



## 11.8 SAR MEASUREMENT RESULTS

**Head Position mode: EUT Configuration 1&2&3&4**

Date of Measurement: June 14, 2012 &amp; June 15, 2012

Test mode: <b>GSM 850</b> , Duty Cycle: 12.5%, Crest Factor: 8								
EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
Right Check	Fixed	190	836.6	20.0	<b>0.293</b>	-0.09	+/- 0.21	1.6
Right Title	Fixed	190	836.6	20.0	0.166	-0.17		
Left Check	Fixed	190	836.6	20.0	0.199	0.11		
Left Title	Fixed	190	836.6	20.0	0.150	0.10		
Test mode: <b>DCS1900</b> , Duty Cycle: 12.5%, Crest Factor: 8								
EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
Right Check	Fixed	661	1880.0	20.0	<b>0.195</b>	0.17	+/- 0.21	1.6
Right Title	Fixed	661	1880.0	20.0	0.103	0.13		
Left Check	Fixed	661	1880.0	20.0	0.135	0.11		
Left Title	Fixed	661	1880.0	20.0	0.102	0.14		
Remarks: For SAR testing, EUT is in GSM link mode. In GSM850/1900 link mode, its crest factor is 8. (Duty cycle: 1:8)								

**Body Position mode(Body Worn): EUT Configuration 5&6****GSM 850 & GPRS 850& EDGE 850**

Date of Measurement: June 14, 2012

Test mode: <b>GSM 850</b> EUT Configuration 5:UP								
EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
<b>Flat(1.0cm)</b>	Fixed	190	836.6	20.0	0.206	-0.02	+/-0.21	1.6
Test mode: <b>GSM 850</b> EUT Configuration 6:Down								
EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
<b>Flat(1.0cm)</b>	Fixed	190	836.6	20.0	<b>0.258</b>	-0.16	+/-0.21	1.6
Test mode: <b>GPRS 850 CLASS 12</b> EUT Configuration 5:UP								
EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
<b>Flat(1.0cm)</b>	Fixed	190	836.6	20.0	0.152	0.06	+/-0.21	1.6



Test mode: <b>GPRS 850 CLASS 12</b> EUT Configuration 6:Down								
EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
<b>Flat(1.0cm)</b>	Fixed	190	836.6	20.0	<b>0.199</b>	0.11	+/-0.21	1.6

Test mode: <b>EDGE850 CLASS 12</b> EUT Configuration 5:UP								
EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
<b>Flat(1.0cm)</b>	Fixed	190	836.6	20.0	0.150	0.10	+/-0.21	1.6

Test mode: <b>EDGE 850 CLASS 12</b> EUT Configuration 6:Down								
EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
<b>Flat(1.0cm)</b>	Fixed	190	836.6	20.0	<b>0.168</b>	0.12	+/-0.21	1.6

Remarks: For SAR testing, In GSM link mode, its crest factor is 8. (Duty cycle: 1:8);  
In EDGE link mode, its crest factor is 2. (Duty cycle: 1:2)

## GSM 1900 & GPRS 1900& EDGE 1900

Date of Measurement: June 15, 2012

Test mode: <b>GSM1900</b> EUT Configuration 5:UP								
EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
<b>Flat(1.0cm)</b>	Fixed	661	1880	20.0	0.169	-0.05	+/-0.21	1.6

Test mode: <b>GSM 1900</b> EUT Configuration 6:Down								
EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
<b>Flat(1.0cm)</b>	Fixed	661	1880	20.0	<b>0.221</b>	-0.08	+/-0.21	1.6

Test mode: <b>GPRS 1900 CLASS 12</b> EUT Configuration 5:UP								
EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
<b>Flat(1.0cm)</b>	Fixed	661	1880	20.0	0.110	0.05	+/-0.21	1.6

Test mode: <b>GPRS 1900 CLASS 12</b> EUT Configuration 6:Down								
EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
<b>Flat(1.0cm)</b>	Fixed	661	1880	20.0	<b>0.181</b>	0.08	+/-0.21	1.6



Remarks: For SAR testing, In GSM link mode, its crest factor is 8. (Duty cycle: 1:8);  
In GPRS link mode, its crest factor is 2. (Duty cycle: 1:2)

Test mode: **EDGE1900 CLASS 12** EUT Configuration 5:UP

EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
Flat(1.0cm)	Fixed	661	1880	20.0	0.104	0.13	+/-0.21	1.6

Test mode: **EDGE 1900 CLASS 12** EUT Configuration 6:Down

EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
Flat(1.0cm)	Fixed	661	1880	20.0	<b>0.166</b>	-0.12	+/-0.21	1.6

Remarks: For SAR testing, In GSM link mode, its crest factor is 8. (Duty cycle: 1:8);  
In EDGE link mode, its crest factor is 2. (Duty cycle: 1:2)

### Head Position mode(WCDMA BandII& BandV): EUT Configuration 1&2&3&4

Date of Measurement: June 14, 2012 & June 15, 2012

Test mode: **BandII**, Duty Cycle: 100%, Crest Factor: 1

EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
Right Check	Fixed	9400	1880	20.0	<b>0.382</b>	-0.03	+/- 0.21	1.6
Right Title	Fixed	9400	1880	20.0	0.291	0.09		
Left Check	Fixed	9400	1880	20.0	0.363	-0.12		
Left Title	Fixed	9400	1880	20.0	0.280	-0.03		

Test mode: **BandV**, Duty Cycle: 100%, Crest Factor: 1

EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
Right Check	Fixed	4233	846.6	20.0	<b>0.419</b>	-0.10	+/- 0.21	1.6
Right Title	Fixed	4233	846.6	20.0	0.281	0.07		
Left Check	Fixed	4233	846.6	20.0	0.334	0.17		
Left Title	Fixed	4233	846.6	20.0	0.248	-0.09		

Remarks: For SAR testing, EUT is in GSM link mode. In GSM850/1900 link mode, its crest factor is 1. (Duty cycle: 1:1)

**Body Position mode(Body Worn): EUT Configuration 5&6  
WCDMA BandII& BandV**

Date of Measurement: June 14, 2012 &amp; June 15, 2012

Test mode: <b>WCDMA BandII</b> EUT Configuration 5:UP								
EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
<b>Flat(1.0cm)</b>	Fixed	9400	1880	20.0	0.342	0.06	+/-0.21	1.6
Test mode: <b>WCDMA BandII</b> EUT Configuration 6:Down								
EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
<b>Flat(1.0cm)</b>	Fixed	9400	1880	20.0	<b>0.579</b>	0.07	+/-0.21	1.6
Test mode: <b>WCDMA BandV</b> EUT Configuration 5:UP								
EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
<b>Flat(1.0cm)</b>	Fixed	4233	846.6	20.0	0.403	-0.04	+/-0.21	1.6
Test mode: <b>WCDMA BandV</b> EUT Configuration 6:Down								
EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
<b>Flat(1.0cm)</b>	Fixed	4233	846.6	20.0	<b>0.691</b>	-0.02		
Remarks: For SAR testing, In GSM link mode, its crest factor is 1. (Duty cycle: 1:1); In GPRS link mode, its crest factor is 1. (Duty cycle: 1:)								

