

## Appendix 5. System Check

Prior to the assessment, the system was verified in the flat region of the phantom, 900 MHz, 1800 MHz, 1900 MHz, 2450 MHz and 5.0 GHz dipoles were used. A forward power of 250 mW was applied to the 900 MHz, 1800 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, 1800 MHz, 1900MHz, 2450 MHz and 5.0 GHz dipoles.

The applicable verification normalised to 1 Watt.

### System Check 900 Head

Date: 02/03/2013

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	23.3°C	$\epsilon_r$	41.50	41.93	1.04	5.00
				$\sigma$	0.970	0.97	-0.26	5.00
				1g SAR	10.50	10.52	0.19	5.00
				10g SAR	6.74	6.80	0.89	5.00

Date: 05/03/2013

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	$\epsilon_r$	41.50	41.97	1.13	5.00
				$\sigma$	0.970	0.98	1.13	5.00
				1g SAR	10.50	10.20	-2.86	5.00
				10g SAR	6.74	6.64	-1.48	5.00

#### Note:

The 850/900 MHz Head fluid was used to perform the system check at spot frequency of 900 MHz. The system checked performed at 900 MHz is valid for 800 MHz to 1000 MHz which covers the 850 MHz band. The probe(s) calibration for SN1587 and SN1586 were performed at the spot frequencies of 835 MHz and 900 MHz.

**System Check 900 Body**

Date: 07/03/2013

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	$\epsilon_r$	55.00	53.47	-2.78	5.00
				$\sigma$	1.05	1.04	-0.67	5.00
				1g SAR	10.80	11.04	2.22	5.00
				10g SAR	6.96	7.20	3.45	5.00

Date: 08/03/2013

Validation Dipole and Serial Number: D900V2; SN: 035

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	900	23.0°C	22.5°C	$\epsilon_r$	55.00	53.86	-2.07	5.00
				$\sigma$	1.05	1.03	-1.76	5.00
				1g SAR	10.80	10.72	-0.74	5.00
				10g SAR	6.96	7.08	1.72	5.00

Date: 11/03/2013

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	24.0 °C	$\epsilon_r$	55.00	53.82	-2.15	5.00
				$\sigma$	1.05	1.04	-0.52	5.00
				1g SAR	10.80	10.44	-3.33	5.00
				10g SAR	6.96	6.88	-1.15	5.00

Date: 12/03/2013

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	24.0 °C	$\epsilon_r$	55.00	53.82	-2.15	5.00
				$\sigma$	1.05	1.04	-0.52	5.00
				1g SAR	10.80	10.96	1.48	5.00
				10g SAR	6.96	7.20	3.45	5.00

**Note:**

The 850/900 MHz Body fluid was used to perform the system check at spot frequency of 900 MHz. The system checked performed at 900 MHz is valid for 800 MHz to 1000 MHz which covers the GSM850 and UMTS FDD 5 bands. The probe(s) calibration for SN1587 and SN1586 were performed at the spot frequencies of 835 MHz and 900 MHz.

**System Check 900 Body (Continued)**

Date: 22/05/2013

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	24.0 °C	$\epsilon_r$	55.00	53.22	-3.24	5.00
				$\sigma$	1.05	1.04	-0.95	5.00
				1g SAR	10.80	11.08	2.59	5.00
				10g SAR	6.96	7.28	4.60	5.00

Date: 24/05/2013

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	24.0 °C	$\epsilon_r$	55.00	52.91	-3.80	5.00
				$\sigma$	1.05	1.04	-0.71	5.00
				1g SAR	10.80	10.68	-1.11	5.00
				10g SAR	6.96	6.96	0.57	5.00

**Note:**

The 850/900 MHz Body fluid was used to perform the system check at spot frequency of 900 MHz.

The system checked performed at 900 MHz is valid for 800 MHz to 1000 MHz which covers the GSM850 and UMTS FDD 5 bands. The probe(s) calibration for SN1587 and SN1586 were performed at the spot frequencies of 835 MHz and 900 MHz.

**System Check 1800 Head**

Date: 06/03/2013

Validation Dipole and Serial Number: D1800V2; SN: 264

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Head	1800	23.0 °C	21.5 °C	$\epsilon_r$	40.00	39.81	-0.47	5.00
				$\sigma$	1.40	1.36	-2.64	5.00
				<b>1g SAR</b>	37.20	36.80	-1.08	5.00
				<b>10g SAR</b>	19.60	19.84	1.22	5.00

**Note:**

The 1800 MHz Head fluid was used to perform the system check at spot frequency of 1800 MHz. The system checked performed at 1800 MHz is valid for 1700 MHz to 1900 MHz which covers the UMTS FDD 4 band. The probe(s) calibration for SN1528 was performed at the spot frequencies of 1750 MHz.

