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SAR TEST REPORT

Applicant Name: **Panasonic Corporation of North America** Two Riverfront Plaza, 9th Floor, Newark, NJ 07102-5490, USA	**Date of Issue:** Nov. 17, 2020 **Test Report No.:** HCT-SR-2011-FI005 **Test Site: HCT CO., LTD.**

FCC ID: **ACJ9TGWL20A**

Equipment Type:	**Radio Module**
Application Type:	**Class II Permissive change**
FCC Rule Part(s):	**47CFR §2.1093**
Model Name:	**WL20A (Tested inside of Panasonic PC CF-33)**
Date of Test:	**11/10/2020 ~ 11/12/2020**

This device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in FCC KDB procedures and had been tested in accordance with the measurement procedures specified in FCC KDB procedures.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Tested By

Jee-ill Lee
Test Engineer
SAR Team
Certification Division

Reviewed By

Yun-jeang, Heo
Technical Manager
SAR Team
Certification Division

DOCUMENT HISTORY

Rev.	DATE	DESCRIPTION
0	Nov.17, 2020	First Approval Report

Table of Contents

1. ATTESTATION OF TEST RESULT OF DEVICE UNDER TEST

Test Laboratory	
Company Name:	HCT Co., LTD
Address:	74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of Korea
Telephone:	+82 31 645 6300
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Attestation of SAR test result	
Applicant Name:	Panasonic Corporation of North America
FCC ID:	ACJ9TGWL20A
Model:	WL20A (Tested inside of Panasonic PC CF-33)
EUT Type:	Radio Module
Application Type:	Class II Permissive change

The Highest Reported SAR

Band	Tx. Frequency (MHz)	Equipment Class	Reported SAR 1g Body SAR (W/Kg)
802.11b	2 412 ㎒ ~ 2 472 ㎒	PCB	1.25
U-NII-1	5 180 ㎒ ~ 5 240 ㎒	PCB	N/A
U-NII-2A	5 260 ㎒ ~ 5 320 ㎒	PCB	0.99
U-NII-2C	5 500 ㎒ ~ 5 720 ㎒	PCB	0.92
U-NII-3	5 745 ㎒ ~ 5 825 ㎒	PCB	0.75
Bluetooth	2 402 ㎒ ~ 2 480 ㎒	PCB	0.28
Simultaneous SAR per KDB 690783 D01v01r03 * All Simultaneous transmission conditions with WWAN module is evaluated in SAR report no. HCT-SR-1811-FI001-R1.,submitted under FCC ID: ACJ9TGWW18A.			1.50
Date(s) of Tests:	11/10/2020 ~ 11/12/2020		

2. DEVICE UNDER TEST DESCRIPTION

2.1 DUT specification

Device Wireless specification overview		
Band & Mode	**Operating Mode**	**Tx Frequency**
U-NII-1	Voice / Data	5 180 ㎒ ~ 5 240 ㎒
U-NII-2A	Voice / Data	5 260 ㎒ ~ 5 320 ㎒
U-NII-2C	Voice / Data	5 500 ㎒ ~ 5 720 ㎒
U-NII-3	Voice / Data	5 745 ㎒ ~ 5 825 ㎒
2.4 ㎓ WLAN	Voice / Data	2 412 ㎒ ~ 2 472 ㎒
Bluetooth / LE 5.0	Data	2 402 ㎒ ~ 2 480 ㎒
WLAN Module	WL20A	
Device Serial Numbers	**Mode**	**Serial Number**
	2.4 ㎓ WLAN, 5 ㎓ WLAN, Bluetooth	OFTSC00072, OFTSC00069

2.2 Nominal and Maximum Output Power Specifications

This device operates using the following maximum output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB publication 447498 D01v06.

2.2.1 Maximum 2.4 GHz, 5 GHz WIFI output power

Tablet/ Convertible mode:

Band	Technology	Central Channel	Maximum Target Power for Host Approval(dBm)		
			Main Antenna	Aux Antenna	MIMO at both Antenna
2.4 GHz	20MHz DSSS(802.11b)	1-12	16.50	16.50	-
		13	15.50	15.50	-
	20MHz OFDM(802.11g)	1-11	16.00	16.00	-
		12	15.00	15.50	-
		13	1.50	2.00	-
	20MHz OFDM(802.11n)	1-11	16.00	16.00	17.00
		12	15.00	15.50	15.50
		13	1.50	2.00	2.00
	20MHz OFDM(802.11ax)	1-10	16.00	16.00	17.00
		11	16.00	16.00	17.00
		12	15.00	15.50	15.50
		13	1.50	2.00	2.00
	40MHz OFDM(802.11n)	3	16.00	16.00	16.50
		7-8	16.00	16.00	16.50
		9	16.00	16.00	16.50
		10	12.50	12.50	13.00
		11	5.00	5.00	6.00
	40MHz OFDM(802.11ax)	3	16.00	16.00	16.50
		4-6	16.00	16.00	16.50
		7-8	16.00	16.00	16.50
		9	16.00	16.00	16.50
		10	12.00	12.50	13.50
		11	4.50	5.50	6.00
Wi-Fi 5GHz Band I,II	20MHz OFDM(802.11a)	36-64	14.00	14.00	-
	20MHz OFDM(802.11n)	36-56	14.00	14.00	17.00
		64	14.00	14.00	16.50
	20MHz OFDM(802.11ax)	36-56	14.00	14.00	17.00
		64	14.00	14.00	16.50
	40MHz OFDM(802.11n)	38-54	14.00	14.00	17.00
		62	14.00	14.00	16.00
	40MHz OFDM(802.11ax)	38-54	14.00	14.00	17.00
		62	14.00	14.00	16.00
	80MHz OFDM(802.11ac) (802.11ax)	42	14.00	14.00	17.00
		58	14.00	14.00	17.00
	160MHz OFDM(802.11ac)	50	13.50	13.50	15.00
	160MHz OFDM(802.11ax)	50	13.50	13.50	15.50
Wi-Fi 5GHz Band III	20MHz OFDM(802.11a)	100-140	13.50	13.50	-
	20MHz OFDM(802.11n)	100-144	13.50	13.50	16.50
	20MHz OFDM(802.11ax)	100-144	13.50	13.50	16.50
	40MHz OFDM(802.11n)	102-142	13.50	13.50	16.50
	40MHz OFDM(802.11ax)	102-142	13.50	13.50	16.50
	80MHz OFDM(802.11ac)	106-138	13.50	13.50	16.50
	80MHz OFDM(802.11ax)	106-138	13.50	13.50	16.50
	160MHz OFDM(802.11ac)	114	13.00	13.00	15.00
	160MHz OFDM(802.11ax)	114	13.00	13.00	15.00
Wi-Fi 5GHz Band IV	20MHz OFDM(802.11a)	149-165	13.50	13.50	-
	20MHz OFDM(802.11n)	149-165	13.50	13.50	16.50
	20MHz OFDM(802.11ax)	149-165	13.50	13.50	16.50
	40MHz OFDM(802.11n)	151	13.50	13.50	16.50
		159	13.50	13.50	16.50
	40MHz OFDM(802.11ax)	151	13.50	13.50	16.50
		159	13.50	13.50	16.50
	80MHz OFDM(802.11ac)	155	13.50	13.50	16.50
	80MHz OFDM(802.11ax)	155	13.50	13.50	16.50

(Upper Tolerance: target -1.0dB ~ +1.0 dB)

Laptop mode:

Band	Technology	Central Channel	Maximum Target Power for Host Approval(dBm)		
			Main Antenna	Aux Antenna	MIMO at both Antenna
2.4 GHz	20MHz DSSS (802.11b)	1	19.50	19.50	-
		2-10	21.00	21.00	-
		11	20.00	20.00	-
		12	18.50	19.00	-
		13	15.50	15.50	-
	20MHz OFDM (802.11g)	1	17.00	17.00	-
		2	19.00	19.00	-
		3-9	20.25	20.25	-
		10	19.25	19.25	-
		11	17.50	17.50	-
		12	15.00	15.50	-
		13	1.50	2.00	-
	20MHz OFDM (802.11n)	1	17.00	17.00	17.00
		2	20.50	20.50	21.00
		3-9	20.50	20.50	21.00
		10	20.50	20.50	21.00
		11	16.50	16.00	17.50
		12	15.00	15.50	16.00
		13	1.50	2.00	2.00
	20MHz OFDM (802.11ax)	1	17.00	17.50	17.00
		2	20.00	20.00	20.00
		3-9	20.00	20.00	20.00
		10	20.00	20.00	20.00
		11	16.00	16.00	17.00
		12	15.50	15.50	15.50
		13	1.50	2.00	2.00
	40MHz OFDM (802.11n)	3	17.00	16.50	17.50
		4-6	16.00	16.50	17.00
		7-9	16.00	16.00	16.50
		10	12.50	12.50	13.00
		11	5.00	5.00	6.00
	40MHz OFDM (802.11ax)	3	16.50	16.50	17.00
		4-6	16.00	16.00	17.50
		7-9	16.00	16.00	16.50
		10	12.00	12.50	13.50
		11	4.50	5.50	6.00
Wi-Fi 5GHz Band I,II	20MHz OFDM (802.11a)	36	18.50	18.00	-
		40	21.00	21.50	-
		48	21.00	21.00	-
		52	21.50	21.00	-
		56	21.00	21.00	-
		64	17.50	17.50	-
	20MHz OFDM (802.11n)	36	18.00	18.50	19.00
		40	21.00	20.50	20.50
		48	21.00	19.50	21.00
		52	21.00	21.00	21.00
		56	21.00	21.00	21.00
		64	17.50	17.50	16.50
	20MHz OFDM (802.11ax)	36	18.00	18.00	19.00
		40	21.00	20.50	21.00
		48	21.00	21.00	21.00
		56	21.00	21.00	21.00
		64	17.50	17.50	16.50
	40MHz OFDM (802.11n)	38	18.50	18.00	18.50
		46	21.00	19.50	20.50
		54	20.50	20.00	19.50
		62	16.50	16.50	16.00
	40MHz OFDM (802.11ax)	38	18.00	18.00	18.00
		46	21.00	19.50	20.50
		54	20.50	20.00	19.50
		62	16.50	16.50	16.00
	80MHz OFDM	42	18.50	18.00	18.50

	(802.11ac)	58	17.50	17.50	17.00
	80MHz OFDM (802.11ax)	42	18.50	18.00	18.50
		58	17.50	17.50	17.00
	160MHz OFDM (802.11ac)	50	15.00	15.00	15.00
	160MHz OFDM (802.11ax)	50	15.00	15.00	15.50
Wi-Fi 5GHz Band III	20MHz OFDM (802.11a)	100	17.50	17.50	-
		120	21.00	21.00	-
		140	18.00	18.00	-
	20MHz OFDM (802.11n)	100	17.50	17.50	17.00
		120	21.00	21.00	21.50
		140	18.00	18.00	17.50
		144	20.50	20.50	21.00
	20MHz OFDM (802.11ax)	100	17.50	17.50	17.00
		120	21.00	21.00	21.50
		140	17.50	18.00	17.00
		144	20.50	21.00	21.50
	40MHz OFDM (802.11n)	102	17.50	18.00	17.00
		118	20.50	20.00	21.00
		134	19.00	19.00	20.00
		142	20.50	21.00	21.50
	40MHz OFDM (802.11ax)	102	17.50	18.00	17.00
		118	20.50	20.50	21.00
		134	19.00	19.50	20.00
		142	21.00	21.00	21.50
	80MHz OFDM (802.11ac)	106	18.00	18.00	18.00
		122	20.50	20.00	21.50
		138	21.00	21.00	22.00
	80MHz OFDM (802.11ax)	106	18.00	17.50	18.00
		122	19.50	19.50	21.50
		138	21.00	21.00	21.50
	160MHz OFDM (802.11ac)	114	14.50	15.00	15.00
	160MHz OFDM (802.11ax)	114	14.50	14.50	15.00
Wi-Fi 5GHz Band IV	20MHz OFDM (802.11a)	149-165	21.00	21.00	-
	20MHz OFDM (802.11n)	149	21.00	21.00	21.00
		157	21.00	21.00	21.00
		165	21.00	21.00	21.00
	20MHz OFDM (802.11ax)	149	21.00	21.00	20.50
		157	21.00	21.00	21.00
		165	21.00	21.00	21.00
	40MHz OFDM (802.11n)	151	21.00	21.00	21.00
		159	21.00	21.00	21.00
	40MHz OFDM (802.11ax)	151	21.00	21.00	21.00
		159	21.00	21.00	21.00
	80MHz OFDM (802.11ac)	155	19.50	19.50	19.50
	80MHz OFDM (802.11ax)	155	19.00	19.00	19.50

2.2.2 Maximum Bluetooth Power

Mode / Band		Modulated Average (dBm)
Bluetooth	Maximum	10.5
	Nominal	9.5

(Upper Tolerance: target -1.0dB ~ +1.0 dB)

2.3 Test Methodology and Procedures

The tests documented in this report were performed in accordance with IEEE Standard 1528-2013 and the following published KDB procedures.

- FCC KDB Publication 616217 D04 SAR for Laptop and tablets v01r02
- FCC KDB Publication 447498 D01 General SAR Guidance v06
- FCC KDB Publication 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- FCC KDB Publication 865664 D02 SAR Reporting v01r02
- FCC KDB Publication 248227 D01 802.11 Wi-Fi SAR v02r02
- April 2015 TCB Workshop Notes (Simultaneous transmission summation clarified)

2.4 Power reduction for SAR configuration.

This device is power reduction by two mode change mechanism. The first mode change is from Laptop mode to Tablet mode by detaching the docking connector. The second mode change is from Laptop mode to Convertible mode by detecting the magnetic sensor.
The device in Laptop mode output the Max. Power. The power in Tablet mode and convertible mode is reduced from in Laptop mode by the same amount. Therefore, there is no power change due to mode change between Tablet and Convertible.

2.4.1 Mode change by docking connector

Docking connector of Tablet and Keyboard Base are connected and fixed. This state is called Laptop mode. When lift the Tablet while pulling the slide switch of the Keyboard Base, it is disconnected and changes to Tablet mode (See Fig.2-1). This Keyboard Base is only for CF-33 Tablet, and there is no other Keyboard Base that can be connected with CF-33 Tablet.

Fig.2-1 Prototype of Laptop and Tablet

Item	Docking Connect	Magnetic Sensor	EC	WLAN power
Conditions	Disconnect	Detection	Tablet/Convertible mode	Reduction
	Disconnect	Non-detection	Tablet/Convertible mode	Reduction
	Connect	Detection	Tablet/Convertible mode	Reduction
	Connect	Non-detection	Laptop mode	Max.Power

2.4.2. Mode change by magnetic sensor detection

With the display side of the Tablet facing away from the Keyboard Base side, connect to the Keyboard Base with the docking connector. This state is called Laptop mode.
When the Tablet is closed toward the Keyboard Base, the Tablet magnetic sensor detects the Keyboard Base magnet. The state where the tablet and Keyboard Base are in close contact is called the Convertible mode.

2.5 SAR Summation Scenario

Test selection was performed in accordance with KDB 248227 D01 802.11 Wi-Fi SAR v02r02.

Simultaneous transmission paths

Tested inside of Panasonic PC CF-33
* All Simultaneous transmission conditions with WWAN module is evaluated in SAR report no. HCT-SR-1811-FI001-R1.,submitted under

FCC ID: ACJ9TGWW18A**.**

This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB 447498 D01v06.

Simultaneous Transmission Scenarios	
Applicable Combination	Body Exposure Condition
2.4 GHz WiFi main + 2.4 GHz WLAN Aux	Yes
2.4 GHz WiFi main + 2.4 GHz Bluetooth	Yes
5 GHz WiFi main + 5GHz WLAN Aux	Yes
5 GHz WiFi main + 2.4 GHz Bluetooth	Yes

1. The highest reported SAR for each exposure condition is used for SAR summation purpose.

2.6 SAR Test Considerations

Since U-NII-1 and U-NII-2A bands have the same maximum output power and the highest reported SAR for U-NII-2A is less than 1.2 W/kg for 1g SAR and is less than 3.0 W/kg for 10g SAR, SAR is not required for U-NII-1 band according to FCC KDB 248227D01v02r02.

This device supports IEEE 802.11 ac with the following features:
a) Up to 160 ㎒ Bandwidth.
b) Aggregate channel configurations are supported.
c) 2 Tx antenna output
d) 256 QAM is supported
e) TDWR channels are supported.
f) Straddle channels are supported

Per April 2019 TCB Workshop Notes, SAR testing was not required for 802.11ax when applying the initial test configuration procedures of KDB 248227, with 802.11ax considered a higher order 802.11 mode.

3. INTRODUCTION

The FCC has adopted the guidelines for evaluating the environmental effects of radio frequency radiation in ET Docket 93-62 on Aug. 6, 1996 to protect the public and workers from the potential hazards of RF emissions due to FCC-regulated portable devices.

The safety limits used for the environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (SAR) in IEEE/ANSI C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz. 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York 10017. The measurement procedure described in IEEE/ANSI C95.3-1992 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave is used for guidance in measuring SAR due to the RF radiation exposure from the Equipment Under Test (EUT). 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 NCRP, 1986, Bethesda, MD 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.

SAR Definition

Specific Absorption Rate (SAR) is defined as the time derivative of the incremental electromagnetic energy (d*W*) absorbed by (dissipated in) an incremental mass (d*m*) contained in a volume element (d*V*) of a given density (*r*). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body.

$$SAR = \frac{d}{dt}\left(\frac{dU}{dm}\right)$$

Figure 1. SAR Mathematical Equation

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

$$SAR = \sigma E^2 / \rho$$

Where:
σ = conductivity of the tissue-simulant material (S/m)
ρ = mass density of the tissue-simulant material (kg/㎥)
E = Total RMS electric field strength (V/m)

NOTE: The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relations to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.

4. DESCRIPTION OF TEST EQUIPMENT

4.1 SAR MEASUREMENT SETUP

These measurements are performed using the DASY4 automated dosimetric assessment system. It is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland. It consists of high precision robotics system (Staubli), robot controller, Pentium III computer, near-field probe, probe alignment sensor, and the generic twin phantom containing the brain equivalent material. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF) (see Figure.2).

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The PC with Windows XP or Windows 7 is working with SAR Measurement system DASY4 & DASY5, A/D interface card, monitor, mouse, and keyboard. The Staubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.

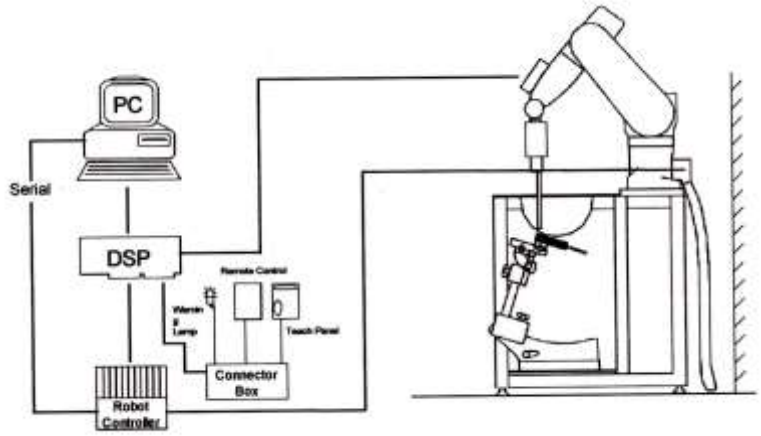


Figure 2. HCT SAR Lab. Test Measurement Set-up

The DAE consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer. The system is described in detail in.

5. SAR MEASUREMENT PROCEDURE

The evaluation was performed using the following procedure compliant to FCC KDB Publication 865664 D01v01r04 and IEEE 1528-2013

1. The SAR distribution at the exposed side of the head or body was measured at a distance no more than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the DUT's head and body area and the horizontal grid resolution was depending on the FCC KDB 865664 D01v01r04 table 4-1 & IEEE 1528-2013.

2. Based on step, the area of the maximum absorption was determined by sophisticated interpolations routines implemented in DASY software. When an Area Scan has measured all reachable point. DASY system computes the field maximal found in the scanned are, within a range of the maximum. SAR at this fixed point was measured and used as a reference value.