**Head Position mode(802.11b): EUT Configuration 1&2&3&4** Date of Measurement: June 16, 2012Test mode: **802.11b**, Duty Cycle: 100%, Crest Factor: 1

EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
Right Check	Fixed	6	2437	20.0	<b>0.441</b>	0.01	+/- 0.21	1.6
Right Title	Fixed	6	2437	20.0	0.309	0.02		
Left Check	Fixed	6	2437	20.0	0.363	-0.11		
Left Title	Fixed	6	2437	20.0	0.312	-0.09		

Remarks: For SAR testing, EUT is in GSM link mode. In GSM850/1900 link mode, its crest factor is 1. (Duty cycle: 1:1)

**Body Position mode(Body Worn) 802.11 b: EUT Configuration 5&6**Test mode: **802.11b** EUT Configuration 5:UP

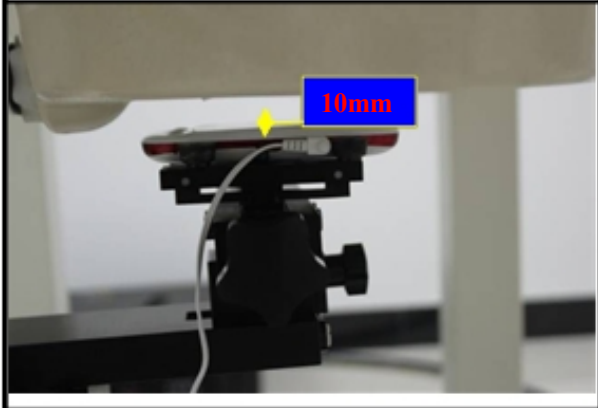
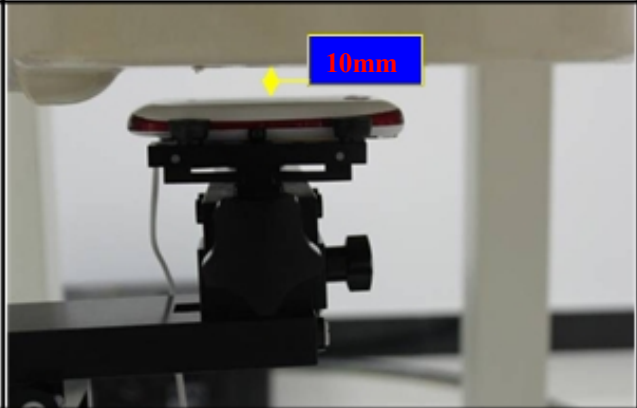
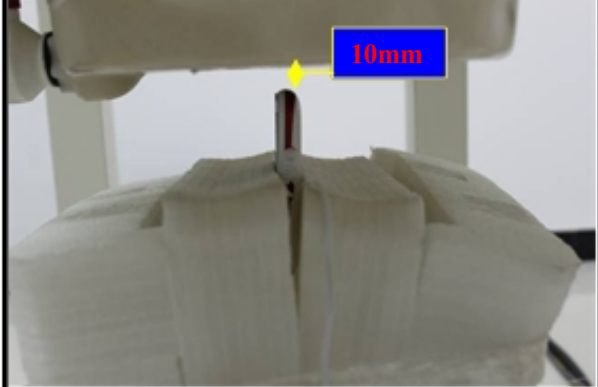
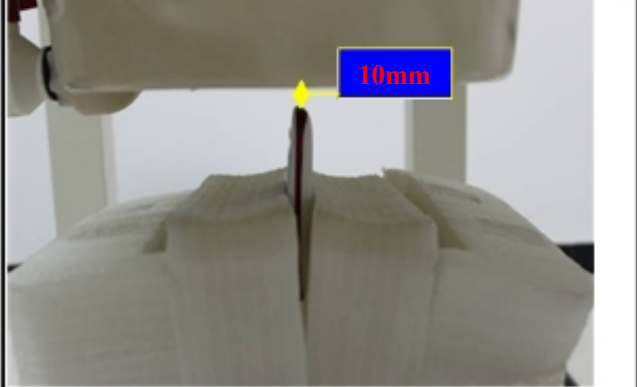
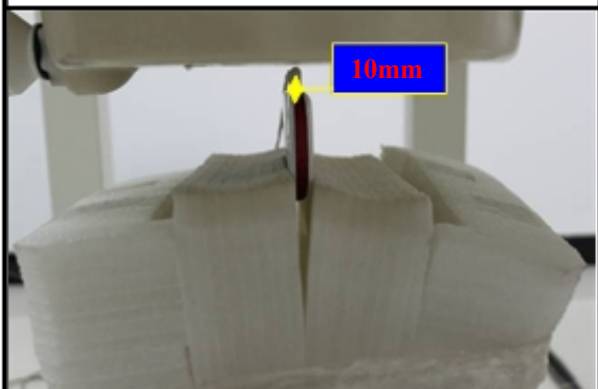
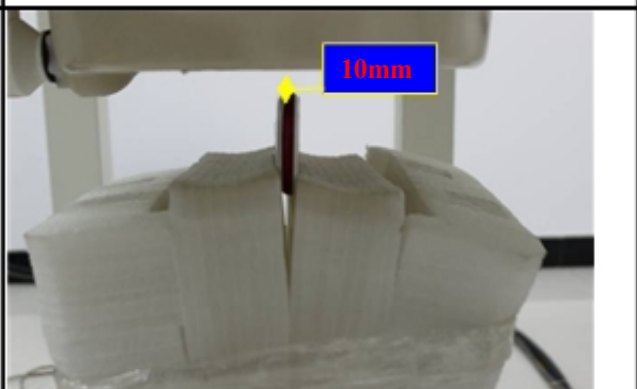
EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
<b>Flat(1.0cm)</b>	Fixed	6	2437	20.0	0.315	-0.04	+/-0.21	1.6

Test mode: **802.11b** EUT Configuration 6:Down

EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
<b>Flat(1.0cm)</b>	Fixed	6	2437	20.0	<b>0.394</b>	0.17	+/-0.21	1.6



## SAR Tested for Body(Hotspot):

<p>Up face in body position</p> 	<p>Down face in body position</p> 
<p><u>EUT Setup Configuration 5</u></p>	<p><u>EUT Setup Configuration 6</u></p>
<p>Top side body position</p> 	<p>Bottom side body position</p> 
<p><u>UT Setup Configuration 7</u></p>	<p><u>EUT Setup Configuration 8</u></p>
<p>Right side body position</p> 	<p>Left side body position</p> 
<p><u>EUT Setup Configuration 9</u></p>	<p><u>EUT Setup Configuration 10</u></p>

