Ambient Temperature of the Laboratory: 22 °C +/- 0.5°C
Temperature of the Tissue: 21 °C +/- 0.5°C

Attestation

The below named signatories have conducted the calibration and review of the data which is presented in this calibration report.

We the undersigned attest that to the best of our knowledge the calibration of this subject has been accurately conducted and that all information contained within the results pages have been reviewed for accuracy.

Art Brennan, Quality Manager

Maryna Nesterova Calibration Engineer

Primary Measurement Standards

Instrument	Serial Number	Cal due date
Tektronix USB Power Meter	11C940	May 14, 2015
Network Analyzer Anritsu 37347C	002106	Feb. 20, 2015

This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories

Division of APREL Laboratories.

Calibration Results Summary

The following results relate the Calibrated Dipole and should be used as a quick reference for the user.

Mechanical Dimensions

Length: 67.1 mm
Height: 38.9 mm

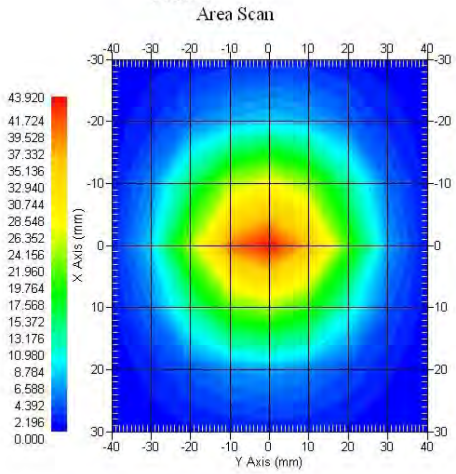
Electrical Specification

Tissue	Frequency	SWR:	Return Loss	Impedance
Head	1900MHz	1.084 U	-27.92 dB	52.247 Ω
Body	1900MHz	1.128 U	-24.40 dB	52.618 Ω

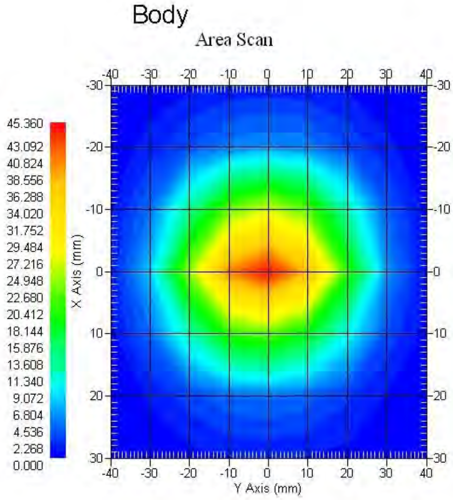
System Validation Results

Tissue	Frequency	1 Gram	10 Gram	Peak
Head	1900 MHz	39.481	20.44	73.364
Body	1900 MHz	39.715	20.552	73.565

Head



Body



This page has been reviewed for content and attested to by signature within this document. 3

Introduction

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole 210-00710. The calibration routine consisted of a three-step process. Step 1 was a mechanical verification of the dipole to ensure that it meets the mechanical specifications. Step 2 was an Electrical Calibration for the Validation Dipole, where the SWR, Impedance, and the Return loss were assessed. Step 3 involved a System Validation using the ALSAS-10U, along with APREL E-020 30 MHz to 6 GHz E-Field Probe Serial Number 225.

References

- IEC-62209 “Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures”
- Part 2: “Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity of the ear (frequency range of 30 MHz to 6 GHz)”
- TP-D01-032-E020-V2 E-Field probe calibration procedure
- D22-012-Tissue dielectric tissue calibration procedure
- D28-002-Dipole procedure for validation of SAR system using a dipole
- IEEE 1309 Draft Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas, from 9kHz to 40GHz

Conditions

Dipole 210-00710 was a recalibration.

Ambient Temperature of the Laboratory:	22 °C +/- 0.5°C
Temperature of the Tissue:	20 °C +/- 0.5°C

Dipole Calibration uncertainty

The calibration uncertainty for the dipole is made up of various parameters presented below.

Mechanical	1%
Positioning Error	1.22%
Electrical	1.7%
Tissue	2.2%
Dipole Validation	2.2%
TOTAL	**8.32% (16.64% K=2)**

NCL Calibration Laboratories
Division of APREL Laboratories.

Dipole Calibration Results

Mechanical Verification

APREL Length	APREL Height	Measured Length	Measured Height
68.0 mm	39.5 mm	67.1mm	38.9 mm

Electrical Validation

Tissue	Frequency	SWR:	Return Loss	Impedance
Head	1900MHz	1.084 U	-27.92 dB	52.247 Ω
Body	1900MHz	1.128 U	-24.40 dB	52.618 Ω

Tissue Validation

	Dielectric constant, ε_r	Conductivity, σ [S/m]
Head Tissue 1900MHz	40.20	1.38
Body Tissue 1900MHz	52.63	1.46

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This page has been reviewed for content and attested to by signature within this document.

