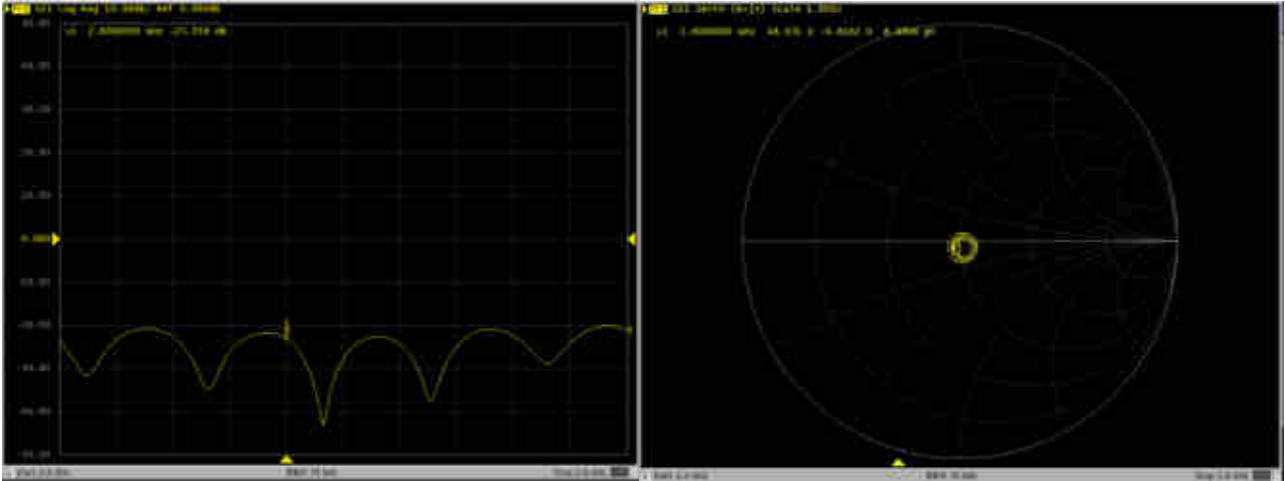
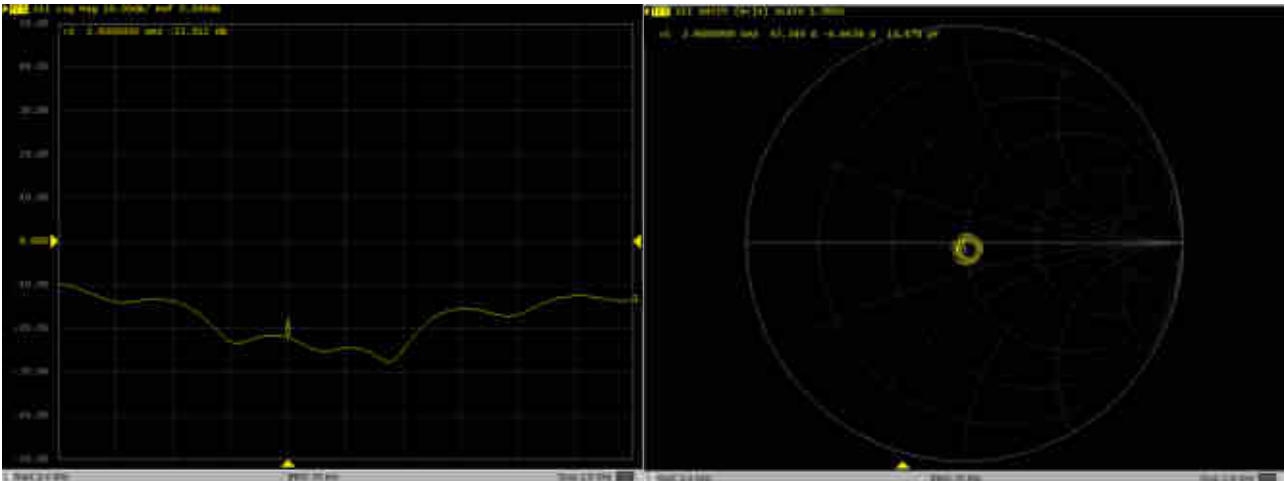


Dipole Verification Data> D2600V2, serial no. 1070

2600MHz - Head



2600MHz - Body





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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **Sporton**

Certificate No: **D5GHzV2-1113\_Sep19**

**CALIBRATION CERTIFICATE**

Object: **D5GHzV2 - SN:1113**

Calibration procedure(s): **QA CAL-22.v4  
Calibration Procedure for SAR Validation Sources between 3-6 GHz**

Calibration date: **September 24, 2019**

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 NRP	SN: 104778	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-19 (No. 217-02894)	Apr-20
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-19 (No. 217-02895)	Apr-20
Reference Probe EX3DV4	SN: 3503	25-Mar-19 (No. EX3-3503_Mar19)	Mar-20
DAE4	SN: 601	30-Apr-19 (No. DAE4-601_Apr19)	Apr-20
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Feb-19)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

Calibrated by: **Name: Jelton Kastrati, Function: Laboratory Technician, Signature: [Signature]**

Approved by: **Name: Katja Pokovic, Function: Technical Manager, Signature: [Signature]**

Issued: September 25, 2019

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

Accreditation No.: SCS 0108

### Glossary:

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

### Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

### Additional Documentation:

- DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

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

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	V52.10.2
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	5250 MHz ± 1 MHz 5600 MHz ± 1 MHz 5750 MHz ± 1 MHz	

## Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.9	4.71 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.1 ± 6 %	4.53 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

## SAR result with Head TSL at 5250 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.09 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>80.5 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>23.1 W/kg ± 19.5 % (k=2)</b>

## Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.6 ± 6 %	4.88 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

## SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>83.4 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>23.8 W/kg ± 19.5 % (k=2)</b>

## Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.4	5.22 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.4 ± 6 %	5.03 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

## SAR result with Head TSL at 5750 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.06 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>80.0 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.30 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>22.8 W/kg ± 19.5 % (k=2)</b>

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	51.7 $\Omega$ - 6.2 $j\Omega$
Return Loss	- 24.0 dB

### Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	56.0 $\Omega$ - 2.7 $j\Omega$
Return Loss	- 24.1 dB

### Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	56.7 $\Omega$ - 1.0 $j\Omega$
Return Loss	- 23.9 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.195 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

Manufactured by	SPEAG
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Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1113**

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz,  
Frequency: 5750 MHz

Medium parameters used:  $f = 5250$  MHz;  $\sigma = 4.53$  S/m;  $\epsilon_r = 35.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>,

Medium parameters used:  $f = 5600$  MHz;  $\sigma = 4.88$  S/m;  $\epsilon_r = 34.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>,

Medium parameters used:  $f = 5750$  MHz;  $\sigma = 5.03$  S/m;  $\epsilon_r = 34.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.4, 5.4, 5.4) @ 5250 MHz, ConvF(4.95, 4.95, 4.95) @ 5600 MHz, ConvF(4.98, 4.98, 4.98) @ 5750 MHz; Calibrated: 25.03.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan,**

**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 78.54 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 27.9 W/kg

**SAR(1 g) = 8.09 W/kg; SAR(10 g) = 2.33 W/kg**

Maximum value of SAR (measured) = 18.1 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan,**

**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 78.00 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 31.1 W/kg

**SAR(1 g) = 8.40 W/kg; SAR(10 g) = 2.40 W/kg**

Maximum value of SAR (measured) = 19.4 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan,**

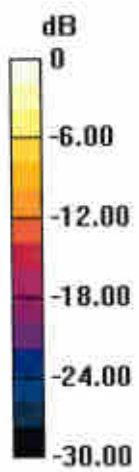
**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 75.13 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 31.8 W/kg

**SAR(1 g) = 8.06 W/kg; SAR(10 g) = 2.30 W/kg**

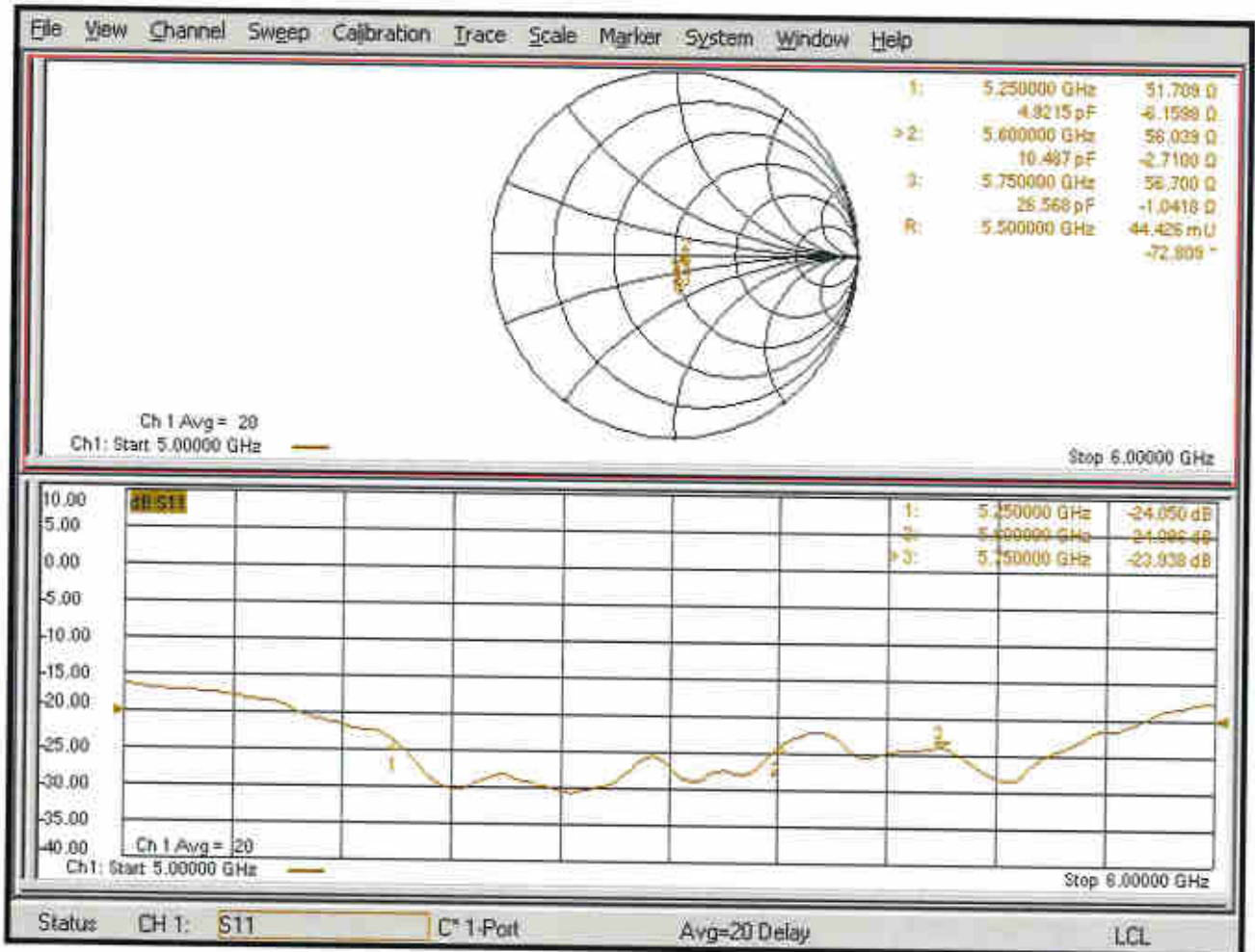
Maximum value of SAR (measured) = 19.0 W/kg