**SAR Data for Body(Hotspot) :**

Body Position mode(hotspot): EUT Configuration 5&amp;6&amp;8&amp;9&amp;10

GSM 850 &amp; GPRS 850&amp; EDGE 850

Date of Measurement: June 14, 2012

Test mode: <b>GSM 850 hotspot</b>								
EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
Up(1.0cm)	Fixed	190	836.6	20.0	0.101	0.19	+/-0.21	1.6
Down(1.0cm)		190	836.6	20.0	0.153	-0.14		
Bottom(1.0cm)		190	836.6	20.0	0.191	0.12		
Right(1.0cm)		190	836.6	20.0	0.142	-0.04		
Left(1.0cm)		190	836.6	20.0	<b>0.192</b>	-0.09		
Test mode: <b>GPRS850 CLASS 12 hotspot</b>								
EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
Up(1.0cm)	Fixed	190	836.6	20.0	0.130	0.08	+/-0.21	1.6
Down(1.0cm)		190	836.6	20.0	<b>0.217</b>	0.10		
Bottom(1.0cm)		190	836.6	20.0	0.193	-0.17		
Right(1.0cm)		190	836.6	20.0	0.122	-0.09		
Left(1.0cm)		190	836.6	20.0	0.120	0.03		
Test mode: <b>EDGE 850 CLASS 12 hotspot</b>								
EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
Up(1.0cm)	Fixed	190	836.6	20.0	0.102	-0.15	+/-0.21	1.6
Down(1.0cm)		190	836.6	20.0	<b>0.116</b>	-0.07		
Bottom(1.0cm)		190	836.6	20.0	0.112	0.06		
Right(1.0cm)		190	836.6	20.0	0.107	0.04		
Left(1.0cm)		190	836.6	20.0	0.105	0.15		

GSM 1900 &amp; GPRS 1900&amp; EDGE 1900 hotspot

Date of Measurement: June 15, 2012

Test mode: <b>GSM 1900 hotspot</b>								
EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
Up(1.0cm)	Fixed	661	1880	20.0	0.152	-0.02	+/-0.21	1.6
Down(1.0cm)		661	1880	20.0	<b>0.214</b>	0.13		
Bottom(1.0cm)		661	1880	20.0	0.202	-0.09		
Right(1.0cm)		661	1880	20.0	0.176	0.10		
Left(1.0cm)		661	1880	20.0	0.166	0.04		
Test mode: <b>GPRS 1900 CLASS 12 hotspot</b>								
EUT Setup Condition		Frequency		Liquid	SAR(1g)	Power	Drift	Limit





Position	Antenna	Channel	MHz	Temp [°C]	(W/kg)	Drift	Limit (dB)	(W/kg)
Up(1.0cm)	Fixed	661	1880	20.0	0.121	0.17	+/-0.21	1.6
Down(1.0cm)		661	1880	20.0	<b>0.233</b>	0.11		
Bottom(1.0cm)		661	1880	20.0	0.215	-0.14		
Right(1.0cm)		661	1880	20.0	0.198	0.03		
Left(1.0cm)		661	1880	20.0	0.186	0.11		

**Test mode: EDGE1900 CLASS 12 hotspot**

EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
Up(1.0cm)	Fixed	661	1880	20.0	0.137	0.17	+/-0.21	1.6
Down(1.0cm)		661	1880	20.0	<b>0.228</b>	0.03		
Bottom(1.0cm)		661	1880	20.0	0.201	-0.16		
Right(1.0cm)		661	1880	20.0	0.189	0.03		
Left(1.0cm)		661	1880	20.0	0.144	0.11		

**WCDMA Band II & WCDMA Band V hotspot**

Date of Measurement: June 14, 2012 & June 15, 2012

**Test mode: WCDMA Band II hotspot**

EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
Up(1.0cm)	Fixed	9400	1880	20.0	0.297	0.12	+/-0.21	1.6
Down(1.0cm)		9400	1880	20.0	<b>0.415</b>	0.04		
Bottom(1.0cm)		9400	1880	20.0	0.403	0.03		
Right(1.0cm)		9400	1880	20.0	0.314	-0.09		
Left(1.0cm)		9400	1880	20.0	0.326	-0.01		

**Test mode: WCDMA Band V hotspot**

EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					
Up(1.0cm)	Fixed	4233	846.6	20.0	0.201	0.12	+/-0.21	1.6
Down(1.0cm)		4233	846.6	20.0	0.398	0.03		
Bottom(1.0cm)		4233	846.6	20.0	<b>0.421</b>	0.06		
Right(1.0cm)		4233	846.6	20.0	0.341	-0.12		
Left(1.0cm)		4233	846.6	20.0	0.322	-0.01		

**Body Position mode(hotspot): EUT Configuration 5&6&7&9&10**

**802.11 b**

Date of Measurement: June 16, 2012

**Test mode: 802.11 b**

EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	Power Drift	Drift Limit (dB)	Limit (W/kg)
Position	Antenna	Channel	MHz					





# Compliance Certification Services Inc.

Report No: KS120710A21-SF

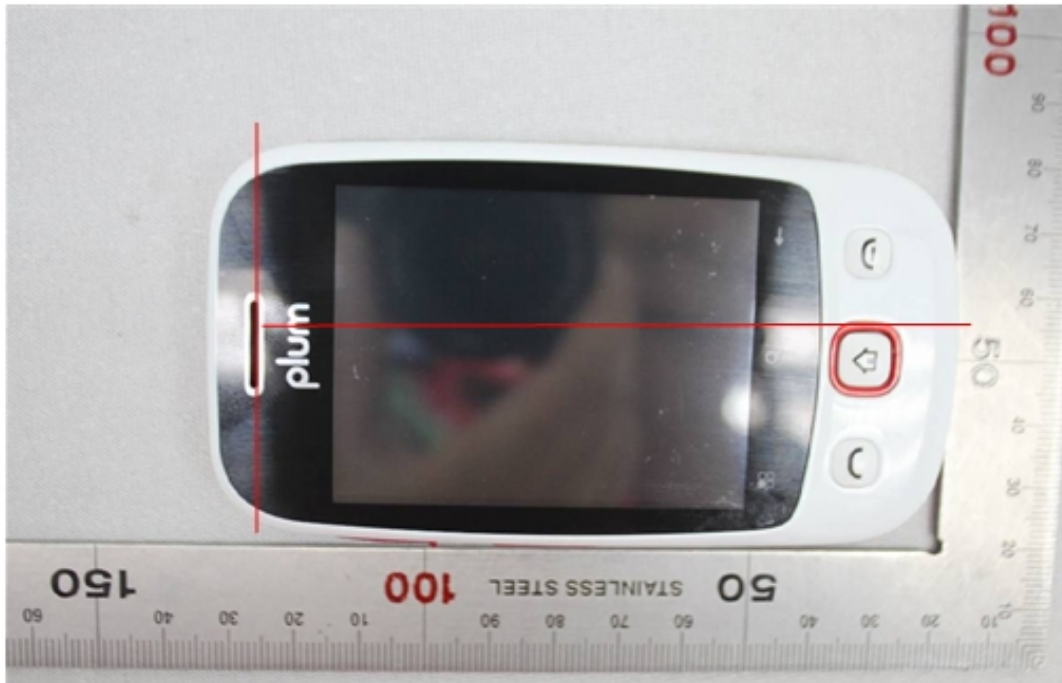
FCCID: Y7WPLUMWICKED

Date of Issue : July 27, 2012

Up(1.0cm)	Fixed	6	2437	20.0	0.354	0.04	+/- 0.21	1.6
Down(1.0cm)		6	2437	20.0	<b>0.385</b>	-0.03		
Top(1.0cm)		6	2437	20.0	0.363	-0.09		
Left(1.0cm)		6	2437	20.0	0.338	0.08		



