SAR EVALUATION REPORT

For

Acegame S.A

Gorriti 4539 - C.A.B.A., Buenos Aires, Argentina

FCC ID: 2ADTU-ZENFLOW

Report Type:	Product Type:
Original Report	Mobile Phone

Test Engineer:	Rocky Xiao Rocky Xiao
Report Number:	RDG150522001-20
Report Date:	2015-06-01
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Attestation of Test Results

EUT Information	**Company Name**	Acegame S.A
	EUT Description	Mobile Phone
	FCC ID	2ADTU-ZENFLOW
	Model Number	Zen Flow
	Test Date	2015-05-30

MODE		**Max. SAR Level(s) Reported(W/Kg)**	**Limit(W/Kg)**
GSM 850	1g Head SAR	0.273	**1. 6**
	1g Body SAR	0.893	
PCS 1900	1g Head SAR	0.349	
	1g Body SAR	1.218	
WCDMA 850	1g Head SAR	0.30	
	1g Body SAR	0.549	
WCDMA 1900	1g Head SAR	0.628	
	1g Body SAR	1.205	
LTE Band 4	1g Head SAR	0.541	
	1g Body SAR	1.069	
Simultaneous	1g Head SAR	1.00	
	1g Body SAR	1.404	

Applicable Standards	**ANSI / IEEE C95.1 : 2005** IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fileds,3 kHz to 300 GHz.
	ANSI / IEEE C95.3 : 2002 IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to SuchFields,100 kHz—300 GHz.
	FCC 47 CFR part 2.1093 Radiofrequency radiation exposure evaluation: portable devices
	IEEE1528:2013 IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
	IEC 62209-2: 2010 Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices-Human models, instrumentation, and procedures-Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)
	KDB procedures KDB 447498 D01 General RF Exposure Guidance v05r02. KDB 648474 D04 Handset SAR v01r02. KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r03 KDB 865664 D02 RF Exposure Reporting v01r01 KDB 941225 D01 3G SAR Procedures v03 KDB 941225 D06 Hotspot Mode v02 KDB 914225 D05 SAR for LTE Devices v02r03

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

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

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	RDG150522001-20	Original Report	2015-06-01

EUT DESCRIPTION

This report has been prepared on behalf of Acegame S.A and their product, Model: Zen Flow, FCC ID: 2ADTU-ZENFLOW or the EUT (Equipment under Test) as referred to in the rest of this report.

Technical Specification

Product Type	Mobile Phone
Exposure Category:	Population / Uncontrolled
Antenna Type(s):	Internal Antenna
Body-Worn Accessories:	Portable
Face-Head Accessories:	None
Operation Mode :	GSM Voice, GPRS Class12, EGPRS Class12, WCDMA R99 (Voice+Data),HSUPA Rel 6,HSDPA Rel 7, DC-HSDPA Rel 8, HSPA+ Rel 6 FDD-LTE 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) LTE Band 4: 1710-1755MHz(TX) ; 2110-2155MHz(RX) WLAN: 2412MHz-2462MHz Bluetooth : 2402MHz-2480MHz
Conducted RF Power:	GSM 850 : 33.1dBm PCS 1900: 29.6 dBm WCDMA 850: 22.89 dBm WCDMA 1900: 22.31 dBm LTE Band 4:22.84 dBm WLAN: 9.47 dBm Bluetooth: 1.95dBm
Dimensions (L*W*H):	134.3mm (L) × 65.9 mm (W) × 9.6 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

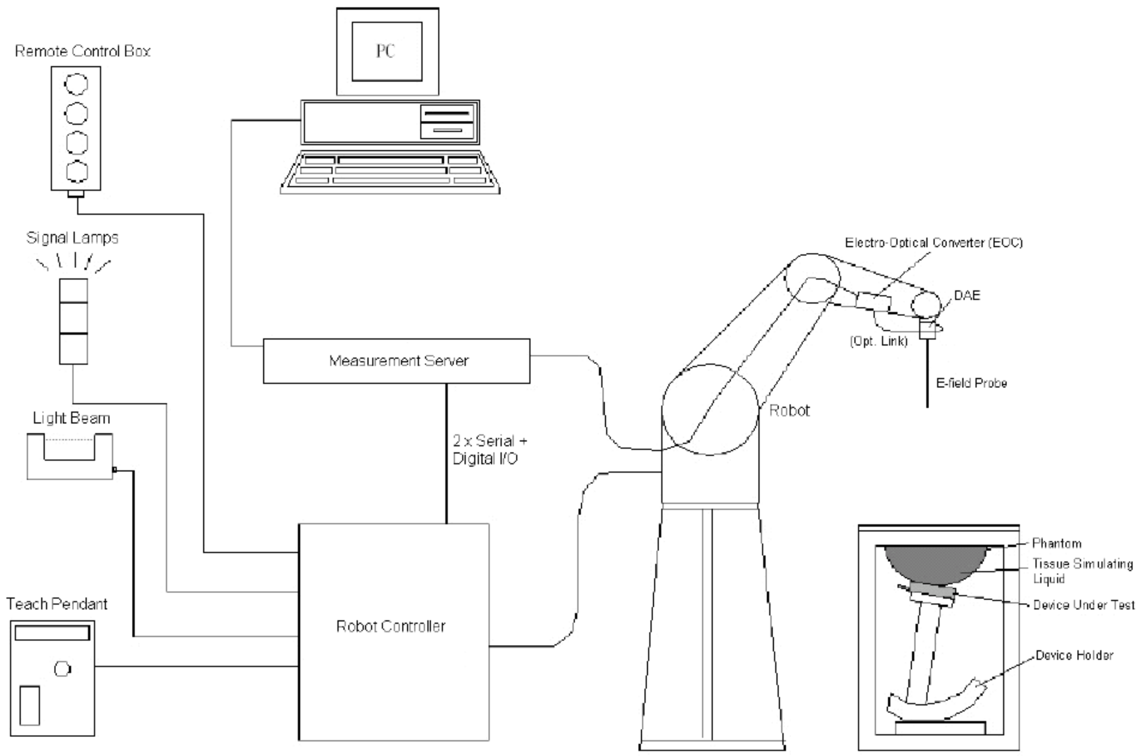
The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

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.

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

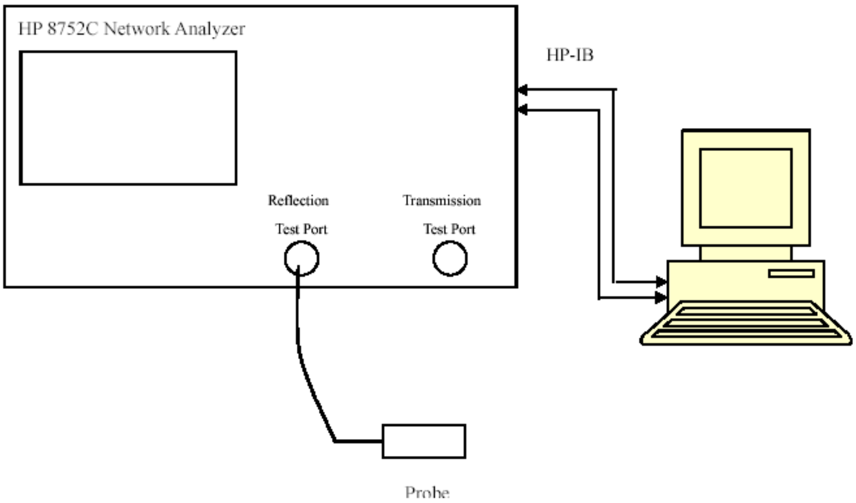
EQUIPMENT LIST AND CALIBRATION

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, 1750MHz	ALS-D-1750-S-2	198-00304	2013-10-08	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 1750 MHz Head	TS-1750-H	201508	Each Time	/
Simulated Tissue 1750 MHz Body	TS-1750-B	201509	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	Ơ (S/m)	ε_r	Ơ (S/m)	$\Delta\varepsilon_r$	ΔƠ (S/m)	
824.2	Head	42.93	0.88	41.5	0.9	3.45	-2.22	±5
	Body	55.15	0.96	55.2	0.97	-0.09	-1.03	±5
826.4	Head	42.9	0.88	41.5	0.9	3.37	-2.22	±5
	Body	55.15	0.97	55.2	0.97	-0.09	0	±5
836.6	Head	42.87	0.89	41.5	0.9	3.3	-1.11	±5
	Body	55.12	0.98	55.2	0.97	-0.14	1.03	±5
846.6	Head	42.8	0.9	41.5	0.9	3.13	0	±5
	Body	55.03	0.99	55.2	0.97	-0.31	2.06	±5
848.8	Head	42.71	0.9	41.5	0.9	2.92	0	±5
	Body	54.99	0.99	55.2	0.97	-0.38	2.06	±5
1720	Head	39.85	1.37	40.8	1.37	-2.33	0	±5
	Body	53.48	1.47	53.43	1.49	0.09	-1.34	±5
1732.5	Head	40.4	1.38	40.8	1.37	-0.98	0.73	±5
	Body	53.42	1.48	53.43	1.49	-0.02	-0.67	±5
1745	Head	39.71	1.38	40.8	1.37	-2.67	0.73	±5
	Body	53.31	1.49	53.43	1.49	-0.22	0	±5
1850.2	Head	39.83	1.36	40	1.4	-0.43	-2.86	±5
	Body	55.28	1.48	53.3	1.52	3.71	-2.63	±5
1852.4	Head	39.85	1.36	40	1.4	-0.37	-2.86	±5
	Body	55.21	1.48	53.3	1.52	3.58	-2.63	±5
1880	Head	39.75	1.38	40	1.4	-0.63	-1.43	±5
	Body	53.73	1.54	53.3	1.52	0.81	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	39.58	1.41	40	1.4	-1.05	0.71	±5
	Body	53.37	1.49	53.3	1.52	0.13	-1.97	±5

**Liquid Verification was performed on 2015-05-30.*

Please refer to the following tables.

835 MHz Head			835 MHz Body		
Frequency (MHz)	e'	e''	Frequency (MHz)	e'	e''
824	42.9064	19.1612	824	55.158	21.0391
824.5	42.976	19.1502	824.5	55.1477	20.9509
825	42.953	19.1336	825	55.1424	21.017
825.5	42.896	19.19	825.5	55.2093	20.9524
826	42.907	19.1555	826	55.1276	21.0362
826.5	42.8926	19.1378	826.5	55.1603	21.0292
827	42.9239	19.1725	827	55.0349	20.9947
827.5	42.9129	19.17	827.5	55.1533	20.9498
828	42.9525	19.2068	828	55.124	21.0104
828.5	42.9334	19.1961	828.5	55.1652	21.0382
829	42.929	19.2239	829	55.1074	20.9261
829.5	42.9157	19.1685	829.5	55.0813	20.9133
830	43.0042	19.1941	830	55.0937	20.9497
830.5	42.9389	19.2301	830.5	55.1218	20.9643
831	42.9404	19.1967	831	55.1098	20.9654
831.5	42.9014	19.1786	831.5	55.1393	21.0025
832	42.9656	19.1973	832	55.211	20.9735
832.5	42.9448	19.2437	832.5	55.1052	20.9366
833	42.9789	19.1748	833	55.1533	20.9534
833.5	42.9311	19.2317	833.5	55.1497	20.973
834	42.922	19.2124	834	55.1687	21.0578
834.5	42.8894	19.1874	834.5	55.1222	20.9317
835	42.9362	19.2171	835	55.1054	20.9682
835.5	42.9271	19.1767	835.5	55.0922	21.0164
836	42.9439	19.1817	836	55.1367	21.0191
836.5	42.8659	19.1484	836.5	55.1301	20.986
837	42.8705	19.2071	837	55.0894	20.9821
837.5	42.891	19.1926	837.5	55.0064	20.9348
838	42.8879	19.235	838	55.109	20.9727
838.5	42.8729	19.1948	838.5	55.1472	21.026
839	42.9413	19.1892	839	55.0782	20.9508
839.5	42.9086	19.1462	839.5	55.0759	21.0442
840	42.9132	19.113	840	55.0601	21.0108
840.5	42.8783	19.0841	840.5	55.1621	20.9674
841	42.9065	19.2073	841	55.0748	21.0253
841.5	42.9066	19.1144	841.5	55.0416	20.9569
842	42.89	19.1085	842	55.1052	20.9555
842.5	42.8165	19.1455	842.5	55.0187	20.9729
843	42.8269	19.0706	843	55.0714	20.9481
843.5	42.8275	19.0876	843.5	54.9912	20.9554
844	42.8107	19.0905	844	55.0574	20.9371
844.5	42.8503	19.0373	844.5	55.0633	21.0453
845	42.7506	19.0842	845	55.1223	20.9369
845.5	42.8136	19.1018	845.5	55.0023	20.906
846	42.8667	19.0272	846	55.0452	20.963
846.5	42.8199	19.0228	846.5	55.0273	20.9306
847	42.7421	19.0898	847	55.0279	20.9583
847.5	42.7479	18.9637	847.5	55.0315	20.9755
848	42.7958	19.0006	848	55.0242	20.9812
848.5	42.7189	19.0359	848.5	54.9967	20.8947
849	42.6985	18.9557	849	54.9918	20.9202

1750 MHz Head					
Frequency (MHz)	**e'**	**e''**	**Frequency (MHz)**	**e'**	**e''**
1710	40.4676	14.3110	1748	40.2422	14.2404
1711	40.4615	14.2842	1749	40.2377	14.2732
1712	40.4544	14.3088	1750	40.3711	14.2512
1713	40.3896	14.2885	1751	40.3535	14.2646
1714	40.4203	14.2747	1752	40.3387	14.2496
1715	40.3959	14.3106	1753	40.3088	14.2226
1716	40.4523	14.3277	1754	40.3072	14.2383
1717	40.4113	14.2887	1755	40.3428	14.2065
1718	40.456	14.3268	1756	40.3011	14.2597
1719	40.3547	14.3143	1757	40.2468	14.2079
1720	40.4342	14.3245	1758	40.2021	14.2010
1721	40.5668	14.2664	1759	40.2285	14.2225
1722	40.5387	14.2859	1760	40.2641	14.1888
1723	40.5155	14.2512	1761	40.2563	14.2994
1724	40.5858	14.2190	1762	40.2864	14.2947
1725	40.5437	14.2811	1763	40.2486	14.2688
1726	40.5598	14.2463	1764	40.1833	14.2674
1727	40.4312	14.2747	1765	40.1554	14.2944
1728	40.4986	14.3143	1766	40.183	14.3342
1729	40.4942	14.2638	1767	40.1991	14.2756
1730	40.4757	14.3365	1768	40.1538	14.2483
1731	40.4067	14.3342	1769	40.3661	14.2738
1732	40.4379	14.2786	1770	40.3326	14.2346
1733	40.3682	14.2839	1771	40.3326	14.2346
1734	40.3523	14.2450	1772	40.3326	14.2346
1735	40.367	14.3229	1773	40.3326	14.2346
1736	40.3922	14.2645	1774	40.3326	14.2346
1737	40.371	14.2716	1775	40.3326	14.2346
1738	40.344	14.3117	1776	40.3326	14.2346
1739	40.3607	14.3234	1777	40.3326	14.2346
1740	40.3653	14.2905	1778	40.3326	14.2346
1741	40.3419	14.2762	1779	40.3326	14.2346
1742	40.322	14.2946	1780	40.3326	14.2346
1743	40.2932	14.2805	1781	40.3326	14.2346
1744	40.3448	14.3422	1782	40.3326	14.2346
1745	40.2928	14.2500	1783	40.3326	14.2346
1746	40.2971	14.2642	1784	40.3326	14.2346
1747	40.2417	14.2995	1785	40.3326	14.2346

1750 MHz Body					
Frequency (MHz)	**e'**	**e''**	**Frequency (MHz)**	**e'**	**e''**
1710	53.4891	15.3715	1748	53.1762	15.304
1711	53.5113	15.3563	1749	53.2411	15.326
1712	53.4685	15.4121	1750	53.3469	15.3489
1713	53.4383	15.3399	1751	53.3635	15.3257
1714	53.4698	15.3612	1752	53.3391	15.3319
1715	53.399	15.3822	1753	53.3128	15.2865
1716	53.5111	15.3817	1754	53.2878	15.2966
1717	53.4079	15.3503	1755	53.3174	15.2782
1718	53.4901	15.3736	1756	53.3159	15.3573
1719	53.4187	15.4032	1757	53.2482	15.29
1720	53.4784	15.3739	1758	53.1919	15.2514
1721	53.6829	15.3241	1759	53.2111	15.2455
1722	53.5621	15.3561	1760	53.2471	15.2611
1723	53.5563	15.3308	1761	53.2565	15.3973
1724	53.6596	15.3035	1762	53.2985	15.3629
1725	53.5986	15.3172	1763	53.2156	15.3384
1726	53.658	15.3145	1764	53.1687	15.3471
1727	53.5057	15.353	1765	53.1441	15.343
1728	53.5196	15.3963	1766	53.1753	15.3963
1729	53.5513	15.3135	1767	53.1925	15.31
1730	53.4842	15.3798	1768	53.1278	15.2881
1731	53.4439	15.4113	1769	53.383	15.3328
1732	53.45	15.3678	1770	53.3434	15.279
1733	53.3823	15.3693	1771	53.3535	15.3008
1734	53.3874	15.3375	1772	53.3436	15.3386
1735	53.4174	15.4089	1773	53.3039	15.361
1736	53.4521	15.3364	1774	53.3145	15.3353
1737	53.4005	15.3543	1775	53.306	15.308
1738	53.3149	15.4081	1776	53.2708	15.3002
1739	53.3555	15.4151	1777	53.1952	15.2331
1740	53.3462	15.3721	1778	53.2195	15.355
1741	53.3264	15.3499	1779	53.219	15.3083
1742	53.3328	15.3541	1780	53.375	15.2963
1743	53.2833	15.3378	1781	53.3948	15.2696
1744	53.3092	15.4095	1782	53.365	15.3376
1745	53.3127	15.3537	1783	53.3366	15.2986
1746	53.2445	15.2849	1784	53.3004	15.2508
1747	53.1728	15.3356	1785	53.3188	15.2643