**System Check 1800 Body**

Date: 07/03/2013

Validation Dipole and Serial Number: D1800V2; SN: 264

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	1800	23.0 °C	21.5 °C	$\epsilon_r$	53.30	52.22	-2.03	5.00
				$\sigma$	1.52	1.55	2.11	5.00
				1g SAR	37.80	37.48	-0.85	5.00
				10g SAR	20.10	19.96	-0.70	5.00

Date: 22/05/2013

Validation Dipole and Serial Number: D1800V2; SN: 264

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	1800	24.0 °C	24.0 °C	$\epsilon_r$	53.30	51.83	-2.76	5.00
				$\sigma$	1.52	1.48	-2.50	5.00
				1g SAR	37.80	36.20	-4.23	5.00
				10g SAR	20.10	19.64	-2.29	5.00

Date: 24/05/2013

Validation Dipole and Serial Number: D1800V2; SN: 264

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	1800	24.0 °C	24.0 °C	$\epsilon_r$	53.30	51.05	-4.22	5.00
				$\sigma$	1.52	1.49	-1.91	5.00
				1g SAR	37.80	36.36	-3.81	5.00
				10g SAR	20.10	19.76	-1.69	5.00

**Note:**

The 1800 MHz Body fluid was used to perform the system check at spot frequency of 1800 MHz. The system checked performed at 1800 MHz is valid for 1700 MHz to 1900 MHz which covers the UMTS FDD 4 band. The probe(s) calibration for SN3304 and SN1586 were performed at the spot frequencies of 1750 MHz.

**System Check 1900 Head****Date: 27/02/2013****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	22.6 °C	$\epsilon_r$	40.00	38.58	-3.55	5.00
				$\sigma$	1.40	1.43	2.24	5.00
				1g SAR	39.40	38.68	-1.83	5.00
				10g SAR	20.70	20.20	-2.42	5.00

**Date: 06/03/2013****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	24.0 °C	$\epsilon_r$	40.00	41.16	2.90	5.00
				$\sigma$	1.40	1.45	3.29	5.00
				1g SAR	39.40	39.24	-0.41	5.00
				10g SAR	20.70	20.24	-2.22	5.00

**Note:**

The 1900 MHz Head fluid was used to perform the system check at spot frequency of 1900 MHz. The system checked performed at 1900 MHz is valid for 1800 MHz to 2000 MHz which covers the PCS1900 and UMTS FDD 2 bands. The probe(s) calibration for SN1528 and SN1587 were performed at the spot frequencies of 1900 MHz.

**System Check 1900 Body**

Date: 10/03/2013

Validation Dipole and Serial Number: D1900V2; SN: 537

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	1900	23.0 °C	21.5 °C	$\epsilon_r$	53.30	51.41	-3.55	5.00
				$\sigma$	1.52	1.51	-0.42	5.00
				1g SAR	40.50	42.00	3.70	5.00
				10g SAR	21.40	21.68	1.31	5.00

Date: 02/04/2013

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	23.1 °C	$\epsilon_r$	53.30	51.20	-3.94	5.00
				$\sigma$	1.52	1.58	3.89	5.00
				1g SAR	40.50	40.40	-0.25	5.00
				10g SAR	21.40	21.84	2.06	5.00

**Note:**

The 1900 MHz Body fluid was used to perform the system check at spot frequency of 1900 MHz. The system checked performed at 1900 MHz is valid for 1800 MHz to 2000 MHz which covers the PCS1900 and UMTS FDD 2 bands. The probe(s) calibration for SN1528 and SN1587 were performed at the spot frequencies of 1900 MHz.

**System Check 2450 Head**

Date: 08/03/2013

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	22.7 °C	$\epsilon_r$	39.20	39.25	0.13	5.00
				$\sigma$	1.80	1.81	0.72	5.00
				1g SAR	52.30	53.60	2.49	5.00
				10g SAR	24.20	24.48	1.16	5.00

**Note:**

The 2450 MHz Head fluid was used to perform the system check at spot frequency of 2450 MHz. The system checked performed at 2450 MHz is valid for 2350 MHz to 2550 MHz which covers the WLAN 2.4GHz band. The probe(s) calibration for SN3304 was performed at the spot frequencies of 2450 MHz.

**System Check 2450 Body**

Date: 11/03/2013

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	22.5 °C	$\epsilon_r$	52.70	51.56	-2.16	5.00
				$\sigma$	1.95	2.01	3.17	5.00
				1g SAR	52.00	53.60	3.08	5.00
				10g SAR	24.10	23.16	-3.90	5.00

**Note:**

The 2450 MHz Body fluid was used to perform the system check at spot frequency of 2450 MHz. The system checked performed at 2450 MHz is valid for 2350 MHz to 2550 MHz which covers the WLAN 2.4GHz band. The probe(s) calibration for SN3304 was performed at the spot frequencies of 2450 MHz.



