

FCC SAR TEST REPORT

Application No.: SEWA2209000044RG
Applicant: Gosuncn Technology Group Co., Ltd.
Manufacturer: Gosuncn Technology Group Co., Ltd.
Product Name: Automatic Database Diagnostic Monitor (LTE OBD II Hotspot)
Model No.(EUT): GD506
Trade Mark: GOSUNCN
FCC ID: 2APNR-GD506
Standards: FCC 47CFR §2.1093
Date of Receipt: 2022-09-26
Date of Test: 2022-10-19 to 2022-11-04
Date of Issue: 2022-11-09
Test Result: **PASS ***

* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Authorized Signature:

Panta Sun

Panta Sun

Wireless Laboratory Manager

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REVISION HISTORY

Report Number	Revision	Description	Issue Date
SEWA2209000044RG07	01	Original	2022-11-09



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TEST SUMMARY

Frequency Band	Test position	Max Report SAR1-g (W/kg)	SAR limit (W/kg)
WCDMA Band II	Body	0.77	1.60
WCDMA Band IV	Body	0.54	1.60
WCDMA Band V	Body	0.32	1.60
LTE Band 2	Body	0.89	1.60
LTE Band 4	Body	1.14	1.60
LTE Band 5	Body	0.30	1.60
LTE Band 12	Body	0.35	1.60
LTE Band 13	Body	0.35	1.60
LTE Band 25	Body	0.89	1.60
LTE Band 26	Body	0.30	1.60
LTE Band 66	Body	1.14	1.60
WI-FI (2.4GHz)	Body	0.31	1.60
WI-FI (5GHz)	Body	0.45	1.60
BT	Body	<0.01	1.60
Maximum Simultaneous Transmission SAR (W/kg)		1.59	1.60

Note:

- 1) The Simultaneous transmission SAR is the same test position of the WWAN antenna + WiFi/BT antenna.
- 2) According to TCB workshop October,2014 RF Exposure Procedures Update (Overlapping Bands): SAR for LTE Band 2/LTE Band 4/LTE Band5 is respectively covered by LTE Band 25/LTE Band 66/LTE Band 26 due to similar frequency range, same maximum tune up limit and same channel bandwidth.

Reviewed by

Well Wei

Well Wei

Prepared by

Nick Hu

Nick Hu



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1 General Information

1.1 Details of Client

Applicant:	Gosuncn Technology Group Co., Ltd.
Address:	6F, 2819 KaiChuang Blvd., Science Town, Huangpu District, Guangzhou City, Guangdong, China.
Manufacturer:	Gosuncn Technology Group Co., Ltd.
Address:	6F, 2819 KaiChuang Blvd., Science Town, Huangpu District, Guangzhou City, Guangdong, China.

1.2 Test Location

Company:	SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd.
Address:	South of No. 6 Plant, No. 1, Runsheng Road, Suzhou Industrial Park, Suzhou Area, China (Jiangsu) Pilot Free Trade Zone
Post code:	215000
Test Engineer :	Alan Zhang



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1.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **A2LA (Certificate No. 6336.01)**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 6336.01.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0120.

IC#: 27594.

- **FCC –Designation Number: CN1312**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized as an accredited testing laboratory.

Designation Number: CN1312.

Test Firm Registration Number: 717327



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1.4 General Description of EUT

Product Name:	Automatic Database Diagnostic Monitor (LTE OBD II Hotspot)		
Model No.(EUT):	GD506		
Trade Mark:	GOSUNCN		
Product Phase:	production unit		
Device Type:	peripheral transmitter		
Exposure Category:	uncontrolled environment / general population		
IMEI:	861240040116568		
FCC ID:	2APNR-GD506		
Hardware Version:	GD506.H01		
Software Version:	MDM_GEN_GD506V1.1.1B01		
Antenna Type:	PIFA Antenna		
Device Operating Configurations:			
Modulation Mode:	WIFI: DSSS, OFDM, OFDMA; BT: GFSK, $\pi/4$ DQPSK,8DPSK		
Frequency Bands:	Band	Tx (MHz)	Rx (MHz)
	WCDMA band 2	1850 -1910 MHz	1930 - 1990 MHz
	WCDMA band 4	1710 -1755MHz	2110 - 2155MHz
	WCDMA band 5	824 - 849MHz	869 - 894MHz
	LTE band 2	1850 - 1910 MHz	1930 - 1990 MHz
	LTE band 4	1710 - 1755 MHz	2110 - 2155 MHz
	LTE band 5	824 - 849 MHz	869 - 894 MHz
	LTE band 12	699 - 716 MHz	729 - 746 MHz
	LTE band 13	777 - 787 MHz	746 - 756 MHz
	LTE band 25	1850 - 1915 MHz	1930 - 1995 MHz
	LTE band 26	814 - 849 MHz	859 - 894 MHz
	LTE band 66	1710 - 1780 MHz	2110 - 2200 MHz
	WIFI2.4GHz	2412-2462 MHz	2412-2462 MHz
	WIFI5GHz	5150-5250 MHz 5250-5350 MHz 5470-5725 MHz 5725-5850 MHz	5150-5250 MHz 5250-5350 MHz 5470-5725 MHz 5725-5850 MHz
	BT	2402-2480 MHz	2402-2480 MHz



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1.5 Test Specification

Identity	Document Title
FCC 47CFR §2.1093	Radiofrequency Radiation Exposure Evaluation: Portable Devices
ANSI/IEEE Std C95.1 – 1992	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.
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
KDB 248227 D01 v02r02	802.11 Wi-Fi SAR
KDB 941225 D01 v03r01	3G SAR Procedures
KDB 941225 D05 v02r05	SAR for LTE Devices
KDB 447498 D01 v06	General RF Exposure Guidance
KDB 447498 D03 v01	Supplement C Cross-Reference
KDB 865664 D01 v01r04	SAR Measurement 100 MHz to 6 GHz
KDB 865664 D02 v01r02	RF Exposure Reporting

1.6 RF exposure limits

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Spatial Peak SAR* (Brain*Trunk)	1.60 mW/g	8.00 mW/g
Spatial Average SAR** (Whole Body)	0.08 mW/g	0.40 mW/g
Spatial Peak SAR*** (Hands/Feet/Ankle/Wrist)	4.00 mW/g	20.00 mW/g

Notes:

* The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time

** The Spatial Average value of the SAR averaged over the whole body.

*** The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation.)



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2 SAR Measurements System Configuration

2.1 The SAR Measurement System

This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY5 professional system). A E-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation $SAR = \sigma (|E|^2) / \rho$ where σ and ρ are the conductivity and mass density of the tissue-Simulate.

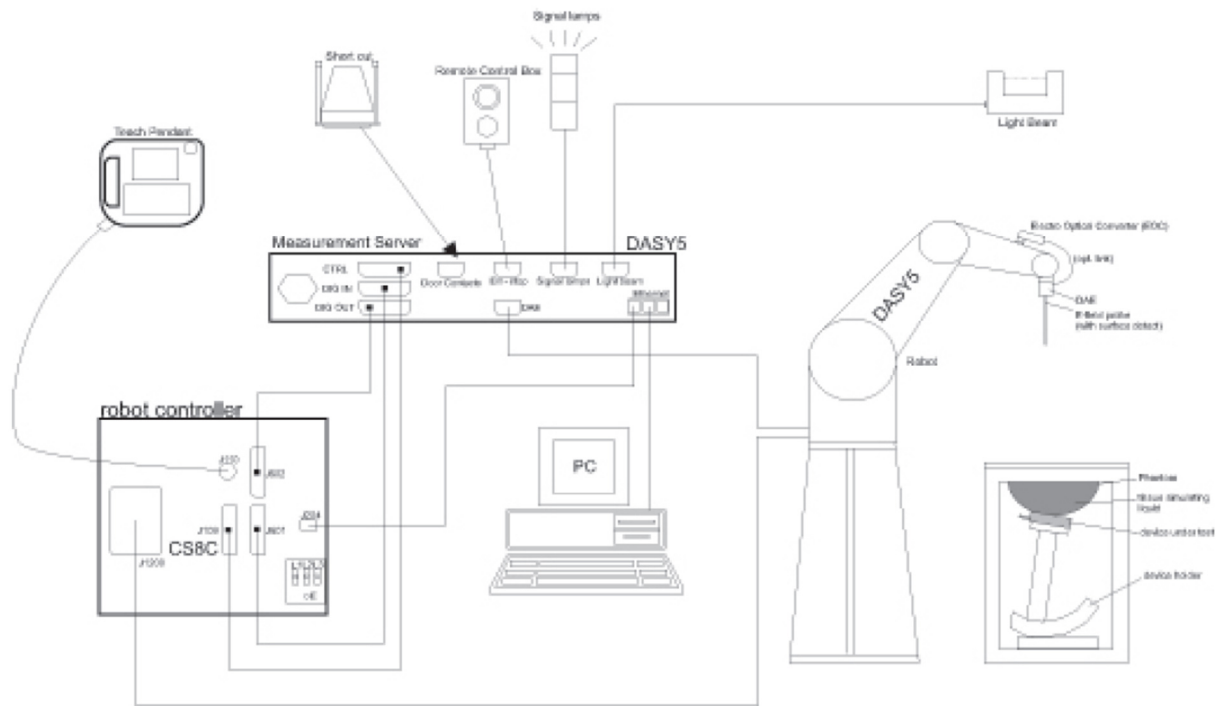
The DASY5 system for performing compliance tests consists of the following items:

A standard high precision 6-axis robot (Stabile RX family) with controller, teach pendant and software .An arm extension for accommodation the data acquisition electronics (DAE).

A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.

A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.


The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.




F-1. SAR Measurement System Configuration

- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 7.
- DASY5 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand, right-hand and Body Worn usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validating the proper functioning of the system.


2.2 Isotropic E-field Probe EX3DV4

	<p>Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)</p>
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in TSL (rotation around probe axis) ± 0.5 dB in TSL (rotation normal to probe axis)
Dynamic Range	10 μ W/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 μ W/g)
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better 30%.
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

2.3 Data Acquisition Electronics (DAE)

Model	DAE4	
Construction	Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY4/5 embedded system (fully remote controlled). Two step probe touch detector for mechanical surface detection and emergency robot stop.	
Measurement Range	-100 to +300 mV (16 bit resolution and two range settings: 4mV, 400mV)	
Input Offset Voltage	< 5μV (with auto zero)	
Input Bias Current	< 50 f A	
Dimensions	60 x 60 x 68 mm	


2.4 SAM Twin Phantom

Material	Vinylester, glass fiber reinforced (VE-GF)	
Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)	
Shell Thickness	2 ± 0.2 mm (6 ± 0.2 mm at ear point)	
Dimensions (incl. Wooden Support)	Length: 1000 mm Width: 500 mm Height: adjustable feet	
Filling Volume	approx. 25 liters	
Wooden Support	SPEAG standard phantom table	

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.

Twin SAM V5.0 has the same shell geometry and is manufactured from the same material as Twin SAM V4.0, but has reinforced top structure.

2.5 ELI Phantom

Material	Vinylester, glass fiber reinforced (VE-GF)	
Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)	
Shell Thickness	2.0 ± 0.2 mm (bottom plate)	
Dimensions	Major axis: 600 mm Minor axis: 400 mm	
Filling Volume	approx. 30 liters	
Wooden Support	SPEAG standard phantom table	

Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.

ELI V5.0 has the same shell geometry and is manufactured from the same material as ELI4, but has reinforced top structure.

2.6 Device Holder for Transmitters



F-2. Device Holder for Transmitters

- The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation centres for both scales are the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.
- The DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity $\epsilon=3$ and loss tangent $\delta=0.02$. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

2.7 Measurement procedure

2.7.1 Scanning procedure

Step 1: Power reference measurement

The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure.

Step 2: Area scan

The SAR distribution at the exposed side of the head was measured at a distance of 4mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 15mm*15mm or 12mm*12mm or 10mm*10mm. Based on the area scan data, the area of the maximum absorption was determined by spline interpolation.

Step 3: Zoom scan

Around this point, a volume of 30mm*30mm*30mm (fine resolution volume scan, zoom scan) was assessed by measuring 5x5x7 points ($\leq 2\text{GHz}$) and 7x7x7 points ($\geq 2\text{GHz}$). On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

The data at the surface was extrapolated, since the centre of the dipoles is 2.0mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2mm. (This can be variable. Refer to the probe specification). The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The volume was integrated with the trapezoidal algorithm. One thousand points were interpolated to calculate the average. All neighbouring volumes were evaluated until no neighboring volume with a higher average value was found.

The area and zoom scan resolutions specified in the table below must be applied to the SAR measurements. 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. 1528-2013.

		$\leq 3 \text{ GHz}$	$> 3 \text{ GHz}$
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: $\Delta x_{\text{Area}}, \Delta y_{\text{Area}}$		$\leq 2 \text{ GHz}: \leq 15 \text{ mm}$ $2 - 3 \text{ GHz}: \leq 12 \text{ mm}$	$3 - 4 \text{ GHz}: \leq 12 \text{ mm}$ $4 - 6 \text{ GHz}: \leq 10 \text{ mm}$
		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: $\Delta x_{\text{Zoom}}, \Delta y_{\text{Zoom}}$		$\leq 2 \text{ GHz}: \leq 8 \text{ mm}$ $2 - 3 \text{ GHz}: \leq 5 \text{ mm}^*$	$3 - 4 \text{ GHz}: \leq 5 \text{ mm}^*$ $4 - 6 \text{ GHz}: \leq 4 \text{ mm}^*$
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{\text{Zoom}}(n)$	$\leq 5 \text{ mm}$	$3 - 4 \text{ GHz}: \leq 4 \text{ mm}$ $4 - 5 \text{ GHz}: \leq 3 \text{ mm}$ $5 - 6 \text{ GHz}: \leq 2 \text{ mm}$
	graded grid	$\Delta z_{\text{Zoom}}(1)$: between 1 st two points closest to phantom surface	$3 - 4 \text{ GHz}: \leq 3 \text{ mm}$ $4 - 5 \text{ GHz}: \leq 2.5 \text{ mm}$ $5 - 6 \text{ GHz}: \leq 2 \text{ mm}$
		$\Delta z_{\text{Zoom}}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{\text{Zoom}}(n-1)$
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 <u>area scan based 1-g SAR estimation</u> 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.			

Step 4: Power reference measurement (drift)

The Power Drift Measurement job measures the field at the same location as the most recent power reference measurement job within the same procedure, and with the same settings. The indicated drift is mainly the variation of the DUT's output power and should vary max. $\pm 5\%$

2.7.2 Data Storage

The DASY software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension "DAE". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated. The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [m W/g], [m W/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

2.7.3 Data Evaluation by SEMCAD

The SEMCAD software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters:	- Sensitivity	Normi, ai0, ai1, ai2
- Conversion factor	ConvFi	
- Diode compression point	Dcpi	
Device parameters:	- Frequency	f
- Crest factor	cf	
Media parameters:	- Conductivity	ε
- Density	ρ	

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power.