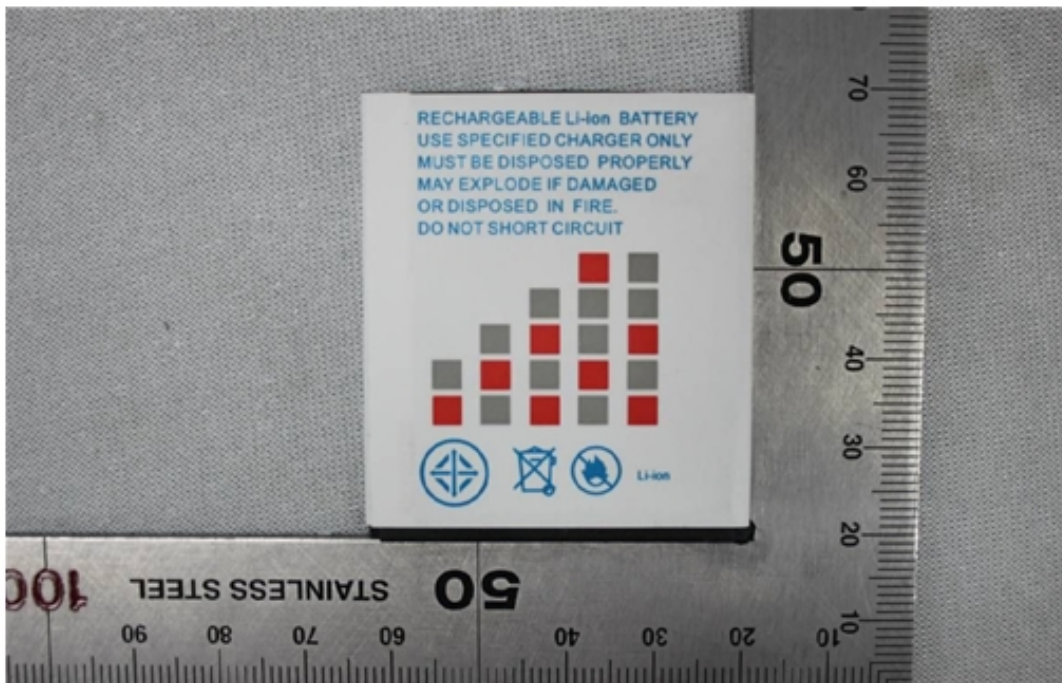
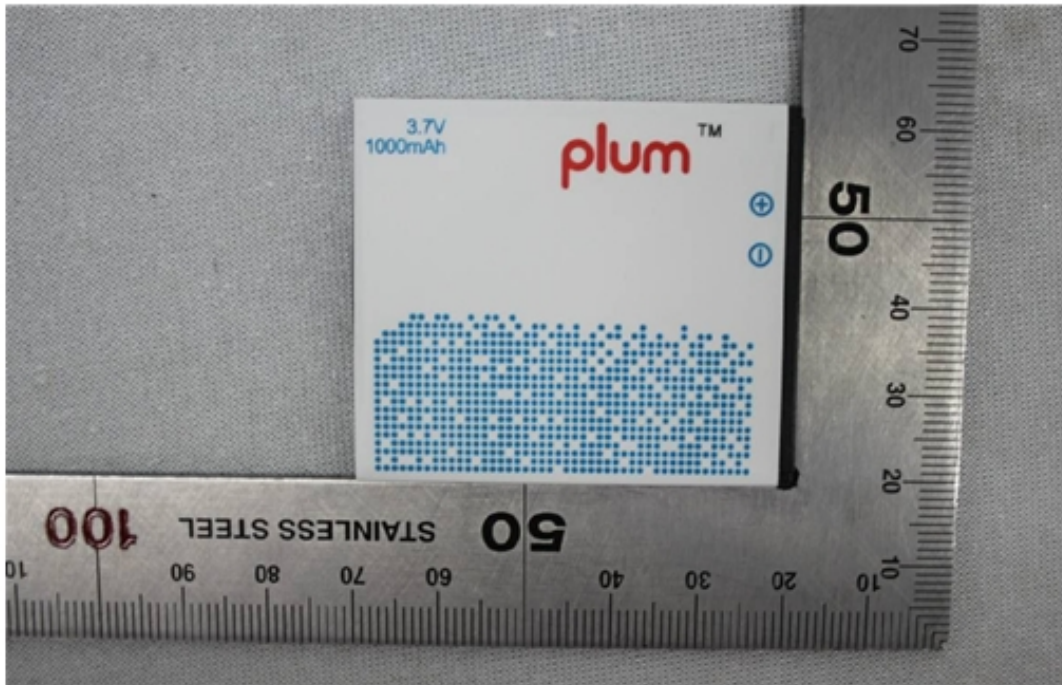
## 12. EUT PHOTO













## 13. EQUIPMENT LIST & CALIBRATION STATUS

Name of Equipment	Manufacturer	Type/Model	Serial Number	Calibration Due
P C	HP	Core(rm)3.16G	CZCO48171H	N/A
Signal Generator	Agilent	E8257C	MY43321570	05/12/2013
S-Parameter Network Analyzer	Agilent	E5071B	MY42301382	03/11/2013
Wireless Communication Test Set	R&S	CMU200	SN:B23-03291	05/12/2013
Power Meter	Agilent	E4416A	QB41292714	03/16/2013
Peak & Average sensor	Agilent	E9327A	CF0001	03/16/2013
E-field PROBE	SPEAG	EX3DV4	3755	01/20/2013
DIPOLE 835MHZ ANTENNA	SPEAG	D835V2	4d114	01/10/2013
DIPOLE 1800MHZ ANTENNA	SPEAG	D1800V2	2d170	01/26/2013
DIPOLE 1900MHZ ANTENNA	SPEAG	D1900V2	5d136	01/05/2013
DIPOLE 2450MHZ ANTENNA	SPEAG	D2450V2	817	01/26/2013
DIPOLE 2000MHZ ANTENNA	SPEAG	D2000V2	1041	01/12/2013
DIPOLE 5000MHZ ANTENNA	SPEAG	D5GHzV2	1095	12/25/2012
DUMMY PROBE	SPEAG	DP_2	SPDP2001AA	N/A
SAM PHANTOM (ELI4 v4.0)	SPEAG	QDOVA001BB	1102	N/A
Twin SAM Phantom	SPEAG	QD000P40CD	1609	N/A
ROBOT	SPEAG	TX60	F10/5E6AA1/A101	N/A
ROBOT KRC	SPEAG	CS8C	F10/5E6AA1/C101	N/A
LIQUID CALIBRATION KIT	ANTENNESSA	41/05 OCP9	00425167	N/A
DAE	SD000D04BJ	DEA4	1245	01/11/2013



## 14. FACILITIES

All measurement facilities used to collect the measurement data are located at

No.10, Weiye Rd., Innovation Park, Eco & Tec. Development Part, Kunshan City, Jiangsu Province, China.