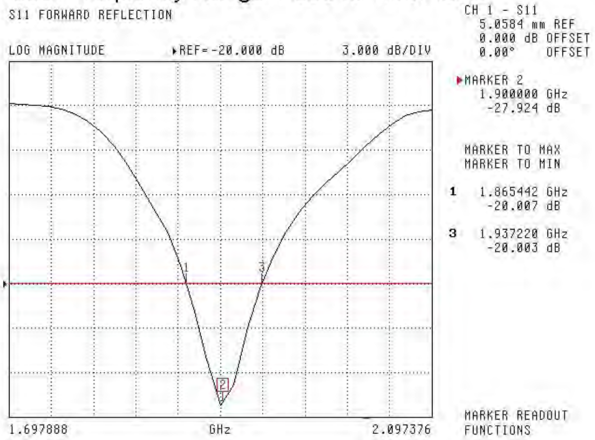
NCL Calibration Laboratories

Division of APREL Laboratories.

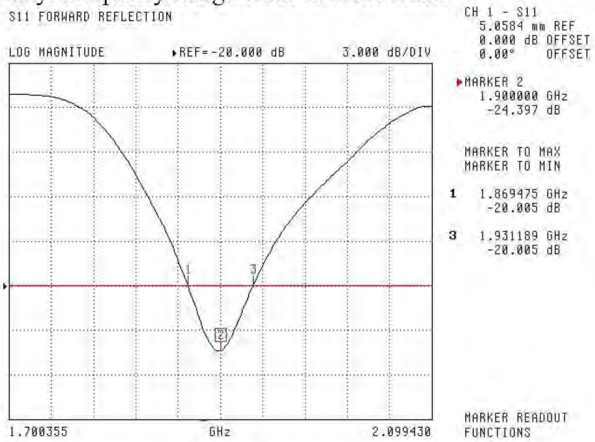
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head: Frequency Range 1.865 to 1.937 GHz



Body: Frequency Range 1.869 to 1.931 MHz



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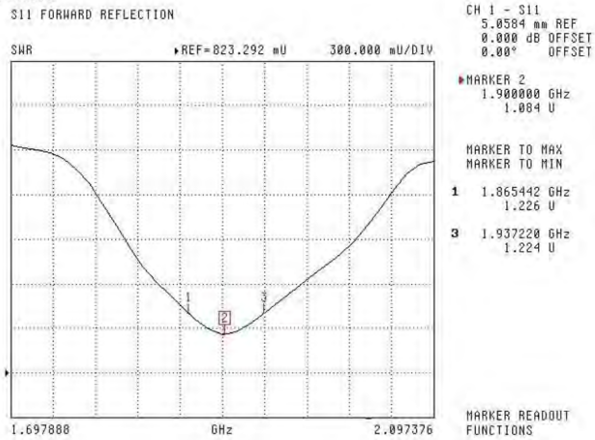
NCL Calibration Laboratories

Division of APREL Laboratories.

SWR

Head



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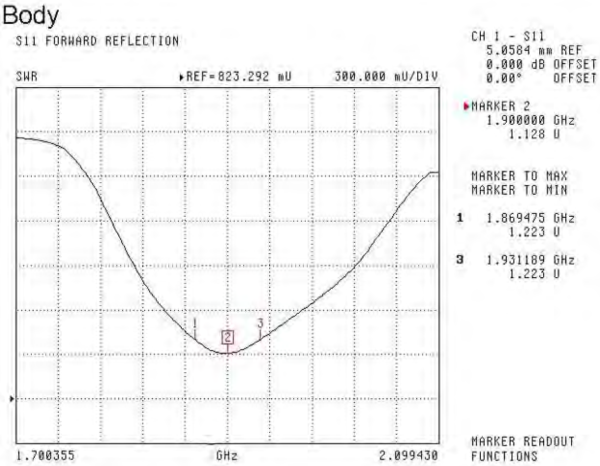

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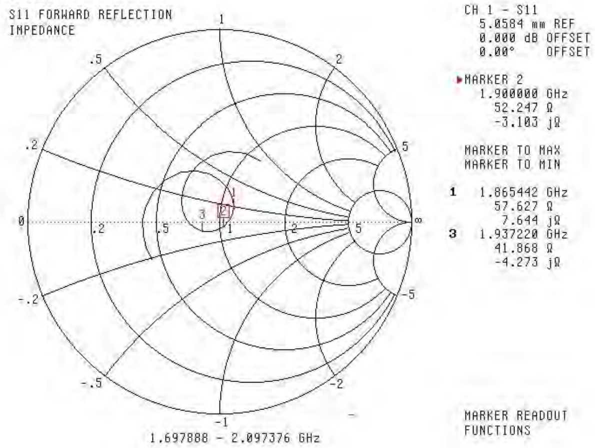
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories

Division of APREL Laboratories.