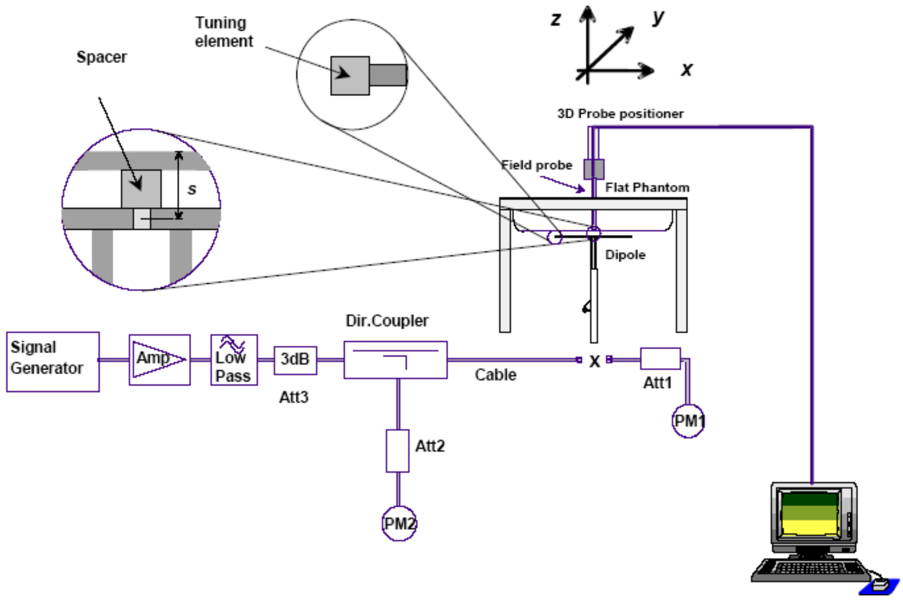
1900 MHz Head			1900 MHz Body		
Frequency (MHz)	e'	e''	Frequency (MHz)	e'	e''
1850	39.828	13.2218	1850	55.2506	14.373
1851	39.8579	13.2129	1851	55.382	14.3607
1852	39.837	13.1844	1852	55.2347	14.3683
1853	39.8677	13.1636	1853	55.1616	14.2695
1854	39.8643	13.1729	1854	55.0483	14.1914
1855	39.894	13.215	1855	55.0678	14.2608
1856	39.8554	13.1626	1856	54.9361	14.2749
1857	39.8973	13.1902	1857	54.7678	14.1876
1858	39.8682	13.2156	1858	54.634	14.1331
1859	39.8115	13.181	1859	54.572	14.0783
1860	39.8278	13.2469	1860	54.4266	14.1559
1861	39.8766	13.2154	1861	54.5174	14.1177
1862	39.9081	13.2243	1862	54.3744	14.1103
1863	39.8097	13.1418	1863	54.2032	14.1244
1864	39.8455	13.1944	1864	54.1676	14.1735
1865	39.8428	13.2091	1865	54.0831	14.1356
1866	39.7834	13.1918	1866	53.9922	14.1717
1867	39.831	13.2036	1867	53.8987	14.1422
1868	39.8124	13.2255	1868	53.8496	14.2349
1869	39.8721	13.2913	1869	53.7391	14.1822
1870	39.8563	13.222	1870	53.6783	14.2659
1871	39.8036	13.218	1871	53.6404	14.3127
1872	39.8113	13.2024	1872	53.7057	14.3464
1873	39.8211	13.2057	1873	53.6683	14.428
1874	39.7329	13.2595	1874	53.6282	14.4206
1875	39.8032	13.1974	1875	53.6138	14.4927
1876	39.7362	13.2429	1876	53.6066	14.549
1877	39.7955	13.2356	1877	53.6795	14.6175
1878	39.7839	13.2261	1878	53.6385	14.6731
1879	39.7585	13.2118	1879	53.7025	14.6657
1880	39.7549	13.2354	1880	53.7268	14.7574
1881	39.724	13.2474	1881	53.742	14.7365
1882	39.7295	13.2526	1882	53.7608	14.8034
1883	39.7273	13.2694	1883	53.8114	14.7949
1884	39.737	13.2633	1884	53.8642	14.7866
1885	39.7007	13.295	1885	53.9755	14.8364
1886	39.6697	13.3179	1886	54.133	14.7961
1887	39.6468	13.2919	1887	54.1584	14.767
1888	39.6654	13.2861	1888	54.2393	14.8023
1889	39.6993	13.3438	1889	54.2321	14.7269
1890	39.6986	13.3115	1890	54.2919	14.723
1891	39.6712	13.3131	1891	54.3258	14.7224
1892	39.67	13.2743	1892	54.3678	14.7339
1893	39.6467	13.2955	1893	54.3745	14.6745
1894	39.6907	13.2967	1894	54.3468	14.6418
1895	39.606	13.3059	1895	54.3399	14.6187
1896	39.6703	13.2878	1896	54.4218	14.4957
1897	39.668	13.3182	1897	54.391	14.4727
1898	39.6444	13.3069	1898	54.3958	14.4346
1899	39.6406	13.2814	1899	54.2598	14.4079
1900	39.6643	13.342	1900	54.1974	14.3117

1900 MHz Head			1900 MHz Body		
Frequency (MHz)	**e'**	**e''**	**Frequency (MHz)**	**e'**	**e''**
1901	39.639	13.3112	1901	54.1267	14.2713
1902	39.5973	13.3498	1902	54.0864	14.266
1903	39.6209	13.2763	1903	53.9447	14.2401
1904	39.6421	13.3321	1904	53.8894	14.1495
1905	39.6524	13.3394	1905	53.8	14.1619
1906	39.6121	13.3796	1906	53.6981	14.1217
1907	39.5733	13.294	1907	53.619	14.1319
1908	39.5819	13.3128	1908	53.5531	14.0306
1909	39.571	13.3458	1909	53.4305	14.0561
1910	39.5798	13.2975	1910	53.3581	14.058

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 (%)
2015/5/30	835	Head	1g	9.41	9.773	-3.71	±10
		Body	1g	8.91	9.736	-8.48	±10
	1750	Head	1g	39.8	37.02	7.51	±10
		Body	1g	35.3	36.65	-3.68	±10
	1900	Head	1g	39.4	39.481	-0.21	±10
		Body	1g	40.5	39.715	1.98	±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: ALS-D-835-S-2; Type: 835 MHz; Serial: 180-00558

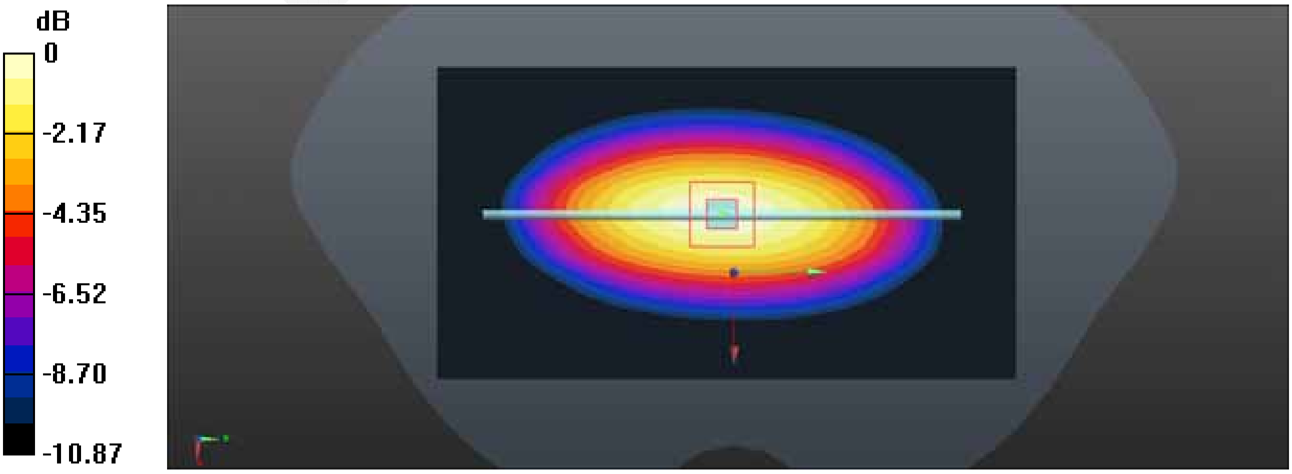
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.893 S/m; ε_r = 42.936; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.52, 9.52, 9.52); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

835MHz/System Check/Area Scan (71x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 9.96 W/kg

835MHz/System Check/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 105.0 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 14.7 W/kg
SAR(1 g) = 9.41 W/kg; SAR(10 g) = 6.01 W/kg
Maximum value of SAR (measured) = 10.2 W/kg



0 dB = 10.2 W/kg = 10.09 dBW/kg

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

System Performance 835MHz Body

DUT: ALS-D-835-S-2; Type: 835 MHz; Serial: 180-00558

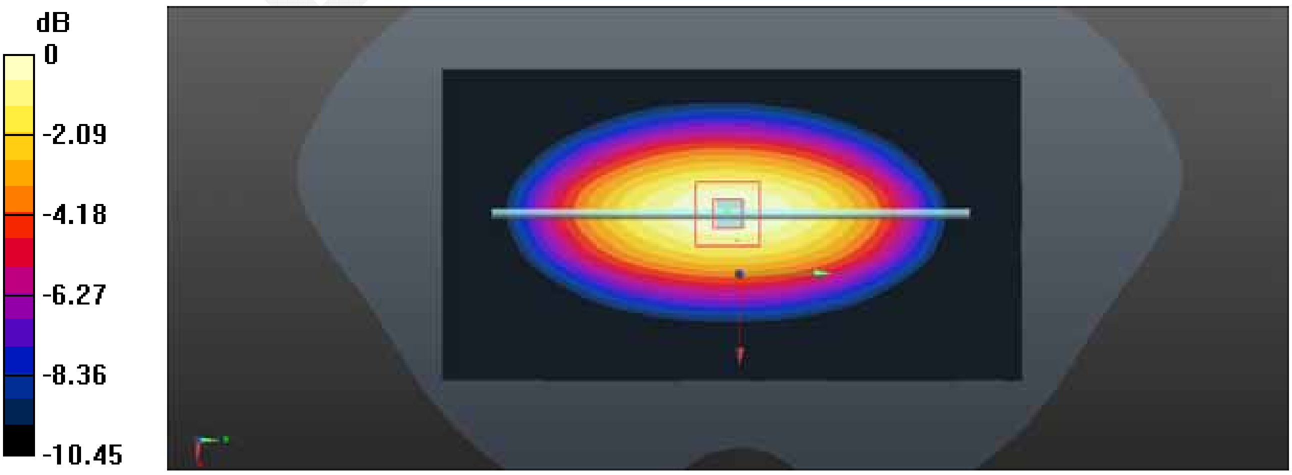
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.974 S/m; ε_r = 55.105; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.17, 9.17, 9.17); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

835MHz/System Check/Area Scan (71x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 9.61 W/kg

835MHz/System Check/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.67 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 13.3 W/kg
SAR(1 g) = 8.91 W/kg; SAR(10 g) = 5.84 W/kg
Maximum value of SAR (measured) = 9.60 W/kg



0 dB = 9.60 W/kg = 9.82 dBW/kg

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

System Performance 1750MHz Head

DUT: ALS-D-1750-S-2; Type: 1750 MHz; Serial: 198-00304

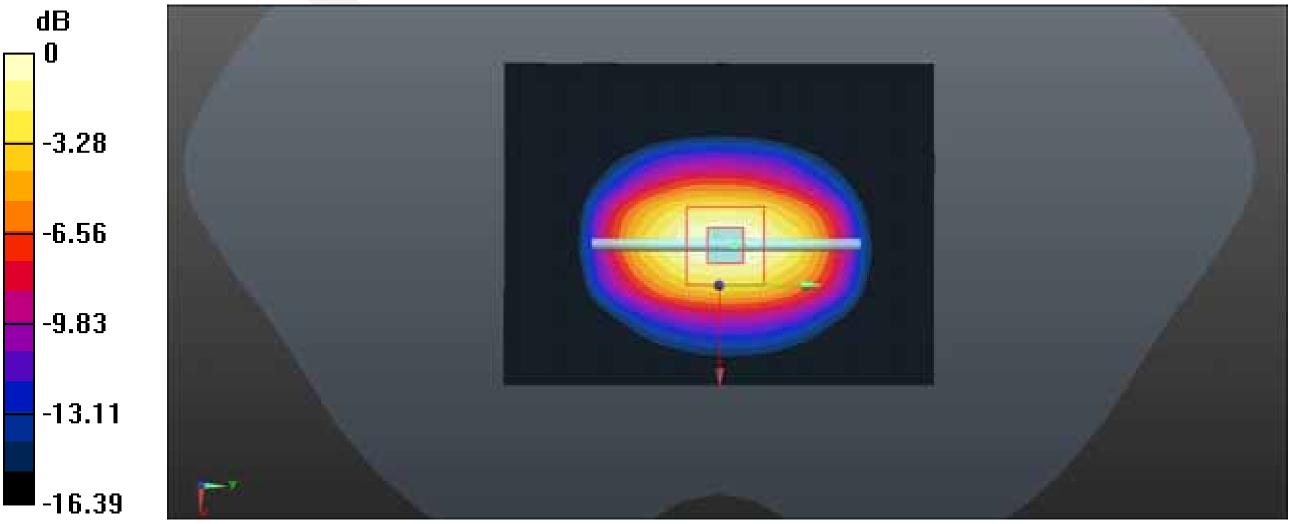
Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1750 MHz; σ = 1.387 S/m; ε_r = 40.371; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(8.12, 8.12, 8.12); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

1750MHz/System Check/Area Scan (61x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 45.3 W/kg

1750MHz /System Check/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 162.0 V/m; Power Drift = -0.38 dB
Peak SAR (extrapolated) = 72.6 W/kg
SAR(1 g) = 39.8 W/kg; SAR(10 g) = 21.1 W/kg
Maximum value of SAR (measured) = 44.7 W/kg



0 dB = 44.7 W/kg = 16.50 dBW/kg

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

System Performance 1750MHz Body

DUT: ALS-D-1750-S-2; Type: 1750 MHz; Serial: 198-00304

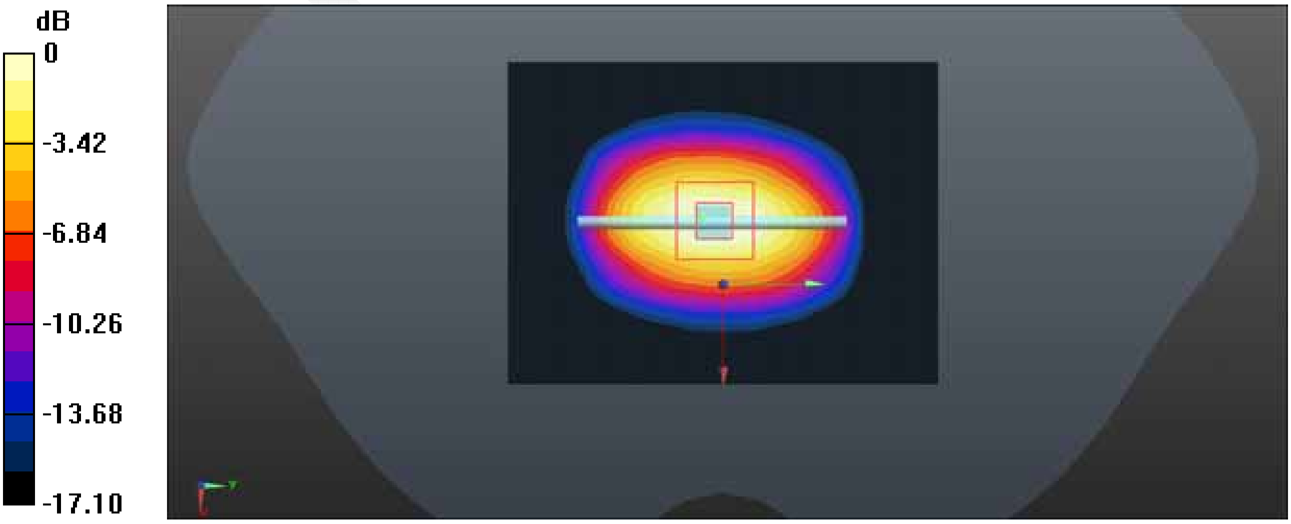
Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1750 MHz; σ = 1.494 S/m; ε_r = 53.347; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.85, 7.85, 7.85); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

1750MHz/System Check/Area Scan (61x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 41.4 W/kg

1750MHz/System Check/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 161.9 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 65.8 W/kg
SAR(1 g) = 35.3 W/kg; SAR(10 g) = 18.6 W/kg
Maximum value of SAR (measured) = 39.4 W/kg



0 dB = 39.4 W/kg = 15.95 dBW/kg

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

System Performance 1900MHz Head

DUT: ALS-D-1900-S-2; Type: 1900 MHz; Serial: 210-00710

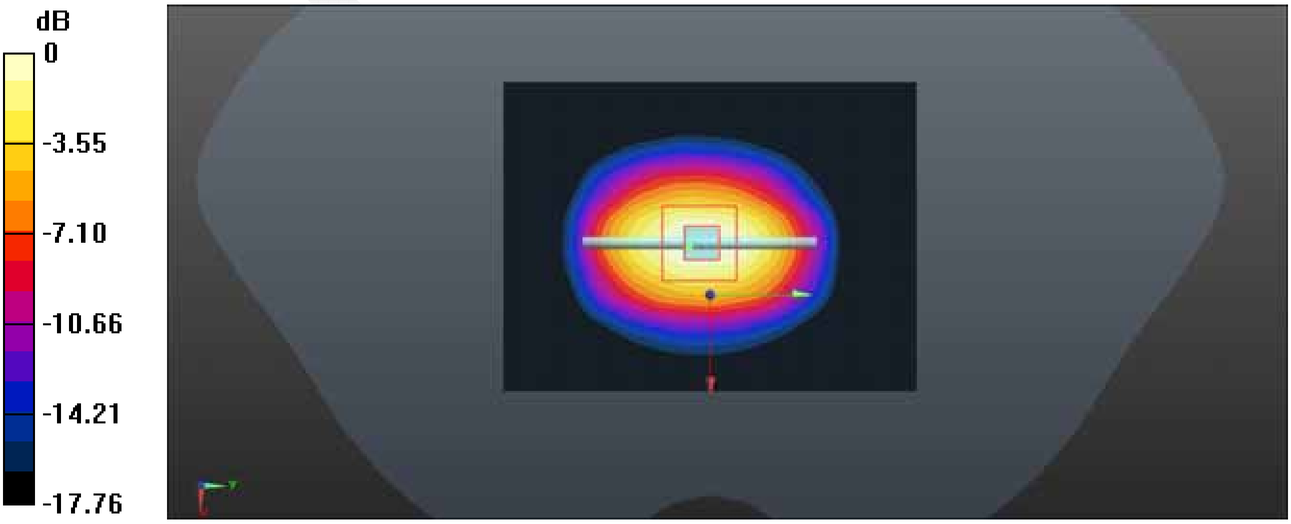
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.41 S/m; ε_r = 39.664; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

1900MHz/System Check/Area Scan (61x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 46.9 W/kg

1900MHz/System Check/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 174.5 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 74.0 W/kg
SAR(1 g) = 39.4 W/kg; SAR(10 g) = 20.4 W/kg
Maximum value of SAR (measured) = 44.4 W/kg



0 dB = 44.4 W/kg = 16.47 dBW/kg

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

System Performance 1900MHz Body

DUT: ALS-D-1900-S-2; Type: 1900 MHz; Serial: 210-00710

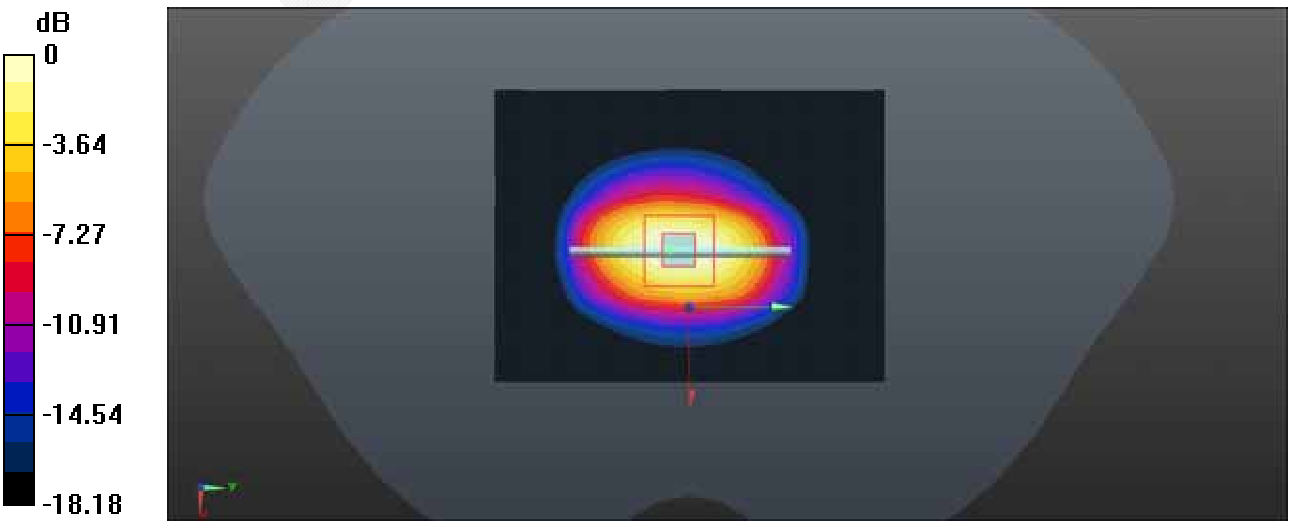
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.515 S/m; ε_r = 54.189; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.56, 7.56, 7.56); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

