

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, 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, 1800MHz, 1900MHz, 2450 MHz and 5.0 GHz dipoles.

The applicable verification normalised to 1 Watt.

System Check 900 Head

Date: 27/12/2012

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	22.1 °C	ϵ_r	41.50	40.34	-2.79	5.00
				σ	0.97	0.94	-3.34	5.00
				1g SAR	10.50	10.88	3.62	5.00
				10g SAR	6.74	7.04	4.45	5.00

Dielectrics for Frequencies Tested

Channel Number	Channel Description	Frequency (MHz)	Parameters	
128	Low	824.2	ϵ_r	40.83
			σ	0.89
190	Middle	836.6	ϵ_r	40.76
			σ	0.90
251	High	848.8	ϵ_r	40.69
			σ	0.90

Date: 28/12/2012

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	22.1 °C	ϵ_r	41.50	40.34	-2.79	5.00
				σ	0.97	0.94	-3.34	5.00
				1g SAR	10.50	10.76	2.48	5.00
				10g SAR	6.74	6.96	3.26	5.00

Dielectrics for Frequencies Tested

Channel Number	Channel Description	Frequency (MHz)	Parameters	
4132	Low	826.4	ϵ_r	40.82
			σ	0.89
4183	Middle	836.6	ϵ_r	40.76
			σ	0.90
4233	High	846.6	ϵ_r	40.70
			σ	0.90

System Check 900 Body**Date: 27/12/2012****Validation Dipole and Serial Number: D900V2; SN: 035**

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	900	24.0 °C	22.1 °C	ϵ_r	55.00	55.11	0.20	5.00
				σ	1.05	1.03	-2.20	5.00
				1g SAR	10.80	10.36	-4.07	5.00
				10g SAR	6.96	6.72	-3.45	5.00

Dielectrics for Frequencies Tested

Channel Number	Channel Description	Frequency (MHz)	Parameters	
128	Low	824.2	ϵ_r	55.40
			σ	0.98
190	Middle	836.6	ϵ_r	55.40
			σ	0.99
251	High	848.8	ϵ_r	55.30
			σ	1.00

Date: 31/12/2012**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	21.5 °C	ϵ_r	55.00	52.75	-4.08	5.00
				σ	1.05	1.04	-1.20	5.00
				1g SAR	10.80	10.76	-0.37	5.00
				10g SAR	6.96	7.00	0.57	5.00

Dielectrics for Frequencies Tested

Channel Number	Channel Description	Frequency (MHz)	Parameters	
4132	Low	826.4	ϵ_r	53.10
			σ	0.99
4183	Middle	836.6	ϵ_r	53.00
			σ	1.00
4233	High	846.6	ϵ_r	52.90
			σ	1.00

System Check 900 Body (Continued):**Date: 02/01/2013****Validation Dipole and Serial Number: D900V2; SN: 035**

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	900	23.8 °C	22.9 °C	ϵ_r	55.00	52.90	-3.82	5.00
				σ	1.05	1.04	-0.84	5.00
				1g SAR	10.80	10.72	-0.74	5.00
				10g SAR	6.96	6.96	0.00	5.00

Dielectrics for Frequencies Tested

Channel Number	Channel Description	Frequency (MHz)	Parameters	
4132	Low	826.4	ϵ_r	53.30
			σ	1.00
4183	Middle	836.6	ϵ_r	53.30
			σ	1.00
4233	High	846.6	ϵ_r	53.20
			σ	1.00

System Check 1800 Head**Date: 03/01/2013****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	21.0 °C	ϵ_r	40.00	39.38	-1.55	5.00
				σ	1.40	1.42	1.11	5.00
				1g SAR	37.20	38.84	4.41	5.00
				10g SAR	19.60	20.56	4.90	5.00

Dielectrics for Frequencies Tested

Channel Number	Channel Description	Frequency (MHz)	Parameters	
1312	Low	1712.4	ϵ_r	39.76
			σ	1.34
1412	Middle	1732.4	ϵ_r	39.66
			σ	1.35
1513	High	1752.6	ϵ_r	39.57
			σ	1.37

System Check 1800 Body**Date: 07/01/2013****Validation Dipole and Serial Number: D1800V2; SN: 264**

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	1800	22.0 °C	23.0 °C	ϵ_r				5.00
				σ				5.00
				1g SAR	37.80	39.48	4.44	5.00
				10g SAR	20.10	21.08	4.88	5.00

