SAR EVALUATION REPORT

For

HONG KONG IPRO TECHNOLOGY CO.,LIMITED

FLAT/RM A3, 9/F SILVERCORP INT TOWER 707-713 NATHAN RD MONGKOK, HONGKONG

FCC ID: PQ4IPROARCOA58

Report Type:	**Product Type:**
Original Report	Smart Mobile Phone

Test Engineer: Rocky Xiao

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Attestation of Test Results			
EUT Information	**Company Name**	HONG KONG IPRO TECHNOLOGY CO.,LIMITED	
	EUT Description	Smart Mobile Phone	
	FCC ID	PQ4IPROARCOA58	
	Model Number	ACRO A58	
	Test Date	2015-05-11	
MODE		**Max. SAR Level(s) Reported(W/Kg)**	**Limit(W/Kg)**
GSM 850	1g Head SAR	0.084	**1. 6**
	1g Body SAR	0.536	
PCS 1900	1g Head SAR	0.055	
	1g Body SAR	0.417	
WCDMA 850	1g Head SAR	0.080	
	1g Body SAR	0.502	
WCDMA 1900	1g Head SAR	0.061	
	1g Body SAR	0.545	
Simultaneous	1g Head SAR	0.454	
	1g Body SAR	0.915	
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		
	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		

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.

TABLE OF CONTENTS

RADIOFREQUENCY RADIATION EXPOSURE EVALUATION: PORTABLE DEVICES 2

DOCUMENT REVISION HISTORY 5

EUT DESCRIPTION 6

TECHNICAL SPECIFICATION 6

REFERENCE, STANDARDS, AND GUILDELINES 7

SAR LIMITS 8

FACILITIES 9

DESCRIPTION OF TEST SYSTEM 10

EQUIPMENT LIST AND CALIBRATION 16

EQUIPMENTS LIST & CALIBRATION INFORMATION 16

SAR MEASUREMENT SYSTEM VERIFICATION 17

LIQUID VERIFICATION 17
SYSTEM ACCURACY VERIFICATION 20
SAR SYSTEM VALIDATION DATA 21

EUT TEST STRATEGY AND METHODOLOGY 25

TEST POSITIONS FOR DEVICE OPERATING NEXT TO A PERSON'S EAR 25
CHEEK/TOUCH POSITION 26
EAR/TILT POSITION 26
TEST POSITIONS FOR BODY-WORN AND OTHER CONFIGURATIONS 27
SAR EVALUATION PROCEDURE 28
TEST METHODOLOGY 28

CONDUCTED OUTPUT POWER MEASUREMENT 29

PROVISION APPLICABLE 29
TEST PROCEDURE 29
RADIO CONFIGURATION 29
MAXIMUM OUTPUT POWER AMONG PRODUCTION UNITS 34
TEST RESULTS: 35

SAR MEASUREMENT RESULTS 40

SAR TEST DATA 40

SAR SIMULTANEOUS TRANSMISSION DESCRIPTION 45

SAR PLOTS (SUMMARY OF THE HIGHEST SAR VALUES) 49

APPENDIX A MEASUREMENT UNCERTAINTY 57

APPENDIX B – PROBE CALIBRATION CERTIFICATES 59

APPENDIX C DIPOLE CALIBRATION CERTIFICATES 70

APPENDIX D EUT TEST POSITION PHOTOS 88

LIQUID DEPTH ≥ 15CM 88
LEFT HEAD CHEEK 88
LEFT HEAD TILT 89
RIGHT HEAD CHEEK 89
RIGHT HEAD TILT 90
BODY -WORN-BACK (10MM) 90
BODY -WORN-LEFT (10MM) 91
BODY -WORN-RIGHT (10MM) 91
BODY -WORN-BOTTOM(10MM) 92

APPENDIX E EUT PHOTOS 93

EUT – FRONT VIEW 93
EUT – BACK VIEW 93
EUT –LEFT SIDE VIEW 94
EUT – RIGHT SIDE VIEW 94
EUT – UNCOVER VIEW 95

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	RDG150505007-20	Original Report	2015-05-13

EUT DESCRIPTION

This report has been prepared on behalf of HONG KONG IPRO TECHNOLOGY CO.,LIMITED and their product, Model: ACRO A58, FCC ID: PQ4IPROARCOA58 or the EUT (Equipment under Test) as referred to in the rest of this report.

Technical Specification

Product Type	Smart Mobile Phone
Exposure Category:	Population / Uncontrolled
Antenna Type(s):	Internal Antenna
Body-Worn Accessories:	Portable
Face-Head Accessories:	None
Multi-slot Class:	Class12
Operation Mode :	GSM Voice, GPRS/EGPRS Data, WCDMA R99 (Voice+Data),HSUPA Rel 6,HSDPA Rel 7, DC-HSDPA Rel 8, HSPA+ Rel 6 WLAN 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) WLAN: 2412MHz-2462MHz Bluetooth : 2402MHz-2480MHz
Conducted RF Power:	GSM 850 : 32.18dBm PCS 1900: 29.17 dBm WCDMA 850: 22.49 dBm WCDMA 1900: 22.40 dBm WLAN: 9.11 dBm Bluetooth: 4.61dBm
Dimensions (L*W*H):	140 mm (L) × 70 mm (W) × 6 mm (H)
Power Source:	3.8 VDC Rechargeable Battery
Normal Operation:	Head and Body-worn

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

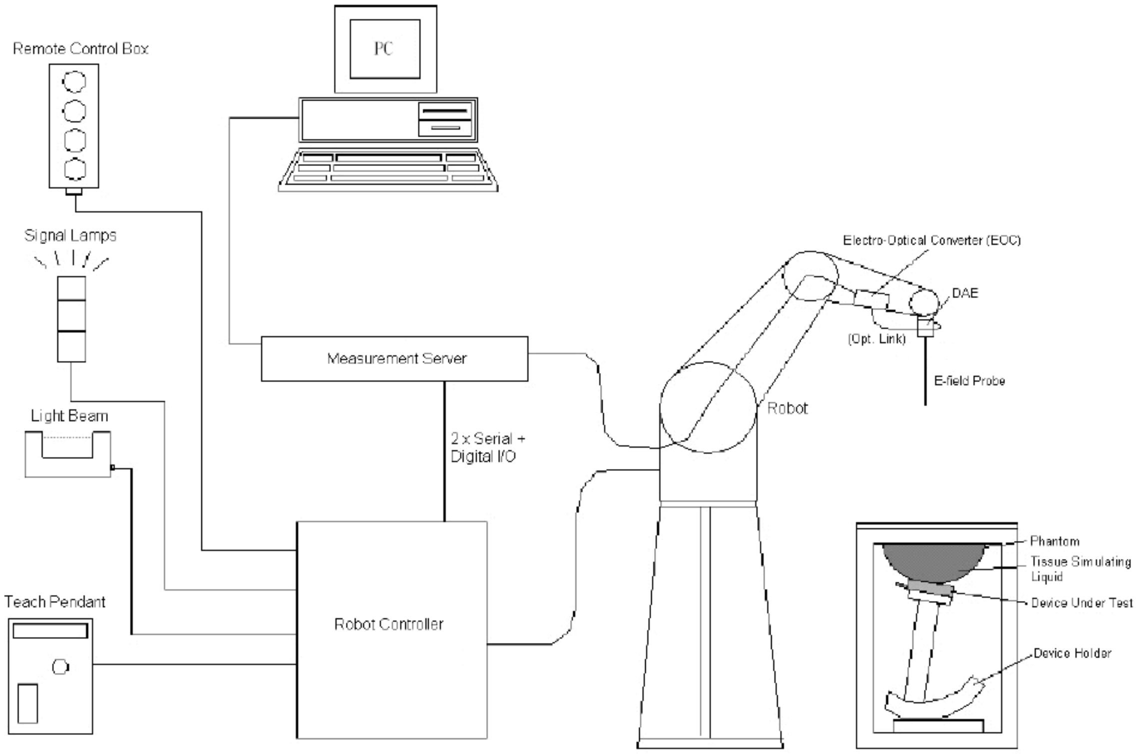
The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

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

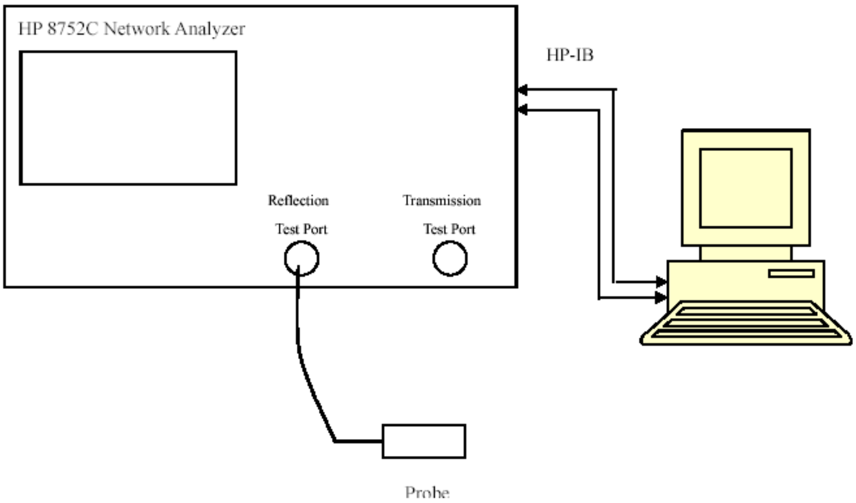
EQUIPMENT LIST AND CALIBRATION

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
R&S, universal Radio Communication Tester	CMU200	105047	2014-11-20	2015-11-20
8960 Series 10 Wireless Communication Test Set	E5515C	MY50266471	2015-01-13	2016-01-13
Mounting Device	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	/
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	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	Δσ (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

**Liquid Verification was performed on 2015-05-11.*

Please refer to the following tables.

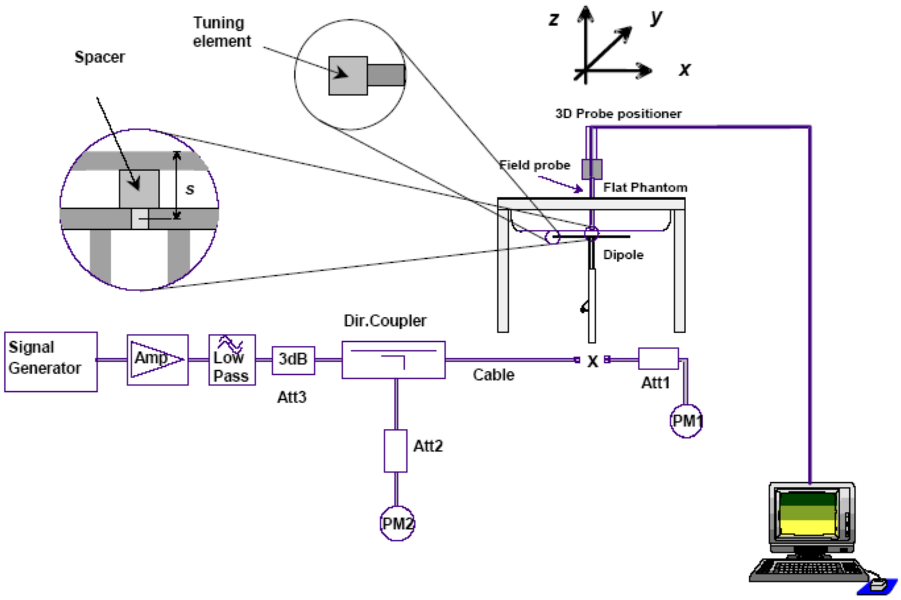
835 MHz Head			835 MHz Body		
Frequency (MHz)	**e'**	**e''**	**Frequency (MHz)**	**e'**	**e''**
824	42.8961	19.1643	824	55.1388	21.0542
824.5	42.9676	19.1325	824.5	55.1669	20.9472
825	42.9556	19.1375	825	55.1441	21.0086
825.5	42.9151	19.2006	825.5	55.2006	20.971
826	42.9115	19.1389	826	55.1084	21.0416
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	43.000	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	55.000	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

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 (%)
2015/5/11	835	Head	1g	9.62	9.773	-1.57	±10
		Body	1g	9.73	9.736	-0.06	±10
	1900	Head	1g	42.1	39.481	6.63	±10
		Body	1g	41.4	39.715	4.24	±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

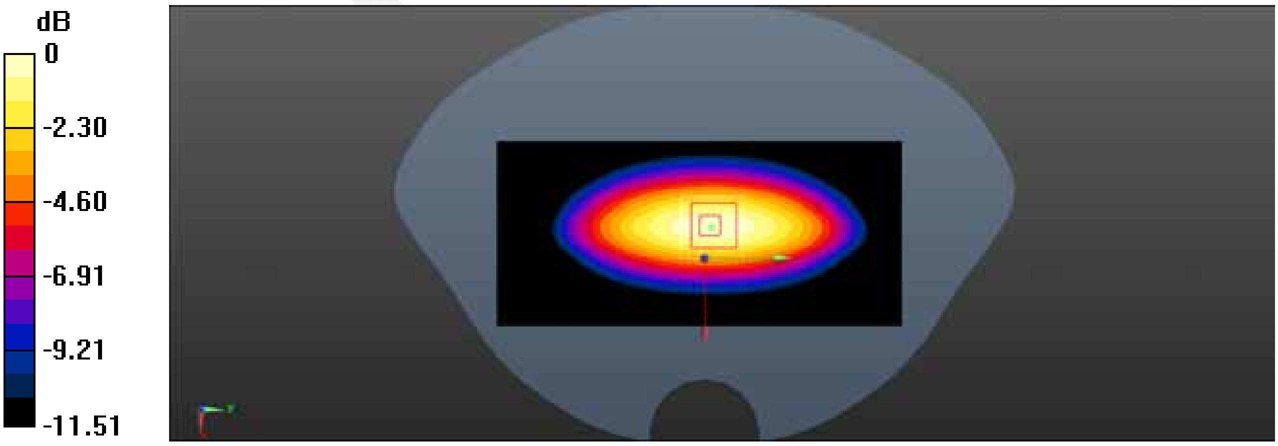
Communication System: CW ; Communication System Band: D835 (835.0 MHz); Frequency: 835 MHz; Duty Cycle 1:1
Medium parameters used: f = 835 MHz; σ = 0.892 S/m; ε_r = 42.967; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.52, 9.52, 9.52); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 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);

835 MHz/HEAD/Area Scan (126x251x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 10.3 W/kg

835 MHz/HEAD/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 108.4 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 16.0 W/kg
SAR(1 g) = 9.62 W/kg; SAR(10 g) = 5.88 W/kg
Maximum value of SAR (measured) = 10.5 W/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

