

## Appendix 5. Simulated Tissues

The body mixture consists of water, Polysorbate (Tween 20) and salt. Visual inspection is made to ensure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the tissue.

| Ingredient<br>(% by weight) | Frequency 750/835/850/900 MHz |       |
|-----------------------------|-------------------------------|-------|
|                             | Head                          | Body  |
| De-Ionized Water            | 52.87                         | 71.30 |
| Polysorbate 20              | 46.10                         | 28.00 |
| Salt                        | 1.03                          | 0.70  |

| Ingredient<br>(% by weight) | Frequency 1800/1900 MHz |       |
|-----------------------------|-------------------------|-------|
|                             | Head                    | Body  |
| De-Ionized Water            | 55.40                   | 71.50 |
| Polysorbate 20              | 44.22                   | 28.00 |
| Salt                        | 0.38                    | 0.50  |

| Ingredient<br>(% by weight) | Frequency 2450/2600 MHz |       |
|-----------------------------|-------------------------|-------|
|                             | Head                    | Body  |
| De-Ionized Water            | 55.75 <sup>(1)</sup>    | 71.70 |
| Polysorbate 20              | 45.25 <sup>(1)</sup>    | 28.00 |
| Salt                        | 0.00                    | 0.30  |

Stimulating Liquid for 3700 MHz to 5800 MHz are supplied and manufactured by SPEAG

| Ingredient<br>(% by weight) | Frequency                      |
|-----------------------------|--------------------------------|
|                             | 3700 - 5800 MHz<br>Head / Body |
| De-Ionized Water            | ~78.00                         |
| Mineral Oil                 | ~11.00                         |
| Emulsifiers                 | ~9.00                          |
| Additives and Salt          | ~2.00                          |

### Note(s):

- As per the recipe provided by National Physical Laboratory, the 2450 MHz Head Fluid recipe is mixed to the total percentage of weight is by 101.0 %.

## **Appendix 6. System Check and Dielectric Parameters**

**Dielectric Property Measurements:** The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within  $\pm 2^\circ\text{C}$  of the temperature when the tissue parameters are characterized.

The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 3 days of use; or earlier if the dielectric parameters can become out of tolerance; for example, when the parameters are marginal at the beginning of the measurement series.

Tissue dielectric parameters were measured at the low, middle and high frequency of each operating frequency range of the test device.

**System Performance Check:** Prior to the assessment, the system was verified in the flat region of the phantom, 750 MHz, 900 MHz, 1800 MHz, 1900 MHz, 2450 MHz, 2600 MHz and 5.0 GHz dipoles were used. A forward power of 250 mW was applied to the 750 MHz, 900 MHz, 1800 MHz, 1900 MHz, 2450 MHz, 2600 MHz dipoles and 100 mW was applied to 5.0 GHz dipole and the system was verified to a tolerance of  $\pm 5\%$  for the 900MHz, 1800MHz, 1900MHz, 2450 MHz, 2600 MHz and 5.0 GHz dipoles.

The applicable verification normalised to 1 Watt.

## System Check 750 Head

Date: 02/07/2014

Validation Dipole and Serial Number: D750V3 SN: 1011

| Simulant | Frequency (MHz) | Room Temp | Liquid Temp | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|-----------|-------------|--------------|--------------|----------------|---------------|-----------|
| Head     | 750             | 23.1°C    | 22.4°C      | $\epsilon_r$ | 41.96        | 41.77          | -0.45         | 5.00      |
|          |                 |           |             | $\sigma$     | 0.89         | 0.85           | -3.98         | 5.00      |
|          |                 |           |             | 1g SAR       | 8.48         | 8.48           | 0.00          | 5.00      |
|          |                 |           |             | 10g SAR      | 5.57         | 5.68           | 1.97          | 5.00      |

## System Check 750 Body

Date: 03/07/2014

Validation Dipole and Serial Number: D750V3 SN: 1011

| Simulant | Frequency (MHz) | Room Temp | Liquid Temp | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|-----------|-------------|--------------|--------------|----------------|---------------|-----------|
| Body     | 750             | 22.7°C    | 22..7°C     | $\epsilon_r$ | 55.55        | 53.67          | -3.39         | 5.00      |
|          |                 |           |             | $\sigma$     | 0.96         | 0.94           | -2.45         | 5.00      |
|          |                 |           |             | 1g SAR       | 8.84         | 8.72           | -1.36         | 5.00      |
|          |                 |           |             | 10g SAR      | 5.84         | 5.88           | 0.68          | 5.00      |

## System Check 900 Head

Date: 30/06/2014

Validation Dipole and Serial Number: D900V2 SN: 035

| Simulant | Frequency (MHz) | Room Temp | Liquid Temp | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|-----------|-------------|--------------|--------------|----------------|---------------|-----------|
| Head     | 900             | 23.0°C    | 22.°C       | $\epsilon_r$ | 41.50        | 41.83          | 0.80          | 5.00      |
|          |                 |           |             | $\sigma$     | 0.97         | 0.96           | -1.34         | 5.00      |
|          |                 |           |             | 1g SAR       | 10.50        | 10.36          | -1.33         | 5.00      |
|          |                 |           |             | 10g SAR      | 6.69         | 6.76           | 1.05          | 5.00      |

Date: 03/07/2014

Validation Dipole and Serial Number: D900V2 SN: 035

| Simulant | Frequency (MHz) | Room Temp | Liquid Temp | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|-----------|-------------|--------------|--------------|----------------|---------------|-----------|
| Head     | 900             | 22.6.0°C  | 22.4°C      | $\epsilon_r$ | 41.50        | 40.91          | -1.42         | 5.00      |
|          |                 |           |             | $\sigma$     | 0.97         | 0.95           | -1.60         | 5.00      |
|          |                 |           |             | 1g SAR       | 10.50        | 10.08          | -4.00         | 5.00      |
|          |                 |           |             | 10g SAR      | 6.69         | 6.52           | -2.54         | 5.00      |

## System Check 900 Body

Date: 30/06/2014

Validation Dipole and Serial Number: D900V2 SN: 035

| Simulant | Frequency (MHz) | Room Temp | Liquid Temp | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|-----------|-------------|--------------|--------------|----------------|---------------|-----------|
| Body     | 900             | 23.0°C    | 22.6°C      | $\epsilon_r$ | 55.00        | 53.42          | -2.87         | 5.00      |
|          |                 |           |             | $\sigma$     | 1.05         | 1.01           | -3.62         | 5.00      |
|          |                 |           |             | 1g SAR       | 10.40        | 10.52          | 1.15          | 5.00      |
|          |                 |           |             | 10g SAR      | 6.73         | 6.88           | 2.23          | 5.00      |

Date: 03/07/2014

Validation Dipole and Serial Number: D900V2 SN: 035

| Simulant | Frequency (MHz) | Room Temp | Liquid Temp | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|-----------|-------------|--------------|--------------|----------------|---------------|-----------|
| Body     | 900             | 23.0°C    | 22.5°C      | $\epsilon_r$ | 55.00        | 53.75          | -2.27         | 5.00      |
|          |                 |           |             | $\sigma$     | 1.05         | 1.07           | 2.24          | 5.00      |
|          |                 |           |             | 1g SAR       | 10.40        | 10.08          | -3.08         | 5.00      |
|          |                 |           |             | 10g SAR      | 6.73         | 6.52           | -3.12         | 5.00      |

## System Check 1800 Head

Date: 30/06/2014

Validation Dipole and Serial Number: D1800V2 SN: 2d009

| Simulant | Frequency (MHz) | Room Temp | Liquid Temp | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|-----------|-------------|--------------|--------------|----------------|---------------|-----------|
| Head     | 1800            | 24.0°C    | 23.2°C      | $\epsilon_r$ | 40.00        | 38.38          | -4.05         | 5.00      |
|          |                 |           |             | $\sigma$     | 1.40         | 1.38           | -1.14         | 5.00      |
|          |                 |           |             | 1g SAR       | 37.30        | 36.92          | -1.02         | 5.00      |
|          |                 |           |             | 10g SAR      | 19.70        | 19.84          | 0.71          | 5.00      |

## System Check 1800 Body

Date: 30/06/2014

Validation Dipole and Serial Number :D1800V2 SN: 2d009

| Simulant | Frequency (MHz) | Room Temp | Liquid Temp | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|-----------|-------------|--------------|--------------|----------------|---------------|-----------|
| Body     | 1800            | 24.0°C    | 22.7°C      | $\epsilon_r$ | 53.30        | 50.81          | -4.67         | 5.00      |
|          |                 |           |             | $\sigma$     | 1.52         | 1.57           | 3.09          | 5.00      |
|          |                 |           |             | 1g SAR       | 36.50        | 35.96          | -1.48         | 5.00      |
|          |                 |           |             | 10g SAR      | 19.50        | 19.48          | -0.10         | 5.00      |

**System Check 1900 Head**

Date: 30/06/2014

Validation Dipole and Serial Number: D1900V2 SN: 537

| Simulant | Frequency (MHz) | Room Temp | Liquid Temp | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|-----------|-------------|--------------|--------------|----------------|---------------|-----------|
| Head     | 1900            | 23.0°C    | 23.8°C      | $\epsilon_r$ | 40.00        | 39.68          | -0.80         | 5.00      |
|          |                 |           |             | $\sigma$     | 1.40         | 1.34           | -4.32         | 5.00      |
|          |                 |           |             | 1g SAR       | 39.80        | 39.36          | -1.11         | 5.00      |
|          |                 |           |             | 10g SAR      | 20.70        | 20.44          | -1.26         | 5.00      |

Date: 30/06/2014

Validation Dipole and Serial Number: D1900V2 SN: 537

| Simulant | Frequency (MHz) | Room Temp | Liquid Temp | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|-----------|-------------|--------------|--------------|----------------|---------------|-----------|
| Head     | 1900            | 23.0°C    | 23.8°C      | $\epsilon_r$ | 40.00        | 39.14          | -2.15         | 5.00      |
|          |                 |           |             | $\sigma$     | 1.40         | 1.34           | -4.10         | 5.00      |
|          |                 |           |             | 1g SAR       | 39.80        | 39.64          | -0.40         | 5.00      |
|          |                 |           |             | 10g SAR      | 20.70        | 20.52          | -0.87         | 5.00      |

**System Check 1900 Body**

Date: 30/06/2014

Validation Dipole and Serial Number: D1900V2 SN: 537

| Simulant | Frequency (MHz) | Room Temp | Liquid Temp | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|-----------|-------------|--------------|--------------|----------------|---------------|-----------|
| Body     | 1900            | 23.0°C    | 22.4°C      | $\epsilon_r$ | 53.30        | 53.40          | 0.19          | 5.00      |
|          |                 |           |             | $\sigma$     | 1.52         | 1.53           | 0.63          | 5.00      |
|          |                 |           |             | 1g SAR       | 40.20        | 41.20          | 2.49          | 5.00      |
|          |                 |           |             | 10g SAR      | 21.1         | 21.44          | 1.61          | 5.00      |

Date: 30/06/2014

Validation Dipole and Serial Number: D1900V2 SN: 537

| Simulant | Frequency (MHz) | Room Temp | Liquid Temp | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|-----------|-------------|--------------|--------------|----------------|---------------|-----------|
| Body     | 1900            | 23.0°C    | 24.0°C      | $\epsilon_r$ | 53.30        | 53.02          | -0.53         | 5.00      |
|          |                 |           |             | $\sigma$     | 1.52         | 1.47           | -3.40         | 5.00      |
|          |                 |           |             | 1g SAR       | 40.20        | 39.60          | -1.49         | 5.00      |
|          |                 |           |             | 10g SAR      | 21.1         | 20.84          | -1.23         | 5.00      |

