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Appendix 5. Validation of System

Prior to the assessment, the system was verified in the flat region of the phantom, 900 MHz dipole was used. A forward power of 250 mW was applied to the 900 MHz dipole and the system was verified to a tolerance of $\pm 5\%$ for the dipoles.

The applicable verification normalised to 1 Watt.

System Check 900 Head

Date: 14/08/2013

Validation Dipole and Serial Number: D900V2 SN: 185

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
				ε _r	41.50	40.79	-1.71 5.	5.00
Head	900	24.0 °C	22.7 ºC	σ	0.97	0.97	-0.31	5.00
Tieau	900	24.0 C	22.1	1g SAR	10.80	11.00	1.85	5.00
				10g SAR	6.97	7.12	2.15	5.00

System Check 900 Body

Date: 14/08/2013

Validation Dipole and Serial Number: D900V2 SN: 185

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body				ε _r	55.00	53.06		5.00
	900	24.0 °C	21.7 ºC	σ	1.05	1.04		5.00
	900	24.0 0 21.7 0	21.7 C	1g SAR	10.70	10.72	0.19	5.00
				10g SAR	6.95	7.00	0.72	5.00

Date: 19/08/2013

Validation Dipole and Serial Number: D900V2 SN: 185

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body				ε _r	55.00	52.64		5.00
	900	24.0 °C	23.0 °C	σ	1.05	1.05		5.00
	900	24.0 C	23.0 C	1g SAR	10.70	11.08	3.55	5.00
				10g SAR	6.95	7.24	4.17	5.00

Date: 20/08/2013

Validation Dipole and Serial Number: D900V2 SN: 185

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
				ε _r	55.00	52.64	-4.29 5.	5.00
Body	900	24.0 °C	23.0 °C	σ	1.05	1.05	0.14	5.00
Dody	900	24.0 C	23.0 C	1g SAR	10.70	10.40	-2.80	5.00
				10g SAR	6.95	6.80	-2.16	5.00

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Appendix 6. 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	Frequency 850/900 MHz					
(% by weight)	Head	Body				
De-Ionized Water	52.87	71.30				
Polysorbate 20	46.10	28.00				
Salt	1.03	0.70				

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Appendix 7. DASY4 System Details

A.7.1. DASY4 SAR Measurement System

UL. SAR measurement facility utilises the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY4 system is comprised of the robot controller, computer, near-field probe, probe alignment sensor, and the SAM phantom containing brain or muscle equivalent material. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). A cell controller system contains the power supply, robot controller; teach pendant (Joystick), and remote control. This is used to drive the robot motors. The Staubli robot is connected to the cell controller to allow software manipulation of the robot. The data acquisition electronics (DAE) performs signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection etc. The DAE is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card. The DAE3 utilises a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching mulitplexer, a fast 16bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe-mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

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A.7.2. DASY4 SAR System Specification	ons						
Robot System							
Positioner:	Stäubli Unimation Corp. Robot Model: RX90L						
Repeatability:	0.025 mm						
No. of Axis:	6						
Serial Number:	F01/5J86A1/A/01						
Reach:	1185 mm						
Payload:	3.5 kg						
Control Unit:	CS7						
Programming Language:	V+						
Data Acquisition Electronic (DAE) System							
Serial Number:	DAE3 SN:450						
PC Controller							
PC:	Dell Precision 340						
Operating System:	Windows 2000						
Data Card:	DASY Measurement Server						
Serial Number:	1080						
Data Converter							
Features:	Signal Amplifier, multiplexer, A/D converted and control logic.						
Software:	DASY4 Software						
Connecting Lines:	Optical downlink for data and status info. Optical uplink for commands and clock.						
PC Interface Card							
Function:	24 bit (64 MHz) DSP for real time processing Link to DAE3 16 nit A/D converter for surface detection system serial link to robot direct emergency stop output for robot.						

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DASY4 SAR System Specifications (Conti	nued)
E-Field Probe	
Model:	ET3DV6
Serial No:	1529
Construction:	Triangular core
Frequency:	10 MHz to 2.55GHz
Linearity:	±0.2 dB (30 MHz to 2.55GHz)
Probe Length (mm):	337
Probe Diameter (mm):	10
Tip Length (mm):	10
Tip Diameter (mm):	6.8
Sensor X Offset (mm):	2.7
Sensor Y Offset (mm):	2.7
Sensor Z Offset (mm):	2.7
Phantom	
Phantom:	SAM Phantom, Eli Phantom
Shell Material:	Fibreglass
Thickness:	2.0 ±0.1 mm

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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.