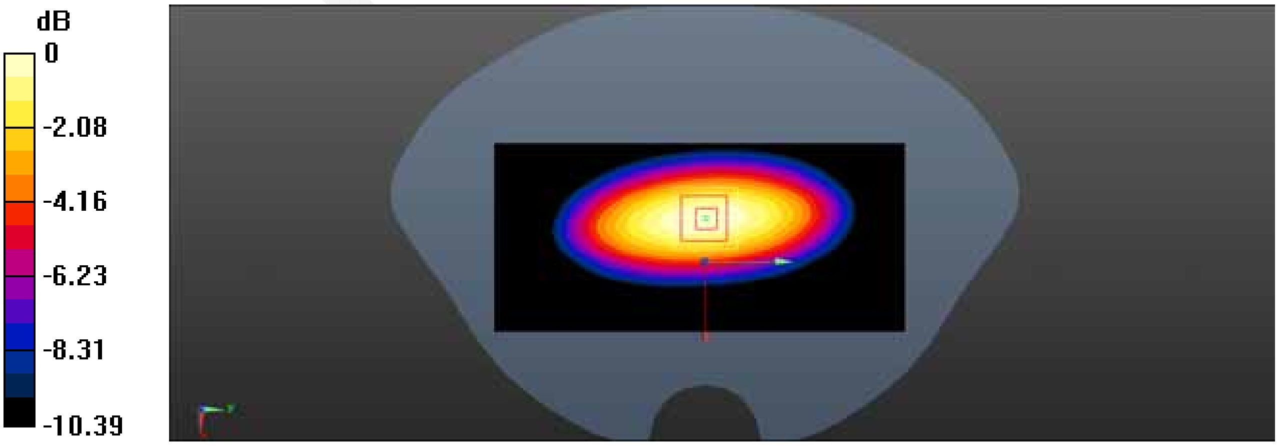
Communication System: CW; Communication System Band: D835 (835.0 MHz); Frequency: 835 MHz; Duty Cycle 1:1
Medium parameters used: f = 835 MHz; σ = 0.973 S/m; ε_r = 55.095; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.17, 9.17, 9.17); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 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);

835MHz/BODY/Area Scan (126x251x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 10.4 W/kg

835MHz/BODY/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 102.0 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 14.8 W/kg
SAR(1 g) = 9.73 W/kg; SAR(10 g) = 6.3 W/kg
Maximum value of SAR (measured) = 10.5 W/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

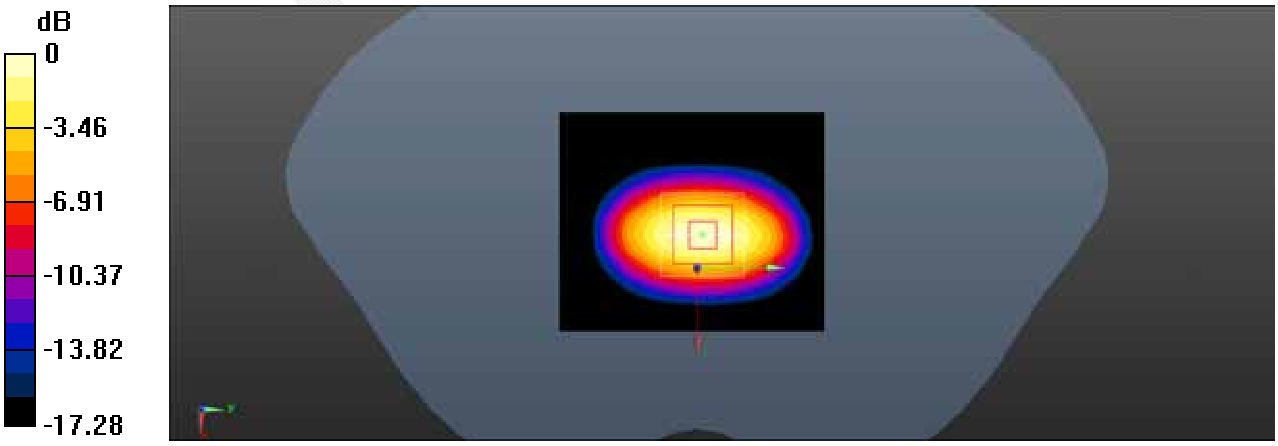
Communication System: CW ; Communication System Band: D1900 (1900.0 MHz); Frequency: 1900 MHz; Duty Cycle 1:1
Medium parameters used: f = 1900 MHz; σ = 1.411 S/m; ε_r = 39.664; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = -9.0, 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);

1900MHz/HEAD/Area Scan (101x121x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 47.9 W/kg

1900MHz/HEAD/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 169.4 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 87.2 W/kg
SAR(1 g) = 42.1 W/kg; SAR(10 g) = 21.5 W/kg
Maximum value of SAR (measured) = 49.4 W/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

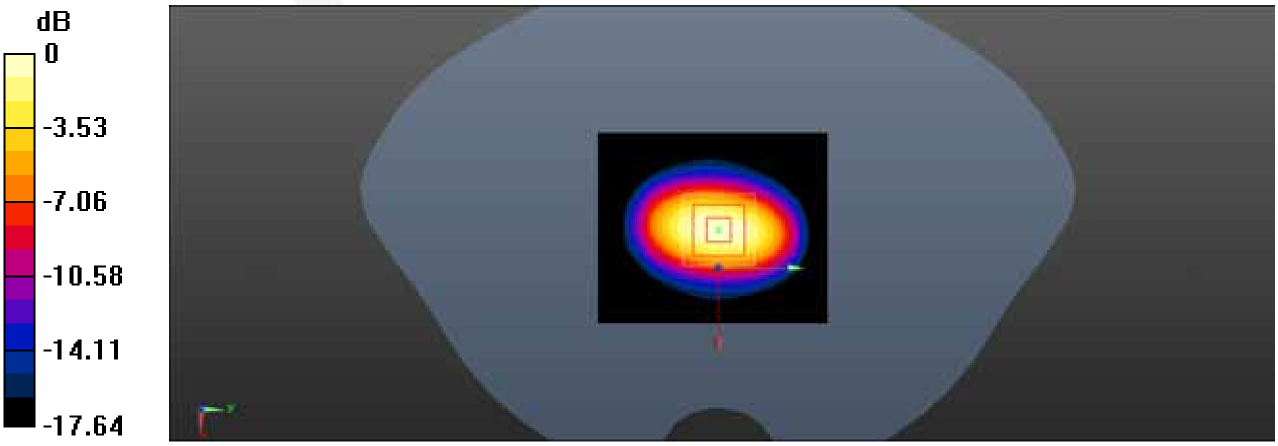
Communication System: CW; Communication System Band: D1900 (1900.0 MHz); Frequency: 1900 MHz; Duty Cycle 1:1
Medium parameters used: f = 1900 MHz; σ = 1.515 S/m; ε_r = 54.189; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.56, 7.56, 7.56); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = -9.0, 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);

1900MHz/BODY 2/Area Scan (101x121x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 48.1 W/kg

1900MHz/BODY 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 177.2 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 79.9 W/kg
SAR(1 g) = 41.4 W/kg; SAR(10 g) = 21.4 W/kg
Maximum value of SAR (measured) = 48.1 W/kg

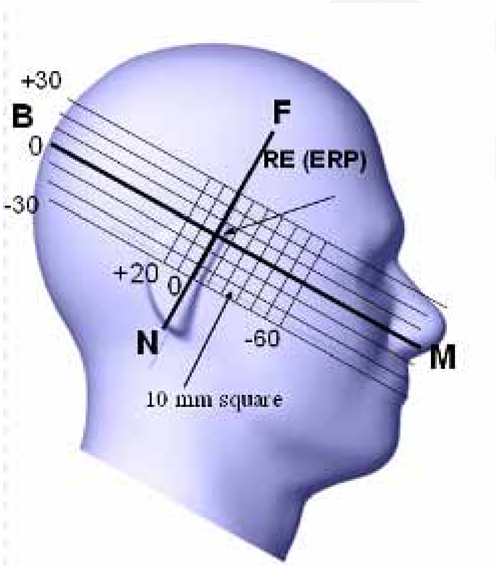


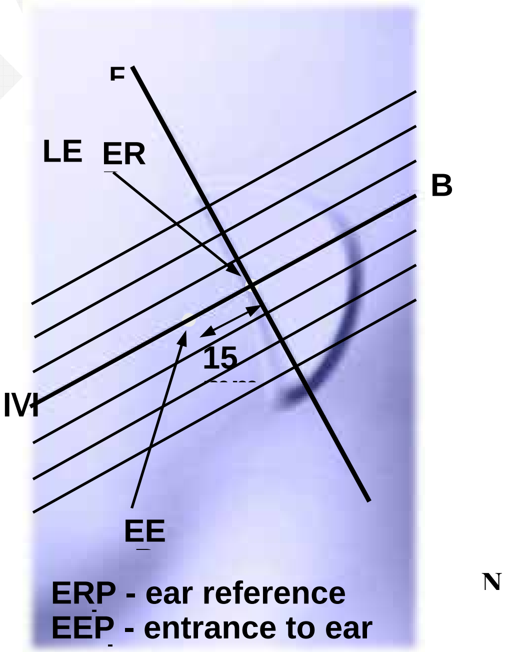
EUT TEST STRATEGY AND METHODOLOGY

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

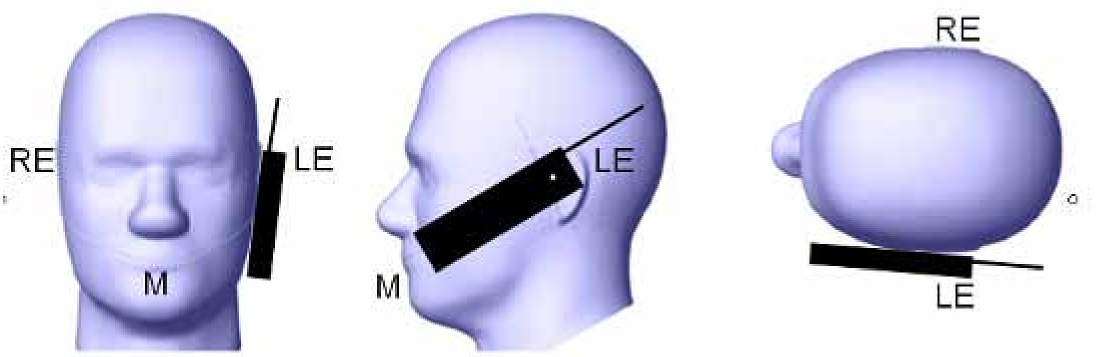
The device is brought toward the mouth of the head phantom by pivoting against the "ear reference point" or along the "N-F" line for the SCC-34/SC-2 head phantom.

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

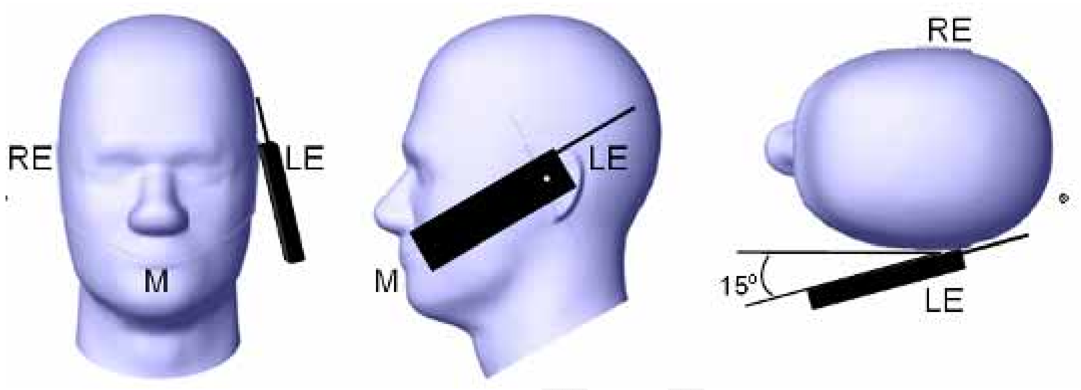
With the handset aligned in the "Cheek/Touch Position":

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.

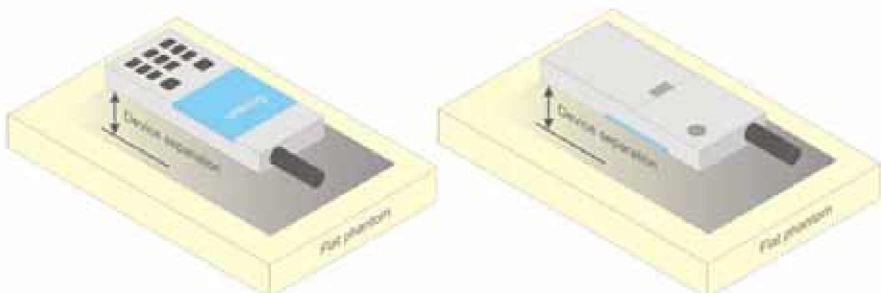


Figure 5 – Test positions for body-worn devices

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

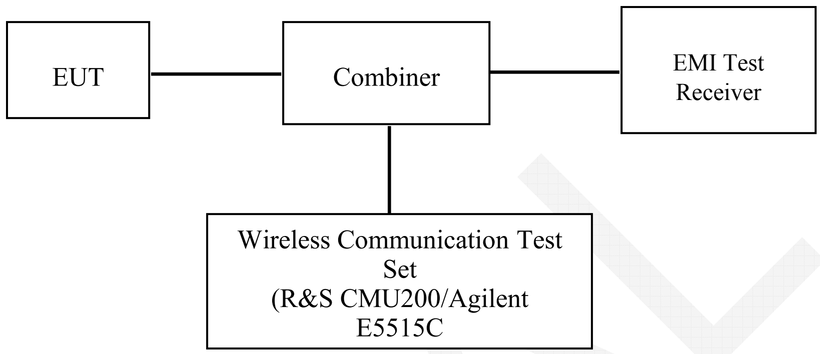
CONDUCTED OUTPUT POWER MEASUREMENT

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

Radio Configuration

The power measurement was configured by the Wireless Communication Test Set CMU200 for all Radio configurations except the HSPA+/DC-HSDPA configured by E5515C.

GSM

Function: Menu select > GSM Mobile Station > GSM 850/1900
Press Connection control to choose the different menus
Press RESET > choose all the reset all settings
Connection: Press Signal Off to turn off the signal and change settings
Network Support > GSM + only
MS Signal
> 33 dBm for GSM 850
> 30 dBm for GSM 1900
BS Signal:Enter the same channel number for TCH channel (test channel) and BCCH channel
Frequency Offset >+ 0 Hz
Mode > BCCH and TCH
BCCH Level > -85 dBm (May need to adjust if link is not stabe)
BCCH Channel >choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]
Channel Type > Off
P0 > 4 dB
TCH > choose desired test channel
Hopping >Off
AF/RF: Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input
Connection: Press Signal on to turn on the signal and change settings

GPRS

Function: Menu select > GSM Mobile Station > GSM 850/1900
Press Connection control to choose the different menus
Press RESET > choose all the reset all settings
Connection:Press Signal Off to turn off the signal and change settings
Network Support > GSM + GPRS or GSM + EGSM
Main Service > Packet Data

Service selection > Test Mode A – Auto Slot Config. off
MS Signal:Press Slot Config Bottom on the right twice to select and change the number of time slots and power setting
> Slot configuration > Uplink/Gamma
> 33 dBm for GPRS 850
> 30 dBm for GPRS 1900
BS Signal: Enter the same channel number for TCH channel (test channel) and BCCH channel
Frequency Offset >+ 0 Hz
Mode >BCCH and TCH
BCCH Level >-85 dBm (May need to adjust if link is not stabe)
BCCH Channel > choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]

Channel Type > Off
P0 > 4 dB
Slot Config > Unchanged (if already set under MS signal)
TCH > choose desired test channel
Hopping >Off
Main Timeslot >3
Network:Coding Scheme >CS4 (GPRS)
Bit Stream >2E9-1 PSR Bit Stream
AF/RF: Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input
Connection: Press Signal on to turn on the signal and change settings

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

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			

HSUPA

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

	Mode Subset	HSUPA 1	HSUPA 2	HSUPA 3	HSUPA 4	HSUPA 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	

HSPA+

The following tests were conducted according to the test requirements in Table C.11.1.4 of 3GPP TS 34.121-1

Sub-test	β_c (Note3)	β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (2xSF2) (Note 4)	β_{ed} (2xSF4) (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCI (Note 5)	E-TFCI (boost)
1	1	0	30/15	30/15	β_{ed}1: 30/15 β_{ed}2: 30/15	β_{ed}3: 24/15 β_{ed}4: 24/15	3.5	2.5	14	105	105

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c .
Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0).
Note 3: DPDCH is not configured, therefore the β_c is set to 1 and β_d = 0 by default.
Note 4: β_{ed} can not be set directly; it is set by Absolute Grant Value.
Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signalled to use the extrapolation algorithm.