3. Around this point, a volume was assessed according to the measurement resolution and volume size requirements of FCC KDB 865664 D01v01r04 table 4-1 and IEEE 1528-2013. On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure (reference from the DASY manual.)

   a. The data at the surface were extrapolated, since the center of the dipoles is no more than 2.7 mm away from the tip of the probe (it is different from the probe type) and the distance between the surface and the lowest measuring point is 1.2 mm. 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.

   b. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed using the 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y, and z directions. The volume was integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.

   c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan. If the value changed by more than 5 %, the SAR evaluation and drift measurements were repeated.

Area scan and zoom scan resolution setting follow KDB 865664 D01v01r04 quoted below.

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5±1 mm	$\frac{1}{2}\cdot\delta\cdot\ln(2)\pm0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30°±1°	20°±1°
Maximum area scan Spatial resolution: Δx_{Area}, Δy_{Area}			≤ 2 GHz: ≤15 mm 2-3 GHz: ≤12 mm	3-4 GHz: ≤12 mm 4-6 GHz: ≤10 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 ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan Spatial resolution: Δx_{zoom}, Δy_{zoom}			≤ 2 GHz: ≤8mm 2-3 GHz: ≤5mm*	3-4 GHz: ≤5 mm* 4-6 GHz: ≤4 mm*
Maximum zoom scan Spatial resolution normal to phantom surface	uniform grid: $\Delta z_{zoom}(n)$		≤ 5 mm	3-4 GHz: ≤4 mm 4-5 GHz: ≤3 mm 5-6 GHz: ≤2 mm
	graded grid	$\Delta z_{zoom}(1)$: between 1 st two Points closest to phantom surface	≤ 4 mm	3-4 GHz: ≤3 mm 4-5 GHz: ≤2.5 mm 5-6 GHz: ≤2 mm
		$\Delta z_{zoom}(n>1)$: between subsequent Points	$\leq 1.5\cdot\Delta z_{zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3-4 GHz: ≥28 mm 4-5 GHz: ≥25 mm 5-6 GHz: ≥22 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 reported SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 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.

6. SAR Test Configurations

6.1 Test Configurations for WLAN Main Antenna

LEGEND:

Edge 1 / Edge 2 / Edge 2 tilt / Edge 3 / Edge 4 / Edge 4 tilt / Rear

Tablet Mode:

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	19.3mm	Yes	
Front	-	No	SAR is not required as this is not a typical use scenario.
Edge 1	162.5 mm	Yes	SAR test is required for simultaneous transmission analysis with WWAN antenna
Edge 2	>200 mm	No	Since this position is more than 20cm away, SAR test was excluded.
Edge 3	45.5 mm	Yes	Due to simultaneous transmission SAR analysis with WLAN, this position was Estimated SAR 0.4 W/kg is applied.
Edge 4	3.3 mm	Yes	-
Edge 4 Tilt	2.6 mm	Yes	

Laptop Mode:

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Bottom Side (Laptop Mode)	96.6 mm	No	SAR of WLAN Main antenna does not require testing in this position When operating in LapTop mode as the same test position for Tablet mode(Edge 3) is Far more conservative.

Convertible Mode:

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	42.3 mm	No	SAR of WLAN Main antenna does not require testing in this position as it is accounted for by the Rear test position for Tablet mode..
Front	-	No	SAR is not required as this is not a typical use scenario.
Edge 1	162.5 mm	No	SAR of WLAN Main antenna does not require testing in this position as it is accounted for by the Edge 1 test position for Tablet mode..
Edge 2	>200 mm	No	Since this position is more than 20cm away, SAR test was excluded.
Edge 3	72 mm	No	SAR of WLAN Main antenna does not require testing in this position as it is accounted for by the Edge 3 test position for Tablet mode..
Edge 4	3.3 mm	No	SAR is not required as this is accounted for by the Edge 4 test position for Tablet mode.

6.2 Test Configurations for WLAN Aux Antenna

Tablet Mode:

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	19.3mm	Yes	
Front	-	No	SAR is not required as this is not a typical use scenario.
Edge 1	169.8 mm	Yes	SAR test is required for simultaneous transmission analysis with WWAN antenna
Edge 2	5.4 mm	Yes	
Edge 2 tilt	4.5 mm	Yes	
Edge 3	41.8 mm	Yes	Due to simultaneous transmission SAR analysis with WLAN, this position was Estimated SAR 0.4 W/kg is applied.
Edge 4	>200 mm	No	Since this position is more than 20cm away, SAR test was excluded.

Laptop Mode:

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Bottom Side (Laptop Mode)	92.9 mm	No	SAR of WLAN Aux antenna does not require testing in this position When operating in LapTop mode as the same test position for Tablet mode(Edge 3) is Far more conservative.

Convertible Mode:

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	42.3 mm	No	SAR of WLAN Aux antenna does not require testing in this position as it is accounted for by the Rear test position for Tablet mode..
Front	-	No	SAR is not required as this is not a typical use scenario.
Edge 1	169.8 mm	No	SAR of WLAN Aux antenna does not require testing in this position as it is accounted for by the Edge 1 test position for Tablet mode..
Edge 2	5.4 mm	No	SAR of WLAN Aux antenna does not require testing in this position as it is accounted for by the Edge 1 test position for Tablet mode.
Edge 3	68.3 mm	No	SAR of WLAN Aux antenna does not require testing in this position as it is accounted for by the Edge 3 test position for Tablet mode..
Edge 4	>200 mm	No	SAR is not required as this is accounted for by the Edge 4 test position for Tablet mode.

6.3 Test Configurations for the Auxiliary Antenna, Bluetooth

Tablet Mode:

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	19.3mm	Yes	
Front	-	No	SAR is not required as this is not a typical use scenario.
Edge 1	169.8 mm	Yes	SAR test is required for simultaneous transmission analysis with WWAN antenna
Edge 2	5.4 mm	Yes	
Edge 2 tilt	4.5 mm	Yes	
Edge 3	41.8 mm	Yes	SAR test is required for simultaneous transmission analysis with WWAN antenna
Edge 4	>200 mm	No	Since this position is more than 20cm away, SAR test was excluded.

Laptop Mode:

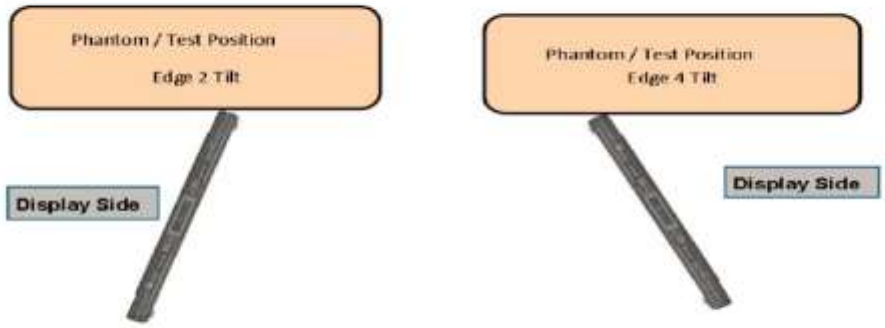
Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Bottom Side (Laptop Mode)	92.9 mm	No	SAR of Bluetooth Aux antenna does not require testing in this position When operating in LapTop mode as the same test position for Tablet mode(Edge 3) is Far more conservative.

Convertible Mode:

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	42.3 mm	No	SAR of Bluetooth Aux antenna does not require testing in this position as it is accounted for by the Rear test position for Tablet mode..
Front	-	No	SAR is not required as this is not a typical use scenario.
Edge 1	169.8 mm	No	SAR of Bluetooth Aux antenna does not require testing in this position as it is accounted for by the Edge 1 test position for Tablet mode..
Edge 2	5.4 mm	No	SAR of Bluetooth Aux antenna does not require testing in this position as it is accounted for by the Edge 1 test position for Tablet mode.
Edge 3	68.3 mm	No	SAR of WLAN Aux antenna does not require testing in this position as it is accounted for by the Edge 3 test position for Tablet mode..
Edge 4	>200 mm	No	SAR is not required as this is accounted for by the Edge 4 test position for Tablet mode.

6.4 Additional Test Scenarios

Due to the user separation distance of below setup case is shorter than Edge 2 and Edge 4. Therefore below additional 2 positions were tested.



7. RF EXPOSURE LIMITS

HUMAN EXPOSURE	UNCONTROLLED ENVIRONMENT General Population (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT Occupational (W/kg) or (mW/g)
SPATIAL PEAK SAR * (Head)	1.60	8.00
SPATIAL AVERAGE SAR ** (Whole Body)	0.08	0.40
SPATIAL PEAK SAR *** (Hands / Feet / Ankle / Wrist)	4.00	20.00

NOTES:

* The Spatial Peak value of the SAR averaged over any 1 g 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 g 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. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be mad fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

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). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

8. FCC SAR General Measurement Procedures

8.1 SAR Testing with 802.11 Transmitters

The normal network operating configurations of 802.11 transmitters are not suitable for SAR measurements. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable. See KDB Publication 248227 D01v02r02 for more details.

8.2 General Device Setup

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters.
A periodic duty factor is required for current generation SAR system to measure SAR. When 802.11 frame gaps are accounted for in the transmission, a maximum transmission duty factor of 92-96% is typically achievable in most test mode configurations. A minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR scaling. The reported SAR is scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

8.3 U-NII-1 and U-NII-2A

For devices that operate in both U-NII-1 and U-NII2A bands, when the same maximum output power is specified for both bands, SAR measurement using OFDM SAR test procedures is not required for U-NII-1 unless the highest reported SAR for U-NII-2A is > 1.2 W/kg for 1g SAR or > 3.0 W/kg for 10g SAR. When different maximum output powers are specified for the bands, SAR measurement for the U-NII band with the lower maximum output power is not required unless the highest reported SAR for the U-NII band with the higher maximum output power, adjusted by the ratio of lower to higher specified maximum output power for the two bands, is > 1.2 W/kg for 1g SAR or > 3.0 W/kg for 10g SAR.

8.4 U-NII-2C and U-NII-3

The frequency range covered by U-NII-2C and U-NII-3 is 380 ㎒ (5.47 ㎓ ~ 5.85 ㎓), 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, the channels at 5.60 ㎓ ~ 5.65 ㎓ in U-NII-2C band must be disabled with acceptable mechanisms and documented in the equipment certification.
Unless band gap channels are permanently disabled, SAR must be considered for these channels.

8.5 2.4 ㎓ SAR test Requirements

SAR is measured for 2.4 ㎓ 802.11b DSSS using either the fixed test position 2.4 ㎓ 802.11 g/n OFDM are additionally evaluated for SAR if the highest reported SAR for 802.11b, adjusted by the ratio of the OFDM to DSSS specified maximum output power, is > 1.2 W/kg.

8.6 OFDM Transmission Mode and SAR Test Channel Selection

For the 2.4 ㎓ and 5 ㎓ bands, when the same maximum output power was specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration with the largest channel bandwidth, lowest order modulation and lowest data rate and lowest order 802.11 a/g/n/ac mode. When the maximum output power of a channel is the same for equivalent OFDM configurations; for example, 802.11a, 802.11n and 802.11 ac or 802.11g and 802.11n with the same channel bandwidth, modulation and data rate etc., the lower order 802.11 mode i.2., 802.11a, then 802.11n and 802.11ac or 802.11g then 802.11n, is used for SAR measurement. When the maximum output power are the same for multiple test channels, either according to the default or additional power measurement requirements, SAR is measured using the channel closest to the middle of the frequency band or aggregated band. When there are multiple channels with the same maximum output power, SAR is measured using the higher number channel.

8.7 Initial Test Configuration Procedure

For OFDM, in both 2.4 ㎓ and 5 ㎓ bands, an initial test configuration is determined for each frequency band and aggregated band, according to the transmission mode with the highest maximum output power specified for SAR measurements. When the same maximum output power is specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration(s) with the largest channel bandwidth, lowest order modulation, and lowest data rate. If the average RF output powers of the highest identical transmission modes are within 0.25 dB of each other, mid channel of the transmission mode with highest average RF output power is the initial test channel. Otherwise, the channel of the transmission mode with the highest average RF output conducted power will be the initial test configuration.

When the reported SAR is ≤ 0.8 W/kg, no additional measurements on other test channels are required. Otherwise, SAR is evaluated using the subsequent highest average RF output channel until the reported SAR result is 1.2 W/kg or all channels are measured. When there are multiple untested channels having the same subsequent highest average RF output power, the channel with higher frequency from the lowest 802.11 mode is considered for SAR measurements.

8.8 Subsequent Test Configuration Procedures

For OFDM configurations in each frequency band and aggregated band, SAR is evaluated for initial test configuration using the fixed test position or the initial test position on procedure. When the highest reported SAR (for the initial test configuration), adjusted by the ratio of the specified maximum output power of the subsequent test configuration to initial test configuration, is ≤ 1.2 W/kg for 1g SAR and ≤ 3.0 W/kg for 10g SAR, no additional SAR tests for the subsequent test configurations are required.

9. OUTPUT POWER SPECIFICATIONS

This device operates using the following maximum output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB publication 447498 D01v06.

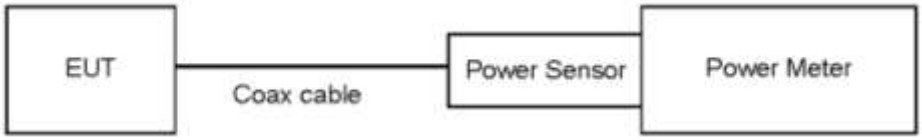
9.1 WIFI Conducted Power measurement method

Un-Licensed bands (DTS Band)

Test Description	Test Procedure Used
Conducted Output Power	- KDB 558074 v05 - Section 8.3.2.3 - ANSI 63.10-2013 - Section 11.9.2.3

Test Procedure
1. Measure the duty cycle.
2. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
3. Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

Test setup

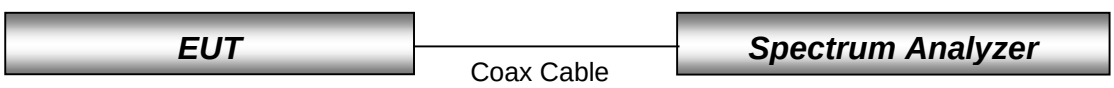


Un-Licensed bands(NII Band)

Test Description	Test Procedure Used
Conducted Output Power	- KDB 789033 D02 v02r01 - Section E.3.a

Test Procedure
1. Measure the duty cycle.
2. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
3. Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

Test setup



9.2 IEEE 802.11 (2.4 GHz) Maximum Conducted Power for Tablet mode/convertible Mode

Mode	Frequency [MHz]	Channel	IEEE 802.11 (2.4 GHz) Average RF Conducted Power [dBm]	
			Main Ant.	Aux Ant.
802.11b	2 412	1	15.90	15.96
	2 437	6	15.96	16.03
	2 462	11	15.94	15.98
	2 467	12	15.71	15.85
	2 472	13	15.70	15.85

9.3 IEEE 802.11 (5 GHz) Maximum Conducted Power For Tablet mode/convertible Mode

Mode	Frequency [MHz]	Channel	IEEE 802.11 (5 GHz) Reduced Average Conducted Power [dBm]	
			Main Ant.	Aux Ant.
802.11ac (80 MHz BW)	5 210	42	13.54	13.49
	5 290	58	13.55	13.62
	5 530	106	13.05	13.02
	5 610	122	13.10	13.08
	5 690	138	13.04	12.97
	5 775	155	13.15	13.04

9.4 IEEE 802.11 (2.4 GHz) Maximum Conducted Power For Laptop mode

Mode	Frequency [MHz]	Channel	IEEE 802.11 (2.4 GHz) Average RF Conducted Power [dBm]	
			Main Ant.	Aux Ant.
802.11b	2 412	1	19.18	19.25
	2 437	6	**20.24**	**20.32**
	2 462	11	19.26	19.34
	2 467	12	18.26	18.35
	2 472	13	16.55	17.35

9.5 IEEE 802.11 (5 GHz) Maximum Conducted Power For Laptop mode

Mode	Frequency [MHz]	Channel	IEEE 802.11 (5 GHz) Reduced Average Conducted Power [dBm]	
			Main Ant.	Aux Ant.
802.11a	5180	36	19.06	19.00
	5200	**40**	20.87	**20.97**
	5220	44	20.83	20.91
	5240	48	20.77	20.93
	5260	**52**	**20.98**	20.87
	5320	64	17.53	17.53
	5500	100	17.78	18.15
	5600	120	20.93	20.87
	5580	116	20.90	20.87
	5700	140	18.09	18.24
	5745	149	20.97	20.94
	5785	157	20.91	20.93
	5805	161	20.84	20.93
	5825	165	20.68	20.82

Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02:

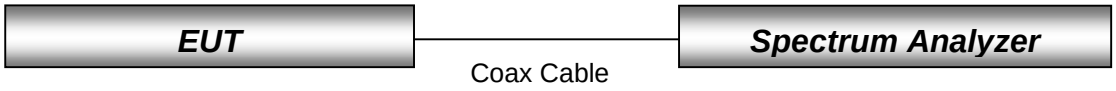
▪ Power measurements were performed for the transmission mode configuration with the highest maximum output power specified for production units.

▪ For transmission mode with the same maximum output power specification, powers were measured for the largest channel bandwidth, lowest order modulation and lowest data rate.

▪ For transmission modes with identical maximum specified output power, channel bandwidth, modulation and data rates, power measurements were required for all identical configurations.

▪ For each transmission mode configuration, powers were measured for the highest and lowest channels; and at the mid-band channel(s) when there were at least 3 channels supported. For configurations with multiple mid-band channels, due to an even number of channels, both channels were measured.

Test Configuration



9.4 Bluetooth Maximum Conducted Power

The Burst averaged-conducted power

Mode	Channel	Ant	Bluetooth Power [dBm]
DH5	0	Ant.2 (Aux)	9.05
	39	Ant.2 (Aux)	9.44
	78	Ant.2 (Aux)	9.72

Per October 2016 TCB Workshop Notes:
When call box and Bluetooth protocol are used for Bluetooth SAR measurement, time-domain plot is required to identify duty factor for supporting the test setup and result.
Bluetooth duty cycle was measured using Bluetooth tester equipment (CBT / R&S) with Bluetooth DH5 mode.

Bluetooth

Duty Cycle

= (BT-On time /BT-Full time) =(2.883/3.750) = 0.769 (DH5)

Duty factor= 1/Duty cycle : 1.300

10. SYSTEM VERIFICATION

10.1 Tissue Verification

The body simulating material is calibrated by HCT using the DAKS 3.5 to determine the conductivity and permittivity.

Table for Head Tissue Verification									
Date of Tests	Tissue Temp. (°C)	Tissue Type	Freq. (㎒)	Measured Conductivity σ (S/m)	Measured Dielectric Constant, ε	Target Conductivity σ (S/m)	Target Dielectric Constant, ε	% dev σ	% dev ε
11/10/2020	21.1	2450H	2400	1.754	40.240	1.756	39.290	-0.11%	2.42%
			2450	1.817	40.094	1.800	39.200	0.94%	2.28%
			2500	1.870	39.916	1.855	39.140	0.81%	1.98%
11/11/2020	21.8	5180H-5825H	5180	4.571	37.084	4.635	36.010	-1.38%	2.98%
			5250	4.632	36.984	4.706	35.930	-1.57%	2.93%
			5280	4.624	36.751	4.737	35.894	-2.39%	2.39%
			5320	4.631	37.168	4.778	35.846	-3.08%	3.69%
11/12/2020	20.5		5500	4.864	36.743	4.963	35.640	-1.99%	3.09%
			5600	5.028	36.795	5.065	35.530	-0.73%	3.56%
			5750	5.178	36.769	5.219	35.360	-0.79%	3.98%
			5800	5.056	36.550	5.270	35.300	-4.06%	3.54%
			5825	5.066	36.581	5.296	35.270	-4.34%	3.72%

Note:
All Frequencies were measured to be within ± 5% of targets in listed in IEC 62209-1(Head) and RSS102 Annex D(Body). Per Notice 2012-DRS0529, since the dielectric properties of the tissue simulating are all equal or less 5% of target values, SAR was not scaled. The measurement uncertainty 5% for deviation of conductivity and liquid permittivity from the target was added to the uncertainty table.

10.2 System Check

Prior to assessment, the system is verified to the ± 10 % of the specifications at 2 450 MHz/ 5 250 MHz /

5 600 MHz 5 750 MHz by using the system Check kit. (Graphic Plots Attached)

The system is verified to ±10 % of the SAR measurement on the reference dipole at the time of calibration by the calibration facility.

