



SAR TEST REPORT

No. I16Z40966-SEM01

For

TCL Communication Ltd.

GSM Quad band/UMTS Tri-band/LTE 4-band mobile phone

Model name: 4060A

With

Hardware Version: 02

Software Version: M5BUAB4

FCC ID: 2ACCJB039

Issued Date: 2016-05-30



Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

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REPORT HISTORY

Report Number	Revision	Issue Date	Description
I16Z40966-SEM01	Rev.0	2016-05-25	Initial creation of test report
I16Z40966-SEM01	Rev.1	2016-05-30	Add the description of Product dimension in table 4.1

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1 Test Laboratory

1.1 Testing Location

Company Name:	CTTL(Shouxiang)
Address:	No. 51 Shouxiang Science Building, Xueyuan Road, Haidian District, Beijing, P. R. China100191

1.2 Testing Environment

Temperature:	18°C~25 °C,
Relative humidity:	30%~ 70%
Ground system resistance:	< 0.5 Ω
Ambient noise & Reflection:	< 0.012 W/kg

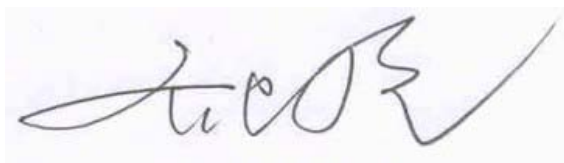
1.3 Project Data

Project Leader:	Qi Dianyuan
Test Engineer:	Lin Xiaojun
Testing Start Date:	January 8, 2016
Testing End Date:	May 14, 2016

1.4 Signature



Lin Xiaojun
(Prepared this test report)



Qi Dianyuan
(Reviewed this test report)



Xiao Li
Deputy Director of the laboratory
(Approved this test report)

2 Statement of Compliance

This EUT is a variant product and the report of original sample is No.I15Z43178-SEM01. According to the client request, we quote the test results of original sample and do the spot check for the Head. The Body SAR will be all tested in the report. And delete the LTE Band17. The results of spot check are presented in the annex I.

The maximum results of SAR found during testing for TCL Communication Ltd. GSM Quad band/UMTS Tri-band/LTE 4-band mobile phone 4060A are as follows:

Table 2.1: Highest Reported SAR (1g)

Exposure Configuration	Technology Band	Highest Reported SAR 1g (W/Kg)	Equipment Class
Head (Separation Distance 0mm)	GSM 850	0.39	PCE
	PCS 1900	0.39	
	UMTS FDD 2	0.76	
	UMTS FDD 4	0.59	
	UMTS FDD 5	0.44	
	LTE Band 2	0.78	
	LTE Band 4	0.74	
	LTE Band 5	0.44	
	LTE Band 12	0.33	
	WLAN 2.4 GHz	1.25	DTS
Body-worn (Separation Distance 10mm)	GSM 850	0.79	PCE
	PCS 1900	1.18	
	UMTS FDD 2	1.04	
	UMTS FDD 4	1.14	
	UMTS FDD 5	0.48	
	LTE Band 2	1.27	
	LTE Band 4	1.26	
	LTE Band 5	0.52	
	LTE Band 12	0.52	
	WLAN 2.4 GHz	0.29	DTS
Body-worn (Data) (Separation Distance 15mm)	UMTS FDD 2	0.63	PCE
	LTE Band2	0.79	

The SAR values found for the Mobile Phone are below the maximum recommended levels of 1.6 W/Kg as averaged over any 1g tissue according to the ANSI C95.1-1992.

For body worn operation, this device has been tested and meets FCC RF exposure guidelines when used with any accessory that contains no metal and which provides a minimum separation distance of 10 mm or 15mm between this device and the body of the user. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.

The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output.

The measurement together with the test system set-up is described in annex C of this test report. A detailed description of the equipment under test can be found in chapter 4 of this test report.

The highest reported SAR value is obtained at the case of (**Table 2.1**), and the values are: **1.27 W/kg (1g)**.

Table 2.2: The sum of reported SAR values for main antenna and WLAN

	Band	Position	Main antenna	WLAN	Sum	Distance (mm)	Ratio
Maximum reported SAR value for Head	LTE Band 2	Left hand, Touch cheek	0.78	0.58	1.36	/	/
	GSM 850	Right hand, Touch cheek	0.37	1.25	1.62	69.9	0.03
	LTE Band 5		0.37	1.25	1.62	64.9	0.03
Maximum reported SAR value for Body	LTE Band 4	Rear	1.26	0.29	1.55	/	/
	LTE Band 2	Bottom	1.27	/	1.27	/	/

According to the KDB 447498 D01, when the sum of SAR is larger than the limit, SAR test exclusion is determined by the SAR to peak location separation ratio. The ratio is determined by $(SAR1 + SAR2)^{1.5}/R_i$, rounded to two decimal digits, and must be ≤ 0.04 for all antenna pairs in the configuration to qualify for 1-g SAR test exclusion.

Table 2.3: The sum of reported SAR values for main antenna and Bluetooth

	Position	Main antenna	BT*	Sum
Highest reported SAR value for Head	Left hand, Touch cheek	0.78	0.17	0.95
Highest reported SAR value for Body	Rear	1.26	0.08	1.34

BT* - Estimated SAR for Bluetooth (see the table 13.3)

According to the above tables, the highest sum of reported SAR values is **1.62 W/kg (1g)**. The detail for simultaneous transmission consideration is described in chapter 13.

3 Client Information

3.1 Applicant Information

Company Name:	TCL Communication Ltd.
Address /Post:	5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area Shanghai, P.R. China. 201203
City:	Shanghai
Postal Code:	201203
Country:	China
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Email:	zhizhou.gong@tcl.com
Telephone:	0086-21-31363544
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3.2 Manufacturer Information

Company Name:	TCL Communication Ltd.
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City:	Shanghai
Postal Code:	201203
Country:	China
Contact Person:	Gong Zhizhou
Email:	zhizhou.gong@tcl.com
Telephone:	0086-21-31363544
Fax:	0086-21-61460602

4 Equipment Under Test (EUT) and Ancillary Equipment (AE)

4.1 About EUT

Description:	GSM Quad band/UMTS Tri-band/LTE 4-band mobile phone
Model name:	4060A
Operating mode(s):	GSM 850/900/1800/1900, WCDMA 850/1700/1900 BT, Wi-Fi, LTE Band 2/4/5/12
Tested Tx Frequency:	825 – 848.8 MHz (GSM 850)
	1850.2 – 1910 MHz (GSM 1900)
	826.4–846.6 MHz (WCDMA850 Band V)
	1712.4 – 1752.6 MHz (WCDMA 1700 Band IV)
	1852.4–1907.6 MHz (WCDMA1900 Band II)
	1860 – 1900 MHz (LTE Band 2)
	1720 – 1745 MHz (LTE Band 4)
	824.7 – 848.3 MHz (LTE Band 5)
	699.7 – 715.3 MHz (LTE Band 12)
	2412 – 2462 MHz (Wi-Fi 2.4G)
GPRS/EGPRS Multislot Class:	33
GPRS capability Class:	B
Test device Production information:	Production unit
Device type:	Portable device
Antenna type:	Integrated antenna
Accessories/Body-worn configurations:	Headset
Hotspot mode:	Support
Product dimension	Long 132.2mm ;Wide 65.1mm ; Diagonal 147.36mm

4.2 Internal Identification of EUT used during the test

EUT ID*	IMEI	HW	SW Version
EUT1	014514000001473	PIO	vE7G
EUT2	014514000001440	PIO	vE7G
EUT3	014514000001424	PIO	vE7G
EUT4	014514000001101	PIO	vE7G
EUT5	014514000001457	PIO	vE7G
EUT6	014699000001811	02	M5BUAB4
EUT7	014699000001829	02	M5BUAB4
EUT8	014699000001803	02	M5BUAB4

*EUT ID: is used to identify the test sample in the lab internally.

Note: It is performed to test SAR with the EUT1&2&3 and conducted power with the EUT4&5.

It is performed to test new SAR with the EUT6&7 and conducted power with the EUT8.

4.3 Internal Identification of AE used during the test

AE ID*	Description	Model	SN	Manufacturer
AE1	Battery	CAB1780002C1	/	BYD

*AE ID: is used to identify the test sample in the lab internally.

5 TEST METHODOLOGY

5.1 Applicable Limit Regulations

ANSI C95.1–1992: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

It specifies the maximum exposure limit of **1.6 W/kg** as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

5.2 Applicable Measurement Standards

IEEE 1528–2013: Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.

KDB447498 D01: General RF Exposure Guidance v06: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

KDB648474 D04 Handset SAR v01r03: SAR Evaluation Considerations for Wireless Handsets.

KDB941225 D01 SAR test for 3G devices v03r01: SAR Measurement Procedures for 3G Devices

KDB941225 D05 SAR for LTE Devices v02r05: SAR Evaluation Considerations for LTE Devices

KDB941225 D06 Hotspot Mode SAR v02r01: SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities

KDB248227 D01 802.11 Wi-Fi SAR v02r02: SAR GUIDANCE FOR IEEE 802.11 (Wi-Fi) TRANSMITTERS

KDB865664 D01 SAR measurement 100 MHz to 6 GHz v01r04: SAR Measurement Requirements for 100 MHz to 6 GHz.

KDB865664 D02 RF Exposure Reporting v01r02: RF Exposure Compliance Reporting and Documentation Considerations

6 Specific Absorption Rate (SAR)

6.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

6.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

$$SAR = \frac{d}{dt} \left(\frac{dW}{dm} \right) = \frac{d}{dt} \left(\frac{dW}{\rho dv} \right)$$

SAR is expressed in units of Watts per kilogram (W/kg)

SAR measurement can be either related to the temperature elevation in tissue by

$$SAR = c \left(\frac{\delta T}{\delta t} \right)$$

Where: C is the specific heat capacity, δT is the temperature rise and δt is the exposure duration, or related to the electrical field in the tissue by

$$SAR = \frac{\sigma |E|^2}{\rho}$$

Where: σ is the conductivity of the tissue, ρ is the mass density of tissue and E is the RMS electrical field strength.

