Part 0 SAR Char Report

The following samples were submitted and identified on behalf of the client as:

Equipment Under Test	Notebook Computer
Brand Name	HP
Model No.	HSN-I41C
Company Name	HP Inc.
Company Address	1501 Page Mill Road, Palo Alto CA 94304 USA
Standards	IEEE/ANSI C95.1-1992, IEEE 1528-2013
FCC ID	B94HNI41CTKR
Date of Receipt	Sep. 01, 2020
Date of Test(s)	Sep. 15, 2020 ~ Sep. 30, 2020
Date of Issue	Oct. 21, 2020

In the configuration tested, the EUT complied with the standards specified above.

Remarks:

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS Taiwan Ltd. Central RF Lab or testing done by SGS Taiwan Ltd. Central RF Lab in connection with distribution or use of the product described in this report must be approved by SGS Taiwan Ltd. Central RF Lab in writing.

Signed on behalf of SGS

Clerk / Ruby Ou	Engineer / Bond Tsai	Asst. Manager / John Yeh
Ruby Ou	Bond Tsai	John Yeh

Date: Oct. 21, 2020

Revision History

Report Number	Revision	Description	Issue Date
ES/2020/80013	Rev.00	Initial creation of document	Oct. 21, 2020

Contents

0. Guidance applied

The SAR testing method and procedure for this device is in accordance with the following standards:

IEEE/ANSI C95.1-1992
IEEE 1528-2013
KDB616217D04v01r02
KDB865664D01v01r04
KDB865664D02v01r02
KDB941225D01v03r01
KDB941225D05v02r05
KDB941225D05Av01r02
KDB447498D01v06
KDB248227D01v02r02

1. General Information

1.1 Testing Laboratory

SGS Taiwan Ltd. Central RF Lab	
No. 2, Keji 1st Rd., Guishan Township, Taoyuan County, 33383, Taiwan	
FCC Designation Number	TW0027
Tel	+886-2-2299-3279
Fax	+886-2-2298-0488
Internet	http://www.tw.sgs.com/

1.2 Details of Applicant

Company Name	HP Inc.
Company Address	1501 Page Mill Road, Palo Alto CA 94304 USA

1.3 Description of EUT

Equipment Under Test	Notebook Computer	
Brand Name	HP	
Model No.	HSN-I41C	
FCC ID	B94HNI41CTKR	
Integrated Module	WLAN	Brand Name : Intel Model Name : AX201NGW
	WWAN	Brand Name : Foxconn Model Name : T99W175
	NFC	Brand Name : WNC Model Name : XRAV-1
Mode of Operation	☒WCDMA ☒HSDPA ☒HSUPA ☒HSPA+ ☒DC-HSDPA ☒LTE FDD ☒LTE TDD ☒5G NR ☒WLAN802.11 a/b/g/n/ac/ax(20M/40M/80M/160M) ☒Bluetooth ☒NFC	
Duty Cycle	WCDMA	100%
	LTE FDD	100%
	LTE TDD Power Class 3	63.3%
	LTE TDD Power Class 2	43.3%
	5G NR	100%
	WLAN802.11 a/b/g/n/ac/ax(20M/40M/80M/160M)	100%
	Bluetooth	100%
TX Frequency Range (MHz)	Tx5 antenna	
	WCDMA Band II	1850 – 1910
	WCDMA Band IV	1710 – 1755
	WCDMA Band V	824 – 849
	LTE FDD Band 2	1850 – 1910
	LTE FDD Band 4	1710 – 1755
	LTE FDD Band 5	824 – 849

TX Frequency Range (MHz)	LTE FDD Band 7	2500	–	2570
	LTE FDD Band 12	699	–	716
	LTE FDD Band 13	777	–	787
	LTE FDD Band 14	788	–	798
	LTE FDD Band 17	704	–	716
	LTE FDD Band 25	1850	–	1915
	LTE FDD Band 26	814	–	849
	LTE FDD Band 30	2305	–	2315
	LTE TDD Band 38 Power Class 3	2570	–	2620
	LTE TDD Band 41 Power Class 2/3	2496	–	2690
	LTE FDD Band 66	1710	–	1780
	n2	1850	–	1910
	n5	824	–	849
	n12	699	–	716
	n66	1710	–	1780
	Tx8 antenna			
	LTE FDD Band 2	1850	–	1910
	LTE FDD Band 7	2500	–	2570
	LTE FDD Band 42 Power Class 3	3400	–	3600
	LTE FDD Band 48 Power Class 3	3550	–	3700
	LTE FDD Band 66	1710	–	1780
	n2	1850	–	1910
	n7	2500	–	2570
	n41	2496	–	2690
	n66	1710	–	1780
	WLAN/BT			
	WLAN802.11 b/g/n/ax(20M)	2412	–	2472
	WLAN802.11 n/ax(40M)	2422	–	2462

TX Frequency Range (MHz)	WLAN802.11 a/n/ac/ax(20M) 5.2G	5180	—	5240
	WLAN802.11 n/ac/ax(40M) 5.2G	5190	—	5230
	WLAN802.11 ac/ax(80M) 5.2G	5210		
	WLAN802.11 ac/ax(160M) 5.2G	5250		
	WLAN802.11 a/n/ac/ax(20M) 5.3G	5260	—	5320
	WLAN802.11 n/ac/ax(40M) 5.3G	5270	—	5310
	WLAN802.11 ac/ax(80M) 5.3G	5290		
	WLAN802.11 a/n/ac/ax(20M) 5.6G	5500	—	5720
	WLAN802.11 n/ac/ax(40M) 5.6G	5510	—	5710
	WLAN802.11 ac/ax(80M) 5.6G	5530	—	5690
	WLAN802.11 ac/ax(160M) 5.6G	5570		
	WLAN802.11 a/n/ac/ax(20M) 5.8G	5745	—	5825
	WLAN802.11 n/ac/ax(40M) 5.8G	5755	—	5795
	WLAN802.11 ac/ax(80M) 5.8G	5775		
	Bluetooth	2402	—	2480
Channel Number (ARFCN)	Tx5 antenna			
	WCDMA Band II	9262	—	9538
	WCDMA Band IV	1312	—	1513
	WCDMA Band V	4132	—	4233
	LTE FDD Band 2	18607	—	19193
	LTE FDD Band 4	19957	—	20393
	LTE FDD Band 5	20407	—	20643
	LTE FDD Band 7	20775	—	21425
	LTE FDD Band 12	23017	—	23173
	LTE FDD Band 13	23205	—	23255
	LTE FDD Band 14	23305	—	23355
	LTE FDD Band 17	23755	—	23825

Channel Number (ARFCN)	LTE FDD Band 25	26047	—	26683
	LTE FDD Band 26	26697	—	27033
	LTE FDD Band 30	27685	—	27735
	LTE TDD Band 38 Power Class 3	37775	—	38225
	LTE TDD Band 41 Power Class 2/3	39675	—	41565
	LTE FDD Band 66	131979	—	132665
	n2	370500	—	381500
	n5	165300	—	169300
	n12	140300	—	142200
	n66	342500	—	355500
	Tx8 antenna			
	LTE FDD Band 2	18607	—	19193
	LTE FDD Band 7	20775	—	21425
	LTE FDD Band 42 Power Class 3	41615	—	43565
	LTE FDD Band 48 Power Class 3	55265	—	56715
	LTE FDD Band 66	131979	—	132665
	n2	370500	—	381500
	n7	500500	—	513500
	n41	501204	—	535998
	n66	342500	—	355500
	WLAN/BT			
	WLAN802.11 b/g/n/ax(20M)	1	—	13
	WLAN802.11 n/ax(40M)	3	—	11
	WLAN802.11 a/n/ac/ax(20M) 5.2G	36	—	48
	WLAN802.11 n/ac/ax(40M) 5.2G	38	—	46
	WLAN802.11 ac/ax(80M) 5.2G		42	
	WLAN802.11 ac/ax(160M) 5.2G		50	
	WLAN802.11 a/n/ac/ax(20M) 5.3G	52	—	64
	WLAN802.11 n/ac/ax(40M) 5.3G	54	—	62

Channel Number (ARFCN)	WLAN802.11 ac/ax(80M) 5.3G	58		
	WLAN802.11 a/n/ac/ax(20M) 5.6G	100	—	144
	WLAN802.11 n/ac/ax(40M) 5.6G	102	—	142
	WLAN802.11 ac/ax(80M) 5.6G	106	—	138
	WLAN802.11 ac/ax(160M) 5.6G	114		
	WLAN802.11 a/n/ac/ax(20M) 5.8G	149	—	165
	WLAN802.11 n/ac/ax(40M) 5.8G	151	—	159
	WLAN802.11 ac/ax(80M) 5.8G	155		
	Bluetooth	0	—	78

This device uses the Qualcomm® Smart Transmit feature to control and manage transmitting power in real time and to ensure the time-averaged RF exposure is in compliance with the FCC requirement at all times for 3G/4G/5G Sub-6 NR WWAN operations. Additionally, this device supports WLAN/BT technologies, but the output power of these modems is not controlled by the Smart Transmit algorithm.

Antenna Information

Vendor	WNC					
Antenna	Main Tx5 (PIFA)					
Part Number	6036B0253201 (81EABB15.G35)					
Frequency	699-787	814-849	1710-1780	1850-1910	2305-2315	2496-2690
Gain (dBi)	-1.17	0.08	-0.85	0.31	3.45	-0.19

Vendor	HONG-BO					
Antenna	Main Tx5 (PIFA)					
Part Number	6036B0257701 (260-27365)					
Frequency	699-787	814-849	1710-1780	1850-1910	2305-2315	2496-2690
Gain (dBi)	-1.20	-0.78	-0.98	-0.77	0.53	0.22

Vendor	AWAN					
Antenna	Main Tx5 (PIFA)					
Part Number	6036B0255901 (AUP6Y-100025)					
Frequency	699-787	814-849	1710-1780	1850-1910	2305-2315	2496-2690
Gain (dBi)	-1.02	-3.45	-0.69	1.68	1.88	-0.38

Vendor	WNC			
Antenna	Aux3 Tx8 (PIFA)			
Part Number	6036B0277201 (81EABD15.G04)			
Frequency	1710~1780	1850~1910	2490~2690	3400~3700
Gain (dBi)	0.32	0.50	-0.60	-1.74

Vendor	HONG-BO			
Antenna	Aux3 Tx8 (PIFA)			
Part Number	6036B0278701 (260-27437)			
Frequency	1710~1780	1850~1910	2490~2690	3400~3700
Gain (dBi)	-1.20	-1.53	-3.77	-1.44

Vendor	AWAN			
Antenna	Aux3 Tx8 (PIFA)			
Part Number	6036B0281501 (AUP6Y-100070)			
Frequency	1710~1780	1850~1910	2490~2690	3400~3700
Gain (dBi)	-2.70	-1.71	-3.66	1.70

1.4 Time-Averaging for SAR

This device is enabled with Qualcomm® Smart Transmit algorithm to control and manage transmitting power in real time and to ensure that the time-averaged RF exposure from 3G/4G/5G Sub-6 NR WWAN is in compliance with FCC requirements. This Part 0 report shows SAR characterization of WWAN radios for 3G/4G and 5G Sub-6 NR. Characterization is achieved by determining Plimit for 3G/4G and 5G Sub-6 NR that correspond to the exposure design targets after accounting for all device design related uncertainties, i.e., SAR_design_target (< FCC SAR limit) for sub-6 radio. The SAR characterization is denoted as SAR Char in this report. Section 1.5 includes a nomenclature of the specific terms used in this report.

