TEST REPORT

Test of: C6902

To: RSS-102 Issue 4 March 2010

IC ID: 4170B-PM0500

Test Report Serial No:
UL-SAR-RP10014952JD10C V3.0

Version 3.0 superseded all previous report versions

This Test Report Is Issued Under The Authority of Richelieu Quoi, SAR Technology Consultant:	 (APPROVED SIGNATORY)
Checked By: Naseer Mirza	 (APPROVED SIGNATORY)
Issue Date:	**31 July 2013**
Test Dates:	**27 June 2013 to 16 July 2013**

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1. Customer Information

Company Name:	Sony Mobile Communications AB
Address:	Nya Vattentornet 22188 Lund Sweden

2. Summary of Test Results

Test Name	Specification Reference	Result
Specific Absorption Rate - GSM 850	RSS-102 Issue 4 March 2010	✓
Specific Absorption Rate - PCS 1900	RSS-102 Issue 4 March 2010	✓
Specific Absorption Rate - UMTS FDD 2	RSS-102 Issue 4 March 2010	✓
Specific Absorption Rate - UMTS FDD 4	RSS-102 Issue 4 March 2010	✓
Specific Absorption Rate - UMTS FDD 5	RSS-102 Issue 4 March 2010	✓
Specific Absorption Rate - Wi-Fi 802.11b/g/n 2.4 GHz	RSS-102 Issue 4 March 2010	✓
Specific Absorption Rate- Wi-Fi 802.11a/n/ac 5.0 GHz	RSS-102 Issue 4 March 2010	✓
Key to Results	✓ = Complied ✗ = Did not comply	

2.1. Highest Reported SAR

Individual Transmitter Evaluation per Band:

Exposure Configuration	Technology Band	Mode	Highest Reported 1g -SAR (W/kg)	Equipment Class	Max Rated Source base Avg Power + Max Tolerance [dBm]	Highest Reported 1g-SAR (W/kg)
HEAD (Separation Distance 0mm)	GSM850	DTM	0.789	PCE	26.3	0.846
	PCS1900	DTM	0.583		23.2	
	UMTS FDD 2	RMC	0.846		24.0	
	UMTS FDD 4	RMC	0.587		24.5	
	UMTS FDD 5	RMC	0.607		24.5	
	WLAN 2.4 GHz	802.11b	0.053	DTS	16.1	0.053
	WLAN 5.2/5.3/5.6 GHz	802.11a	0.010	NII	12.6	0.010
	WLAN 5.8 GHz	802.11a	0.008	DTS	12.3	0.008
HOTSPOT (Separation Distance 10mm)	GSM850	GPRS	0.999	PCE	26.6	1.148
	PCS1900	GPRS	0.939		23.5	
	UMTS FDD 2#	RMC	1.148		23.5	
	UMTS FDD 4#	RMC	1.079		23.5	
	UMTS FDD 5	RMC	0.895		24.5	
	WLAN 2.4 GHz	802.11b	0.084	DTS	16.1	0.084
	WLAN 5.2/5.3/5.6 GHz	802.11a	0.076	NII	13.6	0.076
	WLAN 5.8 GHz	802.11a	0.030	DTS	12.3	0.030
BODY-WORN (Separation Distance 15mm)	GSM850	DTM	0.811	PCE	26.3	0.847
	PCS1900	DTM	0.476		23.2	
	UMTS FDD 2	RMC	0.690		24.0	
	UMTS FDD 4	RMC	0.847		24.5	
	UMTS FDD 5	RMC	0.620		24.5	
	WLAN 2.4 GHz	802.11b	0.065	DTS	16.1	0.065
	WLAN 5.2/5.3/5.6 GHz	802.11a	0.076	NII	13.6	0.076
	WLAN 5.8 GHz	802.11a	0.030	DTS	12.3	0.030

Note(s):

1. As per FCC KDB 447498 D01, Bluetooth maximum source based time average power was below the allowed therhold for both 10 and 15mm separation distances.

When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

- *(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]·[√f(GHz)/x]* W/kg for *test separation distances* ≤ 50 mm;
  where $x = 7.5$ for 1-g SAR, and $x = 18.75$ for 10-g SAR.

10mm Bluetooth estimated SAR level:

Estimated *Bluetooth* SAR = (8.91mW/10mm)*(√2.4 / 7.5) = 0.184 W/kg

15mm Bluetooth estimated SAR level:

Estimated *Bluetooth* SAR = (8.91mW/15mm)*(√2.4 / 7.5) = 0.123 W/kg

Auto *RF Power Back-off' mode facility is available on 'Hotspot Mode Configuration of UMTS FDD 2 and UMTS FDD 4 bands only. When Hotspot mode is activated, in all operating modes, the maximum output power level in UMTS Band 2 will not exceed 23.5 dBm, and UMTS Band 4 will not exceed 23.5 dBm.*

2.2.Highest Reported SAR (Continued):

Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the *reported* standalone SAR of each applicable simultaneous transmitting antenna.

Simultaneous Transmitter Evaluation:

Exposure Configuration	Technology Band	Highest Reported 1g SAR (W/kg)	Equipment Class	Max Rated Source base Avg Power + Max Tolerance [dBm]	Highest Reported Sum-SAR 1g-SAR (W/kg)	SPLSR Ratio
HEAD (Separation Distance 0mm)	UMTS FDD 2	0.846	PCE	24.0	0.899	N/A
	WLAN 2.4 GHz	0.053	DTS	16.1		
	UMTS FDD 2	0.846	PCE	24.0	0.854	N/A
	WLAN 5.0 GHz	0.008	DTS	12.3		
	UMTS FDD 2	0.846	PCE	24.0	0.856	N/A
	WLAN 5 GHz	0.010	NII	12.6		
HOTSPOT (Separation Distance 10mm)	UMTS FDD 2	1.148	PCE	23.5	1.232	N/A
	WLAN 2.4 GHz	0.084	DTS	16.1		
	UMTS FDD 2	1.148	PCE	23.5	1.332	N/A
	Bluetooth	0.184	DSS	9.5		
BODY-WORN (Separation Distance 15mm)	UMTS FDD 4	0.847	PCE	24.5	0.912	N/A
	WLAN 2.4 GHz	0.065	DTS	16.1		
	UMTS FDD 4	0.847	PCE	24.5	0.877	N/A
	WLAN 5.0 GHz	0.030	DTS	12.3		
	UMTS FDD 4	0.847	PCE	24.5	0.923	N/A
	WLAN 5 GHz	0.076	NII	13.6		
	UMTS FDD 4	0.847	PCE	24.5	0.970	N/A
	Bluetooth	0.123	DSS	9.5		

Note(s):

1. As per FCC KDB publication 447498 SAR peak location separation ratio (SPLSR) was not required as the sum of the combination of WWAN+WLAN and WWAN+WPAN <1.6 w/kg.
2. *Bluetooth* estimated SAR level calculation is shown in section 2.1 in this report
3. All the possible simultaneous Transmission possibilities are included in section 4.6 of this report.

2.3. SAR measurement variability and measurement uncertainty analysis:

Exposure Configuration	Technology Band	Measured 1g -SAR (W/Kg)	Equipment Class	Max Meas. Source base Avg Power [dBm]	Ratio of Largest to Smallest SAR Measured
HOTSPOT (Separation Distance 10mm)	GSM850 (Original)	0.932	PCE	26.3	1.01
	GSM850 (Repeated)	0.922			
	PCS1900 (Original)	0.876		23.2	1.07
	PCS1900 (Repeated)	0.818			
	UMTS FDD 2 (Original)	1.000		22.9	1.01
	UMTS FDD 2(Repeated)	0.991			
	UMTS FDD 4 (Original)	0.984		23.1	1.02
	UMTS FDD 4 (Repeated)	0.968			
	UMTS FDD 5 (Original)	0.816		24.1	1.07
	UMTS FDD 5 (Repeated)	0.762			

Note(s):

1. The following step below were followed as per KDB publication 865664 D01:

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.

2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.

3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).

4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

2.4. Location of Tests

All the measurements described in this report were performed at the premises of
UL, Pavilion A, Ashwood Park, Ashwood Way, Basingstoke, Hampshire, RG23 8BG United Kingdom

2.5.Nominal and Maximum Output power:

Note: The following source based average rated powers for GSM/GPRS/EDGE are without consideration of uplink time slot.

Bands	Power Back-off Not Supported (Speech (Voice Mode)	
	Target (dBm)	Tolerance ± (dB)
GSM850	33.0	-1.0 ~ +0.6
PCS1900	30.0	-0.6 ~ +0.6

Bands	Power Back-off Not Supported GPRS							
	Tx Slot 1		Tx Slot 2		Tx Slot 3		Tx Slot 4	
	Target (dBm)	Tolerance ± (dB)	Target (dBm)	Tolerance ± (dB)	Target (dBm)	Tolerance ± (dB)	Target (dBm)	Tolerance ± (dB)
GSM850	33.0	-1.0 ~ +0.6	31.0	-0.6 ~ +0.6	30.0	-0.6 ~ +0.6	29.0	-0.6 ~ +0.6
PCS1900	30.0	-0.6 ~ +0.6	28.0	-0.5 ~ +0.5	27.0	-0.5 ~ +0.5	26.0	-0.5 ~ +0.5

Bands	Power Back-off Not Supported EDGE GMSK (MCS1-4)							
	Tx Slot 1		Tx Slot 2		Tx Slot 3		Tx Slot 4	
	Target (dBm)	Tolerance ± (dB)	Target (dBm)	Tolerance ± (dB)	Target (dBm)	Tolerance ± (dB)	Target (dBm)	Tolerance ± (dB)
GSM850	33.0	-1.0 ~ +0.6	31.0	-0.6 ~ +0.6	30.0	-0.6 ~ +0.6	29.0	-0.6 ~ +0.6
PCS1900	30.0	-0.6 ~ +0.6	28.0	-0.5 ~ +0.5	27.0	-0.5 ~ +0.5	26.0	-0.5 ~ +0.5

Bands	Power Back-off Not Supported EDGE 8PSK (MCS5-9)							
	Tx Slot 1		Tx Slot 2		Tx Slot 3		Tx Slot 4	
	Target (dBm)	Tolerance ± (dB)	Target (dBm)	Tolerance ± (dB)	Target (dBm)	Tolerance ± (dB)	Target (dBm)	Tolerance ± (dB)
GSM850	27.0	-1.5 ~ +1.0	25.0	-1.0 ~ +1.0	24.0	-1.0 ~ +1.0	23.0	-1.0 ~ +1.0
PCS1900	26.0	-1.5 ~ +1.0	24.0	-1.0 ~ +1.0	23.0	-1.0 ~ +1.0	22.0	-1.0 ~ +1.0

Bands	Power Back-off Supported & Disabled			
	CS		HS	
	Target (dBm)	Tolerance ± (dB)	Target (dBm)	Tolerance ± (dB)
UMTS FDD 2	23.5	-0.7 ~ +0.5	23.5	-0.7 ~ +0.5
UMTS FDD 4	24.0	-0.7 ~ +0.5	24.0	-0.7 ~ +0.5
	Power Back-off Not Supported			
UMTS FDD 5	24.0	-0.7 ~ +0.5	24.0	-0.7 ~ +0.5

Bands	Power Back-off Supported & Enabled			
	CS		HS	
	Target (dBm)	Tolerance ± (dB)	Target (dBm)	Tolerance ± (dB)
UMTS FDD 2	23.0	-0.7 ~ +0.5	23.0	-0.7 ~ +0.5
UMTS FDD 4	23.0	-0.7 ~ +0.5	23.0	-0.7 ~ +0.5

Nominal and Maximum Output power (Continued):

Power Back-off Not Supported

WiFi802.11b/g

Channel Number	Frequency (MHZ)	Target(dBm)	Tolerance(dB)	Note
1	2412.0	14.6	-6.08 ~ +0.7	**2.4GHz 802.11b** (1Mbps)
6	2437.0	15.4	-6.08 ~ +0.7	
11	2462.0	14.1	-6.08 ~ +0.7	
1	2412.0	14.6	-6.08 ~ +0.7	**2.4GHz 802.11b** (11Mbps)
6	2437.0	15.4	-6.08 ~ +0.7	
11	2462.0	14.1	-6.08 ~ +0.7	
1	2412.0	13.3	-6.08 ~ +0.7	**2.4GHz 802.11g** (6Mbps)
6	2437.0	14.8	-6.08 ~ +0.7	
11	2462.0	12.8	-6.08 ~ +0.7	
1	2412.0	11.3	-6.08 ~ +0.7	**2.4GHz 802.11g** (54Mbps)
6	2437.0	12.8	-6.08 ~ +0.7	
11	2462.0	10.8	-6.08 ~ +0.7	

WiFi802.11n

Channel Number	Frequency (MHZ)	Target(dBm)	Tolerance(dB)	Note
1	2412.0	12.8	-6.08 ~ +0.7	**2.4GHz 802.11n** (MCS0 6.5Mbps)
6	2437.0	14.3	-6.08 ~ +0.7	
11	2462.0	12.3	-6.08 ~ +0.7	
1	2412.0	10.4	-6.08 ~ +0.7	**2.4GHz 802.11n** (MCS7 65Mbps)
6	2437.0	11.9	-6.08 ~ +0.7	
11	2462.0	9.9	-6.08 ~ +0.7	

Wi-Fi802.11a/n (5.0 GHz)

Power Back-off Not Supported

Channel Number	Frequency (MHZ)	Target (dBm) 6 Mbps	Target (dBm) 54 Mbps	Tolerance (dB)	Note
36	5180.0	11.7	9.1	-6.08 ~ +0.7	**5.2 GHz**
40	5200.0	11.9	9.3	-6.08 ~ +0.7	
44	5220.0	11.9	9.3	-6.08 ~ +0.7	
48	5240.0	11.9	9.3	-6.08 ~ +0.7	
52	5260.0	12.9	10.3	-6.08 ~ +0.7	**5.3 GHz**
56	5280.0	11.7	9.1	-6.08 ~ +0.7	
60	5300.0	11.7	9.1	-6.08 ~ +0.7	
64	5320.0	11.7	9.1	-6.08 ~ +0.7	
100	5500.0	11.6	9.0	-3.06 ~ +0.7	**5.6 GHz**
104	5520.0	11.6	9.0	-3.06 ~ +0.7	
108	5540.0	11.6	9.0	-3.06 ~ +0.7	
112	5560.0	11.6	9.0	-3.06 ~ +0.7	
116	5580.0	11.6	9.0	-3.06 ~ +0.7	
132	5660.0	11.6	9.0	-3.06 ~ +0.7	
136	5680.0	11.6	9.0	-3.06 ~ +0.7	
140	5700.0	10.9	8.3	-3.06 ~ +0.7	
149	5745.0	11.6	9.0	-6.08 ~ +0.7	**5.8 GHz**
153	5765.0	11.6	9.0	-6.08 ~ +0.7	
157	5785.0	11.6	9.0	-6.08 ~ +0.7	
161	5805.0	11.4	8.8	-6.08 ~ +0.7	
165	5825.0	11.4	8.8	-6.08 ~ +0.7	

Wi-Fi802.11n (5.0 GHz) (HT20)

Power Back-off Not Supported

Channel Number	Frequency (MHZ)	Target (dBm) 6.5 Mbps	Target (dBm) 65 Mbps	Tolerance (dB)	Note
36	5180.0	11.4	8.6	-6.08 ~ +0.7	5.2 GHz
40	5200.0	11.4	8.6	-6.08 ~ +0.7	
44	5220.0	11.4	8.6	-6.08 ~ +0.7	
48	5240.0	11.4	8.6	-6.08 ~ +0.7	
52	5260.0	12.4	9.6	-6.08 ~ +0.7	5.3 GHz
56	5280.0	11.2	8.4	-6.08 ~ +0.7	
60	5300.0	11.2	8.4	-6.08 ~ +0.7	
64	5320.0	11.2	8.4	-6.08 ~ +0.7	
100	5500.0	11.1	8.3	-3.06 ~ +0.7	5.6 GHz
104	5520.0	11.1	8.3	-3.06 ~ +0.7	
108	5540.0	11.1	8.3	-3.06 ~ +0.7	
112	5560.0	11.1	8.3	-3.06 ~ +0.7	
116	5580.0	11.1	8.3	-3.06 ~ +0.7	
132	5660.0	11.1	8.3	-3.06 ~ +0.7	
136	5680.0	11.1	8.3	-3.06 ~ +0.7	
140	5700.0	11.1	8.3	-3.06 ~ +0.7	
149	5745.0	11.4	8.6	-6.08 ~ +0.7	5.8 GHz
153	5765.0	11.4	8.6	-6.08 ~ +0.7	
157	5785.0	11.4	8.6	-6.08 ~ +0.7	
161	5805.0	11.4	8.6	-6.08 ~ +0.7	
165	5825.0	10.9	8.1	-6.08 ~ +0.7	

Wi-Fi802.11n (5.0 GHz) (HT40)

Power Back-off Not Supported

Channel Number	Frequency (MHZ)	Target (dBm) 13.5 Mbps	Target (dBm) 135 Mbps	Tolerance (dB)	Note
38	5190.0	10.3	9.4	-6.08 ~ +0.7	5.2 GHz
46	5230.0	10.3	9.4	-6.08 ~ +0.7	
54	5270.0	10.3	9.4	-6.08 ~ +0.7	5.3 GHz
62	5310.0	9.3	8.4	-6.08 ~ +0.7	
102	5510.0	10.1	9.2	-3.06 ~ +0.7	5.6 GHz
110	5550.0	10.1	9.2	-3.06 ~ +0.7	
134	5670.0	10.1	9.2	-3.06 ~ +0.7	
151	5755.0	10.1	9.2	-6.08 ~ +0.7	5.8 GHz
159	5795.0	10.1	9.2	-6.08 ~ +0.7	

802.11 ac (5.0 GHz) (20 MHz)

Power Back-off Not Supported

Channel Number	Frequency (MHZ)	Target (dBm) 6.5 Mbps	Target (dBm) 65 Mbps	Tolerance (dB)	Note
36	5180.0	11.4	8.6	-6.08 ~ +0.7	5.2 GHz
40	5200.0	11.4	8.6	-6.08 ~ +0.7	
44	5220.0	11.4	8.6	-6.08 ~ +0.7	
48	5240.0	11.4	8.6	-6.08 ~ +0.7	
52	5260.0	12.4	9.6	-6.08 ~ +0.7	5.3 GHz
56	5280.0	11.2	8.4	-6.08 ~ +0.7	
60	5300.0	11.2	8.4	-6.08 ~ +0.7	
64	5320.0	11.2	8.4	-6.08 ~ +0.7	
100	5500.0	11.1	8.3	-3.06 ~ +0.7	5.6 GHz
104	5520.0	11.1	8.3	-3.06 ~ +0.7	
108	5540.0	11.1	8.3	-3.06 ~ +0.7	
112	5560.0	11.1	8.3	-3.06 ~ +0.7	
116	5580.0	11.1	8.3	-3.06 ~ +0.7	
132	5660.0	11.1	8.3	-3.06 ~ +0.7	
136	5680.0	11.1	8.3	-3.06 ~ +0.7	
140	5700.0	11.1	8.3	-3.06 ~ +0.7	
149	5745.0	11.4	8.6	-6.08 ~ +0.7	5.8 GHz
153	5765.0	11.4	8.6	-6.08 ~ +0.7	
157	5785.0	11.4	8.6	-6.08 ~ +0.7	
161	5805.0	11.4	8.6	-6.08 ~ +0.7	
165	5825.0	10.9	8.1	-6.08 ~ +0.7	

Wi-Fi802.11ac (5.0 GHz) (40 MHz)

Power Back-off Not Supported

Channel Number	Frequency (MHZ)	Target (dBm) 13.5 Mbps	Target (dBm) 135 Mbps	Tolerance (dB)	Note
38	5190.0	10.3	9.4	-6.08 ~ +0.7	5.2 GHz
46	5230.0	10.3	9.4	-6.08 ~ +0.7	
54	5270.0	10.3	9.4	-6.08 ~ +0.7	5.3 GHz
62	5310.0	9.3	8.4	-6.08 ~ +0.7	
102	5510.0	10.1	9.2	-3.06 ~ +0.7	5.6 GHz
110	5550.0	10.1	9.2	-3.06 ~ +0.7	
134	5670.0	10.1	9.2	-3.06 ~ +0.7	
151	5755.0	10.1	9.2	-6.08 ~ +0.7	5.8 GHz
159	5795.0	10.1	9.2	-6.08 ~ +0.7	

Wi-Fi802.11ac (5.0 GHz) (80 MHz)

Power Back-off Not Supported

Channel Number	Frequency (MHZ)	Target (dBm) 13.5 Mbps	Target (dBm) 135 Mbps	Tolerance (dB)	Note
42	5210	9.8	9.1	-6.08 ~ +0.7	5.2 GHz
58	5290	9.8	9.1	-6.08 ~ +0.7	5.3 GHz
106	5530	9.8	9.1	-3.06 ~ +0.7	5.6 GHz
155	5775	9.8	9.1	-6.08 ~ +0.7	5.8 GHz

Nominal and Maximum Output power (Continued):

Power Back-off Not Supported

Band	BR	EDR	BLE	Tolerance (dB)
Bluetooth	6.0	4.0	0.0	-3.5 ~ +3.5

Note:

1. As per KDB865664 D02 SAR Reporting v01r01, 2.1.4(a), the nominal and maximum average source based rated power, declared by manufacturer are shown in the above tables.
2. These are specified maximum allowed average power for all the wireless modes and frequency bands supported as indicated by manufacturer.

3. Test Specification, Methods and Procedures

3.1. Test Specification

Reference:	RSS-102 Issue 4 March 2010
Title:	Radio Frequency (RF) Exposure Compliance of Radio communication Apparatus (All Frequency Bands)
Purpose of Test:	To determine whether the equipment met the basic restrictions as defined in RSS-102 Issue 4 March 2010 using the SAR averaging method as described in the test specification above.

3.2. Methods and Procedures Reference Documentation

The methods and procedures used were as detailed in:

Federal Communications Commission, “Evaluating compliance with FCC Guidelines for human exposure to radio frequency electromagnetic fields”, OET Bulletin 65 Supplement C, FCC, Washington, D.C, 20554, 2001.

IEEE 1528: 2003
IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques

Thomas Schmid, Oliver Egger and Neils Kuster, “Automated E-field scanning system for dosimetric assessments”, IEEE Transaction on microwave theory and techniques,
Vol. 44, pp. 105-113, January 1996.

Neils Kuster, Ralph Kastle and Thomas Schmid, “Dosimetric evaluation of mobile communications equipment with know precision”, IEICE Transactions of communications, Vol. E80-B, No.5, pp. 645-652, May 1997.

FCC KDB Publication:

KDB 248227 D01 SAR meas for 802 11 a b g v01r02

KDB 447498 D01 General RF Exposure Guidance v05r01

KDB 648474 D04 Handset SAR v01r01

KDB 941225 D01 SAR test for 3G devices v02

KDB 941225 D02 HSPA and 1x Advanced v02r02

KDB 941225 D03 SAR Test Reduction GSM GPRS EDGE vo1

KDB 941225 D04 SAR for GSM E GPRS Dual Xfer Mode v01

KDB 941225 D06 Hotspot Mode SAR v01r01

KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r01

KDB 865664 D02 RF Exposure Reporting v01r01

3.3. Definition of Measurement Equipment

The measurement equipment used complied with the requirements of the standards referenced in the methods & procedures section above. Appendix 1 contains a list of the test equipment used.

4. Equipment Under Test (EUT)

4.1. Identification of Equipment Under Test (EUT)

Description:	Smartphone Handset						
Brand Name:	Sony						
Model Number or Name:	C6902						
Type Number:	PM-0500-BV						
Serial Number:	CB5124U7E6	CB5124U7B0	CB5124U7EL	CB5124U7AP	CB5124U7CW	CB5124U743	CB5124U7EP
IMEI Number:	00440214-685877-8	00440214-685859-6	00440214-685494-2	00440214-685887-7	00440214-685885-1	00440214-685882-9	00440214-685461-1
Hardware Version Number:	AP2.0						
Software Version Number:	14.1.G.1.241			s_atp_honami_1_25_1			
FCC ID Number:	PY7PM-0500						
IC ID:	4170B-PM0500						
Country of Manufacture:	China						
Date of Receipt:	26 June 2013						

Note(s):

1. IMEI: 00440214-685877-8 used to perform GSM850 and PCS1900 SAR measurements only.
2. IMEI: 00440214-685859-6 used to perform UMTS FDD 2, 4 and 5 SAR measurements only.
3. IMEI: 00440214-685494-2 used to perform WWAN conducted power measurements only.
4. IMEI: 00440214-685882-9 used to perform WLAN 2.4GHz SAR measurements only.
5. IMEI: 00440214-685887-7 used to perform WLAN 5GHz Head SAR measurements only.
6. IMEI: 00440214-685885-1 used to perform WLAN 5GHz Body SAR measurements only.
7. IMEI: 00440214-685461-1 used to perform WLAN conducted power measurements only.

Auto RF Power Back-off' mode facility is available on 'Hotspot Mode Configuration of UMTS FDD 2 and UMTS FDD 4 bands only.When Hotspot mode is activated, in all operating modes, the maximum output power level in UMTS Band 2 will not exceed 23.5 dBm, and UMTS Band 4 will not exceed 23.5 dBm.

4.2. Description of EUT

The equipment under test (EUT) is a model of GSM/UMTS mobile phone with integrated antenna and inbuilt Li-Polymer battery.The EUT supports GSM 850/900/1800/1900MHz bands & UMTS FDD bands 1/2/4/5/8. It also supports Dual Transfer Mode (DTM) class 11, GPRS service with multi-slots class 33 and EGPRS service with multi-slots class 33. The HSDPA (Category 24) and HSUPA (Category 6) features are also supported. It has MP3, camera, FM radio, USB memory, GPS receiver, NFC, Mobile High-Definition Link (MHL), Bluetooth (EDR and Bluetooth 4.0), WLAN (802.11 a/b/g/n/ac), Wi-Fi hotspot functions with 'Auto RF Power Back-Off' mode and RFID capabilities."

4.3. Modifications Incorporated in the EUT

There were no modification during the course of testing the device

4.4. Accessories

The following accessories were supplied with the EUT during testing:

Description:	Memory Card (2 GB)	Personal Hands-Free Kit (PHF)	Dummy Battery
Brand Name:	None Stated	Sony	None Stated
Model Name or Number:	None Stated	MH750	None Stated
Serial Number:	None Stated	12060C160061850	None Stated
Cable Length and Type:	Not Applicable	~1.2 m	~0.5m
Country of Manufacture:	China	None Stated	None Stated
Connected to Port	Micro SD Slot	3.5mm Audio jack and custom type	Unique to Manufacturer

Note(s):

This Dummy Battery was only used to perform conducted power measurements.

4.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Description:	Communication Test Set	Communication Test Set	Communication Test Set
Brand Name:	Agilent	Agilent	Agilent
Model Name or Number:	8960 Series 10 (E5515C)	8960 Series 10 (E5515E)	8960 Series 10 (E5515E)
Serial Number:	GB46311280	GB46200666	MY52112050
Cable Length and Type:	~4.0m Utiflex Cable	~4.0m Utiflex Cable	~4.0m Utiflex Cable
Connected to Port:	RF (Input / Output) Air Link	RF (Input / Output) Air Link	RF (Input / Output) Air Link

4.6. Additional Information Related to Testing

Equipment Category	2G GSM / PCS	TDMA 850 / 1900	Voice, DTM, GPRS, EDGE Data
	3G UMTS Band	FDD 2 / 4 / 5	RMC12.2 / HSDPA (Cat 24) / HSPA (Cat 6) Data
	Wi-Fi Band	(2.4 / 5.0) GHz	Data 802.11a/b/g/n/ac
Type of Unit	Portable Transceiver		
Intended Operating Environment:	Within GSM, UMTS and WiFi and *Bluetooth* Coverage for General Population / Uncontrolled Exposure category.		
Transmitter Maximum Output Power Characteristics:	GSM850	Communication Test Set was configured to allow the EUT to transmit at a maximum power using Power Control Level (PCL) setting of 5.	
	PCS1900	Communication Test Set was configured to allow the EUT to transmit at a maximum power using Power Control Level (PCL) setting of 0.	
	UMTS FDD 2	Communication Test Set configured to allow to EUT to transmit at a maximum power as per KDB 941225 D01.	
	UMTS FDD 4	Communication Test Set configured to allow to EUT to transmit at a maximum power as per KDB 941225 D01.	
	UMTS FDD 5	Communication Test Set configured to allow to EUT to transmit at a maximum power as per KDB 941225 D01.	
	2.4 GHz Wi-Fi 802.11b/g/n	Test Software was used to configure the EUT to transmit at a maximum power of up to 16.0 dBm.	
	5.0 GHz Wi-Fi 802.11a	Test Software was used to configure the EUT to transmit at a maximum power of up to 12.8 dBm.	
	5.0 GHz Wi-Fi 802.11n (HT20 / HT40)	Test Software was used to configure the EUT to transmit at a maximum power of up to 12.8 dBm for HT20 and 10.3 dBm for HT40.	
	5.0 GHz Wi-Fi 802.11ac (VHT20 / VHT40 / VHT80)	Test Software was used to configure the EUT to transmit at a maximum power of up to 11.6 dBm for VHT20, 10.1 dBm for VHT40 and 10.3 dBm for VHT80.	
	Bluetooth	:= 8.91 mW or ~9.5 dBm	
Transmitter Frequency Range:	GSM850	824 to 849 MHz	
	PCS1900	1850 to 1910 MHz	
	UMTS FDD 2	1852 to 1908 MHz	
	UMTS FDD 4	1712 to 1753 MHz	
	UMTS FDD 5	826 to 847 MHz	
	2.4 GHz Wi-Fi 802.11b/g/n	2412 to 2462 MHz	
	5.2 GHz Wi-Fi (20 MHz / 40 MHz / 80 MHz)	5170 to 5250 MHz	
	5.3 GHz Wi-Fi (20 MHz / 40 MHz / 80 MHz)	5250 to 5330 MHz	
	5.6 GHz Wi-Fi (20 MHz / 40 MHz / 80 MHz)	5490 to 5600 MHz	
	5.6 GHz Wi-Fi (20 MHz / 40 MHz)	5650 to 5710 MHz	
	5.8 GHz Wi-Fi (20 MHz / 40 MHz / 80 MHz)	5735 to 5835 MHz	
	Bluetooth	2402 to 2480 MHz	

Additional Information Related to Testing (Continued):

Transmitter Frequency Allocation of EUT When Under Test:

Bands	Channel Number	Channel Description	Frequency (MHz)
GSM850	128	Low	824.2
	190	Middle	836.6
	251	High	848.8
PCS1900	512	Low	1850.2
	661	Middle	1880.0
	810	High	1909.8
UMTS FDD 2	9262	Low	1852.4
	9400	Middle	1880.0
	9538	High	1907.6
UMTS FDD 4	1312	Low	1712.4
	1412	Middle	1732.6
	1513	High	1752.6
UMTS FDD 5	4132	Low	826.4
	4183	Middle	836.6
	4233	High	846.6

Transmitter Frequency Allocation of EUT When Under Test:

Band: 2.4 / 5.0 GHz Wi-Fi 802.11a/n/AC (HT20 / HT40/HT80)

Rule	20 MHz BW Ch.#	Frq. (MHz)	40 MHz BW Ch.#	Frq. (MHz)	80 MHz BW Ch.#	Frq. (MHz)
15.247	1	2412.0				
	6	2437.0				
	11	2462.0				
5.2 U-NII	36	5180.0	38	5190.0		
	40	5200.0			42	5210.0
	44	5220.0	46	5230.0		
	48	5240.0				
5.3 U-NII	52	5260.0	54	5270.0		
	56	5280.0			58	5290.0
	60	5300.0	62	5310.0		
	64	5320.0				
5.6 U-NII	100	5500.0	102	5510.0		
	104	5520.0			106	5530.0
	108	5540.0	110	5550.0		
	112	5560.0				
	116	5580.0				
	132	5660.0	134	5670.0		
	136	5680.0				
	140	5700.0				
U-NII or 15.247	149	5745.0	151	5755.0		
	153	5765.0			155	5775.0
	157	5785.0	159	5795.0		
	161	5805.0				
15.247	165	5825.0				

Additional Information Related to Testing (Continued)

Modulation(s):	GMSK (GSM/ DTM / GPRS):	217 Hz
	QPSK(UMTS / HSDPA / HSUPA):	0 Hz
	DBPSK, BPSK, CCK (Wi-Fi):	0 Hz
Modulation Scheme (Crest Factor):	GMSK (DTM Class11):	2.67
	GMSK (GPRS850/GPRS1900):	2
	DBPSK, BPSK, CCK (Wi-Fi):	1
	QPSK(UMTS FDD / HSDPA):	1
Antenna Type:	Internal integral	
Antenna Length:	Unknown	
Number of Antenna Positions:	WWAN ~ UMTS / GSM	1 fixed
	WWAN Diversity (Rx Only) ~ UMTS / GPS	1 fixed
	WLAN/ BT	1 fixed
	NFC/Felica	1 fixed
Power Supply Requirement:	4.2 V (Nominal)	
Battery Type(s):	In built Li-ion	

Simultaneous Tranmission Combination:

	WWAN				WLAN		WPAN
	GSM Voice	**GPRS/EDGE Data**	**UMTS Voice**	**UMTS Data**	**WiFi 2.4 GHz**	**WiFi 5.0 GHz**	**BT**
1		X			X		
2				X	X		
3	X				X		
4			X		X		
5	X					X	
6			X			X	
7		X					X
8				X			X
9	X DTM	X DTM			X		
10	X						X
11			X				X

X Simultaneous transmission supported

0 No simultaneous transmission supported

Bluetooth average power measurement is below the rated threshold therefore Individual SAR will not be tested. Sim_Tx consideration will be based on the estimated SAR level.

	WiFi Hotspot Combinations Only			
	WWAN		**WLAN**	
	GPRS/EDGE Data	**UMTS Data**	**WiFi 2.4GHz**	**WiFi 5GHz**
1	X		X	O
2		X	X	O

5. Deviations from the Test Specification

Test was performed as per reference documents and FCC KDB publication procesdures listed in section 3.2 of this report.

