SAR EVALUATION REPORT

For

Wilken Technology Company Limited

PAYSANDU 1842, (CP 1416), BUENOS AIRES, Argentina

FCC ID: 2AFDSS500

Report Type:	Product Type:
Original Report	mobile product

Test Engineer:	Rocky Xiao
Report Number:	RSZ150706008-20A
Report Date:	2015-07-26
Reviewed By:	Sula Huang RF Leader
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

Note: This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

Attestation of Test Results		
EUT Information	Company Name	Wilken Technology Company Limited
	EUT Description	mobile product
	FCC ID	2AFDSS500
	Model Number	S500
	Test Date	2015-07-16

MODE	Max. SAR Level(s) Reported (W/Kg@1g tissue)	Limit(W/Kg)
GSM 850	0.338 with Head SAR;0.460 with Body SAR	1. 6
PCS 1900	0.201 with Head SAR;0.312 with Body SAR	
WCDMA 850	0.226 with Head SAR;0.282 with Body SAR	
WCDMA 1900	0.278 with Head SAR;0.395 with Body SAR	
LTE Band 2	0.159 with Head SAR;0.276 with Body SAR	
LTE Band 4	0.225 with Head SAR;0.337 with Body SAR	
LTE Band 7	0.360 with Head SAR;0.309 with Body SAR	
Simultaneous	0.732 with Head SAR;0.646 with Body SAR	
Hotspot	0.646 with Body SAR	

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

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

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

TABLE OF CONTENTS

DOCUMENT REVISION HISTORY **5**
EUT DESCRIPTION **6**
TECHNICAL SPECIFICATION 6
REFERENCE, STANDARDS, AND GUILDELINES **7**
SAR LIMITS 8
FACILITIES **9**
DESCRIPTION OF TEST SYSTEM **10**
EQUIPMENT LIST AND CALIBRATION **15**
EQUIPMENTS LIST & CALIBRATION INFORMATION 15
SAR MEASUREMENT SYSTEM VERIFICATION **16**
LIQUID VERIFICATION 16
SYSTEM ACCURACY VERIFICATION 22
SAR SYSTEM VALIDATION DATA 23
EUT TEST STRATEGY AND METHODOLOGY **31**
TEST POSITIONS FOR DEVICE OPERATING NEXT TO A PERSON'S EAR 31
CHEEK/TOUCH POSITION 32
EAR/TILT POSITION 32
TEST POSITIONS FOR BODY-WORN AND OTHER CONFIGURATIONS 33
SAR EVALUATION PROCEDURE 34
TEST METHODOLOGY 34
CONDUCTED OUTPUT POWER MEASUREMENT **35**
PROVISION APPLICABLE 35
TEST PROCEDURE 35
RADIO CONFIGURATION 35
MAXIMUM OUTPUT POWER AMONG PRODUCTION UNITS 40
TEST RESULTS: 41
SAR MEASUREMENT RESULTS **52**
SAR TEST DATA 52
SAR SIMULTANEOUS TRANSMISSION DESCRIPTION **61**
SAR PLOTS (SUMMARY OF THE HIGHEST SAR VALUES) **67**
APPENDIX A MEASUREMENT UNCERTAINTY **81**
APPENDIX B – PROBE CALIBRATION CERTIFICATES **83**
APPENDIX C DIPOLE CALIBRATION CERTIFICATES **94**
APPENDIX D EUT TEST POSITION PHOTOS **130**
LIQUID DEPTH ≥ 15CM 130
LEFT HEAD CHEEK 130
LEFT HEAD TILT 131
RIGHT HEAD CHEEK 131
RIGHT HEAD TILT 132
BODY -WORN-BACK (10MM) 132
BODY -WORN-LEFT (10MM) 133
BODY -WORN-RIGHT (10MM) 133
BODY -WORN-BOTTOM(10MM) 134
APPENDIX E EUT PHOTOS **135**

EUT – FRONT VIEW 135
EUT – BACK VIEW 135
EUT –LEFT SIDE VIEW 136
EUT – RIGHT SIDE VIEW 136
EUT –TOP VIEW 137
EUT – BOTTOM VIEW 137
EUT – UNCOVER VIEW 138

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	RSZ150706008-20A	Original Report	2015-07-16

For LTE Band 17 SAR data, please refer to the report RSZ150706008-20B.

EUT DESCRIPTION

This report has been prepared on behalf of Wilken Technology Company Limited and their product, Model: S500, FCC ID: 2AFDSS500 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
Multi-slot Class:	Class12
Operation Mode :	GSM Voice, EGPRS/GPRS Data, WCDMA,LTE, Wi-Fi and 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 2: 1850-1910MHz(TX) ; 1930-1990MHz(RX) LTE Band 4: 1710-1785MHz(TX) ; 2110-2155MHz(RX) LTE Band 7: 2500-2570MHz(TX) ; 2620-2690MHz(RX) LTE Band 17: 704-716MHz(TX) ; 734-746MHz(RX) Wi-Fi(802.11b/g/n20): 2412MHz-2472MHz Wi-Fi(802.11n40): 2422MHz-2462MHz Bluetooth3.0 : 2402MHz-2480MHz BLTE:2402MHz-2480MHz
Conducted RF Power:	GSM 850 : 32.63 dBm PCS 1900: 29.17 dBm WCDMA 850: 22.67 dBm WCDMA 1900: 21.76 dBm LTE Band 2: 22.34 dBm LTE Band 4: 23.20 dBm LTE Band 7: 22.57 dBm LTE Band 17: 23.73 dBm Wi-Fi(802.11b/g/n20): 9.46 dBm Wi-Fi(802.11n40) : 8.73 dBm Bluetooth : 4.71 dBm BLE: -2.56 dBm
Dimensions (L*W*H):	143 mm (L) × 71 mm (W) × 7 mm (H)
Power Source:	3.8 VDC Rechargeable Battery
Normal Operation:	Head and Body-worn

Note: For LTE Band 17 SAR data, please refer to the report RSZ150706008-20B.

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

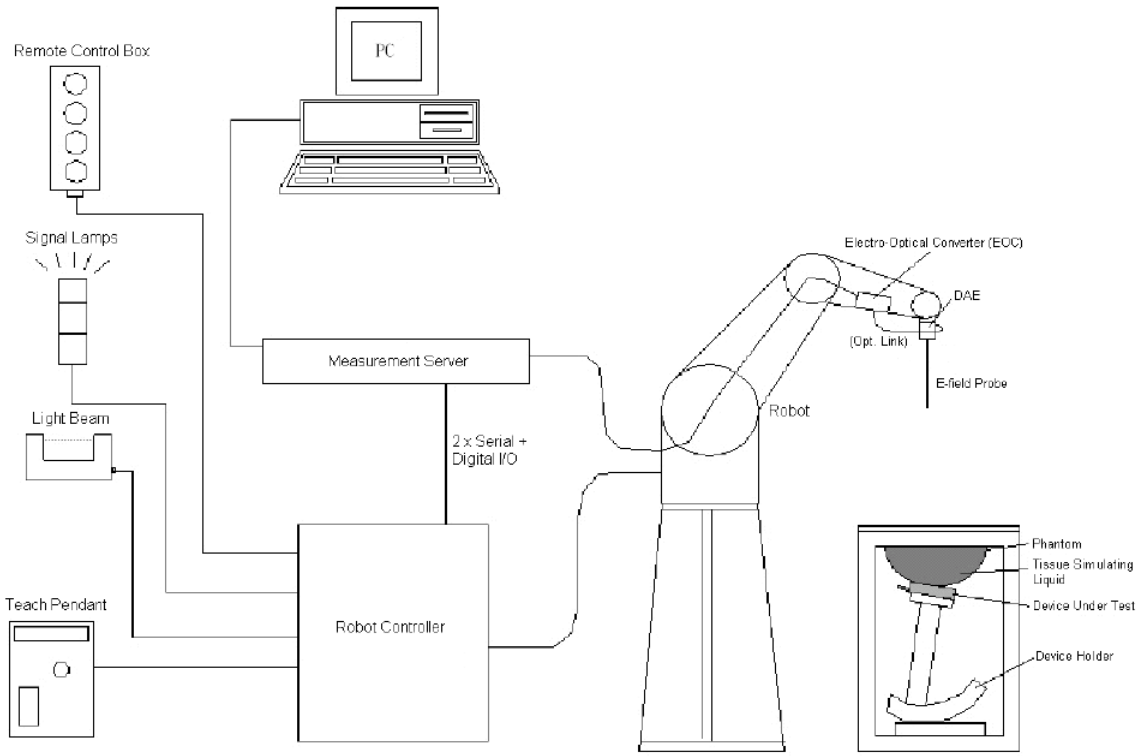
The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

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

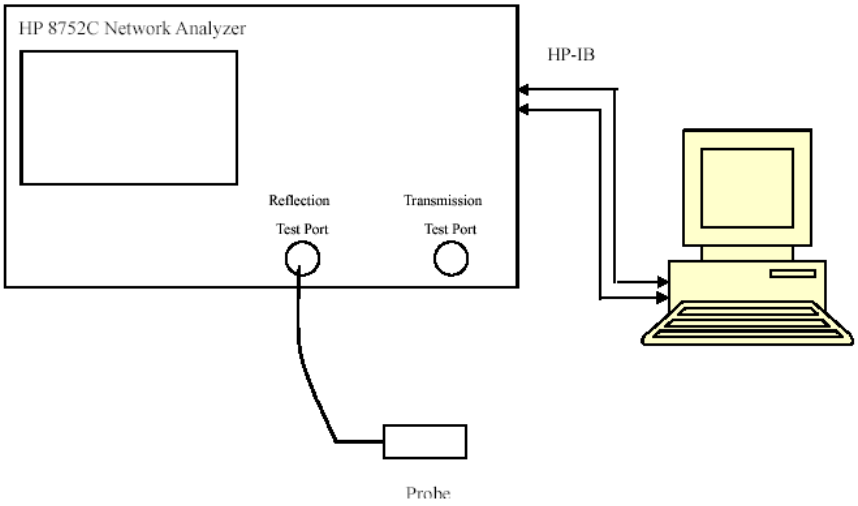
EQUIPMENT LIST AND CALIBRATION

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
Dipole,2450MHz	ALS-D-2450-S-2	220-00758	2014-10-09	2017-10-09
R&S, universal Radio Communication Tester	CMU200	105047	2014-11-20	2015-11-20
Wideband Radio Communication Tester	CMW500	1201.0002K50-146520-wh	2014-11-19	2015-11-19
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	/
Simulated Tissue 2450 MHz Head	TS-2450-H	201512	Each Time	/
Simulated Tissue 2450 MHz Body	TS-2450-B	201513	Each Time	/
Network Analyzer	8752C	3140A02356	2015-06-03	2016-06-03
Dielectric probe kit	85070B	US33020324	N/A	N/A
Signal Generator	E4422B	MY41000355	2014-10-27	2015-10-27
Power Meter	EPM-441A	GB37481494	2014-11-03	2015-11-03
Power Meter Sensor	8481A	T-03-EM-127	2014-11-03	2015-11-03
Power Amplifier	5205PE	1015	N/A	N/A
Directional Coupler	488Z	N/A	N/A	N/A
attenuator	20dB, 100W	N/A	N/A	N/A

SAR MEASUREMENT SYSTEM VERIFICATION

Liquid Verification



Liquid Verification Setup Block Diagram

Liquid Verification Results

Frequency	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	Δσ (S/m)	
824.2	Head	41.09	0.90	41.50	0.90	-0.988	0.000	±5
	Body	53.78	0.95	55.20	0.97	-2.572	-2.062	±5
826.4	Head	41.06	0.91	41.50	0.90	-1.060	1.111	±5
	Body	53.80	0.95	55.20	0.97	-2.536	-2.062	±5
836.6	Head	41.01	0.91	41.50	0.90	-1.181	1.111	±5
	Body	53.79	0.96	55.20	0.97	-2.554	-1.031	±5
846.6	Head	41.11	0.91	41.50	0.90	-0.940	1.111	±5
	Body	53.86	0.97	55.20	0.97	-2.428	0.000	±5
848.8	Head	41.03	0.92	41.50	0.90	-1.133	2.222	±5
	Body	53.81	0.98	55.20	0.97	-2.518	1.031	±5
1720.0	Head	39.30	1.38	40.08	1.37	-1.946	0.730	±5
	Body	51.93	1.50	53.43	1.49	-2.807	0.671	±5
1732.5	Head	39.51	1.40	40.08	1.37	-1.422	2.190	±5
	Body	51.90	1.51	53.43	1.49	-2.864	1.342	±5
1745.0	Head	39.15	1.41	40.08	1.37	-2.320	2.920	±5
	Body	51.84	1.52	53.43	1.49	-2.976	2.013	±5
1850.2	Head	39.62	1.37	40.00	1.40	-0.950	-2.143	±5
	Body	51.89	1.49	53.30	1.52	-2.645	-1.974	±5
1852.4	Head	39.57	1.37	40.00	1.40	-1.075	-2.143	±5
	Body	51.96	1.48	53.30	1.52	-2.514	-2.632	±5
1860.0	Head	39.56	1.38	40.00	1.40	-1.100	-1.429	±5
	Body	51.82	1.49	53.30	1.52	-2.777	-1.974	±5
1880.0	Head	39.67	1.40	40.00	1.40	-0.825	0.000	±5
	Body	51.79	1.51	53.30	1.52	-2.833	-0.658	±5
1900.0	Head	39.66	1.42	40.00	1.40	-0.850	1.429	±5
	Body	51.81	1.53	53.30	1.52	-2.795	0.658	±5

Frequency	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	Δσ (S/m)	
1907.6	Head	39.69	1.42	40.00	1.40	-0.775	1.429	±5
	Body	52.03	1.54	53.30	1.52	-2.383	1.316	±5
1909.8	Head	39.54	1.42	40.00	1.40	-1.150	1.429	±5
	Body	52.01	1.54	53.30	1.52	-2.420	1.316	±5
2510	Head	39.58	1.78	39.20	1.80	0.969	-1.111	±5
	Body	52.00	1.91	52.70	1.95	-1.328	-2.051	±5
2535	Head	39.61	1.79	39.20	1.80	1.046	-0.556	±5
	Body	51.80	1.93	52.70	1.95	-1.708	-1.026	±5
2560	Head	39.65	1.81	39.20	1.80	1.148	0.556	±5
	Body	51.96	1.94	52.70	1.95	-1.404	-0.513	±5

**Liquid Verification above was performed on 2015-07-16.*

Please refer to the following tables.

835 MHz Head				835 MHz Body		
Frequency (MHz)	e'	e''		Frequency (MHz)	e'	e''
824.0	41.0881	19.7044		824.0	53.7756	20.7032
824.5	41.0854	19.6852		824.5	53.8444	20.6885
825.0	41.0966	19.7251		825.0	53.8167	20.6486
825.5	41.0158	19.7430		825.5	53.7726	20.6460
826.0	41.0405	19.6898		826.0	53.7942	20.6967
826.5	41.0558	19.6964		826.5	53.7965	20.6657
827.0	41.1051	19.7080		827.0	53.7711	20.6882
827.5	41.0544	19.7116		827.5	53.8468	20.6314
828.0	41.0021	19.7587		828.0	53.8275	20.6224
828.5	41.0439	19.6853		828.5	53.8705	20.6348
829.0	41.0889	19.6897		829.0	53.8702	20.6921
829.5	41.0138	19.7512		829.5	53.8502	20.6875
830.0	41.0020	19.7598		830.0	53.8465	20.6780
830.5	41.1069	19.7526		830.5	53.8628	20.6911
831.0	41.0385	19.7734		831.0	53.8612	20.6888
831.5	41.0379	19.7350		831.5	53.8249	20.6179
832.0	41.1044	19.7112		832.0	53.8451	20.6469
832.5	41.0573	19.6921		832.5	53.8284	20.6441
833.0	41.0514	19.6899		833.0	53.7705	20.7062
833.5	41.0201	19.7453		833.5	53.7673	20.6349
834.0	41.0667	19.7574		834.0	53.8208	20.6231
834.5	41.0386	19.7369		834.5	53.8041	20.6127
835.0	41.0967	19.7034		835.0	53.8414	20.7060
835.5	41.0067	19.6926		835.5	53.7916	20.6920
836.0	41.0974	19.6806		836.0	53.7687	20.6191
836.5	41.0530	19.7128		836.5	53.8024	20.6467
837.0	41.0321	19.6865		837.0	53.8078	20.6267
837.5	41.0371	19.7080		837.5	53.8655	20.7020
838.0	41.0655	19.6749		838.0	53.8221	20.6810
838.5	41.0043	19.7521		838.5	53.7680	20.6593
839.0	41.0297	19.6866		839.0	53.7697	20.6407
839.5	41.0727	19.7392		839.5	53.8612	20.6844
840.0	41.0596	19.4655		840.0	53.7767	20.6858
840.5	41.0260	19.4674		840.5	53.8102	20.6545
841.0	41.1069	19.4603		841.0	53.7822	20.6285
841.5	41.0006	19.4101		841.5	53.8542	20.6424
842.0	41.0618	19.4220		842.0	53.7798	20.6418
842.5	41.0120	19.3819		842.5	53.8035	20.6134
843.0	41.0068	19.4065		843.0	53.8365	20.7101
843.5	41.0214	19.4717		843.5	53.8580	20.6621
844.0	41.0945	19.4563		844.0	53.8674	20.6651
844.5	41.1062	19.4232		844.5	53.7692	20.6715
845.0	41.0923	19.4283		845.0	53.8245	20.6207
845.5	41.0203	19.4268		845.5	53.7655	20.6640
846.0	41.0477	19.4692		846.0	53.8421	20.6691
846.5	41.1063	19.4039		846.5	53.8551	20.6525
847.0	41.0934	19.4640		847.0	53.7816	20.6454
847.5	41.0578	19.4504		847.5	53.7709	20.6135
848.0	41.0697	19.3909		848.0	53.8332	20.6211
848.5	41.0020	19.3873		848.5	53.7844	20.6526
849.0	41.0322	19.4710		849.0	53.8051	20.6779

1750 MHz Head				1750 MHz Body		
Frequency (MHz)	e'	e''		Frequency (MHz)	e'	e''
1710.0	39.6156	14.1699		1710.0	51.8478	15.6539
1711.5	39.3198	14.1160		1711.5	51.8467	15.6561
1713.0	39.1091	14.3077		1713.0	51.8934	15.6223
1714.5	39.4633	14.1858		1714.5	51.8812	15.6223
1716.0	39.1909	14.1714		1716.0	51.9810	15.6286
1717.5	39.3903	14.1332		1717.5	51.8903	15.6514
1719.0	39.2306	14.4646		1719.0	51.9082	15.6622
1720.5	39.3649	14.4679		1720.5	51.9566	15.6348
1722.0	39.1758	14.3180		1722.0	51.9539	15.6670
1723.5	39.1008	14.3460		1723.5	51.8574	15.6498
1725.0	39.5686	14.2821		1725.0	51.9705	15.4986
1726.5	39.4825	14.3907		1726.5	51.9588	15.6755
1728.0	39.3822	14.5791		1728.0	51.9429	15.6219
1729.5	39.1354	14.5251		1729.5	51.9000	15.6887
1731.0	39.2702	14.3592		1731.0	51.8666	15.6312
1732.5	39.5102	14.5519		1732.5	51.8970	15.6959
1734.0	39.4350	14.4675		1734.0	51.9292	15.6625
1735.5	39.3360	14.4581		1735.5	51.9305	15.7077
1737.0	39.4315	14.3063		1737.0	51.8476	15.6618
1738.5	39.6233	14.2798		1738.5	51.9530	15.6519
1740.0	39.4040	14.3228		1740.0	51.8604	15.6692
1741.5	39.3979	14.4506		1741.5	51.8697	15.6280
1743.0	39.5313	14.0977		1743.0	51.8725	15.6685
1744.5	39.1089	14.5705		1744.5	51.8522	15.6566
1746.0	39.1921	14.5650		1746.0	51.8355	15.6008
1747.5	39.4325	14.5703		1747.5	51.8573	15.6487
1749.0	39.5829	14.5060		1749.0	51.9247	15.6639
1750.5	39.1535	14.2012		1750.5	51.8599	15.6996
1752.0	39.5411	14.1865		1752.0	51.8477	15.7057
1753.5	39.6259	14.4097		1753.5	51.9648	15.6738
1755.0	39.4691	14.3986		1755.0	51.9895	15.6469
1756.5	39.3935	14.1229		1756.5	51.9182	15.6626
1758.0	39.1690	14.1309		1758.0	51.8615	15.5466
1759.5	39.6135	14.4706		1759.5	51.8846	15.4925
1761.0	39.3126	14.4515		1761.0	51.9230	15.5043
1762.5	39.4595	14.1617		1762.5	51.8566	15.3285
1764.0	39.4866	14.1289		1764.0	51.8605	15.5315
1765.5	39.5938	14.3602		1765.5	51.9825	15.5541
1767.0	39.3437	14.4945		1767.0	51.8558	15.4820
1768.5	39.3555	14.1615		1768.5	51.9421	15.4522
1770.0	39.3175	14.4068		1770.0	51.8794	15.3186
1771.5	39.3699	14.3945		1771.5	51.8584	15.5181
1773.0	39.5495	14.3467		1773.0	51.9506	15.4879
1774.5	39.2224	14.1139		1774.5	51.8526	15.5461
1776.0	39.2901	14.3267		1776.0	51.8869	15.4767
1777.5	39.2333	14.5434		1777.5	51.8832	15.4942
1779.0	39.4980	14.5537		1779.0	51.9426	15.4825
1780.5	39.4947	14.5552		1780.5	51.9656	15.5854
1782.0	39.6353	14.3928		1782.0	51.9499	15.4180
1783.5	39.5501	14.2311		1783.5	51.9993	15.4580
1785.0	39.2510	14.5283		1785.0	51.9152	15.3234

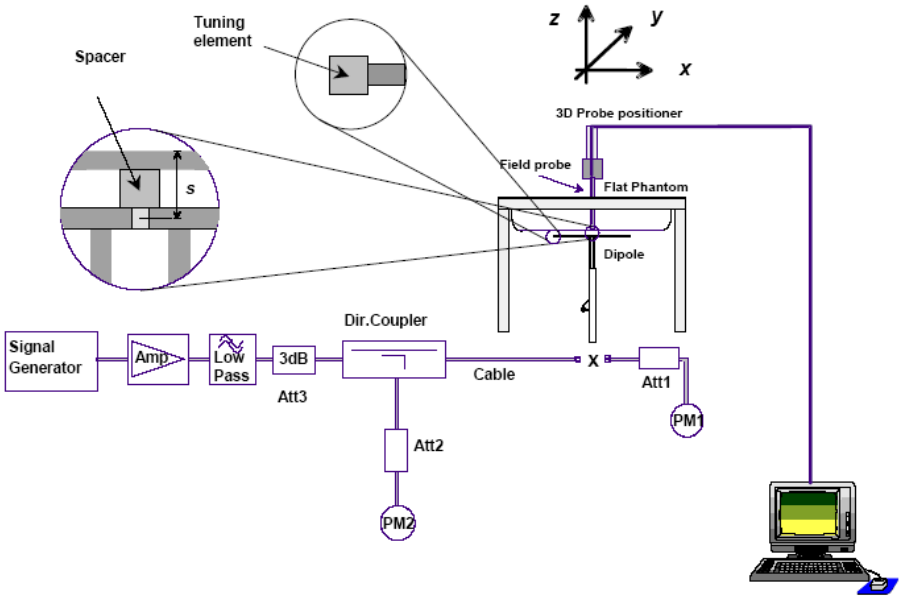
1900 MHz Head				1900 MHz Body		
Frequency (MHz)	e'	e''		Frequency (MHz)	e'	e''
1850.0	39.6171	13.3586		1850.0	51.8939	14.5102
1851.2	39.7326	13.3934		1851.2	51.7691	14.4312
1852.4	39.5714	13.2588		1852.4	51.9586	14.4162
1853.6	39.6632	13.2452		1853.6	51.7495	14.5690
1854.8	39.6292	13.3449		1854.8	51.9646	14.5344
1856.0	39.6756	13.3783		1856.0	51.9768	14.5604
1857.2	39.7390	13.2715		1857.2	51.9615	14.4397
1858.4	39.6381	13.2946		1858.4	52.0100	14.4496
1859.6	39.5628	13.3084		1859.6	51.8329	14.4176
1860.8	39.5574	13.3371		1860.8	51.8036	14.5470
1862.0	39.6586	13.2462		1862.0	51.9630	14.4874
1863.2	39.5723	13.3216		1863.2	52.0688	14.5270
1864.4	39.6597	13.3782		1864.4	51.7590	14.5121
1865.6	39.6663	13.3152		1865.6	51.9670	14.4880
1866.8	39.6368	13.3057		1866.8	52.0273	14.4219
1868.0	39.5637	13.2865		1868.0	51.7642	14.5438
1869.2	39.7401	13.2935		1869.2	51.9543	14.4931
1870.4	39.6769	13.2415		1870.4	51.7478	14.5069
1871.6	39.6241	13.3396		1871.6	51.7448	14.5516
1872.8	39.6765	13.3920		1872.8	51.7560	14.5335
1874.0	39.6334	13.2841		1874.0	51.7802	14.4258
1875.2	39.5465	13.3038		1875.2	51.7938	14.5248
1876.4	39.5615	13.3632		1876.4	52.0127	14.4871
1877.6	39.5929	13.3809		1877.6	52.0793	14.4803
1878.8	39.7233	13.3854		1878.8	51.9236	14.5046
1880.0	39.6707	13.4311		1880.0	51.7874	14.4694
1881.2	39.6302	13.3806		1881.2	52.0811	14.5413
1882.4	39.5813	13.3228		1882.4	51.9544	14.5452
1883.6	39.5737	13.2936		1883.6	52.0377	14.4204
1884.8	39.7020	13.4218		1884.8	52.0186	14.5611
1886.0	39.7102	13.2908		1886.0	51.9936	14.5399
1887.2	39.5826	13.2674		1887.2	51.7777	14.5372
1888.4	39.6502	13.3680		1888.4	51.8564	14.4931
1889.6	39.6518	13.2908		1889.6	52.0824	14.4993
1890.8	39.6599	13.4289		1890.8	52.0197	14.5701
1892.0	39.6100	13.3993		1892.0	51.8177	14.5525
1893.2	39.6144	13.2635		1893.2	51.7578	14.4940
1894.4	39.6530	13.2685		1894.4	51.8942	14.5688
1895.6	39.6147	13.4090		1895.6	51.7790	14.4491
1896.8	39.7343	13.3319		1896.8	51.8428	14.4131
1898.0	39.5854	13.2402		1898.0	51.7532	14.4523
1899.2	39.7260	13.4088		1899.2	51.9914	14.5686
1900.4	39.6006	13.3905		1900.4	51.7780	14.4944
1901.6	39.6884	13.3039		1901.6	51.7428	14.4170
1902.8	39.6629	13.2408		1902.8	51.8402	14.5437
1904.0	39.6348	13.2720		1904.0	51.9421	14.4840
1905.2	39.6759	13.2839		1905.2	51.9176	14.4418
1906.4	39.7382	13.3151		1906.4	52.0405	14.5371
1907.6	39.6923	13.3578		1907.6	52.0253	14.4802
1908.8	39.5591	13.3293		1908.8	51.9700	14.5160
1910.0	39.5447	13.4058		1910.0	52.0099	14.4915