0 dB = 18.1 W/kg = 12.58 dBW/kg



# Impedance Measurement Plot for Head TSL



## IMPORTANT NOTICE

### USAGE OF THE DAE4

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

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

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

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

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

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

**Important Note:**

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

**Important Note:**

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

**Important Note:**

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



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Accreditation No.: **SCS 0108**

Client **Sporton**

Certificate No: **DAE4-1358\_Apr19**

**CALIBRATION CERTIFICATE**

Object: **DAE4 - SD 000 D04 BN - SN: 1358**

Calibration procedure(s): **QA CAL-06.v29  
Calibration procedure for the data acquisition electronics (DAE)**

Calibration date: **April 17, 2019**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	03-Sep-18 (No:23488)	Sep-19
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Auto DAE Calibration Unit	SE UWS 053 AA 1001	07-Jan-19 (in house check)	In house check: Jan-20
Calibrator Box V2.1	SE UMS 006 AA 1002	07-Jan-19 (in house check)	In house check: Jan-20

Calibrated by:	Name <b>Eric Hainfeld</b>	Function <b>Laboratory Technician</b>	Signature 
Approved by:	Name <b>Sven Kühn</b>	Function <b>Deputy Manager</b>	Signature 

Issued: April 17, 2019

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## Glossary

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

## Methods Applied and Interpretation of Parameters

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

## DC Voltage Measurement

A/D - Converter Resolution nominal

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

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

Calibration Factors	X	Y	Z
High Range	403.463 $\pm$ 0.02% (k=2)	403.495 $\pm$ 0.02% (k=2)	403.499 $\pm$ 0.02% (k=2)
Low Range	3.96163 $\pm$ 1.50% (k=2)	3.98764 $\pm$ 1.50% (k=2)	3.99290 $\pm$ 1.50% (k=2)

## Connector Angle

Connector Angle to be used in DASY system	113.0 $^{\circ}$ $\pm$ 1 $^{\circ}$
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## Appendix (Additional assessments outside the scope of SCS0108)

### 1. DC Voltage Linearity

High Range		Reading ( $\mu\text{V}$ )	Difference ( $\mu\text{V}$ )	Error (%)
Channel X	+ Input	199991.46	-1.31	-0.00
Channel X	+ Input	20003.38	2.07	0.01
Channel X	- Input	-19999.84	1.82	-0.01
Channel Y	+ Input	199991.03	-1.92	-0.00
Channel Y	+ Input	20000.40	-0.91	-0.00
Channel Y	- Input	-20002.77	-1.13	0.01
Channel Z	+ Input	199994.09	1.49	0.00
Channel Z	+ Input	20001.51	0.27	0.00
Channel Z	- Input	-20002.76	-1.19	0.01

Low Range		Reading ( $\mu\text{V}$ )	Difference ( $\mu\text{V}$ )	Error (%)
Channel X	+ Input	2000.92	0.16	0.01
Channel X	+ Input	201.43	0.28	0.14
Channel X	- Input	-198.26	0.46	-0.23
Channel Y	+ Input	2000.61	-0.03	-0.00
Channel Y	+ Input	200.72	-0.33	-0.17
Channel Y	- Input	-199.37	-0.63	0.32
Channel Z	+ Input	2000.74	0.14	0.01
Channel Z	+ Input	199.99	-1.04	-0.52
Channel Z	- Input	-200.11	-1.38	0.69

### 2. Common mode sensitivity

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

	Common mode Input Voltage (mV)	High Range Average Reading ( $\mu\text{V}$ )	Low Range Average Reading ( $\mu\text{V}$ )
Channel X	200	23.19	21.08
	- 200	-19.67	-21.90
Channel Y	200	-27.40	-27.73
	- 200	26.53	26.79
Channel Z	200	-11.13	-11.37
	- 200	9.54	9.31

### 3. Channel separation

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

	Input Voltage (mV)	Channel X ( $\mu\text{V}$ )	Channel Y ( $\mu\text{V}$ )	Channel Z ( $\mu\text{V}$ )
Channel X	200	-	2.83	-3.89
Channel Y	200	8.40	-	3.80
Channel Z	200	9.80	6.24	-

#### 4. AD-Converter Values with inputs shorted

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

	High Range (LSB)	Low Range (LSB)
Channel X	15584	17186
Channel Y	16049	15312
Channel Z	16077	16767

#### 5. Input Offset Measurement

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

Input 10M $\Omega$

	Average ( $\mu$ V)	min. Offset ( $\mu$ V)	max. Offset ( $\mu$ V)	Std. Deviation ( $\mu$ V)
Channel X	0.71	-0.27	1.96	0.43
Channel Y	-0.32	-1.14	0.46	0.37
Channel Z	-0.75	-2.06	0.69	0.43

#### 6. Input Offset Current

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

#### 7. Input Resistance (Typical values for information)

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

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

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

#### 9. Power Consumption (Typical values for information)

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



Accreditation No.: **SCS 0108**

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Client **Sporton**

Certificate No: **EX3-3843\_Sep19**

## CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3843**

Calibration procedure(s) **QA CAL-01.v9, QA CAL-14.v5, QA CAL-23.v5, QA CAL-25.v7  
Calibration procedure for dosimetric E-field probes**

Calibration date: **September 26, 2019**

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  $(22 \pm 3)^\circ\text{C}$  and humidity  $< 70\%$ .

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-19 (No. 217-02894)	Apr-20
DAE4	SN: 660	19-Dec-18 (No. DAE4-660_Dec18)	Dec-19
Reference Probe ES3DV2	SN: 3013	31-Dec-18 (No. ES3-3013_Dec18)	Dec-19
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-16)	In house check: Jun-20
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-18)	In house check: Jun-20
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

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

Issued: October 1, 2019

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### Glossary:

TSL	tissue simulating liquid
NORM <sub>x,y,z</sub>	sensitivity in free space
ConvF	sensitivity in TSL / NORM <sub>x,y,z</sub>
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization $\varphi$	$\varphi$ rotation around probe axis
Polarization $\vartheta$	$\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

### Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

### Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not affect the E<sup>2</sup>-field uncertainty inside TSL (see below ConvF).
- NORM(f)<sub>x,y,z</sub> = NORM<sub>x,y,z</sub> \* 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.
- DCP<sub>x,y,z</sub>**: 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
- A<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>; D<sub>x,y,z</sub>; VR<sub>x,y,z</sub>; 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  $f \leq 800$  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 NORM<sub>x,y,z</sub> \* 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  $\pm 50$  MHz to  $\pm 100$  MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle**: The angle is assessed using the information gained by determining the NORM<sub>x</sub> (no uncertainty required).

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3843

### Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup>	0.34	0.35	0.25	± 10.1 %
DCP (mV) <sup>B</sup>	110.9	96.1	101.1	

### Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Max dev.	Unc <sup>C</sup> (k=2)
0	CW	X	0.0	0.0	1.0	0.00	134.1	±3.8 %	± 4.7 %
		Y	0.0	0.0	1.0		146.5		
		Z	0.0	0.0	1.0		132.2		

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

<sup>A</sup> The uncertainties of Norm X,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Page 5).

<sup>B</sup> Numerical linearization parameter; uncertainty not required.

<sup>C</sup> 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:3843****Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle (°)	-34.3
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3843

### Calibration Parameter Determined in Head Tissue Simulating Media

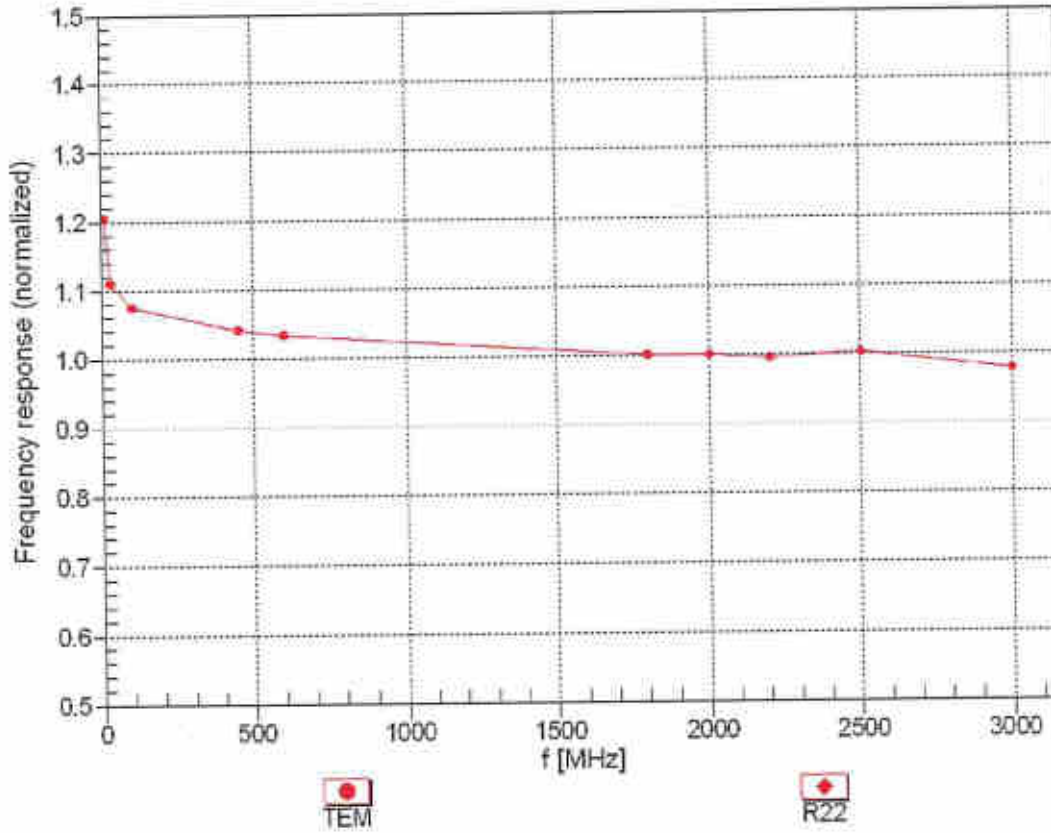
f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unc (k=2)
750	41.9	0.89	9.37	9.37	9.37	0.50	0.87	± 12.0 %
835	41.5	0.90	9.07	9.07	9.07	0.43	0.80	± 12.0 %
900	41.5	0.97	8.92	8.92	8.92	0.41	0.90	± 12.0 %
1450	40.5	1.20	8.17	8.17	8.17	0.32	0.80	± 12.0 %
1750	40.1	1.37	7.95	7.95	7.95	0.34	0.87	± 12.0 %
1900	40.0	1.40	7.67	7.67	7.67	0.32	0.87	± 12.0 %
2000	40.0	1.40	7.66	7.66	7.66	0.34	0.87	± 12.0 %
2300	39.5	1.67	7.30	7.30	7.30	0.26	0.90	± 12.0 %
2450	39.2	1.80	7.06	7.06	7.06	0.35	0.90	± 12.0 %
2600	39.0	1.96	6.90	6.90	6.90	0.43	0.80	± 12.0 %
5250	35.9	4.71	4.74	4.74	4.74	0.40	1.80	± 14.0 %
5600	35.5	5.07	4.47	4.47	4.47	0.40	1.80	± 14.0 %
5750	35.4	5.22	4.44	4.44	4.44	0.40	1.80	± 14.0 %

