TEST REPORT

No. I18D00109-SAR01

For

Client: Hisense International Co., Ltd.

Production: Smartphone

Model Name: Hisense F28

FCC ID: 2ADOBF28

Hardware Version: V1.00

Software Version: L1544.6.01.01.MX02

Issued date: 2018-9-29

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 ECIT Shanghai.

Test Laboratory:

ECIT Shanghai, East China Institute of Telecommunications

Add: 7-8F, G Area, No.668, Beijing East Road, Huangpu District, Shanghai, P. R. China

Tel: (+86)-021-63843300, E-Mail: welcome@ecit.org.cn

Revision Version

Report Number	Revision	Date	Memo
I18D00109-SAR01	00	2018-9-29	Initial creation of test report

CONTENTS

1. Test Laboratory

1.1. Testing Location

Company Name:	ECIT Shanghai, East China Institute of Telecommunications
Address:	7-8F, G Area,No. 668, Beijing East Road, Huangpu District, Shanghai, P. R. China
Postal Code:	200001
Telephone:	(+86)-021-63843300
Fax:	(+86)-021-63843301

1.2. Testing Environment

Normal Temperature:	18-25℃
Relative Humidity:	25-75%
Ambient noise & Reflection:	< 0.012 W/kg

1.3. Project Data

Project Leader:	Yu Anlu
Testing Start Date:	2018-7-29
Testing End Date:	2018-9-20

1.4. Signature

Yan Hang
(Prepared this test report)

Fu Erliang
(Reviewed this test report)

Zheng Zhongbin
(Approved this test report)

2. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **MEMOR 10** are as follows .

Table 2.1: Max. Reported SAR (1g)

Band	Reported SAR 1g(W/Kg)		
	Head	Body worn (10mm)	Hotspot (10mm)
GSM 850	0.954	0.740	0.818
GSM 1900	0.719	0.515	0.515
WCDMA Band 2	0.761	0.356	0.356
WCDMA Band 4	0.946	0.408	0.408
WCDMA Band 5	1.123	0.517	0.517
LTE Band 2	0.585	0.609	0.899
LTE Band 5	1.038	0.371	0.439
LTE Band 7	1.052	0.535	0.535
LTE Band 12	0.134	0.186	0.271
LTE Band 66	0.977	0.517	0.517
WIFI 2.4G	0.403	0.231	0.432

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 C95.1-1999.

For body worn operation, this device has been tested and meets FCC RF exposure guidelines when used with any accessory that contains no metal. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.

Table 2.2: Simultaneous SAR (1g)

Simultaneous multi-band transmission (Up Antenna + WLAN)								
Test Position			2G	3G	4G	2.4GHz		SUM
						BT	WiFi	2.4GHz
Head	Left	Cheek	0.776	0.826	0.457	0.133	0.389	1.215
		Tilt 15°	0.954	0.818	1.038	0.133	0.293	1.331
	Right	Cheek	0.929	1.123	1.039	0.133	0.348	1.471
		Tilt 15°	0.862	1.117	1.052	0.133	0.403	1.520
Hotspot &Body-worn 10 mm	Phantom Side		0.740	0.517	0.535	0.066	0.231	0.971
	Ground Side		0.547	0.326	0.346	0.066	0.179	0.726
Hotspot 10 mm	Left Side		0.451	0.281	0.278	0.066	0.009	0.517
	Right Side		0.298	0.096	0.043	0.066	0.023	0.364
	Top Side		0.818	0.404	0.509	0.066	0.432	1.250
	Bottom Side		--	--	--	0.066	--	0.084

Simultaneous multi-band transmission (Down Antenna + WLAN)								
Test Position			2G	3G	4G	2.4GHz		SUM
						BT	WiFi	2.4GHz
Head	Left	Cheek	0.271	0.271	0.520	0.133	0.389	0.909
		Tilt 15°	0.206	0.206	0.416	0.133	0.293	0.709
	Right	Cheek	0.345	0.345	0.710	0.133	0.348	1.058
		Tilt 15°	0.180	0.180	0.412	0.133	0.403	0.815
Hotspot &Body-worn 10 mm	Phantom Side		0.408	0.408	0.517	0.066	0.231	0.748
	Ground Side		0.356	0.356	0.609	0.066	0.179	0.788
Hotspot 10 mm	Left Side		0.206	0.206	0.342	0.066	0.009	0.408
	Right Side		0.331	0.331	0.493	0.066	0.023	0.559
	Top Side		--	--	--	0.066	0.432	0.432
	Bottom Side		0.348	0.348	0.899	0.066	--	0.983

According to the above table, the maximum sum of reported SAR values for GSM/WCDMA/LTE/CDMA and BT/WiFi is **1.52 W/kg** (1g).

3. Client Information

3.1. Applicant Information

Company Name:	Hisense International Co., Ltd.
Address:	Floor 22, Hisense Tower, 17 Donghai Xi Road, Qingdao, 266071, China
Telephone:	+86-532-80877742
Postcode:	/

3.2. Manufacturer Information

Company Name:	Hisense International Co., Ltd.
Address:	Floor 22, Hisense Tower, 17 Donghai Xi Road, Qingdao, 266071, China
Telephone:	+86-532-80877742
Postcode:	/

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

4.1. About EUT

Description:	Smartphone
Model name:	Hisense F28
Operation Model(s):	GSM850/GSM1900/GSM900/GSM1800 WCDMA Band I/Band II/Band IV/Band V LTE 1/2/3/4/5/7/12/28/66; BT4.2, WiFi 802.11b,g,n;GPS;GLONASS; FM
Tx Frequency:	824.2-848.8MHz(GSM850) 1850.2-1909.8MHz（GSM1900） 1852.4-1907.6 MHz (WCDMA Band II) 1712.4-1752.6 MHz (WCDMA Band IV) 826.4-846.6MHz (WCDMA Band V) 1850.7 -1909.3 MHz (LTE Band 2) 1710.7 -1754.3 MHz (LTE Band 4) 824.7 -848.3 MHz (LTE Band 5) 2502.5 – 2567.5 MHz (LTE Band 7) 699.7 -715.3 MHz (LTE Band 12) 1710.7 -1779.3 MHz (LTE Band 66) 2412- 2462 MHz (WiFi) 2402 – 2480 MHz (BT)
Test device Production information: GPRS/EGPRS Class Mode: GPRS/ EGPRS Multislot Class:	Production unit B 12
Device type:	Portable device
UE category:	3
Antenna type:	Inner antenna
Accessories/Body-worn configurations:	Battery
Dimensions: Hotspot Mode:	155x75x9mm Support

4.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
N17(Main supply)	863095040002533	V1.00	L1544.6.01.01.MX02
N24(Secondary supply)	863095040000388	V1.00	L1544.6.01.01.MX02

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

Note: The product has two prototypes, the main supply is same as Secondary supply, except the supplier of PCB/Memory IC/Battery. In this report, we test all cases about main supply, and we only test worse case about secondary supply.

4.3. Internal Identification of AE used during the test

AE ID*	Description	Model	SN	Manufacturer
BA01	Battery	N/A	N/A	N/A

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

5. TEST METHODOLOGY

5.1. Applicable Limit Regulations

ANSI C95.1–1999: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 Body Due to Wireless Communications Devices:
Experimental Techniques.
KDB648474 D04 Handset SAR v01r03:SAR Evaluation Considerations for Wireless Handsets.
KDB248227 D01 802 11 WiFi SAR v02r02: SAR measurement procedures for 802.112abg transmitters.
KDB447498 D01 General RF Exposure Guidance v06: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.
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:provides general reporting requirements as well as certain specific information required to support MPE and SAR compliance.
KDB941225 D01 3G SAR Procedures v03r01: 3G SAR Measurement Procedures.
KDB941225 D06 hotspot SAR v02r01:SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities.
NOTE: KDB is not in A2LA Scope List.

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 head 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)	± 5% Range	Permittivity(ε)	± 5% Range
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
1800	Head	1.40	1.33～1.47	40.0	38.0～42.0
1800	Body	1.52	1.44～1.60	53.3	50.6～56.0
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
2600	Head	1.96	1.86~2.06	39.0	37.1~40.9
2600	Body	2.16	2.05~2.27	52.5	59.9~55.1
5200	Head	4.66	4.43~4.89	36.0	34.2~37.8
5200	Body	5.30	5.04~5.57	49.0	46.6~51.5

7.2. Dielectric Performance

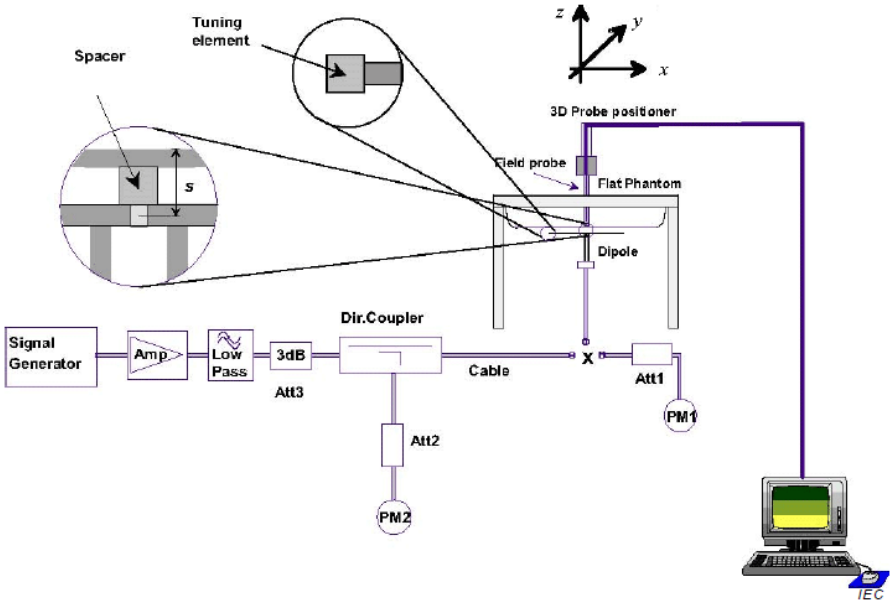
Table 7.2: Dielectric Performance of Tissue Simulating Liquid