Smith Chart Dipole Impedance

Head



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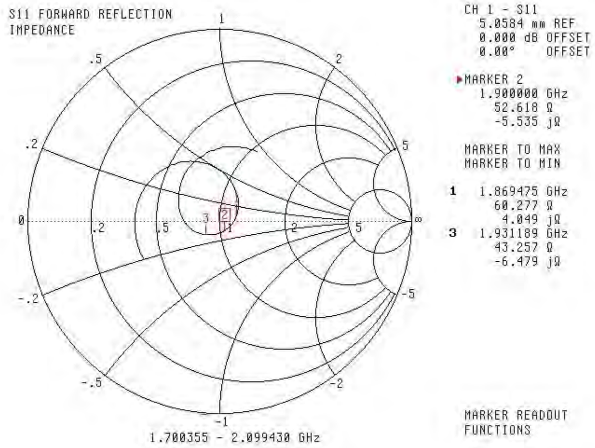


This page has been reviewed for content and attested to by signature within this document. 8

Test Equipment

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List 2014

NCL CALIBRATION LABORATORIES

Calibration File No: DC-1602
Project Number: BAC-dipole-cal-5779

CERTIFICATE OF CALIBRATION

It is certified that the equipment identified below has been calibrated in the **NCL CALIBRATION LABORATORIES** by qualified personnel following recognized procedures and using transfer standards traceable to NRC/NIST.

Validation Dipole (Head & Body)

Manufacturer: APREL Laboratories
Part number: ALS-D-2450-S-2
Frequency: 2450 MHz
Serial No: 220-00758

Customer: Bay Area Compliance Laboratory

Calibrated: 9th October, 2014
Released on: 9th October, 2014

This Calibration Certificate is Incomplete Unless Accompanied with the Calibration Results Summary

Released By: ______________________

Art Brennan, Quality Manager

NCL CALIBRATION LABORATORIES

Suite 102, 303 Terry Fox Dr.
Kanata, ONTARIO
CANADA K2K 3J1

Division of APREL Lab.
TEL: (613) 435-8300
FAX: (613)435-8306

NCL Calibration Laboratories
Division of APREL Laboratories.

Conditions

Dipole 220-00758 was received in good condition and was a re-calibration.

Ambient Temperature of the Laboratory: 22 °C +/- 0.5°C
Temperature of the Tissue: 21 °C +/- 0.5°C

Attestation

The below named signatories have conducted the calibration and review of the data which is presented in this calibration report.

We the undersigned attest that to the best of our knowledge the calibration of this subject has been accurately conducted and that all information contained within the results pages have been reviewed for accuracy.

Art Brennan, Quality Manager

Maryna Nesterova Calibration Engineer

Primary Measurement Standards

Instrument	Serial Number	Cal due date
Tektronix USB Power Meter	11C940	May 14, 2015
Network Analyzer Anritsu 37347C	002106	Feb. 20, 2015

This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories
Division of APREL Laboratories.

Calibration Results Summary

The following results relate the Calibrated Dipole and should be used as a quick reference for the user.

Mechanical Dimensions

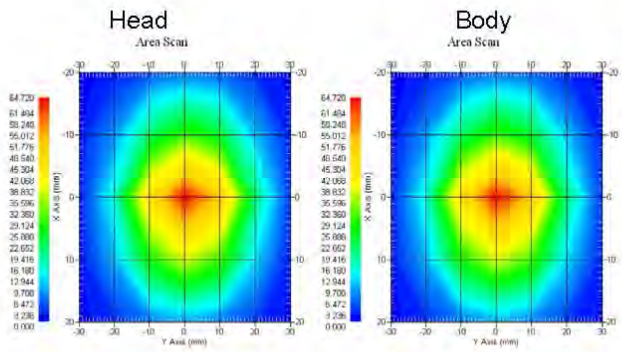
Length: 52.4 mm
Height: 30.3 mm

Electrical Specification

Tissue	Frequency	SWR:	Return Loss	Impedance
Head	2450 MHz	1.014 U	-45.184 dB	50.006Ω
Body	2450 MHz	1.070 U	-29.453 dB	50.672 Ω

System Validation Results

Tissue	Frequency	1 Gram	10 Gram	Peak
Head	2450 MHz	54.916	25.327	111.97
Body	2450 MHz	52.418	24.691	103.91



This page has been reviewed for content and attested to by signature within this document. 3

NCL Calibration Laboratories
Division of APREL Laboratories.

