FCC SAR EVALUATION REPORT

For

Shenzhen Tianjian Telecom Technology Co., Ltd

22J Room, D Building Huaqiang Square, Huaqiang Road,

Shenzhen, Guangdong, China

Product Name: USB Modem

Model No. : E618, E301, E302, E602, E603, E608, E613, E616, E617, E618, W801, W802, W803, W805, W806, W807, W808, W916, W917, W918, W928, WM72, WM31

FCC ID: RSZ-TJE618

Date of Receipt: 1st Feb. 2013

Date of Test: 1st -24th Feb. 2013

Issued Date: 28th Feb.2013

Report No.:TS20130218001

Report Version: V1.0

Issue By

Shenzhen Sunway Communication CO.,LTD Testing Center

Building 9, Changxing High-tech Industrial Park, Wan'an Road, Shajing Town,

Bao'an District, Shenzhen 518104, P.R.China

Note: *The test results relate only to the samples tested. This report shall not be reproduced in full, without the written approval of SUNWAY Testing Center.*

SAR Evaluation compliance

Product Name:	USB Modem
Model Name:	E618, E301, E302, E602, E603, E608, E613, E616, E617, E618, W801, W802, W803, W805, W806, W807, W808, W916, W917, W918, W928, WM72, WM31
Applicant:	Shenzhen Tianjian Telecom Technology Co., Ltd
Address:	22J Room, D Building Huaqiang Square, Huaqiang Road, Shenzhen, Guangdong, China
Manufacturer:	Shenzhen Tianjian Telecom Technology Co., Ltd
Address:	22J Room, D Building Huaqiang Square, Huaqiang Road, Shenzhen, Guangdong, China
Applicable Standard:	FCC Oet65 Supplement C June 2001 IEEE Std. 1528-2003,47CFR § 2.1093
Test Guidance	KDB 447498 D01 General RF Exposure Guidance v05 KDB 447498 D02 SAR Procedures for Dongle Xmtr v02 KDB 941225 D01 SAR test for 3G devices v02 KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01
Test Result:	Max. SAR Measurement (1g) Body: 1.134 mW/kg
Performed Date:	1st Feb. 2013
Test Engineer:	Andy Wu
Reviewed By	Sky Song
Performed Location:	Shenzhen Sunway Communication CO.,LTD Testing Center Address:Building 9, Changxing High-tech Industrial Park, Wan'an Road, Shajing Town, Bao'an District, Shenzhen 518104, P.R.China Tel: +86-755- 81773388 Fax: +86-755- 81773335

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1. General Information:

1.1 EUT Description:

EUT Information	
Product Name	USB Modem
Model Name	E618, E301, E302, E602, E603, E608, E613, E616, E617, E618, W801, W802, W803, W805, W806, W807, W808, W916, W917, W918, W928, WM72, WM31
Hardware Version	Mainboard: V0.0 Subboard: V0.0
Software Version	V0.0
Antenna Type	Fixed Internal Antenna
Dimensions (L*W*H):	79mm (L)× 21mm (W)× 10mm (H)
Power Source:	USB Port supply
Normal Operation:	Body-worn
GPS	
Class of SRD	Class 3

EVDO-3G	
Support Band	CDMA2000 Cellular/CDMA2000 PCS
Frequency Bands:	CDMA2000 Cellular : UL:824.7(CH1013)~848.31(CH777) MHz DL: 869.76(CH1013)~893.31(CH777)MHz CDMA2000 PCS : UL: 1851.25(CH25)~1908.75(CH1175)MHz DL:1931.25(CH25)~1988.75(CH1175) MHz
Release Version	1XEVDO Release A
Type of Modulation	CDMA2000: QPSK
Antenna Gain	-0.5dBi for EVDO 850 1dBi for EVDO 1900

Max. Output Power (Conducted)	
CDMA2000 Cellular(1XRTT)	24.18dBm
CDMA2000 Cellular(1XEVDO Rev.0)	24.61dBm
CDMA2000 PCS(1XRTT)	23.55dBm
CDMA2000 PCS(1XEVDO Rev.0)	23.47dBm

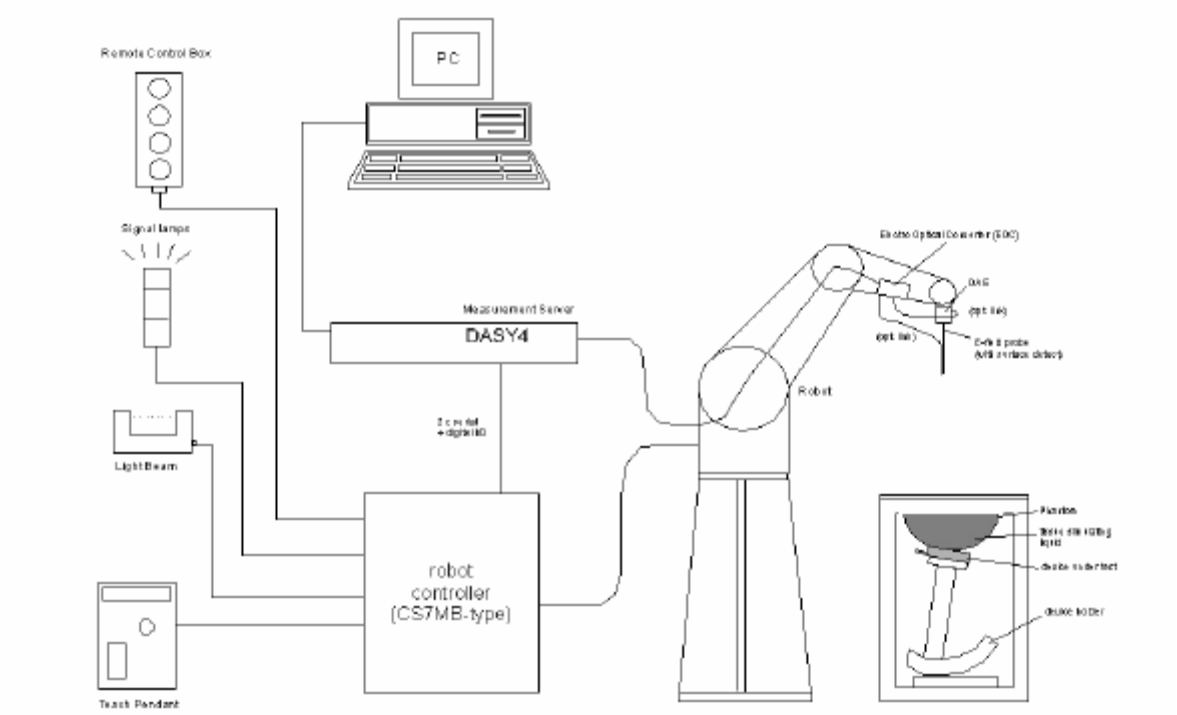
1.2 Test Environment:

Ambient conditions in the SAR laboratory:

Items	Required	Actual
Temperature (℃)	18-25	22~23
Humidity (%RH)	30-70	55~65

2. SAR Measurement System:

2.1 Dasy4 System Description:



The DASY4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc.
- The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 2000 or Windows XP.
- DASY4 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validate the proper functioning of the system.

3. System Components:

- DAsY4 Measurement Server:

Calibration: No calibration required.

The DASY4 measurement server is based on a PC/104 CPU board with a 166MHz low-power pentium, 32MB chipdisk and 64MB RAM. The necessary circuits for communication with either the DAE4 (or DAE3) electronic box as well as the 16-bit AD-converter system for optical detection and digital I/O interface are contained on the DASY4 I/O-board, which is directly connected to the PC/104 bus of the CPU board.

- DATA Acquisition Electronics (DAE):

Calibration: Recommended once a year

The data acquisition electronics consists of a highly sensitive electrometer grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD converter and a command decoder and 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.

- Dosimetric Probes:

Model: ES3DV3,
Frequency: 10MHz to 3G, Linearity:±0.2dB,
Dynamic Range: 10 μW/g to100 mW/g
Directivity:
± 0.3 dB in HSL (rotation around probe axis)
± 0.5 dB in tissue material (rotation normal to probe axis)

These probes are specially designed and calibrated for use in liquids with high permittivities. They should not be used in air, since the spherical isotropy in air is poor (±2 dB). The dosimetric probes have special calibrations in various liquids at different frequencies.

Calibration: Recommended once a year

- Light Beam unit:

The light beam switch allows automatic "tooling" of the probe. During the process, the actual position of the probe tip with respect to the robot arm is measured, as well as the probe length and the horizontal probe offset. The software then corrects all movements, such that the robot coordinates are valid for the probe tip. The repeatability of this process is better than 0.1 mm.

Calibration: No calibration required.

- 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 6mm). It has three measurement areas:
• Left hand
• Right hand
• Flat phantom

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

- Device Holder for SAM Twin Phantom:

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 is 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

4. Tissue Simulating Liquid

4.1 The composition of the tissue simulating liquid:

INGREDIENT (% Weight)	835MHz Body	1900MHz Body
Water	52.4	40.4
Salt	1.4	0.5
Sugar	45.0	58.0
HEC	1.0	1.0
Preventol	0.1	0.1
DGBE	0	0

4.2 Tissue Calibration Result:

Body Tissue Simulate Measurement:					
Frequency (MHz)	Description	Dielectric Parameters		Tissue Temp. (℃)	Measurement Date
		ε_r	σ [s/m]		
835MHz	Reference	55.2±5% (52.45~57.96)	0.97±5% (0.93~1.01)	N/A	1st Feb.,2013
	Measurement	55.3	0.98	22.5	
1900MHz	Reference	53.3±5% (50.64~55.96)	1.52±5% (1.45~1.59)	N/A	2nd Feb.,2013
	Measurement	53.6	1.55	22.5	

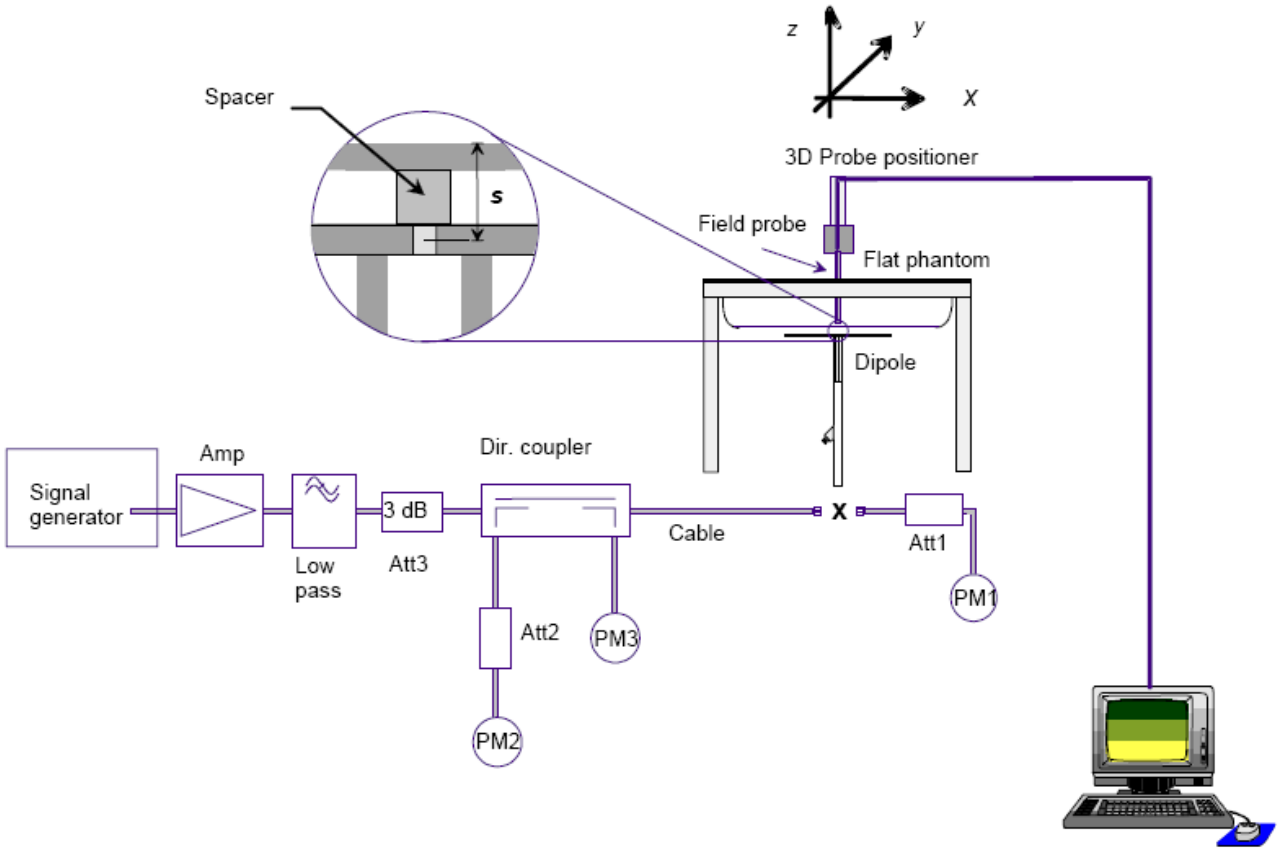
4.3 Tissue Dielectric Parameters for Head and Body Phantoms:

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table

Target Frequency (MHz)	Head		Body	
	ε_r	σ [s/m]	ε_r	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

5. SAR System Validation

5.1 Validation System:



5.2 Validation Dipoles:

The dipoles used is based on the IEEE-1528/EN62209-1 standard, and is complied with mechanical and electrical specifications in line with the requirements of both IEEE-1528/EN62209-1 and FCC Supplement C. the table below provides details for the mechanical and electrical specifications for the dipoles

Frequency	L(mm)	H(mm)	D(mm)
835MHz	161	89.8	3.6
1900MHz	68	39.5	3.6

5.3 Validation Result:

System performance check for Body at 835MHz,1900MHz Validation Dipole: D835V2-SN:4d134					
Frequency (MHz)	Description	SAR(1g) W/Kg	SAR(10g) W/Kg	Tissue Temp. (℃)	Measurement Date
835MHz	Reference	9.49±10% (8.55~10.43)	6.26±10% (5.64~6.88)	N/A	1st Feb.,2013
	Validation	9.88	6.2	22.5	
Validation Dipole: D1900V2-SN:5d150					
1900MHz	Reference	40.1±10% (36.1~44.11)	21.1±10% (18.99~23.21)	N/A	2nd Feb.,2013
	Validation	39.64	19.68	22.5	
Note: All SAR values are normalized to 1W forward power.					

6. SAR Evaluation Procedures:

The procedure for assessing the average SAR value consists of the following steps:

- Power Reference Measurement

  The Power Reference Measurement and Power Drift Measurement jobs are useful jobs for monitoring the power drift of the device under test in the batch process. Both jobs measure the field at a specified reference position, at a selectable distance from the phantom surface. The reference position can be either the selected section's grid reference point or a user point in this section. The reference job projects the selected point onto the phantom surface, orients the probe perpendicularly to the surface, and approaches the surface using the selected detection method.

- Area Scan

  The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a finer measurement around the hot spot. The sophisticated interpolation routines implemented in DASY4 software can find the maximum locations even in relatively coarse grids. The scanning area is defined by an editable grid. This grid is anchored at the grid reference point of the selected section in the phantom. When the Area Scan's property sheet is brought-up, grid settings can be edited by a user.

- Zoom Scan

  Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The default Zoom Scan measures 7 x 7 x 7 points (5mmx5mmx5mm) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure.

- Power Drift Measurement

  The Power Drift Measurement job measures the field at the same location as the most recent power reference measurement job within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement.

7. SAR Exposure Limits

SAR assessments have been made in line with the requirements of IEEE-15288,FCC Supplement C ,and comply with ANSI/IEEE C95.1-1992”Uncontrolled Environments” limits.

Limits for General Population/Uncontrolled Exposure (W/kg)

Type Exposure	Uncontrolled Environment Limit
Spatial Peak SAR (1g cube tissue for brain or body)	1.60W/kg
Spatial Peak SAR (whole body)	0.08W/kg
Spatial Peak SAR (10g for hands,feet,ankles and wrist)	4.00W/kg

Note: Occupational/Uncontrolled 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)

8. Measurement Uncertainty:

NO	Source	Uncert. ai（%）	Prob. Dist.	Div. k	ci (1g)	ci (10g)	Stand. Uncert. ui (1g)	Stand. Uncert. ui (10g)	*Veff*
1	Repeat	0.04	N	1	1	1	0.04	0.04	9
Instrument									
2	Probe calibration	7	N	2	1	1	3.5	3.5	∞
3	Axial isotropy	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
4	Hemispherical isotropy	9.6	R	$\sqrt{3}$	0.7	0.7	3.9	3.9	∞
5	Boundary effect	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
6	Linearity	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
7	Detection limits	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
8	Readout electronics	0.3	N	1	1	1	0.3	0.3	∞
9	Response time	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
10	Integration time	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
11	Ambient noise	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
12	Ambient reflections	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	Probe positioner mech. restrictions	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	∞
14	Probe positioning with respect to phantom shell	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
15	Max.SAR evaluation	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Test sample related									

16	Device positioning	3.8	N	1	1	1	3.8	3.8	99
17	Device holder	5.1	N	1	1	1	5.1	5.1	5
18	Drift of output power	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up									
19	Phantom uncertainty	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
20	Liquid conductivity (target)	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
21	Liquid conductivity (meas)	2.5	N	1	0.64	0.43	1.6	1.2	∞
22	Liquid Permittivity (target)	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.5	∞
23	Liquid Permittivity (meas)	2.5	N	1	0.6	0.49	1.5	1.2	∞
Combined standard			RSS	$U_C = \sqrt{\sum_{i=1}^{n} C_i^2 U_i^2}$			12.2%	11.9%	236
Expanded uncertainty (P=95%)		$U = k\,U_C$,k=2					24.4%	23.8%	

9. Conducted Power Measurement:

Band	Channel	Frequency (MHz)	Avg.Burst Power(dBm)	Duty Cycle Factor(dB)	Frame Power (dBm)
1XRTT Cellular FCH+RC1	CH1013	824.7	24.14	-3	21.14
	CH384	836.52	23.81	-3	20.81
	CH777	848.31	23.50	-3	20.50
1XRTT Cellular FCH+RC3	CH1013	824.7	24.16	-3	21.16
	CH384	836.52	23.83	-3	20.83
	CH777	848.31	23.53	-3	20.53
1XRTT Cellular FCH+RC3+SCH	CH1013	824.7	24.18	-3	21.18
	CH384	836.52	23.87	-3	20.87
	CH777	848.31	23.55	-3	20.55
1xEVDO Cellular Rev. 0 RTAP-9.6kbps	CH1013	824.7	24.22	-3	21.22
	CH384	836.52	24.40	-3	21.40
	CH777	848.31	24.30	-3	21.30
1x EVDO Cellular Rev. 0 RTAP-38.4kbps	CH1013	824.7	24.24	-3	21.24
	CH384	836.52	24.43	-3	21.43
	CH777	848.31	24.28	-3	21.28
1x EVDO Cellular Rev. 0 RTAP-153.6kbps	CH1013	824.7	24.30	-3	21.30
	CH384	836.52	24.51	-3	21.51
	CH777	848.31	24.35	-3	21.35
1x EVDO Cellular Rev. A RETAP-9.6kbps	CH1013	824.7	24.31	-3	21.31
	CH384	836.52	24.46	-3	21.46
	CH777	848.31	24.35	-3	21.35
1x EVDO Cellular Rev. A RETAP-38.4kbps	CH1013	824.7	24.34	-3	21.34
	CH384	836.52	24.56	-3	21.56
	CH777	848.31	24.43	-3	21.43
1x EVDO Cellular Rev. A RETAP-153.6kbp	CH1013	824.7	24.44	-3	21.44
	CH384	836.52	24.61	-3	21.61
	CH777	848.31	24.50	-3	21.40