Measurement Value						
Liquid Temperature: 22.5 ℃						
Type	**Frequency**	**Permittivity ε**	**Drift (%)**	**Conductivity σ**	**Drift (%)**	Test Date
Head	750 MHz	41.565	-0.80%	0.878	-1.35%	2018/7/29
Head	835 MHz	42.694	2.88%	0.933	3.67%	2018/9/20
Head	1800 MHz	40.797	1.38%	1.362	-0.58%	2018/9/10
Head	1900 MHz	41.611	4.03%	1.356	-3.14%	2018/9/11
Head	2450 MHz	38.941	-0.66%	1.864	3.56%	2018/9/12
Head	2600 MHz	39.996	2.55%	1.955	-0.26%	2018/9/20
Body	750 MHz	56.721	2.20%	0.936	-2.50%	2018/7/29
Body	835 MHz	56.705	2.73%	0.998	2.89%	2018/9/13
Body	1800 MHz	54.975	2.95%	1.472	-1.21%	2018/9/13
Body	1900 MHz	51.75	-2.91%	1.553	2.17%	2018/9/15
Body	2450 MHz	54.785	3.96%	1.927	-1.18%	2018/9/12
Body	2600 MHz	54.37	3.56%	2.11	-2.31%	2018/9/18

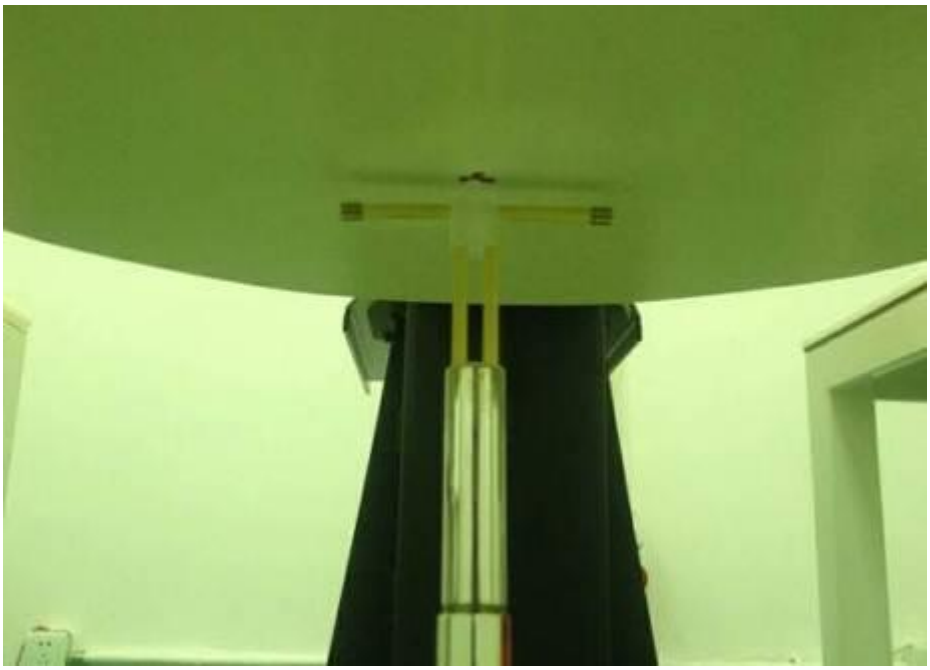
8. System verification

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 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.

Table 8.1: System Verification of Head

Verification Results							
Input power level: 1W							
Frequency	**Target value (W/kg)**		**Measured value (W/kg)**		**Deviation**		**Test date**
	10 g Average	**1 g Average**	**10 g Average**	**1 g Average**	**10 g Average**	**1 g Average**	
750 MHz	5.29	8.07	5.56	8.44	5.10%	4.58%	2018/7/29
835 MHz	6.03	9.22	6.16	9.4	2.16%	1.95%	2018/9/20
1750 MHz	20.1	37.3	20.32	37.2	1.09%	-0.27%	2018/9/10
1900 MHz	21.1	40.5	21.68	41.6	2.75%	2.72%	2018/9/11
2450 MHz	24.3	52.9	24.52	54	0.91%	2.08%	2018/9/12
2600 MHz	25.5	58	25.52	58.4	0.08%	0.69%	2018/9/20

Table 8.2: System Verification of Body

Verification Results							
Input power level: 1W							
Frequency	Target value (W/kg)		Measured value (W/kg)		Deviation		Test date
	10 g Average	1 g Average	10 g Average	1 g Average	10 g Average	1 g Average	
750 MHz	5.71	8.6	5.8	8.56	1.58%	-0.47%	2018/7/29
835 MHz	6.29	9.57	6.2	9.48	-1.43%	-0.94%	2018/9/13
1750 MHz	20.2	37.6	19.92	37.28	-1.39%	-0.85%	2018/9/13
1900 MHz	21.2	40.4	20.68	39.44	-2.45%	-2.38%	2018/9/15
2450 MHz	24.7	53.1	24.28	53.6	-1.70%	0.94%	2018/9/12
2600 MHz	25.4	57.1	24.4	54.8	-3.94%	-4.03%	2018/9/18

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 11.1.

Step 1: The tests described in 11.2 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 Chapter 8),

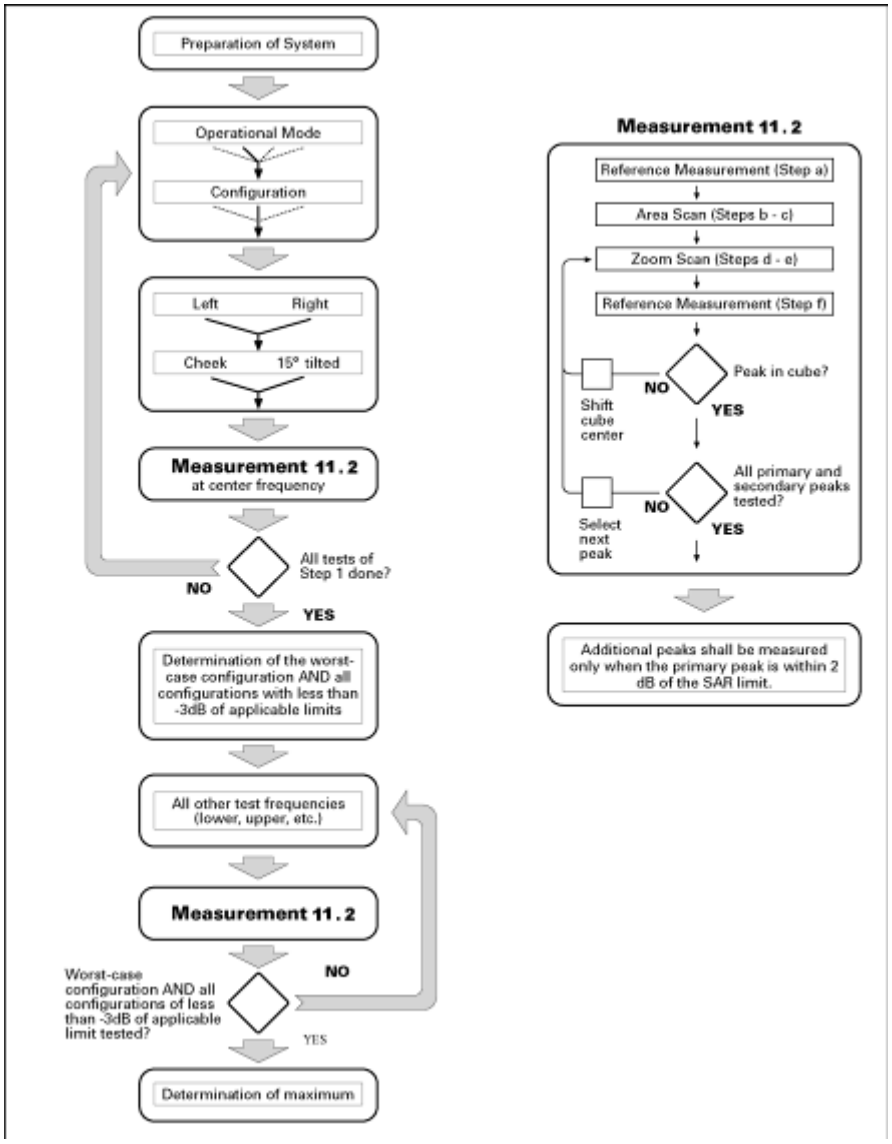
b) all configurations for each device position in a), e.g., antenna extended and retracted, and

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 11.2 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 9.1Block diagram of the tests to be performed

9.2. General Measurement Procedure

The following procedure shall be performed for each of the test conditions (see Picture 11.1) described in 11.1:

a) Measure the local SAR at a test point within 8 mm or less in the normal direction from the inner surface of the phantom.

b) Measure the two-dimensional SAR distribution within the phantom (area scan procedure). The boundary of the measurement area shall not be closer than 20 mm from the phantom side walls. The distance between the measurement points should enable the detection of the location of local maximum with an accuracy of better than half the linear

dimension of the tissue cube after interpolation. A maximum grip spacing of 20 mm for frequencies below 3 GHz and (60/f [GHz]) mm for frequencies of 3GHz and greater is recommended. The maximum distance between the geometrical centre of the probe detectors and the inner surface of the phantom shall be 5 mm for frequencies below 3 GHz and δ In(2)/2 mm for frequencies of 3 GHz and greater, where δ is the plane wave skin depth and In(x) is the natural logarithm. The maximum variation of the sensor-phantom surface shall be $\pm$1 mm for frequencies below 3 GHz and $\pm$0.5 mm for frequencies of 3 GHz and greater. At all measurement points the angle of the probe with respect to the line normal to the surface should be less than 5° . If this cannot be achieved for a measurement distance to the phantom inner surface shorter than the probe diameter, additional uncertainty evaluation is needed.

c) From the scanned SAR distribution, identify the position of the maximum SAR value, in addition identify the positions of any local maxima with SAR values within 2 dB of the maximum value that are not within the zoom-scan volume; additional peaks shall be measured only when the primary peak is within 2 dB of the SAR limit. This is consistent with the 2 dB threshold already stated;

d) Measure the three-dimensional SAR distribution at the local maxima locations identified in step c). The horizontal grid step shall be (24/f[GHz]) mm or less but not more than 8 mm. The minimum zoom size of 30 mm by 30 mm and 30 mm for frequencies below 3 GHz. For higher frequencies, the minimum zoom size of 22 mm by 22 mm and 22 mm. The grip step in the vertical direction shall be (8-f[GHz]) mm or less but not more than 5 mm, if uniform spacing is used. If variable spacing is used in the vertical direction, the maximum spacing between the two closest measured points to the phantom shell shall be (12 / f[GHz]) mm or less but not more than 4 mm, and the spacing between father points shall increase by an incremental factor not exceeding 1.5. When variable spacing is used, extrapolation routines shall be tested with the same spacing as used in measurements. The maximum distance between the geometrical centre of the probe detectors and the inner surface of the phantom shall be 5 mm for frequencies below 3 GHz and δ In(2)/2 mm for frequencies of 3 GHz and greater, where δ is the plane wave skin depth and In(x) is the natural logarithm. Separate grids shall be centered on each of the local SAR maxima found in step c). Uncertainties due to field distortion between the media boundary and the dielectric enclosure of the probe should also be minimized, which is achieved is the distance between the phantom surface and physical tip of the probe is larger than probe tip diameter. Other methods may utilize correction procedures for these boundary effects

that enable high precision measurements closer than half the probe diameter. For all measurement points, the angle of the probe with respect to the flat phantom surface shall be less than 5°. If this cannot be achieved an additional uncertainty evaluation is needed.

e) Use post processing(e.g. interpolation and extrapolation) procedures to determine the local SAR values at the spatial resolution needed for mass averaging.