DC-HSDPA

The following tests were conducted according to the test requirements in Table Table C.8.1.12 of 3GPP TS 34.121-1

Table C.8.1.12: Fixed Reference Channel H-Set 12

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	Processes	6
Information Bit Payload (N_{INF})	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codes	Codes	1
Modulation		QPSK

Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table.
Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.

Maximum Output Power among production units

Max Target Power for Production Unit (dBm)			
Mode/Band	Channel		
	Low	Middle	High
GSM 850	32.5	32.5	32.5
GPRS 1 slot	32.5	32.5	32.5
GPRS 2 slots	32	32	32
GPRS 3 slots	30.5	30.5	30.5
GPRS 4 slots	29	29	29
EGPRS 1 slot	30	30	30
EGPRS 2 slots	29	29	29
EGPRS 3 slots	26	26	26
EGPRS 4 slots	25	25	25
PCS 1900	29.5	29.5	29.5
GPRS 1 slot	29.5	29.5	29.5
GPRS 2 slots	29	29	29
GPRS 3 slots	27	27	27
GPRS 4 slots	26	26	26
EGPRS 1 slot	28.5	28.5	28.5
EGPRS 2 slots	27.5	27.5	27.5
EGPRS 3 slots	25	25	25
EGPRS 4 slots	24	24	24
WCDMA850	22.6	21.6	22
HSUPA	22	21	22
HSDPA	22	21	22
DC-HSDPA	22	22	22
HSPA+	21.5	21.5	21.5
WCDMA1900	22.6	22.6	22.6
HSUPA	22	22	22
HSDPA	22	22	22
DC-HSDPA	21.5	21.5	21.5
HSPA+	21	21	21
WLAN	9.5	9.5	9.5
Bluetooth	4.65	4.65	4.65

Test Results:

GSM:

Band	Channel No.	Frequency (MHz)	Time Based Average Power (dBm)
GSM 850	128	824.2	32.17
	190	836.6	**32.18**
	251	848.8	32.15
PCS 1900	512	1850.2	**29.17**
	661	1880	29.05
	810	1909.8	28.97

GPRS:

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			1 slot	2 slots	3 slots	4 slots
GSM 850	128	824.2	32.44	31.7	30.01	28.83
	190	836.6	32.45	31.66	29.94	28.76
	251	848.8	32.42	31.63	29.93	28.65
PCS 1900	512	1850.2	29.17	28.4	26.62	25.87
	661	1880	29.05	28.29	26.47	25.35
	810	1909.8	28.96	28.15	26.34	25.12

EGPRS:

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			1 slot	2 slots	3 slots	4 slots
GSM 850	128	824.2	29.17	28.39	25.65	24.42
	190	836.6	29.95	28.28	25.48	24.34
	251	848.8	28.65	28.04	25.19	24.18
PCS 1900	512	1850.2	28.4	27.1	24.82	23.66
	661	1880	28.27	26.98	24.67	23.56
	810	1909.8	28.22	26.91	24.6	23.5

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	23.44	25.7	25.76	**25.83**
	190	836.6	23.45	25.66	25.69	25.76
	251	848.8	23.42	25.63	25.68	25.65
PCS 1900	512	1850.2	20.17	22.4	22.37	**22.87**
	661	1880	20.05	22.29	22.22	22.35
	810	1909.8	19.96	22.15	22.09	22.12

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	20.17	22.39	21.4	21.42
	190	836.6	20.95	22.28	21.23	21.34
	251	848.8	19.65	22.04	20.94	21.18
PCS 1900	512	1850.2	19.4	21.1	20.57	20.66
	661	1880	19.27	20.98	20.42	20.56
	810	1909.8	19.22	20.91	20.35	20.5

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).
4. According to KDB941225D06-SAR for EGPRS mode are not required when the source-based time-averaged output power for data mode is lower than that in the normal GPRS mode

WCDMA:

Results (12.2kbps RMC)

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)
WCDMA 850	4132	826.4	22.49
	4183	836.6	21.47
	4233	846.6	21.98
WCDMA 1900	9262	1852.4	22.17
	9400	1880	22.4
	9538	1907.6	22.35

Results (HSDPA)

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			Subset 1	Subset 2	Subset 3	Subset 4
WCDMA 850	4132	826.4	21.35	21.79	21.16	21.55
	4183	836.6	20.56	20.41	20.24	20.4
	4233	846.6	21.18	20.81	20.98	21.38
WCDMA 1900	9262	1852.4	21.24	21.14	21.29	21.27
	9400	1880	21.45	21.04	21.64	21.49
	9538	1907.6	21.4	21.48	21.47	21.63

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	21.36	21.26	21.42	21.58	21.58
	4183	836.6	20.48	21.45	21.27	21.46	21.1
	4233	846.6	21.12	21.26	21.17	21.41	21.5
WCDMA 1900	9262	1852.4	21.22	21.74	21.87	21.03	21.36
	9400	1880	21.16	21.72	20.99	21.88	21.77
	9538	1907.6	21.45	21.83	21.22	21.32	21.37

Results (DC-HSDPA):

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			Subset 1	Subset 2	Subset 3	Subset 4
WCDMA 850	4132	826.4	21.96	21.83	21.66	21.29
	4183	836.6	21.67	21.71	21.63	21.14
	4233	846.6	21.81	21.79	21.36	21.51
WCDMA 1900	9262	1852.4	21.17	20.92	20.76	20.14
	9400	1880	21.39	21.08	20.88	20.48
	9538	1907.6	21.38	21.35	21.33	21.10

Results (HSPA+)

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)
WCDMA 850	4132	826.4	21.41
	4183	836.6	21.31
	4233	846.6	21.41
WCDMA 1900	9262	1852.4	20.67
	9400	1880	20.52
	9538	1907.6	20.81

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/HSUPA/HSPA+/DC-HSDPA when the maximum average output of each RF channel is less than ¼ dB higher than measured 12.2kbps RMC or the maximum SAR for 12.2kbps RMC is < 75% of SAR limit.

Bluetooth

Mode	Channel No.	Channel frequency (MHz)	RF Output Power (dBm)
BDR(GFSK)	0	2402	3.25
	39	2441	3.82
	78	2480	4.61
EDR(4-DQPSK)	0	2402	2.48
	39	2441	3.13
	78	2480	3.85
EDR-8DPSK	0	2402	2.64
	39	2441	3.22
	78	2480	4.00
BLE	0	2402	-4.19
	19	2440	-3.75
	39	2480	-3.13

WLAN

Mode	Channel No.	Channel frequency (MHz)	RF Output Power (dBm)
802.11b	1	2412	9.22
	6	2437	**9.35**
	11	2462	9.27
802.11g	1	2412	9.11
	6	2437	8.95
	11	2462	9.01
802.11n HT20	1	2412	8.91
	6	2437	8.74
	11	2462	9.05
802.11n HT40	3	2422	7.39
	6	2437	7.68
	9	2452	7.55

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.

The EUT is capable of function as a WLAN to cellular mobile hotspot. Additional SAR test was performed according to KDB941225 D06. Test was performed with a separation of 1cm between the EUT and the flat phantom. The EUT was positioned for SAR tests with the front and back surfaces facing the edge. Each transmit band was utilized for SAR testing. The tested mode has been selected within each band that exhibits the highest time average output power.

SAR Test Data

Environmental Conditions

Temperature:	24 ℃
Relative Humidity:	52 %
ATM Pressure:	1001 mbar

Testing was performed by Rocky Xiao on 2015-05-11

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
Left Head Cheek	824.2	GSM	-0.79	32.17	32.5	1.079	0.078	0.084	**1#**
	836.6	GSM	-1.23	32.18	32.5	1.076	0.077	0.083	/
	848.8	GSM	-2.06	32.15	32.5	1.084	0.074	0.080	/
Left Head Tilt	824.2	GSM	/	/	/	/	/	/	/
	836.6	GSM	-0.23	32.18	32.5	1.076	0.045	0.048	/
	848.8	GSM	/	/	/	/	/	/	/
Right Head Cheek	824.2	GSM	/	/	/	/	/	/	/
	836.6	GSM	-0.16	32.18	32.5	1.076	0.064	0.069	/
	848.8	GSM	/	/	/	/	/	/	/
Right Head Tilt	824.2	GSM	/	/	/	/	/	/	/
	836.6	GSM	-0.37	32.18	32.5	1.076	0.039	0.042	/
	848.8	GSM	/	/	/	/	/	/	/
Body-Back-Headset (10mm)	824.2	GSM	/	/	/	/	/	/	/
	836.6	GSM	-1.33	32.18	32.5	1.076	0.315	0.339	/
	848.8	GSM	/	/	/	/	/	/	/
Body-Worn-Back (10mm)	824.2	GPRS	-2.49	28.83	29	1.04	0.515	0.536	**2#**
	836.6	GPRS	-1.1	28.76	29	1.057	0.486	0.514	/
	848.8	GPRS	-0.62	28.65	29	1.084	0.438	0.475	/
Body- Worn-Right (10mm)	824.2	GPRS	/	/	/	/	/	/	/
	836.6	GPRS	1.17	28.76	29	1.057	0.377	0.398	/
	848.8	GPRS	/	/	/	/	/	/	/
Body -Worn-Left (10mm)	824.2	GPRS	/	/	/	/	/	/	/
	836.6	GPRS	3.28	28.76	29	1.057	0.324	0.342	/
	848.8	GPRS	/	/	/	/	/	/	/
Body -Worn-Bottom (10mm)	824.2	GPRS	/	/	/	/	/	/	/
	836.6	GPRS	0.036	28.76	29	1.057	0.447	0.472	/
	848.8	GPRS	/	/	/	/	/	/	/

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
Left Head Cheek	1850.2	GSM	0.67	29.17	29.5	1.079	0.049	0.053	/
	1880	GSM	0.54	29.05	29.5	1.109	0.050	**0.055**	**3#**
	1909.8	GSM	1.25	28.97	29.5	1.130	0.044	0.050	/
Left Head Tilt	1850.2	GSM	/	/	/	/	/	/	/
	1880	GSM	0.09	29.05	29.5	1.109	0.036	0.040	/
	1909.8	GSM	/	/	/	/	/	/	/
Right Head Cheek	1850.2	GSM	/	/	/	/	/	/	/
	1880	GSM	2.35	29.05	29.5	1.109	0.048	0.053	/
	1909.8	GSM	/	/	/	/	/	/	/
Right Head Tilt	1850.2	GSM	/	/	/	/	/	/	/
	1880	GSM	1.24	29.05	29.5	1.109	0.029	0.032	/
	1909.8	GSM	/	/	/	/	/	/	/
Body-Back-Headset (10mm)	1850.2	GSM	/	/	/	/	/	/	/
	1880	GSM	-0.3	29.05	29.5	1.109	0.348	0.386	/
	1909.8	GSM	/	/	/	/	/	/	
Body-Worn-Back (10mm)	1850.2	GPRS	-0.04	25.87	26	1.03	0.405	0.417	**4#**
	1880	GPRS	/	/	/	/	/	/	/
	1909.8	GPRS	/	/	/	/	/	/	/
Body- Worn-Right (10mm)	1850.2	GPRS	2.03	25.87	26	1.03	0.332	0.342	/
	1880	GPRS	/	/	/	/	/	/	/
	1909.8	GPRS	/	/	/	/	/	/	/
Body -Worn-Left (10mm)	1850.2	GPRS	1.66	25.87	26	1.03	0.301	0.31	/
	1880	GPRS	/	/	/	/	/	/	/
	1909.8	GPRS	/	/	/	/	/	/	/
Body -Worn-Bottom (10mm)	1850.2	GPRS	0.27	25.87	26	1.03	0.376	0.387	/
	1880	GPRS	/	/	/	/	/	/	/
	1909.8	GPRS	/	/	/	/	/	/	/

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. When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.
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.

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
Left Head Cheek	826.4	WCDMA	0.78	22.49	22.6	1.026	0.078	0.08	**5#**
	836.6	WCDMA	/	/	/	/	/	/	/
	846.6	WCDMA	/	/	/	/	/	/	/
Left Head Tilt	826.4	WCDMA	-2.54	22.49	22.6	1.026	0.056	0.057	/
	836.6	WCDMA	/	/	/	/	/	/	/
	846.6	WCDMA	/	/	/	/	/	/	/
Right Head Cheek	826.4	WCDMA	-1.37	22.49	22.6	1.026	0.073	0.075	/
	836.6	WCDMA	/	/	/	/	/	/	/
	846.6	WCDMA	/	/	/	/	/	/	/
Right Head Tilt	826.4	WCDMA	-0.29	22.49	22.6	1.026	0.047	0.048	/
	836.6	WCDMA	/	/	/	/	/	/	/
	846.6	WCDMA	/	/	/	/	/	/	/
Body-Worn-Back (10mm)	826.4	WCDMA	-1.6	22.49	22.6	1.026	0.489	0.502	**6#**
	836.6	WCDMA	1.23	21.47	21.6	1.03	0.451	0.465	/
	846.6	WCDMA	2.57	21.98	22	1.005	0.477	0.479	/
Body- Worn-Right (10mm)	826.4	WCDMA	1.02	22.49	22.6	1.026	0.403	0.413	/
	836.6	WCDMA	/	/	/	/	/	/	/
	846.6	WCDMA	/	/	/	/	/	/	/
Body -Worn-Left (10mm)	826.4	WCDMA	2.13	22.49	22.6	1.026	0.392	0.402	/
	836.6	WCDMA	/	/	/	/	/	/	/
	846.6	WCDMA	/	/	/	/	/	/	/
Body -Worn-Bottom (10mm)	826.4	WCDMA	-0.42	22.49	22.6	1.026	0.421	0.432	/
	836.6	WCDMA	/	/	/	/	/	/	/
	846.6	WCDMA	/	/	/	/	/	/	/