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

7 Tissue Simulating Liquids

7.1 Targets for tissue simulating liquid

Table 7.1: Targets for tissue simulating liquid

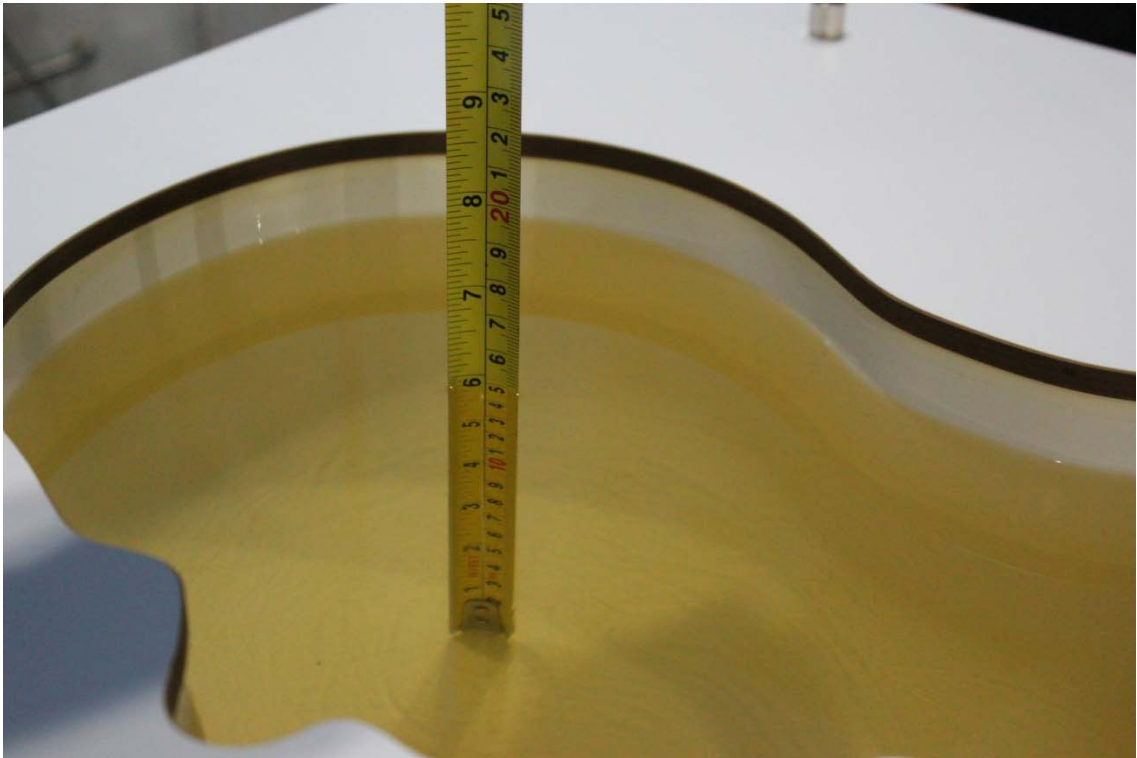
Frequency(MHz)	Liquid Type	Conductivity(σ)	$\pm 5\%$ Range	Permittivity(ϵ)	$\pm 5\%$ Range
750	Head	0.89	0.85~0.93	41.94	39.8~44.0
750	Body	0.96	0.91~1.01	55.5	52.7~58.3
835	Head	0.90	0.86~0.95	41.5	39.4~43.6
835	Body	0.97	0.92~1.02	55.2	52.4~58.0
1750	Head	1.37	1.30~1.44	40.08	38.1~42.1
1750	Body	1.49	1.42~1.56	53.4	50.7~56.1
1900	Head	1.40	1.33~1.47	40.0	38.0~42.0
1900	Body	1.52	1.44~1.60	53.3	50.6~56.0
2450	Head	1.80	1.71~1.89	39.2	37.2~41.2
2450	Body	1.95	1.85~2.05	52.7	50.1~55.3

7.2 Dielectric Performance

Table 7.2: Dielectric Performance of Tissue Simulating Liquid

Measurement Date (yyyy-mm-dd)	Type	Frequency	Permittivity ϵ	Drift (%)	Conductivity σ (S/m)	Drift (%)
2016-01-08	Head	750 MHz	43.08	2.72	0.912	2.47
	Body	750 MHz	56.98	2.67	0.946	-1.46
2016-01-11	Head	835 MHz	41.85	0.84	0.915	1.67
	Body	835 MHz	54.75	-0.82	0.96	-1.03
2016-01-12	Head	1750 MHz	41.41	3.32	1.351	-1.39
	Body	1750 MHz	54.14	1.39	1.459	-2.08
2016-01-13	Head	1900 MHz	40.64	1.60	1.394	-0.43
	Body	1900 MHz	54.59	2.42	1.506	-0.92
2016-01-14	Head	2450 MHz	39.65	1.15	1.817	0.94
	Body	2450 MHz	54.48	3.38	2.006	2.87
2016-05-10	Head	750 MHz	43.11	2.79	0.923	3.71
	Body	750 MHz	56.98	2.67	0.946	-1.46
2016-05-11	Head	835 MHz	41.22	-0.67	0.923	2.56
	Body	835 MHz	56.36	2.10	0.946	-2.47
2016-05-12	Head	1750 MHz	39.65	-1.07	1.351	-1.39
	Body	1750 MHz	52.78	-1.16	1.481	-0.60
2016-05-13	Head	1900 MHz	39.88	-0.30	1.436	2.57
	Body	1900 MHz	54.23	1.74	1.561	2.70
2016-05-14	Head	2450 MHz	38.55	-1.66	1.834	1.89
	Body	2450 MHz	51.68	-1.94	1.982	1.64

Note: The liquid temperature is 22.0 °C



Picture 7-1: Liquid depth in the Head Phantom (750 MHz)



Picture 7-2: Liquid depth in the Flat Phantom (750 MHz)



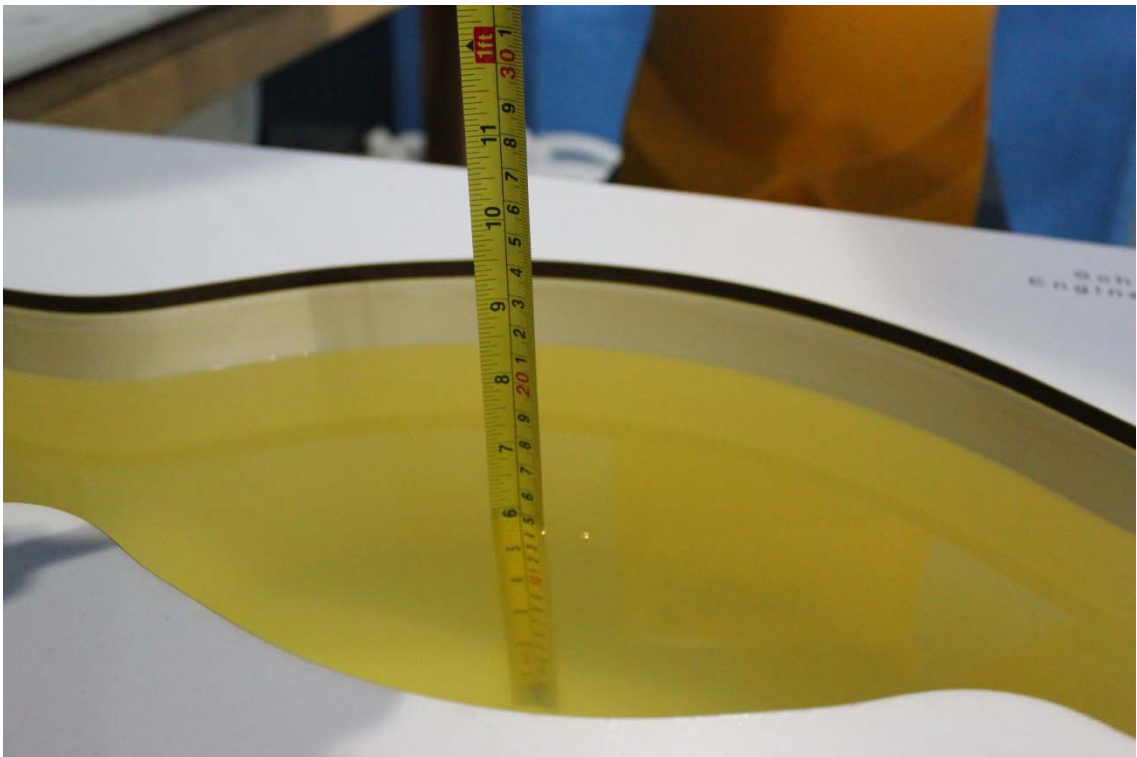
Picture 7-3: Liquid depth in the Head Phantom (835 MHz)



Picture 7-4: Liquid depth in the Flat Phantom (835 MHz)



Picture 7-5: Liquid depth in the Head Phantom (1750 MHz)