Dielectrics for Frequencies Tested

Channel Number	Channel Description	Frequency (MHz)	Parameters	
1312	Low	1712.4	ϵ_r	51.39
			σ	1.48
1412	Middle	1732.4	ϵ_r	51.33
			σ	1.50
1513	High	1752.6	ϵ_r	51.25
			σ	1.52

System Check 1900 Head**Date: 31/12/2012****Validation Dipole and Serial Number: D1900V2; SN: 540**

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Head	1900	23.0 °C	21.5 °C	ϵ_r	40.00	38.80	-2.99	5.00
				σ	1.40	1.46	3.98	5.00
				1g SAR	40.30	41.20	2.23	5.00
				10g SAR	21.00	21.32	1.52	5.00

Dielectrics for Frequencies Tested

Channel Number	Channel Description	Frequency (MHz)	Parameters	
512	Low	1850.2	ϵ_r	38.85
			σ	1.44
661	Middle	1880.0	ϵ_r	38.85
			σ	1.44
810	High	1909.8	ϵ_r	38.76
			σ	1.47

Dielectrics for Frequencies Tested

Channel Number	Channel Description	Frequency (MHz)	Parameters	
9262	Low	1852.4	ϵ_r	38.92
			σ	1.41
9400	Middle	1880.0	ϵ_r	38.85
			σ	1.44
9538	High	1907.6	ϵ_r	38.77
			σ	1.47

System Check 1900 Body

Date: 20/12/2012

Validation Dipole and Serial Number: D1900V2; SN: 540

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	1900	24.0 °C	23.5 °C	ϵ_r	53.30	52.00	-2.43	5.00
				σ	1.52	1.53	0.53	5.00
				1g SAR	40.70	40.00	-1.72	5.00
				10g SAR	21.60	21.48	-0.56	5.00

Dielectrics for Frequencies Tested

Channel Number	Channel Description	Frequency (MHz)	Parameters	
512	Low	1850.2	ϵ_r	52.10
			σ	1.48
661	Middle	1880.0	ϵ_r	52.00
			σ	1.51
810	High	1909.8	ϵ_r	52.00
			σ	1.54

Date: 21/12/2012

Validation Dipole and Serial Number: D1900V2; SN: 540

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	1900	24.0 °C	23.5 °C	ϵ_r	53.30	51.32	-3.72	5.00
				σ	1.52	1.49	-2.09	5.00
				1g SAR	40.70	41.20	1.23	5.00
				10g SAR	21.60	21.96	1.67	5.00

Dielectrics for Frequencies Tested

Channel Number	Channel Description	Frequency (MHz)	Parameters	
512	Low	1850.2	ϵ_r	51.50
			σ	1.44
661	Middle	1880.0	ϵ_r	51.40
			σ	1.47
810	High	1909.8	ϵ_r	51.30
			σ	1.50

Dielectrics for Frequencies Tested

Channel Number	Channel Description	Frequency (MHz)	Parameters	
9262	Low	1852.4	ϵ_r	51.50
			σ	1.45
9400	Middle	1880.0	ϵ_r	51.40
			σ	1.47
9538	High	1907.6	ϵ_r	51.30
			σ	1.50

System Check 1900 Body (Continued):

Date: 22/12/2012

Validation Dipole and Serial Number: D1900V2; SN: 540

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	1900	24.0 °C	23.5 °C	ϵ_r	53.30	51.32	-3.72	5.00
				σ	1.52	1.49	-2.09	5.00
				1g SAR	40.70	39.72	-2.41	5.00
				10g SAR	21.60	21.16	-2.04	5.00

Dielectrics for Frequencies Tested

Channel Number	Channel Description	Frequency (MHz)	Parameters	
9262	Low	1852.4	ϵ_r	51.50
			σ	1.45
9400	Middle	1880.0	ϵ_r	51.40
			σ	1.47
9538	High	1907.6	ϵ_r	51.30
			σ	1.50

System Check 2450 Head**Date: 25/02/2013****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	24.0 °C	ϵ_r	39.20	37.99	-3.09	5.00
				σ	1.80	1.83	1.86	5.00
				1g SAR	52.30	50.80	-2.87	5.00
				10g SAR	24.20	23.16	-2.30	5.00

Dielectrics for Frequencies Tested

Channel Number	Channel Description	Frequency (MHz)	Parameters	
1	Low	2412.0	ϵ_r	38.20
			σ	1.79
6	Middle	2437.0	ϵ_r	38.00
			σ	1.82
11	High	2462.0	ϵ_r	37.90
			σ	1.85

