

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 900MHz, 1900MHz, 2450 MHz and 5.0 GHz dipoles.

The applicable verification normalised to 1 Watt.

System Check 900 Head

Date: 13/03/2013

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	23.0 °C	ϵ_r	41.50	41.29	-0.51	5.00
				σ	0.97	0.98	0.62	5.00
				1g SAR	10.50	10.64	1.33	5.00
				10g SAR	6.74	6.92	2.67	5.00

System Check 900 Body

Date: 14/03/2013

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	23.1 °C	ϵ_r	55.00	52.92	-3.78	5.00
				σ	1.05	1.07	1.90	5.00
				1g SAR	10.80	10.72	-0.74	5.00
				10g SAR	6.96	7.00	0.57	5.00

Date: 15/03/2013

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	23.1 °C	ϵ_r	55.00	52.92	-3.78	5.00
				σ	1.05	1.07	1.90	5.00
				1g SAR	10.80	10.36	-4.07	5.00
				10g SAR	6.96	7.20	3.45	5.00

Date: 18/03/2013

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	23.0 °C	ϵ_r	55.00	53.01	-3.62	5.00
				σ	1.05	1.05	0.24	5.00
				1g SAR	10.80	10.84	0.37	5.00
				10g SAR	6.96	7.12	2.30	5.00

System Check 1900 Head

Date: 18/03/2013

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	22.8°C	ϵ_r	40.00	39.11	-2.23	5.00
				σ	1.40	1.43	1.86	5.00
				1g SAR	39.40	37.96	-3.65	5.00
				10g SAR	20.70	20.00	-3.38	5.00

Date: 19/03/2013

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	22.8 °C	ϵ_r	40.00	39.11	-2.23	5.00
				σ	1.40	1.43	1.86	5.00
				1g SAR	39.40	38.20	-3.05	5.00
				10g SAR	20.70	20.20	-2.42	5.00

System Check 1900 Body

Date: 19/03/2013

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	23.3 °C	ϵ_r	53.30	51.26	-3.83	5.00
				σ	1.52	1.49	-2.15	5.00
				1g SAR	40.50	40.80	0.74	5.00
				10g SAR	21.40	22.00	2.80	5.00

Date: 20/03/2013

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	23.3 °C	ϵ_r	53.30	51.26	-3.83	5.00
				σ	1.52	1.49	-2.15	5.00
				1g SAR	40.50	40.80	0.74	5.00
				10g SAR	21.40	22.00	2.80	5.00

System Check 2450 Head

Date: 02/04/2013

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	23.9 °C	ϵ_r	39.20	39.02	-0.46	5.00
				σ	1.80	1.87	4.05	5.00
				1g SAR	52.30	53.20	1.72	5.00
				10g SAR	24.20	24.24	0.17	5.00

System Check 2450 Body

Date: 04/04/2013

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	23.5 °C	ϵ_r	52.70	50.52	-4.14	5.00
				σ	1.95	2.02	3.51	5.00
				1g SAR	52.00	53.20	2.31	5.00
				10g SAR	24.10	23.64	-1.91	5.00

Date: 08/05/2013

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	22.8°C	ϵ_r	52.70	51.51	-2.26	5.00
				σ	1.95	2.03	4.00	5.00
				1g SAR	52.00	52.80	1.54	5.00
				10g SAR	24.10	24.76	2.74	5.00

Date: 09/05/2013

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	22.8 °C	ϵ_r	52.70	51.51	-2.26	5.00
				σ	1.95	2.03	4.00	5.00
				1g SAR	52.00	52.40	0.77	5.00
				10g SAR	24.10	24.40	1.24	5.00

System Check 5200/5500/5800 Head

Date: 25/03/2013

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	23.0 °C	ϵ_r	36.00	36.09	0.25	10.00
				σ	4.66	4.68	0.43	5.00
				1g SAR	78.10	79.10	1.28	5.00
				10g SAR	22.30	23.00	3.14	5.00

Date: 25/03/2013

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	23.0 °C	ϵ_r	35.60	35.42	-0.51	10.00
				σ	4.96	4.95	-0.14	5.00
				1g SAR	82.50	85.80	4.00	5.00
				10g SAR	23.50	24.50	4.26	5.00