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
Left Head Cheek	1852.4	WCDMA	/	/	/	/	/	/	/
	1880	WCDMA	-0.69	22.4	22.6	1.047	0.058	0.061	**7#**
	1907.6	WCDMA	/	/	/	/	/	/	/
Left Head Tilt	1852.4	WCDMA	/	/	/	/	/	/	/
	1880	WCDMA	1.35	22.4	22.6	1.047	0.032	0.034	/
	1907.6	WCDMA	/	/	/	/	/	/	/
Right Head Cheek	1852.4	WCDMA	/	/	/	/	/	/	/
	1880	WCDMA	2.07	22.4	22.6	1.047	0.049	0.051	/
	1907.6	WCDMA	/	/	/	/	/	/	/
Right Head Tilt	1852.4	WCDMA	/	/	/	/	/	/	/
	1880	WCDMA	-1.36	22.4	22.6	1.047	0.027	0.028	/
	1907.6	WCDMA	/	/	/	/	/	/	/
Body-Worn-Back (10mm)	1852.4	WCDMA	-0.11	22.17	22.6	1.104	0.493	0.544	/
	1880	WCDMA	0.03	22.4	22.6	1.047	0.521	0.545	**8#**
	1907.6	WCDMA	-0.92	22.35	22.6	1.059	0.472	0.5	/
Body- Worn-Right (10mm)	1852.4	WCDMA	/	/	/	/	/	/	/
	1880	WCDMA	-1.38	22.4	22.6	1.047	0.313	0.328	/
	1907.6	WCDMA	/	/	/	/	/	/	/
Body -Worn-Left (10mm)	1852.4	WCDMA	/	/	/	/	/	/	/
	1880	WCDMA	3.29	22.4	22.6	1.047	0.299	0.313	/
	1907.6	WCDMA	/	/	/	/	/	/	/
Body -Worn-Bottom (10mm)	1852.4	WCDMA	/	/	/	/	/	/	/
	1880	WCDMA	0.97	22.4	22.6	1.047	0.364	0.381	/
	1907.6	WCDMA	/	/	/	/	/	/	/

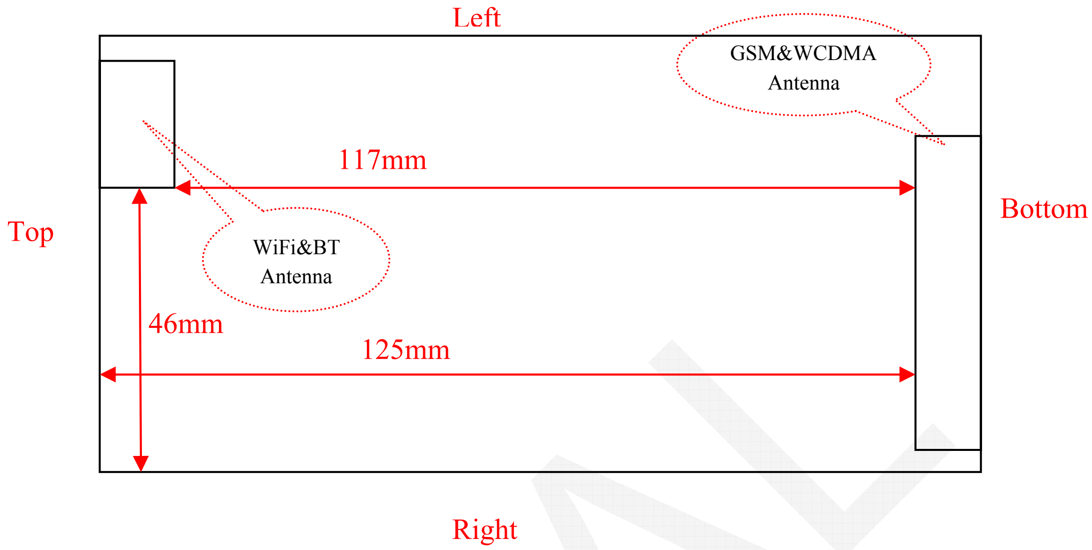
Note:

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/HSUPA/HSPA+/DC-HSDPA when the maximum average output of each RF channel is less than ¼ dB higher than measured 12.2kbps RMC or the maximum SAR for 12.2kbps RMC is < 75% of SAR limit.

5. 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.

SAR SIMULTANEOUS TRANSMISSION DESCRIPTION

BT&WLAN and GSM&3G Antennas Location:



Simultaneous Transmission:

Description of Simultaneous Transmit Capabilities			Antennas Distance (mm)
Transmitter Combination	Simultaneous?	Hotspot?	
GSM + WCDMA	×	×	0
GSM + Bluetooth	√	×	117
GSM + WLAN	√	×	117
GPRS + WCDMA	×	×	0
GPRS + Bluetooth	√	×	117
GPRS + WLAN	√	√	117
WCDMA + Bluetooth	√	×	117
WCDMA + WLAN	√	√	117

Standalone SAR test exclusion considerations

Mode	Frequency (MHz)	Pavg (dBm)	Pavg (mW)	Distance (mm)	Calculated value	Threshold (1-g)	SAR Test Exclusion
WLAN	2450	9.5	8.91	0	2.79	3	YES
Bluetooth	2450	4.65	2.92	0	0.91	3	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)
WLAN	2450	9.5	8.91	0	0.37
BT	2450	4.65	2.92	0	0.12

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 and Hotspot SAR test exclusion considerations:

Mode (SAR1+SAR2)	Position	Reported SAR (W/kg)		ΣSAR < 1.6W/kg
		SAR1	SAR2	
GSM 850+BT	Left Head Cheek	0.084	0.12	0.204
	Left Head Tilt	0.048	0.12	0.168
	Right Head Cheek	0.069	0.12	0.189
	Right Head Tilt	0.042	0.12	0.162
	Body-Back-Headset	0.339	0.12	0.459
GPRS 850 +BT	Body-Back	0.536	0.12	0.656
	Body-Right	0.398	0.12	0.518
	Body-Left	0.342	0.12	0.462
	Body-Bottom	0.472	0.12	0.592
GSM 1900+BT	Left Head Cheek	0.055	0.12	0.175
	Left Head Tilt	0.04	0.12	0.16
	Right Head Cheek	0.053	0.12	0.173
	Right Head Tilt	0.032	0.12	0.152
	Body-Back-Headset	0.386	0.12	0.506
GPRS 1900 +BT	Body-Back	0.417	0.12	0.537
	Body-Right	0.342	0.12	0.462
	Body-Left	0.31	0.12	0.43
	Body-Bottom	0.387	0.12	0.507
GSM 850 +WLAN	Left Head Cheek	0.084	0.37	0.454
	Left Head Tilt	0.048	0.37	0.418
	Right Head Cheek	0.069	0.37	0.439
	Right Head Tilt	0.042	0.37	0.412
	Body-Back-Headset	0.339	0.37	0.709
GPRS 850 +WLAN (Hotspot)	Body-Back	0.536	0.37	0.906
	Body-Right	0.398	0.37	0.768
	Body-Left	0.342	0.37	0.712
	Body-Bottom	0.472	0.37	0.842
GSM 1900 +WLAN	Left Head Cheek	0.055	0.37	0.425
	Left Head Tilt	0.04	0.37	0.41
	Right Head Cheek	0.053	0.37	0.423
	Right Head Tilt	0.032	0.37	0.402
	Body-Back-Headset	0.386	0.37	0.756
GPRS 1900 +WLAN (Hotspot)	Body-Back	0.417	0.37	0.787
	Body-Right	0.342	0.37	0.712
	Body-Left	0.31	0.37	0.68
	Body-Bottom	0.387	0.37	0.757

Note: Hotspot mode SAR is only required for the edges within 25mm from the transmitting antenna located.

Mode (SAR1+SAR2)	Position	Reported SAR (W/kg)		ΣSAR < 1.6W/kg
		SAR1	SAR2	
WCDMA 850 +BT	Left Head Cheek	0.08	0.12	0.2
	Left Head Tilt	0.057	0.12	0.177
	Right Head Cheek	0.075	0.12	0.195
	Right Head Tilt	0.048	0.12	0.168
	Body-Back	0.502	0.12	0.622
	Body-Right	0.413	0.12	0.533
	Body-Left	0.402	0.12	0.522
	Body-Bottom	0.432	0.12	0.552
WCDMA 1900 +BT	Left Head Cheek	0.061	0.12	0.181
	Left Head Tilt	0.034	0.12	0.154
	Right Head Cheek	0.051	0.12	0.171
	Right Head Tilt	0.028	0.12	0.148
	Body-Back	0.545	0.12	0.665
	Body-Right	0.328	0.12	0.448
	Body-Left	0.313	0.12	0.433
	Body-Bottom	0.381	0.12	0.501
WCDMA 850 +WLAN	Left Head Cheek	0.08	0.37	0.45
	Left Head Tilt	0.057	0.37	0.427
	Right Head Cheek	0.075	0.37	0.445
	Right Head Tilt	0.048	0.37	0.418
WCDMA 850 +WLAN (Hotspot)	Body-Back	0.502	0.37	0.872
	Body-Right	0.413	0.37	0.783
	Body-Left	0.402	0.37	0.772
	Body-Bottom	0.432	0.37	0.802
WCDMA 1900 +WLAN	Left Head Cheek	0.061	0.37	0.431
	Left Head Tilt	0.034	0.37	0.404
	Right Head Cheek	0.051	0.37	0.421
	Right Head Tilt	0.028	0.37	0.398
WCDMA 1900 +WLAN (Hotspot)	Body-Back	0.545	0.37	0.915
	Body-Right	0.328	0.37	0.698
	Body-Left	0.313	0.37	0.683
	Body-Bottom	0.381	0.37	0.751

Note: Hotspot mode SAR is only required for the edges within 25mm from the transmitting antenna located.

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-Left Head Check Low Channel

DUT: Smart Mobile Phone; Type: ACRO A58

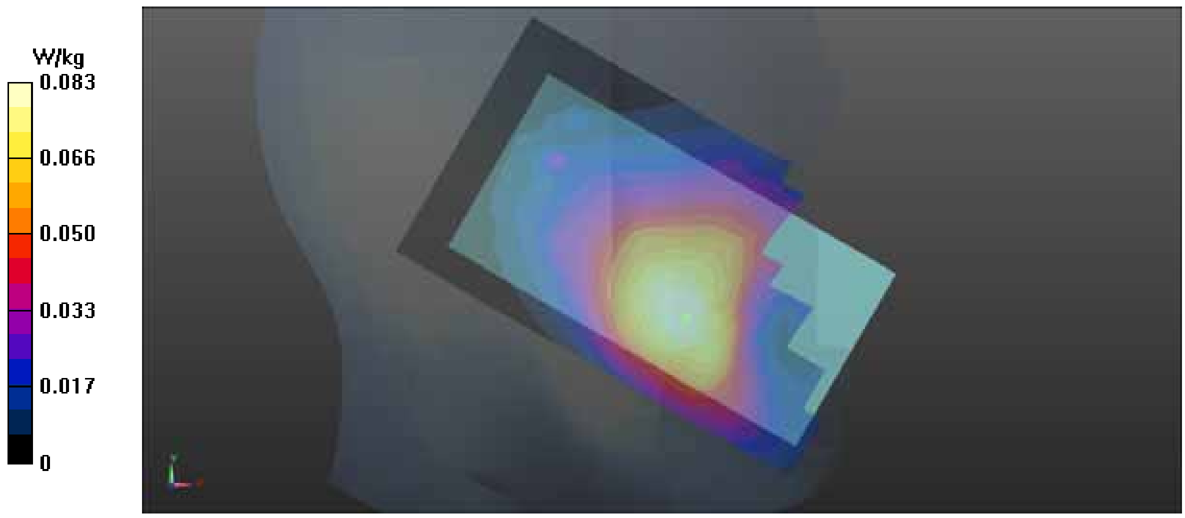
Communication System: GSM 850; Communication System Band: GSM 850 (824.0 - 849.0 MHz); Frequency: 824.2 MHz;Duty Cycle:1:8
Medium parameters used: f = 824.2 MHz; σ = 0.878 S/m; ε_r = 42.881; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.52, 9.52, 9.52); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = -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);

GSM 850/Left Head Cheek/Area Scan (121x201x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 0.0831 W/kg

GSM 850/Left Head Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.146 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.0940 W/kg
SAR(1 g) = 0.078 W/kg; SAR(10 g) = 0.060 W/kg
Maximum value of SAR (measured) = 0.0810 W/kg



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

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

DUT: Smart Mobile Phone; Type: ACRO A58

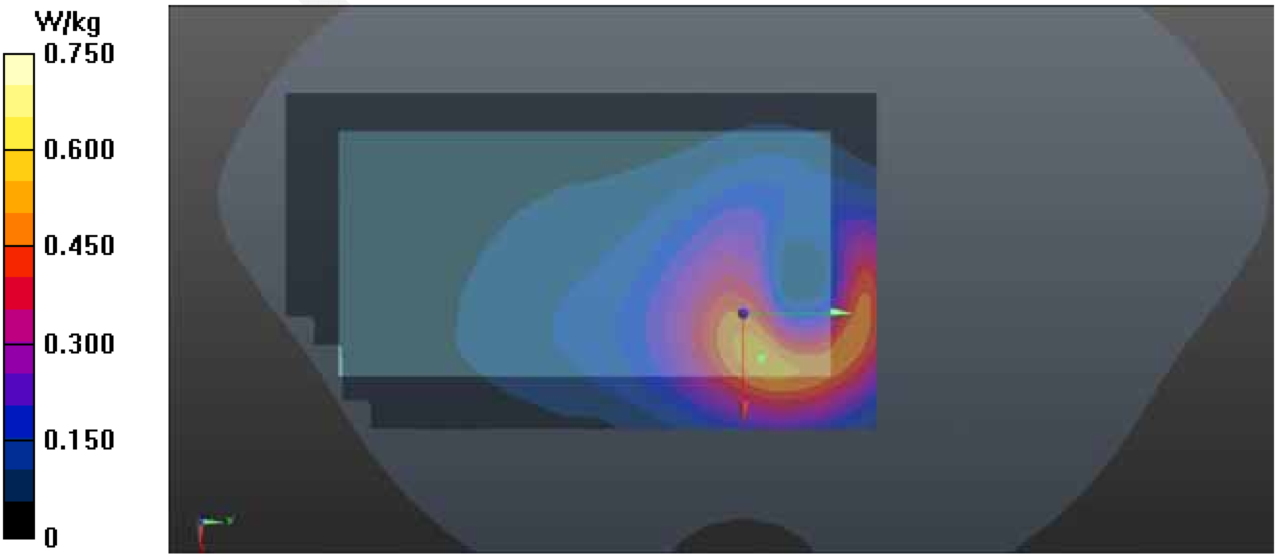
Communication System: GPRS 850 4 Slots; Communication System Band: GSM 850 (824.0 - 849.0 MHz);
Frequency: 824.2 MHz; Duty Cycle:1:2
Medium parameters used: f = 824.2 MHz; σ = 0.965 S/m; ε_r = 55.149; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.17, 9.17, 9.17); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 11.0, 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);

GPRS 850/Body-Back-Worn/Area Scan (121x211x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 0.571 W/kg

GPRS 850/Body-Back-Worn/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.06 V/m; Power Drift = -0.22 dB
Peak SAR (extrapolated) = 0.826 W/kg
SAR(1 g) = 0.515 W/kg; SAR(10 g) = 0.322 W/kg
Maximum value of SAR (measured) = 0.563 W/kg