1XRTT PCS FCH+RC1	CH25	1851.25	23.51	-3	20.81
	CH600	1880	23.44	-3	20.44
	CH1175	1908.75	22.92	-3	19.92
1XRTT PCS FCH+RC3	CH25	1851.25	23.51	-3	20.81
	CH600	1880	23.43	-3	20.43
	CH1175	1908.75	22.90	-3	19.90
1XRTT PCS FCH+RC3+SCH	CH25	1851.25	23.55	-3	20.85
	CH600	1880	23.49	-3	20.49
	CH1175	1908.75	22.99	-3	19.99
1x EVDO PCS Rev. 0 RTAP-9.6kbps	CH25	1851.25	23.17	-3	20.17
	CH600	1880	23.22	-3	20.12
	CH1175	1908.75	23.13	-3	20.13
1x EVDO PCS Rev. 0 RTAP-38.4kbps	CH25	1851.25	23.18	-3	20.18
	CH600	1880	23.25	-3	20.25
	CH1175	1908.75	23.15	-3	20.15
1x EVDO PCS Rev. 0 RTAP-153.6kbps	CH25	1851.25	23.24	-3	20.24
	CH600	1880	23.38	-3	20.32
	CH1175	1908.75	23.23	-3	20.23
1x EVDO PCS Rev. A RETAP-9.6kbps	CH25	1851.25	23.29	-3	20.29
	CH600	1880	23.34	-3	20.34
	CH1175	1908.75	23.24	-3	20.24
1x EVDO PCS Rev. A RETAP-38.4kbps	CH25	1851.25	23.34	-3	20.34
	CH600	1880	23.41	-3	20.41
	CH1175	1908.75	23.27	-3	20.27
1x EVDO PCS Rev. A RETAP-153.6kbp	CH25	1851.25	23.41	-3	20.41
	CH600	1880	23.47	-3	20.47
	CH1175	1908.75	23.37	-3	20.37

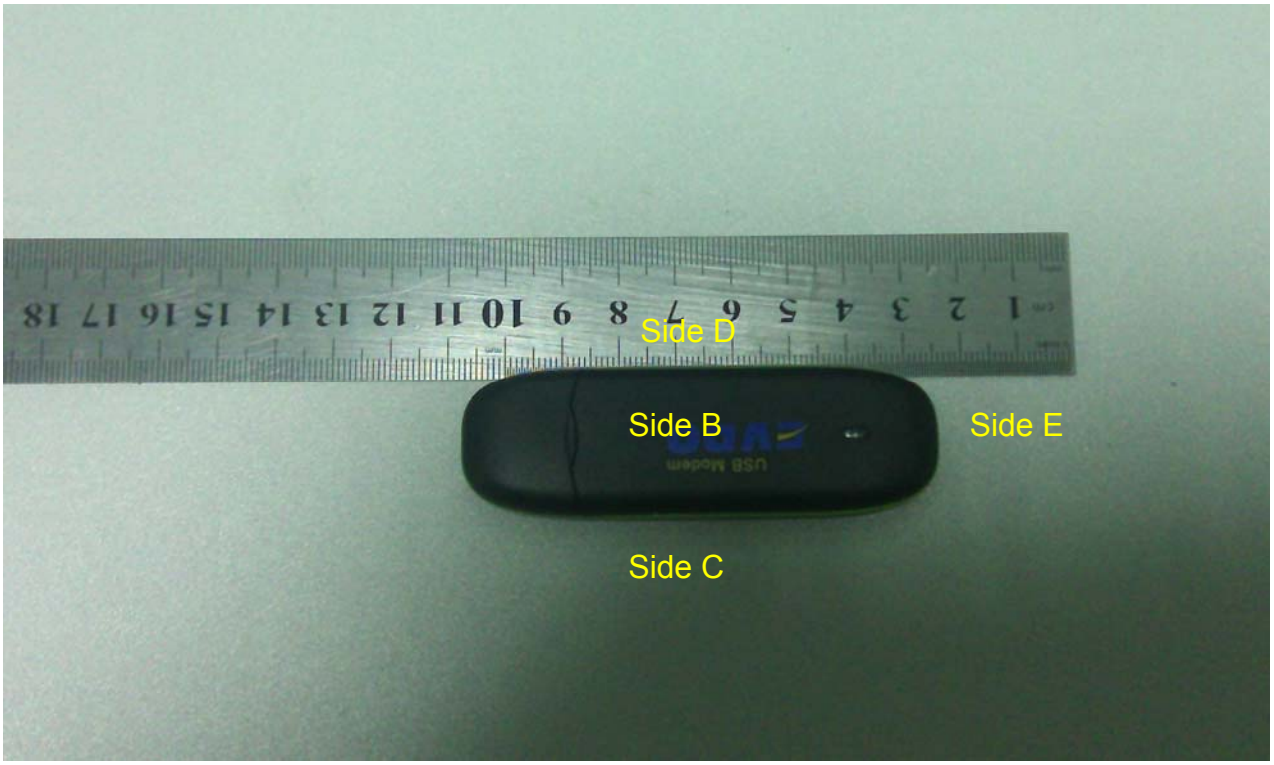
Note 1: The device doesn't support Subtype2 for Rev. A.

Note 2: "FTAP Rate" set 307.2kbps(2slot).Power Control set "All Bits up".

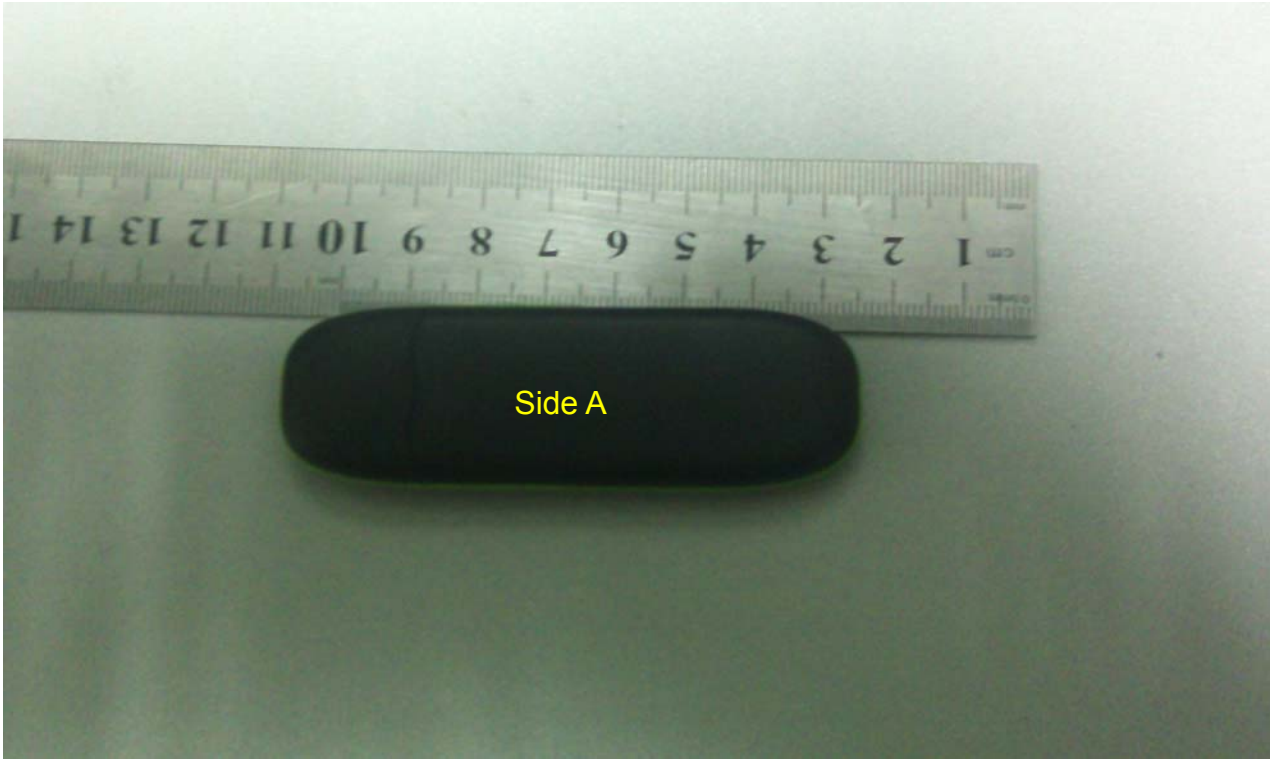
Note 3: According KDB941225,for 1xEV-DO Data Devics, the maximum average output power of 1xRTT each channel is less than 0.25dB higher than 1xEV-DO Rev.0,the SAR of 1XRTT is not required.

10. Test photos and results:

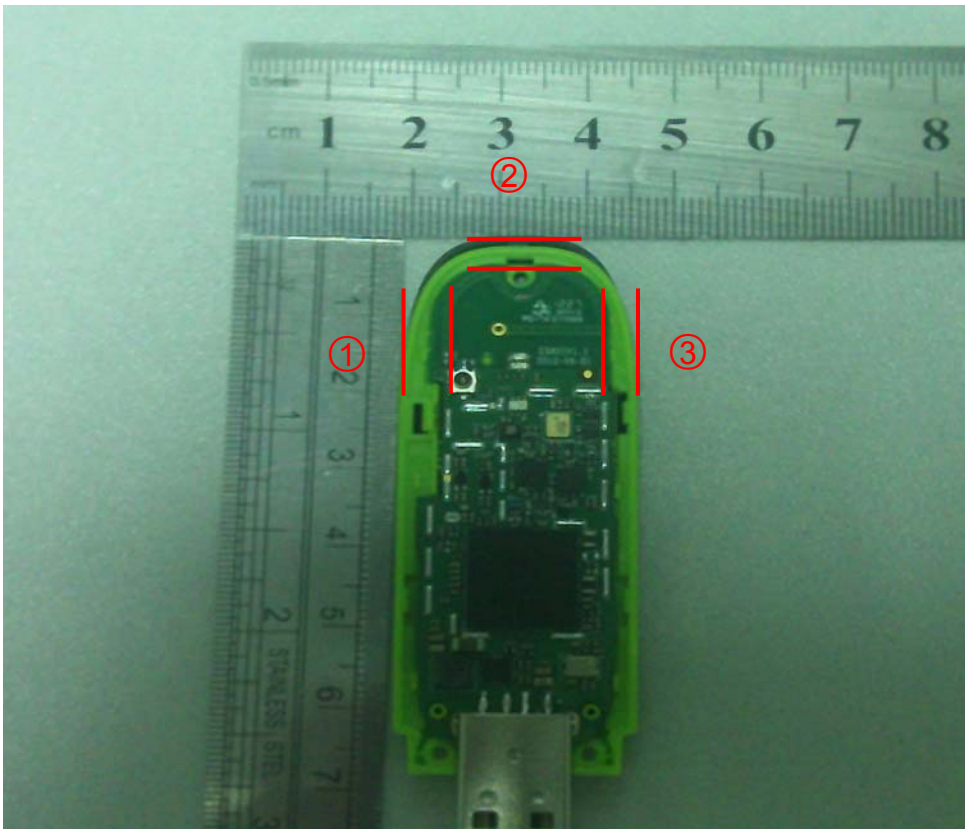
10.1 DUT photos:



Front side



Back side


cm 1 2 3 4 5 6 7 8
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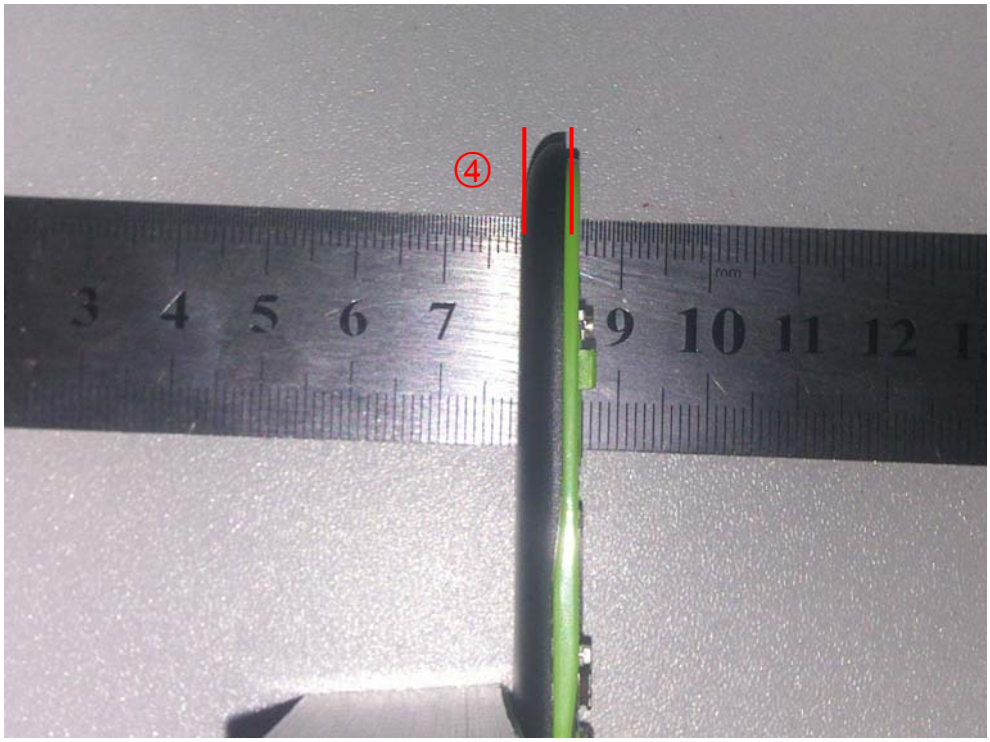
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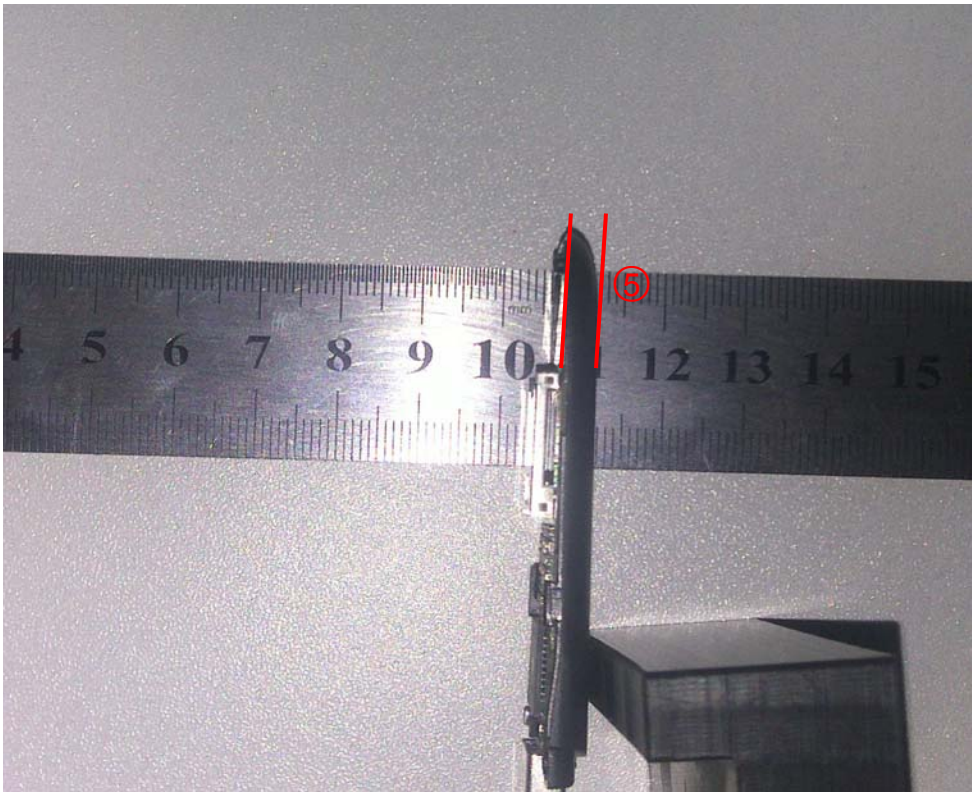
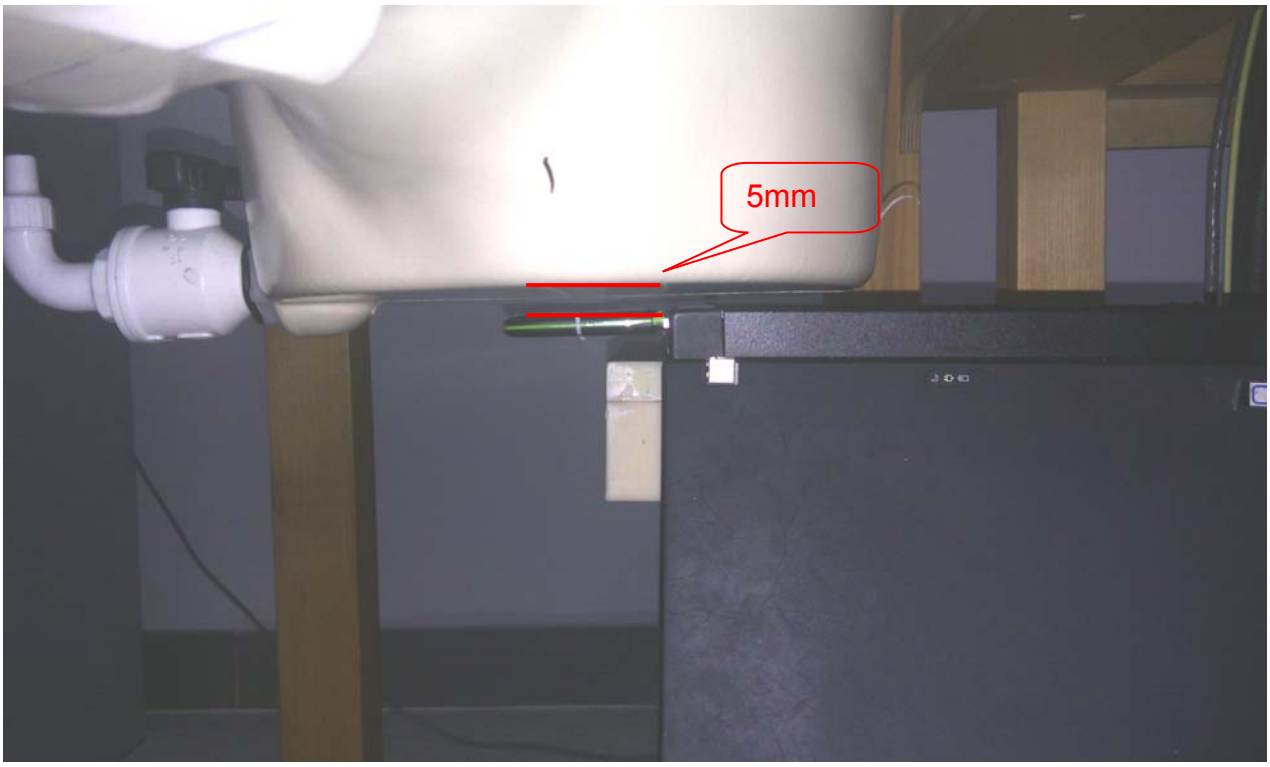
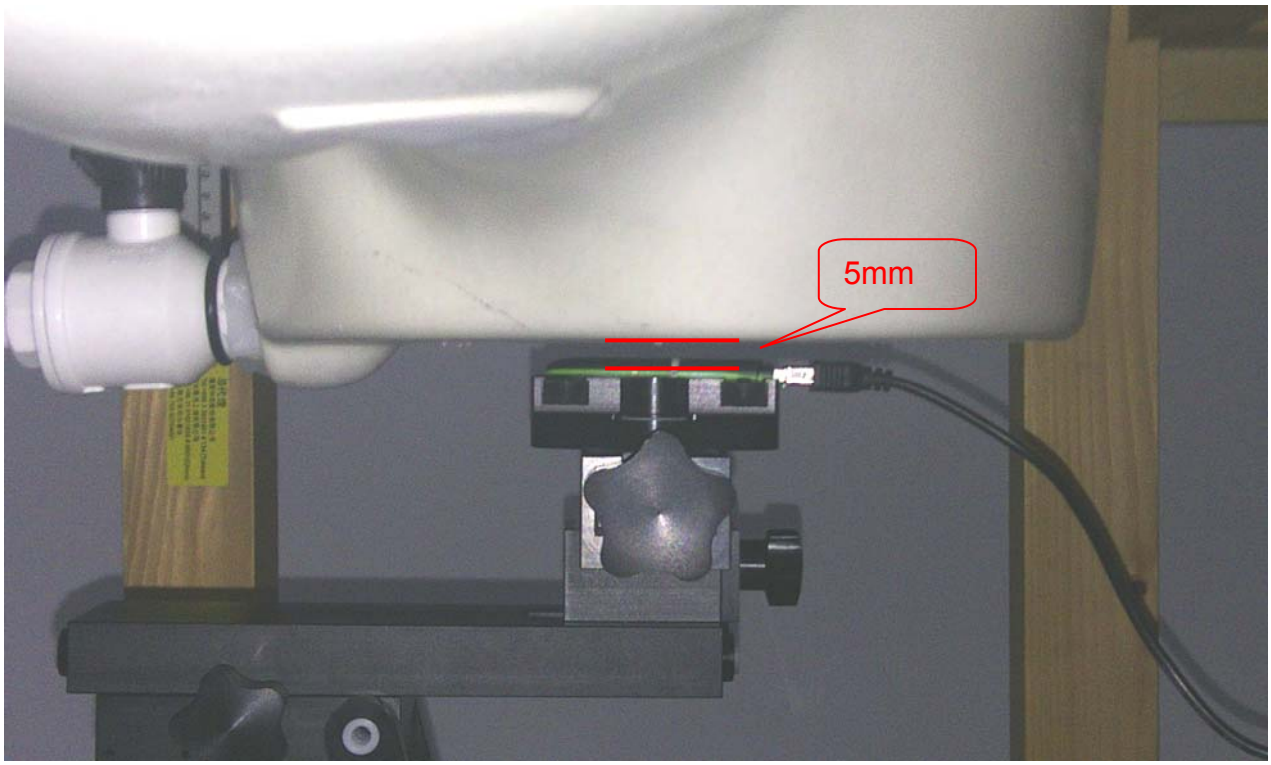