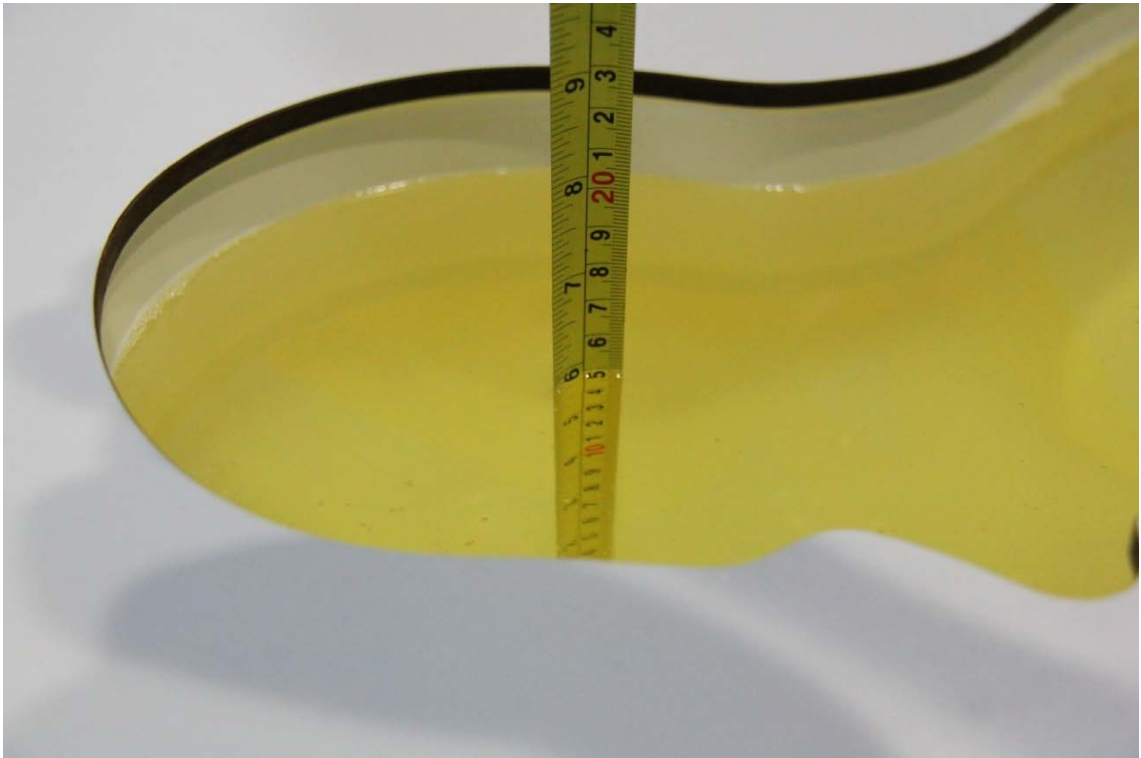
Picture 7-6 Liquid depth in the Flat Phantom (1750MHz)



Picture 7-7: Liquid depth in the Head Phantom (1900 MHz)



Picture 7-8 Liquid depth in the Flat Phantom (1900MHz)



Picture 7-9 Liquid depth in the Head Phantom (2450MHz)

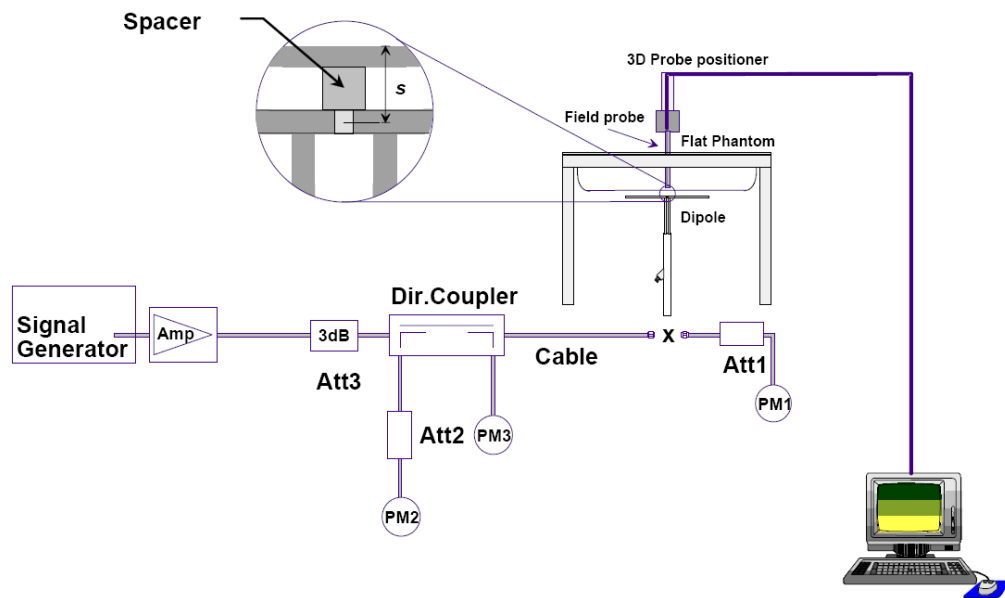


Picture 7-10 Liquid depth in the Flat Phantom (2450MHz)

8 System verification

8.1 System Setup

In the simplified setup for system evaluation, the DUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave that comes from a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The equipment setup is shown below:



Picture 8.1 System Setup for System Evaluation



Picture 8.2 Photo of Dipole Setup

8.2 System Verification

SAR system verification is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device. The system verification results are required that the area scan estimated 1-g SAR is within 3% of the zoom scan 1-g SAR. The details are presented in annex B.

Table 8.1: System Verification of Head

Measurement Date (yyyy-mm-dd)	Frequency	Target value (W/kg)		Measured value (W/kg)		Deviation	
		10 g Average	1 g Average	10 g Average	1 g Average	10 g Average	1 g Average
2016-01-08	750 MHz	5.33	8.15	5.40	8.28	1.31%	1.60%
2016-01-11	835 MHz	5.86	9.01	5.88	9.08	0.34%	0.78%
2016-01-12	1750 MHz	19.9	36.9	19.60	36.48	-1.51%	-1.14%
2016-01-13	1900 MHz	21.5	40.7	21.72	41.40	1.02%	1.72%
2016-01-14	2450 MHz	24.5	52.5	24.48	52.44	-0.08%	-0.11%
2016-05-10	750 MHz	5.33	8.15	5.40	8.28	1.31%	1.60%
2016-05-11	835 MHz	5.86	9.01	5.92	9.20	1.02%	2.11%
2016-05-12	1750 MHz	19.9	36.9	19.36	36.60	-2.71%	-0.81%
2016-05-13	1900 MHz	21.5	40.7	21.52	41.60	0.09%	2.21%
2016-05-14	2450 MHz	24.5	52.5	24.16	52.80	-1.39%	0.57%

Table 8.2: System Verification of Body

Measurement Date (yyyy-mm-dd)	Frequency	Target value (W/kg)		Measured value (W/kg)		Deviation	
		10 g Average	1 g Average	10 g Average	1 g Average	10 g Average	1 g Average
2016-05-10	750 MHz	5.6	8.49	5.80	8.84	3.57%	4.12%
2016-05-11	835 MHz	6.12	9.29	6.16	9.52	0.65%	2.48%
2016-05-12	1750 MHz	20.3	37.4	19.96	36.56	-1.67%	-2.25%
2016-05-13	1900 MHz	21.7	40.4	21.20	40.80	-2.30%	0.99%
2016-05-14	2450 MHz	24.4	52.1	23.76	50.80	-2.62%	-2.50%

9 Measurement Procedures

9.1 Tests to be performed

In order to determine the highest value of the peak spatial-average SAR of a handset, all device positions, configurations and operational modes shall be tested for each frequency band according to steps 1 to 3 below. A flowchart of the test process is shown in picture 9.1.

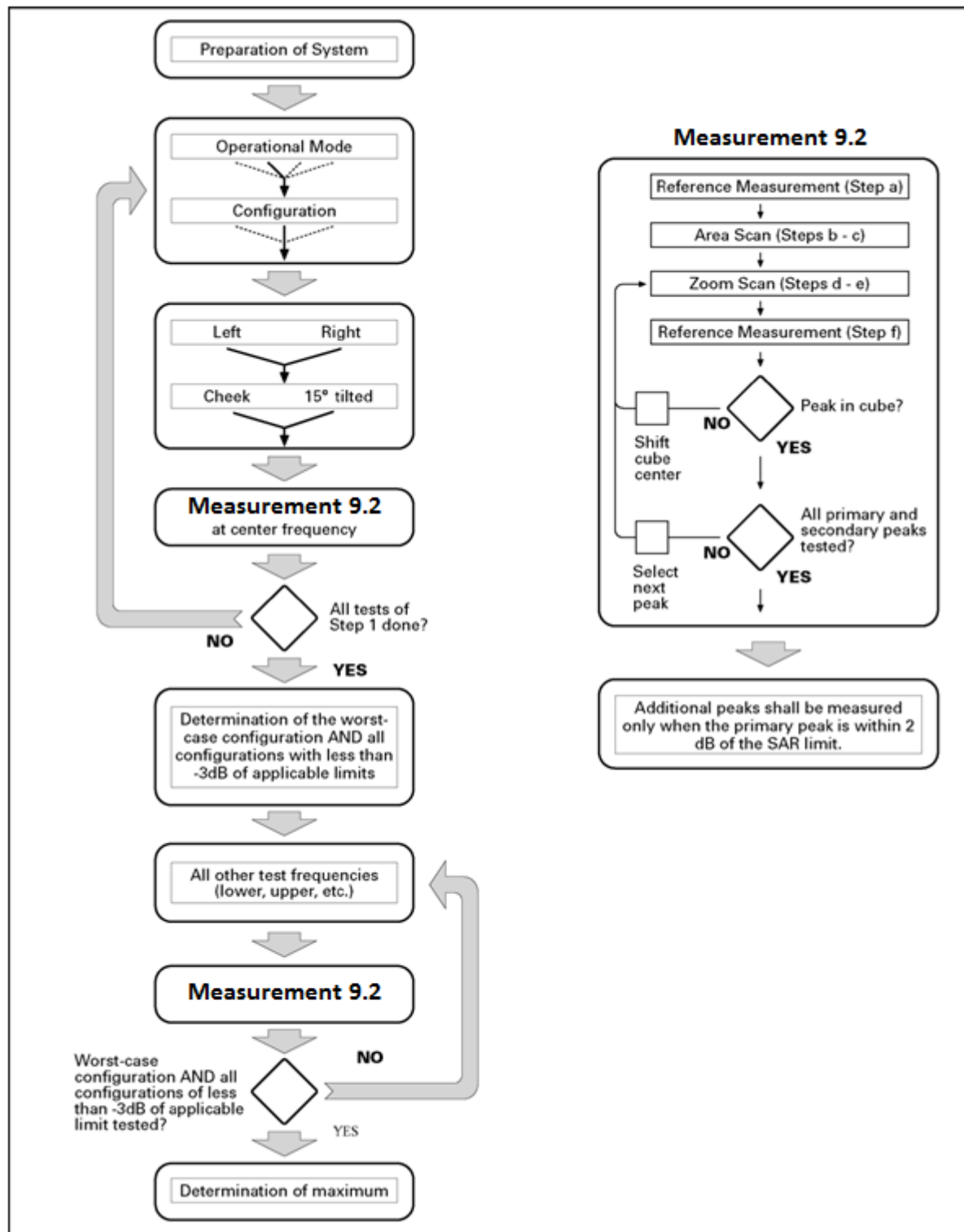
Step 1: The tests described in 9.2 shall be performed at the channel that is closest to the centre of the transmit frequency band (f_c) for:

- a) all device positions (cheek and tilt, for both left and right sides of the SAM phantom, as described in annex D),
- b) all configurations for each device position in a), e.g., antenna extended and retracted, and
- c) all operational modes, e.g., analogue and digital, for each device position in a) and configuration in b) in each frequency band.