Date: 03/07/2014

Validation Dipole and Serial Number: D1900V2 SN: 540

| Simulant | Frequency (MHz) | Room Temp | Liquid Temp | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|-----------|-------------|--------------|--------------|----------------|---------------|-----------|
| Body     | 1900            | 23.0°C    | 24.0°C      | $\epsilon_r$ | 53.30        | 52.30          | -1.88         | 5.00      |
|          |                 |           |             | $\sigma$     | 1.52         | 1.49           | -1.88         | 5.00      |
|          |                 |           |             | 1g SAR       | 40.20        | 38.96          | -3.08         | 5.00      |
|          |                 |           |             | 10g SAR      | 21.1         | 20.16          | -4.45         | 5.00      |

**System Check 2450 Head****Date: 30/06/2014****Validation Dipole and Serial Number: D2450V2 SN: 701**

| Simulant | Frequency (MHz) | Room Temp | Liquid Temp | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|-----------|-------------|--------------|--------------|----------------|---------------|-----------|
| Head     | 2450            | 24.0°C    | 23.3°C      | $\epsilon_r$ | 39.20        | 39.84          | 1.63          | 5.00      |
|          |                 |           |             | $\sigma$     | 1.80         | 1.81           | 0.42          | 5.00      |
|          |                 |           |             | 1g SAR       | 53.40        | 54.00          | 1.12          | 5.00      |
|          |                 |           |             | 10g SAR      | 24.70        | 24.72          | 0.08          | 5.00      |

**System Check 2450 Body****Date: 07/07/2014****Validation Dipole and Serial Number: D2440V2 SN: 701**

| Simulant | Frequency (MHz) | Room Temp | Liquid Temp | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|-----------|-------------|--------------|--------------|----------------|---------------|-----------|
| Body     | 2450            | 23.5°C    | 23.3°C      | $\epsilon_r$ | 52.70        | 50.78          | -3.64         | 5.00      |
|          |                 |           |             | $\sigma$     | 1.95         | 2.04           | 4.56          | 5.00      |
|          |                 |           |             | 1g SAR       | 51.40        | 51.60          | 0.39          | 5.00      |
|          |                 |           |             | 10g SAR      | 23.90        | 23.64          | -1.09         | 5.00      |

**System Check 2600 Head****Date: 01/07/2014****Validation Dipole and Serial Number: D2600V2 SN: 1046**

| Simulant | Frequency (MHz) | Room Temp | Liquid Temp | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|-----------|-------------|--------------|--------------|----------------|---------------|-----------|
| Head     | 2600            | 23.3°C    | 23.5°C      | $\epsilon_r$ | 39.00        | 39.35          | 0.90          | 5.00      |
|          |                 |           |             | $\sigma$     | 1.96         | 1.98           | 0.82          | 5.00      |
|          |                 |           |             | 1g SAR       | 57.60        | 60.00          | 4.17          | 5.00      |
|          |                 |           |             | 10g SAR      | 25.80        | 26.48          | 2.64          | 5.00      |

**System Check 2600 Body****Date: 03/07/2014****Validation Dipole and Serial Number: D2600V2 SN: 1046**

| Simulant | Frequency (MHz) | Room Temp | Liquid Temp | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|-----------|-------------|--------------|--------------|----------------|---------------|-----------|
| Body     | 2600            | 23.0°C    | 22.5°C      | $\epsilon_r$ | 52.50        | 51.12          | -2.63         | 5.00      |
|          |                 |           |             | $\sigma$     | 2.16         | 2.21           | 2.38          | 5.00      |
|          |                 |           |             | 1g SAR       | 56.80        | 59.20          | 4.23          | 5.00      |
|          |                 |           |             | 10g SAR      | 25.20        | 25.72          | 2.06          | 5.00      |

**Date: 07/07/2014****Validation Dipole and Serial Number: D2600V2 SN: 1046**

| Simulant | Frequency (MHz) | Room Temp | Liquid Temp | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|-----------|-------------|--------------|--------------|----------------|---------------|-----------|
| Body     | 2600            | 23.0°C    | 22.5°C      | $\epsilon_r$ | 52.50        | 51.09          | -2.69         | 5.00      |
|          |                 |           |             | $\sigma$     | 2.16         | 2.90           | 1.58          | 5.00      |
|          |                 |           |             | 1g SAR       | 56.80        | 56.80          | 0.00          | 5.00      |
|          |                 |           |             | 10g SAR      | 25.20        | 24.44          | -3.02         | 5.00      |



## System Check 5200 Head

Date: 01/07/2014

Validation Dipole and Serial Number: D5GHzV2 SN: 1016

| Simulant | Frequency (MHz) | Room Temp | Liquid Temp | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|-----------|-------------|--------------|--------------|----------------|---------------|-----------|
| Head     | 5200            | 24.0°C    | 23.5°C      | $\epsilon_r$ | 35.99        | 36.31          | 0.89          | 5.00      |
|          |                 |           |             | $\sigma$     | 4.66         | 4.69           | 0.74          | 5.00      |
|          |                 |           |             | 1g SAR       | 77.40        | 75.90          | -1.94         | 5.00      |
|          |                 |           |             | 10g SAR      | 22.30        | 21.90          | -1.79         | 5.00      |

Date: 01/07/2014

Validation Dipole and Serial Number: D5GHzV2 SN: 1016

| Simulant | Frequency (MHz) | Room Temp | Liquid Temp | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|-----------|-------------|--------------|--------------|----------------|---------------|-----------|
| Head     | 5500            | 22.0      | 23.5°C      | $\epsilon_r$ | 35.60        | 35.89          | 0.81          | 5.00      |
|          |                 |           |             | $\sigma$     | 4.96         | 5.03           | 1.40          | 5.00      |
|          |                 |           |             | 1g SAR       | 84.80        | 82.40          | -2.83         | 5.00      |
|          |                 |           |             | 10g SAR      | 24.10        | 23.40          | -2.90         | 5.00      |

Date: 01/07/2014

Validation Dipole and Serial Number: D5GHzV2 SN: 1016

| Simulant | Frequency (MHz) | Room Temp | Liquid Temp | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|-----------|-------------|--------------|--------------|----------------|---------------|-----------|
| Head     | 5800            | 22.0      | 23.5°C      | $\epsilon_r$ | 35.30        | 35.60          | 0.85          | 5.00      |
|          |                 |           |             | $\sigma$     | 5.27         | 5.36           | 1.68          | 5.00      |
|          |                 |           |             | 1g SAR       | 76.90        | 78.50          | -2.08         | 5.00      |
|          |                 |           |             | 10g SAR      | 22.00        | 22.50          | 2.27          | 5.00      |

## System Check 5200 Body

Date: 30/06/2014

Validation Dipole and Serial Number: D5GHzV2 SN: 1016

| Simulant | Frequency (MHz) | Room Temp | Liquid Temp | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|-----------|-------------|--------------|--------------|----------------|---------------|-----------|
| Body     | 5200            | 23.5°C    | 22.0°C      | $\epsilon_r$ | 49.01        | 49.01          | 0.00          | 5.00      |
|          |                 |           |             | $\sigma$     | 5.30         | 5.15           | -2.87         | 5.00      |
|          |                 |           |             | 1g SAR       | 73.10        | 69.60          | -4.79         | 5.00      |
|          |                 |           |             | 10g SAR      | 20.40        | 19.90          | -2.45         | 5.00      |

Date: 30/06/2014

Validation Dipole and Serial Number: D5GHzV2 SN: 1016

| Simulant | Frequency (MHz) | Room Temp | Liquid Temp | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|-----------|-------------|--------------|--------------|----------------|---------------|-----------|
| Body     | 5500            | 23.5      | 22.0°C      | $\epsilon_r$ | 48.60        | 48.46          | -0.29         | 5.00      |
|          |                 |           |             | $\sigma$     | 5.65         | 5.64           | -0.22         | 5.00      |
|          |                 |           |             | 1g SAR       | 79.00        | 76.60          | -2.91         | 5.00      |
|          |                 |           |             | 10g SAR      | 21.90        | 21.70          | -0.91         | 5.00      |

Date: 30/06/2014

Validation Dipole and Serial Number: D5GHzV2 SN: 1016

| Simulant | Frequency (MHz) | Room Temp | Liquid Temp | Parameters   | Target Value | Measured Value | Deviation (%) | Limit (%) |
|----------|-----------------|-----------|-------------|--------------|--------------|----------------|---------------|-----------|
| Body     | 5800            | 23.5      | 22.0°C      | $\epsilon_r$ | 48.20        | 47.75          | -0.93         | 5.00      |
|          |                 |           |             | $\sigma$     | 6.00         | 6.13           | 2.14          | 5.00      |
|          |                 |           |             | 1g SAR       | 75.20        | 73.20          | 2.73          | 5.00      |
|          |                 |           |             | 10g SAR      | 20.20        | 21.10          | 4.46          | 5.00      |

## Appendix 7. Measurement Uncertainty Table

Measurement uncertainty tables for technologies tested.

### A.7.1. GSM 850 / UMTS FDD 5 / LTE Band 5 / LTE Band 17 Head Configuration 1g

| Type | Source of uncertainty                                  | + Value | - Value | Probability Distribution | Divisor | C <sub>i</sub> (1g) | Standard Uncertainty |         | u <sub>i</sub> or u <sub>eff</sub> |
|------|--------------------------------------------------------|---------|---------|--------------------------|---------|---------------------|----------------------|---------|------------------------------------|
|      |                                                        |         |         |                          |         |                     | + 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                                | 2.510   | 2.510   | normal (k=1)             | 1.0000  | 1.0000              | 2.510                | 2.510   | 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)                   | 2.950   | 2.950   | normal (k=1)             | 1.0000  | 0.6400              | 1.888                | 1.888   | 5                                  |
| B    | Liquid Permittivity (target value)                     | 5.000   | 5.000   | Rectangular              | 1.7321  | 0.6000              | 1.732                | 1.732   | ∞                                  |
| A    | Liquid Permittivity (measured value)                   | 2.840   | 2.840   | normal (k=1)             | 1.0000  | 0.6000              | 1.704                | 1.704   | 5                                  |
|      | Combined standard uncertainty                          |         |         | t-distribution           |         |                     | 9.58                 | 9.58    | >500                               |
|      | Expanded uncertainty                                   |         |         | k = 1.96                 |         |                     | 18.77                | 18.77   | >500                               |

**A.7.2. GSM / GPRS / EDGE 850 / UMTS FDD 5 / LTE Band 5 / LTE Band 17 Body Configuration 1g**

| Type | Source of uncertainty                                 | + Value | - Value | Probability Distribution | Divisor | C <sub>i</sub> (1g) | Standard Uncertainty |         | u <sub>i</sub> or u <sub>eff</sub> |
|------|-------------------------------------------------------|---------|---------|--------------------------|---------|---------------------|----------------------|---------|------------------------------------|
|      |                                                       |         |         |                          |         |                     | + 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                               | 2.510   | 2.510   | normal (k=1)             | 1.0000  | 1.0000              | 2.510                | 2.510   | 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)                  | 2.000   | 2.000   | normal (k=1)             | 1.0000  | 0.6400              | 1.280                | 1.280   | 5                                  |
| B    | Liquid Permittivity (target value)                    | 5.000   | 5.000   | Rectangular              | 1.7321  | 0.6000              | 1.732                | 1.732   | ∞                                  |
| A    | Liquid Permittivity (measured value)                  | 1.560   | 1.560   | normal (k=1)             | 1.0000  | 0.6000              | 0.936                | 0.936   | 5                                  |
|      | Combined standard uncertainty                         |         |         | t-distribution           |         |                     | 9.37                 | 9.37    | >500                               |
|      | Expanded uncertainty                                  |         |         | k = 1.96                 |         |                     | 18.36                | 18.36   | >500                               |