## 15. REFERENCES

- [1] Federal Communications Commission, "Report and order: Guidelines for evaluating the environmental effects of radiofrequency radiation", Tech. Rep. FCC 96-326, FCC, Washington, D.C. 20554, 1996.
- [2] David L. Means Kwok Chan, Robert F. Cleveland, "Evaluating compliance with FCC guidelines for human exposure to radiofrequency electromagnetic fields", Tech. Rep., Federal Communication Commission, Office of Engineering & Technology, Washington, DC, 1997.
- [3] Thomas Schmid, Oliver Egger, and Niels Kuster, "Automated E-field scanning system for dosimetric assessments", IEEE Transactions on Microwave Theory and Techniques, vol. 44, pp. 105-113, Jan. 1996.
- [4] Niels Kuster, Ralph Kastle, and Thomas Schmid, "Dosimetric evaluation of mobile communications equipment with known precision", IEEE Transactions on Communications, vol. E80-B, no. 5, pp. 645-652, May 1997.
- [5] CENELEC, "Considerations for evaluating of human exposure to electromagnetic fields (EMFs) from mobile telecommunication equipment (MTE) in the frequency range 30MHz - 6GHz", Tech. Rep., CENELEC, European Committee for Electrotechnical Standardization, Brussels, 1997.
- [6] ANSI, ANSI/IEEE C95.1-1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz, The Institute of Electrical and Electronics Engineers, Inc., New York, NY 10017, 1992.
- [7] Katja Pokovic, Thomas Schmid, and Niels Kuster, "Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies", in ICECOM '97, Dubrovnik, October 15-17, 1997, pp. 120-124.
- [8] Katja Pokovic, Thomas Schmid, and Niels Kuster, "E-field probe with improved isotropy in brain simulating liquids", in Proceedings of the ELMAR, Zadar, Croatia, 23-25 June, 1996, pp. 172-175.
- [9] Volker Hombach, Klaus Meier, Michael Burkhardt, Eberhard Kuhn, and Niels Kuster, "The dependence of EM energy absorption upon human head modeling at 900 MHz", IEEE Transactions on Microwave Theory and Techniques, vol. 44, no. 10, pp. 1865-1873, Oct. 1996.
- [10] Klaus Meier, Ralf Kastle, Volker Hombach, Roger Tay, and Niels Kuster, "The dependence of EM energy absorption upon human head modeling at 1800 MHz", IEEE Transactions on Microwave Theory and Techniques, Oct. 1997, in press.
- [11] W. Gander, Computermathematik, Birkhaeuser, Basel, 1992.
- [12] W. H. Press, S. A. Teukolsky, W. T. Vetterling, and B. P. Flannery, Numerical Recipes in C, The Art of Scientific Computing, Second Edition, Cambridge University Press, 1992. Dosimetric Evaluation of Sample device, month 1998 9
- [13] NIS81 NAMAS, "The treatment of uncertainty in EMC measurement", Tech. Rep., NAMAS Executive, National Physical Laboratory, Teddington, Middlesex, England, 1994.
- [14] Barry N. Taylor and Christ E. Kuyatt, "Guidelines for evaluating and expressing the uncertainty of NIST measurement results", Tech. Rep., National Institute of Standards and Technology, 1994. Dosimetric Evaluation of Sample device, month 1998 10





## 16. ATTACHMENTS

Exhibit	Content
1	System Performance Check Plots
2	SAR Test Plots
3	Probe calibration report EX3DV4 SN3755
4	Dipole calibration report D835V2 SN:4d114
5	Dipole calibration report D1900V2-SN:5d136
6	Dipole calibration report D2450V2 SN: 817
7	DAE calibration report DEA4 SD000D04BJ SN: 1245



**APPENDIX A: PLOTS OF PERFORMANCE CHECK**

The plots are showing as followings.



Test Laboratory: Compliance Certification Services Inc.

## System Performance Head Check-D850\_2012.07.24

DUT: Dipole 850 MHz D835V2; Type: D835V2; SN:4d114

Communication System: CW; Frequency: 850 MHz

Medium parameters used:  $f = 850 \text{ MHz}$ ;  $\sigma = 0.91 \text{ mho/m}$ ;  $\epsilon_r = 41.57$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3755; ConvF(8.99, 8.99, 8.99); Calibrated: 1/20/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1245; Calibrated: 1/11/2012
- Phantom: Twin SAM Phantom; Type: QD 000 P40 CD; Serial: 1609
- Measurement SW: DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

### System Performance Check at Frequencies below 1 GHz/d=15mm, Pin=250 mW, dist=3.0mm (EX-Probe)/Area Scan (7x12x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 3.362mW/g

### System Performance Check at Frequencies below 1 GHz/d=15mm, Pin=250 mW, dist=3.0mm (EX-Probe)/Zoom Scan (7x7x7) /Cube 0:

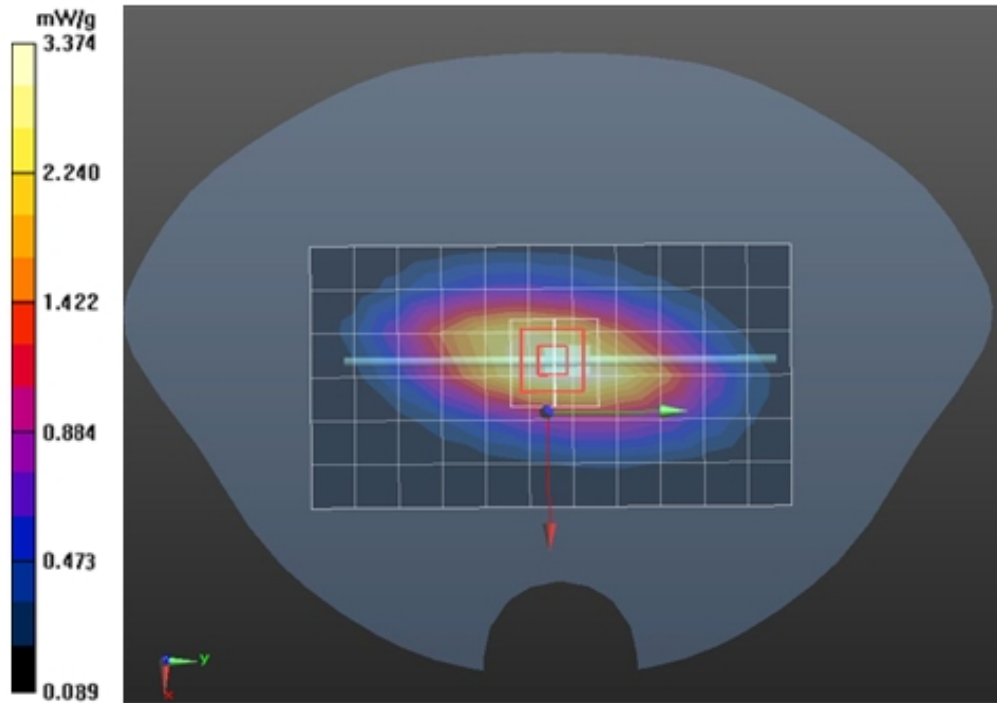
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.952 V/m; Power Drift = 0.00052 dB