Prior to testing the FCC was contacted for SAR evaluation and testing was performed as per response on DC-HSDPA (Cat 24), WiFi 802.11ac and power back-OFF support for UMTS FDD 2 and FDD 4. The resulting guidance for each KDB inquiry was obtained as follows:

DC-HSDPA (Cat 24):
'Apply KDB 941225 Rel 6. HSPA procedures to determine SAR exclusion for HSPA+ and DC-HSDPA according to the measured power, if measured maximum output power for HSPA+ or DC-HSDPA is ≤ ¼ dB higher than the WCDMA 12.2 kbps RMC maximum output and when maximum SAR for 12.2 kbps RMC is ≤ 75% of SAR limit, SAR is not required'.

WiFi802.11ac:
'Apply usual 802.11 test exclusion considerations, but include 802.11ac SAR for highest 802.11a configuration in each 5 GHz band and each exposure condition.'

Power Back OFF:
'The power reduction scheme was accepted by FCC, a PBA is not required.'

The following settings were used for DC-HSDPA:
Apply FRC H-Set 12 (QPSK) in Table C.8.1.12 of TS 34.121-1 to measure DC-HSDPA uplink maximum output power using the 4 Rel. 5 HSDPA subtests in Table C.10.1.4 of TS 234.121-1

For informational purpose: GPRS clas33 / uplink setup of 1-uplink, 2-uplink, 3-uplink and 4-uplink & DTM setup were all evaluated to find the setting with the highest power reference point (unit v/m) as per the DASY4 system. 4-uplink was found to give the highest power reference point measurement on the DASY4 system (unit v/m) for GPRS850 and for GPRS1900 Hotspot mode measurements and DTM11 was found to give highest power reference measurement for head and Body-Worn measurements. All settings were performed with the device in a fixed position Back facing phantom at 0mm separation to ensure there were no positioning errors. The following values were measured relative to the uplink settings:

GPRS Mode	GPRS850 Power reference (v/m)	GPRS1900 Power reference (v/m)
1 uplink	13.59	5.304
2 uplink	16.72	5.738
3 uplink	18.81	6.302
4 uplink	**19.68**	**6.588**

DTM Mode	GSM850 Power reference (v/m)	PCS1900 Power reference (v/m)
DTM 5(2uplink, 2downlink)	16.92	6.255
DTM 9(2 uplink, 3 downlink)	16.82	6.268
DTM 11(3 uplink, 2 downlink)	**18.96**	**6.508**

6. Operation and Configuration of the EUT during Testing

Operating Modes

The EUT was tested in the following operating mode(s) unless otherwise stated:

- GSM850 – DTM Class 11 (Voice + Data) allocated mode with Communication Test Set configured to allow the EUT to transmit at a maximum power using Power Control Level (PCL) setting of 5. Tested using 3 Uplink time slots with 2 time slots set as CS1 for GPRS and 1 time slot slot for voice.
- GPRS850 – Data allocated mode with Communication Test Set configured to allow the EUT to transmit at a maximum power using Power Control Level (PCL) setting of 5. Tested using 4 Uplink time slots with CS1 for GPRS.
- PCS1900 – DTM Class 11 (Voice + Data) allocated mode with Communication Test Set configured to allow the EUT to transmit at a maximum power using Power Control Level (PCL) setting of 0. Tested using 3 Uplink time slots with 2 time slots set as CS1 for GPRS and 1 time slot set for voice.
- GPRS1900 – Data allocated mode with Communication Test Set configured to allow the EUT to transmit at a maximum power using Power Control Level (PCL) setting of 0. Tested using 4 Uplink time slots with CS1 for GPRS.

GSM850: Power Table Settings used for Test Set	
Power Control Level PCL	Nominal Power (dBm)
0 … 2	39
3	37
4	35
5	**33**
6	31
7	29
8	27
9	25
10	23
11	21
12	19
13	17
14	15
15	13
16	11
17	9
18	7
19 ... 31	5

PCS1900: Power Table Settings used for Test Set	
Power Control Level PCL	Nominal Power (dBm)
22 … 29	Reserved
30	33
31	32
0	**30**
1	28
2	26
3	24
4	22
5	20
6	18
7	16
8	14
9	12
10	10
11	8
12	6
13	4
14	2
15	0
16 … 21	Reserved

DTM Time slot settings per multislot class:

Mulitslot Class	Max. number of downlink slots	Max. number of uplink slots	Max. sum of uplink and downlink
5	2	2	4
6	3	2	4
9	3	2	5
10	4	2	5
11	4	3	5
31, 36	5	2	6
32, 37	5	3	6
34, 39	5	5	6
41	6	2	7
42	6	3	7
45	6	6	7

Operating Modes (Continued)

- UMTS FDD 2, 4, 5 - RMC 12.2kbps allocated mode with Communication Test Set configured to allow the EUT to transmit at a maximum as per KDB 941225 D01.
- UMTS FDD 2, 4, 5 - RMC 12.2kbps + HSDPA with Test loop mode 1 and TPC bits configured to all "1's", Sub-test 1 with Communication Test Set configured to allow to EUT to transmit at a maximum power as per KDB 941225 D01.
- UMTS FDD 2, 4, 5 - RMC 12.2kbps + HSUPA with Test loop mode 1 and TPC bits configured to all "1's", Sub-test 5, AG Index set to 21 and E-TFCI set to 81 with Communication Test Set configured to allow to EUT to transmit at a maximum power as per KDB 941225 D01.
- UMTS FDD 2, 4, 5 - RMC 12.2kbps + DC-HSDPA (Cat 24) with Test loop mode 1 and TPC bits configured to all "1's", Sub-test 1 with Communication Test Set configured to allow to EUT to transmit at a maximum power as per KDB 941225 D01. (See Appendix 9 for detailed description)
- 2.4 GHz WiFi802.11b/g/n Data allocated mode using 'HyperTerminal' software to excise mode ‘b’, ‘g’ and ‘n’, with maximum power of up to 16.0 dBm for ‘b’ mode and 15.0 dBm for ‘g’ and 14.7 dBm for ‘n’ modes.
- 5.0 GHz WiFi802.11a/n/ac Data allocated mode using 'HyperTerminal' software to excise mode ‘a’ and ‘n’, with maximum power of up to 12.8dBm for ‘a’ mode, 12.8 dBm for ‘n’ mode and 11.6dBm for ‘ac’ mode.
- As per 648474 D04 SAR Handsets Multi Xmiter and Ant v01, ‘’When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset’’. Hence, Body worn configurations were not evaluated with PHF attached.

Activating the ‘Portable Wi-Fi hotspot mode’

- Go to the home screen of the EUT
- Press the ‘Applications’ icon on the screen of the device and then tap "Settings".
- On the Settings screen, tap the "Wireless & networks" option, followed by "Portable Wi-Fi hotspot".
- Click the check mark beside it to turn on the hotspot and the EUT starts acting like a wireless access point. (It should also see a message in the notification bar when it's activated.).
- Once ‘Portable Wi-Fi Hotspot’ mode is activated, it is active until it is deactivated by the user.
- ‘Auto RF Power Back-off’ mode facility is available on ‘Hotspot Mode Configuration of UMTS Band 2 and Band 4 only. There is no power back-off to the WLAN 2.4 GHz or WLAN 5.0 GHz.
- Once the ‘Portable Wi-Fi hotspot’ mode is activated, the ‘Auto RF Power Reduction’ mode is active. This enables ‘Power Back-Off’ and the RF power gets reduced on the specific band on which it is supported.. Once ‘Auto RF Power Back-off’ mode is activated, power reduction applies until ‘Portable Wi-Fi hotspot’ is deactivated by the user.

6.1. Configuration and Peripherals

The EUT was tested in the following configuration(s) unless otherwise stated:

- Standalone fully charged battery powered.
- Head, Hotspot Mode and Body-worn configurations were evaluated.
- The applied FCC body-worn Personal Hotspot orientations where the corresponding edge(s) closest to the user with the most conservative exposure condition were all evaluated at 10 mm from the body. For modes and configuration that did not overlap with Personal hotspot, SAR evaluation was performed at 15mm separation.
- GPRS clas33 / uplink setup of 1-uplink, 2-uplink, 3-uplink and 4-uplink & DTM Class 5, 9, 11setup were all evaluated to find the setting with the highest power reference point (unit v/m) as per the DASY system. 4-uplink was found to give the highest power reference point measurement for GPRS850 and for GPRS1900 Hotspot mode measurements and DTM Class11 was found to give highest power reference measurement for Head and Body-Worn measurements. All settings were performed with the device in a fixed position 'Back facing phantom' at 0mm separation to ensure there were no positioning errors. These measurements were performed for information purpose only.
- DTM Class11, GPRS Class 33 and EDGE Class 33 power measurement were all measured as per FCC pubs. 941225 D03 and 941225 D04. Although power reduction was allowed SAR test was performed on GPRS using GMSK. Test reduction was applied to EDGE using GMSK and 8PSK modulation scheme.

Head Configuration

a) The EUT was placed in a normal operating position with the centre of the ear-piece aligned with the ear canal on the phantom.

b) With the ear-piece touching the phantom the centre line of the EUT was aligned with an imaginary plane (X and Y axis) consisting of three lines connecting both ears and the mouth.

c) For the cheek position the EUT was gradually moved towards the cheek until any point of the mouth-piece or keypad touched the cheek.

d) For the tilted position the EUT was positioned as for the cheek position, and then the horizontal angle was increased by fifteen degrees (the phone keypad was moved away from the cheek by fifteen degrees).

e) SAR measurements were evaluated at maximum power and the unit was operated for an appropriate period prior to the evaluation in order to minimise the drift.

f) The device was keyed to operate continuously in the transmit mode for the duration of the test.

g) The location of the maximum spatial SAR distribution (hot spot) was determined relative to the EUT and its antenna.

h) The EUT was transmitting at full power throughout the duration of the test powered by a fully charged battery.

Body Configuration

a) The EUT was placed in a normal operating position where the centre of EUT was aligned with the centre reference point on the flat section of the 'SAM' phantom.

b) With the EUT touching the phantom at an imaginary centre line. The EUT was aligned with a marked plane (X and Y axis) consisting of two lines.

c) For the touch-safe position the EUT was gradually moved towards the flat section of the 'SAM' phantom until any point of the EUT touched the phantom.

d) For position(s) greater then 0mm separation the EUT was positioned as per the touch-safe position, and then the vertical height was decreased/adjusted as required.

e) SAR measurements were evaluated at maximum power and the unit was operated for an appropriate period prior to the evaluation in order to minimise the drift.

f) The device was keyed to operate continuously in the transmit mode for the duration of the test.

g) The location of the maximum spatial SAR distribution (hot spot) was determined relative to the EUT and its antenna.

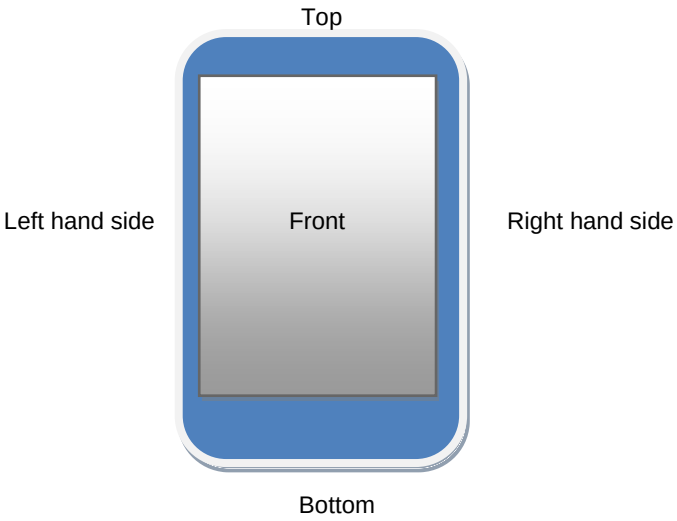
h) The EUT was transmitting at full power throughout the duration of the test powered by a fully charged battery.

6.2. Configuration Consideration

Technology Antenna	Configuration	Antenna-to-User Separation	Position	Antenna-to-Edge Separation	Evaluation Considered
WWAN	Head	0mm	Touch Left	<25mm	Yes
			Tilt Left	<25mm	Yes
			Touch Right	<25mm	Yes
			Tilt Right	<25mm	Yes
	Hotspot	10mm	Front	<25mm	Yes
			Back	<25mm	Yes
			Top Edge	>25mm	No
			Bottom Edge	<25mm	Yes
			Right Edge	<25mm	Yes
			Left Edge	<25mm	Yes
	Body	15mm	Front	<25mm	Yes
			Back	<25mm	Yes
WLAN	Head	0mm	Touch Left	<25mm	Yes
			Tilt Left	<25mm	Yes
			Touch Right	<25mm	Yes
			Tilt Right	<25mm	Yes
	Hotspot	10mm	Front	<25mm	Yes
			Back	<25mm	Yes
			Top Edge	>25mm	No
			Bottom Edge	<25mm	Yes
			Right Edge	<25mm	Yes
			Left Edge	>25mm	No
	Body	15mm	Front	<25mm	Yes
			Back	<25mm	Yes

Note(s):

1. Test distances are as per FCC KDB publication 447498 D01v05 for mobile handsets.



6.3. SAR Test Exclusion Consideration

Frequency Band	Configuration(s)		
	Head	Hotspot Mode	Body-worn
GSM850	No	No	No
PCS1900	No	No	No
UMTS FDD 2	No	No	No
UMTS FDD 4	No	No	No
UMTS FDD 5	No	No	No
WLAN 2.4 GHz	No	No	No
WLAN 5.0 GHz	No	No	No
Bluetooth[2]	N/A	Yes	Yes

Note:

1. As per RSS-102 Issue 4 March 2010, the Frequency Bands with Rated Power including Upper tolerance (or ERP / EIRP), which qualify for **Standalone SAR Test Exclusion,** are as per the above table.
2. As per RSS-102 Issue 4 March 2010, for frequencies above 2.2 GHz and up to 3GHz inclusively, and with output power (or EIRP) that is less than or equal to 20mW , SAR evaluation is not required.

   For the SAR Test Exlusion consideration, the Maximum Target power + Upper tolerance for *Bluetooth* = 6.0 + 3.5 = 9.5 dBm (~ 8.91 mW) is considered < 20mW.

   Hence, testing is not required on *Bluetooth* Hotspot Mode and Body-worn configurations.
3. The details for the ***Maximum Rated Power*** and tolerance(s) can be found in section 2.5.

7. Measurements, Examinations and Derived Results

7.1. General Comments

This section contains test results only.

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to section 8 for details of measurement uncertainties.

7.2. Conducted Power Measurements
7.2.1.Conducted Average Power Measurement 2G: GSM850
Power Back-off Not Supported

Band: GSM 850		Burst Avg. Power (dBm)			Frame Average Power (dBm)		
Channel		128	190	251	128	190	251
Frequency (MHz)		824.2	836.6	848.8	824.2	836.6	848.8
GSM (GMSK, 1Tx Slot)		33.0	32.9	33.1	24.0	23.9	24.1
GPRS (GMSK, 1 Tx Slot) - CS1		33.0	32.9	33.1	24.0	23.9	24.1
GPRS (GMSK, 2 Tx Slot) - CS1		31.5	31.5	31.4	25.5	25.5	25.4
GPRS (GMSK, 3 Tx Slot) - CS1		30.3	30.2	30.2	26.0	25.9	25.9
GPRS (GMSK, 4 Tx Slot) - CS1		29.4	29.3	29.3	26.4	26.3	26.3
EDGE (GMSK, 1 Tx Slot) - MCS1		33.0	32.9	33.1	24.0	23.9	24.1
EDGE (GMSK, 2 Tx Slot) - MCS1		31.5	31.5	31.4	25.5	25.5	25.4
EDGE (GMSK, 3 Tx Slot) - MCS1		30.3	30.2	30.2	26.0	25.9	25.9
EDGE (GMSK, 4 Tx Slot) - MCS1		29.4	29.3	29.3	26.4	26.3	26.3
EDGE (8PSK, 1 Tx Slot) - MCS9		27.1	27.1	27.1	18.1	18.1	18.1
EDGE (8PSK, 2 Tx Slot) - MCS9		25.0	25.0	25.0	19.0	19.0	19.0
EDGE (8PSK, 3 Tx Slot) - MCS9		24.1	24.1	24.0	19.8	19.8	19.7
EDGE (8PSK, 4 Tx Slot) - MCS9		23.2	23.2	23.1	20.2	20.2	20.1
DTM 5 (2Tx Slot)	GSM (GMSK, 1Tx Slot)	31.3	31.3	31.2	25.3	25.3	25.2
	GPRS (GMSK, 1 Tx Slot) - CS1	31.3	31.3	31.2	25.3	25.3	25.2
DTM 9 (2Tx Slot)	GSM (GMSK, 1Tx Slot)	31.3	31.3	31.2	25.3	25.3	25.2
	GPRS (GMSK, 1 Tx Slot) - CS1	31.4	31.4	31.2	25.4	25.4	25.2
DTM 11 (3Tx Slot)	GSM (GMSK, 1Tx Slot)	30.2	30.1	30.0	25.9	25.8	25.7
	GPRS (GMSK, 2 Tx Slot) - CS1	30.2	30.2	30.1	25.9	25.9	25.8
DTM 5 (2Tx Slot)	GSM (GMSK, 1Tx Slot)	31.3	31.3	31.2	25.3	25.3	25.2
	EDGE (GMSK, 1 Tx Slot) - MCS1	31.3	31.3	31.2	25.3	25.3	25.2
DTM 9 (2Tx Slot)	GSM (GMSK, 1Tx Slot)	31.3	31.3	31.2	25.3	25.3	25.2
	EDGE (GMSK, 1 Tx Slot) - MCS1	31.4	31.4	31.2	25.4	25.4	25.2
DTM 11 (3Tx Slot)	GSM (GMSK, 1Tx Slot)	30.2	30.1	30.0	25.9	25.8	25.7
	EDGE (GMSK, 2 Tx Slot) - MCS1	30.2	30.2	30.1	25.9	25.9	25.8
DTM 5 (2Tx Slot)	GSM (GMSK, 1Tx Slot)	31.3	31.3	31.2	25.3	25.3	25.2
	EDGE (8PSK, 1 Tx Slot) - MCS9	24.7	24.6	24.6	18.7	18.6	18.6
DTM 9 (2Tx Slot)	GSM (GMSK, 1Tx Slot)	31.3	31.3	31.2	25.3	25.3	25.2
	EDGE (8PSK, 1 Tx Slot) - MCS9	24.7	24.6	24.6	18.7	18.6	18.6
DTM 11 (3Tx Slot)	GSM (GMSK, 1Tx Slot)	30.2	30.1	30.0	25.9	25.8	25.7
	EDGE (8PSK, 2 Tx Slot) - MCS9	23.8	23.8	23.7	19.5	19.5	19.4

Note:

Scale factor for uplink time slot to calculate frame average power:

1. 1 Uplink: time slot ratio = 8:1 => 10*log(8/1) = **9.03 dB**
2. 2 Uplink: time slot ratio = 8:2 => 10*log(8/2) = **6.02 dB**
3. 3 Uplink: time slot ratio = 8:3 => 10*log(8/3) = **4.26 dB**
4. 4 Uplink: time slot ratio = 8:4 => 10*log(8/4) = **3.01 dB**

Conducted Average Power Measurement 2G: GSM850 Power Back-off Disabled Conclusions:

1. **Head SAR Testing**; GSM and DTM were the modes used in this configuration for evaluation. DTM Multi-slot class 11 measured highest of the two modes for the Frame Average Power, therefore the EUT was set in this mode for SAR testing.
2. **Hotspot Mode SAR Testing**; GPRS, EDGE and DTM were the modes used in this configuration for evaluation. GPRS 4 Tx slots measured highest of the three modes for the Frame Average Power, therefore the EUT was set in this mode for SAR testing.
3. **Body worn SAR Testing**; GSM and DTM were the modes used in this configuration for evaluation. DTM Multi-slot class 11 measured highest of the three modes for the Frame Average Power, therefore the EUT was set in this mode for SAR testing.

7.2.2.Conducted Average Power Measurement 2G: PCS1900
Power Back-off Not Supported

Band: PCS 1900		Burst Avg. Power (dBm)			Frame Average Power (dBm)		
Channel		512	661	810	512	661	810
Frequency (MHz)		1850.2	1880	1909.8	1850.2	1880	1909.8
GSM (GMSK, 1Tx Slot)		30.1	30.0	30.1	21.1	21.0	21.1
GPRS (GMSK, 1 Tx Slot) - CS1		30.1	30.0	30.1	21.1	21.0	21.1
GPRS (GMSK, 2 Tx Slot) - CS1		28.2	28.3	28.2	22.2	22.3	22.2
GPRS (GMSK, 3 Tx Slot) - CS1		27.2	27.2	27.2	22.9	22.9	22.9
GPRS (GMSK, 4 Tx Slot) - CS1		26.2	26.2	26.2	23.2	23.2	23.2
EDGE (GMSK, 1 Tx Slot) - MCS1		30.1	30.0	30.1	21.1	21.0	21.1
EDGE (GMSK, 2 Tx Slot) - MCS1		28.2	28.3	28.2	22.2	22.3	22.2
EDGE (GMSK, 3 Tx Slot) - MCS1		27.2	27.2	27.2	22.9	22.9	22.9
EDGE (GMSK, 4 Tx Slot) - MCS1		26.2	26.2	26.2	23.2	23.2	23.2
EDGE (8PSK, 1 Tx Slot) - MCS9		25.9	25.9	25.9	16.9	16.9	16.9
EDGE (8PSK, 2 Tx Slot) - MCS9		24.0	24.0	24.0	18.0	18.0	18.0
EDGE (8PSK, 3 Tx Slot) - MCS9		22.9	22.9	22.9	18.6	18.6	18.6
EDGE (8PSK, 4 Tx Slot) - MCS9		22.0	22.0	22.0	19.0	19.0	19.0
DTM 5 (2Tx Slot)	GSM (GMSK, 1Tx Slot)	28.2	28.2	28.3	22.2	22.2	22.3
	GPRS (GMSK, 1 Tx Slot) - CS1	28.2	28.2	28.3	22.2	22.2	22.3
DTM 9 (2Tx Slot)	GSM (GMSK, 1Tx Slot)	28.2	28.2	28.3	22.2	22.2	22.3
	GPRS (GMSK, 1 Tx Slot) - CS1	28.2	28.2	28.3	22.2	22.2	22.3
DTM 11 (3Tx Slot)	GSM (GMSK, 1Tx Slot)	27.2	27.3	27.2	22.9	23.0	22.9
	GPRS (GMSK, 2 Tx Slot) - CS1	27.2	27.3	27.2	22.9	23.0	22.9
DTM 5 (2Tx Slot)	GSM (GMSK, 1Tx Slot)	28.2	28.2	28.3	22.2	22.2	22.3
	EDGE (GMSK, 1 Tx Slot) - MCS1	28.2	28.2	28.3	22.2	22.2	22.3
DTM 9 (2Tx Slot)	GSM (GMSK, 1Tx Slot)	28.2	28.2	28.3	22.2	22.2	22.3
	EDGE (GMSK, 1 Tx Slot) - MCS1	28.2	28.2	28.3	22.2	22.2	22.3
DTM 11 (3Tx Slot)	GSM (GMSK, 1Tx Slot)	27.2	27.3	27.2	22.9	23.0	22.9
	EDGE (GMSK, 2 Tx Slot) - MCS1	27.2	27.3	17.2	22.9	23.0	12.9
DTM 5 (2Tx Slot)	GSM (GMSK, 1Tx Slot)	28.2	28.3	28.2	22.2	22.3	22.2
	EDGE (8PSK, 1 Tx Slot) - MCS9	23.9	23.9	23.9	17.9	17.9	17.9
DTM 9 (2Tx Slot)	GSM (GMSK, 1Tx Slot)	28.2	28.3	28.2	22.2	22.3	22.2
	EDGE (8PSK, 1 Tx Slot) - MCS9	23.9	23.9	23.9	17.9	17.9	17.9
DTM 11 (3Tx Slot)	GSM (GMSK, 1Tx Slot)	27.3	27.3	27.2	23.0	23.0	22.9
	EDGE (8PSK, 2 Tx Slot) - MCS9	22.8	22.8	22.8	18.5	18.5	18.5

Note:

Scale factor for uplink time slot to calculate frame average power:

1. 1 Uplink: time slot ratio = 8:1 => 10*log(8/1) = **9.03 dB**
2. 2 Uplink: time slot ratio = 8:2 => 10*log(8/2) = **6.02 dB**
3. 3 Uplink: time slot ratio = 8:3 => 10*log(8/3) = **4.26 dB**
4. 4 Uplink: time slot ratio = 8:4 => 10*log(8/4) = **3.01 dB**

Conducted Average Power Measurement 2G: PCS1900
Power Back-off Disabled
Conclusions:

1. **Head SAR Testing**; GSM and DTM were the modes used in this configuration for evaluation. DTM Multi-slot class 11 measured highest of the two modes for the Frame Average Power, therefore the EUT was set in this mode for SAR testing.
2. **Hotspot Mode SAR Testing**; GPRS, EDGE and DTM were the modes used in this configuration for evaluation. GPRS 4 Tx slots measured highest of the three modes for the Frame Average Power, therefore the EUT was set in this mode for SAR testing.
3. **Body worn SAR Testing**; GSM and DTM were the modes used in this configuration for evaluation. DTM Multi-slot class 11 measured highest of the three modes for the Frame Average Power, therefore the EUT was set in this mode for SAR testing.

7.2.3.Conducted Average Power Measurement 3G:
Power Back-off Supported & Disabled

Modes		HSDPA				HSUPA					WCDMA
Sets		1	2	3	4	1	2	3	4	5	Voice / RMC 12.2kbps
Band	Channel	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]
1900 (Band 2)	UL: 9262 DL: 9662	23.1	23.1	22.6	22.5	22.5	20.9	22.1	21.4	22.6	23.5
	UL: 9400 DL: 9800	23.1	23.1	22.6	22.5	22.6	21.0	21.8	21.4	22.6	23.5
	UL: 9538 DL: 9938	23.2	23.2	22.6	22.6	22.2	20.6	21.8	21.4	22.6	23.6
1700 (Band 4)	UL: 1312 DL: 1537	23.7	23.7	23.1	23.2	23.3	21.2	22.5	21.9	23.1	23.9
	UL: 1412 DL: 1637	23.6	23.6	23.1	23.2	23.0	21.1	22.5	22.0	23.1	24.1
	UL: 1513 DL: 1738	23.7	23.7	23.1	23.2	22.6	21.2	22.4	21.7	23.2	24.0
Power Back-off Not Supported											
850 (Band 5)	UL: 4132 DL: 4357	23.7	23.7	23.2	23.2	22.6	21.3	22.3	22.1	23.2	24.1
	UL: 4183 DL: 4408	23.7	23.7	23.2	23.3	23.2	21.2	22.4	22.2	23.3	24.1
	UL: 4233 DL: 4458	23.7	23.8	23.2	23.3	23.0	21.2	22.4	22.1	23.2	24.0
ßc		2	12	15	15	11	6	15	2	15	
ßd		15	15	8	4	15	15	9	15	15	
ΔACK, ΔNACK, ΔCQI		8	8	8	8	8	8	8	8	8	
AGV		-	-	-	-	20	12	15	17	21	

Power Back-off Supported & Disabled

Modes		DC HSDPA (Cat 24)				WCDMA
Sets		1	2	3	4	Voice / RMC 12.2kbps
Band	Channel	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]
1900 (Band 2)	UL: 9262 DL: 9662	22.1	22.3	22.3	22.4	23.5
	UL: 9400 DL: 9800	22.5	21.7	22.3	21.7	23.5
	UL: 9538 DL: 9938	22.4	22.2	22.2	22.3	23.6
1700 (Band 4)	UL: 1312 DL: 1537	22.8	22.8	22.6	22.9	23.9
	UL: 1412 DL: 1637	22.5	22.9	22.7	22.9	24.1
	UL: 1513 DL: 1738	22.5	22.7	22.6	22.8	24.0
Power Back-off Not Supported						
850 (Band 5)	UL: 4132 DL: 4357	22.2	22.6	22.7	22.7	24.1
	UL: 4183 DL: 4408	22.4	22.4	22.6	22.6	24.1
	UL: 4233 DL: 4458	22.4	22.4	22.6	22.7	24.0
ßc		2	12	15	15	
ßd		15	15	8	4	
ΔACK, ΔNACK, ΔCQI		8	8	8	8	
AGV		-	-	-	-	

Conducted Average Power Measurement 3G: (Continued)
Power Back-off Supported & Enabled

Modes		HSDPA				HSUPA					WCDMA
Sets		1	2	3	4	1	2	3	4	5	Voice / RMC 12.2kbps
Band	Channel	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]
1900 (Band 2)	UL: 9262 DL: 9662	22.7	22.7	22.4	22.3	22.1	20.3	21.9	21.1	21.5	23.0
	UL: 9400 DL: 9800	22.7	22.7	22.3	22.4	22.2	20.6	21.3	21.2	21.9	22.9
	UL: 9538 DL: 9938	22.8	22.7	22.4	22.4	22.1	20.4	21.8	21.2	22.1	23.0
1700 (Band 4)	UL: 1312 DL: 1537	22.8	22.8	22.4	22.4	22.1	20.3	21.8	21.4	22.0	23.1
	UL: 1412 DL: 1637	22.7	22.7	22.3	22.2	22.1	20.1	21.4	20.9	22.7	23.0
	UL: 1513 DL: 1738	22.8	22.7	22.3	22.3	22.4	20.3	21.6	21.0	22.4	23.1
ßc		2	12	15	15	11	6	15	2	15	
ßd		15	15	8	4	15	15	9	15	15	
ΔACK, ΔNACK, ΔCQI		8	8	8	8	8	8	8	8	8	
AGV		-	-	-	-	20	12	15	17	21	

Power Back-off Supported & Enabled

Modes		DC HSDPA (Cat 24)				WCDMA
Sets		1	2	3	4	Voice / RMC 12.2kbps
Band	Channel	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]
1900 (Band 2)	UL: 9262 DL: 9662	21.7	21.7	21.9	21.9	23.0
	UL: 9400 DL: 9800	21.5	21.5	21.4	21.5	22.9
	UL: 9538 DL: 9938	21.9	21.7	21.9	21.8	23.0
1700 (Band 4)	UL: 1312 DL: 1537	21.8	21.9	21.9	21.8	23.1
	UL: 1412 DL: 1637	21.8	22.0	21.9	21.9	23.0
	UL: 1513 DL: 1738	21.9	21.9	21.9	21.9	23.1
ßc		2	12	15	15	
ßd		15	15	8	4	
ΔACK, ΔNACK, ΔCQI		8	8	8	8	
AGV		-	-	-	-	

The module power levels were measured in both HSPA and 3G RMC 12.2kbps modes and compared to ensure the correct mode of operation had been established.

The following tables taken from FCC 3G SAR procedures (KDB 941225 D01 SAR test for 3G devices v02) below were applied using an Agilent 8960 series 10 wireless communications test set which supports 3G / HSDPA release 5 / HSUPA release 6.

Sub-test Setup for Release 5 HSDPA

Sub-test	β_c	β_d	B_d *(SF)*	β_c/β_d	β_{hs} (1)	SM (dB) (2)
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15 (3)	15/15 (3)	64	12/15 (3)	24/15	1.0
3	15/15	8/15	64	15/8	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5

Note 1: Δ_{ACK}, Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$

Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $B_{hs}/\beta_c = 24/15$

Note 3: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 11/15$ and $\beta_d = 15/15$

Sub-test Setup for Release 6 HSUPA

Sub-test	β_c	β_d	B_d *(SF)*	β_c/β_d	β_{hs} (1)	B_{oc}	B_{od}	B_{od} *(SF)*	B_{od} *(codes)*	CM (2) (dB)	MPR (dB)	AG (4) Index	E-TFCI
1	11/15 (3)	15/15 (3)	64	11/15 (3)	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	31/15	B_{al1}: 47/15 B_{al2}: 47/15	4	1	2.0	1.0	15	92
4	2/15	15/15	64	2/15	2/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (4)	15/15 (4)	64	15/15 (4)	24/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$

Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $B_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH AND E-DPCCH for the Power Back-off is based on the relative CM difference.

Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$.

Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 14/15$ and $\beta_d = 15/15$.

Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Tavle 5.1g.

Note 6: B_{od} can not be set directly; it is set by Absolute Grant Value.

