

Appendix 5. System Check

Prior to the assessment, the system was verified in the flat region of the phantom, 900 MHz, 1900 MHz, 2450 MHz and 5.0 GHz dipoles were used. A forward power of 250 mW was applied to the 900 MHz, 1900 MHz, 2450 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 900 MHz, 1900 MHz, 2450 MHz and 5.0 GHz dipoles.

The applicable verification normalised to 1 Watt.

System Check 900 Head

Date: 17/07/2013

Validation Dipole and Serial Number: D900V2; SN: 035

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Head	900	24.0 °C	23.9 °C	ϵ_r	41.50	39.91	-3.83	5.00
				σ	0.97	0.96	-1.39	5.00
				1g SAR	10.50	10.24	-2.48	5.00
				10g SAR	6.74	6.68	-0.89	5.00
Channel Number	Channel Description	Frequency (MHz)	Parameters					
128	Low	824.2	ϵ_r		40.40	0.90		
			σ					
190	Middle	836.6	ϵ_r		40.30	0.91		
			σ					
251	High	848.8	ϵ_r		40.20	0.92		
			σ					
Channel Number	Channel Description	Frequency (MHz)	Parameters					
4132	Low	826.4	ϵ_r		40.40	0.91		
			σ					
4183	Middle	836.6	ϵ_r		40.30	0.91		
			σ					
4233	High	846.6	ϵ_r		40.30	0.92		
			σ					

System Check 900 Body

Date: 17/07/2013

Validation Dipole and Serial Number: D900V2; SN: 035

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	900	24.0 °C	22.9 °C	ϵ_r	55.00	53.29	-3.11	5.00
				σ	1.05	1.04	-1.43	5.00
				1g SAR	10.80	10.72	-0.74	5.00
				10g SAR	6.96	6.96	0.00	5.00

Channel Number	Channel Description	Frequency	Parameters	
		(MHz)		
4132	Low	826.4	ϵ_r	53.50
			σ	1.00
4183	Middle	836.6	ϵ_r	53.50
			σ	1.00
4233	High	846.6	ϵ_r	53.50
			σ	1.01

Date: 23/07/2013

Validation Dipole and Serial Number: D900V2; SN: 035

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	900	24.0 °C	22.1 °C	ϵ_r	55.00	53.05	-3.55	5.00
				σ	1.05	1.05	0.43	5.00
				1g SAR	10.80	10.48	-2.96	5.00
				10g SAR	6.96	6.84	-1.72	5.00

Channel Number	Channel Description	Frequency	Parameters	
		(MHz)		
128	Low	824.2	ϵ_r	53.40
			σ	1.01
190	Middle	836.6	ϵ_r	53.30
			σ	1.01
251	High	848.8	ϵ_r	53.30
			σ	1.02

System Check 900 Body (Continued):**Date: 24/07/2013****Validation Dipole and Serial Number: D900V2; SN: 035**

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	900	24.0 °C	22.1 °C	ϵ_r	55.00	53.48	-2.76	5.00
				σ	1.05	1.05	-0.43	5.00
				1g SAR	10.80	10.72	-0.74	5.00
				10g SAR	6.96	7.00	0.57	5.00
Channel Number		Channel Description		Frequency		Parameters		
				(MHz)				
128		Low		824.2		ϵ_r	53.40	
						σ	1.01	
190		Middle		836.6		ϵ_r	53.30	
						σ	1.01	
251		High		848.8		ϵ_r	53.30	
						σ	1.02	

System Check 1900 Head**Date: 16/07/2013****Validation Dipole and Serial Number: D1900V2; SN: 537**

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Head	1900	24.0 °C	24.0 °C	ϵ_r	40.00	39.10	-2.25	5.00
				σ	1.40	1.45	3.29	5.00
				1g SAR	39.40	39.72	0.81	5.00
				10g SAR	20.70	21.32	3.00	5.00
Channel Number		Channel Description		Frequency		Parameters		
				(MHz)				
9262		Low		1852.4		ϵ_r	39.30	
						σ	1.40	
9400		Middle		1880		ϵ_r	39.20	
						σ	1.43	
9538		High		1907.6		ϵ_r	39.10	
						σ	1.45	