1900MHz/System Check/Area Scan (61x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 49.0 W/kg

1900MHz/System Check/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 172.8 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 76.2 W/kg
SAR(1 g) = 40.5 W/kg; SAR(10 g) = 20.5 W/kg
Maximum value of SAR (measured) = 45.7 W/kg



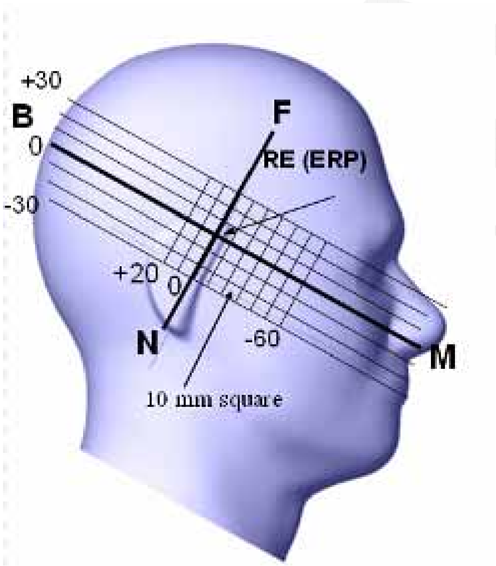
0 dB = 45.7 W/kg = 16.60 dBW/kg

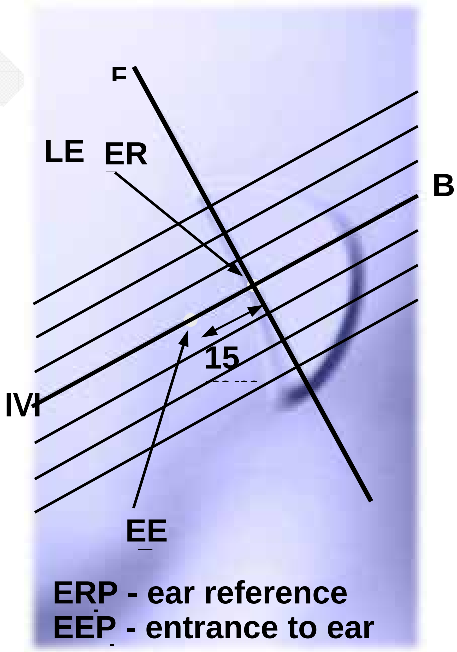
EUT TEST STRATEGY AND METHODOLOGY

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

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

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





N

Cheek/Touch Position

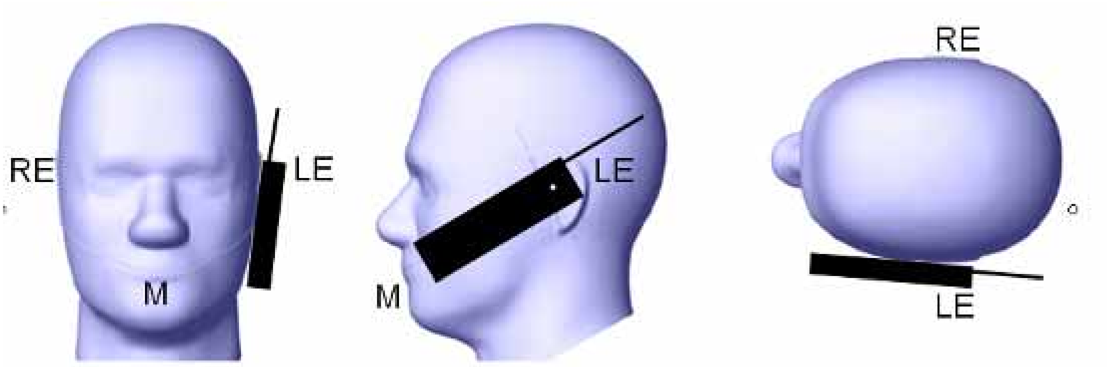
The device is brought toward the mouth of the head phantom by pivoting against the "ear reference point" or along the "N-F" line for the SCC-34/SC-2 head phantom.

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

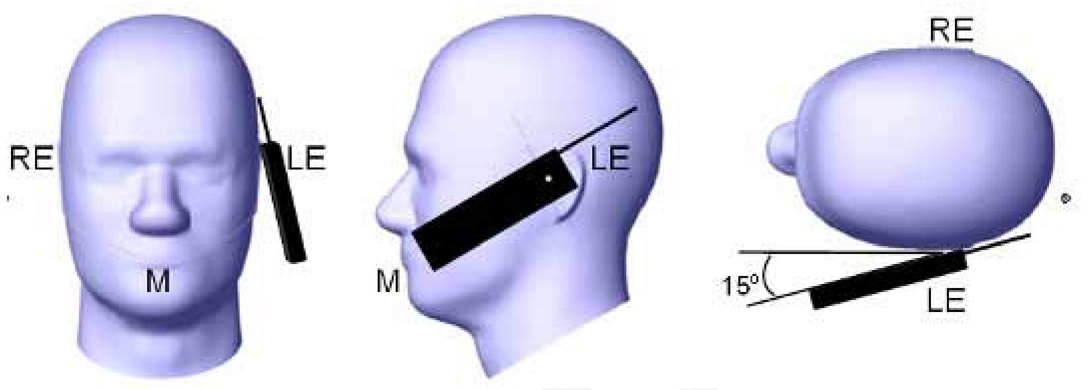
With the handset aligned in the "Cheek/Touch Position":

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.

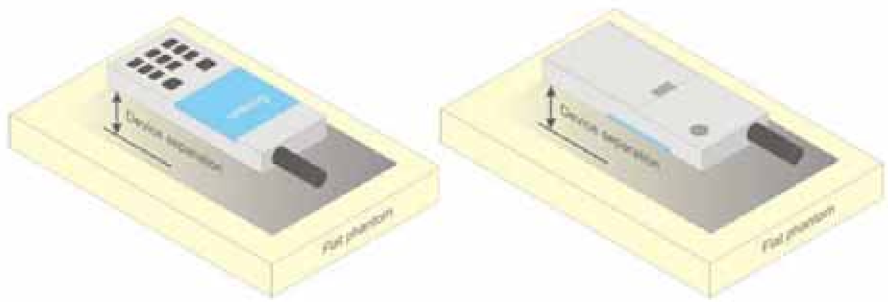


Figure 5 – Test positions for body-worn devices

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
KDB 914225 D05 SAR for LTE Devices v02r03

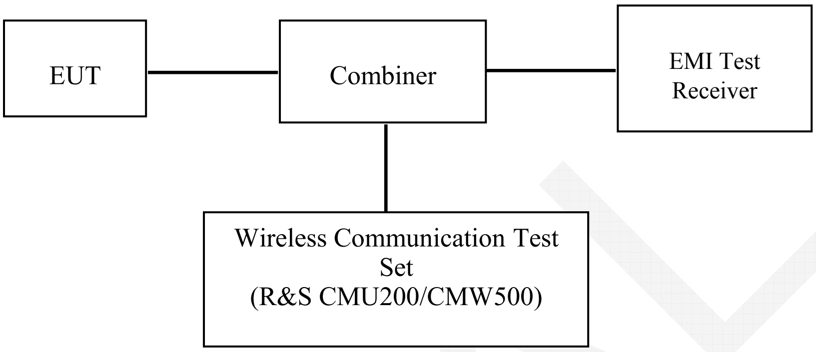
CONDUCTED OUTPUT POWER MEASUREMENT

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 and CMW500.

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

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.

LTE

For UE Power Class 1 and 3, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2-1due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1 and 3

Modulation	Channel bandwidth / Transmission bandwidth (N_{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

For UE Power Class 1 and 3 the specific requirements and identified subclauses are specified in Table 6.2.4-1 along with the allowed A-MPR values that may be used to meet these requirements. The allowed A-MPR values specified below in Table 6.2.4.-1 to 6.2.4-15 are in addition to the allowed MPR requirements specified in subclause 6.2.3.

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (subclause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	N/A
NS_03	6.6.2.2.1	2, 4,10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10,15,20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	N/A
NS_07	6.6.2.2.3 6.6.3.3.2	13	10	Table 6.2.4-2	
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	
NS_11	6.6.2.2.1	23	1.4, 3, 5, 10, 15, 20	Table 6.2.4-5	
NS_12	6.6.3.3.5	26	1.4, 3, 5	Table 6.2.4-6	
NS_13	6.6.3.3.6	26	5	Table 6.2.4-7	
NS_14	6.6.3.3.7	26	10, 15	Table 6.2.4-8	
NS_15	6.6.3.3.8	26	1.4, 3, 5, 10, 15	Table 6.2.4-9 Table 6.2.4-10	
NS_16	6.6.3.3.9	27	3, 5, 10	Table 6.2.4-11, Table 6.2.4-12, Table 6.2.4-13	
NS_17	6.6.3.3.10	28	5, 10	Table 5.6-1	N/A
NS_18	6.6.3.3.11	28	5	≥ 2	≤ 1
			10, 15, 20	≥ 1	≤ 4
NS_19	6.6.3.3.12	44	10, 15, 20	Table 6.2.4-14	
NS_20	6.2.2 6.6.2.2.1 6.6.3.2	23	5, 10, 15, 20	Table 6.2.4-15	
...					
NS_32	-	-	-	-	-

Maximum Target Output Power

Max Target Power (dBm)			
Mode/Band	Channel		
	Low	Middle	High
GSM 850	33.2	33.2	33.2
GPRS 1 TX Slot	33.2	33.2	33.2
GPRS 2 TX Slot	32.5	32.5	32.5
GPRS 3 TX Slot	30.8	30.8	30.8
GPRS 4 TX Slot	29.5	29.5	29.5
EDGE 1 TX Slot	26.8	26.8	26.8
EDGE 2 TX Slot	25.5	25.5	25.5
EDGE 3 TX Slot	23.1	23.1	23.1
EDGE 4 TX Slot	22	22	22
GSM 1900	29.6	29.6	29.6
GPRS 1 TX Slot	29.6	29.6	29.6
GPRS 2 TX Slot	28.7	28.7	28
GPRS 3 TX Slot	26.8	26.8	26
GPRS 4 TX Slot	25.8	25.8	25.8
EDGE 1 TX Slot	25.2	25.2	25.2
EDGE 2 TX Slot	24.2	24.2	24.2
EDGE 3 TX Slot	22.1	22.1	22.1
EDGE 4 TX Slot	21	21	21
WCDMA850	22.9	22.9	22.9
HSDPA	22	22	22
HSUPA	22.5	22.5	22.5
DC-HSDPA	22.5	22.5	22.5
HSPA+	22	22	22
WCDMA1900	22.5	22.5	22.5
HSDPA	21.5	21.5	21.5
HSUPA	21.5	21.5	21.5
DC-HSDPA	21.5	21.5	21.5
HSPA+	21.5	21.5	21.5
LTE BAND 4	23	23	23
WLAN	9.5	9.5	9.5
Bluetooth	2.0	2.0	2.0

Test Results:

GSM:

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)
GSM 850	128	824.2	33.1
	190	836.6	33.1
	251	848.8	33
PCS 1900	512	1850.2	29.6
	661	1880	29.4
	810	1909.8	28.9

GPRS:

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			1 slot	2 slots	3 slots	4 slots
GSM 850	128	824.2	33.04	32.29	30.64	29.42
	190	836.6	33.08	32.31	30.54	29.29
	251	848.8	32.97	32.25	30.46	29.19
PCS 1900	512	1850.2	29.58	28.62	26.71	25.71
	661	1880	29.39	28.35	26.42	25.36
	810	1909.8	28.82	27.67	25.62	24.52

EGPRS:

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			1 slot	2 slots	3 slots	4 slots
GSM 850	128	824.2	26.78	25.18	23.01	21.61
	190	836.6	26.65	25.14	22.95	21.69
	251	848.8	26.61	25.49	22.89	21.61
PCS 1900	512	1850.2	25.19	24.15	22.01	20.51
	661	1880	24.89	23.82	21.74	20.31
	810	1909.8	24.08	22.97	21.02	19.61

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	24.04	26.29	26.39	**26.42**
	190	836.6	24.08	26.31	26.29	26.29
	251	848.8	23.97	26.25	26.21	26.19
PCS 1900	512	1850.2	20.61	22.62	22.46	**22.71**
	661	1880	20.39	22.35	22.17	22.36
	810	1909.8	19.82	21.67	21.37	21.52

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	17.78	19.18	18.76	18.61
	190	836.6	17.65	19.14	18.7	18.69
	251	848.8	17.61	**19.49**	18.64	18.61
PCS 1900	512	1850.2	16.19	**18.15**	17.76	17.51
	661	1880	15.89	17.82	17.49	17.31
	810	1909.8	15.08	16.97	16.77	16.61

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	**22.89**
	4183	836.6	22.72
	4233	846.6	22.78
WCDMA 1900	9262	1852.4	22.28
	9400	1880	**22.31**
	9538	1907.6	22.13

Results (HSDPA)

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			Subset 1	Subset 2	Subset 3	Subset 4
WCDMA 850	4132	826.4	**21.78**	21.57	21.73	21.65
	4183	836.6	21.62	21.75	21.54	21.68
	4233	846.6	21.65	21.74	21.69	21.75
WCDMA 1900	9262	1852.4	21.22	21.34	21.37	21.25
	9400	1880	21.28	21.23	20.99	21.16
	9538	1907.6	21.13	21.17	21.22	**21.48**

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	21.78	21.57	21.73	21.65	**21.81**
	4183	836.6	21.62	21.75	21.54	21.68	21.64
	4233	846.6	21.65	21.74	21.69	21.75	21.65
WCDMA 1900	9262	1852.4	21.22	21.13	21.29	21.38	21.25
	9400	1880	21.24	21.11	21.35	**21.38**	21.29
	9538	1907.6	21.11	20.95	21.15	21.22	21.26

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	21.75	21.63	22.01	21.92
	4183	836.6	21.58	21.28	21.54	21.41
	4233	846.6	21.71	21.41	21.56	21.44
WCDMA 1900	9262	1852.4	21.34	21.31	21.42	21.29
	9400	1880	21.16	21.13	21.25	21.16
	9538	1907.6	21.18	21.22	21.25	21.31

Results (HSPA+)

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)
WCDMA 850	4132	826.4	21.71
	4183	836.6	21.64
	4233	846.6	21.76
WCDMA 1900	9262	1852.4	21.25
	9400	1880	21.22
	9538	1907.6	21.19

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.

LTE Band 4:

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5M	QPSK	1#0	22.20	22.47	22.23
		1#12	22.16	22.51	22.12
		1#24	22.65	22.47	22.38
		12#0	22.41	21.43	21.71
		12#6	22.13	21.62	21.85
		12#11	22.46	22.72	22.84
		25#0	22.45	22.60	22.20
	16-QAM	1#0	22.53	22.58	22.41
		1#12	22.45	22.27	22.19
		1#24	22.37	22.32	22.49
		12#0	21.36	21.24	21.74
		12#6	21.38	21.18	21.41
		12#11	21.42	21.08	21.34
		25#0	21.33	21.16	21.37
10M	QPSK	1#0	22.38	22.33	21.93
		1#24	21.72	21.87	21.79
		1#49	21.24	20.98	21.29
		25#0	21.81	21.41	21.96
		25#12	22.48	22.40	22.65
		25#24	21.60	21.36	21.49
		50#0	21.61	21.37	21.63
	16-QAM	1#0	22.11	21.47	21.22
		1#24	21.09	21.51	21.31
		1#49	22.32	22.48	21.94
		25#0	21.31	21.01	21.66
		25#12	21.16	21.86	21.09
		25#24	21.35	21.61	21.54
		50#0	21.64	21.49	21.23
15M	QPSK	1#0	22.65	22.41	22.43
		1#37	22.13	22.08	22.17
		1#74	21.65	21.51	21.33
		36#0	21.16	21.13	21.77
		36#17	21.83	21.83	21.63
		36#35	21.11	21.48	21.33
		75#0	21.35	21.52	21.16
	16-QAM	1#0	21.97	21.94	21.74
		1#37	21.72	21.16	21.82
		1#74	21.13	21.64	21.48

		36#0	21.78	21.49	21.77
		36#17	21.64	21.37	21.71
		36#35	21.64	21.85	21.91
		75#0	21.49	21.31	21.74
20M	QPSK	1#0	**22.78**	**22.84**	**22.62**
		1#49	22.71	22.39	22.28
		1#99	22.61	22.56	22.20
		50#0	22.27	22.76	22.34
		50#24	22.16	22.10	22.24
		50#49	22.34	22.12	22.11
		100#0	22.06	21.96	21.90
	16-QAM	1#0	21.60	21.67	21.66
		1#49	21.00	21.36	21.73
		1#99	21.74	20.40	21.44
		50#0	21.65	21.06	21.86
		50#24	21.33	21.02	21.94
		50#49	21.32	21.45	21.99
		100#0	21.58	21.00	21.68

Note:
1.SAR for LTE band exposure configurations is measured according to the procedures of KDB 941225 D05 SAR for LTE Devices v02r03.
2.The CMW500 Wideband Radio Communication tester is used for LTE output power measurements and SAR testing. Closed loop power control is used to keep the radio transmitters the max output power during the test.

Bluetooth

Mode	Channel No.	Channel frequency (MHz)	RF Output Power (dBm)
BDR(GFSK)	0	2402	-1.02
	39	2441	1.95
	78	2480	-0.07
EDR(4-DQPSK)	0	2402	-1.67
	39	2441	1.21
	78	2480	-0.76
EDR-8DPSK	0	2402	-1.59
	39	2441	1.28
	78	2480	-0.68
BLE	0	2402	-8.35
	19	2440	-6.09
	39	2480	-7.72

WLAN

Mode	Channel No.	Channel frequency (MHz)	RF Output Power (dBm)
802.11b	1	2412	9.20
	6	2437	9.45
	11	2462	9.27
802.11g	1	2412	9.02
	6	2437	9.47
	11	2462	9.15
802.11n HT20	1	2412	8.95
	6	2437	9.28
	11	2462	9.35
802.11n HT40	3	2422	8.22
	6	2437	8.65
	9	2452	8.55

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:	22 ℃
Relative Humidity:	40 %
ATM Pressure:	1000-1001 mbar

Testing was performed by Rocky Xiao on 2015-05-30

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	1.326	33.1	33.2	1.023	0.255	0.261	/
	836.6	GSM	2.802	33.1	33.2	1.023	0.267	**0.273**	**1#**
	848.8	GSM	2.229	33.0	33.2	1.047	0.248	0.26	/
Left Head Tilt	824.2	GSM	/	/	/	/	/	/	/
	836.6	GSM	-2.462	33.1	33.2	1.023	0.151	0.154	/
	848.8	GSM	/	/	/	/	/	/	/
Right Head Cheek	824.2	GSM	/	/	/	/	/	/	/
	836.6	GSM	3.567	33.1	33.2	1.023	0.236	0.241	/
	848.8	GSM	/	/	/	/	/	/	/
Right Head Tilt	824.2	GSM	/	/	/	/	/	/	/
	836.6	GSM	-1.703	33.1	33.2	1.023	0.106	0.108	/
	848.8	GSM	/	/	/	/	/	/	/
Body-Back-Headset (10mm)	824.2	GSM	/	/	/	/	/	/	/
	836.6	GSM	-0.541	33.1	33.2	1.023	0.518	0.53	/
	848.8	GSM	/	/	/	/	/	/	/
Body-Worn-Back (10mm)	824.2	GPRS	-1.099	29.42	29.5	1.019	0.854	0.87	/
	836.6	GPRS	-2.276	29.29	29.5	1.05	0.85	0.893	**2#**
	848.8	GPRS	0.28	29.19	29.5	1.074	0.801	0.86	/
Body-Worn -Left (10mm)	824.2	GPRS	/	/	/	/	/	/	/
	836.6	GPRS	-2.893	29.29	29.5	1.05	0.303	0.318	/
	848.8	GPRS	/	/	/	/	/	/	/
Body-Worn -Right (10mm)	824.2	GPRS	/	/	/	/	/	/	/
	836.6	GPRS	1.885	29.29	29.5	1.05	0.213	0.224	/
	848.8	GPRS	/	/	/	/	/	/	/
Body-Worn-Bottom (10mm)	824.2	GPRS	/	/	/	/	/	/	/
	836.6	GPRS	-2.21	29.29	29.5	1.05	0.443	0.465	/
	848.8	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.