Introduction

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole 220-00758. The calibration routine consisted of a three-step process. Step 1 was a mechanical verification of the dipole to ensure that it meets the mechanical specifications. Step 2 was an Electrical Calibration for the Validation Dipole, where the SWR, Impedance, and the Return loss were assessed. Step 3 involved a System Validation using the ALSAS-10U, along with APREL E-020 30 MHz to 6 GHz E-Field Probe Serial Number 225.

References

SSI-TP-018-ALSAS Dipole Calibration Procedure
SSI-TP-016 Tissue Calibration Procedure
IEEE 1528 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques"
IEC-62209 "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures"
Part 1: "Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity of the ear (frequency range of 300 MHz to 3 GHz)"
IEC-62209 "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures"
Part 2 *Draft*: "Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity of the ear (frequency range of 30 MHz to 6 GHz)"

Conditions

Dipole 220-00758 was a re-calibration.

Ambient Temperature of the Laboratory: 22 °C +/- 0.5°C
Temperature of the Tissue: 20 °C +/- 0.5°C

Dipole Calibration uncertainty

The calibration uncertainty for the dipole is made up of various parameters presented below.

Mechanical	1%
Positioning Error	1.22%
Electrical	1.7%
Tissue	2.2%
Dipole Validation	2.2%
TOTAL	**8.32% (16.64% K=2)**

4

This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories
Division of APREL Laboratories.

Dipole Calibration Results

Mechanical Verification

APREL Length	APREL Height	Measured Length	Measured Height
51.5 mm	30.4 mm	52.4 mm	30.3 mm

Electrical Specification

Tissue	Frequency	SWR:	Return Loss	Impedance
Head	2450 MHz	1.014 U	-45.184 dB	50.006Ω
Body	2450 MHz	1.070 U	-29.453 dB	50.672 Ω

Tissue Validation

	Dielectric constant, ε_r	Conductivity, σ [S/m]
Head Tissue 2450MHz	37.26	1.84
Body Tissue 2450MHz	53.61	1.90

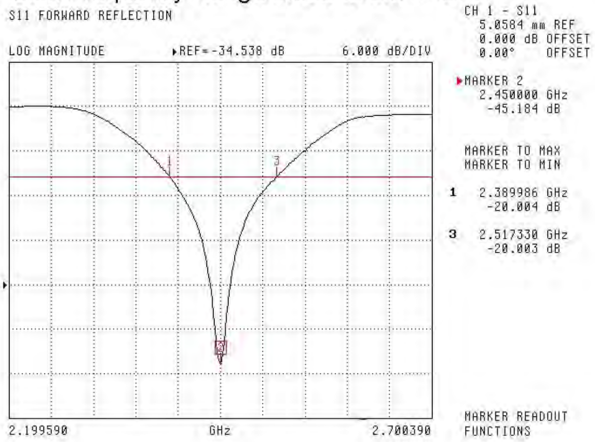
This page has been reviewed for content and attested to by signature within this document. 5

NCL Calibration Laboratories
Division of APREL Laboratories.

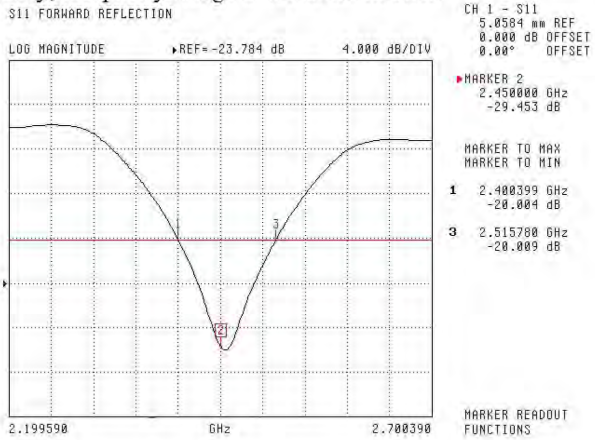
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head: Frequency Range 2.390 to 2.517 GHz



Body; Frequency Range 2.400 to 2.516 GHz



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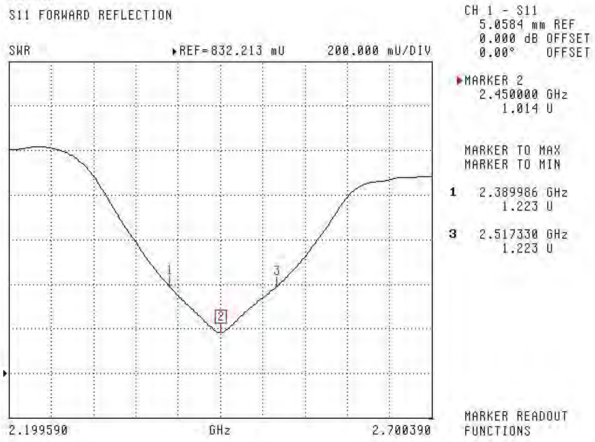
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories

Division of APREL Laboratories.

