TEST REPORT

Test of: PM-0450-BV

To: OET Bulletin 65 Supplement C: (2001-01)
IEEE1528: 2003

FCC ID: PY7PM-0450

Test Report Serial No:
UL-SAR-RP10014948JD25A V4.0

Version 3.0 superseded all previous report versions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:	**18 July 2013**
Test Dates:	**17 June 2013 to 29 June 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	OET Bulletin 65 Supplement C: (2001-01)	✓
Specific Absorption Rate - PCS 1900	OET Bulletin 65 Supplement C: (2001-01)	✓
Specific Absorption Rate - UMTS FDD 2	OET Bulletin 65 Supplement C: (2001-01)	✓
Specific Absorption Rate - UMTS FDD 4	OET Bulletin 65 Supplement C: (2001-01)	✓
Specific Absorption Rate - UMTS FDD 5	OET Bulletin 65 Supplement C: (2001-01)	✓
Specific Absorption Rate - LTE Band 2	OET Bulletin 65 Supplement C: (2001-01)	✓
Specific Absorption Rate - LTE Band 4	OET Bulletin 65 Supplement C: (2001-01)	✓
Specific Absorption Rate - LTE Band 5	OET Bulletin 65 Supplement C: (2001-01)	✓
Specific Absorption Rate - LTE Band 7	OET Bulletin 65 Supplement C: (2001-01)	✓
Specific Absorption Rate - Wi-Fi 802.11b/g/n 2.4 GHz	OET Bulletin 65 Supplement C: (2001-01)	✓
Specific Absorption Rate- Wi-Fi802.11a/n/ac 5.0 GHz	OET Bulletin 65 Supplement C: (2001-01)	✓

Key to Results ✓ = Complied ✗ = Did not comply

2.1. Highest Standalone Reported SAR

Individual Transmitter Evaluation per Band:

Exposure Configuration	Technology Band	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	0.736	PCE	26.3	0.754
	PCS1900	0.534		23.2	
	UMTS FDD 2	0.647		24.0	
	UMTS FDD 4	0.629		24.5	
	UMTS FDD 5	0.607		24.5	
	LTE Band 2	0.754		23.7	
	LTE Band 4	0.534		23.7	
	LTE Band 5	0.538		23.2	
	LTE Band 7	0.504		23.7	
	WLAN 2.4 GHz	0.079	DTS	17.0	0.079
	WLAN 5.2 / 5.3 / 5.6 GHz	0.017	NII	12.1	0.017
	WLAN 5.8 GHz	0.000	DTS	12.3	0.000

HOTSPOT (Separation Distance 10mm)	GSM850	1.089	PCE	26.6	1.149
	PCS1900	0.855		23.5	
	UMTS FDD 2	1.144		23.5	
	UMTS FDD 4	1.094		23.5	
	UMTS FDD 5	0.792		24.5	
	LTE Band 2	1.149		23.7	
	LTE Band 4	1.057		23.7	
	LTE Band 5	0.578		23.2	
	LTE Band 7	0.608		23.7	
	WLAN 2.4 GHz	0.129	DTS	15.5	0.129
	WLAN 5.2 / 5.3 / 5.6 GHz	0.084	NII	12.6	0.084
	WLAN 5.8 GHz	0.061	DTS	12.3	0.061

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. This is calculated in section 6.3 of this report.

Highest Reported SAR

Individual Transmitter Evaluation per Band:

Exposure Configuration	Technology Band	Highest Reported 1g -SAR (W/kg)	Equipment Class	Max Rated Source base Avg Power + Max Tolerance [dBm]	Highest Reported 1g-SAR (W/kg)
BODY-WORN (Separation Distance 15mm)	GSM850	0.737	PCE	26.3	0.766
	PCS1900	0.466		23.2	
	UMTS FDD 2	0.686		24.0	
	UMTS FDD 4	0.766		24.5	
	UMTS FDD 5	0.656		24.5	
	LTE Band 2	0.674		23.7	
	LTE Band 4	0.707		23.7	
	LTE Band 5	0.452		23.2	
	LTE Band 7	0.289		23.7	
	WLAN 2.4 GHz	0.047	DTS	15.5	0.047
	WLAN 5.2 / 5.3 / 5.6 GHz	0.032	NII	12.6	0.032
	WLAN 5.8 GHz	-	DTS	-	

2.2. Highest Reported Simultaneous Transmission SAR:

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)	LTE Band 2	0.754	PCE	23.7	0.833	N/A
	WLAN 2.4 GHz	0.079	DTS	17.0		
	GSM850[5]	0.736	PCE	26.3	0.753	N/A
	WLAN 5.0 GHz	0.017	NII	12.1		
HOTSPOT (Separation Distance 10mm)	UMTS FDD 2	1.144	PCE	23.5	1.273	N/A
	WLAN 2.4 GHz	0.129	DTS	15.5		
	UMTS FDD 2	1.144	PCE	23.5	1.328	N/A
	Bluetooth	0.184	DSS	9.5		
BODY-WORN (Separation Distance 15mm)	UMTS FDD 4	0.766	PCE	24.5	0.813	N/A
	WLAN 2.4 GHz	0.047	DSS	15.5		
	UMTS FDD 4	0.766	PCE	24.5	0.889	N/A
	Bluetooth	0.123	DSS	9.5		
	UMTS FDD 4	0.766	PCE	24.5	0.798	N/A
	WLAN 5.0 GHz	0.032	NII	12.6		

Note(s):

1. As per FCC KDB 447498 D01, the individual test positions of each exposure conditions were considered separately for the sum of 1g reported SAR Simultaneous Transmission test exclusion. See section 7.4 of this report the most conservative simultaneous transmission analysis.
2. As per FCC KDB publication 447498 SAR peak location separation ratio (SPLSR) was not required as the sume of the combination of WWAN+WLAN and WWAN+WPAN < 1.6 w/kg.
3. Bluetooth estimated SAR level calculation is shown in section 6.3 in this report
4. All the possible simultaneous Transmission supported is included in section 4.6 of this report.
5. The SAR level measured for DTM is considered for simultaneous transmission with NII band, as it is more conservative compared to GSM (voice) on Head configuration.

2.3. SAR measurement variability and 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)	0.971	PCE	26.1	1.08
	GSM850 (Repeated)	0.901			
	UMTS FDD 2 (Original)	1.020		23.0	1.07
	UMTS FDD 2 (Repeated)	0.951			
	UMTS FDD 4 (Original)	0.975		23.0	1.02
	UMTS FDD 4 (Repeated)	0.958			
	LTE Band 2 (Original)	0.978		23.0	1.04
	LTE Band 2 (Repeated)	0.941			
	LTE Band 4 (Original)	0.920		23.1	1.03
	LTE Band 4 (Repeated)	0.893			

Note(s):

1. The following step below were followed were applicable 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):

Bands	Power Back-off Not Supported								
	BW		Target (dBm)						Tolerance ± (dB)
			QPSK			16QAM			
			1RB	50% RB	100% RB	1RB	50% RB	100% RB	
LTE Band 2 (Low, Mid)	1.4MHz		23.0	23.0	22.0	22.0	22.0	21.0	-0.7~ +0.7
	3MHz, 5MHz, 10MHz, 15MHz, 20MHz		23.0	22.0	22.0	22.0	21.0	21.0	-0.7~ +0.7
LTE Band 2 (High)	1.4MHz	L	21.5	21.5	20.5	20.5	20.5	19.5	-0.7~ +0.7
		M	21.5	21.5		20.5	20.5		-0.7~ +0.7
		H	21.5	21.5		20.5	20.5		-0.7~ +0.7
	3MHz	L	21.5	20.5	20.5	20.5	19.5	19.5	-0.7~ +0.7
		M	21.5	20.5		20.5	19.5		-0.7~ +0.7
		H	21.5	20.5		20.5	19.5		-0.7~ +0.7
	5MHz	L	23.0	22.0	22.0	22.0	21.0	21.0	-0.7~ +0.7
		M	21.5	20.5		20.5	19.5		-0.7~ +0.7
		H	21.5	20.5		20.5	19.5		-0.7~ +0.7
	10MHz,	L	23.0	22.0	22.0	22.0	21.0	21.0	-0.7~ +0.7
		M	23.0	22.0		22.0	21.0		-0.7~ +0.7
		H	21.5	22.0		20.5	21.0		-0.7~ +0.7
	15MHz,	L	23.0	22.0	22.0	22.0	21.0	21.0	-0.7~ +0.7
		M	23.0	22.0		22.0	21.0		-0.7~ +0.7
		H	21.5	22.0		20.5	21.0		-0.7~ +0.7
	20MHz	L	23.0	22.0	22.0	22.0	21.0	21.0	-0.7~ +0.7
		M	23.0	22.0		22.0	21.0		-0.7~ +0.7
		H	21.5	22.0		20.5	21.0		-0.7~ +0.7
LTE Band 4	1.4MHz		23.0	23.0	22.0	22.0	22.0	21.0	-0.7~ +0.7
	3MHz, 5MHz, 10MHz, 15MHz, 20MHz		23.0	22.0	22.0	22.0	21.0	21.0	-0.7~ +0.7
LTE Band 5	1.4MHz		22.5	22.5	21.5	21.5	21.5	20.5	-0.7~ +0.7
	3MHz, 5MHz, 10MHz		22.5	21.5	21.5	21.5	20.5	20.5	-0.7~ +0.7
LTE Band 7	5MHz, 10MHz, 15MHz, 20MHz		23.0	22.0	22.0	22.0	21.0	21.0	-0.7~ +0.7

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	14.8	-6.08 ~ +0.7	**2.4GHz 802.11b** (1Mbps)
6	2437.0	16.3	-6.08 ~ +0.7	
11	2462.0	14.3	-6.08 ~ +0.7	
1	2412.0	14.8	-6.08 ~ +0.7	**2.4GHz 802.11b** (11Mbps)
6	2437.0	16.3	-6.08 ~ +0.7	
11	2462.0	14.3	-6.08 ~ +0.7	
1	2412.0	12.9	-6.08 ~ +0.7	**2.4GHz 802.11g** (6Mbps)
6	2437.0	14.4	-6.08 ~ +0.7	
11	2462.0	12.4	-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	12.4	-6.08 ~ +0.7	**2.4GHz 802.11n** (MCS0 6.5Mbps)
6	2437.0	13.9	-6.08 ~ +0.7	
11	2462.0	11.9	-6.08 ~ +0.7	
1	2412.0	10.5	-6.08 ~ +0.7	**2.4GHz 802.11n** (MCS7 65Mbps)
6	2437.0	12.0	-6.08 ~ +0.7	
11	2462.0	10.0	-6.08 ~ +0.7	

Nominal and Maximum Output power (Continued):

Wi-Fi802.11a (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	

Nominal and Maximum Output power (Continued):

Wi-Fi802.11n / WiFi 802.11ac (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/ Wi-Fi802.11ac (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	

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 v01, 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:	OET Bulletin 65 Supplement C: (2001-01)
Title:	Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.
Purpose of Test:	To determine whether the equipment met the basic restrictions as defined in OET Bulletin 65 Supplement C: (2001-01) using the SAR averaging method as described in the test specification above.

The Equipment Under Test complied with the Specific Absorption Rate for general population/uncontrolled exposure limit of 1.6 W/kg as specified in FCC 47 CFR part 2 (2.1093) and ANSI C95.1-1992 and has been tested in accordance with the reference documents in section 3.2 of this report.

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.

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.

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

FCC KDB Publication:

KDB 248227 D01 SAR measurements for 802.11a/b/g v01r02

KDB 447498 D01 General RF Exposure Guidance v05r01

KDB 648474 D04 Handset SAR v01r01

KDB KDB 941225 D01 SAR test for 3G devices v02

KDB 941225 D03 SAR Test Reduction GSM/GPRS/EDGE v01

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

KDB 941225 D05 SAR for LTE Devices v02r02

KDB 941225 D06 Hotspot Mode SAR v01r01

KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r01

KDB865664 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									
Type Number:	PM-0450-BV									
Serial Number:	CB5124TU3A	CB5124TU27	CB5124TU2V	CB5124TU1Q	CB5124TU0W	CB5124TU29	CB5124TU0F	CB5124TUAB	CB5124TUDR	CB5124TU3N
IMEI Number:	00440245-121711-5	00440245-121738-8	00440245-121730-5	00440245-121707-3	00440245-121715-6	00440245-121741-2	00440245-121743-8	00440245-121632-3	00440245-121633-1	00440245-121545-7
Hardware Version Number:	AP2.0									
Software Version Number:	14.1.G.1.184				s_atp_honami_1_25_1					
FCC ID Number:	PY7PM-0450									
Country of Manufacture:	China									
Date of Receipt:	17 June 2013									

Note(s):

1. IMEI: 00440245-121711-5 used to perform GSM850 and PCS1900 SAR measurements only.
2. IMEI: 00440245-121738-8 used to perform UMTS FDD 2, 4 and 5 SAR measurements only.
3. IMEI: 00440245-121730-5 used to perform LTE Band 2 (20MHz), LTE 4(20MHz), LTE Band 5(10MHz) and LTE Band 7 Body SAR measurements only.
4. IMEI: 00440245-121707-3 used to perform LTE Band 2 (1.4MHz), LTE 4(1.4MHz), LTE Band 5(1.4MHz) and LTE Band 7 Head SAR measurements only.
5. IMEI: 00440245-121715-6 used to perform WLAN 2.4GHz SAR measurements only.
6. IMEI: 00440245-121741-2 used to perform WLAN 5GHz SAR measurements only.
7. IMEI: 00440245-121743-8 used to perform WLAN 5GHz SAR measurements only.
8. IMEI: 00440245-121632-3 used to perform WWAN conducted power measurements only.
9. IMEI: 00440245-121633-1 used to perform WLAN conducted power measurements
10. MEI: 00440245-121545-7 used to perform WLAN conducted power measurements
11. *Auto RF Power Back-off' mode facility is available on 'Hotspot Mode Configuration of UMTS FDD 2 and UMTS FDD 4 bands only. Power Back off function is implemented to reduce the maximum output power to keep the value with in safe SAR limit. 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/LTE mobile phone with integrated antenna and inbuilt Li-Polymer battery. The EUT supports GSM 850/900/1800/1900MHz bands, WCDMA FDD bands 1/2/4/5/8 and LTE FDD bands 1/2/3/4/5/7/8/20. It also supports GPRS service with multi-slots class 33 and EGPRS service with multi-slots class 33 too. The EUT supports HSPA with HSDPA (Categoray 24) and HSUPA (Category 6), LTE Release 9. 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' and RFID mode 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	Personal Hands-Free Kit (PHF)	Dummy Battery
Brand Name:	None Stated (Generic)	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	Dedicated 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	Communication Test Set	Communication Test Set
Brand Name:	Agilent	Agilent	Agilent	Agilent	Anritsu
Model Name or Number:	8960 Series 10 (E5515C)	8960 Series 10 (E5515E)	8960 Series 10 (E5515E)	E6621A (PXT)	MT8820C
Serial Number:	GB46311280	GB46200666	MY52112050	KR50230109	6200938937
Cable Length and Type:	~4.0m Utiflex Cable	~4.0m Utiflex Cable	~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	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, GPRS, EDGE Data
	3G UMTS Band	FDD 2 / 4 / 5 Cat24	RMC12.2 / HSDPA / HSPA Data
	4G LTE Band	FDD 2 / 4 / 5 / 7	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, LTE , WiFi and *Bluetooth* Coverage		
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.	
	LTE Band 2	Communication Test Set configured to allow to EUT to transmit at a maximum power as per KDB 941225 D05.	
	LTE Band 4	Communication Test Set configured to allow to EUT to transmit at a maximum power as per KDB 941225 D05.	
	LTE Band 5	Communication Test Set configured to allow to EUT to transmit at a maximum power as per KDB 941225 D05.	
	LTE Band 7	Communication Test Set configured to allow to EUT to transmit at a maximum power as per KDB 941225 D05.	
	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 16.5Bm.	
	5.0 GHz Wi-Fi 802.11a/n/ac (HT20 / HT40 / HT80)	Test Software was used to configure the EUT to transmit at a maximum power of up to 12.9Bm.	
	Bluetooth	:= 8.91 mW or ~9.5 dBm	

Additional Information Related to Testing (Continued):

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
	LTE Band 2	1850 to 1910 MHz
	LTE Band 4	1710 to 1755 MHz
	LTE Band 5	824 to 844 MHz
	LTE Band 7	2502 to 2568 MHz
	2.4 GHz Wi-Fi 802.11b/g/n	2412 to 2462 MHz
	5.0 GHz Wi-Fi 802.11a/n (HT20 / HT40)	5180 to 5825 MHz

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
	LTE Band 2	18700(20MHz)	Low	1860.0
		18900(20MHz)	Middle	1880.0
		19100(20MHz)	High	1900.0
		18607(1.4MHz)	Low	1850.7
		18900(1.4MHz)	Middle	1880.0
		19193(1.4MHz)	High	1908.5

Additional Information Related to Testing (Continued)

Transmitter Frequency Allocation of EUT When Under Test:

Bands	Channel Number	Channel Description	Frequency (MHz)
LTE Band 4	20050(20MHz)	Low	1720.0
	20175(20MHz)	Middle	1732.5
	20300(20MHz)	High	1745.0
	19957(1.4MHz)	Low	1710.7
	20175(1.4MHz)	Middle	1732.5
	20393(1.4MHz)	High	1754.3
LTE Band 5	20450(10MHz)	Low	829.0
	20525(10MHz)	Middle	836.5
	20600(10MHz)	High	844.0
	20407(1.4MHz)	Low	824.7
	20525(1.4MHz)	Middle	836.5
	20643(1.4MHz)	High	848.3
LTE Band 7	20850(20MHz)	Low	2510.0
	21100(20MHz)	Middle	2535.0
	21350(20MHz)	High	2560.0

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/ GPRS):	217 Hz
	QPSK(UMTS / HSDPA/HSPA):	0Hz
	DBPSK, BPSK, CCK (Wi-Fi):	0 Hz
	FDD (QPSK/ 16QAM):	0 Hz
Modulation Scheme (Crest Factor):	GMSK (DTM 11):	2.67
	GMSK (GPRS850/GPRS1900):	2
	DBPSK, BPSK, CCK (Wi-Fi):	1
	QPSK(UMTS FDD / HSDPA):	1
	FDD (QPSK/ 16QAM):	1
Antenna Type:	Internal integral	
Antenna Length:	Unknown	
Number of Antenna Positions:	WWAN ~ LTE / UMTS / GSM	1 fixed
	WWAN Diversity ~ LTE / UMTS / GPS	1 fixed
	WLAN/ BT	1 fixed
	NFC/Felica	1 fixed
Power Supply Requirement:	4.2 V	
Battery Type(s):	Embedded Li-ion	

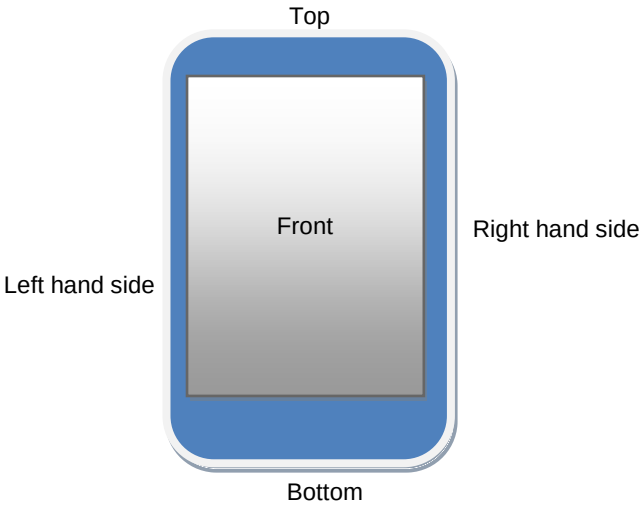
Additional Information Related to LTE Test parameter

#	Description	Parameter
1	Identify the operating frequency range of each LTE transmission FCC band used by the device	Band 2: frequency range – 1850 MHz– 1910 MHz Band 4: frequency range – 1710 MHz– 1755 MHz Band 5: frequency range – 824 MHz– 849 MHz Band 7: frequency range – 2502 to 2568 MHz
2	Identify the channel bandwidths used in each frequency band; e.g.: 1.4, 3, 5, 10, 15, 20 MHz etc.	Channel Bandwidths used are: B2 (1.4, 3, 5, 10, 15, 20) MHz B4 (1.4, 3, 5, 10, 15, 20) MHz B5 (1.4, 3, 5, 10) MHz B7 (5, 10, 15, 20) MHz
3	Identify the high, middle and low (L, M, H) channel numbers and frequencies tested in each LTE frequency band	B2 -20 MHz (H,M,L)= (18700, 18900, 19100) (1860, 1880, 1900) MHz B2 -1.4MHz (H,M,L)= (18607, 18900, 19193) (1850.7, 1880, 1908.5) MHz B4 -20 MHz (H,M,L)= (20050, 20175, 204300) (1720, 1732.5, 1745) MHz B4 -1.4MHz (H,M,L)= (19957, 20175, 20393) (1710.7, 1732.5, 1754.3) MHz B5 -10MHz (H,M,L)= (20600, 20525, 20450) (844.0, 836.5, 829.0) MHz B5 -1.4 MHz (H,M,L)= (20643, 20525, 20407) (848.3, 836.5, 824.7) MHz B7 -20MHz (H,M,L)= (20850, 21100, 21350) (2510, 2530, 2560) MHz
4	Specify the UE category and uplink modulations used	The UE Category is 3 and the Uplink modulations used are QPSK, 16QAM.

Additional Information Related to LTE Test parameter (Continued):

#	Description	Parameter
5	Descriptions of the LTE transmitter and antenna implementation & identify whether it is a standalone transmitter operating independently of other wireless transmitters in the device or sharing hardware components and/or antenna(s) with other transmitters etc.	This model (PM-0450-BV) has only one main antenna for LTE/UMTS/GSM bands (plese see appendix 10).

Additional Information Related to LTE Test parameter (Continued):

#	Description	Parameter
6	Identify the LTE Band Voice/data requirements in each operating mode and exposure condition with respect to head and body test configurations, antenna locations, handset flip-cover or slide positions, antenna diversity conditions, etc.	The following exposure condition with respect to head and body test are required for both voice and data modes due to EUT functionality and antenna locations. 1) Body-worn SAR is required at 15 mm separation distance 2) Mobile Hot Spot Mode will be tested by positioning the smart phone with 10 mm separation distance. - Wireless Personal Hotspot mode with consideration for the Front Display of EUT, Back of EUT, Left Hand side of EUT, Right Hand side of EUT, Top Edge of EUT and Bottom Edge of EUT with respect to the antenna location. The test separation distance between the EUT edge and phantom flat surface for this mode will be 10mm as the dimensions of the device is > 9cm x 5cm. 3) Head SAR is required in LTE mode as this model supports SVLTE operation. 
7	Identify if Maximum Power Reduction (MPR) is optional or mandatory, i.e. built-in by design: a) only mandatory MPR may be considered during SAR testing, when the maximum output power is permanently limited by the MPR implemented within the UE; and only for the applicable RB (resource block) configurations specified in LTE standards b) A-MPR (additional MPR) must be Not Supported.	The EUT incorporates MPR as per 36.101 as shown in the section 7.2. MPR cannot be Not Supported after the phone is manufactured, MPR is mandatory. * Target MPR
8	Include the maximum average conducted output power measured on the required test channels for each channel bandwidth and UL modulation used in each frequency band: a) using 1 RB allocated at the low edge, centered and high edge of a channel b) using 50% RB allocated at the low edge, centered and high edge of a channel c) using 100% RB allocation	This is included in the section 7.2 of this report.

Additional Information Related to LTE Test parameter (Continued):

#	Description	Parameter
9	Identify all other U.S. wireless operating modes (3G, Wi-Fi, WiMax, Bluetooth etc), device/exposure configurations (head and body, antenna and handset flip-cover or slide positions, antenna diversity conditions etc.) and frequency bands used for these modes	The following bands are supported for the exposure conditions 1) GSM (850/1900) and UMTS FDD (850, 1700, 1900) - Exposure conditions: Head/Body worn SAR required for GSM / UMTS FDD and wireless personal hotspot. DTM is supported. 2) Bluetooth 2.4GHz (Basic Rate & EDR) - Exposure conditions: BT SAR is not required as maximum output power < 19 mW threshold value for separation distance of 10mm & antenna separation distance > 5cm. 3) WiFi 2.4GHz - Exposure conditions: Head/Body SAR required for wireless personal hotspot. No power reduction. 4) WiFi 5 GHz - Exposure conditions: Head/Body SAR required for wireless personal hotspot. No power reduction
10	Include the maximum average conducted output power measured for the other wireless mode and frequency bands	This is included in the section 7.2 of this report.
11	Identify the simultaneous transmission conditions for the voice and data configurations supported by all wireless modes, device configurations and frequency bands, for the head and body exposure conditions and device operating configurations (handset flip or cover positions, antenna diversity conditions etc.)	

Simultaneous Transmission Combination:

	WWAN					WLAN		WPAN
	LTE Voice/ Data	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					X
10					X			X
11		X DTM	X DTM			X		
12		X						X
13				X				X

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 Combination:

	WiFi Hotspot Combinations Only				
	WWAN			WLAN	
	LTE Band Voice/Data	GPRS/EDGE Data	UMTS Data	WiFi 2.4GHz	WiFi 5GHz
1	X			X	O
2		X		X	O
3			X	X	O

Additional Information Related to LTE Test parameter (Continued):

#	Description	Parameter
12	When power reduction is applied to certain wireless modes to satisfy SAR compliance for simultaneous transmission conditions, other equipment certification or operating requirements, include the maximum average conducted output power measured in each power reduction mode applicable to the simultaneous voice/data transmission configurations for such wireless configurations and frequency bands; and also include details of the power reduction implementation and measurement setup	Not applicable.
13	Include descriptions of the test equipment, test software, built-in test firmware etc. required to support testing the device when power reduction is applied to one or more transmitters/antennas for simultaneous voice/data transmission	Anritsu MT8820C and Agilent PXT communication simulator Communication tester which support LTE modes (voice/data) were used for testing.
14	When appropriate, include a SAR test plan proposal with respect to the above.	Not Applicable
15	If applicable, include preliminary SAR test data and/or supporting information in laboratory testing inquiries to address specific issues and concerns or for requesting further test reduction considerations appropriate for the device; for example simultaneous transmission configurations.	Not Applicable

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 DCHSDPA 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	12.61	4.06
2 uplink	15.44	5.12
3 uplink	17.49	5.03
4 uplink	**18.42**	**5.21**

DTM Mode	GSM850 Power reference (v/m)	PCS1900 Power reference (v/m)
DTM 5(2uplink, 2downlink)	14.47	4.43
DTM 9(2 uplink, 3 downlink)	14.69	4.40
DTM 11(3 uplink, 2 downlink)	**16.52**	**5.16**

Note:
Power reference point measurements are from the DASY4 system and used to check the device power drift although the units are v/m. For informational purpose to ensure the worst case uplink time slot is also verified by the DASY4 SAR system, this was use as per above comment at a fixed point.

6. Operation and Configuration of the EUT during Testing

6.1. Operating Modes

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

- GSM850 – DTM 11 mode with Communication Test Set configured to allow the EUT to transmit at a maximum power using Power Control Level (PCL) setting of 5.
- 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 11 mode with Communication Test Set configured to allow the EUT to transmit at a maximum power using Power Control Level (PCL) setting of 0.
- 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 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 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 Call 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 + 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 + 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 - 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)
- LTE Band 2 and LTE Band 4 data allocated mode at QPSK on the 1.4MHz BW and 20MHz BW channels, using a Communication Test Set configured to allow to EUT to transmit at a maximum power as per KDB 941225 D05.
- LTE Band 5 data allocated mode at QPSK on the 1.4MHz BW and 10MHz BW channels, using a Communication Test Set configured to allow to EUT to transmit at a maximum power as per KDB 941225 D05.
- LTE Band 7 data allocated mode at QPSK on the 10MHz BW channels, using a Communication Test Set configured to allow to EUT to transmit at a maximum power as per KDB 941225 D05.
- 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 16.5 dBm for ‘b’ mode and 14.5 dBm for ‘g’ and 14.1 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 12.9dBm for ‘a’ mode, 12.1 dBm for ‘n’ mode and 11.8dBm for ‘ac’ mode.
- For LTE testing, as per KDB 941225 D05, when the maximum average conducted output power for a smaller channel Bandwidth is >0.5 dB higher than that measured for the highest channel Bandwidth, the largest channel Bandwidth test procedures are applied to the smaller channel Bandwidth. Hence, for LTE Band 2, LTE Band 4 and LTE Band 5 testing was performed on both largest channel Bandwidth and 1.4MHz channel Bandwidth.
- 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. This option is available in the device to
- ‘Reduce the RF Power’ and to comply with the Standard for the measured SAR and conducted power level. 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 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 setup 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 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.
- DTM Class11, GPRS 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.
2. Bluetooth standalone SAR is excluded as the output power meets the exclusion threshold:

"

1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:

[(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] · [$\sqrt{f_{(GHz)}}$] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR,[16] where

- $f_{(GHz)}$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation[17]
- The result is rounded to one decimal place for comparison

" **Taken from FCC KDB publication 447498 D01v05**

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
LTE Band 2	No	No	No
LTE Band 4	No	No	No
LTE Band 5	No	No	No
LTE Band 7	No	No	No
WLAN 2.4 GHz	No	No	No
WLAN 5.0 GHz	No	No	No
Bluetooth	N/A	Yes	Yes

Note:

1. As per KDB 447498 D01 General RF Exposure Guidance v05, The Frequency Bands with Rated Power including Upper tolerance, which qualify for **Standalone SAR Test Exclusion,** are as per the above table.

   The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
   [(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] * [$\sqrt{f_{(GHz)}}$] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

   - $f_{(GHz)}$ is the RF channel transmit frequency in GHz
   - Power and distance are rounded to the nearest *mW* and *mm* before calculation
   - The result is rounded to one decimal place for comparison

   The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

   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.

   Applying the above formula for *Bluetooth* Hotspot Mode we get:

   - For 2450MHz, [(8.91)/10]*[√2.45] =1.4 ≤ 3.0

   Applying the above formula for *Bluetooth* Body-worn we get:
   - For 2450MHz, [(8.91)/15]*[√2.45] =0.93 ≤ 3.0

   Hence, testing is not required on *Bluetooth* Hotspot Mode and Body-worn configurations.

2. The details for the ***Maximum Rated Power*** and tolerance(s) can be found in section 2.5.

6.4. SAR Test Exclusion For WiFi 802.11ac HT40 HT80 Consideration

Frequency **(GHz)**	Power **(mW)**	Separation Distance **(mm)**	Exclusion Threshold Calculation[1]	Test Required (Y / N)	Exposurer Config
WiFi802.11ac HT40:					
5.19	12.59	5	5.74	Y	Head
5.19	12.59	10	2.87	N	Hotspot
5.19	12.59	15	1.91	N	Body-worn
5.23	12.59	5	5.76	Y	Head
5.23	12.59	10	2.88	N	Hotspot
5.23	12.59	15	1.92	N	Body-worn
5.27	12.59	5	5.78	Y	Head
5.27	12.59	10	2.89	N	Hotspot
5.27	12.59	15	1.93	N	Body-worn
5.31	10.00	5	4.61	Y	Head
5.31	10.00	10	2.30	N	Hotspot
5.31	10.00	15	1.54	N	Body-worn
5.51	12.02	5	5.64	Y	Head
5.51	12.02	10	2.82	N	Hotspot
5.51	12.02	15	1.88	N	Body-worn
5.55	12.02	5	5.66	Y	Head
5.55	12.02	10	2.83	N	Hotspot
5.55	12.02	15	1.89	N	Body-worn
5.67	12.02	5	5.73	Y	Head
5.67	12.02	10	2.86	N	Hotspot
5.67	12.02	15	1.91	N	Body-worn
5.755	12.02	5	5.77	Y	Head
5.755	12.02	10	2.88	N	Hotspot
5.755	12.02	15	1.92	N	Body-worn
5.795	12.02	5	5.79	Y	Head
5.795	12.02	10	2.89	N	Hotspot
5.795	12.02	15	1.93	N	Body-worn
WiFi802.11ac HT80					
5.21	11.22	5	5.12	Y	Head
5.21	11.22	10	2.56	N	Hotspot
5.21	11.22	15	1.71	N	Body-worn
5.29	11.22	5	5.16	Y	Head
5.29	11.22	10	2.58	N	Hotspot
5.29	11.22	15	1.72	N	Body-worn
5.53	11.22	5	5.28	Y	Head
5.53	11.22	10	2.64	N	Hotspot
5.53	11.22	15	1.76	N	Body-worn
5.775	11.22	5	5.39	Y	Head
5.775	11.22	10	2.70	N	Hotspot
5.775	11.22	15	1.80	N	Body-worn

Note:

1. Threshold : [(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] * [$\sqrt{f_{(GHz)}}$] ≤ **3.0** for 1-g SAR
2. For the SAR Test Exlusion consideration, the Maximum Target power + Upper tolerance for is considered.