The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot cf / dcpi$$

With V_i = compensated signal of channel i ($i = x, y, z$)

U_i = input signal of channel i ($i = x, y, z$)

cf = crest factor of exciting field (DASY parameter)

dcpi = diode compression point (DASY parameter)



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From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes:

$$E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$$

H-field probes:

$$H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1}f + a_{i2}f^2) / f$$

With V_i = compensated signal of channel i (i = x, y, z)

$Norm_i$ = sensor sensitivity of channel i (i = x, y, z)

[mV/(V/m)²] for E-field Probes

ConvF = sensitivity enhancement in solution

a_{ij} = sensor sensitivity factors for H-field probes

f = carrier frequency [GHz]

E_i = electric field strength of channel i in V/m

H_i = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = (E_x^2 + E_y^2 + E_z^2)^{1/2}$$

The primary field data are used to calculate the derived field units.

$$SAR = (E_{tot}^2 \cdot \sigma) / (\epsilon \cdot 1000)$$

with SAR = local specific absorption rate in mW/g

E_{tot} = total field strength in V/m

σ = conductivity in [mho/m] or [Siemens/m]

ϵ = equivalent tissue density in g/cm³

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = E_{tot}^2 / 3770 \text{ or } P_{pwe} = H_{tot}^2 \cdot 37.7$$

with P_{pwe} = equivalent power density of a plane wave in mW/cm²

E_{tot} = total electric field strength in V/m

H_{tot} = total magnetic field strength in A/m



3 Description of Test Position

3.1 The Body Test Position

The device is an Automatic Database Diagnostic Monitor (LTE OBD II Dongle) using at vehicle, it has a special connector not general USB type. So according to the manufacturer, the declared 10mm distance is used to perform SAR testing with (A) Horizontal-Up, (B) Horizontal-down, (C) Vertical-Front, (D) Vertical-Back and tip

The detailed information can refer to Appendix D: Photographs setup photo



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4 SAR System Verification Procedure

4.1 Tissue Simulate Liquid

4.1.1 Recipes for Tissue Simulate Liquid

The following tables give the recipes for tissue simulating liquids to be used in different frequency bands:

Ingredients (% by weight)	Frequency (MHz)
	2450
Tissue Type	Head
Water	55.00
Salt (NaCl)	0.2
Sucrose	0
HEC	0
Bactericide	0
Tween	44.80
Salt: 99+% Pure Sodium Chloride Sucrose: 98+% Pure Sucrose	
Water: De-ionized, 16 MΩ ⁺ resistivity HEC: Hydroxyethyl Cellulose	
Tween: Polyoxyethylene (20) sorbitan monolaurate	
HSL5GHz is composed of the following ingredients :	
Water : 50-65%	
Mineral oil : 10-30%	
Emulsifiers : 8-25%	
Sodium salt : 0-1.5%	

Table 1 : Recipe of Tissue Simulate Liquid



4.1.2 Measurement for Tissue Simulate Liquid

The Conductivity (σ) and Permittivity (ρ) are listed in Table 2. For the SAR measurement given in this report. The temperature variation of the Tissue Simulate Liquids was $22 \pm 2^\circ\text{C}$.

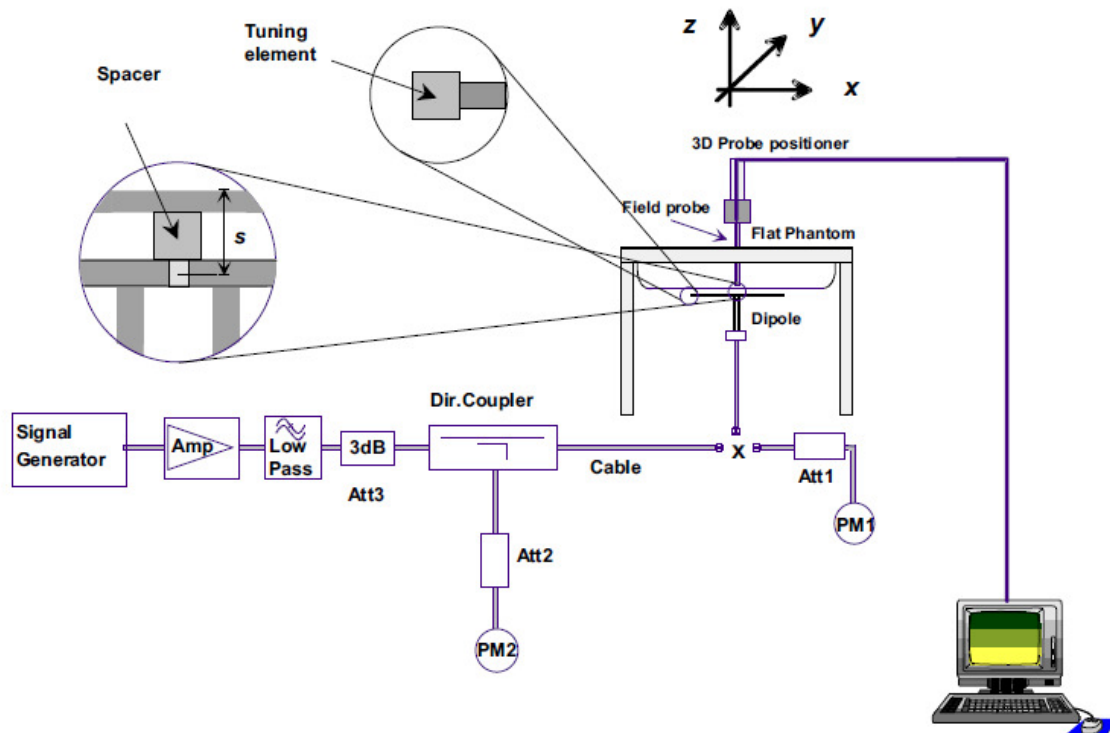
Tissue Type	Measured Frequency (MHz)	Target Tissue ($\pm 5\%$)		Measured Tissue		Liquid Temp. ($^\circ\text{C}$)	Test Date
		ϵ_r	$\sigma(\text{S/m})$	ϵ_r	$\sigma(\text{S/m})$		
750 Head	750	41.9 (39.81~44)	0.89 (0.85~0.94)	43.580	0.899	22.6	2022/10/19
835 Head	835	41.5 (39.43~43.58)	0.90 (0.86~0.95)	43.024	0.931	22.8	2022/10/21
1750 Head	1750	40.1 (38.10~42.11)	1.37 (1.30~1.44)	40.400	1.421	22.6	2022/10/24
1900 Head	1900	40.0 (38.00~42.00)	1.40 (1.33~1.47)	40.340	1.442	22.7	2022/10/26
2450 Head	2450	39.20 (37.24~41.16)	1.80 (1.71~1.89)	38.336	1.769	22.8	2022/10/31
5250 Head	5250	35.9 (34.11~37.70)	4.66 (4.47~4.95)	35.503	4.706	22.7	2022/11/4
5250 Head	5600	35.5 (33.73~37.30)	5.07 (4.82~5.32)	34.831	5.178	22.7	2022/11/4
5750 Head	5750	35.4 (33.63~37.17)	5.22 (4.96~5.48)	34.459	5.362	22.7	2022/11/4

Table 2 : Measurement result of Tissue electric parameters



4.2 SAR System Check

The microwave circuit arrangement for system Check is sketched in F-3. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within $\pm 10\%$ from the target SAR values. The tests were conducted on the same days as the measurement of the EUT. The obtained results from the system accuracy verification are displayed in the following table (A power level of 250mW (below 3GHz) or 100mW (3-6GHz) was input to the dipole antenna). During the tests, the ambient temperature of the laboratory was in the range $22 \pm 2^\circ\text{C}$, the relative humidity was in the range 60% and the liquid depth above the ear reference points was above 15 ± 0.5 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.



F-3. the microwave circuit arrangement used for SAR system check

4.2.1 Justification for Extended SAR Dipole Calibrations

1) Referring to KDB865664 D01 requirements for dipole calibration, instead of the typical annual calibration recommended by measurement standards, longer calibration intervals of up to three years may be considered when it is demonstrated that the SAR target, impedance and return loss of a dipole have remain stable according to the following requirements. Each measured dipole is expected to evaluate with the following criteria at least on annual interval in Appendix C.

- a) There is no physical damage on the dipole;
- b) System check with specific dipole is within 10% of calibrated value;
- c) Return-loss is within 10% of calibrated measurement;
- d) Impedance is within 5Ω from the previous measurement.

2) Network analyzer probe calibration against air, distilled water and a shorting block performed before measuring liquid parameters.



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4.2.2 Summary System Validation Result(s)

Validation Kit		Measured SAR 250mW	Measured SAR 250mW	Measured SAR (normalized to 1W)	Measured SAR (normalized to 1W)	Target SAR (normalized to 1W)	Target SAR (normalized to 1W)	Deviation (Within ±10%)		Liquid Temp. (°C)	Test Date
		1g (W/kg)	10g (W/kg)	1g (W/kg)	10g (W/kg)	1-g(W/kg)	10-g(W/kg)	1-g(W/kg)	10-g(W/kg)		
D750V3	Head	2.2	1.47	8.80	5.88	8.48	5.56	3.77%	5.76%	22.6	2022/10/19
D835V2	Head	2.56	1.54	10.24	6.16	9.52	6.17	7.56%	-0.16%	22.8	2022/10/21
D1750V2	Head	8.93	4.74	35.72	18.96	35.30	18.70	1.19%	1.39%	22.6	2022/10/24
D1900V2	Head	10.70	5.52	42.80	22.08	39.70	20.30	7.81%	8.77%	22.7	2022/10/26
D2450V2	Head	11.80	5.67	47.20	22.68	52.20	24.50	-9.58%	-7.43%	22.8	2022/10/31
Validation Kit		Measured SAR 100mW	Measured SAR 100mW	Measured SAR (normalized to 1W)	Measured SAR (normalized to 1W)	Target SAR (normalized to 1W)	Target SAR (normalized to 1W)	Deviation (Within ±10%)		Liquid Temp. (°C)	Test Date
		1g (W/kg)	10g (W/kg)	1g (W/kg)	10g (W/kg)	1-g(W/kg)	10-g(W/kg)	1-g(W/kg)	10-g(W/kg)		
D5GHzV2	Head(5.25GHz)	7.55	2.14	75.50	21.40	78.00	21.80	-3.21%	-1.83%	22.7	2022/11/4
	Head(5.60GHz)	7.69	2.15	76.90	21.50	79.90	22.50	-3.75%	-4.44%	22.7	2022/11/4
	Head(5.75GHz)	8.24	2.25	82.40	22.50	76.40	21.20	7.85%	6.13%	22.7	2022/11/4

Table 3 : SAR System Check Result

4.2.3 Detailed System Check Results

Please see the Appendix A

5 Test Configuration

5.1 3G SAR Test Reduction Procedure

According to KDB 941225D01, in the following procedures, the mode tested for SAR is referred to as the primary mode. The equivalent modes considered for SAR test reduction are denoted as secondary modes. Both primary and secondary modes must be in the same frequency band. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is $\leq \frac{1}{4}$ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode. This is referred to as the 3G SAR test reduction procedure in the following SAR test guidance, where the primary mode is identified in the applicable wireless mode test procedures and the secondary mode is wireless mode being considered for SAR test reduction by that procedure. When the 3G SAR test reduction procedure is not satisfied, it is identified as “otherwise” in the applicable procedures; SAR measurement is required for the secondary mode.



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5.1.1 WCDMA Test Configuration

1) . Output Power Verification

Maximum output power is verified on the high, middle and low channels according to procedures described in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all "1's" for WCDMA/HSDPA or by applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Results for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HSDPA, HSPA) are required in the SAR report. All configurations that are not supported by the handset or cannot be measured due to technical or equipment limitations must be clearly identified.

2) . Head SAR

SAR for next to the ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all "1's". The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for 12.2 kbps AMR in 3.4 kbps SRB (signaling radio bearer) using the highest reported SAR configuration in 12.2 kbps RMC for head exposure

3) . Body SAR

SAR for body configurations is measured using a 12.2 kbps RMC with TPC bits configured to all "1's". The 3G SAR test reduction procedure is applied to other spreading codes and multiple DPDCHn configurations supported by the handset with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured using an applicable RMC configuration with the corresponding spreading code or DPDCHn, for the highest reported body-worn accessory exposure SAR configuration in 12.2 kbps RMC. When more than 2 DPDCHn are supported by the handset, it may be necessary to configure additional DPDCHn using FTM (Factory Test Mode) or other chipset based test approaches with parameters similar to those used in 384 kbps and 768 kbps RMC.

4) . HSDPA / HSUPA / DC-HSDPA

According to KDB 941225 D01v03, RMC 12.2kbps setting is used to evaluate SAR. If the maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA / DC-HSDPA is $\leq \frac{1}{4}$ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA

a) HSDPA

HSDPA is configured according to the applicable UE category of a test device. The number of HS-DSCH/HS-PDSCHs, HARQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the H-set. To maintain a consistent test configuration and stable transmission conditions, QPSK is used in the H-set for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 4 ms and a CQI repetition factor of 2 to maintain a constant rate of active CQI slots. DPCCH and DPDCH gain factors (β_c , β_d), and HS-DPCCH power offset parameters (Δ_{ACK} , Δ_{NACK} , Δ_{CQI}) are set according to values indicated in the following table. The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the H-set.



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Sub-test	β_c	Bd	$\beta_d(\text{SF})$	β_c/β_d	β_{hs}	CM(dB)	MPR (dB)
1	2/15	15/15	64	2/15	4/15	0.0	0
2	12/15(3)	15/15(3)	64	12/15(3)	24/15	1.0	0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note1: ΔACK , ΔNACK and $\Delta\text{CQI} = 8$ $A_{hs} = \beta_{hs}/\beta_c = 30/15$ $\beta_{hs} = 30/15 * \beta_c$

Note2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1.A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, ΔACK and $\Delta\text{NACK} = 8$ ($A_{hs} = 30/15$) with $\beta_{hs} = 30/15 * \beta_c$, and $\Delta\text{CQI} = 7$ ($A_{hs} = 24/15$) with $\beta_{hs} = 24/15 * \beta_c$.

Note3: CM=1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

The measurements were performed with a Fixed Reference Channel (FRC) and H-Set 1 QPSK.

Parameter	Value
Nominal average inf. bit rate	534 kbit/s
Inter-TTI Distance	3 TTI"s
Number of HARQ Processes	2 Processes
Information Bit Payload	3202 Bits
MAC-d PDU size	336 Bits
Number Code Blocks	1 Block
Binary Channel Bits Per TTI	4800 Bits
Total Available SMLs in UE	19200 SMLs
Number of SMLs per HARQ Process	9600 SMLs
Coding Rate	0.67
Number of Physical Channel Codes	5

Table 4 : settings of required H-Set 1 QPSK acc. to 3GPP 34.121



HS-DSCH Category	Maximum HS-DSCH Codes Received	Minimum Inter-TTI Interval	Maximum HS-DSCH Transport Block Bits/HS-DSCH TTI	Total Soft Channel Bits
1	5	3	7298	19200
2	5	3	7298	28800
3	5	2	7298	28800
4	5	2	7298	38400
5	5	1	7298	57600
6	5	1	7298	67200
7	10	1	14411	115200
8	10	1	14411	134400
9	15	1	25251	172800
10	15	1	27952	172800
11	5	2	3630	14400
12	5	1	3630	28800
13	15	1	34800	259200
14	15	1	42196	259200
15	15	1	23370	345600
16	15	1	27952	345600

Table 5 : HSDPA UE category

b) HSUPA

Due to inner loop power control requirements in HSUPA, a commercial communication test set should be used for the output power and SAR tests. The 12.2 kbps RMC, FRC H-set 1 and E-DCH configurations for HSUPA should be configured according to the values indicated below as well as other applicable procedures described in the „WCDMA Handset“ and „Release 5 HSUPA Data Device“ sections of 3G device.