**System Check 5200/5500/5800 Head****Date: 12/03/2013****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	22.5 °C	$\epsilon_r$	36.00	36.30	0.83	10.00
				$\sigma$	4.66	4.53	-2.73	5.00
				1g SAR	78.10	79.70	2.05	5.00
				10g SAR	22.30	23.30	4.48	5.00

**Date: 12/03/2013****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	22.5 °C	$\epsilon_r$	36.00	36.30	0.83	10.00
				$\sigma$	4.66	4.53	-2.73	5.00
				1g SAR	78.10	75.70	-3.07	5.00
				10g SAR	22.30	21.60	-3.14	5.00

**Date: 13/03/2013****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	22.5 °C	$\epsilon_r$	35.60	35.96	1.01	10.00
				$\sigma$	4.96	4.80	-3.16	5.00
				1g SAR	82.50	82.40	-0.12	5.00
				10g SAR	23.50	23.90	1.70	5.00

**Date: 13/03/2013****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	22.5 °C	$\epsilon_r$	35.30	35.57	0.76	10.00
				$\sigma$	5.27	5.12	-2.78	5.00
				1g SAR	77.00	75.00	-2.60	5.00
				10g SAR	21.90	21.80	-0.46	5.00

**Note:**

The 5GHz Head fluid was used to perform the system check at spot frequencies of 5200 MHz, 5500 MHz and 5800 MHz which covers the WLAN 5GHz band. The probe(s) calibration for SN3814 was performed at the spot frequencies of 5200 MHz, 5300MHz, 5500 MHz, 5600 MHz and 5800 MHz.

## 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 <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 (% 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**

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

**Robot System**

<b>Positioner:</b>	Stäubli Unimation Corp. Robot Model: RX90L
<b>Repeatability:</b>	0.025 mm
<b>No. of Axis:</b>	6
<b>Serial Number:</b>	F01/5J86A1/A/01
<b>Reach:</b>	1185 mm
<b>Payload:</b>	3.5 kg
<b>Control Unit:</b>	CS7
<b>Programming Language:</b>	V+

**Robot System**

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

**Data Acquisition Electronic (DAE) System**

<b>Serial Number:</b>	DAE3 SN:431
<b>Serial Number:</b>	DAE3 SN:432
<b>Serial Number:</b>	DAE3 SN:450

<b>DASY4 SAR System Specifications (Continued)</b>	
<b>PC Controller</b>	
<b>PC:</b>	Dell Precision 340
<b>Operating System:</b>	Windows 2000
<b>Data Card:</b>	DASY4 Measurement Server
<b>Serial Number:</b>	1080
<b>Data Converter</b>	
<b>Features:</b>	Signal Amplifier, multiplexer, A/D converted and control logic.
<b>Software:</b>	DASY4 Software
<b>Connecting Lines:</b>	Optical downlink for data and status info. Optical uplink for commands and clock.
<b>PC Interface Card</b>	
<b>Function:</b>	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.
<b>E-Field Probe</b>	
<b>Model:</b>	EX3DV4
<b>Serial No:</b>	3814
<b>Construction:</b>	Triangular core
<b>Frequency:</b>	10 MHz to >6 GHz
<b>Linearity:</b>	±0.2 dB (30 MHz to 6 GHz)
<b>Probe Length (mm):</b>	337
<b>Probe Diameter (mm):</b>	10
<b>Tip Length (mm):</b>	9
<b>Tip Diameter (mm):</b>	2.5
<b>Sensor X Offset (mm):</b>	1
<b>Sensor Y Offset (mm):</b>	1
<b>Sensor Z Offset (mm):</b>	1