NO.	To Edge	Distance
①	Side C	5mm
②	Side E	4mm
③	Side D	3mm
④	Side A	2mm
⑤	Side B	2mm
Laptop	Trade Mark: Lenovo Model: ThinkPad T61 SN: L3-47KTA 09/01 System: Windows XP SP3	

10.2 Setup photos:

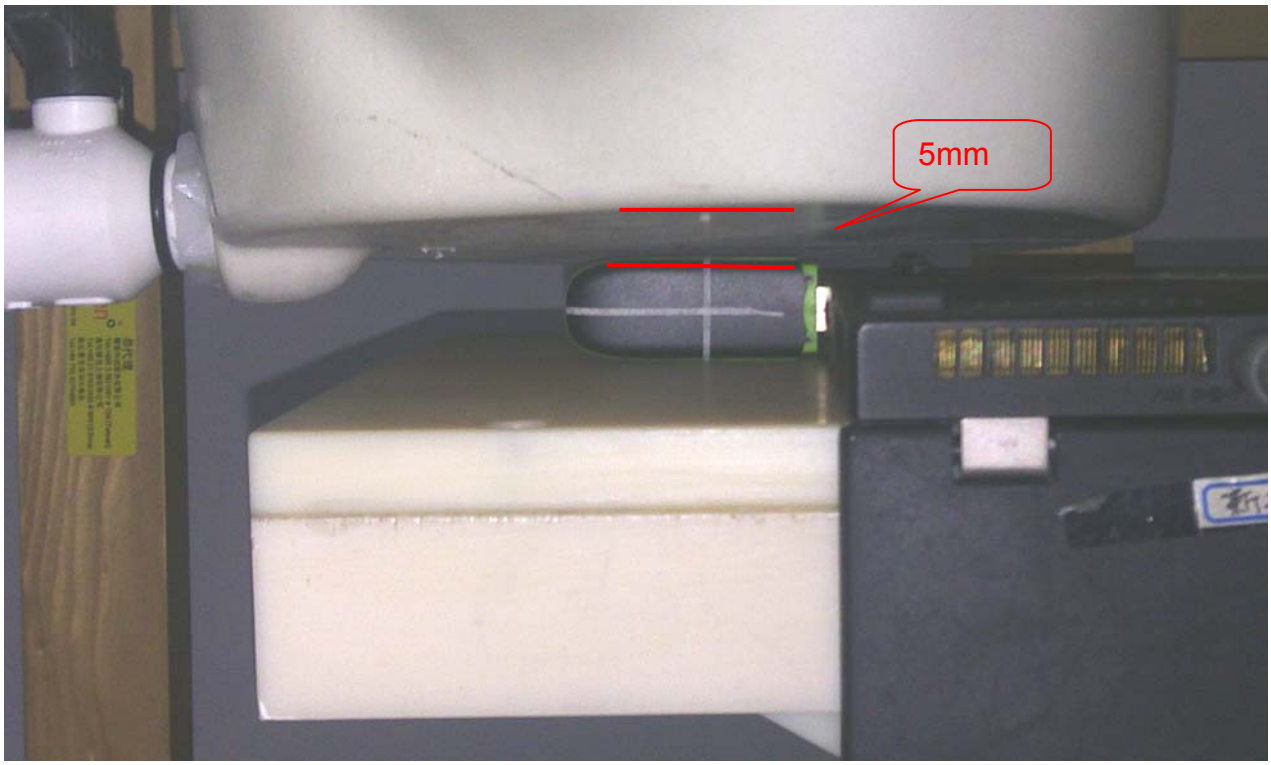


Side A

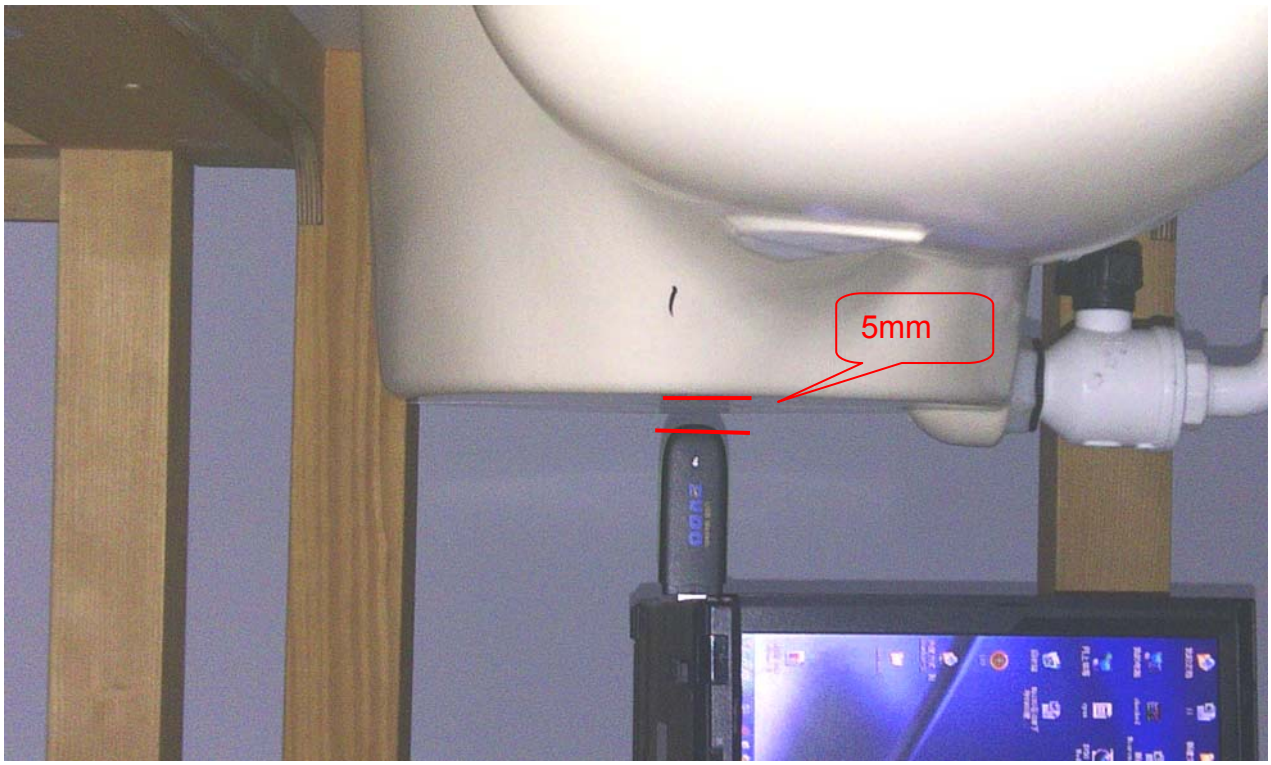


Side B (connect to PC with USB cable less than 12 inch)

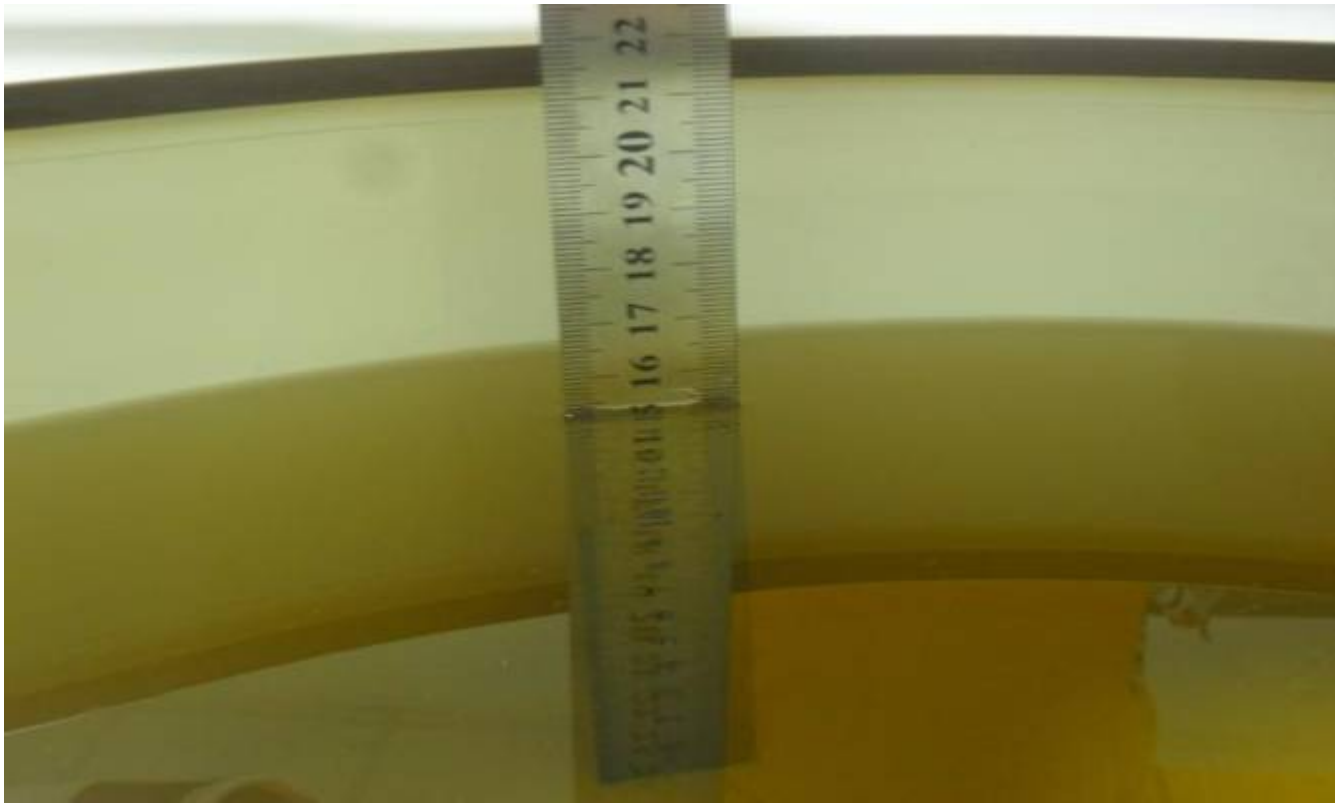
Side C



Side D



Side E



Liquid depth (15cm)

10.3 SAR result summary:
Body (5mm between DUT and Phantom)

Test Case of Body				Result(mW/g) 1g Average	Power Drift <±0.2dB (dB)	Test Plot
Band	Test Position	Separation	Channel			
SIM 1:						
1xEVDO 850 Rev.0	Side A	5mm	CH1013	0.431	-0.135	Plot 1
	Side B	5mm	CH1013	0.303	-0.134	Plot 2
	Side A	5mm	CH384	1.01	0.169	Plot 3
	Side A (Repeat)	5mm	CH384	0.98	0.013	Plot 4
	Side B	5mm	CH384	0.838	0.141	Plot 5
	Side C	5mm	CH384	0.78	0.009	Plot 6
	Side D	5mm	CH384	0.602	0.073	Plot 7
	Side E	5mm	CH384	0.192	-0.13	Plot 8
	Side A	5mm	CH777	0.755	0.14	Plot 9
	Side B	5mm	CH777	0.559	0.172	Plot 10
1xEVDO 850 Rev. A	Side A	5mm	CH1013	0.531	-0.112	Plot 11
	Side A	5mm	CH384	1.04	0.142	Plot 12
	Side A (Repeat)	5mm	CH384	1.02	-0.03	Plot 13
	Side A	5mm	CH777	0.792	0.06	Plot 14
1xEVDO 1900	Side A	5mm	CH600	0.154	-0.006	Plot 15
	Side B	5mm	CH600	0.323	-0.17	Plot 16
	Side C	5mm	CH600	0.102	-0.147	Plot 17
	Side D	5mm	CH600	0.094	-0.196	Plot 18
	Side E	5mm	CH600	0.116	-0.114	Plot 19
1xEVDO 1900 Rev. A	Side B	5mm	CH600	0.362	-0.143	Plot 20

Note1: When the 1g SAR is ≤0.8W/kg，testing for low and high channel is optional
Note2: The DUT is tested with a Reverse Data Channel rate 153.6kbps in Subtype0,and Forward Traffic Channel data rate corresponded to the 2-slot version of 307.2kbps for both FTAP and FETAP.

10.4 Scale SAR result:

The device's power specific is 24±1dBm,so the target power is 25dBm.
Scale Factor=Target Power/Measurement Power
Scale SAR=Measurement SAR*Scale Factor

Band	Channel/ Position	Measurement Power	Target Power	Scale Factor	Measurement SAR	Scale SAR
1xEVDO 850 Rev. 0	CH1013 (Side A)	269.15mw (24.30dBm)	316.22mw (25dBm)	1.17	0.431 mw/g	0.504 mw/g
	CH384 (Side A)	282.48mw (24.51dBm)		1.12	1.01mw/g	1.131 mw/g
	CH777 (Side A)	272.27mw (24.35dBm)		1.16	0.755	0.875 mw/g
1xEVDO 850 Rev. A	**Ch384 (Side A)**	**289.06mw (24.61dBm)**		**1.09**	**1.04 mw/g**	**1.134 mw/g**
1xEVDO 1900 Rev. 0	CH600 (Side B)	270.39mw (24.32dBm)		1.42	0.323 mw/g	0.459 mw/g
1xEVDO 1900 Rev. A	CH600 (Side B)	222.33mw (23.47dBm)		1.17	0.362 mw/g	0.424 mw/g

Above all, the max SAR value is 1.134mw/g.

11. Equipment List:

NO.	Instrument	Manufacture	Model	S/N	Cal. Date	Cal. Due Date
1	Communication Tester	Agilent	E5515C	GB47200710	Jun 11th ,2012	Jun 11th ,2013
2	E-field Probe	Speag	ES3DV3	3292	Feb 24th 2012	Feb 24th 2013
3	DAE	Speag	DAE4	1315	Feb 27th 2012	Feb 27th 2013
4	SAM TWIN phantom	Speag	SAM	1360/1432	N/A	N/A
5	Robot	Stabuli	TX60L	N/A	N/A	N/A
6	Device Holder	Speag	SD000H01HA	N/A	N/A	N/A
7	Vector Network	Agilent	E5071C	MY46107615	Jan 6th 2013	Jan 7th 2014
8	Signal Generator	Agilent	E4438C	MY49072279	Dec 26th 2012	Dec 26th 2013
9	Amplifier	Mini-circult	ZHL-42W	QA098002	N/A	N/A
10	Power Meter	Agilent	N1419A	MY50001563	Dec 26th 2012	Dec 26th 2013
11	Power Sensor	Agilent	N8481H	MY51020010	Dec 26th 2012	Dec 26th 2013
12	Directional Coupler	Agilent	778D	MY48220607	Dec 26th 2012	Dec 26th 2013
13	Dipole 835MHz	Speag	D835V2	4d134	Feb 27th 2012	Feb 27th 2014
14	Dipole 1900MHz	Speag	D1900V2	5d150	Feb 28th 2012	Feb 28th 2014

Appendix A. System validation plots:

Date: 2/1/2013 Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

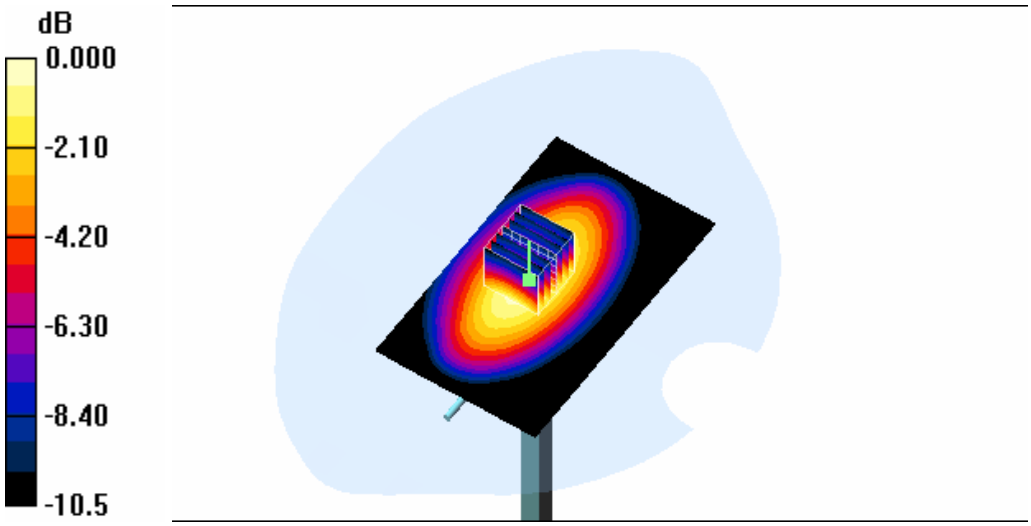
DUT: Dipole 835MHz; Type: D835V2; Serial: D835V2 - SN: 4d134
Program Name: System Performance Check Body at 835 MHz

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 900 MHz; σ =0.98 mho/m; ε_r = 55.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3292; ConvF(6.14, 6.14, 6.14); Calibrated: 2/24/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 2/27/2012
- Phantom: SAM with TP1360; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

d=10mm, Pin=250mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.88 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.35 V/m; Power Drift = -0.0135dB
Peak SAR (extrapolated) = 4.48 W/kg
SAR(1 g) = 2.47 mW/g; SAR(10 g) = 1.55 mW/g
Maximum value of SAR (measured) = 3.12 mW/g



0 dB = 3.12mW/g

Date: 2/2/2013 Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

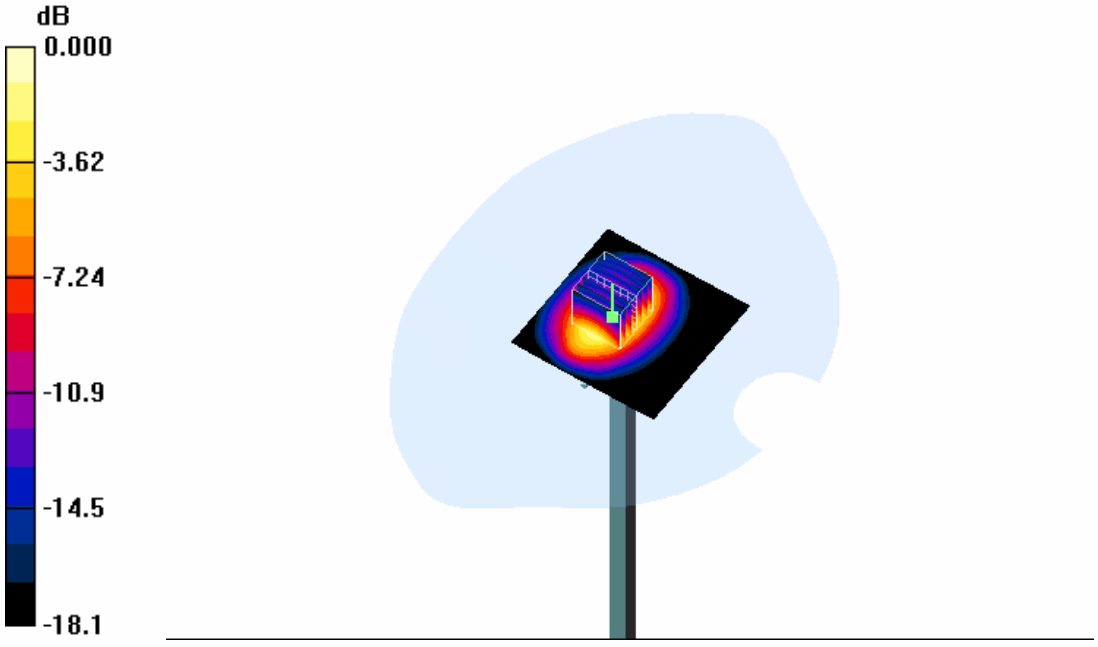
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d150
Program Name: System Performance Check Body at 1900 MHz