The compliance test under the static transmission scenario and simultaneous transmission analysis are reported in Part 1 report. The validation of the time-averaging algorithm and compliance under the dynamic (time-varying) transmission scenario for WWAN technologies are reported in Part 2 report (report Number could be found in Section 1.6 – Bibliography).

1.5 Nomenclature for Part 0 Report

Technology	Term	Description
3G/4G/5G Sub-6 NR	Plimit	The time-averaged RF power which corresponds to SAR_design_target
	Pmax	Maximum tune-up power level
	SAR_design_target	The SAR design target for SAR compliance. It shall be less than SAR limit after accounting for all device design related uncertainties.
	SAR Char	Plimit for all technologies/bands for all applicable DSI

1.6 Bibliography

Report Type	Report Number
FCC SAR Test Report (Part 1)	ES/2020/80013
RF Exposure Part 2 Test Report	ES/2020/80013

1.7 Test Environment

Ambient Temperature: 22±2° C
Tissue Simulating Liquid: 22±2° C

1.8 Operation Description

For WWAN, the EUT is controlled by using a Radio Communication Tester, and the communication between the EUT and the tester is established by air link. Also, the device is a laptop computer with notebook mode only, so SAR measurement for notebook mode is required.

Notebook mode

SAR is measured with display screen open at 90 degree and bottom side of keyboard touch against the flat phantom.

Note

For WWAN, there are two TX antennas, the one is WWAN 5 TX located on the top edge of display screen, the other is WWAN 8 TX antenna located on the bottom edge of display screen. In order to mitigate RF exposure concern, Qualcomm smart transmit is used in WWAN.

1.9 The SAR Measurement System

A block diagram of the SAR measurement System is given in Fig. a. This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY 5 professional system). The model EX3DV4 field probe is used to determine the internal electric fields. The SAR can be obtained from the equation $SAR= \sigma (|Ei|^2)/ \rho$ where σ and ρ are the conductivity and mass density of the tissue-simulant.

The DASY 5 system for performing compliance tests consists of the following items:

1. A standard high precision 6-axis robot (Staubli RX family) with controller, teach pendant and software. An arm extension is for accommodating the data acquisition electronics (DAE).
2. A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage intissue simulating liquid. The probe is equipped with an optical surface detector system.
3. 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.

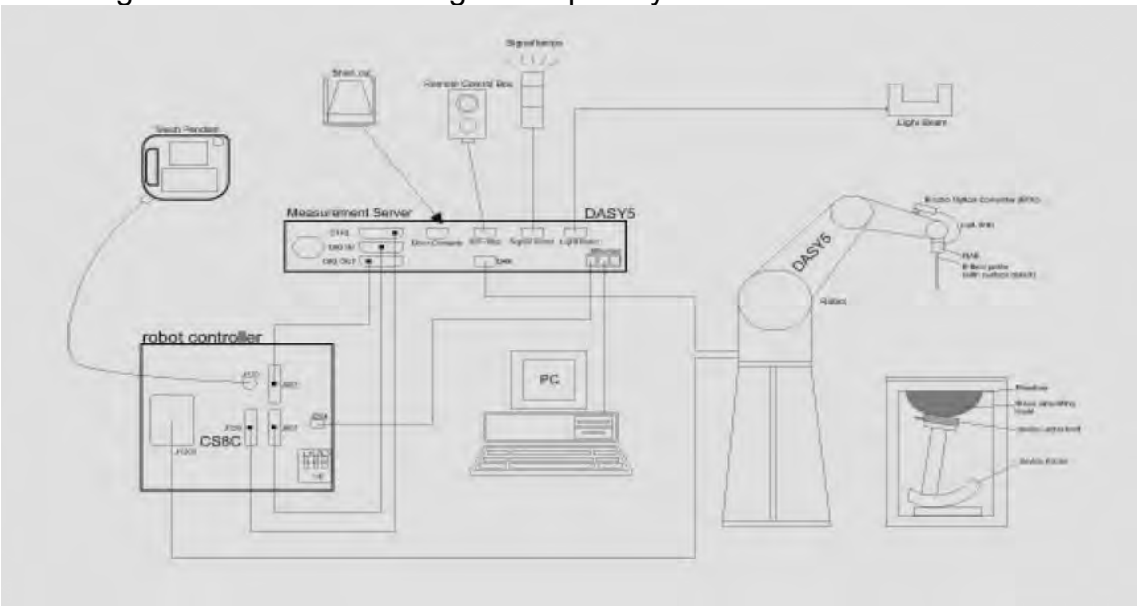

Fig. a The block diagram of SAR system

4. The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.
5. 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.
6. A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
7. A computer operating Windows 7.
8. DASY 5 software.
9. Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
10. Tissue simulating liquid mixed according to the given recipes.
11. Validation dipole kits allowing to validate the proper functioning of the system.

1.10 System Components

EX3DV4 E-Field Probe

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Calibration	Basic Broad Band Calibration in air Conversion Factors (CF) for HSL 750/835/1750/1900/2300/2600/330/3500 /3700 MHz Additional CF for other liquids and frequencies upon request	
Frequency	10 MHz to > 6 GHz	
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)	
Dynamic Range	10 µW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)	
Dimensions	Tip diameter: 2.5 mm	
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.	

PHANTOM

Model	ELI
Construction	The ELI phantom is used 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.
Shell Thickness	2 ± 0.2 mm
Filling Volume	Approx. 30 liters
Dimensions	Major axis: 600 mm Minor axis: 400 mm

DEVICE HOLDER

Construction	The device holder (Supporter) for Notebook is made by POM (polyoxymethylene resin) , which is non-metal and non-conductive. The height can be adjusted to fit varies kind of notebooks.

Device Holder

1.11 Evaluation Procedures

The entire evaluation of the spatial peak values is performed within the Post-processing engine (SEMCAD). The system always gives the maximum values for the 1 g and 10 g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

1. The extraction of the measured data (grid and values) from the Zoom Scan.
2. The calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
3. The generation of a high-resolution mesh within the measured volume
4. The interpolation of all measured values from the measurement grid to the high-resolution grid
5. The extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
6. The calculation of the averaged SAR within masses of 1g and 10g.

The probe is calibrated at the center of the dipole sensors that is located 1 to 2.7mm away from the probe tip. During measurements, the probe stops shortly above the phantom surface, depending on the probe and the surface detecting system. Both distances are included as parameters in the probe configuration file. The software always knows exactly how far away the measured point is from the surface. As the probe cannot directly measure at the surface, the values between the deepest measured point and the surface must be extrapolated. The angle between the probe axis and the surface normal line is less than 30 degree.

In the Area Scan, the gradient of the interpolation function is evaluated to find all the extreme of the SAR distribution. The uncertainty on the locations of the extreme is less than 1/20 of the grid size. Only local maximum within –2 dB of the global maximum are searched and passed for the Cube Scan measurement. In the Cube Scan, the interpolation function is used to extrapolate the Peak SAR from the lowest measurement points to the inner phantom surface (the extrapolation distance). The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5mm.

The maximum search is automatically performed after each area scan measurement. It is based on splines in two or three dimensions. The procedure can find the maximum for most SAR distributions even with relatively large grid spacing. After the area scanning measurement, the probe is automatically moved to a position at the interpolated maximum. The following scan can directly use this position for reference, e.g., for a finer resolution grid or the cube evaluations. The 1g and 10g peak evaluations are only available for the predefined cube 7x7x7 scans. The routines are verified and optimized for the grid dimensions used in these cube measurements.

The measured volume of 30x30x30mm contains about 30g of tissue.

The first procedure is an extrapolation (incl. Boundary correction) to get the points

between the lowest measured plane and the surface. The next step uses 3D interpolation to get all points within the measured volume. In the last step, a 1g cube is placed numerically into the volume and its averaged SAR is calculated. This cube is the moved around until the highest averaged SAR is found. If the highest SAR is found at the edge of the measured volume, the system will issue a warning: higher SAR values might be found outside of the measured volume. In that case the cube measurement can be repeated, using the new interpolated maximum as the center.

1.12 Probe Calibration Procedures

For the calibration of E-field probes in lossy liquids, an electric field with an accurately known field strength must be produced within the measured liquid. For standardization purposes it would be desirable if all measurements which are necessary to assess the correct field strength would be traceable to standardized measurement procedures. In the following two different calibration techniques are summarized:

1.12.1 Transfer Calibration with Temperature Probes

In lossy liquids the specific absorption rate (SAR) is related both to the electric field (E) and the temperature gradient ($\delta T / \delta t$) in the liquid.

$$SAR = \frac{\sigma}{\rho}|E|^2 = c\frac{\delta T}{\delta t}$$

whereby σ is the conductivity, ρ the density and c the heat capacity of the liquid.