System Check 2450 Body**Date: 25/02/2013****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	ϵ_r	52.70	51.16	-2.92	5.00
				σ	1.95	1.97	1.21	5.00
				1g SAR	52.00	52.00	0.00	5.00
				10g SAR	24.10	23.44	-2.74	5.00

Dielectrics for Frequencies Tested

Channel Number	Channel Description	Frequency (MHz)	Parameters	
1	Low	2412.0	ϵ_r	51.20
			σ	1.92
6	Middle	2437.0	ϵ_r	51.20
			σ	1.96
11	High	2462.0	ϵ_r	51.10
			σ	1.99

System Check 5200/5500/5800 Head**Date: 26/02/2013****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	22.0 °C	ϵ_r	36.00	35.87	-0.36	10.00
				σ	4.66	4.57	-1.99	5.00
				1g SAR	78.10	76.90	-1.54	5.00
				10g SAR	22.30	22.20	-0.45	5.00

Dielectrics for Frequencies Tested

Channel Number	Channel Description	Frequency (MHz)	Parameters		
36	Middle	5180.0	ϵ_r	36.00	
			σ	4.57	
64	Middle	5320.0	ϵ_r	35.80	
			σ	4.71	

Date: 26/02/2013**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	22.0 °C	ϵ_r	35.60	35.39	-0.59	10.00
				σ	4.96	4.87	-1.74	5.00
				1g SAR	82.50	80.20	-2.79	5.00
				10g SAR	23.50	22.70	-3.40	5.00

Dielectrics for Frequencies Tested

Channel Number	Channel Description	Frequency (MHz)	Parameters		
64	Middle	5320.0	ϵ_r	35.80	
			σ	4.71	
104	Middle	5520.0	ϵ_r	35.60	
			σ	4.92	

Date: 26/02/2013**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	22.0 °C	ϵ_r	35.30	35.12	-0.51	10.00
				σ	5.27	5.19	-1.50	5.00
				1g SAR	77.00	77.70	0.91	5.00
				10g SAR	21.90	21.90	0.00	5.00

Dielectrics for Frequencies Tested

Channel Number	Channel Description	Frequency (MHz)	Parameters		
149	Middle	5745.0	ϵ_r	35.30	
			σ	5.18	

System Check 5200/5500/5800 Body:

Date: 26/02/2013

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	24.0 °C	ϵ_r	49.00	48.58	-0.86	10.00
				σ	5.30	5.27	-0.58	5.00
				1g SAR	75.10	77.10	2.66	5.00
				10g SAR	21.10	20.10	-4.74	5.00

Dielectrics for Frequencies Tested

Channel Number	Channel Description	Frequency (MHz)	Parameters		
36	Middle	5180.0	ϵ_r	48.55	
			σ	5.25	
64	Middle	5320.0	ϵ_r	48.30	
			σ	5.43	

Date: 26/02/2013

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	24.0 °C	ϵ_r	48.60	48.03	-1.17	10.00
				σ	5.65	5.67	0.32	5.00
				1g SAR	79.00	82.60	4.56	5.00
				10g SAR	22.00	21.60	-1.82	5.00

Dielectrics for Frequencies Tested

Channel Number	Channel Description	Frequency (MHz)	Parameters		
64	Middle	5320.0	ϵ_r	48.30	
			σ	5.43	
104	Middle	5520.0	ϵ_r	48.08	
			σ	5.69	

Date: 26/02/2013

Validation Dipole and Serial Number: D5GHzV2; SN: 1016

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	5800	23.0 °C	21.7 °C	ϵ_r	48.20	47.79	-0.85	10.00
				σ	6.00	6.04	0.59	5.00
				1g SAR	74.40	75.20	1.08	5.00
				10g SAR	20.60	20.80	0.97	5.00

Dielectrics for Frequencies Tested

Channel Number	Channel Description	Frequency (MHz)	Parameters		
149	Middle	5745.0	ϵ_r	47.81	
			σ	6.01	

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
De-Ionized Water	52.87
Polysorbate 20	46.10
Salt	1.03

Ingredient (% by weight)	Frequency
	750/835/850/900 MHz Body
De-Ionized Water	71.30
Polysorbate 20	28.00
Salt	0.70

Ingredient (% by weight)	Frequency
	1800/1900 MHz Head
De-Ionized Water	55.40
Polysorbate 20	44.22
Salt	0.38

Ingredient (% by weight)	Frequency
	1800/1900 MHz Body
De-Ionized Water	71.50
Polysorbate 20	28.00
Salt	0.50