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.55 mho/m; ε_r = 53.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3292; ConvF(4.66, 4.66, 4.66); Calibrated: 2/24/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 2/27/2012
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

d=15mm, Pin=250mW/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 9.82 mW/g

d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 80.635 V/m; Power Drift = 0.025dB
Peak SAR (extrapolated) = 18.65 W/kg
SAR(1 g) = 9.91 mW/g; SAR(10 g) = 4.92 mW/g
Maximum value of SAR (measured) = 10.13 mW/g



0 dB = 10.13mW/g

Appendix B. SAR Test plots:

Test Plot 1: Date: 2/1/2013 Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

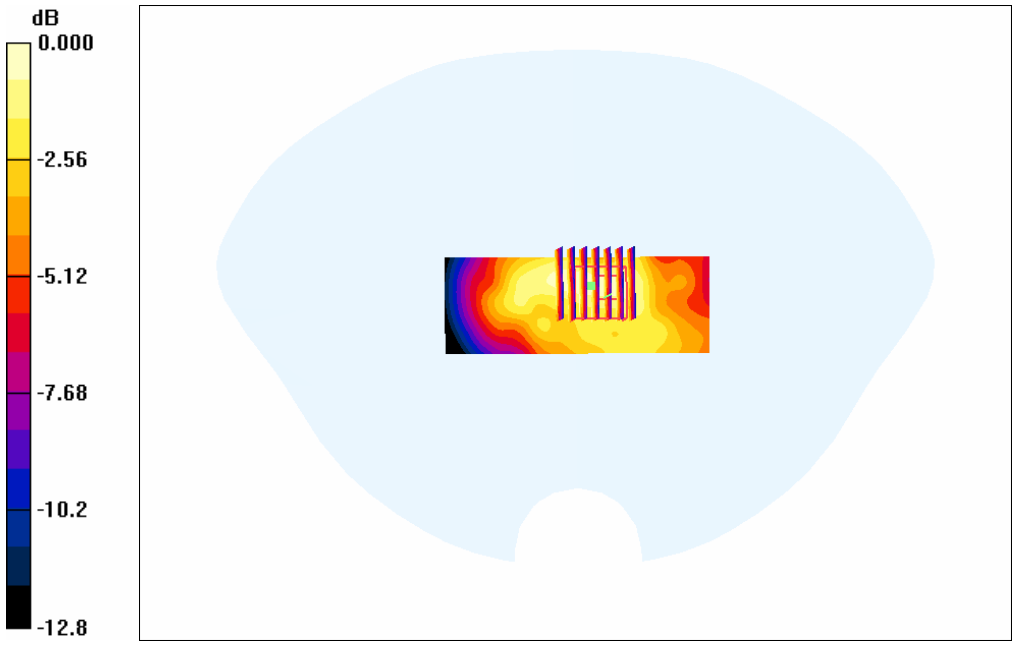
DUT: USB Modem; Type: SI PIN; Serial: IMEI Number
Program Name: USB Modem

Communication System: EVDO 850; Frequency: 824.7 MHz;Duty Cycle: 1:1
Medium parameters used: f = 825 MHz; σ = 0.967 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3292; ConvF(6.14, 6.14, 6.14); Calibrated: 2/27/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 2/27/2012
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side A/Area Scan (41x111x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.482 mW/g

Side A/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 23.9 V/m; Power Drift = -0.135 dB
Peak SAR (extrapolated) = 0.830 W/kg
SAR(1 g) = 0.431 mW/g; SAR(10 g) = 0.276 mW/g
Maximum value of SAR (measured) = 0.484 mW/g



0 dB = 0.484mW/g

Test Plot 2: Date: 2/1/2013 Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

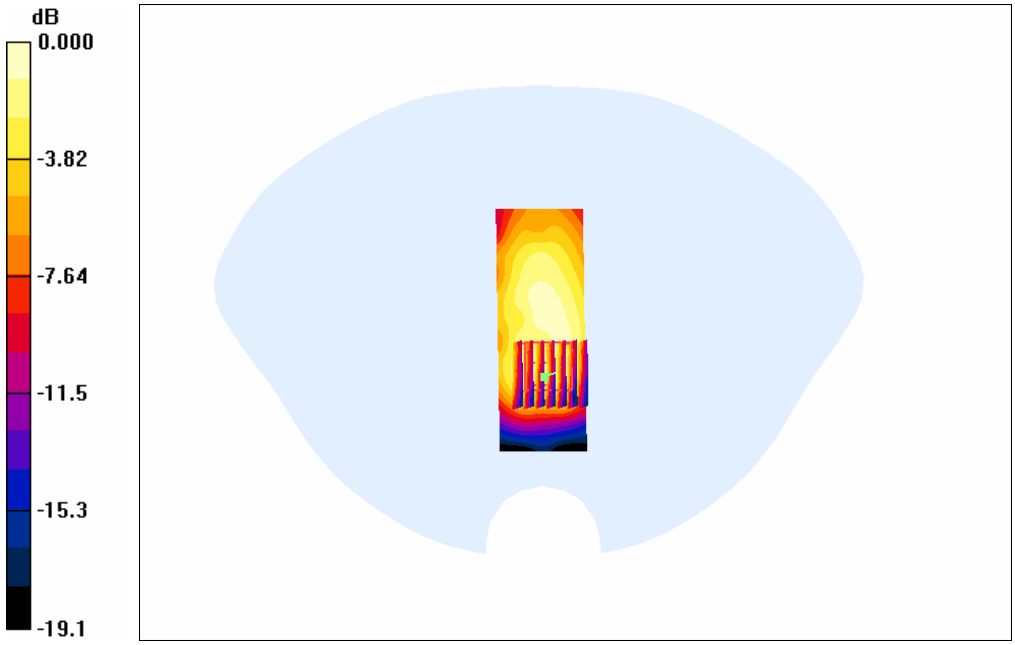
DUT: USB Modem; Type: SI PIN; Serial: IMEI Number
Program Name: USB Modem

Communication System: EVDO 850; Frequency: 824.7 MHz;Duty Cycle: 1:1
Medium parameters used: f = 825 MHz; σ = 0.967 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3292; ConvF(6.14, 6.14, 6.14); Calibrated: 2/27/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 2/27/2012
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side B/Area Scan (111x41x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.360 mW/g

Side B/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.8 V/m; Power Drift = -0.134 dB
Peak SAR (extrapolated) = 0.797 W/kg
SAR(1 g) = 0.303 mW/g; SAR(10 g) = 0.169 mW/g
Maximum value of SAR (measured) = 0.333 mW/g



0 dB = 0.333mW/g

Test Plot 3: Date: 2/1/2013 Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

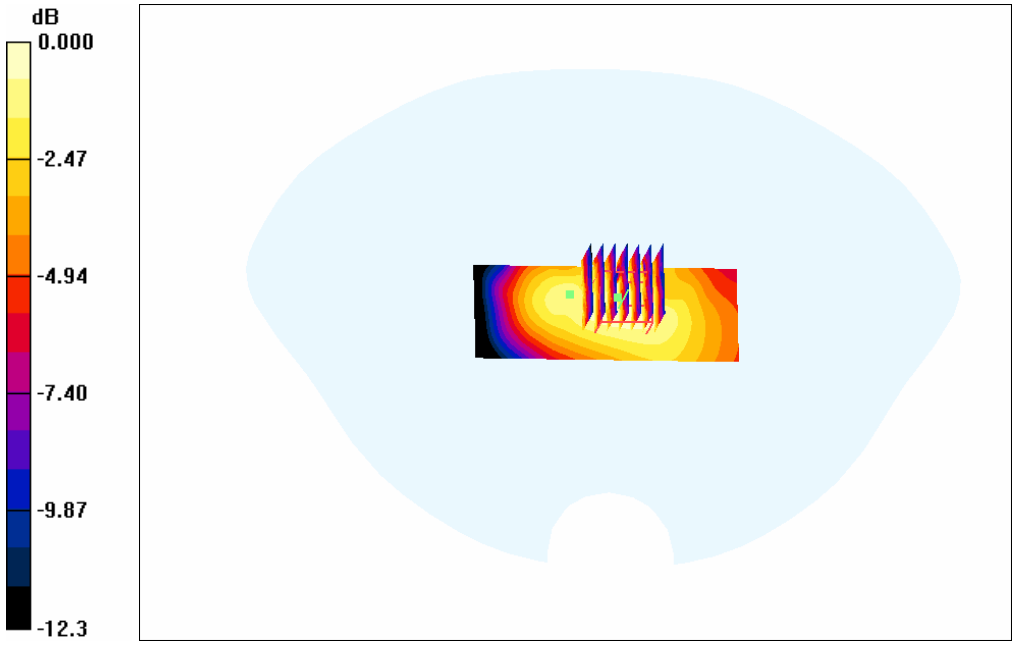
DUT: USB Modem; Type: SI PIN; Serial: IMEI Number
Program Name: USB Modem

Communication System: EVDO 850; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used: f = 837 MHz; σ = 0.976 mho/m; ε_r = 55.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3292; ConvF(6.14, 6.14, 6.14); Calibrated: 2/27/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 2/27/2012
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

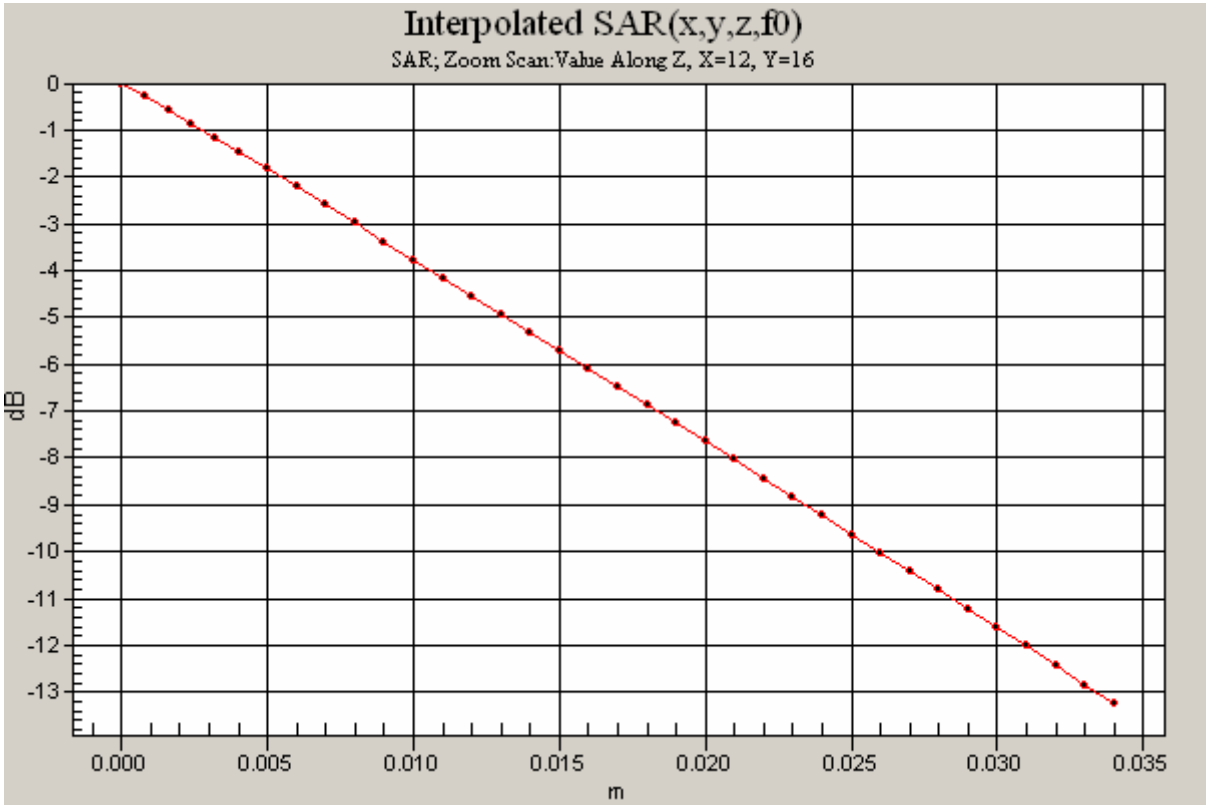
Side A/Area Scan (41x111x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.27 mW/g

Side A/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 30.2 V/m; Power Drift = 0.169 dB
Peak SAR (extrapolated) = 2.77 W/kg
SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.726 mW/g
Maximum value of SAR (measured) = 1.29 mW/g



0 dB = 1.29mW/g

Z-Axis:


Interpolated SAR(x,y,z,f0)
SAR; Zoom Scan:Value Along Z, X=12, Y=16
dB
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
-11
-12
-13
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
m

Test Plot 4: Date: 2/1/2013 Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

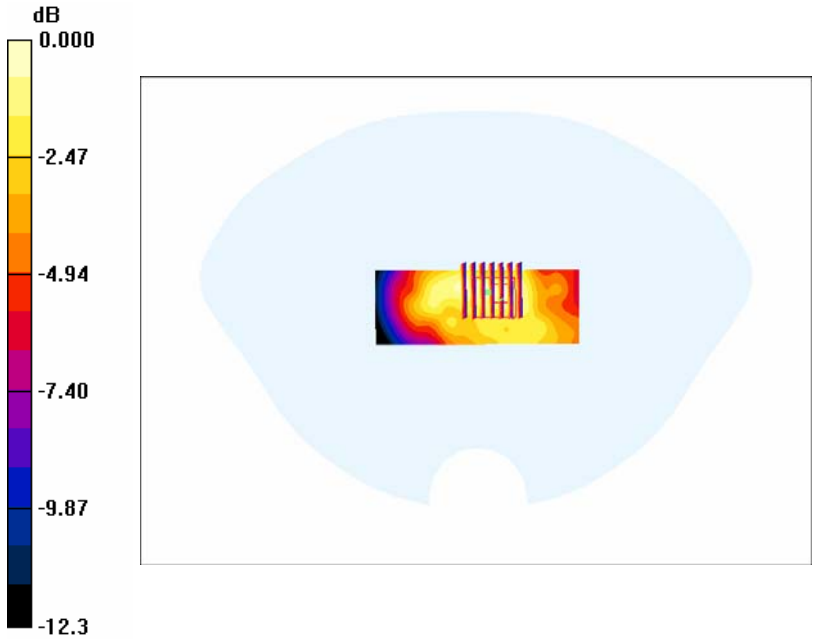
DUT: USB Modem; Type: SI PIN; Serial: IMEI Number
Program Name: USB Modem

Communication System: EVDO 850; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used: f = 837 MHz; σ = 0.976 mho/m; ε_r = 55.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3292; ConvF(6.14, 6.14, 6.14); Calibrated: 2/27/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 2/27/2012
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side A/Area Scan (41x111x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.15 mW/g

Side A/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 29.6 V/m; Power Drift = 0.013 dB
Peak SAR (extrapolated) = 2.42 W/kg
SAR(1 g) = 0.98 mW/g; SAR(10 g) = 0.675 mW/g
Maximum value of SAR (measured) = 1.04 mW/g



0 dB = 1.04mW/g

Test Plot 5: Date: 2/1/2013 Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

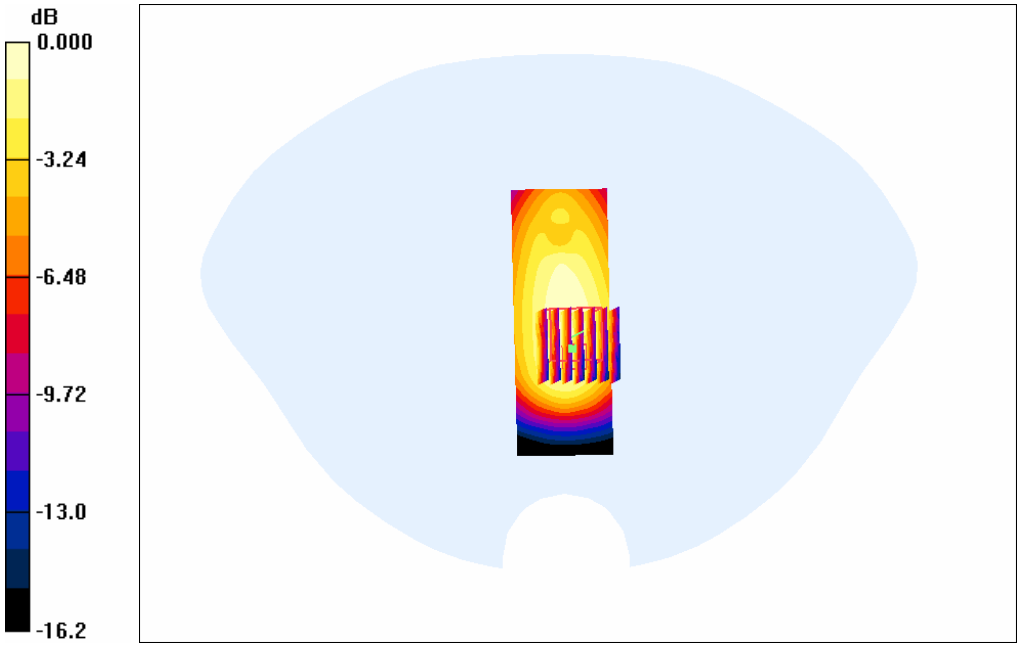
DUT: USB Modem; Type: SI PIN; Serial: IMEI Number
Program Name: USB Modem

Communication System: EVDO 850; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used: f = 837 MHz; σ = 0.976 mho/m; ε_r = 55.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3292; ConvF(6.14, 6.14, 6.14); Calibrated: 2/27/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 2/27/2012
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side B/Area Scan (111x41x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.923 mW/g

Side B/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 30.6 V/m; Power Drift = 0.141 dB
Peak SAR (extrapolated) = 3.55 W/kg
SAR(1 g) = 0.838 mW/g; SAR(10 g) = 0.521 mW/g
Maximum value of SAR (measured) = 0.952 mW/g



0 dB = 0.952mW/g

Test Plot 6: Date: 2/1/2013 Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

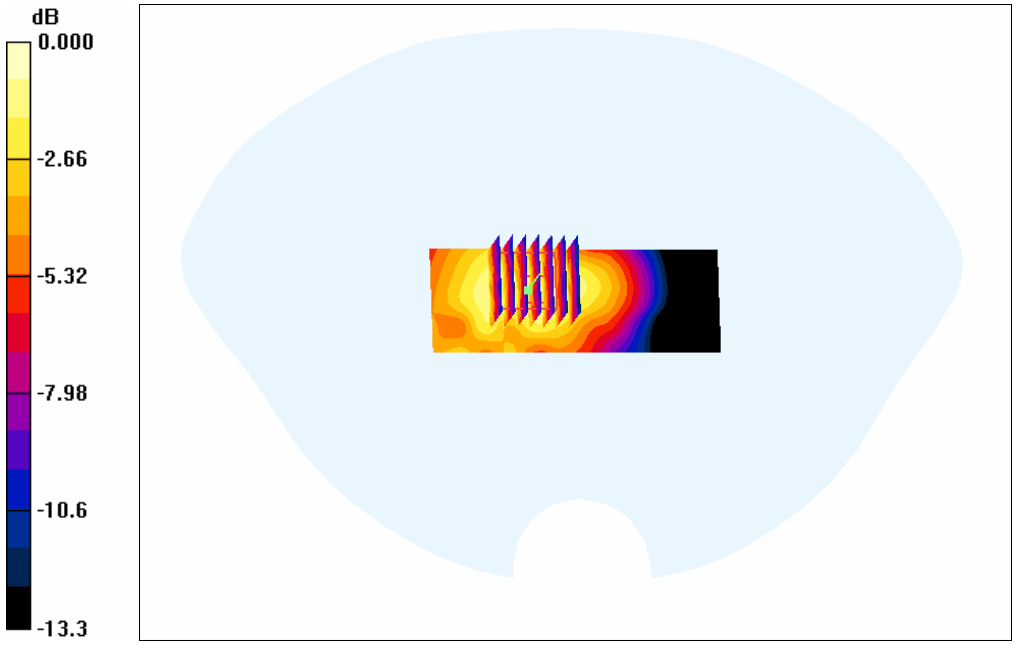
DUT: USB Modem; Type: SI PIN; Serial: IMEI Number
Program Name: USB Modem