7.2.4.Conducted Power Measurements Wi-Fi802.11b/g/n

802.11b/g

Power Back-off Not Supported

Channel Number	Frequency (MHZ)	Tx Power (dBm) 802.11b (1Mbps)	Tx Power (dBm) 802.11b (11Mbps)	Note
1	2412.0	15.2	15.3	2.4 GHz
6	2437.0	16.0	15.9	
11	2462.0	14.8	14.8	
Channel Number	**Frequency (MHZ)**	**Tx Power (dBm) 802.11g (6Mbps)**	**TX Power (dBm) 802.11g (54Mbps**	**Note**
1	2412.0	13.6	12.0	2.4 GHz
6	2437.0	15.0	13.3	
11	2462.0	13.2	11.5	

802.11n

Channel Number	Frequency (MHZ)	Tx Power (dBm) 802.11n (MCS0 6.5Mbps)	Tx Power (dBm) 802.11n (MCS7 65Mbps)	Note
1	2412.0	13.5	11.1	2.4 GHz
6	2437.0	14.7	12.5	
11	2462.0	12.8	10.0	

7.2.5.Conducted Power Measurements Wi-Fi802.11a/n (5.0 GHz)
802.11a (5.0 GHz)
Power Back-off Not Supported

Channel Number	Frequency (MHZ)	TX Power (dBm) 6 Mbps	TX Power (dBm) 54 Mbps	Note
36*	**5180.0**	11.8	9.2	**5.2 GHz**
40	5200.0	11.6	9.6	
44	5220.0	11.8	9.6	
48*	**5240.0**	11.9	10.0	
52*	**5260.0**	12.8	10.3	**5.3 GHz**
56	5280.0	11.4	8.9	
60	5300.0	11.4	9.4	
64*	**5320.0**	11.3	9.5	
100	5500.0	11.2	9.0	**5.6 GHz**
104*	**5520.0**	11.3	8.9	
108	5540.0	11.3	8.9	
112	5560.0	11.3	8.9	
116*	**5580.0**	11.7	9.3	
132	5660.0	11.4	8.7	
136*	**5680.0**	11.9	9.0	
140	5700.0	11.4	8.5	
149*	**5745.0**	11.9	8.9	**5.8 GHz**
153	5765.0	11.9	9.0	
157*	**5785.0**	12.0	9.0	
161	5805.0	11.6	8.5	
165*	**5825.0**	11.6	8.5	

*** Default test Channels**

802.11n (5.0 GHz) (HT20)
Power Back-off Not Supported

Channel Number	Frequency (MHZ)	TX Power (dBm) 6.5 Mbps	TX Power (dBm) 65 Mbps	Note
36*	**5180.0**	11.3	8.1	**5.2 GHz**
40	5200.0	11.2	9.0	
44	5220.0	11.4	9.0	
48*	**5240.0**	11.5	8.9	
52*	**5260.0**	12.8	9.9	**5.3 GHz**
56	5280.0	11.4	8.4	
60	5300.0	11.4	8.4	
64*	**5320.0**	11.5	8.9	
100	5500.0	10.8	8.5	**5.6 GHz**
104*	**5520.0**	10.8	8.0	
108	5540.0	10.7	8.1	
112	5560.0	10.7	8.5	
116*	**5580.0**	11.3	8.4	
132	5660.0	11.1	8.3	
136*	**5680.0**	11.5	8.3	
140	5700.0	11.5	8.6	
149*	**5745.0**	12.0	8.6	**5.8 GHz**
153	5765.0	12.0	8.7	
157*	**5785.0**	11.6	8.8	
161	5805.0	11.5	8.7	
165*	**5825.0**	11.1	7.8	

*** Default test Channels**

802.11n (5.0 GHz) (HT40)
Power Back-off Not Supported

Channel Number	Frequency (MHZ)	TX Power (dBm) 13.5 Mbps	TX Power (dBm) 135 Mbps	Note
38	5190.0	10.2	9.2	5.2 GHz
46	5230.0	10.0	9.4	
54	5270.0	9.9	9.5	5.3 GHz
62	5310.0	8.8	8.5	
102	5510.0	9.3	9.0	5.6 GHz
110	5550.0	9.8	9.2	
134	5670.0	10.0	8.9	
151	5755.0	9.0	9.2	5.8 GHz
159	5795.0	9.2	8.9	

802.11 ac (5.0 GHz) (20 MHz)
Power Back-off Not Supported

Channel Number	Frequency (MHZ)	TX Power (dBm) 6.5 Mbps	TX Power (dBm) 65 Mbps	Note
36*	**5180.0**	11.1	9.1	5.2 GHz
40	5200.0	10.6	8.5	
44	5220.0	10.5	8.4	
48*	**5240.0**	10.5	8.8	
52*	**5260.0**	11.4	8.7	5.3 GHz
56	5280.0	10.9	7.7	
60	5300.0	10.9	7.6	
64*	**5320.0**	11.0	8.4	
100	5500.0	10.9	8.4	5.6 GHz
104*	**5520.0**	11.3	8.2	
108	5540.0	10.9	8.2	
112	5560.0	10.4	7.2	
116*	**5580.0**	10.8	7.6	
132	5660.0	10.8	7.5	
136*	**5680.0**	10.7	7.5	
140	5700.0	10.6	7.8	
149*	**5745.0**	11.0	7.8	5.8 GHz
153	5765.0	11.6	8.8	
157*	**5785.0**	11.6	8.8	
161	5805.0	11.6	8.8	
165*	**5825.0**	9.6	6.9	

*** Default test Channels**

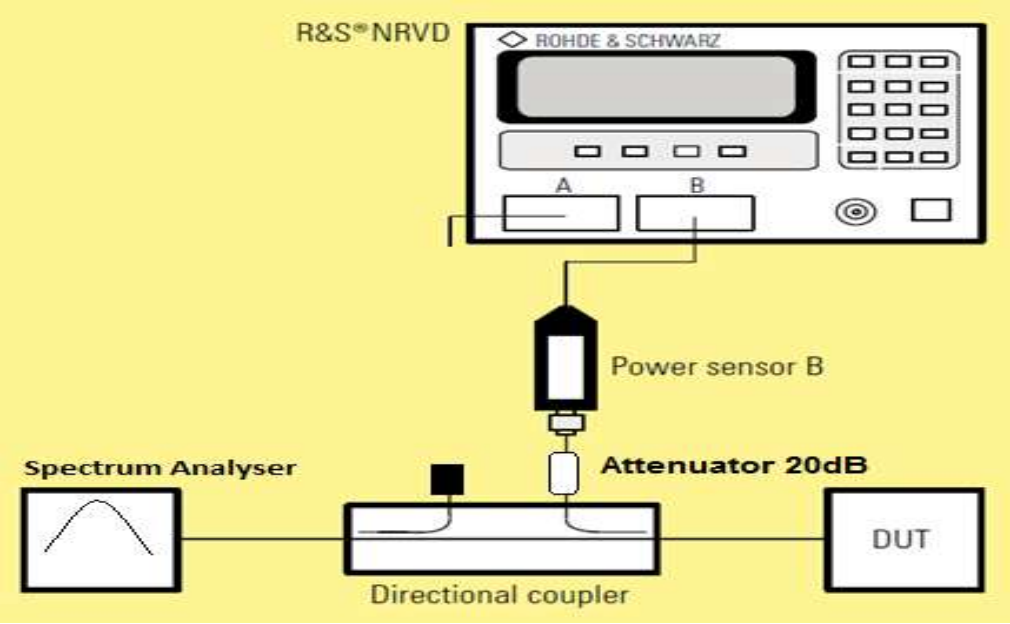
802.11ac (5.0 GHz) (40 MHz)
Power Back-off Not Supported

Channel Number	Frequency (MHZ)	TX Power (dBm) 13.5 Mbps	TX Power (dBm) 135 Mbps	Note
38	5190.0	10.0	8.1	5.2 GHz
46	5230.0	10.0	8.5	
54	5270.0	9.4	8.5	5.3 GHz
62	5310.0	8.4	7.5	
102	5510.0	9.4	8.9	5.6 GHz
110	5550.0	9.4	8.1	
134	5670.0	9.4	8.4	
151	5755.0	10.1	8.6	5.8 GHz
159	5795.0	10.1	8.8	

802.11ac (5.0 GHz) (80 MHz)
Power Back-off Not Supported

Channel Number	Frequency (MHZ)	TX Power (dBm) 13.5 Mbps	TX Power (dBm) 135 Mbps	Note
42	5210	10.2	9.4	5.2 GHz
58	5290	10.3	9.8	5.3 GHz
106	5530	9.7	9.7	5.6 GHz
155	5775	9.8	9.4	5.8 GHz

Test setup for power measurements



7.3. Test Results

For All SAR measurement in this report the SAR limit tested to is 1.6 W/Kg

7.3.1.Specific Absorption Rate - GSM 850 Head Configuration 1g

Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.703
Maximum Reported Level (W/kg):	0.789
Environmental Conditions:	
Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	22.2 to 22.2

Results:

Scan No.	EUT Position	Channel Number	Meas. Avg Power (dBm)	Max Rated Power (dBm)	Meas. Level (W/kg)	Reported SAR (W/kg)	Note(s)	Mod.
1	Touch Left	190	25.9	26.3	0.551	0.604	1	GMSK
2	Tilt Left	190	25.9	26.3	0.345	0.378	1	GMSK
3	Touch Right	190	25.9	26.3	0.643	0.705	1	GMSK
4	Tilt Right	190	25.9	26.3	0.365	0.400	1	GMSK
5	Touch Right	128	25.9	26.3	0.616	0.675	1	GMSK
6	Touch Right	251	25.8	26.3	0.703	**0.789**	1	GMSK

Note(s):

1. DTM Multi-slot Class 11 - Tested using 3 Uplink time slots (with 2 time slots set as CS1 for GPRS and 1 time slot set for voice).

7.3.2.Specific Absorption Rate - GPRS 850 Hotspot Mode Configuration 1g
Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.932
Maximum Reported Level (W/kg):	0.999

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	22.5 to 22.5

Results:

Scan No.	EUT Position	Channel Number	Meas. Avg Power (dBm)	Max Rated Power (dBm)	Meas. Level (W/kg)	Reported SAR (W/kg)	Note(s)	Mod.
7	Front	190	26.3	26.6	0.913	0.978	1, 2	GMSK
8	Front	128	26.4	26.6	0.902	0.945	1, 2	GMSK
9	Front	251	26.3	26.6	0.932	**0.999**	1, 2, 3	GMSK
10	Back	190	26.3	26.6	0.867	0.929	1, 2	GMSK
11	Back	128	26.4	26.6	0.887	0.929	1, 2	GMSK
12	Back	251	26.3	26.6	0.932	**0.999**	1, 2	GMSK
13	Left Hand Side	190	26.3	26.6	0.286	0.306	1, 2	GMSK
14	Right Hand Side	190	26.3	26.6	0.202	0.216	1, 2	GMSK
15	Bottom	190	26.3	26.6	0.031	0.033	1, 2	GMSK

Note(s):

1. Data - SAR measurements were performed using 4 uplink timeslots
2. SAR measurements were performed with the closest edge of the EUT at a separation distance of 10mm from the 'SAM' phantom flat section.
3. As per 865664 D01, the highest SAR measured > 0.8 W/kg has been re-measured and included in the report in section 2.3 under ***SAR Measurement Variability and Measurement Uncertainty Analysis Results*** Table.

*KDB 941225 D03 - SAR is not required for EDGE and DTM technology when the maximum average output power is lower than that measured on the corresponding GPRS channels.

7.3.3.Specific Absorption Rate - GSM 850 Body-Worn Configuration 1g
Power Back-off Not Supported
Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.723
Maximum Reported Level (W/kg):	0.811

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	22.5 to 22.5

Results:

Scan No.	EUT Position	Channel Number	Meas. Avg Power (dBm)	Max Rated Power (dBm)	Meas. Level (W/kg)	Reported SAR (W/kg)	Note(s)	Mod.
16	Front	251	25.8	26.3	0.720	0.808	1, 2, 3	GMSK
17	Back	251	25.8	26.3	0.723	**0.811**	1, 2, 3	GMSK

Note(s):

1. DTM Multi-slot Class 11 - Tested using 3 Uplink time slots (with 2 time slots set as CS1 for GPRS and 1 time slot set for voice).
2. Worst case channel from hotspot mode configuration is used for body-worn configuration.
3. SAR measurements were performed with the closest edge of the EUT at a separation distance of 15mm from the 'SAM' phantom flat section.

7.3.4.Specific Absorption Rate - PCS 1900 Head Configuration 1g
Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.544
Maximum Reported Level (W/kg):	0.583

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	23.5 to 23.5

Results:

Scan No.	EUT Position	Channel Number	Meas. Avg Power (dBm)	Max Rated Power (dBm)	Meas. Level (W/kg)	Reported SAR (W/kg)	Note(s)	Mod.
18	Touch Left	661	23.0	23.2	0.516	0.540	1	QPSK
19	Tilt Left	661	23.0	23.2	0.129	0.135	1	QPSK
20	Touch Right	661	23.0	23.2	0.336	0.352	1	QPSK
21	Tilt Right	661	23.0	23.2	0.143	0.150	1	QPSK
22	Touch Left	512	22.9	23.2	0.452	0.484	1	QPSK
23	Touch Left	810	22.9	23.2	0.544	**0.583**	1	QPSK

Note(s):

1. DTM Multi-slot Class 11 - Tested using 3 Uplink time slots (with 2 time slots set as CS1 for GPRS and 1 time slot set for voice).

7.3.5.Specific Absorption Rate - GPRS 1900 Hotspot Mode Configuration 1g
Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.876
Maximum Reported Level (W/kg):	0.939

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	23.5 to 23.5

Results:

Scan No.	EUT Position	Channel Number	Meas. Avg Power (dBm)	Max Rated Power (dBm)	Meas. Level (W/kg)	Reported SAR (W/kg)	Note(s)	Mod.
24	Front	661	23.2	23.5	0.680	0.729	1, 2	QPSK
25	Back	661	23.2	23.5	0.808	0.866	1, 2	QPSK
26	Back	512	23.2	23.5	0.816	0.874	1, 2	QPSK
27	Back	810	23.2	23.5	0.876	0.939	1, 2 , 3	QPSK
28	Left Hand Side	661	23.2	23.5	0.165	0.177	1, 2	QPSK
29	Right Hand Side	661	23.2	23.5	0.089	0.095	1, 2	QPSK
30	Bottom	661	23.2	23.5	0.173	0.185	1, 2	QPSK

Note(s):

1. Data - SAR measurements were performed using 4 uplink timeslots
2. SAR measurements were performed with the closest edge of the EUT at a separation distance of 10mm from the 'SAM' phantom flat section.
3. As per 865664 D01, the highest SAR measured > 0.8 W/kg has been re-measured and included in the report in section 2.3 under ***SAR Measurement Variability and Measurement Uncertainty Analysis Results*** Table.

*KDB 941225 D03 - SAR is not required for EDGE and DTM technology when the maximum average output power is lower than that measured on the corresponding GPRS channels.

7.3.6.Specific Absorption Rate - PCS 1900 Body-Worn Configuration 1g
Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.444
Maximum Reported Level (W/kg):	0.476

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	23.5 to 23.5

Results:

Scan No.	EUT Position	Channel Number	Meas. Avg Power (dBm)	Max Rated Power (dBm)	Meas. Level (W/kg)	Reported SAR (W/kg)	Note(s)	Mod.
31	Front	810	22.9	23.2	0.415	0.445	1, 2, 3	QPSK
32	Back	810	22.9	23.2	0.444	0.476	1, 2, 3	QPSK

Note(s):

1. DTM Multi-slot Class 11 - Tested using 3 Uplink time slots (with 2 time slots set as CS1 for GPRS and 1 time slot set for voice).
2. SAR measurements were performed with the closest edge of the EUT at a separation distance of 15mm from the 'SAM' phantom flat section.
3. Worst case channel from hotspot mode configuration is used for body-worn configuration.

7.3.7.Specific Absorption Rate - UMTS-FDD 2 Head Configuration 1g
Power Back-off Supported & Disabled
Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.754
Maximum Reported Level (W/kg):	0.846

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	23.0 to 23.0

Results:

Scan No.	EUT Position	Channel Number	Meas. Avg Power (dBm)	Max Rated Power (dBm)	Meas. Level (W/kg)	Reported SAR (W/kg)	Note(s)	Mod.
33	Touch Left	9400	23.5	24.0	0.754	**0.846**	1	QPSK
34	Tilt Left	9400	23.5	24.0	0.192	0.215	1	QPSK
35	Touch Right	9400	23.5	24.0	0.433	0.486	1	QPSK
36	Tilt Right	9400	23.5	24.0	0.234	0.263	1	QPSK
37	Touch Left	9262	23.5	24.0	0.658	0.738	1	QPSK
38	Touch Left	9538	23.6	24.0	0.689	0.755	1	QPSK

Note(s):

1. Circuit Switch (CS) - RMC 12.2kbps with Test loop mode 1 and TPC bits configured to All "1's"

7.3.8.Specific Absorption Rate - UMTS-FDD 2 Hotspot Mode Configuration 1g
Power Back-off Supported & Enabled

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	1.000
Maximum Reported Level (W/kg):	1.148

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	23.5 to 23.5

Results:

Scan No.	EUT Position	Channel Number	Meas. Avg Power (dBm)	Max Rated Power (dBm)	Meas. Level (W/kg)	Reported SAR (W/kg)	Note(s)	Mod.
39	Front	9400	22.9	23.5	0.869	0.998	1, 2	QPSK
40	Front	9262	23.0	23.5	0.876	0.983	1, 2	QPSK
41	Front	9538	23.0	23.5	0.842	0.945	1, 2	QPSK
42	Back	9400	22.9	23.5	1.000	**1.148**	1, 2, 3	QPSK
43	Back	9262	23.0	23.5	0.986	1.106	1, 2	QPSK
44	Back	9538	23.0	23.5	0.956	1.073	1, 2	QPSK
45	Left Hand Side	9400	22.9	23.5	0.282	0.324	1, 2	QPSK
46	Right Hand Side	9400	22.9	23.5	0.131	0.150	1, 2	QPSK
47	Bottom	9400	22.9	23.5	0.213	0.245	1, 2	QPSK

Note(s):

1. Circuit Switch (CS) - RMC 12.2kbps with Test loop mode 1 and TPC bits configured to All "1's"
2. SAR measurements were performed with the closest edge of the EUT at a separation distance of 10mm from the 'SAM' phantom flat section.
3. As per 865664 D01, the highest SAR measured > 0.8 W/kg has been re-measured and included in the report in section 2.3 under ***SAR Measurement Variability and Measurement Uncertainty Analysis Results*** Table.

*KDB 941225 D02 - SAR is not required for RMC+HSPA or RMC+DC-HSDPA (HSDPA/HSUPA/DC-HSDPA) channels when the maximum average output power is less than ¼ dB higher than that measured on the corresponding RMC channels and 1g SAR level reported in 'RMC 12.2kbps' is <75% SAR limit.

7.3.9.Specific Absorption Rate - UMTS-FDD 2 Body-Worn Configuration 1g
Power Back-off Supported & Disabled
Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.615
Maximum Reported Level (W/kg):	0.690

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	23.5 to 23.5

Results:

Scan No.	EUT Position	Channel Number	Meas. Avg Power (dBm)	Max Rated Power (dBm)	Meas. Level (W/kg)	Reported SAR (W/kg)	Note(s)	Mod.
48	Front	9400	23.5	24.0	0.546	0.613	1, 2, 3	QPSK
49	Back	9400	23.5	24.0	0.615	0.690	1, 2, 3	QPSK

Note(s):

1. Circuit Switch (CS) - RMC 12.2kbps with Test loop mode 1 and TPC bits configured to All "1's"
2. SAR measurements were performed with the closest edge of the EUT at a separation distance of 15mm from the 'SAM' phantom flat section.
3. Worst case channel from hotspot mode configuration is used for body-worn configuration.

*KDB 941225 D02- SAR is not required for RMC+HSPA or RMC+DC-HSDPA (HSDPA/HSUPA/DC-HSDPA) channels when the maximum average output power is less than ¼ dB higher than that measured on the corresponding RMC channels and 1g SAR level reported in ‘RMC 12.2kbps’ is <75% SAR limit.

7.3.10.Specific Absorption Rate - UMTS-FDD 4 Head Configuration 1g
Power Back-off Supported & Disabled

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.523
Maximum Reported Level (W/kg):	0.587

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	21.1 to 21.1

Results:

Scan No.	EUT Position	Channel Number	Meas. Avg Power (dBm)	Max Rated Power (dBm)	Meas. Level (W/kg)	Reported SAR (W/kg)	Note(s)	Mod.
50	Touch Left	1412	24.1	24.5	0.493	0.541	1	QPSK
51	Tilt Left	1412	24.1	24.5	0.154	0.169	1	QPSK
52	Touch Right	1412	24.1	24.5	0.404	0.443	1	QPSK
53	Tilt Right	1412	24.1	24.5	0.244	0.268	1	QPSK
54	Touch Left	1312	23.9	24.5	0.402	0.462	1	QPSK
55	Touch Left	1513	24.0	24.5	0.523	**0.587**	1	QPSK

Note(s):

1. Circuit Switch (CS) - RMC 12.2kbps with Test loop mode 1 and TPC bits configured to All "1's"

7.3.11.Specific Absorption Rate - UMTS-FDD 4 Hotspot Mode Configuration 1g Power Back-off Supported & Enabled

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.984
Maximum Reported Level (W/kg):	1.079

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	23.0 to 23.0

Results:

Scan No.	EUT Position	Channel Number	Meas. Avg Power (dBm)	Max Rated Power (dBm)	Meas. Level (W/kg)	Reported SAR (W/kg)	Note(s)	Mod.
56	Front	1412	23.0	23.5	0.952	1.068	1, 2	QPSK
57	Front	1312	23.1	23.5	0.853	0.935	1, 2	QPSK
58	Front	1513	23.1	23.5	0.950	1.042	1, 2	QPSK
59	Back	1412	23.0	23.5	0.929	1.042	1, 2	QPSK
60	Back	1312	23.1	23.5	0.810	0.888	1, 2	QPSK
61	Back	1513	23.1	23.5	0.984	1.079	1, 2, 3	QPSK
62	Left Hand Side	1412	23.0	23.5	0.203	0.228	1, 2	QPSK
63	Right Hand Side	1412	23.0	23.5	0.133	0.149	1, 2	QPSK
64	Bottom	1412	23.0	23.5	0.209	0.235	1, 2	QPSK

Note(s):

1. Circuit Switch (CS) - RMC 12.2kbps with Test loop mode 1 and TPC bits configured to All "1's"
2. SAR measurements were performed with the closest edge of the EUT at a separation distance of 10mm from the 'SAM' phantom flat section.
3. As per 865664 D01, the highest SAR measured > 0.8 W/kg has been re-measured and included in the report in section 2.3 under ***SAR Measurement Variability and Measurement Uncertainty Analysis Results*** Table.

*KDB 941225 D02 - SAR is not required for RMC+HSPA or RMC+DC-HSDPA (HSDPA/HSUPA/DC-HSDPA) channels when the maximum average output power is less than ¼ dB higher than that measured on the corresponding RMC channels and 1g SAR level reported in 'RMC 12.2kbps' is <75% SAR limit.

7.3.12.Specific Absorption Rate - UMTS-FDD 4 Body-Worn Configuration 1g
Power Back-off Supported & Disabled
Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.755
Maximum Reported Level (W/kg):	0.847

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	23.0 to 23.0

Results:

Scan No.	EUT Position	Channel Number	Meas. Avg Power (dBm)	Max Rated Power (dBm)	Meas. Level (W/kg)	Reported SAR (W/kg)	Note(s)	Mod.
65	Front	1513	24.0	24.5	0.755	0.847	1, 2, 3	QPSK
66	Back	1513	24.0	24.5	0.729	0.818	1, 2, 3	QPSK

Note(s):

1. Circuit Switch (CS) - RMC 12.2kbps with Test loop mode 1 and TPC bits configured to All "1's"
2. SAR measurements were performed with the closest edge of the EUT at a separation distance of 15mm from the 'SAM' phantom flat section.
3. Worst case channel from hotspot mode configuration is used for body-worn configuration.

*KDB 941225 D02 - SAR is not required for RMC+HSPA or RMC+DC-HSDPA (HSDPA/HSUPA/DC-HSDPA) channels when the maximum average output power is less than ¼ dB higher than that measured on the corresponding RMC channels and 1g SAR level reported in 'RMC 12.2kbps' is <75% SAR limit.

7.3.13.Specific Absorption Rate - UMTS-FDD 5 Head Configuration 1g
Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.554
Maximum Reported Level (W/kg):	0.607

Environmental Conditions:

Temperature Variation in Lab (°C):	23.6 to 23.6
Temperature Variation in Liquid (°C):	21.9 to 21.9

Results:

Scan No.	EUT Position	Channel Number	Meas. Avg Power (dBm)	Max Rated Power (dBm)	Meas. Level (W/kg)	Reported SAR (W/kg)	Note(s)	Mod.
67	Touch Left	4183	24.1	24.5	0.478	0.524	1	QPSK
68	Tilt Left	4183	24.1	24.5	0.302	0.331	1	QPSK
69	Touch Right	4183	24.1	24.5	0.554	**0.607**	1	QPSK
70	Tilt Right	4183	24.1	24.5	0.307	0.337	1	QPSK
71	Touch Right	4132	24.1	24.5	0.505	0.554	1	QPSK
72	Touch Right	4233	24.0	24.5	0.538	0.604	1	QPSK

Note(s):

1. Circuit Switch (CS) - RMC 12.2kbps with Test loop mode 1 and TPC bits configured to All "1's"

7.3.14.Specific Absorption Rate - UMTS-FDD 5 Hotspot Mode Configuration 1g
Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.816
Maximum Reported Level (W/kg):	0.895

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	22.9 to 22.9

Results:

Scan No.	EUT Position	Channel Number	Meas. Avg Power (dBm)	Max Rated Power (dBm)	Meas. Level (W/kg)	Reported SAR (W/kg)	Note(s)	Mod.
73	Front	4183	24.1	24.5	0.707	0.775	1, 2	QPSK
74	Back	4183	24.1	24.5	0.816	**0.895**	1, 2, 3	QPSK
75	Back	4132	24.1	24.5	0.763	0.837	1, 2	QPSK
76	Back	4233	24.0	24.5	0.763	0.856	1, 2	QPSK
77	Left Hand Side	4183	24.1	24.5	0.285	0.312	1, 2	QPSK
78	Right Hand Side	4183	24.1	24.5	0.181	0.198	1, 2	QPSK
79	Bottom	4183	24.1	24.5	0.031	0.034	1, 2	QPSK

Note(s):

1. Circuit Switch (CS) - RMC 12.2kbps with Test loop mode 1 and TPC bits configured to All "1's"
2. EUT supports Hotspot: As per FCC KDB procedure SAR measurements were performed with the EUT at a separation distance of 10mm from the 'SAM' phantom flat section.
3. As per 865664 D01, the highest SAR measured > 0.8 W/kg has been re-measured and included in the report in section 2.3 under ***SAR Measurement Variability and Measurement Uncertainty Analysis Results*** Table.

*KDB 941225 D02 - SAR is not required for RMC+HSPA or RMC+DC-HSDPA (HSDPA/HSUPA/DC-HSDPA) channels when the maximum average output power is less than ¼ dB higher than that measured on the corresponding RMC channels and 1g SAR level reported in 'RMC 12.2kbps' is <75% SAR limit.

7.3.15.Specific Absorption Rate - UMTS-FDD 5 Body-Worn Configuration 1g
Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.565
Maximum Reported Level (W/kg):	0.620

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	22.9 to 22.9

Results:

Scan No.	EUT Position	Channel Number	Meas. Avg Power (dBm)	Max Rated Power (dBm)	Meas. Level (W/kg)	Reported SAR (W/kg)	Note(s)	Mod.
80	Front	4183	24.1	24.5	0.565	**0.620**	1, 2, 3	QPSK
81	Back	4183	24.1	24.5	0.563	0.617	1, 2, 3	QPSK

Note(s):

1. Circuit Switch (CS) - RMC 12.2kbps with Test loop mode 1 and TPC bits configured to All "1's"
2. SAR measurements were performed with the closest edge of the EUT at a separation distance of 15mm from the 'SAM' phantom flat section.
3. Worst case channel from hotspot mode configuration is used for body-worn configuration.

*KDB 941225 D02 - SAR is not required for RMC+HSPA or RMC+DC-HSDPA (HSDPA/HSUPA/DC-HSDPA) channels when the maximum average output power is less than ¼ dB higher than that measured on the corresponding RMC channels and 1g SAR level reported in ‘RMC 12.2kbps’ is <75% SAR limit.

7.3.16.Specific Absorption Rate - Wi-Fi 2450 Head Configuration 1g
Power Back-off Not Supported
Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.052
Maximum Reported Level (W/kg):	0.053

Environmental Conditions:

Temperature Variation in Lab (°C):	23.0 to 23.0
Temperature Variation in Liquid (°C):	23.7 to 23.7

Results:

Scan No.	EUT Position	Channel Number	Meas. Avg Power (dBm)	Max Rated Power (dBm)	Meas. Level (W/kg)	Reported SAR (W/kg)	Note(s)	Mod.
82	Touch Left	6	16.0	16.1	0.052	**0.053**	1	DBPSK
83	Tilt Left	6	16.0	16.1	0.015	0.016	1	DBPSK
84	Touch Right	6	16.0	16.1	0.044	0.045	1	DBPSK
85	Tilt Right	6	16.0	16.1	0.013	0.013	1	DBPSK
86	Touch Left	1	15.2	15.3	0.035	0.036	1	DBPSK
87	Touch Left	11	14.8	14.8	0.024	0.024	1	DBPSK

Note(s):

1. WLAN 802.11b 11Mbps

*KDB 248227 - SAR is not required for 802.11g/n channels when the maximum average output power is equal to that measured on the corresponding 802.11b channels.

7.3.17.Specific Absorption Rate - Wi-Fi 2450 Hotspot Mode Configuration 1g
Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.082
Maximum Reported Level (W/kg):	0.084

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	23.5 to 23.5

Results:

Scan No.	EUT Position	Channel Number	Meas. Avg Power (dBm)	Max Rated Power (dBm)	Meas. Level (W/kg)	Reported SAR (W/kg)	Note(s)	Mod.
88	Front	6	16.0	16.1	0.025	0.026	1, 2	DBPSK
89	Back	6	16.0	16.1	0.082	**0.084**	1, 2	DBPSK
90	Left Hand Side	6	16.0	16.1	0.010	0.010	1, 2	DBPSK
91	Bottom	6	16.0	16.1	0.028	0.028	1, 2	DBPSK
92	Back	1	15.2	15.3	0.056	0.058	1, 2	DBPSK
93	Back	11	14.8	14.8	0.025	0.025	1, 2	DBPSK

Note(s):

1. WLAN 802.11b 1Mbps
2. SAR measurements were performed with the closest edge of the EUT at a separation distance of 10mm from the 'SAM' phantom flat section.

*KDB 248227 - SAR is not required for 802.11g/n channels when the maximum average output power is equal to that measured on the corresponding 802.11b channels.

7.3.18.Specific Absorption Rate - Wi-Fi 2450 Body-Worn Configuration 1g
Power Back-off Not Supported
Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.063
Maximum Reported Level (W/kg):	0.065

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	23.5 to 23.5

Results:

Scan No.	EUT Position	Channel Number	Meas. Avg Power (dBm)	Max Rated Power (dBm)	Meas. Level (W/kg)	Reported SAR (W/kg)	Note(s)	Mod.
94	Front	6	16.0	16.1	0.037	0.038	1, 2, 3	DBPSK
95	Back	6	16.0	16.1	0.063	**0.065**	1, 2, 3	DBPSK

Note(s):

1. WLAN 802.11b 1Mbps
2. SAR measurements were performed with the closest edge of the EUT at a separation distance of 15mm from the 'SAM' phantom flat section.
3. Worst case channel from hotspot mode configuration is used for body-worn configuration.

*KDB 248227 - SAR is not required for 802.11g/n channels when the maximum average output power is equal to that measured on the corresponding 802.11b channels.

7.3.19.Specific Absorption Rate - Wi-Fi 5 GHz Head Configuration 1g
Power Back-off Not Supported
Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.009
Maximum Reported Level (W/kg):	0.010

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	23.5 to 23.5

Results:

Scan No.	EUT Position	Channel Number	Meas. Avg Power (dBm)	Max Rated Power (dBm)	Meas. Level (W/kg)	Reported SAR (W/kg)	Note(s)	Mod.
802.11a								
96	Touch Left	48	11.9	12.6	0.006	0.007	1, 4, 5	BPSK
97	Tilt Left	48	11.9	12.6	0.008	**0.010**	1, 4, 5	BPSK
98	Touch Right	48	11.9	12.6	0.008	**0.010**	1, 4, 5	BPSK
99	Tilt Right	48	11.9	12.6	0.009	**0.010**	1, 4, 5	BPSK
100	Touch Right	52	12.8	13.6	0.006	0.007	1, 4, 5	BPSK
-	Touch Right	136	11.9	12.3	0.000	0.000	1, 4, 6	BPSK
101	Touch Right	157	12.0	12.3	0.007	0.008	1, 4, 5	BPSK

Specific Absorption Rate - Wi-Fi 5GHz Head Configuration 1g (Continued)
Power Back-off Not Supported
Test Summary:

Scan No.	EUT Position	Channel Number	Meas. Avg Power (dBm)	Max Rated Power (dBm)	Meas. Level (W/kg)	Reported SAR (W/kg)	Note(s)	Mod.
802.11ac HT40								
-	Touch Right	46	10.0	11.0	0.000	0.000	2, 4, 5	BPSK
-	Touch Right	54	9.4	11.0	0.000	0.000	2, 4, 5	BPSK
-	Touch Right	134	9.4	10.8	0.000	0.000	2, 4, 6	BPSK
-	Touch Right	159	10.1	10.8	0.000	0.000	2, 4, 5	BPSK
802.11ac HT80								
-	Touch Right	42	10.2	10.5	0.000	0.000	3, 4, 5	BPSK
-	Touch Right	58	10.3	10.5	0.000	0.000	3, 4, 5	BPSK
-	Touch Right	106	9.7	10.5	0.000	0.000	3, 4, 6	BPSK
-	Touch Right	155	9.8	10.5	0.000	0.000	3, 4, 5	BPSK

Note(s):

1. WLAN 802.11a 6Mbps
2. WLAN 802,11ac VHT40 13.5 Mbps
3. WLAN 802.11ac VHT80 13.5 Mbps
4. Value measured was below noise floor
5. For frequency bands with an operating range of ≤ 100 MHz, when the SAR measured for the highest output power channel within is ≤ 0.8 W/kg, SAR for the remaining channels is not required as per KDB 447498 D01, section 4.3.3
6. For frequency bands with an operating range of ≥ 200 MHz, when the SAR for the highest output power channel within is ≤ 0.4 W/kg, SAR for the remaining channels is not required as per KDB 447498 D01, section 4.3.3

*KDB 248227 - SAR is not required for 802.11n HT20 / 802.11ac VHT20 channels as the maximum average output power is less than ¼ dB higher than 802.11a.

*KDB 248227 - SAR is not required for 802.11n HT40 channels as the maximum average output power is less than ¼ dB higher than 802.11ac VHT40.

7.3.20.Specific Absorption Rate - Wi-Fi 5GHz Hotspot Mode Configuration 1g
Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.063
Maximum Reported Level (W/kg):	0.076

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	23.0 to 23.0

Results:

Scan No.	EUT Position	Channel Number	Meas. Avg Power (dBm)	Max Rated Power (dBm)	Meas. Level (W/kg)	Reported SAR (W/kg)	Note(s)	Mod.
802.11a								
102	Front	48	11.9	12.6	0.016	0.019	1, 4, 5, 7	BPSK
103	Back	48	11.9	12.6	0.048	0.056	1, 4, 5, 7	BPSK
104	Left Hand Side	48	11.9	12.6	0.022	0.026	1, 4, 5, 7	BPSK
105	Bottom	48	11.9	12.6	0.010	0.012	1, 4, 5, 7	BPSK
106	Back	52	12.8	13.6	0.063	**0.076**	1, 4, 5, 7	BPSK
107	Back	136	11.9	12.3	0.024	0.026	1, 4, 6, 7	BPSK
108	Back	157	12.0	12.3	0.028	0.030	1, 4, 5, 7	BPSK

Specific Absorption Rate - Wi-Fi 5GHz Hotspot Mode Configuration 1g
Power Back-off Not Supported (Continued)

Scan No.	EUT Position	Channel Number	Meas. Avg Power (dBm)	Max Rated Power (dBm)	Meas. Level (W/kg)	Reported SAR (W/kg)	Note(s)	Mod.
802.11ac VHT40								
109	Back	46	10.0	11.0	0.017	0.021	2, 4, 5, 7	BPSK
110	Back	54	9.4	11.0	0.025	0.036	2, 4, 5, 7	BPSK
111	Back	134	9.3	10.8	0.018	0.026	2, 4, 6, 7	BPSK
112	Back	159	10.1	10.8	0.037	0.043	2, 4, 5, 7	BPSK
802.11ac VHT80								
113	Back	42	10.2	10.5	0.019	0.020	3, 4, 5, 7	BPSK
114	Back	58	10.3	10.5	0.014	0.015	3, 4, 5, 7	BPSK
115	Back	106	9.7	10.5	0.031	0.037	3, 4, 6, 7	BPSK
116	Back	155	9.8	10.5	0.026	0.030	3, 4, 5, 7	BPSK

Note(s):

1. WLAN 802.11a 6Mbps
2. WLAN 802,11ac VHT40 13.5 Mbps
3. WLAN 802.11ac VHT80 13.5 Mbps
4. Value measured was below noise floor
5. For frequency bands with an operating range of ≤ 100 MHz, when the SAR measured for the highest output power channel within is ≤ 0.8 W/kg, SAR for the remaining channels is not required as per KDB 447498 D01, section 4.3.3
6. For frequency bands with an operating range of ≥ 200 MHz, when the SAR for the highest output power channel within is ≤ 0.4 W/kg, SAR for the remaining channels is not required as per KDB 447498 D01, section 4.3.3
7. EUT supports Hotspot: As per FCC KDB procedure SAR measurements were performed with the EUT at a separation distance of 10mm from the 'SAM' phantom flat section.