**A.7.3. UMTS FDD 4 / LTE Band 4 Head Configuration 1g**

| Type | Source of uncertainty                                 | + Value | - Value | Probability Distribution | Divisor | C <sub>i</sub> (1g) | Standard Uncertainty |         | u <sub>i</sub> or u <sub>eff</sub> |
|------|-------------------------------------------------------|---------|---------|--------------------------|---------|---------------------|----------------------|---------|------------------------------------|
|      |                                                       |         |         |                          |         |                     | + 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                               | 2.440   | 2.440   | normal (k=1)             | 1.0000  | 1.0000              | 2.440                | 2.440   | 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)                  | 2.120   | 2.120   | normal (k=1)             | 1.0000  | 0.6400              | 1.357                | 1.357   | 5                                  |
| B    | Liquid Permittivity (target value)                    | 5.000   | 5.000   | Rectangular              | 1.7321  | 0.6000              | 1.732                | 1.732   | ∞                                  |
| A    | Liquid Permittivity (measured value)                  | 2.270   | 2.270   | normal (k=1)             | 1.0000  | 0.6000              | 1.362                | 1.362   | 5                                  |
|      | Combined standard uncertainty                         |         |         | t-distribution           |         |                     | 9.41                 | 9.41    | >500                               |
|      | Expanded uncertainty                                  |         |         | k = 1.96                 |         |                     | 18.45                | 18.45   | >500                               |

**A.7.4. UMTS FDD 4 / LTE Band 4 Body Configuration 1g**

| Type | Source of uncertainty                                 | + Value | - Value | Probability Distribution | Divisor | C <sub>i</sub> (1g) | Standard Uncertainty |         | u <sub>i</sub> or u <sub>eff</sub> |
|------|-------------------------------------------------------|---------|---------|--------------------------|---------|---------------------|----------------------|---------|------------------------------------|
|      |                                                       |         |         |                          |         |                     | + 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                               | 2.460   | 2.460   | normal (k=1)             | 1.0000  | 1.0000              | 2.460                | 2.460   | 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)                  | 2.210   | 2.210   | normal (k=1)             | 1.0000  | 0.6400              | 1.414                | 1.414   | 5                                  |
| B    | Liquid Permittivity (target value)                    | 5.000   | 5.000   | Rectangular              | 1.7321  | 0.6000              | 1.732                | 1.732   | ∞                                  |
| A    | Liquid Permittivity (measured value)                  | 2.150   | 2.150   | normal (k=1)             | 1.0000  | 0.6000              | 1.290                | 1.290   | 5                                  |
|      | Combined standard uncertainty                         |         |         | t-distribution           |         |                     | 9.42                 | 9.42    | >500                               |
|      | Expanded uncertainty                                  |         |         | k = 1.96                 |         |                     | 18.45                | 18.45   | >500                               |

**A.7.5. PCS 1900 / UMTS FDD 2 / LTE Band 2 Head Configuration 1g**

| Type | Source of uncertainty                                  | + Value | - Value | Probability Distribution | Divisor | C <sub>i</sub> (1g) | Standard Uncertainty |         | u <sub>i</sub> or u <sub>eff</sub> |
|------|--------------------------------------------------------|---------|---------|--------------------------|---------|---------------------|----------------------|---------|------------------------------------|
|      |                                                        |         |         |                          |         |                     | + 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                                | 2.490   | 2.490   | normal (k=1)             | 1.0000  | 1.0000              | 2.490                | 2.490   | 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)                   | 3.560   | 3.560   | normal (k=1)             | 1.0000  | 0.6400              | 2.278                | 2.278   | 5                                  |
| B    | Liquid Permittivity (target value)                     | 5.000   | 5.000   | Rectangular              | 1.7321  | 0.6000              | 1.732                | 1.732   | ∞                                  |
| A    | Liquid Permittivity (measured value)                   | 2.620   | 2.620   | normal (k=1)             | 1.0000  | 0.6000              | 1.572                | 1.572   | 5                                  |
|      | Combined standard uncertainty                          |         |         | t-distribution           |         |                     | 9.63                 | 9.63    | >500                               |
|      | Expanded uncertainty                                   |         |         | k = 1.96                 |         |                     | 18.88                | 18.88   | >500                               |

**A.7.6. PCS / GPRS / EDGE 1900 / UMTS FDD 2 / LTE Band 2 Body Configuration 1g**

| Type | Source of uncertainty                                  | + Value | - Value | Probability Distribution | Divisor | C <sub>i</sub> (1g) | Standard Uncertainty |         | u <sub>i</sub> or u <sub>eff</sub> |
|------|--------------------------------------------------------|---------|---------|--------------------------|---------|---------------------|----------------------|---------|------------------------------------|
|      |                                                        |         |         |                          |         |                     | + 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                                | 1.860   | 1.860   | normal (k=1)             | 1.0000  | 1.0000              | 1.860                | 1.860   | 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)                   | 2.610   | 2.610   | normal (k=1)             | 1.0000  | 0.6400              | 1.670                | 1.670   | 5                                  |
| B    | Liquid Permittivity (target value)                     | 5.000   | 5.000   | Rectangular              | 1.7321  | 0.6000              | 1.732                | 1.732   | ∞                                  |
| A    | Liquid Permittivity (measured value)                   | 2.140   | 2.140   | normal (k=1)             | 1.0000  | 0.6000              | 1.284                | 1.284   | 5                                  |
|      | Combined standard uncertainty                          |         |         | t-distribution           |         |                     | 9.32                 | 9.32    | >500                               |
|      | Expanded uncertainty                                   |         |         | k = 1.96                 |         |                     | 18.26                | 18.26   | >500                               |



**A.7.7. LTE Band 7 / Wi-Fi 2450 MHz Head Configuration 1g**

| Type | Source of uncertainty                                  | + Value | - Value | Probability Distribution | Divisor | C <sub>i</sub> (1g) | Standard Uncertainty |         | u <sub>i</sub> or u <sub>eff</sub> |
|------|--------------------------------------------------------|---------|---------|--------------------------|---------|---------------------|----------------------|---------|------------------------------------|
|      |                                                        |         |         |                          |         |                     | + 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)                   | 1.840   | 1.840   | normal (k=1)             | 1.0000  | 0.6400              | 1.178                | 1.178   | 5                                  |
| B    | Liquid Permittivity (target value)                     | 5.000   | 5.000   | Rectangular              | 1.7321  | 0.6000              | 1.732                | 1.732   | ∞                                  |
| A    | Liquid Permittivity (measured value)                   | 2.030   | 2.030   | normal (k=1)             | 1.0000  | 0.6000              | 1.218                | 1.218   | 5                                  |
|      | Combined standard uncertainty                          |         |         | t-distribution           |         |                     | 9.25                 | 9.25    | >500                               |
|      | Expanded uncertainty                                   |         |         | k = 1.96                 |         |                     | 18.13                | 18.13   | >500                               |

**A.7.8. LTE Band 7 / Wi-Fi 2450 MHz Body Configuration 1g**

| Type | Source of uncertainty                                  | + Value | - Value | Probability Distribution | Divisor | C <sub>i</sub> (1g) | Standard Uncertainty |         | u <sub>i</sub> or u <sub>eff</sub> |
|------|--------------------------------------------------------|---------|---------|--------------------------|---------|---------------------|----------------------|---------|------------------------------------|
|      |                                                        |         |         |                          |         |                     | + 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                                | 2.440   | 2.440   | normal (k=1)             | 1.0000  | 1.0000              | 2.440                | 2.440   | 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)                   | 2.260   | 2.260   | normal (k=1)             | 1.0000  | 0.6400              | 1.446                | 1.446   | 5                                  |
| B    | Liquid Permittivity (target value)                     | 5.000   | 5.000   | Rectangular              | 1.7321  | 0.6000              | 1.732                | 1.732   | ∞                                  |
| A    | Liquid Permittivity (measured value)                   | 2.150   | 2.150   | normal (k=1)             | 1.0000  | 0.6000              | 1.290                | 1.290   | 5                                  |
|      | Combined standard uncertainty                          |         |         | t-distribution           |         |                     | 9.36                 | 9.36    | >500                               |
|      | Expanded uncertainty                                   |         |         | k = 1.96                 |         |                     | 18.35                | 18.35   | >500                               |

**A.7.9. Wi-Fi 5GHz Head Configuration 1g**

| Type | Source of uncertainty                                  | + Value | - Value | Probability Distribution | Divisor | C <sub>i</sub> (1g) | Standard Uncertainty |         | u <sub>i</sub> or u <sub>eff</sub> |
|------|--------------------------------------------------------|---------|---------|--------------------------|---------|---------------------|----------------------|---------|------------------------------------|
|      |                                                        |         |         |                          |         |                     | + 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                                | 2.380   | 2.380   | normal (k=1)             | 1.0000  | 1.0000              | 2.380                | 2.380   | 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           |         |                     | 10.48                | 10.48   | >250                               |
|      | Expanded uncertainty                                   |         |         | k = 1.96                 |         |                     | 20.53                | 20.53   | >250                               |

**A.7.10. Wi-Fi 5GHz Body Configuration 1g**

| Type | Source of uncertainty                                  | + Value | - Value | Probability Distribution | Divisor | C <sub>i</sub> (1g) | Standard Uncertainty |         | U <sub>i</sub> or U <sub>eff</sub> |
|------|--------------------------------------------------------|---------|---------|--------------------------|---------|---------------------|----------------------|---------|------------------------------------|
|      |                                                        |         |         |                          |         |                     | + 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                                | 1.960   | 1.960   | normal (k=1)             | 1.0000  | 1.0000              | 1.960                | 1.960   | 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)                   | 4.370   | 4.370   | normal (k=1)             | 1.0000  | 0.6400              | 2.797                | 2.797   | 5                                  |
| B    | Liquid Permittivity (target value)                     | 5.000   | 5.000   | Rectangular              | 1.7321  | 0.6000              | 1.732                | 1.732   | ∞                                  |
| A    | Liquid Permittivity (measured value)                   | 4.270   | 4.270   | normal (k=1)             | 1.0000  | 0.6000              | 2.562                | 2.562   | 5                                  |
|      | Combined standard uncertainty                          |         |         | t-distribution           |         |                     | 10.15                | 10.15   | >450                               |
|      | Expanded uncertainty                                   |         |         | k = 1.96                 |         |                     | 19.90                | 19.90   | >450                               |

## Appendix 8. 3G Test set-up

### 3G (12.K RMC / HSDPA / HSUPA) setup

To switch from 2G to 3G, on the system config screen choose Format Switch and select WCDMA. The Call Setup Screen as shown in figure 1 pops up.

| Call Setup Screen   |  |                                                                                                  |  |  |  |                           |  |                              |  |
|---------------------|--|--------------------------------------------------------------------------------------------------|--|--|--|---------------------------|--|------------------------------|--|
| Call Control        |  | Active Cell Operating Mode                                                                       |  |  |  |                           |  | Call Params                  |  |
| Operating Mode      |  | UE Information                                                                                   |  |  |  |                           |  | Cell Power                   |  |
| Active Cell         |  | IMSI:<br>IMEI(SV): (---)<br>Power Class:                                                         |  |  |  |                           |  | -35.00                       |  |
|                     |  | UE Expected Open Loop Transmit Power                                                             |  |  |  |                           |  | dBm/3.84 MHz                 |  |
|                     |  | Initial PRACH TX Power: -60.00 dBm<br>Initial DPCH TX Power: -11.55 dBm                          |  |  |  |                           |  | Channel Type                 |  |
| Originate Call      |  |                                                                                                  |  |  |  |                           |  | 12.2k RMC                    |  |
|                     |  | Call Processing Status                                                                           |  |  |  |                           |  | Paging Service               |  |
| Paging Parameters ▾ |  | Current Service Type: None<br>MM Status: None<br>GMM State: None<br>Current DPCH Offset: 0 chips |  |  |  |                           |  | RB Test Mode                 |  |
|                     |  | Handovers                                                                                        |  |  |  |                           |  | HSPA Parameters              |  |
|                     |  | HSUPA Information                                                                                |  |  |  | HSDPA Information         |  | 34.121 Preset Call Configs ▾ |  |
|                     |  | Rep EDCH Cat/Ext: Unrep/Unrep                                                                    |  |  |  | Cur UE HS-DSCH Cat: ----  |  |                              |  |
|                     |  | Last received E-TFCI: ----                                                                       |  |  |  | Block Error Ratio: ---- % |  |                              |  |
|                     |  | Throughput: ---- kbps                                                                            |  |  |  | Throughput: ---- kbps     |  |                              |  |
| Clear UE Info       |  | Acks Transmitted: ----                                                                           |  |  |  | Blocks Transmitted: ----  |  | Channel (UARFCN) Params      |  |
|                     |  | Active Cell                                                                                      |  |  |  | Sys Type: UTRA FDD        |  |                              |  |
|                     |  | Idle                                                                                             |  |  |  |                           |  |                              |  |
| 1 of 5              |  | IntRef                                                                                           |  |  |  |                           |  | 1 of 3                       |  |

Figure 1: 3G Call Setup Screen

For a 12.2k RMC call follow the steps below.