Date: 25/03/2013

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	23.0 °C	ϵ_r	35.30	35.06	-0.68	10.00
				σ	5.27	5.26	-0.15	5.00
				1g SAR	77.00	75.50	-1.95	5.00
				10g SAR	21.90	21.30	-2.74	5.00

System Check 5200/5500/5800 Body**Date: 08/04/2013****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	23.5 °C	ϵ_r	49.00	48.15	-1.73	10.00
				σ	5.30	5.36	1.17	5.00
				1g SAR	75.10	74.20	-1.20	5.00
				10g SAR	21.10	21.20	0.47	5.00

Date: 09/04/2013**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	23.5 °C	ϵ_r	49.00	48.15	-1.73	10.00
				σ	5.30	5.36	1.17	5.00
				1g SAR	75.10	71.90	-4.26	5.00
				10g SAR	21.20	20.50	-2.84	5.00

Date: 09/04/2013**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	23.5 °C	ϵ_r	48.60	47.57	-2.12	10.00
				σ	5.65	5.74	1.51	5.00
				1g SAR	79.00	76.90	-2.66	5.00
				10g SAR	22.00	21.70	-1.36	5.00

Date: 09/04/2013**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	23.5 °C	ϵ_r	48.20	47.21	-2.05	10.00
				σ	6.00	6.18	3.06	5.00
				1g SAR	74.40	74.00	-0.54	5.00
				10g SAR	20.60	20.70	0.49	5.00

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	Body
De-Ionized Water	55.75 ⁽¹⁾	71.70
Polysorbate 20	45.25 ⁽¹⁾	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):

- 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:432
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:	DASY4 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 bit A/D converter for surface detection system serial link to robot direct emergency stop output for robot.
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

DASY4 SAR System Specifications (Continued)	
E-Field Probe	
Model:	ET3DV6
Serial No:	1528, 1587
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
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 Parms																					
Operating Mode	<table border="1"> <thead> <tr> <th colspan="2">UE Information</th> </tr> </thead> <tbody> <tr> <td>IMSI:</td> <td></td> </tr> <tr> <td>IMEI(SV):</td> <td>(--)</td> </tr> <tr> <td>Power Class:</td> <td></td> </tr> </tbody> </table>				UE Information		IMSI:		IMEI(SV):	(--)	Power Class:		Cell Power													
UE Information																										
IMSI:																										
IMEI(SV):	(--)																									
Power Class:																										
Active Cell					-35.00																					
					dBm/3.84 MHz																					
					Channel Type																					
					12.2k RMC																					
Originate Call	<table border="1"> <thead> <tr> <th colspan="2">UE Expected Open Loop Transmit Power</th> </tr> </thead> <tbody> <tr> <td>Initial PRACH TX Power:</td> <td>-60.00 dBm</td> </tr> <tr> <td>Initial DPCH TX Power:</td> <td>-11.55 dBm</td> </tr> </tbody> </table>				UE Expected Open Loop Transmit Power		Initial PRACH TX Power:	-60.00 dBm	Initial DPCH TX Power:	-11.55 dBm	Paging Service															
UE Expected Open Loop Transmit Power																										
Initial PRACH TX Power:	-60.00 dBm																									
Initial DPCH TX Power:	-11.55 dBm																									
					RB Test Mode																					
Paging Parameters	<table border="1"> <thead> <tr> <th colspan="2">Call Processing Status</th> </tr> </thead> <tbody> <tr> <td>Current Service Type:</td> <td>None</td> </tr> <tr> <td>MM Status:</td> <td>None</td> </tr> <tr> <td>GMN State:</td> <td>None</td> </tr> <tr> <td>Current DPCH Offset:</td> <td>0 chips</td> </tr> </tbody> </table>				Call Processing Status		Current Service Type:	None	MM Status:	None	GMN State:	None	Current DPCH Offset:	0 chips	HSPA Parameters											
Call Processing Status																										
Current Service Type:	None																									
MM Status:	None																									
GMN State:	None																									
Current DPCH Offset:	0 chips																									
Handovers	<table border="1"> <thead> <tr> <th colspan="2">HSUPA Information</th> </tr> </thead> <tbody> <tr> <td>Rep EDCH Cat/Ext:</td> <td>Unrep/Unrep</td> </tr> <tr> <td>Last received E-TFCI:</td> <td>----</td> </tr> <tr> <td>Throughput:</td> <td>---- kbps</td> </tr> <tr> <td>Acks Transmitted:</td> <td>----</td> </tr> </tbody> </table>		HSUPA Information		Rep EDCH Cat/Ext:	Unrep/Unrep	Last received E-TFCI:	----	Throughput:	---- kbps	Acks Transmitted:	----	<table border="1"> <thead> <tr> <th colspan="2">HSDPA Information</th> </tr> </thead> <tbody> <tr> <td>Cur UE HS-DSCH Cat:</td> <td>----</td> </tr> <tr> <td>Block Error Ratio:</td> <td>---- %</td> </tr> <tr> <td>Throughput:</td> <td>---- kbps</td> </tr> <tr> <td>Blocks Transmitted:</td> <td>----</td> </tr> </tbody> </table>		HSDPA Information		Cur UE HS-DSCH Cat:	----	Block Error Ratio:	---- %	Throughput:	---- kbps	Blocks Transmitted:	----	34,121 Preset Call Configs	
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:	----																									
Clear UE Info					Channel (UARFCN) Parms																					
	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 (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.