*KDB 248227 - SAR is not required for 802.11n HT20 / 802.11ac VHT20 channels as the maximum average output power is less than ¼ dB higher than 802.11a.

*KDB 248227 - SAR is not required for 802.11n HT40 channels as the maximum average output power is less than ¼ dB higher than 802.11ac VHT40.

7.3.21.Specific Absorption Rate - Wi-Fi 5GHz Body-Worn Configuration 1g
Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.063
Maximum Reported Level (W/kg):	0.076

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	23.0 to 23.0

Results:

Scan No.	EUT Position	Channel Number	Meas. Avg Power (dBm)	Max Rated Power (dBm)	Meas. Level (W/kg)	Reported SAR (W/kg)	Note(s)	Mod.
102	Front	48	11.9	12.6	0.016	0.019	1, 4, 5, 7	BPSK
103	Back	48	11.9	12.6	0.048	0.056	1, 4, 5, 7	BPSK
106	Back	52	12.8	13.6	0.063	**0.076**	1, 4, 5, 7	BPSK
107	Back	136	11.9	12.3	0.024	0.026	1, 4, 6, 7	BPSK
108	Back	157	12.0	12.3	0.028	0.030	1, 4, 5, 7	BPSK

Specific Absorption Rate - Wi-Fi 5GHz Body-Worn Configuration 1g
Power Back-off Not Supported (Continued)

Scan No.	EUT Position	Channel Number	Meas. Avg Power (dBm)	Max Rated Power (dBm)	Meas. Level (W/kg)	Reported SAR (W/kg)	Note(s)	Mod.
802.11ac VHT40								
109	Back	46	10.0	11.0	0.017	0.021	2, 4, 5, 7	BPSK
110	Back	54	9.4	11.0	0.025	0.036	2, 4, 5, 7	BPSK
111	Back	134	9.3	10.8	0.018	0.026	2, 4, 6, 7	BPSK
112	Back	159	10.1	10.8	0.037	0.043	2, 4, 5, 7	BPSK
802.11ac VHT80								
113	Back	42	10.2	10.5	0.019	0.020	3, 4, 5, 7	BPSK
114	Back	58	10.3	10.5	0.014	0.015	3, 4, 5, 7	BPSK
115	Back	106	9.7	10.5	0.031	0.037	3, 4, 6, 7	BPSK
116	Back	155	9.8	10.5	0.026	0.030	3, 4, 5, 7	BPSK

Note(s):

1. WLAN 802.11a 6Mbps
2. WLAN 802,11ac VHT40 13.5 Mbps
3. WLAN 802.11ac VHT80 13.5 Mbps
4. Value measured was below noise floor
5. For frequency bands with an operating range of ≤ 100 MHz, when the SAR measured for the highest output power channel within is ≤ 0.8 W/kg, SAR for the remaining channels is not required as per KDB 447498 D01, section 4.3.3
6. For frequency bands with an operating range of ≥ 200 MHz, when the SAR for the highest output power channel within is ≤ 0.4 W/kg, SAR for the remaining channels is not required as per KDB 447498 D01, section 4.3.3
7. EUT supports Hotspot: As per FCC KDB procedure SAR measurements were performed with the EUT at a separation distance of 10mm from the 'SAM' phantom flat section.

*The applied FCC body-worn Personal Hotspot orientations where the corresponding edge(s) closest to the user with the most conservative exposure condition were all evaluated at 10 mm from the body. For modes and configuration that overlap with Personal hotspot, SAR evaluation was NOT performed at 15mm separation.

*KDB 248227 - SAR is not required for 802.11n HT20 / 802.11ac VHT20 channels as the maximum average output power is less than ¼ dB higher than 802.11a.

*KDB 248227 - SAR is not required for 802.11n HT40 channels as the maximum average output power is less than ¼ dB higher than 802.11ac VHT40.

8. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently, the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor, such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Test Name	Confidence Level	Calculated Uncertainty
Specific Absorption Rate-GSM 850/ UMTS FDD Head Configuration 1g	95%	±20.08%
Specific Absorption Rate-GSM / GPRS / EDGE 850 / UMTS FDD 5 Body Configurations 1g	95%	±21.09%
Specific Absorption Rate-UMTS FDD 4 Configuration 1g	95%	±21.09%
Specific Absorption Rate-UMTS FDD 4 Body Configuration 1g	95%	±20.59%
Specific Absorption Rate-PCS 1900 / UMTS FDD 2 Head Configuration 1g	95%	±23.70%
Specific Absorption Rate-GSM / GPRS / EDGE 1900 / UMTS FDD 2 Body Configuration 1g	95%	±20.18%
Specific Absorption Rate-Wi-Fi 2450 MHz Head Configuration 1g	95%	±19.79%
Specific Absorption Rate-Wi-Fi 2450 MHz Body Configuration 1g	95%	±19.92%
Specific Absorption Rate-Wi-Fi 5GHz Head Configuration 1g	95%	±20.41%
Specific Absorption Rate-Wi-Fi 5GHz Body Configuration 1g	95%	±20.37%

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty, the published guidance of the appropriate accreditation body is followed.

Note:

1. See Appendix 2 section A.2.3 for table calculations and parameters

Appendix 1. Test Equipment Used

UL No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A034	Narda 20W Termination	Narda	374BNM	8706	Calibrated as part of system	-
A1097	SMA Directional Coupler	MiDISCO	MDC6223-30	None	Calibrated as part of system	-
M1755	DAK Fluid probe	Schmid & Partner Engineering AG	SM DAK 040 CA	1089	Calibrated before use	-
A1328	Handset Positioner	Schmid & Partner Engineering AG	Modification	SD 000 H01 DA	-	-
A1182	Handset Positioner	Schmid & Partner Engineering AG	V3.0	None	-	-
A2109	Data Acquisition Electronics	Schmid & Partner Engineering AG	DAE3	417	17 April 2013	12
A2110	Data Acquisition Electronics	Schmid & Partner Engineering AG	DAE3	431	20 Sept 2012	12
A1234	Data Acquisition Electronics	Schmid & Partner Engineering AG	DAE3	450	22 Jan 2013	12
A2077	Probe	Schmid & Partner Engineering AG	EX3 DV4	3814	24 Sep 2012	12
A1185	Probe	Schmid & Partner Engineering AG	ET3 DV6	1528	26 July 2012	12
A1186	Probe	Schmid & Partner Engineering AG	ET3 DV6	1529	22 April 2013	12
A2243	Probe	Schmid & Partner Engineering AG	ES3DV3	3304	31 Aug 2012	12
A2201	900 MHz Dipole Kit	Schmid & Partner Engineering AG	D900V2	035	16 Aug 2012	12
A1190	1800 MHz Dipole Kit	Schmid & Partner Engineering AG	D1800V2	264	15 Aug 2012	12
A2200	1900 MHz Dipole Kit	Schmid & Partner Engineering AG	D1900V2	537	14 Aug 2012	12
A2202	2440 MHz Dipole Kit	Schmid & Partner Engineering AG	D2440V2	701	13 Aug 2012	12
A1377	5.0 GHz Dipole Kit	Schmid & Partner Engineering AG	D5GHzV2	1016	20 Feb 2013	12
A1497	Amplifier	Mini-Circuits	zhl-42w (sma)	e020105	Calibrated as part of system	-
A1566	SAM Phantom	Schmid & Partner Engineering AG	SAM (Site 56)	TP-1207	Calibrated before use	-
A1238	SAM Phantom	Schmid & Partner Engineering AG	SAM (Site 56)	TP-1192	Calibrated before use	-
A2125	SAM Phantom	Schmid & Partner Engineering AG	SAM (Site 57)	TP-1031	Calibrated before use	-
A2252	2mm Oval Phantom	Schmid & Partner Engineering AG	Eli5 (Site 57)	1177	Calibrated before use	-
A2124	SAM Phantom	Schmid & Partner Engineering AG	SAM (Site 58)	TP-1020	Calibrated before use	-
A2255	SAM Phantom	Schmid & Partner Engineering AG	SAM (Site 58)	TP-1193	Calibrated before use	-
A215	20 dB Attenuator	Narda	766-20	9402	Calibrated as part of system	-

UL No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A1137	3dB Attenuator	Narda	779	04690	Calibrated as part of system	-
A2263	Digital Camera	Samsung	PL211	9453C90B 607487L	-	-
M1015	Network Analyser	Agilent Technologies	8753ES	US39172406	09 Oct 2012	12
C1145	Cable	Rosenberger MICRO-COAX	FA147A F003003030	41843-1	Calibrated as part of system	-
C1146	Cable	Rosenberger MICRO-COAX	FA147A F030003030	41752-1	Calibrated as part of system	-
G0528	Robot Power Supply	Schmid & Partner Engineering AG	DASY4	None	Calibrated before use	-
G0591	Robot Power Supply	Schmid & Partner Engineering AG	DASY4	F01/5J86A1/C/01	Calibrated before use	-
G0592	Robot Power Supply	Schmid & Partner Engineering AG	DASY53	F125MZ7A1/C/01	Calibrated before use	-
G087	PSU	Thurlby Thandar	CPX200	100701	Calibrated before use	-
M1047	Robot Arm	Staubli	RX908 L	F00/SD8 9A1/A/01	Calibrated before use	-
M1653	Robot Arm	Staubli	RX908 L	F01/5J8 6A1/C/01	Calibrated before use	-
M1680	Robot Arm	Staubli	TX60 L	F12/5MZ7 A1/A/01	Calibrated before use	-
M1159	Signal Generator	Agilent Technologies	E8241A	US42110332	Internal Checked 10 Apr 2013	4
M1647	Signal Generator	Hewlett Packward	8648C	3537A01598	Internal Checked 17 May 2013	4
M1071	Spectrum Analyzer	Agilent	HP8590E	3647U00514	(Monitoring use only)	-
M1270	Digital Thermometer	RS	N/A	N/A	03 May 2013	12
M1651	Digital Thermometer	Dickson	FH325	08021393	03 May 2013	12
M1023	Dual Channel Power Meter	R & S	NRVD	863715/030	06 Jun 2013	12
S256	SAR Lab	UL	Site 56	N/A	Calibrated before use	-
S512	SAR Lab	UL	Site 57	N/A	Calibrated before use	-
S513	SAR Lab	UL	Site 58	N/A	Calibrated before use	-

Note:

All the assets were in calibration during the course of testing.

A.1.1. Calibration Certificates

This section contains the calibration certificates and data for the Probe(s) and Dipole(s) used, which are not included in the total number of pages for this report.

Checked by [illegible] DATE: 26-SEPT-2012

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) ASSET A2077 **Accreditation No.: SCS 108**
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Client RFI **Certificate No: EX3-3814_Sep12**

CALIBRATION CERTIFICATE

Object EX3DV4 - SN:3814

Calibration procedure(s) QA CAL-01.v8, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: September 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	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	20-Jun-12 (No. DAE4-660_Jun12)	Jun-13
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: September 24, 2012

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 EX3DV4

SN:3814

Manufactured: September 2, 2011
Calibrated: September 24, 2012

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3814

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.53	0.50	0.44	± 10.1 %
DCP (mV)[B]	99.9	93.7	98.7	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc[E] (k=2)
0	CW	0.00	X	0.00	0.00	1.00	172.6	±3.0 %
			Y	0.00	0.00	1.00	154.1	
			Z	0.00	0.00	1.00	144.1	

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: EX3DV4 - SN:3814

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)
1450	40.5	1.20	8.56	8.56	8.56	0.19	2.04	± 12.0 %
2450	39.2	1.80	6.89	6.89	6.89	0.33	0.97	± 12.0 %
2600	39.0	1.96	6.81	6.81	6.81	0.34	1.00	± 12.0 %
5200	36.0	4.66	5.06	5.06	5.06	0.42	1.80	± 13.1 %
5300	35.9	4.76	4.73	4.73	4.73	0.42	1.80	± 13.1 %
5500	35.6	4.96	4.54	4.54	4.54	0.45	1.80	± 13.1 %
5600	35.5	5.07	4.26	4.26	4.26	0.50	1.80	± 13.1 %
5800	35.3	5.27	4.50	4.50	4.50	0.45	1.80	± 13.1 %

[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: EX3DV4 - SN:3814

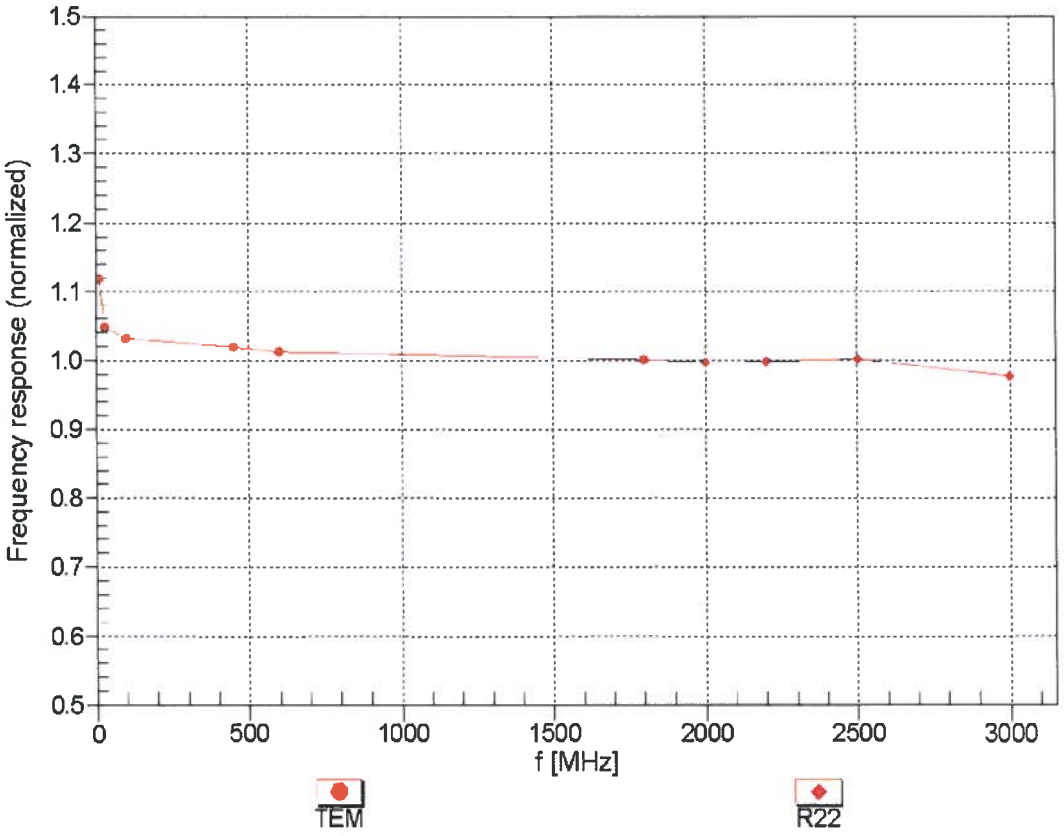
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
1450	54.0	1.30	8.26	8.26	8.26	0.23	1.40	± 12.0 %
2450	52.7	1.95	7.41	7.41	7.41	0.80	0.66	± 12.0 %
2600	52.5	2.16	7.08	7.08	7.08	0.79	0.61	± 12.0 %
3700	51.0	3.55	6.27	6.27	6.27	0.22	2.24	± 13.1 %
5200	49.0	5.30	4.39	4.39	4.39	0.52	1.90	± 13.1 %
5300	48.9	5.42	4.11	4.11	4.11	0.55	1.90	± 13.1 %
5500	48.6	5.65	4.02	4.02	4.02	0.52	1.90	± 13.1 %
5600	48.5	5.77	3.71	3.71	3.71	0.60	1.90	± 13.1 %
5800	48.2	6.00	3.97	3.97	3.97	0.60	1.90	± 13.1 %

[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.

Frequency Response of E-Field

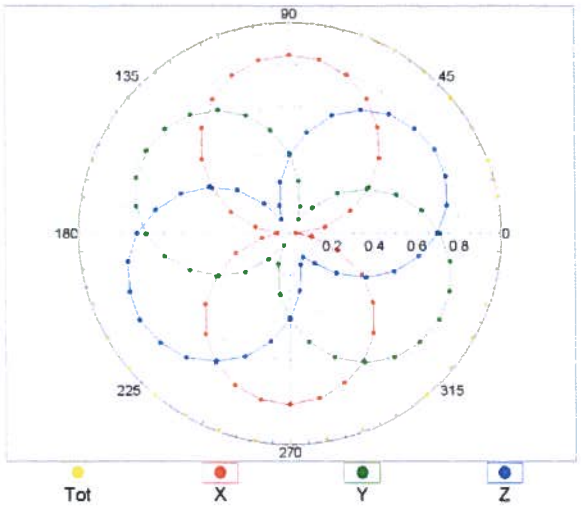
(TEM-Cell:ifi110 EXX, Waveguide: R22)



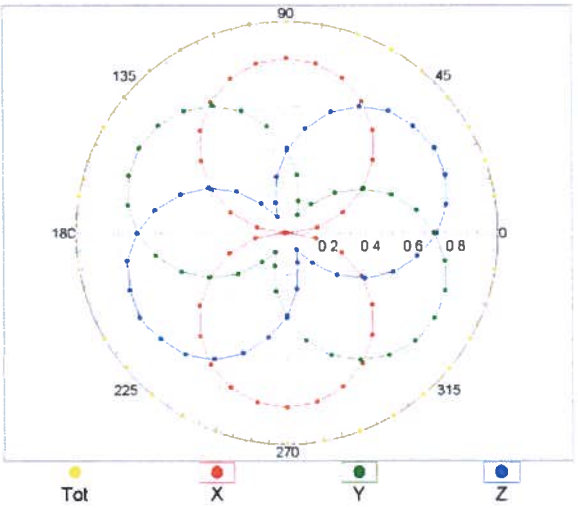
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

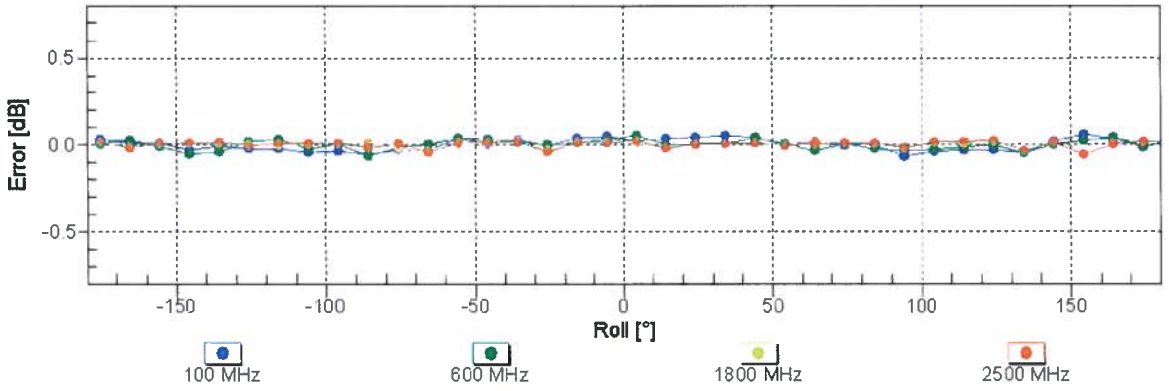
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



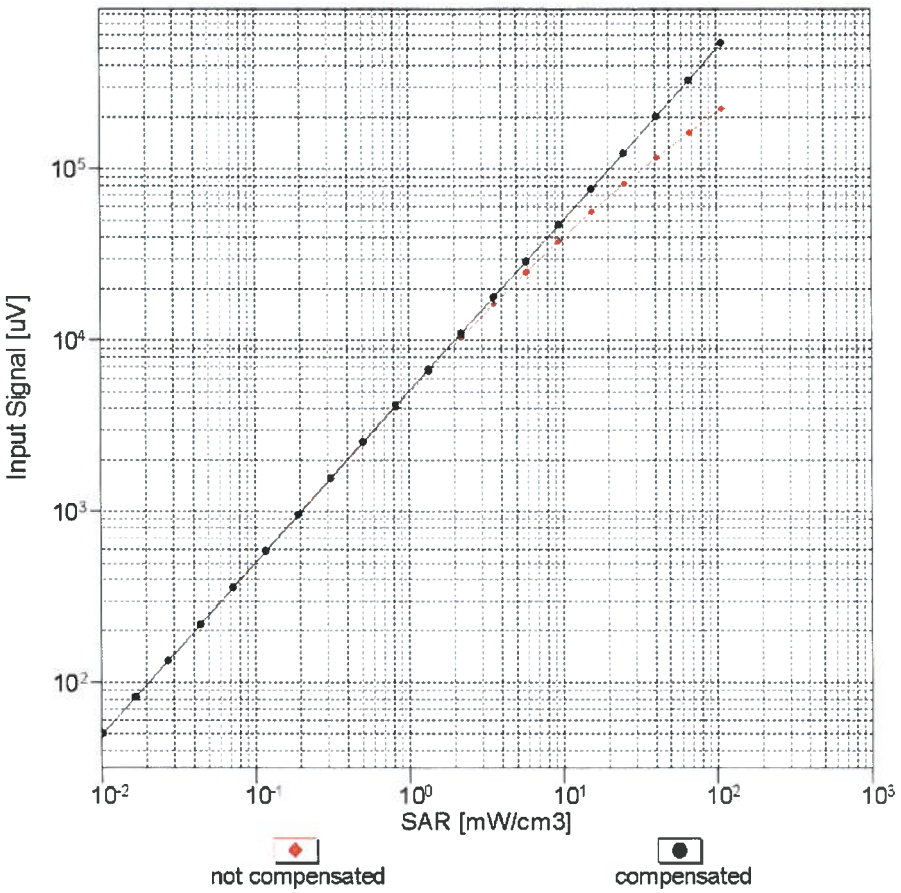
f=1800 MHz,R22

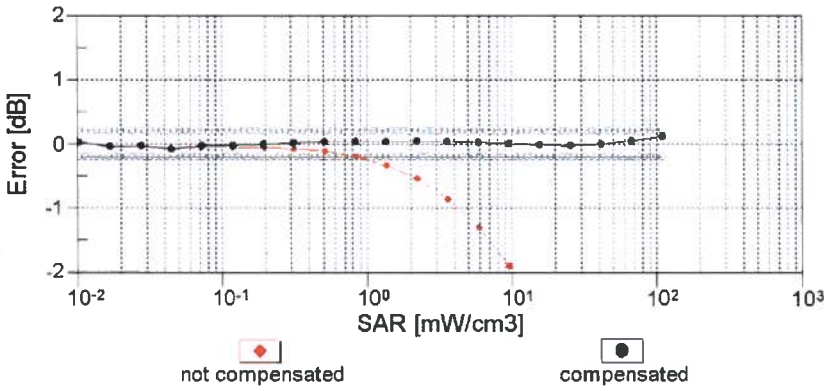




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR$_{head}$)
(TEM cell , f = 900 MHz)

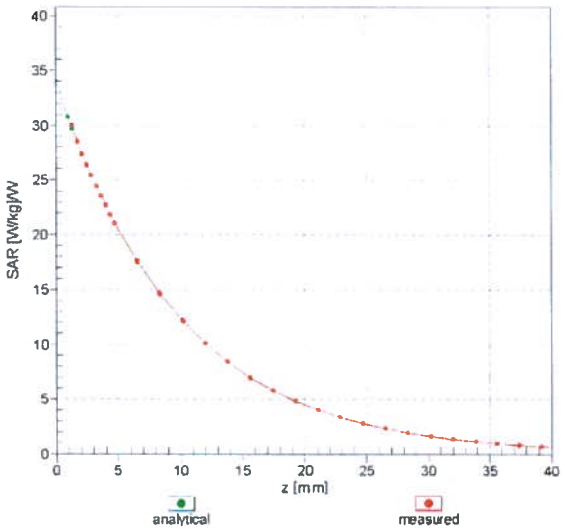




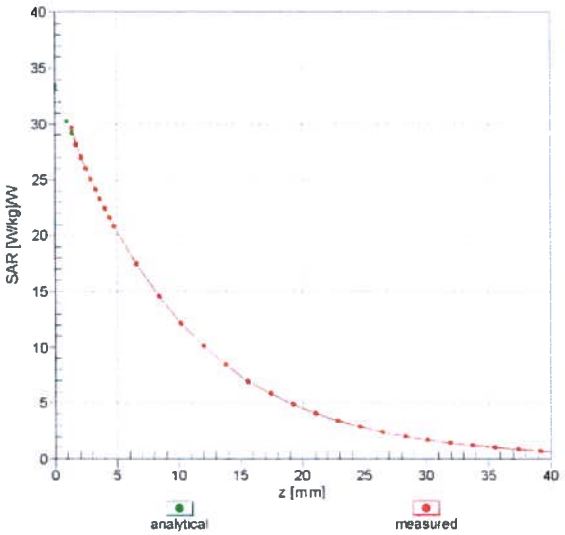
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 2450 MHz,WGLS R22 (H_convF)

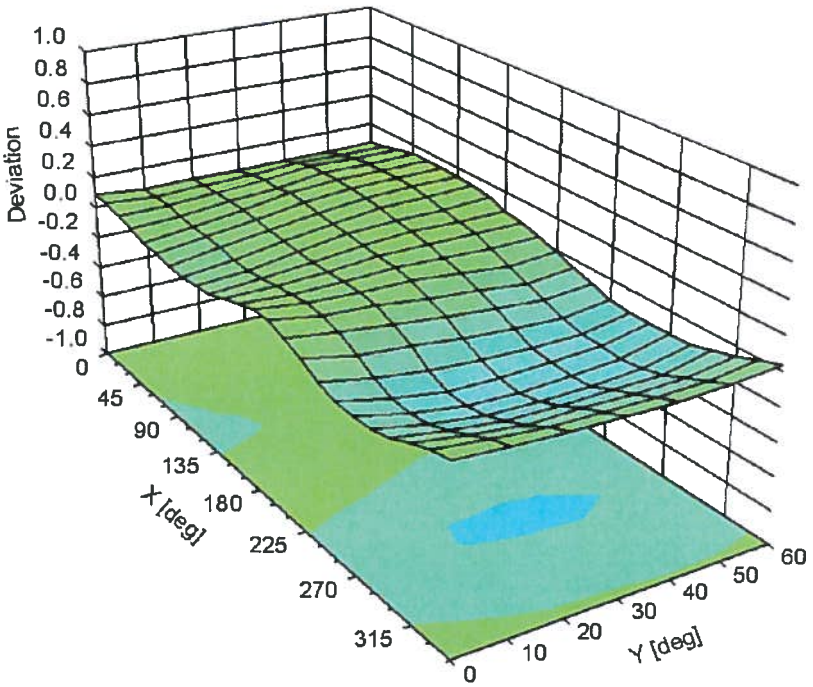


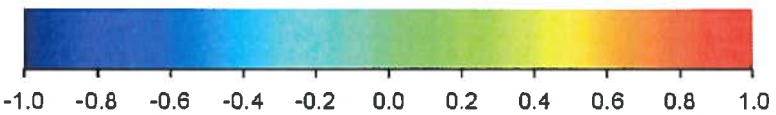
f = 2450 MHz,WGLS R22 (M_convF)



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: EX3DV4 - SN:3814

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-65.7
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

checked by KD 16 Aug 2012

ASSET: A1185

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

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Accreditation No.: SCS 108

Client RFI

Certificate No: ET3-1528_Jul12

CALIBRATION CERTIFICATE

Object: ET3DV6 - SN:1528

Calibration procedure(s): QA CAL-01.v8, QA CAL-12.v7, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: July 26, 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	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	20-Jun-12 (No. DAE4-660_Jun12)	Jun-13
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: July 26, 2012

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

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Accreditation No.: SCS 108
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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 ET3DV6

SN:1528

Manufactured: March 21, 2000
Calibrated: July 26, 2012

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

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1528

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.45	1.86	1.61	± 10.1 %
DCP (mV)[B]	95.5	97.5	100.3	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc[E] (k=2)
0	CW	0.00	X	0.00	0.00	1.00	166.6	±1.9 %
			Y	0.00	0.00	1.00	160.4	
			Z	0.00	0.00	1.00	170.5	

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

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

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1528

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	7.01	7.01	7.01	0.23	2.32	± 13.4 %
750	41.9	0.89	6.37	6.37	6.37	0.49	2.16	± 12.0 %
835	41.5	0.90	6.06	6.06	6.06	0.61	1.95	± 12.0 %
900	41.5	0.97	5.95	5.95	5.95	0.30	3.00	± 12.0 %
1450	40.5	1.20	5.22	5.22	5.22	0.49	2.80	± 12.0 %
1750	40.1	1.37	5.12	5.12	5.12	0.80	2.07	± 12.0 %
1900	40.0	1.40	4.92	4.92	4.92	0.80	2.10	± 12.0 %
2150	39.7	1.53	4.65	4.65	4.65	0.80	2.00	± 12.0 %
2450	39.2	1.80	4.31	4.31	4.31	0.80	1.74	± 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.

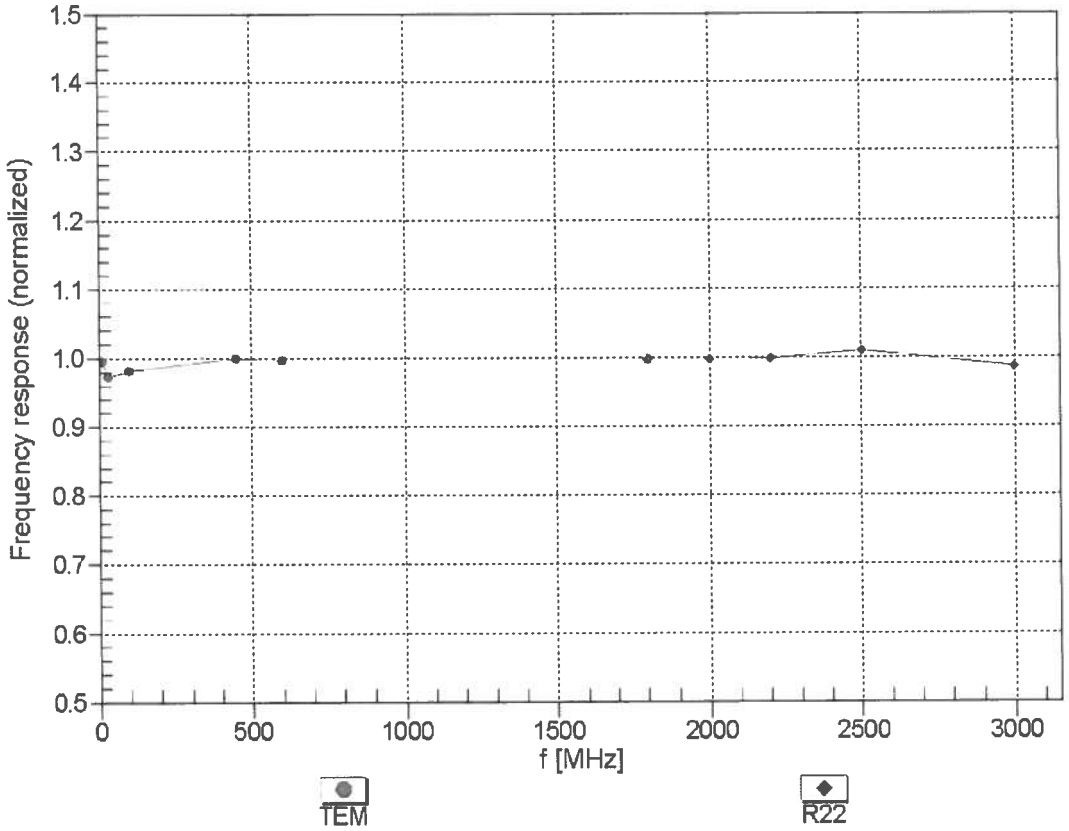
DASY/EASY - Parameters of Probe: ET3DV6 - SN:1528

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	7.47	7.47	7.47	0.16	2.32	± 13.4 %
750	55.5	0.96	6.17	6.17	6.17	0.33	2.75	± 12.0 %
835	55.2	0.97	5.99	5.99	5.99	0.33	3.00	± 12.0 %
900	55.0	1.05	5.92	5.92	5.92	0.55	2.18	± 12.0 %
1450	54.0	1.30	5.11	5.11	5.11	0.76	2.07	± 12.0 %
1750	53.4	1.49	4.64	4.64	4.64	0.80	2.45	± 12.0 %
1900	53.3	1.52	4.42	4.42	4.42	0.80	2.33	± 12.0 %
2150	53.1	1.66	4.37	4.37	4.37	0.80	1.93	± 12.0 %
2450	52.7	1.95	3.99	3.99	3.99	0.56	0.98	± 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.