#### 8.1. Steps for 12.2k RMC

1. Ensure that the Operating Mode of the cell is off before setting up the instrument.
2. On the Call Setup Screen, under Call Parameters, press the button against Cell Power. The Cell Power value is set to about -35dBm to account for all the losses and ensure sufficient signal strength to the EUT.
3. The Channel Type is selected to 12.2k RMC. Press button against Channel (UARFCN) Params select the correct Downlink Channel for the required UMTS FDD Band.
4. On the Call Setup Screen, under Call Parameters, press the button against HSPA Parameters. Under HSDPA Parameters on page 1, press HSDPA Uplink parameters and set the Delta ACK, Delta NACK, Delta CQI values to 8. Under HSDPA Params itself, press HSDPA RB Test Mode Setup button and then the HSDPA RB Test Mode Settings and change HS-DSCH Data Pattern to All Ones.

| Call Setup Screen |                                                                                                                         |             |  |  |  |                    |                          |        |  |
|-------------------|-------------------------------------------------------------------------------------------------------------------------|-------------|--|--|--|--------------------|--------------------------|--------|--|
| Call Control      | Active Cell Operating Mode                                                                                              |             |  |  |  |                    | HSDPA Parms              |        |  |
|                   | <b>UE Information</b><br>IMSI:<br>IMEI(SV): (---)<br>Power Class:                                                       |             |  |  |  |                    | HSDPA RB Test Mode Setup |        |  |
|                   | <b>UE Expected Open Loop Transmit Power</b><br>Initial PRACH TX Power: -60.00 dBm<br>Initial DPCCH TX Power: -11.55 dBm |             |  |  |  |                    |                          |        |  |
|                   | <b>HSDPA Uplink Parameters</b>                                                                                          |             |  |  |  |                    | <b>Value</b>             |        |  |
|                   | DeltaACK                                                                                                                |             |  |  |  |                    | 8                        |        |  |
|                   | DeltaNACK                                                                                                               |             |  |  |  |                    | 8                        |        |  |
|                   | DeltaCQI                                                                                                                |             |  |  |  |                    | 8                        |        |  |
|                   | Ack-Nack Repetition Factor                                                                                              |             |  |  |  |                    | 1                        |        |  |
|                   | CQI Feedback Cycle (k)                                                                                                  |             |  |  |  |                    | 2 ms                     |        |  |
|                   | CQI Repetition Factor                                                                                                   |             |  |  |  |                    | 1                        |        |  |
|                   | Close Menu                                                                                                              |             |  |  |  |                    |                          | Return |  |
|                   |                                                                                                                         |             |  |  |  |                    |                          |        |  |
|                   |                                                                                                                         | Active Cell |  |  |  | Sys Type: UTRA FDD |                          |        |  |
|                   |                                                                                                                         | Idle        |  |  |  |                    |                          |        |  |
|                   |                                                                                                                         | IntRef      |  |  |  |                    |                          |        |  |
|                   |                                                                                                                         |             |  |  |  | 1 of 2             |                          |        |  |

Figure 2: HSDPA Parameters

5. On the Call Setup Screen, under Call Parameters, on page 2, check if the DL DTCH Data is set to All Ones. On page 3, ensure that the Receiver is set to Manual. On page 3 itself, under UL CL Power Ctrl Parameters, UL CL Power Ctrl Mode is set to All Up Bits.

| Call Setup Screen |                                                                                                                                            |                                                                                                                                   |  |  |  |                    |                                                                                                                                        |                  |  |  |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|--|--|--|--------------------|----------------------------------------------------------------------------------------------------------------------------------------|------------------|--|--|
| Call Control      | Active Cell Operating Mode                                                                                                                 |                                                                                                                                   |  |  |  |                    | Call Parms                                                                                                                             |                  |  |  |
| Operating Mode    |                                                                                                                                            |                                                                                                                                   |  |  |  |                    | DL DTCH Data                                                                                                                           |                  |  |  |
| Active Cell       |                                                                                                                                            |                                                                                                                                   |  |  |  |                    | All Ones                                                                                                                               |                  |  |  |
|                   | <b>UE Information</b><br>IMSI:<br>IMEI(SV): (---)<br>Power Class:                                                                          |                                                                                                                                   |  |  |  |                    | RLC Reestablish                                                                                                                        |                  |  |  |
|                   | <b>UE Expected Open Loop Transmit Power</b><br>Initial PRACH TX Power: -60.00 dBm<br>Initial DPCCH TX Power: -11.55 dBm                    |                                                                                                                                   |  |  |  |                    |                                                                                                                                        |                  |  |  |
|                   | Originate Call                                                                                                                             | <b>Call Processing Status</b><br>Current Service Type: None<br>MM Status: None<br>GMM State: None<br>Current DPCH Offset: 0 chips |  |  |  |                    |                                                                                                                                        | Call Limit State |  |  |
|                   |                                                                                                                                            |                                                                                                                                   |  |  |  |                    |                                                                                                                                        | Off              |  |  |
| Paging Parameters |                                                                                                                                            |                                                                                                                                   |  |  |  |                    | Call Drop Timer                                                                                                                        |                  |  |  |
| Handovers         | <b>HSUPA Information</b><br>Rep EDCH Cat/Ext: Unrep/Unrep<br>Last received E-TFCI: ----<br>Throughput: ---- kbps<br>Acks Transmitted: ---- |                                                                                                                                   |  |  |  |                    | <b>HSDPA Information</b><br>Cur UE HS-DSCH Cat: ----<br>Block Error Ratio: ---- %<br>Throughput: ---- kbps<br>Blocks Transmitted: ---- |                  |  |  |
|                   |                                                                                                                                            |                                                                                                                                   |  |  |  |                    | SRB Parameters                                                                                                                         |                  |  |  |
| Clear UE Info     |                                                                                                                                            |                                                                                                                                   |  |  |  |                    |                                                                                                                                        |                  |  |  |
|                   |                                                                                                                                            |                                                                                                                                   |  |  |  |                    |                                                                                                                                        |                  |  |  |
|                   |                                                                                                                                            | Active Cell                                                                                                                       |  |  |  | Sys Type: UTRA FDD |                                                                                                                                        |                  |  |  |
|                   |                                                                                                                                            | Idle                                                                                                                              |  |  |  |                    |                                                                                                                                        |                  |  |  |
|                   |                                                                                                                                            | IntRef                                                                                                                            |  |  |  |                    |                                                                                                                                        |                  |  |  |
|                   |                                                                                                                                            |                                                                                                                                   |  |  |  | 2 of 3             |                                                                                                                                        |                  |  |  |

Figure 3: DL DTCH Data Parms

| Call Setup Screen |                                                                                                                          |  |  |        |                           |  |                                    |  |        |
|-------------------|--------------------------------------------------------------------------------------------------------------------------|--|--|--------|---------------------------|--|------------------------------------|--|--------|
| Call Control      | Active Cell Operating Mode                                                                                               |  |  |        |                           |  | Call Params                        |  |        |
|                   | <b>UE Information</b><br>IMSI:<br>IMEI(SU): (--)<br>Power Class:                                                         |  |  |        |                           |  | <b>UE Target Power</b><br>-5 dBm   |  |        |
|                   | <b>UE Expected Open Loop Transmit Power</b><br>Initial PRACH TX Power: -60.00 dBm<br>Initial DPCCCH TX Power: -11.55 dBm |  |  |        |                           |  | <b>UL CL Power Ctrl Parameters</b> |  |        |
|                   | <b>UL CL Power Ctrl Parameters</b>                                                                                       |  |  |        |                           |  | <b>Value</b>                       |  |        |
|                   | <b>UL CL Power Ctrl Mode</b>                                                                                             |  |  |        |                           |  | <b>All Up bits</b>                 |  |        |
|                   | <b>UL CL Power Ctrl Algorithm</b>                                                                                        |  |  |        |                           |  | <b>Two</b>                         |  |        |
|                   | <b>UL CL Power Ctrl Stepsize</b>                                                                                         |  |  |        |                           |  | <b>1 dB</b>                        |  |        |
|                   |                                                                                                                          |  |  |        |                           |  |                                    |  |        |
|                   |                                                                                                                          |  |  |        |                           |  |                                    |  |        |
|                   |                                                                                                                          |  |  |        |                           |  |                                    |  |        |
|                   |                                                                                                                          |  |  |        |                           |  |                                    |  |        |
| Close Menu        |                                                                                                                          |  |  |        |                           |  | <b>Receiver Control</b>            |  |        |
|                   | <b>Active Cell</b><br><b>Idle</b>                                                                                        |  |  |        | <b>Sys Type: UTRA FDD</b> |  |                                    |  |        |
|                   |                                                                                                                          |  |  | IntRef |                           |  |                                    |  | 3 of 3 |

Figure 4: UL CL Power Ctrl Parameters

6. On the Call Setup Screen, under Call Control, page 2, Cell Parameters, it is ensured that PS Domain information is kept as Absent for RMC.

| Call Setup Screen  |                                                                                                                          |  |  |        |                           |  |                                       |  |        |
|--------------------|--------------------------------------------------------------------------------------------------------------------------|--|--|--------|---------------------------|--|---------------------------------------|--|--------|
| Call Control       | Active Cell Operating Mode                                                                                               |  |  |        |                           |  | Call Params                           |  |        |
| Additional Screens | <b>UE Information</b><br>IMSI:<br>IMEI(SU): (--)<br>Power Class:                                                         |  |  |        |                           |  | <b>Cell Power</b><br>-35.00           |  |        |
|                    | <b>UE Expected Open Loop Transmit Power</b><br>Initial PRACH TX Power: -60.00 dBm<br>Initial DPCCCH TX Power: -11.55 dBm |  |  |        |                           |  | <b>dBm/3.84 MHz</b>                   |  |        |
| Cell Parameters    |                                                                                                                          |  |  |        |                           |  | <b>Channel Type</b><br>12.2k RMC      |  |        |
| Generator Info     |                                                                                                                          |  |  |        |                           |  | <b>Paging Service</b><br>RB Test Mode |  |        |
|                    | <b>Cell Parameters</b>                                                                                                   |  |  |        |                           |  | <b>Value</b>                          |  |        |
| Uplink Parameters  | <b>BCCH Update Page</b>                                                                                                  |  |  |        |                           |  | <b>Inhibit</b>                        |  |        |
|                    | <b>PS Domain Information</b>                                                                                             |  |  |        |                           |  | <b>Absent</b>                         |  |        |
| UE Rep Neas        | <b>MCC (Mobile Country Code)</b>                                                                                         |  |  |        |                           |  | <b>1</b>                              |  |        |
|                    | <b>MNC (Mobile Network Code)</b>                                                                                         |  |  |        |                           |  | <b>1</b>                              |  |        |
|                    | <b>MNC (Mobile Network Code) Length</b>                                                                                  |  |  |        |                           |  | <b>Auto</b>                           |  |        |
| Close Menu         | <b>LAC (Local Area Code)</b>                                                                                             |  |  |        |                           |  | <b>1</b>                              |  |        |
|                    | <b>RAC (Routing Area Code)</b>                                                                                           |  |  |        |                           |  | <b>1</b>                              |  |        |
|                    | <b>Cell Identity</b>                                                                                                     |  |  |        |                           |  | <b>1</b>                              |  |        |
|                    | <b>Active Cell</b><br><b>Idle</b>                                                                                        |  |  |        | <b>Sys Type: UTRA FDD</b> |  |                                       |  |        |
| 2 of 5             |                                                                                                                          |  |  | IntRef |                           |  |                                       |  | 1 of 3 |