2450 MHz Head				2450 MHz Body		
Frequency (MHz)	e'	e''		Frequency (MHz)	e'	e''
2500.0	39.6178	12.7095		2500.0	51.9705	13.7240
2501.5	39.6893	12.8033		2501.5	51.8469	13.6913
2503.0	39.6933	12.6606		2503.0	51.8780	13.6854
2504.5	39.6889	12.8246		2504.5	51.7700	13.6222
2506.0	39.6599	12.7337		2506.0	52.0534	13.6622
2507.5	39.6207	12.7104		2507.5	52.0698	13.7390
2509.0	39.5674	12.7589		2509.0	51.8607	13.6744
2510.5	39.5832	12.7263		2510.5	52.0590	13.7138
2512.0	39.6347	12.7255		2512.0	52.0596	13.7651
2513.5	39.7232	12.6807		2513.5	51.8827	13.6671
2515.0	39.6040	12.6403		2515.0	51.9937	13.7465
2516.5	39.7408	12.7574		2516.5	52.0682	13.6509
2518.0	39.6399	12.6545		2518.0	52.0689	13.7341
2519.5	39.6141	12.6751		2519.5	52.0612	13.6214
2521.0	39.7287	12.7037		2521.0	51.7697	13.6478
2522.5	39.6931	12.7710		2522.5	52.0466	13.7054
2524.0	39.6993	12.7787		2524.0	51.9553	13.6404
2525.5	39.7322	12.6955		2525.5	52.0520	13.6356
2527.0	39.5650	12.7380		2527.0	51.8428	13.6826
2528.5	39.6781	12.7135		2528.5	51.7438	13.6773
2530.0	39.6015	12.8130		2530.0	52.0702	13.6759
2531.5	39.6993	12.7612		2531.5	52.0057	13.6361
2533.0	39.5945	12.6771		2533.0	52.0573	13.7266
2534.5	39.6216	12.6902		2534.5	51.8001	13.6589
2536.0	39.5808	12.7335		2536.0	51.7856	13.7612
2537.5	39.5738	12.6842		2537.5	51.8104	13.7234
2539.0	39.5607	12.6758		2539.0	51.7676	13.7380
2540.5	39.6707	12.7354		2540.5	51.9100	13.6892
2542.0	39.5780	12.7797		2542.0	51.9904	13.6505
2543.5	39.5506	12.7171		2543.5	52.0293	13.6516
2545.0	39.6598	12.8018		2545.0	51.9315	13.6410
2546.5	39.5692	12.7144		2546.5	52.0222	13.7524
2548.0	39.6471	12.6438		2548.0	51.9205	13.6635
2549.5	39.6728	12.7902		2549.5	52.0999	13.7601
2551.0	39.5441	12.7988		2551.0	51.9946	13.6401
2552.5	39.6017	12.8303		2552.5	51.8187	13.6233
2554.0	39.6210	12.6654		2554.0	51.7451	13.6312
2555.5	39.7211	12.8225		2555.5	51.8665	13.7307
2557.0	39.6381	12.6405		2557.0	51.8690	13.6351
2558.5	39.5931	12.7217		2558.5	51.8920	13.7229
2560.0	39.6487	12.7212		2560.0	51.9642	13.6498
2561.5	39.7132	12.7257		2561.5	52.0738	13.6131
2563.0	39.6840	12.7476		2563.0	52.0292	13.6725
2564.5	39.7373	12.7082		2564.5	51.9495	13.6987
2566.0	39.6641	12.6716		2566.0	51.8746	13.7584
2567.5	39.6727	12.7678		2567.5	51.7600	13.7017
2569.0	39.6423	12.7876		2569.0	51.9529	13.6675
2570.5	39.5705	12.6772		2570.5	52.0506	13.7780
2572.0	39.7168	12.8318		2572.0	52.1006	13.6441
2573.5	39.6358	12.7305		2573.5	51.8497	13.6647
2575.0	39.5665	12.6474		2575.0	51.9106	13.7108

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 (%)
2015-7-16	835	Head	1g	9.83	9.773	0.583	±10
		Body	1g	10.4	9.736	6.820	±10
	1750	Head	1g	37.7	37.020	1.837	±10
		Body	1g	36.2	36.650	-1.228	±10
	1900	Head	1g	39.4	39.481	-0.205	±10
		Body	1g	41.7	39.715	4.998	±10
	2450	Head	1g	52.1	54.916	-5.128	±10
		Body	1g	50.6	52.418	-3.468	±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

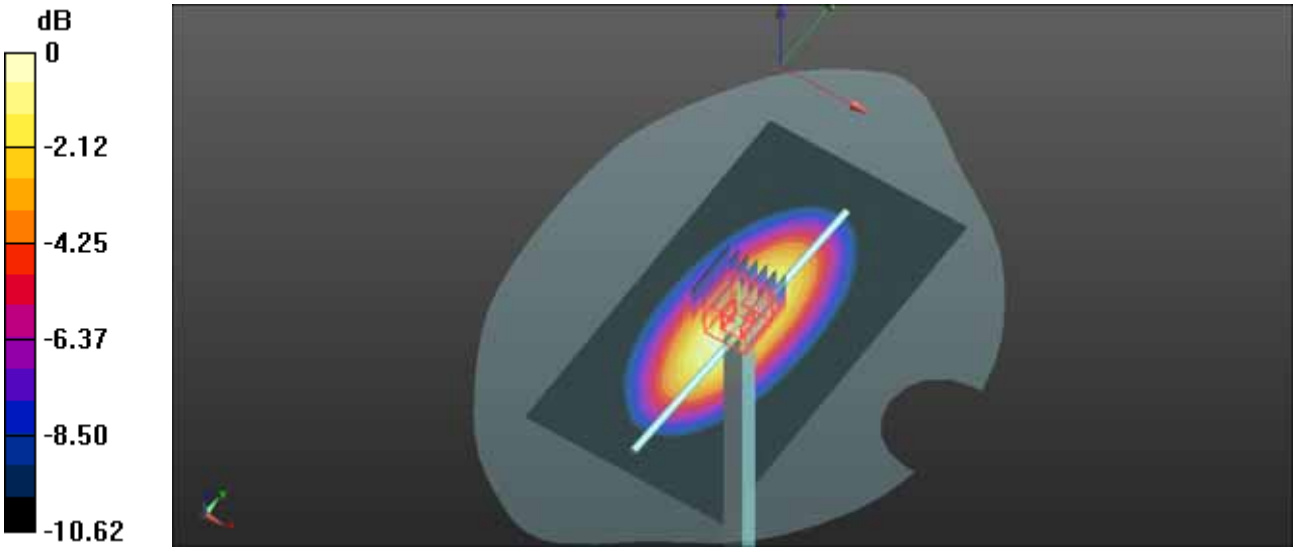
Communication System:CW ; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.915 S/m; ε_r = 41.097; ρ = 1000 kg/m^3
Phantom section: Flat Section

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);

System Performance 835MHz Head /Area Scan (71x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 10.5 W/kg

System Performance 835MHz Head /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 109.5 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 15.7 W/kg
SAR(1 g) = 9.83 W/kg; SAR(10 g) = 6.30 W/kg
Maximum value of SAR (measured) = 10.7 W/kg



0 dB = 10.7 W/kg = 10.29 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

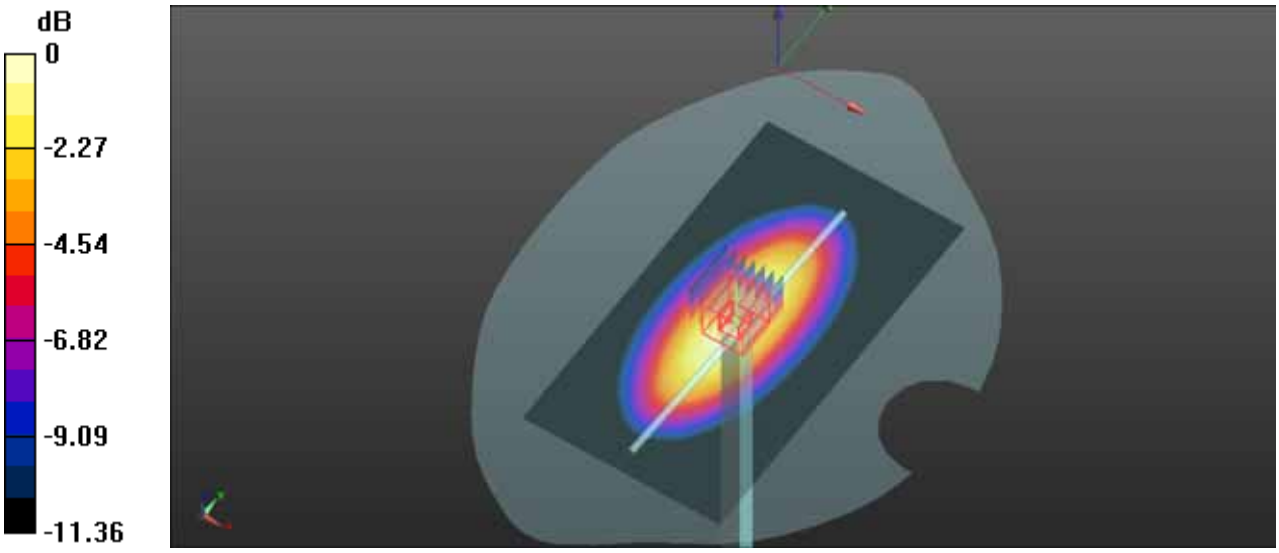
Communication System:CW ; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.961 S/m; ε_r = 53.841; ρ = 1000 kg/m^3
Phantom section: Flat Section

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);

System Performance 835MHz Body /Area Scan (71x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 11.1 W/kg

System Performance 835MHz Body /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 111.3 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 16.2 W/kg
SAR(1 g) = 10.4 W/kg; SAR(10 g) = 6.68 W/kg
Maximum value of SAR (measured) = 11.3 W/kg



0 dB = 11.3 W/kg = 10.53 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

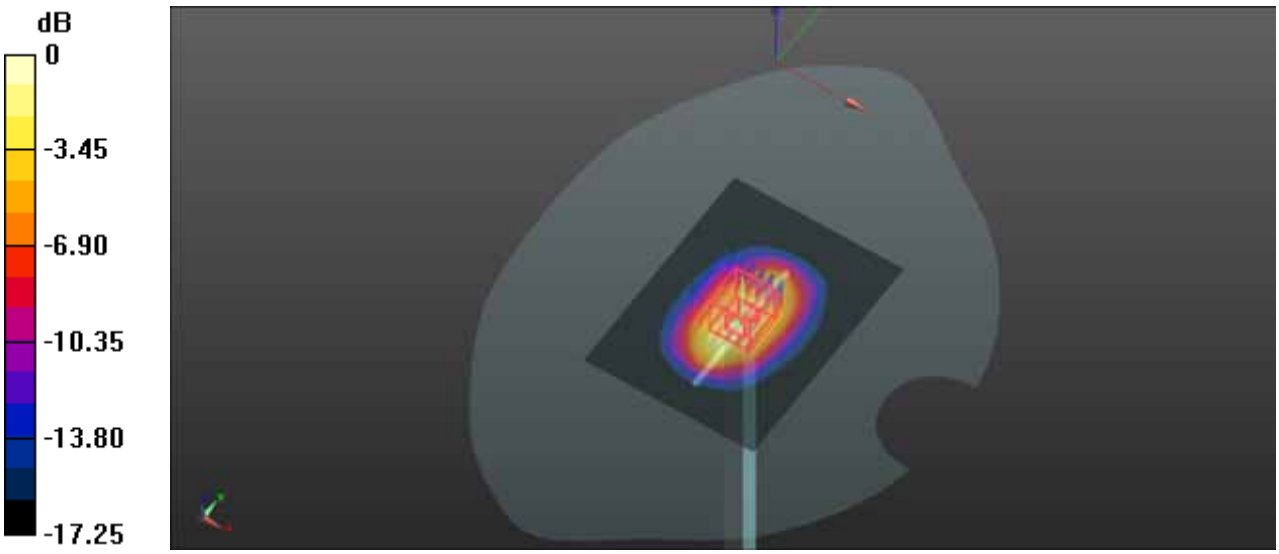
Communication System:CW ; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1750 MHz; σ = 1.399 S/m; ε_r = 39.326; ρ = 1000 kg/m^3
Phantom section: Flat Section

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);

System Performance 1750MHz Head /Area Scan (61x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 43.1 W/kg

System Performance 1750MHz Head /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 167.3 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 70.4 W/kg
SAR(1 g) = 37.7 W/kg; SAR(10 g) = 19.9 W/kg
Maximum value of SAR (measured) = 42.0 W/kg



0 dB = 42.0 W/kg = 16.23 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

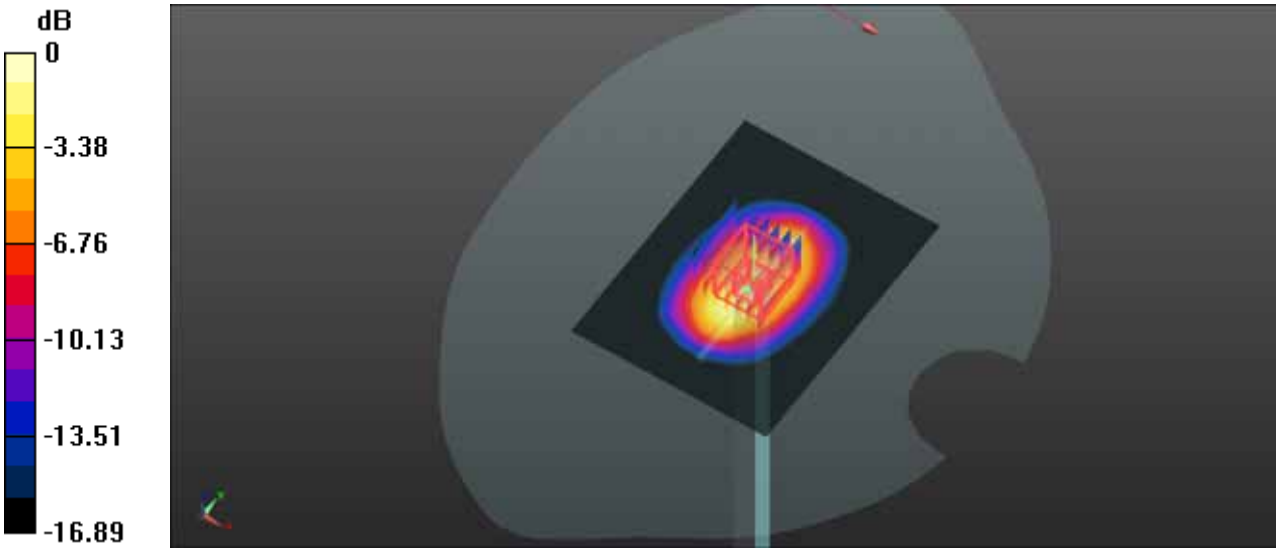
Communication System:CW ; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1750 MHz; σ = 1.525 S/m; ε_r = 51.882; ρ = 1000 kg/m^3
Phantom section: Flat Section

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);

System Performance 1750MHz Body /Area Scan (61x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 42.4 W/kg

System Performance 1750MHz Body /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 164.4 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 67.5 W/kg
SAR(1 g) = 36.2 W/kg; SAR(10 g) = 19.1 W/kg
Maximum value of SAR (measured) = 40.5 W/kg



0 dB = 40.5 W/kg = 16.07 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

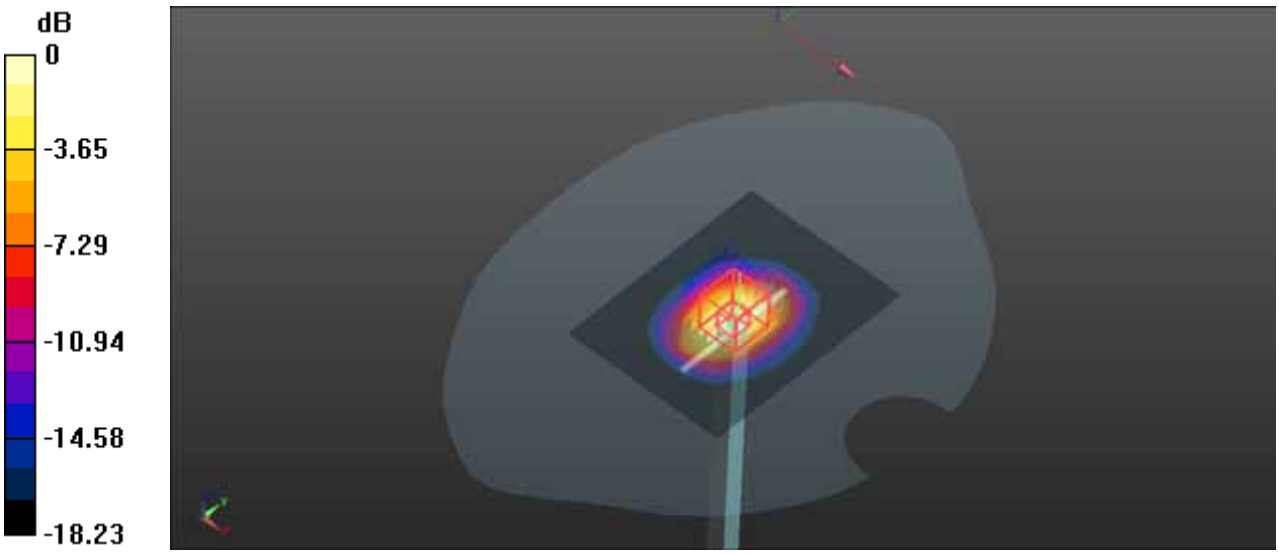
Communication System:CW ; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.415 S/m; ε_r = 39.662; ρ = 1000 kg/m^3
Phantom section: Flat Section

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);

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

System Performance 1900MHz Head /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

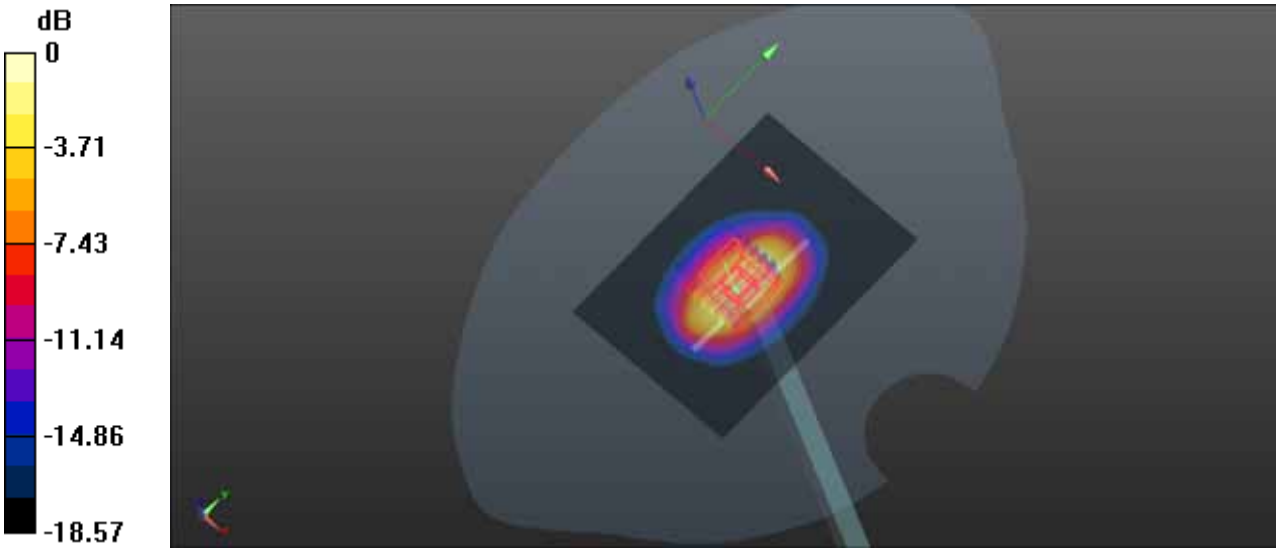
Communication System:CW ; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.534 S/m; ε_r = 51.808; ρ = 1000 kg/m^3
Phantom section: Flat Section

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);

System Performance 1900MHz Body /Area Scan (61x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 48.7 W/kg

System Performance 1900MHz Body /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 171.8 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 79.0 W/kg
SAR(1 g) = 41.7 W/kg; SAR(10 g) = 21.0 W/kg
Maximum value of SAR (measured) = 47.0 W/kg



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

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

System Performance 2450MHz Head

DUT: ALS-D-2450-S-2; Type: 2450 MHz; Serial: 220-00759

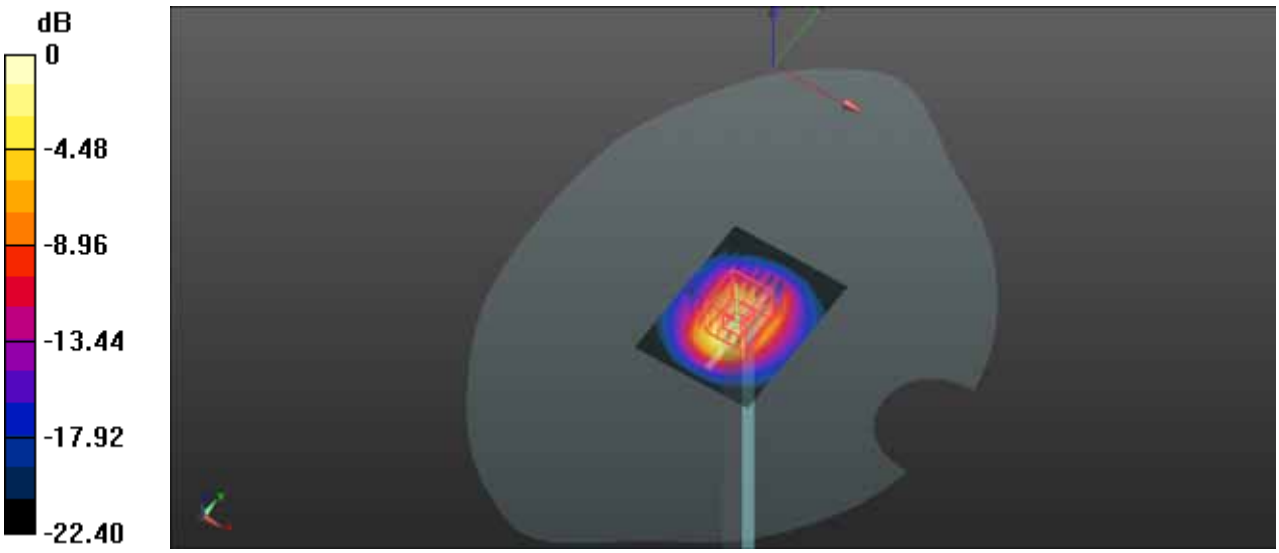
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.756 S/m; ε_r = 39.637; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.06, 7.06, 7.06); 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);

System Performance/2450MHz Head /Area Scan (61x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 60.6 W/kg

System Performance/2450MHz Head /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 180.5 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 108 W/kg
SAR(1 g) = 52.1 W/kg; SAR(10 g) = 23.6 W/kg
Maximum value of SAR (measured) = 59.3 W/kg



0 dB = 59.3 W/kg = 17.73 dBW/kg

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

System Performance 2450MHz Body

DUT: ALS-D-2450-S-2; Type: 2450 MHz; Serial: 220-00759

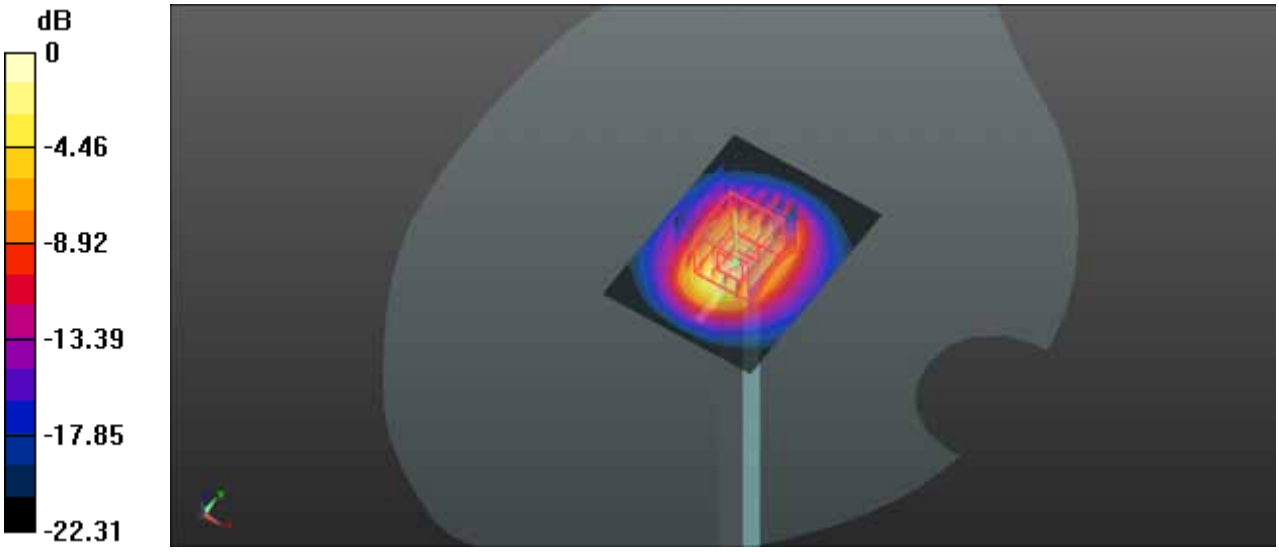
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.920 S/m; ε_r = 51.922; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.2, 7.2, 7.2); 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);

System Performance/2450MHz Body /Area Scan (61x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 55.9 W/kg

System Performance/2450MHz Body /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 172.5 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 102 W/kg
SAR(1 g) = 50.6 W/kg; SAR(10 g) = 23.1 W/kg
Maximum value of SAR (measured) = 57.2 W/kg



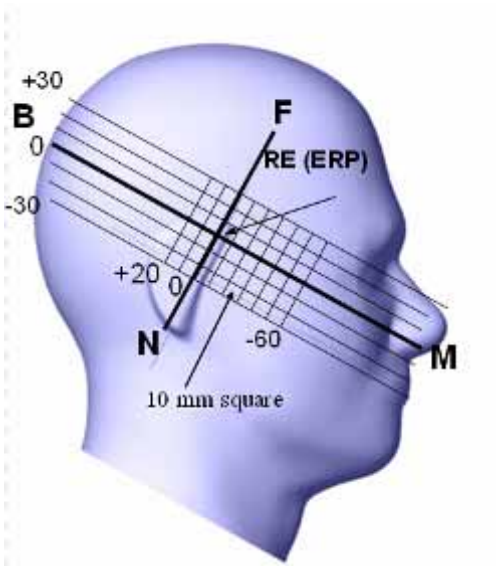
0 dB = 57.2 W/kg = 17.57 dBW/kg

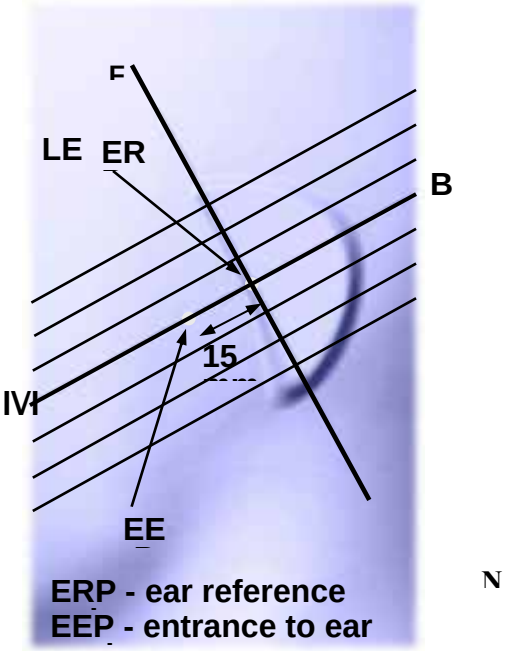
EUT TEST STRATEGY AND METHODOLOGY

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

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

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





Cheek/Touch Position

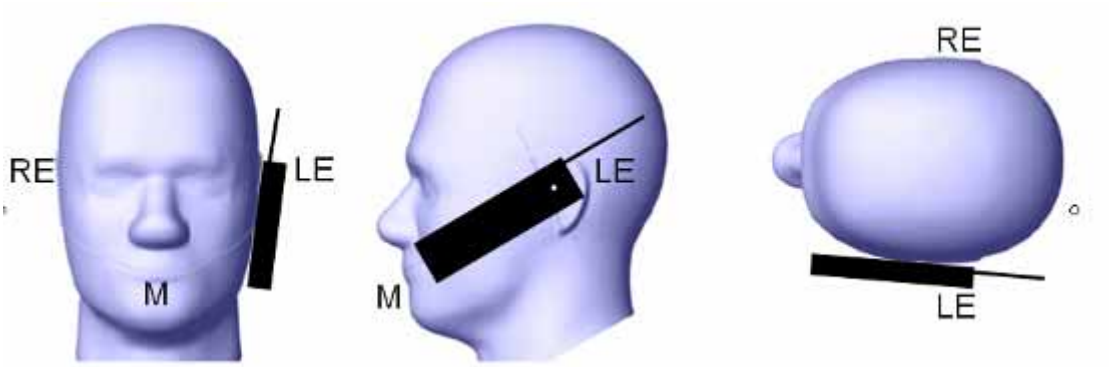
The device is brought toward the mouth of the head phantom by pivoting against the "ear reference point" or along the "N-F" line for the SCC-34/SC-2 head phantom.