Peak SAR (extrapolated) = 3.625W/kg

**SAR(1 g) = 2.42mW/g; SAR(10 g) = 1.59 mW/g**

Maximum value of SAR (measured) =3.374 mW/g





Test Laboratory: Compliance Certification Services Inc.

## System Performance Body Check-D850\_2012.07.24

DUT: Dipole 850 MHz D835V2; Type: D835V2; SN:4d114

Communication System: CW; Frequency: 850 MHz

Medium parameters used:  $f = 850$  MHz;  $\sigma = 0.98$  mho/m;  $\epsilon_r = 55.84$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3755; ConvF(9.07, 9.07, 9.07); Calibrated: 1/20/2012 · Sensor-Surface: 2.5mm (Mechanical Surface Detection)
  - Electronics: DAE4 Sn1245; Calibrated: 1/11/2012
  - Phantom: Twin SAM Phantom; Type: QD 000 P40 CD; Serial: 1609
- Measurement SW: DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

### System Performance Check at Frequencies below 1 GHz/d=15mm, Pin=250 mW, dist=3.0mm (EX-Probe)/Area Scan (7x12x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 3.127mW/g

### System Performance Check at Frequencies below 1 GHz/d=15mm, Pin=250 mW, dist=3.0mm (EX-Probe)/Zoom Scan (7x7x7)/Cube 0:

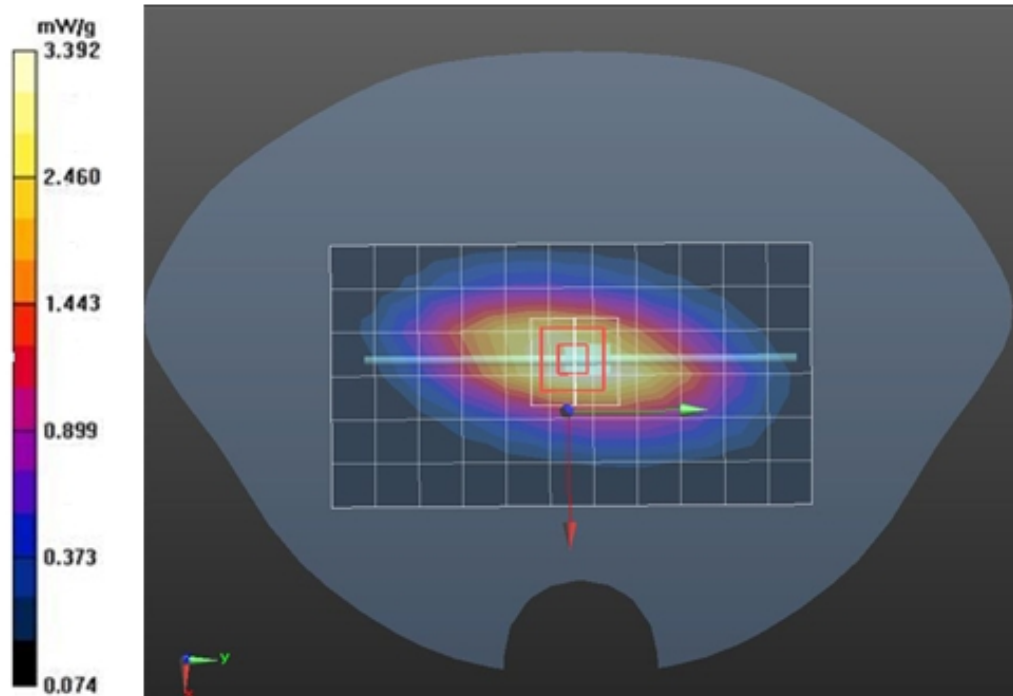
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 58.83 V/m; Power Drift = 0.0021 dB

Peak SAR (extrapolated) = 3.624 W/kg

**SAR(1 g) = 2.52 mW/g; SAR(10 g) = 1.61 mW/g**

Maximum value of SAR (measured) = 3.392 mW/g





Test Laboratory: Compliance Certification Services Inc.

## System Performance Head Check-D1900\_2012.07.25

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2; Serial: D1900V2 - SN:5d136

Communication System: CW; Frequency: 1900 MHz

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.41$  mho/m;  $\epsilon_r = 40.20$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3755; ConvF(7.84, 7.84, 7.84); Calibrated: 1/20/2012 · Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1245; Calibrated: 1/11/2012
- Phantom: SAM1; Type: SAM; Serial: 1609
- Measurement SW: DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

### System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW, dist=3.0mm (EX-Probe) 2/Area Scan (7x7x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 11.897 mW/g

### System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW, dist=3.0mm (EX-Probe) 2/Zoom Scan (7x7x7) /Cube 0:

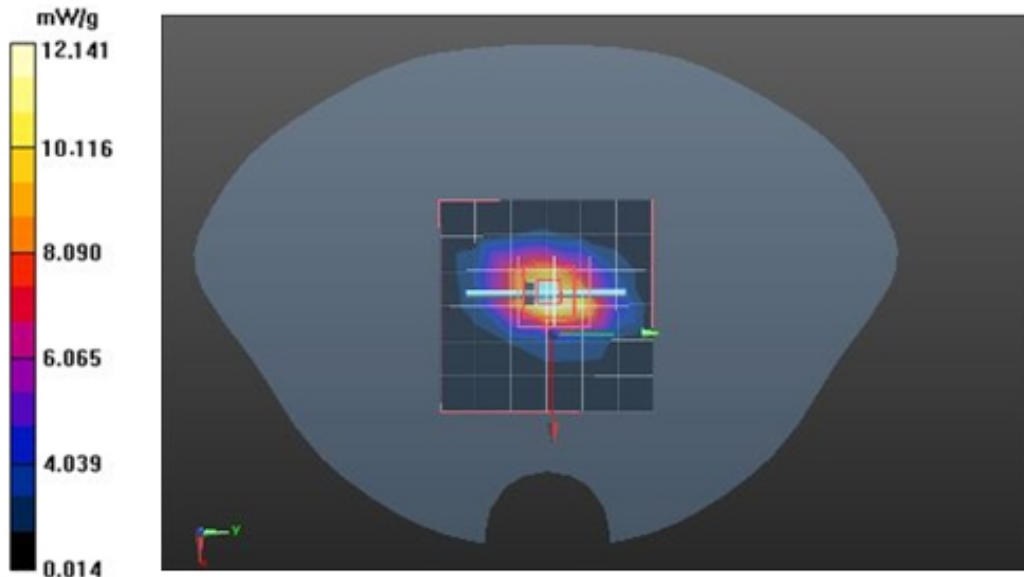
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.57 V/m; Power Drift = 0.0032 dB