Figure 5: Cell Parameters

7. On the same page under Uplink Parameters the maximum Uplink Transmit Power is made 24dBm. Uplink DPCH Bc/Bd Control Settings are kept at Auto for RMC. These vary according for HSDPA and HSUPA as per the values given in KDB 941225 D01 SAR test for 3G devices v02.

| Call Setup Screen  |                                                                         |  |  |        |  |  |                            |  |  |
|--------------------|-------------------------------------------------------------------------|--|--|--------|--|--|----------------------------|--|--|
| Call Control       | Active Cell Operating Mode                                              |  |  |        |  |  | Call Parm                  |  |  |
| Additional Screens | UE Information                                                          |  |  |        |  |  | Cell Power                 |  |  |
|                    | IMSI:<br>IMEI(SV): (--)<br>Power Class:                                 |  |  |        |  |  | -35.00                     |  |  |
| Cell Parameters    | UE Expected Open Loop Transmit Power                                    |  |  |        |  |  | dBm/3.84 MHz               |  |  |
|                    | Initial PRACH TX Power: -60.00 dBm<br>Initial DPCH TX Power: -11.55 dBm |  |  |        |  |  | Channel Type               |  |  |
| Generator Info     | Uplink Parameters                                                       |  |  |        |  |  | 12.2k RMC                  |  |  |
|                    | Value                                                                   |  |  |        |  |  | Paging Service             |  |  |
| Uplink Parameters  | PRACH Preambles                                                         |  |  |        |  |  | RB Test Mode               |  |  |
|                    | PRACH Ramping Cycles(MMAX)                                              |  |  |        |  |  | HSPA Parameters            |  |  |
| UE Rep Neas        | Available Subchannels (Bit Mask)                                        |  |  |        |  |  | 34,121 Preset Call Configs |  |  |
|                    | Uplink DPCH Scrambling Code                                             |  |  |        |  |  | Channel (UARFCN) Parm      |  |  |
| Close Menu         | Uplink DPCH Bc/Bd Control                                               |  |  |        |  |  | 1 of 3                     |  |  |
|                    | Manual Uplink DPCH Bc                                                   |  |  |        |  |  |                            |  |  |
|                    | Manual Uplink DPCH Bd                                                   |  |  |        |  |  |                            |  |  |
|                    | Maximum Uplink Transmit Power Level                                     |  |  |        |  |  |                            |  |  |
|                    | Active Cell                                                             |  |  |        |  |  | Sys Type: UTRA FDD         |  |  |
|                    | Idle                                                                    |  |  |        |  |  |                            |  |  |
| 2 of 5             |                                                                         |  |  | IntRef |  |  |                            |  |  |

Figure 6: Uplink Parameters

8. On page 3 under Call Control, for the RB Test Mode setup, Asymmetric RMC CN Domain is ensured to be in CS Domain for RMC call.

| Call Setup Screen |                                                                         |  |  |        |  |  |                            |  |  |
|-------------------|-------------------------------------------------------------------------|--|--|--------|--|--|----------------------------|--|--|
| Call Control      | Active Cell Operating Mode                                              |  |  |        |  |  | Call Parm                  |  |  |
|                   | UE Information                                                          |  |  |        |  |  | Cell Power                 |  |  |
|                   | IMSI:<br>IMEI(SV): (--)<br>Power Class:                                 |  |  |        |  |  | -35.00                     |  |  |
|                   | UE Expected Open Loop Transmit Power                                    |  |  |        |  |  | dBm/3.84 MHz               |  |  |
|                   | Initial PRACH TX Power: -60.00 dBm<br>Initial DPCH TX Power: -11.55 dBm |  |  |        |  |  | Channel Type               |  |  |
|                   | RB Test Mode Settings                                                   |  |  |        |  |  | 12.2k RMC                  |  |  |
|                   | Value                                                                   |  |  |        |  |  | Paging Service             |  |  |
|                   | Uplink DTCH RMC CRC Presence                                            |  |  |        |  |  | RB Test Mode               |  |  |
|                   | Uplink Dummy DCCH Data                                                  |  |  |        |  |  | HSPA Parameters            |  |  |
| Voice Call        | UE Loopback Type                                                        |  |  |        |  |  | 34,121 Preset Call Configs |  |  |
|                   | Asymmetric RMC Loopback Messaging                                       |  |  |        |  |  | Channel (UARFCN) Parm      |  |  |
|                   | Asymmetric RMC CN Domain                                                |  |  |        |  |  | 1 of 3                     |  |  |
|                   |                                                                         |  |  |        |  |  |                            |  |  |
| Close Menu        |                                                                         |  |  |        |  |  |                            |  |  |
|                   |                                                                         |  |  |        |  |  |                            |  |  |
|                   | Active Cell                                                             |  |  |        |  |  | Sys Type: UTRA FDD         |  |  |
|                   | Idle                                                                    |  |  |        |  |  |                            |  |  |
| 3 of 5            |                                                                         |  |  | IntRef |  |  |                            |  |  |

Figure 7: RB Test Mode Settings

9. After the test set has been set up, change the cell Operating Mode to Active Cell and originate a call.

## 8.2. Steps for 12.2k RMC + HSDPA/HSUPA

1. Most of the steps to be followed are as in the case of 12.2k RMC however, some of the settings need to be changed. The Channel Type is changed to 12.2k RMC+HSDPA or 12.2k RMC+HSUPA as required.



- For HSDPA and HSUPA, the settings remain same as the case for RMC but the PS Domain is made Present for Cell Parameters (Figure 5) and RB Test Mode Setup (Figure 7).
- The following tables taken from FCC 3G SAR procedures (KDB 941225 D01 SAR test for 3G devices v02) below were applied to the Agilent 8960 series 10 wireless communications test set which supports 3G / HSDPA release 5 / HSUPA release 6.

**Sub-test 1 Setup for Release 5 HSDPA**

| Sub-test | $\beta_c$            | $\beta_d$            | $B_d$<br>(SF) | $\beta_c \beta_d$    | $\beta_{hs}^{(1)}$ | SM (dB) <sup>(2)</sup> |
|----------|----------------------|----------------------|---------------|----------------------|--------------------|------------------------|
| 1        | 2/15                 | 15/15                | 64            | 2/15                 | 4/15               | 0.0                    |
| 2        | 12/15 <sup>(3)</sup> | 15/15 <sup>(3)</sup> | 64            | 12/15 <sup>(3)</sup> | 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:  $\Delta_{ACK}$ ,  $\Delta_{NACK}$  and  $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$

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

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

**Sub-test 5 Setup for Release 6 HSUPA**

| Sub-test | $\beta_c$            | $\beta_d$            | $B_d$<br>(SF) | $\beta_c \beta_d$    | $\beta_{hs}^{(1)}$ | $B_{oc}$ | $B_{od}$                             | $B_{od}$<br>(SF) | $B_{od}$<br>(codes) | CM <sup>(2)</sup><br>(dB) | MPR<br>(dB) | AG <sup>(4)</sup><br>Index | E-TFCI |
|----------|----------------------|----------------------|---------------|----------------------|--------------------|----------|--------------------------------------|------------------|---------------------|---------------------------|-------------|----------------------------|--------|
| 1        | 11/15 <sup>(3)</sup> | 15/15 <sup>(3)</sup> | 64            | 11/15 <sup>(3)</sup> | 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    | $B_{dl1}: 47/15$<br>$B_{dl2}: 47/15$ | 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 <sup>(4)</sup> | 15/15 <sup>(4)</sup> | 64            | 15/15 <sup>(4)</sup> | 24/15              | 24/15    | 134/15                               | 4                | 1                   | 1.0                       | 0.0         | 21                         | 81     |

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

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

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

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

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

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

| Call Setup Screen |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |  |                    |  |  |  |                                 |  |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--------------------|--|--|--|---------------------------------|--|
| Call Control      | Active Cell Operating Mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |                    |  |  |  | Serving Grant                   |  |
| Operating Mode    | <div>UE Information</div> <div>           INSI:<br/>           INEI(SV): (---)<br/>           Power Class:         </div> <div>UE Expected Open Loop Transmit Power</div> <div>           Initial PRACH TX Power: -60.00 dBm<br/>           Initial DPCCH TX Power: -11.55 dBm         </div> <div>Call Processing Status</div> <div>           Current Service Type: None<br/>           MM Status: Abs Single Shot AG<br/>           GMM State: Index 18: (95/15)^2<br/>           Current DPCCH: Index 19: (106/15)^2<br/>           HSUPA In: Index 20: (119/15)^2<br/>           Rep EDCH Cat: Index 21: (134/15)^2<br/>           Last received: Index 22: (150/15)^2<br/>           Throughput: Index 23: (168/15)^2<br/>           Acks Transmitted:         </div> |  |  |                    |  |  |  | AG Mode                         |  |
| Active Cell       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |  |                    |  |  |  | Single Shot                     |  |
|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |  |                    |  |  |  | Single Shot AG                  |  |
|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |  |                    |  |  |  | 21: (134/15)^2                  |  |
| Originate Call    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |  |                    |  |  |  | Send Single Shot Absolute Grant |  |
|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |  |                    |  |  |  | RB Setup AG                     |  |
| Paging Parameters |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |  |                    |  |  |  | 33: 4(134/15)^2                 |  |
|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |  |                    |  |  |  | AG Pattern Parameters           |  |
| Handovers         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |  |                    |  |  |  | Return                          |  |
| Clear UE Info     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |  |                    |  |  |  |                                 |  |
|                   | Active Cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |  | Sys Type: UTRA FDD |  |  |  |                                 |  |
|                   | Idle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |                    |  |  |  |                                 |  |
| 1 of 5            | IntRef                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |  |                    |  |  |  | 1 of 2                          |  |

| Call Setup Screen  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |                    |  |  |  |                            |  |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--------------------|--|--|--|----------------------------|--|
| Call Control       | Active Cell Operating Mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |  |                    |  |  |  | Call Params                |  |
| Additional Screens | <div>UE Information</div> <div>           INSI:<br/>           INEI(SV): (---)<br/>           Power Class:         </div> <div>UE Expected Open Loop Transmit Power</div> <div>           Initial PRACH TX Power: -60.00 dBm<br/>           Initial DPCCH TX Power: -22.58 dBm         </div> <div>Uplink Parameters</div> <div>           PRACH Preambles: 64<br/>           PRACH Ramping Cycles(MAX): 2<br/>           Available Subchannels (Bit Mask): 000000000001<br/>           Uplink DPCCH Scrambling Code: 0<br/>           Uplink DPCCH Bc/Bd Control: Manual<br/>           Manual Uplink DPCCH Bc: 2<br/>           Manual Uplink DPCCH Bd: 15<br/>           Maximum Uplink Transmit Power Level: 24 dBm         </div> |  |  |                    |  |  |  | Cell Power                 |  |
| Cell Parameters    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |                    |  |  |  | -35.00                     |  |
|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |                    |  |  |  | dBm/3.84 MHz               |  |
| Generator Info     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |                    |  |  |  | Channel Type               |  |
|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |                    |  |  |  | 12.2k + HSDPA              |  |
| Uplink Parameters  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |                    |  |  |  | Paging Service             |  |
|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |                    |  |  |  | RB Test Mode               |  |
| UE Rep Params      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |                    |  |  |  | HSPA Parameters            |  |
|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |                    |  |  |  | 34.121 Preset Call Configs |  |
| Close Menu         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |                    |  |  |  | Channel (UARFCN) Params    |  |
|                    | Cell Off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |  | Sys Type: UTRA FDD |  |  |  |                            |  |
| 2 of 5             | IntRef                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |  |                    |  |  |  | 1 of 3                     |  |