Communication System: EVDO 850; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used: f = 837 MHz; $\sigma = \sigma$ = 0.976 mho/m; ε_r = 55.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3292; ConvF(6.14, 6.14, 6.14); Calibrated: 2/27/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 2/27/2012
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side C/Area Scan (41x111x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.929 mW/g

Side C/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 26.6 V/m; Power Drift = 0.009 dB
Peak SAR (extrapolated) = 1.83 W/kg
SAR(1 g) = 0.780 mW/g; SAR(10 g) = 0.494 mW/g
Maximum value of SAR (measured) = 0.926 mW/g



0 dB = 0.926mW/g

Test Plot 7: Date: 2/1/2013 Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

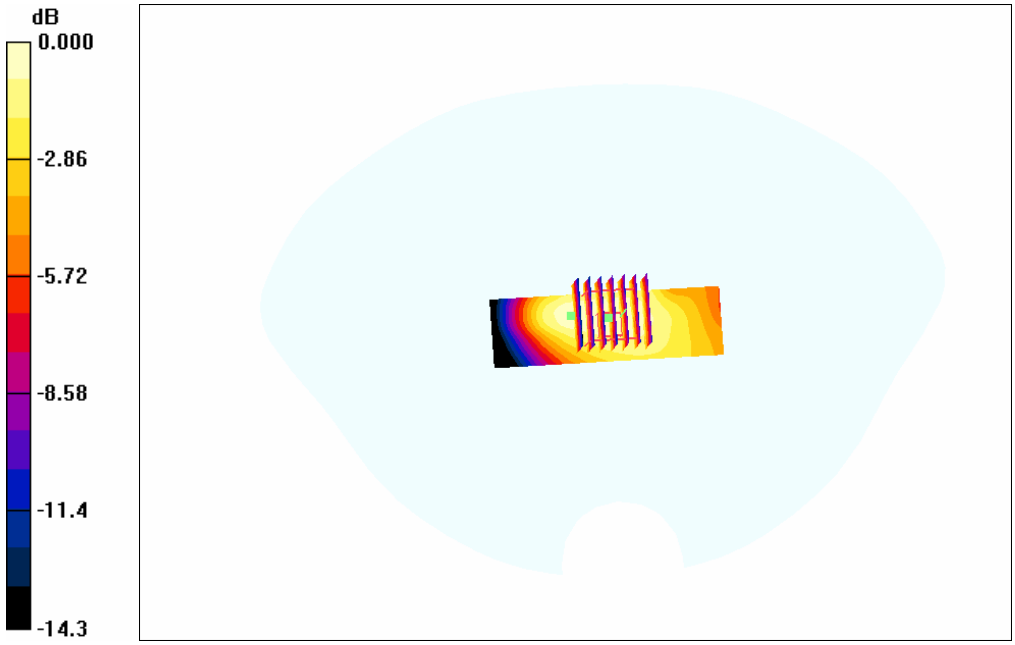
DUT: USB Modem; Type: SI PIN; Serial: IMEI Number
Program Name: USB Modem

Communication System: EVDO 850; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used: f = 837 MHz; σ = 0.976 mho/m; ε_r = 55.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3292; ConvF(6.14, 6.14, 6.14); Calibrated: 2/27/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 2/27/2012
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side D/Area Scan (31x101x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.644 mW/g

Side D/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 25.8 V/m; Power Drift = 0.073 dB
Peak SAR (extrapolated) = 1.93 W/kg
SAR(1 g) = 0.602 mW/g; SAR(10 g) = 0.359 mW/g
Maximum value of SAR (measured) = 0.645 mW/g



0 dB = 0.645mW/g

Test Plot 8: Date: 2/1/2013 Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

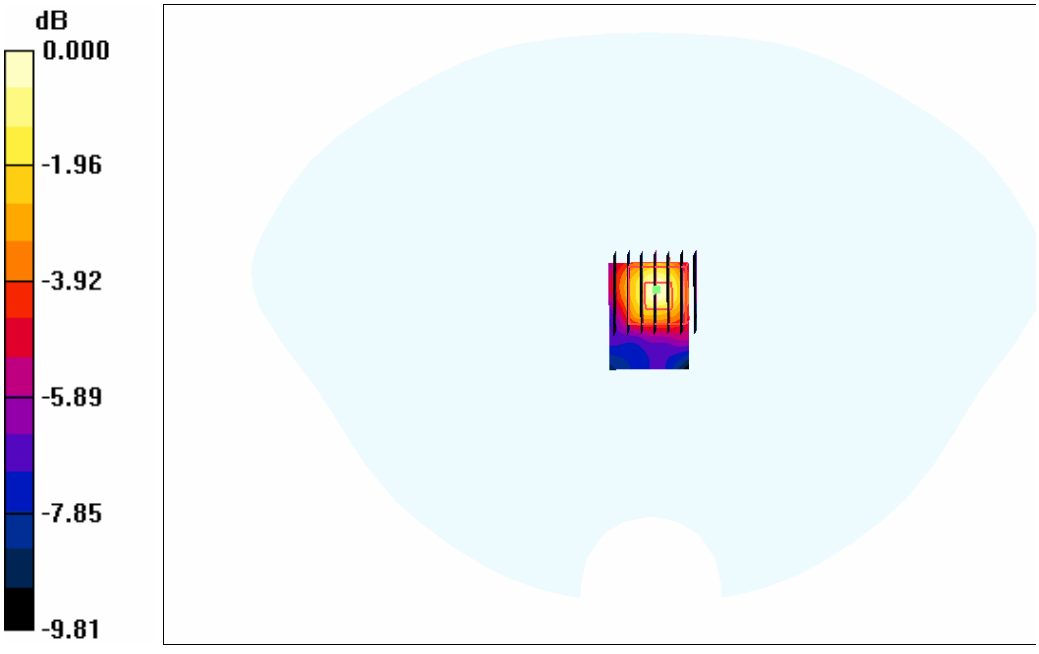
DUT: USB Modem; Type: SI PIN; Serial: IMEI Number
Program Name: USB Modem

Communication System: EVDO 850; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used: f = 837 MHz; σ = 0.976 mho/m; ε_r = 55.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3292; ConvF(6.14, 6.14, 6.14); Calibrated: 2/27/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 2/27/2012
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Tip Side/Area Scan (41x31x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.261 mW/g

Tip Side/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.6 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.447 W/kg
SAR(1 g) = 0.192 mW/g; SAR(10 g) = 0.082 mW/g
Maximum value of SAR (measured) = 0.241 mW/g



0 dB = 0.261mW/g

Test Plot 9: Date: 2/1/2013 Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

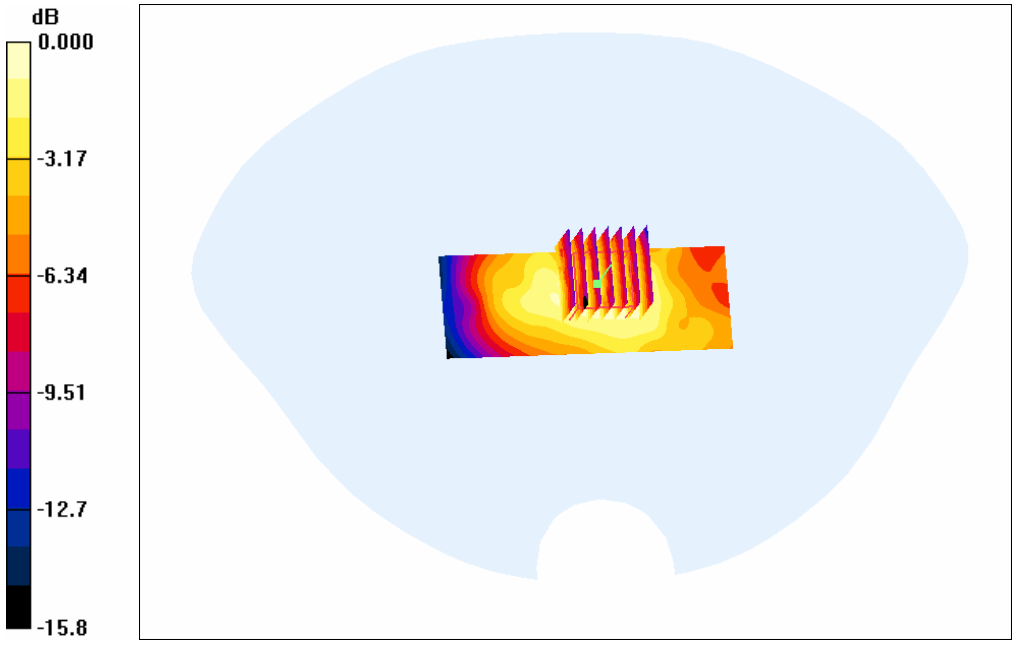
DUT: USB Modem; Type: SI PIN; Serial: IMEI Number
Program Name: USB Modem

Communication System: EVDO 850; Frequency: 848.31 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 848.31 MHz; σ = 0.981 mho/m; ε_r = 55.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3292; ConvF(6.14, 6.14, 6.14); Calibrated: 2/27/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 2/27/2012
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side A 2/Area Scan (41x111x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.775 mW/g

Side A 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 22.4 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 1.88 W/kg
SAR(1 g) = 0.755 mW/g; SAR(10 g) = 0.1468 mW/g
Maximum value of SAR (measured) = 0.798 mW/g



0 dB = 0.798mW/g

Test Plot 10: Date: 2/1/2013 Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

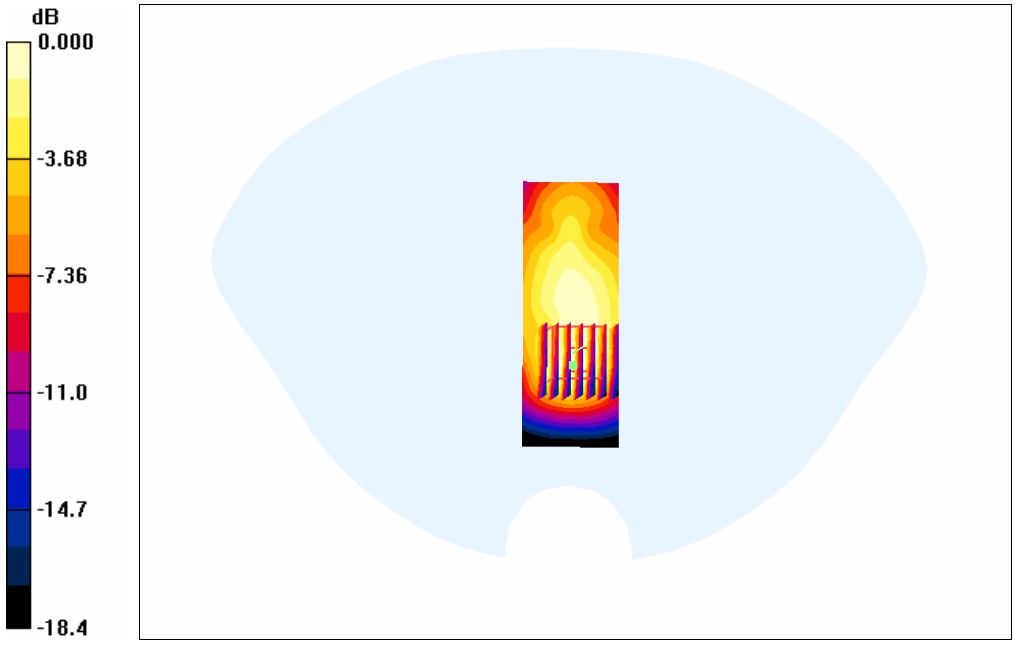
DUT: USB Modem; Type: SI PIN; Serial: IMEI Number
Program Name: USB Modem

Communication System: EVDO 850; Frequency: 848.31 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 848.31 MHz; σ = 0.981 mho/m; ε_r = 55.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3292; ConvF(6.14, 6.14, 6.14); Calibrated: 2/27/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 2/27/2012
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side B 2/Area Scan (111x41x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.639 mW/g

Side B 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 24.6 V/m; Power Drift = 0.172 dB
Peak SAR (extrapolated) = 1.30 W/kg
SAR(1 g) = 0.559 mW/g; SAR(10 g) = 0.314 mW/g
Maximum value of SAR (measured) = 0.635 mW/g



0 dB = 0.635mW/g

Test Plot 11: Date: 2/1/2013 Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

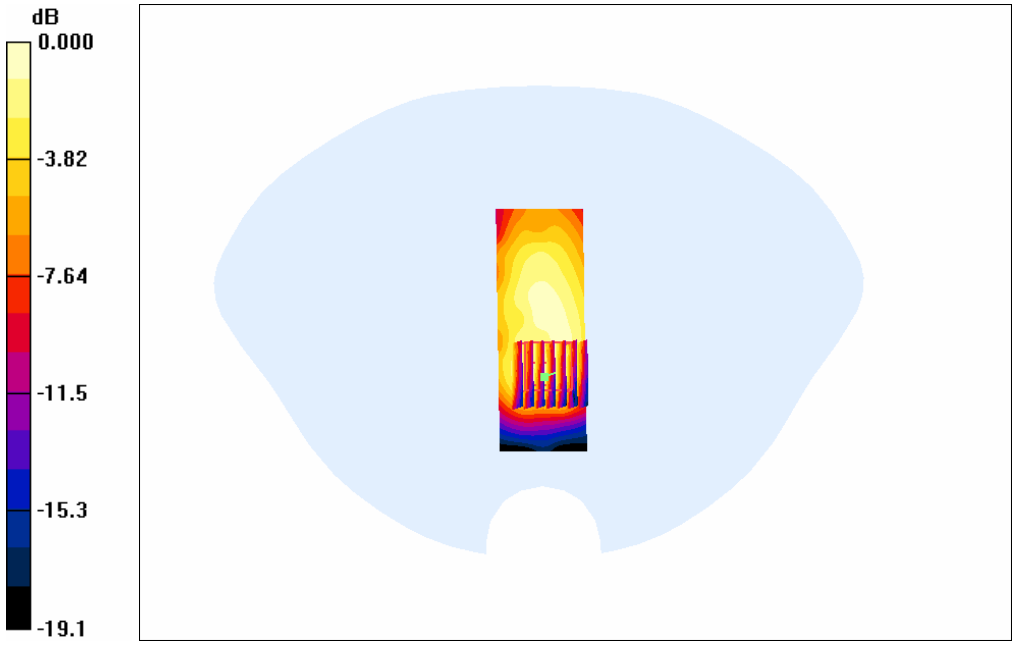
DUT: USB Modem; Type: SI PIN; Serial: IMEI Number
Program Name: USB Modem

Communication System: EVDO 850; Frequency: 824.7 MHz;Duty Cycle: 1:1
Medium parameters used: f = 825 MHz; σ = 0.967 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3292; ConvF(6.14, 6.14, 6.14); Calibrated: 2/27/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 2/27/2012
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side A/Area Scan (111x41x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.760 mW/g

Side A/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 30.3 V/m; Power Drift = -0.112 dB
Peak SAR (extrapolated) = 0.971 W/kg
SAR(1 g) = 0.531 mW/g; SAR(10 g) = 0.283 mW/g
Maximum value of SAR (measured) = 0.685mW/g



0 dB = 0.685mW/g

Test Plot 12: Date: 2/1/2013 Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

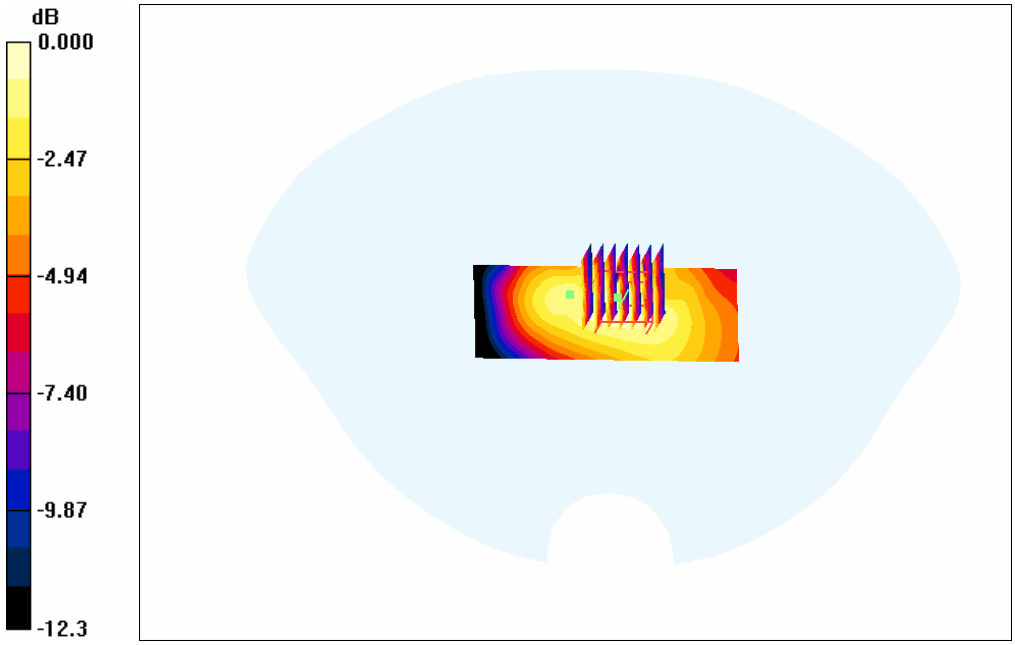
DUT: USB Modem; Type: SI PIN; Serial: IMEI Number
Program Name: USB Modem

Communication System: EVDO 850; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used: f = 837 MHz; σ = 0.976 mho/m; ε_r = 55.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3292; ConvF(6.14, 6.14, 6.14); Calibrated: 2/27/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 2/27/2012
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

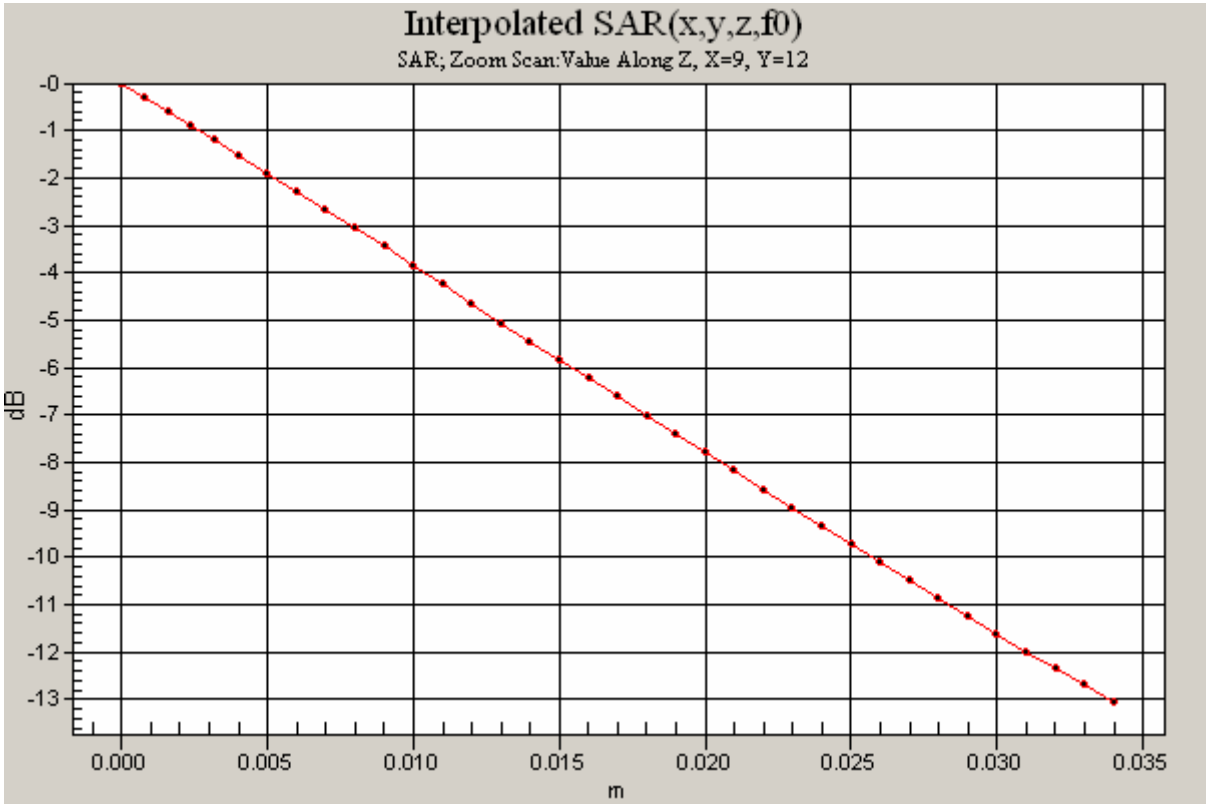
Side A/Area Scan (41x111x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.31mW/g