If more than three frequencies need to be tested according to 11.1 (i.e., $N_c > 3$), then all frequencies, configurations and modes shall be tested for all of the above test conditions.

Step 2: For the condition providing highest peak spatial-average SAR determined in Step 1, perform all tests described in 9.2 at all other test frequencies, i.e., lowest and highest frequencies. In addition, for all other conditions (device position, configuration and operational mode) where the peak spatial-average SAR value determined in Step 1 is within 3 dB of the applicable SAR limit, it is recommended that all other test frequencies shall be tested as well.

Step 3: Examine all data to determine the highest value of the peak spatial-average SAR found in Steps 1 to 2.



Picture 9.1 Block diagram of the tests to be performed

9.2 General Measurement Procedure

The area and zoom scan resolutions specified in the table below must be applied to the SAR measurements and fully documented in SAR reports to qualify for TCB approval. Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Both the probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1-g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE Std 1528-2003. The results should be documented as part of the system validation records and may be requested to support test results when all the measurement parameters in the following table are not satisfied.

			$\leq 3\text{ GHz}$	$> 3\text{ GHz}$
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			$5 \pm 1\text{ mm}$	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5\text{ mm}$
Maximum probe angle from probe axis to phantom surface normal at the measurement location			$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: Δx_{Area} , Δy_{Area}			$\leq 2\text{ GHz: } \leq 15\text{ mm}$ $2 - 3\text{ GHz: } \leq 12\text{ mm}$	$3 - 4\text{ GHz: } \leq 12\text{ mm}$ $4 - 6\text{ GHz: } \leq 10\text{ mm}$
			When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: Δx_{Zoom} , Δy_{Zoom}			$\leq 2\text{ GHz: } \leq 8\text{ mm}$ $2 - 3\text{ GHz: } \leq 5\text{ mm}^*$	$3 - 4\text{ GHz: } \leq 5\text{ mm}^*$ $4 - 6\text{ GHz: } \leq 4\text{ mm}^*$
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		$\leq 5\text{ mm}$	$3 - 4\text{ GHz: } \leq 4\text{ mm}$ $4 - 5\text{ GHz: } \leq 3\text{ mm}$ $5 - 6\text{ GHz: } \leq 2\text{ mm}$
	graded grid	$\Delta z_{Zoom}(1)$: between 1 st two points closest to phantom surface	$\leq 4\text{ mm}$	$3 - 4\text{ GHz: } \leq 3\text{ mm}$ $4 - 5\text{ GHz: } \leq 2.5\text{ mm}$ $5 - 6\text{ GHz: } \leq 2\text{ mm}$
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		$\geq 30\text{ mm}$	$3 - 4\text{ GHz: } \geq 28\text{ mm}$ $4 - 5\text{ GHz: } \geq 25\text{ mm}$ $5 - 6\text{ GHz: } \geq 22\text{ mm}$
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.				
* When zoom scan is required and the <u>reported</u> SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is $\leq 1.4\text{ W/kg}$, $\leq 8\text{ mm}$, $\leq 7\text{ mm}$ and $\leq 5\text{ mm}$ zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

9.3 WCDMA Measurement Procedures for SAR

The following procedures are applicable to WCDMA handsets operating under 3GPP Release99, Release 5 and Release 6. The default test configuration is to measure SAR with an established radio link between the DUT and a communication test set using a 12.2kbps RMC (reference measurement channel) configured in Test Loop Mode 1. SAR is selectively confirmed for other physical channel configurations (DPCCH & DPDCH_n), HSDPA and HSPA (HSUPA/HSDPA) modes according to output power, exposure conditions and device operating capabilities. Both uplink and downlink should be configured with the same RMC or AMR, when required. SAR for Release 5 HSDPA and Release 6 HSPA are measured using the applicable FRC (fixed reference channel) and E-DCH reference channel configurations. Maximum output power is verified according to applicable versions of 3GPP TS 34.121 and SAR must be measured according to these maximum output conditions. When Maximum Power Reduction (MPR) is not implemented according to Cubic Metric (CM) requirements for Release 6 HSPA, the following procedures do not apply.

For Release 5 HSDPA Data Devices:

Sub-test	β_c	β_d	β_d (SF)	β_c / β_d	β_{hs}	CM/dB
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15	15/15	64	12/15	24/25	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

For Release 6 HSPA Data Devices

Sub-test	β_c	β_d	β_d (SF)	β_c / β_d	β_{hs}	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM (dB)	MPR (dB)	AG Index	E-TFCI
1	11/15	15/15	64	11/15	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	12/15	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed1}:47/15$ $\beta_{ed2}:47/15$	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	4/15	56/75	4	1	3.0	2.0	17	71
5	15/15	15/15	64	15/15	24/15	30/15	134/15	4	1	1.0	0.0	21	81

For Release 8

SAR is required for Rel. 8 DC-HSDPA when SAR is required for Rel. 5 HSDPA; otherwise, the 3G SAR test reduction procedure is applied to DC-HSDPA with 12.2 kbps RMC as the primary mode. Power is measured for DC-HSDPA according to the H-Set 12, FRC configuration in Table C.8.1.12 of 3GPP TS 34.121-1 to determine SAR test reduction. A primary and a secondary serving HS-DSCH Cell are required to perform the power measurement and for the results to be acceptable.

9.4 SAR Measurement for LTE

SAR tests for LTE are performed with a base station simulator, Rohde & Schwarz CMW500. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. All powers were measured with the CMW 500.

It is performed for conducted power and SAR based on the KDB941225 D05.

SAR is evaluated separately according to the following procedures for the different test positions in each exposure condition – head, body, body-worn accessories and other use conditions. The procedures in the following subsections are applied separately to test each LTE frequency band.

1) QPSK with 1 RB allocation

Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.

2) QPSK with 50% RB allocation

The procedures required for 1 RB allocation in 1) are applied to measure the SAR for QPSK with 50% RB allocation.

3) QPSK with 100% RB allocation

For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation in 1) and 2) are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.

9.5 Bluetooth & Wi-Fi Measurement Procedures for SAR

Normal network operating configurations are not suitable for measuring the SAR of 802.11 transmitters in general. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure that the results are consistent and reliable.

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in a test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters. The test frequencies should correspond to actual channel frequencies defined for domestic use. SAR for devices with switched diversity should be measured with only one antenna transmitting at a time during each SAR measurement, according to a fixed modulation and data rate. The same data pattern should be used for all measurements.

9.6 Power Drift

To control the output power stability during the SAR test, DASY4 system calculates the power drift by measuring the E-field at the same location at the beginning and at the end of the measurement for each test position. These drift values can be found in section 14 labeled as: (Power Drift [dB]). This ensures that the power drift during one measurement is within 5%.

10 Area Scan Based 1-g SAR

10.1 Requirement of KDB

According to the KDB447498 D01 v05, when the implementation is based the specific polynomial fit algorithm as presented at the 29th Bioelectromagnetics Society meeting (2007) and the estimated 1-g SAR is ≤ 1.2 W/kg, a zoom scan measurement is not required provided it is also not needed for any other purpose; for example, if the peak SAR location required for simultaneous transmission SAR test exclusion can be determined accurately by the SAR system or manually to discriminate between distinctive peaks and scattered noisy SAR distributions from area scans.

There must not be any warning or alert messages due to various measurement concerns identified by the SAR system; for example, noise in measurements, peaks too close to scan boundary, peaks are too sharp, spatial resolution and uncertainty issues etc. The SAR system verification must also demonstrate that the area scan estimated 1-g SAR is within 3% of the zoom scan 1-g SAR (See Annex B). When all the SAR results for each exposure condition in a frequency band and wireless mode are based on estimated 1-g SAR, the 1-g SAR for the highest SAR configuration must be determined by a zoom scan.

10.2 Fast SAR Algorithms

The approach is based on the area scan measurement applying a frequency dependent attenuation parameter. This attenuation parameter was empirically determined by analyzing a large number of phones. The MOTOROLA FAST SAR was developed and validated by the MOTOROLA Research Group in Ft. Lauderdale.

In the initial study, an approximation algorithm based on Linear fit was developed. The accuracy of the algorithm has been demonstrated across a broad frequency range (136-2450 MHz) and for both 1- and 10-g averaged SAR using a sample of 264 SAR measurements from 55 wireless handsets. For the sample size studied, the root-mean-squared errors of the algorithm are 1.2% and 5.8% for 1- and 10-g averaged SAR, respectively. The paper describing the algorithm in detail is expected to be published in August 2004 within the Special Issue of Transactions on MTT.

In the second step, the same research group optimized the fitting algorithm to an Polynomial fit whereby the frequency validity was extended to cover the range 30-6000MHz. Details of this study can be found in the BEMS 2007 Proceedings.

Both algorithms are implemented in DASY software.

11 Conducted Output Power

When WLAN Hotspot mode is activated (AP ON), the conducted output power will be reduced for WCDMA1900 and LTE band 2. When WLAN Hotspot mode is deactivated (AP OFF), the RF output power level return to their normal RF power level.

11.1 Manufacturing tolerance

When the hotspot mode is ON:

Table 11.1: WCDMA

WCDMA 1900 CS			
Channel	Channel 9538	Channel 9400	Channel 9262
Target (dBm)	21.5	21.5	21.5
Tune-up(dBm)	22.5	22.5	22.5
HSUPA (sub-test 1/5)			
Channel	Channel 9538	Channel 9400	Channel 9262
Target (dBm)	21	21	21
Tune-up(dBm)	22	22	22
HSUPA (sub-test 2/3)			
Channel	Channel 9538	Channel 9400	Channel 9262
Target (dBm)	20	20	20
Tune-up(dBm)	21	21	21
HSUPA (sub-test 4)			
Channel	Channel 9538	Channel 9400	Channel 9262
Target (dBm)	20.5	20.5	20.5
Tune-up(dBm)	21.5	21.5	21.5
DC-HSDPA (sub-test 1-4)			
Channel	Channel 9538	Channel 9400	Channel 9262
Target (dBm)	21	21	21
Tune-up(dBm)	22	22	22

Table 11.2: LTE

Mode	Target (dBm)	Tune-up(dBm)
LTE Band 2	22	23

Note: When the hotspot mode is ON, MPR settings doesn't work.