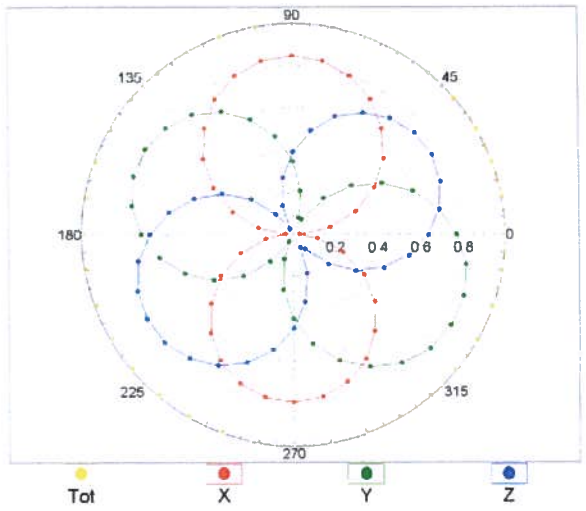
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



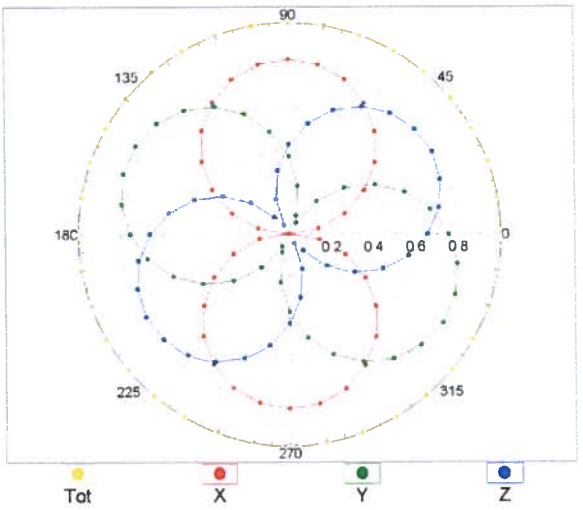
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

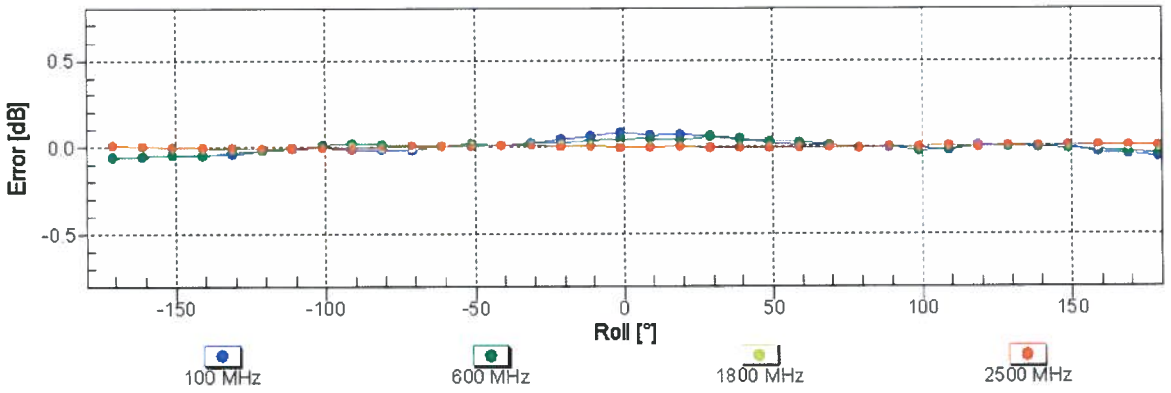
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



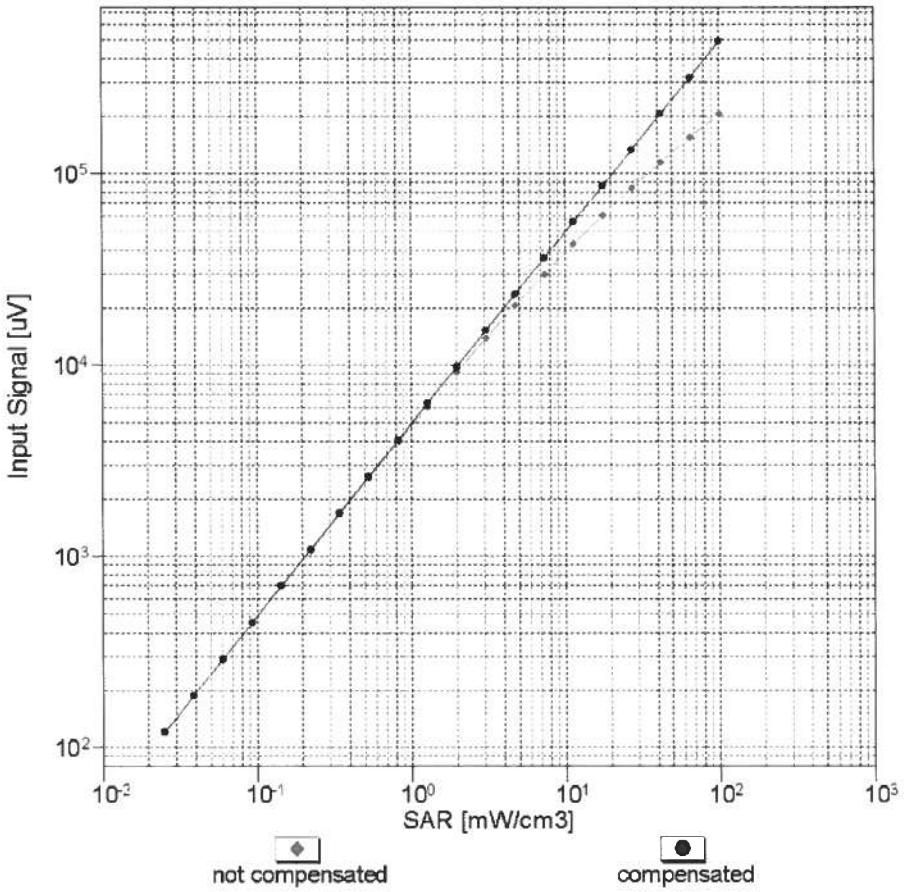
f=1800 MHz,R22

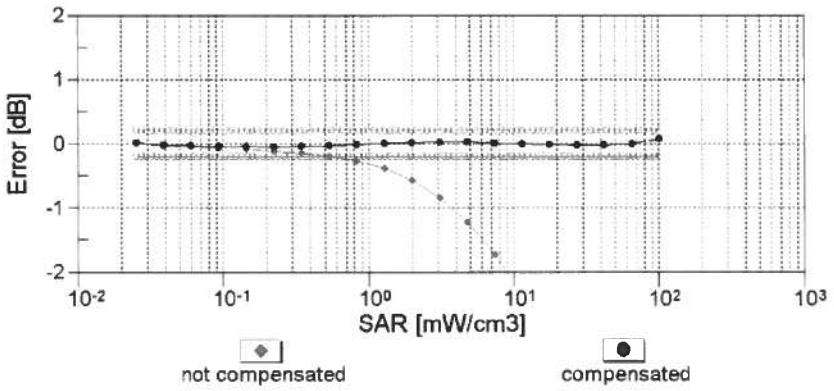




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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

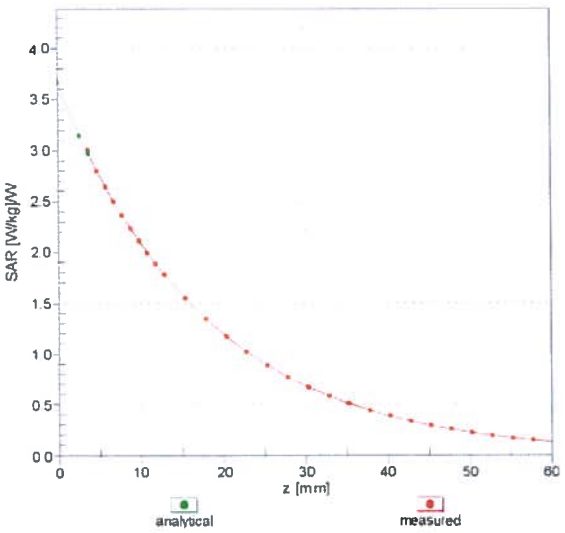




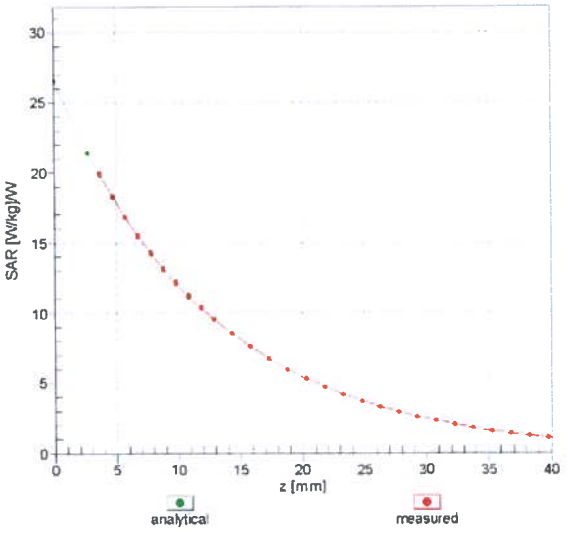
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)

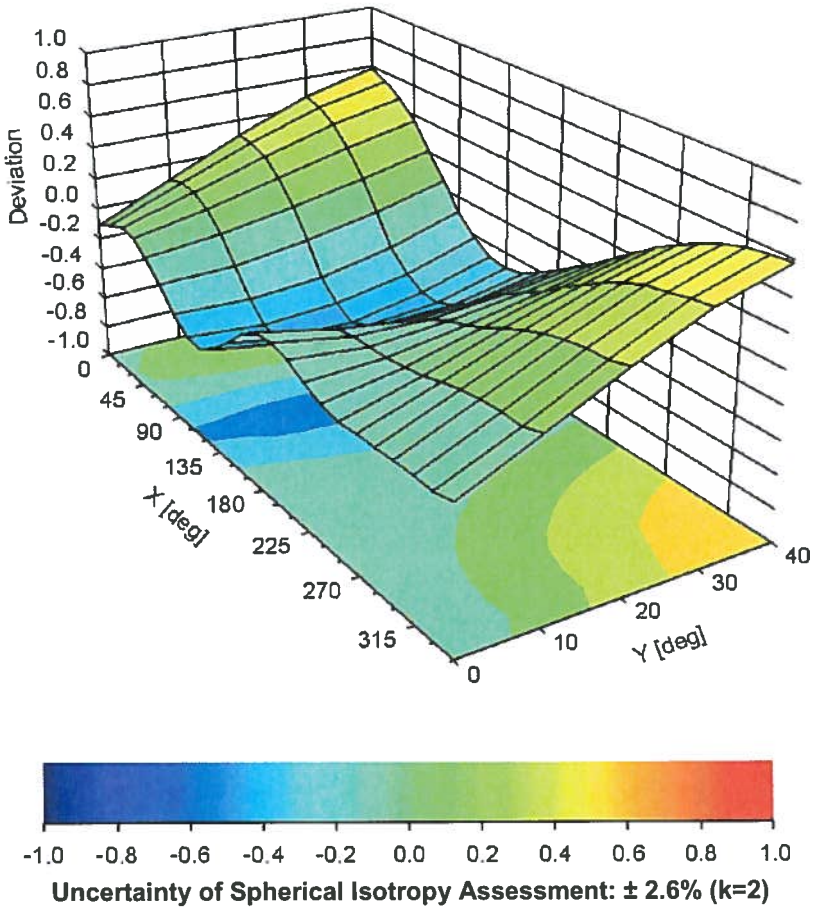


f = 1750 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



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

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1528

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	18.9
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	enabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	6.8 mm
Probe Tip to Sensor X Calibration Point	2.7 mm
Probe Tip to Sensor Y Calibration Point	2.7 mm
Probe Tip to Sensor Z Calibration Point	2.7 mm
Recommended Measurement Distance from Surface	4 mm

Checked by : Date : 2-May-2013

Calibration Laboratory of
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Zeughausstrasse 43, 8004 Zurich, Switzerland

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Client RFI **Certificate No: ET3-1529_Apr13**

CALIBRATION CERTIFICATE

Object ET3DV6 - SN:1529

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

Calibration date: April 22, 2013

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	04-Apr-13 (No. 217-01733)	Apr-14
Power sensor E4412A	MY41498087	04-Apr-13 (No. 217-01733)	Apr-14
Reference 3 dB Attenuator	SN: S5054 (3c)	04-Apr-13 (No. 217-01737)	Apr-14
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-13 (No. 217-01735)	Apr-14
Reference 30 dB Attenuator	SN: S5129 (30b)	04-Apr-13 (No. 217-01738)	Apr-14
Reference Probe ES3DV2	SN: 3013	28-Dec-12 (No. ES3-3013_Dec12)	Dec-13
DAE4	SN: 660	31-Jan-13 (No. DAE4-660_Jan13)	Jan-14
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-15
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

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

Issued: April 22, 2013

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

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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, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis

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; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ET3DV6

SN:1529

Manufactured: March 21, 2000
Calibrated: April 22, 2013

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

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1529

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.68	1.89	1.78	± 10.1 %
DCP (mV)[B]	109.8	99.0	97.7	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	149.7	±2.5 %
		Y	0.0	0.0	1.0		199.9	
		Z	0.0	0.0	1.0		195.1	

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: ET3DV6 - SN:1529

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)
750	41.9	0.89	6.59	6.59	6.59	0.53	2.04	± 12.0 %
835	41.5	0.90	6.24	6.24	6.24	0.35	2.65	± 12.0 %
900	41.5	0.97	6.13	6.13	6.13	0.40	2.37	± 12.0 %
1450	40.5	1.20	5.20	5.20	5.20	0.46	2.90	± 12.0 %
1750	40.1	1.37	5.13	5.13	5.13	0.80	2.07	± 12.0 %
1900	40.0	1.40	4.93	4.93	4.93	0.80	2.05	± 12.0 %
2100	39.8	1.49	4.93	4.93	4.93	0.80	1.93	± 12.0 %
2450	39.2	1.80	4.30	4.30	4.30	0.80	2.10	± 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: ET3DV6 - SN:1529

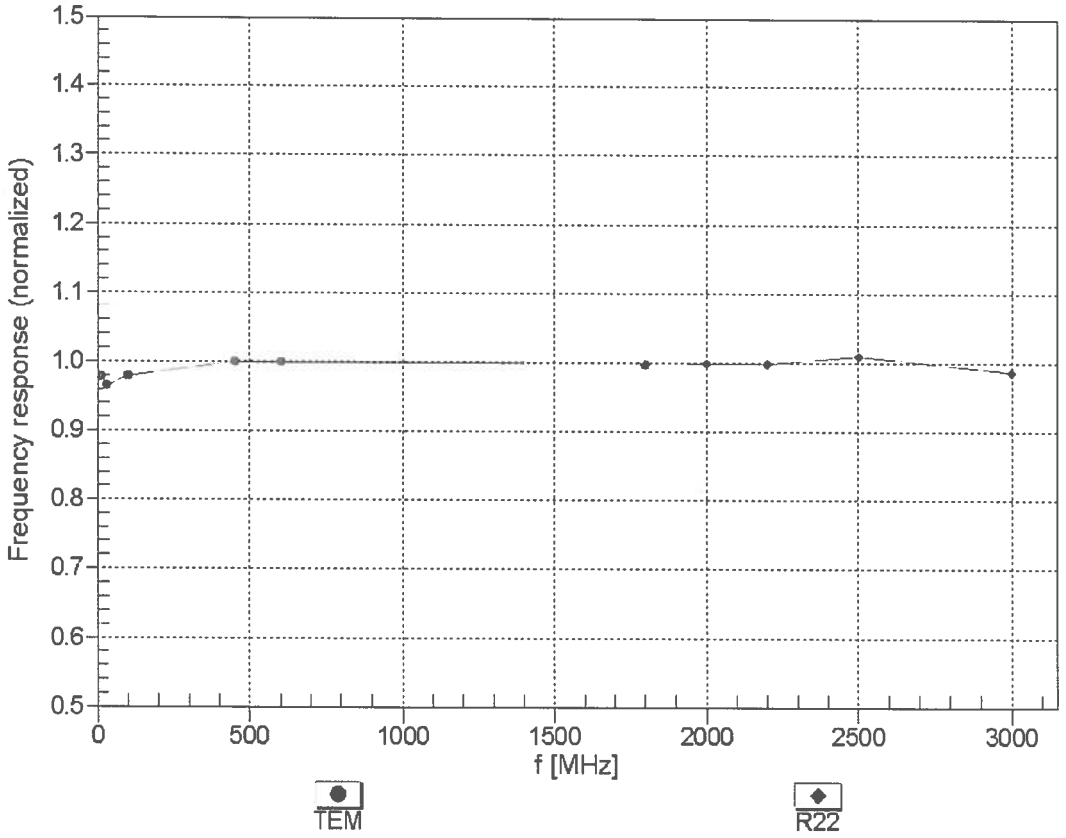
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.31	6.31	6.31	0.43	2.28	± 12.0 %
835	55.2	0.97	6.16	6.16	6.16	0.44	2.29	± 12.0 %
900	55.0	1.05	6.12	6.12	6.12	0.47	2.27	± 12.0 %
1450	54.0	1.30	5.03	5.03	5.03	0.79	1.99	± 12.0 %
1750	53.4	1.49	4.68	4.68	4.68	0.80	2.40	± 12.0 %
1900	53.3	1.52	4.46	4.46	4.46	0.80	2.29	± 12.0 %
2100	53.2	1.62	4.52	4.52	4.52	0.80	2.11	± 12.0 %
2450	52.7	1.95	4.01	4.01	4.01	0.63	2.10	± 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.

Frequency Response of E-Field

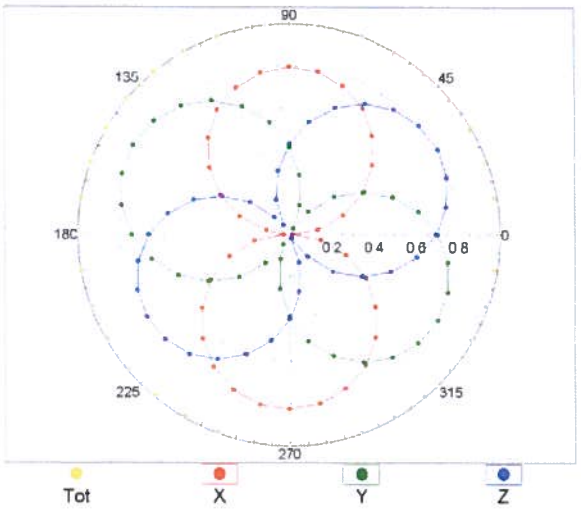
(TEM-Cell:ifi110 EXX, Waveguide: R22)



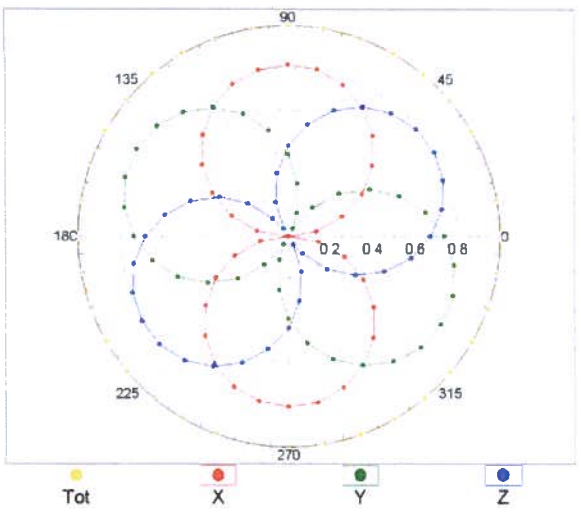
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

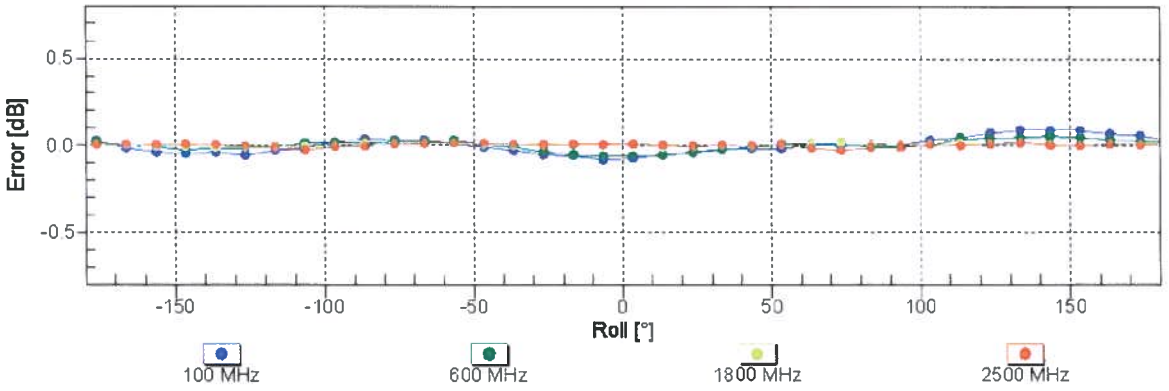
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



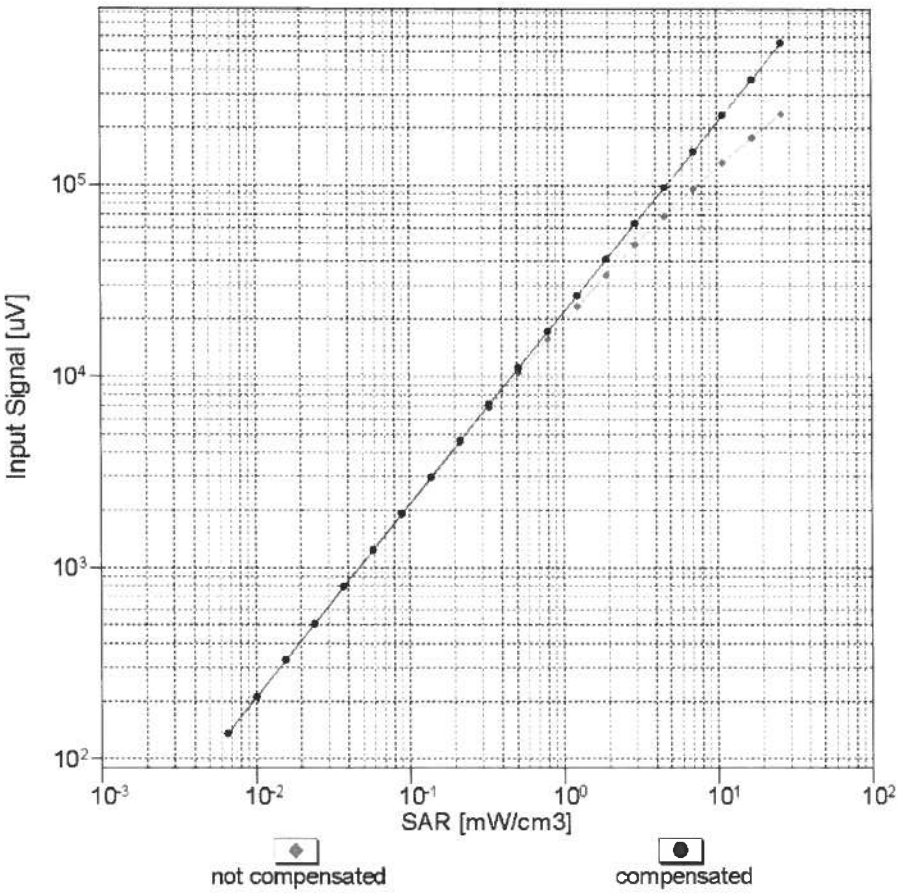
f=1800 MHz,R22

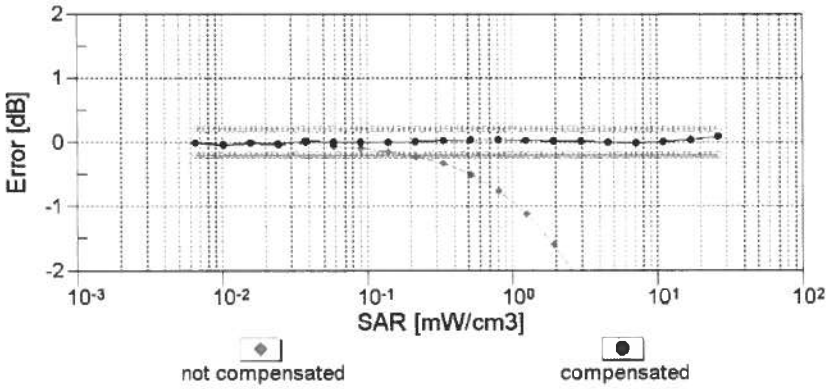




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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

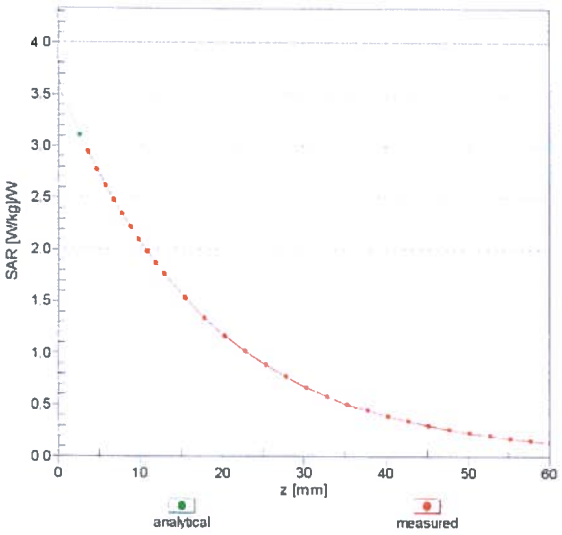




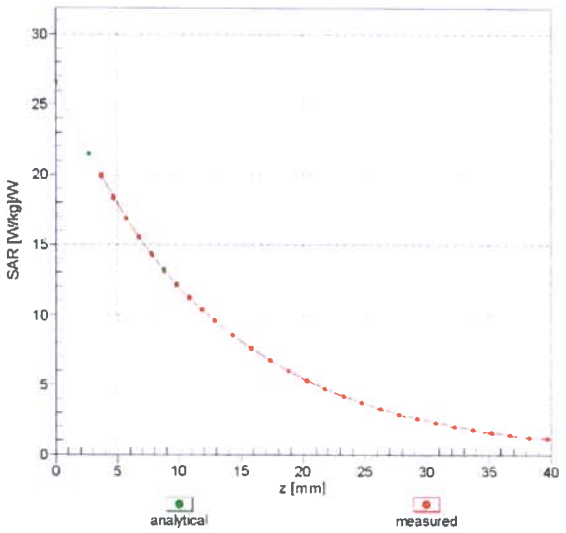
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)

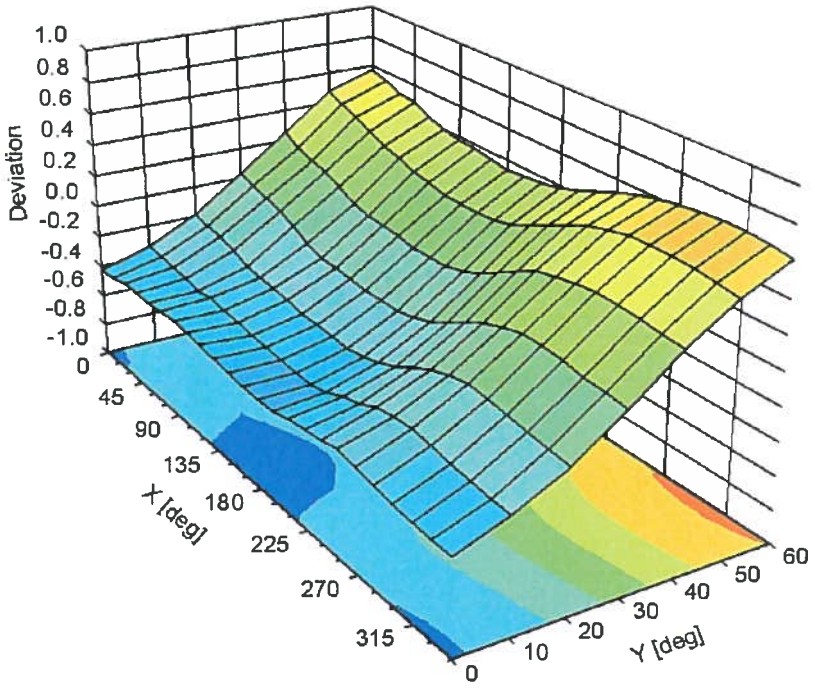


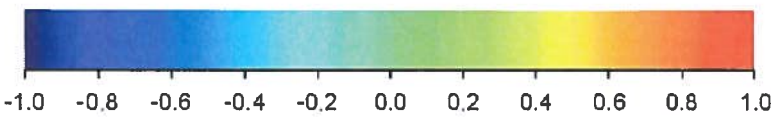
f = 1750 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





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

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1529

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-6.5
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	enabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	6.8 mm
Probe Tip to Sensor X Calibration Point	2.7 mm
Probe Tip to Sensor Y Calibration Point	2.7 mm
Probe Tip to Sensor Z Calibration Point	2.7 mm
Recommended Measurement Distance from Surface	4 mm

checked by DATE: 18-09-2012

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Client RFI **Certificate No: ES3-3304_Aug12**

CALIBRATION CERTIFICATE

Object ES3DV3 - SN:3304

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

Calibration date: August 31, 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	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	20-Jun-12 (No. DAE4-660_Jun12)	Jun-13
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: September 3, 2012

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Accredited by the Swiss Accreditation Service (SAS) **Accreditation No.: SCS 108**
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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:3304

Manufactured: August 27, 2010
Calibrated: August 31, 2012

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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3304

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.14	1.33	1.33	± 10.1 %
DCP (mV)[B]	104.7	101.1	103.7	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc[E] (k=2)
0	CW	0.00	X	0.00	0.00	1.00	146.4	±3.8 %
			Y	0.00	0.00	1.00	159.8	
			Z	0.00	0.00	1.00	158.8	

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:3304

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)
750	41.9	0.89	6.44	6.44	6.44	0.29	1.92	± 12.0 %
835	41.5	0.90	6.17	6.17	6.17	0.27	1.96	± 12.0 %
900	41.5	0.97	6.09	6.09	6.09	0.33	1.75	± 12.0 %
1750	40.1	1.37	5.47	5.47	5.47	0.61	1.36	± 12.0 %
1900	40.0	1.40	5.24	5.24	5.24	0.80	1.18	± 12.0 %
2100	39.8	1.49	5.24	5.24	5.24	0.80	1.16	± 12.0 %
2450	39.2	1.80	4.59	4.59	4.59	0.78	1.22	± 12.0 %
2600	39.0	1.96	4.40	4.40	4.40	0.75	1.28	± 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:3304

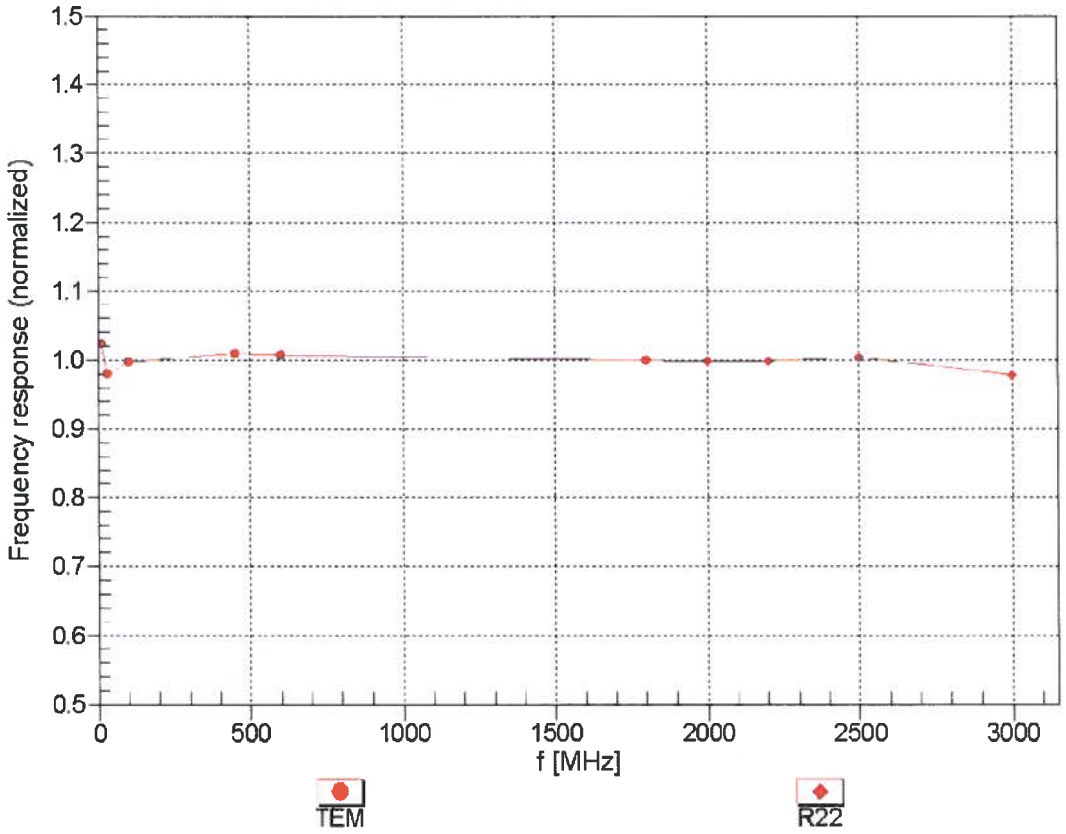
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.25	6.25	6.25	0.58	1.30	± 12.0 %
835	55.2	0.97	6.13	6.13	6.13	0.60	1.32	± 12.0 %
900	55.0	1.05	6.11	6.11	6.11	0.80	1.18	± 12.0 %
1750	53.4	1.49	5.15	5.15	5.15	0.45	1.78	± 12.0 %
1900	53.3	1.52	4.88	4.88	4.88	0.70	1.35	± 12.0 %
2100	53.2	1.62	4.94	4.94	4.94	0.64	1.43	± 12.0 %
2450	52.7	1.95	4.32	4.32	4.32	0.74	1.09	± 12.0 %
2600	52.5	2.16	4.16	4.16	4.16	0.68	0.99	± 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.