Side A/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 32.5 V/m; Power Drift = 0.142 dB
Peak SAR (extrapolated) = 2.85 W/kg
SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.735 mW/g
Maximum value of SAR (measured) = 1.34 mW/g



0 dB = 1.34mW/g

Z-Axis Plot:


Interpolated SAR(x,y,z,f0)
SAR; Zoom Scan:Value Along Z, X=9, Y=12
dB
-0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
-11
-12
-13
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
m

Test Plot 13: Date: 2/1/2013 Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

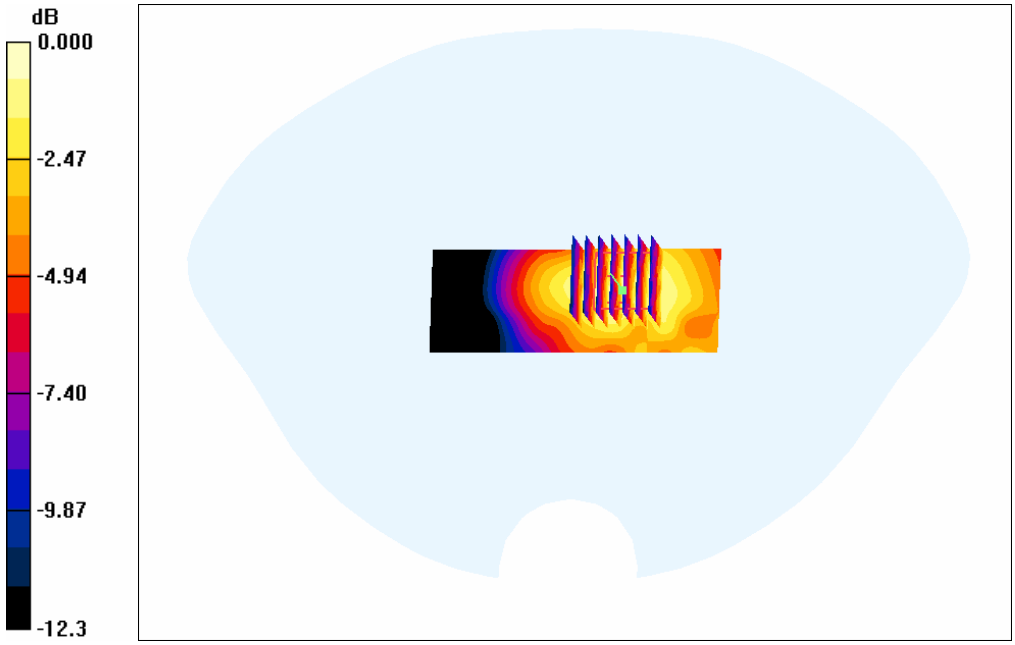
DUT: USB Modem; Type: SI PIN; Serial: IMEI Number
Program Name: USB Modem

Communication System: EVDO 850; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used: f = 837 MHz; σ = 0.976 mho/m; ε_r = 55.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3292; ConvF(6.14, 6.14, 6.14); Calibrated: 2/27/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 2/27/2012
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side A/Area Scan (41x111x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.18mW/g

Side A/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 31.3 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 2.33 W/kg
SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.721 mW/g
Maximum value of SAR (measured) = 1.27 mW/g



0 dB = 1.27mW/g

Test Plot 14: Date: 2/1/2013 Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

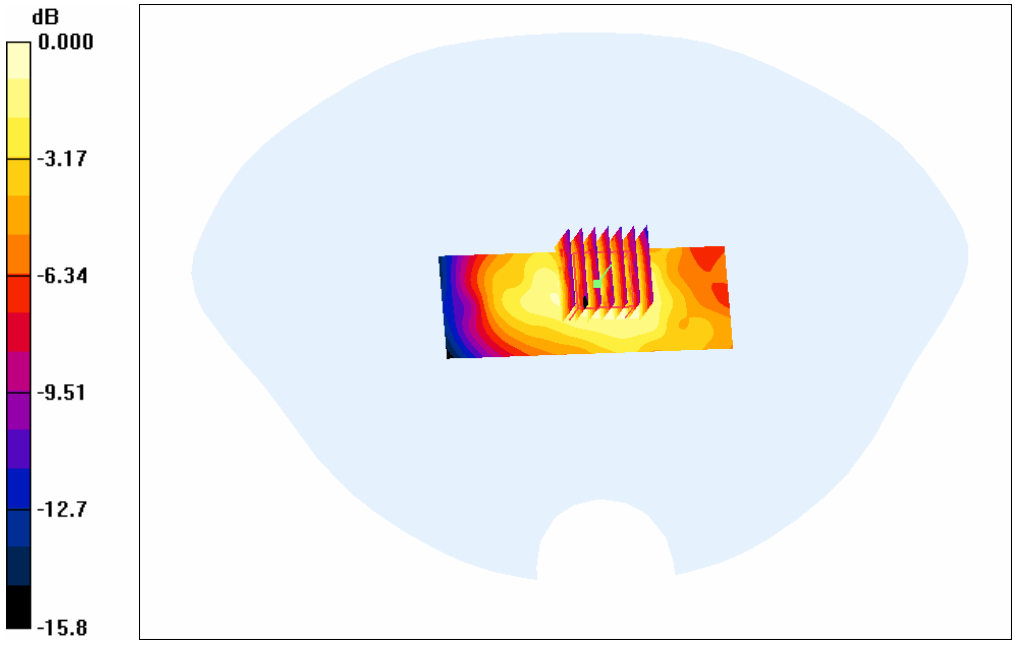
DUT: USB Modem; Type: SI PIN; Serial: IMEI Number
Program Name: USB Modem

Communication System: EVDO 850; Frequency: 848.31 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 848.31 MHz; σ = 0.981 mho/m; ε_r = 55.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3292; ConvF(6.14, 6.14, 6.14); Calibrated: 2/27/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 2/27/2012
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side A 2/Area Scan (41x111x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.034 mW/g

Side A 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 36.2V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 2.12 W/kg
SAR(1 g) = 0.792 mW/g; SAR(10 g) = 0.1468 mW/g
Maximum value of SAR (measured) = 1.248 mW/g



0 dB = 1.248mW/g

Test Plot 15: Date: 2/2/2013 Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

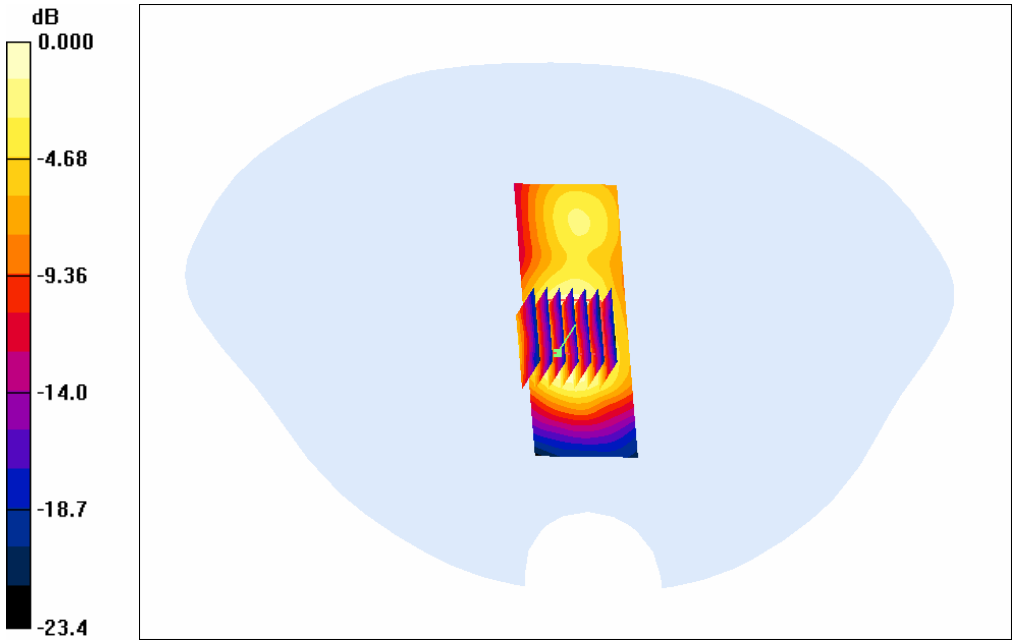
DUT: USB Modem; Type: SI PIN; Serial: IMEI Number
Program Name: USB Modem

Communication System: EVDO 1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.54 mho/m; εr = 53.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3292; ConvF(4.66, 4.66, 4.66); Calibrated: 2/27/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 2/27/2012
- Phantom: SAM with TP1360; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side A/Area Scan (41x111x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.178 mW/g

Side A/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.2 V/m; Power Drift = -0.006 dB
Peak SAR (extrapolated) = 0.414 W/kg
SAR(1 g) = 0.154 mW/g; SAR(10 g) = 0.074 mW/g
Maximum value of SAR (measured) = 0.166 mW/g



0 dB = 0.166mW/g

Test Plot 16: Date: 2/2/2013 Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

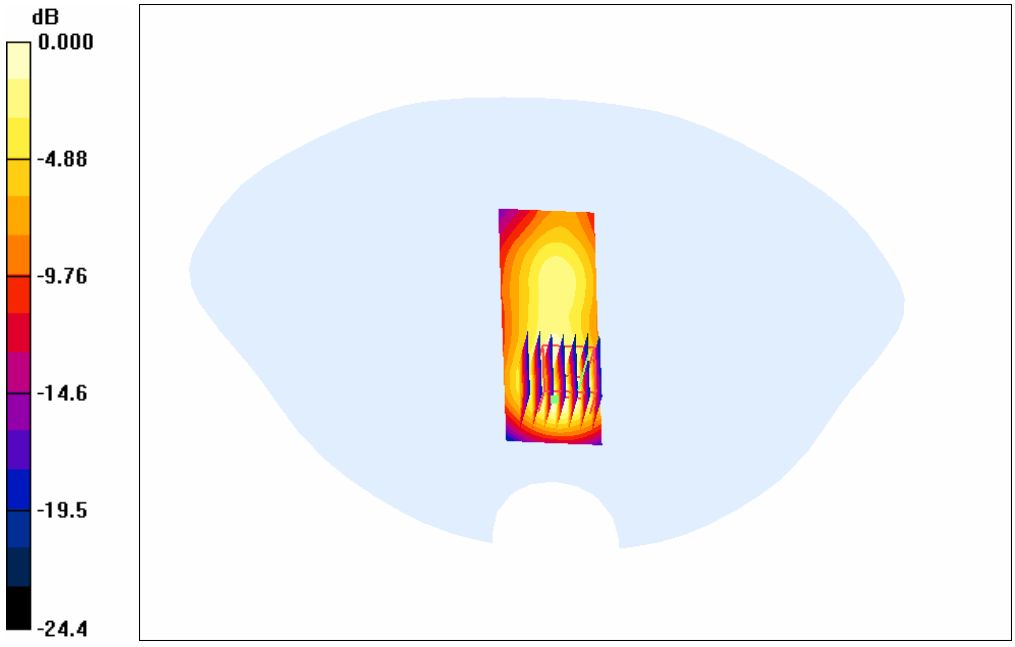
DUT: USB Modem; Type: SI PIN; Serial: IMEI Number
Program Name: USB Modem

Communication System: EVDO 1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.54 mho/m; εr = 53.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3292; ConvF(4.66, 4.66, 4.66); Calibrated: 2/27/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 2/27/2012
- Phantom: SAM with TP1360; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

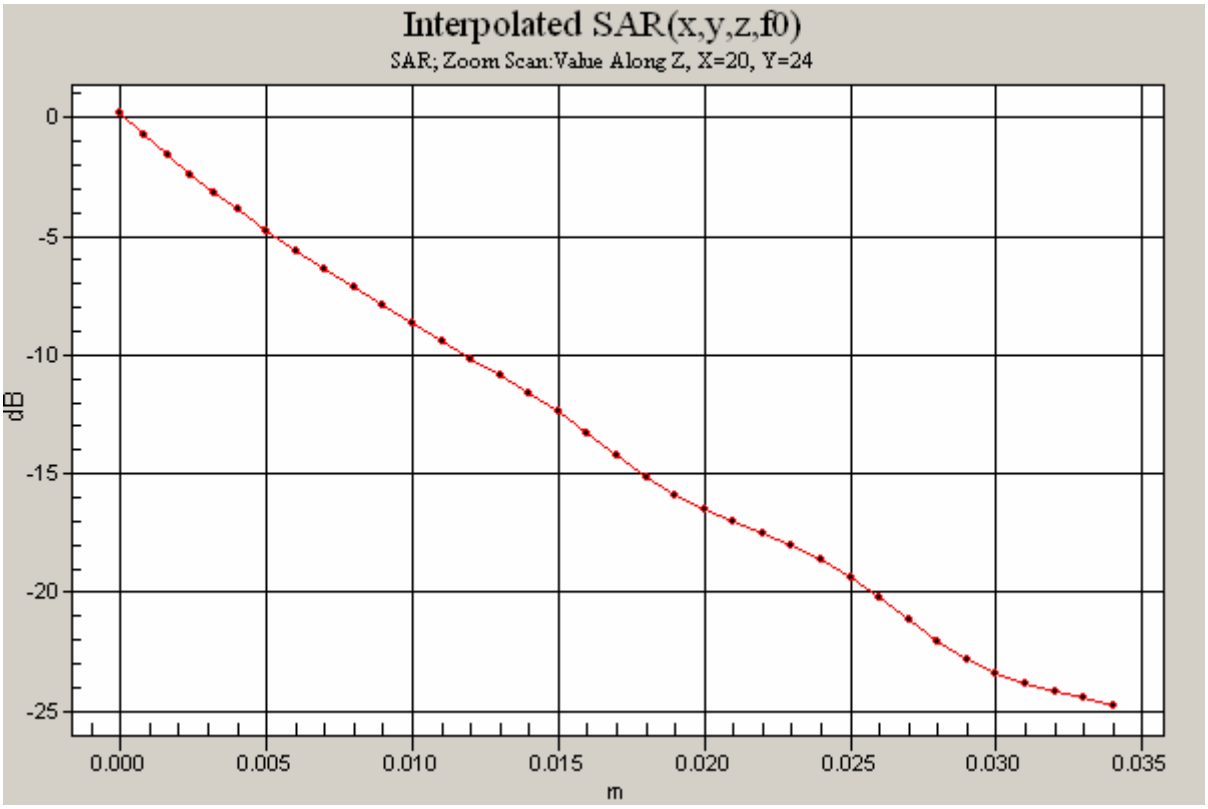
Side B/Area Scan (41x111x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.360 mW/g

Side B/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.3 V/m; Power Drift = -0.170 dB
Peak SAR (extrapolated) = 0.925 W/kg
SAR(1 g) = 0.323 mW/g; SAR(10 g) = 0.144 mW/g
Maximum value of SAR (measured) = 0.360 mW/g



0 dB = 0.360mW/g

Z-Axis Plot


Interpolated SAR(x,y,z,f0)
SAR; Zoom Scan:Value Along Z, X=20, Y=24
dB
0
-5
-10
-15
-20
-25
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
m

Test Plot 17: Date: 2/2/2013 Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

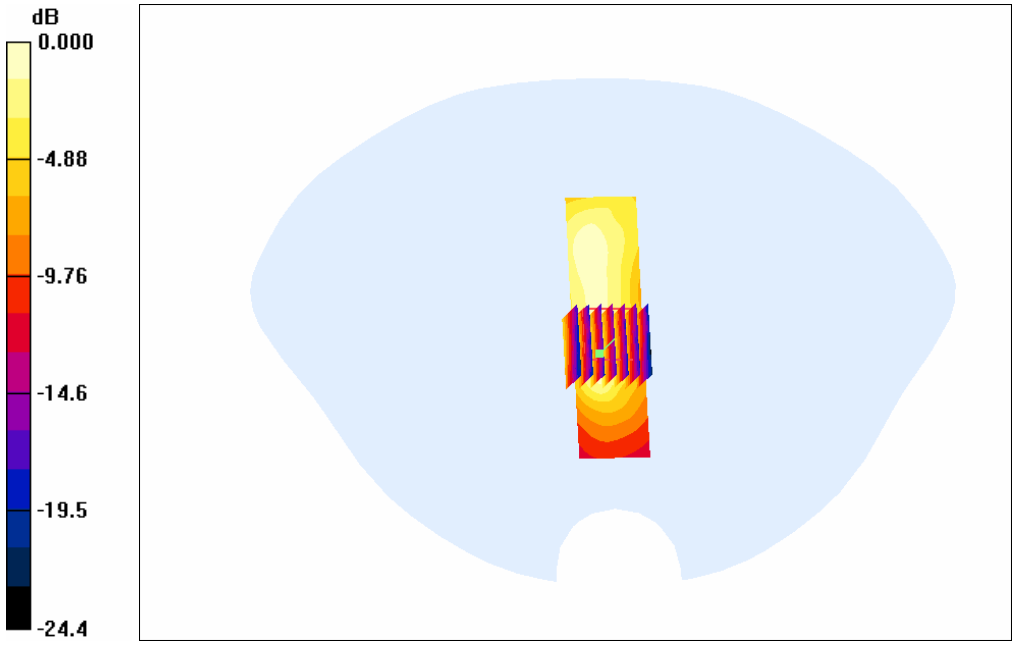
DUT: USB Modem; Type: SI PIN; Serial: IMEI Number
Program Name: USB Modem

Communication System: EVDO 1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.54 mho/m; εr = 53.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3292; ConvF(4.66, 4.66, 4.66); Calibrated: 2/27/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 2/27/2012
- Phantom: SAM with TP1360; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side C/Area Scan (31x111x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.126 mW/g

Side C/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.81 V/m; Power Drift = -0.147 dB
Peak SAR (extrapolated) = 0.215 W/kg
SAR(1 g) = 0.102 mW/g; SAR(10 g) = 0.050 mW/g
Maximum value of SAR (measured) = 0.114 mW/g



0 dB = 0.114mW/g

Test Plot 18: Date: 2/2/2013 Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

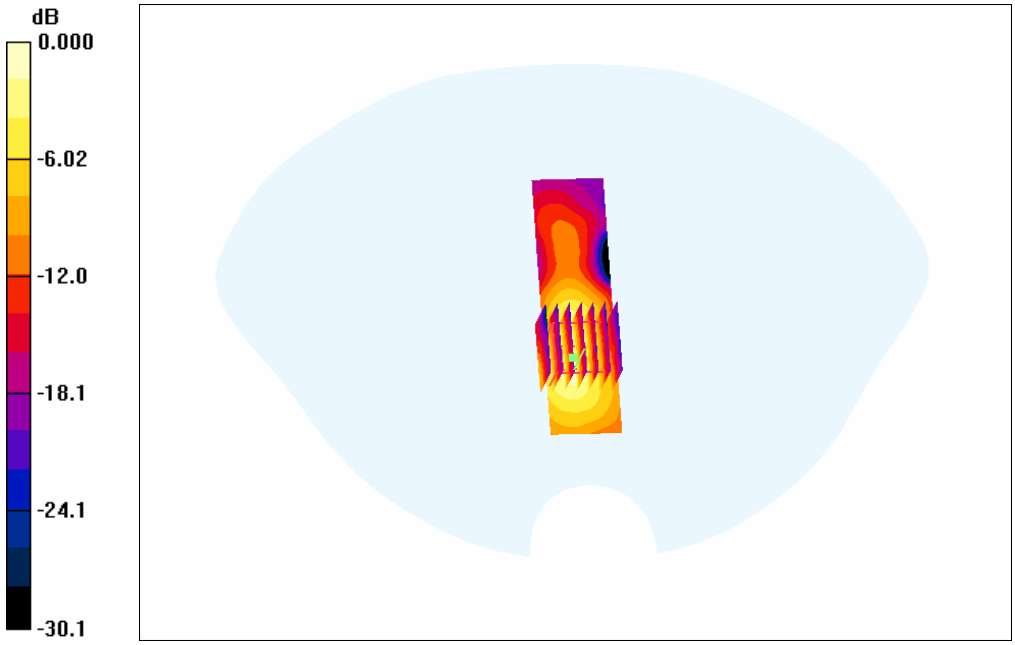
DUT: USB Modem; Type: SI PIN; Serial: IMEI Number
Program Name: USB Modem