When the hotspot mode is OFF:

Table 11.3: GSM Speech

GSM 850			
Channel	Channel 251	Channel 190	Channel 128
Target (dBm)	32.5	32.5	32.5
Tune-up (dBm)	33.5	33.5	33.5
GSM 1900			
Channel	Channel 810	Channel 661	Channel 512
Target (dBm)	29.5	29.5	29.5
Tune-up (dBm)	30.5	30.5	30.5

Table 11.4: GPRS and EGPRS

GSM 850 GPRS/EGPRS (GMSK)				
Channel		251	190	128
1 Txslot	Target (dBm)	32.5	32.5	32.5
	Tune-up (dBm)	33.5	33.5	33.5
2 Txslots	Target (dBm)	30.5	30.5	30.5
	Tune-up (dBm)	31.5	31.5	31.5
3 Txslots	Target (dBm)	28.5	28.5	28.5
	Tune-up (dBm)	29.5	29.5	29.5
4 Txslots	Target (dBm)	27.5	27.5	27.5
	Tune-up (dBm)	28.5	28.5	28.5
GSM 850 EGPRS (8PSK)				
Channel		251	190	128
1 Txslot	Target (dBm)	27	27	27
	Tune-up (dBm)	28	28	28
2 Txslots	Target (dBm)	25.5	25.5	25.5
	Tune-up (dBm)	26.5	26.5	26.5
3 Txslots	Target (dBm)	24	24	24
	Tune-up (dBm)	25	25	25
4 Txslots	Target (dBm)	22.5	22.5	22.5
	Tune-up (dBm)	23.5	23.5	23.5
GSM 1900 GPRS/EGPRS (GMSK)				
Channel		810	661	512
1 Txslot	Target (dBm)	29.5	29.5	29.5
	Tune-up (dBm)	30.5	30.5	30.5
2 Txslots	Target (dBm)	27.5	27.5	27.5
	Tune-up (dBm)	28.5	28.5	28.5
3 Txslots	Target (dBm)	26	26	26
	Tune-up (dBm)	27	27	27
4 Txslots	Target (dBm)	25	25	25
	Tune-up (dBm)	26	26	26
GSM 1900 EGPRS (8PSK)				
Channel		810	661	512
1 Txslot	Target (dBm)	26	26	26
	Tune-up (dBm)	27	27	27
2 Txslots	Target (dBm)	24.5	24.5	24.5
	Tune-up (dBm)	25.5	25.5	25.5
3 Txslots	Target (dBm)	23	23	23
	Tune-up (dBm)	24	24	24
4 Txslots	Target (dBm)	21.5	21.5	21.5
	Tune-up (dBm)	22.5	22.5	22.5

Table 11.5: WCDMA

WCDMA 850 CS			
Channel	Channel 4233	Channel 4182	Channel 4132
Target (dBm)	23	23	23
Tune-up (dBm)	24	24	24
HSUPA (sub-test 1/4/5)			
Channel	Channel 4233	Channel 4182	Channel 4132
Target (dBm)	22	22	22
Tune-up (dBm)	23	23	23
HSUPA (sub-test 2)			
Channel	Channel 4233	Channel 4182	Channel 4132
Target (dBm)	21.5	21.5	21.5
Tune-up (dBm)	22.5	22.5	22.5
HSUPA (sub-test 3)			
Channel	Channel 4233	Channel 4182	Channel 4132
Target (dBm)	21	21	21
Tune-up (dBm)	22	22	22
DC-HSDPA (sub-test 1~4)			
Channel	Channel 4233	Channel 4182	Channel 4132
Target (dBm)	22	22	22
Tune-up (dBm)	23	23	23
WCDMA 1700 CS			
Channel	Channel 1513	Channel 1412	Channel 1312
Target (dBm)	23	23	23
Tune-up (dBm)	24	24	24
HSUPA (sub-test 1/4/5)			
Channel	Channel 1513	Channel 1412	Channel 1312
Target (dBm)	22	22	22
Tune-up (dBm)	23	23	23
HSUPA (sub-test 2/3)			
Channel	Channel 1513	Channel 1412	Channel 1312
Target (dBm)	21.5	21.5	21.5
Tune-up (dBm)	22.5	22.5	22.5
DC-HSDPA (sub-test 1~4)			
Channel	Channel 1513	Channel 1412	Channel 1312
Target (dBm)	22	22	22
Tune-up (dBm)	23	23	23
WCDMA 1900 CS			
Channel	Channel 9538	Channel 9400	Channel 9262
Target (dBm)	23	23	23
Tune-up (dBm)	24	24	24
HSUPA (sub-test 1/4)			
Channel	Channel 9538	Channel 9400	Channel 9262

Target (dBm)	22	22	22
Tune-up (dBm)	23	23	23
HSUPA (sub-test 2)			
Channel	Channel 9538	Channel 9400	Channel 9262
Target (dBm)	21.5	21.5	21.5
Tune-up (dBm)	22.5	22.5	22.5
HSUPA (sub-test 3)			
Channel	Channel 9538	Channel 9400	Channel 9262
Target (dBm)	21	21	21
Tune-up (dBm)	22	22	22
HSUPA (sub-test 5)			
Channel	Channel 9538	Channel 9400	Channel 9262
Target (dBm)	23	23	23
Tune-up (dBm)	24	24	24
DC-HSDPA (sub-test 1~4)			
Channel	Channel 9538	Channel 9400	Channel 9262
Target (dBm)	22	22	22
Tune-up (dBm)	23	23	23

Table 11.6: LTE

Mode	Target (dBm)	Tune-up (dBm)
LTE Band 2	23.8	24.8
LTE Band 4	23.5	24.5
LTE Band 5	23.5	24.5
LTE Band 12	23	24

LTE MPR will follow up 3GPP setting as below:

Modulation	Channel bandwidth / Transmission bandwidth (NRB)						MPR (dB)
	1.4MHz	3.0MHz	5MHz	10MHz	15MHz	20MHz	
QPSK	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	0
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	2

Table 11.7: Bluetooth

GFSK			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	5	5	5
Tune-up (dBm)	6	6	6

Table 11.8: WiFi

Mode	Target (dBm)	Tune-up (dBm)
802.11b	17	18
802.11g 6Mbps~24Mbps	15	16
802.11g 36Mbps~54Mbps	14	15
802.11n-HT20 MCS0~ MCS3	13	14
802.11n-HT20 MCS4~ MCS7	12	13

11.2 Hotspot

The conducted power is normal for all bands except WCDMA1900 and LTE band 2. There is power reduction enabled for WCDMA1900 and LTE band 2. The power reduction is enabled when the user enables hotspot mode via the manufacturer software. The tables below show the measured powers with hotspot.

Table 11.9: The conducted Power for WCDMA

Item	band	FDDII result		
	ARFCN	9538(1907.6MHz)	9400(1880MHz)	9262(1852.4MHz)
WCDMA	1	22.47	22.49	22.50
HSUPA	1	20.72	20.77	20.72
	2	20.10	20.29	20.10
	3	19.73	19.85	19.73
	4	20.66	20.88	20.66
	5	21.06	21.25	21.06
DC-HSDPA	1	20.96	21.06	21.03
	2	20.92	21.02	21.01
	3	20.93	21.01	21.02
	4	20.93	21.03	21.03

Table 11.10: The conducted Power for LTE

Band 2							
Bandwidth (MHz)	RB allocation	Frequency (MHz)	Max. Target Power (dBm)	QPSK		16QAM	
	RB offset (Start RB)			Actual output power (dBm)	MPR	Actual output power (dBm)	MPR
1.4 MHz	1RB High (5)	1909.3	23	22.15	0	22.23	0
		1880	23	22.09	0	22.28	0
		1850.7	23	22.21	0	22.29	0
	1RB Middle (3)	1909.3	23	22.16	0	22.65	0
		1880	23	22.32	0	22.68	0
		1850.7	23	22.20	0	22.23	0
	1RB Low (0)	1909.3	23	22.24	0	22.53	0
		1880	23	22.29	0	22.54	0
		1850.7	23	22.33	0	22.45	0
	3RB High (3)	1909.3	23	22.24	0	22.00	0
		1880	23	22.04	0	22.13	0
		1850.7	23	22.11	0	21.93	0
	3RB	1909.3	23	22.04	0	21.94	0

	Middle (1)	1880	23	22.07	0	22.07	0
		1850.7	23	22.26	0	22.42	0
	3RB Low (0)	1909.3	23	22.05	0	22.03	0
		1880	23	22.03	0	21.74	0
		1850.7	23	22.10	0	21.94	0
	6RB (0)	1909.3	23	21.98	0	21.54	0
		1880	23	22.03	0	21.25	0
		1850.7	23	22.11	0	21.65	0
3 MHz	1RB High (14)	1908.5	23	22.02	0	22.52	0
		1880	23	22.38	0	22.52	0
		1851.5	23	22.21	0	22.57	0
	1RB Middle (7)	1908.5	23	22.12	0	22.43	0
		1880	23	21.89	0	22.41	0
		1851.5	23	22.32	0	22.54	0
	1RB Low (0)	1908.5	23	22.11	0	22.71	0
		1880	23	22.41	0	22.57	0
		1851.5	23	22.47	0	22.64	0
	8RB High (7)	1908.5	23	22.02	0	21.63	0
		1880	23	22.03	0	21.62	0
		1851.5	23	22.05	0	21.55	0
	8RB Middle (4)	1908.5	23	22.11	0	21.64	0
		1880	23	21.96	0	21.50	0
		1851.5	23	22.03	0	21.75	0
	8RB Low (0)	1908.5	23	22.07	0	21.68	0
		1880	23	21.98	0	21.59	0
		1851.5	23	22.04	0	21.74	0
	15RB (0)	1908.5	23	22.11	0	21.62	0
		1880	23	21.99	0	21.55	0
		1851.5	23	22.14	0	21.80	0
	1RB High (24)	1907.5	23	22.07	0	22.18	0
		1880	23	22.16	0	22.17	0
		1852.5	23	21.88	0	22.14	0
	1RB Middle (12)	1907.5	23	21.93	0	22.07	0
		1880	23	21.89	0	22.12	0
		1852.5	23	21.95	0	22.26	0
	1RB Low (0)	1907.5	23	22.21	0	22.31	0
		1880	23	21.84	0	22.15	0
		1852.5	23	22.10	0	22.16	0
	12RB High (13)	1907.5	23	22.06	0	21.59	0
		1880	23	21.94	0	21.64	0
		1852.5	23	21.97	0	21.65	0
	12RB	1907.5	23	21.94	0	21.63	0