Sub-test ¹	β_c ²	β_d ²	β_d (SF) ³	β_c/β_d ²	β_{hs} ¹	β_{hs} ²	β_{ad} ²	β_c ² (SF) ³	β_{ad} ² (code) ³	CM ² (dB) ³	MP R ² (dB) ³	AG ² (dB) ³	E-TFC I ²
1 ⁴	11/15 ⁽³⁾	15/15 ⁽³⁾	64 ²	11/15 ⁽³⁾	22/15 ²	209/225 ²	1039/225 ²	4 ²	1 ²	1.0 ²	0.0 ²	20 ²	75 ²
2 ⁴	6/15 ²	15/15 ²	64 ²	6/15 ²	12/15 ²	12/15 ²	94/75 ²	4 ²	1 ²	3.0 ²	2.0 ²	12 ²	67 ²
3 ⁴	15/15 ²	9/15 ²	64 ²	15/9 ²	30/15 ²	30/15 ²	$\beta_{ad1}:47/15$ $\beta_{ad2}:47/15$	4 ²	2 ²	2.0 ²	1.0 ²	15 ²	92 ²
4 ⁴	2/15 ²	15/15 ²	64 ²	2/15 ²	4/15 ²	2/15 ²	56/75 ²	4 ²	1 ²	3.0 ²	2.0 ²	17 ²	71 ²
5 ⁴	15/15 ⁽⁴⁾	15/15 ⁽⁴⁾	64 ²	15/15 ⁽⁴⁾	30/15 ²	24/15 ²	134/15 ²	4 ²	1 ²	1.0 ²	0.0 ²	21 ²	81 ²
<p>Note 1: ΔACK, $\Delta NACK$ and $\Delta CQI=8$ $A_{hs} = \beta_{hs}/\beta_c = 30/15$ $\beta_{hs} = 30/15 * \beta_c$</p> <p>Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference⁵</p> <p>Note 3 : For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$⁴</p> <p>Note 4 : For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 14/15$ and $\beta_d = 15/15$⁴</p> <p>Note 5 : Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g⁴</p> <p>Note 6: β_{ad} can not be set directly; it is set by Absolute Grant Value.⁴</p>													

Table 6 : Subtests for UMTS Release 6 HSUPA

UE E-DCH Category	Maximum E-DCH Codes Transmitted	Number of HARQ Processes	E-DCH TTI(ms)	Minimum Spreading Factor	Maximum E-DCH Transport Block Bits	Max Rate (Mbps)
1	1	4	10	4	7110	0.7296
2	2	8	2	4	2798	1.4592
	2	4	10	4	14484	
3	2	4	10	4	14484	1.4592
4	2	8	2	2	5772	2.9185
	2	4	10	2	20000	2.00
5	2	4	10	2	20000	2.00
6 (No DPDCH)	4	8	10	2SF2&2SF	11484	5.76
	4	4	2	4	20000	2.00
7 (No DPDCH)	4	8	2	2SF2&2SF	22996	?
	4	4	10	4	20000	?
NOTE: When 4 codes are transmitted in parallel, two codes shall be transmitted with SF2 and two with SF4. UE categories 1 to 6 support QPSK only. UE category 7 supports QPSK and 16QAM. (TS25.306-7.3.0).						

Table 7 : HSUPA UE category



c) DC-HSDPA

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 Second serving HS-DSCH Cell are required to perform the power measurement and for the results to be acceptable.

The following tests were completed according to procedures in section 7.3.13 of 3GPP TS 34.108 v9.5.0.

A summary of these settings are illustrated below:

Downlink Physical Channels are set as per 3GPP TS34.121-1 v9.0.0 E.5.0

Table E.5.0: Levels for HSDPA connection setup

Parameter During Connection setup	Unit	Value
P-CPICH_Ec/Ior	dB	-10
P-CCPCH and SCH_Ec/Ior	dB	-12
PICH_Ec/Ior	dB	-15
HS-PDSCH	dB	off
HS-SCCH_1	dB	off
DPCH_Ec/Ior	dB	-5
OCNS_Ec/Ior	dB	-3.1

Call is set up as per 3GPP TS34.108 v9.5.0 sub clause 7.3.13.

The configurations of the fixed reference channels for HSDPA RF tests are described in 3GPP TS 34.121, annex C for FDD and 3GPP TS 34.122.

The measurements were performed with a Fixed Reference Channel (FRC) H-Set 12 with QPSK.

Parameter	Value
Nominal average inf. bit rate	60 kbit/s
Inter-TTI Distance	1 TTI's
Number of HARQ Processes	6 Processes
Information Bit Payload	120 Bits
Number Code Blocks	1 Block
Binary Channel Bits Per TTI	960 Bits
Total Available SMLs in UE	19200 SMLs
Number of SMLs per HARQ Process	3200 SMLs
Coding Rate	0.15
Number of Physical Channel Codes	1

Table 8 : settings of required H-Set 12 QPSK acc. to 3GPP 34.121

Note:

1. The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table above.
2. Maximum number of transmission is limited to 1,i.e.,retransmission is not allowed. The redundancy and constellation version 0 shall be used.

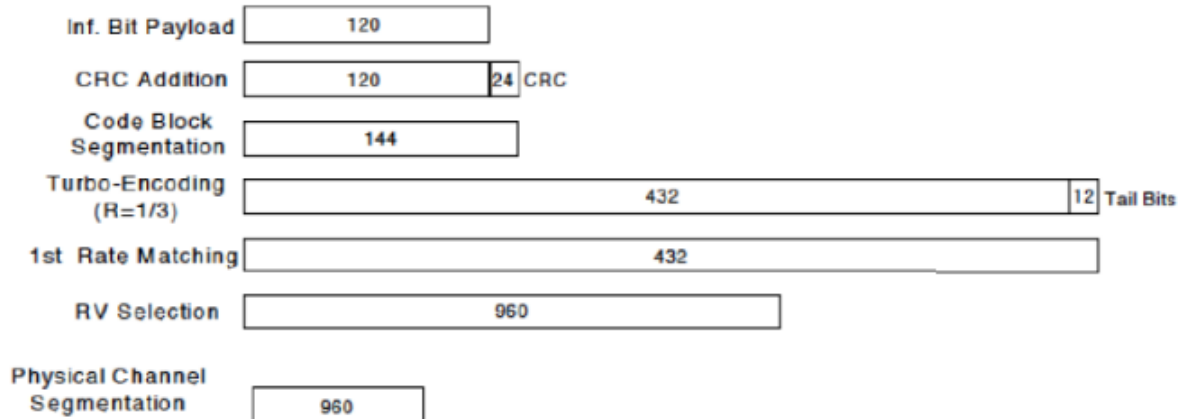


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

The following 4 Sub-tests for HSDPA were completed according to Release 5 procedures. A summary of subtest settings are illustrated below:

Sub-test ^o	β_c ^o	β_d ^o	β_d (SF) ^o	β_c/β_d ^o	$\beta_{hs}(1)$ ^o	CM(dB)(2) ^o	MPR (dB) ^o
1 ^o	2/15 ^o	15/15 ^o	64 ^o	2/15 ^o	4/15 ^o	0.0 ^o	0 ^o
2 ^o	12/15(3) ^o	15/15(3) ^o	64 ^o	12/15(3) ^o	24/15 ^o	1.0 ^o	0 ^o
3 ^o	15/15 ^o	8/15 ^o	64 ^o	15/8 ^o	30/15 ^o	1.5 ^o	0.5 ^o
4 ^o	15/15 ^o	4/15 ^o	64 ^o	15/4 ^o	30/15 ^o	1.5 ^o	0.5 ^o

Note 1: ΔACK , $\Delta NACK$ and $\Delta CQI = 8$ $A_{hs} = \beta_{hs}/\beta_c = 30/15$ $\beta_{hs} = 30/15 * \beta_c$
 Note 2: CM=1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.
 Note 3: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 11/15$ and $\beta_d = 15/15$

Up commands are set continuously to set the UE to Max power.

Note:

1. The Dual Carriers transmission only applies to HSDPA physical channels
2. The Dual Carriers belong to the same Node and are on adjacent carriers.
3. The Dual Carriers do not support MIMO to serve UEs configured for dual cell operation
4. The Dual Carriers operate in the same frequency band.
5. The device doesn't support carrier aggregation for it just can operate in Release 8.

5.1.2 LTE Test Configuration

LTE modes were tested according to FCC KDB 941225 D05 publication. Please see notes after the tabulated SAR data for required test configurations. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The Anritsu MT8820C was used for LTE output power measurements and SAR testing. Max power control was used so the UE transmits with maximum output power during SAR testing. SAR must be measured with the maximum TTI (transmit time interval) supported by the device in each LTE configuration.

A) Spectrum Plots for RB Configurations

A properly configured base station simulator was used for SAR tests and power measurements. Therefore, spectrum plots for RB configurations were not required to be included in this report.

B) MPR

MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.

Modulation	Channel bandwidth / Transmission bandwidth (N_{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3

C) A-MPR

A-MPR (Additional MPR) has been disabled for all SAR tests by setting NS=01 on the base station simulator.

D) Largest channel bandwidth standalone SAR test requirements

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 for 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.

4) Higher order modulations

For each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK procedures in above sections to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is $> \frac{1}{2}$ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg.

E) Other channel bandwidth standalone SAR test requirements

For the other channel bandwidths used by the device in a frequency band, apply all the procedures required for the largest channel bandwidth in section A) to determine the channels and RB configurations that need SAR testing and only measure SAR when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is $> \frac{1}{2}$ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the reported SAR of a configuration for the largest channel bandwidth is > 1.45 W/kg.



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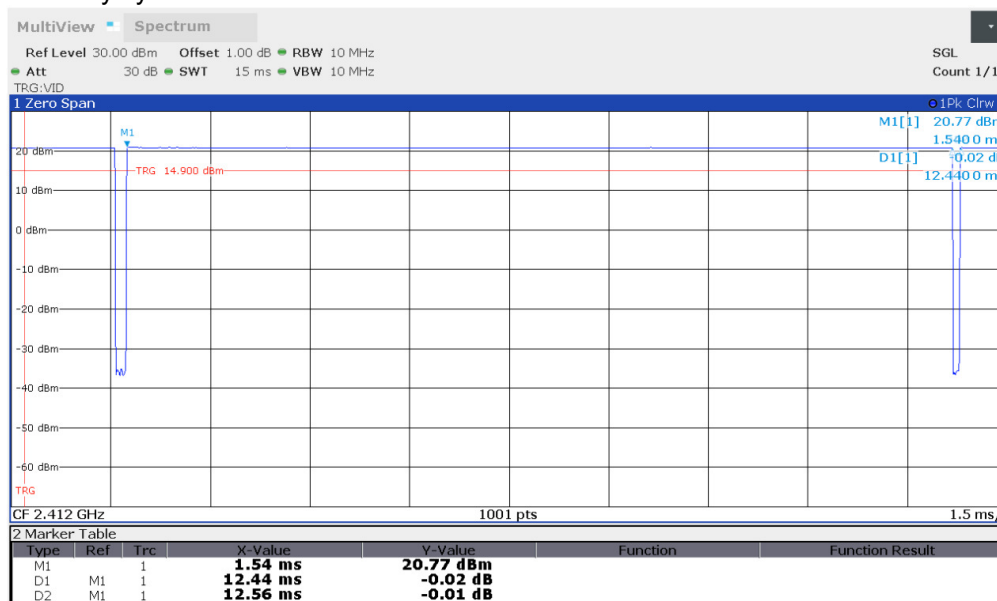
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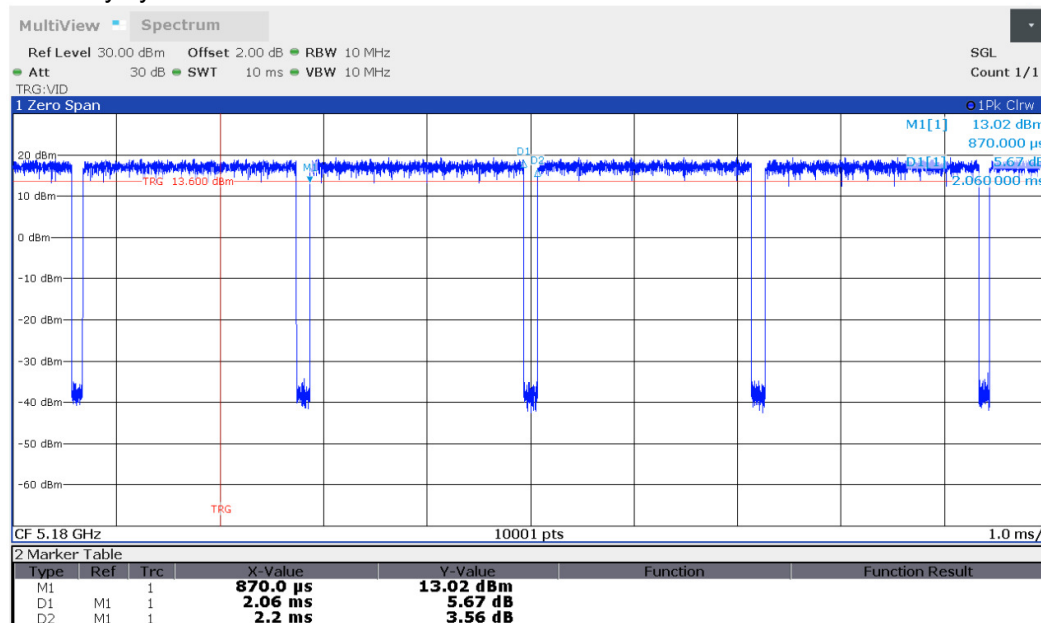
5.1.3 WiFi Test Configuration

A Wi-Fi device must be configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools for SAR measurement.

- 2.4G WIFI
Duty cycle=99.04%



- 5G WIFI 802.11a
Duty cycle=93.64%



5.1.3.1 Initial Test Position SAR Test Reduction Procedure

DSSS and OFDM configurations are considered separately according to the required SAR procedures. SAR is measured in the initial test position using the 802.11 transmission mode configuration required by the DSSS procedure or initial test configuration and subsequent test configuration(s) according to the OFDM procedures. The initial test position procedure is described in the following:

- 1) . When the reported SAR of the initial test position is ≤ 0.4 W/kg, further SAR measurement is not required for the other (remaining) test positions in that exposure configuration and 802.11 transmission mode combinations within the frequency band or aggregated band. SAR is also not required for that exposure configuration in the subsequent test configuration(s).
- 2) . When the reported SAR of the initial test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position using subsequent highest extrapolated or estimated 1-g SAR conditions determined by area scans or next closest/smallest test separation distance and maximum RF coupling test positions based on manufacturer justification, on the highest maximum output power channel, until the reported SAR is ≤ 0.8 W/kg or all required test positions (left, right, touch, tilt or subsequent surfaces and edges) are tested.
- 3) . For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested. a) Additional power measurements may be required for this step, which should be limited to those necessary for identifying the subsequent highest output power channels.

5.1.3.2 Initial Test Configuration Procedures

An initial test configuration is determined for OFDM transmission modes according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified for production units in each standalone and aggregated frequency band. SAR is measured using the highest measured maximum output power channel. For configurations with the same specified or measured maximum output power, additional transmission mode and test channel selection procedures are required. SAR test reduction for subsequent highest output test channels is determined according to *reported* SAR of the initial test configuration. For next to the ear, hotspot mode and UMC mini-tablet exposure configurations where multiple test positions are required, the initial test position procedure is applied to minimize the number of test positions required for SAR measurement using the initial test configuration transmission mode. For fixed exposure conditions that do not have multiple SAR test positions, SAR is measured in the transmission mode determined by the initial test configuration.

When the *reported* SAR of the initial test configuration is > 0.8 W/kg, SAR measurement is required for subsequent next highest measured output power channel(s) in the initial test configuration until *reported* SAR is ≤ 1.2 W/kg or all required channels are tested.

5.1.3.3 Subsequent Test Configuration Procedures

SAR measurement requirements for the remaining 802.11 transmission mode configurations that have not been tested in the initial test configuration are determined separately for each standalone and aggregated frequency band, in each exposure condition, according to the maximum output power specified for production units. The initial test position procedure is applied to next to the ear, UMPC mini-tablet and hotspot mode configurations. When the same maximum output power is specified for multiple transmission modes, additional power measurements may be required to determine if SAR measurements are required for subsequent highest output power channels in a subsequent test configuration. The subsequent test configuration and SAR measurement procedures are described in the following.

- 1) . When SAR test exclusion provisions of KDB Publication 447498 are applicable and SAR measurement is not required for the initial test configuration, SAR is also not required for the next highest maximum output power transmission mode subsequent test configuration(s) in that frequency band or aggregated band and exposure configuration.