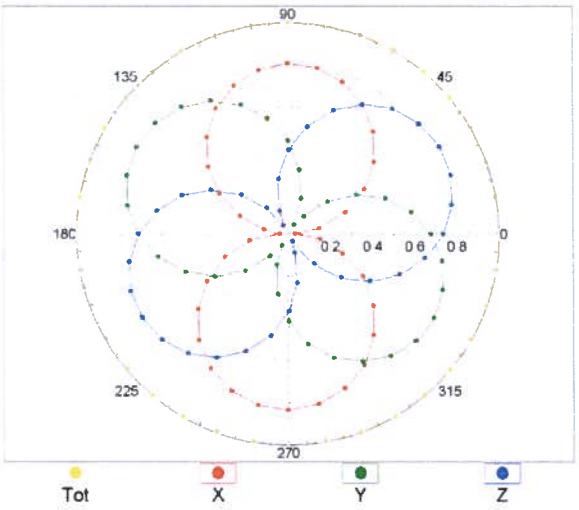
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



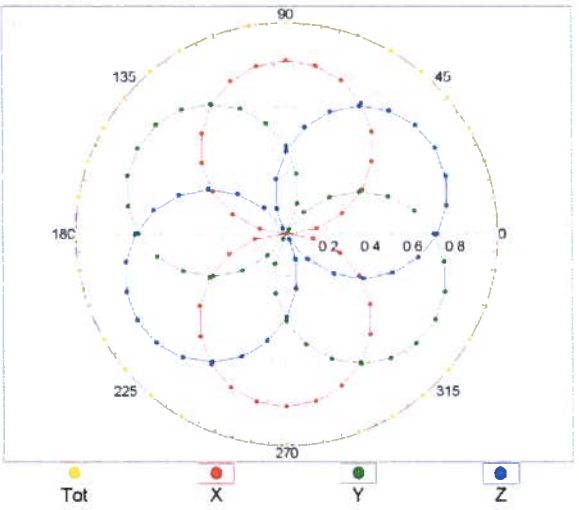
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

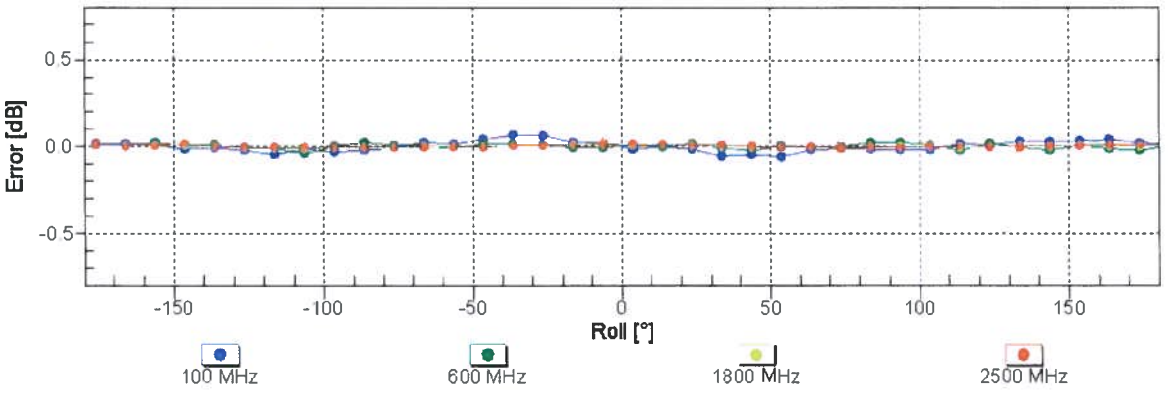
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



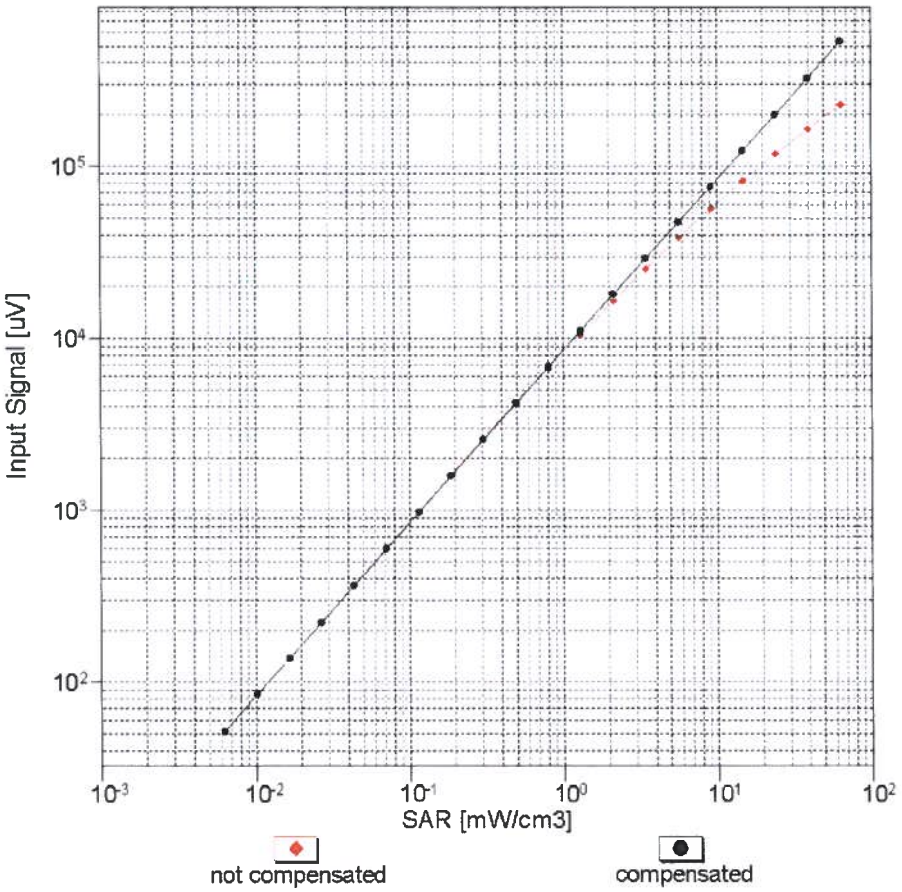
f=1800 MHz,R22

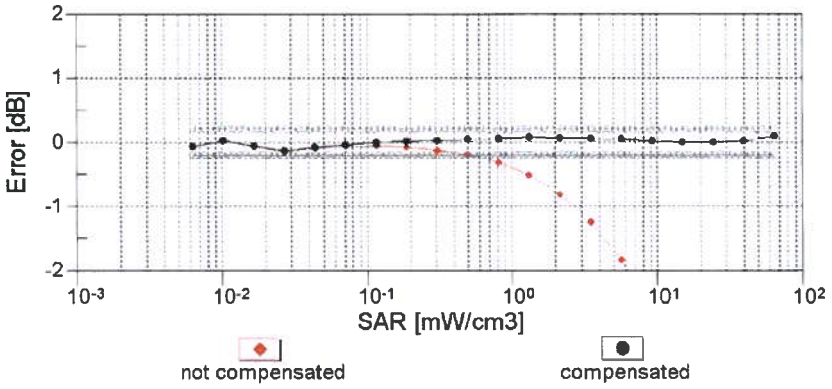




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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

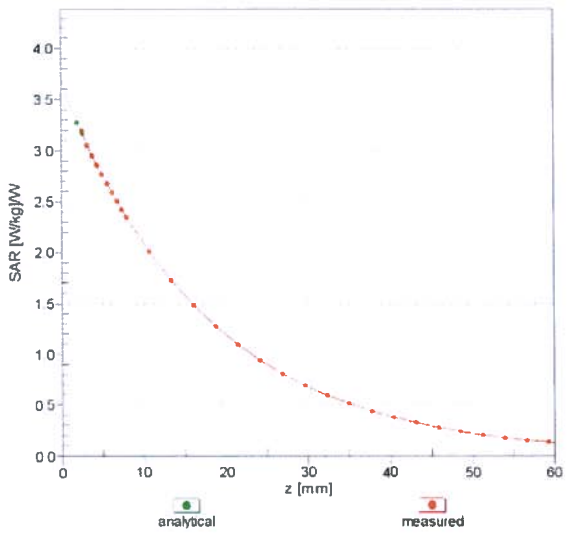




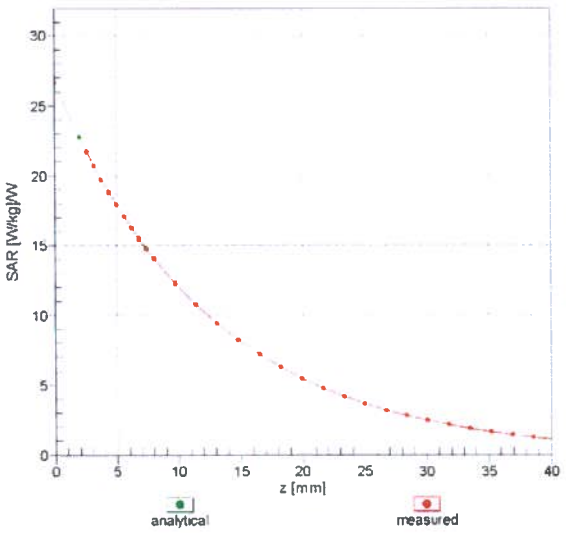
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)

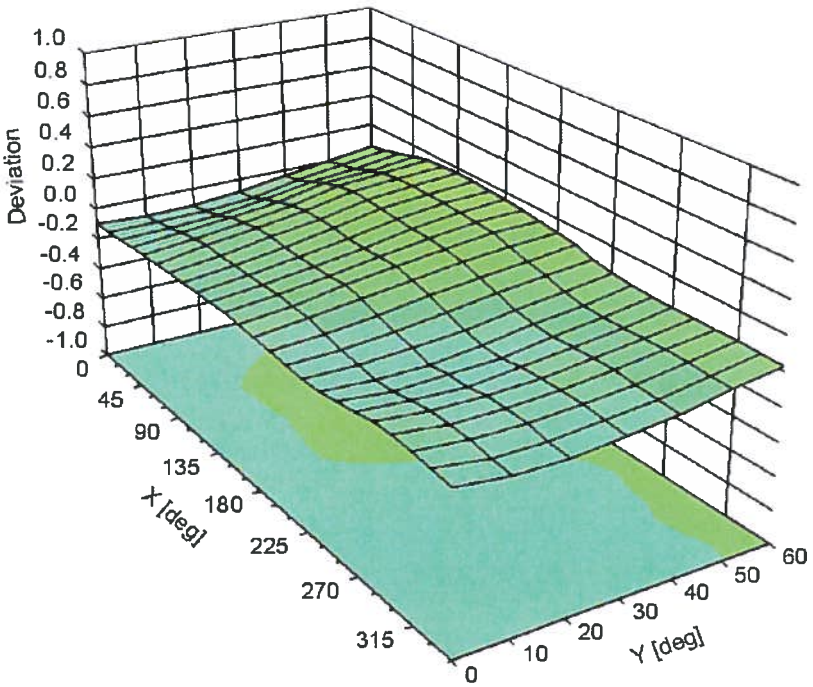


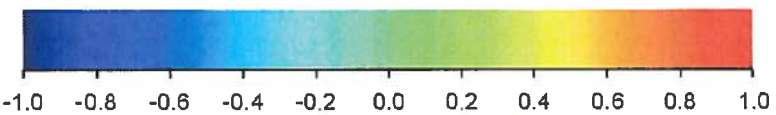
f = 1750 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3304

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	33.7
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

Check by [signature] DATE: 7-August 2012

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) ASSET: A220/ **Accreditation No.: SCS 108**
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Client RFI **Certificate No: D900V2-035_Aug12**

CALIBRATION CERTIFICATE

Object	D900V2 - SN: 035
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	August 16, 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: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13

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	[signature]
Approved by:	Katja Pokovic	Technical Manager	[signature]

Issued: August 16, 2012

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.

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%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	900 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	0.97 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.6 ± 6 %	0.96 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	2.62 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**10.5 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.68 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**6.74 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	55.0	1.05 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.6 ± 6 %	1.06 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	2.74 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**10.8 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.76 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**6.96 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.8 Ω - 5.8 jΩ
Return Loss	- 24.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.5 Ω - 5.5 jΩ
Return Loss	- 24.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.404 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	February 26, 1998

DASY5 Validation Report for Head TSL

Date: 16.08.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 035

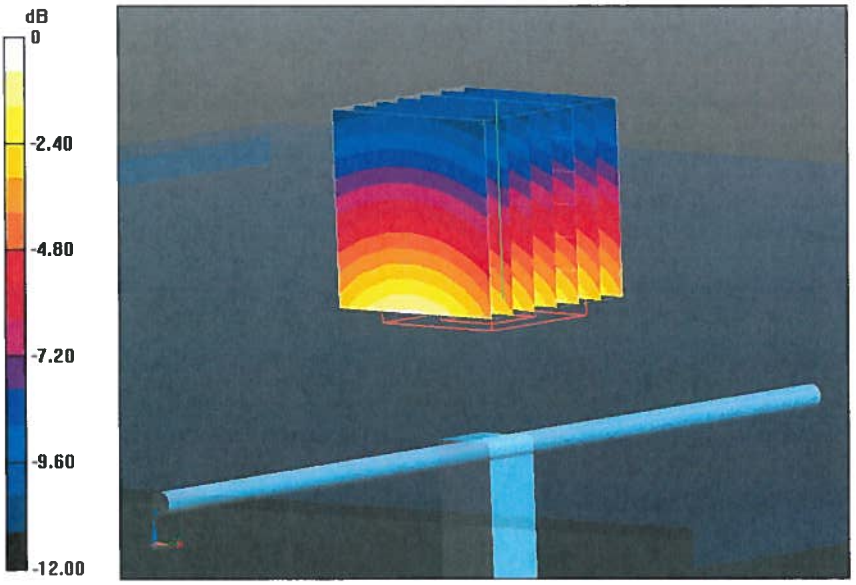
Communication System: CW; Frequency: 900 MHz
Medium parameters used: f = 900 MHz; σ = 0.96 mho/m; ε_r = 40.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.97, 5.97, 5.97); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.2(969); SEMCAD X 14.6.6(6824)

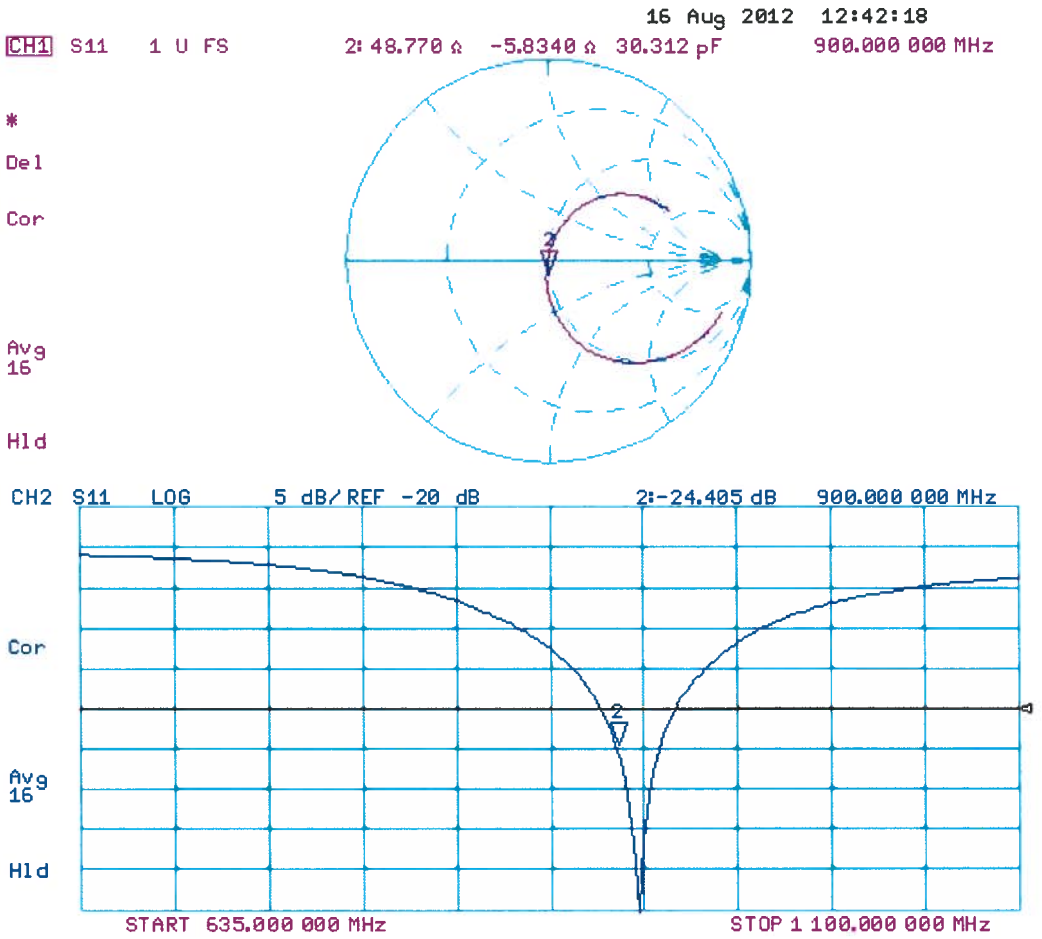
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.325 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.926 mW/g
SAR(1 g) = 2.62 mW/g; SAR(10 g) = 1.68 mW/g
Maximum value of SAR (measured) = 3.06 W/kg



0 dB = 3.06 W/kg = 9.71 dB W/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 16.08.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 035

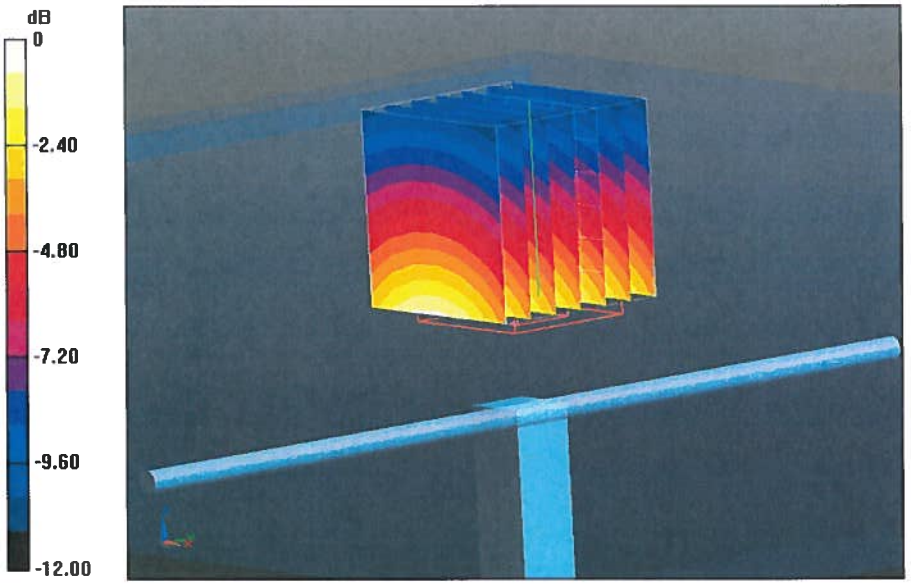
Communication System: CW; Frequency: 900 MHz
Medium parameters used: f = 900 MHz; σ = 1.06 mho/m; ε_r = 52.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.94, 5.94, 5.94); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.2(969); SEMCAD X 14.6.6(6824)

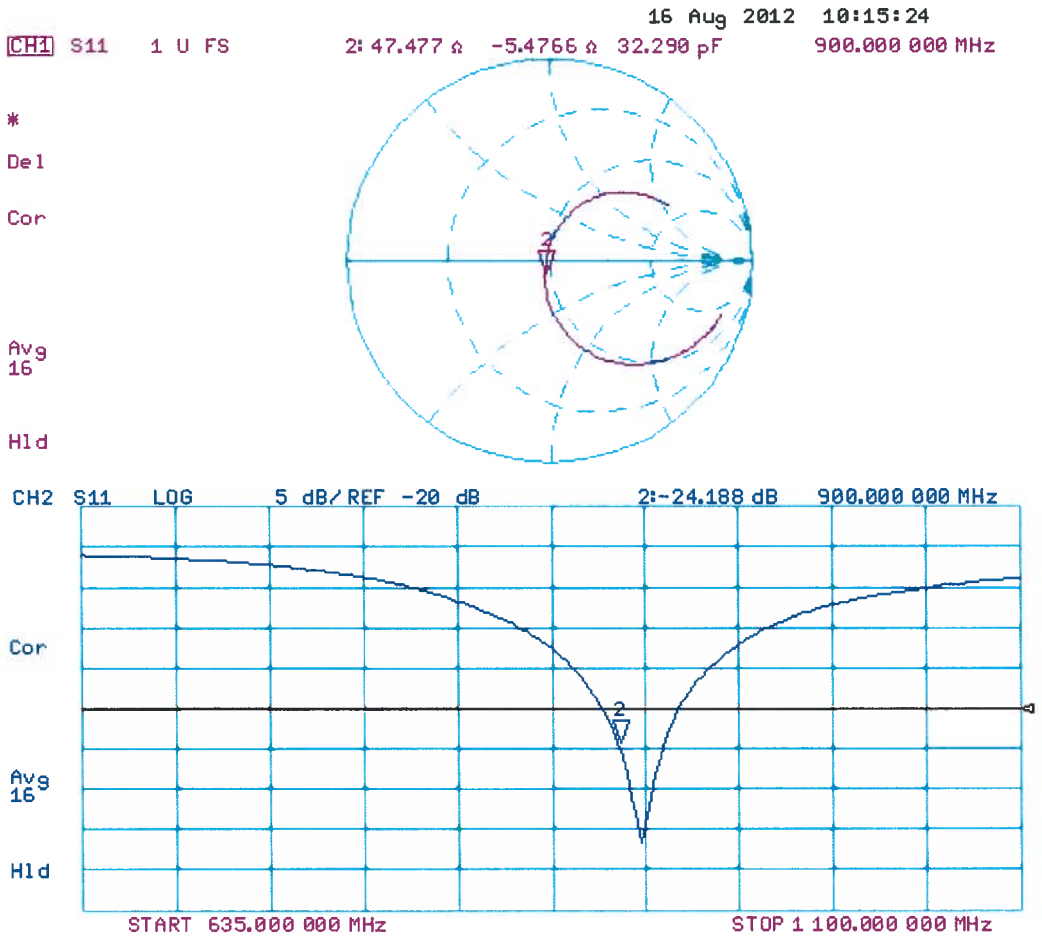
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.325 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 4.184 mW/g
SAR(1 g) = 2.74 mW/g; SAR(10 g) = 1.76 mW/g
Maximum value of SAR (measured) = 3.18 W/kg



0 dB = 3.18 W/kg = 10.05 dB W/kg

Impedance Measurement Plot for Body TSL



Checked by [signature] DATE: 7 Sept 2012

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) ASSET: A1190 **Accreditation No.: SCS 108**
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Client RFI **Certificate No: D1800V2-264_Aug12**

CALIBRATION CERTIFICATE

Object	D1800V2 - SN: 264
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	August 15, 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: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13

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: August 15, 2012

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.

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%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1800 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	39.8 ± 6 %	1.38 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	9.22 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**37.2 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.87 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**19.6 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	52.0 ± 6 %	1.52 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	9.50 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**37.8 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.04 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**20.1 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	45.8 Ω - 5.8 jΩ
Return Loss	- 22.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	42.9 Ω - 5.3 jΩ
Return Loss	- 20.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.201 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 05, 2000

DASY5 Validation Report for Head TSL

Date: 15.08.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 264

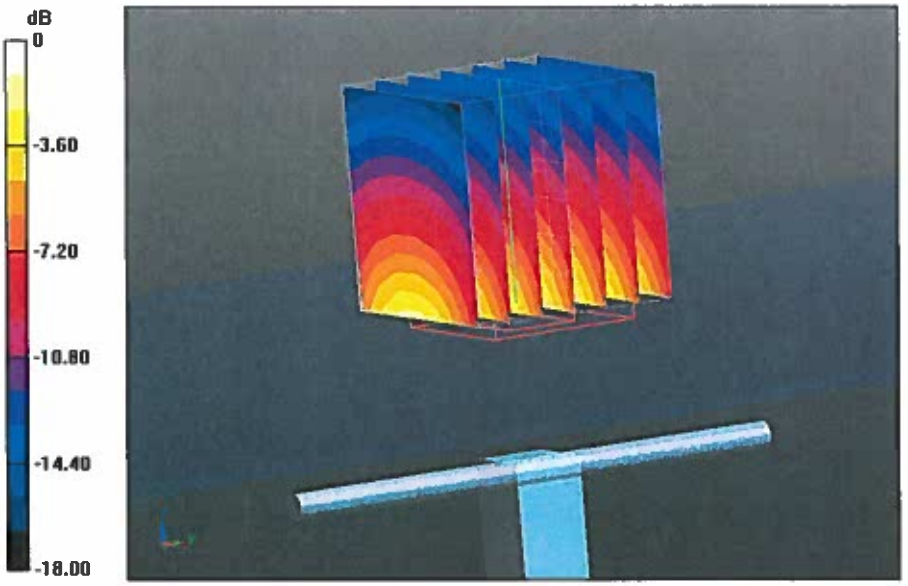
Communication System: CW; Frequency: 1800 MHz
Medium parameters used: f = 1800 MHz; σ = 1.38 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.07, 5.07, 5.07); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.2(969); SEMCAD X 14.6.6(6824)

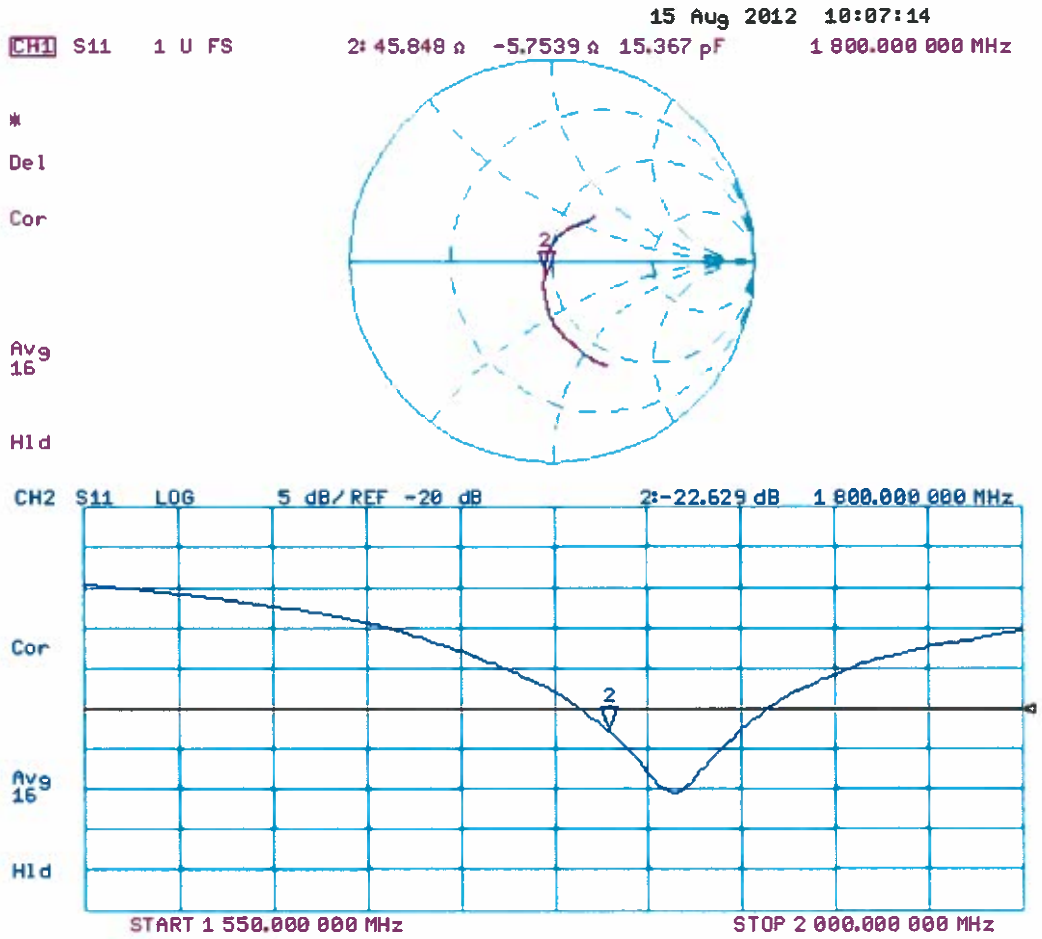
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.984 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 16.364 mW/g
SAR(1 g) = 9.22 mW/g; SAR(10 g) = 4.87 mW/g
Maximum value of SAR (measured) = 11.3 W/kg



0 dB = 11.3 W/kg = 21.06 dB W/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 15.08.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 264

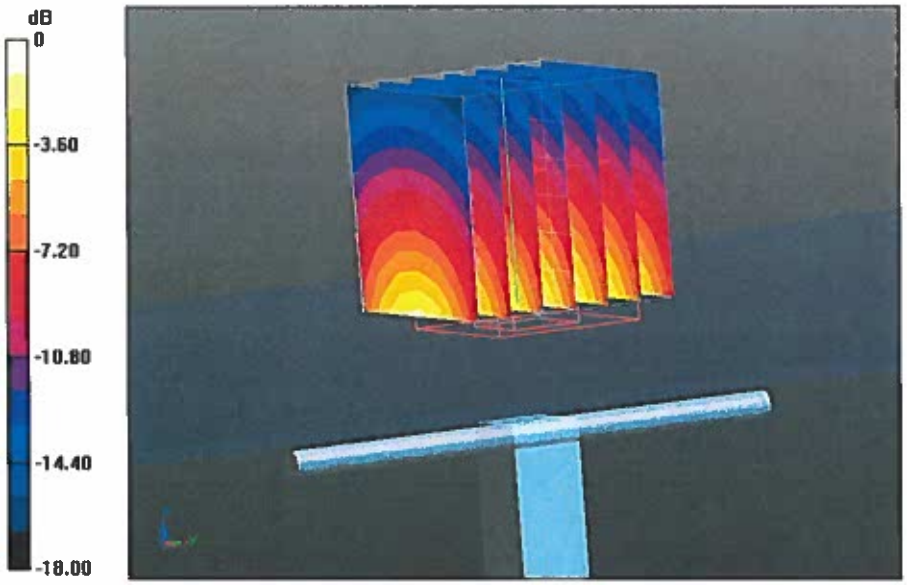
Communication System: CW; Frequency: 1800 MHz
Medium parameters used: f = 1800 MHz; σ = 1.52 mho/m; ε_r = 52; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.74, 4.74, 4.74); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.2(969); SEMCAD X 14.6.6(6824)

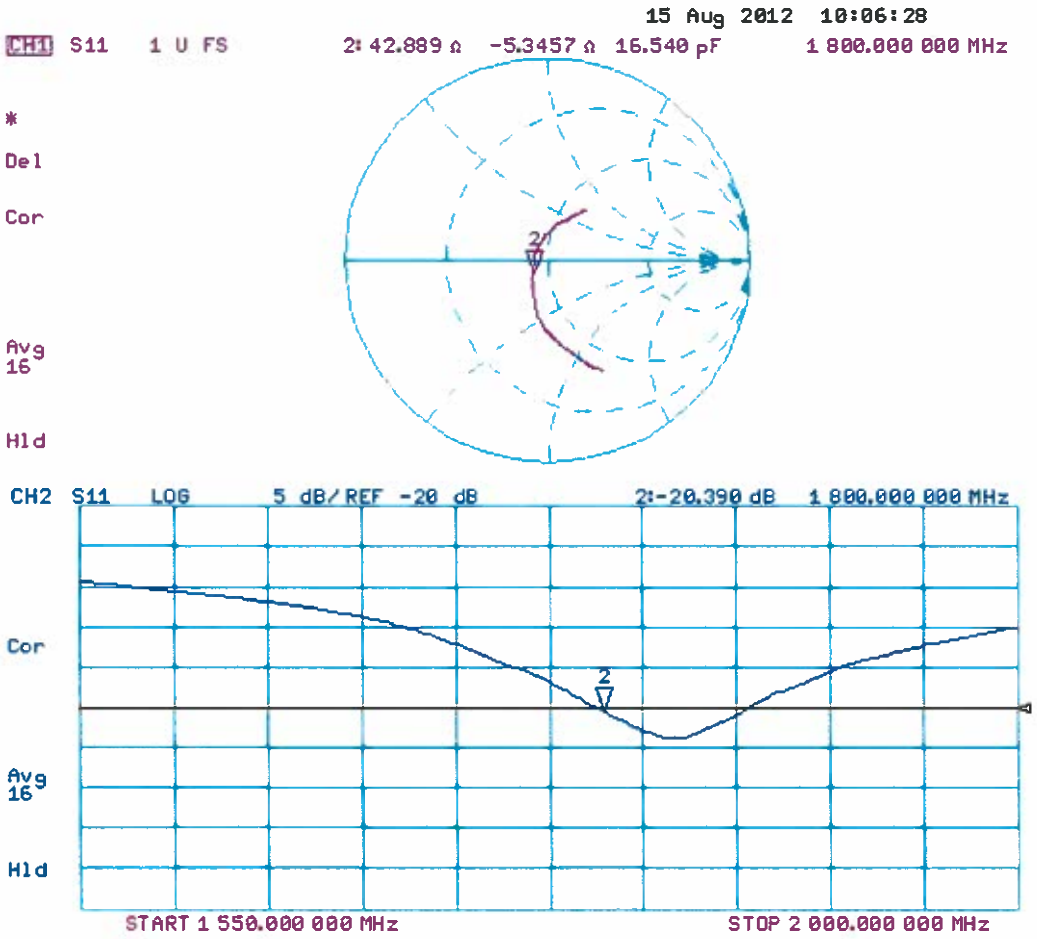
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 92.107 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 16.733 mW/g
SAR(1 g) = 9.5 mW/g; SAR(10 g) = 5.04 mW/g
Maximum value of SAR (measured) = 11.9 W/kg



0 dB = 11.9 W/kg = 21.51 dB W/kg

Impedance Measurement Plot for Body TSL



checked by [signature] Date: 7 Sept 2012

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Accredited by the Swiss Accreditation Service (SAS) ASSET: A2290 **Accreditation No.: SCS 108**
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Client RFI **Certificate No: D1900V2-537_Aug12**

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 537
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	August 14, 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: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13

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	[signature]
Approved by:	Katja Pokovic	Technical Manager	[signature]

Issued: August 14, 2012

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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.