Call Setup Screen									
Call Control	Active Cell Operating Mode						HSDPA Parm		
Close Menu	UE Information INSI: INEI(SU): (--) Power Class:						HSDPA RB Test Mode Setup		
	UE Expected Open Loop Transmit Power Initial PRACH TX Power: -60.00 dBm Initial DPCCH TX Power: -11.55 dBm						UE Category Parameters ▾		
	HSDPA Uplink Parameters				Value		MAC-(e)hs Parameters ▾		
	DeltaACK				8		HSDPA Uplink Parameters ▾		
	DeltaNACK				8		Return		
	DeltaCQI				8				
	Ack-Nack Repetition Factor				1				
	CQI Feedback Cycle (k)				2 ms				
	CQI Repetition Factor				1				
		Active Cell Idle			Sys Type: UTRA FDD				
		IntRef					1 of 2		

Figure 2: HSDPA Parameters

- 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	UE Expected Open Loop Transmit Power Initial PRACH TX Power: -60.00 dBm Initial DPCCH TX Power: -11.55 dBm						All Ones		
Originate Call	Call Processing Status Current Service Type: None RIM Status: None GMM State: None Current DPCH Offset: 0 chips						RLC Reestablish Auto		
Paging Parameters ▾	HSUPA Information Rep EDCH Cat/Ext: Unrep/Unrep Last received E-TFCI: ---- Throughput: ---- kbps Acks Transmitted: ----						Call Limit State Off		
Handovers	HSDPA Information Cur UE HS-DSCH Cat: ---- Block Error Ratio: ---- % Throughput: ---- kbps Blocks Transmitted: ----						Call Drop Timer On		
Clear UE Info							SRB Parameters ▾		
		Active Cell Idle			Sys Type: UTRA FDD				
1 of 5		IntRef					2 of 3		