This test position is established:

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

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

Cheek /Touch Position



Ear/Tilt Position

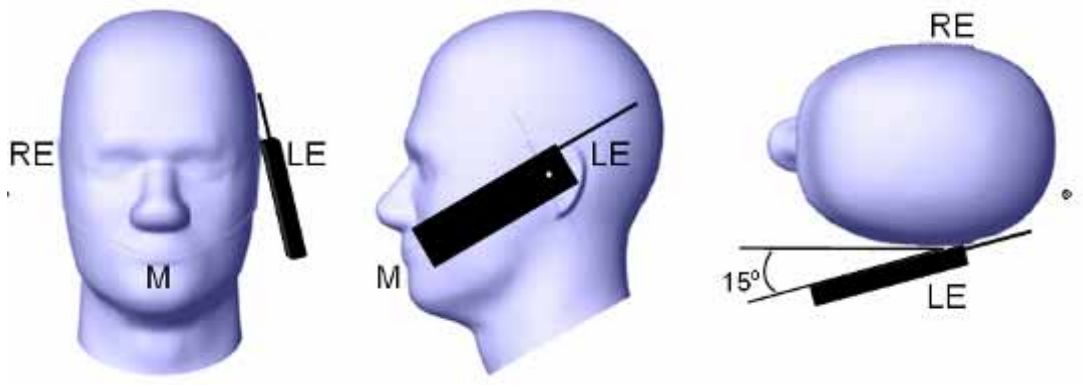
With the handset aligned in the "Cheek/Touch Position":

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

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

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

Ear /Tilt 15° Position



Test positions for body-worn and other configurations

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations. Devices with a headset output should be tested with a headset connected to the device. When multiple accessories that do not contain metallic components are supplied with the device, the device may be tested with only the accessory that dictates the closest spacing to the body. When multiple accessories that contain metallic components are supplied with the device, the device must be tested with each accessory that contains a unique metallic component. If multiple accessories share an identical metallic component (e.g., the same metallic belt-clip used with different holsters with no other metallic components), only the accessory that dictates the closest spacing to the body must be tested.

Body-worn accessories may not always be supplied or available as options for some devices that are intended to be authorized for body-worn use. A separation distance of 1.5 cm between the back of the device and a flat phantom is recommended for testing body-worn SAR compliance under such circumstances. Other separation distances may be used, but they should not exceed 2.5 cm. In these cases, the device may use body-worn accessories that provide a separation distance greater than that tested for the device provided however that the accessory contains no metallic components.

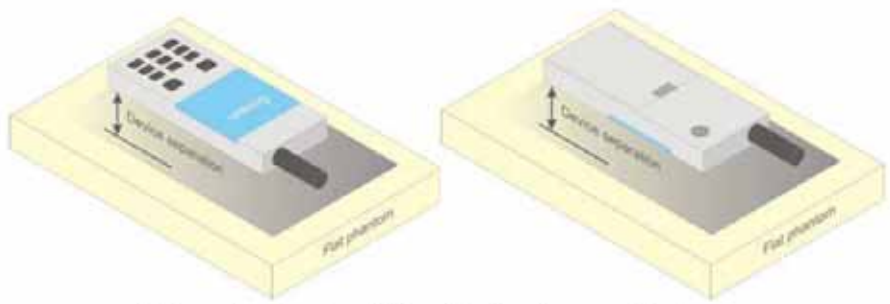


Figure 5 – Test positions for body-worn devices

SAR Evaluation Procedure

The evaluation was performed with the following procedure:

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

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

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

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

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

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

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

Test methodology

KDB 447498 D01 General RF Exposure Guidance v05r02.
KDB 648474 D04 Handset SAR v01r02.
KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r03
KDB 865664 D02 RF Exposure Reporting v01r01
KDB 941225 D01 3G SAR Procedures v03
KDB 941225 D05 SAR for LTE Devices v02r03
KDB 941225 D06 Hotspot Mode v02

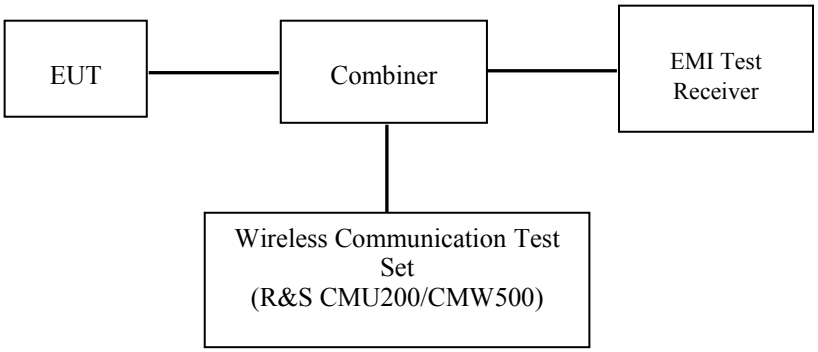
CONDUCTED OUTPUT POWER MEASUREMENT

Provision Applicable

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

Test Procedure

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



GSM/WCDMA/LTE

Radio Configuration

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

GSM

Function: Menu select > GSM Mobile Station > GSM 850/1900
Press Connection control to choose the different menus
Press RESET > choose all the reset all settings
Connection: Press Signal Off to turn off the signal and change settings
Network Support > GSM + only
MS Signal
> 33 dBm for GSM 850
> 30 dBm for PCS 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
	β c / 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			
	β c	2/15	12/15	15/15	15/15
	β d	15/15	15/15	8/15	4/15
	β d (SF)	64			
	β c/ β d	2/15	12/15	15/8	15/4
	β hs	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= β hs/ β c	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				
	β c	11/15	6/15	15/15	2/15	15/15
	β d	15/15	15/15	9/15	15/15	0
	β ec	209/225	12/15	30/15	2/15	5/15
	β c/ β d	11/15	6/15	15/9	2/15	-
	β hs	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= β hs/ β c	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	

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 Output Power among production units

Max Target Power for Production Unit (dBm)			
Mode/Band	Channel		
	Low	Middle	High
GSM 850	32.70	32.70	32.70
GPRS 1 TX Slot	32.70	32.70	32.70
GPRS 2 TX Slot	32.00	32.00	32.00
GPRS 3 TX Slot	30.20	30.20	30.20
GPRS 4 TX Slot	28.90	28.90	28.90
EDGE 1 TX Slot	26.10	26.10	26.10
EDGE 2 TX Slot	24.90	24.90	24.90
EDGE 3 TX Slot	22.80	22.80	22.80
EDGE 4 TX Slot	21.60	21.60	21.60
PCS 1900	29.20	29.20	29.20
GPRS 1 TX Slot	29.20	29.20	29.20
GPRS 2 TX Slot	28.30	28.30	28.30
GPRS 3 TX Slot	26.10	26.10	26.10
GPRS 4 TX Slot	24.70	24.70	24.70
EDGE 1 TX Slot	24.10	24.10	24.10
EDGE 2 TX Slot	22.90	22.90	22.90
EDGE 3 TX Slot	20.50	20.50	20.50
EDGE 4 TX Slot	19.30	19.30	19.30
WCDMA850	22.70	22.70	22.70
WCDMA1900	21.80	21.80	21.80
LTE Band 2	22.40	22.40	22.40
LTE Band 4	23.30	23.30	23.30
LTE Band 7	22.60	22.60	22.60
LTE Band 17	23.80	23.80	23.80
Wi-Fi(b/n/n20)	9.50	9.50	9.50
Wi-Fi(n40)	8.80	8.80	8.80
Bluetooth	2.20	4.80	1.60
BLE	-5.00	-2.50	-5.90

Test Results:

GSM:

Band	Frequency (MHz)	Conducted Output Power	
		Meas. Power (dBm)	Meas. Power (W)
GSM 850	824.2	**32.63**	1.832
	836.6	32.55	1.799
	848.8	32.54	1.795
PCS 1900	1850.2	29.02	0.798
	1880.0	29.00	0.794
	1909.8	**29.17**	0.826

GPRS:

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			1 slot	2 slots	3 slots	4 slots
GSM 850	128	824.2	32.65	31.92	30.11	28.86
	190	836.6	32.54	31.81	29.91	28.74
	251	848.8	32.51	31.78	29.86	28.70
PCS 1900	512	1850.2	29.01	28.02	25.73	24.36
	661	1880	29.04	28.00	25.67	24.32
	810	1909.8	29.18	28.21	26.01	24.69

EGPRS:

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			1 slot	2 slots	3 slots	4 slots
GSM 850	128	824.2	26.04	24.81	22.74	21.54
	190	836.6	25.99	24.73	22.71	21.50
	251	848.8	25.80	24.59	22.52	21.29
PCS 1900	512	1850.2	23.53	22.29	20.00	18.72
	661	1880	23.79	22.54	20.24	18.98
	810	1909.8	24.09	22.85	20.48	19.21

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

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

The time based average power for GPRS

Band	Channel No.	Frequency (MHz)	Time based average Power (dBm)			
			1 slot	2 slot	3 slots	4 slots
GSM 850	128	824.2	23.65	**25.92**	25.86	25.86
	190	836.6	23.54	25.81	25.66	25.74
	251	848.8	23.51	25.78	25.61	25.70
PCS 1900	512	1850.2	20.01	22.02	21.48	21.36
	661	1880	20.04	22.00	21.42	21.32
	810	1909.8	20.18	**22.21**	21.76	21.69

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	17.04	**18.81**	18.49	18.54
	190	836.6	16.99	18.73	18.46	18.50
	251	848.8	16.80	18.59	18.27	18.29
PCS 1900	512	1850.2	14.53	16.29	15.75	15.72
	661	1880	14.79	16.54	15.99	15.98
	810	1909.8	15.09	**16.85**	16.23	16.21

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. For EGPRS, 1, 2, 3 and 4 timeslots has been activated separately with power level 6(850 MHz band) and 5(1900 MHz band).
5. 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	Frequency (MHz)	Channel NO.	Conducted Output Power	
			(dBm)	(Watt)
WCDMA 850	826.4	4132	22.35	0.172
	836.6	4183	22.62	0.183
	846.6	4233	**22.67**	0.185
WCDMA 1900	1852.4	9262	21.49	0.141
	1880.0	9400	21.50	0.141
	1907.6	9538	**21.76**	0.150

Results (HSDPA)

Band	Frequency (MHz)	Channel NO.	Conducted Output Power (dBm)			
			Subset 1	Subset 2	Subset 3	Subset 4
WCDMA 850	826.4	4132	21.28	21.26	21.20	21.26
	836.6	4183	21.55	21.56	21.51	21.54
	846.6	4233	21.56	21.60	21.52	21.63
WCDMA 1900	1852.4	9262	20.33	20.29	20.26	20.31
	1880.0	9400	20.41	20.37	20.29	20.39
	1907.6	9538	20.61	20.57	20.47	20.64

Results (HSUPA)

Band	Frequency (MHz)	Channel NO.	Conducted Output Power (dBm)				
			Subset 1	Subset 2	Subset 3	Subset 4	Subset 5
WCDMA 850	826.4	4132	21.28	21.29	21.22	21.30	21.24
	836.6	4183	21.57	21.58	21.53	21.55	21.56
	846.6	4233	21.61	21.59	21.51	21.56	21.57
WCDMA 1900	1852.4	9262	20.32	20.27	20.34	20.32	20.30
	1880.0	9400	20.40	20.41	20.35	20.43	20.40
	1907.6	9538	20.65	20.67	20.57	20.69	20.65

Results (DC-HSDPA)

Band	Frequency (MHz)	Channel NO.	Conducted Output Power (dBm)			
			Subset 1	Subset 2	Subset 3	Subset 4
WCDMA 850	826.4	4132	21.14	21.11	21.08	21.13
	836.6	4183	21.01	21.20	21.04	21.09
	846.6	4233	21.03	21.14	21.02	21.13
WCDMA 1900	1852.4	9262	20.19	20.06	20.01	20.09
	1880.0	9400	20.19	20.08	20.10	20.07
	1907.6	9538	20.02	20.06	20.13	20.07

Results (HSPA+)

Band	Frequency (MHz)	Channel NO.	Conducted Output Power (dBm)
WCDMA 850	826.4	4132	20.09
	836.6	4183	21.17
	846.6	4233	20.03
WCDMA 1900	1852.4	9262	20.14
	1880.0	9400	20.03
	1907.6	9538	20.01

Note:

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

LTE Band 2:

BW	Modulation	Resource Block Size& Resource Block Offset	Ave Tx Power(dBm)		
			Low Channel	Mid Channel	High Channel
1.4M	QPSK	RB Size=1, RB Offset=0	22.09	22.23	22.12
		RB Size=1, RB Offset=3	21.35	22.14	21.21
		RB Size=1, RB Offset=5	21.12	21.75	21.72
		RB Size=3, RB Offset=0	21.54	22.20	21.38
		RB Size=3, RB Offset=1	21.17	21.79	20.86
		RB Size=3, RB Offset=3	20.61	21.83	20.82
		RB Size=6, RB Offset=0	21.11	21.38	20.45
	16-QAM	RB Size=1, RB Offset=0	21.11	21.22	21.15
		RB Size=1, RB Offset=3	20.90	21.19	20.89
		RB Size=1, RB Offset=5	20.28	21.16	20.41
		RB Size=3, RB Offset=0	20.39	21.03	21.04
		RB Size=3, RB Offset=1	19.96	20.49	20.76
		RB Size=3, RB Offset=3	19.93	20.99	20.57
		RB Size=6, RB Offset=0	20.71	20.64	20.47
3M	QPSK	RB Size=1, RB Offset=0	22.07	22.19	22.11
		RB Size=1, RB Offset=7	21.31	21.51	21.73
		RB Size=1, RB Offset=14	21.32	21.83	21.66
		RB Size=8, RB Offset=0	21.69	21.55	21.43
		RB Size=8, RB Offset=4	21.03	20.70	21.18
		RB Size=8, RB Offset=7	20.73	21.08	21.08
		RB Size=15, RB Offset=0	21.06	21.32	21.67
	16-QAM	RB Size=1, RB Offset=0	21.07	21.17	21.10
		RB Size=1, RB Offset=7	20.96	20.43	20.85
		RB Size=1, RB Offset=14	20.22	20.77	20.83
		RB Size=8, RB Offset=0	20.72	20.74	20.11
		RB Size=8, RB Offset=4	20.43	19.71	20.28
		RB Size=8, RB Offset=7	20.65	19.51	20.09
		RB Size=15, RB Offset=0	20.48	20.13	20.54
5M	QPSK	RB Size=1, RB Offset=0	22.14	22.23	22.12
		RB Size=1, RB Offset=12	21.25	21.25	21.22
		RB Size=1, RB Offset=24	21.22	21.33	21.20
		RB Size=12, RB Offset=0	21.82	21.95	21.27
		RB Size=12, RB Offset=6	20.82	20.55	20.61
		RB Size=12, RB Offset=11	21.06	20.36	20.51
		RB Size=25, RB Offset=0	21.21	20.70	20.29
	16-QAM	RB Size=1, RB Offset=0	21.09	21.18	21.11
		RB Size=1, RB Offset=12	20.55	20.82	20.37
		RB Size=1, RB Offset=24	20.78	20.47	20.80
		RB Size=12, RB Offset=0	21.03	21.04	20.56
		RB Size=12, RB Offset=6	20.40	19.96	20.00
		RB Size=12, RB Offset=11	20.28	20.52	19.93
		RB Size=25, RB Offset=0	19.70	20.13	20.32

10M	QPSK	RB Size=1, RB Offset=0	22.22	22.32	22.25
		RB Size=1, RB Offset=24	21.25	22.23	21.48
		RB Size=1, RB Offset=49	21.37	21.85	21.99
		RB Size=25, RB Offset=0	21.57	22.06	21.34
		RB Size=25, RB Offset=12	20.71	21.73	21.20
		RB Size=25, RB Offset=24	21.04	21.36	20.79
		RB Size=50, RB Offset=0	21.24	22.09	21.01
	16-QAM	RB Size=1, RB Offset=0	21.60	21.71	21.63
		RB Size=1, RB Offset=24	21.10	21.27	21.09
		RB Size=1, RB Offset=49	21.31	20.87	21.21
		RB Size=25, RB Offset=0	20.64	20.99	21.27
		RB Size=25, RB Offset=12	20.18	20.66	21.02
		RB Size=25, RB Offset=24	20.30	20.61	20.62
		RB Size=50, RB Offset=0	20.29	20.99	20.31
15M	QPSK	RB Size=1, RB Offset=0	22.24	22.35	22.27
		RB Size=1, RB Offset=37	21.97	22.06	22.05
		RB Size=1, RB Offset=74	21.96	21.72	22.12
		RB Size=36, RB Offset=0	21.67	21.61	21.71
		RB Size=36, RB Offset=18	21.89	21.58	22.04
		RB Size=36, RB Offset=37	21.53	21.63	22.00
		RB Size=75, RB Offset=0	21.54	21.41	21.96
	16-QAM	RB Size=1, RB Offset=0	21.71	21.76	21.66
		RB Size=1, RB Offset=37	21.07	20.98	20.74
		RB Size=1, RB Offset=74	20.87	21.14	21.33
		RB Size=36, RB Offset=0	21.22	20.85	21.13
		RB Size=36, RB Offset=18	20.71	20.03	20.29
		RB Size=36, RB Offset=37	21.00	20.84	19.79
		RB Size=75, RB Offset=0	20.92	20.61	20.70
20M	QPSK	RB Size=1, RB Offset=0	22.22	**22.34**	22.26
		RB Size=1, RB Offset=49	22.07	21.51	21.28
		RB Size=1, RB Offset=99	22.16	21.77	21.47
		RB Size=50, RB Offset=0	**22.11**	21.68	21.87
		RB Size=50, RB Offset=24	22.02	21.45	20.84
		RB Size=50, RB Offset=49	21.77	20.67	20.40
		RB Size=100, RB Offset=0	21.65	20.80	21.03
	16-QAM	RB Size=1, RB Offset=0	21.39	21.57	21.42
		RB Size=1, RB Offset=49	20.85	20.73	21.26
		RB Size=1, RB Offset=99	21.37	21.31	21.02
		RB Size=50, RB Offset=0	20.56	21.34	20.52
		RB Size=50, RB Offset=24	20.57	20.64	20.37
		RB Size=50, RB Offset=49	19.98	19.99	20.39
		RB Size=100, RB Offset=0	20.08	20.40	20.64

LTE Band 4:

BW	Modulation	Resource Block Size& Resource Block Offset	Ave Tx Power (dBm)		
			Low Channel	Mid Channel	High Channel
1.4M	QPSK	RB Size=1, RB Offset=0	23.05	23.19	23.08
		RB Size=1, RB Offset=3	22.31	23.10	22.17
		RB Size=1, RB Offset=5	22.08	22.71	22.68
		RB Size=3, RB Offset=0	22.50	23.16	22.34
		RB Size=3, RB Offset=1	22.13	22.75	21.82
		RB Size=3, RB Offset=3	21.57	22.79	21.78
		RB Size=6, RB Offset=0	22.07	22.34	21.41
	16QAM	RB Size=1, RB Offset=0	22.07	22.18	22.11
		RB Size=1, RB Offset=3	21.86	22.15	21.85
		RB Size=1, RB Offset=5	21.24	22.12	21.37
		RB Size=3, RB Offset=0	21.35	21.99	22.00
		RB Size=3, RB Offset=1	20.92	21.45	21.72
		RB Size=3, RB Offset=3	20.89	21.95	21.53
		RB Size=6, RB Offset=0	21.67	21.60	21.43
3M	QPSK	RB Size=1, RB Offset=0	22.96	23.08	23.00
		RB Size=1, RB Offset=7	22.20	22.40	22.62
		RB Size=1, RB Offset=14	22.21	22.72	22.55
		RB Size=8, RB Offset=0	22.58	22.44	22.32
		RB Size=8, RB Offset=4	21.92	21.59	22.07
		RB Size=8, RB Offset=7	21.62	21.97	21.97
		RB Size=15, RB Offset=0	21.95	22.21	22.56
	16QAM	RB Size=1, RB Offset=0	21.96	22.06	21.99
		RB Size=1, RB Offset=7	21.85	21.32	21.74
		RB Size=1, RB Offset=14	21.11	21.66	21.72
		RB Size=8, RB Offset=0	21.61	21.63	21.00
		RB Size=8, RB Offset=4	21.32	20.60	21.17
		RB Size=8, RB Offset=7	21.54	20.40	20.98
		RB Size=15, RB Offset=0	21.37	21.02	21.43
5M	QPSK	RB Size=1, RB Offset=0	22.93	23.02	22.91
		RB Size=1, RB Offset=12	22.04	22.04	22.01
		RB Size=1, RB Offset=24	22.01	22.12	21.99
		RB Size=12, RB Offset=0	22.61	22.74	22.06
		RB Size=12, RB Offset=6	21.61	21.34	21.40
		RB Size=12, RB Offset=11	21.85	21.15	21.30
		RB Size=25, RB Offset=0	22.00	21.49	21.08
	16QAM	RB Size=1, RB Offset=0	21.88	21.97	21.90
		RB Size=1, RB Offset=12	21.34	21.61	21.16
		RB Size=1, RB Offset=24	21.57	21.26	21.59
		RB Size=12, RB Offset=0	21.82	21.83	21.35
		RB Size=12, RB Offset=6	21.19	20.75	20.79
		RB Size=12, RB Offset=11	21.07	21.31	20.72
		RB Size=25, RB Offset=0	20.49	20.92	21.11

10M	QPSK	RB Size=1, RB Offset=0	22.56	22.66	22.59
		RB Size=1, RB Offset=24	21.59	22.57	21.82
		RB Size=1, RB Offset=49	21.71	22.19	22.33
		RB Size=25, RB Offset=0	21.91	22.40	21.68
		RB Size=25, RB Offset=12	21.05	22.07	21.54
		RB Size=25, RB Offset=24	21.38	21.70	21.13
		RB Size=50, RB Offset=0	21.58	22.43	21.35
	16QAM	RB Size=1, RB Offset=0	21.94	22.05	21.97
		RB Size=1, RB Offset=24	21.44	21.61	21.43
		RB Size=1, RB Offset=49	21.65	21.21	21.55
		RB Size=25, RB Offset=0	20.98	21.33	21.61
		RB Size=25, RB Offset=12	20.52	21.00	21.36
		RB Size=25, RB Offset=24	20.64	20.95	20.96
		RB Size=50, RB Offset=0	20.63	21.33	20.65
15M	QPSK	RB Size=1, RB Offset=0	22.90	23.01	22.93
		RB Size=1, RB Offset=37	22.63	22.72	22.71
		RB Size=1, RB Offset=74	22.62	22.38	22.78
		RB Size=36, RB Offset=0	22.33	22.27	22.37
		RB Size=36, RB Offset=18	22.55	22.24	22.70
		RB Size=36, RB Offset=37	22.19	22.29	22.66
		RB Size=75, RB Offset=0	22.20	22.07	22.62
	16QAM	RB Size=1, RB Offset=0	22.37	22.42	22.32
		RB Size=1, RB Offset=37	21.73	21.64	21.40
		RB Size=1, RB Offset=74	21.53	21.80	21.99
		RB Size=36, RB Offset=0	21.88	21.51	21.79
		RB Size=36, RB Offset=18	21.37	20.69	20.95
		RB Size=36, RB Offset=37	21.66	21.50	20.45
		RB Size=75, RB Offset=0	21.58	21.27	21.36
20M	QPSK	RB Size=1, RB Offset=0	23.08	**23.20**	23.12
		RB Size=1, RB Offset=49	22.93	22.37	22.14
		RB Size=1, RB Offset=99	23.02	22.63	22.33
		RB Size=50, RB Offset=0	**22.97**	22.54	22.73
		RB Size=50, RB Offset=24	22.88	22.31	21.70
		RB Size=50, RB Offset=49	22.63	21.53	21.26
		RB Size=100, RB Offset=0	22.51	21.66	21.89
	16QAM	RB Size=1, RB Offset=0	22.25	22.43	22.28
		RB Size=1, RB Offset=49	21.71	21.59	22.12
		RB Size=1, RB Offset=99	22.23	22.17	21.88
		RB Size=50, RB Offset=0	21.42	22.20	21.38
		RB Size=50, RB Offset=24	21.43	21.50	21.23
		RB Size=50, RB Offset=49	20.84	20.85	21.25
		RB Size=100, RB Offset=0	20.94	21.26	21.50