Freq. [㎒]	Date	Probe (S/N)	Dipole (S/N)	Liquid	Amb. Temp. [°C]	Liquid Temp. [°C]	1 W Target SAR_{1g} (SPEAG) [W/kg]	50mW Measured SAR_{1g} [W/kg]	1 W Normalized SAR_{1g} [W/kg]	Deviation [%]	Limit [%]
2 450	11/10/2020	7370	1049	Head	21.2	21.1	51.4	2.66	53.2	+ 3.50	± 10
5 250	11/11/2020	7370	1253	Head	21.9	21.8	79.7	3.81	76.2	- 4.39	± 10
5 600	11/12/2020	7370	1253	Head	20.6	20.5	82.2	4.12	82.4	+ 0.24	± 10
5 750	11/12/2020	7370	1253	Head	20.6	20.5	79.6	4.04	80.8	+ 1.51	± 10

11. SAR TEST DATA SUMMARY

11.1 Body SAR Measurement Results

DTS Body SAR																	
Frequency		Mode	Band width (㎒)	Data Rate (Mbps)	Tune-Up Limit (dBm)	Meas. Power (dBm)	Power Drift (dB)	Test Position	Ant Config.	Duty Cycle	Distance (mm)	Area Scan Peak SAR (W/kg)	Meas. SAR (W/kg)	Scaling Factor	Scaling Factor (Duty)	Reported SAR (W/kg)	Plot No.
㎒	Ch.																
2 437	6	802.11b	20	1	16.5	15.96	0.01	Edge 1	Main	99.5	0	0.021	0.00736	1.132	1.005	0.008	-
2 437	6	802.11b	20	1	16.5	15.96	0.01	Edge 3	Main	99.5	0	0.077	0.046	1.132	1.005	0.052	-
2 437	6	802.11b	20	1	16.5	15.96	0.06	Edge 4	Main	99.5	0	1.786	1	1.132	1.005	1.138	-
2 462	11	802.11b	20	1	16.5	15.94	0.05	Edge 4	Main	99.5	0	1.788	0.995	1.138	1.005	1.138	-
2 412	1	802.11b	20	1	16.5	15.90	-0.14	Edge 4 Tilt	Main	99.5	0	1.504	0.903	1.148	1.005	1.042	-
2 437	6	802.11b	20	1	16.5	15.96	0.19	Edge 4 Tilt	Main	99.5	0	2.044	1.05	1.132	1.005	**1.195**	1
2 462	11	802.11b	20	1	16.5	15.94	0.19	Edge 4 Tilt	Main	99.5	0	1.967	1.03	1.138	1.005	1.178	-
2 437	6	802.11b	20	1	16.5	15.96	0.01	Rear	Main	99.5	0	0.253	0.157	1.132	1.005	0.179	-
2 437	6	802.11b	20	1	16.5	15.96	0.16	Edge 4 Tilt	Main	99.5	0	2.05	1.04	1.132	1.005	1.183	*
2 437	6	802.11b	20	1	16.5	16.03	0.01	Edge 1	Aux	99.5	0	0.03	0.016	1.114	1.005	0.018	-
2 437	6	802.11b	20	1	16.5	16.03	-0.01	Edge 2	Aux	99.5	0	2.019	1.07	1.114	1.005	1.198	-
2 462	11	802.11b	20	1	16.5	15.98	0.07	Edge 2	Aux	99.5	0	1.9	1.03	1.127	1.005	1.167	-
2 437	6	802.11b	20	1	16.5	16.03	0.01	Edge 3	Aux	99.5	0	0.119	0.075	1.114	1.005	0.084	-
2 412	1	802.11b	20	1	16.5	15.96	0.08	Edge 2 Tilt	Aux	99.5	0	1.823	1	1.132	1.005	1.138	-
2 437	6	802.11b	20	1	16.5	16.03	-0.18	Edge 2 Tilt	Aux	99.5	0	2.052	1.12	1.114	1.005	**1.254**	2
2 462	11	802.11b	20	1	16.5	15.98	-0.07	Edge 2 Tilt	Aux	99.5	0	1.795	0.999	1.127	1.005	1.132	-
2 437	6	802.11b	20	1	16.5	16.03	-0.01	Rear	Aux	99.5	0	0.329	0.209	1.114	1.005	0.234	-
2 437	6	802.11b	20	1	16.5	16.03	-0.04	Edge 2 Tilt	Aux	99.5	0	1.914	1.06	1.114	1.005	1.187	*
2 437	6	802.11b	20	1	16.5	16.03	-0.03	Edge 2 Tilt	Aux	99.5	0	1.992	1.1	1.114	1.005	1.232	**
ANSI/ IEEE C95.1 - 2005– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population												Body 1.6 W/kg Averaged over 1 gram					

Note: *Data entry indicate Variability measurement.

** Data entry indicate Device holder perturbation measurement.

5 GHz WLAN Body SAR																	
Frequency		Mode	Band width (㎒)	Data Rate (Mbps)	Tune-Up Limit (dBm)	Meas. Power (dBm)	Power Drift (dB)	Test Position	Ant Config.	Duty Cycle	Distance (mm)	Area Scan Peak SAR (W/kg)	Meas. SAR (W/kg)	Scaling Factor	Scaling Factor (Duty)	Reported SAR (W/kg)	Plot No.
㎒	Ch.																
5290	58	802.11ac	80	MCS0	14	13.55	0.01	Edge 1	Main	98.7	0	0.12	0.039	1.109	1.013	0.044	-
5290	58	802.11ac	80	MCS0	14	13.55	0.01	Edge 3	Main	98.7	0	0.166	0.025	1.109	1.013	0.028	-
5290	58	802.11ac	80	MCS0	14	13.55	0.19	Edge 4	Main	98.7	0	0.1657	0.658	1.109	1.013	0.739	-
5290	58	802.11ac	80	MCS0	14	13.55	0.02	Edge 4 Tilt	Main	98.7	0	2.29	0.840	1.109	1.013	**0.944**	3
5290	58	802.11ac	80	MCS0	14	13.55	0.01	Rear	Main	98.7	0	0.253	0.087	1.109	1.013	0.098	-
5290	58	802.11ac	80	MCS0	14	13.55	0.10	Edge 4 Tilt	Main	98.7	0	1.997	0.825	1.109	1.013	0.927	*
5610	122	802.11ac	80	MCS0	13.5	13.10	0.01	Edge 1	Main	98.7	0	0.103	0.042	1.096	1.013	0.047	-
5610	122	802.11ac	80	MCS0	13.5	13.10	0.01	Edge 3	Main	98.7	0	0.03	0.011	1.096	1.013	0.012	-
5610	122	802.11ac	80	MCS0	13.5	13.10	0.14	Edge 4	Main	98.7	0	1.577	0.597	1.096	1.013	0.663	-
5610	122	802.11ac	80	MCS0	13.5	13.10	0.14	Edge 4 Tilt	Main	98.7	0	1.799	0.709	1.096	1.013	0.787	-
5610	122	802.11ac	80	MCS0	13.5	13.10	0.01	Rear	Main	98.7	0	0.295	0.078	1.096	1.013	0.087	-
5775	155	802.11ac	80	MCS0	13.5	13.15	0.01	Edge 1	Main	98.7	0	0.094	0.034	1.084	1.013	0.037	-
5775	155	802.11ac	80	MCS0	13.5	13.15	0.01	Edge 3	Main	98.7	0	0.047	0.000705	1.084	1.013	0.001	-
5775	155	802.11ac	80	MCS0	13.5	13.15	0.16	Edge 4	Main	98.7	0	1.474	0.584	1.084	1.013	0.641	-
5775	155	802.11ac	80	MCS0	13.5	13.15	0.02	Edge 4 Tilt	Main	98.7	0	1.714	0.680	1.084	1.013	0.747	-
5775	155	802.11ac	80	MCS0	13.5	13.15	0.01	Rear	Main	98.7	0	0.282	0.078	1.084	1.013	0.086	-
5290	58	802.11ac	80	MCS0	14	13.62	0.01	Edge 1	Aux	98.7	0	0.1	0.020	1.091	1.013	0.022	-
5290	58	802.11ac	80	MCS0	14	13.62	-0.17	Edge 2	Aux	98.7	0	1.864	0.778	1.091	1.013	0.860	-
5290	58	802.11ac	80	MCS0	14	13.62	0.19	Edge 2 Tilt	Aux	98.7	0	2.256	0.894	1.091	1.013	**0.988**	4
5290	58	802.11ac	80	MCS0	14	13.62	0.01	Edge 3	Aux	98.7	0	0.197	0.077	1.091	1.013	0.085	-
5290	58	802.11ac	80	MCS0	14	13.62	0.01	Rear	Aux	98.7	0	0.205	0.079	1.091	1.013	0.087	-
5290	58	802.11ac	80	MCS0	14	13.62	0.13	Edge 2 Tilt	Aux	98.7	0	2.235	0.891	1.091	1.013	0.985	*
5610	122	802.11ac	80	MCS0	13.5	13.08	0.01	Edge 1	Aux	98.7	0	0.029	0.00857	1.102	1.013	0.010	-
5530	106	802.11ac	80	MCS0	13.5	13.02	0.01	Edge 2	Aux	98.7	0	1.554	0.659	1.117	1.013	0.746	-
5610	122	802.11ac	80	MCS0	13.5	13.08	0.10	Edge 2	Aux	98.7	0	1.789	0.744	1.102	1.013	0.831	-
5530	106	802.11ac	80	MCS0	13.5	13.02	0.14	Edge 2 Tilt	Aux	98.7	0	1.829	0.713	1.117	1.013	0.807	-
5610	122	802.11ac	80	MCS0	13.5	13.08	0.12	Edge 2 Tilt	Aux	98.7	0	2.146	0.822	1.102	1.013	0.918	-
5690	138	802.11ac	80	MCS0	13.5	12.97	0.10	Edge 2 Tilt	Aux	98.7	0	1.946	0.726	1.130	1.013	0.831	-
5610	122	802.11ac	80	MCS0	13.5	13.08	0.01	Edge 3	Aux	98.7	0	0.114	0.036	1.102	1.013	0.040	-
5610	122	802.11ac	80	MCS0	13.5	13.08	0.01	Rear	Aux	98.7	0	0.330	0.136	1.102	1.013	0.152	-
5610	122	802.11ac	80	MCS0	13.5	13.08	-0.12	Edge 2 Tilt	Aux	98.7	0	2.179	0.819	1.102	1.013	0.914	*
5775	155	802.11ac	80	MCS0	13.5	13.04	0.01	Edge 1	Aux	98.7	0	0.035	0.00698	1.112	1.013	0.008	-
5775	155	802.11ac	80	MCS0	13.5	13.04	0.10	Edge 2	Aux	98.7	0	1.323	0.550	1.112	1.013	0.620	-
5775	155	802.11ac	80	MCS0	13.5	13.04	-0.11	Edge 2 Tilt	Aux	98.7	0	1.785	0.668	1.112	1.013	0.752	-
5775	155	802.11ac	80	MCS0	13.5	13.04	0.01	Edge 3	Aux	98.7	0	0.134	0.023	1.112	1.013	0.026	-
5775	155	802.11ac	80	MCS0	13.5	13.04	0.01	Rear	Aux	98.7	0	0.383	0.154	1.112	1.013	0.173	-

ANSI/ IEEE C95.1 - 2005– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population	Body 1.6 W/kg Averaged over 1 gram

Note: *Data entry indicate Variability measurement.

DSS Tethering SAR												
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Distance	Meas. SAR	Scaling Factor	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dBm)	(dBm)	(dB)		(mm)	(W/kg)		(Duty)	(W/kg)	
2 480	78	Bluetooth DH5	10.5	9.72	0.01	Edge 1	0	0.000622	1.197	1.300	0.001	-
2 480	78	Bluetooth DH5	10.5	9.72	0.02	Edge 2	0	0.178	1.197	1.300	**0.277**	5
2 480	78	Bluetooth DH5	10.5	9.72	0.14	Edge 2 Tilt	0	0.168	1.197	1.300	0.261	-
2 480	78	Bluetooth DH5	10.5	9.72	0.01	Edge 3	0	0.010	1.197	1.300	0.016	-
2 480	78	Bluetooth DH5	10.5	9.72	0.01	Rear	0	0.022	1.197	1.300	0.034	-
ANSI/ IEEE C95.1 - 2005– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg Averaged over 1 gram						

11.2 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE1528:2013 and FCC KDB Publication 447498D01v06.
2. Batteries are fully charged at the beginning of the SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB 447498 D01v06..

WLAN Notes:.

1. Per KDB 2482227 D01v02r02 justification for test configurations of 2.4 GHz WiFi Single transmission chain operations, the highest measured maximum output power channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4 GHz 802.11 g/n) was not required due to the maximum allowed powers and the highest reported DSSS SAR.
2. Per KDB 2482227 D01v02r02 justification for test configurations of 5 GHz WiFi Single transmission chain operations, the initial test configuration was selected according to the transmission mode with the highest maximum allowed powers. Other transmission mode were not investigated since the highest reported SAR for initial test configuration adjusted by the ration of maximum output powers is less than 1.2 W/kg for 1g SAR and less than 3.0 W/kg for 10 g SAR.
3. When the maximum reported 1g averaged SAR is ≤ 0.8 W/kg, SAR testing on additional channels was not required. Otherwise, SAR for the next highest output power channel was required until the reported SAR result was ≤ 1.20 W/kg or all test channels were measured.
4. The device was configured to transmit continuously at the required data rated, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools. The reported SAR was scaled to the 100% transmission duty factor to determine compliance. Procedures used to measure the duty factor are identical to that in the associated WLAN test reports.

Bluetooth Notes:

1. Bluetooth SAR was measured with the device connected to a call box with hopping disabled with DH5 operation and Tx Tests mode type. Per October 2016 TCBC Workshop Notes, the reported SAR was scaled to 100% transmission duty factor to determine compliance. Please see sec.10 for the time-domain plot and calculation for duty factor of the device.
2. Bluetooth tethering SAR were evaluated for BT BR tethering applications.

12. SIMULTANEOUS SAR ANALYSIS

12.1 Simultaneous Transmission Summation for Body.

The highest reported SAR for each exposure condition is used for SAR summation purpose. The WWAN SAR testing results were used to perform transmission simultaneous analysis from ISED SAR Test Report, Module model: WW18A with pre-existing FCC ID : ACJ9TGWW18A**.,** Report No: HCT-SR-1811-FI001-R1.

FCC KDB 447498 D01v06 General RF Exposure Guidance introduces a new formula for calculating the SAR a Peak Location Separation Ratio(SPLSR) between pairs of simultaneously transmitting antennas:

$SPLSR_i$=$(SAR_1 + SAR_2)^{1.5}/R_i$

Where:

SAR_1 is the highest measured or estimated SAR for the first of a pair of simultaneous transmitting antennas, in a specific test operating mode and exposure condition

SAR_2 is the highest measured of estimated SAR for the second of a pair of simultaneous transmitting antennas, in the same test operating mode and exposure condition as the first

$Ri_i$is the separation distance between the pair of simultaneous transmitting antennas, When the SAR is measured, for both antennas in the pair, it is determined by the actual x, y and z coordinates in the 1-g SAR for each SAR peak location, based on the extrapolated and interpolated result in the zoom scan measurement, using the formula of $[(X_1 - X_2)^2 + (Y_1 - Y_2)^2 + (Z_1 - Z_2)^2]$

In order for a pair of simultaneous transmitting antennas with the sum 1-g of SAR> 1.6 W/kg and with the sum 10-g of SAR >4W/Kg to qualify for exemption from Simultaneous Transmission SAR measurements, it has to satisfy the condition of:
$(SAR_1 + SAR_2)^{1.5}/R_i \leq 0.04$ for 1g SAR and $(SAR_1 + SAR_2)^{1.5}/R_i \leq 0.1$ for 10g SAR.

Simultaneous Transmission Summation Scenario with 2.4 GHz WLAN										
Band	Configuration	WWAN SAR 1	2.4 GHz Main WLAN 2	2.4 GHz Aux WLAN 3	2.4 GHz BT 4	∑ 1-g SAR 1+2	∑ 1-g SAR 1+3	∑ 1-g SAR 1+2+3	∑ 1-g SAR 1+2+4	SPLSR
		(W/kg)	SAR (W/kg)	SAR (W/kg)	SAR (W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(Yes/No)
UMTS 850	Rear	0.436	0.179	0.234	0.034	0.615	0.670	0.849	0.47	No
	Edge 1	0.901	0.008	0.018	0.001	0.909	0.919	0.927	0.902	No
	Edge 2	0.013		1.198	0.277	0.013	1.211	1.211	0.29	No
	Edge 2 Tilt	0.126		1.254	0.261	0.126	1.380	1.380	0.387	No
	Edge 3	0.4	0.052	0.084	0.016	0.452	0.484	0.536	0.416	No
	Edge 4	0.155	1.138			1.293	0.155	1.293	0.155	No
	Edge 4 Tilt	0.013	1.195			1.208	0.013	1.208	0.013	No
UMTS 1700	Rear	0.670	0.179	0.234	0.034	0.849	0.904	1.083	0.704	No
	Edge 1	1.131	0.008	0.018	0.001	1.139	1.149	1.157	1.132	No
	Edge 2	0.010		1.198	0.277	0.01	1.208	1.208	0.287	No
	Edge 2 Tilt	0.009		1.254	0.261	0.009	1.263	1.263	0.27	No
	Edge 3	0.4	0.052	0.084	0.016	0.452	0.484	0.536	0.416	No
	Edge 4	0.284	1.138			1.422	0.284	1.422	0.284	No
	Edge 4 Tilt	0.219	1.195			1.414	0.219	1.414	0.219	No
UMTS 1900	Rear	0.621	0.179	0.234	0.034	0.8	0.855	1.034	0.655	No
	Edge 1	1.127	0.008	0.018	0.001	1.135	1.145	1.153	1.128	No
	Edge 2	0.022		1.198	0.277	0.022	1.22	1.22	0.299	No
	Edge 2 Tilt	0.023		1.254	0.261	0.023	1.277	1.277	0.284	No
	Edge 3	0.4	0.052	0.084	0.016	0.452	0.484	0.536	0.416	No
	Edge 4	0.683	1.138			See below table (#1)	0.683	See below table (#1)	0.683	**Yes**
	Edge 4 Tilt	0.667	1.195			See below table (#2)	0.667	See below table (#2)	0.667	**Yes**
LTE Band 2	Rear	0.708	0.179	0.234	0.034	0.887	0.942	1.121	0.742	No
	Edge 1	1.212	0.008	0.018	0.001	1.22	1.23	1.238	1.213	No
	Edge 2	0.024		1.198	0.277	0.024	1.222	1.222	0.301	No
	Edge 2 Tilt	0.024		1.254	0.261	0.024	1.278	1.278	0.285	No
	Edge 3	0.4	0.052	0.084	0.016	0.452	0.484	0.536	0.416	No
	Edge 4	0.742	1.138			See below table (#4)	0.742	See below table (#4)	0.742	Yes
	Edge 4 Tilt	0.740	1.195			See below table (#5)	0.74	See below table (#5)	0.740	Yes
LTE Band 4	Rear	0.775	0.179	0.234	0.034	0.954	1.009	1.188	0.809	No
	Edge 1	1.116	0.008	0.018	0.001	1.124	1.134	1.142	1.117	No
	Edge 2			1.198	0.277		1.198	1.198	0.277	No
	Edge 2 Tilt			1.254	0.261		1.254	1.254	0.261	No
	Edge 3		0.052	0.084	0.016	0.052	0.084	0.136	0.016	No
	Edge 4		1.138			1.138		1.138		
	Edge 4 Tilt		1.195			1.195		1.195		
LTE Band 5	Rear	0.430	0.179	0.234	0.034	0.609	0.664	0.843	0.464	No
	Edge 1	1.080	0.008	0.018	0.001	1.088	1.098	1.106	1.081	No
	Edge 2			1.198	0.277	0	1.198	1.198	0.277	No
	Edge 2 Tilt			1.254	0.261	0	1.254	1.254	0.261	No
	Edge 3		0.052	0.084	0.016	0.052	0.084	0.136	0.016	No
	Edge 4		1.138			1.138		1.138		
	Edge 4 Tilt		1.195			1.195		1.195		