Figure 3: DL DTCH Data Parm

Call Setup Screen																					
Call Control	Active Cell Operating Mode						Call Parm														
Additional Screens	<table border="1"> <thead> <tr> <th colspan="3">UE Information</th> </tr> </thead> <tbody> <tr> <td>IMSI:</td> <td></td> <td></td> </tr> <tr> <td>IMEI(SU):</td> <td></td> <td>(--)</td> </tr> <tr> <td>Power Class:</td> <td></td> <td></td> </tr> </tbody> </table>						UE Information			IMSI:			IMEI(SU):		(--)	Power Class:			Cell Power		
	UE Information																				
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Cell Parameters	<table border="1"> <thead> <tr> <th colspan="3">UE Expected Open Loop Transmit Power</th> </tr> </thead> <tbody> <tr> <td>Initial PRACH TX Power:</td> <td>-60.00</td> <td>dBm</td> </tr> <tr> <td>Initial DPCCCH TX Power:</td> <td>-11.55</td> <td>dBm</td> </tr> </tbody> </table>						UE Expected Open Loop Transmit Power			Initial PRACH TX Power:	-60.00	dBm	Initial DPCCCH TX Power:	-11.55	dBm	-35.00 dBm/3.84 MHz					
	UE Expected Open Loop Transmit Power																				
Initial PRACH TX Power:	-60.00	dBm																			
Initial DPCCCH TX Power:	-11.55	dBm																			
Generator Info	<table border="1"> <thead> <tr> <th>Uplink Parameters</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>PRACH Preambles</td> <td>64</td> </tr> <tr> <td>PRACH Ramping Cycles(MMAX)</td> <td>2</td> </tr> <tr> <td>Available Subchannels (Bit Mask)</td> <td>000000000001</td> </tr> </tbody> </table>						Uplink Parameters	Value	PRACH Preambles	64	PRACH Ramping Cycles(MMAX)	2	Available Subchannels (Bit Mask)	000000000001	Channel Type 12.2k RMC						
	Uplink Parameters	Value																			
PRACH Preambles	64																				
PRACH Ramping Cycles(MMAX)	2																				
Available Subchannels (Bit Mask)	000000000001																				
Uplink Parameters	<table border="1"> <tbody> <tr> <td>Uplink DPCH Scrambling Code</td> <td>0</td> </tr> <tr> <td>Uplink DPCH Bc/Bd Control</td> <td>Auto</td> </tr> <tr> <td>Manual Uplink DPCH Bc</td> <td>8</td> </tr> <tr> <td>Manual Uplink DPCH Bd</td> <td>15</td> </tr> <tr> <td>Maximum Uplink Transmit Power Level</td> <td>24 dBm</td> </tr> </tbody> </table>						Uplink DPCH Scrambling Code	0	Uplink DPCH Bc/Bd Control	Auto	Manual Uplink DPCH Bc	8	Manual Uplink DPCH Bd	15	Maximum Uplink Transmit Power Level	24 dBm	Paging Service RB Test Mode				
	Uplink DPCH Scrambling Code	0																			
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Maximum Uplink Transmit Power Level	24 dBm																				
UE Rep Meas	<table border="1"> <tbody> <tr> <td>Active Cell</td> <td>Idle</td> <td>Sys Type: UTRA FDD</td> </tr> <tr> <td>IntRef</td> <td></td> <td></td> </tr> </tbody> </table>						Active Cell	Idle	Sys Type: UTRA FDD	IntRef			HSPA Parameters								
	Active Cell	Idle	Sys Type: UTRA FDD																		
IntRef																					
Close Menu	<table border="1"> <tbody> <tr> <td>Asymmetric RMC Loopback Messaging</td> <td>Close/Open</td> </tr> <tr> <td>Asymmetric RMC CN Domain</td> <td>CS Domain</td> </tr> </tbody> </table>						Asymmetric RMC Loopback Messaging	Close/Open	Asymmetric RMC CN Domain	CS Domain	34,121 Preset Call Configs										
	Asymmetric RMC Loopback Messaging	Close/Open																			
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2 of 5	<table border="1"> <tbody> <tr> <td>Active Cell</td> <td>Idle</td> <td>Sys Type: UTRA FDD</td> </tr> <tr> <td>IntRef</td> <td></td> <td></td> </tr> </tbody> </table>						Active Cell	Idle	Sys Type: UTRA FDD	IntRef			Channel (UARFCN) Parm								
Active Cell	Idle	Sys Type: UTRA FDD																			
IntRef																					
							1 of 3														