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- 2) . When the highest *reported* SAR for the initial test configuration (when applicable, include subsequent highest output channels), according to the initial test position or fixed exposure position requirements, is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for that subsequent test configuration.
- 3) . The number of channels in the initial test configuration and subsequent test configuration can be different due to differences in channel bandwidth. When SAR measurement is required for a subsequent test configuration and the channel bandwidth is smaller than that in the initial test configuration, all channels in the subsequent test configuration that overlap with the larger bandwidth channel tested in the initial test configuration should be used to determine the highest maximum output power channel. This step requires additional power measurement to identify the highest maximum output power channel in the subsequent test configuration to determine SAR test reduction.
 - a) SAR should first be measured for the channel with highest measured output power in the subsequent test configuration.
 - b) SAR for subsequent highest measured maximum output power channels in the subsequent test configuration is required only when the *reported* SAR of the preceding higher maximum output power channel(s) in the subsequent test configuration is > 1.2 W/kg or until all required channels are tested. i) For channels with the same measured maximum output power, SAR should be measured using the channel closest to the center frequency of the larger channel bandwidth channel in the initial test configuration.
- 4) . SAR measurements for the remaining highest specified maximum output power OFDM transmission mode configurations that have not been tested in the initial test configuration (highest maximum output) or subsequent test configuration(s) (subsequent next highest maximum output power) is determined by recursively applying the subsequent test configuration procedures in this section to the remaining configurations according to the following:
 - a) replace "subsequent test configuration" with "next subsequent test configuration" (i.e., subsequent next highest specified maximum output power configuration)
 - b) replace "initial test configuration" with "all tested higher output power configurations"

5.1.3.4 2.4 GHz SAR Procedures

Separate SAR procedures are applied to DSSS and OFDM configurations in the 2.4 GHz band to simplify DSSS test requirements. For 802.11b DSSS SAR measurements, DSSS SAR procedure applies to fixed exposure test position and initial test position procedure applies to multiple exposure test positions. When SAR measurement is required for an OFDM configuration, the initial test configuration, subsequent test configuration and initial test position procedures are applied. The SAR test exclusion requirements for 802.11g/n OFDM configurations are described in following.

• 802.11b DSSS SAR Test Requirements

SAR is measured for 2.4 GHz 802.11b DSSS using either a fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:

- 1) . When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
- 2) . When the reported SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

• 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 (section 5.3, including sub-sections). SAR is not required for the following 2.4 GHz OFDM conditions.

- 1) . When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration.
- 2) . 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.



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5.1.3.5 WiFi 5G SAR Test Procedures

5.1.3.5.1 U-NII-1 and U-NII-2A Bands

For devices that operate in only one of the U-NII-1 and U-NII-2A bands, the normally required SAR procedures for OFDM configurations are applied. For devices that operate in both U-NII bands using the same transmitter and antenna(s), SAR test reduction is determined according to the following:

- 1) When the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest *reported* SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition); otherwise, both bands are tested independently for SAR.
- 2) When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest *reported* SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for the band with lower maximum output power in that test configuration; otherwise, both bands are tested independently for SAR.
- 3) The two U-NII bands may be aggregated to support a 160 MHz channel on channel number 50. Without additional testing, the maximum output power for this is limited to the lower of the maximum output power certified for the two bands. When SAR measurement is required for at least one of the bands and the highest *reported* SAR adjusted by the ratio of specified maximum output power of aggregated to standalone band is > 1.2 W/kg, SAR is required for the 160 MHz channel. This procedure does not apply to an aggregated band with maximum output higher than the standalone band(s); the aggregated band must be tested independently for SAR. SAR is not required when the 160 MHz channel is operating at a reduced maximum power and also qualifies for SAR test exclusion.

5.1.3.5.2 U-NII-2C and U-NII-3 Bands

The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. when Terminal Doppler Weather Radar (TDWR) restriction applies, all channels that operate at 5.60 – 5.65 GHz must be included to apply the SAR test reduction and measurement procedures.

When the same transmitter and antenna(s) are used for U-NII-2C band and U-NII-3 band or 5.8 GHz band of §15.247, the bands may be aggregated to enable additional channels with 20, 40 or 80 MHz bandwidth to span across the band gap, as illustrated in Appendix B. The maximum output power for the additional band gap channels is limited to the lower of those certified for the bands. Unless band gap channels are permanently disabled, they must be considered for SAR testing. The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. To maintain SAR measurement accuracy and to facilitate test reduction, the channels in U-NII-2C band above 5.65 GHz may be grouped with the 5.8 GHz channels in U-NII-3 or §15.247 band to enable two SAR probe calibration frequency points to cover the bands, including the band gap channels. When band gap channels are supported and the bands are not aggregated for SAR testing, band gap channels must be considered independently in each band according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

5.1.3.5.3 OFDM Transmission Mode SAR Test Configuration and Channel Selection Requirements

The initial test configuration for 5 GHz OFDM transmission modes is determined by the 802.11 configuration with the highest maximum output power specified for production units, including tune-up tolerance, in each standalone and aggregated frequency band. SAR for the initial test configuration is measured using the highest maximum output power channel determined by the default power measurement procedures. When multiple configurations in a frequency band have the same specified maximum output power, the initial test configuration is determined according to the following steps applied sequentially.

- 1) The largest channel bandwidth configuration is selected among the multiple configurations with the same specified maximum output power.
- 2) If multiple configurations have the same specified maximum output power and largest channel bandwidth, the lowest order modulation among the largest channel bandwidth configurations is selected.
- 3) If multiple configurations have the same specified maximum output power, largest channel bandwidth and lowest order modulation, the lowest data rate configuration among these configurations is selected.
- 4) When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected; i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n. After an initial test configuration is determined, if multiple test channels have the same measured maximum output power, the channel chosen for SAR measurement is determined according to the following. These channel selection procedures apply to both the initial test configuration and subsequent test configuration(s), with respect to the default power measurement procedures or additional power measurements required for further SAR test reduction. The same procedures also apply to subsequent highest output power channel(s) selection.
 - The channel closest to mid-band frequency is selected for SAR measurement.
 - For channels with equal separation from mid-band frequency; for example, high and low channels or two mid-band channels, the higher frequency (number) channel is selected for SAR measurement.

5.1.3.5.4 SAR Test Requirements for OFDM configurations

When SAR measurement is required for 802.11 a/n/ac OFDM configurations, each standalone and frequency aggregated band is considered separately for SAR test reduction. When the same transmitter and antenna(s) are used for U-NII-1 and U-NII-2A bands, additional SAR test reduction applies. When band gap channels between U-NII-2C band and 5.8 GHz U-NII-3 or §15.247 band are supported, the highest maximum output power transmission mode configuration and maximum output power channel across the bands must be used to determine SAR test reduction, according to the initial test configuration and subsequent test configuration requirements. In applying the initial test configuration and subsequent test configuration procedures, the 802.11 transmission configuration with the highest specified maximum output power and the channel within a test configuration with the highest measured maximum output power should be clearly distinguished to apply the procedures.

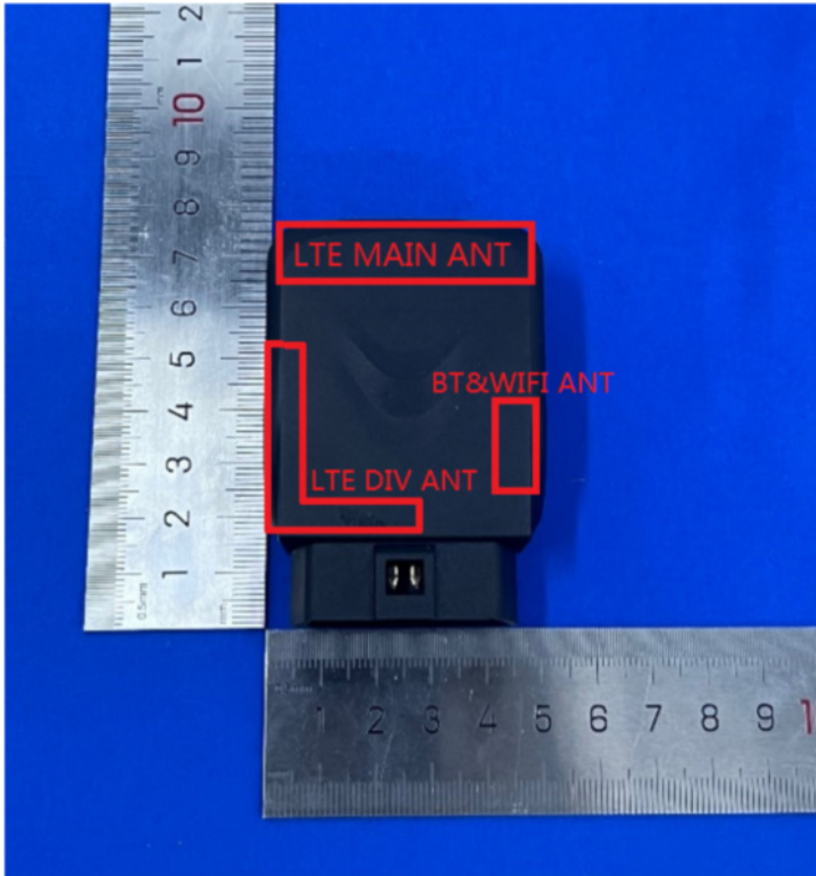


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5.1.4 DUT Antenna Locations(Horizontal-Down Veiw)



Note:

DIV Antenna does not support transmitter function.

Mode	Horizontal Up	Horizontal Down	Vertical Front	Vertical Back	Tip Mode
Main Ant	Yes	Yes	Yes	Yes	Yes
WIFI/BT Ant	Yes	Yes	Yes	Yes	Yes



5.2 Measurement of RF conducted Power

5.2.1 Conducted Power of WCDMA

WCDMA Band II					
Average Conducted Power(dBm)					
Channel		9262	9400	9538	Tune up
WCDMA	12.2kbps RMC	23.63	23.91	23.40	24.00
	12.2kbps AMR	23.62	23.59	23.29	24.00
HSDPA	Subtest 1	22.99	22.96	22.68	23.00
	Subtest 2	22.52	22.62	22.33	23.00
	Subtest 3	22.50	22.37	22.28	22.50
	Subtest 4	20.94	20.82	20.56	22.50
HSUPA	Subtest 1	20.91	20.95	20.61	21.50
	Subtest 2	20.50	20.41	20.18	21.00
	Subtest 3	21.96	21.91	21.81	22.00
	Subtest 4	20.86	20.93	20.76	21.00
DC-HSDPA	Subtest 1	21.93	21.85	21.78	22.00
	Subtest 2	22.95	22.99	22.72	23.00
	Subtest 3	22.44	22.55	22.18	23.00
	Subtest 4	22.45	22.43	22.20	22.50
		22.49	22.50	22.40	22.50

WCDMA Band IV					
Average Conducted Power(dBm)					
Channel		1312	1412	1513	Tune up
WCDMA	12.2kbps RMC	23.51	23.60	22.66	24.00
	12.2kbps AMR	23.46	23.41	22.48	24.00
HSDPA	Subtest 1	22.94	22.95	21.97	23.00
	Subtest 2	22.79	22.72	21.86	23.00
	Subtest 3	22.24	22.23	21.38	22.50
	Subtest 4	22.32	22.13	21.33	22.50
HSUPA	Subtest 1	20.67	20.63	19.83	21.50
	Subtest 2	20.70	20.70	19.70	21.00
	Subtest 3	21.70	21.67	20.92	22.00
	Subtest 4	20.24	20.25	19.32	21.00
DC-HSDPA	Subtest 1	21.68	21.73	20.87	22.00
	Subtest 2	22.71	22.72	21.84	23.00
	Subtest 3	22.67	22.76	21.89	23.00
	Subtest 4	22.19	22.31	21.36	22.50
		22.18	22.18	21.31	22.50

WCDMA Band V					
Average Conducted Power(dBm)					
Channel		4132	4182	4233	Tune up
WCDMA	12.2kbps RMC	23.58	23.78	23.75	24.00
	12.2kbps AMR	23.48	23.49	23.42	24.00
HSDPA	Subtest 1	22.98	22.99	22.95	23.00
	Subtest 2	22.91	22.90	22.93	23.00
	Subtest 3	22.34	22.48	22.44	22.50
	Subtest 4	22.43	22.26	22.41	22.50
HSUPA	Subtest 1	20.81	20.79	20.79	21.50
	Subtest 2	20.87	20.85	20.82	21.00
	Subtest 3	21.90	21.84	21.98	22.00
	Subtest 4	20.43	20.37	20.44	21.00
		21.82	21.79	21.89	22.00



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DC-HSDPA	Subtest 1	22.82	22.82	22.96	23.00
	Subtest 2	22.82	22.92	23.00	23.00
	Subtest 3	22.31	22.42	22.46	22.50
	Subtest 4	22.35	22.34	22.43	22.50

Table 9: Conducted Power of BT.

5.2.2 Conducted Power of LTE

LTE Band 2				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				18607	18900	19193	
1.4MHz	QPSK	1	0	22.81	22.89	22.90	24.00
		1	2	22.80	22.84	22.81	24.00
		1	5	22.72	22.73	22.73	24.00
		3	0	21.95	22.12	21.96	23.00
		3	2	21.98	21.88	22.01	23.00
		3	3	21.99	21.94	22.00	23.00
	16QAM	6	0	21.92	22.12	21.98	23.00
		1	0	21.93	21.87	21.94	23.00
		1	2	21.79	22.02	21.79	23.00
		1	5	21.92	22.06	21.88	23.00
		3	0	20.98	21.14	20.91	22.00
		3	2	20.97	20.99	20.97	22.00
		3	3	20.98	21.01	21.17	22.00
		6	0	20.97	20.78	21.03	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
3MHz	QPSK	1	0	22.79	22.87	22.88	24.00
		1	7	22.82	22.84	22.90	24.00
		1	14	22.71	22.76	22.74	24.00
		8	0	21.90	22.08	21.92	23.00
		8	4	21.99	21.86	21.97	23.00
		8	7	22.01	21.88	22.03	23.00
	16QAM	15	0	21.96	22.09	21.98	23.00
		1	0	21.94	21.84	21.98	23.00
		1	7	21.75	21.98	21.83	23.00
		1	14	21.98	22.00	21.89	23.00
		8	0	20.96	21.12	20.92	22.00
		8	4	20.98	20.94	20.94	22.00
		8	7	21.00	20.99	21.13	22.00
		15	0	20.95	20.78	20.99	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
5MHz	QPSK	1	0	22.77	22.85	22.92	24.00
		1	13	22.76	22.86	22.86	24.00
		1	24	22.73	22.76	22.74	24.00
		12	0	21.92	22.06	21.93	23.00
		12	6	21.98	21.85	22.01	23.00
		12	13	22.04	21.86	21.98	23.00
		25	0	21.96	22.03	22.03	23.00
	16QAM	1	0	21.93	21.83	21.96	23.00
		1	13	21.77	22.00	21.83	23.00



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		1	24	21.93	22.07	21.90	23.00
		12	0	21.01	21.09	20.98	22.00
		12	6	20.94	20.99	20.94	22.00
		12	13	20.96	20.94	21.13	22.00
		25	0	20.98	20.83	21.00	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				18650	18900	19150	
10MHz	QPSK	1	0	22.82	22.83	22.90	24.00
		1	25	22.78	22.86	22.88	24.00
		1	49	22.77	22.74	22.80	24.00
		25	0	21.91	22.09	21.93	23.00
		25	13	21.98	21.82	22.02	23.00
		25	25	22.03	21.94	21.95	23.00
		50	0	21.97	22.04	21.97	23.00
	16QAM	1	0	21.94	21.84	21.97	23.00
		1	25	21.78	21.99	21.86	23.00
		1	49	21.98	22.01	21.89	23.00
		25	0	21.02	21.14	20.99	22.00
		25	13	20.93	20.96	20.91	22.00
		25	25	21.01	21.01	21.12	22.00
		50	0	20.93	20.81	21.03	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				18675	18900	19125	
15MHz	QPSK	1	0	22.82	22.91	22.89	24.00
		1	38	22.82	22.86	22.86	24.00
		1	74	22.77	22.74	22.78	24.00
		36	0	21.96	22.10	21.95	23.00
		36	18	22.00	21.88	22.02	23.00
		36	39	22.01	21.92	21.95	23.00
		75	0	21.98	22.08	22.01	23.00
	16QAM	1	0	21.91	21.92	21.98	23.00
		1	38	21.75	22.02	21.81	23.00
		1	74	21.97	22.00	21.90	23.00
		36	0	20.97	21.14	20.95	22.00
		36	18	20.93	20.95	20.91	22.00
		36	39	21.01	20.94	21.18	22.00
		75	0	20.98	20.82	21.03	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				18700	18900	19100	
20MHz	QPSK	1	0	22.78	22.93	22.89	24.00
		1	50	22.82	22.89	22.83	24.00
		1	99	22.77	22.75	22.73	24.00
		50	0	21.91	22.13	21.98	23.00
		50	25	21.97	21.86	21.96	23.00
		50	50	21.98	21.90	22.01	23.00
		100	0	21.94	22.08	21.98	23.00
	16QAM	1	0	21.91	21.91	21.94	23.00
		1	50	21.84	22.01	21.79	23.00
		1	99	21.94	22.00	21.85	23.00
		50	0	21.00	21.09	21.00	22.00
		50	25	20.99	20.99	20.89	22.00
		50	50	20.92	21.03	21.19	22.00
		100	0	20.94	20.80	21.01	22.00