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	-0.692	29.6	29.6	1.00	0.314	0.314	/
	1880	GSM	3.992	29.4	29.6	1.047	0.333	0.349	**3#**
	1909.8	GSM	-1.535	28.9	29.6	1.175	0.307	0.361	/
Left Head Tilt	1850.2	GSM	/	/	/	/	/	/	/
	1880	GSM	-1.291	29.4	29.6	1.047	0.158	0.165	/
	1909.8	GSM	/	/	/	/	/	/	/
Right Head Cheek	1850.2	GSM	/	/	/	/	/	/	/
	1880	GSM	-3.888	29.4	29.6	1.047	0.286	0.299	/
	1909.8	GSM	/	/	/	/	/	/	/
Right Head Tilt	1850.2	GSM	/	/	/	/	/	/	/
	1880	GSM	1.933	29.4	29.6	1.047	0.123	0.129	/
	1909.8	GSM	/	/	/	/	/	/	/
Body-Back-Headset (10mm)	1850.2	GSM	/	/	/	/	/	/	/
	1880	GSM	-1.135	29.4	29.6	1.047	0.667	0.698	/
	1909.8	GSM	/	/	/	/	/	/	/
Body-Worn-Back (10mm)	1850.2	GPRS	-0.126	25.71	25.8	1.021	1.060	1.082	/
	1880.0	GPRS	-0.069	25.36	25.8	1.107	1.1	1.218	**4#**
	1909.8	GPRS	-0.936	24.52	25.8	1.343	0.896	1.203	/
Body-Worn -Left (10mm)	1850.2	GPRS	/	/	/	/	/	/	/
	1880.0	GPRS	-3.934	25.36	25.8	1.107	0.412	0.456	/
	1909.8	GPRS	/	/	/	/	/	/	/
Body-Worn -Right (10mm)	1850.2	GPRS	/	/	/	/	/	/	/
	1880.0	GPRS	2.895	25.36	25.8	1.107	0.379	0.42	/
	1909.8	GPRS	/	/	/	/	/	/	/
Body-Worn-Bottom (10mm)	1850.2	GPRS	/	/	/	/	/	/	/
	1880.0	GPRS	2.018	25.36	25.8	1.107	0.602	0.666	/
	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	1.492	22.89	22.9	1.002	0.29	0.291	/
	836.6	WCDMA	3.753	22.72	22.9	1.042	0.288	0.3	**5#**
	846.6	WCDMA	2.183	22.78	22.9	1.028	0.274	0.282	/
Left Head Tilt	826.4	WCDMA	/	/	/	/	/	/	/
	836.6	WCDMA	-0.622	22.72	22.9	1.042	0.162	0.169	/
	846.6	WCDMA	/	/	/	/	/	/	/
Right Head Cheek	826.4	WCDMA	/	/	/	/	/	/	/
	836.6	WCDMA	-0.285	22.72	22.9	1.042	0.255	0.266	/
	846.6	WCDMA	/	/	/	/	/	/	/
Right Head Tilt	826.4	WCDMA	/	/	/	/	/	/	/
	836.6	WCDMA	3.9	22.72	22.9	1.042	0.14	0.146	/
	846.6	WCDMA	/	/	/	/	/	/	/
Body-Worn-Back (10mm)	826.4	WCDMA	-0.243	22.89	22.9	1.002	0.517	0.518	/
	836.6	WCDMA	-0.688	22.72	22.9	1.042	0.527	0.549	**6#**
	846.6	WCDMA	-1.193	22.78	22.9	1.028	0.521	0.536	/
Body-Worn -Left (10mm)	826.4	WCDMA	/	/	/	/	/	/	/
	836.6	WCDMA	-3.815	22.72	22.9	1.042	0.196	0.204	/
	846.6	WCDMA	/	/	/	/	/	/	/
Body-Worn -Right (10mm)	826.4	WCDMA	/	/	/	/	/	/	/
	836.6	WCDMA	3.707	22.72	22.9	1.042	0.134	0.14	/
	846.6	WCDMA	/	/	/	/	/	/	/
Body-Worn-Bottom (10mm)	826.4	WCDMA	/	/	/	/	/	/	/
	836.6	WCDMA	-1.685	22.72	22.9	1.042	0.273	0.284	/
	846.6	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.

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	0.942	22.28	22.4	1.028	0.536	0.551	/
	1880	WCDMA	2.565	22.31	22.4	1.021	0.615	0.628	**7#**
	1907.6	WCDMA	-0.857	22.13	22.4	1.064	0.493	0.525	/
Left Head Tilt	1852.4	WCDMA	/	/	/	/	/	/	/
	1880	WCDMA	3.165	22.31	22.4	1.021	0.214	0.218	/
	1907.6	WCDMA	/	/	/	/	/	/	/
Right Head Cheek	1852.4	WCDMA		/	/	/	/	/	/
	1880	WCDMA	-1.182	22.31	22.4	1.021	0.477	0.487	/
	1907.6	WCDMA	/	/	/	/	/	/	/
Right Head Tilt	1852.4	WCDMA	/	/	/	/	/	/	/
	1880	WCDMA	0.095	22.31	22.4	1.021	0.192	0.196	/
	1907.6	WCDMA	/	/	/	/	/	/	/
Body-Worn-Back (10mm)	1852.4	WCDMA	-1.607	22.28	22.4	1.028	1.14	1.172	/
	1880.0	WCDMA	0.023	22.31	22.4	1.021	1.18	1.205	**8#**
	1907.6	WCDMA	3.262	22.13	22.4	1.064	1.09	1.16	/
Body-Worn -Left (10mm)	1852.4	WCDMA	/	/	/	/	/	/	/
	1880.0	WCDMA	-0.873	22.31	22.4	1.021	0.404	0.412	/
	1907.6	WCDMA	/	/	/	/	/	/	/
Body-Worn -Right (10mm)	1852.4	WCDMA	/	/	/	/	/	/	/
	1880.0	WCDMA	2.1	22.31	22.4	1.021	0.362	0.37	/
	1907.6	WCDMA	/	/	/	/	/	/	/
Body-Worn-Bottom (10mm)	1852.4	WCDMA	/	/	/	/	/	/	/
	1880.0	WCDMA	0.5	22.31	22.4	1.021	0.75	0.766	/
	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.

LTE Band 4:

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	1710	1RB	/	/	/	/	/	/	/
	1732.5	1RB	1.391	22.84	23	1.038	0.521	0.541	**9#**
	1754.9	1RB	/	/	/	/	/	/	/
	1732.5	50%RB	0.287	22.76	23	1.057	0.511	0.540	/
Left Head Tilt	1710	1RB	/	/	/	/	/	/	/
	1732.5	1RB	2.243	22.84	23	1.038	0.207	0.215	/
	1754.9	1RB	/	/	/	/	/	/	/
	1732.5	50%RB	3.325	22.76	23	1.057	0.192	0.203	/
Right Head Cheek	1710	1RB	/	/	/	/	/	/	/
	1732.5	1RB	-2.121	22.84	23	1.038	0.456	0.473	/
	1754.9	1RB	/	/	/	/	/	/	/
	1732.5	50%RB	-3.725	22.76	23	1.057	0.428	0.452	/
Right Head Tilt	1710	1RB	/	/	/	/	/	/	/
	1732.5	1RB	1.331	22.84	23	1.038	0.188	0.195	/
	1754.9	1RB	/	/	/	/	/	/	/
	1732.5	50%RB	3.334	22.76	23	1.057	0.162	0.171	/
Body-Worn-Back (10mm)	1710	1RB	-1.745	22.78	23	1.052	0.871	0.916	/
	1732.5	1RB	-3.839	22.84	23	1.038	1.03	1.069	**10#**
	1754.9	1RB	-3.872	22.62	23	1.091	0.904	0.987	/
	1732.5	50%RB	1.058	22.76	23	1.057	0.92	0.972	/
Body-Worn-Left (10mm)	1710	1RB	/	/	/	/	/	/	/
	1732.5	1RB	-1.904	22.84	23	1.038	0.332	0.344	/
	1754.9	1RB	/	/	/	/	/	/	/
	1732.5	50%RB	3.161	22.76	23	1.057	0.277	0.293	/
Body-Worn-Right (10mm)	1710	1RB	/	/	/	/	/	/	/
	1732.5	1RB	-3.55	22.84	23	1.038	0.286	0.297	/
	1754.9	1RB	/	/	/	/	/	/	/
	1732.5	50%RB	-0.667	22.76	23	1.057	0.254	0.268	/
Body-Worn-Bottom (10mm)	1710	1RB	/	/	/	/	/	/	/
	1732.5	1RB	-3.802	22.84	23	1.038	0.553	0.574	/
	1754.9	1RB	/	/	/	/	/	/	/
	1732.5	50%RB	2.199	22.76	23	1.057	0.511	0.54	/

Note:

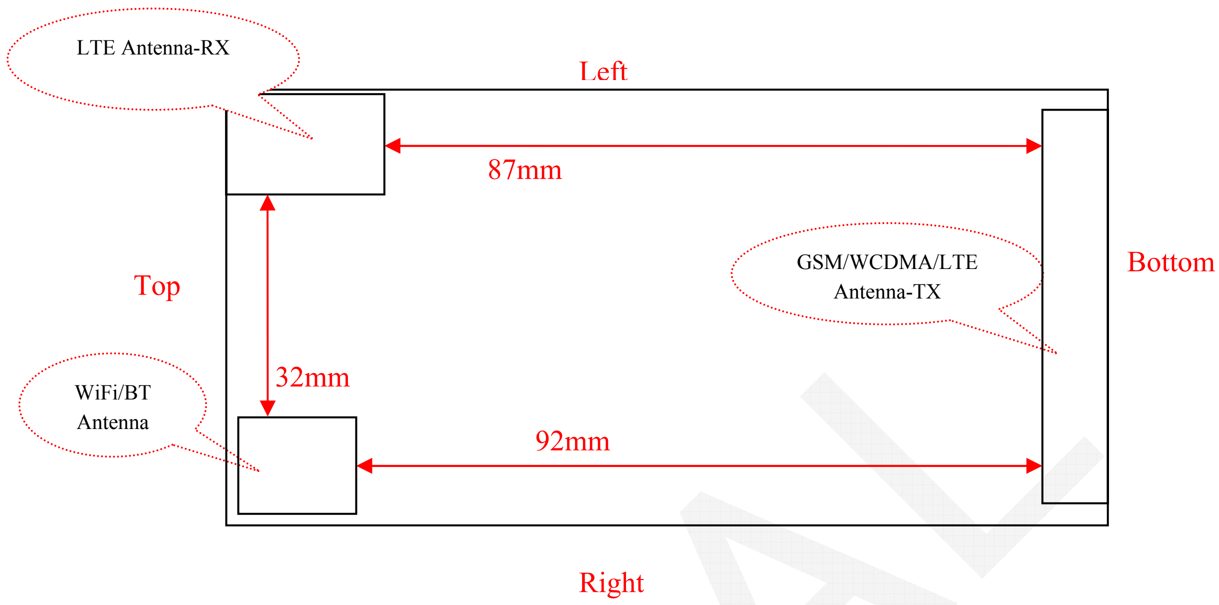
1. When the 1-g SAR is ≤ 0.8W/Kg, testing for other channels are optional.

2. SAR for LTE band exposure configurations is measured according to the procedures of KDB 941225 D05 SAR for LTE Devices v02.
3. KDB941225D05- SAR for higher order modulation is required only when the highest maximum output power for the configuration in the higher order modulation is > ½ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg
4. KDB941225D05- For QPSK with 100% RB allocation, when the reported SAR measured for the Highest output power channel is <1.45 W/kg, tests for the remaining required test channels are optional.
5.KDB941225D05- For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg.

6. KDB941225D05- Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offset the upper edge, middle and lower edge of each required test channel.
7. KDB941225D05- SAR for the other channel bandwidth is not necessary except the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > ½ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the reported SAR of a configuration for the largest channel bandwidth is > 1.45 W/kg.
8. Worst case SAR for 50% RB allocation is selected to be tested.

SAR SIMULTANEOUS TRANSMISSION DESCRIPTION

BT/WLAN and GSM/3G/LTE Antennas Location:



Simultaneous Transmission:

Description of Simultaneous Transmit Capabilities			Antennas Distance (mm)
Transmitter Combination	Simultaneous?	Hotspot?	
GSM + WCDMA	×	×	0
GSM+LTE	×	×	0
GSM + Bluetooth	√	×	92
GSM + WLAN	√	√	92
WCDMA+LTE	×	×	0
WCDMA + Bluetooth	√	×	92
WCDMA + WLAN	√	√	92
LTE + Bluetooth	√	×	92
LTE + WLAN	√	√	92

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	2.0	1.58	0	0.50	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 (GHz)	Pavg (dBm)	Pavg (mW)	Distance (mm)	Estimated 1-g (W/kg)
WLAN Head	2450	9.5	8.91	0	0.372
WLAN Body	2450	9.5	8.91	10	0.186
Bluetooth Head	2450	2.0	1.58	0	0.066
Bluetooth Body	2450	2.0	1.58	10	0.033

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+Bluetooth	Left Head Cheek	0.273	0.066	0.339
	Left Head Tilt	0.154	0.066	0.22
	Right Head Cheek	0.241	0.066	0.307
	Right Head Tilt	0.108	0.066	0.174
	Body-Back-Headset	0.53	0.066	0.596
GPRS 850 + Bluetooth	Body-Back	0.893	0.033	0.926
	Body-Right	0.318	0.033	0.351
	Body-Left	0.224	0.033	0.257
	Body-Bottom	0.465	0.033	0.498
PCS1900 +Bluetooth	Left Head Cheek	0.349	0.066	0.415
	Left Head Tilt	0.165	0.066	0.231
	Right Head Cheek	0.299	0.066	0.365
	Right Head Tilt	0.129	0.066	0.195
	Body-Back-Headset	0.698	0.066	0.764
GPRS 1900 + Bluetooth	Body-Back	1.218	0.033	1.251
	Body-Right	0.456	0.033	0.489
	Body-Left	0.42	0.033	0.453
	Body-Bottom	0.666	0.033	0.699
WCDMA 850+Bluetooth	Left Head Cheek	0.3	0.066	0.366
	Left Head Tilt	0.169	0.066	0.235
	Right Head Cheek	0.266	0.066	0.332
	Right Head Tilt	0.146	0.066	0.212
	Body-Back	0.549	0.033	0.582
	Body-Right	0.204	0.033	0.237
	Body-Left	0.14	0.033	0.173
	Body-Bottom	0.284	0.033	0.317
WCDMA 1900+Bluetooth	Left Head Cheek	0.628	0.066	0.694
	Left Head Tilt	0.218	0.066	0.284
	Right Head Cheek	0.487	0.066	0.553
	Right Head Tilt	0.196	0.066	0.262
	Body-Back	1.205	0.033	1.238
	Body-Right	0.412	0.033	0.445
	Body-Left	0.37	0.033	0.403
	Body-Bottom	0.766	0.033	0.799
LTE Band 4 +Bluetooth	Left Head Cheek	0.541	0.066	0.607
	Left Head Tilt	0.215	0.066	0.281
	Right Head Cheek	0.473	0.066	0.539
	Right Head Tilt	0.195	0.066	0.261
	Body-Back	1.069	0.033	1.102
	Body-Right	0.344	0.033	0.377
	Body-Left	0.297	0.033	0.33
	Body-Bottom	0.574	0.033	0.607

Mode (SAR1+SAR2)	Position	Reported SAR (W/kg)		ΣSAR < 1.6W/kg
		SAR1	SAR2	
GSM 850+ WLAN	Left Head Cheek	0.273	0.372	0.645
	Left Head Tilt	0.154	0.372	0.526
	Right Head Cheek	0.241	0.372	0.613
	Right Head Tilt	0.108	0.372	0.48
	Body-Back-Headset	0.53	0.372	0.902
GPRS 850 + WLAN (Hotspot)	Body-Back	0.893	0.186	1.079
	Body-Right	0.318	0.186	0.504
	Body-Left	0.224	0.186	0.41
	Body-Bottom	0.465	0.186	0.651
PCS1900 + WLAN	Left Head Cheek	0.349	0.372	0.721
	Left Head Tilt	0.165	0.372	0.537
	Right Head Cheek	0.299	0.372	0.671
	Right Head Tilt	0.129	0.372	0.501
	Body-Back-Headset	0.698	0.372	1.07
GPRS 1900 + WLAN (Hotspot)	Body-Back	1.218	0.186	**1.404**
	Body-Right	0.456	0.186	0.642
	Body-Left	0.42	0.186	0.606
	Body-Bottom	0.666	0.186	0.852
WCDMA 850+ WLAN	Left Head Cheek	0.3	0.372	0.672
	Left Head Tilt	0.169	0.372	0.541
	Right Head Cheek	0.266	0.372	0.638
	Right Head Tilt	0.146	0.372	0.518
WCDMA 850+ WLAN (Hotspot)	Body-Back	0.549	0.186	0.735
	Body-Right	0.204	0.186	0.39
	Body-Left	0.14	0.186	0.326
	Body-Bottom	0.284	0.186	0.47
WCDMA 1900+ WLAN	Left Head Cheek	0.628	0.372	1.00
	Left Head Tilt	0.218	0.372	0.59
	Right Head Cheek	0.487	0.372	0.859
	Right Head Tilt	0.196	0.372	0.568
WCDMA 1900+ WLAN (Hotspot)	Body-Back	1.205	0.186	1.391
	Body-Right	0.412	0.186	0.598
	Body-Left	0.37	0.186	0.556
	Body-Bottom	0.766	0.186	0.952
LTE Band 4 + WLAN	Left Head Cheek	0.541	0.372	0.913
	Left Head Tilt	0.215	0.372	0.587
	Right Head Cheek	0.473	0.372	0.845
	Right Head Tilt	0.195	0.372	0.567
LTE Band 4 + WLAN (Hotspot)	Body-Back	1.069	0.186	1.255
	Body-Right	0.344	0.186	0.53
	Body-Left	0.297	0.186	0.483
	Body-Bottom	0.574	0.186	0.76