Figure 6: Uplink Parameters

- 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														
	<table border="1"> <thead> <tr> <th colspan="3">UE Information</th> </tr> </thead> <tbody> <tr> <td>IMSI:</td> <td></td> <td></td> </tr> <tr> <td>IMEI(SU):</td> <td></td> <td>(--)</td> </tr> <tr> <td>Power Class:</td> <td></td> <td></td> </tr> </tbody> </table>						UE Information			IMSI:			IMEI(SU):		(--)	Power Class:			Cell Power		
	UE Information																				
IMSI:																					
IMEI(SU):		(--)																			
Power Class:																					
	<table border="1"> <thead> <tr> <th colspan="3">UE Expected Open Loop Transmit Power</th> </tr> </thead> <tbody> <tr> <td>Initial PRACH TX Power:</td> <td>-60.00</td> <td>dBm</td> </tr> <tr> <td>Initial DPCCCH TX Power:</td> <td>-11.55</td> <td>dBm</td> </tr> </tbody> </table>						UE Expected Open Loop Transmit Power			Initial PRACH TX Power:	-60.00	dBm	Initial DPCCCH TX Power:	-11.55	dBm	-35.00 dBm/3.84 MHz					
	UE Expected Open Loop Transmit Power																				
Initial PRACH TX Power:	-60.00	dBm																			
Initial DPCCCH TX Power:	-11.55	dBm																			
Voice Call	<table border="1"> <thead> <tr> <th>RB Test Mode Settings</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>Uplink DTCH RMC CRC Presence</td> <td>Present</td> </tr> <tr> <td>Uplink Dummy DCCH Data</td> <td>Off</td> </tr> <tr> <td>UE Loopback Type</td> <td>Type 1</td> </tr> <tr> <td>Asymmetric RMC Loopback Messaging</td> <td>Close/Open</td> </tr> <tr> <td>Asymmetric RMC CN Domain</td> <td>CS Domain</td> </tr> </tbody> </table>						RB Test Mode Settings	Value	Uplink DTCH RMC CRC Presence	Present	Uplink Dummy DCCH Data	Off	UE Loopback Type	Type 1	Asymmetric RMC Loopback Messaging	Close/Open	Asymmetric RMC CN Domain	CS Domain	Channel Type 12.2k RMC		
	RB Test Mode Settings	Value																			
Uplink DTCH RMC CRC Presence	Present																				
Uplink Dummy DCCH Data	Off																				
UE Loopback Type	Type 1																				
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Close Menu	<table border="1"> <tbody> <tr> <td>Active Cell</td> <td>Idle</td> <td>Sys Type: UTRA FDD</td> </tr> <tr> <td>IntRef</td> <td></td> <td></td> </tr> </tbody> </table>						Active Cell	Idle	Sys Type: UTRA FDD	IntRef			Paging Service RB Test Mode								
	Active Cell	Idle	Sys Type: UTRA FDD																		
IntRef																					
3 of 5	<table border="1"> <tbody> <tr> <td>Active Cell</td> <td>Idle</td> <td>Sys Type: UTRA FDD</td> </tr> <tr> <td>IntRef</td> <td></td> <td></td> </tr> </tbody> </table>						Active Cell	Idle	Sys Type: UTRA FDD	IntRef			HSPA Parameters								
Active Cell	Idle	Sys Type: UTRA FDD																			
IntRef																					
							34,121 Preset Call Configs														
							Channel (UARFCN) Parm														
							1 of 3														