Ingredient (% by weight)	Frequency
	2450 MHz Head
De-Ionized Water	55.75 ¹
Polysorbate 20	45.25 ¹

Ingredient (% by weight)	Frequency
	2450 MHz Body
De-Ionized Water	71.70
Polysorbate 20	28.00
Salt	0.30

Simulated Tissues (Continued)

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

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

Note(s):

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

Appendix 7. DASY4 System Details

A.7.1. DASY4 SAR Measurement System

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

A.7.2. DASY4 SAR System Specifications

Robot System	
Positioner:	Stäubli Unimation Corp. Robot Model: RX90L
Repeatability:	0.025 mm
No. of Axis:	6
Serial Number:	F00/SD89A1/A/01
Reach:	1185 mm
Payload:	3.5 kg
Control Unit:	CS7
Programming Language:	V+
Robot System	
Positioner:	Stäubli Unimation Corp. Robot Model: RX90L
Repeatability:	0.025 mm
No. of Axis:	6
Serial Number:	F01/5J86A1/A/01
Reach:	1185 mm
Payload:	3.5 kg
Control Unit:	CS7
Programming Language:	V+
Robot System	
Positioner:	Stäubli Unimation Corp. Robot Model: TX60L
Repeatability:	±0.030 mm
No. of Axis:	6
Serial Number:	F12/5MZ7A1/A/01
Reach:	920 mm
Payload:	2.0 kg
Control Unit:	CS8C
Programming Language:	V+
Data Acquisition Electronic (DAE) System	
Serial Number:	DAE3 SN:394
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 nit A/D converter for surface detection system serial link to robot direct emergency stop output for robot.
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E-Field Probe

Model:	EX3DV4
Serial No:	3814, 3871
Construction:	Triangular core
Frequency:	10 MHz to >6 GHz
Linearity:	±0.2 dB (30 MHz to 6 GHz)
Probe Length (mm):	337
Probe Diameter (mm):	10
Tip Length (mm):	9
Tip Diameter (mm):	2.5
Sensor X Offset (mm):	1
Sensor Y Offset (mm):	1
Sensor Z Offset (mm):	1

E-Field Probe

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

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

Model:	ET3DV6
Serial No:	1528, 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, Eli Phantom
Shell Material:	Fibreglass
Thickness:	2.0 ± 0.1 mm

Appendix 8. 3G Test set-up

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

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

Call Control		Call Setup Screen							
		Active Cell Operating Mode				Call Params			
Operating Mode		UE Information							
Active Cell		IMSI: _____ IMEI(SV): _____ Power Class: _____							
Originate Call		UE Expected Open Loop Transmit Power							
Paging Parameters		Initial PRACH TX Power: -60.00 dBm Initial DPCCH TX Power: -11.55 dBm							
Handovers		Call Processing Status							
Clear UE Info		Current Service Type: None IMI Status: None GMI State: None Current DPCH Offset: 0 chips							
HSUPA Information		HSOPA Information							
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: -----							
1 of 5		Active Cell Idle							
Sys Type: UTRA FDD						3G.121 Preset Call Configs			
1 of 3						Channel (VARFCN) Params			

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) Params select the correct Downlink Channel for the required UMTS FDD Band.
4. On the Call Setup Screen, under Call Parameters, press the button against HSPA Parameters. Under HSDPA Parameters on page 1, press HSDPA Uplink parameters and set the Delta ACK, Delta NACK, Delta CQI values to 8. Under HSDPA Params itself, press HSDPA RB Test Mode Setup button and then the HSDPA RB Test Mode Settings and change HS-DSCH Data Pattern to All Ones.

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

Figure 2: HSDPA Parameters

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

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

Figure 3: DL DTCH Data Params

Figure 4: UL CL Power Ctrl Parameters

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

Call Setup Screen						
Call Control	Active Cell Operating Mode					CallParms
Additional Screens	UE Information					
	IMSI: _____ IMEI(SU): _____ Power Class: _____					
Cell Parameters	UE Expected Open Loop Transmit Power					
Generator Info	Initial PRACH TX Power: -60.00 dBm Initial DPCCH TX Power: -11.55 dBm					
	Cell Parameters			Value		
Uplink Parameters	BCCH Update Page			Inhibit		
	PS Domain Information			Absent		
	MCC (Mobile Country Code)			1		
	MNC (Mobile Network Code)			1		
UE Report Ideas	MNC (Mobile Network Code) Length			Auto		
	LAC (Local Area Code)			1		
	RAC (Routing Area Code)			1		
Close Menu	Cell Identity			1		
		Active Cell Idle			Sys Type: UTRA FDD	
2 of 5		IntRef				
						1 of 3