LTE Band 7:

BW	Modulation	Resource Block Size& Resource Block Offset	Ave Tx Power (dBm)		
			Low Channel	Mid Channel	High Channel
5M	QPSK	RB Size=1, RB Offset=0	21.52	21.67	21.55
		RB Size=1, RB Offset=12	21.09	20.92	21.33
		RB Size=1, RB Offset=24	20.71	20.82	21.45
		RB Size=12, RB Offset=0	21.41	20.72	21.14
		RB Size=12, RB Offset=6	20.91	20.75	20.56
		RB Size=12, RB Offset=11	21.00	20.81	20.90
		RB Size=25, RB Offset=0	21.52	21.92	22.28
	16QAM	RB Size=1, RB Offset=0	21.63	21.84	21.69
		RB Size=1, RB Offset=12	21.37	21.39	21.13
		RB Size=1, RB Offset=24	21.27	21.26	21.38
		RB Size=12, RB Offset=0	21.19	21.30	20.70
		RB Size=12, RB Offset=6	20.51	20.49	20.81
		RB Size=12, RB Offset=11	20.88	20.40	20.69
		RB Size=25, RB Offset=0	20.70	20.71	20.83
10M	QPSK	RB Size=1, RB Offset=0	21.49	21.67	21.45
		RB Size=1, RB Offset=24	21.28	21.62	20.47
		RB Size=1, RB Offset=49	20.74	20.95	20.87
		RB Size=25, RB Offset=0	21.20	20.76	21.14
		RB Size=25, RB Offset=12	21.06	21.61	20.26
		RB Size=25, RB Offset=24	21.22	21.24	19.89
		RB Size=50, RB Offset=0	20.86	20.92	19.56
	16QAM	RB Size=1, RB Offset=0	20.76	20.97	20.89
		RB Size=1, RB Offset=24	21.27	21.87	21.69
		RB Size=1, RB Offset=49	21.88	22.09	21.41
		RB Size=25, RB Offset=0	21.51	21.32	21.41
		RB Size=25, RB Offset=12	21.01	21.10	21.00
		RB Size=25, RB Offset=24	21.09	21.63	21.57
		RB Size=50, RB Offset=0	20.49	20.97	21.02
15M	QPSK	RB Size=1, RB Offset=0	21.98	22.15	22.06
		RB Size=1, RB Offset=37	21.48	21.85	21.50
		RB Size=1, RB Offset=74	21.58	21.19	21.95
		RB Size=36, RB Offset=0	21.34	21.32	21.18
		RB Size=36, RB Offset=18	21.11	21.71	20.61
		RB Size=36, RB Offset=37	21.02	21.54	21.02
		RB Size=75, RB Offset=0	21.18	21.54	20.81
	16QAM	RB Size=1, RB Offset=0	21.33	21.43	21.36
		RB Size=1, RB Offset=37	20.83	20.48	20.90
		RB Size=1, RB Offset=74	20.83	21.31	21.20
		RB Size=36, RB Offset=0	21.10	21.13	21.14
		RB Size=36, RB Offset=18	20.36	19.85	20.22
		RB Size=36, RB Offset=37	20.61	20.44	20.17
		RB Size=75, RB Offset=0	20.32	19.58	20.28

20M	QPSK	RB Size=1, RB Offset=0	22.47	**22.57**	22.51
		RB Size=1, RB Offset=49	22.41	22.11	21.84
		RB Size=1, RB Offset=99	22.27	21.80	22.23
		RB Size=50, RB Offset=0	22.16	22.14	21.71
		RB Size=50, RB Offset=24	**22.31**	22.09	21.14
		RB Size=50, RB Offset=49	21.69	21.44	21.02
		RB Size=100, RB Offset=0	22.08	21.29	21.00
	16QAM	RB Size=1, RB Offset=0	21.66	21.73	21.64
		RB Size=1, RB Offset=49	21.45	21.49	20.66
		RB Size=1, RB Offset=99	21.06	20.83	20.67
		RB Size=50, RB Offset=0	21.39	21.38	21.01
		RB Size=50, RB Offset=24	20.76	21.45	19.79
		RB Size=50, RB Offset=49	20.72	21.44	19.85
		RB Size=100, RB Offset=0	20.64	21.45	20.08

LTE Band 17:

BW	Modulation	Resource Block Size& Resource Block Offset	Ave Tx Power (dBm)		
			Low Channel	Mid Channel	High Channel
5M	QPSK	RB Size=1, RB Offset=0	23.61	23.76	23.71
		RB Size=1, RB Offset=12	23.38	22.83	22.90
		RB Size=1, RB Offset=24	23.24	22.78	22.97
		RB Size=12, RB Offset=0	23.04	23.71	23.09
		RB Size=12, RB Offset=6	23.15	22.15	22.08
		RB Size=12, RB Offset=11	22.63	22.69	22.26
		RB Size=25, RB Offset=0	23.22	22.78	22.37
	16QAM	RB Size=1, RB Offset=0	22.86	22.94	22.84
		RB Size=1, RB Offset=12	22.70	22.31	21.88
		RB Size=1, RB Offset=24	22.37	22.53	22.18
		RB Size=12, RB Offset=0	22.64	22.58	22.36
		RB Size=12, RB Offset=6	21.75	21.75	21.45
		RB Size=12, RB Offset=11	21.77	22.14	21.74
		RB Size=25, RB Offset=0	22.02	22.27	21.15
10M	QPSK	RB Size=1, RB Offset=0	23.65	**23.73**	23.59
		RB Size=1, RB Offset=24	22.89	23.35	22.92
		RB Size=1, RB Offset=49	23.10	23.00	23.42
		RB Size=25, RB Offset=0	**23.28**	23.13	22.66
		RB Size=25, RB Offset=12	22.53	22.75	22.33
		RB Size=25, RB Offset=24	22.15	22.86	22.44
		RB Size=50, RB Offset=0	22.39	22.61	21.97
	16QAM	RB Size=1, RB Offset=0	22.70	22.81	22.74
		RB Size=1, RB Offset=24	22.16	22.05	22.69
		RB Size=1, RB Offset=49	21.81	21.95	22.05
		RB Size=25, RB Offset=0	22.13	21.82	22.52
		RB Size=25, RB Offset=12	21.79	21.44	21.87
		RB Size=25, RB Offset=24	21.99	21.58	22.41
		RB Size=50, RB Offset=0	21.33	21.49	21.75

Note:
1. SAR for LTE band exposure configurations is measured according to the procedures of KDB 941225 D05 SAR for LTE Devices v02.
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.
3. KDB941225D05v02- 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

Bluetooth

Mode	Channel No.	Channel frequency (MHz)	Conducted Output Power	
			(dBm)	(dBm)
BDR(GFSK)	0	2402	2.10	1.622
	39	2441	**4.71**	2.958
	78	2480	1.57	1.435
EDR(4-DQPSK)	0	2402	0.57	1.140
	39	2441	3.27	2.123
	78	2480	0.12	1.028
EDR-8DPSK	0	2402	0.76	1.191
	39	2441	3.40	2.188
	78	2480	0.29	1.069
BLE	0	2402	-5.08	0.310
	19	2440	-2.56	0.555
	39	2480	-5.94	0.255

Wi-Fi

Mode	Channel No.	Channel frequency (MHz)	Conducted Output Power	
			(dBm)	(dBm)
802.11b	1	2412	8.36	6.855
	7	2442	9.43	8.770
	13	2472	8.67	7.362
802.11g	1	2412	8.03	6.353
	7	2442	9.27	8.453
	13	2472	7.81	6.039
802.11n HT20	1	2412	8.16	6.546
	7	2442	**9.46**	8.831
	13	2472	7.84	6.081
802.11n HT40	3	2422	7.78	5.998
	7	2442	8.73	7.464
	11	2462	8.47	7.031

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 Wi-Fi 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:	22-23 ℃
Relative Humidity:	36-35 %
ATM Pressure:	997-994 mbar

Testing was performed by Rocky Xiao on 2015-07-16

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	2.329	32.63	32.70	1.016	0.333	**0.338**	**1#**
	836.6	GSM	-1.339	32.55	32.70	1.035	0.289	0.299	/
	848.8	GSM	-2.422	32.54	32.70	1.038	0.292	0.303	/
Left Head Tilt	824.2	GSM	/	/	/	/	/	/	/
	836.6	GSM	1.758	32.55	32.70	1.035	0.169	0.175	/
	848.8	GSM	/	/	/	/	/	/	/
Right Head Cheek	824.2	GSM	/	/	/	/	/	/	/
	836.6	GSM	2.389	32.55	32.70	1.035	0.263	0.272	/
	848.8	GSM	/	/	/	/	/	/	/
Right Head Tilt	824.2	GSM	/	/	/	/	/	/	/
	836.6	GSM	-0.901	32.55	32.70	1.035	0.155	0.160	/
	848.8	GSM	/	/	/	/	/	/	/
Body-Back-Headset (10mm)	824.2	GSM	/	/	/	/	/	/	/
	836.6	GSM	2.671	32.55	32.70	1.035	0.311	0.322	/
	848.8	GSM	/	/	/	/	/	/	/

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	0.462	29.02	29.20	1.042	0.193	**0.201**	**3#**
	1880	GSM	2.959	29.00	29.20	1.047	0.177	0.185	/
	1909.8	GSM	-2.008	29.17	29.20	1.007	0.189	0.190	/
Left Head Tilt	1850.2	GSM	/	/	/	/	/	/	/
	1880	GSM	2.297	29.00	29.20	1.047	0.085	0.089	/
	1909.8	GSM	/	/	/	/	/	/	/
Right Head Cheek	1850.2	GSM	/	/	/	/	/	/	/
	1880	GSM	2.320	29.00	29.20	1.047	0.156	0.163	/
	1909.8	GSM	/	/	/	/	/	/	/
Right Head Tilt	1850.2	GSM	/	/	/	/	/	/	/
	1880	GSM	-1.223	29.00	29.20	1.047	0.082	0.086	/
	1909.8	GSM	/	/	/	/	/	/	/
Body-Back-Headset (10mm)	1850.2	GSM	/	/	/	/	/	/	/
	1880	GSM	-2.591	29.00	29.20	1.047	0.227	0.238	/
	1909.8	GSM	/	/	/	/	/	/	/

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.

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	/	/	/	/	/	/	/
	836.6	WCDMA	/	/	/	/	/	/	/
	846.6	WCDMA	1.391	22.67	22.70	1.007	0.224	**0.226**	**5#**
Left Head Tilt	826.4	WCDMA	/	/	/	/	/	/	/
	836.6	WCDMA	/	/	/	/	/	/	/
	846.6	WCDMA	-3.090	22.67	22.70	1.007	0.146	0.147	/
Right Head Cheek	826.4	WCDMA	/	/	/	/	/	/	/
	836.6	WCDMA	/	/	/	/	/	/	/
	846.6	WCDMA	3.140	22.67	22.70	1.007	0.195	0.196	/
Right Head Tilt	826.4	WCDMA	/	/	/	/	/	/	/
	836.6	WCDMA	/	/	/	/	/	/	/
	846.6	WCDMA	2.227	22.67	22.70	1.007	0.151	0.152	/

WCDMA 1900 Band:

EUT Position	Frequency (MHz)	Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/Kg)			
						Scaled Factor	Meas. SAR	Scaled SAR	Plot
Left Head Cheek	1852.4	WCDMA	/	/	/	/	/	/	/
	1880	WCDMA	/	/	/	/	/	/	/
	1907.6	WCDMA	-2.501	21.76	21.80	1.009	0.275	**0.278**	**7#**
Left Head Tilt	1852.4	WCDMA	/	/	/	/	/	/	/
	1880	WCDMA	/	/	/	/	/	/	/
	1907.6	WCDMA	-1.329	21.76	21.80	1.009	0.155	0.156	/
Right Head Cheek	1852.4	WCDMA	/	/	/	/	/	/	/
	1880	WCDMA	/	/	/	/	/	/	/
	1907.6	WCDMA	2.981	21.76	21.80	1.009	0.232	0.234	/
Right Head Tilt	1852.4	WCDMA	/	/	/	/	/	/	/
	1880	WCDMA	/	/	/	/	/	/	/
	1907.6	WCDMA	3.363	21.76	21.80	1.009	0.141	0.142	/

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 2:

EUT Position	Frequency (MHz)	Bandwith (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	1860	20	1RB, Offset=0	/	/	/	/	/	/	/
	1880	20	1RB, Offset=0	-1.145	22.34	22.40	1.014	0.157	**0.159**	**9#**
	1900	20	1RB, Offset=0	/	/	/	/	/	/	/
	1860	20	50%RB, Offset=0	-2.518	22.11	22.40	1.069	0.115	0.123	/
Left Head Tilt	1860	20	1RB, Offset=0	/	/	/	/	/	/	/
	1880	20	1RB, Offset=0	2.623	22.34	22.40	1.014	0.089	0.090	/
	1900	20	1RB, Offset=0	/	/	/	/	/	/	/
	1860	20	50%RB, Offset=0	2.419	22.11	22.40	1.069	0.073	0.078	
Right Head Cheek	1860	20	1RB, Offset=0	/	/	/	/	/	/	/
	1880	20	1RB, Offset=0	-2.751	22.34	22.40	1.014	0.152	0.154	/
	1900	20	1RB, Offset=0	/	/	/	/	/	/	/
	1860	20	50%RB, Offset=0	-2.474	22.11	22.40	1.069	0.103	0.110	
Right Head Tilt	1860	20	1RB, Offset=0	/	/	/	/	/	/	/
	1880	20	1RB, Offset=0	1.545	22.34	22.40	1.014	0.082	0.083	/
	1900	20	1RB, Offset=0	/	/	/	/	/	/	/
	1860	20	50%RB, Offset=0	-3.527	22.11	22.40	1.069	0.076	0.081	/

LTE Band 4:

EUT Position	Frequency (MHz)	Bandwith (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	1720	20	1RB, Offset=0	/	/	/	/	/	/	/
	1732.5	20	1RB, Offset=0	-2.501	23.20	23.30	1.023	0.220	**0.225**	**11#**
	1745	20	1RB, Offset=0	/	/	/	/	/	/	/
	1720	20	50%RB, Offset=0	-3.318	22.97	23.30	1.079	0.189	0.204	/
Left Head Tilt	1720	20	1RB, Offset=0	/	/	/	/	/	/	/
	1732.5	20	1RB, Offset=0	-1.124	23.20	23.30	1.023	0.098	0.100	/
	1745	20	1RB, Offset=0	/	/	/	/	/	/	/
	1720	20	50%RB, Offset=0	2.928	22.97	23.30	1.079	0.092	0.099	
Right Head Cheek	1720	20	1RB, Offset=0	/	/	/	/	/	/	/
	1732.5	20	1RB, Offset=0	1.059	23.20	23.30	1.023	0.202	0.207	/
	1745	20	1RB, Offset=0	/	/	/	/	/	/	/
	1720	20	50%RB, Offset=0	3.159	22.97	23.30	1.079	0.167	0.180	
Right Head Tilt	1720	20	1RB, Offset=0	/	/	/	/	/	/	/
	1732.5	20	1RB, Offset=0	-0.712	23.20	23.30	1.023	0.115	0.118	/
	1745	20	1RB, Offset=0	/	/	/	/	/	/	/
	1720	20	50%RB, Offset=0	-1.865	22.97	23.30	1.079	0.085	0.092	/

LTE Band 7:

EUT Position	Frequency (MHz)	Bandwith (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	2510	20	1RB, Offset=0	/	/	/	/	/	/	/
	2535	20	1RB, Offset=0	-1.599	22.57	22.60	1.007	0.358	**0.360**	**13#**
	2560	20	1RB, Offset=0	/	/	/	/	/	/	/
	2510	20	50%RB, Offset=24	-1.471	22.31	22.60	1.069	0.292	0.312	/
Left Head Tilt	2510	20	1RB, Offset=0	/	/	/	/	/	/	/
	2535	20	1RB, Offset=0	1.569	22.57	22.60	1.007	0.159	0.160	/
	2560	20	1RB, Offset=0	/	/	/	/	/	/	/
	2510	20	50%RB, Offset=24	1.915	22.31	22.60	1.069	0.137	0.146	
Right Head Cheek	2510	20	1RB, Offset=0	/	/	/	/	/	/	/
	2535	20	1RB, Offset=0	-1.220	22.57	22.60	1.007	0.326	0.328	/
	2560	20	1RB, Offset=0	/	/	/	/	/	/	/
	2510	20	50%RB, Offset=24	1.805	22.31	22.60	1.069	0.283	0.303	
Right Head Tilt	2510	20	1RB, Offset=0	/	/	/	/	/	/	/
	2535	20	1RB, Offset=0	3.537	22.57	22.60	1.007	0.162	0.163	/
	2560	20	1RB, Offset=0	/	/	/	/	/	/	/
	2510	20	50%RB, Offset=24	1.414	22.31	22.60	1.069	0.137	0.146	/

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 (20M) 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. Worst case SAR for 50% RB allocation is selected to be tested.

Mobile Hot-Spot Test Result

The DUT is capable of functioning as a Wi-Fi to Cellular Mobile hotspot. Additional SAR testing was performed according to KDB 941225 D06. Testing was performed with a separation of 1cm between the DUT and the flat phantom. The DUT was positioned for SAR tests with the front and back surfaces facing the phantom, and also with the edges facing the phantom in which the transmitting antenna is <2.5 cm from 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.

Hot spot-GPRS (Frequency Band: 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
Body-Back (10mm)	824.2	GPRS	-0.459	31.92	32.00	1.019	0.452	**0.460**	**2#**
	836.6	GPRS	/	/	/	/	/	/	/
	848.8	GPRS	/	/	/	/	/	/	/
Body-Left (10mm)	824.2	GPRS	-1.176	31.92	32.00	1.019	0.266	0.271	/
	836.6	GPRS	/	/	/	/	/	/	/
	848.8	GPRS	/	/	/	/	/	/	/
Body-Right (10mm)	824.2	GPRS	-2.759	31.92	32.00	1.019	0.225	0.229	/
	836.6	GPRS	/	/	/	/	/	/	/
	848.8	GPRS	/	/	/	/	/	/	/
Body-Bottom (10mm)	824.2	GPRS	-1.080	31.92	32.00	1.019	0.089	0.091	/
	836.6	GPRS	/	/	/	/	/	/	/
	848.8	GPRS	/	/	/	/	/	/	/

Hot spot-GPRS (Frequency Band: 1900)

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
Body-Back (10mm)	1850.2	GPRS	/	/	/	/	/	/	/
	1880.0	GPRS	/	/	/	/	/	/	/
	1909.8	GPRS	-1.145	28.21	28.30	1.021	0.306	**0.312**	**4#**
Body-Left (10mm)	1850.2	GPRS	/	/	/	/	/	/	/
	1880.0	GPRS	/	/	/	/	/	/	/
	1909.8	GPRS	2.534	28.21	28.30	1.021	0.076	0.078	/
Body-Right (10mm)	1850.2	GPRS	/	/	/	/	/	/	/
	1880.0	GPRS	/	/	/	/	/	/	/
	1909.8	GPRS	2.488	28.21	28.30	1.021	0.082	0.084	/
Body-Bottom (10mm)	1850.2	GPRS	/	/	/	/	/	/	/
	1880.0	GPRS	/	/	/	/	/	/	/
	1909.8	GPRS	2.643	28.21	28.30	1.021	0.225	0.230	/

Note:

1 .When the 1-g SAR is ≤ 0.8W/Kg, testing for other channels are optional.
2. The EUT is a Capability Class B mobile phone which can be attached to both GPRS and GSM services.
3. The Multi-slot Classes of EUT is Class12 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.
4. The EUT transmit and receive through the same GSM antenna while testing SAR.

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 tole rance limit according to the power applied to the individual channels tested to determine compliance.

Hot Spot-WCDMA850

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
Body-Back (10mm)	826.4	WCDMA850	/	/	/	/	/	/	/
	836.6	WCDMA850	/	/	/	/	/	/	/
	846.6	WCDMA850	-2.051	22.67	22.70	1.007	0.280	**0.282**	**6#**
Body-Left (10mm)	826.4	WCDMA850	/	/	/	/	/	/	/
	836.6	WCDMA850	/	/	/	/	/	/	/
	846.6	WCDMA850	1.562	22.67	22.70	1.007	0.155	0.156	/
Body-Right (10mm)	826.4	WCDMA850	/	/	/	/	/	/	/
	836.6	WCDMA850	/	/	/	/	/	/	/
	846.6	WCDMA850	3.382	22.67	22.70	1.007	0.171	0.172	/
Body-Bottom (10mm)	826.4	WCDMA850	/	/	/	/	/	/	/
	836.6	WCDMA850	/	/	/	/	/	/	/
	846.6	WCDMA850	-2.074	22.67	22.70	1.007	0.096	0.097	/

Hot Spot-WCDMA 1900

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
Body-Back (10mm)	1852.4	WCDMA1900	/	/	/	/	/	/	/
	1880.0	WCDMA1900	/	/	/	/	/	/	/
	1907.6	WCDMA1900	-2.051	21.76	21.80	1.009	0.391	**0.395**	**8#**
Body-Left (10mm)	1852.4	WCDMA1900	/	/	/	/	/	/	/
	1880.0	WCDMA1900	/	/	/	/	/	/	/
	1907.6	WCDMA1900	-2.166	21.76	21.80	1.009	0.133	0.134	/
Body-Right (10mm)	1852.4	WCDMA1900	/	/	/	/	/	/	/
	1880.0	WCDMA1900	/	/	/	/	/	/	/
	1907.6	WCDMA1900	-3.341	21.76	21.80	1.009	0.152	0.153	/
Body-Bottom (10mm)	1852.4	WCDMA1900	/	/	/	/	/	/	/
	1880.0	WCDMA1900	/	/	/	/	/	/	/
	1907.6	WCDMA1900	1.882	21.76	21.80	1.009	0.316	0.319	/

Note:

1. When the 1-g SAR is ≤ 0.8W/Kg, testing for other channels are optional.
2. The default test configuration is to measure SA R with an established radio link between the EUT and a communication test set using a 12.2 kbps RMC (refere nce measurement Channel) Configured in Test Loop Model.
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 tole rance limit according to the power applied to the individual channels tested to determine compliance.