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-Cheek Middle Channel

DUT: Mobile Phone; Type: Zen Flow

Communication System: Generic GSM; Frequency: 836.6 MHz;Duty Cycle: 1:8

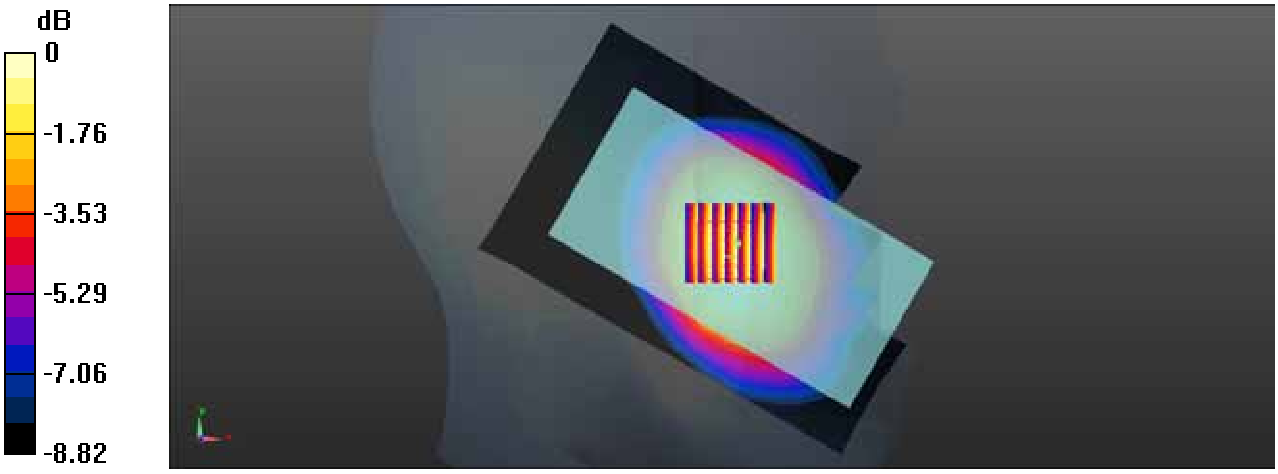
Medium parameters used: f = 836.6 MHz; σ = 0.891 S/m; ε_r = 42.866; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.52, 9.52, 9.52); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

Head/GSM 850 Left-Cheek/Area Scan (101x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.283 W/kg

Head/GSM 850 Left-Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.533 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.330 W/kg
SAR(1 g) = 0.267 W/kg; SAR(10 g) = 0.203 W/kg
Maximum value of SAR (measured) = 0.281 W/kg



0 dB = 0.281 W/kg = -5.51 dBW/kg

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

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

DUT: Mobile Phone; Type: Zen Flow

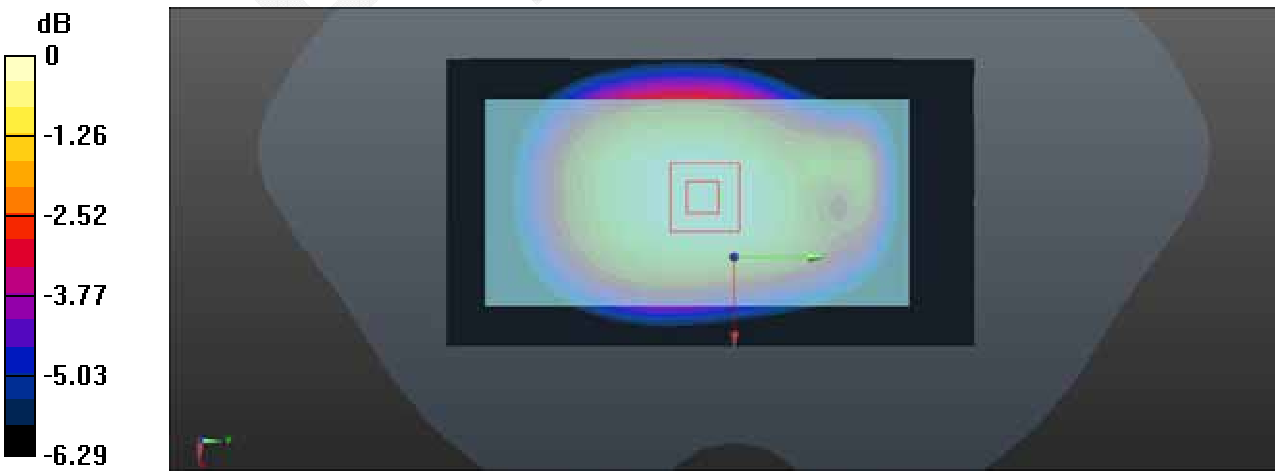
Communication System: Generic GPRS-4 SLOT; Frequency: 836.6 MHz;Duty Cycle: 1:2
Medium parameters used: f = 836.6 MHz; σ = 0.977 S/m; ε_r = 55.13; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.17, 9.17, 9.17); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

Body/GPRS 850 Body-Back/Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.901 W/kg

Body/ GPRS 850 Body-Back /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 30.08 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 1.07 W/kg
SAR(1 g) = 0.850 W/kg; SAR(10 g) = 0.651 W/kg
Maximum value of SAR (measured) = 0.892 W/kg



0 dB = 0.892 W/kg = -0.50 dBW/kg

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

Test Plot 3#:GSM 1900 Left Cheek Middle Channel

DUT: Mobile Phone; Type: Zen Flow

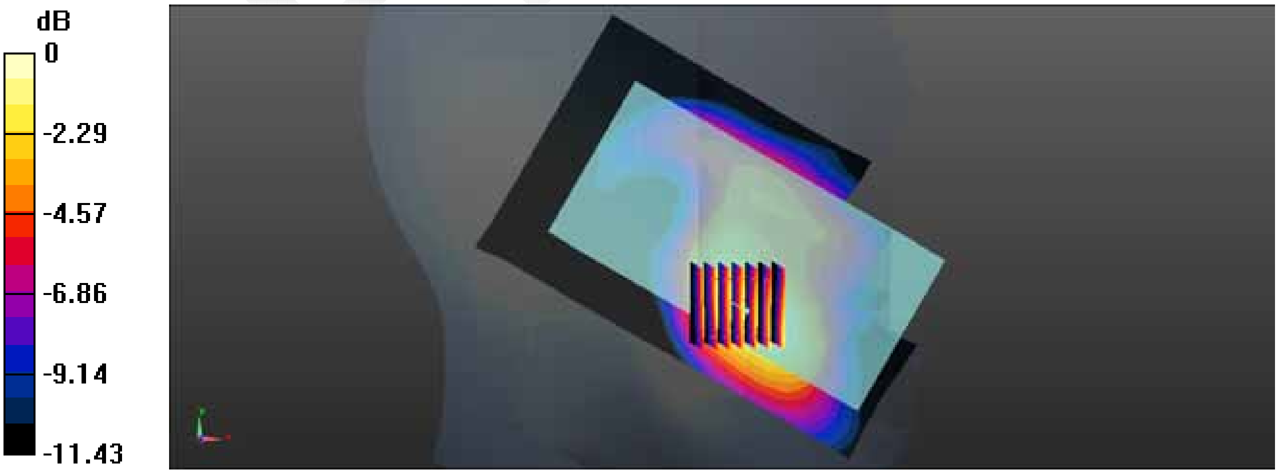
Communication System: Generic GSM; Frequency: 1880 MHz;Duty Cycle: 1:8
Medium parameters used: f = 1880 MHz; σ = 1.384 S/m; ε_r = 39.755; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

Head/GSM 1900 Left Cheek/Area Scan (101x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.365 W/kg

Head/GSM 1900 Left Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.059 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 0.526 W/kg
SAR(1 g) = 0.333 W/kg; SAR(10 g) = 0.204 W/kg
Maximum value of SAR (measured) = 0.360 W/kg



0 dB = 0.360 W/kg = -4.44 dBW/kg

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

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

DUT: Mobile Phone; Type: Zen Flow

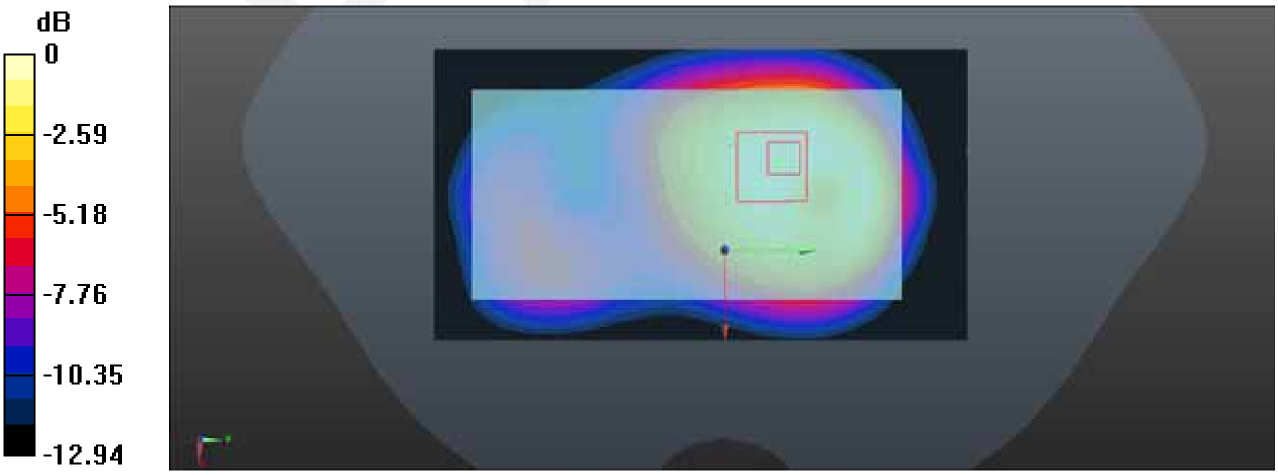
Communication System: Generic GPRS-4 SLOT; Frequency: 1880 MHz;Duty Cycle: 1:2
Medium parameters used: f = 1880 MHz; σ = 1.543 S/m; ε_r = 53.738; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.56, 7.56, 7.56); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

Body/PCS 1900 Body-Back/Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.20 W/kg

Body/PCS 1900Body- Back/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 22.50 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 1.79 W/kg
SAR(1 g) = 1.1 W/kg; SAR(10 g) = 0.665 W/kg
Maximum value of SAR (measured) = 1.19 W/kg



0 dB = 1.19 W/kg = 0.76 dBW/kg

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

Test Plot 5#:WCDMA 850 Left-Cheek Middle Channel

DUT: Mobile Phone; Type: Zen Flow

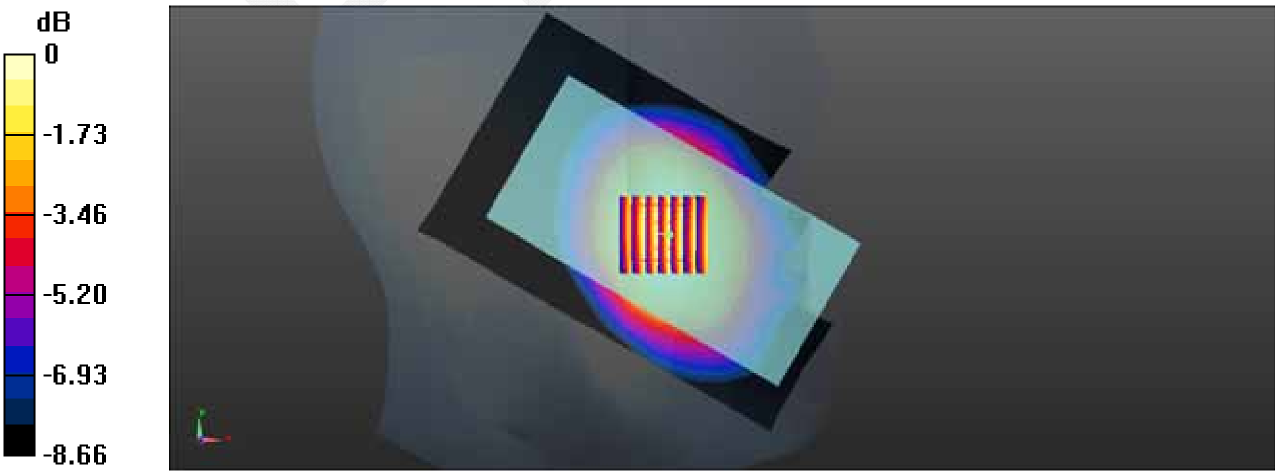
Communication System: BAND V; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used: f = 836.6 MHz; σ = 0.891 S/m; ε_r = 42.866; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.52, 9.52, 9.52); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

Head/WCDMA 850 Left-Cheek/Area Scan (101x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.302 W/kg

Head/WCDMA 850 Left-Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.946 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 0.354 W/kg
SAR(1 g) = 0.288 W/kg; SAR(10 g) = 0.219 W/kg
Maximum value of SAR (measured) = 0.303 W/kg



0 dB = 0.303 W/kg = -5.19 dBW/kg

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

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

DUT: Mobile Phone; Type: Zen Flow

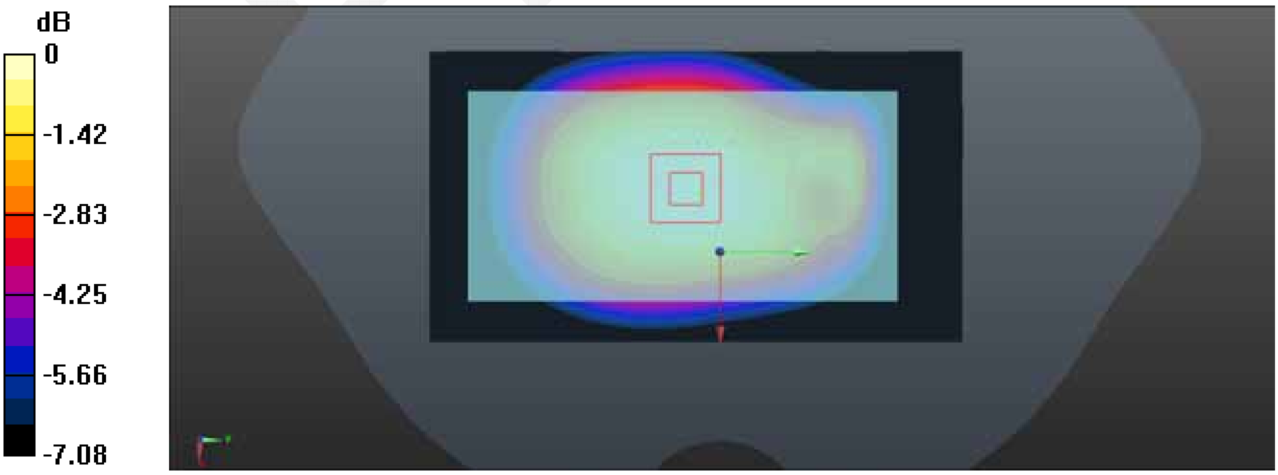
Communication System: BAND V; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used: f = 836.6 MHz; σ = 0.977 S/m; ε_r = 55.13; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.17, 9.17, 9.17); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

Body/WCDMA 850 Body-Back/Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.552 W/kg

Body/WCDMA 850 Back/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 23.61 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.658 W/kg
SAR(1 g) = 0.527 W/kg; SAR(10 g) = 0.404 W/kg
Maximum value of SAR (measured) = 0.553 W/kg



0 dB = 0.553 W/kg = -2.57 dBW/kg

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

Test Plot 7#:WCDMA 1900 Left Cheek Middle Channel

DUT: Mobile Phone; Type: Zen Flow

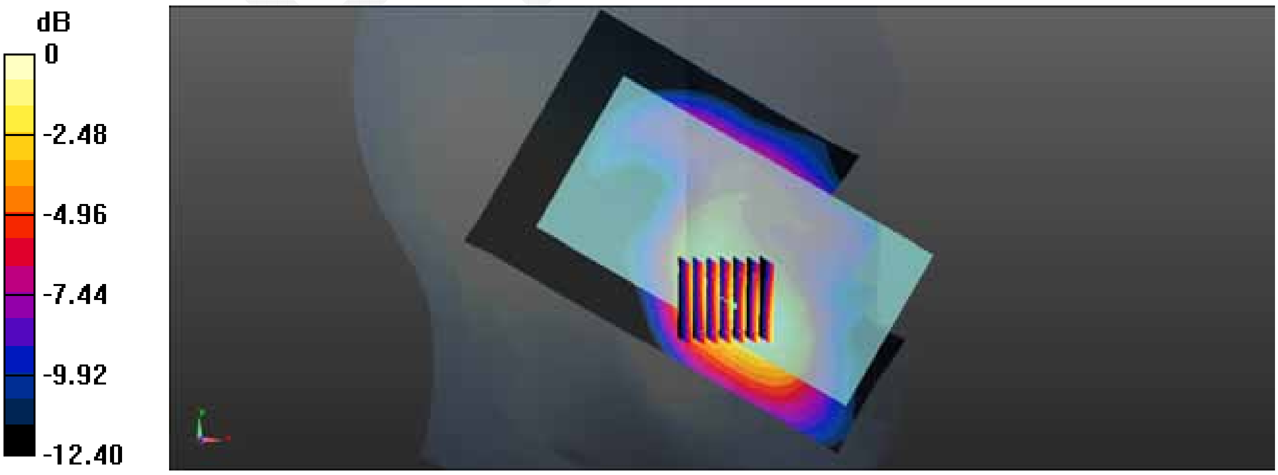
Communication System: BAND II; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.413 S/m; ε_r = 39.58; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

Head/WCDMA 1900 Left Cheek/Area Scan (101x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.694 W/kg

Head/WCDMA 1900 Left Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.261 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 1.00 W/kg
SAR(1 g) = 0.615 W/kg; SAR(10 g) = 0.366 W/kg
Maximum value of SAR (measured) = 0.664 W/kg



0 dB = 0.664 W/kg = -1.78 dBW/kg

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

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

DUT: Mobile Phone; Type: Zen Flow

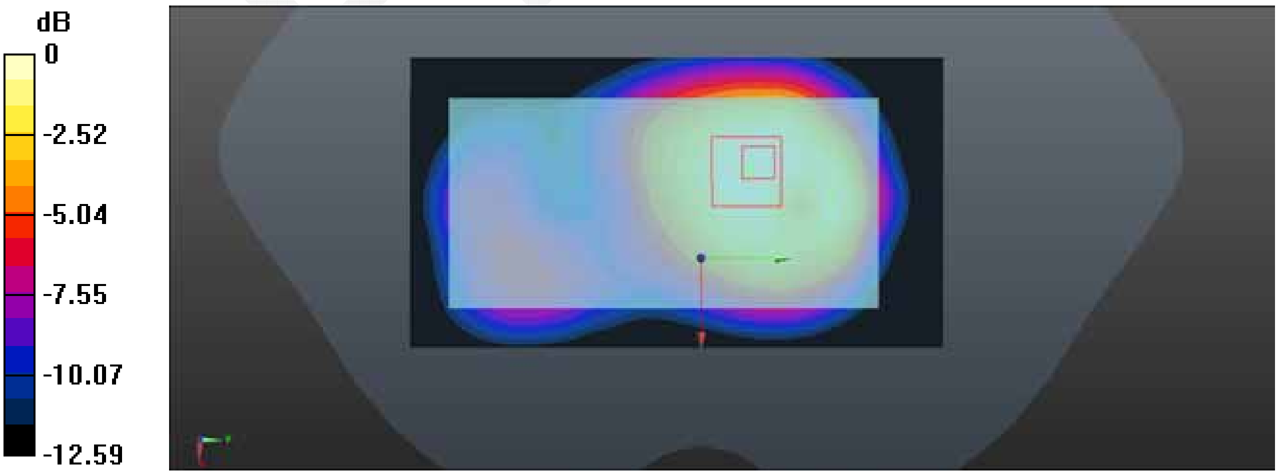
Communication System: BAND II; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.543 S/m; ε_r = 53.738; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.56, 7.56, 7.56); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