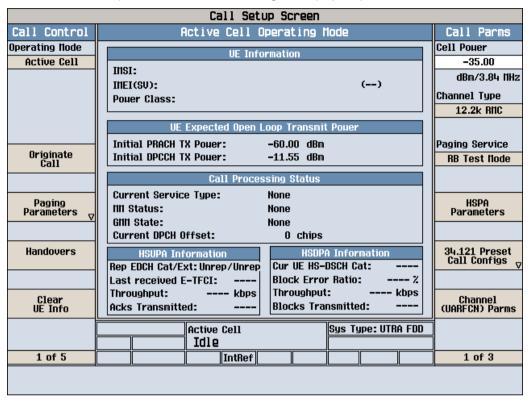


Figure 1: 3G Call Setup Screen

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.
- The Channel Type is selected to 12.2k RMC. Press button against Channel (VARFCN) Parms 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 Parms 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.

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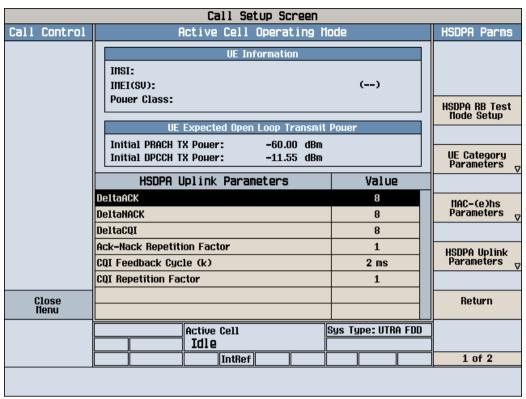


Figure 2: HSDPA Parameters

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.

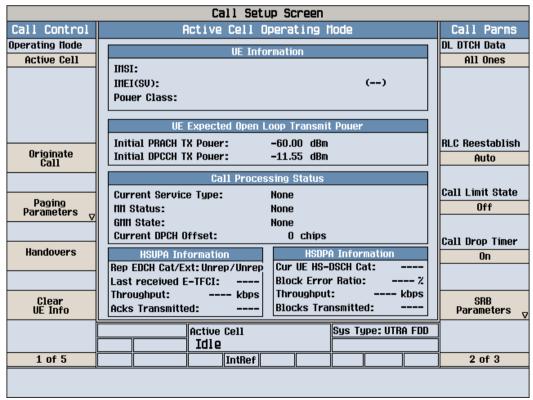


Figure 3: DL DTCH Data Parms

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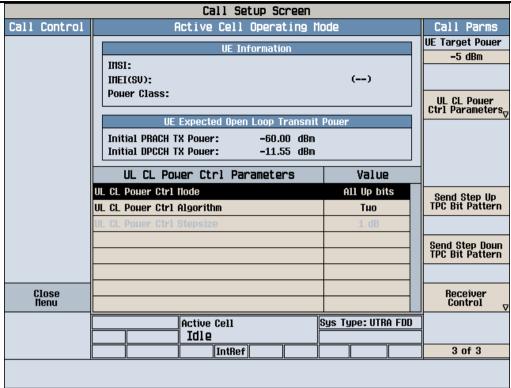


Figure 4: UL CL Power Ctrl Parameters

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.

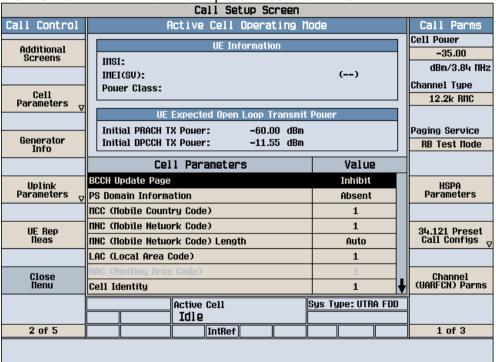


Figure 5: Cell Parameters

 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.

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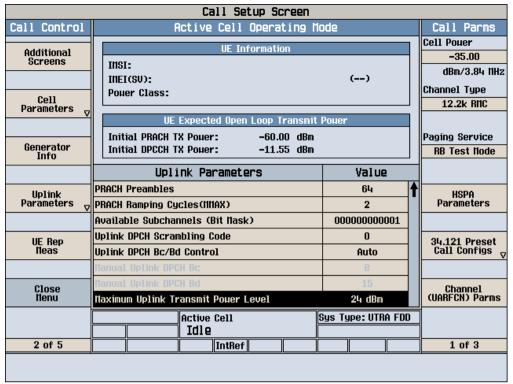


Figure 6: Uplink Parameters

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.