Hence, the electric field in lossy liquid can be measured indirectly by measuring the temperature gradient in the liquid. Non-disturbing temperature probes (optical probes or thermistor probes with resistive lines) with high spatial resolution (<1-2 mm) and fast reaction time (<1 s) are available and can be easily calibrated with high precision [1]. The setup and the exciting source have no influence on the calibration; only the relative positioning uncertainties of the standard temperature probe and the E-field probe to be calibrated must be considered. However, several problems limit the available accuracy of probe calibrations with temperature probes:

1. The temperature gradient is not directly measurable but must be evaluated from temperature measurements at different time steps. Special precaution is necessary to avoid measurement errors caused by temperature gradients due to energy equalizing effects or convection currents in the liquid. Such effects cannot be completely avoided, as the measured field itself destroys the thermal equilibrium in the liquid. With a careful setup these errors can be kept small.
2. The measured volume around the temperature probe is not well defined. It is difficult to calculate the energy transfer from a surrounding gradient temperature field into the probe. These effects must be considered, since temperature probes are calibrated in liquid with homogeneous temperatures. There is no traceable standard for temperature rise measurements.
3. The calibration depends on the assessment of the specific density, the heat capacity and the conductivity of the medium. While the specific density and heat capacity can be measured accurately with standardized procedures (~ 2% for c; much better for ρ) , there is no standard for the measurement of the conductivity. Depending on the method and liquid, the error can well exceed ±5%.
4. Temperature rise measurements are not very sensitive and therefore are often performed at a higher power level than the E-field measurements. The nonlinearities in the system (e.g., power measurements, different components, etc.) must be considered.

Considering these problems, the possible accuracy of the calibration of E-field probes with temperature gradient measurements in a carefully designed setup is about ±10% (RSS) [2]. Recently, a setup which is a combination of the waveguide techniques and the thermal measurements was presented in [3]. The estimated uncertainty of the setup is ±5% (RSS) when the same liquid is used for the calibration and for actual measurements and ±7-9% (RSS) when not, which is in good agreement with the estimates given in [2].

1.12.2 Calibration with Analytical Fields

In this method a technical setup is used in which the field can be calculated analytically from measurements of other physical magnitudes (e.g., input power). This corresponds to the standard field method for probe calibration in air; however, there is no standard defined for fields in lossy liquids.
When using calculated fields in lossy liquids for probe calibration, several points must be considered in the assessment of the uncertainty:

1. The setup must enable accurate determination of the incident power.
2. The accuracy of the calculated field strength will depend on the assessment of the dielectric parameters of the liquid.

3. Due to the small wavelength in liquids with high permittivity, even small setups might be above the resonant cutoff frequencies. The field distribution in the setup must be carefully checked for conformity with the theoretical field distribution.

References

1. N. Kuster, Q. Balzano, and J.C. Lin, Eds., *Mobile Communications Safety*, Chapman & Hall, London, 1997.
2. K. Meier, M. Burkhardt, T. Schmid, and N. Kuster, \Broadband calibration of E-field probes in lossy media", *IEEE Transactions on Microwave Theory and Techniques*, vol. 44, no. 10, pp. 1954{1962, Oct. 1996.
3. K. Jokela, P. Hyysalo, and L. Puranen, \Calibration of specific absorption rate (SAR) probes in waveguide at 900 MHz", *IEEE Transactions on Instrumentation and Measurements*, vol. 47, no. 2, pp. 432{438, Apr. 1998.

1.13 Test Standards and Limits

According to FCC 47CFR §2.1093(d) The limits to be used for evaluation are based generally on criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (‘‘SAR’’) in Section 4.2 of ‘‘IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz,’’ ANSI/IEEE C95.1, By the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017. These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in ‘‘Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields,’’ NCRP Report No. 86, Section 17.4.5. Copyright NCRP, 1986, Bethesda, Maryland 20814. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards. The criteria to be used are specified in paragraphs (d)(1) and (d)(2) of this section and shall apply for portable devices transmitting in the frequency range from 100 kHz to 6 GHz. Portable devices that transmit at frequencies above 6 GHz are to be evaluated in terms of the MPE limits specified in § 1.1310 of this chapter. Measurements and calculations to demonstrate compliance with MPE field strength or power density limits for devices operating above 6 GHz should be made at a minimum distance of 5 cm from the radiating source.

1. Limits for Occupational/Controlled exposure: 0.4 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 8 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 20 W/kg, as averaged over an 10 grams of tissue (defined as a tissue volume in the shape of a cube).
2. Occupational/Controlled limits apply when persons are exposed as a consequence of their employment provided these persons are fully aware of and exercise control over their exposure. Awareness of exposure can be accomplished by use of warning labels or by specific training or education through appropriate means, such as an RF safety program in a work environment.
3. Limits for General Population/Uncontrolled exposure: 0.08 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 4 W/kg, as averaged over any 10 grams of

tissue (defined as a tissue volume in the shape of a cube). General Population/Uncontrolled limits apply when the general public may be exposed, or when persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or do not exercise control over their exposure. Warning labels placed on consumer devices such as cellular telephones will not be sufficient reason to allow these devices to be evaluated subject to limits for occupational/controlled exposure in paragraph (d)(1) of this section. (Table 4.)

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

Table 4. RF exposure limits

Notes:

1. Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.
2. Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.

2. Instruments List

Manufacturer	Device	Type	Serial number	Date of last calibration	Date of next calibration
SPEAG	Dosimetric E-Field Probe	EX3DV4	3665	Aug.20,2020	Aug.19,2021
SPEAG	System Validation Dipole	D750V3	1015	Aug.13,2020	Aug.12,2021
		D835V2	4d063	Aug.13,2020	Aug.12,2021
		D1750V2	1008	Aug.14,2020	Aug.13,2021
		D1900V2	5d173	Apr.22,2020	Apr.21,2021
		D2300V2	1023	Aug.13,2020	Aug.12,2021
		D2600V2	1005	Jan.29,2020	Jan.28,2021
		D3500V2	1009	Aug.12,2020	Aug.11,2021
		D3700V2	1057	Nov.04,2019	Nov.03,2020
SPEAG	Data acquisition Electronics	DAE4	856	Apr.23,2020	Apr.22,2021
SPEAG	Software	DASY 52 V52.10.3	N/A	Calibration not required	Calibration not required
SPEAG	Phantom	ELI	N/A	Calibration not required	Calibration not required
Agilent	Network Analyzer	E5071C	MY46100433	Dec.13,2019	Dec.12,2020
Agilent	Dielectric Probe Kit	85070E	MY44300677	Calibration not required	Calibration not required
Agilent	Dual-directional coupler	772D	MY46151242	Aug.17,2020	Aug.16,2021
		778D	MY48220468	Aug.17,2020	Aug.16,2021
Agilent	RF Signal Generator	N5181A	MY50141235	May.04,2020	May.03,2021
Agilent	Power Meter	E4417A	MY51410006	Mar.09,2020	Mar.08,2021
Agilent	Power Sensor	E9301H	MY51470001	Mar.09,2020	Mar.08,2021
			MY51470002	Mar.09,2020	Mar.08,2021

Manufacturer	Device	Type	Serial number	Date of last calibration	Date of next calibration
TECPEL	Digital thermometer	DTM-303A	TP130074	Apr.10,2020	Apr.09,2021
Anritsu	Radio Communication Test	MT8820C	6201061049	Dec.08,2019	Dec.07,2020
R&S	Radio Communication Test	CMW 500	125470	Dec.11,2019	Dec.10,2020

3. Uncertainty Budget

Measurement Uncertainty evaluation template for DUT SAR test (3-6G)

A	c	D	e		f	g	h=c * f / e	i=c * g / e	k
Source of Uncertainty	Tolerance/ Uncertainty	Probability	Div	Div Value	ci (1g)	ci (10g)	Standard uncertainty	Standard uncertainty	vi, or Veff
Measurement system									
Probe calibration	6.55%	N	1	1	1	1	6.55%	6.55%	∞
Isotropy , Axial	3.50%	R	√3	1.732	1	1	2.02%	2.02%	∞
Isotropy, Hemispherical	9.60%	R	√3	1.732	1	1	5.54%	5.54%	∞
Modulation Response	2.40%	R	√3	1.732	1	1	1.40%	1.40%	∞
Boundary Effect	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Linearity	4.70%	R	√3	1.732	1	1	2.71%	2.71%	∞
Detection Limits	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Readout Electronics	0.30%	N	1	1	1	1	0.30%	0.30%	∞
Response time	0.80%	R	√3	1.732	1	1	0.46%	0.46%	∞
Integration Time	2.60%	R	√3	1.732	1	1	1.50%	1.50%	∞
Measurement drift (class A evaluation)	1.75%	R	√3	1.732	1	1	1.01%	1.01%	∞
RF ambient condition - noise	3.00%	R	√3	1.732	1	1	1.73%	1.73%	∞
RF ambient conditions - reflections	3.00%	R	√3	1.732	1	1	1.73%	1.73%	∞
Probe positioner Mechanical restrictions	0.40%	R	√3	1.732	1	1	0.23%	0.23%	∞
Probe Positioning with respect to phantom	2.90%	R	√3	1.732	1	1	1.67%	1.67%	∞
Post-processing	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Max SAR Eval	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Test Sample related									
Test sample positioning	2.90%	N	1	1	1	1	2.90%	2.90%	M-1
Device Holder Uncertainty	3.60%	N	1	1	1	1	3.60%	3.60%	M-1
Drift of output power	5.00%	R	√3	1.732	1	1	2.89%	2.89%	∞
Phantom and Setup									
Phantom Uncertainty	4.00%	R	√3	1.732	1	1	2.31%	2.31%	∞
Liquid permittivity (mea.)	1.05%	N	1	1	0.64	0.43	0.67%	0.45%	M
Liquid Conductivity (mea.)	1.36%	N	1	1	0.6	0.49	0.82%	0.67%	M
Combined standard uncertainty		RSS					11.76%	11.73%	
Expant uncertainty (95% confidence							23.53%	23.47%	

Measurement Uncertainty evaluation template for DUT SAR test (0.3-3G)