Hot Spot-LTE Band 2

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
Body-Back (10mm)	1860	1RB, Offset=0	/	/	/	/	/	/	/
	1880	1RB, Offset=0	1.859	22.34	22.40	1.014	0.272	**0.276**	**10#**
	1900	1RB, Offset=0	/	/	/	/	/	/	/
	1860	50%RB, Offset=0	-3.441	22.11	22.40	1.069	0.233	0.249	/
Body-Left (10mm)	1860	1RB, Offset=0	/	/	/	/	/	/	/
	1880	1RB, Offset=0	-0.977	22.34	22.40	1.014	0.089	0.090	/
	1900	1RB, Offset=0	/	/	/	/	/	/	/
	1860	50%RB, Offset=0	1.066	22.11	22.40	1.069	0.075	0.080	/
Body-Right (10mm)	1860	1RB, Offset=0	/	/	/	/	/	/	/
	1880	1RB, Offset=0	1.784	22.34	22.40	1.014	0.105	0.106	/
	1900	1RB, Offset=0	/	/	/	/	/	/	/
	1860	50%RB, Offset=0	3.185	22.11	22.40	1.069	0.077	0.082	/
Body-Bottom (10mm)	1860	1RB, Offset=0	/	/	/	/	/	/	/
	1880	1RB, Offset=0	1.633	22.34	22.40	1.014	0.189	0.192	/
	1900	1RB, Offset=0	/	/	/	/	/	/	/
	1860	50%RB, Offset=0	-2.184	22.11	22.40	1.069	0.192	0.205	/

Hot Spot-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
Body-Back (10mm)	1720	1RB, Offset=0	/	/	/	/	/	/	/
	1732.5	1RB, Offset=0	1.158	23.20	23.30	1.023	0.329	**0.337**	**12#**
	1745	1RB, Offset=0	/	/	/	/	/	/	/
	1720	50%RB, Offset=0	-0.568	22.97	23.30	1.079	0.277	0.299	/
Body-Left (10mm)	1720	1RB, Offset=0	/	/	/	/	/	/	/
	1732.5	1RB, Offset=0	-2.549	23.20	23.30	1.023	0.136	0.139	/
	1745	1RB, Offset=0	/	/	/	/	/	/	/
	1720	50%RB, Offset=0	1.620	22.97	23.30	1.079	0.125	0.135	/
Body-Right (10mm)	1720	1RB, Offset=0	/	/	/	/	/	/	/
	1732.5	1RB, Offset=0	0.844	23.20	23.30	1.023	0.153	0.157	/
	1745	1RB, Offset=0	/	/	/	/	/	/	/
	1720	50%RB, Offset=0	2.841	22.97	23.30	1.079	0.116	0.125	/
Body-Bottom (10mm)	1720	1RB, Offset=0	/	/	/	/	/	/	/
	1732.5	1RB, Offset=0	-2.668	23.20	23.30	1.023	0.257	0.263	/
	1745	1RB, Offset=0	/	/	/	/	/	/	/
	1720	50%RB, Offset=0	-1.034	22.97	23.30	1.079	0.207	0.223	/

Hot Spot-LTE Band 7

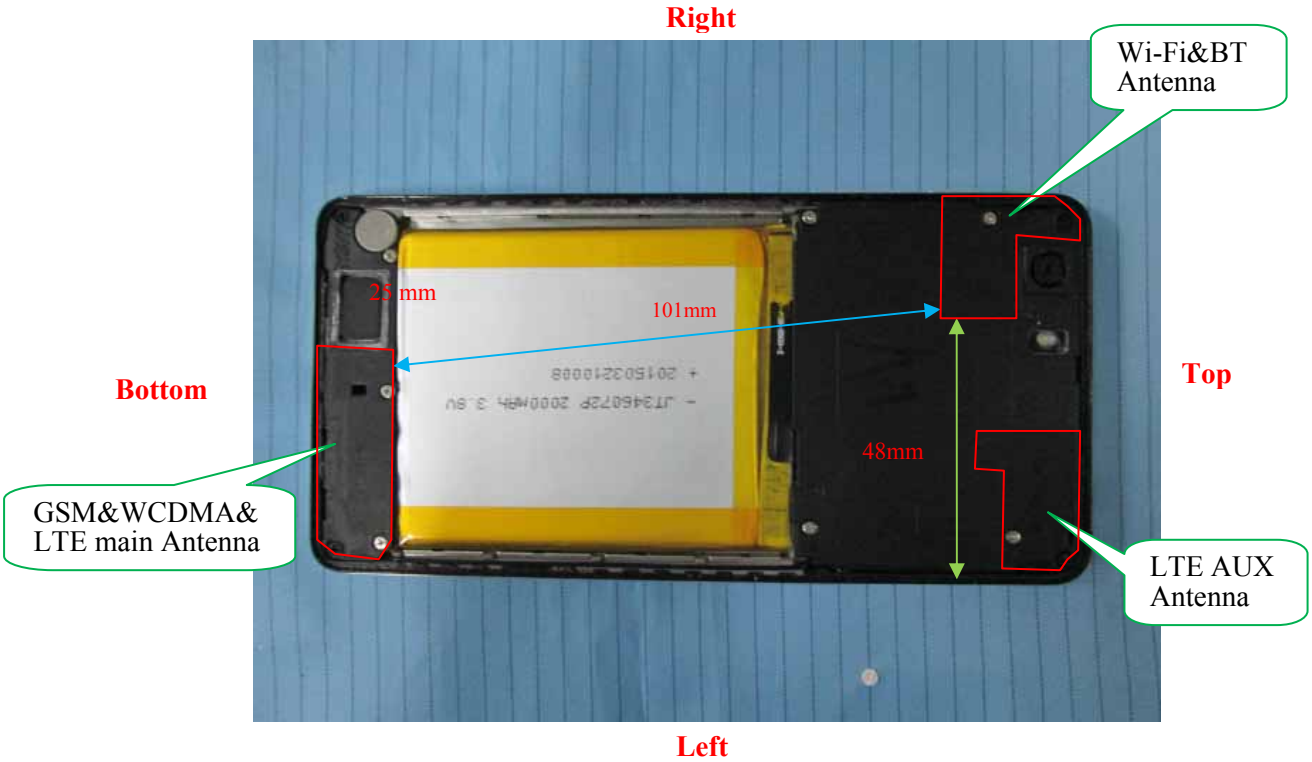
EUT Position	Frequency (MHz)	Test Mode	Power Drift (%)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/Kg)			
						Scaled Factor	Meas. SAR	Scaled SAR	Plot
Body-Back (10mm)	2510	1RB, Offset=0	/	/	/	/	/	/	/
	2535	1RB, Offset=0	1.158	22.57	22.60	1.007	0.307	**0.309**	**14#**
	2560	1RB, Offset=0	/	/	/	/	/	/	/
	2510	50%RB, Offset=24	-2.338	22.31	22.60	1.069	0.272	0.291	/
Body-Left (10mm)	2510	1RB, Offset=0	/	/	/	/	/	/	/
	2535	1RB, Offset=0	-3.540	22.57	22.60	1.007	0.116	0.117	/
	2560	1RB, Offset=0	/	/	/	/	/	/	/
	2510	50%RB, Offset=24	1.089	22.31	22.60	1.069	0.105	0.112	/
Body-Right (10mm)	2510	1RB, Offset=0	/	/	/	/	/	/	/
	2535	1RB, Offset=0	2.922	22.57	22.60	1.007	0.125	0.126	/
	2560	1RB, Offset=0	/	/	/	/	/	/	/
	2510	50%RB, Offset=24	1.126	22.31	22.60	1.069	0.099	0.106	/
Body-Bottom (10mm)	2510	1RB, Offset=0	/	/	/	/	/	0.000	/
	2535	1RB, Offset=0	-1.622	22.57	22.60	1.007	0.262	0.264	/
	2560	1RB, Offset=0	/	/	/	/	/	/	/
	2510	50%RB, Offset=24	0.661	22.31	22.60	1.069	0.257	0.275	/

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 (20M) 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. Worst case SAR for 50% RB allocation is selected to be tested.

SAR SIMULTANEOUS TRANSMISSION DESCRIPTION

BT& WLan and GSM&3G&4G Antennas Location:



Simultaneous Transmission:

Description of Simultaneous Transmit Capabilities			Antennas Distance (mm)
Transmitter Combination	Simultaneous?	Hotspot?	
GSM + WCDMA	×	×	0
GSM+LTE	×	×	0
GSM + Bluetooth	√	×	101
GSM + Wi-Fi	√	√	101
WCDMA+LTE	×	×	0
WCDMA+Bluetooth	√	×	101
WCDMA + Wi-Fi	√	√	101
LTE + Bluetooth	√	×	101
LTE + Wi-Fi	√	√	101

Standalone SAR test exclusion considerations

Mode	Frequency (MHz)	Pavg (dBm)	Pavg (mW)	Distance (mm)	Calculated value	Threshold (1-g)	SAR Test Exclusion
Wi-Fi	2450	9.50	8.91	0	**2.79**	3	YES
Bluetooth	2450	4.80	3.02	0	**0.95**	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)
Wi-Fi Head	2450	9.50	8.91	0	0.372
Wi-Fi Body	2450	9.50	8.91	10	0.186
BT Head	2450	4.80	3.02	0	0.126
BT Body	2450	4.80	3.02	10	0.063

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

Simultaneous and Hotspot SAR test exclusion considerations:

Mode (SAR1+SAR2)	Position	Reported SAR (W/kg)		ΣSAR < 1.6W/kg
		SAR1	SAR2	
GSM 850+BT	Left Head Cheek	0.338	0.126	0.464
	Left Head Tilt	0.175	0.126	0.301
	Right Head Cheek	0.272	0.126	0.398
	Right Head Tilt	0.160	0.126	0.286
	Body-Back-Headset	0.322	0.063	0.385
GPRS 850 +BT	Body-Back	0.460	0.063	0.523
	Body-Left	0.271	0.063	0.334
	Body-Right	0.229	0.063	0.292
	Body-Bottom	0.091	0.063	0.154
PCS 1900+BT	Left Head Cheek	0.201	0.126	0.327
	Left Head Tilt	0.089	0.126	0.215
	Right Head Cheek	0.163	0.126	0.289
	Right Head Tilt	0.086	0.126	0.212
	Body-Back-Headset	0.238	0.063	0.301
GPRS 1900 +BT	Body-Back	0.312	0.063	0.375
	Body-Left	0.078	0.063	0.141
	Body-Right	0.084	0.063	0.147
	Body-Bottom	0.230	0.063	0.293
GSM 850 +Wi-Fi	Left Head Cheek	0.338	0.372	0.710
	Left Head Tilt	0.175	0.372	0.547
	Right Head Cheek	0.272	0.372	0.644
	Right Head Tilt	0.160	0.372	0.532
	Body-Back-Headset	0.322	0.186	0.508
GSM 850 +Wi-Fi (Hotspot)	Body-Back	0.460	0.186	**0.646**
	Body-Left	0.271	0.186	0.457
	Body-Right	0.229	0.186	0.415
	Body-Bottom	0.091	0.186	0.277
PCS 1900 +Wi-Fi	Left Head Cheek	0.201	0.372	0.573
	Left Head Tilt	0.089	0.372	0.461
	Right Head Cheek	0.163	0.372	0.535
	Right Head Tilt	0.086	0.372	0.458
	Body-Back-Headset	0.238	0.186	0.424
PCS 1900 +Wi-Fi (Hotspot)	Body-Back	0.312	0.186	0.498
	Body-Left	0.078	0.186	0.264
	Body-Right	0.084	0.186	0.270
	Body-Bottom	0.230	0.186	0.416

Mode (SAR1+SAR2)	Position	Reported SAR (W/kg)		Σ SAR < 1.6W/kg
		SAR1	SAR2	
WCDMA 850 +BT	Left Head Cheek	0.226	0.126	0.352
	Left Head Tilt	0.147	0.126	0.273
	Right Head	0.196	0.126	0.322
	Right Head Tilt	0.152	0.126	0.278
	Body-Back	0.282	0.063	0.345
	Body-Left	0.156	0.063	0.219
	Body-Right	0.172	0.063	0.235
	Body-Bottom	0.097	0.063	0.160
WCDMA 1900 +BT	Left Head Cheek	0.278	0.126	0.404
	Left Head Tilt	0.156	0.126	0.282
	Right Head	0.234	0.126	0.360
	Right Head Tilt	0.142	0.126	0.268
	Body-Back	0.395	0.063	0.458
	Body-Left	0.134	0.063	0.197
	Body-Right	0.153	0.063	0.216
	Body-Bottom	0.319	0.063	0.382
WCDMA 850 +Wi-Fi	Left Head Cheek	0.226	0.372	0.598
	Left Head Tilt	0.147	0.372	0.519
	Right Head	0.196	0.372	0.568
	Right Head Tilt	0.152	0.372	0.524
WCDMA 850 +Wi-Fi (Hotspot)	Body-Back	0.282	0.186	0.468
	Body-Left	0.156	0.186	0.342
	Body-Right	0.172	0.186	0.358
	Body-Bottom	0.097	0.186	0.283
WCDMA 1900 +Wi-Fi	Left Head Cheek	0.278	0.372	0.650
	Left Head Tilt	0.156	0.372	0.528
	Right Head	0.234	0.372	0.606
	Right Head Tilt	0.142	0.372	0.514
WCDMA 1900 +Wi-Fi (Hotspot)	Body-Back	0.395	0.186	0.581
	Body-Left	0.134	0.186	0.320
	Body-Right	0.153	0.186	0.339
	Body-Bottom	0.319	0.186	0.505

Mode(SAR1+SAR2)	Position	Reported SAR(W/kg)		ΣSAR < 1.6W/kg
		SAR1	SAR2	
LTE Band 2+BT	Left Head Cheek	0.159	0.126	0.285
	Left Head Tilt	0.090	0.126	0.216
	Right Head Cheek	0.154	0.126	0.280
	Right Head Tilt	0.083	0.126	0.209
	Body-Back	0.276	0.063	0.339
	Body-Left	0.090	0.063	0.153
	Body-Right	0.106	0.063	0.169
	Body-Bottom	0.205	0.063	0.268
LTE Band 4+BT	Left Head Cheek	0.225	0.126	0.351
	Left Head Tilt	0.100	0.126	0.226
	Right Head Cheek	0.207	0.126	0.333
	Right Head Tilt	0.118	0.126	0.244
	Body-Back	0.337	0.063	0.400
	Body-Left	0.139	0.063	0.202
	Body-Right	0.157	0.063	0.220
	Body-Bottom	0.263	0.063	0.326
LTE Band 7+BT	Left Head Cheek	0.360	0.126	0.486
	Left Head Tilt	0.160	0.126	0.286
	Right Head Cheek	0.328	0.126	0.454
	Right Head Tilt	0.163	0.126	0.289
	Body-Back	0.309	0.063	0.372
	Body-Left	0.117	0.063	0.180
	Body-Right	0.126	0.063	0.189
	Body-Bottom	0.275	0.063	0.338
LTE Band 17+BT	Left Head Cheek	0.148	0.126	0.274
	Left Head Tilt	0.105	0.126	0.231
	Right Head Cheek	0.158	0.126	0.284
	Right Head Tilt	0.094	0.126	0.220
	Body-Back	0.240	0.063	0.030
	Body-Left	0.135	0.063	0.198
	Body-Right	0.160	0.063	0.223
	Body-Bottom	0.082	0.063	0.145
LTE Band 2 +Wi-Fi	Left Head Cheek	0.159	0.372	0.531
	Left Head Tilt	0.090	0.372	0.462
	Right Head Cheek	0.154	0.372	0.526
	Right Head Tilt	0.083	0.372	0.455
LTE Band 2 +Wi-Fi (Hotspot)	Body-Back	0.276	0.186	0.462
	Body-Left	0.090	0.186	0.276
	Body-Right	0.106	0.186	0.292
	Body-Bottom	0.205	0.186	0.391
LTE Band 4 +Wi-Fi	Left Head Cheek	0.225	0.372	0.597
	Left Head Tilt	0.100	0.372	0.472
	Right Head Cheek	0.207	0.372	0.579
	Right Head Tilt	0.118	0.372	0.490

LTE Band 4 +Wi-Fi (Hotspot)	Body-Back	0.337	0.186	0.523
	Body-Left	0.139	0.186	0.325
	Body-Right	0.157	0.186	0.343
	Body-Bottom	0.263	0.186	0.449
LTE Band 7 +Wi-Fi	Left Head Cheek	0.360	0.372	**0.732**
	Left Head Tilt	0.160	0.372	0.532
	Right Head Cheek	0.328	0.372	0.700
	Right Head Tilt	0.163	0.372	0.535
LTE Band 7 +Wi-Fi (Hotspot)	Body-Back	0.309	0.186	0.495
	Body-Left	0.117	0.186	0.303
	Body-Right	0.126	0.186	0.312
	Body-Bottom	0.275	0.186	0.461
LTE Band 7 +Wi-Fi	Left Head Cheek	0.148	0.372	0.520
	Left Head Tilt	0.105	0.372	0.477
	Right Head Cheek	0.158	0.372	0.530
	Right Head Tilt	0.094	0.372	0.466
LTE Band 17 +Wi-Fi (Hotspot)	Body-Back	0.240	0.186	0.426
	Body-Left	0.135	0.186	0.321
	Body-Right	0.160	0.186	0.346
	Body-Bottom	0.082	0.186	0.268

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

SAR Plots (Summary of the Highest SAR Values)

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

Test Plot 1#:GSM 850 Left-Cheek Low Channel

DUT: mobile product; Type: S500

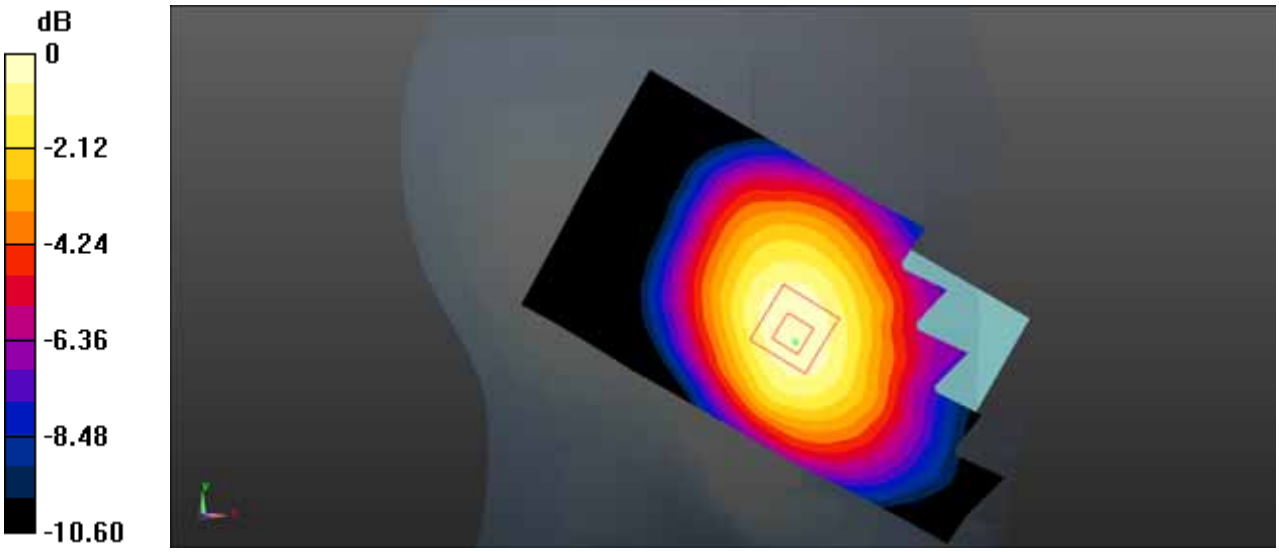
Communication System:Generic GSM ; Frequency: 824.2 MHz;Duty Cycle: 1:8
Medium parameters used: f = 824.2 MHz; σ = 0.90 S/m; ε_r = 41.09; ρ = 1000 kg/m^3
Phantom section: Left Section

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 Head Left Cheek/Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.375 W/kg

Head/GSM 850 Head Left Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.885 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.527 W/kg
SAR(1 g) = 0.333 W/kg; SAR(10 g) = 0.226 W/kg
Maximum value of SAR (measured) = 0.357 W/kg



0 dB = 0.357 W/kg = -4.47 dBW/kg

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

Test Plot 2#:GSM 850 Back Low Channel

DUT: mobile product; Type: S500

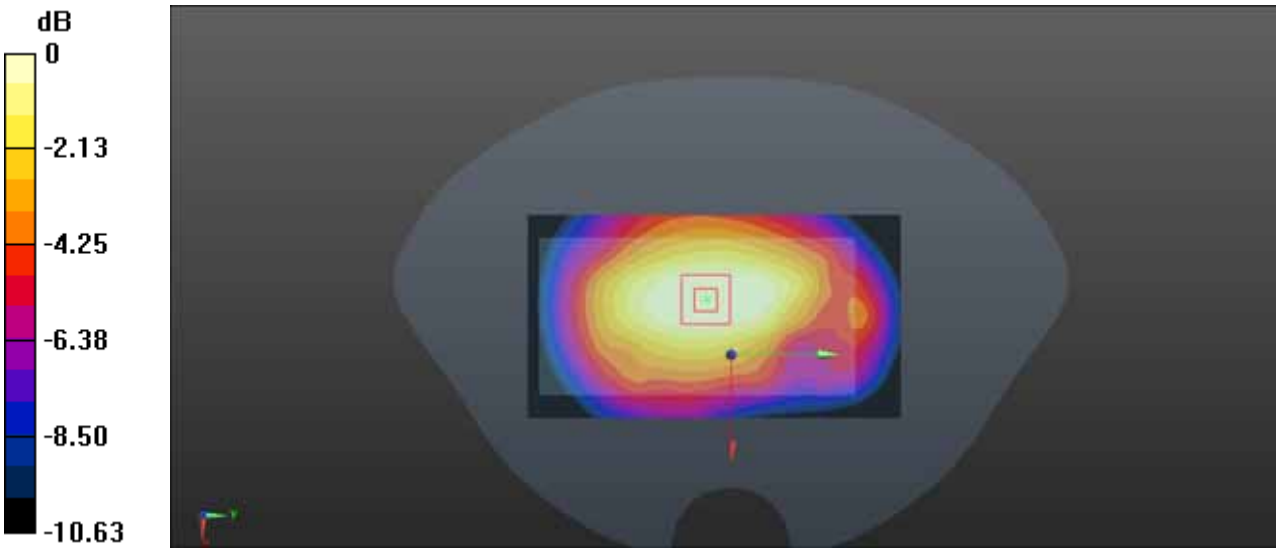
Communication System:Generic GPRS-2 SLOT ; Frequency: 824.2 MHz;Duty Cycle: 1:4
Medium parameters used: f = 824.2 MHz; σ = 0.95 S/m; ε_r = 53.78; ρ = 1000 kg/m^3
Phantom section: Flat Section

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/GSM 850 Back/Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.482 W/kg

Body/GSM 850 Back/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.85 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.616 W/kg
SAR(1 g) = 0.452 W/kg; SAR(10 g) = 0.310 W/kg
Maximum value of SAR (measured) = 0.462 W/kg



0 dB = 0.462 W/kg = -3.35 dBW/kg

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

Test Plot 3#:PCS 1900 Left Cheek Low Channel

DUT: mobile product; Type: S500

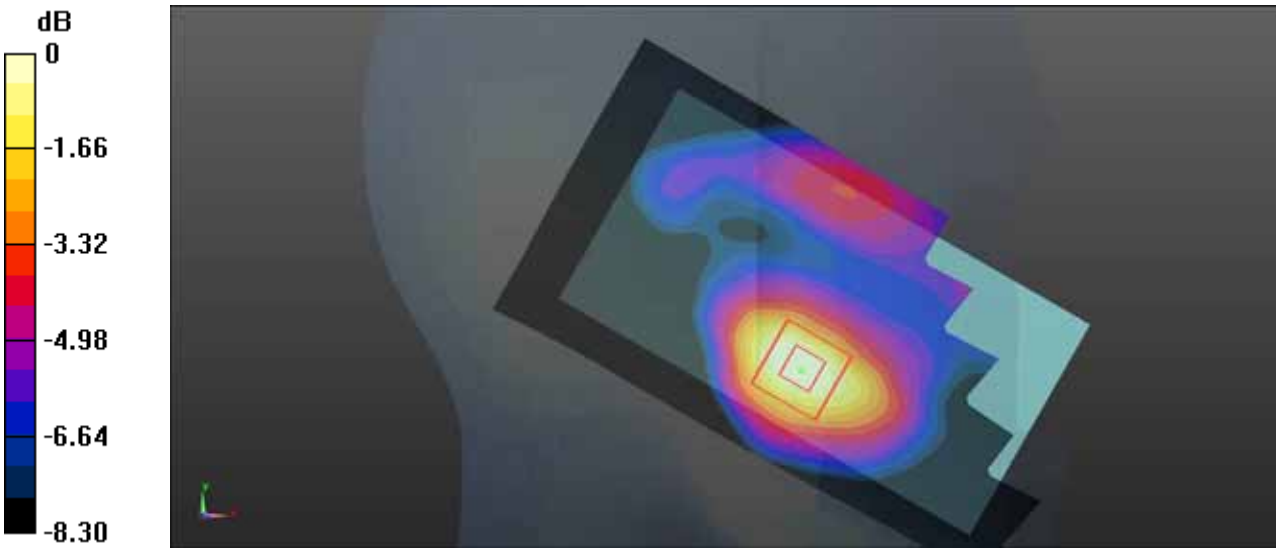
Communication System:Generic GSM ; Frequency: 1850.2 MHz;Duty Cycle: 1:8
Medium parameters used: f = 1850.2 MHz; σ = 1.37 S/m; ε_r = 39.62; ρ = 1000 kg/m^3
Phantom section: Left Section

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);

Head 2/PCS 1900/Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.227 W/kg

Head 2/PCS 1900/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.431 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.295 W/kg
SAR(1 g) = 0.193 W/kg; SAR(10 g) = 0.115 W/kg
Maximum value of SAR (measured) = 0.218 W/kg



0 dB = 0.218 W/kg = -6.64 dBW/kg

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

Test Plot 4#:PCS 1900 Back High Channel

DUT: mobile product; Type: S500

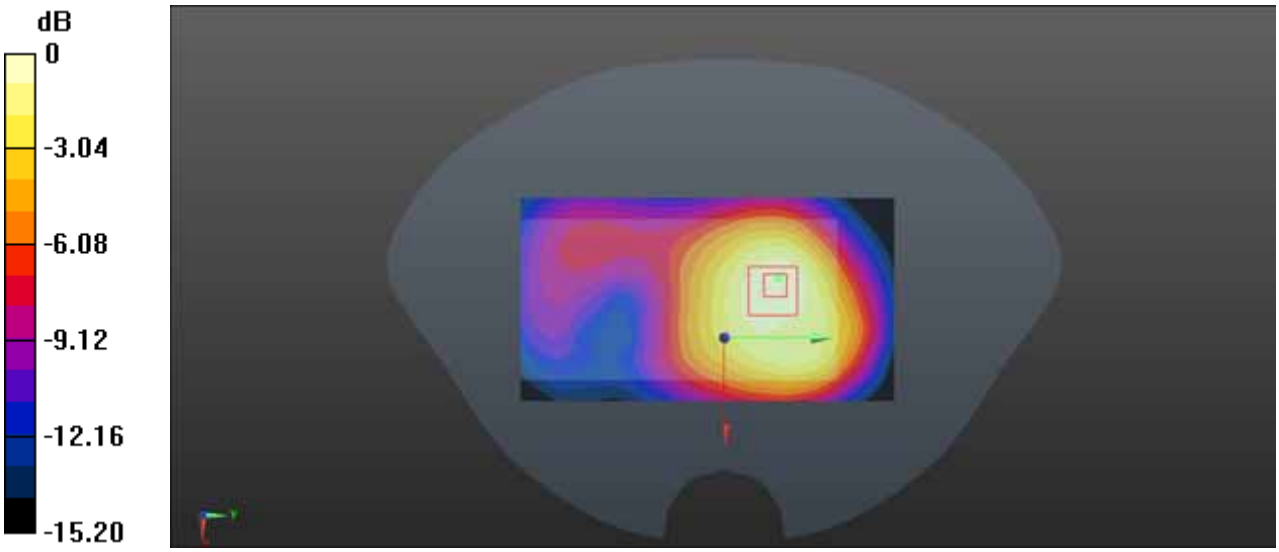
Communication System:Generic GPRS-2 SLOT ; Frequency: 1909.8 MHz;Duty Cycle: 1:4
Medium parameters used: f = 1909.8 MHz; σ = 1.54 S/m; ε_r = 52.01; ρ = 1000 kg/m^3
Phantom section: Flat Section

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 2/PCS 1900 Back/Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.325 W/kg

Body 2/PCS 1900 Back/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.402 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.463 W/kg
SAR(1 g) = 0.306 W/kg; SAR(10 g) = 0.192 W/kg
Maximum value of SAR (measured) = 0.335 W/kg



0 dB = 0.335 W/kg = -4.75 dBW/kg

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

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

DUT: mobile product; Type: S500

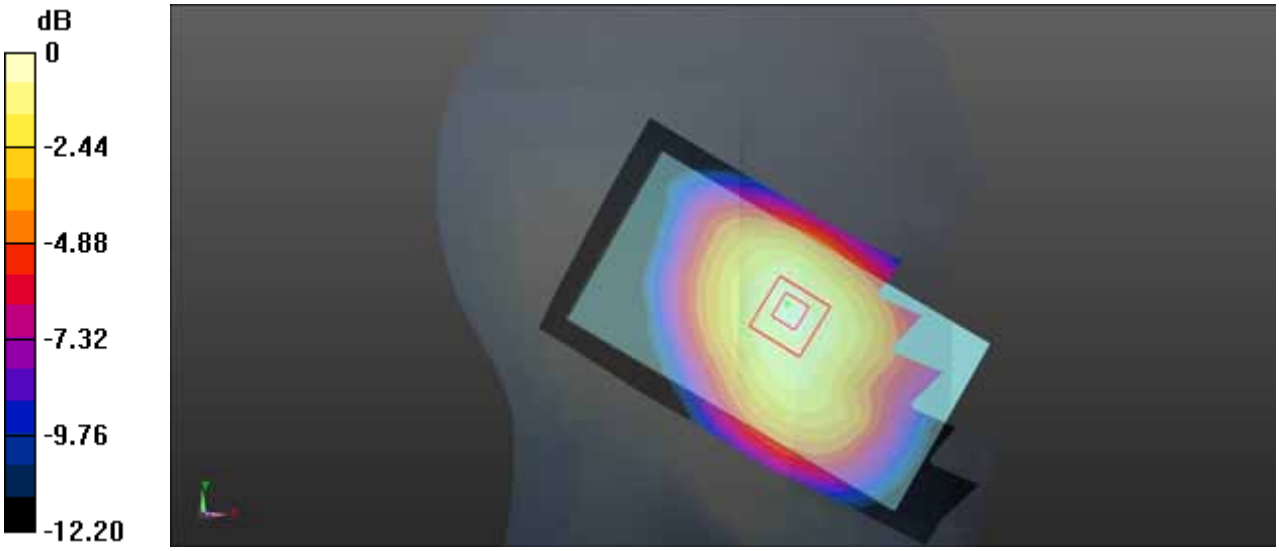
Communication System:BAND V ; Frequency: 846.6 MHz;Duty Cycle: 1:1
Medium parameters used: f = 848.8 MHz; σ = 0.92 S/m; ε_r = 41.03; ρ = 1000 kg/m^3
Phantom section: Left Section