Figure 5: Cell Parameters

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

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

Figure 6: Uplink Parameters

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

Call Setup Screen			
Call Control	Active Cell Operating Mode		CallParms
Additional Screens	UE Information		Cell Power -35.00 dBm/3.84 MHz
Cell Parameters	IMSI: IMEI(SV): (--) Power Class:		Channel Type 12.2k RMC
Generator Info	UE Expected Open Loop Transmit Power		Paging Service RB Test Node
Uplink Parameters	Initial PRACH TX Power: -60.00 dBm Initial DPCCH TX Power: -11.55 dBm		HSPA Parameters
UE Rep Meas	RB Test Mode Settings Value		34.121 Preset Call Configs
Close Menu	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 (UARFCN) Params
3 of 5	Active Cell Idle Sys Type: UTRA FDD		1 of 3

Figure 7: RB Test Mode Settings

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

8.2. Steps for 12.2k RMC + HSDPA/HSUPA

1. Most of the steps to be followed are as in the case of 12.2k RMC however, some of the settings need to be changed. The Channel Type is changed to 12.2k RMC+HSDPA or 12.2k RMC+HSUPA as required.
2. For HSDPA and HSUPA, the settings remain same as the case for RMC but the PS Domain is made Present for Cell Parameters (Figure 5) and RB Test Mode Setup (Figure 7).
3. The following tables taken from FCC 3G SAR procedures (KDB 941225 D01 SAR test for 3G devices v02) below were applied to the Agilent 8960 series 10 wireless communications test set which supports 3G / HSDPA release 5 / HSUPA release 6.

Sub-test 1 Setup for Release 5 HSDPA						
Sub-test	β_c	β_d	B_d (SF)	β_c / β_d	$\beta_{hs}^{(1)}$	SM (dB) ⁽²⁾
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15 ⁽³⁾	15/15 ⁽³⁾	64	12/15 ⁽³⁾	24/15	1.0
3	15/15	8/15	64	15/8	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5

Note 1: $\Delta_{ACK}, \Delta_{NACK}$ 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 _{alt1} : 47/15 B _{alt2} : 47/15	4	1	2.0	1.0	15	92
4	2/15	15/15	64	2/15	2/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 ⁽⁴⁾	15/15 ⁽⁴⁾	64	15/15 ⁽⁴⁾	24/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: $\Delta_{ACK}, \Delta_{NACK}$ 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		UE Information						AG Mode																			
Active Cell		IMSI: (--)						Single Shot																			
Originate Call		IMEI(SU): (--)						Single Shot AG																			
Paging Parameters		Power Class: (--)						21: (134/15)^2																			
Handovers		UE Expected Open Loop Transmit Power						Send Single Shot Absolute Grant																			
Clear UE Info		Initial PRACH TX Power: -60.00 dBm Initial DPCCH TX Power: -11.55 dBm						RB Setup AG																			
1 of 5		Call Processing Status						33: 4(134/15)^2																			
		<table border="1"> <tr> <td>Current Service Type:</td> <td>None</td> </tr> <tr> <td>IMI Status:</td> <td>Abs Single Shot AG</td> </tr> <tr> <td>GMI State:</td> <td>Index 18: (95/15)^2</td> </tr> <tr> <td>Current DPCCH</td> <td>Index 19: (106/15)^2</td> </tr> <tr> <td>HSUPA In</td> <td>Index 20: (119/15)^2</td> </tr> <tr> <td>Rep EDCH Cat/B</td> <td>Index 21: (134/15)^2</td> </tr> <tr> <td>Last received</td> <td>Index 22: (150/15)^2</td> </tr> <tr> <td>Throughput:</td> <td>Index 23: (168/15)^2</td> </tr> <tr> <td>Acks Transmitt</td> <td>-----</td> </tr> </table>						Current Service Type:	None	IMI Status:	Abs Single Shot AG	GMI State:	Index 18: (95/15)^2	Current DPCCH	Index 19: (106/15)^2	HSUPA In	Index 20: (119/15)^2	Rep EDCH Cat/B	Index 21: (134/15)^2	Last received	Index 22: (150/15)^2	Throughput:	Index 23: (168/15)^2	Acks Transmitt	-----	AG Pattern Parameters	
Current Service Type:	None																										
IMI Status:	Abs Single Shot AG																										
GMI State:	Index 18: (95/15)^2																										
Current DPCCH	Index 19: (106/15)^2																										
HSUPA In	Index 20: (119/15)^2																										
Rep EDCH Cat/B	Index 21: (134/15)^2																										
Last received	Index 22: (150/15)^2																										
Throughput:	Index 23: (168/15)^2																										
Acks Transmitt	-----																										
		<table border="1"> <tr> <td>Active Cell</td> <td>Idle</td> <td>Sys Type: UTRA FDD</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>						Active Cell	Idle	Sys Type: UTRA FDD							Return										
Active Cell	Idle	Sys Type: UTRA FDD																									
		1 of 2																									