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	MPR (dB)
1	2/15	15/15	64	2/15	4/15	1.5	0.5
2	12/15	15/15	64	12/15	24/25	2.0	1
3	15/15	8/15	64	15/8	30/15	2.0	1
4	15/15	4/15	64	15/4	30/15	2.0	1

For Release 6 HSUPA 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	2.0	1.0	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	β_{ed1}:47/15 β_{ed2}:47/15	4	2	3.0	2.0	15	92
4	2/15	15/15	64	2/15	4/15	4/15	56/75	4	1	2.0	1.0	17	71
5	15/15	15/15	64	15/15	24/15	30/15	134/15	4	1	2.0	1.0	21	81

9.4. Bluetooth & WiFi 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.

9.5. 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 13 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 v06, 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 fo 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

Manufacturing tolerance

Table 11.1: GSM Speech

GSM 850			
Channel	Channel 128	Channel 190	Channel 251
Maximum Target Value (dBm)	33	33	33
GSM1900			
Channel	Channel 512	Channel 661	Channel 810
Maximum Target Value (dBm)	30	30	30

Table 11.2: GPRS (GMSK Modulation)

GSM 850				
Channel		**128**	**190**	**251**
1 Txslots	Maximum Target Value (dBm)	33	33	33
2 Txslots	Maximum Target Value (dBm)	32	32	32
3 Txslots	Maximum Target Value (dBm)	30	30	30
4 Txslots	Maximum Target Value (dBm)	29	29	29
GSM 1900				
Channel		**512**	**661**	**810**
1 Txslots	Maximum Target Value (dBm)	30	30	30
2 Txslots	Maximum Target Value (dBm)	29	29	29
3 Txslots	Maximum Target Value (dBm)	27	27	27
4 Txslots	Maximum Target Value (dBm)	26	26	26

Table 11.3: EGPRS (8-PSK Modulation)

GSM 850				
Channel		**128**	**190**	**251**
1 Txslots	Maximum Target Value (dBm)	28	28	28
2 Txslots	Maximum Target Value (dBm)	27	27	27
3 Txslots	Maximum Target Value (dBm)	24	24	24
4 Txslots	Maximum Target Value (dBm)	23	23	23
GSM 1900				
Channel		**512**	**661**	**810**
1 Txslots	Maximum Target Value (dBm)	27	27	27
2 Txslots	Maximum Target Value (dBm)	26	26	26
3 Txslots	Maximum Target Value (dBm)	23	23	23
4 Txslots	Maximum Target Value (dBm)	22.5	22.5	22.5

Table 11.4: WCDMA

WCDMA Band II			
Channel	Channel 9262	Channel 9400	Channel 9538
Maximum Target Value (dBm)	24	24	24

WCDMA Band II **HSDPA**					MPR (dB)
Channel		9262	9400	9538	
1	Maximum Target Value (dBm)	23	23	23	0
2	Maximum Target Value (dBm)	23	23	23	1
3	Maximum Target Value (dBm)	23	23	23	1
4	Maximum Target Value (dBm)	22	22	22	1
WCDMA Band II **HSUPA**					MPR (dB)
Channel		9262	9400	9538	
1	Maximum Target Value (dBm)	22	22	22	1
2	Maximum Target Value (dBm)	22	22	22	0
3	Maximum Target Value (dBm)	22	22	22	1
4	Maximum Target Value (dBm)	22	22	22	1
5	Maximum Target Value (dBm)	22	22	22	1

Table 11.5: WCDMA

WCDMA Band IV			
Channel	1312	1413	1513
Maximum Target Value (dBm)	23	23	23

WCDMA Band IV **HSDPA**					MPR (dB)
Channel		1312	1413	1513	
1	Maximum Target Value (dBm)	22	22	22	1
2	Maximum Target Value (dBm)	22	22	22	1
3	Maximum Target Value (dBm)	22	22	22	1
4	Maximum Target Value (dBm)	22	22	22	1
WCDMA Band IV **HSUPA**					MPR (dB)
Channel		1312	1413	1513	
1	Maximum Target Value (dBm)	22	22	22	1
2	Maximum Target Value (dBm)	21	21	21	1
3	Maximum Target Value (dBm)	21	21	21	1
4	Maximum Target Value (dBm)	21	21	21	1
5	Maximum Target Value (dBm)	21	21	21	1

Table 11.6: WCDMA

WCDMA Band V			
Channel	4132	4183	4233
Maximum Target Value (dBm)	23	23	23

WCDMA Band V **HSDPA**					MPR (dB)
Channel		4132	4183	4233	
1	Maximum Target Value (dBm)	22	22	22	1
2	Maximum Target Value (dBm)	22	22	22	1
3	Maximum Target Value (dBm)	22	22	22	1
4	Maximum Target Value (dBm)	21	21	21	1
WCDMA Band V **HSUPA**					MPR (dB)
Channel		4132	4183	4233	
1	Maximum Target Value (dBm)	21	21	21	1
2	Maximum Target Value (dBm)	21	21	21	1
3	Maximum Target Value (dBm)	21	21	21	1
4	Maximum Target Value (dBm)	21	21	21	1
5	Maximum Target Value (dBm)	21	21	21	1

Table 11.7: LTE

LTE Band2			
RB Size	1	50%	100%
Maximum Target Value (dBm)	23	23	22
LTE Band4			
RB Size	1	50%	100%
Maximum Target Value (dBm)	23	23	22
LTE Band5			
RB Size	1	50%	100%
Maximum Target Value (dBm)	23	23	22

LTE Band7			
RB Size	1	50%	100%
Maximum Target Value (dBm)	20	20	19.5
LTE Band12			
RB Size	1	50%	100%
Maximum Target Value (dBm)	23.5	23	22.5
LTE Band66			
RB Size	1	50%	100%
Maximum Target Value (dBm)	23.5	23.5	22.5

Table 11.8: WiFi

WiFi 802.11b 2.4G			
Channel	Channel 1	Channel 6	Channel 11
Maximum Target Value (dBm)	13.5	13.5	13.5
WiFi 802.11g 2.4G			
Channel	Channel 1	Channel 6	Channel 11
Maximum Target Value (dBm)	13.0	13.0	13.0
WiFi 802.11n 20M 2.4G			
Channel	Channel 1	Channel 6	Channel 11
Maximum Target Value (dBm)	13.0	13.0	13.0

Table 11.9: Bluetooth

Bluetooth			
Channel	Channel 0	Channel 39	Channel 78
Maximum Target Value (dBm)	5.0	5.0	5.0

Table 11.10: BLE

Bluetooth			
Channel	Channel 0	Channel 19	Channel 39
Maximum Target Value (dBm)	5.0	5.0	5.0

11.1. 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 GSM

GSM 850MHZ	Conducted Power (dBm)		
	Channel 128(824.2MHz)	**Channel 190(826.6MHz)**	**Channel 251(848.8MHz)**
	32.33	32.44	32.45
GSM 1900MHZ	**Conducted Power(dBm)**		
	Channel 512(1850.2MHz)	**Channel 661(1880 MHz)**	**Channel 810(1909.8MHz)**
	29.78	29.76	29.66

Table 11.12: The conducted power measurement results for GPRS/EGPRS

GSM 850 GMSK	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	128	**190**	**251**		**128**	**190**	**251**
1 Txslot	32.33	32.44	32.45	-9.03dB	23.3	23.41	23.42
2 Txslots	31.19	31.31	31.42	-6.02dB	25.17	25.29	25.4
3 Txslots	29.54	29.62	29.73	-4.26dB	25.28	25.36	25.47
4 Txslots	28.45	28.53	28.6	-3.01dB	25.44	25.52	**25.59**
GSM 1900 GMSK	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	512	**661**	**810**		**512**	**661**	**810**
1 Txslot	29.27	29.25	29.35	-9.03dB	20.24	20.22	20.32
2 Txslots	28.11	28.38	28.71	-6.02dB	22.09	22.36	22.69
3 Txslots	26.37	26.68	26.86	-4.26dB	22.11	22.42	22.6
4 Txslots	25.25	25.6	25.89	-3.01dB	22.24	22.59	**22.88**

Table 11.13: The conducted power measurement results for E-GPRS

GSM 850 8-PSK	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	128	**190**	**251**		**128**	**190**	**251**
1 Txslot	27.44	27.37	27.54	-9.03dB	18.41	18.34	18.51
2 Txslots	26.23	26.33	26.25	-6.02dB	20.21	20.31	20.23
3 Txslots	23.9	23.98	23.99	-4.26dB	19.64	19.72	19.73
4 Txslots	22.78	22.96	22.68	-3.01dB	19.77	19.95	19.67
GSM 1900 8-PSK	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	512	**661**	**810**		**512**	**661**	**810**
1 Txslot	26.38	26.47	26.91	-9.03dB	17.35	17.44	17.88
2 Txslots	25.02	25.32	25.67	-6.02dB	19	19.3	19.65
3 Txslots	22.77	22.97	22.89	-4.26dB	18.51	18.71	18.63
4 Txslots	21.63	21.85	22.33	-3.01dB	18.62	18.84	19.32

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 4Txslots for 850MHz ; 4Txslots for1900MHz;

11.2. WCDMA Measurement result

Table 11.14: The conducted Power for WCDMA

Item	band	WCDMA BAND II result(dBm)		
	ARFCN	9262 (1852.4MHz)	9400 (1880.0MHz)	9538 (1907.6MHz)
WCDMA	\	23.31	23.27	23.01
HSDPA	1	22.59	22.54	22.27
	2	22.37	22.34	22.09
	3	22.04	22.04	21.8
	4	21.96	21.94	21.67
HSUPA	1	21.94	21.94	21.66
	2	20.99	20.88	20.7
	3	20.98	21.02	20.63
	4	21.79	21.72	21.54
	5	21.59	21.62	21.43
Item	band	WCDMA BAND V result(dBm)		
	ARFCN	Channel 4132 (826.4MHz)	Channel 4183 (836.6MHz)	Channel 4233 (846.6MHz)
WCDMA	\	22.25	22.28	22.27
HSDPA	1	21.53	21.55	21.53
	2	21.31	21.35	21.35
	3	20.98	21.05	21.06
	4	20.9	20.95	20.93
HSUPA	1	20.88	20.95	20.92
	2	19.93	19.89	19.96
	3	19.92	20.03	19.89
	4	20.73	20.73	20.8
	5	20.53	20.63	20.69
Item	band	WCDMA BAND IV result(dBm)		
	ARFCN	Channel 1312 (1712.4MHz)	Channel 1413 (1732.6MHz)	Channel 1513 (1752.6MHz)
WCDMA	\	22.13	22.12	22.34
HSDPA	1	21.38	21.38	21.62
	2	21.18	21.2	21.38
	3	20.91	20.89	21.13
	4	20.81	20.82	21.03
HSUPA	1	20.81	20.79	20.96
	2	19.78	19.8	19.97
	3	19.78	19.85	20.01
	4	20.71	20.62	20.89
	5	20.42	20.45	20.72