SWR

Head



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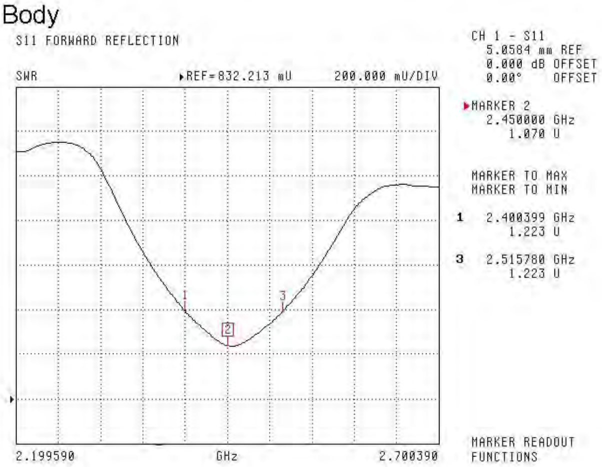

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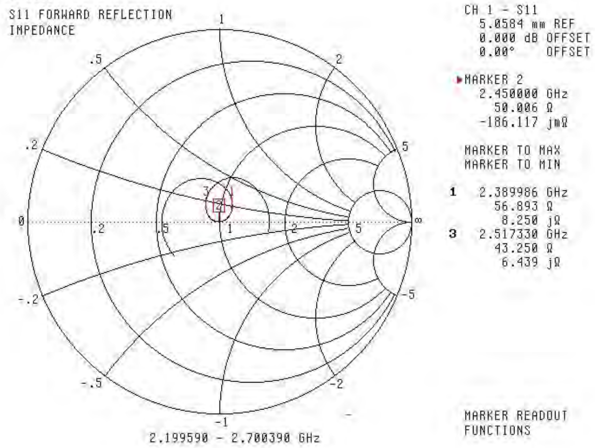
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories

Division of APREL Laboratories.

Smith Chart Dipole Impedance

Head



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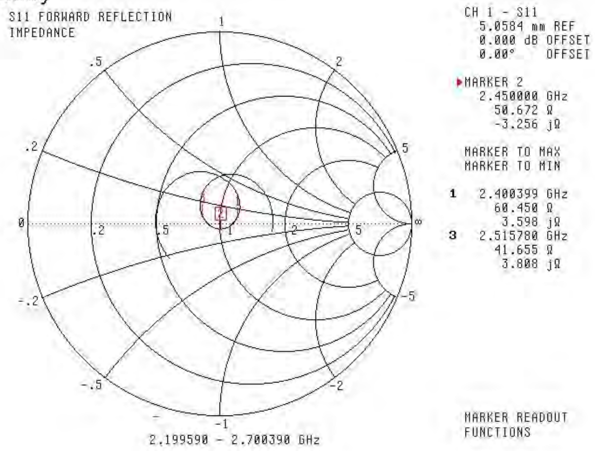

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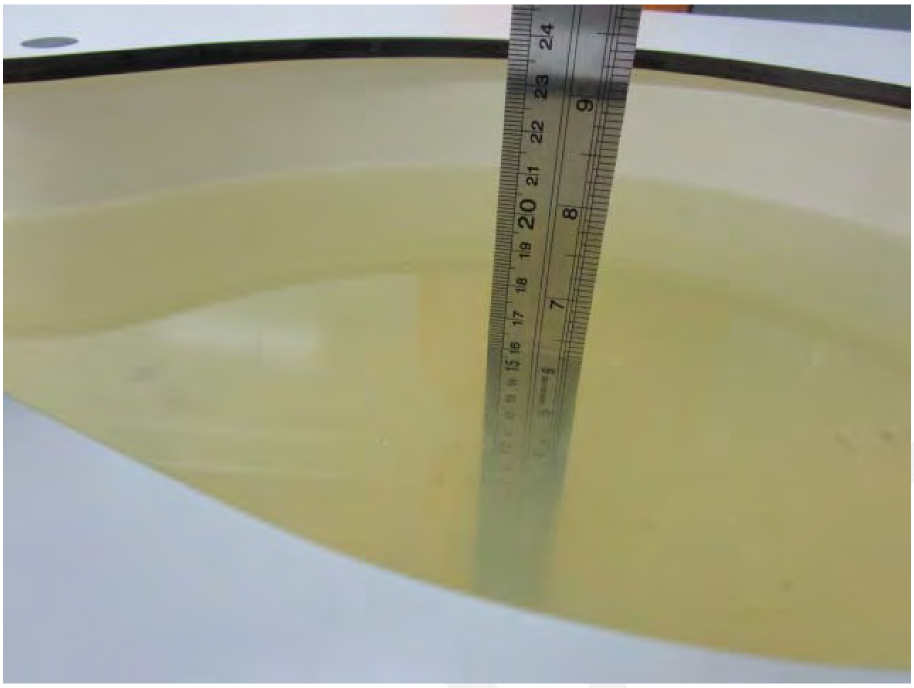
This page has been reviewed for content and attested to by signature within this document.