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%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.2
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	39.9 ± 6 %	1.38 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	9.78 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**39.4 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.16 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**20.7 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	52.5 ± 6 %	1.53 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	**40.5 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.37 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**21.4 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.1 Ω - 5.7 jΩ
Return Loss	- 24.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	44.0 Ω - 5.2 jΩ
Return Loss	- 21.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.181 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 22, 2001

DASY5 Validation Report for Head TSL

Date: 14.08.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 537

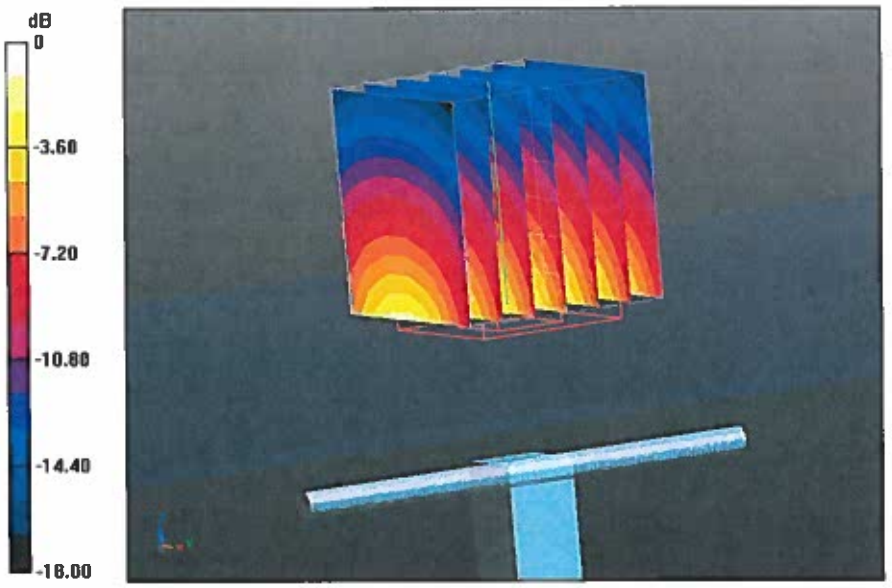
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.38 mho/m; ε_r = 39.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.2(969); SEMCAD X 14.6.6(6824)

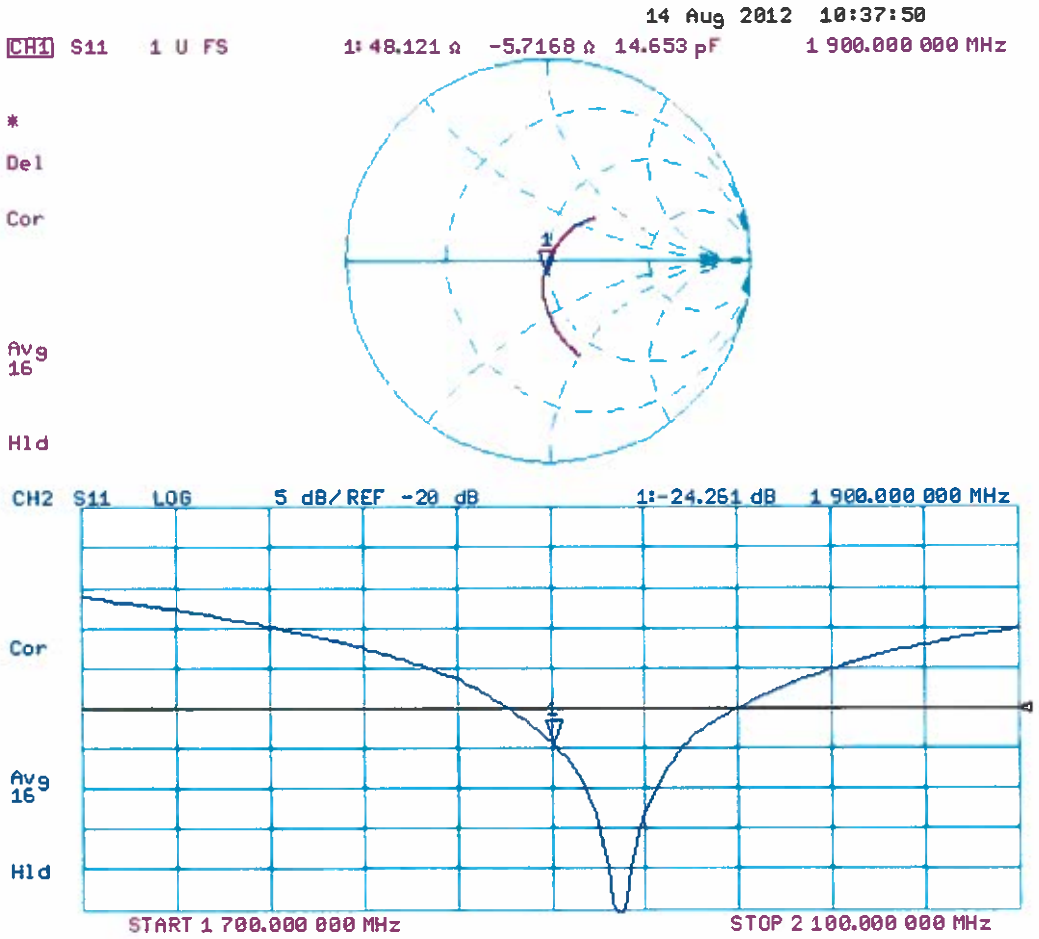
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.874 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 17.436 mW/g
SAR(1 g) = 9.78 mW/g; SAR(10 g) = 5.16 mW/g
Maximum value of SAR (measured) = 11.9 W/kg



0 dB = 11.9 W/kg = 21.51 dB W/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 14.08.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 537

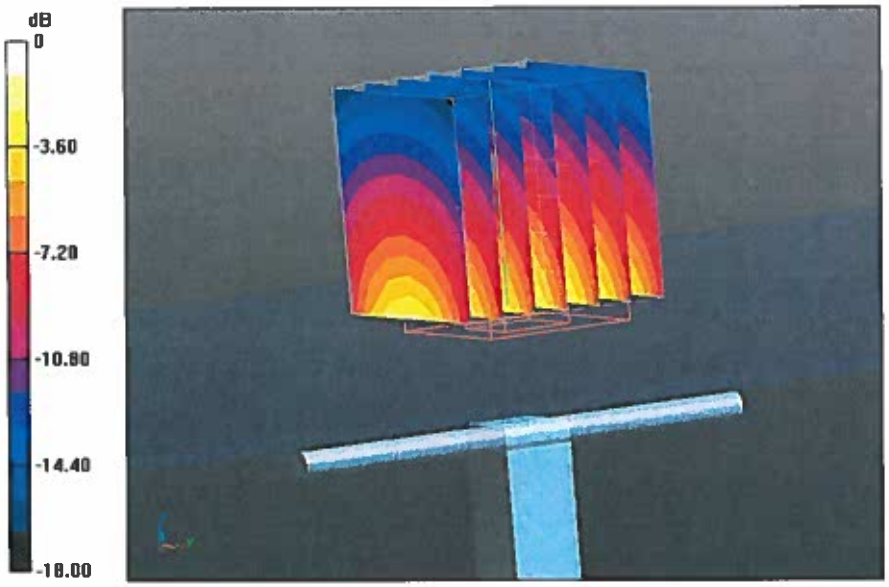
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.53 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.2(969); SEMCAD X 14.6.6(6824)

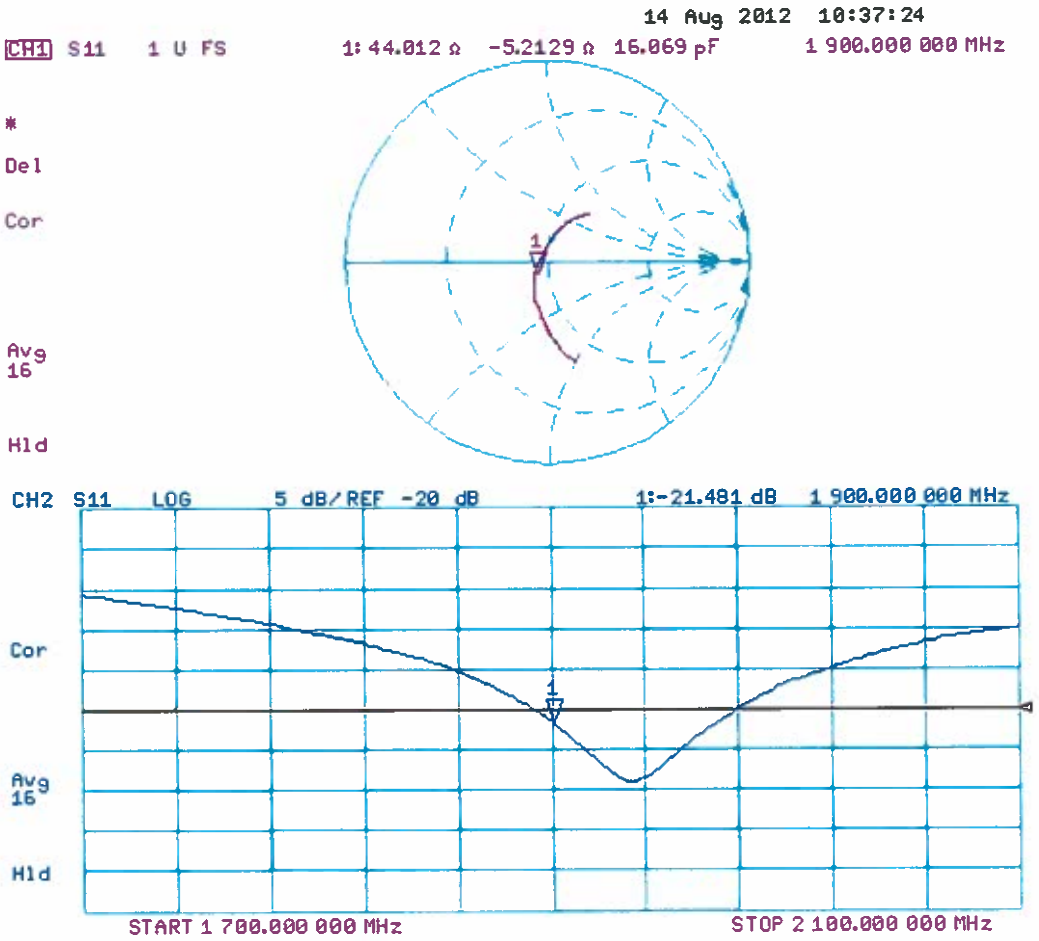
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.874 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 17.899 mW/g
SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.37 mW/g
Maximum value of SAR (measured) = 12.8 W/kg



0 dB = 12.8 W/kg = 22.14 dB W/kg

Impedance Measurement Plot for Body TSL



Checked by [signature] DATE: 7 Sept 2012

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Accreditation No.: SCS 108

Client RFI

Certificate No: D2440V2-701_Aug12

CALIBRATION CERTIFICATE

Object	D2440V2 - SN: 701
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	August 13, 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: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13

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	Israa El-Naouq
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 13, 2012

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.

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%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.2 ± 6 %	1.81 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	13.1 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**52.3 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.06 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**24.2 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	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.3 ± 6 %	1.99 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	13.2 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**52.0 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.09 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**24.1 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.4 Ω - 8.2 jΩ
Return Loss	- 21.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.8 Ω - 6.9 jΩ
Return Loss	- 21.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.141 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	August 24, 2000

DASY5 Validation Report for Head TSL

Date: 13.08.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2440 MHz; Type: D2440V2; Serial: D2440V2 - SN: 701

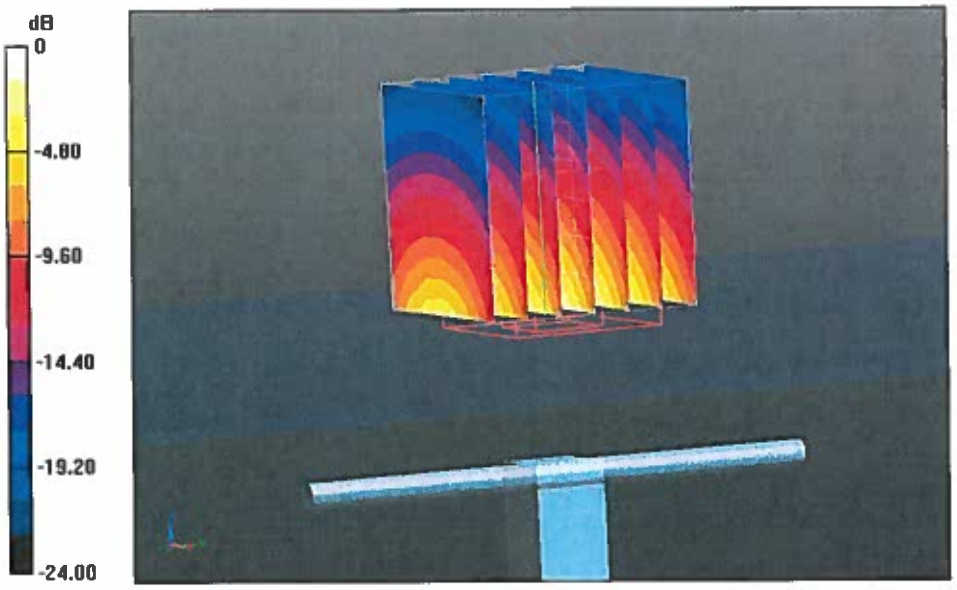
Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.81 mho/m; ε_r = 39.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.2(969); SEMCAD X 14.6.6(6824)

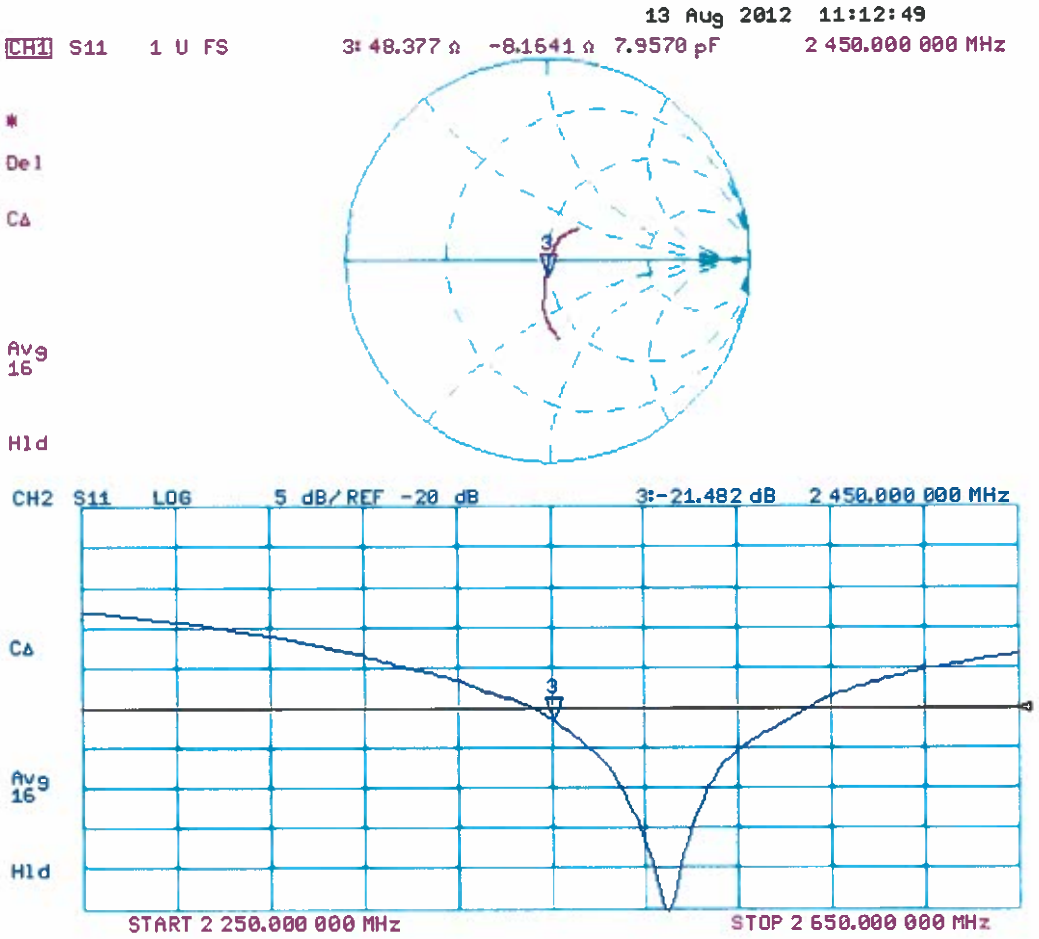
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 99.955 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 27.027 mW/g
SAR(1 g) = 13.1 mW/g; SAR(10 g) = 6.06 mW/g
Maximum value of SAR (measured) = 16.8 W/kg



0 dB = 16.8 W/kg = 24.51 dB W/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 13.08.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2440 MHz; Type: D2440V2; Serial: D2440V2 - SN: 701

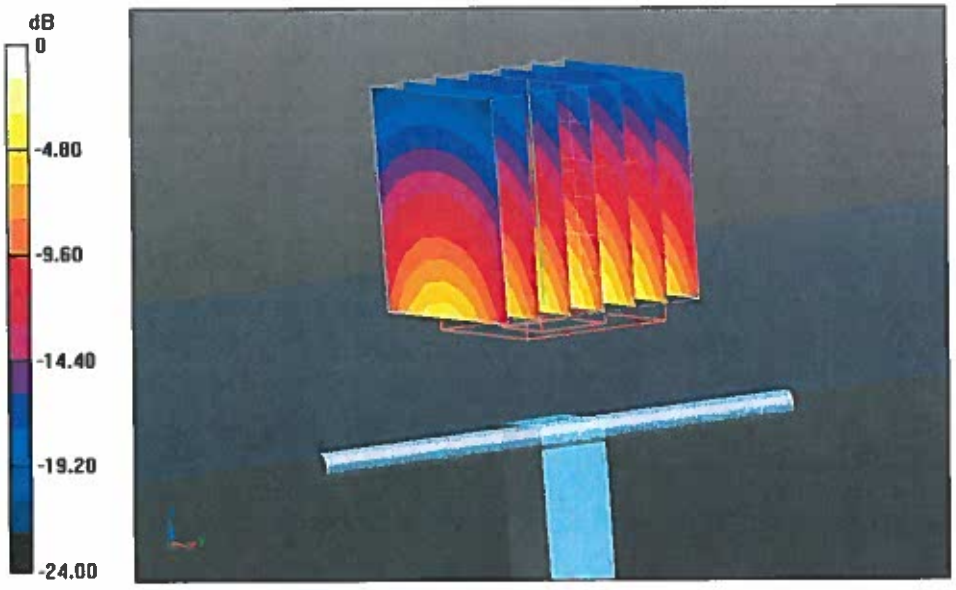
Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.99 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.26, 4.26, 4.26); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.2(969); SEMCAD X 14.6.6(6824)

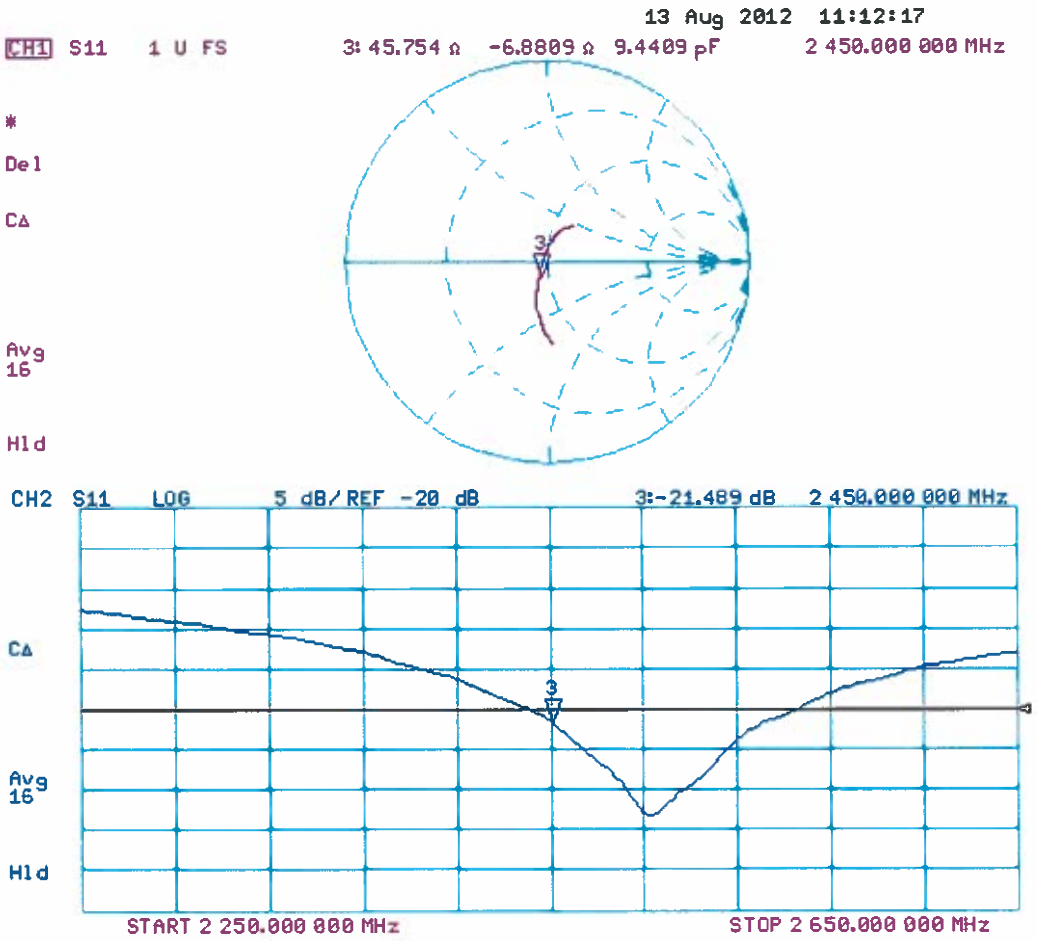
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.149 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 26.944 mW/g
SAR(1 g) = 13.2 mW/g; SAR(10 g) = 6.09 mW/g
Maximum value of SAR (measured) = 17.1 W/kg



0 dB = 17.1 W/kg = 24.66 dB W/kg

Impedance Measurement Plot for Body TSL



checked by: [illegible] DATE: 26-Feb-2013

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Accreditation No.: SCS 108

Client RFI A1377 **Certificate No: D5GHzV2-1016_Feb13**

CALIBRATION CERTIFICATE

Object	D5GHzV2 - SN: 1016
Calibration procedure(s)	QA CAL-22.v2 Calibration procedure for dipole validation kits between 3-6 GHz
Calibration date:	February 20, 2013

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	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.3 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe EX3DV4	SN: 3503	28-Dec-12 (No. EX3-3503_Dec12)	Dec-13
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13

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-12)	In house check: Oct-13

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

Issued: February 20, 2013

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) IEC 62209-2, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation, and Procedures"; Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for including accessories and multiple transmitters", March 2010

b) 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:

c) 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.

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%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.5
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5200 MHz ± 1 MHz 5500 MHz ± 1 MHz 5800 MHz ± 1 MHz	

Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	36.0	4.66 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.7 ± 6 %	4.47 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.88 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**78.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.26 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.3 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	35.6	4.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.2 ± 6 %	4.74 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5500 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.34 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**82.5 W / kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.5 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.3	5.27 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	33.9 ± 6 %	5.05 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.78 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**77.0 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.22 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**21.9 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	49.0	5.30 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.9 ± 6 %	5.36 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5200 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.58 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**75.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.13 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.1 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.6	5.65 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.3 ± 6 %	5.71 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5500 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.98 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**79.0 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.23 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**22.0 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.2	6.00 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	45.9 ± 6 %	6.12 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5800 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.51 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**74.4 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.09 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.6 W/kg ± 19.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	52.7 Ω - 9.7 jΩ
Return Loss	- 20.2 dB

Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	48.5 Ω - 0.8 jΩ
Return Loss	- 35.3 dB

Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	57.1 Ω + 7.1 jΩ
Return Loss	- 20.6 dB

Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	53.2 Ω - 9.1 jΩ
Return Loss	- 20.6 dB

Antenna Parameters with Body TSL at 5500 MHz

Impedance, transformed to feed point	48.7 Ω - 0.2 jΩ
Return Loss	- 37.3 dB

Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	57.1 Ω + 8.7 jΩ
Return Loss	- 19.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.199 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	November 14, 2003

DASY5 Validation Report for Head TSL

Date: 20.02.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1016

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 4.47 S/m; ε_r = 34.7; ρ = 1000 kg/m^3 , Medium parameters used: f = 5500 MHz; σ = 4.74 S/m; ε_r = 34.2; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 5.05 S/m; ε_r = 33.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

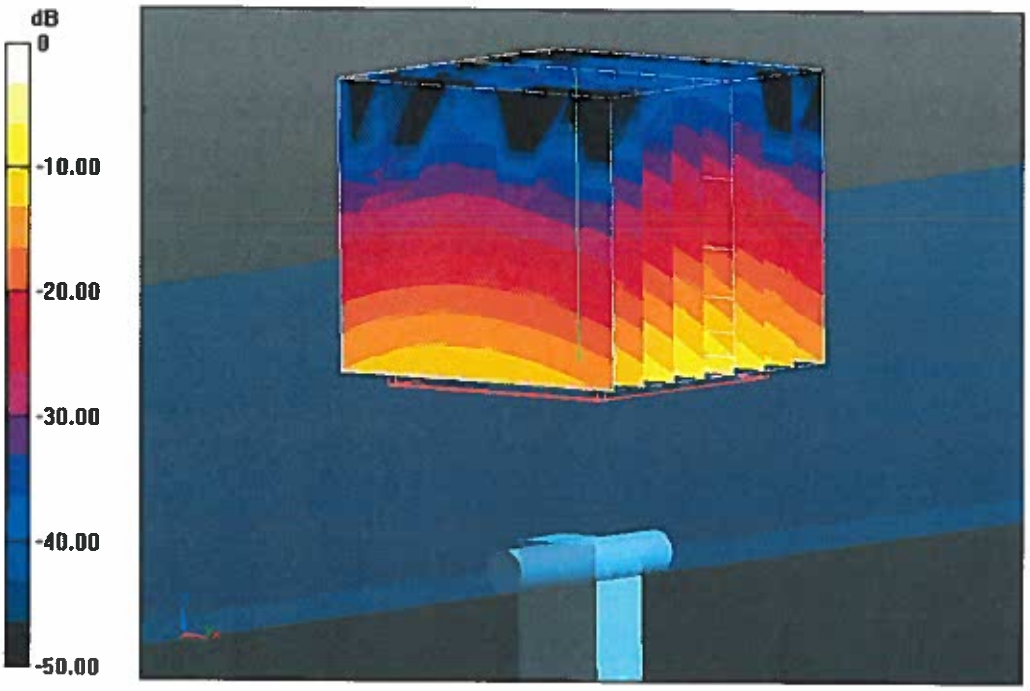
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.41, 5.41, 5.41); Calibrated: 28.12.2012, ConvF(4.91, 4.91, 4.91); Calibrated: 28.12.2012, ConvF(4.81, 4.81, 4.81); Calibrated: 28.12.2012;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 64.875 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 29.2 W/kg
SAR(1 g) = 7.88 W/kg; SAR(10 g) = 2.26 W/kg
Maximum value of SAR (measured) = 18.5 W/kg

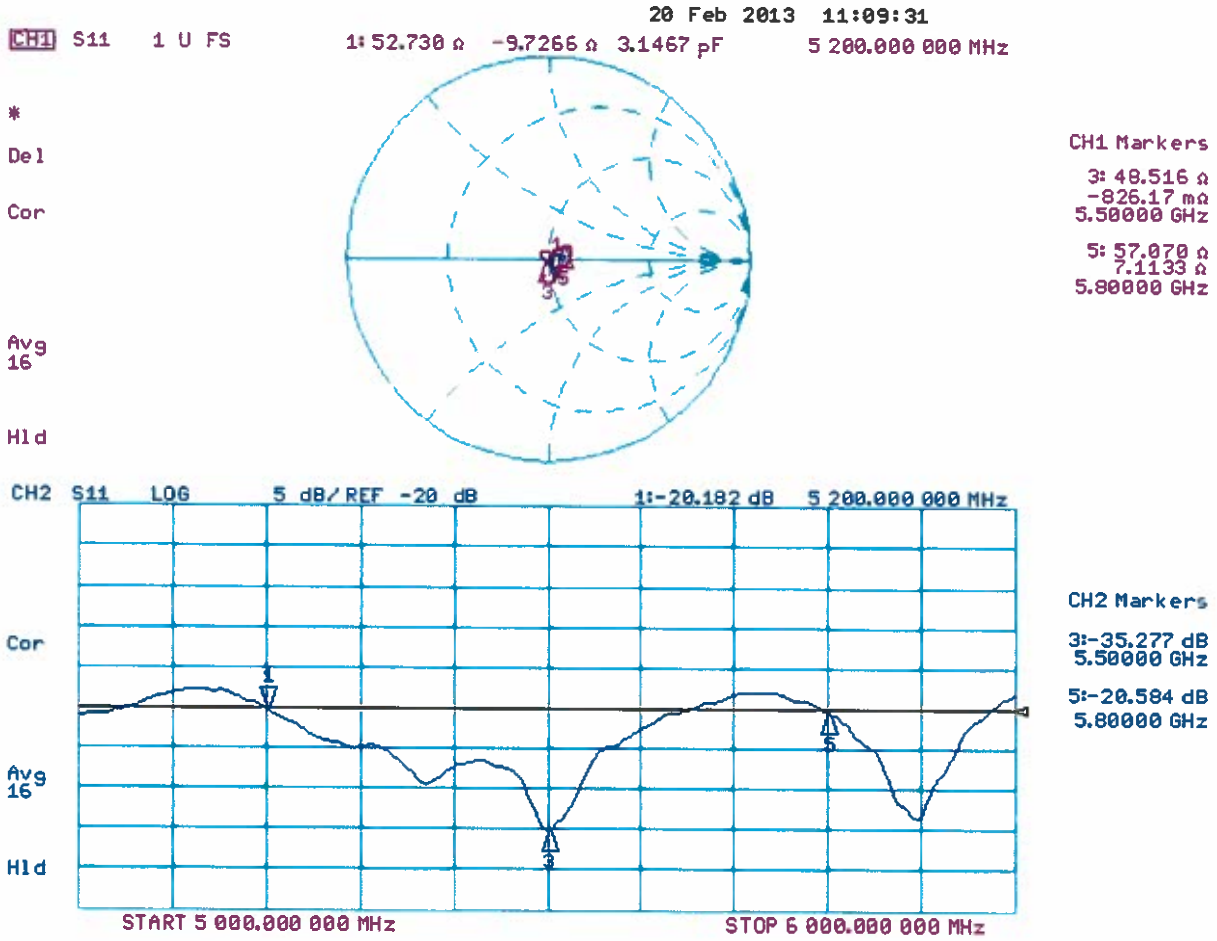
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 65.120 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 33.0 W/kg
SAR(1 g) = 8.34 W/kg; SAR(10 g) = 2.38 W/kg
Maximum value of SAR (measured) = 20.1 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 61.682 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 32.4 W/kg
SAR(1 g) = 7.78 W/kg; SAR(10 g) = 2.22 W/kg
Maximum value of SAR (measured) = 19.1 W/kg



0 dB = 19.1 W/kg = 12.81 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 14.02.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1016

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 5.36 S/m; ε_r = 46.9; ρ = 1000 kg/m^3 , Medium parameters used: f = 5500 MHz; σ = 5.71 S/m; ε_r = 46.3; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 6.12 S/m; ε_r = 45.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

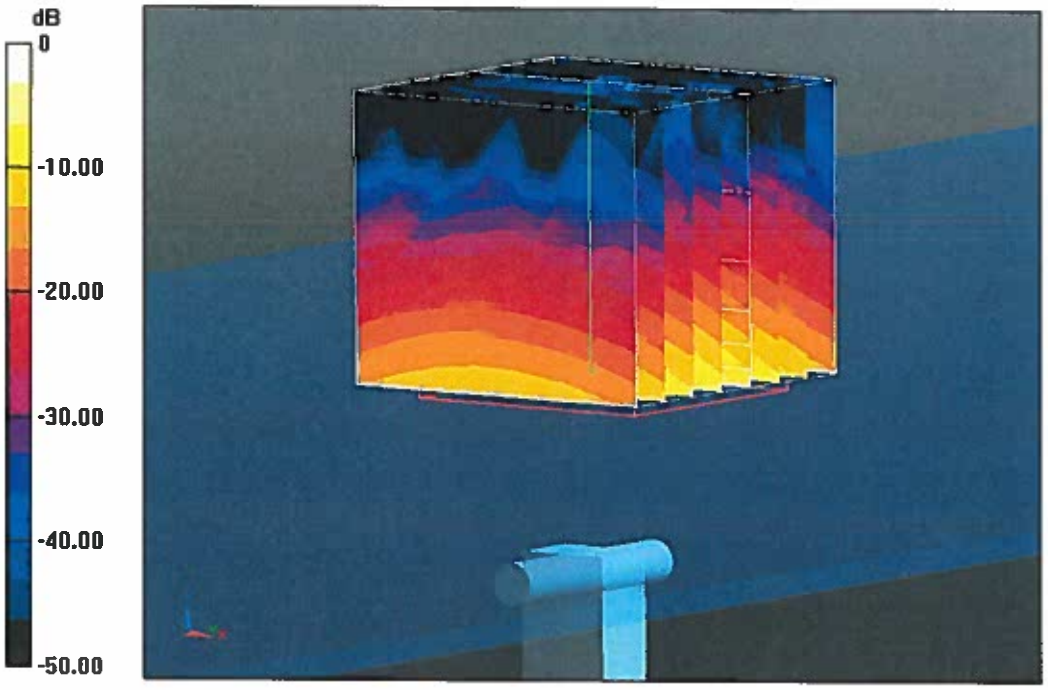
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.91, 4.91, 4.91); Calibrated: 28.12.2012, ConvF(4.43, 4.43, 4.43); Calibrated: 28.12.2012, ConvF(4.38, 4.38, 4.38); Calibrated: 28.12.2012;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 60.072 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 30.6 W/kg
SAR(1 g) = 7.58 W/kg; SAR(10 g) = 2.13 W/kg
Maximum value of SAR (measured) = 18.0 W/kg

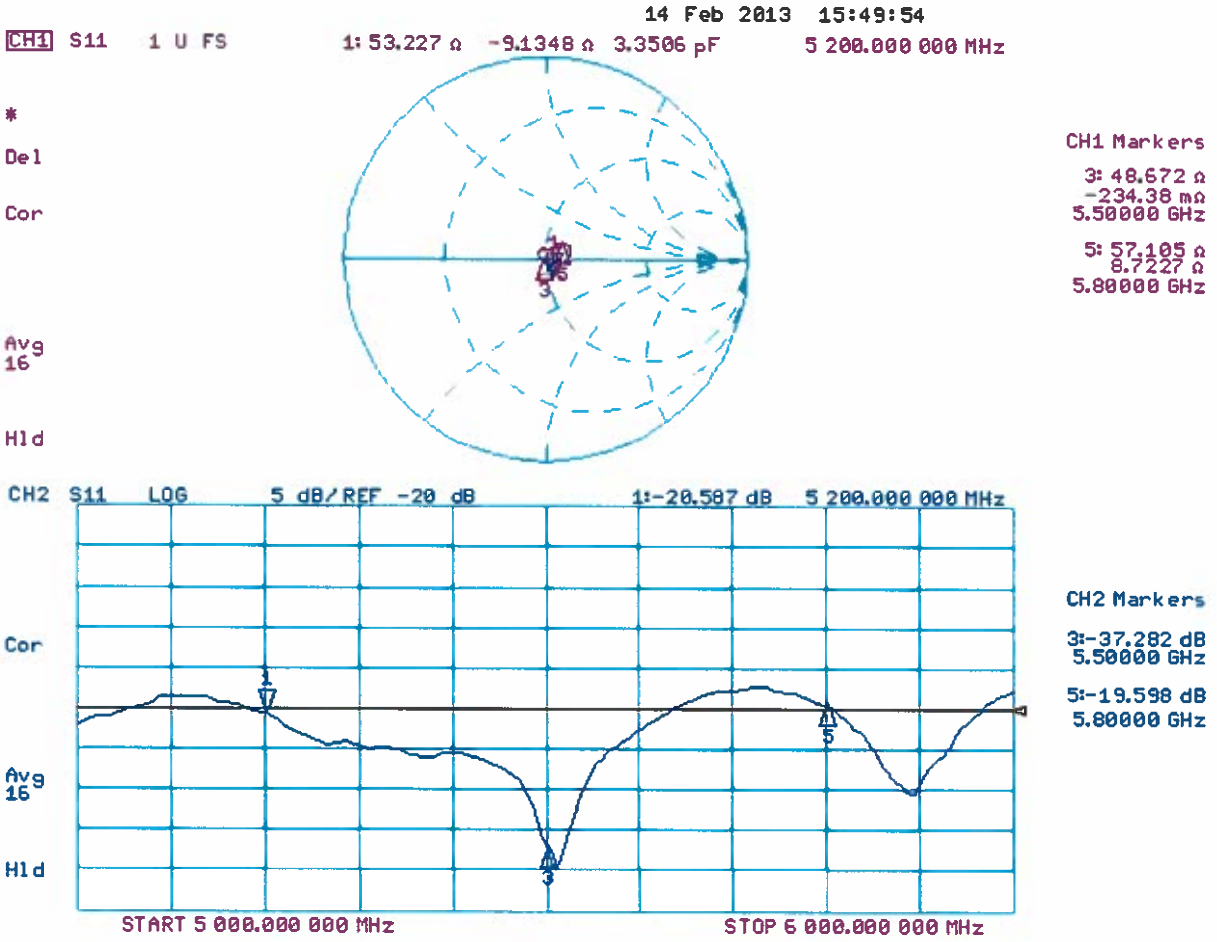
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 59.550 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 35.1 W/kg
SAR(1 g) = 7.98 W/kg; SAR(10 g) = 2.23 W/kg
Maximum value of SAR (measured) = 19.5 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 56.431 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 35.6 W/kg
SAR(1 g) = 7.51 W/kg; SAR(10 g) = 2.09 W/kg
Maximum value of SAR (measured) = 18.8 W/kg



0 dB = 18.8 W/kg = 12.74 dBW/kg

Impedance Measurement Plot for Body TSL



Appendix 2. Measurement Methods & Measurement Uncetainty Tables

A.2.1. Evaluation Procedure

The Specific Absorption Rate (SAR) evaluation was performed in the following manner:

a) (i) The evaluation was performed in an applicable area of the phantom depending on the type of device being tested. For devices worn about the ear during normal operation, both the left and right ear positions were evaluated at the centre frequency of the band at maximum power. The side, which produced the greatest SAR, determined which side of the phantom would be used for the entire evaluation. The positioning of the head worn device relative to the phantom was dictated by the test specification identified in section 3.1 of this report.