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

Test Plot 3: GSM 1900 Left-Head-Check Middle Channel

DUT: Smart Mobile Phone; Type: ACRO A58

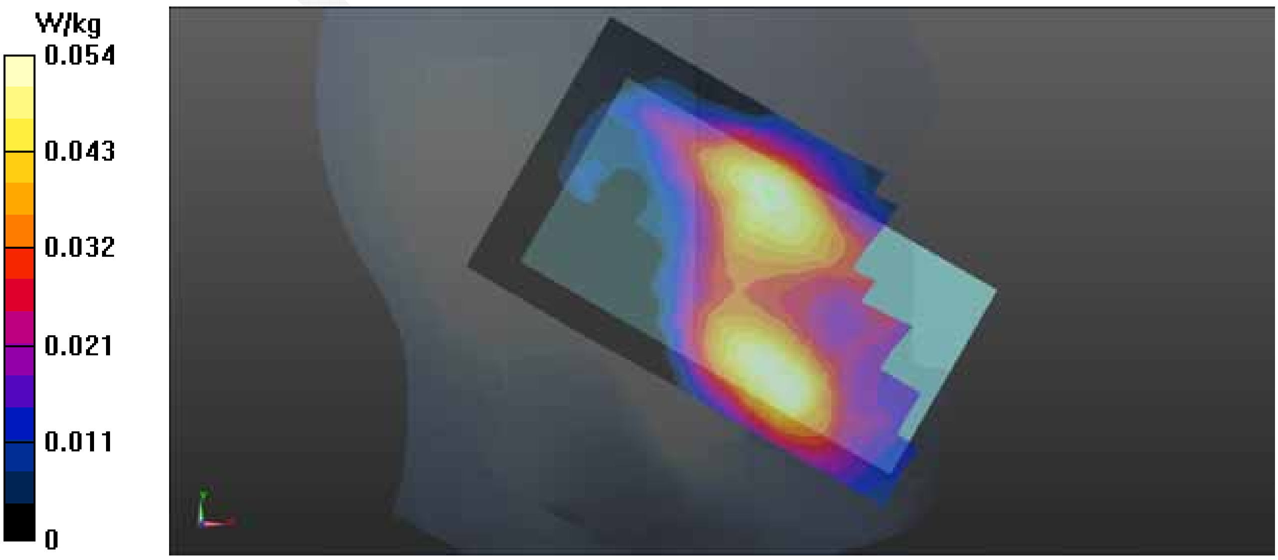
Communication System: GSM 1900; Communication System Band: PCS 1900 (1850.0 - 1910.0 MHz); Frequency: 1880 MHz; Duty Cycle:1:8
Medium parameters used: f = 1880 MHz; σ = 1.386 S/m; ε_r = 39.75; ρ = 1000 kg/m^3
Phantom section: Left Section

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, 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);

PCS 1900/Left Head Cheek/Area Scan (121x201x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 0.0537 W/kg

PCS 1900/Left Head Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.032 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.0750 W/kg
SAR(1 g) = 0.050 W/kg; SAR(10 g) = 0.032 W/kg
Maximum value of SAR (measured) = 0.0541 W/kg



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

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

DUT: Smart Mobile Phone; Type: ACRO A58

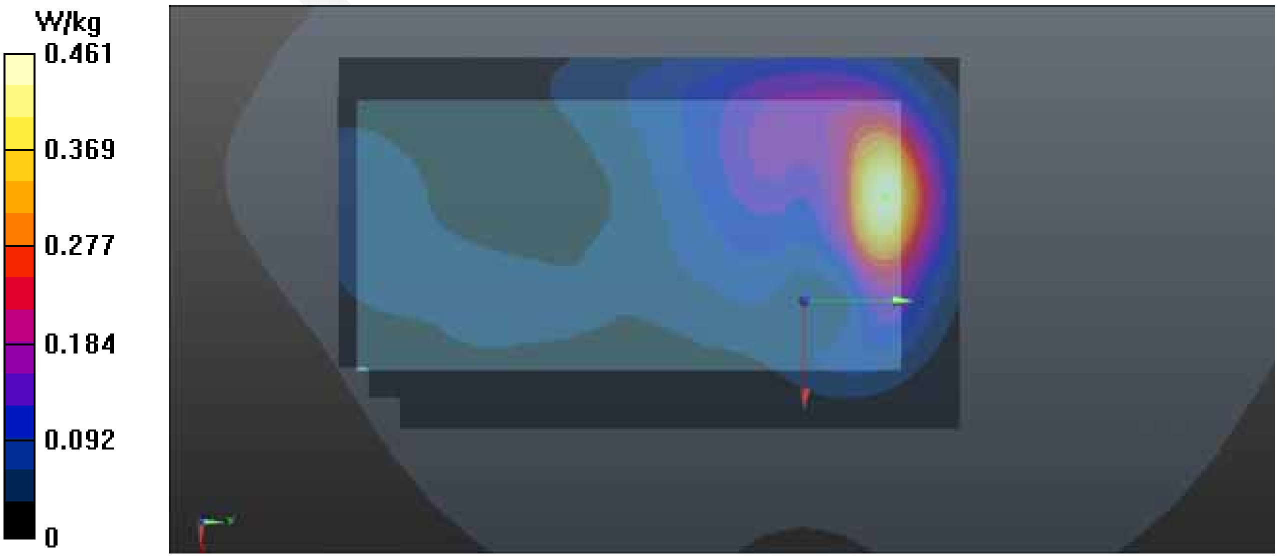
Communication System: GPRS 1900 4 Slots; Communication System Band: PCS 1900 (1850.0 - 1910.0 MHz);
Frequency: 1850.2 MHz;Duty Cycle 1:2
Medium parameters used: f = 1850.2 MHz; σ = 1.479 S/m; ε_r = 55.264; ρ = 1000 kg/m^3
Phantom section: Flat Section

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, 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);

PCS 1900/Body-Back-Worn/Area Scan (121x201x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 0.461 W/kg

PCS 1900/Body-Back-Worn/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.148 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 0.706 W/kg
SAR(1 g) = 0.405 W/kg; SAR(10 g) = 0.217 W/kg
Maximum value of SAR (measured) = 0.459 W/kg



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

Test Plot 5: WCDMA850 Left-Head Low Channel

DUT: Smart Mobile Phone; Type: ACRO A58

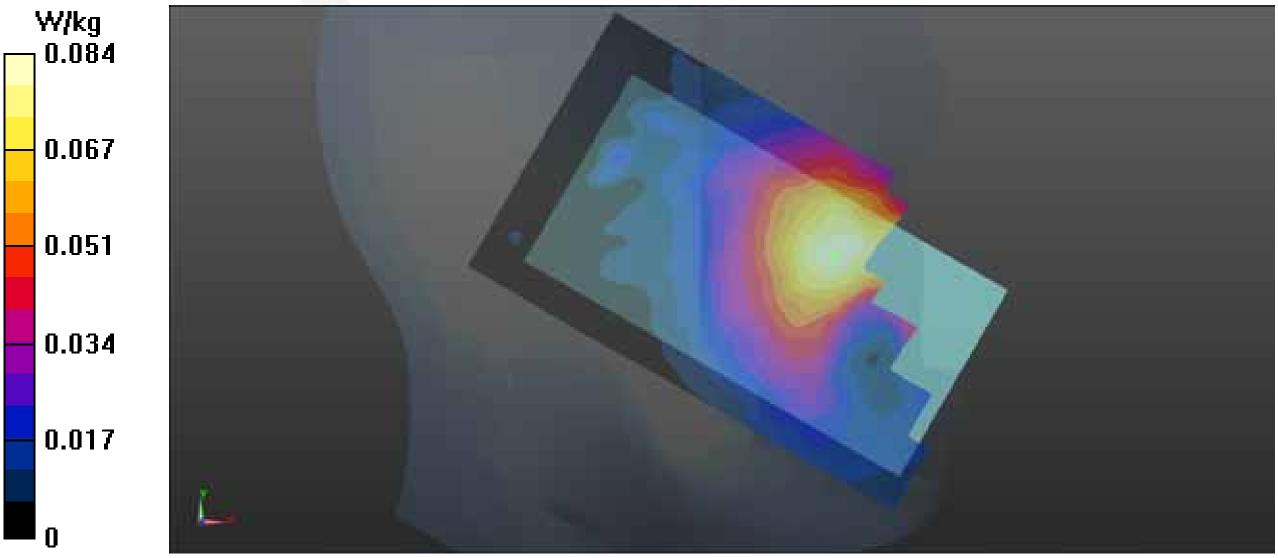
Communication System: WCDMA 850; Communication System Band: WCDMA 850 (824.0 - 849.0 MHz);
Frequency: 826.4 MHz;Duty Cylce:1:1
Medium parameters used: f = 826.4 MHz; σ = 0.878 S/m; ε_r = 42.881; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.52, 9.52, 9.52); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = -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);

WCDMA 850/Left Head Cheek/Area Scan (121x201x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 0.0842 W/kg

WCDMA 850/Left Head Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.313 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.102 W/kg
SAR(1 g) = 0.078 W/kg; SAR(10 g) = 0.056 W/kg
Maximum value of SAR (measured) = 0.0821 W/kg



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

Test Plot 6: WCDMA850 Body-Back-Worn Low Channel

DUT: Smart Mobile Phone; Type: ACRO A58

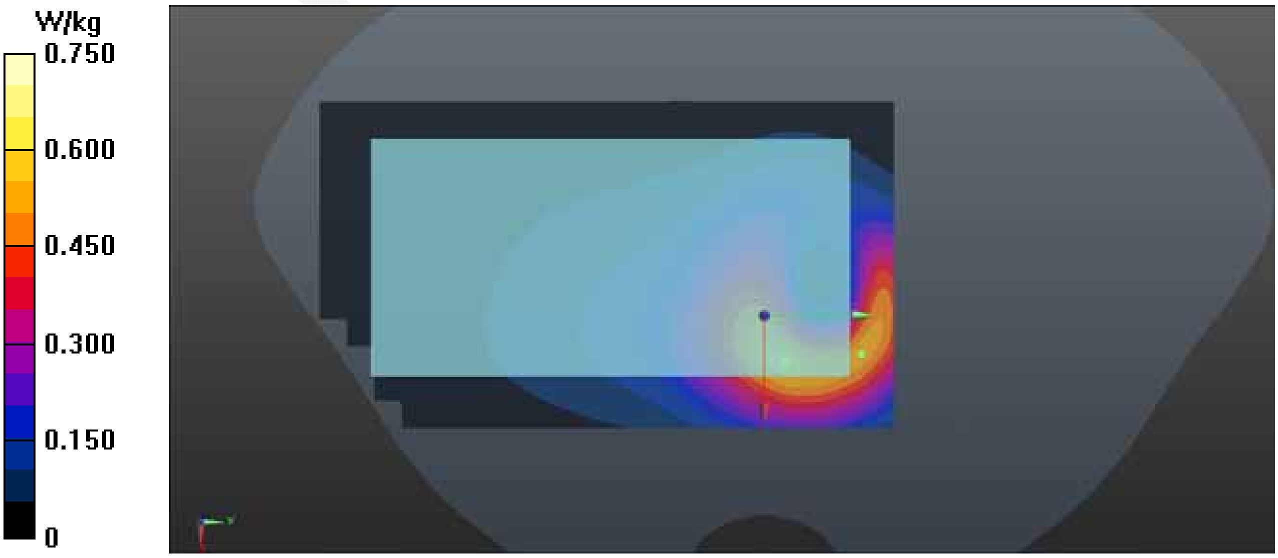
Communication System: WCDMA 850; Communication System Band: WCDMA 850 (824.0 - 849.0 MHz);
Frequency: 826.4 MHz; Duty Cylce:1:1
Medium parameters used: f = 826.4 MHz; σ = 0.977 S/m; ε_r = 55.09; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.17, 9.17, 9.17); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 11.0, 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);

WCDMA 850/Body-Back-Worn/Area Scan (121x211x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 0.537 W/kg

WCDMA 850/Body-Back-Worn/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.54 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 0.756 W/kg
SAR(1 g) = 0.489 W/kg; SAR(10 g) = 0.310 W/kg
Maximum value of SAR (measured) = 0.533 W/kg



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

Test Plot 7: WCDMA1900 Left-Head Middle Channel

DUT: Smart Mobile Phone; Type: ACRO A58

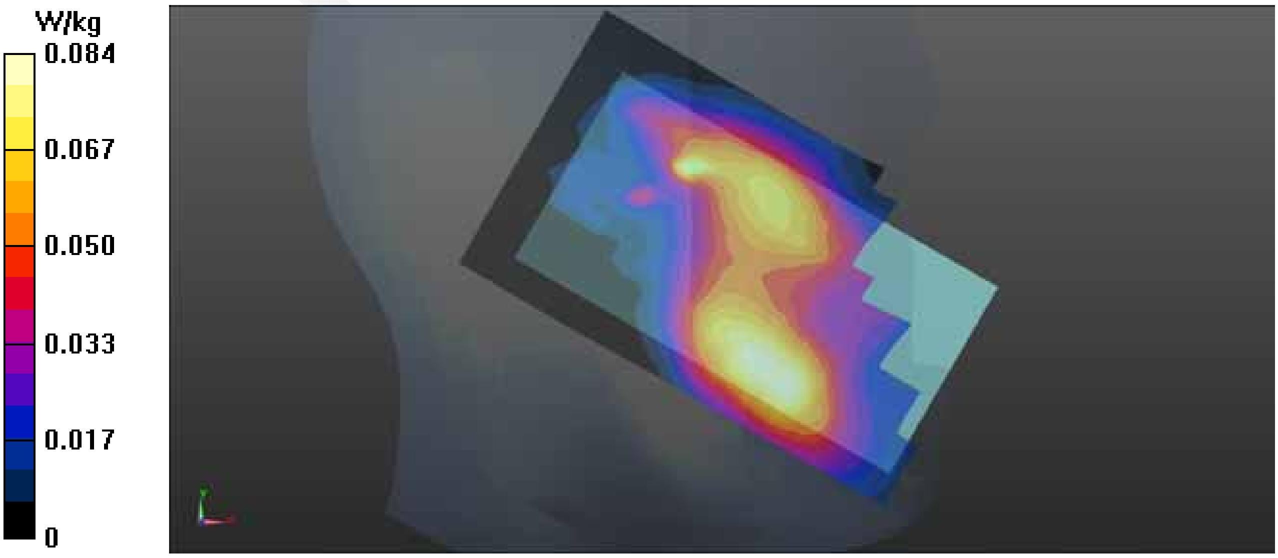
Communication System: WCDMA 1900; Communication System Band: WCDMA 1900 (1850.0 - 1910.0 MHz);
Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.386 S/m; ε_r = 39.75; ρ = 1000 kg/m^3
Phantom section: Left Section

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, 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);

WCDMA 1900/Left Head Cheek /Area Scan (121x201x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 0.0837 W/kg

WCDMA 1900/Left Head Cheek /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.744 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.0930 W/kg
SAR(1 g) = 0.058 W/kg; SAR(10 g) = 0.036 W/kg
Maximum value of SAR (measured) = 0.0675 W/kg