Call Setup Screen																											
Call Control		Active Cell Operating Mode						CallParms																			
Additional Screens		UE Information						Cell Power																			
Cell Parameters		IMSI: (--)						-35.00																			
Generator Info		IMEI(SU): (--)						dBm/3.84 MHz																			
Uplink Parameters		Power Class: (--)						Channel Type																			
UE Rep Meas		UE Expected Open Loop Transmit Power						12.2k + HSDPA																			
Close Menu		<table border="1"> <tr> <th>Uplink Parameters</th> <th>Value</th> </tr> <tr> <td>PRACH Preambles</td> <td>64</td> </tr> <tr> <td>PRACH Ramping Cycles(MAX)</td> <td>2</td> </tr> <tr> <td>Available Subchannels (Bit Mask)</td> <td>00000000000001</td> </tr> <tr> <td>Uplink DPCH Scrambling Code</td> <td>0</td> </tr> <tr> <td>Uplink DPCH Bc/Bd Control</td> <td>Manual</td> </tr> <tr> <td>Manual Uplink DPCH Bc</td> <td>2</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> </table>						Uplink Parameters	Value	PRACH Preambles	64	PRACH Ramping Cycles(MAX)	2	Available Subchannels (Bit Mask)	00000000000001	Uplink DPCH Scrambling Code	0	Uplink DPCH Bc/Bd Control	Manual	Manual Uplink DPCH Bc	2	Manual Uplink DPCH Bd	15	Maximum Uplink Transmit Power Level	24 dBm	HSPA Parameters	
Uplink Parameters	Value																										
PRACH Preambles	64																										
PRACH Ramping Cycles(MAX)	2																										
Available Subchannels (Bit Mask)	00000000000001																										
Uplink DPCH Scrambling Code	0																										
Uplink DPCH Bc/Bd Control	Manual																										
Manual Uplink DPCH Bc	2																										
Manual Uplink DPCH Bd	15																										
Maximum Uplink Transmit Power Level	24 dBm																										
2 of 5		<table border="1"> <tr> <td>Cell Off</td> <td>Sys Type: UTRA FDD</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </table>						Cell Off	Sys Type: UTRA FDD					34.121 Preset Call Configs													
Cell Off	Sys Type: UTRA FDD																										
		1 of 3						Channel (UARFCN)Parms																			

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

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

Figure 8: Serving Grant Example

Appendix 9. CAT24 Test set-up

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

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

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

A.9.1.1 Configure 8960

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

Call Setup Screen		
Call Control	Active Cell Operating Mode	Call Params
Operating Node	UE Information	Cell Power
Cell Off	IMSI: Power Class: IMEI(SU): (--) Detected PRACH Sig: -----	-75.00 dBm/3.84 kHz
Originate Call	Called Party Number:	Channel Type
Paging Parameters	UE Expected Open Loop Transmit Power	12.2k RMC
	Init PRACH TX Pow: -22.70 dBm Init DPCCH TX Pow: -11.55 dBm	
Handovers	Current Service Type	Paging Service
	None	RB Test Node
Clear UE Info	Call Processing Status	HSPA Parameters
	RRC State: Operating Mode Sver State: Off	
	IMI Status: Active Cell Node State: Off	
	GMI Status: FDD Test Offset: 0 chips	
	HSUPA Info CU Information	34.121 Preset Call Configs
	UE Rep E-DCH Cell Off DSCH Cat: 14	
	Last Happy Bit Ratio: ----- %	
	Throughput: ----- kbps	
	ACKs Transmitt: -----	
	Background Cell Off Sys Type: UTRA FDD	Channel (UARFCN) Params
1 of 5	IntRef Offset Logging: No Conn	
		1 of 3