Simultaneous Transmission Summation Scenario with 2.4 GHz WLAN									
Band	Configuration	WWAN SAR 1 (W/kg)	2.4 GHz Main WLAN 2 SAR (W/kg)	2.4 GHz Aux WLAN 3 SAR (W/kg)	2.4 GHz BT 4 SAR (W/kg)	∑ 1-g SAR 1+2 (W/kg)	∑ 1-g SAR 1+3 (W/kg)	∑ 1-g SAR 1+2+3 (W/kg)	∑ 1-g SAR 1+2+4 (W/kg)
LTE Band 7	Rear	0.600	0.179	0.234	0.034	0.779	0.834	1.013	0.813
	Edge 1	0.753	0.008	0.018	0.001	0.761	0.771	0.779	0.762
	Edge 2	0.034		1.198	0.277	0.034	1.232	1.232	0.311
	Edge 2 Tilt	0.041		1.254	0.261	0.041	1.295	1.295	0.302
	Edge 3	0.4	0.052	0.084	0.016	0.452	0.484	0.536	0.468
	Edge 4	0.343	1.138			1.481	0.343	1.481	1.481
	Edge 4 Tilt	0.309	1.195			1.504	0.309	1.504	1.504
LTE Band 12	Rear	0.478	0.179	0.234	0.034	0.657	0.712	0.891	0.691
	Edge 1	0.869	0.008	0.018	0.001	0.877	0.887	0.895	0.878
	Edge 2	0.020		1.198	0.277	0.02	1.218	1.218	0.297
	Edge 2 Tilt	0.015		1.254	0.261	0.015	1.269	1.269	0.276
	Edge 3	0.4	0.052	0.084	0.016	0.452	0.484	0.536	0.468
	Edge 4	0.068	1.138			1.206	0.068	1.206	1.206
	Edge 4 Tilt	0.082	1.195			1.277	0.082	1.277	1.277
LTE Band 13	Rear	0.490	0.179	0.234	0.034	0.669	0.724	0.903	0.703
	Edge 1	0.998	0.008	0.018	0.001	1.006	1.016	1.024	1.007
	Edge 2	0.017		1.198	0.277	0.017	1.215	1.215	0.294
	Edge 2 Tilt	0.011		1.254	0.261	0.011	1.265	1.265	0.272
	Edge 3	0.4	0.052	0.084	0.016	0.452	0.484	0.536	0.468
	Edge 4	0.137	1.138			1.275	0.137	1.275	1.275
	Edge 4 Tilt	0.174	1.195			1.369	0.174	1.369	1.369
LTE Band 14	Rear	0.497	0.179	0.234	0.034	0.676	0.731	0.91	0.71
	Edge 1	1.049	0.008	0.018	0.001	1.057	1.067	1.075	1.058
	Edge 2	0.024		1.198	0.277	0.024	1.222	1.222	0.301
	Edge 2 Tilt	0.019		1.254	0.261	0.019	1.273	1.273	0.28
	Edge 3	0.4	0.052	0.084	0.016	0.452	0.484	0.536	0.468
	Edge 4	0.131	1.138			1.269	0.131	1.269	1.269
	Edge 4 Tilt	0.159	1.195			1.354	0.159	1.354	1.354
LTE Band 26	Rear	0.415	0.179	0.234	0.034	0.594	0.649	0.828	0.628
	Edge 1	0.977	0.008	0.018	0.001	0.985	0.995	1.003	0.986
	Edge 2	0.018		1.198	0.277	0.018	1.216	1.216	0.295
	Edge 2 Tilt	0.024		1.254	0.261	0.024	1.278	1.278	0.285
	Edge 3	0.4	0.052	0.084	0.016	0.452	0.484	0.536	0.468
	Edge 4	0.110	1.138			1.248	0.11	1.248	1.248
	Edge 4 Tilt	0.154	1.195			1.349	0.154	1.349	1.349
LTE Band 41	Rear	0.308	0.179	0.234	0.034	0.487	0.542	0.721	0.521
	Edge 1	0.518	0.008	0.018	0.001	0.526	0.536	0.544	0.527
	Edge 2	0.005		1.198	0.277	0.005	1.203	1.203	0.282
	Edge 2 Tilt	0.004		1.254	0.261	0.004	1.258	1.258	0.265
	Edge 3	0.4	0.052	0.084	0.016	0.452	0.484	0.536	0.468
	Edge 4	0.076	1.138			1.214	0.076	1.214	1.214
	Edge 4 Tilt	0.069	1.195			1.264	0.069	1.264	1.264
LTE Band 66	Rear	0.780	0.179	0.234	0.034	0.959	1.014	1.193	0.993
	Edge 1	1.275	0.008	0.018	0.001	1.283	1.293	1.301	1.284
	Edge 2	0.009		1.198	0.277	0.009	1.207	1.207	0.286
	Edge 2 Tilt	0.011		1.254	0.261	0.011	1.265	1.265	0.272
	Edge 3	0.4	0.052	0.084	0.016	0.452	0.484	0.536	0.468
	Edge 4	0.330	1.138			1.468	0.33	1.468	1.468
	Edge 4 Tilt	0.268	1.195			1.463	0.268	1.463	1.463

Simultaneous Transmission Summation Scenario with 5 GHz WLAN										
Band	Configuration	WWAN SAR 1	5 GHz Main WLAN 2	5 GHz Aux WLAN 3	2.4 GHz BT 4	∑ 1-g SAR 1+2	∑ 1-g SAR 1+3	∑ 1-g SAR 1+2+3	∑ 1-g SAR 1+2+4	SPLSR
		(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(Yes/No)
UMTS 850	Rear	0.436	0.098	0.173	0.034	0.534	0.609	0.707	0.568	No
	Edge 1	0.901	0.047	0.022	0.001	0.948	0.923	0.97	0.949	No
	Edge 2	0.013		0.860	0.277	0.013	0.873	0.873	0.29	No
	Edge 2 Tilt	0.126		0.988	0.261	0.126	1.114	1.114	0.387	No
	Edge 3	0.4	0.028	0.085	0.016	0.428	0.485	0.513	0.444	No
	Edge 4	0.155	0.739			0.894	0.155	0.894	0.894	No
	Edge 4 Tilt	0.013	0.944			0.957	0.013	0.957	0.957	No
UMTS 1700	Rear	0.670	0.098	0.173	0.034	0.768	0.843	0.941	0.802	No
	Edge 1	1.131	0.047	0.022	0.001	1.178	1.153	1.2	1.179	No
	Edge 2	0.010		0.860	0.277	0.01	0.87	0.87	0.287	No
	Edge 2 Tilt	0.009		0.988	0.261	0.009	0.997	0.997	0.27	No
	Edge 3	0.4	0.028	0.085	0.016	0.428	0.485	0.513	0.444	No
	Edge 4	0.284	0.739			1.023	0.284	1.023	1.023	No
	Edge 4 Tilt	0.219	0.944			1.163	0.219	1.163	1.163	No
UMTS 1900	Rear	0.621	0.098	0.173	0.034	0.719	0.794	0.892	0.753	No
	Edge 1	1.127	0.047	0.022	0.001	1.174	1.149	1.196	1.175	No
	Edge 2	0.022		0.860	0.277	0.022	0.882	0.882	0.299	No
	Edge 2 Tilt	0.023		0.988	0.261	0.023	1.011	1.011	0.284	No
	Edge 3	0.4	0.028	0.085	0.016	0.428	0.485	0.513	0.444	No
	Edge 4	0.683	0.739			1.422	0.683	1.422	1.422	No
	Edge 4 Tilt	0.667	0.944			See below table (#3)	0.667	See below table (#3)	See below table (#3)	Yes
LTE Band 2	Rear	0.708	0.098	0.173	0.034	0.806	0.881	0.979	0.84	No
	Edge 1	1.212	0.047	0.022	0.001	1.259	1.234	1.281	1.26	No
	Edge 2	0.024		0.860	0.277	0.024	0.884	0.884	0.301	No
	Edge 2 Tilt	0.024		0.988	0.261	0.024	1.012	1.012	0.285	No
	Edge 3	0.4	0.028	0.085	0.016	0.428	0.485	0.513	0.444	No
	Edge 4	0.742	0.739			1.481	0.742	1.481	**1.481**	No
	Edge 4 Tilt	0.740	0.944			See below table (#6)	0.740	See below table (#6)	See below table (#6)	Yes
LTE Band 4	Rear	0.775	0.098	0.173	0.034	0.873	0.948	1.046	0.907	No
	Edge 1	1.116	0.047	0.022	0.001	1.163	1.138	1.185	1.164	No
	Edge 2			0.860	0.277		0.860	0.860	0.277	No
	Edge 2 Tilt			0.988	0.261		0.988	0.988	0.261	No
	Edge 3		0.028	0.085	0.016	0.028	0.085	0.113	0.044	No
	Edge 4		0.739			0.739		0.739	0.739	No
	Edge 4 Tilt		0.944			0.944		0.944	0.944	No
LTE Band 5	Rear	0.430	0.098	0.173	0.034	0.528	0.603	0.701	0.562	No
	Edge 1	1.080	0.047	0.022	0.001	1.127	1.102	1.149	1.128	No
	Edge 2			0.860	0.277		0.86	0.86	0.277	No
	Edge 2 Tilt			0.988	0.261		0.988	0.988	0.261	No
	Edge 3		0.028	0.085	0.016	0.028	0.085	0.113	0.044	No
	Edge 4		0.739			0.739		0.739	0.739	No
	Edge 4 Tilt		0.944			0.944		0.944	0.944	No

Simultaneous Transmission Summation Scenario with 5 GHz WLAN									
Band	Configuration	WWAN SAR 1	5 GHz Main WLAN 2	5 GHz Aux WLAN 3	2.4 GHz BT 4	∑ 1-g SAR 1+2	∑ 1-g SAR 1+3	∑ 1-g SAR 1+2+3	∑ 1-g SAR 1+2+4
		(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)
LTE Band 7	Rear	0.600	0.098	0.173	0.034	0.698	0.773	0.871	0.732
	Edge 1	0.753	0.047	0.022	0.001	0.800	0.775	0.822	0.801
	Edge 2	0.034		0.860	0.277	0.034	0.894	0.894	0.311
	Edge 2 Tilt	0.041		0.988	0.261	0.041	1.029	1.029	0.302
	Edge 3	0.4	0.028	0.085	0.016	0.428	0.485	0.513	0.444
	Edge 4	0.343	0.739			1.082	0.343	1.082	1.082
	Edge 4 Tilt	0.309	0.944			1.253	0.309	1.253	1.253
LTE Band 12	Rear	0.478	0.098	0.173	0.034	0.576	0.651	0.749	0.61
	Edge 1	0.869	0.047	0.022	0.001	0.916	0.891	0.938	0.917
	Edge 2	0.020		0.860	0.277	0.02	0.88	0.88	0.297
	Edge 2 Tilt	0.015		0.988	0.261	0.015	1.003	1.003	0.276
	Edge 3	0.4	0.028	0.085	0.016	0.428	0.485	0.513	0.444
	Edge 4	0.068	0.739			0.807	0.068	0.807	0.807
	Edge 4 Tilt	0.082	0.944			1.026	0.082	1.026	1.026
LTE Band 13	Rear	0.490	0.098	0.173	0.034	0.588	0.663	0.761	0.622
	Edge 1	0.998	0.047	0.022	0.001	1.045	1.02	1.067	1.046
	Edge 2	0.017		0.860	0.277	0.017	0.877	0.877	0.294
	Edge 2 Tilt	0.011		0.988	0.261	0.011	0.999	0.999	0.272
	Edge 3	0.4	0.028	0.085	0.016	0.428	0.485	0.513	0.444
	Edge 4	0.137	0.739			0.876	0.137	0.876	0.876
	Edge 4 Tilt	0.174	0.944			1.118	0.174	1.118	1.118
LTE Band 14	Rear	0.497	0.098	0.173	0.034	0.595	0.67	0.768	0.629
	Edge 1	1.049	0.047	0.022	0.001	1.096	1.071	1.118	1.097
	Edge 2	0.024		0.860	0.277	0.024	0.884	0.884	0.301
	Edge 2 Tilt	0.019		0.988	0.261	0.019	1.007	1.007	0.28
	Edge 3	0.4	0.028	0.085	0.016	0.428	0.485	0.513	0.444
	Edge 4	0.131	0.739			0.87	0.131	0.87	0.87
	Edge 4 Tilt	0.159	0.944			1.103	0.159	1.103	1.103
LTE Band 26	Rear	0.415	0.098	0.173	0.034	0.513	0.588	0.686	0.547
	Edge 1	0.977	0.047	0.022	0.001	1.024	0.999	1.046	1.025
	Edge 2	0.018		0.860	0.277	0.018	0.878	0.878	0.295
	Edge 2 Tilt	0.024		0.988	0.261	0.024	1.012	1.012	0.285
	Edge 3	0.4	0.028	0.085	0.016	0.428	0.485	0.513	0.444
	Edge 4	0.110	0.739			0.849	0.11	0.849	0.849
	Edge 4 Tilt	0.154	0.944			1.098	0.154	1.098	1.098
LTE Band 41	Rear	0.308	0.098	0.173	0.034	0.406	0.481	0.579	0.44
	Edge 1	0.518	0.047	0.022	0.001	0.565	0.54	0.587	0.566
	Edge 2	0.005		0.860	0.277	0.005	0.865	0.865	0.282
	Edge 2 Tilt	0.004		0.988	0.261	0.004	0.992	0.992	0.265
	Edge 3	0.4	0.028	0.085	0.016	0.428	0.485	0.513	0.444
	Edge 4	0.076	0.739			0.815	0.076	0.815	0.815
	Edge 4 Tilt	0.069	0.944			1.013	0.069	1.013	1.013
LTE Band 66	Rear	0.780	0.098	0.173	0.034	0.878	0.953	1.051	0.912
	Edge 1	1.275	0.047	0.022	0.001	1.322	1.297	1.344	1.323
	Edge 2	0.009		0.860	0.277	0.009	0.869	0.869	0.286
	Edge 2 Tilt	0.011		0.988	0.261	0.011	0.999	0.999	0.272
	Edge 3	0.4	0.028	0.085	0.016	0.428	0.485	0.513	0.444
	Edge 4	0.330	0.739			1.069	0.33	1.069	1.069
	Edge 4 Tilt	0.268	0.944			1.212	0.268	1.212	1.212

Band	Configuration	WWAN SAR (W/kg)	Bluetooth SAR (W/kg)	∑ 1-g SAR (W/kg)
UMTS 850	Rear	0.436	0.034	0.470
	Edge 1	0.901	0.001	0.902
	Edge 2	0.013	0.277	0.290
	Edge 2 Tilt	0.126	0.261	0.387
	Edge 3	0.400	0.016	0.416
	Edge 4	0.155		0.155
	Edge 4 Tilt	0.013		0.013
UMTS 1700	Rear	0.670	0.034	0.704
	Edge 1	1.131	0.001	1.132
	Edge 2	0.010	0.277	0.287
	Edge 2 Tilt	0.009	0.261	0.270
	Edge 3	0.400	0.016	0.416
	Edge 4	0.284		0.284
	Edge 4 Tilt	0.219		0.219
UMTS 1900	Rear	0.621	0.034	0.655
	Edge 1	1.127	0.001	1.128
	Edge 2	0.022	0.277	0.299
	Edge 2 Tilt	0.023	0.261	0.284
	Edge 4	0.683		0.683
	Edge 4 Tilt	0.667		0.667
LTE Band 2	Rear	0.708	0.034	0.742
	Edge 1	1.212	0.001	1.213
	Edge 2	0.024	0.277	0.301
	Edge 2 Tilt	0.024	0.261	0.285
	Edge 3	0.400	0.016	0.416
	Edge 4	0.742		0.742
	Edge 4 Tilt	0.740		0.740
LTE Band 4	Rear	0.775	0.034	0.809
	Edge 1	1.116	0.001	1.117
	Edge 2		0.277	0.277
	Edge 2 Tilt		0.261	0.261
	Edge 3		0.016	0.016
	Edge 4			
	Edge 4 Tilt			
LTE Band 5	Rear	0.430	0.034	0.464
	Edge 1	1.080	0.001	1.081
	Edge 2		0.277	0.277
	Edge 2 Tilt		0.261	0.261
	Edge 3		0.016	0.016
	Edge 4			
	Edge 4 Tilt			

Band	Configuration	WWAN SAR (W/kg)	Bluetooth SAR (W/kg)	∑ 1-g SAR (W/kg)
LTE Band 7	Rear	0.600	0.034	0.634
	Edge 1	0.753	0.001	0.754
	Edge 2	0.034	0.277	0.311
	Edge 2 Tilt	0.041	0.261	0.302
	Edge 4	0.343		0.343
	Edge 4 Tilt	0.309		0.309
LTE Band 12	Rear	0.478	0.034	0.512
	Edge 1	0.869	0.001	0.870
	Edge 2	0.020	0.277	0.297
	Edge 2 Tilt	0.015	0.261	0.276
	Edge 3	0.400	0.016	0.416
	Edge 4	0.068		0.068
	Edge 4 Tilt	0.082		0.082
LTE Band 13	Rear	0.490	0.034	0.524
	Edge 1	0.998	0.001	0.999
	Edge 2	0.017	0.277	0.294
	Edge 2 Tilt	0.011	0.261	0.272
	Edge 3	0.400	0.016	0.416
	Edge 4	0.137		0.137
	Edge 4 Tilt	0.174		0.174
LTE Band 14	Rear	0.497	0.034	0.531
	Edge 1	1.049	0.001	1.050
	Edge 2	0.024	0.277	0.301
	Edge 2 Tilt	0.019	0.261	0.280
	Edge 3	0.400	0.016	0.416
	Edge 4	0.131		0.131
	Edge 4 Tilt	0.159		0.159
LTE Band 26	Rear	0.415	0.034	0.449
	Edge 1	0.977	0.001	0.978
	Edge 2	0.018	0.277	0.295
	Edge 2 Tilt	0.024	0.261	0.285
	Edge 3	0.400	0.016	0.416
	Edge 4	0.110		0.110
	Edge 4 Tilt	0.154		0.154
LTE Band 41	Rear	0.308	0.034	0.342
	Edge 1	0.518	0.001	0.519
	Edge 2	0.005	0.277	0.282
	Edge 2 Tilt	0.004	0.261	0.265
	Edge 3	0.400	0.016	0.416
	Edge 4	0.076		0.076
	Edge 4 Tilt	0.069		0.069
LTE Band 66	Rear	0.780	0.034	0.814
	Edge 1	1.275	0.001	1.276
	Edge 2	0.009	0.277	0.286
	Edge 2 Tilt	0.011	0.261	0.272
	Edge 3	0.400	0.016	0.416
	Edge 4	0.330		0.330
	Edge 4 Tilt	0.268		0.268

12.2 SAR to Peak Location Separation Ratio (SPLSR)

FCC KDB 447498 D01v06 General RF Exposure Guidance introduces a new formula for calculating the SAR a Peak Location Separation Ratio(SPLSR) between pairs of simultaneously transmitting antennas:

$SPLSR_i=(SAR_1+SAR_2)^{1.5}/R_i$

Where:

SAR_1 is the highest measured or estimated SAR for the first of a pair of simultaneous transmitting antennas, in a specific test operating mode and exposure condition

SAR_2 is the highest measured of estimated SAR for the second of a pair of simultaneous transmitting antennas, in the same test operating mode and exposure condition as the first

$Ri_i$is the separation distance between the pair of simultaneous transmitting antennas, When the SAR is measured, for both antennas in the pair, it is determined by the actual x, y and z coordinates in the 1-g SAR for each SAR peak location, based on the extrapolated and interpolated result in the zoom scan measurement, using the formula of $[(X_1-X_2)^2+(Y_1-Y_2)^2+(Z_1-Z_2)^2]$

In order for a pair of simultaneous transmitting antennas with the sum 1-g of SAR> 1.6 W/kg and with the sum 10-g of SAR >4W/Kg to qualify for exemption from Simultaneous Transmission SAR measurements, it has to satisfy the condition of:
$(SAR_1+SAR_2)^{1.5}/R_i \le 0.04$ for 1g SAR and $(SAR_1+SAR_2)^{1.5}/R_i \le 0.1$ for 10g SAR.
for 1g SAR and for 10g SAR

below simultaneous transmission summations need to be calculated SPLSR.