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

Test Plot 8: WCDMA1900 Body-Back-Worn Middle Channel

DUT: Smart Mobile Phone; Type: ACRO A58

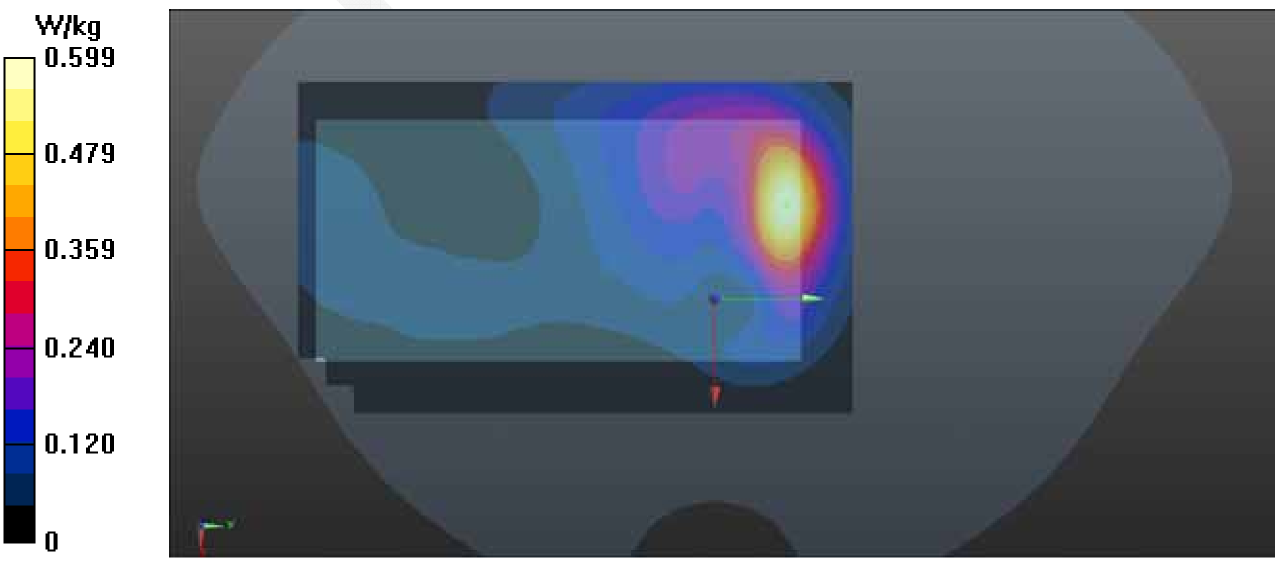
Communication System: WCDMA 1900; Communication System Band: WCDMA 1900 (1850.0 - 1910.0 MHz);
Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880MHz; σ = 1.478 S/m; ε_r = 55.193; ρ = 1000 kg/m^3
Phantom section: Flat Section

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, 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);

WCDMA 1900/Body-Back-Worn/Area Scan (121x201x1): Interpolated grid: dx=0.8000 mm, dy=0.8000 mm
Maximum value of SAR (interpolated) = 0.599 W/kg

WCDMA 1900/Body-Back-Worn/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.295 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.887 W/kg
SAR(1 g) = 0.521 W/kg; SAR(10 g) = 0.281 W/kg
Maximum value of SAR (measured) = 0.590 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	
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 9, 2015

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

Certificate No: EX3-7329_Feb15 Page 1 of 11

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).

Certificate No: EX3-7329_Feb15 Page 2 of 11

Probe EX3DV4

SN:7329

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

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

EX3DV4– SN:7329 February 5, 2015

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

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (µV/(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.

Certificate No: EX3-7329_Feb15 Page 4 of 11

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.

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

Calibration Parameter Determined in Body Tissue Simulating Media

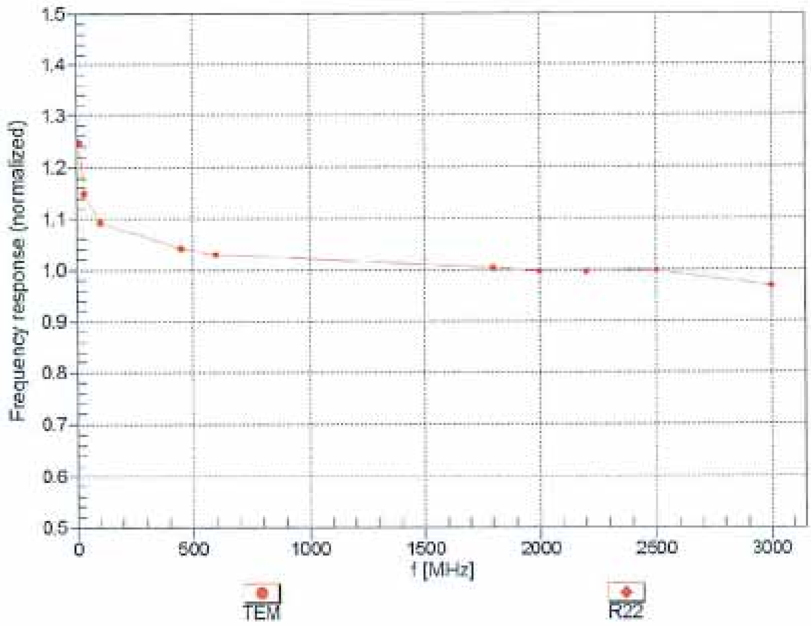
f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unct. (k=2)
900	55.0	1.05	9.17	9.17	9.17	0.41	0.90	± 12.0 %
1750	53.4	1.49	7.85	7.85	7.85	0.70	0.64	± 12.0 %
1900	53.3	1.52	7.56	7.56	7.56	0.56	0.70	± 12.0 %
2450	52.7	1.95	7.20	7.20	7.20	0.78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

EX3DV4– SN:7329 February 5, 2015

Frequency Response of E-Field

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



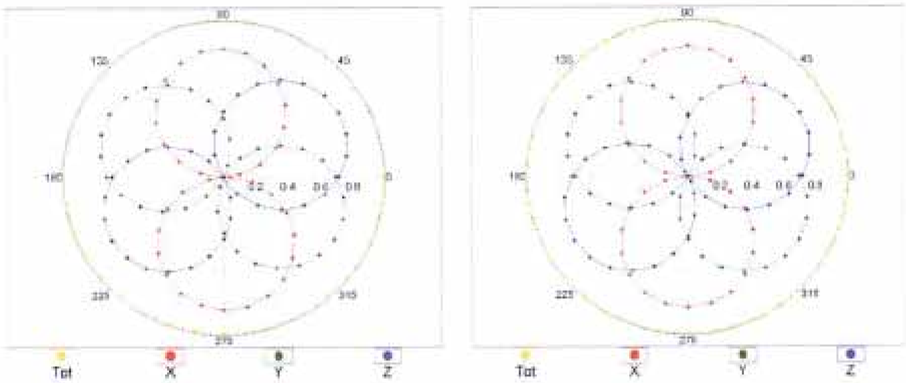
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

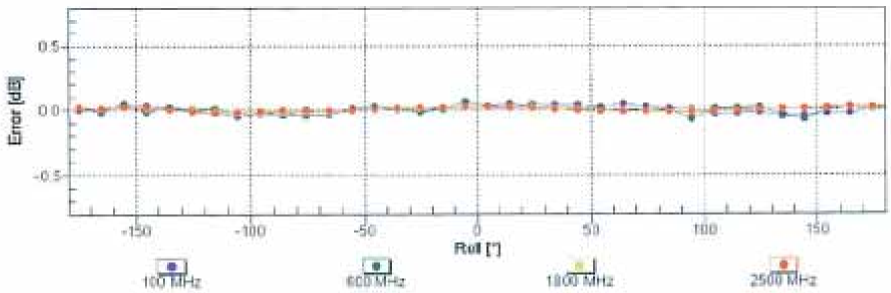
Certificate No: EX3-7329_Feb15 Page 7 of 11

EX3DV4– SN:7329 February 5, 2015

Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM f=1800 MHz,R22



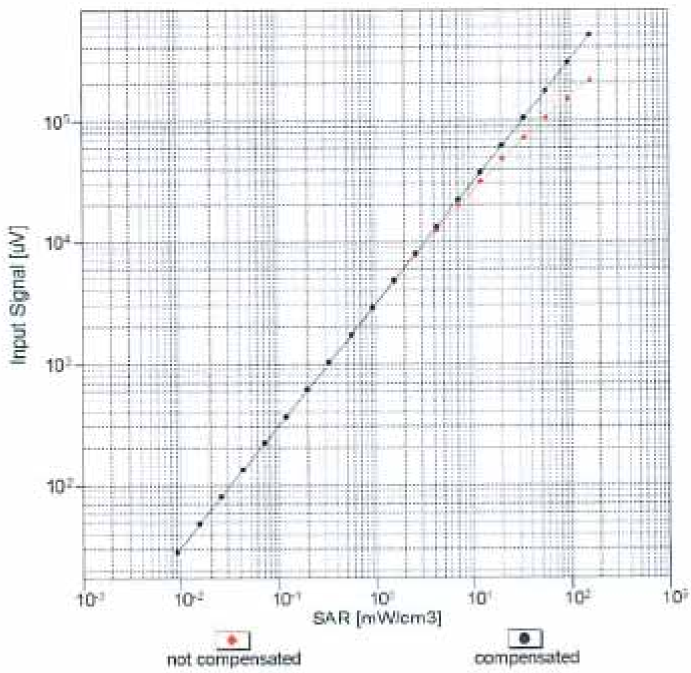


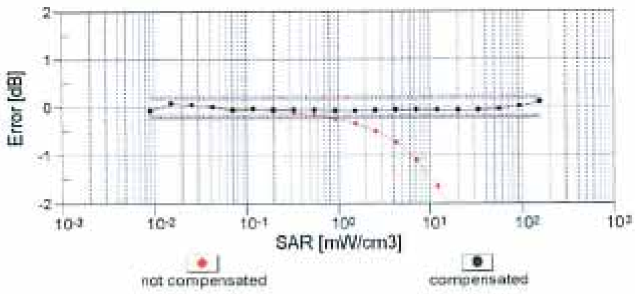
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Certificate No: EX3-7329_Feb15 Page 8 of 11

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)

Certificate No: EX3-7329_Feb15 Page 9 of 11

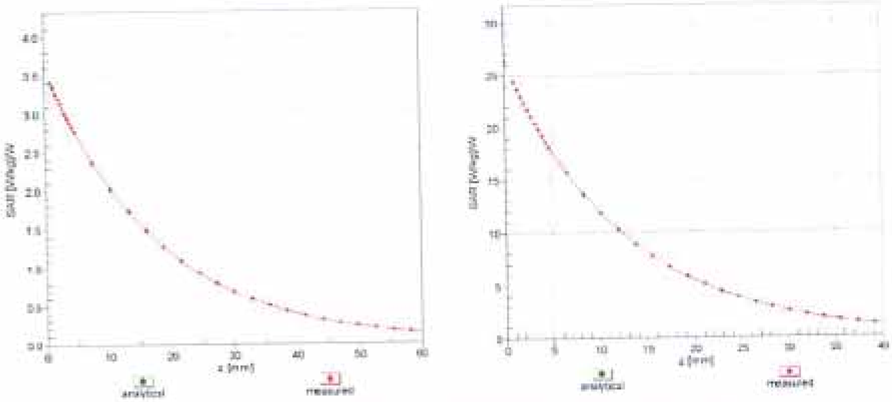
EX3DV4– SN:7329

February 5, 2015

Conversion Factor Assessment

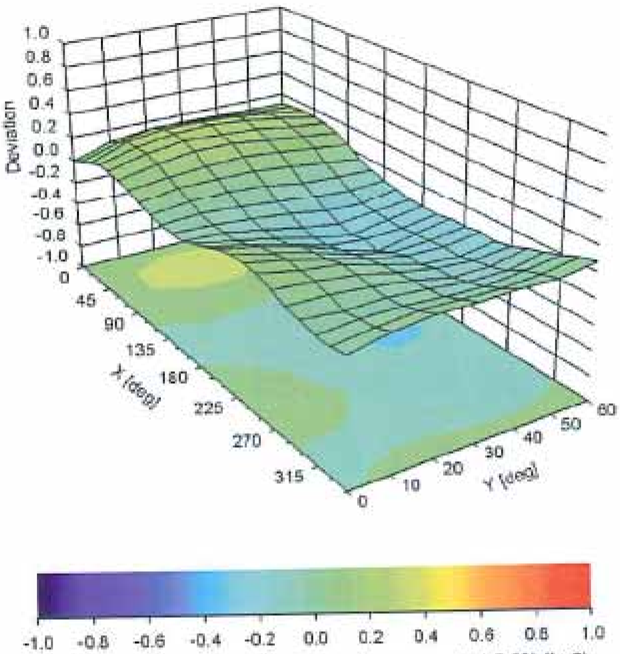
f = 900 MHz,WGLS R9 (H_convF)

f = 1750 MHz,WGLS R22 (H_convF)



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

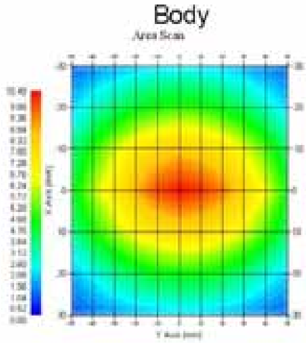
Length: 162.2 mm
Height: 89.4 mm

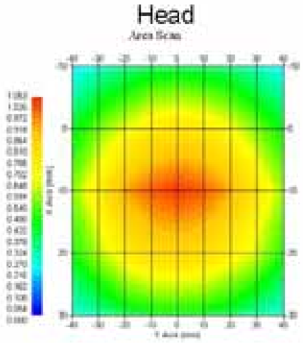
Electrical Specification

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





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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

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NCL Calibration Laboratories

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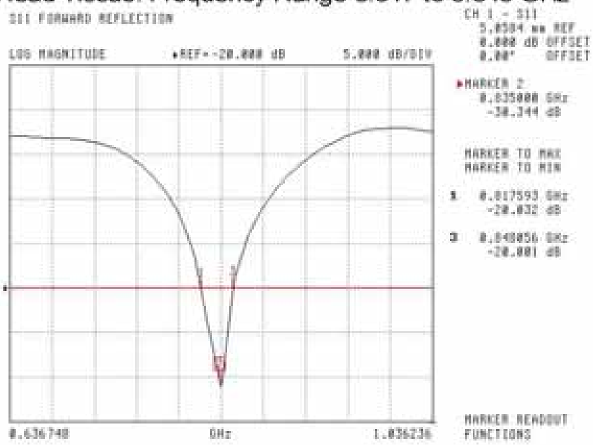
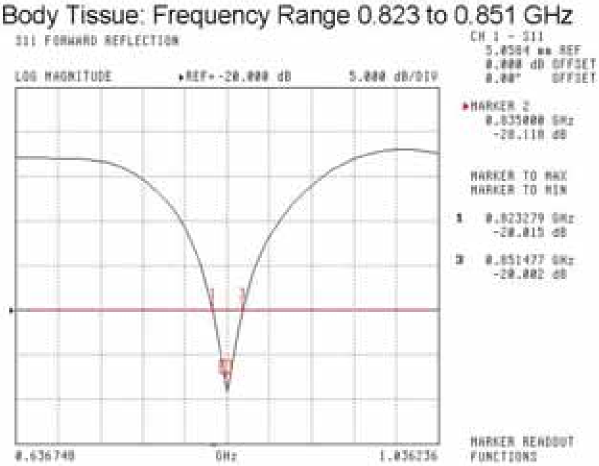
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head Tissue: Frequency Range 0.817 to 0.848 GHz



Body Tissue: Frequency Range 0.823 to 0.851 GHz



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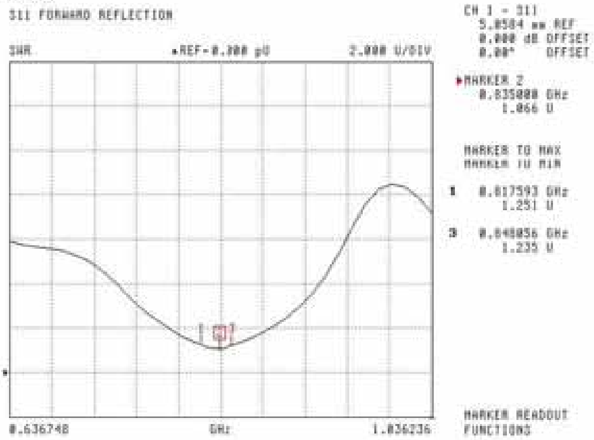
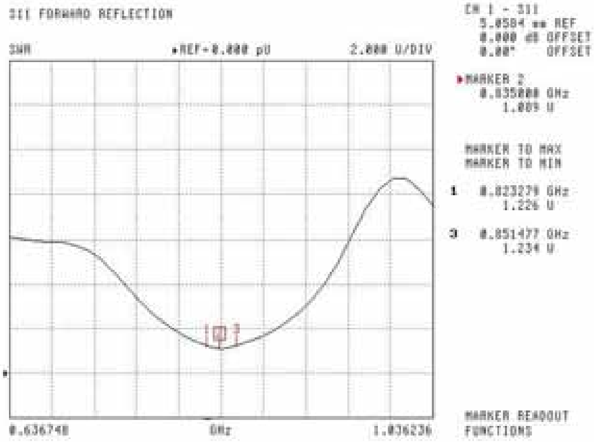
SWR

Head



Body



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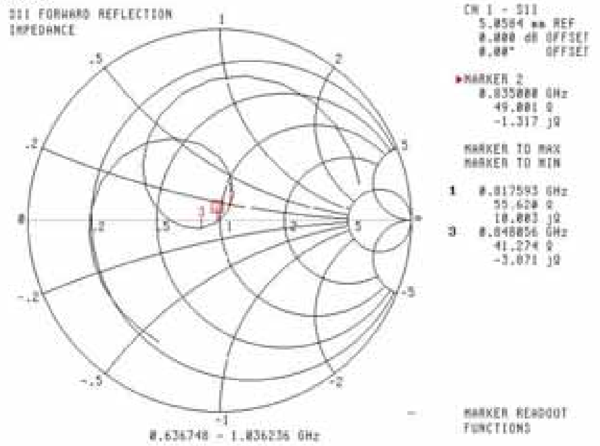
NCL Calibration Laboratories

Division of APREL Laboratories.