Communication System: EVDO 1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.54 mho/m; εr = 53.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3292; ConvF(4.66, 4.66, 4.66); Calibrated: 2/27/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 2/27/2012
- Phantom: SAM with TP1360; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side D/Area Scan (31x111x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.125 mW/g

Side D/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.42 V/m; Power Drift = -0.196 dB
Peak SAR (extrapolated) = 0.243 W/kg
SAR(1 g) = 0.094 mW/g; SAR(10 g) = 0.038 mW/g
Maximum value of SAR (measured) = 0.115 mW/g



0 dB = 0.115mW/g

Test Plot 19: Date: 2/2/2013 Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

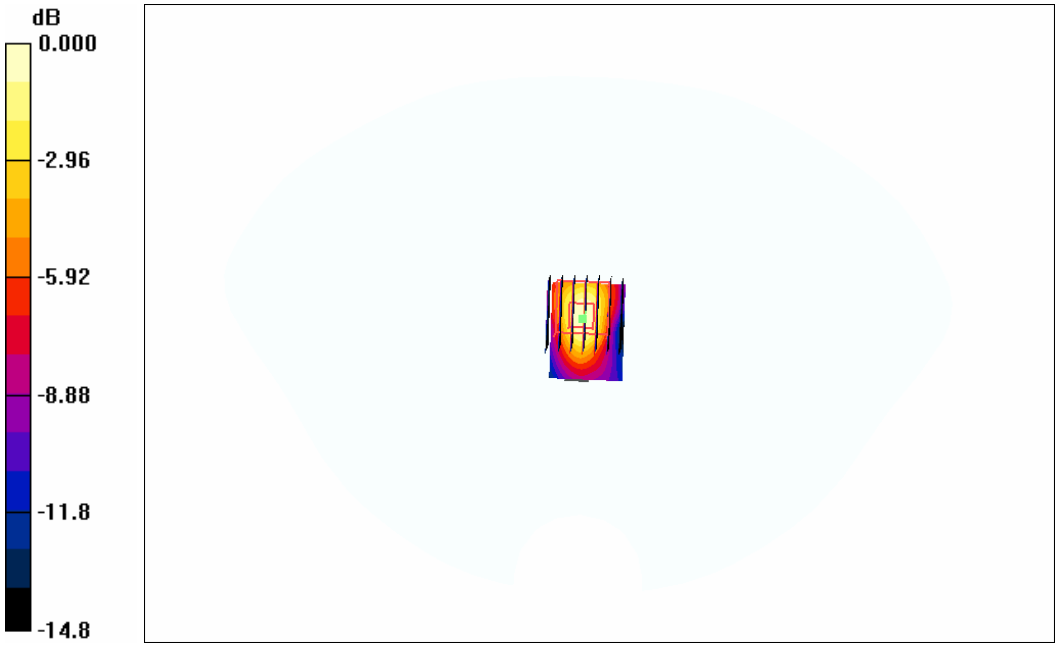
DUT: USB Modem; Type: SI PIN; Serial: IMEI Number
Program Name: USB Modem

Communication System: EVDO 1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.54 mho/m; εr = 53.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3292; ConvF(4.66, 4.66, 4.66); Calibrated: 2/27/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 2/27/2012
- Phantom: SAM with TP1360; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Tip Side/Area Scan (41x31x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.141 mW/g

Tip Side/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.57 V/m; Power Drift = 0.114 dB
Peak SAR (extrapolated) = 0.405 W/kg
SAR(1 g) = 0.116 mW/g; SAR(10 g) = 0.044 mW/g
Maximum value of SAR (measured) = 0.130 mW/g



0 dB = 0.130mW/g

Test Plot 20: Date: 2/2/2013 Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

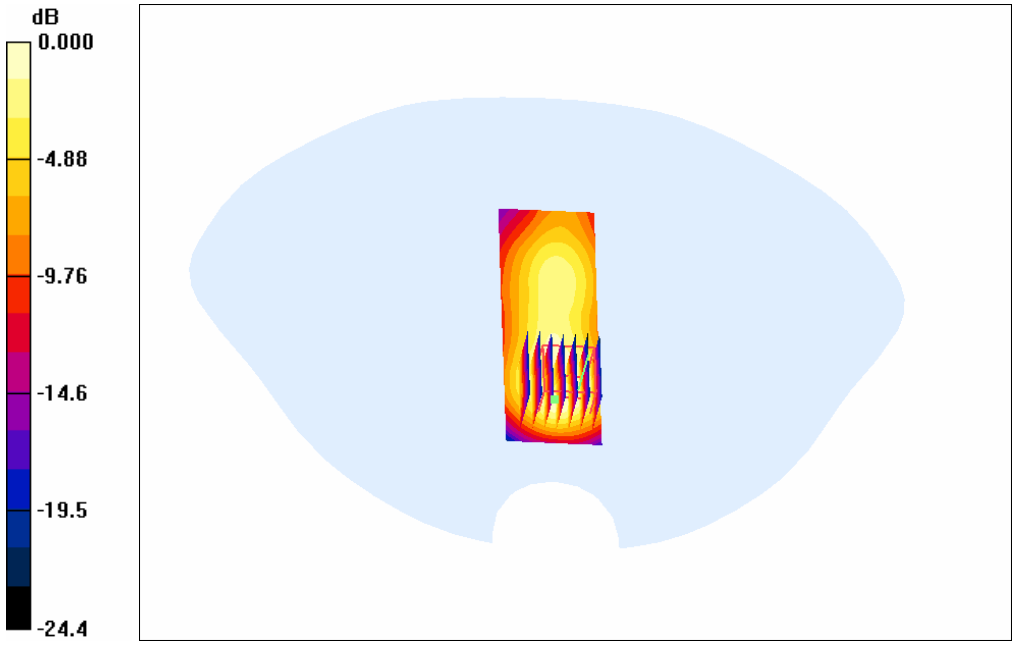
DUT: USB Modem; Type: SI PIN; Serial: IMEI Number
Program Name: USB Modem

Communication System: EVDO 1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.54 mho/m; εr = 53.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3292; ConvF(4.66, 4.66, 4.66); Calibrated: 2/27/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 2/27/2012
- Phantom: SAM with TP1360; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

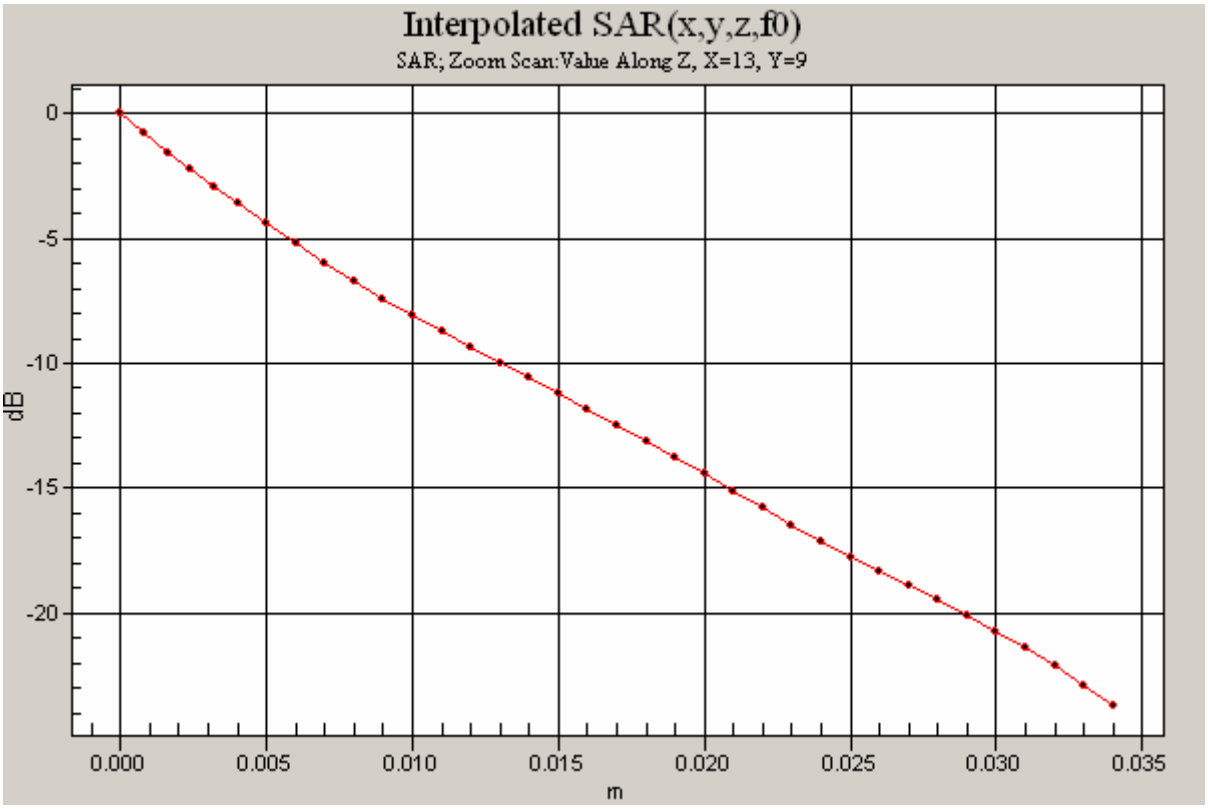
Side B/Area Scan (41x111x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.385 mW/g

Side B/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.8 V/m; Power Drift = -0.143 dB
Peak SAR (extrapolated) = 0.975 W/kg
SAR(1 g) = 0.362 mW/g; SAR(10 g) = 0.151 mW/g
Maximum value of SAR (measured) = 0.425 mW/g



0 dB = 0.425mW/g

Z-Axis Plot


Interpolated SAR(x,y,z,f0)
SAR; Zoom Scan:Value Along Z, X=13, Y=9
0
-5
-10
-15
-20
dB
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
m

Appendix C. Probe Calibration Data:

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
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 108

Client Sunway (Auden)

Certificate No: ES3-3292_Feb12

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3292

Calibration procedure(s): QA CAL-01.v8, QA CAL-14.v7, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: February 24, 2012

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	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 27, 2012

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

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 108

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	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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
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, VRx,y,z: A, B, C* 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.

Probe ES3DV3

SN:3292

Manufactured: July 6, 2010
Calibrated: February 24, 2012

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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3292

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.81	0.90	1.18	± 10.1 %
DCP (mV)[B]	105.9	104.7	102.0	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	117.3	±2.2 %
			Y	0.00	0.00	1.00	94.2	
			Z	0.00	0.00	1.00	108.2	

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

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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3292

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	Depth (mm)	Unct. (k=2)
450	43.5	0.87	6.71	6.71	6.71	0.15	1.80	± 13.4 %
835	41.5	0.90	6.06	6.06	6.06	0.26	2.19	± 12.0 %
900	41.5	0.97	6.03	6.03	6.03	0.29	2.00	± 12.0 %
1810	40.0	1.40	5.25	5.25	5.25	0.80	1.17	± 12.0 %
1900	40.0	1.40	5.21	5.21	5.21	0.63	1.38	± 12.0 %
2100	39.8	1.49	5.15	5.15	5.15	0.80	1.20	± 12.0 %
2450	39.2	1.80	4.47	4.47	4.47	0.63	1.50	± 12.0 %

[C] Frequency validity 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.
[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.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3292

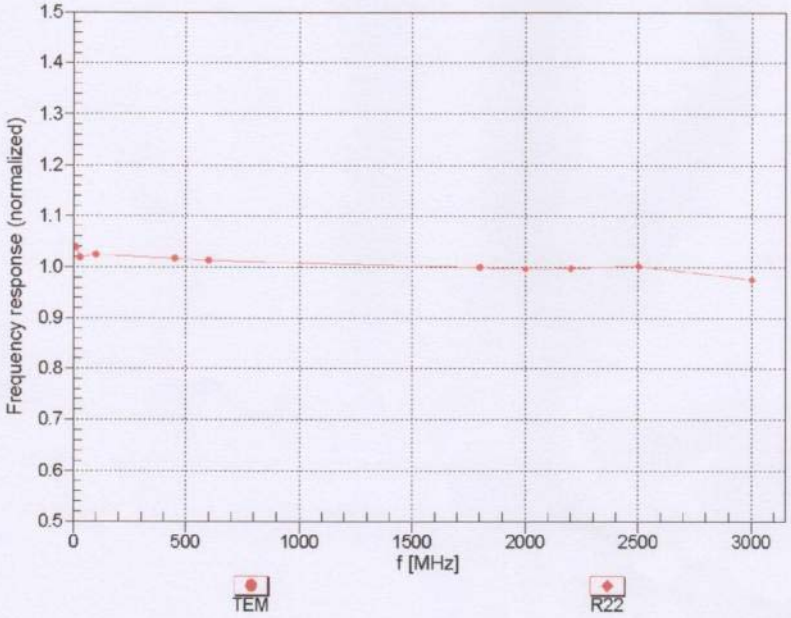
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	56.7	0.94	7.10	7.10	7.10	0.09	1.00	± 13.4 %
835	55.2	0.97	6.14	6.14	6.14	0.42	1.57	± 12.0 %
900	55.0	1.05	6.07	6.07	6.07	0.48	1.49	± 12.0 %
1810	53.3	1.52	4.86	4.86	4.86	0.62	1.42	± 12.0 %
1900	53.3	1.52	4.66	4.66	4.66	0.47	1.75	± 12.0 %
2100	53.2	1.62	4.76	4.76	4.76	0.70	1.39	± 12.0 %
2450	52.7	1.95	4.25	4.25	4.25	0.80	1.03	± 12.0 %

[C] Frequency validity 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.
[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.

ES3DV3– SN:3292 February 24, 2012

Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)

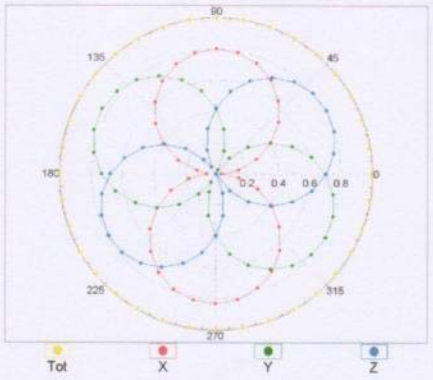


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

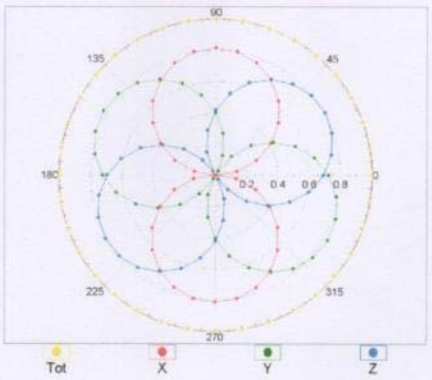
ES3DV3– SN:3292 February 24, 2012

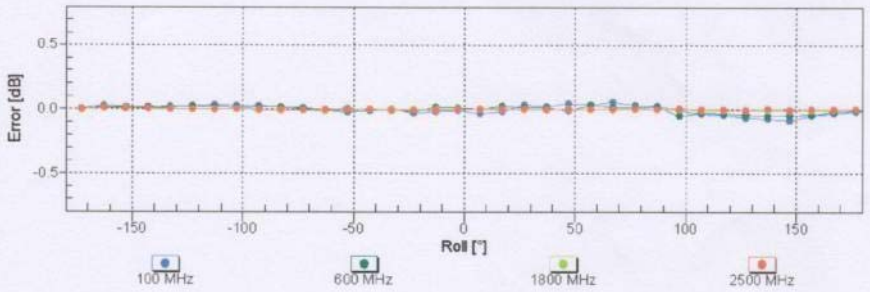
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



f=1800 MHz,R22

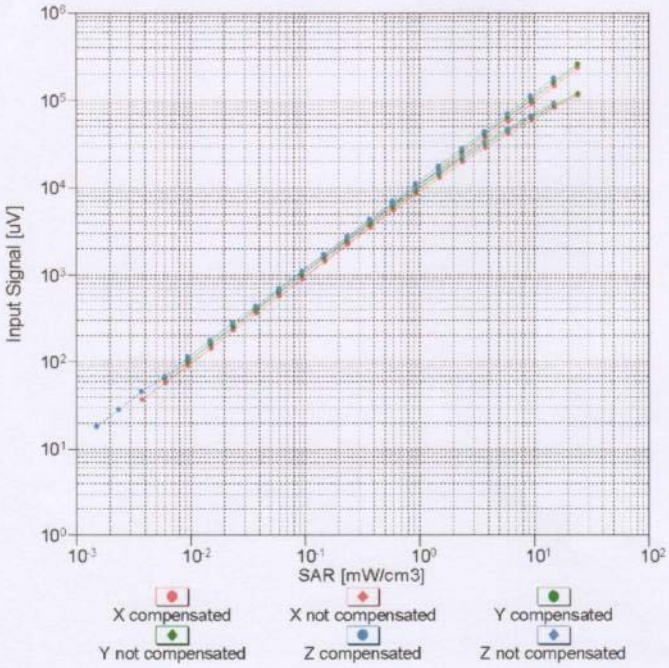


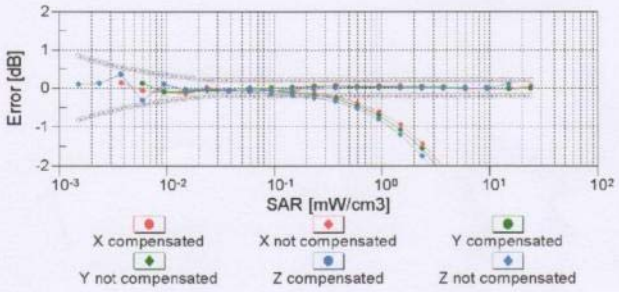


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

ES3DV3– SN:3292 February 24, 2012

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)



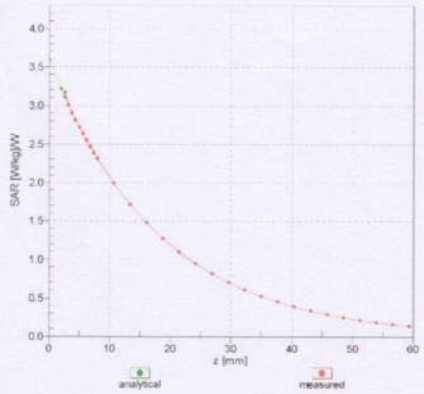


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

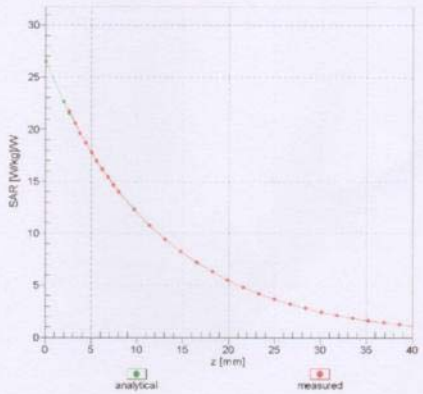
ES3DV3– SN:3292 February 24, 2012

Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)

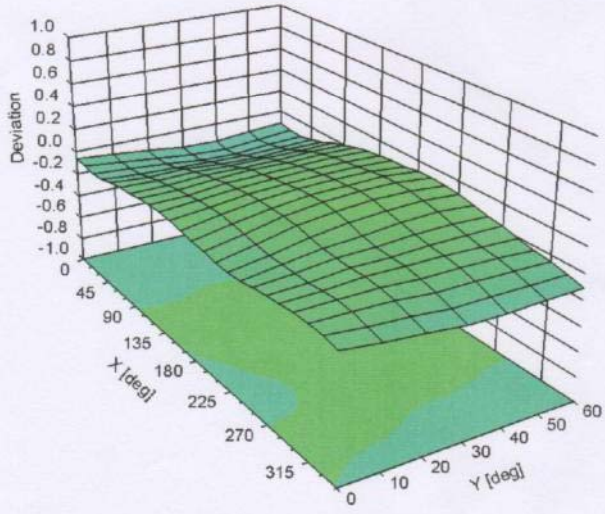


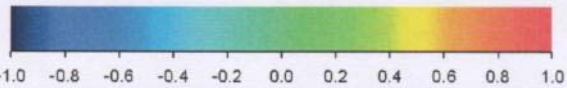
f = 1810 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3292

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

Appendix D. DAE Calibration Data:

Schmid & Partner Engineering AG
s p e a g
Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

IMPORTANT NOTICE

USAGE OF THE DAE 4

The DAE unit is a delicate, high precision instrument and requires careful treatment by the user. There are no serviceable parts inside the DAE. Special attention shall be given to the following points:

Battery Exchange: The battery cover of the DAE4 unit is closed using a screw, over tightening the screw may cause the threads inside the DAE to wear out.