11.3. LTE Measurement result

Table 11.15: The conducted Power for LTE BAND 2/4/5/7/12/66

Band2						
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 18625 1852.5MHz	Channel 18900 1880MHz	Channel 19175 1907.5MHz
5MHz	QPSK	1	0	22.62	22.62	22.38
		1	13	22.7	22.73	22.48
		1	24	22.59	22.6	22.31
		12	0	21.69	21.75	21.53
		12	6	21.77	21.76	21.53
		12	13	21.7	21.68	21.38
		25	0	21.73	21.74	21.49
	16QAM	1	0	21.98	21.91	21.64
		1	13	22.05	22.03	21.72
		1	24	21.94	21.89	21.61
		12	0	20.72	20.75	20.49
		12	6	20.8	20.77	20.47
		12	13	20.74	20.67	20.37
		25	0	20.74	20.69	20.44
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 18650 1855MHz	Channel 18900 1880MHz	Channel 19150 1905MHz
10MHz	QPSK	1	0	22.78	22.79	22.6
		1	25	22.81	22.81	22.6
		1	49	22.69	22.69	22.42
		25	0	21.74	21.86	21.61
		25	13	21.79	21.81	21.59
		25	25	21.77	21.72	21.41
		50	0	21.78	21.79	21.53
	16QAM	1	0	22.1	22.07	21.83
		1	25	22.1	22.1	21.85
		1	49	21.96	22.01	21.78
		25	0	20.72	20.81	20.55
		25	13	20.76	20.78	20.51

		25	25	20.74	20.68	20.35
		50	0	20.72	20.75	20.47
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 18675 1857.5MHz	Channel 18900 1880MHz	Channel 19125 1902.5MHz
15MHz	QPSK	1	0	22.74	22.75	22.59
		1	37	22.75	22.75	22.59
		1	74	22.62	22.66	22.57
		36	0	21.72	21.85	21.6
		36	19	21.76	21.79	21.58
		36	38	21.72	21.68	21.46
		75	0	21.74	21.77	21.51
	16QAM	1	0	22.03	22.04	21.86
		1	37	22.06	22.07	21.83
		1	74	21.95	21.87	21.58
		36	0	20.77	20.86	20.6
		36	19	20.78	20.81	20.58
		36	38	20.75	20.7	20.46
		75	0	20.74	20.75	20.49
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 18700 1860MHz	Channel 18900 1880MHz	Channel 19100 1900MHz
20MHz	QPSK	1	0	22.54	22.56	22.47
		1	50	22.77	22.73	22.61
		1	99	22.34	22.39	22.17
		50	0	21.84	21.81	21.65
		50	25	21.74	21.74	21.59
		50	50	21.73	21.61	21.4
		100	0	21.69	21.74	21.54
	16QAM	1	0	21.9	21.88	21.78
		1	50	22.07	22.11	21.88
		1	99	21.66	21.7	21.47
		50	0	20.7	20.87	20.66
		50	25	20.75	20.77	20.6
		50	50	20.74	20.64	20.41
		100	0	20.7	20.73	20.51
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 18615 1851.5MHz	Channel 18900 1880MHz	Channel 19185 1908.5MHz

3MHz	QPSK	1	0	22.7	22.7	22.43
		1	7	22.71	22.69	22.41
		1	14	22.68	22.68	22.37
		8	0	21.75	21.71	21.44
		8	4	21.76	21.75	21.47
		8	7	21.73	21.72	21.41
		15	0	21.72	21.66	21.41
	16QAM	1	0	22.04	21.98	21.71
		1	7	22.03	21.98	21.71
		1	14	22.01	21.98	21.69
		8	0	20.78	20.78	20.51
		8	4	20.81	20.77	20.51
		8	7	20.79	20.76	20.47
		15	0	20.71	20.71	20.44
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 18607 1850.7MHz	Channel 18900 1880MHz	Channel 19193 1909.3MHz
1.4MHz	QPSK	1	0	22.66	22.67	22.37
		1	3	22.79	22.79	22.49
		1	5	22.66	22.64	22.37
		3	0	22.76	22.77	22.45
		3	1	22.8	22.8	22.5
		3	3	22.78	22.8	22.49
		6	0	21.77	21.72	21.44
	16QAM	1	0	22	21.98	21.67
		1	3	22.15	22.14	21.86
		1	5	22	21.98	21.71
		3	0	21.82	21.8	21.51
		3	1	21.81	21.83	21.54
		3	3	21.81	21.8	21.53
		6	0	20.84	20.85	20.56

Band4						
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 19975 1712.5MHz	Channel 20175 1732.5MHz	Channel 20375 1752.5MHz

5MHz	QPSK	1	0	22.08	21.93	21.69
		1	13	22.17	22.03	21.78
		1	24	22.01	21.88	21.66
		12	0	21.13	21.04	20.75
		12	6	21.19	21.03	20.81
		12	13	21.13	20.92	20.74
		25	0	21.17	21.01	20.77
	16QAM	1	0	21.46	21.35	21.11
		1	13	21.52	21.41	21.15
		1	24	21.41	21.28	21.08
		12	0	20.29	20.19	19.89
		12	6	20.38	20.22	19.95
		12	13	20.27	20.08	19.91
		25	0	20.26	20.13	19.87
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20000 1715MHz	Channel 20175 1732.5MHz	Channel 20350 1750MHz
10MHz	QPSK	1	0	21.24	21.11	20.98
		1	25	21.24	21.15	20.90
		1	49	21.10	20.98	20.79
		25	0	20.23	20.13	19.85
		25	13	20.23	20.11	19.87
		25	25	20.18	19.97	19.87
		50	0	20.23	20.07	19.84
	16QAM	1	0	20.54	20.39	20.26
		1	25	20.53	20.43	20.25
		1	49	20.38	20.28	20.06
		25	0	19.26	19.18	18.90
		25	13	19.28	19.15	18.90
		25	25	19.20	19.02	18.89
		50	0	19.24	19.14	18.88
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20025 1717.5MHz	Channel 20175 1732.5MHz	Channel 20325 1747.5MHz
15MHz	QPSK	1	0	22.17	22.04	21.92
		1	38	22.14	22.03	21.87
		1	74	21.92	21.86	21.71
		36	0	21.2	21.12	20.89
		36	18	21.15	21.04	20.86
		36	39	21.05	20.91	20.79

		75	0	21.16	21.06	20.86
	16QAM	1	0	21.47	21.38	21.3
		1	38	21.45	21.4	21.22
		1	74	21.27	21.2	20.98
		36	0	20.32	20.23	20.02
		36	18	20.28	20.18	19.97
		36	39	20.17	20.03	19.9
		75	0	20.21	20.15	19.95
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20050 1720MHz	Channel 20175 1732.5MHz	Channel 20300 1745MHz
20MHz	QPSK	1	0	22.78	22.68	22.61
		1	50	22.88	22.89	22.75
		1	99	22.71	22.59	22.44
		50	0	22.26	22.31	22.15
		50	25	22.15	22.05	21.9
		50	50	21.9	21.89	21.85
		100	0	22.1	22.05	21.92
	16QAM	1	0	22.31	22.17	22.12
		1	50	22.47	22.48	22.33
		1	99	22.06	21.95	21.81
		50	0	21.33	21.31	21.06
		50	25	21.21	21.14	21.01
		50	50	21.01	20.97	20.96
		100	0	21.14	21.12	20.98
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 19965 1711.5MHz	Channel 20175 1732.5MHz	Channel 20385 1753.5MHz
3MHz	QPSK	1	0	22.26	22.08	21.83
		1	8	22.24	22.06	21.82
		1	14	22.22	22.06	21.82
		8	0	21.27	21.09	20.79
		8	4	21.29	21.12	20.86
		8	7	21.26	21.09	20.85
		15	0	21.24	21.05	20.81
	16QAM	1	0	21.53	21.39	21.09
		1	8	21.54	21.34	21.11
		1	15	21.51	21.37	21.09
		8	0	20.33	20.18	19.92
		8	4	20.36	20.22	19.94

		8	7	20.32	20.17	19.94
		15	0	20.29	20.1	19.84
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 19957 1710.7MHz	Channel 20175 1732.5MHz	Channel 20393 1754.3MHz
1.4MHz	QPSK	1	0	22.19	22.02	21.79
		1	2	22.32	22.19	21.92
		1	5	22.2	22.03	21.79
		3	0	22.3	22.12	21.88
		3	1	22.34	22.16	21.92
		3	2	22.31	22.15	21.92
		6	0	21.24	21.09	20.86
	16QAM	1	0	21.44	21.32	21.06
		1	2	21.6	21.47	21.22
		1	5	21.4	21.32	21.1
		3	0	21.24	21.13	20.92
		3	1	21.32	21.22	20.94
		3	2	21.33	21.17	20.96
		6	0	20.35	20.22	20.01

Band5						
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20425 826.5MHz	Channel 20525 836.5MHz	Channel 20625 846.5MHz
5MHz	QPSK	1	0	22.33	22.37	22.38
		1	12	22.47	22.45	22.5
		1	24	22.37	22.38	22.43
		12	0	21.47	21.5	21.54
		12	6	21.54	21.56	21.6
		12	13	21.48	21.49	21.52
		25	0	21.5	21.54	21.58
	16QAM	1	0	21.64	21.66	21.65
		1	12	21.72	21.77	21.77
		1	24	21.65	21.66	21.72
		12	0	20.41	20.47	20.51
		12	6	20.5	20.55	20.56
		12	13	20.45	20.47	20.5
		25	0	20.43	20.48	20.47
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20450 829MHz	Channel 20525 836.5MHz	Channel 20600 844MHz
10MHz	QPSK	1	0	22.46	22.52	22.49
		1	25	22.58	22.62	22.59
		1	49	22.5	22.5	22.52
		25	0	21.6	21.63	21.66
		25	13	21.69	21.7	21.68
		25	25	21.58	21.65	21.61
		50	0	21.61	21.7	21.62
	16QAM	1	0	21.69	21.71	21.74
		1	25	21.77	21.83	21.81
		1	49	21.74	21.73	21.74
		25	0	20.54	20.56	20.57
		25	13	20.53	20.57	20.57
		25	25	20.47	20.57	20.5
		50	0	20.52	20.61	20.56
Bandwidth	Mode	RB Size	RB Offset	Channel 20415 825.5MHz		
				Channel 20415 825.5MHz	Channel 20525 836.5MHz	Channel 20635 847.5MHz