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)			Sourced Based 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)		32.8	32.8	33.0	23.8	23.8	24.0
GPRS (GMSK, 1 Tx Slot) - CS1		32.8	32.8	33.0	23.8	23.8	24.0
GPRS (GMSK, 2 Tx Slot) - CS1		30.9	31.2	31.1	24.9	25.2	25.1
GPRS (GMSK, 3 Tx Slot) - CS1		30.2	30.1	30.1	25.9	25.8	25.8
GPRS (GMSK, 4 Tx Slot) - CS1		29.1	29.1	29.1	**26.1**	**26.1**	**26.1**
EDGE (GMSK, 1 Tx Slot) - MCS1		32.7	32.8	33.0	23.7	23.8	24.0
EDGE (GMSK, 2 Tx Slot) - MCS1		30.9	31.1	31.1	24.9	25.1	25.1
EDGE (GMSK, 3 Tx Slot) - MCS1		30.2	30.1	30.1	25.9	25.8	25.8
EDGE (GMSK, 4 Tx Slot) - MCS1		29.1	29.1	29.1	26.1	26.1	26.1
EDGE (8PSK, 1 Tx Slot) - MCS9		27.0	27.0	27.0	18.0	18.0	18.0
EDGE (8PSK, 2 Tx Slot) - MCS9		25.0	25.0	25.0	19.0	19.0	19.0
EDGE (8PSK, 3 Tx Slot) - MCS9		23.9	23.9	23.8	19.6	19.6	19.5
EDGE (8PSK, 4 Tx Slot) - MCS9		23.0	23.0	23.0	20.0	20.0	20.0
DTM 5 (2Tx Slot)	GSM (GMSK, 1Tx Slot)	31.1	31.0	30.9	25.1	25.0	24.9
	GPRS (GMSK, 1 Tx Slot) - CS1	31.1	31.1	31.0	25.1	25.1	25.0
DTM 9 (2Tx Slot)	GSM (GMSK, 1Tx Slot)	31.1	31.0	31.0	25.1	25.0	25.0
	GPRS (GMSK, 1 Tx Slot) - CS1	31.1	31.1	31.0	25.1	25.1	25.0
DTM 11 (3Tx Slot)	GSM (GMSK, 1Tx Slot)	30.1	30.0	30.0	25.8	25.7	25.7
	GPRS (GMSK, 2 Tx Slot) - CS1	30.2	30.1	30.1	**25.9**	**25.8**	**25.8**
DTM 5 (2Tx Slot)	GSM (GMSK, 1Tx Slot)	31.1	31.0	30.9	25.1	25.0	24.9
	EDGE (8PSK, 1 Tx Slot) - MCS1	31.1	31.1	31.0	25.1	25.1	25.0
DTM 9 (2Tx Slot)	GSM (GMSK, 1Tx Slot)	31.1	31.0	31.0	25.1	25.0	25.0
	EDGE (8PSK, 1 Tx Slot) - MCS1	31.1	31.1	31.0	25.1	25.1	25.0
DTM 11 (3Tx Slot)	GSM (GMSK, 1Tx Slot)	30.1	30.0	30.0	25.8	25.7	25.7
	EDGE (8PSK, 2 Tx Slot) - MCS1	30.2	30.1	30.1	25.9	25.8	25.8
DTM 5 (2Tx Slot)	GSM (GMSK, 1Tx Slot)	31.1	31.0	30.9	25.1	25.0	24.9
	EDGE (8PSK, 1 Tx Slot) - MCS9	25.0	24.9	25.0	19.0	18.9	19.0
DTM 9 (2Tx Slot)	GSM (GMSK, 1Tx Slot)	31.1	31.0	31.0	25.1	25.0	25.0
	EDGE (8PSK, 1 Tx Slot) - MCS9	25.0	24.9	25.0	19.0	18.9	19.0
DTM 11 (3Tx Slot)	GSM (GMSK, 1Tx Slot)	30.1	30.0	30.0	25.8	25.7	25.7
	EDGE (8PSK, 2 Tx Slot) - MCS9	23.8	23.7	23.8	19.5	19.4	19.5

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**

Conclusions: Conducted Average Power Measurement 2G: GSM850
Power Back-off Not Supported

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)			Sourced Based 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	28.2	28.2	22.2	22.2	22.2
GPRS (GMSK, 3 Tx Slot) - CS1		27.1	27.2	27.2	22.8	22.9	22.9
GPRS (GMSK, 4 Tx Slot) - CS1		26.2	26.2	26.1	**23.2**	**23.2**	**23.1**
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	28.2	28.2	22.2	22.2	22.2
EDGE (GMSK, 3 Tx Slot) - MCS1		27.1	27.2	27.2	22.8	22.9	22.9
EDGE (GMSK, 4 Tx Slot) - MCS1		26.2	26.2	26.1	23.2	23.2	23.1
EDGE (8PSK, 1 Tx Slot) - MCS9		25.9	25.9	26.0	16.9	16.9	17.0
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)	28.1	28.1	28.1	22.1	22.1	22.1
	GPRS (GMSK, 1 Tx Slot) - CS1	28.1	28.1	28.1	22.1	22.1	22.1
DTM 9 (2Tx Slot)	GSM (GMSK, 1Tx Slot)	28.1	28.1	28.1	22.1	22.1	22.1
	GPRS (GMSK, 1 Tx Slot) - CS1	28.1	28.1	28.1	22.1	22.1	22.1
DTM 11 (3Tx Slot)	GSM (GMSK, 1Tx Slot)	27.1	27.2	27.2	22.8	22.9	22.9
	GPRS (GMSK, 2 Tx Slot) - CS1	27.1	27.2	27.2	**22.8**	**22.9**	**22.9**
DTM 5 (2Tx Slot)	GSM (GMSK, 1Tx Slot)	28.1	28.1	28.1	22.1	22.1	22.1
	EDGE (8PSK, 1 Tx Slot) - MCS1	28.1	28.1	28.1	22.1	22.1	22.1
DTM 9 (2Tx Slot)	GSM (GMSK, 1Tx Slot)	28.1	28.1	28.1	22.1	22.1	22.1
	EDGE (8PSK, 1 Tx Slot) - MCS1	28.1	28.1	28.1	22.1	22.1	22.1
DTM 11 (3Tx Slot)	GSM (GMSK, 1Tx Slot)	27.1	27.2	27.2	22.8	22.9	22.9
	EDGE (8PSK, 2 Tx Slot) - MCS1	27.1	27.2	27.2	22.8	22.9	22.9
DTM 5 (2Tx Slot)	GSM (GMSK, 1Tx Slot)	28.1	28.1	28.1	22.1	22.1	22.1
	EDGE (8PSK, 1 Tx Slot) - MCS9	23.7	23.7	23.8	17.7	17.7	17.8
DTM 9 (2Tx Slot)	GSM (GMSK, 1Tx Slot)	28.1	28.1	28.1	22.1	22.1	22.1
	EDGE (8PSK, 1 Tx Slot) - MCS9	23.7	23.7	23.8	17.7	17.7	17.8
DTM 11 (3Tx Slot)	GSM (GMSK, 1Tx Slot)	27.1	27.2	27.2	22.8	22.9	22.9
	EDGE (8PSK, 2 Tx Slot) - MCS9	22.6	22.6	22.7	18.3	18.3	18.4

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**

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

1. **Head SAR Testing**; PCS1900 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**; PCS 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.

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	23.7	23.7	23.1	23.1	22.8	21.5	22.3	21.9	23.6	23.7
	UL: 9400 DL: 9800	23.7	23.7	23.2	23.1	23.3	21.2	22.3	21.3	23.6	23.7
	UL: 9538 DL: 9938	23.6	23.7	23.1	23.2	22.8	21.4	22.2	21.9	23.5	23.6
1700 (Band 4)	UL: 1312 DL: 1537	24.0	23.9	23.4	23.4	23.4	21.3	22.7	21.5	23.9	24.0
	UL: 1412 DL: 1637	24.0	23.9	23.4	23.5	23.6	21.4	22.8	21.8	23.8	24.0
	UL: 1513 DL: 1738	24.0	23.9	23.3	23.4	23.4	21.4	22.7	21.7	23.8	24.0
Power Back-off Not Supported											
850 (Band 5)	UL: 4132 DL: 4357	24.2	24.2	23.8	23.8	23.5	21.8	22.8	22.2	24.1	24.2
	UL: 4183 DL: 4408	24.2	24.2	23.9	23.7	23.6	21.8	23.0	22.3	24.1	24.2
	UL: 4233 DL: 4458	24.1	24.1	23.7	23.7	23.6	21.6	22.8	22.6	24.1	24.1
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 & 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	20.7	21.1	21.0	20.7	23.7
	UL: 9400 DL: 9800	20.9	21.1	21.0	21.0	23.7
	UL: 9538 DL: 9938	21.0	20.0	21.1	21.0	23.6
1700 (Band 4)	UL: 1312 DL: 1537	21.4	21.3	21.2	21.2	24.0
	UL: 1412 DL: 1637	21.1	21.0	21.1	21.1	24.0
	UL: 1513 DL: 1738	21.2	21.0	21.0	21.1	24.0
Power Back-off Not Supported						
850 (Band 5)	UL: 4132 DL: 4357	21.3	21.6	21.5	21.7	24.2
	UL: 4183 DL: 4408	21.4	21.6	21.4	21.6	24.2
	UL: 4233 DL: 4458	21.3	21.5	21.4	21.6	24.1
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	23.0	23.0	22.6	22.6	21.8	20.0	21.6	20.0	23.0	23.0
	UL: 9400 DL: 9800	23.0	22.9	22.6	22.6	22.1	20.2	21.7	20.1	23.0	23.0
	UL: 9538 DL: 9938	23.0	23.0	22.5	22.5	22.3	20.3	21.7	20.2	23.0	23.0
1700 (Band 4)	UL: 1312 DL: 1537	23.0	23.0	22.5	22.6	22.2	20.3	21.7	20.4	23.0	23.0
	UL: 1412 DL: 1637	23.0	23.0	22.5	22.5	22.6	20.7	21.8	20.6	23.0	23.0
	UL: 1513 DL: 1738	23.0	23.0	22.6	22.5	22.5	20.5	21.8	20.5	23.0	23.0
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 & 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	19.5	20.2	20.1	20.3	23.0
	UL: 9400 DL: 9800	20.2	20.3	20.5	20.4	23.0
	UL: 9538 DL: 9938	20.3	20.3	20.2	20.3	23.0
1700 (Band 4)	UL: 1312 DL: 1537	20.2	19.9	20.3	20.4	23.0
	UL: 1412 DL: 1637	20.3	20.1	20.2	20.4	23.0
	UL: 1513 DL: 1738	20.2	20.2	20.3	20.4	23.0
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 β_c/β_d = 12/15, B_{hs}/β_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 β_c = 11/15 and β_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 β_c/β_d = 12/15, B_{hs}/β_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 β_c = 10/15 and β_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 β_c = 14/15 and β_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 Average Power Measurement For 4G
Conducted Average Power Measurement: LTE Band 2 (1900 MHz)
Power Back-off Not Supported

Ch. BW	Modulations	RB Config	Start RB Offset		MPR (dB)	Actual Max Power (dBm)	Measured Avg Power (dBm).		
							Frequency **1860.0 MHz** (Low)	Frequency **1880.0 MHz** (Middle)	Frequency **1900.0 MHz** (High)[1]
20 MHz	QPSK	1	Low	0	(0)	23.0	23.0	23.1	23.0
		1	Mid	49	(0)	23.0	23.0	23.1	23.0
		1	High	99	(0)	23.0	23.0	23.1	21.7
		50	low	0	(1)	22.0	21.8	21.8	21.8
		50	Mid	25	(1)	22.0	21.8	21.8	21.8
		50	High	50	(1)	22.0	21.8	21.8	21.8
		100	-	0	(1)	22.0	21.8	21.8	21.8
	16QAM	1	Low	0	(1)	22.0	22.0	22.1	22.0
		1	Mid	49	(1)	22.0	22.0	22.1	22.0
		1	High	99	(1)	22.0	22.0	22.1	20.8
		50	low	0	(2)	21.0	20.8	20.8	20.8
		50	Mid	25	(2)	21.0	20.8	20.8	20.8
		50	High	50	(2)	21.0	20.8	20.8	20.8
		100	-	0	(2)	21.0	20.8	20.8	20.8

Ch. BW	Modulations	RB Config	Start RB Offset		MPR (dB)	Actual Max Power (dBm)	Measured Avg Power (dBm).		
							Frequency **1857.5 MHz** (Low)	Frequency **1880.0 MHz** (Middle)	Frequency **1902.5 MHz** (High)[1]
15 MHz	QPSK	1	Low	0	(0)	23.0	23.0	23.0	23.0
		1	Mid	37	(0)	23.0	23.0	23.0	23.0
		1	High	74	(0)	23.0	23.0	23.0	21.7
		36	low	0	(1)	22.0	21.8	21.8	21.8
		36	Mid	19	(1)	22.0	21.8	21.8	21.8
		36	High	39	(1)	22.0	21.8	21.8	21.8
		75	-	0	(1)	22.0	21.8	21.8	21.8
	16QAM	1	Low	0	(1)	22.0	22.0	22.0	22.0
		1	Mid	37	(1)	22.0	22.0	22.0	21.9
		1	High	74	(1)	22.0	22.0	22.0	20.7
		36	low	0	(2)	21.0	20.9	20.9	20.9
		36	Mid	19	(2)	21.0	20.9	20.9	20.9
		36	High	39	(2)	21.0	20.9	20.9	21.0
		75	-	0	(2)	21.0	20.9	20.9	20.9

Note:

1. For “transmission all RB bandwidth” confined within FULL_ high- 4MHz and FULL _high is specified in the 3GPP TS36.521-1 V11.0.1, the maximum output power requirement is relax by reducing the low tolerance by **1.5 dB**. This is conveyed in the power measurement in the above tables

Conducted Average Power Measurement: LTE Band 2 (1900 MHz)
Power Back-off Not Supported (Continued)

Ch. BW	Modulations	RB Config	Start RB Offset		MPR (dB)	Actual Max Power (dBm)	Measured Avg Power (dBm).		
							Frequency **1855.0 MHz** (Low)	Frequency **1880.0 MHz** (Middle)	Frequency **1905.0 MHz** (High)[1]
10 MHz	QPSK	1	Low	0	(0)	23.0	23.0	23.1	23.0
		1	Mid	24	(0)	23.0	23.0	23.0	22.9
		1	High	49	(0)	23.0	23.0	23.0	21.7
		25	Low	0	(1)	22.0	21.8	21.8	21.8
		25	Mid	12	(1)	22.0	21.8	21.8	21.8
		25	High	25	(1)	22.0	21.8	21.8	21.8
		50	-	0	(1)	22.0	21.8	21.7	21.8
	16QAM	1	Low	0	(1)	22.0	22.0	22.1	21.9
		1	mid	24	(1)	22.0	22.0	22.0	21.9
		1	High	49	(1)	22.0	22.0	22.0	20.6
		25	Low	0	(2)	21.0	21.0	20.8	20.9
		25	Mid	12	(2)	21.0	21.0	20.8	20.9
		25	High	25	(2)	21.0	21.0	20.9	20.9
		50	-	0	(2)	21.0	20.8	20.7	20.9
Ch. BW	**Modulations**	**RB Config**	**Start RB Offset**		**MPR (dB)**	**Actual Max Power (dBm)**	**Measured Avg Power (dBm).**		
							Frequency **1852.5 MHz** (Low)	Frequency **1880.0 MHz** (Middle)	Frequency **1907.5 MHz** (High)[1]
5 MHz	QPSK	1	Low	0	(0)	23.0	22.6	22.7	22.6
		1	Mid	12	(0)	23.0	22.6	22.7	21.4
		1	High	24	(0)	23.0	22.6	22.7	21.4
		12	low	0	(1)	22.0	21.6	21.6	21.7
		12	Mid	6	(1)	22.0	21.7	21.6	20.4
		12	High	13	(1)	22.0	21.7	21.6	20.5
		25	-	0	(1)	22.0	21.6	21.5	21.7
	16QAM	1	Low	0	(1)	22.0	21.6	21.7	21.6
		1	Mid	12	(1)	22.0	21.6	21.7	20.4
		1	High	24	(1)	22.0	21.6	21.7	20.4
		12	low	0	(2)	21.0	20.7	20.6	20.8
		12	Mid	6	(2)	21.0	20.7	20.6	19.5
		12	High	13	(2)	21.0	20.7	20.6	19.5
		25	-	0	(2)	21.0	20.6	20.5	20.7

Note:

1. For “transmission all RB bandwidth” confined within FULL_ high- 4MHz and FULL _high is specified in the 3GPP TS36.521-1 V11.0.1, the maximum output power requirement is relax by reducing the low tolerance by **1.5 dB**. This is conveyed in the power measurement in the above tables

Conducted Average Power Measurement: LTE Band 2 (1900 MHz)
Power Back-off Not Supported (Continued)

Ch. BW	Modulations	RB Config	Start RB Offset		MPR (dB)	Actual Max Power (dBm)	Measured Avg Power (dBm).		
							Frequency **1851.5 MHz** (Low)	Frequency **1880 MHz** (Middle)	Frequency **1908.5 MHz** (High)[1]
3 MHz	QPSK	1	Low	0	(0)	23.0	23.0	23.0	21.7
		1	Mid	7	(0)	23.0	23.0	23.0	21.7
		1	High	14	(0)	23.0	22.9	23.0	21.6
		8	Low	0	(1)	22.0	21.8	21.8	20.8
		8	Mid	4	(1)	22.0	21.8	21.8	20.8
		8	High	7	(1)	22.0	21.8	21.8	20.8
		15	-	0	(1)	22.0	22.0	21.9	20.7
	16QAM	1	Low	0	(1)	22.0	22.0	22.0	20.7
		1	Mid	7	(1)	22.0	22.0	22.0	20.7
		1	High	14	(1)	22.0	21.9	22.0	20.6
		8	Low	0	(2)	21.0	21.0	20.9	19.7
		8	Mid	4	(2)	21.0	21.0	20.9	19.8
		8	High	7	(2)	21.0	21.0	20.9	19.8
		15	-	0	(2)	21.0	21.0	20.9	19.8

Ch. BW	Modulations	RB Config	Start RB Offset		MPR (dB)	Actual Max Power (dBm)	Measured Avg Power (dBm).		
							Frequency **1850.7 MHz** (Low)	Frequency **1880 MHz** (Middle)	Frequency **1909.3 MHz** (High)[1]
1.4 MHz	QPSK	1	Low	0	(0)	23.0	23.0	22.9	21.6
		1	Mid	3	(0)	23.0	23.0	23.0	21.7
		1	High	5	(0)	23.0	23.0	23.0	21.6
		3	Low	0	(0)	23.0	22.9	22.9	21.7
		3	Mid	1	(0)	23.0	23.0	23.0	21.7
		3	high	3	(0)	23.0	23.0	22.9	21.7
		6	-	0	(1)	22.0	22.0	21.9	20.8
	16QAM	1	Low	0	(1)	22.0	22.0	21.9	20.7
		1	Mid	3	(1)	22.0	22.0	22.0	20.7
		1	High	5	(1)	22.0	22.0	22.0	20.7
		3	Low	0	(1)	22.0	21.9	21.9	20.7
		3	Mid	1	(1)	22.0	22.0	22.0	20.7
		3	high	3	(1)	22.0	22.0	21.9	20.7
		6	-	0	(2)	21.0	21.0	20.9	19.9

Note:

1. For “transmission all RB bandwidth” confined within FULL_ high- 4MHz and FULL _high is specified in the 3GPP TS36.521-1 V11.0.1, the maximum output power requirement is relax by reducing the low tolerance by **1.5 dB**. This is conveyed in the power measurement in the above tables

7.2.5.Conducted Average Power Measurement: LTE Band 4 (1700 MHz)
Power Back-off Not Supported

Ch. BW	Modulations	RB Config	Start RB Offset		MPR (dB)	Actual Max Power (dBm)	Measured Avg Power (dBm).		
							Frequency **1720.0 MHz** (Low)	Frequency **1732.5 MHz** (Middle)	Frequency **1745.0 MHz** (High)
20 MHz	QPSK	1	Low	0	(0)	23.0	23.1	23.1	23.0
		1	Mid	49	(0)	23.0	23.0	23.0	23.1
		1	High	99	(0)	23.0	23.0	23.0	23.0
		50	low	0	(1)	22.0	21.9	21.8	21.8
		50	Mid	25	(1)	22.0	21.8	21.8	21.8
		50	High	50	(1)	22.0	21.7	21.7	21.7
		100	-	0	(1)	22.0	21.8	21.8	21.8
	16QAM	1	Low	0	(1)	22.0	22.1	22.1	22.0
		1	Mid	49	(1)	22.0	22.1	22.0	22.1
		1	High	99	(1)	22.0	22.0	21.9	22.0
		50	low	0	(2)	21.0	20.8	20.7	20.7
		50	Mid	25	(2)	21.0	20.7	20.7	20.8
		50	High	50	(2)	21.0	20.7	20.6	20.7
		100	-	0	(2)	21.0	20.8	20.7	20.7
Ch. BW	**Modulations**	**RB Config**	**Start RB Offset**		**MPR (dB)**	**Actual Max Power (dBm)**	**Measured Avg Power (dBm).**		
							Frequency **1717.5.0 MHz** (Low)	Frequency **1732.5 MHz** (Middle)	Frequency **1747.5 MHz** (High)
15 MHz	QPSK	1	Low	0	(0)	23.0	23.1	23.1	23.0
		1	Mid	37	(0)	23.0	23.1	23.0	23.0
		1	High	74	(0)	23.0	23.1	23.0	23.0
		36	low	0	(1)	22.0	21.9	21.9	21.9
		36	Mid	19	(1)	22.0	21.9	21.8	21.8
		36	High	39	(1)	22.0	21.9	21.8	21.8
		75	-	0	(1)	22.0	21.8	21.8	21.8
	16QAM	1	Low	0	(1)	22.0	22.1	22.1	22.0
		1	Mid	37	(1)	22.0	22.1	22.0	22.0
		1	High	74	(1)	22.0	22.1	22.0	22.0
		36	low	0	(2)	21.0	20.9	20.8	20.8
		36	Mid	19	(2)	21.0	20.9	20.8	20.8
		36	High	39	(2)	21.0	20.8	20.7	20.8
		75	-	0	(2)	21.0	20.8	20.7	20.7

Conducted Average Power Measurement: LTE Band 4 (1700 MHz)
Power Back-off Not Supported (Continued):

Ch. BW	Modulations	RB Config	Start RB Offset		MPR (dB)	Actual Max Power (dBm)	Measured Avg Power (dBm).		
							Frequency **1715.0 MHz** (Low)	Frequency **1732.5 MHz** (Middle)	Frequency **1750 MHz** (High)
10 MHz	QPSK	1	Low	0	(0)	23.0	23.1	23.1	23.1
		1	Mid	24	(0)	23.0	23.1	23.0	23.1
		1	High	49	(0)	23.0	23.0	23.0	23.0
		25	Low	0	(1)	22.0	21.9	21.9	21.9
		25	Mid	12	(1)	22.0	21.9	21.9	21.8
		25	High	25	(1)	22.0	21.9	21.9	21.9
		50	-	0	(1)	22.0	21.8	21.7	21.8
	16QAM	1	Low	0	(1)	22.0	22.1	22.0	22.1
		1	mid	24	(1)	22.0	22.1	22.0	22.1
		1	High	49	(1)	22.0	22.0	22.0	22.0
		25	Low	0	(2)	21.0	21.0	20.8	20.9
		25	Mid	12	(2)	21.0	21.0	20.8	20.8
		25	High	25	(2)	21.0	20.9	20.8	20.9
		50	-	0	(2)	21.0	20.8	20.7	20.8

Ch. BW	Modulations	RB Config	Start RB Offset		MPR (dB)	Actual Max Power (dBm)	Measured Avg Power (dBm).		
							Frequency **1712.5 MHz** (Low)	Frequency **1732.5 MHz** (Middle)	Frequency **1752.5 MHz** (High)
5 MHz	QPSK	1	Low	0	(0)	23.0	23.0	23.0	23.1
		1	Mid	12	(0)	23.0	23.0	23.0	23.1
		1	High	24	(0)	23.0	23.1	23.0	23.1
		12	low	0	(1)	22.0	21.9	21.9	21.9
		12	Mid	6	(1)	22.0	21.9	21.9	21.8
		12	High	13	(1)	22.0	21.9	21.9	21.9
		25	-	0	(1)	22.0	21.8	21.8	21.8
	16QAM	1	Low	0	(1)	22.0	22.1	22.0	22.1
		1	Mid	12	(1)	22.0	22.2	22.0	22.0
		1	High	24	(1)	22.0	22.1	22.0	22.0
		12	low	0	(2)	21.0	21.1	21.0	21.0
		12	Mid	6	(2)	21.0	21.1	21.0	21.0
		12	High	13	(2)	21.0	21.1	21.0	21.0
		25	-	0	(2)	21.0	20.9	20.8	20.9

Conducted Average Power Measurement: LTE Band 4 (1700 MHz)
Power Back-off Not Supported (Continued)

Ch. BW	Modulations	RB Config	Start RB Offset		MPR (dB)	Actual Max Power (dBm)	Measured Avg Power (dBm).		
							Frequency **1711.5 MHz** (Low)	Frequency **1732.5 MHz** (Middle)	Frequency **1753.5 MHz** (High)
3 MHz	QPSK	1	Low	0	(0)	23.0	23.1	23.0	23.0
		1	Mid	7	(0)	23.0	23.1	23.0	23.1
		1	High	14	(0)	23.0	23.1	23.0	23.1
		8	Low	0	(1)	22.0	21.9	21.9	21.9
		8	Mid	4	(1)	22.0	21.9	21.9	21.8
		8	High	7	(1)	22.0	21.9	21.9	21.9
		15	-	0	(1)	22.0	21.9	21.9	21.9
	16QAM	1	Low	0	(1)	22.0	22.1	22.0	22.0
		1	Mid	7	(1)	22.0	22.1	22.0	22.0
		1	High	14	(1)	22.0	22.1	22.0	22.1
		8	Low	0	(2)	21.0	21.0	20.9	21.0
		8	Mid	4	(2)	21.0	21.0	20.9	21.0
		8	High	7	(2)	21.0	21.0	20.9	21.0
		15	-	0	(2)	21.0	21.0	21.0	21.0

Ch. BW	Modulations	RB Config	Start RB Offset		MPR (dB)	Actual Max Power (dBm)	Measured Avg Power (dBm).		
							Frequency **1710.7 MHz** (Low)	Frequency **1732.5 MHz** (Middle)	Frequency **1754.3 MHz** (High)
1.4 MHz	QPSK	1	Low	0	(0)	23.0	23.1	23.0	23.1
		1	Mid	3	(0)	23.0	23.1	23.0	23.1
		1	High	5	(0)	23.0	23.1	23.0	23.1
		3	Low	0	(0)	23.0	23.1	23.0	23.0
		3	Mid	1	(0)	23.0	23.1	23.0	23.1
		3	high	3	(0)	23.0	23.1	23.0	23.1
		6	-	0	(1)	22.0	22.2	22.0	22.1
	16QAM	1	Low	0	(1)	22.0	22.2	22.0	22.0
		1	Mid	3	(1)	22.0	22.1	22.0	22.1
		1	High	5	(1)	22.0	22.1	22.0	22.1
		3	Low	0	(1)	22.0	22.2	22.0	22.1
		3	Mid	1	(1)	22.0	22.2	22.0	22.1
		3	high	3	(1)	22.0	22.2	22.0	22.1
		6	-	0	(2)	21.0	21.1	21.0	21.1

7.2.6.Conducted Average Power Measurement: LTE Band 5 (850 MHz)
Power Back-off Not Supported

Ch. BW	Modulations	RB Config	Start RB Offset		MPR (dB)	Actual Max Power (dBm)	Measured Avg Power (dBm).		
							Frequency **829.0 MHz** (Low)	Frequency **836.5 MHz** (Middle)	Frequency **844.0 MHz** (High)
10 MHz	QPSK	1	Low	0	(0)	22.5	22.5	22.6	22.5
		1	Mid	24	(0)	22.5	22.5	22.5	22.6
		1	High	49	(0)	22.5	22.6	22.6	22.6
		25	Low	0	(1)	21.5	21.5	21.4	21.6
		25	Mid	12	(1)	21.5	21.5	21.4	21.5
		25	High	25	(1)	21.5	21.4	21.4	21.5
		50	-	0	(1)	21.5	21.4	21.4	21.4
	16QAM	1	Low	0	(1)	21.5	21.5	21.5	21.5
		1	mid	24	(1)	21.5	21.5	21.5	21.6
		1	High	49	(1)	21.5	21.5	21.6	21.7
		25	Low	0	(2)	20.5	20.4	20.4	20.5
		25	Mid	12	(2)	20.5	20.5	20.5	20.5
		25	High	25	(2)	20.5	20.4	20.4	20.5
		50	-	0	(2)	20.5	20.4	20.4	20.5

Ch. BW	Modulations	RB Config	Start RB Offset		MPR (dB)	Actual Max Power (dBm)	Measured Avg Power (dBm).		
							Frequency **826.5 MHz** (Low)	Frequency **836.5 MHz** (Middle)	Frequency **846.5 MHz** (High)
5 MHz	QPSK	1	Low	0	(0)	22.5	22.5	22.5	22.5
		1	Mid	12	(0)	22.5	22.5	22.5	22.6
		1	High	24	(0)	22.5	22.6	22.6	22.6
		12	low	0	(1)	21.5	21.5	21.5	21.6
		12	Mid	6	(1)	21.5	21.5	21.5	21.6
		12	High	13	(1)	21.5	21.4	21.5	21.6
		25	-	0	(1)	21.5	21.5	21.4	21.6
	16QAM	1	Low	0	(1)	21.5	21.5	21.5	21.6
		1	Mid	12	(1)	21.5	21.5	21.5	21.7
		1	High	24	(1)	21.5	21.5	21.6	21.6
		12	low	0	(2)	20.5	20.5	20.6	20.7
		12	Mid	6	(2)	20.5	20.6	20.6	20.7
		12	High	13	(2)	20.5	20.6	20.6	20.7
		25	-	0	(2)	20.5	20.5	20.4	20.6

Conducted Average Power Measurement: LTE Band 5 (850 MHz)
Power Back-off Not Supported (Continued)

Ch. BW	Modulations	RB Config	Start RB Offset		MPR (dB)	Actual Max Power (dBm)	Measured Avg Power (dBm).		
							Frequency **825.5 MHz** (Low)	Frequency **836.5 MHz** (Middle)	Frequency **847.5 MHz** (High)
3 MHz	QPSK	1	Low	0	(0)	22.5	22.5	22.5	22.6
		1	Mid	7	(0)	22.5	22.5	22.5	22.6
		1	High	14	(0)	22.5	22.5	22.5	22.5
		8	Low	0	(1)	21.5	21.5	21.5	21.6
		8	Mid	4	(1)	21.5	21.5	21.5	21.6
		8	High	7	(1)	21.5	21.5	21.5	21.6
		15	-	0	(1)	21.5	21.4	21.5	21.6
	16QAM	1	Low	0	(1)	21.5	21.5	21.5	21.6
		1	Mid	7	(1)	21.5	21.5	21.5	21.6
		1	High	14	(1)	21.5	21.5	21.5	21.5
		8	Low	0	(2)	20.5	20.4	20.4	20.5
		8	Mid	4	(2)	20.5	20.4	20.4	20.6
		8	High	7	(2)	20.5	20.4	20.4	20.5
		15	-	0	(2)	20.5	20.5	20.5	20.6
Ch. BW	**Modulations**	**RB Config**	**Start RB Offset**		**MPR (dB)**	**Actual Max Power (dBm)**	**Measured Avg Power (dBm).**		
							Frequency **824.7 MHz** (Low)	Frequency **836.5 MHz** (Middle)	Frequency **848.3 MHz** (High)
1.4 MHz	QPSK	1	Low	0	(0)	22.5	22.4	22.4	22.6
		1	Mid	3	(0)	22.5	22.6	22.6	22.6
		1	High	5	(0)	22.5	22.4	22.5	22.5
		3	Low	0	(0)	22.5	22.4	22.4	22.5
		3	Mid	1	(0)	22.5	22.4	22.5	22.5
		3	high	3	(0)	22.5	22.4	22.5	22.5
		6	-	0	(1)	21.5	21.5	21.5	21.6
	16QAM	1	Low	0	(1)	21.5	21.4	21.4	21.6
		1	Mid	3	(1)	21.5	21.5	21.5	21.5
		1	High	5	(1)	21.5	21.5	21.5	21.5
		3	Low	0	(1)	21.5	21.5	21.5	21.6
		3	Mid	1	(1)	21.5	21.5	21.5	21.6
		3	high	3	(1)	21.5	21.5	21.5	21.6
		6	-	0	(2)	20.5	20.5	20.5	20.6

7.2.7.Conducted Average Power Measurement: LTE Band 7 (2600 MHz) Power Back-off Not Supported (Continued)