Date: 25/07/2013**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	24.0°C	ϵ_r	40.00	39.98	-0.05	5.00
				σ	1.40	1.40	-0.25	5.00
				1g SAR	39.40	41.20	4.57	5.00
				10g SAR	20.70	21.60	4.35	5.00
Channel Number		Channel Description		Frequency		Parameters		
				(MHz)				
512		Low		1850.2		ϵ_r	39.10	
						σ	1.35	
661		Middle		1880		ϵ_r	39.00	
						σ	1.38	
810		High		1909.8		ϵ_r	38.80	
						σ	1.41	

System Check 1900 Body

Date: 24/07/2013

Validation Dipole and Serial Number: D1900V2; SN: 537

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	1900	24.0 °C	23.9 °C	ϵ_r	53.30	51.73	-2.95	5.00
				σ	1.52	1.52	0.00	5.00
				1g SAR	40.50	41.20	1.73	5.00
				10g SAR	21.40	21.48	0.37	5.00
Channel Number		Channel Description		Frequency		Parameters		
				(MHz)				
9262		Low		1852.4		ϵ_r	51.90	
						σ	1.48	
9400		Middle		1880		ϵ_r	51.80	
						σ	1.50	
9538		High		1907.6		ϵ_r	51.90	
						σ	1.48	

Date: 25/07/2013

Validation Dipole and Serial Number: D1900V2; SN: 537

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	1900	24.0 °C	23.9 °C	ϵ_r	53.30	51.73	-2.95	5.00
				σ	1.52	1.52	0.00	5.00
				1g SAR	40.50	41.20	1.73	5.00
				10g SAR	21.40	21.48	0.37	5.00
Channel Number		Channel Description		Frequency		Parameters		
				(MHz)				
512		Low		1850.2		ϵ_r	51.90	
						σ	1.48	
661		Middle		1880		ϵ_r	51.80	
						σ	1.50	
810		High		1909.8		ϵ_r	51.70	
						σ	1.53	

System Check 2450 Head**Date: 24/07/2013****Validation Dipole and Serial Number: D2440V2; SN: 701**

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Head	2450	24.0 °C	23.0 °C	ϵ_r	39.20	39.93	1.86	5.00
				σ	1.80	1.85	2.69	5.00
				1g SAR	52.30	52.40	0.19	5.00
				10g SAR	24.20	24.20	0.00	5.00
Channel Number		Channel Description		Frequency		Parameters		
				(MHz)				
1	Low	2412	ϵ_r	40.05				
			σ	1.81				
6	Middle	2437	ϵ_r	39.97				
			σ	1.84				
11	High	2462	ϵ_r	39.88				
			σ	1.87				

System Check 2450 Body**Date: 25/07/2013****Validation Dipole and Serial Number: D2440V2; SN: 701**

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	2450	24.0 °C	23.0 °C	ϵ_r	52.70	50.80	-3.61	5.00
				σ	1.95	1.99	2.26	5.00
				1g SAR	52.00	52.40	0.77	5.00
				10g SAR	24.10	23.80	-1.24	5.00

Channel Number	Channel Description	Frequency	Parameters	
		(MHz)		
1	Low	2412	ϵ_r	50.96
			σ	1.95
6	Middle	2437	ϵ_r	50.86
			σ	1.98
11	High	2462	ϵ_r	50.78
			σ	2.01

Date: 26/07/2013**Validation Dipole and Serial Number: D2440V2; SN: 701**

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	2450	24.0 °C	23.0 °C	ϵ_r	52.70	50.80	-3.61	5.00
				σ	1.95	1.99	2.26	5.00
				1g SAR	52.00	50.00	-3.85	5.00
				10g SAR	24.10	23.00	-4.56	5.00

Channel Number	Channel Description	Frequency	Parameters	
		(MHz)		
1	Low	2412	ϵ_r	50.96
			σ	1.95
6	Middle	2437	ϵ_r	50.86
			σ	1.98
11	High	2462	ϵ_r	50.78
			σ	2.01

System Check 5200Head**Date: 31/07/2013****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	ϵ_r	36.00	35.93	-0.19	5.00
				σ	4.66	4.69	0.68	5.00
				1g SAR	78.10	77.20	-1.15	5.00
				10g SAR	23.00	21.80	-2.24	5.00
Channel Number		Channel Description		Frequency		Parameters		
				(MHz)				
48		Middle		5240		ϵ_r	35.89	
						σ	4.74	