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 Channel 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										CallParms	
	Serving Cell Primary Scrambling Code: 0					Secondary Serving Cell Primary Scrambling Code: 2						
DL Code Channel Info Screen	Channel	Serving Cell DL Chan Info			Sec Cell DL Chan Info			Serving Cell DL Chan Info			Cell Power	
Generated Power Info Screen	Channel	Level (dB)	Chan	Current	Desired	OVSF	Code	Level (dB)	Chan	Current	Desired	dBm/3.84 MHz
DC-HSDPA DL Code Chan Info	CPICH:	Off	-3.30	256	0			Off	Off	256	0	12.2k + HSDPA
	P-CCPCH/SCH:	Off	-5.30	256	1			Off	Off	256	1	Paging Service
OCNS Info Screen	S-CCPCH:	Off	-10.30	64	2			Off	Off	256	2	RB Test Mode
	PICH:	Off	-8.30	256	2			Off	Off	256	2	HSPA Parameters
	AICH:	Off	-9.90	256	3			Off	Off	128	2	34.121 Preset Call Configs
	(F-)DPCH:	Off	Off	128	7			Off	Off	128	2	
	E-AGCH:	Off	Off	256	42			Off	Off	128	3	
	E-HICH:	Off	Off	128	22			Off	Off	128	3	
	E-RGCH:	Off	Off	128	22			Off	Off	128	3	
	HS-SCCH 1:	Off	Off	128	2			Off	Off	128	2	
	HS-SCCH 2:	Off	Off	128	3			Off	Off	128	3	
	HS-SCCH 3:	Off	Off	128	2			Off	Off	128	3	
	HS-SCCH 4:	Off	Off	128	2			Off	Off	128	3	
	HS-PDSCHs:	Off	Off	16	1-15			Off	Off	16	1-15	Channel (UARFCN) Params
	Comp OCNS:	Off	Off	128	WCDMA			Off	Off	128	HSDPA	
Return		Cell Off		Sys Type: UTRA FDD			Logging: No Conn					
		DBUS-INT		IntRef	Offset							1 of 3

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

First of all, you must know the maximum data rate of the device under test according to its category and the key factors to achieve the maximum date 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: CallParms 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 DPCP Loopback State = On

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

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

b) Set up the Serving Cell Parameters

Path: F10

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

c) Set up the Secondary Serving Cell Parameters

Path: **F11**

- **RB Test User Def Secondary Cell 64QAM State =On**
- **RBTM User Def Sec Cell Active HS-PDSCHs = 15**
- **RBTM User Def Sec Cell TB Size Index = 62**
- **RBTM User Def Sec Cell Modulation Type =64QAM**
- **RBTM User Def Sec Cell Inter-TTI Interval = 1**

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

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

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

Path: *CALL SETUP -> F7*

f) Set the HSDPA Conn DL Channel Levels

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

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

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

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

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

Call Setup Screen									
Call Control		Active Cell Operating Mode						CallParms	
Operating Mode		UE Information						Cell Power	
Active Cell		IMSI: 001012345678901 Power Class: 4 IMEI(SV):352358040214948(--) Detected PRACH Sig: 0						-25.00 dBm/3.84 MHz	
Originate Call		Called Party Number:						Channel Type	
Paging Parameters		UE Expected Open Loop Transmit Power						12.2k + HSDPA	
Handovers		Init PRACH TX Pow: -60.00 dBm Init DPCCH TX Pow: -11.55 dBm						Paging Service	
Clear UE Info		Current Service Type						RB Test Node	
1 of 6		None						HSPA Parameters	
		Call Processing Status						34.121 Preset Call Configs	
		RRC State: Idle Soft Handover State: Off M1 Status: None Compressed Mode State: Off GMM State: Attached Cur DPCH Offset: 0 chips						Channel (UARFCN)Parms	
		HSUPA Information						34.121 Preset Call Configs	
		Rep EDCH Cat/Ext: 6/Unrep Cur UE HS-DSCH Cat: 24 Last Happy Bit: None Block Error Ratio: ---- % Throughput: ---- kbps Throughput: ---- kbps ACKs Transmitted: ---- Blocks Transmitted: ----						1 of 3	
		Active Cell Sys Type: UTRA FDD Idle Logging: No Conn							
		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