Ch. BW	Modulations	RB Config	Start RB Offset		MPR (dB)	Actual Max Power (dBm)	Measured Avg Power (dBm).		
							Frequency **2510.0 MHz** (Low)	Frequency **2535.0 MHz** (Middle)	Frequency **2560.0 MHz** (High)
20 MHz	QPSK	1	Low	0	(0)	23.0	22.6	22.6	22.6
		1	Mid	49	(0)	23.0	22.7	22.5	22.6
		1	High	99	(0)	23.0	22.7	22.6	22.6
		50	low	0	(1)	22.0	21.5	21.5	21.4
		50	Mid	25	(1)	22.0	21.4	21.4	21.5
		50	High	50	(1)	22.0	21.4	21.5	21.5
		100	-	0	(1)	22.0	21.5	21.4	21.5
	16QAM	1	Low	0	(1)	22.0	21.6	21.6	21.6
		1	Mid	49	(1)	22.0	21.7	21.5	21.6
		1	High	99	(1)	22.0	21.7	21.6	21.6
		50	low	0	(2)	21.0	20.5	20.5	20.5
		50	Mid	25	(2)	21.0	20.4	20.4	20.5
		50	High	50	(2)	21.0	20.5	20.4	20.5
		100	-	0	(2)	21.0	20.5	20.5	20.5
Ch. BW	**Modulations**	**RB Config**	**Start RB Offset**		**MPR (dB)**	**Actual Max Power (dBm)**	**Measured Avg Power (dBm).**		
							Frequency **2507.5 MHz** (Low)	Frequency **2535.0 MHz** (Middle)	Frequency **2562.5 MHz** (High)
15 MHz	QPSK	1	Low	0	(0)	23.0	22.6	22.6	22.6
		1	Mid	37	(0)	23.0	22.6	22.5	22.6
		1	High	74	(0)	23.0	22.6	22.6	22.6
		36	low	0	(1)	22.0	21.5	21.3	21.5
		36	Mid	19	(1)	22.0	21.5	21.4	21.5
		36	High	39	(1)	22.0	21.5	21.4	21.5
		75	-	0	(1)	22.0	21.5	21.3	21.4
	16QAM	1	Low	0	(1)	22.0	21.6	21.6	21.5
		1	Mid	37	(1)	22.0	21.7	21.5	21.5
		1	High	74	(1)	22.0	21.6	21.6	21.6
		36	low	0	(2)	21.0	20.5	20.4	20.5
		36	Mid	19	(2)	21.0	20.6	20.4	20.5
		36	High	39	(2)	21.0	20.5	20.4	20.5
		75	-	0	(2)	21.0	20.5	20.3	20.4

Conducted Average Power Measurement: LTE Band 7 (2600 MHz)
Power Back-off Not Supported (Continued)

Ch. BW	Modulations	RB Config	Start RB Offset		MPR (dB)	Actual Max Power (dBm)	Measured Avg Power (dBm).		
							Frequency **2505.0 MHz** (Low)	Frequency **2535.0 MHz** (Middle)	Frequency **2565.0 MHz** (High)
10 MHz	QPSK	1	Low	0	(0)	23.0	22.6	22.6	22.6
		1	Mid	24	(0)	23.0	22.6	22.6	22.6
		1	High	49	(0)	23.0	22.6	22.6	22.6
		25	Low	0	(1)	22.0	21.5	21.5	21.5
		25	Mid	12	(1)	22.0	21.5	21.5	21.5
		25	High	25	(1)	22.0	21.5	21.5	21.5
		50	-	0	(1)	22.0	21.4	21.3	21.4
	16QAM	1	Low	0	(1)	22.0	21.6	21.6	21.5
		1	mid	24	(1)	22.0	21.6	21.5	21.6
		1	High	49	(1)	22.0	21.6	21.6	21.6
		25	Low	0	(2)	21.0	20.5	20.5	20.6
		25	Mid	12	(2)	21.0	20.5	20.5	20.6
		25	High	25	(2)	21.0	20.6	20.5	20.6
		50	-	0	(2)	21.0	20.5	20.4	20.4
Ch. BW	**Modulations**	**RB Config**	**Start RB Offset**		**MPR (dB)**	**Actual Max Power (dBm)**	**Measured Avg Power (dBm).**		
							Frequency **2510.0 MHz** (Low)	Frequency **2535.0 MHz** (Middle)	Frequency **2567.5 MHz** (High)
5 MHz	QPSK	1	Low	0	(0)	23.0	22.6	22.6	22.6
		1	Mid	12	(0)	23.0	22.6	22.5	22.6
		1	High	24	(0)	23.0	22.6	22.5	22.6
		12	low	0	(1)	22.0	21.5	21.5	21.5
		12	Mid	6	(1)	22.0	21.5	21.5	21.5
		12	High	13	(1)	22.0	21.5	21.5	21.5
		25	-	0	(1)	22.0	21.5	21.4	21.5
	16QAM	1	Low	0	(1)	22.0	21.6	21.6	21.6
		1	Mid	12	(1)	22.0	21.6	21.5	21.6
		1	High	24	(1)	22.0	21.6	21.5	21.6
		12	low	0	(2)	21.0	20.5	20.5	20.5
		12	Mid	6	(2)	21.0	20.5	20.5	20.5
		12	High	13	(2)	21.0	20.5	20.5	20.5
		25	-	0	(2)	21.0	20.5	20.4	20.6

7.2.8.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	14.9	14.7	**2.4 GHz**
6	2437.0	16.3	16.5	
11	2462.0	14.3	14.3	
Channel Number	**Frequency (MHZ)**	**Tx Power (dBm)** 802.11g **(6Mbps)**	**TX Power (dBm)** 802.11g **(54Mbps**	**Note**
1	2412.0	12.6	11.6	**2.4 GHz**
6	2437.0	14.5	13.0	
11	2462.0	12.4	10.9	

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	12.7	10.8	**2.4 GHz**
6	2437.0	14.1	12.2	
11	2462.0	12.0	10.1	

7.2.9.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**	11.5	9.1	**5.2 GHz**
40	5200.0	11.5	9.2	
44	5220.0	11.9	9.2	
48*	**5240.0**	12.0	9.1	
52*	**5260.0**	12.9	10.1	**5.3 GHz**
56	5280.0	11.6	9.1	
60	5300.0	11.5	9.0	
64*	**5320.0**	11.5	9.1	
100	5500.0	11.0	8.0	**5.6 GHz**
104*	**5520.0**	10.8	8.3	
108	5540.0	10.6	8.1	
112	5560.0	10.7	8.1	
116*	**5580.0**	11.2	8.6	
132	5660.0	11.2	8.7	
136*	**5680.0**	11.0	8.5	
140	5700.0	10.9	8.3	
149*	**5745.0**	11.1	8.5	**5.8 GHz**
153	5765.0	12.1	9.0	
157*	**5785.0**	11.2	8.2	
161	5805.0	10.7	8.1	
165*	**5825.0**	10.7	8.2	

*** 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**	11.2	8.4	**5.2 GHz**
40	5200.0	11.2	8.4	
44	5220.0	11.1	8.8	
48*	**5240.0**	11.7	8.4	
52*	**5260.0**	12.1	9.8	**5.3 GHz**
56	5280.0	11.2	8.3	
60	5300.0	11.1	8.3	
64*	**5320.0**	11.2	8.4	
100	5500.0	11.1	8.3	**5.6 GHz**
104*	**5520.0**	10.9	8.1	
108	5540.0	10.7	7.4	
112	5560.0	10.7	8.4	
116*	**5580.0**	11.2	8.4	
132	5660.0	10.8	7.9	
136*	**5680.0**	10.7	7.9	
140	5700.0	11.0	8.0	
149*	**5745.0**	11.3	7.8	**5.8 GHz**
153	5765.0	11.1	8.7	
157*	**5785.0**	10.8	8.4	
161	5805.0	10.8	7.8	
165*	**5825.0**	10.7	7.9	

*** 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	10.1	9.4	5.2 GHz
46	5230.0	10.2	9.4	
54	5270.0	10.2	9.4	5.3 GHz
62	5310.0	9.1	8.3	
102	5510.0	9.9	9.1	5.6 GHz
110	5550.0	9.6	8.9	
134	5670.0	9.8	9.0	
151	5755.0	9.6	8.8	5.8 GHz
159	5795.0	9.3	8.3	

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**	10.8	8.3	5.2 GHz
40	5200.0	11.0	8.2	
44	5220.0	10.9	8.4	
48*	**5240.0**	11.0	8.3	
52*	**5260.0**	11.8	8.9	5.3 GHz
56	5280.0	10.9	7.7	
60	5300.0	11.0	7.8	
64*	**5320.0**	10.9	7.8	
100	5500.0	11.3	8.3	5.6 GHz
104*	**5520.0**	10.7	7.7	
108	5540.0	10.8	7.8	
112	5560.0	10.7	7.7	
116*	**5580.0**	10.7	8.2	
132	5660.0	11.1	8.1	
136*	**5680.0**	11.2	8.3	
140	5700.0	11.0	8.1	
149*	**5745.0**	11.7	8.9	5.8 GHz
153	5765.0	11.0	8.2	
157*	**5785.0**	11.1	9.2	
161	5805.0	11.0	8.1	
165*	**5825.0**	11.0	8.2	

*** Default test Channels**

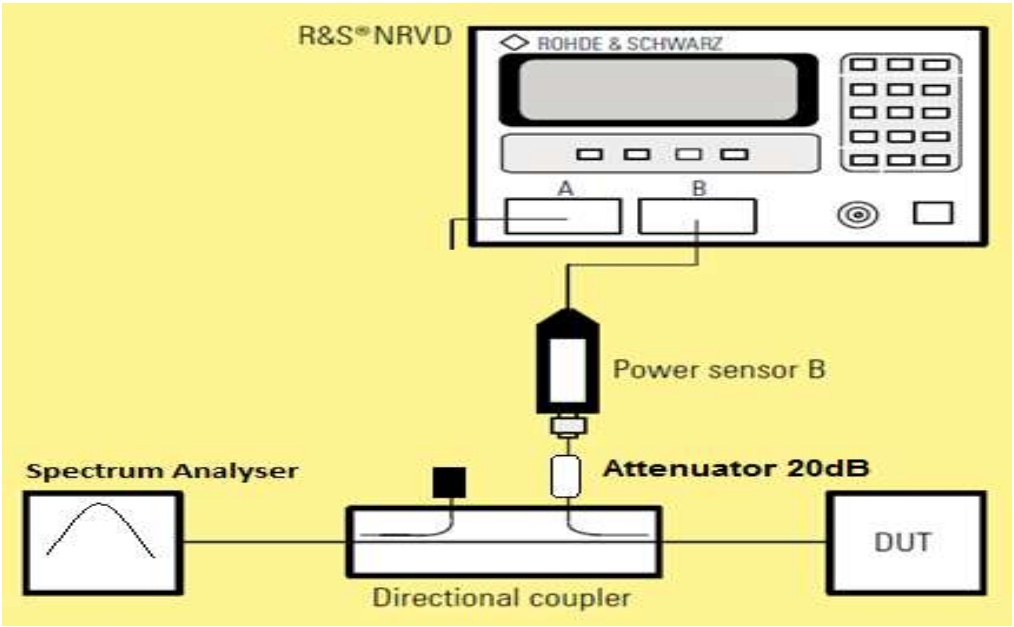
802.11ac (5.0 GHz) (40 MHz)
Power Back-off Not Supported

Channel Number	Frequency (MHZ)	TX Power (dBm) 13.5 Mbps	TX Power (dBm) 135 Mbps	Note
38	5190.0	9.7	8.7	5.2 GHz
46	5230.0	9.8	8.7	
54	5270.0	9.7	8.5	5.3 GHz
62	5310.0	8.7	7.7	
102	5510.0	9.6	8.6	5.6 GHz
110	5550.0	9.2	8.7	
134	5670.0	10.0	8.9	
151	5755.0	10.1	9.0	5.8 GHz
159	5795.0	10.0	8.9	

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	9.2	9.0	5.2 GHz
58	5290	9.4	9.0	5.3 GHz
106	5530	9.3	8.9	5.6 GHz
155	5775	9.3	9.0	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):	0.656
Maximum Reported Level (W/kg):	0.736

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	22.6 to 22.6

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	25.8	26.3	0.549	0.616	1	GMSK
2	Tilt Left	190	25.8	26.3	0.341	0.383	1	GMSK
3	Touch Right	190	25.8	26.3	0.632	0.709	1	GMSK
4	Tilt Right	190	25.8	26.3	0.343	0.385	1	GMSK
5	Touch Right	128	25.9	26.3	0.595	0.652	1	GMSK
6	Touch Right	251	25.8	26.3	0.656	0.736	1	GMSK

Note(s):

1. DTM Multi-slot Class 11

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):	0.971
Maximum Reported Level (W/kg):	1.089

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	26.1	26.6	0.856	0.960	1, 2	GMSK
8	Front	128	26.1	26.6	0.886	0.994	1, 2	GMSK
9	Front	251	26.1	26.6	0.856	0.960	1, 2	GMSK
10	Back	190	26.1	26.6	0.878	0.985	1, 2	GMSK
11	Back	128	26.1	26.6	0.971	1.089	1, 2, 3	GMSK
12	Back	251	26.1	26.6	0.791	0.888	1, 2	GMSK
13	Left Hand Side	190	26.1	26.6	0.248	0.278	1, 2	GMSK
14	Right Hand Side	190	26.1	26.6	0.167	0.187	1, 2	GMSK
15	Bottom	190	26.1	26.6	0.029	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):	0.672
Maximum Reported Level (W/kg):	0.737

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	128	25.9	26.3	0.672	0.737	1, 2, 3	GMSK
17	Back	128	25.9	26.3	0.668	0.732	1, 2, 3	GMSK

Note(s):

1. DTM Multi-slot Class 11
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):	0.498
Maximum Reported Level (W/kg):	0.534

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.
18	Touch Left	661	22.9	23.2	0.498	0.534	1	GMSK
19	Tilt Left	661	22.9	23.2	0.134	0.144	1	GMSK
20	Touch Right	661	22.9	23.2	0.293	0.314	1	GMSK
21	Tilt Right	661	22.9	23.2	0.196	0.210	1	GMSK
22	Touch Left	512	22.8	23.2	0.409	0.448	1	GMSK
23	Touch Left	810	22.9	23.2	0.432	0.463	1	GMSK

Note(s):

1. DTM Multi-slot Class 11

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):	0.798
Maximum Reported Level (W/kg):	0.855

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.
24	Front	661	23.2	23.5	0.707	0.758	1, 2	GMSK
25	Back	661	23.2	23.5	0.798	0.855	1, 2	GMSK
26	Left Hand Side	661	23.2	23.5	0.165	0.177	1, 2	GMSK
27	Right Hand Side	661	23.2	23.5	0.069	0.074	1, 2	GMSK
28	Bottom	661	23.2	23.5	0.147	0.158	1, 2	GMSK
29	Back	512	23.2	23.5	0.782	0.838	1, 2	GMSK
30	Back	810	23.1	23.5	0.759	0.832	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.

*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):	0.435
Maximum Reported Level (W/kg):	0.466

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.
31	Front	661	22.9	23.2	0.377	0.404	1, 2, 3	GMSK
32	Back	661	22.9	23.2	0.435	0.466	1, 2, 3	GMSK

Note(s):

1. DTM Multi-slot Class 11
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):	0.604
Maximum Reported Level (W/kg):	0.647

Environmental Conditions:

Temperature Variation in Lab (°C):	23.6 to 23.6
Temperature Variation in Liquid (°C):	24.0 to 24.0

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	23.7	24.0	0.604	0.647	1	QPSK
34	Tilt Left	9400	23.7	24.0	0.206	0.221	1	QPSK
35	Touch Right	9400	23.7	24.0	0.402	0.431	1	QPSK
36	Tilt Right	9400	23.7	24.0	0.299	0.320	1	QPSK
37	Touch Left	9262	23.7	24.0	0.571	0.612	1	QPSK
38	Touch Left	9538	23.6	24.0	0.544	0.596	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):	1.020
Maximum Reported Level (W/kg):	1.144

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.
39	Front	9400	23.0	23.5	0.820	0.920	1, 2	QPSK
40	Front	9262	23.0	23.5	0.846	0.949	1, 2	QPSK
41	Front	9538	23.0	23.5	0.835	0.937	1, 2	QPSK
42	Back	9400	23.0	23.5	0.960	1.077	1, 2	QPSK
43	Back	9262	23.0	23.5	0.989	1.110	1, 2	QPSK
44	Back	9538	23.0	23.5	1.020	1.144	1, 2, 3	QPSK
45	Left Hand Side	9400	23.0	23.5	0.323	0.362	1, 2	QPSK
46	Right Hand Side	9400	23.0	23.5	0.074	0.083	1, 2	QPSK
47	Bottom	9400	23.0	23.5	0.184	0.206	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 - 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):	0.626
Maximum Reported Level (W/kg):	0.686

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.
48	Front	9538	23.6	24.0	0.544	0.596	1, 2, 3	QPSK
49	Back	9538	23.6	24.0	0.626	0.686	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 - 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):	0.561
Maximum Reported Level (W/kg):	0.629

Environmental Conditions:

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

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.
50	Touch Left	1412	24.0	24.5	0.557	0.625	1	QPSK
51	Tilt Left	1412	24.0	24.5	0.179	0.201	1	QPSK
52	Touch Right	1412	24.0	24.5	0.423	0.475	1	QPSK
53	Tilt Right	1412	24.0	24.5	0.230	0.258	1	QPSK
54	Touch Left	1312	24.0	24.5	0.499	0.560	1	QPSK
55	Touch Left	1513	24.0	24.5	0.561	0.629	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):	0.975
Maximum Reported Level (W/kg):	1.094

Environmental Conditions:

Temperature Variation in Lab (°C):	23.0 to 23.0
Temperature Variation in Liquid (°C):	22.0 to 22.0

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	0.830	0.931	1, 2	QPSK
57	Back	1412	23.0	23.5	0.869	0.975	1, 2	QPSK
58	Left Hand Side	1412	23.0	23.5	0.138	0.155	1, 2	QPSK
59	Right Hand Side	1412	23.0	23.5	0.165	0.185	1, 2	QPSK
60	Bottom	1412	23.0	23.5	0.131	0.147	1, 2	QPSK
61	Back	1312	23.0	23.5	0.959	1.076	1, 2	QPSK
62	Back	1513	23.0	23.5	0.975	1.094	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 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 - 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):	0.683
Maximum Reported Level (W/kg):	0.766

Environmental Conditions:

Temperature Variation in Lab (°C):	23.0 to 23.0
Temperature Variation in Liquid (°C):	22.0 to 22.0

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.
63	Front	1513	24.0	24.5	0.683	0.766	1, 2, 3	QPSK
64	Back	1513	24.0	24.5	0.678	0.761	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 - 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):	23.0 to 23.0
Temperature Variation in Liquid (°C):	21.6 to 21.6

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	Touch Left	4183	24.2	24.5	0.423	0.453	1	QPSK
66	Tilt Left	4183	24.2	24.5	0.265	0.284	1	QPSK
67	Touch Right	4183	24.2	24.5	0.543	0.582	1	QPSK
68	Tilt Right	4183	24.2	24.5	0.302	0.324	1	QPSK
69	Touch Right	4132	24.2	24.5	0.515	0.552	1	QPSK
70	Touch Right	4233	24.1	24.5	0.554	0.607	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):	0.739
Maximum Reported Level (W/kg):	0.792

Environmental Conditions:

Temperature Variation in Lab (°C):	23.0 to 23.0
Temperature Variation in Liquid (°C):	21.7 to 21.7

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.
71	Front	4183	24.2	24.5	0.684	0.733	1, 2	QPSK
72	Back	4183	24.2	24.5	0.739	0.792	1, 2	QPSK
73	Left Hand Side	4183	24.2	24.5	0.294	0.315	1, 2	QPSK
74	Right Hand Side	4183	24.2	24.5	0.201	0.215	1, 2	QPSK
75	Bottom	4183	24.2	24.5	0.030	0.032	1, 2	QPSK
76	Back	4132	24.2	24.5	0.634	0.679	1, 2	QPSK
77	Back	4233	24.1	24.5	0.652	0.715	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.

*KDB 941225 - 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):	0.612
Maximum Reported Level (W/kg):	0.656

Environmental Conditions:

Temperature Variation in Lab (°C):	23.0 to 23.0
Temperature Variation in Liquid (°C):	21.7 to 21.7

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.
78	Front	4183	24.2	24.5	0.586	0.628	1, 2, 3	QPSK
79	Back	4183	24.2	24.5	0.612	0.656	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 - 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 - LTE Band 2 - 20MHz BW Head Configuration 1g Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.642
Maximum Reported Level (W/kg):	0.754

Environmental Conditions:

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

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.
80	Touch Left	18900	23.1	23.7	0.615	0.706	1	QPSK
81	Touch Left	18900	21.8	22.7	0.474	0.583	2	QPSK
82	Tilt Left	18900	23.1	23.7	0.180	0.207	1	QPSK
83	Tilt Left	18900	21.8	22.7	0.136	0.167	2	QPSK
84	Touch Right	18900	23.1	23.7	0.357	0.410	1	QPSK
85	Touch Right	18900	21.8	22.7	0.268	0.330	2	QPSK
86	Tilt Right	18900	23.1	23.7	0.228	0.262	1	QPSK
87	Tilt Right	18900	21.8	22.7	0.169	0.208	2	QPSK
88	Touch Left	18700	23.0	23.7	0.642	0.754	1	QPSK
89	Touch Left	19100	23.0	23.7	0.417	0.490	1	QPSK

Note(s):

1. 1 RB Allocation Middle of the Channel Bandwidth.
2. 50% RB Allocation Middle of the channel Bandwidth.

*As per KDB 941225 D05 SAR for LTE Devices v02r02, the following steps were followed to perform SAR evaluation:

Largest Channel BW

1. QPSK 1RB Allocation

Start with 1RB offset Config with the highest maximum output power on required test channel (1RB low, 1RB high or 1RB mid). If value in (1) is <0.8W/kg, testing of remaining RB offset configurations and test channels not required for 1RB

2. QPSK 50% RB Allocation

Apply steps followed in (1) for measuring 50% RB

3. QPSK 100% RB Allocation

SAR not required if highest output power from (1) and (2) is higher than 100% RB output power and if SAR Values in step (1) and (2) ≤0.8W/kg

4. 16 QAM

Apply steps (1), (2) and (3) for testing 16-QAM/64-QAM, for each configuration SAR required only when highest maximum output power for the highest order modulation (ex. 16-QAM) > QPSK by 0.5dB or when reported SAR for QPSK > 1.45W/kg

7.3.17.Specific Absorption Rate - LTE Band 2 - 20MHz BW Hotspot Mode Configuration 1g

Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.978
Maximum Reported Level (W/kg):	1.149

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	23.8 to 23.8

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.
90	Front	18900	23.1	23.7	0.815	0.936	1, 4	QPSK
91	Front	18700	23.0	23.7	0.806	0.947	1, 4	QPSK
92	Front	19100	23.0	23.7	0.755	0.887	1, 4	QPSK
93	Front	18900	21.8	22.7	0.593	0.730	2, 4	QPSK
94	Front	18900	21.8	22.7	0.631	0.776	3, 4	QPSK
95	Back	18900	23.1	23.7	0.901	1.034	1, 4	QPSK
96	Back	18700	23.0	23.7	0.978	1.149	1, 4	QPSK
97	Back	19100	23.0	23.7	0.931	1.094	1, 4	QPSK
98	Back	18900	21.8	22.7	0.721	0.887	2, 4	QPSK
99	Back	18700	21.8	22.7	0.742	0.913	2, 4	QPSK
100	Back	19100	21.8	22.7	0.695	0.855	2, 4	QPSK
101	Back	18900	21.8	22.7	0.714	0.878	3, 4	QPSK
102	Left Hand Side	18900	23.1	23.7	0.269	0.309	1, 4	QPSK
103	Left Hand Side	18900	21.8	22.7	0.213	0.262	2, 4	QPSK

Specific Absorption Rate - LTE Band 2 - 20MHz BW Hotspot Mode Configuration 1g (Continued)

Power Back-off Not Supported

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.
104	Right Hand Side	18900	23.1	23.7	0.119	0.137	1, 4	QPSK
105	Right Hand Side	18900	21.8	22.7	0.093	0.114	2, 4	QPSK
106	Bottom	18900	23.1	23.7	0.164	0.188	1, 4	QPSK
107	Bottom	18900	21.8	22.7	0.126	0.155	2, 4	QPSK

Note(s):

1. 1 RB Allocation Middle of the Channel Bandwidth.
2. 50% RB Allocation Middle of the channel Bandwidth.
3. 100% RB Allocation of channel Bandwidth.
4. 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.

*As per KDB 941225 D05 SAR for LTE Devices v02r02, the following steps were followed to perform SAR evaluation:

Largest Channel BW

1. QPSK 1RB Allocation

Start with 1RB offset Config with the highest maximum output power on required test channel (1RB low, 1RB high or 1RB mid). If value in (1) is <0.8W/kg, testing of remaining RB offset configurations and test channels not required for 1RB

2. QPSK 50% RB Allocation

Apply steps followed in (1) for measuring 50% RB

3. QPSK 100% RB Allocation

SAR not required if highest output power from (1) and (2) is higher than 100% RB output power and if SAR Values in step (1) and (2) ≤0.8W/kg

4. 16 QAM

Apply steps (1), (2) and (3) for testing 16-QAM/64-QAM, for each configuration SAR required only when highest maximum output power for the highest order modulation (ex. 16-QAM) > QPSK by 0.5dB or when reported SAR for QPSK > 1.45W/kg

7.3.18.Specific Absorption Rate - LTE Band 2 - 20MHz BW Body-Worn Configuration 1g

Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.574
Maximum Reported Level (W/kg):	0.674

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.
108	Front	18700	23.0	23.7	0.516	0.606	1, 2, 3	QPSK
109	Back	18700	23.0	23.7	0.574	0.674	1, 2, 3	QPSK

Note(s):

1. 1 RB Allocation Middle of the Channel Bandwidth.
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.

7.3.19.Specific Absorption Rate - LTE Band 2 - 1.4MHz BW Head Configuration 1g Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.573
Maximum Reported Level (W/kg):	0.673

Environmental Conditions:

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

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.
110	Touch Left	18900	23.0	23.7	0.547	0.643	1	QPSK
111	Touch Left	18900	23.0	23.7	0.547	0.643	2	QPSK
112	Tilt Left	18900	23.0	23.7	0.184	0.216	1	QPSK
113	Tilt Left	18900	23.0	23.7	0.172	0.202	2	QPSK
114	Touch Right	18900	23.0	23.7	0.356	0.418	1	QPSK
115	Touch Right	18900	23.0	23.7	0.339	0.398	2	QPSK
116	Tilt Right	18900	23.0	23.7	0.235	0.276	1	QPSK
117	Tilt Right	18900	23.0	23.7	0.238	0.280	2	QPSK
118	Touch Left	18607	23.0	23.7	0.573	0.673	1	QPSK
119	Touch Left	19193	21.7	22.2	0.372	0.417	1	QPSK

Note(s):

1. 1 RB Allocation Middle of the Channel Bandwidth.
2. 50% RB Allocation Middle of the channel Bandwidth.

*As per KDB 941225 D05 SAR for LTE Devices v02r02, the following steps were followed to perform SAR evaluation:

Other Channel BW

1. QPSK 1RB Allocation

Start with 1RB offset Config with the highest maximum output power on required test channel (1RB low, 1RB high or 1RB mid). If value in (1) is <0.8W/kg, testing of remaining RB offset configurations and test channels not required for 1RB

2. QPSK 50% RB Allocation

Apply steps followed in (1) for measuring 50% RB

3. QPSK 100% RB Allocation

SAR not required if highest output power from (1) and (2) is higher than 100% RB output power and if SAR Values in step (1) and (2) ≤0.8W/kg

4. 16 QAM

Apply steps (1), (2) and (3) for testing 16-QAM/64-QAM, for each configuration SAR required only when highest maximum output power for the highest order modulation (ex. 16-QAM) > QPSK by 0.5dB or when reported SAR for QPSK > 1.45W/kg

7.3.20.Specific Absorption Rate - LTE Band 2 - 1.4MHz BW Hotspot Mode Configuration 1g

Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.941
Maximum Reported Level (W/kg):	1.130

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	23.8 to 23.8

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.
120	Front	18900	23.0	23.7	0.783	0.920	1, 4	QPSK
121	Front	18607	23.0	23.7	0.814	0.956	1, 4	QPSK
122	Front	19193	21.7	22.2	0.524	0.588	1, 4	QPSK
123	Front	18900	23.0	23.7	0.779	0.915	2, 4	QPSK
124	Front	18607	23.0	23.7	0.858	1.008	2, 4	QPSK
125	Front	19193	21.7	22.2	0.537	0.603	2, 4	QPSK
126	Front	18607	22.0	22.7	0.654	0.768	3, 4	QPSK
127	Back	18900	23.0	23.7	0.871	1.023	1, 4	QPSK
128	Back	18607	23.0	23.7	0.925	1.087	1, 4	QPSK
129	Back	19193	21.7	22.2	0.603	0.677	1, 4	QPSK
130	Back	18900	23.0	23.7	0.872	1.025	2, 4	QPSK
131	Back	18607	23.0	23.7	0.941	1.130	2, 4	QPSK
132	Back	19193	21.7	22.2	0.607	0.681	2, 4	QPSK
133	Back	18607	22.0	22.7	0.732	0.860	3, 4	QPSK
134	Left Hand Side	18900	23.0	23.7	0.268	0.315	1, 4	QPSK
135	Left Hand Side	18900	23.0	23.7	0.259	0.304	2, 4	QPSK

Specific Absorption Rate - LTE Band 2 - 1.4MHz BW Hotspot Mode Configuration 1g Power Back-off Not Supported

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.
136	Right Hand Side	18900	23.0	23.7	0.116	0.136	1, 4	QPSK
137	Right Hand Side	18900	23.0	23.7	0.115	0.135	2, 4	QPSK
138	Bottom	18900	23.0	23.7	0.158	0.186	1, 4	QPSK
139	Bottom	18900	23.0	23.7	0.155	0.182	2, 4	QPSK

Note(s):

1. 1 RB Allocation Middle of the Channel Bandwidth.
2. 50% RB Allocation Middle of the channel Bandwidth.
3. 100% RB Allocation of channel Bandwidth.
4. 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.

*As per KDB 941225 D05 SAR for LTE Devices v02r02, the following steps were followed to perform SAR evaluation:

Other Channel BW

1. QPSK 1RB Allocation

Start with 1RB offset Config with the highest maximum output power on required test channel (1RB low, 1RB high or 1RB mid). If value in (1) is <0.8W/kg, testing of remaining RB offset configurations and test channels not required for 1RB

2. QPSK 50% RB Allocation

Apply steps followed in (1) for measuring 50% RB

3. QPSK 100% RB Allocation

SAR not required if highest output power from (1) and (2) is higher than 100% RB output power and if SAR Values in step (1) and (2) ≤0.8W/kg

4. 16 QAM

Apply steps (1), (2) and (3) for testing 16-QAM/64-QAM, for each configuration SAR required only when highest maximum output power for the highest order modulation (ex. 16-QAM) > QPSK by 0.5dB or when reported SAR for QPSK > 1.45W/kg

7.3.21.Specific Absorption Rate - LTE Band 2 - 1.4MHz BW Body-Worn Configuration 1g

Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.566
Maximum Reported Level (W/kg):	0.665

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	23.8 to 23.8

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.
140	Front	18607	23.0	23.7	0.549	0.645	1, 2, 3	QPSK
141	Back	18607	23.0	23.7	0.566	0.665	1, 2, 3	QPSK

Note(s):

1. 50% RB Allocation Middle of the channel Bandwidth.
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.

7.3.22.Specific Absorption Rate - LTE Band 4 - 20MHz BW Head Configuration 1g Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.402
Maximum Reported Level (W/kg):	0.462

Environmental Conditions:

Temperature Variation in Lab (°C):	23.0 to 23.0
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.
142	Touch Left	20175	23.1	23.7	0.402	0.462	1	QPSK
143	Touch Left	20050	21.9	22.7	0.286	0.344	2	QPSK
144	Tilt Left	20175	23.1	23.7	0.101	0.116	1	QPSK
145	Tilt Left	20050	21.9	22.7	0.075	0.090	2	QPSK
146	Touch Right	20175	23.1	23.7	0.295	0.339	1	QPSK
147	Touch Right	20050	21.9	22.7	0.205	0.246	2	QPSK
148	Tilt Right	20175	23.1	23.7	0.169	0.194	1	QPSK
149	Tilt Right	20050	21.9	22.7	0.109	0.131	2	QPSK
150	Touch Left	20050	23.1	23.7	0.369	0.424	1	QPSK
151	Touch Left	20300	23.0	23.7	0.378	0.444	1	QPSK

Note(s):

1. 1 RB Allocation Low End of the Channel Bandwidth.
2. 50% RB Allocation Low End of the channel Bandwidth.

*As per KDB 941225 D05 SAR for LTE Devices v02r02, the following steps were followed to perform SAR evaluation:

Largest Channel BW

1. QPSK 1RB Allocation

Start with 1RB offset Config with the highest maximum output power on required test channel (1RB low, 1RB high or 1RB mid). If value in (1) is <0.8W/kg, testing of remaining RB offset configurations and test channels not required for 1RB

2. QPSK 50% RB Allocation

Apply steps followed in (1) for measuring 50% RB

3. QPSK 100% RB Allocation

SAR not required if highest output power from (1) and (2) is higher than 100% RB output power and if SAR Values in step (1) and (2) ≤0.8W/kg

4. 16 QAM

Apply steps (1), (2) and (3) for testing 16-QAM/64-QAM, for each configuration SAR required only when highest maximum output power for the highest order modulation (ex. 16-QAM) > QPSK by 0.5dB or when reported SAR for QPSK > 1.45W/kg

7.3.23.Specific Absorption Rate - LTE Band 4 - 20MHz BW Hotspot Mode Configuration 1g

Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.900
Maximum Reported Level (W/kg):	1.057

Environmental Conditions:

Temperature Variation in Lab (°C):	23.0 to 23.0
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.
152	Front	20175	23.1	23.7	0.887	1.018	1, 4	QPSK
153	Front	20050	23.1	23.7	0.860	0.987	1, 4	QPSK
154	Front	20300	23.0	23.7	0.900	1.057	1, 4	QPSK
155	Front	20050	21.9	22.7	0.659	0.792	2, 4	QPSK
156	Front	20175	21.8	22.7	0.688	0.846	3, 4	QPSK
157	Back	20175	23.1	23.7	0.891	1.023	1, 4	QPSK
158	Back	20050	23.1	23.7	0.841	0.966	1, 4	QPSK
159	Back	20300	23.0	23.7	0.879	1.033	1, 4	QPSK
160	Back	20050	21.9	22.7	0.648	0.779	2, 4	QPSK
161	Back	20175	21.8	22.7	0.685	0.843	3, 4	QPSK
162	Left Hand Side	20175	23.1	23.7	0.165	0.189	1, 4	QPSK
163	Left Hand Side	20050	21.9	22.7	0.106	0.127	2, 4	QPSK

Specific Absorption Rate - LTE Band 4 - 20MHz BW Hotspot Mode Configuration 1g Power Back-off Not Supported

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.
164	Right Hand Side	20175	23.1	23.7	0.132	0.152	1, 4	QPSK
165	Right Hand Side	20050	21.9	22.7	0.105	0.126	2, 4	QPSK
166	Bottom	20175	23.1	23.7	0.149	0.171	1, 4	QPSK
167	Bottom	20050	21.9	22.7	0.091	0.109	2, 4	QPSK

Note(s):

1. 1 RB Allocation Low End of the Channel Bandwidth.
2. 50% RB Allocation Low End of the channel Bandwidth.
3. 100% RB Allocation of channel Bandwidth.
4. 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.