Date: 01/08/2013**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	ϵ_r	36.00	35.93	-0.19	5.00
				σ	4.66	4.69	0.68	5.00
				1g SAR	78.10	76.90	-1.54	5.00
				10g SAR	23.00	21.90	-1.79	5.00
Channel Number		Channel Description		Frequency		Parameters		
				(MHz)				
38	Middle	5190	ϵ_r	35.96				
			σ	4.69				
42	Middle	5210	ϵ_r	35.99				
			σ	4.71				
48	Middle	5240	ϵ_r	35.89				
			σ	4.74				
52	Middle	5260	ϵ_r	35.86				
			σ	4.76				
54	Middle	5270	ϵ_r	38.85				
			σ	4.77				
58	Middle	5290	ϵ_r	35.83				
			σ	4.79				

System Check 5500 Head**Date: 01/08/2013****Validation Dipole and Serial Number: D5GHzV2; SN: 1016**

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Head	5500	24.0 °C	23.5 °C	ϵ_r	35.60	35.53	-0.20	5.00
				σ	4.96	5.01	0.91	5.00
				1g SAR	82.50	81.00	-1.82	5.00
				10g SAR	23.50	22.80	-2.98	5.00
Channel Number		Channel Description		Frequency		Parameters		
				(MHz)				
102		Middle		5510		ϵ_r	35.50	
						σ	5.02	
104		Middle		5520		ϵ_r	35.47	
						σ	5.04	
106		Middle		5530		ϵ_r	35.45	
						σ	5.05	

System Check 5800Head**Date: 01/08/2013****Validation Dipole and Serial Number: D5GHzV2; SN: 1016**

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Head	5800	24.0 °C	23.5 °C	ϵ_r	35.30	35.03	-0.76	5.00
				σ	5.27	5.35	1.50	5.00
				1g SAR	77.00	78.30	1.69	5.00
				10g SAR	21.90	22.00	0.46	5.00
Channel Number		Channel Description		Frequency		Parameters		
				(MHz)				
155		Middle		5775		ϵ_r	35.07	
						σ	5.32	
157		Middle		5785		ϵ_r	35.47	
						σ	5.04	
159		Middle		5795		ϵ_r	35.04	
						σ	5.35	

System Check 5200 Body**Date: 02/08/2013****Validation Dipole and Serial Number: D5GHzV2; SN: 1016**

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	5200	24.0 °C	23.0 °C	ϵ_r	49.00	48.75	-0.51	5.00
				σ	5.30	5.38	0.57	5.00
				1g SAR	75.10	74.50	-0.80	5.00
				10g SAR	21.10	21.20	0.47	5.00
Channel Number	Channel Description	Frequency (MHz)	Parameters					
38	Middle	5190	ϵ_r			48.70		
			σ			5.33		
42	Middle	5210	ϵ_r			48.68		
			σ			5.35		
48	Middle	5240	ϵ_r			48.46		
			σ			5.37		
52	Middle	5260	ϵ_r			48.41		
			σ			5.41		
54	Middle	5270	ϵ_r			48.44		
			σ			5.44		
58	Middle	5290	ϵ_r			48.49		
			σ			5.50		

System Check 5500 Body**Date: 02/08/2013****Validation Dipole and Serial Number: D5GHzV2; SN: 1016**

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	5500	24.0 °C	23.0 °C	ϵ_r	48.60	48.00	-1.23	5.00
				σ	5.65	5.69	0.70	5.00
				1g SAR	79.00	76.90	0.76	5.00
				10g SAR	22.00	22.30	1.36	5.00
Channel Number	Channel Description	Frequency (MHz)	Parameters					
102	Middle	5510	ϵ_r			48.04		
			σ			5.72		
104	Middle	5520	ϵ_r			48.08		
			σ			5.74		
106	Middle	5530	ϵ_r			48.11		
			σ			5.75		

System Check 5800 Body**Date: 02/08/2013****Validation Dipole and Serial Number: D5GHzV2; SN: 1016**

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	5800	24.0 °C	23.0 °C	ϵ_r	48.20	47.86	-0.71	5.00
				σ	6.00	6.08	1.29	5.00
				1g SAR	74.40	73.00	-1.88	5.00
				10g SAR	20.60	20.40	-0.97	5.00
Channel Number		Channel Description		Frequency		Parameters		
				(MHz)				
155		Middle		5775		ϵ_r	47.81	
						σ	6.07	
157		Middle		5785		ϵ_r	47.83	
						σ	6.08	
159		Middle		5795		ϵ_r	47.85	
						σ	6.08	

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

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

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

Note(s):

1. 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 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 multiplexer, a fast 16-bit 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.