- Now, Originate an RB Test call with DC-HSDPA by pressing „**F3**“ from the main Call Setup screen.
- 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						CallParms	
Operating Mode		UE Information						Cell Power	
Active Cell		IMSI: 001012345678901 Power Class: 4 IMEI(SV):352358040214948(--) Detected PRACH Sig: 0						-25.00 dBm/3.84 MHz	
End Call		Called Party Number:						Channel Type	
Paging Parameters		UE Expected Open Loop Transmit Power						12.2k + HSDPA	
Handovers		Init PRACH TX Pow: -60.00 dBm Init DPCCH TX Pow: -11.55 dBm						Paging Service	
Clear UE Info		Current Service Type						RB Test Node	
1 of 6		RB Test Node - HSDPA						HSPA Parameters	
		Call Processing Status						34.121 Preset Call Configs	
		RRC State: CELL_DCH Soft Handover State: Off M1 Status: None Compressed Mode State: Off GMM State: Attached Cur DPCH Offset: 0 chips						1 of 3	
		HSUPA Information						Channel (UARFCN)Parms	
		Rep EDCH Cat/Ext: 6/Unrep Cur UE HS-DSCH Cat: 24 Last Happy Bit: None Block Error Ratio: 0 % Throughput: 42101 kbps Throughput: 115500 ACKs Transmitted: ---- Blocks Transmitted: ----							
		Active Cell Sys Type: UTRA FDD Connected Logging: No Conn							
		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**).*

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						CallParms			
Operating Mode		UE Information				Cell Power					
Active Cell		IMSI: 001012345678901 Power Class: 4				-25.00					
		IMEI(SV):352358040214948(--) Detected PRACH Sig: 0				dBm/3.84 MHz					
End Call		Called Party Number:				Channel Type					
Paging Parameters		UE Expected Open Loop Transmit Power				12.2k + HSDPA					
Handovers		Init PRACH TX Pow: -60.00 dBm Init DPCCH TX Pow: -11.55 dBm				Paging Service					
Clear UE Info		Current Service Type				RB Test Node					
		RB Test Node - HSDPA				HSPA Parameters					
		Call Processing Status				34.121 Preset Call Configs					
		RRC State: CELL_DCH Soft Handover State: Off				Channel (UARFCN)Parms					
		MM Status: None Compressed Mode State: Off									
		GM State: Attached Cur DPCH Offset: 0 chips									
		HSUPA Information									
		Rep EDCH Cat/Ext: 6/Unrep Cur UE HS-DSCH Cat: 24									
		Last Happy Bit: None Block Error Ratio: 0 %									
		Throughput: ---- kbps Throughput: 21088 kbps									
		ACKs Transmitted: ---- Blocks Transmitted: 35000									
		Active Cell Connected				1 of 3					
1 of 6		DBUS-INT IntRef Offset									

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						CallParms			
Channel (UARFCN) Info		Secondary Serving Cell Status				Cell Power					
HSPA Information		Current Secondary Serving Cell Status: Configured-Inactive				-25.00					
E-TFCI Recording Information		DC-HSDPA Information				dBm/3.84 MHz					
HSDPA Information		Summary Serving Cell Secondary Serving Cell				Channel Type					
Clear UE Info		Block Error Ratio: 0 % 0 % ---- %				12.2k + HSDPA					
Return		Throughput (kbps): 21082 21082 0				Paging Service					
1 of 2		Blocks Transmitted: 66000 66000 0				RB Test Node					
		ACKs Received: 65958 65958 0				HSPA Parameters					
		NACKs Received: 42 42 0				34.121 Preset Call Configs					
		statDTXs Received: 0 0 0				Channel (UARFCN)Parms					
		Count of Rep CQI Lim: ---- ---- ----									
		Last Received CQI: 30 30 30									
		Max Allowed CQI: ---- ---- ----									
		Test Node User Def TBS: 42192 42192									
		PS Data User Def TBS: 7298 7298									
		Last Sig Neas Pur Offs (dB): 6.0 6.0									
		Active Cell Connected				1 of 3					
		DBUS-INT IntRef Offset									

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		CallParms
Channel (UARFCN) Info	Secondary Serving Cell Status		
	Current Secondary Serving Cell Status: Configured-Active		
HSPA Information	DC-HSDPA Information		Cell Power
E-TFCI Recording Information	Summary	Serving Cell	-25.00
HSDPA Information	Block Error Ratio:	0 %	dBm/3.84 MHz
Clear UE Info	Throughput (kbps):	41996	12.2k + HSDPA
	Blocks Transmitted:	11000	
Return	ACKs Received:	10949	Paging Service
	NACKs Received:	5956	RB Test Node
1 of 2	statDTXs Received:	51	
	Count of Rep CQI Lim:	0	HSPA Parameters
	Last Received CQI:	30	34.121 Preset Call Configs
	Max Allowed CQI:	30	▼
	Test Node User Def TBS:	42192	
	PS Data User Def TBS:	7298	
	Last Sig Ieas Pur Offs (dB):	6.0	Channel (UARFCN) Params
			1 of 3

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.