A	c	D	e		f	g	h=c * f / e	i=c * g / e	k
Source of Uncertainty	Tolerance/ Uncertainty	Probability	Div	Div Value	ci (1g)	ci (10g)	Standard uncertainty	Standard uncertainty	vi, or Veff
Measurement system									
Probe calibration	6.00%	N	1	1	1	1	6.00%	6.00%	∞
Isotropy , Axial	3.50%	R	√3	1.732	1	1	2.02%	2.02%	∞
Isotropy, Hemispherical	9.60%	R	√3	1.732	1	1	5.54%	5.54%	∞
Modulation Response	2.40%	R	√3	1.732	1	1	1.40%	1.40%	∞
Boundary Effect	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Linearity	4.70%	R	√3	1.732	1	1	2.71%	2.71%	∞
Detection Limits	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Readout Electronics	0.30%	N	1	1	1	1	0.30%	0.30%	∞
Response time	0.80%	R	√3	1.732	1	1	0.46%	0.46%	∞
Integration Time	2.60%	R	√3	1.732	1	1	1.50%	1.50%	∞
Measurement drift (class A evaluation)	1.75%	R	√3	1.732	1	1	1.01%	1.01%	∞
RF ambient condition - noise	3.00%	R	√3	1.732	1	1	1.73%	1.73%	∞
RF ambient conditions - reflections	3.00%	R	√3	1.732	1	1	1.73%	1.73%	∞
Probe positioner Mechanical restrictions	0.40%	R	√3	1.732	1	1	0.23%	0.23%	∞
Probe Positioning with respect to phantom	2.90%	R	√3	1.732	1	1	1.67%	1.67%	∞
Post-processing	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Max SAR Eval	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Test Sample related									
Test sample positioning	2.90%	N	1	1	1	1	2.90%	2.90%	M-1
Device Holder Uncertainty	3.60%	N	1	1	1	1	3.60%	3.60%	M-1
Drift of output power	5.00%	R	√3	1.732	1	1	2.89%	2.89%	∞
Phantom and Setup									
Phantom Uncertainty	4.00%	R	√3	1.732	1	1	2.31%	2.31%	∞
Liquid permittivity (mea.)	1.15%	N	1	1	0.64	0.43	0.74%	0.49%	M
Liquid Conductivity (mea.)	1.16%	N	1	1	0.6	0.49	0.70%	0.57%	M
Combined standard uncertainty		RSS					11.46%	11.43%	
Expant uncertainty (95% confidence							22.93%	22.87%	

4. SAR Characterization

4.1 SAR_design_target and Uncertainty

SAR_design_target is determined by ensuring that it is less than FCC SAR limit after accounting for total device designed related uncertainties specified by the manufacturer (see Table 4-1).

SAR_design_target < SAR_limit x 10 ^(−total uncertainty/10)

	Uncertainty dB (k=2)
Total uncertainty	1.0

Exposure	Antenna	Frequency band	SAR_design_target
Laptop mode	Tx5	All	0.647 W/Kg
	Tx8	All	0.452 W/Kg

4.2 SAR Characterization

SAR test results corresponding to Pmax for each antenna/technology/band can be found in next chapter.

Plimit is calculated by linearly scaling the measured SAR at the Pmax to SAR_design_target. Plimit determination corresponding to SAR_design_target are shown in next chapter.

5. SAR test results for Plimit calculations

Tx5

Band / Mode	Antenna	Antenna Vendor	Bandwidth	Modulation	RB size	RB offset	Frequency (MHz)	Channel	Duty cycle	Test position	Test Distance	MPR (dBm)	Measured conducted power (dBm)	TDD Correction	Measured 1g-SAR (W/Kg)	Plimit** (dBm)	Minimum Plimit** (dBm)	Pmax* (dBm)
WCDMA II	5	WNC	na	3GPP Rel99	na	na	1852.4	9262	100.00%	Bottom	0mm	0	24.16		0.023	38.71		23.5
WCDMA II	5	WNC	na	3GPP Rel99	na	na	1880	9400	100.00%	Bottom	0mm	0	24.06		0.014	40.71		23.5
WCDMA II	5	WNC	na	3GPP Rel99	na	na	1907.6	9887	100.00%	Bottom	0mm	0	24.14		0.015	40.49		23.5
WCDMA II	5	HB	na	3GPP Rel99	na	na	1852.4	9262	100.00%	Bottom	0mm	0	24.16		0.022	38.84		23.5
WCDMA II	5	HB	na	3GPP Rel99	na	na	1880	9400	100.00%	Bottom	0mm	0	24.06		0.013	41.03	38.71	23.5
WCDMA II	5	HB	na	3GPP Rel99	na	na	1907.6	9887	100.00%	Bottom	0mm	0	24.14		0.015	40.49		23.5
WCDMA II	5	AWAN	na	3GPP Rel99	na	na	1852.4	9262	100.00%	Bottom	0mm	0	24.16		0.022	38.84		23.5
WCDMA II	5	AWAN	na	3GPP Rel99	na	na	1880	9400	100.00%	Bottom	0mm	0	24.06		0.013	41.03		23.5
WCDMA II	5	AWAN	na	3GPP Rel99	na	na	1907.6	9887	100.00%	Bottom	0mm	0	24.14		0.015	40.49		23.5
WCDMA IV	5	WNC	na	3GPP Rel99	na	na	1712.4	1312	100.00%	Bottom	0mm	0	23.95		0.022	38.63		23.5
WCDMA IV	5	WNC	na	3GPP Rel99	na	na	1732.4	1412	100.00%	Bottom	0mm	0	24.28		0.025	38.46		23.5
WCDMA IV	5	WNC	na	3GPP Rel99	na	na	1752.6	1513	100.00%	Bottom	0mm	0	23.89		0.017	39.69		23.5
WCDMA IV	5	HB	na	3GPP Rel99	na	na	1712.4	1312	100.00%	Bottom	0mm	0	23.95		0.022	38.63		23.5
WCDMA IV	5	HB	na	3GPP Rel99	na	na	1732.4	1412	100.00%	Bottom	0mm	0	24.28		0.024	38.59	38.46	23.5
WCDMA IV	5	HB	na	3GPP Rel99	na	na	1752.6	1513	100.00%	Bottom	0mm	0	23.89		0.017	39.69		23.5
WCDMA IV	5	AWAN	na	3GPP Rel99	na	na	1712.4	1312	100.00%	Bottom	0mm	0	23.95		0.021	38.84		23.5
WCDMA IV	5	AWAN	na	3GPP Rel99	na	na	1732.4	1412	100.00%	Bottom	0mm	0	24.28		0.024	38.59		23.5
WCDMA IV	5	AWAN	na	3GPP Rel99	na	na	1752.6	1513	100.00%	Bottom	0mm	0	23.89		0.017	39.69		23.5
WCDMA V	5	WNC	na	3GPP Rel99	na	na	826.4	4132	100.00%	Bottom	0mm	0	24.12		0.017	39.92		23.5
WCDMA V	5	WNC	na	3GPP Rel99	na	na	836.6	4183	100.00%	Bottom	0mm	0	23.87		0.014	40.52		23.5
WCDMA V	5	WNC	na	3GPP Rel99	na	na	846.6	4233	100.00%	Bottom	0mm	0	23.86		0.012	41.18		23.5
WCDMA V	5	HB	na	3GPP Rel99	na	na	826.4	4132	100.00%	Bottom	0mm	0	24.12		0.015	40.47		23.5
WCDMA V	5	HB	na	3GPP Rel99	na	na	836.6	4183	100.00%	Bottom	0mm	0	23.87		0.014	40.52	39.92	23.5
WCDMA V	5	HB	na	3GPP Rel99	na	na	846.6	4233	100.00%	Bottom	0mm	0	23.86		0.012	41.18		23.5
WCDMA V	5	AWAN	na	3GPP Rel99	na	na	826.4	4132	100.00%	Bottom	0mm	0	24.12		0.016	40.19		23.5
WCDMA V	5	AWAN	na	3GPP Rel99	na	na	836.6	4183	100.00%	Bottom	0mm	0	23.87		0.013	40.84		23.5
WCDMA V	5	AWAN	na	3GPP Rel99	na	na	846.6	4233	100.00%	Bottom	0mm	0	23.86		0.012	41.18		23.5
LTE B2	5	WNC	20	QPSK	1	0	1860	18700	100.00%	Bottom	0mm	0	23.82		0.009	42.39		23
LTE B2	5	WNC	20	QPSK	1	50	1880	18900	100.00%	Bottom	0mm	0	23.94		0.011	41.64		23
LTE B2	5	WNC	20	QPSK	1	99	1900	19100	100.00%	Bottom	0mm	0	23.69		0.009	42.26		23
LTE B2	5	HB	20	QPSK	1	0	1860	18700	100.00%	Bottom	0mm	0	23.82		0.009	42.39		23
LTE B2	5	HB	20	QPSK	1	50	1880	18900	100.00%	Bottom	0mm	0	23.94		0.010	42.05	41.64	23
LTE B2	5	HB	20	QPSK	1	99	1900	19100	100.00%	Bottom	0mm	0	23.69		0.009	42.26		23
LTE B2	5	AWAN	20	QPSK	1	0	1860	18700	100.00%	Bottom	0mm	0	23.82		0.009	42.39		23
LTE B2	5	AWAN	20	QPSK	1	50	1880	18900	100.00%	Bottom	0mm	0	23.94		0.008	42.79		23
LTE B2	5	AWAN	20	QPSK	1	99	1900	19100	100.00%	Bottom	0mm	0	23.69		0.009	42.26		23
LTE B4	5	WNC	20	QPSK	1	0	1720	20050	100.00%	Bottom	0mm	0	23.94		0.018	39.50		23
LTE B4	5	WNC	20	QPSK	1	0	1732.5	20175	100.00%	Bottom	0mm	0	23.99		0.024	38.26		23
LTE B4	5	WNC	20	QPSK	1	50	1745	20300	100.00%	Bottom	0mm	0	23.49		0.016	39.56		23
LTE B4	5	HB	20	QPSK	1	0	1720	20050	100.00%	Bottom	0mm	0	23.94		0.018	39.50		23
LTE B4	5	HB	20	QPSK	1	0	1732.5	20175	100.00%	Bottom	0mm	0	23.99		0.024	38.30	38.26	23
LTE B4	5	HB	20	QPSK	1	0	1745	20300	100.00%	Bottom	0mm	0	23.49		0.016	39.56		23
LTE B4	5	AWAN	20	QPSK	1	0	1720	20050	100.00%	Bottom	0mm	0	23.94		0.018	39.50		23
LTE B4	5	AWAN	20	QPSK	1	0	1732.5	20175	100.00%	Bottom	0mm	0	23.99		0.024	38.30		23
LTE B4	5	AWAN	20	QPSK	1	0	1745	20300	100.00%	Bottom	0mm	0	23.49		0.016	39.56		23
LTE B5	5	WNC	10	QPSK	1	25	829	20450	100.00%	Bottom	0mm	0	23.95		0.009	42.52		23.5
LTE B5	5	WNC	10	QPSK	1	0	836.5	20525	100.00%	Bottom	0mm	0	23.78		0.008	42.96		23.5
LTE B5	5	WNC	10	QPSK	1	0	844	20600	100.00%	Bottom	0mm	0	23.78		0.008	43.10		23.5
LTE B5	5	HB	10	QPSK	1	0	829	20450	100.00%	Bottom	0mm	0	23.95		0.008	42.81		23.5
LTE B5	5	HB	10	QPSK	1	0	836.5	20525	100.00%	Bottom	0mm	0	23.78		0.008	42.86	42.52	23.5
LTE B5	5	HB	10	QPSK	1	0	844	20600	100.00%	Bottom	0mm	0	23.78		0.007	43.44		23.5
LTE B5	5	AWAN	10	QPSK	1	0	829	20450	100.00%	Bottom	0mm	0	23.95		0.008	42.86		23.5
LTE B5	5	AWAN	10	QPSK	1	0	836.5	20525	100.00%	Bottom	0mm	0	23.78		0.008	42.86		23.5
LTE B5	5	AWAN	10	QPSK	1	0	844	20600	100.00%	Bottom	0mm	0	23.78		0.007	43.44		23.5
LTE B7	5	WNC	20	QPSK	1	50	2510	20850	100.00%	Bottom	0mm	0	23.80		0.008	42.88		23
LTE B7	5	WNC	20	QPSK	1	99	2535	21100	100.00%	Bottom	0mm	0	23.98		0.009	42.55		23
LTE B7	5	WNC	20	QPSK	1	0	2560	21350	100.00%	Bottom	0mm	0	23.29		0.007	42.67		23
LTE B7	5	HB	20	QPSK	1	50	2510	20850	100.00%	Bottom	0mm	0	23.80		0.008	42.88		23
LTE B7	5	HB	20	QPSK	1	50	2535	21100	100.00%	Bottom	0mm	0	23.98		0.008	42.83	42.55	23
LTE B7	5	HB	20	QPSK	1	50	2560	21350	100.00%	Bottom	0mm	0	23.29		0.007	42.70		23
LTE B7	5	AWAN	20	QPSK	1	50	2510	20850	100.00%	Bottom	0mm	0	23.80		0.008	42.88		23
LTE B7	5	AWAN	20	QPSK	1	50	2535	21100	100.00%	Bottom	0mm	0	23.98		0.008	42.96		23
LTE B7	5	AWAN	20	QPSK	1	50	2560	21350	100.00%	Bottom	0mm	0	23.29		0.006	43.50		23
LTE B12	5	WNC	10	QPSK	1	0	704	23060	100.00%	Bottom	0mm	0	23.44		0.011	41.17		23.5
LTE B12	5	WNC	10	QPSK	1	25	707.5	23095	100.00%	Bottom	0mm	0	23.47		0.011	41.12		23.5
LTE B12	5	WNC	10	QPSK	1	25	711	23130	100.00%	Bottom	0mm	0	23.78		0.013	40.75		23.5
LTE B12	5	HB	10	QPSK	1	50	704	23060	100.00%	Bottom	0mm	0	23.44		0.010	41.55		23.5
LTE B12	5	HB	10	QPSK	1	50	707.5	23095	100.00%	Bottom	0mm	0	23.47		0.011	41.17	40.75	23.5
LTE B12	5	HB	10	QPSK	1	50	711	23130	100.00%	Bottom	0mm	0	23.78		0.012	41.10		23.5
LTE B12	5	AWAN	10	QPSK	1	50	704	23060	100.00%	Bottom	0mm	0	23.44		0.010	41.55		23.5
LTE B12	5	AWAN	10	QPSK	1	50	707.5	23095	100.00%	Bottom	0mm	0	23.47		0.011	41.17		23.5
LTE B12	5	AWAN	10	QPSK	1	50	711	23130	100.00%	Bottom	0mm	0	23.78		0.012	41.10		23.5