3MHz	QPSK	1	0	22.93	22.98	22.99
		1	7	22.94	22.95	22.97
		1	14	23.00	22.99	23.01
		8	0	21.99	22.02	22.06
		8	4	22.05	22.06	22.11
		8	7	22.02	22.04	22.05
		15	0	21.97	22.04	22.07
	16QAM	1	0	22.17	22.25	22.29
		1	7	22.21	22.25	22.26
		1	14	22.21	22.29	22.29
		8	0	20.99	21.02	21.05
		8	4	21.04	21.07	21.08
		8	7	21.01	21.03	21.06
		15	0	20.95	20.99	21.03
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20407 824.7MHz	Channel 20525 836.5MHz	Channel 20643 848.3MHz
1.4MHz	QPSK	1	0	22.38	22.4	22.45
		1	2	22.5	22.54	22.6
		1	5	22.41	22.4	22.46
		3	0	22.46	22.49	22.57
		3	2	22.55	22.53	22.63
		3	3	22.5	22.54	22.61
		6	0	21.53	21.53	21.62
	16QAM	1	0	21.61	21.67	21.7
		1	2	21.78	21.83	21.87
		1	5	21.67	21.67	21.71
		3	0	21.51	21.54	21.57
		3	2	21.57	21.6	21.65
		3	3	21.54	21.53	21.62
		6	0	20.55	20.58	20.63

Band7						
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20775 2502.5MHz	Channel 21100 2535MHz	Channel 21425 2567.5MHz
5MHz	QPSK	1	0	19.63	19.85	19.58

		1	13	19.75	19.90	19.65
		1	24	19.7	19.83	19.54
		12	0	18.68	18.92	18.66
		12	6	18.8	18.99	18.69
		12	13	18.78	18.96	18.58
		25	0	18.79	18.96	18.66
	16QAM	1	0	18.89	19.14	18.85
		1	13	19.03	19.24	18.97
		1	24	18.96	19.14	18.85
		12	0	17.67	17.94	17.67
		12	6	17.83	18	17.72
		12	13	17.81	17.96	17.61
		25	0	17.76	17.94	17.64
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20800 2505MHz	Channel 21100 2535MHz	Channel 21400 2565MHz
10MHz	QPSK	1	0	19.73	19.96	19.77
		1	25	19.92	19.96	19.84
		1	49	19.89	19.99	19.68
		25	0	18.74	18.97	18.82
		25	13	18.93	19.06	18.77
		25	25	18.96	19.09	18.73
		50	0	18.88	19.06	18.78
	16QAM	1	0	18.97	19.2	18.97
		1	25	19.08	19.31	19.05
		1	49	19.05	19.19	18.9
		25	0	17.66	17.92	17.76
		25	13	17.84	18.01	17.71
		25	25	17.91	18.02	17.68
		50	0	17.82	17.99	17.72
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20825 2507.5MHz	Channel 21100 2535MHz	Channel 21375 2562.5MHz
15MHz	QPSK	1	0	19.68	19.93	19.73
		1	38	19.85	19.97	19.77
		1	74	19.86	19.89	19.64
		36	0	18.72	18.92	18.79
		36	18	18.89	18.98	18.78
		36	39	18.91	19.02	18.7
		75	0	18.86	19.02	18.78

	16QAM	1	0	18.95	19.16	18.94
		1	38	19.06	19.25	19.02
		1	74	19.11	19.14	18.91
		36	0	17.69	17.91	17.78
		36	18	17.86	18	17.79
		36	39	17.91	18.01	17.71
		75	0	17.8	17.99	17.75
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20850 2510MHz	Channel 21100 2535MHz	Channel 21350 2560MHz
20MHz	QPSK	1	0	19.46	19.68	19.52
		1	50	19.86	19.95	19.82
		1	99	19.65	19.66	19.44
		50	0	18.7	18.9	18.89
		50	25	18.98	19.11	18.88
		50	50	18.94	19.09	18.71
		100	0	18.77	19	18.76
	16QAM	1	0	18.77	19	18.81
		1	50	19.18	19.34	19.1
		1	99	18.97	18.95	18.75
		50	0	17.61	17.9	17.84
		50	25	17.84	17.98	17.75
		50	50	17.89	18.08	17.68
		100	0	17.73	17.99	17.73

Band12						
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 23035 701.5MHz	Channel 23095 707.5MHz	Channel 23155 713.5MHz
5MHz	QPSK	1	0	22.89	22.87	22.87
		1	12	23.00	23.02	23.01
		1	24	22.95	22.89	22.94
		12	0	21.88	22.01	21.96
		12	6	22.02	22.05	22.05
		12	13	22.03	21.99	21.93
		25	0	21.95	22.01	21.95
	16QAM	1	0	22.14	22.13	22.13
		1	12	22.27	22.29	22.30

		1	24	22.21	22.17	22.21
		12	0	20.85	21.01	20.98
		12	6	21.02	21.03	21.05
		12	13	21.03	20.98	20.93
		25	0	20.93	20.98	20.92
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 23060 704MHz	Channel 23095 707.5MHz	Channel 23130 711MHz
10MHz	QPSK	1	0	22.96	22.95	22.99
		1	25	23.13	**23.15**	23.13
		1	49	23.04	23.06	23.07
		25	0	21.93	**22.19**	22.10
		25	13	22.07	22.09	22.08
		25	25	22.07	22.11	22.07
		50	0	22.02	22.13	22.10
	16QAM	1	0	22.17	22.18	22.21
		1	25	22.35	22.32	22.32
		1	49	22.27	22.26	22.25
		25	0	20.88	21.03	21.02
		25	13	21.01	21.02	21.04
		25	25	21.03	21.04	21.04
		50	0	20.94	21.06	21.01
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 23025 700.5MHz	Channel 23095 707.5MHz	Channel 23165 714.5MHz
3MHz	QPSK	1	0	22.97	22.99	22.97
		1	7	23.00	23.01	23.04
		1	14	22.99	23.00	23.02
		8	0	21.97	22.01	22.03
		8	4	22.02	22.06	22.06
		8	7	22.00	22.01	21.99
		15	0	21.98	21.99	22.05
	16QAM	1	0	22.26	22.26	22.27
		1	7	22.29	22.28	22.27
		1	14	22.25	22.25	22.26
		8	0	21.00	21.03	21.07
		8	4	21.05	21.07	21.08
		8	7	21.05	21.03	21.03
		15	0	20.98	20.99	21.00
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		

				Channel 23017 699.7MHz	Channel 23095 707.5MHz	Channel 23173 715.3MHz
1.4MHz	QPSK	1	0	22.96	22.97	22.97
		1	2	23.12	23.13	23.13
		1	5	23.01	22.99	22.99
		3	0	23.07	23.06	23.06
		3	2	23.11	23.14	23.13
		3	3	23.11	23.09	23.10
		6	0	22.08	22.08	22.07
	16QAM	1	0	22.22	22.24	22.21
		1	2	22.36	22.40	22.41
		1	5	22.27	22.25	22.24
		3	0	22.05	22.08	22.06
		3	2	22.10	22.13	22.11
		3	3	22.12	22.11	22.08
		6	0	21.13	21.12	21.13

Band66						
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 131997 1712.5MHz	Channel 132322 1745MHz	Channel 132647 1777.5MHz
5MHz	QPSK	1	0	22.72	22.38	22.18
		1	12	22.8	22.49	22.33
		1	24	22.61	22.32	22.21
		12	0	21.79	21.45	21.36
		12	6	21.83	21.52	21.34
		12	13	21.74	21.44	21.31
		25	0	21.79	21.48	21.33
	16QAM	1	0	22.05	21.74	21.52
		1	12	22.1	21.82	21.67
		1	24	21.94	21.63	21.57
		12	0	20.87	20.56	20.46
		12	6	20.93	20.61	20.45
		12	13	20.84	20.56	20.41
		25	0	20.85	20.55	20.41
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 132022 1715MHz	Channel 132322 1745MHz	Channel 132622 1775MHz

10MHz	QPSK	1	0	22.8	22.52	22.29
		1	25	22.85	22.55	22.34
		1	49	22.65	22.34	22.25
		25	0	21.8	21.49	21.41
		25	13	21.78	21.5	21.34
		25	25	21.73	21.49	21.24
		50	0	21.76	21.49	21.32
	16QAM	1	0	22.16	21.89	21.6
		1	25	22.16	21.93	21.67
		1	49	21.99	21.7	21.62
		25	0	20.85	20.56	20.49
		25	13	20.84	20.57	20.4
		25	25	20.78	20.52	20.29
		50	0	20.82	20.56	20.4
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 132047 1717.5MHz	Channel 132322 1745MHz	Channel 132597 1772.5MHz
15MHz	QPSK	1	0	23.27	23.03	22.77
		1	38	23.28	23.01	22.82
		1	74	23.09	22.8	22.73
		36	0	22.36	22.03	21.87
		36	18	22.27	22.02	21.84
		36	39	22.18	21.96	21.71
		75	0	22.29	22	21.83
	16QAM	1	0	22.6	22.36	22.04
		1	38	22.58	22.35	22.12
		1	74	22.4	22.14	22.04
		36	0	21.44	21.13	20.94
		36	18	21.38	21.11	20.92
		36	39	21.26	21.04	20.81
		75	0	21.34	21.06	20.89
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 132072 1720MHz	Channel 132322 1745MHz	Channel 132572 1770MHz
20MHz	QPSK	1	0	23.15	22.93	22.65
		1	50	**23.34**	23.13	22.91
		1	99	22.89	22.57	22.5
		50	0	**22.56**	22.49	22.36
		50	25	22.27	22.02	21.85
		50	50	22.11	22.01	21.6