Peak SAR (extrapolated) = 16.572 W/kg

**SAR(1 g) = 10.02 mW/g; SAR(10 g) = 5.34 mW/g**

Maximum value of SAR (measured) = 12.141 mW/g





Test Laboratory: Compliance Certification Services Inc.

## System Performance Body Check-D1900\_2012.07.25

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2; Serial: D1900V2 - SN:5d136

Communication System: CW; Frequency: 1900 MHz

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 54.31$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3755; ConvF(7.23, 7.23, 7.23); Calibrated: 1/20/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1245; Calibrated: 1/11/2012
- Phantom: SAM1; Type: SAM; Serial: 1609
- Measurement SW: DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

### System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW, dist=3.0mm (EX-Probe) 2/Area Scan (7x7x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 12.533mW/g

### System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=xx mW, dist=3.0mm (EX-Probe) 2/Zoom Scan (7x7x7) /Cube 0:

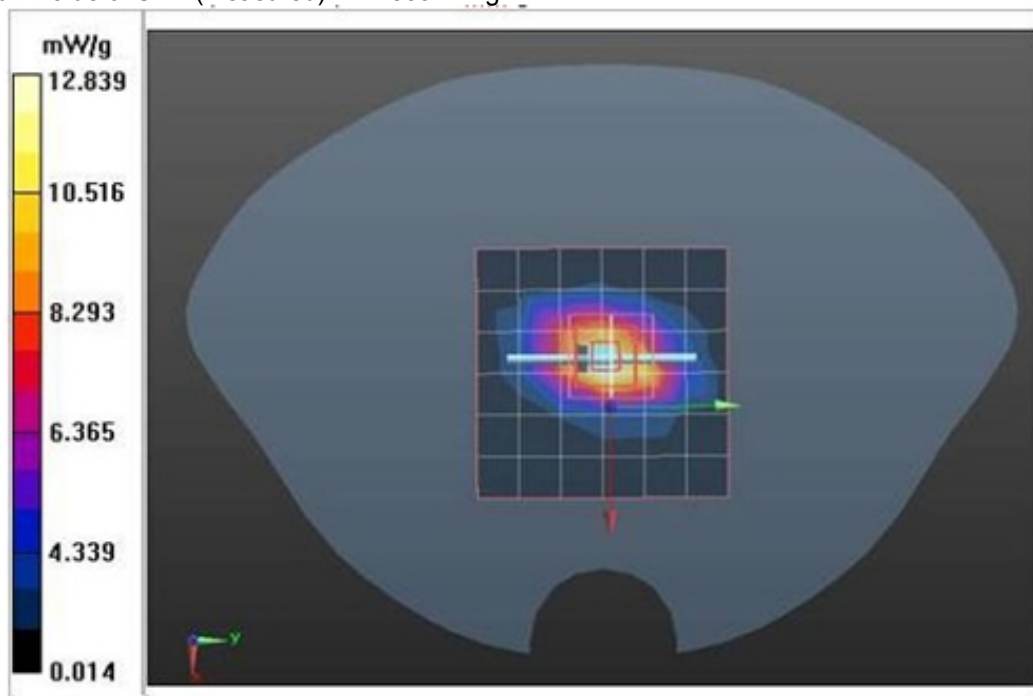
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 102.5V/m; Power Drift = 0.0001 dB

Peak SAR (extrapolated) = 16.529 W/kg

**SAR(1 g) = 9.99 mW/g; SAR(10 g) = 5.17 mW/g**

Maximum value of SAR (measured) = 12.839mW/g





Test Laboratory: Compliance Certification Services Inc.

## System Performance Head Check-D2450-2012.07.26

DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; SN:817

Communication System: CW; Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.79$  mho/m;  $\epsilon_r = 41.23$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3755; ConvF(7.07, 7.07, 7.07); Calibrated: 1/20/2012 · Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1245; Calibrated: 1/11/2012
- Phantom: Twin SAM Phantom; Type: QD 000 P40 CD; Serial: 1609
- Measurement SW: DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

### System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW, dist=3.0mm (EX-Probe)/Area Scan(7x7x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 17.715mW/g

### System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW, dist=3.0mm (EX-Probe)/Zoom Scan (7x7x7) /Cube 0:

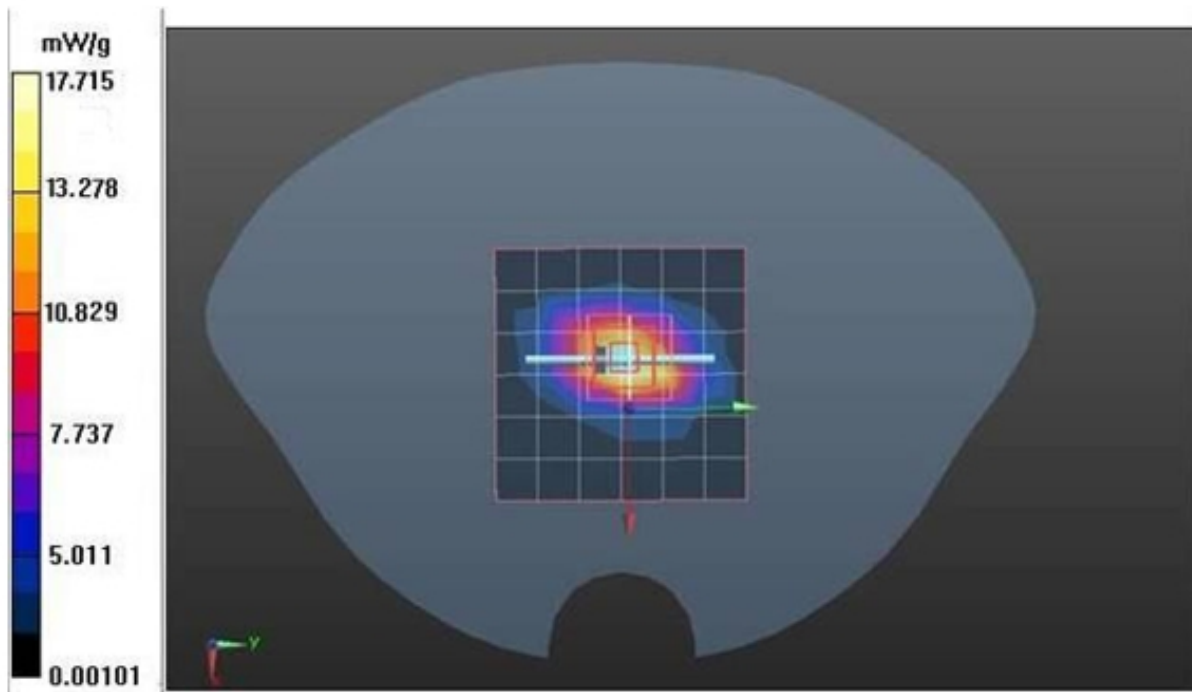
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 103.55 V/m; Power Drift = 0.007 dB