Shipping of the DAE: Before shipping the DAE to SPEAG for calibration, remove the batteries and pack the DAE in an antistatic bag. This antistatic bag shall then be packed into a larger box or container which protects the DAE from impacts during transportation. The package shall be marked to indicate that a fragile instrument is inside.

E-Stop Failures: Touch detection may be malfunctioning due to broken magnets in the E-stop. Rough handling of the E-stop may lead to damage of these magnets. Touch and collision errors are often caused by dust and dirt accumulated in the E-stop. To prevent E-stop failure, the customer shall always mount the probe to the DAE carefully and keep the DAE unit in a non-dusty environment if not used for measurements.

Repair: Minor repairs are performed at no extra cost during the annual calibration. However, SPEAG reserves the right to charge for any repair especially if rough unprofessional handling caused the defect.

DASY Configuration Files: Since the exact values of the DAE input resistances, as measured during the calibration procedure of a DAE unit, are not used by the DASY software, a nominal value of 200 MOhm is given in the corresponding configuration file.

Important Note:
Warranty and calibration is void if the DAE unit is disassembled partly or fully by the Customer.

Important Note:
Never attempt to grease or oil the E-stop assembly. Cleaning and readjusting of the E-stop assembly is allowed by certified SPEAG personnel only and is part of the annual calibration procedure.

Important Note:
To prevent damage of the DAE probe connector pins, use great care when installing the probe to the DAE. Carefully connect the probe with the connector notch oriented in the mating position. Avoid any rotational movement of the probe body versus the DAE while turning the locking nut of the connector. The same care shall be used when disconnecting the probe from the DAE.

Schmid & Partner Engineering

TN_BR040315AD DAE4.doc 11.12.2009

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Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accreditation No.: SCS 108

Client Sunway (Auden)

Certificate No: DAE4-1315_Feb12

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BJ - SN: 1315
Calibration procedure(s)	QA CAL-06.v24 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	February 27, 2012

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
Keithley Multimeter Type 2001	SN: 0810278	28-Sep-11 (No:11450)	Sep-12
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Calibrator Box V2.1	SE UWS 053 AA 1001	05-Jan-12 (in house check)	In house check: Jan-13

	Name	Function	Signature
Calibrated by:	Andrea Guntli	Technician	
Approved by:	Fin Bomholt	R&D Director	i.V.

Issued: February 27, 2012

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

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Accreditation No.: SCS 108

Glossary

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance:* Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption:* Typical value for information. Supply currents in various operating modes.

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range:	1LSB =	6.1µV ,	full range =	-100...+300 mV
Low Range:	1LSB =	61nV ,	full range =	-1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	405.194 ± 0.1% (k=2)	405.031 ± 0.1% (k=2)	405.006 ± 0.1% (k=2)
Low Range	4.00179 ± 0.7% (k=2)	3.99504 ± 0.7% (k=2)	4.00535 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	20.0 ° ± 1 °

Appendix

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	199993.07	-0.46	-0.00
Channel X	+ Input	19998.21	0.29	0.00
Channel X	- Input	-19997.04	5.94	-0.03
Channel Y	+ Input	199992.78	-1.05	-0.00
Channel Y	+ Input	19995.99	-1.88	-0.01
Channel Y	- Input	-20001.41	1.50	-0.01
Channel Z	+ Input	199996.23	3.02	0.00
Channel Z	+ Input	19996.75	-0.72	-0.00
Channel Z	- Input	-20003.50	-0.24	0.00

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	1999.32	-1.73	-0.09
Channel X	+ Input	200.22	-1.03	-0.51
Channel X	- Input	-198.55	0.32	-0.16
Channel Y	+ Input	1997.53	-3.28	-0.16
Channel Y	+ Input	199.64	-1.21	-0.60
Channel Y	- Input	-199.77	-0.78	0.39
Channel Z	+ Input	1997.90	-2.04	-0.10
Channel Z	+ Input	199.23	-1.21	-0.61
Channel Z	- Input	-200.63	-1.12	0.56

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	-1.10	-3.09
	- 200	4.35	3.23
Channel Y	200	-22.09	-22.46
	- 200	21.74	22.31
Channel Z	200	-4.46	-4.92
	- 200	3.65	2.86

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	-2.62	-3.29
Channel Y	200	6.73	-	-2.17
Channel Z	200	8.11	5.38	-

4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	16132	15682
Channel Y	16251	15151
Channel Z	15551	15659

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	1.32	0.22	2.38	0.46
Channel Y	-1.23	-2.04	-0.58	0.36
Channel Z	-1.89	-3.56	-1.12	0.39

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

8. Low Battery Alarm Voltage (Typical values for information)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	–0.01	-8	-9

Appendix E. Dipole Calibration Data:

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

S Schweizerischer Kalibrierdienst
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Accreditation No.: SCS 108

Client CIQ SZ (Auden)

Certificate No: D835V2-4d134_Feb12

CALIBRATION CERTIFICATE

Object: D835V2 - SN: 4d134

Calibration procedure(s): QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: February 27, 2012

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 EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Israe El-Naouq	Laboratory Technician	Israe El-Naouq
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 27, 2012

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Calibration Laboratory of
Schmid & Partner
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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
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
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.0 ± 6 %	0.89 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.33 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**9.37 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.52 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**6.11 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.7 ± 6 %	1.01 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.44 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**9.49 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.60 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**6.26 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.7 Ω - 2.1 jΩ
Return Loss	- 29.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.1 Ω - 4.6 jΩ
Return Loss	- 25.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.398 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 22, 2011

DASY5 Validation Report for Head TSL

Date: 27.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

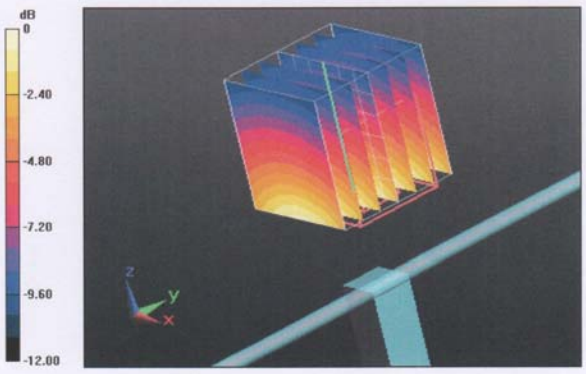
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d134

Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.89 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

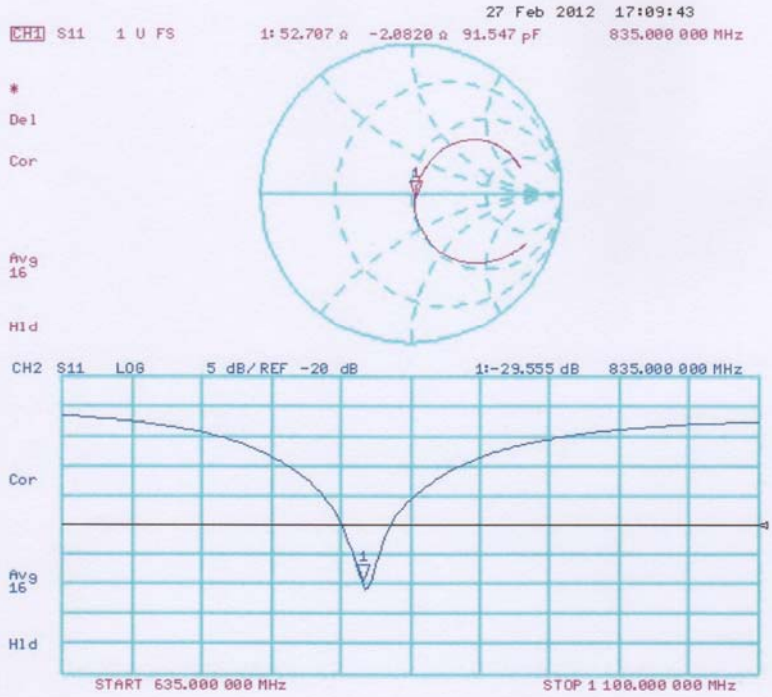
- Probe: ES3DV3 - SN3205; ConvF(6.07, 6.07, 6.07); Calibrated: 30.12.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.043 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.4280
SAR(1 g) = 2.33 mW/g; SAR(10 g) = 1.52 mW/g
Maximum value of SAR (measured) = 2.725 mW/g



0 dB = 2.730mW/g = 8.72 dB mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 27.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

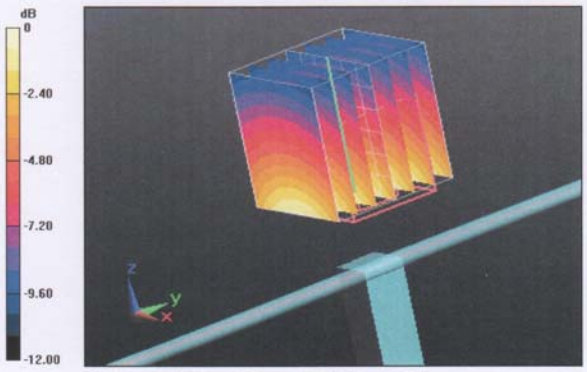
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d134

Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 1.01 mho/m; ε_r = 55.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

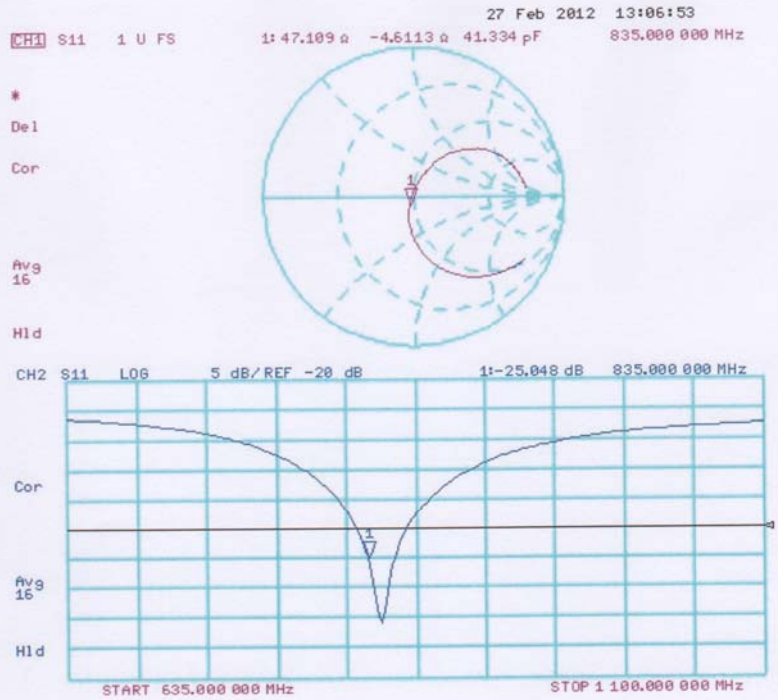
- Probe: ES3DV3 - SN3205; ConvF(6.02, 6.02, 6.02); Calibrated: 30.12.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.902 V/m; Power Drift = 0.0055 dB
Peak SAR (extrapolated) = 3.5280
SAR(1 g) = 2.44 mW/g; SAR(10 g) = 1.6 mW/g
Maximum value of SAR (measured) = 2.838 mW/g



0 dB = 2.840mW/g = 9.07 dB mW/g

Impedance Measurement Plot for Body TSL



Calibration Laboratory of
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Accreditation No.: SCS 108

Client CIQ SZ (Auden)

Certificate No: D1900V2-5d150_Feb12

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d150
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	February 28, 2012

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 EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

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

Issued: February 28, 2012

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

Calibration Laboratory of
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The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
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
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.4 ± 6 %	1.40 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.94 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**39.8 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.24 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**21.0 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.0 ± 6 %	1.56 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.2 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**40.1 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.32 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**21.1 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.9 Ω + 6.8 jΩ
Return Loss	- 22.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.5 Ω + 7.4 jΩ
Return Loss	- 22.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.195 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 11, 2011

DASY5 Validation Report for Head TSL

Date: 28.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

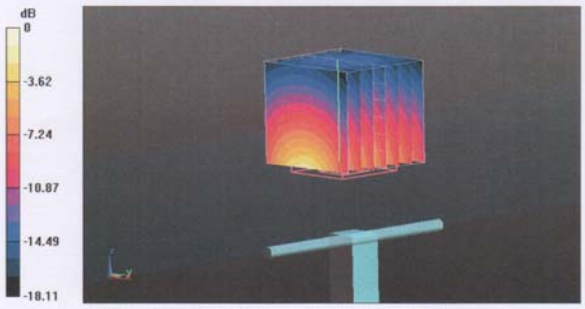
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d150

Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.4 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

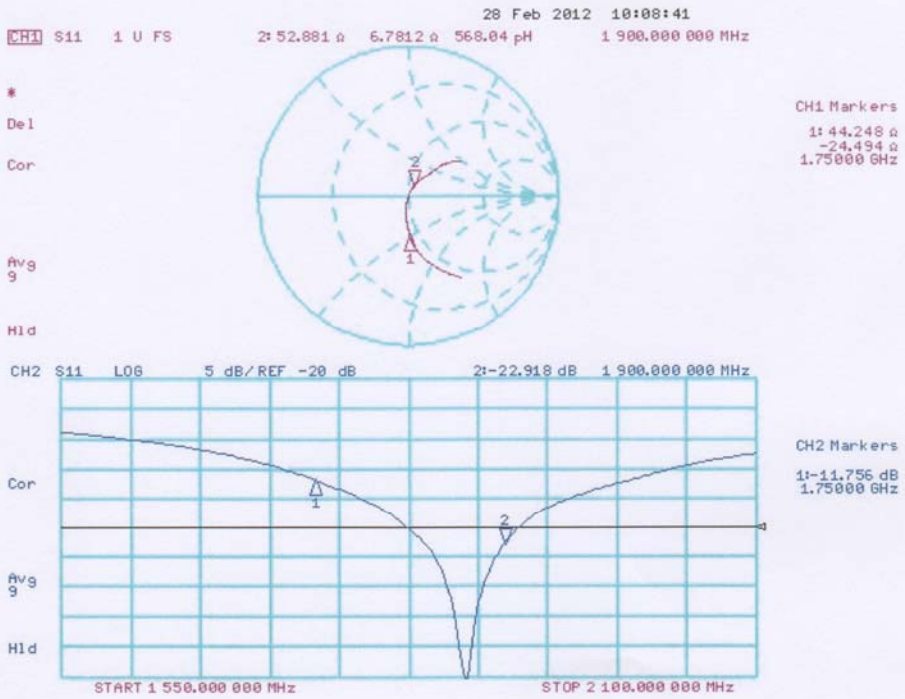
- Probe: ES3DV3 - SN3205; ConvF(5.01, 5.01, 5.01); Calibrated: 30.12.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (8x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 92.182 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 17.6990
SAR(1 g) = 9.94 mW/g; SAR(10 g) = 5.24 mW/g
Maximum value of SAR (measured) = 12.584 mW/g



0 dB = 12.580mW/g = 21.99 dB mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 28.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

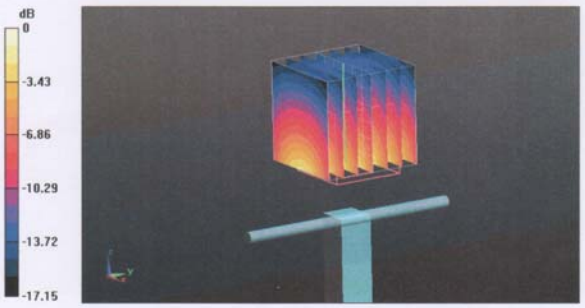
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d150

Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.56 mho/m; ε_r = 53; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

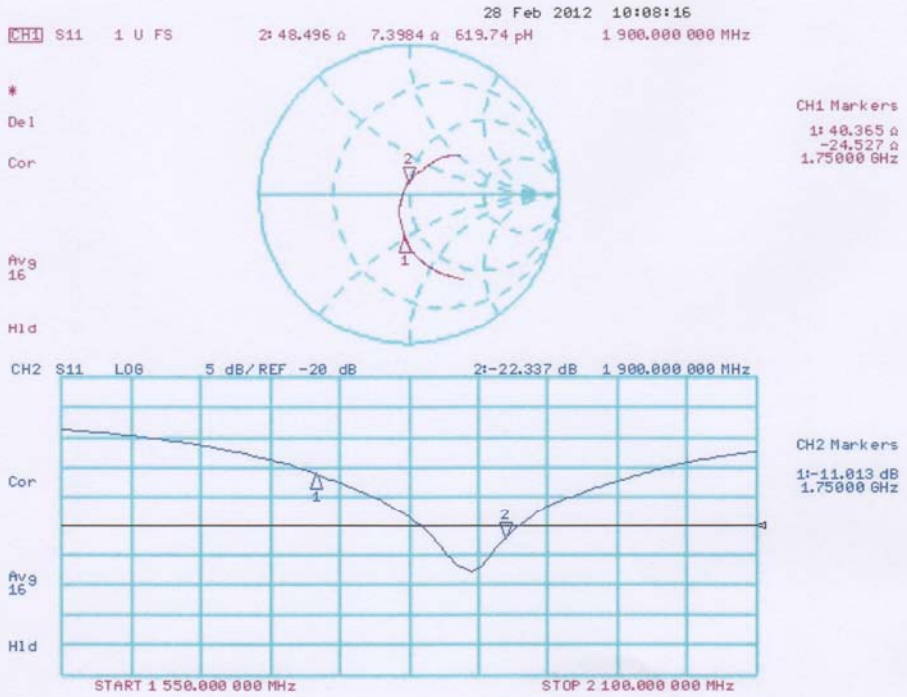
- Probe: ES3DV3 - SN3205; ConvF(4.62, 4.62, 4.62); Calibrated: 30.12.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.968 V/m; Power Drift = 0.0033 dB
Peak SAR (extrapolated) = 18.0350
SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.32 mW/g
Maximum value of SAR (measured) = 12.901 mW/g



0 dB = 12.900mW/g = 22.21 dB mW/g

Impedance Measurement Plot for Body TSL



China National Accreditation Service for Conformity Assessment

LABORATORY ACCREDITATION CERTIFICATE

(Registration No. CNAS L5718)

Shenzhen Sunway Communication Co., Ltd. Testing Center

Building 9, Changxing High-Tech Industrial Park, Wan'an Road, Shayi,
Shajing, Bao'an District, Shenzhen, Guangdong, China

is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories(CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence of testing.

The scope of accreditation is detailed in the attached appendices bearing the same registration number as above. The appendices form an integral part of this certificate.

Date of Issue: 2012-06-20
Date of Expiry: 2015-06-19
Date of Initial Accreditation: 2012-06-20
Date of Update: 2012-06-20

Signed on behalf of China National Accreditation Service for Conformity Assessment

China National Accreditation Service for Conformity Assessment (CNAS) is authorized by Certification and Accreditation Administration of the People's Republic of China (CNCA) to operate the national accreditation schemes for conformity assessment. CNAS is the signatory to International Laboratory Accreditation Cooperation Multilateral Recognition Arrangement (ILAC MRA) and Asia Pacific Laboratory Accreditation Cooperation Multilateral Recognition Arrangement (APLAC MRA).

No.CNAS AL 2 0004556

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