	Middle (6)	1880	23	21.98	0	21.74	0
		1852.5	23	22.02	0	21.68	0
		1907.5	23	22.06	0	21.77	0
	12RB Low (0)	1880	23	22.05	0	21.71	0
		1852.5	23	22.11	0	21.76	0
		1907.5	23	21.98	0	21.87	0
	25RB (0)	1880	23	22.06	0	21.73	0
		1852.5	23	22.10	0	21.67	0
		1907.5	23	21.98	0	21.87	0
10 MHz	1RB High (49)	1905	23	21.93	0	22.91	0
		1880	23	21.88	0	22.43	0
		1855	23	22.09	0	22.16	0
	1RB Middle (24)	1905	23	22.17	0	22.81	0
		1880	23	22.30	0	22.85	0
		1855	23	22.35	0	22.59	0
	1RB Low (0)	1905	23	22.12	0	22.85	0
		1880	23	21.92	0	22.81	0
		1855	23	22.04	0	22.90	0
	25RB High (25)	1905	23	22.01	0	21.57	0
		1880	23	22.11	0	21.57	0
		1855	23	22.15	0	21.69	0
	25RB Middle (12)	1905	23	22.02	0	21.74	0
		1880	23	21.97	0	21.52	0
		1855	23	22.23	0	21.58	0
	25RB Low (0)	1905	23	22.22	0	21.91	0
		1880	23	22.02	0	21.69	0
		1855	23	22.01	0	21.55	0
	50RB (0)	1905	23	22.10	0	21.84	0
		1880	23	22.05	0	21.59	0
		1855	23	22.12	0	21.74	0
15 MHz	1RB High (74)	1902.5	23	21.98	0	22.12	0
		1880	23	22.09	0	22.08	0
		1857.5	23	22.04	0	22.23	0
	1RB Middle (37)	1902.5	23	22.03	0	22.59	0
		1880	23	22.06	0	22.80	0
		1857.5	23	22.15	0	22.12	0
	1RB Low (0)	1902.5	23	22.34	0	22.94	0
		1880	23	22.48	0	22.97	0
		1857.5	23	22.30	0	22.34	0
	36RB High (38)	1902.5	23	21.94	0	21.74	0
		1880	23	21.98	0	21.55	0
		1857.5	23	22.05	0	21.62	0
	36RB Middle (19)	1902.5	23	22.13	0	21.59	0
		1880	23	21.93	0	21.50	0
		1857.5	23	22.07	0	21.71	0
	36RB Low (0)	1902.5	23	22.16	0	21.66	0
		1880	23	21.99	0	21.61	0
		1857.5	23	22.08	0	21.69	0
	75RB	1902.5	23	22.06	0	21.65	0

	(0)	1880	23	21.99	0	21.44	0
		1857.5	23	22.03	0	21.57	0
20 MHz	1RB High (99)	1900	23	21.98	0	22.11	0
		1880	23	22.15	0	22.52	0
		1860	23	22.00	0	22.60	0
	1RB Middle (50)	1900	23	22.34	0	22.84	0
		1880	23	22.24	0	22.30	0
		1860	23	22.21	0	22.21	0
	1RB Low (0)	1900	23	22.40	0	22.65	0
		1880	23	22.25	0	22.68	0
		1860	23	22.11	0	22.70	0
	50RB High (50)	1900	23	22.00	0	21.76	0
		1880	23	21.96	0	21.51	0
		1860	23	21.95	0	21.50	0
	50RB Middle (25)	1900	23	22.10	0	21.55	0
		1880	23	22.02	0	21.46	0
		1860	23	21.96	0	21.45	0
	50RB Low (0)	1900	23	22.16	0	21.62	0
		1880	23	22.08	0	21.71	0
		1860	23	21.97	0	21.50	0
	100RB (0)	1900	23	22.05	0	21.73	0
		1880	23	22.00	0	21.52	0
		1860	23	21.99	0	21.51	0

11.3 GSM Measurement result

During the process of testing, the EUT was controlled via Agilent Digital Radio Communication tester (E5515C) to ensure the maximum power transmission and proper modulation. This result contains conducted output power for the EUT. In all cases, the measured peak output power should be greater and within 5% than EMI measurement.

Table 11.11: The conducted power measurement results for GSM850/1900 for head

GSM 850MHz	Conducted Power (dBm)		
	Channel 251(848.8MHz)	Channel 190(836.6MHz)	Channel 128(824.2MHz)
	32.56	32.50	32.66
GSM 1900MHz	Conducted Power (dBm)		
	Channel 810(1909.8MHz)	Channel 661(1880MHz)	Channel 512(1850.2MHz)
	29.64	29.50	29.35

Table 11.12: The conducted power measurement results for GPRS and EGPRS for body

GSM 850 GPRS (GMSK)	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	251	190	128		251	190	128
1 Txslot	32.23	32.56	32.45	-9.03	23.20	23.53	23.42
2 Txslots	30.34	30.37	30.47	-6.02	24.32	24.35	24.45
3Txslots	28.57	28.53	28.77	-4.26	24.31	24.27	24.51
4 Txslots	27.21	27.27	27.51	-3.01	24.20	24.26	24.50
GSM 850 EGPRS (GMSK)	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	251	190	128		251	190	128

1 Txslot	32.24	32.56	32.45	-9.03	23.21	23.53	23.42
2 Txslots	30.35	30.38	30.67	-6.02	24.33	24.36	24.65
3Txslots	28.57	28.52	28.77	-4.26	24.31	24.26	24.51
4 Txslots	27.21	27.22	27.52	-3.01	24.20	24.21	24.51
GSM 850 EGPRS (8PSK)	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	251	190	128		251	190	128
1 Txslot	26.01	26.09	26.19	-9.03	16.98	17.06	17.16
2 Txslots	24.79	24.95	25.01	-6.02	18.77	18.93	18.99
3Txslots	23.14	23.25	23.37	-4.26	18.88	18.99	19.11
4 Txslots	21.50	21.55	21.61	-3.01	18.49	18.54	18.60
PCS1900 GPRS (GMSK)	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	810	661	512		810	661	512
1 Txslot	29.60	29.50	29.45	-9.03	20.57	20.47	20.42
2 Txslots	27.54	27.54	27.62	-6.02	21.52	21.52	21.60
3Txslots	26.00	25.94	25.95	-4.26	21.74	21.68	21.69
4 Txslots	24.69	24.64	24.68	-3.01	21.68	21.63	21.67
PCS1900 EGPRS (GMSK)	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	810	661	512		810	661	512
1 Txslot	29.60	29.50	29.45	-9.03	20.57	20.47	20.42
2 Txslots	27.53	27.54	27.62	-6.02	21.51	21.52	21.60
3Txslots	25.98	25.93	25.91	-4.26	21.72	21.67	21.65
4 Txslots	24.68	24.61	24.65	-3.01	21.67	21.60	21.64
PCS1900 EGPRS (8PSK)	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	810	661	512		810	661	512
1 Txslot	25.36	25.36	25.41	-9.03	16.33	16.33	16.38
2 Txslots	24.21	24.20	24.25	-6.02	18.19	18.18	18.23
3Txslots	22.56	22.52	22.60	-4.26	18.30	18.26	18.34
4 Txslots	20.94	20.87	20.93	-3.01	17.93	17.86	17.92

NOTES:

1) Division Factors

To average the power, the division factor is as follows:

1TX-slot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB

2TX-slots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB

3TX-slots = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB

4TX-slots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB

According to the conducted power as above, the body measurements are performed with 2Txslots for GSM850 and 3Txslots for PCS1900.

11.4 WCDMA Measurement result

Table 11.13: The conducted Power for WCDMA for head

Item	band	FDDV result		
	ARFCN	4233 (846.6MHz)	4182 (836.4MHz)	4132 (826.4MHz)
WCDMA	1	23.45	23.28	23.27
HSUPA	1	21.58	21.53	21.30
	2	20.89	20.92	20.65
	3	20.46	20.52	20.84
	4	21.41	21.41	21.43
	5	21.94	21.88	21.88
DC-HSDPA	1	21.91	21.99	21.83
	2	21.89	21.82	21.82
	3	21.87	21.85	21.82
	4	21.92	21.83	21.79
Item	band	FDDIV result		
	ARFCN	1513 (1752.6MHz)	1412 (1732.4MHz)	1312 (1712.4MHz)
WCDMA	1	23.57	23.60	23.55
HSUPA	1	21.84	21.84	21.44
	2	20.62	21.14	21.01
	3	21.02	20.77	20.59
	4	21.72	21.71	21.48
	5	22.12	22.16	21.93
DC-HSDPA	1	22.15	22.09	22.21
	2	22.12	22.08	22.18
	3	22.09	22.05	22.15
	4	22.11	22.05	22.17
Item	band	FDDII result		
	ARFCN	9538 (1907.6MHz)	9400 (1880MHz)	9262 (1852.4MHz)
WCDMA	1	23.83	23.78	23.68
HSUPA	1	21.88	21.76	21.33
	2	21.15	21.10	20.71
	3	20.81	20.77	20.38
	4	21.68	21.70	21.62
	5	22.2	22.12	22.10
DC-HSDPA	1	22.38	22.22	22.32
	2	22.35	22.19	22.23
	3	22.32	22.25	22.25
	4	22.37	22.17	22.28