A.7.2. DASY4 SAR System Specifications**Robot System**

Positioner:	Stäubli Unimation Corp. Robot Model: RX90L
Repeatability:	0.025 mm
No. of Axis:	6
Serial Number:	F00/SD89A1/A/01
Reach:	1185 mm
Payload:	3.5 kg
Control Unit:	CS7
Programming Language:	V+

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+

Robot System

Positioner:	Stäubli Unimation Corp. Robot Model: TX60L
Repeatability:	±0.030 mm
No. of Axis:	6
Serial Number:	F12/5MZ7A1/A/01
Reach:	920 mm
Payload:	2.0 kg
Control Unit:	CS8C
Programming Language:	V+

Data Acquisition Electronic (DAE) System

Serial Number:	DAE3 SN:417
Serial Number:	DAE3 SN:431
Serial Number:	DAE3 SN:450

DASY4 SAR System Specifications (Continued)**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:	DASY 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 bit A/D converter for surface detection system serial link to robot direct emergency stop output for robot.
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E-Field Probe

Model:	EX3DV4
Serial No:	3814
Construction:	Triangular core
Frequency:	10 MHz to >6 GHz
Linearity:	±0.2 dB (30 MHz to 6 GHz)
Probe Length (mm):	337
Probe Diameter (mm):	10
Tip Length (mm):	9
Tip Diameter (mm):	2.5
Sensor X Offset (mm):	1
Sensor Y Offset (mm):	1
Sensor Z Offset (mm):	1

E-Field Probe

Model:	ES3DV3
Serial No:	3304
Construction:	Triangular core
Frequency:	10 MHz to >4 GHz
Linearity:	±0.2 dB (30 MHz to 4 GHz)
Probe Length (mm):	337
Probe Diameter (mm):	10
Tip Length (mm):	10
Tip Diameter (mm):	4
Sensor X Offset (mm):	2
Sensor Y Offset (mm):	2
Sensor Z Offset (mm):	2

DASY4 SAR System Specifications (Continued)**E-Field Probe**

Model:	ET3DV6
Serial No:	1528;1529; 1586
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

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 IMSI: IMEI(SV): (---) Power Class:						Cell Power	
Active Cell								-35.00	
								dBm/3.84 MHz	
								Channel Type	
								12.2k RMC	
Originate Call		UE Expected Open Loop Transmit Power Initial PRACH TX Power: -60.00 dBm Initial DPCH TX Power: -11.55 dBm						Paging Service	
								RB Test Mode	
		Call Processing Status Current Service Type: None RIM Status: None GMM State: None Current DPCH Offset: 0 chips							
Paging Parameters								HSPA Parameters	
Handovers		HSUPA Information Rep EDCH Cat/Ext: Unrep/Unrep Last received E-TFCI: ---- Throughput: ---- kbps Acks Transmitted: ----			HSDPA Information Cur UE HS-DSCH Cat: ---- Block Error Ratio: ---- % Throughput: ---- kbps Blocks Transmitted: ----			34,121 Preset Call Configs	
Clear UE Info								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 Parm																
	UE Information INSI: INEI(SU): (---) Power Class:						HSDPA RB Test Node Setup																
	UE Expected Open Loop Transmit Power Initial PRACH TX Power: -60.00 dBm Initial DPCCH TX Power: -11.55 dBm																						
	HSDPA Uplink Parameters <table border="1"> <thead> <tr> <th></th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>DeltaACK</td> <td>8</td> </tr> <tr> <td>DeltaNACK</td> <td>8</td> </tr> <tr> <td>DeltaCQI</td> <td>8</td> </tr> <tr> <td>Ack-Nack Repetition Factor</td> <td>1</td> </tr> <tr> <td>CQI Feedback Cycle (k)</td> <td>2 ms</td> </tr> <tr> <td>CQI Repetition Factor</td> <td>1</td> </tr> </tbody> </table>							Value	DeltaACK	8	DeltaNACK	8	DeltaCQI	8	Ack-Nack Repetition Factor	1	CQI Feedback Cycle (k)	2 ms	CQI Repetition Factor	1	UE Category Parameters MAC-(e)hs Parameters HSDPA Uplink Parameters		
		Value																					
	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 Idle				Sys Type: UTRA FDD																		
				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 Parm		
Operating Mode	UE Information INSI: INEI(SU): (---) Power Class:						DL DTCH Data		
Active Cell							All Ones		
Originate Call	UE Expected Open Loop Transmit Power Initial PRACH TX Power: -60.00 dBm Initial DPCCH TX Power: -11.55 dBm						RLC Reestablish		
							Auto		
Paging Parameters	Call Processing Status Current Service Type: None MM Status: None GMM State: None Current DPCCH Offset: 0 chips						Call Limit State		
							Off		
Handovers	HSUPA Information Rep EDCH Cat/Ext: Unrep/Unrep Last received E-TFCI: ---- Throughput: ---- kbps Acks Transmitted: ----						Call Drop Timer		
							On		
Clear UE Info	HSUPA Information Cur UE HS-DSCH Cat: ---- Block Error Ratio: ---- % Throughput: ---- kbps Blocks Transmitted: ----						SRB Parameters		
	Active Cell Idle				Sys Type: UTRA FDD				
1 of 5				IntRef					2 of 3