12.2.1 SPLSR Evaluation

Peak location for SAR Rear side(Active)

Mode/Band	X(mm)	Y(mm)	Z(mm)	Reported SAR [W/kg]
WCDMA B2 Edge4	0.0045	0.099	-0.178	0.683
WCDMA B2 Edge4 Tilt	-0.006	0.104	-0.178	0.667
LTE Band 2 Edge 4	0.006	0.0945	-0.178	0.742
LTE Band 2 Edge 4 Tilt	0.0015	0.104	-0.178	0.740
2.4 GHz WLAN Egde4	0.0036	-0.074	-0.178	1.138
2.4 GHz WLAN Edge 4 Tilt	-0.0048	-0.0752	-0.179	1.195
5 GHz WLAN Edge 4 Tilt	8.74E-11	-0.07	-0.178	0.944

12.2.2 SAR to Peak Location Ratio (SPLSR) Figures

WCDMA B2 SAR 1g (W/kg)	2.4GHz WLAN SAR 1g (W/kg)	Sum 1g SAR 1+2	Peak SAR Seperation Distance (mm)	SPLSR	Plot No
1	2				
0.683	1.138	1.821	173.00	0.014	#1

WCDMA B2 SAR 1g (W/kg)	2.4GHz WLAN SAR 1g (W/kg)	Sum 1g SAR 1+2	Peak SAR Seperation Distance (mm)	SPLSR	Plot No
1	2				
0.667	1.195	1.862	179.21	0.014	#2

WCDMA B2 SAR 1g (W/kg)	5GHz WLAN SAR 1g (W/kg)	Sum 1g SAR 1+2	Peak SAR Seperation Distance (mm)	SPLSR	Plot No
1	2				
0.667	0.944	1.611	174.10	0.012	#3

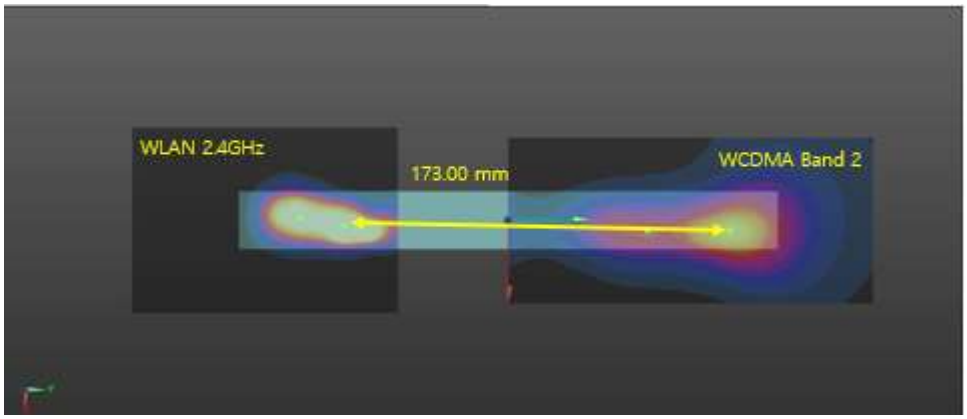
LTE Band 2 SAR 1g (W/kg)	2.4GHz WLAN SAR 1g (W/kg)	Sum 1g SAR 1+2	Peak SAR Seperation Distance (mm)	SPLSR	Plot No
1	2				
0.742	1.138	1.880	168.52	0.015	#4

LTE Band 2 SAR 1g (W/kg)	2.4GHz WLAN SAR 1g (W/kg)	Sum 1g SAR 1+2	Peak SAR Seperation Distance (mm)	SPLSR	Plot No
1	2				
0.740	1.195	1.935	179.31	0.015	#5

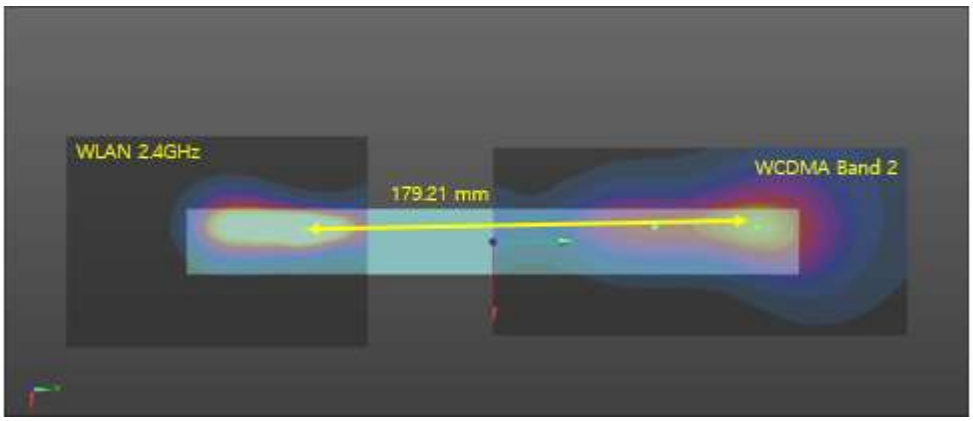
LTE Band 2 SAR 1g (W/kg)	5GHz WLAN SAR 1g (W/kg)	Sum 1g SAR 1+2	Peak SAR Seperation Distance (mm)	SPLSR	Plot No
1	2				
0.740	0.944	1.684	174.01	0.013	#6

12.2.3 SPLSR Plot

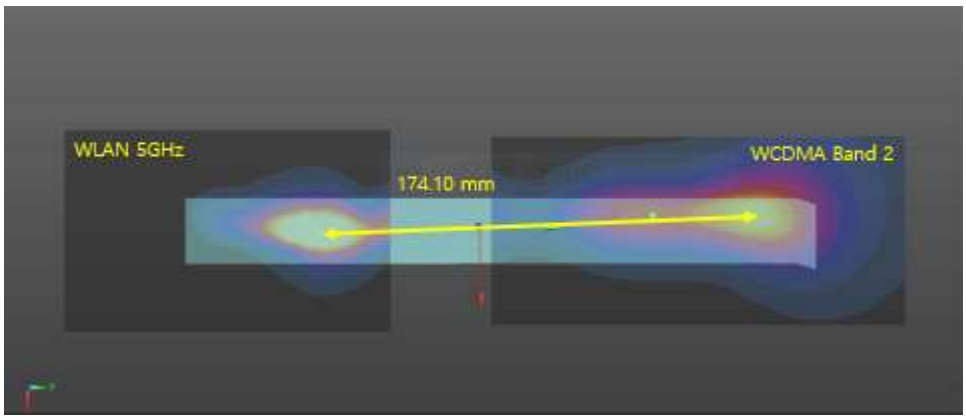
Plot #1 WCDMA Band 2 + WLAN 2.4GHz Edge4



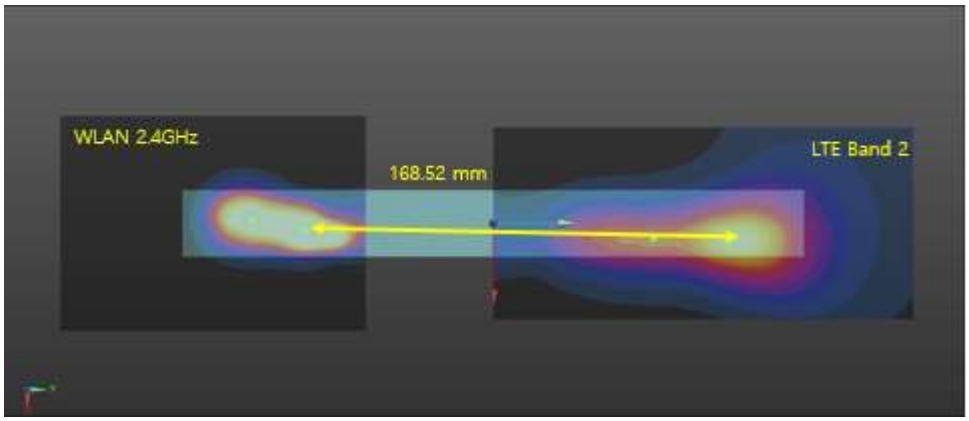
Plot #2 WCDMA Band 2 + WLAN 2.4GHz Edge4 Tilt



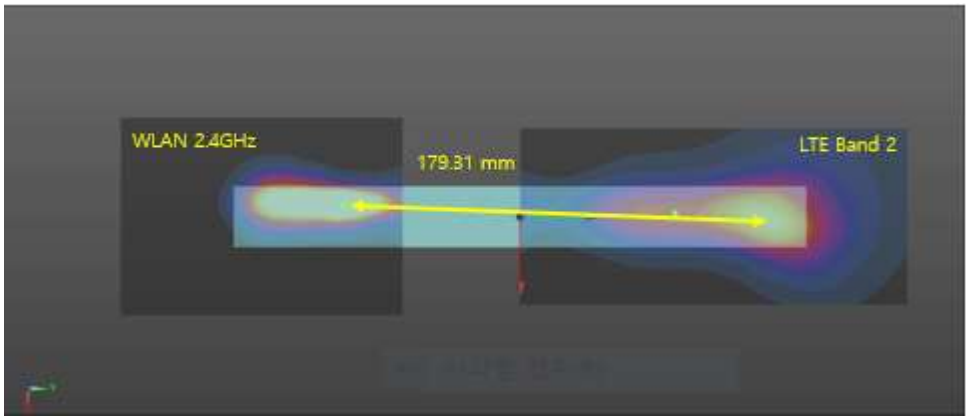
Plot #3 WCDMA Band 2 + WLAN 5GHz Edge4 Tilt



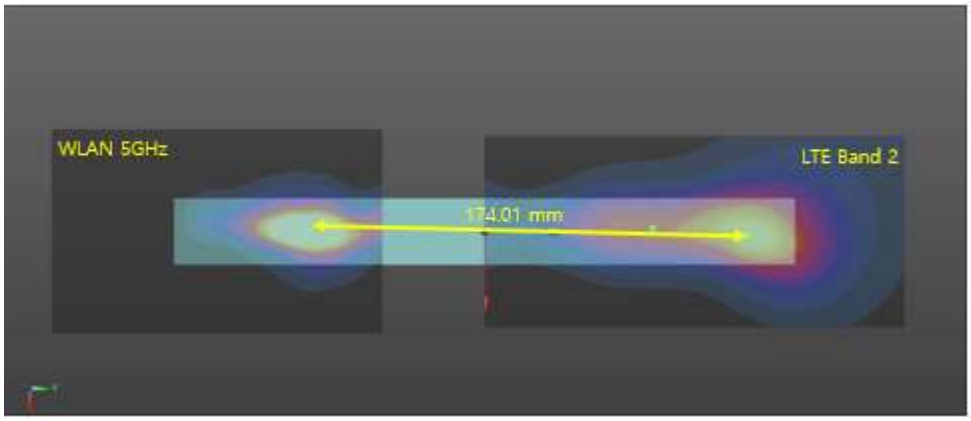
Plot #4 LTE Band2 + WLAN 2.4GHz Edge4



Plot #5 LTE Band2 + WLAN 2.4GHz Edge4 Tilt



Plot #6 LTE Band2 + WLAN 5GHz Edge4 Tilt



12.3 Simultaneous Transmission Conclusion

The above numerical summed SAR Results are sufficient to determine that simultaneous transmission cases will not exceed the SAR Limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v06 and IEEE1528-2013.

13. SAR MEASUREMENT VARIABILITY AND UNCERTAINTY

In accordance with KDB procedure 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz, SAR additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR Measurement variability was assessed using the following procedures for each frequency band:

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg for 1g SAR or < 2.0 W/kg for 10g SAR; steps 2) through 4) do not apply.

2) When the original highest measured 1g SAR is ≥ 0.80 W/kg or 10g SAR ≥ 2.0W/kg, repeat that measurement once.

3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg for 1g SAR or ≥ 3.625 W/kg for 10g SAR (~ 10% from the 1-g SAR limit).

4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg for 1g SAR or ≥3.75 W/kg for 10g SAR and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

Body SAR measurement variability Results

Frequency		Mode/Band	Configuration	Ant.	Measured SAR	Measured SAR	SAR Ratio
MHz	Channel				(W/kg)	(W/kg)	
2 437	6	2.4 GHz WLAN 802.11b (Body)	Edge 4 Tilt	Main	1.05	1.04	1.01
2 437	6	2.4 GHz WLAN 802.11b (Body)	Edge 2 Tilt	Aux	1.12	1.06	1.06
5290	58	5 GHz WLAN 802.11ac80	Edge 4 Tilt	Main	0.840	0.825	1.02
5290	58	5 GHz WLAN 802.11ac80	Edge 2 Tilt	Aux	0.894	0.891	1.00
5610	122	5 GHz WLAN 802.11ac80	Edge 2 Tilt	Aux	0.822	0.819	1.00

14. Device Holder Perturbation Verification.

In accordance with published DUT Holder Perturbations in Oct.2016 TCB Workshop.
When Highest reported SAR is over 1.2 W/kg, Holder Perturbation Verification is required for each antenna, using the highest configuration among all applicable frequency bands.

Frequency		Mode/Band	Configuration	Highest Reported SAR		Deviation (%)
				(without Device Holder)	(with Device Holder)	
MHz	Channel			(W/kg)	(W/kg)	
2 437	6	2.4GHz WLAN	Edge 2 Tilt	1.254	1.232	1.76%

15. MEASUREMENT UNCERTAINTY

Measurement Uncertainty for DUT SAR test

According to IEC 62209-2
(30MHz - 6 GHz range)

a	*b*	*c*	*d*	*e*	*f*	*g*	*h = c x f / e*	*i = c x g / e*	*k*
Source of uncertainty	**Description**	**Uncertainty ± %**	**Probability distribution**	**Div.**	**ci**	**ci**	**Standard Uncertainty**	**Standard Uncertainty**	**vi or veff**
					(1 g)	**(10 g)**	**± % (1 g)**	**± % (10 g)**	
Measurement system									
Probe calibration	7.2.2.1	6.65	N	1	1	1	6.65	6.65	∞
Axial isotropy	7.2.2.2	4.70	R	1.73	0.71	0.71	1.92	1.92	∞
Hemispherical isotropy	7.2.2.2	9.60	R	1.73	0.71	0.71	3.92	3.92	∞
Boundary effect	7.2.2.6	2.00	R	1.73	1	1	1.15	1.15	∞
Linearity	7.2.2.3	4.70	R	1.73	1	1	2.71	2.71	∞
Detection limits	7.2.2.5	1.00	R	1.73	1	1	0.58	0.58	∞
Modulation response	7.2.2.4	2.40	R	1.73	1	1	1.39	1.39	∞
Readout electronics	7.2.2.7	0.30	N	1	1	1	0.30	0.30	∞
Response time	7.2.2.8	0.80	R	1.73	1	1	0.46	0.46	∞
Integration time	7.2.2.9	2.60	R	1.73	1	1	1.50	1.50	∞
RF ambient conditions - noise	7.2.4.5	3.00	R	1.73	1	1	1.73	1.73	∞
RF ambient conditions - reflections	7.2.4.5	3.00	R	1.73	1	1	1.73	1.73	∞
Probe positioner mechanical tolerance	7.2.3.1	0.80	R	1.73	1	1	0.46	0.46	∞
Probe positioning with respect to phantom shell	7.2.3.3	6.70	R	1.73	1	1	3.87	3.87	∞
Post-processing	7.2.5	4.00	R	1.73	1	1	2.31	2.31	∞
Test sample related									
Test sample positioning	7.2.3.4.3	5.51	N	1	1	1	5.51	5.51	47
Device holder uncertainity	7.2.3.4.2	2.99	N	1	1	1	2.99	2.99	5
SAR drift measurement	7.2.2.10	5.00	R	1.73	1	1	2.89	2.89	∞
SAR scaling	L.3	0.00	R	1.73	1	1	0.00	0.00	∞
Phantom and set-up									
Phantom uncertainty (shape and thickness uncertainty)	7.2.3.2	7.60	R	1.73	1	1	4.39	4.39	∞
Uncertainty in SAR correction for deviations in permittivity and conductivity	7.2.4.3	1.20	N	1	1	0.81	1.20	0.97	∞
Liquid conductivity (temperature uncert	7.2.4.4	2.93	R	1.73	0.78	0.71	1.32	1.20	∞
Liquid conductivity (measured)	7.2.4.3	1.54	N	1	0.78	0.71	1.20	1.09	∞
Liquid permittivity (temperature uncerta	7.2.4.4	0.95	R	1.73	0.23	0.26	0.13	0.14	∞
Liquid permittivity (measured)	7.2.4.3	1.17	N	1	0.23	0.26	0.27	0.30	∞
Combined standard uncertainty			RSS				13.22	13.19	∞
Expanded uncertainty (95% confidence interval)			*k = 2*				**26.44**	**26.38**	

16. SAR TEST EQUIPMENT

Manufacturer	Type / Model	S/N	Calib. Date	Calib.Interval	Calib.Due
SPEAG	Triple Modular Phantom	-	N/A	N/A	N/A
HP	SAR System Control PC	-	N/A	N/A	N/A
Staubli	TX90 XLspeag	F12/ 5K9GA1/ A/ 01	N/A	N/A	N/A
Staubli	CS8Cspeag-TX90	F12/ 5K9GA1/ C/ 01	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	S-1206 0513	N/A	N/A	N/A
SPEAG	DAE4	1629	08/11/2020	Annual	08/11/2021
SPEAG	E-Field Probe EX3DV4	7370	08/31/2020	Annual	08/31/2021
SPEAG	Dipole D2450V2	1049	08/26/2020	Annual	08/26/2021
SPEAG	Dipole D5GHzV2	1253	08/31/2020	Annual	08/31/2021
Agilent	Power Meter E4419B	MY41291386	10/23/2020	Annual	10/23/2021
Agilent	Power Meter N1911A	MY45101406	08/31/2020	Annual	08/31/2021
Agilent	Power Sensor 8481A	SG1091286	10/05/2020	Annual	10/05/2021
Agilent	Power Sensor 8481A	MY41090873	10/05/2020	Annual	10/05/2021
SPEAG	DAKS 3.5	1038	03/24/2020	Annual	03/24/2021
H.P	Network Analyzer /8753ES	JP39240221	01/28/2020	Annual	01/28/2021
Agilent	Base Station E5515C	GB44400269	01/29/2020	Annual	01/29/2021
HP	Signal Generator E4433B	US40052109	02/28/2020	Annual	02/28/2021
EMPOWER	RF Power Amplifier	1011	10/05/2020	Annual	10/05/2021
Agilent	Signal Generator N5182A	MY47070230	05/06/2020	Annual	05/06/2021
Agilent	11636B/Power Divider	58698	02/28/2020	Annual	02/28/2021
TESTO	175-H1/Thermometer	40331939309	01/29/2020	Annual	01/29/2021
EMPOWER	RF Power Amplifier	1084	07/01/2020	Annual	07/01/2021
MICRO LAB	LP Filter / LA-30N	-	10/05/2020	Annual	10/05/2021
MICRO LAB	LP Filter / LA-60N	32011	10/05/2020	Annual	10/05/2021
Agilent	Attenuator (3dB) 8693B	MY39260298	09/17/2020	Annual	09/17/2021
HP	Attenuator (20dB) 8493C	09271	09/17/2020	Annual	09/17/2021
HP	Dielectric Probe Kit 85070C	00721521	N/A	N/A	N/A
Agilent	Directional Bridge	3140A03878	06/08/2020	Annual	06/08/2021
Agilent	Signal Analyzer N9020A	MY50510407	10/23/2020	Annual	10/23/2021
Anritsu	Radio Communication Tester MT8820C	6201074225	03/02/2020	Annual	03/02/2021
Anritsu	Radio Communication Tester MT8821C	6201502997	08/06/2020	Annual	08/06/2021
R&S	Bluetooth CBT	100272	03/02/2020	Annual	03/02/2021

1. The E-field probe was calibrated by SPEAG, by the waveguide technique procedure. Dipole Verification measurement is performed by
HCT Lab. before each test. The brain/body simulating material is calibrated by HCT using the DAKS 3.5 to determine the conductivity and permittivity (dielectric constant) of the brain/body-equivalent material.

17. CONCLUSION

The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the ANSI/ IEEE C95.1 - 2005.

These measurements are taken to simulate the RF effects exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests.