***** Pmax is used for RF tune-up procedure. The maximum allowed output power is equal to Pmax + 1dB uncertainty.

** All Plimit power levels in above table corresponding to average power levels after accounting for duty cycle in the case TDD modulation schemes (LTE TDD).

The maximum allowed output power is the Plimit + 1dB device uncertainty, and if Plimit is higher than Pmax, the device output power will be Pmax instead.

Band / Mode	Antenna	Antenna Vendor	Bandwidth	Modulation	RB size	RB offset	Frequency (MHz)	Channel	Duty cycle	Test position	Test Distance	MPR (dBm)	Measured conducted power (dBm)	TDD Correction	Measured 1g-SAR (W/Kg)	Plimit** (dBm)	Minimum Plimit** (dBm)	Pmax* (dBm)
LTE B13	5	WNC	10	QPSK	1	0	782	23230	100.00%	Bottom	0mm	0	23.56		0.011	41.15		23.5
LTE B13	5	WNC	10	QPSK	1	25	782	23230	100.00%	Bottom	0mm	0	23.71		0.010	41.87		23.5
LTE B13	5	WNC	10	QPSK	1	49	782	23230	100.00%	Bottom	0mm	0	23.79		0.012	41.11		23.5
LTE B13	5	HB	10	QPSK	1	0	782	23230	100.00%	Bottom	0mm	0	23.56		0.011	41.26		23.5
LTE B13	5	HB	10	QPSK	1	25	782	23230	100.00%	Bottom	0mm	0	23.71		0.010	41.82	41.11	23.5
LTE B13	5	HB	10	QPSK	1	49	782	23230	100.00%	Bottom	0mm	0	23.79		0.011	41.49		23.5
LTE B13	5	AWAN	10	QPSK	1	0	782	23230	100.00%	Bottom	0mm	0	23.56		0.011	41.26		23.5
LTE B13	5	AWAN	10	QPSK	1	25	782	23230	100.00%	Bottom	0mm	0	23.71		0.010	41.82		23.5
LTE B13	5	AWAN	10	QPSK	1	49	782	23230	100.00%	Bottom	0mm	0	23.79		0.009	42.24		23.5
LTE B14	5	WNC	10	QPSK	1	0	793	23330	100.00%	Bottom	0mm	0	23.64		0.011	41.35		23.5
LTE B14	5	WNC	10	QPSK	1	25	793	23330	100.00%	Bottom	0mm	0	23.74		0.012	41.06		23.5
LTE B14	5	WNC	10	QPSK	1	49	793	23330	100.00%	Bottom	0mm	0	23.57		0.010	41.83		23.5
LTE B14	5	HB	10	QPSK	1	0	793	23330	100.00%	Bottom	0mm	0	23.64		0.010	41.75		23.5
LTE B14	5	HB	10	QPSK	1	25	793	23330	100.00%	Bottom	0mm	0	23.74		0.011	41.44	41.06	23.5
LTE B14	5	HB	10	QPSK	1	49	793	23330	100.00%	Bottom	0mm	0	23.57		0.009	42.14		23.5
LTE B14	5	AWAN	10	QPSK	1	0	793	23330	100.00%	Bottom	0mm	0	23.64		0.011	41.34		23.5
LTE B14	5	AWAN	10	QPSK	1	25	793	23330	100.00%	Bottom	0mm	0	23.74		0.011	41.44		23.5
LTE B14	5	AWAN	10	QPSK	1	49	793	23330	100.00%	Bottom	0mm	0	23.57		0.010	41.68		23.5
LTE B17	5	WNC	10	QPSK	1	49	709	23780	100.00%	Bottom	0mm	0	23.61		0.013	40.58		23.5
LTE B17	5	WNC	10	QPSK	1	49	710	23790	100.00%	Bottom	0mm	0	23.54		0.012	40.86		23.5
LTE B17	5	WNC	10	QPSK	1	49	711	23800	100.00%	Bottom	0mm	0	23.59		0.010	41.70		23.5
LTE B17	5	HB	10	QPSK	1	50	709	23780	100.00%	Bottom	0mm	0	23.61		0.012	40.93		23.5
LTE B17	5	HB	10	QPSK	1	50	710	23790	100.00%	Bottom	0mm	0	23.54		0.012	40.86	40.58	23.5
LTE B17	5	HB	10	QPSK	1	50	711	23800	100.00%	Bottom	0mm	0	23.59		0.010	41.70		23.5
LTE B17	5	AWAN	10	QPSK	1	50	709	23780	100.00%	Bottom	0mm	0	23.61		0.011	41.31		23.5
LTE B17	5	AWAN	10	QPSK	1	50	710	23790	100.00%	Bottom	0mm	0	23.54		0.012	40.86		23.5
LTE B17	5	AWAN	10	QPSK	1	50	711	23800	100.00%	Bottom	0mm	0	23.59		0.010	41.70		23.5
LTE B25	5	WNC	20	QPSK	1	0	1860	26140	100.00%	Bottom	0mm	0	23.75		0.017	39.58		23
LTE B25	5	WNC	20	QPSK	1	0	1882.5	26365	100.00%	Bottom	0mm	0	23.60		0.016	39.67		23
LTE B25	5	WNC	20	QPSK	1	50	1905	26590	100.00%	Bottom	0mm	0	23.68		0.015	40.03		23
LTE B25	5	HB	20	QPSK	1	50	1860	26140	100.00%	Bottom	0mm	0	23.75		0.016	39.82		23
LTE B25	5	HB	20	QPSK	1	50	1882.5	26365	100.00%	Bottom	0mm	0	23.60		0.015	39.95	39.58	23
LTE B25	5	HB	20	QPSK	1	50	1905	26590	100.00%	Bottom	0mm	0	23.68		0.015	40.03		23
LTE B25	5	AWAN	20	QPSK	1	50	1860	26140	100.00%	Bottom	0mm	0	23.75		0.014	40.40		23
LTE B25	5	AWAN	20	QPSK	1	50	1882.5	26365	100.00%	Bottom	0mm	0	23.60		0.016	39.67		23
LTE B25	5	AWAN	20	QPSK	1	50	1905	26590	100.00%	Bottom	0mm	0	23.68		0.015	40.03		23
LTE B26	5	WNC	15	QPSK	1	0	831.5	26865	100.00%	Bottom	0mm	0	23.89		0.009	42.46		23.5
LTE B26	5	WNC	15	QPSK	1	36	836.5	26915	100.00%	Bottom	0mm	0	23.95		0.006	44.28		23.5
LTE B26	5	WNC	15	QPSK	1	0	841.5	26965	100.00%	Bottom	0mm	0	23.88		0.006	44.21		23.5
LTE B26	5	HB	15	QPSK	1	50	831.5	26865	100.00%	Bottom	0mm	0	23.89		0.008	42.85		23.5
LTE B26	5	HB	15	QPSK	1	50	836.5	26915	100.00%	Bottom	0mm	0	23.95		0.006	44.28	42.46	23.5
LTE B26	5	HB	15	QPSK	1	50	841.5	26965	100.00%	Bottom	0mm	0	23.88		0.006	44.21		23.5
LTE B26	5	AWAN	15	QPSK	1	50	831.5	26865	100.00%	Bottom	0mm	0	23.89		0.008	42.87		23.5
LTE B26	5	AWAN	15	QPSK	1	50	836.5	26915	100.00%	Bottom	0mm	0	23.95		0.006	44.28		23.5
LTE B26	5	AWAN	15	QPSK	1	50	841.5	26965	100.00%	Bottom	0mm	0	23.88		0.006	44.21		23.5
LTE B30	5	WNC	10	QPSK	1	0	2310	27710	100.00%	Bottom	0mm	0	22.61		0.003	46.19		22
LTE B30	5	WNC	10	QPSK	1	25	2310	27710	100.00%	Bottom	0mm	0	22.49		0.003	46.53		22
LTE B30	5	WNC	10	QPSK	1	49	2310	27710	100.00%	Bottom	0mm	0	22.44		0.002	46.73		22
LTE B30	5	HB	10	QPSK	1	50	2310	27710	100.00%	Bottom	0mm	0	22.61		0.002	47.71		22
LTE B30	5	HB	10	QPSK	1	50	2310	27710	100.00%	Bottom	0mm	0	22.49		0.002	47.59	46.19	22
LTE B30	5	HB	10	QPSK	1	50	2310	27710	100.00%	Bottom	0mm	0	22.44		0.002	47.54		22
LTE B30	5	AWAN	10	QPSK	1	50	2310	27710	100.00%	Bottom	0mm	0	22.61		0.002	47.71		22
LTE B30	5	AWAN	10	QPSK	1	50	2310	27710	100.00%	Bottom	0mm	0	22.49		0.002	47.59		22
LTE B30	5	AWAN	10	QPSK	1	50	2310	27710	100.00%	Bottom	0mm	0	22.44		0.002	47.54		22
LTE B38	5	WNC	20	QPSK	1	0	2580	37850	63.30%	Bottom	0mm	0	23.94	21.95	0.005	43.01		21
LTE B38	5	WNC	20	QPSK	1	50	2595	38000	63.30%	Bottom	0mm	0	23.77	21.78	0.004	43.80		21
LTE B38	5	WNC	20	QPSK	1	0	2610	38150	63.30%	Bottom	0mm	0	23.80	21.81	0.004	43.66		21
LTE B38	5	HB	20	QPSK	1	50	2580	37850	63.30%	Bottom	0mm	0	23.94	21.95	0.005	43.07		21
LTE B38	5	HB	20	QPSK	1	50	2595	38000	63.30%	Bottom	0mm	0	23.77	21.78	0.004	43.87	43.01	21
LTE B38	5	HB	20	QPSK	1	50	2610	38150	63.30%	Bottom	0mm	0	23.80	21.81	0.004	43.90		21
LTE B38	5	AWAN	20	QPSK	1	50	2580	37850	63.30%	Bottom	0mm	0	23.94	21.95	0.005	43.07		21
LTE B38	5	AWAN	20	QPSK	1	50	2595	38000	63.30%	Bottom	0mm	0	23.77	21.78	0.004	43.87		21
LTE B38	5	AWAN	20	QPSK	1	50	2610	38150	63.30%	Bottom	0mm	0	23.80	21.81	0.004	43.90		21