		100	0	22.23	22.06	21.81
	16QAM	1	0	22.44	22.25	21.93
		1	50	22.64	22.43	22.19
		1	99	22.21	21.85	21.85
		50	0	21.44	21.14	21
		50	25	21.32	21.1	20.89
		50	50	21.14	21.09	20.68
		100	0	18.77	18.59	18.36
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 131987 1711.5MHz	Channel 132322 1745MHz	Channel 132657 1778.5MHz
3MHz	QPSK	1	0	22.95	22.73	22.45
		1	8	23.14	22.93	22.71
		1	14	22.69	22.37	22.3
		8	0	22.66	22.39	22.26
		8	4	22.57	22.32	22.15
		8	7	22.41	22.31	21.9
		15	0	22.53	22.36	22.11
	16QAM	1	0	22.24	22.05	21.73
		1	8	22.44	22.23	21.99
		1	15	22.51	22.15	22.15
		8	0	21.74	21.44	21.3
		8	4	21.62	21.4	21.19
		8	7	21.44	21.39	20.98
		15	0	19.07	18.89	18.66
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 131979 1710.7MHz	Channel 132322 1745MHz	Channel 132665 1779.3MHz
1.4MHz	QPSK	1	0	22.88	22.66	22.38
		1	2	23.07	22.86	22.64
		1	5	22.62	22.3	22.23
		3	0	22.20	22.65	23.18
		3	1	22.21	22.75	23.28
		3	2	22.84	22.74	22.33
		6	0	22.46	22.49	22.54
	16QAM	1	0	22.17	21.98	21.66
		1	2	22.37	22.16	21.92
		1	5	22.44	22.08	22.08
		3	0	21.67	21.37	21.23
		3	1	21.55	21.33	21.12

		3	2	21.37	21.32	20.91
		6	0	19	18.82	18.59

11.4. WiFi and BT Measurement result

Table 11.16: The conducted power for Bluetooth

GFSK			
Channel	Ch0 (2402 MHz)	Ch39 (2441MHz)	CH78 (2480MHz)
Conducted Output Power (dBm)	4.4	4.6	4.1
π /4 DQPSK			
Channel	Ch0 (2402 MHz)	Ch39 (2441MHz)	CH78 (2480MHz)
Conducted Output Power (dBm)	2.9	3.6	2.55
8DPSK			
Channel	Ch0 (2402 MHz)	Ch39 (2441MHz)	CH78 (2480MHz)
Conducted Output Power (dBm)	3.0	3.1	2.3

Table 11.17: The conducted power for BLE

GFSK			
Channel	Ch0 (2402 MHz)	Ch19 (2440MHz)	CH39 (2480MHz)
Conducted Output Power (dBm)	4.1	4.2	3.8

NOTE: According to KDB447498 D01 BT standalone SAR are not required, because maximum average output power is less than 10mW.

When the standalone SAR test exclusion is applied to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to the following to determine simultaneous transmission SAR test exclusion:

(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] • [√f(GHz)/x] W/kg for test separation distances ≤ 50 mm;
where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR.

SAR head value of BT is 0.133 W/Kg. SAR body value of BT is 0.066 W/Kg.

The default power measurement procedures are:

a) Power must be measured at each transmit antenna port according to the DSSS and OFDM transmission configurations in each standalone and aggregated frequency band.

b) Power measurement is required for the transmission mode configuration with the highest maximum output power specified for production units.

1) When the same highest maximum output power specification applies to multiple transmission modes, the largest channel bandwidth configuration with the lowest order modulation and lowest data rate is measured.

2) When the same highest maximum output power is specified for multiple largest channel bandwidth configurations with the same lowest order modulation or lowest order modulation and lowest data rate, power measurement is required for all equivalent 802.11 configurations with the same maximum output power.

c) For each transmission mode configuration, power must be measured for the highest and lowest channels; and at the mid-band channel(s) when there are at least 3 channels. For configurations with multiple mid-band channels, due to an even number of channels, both channels should be measured.

During WLAN SAR testing EUT is configured with the WLAN continuous TX tool, and the transmission duty factor was monitored on the spectrum analyzer with zero-span setting，the duty cycle is 100%.

Duty Cycle 802.11b mode

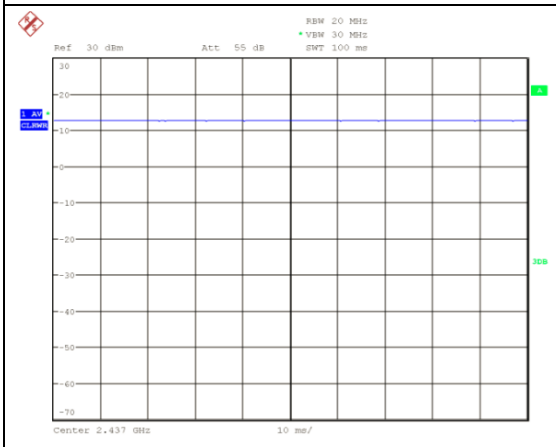


Table 11.18: The average conducted power for WiFi

Mode	Channel	Frequence	Average power(dBm)
802.11 b	1	2412 MHZ	13.12
	6	2437 MHZ	12.85
	11	2462 MHZ	12.76

802.11 g	1	2412 MHZ	12.76
	6	2437 MHZ	12.87
	11	2462 MHZ	12.95
802.11 n 20M	1	2412 MHZ	12.86
	6	2437 MHZ	12.73
	11	2462 MHZ	12.63

2.4 GHz 802.11g/n OFDM SAR Test Exclusion Requirements

When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, the measurement and test reduction procedures for OFDM are applied. SAR is not required for the following 2.4 GHz OFDM conditions.

a) When KDB Publication 447498 D01 SAR test exclusion applies to the OFDM configuration.

b) When the highest *reported* SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

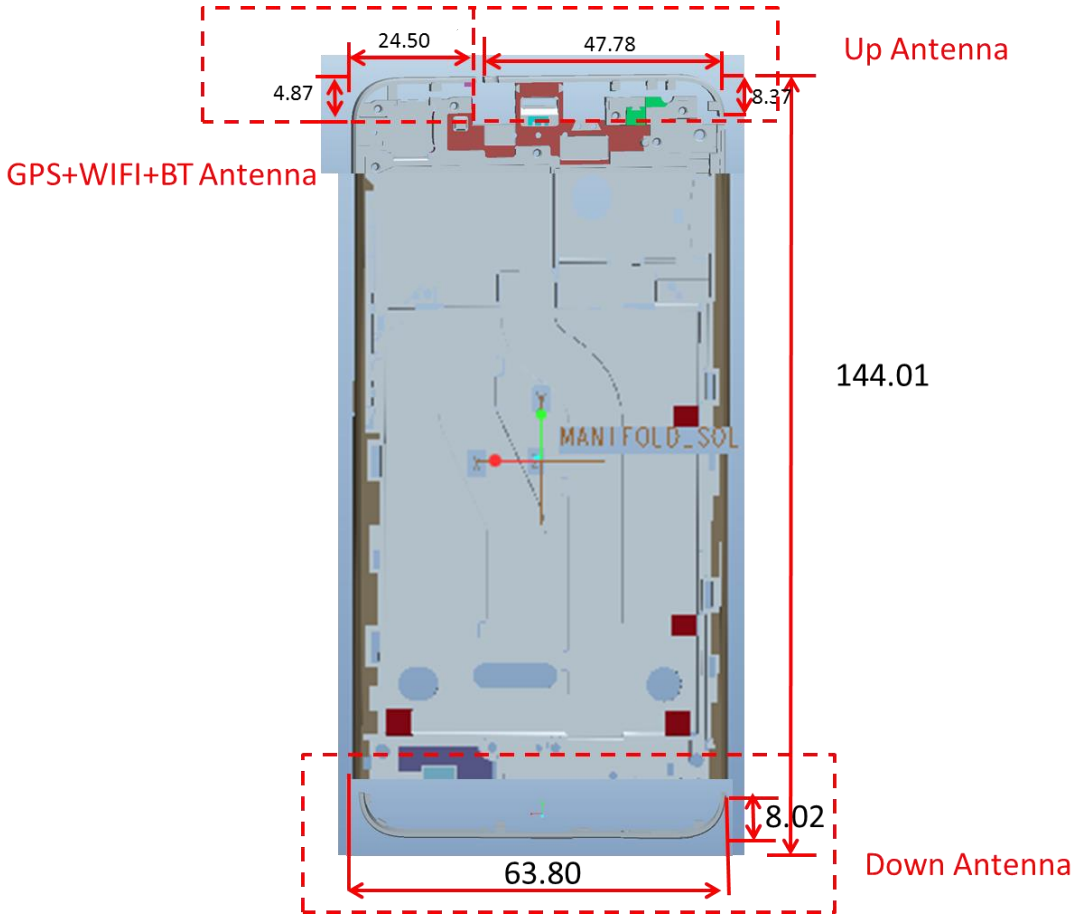
12. Simultaneous TX SAR Considerations

12.1. Introduction

The following procedures adopted from “FCC SAR Considerations for Cell Phones with Multiple Transmitters” are applicable to handsets with built-in unlicensed transmitters such as 802.11 a/b/g and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

For this device, the BT and WiFi can transmit simultaneous with other transmitters.

12.2. Transmit Antenna Separation Distances



Picture 12.1 Antenna Locations

12.3. Standalone SAR Test Exclusion Considerations

Standalone 1-g head or body SAR evaluation by measurement or numerical simulation is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied.

The 1-g SAR test exclusion threshold for 100 MHz to 6 GHz at test separation distances≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] ·

[√f(GHz)] ≤ 3.0 for 1-g SAR, where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

According to the KDB447498 appendix A, the SAR test exclusion threshold for 2450MHz at 5mm test separation distances is 10mW.

$$\frac{\text{(max. power of channel, including tune-up tolerance, mW)}}{\text{(min. test separation distance, mm)}} * \sqrt{\text{Frequency (GHz)}} \leqslant 3.0$$

Based on the above equation, Bluetooth SAR was not required:

12.4. SAR Measurement Positions

According to the KDB941225 D06 Hot Spot SAR v01, the edges with less than 2.5 cm distance to the antennas need to be tested for SAR.