<sup>C</sup> Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) 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 ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

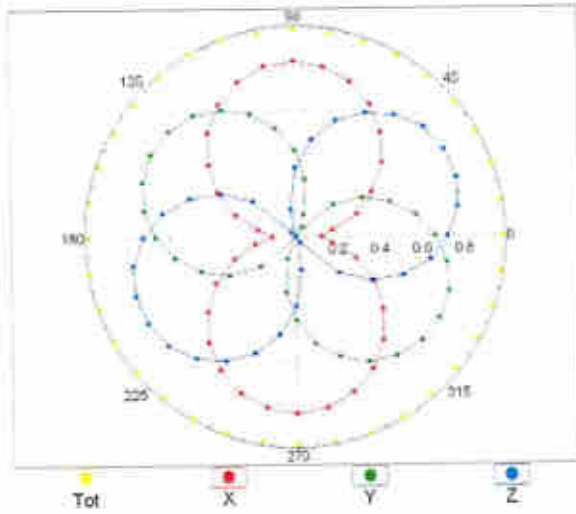
### Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)



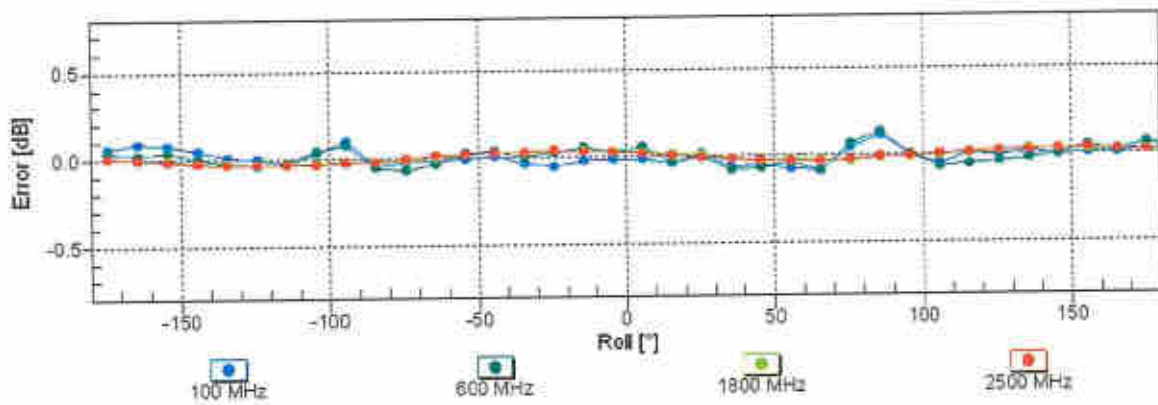
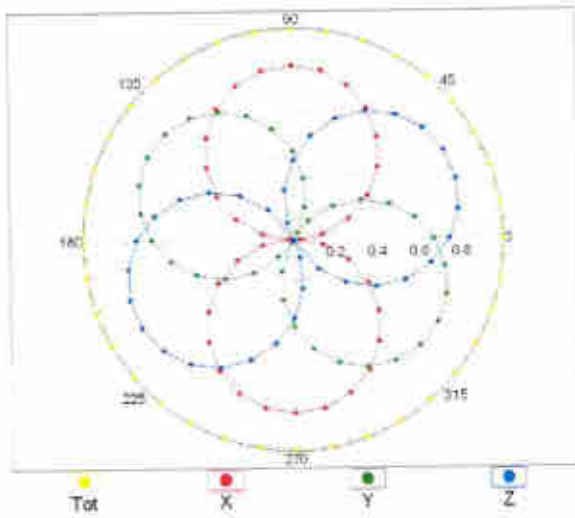
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

### Receiving Pattern ( $\phi$ ), $\theta = 0^\circ$

f=600 MHz,TEM

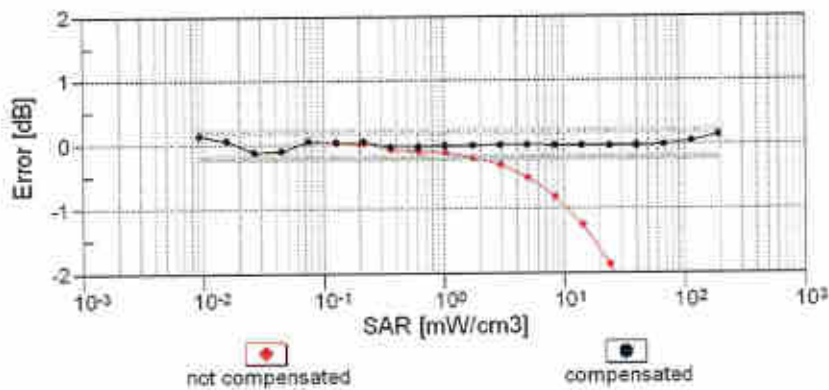
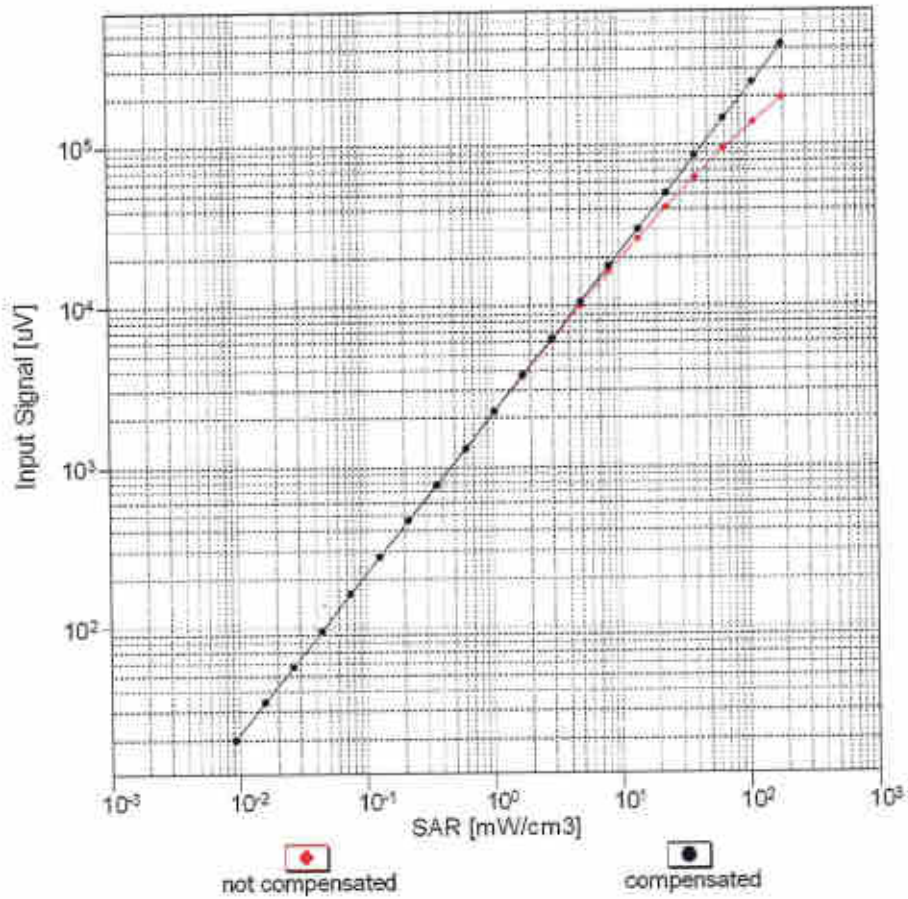


f=1800 MHz,R22



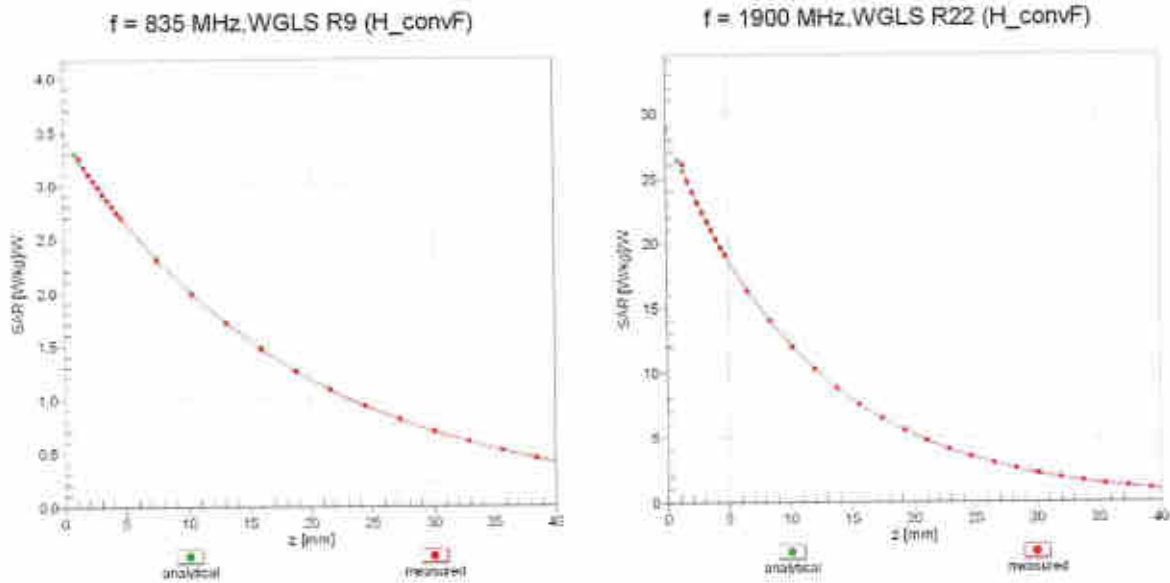
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