Smith Chart Dipole Impedance

Head



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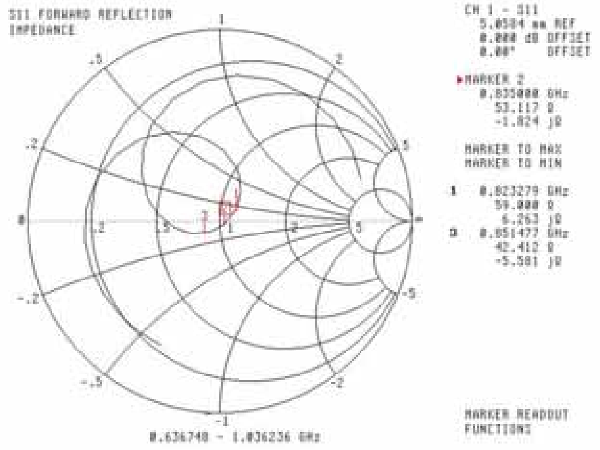

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Test Equipment

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

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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

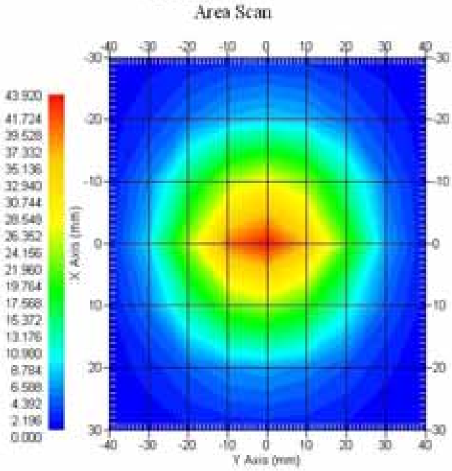
Electrical Specification

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

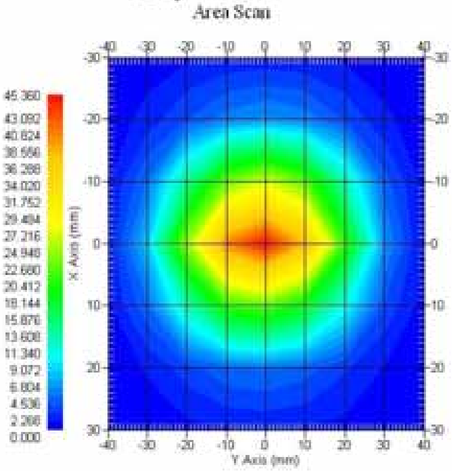
System Validation Results

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



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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)**

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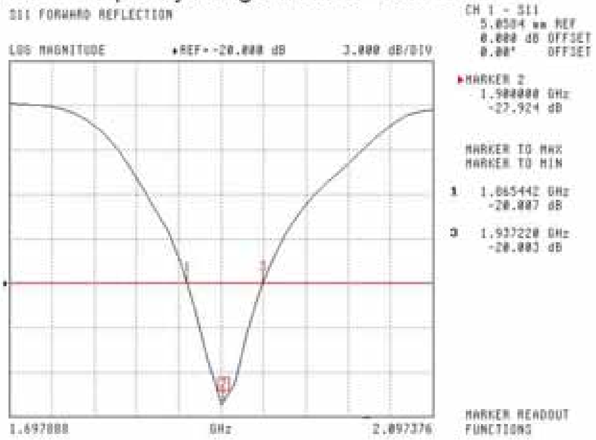
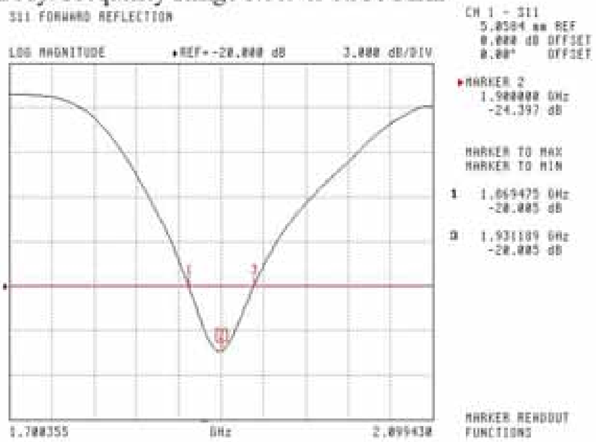
The Following Graphs are the results as displayed on the Vector Network Analyzer.

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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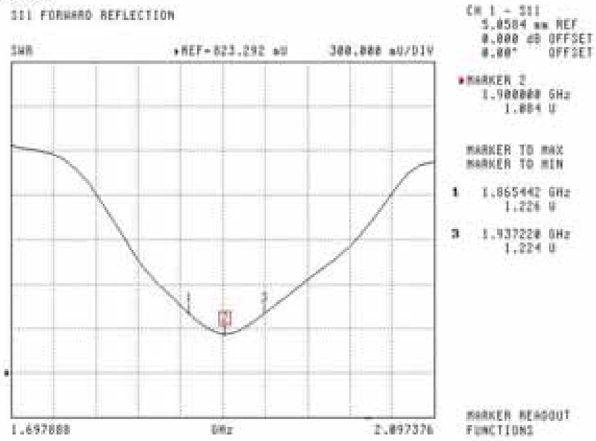
SWR

Head



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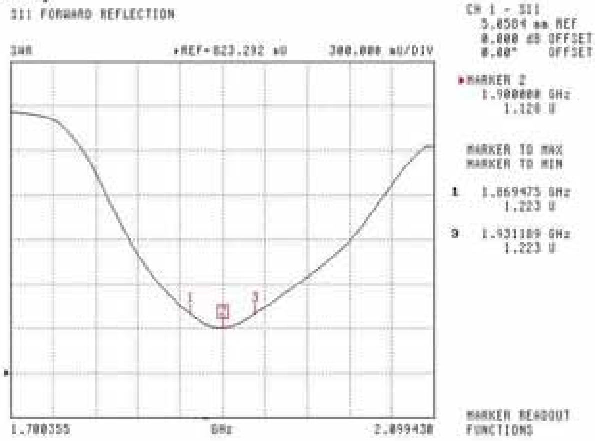

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NCL Calibration Laboratories

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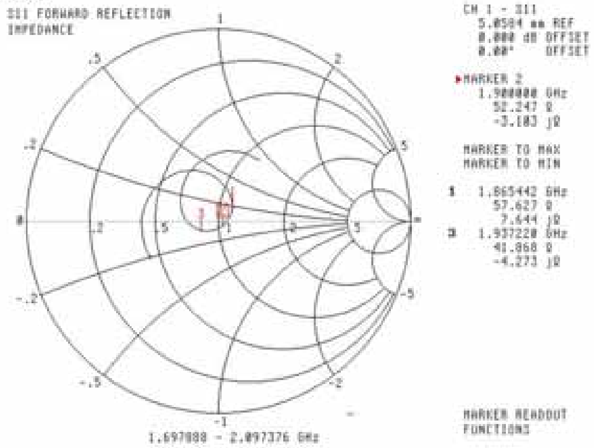
Smith Chart Dipole Impedance

Head



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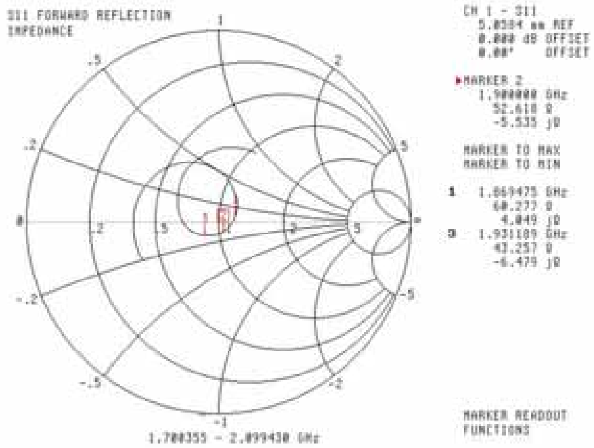

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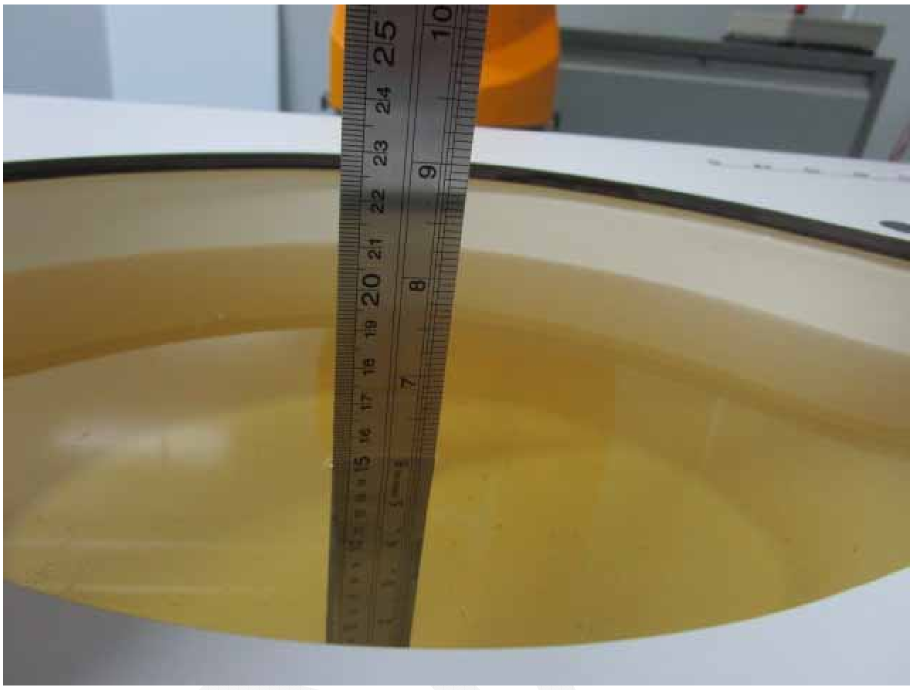
Test Equipment

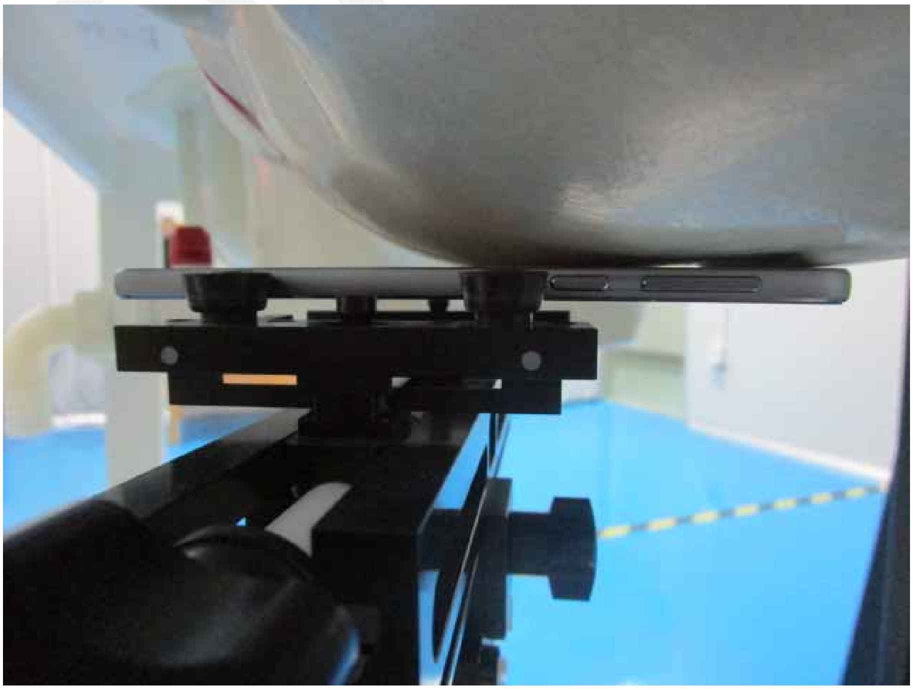
The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List 2014