Test Equipment

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List May 2014.

APPENDIX D EUT TEST POSITION PHOTOS

Liquid depth > 15cm



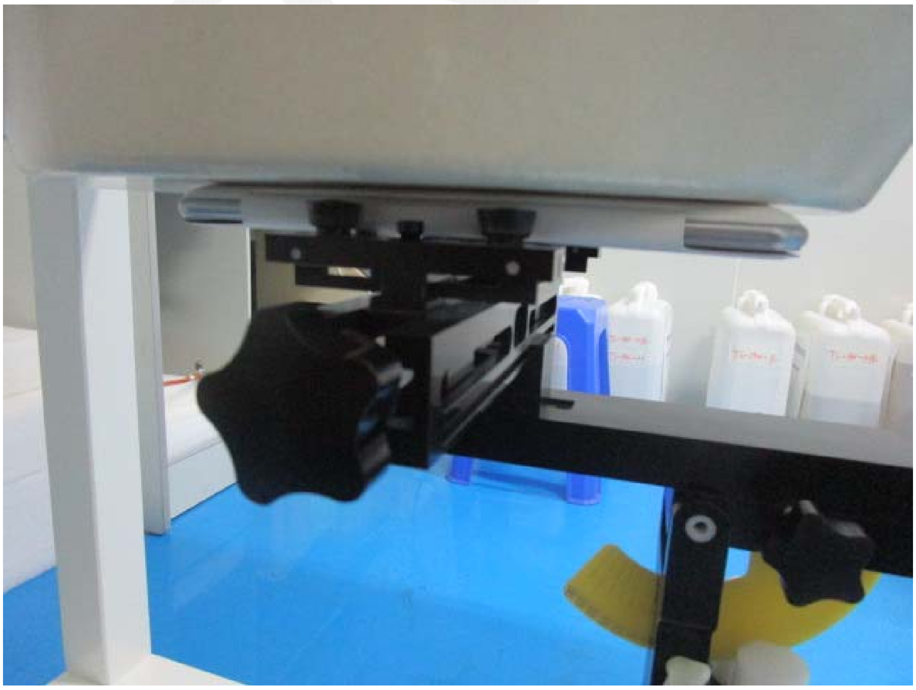
Body-worn Bottom Setup Photo (0mm)

Body-worn Top Setup Photo (0mm)

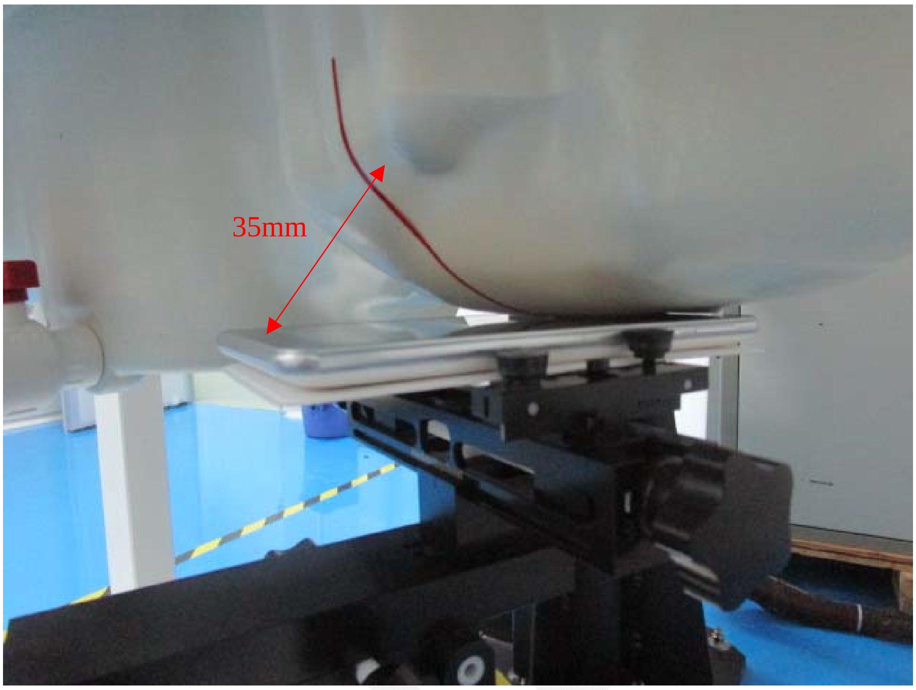
Body-worn Right Setup Photo (0mm)