## Dynamic Range f(SAR<sub>head</sub>) (TEM cell , f<sub>eval</sub>= 1900 MHz)

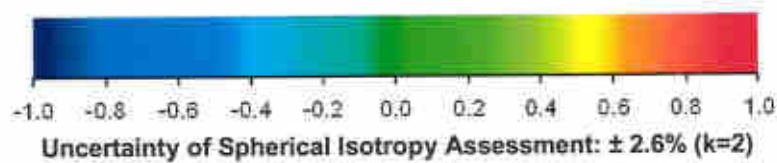
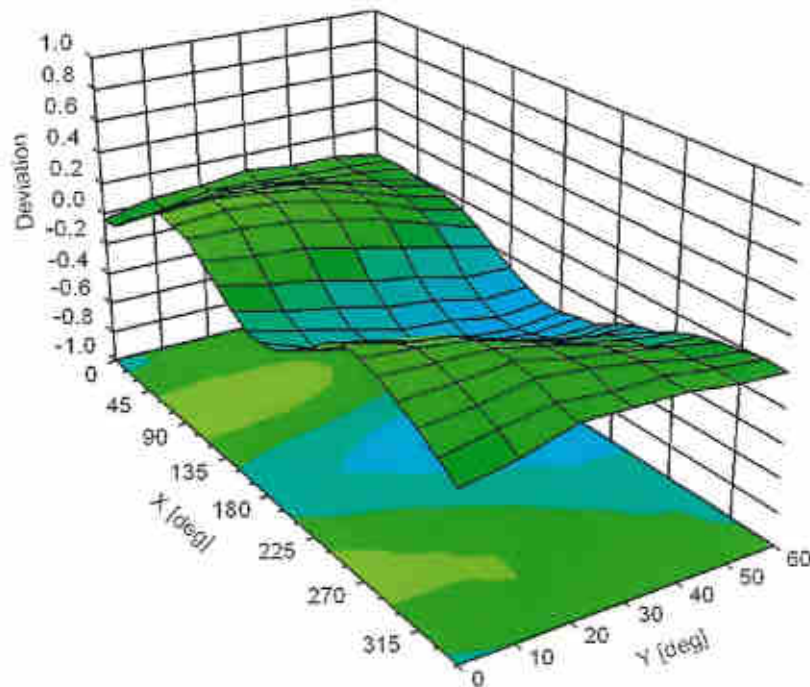


**Uncertainty of Linearity Assessment: ± 0.6% (k=2)**

## Conversion Factor Assessment



## Deviation from Isotropy in Liquid Error ( $\phi, \theta$ ), f = 900 MHz







**Appendix E. Conducted RF Output Power Table**

The detailed power table are shown as follows.



Full Power

GSM850	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame Average Power (dBm)			Tune-up Limit (dBm)
	128	189	251		128	189	251	
	824.2	836.4	848.6		824.2	836.4	848.6	
TX Channel	128	189	251		128	189	251	
Frequency (MHz)	824.2	836.4	848.6		824.2	836.4	848.6	
GSM 1 Tx slot	31.69	31.91	31.77	32.50	22.69	22.91	22.77	23.50
GPRS 1 Tx slot	31.68	31.90	31.76	32.50	22.68	22.90	22.76	23.50
GPRS 2 Tx slots	28.51	28.77	28.87	29.50	22.51	22.77	22.87	23.50
GPRS 3 Tx slots	27.35	27.60	27.71	28.50	23.09	23.24	23.45	24.24
GPRS 4 Tx slots	25.60	25.74	25.62	26.50	22.60	22.74	22.62	23.50
EDGE 1 Tx slot	25.68	25.84	25.84	26.50	16.68	16.84	16.84	17.50
EDGE 2 Tx slots	23.17	23.44	23.25	24.50	17.17	17.44	17.25	18.50
EDGE 3 Tx slots	22.09	22.37	22.17	23.50	17.83	18.11	17.91	19.24
EDGE 4 Tx slots	20.18	20.35	20.32	21.50	17.18	17.35	17.32	18.50

GSM1900	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame Average Power (dBm)			Tune-up Limit (dBm)
	512	651	810		512	651	810	
	1852.2	1890	1928.8		1852.2	1890	1928.8	
TX Channel	512	651	810		512	651	810	
Frequency (MHz)	1852.2	1890	1928.8		1852.2	1890	1928.8	
GSM 1 Tx slot	20.34	20.68	20.49	30.00	20.34	20.68	20.49	21.00
GPRS 1 Tx slot	20.33	20.67	20.48	30.00	20.33	20.67	20.48	21.00
GPRS 2 Tx slots	26.27	26.68	26.32	27.50	20.27	20.68	20.32	21.50
GPRS 3 Tx slots	25.11	25.55	25.16	26.50	20.85	21.29	20.90	22.24
GPRS 4 Tx slots	23.30	23.47	23.34	24.50	20.30	20.47	20.34	21.50
EDGE 1 Tx slot	24.89	25.34	25.12	26.50	15.89	16.34	16.12	17.50
EDGE 2 Tx slots	22.75	23.19	22.81	23.50	16.75	17.19	16.81	17.50
EDGE 3 Tx slots	21.64	22.08	21.70	23.00	17.38	17.82	17.44	18.74
EDGE 4 Tx slots	19.76	20.02	20.04	21.00	16.76	17.02	17.04	18.00

Band	TX Channel	WCDMA II			Tune-up Limit (dBm)	WCDMA IV			Tune-up Limit (dBm)	WCDMA V			Tune-up Limit (dBm)
		9282	9400	9538		1312	1413	1513		4132	4182	4233	
		9622	9800	9938		1557	1638	1738		4357	4407	4458	
	Rx Channel	9622	9800	9938		1557	1638	1738		4357	4407	4458	
	Frequency (MHz)	1852.4	1860	1907.6		1712.4	1722.6	1752.6		356.4	436.4	446.6	
3GPP Rel 99	AMR 12.2Kbps	23.91	23.87	23.89	24.80	23.90	23.91	23.88	24.00	23.32	23.35	23.31	24.00
3GPP Rel 99	RM-C 12.2Kbps	23.94	23.89	23.90	24.00	23.91	23.92	23.87	24.00	23.33	23.36	23.32	24.00
3GPP Rel 6	HSDPA Subtest-1	22.98	22.93	22.95	23.00	22.92	22.87	22.84	23.00	22.32	22.41	22.37	23.00
3GPP Rel 6	HSDPA Subtest-2	22.97	22.95	22.98	23.00	22.96	22.94	22.85	23.00	22.34	22.45	22.40	23.00
3GPP Rel 6	HSDPA Subtest-3	22.44	22.47	22.46	22.50	22.38	22.35	22.33	22.50	21.84	21.90	21.91	22.50
3GPP Rel 6	HSDPA Subtest-4	22.41	22.43	22.46	22.50	22.40	22.35	22.33	22.50	21.85	21.92	21.92	22.50
3GPP Rel 8	DC-HSDPA Subtest-1	22.93	22.89	22.92	23.00	22.88	22.84	22.81	23.00	22.29	22.38	22.33	23.00
3GPP Rel 8	DC-HSDPA Subtest-2	22.94	22.91	22.95	23.00	22.82	22.81	22.82	23.00	22.31	22.42	22.36	23.00
3GPP Rel 8	DC-HSDPA Subtest-3	22.41	22.43	22.43	22.50	22.34	22.32	22.30	22.50	21.81	21.87	21.87	22.50
3GPP Rel 8	DC-HSDPA Subtest-4	22.38	22.39	22.43	22.50	22.36	22.32	22.30	22.50	21.82	21.89	21.88	22.50
3GPP Rel 6	HSUPA Subtest-1	22.95	22.92	22.93	23.00	22.85	22.81	22.77	23.00	22.36	22.45	22.39	23.00
3GPP Rel 6	HSUPA Subtest-2	20.94	20.94	20.97	21.00	20.85	20.79	20.80	21.00	20.38	20.42	20.41	21.00
3GPP Rel 6	HSUPA Subtest-3	21.95	21.90	21.94	22.00	21.87	21.87	21.83	22.00	21.36	21.44	21.44	22.00
3GPP Rel 6	HSUPA Subtest-4	20.98	20.98	20.96	21.00	20.84	20.85	20.79	21.00	20.39	20.41	20.43	21.00
3GPP Rel 6	HSUPA Subtest-5	22.90	23.00	23.00	23.00	22.90	22.80	22.80	23.00	22.40	22.40	22.40	23.00