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 Head Left Cheek/Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.257 W/kg

Head/WCDMA 850 Head Left Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.552 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.368 W/kg
SAR(1 g) = 0.224 W/kg; SAR(10 g) = 0.156 W/kg
Maximum value of SAR (measured) = 0.237 W/kg



0 dB = 0.237 W/kg = -6.25 dBW/kg

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

Test Plot 6#:WCDMA 850 Back High Channel

DUT: mobile product; Type: S500

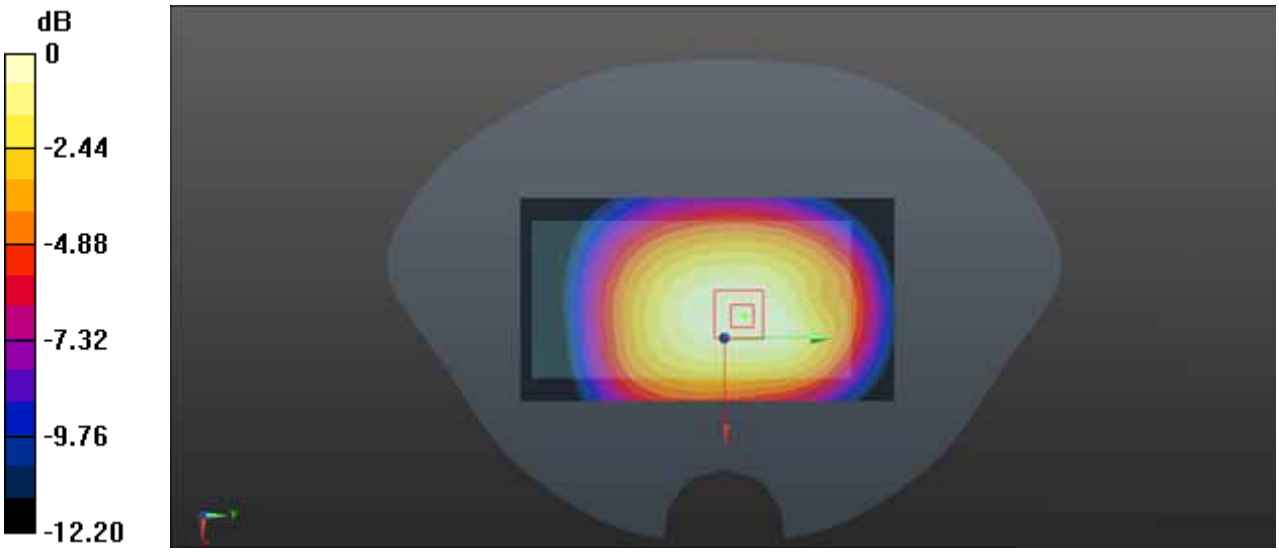
Communication System:BAND V ; Frequency: 846.6 MHz;Duty Cycle: 1:1
Medium parameters used: f = 848.8 MHz; σ = 0.98 S/m; ε_r = 53.81; ρ = 1000 kg/m^3
Phantom section: Flat Section

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 Back/Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.313 W/kg

Body/WCDMA 850 Back/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.94 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.405 W/kg
SAR(1 g) = 0.280 W/kg; SAR(10 g) = 0.195 W/kg
Maximum value of SAR (measured) = 0.296 W/kg



0 dB = 0.296 W/kg = -5.29 dBW/kg

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

Test Plot 7#:WCDMA 1900 Left Cheek High Channel

DUT: mobile product; Type: S500

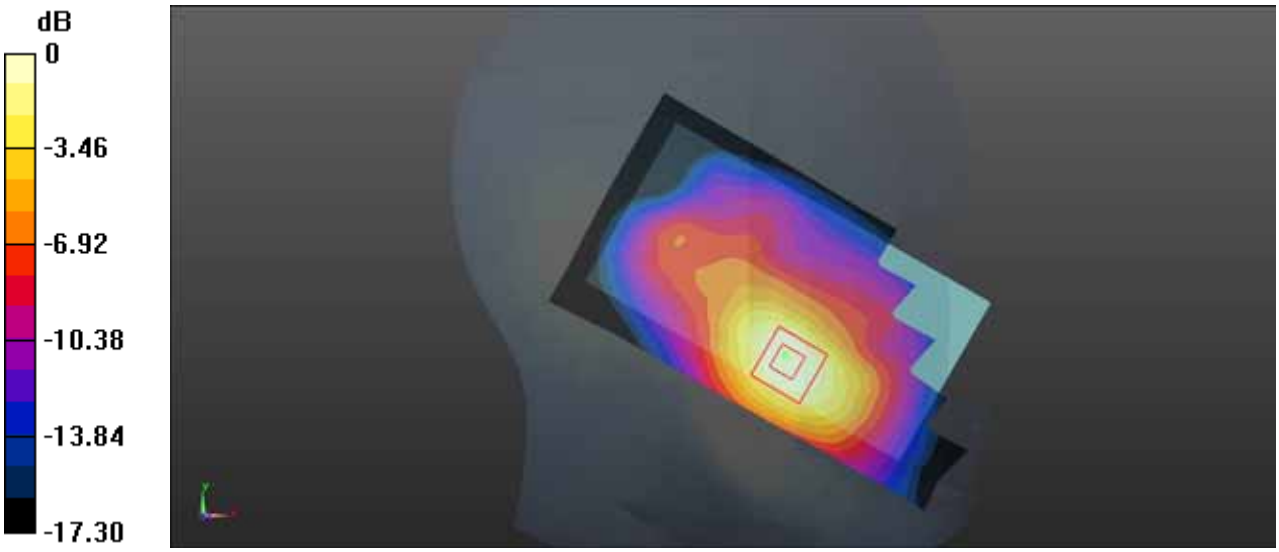
Communication System:BAND II ; Frequency: 1907.6 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1907.6 MHz; σ = 1.42 S/m; ε_r = 39.69; ρ = 1000 kg/m^3
Phantom section: Left Section

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);

Head/WCDMA 1900 Left Cheek/Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.368 W/kg

Head/WCDMA 1900 Left Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.763 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.449 W/kg
SAR(1 g) = 0.275W/kg; SAR(10 g) = 0.167 W/kg
Maximum value of SAR (measured) = 0.343 W/kg



0 dB = 0.343 W/kg = -4.65 dBW/kg

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

Test Plot 8#:WCDMA 1900 Back High Channel

DUT: mobile product; Type: S500

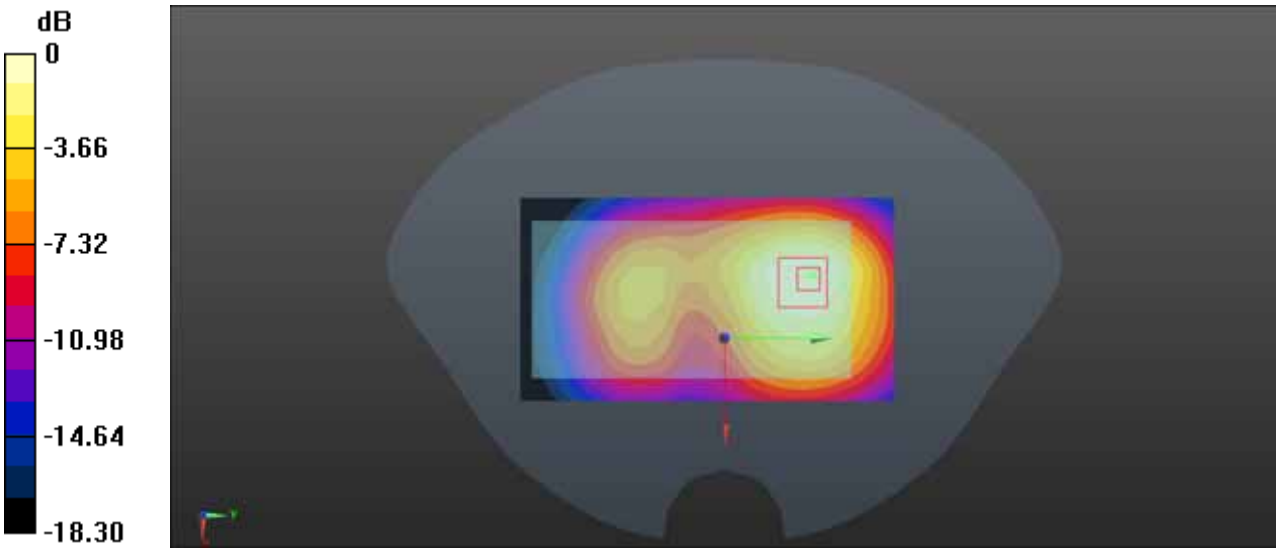
Communication System:BAND II ; Frequency: 1907.6 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1907.6 MHz; σ = 1.54 S/m; ε_r = 52.03; ρ = 1000 kg/m^3
Phantom section: Flat Section

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) = 0.420 W/kg

Body/WCDMA 1900 Back/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.953 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.585 W/kg
SAR(1 g) = 0.391 W/kg; SAR(10 g) = 0.231 W/kg
Maximum value of SAR (measured) = 0.432 W/kg



0 dB = 0.432 W/kg = -3.65 dBW/kg

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

Test Plot 9#:LTE Band 2 Left-Cheek Middle Channel

DUT: mobile product; Type: S500

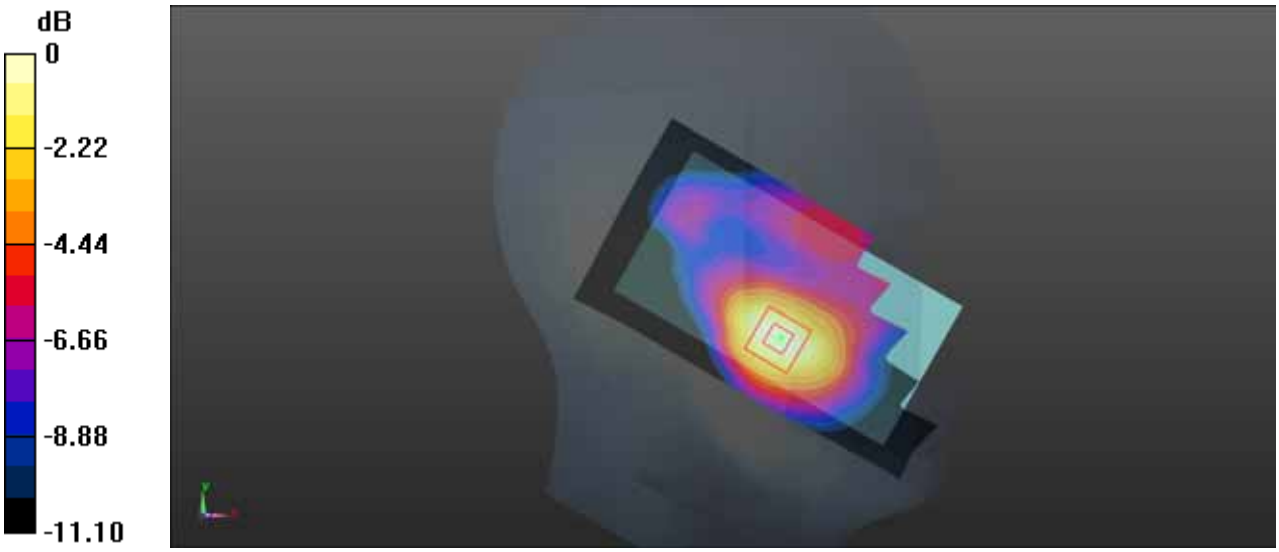
Communication System:Generic LTE ; Frequency: 1880.0 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880.0 MHz; σ = 1.40 S/m; ε_r = 39.671; ρ = 1000 kg/m^3
Phantom section: Left Section

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 2 Head Left Cheek/Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.185 W/kg

Head/LTE Band 2 Head Left Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.860 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.264W/kg
SAR(1 g) = 0.157 W/kg; SAR(10 g) = 0.091 W/kg
Maximum value of SAR (measured) = 0.176 W/kg



0 dB = 0.176 W/kg = -7.54 dBW/kg

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

Test Plot 10#:LTE Band 2 Back Middle Channel

DUT: mobile product; Type: S500

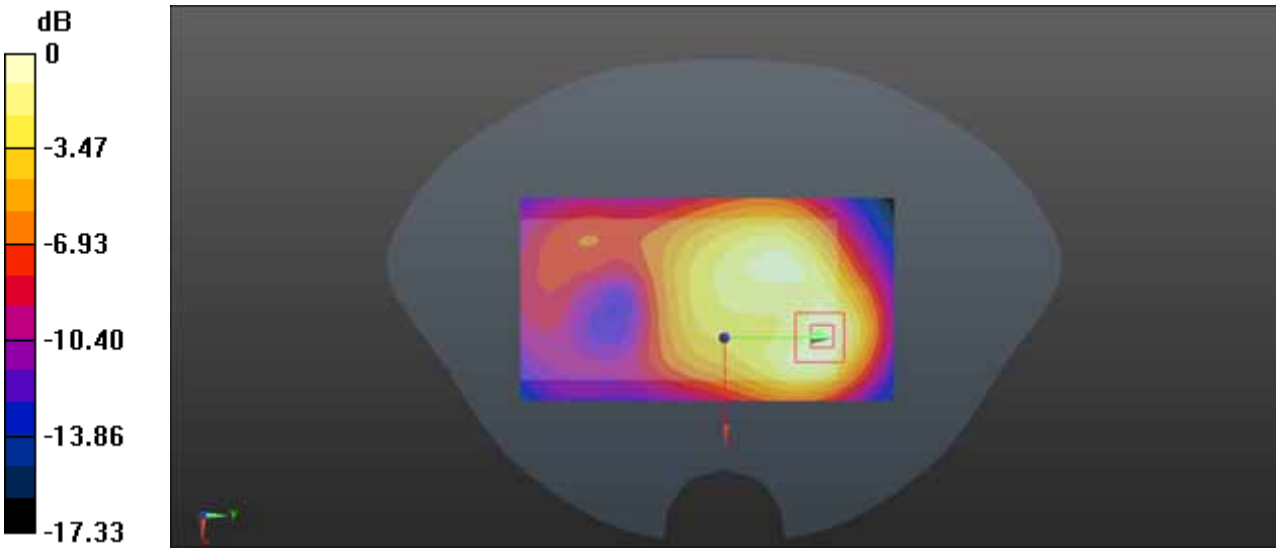
Communication System:Generic LTE ; Frequency: 1880.0 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880.0 MHz; σ = 1.51 S/m; ε_r = 51.79; ρ = 1000 kg/m^3
Phantom section: Flat Section

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);

Body/LTE Band 2 Back/Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.330 W/kg

Body/LTE Band 2 Back/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.56 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.456 W/kg
SAR(1 g) = 0.272 W/kg; SAR(10 g) = 0.156 W/kg
Maximum value of SAR (measured) = 0.311 W/kg



0 dB = 0.311 W/kg = -5.07 dBW/kg

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

Test Plot 11#:LTE Band 4 Left-Cheek Middle Channel

DUT: mobile product; Type: S500

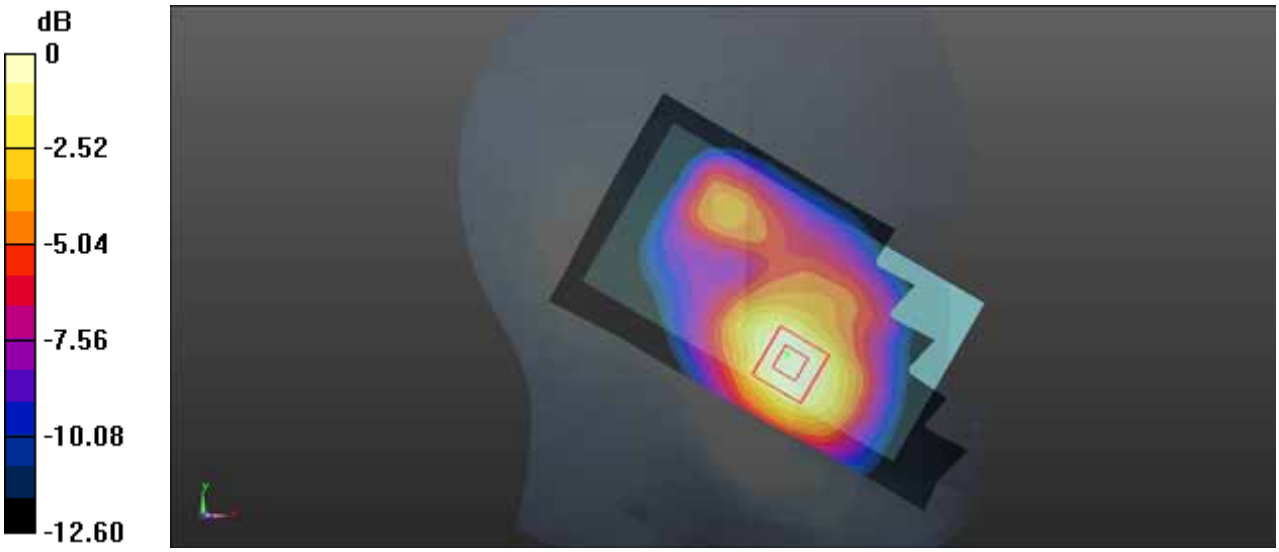
Communication System:Generic LTE ; Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1732.5 MHz; σ = 1.40 S/m; ε_r = 39.51; ρ = 1000 kg/m^3
Phantom section: Left Section

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 Head Left Cheek/Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.225 W/kg

Head/LTE Band 4 Head Left Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.025 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.315 W/kg
SAR(1 g) = 0.220 W/kg; SAR(10 g) = 0.131 W/kg
Maximum value of SAR (measured) = 0.237 W/kg



0 dB = 0.237 W/kg = -6.25 dBW/kg

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

Test Plot 12#:LTE Band 4 Back Middle Channel

DUT: mobile product; Type: S500

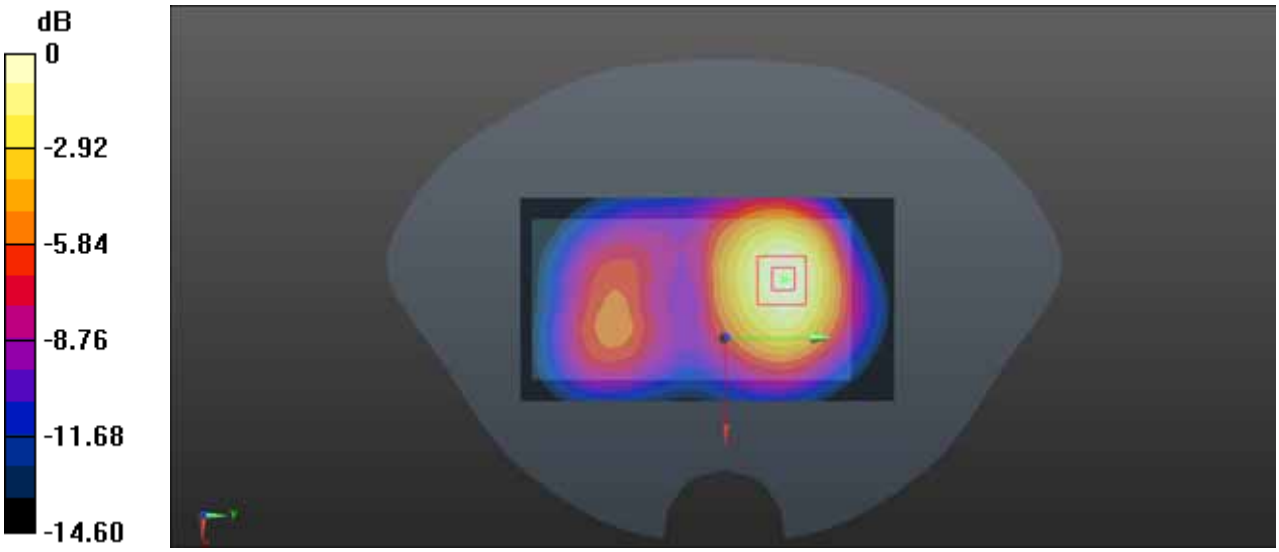
Communication System:Generic LTE ; Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1732.5 MHz; σ = 1.51 S/m; ε_r = 51.90; ρ = 1000 kg/m^3
Phantom section: Flat Section

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);

Body/LTE Band 4 Back/Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.375 W/kg

Body/LTE Band 4 Back/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.69 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.527 W/kg
SAR(1 g) = 0.329 W/kg; SAR(10 g) = 0.168 W/kg
Maximum value of SAR (measured) = 0.362 W/kg



0 dB = 0.362 W/kg = -4.41 dBW/kg

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

Test Plot 13#:LTE Band 7 Left-Cheek Middle Channel

DUT: mobile product; Type: S500

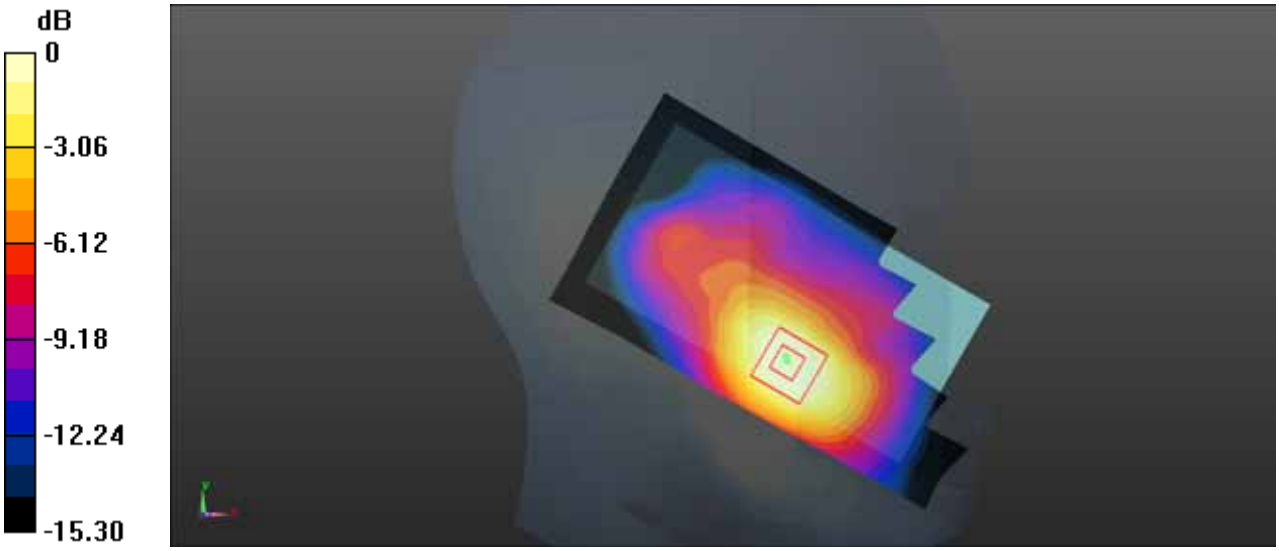
Communication System:Generic LTE ; Frequency: 2535 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2535 MHz; σ = 1.79 S/m; ε_r = 39.61; ρ = 1000 kg/m^3
Phantom section: Left Section

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 7 Head Left Cheek/Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.411 W/kg

Head/LTE Band 7 Head Left Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.460 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.563 W/kg
SAR(1 g) = 0.358 W/kg; SAR(10 g) = 0.202 W/kg
Maximum value of SAR (measured) = 0.389 W/kg



0 dB = 0.389 W/kg = -4.10 dBW/kg

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

Test Plot 14#:LTE Band 7 Back Middle Channel

DUT: mobile product; Type: S500

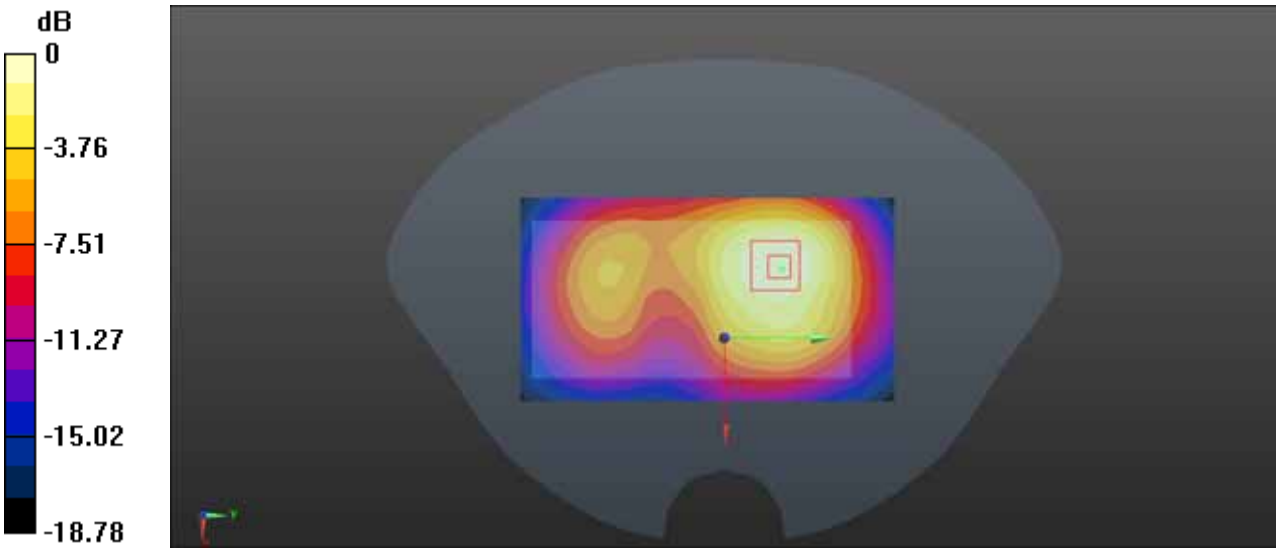
Communication System:Generic LTE ; Frequency: 2535 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2535 MHz; σ = 1.93 S/m; ε_r = 51.80; ρ = 1000 kg/m^3
Phantom section: Flat Section

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);

Body/LTE Band 7 Back/Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.39 W/kg

Body/LTE Band 7 Back/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.31 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.455 W/kg
SAR(1 g) = 0.307 W/kg; SAR(10 g) = 0.183 W/kg
Maximum value of SAR (measured) = 0.335 W/kg



0 dB = 0.335 W/kg = -4.75 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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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 (μV/(V/m)^2)[A]	0.48	0.43	0.46	± 10.1 %
DCP (mV)[B]	96.7	97.6	94.2	

Modulation Calibration Parameters

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

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

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

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.