SAR Measurement Positions						
Antenna Mode	Phantom	Ground	Left	Right	Top	Bottom
WWAN Up antenna	Yes	Yes	Yes	Yes	Yes	No
WWAN Down antenna	Yes	Yes	Yes	Yes	No	Yes
WLAN	Yes	Yes	No	Yes	Yes	No

13. SAR Test Result

Table 13.1: SAR Values(GSM 850 MHz Band-Head) Up Antenna

Frequency		Mode /Band	Side	Test Position	Figure No.	Measured average power (dBm)	Maximum allowed Power (dBm)	Scaling factor	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
836.6	190	GSM850	Left	Touch	/	32.44	33	1.138	0.682	0.776	-0.02
836.6	190	GSM850	Left	Tilt	/	32.44	33	1.138	0.684	0.778	-0.17
836.6	190	GSM850	Right	Touch	/	32.44	33	1.138	0.817	0.929	0.11
836.6	190	GSM850	Right	Tilt	/	32.44	33	1.138	0.758	0.862	0.00
824.2	128	GSM850	Right	Touch	/	32.33	33	1.167	0.679	0.792	0.08
848.8	251	GSM850	Right	Touch	/	32.45	33	1.135	0.813	0.923	-0.12
824.2	128	GSM850	Right	Tilt	/	32.33	33	1.167	0.686	0.800	-0.05
848.8	251	GSM850	Right	Tilt	/	32.45	33	1.135	0.642	0.729	-0.13
Repeated											
836.6	190	GSM850	Right	Touch	Fig.1	32.44	33	1.138	0.839	0.954	0.13

Table 13.2: SAR Values (GSM 850 MHz Band-Body) Up Antenna

Frequency		Mode /Band	Service /Headset	Test Position	Spacing (mm)	Figure No.	Measured average power (dBm)	Maximum allowed Power (dBm)	Scaling factor	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.											
836.6	190	GPRS 4TS	Class12	Toward Phantom	10	/	28.53	29	1.114	0.664	0.740	-0.16
836.6	190	GPRS 4TS	Class12	Toward Ground	10	/	28.53	29	1.114	0.491	0.547	-0.02
836.6	190	GPRS 4TS	Class12	Toward Left	10	/	28.53	29	1.114	0.405	0.451	-0.02
836.6	190	GPRS 4TS	Class12	Toward Right	10	/	28.53	29	1.114	0.118	0.131	-0.09
836.6	190	GPRS 4TS	Class12	Toward Top	10	Fig.2	28.53	29	1.114	0.734	0.818	0.18
824.2	128	GPRS 4TS	Class12	Toward Top	10	/	28.45	29	1.135	0.596	0.676	0.17
848.8	251	GPRS 4TS	Class12	Toward Top	10	/	28.6	29	1.096	0.667	0.731	0.19

Table 13.3: SAR Values(GSM 1900 MHz Band-Head) Up Antenna

Frequency		Mode /Band	Side	Test Position	Figure No.	Measured average power (dBm)	Maximum allowed Power (dBm)	Scaling factor	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
1880	661	GSM1900	Left	Touch	/	29.76	30	1.057	0.277	0.293	0.13
1880	661	GSM1900	Left	Tilt	/	29.76	30	1.057	0.297	0.314	0.10
1880	661	GSM1900	Right	Touch	Fig.3	29.76	30	1.057	0.68	0.719	0.00
1880	661	GSM1900	Right	Tilt	/	29.76	30	1.057	0.652	0.689	-0.10

Table 13.4: SAR Values (GSM 1900 MHz Band-Body) Up Antenna

Frequency		Mode /Band	Service /Headset	Test Position	Spacing (mm)	Figure No.	Measured average power (dBm)	Maximum allowed Power (dBm)	Scaling factor	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.											
1880	661	GPRS 4TS	Class12	Toward Phantom	10	Fig.4	25.6	26	1.096	0.47	0.515	0.08
1880	661	GPRS 4TS	Class12	Toward Ground	10	/	25.6	26	1.096	0.446	0.489	0.09
1880	661	GPRS 4TS	Class12	Toward Left	10	/	25.6	26	1.096	0.165	0.181	0.20
1880	661	GPRS 4TS	Class12	Toward Right	10	/	25.6	26	1.096	0.272	0.298	0.17
1880	661	GPRS 4TS	Class12	Toward Top	10	/	25.6	26	1.096	0.423	0.464	-0.01

Table 13.5: SAR Values(WCDMA Band II-Head) Up Antenna

Frequency		Mode /Band	Side	Test Position	Figure No.	Measured average power (dBm)	Maximum allowed Power (dBm)	Scaling factor	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
1880	9400	Band II	Left	Touch	/	23.27	24	1.183	0.278	0.329	-0.11
1880	9400	Band II	Left	Tilt	/	23.27	24	1.183	0.063	0.075	0.19
1880	9400	Band II	Right	Touch	Fig.5	23.27	24	1.183	0.643	0.761	0.00
1880	9400	Band II	Right	Tilt	/	23.27	24	1.183	0.485	0.574	0.04

Table 13.6: SAR Values (WCDMA Band II-Body) Up Antenna

Frequency		Mode /Band	Service /Headset	Test Position	Spacing (mm)	Figure No.	Measured average power (dBm)	Maximum allowed Power (dBm)	Scaling factor	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.											
1880	9400	Band II	12.2kbps RMC	Toward Phantom	10	/	23.27	24	1.183	0.111	0.131	0.12
1880	9400	Band II	12.2kbps RMC	Toward Ground	10	Fig6	23.27	24	1.183	0.146	0.173	0.12
1880	9400	Band II	12.2kbps RMC	Toward Left	10	/	23.27	24	1.183	0.095	0.112	0.05
1880	9400	Band II	12.2kbps RMC	Toward Right	10	/	23.27	24	1.183	0.023	0.027	0.12
1880	9400	Band II	12.2kbps RMC	Toward Top	10	/	23.27	24	1.183	0.079	0.093	-0.02

Table 13.7: SAR Values(WCDMA Band IV-Head) Up Antenna

Frequency		Mode /Band	Side	Test Position	Figure No.	Measured average power (dBm)	Maximum allowed Power (dBm)	Scaling factor	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
1732.6	1413	Band IV	Left	Touch	/	22.12	23	1.225	0.282	0.345	-0.08
1732.6	1413	Band IV	Left	Tilt	/	22.12	23	1.225	0.303	0.371	0.06
1732.6	1413	Band IV	Right	Touch	/	22.12	23	1.225	0.721	0.883	0.00
1732.6	1413	Band IV	Right	Tilt	/	22.12	23	1.225	0.556	0.681	0.02
1712.4	1312	Band IV	Right	Touch	Fig.7	22.13	23	1.222	0.774	0.946	0.16
1752.6	1512	Band IV	Right	Touch	/	22.34	23	1.164	0.679	0.790	0.09

Table 13.8: SAR Values (WCDMA Band IV-Body) Up Antenna

Frequency		Mode /Band	Service /Headset	Test Position	Spacing (mm)	Figure No.	Measured average power (dBm)	Maximum allowed Power (dBm)	Scaling factor	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.											
1732.6	1413	Band IV	12.2kbps RMC	Toward Phantom	10	Fig.8	22.12	23	1.225	0.165	0.202	0.19
1732.6	1413	Band IV	12.2kbps RMC	Toward Ground	10	/	22.12	23	1.225	0.147	0.180	0.12
1732.6	1413	Band IV	12.2kbps RMC	Toward Left	10	/	22.12	23	1.225	0.137	0.168	0.03
1732.6	1413	Band IV	12.2kbps RMC	Toward Right	10	/	22.12	23	1.225	0.022	0.027	0.15
1732.6	1413	Band IV	12.2kbps RMC	Toward Top	10	/	22.12	23	1.225	0.141	0.173	0.13

Table 13.9: SAR Values(WCDMA Band V-Head) Up Antenna

Frequency		Mode /Band	Side	Test Position	Figure No.	Measured average power (dBm)	Maximum allowed Power (dBm)	Scaling factor	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
836.6	4183	Band V	Left	Touch	/	22.28	23	1.180	0.7	0.826	-0.14
836.6	4183	Band V	Left	Tilt	/	22.28	23	1.180	0.693	0.818	-0.12
836.6	4183	Band V	Right	Touch	/	22.28	23	1.180	0.822	0.970	-0.05
836.6	4183	Band V	Right	Tilt	/	22.28	23	1.180	0.861	1.016	0.00
826.4	4132	Band V	Left	Touch	/	22.25	23	1.189	0.612	0.727	0.12
846.6	4233	Band V	Left	Touch	/	22.27	23	1.183	0.598	0.707	0.03
826.4	4132	Band V	Left	Touch	/	22.25	23	1.189	0.601	0.714	0.15
846.6	4233	Band V	Left	Touch	/	22.27	23	1.183	0.589	0.697	0.13
826.4	4132	Band V	Right	Touch	/	22.25	23	1.189	0.937	1.114	-0.01
846.6	4233	Band V	Right	Touch	/	22.27	23	1.183	0.884	1.046	-0.03
826.4	4132	Band V	Right	Tilt	/	22.25	23	1.189	0.937	1.114	0.01
846.6	4233	Band V	Right	Tilt	/	22.27	23	1.183	0.851	1.007	0.13
Repeated											
826.4	4132	Band V	Right	Touch	Fig9	22.25	23	1.189	0.945	1.123	0.00
826.4	4132	Band V	Right	Tilt	/	22.25	23	1.189	0.94	1.117	-0.01
Secondary supply											
826.4	4132	Band V	Right	Touch	/	22.25	23	1.189	0.693	0.824	-0.02

Table 13.10: SAR Values (WCDMA Band V-Body) Up Antenna

Frequency		Mode /Band	Service /Headset	Test Position	Spacing (mm)	Figure No.	Measured average power (dBm)	Maximum allowed Power (dBm)	Scaling factor	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.											
836.6	4183	Band V	12.2kbps RMC	Toward Phantom	10	Fig.10	22.28	23	1.180	0.438	0.517	-0.11
836.6	4183	Band V	12.2kbps RMC	Toward Ground	10	/	22.28	23	1.180	0.276	0.326	0.02

836.6	4183	Band V	12.2kbps RMC	Toward Left	10	/	22.28	23	1.180	0.238	0.281	-0.03
836.6	4183	Band V	12.2kbps RMC	Toward Right	10	/	22.28	23	1.180	0.081	0.096	-0.03
836.6	4183	Band V	12.2kbps RMC	Toward Top	10	/	22.28	23	1.180	0.342	0.404	0.08

Table 13.11: SAR Values(LTE Band 2-Head) Up Antenna

Frequency		Configuration	Side	Test Position	Figure No.	Measured average power (dBm)	Maximum allowed Power (dBm)	Scaling factor	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
1860	18700	QPSK_20MHz_1RB_ 50 offset Low	Left	Touch	/	22.77	23	1.054	0.244	0.257	0.20
1860	18700	QPSK_20MHz_1RB_ 50 offset Low	Left	Tilt	/	22.77	23	1.054	0.215	0.227	0.17
1860	18700	QPSK_20MHz_1RB_ 50 offset Low	Right	Touch	Fig.11	22.77	23	1.054	0.555	0.585	-0.10
1860	18700	QPSK_20MHz_1RB_ 50 offset Low	Right	Tilt	/	22.77	23	1.054	0.495	0.522	0.01
1860	18700	QPSK_20MHz_50RB_ 0 offset Low	Left	Touch	/	21.84	23	1.306	0.214	0.280	0.12
1860	18700	QPSK_20MHz_50RB_ 0 offset Low	Left	Tilt	/	21.84	23	1.306	0.176	0.230	0.12
1860	18700	QPSK_20MHz_50RB_ 0 offset Low	Right	Touch	/	21.84	23	1.306	0.31	0.405	0.14
1860	18700	QPSK_20MHz_50RB_ 0 offset Low	Right	Tilt	/	21.84	23	1.306	0.06	0.078	0.03