Body/WCDMA 1900 Back/Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.36 W/kg

Body/WCDMA 1900 Back/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 23.21 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 1.98 W/kg
SAR(1 g) = 1.18 W/kg; SAR(10 g) = 0.702 W/kg
Maximum value of SAR (measured) = 1.33 W/kg



0 dB = 1.33 W/kg = 1.24 dBW/kg

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

Test Plot 9#:LTE Band 4 Left Cheek Middle Channel

DUT: Mobile Phone; Type: Zen Flow

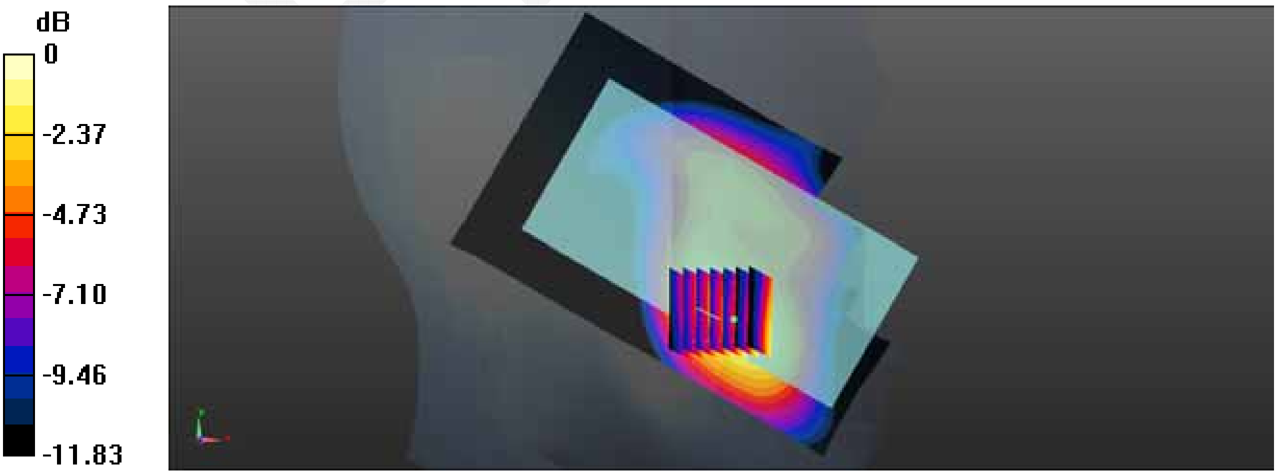
Communication System: Generic LTE; Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1732.5 MHz; σ = 1.376 S/m; ε_r = 40.438; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(8.12, 8.12, 8.12); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

Head/LTE Band 4 Left Cheek/Area Scan (101x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.558 W/kg

Head/LTE Band 4 Left Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.322 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.781 W/kg
SAR(1 g) = 0.521 W/kg; SAR(10 g) = 0.333 W/kg
Maximum value of SAR (measured) = 0.564 W/kg



0 dB = 0.564 W/kg = -2.49 dBW/kg

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

Test Plot 10#:LTE Band 4 Body-Worn-Back Middle Channel

DUT: Mobile Phone; Type: Zen Flow

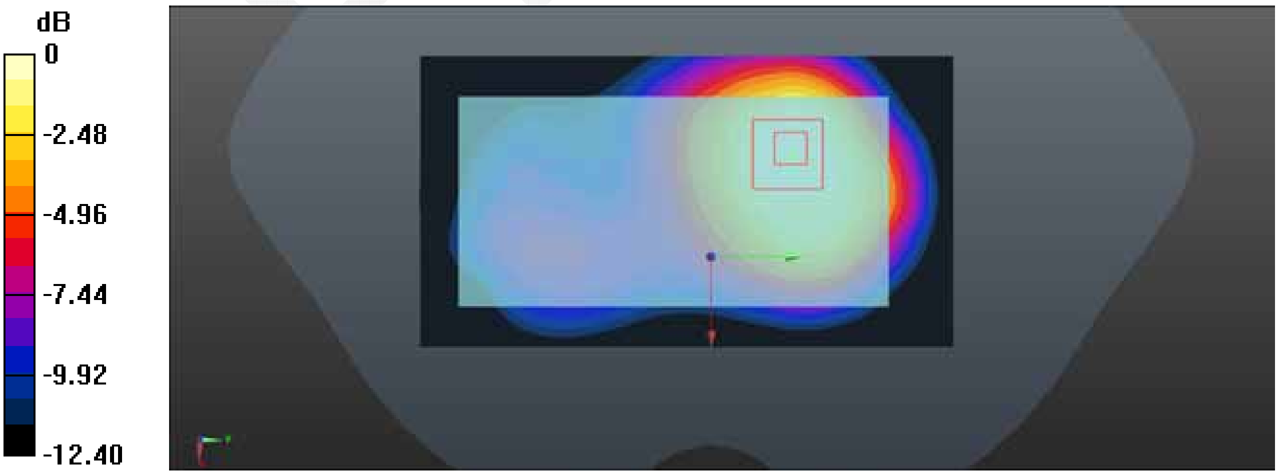
Communication System: Generic LTE; Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1732.5 MHz; σ = 1.376 S/m; ε_r = 40.438; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(8.12, 8.12, 8.12); Calibrated: 2015/2/5;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1459; Calibrated: 2015/1/26
- Phantom: SAM (30deg probe tilt) with CRP v5.0_20150321; Type: QD000P40CD; Serial: TP:1874
- Measurement SW: DASY52, Version 52.8 (8);

Body/LTE Band 4 Back/Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.11 W/kg

Body/LTE Band 4 Back/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.21 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 1.95 W/kg
SAR(1 g) = 1.03 W/kg; SAR(10 g) = 0.563 W/kg
Maximum value of SAR (measured) = 1.11 W/kg



0 dB = 1.11 W/kg = 0.45 dBW/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

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Servizio svizzero di taratura
S 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).

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 ($\mu V/(V/m)^2$)[A]	0.48	0.43	0.46	± 10.1 %
DCP (mV)[B]	96.7	97.6	94.2	

Modulation Calibration Parameters

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

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

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

EX3DV4– SN:7329 February 5, 2015

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.

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

Calibration Parameter Determined in Body Tissue Simulating Media

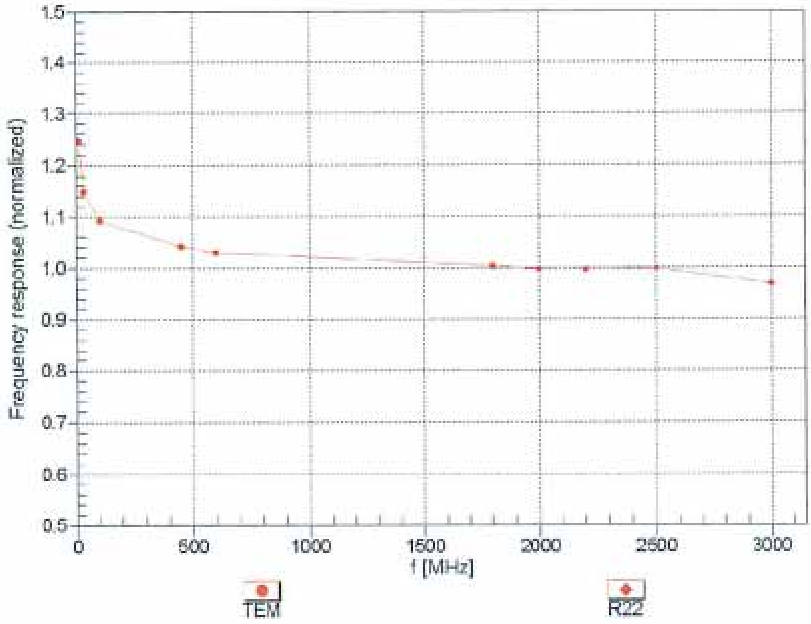
f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unct. (k=2)
900	55.0	1.05	9.17	9.17	9.17	0.41	0.90	± 12.0 %
1750	53.4	1.49	7.85	7.85	7.85	0.70	0.64	± 12.0 %
1900	53.3	1.52	7.56	7.56	7.56	0.56	0.70	± 12.0 %
2450	52.7	1.95	7.20	7.20	7.20	0.78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

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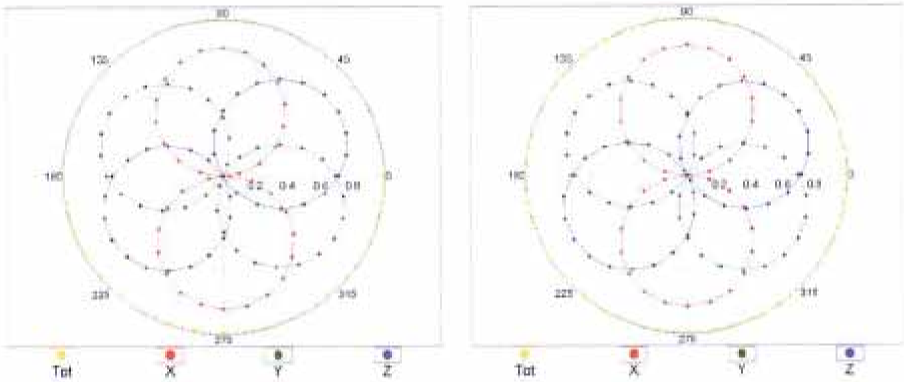
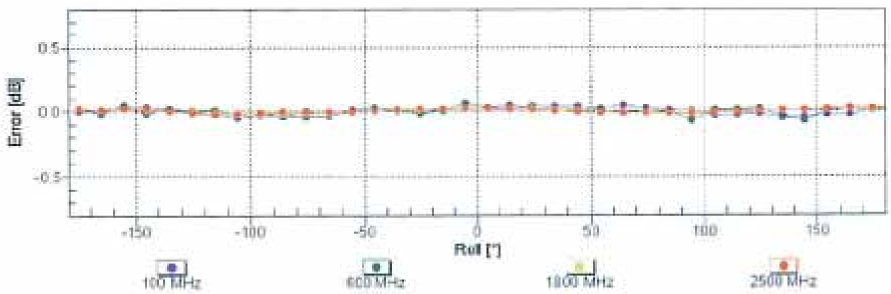
Receiving Pattern (ϕ), ϑ = 0°

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





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

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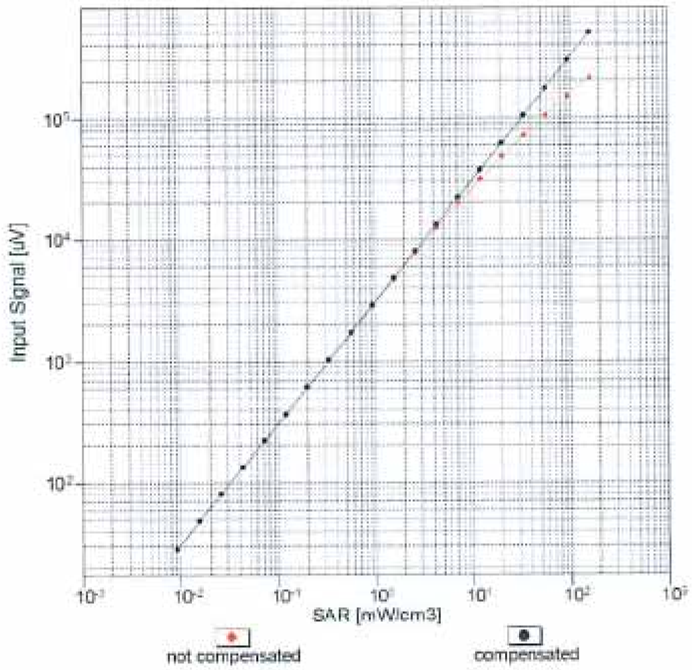
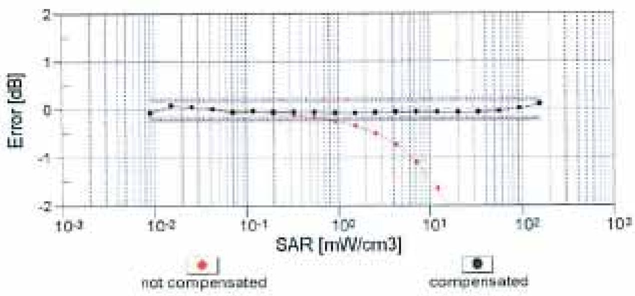
EX3DV4– SN:7329 February 5, 2015

Dynamic Range f(SAR_{head})

(TEM cell , f_{eval}= 1900 MHz)





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

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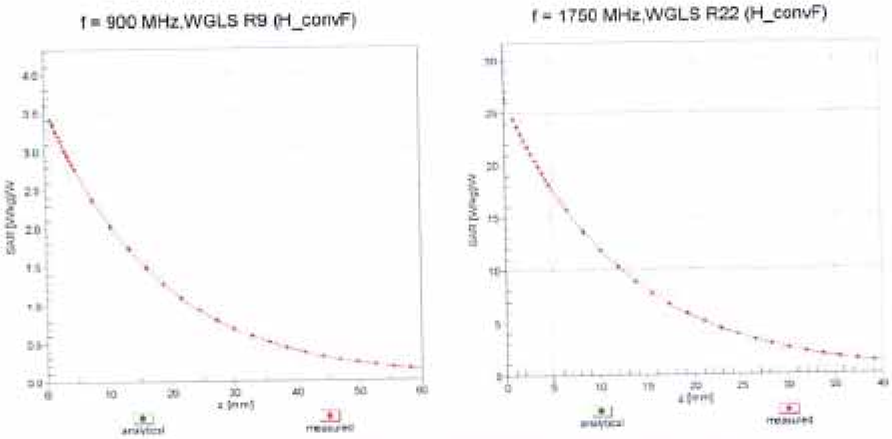
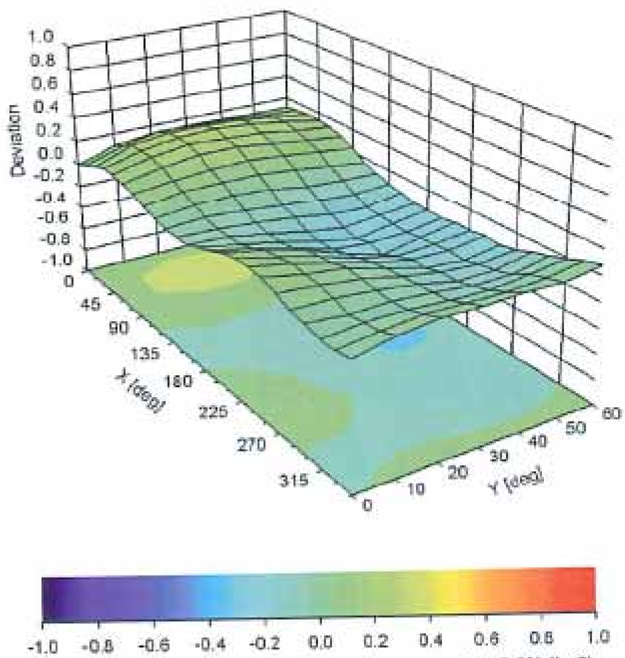
EX3DV4– SN:7329 February 5, 2015

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



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

Certificate No: EX3-7329_Feb15 Page 10 of 11

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

Other Probe Parameters

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

APPENDIX C DIPOLE CALIBRATION CERTIFICATES

NCL CALIBRATION LABORATORIES

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

CERTIFICATE OF CALIBRATION

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

Validation Dipole(Head and Body)

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

Customer: Bay Area Compliance Laboratory (China)

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

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

Released By: ______________________

Art Brennan, Quality Manager

NCL CALIBRATION LABORATORIES

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

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

NCL Calibration Laboratories

Division of APREL Laboratories.

Conditions

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

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

Attestation

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

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

Art Brennan, Quality Manager

Maryna Nesterova Calibration Engineer

Primary Measurement Standards

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

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

NCL Calibration Laboratories
Division of APREL Laboratories.

Calibration Results Summary

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

Mechanical Dimensions

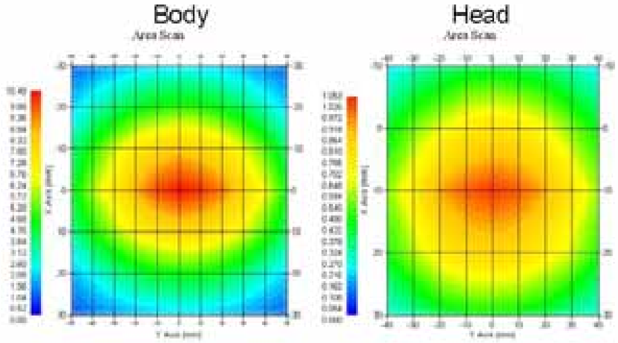
Length: 162.2 mm
Height: 89.4 mm

Electrical Specification

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

System Validation Results

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



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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)**

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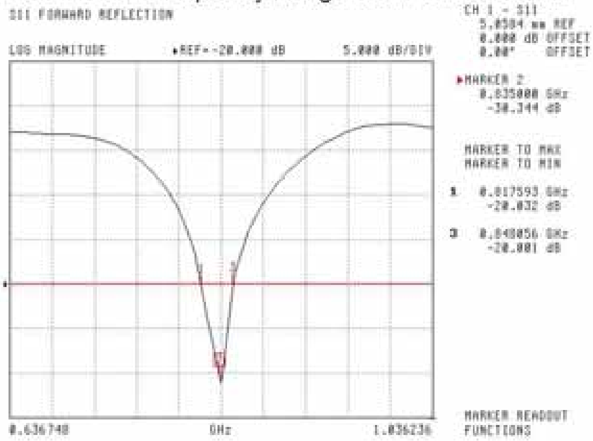
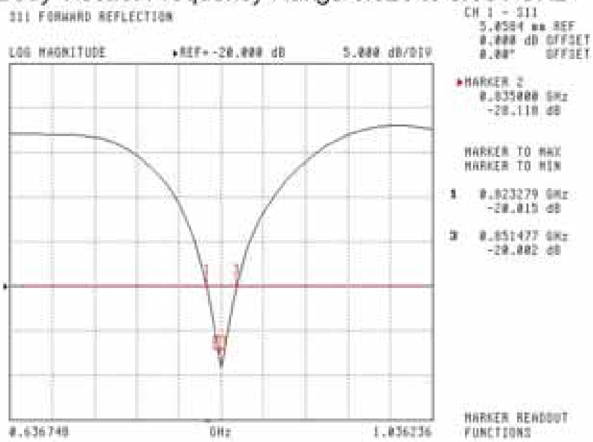
The Following Graphs are the results as displayed on the Vector Network Analyzer.

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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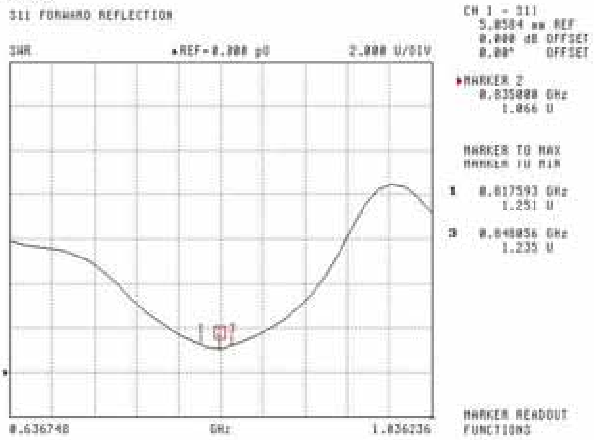
NCL Calibration Laboratories

Division of APREL Laboratories.