<b>DASY4 SAR System Specifications (Continued)</b>	
<b>E-Field Probe</b>	
<b>Model:</b>	ES3DV3
<b>Serial No:</b>	3304
<b>Construction:</b>	Triangular core
<b>Frequency:</b>	10 MHz to >4 GHz
<b>Linearity:</b>	±0.2 dB (30 MHz to 4 GHz)
<b>Probe Length (mm):</b>	337
<b>Probe Diameter (mm):</b>	10
<b>Tip Length (mm):</b>	10
<b>Tip Diameter (mm):</b>	4
<b>Sensor X Offset (mm):</b>	2
<b>Sensor Y Offset (mm):</b>	2
<b>Sensor Z Offset (mm):</b>	2
<b>E-Field Probe</b>	
<b>Model:</b>	ET3DV6
<b>Serial No:</b>	1528, 1587, 1586
<b>Construction:</b>	Triangular core
<b>Frequency:</b>	10 MHz to 2.55GHz
<b>Linearity:</b>	±0.2 dB (30 MHz to 2.55GHz)
<b>Probe Length (mm):</b>	337
<b>Probe Diameter (mm):</b>	10
<b>Tip Length (mm):</b>	10
<b>Tip Diameter (mm):</b>	6.8
<b>Sensor X Offset (mm):</b>	2.7
<b>Sensor Y Offset (mm):</b>	2.7
<b>Sensor Z Offset (mm):</b>	2.7
<b>Phantom</b>	
<b>Phantom:</b>	SAM Phantom, Eli Phantom
<b>Shell Material:</b>	Fibreglass
<b>Thickness:</b>	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													
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					12.2k RMC																					
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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											
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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																										
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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 (UARFCN) 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	<table border="1"> <thead> <tr> <th colspan="3">UE Information</th> </tr> </thead> <tbody> <tr> <td>INSI:</td> <td></td> <td></td> </tr> <tr> <td>INEI(SU):</td> <td></td> <td>(--)</td> </tr> <tr> <td>Power Class:</td> <td></td> <td></td> </tr> </tbody> </table>						UE Information			INSI:			INEI(SU):		(--)	Power Class:			HSDPA RB Test Mode Setup										
	UE Information																												
	INSI:																												
	INEI(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 DPCCH 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 DPCCH TX Power:	-11.55	dBm	UE Category Parameters ▾													
	UE Expected Open Loop Transmit Power																												
	Initial PRACH TX Power:	-60.00	dBm																										
	Initial DPCCH TX Power:	-11.55	dBm																										
	<table border="1"> <thead> <tr> <th colspan="2">HSDPA Uplink Parameters</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>DeltaACK</td> <td></td> <td>8</td> </tr> <tr> <td>DeltaNACK</td> <td></td> <td>8</td> </tr> <tr> <td>DeltaCQI</td> <td></td> <td>8</td> </tr> <tr> <td>Ack-Nack Repetition Factor</td> <td></td> <td>1</td> </tr> <tr> <td>CQI Feedback Cycle (k)</td> <td></td> <td>2 ms</td> </tr> <tr> <td>CQI Repetition Factor</td> <td></td> <td>1</td> </tr> </tbody> </table>						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	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																											
						HSDPA Uplink Parameters ▾																							
						Return																							
<table border="1"> <tr> <td colspan="2">Active Cell</td> <td colspan="2">Sys Type: UTRA FDD</td> </tr> <tr> <td colspan="2">Idle</td> <td colspan="2"></td> </tr> </table>						Active Cell		Sys Type: UTRA FDD		Idle																			
Active Cell		Sys Type: UTRA FDD																											
Idle																													
						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	<table border="1"> <thead> <tr> <th colspan="3">UE Information</th> </tr> </thead> <tbody> <tr> <td>INSI:</td> <td></td> <td></td> </tr> <tr> <td>INEI(SU):</td> <td></td> <td>(--)</td> </tr> <tr> <td>Power Class:</td> <td></td> <td></td> </tr> </tbody> </table>						UE Information			INSI:			INEI(SU):		(--)	Power Class:			DL DTCH Data					
UE Information																								
INSI:																								
INEI(SU):		(--)																						
Power Class:																								
Active Cell	<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 DPCCH 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 DPCCH TX Power:	-11.55	dBm	All Ones								
UE Expected Open Loop Transmit Power																								
Initial PRACH TX Power:	-60.00	dBm																						
Initial DPCCH TX Power:	-11.55	dBm																						
Originate Call	<table border="1"> <thead> <tr> <th colspan="3">Call Processing Status</th> </tr> </thead> <tbody> <tr> <td>Current Service Type:</td> <td colspan="2">None</td> </tr> <tr> <td>MM Status:</td> <td colspan="2">None</td> </tr> <tr> <td>GM State:</td> <td colspan="2">None</td> </tr> <tr> <td>Current DPCH Offset:</td> <td colspan="2">0 chips</td> </tr> </tbody> </table>						Call Processing Status			Current Service Type:	None		MM Status:	None		GM State:	None		Current DPCH Offset:	0 chips		RLC Reestablish Auto		
Call Processing Status																								
Current Service Type:	None																							
MM Status:	None																							
GM State:	None																							
Current DPCH Offset:	0 chips																							
Paging Parameters ▾	<table border="1"> <thead> <tr> <th>HSUPA Information</th> <th colspan="2">HSDPA Information</th> </tr> </thead> <tbody> <tr> <td>Rep EDCH Cat/Ext: Unrep/Unrep</td> <td>Cur UE HS-DSCH Cat:</td> <td>----</td> </tr> <tr> <td>Last received E-TFCI: ----</td> <td>Block Error Ratio:</td> <td>---- %</td> </tr> <tr> <td>Throughput: ---- kbps</td> <td>Throughput:</td> <td>---- kbps</td> </tr> <tr> <td>Acks Transmitted: ----</td> <td>Blocks Transmitted:</td> <td>----</td> </tr> </tbody> </table>						HSUPA Information	HSDPA Information		Rep EDCH Cat/Ext: Unrep/Unrep	Cur UE HS-DSCH Cat:	----	Last received E-TFCI: ----	Block Error Ratio:	---- %	Throughput: ---- kbps	Throughput:	---- kbps	Acks Transmitted: ----	Blocks Transmitted:	----	Call Limit State Off		
HSUPA Information	HSDPA Information																							
Rep EDCH Cat/Ext: Unrep/Unrep	Cur UE HS-DSCH Cat:	----																						
Last received E-TFCI: ----	Block Error Ratio:	---- %																						
Throughput: ---- kbps	Throughput:	---- kbps																						
Acks Transmitted: ----	Blocks Transmitted:	----																						
Handovers	<table border="1"> <tr> <td colspan="2">Active Cell</td> <td colspan="2">Sys Type: UTRA FDD</td> </tr> <tr> <td colspan="2">Idle</td> <td colspan="2"></td> </tr> </table>						Active Cell		Sys Type: UTRA FDD		Idle				Call Drop Timer On									
Active Cell		Sys Type: UTRA FDD																						
Idle																								
Clear UE Info							SRB Parameters ▾																	
1 of 5							2 of 3																	