Band / Mode	Antenna	Antenna Vendor	Bandwidth	Modulation	RB size	RB offset	Frequency (MHz)	Channel	Duty cycle	Test position	Test Distance	MPR (dBm)	Measured conducted power (dBm)	TDD Correction	Measured 1g-SAR (W/Kg)	Plimit** (dBm)	Minimum Plimit** (dBm)	Pmax* (dBm)
LTE B41	5	WNC	20	QPSK	1	0	2506	39750	63.30%	Bottom	0mm	0	23.87	21.88	0.008	40.71		21
LTE B41	5	WNC	20	QPSK	1	99	2549.5	40185	63.30%	Bottom	0mm	0	23.80	21.81	0.008	40.89		21
LTE B41	5	WNC	20	QPSK	1	0	2593	40620	63.30%	Bottom	0mm	0	23.96	21.97	0.010	40.04		21
LTE B41	5	WNC	20	QPSK	1	0	2636.5	41055	63.30%	Bottom	0mm	0	23.70	21.71	0.009	40.49		21
LTE B41	5	WNC	20	QPSK	1	0	2680	41490	63.30%	Bottom	0mm	0	23.70	21.71	0.009	40.52		21
LTE B41	5	HB	20	QPSK	1	50	2506	39750	63.30%	Bottom	0mm	0	23.87	21.88	0.008	40.96		21
LTE B41	5	HB	20	QPSK	1	50	2549.5	40185	63.30%	Bottom	0mm	0	23.80	21.81	0.008	40.89		21
LTE B41	5	HB	20	QPSK	1	50	2593	40620	63.30%	Bottom	0mm	0	23.96	21.97	0.010	40.08	40.04	21
LTE B41	5	HB	20	QPSK	1	50	2636.5	41055	63.30%	Bottom	0mm	0	23.70	21.71	0.008	40.79		21
LTE B41	5	HB	20	QPSK	1	50	2680	41490	63.30%	Bottom	0mm	0	23.70	21.71	0.008	40.79		21
LTE B41	5	AWAN	20	QPSK	1	50	2506	39750	63.30%	Bottom	0mm	0	23.87	21.88	0.008	40.96		21
LTE B41	5	AWAN	20	QPSK	1	50	2549.5	40185	63.30%	Bottom	0mm	0	23.80	21.81	0.008	40.89		21
LTE B41	5	AWAN	20	QPSK	1	50	2593	40620	63.30%	Bottom	0mm	0	23.96	21.97	0.010	40.08		21
LTE B41	5	AWAN	20	QPSK	1	50	2636.5	41055	63.30%	Bottom	0mm	0	23.70	21.71	0.009	40.28		21
LTE B41	5	AWAN	20	QPSK	1	50	2680	41490	63.30%	Bottom	0mm	0	23.70	21.71	0.008	40.79		21
LTE B41(HPUE)	5	WNC	20	QPSK	1	0	2506	39750	43.30%	Bottom	0mm	0	26.78	23.14	0.018	38.70		22.4
LTE B41(HPUE)	5	WNC	20	QPSK	1	50	2549.5	40185	43.30%	Bottom	0mm	0	26.65	23.01	0.015	39.36		22.4
LTE B41(HPUE)	5	WNC	20	QPSK	1	0	2593	40620	43.30%	Bottom	0mm	0	26.88	23.24	0.020	38.30		22.4
LTE B41(HPUE)	5	WNC	20	QPSK	1	0	2636.5	41055	43.30%	Bottom	0mm	0	26.64	23.00	0.019	38.33		22.4
LTE B41(HPUE)	5	WNC	20	QPSK	1	0	2680	41490	43.30%	Bottom	0mm	0	26.61	22.97	0.017	38.78		22.4
LTE B41(HPUE)	5	HB	20	QPSK	1	50	2506	39750	43.30%	Bottom	0mm	0	26.78	23.14	0.017	38.95		22.4
LTE B41(HPUE)	5	HB	20	QPSK	1	50	2549.5	40185	43.30%	Bottom	0mm	0	26.65	23.01	0.014	39.66		22.4
LTE B41(HPUE)	5	HB	20	QPSK	1	50	2593	40620	43.30%	Bottom	0mm	0	26.88	23.24	0.019	38.57	38.3	22.4
LTE B41(HPUE)	5	HB	20	QPSK	1	50	2636.5	41055	43.30%	Bottom	0mm	0	26.64	23.00	0.018	38.56		22.4
LTE B41(HPUE)	5	HB	20	QPSK	1	50	2680	41490	43.30%	Bottom	0mm	0	26.61	22.97	0.016	39.04		22.4
LTE B41(HPUE)	5	AWAN	20	QPSK	1	50	2506	39750	43.30%	Bottom	0mm	0	26.78	23.14	0.018	38.70		22.4
LTE B41(HPUE)	5	AWAN	20	QPSK	1	50	2549.5	40185	43.30%	Bottom	0mm	0	26.65	23.01	0.015	39.36		22.4
LTE B41(HPUE)	5	AWAN	20	QPSK	1	50	2593	40620	43.30%	Bottom	0mm	0	26.88	23.24	0.020	38.34		22.4
LTE B41(HPUE)	5	AWAN	20	QPSK	1	50	2636.5	41055	43.30%	Bottom	0mm	0	26.64	23.00	0.019	38.33		22.4
LTE B41(HPUE)	5	AWAN	20	QPSK	1	50	2680	41490	43.30%	Bottom	0mm	0	26.61	22.97	0.016	39.04		22.4
LTE B66	5	WNC	20	QPSK	1	0	1720	132072	100.00%	Bottom	0mm	0	23.98		0.025	38.11		23
LTE B66	5	WNC	20	QPSK	1	50	1745	132322	100.00%	Bottom	0mm	0	23.69		0.016	39.76		23
LTE B66	5	WNC	20	QPSK	1	0	1770	132572	100.00%	Bottom	0mm	0	23.90		0.023	38.39		23
LTE B66	5	HB	20	QPSK	1	99	1720	132072	100.00%	Bottom	0mm	0	23.98		0.024	38.29		23
LTE B66	5	HB	20	QPSK	1	99	1745	132322	100.00%	Bottom	0mm	0	23.69		0.015	40.04	38.11	23
LTE B66	5	HB	20	QPSK	1	99	1770	132572	100.00%	Bottom	0mm	0	23.90		0.023	38.39		23
LTE B66	5	AWAN	20	QPSK	1	99	1720	132072	100.00%	Bottom	0mm	0	23.98		0.024	38.29		23
LTE B66	5	AWAN	20	QPSK	1	99	1745	132322	100.00%	Bottom	0mm	0	23.69		0.016	39.76		23
LTE B66	5	AWAN	20	QPSK	1	99	1770	132572	100.00%	Bottom	0mm	0	23.90		0.023	38.39		23
5G n2	5	WNC	20	PI/2 BPSK	1	1	1860	372000	100.00%	Bottom	0mm	0	23.91		0.014	40.56		23
5G n2	5	WNC	20	PI/2 BPSK	1	1	1880	376000	100.00%	Bottom	0mm	0	23.18		0.012	40.66		23
5G n2	5	WNC	20	PI/2 BPSK	1	1	1900	380000	100.00%	Bottom	0mm	0	23.72		0.011	41.27		23
5G n2	5	HB	20	PI/2 BPSK	1	1	1860	372000	100.00%	Bottom	0mm	0	23.91		0.013	40.88		23
5G n2	5	HB	20	PI/2 BPSK	1	1	1880	376000	100.00%	Bottom	0mm	0	23.18		0.011	40.88	40.56	23
5G n2	5	HB	20	PI/2 BPSK	1	1	1900	380000	100.00%	Bottom	0mm	0	23.72		0.011	41.42		23
5G n2	5	AWAN	20	PI/2 BPSK	1	1	1860	372000	100.00%	Bottom	0mm	0	23.91		0.013	40.88		23
5G n2	5	AWAN	20	PI/2 BPSK	1	1	1880	376000	100.00%	Bottom	0mm	0	23.18		0.011	40.88		23
5G n2	5	AWAN	20	PI/2 BPSK	1	1	1900	380000	100.00%	Bottom	0mm	0	23.72		0.011	41.42		23
5G n5	5	WNC	20	PI/2 BPSK	1	1	834	166800	100.00%	Bottom	0mm	0	23.68		0.008	42.95		23
5G n5	5	WNC	20	PI/2 BPSK	1	1	836.5	167300	100.00%	Bottom	0mm	0	23.64		0.012	40.96		23
5G n5	5	WNC	20	PI/2 BPSK	1	1	839	167800	100.00%	Bottom	0mm	0	23.60		0.010	41.53		23
5G n5	5	HB	20	PI/2 BPSK	1	1	834	166800	100.00%	Bottom	0mm	0	23.68		0.008	42.76		23
5G n5	5	HB	20	PI/2 BPSK	1	1	836.5	167300	100.00%	Bottom	0mm	0	23.64		0.011	41.34	40.96	23
5G n5	5	HB	20	PI/2 BPSK	1	1	839	167800	100.00%	Bottom	0mm	0	23.60		0.010	41.71		23
5G n5	5	AWAN	20	PI/2 BPSK	1	1	834	166800	100.00%	Bottom	0mm	0	23.68		0.008	42.76		23
5G n5	5	AWAN	20	PI/2 BPSK	1	1	836.5	167300	100.00%	Bottom	0mm	0	23.64		0.011	41.34		23
5G n5	5	AWAN	20	PI/2 BPSK	1	1	839	167800	100.00%	Bottom	0mm	0	23.60		0.010	41.71		23
5G n12	5	WNC	15	PI/2 BPSK	1	1	706.5	141300	100.00%	Bottom	0mm	0	23.96		0.016	39.97		23
5G n12	5	WNC	15	PI/2 BPSK	1	1	707.5	141500	100.00%	Bottom	0mm	0	23.95		0.017	39.88		23
5G n12	5	WNC	15	PI/2 BPSK	1	1	708.5	141700	100.00%	Bottom	0mm	0	23.93		0.015	40.16		23
5G n12	5	HB	15	PI/2 BPSK	1	1	706.5	141300	100.00%	Bottom	0mm	0	23.96		0.015	40.31		23
5G n12	5	HB	15	PI/2 BPSK	1	1	707.5	141500	100.00%	Bottom	0mm	0	23.95		0.016	40.02	39.88	23
5G n12	5	HB	15	PI/2 BPSK	1	1	708.5	141700	100.00%	Bottom	0mm	0	23.93		0.015	40.28		23
5G n12	5	AWAN	15	PI/2 BPSK	1	1	706.5	141300	100.00%	Bottom	0mm	0	23.96		0.016	40.03		23
5G n12	5	AWAN	15	PI/2 BPSK	1	1	707.5	141500	100.00%	Bottom	0mm	0	23.95		0.016	40.02		23
5G n12	5	AWAN	15	PI/2 BPSK	1	1	708.5	141700	100.00%	Bottom	0mm	0	23.93		0.015	40.28		23
5G n66	5	WNC	20	PI/2 BPSK	1	1	1720	344000	100.00%	Bottom	0mm	0	23.86		0.012	41.17		23
5G n66	5	WNC	20	PI/2 BPSK	1	1	1745	349000	100.00%	Bottom	0mm	0	23.45		0.012	40.63		23
5G n66	5	WNC	20	PI/2 BPSK	1	1	1770	354000	100.00%	Bottom	0mm	0	23.95		0.014	40.60		23
5G n66	5	HB	20	PI/2 BPSK	1	1	1720	344000	100.00%	Bottom	0mm	0	23.86		0.011	41.56		23
5G n66	5	HB	20	PI/2 BPSK	1	1	1745	349000	100.00%	Bottom	0mm	0	23.45		0.012	40.77	40.6	23
5G n66	5	HB	20	PI/2 BPSK	1	1	1770	354000	100.00%	Bottom	0mm	0	23.95		0.013	40.92		23
5G n66	5	AWAN	20	PI/2 BPSK	1	1	1720	344000	100.00%	Bottom	0mm	0	23.86		0.012	41.18		23
5G n66	5	AWAN	20	PI/2 BPSK	1	1	1745	349000	100.00%	Bottom	0mm	0	23.45		0.012	40.77		23
5G n66	5	AWAN	20	PI/2 BPSK	1	1	1770	354000	100.00%	Bottom	0mm	0	23.95		0.013	40.92		23