SWR

Head



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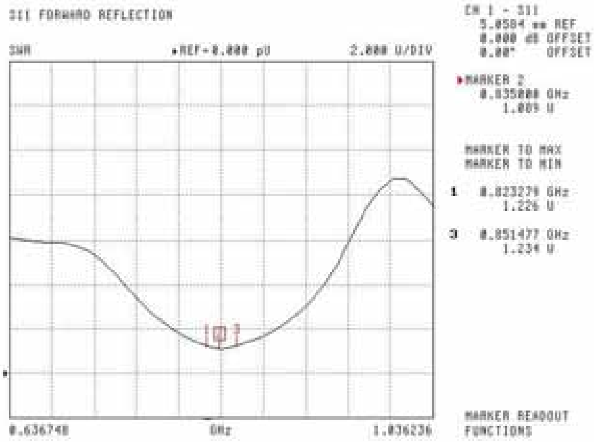

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NCL Calibration Laboratories
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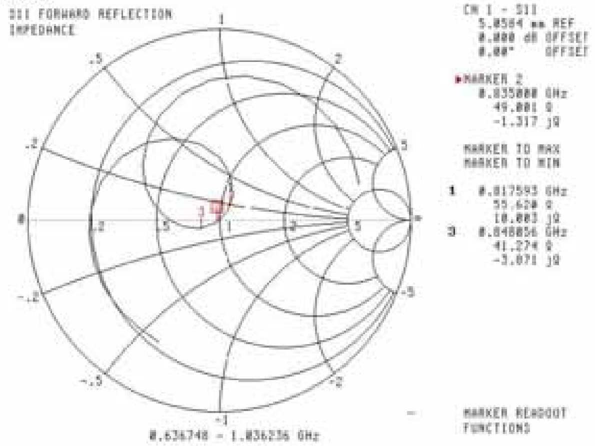
Smith Chart Dipole Impedance

Head



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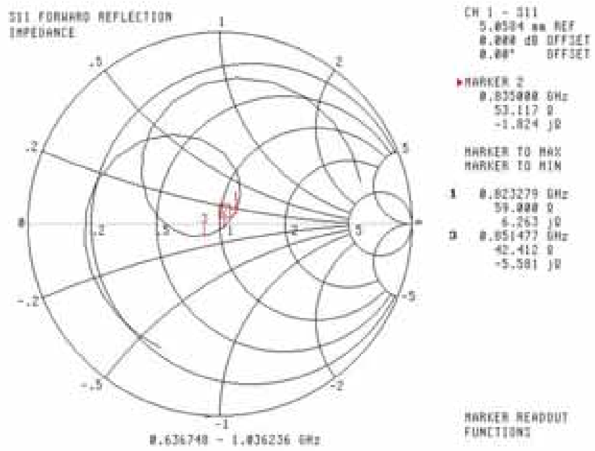

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Test Equipment

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.

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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NCL Calibration Laboratories
Division of APREL Laboratories.

Calibration Results Summary

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

Mechanical Dimensions

Length: 67.1 mm
Height: 38.9 mm

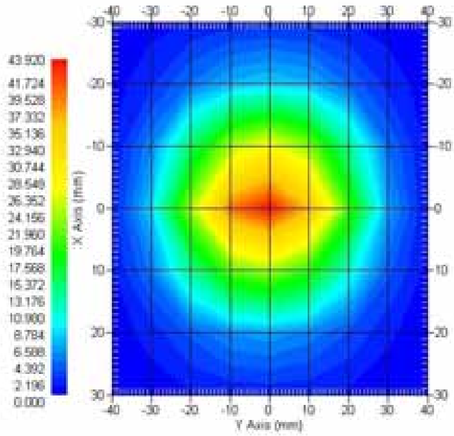
Electrical Specification

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

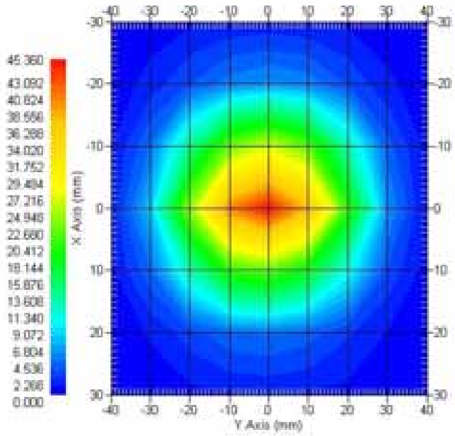
System Validation Results

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

Head
Area Scan



Body
Area Scan



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NCL Calibration Laboratories
Division of APREL Laboratories.

Introduction

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole 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)**

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

NCL Calibration Laboratories
Division of APREL Laboratories.

Dipole Calibration Results

Mechanical Verification

APREL Length	APREL Height	Measured Length	Measured Height
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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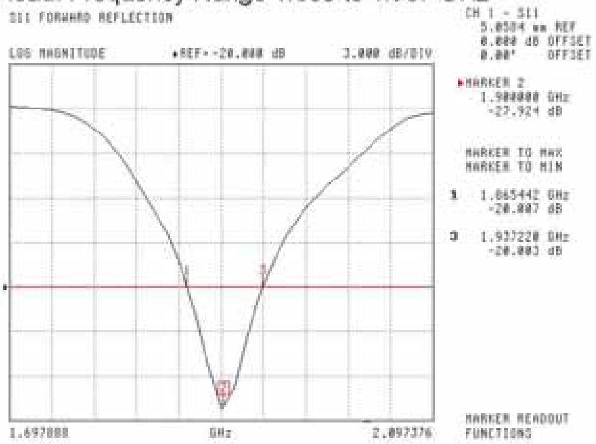
NCL Calibration Laboratories

Division of APREL Laboratories.

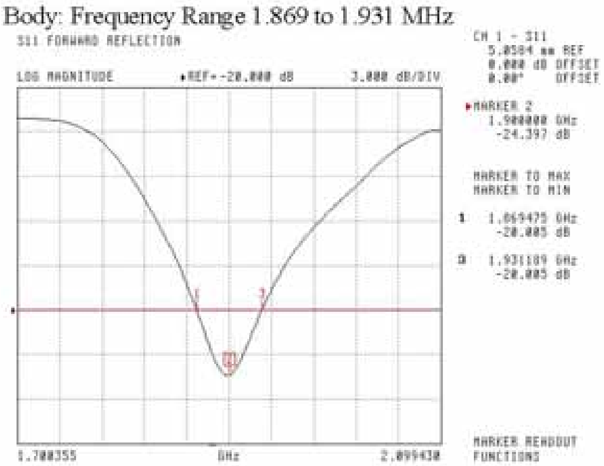
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head: Frequency Range 1.865 to 1.937 GHz



Body: Frequency Range 1.869 to 1.931 MHz



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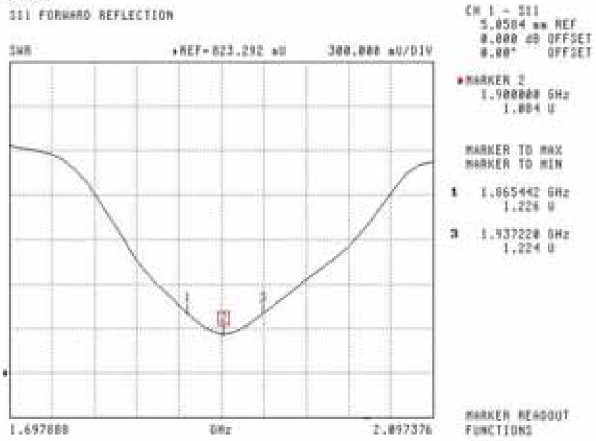
NCL Calibration Laboratories

Division of APREL Laboratories.

SWR

Head



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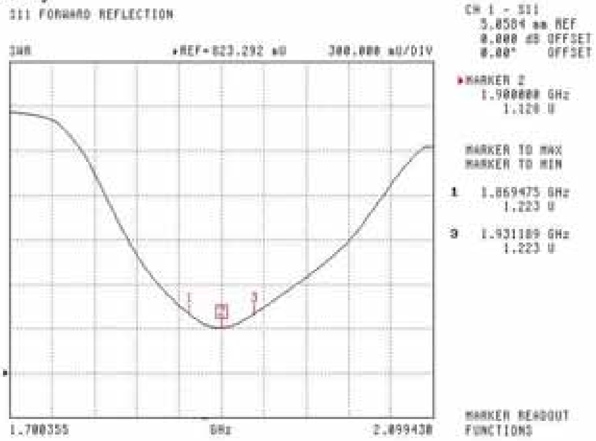

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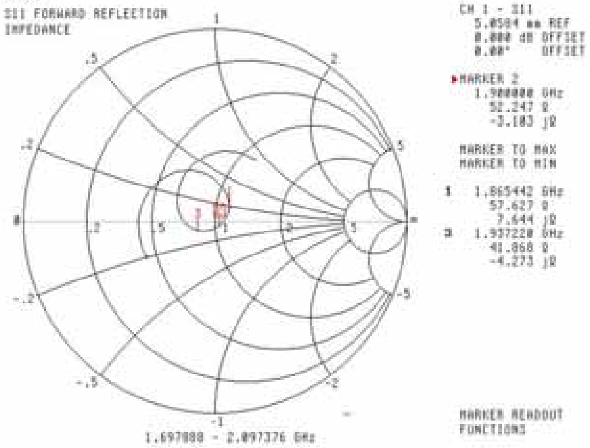
NCL Calibration Laboratories
Division of APREL Laboratories.

Smith Chart Dipole Impedance

Head



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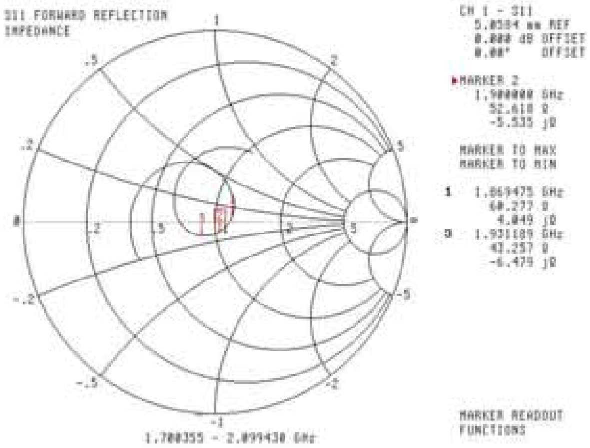

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NCL Calibration Laboratories
Division of APREL Laboratories.

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

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NCL CALIBRATION LABORATORIES

Calibration File No: DC-1531
Project Number: BACL-5745

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.

BACL Head & Body Validation Dipole

Manufacturer: APREL Laboratories
Part number: ALS-D-1750-S-2
Frequency: 1750 MHz
Serial No: 198-00304

Customer: ISL

Calibrated: 8th October, 2013
Released on: 8th October, 2013

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.
OTTAWA, 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 198-00304 was an original calibration.

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: 75 mm
Height: 42 mm

Electrical Calibration

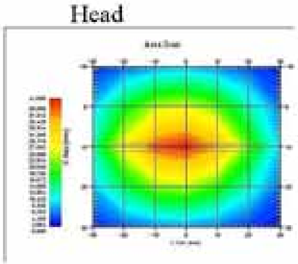
Test	Result Head	Result Body
S11 R/L	-25.567	-20.548 dB
SWR	1.111U	1.207 U
Impedance	53.637Ω	55.929 Ω

System Validation Results, 1750 MHz

	1g	10g
Head	37.02	18.99
Body	36.65	18.85

Type	Epsilon	Sigma
Head	38.51	1.36
Body	51.79	1.53

Head



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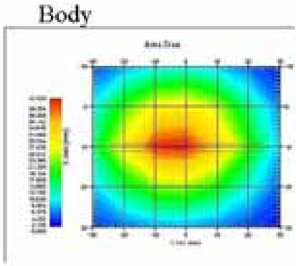


This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories
Division of APREL Laboratories.

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. 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-030 130 MHz to 26 GHz E-Field Probe Serial Number 215.

References

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

Conditions

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

This was an original calibration taken from stock.

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)**

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

NCL Calibration Laboratories
Division of APREL Laboratories.

Dipole Calibration Results

Mechanical Verification

Measured Length	Measured Height
75 mm	42 mm

Tissue Validation

Frequency	Permittivity ε	Conductivity σ
1750 Head	38.23	1.38
1750 Body	52.86	1.54

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

NCL Calibration Laboratories
Division of APREL Laboratories.

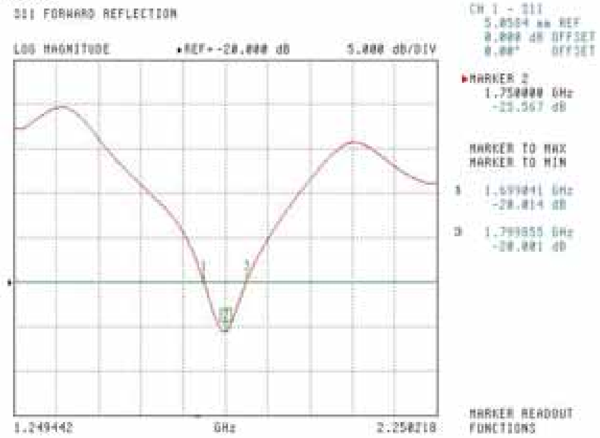
Electrical Calibration

Test	Result Head	Result Body
S11 R/L	-25.567	-20.548 dB
SWR	1.111U	1.207 U
Impedance	53.637Ω	55.929 Ω

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

S11 Parameter Return Loss

Head



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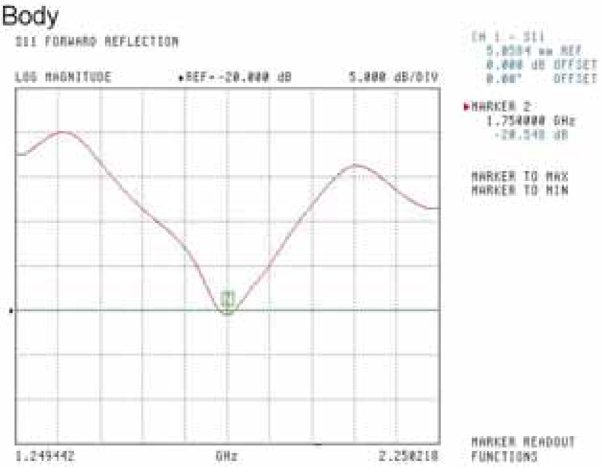

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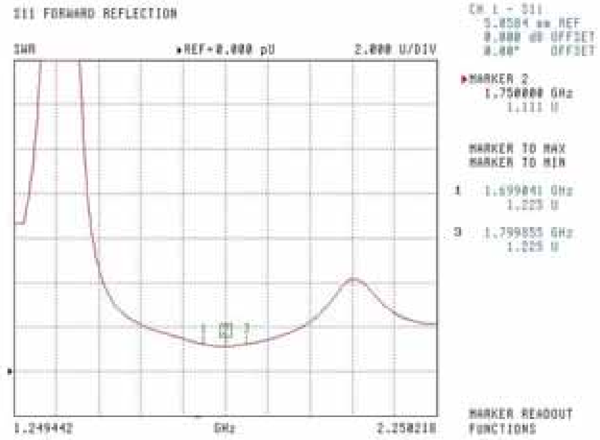
NCL Calibration Laboratories

Division of APREL Laboratories.

SWR

Head



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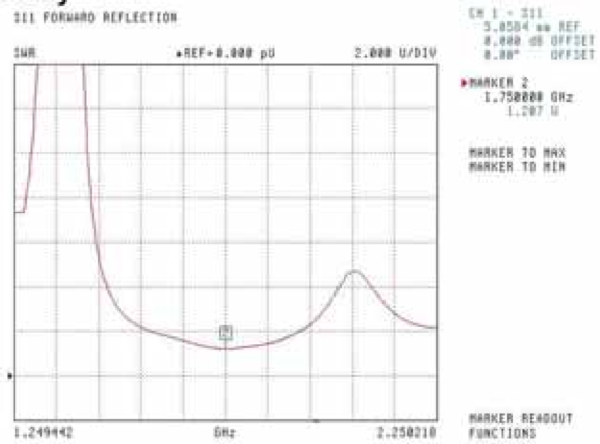

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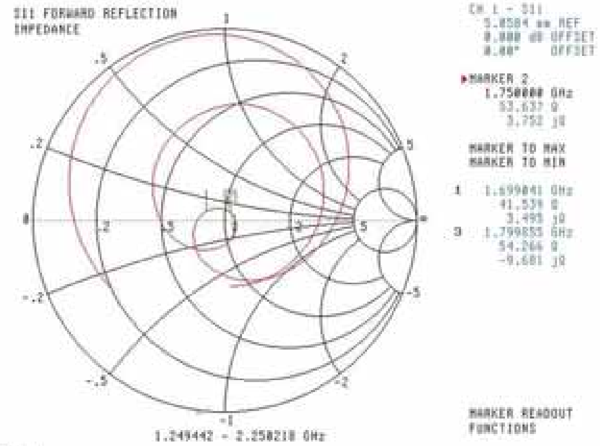
NCL Calibration Laboratories

Division of APREL Laboratories.

Smith Chart Dipole Impedance

Head



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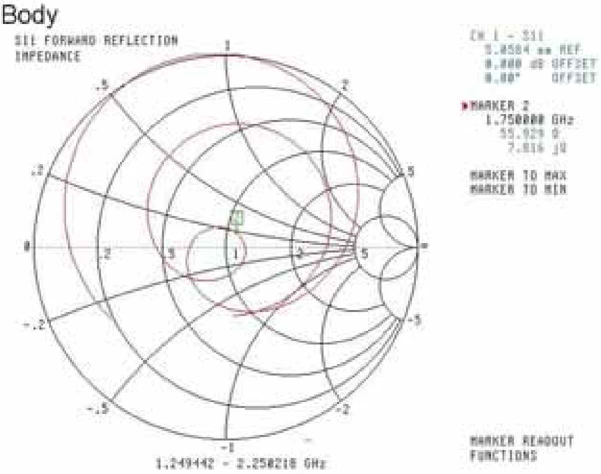

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NCL Calibration Laboratories
Division of APREL Laboratories.