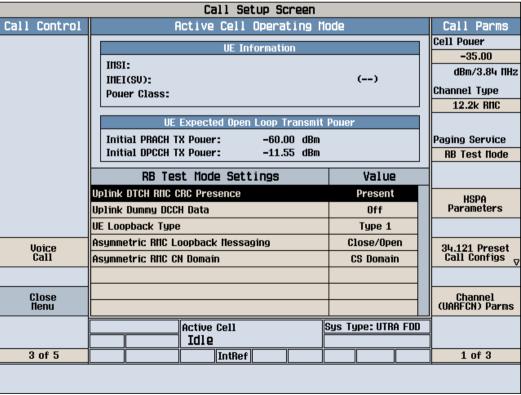


Figure 7: RB Test Mode Settings

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

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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).
- 3. 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	β _c	β_d	B _d (SF)	$\beta_{c/}\beta_d$	${\beta_{hs}}^{(1)}$	SM (dB) ⁽²⁾					
1	2/15	15/15	64	2/15	4/15	0.0					
2	12/15 ⁽³⁾	15/15 ⁽³⁾	64	12/15 ⁽³⁾	24/15	1.0					
3	15/15	8/15	64	15/8	30/15	1.5					
4	15/15	4/15	64	15/4	30/15	1.5					

Note 1: $\Delta_{ACK_1} \Delta_{NACK}$ 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 $\beta_{c/}$ β_d = 12/15, B_{hs}/β_c = 24/15

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

Sub	Sub-test 5 Setup for Release 6 HSUPA												
Sub- test	βο	β _d	B _d (SF)	βα/βα	β _{hs} ⁽¹⁾	B _{oc}	B _{od}	B _{od} (SF)	B _{od} (codes)	CM ⁽²⁾ (dB)	MPR (dB)	AG ⁽⁴⁾ Index	E- TFCI
1	11/15 ⁽³⁾	15/15 ⁽³⁾	64	11/15 ⁽³⁾	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	31/15	B _{al1} : 47/15 B _{al2} : 47/15	4	1	2.0	1.0	15	92
4	2/15	15/15	64	2/15	2/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 ⁽⁴⁾	15/15 ⁽⁴⁾	64	15/15 ⁽⁴⁾	24/15	24/15	134/15	4	1	1.0	0.0	21	81

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

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

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

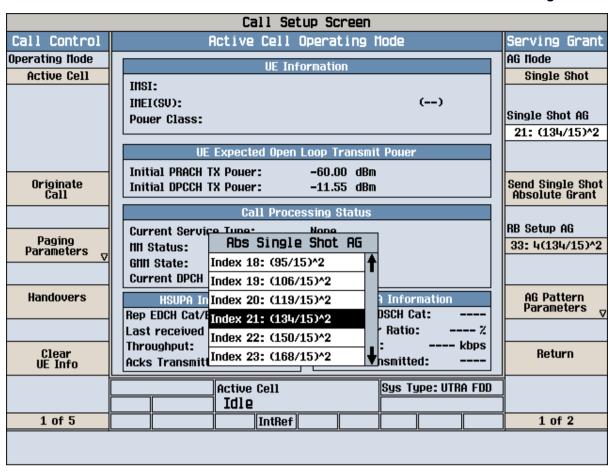
Note 4: For subtest 5 the $\beta_{c'}$ β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 14/15 and β_d = 15/15.

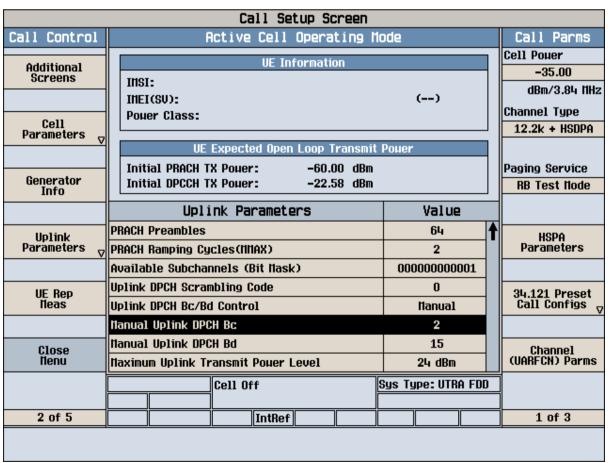
Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Tavle 5.1g.

Note 6: Bod can not be set directly; it is set by Absolute Grant Value.

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 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

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.

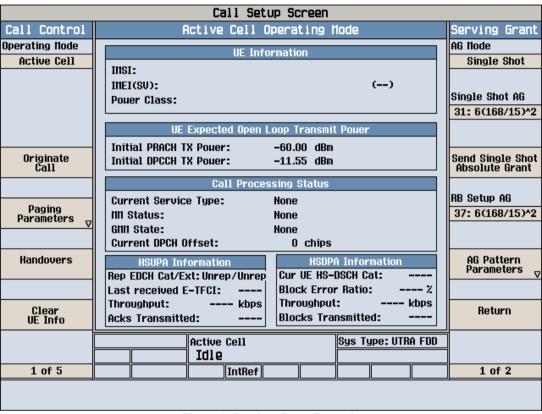


Figure 8: Serving Grant Example

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