18. REFERENCES

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Attachment 1. − SAR Test Plots

Test Laboratory:	HCT CO., LTD
EUT Type:	Multi-Band Radio Module
Liquid Temperature:	21.1 ℃
Ambient Temperature:	21.2 ℃
Test Date:	11/10/2020
Plot No.:	1

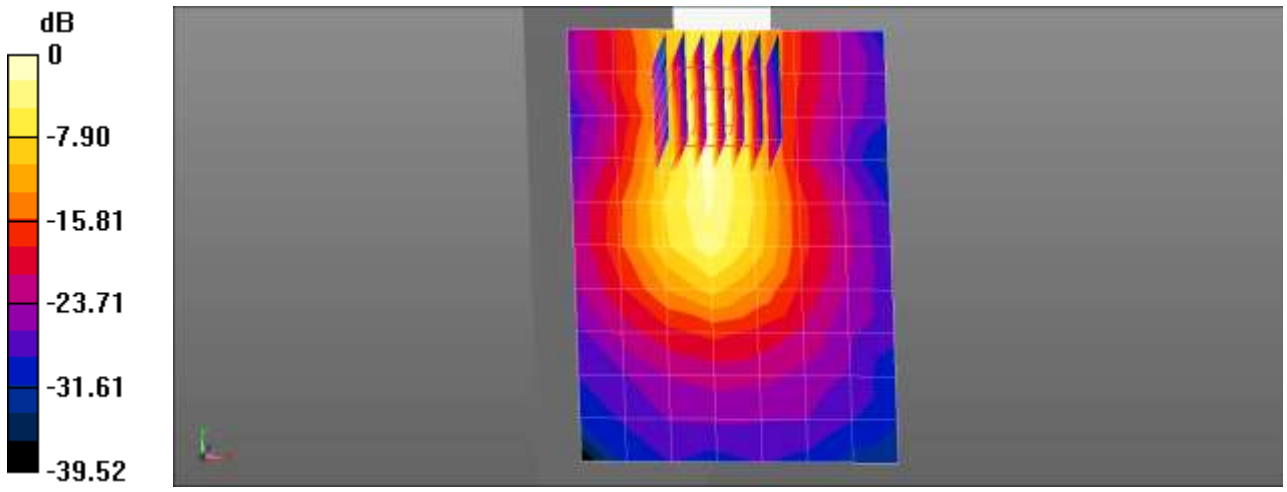
Communication System: UID 0, 2450MHz FCC (0); Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.801 S/m; ε_r = 40.135; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(7.5, 7.5, 7.5)
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1629; Calibrated: 2020-08-11
- Phantom: ELI v5.0, Left
- Measurement SW: DASY52, Version 52.10 (4);

Ant(main) SISO EDGE4 Tilt 802.11b 1Mbps 6ch/Area Scan (11x8x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 2.00 W/kg

Ant(main) SISO EDGE4 Tilt 802.11b 1Mbps 6ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.25 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 2.86 W/kg
SAR(1 g) = 1.05 W/kg; SAR(10 g) = 0.397 W/kg
Maximum value of SAR (measured) = 2.10 W/kg



0 dB = 2.00 W/kg = 3.01 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Multi-Band Radio Module
Liquid Temperature:	21.1 ℃
Ambient Temperature:	21.2 ℃
Test Date:	11/10/2020
Plot No.:	2

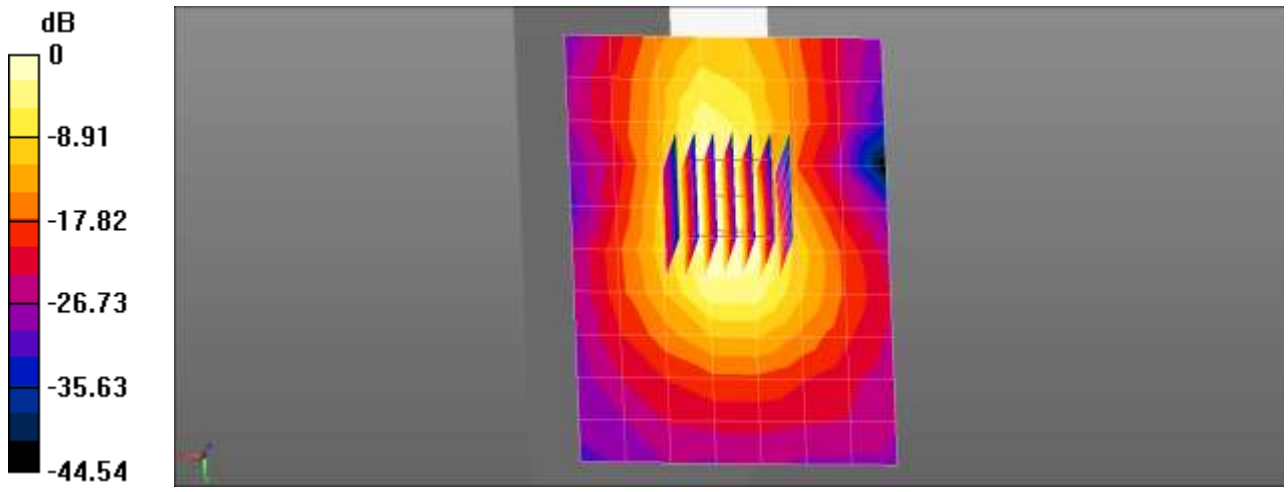
Communication System: UID 0, 2450MHz FCC (0); Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.801 S/m; ε_r = 40.135; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(7.5, 7.5, 7.5)
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1629; Calibrated: 2020-08-11
- Phantom: ELI v5.0, Left
- Measurement SW: DASY52, Version 52.10 (4);

Ant(AUX) SISO EDGE2 Tilt 802.11b 1Mbps 6ch/Area Scan (11x8x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 1.66 W/kg

Ant(AUX) SISO EDGE2 Tilt 802.11b 1Mbps 6ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.928 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 2.61 W/kg
SAR(1 g) = 1.12 W/kg; SAR(10 g) = 0.528 W/kg
Maximum value of SAR (measured) = 1.99 W/kg



0 dB = 1.66 W/kg = 2.20 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Multi-Band Radio Module
Liquid Temperature:	21.8 ℃
Ambient Temperature:	21.9 ℃
Test Date:	11/11/2020
Plot No.:	3

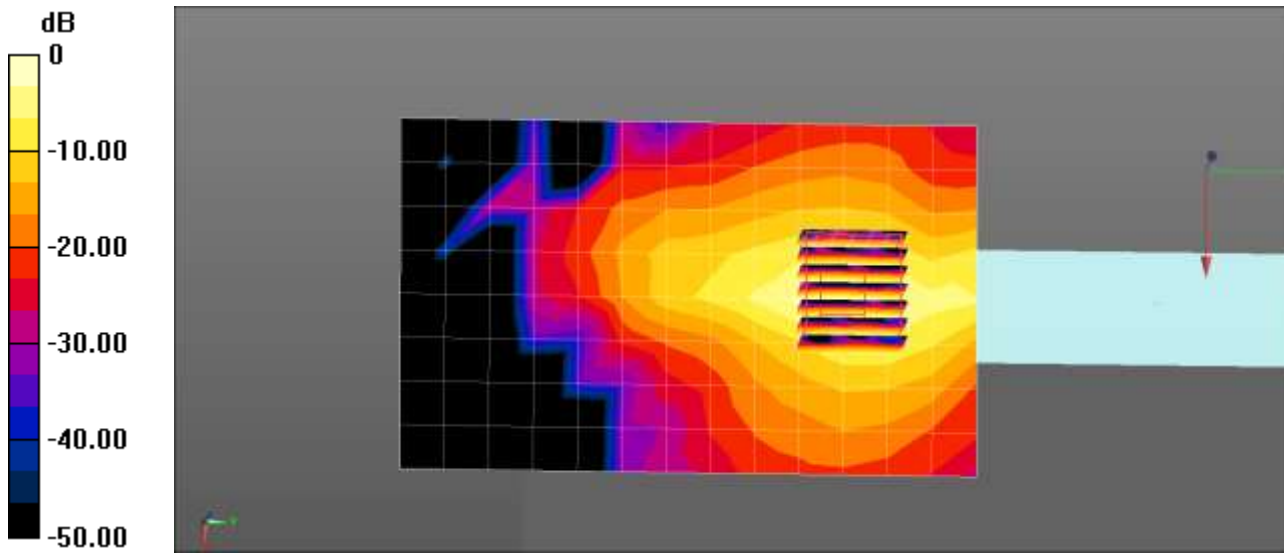
Communication System: UID 0, WiFI5GHz ac80 (0); Frequency: 5290 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5290 MHz; σ = 4.688 S/m; ε_r = 36.768; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(5.15, 5.15, 5.15)
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1629; Calibrated: 2020-08-11
- Phantom: ELI v5.0, Left
- Measurement SW: DASY52, Version 52.10 (4);

Ant(main) SISO EDGE4tilt 802.11ac80 VHT0 58ch/Area Scan (14x9x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 2.29 W/kg

Ant(main) SISO EDGE4tilt 802.11ac80 VHT0 58ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 6.114 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 4.33 W/kg
SAR(1 g) = 0.840 W/kg; SAR(10 g) = 0.246 W/kg
Smallest distance from peaks to all points 3 dB below = 5.1 mm
Maximum value of SAR (measured) = 2.28 W/kg



0 dB = 2.29 W/kg = 3.60 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Multi-Band Radio Module
Liquid Temperature:	21.8 ℃
Ambient Temperature:	21.9 ℃
Test Date:	11/11/2020
Plot No.:	4

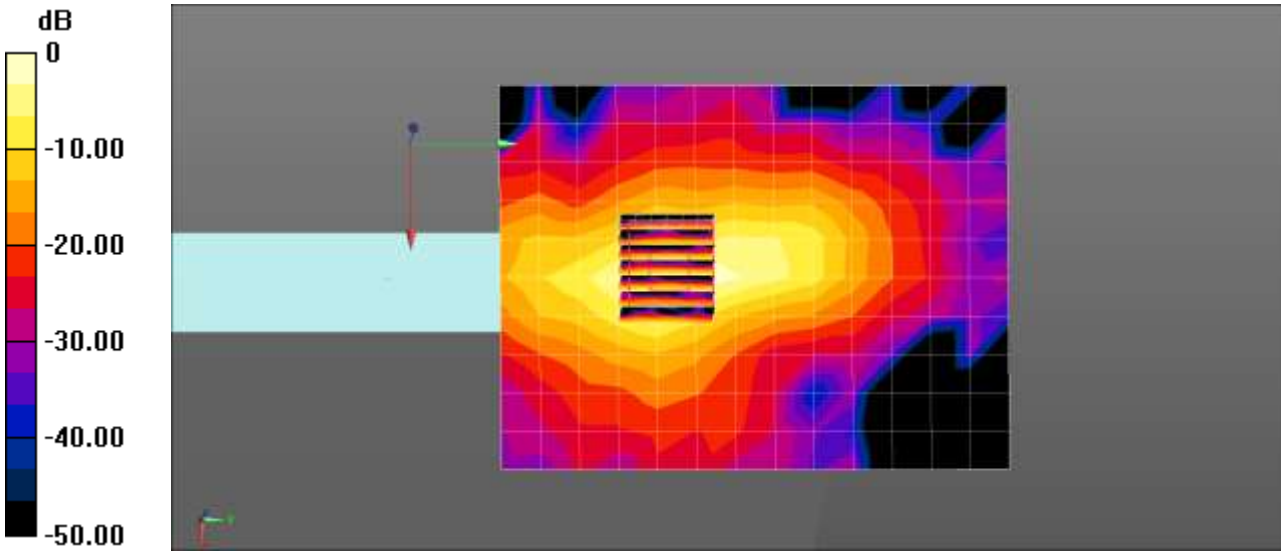
Communication System: UID 0, WiFI5GHz ac80 (0); Frequency: 5290 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5290 MHz; σ = 4.688 S/m; ε_r = 36.768; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(5.15, 5.15, 5.15)
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1629; Calibrated: 2020-08-11
- Phantom: ELI v5.0, Left
- Measurement SW: DASY52, Version 52.10 (4);

Ant(AUX) SISO EDGE2tilt 802.11ac80 VHT0 58ch/Area Scan (14x11x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 2.18 W/kg

Ant(AUX) SISO EDGE2tilt 802.11ac80 VHT0 58ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 1.470 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 4.09 W/kg
SAR(1 g) = 0.894 W/kg; SAR(10 g) = 0.262 W/kg
Smallest distance from peaks to all points 3 dB below = 6.4 mm
Ratio of SAR at M2 to SAR at M1 = 61.3%
Maximum value of SAR (measured) = 2.33 W/kg



0 dB = 2.18 W/kg = 3.38 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Multi-Band Radio Module
Liquid Temperature:	21.1 ℃
Ambient Temperature:	21.2 ℃
Test Date:	11/10/2020
Plot No.:	5

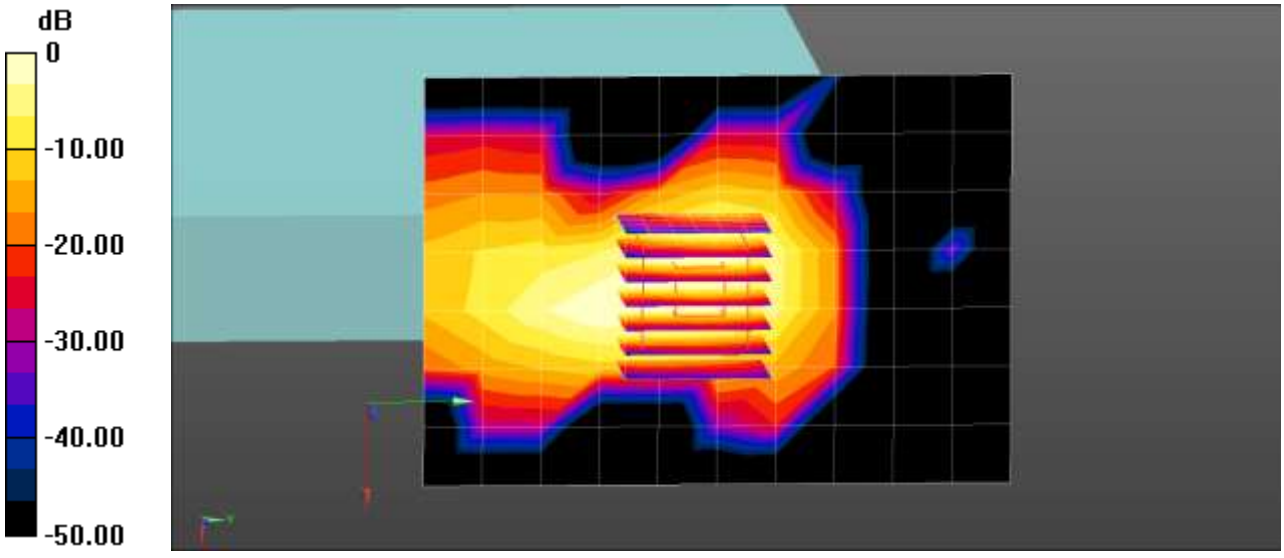
Communication System: UID 0, Bluetooth (0); Frequency: 2480 MHz;Duty Cycle: 1:1.3
Medium parameters used: f = 2480 MHz; σ = 1.849 S/m; ε_r = 39.958; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(7.5, 7.5, 7.5)
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1629; Calibrated: 2020-08-11
- Phantom: ELI v5.0, Left
- Measurement SW: DASY52, Version 52.10 (4);

Bluetooth EDGE2 DH5 78ch/Area Scan (11x8x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.291 W/kg

Bluetooth EDGE2 DH5 78ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.603 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.429 W/kg
SAR(1 g) = 0.178 W/kg; SAR(10 g) = 0.083 W/kg
Smallest distance from peaks to all points 3 dB below = 7 mm
Maximum value of SAR (measured) = 0.306 W/kg



0 dB = 0.291 W/kg = −5.35 dBW/kg

Attachment 2. − Dipole Verification Plots

■ Verification Data (2 450 MHz Body)

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	21.1 ℃
Test Date:	11/10/2020

DUT: Dipole 2450 MHz D2450V2; Type: D2450V2

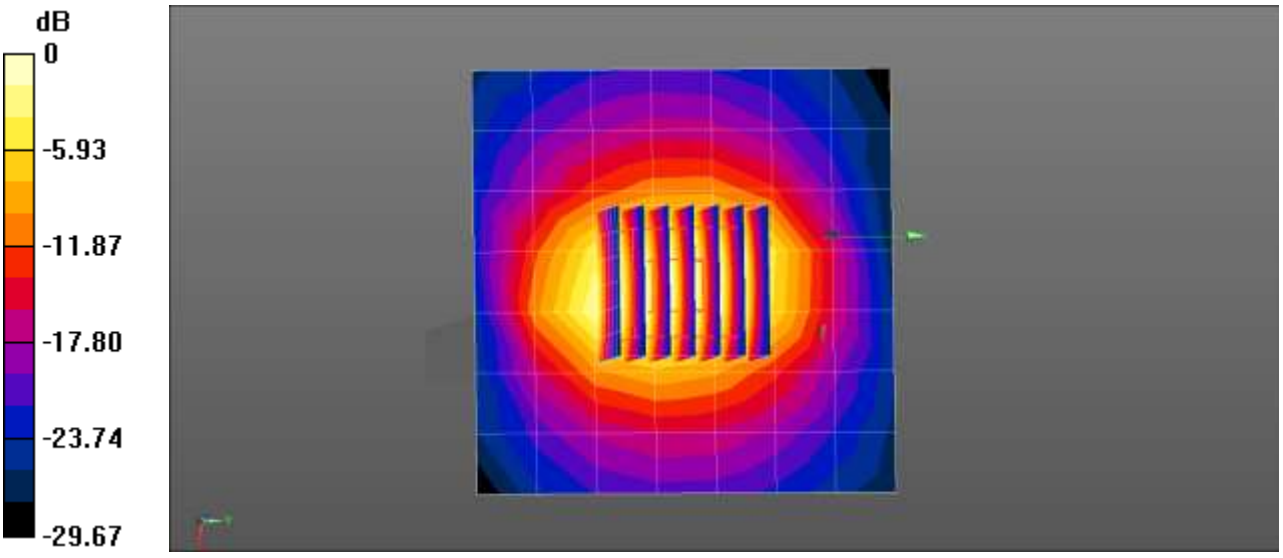
Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2450 MHz; σ = 1.817 S/m; ε_r = 40.094; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(7.5, 7.5, 7.5)
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1629; Calibrated: 2020-08-11
- Phantom: ELI v5.0, Left
- Measurement SW: DASY52, Version 52.10 (4);

Dipole/2450MHz Head Verification/Area Scan (8x8x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 3.83 W/kg

Dipole/2450MHz Head Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.82 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 6.93 W/kg
SAR(1 g) = 2.66 W/kg; SAR(10 g) = 1.11 W/kg
Smallest distance from peaks to all points 3 dB below = 8 mm
Maximum value of SAR (measured) = 5.09 W/kg



0 dB = 3.83 W/kg = 5.84 dBW/kg

■ Verification Data (5 250 MHz Body)

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	21.8 ℃
Test Date:	11/11/2020