Peak SAR (extrapolated) = 26.475 W/kg

**SAR(1 g) = 13.63 mW/g; SAR(10 g) = 6.32 mW/g**

Maximum value of SAR (measured) = 16.954 mW/g







Test Laboratory: Compliance Certification Services Inc.

## System Performance Body Check-D2450-2012.07.26

DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; SN:817

Communication System: CW; Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 53.23$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3755; ConvF(7.06, 7.06, 7.06); Calibrated: 1/20/2012
- Sensor-Surface: 3mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn1245; Calibrated: 1/11/2012
- Phantom: SAM1; Type: SAM; Serial: 1609
- Measurement SW: DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

### System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW, dist=3.0mm (EX-Probe) 2/Area Scan (7x7x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 18.729mW/g

### System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW, dist=3.0mm (EX-Probe) 2/Zoom Scan (7x7x7) /Cube 0:

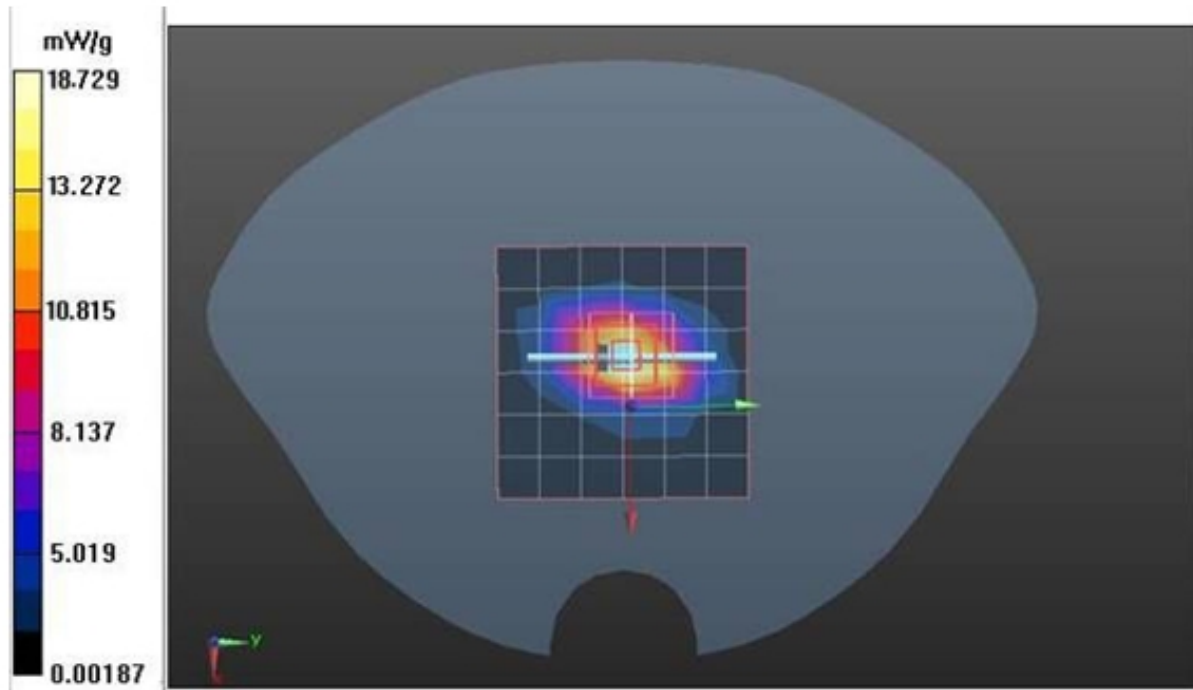
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 101.55 V/m; Power Drift = 0.003 dB

Peak SAR (extrapolated) = 27.671 W/kg

**SAR(1 g) = 13.08 mW/g; SAR(10 g) = 6.15 mW/g**

Maximum value of SAR (measured) = 17.409 mW/g





**APPENDIX B: DASV CALIBRATION CERTIFICATE**

The DASV Calibration Certificates are showing as followings .



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 **CCS (Auden)**

Certificate No: **D835V2-4d114\_Jan11**

## CALIBRATION CERTIFICATE

Object: **D835V2 - SN: 4d114**

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

Calibration date: **January 10, 2011**

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	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 08327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

Calibrated by:	Name <b>Jeton Kasrali</b>	Function <b>Laboratory Technician</b>	Signature 
Approved by:	Name <b>Katja Pokovic</b>	Technical Manager	

Issued: January 10, 2011

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  
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

#### 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:

- 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
- 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
- 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:

- 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	V52.6
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
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	41.3 ± 6 %	0.89 mho/m ± 6 %
Head TSL temperature during test	(21.0 ± 0.2) °C	----	----

## SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.38 mW / g
SAR normalized	normalized to 1W	9.52 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>9.57 mW /g ± 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.55 mW / g
SAR normalized	normalized to 1W	6.20 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>6.23 mW /g ± 16.5 % (k=2)</b>



## 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	54.1 ± 6 %	0.99 mho/m ± 6 %
Body TSL temperature during test	(21.6 ± 0.2) °C	----	----

## SAR result with Body TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.53 mW / g
SAR normalized	normalized to 1W	10.1 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	<b>9.92 mW / g ± 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.66 mW / g
SAR normalized	normalized to 1W	6.64 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	<b>6.55 mW / g ± 16.5 % (k=2)</b>



## Appendix

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.3 $\Omega$ - 2.6 $\mu\Omega$
Return Loss	- 29.5 dB

### Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.6 $\Omega$ - 4.8 $\mu\Omega$
Return Loss	- 25.5 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.400 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.

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	June 29, 2010





## DASY5 Validation Report for Head TSL

Date/Time: 03.01.2011 14:35:06

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d114**

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: HSL900

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.89$  mho/m;  $\epsilon_r = 40.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

### DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.03, 6.03, 6.03); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.6.1 Build (408)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2595)

**Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement**

grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.3 V/m; Power Drift = 0.000428 dB

Peak SAR (extrapolated) = 3.59 W/kg

**SAR(1 g) = 2.38 mW/g; SAR(10 g) = 1.55 mW/g**

Maximum value of SAR (measured) = 2.56 mW/g