*As per KDB 941225 D05 SAR for LTE Devices v02r02, the following steps were followed to perform SAR evaluation:

Largest Channel BW

1. QPSK 1RB Allocation

Start with 1RB offset Config with the highest maximum output power on required test channel (1RB low, 1RB high or 1RB mid). If value in (1) is <0.8W/kg, testing of remaining RB offset configurations and test channels not required for 1RB

2. QPSK 50% RB Allocation

Apply steps followed in (1) for measuring 50% RB

3. QPSK 100% RB Allocation

SAR not required if highest output power from (1) and (2) is higher than 100% RB output power and if SAR Values in step (1) and (2) ≤0.8W/kg

4. 16 QAM

Apply steps (1), (2) and (3) for testing 16-QAM/64-QAM, for each configuration SAR required only when highest maximum output power for the highest order modulation (ex. 16-QAM) > QPSK by 0.5dB or when reported SAR for QPSK > 1.45W/kg

7.3.24.Specific Absorption Rate - LTE Band 4 - 20MHz BW Body-Worn Configuration 1g

Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.602
Maximum Reported Level (W/kg):	0.707

Environmental Conditions:

Temperature Variation in Lab (°C):	23.0 to 23.0
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.
168	Front	20300	23.0	23.7	0.577	0.678	1, 2, 3	QPSK
169	Back	20300	23.0	23.7	0.602	0.707	1, 2, 3	QPSK

Note(s):

1. 1 RB Allocation Low End of the Channel Bandwidth.
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.

7.3.25.Specific Absorption Rate - LTE Band 4 - 1.4MHz BW Head Configuration 1g Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.465
Maximum Reported Level (W/kg):	0.534

Environmental Conditions:

Temperature Variation in Lab (°C):	23.0 to 23.0
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.
170	Touch Left	19957	23.1	23.7	0.389	0.447	1	QPSK
171	Touch Left	19957	23.1	23.7	0.383	0.440	2	QPSK
172	Tilt Left	19957	23.1	23.7	0.112	0.129	1	QPSK
173	Tilt Left	19957	23.1	23.7	0.112	0.129	2	QPSK
174	Touch Right	19957	23.1	23.7	0.265	0.304	1	QPSK
175	Touch Right	19957	23.1	23.7	0.252	0.289	2	QPSK
176	Tilt Right	19957	23.1	23.7	0.152	0.175	1	QPSK
177	Tilt Right	19957	23.1	23.7	0.153	0.176	2	QPSK
178	Touch Left	20175	23.0	23.7	0.431	0.506	1	QPSK
179	Touch Left	20393	23.1	23.7	0.465	0.534	1	QPSK

Note(s):

1. 1 RB Allocation Middle of the Channel Bandwidth.
2. 50% RB Allocation Middle of the channel Bandwidth.

*As per KDB 941225 D05 SAR for LTE Devices v02r02, the following steps were followed to perform SAR evaluation:

Other Channel BW

1. QPSK 1RB Allocation

Start with 1RB offset Config with the highest maximum output power on required test channel (1RB low, 1RB high or 1RB mid). If value in (1) is <0.8W/kg, testing of remaining RB offset configurations and test channels not required for 1RB

2. QPSK 50% RB Allocation

Apply steps followed in (1) for measuring 50% RB

3. QPSK 100% RB Allocation

SAR not required if highest output power from (1) and (2) is higher than 100% RB output power and if SAR Values in step (1) and (2) ≤0.8W/kg

4. 16 QAM

Apply steps (1), (2) and (3) for testing 16-QAM/64-QAM, for each configuration SAR required only when highest maximum output power for the highest order modulation (ex. 16-QAM) > QPSK by 0.5dB or when reported SAR for QPSK > 1.45W/kg

7.3.26.Specific Absorption Rate - LTE Band 4 - 1.4MHz BW Hotspot Mode Configuration 1g

Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.920
Maximum Reported Level (W/kg):	1.056

Environmental Conditions:

Temperature Variation in Lab (°C):	23.0 to 23.0
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.
180	Front	19957	23.1	23.7	0.819	0.940	1, 4	QPSK
181	Front	20175	23.0	23.7	0.872	1.025	1, 4	QPSK
182	Front	20393	23.1	23.7	0.880	1.010	1, 4	QPSK
183	Front	19957	23.1	23.7	0.819	0.940	2, 4	QPSK
184	Front	20175	23.0	23.7	0.808	0.949	2, 4	QPSK
185	Front	20393	23.1	23.7	0.874	1.003	2, 4	QPSK
186	Front	19957	22.2	22.7	0.604	0.678	3, 4	QPSK
187	Back	19957	23.1	23.7	0.836	0.960	1, 4	QPSK
188	Back	20175	23.0	23.7	0.865	1.016	1, 4	QPSK
189	Back	20393	23.1	23.7	0.892	1.024	1, 4	QPSK
190	Back	19957	23.1	23.7	0.825	0.947	2, 4	QPSK
191	Back	20175	23.0	23.7	0.842	0.989	2, 4	QPSK
192	Back	20393	23.1	23.7	0.920	1.056	2, 4	QPSK
193	Back	19957	22.2	22.7	0.658	0.738	3, 4	QPSK
194	Left Hand Side	19957	23.1	23.7	0.125	0.144	1, 4	QPSK
195	Left Hand Side	19957	23.1	23.7	0.125	0.144	2, 4	QPSK

Specific Absorption Rate - LTE Band 4 - 1.4MHz BW Hotspot Mode Configuration 1g Power Back-off Not Supported

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.
196	Right Hand Side	19957	23.1	23.7	0.129	0.148	1, 4	QPSK
197	Right Hand Side	19957	23.1	23.7	0.097	0.111	2, 4	QPSK
198	Bottom	19957	23.1	23.7	0.157	0.180	1, 4	QPSK
199	Bottom	19957	23.1	23.7	0.143	0.164	2, 4	QPSK

Note(s):

1. 1 RB Allocation Middle of the Channel Bandwidth.
2. 50% RB Allocation Middle of the channel Bandwidth.
3. 100% RB Allocation of channel Bandwidth.
4. 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.

*As per KDB 941225 D05 SAR for LTE Devices v02r02, the following steps were followed to perform SAR evaluation:

Other Channel BW

1. QPSK 1RB Allocation

Start with 1RB offset Config with the highest maximum output power on required test channel (1RB low, 1RB high or 1RB mid). If value in (1) is <0.8W/kg, testing of remaining RB offset configurations and test channels not required for 1RB

2. QPSK 50% RB Allocation

Apply steps followed in (1) for measuring 50% RB

3. QPSK 100% RB Allocation

SAR not required if highest output power from (1) and (2) is higher than 100% RB output power and if SAR Values in step (1) and (2) ≤0.8W/kg

4. 16 QAM

Apply steps (1), (2) and (3) for testing 16-QAM/64-QAM, for each configuration SAR required only when highest maximum output power for the highest order modulation (ex. 16-QAM) > QPSK by 0.5dB or when reported SAR for QPSK > 1.45W/kg

7.3.27.Specific Absorption Rate - LTE Band 4 - 1.4MHz BW Body-Worn Configuration 1g

Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.610
Maximum Reported Level (W/kg):	0.700

Environmental Conditions:

Temperature Variation in Lab (°C):	23.0 to 23.0
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.
200	Front	20393	23.1	23.7	0.574	0.659	1, 2, 3	QPSK
201	Back	20393	23.1	23.7	0.610	0.700	1, 2, 3	QPSK

Note(s):

1. 50% RB Allocation Middle of the channel Bandwidth.
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. Most conservative channel from hotspot mode configuration is used for body-worn configuration.

7.3.28.Specific Absorption Rate - LTE Band 5 - 10MHz BW Head Configuration 1g Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.460
Maximum Reported Level (W/kg):	0.528

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	22.7 to 22.7

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.
202	Touch Left	20525	22.6	23.2	0.336	0.386	1	QPSK
203	Touch Left	20600	21.6	22.2	0.275	0.316	2	QPSK
204	Tilt Left	20525	22.6	23.2	0.208	0.239	1	QPSK
205	Tilt Left	20600	21.6	22.2	0.166	0.191	2	QPSK
206	Touch Right	20600	21.6	22.2	0.342	0.393	1	QPSK
207	Touch Right	20525	22.6	23.2	0.438	0.503	2	QPSK
208	Tilt Right	20525	22.6	23.2	0.191	0.219	1	QPSK
209	Tilt Right	20600	21.6	22.2	0.153	0.176	2	QPSK
210	Touch Right	20450	22.6	23.2	0.416	0.478	1	QPSK
211	Touch Right	20600	22.6	23.2	0.460	0.528	1	QPSK

Note(s):

1. 1 RB Allocation High End of the channel Bandwidth.
2. 50% RB Allocation Low End of the channel Bandwidth.

*As per KDB 941225 D05 SAR for LTE Devices v02r02, the following steps were followed to perform SAR evaluation:

Largest Channel BW

1. QPSK 1RB Allocation

Start with 1RB offset Config with the highest maximum output power on required test channel (1RB low, 1RB high or 1RB mid). If value in (1) is <0.8W/kg, testing of remaining RB offset configurations and test channels not required for 1RB

2. QPSK 50% RB Allocation

Apply steps followed in (1) for measuring 50% RB

3. QPSK 100% RB Allocation

SAR not required if highest output power from (1) and (2) is higher than 100% RB output power and if SAR Values in step (1) and (2) ≤0.8W/kg

4. 16 QAM

Apply steps (1), (2) and (3) for testing 16-QAM/64-QAM, for each configuration SAR required only when highest maximum output power for the highest order modulation (ex. 16-QAM) > QPSK by 0.5dB or when reported SAR for QPSK > 1.45W/kg

7.3.29.Specific Absorption Rate - LTE Band 5 - 10MHz BW Hotspot Mode Configuration 1g

Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.503
Maximum Reported Level (W/kg):	0.578

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	22.0 to 22.0

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.
212	Front	20525	22.6	23.2	0.498	0.572	1, 3	QPSK
213	Front	20600	21.6	22.2	0.390	0.448	2, 3	QPSK
214	Back	20525	22.6	23.2	0.490	0.563	1, 3	QPSK
215	Back	20600	21.6	22.2	0.380	0.436	2, 3	QPSK
216	Left Hand Side	20525	22.6	23.2	0.184	0.211	1, 3	QPSK
217	Left Hand Side	20600	21.6	22.2	0.153	0.176	2, 3	QPSK
218	Right Hand Side	20525	22.6	23.2	0.122	0.140	1, 3	QPSK
219	Right Hand Side	20600	21.6	22.2	0.094	0.108	2, 3	QPSK
220	Bottom	20525	22.6	23.2	0.022	0.025	1, 3	QPSK
221	Bottom	20600	21.6	22.2	0.025	0.029	2, 3	QPSK

Specific Absorption Rate - LTE Band 5 - 10MHz BW BodyConfiguration 1g
Power Back-off Not Supported

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.
222	Front	20450	22.6	23.2	0.462	0.530	1, 3	QPSK
223	Front	20600	22.6	23.2	0.503	0.578	1, 3	QPSK

Note(s):

1. 1 RB Allocation High End of the Channel Bandwidth.
2. 50% RB Allocation Low End of the channel Bandwidth.
3. 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.

*As per KDB 941225 D05 SAR for LTE Devices v02r02, the following steps were followed to perform SAR evaluation:

Largest Channel BW

1. QPSK 1RB Allocation

Start with 1RB offset Config with the highest maximum output power on required test channel (1RB low, 1RB high or 1RB mid). If value in (1) is <0.8W/kg, testing of remaining RB offset configurations and test channels not required for 1RB

2. QPSK 50% RB Allocation

Apply steps followed in (1) for measuring 50% RB

3. QPSK 100% RB Allocation

SAR not required if highest output power from (1) and (2) is higher than 100% RB output power and if SAR Values in step (1) and (2) ≤0.8W/kg

4. 16 QAM

Apply steps (1), (2) and (3) for testing 16-QAM/64-QAM, for each configuration SAR required only when highest maximum output power for the highest order modulation (ex. 16-QAM) > QPSK by 0.5dB or when reported SAR for QPSK > 1.45W/kg

7.3.30.Specific Absorption Rate - LTE Band 5 - 10MHz BW Body-Worn Configuration 1g

Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.394
Maximum Reported Level (W/kg):	0.452

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	22.0 to 22.0

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.
224	Front	20600	22.6	23.2	0.391	0.449	1, 2, 3	QPSK
225	Back	20600	22.6	23.2	0.394	0.452	1, 2, 3	QPSK

Note(s):

1. 1 RB Allocation High End of the Channel Bandwidth.
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.

7.3.31.Specific Absorption Rate - LTE Band 5 - 1.4MHz BW Head Configuration 1g Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.469
Maximum Reported Level (W/kg):	0.538

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	22.7 to 22.7

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.
226	Touch Left	20643	22.6	23.2	0.402	0.462	1	QPSK
227	Touch Left	20525	22.5	23.2	0.339	0.398	2	QPSK
228	Tilt Left	20643	22.6	23.2	0.234	0.269	1	QPSK
229	Tilt Left	20525	22.5	23.2	0.217	0.255	2	QPSK
230	Touch Right	20643	22.6	23.2	0.469	0.538	1	QPSK
231	Touch Right	20525	22.5	23.2	0.441	0.518	2	QPSK
232	Tilt Right	20643	22.6	23.2	0.210	0.241	1	QPSK
233	Tilt Right	20525	22.5	23.2	0.212	0.249	2	QPSK
234	Touch Right	20407	22.6	23.2	0.407	0.467	1	QPSK
235	Touch Right	20525	22.6	23.2	0.443	0.509	1	QPSK

Note(s):

1. 1 RB Allocation Middle of the Channel Bandwidth.
2. 50% RB Allocation Middle of the channel Bandwidth.

*As per KDB 941225 D05 SAR for LTE Devices v02r02, the following steps were followed to perform SAR evaluation:

Other Channel BW

1. QPSK 1RB Allocation

Start with 1RB offset Config with the highest maximum output power on required test channel (1RB low, 1RB high or 1RB mid). If value in (1) is <0.8W/kg, testing of remaining RB offset configurations and test channels not required for 1RB

2. QPSK 50% RB Allocation

Apply steps followed in (1) for measuring 50% RB

3. QPSK 100% RB Allocation

SAR not required if highest output power from (1) and (2) is higher than 100% RB output power and if SAR Values in step (1) and (2) ≤0.8W/kg

4. 16 QAM

Apply steps (1), (2) and (3) for testing 16-QAM/64-QAM, for each configuration SAR required only when highest maximum output power for the highest order modulation (ex. 16-QAM) > QPSK by 0.5dB or when reported SAR for QPSK > 1.45W/kg

7.3.32.Specific Absorption Rate - LTE Band 5 - 1.4MHz BW Hotspot Mode Configuration 1g

Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.496
Maximum Reported Level (W/kg):	0.569

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	22.0 to 22.0

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.
236	Front	20643	22.6	23.2	0.381	0.437	1, 3	QPSK
237	Front	20525	22.5	23.2	0.459	0.539	2, 3	QPSK
238	Back	20643	22.6	23.2	0.479	0.550	1, 3	QPSK
239	Back	20525	22.5	23.2	0.465	0.546	2, 3	QPSK
240	Left Hand Side	20643	22.6	23.2	0.186	0.214	1, 3	QPSK
241	Left Hand Side	20525	22.5	23.2	0.187	0.220	2, 3	QPSK
242	Right Hand Side	20643	22.6	23.2	0.141	0.162	1, 3	QPSK
243	Right Hand Side	20525	22.5	23.2	0.116	0.136	2, 3	QPSK
244	Bottom	20643	22.6	23.2	0.029	0.033	1, 3	QPSK
245	Bottom	20525	22.5	23.2	0.020	0.024	2, 3	QPSK

Specific Absorption Rate - LTE Band 5 - 1.4MHz BW Hotspot Mode Configuration 1g Power Back-off Not Supported

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.
246	Back	20407	22.6	23.2	0.496	0.569	1, 3	QPSK
247	Back	20525	22.6	23.2	0.485	0.557	1, 3	QPSK

Note(s):

1. 1 RB Allocation Middle of the Channel Bandwidth.
2. 50% RB Allocation Middle of the channel Bandwidth.
3. 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.

*As per KDB 941225 D05 SAR for LTE Devices v02r02, the following steps were followed to perform SAR evaluation:

Other Channel BW

1. QPSK 1RB Allocation

Start with 1RB offset Config with the highest maximum output power on required test channel (1RB low, 1RB high or 1RB mid). If value in (1) is <0.8W/kg, testing of remaining RB offset configurations and test channels not required for 1RB

2. QPSK 50% RB Allocation

Apply steps followed in (1) for measuring 50% RB

3. QPSK 100% RB Allocation

SAR not required if highest output power from (1) and (2) is higher than 100% RB output power and if SAR Values in step (1) and (2) ≤0.8W/kg

4. 16 QAM

Apply steps (1), (2) and (3) for testing 16-QAM/64-QAM, for each configuration SAR required only when highest maximum output power for the highest order modulation (ex. 16-QAM) > QPSK by 0.5dB or when reported SAR for QPSK > 1.45W/kg

7.3.33.Specific Absorption Rate - LTE Band 5 - 1.4MHz BW Body-Worn Configuration 1g

Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.374
Maximum Reported Level (W/kg):	0.429

Environmental Conditions:

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	22.0 to 22.0

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.
248	Front	20407	22.6	23.2	0.366	0.420	1, 2, 3	QPSK
249	Back	20407	22.6	23.2	0.374	0.429	1, 2, 3	QPSK

Note(s):

1. 1 RB Allocation Middle of the Channel Bandwidth.
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.

7.3.34.Specific Absorption Rate - LTE Band 7 - 20MHz BW Head Configuration 1g Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.382
Maximum Reported Level (W/kg):	0.504

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.
250	Touch Left	20850	22.7	23.7	0.306	0.385	1	QPSK
251	Touch Left	21100	21.5	22.7	0.288	0.380	2	QPSK
252	Tilt Left	20850	22.7	23.7	0.197	0.248	1	QPSK
253	Tilt Left	21100	21.5	22.7	0.128	0.169	2	QPSK
254	Touch Right	20850	22.7	23.7	0.268	0.337	1	QPSK
255	Touch Right	21100	21.5	22.7	0.229	0.302	2	QPSK
256	Tilt Right	20850	22.7	23.7	0.220	0.277	1	QPSK
257	Tilt Right	21100	21.5	22.7	0.146	0.192	2	QPSK
258	Touch Left	21100	22.5	23.7	0.382	0.504	1	QPSK
259	Touch Left	21350	22.6	23.7	0.360	0.464	1	QPSK

Note(s):

1. 1 RB Allocation Middle of the Channel Bandwidth.
2. 50% RB Allocation High End of the channel Bandwidth.

*As per KDB 941225 D05 SAR for LTE Devices v02r02, the following steps were followed to perform SAR evaluation:

Largest Channel BW

1. QPSK 1RB Allocation

Start with 1RB offset Config with the highest maximum output power on required test channel (1RB low, 1RB high or 1RB mid). If value in (1) is <0.8W/kg, testing of remaining RB offset configurations and test channels not required for 1RB

2. QPSK 50% RB Allocation

Apply steps followed in (1) for measuring 50% RB

3. QPSK 100% RB Allocation

SAR not required if highest output power from (1) and (2) is higher than 100% RB output power and if SAR Values in step (1) and (2) ≤0.8W/kg

4. 16 QAM

Apply steps (1), (2) and (3) for testing 16-QAM/64-QAM, for each configuration SAR required only when highest maximum output power for the highest order modulation (ex. 16-QAM) > QPSK by 0.5dB or when reported SAR for QPSK > 1.45W/kg

7.3.35.Specific Absorption Rate - LTE Band 7 - 20MHz BW Hotspot Mode Configuration 1g

Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.472
Maximum Reported Level (W/kg):	0.608

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.
260	Front	20850	22.7	23.7	0.419	0.527	1, 3	QPSK
261	Front	21100	21.5	22.7	0.305	0.402	2, 3	QPSK
262	Back	20850	22.7	23.7	0.391	0.492	1, 3	QPSK
263	Back	21100	21.5	22.7	0.298	0.393	2, 3	QPSK
264	Left Hand Side	20850	22.7	23.7	0.161	0.203	1, 3	QPSK
265	Left Hand Side	21100	21.5	22.7	0.115	0.152	2, 3	QPSK
266	Right Hand Side	20850	22.7	23.7	0.076	0.095	1, 3	QPSK
267	Right Hand Side	21100	21.5	22.7	0.057	0.074	2, 3	QPSK
268	Bottom	20850	22.7	23.7	0.112	0.141	1, 3	QPSK
269	Bottom	21100	21.5	22.7	0.087	0.114	2, 3	QPSK

Specific Absorption Rate - LTE Band 7 - 20MHz BW Hotspot Mode Configuration 1g Power Back-off Not Supported

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.
270	Front	21100	22.5	23.7	0.419	0.552	1, 3	QPSK
271	Front	21350	22.6	23.7	0.472	0.608	1, 3	QPSK

Note(s):

1. 1 RB Allocation Middle of the Channel Bandwidth.
2. 50% RB Allocation High End of the channel Bandwidth.
3. 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.

*As per KDB 941225 D05 SAR for LTE Devices v02r02, the following steps were followed to perform SAR evaluation:

Largest Channel BW

1. QPSK 1RB Allocation

Start with 1RB offset Config with the highest maximum output power on required test channel (1RB low, 1RB high or 1RB mid). If value in (1) is <0.8W/kg, testing of remaining RB offset configurations and test channels not required for 1RB

2. QPSK 50% RB Allocation

Apply steps followed in (1) for measuring 50% RB

3. QPSK 100% RB Allocation

SAR not required if highest output power from (1) and (2) is higher than 100% RB output power and if SAR Values in step (1) and (2) ≤0.8W/kg

4. 16 QAM

Apply steps (1), (2) and (3) for testing 16-QAM/64-QAM, for each configuration SAR required only when highest maximum output power for the highest order modulation (ex. 16-QAM) > QPSK by 0.5dB or when reported SAR for QPSK > 1.45W/kg

7.3.36.Specific Absorption Rate - LTE Band 7 - 20MHz BW Body-Worn Configuration 1g

Power Back-off Not Supported

Test Summary:

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.224
Maximum Reported Level (W/kg):	0.289

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.
272	Front	21350	22.6	23.7	0.216	0.278	1, 2, 3	QPSK
273	Back	21350	22.6	23.7	0.224	0.289	1, 2, 3	QPSK

Note(s):

1. 1 RB Allocation Middle of the Channel Bandwidth.
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.

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

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.070
Maximum Reported Level (W/kg):	0.079

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.
274	Touch Left	6	16.5	17.0	0.053	0.060	1, 2	DBPSK
275	Tilt Left	6	16.5	17.0	0.019	0.021	1, 2	DBPSK
276	Touch Right	6	16.5	17.0	0.070	0.079	1, 2	DBPSK
277	Tilt Right	6	16.5	17.0	0.019	0.021	1, 2	DBPSK
278	Touch Right	1	14.7	15.5	0.059	0.070	1, 2	DBPSK
279	Touch Right	11	14.3	15.0	0.025	0.030	1, 2	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.

7.3.38.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):	0.107
Maximum Reported Level (W/kg):	0.129

Environmental Conditions:

Temperature Variation in Lab (°C):	23.0 to 23.0
Temperature Variation in Liquid (°C):	21.5 to 21.5

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.
280	Front	6	16.5	17.0	0.040	0.045	1, 2, 3	DBPSK
281	Back	6	16.5	17.0	0.094	0.106	1, 2, 3	DBPSK
282	Left Hand Side	6	16.5	17.0	0.020	0.023	1, 2, 3	DBPSK
283	Bottom	6	16.5	17.0	0.037	0.041	1, 2, 3	DBPSK
284	Back	1	14.7	15.5	0.107	0.129	1, 2, 3	DBPSK
285	Back	11	14.3	15.0	0.055	0.064	1, 2, 3	DBPSK

Note(s):

1. WLAN 802.11b 11Mbps
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.

7.3.39.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):	0.039
Maximum Reported Level (W/kg):	0.047

Environmental Conditions:

Temperature Variation in Lab (°C):	23.0 to 23.0
Temperature Variation in Liquid (°C):	21.5 to 21.5

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.
286	Front	1	14.7	15.5	0.022	0.026	1, 2, 3	DBPSK
287	Back	1	14.7	15.5	0.039	0.047	1, 2, 3	DBPSK

Note(s):

1. WLAN 802.11b 11Mbps
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.

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

Tissue Volume:	1g
Maximum Measured Level (W/kg):	0.013
Maximum Reported Level (W/kg):	0.017

Environmental Conditions:

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

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.
288	Touch Left	48	12.0	12.6	0.014	0.016	1, 5, 6	DBPSK
289	Tilt Left	48	12.0	12.6	0.009	0.010	1, 5, 6	DBPSK
290	Touch Right	48	12.0	12.6	0.006	0.007	1, 5, 6	DBPSK
291	Tilt Right	48	12.0	12.6	0.006	0.007	1,5, 6	DBPSK
292	Touch Left	52	12.9	13.6	0.008	0.009	1, 5, 6	DBPSK
-	Touch Left	116	11.2	12.3	0.000	0.000	1, 5, 7	DBPSK
-	Touch Left	157	11.2	12.3	0.000	0.000	1, 5, 7	DBPSK

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 HT20								
293	Touch Left	48	11.0	12.1	0.013	0.017	2, 5, 6	DBPSK
802.11ac HT40								
294	Touch Left	46	9.8	11.0	0.009	0.012	3, 5, 6	DBPSK
295	Touch Left	54	9.7	11.0	0.010	0.013	3, 5, 6	DBPSK
296	Touch Left	134	10.0	10.8	0.007	0.009	3, 5, 7	DBPSK
297	Touch Left	151	10.1	10.8	0.010	0.012	3, 5, 7	DBPSK
802.11ac HT80								
298	Touch Left	42	42	9.2	10.5	0.010	4, 5, 6	DBPSK
299	Touch Left	58	58	9.4	10.5	0.008	4, 5, 6	DBPSK
-	Touch Left	106	106	9.3	10.5	0.000	4, 5, 7	DBPSK
300	Touch Left	155	155	9.3	10.5	0.001	4, 5, 7	DBPSK

Note(s):

1. WLAN 802.11a 6Mbps
2. WLAN 802.11ac HT20 6.5Mbps
3. WLAN 802,11ac HT40 13.5 Mbps
4. WLAN 802.11ac HT80 13.5 Mbps
5. Value measured was below noise floor
6. 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. Per KDB 447498 1) e) i)
7. 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. Per KDB 447498 1) e) i)

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

7.3.41.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):	0.065
Maximum Reported Level (W/kg):	0.084

Environmental Conditions:

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

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.
301	Front	48	12.0	12.6	0.045	0.047	1, 3, 4	DBPSK
302	Back	48	12.0	12.6	0.062	0.071	1, 3, 4	DBPSK
303	Left Hand Side	48	12.0	12.6	0.001	0.001	1, 3, 4	DBPSK
304	Bottom	48	12.0	12.6	0.007	0.008	1, 3, 4	DBPSK
305	Back	52	12.9	13.6	0.064	0.075	1, 3, 4	DBPSK
306	Back	116	11.2	12.3	0.033	0.042	1, 3, 5	DBPSK
307	Back	157	11.4	12.3	0.050	0.061	1, 3, 4	DBPSK
308	Back	48	11.0	12.1	0.065	0.084	2, 3, 4	DBPSK

Note(s):

1. WLAN 802.11a 6Mbps
2. WLAN 802.11ac 6.5Mbps
3. 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.
4. 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. Per KDB 447498 1) e) i)
5. 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. Per KDB 447498 1) e) i)

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

7.3.42.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):	0.028
Maximum Reported Level (W/kg):	0.032

Environmental Conditions:

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

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.
309	Front	48	12.0	12.6	0.028	0.032	1, 2, 3, 4	DBPSK
310	Back	48	12.0	12.6	0.008	0.009	1, 2, 3, 4	DBPSK

Note(s):

1. WLAN 802.11a 6Mbps
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. 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. Per KDB 447498 1) e) i)
4. Worst case channel from hotspot mode configuration is used for body-worn configuration.