LTE Band 4	Conducted Power(dBm)
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Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				19957	20175	20393	
1.4MHz	QPSK	1	0	22.66	22.76	22.78	24.00
		1	2	22.69	22.76	22.77	24.00
		1	5	22.61	22.72	22.66	24.00
		3	0	21.78	22.00	21.85	23.00
		3	2	21.89	21.77	21.86	23.00
		3	3	21.93	21.83	21.84	23.00
	16QAM	6	0	21.83	21.99	21.90	23.00
		1	0	21.79	21.77	21.83	23.00
		1	2	21.70	21.93	21.70	23.00
		1	5	21.86	21.95	21.78	23.00
		3	0	20.89	21.00	20.82	22.00
		3	2	20.88	20.85	20.80	22.00
		3	3	20.83	20.88	21.03	22.00
		6	0	20.82	20.71	20.90	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				19965	20175	20385	
3MHz	QPSK	1	0	22.67	22.79	22.80	24.00
		1	7	22.68	22.77	22.73	24.00
		1	14	22.59	22.64	22.65	24.00
		8	0	21.77	21.99	21.83	23.00
		8	4	21.92	21.71	21.87	23.00
		8	7	21.92	21.81	21.92	23.00
	16QAM	15	0	21.81	22.00	21.86	23.00
		1	0	21.81	21.78	21.84	23.00
		1	7	21.67	21.87	21.71	23.00
		1	14	21.81	21.93	21.75	23.00
		8	0	20.88	21.04	20.85	22.00
		8	4	20.87	20.91	20.84	22.00
		8	7	20.85	20.89	21.00	22.00
		15	0	20.83	20.73	20.89	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				19975	20175	20375	
5MHz	QPSK	1	0	22.66	22.81	22.81	24.00
		1	13	22.70	22.77	22.79	24.00
		1	24	22.60	22.66	22.64	24.00
		12	0	21.80	21.98	21.89	23.00
		12	6	21.93	21.77	21.92	23.00
		12	13	21.89	21.80	21.85	23.00
	16QAM	25	0	21.83	21.94	21.93	23.00
		1	0	21.82	21.73	21.86	23.00
		1	13	21.71	21.94	21.71	23.00
		1	24	21.82	21.93	21.79	23.00
		12	0	20.89	20.99	20.86	22.00
		12	6	20.84	20.89	20.86	22.00
		12	13	20.83	20.88	21.03	22.00
		25	0	20.85	20.75	20.88	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				20000	20175	20350	
10MHz	QPSK	1	0	22.69	22.81	22.78	24.00
		1	25	22.72	22.79	22.74	24.00
		1	49	22.65	22.69	22.64	24.00
		25	0	21.82	21.97	21.83	23.00
		25	13	21.92	21.76	21.89	23.00



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	16QAM	25	25	21.96	21.77	21.91	23.00
		50	0	21.79	21.96	21.89	23.00
		1	0	21.85	21.80	21.83	23.00
		1	25	21.69	21.87	21.72	23.00
		1	49	21.87	21.95	21.79	23.00
		25	0	20.93	20.98	20.88	22.00
		25	13	20.88	20.83	20.84	22.00
		25	25	20.90	20.84	21.00	22.00
		50	0	20.84	20.71	20.87	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				20025	20175	20325	
15MHz	QPSK	1	0	22.72	22.81	22.81	24.00
		1	38	22.72	22.74	22.79	24.00
		1	74	22.68	22.67	22.65	24.00
		36	0	21.80	21.99	21.87	23.00
		36	18	21.92	21.76	21.90	23.00
		36	39	21.96	21.84	21.92	23.00
		75	0	21.84	21.99	21.92	23.00
	16QAM	1	0	21.83	21.76	21.91	23.00
		1	38	21.70	21.88	21.69	23.00
		1	74	21.85	21.93	21.76	23.00
		36	0	20.94	21.00	20.86	22.00
		36	18	20.84	20.91	20.79	22.00
		36	39	20.83	20.89	21.07	22.00
		75	0	20.88	20.74	20.90	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				20050	20175	20300	
20MHz	QPSK	1	0	22.73	22.84	22.83	24.00
		1	50	22.65	22.81	22.75	24.00
		1	99	22.61	22.65	22.67	24.00
		50	0	21.85	22.02	21.87	23.00
		50	25	21.93	21.75	21.89	23.00
		50	50	21.91	21.80	21.87	23.00
		100	0	21.84	21.99	21.89	23.00
	16QAM	1	0	21.85	21.80	21.88	23.00
		1	50	21.74	21.94	21.77	23.00
		1	99	21.84	21.96	21.80	23.00
		50	0	20.86	21.00	20.86	22.00
		50	25	20.82	20.90	20.82	22.00
		50	50	20.84	20.89	21.01	22.00
		100	0	20.85	20.70	20.92	22.00

LTE Band 5				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				20407	20525	20643	
1.4MHz	QPSK	1	0	22.94	22.96	22.98	24.00
		1	2	22.93	22.95	22.92	24.00
		1	5	22.83	22.84	22.83	24.00
		3	0	22.04	22.16	22.03	23.00
		3	2	22.14	21.98	22.08	23.00
		3	3	22.15	22.00	22.07	23.00
		6	0	22.00	22.21	22.09	23.00
	16QAM	1	0	22.04	21.96	22.08	23.00
		1	2	21.92	22.08	21.96	23.00



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		1	5	22.08	22.12	22.04	23.00
		3	0	21.11	21.25	21.05	22.00
		3	2	21.09	21.08	21.02	22.00
		3	3	21.09	21.04	21.23	22.00
		6	0	21.06	20.90	21.08	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				20415	20525	20635	
3MHz	QPSK	1	0	22.89	22.94	22.96	24.00
		1	7	22.91	22.97	22.99	24.00
		1	14	22.87	22.84	22.87	24.00
		8	0	21.98	22.17	22.10	23.00
		8	4	22.09	21.91	22.13	23.00
		8	7	22.11	21.99	22.05	23.00
	16QAM	15	0	22.06	22.18	22.12	23.00
		1	0	22.05	21.95	22.03	23.00
		1	7	21.88	22.13	21.90	23.00
		1	14	22.05	22.10	22.02	23.00
		8	0	21.10	21.17	21.04	22.00
		8	4	21.02	21.08	21.02	22.00
		8	7	21.10	21.11	21.20	22.00
		15	0	21.02	20.87	21.06	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				20425	20525	20625	
5MHz	QPSK	1	0	22.92	22.95	22.99	24.00
		1	13	22.84	23.01	22.94	24.00
		1	24	22.87	22.85	22.90	24.00
		12	0	22.05	22.23	22.07	23.00
		12	6	22.11	21.91	22.08	23.00
		12	13	22.17	22.03	22.12	23.00
	16QAM	25	0	22.08	22.20	22.10	23.00
		1	0	22.05	21.96	22.06	23.00
		1	13	21.90	22.09	21.93	23.00
		1	24	22.09	22.09	21.97	23.00
		12	0	21.14	21.23	21.07	22.00
		12	6	21.08	21.10	21.07	22.00
		12	13	21.03	21.11	21.28	22.00
		25	0	21.04	20.91	21.10	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				20450	20525	20600	
10MHz	QPSK	1	0	22.91	23.02	22.98	24.00
		1	25	22.89	23.00	22.99	24.00
		1	49	22.84	22.89	22.90	24.00
		25	0	21.99	22.18	22.06	23.00
		25	13	22.08	21.92	22.11	23.00
		25	25	22.11	21.99	22.11	23.00
	16QAM	50	0	22.02	22.16	22.08	23.00
		1	0	22.00	21.94	22.07	23.00
		1	25	21.90	22.14	21.96	23.00
		1	49	22.03	22.11	21.99	23.00
		25	0	21.09	21.21	21.04	22.00
		25	13	21.03	21.11	21.03	22.00
		25	25	21.08	21.10	21.28	22.00
		50	0	21.03	20.94	21.05	22.00

LTE FDD Band 12

Conducted Power(dBm)



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Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				23017	23095	23173	
1.4MHz	QPSK	1	0	22.45	23.25	22.86	24.00
		1	2	23.14	23.17	22.77	24.00
		1	5	22.72	22.45	22.39	24.00
		3	0	21.95	22.09	22.29	23.00
		3	2	21.91	21.85	22.32	23.00
		3	3	22.09	21.90	22.09	23.00
	16QAM	6	0	21.88	22.11	22.06	23.00
		1	0	21.65	21.78	21.94	23.00
		1	2	22.24	21.55	22.34	23.00
		1	5	21.92	21.49	21.29	23.00
		3	0	20.96	21.16	21.13	22.00
		3	2	20.94	20.93	21.23	22.00
		3	3	20.98	21.00	21.10	22.00
		6	0	20.93	21.12	21.01	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				23025	23095	23165	
3MHz	QPSK	1	0	22.44	23.27	22.87	24.00
		1	7	23.17	23.21	22.79	24.00
		1	14	22.69	22.41	22.41	24.00
		8	0	21.94	22.05	22.32	23.00
		8	4	21.94	21.84	22.34	23.00
		8	7	22.08	21.89	22.11	23.00
	16QAM	15	0	21.93	22.14	22.05	23.00
		1	0	21.68	21.81	21.96	23.00
		1	7	22.28	21.53	22.34	23.00
		1	14	21.98	21.51	21.34	23.00
		8	0	21.00	21.16	21.13	22.00
		8	4	20.95	20.92	21.23	22.00
		8	7	20.98	21.00	21.11	22.00
		15	0	20.92	21.06	20.98	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				23035	23095	23155	
5MHz	QPSK	1	0	22.44	23.29	22.90	24.00
		1	13	23.11	23.21	22.80	24.00
		1	24	22.73	22.44	22.44	24.00
		12	0	21.94	22.04	22.36	23.00
		12	6	21.95	21.85	22.31	23.00
		12	13	22.03	21.86	22.13	23.00
	16QAM	25	0	21.92	22.11	22.09	23.00
		1	0	21.63	21.84	22.00	23.00
		1	13	22.23	21.58	22.31	23.00
		1	24	21.93	21.50	21.27	23.00
		12	0	20.99	21.16	21.17	22.00
		12	6	20.95	20.92	21.16	22.00
		12	13	21.00	21.00	21.16	22.00
		25	0	20.92	21.11	21.05	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				23060	23095	23130	
10MHz	QPSK	1	0	22.44	23.32	22.92	24.00
		1	25	23.13	23.19	22.82	24.00
		1	49	22.71	22.46	22.45	24.00
		25	0	21.89	22.09	22.34	23.00
		25	13	21.91	21.88	22.37	23.00
		25	25	22.04	21.92	22.10	23.00



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	16QAM	50	0	21.90	22.13	22.04	23.00
		1	0	21.68	21.82	21.97	23.00
		1	25	22.23	21.59	22.29	23.00
		1	49	21.94	21.52	21.29	23.00
		25	0	20.97	21.17	21.17	22.00
		25	13	20.92	20.96	21.17	22.00
		25	25	21.00	20.97	21.10	22.00
		50	0	20.93	21.11	20.97	22.00

LTE FDD Band 13				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				23205	23230	23255	
5MHz	QPSK	1	0	22.78	22.87	22.89	23.00
		1	13	22.76	22.85	22.81	23.00
		1	24	22.73	22.82	22.81	23.00
		12	0	21.89	22.00	21.96	22.00
		12	6	22.00	21.82	21.99	22.00
		12	13	22.00	21.88	22.00	22.00
		25	0	21.97	22.00	21.99	22.00
	16QAM	1	0	21.89	21.90	21.94	22.00
		1	13	21.83	21.97	21.80	22.00
		1	24	21.97	22.00	21.89	22.00
		12	0	20.96	21.00	20.98	21.00
		12	6	20.95	20.95	20.92	21.00
		12	13	20.99	20.98	21.00	21.00
		25	0	20.95	20.86	20.99	21.00
					Channel	Channel	Channel
					/	23230	/
					/	/	/
10MHz	QPSK	1	0	/	22.90	/	23.00
		1	25	/	22.85	/	23.00
		1	49	/	22.80	/	23.00
		25	0	/	21.99	/	22.00
		25	13	/	21.85	/	22.00
		25	25	/	21.90	/	22.00
		50	0	/	22.00	/	22.00
	16QAM	1	0	/	21.86	/	22.00
		1	25	/	22.00	/	22.00
		1	49	/	22.00	/	22.00
		25	0	/	21.00	/	21.00
		25	13	/	20.93	/	21.00
		25	25	/	21.00	/	21.00
		50	0	/	20.84	/	21.00

LTE Band 26				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				26697	26865	27033	
1.4MHz	QPSK	1	0	22.81	22.88	22.87	24.00
		1	2	22.79	22.88	22.82	24.00
		1	5	22.74	22.77	22.73	24.00
		3	0	21.88	22.05	21.94	23.00
		3	2	22.03	21.85	22.04	23.00
		3	3	21.99	21.93	22.01	23.00
		6	0	21.96	22.12	21.99	23.00



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	16QAM	1	0	21.91	21.85	21.99	23.00
		1	2	21.77	21.99	21.84	23.00
		1	5	21.92	21.99	21.86	23.00
		3	0	20.97	21.07	20.96	22.00
		3	2	20.95	20.94	20.91	22.00
		3	3	20.93	20.97	21.12	22.00
		6	0	20.97	20.83	20.98	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
3MHz	QPSK	1	0	22.84	22.95	22.94	24.00
		1	7	22.76	22.83	22.82	24.00
		1	14	22.74	22.75	22.72	24.00
		8	0	21.94	22.06	21.92	23.00
		8	4	21.98	21.87	21.98	23.00
		8	7	22.02	21.89	21.97	23.00
		15	0	21.93	22.10	21.98	23.00
	16QAM	1	0	21.90	21.85	21.98	23.00
		1	7	21.80	22.04	21.84	23.00
		1	14	21.92	22.01	21.93	23.00
		8	0	20.97	21.08	20.99	22.00
		8	4	20.97	20.95	20.92	22.00
		8	7	20.93	20.95	21.18	22.00
		15	0	20.94	20.77	21.00	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
5MHz	QPSK	1	0	22.81	22.95	22.93	24.00
		1	13	22.83	22.88	22.85	24.00
		1	24	22.76	22.79	22.79	24.00
		12	0	21.88	22.11	21.95	23.00
		12	6	22.01	21.82	21.96	23.00
		12	13	22.01	21.89	21.97	23.00
		25	0	21.93	22.12	21.95	23.00
	16QAM	1	0	21.94	21.88	21.94	23.00
		1	13	21.83	21.98	21.84	23.00
		1	24	21.99	22.00	21.89	23.00
		12	0	21.02	21.09	20.92	22.00
		12	6	20.99	20.92	20.95	22.00
		12	13	20.94	20.97	21.18	22.00
		25	0	20.99	20.85	21.02	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
10MHz	QPSK	1	0	22.79	23.00	22.87	24.00
		1	25	22.79	22.83	22.88	24.00
		1	49	22.76	22.74	22.75	24.00
		25	0	21.93	22.12	21.99	23.00
		25	13	22.05	21.81	21.98	23.00
		25	25	22.06	21.90	21.98	23.00
		50	0	21.95	22.04	21.99	23.00
	16QAM	1	0	21.88	21.86	21.95	23.00
		1	25	21.75	22.04	21.84	23.00
		1	49	21.94	22.03	21.90	23.00
		25	0	20.95	21.16	20.95	22.00
		25	13	20.94	20.93	20.91	22.00
		25	25	21.00	21.02	21.18	22.00
		50	0	20.96	20.78	21.03	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
15MHz	QPSK	1	0	22.79	23.12	22.86	24.00