## Full Power

Band 24 for FCC (only on channel required)											
BW (MHz)	Modulation	RB Size	RB Offset	Power Low Ch / Freq	Power Middle Ch / Freq	Power High Ch / Freq	Tune-up limit (dBm)	MFR (dB)			
Channel											
Frequency (MHz)											
10	QPSK	1	0	23.11	23.03	23.06					
15	QPSK	1	37	23.04	23.06	23.06	24	0			
15	QPSK	1	74	22.98	22.97	22.91					
15	QPSK	36	0	23.10	23.21	23.22					
15	QPSK	36	20	23.15	23.21	23.24	24	0			
10	QPSK	36	39	23.21	23.21	23.16					
10	QPSK	75	0	23.15	23.21	23.15					
10	16QAM	1	0	23.09	23.25	23.41					
15	16QAM	1	37	23.32	23.33	23.46	24	0			
15	16QAM	1	74	23.35	23.34	23.15					
15	16QAM	36	0	22.86	22.86	22.87					
15	16QAM	36	20	22.84	22.92	22.94	23	1			
10	16QAM	36	39	22.83	22.85	22.85					
10	16QAM	75	0	22.77	22.85	22.81					
10	64QAM	1	0	22.81	22.90	22.67					
15	64QAM	1	37	22.88	22.98	22.95	23	1			
15	64QAM	1	74	22.95	22.78	22.66					
15	64QAM	36	0	21.67	21.93	21.96					
15	64QAM	36	20	21.67	21.96	21.67	22	2			
10	64QAM	36	39	21.80	21.80	21.86					
10	64QAM	75	0	21.83	21.93	21.89					
Channel											
Frequency (MHz)											
10	QPSK	1	0	23.04	23.10	23.06					
10	QPSK	1	25	22.88	22.98	23.00	24	0			
10	QPSK	1	49	22.83	23.03	22.84					
10	QPSK	25	0	23.10	22.94	23.07					
10	QPSK	25	12	23.04	23.07	23.12	24	0			
10	QPSK	25	25	23.09	23.04	23.06					
10	QPSK	50	0	22.98	23.07	23.02					
10	16QAM	1	0	23.39	23.25	23.37					
10	16QAM	1	25	23.20	23.43	23.31	24	0			
10	16QAM	1	49	23.19	23.29	23.29					
10	16QAM	25	0	22.78	22.76	22.72					
10	16QAM	25	12	22.72	22.82	22.81	23	1			
10	16QAM	25	25	22.70	22.78	22.85					
10	16QAM	50	0	22.60	22.62	22.73					
10	64QAM	1	0	22.95	22.92	23.00					
10	64QAM	1	25	22.83	22.88	22.88	23	1			
10	64QAM	1	49	22.85	22.95	22.74					
10	64QAM	25	0	21.50	21.83	21.73					
10	64QAM	25	12	21.68	21.97	21.79	22	2			
10	64QAM	25	25	21.60	21.77	21.73					
10	64QAM	50	0	21.82	21.81	21.72					
Channel											
Frequency (MHz)											
5	QPSK	1	0	23.06	22.94	23.05					
5	QPSK	1	12	23.05	23.09	23.01	24	0			
5	QPSK	1	24	22.92	23.04	22.91					
5	QPSK	12	0	23.11	23.07	23.12					
5	QPSK	12	7	23.08	23.12	23.08	24	0			
5	QPSK	12	13	23.05	23.00	22.97					
5	QPSK	25	0	23.07	23.07	23.07					
5	16QAM	1	0	23.49	23.27	23.40					
5	16QAM	1	12	23.28	23.27	23.33	24	0			
5	16QAM	1	24	23.14	23.39	23.32					
5	16QAM	12	0	22.81	22.82	22.77					
5	16QAM	12	7	22.81	22.91	22.76	23	1			
5	16QAM	12	13	22.73	22.76	22.71					
5	16QAM	25	0	22.84	22.74	22.74					
5	64QAM	1	0	22.73	22.89	22.87					
5	64QAM	1	12	22.54	22.89	22.54	23	1			
5	64QAM	1	24	22.56	22.99	22.84					
5	64QAM	12	0	21.66	21.85	21.66					
5	64QAM	12	7	21.48	21.85	21.63	22	2			
5	64QAM	12	13	21.43	21.73	21.61					
5	64QAM	25	0	21.42	21.77	21.58					
Channel											
Frequency (MHz)											
3	QPSK	1	0	23.14	22.93	22.94					
3	QPSK	1	8	23.06	23.06	22.98	24	0			
3	QPSK	1	14	22.92	23.02	22.86					
3	QPSK	8	0	23.10	23.03	23.07					
3	QPSK	8	4	23.11	23.05	23.02	24	0			
3	QPSK	8	7	23.05	23.02	22.95					
3	QPSK	15	0	23.08	23.05	23.00					
3	16QAM	1	0	23.37	23.26	23.28					
3	16QAM	1	8	23.48	23.44	23.26	24	0			
3	16QAM	1	14	23.24	23.23	23.37					
3	16QAM	8	0	22.87	22.76	22.83					
3	16QAM	8	4	22.90	22.90	22.70	23	1			
3	16QAM	8	7	22.84	22.82	22.68					
3	16QAM	15	0	22.80	22.78	22.72					
3	64QAM	1	0	22.90	22.89	22.61					
3	64QAM	1	8	22.84	22.95	22.85	23	1			
3	64QAM	1	14	22.63	22.83	22.86					
3	64QAM	8	0	21.74	21.79	21.67					
3	64QAM	8	4	21.69	21.86	21.75	22	2			
3	64QAM	8	7	21.55	21.77	21.65					
3	64QAM	15	0	21.59	21.80	21.67					
Channel											
Frequency (MHz)											
1.4	QPSK	1	0	23.00	22.84	22.88					
1.4	QPSK	1	3	23.04	22.98	22.87	24	0			
1.4	QPSK	1	5	22.95	22.83	22.74					
1.4	QPSK	3	0	23.01	22.95	22.82					
1.4	QPSK	3	1	23.05	23.00	22.96					
1.4	QPSK	3	3	22.92	22.96	22.92					
1.4	QPSK	6	0	23.06	23.00	22.94	24	0			
1.4	16QAM	1	0	23.27	23.22	23.22					
1.4	16QAM	1	3	23.34	23.38	23.30					
1.4	16QAM	1	5	23.12	23.20	23.19	24	0			
1.4	16QAM	3	0	22.98	22.97	22.97					
1.4	16QAM	3	1	23.00	23.04	23.04					
1.4	16QAM	3	3	22.99	23.01	22.99					
1.4	16QAM	6	0	22.84	22.82	22.66	23	1			
1.4	64QAM	1	0	22.16	22.23	22.08					
1.4	64QAM	1	3	22.20	22.09	22.43					
1.4	64QAM	1	5	22.10	22.21	22.00	23	1			
1.4	64QAM	3	0	22.10	22.23	22.08					
1.4	64QAM	3	1	22.10	22.09	22.13					
1.4	64QAM	3	3	22.10	22.32	22.23					
1.4	64QAM	6	0	21.77	21.75	21.57	22	2			



## Reduced Power Mode for P-Sensor On

GSM 1900 TX Channel	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
	512	661	810		512	661	810	
Frequency (MHz)	1850.2	1880	1909.8		1850.2	1880	1909.8	
GSM 1 Tx slot	25.28	25.50	25.34	26.00	16.28	16.50	16.34	17.00
GPRS 1 Tx slot	25.28	25.51	25.36	26.00	16.28	16.51	16.36	17.00
GPRS 2 Tx slots	22.30	22.45	22.13	23.50	16.30	16.45	16.13	17.50
GPRS 3 Tx slots	21.08	21.24	20.86	22.50	16.82	16.98	16.60	16.24
GPRS 4 Tx slots	19.30	19.40	19.23	20.50	16.30	16.40	16.23	17.50
EDGE 1 Tx slot	21.89	21.87	21.69	22.50	12.89	12.87	12.69	13.50
EDGE 2 Tx slots	18.78	18.93	18.64	19.50	12.78	12.93	12.64	13.50
EDGE 3 Tx slots	18.01	18.14	17.81	19.00	13.75	13.88	13.55	14.74
EDGE 4 Tx slots	15.88	16.03	15.98	17.00	12.88	13.03	12.98	14.00

Band TX Channel	WCDMA 1			Tune-up Limit (dBm)	WCDMA 4			Tune-up Limit (dBm)
	9262	9400	9538		1312	1413	1513	
Rx Channel	9552	9900	9938		1537	1538	1738	
Frequency (MHz)	1952.4	1880	1907.6		1712.4	1732.6	1752.6	
3GPP Rel 99 AMR 12.2Kbps	16.61	16.51	16.52	16.00	17.55	17.67	17.64	18.00
3GPP Rel 99 RMC 12.2Kbps	16.63	16.52	16.53	16.00	17.56	17.68	17.66	18.00
3GPP Rel 6 HSDPA Subtest-1	15.48	15.40	15.34	17.00	16.30	16.41	16.55	17.00
3GPP Rel 6 HSDPA Subtest-2	15.47	15.44	15.09	17.00	16.31	16.48	16.53	17.00
3GPP Rel 6 HSDPA Subtest-3	14.99	14.92	14.70	16.50	15.82	15.96	16.02	16.50
3GPP Rel 6 HSDPA Subtest-4	14.96	14.94	14.71	16.50	15.80	15.97	16.05	16.50
3GPP Rel 6 DC-HSDPA Subtest-1	15.46	15.37	15.30	17.00	16.27	16.37	16.53	17.00
3GPP Rel 6 DC-HSDPA Subtest-2	15.45	15.41	15.05	17.00	16.28	16.44	16.51	17.00
3GPP Rel 6 DC-HSDPA Subtest-3	14.97	14.89	14.66	16.50	15.79	15.92	16.00	16.50
3GPP Rel 6 DC-HSDPA Subtest-4	14.94	14.91	14.67	16.50	15.77	15.93	16.03	16.50
3GPP Rel 6 HSUPA Subtest-1	15.49	15.33	15.21	17.00	16.19	16.31	16.40	17.00
3GPP Rel 6 HSUPA Subtest-2	13.48	13.35	13.19	15.00	14.16	14.28	14.38	15.00
3GPP Rel 6 HSUPA Subtest-3	14.46	14.38	14.20	16.00	15.16	15.25	15.44	16.00
3GPP Rel 6 HSUPA Subtest-4	13.42	13.42	13.25	15.00	14.20	14.25	14.40	15.00
3GPP Rel 6 HSUPA Subtest-5	15.50	15.40	15.20	17.00	16.20	16.30	16.40	17.00

**Reduced Power Mode for Hotspot On**

GSM 1900	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
	512	661	810		512	661	810	
Tx Channel	1850.2	1880	1909.8		1850.2	1880	1909.8	
Frequency (MHz)	1850.2	1880	1909.8		1850.2	1880	1909.8	
GSM 1 Tx slot	22.98	23.20	22.96	24.00	13.98	14.20	13.96	15.00
GPRS 1 Tx slot	23.00	23.21	22.98	24.00	14.00	14.21	13.98	15.00
GPRS 2 Tx slots	20.23	20.44	20.20	21.50	14.23	14.44	14.20	15.50
GPRS 3 Tx slots	19.02	19.34	19.12	20.50	14.76	15.08	14.86	16.24
GPRS 4 Tx slots	17.23	17.48	17.36	18.50	14.23	14.48	14.36	15.50
EDGE 1 Tx slot	19.87	20.13	19.89	20.50	10.87	11.13	10.89	11.50
EDGE 2 Tx slots	16.87	17.11	16.81	17.50	10.87	11.11	10.81	11.50
EDGE 3 Tx slots	15.83	16.12	15.83	17.00	11.57	11.86	11.57	12.74
EDGE 4 Tx slots	14.37	14.36	14.13	15.00	11.37	11.36	11.13	12.00