APPENDIX D EUT TEST POSITION PHOTOS

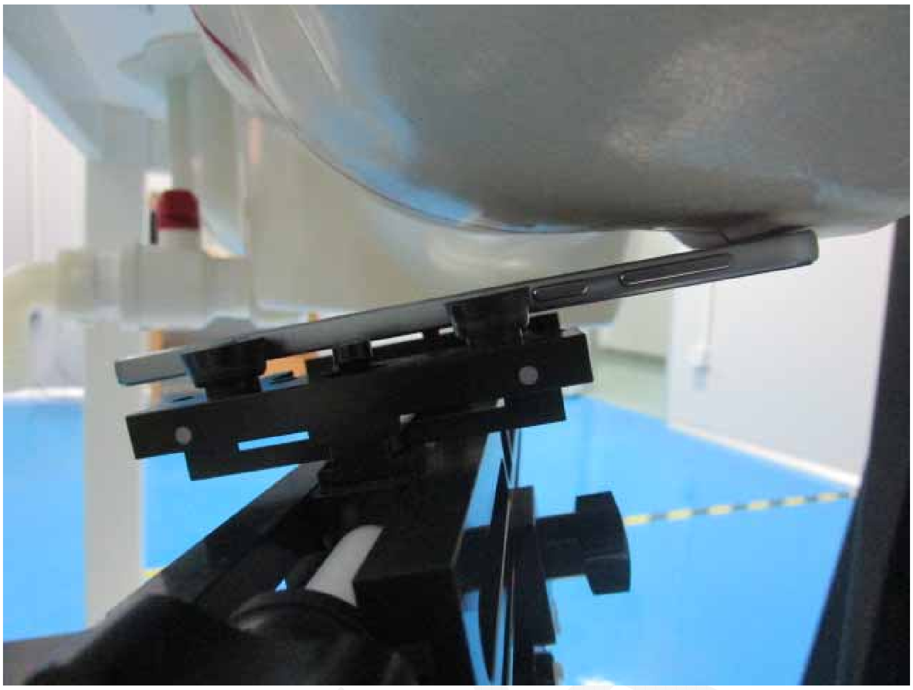
Liquid depth ≥ 15cm



Left Head Cheek



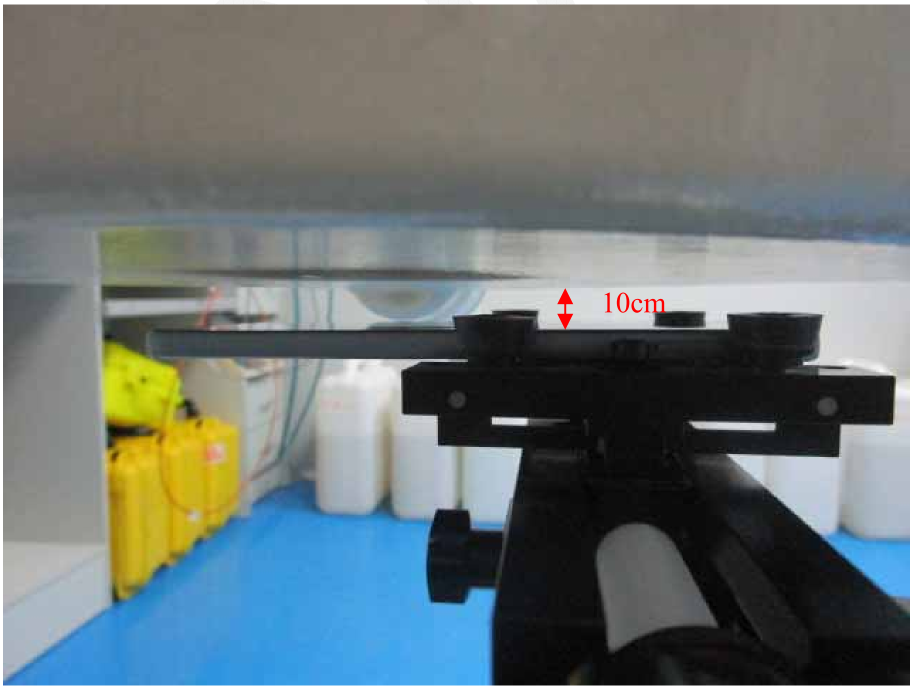
Left Head Tilt



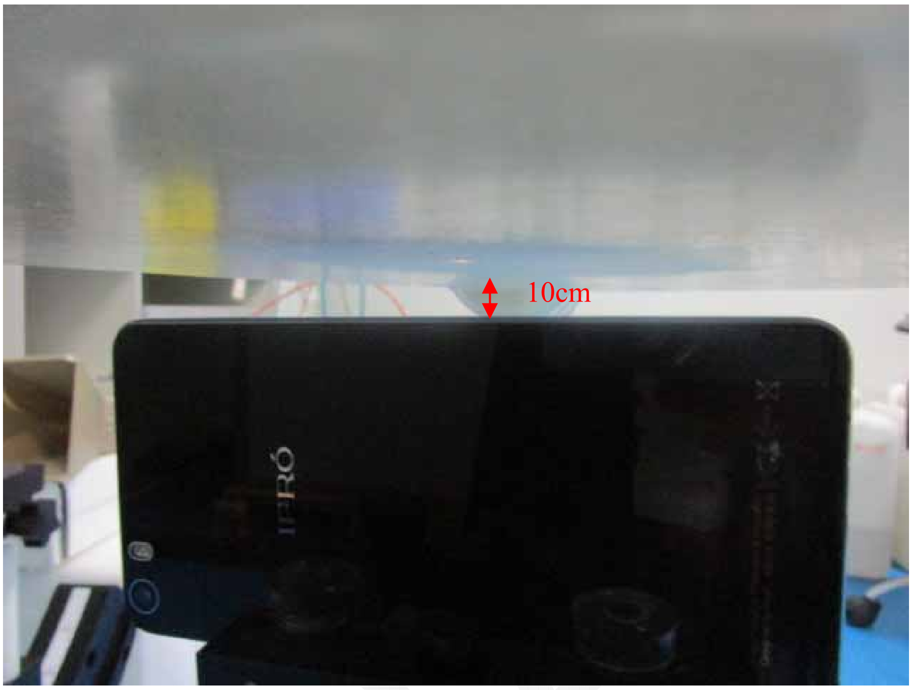
Right Head Cheek

Right Head Tilt

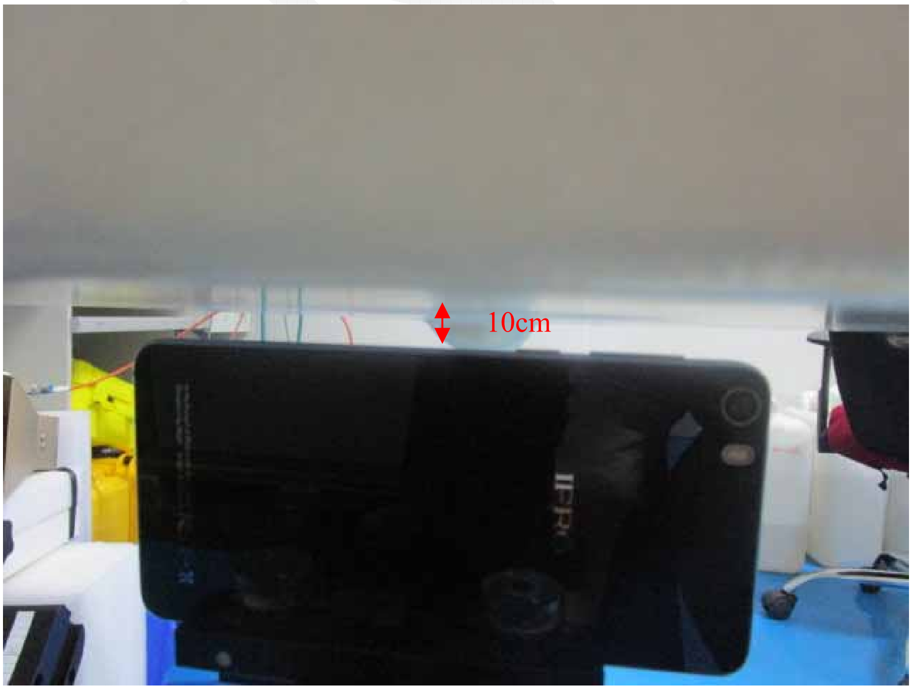
Body -Worn-Back (10mm)



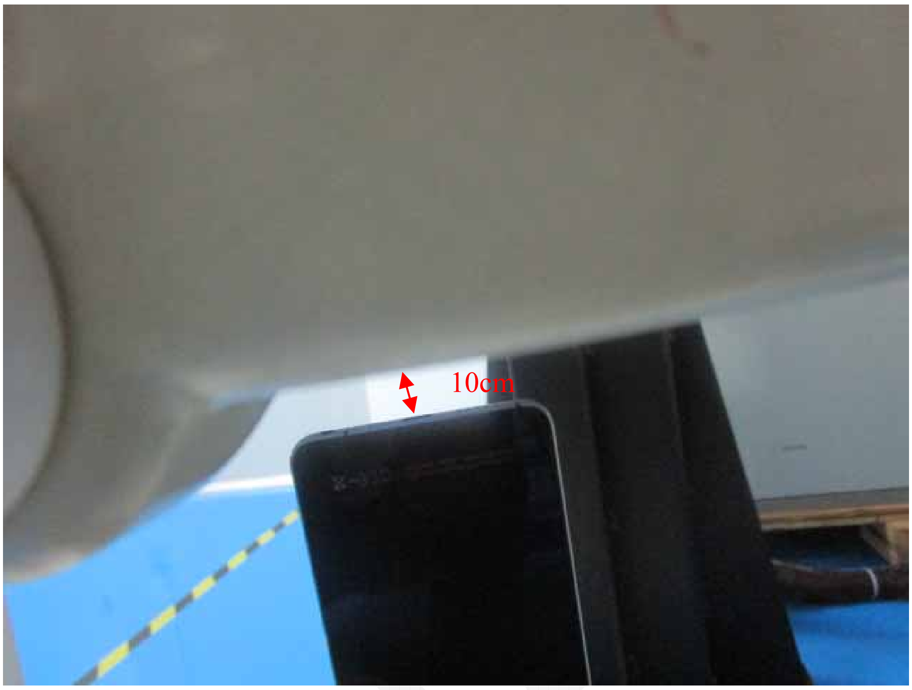
Body -Worn-Left (10mm)



Body -Worn-Right (10mm)

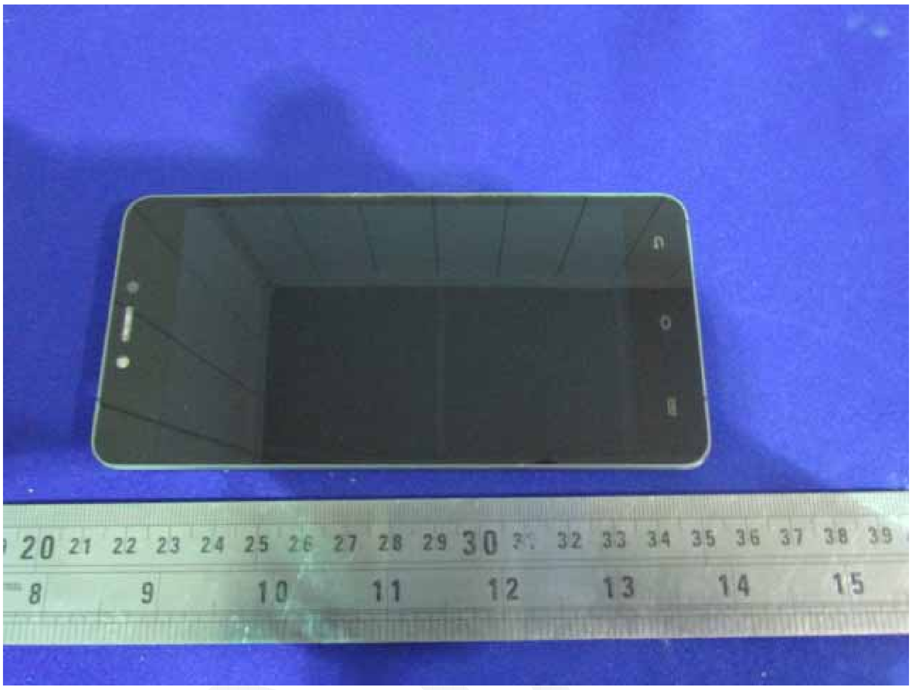


Body -Worn-Bottom(10mm)



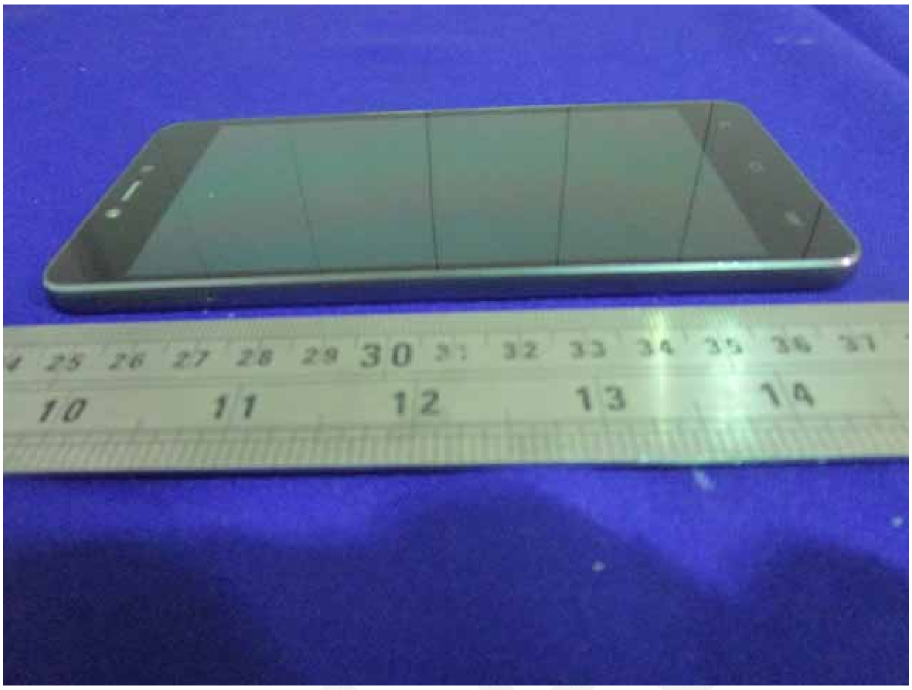
APPENDIX E EUT PHOTOS

EUT – Front View

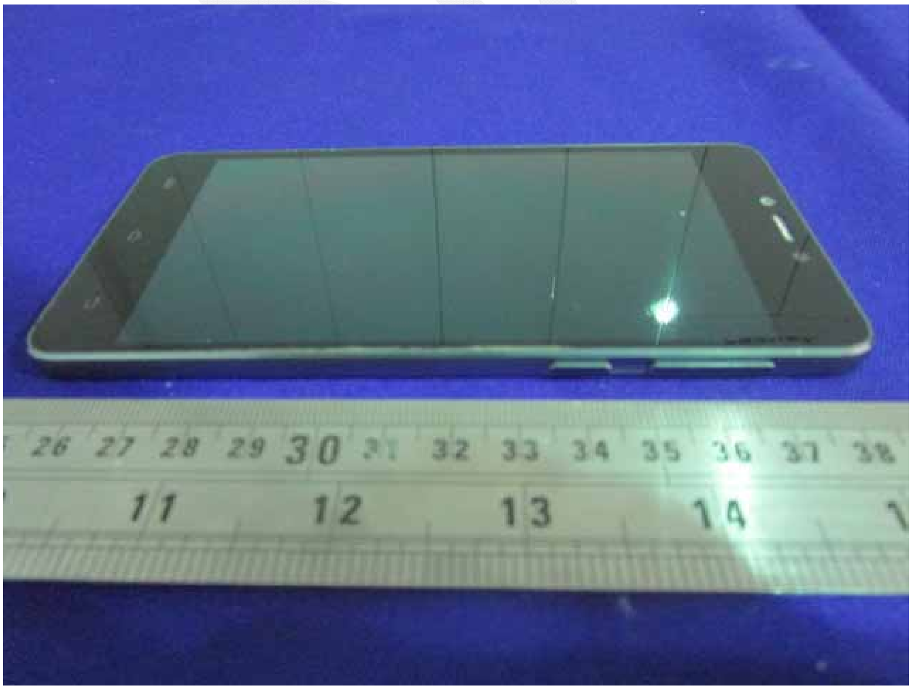


EUT – Back View

EUT –Left Side View



EUT – Right Side View



EUT – Uncover View

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