DUT: Dipole D5GHzV2; Type: D5GHzV2

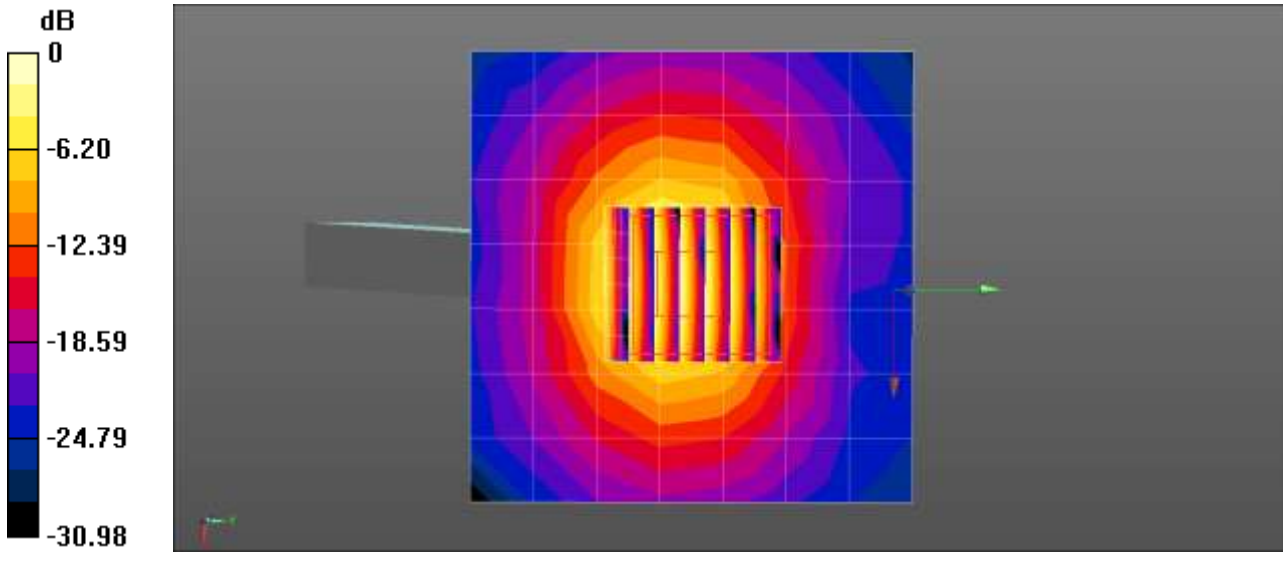
Communication System: UID 0, CW (0); Frequency: 5250 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5250 MHz; σ = 4.632 S/m; ε_r = 36.984; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(5.15, 5.15, 5.15)
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1629; Calibrated: 2020-08-11
- Phantom: ELI v5.0, Left
- Measurement SW: DASY52, Version 52.10 (4);

Dipole/5 250 MHz Head Verification/Area Scan (8x8x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 7.05 W/kg

Dipole/5 250 MHz Head Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 49.88 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 15.6 W/kg
SAR(1 g) = 3.81 W/kg; SAR(10 g) = 1.09 W/kg
Smallest distance from peaks to all points 3 dB below = 7.5 mm
Maximum value of SAR (measured) = 9.58 W/kg



0 dB = 7.05 W/kg = 8.48 dBW/kg

■ Verification Data (5 600 MHz Body)

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	20.5 ℃
Test Date:	11/12/2020

DUT: Dipole D5GHzV2; Type: D5GHzV2

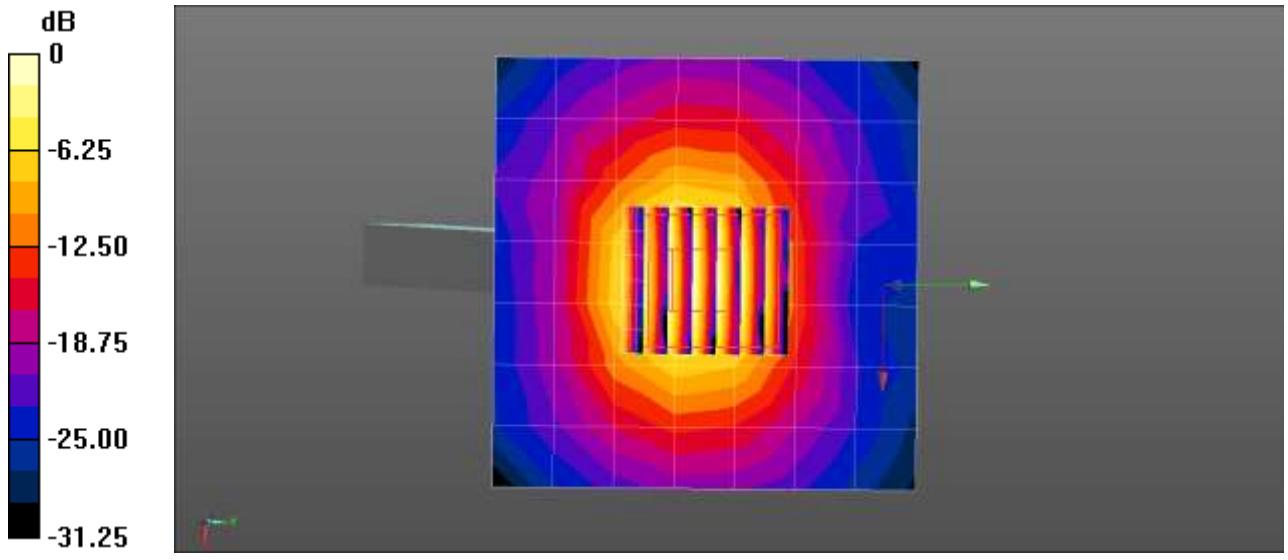
Communication System: UID 0, CW (0); Frequency: 5600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; σ = 5.028 S/m; ε_r = 36.795; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(4.6, 4.6, 4.6)
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1629; Calibrated: 2020-08-11
- Phantom: ELI v5.0, Left
- Measurement SW: DASY52, Version 52.10 (4);

Dipole/5 600 MHz Head Verification/Area Scan (8x8x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 7.90 W/kg

Dipole/5 600 MHz Head Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 50.68 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 19.0 W/kg
SAR(1 g) = 4.12 W/kg; SAR(10 g) = 1.16 W/kg
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Maximum value of SAR (measured) = 10.9 W/kg



0 dB = 7.90 W/kg = 8.98 dBW/kg

■ Verification Data (5 750 MHz Body)

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	20.5 ℃
Test Date:	11/12/2020

DUT: Dipole D5GHzV2; Type: D5GHzV2

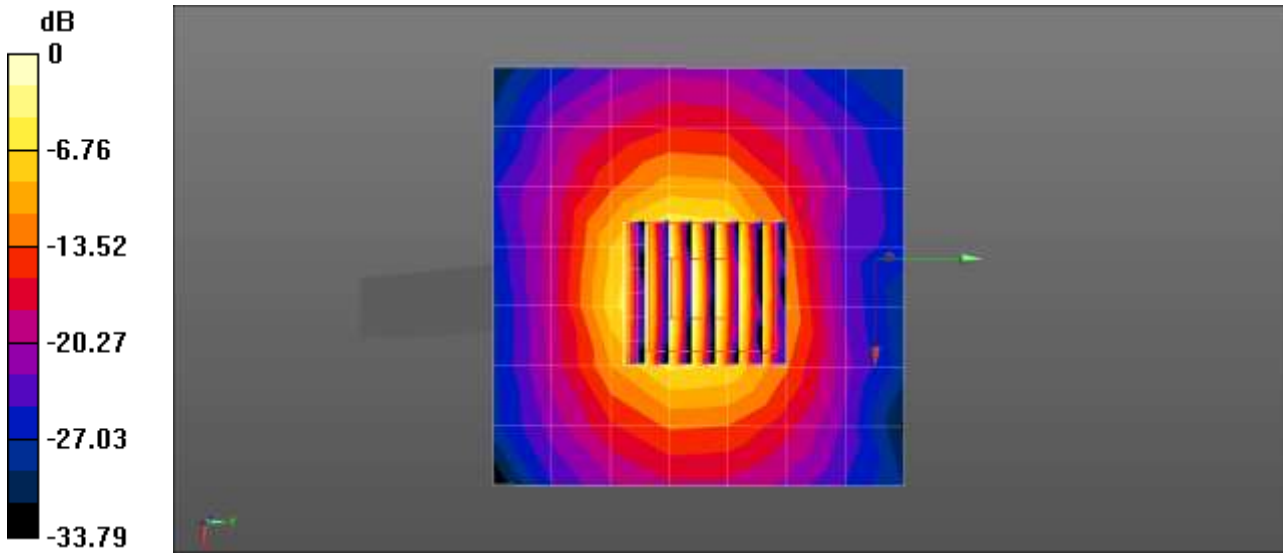
Communication System: UID 0, CW (0); Frequency: 5750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5750 MHz; σ = 5.178 S/m; ε_r = 36.769; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(4.75, 4.75, 4.75)
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1629; Calibrated: 2020-08-11
- Phantom: ELI v5.0, Left
- Measurement SW: DASY52, Version 52.10 (4);

Dipole/5 750 MHz Head Verification/Area Scan (8x8x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 8.22 W/kg

Dipole/5 750 MHz Head Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 48.38 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 20.5 W/kg
SAR(1 g) = 4.04 W/kg; SAR(10 g) = 1.15 W/kg
Smallest distance from peaks to all points 3 dB below = 7.5 mm
Maximum value of SAR (measured) = 10.5 W/kg



0 dB = 8.22 W/kg = 9.15 dBW/kg

Attachment 3. − SAR Tissue Characterization

The brain and muscle mixtures consist of a viscous gel using hydrox-ethyl cellulose (HEC) gelling agent and saline solution (see Table 3.1). Preservation with a bacteriacide is added and visual inspection is made to make sure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. The mixture characterizations used for the brain and muscle tissue simulating liquids are according to the data by C. Gabriel and G. Harts grove.

Ingredients (% by weight)	Frequency (MHz)	
	2 450 – 2 700	3500 - 5 800
Tissue Type	Body	Body
Water	73.2	78.66
Salt (NaCl)	0.1	0.0
Sugar	0.0	0.0
HEC	0.0	0.0
Bactericide	0.0	0.0
Triton X-100	0.0	10.67
DGBE	26.7	0.0
Diethylene glycol hexyl ether	-	-

Salt:	99 % Pure Sodium Chloride	Sugar:	98 % Pure Sucrose
Water:	De-ionized, 16M resistivity	HEC:	Hydroxyethyl Cellulose
DGBE:	99 % Di(ethylene glycol) butyl ether,[2-(2-butoxyethoxy) ethanol]		
Triton X-100(ultra-pure):	Polyethylene glycol mono[4-(1,1,3,3-tetramethylbutyl)phenyl] ether		

Composition of the Tissue Equivalent Matter

Attachment 4. − SAR SYSTEM VALIDATION

Per FCC KCB 865664 D02v01r02, SAR system validation status should be document to confirm measurement accuracy. The SAR systems (including SAR probes, system components and software versions) used for this device were validated against its performance specifications prior to the SAR measurements. Reference dipoles were used with the required tissue- equivalent media for system validation, according to the procedures outlined in IEEE 1528-2013 and FCC KDB 865664 D01v01r04. Since SAR probe calibrations are frequency dependent, each probe calibration point was validated at a frequency within the valid frequency range of the probe calibration point, using the system that normally operates with the probe for routine SAR measurements and according to the required tissue-equivalent media.

A tabulated summary of the system validation status including the validation date(s), measurement frequencies, SAR probes and tissue dielectric parameters has been included.

SAR System No.	Probe	Probe Type	Probe Calibration Point		Dipole	Date	Dielectric Parameters		CW Validation			Modulation Validation		
							Measured Permittivity	Measured Conductivity	Sensitivity	Probe Linearity	Probe Isotropy	MOD. Type	Duty Factor	PAR
12	7370	EX3DV4	Head	2450	1049	2020-09-10	39.4	1.81	PASS	PASS	PASS	OFDM	N/A	PASS
12	7370	EX3DV4	Head	5250	1253	2020-09-10	35.6	4.71	PASS	PASS	PASS	OFDM	N/A	PASS
12	7370	EX3DV4	Head	5600	1253	2020-09-10	35.3	5.04	PASS	PASS	PASS	OFDM	N/A	PASS
12	7370	EX3DV4	Head	5750	1253	2020-09-10	35.8	5.25	PASS	PASS	PASS	OFDM	N/A	PASS

SAR System Validation Summary 1g

Note;

All measurement were performed using probes calibrated for CW signal only. Modulations in the table above represent test configurations for which the measurement system has been validated per FCC KDB Publication 865664 D01v01r04. SAR system were validated for modulated signals with a periodic duty cycle, such as GMSK, or with a high peak to average ratio (>5 dB), such as OFDM according to KDB 865664 D01v01r04.

Attachment 5. − Probe Calibration Data

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client HCT (Dymstec) Certificate No: EX3-7370_Aug20

결	담 당 자	확 인 자
재		
확인일	8월 18, 2020	8월 18, 2020
날 짜	2020. 10. 6	2020. 10. 6

CALIBRATION CERTIFICATE

Object EX3DV4 - SN:7370

Calibration procedure(s) QA CAL-01.v9, QA CAL-14.v6, QA CAL-23.v5, QA CAL-25.v7
Calibration procedure for dosimetric E-field probes

Calibration date: August 31, 2020

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	01-Apr-20 (No. 217-03100/03101)	Apr-21
Power sensor NRP-Z91	SN: 103244	01-Apr-20 (No. 217-03100)	Apr-21
Power sensor NRP-Z91	SN: 103245	01-Apr-20 (No. 217-03101)	Apr-21
Reference 20 dB Attenuator	SN: CC2552 (20x)	31-Mar-20 (No. 217-03106)	Apr-21
DAE4	SN: 660	27-Dec-19 (No. DAE4-660_Dec19)	Dec-20
Reference Probe ES3DV2	SN: 3013	31-Dec-19 (No. ES3-3013_Dec19)	Dec-20
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	08-Apr-16 (in house check Jun-20)	In house check: Jun-22
Power sensor E4412A	SN: MY41498087	08-Apr-16 (in house check Jun-20)	In house check: Jun-22
Power sensor E4412A	SN: 000110210	08-Apr-16 (in house check Jun-20)	In house check: Jun-22
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-20)	In house check: Jun-22
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-19)	In house check: Oct-20

	Name	Function	Signature
Calibrated by:	Jeffrey Katzman	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 3, 2020

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, ", "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy):* in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset:* The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle:* The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

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DASY/EASY - Parameters of Probe: EX3DV4 - SN:7370

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.45	0.50	0.42	± 10.1 %
DCP (mV)[B]	97.1	104.9	97.1	

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Max dev.	Max Unc[E] (k=2)
0	CW	X	0.00	0.00	1.00	0.00	138.3	± 3.5 %	± 4.7 %
		Y	0.00	0.00	1.00		143.8		
		Z	0.00	0.00	1.00		151.5		
10352-AAA	Pulse Waveform (200Hz, 10%)	X	20.00	88.68	18.68	10.00	60.0	± 3.7 %	± 9.6 %
		Y	3.37	68.75	11.61		60.0		
		Z	6.41	76.31	14.67		60.0		
10353-AAA	Pulse Waveform (200Hz, 20%)	X	20.00	90.29	18.35	6.99	80.0	± 2.7 %	± 9.6 %
		Y	3.24	71.76	11.86		80.0		
		Z	20.00	88.81	17.41		80.0		
10354-AAA	Pulse Waveform (200Hz, 40%)	X	20.00	97.01	20.38	3.98	95.0	± 1.4 %	± 9.6 %
		Y	20.00	90.75	16.70		95.0		
		Z	20.00	94.53	18.88		95.0		
10355-AAA	Pulse Waveform (200Hz, 60%)	X	20.00	111.89	26.15	2.22	120.0	± 0.9 %	± 9.6 %
		Y	12.77	98.71	20.24		120.0		
		Z	20.00	110.01	24.88		120.0		
10387-AAA	QPSK Waveform, 1 MHz	X	1.89	67.03	16.05	1.00	150.0	± 1.4 %	± 9.6 %
		Y	1.67	66.59	15.00		150.0		
		Z	1.86	67.55	16.15		150.0		
10388-AAA	QPSK Waveform, 10 MHz	X	2.53	69.48	16.77	0.00	150.0	± 1.0 %	± 9.6 %
		Y	2.19	67.81	15.62		150.0		
		Z	2.48	69.50	16.80		150.0		
10396-AAA	64-QAM Waveform, 100 kHz	X	2.94	70.75	19.25	3.01	150.0	± 0.9 %	± 9.6 %
		Y	2.15	66.37	16.75		150.0		
		Z	2.66	69.64	18.76		150.0		
10399-AAA	64-QAM Waveform, 40 MHz	X	3.72	67.76	16.32	0.00	150.0	± 0.7 %	± 9.6 %
		Y	3.38	66.61	15.44		150.0		
		Z	3.70	67.61	16.35		150.0		
10414-AAA	WLAN CCDF, 64-QAM, 40MHz	X	4.89	65.31	15.54	0.00	150.0	± 1.3 %	± 9.6 %
		Y	4.70	65.46	15.31		150.0		
		Z	4.85	65.42	15.59		150.0		

Note: For details on UID parameters see Appendix

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of Norm X,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 5).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

EX3DV4– SN:7370 August 31, 2020

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7370

Sensor Model Parameters

	C1 fF	C2 fF	α V^{-1}	T1 $ms.V^{-2}$	T2 $ms.V^{-1}$	T3 ms	T4 V^{-2}	T5 V^{-1}	T6
X	52.5	395.96	36.26	9.58	0.00	5.00	1.32	0.18	1.01
Y	37.5	268.07	32.84	3.56	0.00	4.97	1.00	0.07	1.00
Z	46.6	350.09	36.09	7.36	0.00	4.99	1.10	0.15	1.00

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-86.2
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

Note: Measurement distance from surface can be increased to 3-4 mm for an *Area Scan* job.

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DASY/EASY - Parameters of Probe: EX3DV4 - SN:7370

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
600	42.7	0.88	10.40	10.40	10.40	0.10	1.20	± 13.3 %
750	41.9	0.89	10.16	10.16	10.16	0.43	0.80	± 12.0 %
835	41.5	0.90	9.78	9.78	9.78	0.48	0.80	± 12.0 %
900	41.5	0.97	9.57	9.57	9.57	0.37	0.99	± 12.0 %
1450	40.5	1.20	8.53	8.53	8.53	0.33	0.80	± 12.0 %
1750	40.1	1.37	8.38	8.38	8.38	0.30	0.86	± 12.0 %
1900	40.0	1.40	8.19	8.19	8.19	0.34	0.86	± 12.0 %
2000	40.0	1.40	8.13	8.13	8.13	0.32	0.86	± 12.0 %
2300	39.5	1.67	7.73	7.73	7.73	0.35	0.90	± 12.0 %
2450	39.2	1.80	7.50	7.50	7.50	0.37	0.90	± 12.0 %
2600	39.0	1.96	7.35	7.35	7.35	0.35	0.90	± 12.0 %
3300	38.2	2.71	7.10	7.10	7.10	0.30	1.35	± 13.1 %
3500	37.9	2.91	6.90	6.90	6.90	0.30	1.35	± 13.1 %
3700	37.7	3.12	6.87	6.87	6.87	0.40	1.35	± 13.1 %
3900	37.5	3.32	6.40	6.40	6.40	0.35	1.50	± 13.1 %
4100	37.2	3.53	6.37	6.37	6.37	0.35	1.50	± 13.1 %
4400	36.9	3.84	6.10	6.10	6.10	0.40	1.60	± 13.1 %
4600	36.7	4.04	6.03	6.03	6.03	0.40	1.60	± 13.1 %
4800	36.4	4.25	5.94	5.94	5.94	0.40	1.80	± 13.1 %
4950	36.3	4.40	5.72	5.72	5.72	0.40	1.80	± 13.1 %
5250	35.9	4.71	5.15	5.15	5.15	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.60	4.60	4.60	0.40	1.80	± 13.1 %
5750	35.4	5.22	4.75	4.75	4.75	0.40	1.80	± 13.1 %

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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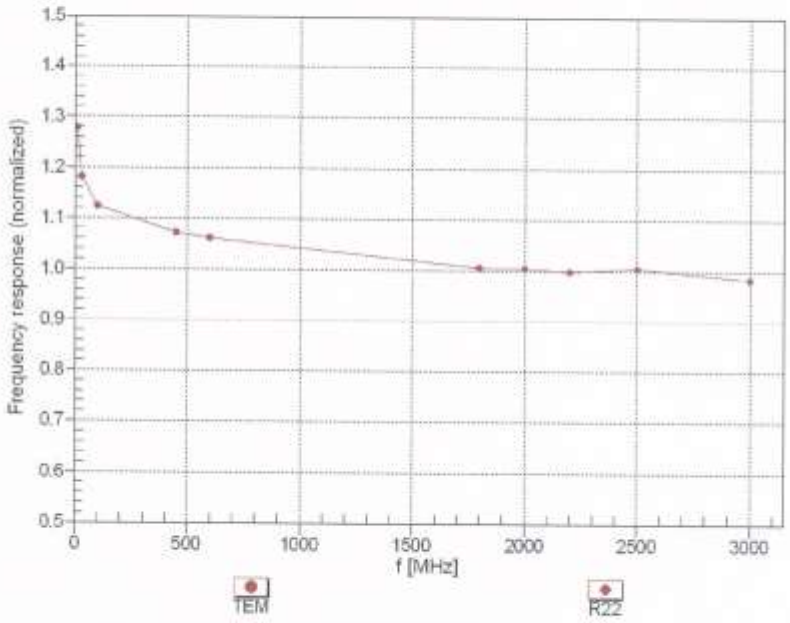
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