7.4. Simultaneous Transmission SAR Analysis
Head Configuration 1g – Worst cases measurements WWAN+WLAN

	Reported SAR 1g (W/Kg)									
	WWAN								WLAN 2.4	Sum of WWAN & WLAN
EUT Position	UMTS FDD 5	LTE Band 2 (20MHz)	LTE Band 2 (1.4MHz)	LTE Band 4 (20MHz)	GSM 850	PCS 1900	UMTS FDD 2	UMTS FDD 4	Wi-Fi 802.11 b	
Touch Left	0.453								0.060	0.513
Tilt Left	0.284								0.021	0.305
Touch Right	0.607								0.079	0.686
Tilt Right	0.324								0.021	0.345
Touch Left		0.754							0.060	0.814
Tilt Left		0.207							0.021	0.228
Touch Right		0.410							0.079	0.489
Tilt Right		0.262							0.021	0.283
Touch Left			0.673						0.060	0.733
Tilt Left			0.216						0.021	0.237
Touch Right			0.418						0.079	0.497
Tilt Right			0.280						0.021	0.301
Touch Left				0.462					0.060	0.522
Tilt Left				0.116					0.021	0.137
Touch Right				0.339					0.079	0.418
Tilt Right				0.194					0.021	0.215
Touch Left					0.736				0.060	0.796
Tilt Left					0.383				0.021	0.404
Touch Right					0.709				0.079	0.788
Tilt Right					0.385				0.021	0.406
Touch Left						0.534			0.060	0.594
Tilt Left						0.144			0.021	0.165
Touch Right						0.314			0.079	0.393
Tilt Right						0.210			0.021	0.231
Touch Left							0.647		0.060	0.707
Tilt Left							0.221		0.021	0.242
Touch Right							0.431		0.079	0.510
Tilt Right							0.320		0.021	0.341
Touch Left								0.629	0.060	0.689
Tilt Left								0.201	0.021	0.222
Touch Right								0.475	0.079	0.554
Tilt Right								0.258	0.021	0.279

Simultaneous Transmission SAR Analysis (Continued)

Head Configuration 1g – Worst cases measurements WWAN+WLAN

	Reported SAR 1g (W/Kg)					
	WWAN				WLAN	Sum of WWAN & WLAN
EUT Position	LTE Band 4 (1.4MHz)	LTE Band 5 (10MHz)	LTE Band 5 (1.4MHz)	LTE Band 7 (10MHz)	Wi-Fi	
Touch Left	0.524				0.060	0.584
Tilt Left	0.129				0.021	0.150
Touch Right	0.304				0.079	0.383
Tilt Right	0.176				0.021	0.197
Touch Left		0.386			0.060	0.446
Tilt Left		0.239			0.021	0.260
Touch Right		0.528			0.079	0.607
Tilt Right		0.219			0.021	0.240
Touch Left			0.462		0.060	0.522
Tilt Left			0.269		0.021	0.290
Touch Right			0.538		0.079	0.617
Tilt Right			0.249		0.021	0.270
Touch Left				0.504	0.060	0.564
Tilt Left				0.248	0.021	0.269
Touch Right				0.337	0.079	0.416
Tilt Right				0.277	0.021	0.298

Simultaneous Transmission SAR Analysis (Continued)
Hotspot Mode 1g – Worst cases measurements WWAN+WLAN

	Reported SAR 1g (W/Kg)					
	WWAN				WLAN	
EUT Position	GSM 850	PCS 1900	UMTS FDD 2	UMTS FDD 4	Wi-Fi	Sum of WWAN & WLAN
Front	0.994				0.045	1.039
Back	1.089				0.129	1.218
Left Hand Side	0.278				0.023	0.301
Right Hand Side	0.187				[a]	0.187
Bottom	0.033				0.041	0.074
Top					[a]	
Front		0.758			0.045	0.803
Back		0.855			0.129	0.984
Left Hand Side		0.177			0.023	0.200
Right Hand Side		0.074			[a]	0.074
Bottom		0.158			0.041	0.199
Top					[a]	
Front			0.949		0.045	0.994
Back			1.144		0.129	1.273
Left Hand Side			0.362		0.023	0.385
Right Hand Side			0.083		[a]	0.083
Bottom			0.206		0.041	0.247
Top					[a]	
Front				0.931	0.045	0.976
Back				1.094	0.129	1.223
Left Hand Side				0.155	0.023	0.178
Right Hand Side				0.185	[a]	0.185
Bottom				0.147	0.041	0.188
Top	[a]					

Note:
[a] N/A due to separation from edge

Simultaneous Transmission SAR Analysis (Continued)

Hotspot Mode 1g – Worst cases measurements WWAN+WLAN

	Reported SAR 1g (W/Kg)					
	WWAN				WLAN	
EUT Position	UMTS FDD 5	LTE Band 2 (20MHz)	LTE Band 2 (1.4MHz)	LTE Band 4 (20MHz)	Wi-Fi	Sum of WWAN & WLAN
Front	0.733				0.045	0.778
Back	0.792				0.129	0.921
Left Hand Side	0.315				0.023	0.338
Right Hand Side	0.215				[a]	0.215
Bottom	0.032				0.041	0.073
Top					[a]	
Front		0.947			0.045	0.992
Back		**1.149**			**0.129**	**1.278**
Left Hand Side		0.309			0.023	0.332
Right Hand Side		0.137			[a]	0.137
Bottom		0.188			0.041	0.229
Top					[a]	
Front			1.008		0.045	1.053
Back			1.130		0.129	1.259
Left Hand Side			0.315		0.023	0.338
Right Hand Side			0.136		[a]	0.136
Bottom			0.186		0.041	0.227
Top					[a]	
Front				1.057	0.045	1.102
Back				1.033	0.129	1.162
Left Hand Side				0.189	0.023	0.212
Right Hand Side				0.152	[a]	0.152
Bottom				0.171	0.041	0.212
Top					[a]	

Note:
[a] N/A due to separation from edge

Simultaneous Transmission SAR Analysis (Continued)

Hotspot Mode 1g – Worst cases measurements WWAN+WLAN

	Reported SAR 1g (W/Kg)					
	WWAN				WLAN	
EUT Position	LTE Band 4 (1.4MHz)	LTE Band 5 (10MHz)	LTE Band 5 (1.4MHz)	LTE Band 7 (10MHz)	Wi-Fi	Sum of WWAN & WLAN
Front	1.025				0.045	1.080
Back	1.056				0.129	1.185
Left Hand Side	0.144				0.023	0.167
Right Hand Side	0.148				[a]	0.148
Bottom	0.180				0.041	0.221
Top					[a]	
Front		0.578			0.045	0.623
Back		0.563			0.129	0.692
Left Hand Side		0.211			0.023	0.234
Right Hand Side		0.140			[a]	0.140
Bottom		0.029			0.041	0.070
Top					[a]	
Front			0.539		0.045	0.584
Back			0.569		0.129	0.698
Left Hand Side			0.220		0.023	0.243
Right Hand Side			0.162		[a]	0.162
Bottom			0.033		0.041	0.074
Top					[a]	
Front				0.608	0.045	0.653
Back				0.492	0.129	0.621
Left Hand Side				0.203	0.023	0.226
Right Hand Side				0.095	[a]	0.095
Bottom				0.141	0.041	0.182
Top					[a]	

Note:
[a] N/A due to separation from edge

Simultaneous Transmission SAR Analysis (Continued)

Body-worn Configuration 1g – Worst cases measurements WWAN+WLAN

	Reported SAR 1g (W/Kg)					
	WWAN				WLAN	
EUT Position	GSM 850	PCS 1900	UMTS FDD 2	UMTS FDD 4	Wi-Fi	Sum of WWAN & WLAN
Front	0.737				0.026	0.763
Back	0.732				0.047	0.779
Front		0.404			0.026	0.430
Back		0.466			0.047	0.513
Front			0.596		0.026	0.622
Back			0.686		0.047	0.733
Front				0.766	0.026	0.792
Back				0.761	0.047	0.808

	Reported SAR 1g (W/Kg)					
	WWAN				WLAN	
EUT Position	UMTS FDD 5	LTE Band 2 (20MHz)	LTE Band 2 (1.4MHz)	LTE Band 4 (20MHz)	Wi-Fi	Sum of WWAN & WLAN
Front	0.628				0.026	0.654
Back	0.656				0.047	0.703
Front		0.606			0.026	0.632
Back		0.674			0.047	0.721
Front			0.645		0.026	0.671
Back			0.665		0.047	0.712
Front				0.678	0.026	0.704
Back				0.707	0.047	0.754

	Reported SAR 1g (W/Kg)					
	WWAN				WLAN	
EUT Position	LTE Band 4 (1.4MHz)	LTE Band 5 (10MHz)	LTE Band 5 (1.4MHz)	LTE Band 7 (10MHz)	Wi-Fi	Sum of WWAN & WLAN
Front	0.659				0.026	0.685
Back	0.700				0.047	0.747
Front		0.449			0.026	0.475
Back		0.452			0.047	0.499
Front			0.420		0.026	0.446
Back			0.429		0.047	0.476
Front				0.278	0.026	0.304
Back				0.289	0.047	0.336

Simultaneous Transmission SAR Analysis (Continued)

Hotspot Mode 1g – Worst cases measurements WWAN+WPAN

	Reported SAR 1g (W/Kg)					
	WWAN				WPAN	Sum of WWAN & WPAN
EUT Position	GSM 850	PCS 1900	UMTS FDD 2	UMTS FDD 4	*Bluetooth*	
Front	0.994				0.184	1.178
Back	1.089				0.184	1.273
Left Hand Side	0.278				0.184	0.462
Right Hand Side	0.187				[a]	0.187
Bottom	0.033				0.184	0.217
Top					[a]	
Front		0.758			0.184	0.942
Back		0.855			0.184	1.039
Left Hand Side		0.177			0.184	0.361
Right Hand Side		0.074			[a]	0.074
Bottom		0.158			0.184	0.342
Top					[a]	
Front			0.949		0.184	1.133
Back			1.144		0.184	1.328
Left Hand Side			0.362		0.184	0.546
Right Hand Side			0.083		[a]	0.083
Bottom			0.206		0.184	0.390
Top					[a]	
Front				0.931	0.184	1.115
Back				1.094	0.184	1.278
Left Hand Side				0.155	0.184	0.339
Right Hand Side				0.185	[a]	0.185
Bottom				0.147	0.184	0.331
Top					[a]	

Note:
[a] N/A due to separation from edge

Simultaneous Transmission SAR Analysis (Continued)

Hotspot Mode 1g – Worst cases measurements WWAN+WPAN

	Reported SAR 1g (W/Kg)					
	WWAN				WPAN	
EUT Position	UMTS FDD 5	LTE Band 2 (20MHz)	LTE Band 2 (1.4MHz)	LTE Band 4 (20MHz)	*Bluetooth*	Sum of WWAN & WPAN
Front	0.733				0.184	0.917
Back	0.792				0.184	0.976
Left Hand Side	0.315				0.184	0.499
Right Hand Side	0.215				[a]	0.215
Bottom	0.032				0.184	0.216
Top					[a]	
Front		0.947			0.184	1.131
Back		**1.149**			**0.184**	**1.333**
Left Hand Side		0.309			0.184	0.493
Right Hand Side		0.137			[a]	0.137
Bottom		0.188			0.184	0.372
Top					[a]	
Front			1.008		0.184	1.192
Back			1.130		0.184	1.314
Left Hand Side			0.315		0.184	0.499
Right Hand Side			0.136		[a]	0.136
Bottom			0.186		0.184	0.370
Top					[a]	
Front				1.057	0.184	1.241
Back				1.033	0.184	1.217
Left Hand Side				0.189	0.184	0.373
Right Hand Side				0.152	[a]	0.152
Bottom				0.171	0.184	0.355
Top					[a]	

Note:
[a] N/A due to separation from edge

Simultaneous Transmission SAR Analysis (Continued)

Hotspot Mode 1g – Worst cases measurements WWAN+WPAN

	Reported SAR 1g (W/Kg)					
	WWAN				WPAN	
EUT Position	LTE Band 4 (1.4MHz)	LTE Band 5 (10MHz)	LTE Band 5 (1.4MHz)	LTE Band 7 (10MHz)	*Bluetooth*	Sum of WWAN & WPAN
Front	1.025				0.184	1.209
Back	1.056				0.184	1.240
Left Hand Side	0.144				0.184	0.328
Right Hand Side	0.148				[a]	0.148
Bottom	0.180				0.184	0.364
Top					[a]	
Front		0.578			0.184	0.762
Back		0.563			0.184	0.747
Left Hand Side		0.211			0.184	0.395
Right Hand Side		0.140			[a]	0.140
Bottom		0.029			0.184	0.213
Top					[a]	
Front			0.539		0.184	0.723
Back			0.569		0.184	0.753
Left Hand Side			0.220		0.184	0.404
Right Hand Side			0.162		[a]	0.162
Bottom			0.033		0.184	0.217
Top					[a]	
Front				0.608	0.184	0.792
Back				0.492	0.184	0.676
Left Hand Side				0.203	0.184	0.387
Right Hand Side				0.095	[a]	0.095
Bottom				0.141	0.184	0.325
Top					[a]	

Note:
[a] N/A due to separation from edge

Simultaneous Transmission SAR Analysis (Continued)

Body-worn Configuration 1g – Worst cases measurements WWAN+WPAN

	Reported SAR 1g (W/Kg)					
	WWAN				WPAN	Sum of WWAN & WPAN
EUT Position	GSM 850	PCS 1900	UMTS FDD 2	UMTS FDD 4	*Bluetooth*	
Front	0.737				0.123	Not Supported
Back	0.732				0.123	Not Supported
Front		0.404			0.123	Not Supported
Back		0.466			0.123	Not Supported
Front			0.596		0.123	0.719
Back			0.686		0.123	0.809
Front				0.766	0.123	0.889
Back				0.761	0.123	0.884

	Reported SAR 1g (W/Kg)					
	WWAN				WPAN	Sum of WWAN & WPAN
EUT Position	UMTS FDD 5	LTE Band 2 (20MHz)	LTE Band 2 (1.4MHz)	LTE Band 4 (20MHz)	*Bluetooth*	
Front	0.628				0.123	0.751
Back	0.656				0.123	0.779
Front		0.606			0.123	0.729
Back		0.674			0.123	0.797
Front			0.645		0.123	0.768
Back			0.665		0.123	0.788
Front				0.678	0.123	0.801
Back				0.707	0.123	0.830

	Reported SAR 1g (W/Kg)					
	WWAN				WPAN	Sum of WWAN & WPAN
EUT Position	LTE Band 4 (1.4MHz)	LTE Band 5 (10MHz)	LTE Band 5 (1.4MHz)	LTE Band 7 (10MHz)	*Bluetooth*	
Front	0.659				0.123	0.782
Back	0.700				0.123	0.823
Front		0.449			0.123	0.572
Back		0.452			0.123	0.575
Front			0.420		0.123	0.543
Back			0.429		0.123	0.552
Front				0.278	0.123	0.401
Back				0.289	0.123	0.412

Simultaneous Transmission SAR Analysis (Continued)
Note(s):

1. The sum of reported SAR for WWAN and WPAN does not exceed 1.6W/kg in any of the above cases and hence, the SAR to peak location separation ratio distance was not calculated.
2. Bluetooth estimated SAR result is calculated as per the formula below following FCC KDB publication 447498.
3. Separation distance of 10mm was used for hotspot mode and 15mm for body-worn configuration.

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)]·[$\sqrt{f_{(GHz)}}/x$]* W/kg for *test separation distances* ≤ 50 mm;
  where $x = 7.5$ for 1-g SAR, and $x = 18.75$ for 10-g SAR.

For the estimated SAR level caluclation, the Maximum Target power + Upper tolerance for *Bluetooth* = 6.0 + 3.5 = 9.5 dBm (~ 8.91 mW) is considered.

- **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

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[1]
Specific Absorption Rate-GSM 850/ UMTS FDD 5 / LTE Band 5 Head Configuration 1g	95%	±20.08%
Specific Absorption Rate-GSM / GPRS / EDGE 850 / UMTS FDD 5 / LTE Band 5 Body Configurations 1g	95%	±21.09%
Specific Absorption Rate-UMTS FDD 4 / LTE Band 4 Head Configuration 1g	95%	±21.09%
Specific Absorption Rate-UMTS FDD 4 / LTE Band 4 Body Configuration 1g	95%	±20.59%
Specific Absorption Rate-PCS 1900 / UMTS FDD 2/ LTE Band 2 Head Configuration 1g	95%	±23.70%
Specific Absorption Rate-GSM / GPRS / EDGE 1900 / UMTS FDD 2 / LTE Band 2 Body Configuration 1g	95%	±20.18%
Specific Absorption Rate-Wi-Fi 2450 MHz/ LTE Band 7 Head Configuration 1g	95%	±19.79%
Specific Absorption Rate-Wi-Fi 2450 MHz/ LTE Band 7 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
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
A2244	2600 MHz Dipole Kit	Schmid & Partner Engineering AG	D2600V2	71046	31 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	-
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

UL No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval
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	4
M1647	Signal Generator	Hewlett Packward	8648C	3537A01598	Internal Checked	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

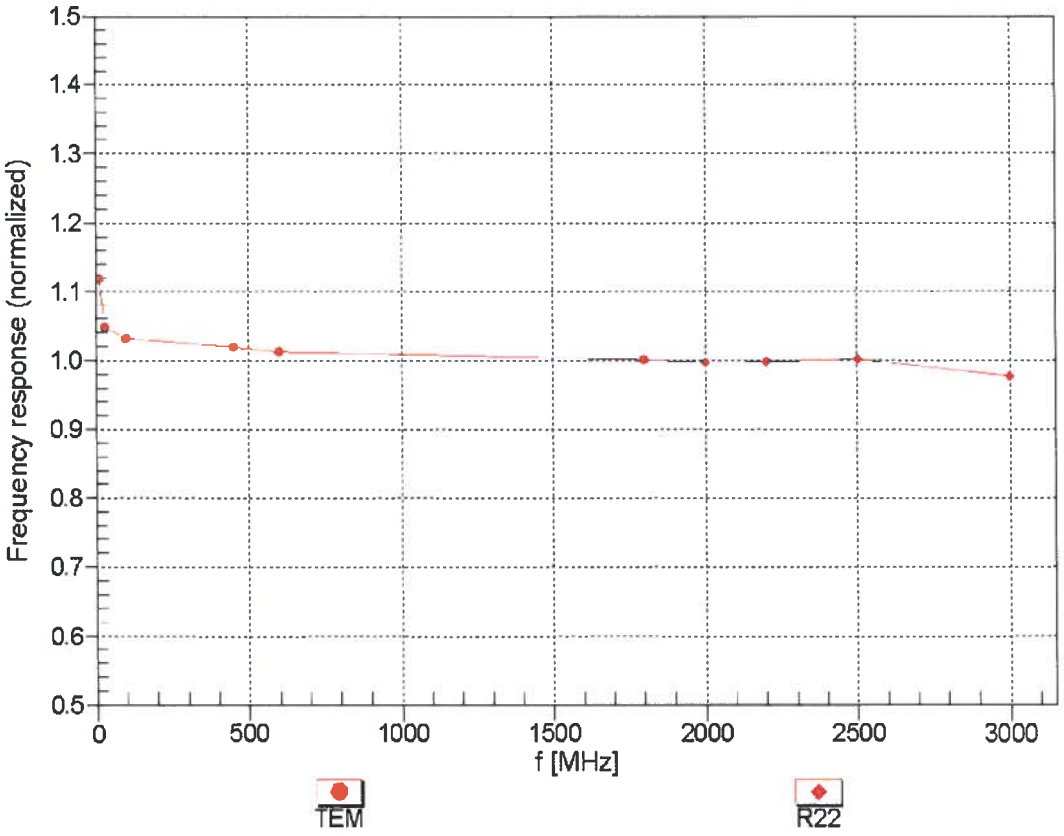
Calibration Parameter Determined in Body Tissue Simulating Media

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

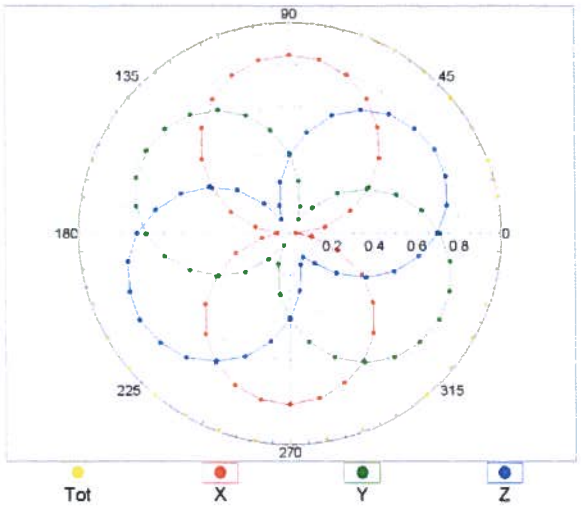
(TEM-Cell:ifi110 EXX, Waveguide: R22)



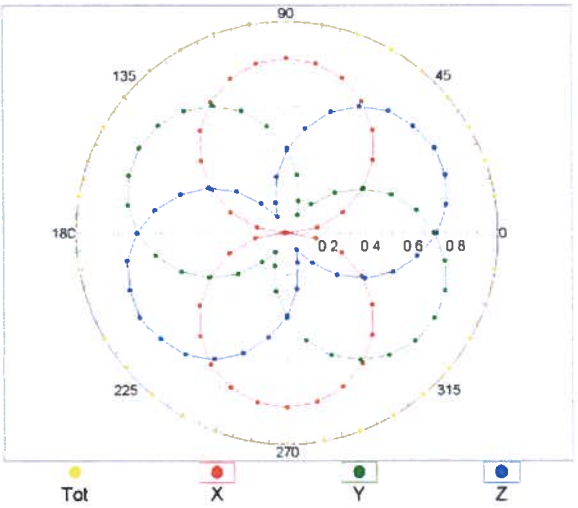
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

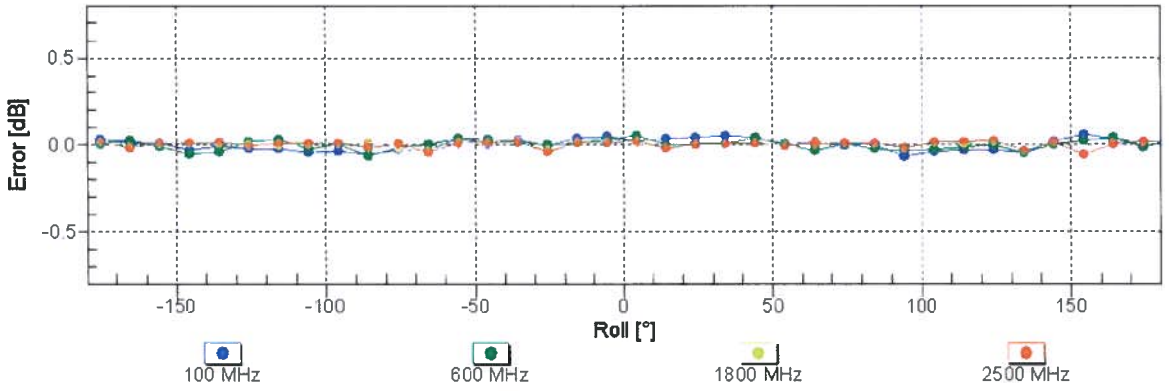
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



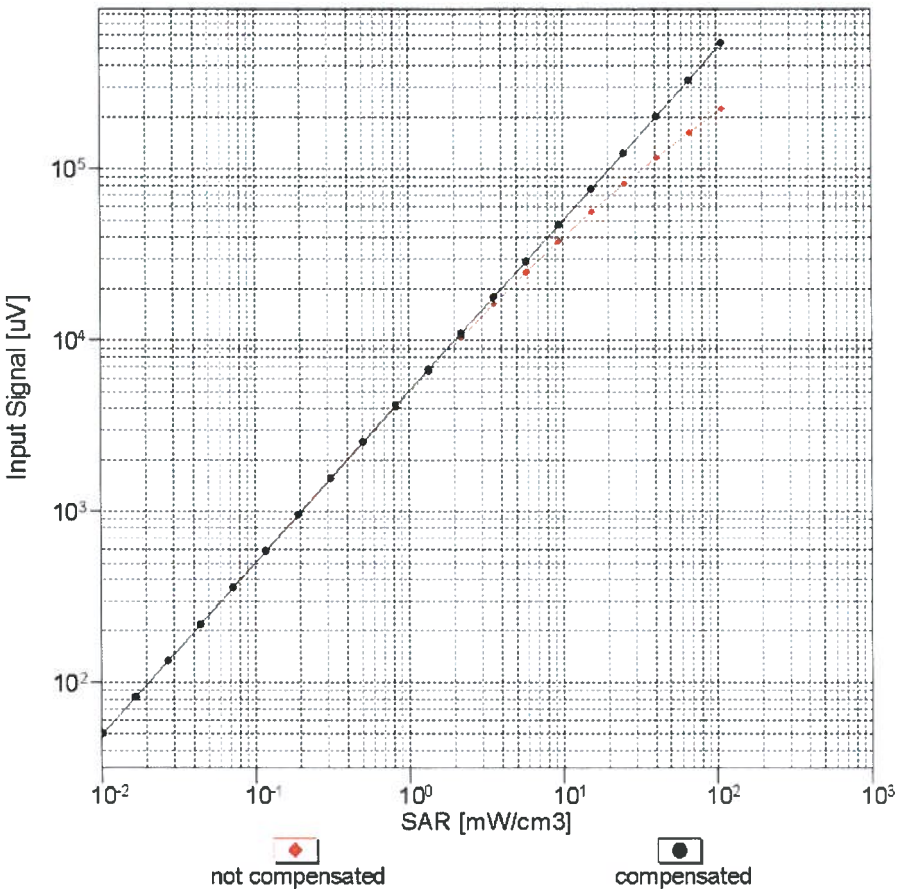
f=1800 MHz,R22

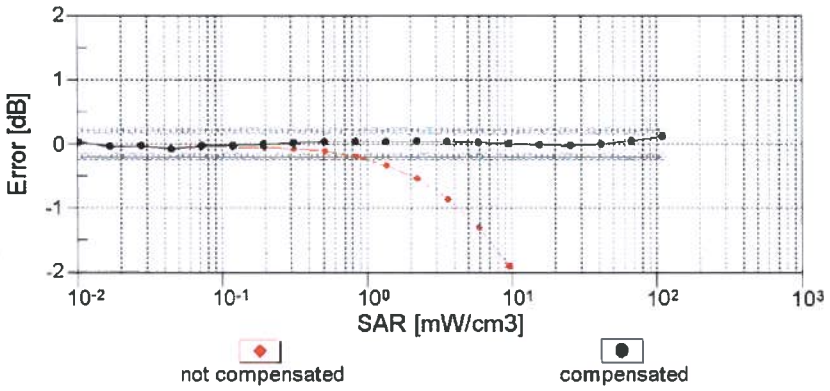




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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

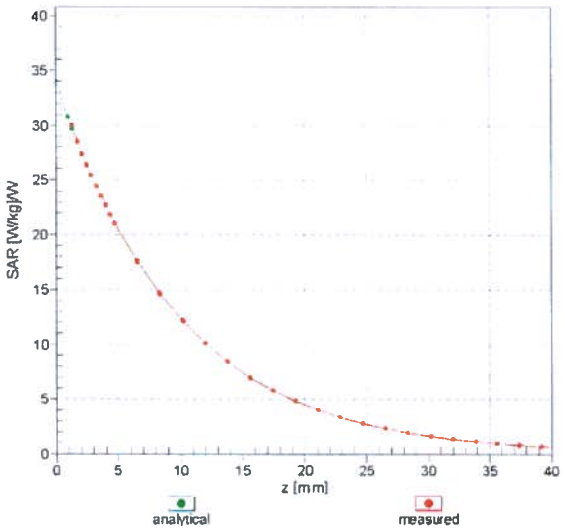




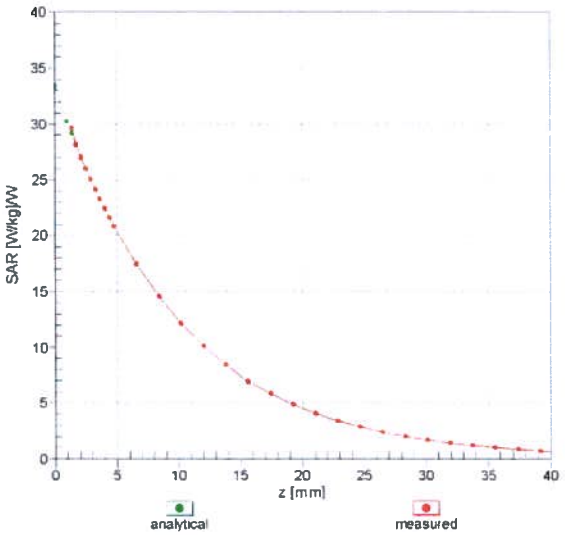
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 2450 MHz,WGLS R22 (H_convF)

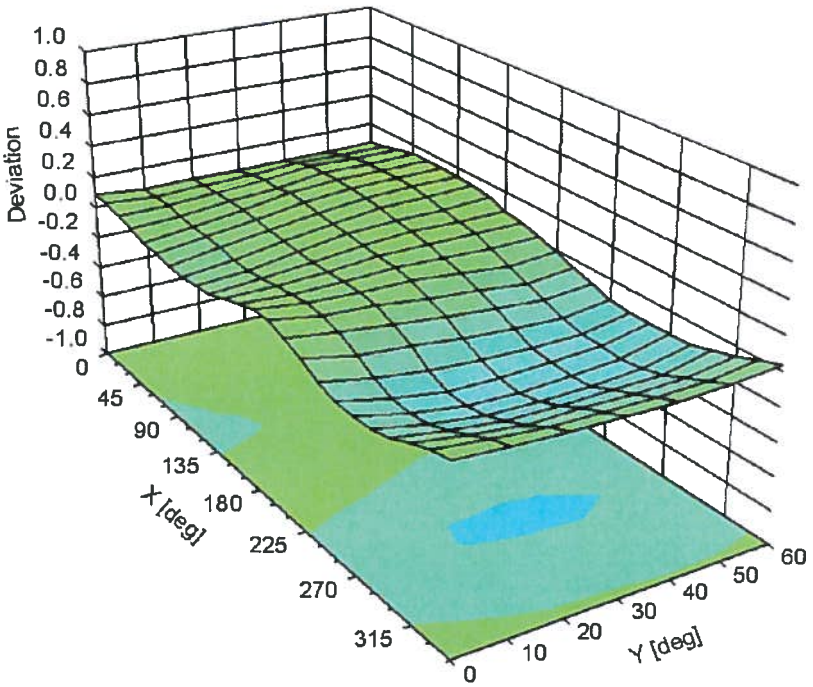


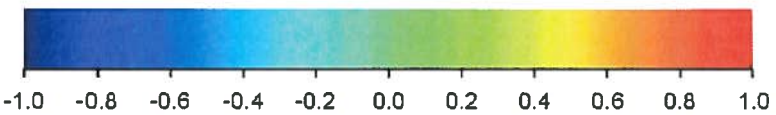
f = 2450 MHz,WGLS R22 (M_convF)



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
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
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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

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

S Schweizerischer Kalibrierdienst
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S Servizio svizzero di taratura
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Accredited by the Swiss Accreditation Service (SAS)
Accreditation No.: SCS 108
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

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.

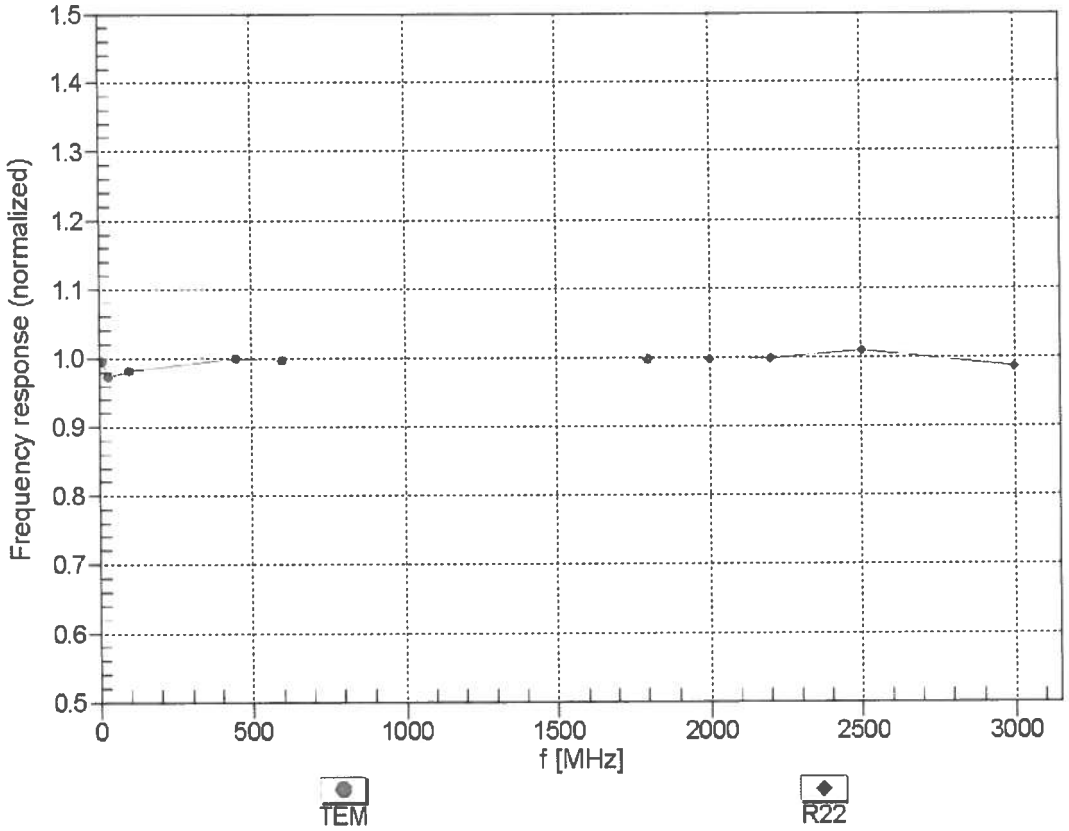
DASY/EASY - Parameters of Probe: ET3DV6 - SN:1528

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.