Tx8

Band / Mode	Antenna	Antenna Vendor	Bandwidth	Modulation	RB size	RB offset	Frequency (MHz)	Channel	Duty cycle	Test position	Test Distance	MPR (dBm)	Measured conducted power (dBm)	TDD Correction	Measured 1g-SAR (W/Kg)	Plimit** (dBm)	Minimum Plimit** (dBm)	Pmax* (dBm)
LTE B2	8	WNC	20	QPSK	1	0	1860	18700	100.00%	Bottom	0mm	0	23.82		0.586	22.69		23
LTE B2	8	WNC	20	QPSK	1	0	1880	18900	100.00%	Bottom	0mm	0	23.91		0.684	22.11		23
LTE B2	8	WNC	20	QPSK	1	0	1900	19100	100.00%	Bottom	0mm	0	23.75		0.446	23.81		23
LTE B2	8	HB	20	QPSK	1	0	1860	18700	100.00%	Bottom	0mm	0	23.82		0.547	22.99		23
LTE B2	8	HB	20	QPSK	1	0	1880	18900	100.00%	Bottom	0mm	0	23.91		0.645	22.37	22.11	23
LTE B2	8	HB	20	QPSK	1	0	1900	19100	100.00%	Bottom	0mm	0	23.75		0.429	23.98		23
LTE B2	8	AWAN	20	QPSK	1	0	1860	18700	100.00%	Bottom	0mm	0	23.82		0.530	23.13		23
LTE B2	8	AWAN	20	QPSK	1	0	1880	18900	100.00%	Bottom	0mm	0	23.91		0.664	22.24		23
LTE B2	8	AWAN	20	QPSK	1	0	1900	19100	100.00%	Bottom	0mm	0	23.75		0.416	24.11		23
LTE B7	8	WNC	20	QPSK	1	50	2510	20850	100.00%	Bottom	0mm	0	23.92		1.350	19.17		23
LTE B7	8	WNC	20	QPSK	1	50	2535	21100	100.00%	Bottom	0mm	0	23.85		1.720	18.05		23
LTE B7	8	WNC	20	QPSK	1	50	2560	21350	100.00%	Bottom	0mm	0	23.00		1.270	18.51		23
LTE B7	8	HB	20	QPSK	1	50	2510	20850	100.00%	Bottom	0mm	0	23.92		1.249	19.51		23
LTE B7	8	HB	20	QPSK	1	50	2535	21100	100.00%	Bottom	0mm	0	23.85		1.633	18.27	18.05	23
LTE B7	8	HB	20	QPSK	1	50	2560	21350	100.00%	Bottom	0mm	0	23.00		1.166	18.88		23
LTE B7	8	AWAN	20	QPSK	1	50	2510	20850	100.00%	Bottom	0mm	0	23.92		1.340	19.20		23
LTE B7	8	AWAN	20	QPSK	1	50	2535	21100	100.00%	Bottom	0mm	0	23.85		1.710	18.07		23
LTE B7	8	AWAN	20	QPSK	1	50	2560	21350	100.00%	Bottom	0mm	0	23.00		1.240	18.62		23
LTE B42	8	WNC	20	QPSK	1	99	3560	43190	63.30%	Bottom	0mm	0	23.43	21.44	0.984	18.07		21.5
LTE B42	8	WNC	20	QPSK	1	99	3575	43340	63.30%	Bottom	0mm	0	23.80	21.81	1.030	18.24		21.5
LTE B42	8	WNC	20	QPSK	1	99	3590	43490	63.30%	Bottom	0mm	0	23.77	21.78	1.110	17.88		21.5
LTE B42	8	HB	20	QPSK	1	99	3560	43190	63.30%	Bottom	0mm	0	23.43	21.44	0.963	18.16		21.5
LTE B42	8	HB	20	QPSK	1	99	3575	43340	63.30%	Bottom	0mm	0	23.80	21.81	0.966	18.52	17.88	21.5
LTE B42	8	HB	20	QPSK	1	99	3590	43490	63.30%	Bottom	0mm	0	23.77	21.78	1.088	17.97		21.5
LTE B42	8	AWAN	20	QPSK	1	99	3560	43190	63.30%	Bottom	0mm	0	23.43	21.44	0.929	18.32		21.5
LTE B42	8	AWAN	20	QPSK	1	99	3575	43340	63.30%	Bottom	0mm	0	23.80	21.81	1.020	18.28		21.5
LTE B42	8	AWAN	20	QPSK	1	99	3590	43490	63.30%	Bottom	0mm	0	23.77	21.78	1.100	17.92		21.5
LTE B48	8	WNC	20	QPSK	1	50	3560	55340	63.30%	Bottom	0mm	0	21.60	19.61	0.851	16.87		19
LTE B48	8	WNC	20	QPSK	1	50	3603.3	55773	63.30%	Bottom	0mm	0	21.65	19.66	0.794	17.22		19
LTE B48	8	WNC	20	QPSK	1	50	3646.7	56207	63.30%	Bottom	0mm	0	21.66	19.67	0.797	17.21		19
LTE B48	8	WNC	20	QPSK	1	50	3690	56640	63.30%	Bottom	0mm	0	21.48	19.49	0.677	17.74		19
LTE B48	8	HB	20	QPSK	1	50	3560	55340	63.30%	Bottom	0mm	0	21.60	19.61	0.832	16.96		19
LTE B48	8	HB	20	QPSK	1	50	3603.3	55773	63.30%	Bottom	0mm	0	21.65	19.66	0.737	17.54		19
LTE B48	8	HB	20	QPSK	1	50	3646.7	56207	63.30%	Bottom	0mm	0	21.66	19.67	0.755	17.45	16.87	19
LTE B48	8	HB	20	QPSK	1	50	3690	56640	63.30%	Bottom	0mm	0	21.48	19.49	0.645	17.95		19
LTE B48	8	AWAN	20	QPSK	1	50	3560	55340	63.30%	Bottom	0mm	0	21.60	19.61	0.826	17.00		19
LTE B48	8	AWAN	20	QPSK	1	50	3603.3	55773	63.30%	Bottom	0mm	0	21.65	19.66	0.784	17.27		19
LTE B48	8	AWAN	20	QPSK	1	50	3646.7	56207	63.30%	Bottom	0mm	0	21.66	19.67	0.793	17.23		19
LTE B48	8	AWAN	20	QPSK	1	50	3690	56640	63.30%	Bottom	0mm	0	21.48	19.49	0.658	17.86		19
LTE B66	8	WNC	20	QPSK	1	99	1720	132072	100.00%	Bottom	0mm	0	23.89		0.892	20.94		23
LTE B66	8	WNC	20	QPSK	1	99	1745	132322	100.00%	Bottom	0mm	0	23.90		1.050	20.24		23
LTE B66	8	WNC	20	QPSK	1	99	1770	132572	100.00%	Bottom	0mm	0	23.88		0.806	21.37		23
LTE B66	8	HB	20	QPSK	1	99	1720	132072	100.00%	Bottom	0mm	0	23.89		0.867	21.06		23
LTE B66	8	HB	20	QPSK	1	99	1745	132322	100.00%	Bottom	0mm	0	23.90		1.036	20.30	20.24	23
LTE B66	8	HB	20	QPSK	1	99	1770	132572	100.00%	Bottom	0mm	0	23.88		0.735	21.77		23
LTE B66	8	AWAN	20	QPSK	1	99	1720	132072	100.00%	Bottom	0mm	0	23.89		0.875	21.02		23