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		1	38	22.78	22.91	22.83	24.00
		1	74	22.72	22.79	22.76	24.00
		36	0	21.87	22.12	21.94	23.00
		36	18	22.03	21.82	21.99	23.00
		36	39	22.03	21.93	22.03	23.00
		75	0	21.92	22.12	22.04	23.00
	16QAM	1	0	21.91	21.90	21.95	23.00
		1	38	21.78	22.03	21.85	23.00
		1	74	21.95	22.01	21.93	23.00
		36	0	21.02	21.13	20.91	22.00
		36	18	21.00	20.96	20.92	22.00
		36	39	20.93	20.96	21.18	22.00
		75	0	20.92	20.81	20.97	22.00

LTE Band 25				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				26047	26365	26683	
1.4MHz	QPSK	1	0	22.86	22.91	22.97	24.00
		1	2	22.79	22.93	22.93	24.00
		1	5	22.75	22.79	22.79	24.00
		3	0	21.97	22.12	22.01	23.00
		3	2	22.09	21.93	22.10	23.00
		3	3	22.03	21.92	22.01	23.00
		6	0	21.98	22.14	22.07	23.00
	16QAM	1	0	21.93	21.89	21.97	23.00
		1	2	21.81	22.08	21.90	23.00
		1	5	22.03	22.06	21.95	23.00
		3	0	21.02	21.10	21.00	22.00
		3	2	21.06	20.95	20.96	22.00
		3	3	21.03	21.01	21.19	22.00
		6	0	21.03	20.86	21.06	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				26055	26365	26675	
3MHz	QPSK	1	0	22.86	22.92	22.95	24.00
		1	7	22.81	22.95	22.90	24.00
		1	14	22.76	22.80	22.77	24.00
		8	0	22.01	22.17	22.00	23.00
		8	4	22.08	21.86	22.06	23.00
		8	7	22.08	21.94	21.96	23.00
		15	0	21.98	22.08	22.04	23.00
	16QAM	1	0	21.99	21.88	22.01	23.00
		1	7	21.81	22.00	21.89	23.00
		1	14	21.98	22.06	21.98	23.00
		8	0	20.97	21.19	21.03	22.00
		8	4	21.04	21.01	20.95	22.00
		8	7	21.01	21.01	21.16	22.00
		15	0	20.99	20.86	21.05	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				26065	26365	26665	
5MHz	QPSK	1	0	22.79	22.88	22.91	24.00
		1	13	22.82	22.99	22.89	24.00
		1	24	22.71	22.78	22.81	24.00
		12	0	22.04	22.13	21.97	23.00
		12	6	22.06	21.89	22.12	23.00
		12	13	22.02	21.92	22.01	23.00





	16QAM	25	0	21.98	22.10	22.06	23.00
		1	0	21.97	21.94	22.03	23.00
		1	13	21.79	22.05	21.90	23.00
		1	24	21.96	22.13	21.97	23.00
		12	0	21.03	21.13	20.98	22.00
		12	6	21.00	20.94	20.96	22.00
		12	13	21.03	21.00	21.22	22.00
		25	0	20.97	20.81	21.03	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				26090	26365	26640	
10MHz	QPSK	1	0	22.78	22.89	22.96	24.00
		1	25	22.77	22.95	22.88	24.00
		1	49	22.74	22.78	22.82	24.00
		25	0	21.99	22.12	22.01	23.00
		25	13	22.08	21.88	22.05	23.00
		25	25	22.05	21.97	21.95	23.00
		50	0	21.94	22.06	22.08	23.00
	16QAM	1	0	21.94	21.95	22.01	23.00
		1	25	21.81	21.99	21.86	23.00
		1	49	21.97	22.12	21.94	23.00
		25	0	21.03	21.13	20.97	22.00
		25	13	21.00	20.98	20.92	22.00
		25	25	21.00	21.04	21.22	22.00
		50	0	21.03	20.88	21.04	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				26115	26365	26615	
15MHz	QPSK	1	0	22.82	22.91	22.97	24.00
		1	38	22.78	22.93	22.91	24.00
		1	74	22.75	22.83	22.84	24.00
		36	0	22.00	22.13	22.00	23.00
		36	18	22.09	21.92	22.09	23.00
		36	39	22.01	21.89	21.95	23.00
		75	0	21.93	22.13	22.07	23.00
	16QAM	1	0	21.99	21.94	21.99	23.00
		1	38	21.84	22.07	21.91	23.00
		1	74	21.97	22.13	21.94	23.00
		36	0	20.99	21.17	20.97	22.00
		36	18	21.07	21.00	20.93	22.00
		36	39	21.06	21.04	21.18	22.00
		75	0	21.03	20.89	21.10	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				26140	26365	26590	
20MHz	QPSK	1	0	22.81	23.10	22.90	24.00
		1	50	22.84	23.03	22.93	24.00
		1	99	22.73	22.77	22.79	24.00
		50	0	22.01	22.12	21.97	23.00
		50	25	22.03	21.90	22.11	23.00
		50	50	22.01	21.90	21.94	23.00
		100	0	21.96	22.08	22.05	23.00
	16QAM	1	0	21.97	21.93	21.98	23.00
		1	50	21.77	22.04	21.93	23.00
		1	99	21.96	22.07	21.92	23.00
		50	0	20.97	21.13	20.98	22.00
		50	25	21.01	20.96	20.93	22.00
		50	50	21.05	21.03	21.19	22.00
		100	0	20.99	20.87	21.03	22.00



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LTE Band 66				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
1.4MHz	QPSK	1	0	131979	132322	132665	24.00
		1	2	22.75	22.88	22.87	24.00
		1	5	22.78	22.87	22.88	24.00
		1	5	22.73	22.74	22.73	24.00
		3	0	21.89	22.08	21.95	23.00
		3	1	22.04	21.85	21.98	23.00
		3	3	22.06	21.87	22.00	23.00
	16QAM	6	0	21.93	22.10	21.99	23.00
		1	0	21.93	21.86	21.96	23.00
		1	2	21.78	22.00	21.79	23.00
		1	5	21.98	22.02	21.87	23.00
		3	0	20.98	21.08	20.92	22.00
		3	1	20.99	20.98	20.92	22.00
		3	3	21.00	20.99	21.10	22.00
		6	0	20.94	20.85	21.00	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
3MHz	QPSK	1	0	131987	132322	132657	24.00
		1	7	22.76	22.89	22.88	24.00
		1	14	22.78	22.86	22.86	24.00
		8	0	22.76	22.74	22.80	24.00
		8	4	21.89	22.12	21.97	23.00
		8	7	22.05	21.86	22.02	23.00
		15	0	22.00	21.87	22.00	23.00
	16QAM	1	0	21.91	22.11	21.99	23.00
		1	7	21.95	21.85	21.94	23.00
		1	7	21.77	21.99	21.86	23.00
		1	14	21.93	21.99	21.91	23.00
		8	0	20.96	21.11	20.94	22.00
		8	4	20.96	20.94	20.98	22.00
		8	7	20.98	21.01	21.17	22.00
		15	0	20.93	20.78	20.99	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
5MHz	QPSK	1	0	131997	132322	132647	24.00
		1	13	22.83	22.91	22.92	24.00
		1	24	22.79	22.83	22.85	24.00
		1	24	22.72	22.82	22.73	24.00
		12	0	21.96	22.11	21.97	23.00
		12	6	22.02	21.84	22.01	23.00
		12	13	22.03	21.87	22.01	23.00
	16QAM	25	0	21.92	22.03	21.96	23.00
		1	0	21.88	21.91	22.02	23.00
		1	13	21.83	21.96	21.83	23.00
		1	24	21.98	21.98	21.85	23.00
		12	0	21.02	21.15	20.92	22.00
		12	6	20.92	20.98	20.94	22.00
		12	13	20.97	21.03	21.18	22.00
		25	0	20.96	20.77	21.02	22.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
10MHz	QPSK	1	0	132022	132322	132622	24.00
		1	25	22.76	22.86	22.85	24.00
		1	49	22.81	22.86	22.83	24.00
		25	0	22.75	22.76	22.73	24.00
		25	13	21.92	22.09	21.92	23.00
		25	13	22.04	21.80	21.96	23.00



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	16QAM	25	25	22.02	21.91	21.97	23.00
		50	0	21.91	22.12	21.96	23.00
		1	0	21.91	21.87	21.96	23.00
		1	25	21.76	21.98	21.84	23.00
		1	49	21.94	22.05	21.92	23.00
		25	0	20.97	21.13	20.94	22.00
		25	13	20.93	21.00	20.90	22.00
		25	25	20.97	20.96	21.12	22.00
		50	0	20.97	20.82	20.98	22.00
Bandwidth	Modulation	RB size	RB offset	Channel 132047	Channel 132322	Channel 132597	Tune up
15MHz	QPSK	1	0	22.76	22.90	22.88	24.00
		1	38	22.83	22.84	22.85	24.00
		1	74	22.70	22.76	22.73	24.00
		36	0	21.96	22.04	21.92	23.00
		36	18	21.98	21.83	22.02	23.00
		36	39	22.02	21.86	22.02	23.00
		75	0	21.95	22.06	21.99	23.00
	16QAM	1	0	21.89	21.88	21.95	23.00
		1	38	21.78	21.99	21.83	23.00
		1	74	21.91	22.07	21.93	23.00
		36	0	21.00	21.10	20.94	22.00
		36	18	20.96	20.94	20.97	22.00
		36	39	20.95	21.01	21.15	22.00
		75	0	20.99	20.83	20.97	22.00
Bandwidth	Modulation	RB size	RB offset	Channel 132072	Channel 132322	Channel 132572	Tune up
20MHz	QPSK	1	0	22.76	22.94	22.91	24.00
		1	50	22.78	22.85	22.87	24.00
		1	99	22.71	22.78	22.73	24.00
		50	0	21.95	22.07	22.00	23.00
		50	25	22.03	21.87	22.03	23.00
		50	50	22.04	21.90	21.99	23.00
		100	0	21.90	22.10	21.96	23.00
	16QAM	1	0	21.87	21.91	21.99	23.00
		1	50	21.82	21.98	21.85	23.00
		1	99	21.91	22.05	21.90	23.00
		50	0	20.99	21.12	20.99	22.00
		50	25	20.96	20.97	20.95	22.00
		50	50	20.94	21.01	21.18	22.00
		100	0	20.98	20.79	20.99	22.00

Table 10: Conducted Power of BT.





5.2.3 Conducted Power of WIFI and BT

WIFI 2.4G						
Mode 2.4G	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm)	Tune up	Power setting
802.11b	1	2412	1	18.03	19.00	19.00
	6	2437		17.92	19.00	19.00
	11	2462		18.01	19.00	19.00
802.11g	1	2412	6	17.03	18.50	18.50
	6	2437		16.85	18.50	18.50
	11	2462		16.92	18.50	18.50
802.11n HT20	1	2412	6.5	14.95	16.50	16.50
	6	2437		14.65	16.50	16.50
	11	2462		14.87	16.50	16.50
802.11n HT40	3	2422	13.5	15.21	16.50	16.50
	6	2437		15.00	16.50	16.50
	9	2452		15.13	16.50	16.50

5GHz	mode	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm)	Tune up	Power setting
802.11a	U-NII-1	36	5180	6	14.98	16.00	16.00
		40	5200		15.04	16.00	16.00
		44	5220		14.99	16.00	16.00
		48	5240		15.01	16.00	16.00
	U-NII-2A	52	5260		15.03	16.00	16.00
		56	5280		14.99	16.00	16.00
		60	5300		14.98	16.00	16.00
		64	5320		15.02	16.00	16.00
	U-NII-2C	100	5500		15.06	16.00	16.50
		116	5580		14.79	16.00	16.50
		124	5620		14.82	16.00	16.50
		132	5660		14.76	16.00	16.50
		140	5700		14.85	16.00	16.50
		144	5720		14.76	16.00	16.50
	U-NII-3	149	5745		15.06	16.00	17.00
		157	5785		14.46	16.00	17.00
		165	5825		14.65	16.00	17.00
5GHz	mode	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm)	Tune up	Power setting
802.11n- HT20	U-NII-1	36	5180	MCS0	14.06	15.00	15.00
		40	5200		14.08	15.00	15.00
		44	5220		14.01	15.00	15.00
		48	5240		13.99	15.00	15.00
	U-NII-2A	52	5260		13.98	15.00	15.50
		56	5280		14.02	15.00	15.50
		60	5300		14.11	15.00	15.50
		64	5320		14.13	15.00	15.50
	U-NII-2C	100	5500		14.13	15.00	16.00
		116	5580		14.03	15.00	16.00
		124	5620		13.99	15.00	16.00
		132	5660		13.96	15.00	16.00
		140	5700		13.85	15.00	16.00
	U-NII-3	149	5745		15.06	16.00	17.00
		157	5785		14.46	16.00	17.00
		165	5825		14.65	16.00	17.00



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		144	5720		14.02	15.00	16.00
		149	5745		14.23	15.00	16.50
	U-NII-3	157	5785		13.98	15.00	16.50
		165	5825		13.88	15.00	16.50
5GHz	mode	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm)	Tune up	Power setting
802.11n-HT40	U-NII-1	38	5190	MCS0	11.98	13.00	12.00
		46	5230		11.89	13.00	12.00
	U-NII-2A	54	5270		12.01	13.00	12.50
		62	5310		12.03	13.00	12.50
	U-NII-2C	102	5510		12.32	13.00	13.00
		110	5550		12.12	13.00	13.00
		126	5630		12.21	13.00	13.00
		126	5630		12.16	13.00	13.00
		134	5670		12.03	13.00	13.00
		142	5710		12.00	13.00	13.00
	U-NII-3	151	5755		11.98	13.00	13.50
		159	5795		11.68	13.00	13.50
5GHz	mode	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm)	Tune up	Power setting
802.11ac-20	U-NII-1	36	5180	MCS0	14.01	15.00	15.00
		40	5200		14.05	15.00	15.00
		44	5220		14.00	15.00	15.00
		48	5240		13.91	15.00	15.00
	U-NII-2A	52	5260		13.99	15.00	15.50
		56	5280		14.03	15.00	15.50
		60	5300		14.10	15.00	15.50
		64	5320		14.09	15.00	15.50
	U-NII-2C	100	5500		14.12	15.00	16.00
		116	5580		14.01	15.00	16.00
		124	5620		14.02	15.00	16.00
		132	5660		14.00	15.00	16.00
		140	5700		13.88	15.00	16.00
		144	5720		13.97	15.00	16.00
	U-NII-3	149	5745		14.21	15.00	16.50
		157	5785		14.01	15.00	16.50
		165	5825		13.89	15.00	16.50
5GHz	mode	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm)	Tune up	Power setting
802.11ac-40	U-NII-1	38	5190	MCS0	11.91	13.00	12.00
		46	5230		11.85	13.00	12.00
	U-NII-2A	54	5270		12.00	13.00	12.50
		62	5310		12.01	13.00	12.50
	U-NII-2C	102	5510		12.29	13.00	13.00
		110	5550		12.11	13.00	13.00
		118	5590		12.08	13.00	13.00
		126	5630		12.03	13.00	13.00