Table 11.14: The conducted Power for WCDMA for body

Item	band	FDDV result		
	ARFCN	4233 (846.6MHz)	4182 (836.4MHz)	4132 (826.4MHz)
WCDMA	1	23.37	23.38	23.28
HSUPA	1	21.81	21.81	21.62
	2	21.11	21.10	21.16
	3	20.71	20.78	20.80
	4	21.69	21.70	21.65
	5	22.18	22.15	22.22
DC-HSDPA	1	21.85	21.85	21.67
	2	21.81	21.87	21.65
	3	21.78	21.82	21.66
	4	21.83	21.84	21.63
Item	band	FDDIV result		
	ARFCN	1513 (1752.6MHz)	1412 (1732.4MHz)	1312 (1712.4MHz)
WCDMA	1	23.45	23.45	23.39
HSUPA	1	22.21	22.27	22.57
	2	21.52	21.69	21.30
	3	21.15	21.28	21.52
	4	22.01	22.07	22.08
	5	22.58	22.54	22.55
DC-HSDPA	1	22.12	22.19	22.13
	2	22.07	22.17	22.08
	3	22.11	22.17	22.06
	4	22.12	22.15	22.11
Item	band	FDDII result		
	ARFCN	9538 (1907.6MHz)	9400 (1880MHz)	9262 (1852.4MHz)
WCDMA	1	23.39	23.49	23.46
HSUPA	1	21.94	22.06	22.42
	2	21.12	21.42	21.09
	3	21.32	21.00	20.75
	4	21.09	21.93	21.92
	5	22.24	22.43	22.40
DC-HSDPA	1	22.06	22.11	22.18
	2	22.03	22.07	22.15
	3	22.01	22.05	22.17
	4	22.04	22.10	22.13

11.5 LTE Measurement result

Table 11.15: The conducted Power for LTE for head

Band 2							
Bandwidth (MHz)	RB allocation	Frequency (MHz)	Max. Target Power (dBm)	QPSK		16QAM	
	RB offset (Start RB)			Actual output power (dBm)	MPR	Actual output power (dBm)	MPR
1.4 MHz	1RB High (5)	1909.3	24.8	23.83	0	22.71	1
		1880	24.8	23.81	0	22.70	1
		1850.7	24.8	23.95	0	22.83	1
	1RB Middle (3)	1909.3	24.8	24.15	0	23.80	1
		1880	24.8	23.89	0	23.08	1
		1850.7	24.8	23.93	0	22.92	1
	1RB Low (0)	1909.3	24.8	23.82	0	22.91	1
		1880	24.8	23.86	0	22.84	1
		1850.7	24.8	23.69	0	22.70	1
	3RB High (3)	1909.3	24.8	24.31	0	22.81	1
		1880	24.8	23.87	0	22.74	1
		1850.7	24.8	23.98	0	22.85	1
	3RB Middle (1)	1909.3	24.8	24.17	0	23.10	1
		1880	24.8	24.06	0	22.93	1
		1850.7	24.8	24.24	0	23.04	1
	3RB Low (0)	1909.3	24.8	24.04	0	22.82	1
		1880	24.8	23.86	0	22.85	1
		1850.7	24.8	24.03	0	23.04	1
	6RB (0)	1909.3	24.8	22.89	1	22.01	2
		1880	24.8	22.97	1	21.91	2
		1850.7	24.8	23.00	1	22.03	2
3 MHz	1RB High (14)	1908.5	24.8	23.68	0	23.31	1
		1880	24.8	24.03	0	23.80	1
		1851.5	24.8	23.76	0	23.62	1
	1RB Middle (7)	1908.5	24.8	23.80	0	23.18	1
		1880	24.8	23.94	0	23.01	1
		1851.5	24.8	23.80	0	23.67	1
	1RB Low (0)	1908.5	24.8	24.08	0	23.42	1
		1880	24.8	24.04	0	23.11	1
		1851.5	24.8	23.87	0	23.71	1
	8RB High (7)	1908.5	24.8	23.02	1	22.11	2
		1880	24.8	23.04	1	22.14	2
		1851.5	24.8	23.02	1	22.20	2
	8RB Middle (4)	1908.5	24.8	23.00	1	22.09	2
		1880	24.8	23.03	1	22.14	2
		1851.5	24.8	23.10	1	22.20	2
	8RB	1908.5	24.8	23.03	1	22.18	2

	Low (0)	1880	24.8	23.05	1	22.16	2
		1851.5	24.8	23.10	1	22.19	2
	15RB (0)	1908.5	24.8	22.86	1	22.00	2
		1880	24.8	23.04	1	22.01	2
		1851.5	24.8	23.09	1	22.16	2
5 MHz	1RB High (24)	1907.5	24.8	23.68	0	23.15	1
		1880	24.8	24.11	0	23.15	1
		1852.5	24.8	24.09	0	23.39	1
	1RB Middle (12)	1907.5	24.8	24.08	0	23.11	1
		1880	24.8	23.90	0	23.24	1
		1852.5	24.8	24.20	0	23.12	1
	1RB Low (0)	1907.5	24.8	24.18	0	23.20	1
		1880	24.8	24.01	0	23.14	1
		1852.5	24.8	24.01	0	23.20	1
	12RB High (13)	1907.5	24.8	22.92	1	22.15	2
		1880	24.8	22.96	1	22.14	2
		1852.5	24.8	22.93	1	22.10	2
	12RB Middle (6)	1907.5	24.8	23.00	1	21.92	2
		1880	24.8	22.94	1	22.22	2
		1852.5	24.8	22.90	1	22.15	2
	12RB Low (0)	1907.5	24.8	22.95	1	21.84	2
		1880	24.8	22.96	1	22.13	2
		1852.5	24.8	22.96	1	22.12	2
	25RB (0)	1907.5	24.8	22.97	1	22.28	2
		1880	24.8	23.03	1	21.92	2
		1852.5	24.8	22.96	1	22.13	2
10 MHz	1RB High (49)	1905	24.8	23.99	0	23.43	1
		1880	24.8	23.87	0	23.38	1
		1855	24.8	24.19	0	23.37	1
	1RB Middle (24)	1905	24.8	24.26	0	23.48	1
		1880	24.8	23.68	0	22.89	1
		1855	24.8	24.31	0	23.61	1
	1RB Low (0)	1905	24.8	23.88	0	23.06	1
		1880	24.8	24.14	0	23.70	1
		1855	24.8	23.98	0	23.26	1
	25RB High (25)	1905	24.8	23.06	1	22.06	2
		1880	24.8	22.86	1	21.73	2
		1855	24.8	23.16	1	22.18	2
	25RB Middle (12)	1905	24.8	23.19	1	21.89	2
		1880	24.8	22.98	1	21.94	2
		1855	24.8	23.01	1	22.25	2
	25RB Low (0)	1905	24.8	23.15	1	22.20	2
		1880	24.8	22.83	1	22.08	2
		1855	24.8	23.07	1	21.92	2

	50RB (0)	1905	24.8	23.07	1	21.99	2
		1880	24.8	23.03	1	21.89	2
		1855	24.8	23.03	1	22.06	2
15 MHz	1RB High (74)	1902.5	24.8	23.68	0	23.44	1
		1880	24.8	23.84	0	23.31	1
		1857.5	24.8	23.91	0	23.23	1
	1RB Middle (37)	1902.5	24.8	23.97	0	23.29	1
		1880	24.8	23.68	0	23.67	1
		1857.5	24.8	24.23	0	23.56	1
	1RB Low (0)	1902.5	24.8	23.91	0	23.47	1
		1880	24.8	23.75	0	23.15	1
		1857.5	24.8	23.71	0	23.60	1
	36RB High (38)	1902.5	24.8	23.00	1	22.23	2
		1880	24.8	22.85	1	21.92	2
		1857.5	24.8	23.10	1	22.08	2
	36RB Middle (19)	1902.5	24.8	22.96	1	22.26	2
		1880	24.8	22.97	1	22.03	2
		1857.5	24.8	22.98	1	22.20	2
	36RB Low (0)	1902.5	24.8	22.99	1	22.08	2
		1880	24.8	22.93	1	22.11	2
		1857.5	24.8	23.08	1	22.14	2
	75RB (0)	1902.5	24.8	23.04	1	22.12	2
		1880	24.8	22.86	1	21.71	2
		1857.5	24.8	22.93	1	22.07	2
20 MHz	1RB High (99)	1900	24.8	24.19	0	23.55	1
		1880	24.8	24.02	0	23.26	1
		1860	24.8	24.22	0	23.24	1
	1RB Middle (50)	1900	24.8	24.32	0	23.29	1
		1880	24.8	24.20	0	23.45	1
		1860	24.8	24.29	0	23.26	1
	1RB Low (0)	1900	24.8	24.09	0	23.22	1
		1880	24.8	24.12	0	23.37	1
		1860	24.8	24.05	0	23.30	1
	50RB High (50)	1900	24.8	23.04	1	22.10	2
		1880	24.8	22.90	1	21.95	2
		1860	24.8	23.08	1	22.01	2
	50RB Middle (25)	1900	24.8	22.73	1	22.07	2
		1880	24.8	22.99	1	21.95	2
		1860	24.8	22.95	1	21.98	2
	50RB Low (0)	1900	24.8	22.91	1	21.96	2
		1880	24.8	22.92	1	21.97	2
		1860	24.8	23.17	1	22.14	2
	100RB (0)	1900	24.8	23.03	1	22.03	2
		1880	24.8	22.92	1	21.95	2
		1860	24.8	23.05	1	22.07	2
Band 4							
Bandwidth (MHz)	RB allocation	Frequency (MHz)	Max. Target Power (dBm)	QPSK		16QAM	
	RB offset (Start RB)			Actual output power (dBm)	MPR	Actual output power (dBm)	MPR
1.4 MHz	1RB High (5)	1754.3	24.5	23.76	0	23.29	1
		1732.5	24.5	23.54	0	23.06	1
		1710.7	24.5	23.54	0	23.08	1
	1RB	1754.3	24.5	23.86	0	22.97	1