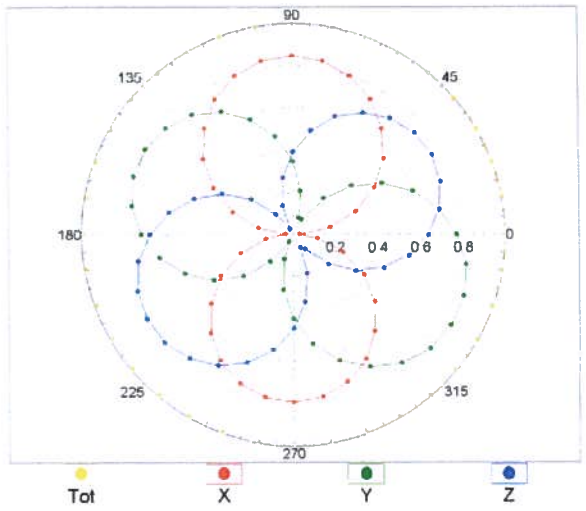
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



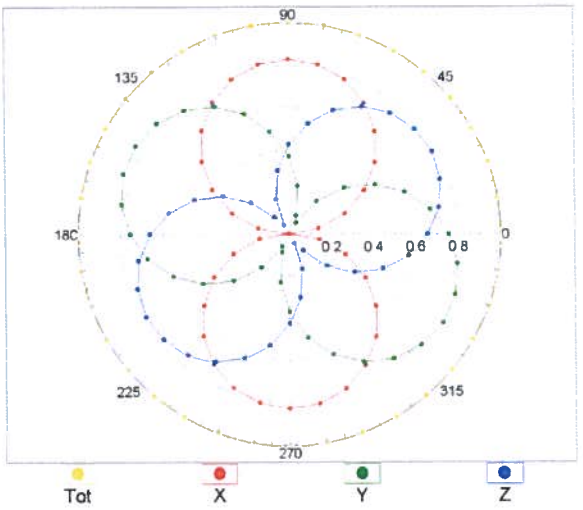
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

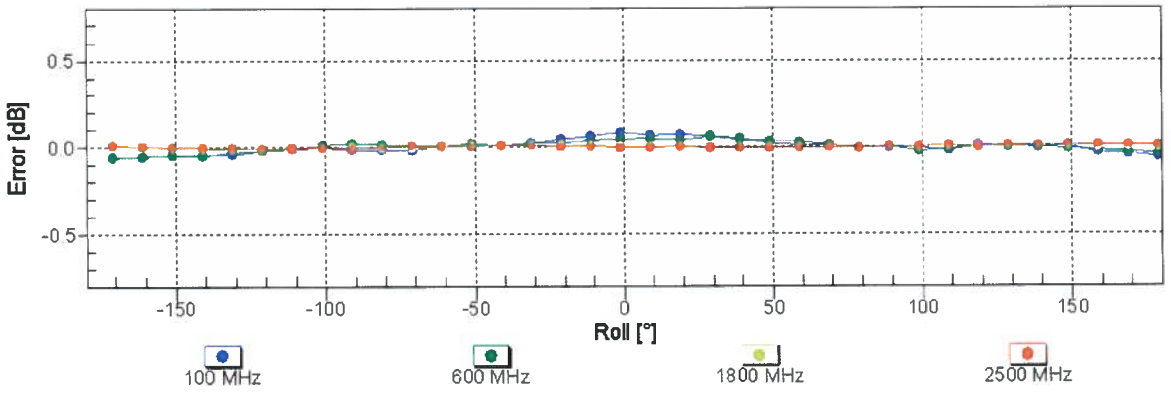
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



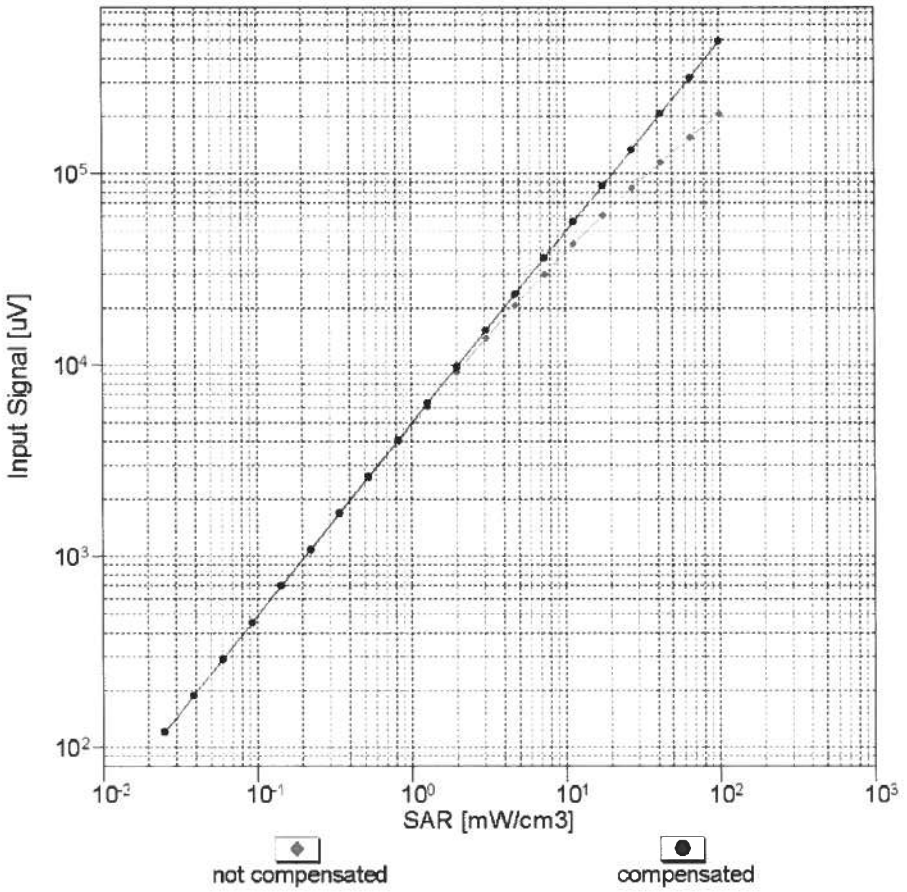
f=1800 MHz,R22

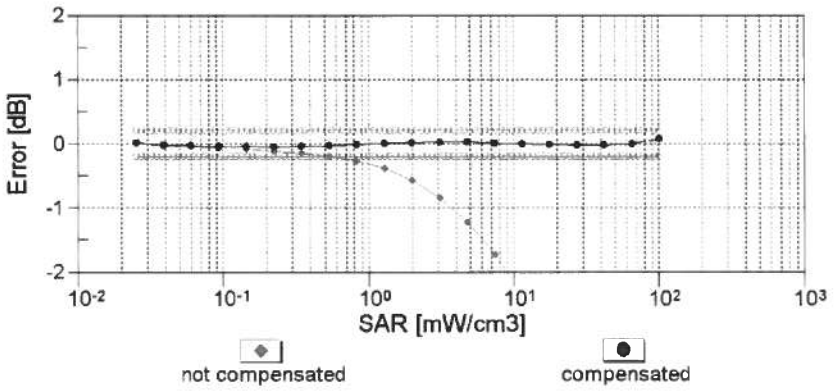




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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

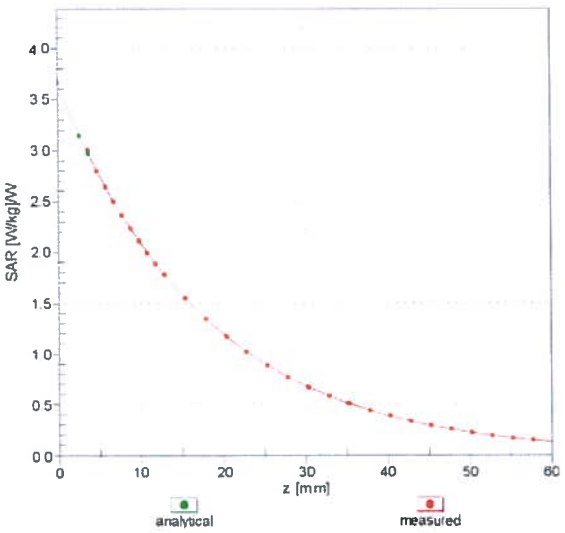




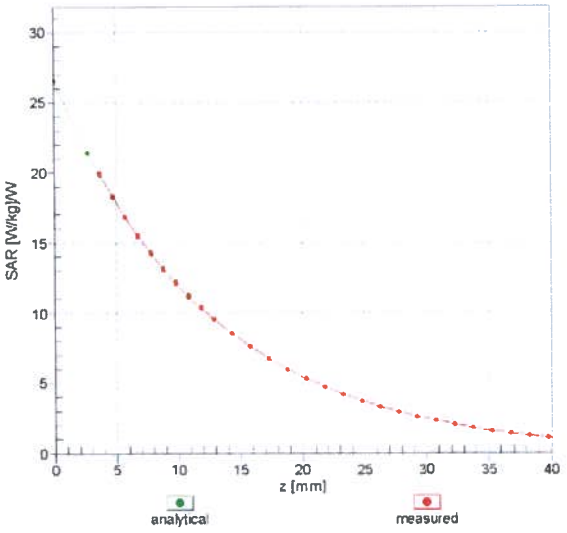
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)

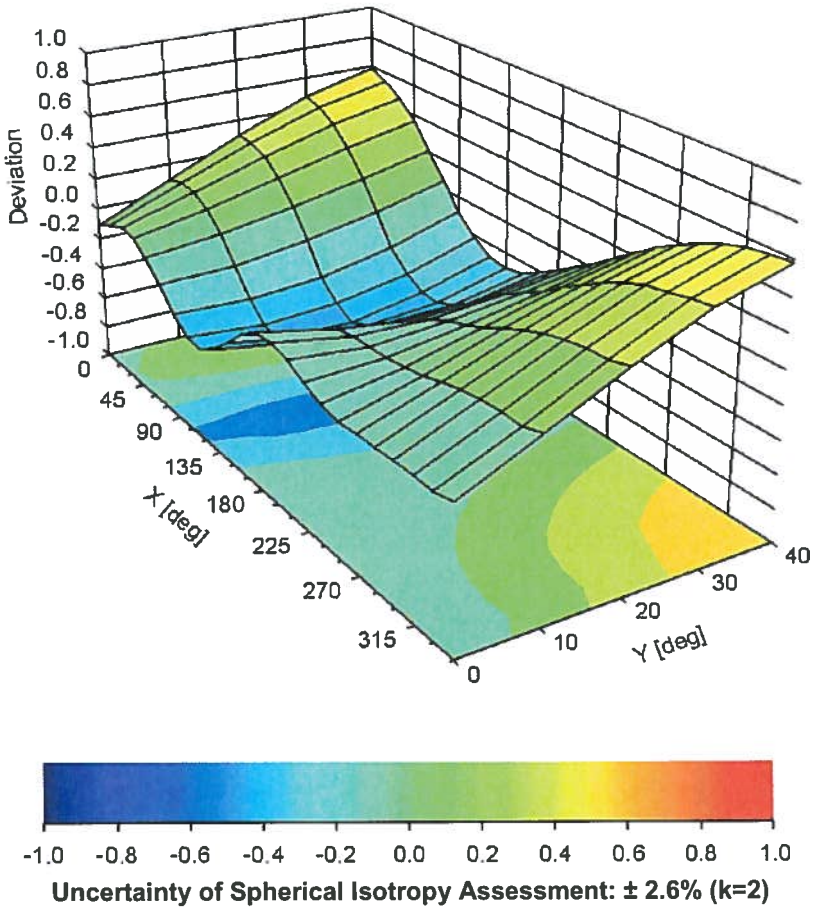


f = 1750 MHz,WGLS R22 (H_convF)



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
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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

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

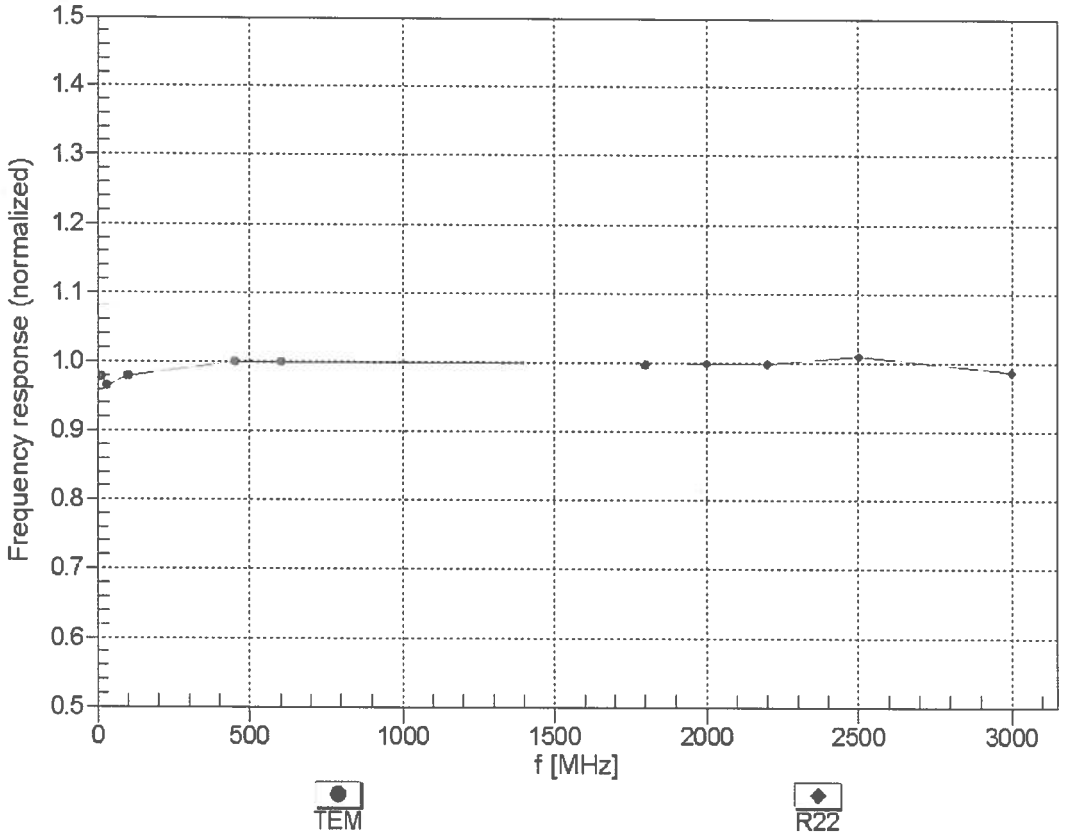
Calibration Parameter Determined in Body Tissue Simulating Media

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

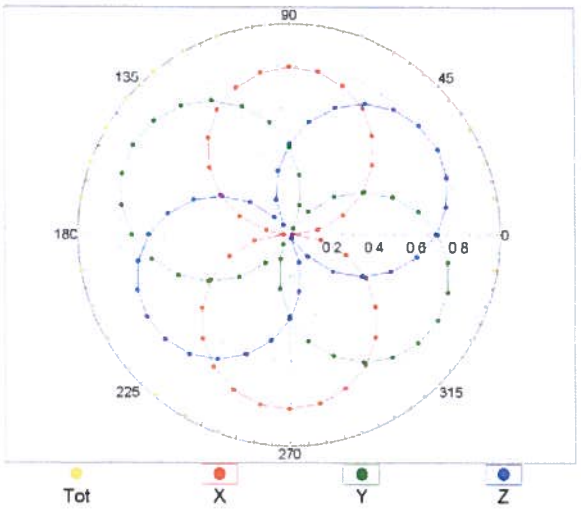
(TEM-Cell:ifi110 EXX, Waveguide: R22)



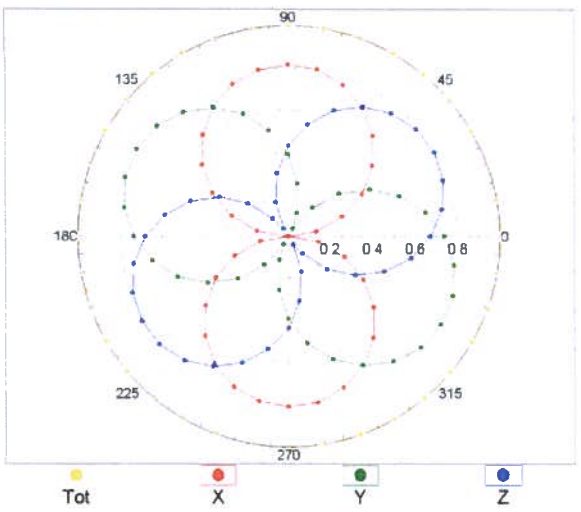
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

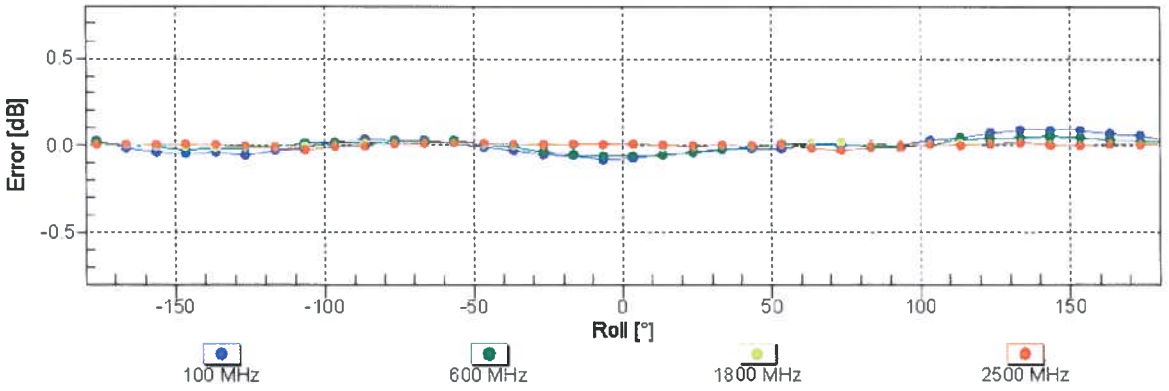
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



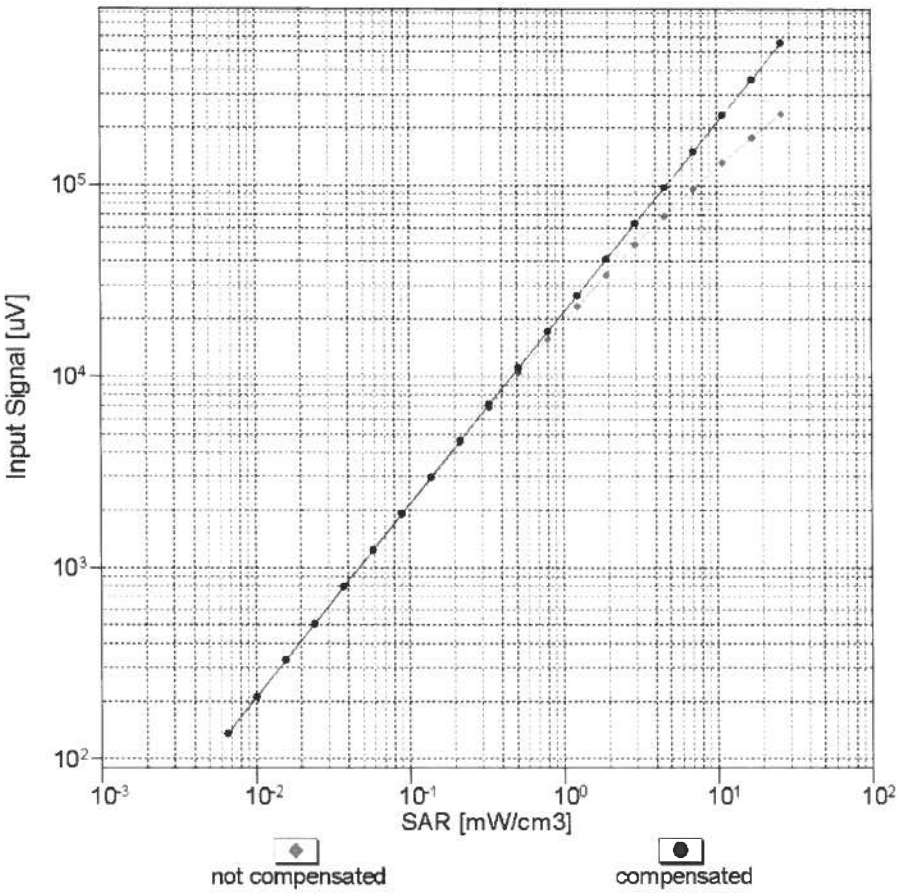
f=1800 MHz,R22

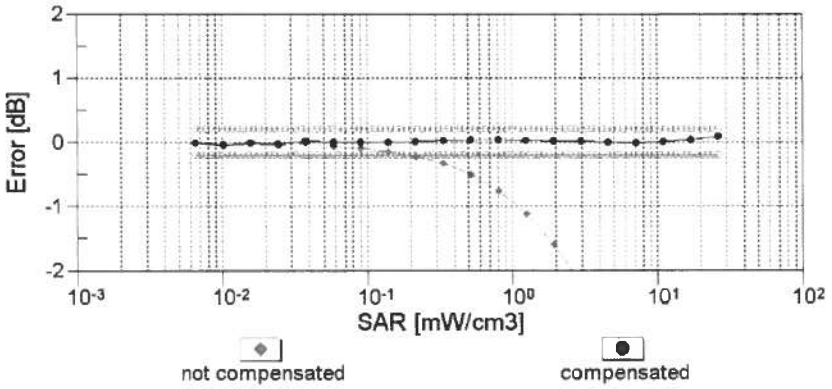




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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

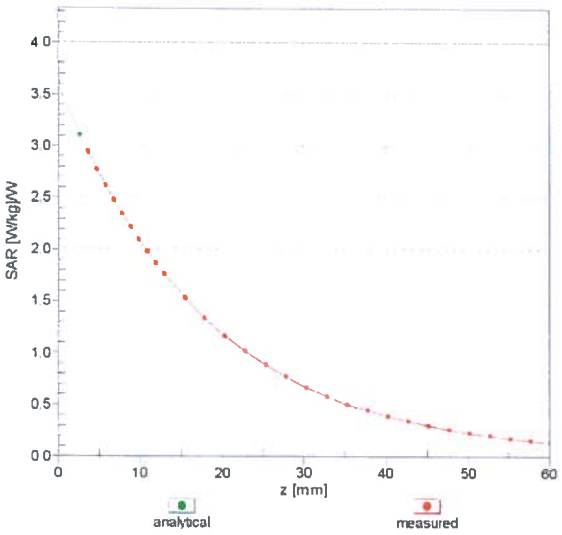




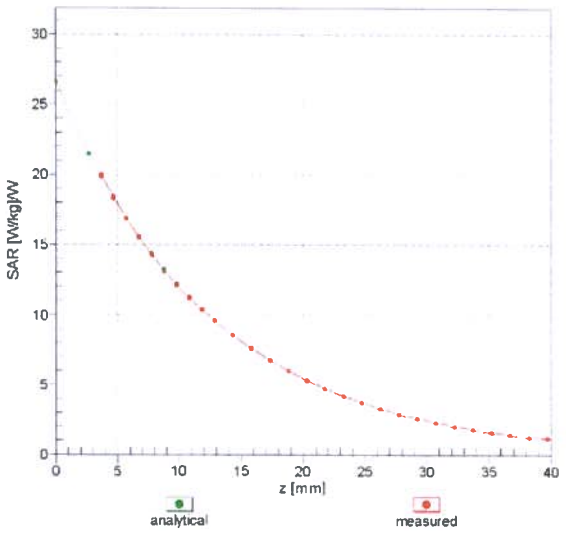
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)

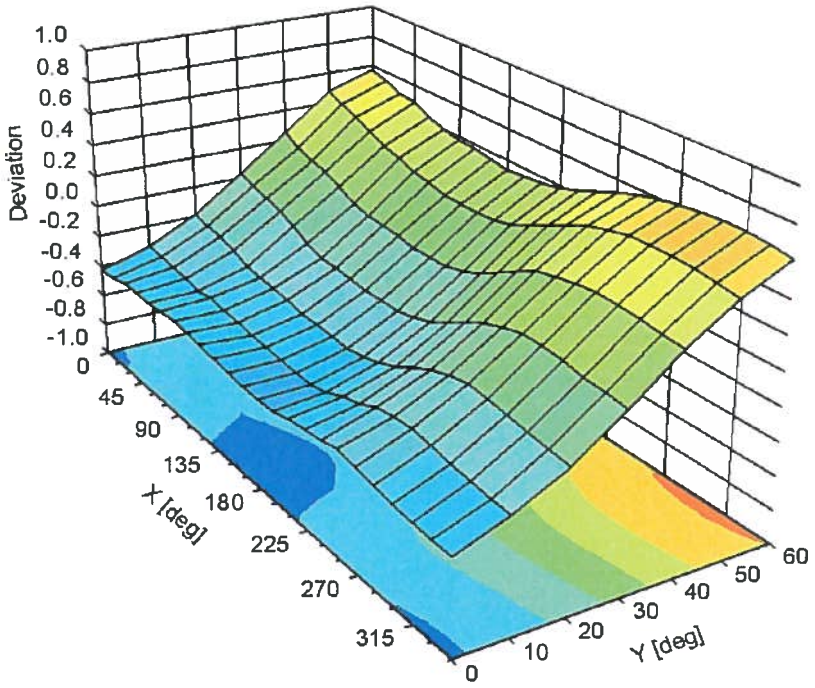


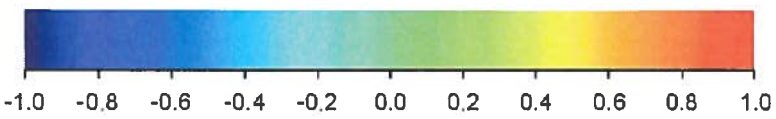
f = 1750 MHz,WGLS R22 (H_convF)



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

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

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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

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

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

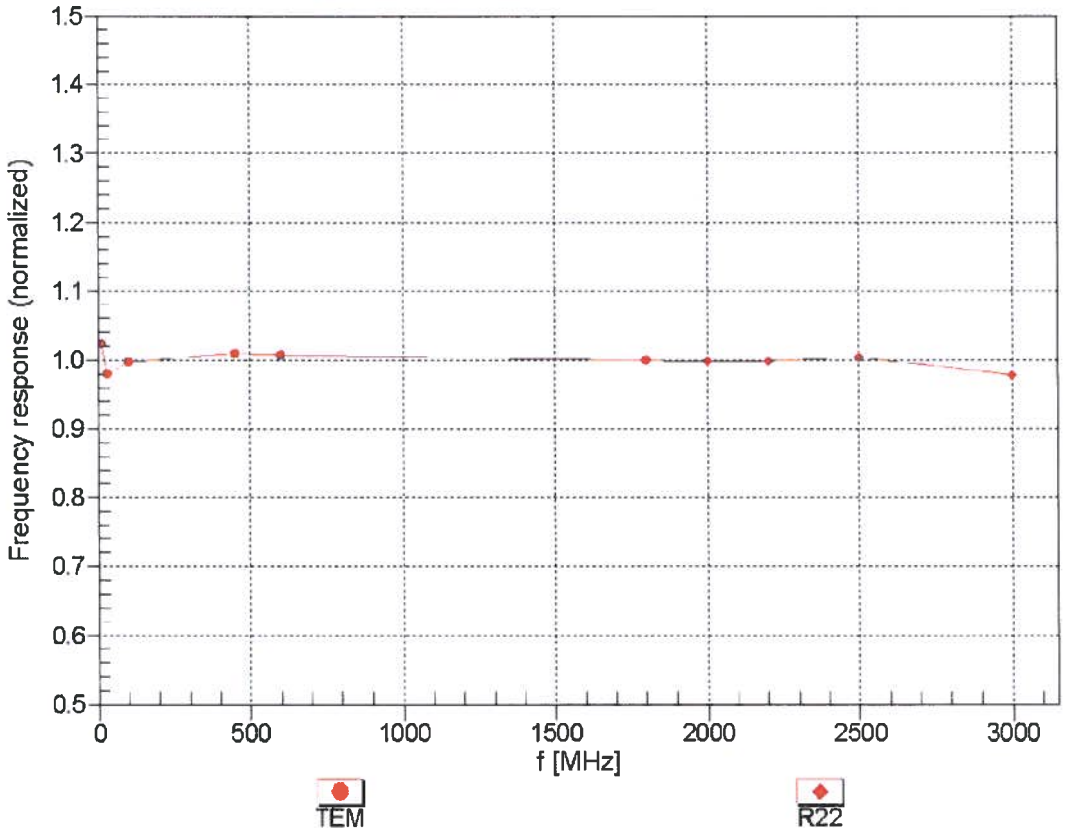
Calibration Parameter Determined in Body Tissue Simulating Media

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.

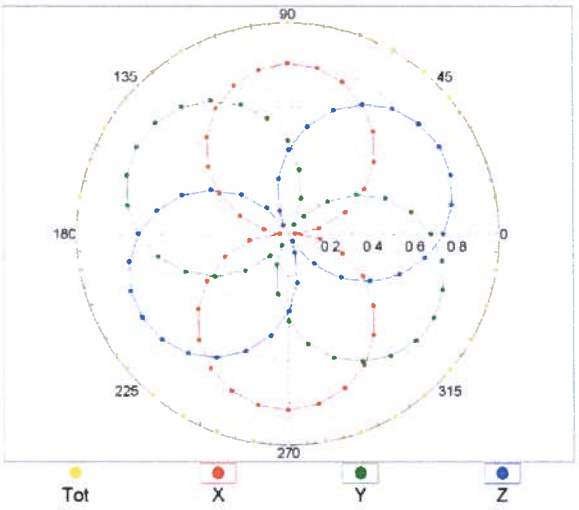
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



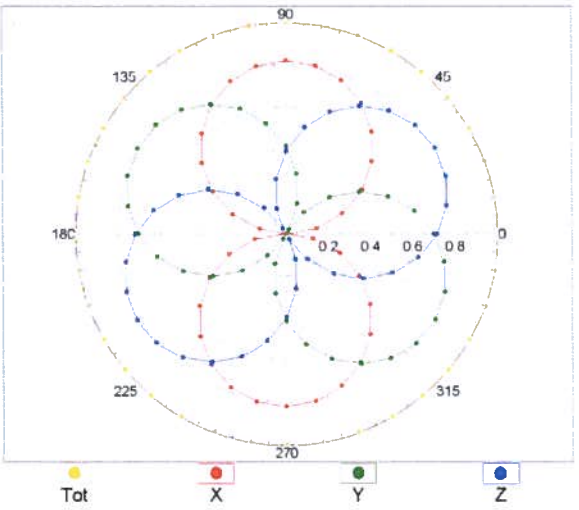
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

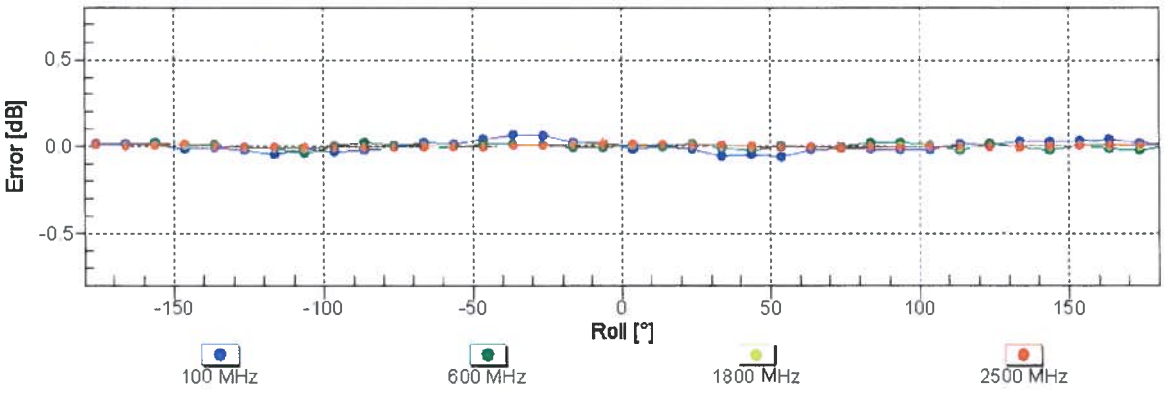
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



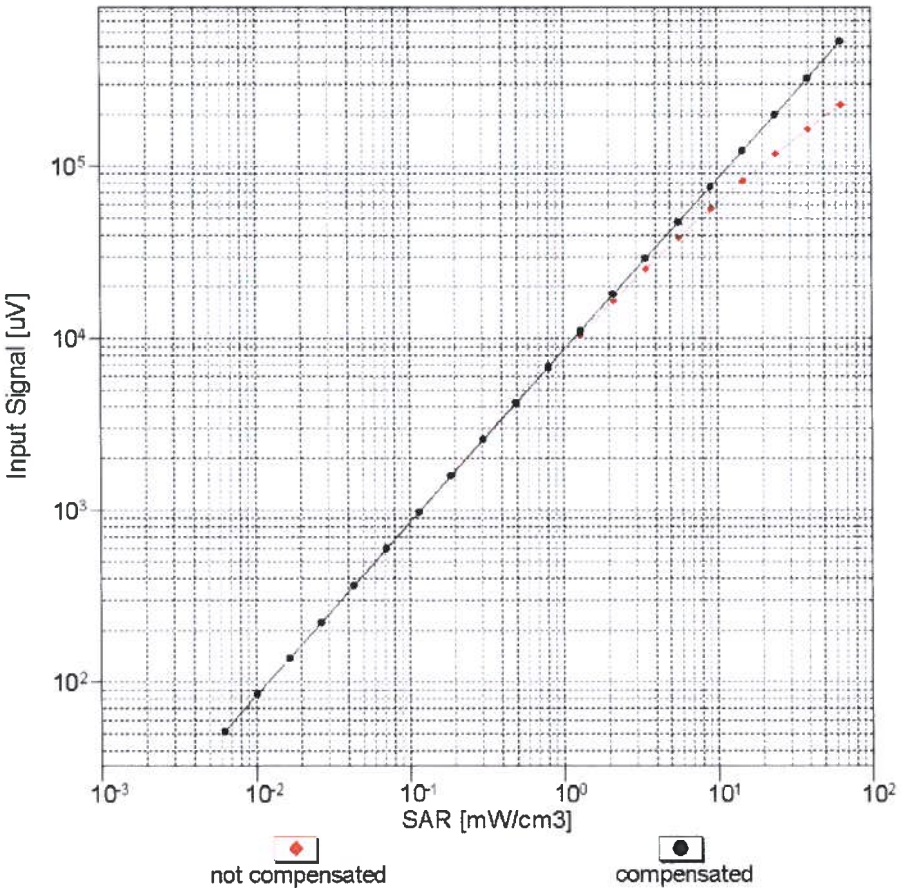
f=1800 MHz,R22

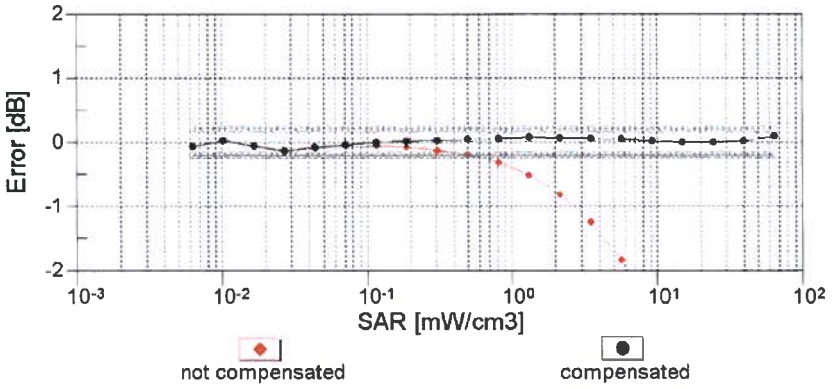




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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