(ii) For body worn devices or devices which can be operated within 20 cm of the body, the flat section of the SAM phantom was used were the size of the device(s) is normal. For bigger devices and base station the 2mm Oval phantom is used for evaluation. The type of device being evaluated dictated the distance of the EUT to the outer surface of the phantom flat section.

b) The SAR was determined by a pre-defined procedure within the DASY4 software. The exposed region of the phantom was scanned near the inner surface with a grid spacing of 20mm x 20mm or appropriate resolution.

c) A 5x5x7 matrix for measurement < 2.0 GHz, 7x7x7 matrix for measurement 2.0 GHz to 3.0 GHz, and 7x7x12 for > 5.0 GHz was performed around the greatest spatial SAR distribution found during the area scan of the applicable exposed region. SAR values were then calculated using a 3-D spline interpolation algorithm and averaged over spatial volumes of 1 and 10 grams.

d) If the EUT had any appreciable drift over the course of the evaluation, then the EUT was re-evaluated. Any unusual anomalies over the course of the test also warranted a re-evaluation.

A.2.2. Specific Absorption Rate (SAR) Measurements to OET Bulletin 65 Supplement C: (2001-01)

Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields

SAR measurements were performed in accordance with Appendix D of the standard FCC OET Bulletin 65 Supplement C: 2001, IEEE 1528 and FCC KDB procedures, against appropriate limits for each measurement position in accordance with the standard. In some cases the FCC was contacted using a PBA or KDB process to ensure test is performed correctly.

The test was performed in a shielded enclosure with the temperature controlled to remain between +18.0ºC and +25.0ºC. The tissue equivalent material fluid temperature was controlled to give a maximum variation of ± 2.0ºC

Prior to any SAR measurements on the EUT, system Check and material dielectric property measurements were conducted. In the absence of a detailed procedure within the specification, system Check and material dielectric property measurements were performed in accordance with Appendix C and Appendix D of FCC OET Bulletin 65 Supplement C: 2001 and FCC KDB publication 865664 D01.

Following the successful system Check and material dielectric property measurements, a SAR versus time sweep shall be performed within 10 mm of the phantom inner surface. If the EUT power output is stable after three minutes then the measurement probe will perform a coarse surface level scan at each test position in order to ascertain the location of the maximum local SAR level. Once this area had been established, a 5x5x7 cube of 175 points for frequency below 2.0 GHz, above 2.0GHz up to 3.0 GHz 7x7x7 cube of 343 points and a 7x7x12 cube of 588 points for frequency 5.0 GHz and above will be centred at the area of concern. Extrapolation and interpolation will then be carried out on the 27g of tissue and the highest averaged SAR over a 1g cube determined.

Once the maximum interpolated SAR measurement is complete; the coarse scan is visually assessed to check for secondary peaks within 50% of the maximum SAR level. If there are any further SAR measurements required, extra 5x5x7 or 7x7x7 or 7x7x12 cubes shall be centred on each of these extra local SAR maxima.

At the end of each position test case a second time sweep shall be performed to check whether the EUT has remained stable throughout the test.

A.2.3. Measurement Uncertainty Tables

A.2.3.1. Specific Absorption Rate Uncertainty -GSM 850 / UMTS FDD 5 Head Configuration 1g

Type	Source of uncertainty	+ Value	- Value	Probability Distribution	Divisor	$c_{i\ (1g)}$	Standard Uncertainty		υ_i or υ_{eff}
							+ u (%)	- u (%)	
B	Probe calibration	6.000	6.000	normal (k=1)	1.0000	1.0000	6.000	6.000	∞
B	Axial Isotropy	0.250	0.250	normal (k=1)	1.0000	1.0000	0.250	0.250	∞
B	Hemispherical Isotropy	1.300	1.300	normal (k=1)	1.0000	1.0000	1.300	1.300	∞
B	Spatial Resolution	0.500	0.500	Rectangular	1.7321	1.0000	0.289	0.289	∞
B	Boundary Effect	0.769	0.769	Rectangular	1.7321	1.0000	0.444	0.444	∞
B	Linearity	0.600	0.600	Rectangular	1.7321	1.0000	0.346	0.346	∞
B	Detection Limits	0.200	0.200	Rectangular	1.7321	1.0000	0.115	0.115	∞
B	Readout Electronics	0.160	0.160	normal (k=1)	1.0000	1.0000	0.160	0.160	∞
B	Response Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞
B	Integration Time	1.730	1.730	Rectangular	1.7321	1.0000	0.999	0.999	∞
B	RF Ambient conditions	3.000	3.000	Rectangular	1.7321	1.0000	1.732	1.732	∞
B	Probe Positioner Mechanical Restrictions	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Probe Positioning with regard to Phantom Shell	2.850	2.850	Rectangular	1.7321	1.0000	1.645	1.645	∞
B	Extrapolation and integration / Maximum SAR evaluation	5.080	5.080	Rectangular	1.7321	1.0000	2.933	2.933	∞
A	Test Sample Positioning	2.600	2.600	normal (k=1)	1.0000	1.0000	2.600	2.600	10
A	Device Holder uncertainty	0.154	0.154	normal (k=1)	1.0000	1.0000	0.154	0.154	10
B	Phantom Uncertainty	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Drift of output power	5.000	5.000	Rectangular	1.7321	1.0000	2.887	2.887	∞
B	Liquid Conductivity (target value)	5.000	5.000	Rectangular	1.7321	0.6400	1.848	1.848	∞
A	Liquid Conductivity (measured value)	5.000	5.000	normal (k=1)	1.0000	0.6400	3.200	3.200	5
B	Liquid Permittivity (target value)	5.000	5.000	Rectangular	1.7321	0.6000	1.732	1.732	∞
A	Liquid Permittivity (measured value)	5.000	5.000	normal (k=1)	1.0000	0.6000	3.000	3.000	5
	Combined standard uncertainty			t-distribution			10.24	10.24	>250
	Expanded uncertainty			k = 1.96			20.08	20.08	>250

A.2.3.2. Specific Absorption Rate-GSM / GPRS / EDGE 850 / UMTS FDD 5 Body Configuration 1g

Type	Source of uncertainty	+ Value	- Value	Probability Distribution	Divisor	$c_{i\ (1g)}$	Standard Uncertainty		υ_i or υ_{eff}
							+ u (%)	- u (%)	
B	Probe calibration	6.000	6.000	normal (k=1)	1.0000	1.0000	6.000	6.000	∞
B	Axial Isotropy	0.250	0.250	normal (k=1)	1.0000	1.0000	0.250	0.250	∞
B	Hemispherical Isotropy	1.300	1.300	normal (k=1)	1.0000	1.0000	1.300	1.300	∞
B	Spatial Resolution	0.500	0.500	Rectangular	1.7321	1.0000	0.289	0.289	∞
B	Boundary Effect	0.769	0.769	Rectangular	1.7321	1.0000	0.444	0.444	∞
B	Linearity	0.600	0.600	Rectangular	1.7321	1.0000	0.346	0.346	∞
B	Detection Limits	0.200	0.200	Rectangular	1.7321	1.0000	0.115	0.115	∞
B	Readout Electronics	0.160	0.160	normal (k=1)	1.0000	1.0000	0.160	0.160	∞
B	Response Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞
B	Integration Time	1.730	1.730	Rectangular	1.7321	1.0000	0.999	0.999	∞
B	RF Ambient conditions	3.000	3.000	Rectangular	1.7321	1.0000	1.732	1.732	∞
B	Probe Positioner Mechanical Restrictions	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Probe Positioning with regard to Phantom Shell	2.850	2.850	Rectangular	1.7321	1.0000	1.645	1.645	∞
B	Extrapolation and integration /Maximum SAR evaluation	5.080	5.080	Rectangular	1.7321	1.0000	2.933	2.933	∞
A	Test Sample Positioning	4.200	4.200	normal (k=1)	1.0000	1.0000	4.200	4.200	10
A	Device Holder uncertainty	0.154	0.154	normal (k=1)	1.0000	1.0000	0.154	0.154	10
B	Phantom Uncertainty	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Drift of output power	5.000	5.000	Rectangular	1.7321	1.0000	2.887	2.887	∞
B	Liquid Conductivity (target value)	5.000	5.000	Rectangular	1.7321	0.6400	1.848	1.848	∞
A	Liquid Conductivity (measured value)	5.000	5.000	normal (k=1)	1.0000	0.6400	3.200	3.200	5
B	Liquid Permittivity (target value)	5.000	5.000	Rectangular	1.7321	0.6000	1.732	1.732	∞
A	Liquid Permittivity (measured value)	5.000	5.000	normal (k=1)	1.0000	0.6000	3.000	3.000	5
	Combined standard uncertainty			t-distribution			10.76	10.76	>250
	Expanded uncertainty			k = 1.96			21.09	21.09	>250

A.2.3.3. Specific Absorption Rate- FDD 4 Head Configuration 1g

Type	Source of uncertainty	+ Value	- Value	Probability Distribution	Divisor	$c_{i\ (1g)}$	Standard Uncertainty		υ_i or υ_{eff}
							+ u (%)	- u (%)	
B	Probe calibration	6.000	6.000	normal (k=1)	1.0000	1.0000	6.000	6.000	∞
B	Axial Isotropy	0.250	0.250	normal (k=1)	1.0000	1.0000	0.250	0.250	∞
B	Hemispherical Isotropy	1.300	1.300	normal (k=1)	1.0000	1.0000	1.300	1.300	∞
B	Spatial Resolution	0.500	0.500	Rectangular	1.7321	1.0000	0.289	0.289	∞
B	Boundary Effect	0.769	0.769	Rectangular	1.7321	1.0000	0.444	0.444	∞
B	Linearity	0.600	0.600	Rectangular	1.7321	1.0000	0.346	0.346	∞
B	Detection Limits	0.200	0.200	Rectangular	1.7321	1.0000	0.115	0.115	∞
B	Readout Electronics	0.160	0.160	normal (k=1)	1.0000	1.0000	0.160	0.160	∞
B	Response Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞
B	Integration Time	1.730	1.730	Rectangular	1.7321	1.0000	0.999	0.999	∞
B	RF Ambient conditions	3.000	3.000	Rectangular	1.7321	1.0000	1.732	1.732	∞
B	Probe Positioner Mechanical Restrictions	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Probe Positioning with regard to Phantom Shell	2.850	2.850	Rectangular	1.7321	1.0000	1.645	1.645	∞
B	Extrapolation and integration/ Maximum SAR evaluation	5.080	5.080	Rectangular	1.7321	1.0000	2.933	2.933	∞
A	Test Sample Positioning	4.200	4.200	normal (k=1)	1.0000	1.0000	4.200	4.200	10
A	Device Holder uncertainty	0.154	0.154	normal (k=1)	1.0000	1.0000	0.154	0.154	10
B	Phantom Uncertainty	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Drift of output power	5.000	5.000	Rectangular	1.7321	1.0000	2.887	2.887	∞
B	Liquid Conductivity (target value)	5.000	5.000	Rectangular	1.7321	0.6400	1.848	1.848	∞
A	Liquid Conductivity (measured value)	5.000	5.000	normal (k=1)	1.0000	0.6400	3.200	3.200	5
B	Liquid Permittivity (target value)	5.000	5.000	Rectangular	1.7321	0.6000	1.732	1.732	∞
A	Liquid Permittivity (measured value)	5.000	5.000	normal (k=1)	1.0000	0.6000	3.000	3.000	5
	Combined standard uncertainty			t-distribution			10.76	10.76	>300
	Expanded uncertainty			k = 1.96			21.09	21.09	>300

A.2.3.4. Specific Absorption Rate- FDD 4 Body Configuration 1g

Type	Source of uncertainty	+ Value	- Value	Probability Distribution	Divisor	$c_{i\ (1g)}$	Standard Uncertainty		υ_i or υ_{eff}
							+ u (%)	- u (%)	
B	Probe calibration	6.000	6.000	normal (k=1)	1.0000	1.0000	6.000	6.000	∞
B	Axial Isotropy	0.250	0.250	normal (k=1)	1.0000	1.0000	0.250	0.250	∞
B	Hemispherical Isotropy	1.300	1.300	normal (k=1)	1.0000	1.0000	1.300	1.300	∞
B	Spatial Resolution	0.500	0.500	Rectangular	1.7321	1.0000	0.289	0.289	∞
B	Boundary Effect	0.769	0.769	Rectangular	1.7321	1.0000	0.444	0.444	∞
B	Linearity	0.600	0.600	Rectangular	1.7321	1.0000	0.346	0.346	∞
B	Detection Limits	0.200	0.200	Rectangular	1.7321	1.0000	0.115	0.115	∞
B	Readout Electronics	1.600	1.600	normal (k=1)	1.0000	1.0000	1.600	1.600	∞
B	Response Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞
B	Integration Time	1.730	1.730	Rectangular	1.7321	1.0000	0.999	0.999	∞
B	RF Ambient conditions	3.000	3.000	Rectangular	1.7321	1.0000	1.732	1.732	∞
B	Probe Positioner Mechanical Restrictions	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Probe Positioning with regard to Phantom Shell	2.850	2.850	Rectangular	1.7321	1.0000	1.645	1.645	∞
B	Extrapolation and integration/ Maximum SAR evaluation	5.080	5.080	Rectangular	1.7321	1.0000	2.933	2.933	∞
A	Test Sample Positioning	3.100	3.100	normal (k=1)	1.0000	1.0000	3.100	3.100	10
A	Device Holder uncertainty	0.154	0.154	normal (k=1)	1.0000	1.0000	0.154	0.154	10
B	Phantom Uncertainty	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Drift of output power	5.000	5.000	Rectangular	1.7321	1.0000	2.887	2.887	∞
B	Liquid Conductivity (target value)	5.000	5.000	Rectangular	1.7321	0.6400	1.848	1.848	∞
A	Liquid Conductivity (measured value)	5.000	5.000	normal (k=1)	1.0000	0.6400	3.200	3.200	5
B	Liquid Permittivity (target value)	5.000	5.000	Rectangular	1.7321	0.6000	1.732	1.732	∞
A	Liquid Permittivity (measured value)	5.000	5.000	normal (k=1)	1.0000	0.6000	3.000	3.000	5
	Combined standard uncertainty			t-distribution			10.50	10.50	>250
	Expanded uncertainty			k = 1.96			20.59	20.59	>250

A.2.3.5. Specific Absorption Rate-PCS 1900 / UMTS FDD 2 Head Configuration 1g

Type	Source of uncertainty	+ Value	- Value	Probability Distribution	Divisor	$c_{i\ (1g)}$	Standard Uncertainty		υ_i or υ_{eff}
							+ u (%)	- u (%)	
B	Probe calibration	6.000	6.000	normal (k=1)	1.0000	1.0000	6.000	6.000	∞
B	Axial Isotropy	0.250	0.250	normal (k=1)	1.0000	1.0000	0.250	0.250	∞
B	Hemispherical Isotropy	1.300	1.300	normal (k=1)	1.0000	1.0000	1.300	1.300	∞
B	Spatial Resolution	0.500	0.500	Rectangular	1.7321	1.0000	0.289	0.289	∞
B	Boundary Effect	0.769	0.769	Rectangular	1.7321	1.0000	0.444	0.444	∞
B	Linearity	0.600	0.600	Rectangular	1.7321	1.0000	0.346	0.346	∞
B	Detection Limits	0.200	0.200	Rectangular	1.7321	1.0000	0.115	0.115	∞
B	Readout Electronics	0.160	0.160	normal (k=1)	1.0000	1.0000	0.160	0.160	∞
B	Response Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞
B	Integration Time	1.730	1.730	Rectangular	1.7321	1.0000	0.999	0.999	∞
B	RF Ambient conditions	3.000	3.000	Rectangular	1.7321	1.0000	1.732	1.732	∞
B	Probe Positioner Mechanical Restrictions	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Probe Positioning with Regard to Phantom Shell	2.850	2.850	Rectangular	1.7321	1.0000	1.645	1.645	∞
B	Extrapolation and integration / Maximum SAR evaluation	5.080	5.080	Rectangular	1.7321	1.0000	2.933	2.933	∞
A	Test Sample Positioning	6.500	6.500	normal (k=1)	1.0000	1.0000	6.500	6.500	10
A	Device Holder uncertainty	0.154	0.154	normal (k=1)	1.0000	1.0000	0.154	0.154	10
B	Phantom Uncertainty	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Drift of output power	5.000	5.000	Rectangular	1.7321	1.0000	2.887	2.887	∞
B	Liquid Conductivity (target value)	5.000	5.000	Rectangular	1.7321	0.6400	1.848	1.848	∞
A	Liquid Conductivity (measured value)	5.000	5.000	normal (k=1)	1.0000	0.6400	3.200	3.200	5
B	Liquid Permittivity (target value)	5.000	5.000	Rectangular	1.7321	0.6000	1.732	1.732	∞
A	Liquid Permittivity (measured value)	5.000	5.000	normal (k=1)	1.0000	0.6000	3.000	3.000	5
	Combined standard uncertainty			t-distribution			11.85	11.85	>200
	Expanded uncertainty			k = 2			23.70	23.70	>200

A.2.3.6. Specific Absorption Rate-PCS / GPRS / EDGE 1900 / UMTS FDD 2 Body Configuration 1g

Type	Source of uncertainty	+ Value	- Value	Probability Distribution	Divisor	$c_{i\ (1g)}$	Standard Uncertainty		υ_i or υ_{eff}
							+ u (%)	- u (%)	
B	Probe calibration	6.000	6.000	normal (k=1)	1.0000	1.0000	6.000	6.000	∞
B	Axial Isotropy	0.250	0.250	normal (k=1)	1.0000	1.0000	0.250	0.250	∞
B	Hemispherical Isotropy	1.300	1.300	normal (k=1)	1.0000	1.0000	1.300	1.300	∞
B	Spatial Resolution	0.500	0.500	Rectangular	1.7321	1.0000	0.289	0.289	∞
B	Boundary Effect	0.769	0.769	Rectangular	1.7321	1.0000	0.444	0.444	∞
B	Linearity	0.600	0.600	Rectangular	1.7321	1.0000	0.346	0.346	∞
B	Detection Limits	0.200	0.200	Rectangular	1.7321	1.0000	0.115	0.115	∞
B	Readout Electronics	0.160	0.160	normal (k=1)	1.0000	1.0000	0.160	0.160	∞
B	Response Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞
B	Integration Time	1.730	1.730	Rectangular	1.7321	1.0000	0.999	0.999	∞
B	RF Ambient conditions	3.000	3.000	Rectangular	1.7321	1.0000	1.732	1.732	∞
B	Probe Positioner Mechanical Restrictions	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Probe Positioning with regard to Phantom Shell	2.850	2.850	Rectangular	1.7321	1.0000	1.645	1.645	∞
B	Extrapolation and integration / Maximum SAR evaluation	5.080	5.080	Rectangular	1.7321	1.0000	2.933	2.933	∞
A	Test Sample Positioning	2.800	2.800	normal (k=1)	1.0000	1.0000	2.800	2.800	10
A	Device Holder uncertainty	0.154	0.154	normal (k=1)	1.0000	1.0000	0.154	0.154	10
B	Phantom Uncertainty	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Drift of output power	5.000	5.000	Rectangular	1.7321	1.0000	2.887	2.887	∞
B	Liquid Conductivity (target value)	5.000	5.000	Rectangular	1.7321	0.6400	1.848	1.848	∞
A	Liquid Conductivity (measured value)	5.000	5.000	normal (k=1)	1.0000	0.6400	3.200	3.200	5
B	Liquid Permittivity (target value)	5.000	5.000	Rectangular	1.7321	0.6000	1.732	1.732	∞
A	Liquid Permittivity (measured value)	5.000	5.000	normal (k=1)	1.0000	0.6000	3.000	3.000	5
	Combined standard uncertainty			t-distribution			10.30	10.30	>250
	Expanded uncertainty			k = 1.96			20.18	20.18	>250

A.2.3.7. Specific Absorption Rate-Wi-Fi 2450 MHz Head Configuration 1g

Type	Source of uncertainty	+ Value	- Value	Probability Distribution	Divisor	$c_{i\ (1g)}$	Standard Uncertainty		υ_i or υ_{eff}
							+ u (%)	- u (%)	
B	Probe calibration	6.000	6.000	normal (k=1)	1.0000	1.0000	6.000	6.000	∞
B	Axial Isotropy	0.250	0.250	normal (k=1)	1.0000	1.0000	0.250	0.250	∞
B	Hemispherical Isotropy	1.300	1.300	normal (k=1)	1.0000	1.0000	1.300	1.300	∞
B	Spatial Resolution	0.500	0.500	Rectangular	1.7321	1.0000	0.289	0.289	∞
B	Boundary Effect	0.769	0.769	Rectangular	1.7321	1.0000	0.444	0.444	∞
B	Linearity	0.600	0.600	Rectangular	1.7321	1.0000	0.346	0.346	∞
B	Detection Limits	0.200	0.200	Rectangular	1.7321	1.0000	0.115	0.115	∞
B	Readout Electronics	0.160	0.160	normal (k=1)	1.0000	1.0000	0.160	0.160	∞
B	Response Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞
B	Integration Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞
B	RF Ambient conditions	3.000	3.000	Rectangular	1.7321	1.0000	1.732	1.732	∞
B	Probe Positioner Mechanical Restrictions	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Probe Positioning with regard to Phantom Shell	2.850	2.850	Rectangular	1.7321	1.0000	1.645	1.645	∞
B	Extrapolation and integration / Maximum SAR evaluation	5.080	5.080	Rectangular	1.7321	1.0000	2.933	2.933	∞
A	Test Sample Positioning	2.180	2.180	normal (k=1)	1.0000	1.0000	2.180	2.180	10
A	Device Holder uncertainty	0.154	0.154	normal (k=1)	1.0000	1.0000	0.154	0.154	10
B	Phantom Uncertainty	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Drift of output power	5.000	5.000	Rectangular	1.7321	1.0000	2.887	2.887	∞
B	Liquid Conductivity (target value)	5.000	5.000	Rectangular	1.7321	0.6400	1.848	1.848	∞
A	Liquid Conductivity (measured value)	5.000	5.000	normal (k=1)	1.0000	0.6400	3.200	3.200	5
B	Liquid Permittivity (target value)	5.000	5.000	Rectangular	1.7321	0.6000	1.732	1.732	∞
A	Liquid Permittivity (measured value)	5.000	5.000	normal (k=1)	1.0000	0.6000	3.000	3.000	5
	Combined standard uncertainty			t-distribution			10.10	10.10	>300
	Expanded uncertainty			k = 1.96			19.79	19.79	>300

A.2.3.8. Specific Absorption Rate-Wi-Fi 2450 MHz Body Configuration 1g

Type	Source of uncertainty	+ Value	- Value	Probability Distribution	Divisor	$c_{i\ (1g)}$	Standard Uncertainty		υ_i or υ_{eff}
							+ u (%)	- u (%)	
B	Probe calibration	6.000	6.000	normal (k=1)	1.0000	1.0000	6.000	6.000	∞
B	Axial Isotropy	0.250	0.250	normal (k=1)	1.0000	1.0000	0.250	0.250	∞
B	Hemispherical Isotropy	1.300	1.300	normal (k=1)	1.0000	1.0000	1.300	1.300	∞
B	Spatial Resolution	0.500	0.500	Rectangular	1.7321	1.0000	0.289	0.289	∞
B	Boundary Effect	0.769	0.769	Rectangular	1.7321	1.0000	0.444	0.444	∞
B	Linearity	0.600	0.600	Rectangular	1.7321	1.0000	0.346	0.346	∞
B	Detection Limits	0.200	0.200	Rectangular	1.7321	1.0000	0.115	0.115	∞
B	Readout Electronics	0.160	0.160	normal (k=1)	1.0000	1.0000	0.160	0.160	∞
B	Response Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞
B	Integration Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞
B	RF Ambient conditions	3.000	3.000	Rectangular	1.7321	1.0000	1.732	1.732	∞
B	Probe Positioner Mechanical Restrictions	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Probe Positioning with regard to Phantom Shell	2.850	2.850	Rectangular	1.7321	1.0000	1.645	1.645	∞
B	Extrapolation and integration / Maximum SAR evaluation	5.080	5.080	Rectangular	1.7321	1.0000	2.933	2.933	∞
A	Test Sample Positioning	2.470	2.470	normal (k=1)	1.0000	1.0000	2.470	2.470	10
A	Device Holder uncertainty	0.154	0.154	normal (k=1)	1.0000	1.0000	0.154	0.154	10
B	Phantom Uncertainty	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Drift of output power	5.000	5.000	Rectangular	1.7321	1.0000	2.887	2.887	∞
B	Liquid Conductivity (target value)	5.000	5.000	Rectangular	1.7321	0.6400	1.848	1.848	∞
A	Liquid Conductivity (measured value)	5.000	5.000	normal (k=1)	1.0000	0.6400	3.200	3.200	5
B	Liquid Permittivity (target value)	5.000	5.000	Rectangular	1.7321	0.6000	1.732	1.732	∞
A	Liquid Permittivity (measured value)	5.000	5.000	normal (k=1)	1.0000	0.6000	3.000	3.000	5
	Combined standard uncertainty			t-distribution			10.16	10.16	>250
	Expanded uncertainty			k = 1.96			19.92	19.92	>250

A.2.3.9. Specific Absorption Rate-Wi-Fi 5GHz Head Configuration 1g

Type	Source of uncertainty	+ Value	- Value	Probability Distribution	Divisor	$c_{i\ (1g)}$	Standard Uncertainty		υ_i or υ_{eff}
							+ u (%)	- u (%)	
B	Probe calibration	6.550	6.550	normal (k=1)	1.0000	1.0000	6.550	6.550	∞
B	Axial Isotropy	0.250	0.250	normal (k=1)	1.0000	1.0000	0.250	0.250	∞
B	Hemispherical Isotropy	1.300	1.300	normal (k=1)	1.0000	1.0000	1.300	1.300	∞
B	Spatial Resolution	0.500	0.500	Rectangular	1.7321	1.0000	0.289	0.289	∞
B	Boundary Effect	0.769	0.769	Rectangular	1.7321	1.0000	0.444	0.444	∞
B	Linearity	0.600	0.600	Rectangular	1.7321	1.0000	0.346	0.346	∞
B	Detection Limits	0.200	0.200	Rectangular	1.7321	1.0000	0.115	0.115	∞
B	Readout Electronics	0.160	0.160	normal (k=1)	1.0000	1.0000	0.160	0.160	∞
B	Response Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞
B	Integration Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞
B	RF Ambient conditions	3.000	3.000	Rectangular	1.7321	1.0000	1.732	1.732	∞
B	Probe Positioner Mechanical Restrictions	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Probe Positioning with regard to Phantom Shell	2.850	2.850	Rectangular	1.7321	1.0000	1.645	1.645	∞
B	Extrapolation and integration / Maximum SAR evaluation	5.080	5.080	Rectangular	1.7321	1.0000	2.933	2.933	∞
A	Test Sample Positioning	2.090	2.090	normal (k=1)	1.0000	1.0000	2.090	2.090	10
A	Device Holder uncertainty	0.154	0.154	normal (k=1)	1.0000	1.0000	0.154	0.154	10
B	Phantom Uncertainty	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Drift of output power	5.000	5.000	Rectangular	1.7321	1.0000	2.887	2.887	∞
B	Liquid Conductivity (target value)	5.000	5.000	Rectangular	1.7321	0.6400	1.848	1.848	∞
A	Liquid Conductivity (measured value)	5.000	5.000	normal (k=1)	1.0000	0.6400	3.200	3.200	5
B	Liquid Permittivity (target value)	5.000	5.000	Rectangular	1.7321	0.6000	1.732	1.732	∞
A	Liquid Permittivity (measured value)	5.000	5.000	normal (k=1)	1.0000	0.6000	3.000	3.000	5
	Combined standard uncertainty			t-distribution			10.41	10.41	>400
	Expanded uncertainty			k = 1.96			20.41	20.41	>400

A.2.3.10. Specific Absorption Rate-Wi-Fi 5GHz Body Configuration 1g

Type	Source of uncertainty	+ Value	- Value	Probability Distribution	Divisor	$c_{i\ (1g)}$	Standard Uncertainty		υ_i or υ_{eff}
							+ u (%)	- u (%)	
B	Probe calibration	6.550	6.550	normal (k=1)	1.0000	1.0000	6.550	6.550	∞
B	Axial Isotropy	0.250	0.250	normal (k=1)	1.0000	1.0000	0.250	0.250	∞
B	Hemispherical Isotropy	1.300	1.300	normal (k=1)	1.0000	1.0000	1.300	1.300	∞
B	Spatial Resolution	0.500	0.500	Rectangular	1.7321	1.0000	0.289	0.289	∞
B	Boundary Effect	0.769	0.769	Rectangular	1.7321	1.0000	0.444	0.444	∞
B	Linearity	0.600	0.600	Rectangular	1.7321	1.0000	0.346	0.346	∞
B	Detection Limits	0.200	0.200	Rectangular	1.7321	1.0000	0.115	0.115	∞
B	Readout Electronics	0.160	0.160	normal (k=1)	1.0000	1.0000	0.160	0.160	∞
B	Response Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞
B	Integration Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞
B	RF Ambient conditions	3.000	3.000	Rectangular	1.7321	1.0000	1.732	1.732	∞
B	Probe Positioner Mechanical Restrictions	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Probe Positioning with regard to Phantom Shell	2.850	2.850	Rectangular	1.7321	1.0000	1.645	1.645	∞
B	Extrapolation and integration / Maximum SAR evaluation	5.080	5.080	Rectangular	1.7321	1.0000	2.933	2.933	∞
A	Test Sample Positioning	1.980	1.980	normal (k=1)	1.0000	1.0000	1.980	1.980	10
A	Device Holder uncertainty	0.154	0.154	normal (k=1)	1.0000	1.0000	0.154	0.154	10
B	Phantom Uncertainty	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Drift of output power	5.000	5.000	Rectangular	1.7321	1.0000	2.887	2.887	∞
B	Liquid Conductivity (target value)	5.000	5.000	Rectangular	1.7321	0.6400	1.848	1.848	∞
A	Liquid Conductivity (measured value)	5.000	5.000	normal (k=1)	1.0000	0.6400	3.200	3.200	5
B	Liquid Permittivity (target value)	5.000	5.000	Rectangular	1.7321	0.6000	1.732	1.732	∞
A	Liquid Permittivity (measured value)	5.000	5.000	normal (k=1)	1.0000	0.6000	3.000	3.000	5
	Combined standard uncertainty			t-distribution			10.39	10.39	>400
	Expanded uncertainty			k = 1.96			20.37	20.37	>400