Test Equipment

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List May 2013
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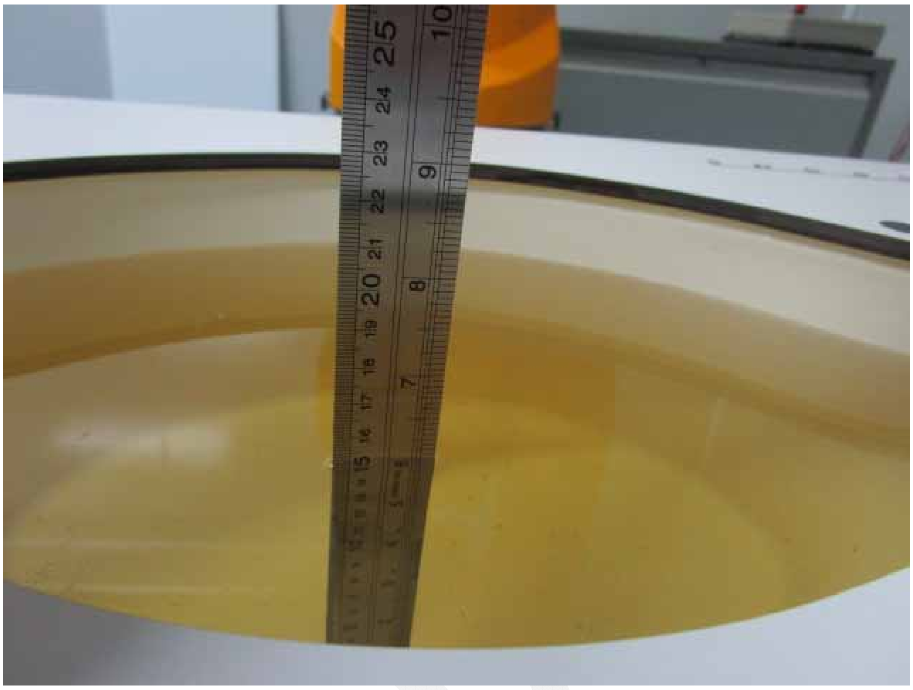
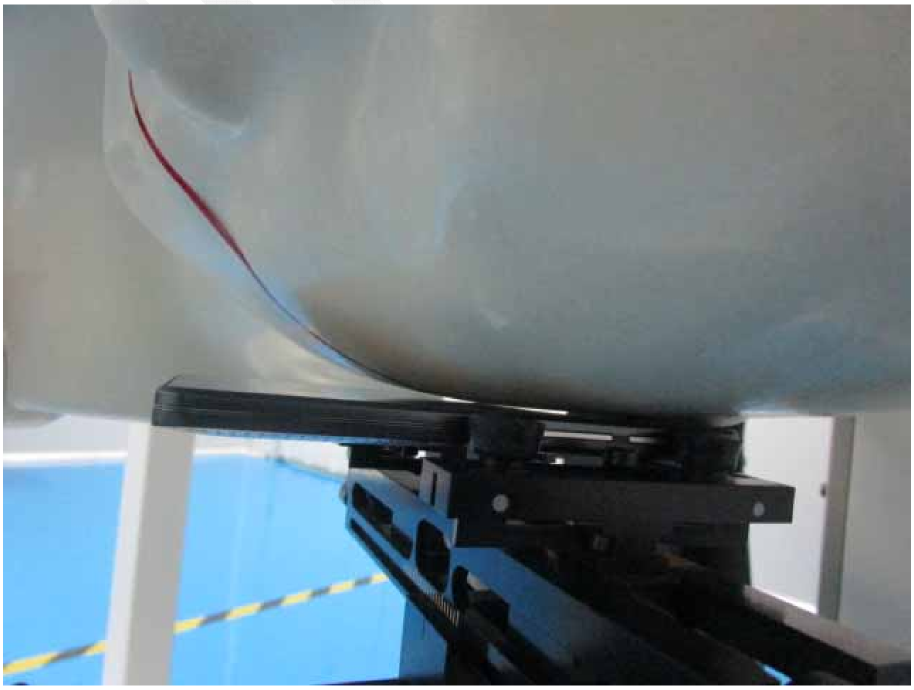
APPENDIX D EUT TEST POSITION PHOTOS

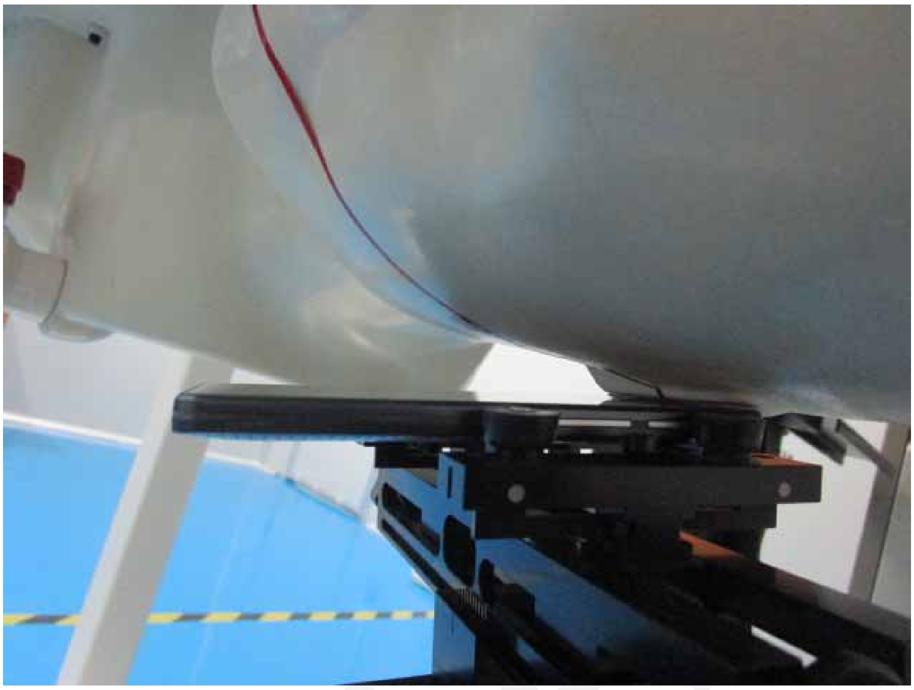
Liquid depth ≥ 15cm



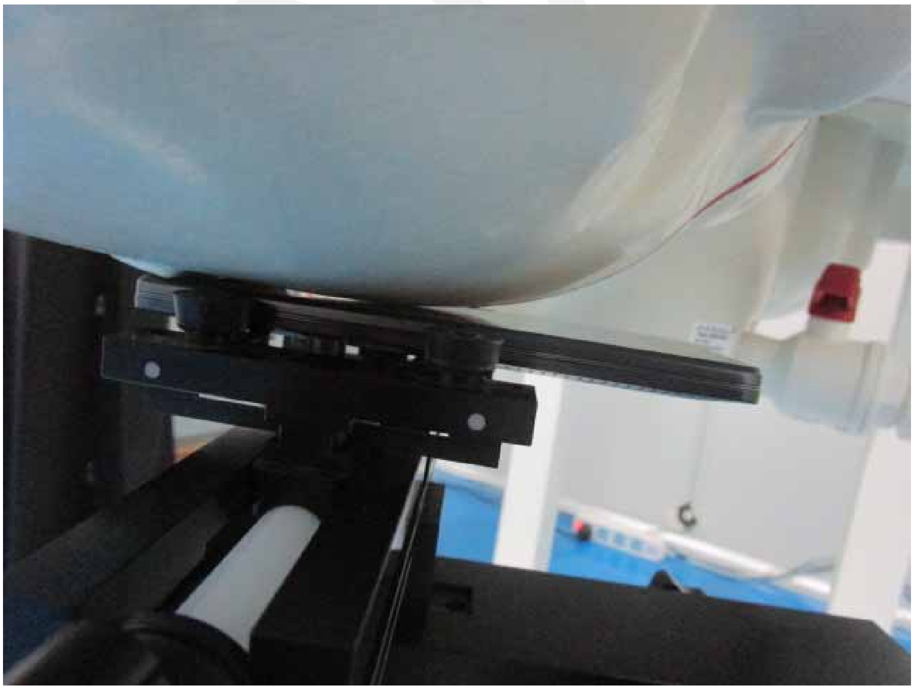
Left Head Cheek



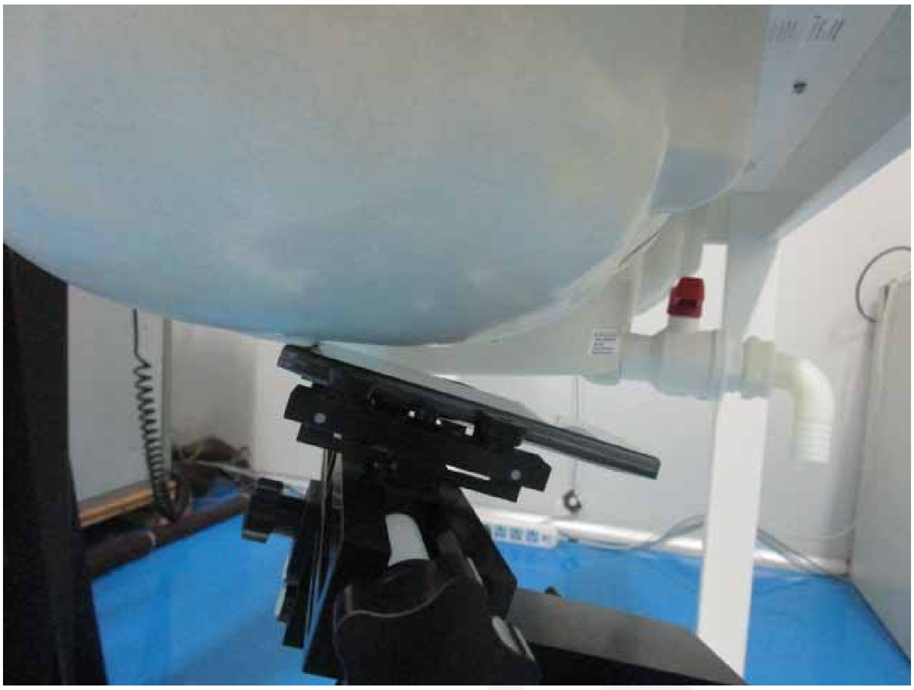
Left Head Tilt



Right Head Cheek

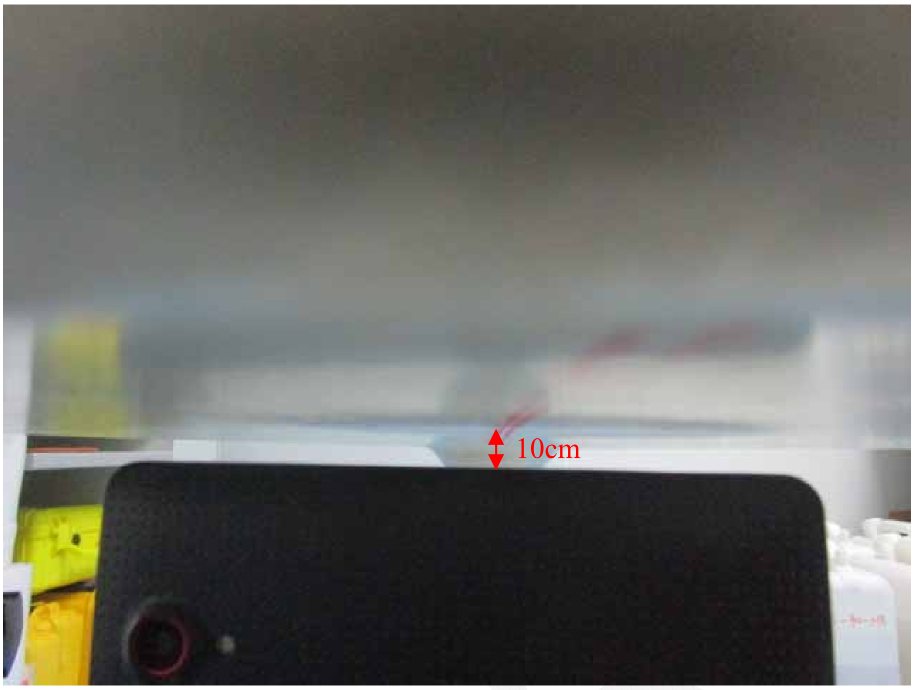


Right Head Tilt

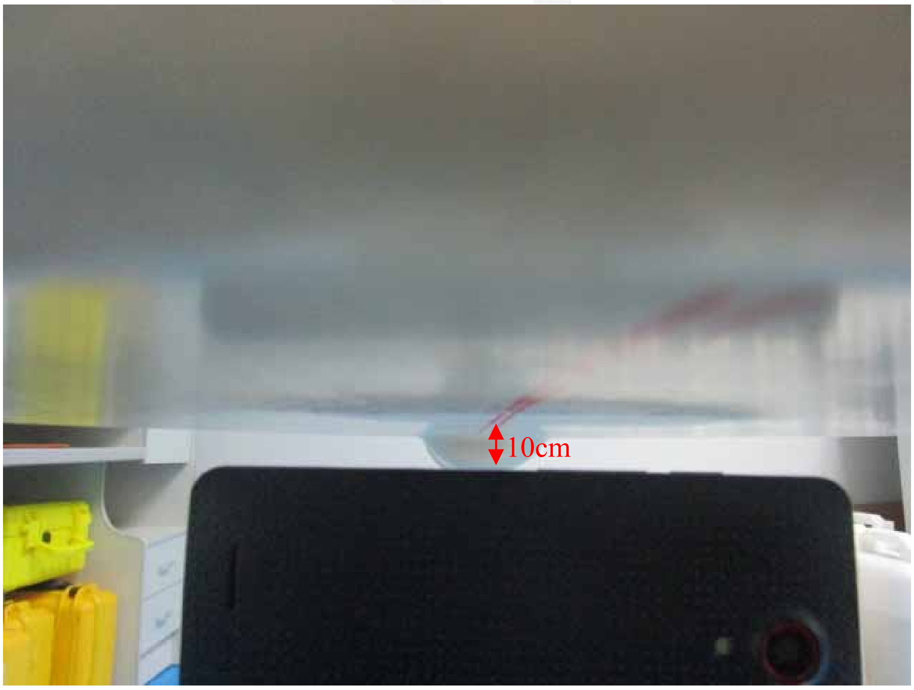


Body -Worn-Back (10mm)

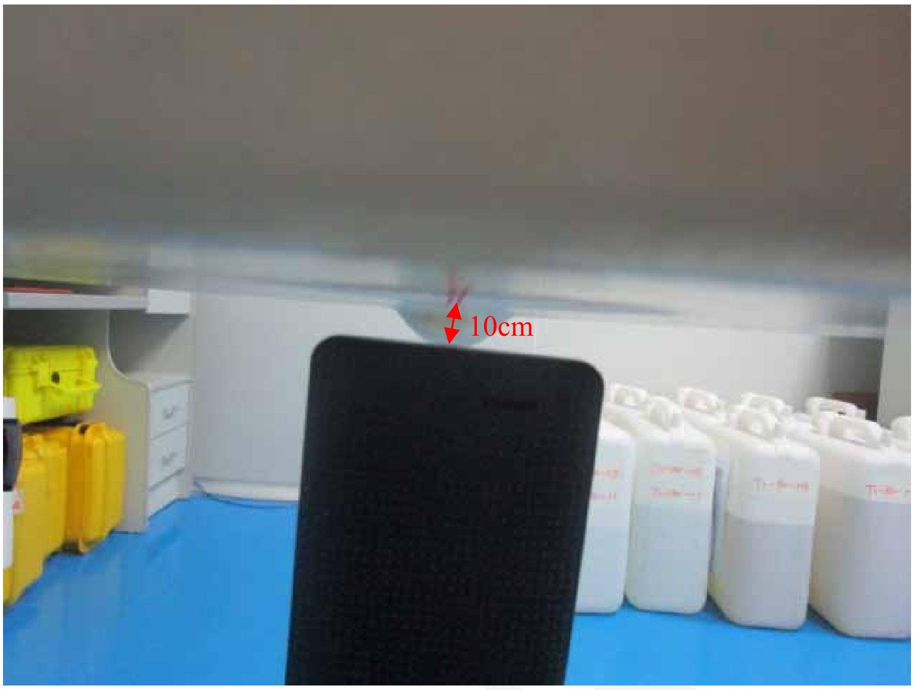
Body -Worn-Left (10mm)



Body -Worn-Right (10mm)



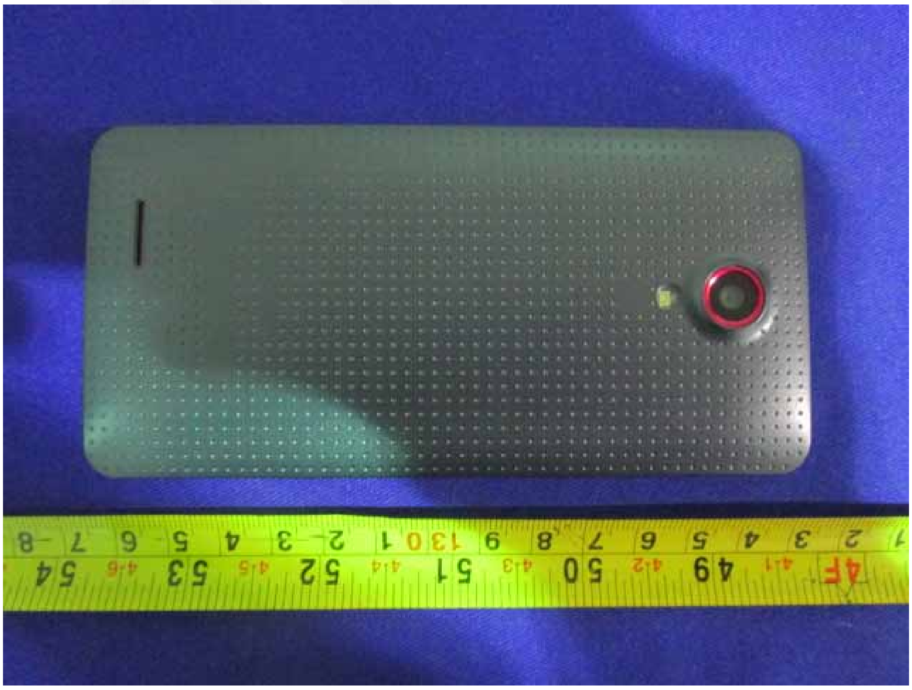
Body -Worn-Bottom(10mm)



APPENDIX E EUT PHOTOS

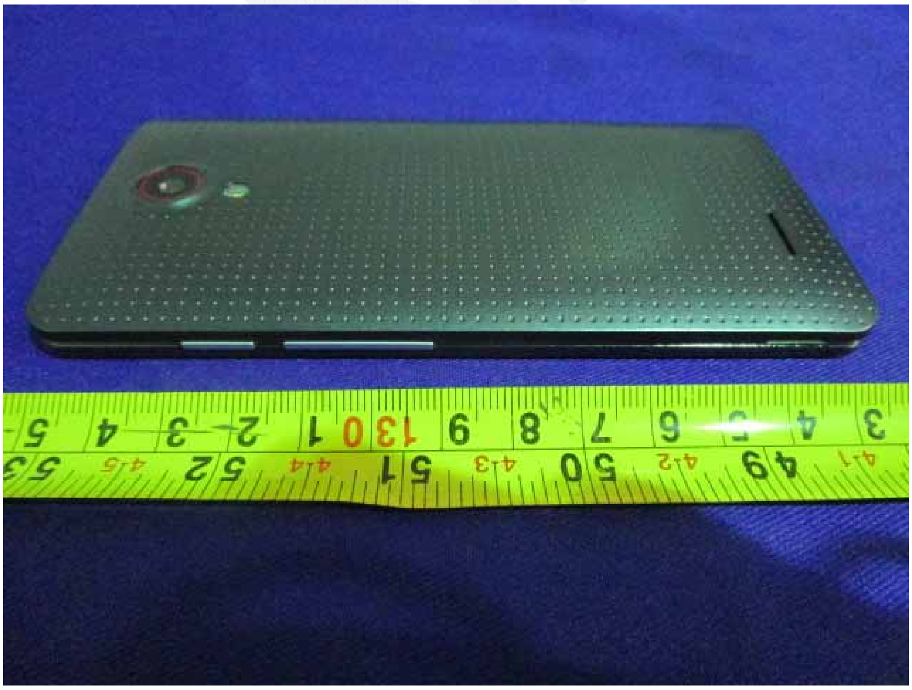
EUT – Front View

EUT – Back View



EUT –Left Side View

EUT – Right Side View



EUT – Uncover View

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