4. For HSUPA the Serving Grant Parameter needs to be set. On the Call Setup Screen, under Call Parameters, press the button against HSPA Parameters. On the new screen that pops up, press HSUPA and Serving Grant. The Serving Grant is set according to the table for HSPA in the KDB (AG Index). The correct AG is chosen from the Single Shot AG. Consecutively, the RG Setup AG is set as per the ratio set on Single Shot AG.

| Call Setup Screen   |                                                                                                                                                                                                                |  |             |        |                                                                                                                                                                                                            |                    |  |                                 |        |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--|---------------------------------|--------|
| Call Control        | Active Cell Operating Mode                                                                                                                                                                                     |  |             |        |                                                                                                                                                                                                            |                    |  | Serving Grant                   |        |
| Operating Mode      | <div>UE Information</div> <div>           IMSI:<br/>           IMEI(SV):<br/>           Power Class:         </div>                                                                                            |  |             |        |                                                                                                                                                                                                            |                    |  | AG Mode                         |        |
| Active Cell         |                                                                                                                                                                                                                |  |             |        |                                                                                                                                                                                                            |                    |  | Single Shot                     |        |
|                     |                                                                                                                                                                                                                |  |             |        |                                                                                                                                                                                                            |                    |  | Single Shot AG                  |        |
|                     |                                                                                                                                                                                                                |  |             |        |                                                                                                                                                                                                            |                    |  | 31: 6(168/15)^2                 |        |
|                     | <div>UE Expected Open Loop Transmit Power</div> <div>           Initial PRACH TX Power: -60.00 dBm<br/>           Initial DPCH TX Power: -11.55 dBm         </div>                                             |  |             |        |                                                                                                                                                                                                            |                    |  |                                 |        |
| Originate Call      |                                                                                                                                                                                                                |  |             |        |                                                                                                                                                                                                            |                    |  | Send Single Shot Absolute Grant |        |
|                     | <div>Call Processing Status</div> <div>           Current Service Type: None<br/>           MM Status: None<br/>           GMM State: None<br/>           Current DPCH Offset: 0 chips         </div>          |  |             |        |                                                                                                                                                                                                            |                    |  | RB Setup AG                     |        |
| Paging Parameters ▾ |                                                                                                                                                                                                                |  |             |        |                                                                                                                                                                                                            |                    |  | 37: 6(168/15)^2                 |        |
|                     |                                                                                                                                                                                                                |  |             |        |                                                                                                                                                                                                            |                    |  |                                 |        |
| Handovers           | <div>HSUPA Information</div> <div>           Rep EDCH Cat/Ext: Unrep/Unrep<br/>           Last received E-TFCI: ----<br/>           Throughput: ---- kbps<br/>           Acks Transmitted: ----         </div> |  |             |        | <div>HSDPA Information</div> <div>           Cur UE HS-DSCH Cat: ----<br/>           Block Error Ratio: ---- %<br/>           Throughput: ---- kbps<br/>           Blocks Transmitted: ----         </div> |                    |  | AG Pattern Parameters ▾         |        |
| Clear UE Info       |                                                                                                                                                                                                                |  |             |        |                                                                                                                                                                                                            |                    |  | Return                          |        |
|                     |                                                                                                                                                                                                                |  | Active Cell |        |                                                                                                                                                                                                            | Sys Type: UTRA FDD |  |                                 |        |
|                     |                                                                                                                                                                                                                |  | Idle        |        |                                                                                                                                                                                                            |                    |  |                                 |        |
| 1 of 5              |                                                                                                                                                                                                                |  |             | IntRef |                                                                                                                                                                                                            |                    |  |                                 | 1 of 2 |

Figure 8: Serving Grant Example

## Appendix 9. CAT24 Test set-up

### A.9.1. Establish a DC-HSDPA RB Test Mode Connection with DL 42Mbps

RB (radio bearer) test mode is a special, defined-channel configuration designed to simplify the testing environment. Since W-CDMA is an incredibly flexible system, defined radio bearers, called RMCs (reference measurement channels) simplify which configurations need to be tested for RF performance.

RB test mode provides the ability to set up a standalone channel configuration originating from the 8960 via call-processing. The direction of the call setup is always from the 8960 to the UE. This is the typical RF test that is used throughout the lifecycle of a device's design process. Using RB test mode is attractive to device manufacturers because it does not require extra software to control the UE. In this type of call connection, the radio bearer (within the 8960) essentially controls the UE during test.

#### A.9.1.1 Configure 8960

1. Press **Operating Mode (F1)**, select **Cell Off** operating mode.

| Call Setup Screen        |                                             |  |                       |                               |                           |  |                                   |  |  |
|--------------------------|---------------------------------------------|--|-----------------------|-------------------------------|---------------------------|--|-----------------------------------|--|--|
| <b>Call Control</b>      | <b>Active Cell Operating Mode</b>           |  |                       |                               |                           |  | <b>Call Parm</b>                  |  |  |
| <b>Operating Mode</b>    | <b>UE Information</b>                       |  |                       |                               |                           |  | <b>Cell Power</b>                 |  |  |
| <b>Cell Off</b>          | INIS:                                       |  | Power Class:          |                               | Detected PRACH Sig: ----  |  | -75.00                            |  |  |
|                          | INEI(SV):                                   |  | (---)                 |                               |                           |  | dBm/3.84 MHz                      |  |  |
|                          | Called Party Number:                        |  |                       |                               |                           |  | <b>Channel Type</b>               |  |  |
|                          | <b>UE Expected Open Loop Transmit Power</b> |  |                       |                               |                           |  | 12.2k RNC                         |  |  |
|                          | Init PRACH TX Pow: -22.70 dBm               |  |                       | Init DPCCH TX Pow: -11.55 dBm |                           |  | <b>Paging Service</b>             |  |  |
| <b>Originate Call</b>    | <b>Current Service Type</b>                 |  |                       |                               |                           |  | RB Test Mode                      |  |  |
|                          | None                                        |  |                       |                               |                           |  |                                   |  |  |
| <b>Paging Parameters</b> | <b>Call Processing Status</b>               |  |                       |                               |                           |  | <b>HSPA Parameters</b>            |  |  |
|                          | RRC State:                                  |  | <b>Operating Mode</b> |                               | Per State: Off            |  |                                   |  |  |
|                          | MM Status:                                  |  | Active Cell           |                               | Node State: Off           |  |                                   |  |  |
|                          | GMM State:                                  |  | FDD Test              |                               | Offset: 0 chips           |  |                                   |  |  |
| <b>Handovers</b>         | <b>HSPA In</b>                              |  | <b>Cell Off</b>       |                               | <b>Information</b>        |  | <b>34.121 Preset Call Configs</b> |  |  |
|                          | UE Rep E-DCH                                |  |                       |                               | SCH Cat: 14               |  |                                   |  |  |
|                          | Last Happy Bit                              |  |                       |                               | Ratio: ---- %             |  |                                   |  |  |
| <b>Clear UE Info</b>     | Throughput:                                 |  |                       |                               | kbps                      |  | <b>Channel (UARFCN) Parm</b>      |  |  |
|                          | ACKs Transmitt                              |  |                       |                               | mitted: ----              |  |                                   |  |  |
|                          | <b>Background</b>                           |  | <b>Cell Off</b>       |                               | <b>Sys Type: UTRA FDD</b> |  |                                   |  |  |
|                          |                                             |  |                       |                               | <b>Logging: No Conn</b>   |  |                                   |  |  |
| <b>1 of 5</b>            |                                             |  | <b>IntRef</b>         |                               | <b>Offset</b>             |  | <b>1 of 3</b>                     |  |  |

2. Set the **Channel type** to **12.2k + HSDPA**.

3. Set the downlink channel code. In order to achieve the 42 Mbps maximum downlink throughput, you have to set up 15 HS-PDSCHs which will possibly cause a code collision.

To easily configure the downlink 15 HS-PDSCH for a maximum throughput, use the code preset to configure the code channels for both the serving cell and the secondary serving cell.

Select **Call Control 2 of 6** -> **Generator Info (F3)** -> **Downlink Channel Configs (F4)** -> **DL Chan code Preset Configs (F5)**, choose **34.121 Tables E.6.2.3,4 (HSDPA 15 HS-PDSCHs)**.

Set the **Conn S-CCPCH Cfg** to **Off** to avoid the code collision.

To see the channel code allocation for the serving cell and the secondary serving cell, select **Additional Gen Info Screens (F1)** -> **DC-HSDPA DL Code Chan Info (F4)**.

| Call Setup Screen           |                                                   |                           |         |         |                       |           |            |                    |         |
|-----------------------------|---------------------------------------------------|---------------------------|---------|---------|-----------------------|-----------|------------|--------------------|---------|
| Screen Ctrl                 | DC-HSDPA DL Code Channel Information              |                           |         |         |                       |           |            | Call Parms         |         |
| DL Code Channel Info Screen | Serving Cell Primary Scrambling Code: 0           |                           |         |         |                       |           |            | Cell Power         |         |
|                             | Secondary Serving Cell Primary Scrambling Code: 2 |                           |         |         |                       |           |            | -75.00             |         |
| Generated Power Info Screen | Channel                                           | Serving Cell DL Chan Info |         |         | Sec Cell DL Chan Info |           |            | dBm/3.84 MHz       |         |
|                             | Channel                                           | Level (dB)                | Current | Desired | OVSF                  | Chan Code | Level (dB) | Current            | Desired |
| OCNS Info Screen            | CPICH:                                            | Off                       | -3.30   | 256     | 0                     | Off       | Off        | 256                | 0       |
|                             | P-CCPCH/SCH:                                      | Off                       | -5.30   | 256     | 1                     | Off       | Off        | 256                | 1       |
| DC-HSDPA DL Code Chan Info  | S-CCPCH:                                          | Off                       | -10.30  | 64      | 2                     | Off       | Off        | 256                | 2       |
|                             | PICH:                                             | Off                       | -8.30   | 256     | 2                     | Off       | Off        | 256                | 2       |
| Return                      | AICh:                                             | Off                       | -9.30   | 256     | 3                     | Off       | Off        | 256                | 3       |
|                             | (F-)DPCH:                                         | Off                       | Off     | 128     | 7                     | Off       | Off        | 128                | 7       |
| Return                      | E-AGCH:                                           | Off                       | Off     | 256     | 42                    | Off       | Off        | 256                | 42      |
|                             | E-HICH:                                           | Off                       | Off     | 128     | 22                    | Off       | Off        | 128                | 22      |
| Return                      | E-AGCH:                                           | Off                       | Off     | 128     | 22                    | Off       | Off        | 128                | 22      |
|                             | HS-SCCH 1:                                        | Off                       | Off     | 128     | 2                     | Off       | Off        | 128                | 2       |
| Return                      | HS-SCCH 2:                                        | Off                       | Off     | 128     | 3                     | Off       | Off        | 128                | 3       |
|                             | HS-SCCH 3:                                        | Off                       | Off     | 128     | 3                     | Off       | Off        | 128                | 3       |
| Return                      | HS-SCCH 4:                                        | Off                       | Off     | 128     | 3                     | Off       | Off        | 128                | 3       |
|                             | HS-PDSCHs:                                        | Off                       | Off     | 16      | 1-15                  | Off       | Off        | 16                 | 1-15    |
| Return                      | Comp OCNS:                                        | Off                       | Off     | 128     | WCDMA                 | Off       | Off        | 128                | HSDPA   |
|                             | Cell Off                                          |                           |         |         |                       |           |            | Sys Type: UTRA FDD |         |
| Return                      |                                                   |                           |         |         |                       |           |            | Logging: No Conn   |         |
|                             | DBUS-INT                                          |                           | IntRef  | Offset  |                       |           |            | 1 of 3             |         |

#### 4. Configure DC-HSDPA parameters to achieve the Maximum Downlink Data Rate:

First of all, you must know the maximum data rate of the device under test according to its category and the key factors to achieve the maximum data rate. In this lab, you use a category 24 device whose maximum data rate is 42 Mbps when DC-HSDPA is configured.