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

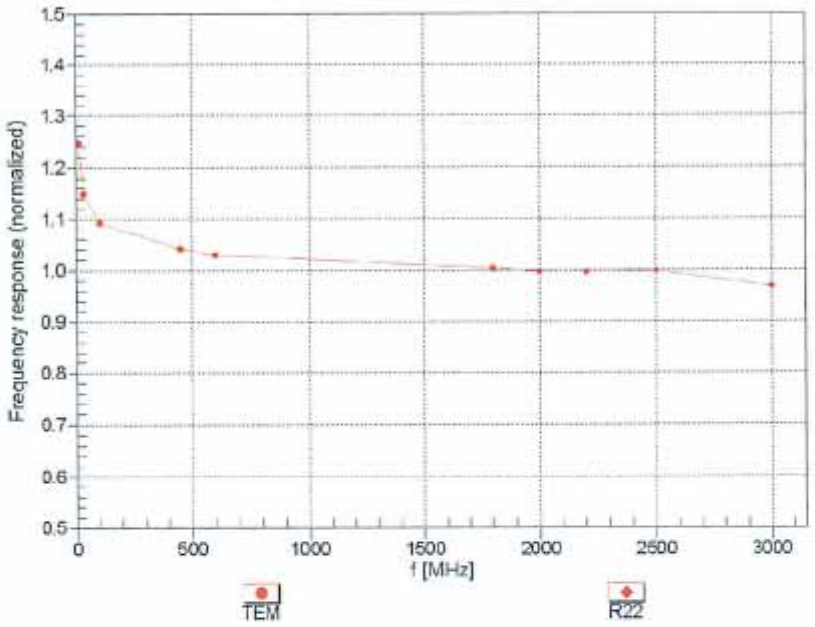
Calibration Parameter Determined in Body Tissue Simulating Media

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)

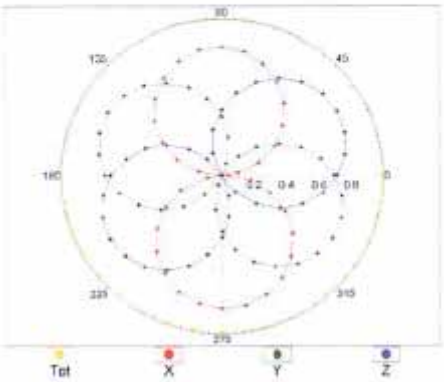


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

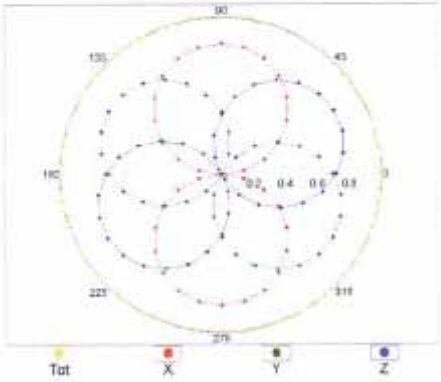
EX3DV4– SN:7329 February 5, 2015

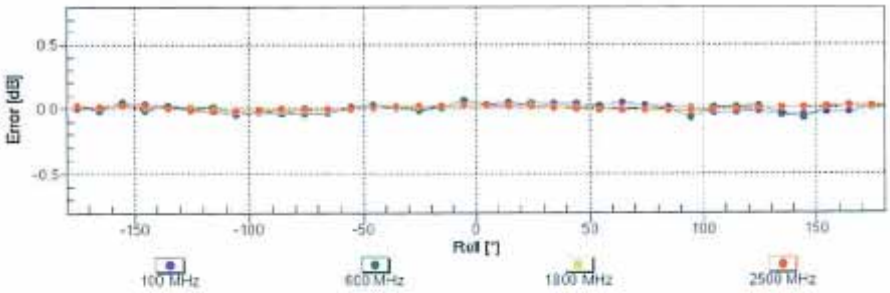
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



f=1800 MHz,R22





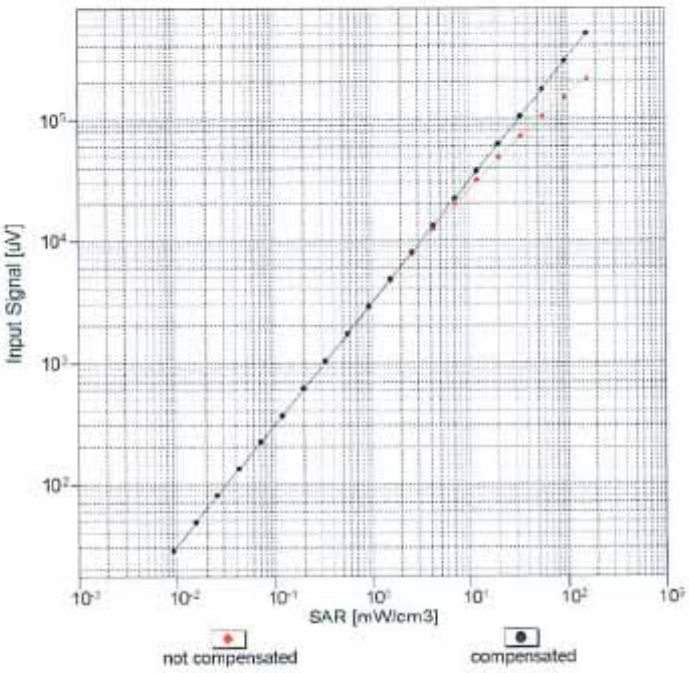
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

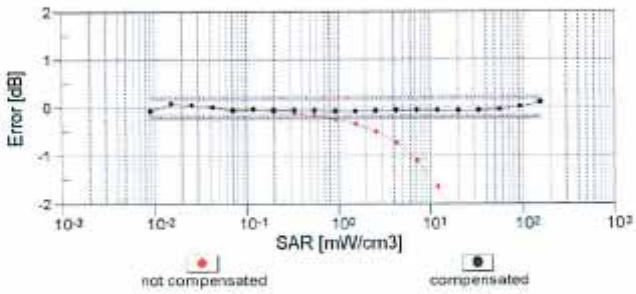
Certificate No: EX3-7329_Feb15 Page 8 of 11

EX3DV4– SN:7329 February 5, 2015

Dynamic Range f(SAR$_{head}$)

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





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

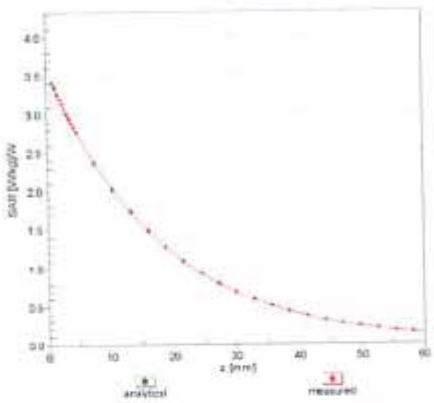
Certificate No: EX3-7329_Feb15 Page 9 of 11

EX3DV4– SN:7329

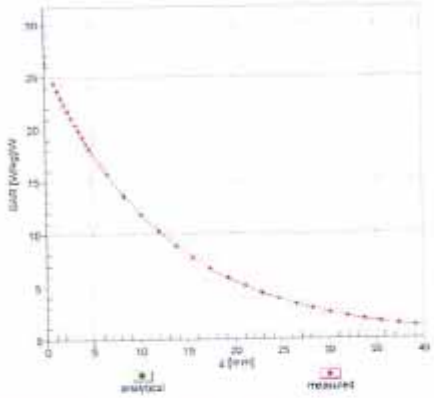
February 5, 2015

Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)

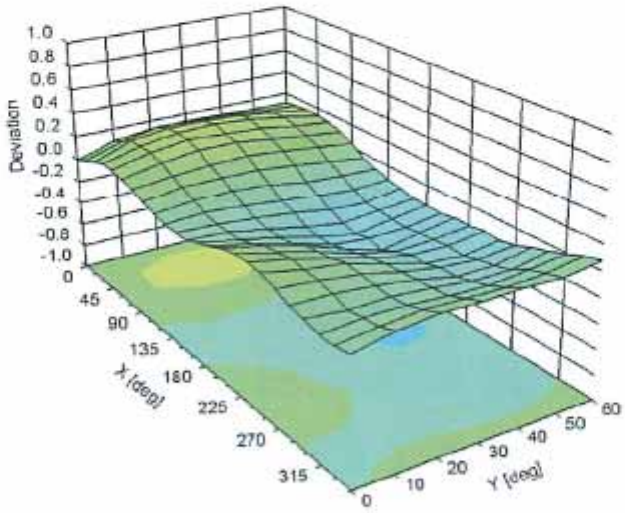


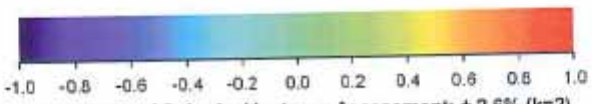
f = 1750 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





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

Certificate No: EX3-7329_Feb15 Page 10 of 11

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

Other Probe Parameters

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

APPENDIX C DIPOLE CALIBRATION CERTIFICATES

NCL CALIBRATION LABORATORIES

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

CERTIFICATE OF CALIBRATION

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

Validation Dipole(Head and Body)

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

Customer: Bay Area Compliance Laboratory (China)

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

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

Released By: _____
Art Brennan, Quality Manager

NCL CALIBRATION LABORATORIES

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

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

NCL Calibration Laboratories
Division of APREL Laboratories.

Conditions

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

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

Attestation

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

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

Art Brennan, Quality Manager

Maryna Nesterova Calibration Engineer

Primary Measurement Standards

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

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

NCL Calibration Laboratories
Division of APREL Laboratories.

Calibration Results Summary

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

Mechanical Dimensions

Length: 162.2 mm
Height: 89.4 mm

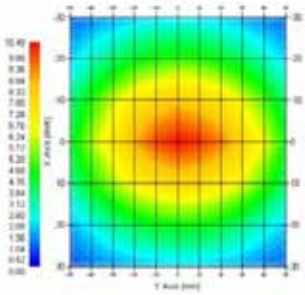
Electrical Specification

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

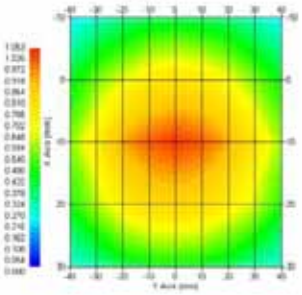
System Validation Results

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

Body



Head



3

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 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)**

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
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	49.001Ω
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

5

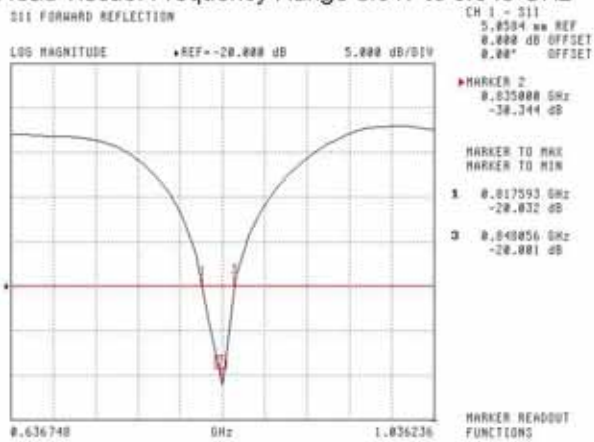
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories
Division of APREL Laboratories.

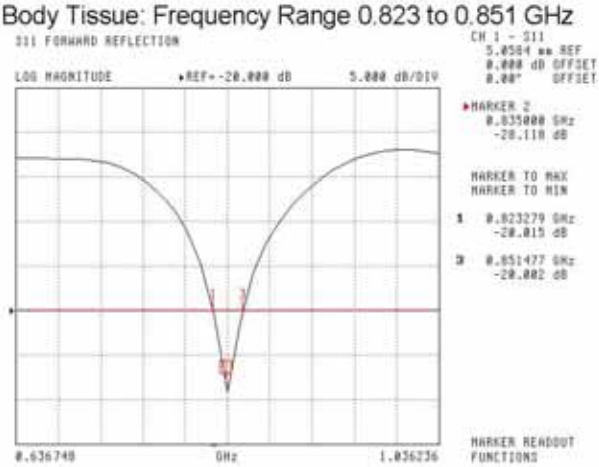
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head Tissue: Frequency Range 0.817 to 0.848 GHz



Body Tissue: Frequency Range 0.823 to 0.851 GHz



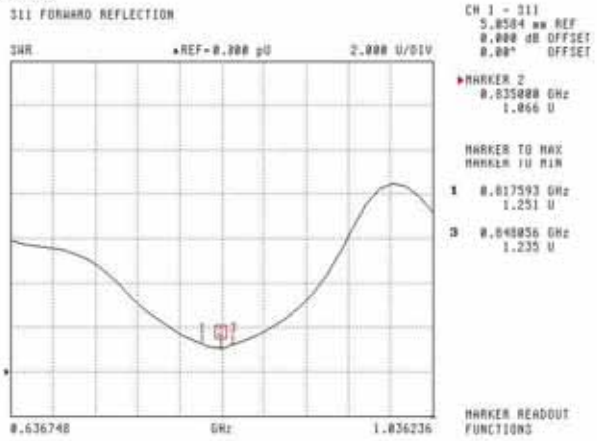
6

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

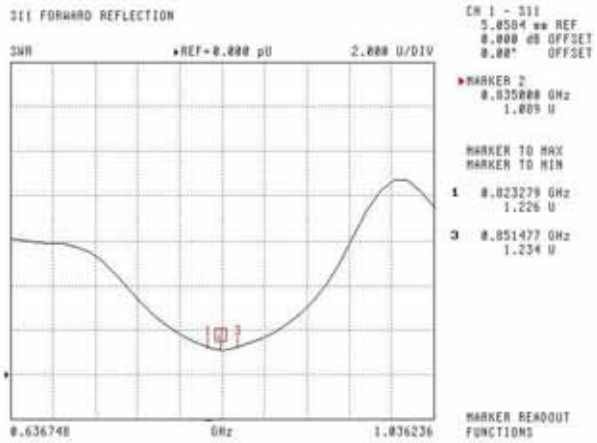
NCL Calibration Laboratories
Division of APREL Laboratories.

SWR

Head



Body



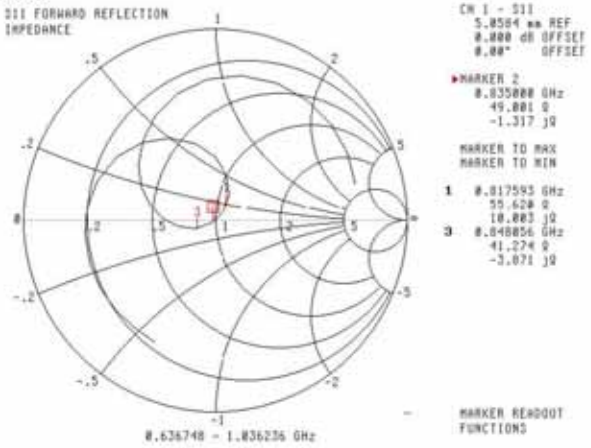
7

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

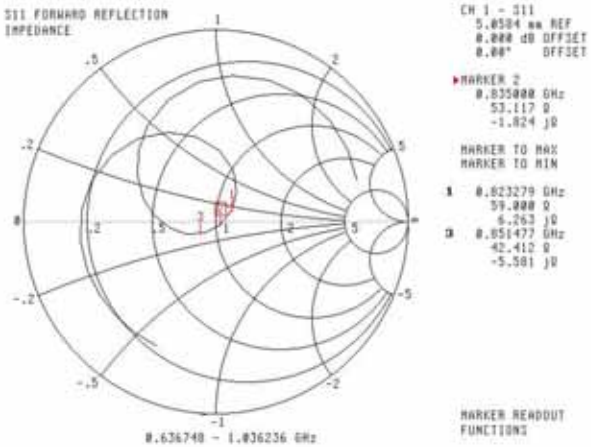
NCL Calibration Laboratories
Division of APREL Laboratories.

Smith Chart Dipole Impedance

Head



Body



8

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

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.

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

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.

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

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

Constantin Teodorian, Test Engineer

2

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: 75 mm
Height: 42 mm

Electrical Calibration

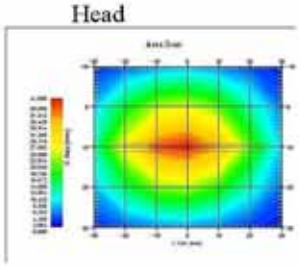
Test	Result Head	Result Body
S11 R/L	-25.567	-20.548 dB
SWR	1.111U	1.207 U
Impedance	53.637Ω	55.929 Ω

System Validation Results, 1750 MHz

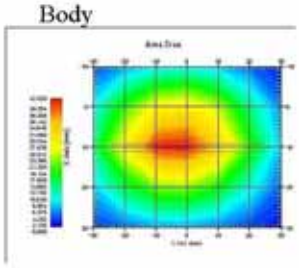
	1g	10g
Head	37.02	18.99
Body	36.65	18.85

Type	Epsilon	Sigma
Head	38.51	1.36
Body	51.79	1.53

Head



Body



3

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)**

4

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

NCL Calibration Laboratories
Division of APREL Laboratories.

Dipole Calibration Results

Mechanical Verification

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

5

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

NCL Calibration Laboratories

Division of APREL Laboratories.

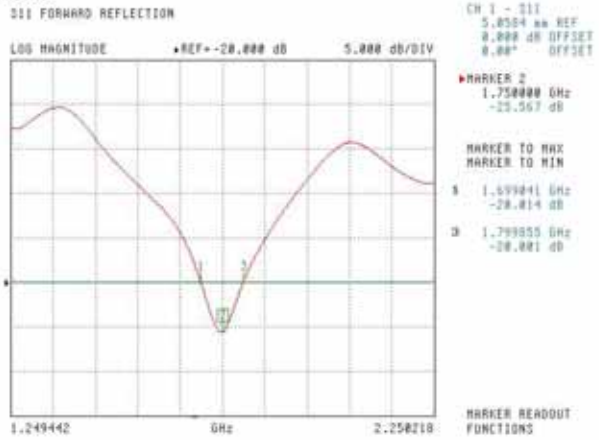
Electrical Calibration

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

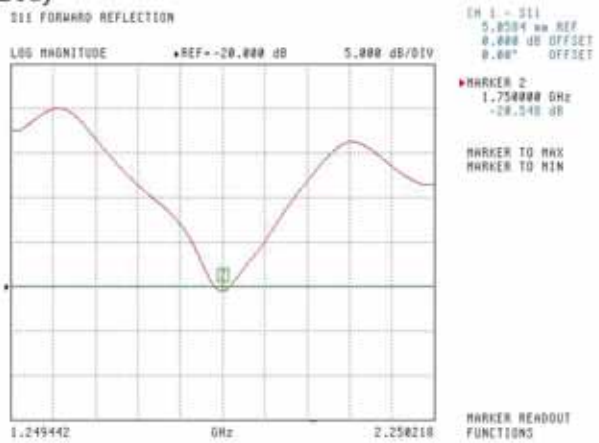
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head



Body



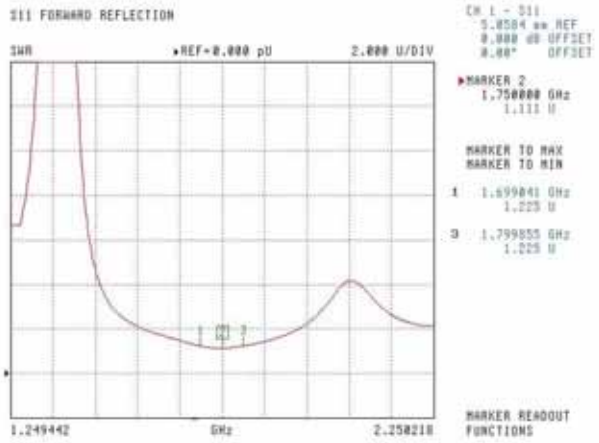
6

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

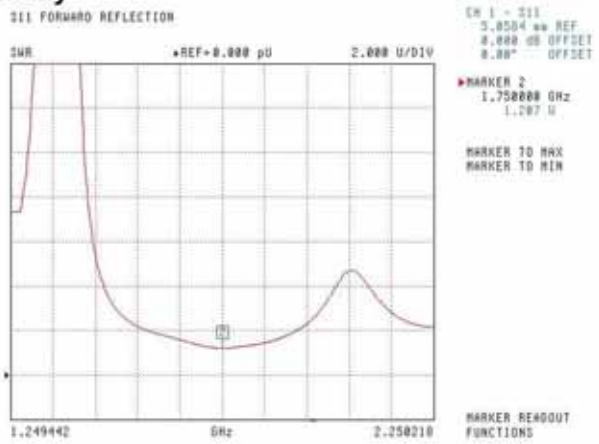
NCL Calibration Laboratories
Division of APREL Laboratories.

SWR

Head



Body



7

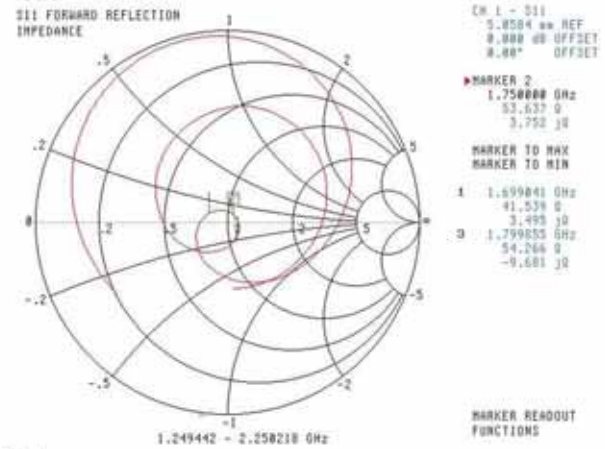
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories

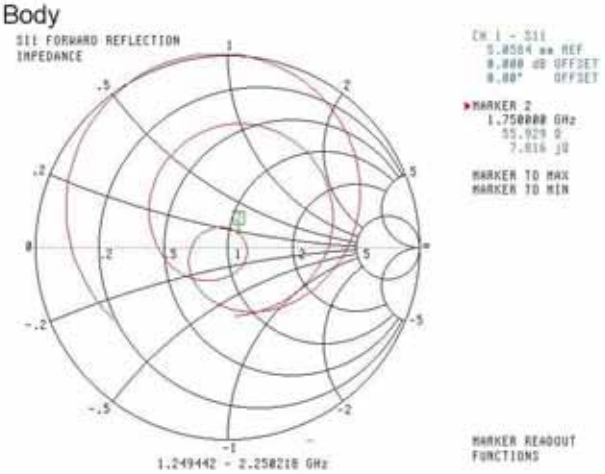
Division of APREL Laboratories.

Smith Chart Dipole Impedance

Head



Body



8

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

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
.

9

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

NCL CALIBRATION LABORATORIES

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

CERTIFICATE OF CALIBRATION

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

Validation Dipole (Head & Body)

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

Customer: Bay Area Compliance Laboratory (China)

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

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

Released By: _____
Art Brennan, Quality Manager

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

NCL Calibration Laboratories
Division of APREL Laboratories.

Conditions

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

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

Attestation

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

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

Art Brennan, Quality Manager

Maryna Nesterova Calibration Engineer

Primary Measurement Standards

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

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

NCL Calibration Laboratories
Division of APREL Laboratories.

Calibration Results Summary

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

Mechanical Dimensions

Length: 67.1 mm
Height: 38.9 mm

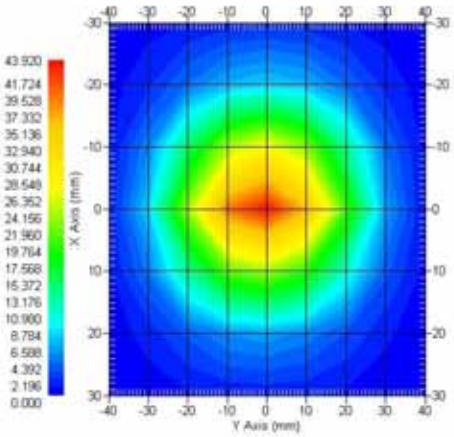
Electrical Specification

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

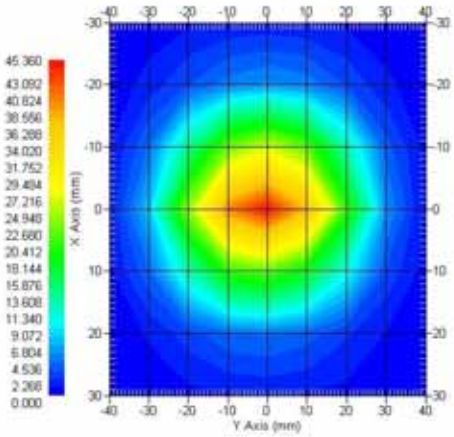
System Validation Results

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

Head
Area Scan



Body
Area Scan



3

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 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

5

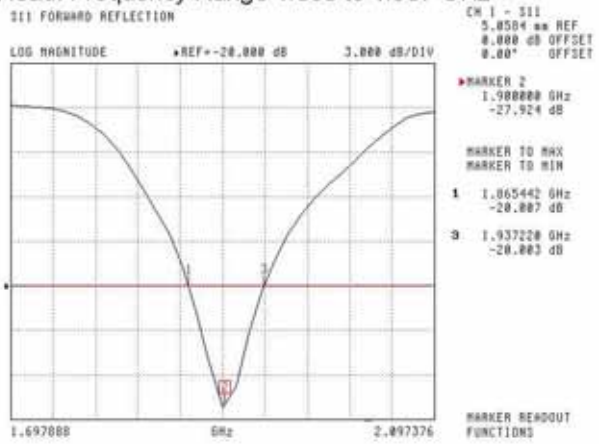
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories
Division of APREL Laboratories.