Figure 3: DL DTCH Data Parm



Call Setup Screen									
Call Control	Active Cell Operating Mode						Call Parm		
Close Menu	UE Information						UE Target Power		
	INSI: INEI(SU): (--) Power Class:						-5 dBm		
	UE Expected Open Loop Transmit Power						UL CL Power Ctrl Parameters		
	Initial PRACH TX Power: -60.00 dBm Initial DPCCH TX Power: -11.55 dBm								
	UL CL Power Ctrl Parameters			Value					
	UL CL Power Ctrl Mode			All Up bits			Send Step Up TPC Bit Pattern		
	UL CL Power Ctrl Algorithm			Two					
	UL CL Power Ctrl Stepsize			1 dB			Send Step Down TPC Bit Pattern		
							Receiver Control		
			Active Cell			Sys Type: UTRA FDD			
			Idle						
			IntRef						
						3 of 3			

Figure 4: UL CL Power Ctrl Parameters

- 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 Parm		
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	Cell Parameters			Value			12.2k RNC		
	BCCH Update Page			Inhibit			Paging Service		
Uplink Parameters	PS Domain Information			Absent			RB Test Mode		
	MCC (Mobile Country Code)			1			HSPA Parameters		
UE Rep Params	MNC (Mobile Network Code)			1			34,121 Preset Call Configs		
	MNC (Mobile Network Code) Length			Auto					
	LAC (Local Area Code)			1					
Close Menu	RAC (Routing Area Code)			1			Channel (UARFCN) Params		
	Cell Identity			1					
	Active Cell			Sys Type: UTRA FDD					
	Idle								
	IntRef								
							1 of 3		

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.

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																							
IMSI:																								
IMEI(SU):		(--)																						
Power Class:																								
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 colspan="2">Uplink Parameters</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>PRACH Preambles</td> <td></td> <td>64</td> </tr> <tr> <td>PRACH Ramping Cycles(MMAX)</td> <td></td> <td>2</td> </tr> <tr> <td>Available Subchannels (Bit Mask)</td> <td></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></td> <td>0</td> </tr> <tr> <td>Uplink DPCH Bc/Bd Control</td> <td></td> <td>Auto</td> </tr> <tr> <td>Manual Uplink DPCH Bc</td> <td></td> <td>8</td> </tr> <tr> <td>Manual Uplink DPCH Bd</td> <td></td> <td>15</td> </tr> <tr> <td>Maximum Uplink Transmit Power Level</td> <td></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																					
Uplink DPCH Bc/Bd Control		Auto																						
Manual Uplink DPCH Bc		8																						
Manual Uplink DPCH Bd		15																						
Maximum Uplink Transmit Power Level		24 dBm																						
UE Rep Meas	<table border="1"> <tbody> <tr> <td>Active Cell</td> <td></td> <td>Idle</td> </tr> <tr> <td>Sys Type:</td> <td></td> <td>UTRA FDD</td> </tr> </tbody> </table>						Active Cell		Idle	Sys Type:		UTRA FDD	HSPA Parameters											
	Active Cell		Idle																					
Sys Type:		UTRA FDD																						
Close Menu	<table border="1"> <tbody> <tr> <td>Asymmetric RMC Loopback Messaging</td> <td></td> <td>Close/Open</td> </tr> <tr> <td>Asymmetric RMC CN Domain</td> <td></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																					
Asymmetric RMC CN Domain		CS Domain																						
2 of 5	<table border="1"> <tbody> <tr> <td>IntRef</td> <td></td> <td></td> </tr> </tbody> </table>						IntRef			Channel (UARFCN) Parm														
	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																			
	<table border="1"> <thead> <tr> <th colspan="2">RB Test Mode Settings</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>Uplink DTCH RMC CRC Presence</td> <td></td> <td>Present</td> </tr> <tr> <td>Uplink Dummy DCCH Data</td> <td></td> <td>Off</td> </tr> <tr> <td>UE Loopback Type</td> <td></td> <td>Type 1</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	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																			
Voice Call	<table border="1"> <tbody> <tr> <td>Asymmetric RMC Loopback Messaging</td> <td></td> <td>Close/Open</td> </tr> <tr> <td>Asymmetric RMC CN Domain</td> <td></td> <td>CS Domain</td> </tr> </tbody> </table>						Asymmetric RMC Loopback Messaging		Close/Open	Asymmetric RMC CN Domain		CS Domain	Paging Service RB Test Mode								
	Asymmetric RMC Loopback Messaging		Close/Open																		
Asymmetric RMC CN Domain		CS Domain																			
Close Menu	<table border="1"> <tbody> <tr> <td>Active Cell</td> <td></td> <td>Idle</td> </tr> <tr> <td>Sys Type:</td> <td></td> <td>UTRA FDD</td> </tr> </tbody> </table>						Active Cell		Idle	Sys Type:		UTRA FDD	HSPA Parameters								
	Active Cell		Idle																		
Sys Type:		UTRA FDD																			
3 of 5	<table border="1"> <tbody> <tr> <td>IntRef</td> <td></td> <td></td> </tr> </tbody> </table>						IntRef			34,121 Preset Call Configs											
	IntRef																				
						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.