Figure 3: DL DTCH Data Params

Call Setup Screen									
Call Control		Active Cell Operating Mode						Call Params	
		UE Information IMSI: IMEI(SV): Power Class:						UE Target Power -5 dBm	
		UE Expected Open Loop Transmit Power Initial PRACH TX Power: -60.00 dBm Initial DPCCH TX Power: -11.55 dBm						UL CL Power Ctrl Parameters	
		UL CL Power Ctrl Mode				Value		Send Step Up TPC Bit Pattern	
		UL CL Power Ctrl Algorithm				All Up bits			
		UL CL Power Ctrl Stepsize				Two			
						1 dB		Send Step Down TPC Bit Pattern	
								Receiver Control	
Close Menu									
		Active Cell				Sys Type: UTRA FDD			
		Idle							
		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 Cell Parameters Generator Info Uplink Parameters UE Rep Meas Close Menu		UE Information IMSI: IMEI(SV): Power Class:						Cell Power -35.00	
		UE Expected Open Loop Transmit Power Initial PRACH TX Power: -60.00 dBm Initial DPCCH TX Power: -11.55 dBm						dBm/3.84 MHz	
		Cell Parameters				Value		Channel Type 12.2k RMC	
		BCCH Update Page				Inhibit		Paging Service RB Test Mode	
		PS Domain Information				Absent			
		MCC (Mobile Country Code)				1			
		MNC (Mobile Network Code)				1		HSPA Parameters	
		MNC (Mobile Network Code) Length				Auto			
		LAC (Local Area Code)				1			
		RAC (Routing Area Code)				1		34.121 Preset Call Configs	
Cell Identity				1					
		Active Cell				Sys Type: UTRA FDD			
		Idle							
		IntRef						1 of 3	
2 of 5									

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 Params		
Additional Screens	UE Information						Cell Power		
	INSI: INEI(SU): (--) Power Class:						-35.00		
Cell Parameters	UE Expected Open Loop Transmit Power						dBm/3.84 MHz		
	Initial PRACH TX Power: -60.00 dBm Initial DPCCH TX Power: -11.55 dBm						Channel Type		
Generator Info	Uplink Parameters						12.2k RNC		
	Value						Paging Service		
Uplink Parameters	PRACH Preambles						RB Test Mode		
	64						HSPA Parameters		
	PRACH Ramping Cycles(MAX)						34.121 Preset Call Configs		
	2								
	Available Subchannels (Bit Mask)								
	000000000001								
UE Rep Meas	Uplink DPCCH Scrambling Code								
	0								
	Uplink DPCCH Bc/Bd Control								
	Auto								
	Manual Uplink DPCCH Bc								
	8								
Close Menu	Manual Uplink DPCCH Bd								
	15								
	Maximum Uplink Transmit Power Level						Channel (UARFCN) Params		
	24 dBm								
	Active Cell						Sys Type: UTRA FDD		
	Idle								
2 of 5				IntRef					1 of 3