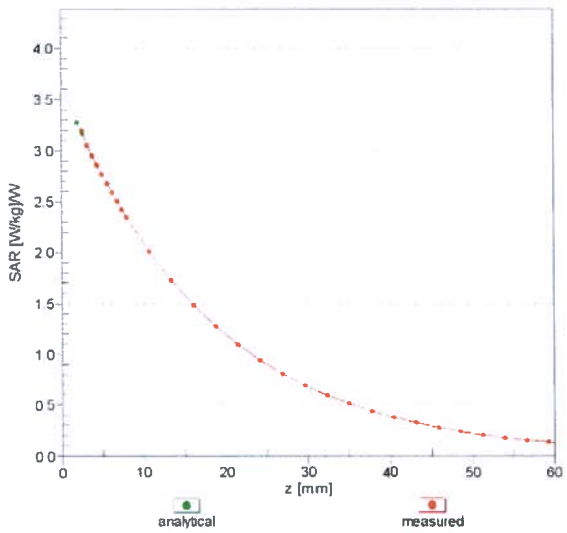




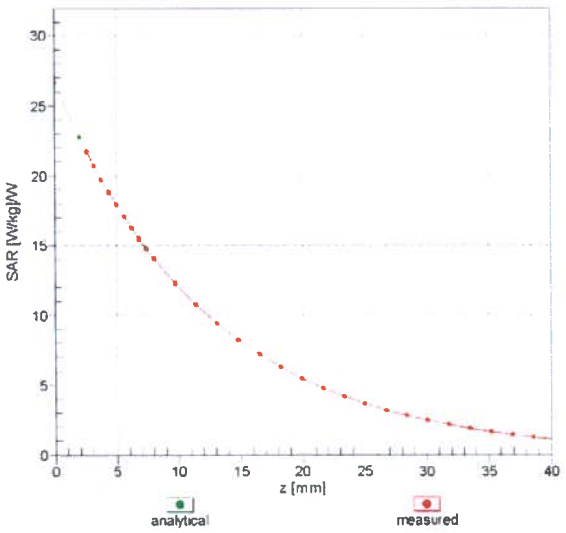
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)

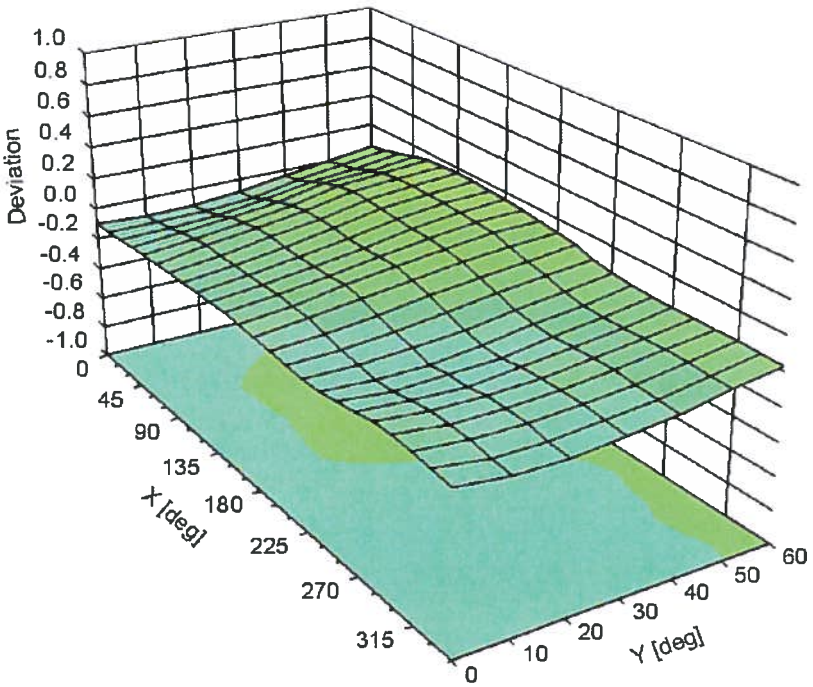


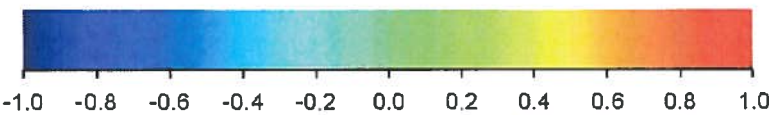
f = 1750 MHz,WGLS R22 (H_convF)



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

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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

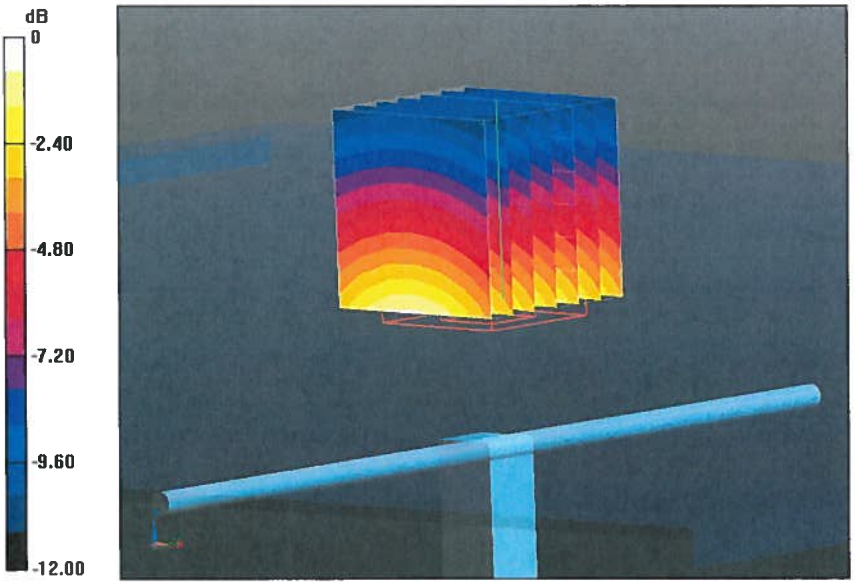
Communication System: CW; Frequency: 900 MHz
Medium parameters used: f = 900 MHz; σ = 0.96 mho/m; ε_r = 40.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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)

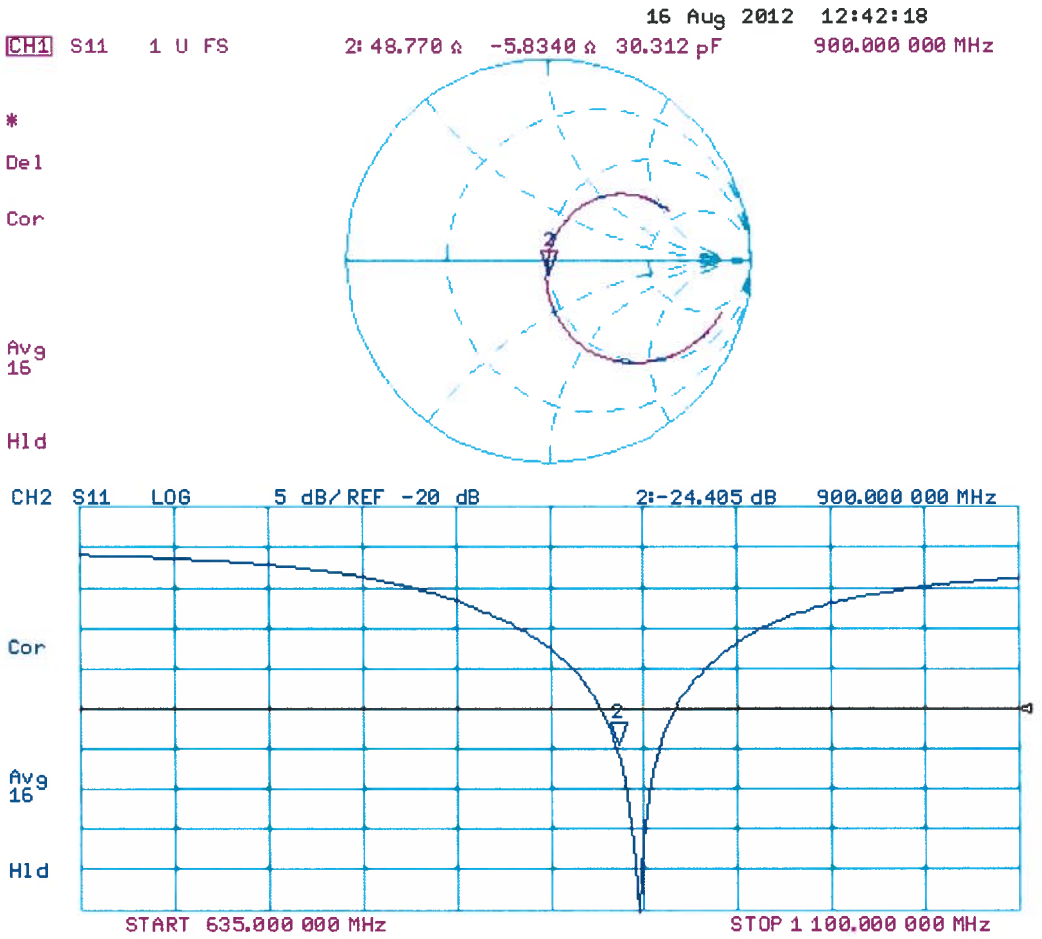
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

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

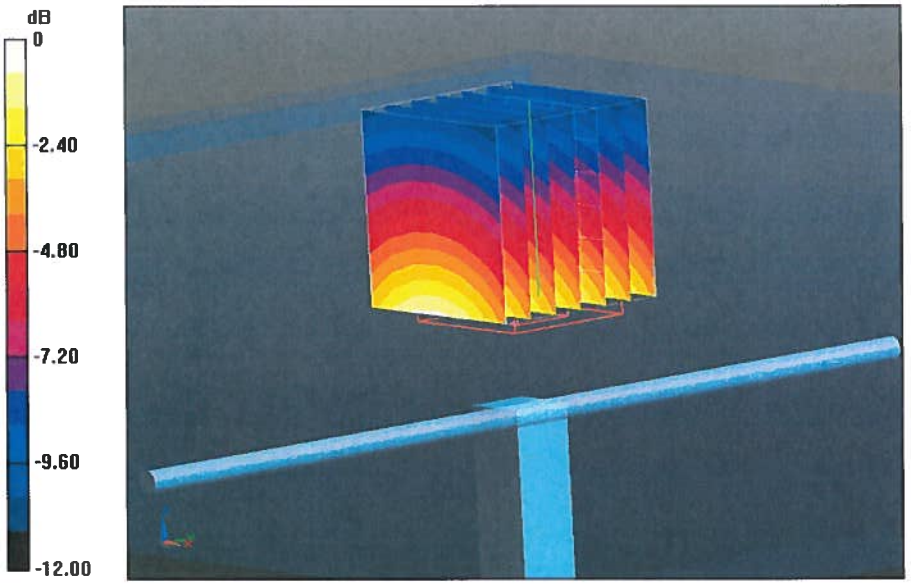
Communication System: CW; Frequency: 900 MHz
Medium parameters used: f = 900 MHz; σ = 1.06 mho/m; ε_r = 52.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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)

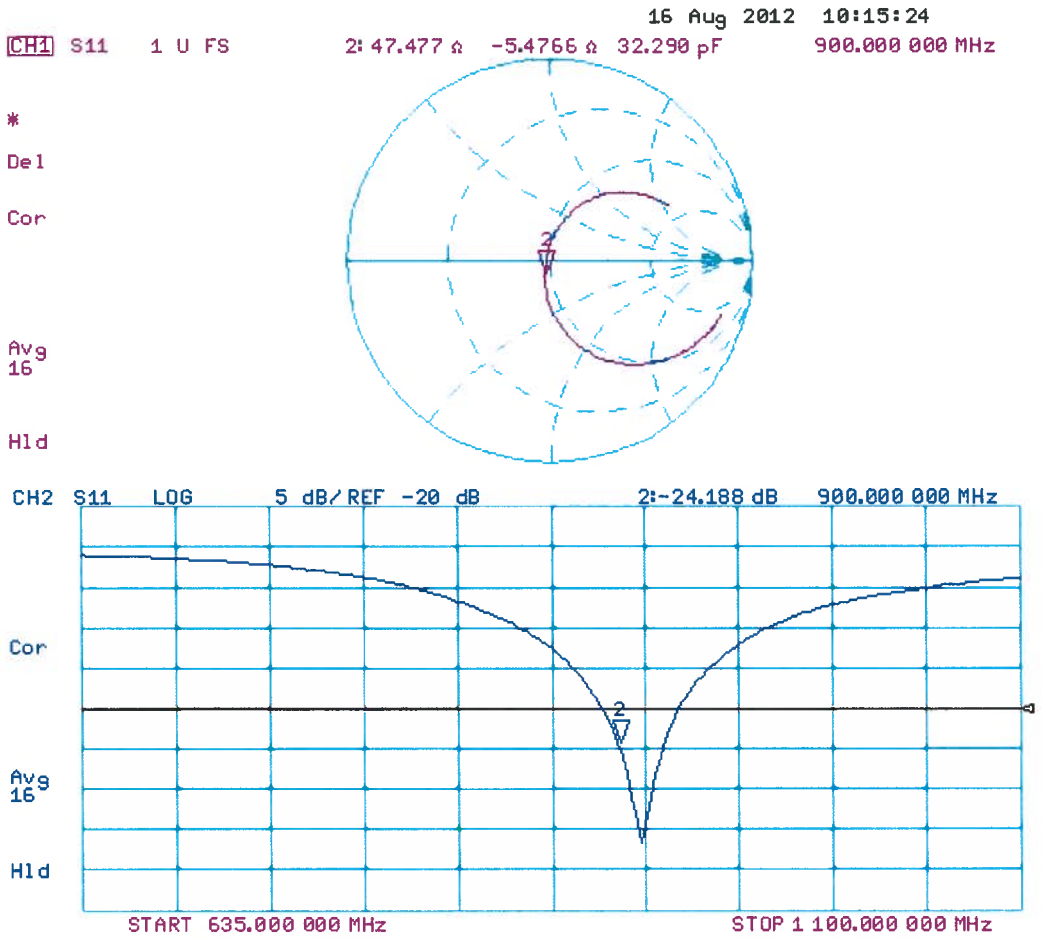
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

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
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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

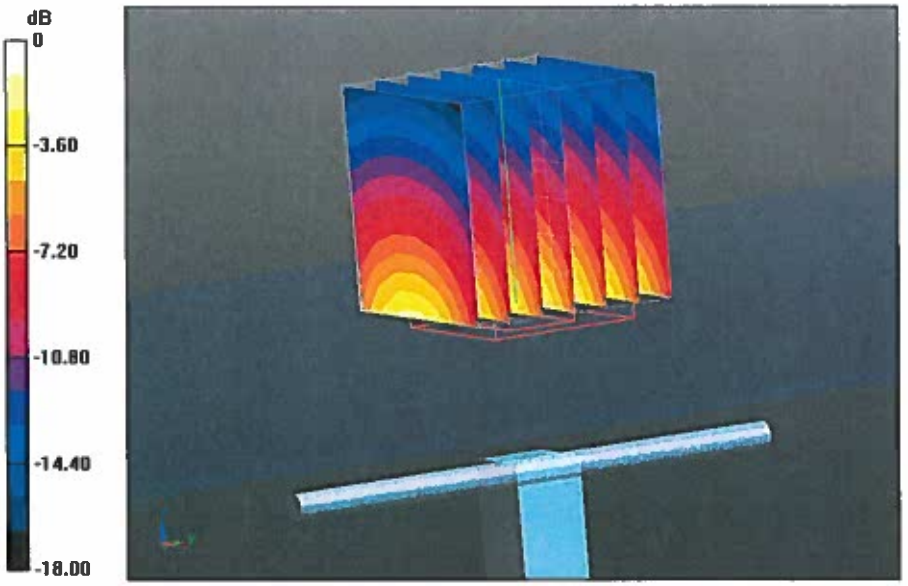
Communication System: CW; Frequency: 1800 MHz
Medium parameters used: f = 1800 MHz; σ = 1.38 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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)

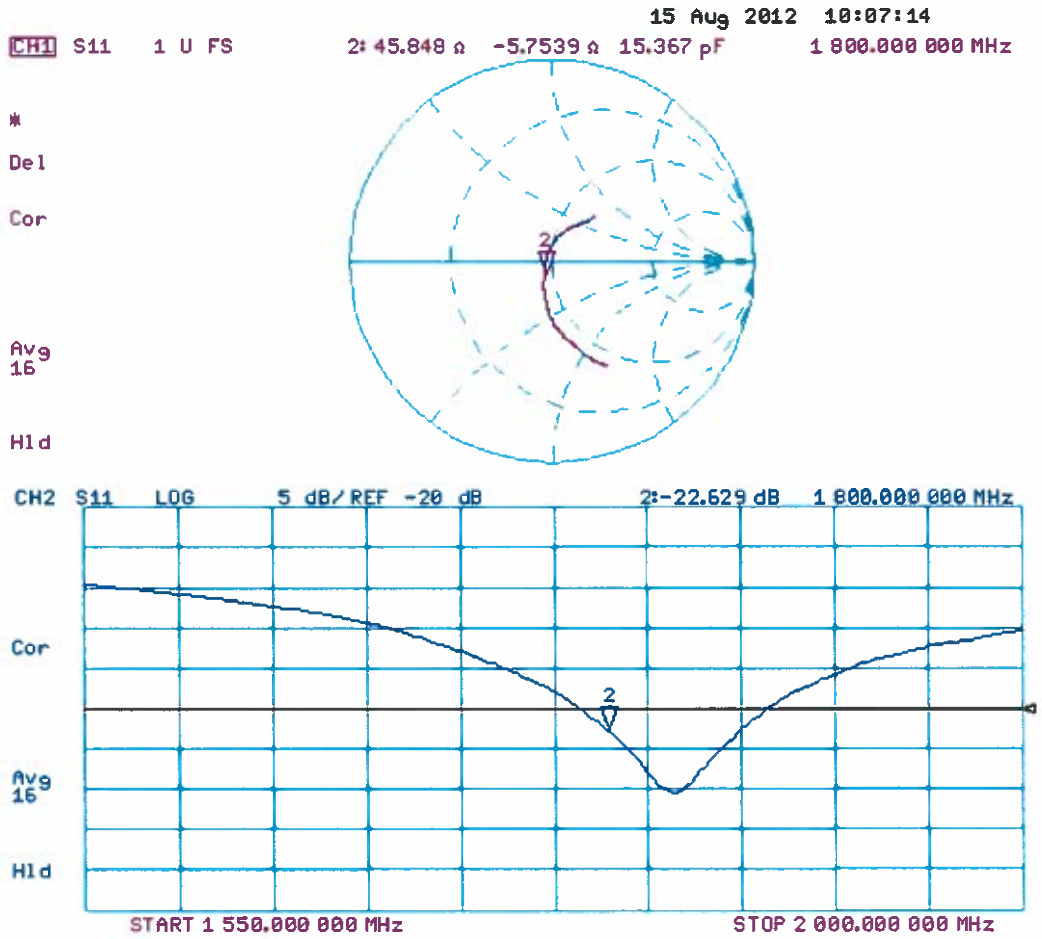
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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

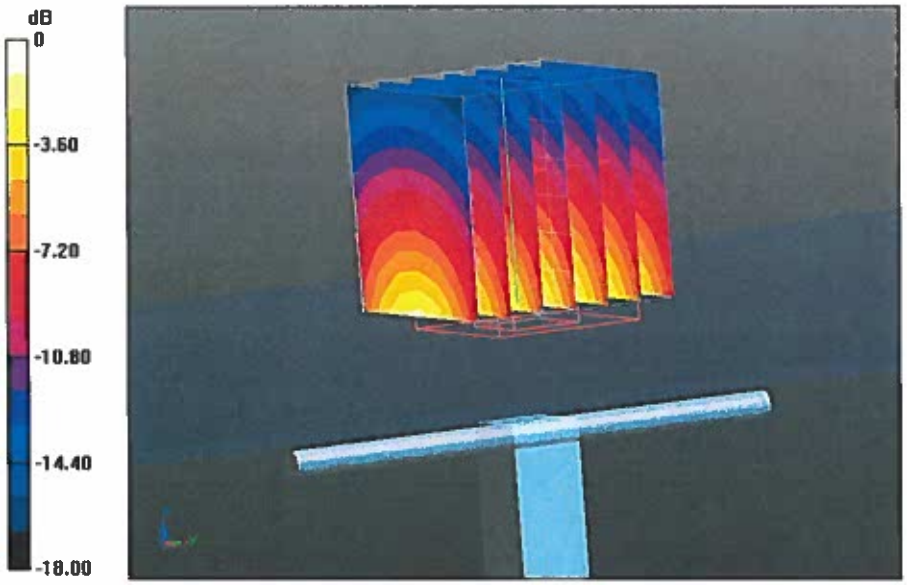
Communication System: CW; Frequency: 1800 MHz
Medium parameters used: f = 1800 MHz; σ = 1.52 mho/m; ε_r = 52; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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)

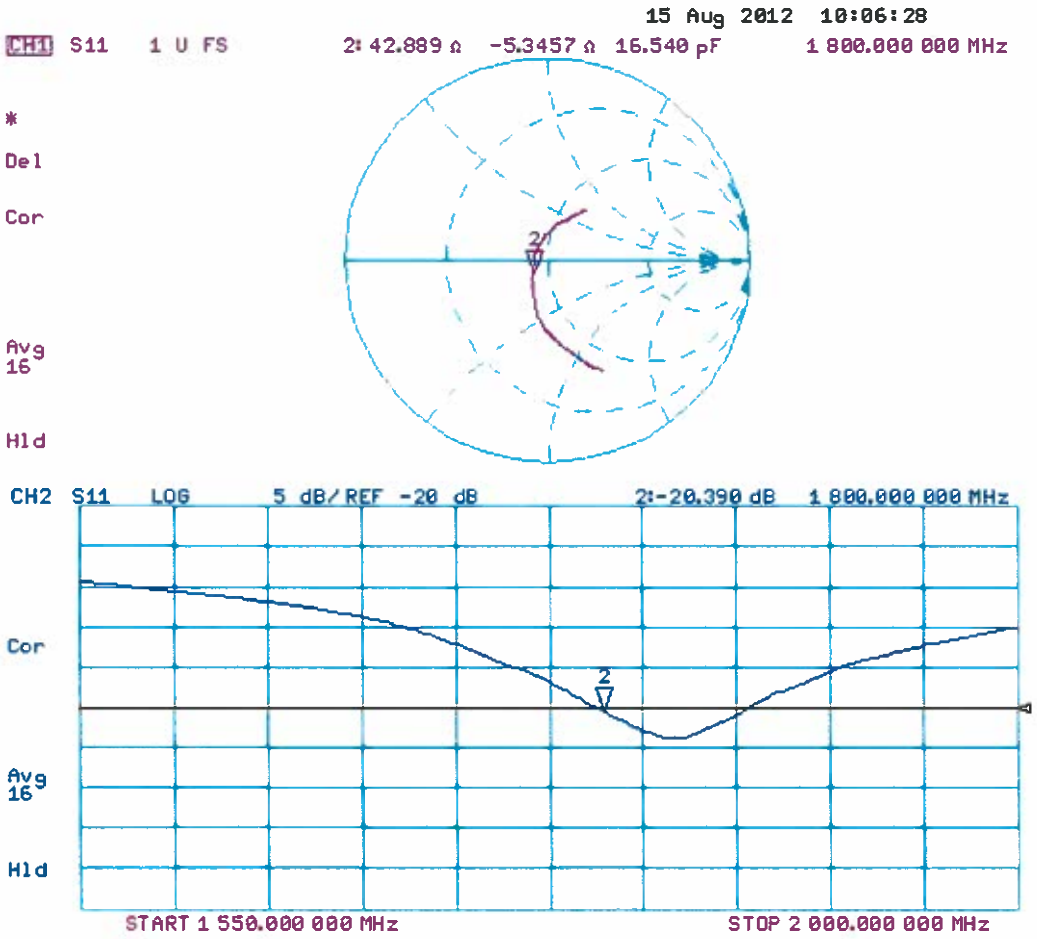
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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

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

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C Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS) ASSET: A2290 **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: 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

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

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S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

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

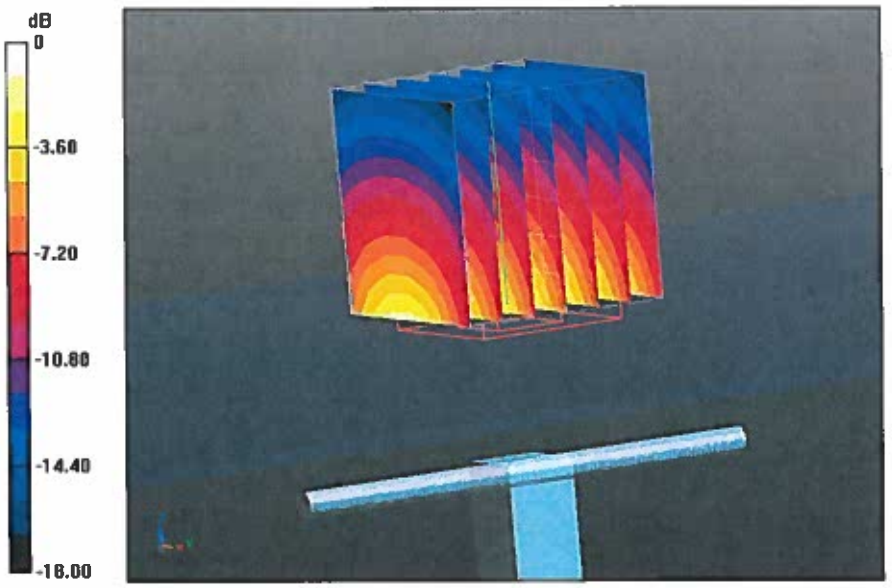
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.38 mho/m; ε_r = 39.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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)

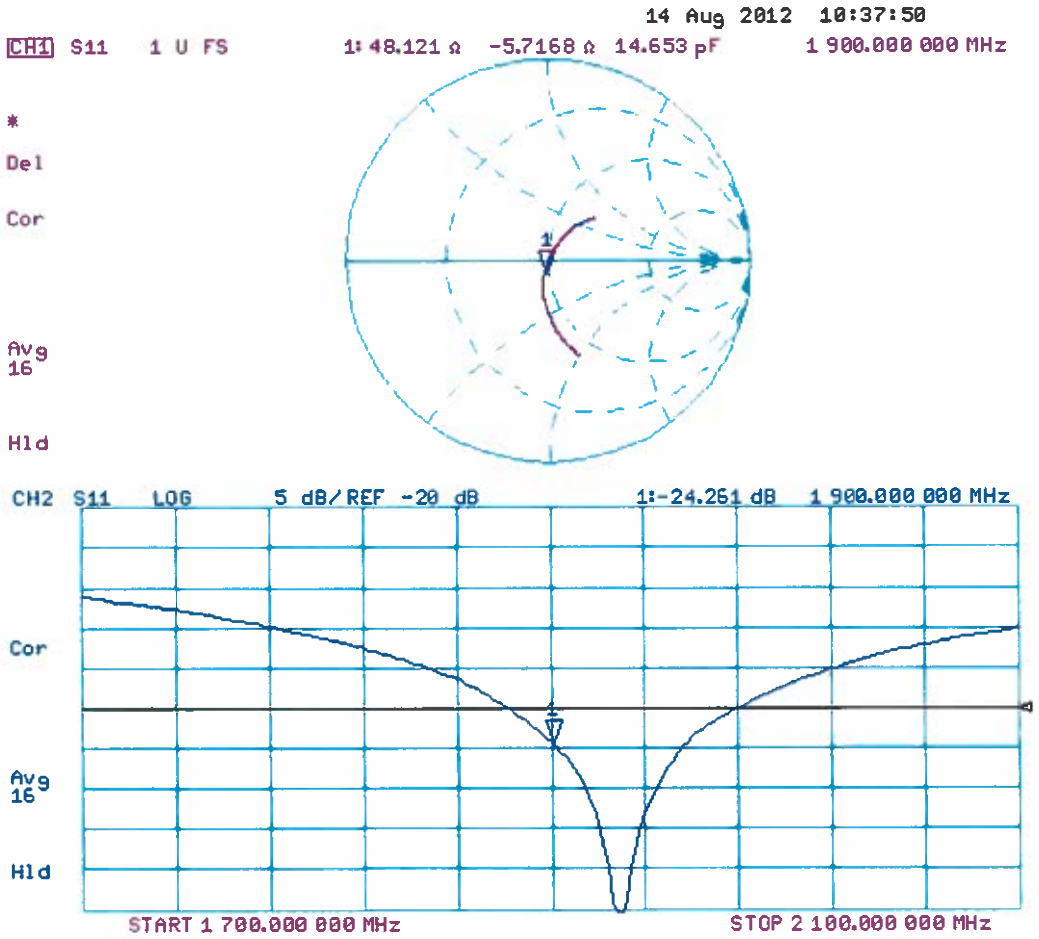
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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

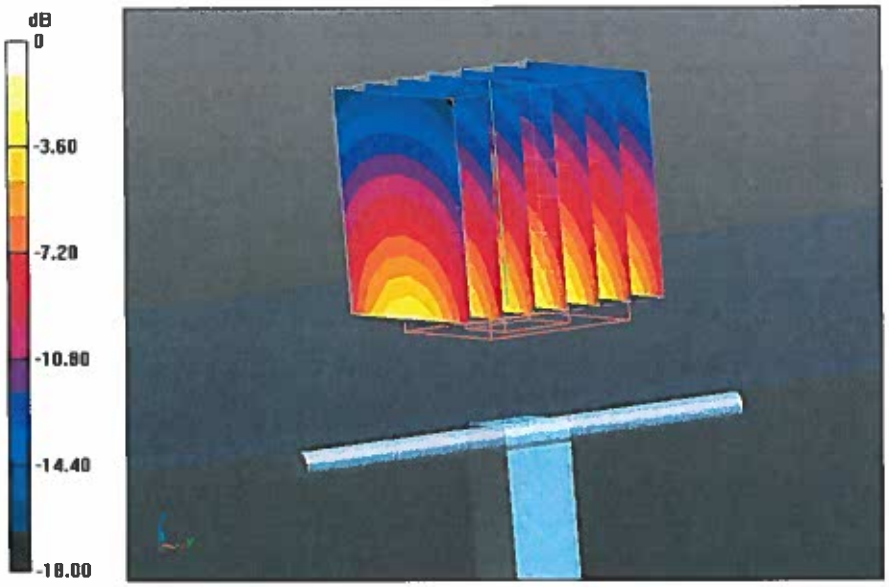
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.53 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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)

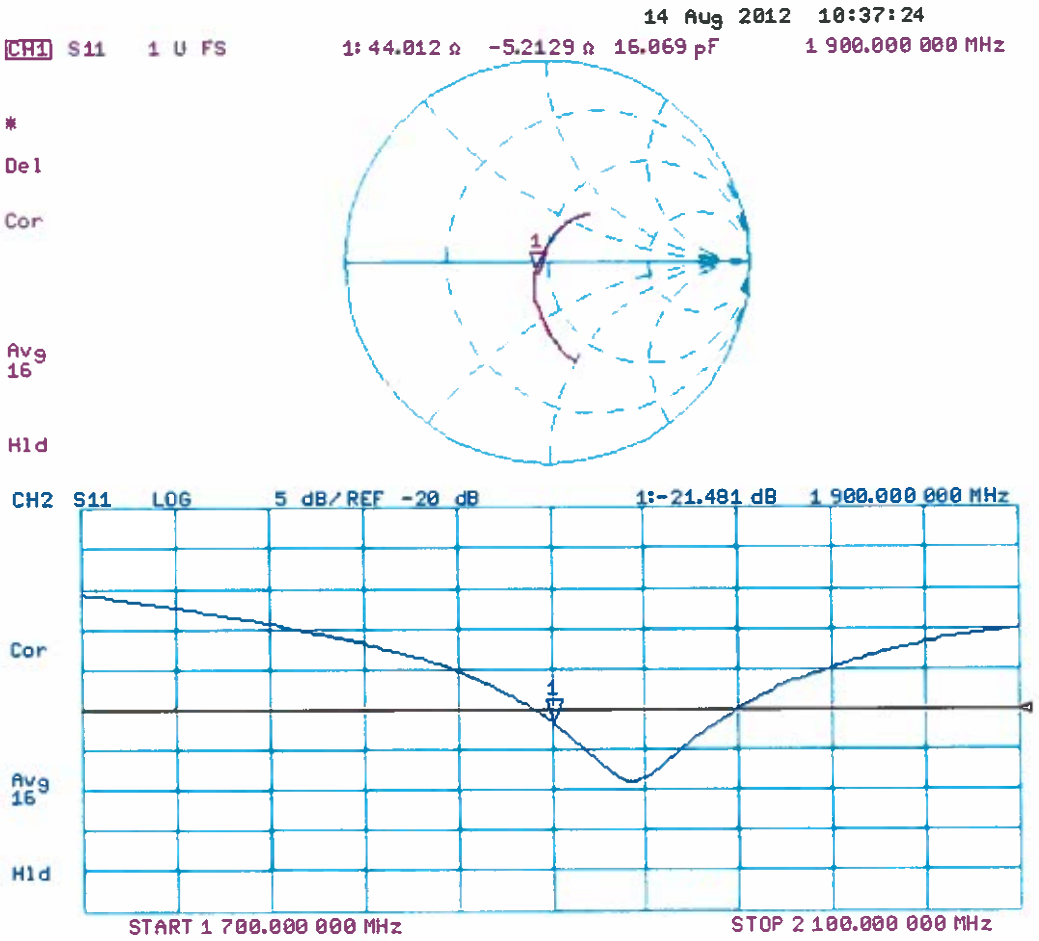
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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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Zeughausstrasse 43, 8004 Zurich, Switzerland

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C Service suisse d'étalonnage
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S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS) ASSET: A2202
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client 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