<b>Sub-test 1 Setup for Release 5 HSDPA</b>						
Sub-test	$\beta_c$	$\beta_d$	$B_d$ (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  $\beta_d = 15/15$

<b>Sub-test 5 Setup for Release 6 HSUPA</b>													
Sub-test	$\beta_c$	$\beta_d$	$B_d$ (SF)	$\beta_c/\beta_d$	$\beta_{hs}^{(1)}$	$B_{oc}$	$B_{od}$	$B_{od}$ (SF)	$B_{od}$ (codes)	CM <sup>(2)</sup> (dB)	MPR (dB)	AG <sup>(4)</sup> 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	$B_{al1}$ : 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 <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 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(SV):</td> <td>(--)</td> </tr> <tr> <td>Power Class:</td> <td></td> </tr> </tbody> </table>						UE Information		IMSI:		IMEI(SV):	(--)	Power Class:		AG Mode							
UE Information																						
IMSI:																						
IMEI(SV):	(--)																					
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																					
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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>GMN State:</td> <td></td> </tr> <tr> <td>Current DPCH</td> <td></td> </tr> </tbody> </table>						Call Processing Status		Current Service Type:	None	MM Status:		GMN State:		Current DPCH		21: (134/15)*2					
Call Processing Status																						
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MM Status:																						
GMN State:																						
Current DPCH																						
Handovers	<table border="1"> <thead> <tr> <th colspan="2">HSUPA In</th> </tr> </thead> <tbody> <tr> <td>Rep EDCH Cat/</td> <td>Index 18: (95/15)*2</td> </tr> <tr> <td>Last received</td> <td>Index 19: (106/15)*2</td> </tr> <tr> <td>Throughput:</td> <td>Index 20: (119/15)*2</td> </tr> <tr> <td>Acks Transmitt</td> <td>Index 21: (134/15)*2</td> </tr> <tr> <td></td> <td>Index 22: (150/15)*2</td> </tr> <tr> <td></td> <td>Index 23: (168/15)*2</td> </tr> </tbody> </table>						HSUPA In		Rep EDCH Cat/	Index 18: (95/15)*2	Last received	Index 19: (106/15)*2	Throughput:	Index 20: (119/15)*2	Acks Transmitt	Index 21: (134/15)*2		Index 22: (150/15)*2		Index 23: (168/15)*2	Send Single Shot Absolute Grant	
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Call Information																						
OSCH Cat:	----																					
Ratio:	---- %																					
:	---- kbps																					
nsmitted:	----																					
		Active Cell				Sys Type: UTRA FDD		AG Pattern Parameters														
		Idle						Return														
1 of 5		IntRef						1 of 2														

Call Setup Screen																																			
Call Control		Active Cell Operating Mode						Call Parm																											
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	Uplink Parameters		Value																																
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Manual Uplink DPCH Bc		2																																	
Manual Uplink DPCH Bd		15																																	
Maximum Uplink Transmit Power Level		24 dBm																																	
Uplink Parameters							Channel Type																												
							12.2k + HSDPA																												
UE Rep							Paging Service																												
							RB Test Mode																												
Close Menu							HSPA Parameters																												
							34.121 Preset Call Configs																												
		Cell Off				Sys Type: UTRA FDD		Channel (UARFCN) Parm																											
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			Cur UE HS-DSCH Cat: ----				
		Last received E-TFCI: ----			Block Error Ratio: ---- %				
		Throughput: ---- kbps			Throughput: ---- kbps				
Clear UE Info		Acks Transmitted: ----			Blocks Transmitted: ----			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