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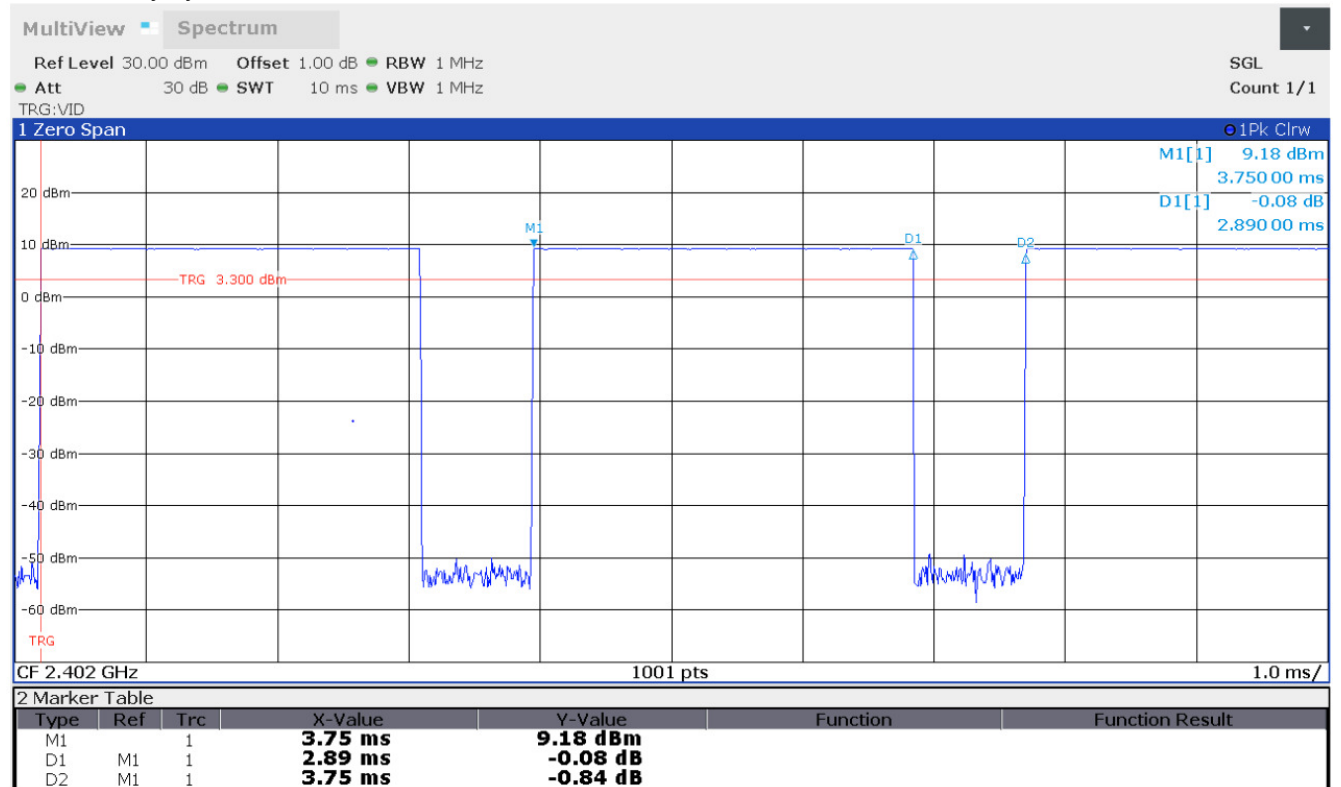
		134	5670		12.01	13.00	13.00
		142	5710		12.04	13.00	13.00
	U-NII-3	151	5755		11.97	13.00	13.50
		159	5795		11.72	13.00	13.50
5GHz	mode	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm)	Tune up	Power setting
802.11ac 80M	U-NII-1	42	5210	MCS0	12.05	13.00	12.50
	U-NII-2A	58	5290		11.98	13.00	12.50
	U-NII-2C	106	5530		11.97	13.00	12.50
		122	5610		12.05	13.00	12.50
		138	5690		12.11	13.00	12.50
	U-NII-3	155	5775		12.16	13.00	14.00

Table 11: Conducted Power of WIFI.

BT		Average Conducted Power(dBm)			Tune up
Band	Channel	0	39	78	
BT	GFSK	8.76	9.46	8.14	10.00
	π /4DQPSK	5.22	6.34	4.43	7.00
	8DPSK	5.43	6.56	4.82	7.00

Table 12: Conducted Power of BT.

BT DH5 Duty cycle=76.80%



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5.3 Measurement of SAR Data

Note:

- 1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B.
- 2) Per KDB447498 D01, testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:
 - $\leq 0.8\text{W/kg}$ for 1-g or 2.0W/kg for 10-g respectively, when the transmission band is $\leq 100\text{MHz}$.
 - $\leq 0.6\text{ W/kg}$ or 1.5 W/kg , for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz.
 - $\leq 0.4\text{ W/kg}$ or 1.0 W/kg , for 1-g or 10-g respectively, when the transmission band is $\geq 200\text{ MHz}$.
- 3) Maximum bandwidth does not support at least three non-overlapping channels in certain channel bandwidths. When a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.



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5.3.1 SAR Result of WCDMA II

W B2 SAR Test Record										
Test Record										
Test position	Test mode	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(°C)
Body Test data(Separate 10mm)										
Horizontal-Up	RMC	9400/1880	1:1	0.751	-0.03	23.91	24.00	1.021	0.767	22.7
Horizontal-Down	RMC	9400/1880	1:1	0.755	-0.01	23.91	24.00	1.021	0.771	22.7
Horizontal-Down	RMC	9262/1852.4	1:1	0.642	-0.02	23.63	24.00	1.089	0.699	22.7
Horizontal-Down	RMC	9538/1907.6	1:1	0.661	0.07	23.40	24.00	1.148	0.759	22.7
Vertical Front	RMC	9400/1880	1:1	0.635	0.08	23.91	24.00	1.021	0.648	22.7
Vertical Back	RMC	9400/1880	1:1	0.314	0.06	23.91	24.00	1.021	0.321	22.7
Tip Mode	RMC	9400/1880	1:1	0.750	0.09	23.91	24.00	1.021	0.766	22.7

Table 13: SAR of WCDMA II.



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5.3.2 SAR Result of WCDMA IV

Test Record										
Test position	Test mode	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(°C)
Body Test data(Separate 10mm)										
Horizontal-Up	RMC	1412/1732.4	1:1	0.491	0.10	23.60	24.00	1.096	0.538	22.6
Horizontal-Down	RMC	1412/1732.4	1:1	0.493	0.02	23.60	24.00	1.096	0.541	22.6
Horizontal-Down	RMC	1312/1712.4	1:1	0.438	0.12	23.51	24.00	1.119	0.490	22.6
Horizontal-Down	RMC	1513/1752.6	1:1	0.389	0.08	22.66	24.00	1.361	0.530	22.6
Vertical Front	RMC	1412/1732.4	1:1	0.441	-0.08	23.60	24.00	1.096	0.484	22.6
Vertical Back	RMC	1412/1732.4	1:1	0.223	0.04	23.60	24.00	1.096	0.245	22.6
Tip Mode	RMC	1412/1732.4	1:1	0.386	0.13	23.60	24.00	1.096	0.423	22.6

Table 14: SAR of WCDAM IV.



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5.3.3 SAR Result of WCDMA V

Test Record										
Test position	Test mode	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(°C)
Body Test data(Separate 10mm)										
Horizontal-Up	RMC	4182/836.4	1:1	0.301	-0.03	23.78	24.00	1.052	0.317	22.8
Horizontal-Down	RMC	4182/836.4	1:1	0.302	0.07	23.78	24.00	1.052	0.318	22.8
Horizontal-Down	RMC	4132/826.4	1:1	0.275	0.13	23.58	24.00	1.102	0.303	22.8
Horizontal-Down	RMC	4233/846.6	1:1	0.289	0.05	23.75	24.00	1.059	0.306	22.8
Vertical Front	RMC	4182/836.4	1:1	0.155	0.08	23.78	24.00	1.052	0.163	22.8
Vertical Back	RMC	4182/836.4	1:1	0.199	-0.15	23.78	24.00	1.052	0.209	22.8
Tip Mode	RMC	4182/836.4	1:1	0.157	0.07	23.78	24.00	1.052	0.165	22.8

Table 15: SAR of WCDMA V.



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5.3.4 SAR Result of LTE Band 12

LTE Band 12 SAR Test Record											
Test Record											
Test position	BW.	Test mode	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(°C)
Body Test data(Separate 10mm 1RB)											
Horizontal-Up	10	QPSK 1_0	23095/707.5	1:1	0.286	-0.05	23.32	24.00	1.169	0.334	22.6
Horizontal-Down	10	QPSK 1_0	23095/707.5	1:1	0.297	-0.06	23.32	24.00	1.169	0.347	22.6
Horizontal-Down	10	QPSK 1_0	23060/704	1:1	0.224	0.17	22.44	24.00	1.432	0.321	22.6
Horizontal-Down	10	QPSK 1_0	23130/711	1:1	0.251	0.02	22.92	24.00	1.282	0.322	22.6
Vertical Front	10	QPSK 1_0	23095/707.5	1:1	0.237	0.02	23.32	24.00	1.169	0.277	22.6
Vertical Back	10	QPSK 1_0	23095/707.5	1:1	0.136	0.08	23.32	24.00	1.169	0.159	22.6
Tip Mode	10	QPSK 1_0	23095/707.5	1:1	0.086	-0.06	23.32	24.00	1.169	0.101	22.6
Body Test data(Separate 10mm 50%RB)											
Horizontal-Up	10	QPSK 25_0	23095/707.5	1:1	0.238	0.03	22.09	23.00	1.233	0.293	22.6
Horizontal-Down	10	QPSK 25_0	23095/707.5	1:1	0.241	0.04	22.09	23.00	1.233	0.297	22.6
Vertical Front	10	QPSK 25_0	23095/707.5	1:1	0.208	0.08	22.09	23.00	1.233	0.256	22.6
Vertical Back	10	QPSK 25_0	23095/707.5	1:1	0.110	0.02	22.09	23.00	1.233	0.136	22.6
Tip Mode	10	QPSK 25_0	23095/707.5	1:1	0.068	0.09	22.09	23.00	1.233	0.084	22.6

Table 16: SAR of LTE Band 12.



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5.3.5 SAR Result of LTE Band 13

LTE Band 13 SAR Test Record											
Test Record											
Test position	BW.	Test mode	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(℃)
Body Test data(Separate 10mm 1RB)											
Horizontal-Up	10	QPSK 1_0	23230/782	1:1	0.337	-0.07	22.90	23.00	1.023	0.345	22.6
Horizontal-Down	10	QPSK 1_0	23230/782	1:1	0.343	-0.05	22.90	23.00	1.023	0.351	22.6
Vertical Front	10	QPSK 1_0	23230/782	1:1	0.195	0.02	22.90	23.00	1.023	0.200	22.6
Vertical Back	10	QPSK 1_0	23230/782	1:1	0.171	0.07	22.90	23.00	1.023	0.175	22.6
Tip Mode	10	QPSK 1_0	23230/782	1:1	0.074	0.05	22.90	23.00	1.023	0.076	22.6
Body Test data(Separate 10mm 50%RB)											
Horizontal-Up	10	QPSK 25_0	23230/782	1:1	0.277	0.16	21.99	22.00	1.002	0.278	22.6
Horizontal-Down	10	QPSK 25_0	23230/782	1:1	0.283	0.01	21.99	22.00	1.002	0.284	22.6
Vertical Front	10	QPSK 25_0	23230/782	1:1	0.158	0.08	21.99	22.00	1.002	0.158	22.6
Vertical Back	10	QPSK 25_0	23230/782	1:1	0.143	-0.03	21.99	22.00	1.002	0.143	22.6
Tip Mode	10	QPSK 25_0	23230/782	1:1	0.067	0.09	21.99	22.00	1.002	0.067	22.6

Table 17: SAR of LTE Band 13.



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5.3.6 SAR Result of LTE Band 25

LTE Band 25 SAR Test Record											
Test Record											
Test position	BW.	Test mode	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(°C)
Body Test data(Separate 10mm 1RB)											
Horizontal-Up	20	QPSK 1_0	26365/1882.5	1:1	0.648	-0.04	23.10	24.00	1.230	0.797	22.7
Horizontal-Down	20	QPSK 1_0	26365/1882.5	1:1	0.688	0.04	23.10	24.00	1.230	0.846	22.7
Horizontal-Down	20	QPSK 1_0	26140/1860	1:1	0.679	-0.06	22.81	24.00	1.315	0.893	22.7
Horizontal-Down	20	QPSK 1_0	26590/1905	1:1	0.603	0.04	22.90	24.00	1.288	0.777	22.7
Vertical Front	20	QPSK 1_0	26365/1882.5	1:1	0.420	0.09	23.10	24.00	1.230	0.517	22.7
Vertical Back	20	QPSK 1_0	26365/1882.5	1:1	0.308	0.16	23.10	24.00	1.230	0.379	22.7
Tip Mode	20	QPSK 1_0	26365/1882.5	1:1	0.435	0.02	23.10	24.00	1.230	0.535	22.7
Body Test data(Separate 10mm 50%RB)											
Horizontal-Up	20	QPSK 50_0	26365/1882.5	1:1	0.541	0.01	22.12	23.00	1.225	0.663	22.7
Horizontal-Down	20	QPSK 50_0	26365/1882.5	1:1	0.576	0.06	22.12	23.00	1.225	0.705	22.7
Vertical Front	20	QPSK 50_0	26365/1882.5	1:1	0.333	-0.11	22.12	23.00	1.225	0.408	22.7
Vertical Back	20	QPSK 50_0	26365/1882.5	1:1	0.300	0.05	22.12	23.00	1.225	0.367	22.7
Tip Mode	20	QPSK 50_0	26365/1882.5	1:1	0.314	0.07	22.12	23.00	1.225	0.385	22.7
Body Test data(Separate 10mm 100%RB)											
Horizontal-Down	20	QPSK 100_0	26365/1882.5	1:1	0.597	0.05	22.08	23.00	1.236	0.738	22.7

Table 18: SAR of LTE Band 25.



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5.3.7 SAR Result of LTE Band 26

LTE Band 26 SAR Test Record											
Test Record											
Test position	BW.	Test mode	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(°C)
Body Test data(Separate 10mm 1RB)											
Horizontal-Up	15	QPSK 1_0	26865/831.5	1:1	0.215	-0.03	23.12	24.00	1.225	0.263	22.8
Horizontal-Down	15	QPSK 1_0	26865/831.5	1:1	0.245	-0.08	23.12	24.00	1.225	0.300	22.8
Vertical Front	15	QPSK 1_0	26865/831.5	1:1	0.227	0.05	23.12	24.00	1.225	0.278	22.8
Vertical Back	15	QPSK 1_0	26865/831.5	1:1	0.125	0.04	23.12	24.00	1.225	0.153	22.8
Tip Mode	15	QPSK 1_0	26865/831.5	1:1	0.117	0.02	23.12	24.00	1.225	0.143	22.8
Body Test data(Separate 10mm 50%RB)											
Horizontal-Up	15	QPSK 36_0	26865/831.5	1:1	0.186	0.06	22.12	23.00	1.225	0.228	22.8
Horizontal-Down	15	QPSK 36_0	26865/831.5	1:1	0.203	0.09	22.12	23.00	1.225	0.249	22.8
Vertical Front	15	QPSK 36_0	26865/831.5	1:1	0.180	0.11	22.12	23.00	1.225	0.220	22.8
Vertical Back	15	QPSK 36_0	26865/831.5	1:1	0.099	0.02	22.12	23.00	1.225	0.121	22.8
Tip Mode	15	QPSK 36_0	26865/831.5	1:1	0.091	0.01	22.12	23.00	1.225	0.111	22.8

Table 19: SAR of LTE Band26.



5.3.8 SAR Result of LTE Band 66

LTE Band 66 SAR Test Record											
Test Record											
Test position	BW	Test mode	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(°C)
Body Test data(Separate 10mm 1RB)											
Horizontal-Up	20	QPSK 1_0	132322/1745	1:1	0.624	0.12	22.94	24.00	1.276	0.796	22.6
Horizontal-Down	20	QPSK 1_0	132322/1745	1:1	0.742	0.04	22.94	24.00	1.276	0.947	22.6
Horizontal-Down	20	QPSK 1_0	132072/1720	1:1	0.858	-0.09	22.76	24.00	1.330	1.142	22.6
Horizontal-Down -Repeat SAR	20	QPSK 1_0	132072/1720	1:1	0.846	0.16	22.76	24.00	1.330	1.126	22.6
Horizontal-Down	20	QPSK 1_0	132572/1770	1:1	0.672	0.02	22.91	24.00	1.285	0.864	22.6
Vertical Front	20	QPSK 1_0	132322/1745	1:1	0.619	-0.01	22.94	24.00	1.276	0.790	22.6
Vertical Back	20	QPSK 1_0	132322/1745	1:1	0.315	0.08	22.94	24.00	1.276	0.402	22.6
Tip Mode	20	QPSK 1_0	132322/1745	1:1	0.544	0.02	22.94	24.00	1.276	0.694	22.6
Body Test data(Separate 10mm 50%RB)											
Horizontal-Up	20	QPSK 50_0	132322/1745	1:1	0.489	0.03	22.07	23.00	1.239	0.606	22.6
Horizontal-Down	20	QPSK 50_0	132322/1745	1:1	0.628	-0.14	22.07	23.00	1.239	0.778	22.6
Vertical Front	20	QPSK 50_0	132322/1745	1:1	0.529	0.05	22.07	23.00	1.239	0.655	22.6
Vertical Back	20	QPSK 50_0	132322/1745	1:1	0.246	-0.01	22.07	23.00	1.239	0.305	22.6
Tip Mode	20	QPSK 50_0	132322/1745	1:1	0.404	0.04	22.07	23.00	1.239	0.500	22.6
Body Test data(Separate 10mm 100%RB)											
Horizontal-Down	20	QPSK 100_0	132322/1745	1:1	0.664	0.12	22.10	23.00	1.230	0.817	22.6

Table 20: SAR of LTE Band 66.