	Middle (3)	1732.5	24.5	23.82	0	23.27	1
		1710.7	24.5	23.46	0	23.00	1
	1RB Low (0)	1754.3	24.5	23.62	0	23.08	1
		1732.5	24.5	23.76	0	23.03	1
		1710.7	24.5	23.72	0	22.72	1
	3RB High (3)	1754.3	24.5	23.67	0	22.64	1
		1732.5	24.5	23.59	0	22.36	1
		1710.7	24.5	23.58	0	22.69	1
	3RB Middle (1)	1754.3	24.5	23.71	0	22.91	1
		1732.5	24.5	23.71	0	22.51	1
		1710.7	24.5	23.70	0	22.72	1
	3RB Low (0)	1754.3	24.5	23.68	0	22.69	1
		1732.5	24.5	23.56	0	22.87	1
		1710.7	24.5	23.65	0	22.68	1
	6RB (0)	1754.3	24.5	22.59	1	21.33	2
		1732.5	24.5	22.67	1	21.61	2
		1710.7	24.5	22.62	1	21.58	2
3 MHz	1RB High (14)	1753.5	24.5	23.68	0	22.74	1
		1732.5	24.5	23.65	0	22.97	1
		1711.5	24.5	23.64	0	22.33	1
	1RB Middle (7)	1753.5	24.5	23.64	0	22.72	1
		1732.5	24.5	23.71	0	22.96	1
		1711.5	24.5	23.54	0	22.82	1
	1RB Low (0)	1753.5	24.5	23.94	0	22.83	1
		1732.5	24.5	23.90	0	23.04	1
		1711.5	24.5	23.64	0	22.83	1
	8RB High (7)	1753.5	24.5	22.63	1	21.69	2
		1732.5	24.5	22.66	1	21.62	2
		1711.5	24.5	22.52	1	21.80	2
	8RB Middle (4)	1753.5	24.5	22.53	1	21.71	2
		1732.5	24.5	22.52	1	21.56	2
		1711.5	24.5	22.69	1	21.81	2
	8RB Low (0)	1753.5	24.5	22.75	1	21.93	2
		1732.5	24.5	22.55	1	21.60	2
		1711.5	24.5	22.68	1	21.79	2
	15RB (0)	1753.5	24.5	22.61	1	21.58	2
		1732.5	24.5	22.56	1	21.55	2
		1711.5	24.5	22.70	1	21.58	2
5 MHz	1RB High (24)	1752.5	24.5	23.88	0	22.91	1
		1732.5	24.5	23.75	0	22.76	1
		1712.5	24.5	23.72	0	22.66	1
	1RB Middle (12)	1752.5	24.5	23.72	0	22.32	1
		1732.5	24.5	23.54	0	22.74	1

	1RB Low (0)	1712.5	24.5	23.71	0	22.85	1
		1752.5	24.5	23.71	0	22.92	1
		1732.5	24.5	23.50	0	22.70	1
		1712.5	24.5	23.55	0	22.77	1
	12RB High (13)	1752.5	24.5	22.49	1	21.39	2
		1732.5	24.5	22.42	1	21.60	2
		1712.5	24.5	22.61	1	21.60	2
	12RB Middle (6)	1752.5	24.5	22.70	1	21.79	2
		1732.5	24.5	22.44	1	21.69	2
		1712.5	24.5	22.67	1	21.83	2
	12RB Low (0)	1752.5	24.5	22.74	1	21.79	2
		1732.5	24.5	22.55	1	21.72	2
		1712.5	24.5	22.72	1	21.76	2
	25RB (0)	1752.5	24.5	22.58	1	21.66	2
		1732.5	24.5	22.52	1	21.67	2
		1712.5	24.5	22.54	1	21.61	2
10 MHz	1RB High (49)	1750	24.5	23.62	0	22.61	1
		1732.5	24.5	23.83	0	22.92	1
		1715	24.5	23.61	0	23.05	1
	1RB Middle (24)	1750	24.5	23.94	0	23.21	1
		1732.5	24.5	23.84	0	23.10	1
		1715	24.5	23.74	0	23.30	1
	1RB Low (0)	1750	24.5	23.87	0	23.08	1
		1732.5	24.5	23.62	0	23.39	1
		1715	24.5	23.60	0	23.14	1
	25RB High (25)	1750	24.5	22.66	1	21.73	2
		1732.5	24.5	22.68	1	21.73	2
		1715	24.5	22.51	1	21.58	2
	25RB Middle (12)	1750	24.5	22.80	1	21.86	2
		1732.5	24.5	22.50	1	21.75	2
		1715	24.5	22.63	1	21.69	2
	25RB Low (0)	1750	24.5	22.80	1	21.87	2
		1732.5	24.5	22.56	1	21.61	2
		1715	24.5	22.50	1	21.56	2
	50RB (0)	1750	24.5	22.71	1	21.75	2
		1732.5	24.5	22.62	1	21.47	2
		1715	24.5	22.51	1	21.72	2
15 MHz	1RB High (74)	1747.5	24.5	23.67	0	22.86	1
		1732.5	24.5	23.82	0	22.93	1
		1717.5	24.5	23.39	0	22.76	1
	1RB Middle (37)	1747.5	24.5	23.83	0	22.95	1
		1732.5	24.5	23.45	0	23.31	1
		1717.5	24.5	23.62	0	23.01	1

	1RB Low (0)	1747.5	24.5	23.90	0	23.32	1
		1732.5	24.5	23.72	0	22.72	1
		1717.5	24.5	23.85	0	23.26	1
	36RB High (38)	1747.5	24.5	22.69	1	21.77	2
		1732.5	24.5	22.60	1	21.67	2
		1717.5	24.5	22.51	1	21.44	2
	36RB Middle (19)	1747.5	24.5	22.81	1	21.89	2
		1732.5	24.5	22.56	1	21.61	2
		1717.5	24.5	22.77	1	21.51	2
	36RB Low (0)	1747.5	24.5	22.83	1	21.91	2
		1732.5	24.5	22.58	1	21.78	2
		1717.5	24.5	22.68	1	21.57	2
	75RB (0)	1747.5	24.5	22.62	1	21.68	2
		1732.5	24.5	22.64	1	21.69	2
		1717.5	24.5	22.50	1	21.51	2
20 MHz	1RB High (99)	1745	24.5	23.88	0	23.13	1
		1732.5	24.5	23.82	0	22.85	1
		1720	24.5	23.59	0	22.79	1
	1RB Middle (50)	1745	24.5	24.08	0	23.18	1
		1732.5	24.5	23.54	0	22.80	1
		1720	24.5	23.91	0	22.86	1
	1RB Low (0)	1745	24.5	23.82	0	22.92	1
		1732.5	24.5	23.72	0	22.80	1
		1720	24.5	23.77	0	23.02	1
	50RB High (50)	1745	24.5	22.73	1	21.69	2
		1732.5	24.5	22.62	1	21.66	2
		1720	24.5	22.53	1	21.59	2
	50RB Middle (25)	1745	24.5	22.79	1	21.83	2
		1732.5	24.5	22.52	1	21.55	2
		1720	24.5	22.55	1	21.47	2
	50RB Low (0)	1745	24.5	22.72	1	21.76	2
		1732.5	24.5	22.59	1	21.63	2
		1720	24.5	22.54	1	21.78	2
	100RB (0)	1745	24.5	22.71	1	21.73	2
		1732.5	24.5	22.66	1	21.51	2
		1720	24.5	22.62	1	21.46	2
Band 5							
Bandwidth (MHz)	RB allocation	Frequency (MHz)	Max. Target Power (dBm)	QPSK		16QAM	
	RB offset (Start RB)			Actual output power (dBm)	MPR	Actual output power (dBm)	MPR
1.4 MHz	1RB High (5)	848.3	24.5	23.54	0	23.39	1
		836.5	24.5	23.63	0	23.03	1
		824.7	24.5	23.41	0	22.83	1
	1RB Middle (3)	848.3	24.5	23.67	0	22.92	1
		836.5	24.5	23.58	0	23.24	1

	1RB Low (0)	824.7	24.5	23.69	0	22.66	1
		848.3	24.5	23.75	0	23.05	1
		836.5	24.5	23.75	0	23.14	1
	3RB High (3)	824.7	24.5	23.56	0	22.64	1
		848.3	24.5	23.56	0	22.60	1
		836.5	24.5	23.71	0	22.89	1
	3RB Middle (1)	824.7	24.5	23.59	0	22.61	1
		848.3	24.5	23.67	0	22.72	1
		836.5	24.5	23.86	0	22.69	1
	3RB Low (0)	824.7	24.5	23.59	0	22.70	1
		848.3	24.5	23.60	0	22.56	1
		836.5	24.5	23.57	0	22.64	1
	6RB (0)	824.7	24.5	23.53	0	22.46	1
		848.3	24.5	22.71	1	21.67	2
		836.5	24.5	22.76	1	21.91	2
3 MHz	1RB High (14)	824.7	24.5	22.63	1	21.42	2
		847.5	24.5	23.40	0	22.80	1
		836.5	24.5	23.43	0	22.77	1
	1RB Middle (7)	825.5	24.5	23.67	0	22.47	1
		847.5	24.5	23.68	0	22.80	1
		836.5	24.5	23.64	0	22.76	1
	1RB Low (0)	825.5	24.5	23.56	0	22.82	1
		847.5	24.5	23.79	0	23.13	1
		836.5	24.5	23.80	0	23.21	1
	8RB High (7)	825.5	24.5	23.66	0	22.60	1
		847.5	24.5	22.61	1	21.81	2
		836.5	24.5	22.83	1	21.92	2
	8RB Middle (4)	825.5	24.5	22.70	1	21.79	2
		847.5	24.5	22.71	1	21.83	2
		836.5	24.5	22.86	1	21.98	2
	8RB Low (0)	825.5	24.5	22.65	1	21.88	2
		847.5	24.5	22.77	1	21.87	2
		836.5	24.5	22.93	1	22.04	2
	15RB (0)	825.5	24.5	22.77	1	21.87	2
		847.5	24.5	22.74	1	21.73	2
		836.5	24.5	22.77	1	21.96	2
5 MHz	1RB High (24)	825.5	24.5	22.63	1	21.82	2
		846.5	24.5	23.60	0	22.86	1
		836.5	24.5	23.60	0	22.87	1
	1RB Middle (12)	826.5	24.5	23.58	0	22.94	1
		846.5	24.5	23.79	0	23.03	1
		836.5	24.5	23.78	0	23.03	1