##### a) Set up the HSDPA RB Test Mode Parameters

Path: Call Parms 1 of 3 -> HSPA Parameters (F10) -> HSDPA Parameters (F10) -> HSDPA RB Test Mode Setup (F8) -> HSDPA RB Test Mode Settings (F8).

- RB Test HS-DSCH Configuration Type = User Defined
- RB Test User Defined HS-DSCH MAC entity = MAC-ehs (Note 1)
- RB Test User Defined HARQ Processes = 6 (Note 2)
- RB Test User Defined UE IR Buffer Allocation = Implicit
- RB Test User Defined DC-HSDPA State = On
- RB Test Mode DC-HSDPA DPCH Loopback State = On

**Note 1:** DC-HSDPA requires MAC-ehs. You must set the MAC entity to MAC-ehs before setting the DC-HSDPA state)

**Note 2:** To restrict the amount of soft memory that can be allocated to a single HARQ process (and thus limit the amount of data that has to be transferred across the UE's internal data buses) the specifications require that when setting up a DC-HSDPA call with the implicit HARQ memory partitioning the network must configure 6, 7, or 8 HARQ processes per cell. For the explicit HARQ memory partitioning case, the number of HARQ processes can be 1 through 8, but the memory size for each HARQ process cannot be greater than the number of soft channel bits for an implicit memory partitioning with 6 processes per HS-DSCH channel.

##### b) Set up the Serving Cell Parameters

Path: F10

- RB Test User Defined 64QAM State = On
- RB Test User Defined Active HS-PDSCHs = 15
- RB Test User Def Transport Block Size Index = 62
- RB Test User Defined Modulation Type = 64QAM
- RB Test User Defined Inter-TTI Interval = 1

##### c) Set up the Secondary Serving Cell Parameters

Path: F11

- RB Test User Def Secondary Cell 64QAM State = On
- RBTM User Def Sec Cell Active HS-PDSCHs = 15

- RBTM User Def Sec Cell TB Size Index = 62
- RBTM User Def Sec Cell Modulation Type = 64QAM
- RBTM User Def Sec Cell Inter-TTI Interval = 1

d) Set the **Secondary Serving Cell Power (dBm/3.84 MHz)** to **-25 dBm/3.84 MHz**

Path: Return (**F12**) -> HSDPA Parms 2 of 2 -> Secondary Serv Cell Parms (**F10**)

e) Set the **Cell power** to **-25 dBm/3.84 MHz**

Path: CALL SETUP -> **F7**

f) Set the HSDPA Conn DL Channel Levels

Path: CALL SETUP -> Call Control 2 of 6 -> Generator Info (**F3**) -> Downlink Channel Levels (**F3**) -> Connected DL Channel Levels (**F3**) -> **F3**

- HSDPA Cell 1 Connected CPICH Level = -8
- HSDPA Cell 1 Connected P-CCPCH/SCH Level = -20
- HSDPA Cell 1 Connected PICH Level = off
- HSDPA Cell 1 Connected DPCH Level = -30
- HSDPA Cell 1 Connected HS-PDSCH Level (Sum) = -1 dBm
- HSDPA Cell 1 Connected HS-SCCH 1 to 4 Level = -20,-20,off,off
- Secondary Cell HSDPA Conn CPICH Level = -8
- Secondary Cell HSDPA Conn PCCPCH/SCH Level = -20
- Secondary Cell HSDPA Conn PICH Level = off
- Secondary Cell HSDPA Conn HS-PDSCHs Lvl (Sum) = -1 dBm
- Secondary Cell HSDPA Conn HS-SCCH 1 to 4 Level = -20,-20,off,off

5. Set the **Operating Mode (F1)** to **Active Cell**.

#### A.9.1.2. Power on the UE and Set up the Connection

Power on the device, and then wait for it to camp on 8960. You should be able to see the following screen.

| Call Setup Screen |                                                                                                                                                                                                                                                            |        |        |  |  |  |                            |  |  |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|--|--|--|----------------------------|--|--|
| Call Control      | Active Cell Operating Mode                                                                                                                                                                                                                                 |        |        |  |  |  | Call Parms                 |  |  |
| Operating Mode    | UE Information                                                                                                                                                                                                                                             |        |        |  |  |  | Cell Power                 |  |  |
| Active Cell       | IMEI: 001012345678901    Power Class: 4<br>IMEI(SV):352358040214948(---)    Detected PRACH Sig: 0                                                                                                                                                          |        |        |  |  |  | -25.00                     |  |  |
|                   | Called Party Number:                                                                                                                                                                                                                                       |        |        |  |  |  | dBm/3.84 MHz               |  |  |
|                   | UE Expected Open Loop Transmit Power                                                                                                                                                                                                                       |        |        |  |  |  | Channel Type               |  |  |
|                   | Init PRACH TX Pow: -60.00 dBm    Init DPCH TX Pow: -11.55 dBm                                                                                                                                                                                              |        |        |  |  |  | 12.2k + HSDPA              |  |  |
| Originate Call    | Current Service Type                                                                                                                                                                                                                                       |        |        |  |  |  | Paging Service             |  |  |
|                   | None                                                                                                                                                                                                                                                       |        |        |  |  |  | RB Test Mode               |  |  |
| Paging Parameters | Call Processing Status                                                                                                                                                                                                                                     |        |        |  |  |  | HSPA Parameters            |  |  |
|                   | RRC State: Idle    Soft Handover State: Off<br>MM Status: None    Compressed Mode State: Off<br>GMM State: Attached    Cur DPCH Offset: 0 chips                                                                                                            |        |        |  |  |  |                            |  |  |
| Handovers         | HSDPA Information    HSDPA Information<br>Rep EDCH Cat/Ext: 6/Unrep    Cur UE HS-DSCH Cat: 24<br>Last Happy Bit: None    Block Error Ratio: ---- %<br>Throughput: ---- kbps    Throughput: ---- kbps<br>ACKs Transmitted: ----    Blocks Transmitted: ---- |        |        |  |  |  | 34.121 Preset Call Configs |  |  |
| Clear UE Info     |                                                                                                                                                                                                                                                            |        |        |  |  |  | Channel (UARFCN) Parms     |  |  |
|                   | Active Cell                                                                                                                                                                                                                                                |        |        |  |  |  | Sys Type: UTRA FDD         |  |  |
|                   | Idle                                                                                                                                                                                                                                                       |        |        |  |  |  | Logging: No Conn           |  |  |
| 1 of 6            | DBUS-INT                                                                                                                                                                                                                                                   | IntRef | Offset |  |  |  | 1 of 3                     |  |  |

The UE reports HSDPA categories to 8960, which represents its maximum data rate capability. DC-HSDPA requires UE categories 21 to 24.

The GMM state must be **Attached**, otherwise you cannot establish a HSDPA connection.

2. Originate the Connection

a) Now, Originate an RB Test call with DC-HSDPA by pressing „**F3**“ from the main Call Setup screen.

b) After a connection is set up, you will be able to see the throughput from the HSDPA Information window. Press the **Measurement Reset** key to reset the calculation.

| Call Setup Screen |                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  |                                                                                                                  |  |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|------------------------------------------------------------------------------------------------------------------|--|
| Call Control      | Active Cell Operating Mode                                                                                                                                                                                                                                                                                                                                                                                                 |  |  |  |  |  |  | Call Params                                                                                                      |  |
| Operating Mode    | <div>UE Information</div> <div>           INSI: 001012345678901    Power Class: 4<br/>           INEI(SV):352358040214948(--)    Detected PRACH Sig: 0         </div> <div>Called Party Number:</div> <div>           UE Expected Open Loop Transmit Power<br/>           Init PRACH TX Pou: -60.00 dBm    Init DPCCH TX Pou: -11.55 dBm         </div> <div>Current Service Type</div> <div>RB Test Mode - HSDPA</div>    |  |  |  |  |  |  | <div>Cell Power</div> <div>-25.00</div> <div>dBm/3.84 MHz</div> <div>Channel Type</div> <div>12.2k + HSDPA</div> |  |
| Active Cell       |                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  | Paging Service                                                                                                   |  |
|                   |                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  | RB Test Mode                                                                                                     |  |
| End Call          |                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  |                                                                                                                  |  |
|                   |                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  |                                                                                                                  |  |
| Paging Parameters | <div>Call Processing Status</div> <div>           RRC State: CELL_DCH    Soft Handover State: Off<br/>           MN Status: None    Compressed Mode State: Off<br/>           GMM State: Attached    Cur DPCH Offset: 0 chips         </div>                                                                                                                                                                               |  |  |  |  |  |  | HSPA Parameters                                                                                                  |  |
|                   |                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  |                                                                                                                  |  |
| Handovers         | <div>HSUPA Information</div> <div>           Rep EDCH Cat/Ext: 6/Unrep<br/>           Last Happy Bit: None<br/>           Throughput: ---- kbps<br/>           ACKs Transmitted: ----         </div> <div> <div>HSUPA Information</div> <div>           Cur UE HS-DSCH Cat: 24<br/>           Block Error Ratio: 0 %<br/>           Throughput: 42101 kbps<br/>           Blocks Transmitted: 115500         </div> </div> |  |  |  |  |  |  | 34.121 Preset Call Configs                                                                                       |  |
|                   |                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  |                                                                                                                  |  |
| Clear UE Info     |                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  | Channel (UARFCN) Params                                                                                          |  |
|                   |                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  |                                                                                                                  |  |
|                   | <div>Active Cell</div> <div>Connected</div> <div>           Sys Type: UTRA FDD<br/>           Logging: No Conn         </div>                                                                                                                                                                                                                                                                                              |  |  |  |  |  |  |                                                                                                                  |  |
| 1 of 6            | <div>DBUS-INT</div> <div>IntRef</div> <div>Offset</div>                                                                                                                                                                                                                                                                                                                                                                    |  |  |  |  |  |  | 1 of 3                                                                                                           |  |

Now you can also check the connected DC-HSDPA downlink channel levels.