Body-worn Left Setup Photo (0mm)

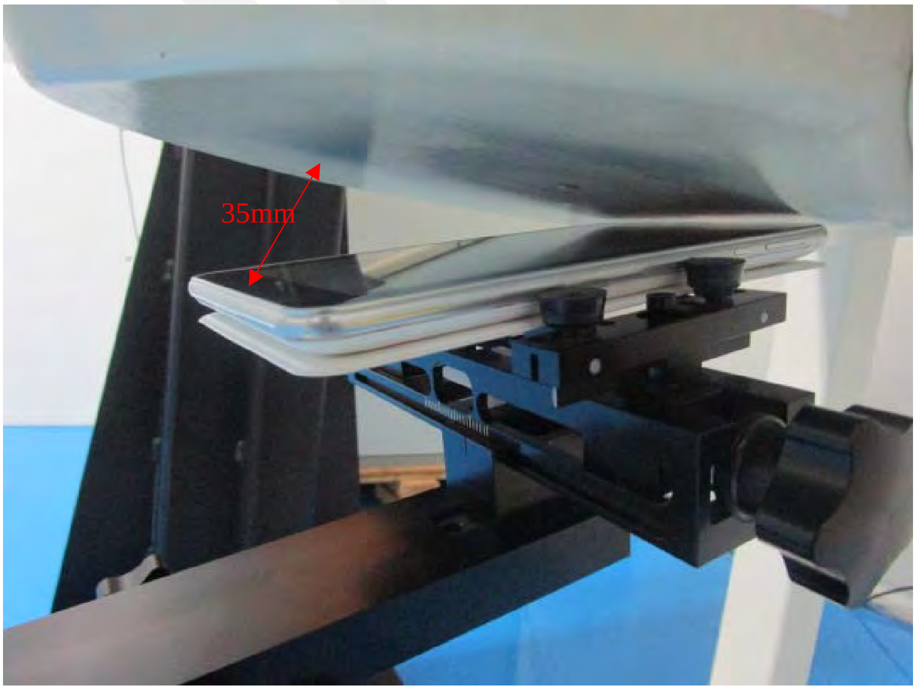
Body-worn Back Setup Photo (0mm)