Band	WCDMA 1			Tune-up Limit (dBm)	WCDMA 4			Tune-up Limit (dBm)
	9262	9400	9538		1312	1413	1513	
Rx Channel	9562	9900	9938		1537	1538	1738	
Frequency (MHz)	9562.4	1890	1907.6		1712.4	1732.6	1752.6	
3GPP Rel 99	AMR 12.2Kbps	14.10	14.08	13.90	15.50	16.60	16.62	16.55
3GPP Rel 99	RMC 12.2Kbps	14.11	14.10	13.94	15.50	16.62	16.65	16.57
3GPP Rel 6	HSDPA Subtest-1	13.18	13.11	12.90	14.50	15.37	15.42	15.49
3GPP Rel 6	HSDPA Subtest-2	13.20	13.20	12.93	14.50	15.36	15.48	15.50
3GPP Rel 6	HSDPA Subtest-3	12.71	12.65	12.40	14.00	14.85	14.95	15.00
3GPP Rel 6	HSDPA Subtest-4	12.71	12.68	12.41	14.00	14.83	14.91	15.02
3GPP Rel 6	DC-HSDPA Subtest-1	13.16	13.09	12.88	14.50	15.35	15.40	15.47
3GPP Rel 6	DC-HSDPA Subtest-2	13.18	13.18	12.91	14.50	15.34	15.46	15.48
3GPP Rel 6	DC-HSDPA Subtest-3	12.69	12.63	12.38	14.00	14.83	14.93	14.98
3GPP Rel 6	DC-HSDPA Subtest-4	12.69	12.66	12.39	14.00	14.81	14.89	15.00
3GPP Rel 6	HSPA Subtest-1	12.96	12.94	12.73	14.50	15.43	15.50	15.56
3GPP Rel 6	HSPA Subtest-2	11.67	10.97	10.67	12.50	13.36	13.55	13.54
3GPP Rel 6	HSPA Subtest-3	11.97	11.96	11.70	13.50	14.40	14.54	14.57
3GPP Rel 6	HSPA Subtest-4	11.01	10.86	10.78	12.50	13.37	13.54	13.56
3GPP Rel 6	HSPA Subtest-5	13.00	12.90	12.80	14.50	15.40	15.50	16.50



**Reduced Power Mode for Handheld On**

GSM1900 TX Channel	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame Average Power (dBm)			Tune-up Limit (dBm)
	512	661	810		512	661	810	
Frequency (MHz)	1659.2	1659	1659.8		1659.2	1659	1659.8	
GSM 1 Tx slot	28.32	28.52	28.20	29.00	19.32	19.52	19.20	20.00
GPRS 1 Tx slot	28.33	28.54	28.21	29.00	19.33	19.54	19.21	20.00
GPRS 2 Tx slots	25.73	25.72	25.43	26.50	19.73	19.72	19.43	20.50
GPRS 3 Tx slots	24.55	24.73	24.38	25.50	20.28	20.47	20.12	21.24
GPRS 4 Tx slots	22.42	22.45	22.03	23.50	19.42	19.45	19.03	20.50
EDGE 1 Tx slot	24.12	24.25	24.11	25.50	15.12	15.25	15.11	16.50
EDGE 2 Tx slots	22.14	22.49	22.04	22.50	16.14	16.49	16.04	18.50
EDGE 3 Tx slots	20.98	21.30	20.89	22.00	16.72	17.04	16.63	17.74
EDGE 4 Tx slots	19.24	19.38	19.18	20.00	16.24	16.38	16.18	17.00

Band TX Channel	WCDMA II			Tune-up Limit (dBm)	WCDMA IV			Tune-up Limit (dBm)
	8262	9400	9538		1312	1413	1513	
Rx Channel	9662	9800	9938		1537	1638	1738	
Frequency (MHz)	1852.4	1890	1907.6		1712.4	1732.6	1752.6	
3GPP Rel 99 AMR 12.2Kbps	19.62	19.62	19.44	21.00	21.22	21.29	21.28	22.00
3GPP Rel 99 RMC 12.2Kbps	19.55	19.64	19.43	21.00	21.25	21.30	21.27	22.00
3GPP Rel 6 HSDPA Subtest-1	18.48	18.43	18.19	20.00	20.14	20.28	20.32	21.00
3GPP Rel 6 HSDPA Subtest-2	18.45	18.43	18.20	20.00	20.14	20.27	20.28	21.00
3GPP Rel 6 HSDPA Subtest-3	17.96	17.88	17.71	19.50	19.63	19.72	19.63	20.50
3GPP Rel 6 HSDPA Subtest-4	17.97	17.87	17.68	19.50	19.63	19.77	19.79	20.50
3GPP Rel 8 DC-HSDPA Subtest-1	18.43	18.38	18.17	20.00	20.09	20.24	20.29	21.00
3GPP Rel 8 DC-HSDPA Subtest-2	18.42	18.38	18.18	20.00	20.09	20.25	20.25	21.00
3GPP Rel 8 DC-HSDPA Subtest-3	17.83	17.83	17.69	19.50	19.58	19.70	19.80	20.50
3GPP Rel 8 DC-HSDPA Subtest-4	17.84	17.82	17.66	19.50	19.58	19.75	19.76	20.50
3GPP Rel 6 HSUPA Subtest-1	18.47	18.40	18.19	20.00	20.09	20.24	20.30	21.00
3GPP Rel 6 HSUPA Subtest-2	16.43	16.38	16.24	18.00	18.10	18.21	18.30	19.00
3GPP Rel 6 HSUPA Subtest-3	17.48	17.36	17.20	19.00	19.12	19.27	19.32	20.00
3GPP Rel 6 HSUPA Subtest-4	16.48	16.37	16.22	18.00	18.14	18.21	18.20	19.00
3GPP Rel 6 HSUPA Subtest-5	18.40	18.40	18.20	20.00	20.20	20.20	20.30	21.00





















## CA Uplink

Full Power										
CA_7C										
Combination 20MHz+20MHz (100RB+100RB)										
PCC Channel	SCC Channel	Modulation	PCC		SCC		Total RB Size	Target MPR Level (dB)	Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset				
21350	21152	QPSK	1	0	0	0	1	0	23.66	24

Reduced Power Mode for P-Sensor On										
CA_7C										
Combination 20MHz+20MHz (100RB+100RB)										
PCC Channel	SCC Channel	Modulation	PCC		SCC		Total RB Size	Target MPR Level (dB)	Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset				
21100	20902	QPSK	1	0	0	0	1	0	17.41	19

Reduced Power Mode for Hotspot On										
CA_7C										
Combination 20MHz+20MHz (100RB+100RB)										
PCC Channel	SCC Channel	Modulation	PCC		SCC		Total RB Size	Target MPR Level (dB)	Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset				
20850	21048	QPSK	1	0	0	0	1	0	14.47	16
21100	20902	QPSK	1	0	0	0	1	0	14.56	16
21350	21152	QPSK	1	0	0	0	1	0	14.72	16

Reduced Power for Handheld On										
CA_7C										
Combination 20MHz+20MHz (100RB+100RB)										
PCC Channel	SCC Channel	Modulation	PCC		SCC		Total RB Size	Target MPR Level (dB)	Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset				
21100	20902	QPSK	1	0	0	0	1	0	22.01	23.5

## CA Downlink

### Full Power

Configure	CA List	PCC								SCC				Power	
		LTE	BW	UL	UL	Mod.	UL#	UL	LTE	BW	DL	DL	With CA Tx. Power (dBm)	Without CA Tx. Power (dBm)	
		Band	(MHz)	Freq. (MHz)	Channel		RB	RB Offset	Band	(MHz)	Freq. (MHz)	Channel			
Inter-Band	CA_4A-7A	Band 4	20M	1745	20300	16QAM	1	99	Band 7	20M	2655	3100	23.21	23.86	
		Band 7	20M	2560	21350	16QAM	1	0	Band 4	20M	2132.5	2175	23.26	23.96	
	CA_5A-38A	Band 5	10M	836.5	20525	16QAM	1	0	Band 38	20M	2595	38000	22.86	23.52	
		Band 38	20M	2610	38150	QPSK	1	0	Band 5	10M	881.5	2525	23.01	23.50	
	CA_5A-41A	Band 5	10M	836.5	20525	16QAM	1	0	Band 41	20M	2593	40620	22.83	23.52	
Intra-Band	Contiguous	CA_7B	Band 7	15M	2535	21100	16QAM	1	0	Band 5	10M	881.5	2525	23.34	23.71
		CA_7C	Band 7	20M	2560	21350	16QAM	1	0	Band 7	5M	2664.3	3193	23.62	23.86
	CA_38C	Band 38	20M	2610	38150	16QAM	1	0	Band 7	20M	2660.2	3162	23.61	23.96	
	Non-Contiguous	CA_4A-4A	Band 4	20M	1745	20300	16QAM	1	99	Band 38	20M	2590.2	37952	23.02	23.50
		CA_7A-7A	Band 4	20M	2560	21350	16QAM	1	0	Band 4	5M	2112.5	1975	23.07	23.86
		Band 7	20M	2560	21350	16QAM	1	0	Band 7	5M	2622.5	2775	23.65	23.96	

### Reduced Power Mode for P-Sensor On

Configure	CA List	PCC								SCC				Power	
		LTE	BW	UL	UL	Mod.	UL#	UL	LTE	BW	DL	DL	With CA Tx. Power (dBm)	Without CA Tx. Power (dBm)	
		Band	(MHz)	Freq. (MHz)	Channel		RB	RB Offset	Band	(MHz)	Freq. (MHz)	Channel			
Inter-Band	CA_4A-7A	Band 4	20M	1745	20300	16QAM	1	99	Band 7	20M	2655	3100	16.07	16.91	
		Band 7	20M	2560	21350	16QAM	1	0	Band 4	20M	2132.5	2175	17.32	17.91	
	CA_5A-38A	Band 5	10M	836.5	20525	16QAM	1	0	Band 38	20M	2595	38000	22.87	23.52	
		Band 38	20M	2595	38000	QPSK	1	49	Band 5	10M	881.5	2525	20.2	20.24	
	CA_5A-41A	Band 5	10M	836.5	20525	16QAM	1	0	Band 41	20M	2593	40620	22.92	23.52	
Intra-Band	Contiguous	CA_7B	Band 7	15M	2535	21100	16QAM	1	74	Band 7	5M	2664.3	3193	17.7	17.89
		CA_7C	Band 7	20M	2560	21350	16QAM	1	0	Band 7	20M	2660.2	3162	17.74	17.91
	CA_38C	Band 38	20M	2595	38000	QPSK	1	49	Band 38	20M	2614.8	38198	20.1	20.24	
	Non-Contiguous	CA_4A-4A	Band 4	20M	1745	20300	16QAM	1	99	Band 4	5M	2112.5	1975	17.01	16.91
		CA_7A-7A	Band 7	20M	2560	21350	16QAM	1	0	Band 7	5M	2622.5	2775	17.6	17.91