Test Position	Channel/ Frequency	Measured SAR (1g)	1 st Repeated	Ratio	2 nd Repeated	3 rd Repeated
	(MHz)		SAR (1g)		SAR (1g)	SAR (1g)
Horizontal-Down	132072/1720	0.858	0.846	1.014	N/A	N/A

Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.

2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg ($\sim 10\%$ from the 1-g SAR limit).

3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .

4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg



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5.3.9 SAR Result of WIFI 2.4G

Test position	Test mode	Test ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(°C)
Body Test data (Separate 10mm)											
Horizontal-Up	802.11b	1-2412	99.04%	1.010	0.041	-0.04	18.03	19.00	1.250	0.051	22.8
Horizontal-Down	802.11b	1-2412	99.04%	1.010	0.247	0.07	18.03	19.00	1.250	0.312	22.8
Horizontal-Down	802.11b	6-2437	99.04%	1.010	0.198	-0.06	17.92	19.00	1.282	0.256	22.8
Horizontal-Down	802.11b	11-2462	99.04%	1.010	0.231	0.05	18.01	19.00	1.256	0.293	22.8
Vertical Front	802.11b	1-2412	99.04%	1.010	0.054	0.03	18.03	19.00	1.250	0.068	22.8
Vertical Back	802.11b	1-2412	99.04%	1.010	0.214	0.09	18.03	19.00	1.250	0.270	22.8
Tip Mode	802.11b	1-2412	99.04%	1.010	0.063	0.04	18.03	19.00	1.250	0.080	22.8

Table 21: SAR of WIFI 2.4G.

Note:

- 1)Per KDB 248227 D01, for Body SAR test of WiFi 2.4G, SAR is measured for 2.4 GHz 802.11b DSSS using the initial test position procedure. The highest reported SAR for DSSS is adjusted by the ratio of OFDM 802.11g/n to DSSS specified maximum output power and the adjusted SAR is < 1.2 W/kg, so SAR for 802.11g/n is not required.
- 2)As the 802.11b highest reported SAR is smaller than 1.2 W/kg , and the tune-up of the other 802.11 modes are not higher than 802.11b,therefore the adjusted SAR is ≤ 1.2 W/kg for other 802.11 modes, SAR test for the other 802.11 modes are not required.



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5.3.10 SAR Result of WIFI 5G

Test position	Test mode	Test ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 10-g (W/kg)	Liquid Temp.(°C)
Body Test data of U-NII-2A(Separate 10mm)											
Horizontal-Up	802.11a	52/5260	93.64%	1.068	0.086	0.01	15.03	16.00	1.250	0.115	22.7
Horizontal-Down	802.11a	52/5260	93.64%	1.068	0.338	-0.06	15.03	16.00	1.250	0.451	22.7
Horizontal-Down	802.11a	60/5300	93.64%	1.068	0.321	0.04	14.98	16.00	1.265	0.434	22.7
Horizontal-Down	802.11a	64/5320	93.64%	1.068	0.333	0.12	15.02	16.00	1.253	0.446	22.7
Vertical Front	802.11a	52/5260	93.64%	1.068	0.121	0.03	15.03	16.00	1.250	0.162	22.7
Vertical Back	802.11a	52/5260	93.64%	1.068	0.272	0.07	15.03	16.00	1.250	0.363	22.7
Tip Mode	802.11a	52/5260	93.64%	1.068	0.103	-0.10	15.03	16.00	1.250	0.138	22.7
Body Test data of U-NII-3(Separate 10mm)											
Horizontal-Up	802.11a	149/5745	93.64%	1.068	0.055	0.03	15.06	16.00	1.242	0.073	22.7
Horizontal-Down	802.11a	149/5745	93.64%	1.068	0.187	-0.18	15.06	16.00	1.242	0.248	22.7
Horizontal-Down	802.11a	157/5785	93.64%	1.068	0.158	-0.05	14.46	16.00	1.426	0.241	22.7
Horizontal-Down	802.11a	165/5825	93.64%	1.068	0.163	0.13	14.65	16.00	1.365	0.238	22.7
Vertical Front	802.11a	149/5745	93.64%	1.068	0.064	0.01	15.06	16.00	1.242	0.085	22.7
Vertical Back	802.11a	149/5745	93.64%	1.068	0.165	-0.16	15.06	16.00	1.242	0.219	22.7
Tip Mode	802.11a	149/5745	93.64%	1.068	0.052	0.02	15.06	16.00	1.242	0.069	22.7
Body Test data of U-NII-2C(Separate 10mm)											
Horizontal-Up	802.11a	100/5500	93.64%	1.068	0.054	0.03	15.06	16.00	1.242	0.072	22.7
Horizontal-Down	802.11a	100/5500	93.64%	1.068	0.240	-0.05	15.06	16.00	1.242	0.318	22.7
Horizontal-Down	802.11a	116/5580	93.64%	1.068	0.218	0.07	14.79	16.00	1.321	0.308	22.7
Horizontal-Down	802.11a	140/5700	93.64%	1.068	0.192	-0.15	14.85	16.00	1.303	0.267	22.7
Vertical Front	802.11a	100/5500	93.64%	1.068	0.051	-0.16	15.06	16.00	1.242	0.068	22.7
Vertical Back	802.11a	100/5500	93.64%	1.068	0.123	0.05	15.06	16.00	1.242	0.163	22.7
Tip Mode	802.11a	100/5500	93.64%	1.068	0.042	0.07	15.06	16.00	1.242	0.056	22.7

Table 22: SAR of WIFI 5G.

Note:

- 1) When the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. As the highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band for that configuration;
- 2) Per KDB248227D01, as the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes are not required.
- 3) As the 802.11a highest reported SAR is smaller than 1.2 W/kg, and the tune-up of the other 802.11 modes are not higher than 802.11a, therefore the adjusted SAR is ≤ 1.2 W/kg for other 802.11 modes, SAR test for the other 802.11 modes are not required.



5.3.1 SAR Result of BT

Test position	Test mode	Test ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(℃)
Hotspot Test data (Separate 10mm)											
Horizontal-Up	DH5	39/2441	77.07%	1.298	0.001	-0.01	9.46	10.00	1.132	0.001	22.8
Horizontal-Down	DH5	39/2441	77.07%	1.298	0.004	-0.09	9.46	10.00	1.132	0.005	22.8
Horizontal-Down	DH5	0/2402	77.07%	1.298	0.003	0.05	8.76	10.00	1.330	0.005	22.8
Horizontal-Down	DH5	78/2480	77.07%	1.298	0.002	0.01	8.14	10.00	1.535	0.004	22.8
Vertical Front	DH5	39/2441	77.07%	1.298	0.001	0.02	9.46	10.00	1.132	0.001	22.8
Vertical Back	DH5	39/2441	77.07%	1.298	0.002	0.11	9.46	10.00	1.132	0.004	22.8
Tip Mode	DH5	39/2441	77.07%	1.298	0.001	0.09	9.46	10.00	1.132	0.001	22.8

Table 23: SAR of BT



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5.4 Multiple Transmitter Evaluation

5.4.1 Simultaneous SAR test evaluation

1) Simultaneous Transmission

NO.	Simultaneous Transmission Configuration	Body
1	WWAN + BT	Yes
2	WWAN + WIFI2.4GHz	Yes
3	WWAN + WIFI5GHz	Yes



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5.4.2 Simultaneous Transmission SAR Summation Scenario

1) SAR Simultaneous transmission

Test position		SARmax (W/kg)				Summed SAR		
		Main Ant0	WiFi 2.4G ANT2	WiFi 5G ANT2	BT			
		1	2	3	4	1+2	1+3	1+4
WCDMA II	Horizontal-Up	0.767	0.051	0.115	0.001	0.82	0.88	0.77
	Horizontal-Down	0.771	0.312	0.451	0.005	1.08	1.22	0.78
	Vertical Front	0.648	0.068	0.162	0.001	0.72	0.81	0.65
	Vertical Back	0.321	0.270	0.363	0.004	0.59	0.68	0.33
	Tip Mode	0.766	0.080	0.138	0.001	0.85	0.90	0.77
WCDMA IV	Horizontal-Up	0.538	0.051	0.115	0.001	0.59	0.65	0.54
	Horizontal-Down	0.541	0.312	0.451	0.005	0.85	0.99	0.55
	Vertical Front	0.484	0.068	0.162	0.001	0.55	0.65	0.49
	Vertical Back	0.245	0.270	0.363	0.004	0.52	0.61	0.25
	Tip Mode	0.423	0.080	0.138	0.001	0.50	0.56	0.42
WCDMA V	Horizontal-Up	0.317	0.051	0.115	0.001	0.37	0.43	0.32
	Horizontal-Down	0.318	0.312	0.451	0.005	0.63	0.77	0.32
	Vertical Front	0.163	0.068	0.162	0.001	0.23	0.33	0.16
	Vertical Back	0.209	0.270	0.363	0.004	0.48	0.57	0.21
	Tip Mode	0.165	0.080	0.138	0.001	0.25	0.30	0.17
LTE Band 12	Horizontal-Up	0.334	0.051	0.115	0.001	0.39	0.45	0.34
	Horizontal-Down	0.347	0.312	0.451	0.005	0.66	0.80	0.35
	Vertical Front	0.277	0.068	0.162	0.001	0.35	0.44	0.28
	Vertical Back	0.159	0.270	0.363	0.004	0.43	0.52	0.16
	Tip Mode	0.101	0.080	0.138	0.001	0.18	0.24	0.10
LTE Band 13	Horizontal-Up	0.345	0.051	0.115	0.001	0.40	0.46	0.35
	Horizontal-Down	0.351	0.312	0.451	0.005	0.66	0.80	0.36
	Vertical Front	0.200	0.068	0.162	0.001	0.27	0.36	0.20
	Vertical Back	0.175	0.270	0.363	0.004	0.45	0.54	0.18
	Tip Mode	0.076	0.080	0.138	0.001	0.16	0.21	0.08
LTE Band 25	Horizontal-Up	0.797	0.051	0.115	0.001	0.85	0.91	0.80
	Horizontal-Down	0.893	0.312	0.451	0.005	1.21	1.34	0.90
	Vertical Front	0.517	0.068	0.162	0.001	0.59	0.68	0.52
	Vertical Back	0.379	0.270	0.363	0.004	0.65	0.74	0.38
	Tip Mode	0.535	0.080	0.138	0.001	0.62	0.67	0.54
LTE Band 26	Horizontal-Up	0.263	0.051	0.115	0.001	0.31	0.38	0.26
	Horizontal-Down	0.300	0.312	0.451	0.005	0.61	0.75	0.31
	Vertical Front	0.278	0.068	0.162	0.001	0.35	0.44	0.28
	Vertical Back	0.153	0.270	0.363	0.004	0.42	0.52	0.16
	Tip Mode	0.143	0.080	0.138	0.001	0.22	0.28	0.14
LTE Band 66	Horizontal-Up	0.796	0.051	0.115	0.001	0.85	0.91	0.80
	Horizontal-Down	1.142	0.312	0.451	0.005	1.45	1.59	1.15
	Vertical Front	0.790	0.068	0.162	0.001	0.86	0.95	0.79
	Vertical Back	0.402	0.270	0.363	0.004	0.67	0.77	0.41
	Tip Mode	0.694	0.080	0.138	0.001	0.77	0.83	0.70

Note:

Select the worst SAR instantaneous transmission for each location.



6 Equipment list

Test Platform		SPEAG DASY5 Professional				
Description		SAR Test System (Frequency range 300MHz-6GHz)				
Software Reference		DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)				
Hardware Reference						
Equipment		Manufacturer	Model	Serial Number	Calibration Date	Due date of calibration
<input checked="" type="checkbox"/>	Twin Phantom	SPEAG	SAM5	1770	NCR	NCR
<input checked="" type="checkbox"/>	DAE	SPEAG	DAE4	1374	2021-11-05	2022-11-04
<input checked="" type="checkbox"/>	E-Field Probe	SPEAG	EX3DV4	7735	2022-08-09	2023-08-08
<input checked="" type="checkbox"/>	Validation Kits	SPEAG	D750V3	1210	2021-09-08	2024-09-07
<input checked="" type="checkbox"/>	Validation Kits	SPEAG	D835V2	4d256	2020-04-15	2023-04-14
<input checked="" type="checkbox"/>	Validation Kits	SPEAG	D1750V2	1105	2020-08-29	2023-08-28
<input checked="" type="checkbox"/>	Validation Kits	SPEAG	D1900V2	5d114	2020-08-27	2023-08-26
<input checked="" type="checkbox"/>	Validation Kits	SPEAG	D2450V2	1038	2020-04-08	2023-04-07
<input checked="" type="checkbox"/>	Validation Kits	SPEAG	D5GHzV2	1313	2022-01-25	2025-01-24
<input checked="" type="checkbox"/>	Dielectric parameter probes	SPEAG	DAKS-3.5	1120	2022-05-30	2023-05-29
<input checked="" type="checkbox"/>	Vector Network Analyzer and Vector Reflectometer	SPEAG	DAKS_VNA R140	0050920	2022-05-23	2023-05-22
<input checked="" type="checkbox"/>	Universal Radio Communication Tester	R&S	CMW500	111637	2022-09-26	2023-09-26
<input checked="" type="checkbox"/>	Radio Communication Analyzer	Anritsu	MT8821C	6261991088	2022-09-16	2023-09-15
<input checked="" type="checkbox"/>	RF Bi-Directional Coupler	Agilent	86205-60001	MY31400031	NCR	NCR
<input checked="" type="checkbox"/>	Signal Generator	R&S	SMB100A	182393	2022-02-14	2023-02-13
<input checked="" type="checkbox"/>	Preamplifier	Qiji	YX28980933	202104001	NCR	NCR
<input checked="" type="checkbox"/>	Power Meter	Anritsu	ML2495A	2136003	2021-12-04	2022-12-03
<input checked="" type="checkbox"/>	Power Sensor	Anritsu	MA2411B	1911376	2021-12-04	2022-12-03
<input checked="" type="checkbox"/>	Power Sensor	Keysight	U2002H	MY5639004	2022-9-16	2023-9-15
<input checked="" type="checkbox"/>	Attenuator	SHX	TS2-3dB	30704	NCR	NCR
<input checked="" type="checkbox"/>	Coaxial low pass filter	Mini-Circuits	VLF-2500(+)	NA	NCR	NCR



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<input checked="" type="checkbox"/>	Coaxial low pass filter	Microlab Fxr	LA-F13	NA	NCR	NCR
<input checked="" type="checkbox"/>	DC POWER SUPPLY	SAKO	SK1730SL5A	NA	NCR	NCR
<input checked="" type="checkbox"/>	Speed reading thermometer	LKM	DTM3000	SUW201-30-01	2022-09-19	2023-09-18
<input checked="" type="checkbox"/>	Humidity and Temperature Indicator	MingGao	MingGao	NA	2022-09-19	2023-09-18

Note: All the equipments are within the valid period when the tests are performed.



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7 Measurement Uncertainty

Per KDB865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. The equivalent ratio (1.5/1.6) is applied to extremity and occupational exposure conditions.

8 Calibration certificate

Please see the Appendix C

9 Photographs

Please see the Appendix D



Appendix A: Detailed System Check Results

Appendix B: Detailed Test Results

Appendix C: Calibration certificate

Appendix D: Photographs

---END---



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