Left Head Cheek Setup Photo



Head Cheek Setup Photo

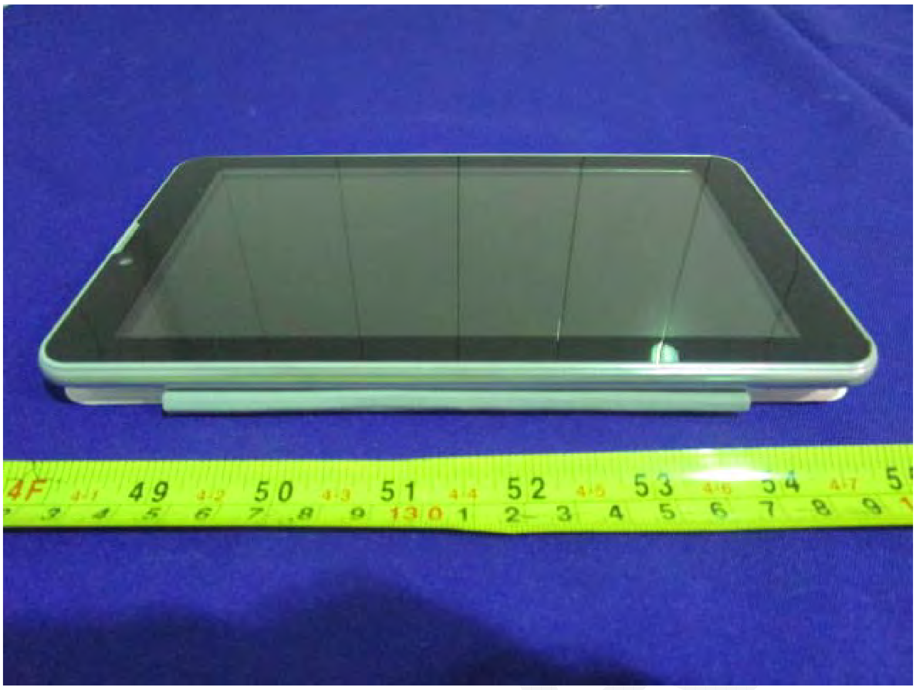


APPENDIX E EUT PHOTOS

EUT – Front View

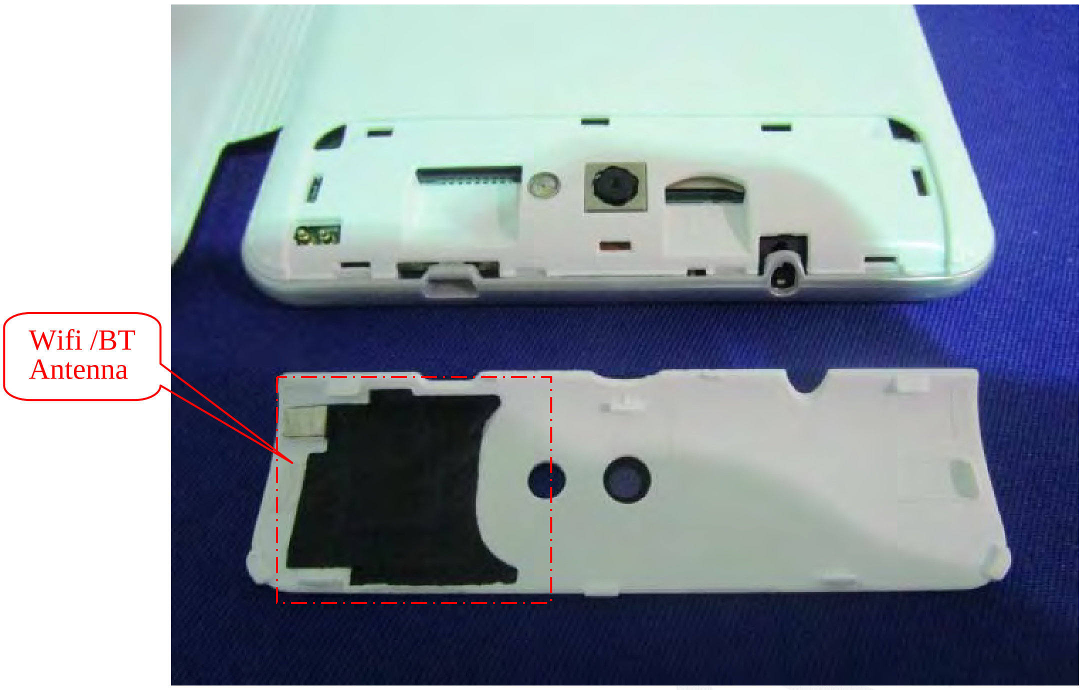
EUT – Back View

EUT –Left Side View

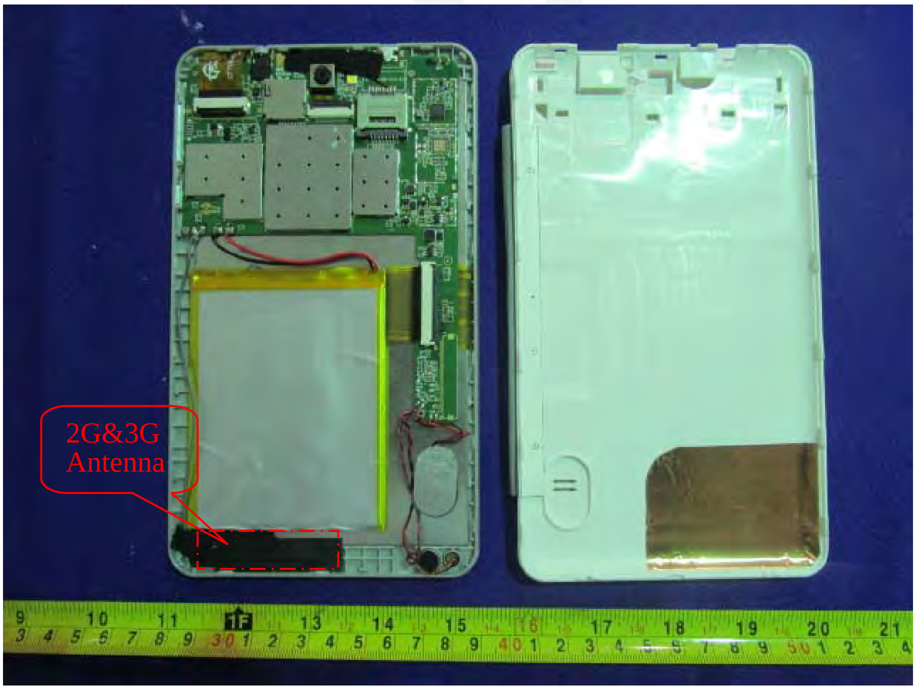


EUT – Right Side View

EUT –Port View



EUT – Uncover View



******* END OF REPORT *****