LTE B66	8	AWAN	20	QPSK	1	99	1745	132322	100.00%	Bottom	0mm	0	23.90		0.975	20.56		23
LTE B66	8	AWAN	20	QPSK	1	99	1770	132572	100.00%	Bottom	0mm	0	23.88		0.782	21.50		23
5G n2	8	WNC	20	PI/2 BPSK	1	1	1860	372000	100.00%	Bottom	0mm	0	23.75		0.798	21.28		23
5G n2	8	WNC	20	PI/2 BPSK	1	1	1880	376000	100.00%	Bottom	0mm	0	23.21		0.690	21.37		23
5G n2	8	WNC	20	PI/2 BPSK	1	1	1900	380000	100.00%	Bottom	0mm	0	23.34		0.981	19.97		23
5G n2	8	HB	20	PI/2 BPSK	1	1	1860	372000	100.00%	Bottom	0mm	0	23.75		0.761	21.49		23
5G n2	8	HB	20	PI/2 BPSK	1	1	1880	376000	100.00%	Bottom	0mm	0	23.21		0.641	21.69	19.97	23
5G n2	8	HB	20	PI/2 BPSK	1	1	1900	380000	100.00%	Bottom	0mm	0	23.34		0.896	20.37		23
5G n2	8	AWAN	20	PI/2 BPSK	1	1	1860	372000	100.00%	Bottom	0mm	0	23.75		0.741	21.60		23
5G n2	8	AWAN	20	PI/2 BPSK	1	1	1880	376000	100.00%	Bottom	0mm	0	23.21		0.685	21.40		23
5G n2	8	AWAN	20	PI/2 BPSK	1	1	1900	380000	100.00%	Bottom	0mm	0	23.34		0.960	20.07		23
5G n7	8	WNC	20	PI/2 BPSK	1	1	2510	502000	100.00%	Bottom	0mm	0	23.59		1.290	19.04		23
5G n7	8	WNC	20	PI/2 BPSK	1	1	2535	507000	100.00%	Bottom	0mm	0	23.85		1.320	19.20		23
5G n7	8	WNC	20	PI/2 BPSK	1	1	2560	512000	100.00%	Bottom	0mm	0	23.89		1.760	17.99		23
5G n7	8	HB	20	PI/2 BPSK	1	1	2510	502000	100.00%	Bottom	0mm	0	23.59		1.220	19.28		23
5G n7	8	HB	20	PI/2 BPSK	1	1	2535	507000	100.00%	Bottom	0mm	0	23.85		1.320	19.20	17.99	23
5G n7	8	HB	20	PI/2 BPSK	1	1	2560	512000	100.00%	Bottom	0mm	0	23.89		1.740	18.04		23
5G n7	8	AWAN	20	PI/2 BPSK	1	1	2510	502000	100.00%	Bottom	0mm	0	23.59		1.270	19.10		23
5G n7	8	AWAN	20	PI/2 BPSK	1	1	2535	507000	100.00%	Bottom	0mm	0	23.85		1.230	19.50		23
5G n7	8	AWAN	20	PI/2 BPSK	1	1	2560	512000	100.00%	Bottom	0mm	0	23.89		1.590	18.43		23
5G n41 PC3	8	WNC	100	PI/2 BPSK	1	1	2546.01	509202	100.00%	Bottom	0mm	0	23.36		1.110	19.46		23
5G n41 PC3	8	WNC	100	PI/2 BPSK	1	1	2592.99	518598	100.00%	Bottom	0mm	0	23.74		1.310	19.12		23
5G n41 PC3	8	WNC	100	PI/2 BPSK	1	1	2640	528000	100.00%	Bottom	0mm	0	23.50		0.984	20.12		23
5G n41 PC3	8	HB	100	PI/2 BPSK	1	1	2546.01	509202	100.00%	Bottom	0mm	0	23.36		1.020	19.83		23
5G n41 PC3	8	HB	100	PI/2 BPSK	1	1	2592.99	518598	100.00%	Bottom	0mm	0	23.74		1.250	19.32	19.12	23
5G n41 PC3	8	HB	100	PI/2 BPSK	1	1	2640	528000	100.00%	Bottom	0mm	0	23.50		0.893	20.54		23
5G n41 PC3	8	AWAN	100	PI/2 BPSK	1	1	2546.01	509202	100.00%	Bottom	0mm	0	23.36		1.060	19.66		23
5G n41 PC3	8	AWAN	100	PI/2 BPSK	1	1	2592.99	518598	100.00%	Bottom	0mm	0	23.74		1.210	19.46		23
5G n41 PC3	8	AWAN	100	PI/2 BPSK	1	1	2640	528000	100.00%	Bottom	0mm	0	23.50		0.969	20.19		23
5G n41 PC2	8	WNC	100	PI/2 BPSK	1	1	2546.01	509202	100.00%	Bottom	0mm	0	26.30		2.630	18.65		26
5G n41 PC2	8	WNC	100	PI/2 BPSK	1	1	2592.99	518598	100.00%	Bottom	0mm	0	26.45		2.740	18.62		26
5G n41 PC2	8	WNC	100	PI/2 BPSK	1	1	2640	528000	100.00%	Bottom	0mm	0	26.37		2.540	18.87		26
5G n41 PC2	8	HB	100	PI/2 BPSK	1	1	2546.01	509202	100.00%	Bottom	0mm	0	26.30		2.550	18.79		26
5G n41 PC2	8	HB	100	PI/2 BPSK	1	1	2592.99	518598	100.00%	Bottom	0mm	0	26.45		2.610	18.83	18.62	26
5G n41 PC2	8	HB	100	PI/2 BPSK	1	1	2640	528000	100.00%	Bottom	0mm	0	26.37		2.510	18.92		26
5G n41 PC2	8	AWAN	100	PI/2 BPSK	1	1	2546.01	509202	100.00%	Bottom	0mm	0	26.30		2.430	19.00		26
5G n41 PC2	8	AWAN	100	PI/2 BPSK	1	1	2592.99	518598	100.00%	Bottom	0mm	0	26.45		2.560	18.92		26
5G n41 PC2	8	AWAN	100	PI/2 BPSK	1	1	2640	528000	100.00%	Bottom	0mm	0	26.37		2.440	19.05		26
5G n66	8	WNC	20	PI/2 BPSK	1	1	1720	344000	100.00%	Bottom	0mm	0	23.78		0.942	20.59		23
5G n66	8	WNC	20	PI/2 BPSK	1	1	1745	349000	100.00%	Bottom	0mm	0	23.35		0.720	21.33		23
5G n66	8	WNC	20	PI/2 BPSK	1	1	1770	354000	100.00%	Bottom	0mm	0	23.93		1.000	20.48		23
5G n66	8	HB	20	PI/2 BPSK	1	1	1720	344000	100.00%	Bottom	0mm	0	23.78		0.881	20.88		23
5G n66	8	HB	20	PI/2 BPSK	1	1	1745	349000	100.00%	Bottom	0mm	0	23.35		0.653	21.75	20.48	23
5G n66	8	HB	20	PI/2 BPSK	1	1	1770	354000	100.00%	Bottom	0mm	0	23.93		0.981	20.56		23
5G n66	8	AWAN	20	PI/2 BPSK	1	1	1720	344000	100.00%	Bottom	0mm	0	23.78		0.911	20.74		23
5G n66	8	AWAN	20	PI/2 BPSK	1	1	1745	349000	100.00%	Bottom	0mm	0	23.35		0.707	21.41		23
5G n66	8	AWAN	20	PI/2 BPSK	1	1	1770	354000	100.00%	Bottom	0mm	0	23.93		0.952	20.70		23

- End of report -