Table 13.12: SAR Values (LTE Band 2-Body) Up Antenna

Frequency		Configuration	Test Position	Spacing (mm)	Figure No.	Measured average power (dBm)	Maximum allowed Power (dBm)	Scaling factor	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
1860	18700	QPSK_20MHz_1RB_ 50 offset Low	Toward Phantom	10	/	22.77	23	1.054	0.086	0.091	-0.12
1860	18700	QPSK_20MHz_1RB_ 50 offset Low	Toward Ground	10	/	22.77	23	1.054	0.113	0.119	0.16
1860	18700	QPSK_20MHz_1RB_ 50 offset Low	Toward Left	10	Fig12	22.77	23	1.054	0.123	0.130	0.04
1860	18700	QPSK_20MHz_1RB_ 50 offset Low	Toward Right	10	/	22.77	23	1.054	0.025	0.026	0.18
1860	18700	QPSK_20MHz_1RB_ 50 offset Low	Toward Top	10	/	22.77	23	1.054	0.075	0.079	-0.13
1860	18700	QPSK_20MHz_50RB_ 0 offset Low	Toward Phantom	10	/	21.84	23	1.306	0.067	0.088	0.03
1860	18700	QPSK_20MHz_50RB_ 0 offset Low	Toward Ground	10	/	21.84	23	1.306	0.113	0.148	0.04
1860	18700	QPSK_20MHz_50RB_ 0 offset Low	Toward Left	10	/	21.84	23	1.306	0.122	0.159	0.11
1860	18700	QPSK_20MHz_50RB_ 0 offset Low	Toward Right	10	/	21.84	23	1.306	0.023	0.030	0.19
1860	18700	QPSK_20MHz_50RB_ 0 offset Low	Toward Top	10	/	21.84	23	1.306	0.06	0.078	0.19

Table 13.13: SAR Values(LTE Band 5-Head) Up Antenna

Frequency		Configuration	Side	Test Position	Figure No.	Measured average power (dBm)	Maximum allowed Power (dBm)	Scaling factor	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
836.5	20525	QPSK_10MHz_1RB_ 25 offset Middle	Left	Touch	/	22.52	23	1.117	0.625	0.698	-0.15
836.5	20525	QPSK_10MHz_1RB_ 25 offset Middle	Left	Tilt	/	22.52	23	1.117	0.63	0.704	-0.10
836.5	20525	QPSK_10MHz_1RB_ 25 offset Middle	Right	Touch	/	22.52	23	1.117	0.881	0.984	-0.12
836.5	20525	QPSK_10MHz_1RB_ 25 offset Middle	Right	Tilt	/	22.52	23	1.117	0.879	0.982	0.19
836.5	20525	QPSK_10MHz_25RB_ 13 offset Middle	Left	Touch	/	21.7	23	1.349	0.498	0.672	-0.19

836.5	20525	QPSK_10MHz_25RB_13 offset Middle	Left	Tilt	/	21.7	23	1.349	0.518	0.699	-0.16
836.5	20525	QPSK_10MHz_25RB_13 offset Middle	Right	Touch	/	21.7	23	1.349	0.704	0.950	-0.05
836.5	20525	QPSK_10MHz_25RB_13 offset Middle	Right	Tilt	/	21.7	23	1.349	0.702	0.947	-0.03
829	20450	QPSK_10MHz_1RB_25 offset Low	Right	Touch	/	22.58	23	1.102	0.891	0.981	-0.15
844	20600	QPSK_10MHz_1RB_25 offset High	Right	Touch	/	22.59	23	1.099	0.843	0.926	-0.15
829	20450	QPSK_10MHz_1RB_25 offset Low	Right	Tilt	/	22.58	23	1.102	0.939	1.034	-0.03
844	20600	QPSK_10MHz_1RB_25 offset High	Right	Tilt	/	22.59	23	1.099	0.866	0.952	-0.05
829	20450	QPSK_10MHz_25RB_13 offset Low	Right	Touch	/	21.69	23	1.352	0.631	0.853	0.15
844	20600	QPSK_10MHz_25RB_13 offset High	Right	Touch	/	21.68	23	1.355	0.637	0.863	0.13
829	20450	QPSK_10MHz_25RB_13 offset Low	Right	Tilt	/	21.69	23	1.352	0.635	0.859	0.09
844	20600	QPSK_10MHz_25RB_13 offset High	Right	Tilt	/	21.68	23	1.355	0.622	0.843	-0.02
836.5	20525	QPSK_10MHz_50RB_0 offset Middle	Right	Tilt	/	20.61	22	1.377	0.722	0.994	-0.02
Repeated											
829	20450	QPSK_10MHz_1RB_25 offset Low	Right	Tilt	Fig.13	22.58	23	1.102	0.942	1.038	-0.01

Table 13.14: SAR Values (LTE Band 5-Body) Up Antenna

Frequency		Configuration	Test Position	Spacing (mm)	Figure No.	Measured average power (dBm)	Maximum allowed Power (dBm)	Scaling factor	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
836.5	20525	QPSK_10MHz_1RB_25 offset Middle	Toward Phantom	10	/	22.52	23	1.117	0.332	0.371	-0.12
836.5	20525	QPSK_10MHz_1RB_25 offset Middle	Toward Ground	10	/	22.52	23	1.117	0.31	0.346	-0.02
836.5	20525	QPSK_10MHz_1RB_25 offset Middle	Toward Left	10	/	22.52	23	1.117	0.142	0.159	-0.09
836.5	20525	QPSK_10MHz_1RB_25 offset Middle	Toward Right	10	/	22.52	23	1.117	0.029	0.032	-0.20
836.5	20525	QPSK_10MHz_1RB_25 offset Middle	Toward Top	10	Fig14	22.52	23	1.117	0.393	0.439	0.15
836.5	20525	QPSK_10MHz_25RB_13 offset Middle	Toward Phantom	10	/	21.7	23	1.349	0.267	0.360	-0.06
836.5	20525	QPSK_10MHz_25RB_13 offset Middle	Toward Ground	10	/	21.7	23	1.349	0.248	0.335	0.03
836.5	20525	QPSK_10MHz_25RB_13 offset Middle	Toward Left	10	/	21.7	23	1.349	0.115	0.155	-0.16
836.5	20525	QPSK_10MHz_25RB_13 offset Middle	Toward Right	10	/	21.7	23	1.349	0.023	0.031	-0.08
836.5	20525	QPSK_10MHz_25RB_13 offset Middle	Toward Top	10	/	21.7	23	1.349	0.31	0.418	0.14

Table 13.15: SAR Values(LTE Band 7-Head) Up Antenna

Frequency		Configuration	Side	Test Position	Figure No.	Measured average power (dBm)	Maximum allowed Power (dBm)	Scaling factor	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
2535	21100	QPSK_20MHz_1RB_ 50 offset Middle	Left	Touch	/	19.95	20	1.012	0.446	0.451	0.02
2535	21100	QPSK_20MHz_1RB_ 50 offset Middle	Left	Tilt	/	19.95	20	1.012	0.516	0.522	0.06
2535	21100	QPSK_20MHz_1RB_ 50 offset Middle	Right	Touch	/	19.95	20	1.012	0.928	0.939	0.01
2535	21100	QPSK_20MHz_1RB_ 50 offset Middle	Right	Tilt	Fig.15	19.95	20	1.012	1.04	1.052	0.449
2535	21100	QPSK_20MHz_50RB_ 25 offset Middle	Left	Touch	/	19.11	20	1.227	0.372	0.457	0.03
2535	21100	QPSK_20MHz_50RB_ 25 offset Middle	Left	Tilt	/	19.11	20	1.227	0.448	0.550	0.02
2535	21100	QPSK_20MHz_50RB_ 25 offset Middle	Right	Touch	/	19.11	20	1.227	0.605	0.743	0.07
2535	21100	QPSK_20MHz_50RB_ 25 offset Middle	Right	Tilt	/	19.11	20	1.227	0.799	0.981	0.05
2510	20850	QPSK_20MHz_1RB_ 50 offset Low	Right	Touch	/	19.86	20	1.033	0.963	0.995	0.06
2560	21350	QPSK_20MHz_1RB_ 50 offset High	Right	Touch	/	19.82	20	1.042	0.997	1.039	0.09
2510	20850	QPSK_20MHz_1RB_ 50 offset Low	Right	Tilt	/	19.86	20	1.033	0.91	0.940	0.01
2560	21350	QPSK_20MHz_1RB_ 50 offset High	Right	Tilt	/	19.82	20	1.042	0.925	0.964	0.06
2510	20850	QPSK_20MHz_50RB_ 25 offset Low	Right	Tilt	/	18.98	20	1.265	0.651	0.823	-0.02
2560	21350	QPSK_20MHz_50RB_ 25 offset High	Right	Tilt	/	18.88	20	1.294	0.674	0.872	0.03
2535	21100	QPSK_20MHz_100RB_ 0 offset Middle	Right	Tilt	/	19	19.5	1.122	0.838	0.94	0.02
Repeated											
2535	21100	QPSK_20MHz_1RB_ 50 offset Middle	Right	Tilt	/	19.95	20	1.012	1.02	1.032	0.05

Table 13.16: SAR Values (LTE Band 7-Body) Up Antenna

Frequency		Configuration	Test Position	Spacing (mm)	Figure No.	Measured average power (dBm)	Maximum allowed Power (dBm)	Scaling factor	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
2535	21100	QPSK_20MHz_1RB_ 50 offset Middle	Toward Phantom	10	Fig.16	19.95	20	1.012	0.529	0.535	-0.04
2535	21100	QPSK_20MHz_1RB_ 50 offset Middle	Toward Ground	10	/	19.95	20	1.012	0.32	0.324	0.04
2535	21100	QPSK_20MHz_1RB_ 50 offset Middle	Toward Left	10	/	19.95	20	1.012	0.239	0.242	0.06
2535	21100	QPSK_20MHz_1RB_ 50 offset Middle	Toward Right	10	/	19.95	20	1.012	0.035	0.035	0.01
2535	21100	QPSK_20MHz_1RB_ 50 offset Middle	Toward Top	10	/	19.95	20	1.012	0.503	0.509	-0.01
2535	21100	QPSK_20MHz_50RB_ 25 offset Middle	Toward Phantom	10	/	19.11	20	1.227	0.426	0.523	0.01
2535	21100	QPSK_20MHz_50RB_ 25 offset Middle	Toward Ground	10	/	19.11	20	1.227	0.258	0.317	0.02
2535	21100	QPSK_20MHz_50RB_ 25 offset Middle	Toward Left	10	/	19.11	20	1.227	0.192	0.236	0.05
2535	21100	QPSK_20MHz_50RB_ 25 offset Middle	Toward Right	10	/	19.11	20	1.227	0.028	0.034	0.02
2535	21100	QPSK_20MHz_50RB_ 25 offset Middle	Toward Top	10	/	19.11	20	1.227	0.401	0.492	-0.05