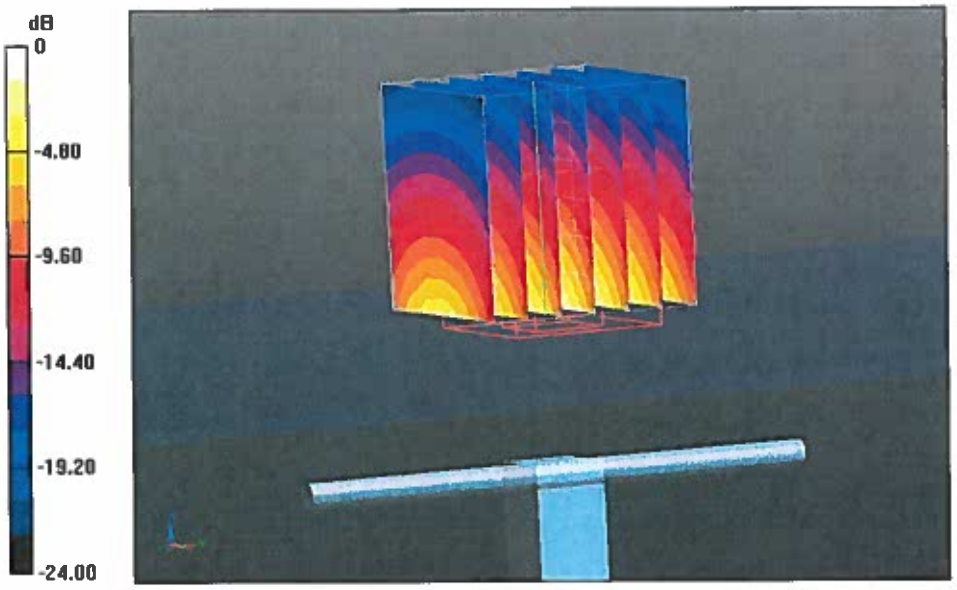
Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.81 mho/m; ε_r = 39.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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)

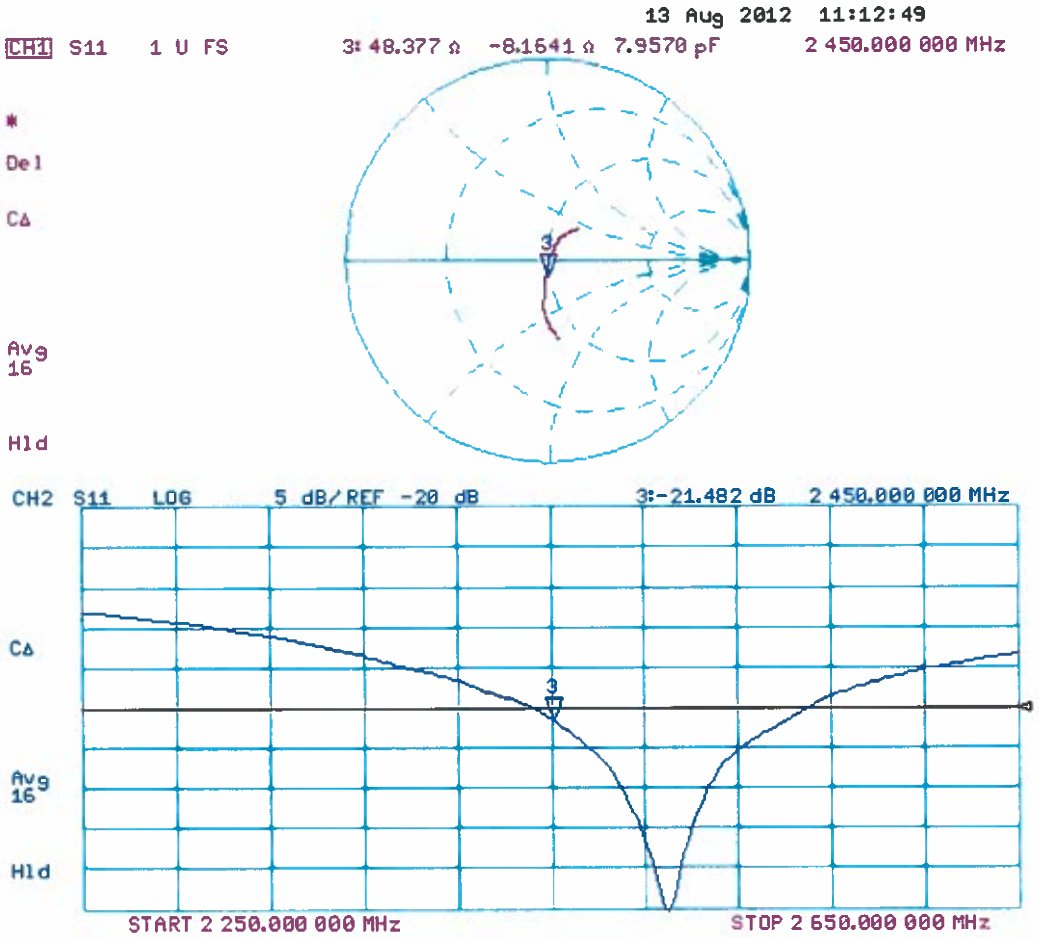
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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

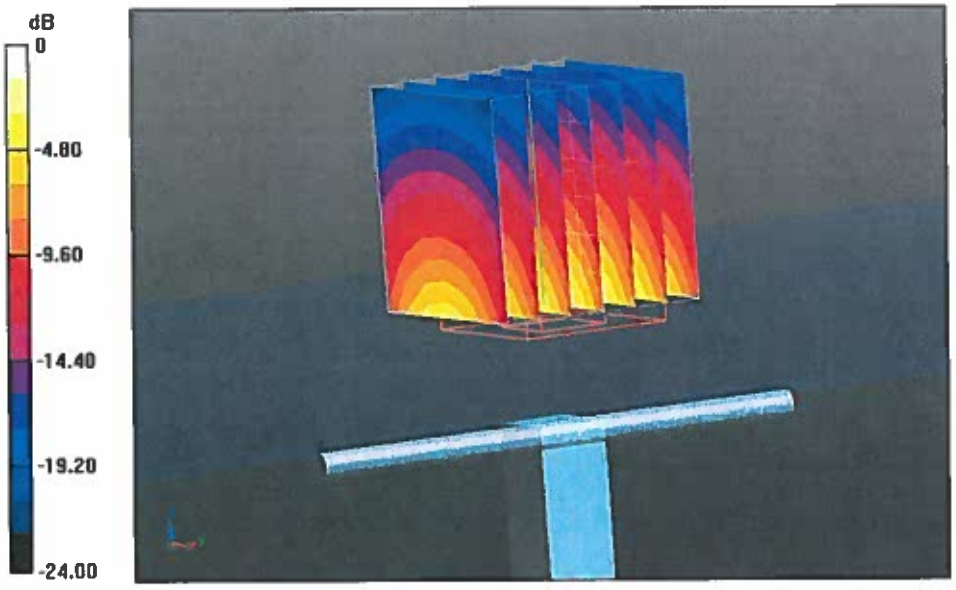
Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.99 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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)

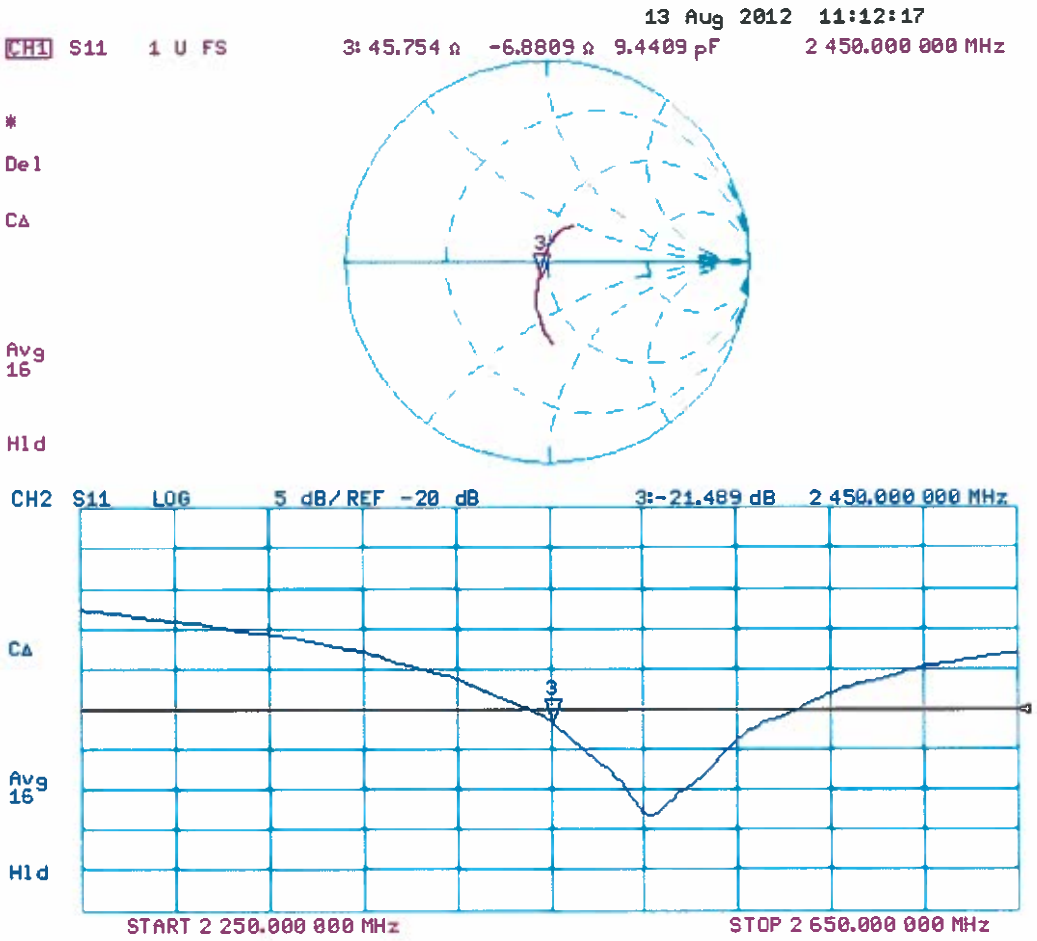
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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 KB Date 18-09-2012

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) Assist: A2244 **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: D2600V2-1046_Aug12**

CALIBRATION CERTIFICATE

Object	D2600V2 - SN: 1046
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
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 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 31, 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	2600 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.7 ± 6 %	1.97 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	14.6 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**58.2 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.57 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**26.2 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	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	50.9 ± 6 %	2.17 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	14.0 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**55.5 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.30 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**25.0 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.4 Ω - 5.3 jΩ
Return Loss	- 25.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.4 Ω - 4.4 jΩ
Return Loss	- 23.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.150 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	May 24, 2011

DASY5 Validation Report for Head TSL

Date: 31.08.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1046

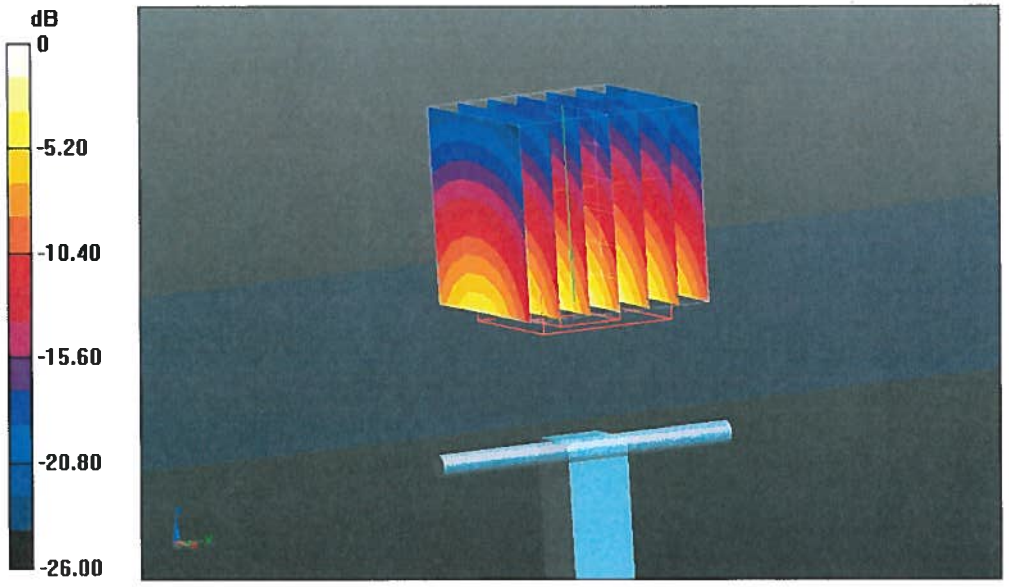
Communication System: CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 1.97 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.39, 4.39, 4.39); 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)

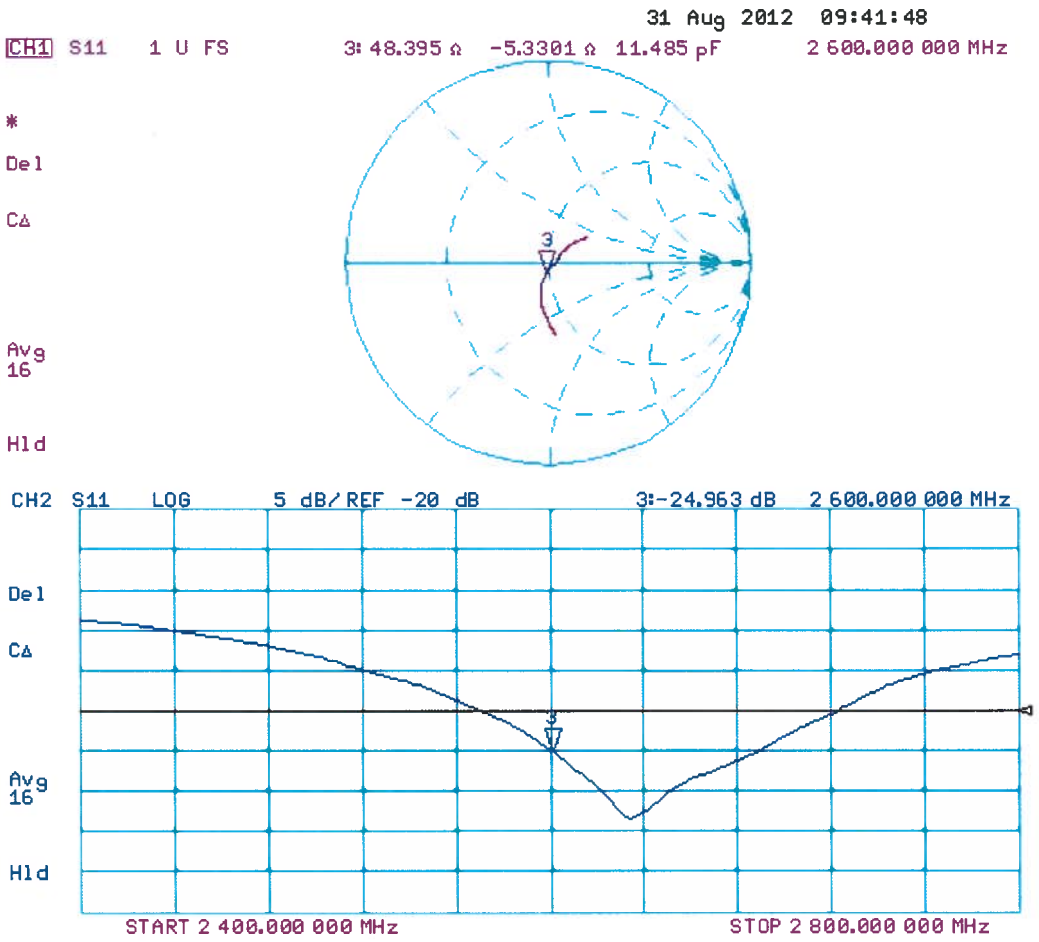
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 101.5 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 30.680 mW/g
SAR(1 g) = 14.6 mW/g; SAR(10 g) = 6.57 mW/g
Maximum value of SAR (measured) = 18.7 W/kg



0 dB = 18.7 W/kg = 25.44 dB W/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 30.08.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1046

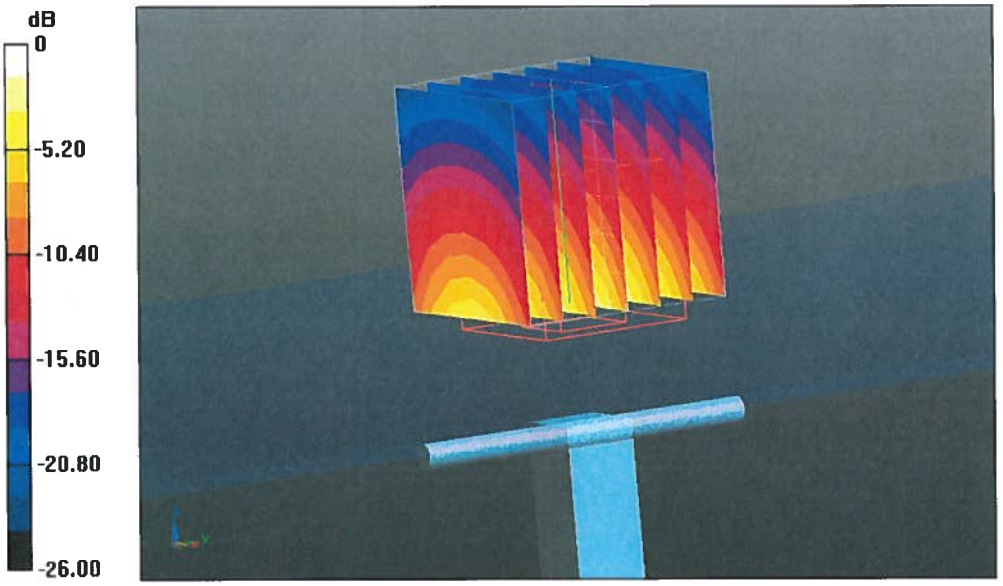
Communication System: CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.17 mho/m; ε_r = 50.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.16, 4.16, 4.16); 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)

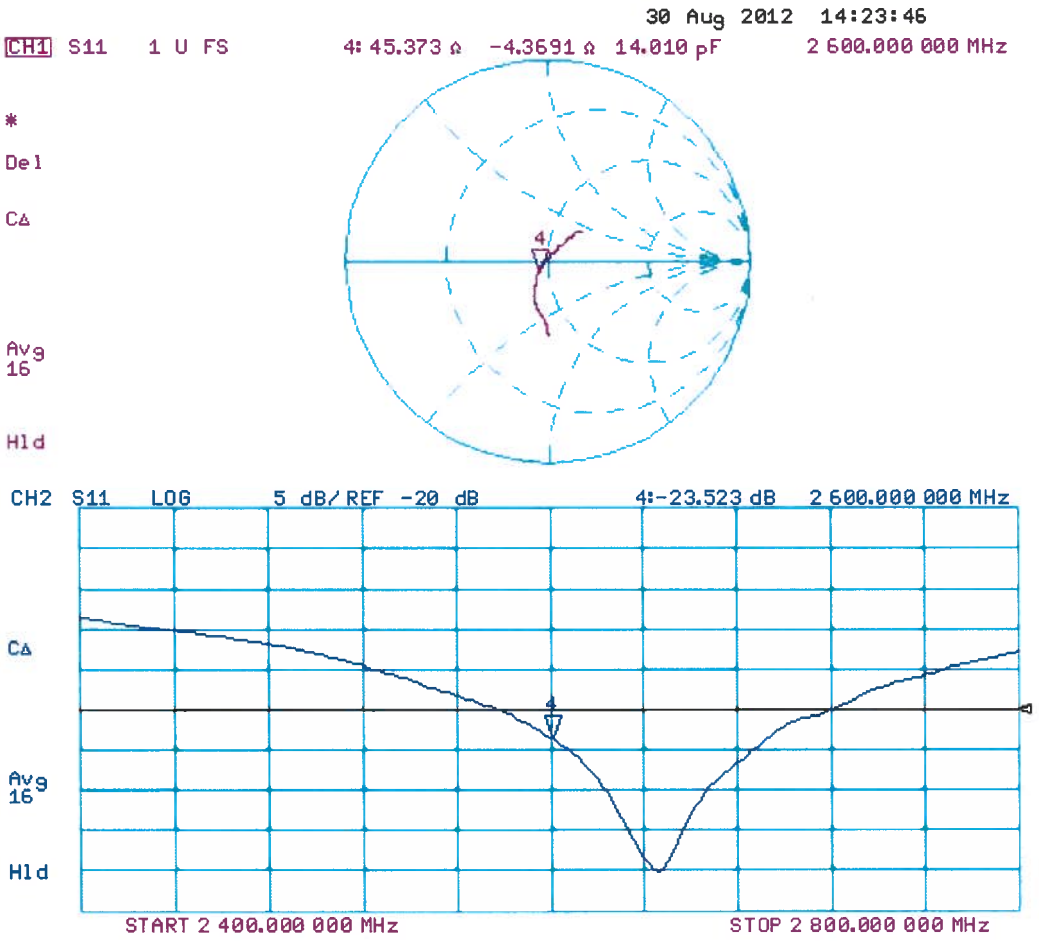
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.765 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 29.194 mW/g
SAR(1 g) = 14 mW/g; SAR(10 g) = 6.3 mW/g
Maximum value of SAR (measured) = 18.5 W/kg



0 dB = 18.5 W/kg = 25.34 dB W/kg

Impedance Measurement Plot for Body TSL



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

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client 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)

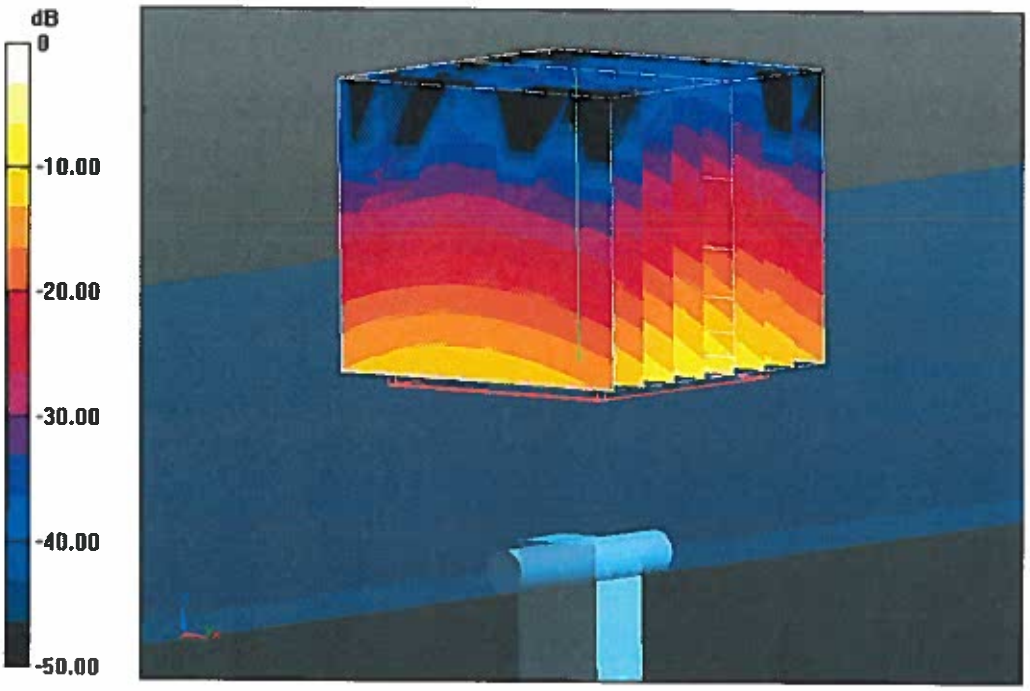
DASY52 Configuration:

- 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

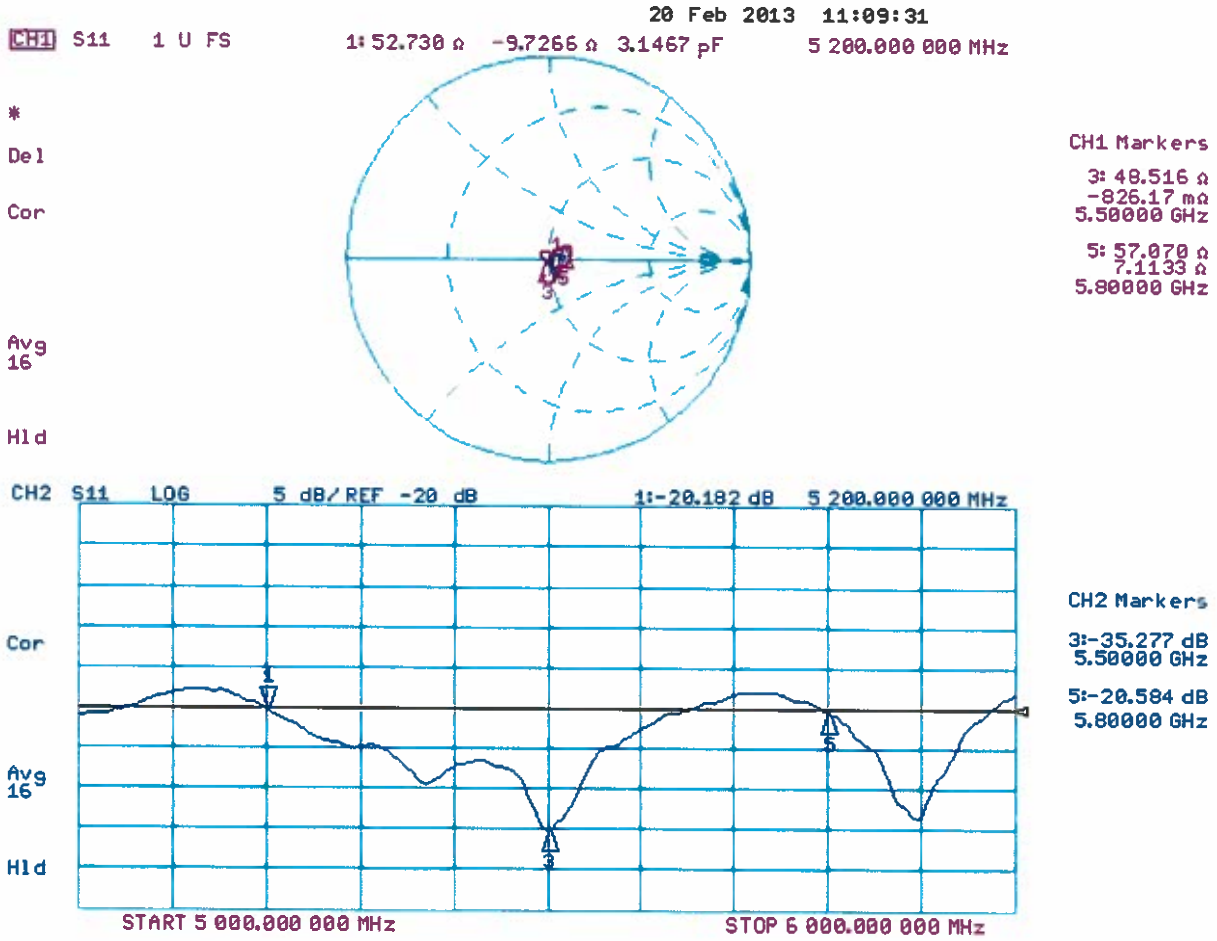
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 65.120 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 33.0 W/kg
SAR(1 g) = 8.34 W/kg; SAR(10 g) = 2.38 W/kg
Maximum value of SAR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

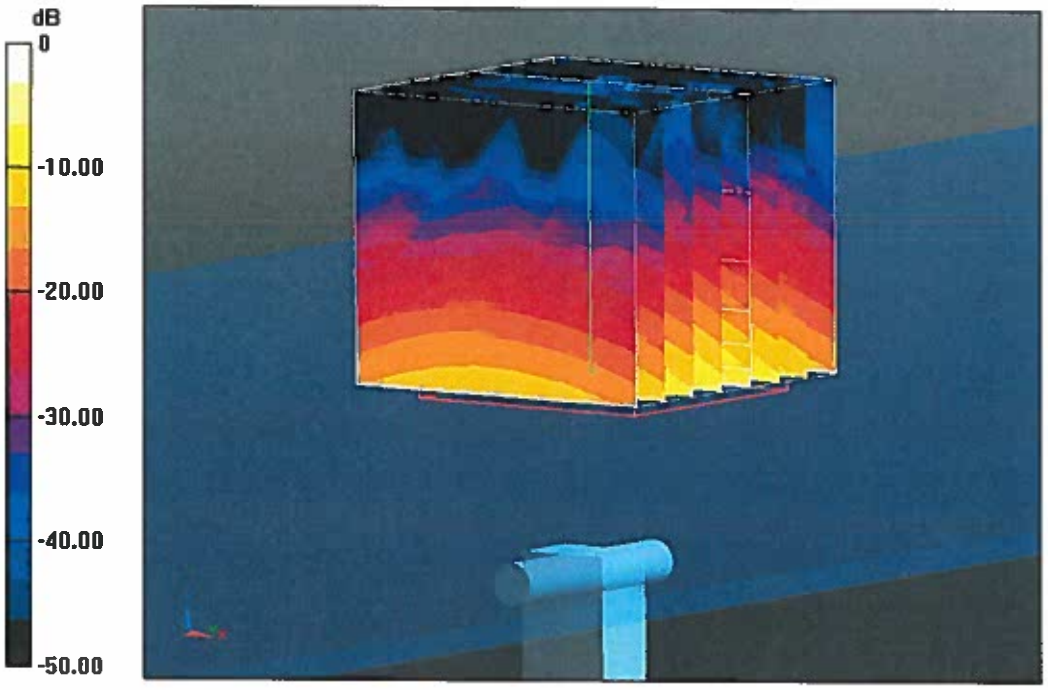
DASY52 Configuration:

- 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

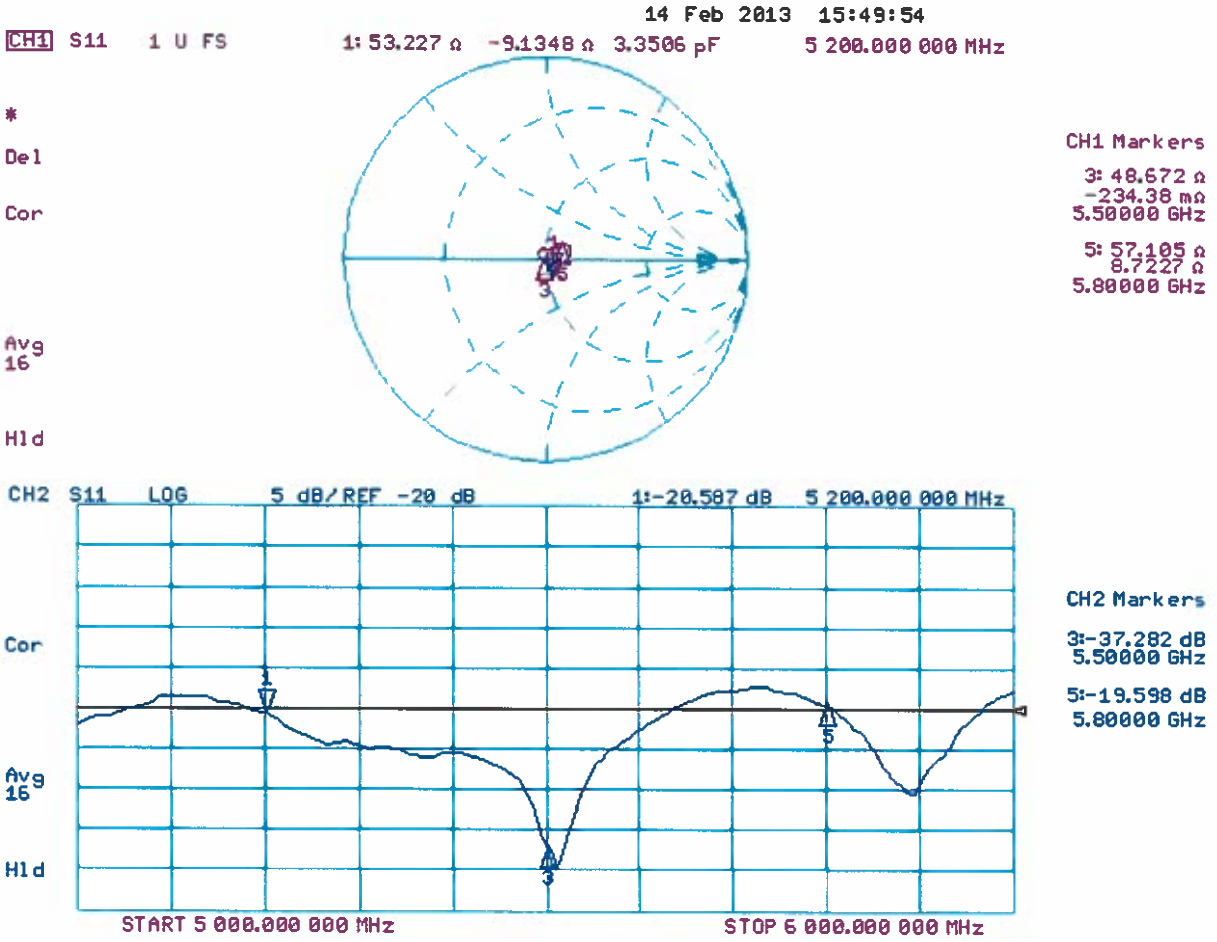
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 59.550 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 35.1 W/kg
SAR(1 g) = 7.98 W/kg; SAR(10 g) = 2.23 W/kg
Maximum value of SAR (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 / LTE Band 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 / LTE Band 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 / LTE Band 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 / LTE Band 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 / LTE Band 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 / LTE Band 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 / LTE Band 7 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/ LT E Band 7 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