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 Params		
	UE Information						Cell Power		
	INSI: INEI(SU): (--) Power Class:						-35.00		
	UE Expected Open Loop Transmit Power						dBm/3.84 MHz		
	Initial PRACH TX Power: -60.00 dBm Initial DPCCH TX Power: -11.55 dBm						Channel Type		
	RB Test Mode Settings						12.2k RNC		
	Value						Paging Service		
	Uplink DTCH RNC CRC Presence						RB Test Mode		
	Present						HSPA Parameters		
	Uplink Dummy DCCH Data						34.121 Preset Call Configs		
	Off								
	UE Loopback Type								
	Type 1								
Voice Call	Asymmetric RNC Loopback Messaging								
	Close/Open								
	Asymmetric RNC CN Domain								
	CS Domain								
Close Menu									
	Active Cell						Sys Type: UTRA FDD		
	Idle								
3 of 5				IntRef					1 of 3

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.
2. 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)	β_c/β_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: Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$

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

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

Sub-test 5 Setup for Release 6 HSUPA

Sub-test	β_c	β_d	B_d (SF)	β_c/β_d	$\beta_{hs}^{(1)}$	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_{alt1} : 47/15 B_{alt2} : 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 β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$.

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

Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 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	UE Information INSI: IMEI(SV): (---) Power Class: UE Expected Open Loop Transmit Power Initial PRACH TX Power: -60.00 dBm Initial DPCCH TX Power: -11.55 dBm Call Processing Status Current Service Type: Mono MM Status: Abs Single Shot AG GMM State: Index 18: (95/15)^2 Current DPCCH: Index 19: (106/15)^2 Index 20: (119/15)^2 Index 21: (134/15)^2 Index 22: (150/15)^2 Index 23: (168/15)^2 HSUPA Information Rep EDCH Cat: ---- Last received: ---- Throughput: ---- kbps Acks Transmitted: ----							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	
Handovers								AG Pattern Parameters	
Clear UE Info								Return	
	Active Cell Idle Sys Type: UTRA FDD								
1 of 5	IntRef							1 of 2	

Call Setup Screen									
Call Control	Active Cell Operating Mode							Call Parms	
Additional Screens	UE Information INSI: IMEI(SV): (---) Power Class: UE Expected Open Loop Transmit Power Initial PRACH TX Power: -60.00 dBm Initial DPCCH TX Power: -22.58 dBm Uplink Parameters PRACH Preambles: 64 PRACH Ramping Cycles(MAX): 2 Available Subchannels (Bit Mask): 000000000001 Uplink DPCCH Scrambling Code: 0 Uplink DPCCH Bc/Bd Control: Manual Manual Uplink DPCCH Bc: 2 Manual Uplink DPCCH Bd: 15 Maximum Uplink Transmit Power Level: 24 dBm							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 Meas								HSPA Parameters	
								34.121 Preset Call Configs	
Close Menu								Channel (UARFCN) Parms	
	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	UE Information INSI: INEI(SU): Power Class: (--)							AG Mode	
Active Cell								Single Shot	
								Single Shot AG	
								31: 6(168/15)^2	
Originate Call	UE Expected Open Loop Transmit Power Initial PRACH TX Power: -60.00 dBm Initial DPCH TX Power: -11.55 dBm							Send Single Shot Absolute Grant	
Paging Parameters ▾	Call Processing Status Current Service Type: None MM Status: None GMM State: None Current DPCH Offset: 0 chips							RB Setup AG	
								37: 6(168/15)^2	
Handovers	HSUPA Information Rep EDCH Cat/Ext: Unrep/Unrep Last received E-TFCI: ---- Throughput: ---- kbps Acks Transmitted: ----				HSDPA Information Cur UE HS-DSCH Cat: ---- Block Error Ratio: ---- % Throughput: ---- kbps Blocks Transmitted: ----			AG Pattern Parameters ▾	
Clear UE Info								Return	
1 of 5								1 of 2	

Figure 8: Serving Grant Example