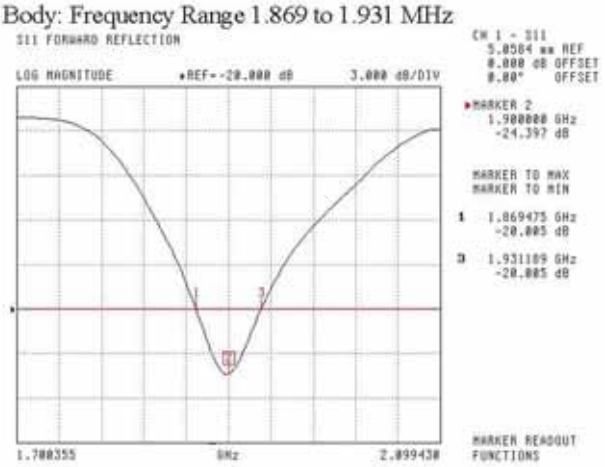
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head: Frequency Range 1.865 to 1.937 GHz



Body: Frequency Range 1.869 to 1.931 MHz



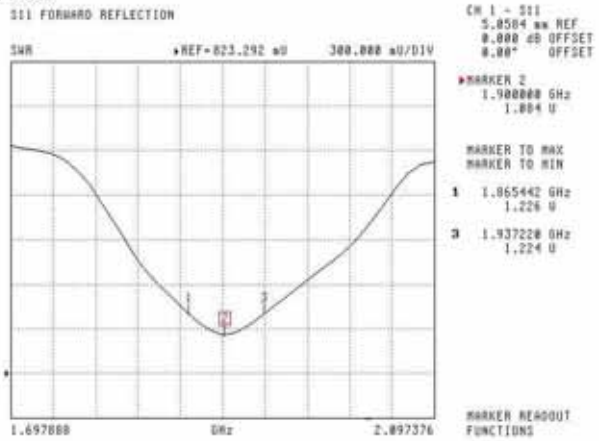
6

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

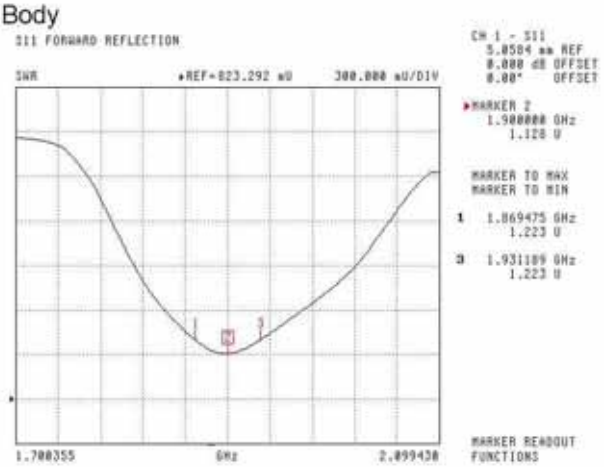
NCL Calibration Laboratories
Division of APREL Laboratories.

SWR

Head



Body



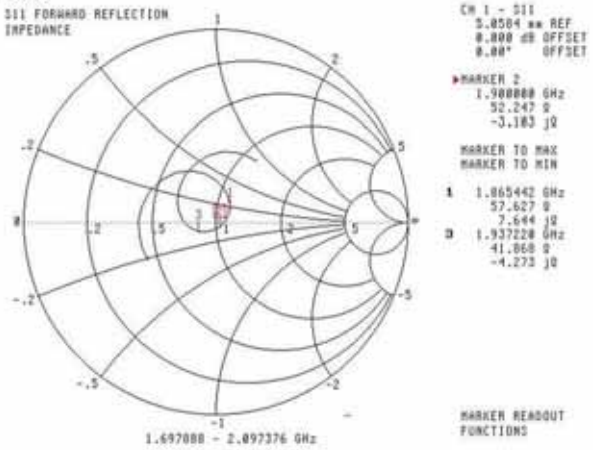
7

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

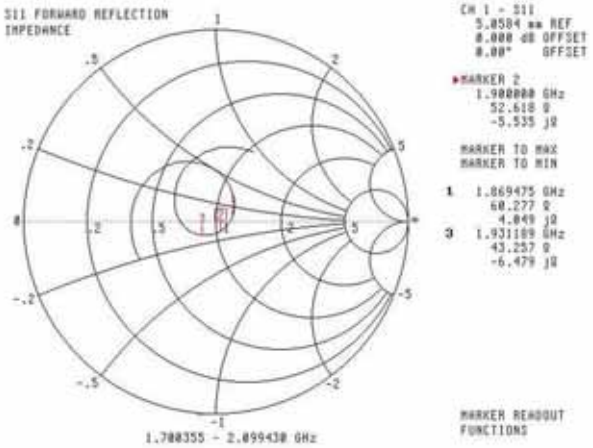
NCL Calibration Laboratories
Division of APREL Laboratories.

Smith Chart Dipole Impedance

Head



Body



8

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

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

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

NCL CALIBRATION LABORATORIES

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

CERTIFICATE OF CALIBRATION

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

Validation Dipole (Head & Body)

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

Customer: Bay Area Compliance Laboratory

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

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

Released By: _____
Art Brennan, Quality Manager

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

NCL Calibration Laboratories
Division of APREL Laboratories.

Conditions

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

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

Attestation

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

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

Art Brennan, Quality Manager

Maryna Nesterova Calibration Engineer

Primary Measurement Standards

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

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

NCL Calibration Laboratories
Division of APREL Laboratories.

Calibration Results Summary

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

Mechanical Dimensions

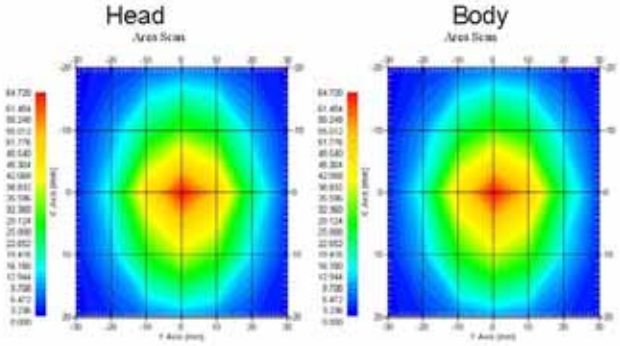
Length: 52.4 mm
Height: 30.3 mm

Electrical Specification

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

System Validation Results

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



3

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 220-00758. The calibration routine consisted of a three-step process. Step 1 was a mechanical verification of the dipole to ensure that it meets the mechanical specifications. Step 2 was an Electrical Calibration for the Validation Dipole, where the SWR, Impedance, and the Return loss were assessed. Step 3 involved a System Validation using the ALSAS-10U, along with APREL E-020 30 MHz to 6 GHz E-Field Probe Serial Number 225.

References

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

Conditions

Dipole 220-00758 was a re-calibration.

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

Dipole Calibration uncertainty

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

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

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

NCL Calibration Laboratories
Division of APREL Laboratories.

Dipole Calibration Results

Mechanical Verification

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

Electrical Specification

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

Tissue Validation

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

5

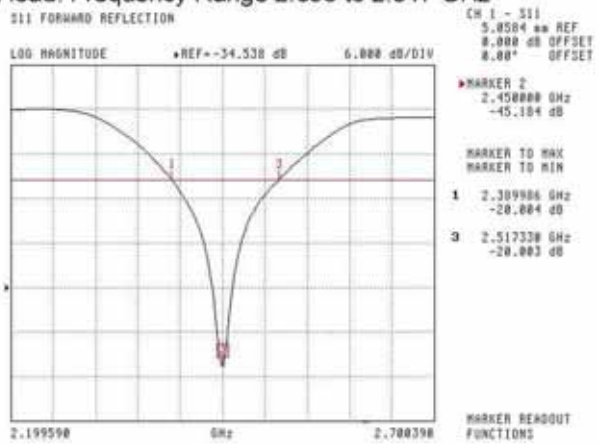
This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories
Division of APREL Laboratories.

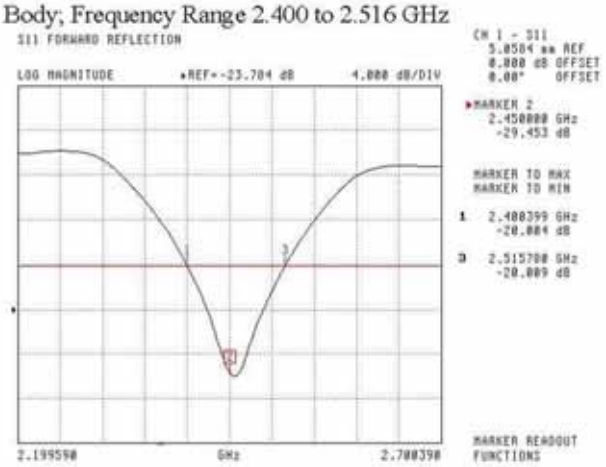
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

Head: Frequency Range 2.390 to 2.517 GHz



Body; Frequency Range 2.400 to 2.516 GHz



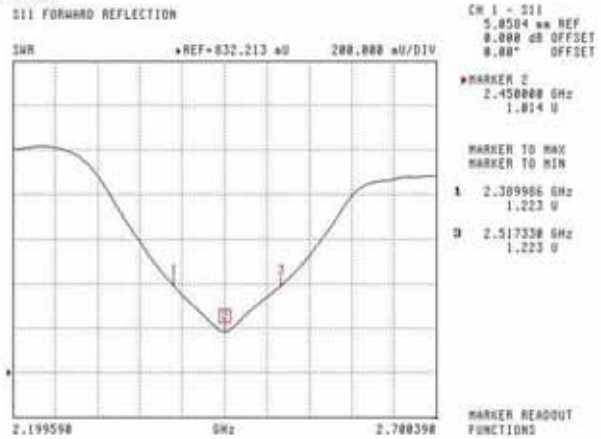
6

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

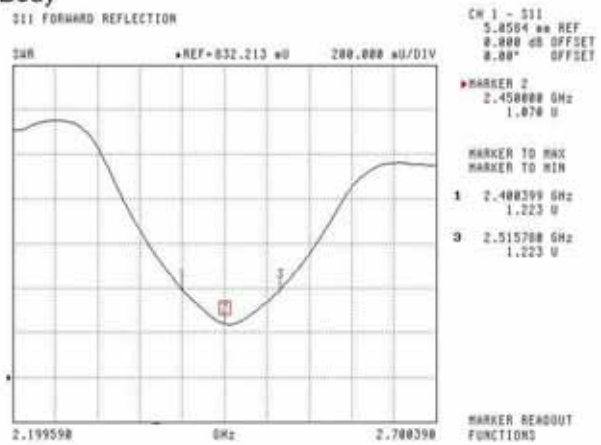
NCL Calibration Laboratories
Division of APREL Laboratories.

SWR

Head



Body



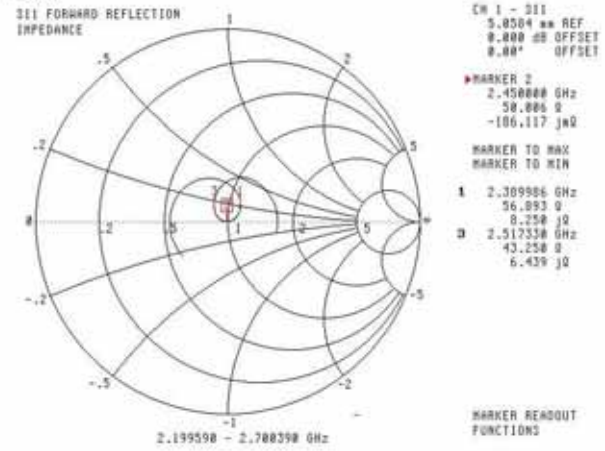
7

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

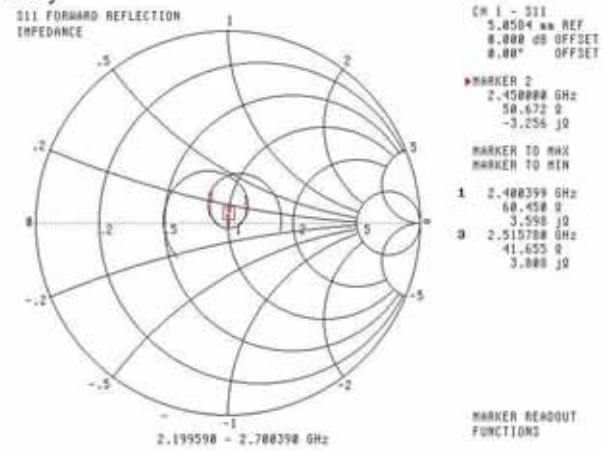
NCL Calibration Laboratories
Division of APREL Laboratories.

Smith Chart Dipole Impedance

Head



Body



8

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

NCL Calibration Laboratories
Division of APREL Laboratories.

Test Equipment

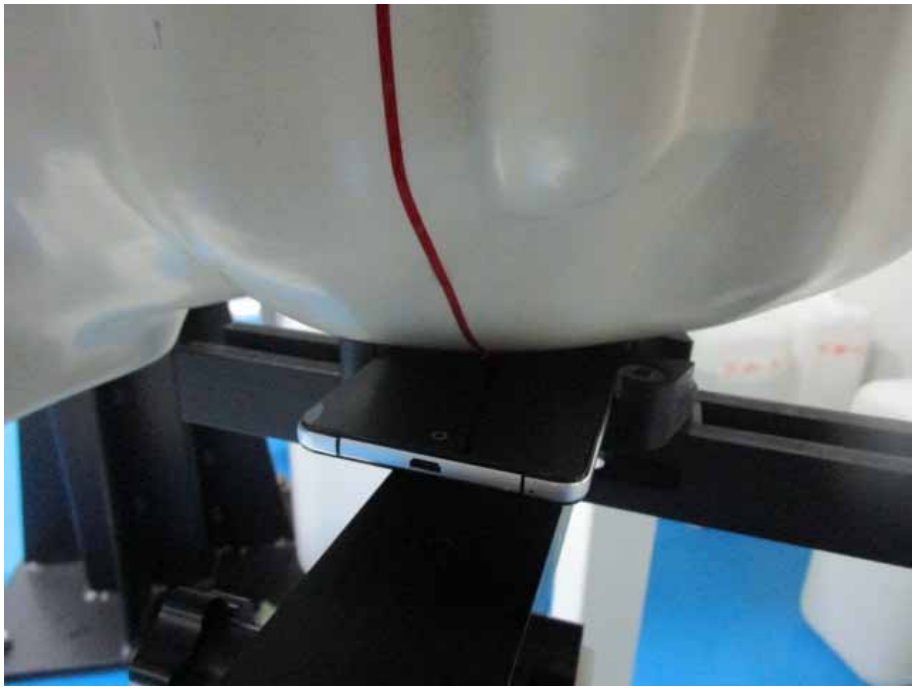
The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List May 2014.

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

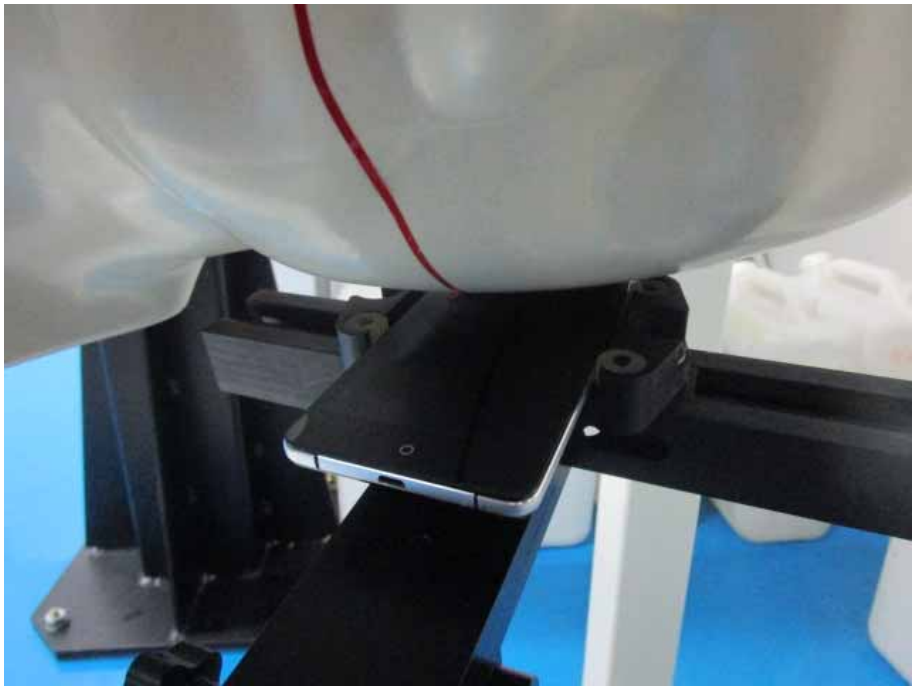
APPENDIX D EUT TEST POSITION PHOTOS

Liquid depth ≥ 15cm

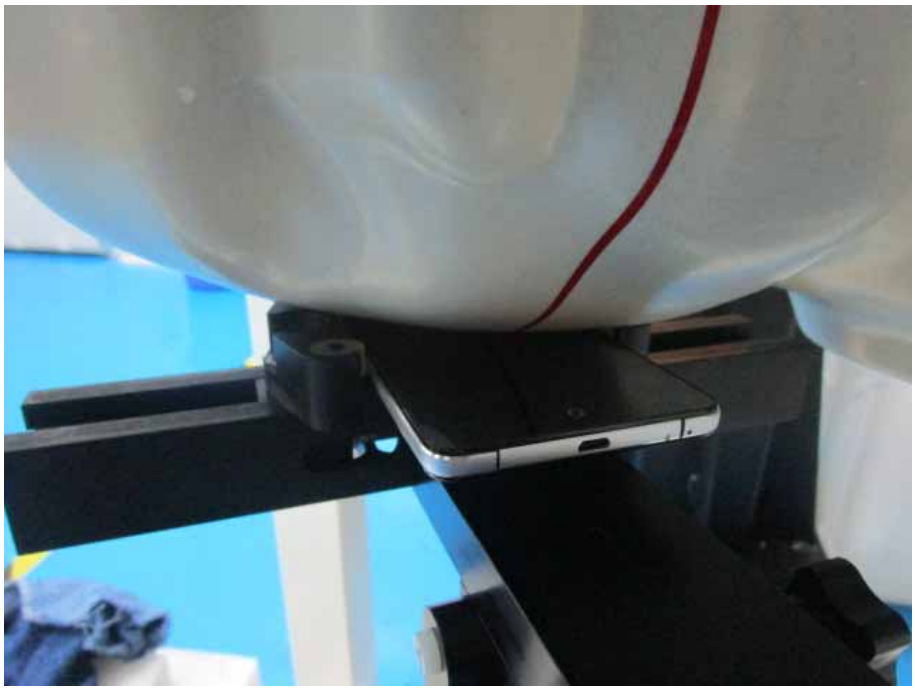
Left Head Cheek



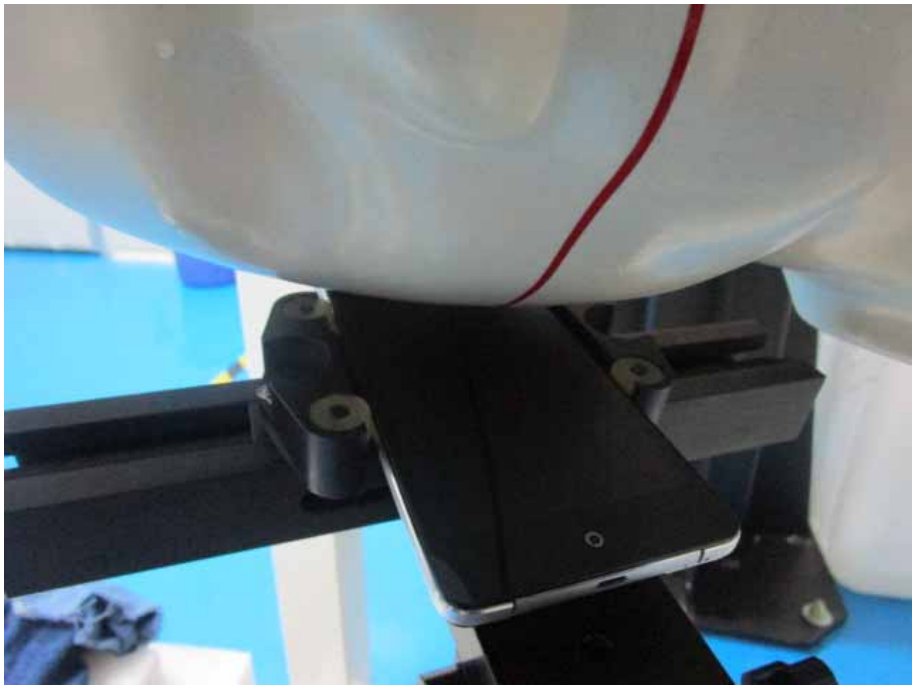
Left Head Tilt



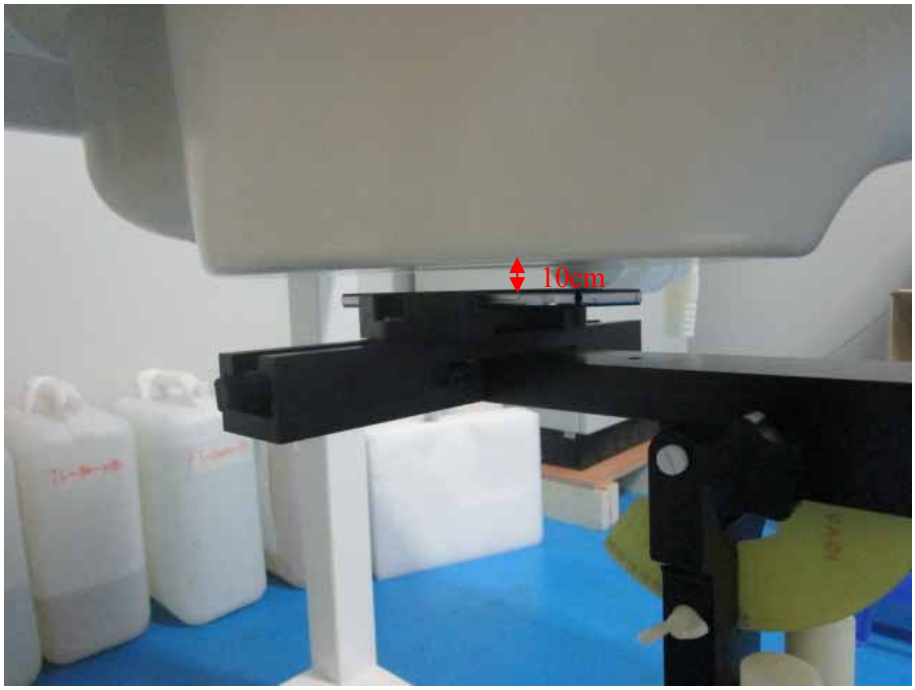
Right Head Cheek



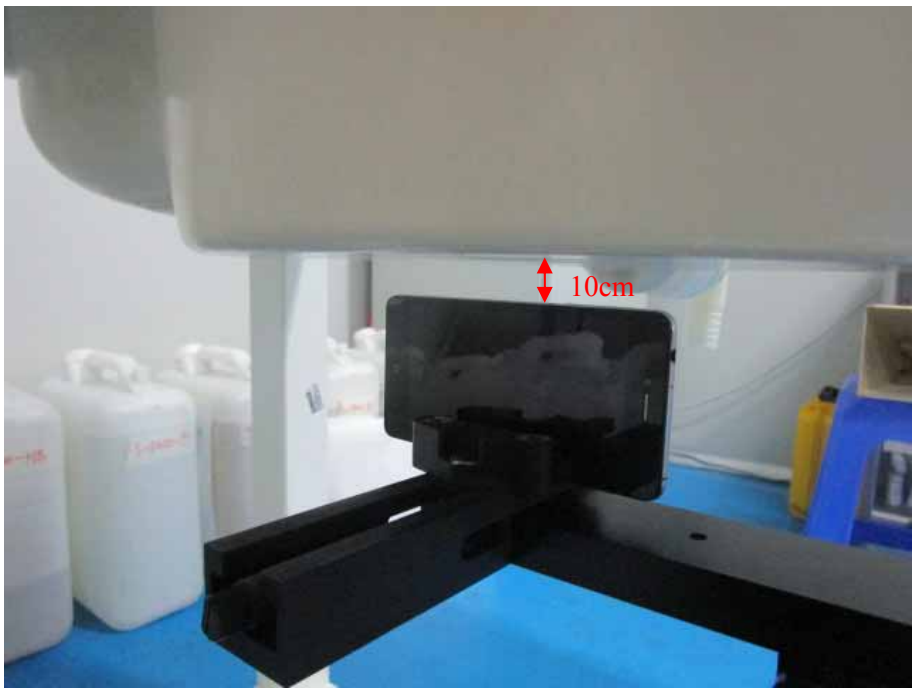
Right Head Tilt



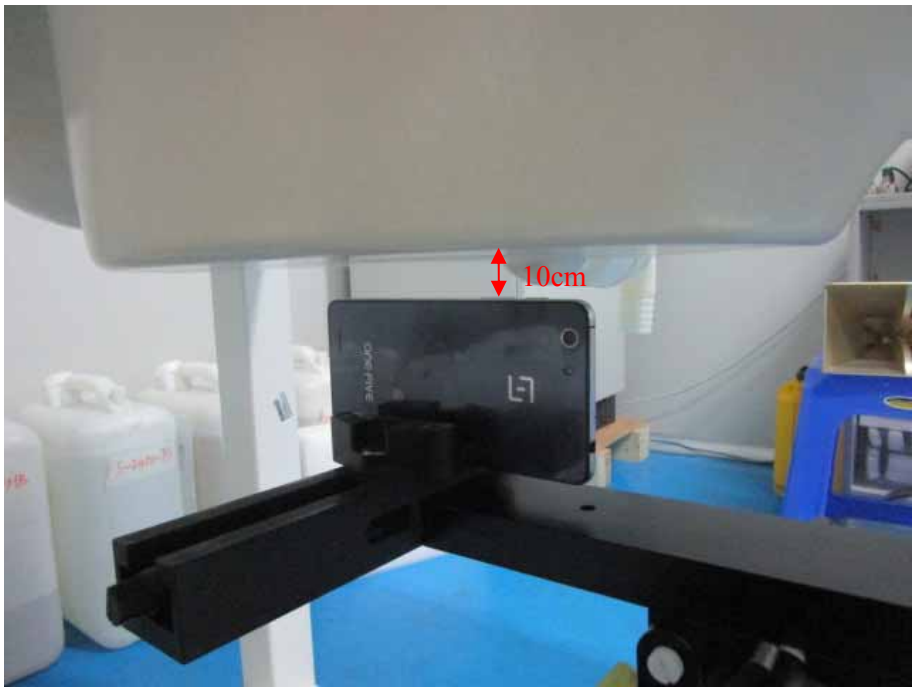
Body -Worn-Back (10mm)



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 –Top View

EUT – Bottom View

EUT – Uncover View

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