### Reduced Power Mode for Hotspot On

Configure	CA List	PCC								SCC				Power	
		LTE	BW	UL	UL	Mod.	UL#	UL	LTE	BW	DL	DL	With CA Tx. Power (dBm)	Without CA Tx. Power (dBm)	
		Band	(MHz)	Freq. (MHz)	Channel		RB	RB Offset	Band	(MHz)	Freq. (MHz)	Channel			
Inter-Band	CA_4A-7A	Band 4	20M	1745	20300	16QAM	1	99	Band 7	20M	2655	3100	15.3	15.35	
		Band 7	20M	2560	21350	16QAM	1	0	Band 4	20M	2132.5	2175	14.68	14.80	
	CA_5A-38A	Band 5	10M	836.5	20525	16QAM	1	0	Band 38	20M	2595	38000	22.84	23.52	
		Band 38	20M	2610	38150	QPSK	1	99	Band 5	10M	881.5	2525	16.05	16.15	
	CA_5A-41A	Band 5	10M	836.5	20525	16QAM	1	0	Band 41	20M	2593	40620	22.86	23.52	
Intra-Band	Contiguous	CA_7B	Band 7	15M	2535	21100	16QAM	1	74	Band 7	5M	2664.3	3193	14.52	14.78
		CA_7C	Band 7	20M	2560	21350	16QAM	1	0	Band 7	20M	2660.2	3162	14.21	14.80
	CA_38C	Band 38	20M	2610	38150	QPSK	1	99	Band 38	20M	2590.2	37952	15.39	16.15	
	Non-Contiguous	CA_4A-4A	Band 4	20M	1745	20300	16QAM	1	99	Band 4	5M	2112.5	1975	15.31	15.35
		CA_7A-7A	Band 7	20M	2560	21350	16QAM	1	0	Band 7	5M	2622.5	2775	14.61	14.80

### Reduced Power for Handheld On

Configure	CA List	PCC								SCC				Power	
		LTE	BW	UL	UL	Mod.	UL#	UL	LTE	BW	DL	DL	With CA Tx. Power (dBm)	Without CA Tx. Power (dBm)	
		Band	(MHz)	Freq. (MHz)	Channel		RB	RB Offset	Band	(MHz)	Freq. (MHz)	Channel			
Inter-Band	CA_4A-7A	Band 4	20M	1745	20300	16QAM	1	0	Band 7	20M	2655	3100	20.94	21.25	
		Band 7	20M	2560	21350	16QAM	1	0	Band 4	20M	2132.5	2175	22.21	22.36	
	CA_5A-38A	Band 5	10M	836.5	20525	16QAM	1	0	Band 38	20M	2595	38000	22.83	23.52	
		Band 38	20M	2610	38150	QPSK	1	0	Band 5	10M	881.5	2525	23.14	23.50	
	CA_5A-41A	Band 5	10M	836.5	20525	16QAM	1	0	Band 41	20M	2593	40620	22.71	23.52	
Intra-Band	Contiguous	CA_7B	Band 7	15M	2535	21100	16QAM	1	74	Band 7	5M	2664.3	3193	22.12	22.34
		CA_7C	Band 7	20M	2560	21350	16QAM	1	0	Band 7	20M	2660.2	3162	22.05	22.36
	CA_38C	Band 38	20M	2610	38150	QPSK	1	0	Band 38	20M	2590.2	37952	23.36	23.50	
	Non-Contiguous	CA_4A-4A	Band 4	20M	1745	20300	16QAM	1	0	Band 4	5M	2112.5	1975	21.06	21.25
		CA_7A-7A	Band 7	20M	2560	21350	16QAM	1	0	Band 7	5M	2622.5	2775	22.14	22.36

**Full Power**
**<Inter-Band for Three Carrier Combination> (three bands)**

Configure		PCC							SCC1				SCC2				Power	
		LTE	BW	UL	UL	Mod.	UL#	UL	LTE	BW	DL	DL	LTE	BW	DL	DL	With CA	Without CA
		Band	(MHz)	Freq. (MHz)	Channel		RB	Offset	Band	(MHz)	Freq. (MHz)	Channel	Band	(MHz)	Freq. (MHz)	Channel	Tx. Power (dBm)	Tx. Power (dBm)
Inter-Band	CA_2A-4A-5A	Band 2	20M	1880	1890	16QAM	1	0	Band 4	20M	2132.5	2175	Band 5	10M	881.5	2525	23.62	23.94
		Band 4	20M	1745	2030	16QAM	1	99	Band 5	10M	881.5	2525	Band 2	20M	1960	900	23.23	23.88
		Band 5	10M	836.5	20525	16QAM	1	0	Band 2	20M	1960	900	Band 4	20M	2132.5	2175	22.82	23.52

**Reduced Power Mode for P-Sensor On**
**<Inter-Band for Three Carrier Combination> (three bands)**

Configure		PCC							SCC1				SCC2				Power	
		LTE	BW	UL	UL	Mod.	UL#	UL	LTE	BW	DL	DL	LTE	BW	DL	DL	With CA	Without CA
		Band	(MHz)	Freq. (MHz)	Channel		RB	Offset	Band	(MHz)	Freq. (MHz)	Channel	Band	(MHz)	Freq. (MHz)	Channel	Tx. Power (dBm)	Tx. Power (dBm)
Inter-Band	CA_2A-4A-5A	Band 2	20M	1880	1890	16QAM	1	0	Band 4	20M	2132.5	2175	Band 5	10M	881.5	2525	16.62	16.89
		Band 4	20M	1745	2030	16QAM	1	99	Band 5	10M	881.5	2525	Band 2	20M	1960	900	16.43	16.91
		Band 5	10M	836.5	20525	16QAM	1	0	Band 2	20M	1960	900	Band 4	20M	2132.5	2175	22.78	23.52

**Reduced Power Mode for Hotspot On**
**<Inter-Band for Three Carrier Combination> (three bands)**

Configure		PCC							SCC1				SCC2				Power	
		LTE	BW	UL	UL	Mod.	UL#	UL	LTE	BW	DL	DL	LTE	BW	DL	DL	With CA	Without CA
		Band	(MHz)	Freq. (MHz)	Channel		RB	Offset	Band	(MHz)	Freq. (MHz)	Channel	Band	(MHz)	Freq. (MHz)	Channel	Tx. Power (dBm)	Tx. Power (dBm)
Inter-Band	CA_2A-4A-5A	Band 2	20M	1880	1890	16QAM	1	0	Band 4	20M	2132.5	2175	Band 5	10M	881.5	2525	14.12	14.45
		Band 4	20M	1745	2030	16QAM	1	99	Band 5	10M	881.5	2525	Band 2	20M	1960	900	15.33	15.35
		Band 5	10M	836.5	20525	16QAM	1	0	Band 2	20M	1960	900	Band 4	20M	2132.5	2175	22.78	23.52

**Reduced Power for Handheld On**
**<Inter-Band for Three Carrier Combination> (three bands)**

Configure		PCC							SCC1				SCC2				Power	
		LTE	BW	UL	UL	Mod.	UL#	UL	LTE	BW	DL	DL	LTE	BW	DL	DL	With CA	Without CA
		Band	(MHz)	Freq. (MHz)	Channel		RB	Offset	Band	(MHz)	Freq. (MHz)	Channel	Band	(MHz)	Freq. (MHz)	Channel	Tx. Power (dBm)	Tx. Power (dBm)
Inter-Band	CA_2A-4A-5A	Band 2	20M	1880	1890	16QAM	1	0	Band 4	20M	2132.5	2175	Band 5	10M	881.5	2525	20.11	20.39
		Band 4	20M	1745	2030	16QAM	1	0	Band 5	10M	881.5	2525	Band 2	20M	1960	900	20.95	21.25
		Band 5	10M	836.5	20525	16QAM	1	0	Band 2	20M	1960	900	Band 4	20M	2132.5	2175	22.82	23.52



**Bluetooth BR/EDR**

Mode	Channel	Frequency (MHz)	Average power (dBm)		
			1Mbps	2Mbps	3Mbps
BR / EDR	CH 00	2402	11.40	11.50	10.89
	CH 39	2441	11.87	11.59	11.29
	CH 78	2480	11.37	10.77	10.52
Tune-up Limit			12	12	12

**Bluetooth LE v4.0**

Mode	Channel	Frequency (MHz)	Average power (dBm)
LE	CH 00	2402	3.09
	CH 19	2440	3.85
	CH 39	2480	3.65
Tune-up Limit			5

**Bluetooth LE v5.0**

Mode	Channel	Frequency (MHz)	Average power (dBm)
LE	CH 00	2402	3.50
	CH 19	2440	3.86
	CH 39	2480	3.55
Tune-up Limit			5



**Appendix F. Supplemental Tuner Head & Body SAR Results**

The results are shown as follows.