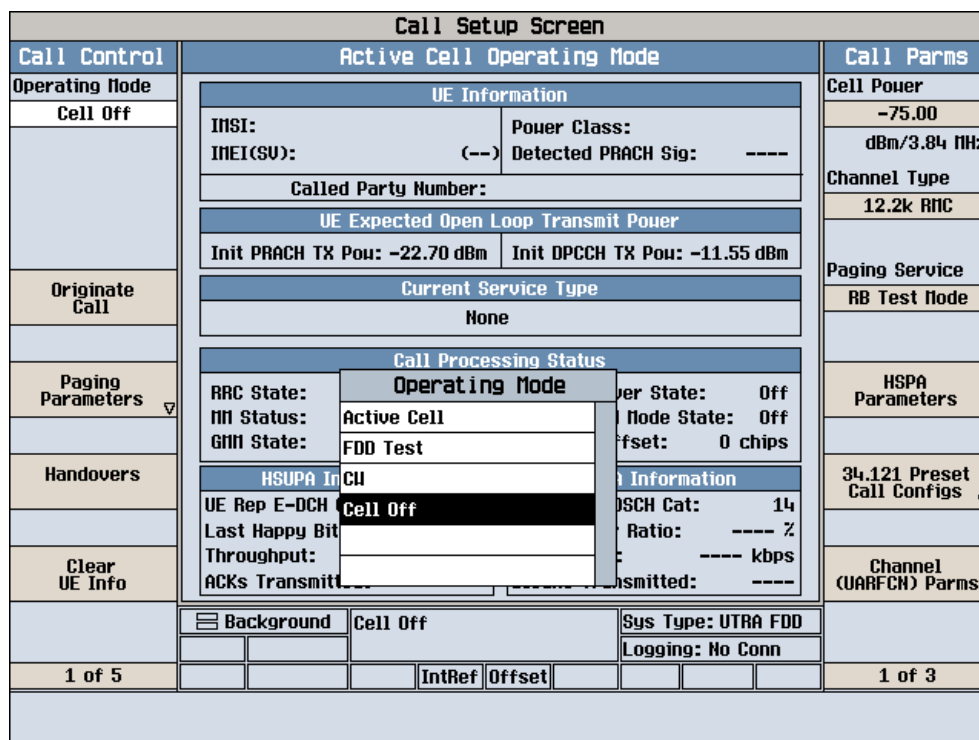
### A.9.1. Establish a DC-HSDPA RB Test Mode Connection with DL 42Mbps

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.



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	OVSF	Chan Code
OCNS Info Screen	CPICH:	Off	-3.30	256	0	Off	Off	256	0	Channel Type	
	P-CCPCH/SCH:	Off	-5.30	256	1	Off	Off	256	1	12.2k + HSDPA	
DC-HSDPA DL Code Chan Info	S-CCPCH:	Off	-10.30	64	2	Off	Off	256	2	Paging Service	
	PICH:	Off	-8.30	256	2	Off	Off	256	2	RB Test Mode	
Return	AICH:	Off	-9.90	256	3					HSPA Parameters	
	(F-)DPCH:	Off	Off	128	7					34.121 Preset Call Configs	
Return	E-AGCH:	Off	Off	256	42					Channel (UARFCN) Parms	
	E-HICH:	Off	Off	128	22					1 of 3	
Return	E-RGCH:	Off	Off	128	22					Cell Off	
	HS-SCCH 1:	Off	Off	128	2	Off	Off	128	2	Sys Type: UTRA FDD	
Return	HS-SCCH 2:	Off	Off	128	3	Off	Off	128	3	Logging: No Conn	
	HS-SCCH 3:									DBUS-INT	
Return	HS-SCCH 4:									IntRef	
	HS-PDSCHs:	Off	Off	16	1-15	Off	Off	16	1-15	Offset	
Return	Comp OCNS:	Off	Off	128	WCDMA	Off	Off	128	HSDPA	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 Params 2 of 2 -> Secondary Serv Cell Params (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 Parm		
Operating Mode	UE Information						Cell Power		
Active Cell	INSI: 001012345678901		Power Class: 4		Detected PRACH Sig: 0		-25.00 dBm/3.84 MHz		
	Called Party Number:						Channel Type		
	UE Expected Open Loop Transmit Power						12.2k + HSDPA		
	Init PRACH TX Pou: -60.00 dBm		Init DPCCH TX Pou: -11.55 dBm				Paging Service		
Originate Call	Current Service Type						RB Test Mode		
	None								
Paging Parameters	Call Processing Status						HSPA Parameters		
	RRC State: Idle		Soft Handover State: Off		Compressed Mode State: Off		34.121 Preset Call Configs		
	MM Status: None		Cur DPCH Offset: 0 chips						
	GMM State: Attached								
Handovers	HSUPA Information			HSDPA Information			Channel (UARFCN) Parm		
	Rep EDCH Cat/Ext: 6/Unrep		Cur UE HS-DSCH Cat: 24		Block Error Ratio: 0 %				
	Last Happy Bit: None		Throughput: 42101 kbps		Blocks Transmitted: 115500				
	Throughput: kbps								
Clear UE Info	ACKs Transmitted: kbps								
1 of 6	Active Cell Idle		Sys Type: UTRA FDD		Logging: No Conn		1 of 3		
	DBUS-INT		IntRef		Offset				