Path: CALL SETUP->Call Control 2 of 6 -> Generator Info (F3) -> Additional Gen Info Screens (F1) ->DC-HSDPA DL Code Chan Info (F4).

| Call Setup Screen           |                                                                                                                               |            |         |         |       |           |            |                                                                 |         |       |           |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------|------------|---------|---------|-------|-----------|------------|-----------------------------------------------------------------|---------|-------|-----------|
| Screen Ctrl                 | DC-HSDPA DL Code Channel Information                                                                                          |            |         |         |       |           |            | Call Params                                                     |         |       |           |
| DL Code Channel Info Screen | <div>Serving Cell Primary Scrambling Code: 0</div> <div>Secondary Serving Cell Primary Scrambling Code: 2</div>               |            |         |         |       |           |            | <div>Cell Power</div> <div>-25.00</div> <div>dBm/3.84 MHz</div> |         |       |           |
|                             | <div>Channel</div> <div>Serving Cell DL Chan Info</div> <div>Sec Cell DL Chan Info</div>                                      |            |         |         |       |           |            | <div>Channel Type</div> <div>12.2k + HSDPA</div>                |         |       |           |
| Generated Power Info Screen | Channel                                                                                                                       | Level (dB) | Current | Desired | OVSF  | Chan Code | Level (dB) | Current                                                         | Desired | OVSF  | Chan Code |
|                             | CPICH:                                                                                                                        | -8.00      | -8.00   | 256     | 0     | 0         | -8.00      | -8.00                                                           | 256     | 0     | 0         |
|                             | P-CCPCH/SCH:                                                                                                                  | -20.00     | -20.00  | 256     | 1     | 1         | -20.00     | -20.00                                                          | 256     | 1     | 1         |
| OCNS Info Screen            | S-CCPCH:                                                                                                                      | Off        | Off     | 64      | 2     | 2         | Off        | Off                                                             | 256     | 2     | 2         |
|                             | PICH:                                                                                                                         | Off        | Off     | 256     | 2     | 2         | Off        | Off                                                             | 256     | 2     | 2         |
|                             | AICH:                                                                                                                         |            |         |         |       |           |            |                                                                 |         |       |           |
| DC-HSDPA DL Code Chan Info  | (F-)DPCH:                                                                                                                     | -30.00     | -30.00  | 128     | 7     | 7         |            |                                                                 |         |       |           |
|                             | E-AGCH:                                                                                                                       | Off        | Off     | 256     | 42    | 42        |            |                                                                 |         |       |           |
|                             | E-HICH:                                                                                                                       | Off        | Off     | 128     | 22    | 22        |            |                                                                 |         |       |           |
|                             | E-RGCH:                                                                                                                       | Off        | Off     | 128     | 22    | 22        |            |                                                                 |         |       |           |
|                             | HS-SCCH 1:                                                                                                                    | -20.00     | -20.00  | 128     | 2     | 2         | -20.00     | -20.00                                                          | 128     | 2     | 2         |
|                             | HS-SCCH 2:                                                                                                                    | -20.00     | -20.00  | 128     | 3     | 3         | -20.00     | -20.00                                                          | 128     | 3     | 3         |
|                             | HS-SCCH 3:                                                                                                                    |            |         |         |       |           |            |                                                                 |         |       |           |
|                             | HS-SCCH 4:                                                                                                                    |            |         |         |       |           |            |                                                                 |         |       |           |
|                             | HS-PDSCHs:                                                                                                                    | -1.00      | -1.00   | 16      | 1-15  | 1-15      | -1.00      | -1.00                                                           | 16      | 1-15  | 1-15      |
| Return                      | Comp OCNS:                                                                                                                    | -17.91     | -17.91  | 128     | HSDPA | HSDPA     | -17.65     | -17.65                                                          | 128     | HSDPA | HSDPA     |
|                             | <div>Active Cell</div> <div>Connected</div> <div>           Sys Type: UTRA FDD<br/>           Logging: No Conn         </div> |            |         |         |       |           |            |                                                                 |         |       |           |
|                             | <div>DBUS-INT</div> <div>IntRef</div> <div>Offset</div>                                                                       |            |         |         |       |           |            | 1 of 3                                                          |         |       |           |

### A.9.2. Activate/ Deactivate the Secondary Serving Cell

Once a DC-HSDPA connection is established, 8960 can control the UE to start or stop monitoring the secondary serving cell using HS-SCCH orders. The HS-SCCH orders can be sent on either the serving or secondary serving cell.



**A.9.2.1 Deactivate the Secondary Serving Cell**

## 1. Setup the Deactivate Secondary Cell Parameter

Path: CALL SETUP->Call Control 6 of 6 -> HS-SCCH Order (F3) -> Deactivate Secondary Cell (F2)

In this lab you set it to deactivate the secondary serving cell from the serving cell.

- Deactivate Secondary Cell HS-SCCH Order From = Serving Cell

Press **Send Deactivate Secondary Cell (F5)**

Press Measurement Reset key and see the throughput has dropped to 21 Mbps or so, like the figure below:

| Call Setup Screen |                                                                                                                                                                                                                                            |        |        |  |  |  |                            |  |  |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|--|--|--|----------------------------|--|--|
| Call Control      | Active Cell Operating Mode                                                                                                                                                                                                                 |        |        |  |  |  | Call Parm                  |  |  |
| Operating Mode    | UE Information                                                                                                                                                                                                                             |        |        |  |  |  | Cell Power                 |  |  |
| Active Cell       | IMSI: 001012345678901 Power Class: 4<br>IMEI(SV):352358040214948(--) Detected PRACH Sig: 0                                                                                                                                                 |        |        |  |  |  | -25.00                     |  |  |
|                   | Called Party Number:                                                                                                                                                                                                                       |        |        |  |  |  | dBm/3.84 MHz               |  |  |
|                   | UE Expected Open Loop Transmit Power                                                                                                                                                                                                       |        |        |  |  |  | Channel Type               |  |  |
|                   | Init PRACH TX Pou: -60.00 dBm Init DPCH TX Pou: -11.55 dBm                                                                                                                                                                                 |        |        |  |  |  | 12.2k + HSDPA              |  |  |
| End Call          | Current Service Type                                                                                                                                                                                                                       |        |        |  |  |  | Paging Service             |  |  |
|                   | RB Test Mode - HSDPA                                                                                                                                                                                                                       |        |        |  |  |  | RB Test Mode               |  |  |
| Paging Parameters | Call Processing Status                                                                                                                                                                                                                     |        |        |  |  |  | HSPA Parameters            |  |  |
|                   | RRC State: CELL_DCH Soft Handover State: Off<br>MM Status: None Compressed Mode State: Off<br>GMM State: Attached Cur DPCH Offset: 0 chips                                                                                                 |        |        |  |  |  | 34.121 Preset Call Configs |  |  |
| Handovers         | HSDPA Information HSDPA Information<br>Rep EDCH Cat/Ext: 6/Unrep Cur UE HS-DSCH Cat: 24<br>Last Happy Bit: None Block Error Ratio: 0 %<br>Throughput: ---- kbps Throughput: 21088 kbps<br>ACKs Transmitted: ---- Blocks Transmitted: 35000 |        |        |  |  |  | Channel (UARFCN) Parm      |  |  |
| Clear UE Info     | Active Cell Connected Sys Type: UTRA FDD<br>Logging: No Conn                                                                                                                                                                               |        |        |  |  |  |                            |  |  |
| 1 of 6            | DBUS-INT                                                                                                                                                                                                                                   | IntRef | Offset |  |  |  | 1 of 3                     |  |  |

You can see more on the DC-HSDPA Information screen.

Path: CALL SETUP->Call Control 2 of 6 -> Additional Screens (F1) -> HSDPA Information (F4) -> DC-HSDPA Information (F4).

| Call Setup Screen            |                                                            |          |             |        |        |                    |  |  |                            |
|------------------------------|------------------------------------------------------------|----------|-------------|--------|--------|--------------------|--|--|----------------------------|
| Screen Ctrl                  | DC-HSDPA Information                                       |          |             |        |        |                    |  |  | Call Parm                  |
| Channel (UARFCN) Info        | Secondary Serving Cell Status                              |          |             |        |        |                    |  |  | Cell Power                 |
|                              | Current Secondary Serving Cell Status: Configured-Inactive |          |             |        |        |                    |  |  | -25.00                     |
| HSPA Information             | DC-HSDPA Information                                       |          |             |        |        |                    |  |  | dBm/3.84 MHz               |
|                              |                                                            |          |             |        |        |                    |  |  | Channel Type               |
|                              |                                                            |          |             |        |        |                    |  |  | 12.2k + HSDPA              |
| E-TFCI Recording Information |                                                            |          |             |        |        |                    |  |  | Paging Service             |
|                              |                                                            |          |             |        |        |                    |  |  | RB Test Mode               |
| HSDPA Information            |                                                            |          |             |        |        |                    |  |  |                            |
|                              |                                                            |          |             |        |        |                    |  |  | HSPA Parameters            |
| Clear UE Info                |                                                            |          |             |        |        |                    |  |  |                            |
|                              |                                                            |          |             |        |        |                    |  |  | 34.121 Preset Call Configs |
|                              |                                                            |          |             |        |        |                    |  |  |                            |
| Return                       |                                                            |          |             |        |        |                    |  |  | Channel (UARFCN) Parm      |
|                              |                                                            |          | Active Cell |        |        | Sys Type: UTRA FDD |  |  |                            |
|                              |                                                            |          | Connected   |        |        | Logging: No Conn   |  |  |                            |
| 1 of 2                       |                                                            | DBUS-INT |             | IntRef | Offset |                    |  |  | 1 of 3                     |
|                              |                                                            |          |             |        |        |                    |  |  |                            |

**A.9.2.2 Re-activate the Secondary Serving Cell**



Now you can activate the secondary serving cell by pressing back to the HS-SCCH Order menu.

Path: CALL SETUP->Call Control 6 of 6 -> HS-SCCH Order (F3)

Press **Send Activate Secondary Cell (F1)**.

Press the Measurement Reset key and see the throughput has increased to 42 Mbps. When you look at the DC-HSDPA Information screen, you can see the secondary serving cell is set up again.

| Call Setup Screen            |                                                          |  |  |             |  |                    |                            |  |  |
|------------------------------|----------------------------------------------------------|--|--|-------------|--|--------------------|----------------------------|--|--|
| Screen Ctrl                  | DC-HSDPA Information                                     |  |  |             |  |                    | Call Params                |  |  |
| Channel (UARFCN) Info        | Secondary Serving Cell Status                            |  |  |             |  |                    | Cell Power                 |  |  |
|                              | Current Secondary Serving Cell Status: Configured-Active |  |  |             |  |                    | -25.00                     |  |  |
| HSPA Information             | DC-HSDPA Information                                     |  |  |             |  |                    | dBm/3.84 MHz               |  |  |
|                              |                                                          |  |  |             |  |                    | Channel Type               |  |  |
| E-TFCI Recording Information |                                                          |  |  |             |  |                    | 12.2k + HSDPA              |  |  |
|                              |                                                          |  |  |             |  |                    | Paging Service             |  |  |
| HSDPA Information            |                                                          |  |  |             |  |                    | RB Test Mode               |  |  |
|                              |                                                          |  |  |             |  |                    | HSPA Parameters            |  |  |
| Clear UE Info                |                                                          |  |  |             |  |                    | 34.121 Preset Call Configs |  |  |
|                              |                                                          |  |  |             |  |                    | Channel (UARFCN) Params    |  |  |
| Return                       |                                                          |  |  |             |  |                    | 1 of 3                     |  |  |
|                              |                                                          |  |  |             |  |                    |                            |  |  |
| 1 of 2                       |                                                          |  |  |             |  |                    |                            |  |  |
|                              |                                                          |  |  |             |  |                    |                            |  |  |
|                              |                                                          |  |  | Active Cell |  | Sys Type: UTRA FDD |                            |  |  |
|                              |                                                          |  |  | Connected   |  | Logging: No Conn   |                            |  |  |
|                              |                                                          |  |  | DBUS-INT    |  | IntRef Offset      |                            |  |  |

When DC-HSDPA is active, the HBLER measurement can also be used to perform receiver testing. 3GPP TS 34.121-1 sections 6.3C and 6.3D are supported and can be set up and tested as described in an appendix in another document, DC-HSDPA User Guide.