## Head

Mode	Service/Modulation	Frequency (MHz)	Channel	RB Size	RB Offset	Test Position	Spacing	Measured 1g SAR (W/kg)	Average Value of Time Sweep (W/kg)																
									Auto-Tune	Default (State 123)	0	9	18	27	36	45	54	63	72	81	90	99	108	117	126
WCDMA II	RMC12.2K	1852.4	9262	N/A	N/A	Left Cheek	0 mm	0.084	0.116	0.042	0.089	0.013	0.080	0.023	0.070	0.089	0.070	0.042	0.051	0.080	0.013	0.004	0.070	0.070	0.099
WCDMA IV	RMC12.2K	1732.6	1413	N/A	N/A	Right Cheek	0 mm	0.117	0.154	0.134	0.134	0.039	0.039	0.039	0.096	0.087	0.049	0.011	0.049	0.087	0.030	0.020	0.096	0.096	0.144
WCDMA V	RMC12.2K	836.4	4182	N/A	N/A	Right Cheek	0 mm	0.148	0.180	0.138	0.072	0.110	0.024	0.034	0.110	0.157	0.119	0.053	0.081	0.072	0.015	0.100	0.129	0.129	0.034
LTE Band 2	QPSK	1880	18900	1	0	Left Cheek	0 mm	0.104	0.141	0.073	0.120	0.016	0.025	0.006	0.016	0.120	0.016	0.054	0.120	0.025	0.016	0.092	0.035	0.006	0.035
LTE Band 7	QPSK	2560	21350	1	0	Right Cheek	0 mm	0.062	0.095	0.009	0.047	0.056	0.085	0.028	0.009	0.028	0.056	0.066	0.056	0.047	0.075	0.085	0.075	0.037	0.028
LTE Band 12	QPSK	707.5	23095	1	0	Right Cheek	0 mm	0.162	0.185	0.150	0.036	0.102	0.159	0.150	0.017	0.112	0.159	0.064	0.055	0.007	0.083	0.007	0.083	0.083	0.036
LTE Band 26	QPSK	831.5	26865	1	0	Right Cheek	0 mm	0.114	0.136	0.116	0.059	0.069	0.040	0.059	0.012	0.021	0.040	0.040	0.116	0.040	0.040	0.012	0.088	0.031	0.107
LTE Band 41	QPSK	2593	40620	1	0	Right Cheek	0 mm	0.045	0.069	0.036	0.045	0.017	0.055	0.055	0.055	0.007	0.017	0.017	0.017	0.007	0.007	0.055	0.036	0.026	0.055
LTE Band 66	QPSK	1745	132322	1	0	Right Cheek	0 mm	0.138	0.183	0.112	0.074	0.027	0.017	0.036	0.017	0.103	0.065	0.055	0.131	0.160	0.103	0.027	0.027	0.131	0.150



**Body**

Mode	Service/Modulation	Frequency (MHz)	Channel	RB Size	RB Offset	Test Position	Spacing	Measured 1g SAR (W/kg)	Average Value of Time Sweep (W/kg)																
									Auto-Tune (State 109)	0	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
WCDMA B2	RM12.2K	1907.6	9538	N/A	N/A	Bottom Side	5mm	0.964	1.280	0.827	0.951	0.894	1.084	1.018	0.258	0.522	0.151	0.979	0.418	0.818	0.465	0.875	0.827	0.656	0.132
Mode	Service/Modulation	Frequency (MHz)	Channel	RB Size	RB Offset	Test Position	Spacing	Measured 1g SAR (W/kg)	Average Value of Time Sweep (W/kg)																
WCDMA B4	RM12.2K	1752.6	1513	N/A	N/A	Back	5mm	1.25	2.000	1.058	1.087	0.230	1.201	1.039	0.258	1.811	1.201	0.335	0.706	0.858	1.744	1.297	0.658	0.801	1.382
Mode	Service/Modulation	Frequency (MHz)	Channel	RB Size	RB Offset	Test Position	Spacing	Measured 1g SAR (W/kg)	Average Value of Time Sweep (W/kg)																
WCDMA B5	RM12.2K	836.4	4182	N/A	N/A	Back	5mm	1.15	1.860	0.677	1.515	0.448	0.420	1.791	1.077	0.858	0.944	0.677	0.706	1.820	0.410	1.048	0.220	1.144	0.915
Mode	Service/Modulation	Frequency (MHz)	Channel	RB Size	RB Offset	Test Position	Spacing	Measured 1g SAR (W/kg)	Average Value of Time Sweep (W/kg)																
LTE Band 2	QPSK	1880	18900	50	50	Front	5mm	1.08	1.580	0.770	0.379	0.122	1.198	0.408	1.294	1.389	1.027	1.284	1.046	0.751	0.751	0.284	0.722	1.246	0.313
Mode	Service/Modulation	Frequency (MHz)	Channel	RB Size	RB Offset	Test Position	Spacing	Measured 1g SAR (W/kg)	Average Value of Time Sweep (W/kg)																
LTE Band 7	QPSK	2535	21100	1	0	Front	5mm	0.816	1.530	1.088	0.459	0.268	1.002	0.316	0.916	0.316	0.773	0.726	0.364	0.240	0.078	1.126	0.345	0.935	0.373
Mode	Service/Modulation	Frequency (MHz)	Channel	RB Size	RB Offset	Test Position	Spacing	Measured 1g SAR (W/kg)	Average Value of Time Sweep (W/kg)																
LTE Band 12	QPSK	707.5	23095	1	0	Back	5mm	0.845	1.370	0.860	0.298	0.422	1.032	0.784	0.879	0.460	1.222	0.803	0.403	0.165	0.270	0.632	1.298	0.394	1.184
Mode	Service/Modulation	Frequency (MHz)	Channel	RB Size	RB Offset	Test Position	Spacing	Measured 1g SAR (W/kg)	Average Value of Time Sweep (W/kg)																
LTE Band 26	QPSK	831.5	26865	1	0	Back	5mm	1.09	1.690	0.638	0.114	0.723	1.238	1.257	0.885	0.504	0.390	0.247	0.895	0.971	0.933	1.333	0.114	0.095	1.552
Mode	Service/Modulation	Frequency (MHz)	Channel	RB Size	RB Offset	Test Position	Spacing	Measured 1g SAR (W/kg)	Average Value of Time Sweep (W/kg)																
LTE Band 41	QPSK	2593	40620	50	24	Front	5mm	0.95	1.640	0.424	0.824	0.672	1.281	0.767	0.405	0.605	1.424	0.291	0.300	0.110	1.196	1.015	0.615	1.158	0.234
Mode	Service/Modulation	Frequency (MHz)	Channel	RB Size	RB Offset	Test Position	Spacing	Measured 1g SAR (W/kg)	Average Value of Time Sweep (W/kg)																
LTE Band 66	QPSK	1770	132572	1	0	Back	13mm	1.15	1.640	1.428	0.228	1.390	1.066	0.418	1.285	1.085	0.647	1.209	1.352	0.990	1.095	0.790	1.142	0.333	0.685





Mode	Service/ Modulation	Frequency (MHz)	Channel	RB Size	RB Offset	Test Position	Spacing	Measured Ig SAR (W/kg)	Average Value of Time Sweep (W/kg)																				
									Auto-Tune	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
									LTE Band 26	QPSK	831.5	26865	1	0	Back	5mm	1.09	1.690	0.428	1.057	1.009	1.542	1.142	0.695	0.638	0.618	0.352	1.428	0.733
									20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
									1.085	1.276	1.238	1.142	0.723	0.123	0.714	0.885	0.485	1.047	1.485	0.695	0.228	1.238	0.780	1.561	1.495	0.580	0.123	1.085	1.104
									41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61
									0.142	1.257	1.552	0.628	0.771	1.409	1.561	0.952	1.057	1.171	0.885	1.618	1.038	1.228	0.190	1.571	0.228	1.571	1.352	0.504	1.161
									62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82
									0.295	1.323	0.190	0.323	0.990	1.561	0.933	0.390	1.409	0.676	0.790	0.485	0.809	1.533	1.571	0.438	0.247	0.961	1.152	0.799	1.018
									83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103
									1.428	1.304	0.628	1.618	0.895	0.723	0.714	1.257	0.123	0.333	1.161	0.866	1.161	0.971	1.618	1.399	1.238	0.333	1.628	0.161	0.790
									104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124
									0.418	0.933	1.561	0.961	0.952	0.590	1.095	0.657	1.352	1.104	1.333	0.942	0.266	1.057	0.476	1.352	0.285	0.161	1.333	0.114	0.752
									125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143		
									0.428	0.733	0.990	0.742	1.190	0.152	1.257	0.095	1.361	1.323	0.666	1.190	0.380	1.180	1.104	0.571	1.552	1.009	0.904		
LTE Band 41	QPSK	2593	40620	50	24	Front	5mm	0.95	1.640	0.634	0.462	0.443	0.205	0.853	1.472	0.462	0.424	0.605	0.624	1.434	1.177	0.291	0.129	0.158	1.529	0.824	1.253	0.348	1.129
									20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
									0.310	0.167	0.786	1.215	0.396	0.672	1.481	0.777	1.053	0.672	1.196	0.919	0.358	0.405	1.281	0.719	0.586	0.100	0.881	1.377	0.100
									41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61
									1.538	1.481	0.767	0.491	0.929	0.119	0.662	0.424	0.481	0.405	0.919	0.405	1.491	1.519	0.472	1.424	0.481	0.253	0.348	0.881	0.605
									62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82
									0.472	1.015	1.091	0.824	0.196	0.091	0.453	1.500	1.424	0.719	1.550	0.596	0.462	0.834	0.177	1.300	0.872	0.291	0.967	1.462	0.529
									83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103
									1.291	0.367	1.481	1.291	1.367	0.300	1.024	1.243	0.196	0.319	0.148	0.805	0.519	0.529	0.110	0.919	0.234	0.300	1.062	1.500	1.443
									104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124
									0.177	0.538	1.196	1.167	0.948	1.091	1.186	0.748	0.748	0.319	1.386	1.015	0.167	0.958	1.405	0.177	0.977	1.024	0.234	0.243	0.615
									125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143		
									1.481	0.386	1.148	0.405	0.881	0.081	0.729	0.567	1.158	1.510	0.272	0.367	0.805	0.224	0.853	1.158	0.710	0.234	1.548		
LTE Band 66	QPSK	1770	132572	1	0	Back	13mm	1.15	1.640	1.066	0.152	0.952	0.390	0.323	0.504	1.028	0.352	1.428	1.028	1.266	1.123	0.238	0.580	0.780	1.180	0.818	0.228	0.876	0.638
									20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
									0.990	0.133	0.504	0.438	0.542	0.695	1.390	0.590	1.095	0.876	0.742	0.723	0.380	1.018	0.523	1.066	0.095	0.599	0.380	0.380	1.142
									41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61
									1.171	0.895	0.952	0.418	0.190	0.657	0.266	0.323	1.409	0.190	0.685	1.076	1.285	1.333	0.657	0.952	0.590	0.999	0.076	0.266	0.180
									62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82
									1.085	1.161	0.066	0.428	1.218	0.847	0.847	0.923	0.228	0.647	1.630	1.447	0.657	1.066	0.847	1.152	0.580	1.190	1.209	1.066	0.923
									83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103
									1.104	1.199	0.161	0.257	1.066	0.514	1.352	0.657	0.342	0.257	0.495	1.199	0.418	1.399	0.552	0.990	0.361	0.609	0.552	0.552	0.561
									104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124
									1.152	0.447	1.057	1.095	1.076	0.323	0.876	0.190	0.409	0.638	1.333	0.790	0.790	1.266	0.533	0.561	0.609	1.123	0.247	0.552	0.085
									125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143		
									1.142	1.142	0.409	0.657	1.390	1.161	0.580	0.514	0.838	0.333	0.676	1.390	0.190	1.399	0.457	0.752	0.390	0.504	0.685		