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

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 Parm	
DL Code Channel Info Screen	Serving Cell Primary Scrambling Code:				0				Cell Power	
	Secondary Serving Cell Primary Scrambling Code:				2				-25.00	
Generated Power Info Screen	Channel	Serving Cell DL Chan Info				Sec Cell DL Chan Info				dBm/3.84 MHz
		Level (dB)	Chan	Level (dB)	Chan	Level (dB)	Chan	Level (dB)	Chan	Channel Type
OCNS Info Screen	CPICH:	-8.00	-8.00	256	0	-8.00	-8.00	256	0	12.2k + HSDPA
	P-CCPCH/SCH:	-20.00	-20.00	256	1	-20.00	-20.00	256	1	Paging Service
DC-HSDPA DL Code Chan Info	S-CCPCH:	Off	Off	64	2					RB Test Mode
	PICH:	Off	Off	256	2	Off	Off	256	2	
Return	AICH:									
	(F-)DPCH:	-30.00	-30.00	128	7					HSPA Parameters
	E-AGCH:	Off	Off	256	42					
	E-HICH:	Off	Off	128	22					
	E-RGCH:	Off	Off	128	22					
	HS-SCCH 1:	-20.00	-20.00	128	2	-20.00	-20.00	128	2	34,121 Preset Call Configs
	HS-SCCH 2:	-20.00	-20.00	128	3	-20.00	-20.00	128	3	
	HS-SCCH 3:									
	HS-SCCH 4:									
	HS-PDSCHs:	-1.00	-1.00	16	1-15	-1.00	-1.00	16	1-15	Channel (UARFCN) Parm
	Comp OCNS:	-17.91	-17.91	128	HSDPA	-17.65	-17.65	128	HSDPA	
		Active Cell Connected				Sys Type: UTRA FDD				
		DBUS-INT				Logging: No Conn				
				IntRef	Offset					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	INSI: 001012345678901		Power Class: 4		Detected PRACH Sig: 0		-25.00 dBm/3.84 MHz		
	Called Party Number:						Channel Type		
	UE Expected Open Loop Transmit Power						12.2k + HSDPA		
	Init PRACH TX Pou: -60.00 dBm		Init DPCC TX Pou: -11.55 dBm				Paging Service		
End Call	Current Service Type						RB Test Node		
	RB Test Node - HSDPA								
	Call Processing Status						HSPA Parameters		
Paging Parameters	RRC State: CELL_DCH		Soft Handover State: Off		Compressed Mode State: Off		34.121 Preset Call Configs		
	FIN Status: None		Cur DPCH Offset: 0 chips		GMM State: Attached		Channel (UARFCN) Parm		
Handovers	HSUPA Information			HSDPA Information					
	Rep EDCH Cat/Ext: 6/Unrep		Cur UE HS-DSCH Cat: 24		Block Error Ratio: 0 %				
	Last Happy Bit: None		Throughput: 21088 kbps		Blocks Transmitted: 35000				
Clear UE Info	ACKs Transmitted: ----								
	Active Cell			Sys Type: UTRA FDD					
	Connected			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 dBm/3.84 MHz		
HSPA Information	DC-HSDPA Information						Channel Type		
			Summary		Serving Cell		Secondary Serving Cell		12.2k + HSDPA
E-TFCI Recording Information	Block Error Ratio:		0 %		0 %		---- %		Paging Service
	Throughput (kbps):		21082		21082		0		RB Test Node
	Blocks Transmitted:		66000		66000		0		
	ACKs Received:		65958		65958		0		
HSDPA Information	NACKs Received:		42		42		0		HSPA Parameters
	statDTXs Received:		0		0		0		
	Count of Rep CQI Lim:		----		----		----		
Clear UE Info	Last Received CQI:				30		30		34.121 Preset Call Configs
	Max Allowed CQI:				----		----		
	Test Node User Def TBS:				42192		42192		
	PS Data User Def TBS:				7298		7298		
Return	Last Sig Meas Pur Offs (dB):				6.0		6.0		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 Parms		
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) Parms		
Return							1 of 3		
			Active Cell			Sys Type: UTRA FDD			
			Connected			Logging: No Conn			
1 of 2		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.