Figure 7: RB Test Mode Settings

- 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: $\Delta_{ACK}, \Delta_{NACK}$ 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 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_{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: $\Delta_{ACK}, \Delta_{NACK}$ 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 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	<table border="1"> <thead> <tr> <th colspan="2">UE Information</th> </tr> </thead> <tbody> <tr> <td>IMSI:</td> <td></td> </tr> <tr> <td>IMEI(SU):</td> <td>(--)</td> </tr> <tr> <td>Power Class:</td> <td></td> </tr> </tbody> </table>						UE Information		IMSI:		IMEI(SU):	(--)	Power Class:		AG Mode			
UE Information																		
IMSI:																		
IMEI(SU):	(--)																	
Power Class:																		
Active Cell							Single Shot											
Originate Call	<table border="1"> <thead> <tr> <th colspan="2">UE Expected Open Loop Transmit Power</th> </tr> </thead> <tbody> <tr> <td>Initial PRACH TX Power:</td> <td>-60.00 dBm</td> </tr> <tr> <td>Initial DPCCH TX Power:</td> <td>-11.55 dBm</td> </tr> </tbody> </table>						UE Expected Open Loop Transmit Power		Initial PRACH TX Power:	-60.00 dBm	Initial DPCCH TX Power:	-11.55 dBm	Single Shot AG					
	UE Expected Open Loop Transmit Power																	
Initial PRACH TX Power:	-60.00 dBm																	
Initial DPCCH TX Power:	-11.55 dBm																	
							21: (134/15)*2											
							Send Single Shot Absolute Grant											
Paging Parameters	<table border="1"> <thead> <tr> <th colspan="2">Call Processing Status</th> </tr> </thead> <tbody> <tr> <td>Current Service Type:</td> <td>None</td> </tr> <tr> <td>MM Status:</td> <td></td> </tr> <tr> <td>GMM State:</td> <td></td> </tr> <tr> <td>Current DPCH</td> <td></td> </tr> </tbody> </table>						Call Processing Status		Current Service Type:	None	MM Status:		GMM State:		Current DPCH		RB Setup AG	
Call Processing Status																		
Current Service Type:	None																	
MM Status:																		
GMM State:																		
Current DPCH																		
							33: 4(134/15)*2											
Handovers	<table border="1"> <thead> <tr> <th colspan="2">HSUPA Information</th> </tr> </thead> <tbody> <tr> <td>Rep EDCH Cat/</td> <td></td> </tr> <tr> <td>Last received</td> <td></td> </tr> <tr> <td>Throughput:</td> <td></td> </tr> <tr> <td>Acks Transmitt</td> <td></td> </tr> </tbody> </table>						HSUPA Information		Rep EDCH Cat/		Last received		Throughput:		Acks Transmitt		AG Pattern Parameters	
HSUPA Information																		
Rep EDCH Cat/																		
Last received																		
Throughput:																		
Acks Transmitt																		
							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 Parm								
Additional Screens	<table border="1"> <thead> <tr> <th colspan="2">UE Information</th> </tr> </thead> <tbody> <tr> <td>IMSI:</td> <td></td> </tr> <tr> <td>IMEI(SU):</td> <td>(--)</td> </tr> <tr> <td>Power Class:</td> <td></td> </tr> </tbody> </table>						UE Information		IMSI:		IMEI(SU):	(--)	Power Class:		Cell Power	
UE Information																
IMSI:																
IMEI(SU):	(--)															
Power Class:																
Cell Parameters							-35.00									
							dBm/3.84 MHz									
Generator Info	<table border="1"> <thead> <tr> <th colspan="2">UE Expected Open Loop Transmit Power</th> </tr> </thead> <tbody> <tr> <td>Initial PRACH TX Power:</td> <td>-60.00 dBm</td> </tr> <tr> <td>Initial DPCCH TX Power:</td> <td>-22.58 dBm</td> </tr> </tbody> </table>						UE Expected Open Loop Transmit Power		Initial PRACH TX Power:	-60.00 dBm	Initial DPCCH TX Power:	-22.58 dBm	Channel Type			
UE Expected Open Loop Transmit Power																
Initial PRACH TX Power:	-60.00 dBm															
Initial DPCCH TX Power:	-22.58 dBm															
							12.2k + HSDPA									
							Paging Service									
							RB Test Mode									
Uplink Parameters	Uplink Parameters				Value		HSPA Parameters									
	PRACH Preambles				64											
	PRACH Ramping Cycles(MAX)				2											
	Available Subchannels (Bit Mask)				000000000001											
UE Rep	Uplink DPCH Scrambling Code				0		34.121 Preset Call Configs									
	Uplink DPCH Bc/Bd Control				Manual											
	Manual Uplink DPCH Bc				2											
Close Menu	Manual Uplink DPCH Bd				15		Channel (UARFCN) Parm									
	Maximum Uplink Transmit Power Level				24 dBm											
		Cell Off				Sys Type: UTRA FDD										
2 of 5		IntRef						1 of 3								

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

Figure 8: Serving Grant Example