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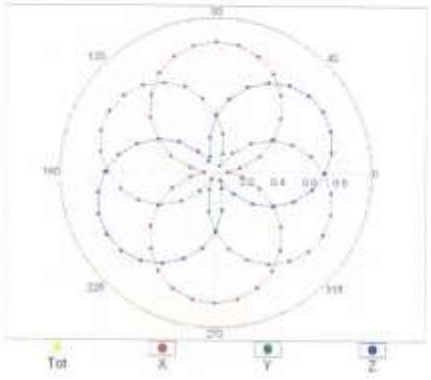
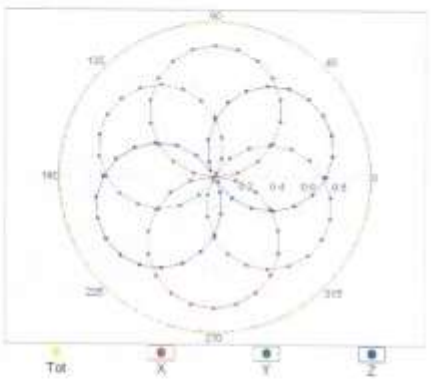
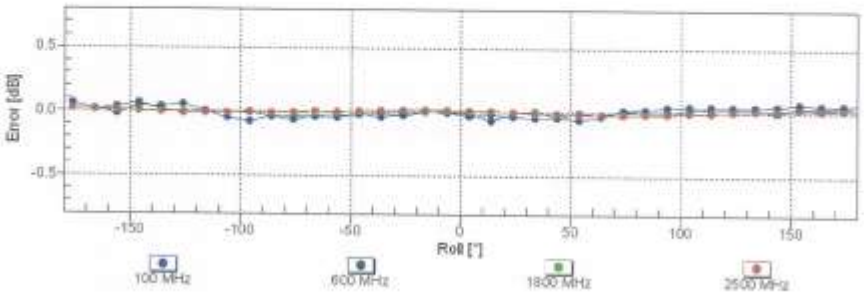
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



f=1800 MHz,R22





Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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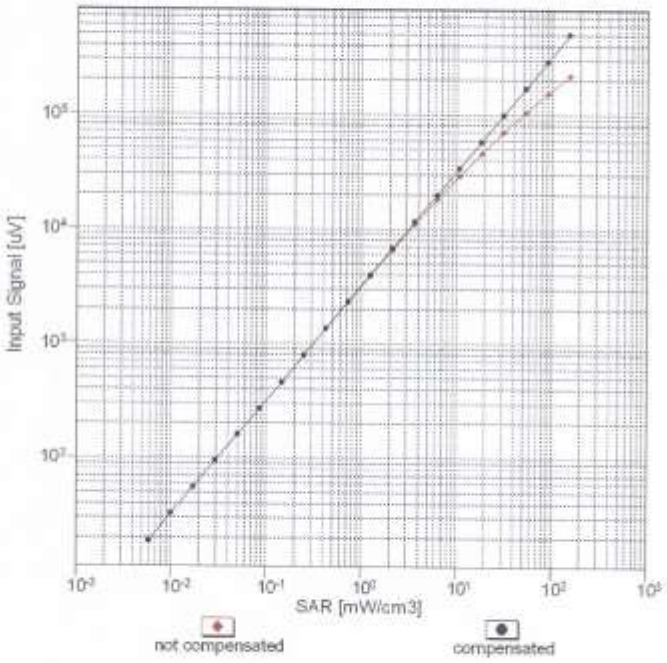
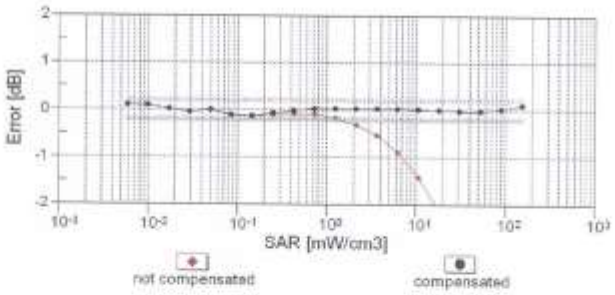
Dynamic Range f(SAR$_{head}$)
(TEM cell , f_{eval}= 1900 MHz)





Uncertainty of Linearity Assessment: ± 0.6% (k=2)

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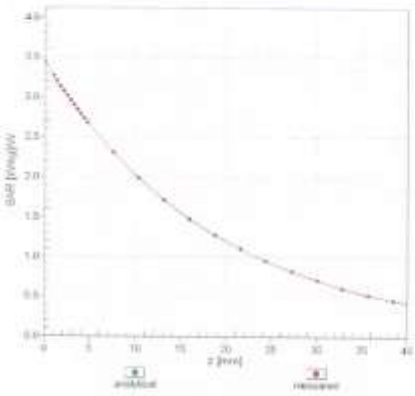
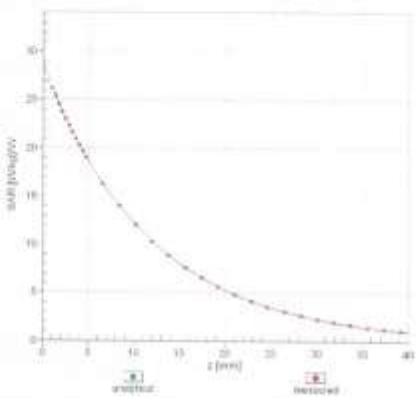
Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

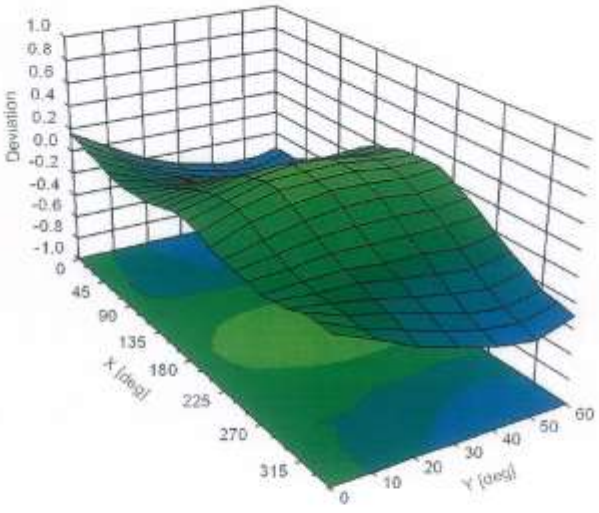


f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

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Appendix: Modulation Calibration Parameters

UID	Rev	Communication System Name	Group	PAR (dB)	Unc[E] (k=2)
0		CW	CW	0.00	± 4.7 %
10010	CAA	SAR Validation (Square, 100ms, 10ms)	Test	10.00	± 9.6 %
10011	CAB	UMTS-FDD (WCDMA)	WCDMA	2.91	± 9.6 %
10012	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	WLAN	1.87	± 9.6 %
10013	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	WLAN	9.46	± 9.6 %
10021	DAC	GSM-FDD (TDMA, GMSK)	GSM	9.39	± 9.6 %
10023	DAC	GPRS-FDD (TDMA, GMSK, TN 0)	GSM	9.57	± 9.6 %
10024	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1)	GSM	6.56	± 9.6 %
10025	DAC	EDGE-FDD (TDMA, 8PSK, TN 0)	GSM	12.62	± 9.6 %
10026	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1)	GSM	9.55	± 9.6 %
10027	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	GSM	4.80	± 9.6 %
10028	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	GSM	3.55	± 9.6 %
10029	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	GSM	7.78	± 9.6 %
10030	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH1)	Bluetooth	5.30	± 9.6 %
10031	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH3)	Bluetooth	1.87	± 9.6 %
10032	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	Bluetooth	1.16	± 9.6 %
10033	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH1)	Bluetooth	7.74	± 9.6 %
10034	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH3)	Bluetooth	4.53	± 9.6 %
10035	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH5)	Bluetooth	3.83	± 9.6 %
10036	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH1)	Bluetooth	8.01	± 9.6 %
10037	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH3)	Bluetooth	4.77	± 9.6 %
10038	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH5)	Bluetooth	4.10	± 9.6 %
10039	CAB	CDMA2000 (1xRTT, RC1)	CDMA2000	4.57	± 9.6 %
10042	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Halfrate)	AMPS	7.78	± 9.6 %
10044	CAA	IS-91/EIA/TIA-553 FDD (FDMA, FM)	AMPS	0.00	± 9.6 %
10048	CAA	DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)	DECT	13.80	± 9.6 %
10049	CAA	DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)	DECT	10.79	± 9.6 %
10056	CAA	UMTS-TDD (TD-SCDMA, 1.28 Mcps)	TD-SCDMA	11.01	± 9.6 %
10058	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	GSM	6.52	± 9.6 %
10059	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)	WLAN	2.12	± 9.6 %
10060	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)	WLAN	2.83	± 9.6 %
10061	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	WLAN	3.60	± 9.6 %
10062	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	WLAN	8.68	± 9.6 %
10063	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	WLAN	8.63	± 9.6 %
10064	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	WLAN	9.09	± 9.6 %
10065	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)	WLAN	9.00	± 9.6 %
10066	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	WLAN	9.38	± 9.6 %
10067	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	WLAN	10.12	± 9.6 %
10068	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	WLAN	10.24	± 9.6 %
10069	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	WLAN	10.56	± 9.6 %
10071	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps)	WLAN	9.83	± 9.6 %
10072	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	WLAN	9.62	± 9.6 %
10073	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)	WLAN	9.94	± 9.6 %
10074	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps)	WLAN	10.30	± 9.6 %
10075	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps)	WLAN	10.77	± 9.6 %
10076	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps)	WLAN	10.94	± 9.6 %
10077	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	WLAN	11.00	± 9.6 %
10081	CAB	CDMA2000 (1xRTT, RC3)	CDMA2000	3.97	± 9.6 %
10082	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Fullrate)	AMPS	4.77	± 9.6 %
10090	DAC	GPRS-FDD (TDMA, GMSK, TN 0-4)	GSM	6.56	± 9.6 %
10097	CAB	UMTS-FDD (HSDPA)	WCDMA	3.98	± 9.6 %
10098	CAB	UMTS-FDD (HSUPA, Subtest 2)	WCDMA	3.98	± 9.6 %
10099	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-4)	GSM	9.55	± 9.6 %
10100	CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-FDD	5.67	± 9.6 %
10101	CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	± 9.6 %
10102	CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10103	CAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-TDD	9.29	± 9.6 %
10104	CAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-TDD	9.97	± 9.6 %
10105	CAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-TDD	10.01	± 9.6 %
10108	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-FDD	5.80	± 9.6 %

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10109	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10110	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-FDD	5.75	± 9.6 %
10111	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-FDD	6.44	± 9.6 %
10112	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-FDD	6.59	± 9.6 %
10113	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-FDD	6.62	± 9.6 %
10114	CAC	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	WLAN	8.10	± 9.6 %
10115	CAC	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	WLAN	8.46	± 9.6 %
10116	CAC	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	WLAN	8.15	± 9.6 %
10117	CAC	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	WLAN	8.07	± 9.6 %
10118	CAC	IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)	WLAN	8.59	± 9.6 %
10119	CAC	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	WLAN	8.13	± 9.6 %
10140	CAE	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-FDD	6.49	± 9.6 %
10141	CAE	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-FDD	6.53	± 9.6 %
10142	CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10143	CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-FDD	6.35	± 9.6 %
10144	CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-FDD	6.65	± 9.6 %
10145	CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-FDD	5.76	± 9.6 %
10146	CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.41	± 9.6 %
10147	CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.72	± 9.6 %
10149	CAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	± 9.6 %
10150	CAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10151	CAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-TDD	9.28	± 9.6 %
10152	CAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-TDD	9.92	± 9.6 %
10153	CAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-TDD	10.05	± 9.6 %
10154	CAG	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-FDD	5.75	± 9.6 %
10155	CAG	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10156	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-FDD	5.79	± 9.6 %
10157	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-FDD	6.49	± 9.6 %
10158	CAG	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-FDD	6.62	± 9.6 %
10159	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-FDD	6.56	± 9.6 %
10160	CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-FDD	5.82	± 9.6 %
10161	CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10162	CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-FDD	6.58	± 9.6 %
10166	CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-FDD	5.46	± 9.6 %
10167	CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.21	± 9.6 %
10168	CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.79	± 9.6 %
10169	CAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10170	CAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10171	AAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-FDD	6.49	± 9.6 %
10172	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10173	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10174	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10175	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10176	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10177	CAI	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10178	CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10179	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10180	CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10181	CAE	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10182	CAE	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10183	AAD	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10184	CAE	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10185	CAE	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-FDD	6.51	± 9.6 %
10186	AAE	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10187	CAF	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10188	CAF	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10189	AAF	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10193	CAC	IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)	WLAN	8.09	± 9.6 %
10194	CAC	IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)	WLAN	8.12	± 9.6 %
10195	CAC	IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)	WLAN	8.21	± 9.6 %
10196	CAC	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	WLAN	8.10	± 9.6 %
10197	CAC	IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)	WLAN	8.13	± 9.6 %
10198	CAC	IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	WLAN	8.27	± 9.6 %
10219	CAC	IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)	WLAN	8.03	± 9.6 %

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10220	CAC	IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)	WLAN	8.13	± 9.6 %
10221	CAC	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)	WLAN	8.27	± 9.6 %
10222	CAC	IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)	WLAN	8.06	± 9.6 %
10223	CAC	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	WLAN	8.48	± 9.6 %
10224	CAC	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	WLAN	8.08	± 9.6 %
10225	CAB	UMTS-FDD (HSPA+)	WCDMA	5.97	± 9.6 %
10226	CAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.49	± 9.6 %
10227	CAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.26	± 9.6 %
10228	CAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-TDD	9.22	± 9.6 %
10229	CAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10230	CAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10231	CAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-TDD	9.19	± 9.6 %
10232	CAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10233	CAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10234	CAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10235	CAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10236	CAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10237	CAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10238	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10239	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10240	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10241	CAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.82	± 9.6 %
10242	CAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-TDD	9.86	± 9.6 %
10243	CAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-TDD	9.46	± 9.6 %
10244	CAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-TDD	10.06	± 9.6 %
10245	CAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-TDD	10.06	± 9.6 %
10246	CAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-TDD	9.30	± 9.6 %
10247	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-TDD	9.91	± 9.6 %
10248	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-TDD	10.09	± 9.6 %
10249	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-TDD	9.29	± 9.6 %
10250	CAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-TDD	9.81	± 9.6 %
10251	CAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-TDD	10.17	± 9.6 %
10252	CAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-TDD	9.24	± 9.6 %
10253	CAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-TDD	9.90	± 9.6 %
10254	CAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-TDD	10.14	± 9.6 %
10255	CAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-TDD	9.20	± 9.6 %
10256	CAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.96	± 9.6 %
10257	CAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.08	± 9.6 %
10258	CAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-TDD	9.34	± 9.6 %
10259	CAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-TDD	9.98	± 9.6 %
10260	CAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-TDD	9.97	± 9.6 %
10261	CAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-TDD	9.24	± 9.6 %
10262	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-TDD	9.83	± 9.6 %
10263	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-TDD	10.16	± 9.6 %
10264	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-TDD	9.23	± 9.6 %
10265	CAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-TDD	9.92	± 9.6 %
10266	CAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-TDD	10.07	± 9.6 %
10267	CAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-TDD	9.30	± 9.6 %
10268	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-TDD	10.06	± 9.6 %
10269	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-TDD	10.13	± 9.6 %
10270	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	LTE-TDD	9.58	± 9.6 %
10274	CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)	WCDMA	4.87	± 9.6 %
10275	CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)	WCDMA	3.96	± 9.6 %
10277	CAA	PHS (QPSK)	PHS	11.81	± 9.6 %
10278	CAA	PHS (QPSK, BW 884MHz, Rolloff 0.5)	PHS	11.81	± 9.6 %
10279	CAA	PHS (QPSK, BW 884MHz, Rolloff 0.38)	PHS	12.18	± 9.6 %
10290	AAB	CDMA2000, RC1, SO55, Full Rate	CDMA2000	3.91	± 9.6 %
10291	AAB	CDMA2000, RC3, SO55, Full Rate	CDMA2000	3.46	± 9.6 %
10292	AAB	CDMA2000, RC3, SO32, Full Rate	CDMA2000	3.39	± 9.6 %
10293	AAB	CDMA2000, RC3, SO3, Full Rate	CDMA2000	3.50	± 9.6 %
10295	AAB	CDMA2000, RC1, SO3, 1/8th Rate 25 fr.	CDMA2000	12.49	± 9.6 %
10297	AAD	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-FDD	5.81	± 9.6 %
10298	AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10299	AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-FDD	6.39	± 9.6 %

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10300	AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10301	AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC)	WiMAX	12.03	± 9.6 %
10302	AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC, 3CTRL)	WiMAX	12.57	± 9.6 %
10303	AAA	IEEE 802.16e WiMAX (31:15, 5ms, 10MHz, 64QAM, PUSC)	WiMAX	12.52	± 9.6 %
10304	AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, 64QAM, PUSC)	WiMAX	11.86	± 9.6 %
10305	AAA	IEEE 802.16e WiMAX (31:15, 10ms, 10MHz, 64QAM, PUSC)	WiMAX	15.24	± 9.6 %
10306	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 64QAM, PUSC)	WiMAX	14.67	± 9.6 %
10307	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, PUSC)	WiMAX	14.49	± 9.6 %
10308	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, PUSC)	WiMAX	14.46	± 9.6 %
10309	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM,AMC 2x3)	WiMAX	14.58	± 9.6 %
10310	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, AMC 2x3	WiMAX	14.57	± 9.6 %
10311	AAD	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	LTE-FDD	6.06	± 9.6 %
10313	AAA	iDEN 1:3	iDEN	10.51	± 9.6 %
10314	AAA	iDEN 1:6	iDEN	13.48	± 9.6 %
10315	AAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc dc)	WLAN	1.71	± 9.6 %
10316	AAB	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc dc)	WLAN	8.36	± 9.6 %
10317	AAC	IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc dc)	WLAN	8.36	± 9.6 %
10352	AAA	Pulse Waveform (200Hz, 10%)	Generic	10.00	± 9.6 %
10353	AAA	Pulse Waveform (200Hz, 20%)	Generic	6.99	± 9.6 %
10354	AAA	Pulse Waveform (200Hz, 40%)	Generic	3.98	± 9.6 %
10355	AAA	Pulse Waveform (200Hz, 60%)	Generic	2.22	± 9.6 %
10356	AAA	Pulse Waveform (200Hz, 80%)	Generic	0.97	± 9.6 %
10387	AAA	QPSK Waveform, 1 MHz	Generic	5.10	± 9.6 %
10388	AAA	QPSK Waveform, 10 MHz	Generic	5.22	± 9.6 %
10396	AAA	64-QAM Waveform, 100 kHz	Generic	6.27	± 9.6 %
10399	AAA	64-QAM Waveform, 40 MHz	Generic	6.27	± 9.6 %
10400	AAD	IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc dc)	WLAN	8.37	± 9.6 %
10401	AAD	IEEE 802.11ac WiFi (40MHz, 64-QAM, 99pc dc)	WLAN	8.60	± 9.6 %
10402	AAD	IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc dc)	WLAN	8.53	± 9.6 %
10403	AAB	CDMA2000 (1xEV-DO, Rev. 0)	CDMA2000	3.76	± 9.6 %
10404	AAB	CDMA2000 (1xEV-DO, Rev. A)	CDMA2000	3.77	± 9.6 %
10406	AAB	CDMA2000, RC3, SO32, SCH0, Full Rate	CDMA2000	5.22	± 9.6 %
10410	AAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Sub=2,3,4,7,8,9)	LTE-TDD	7.82	± 9.6 %
10414	AAA	WLAN CCDF, 64-QAM, 40MHz	Generic	8.54	± 9.6 %
10415	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc dc)	WLAN	1.54	± 9.6 %
10416	AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc dc)	WLAN	8.23	± 9.6 %
10417	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 99pc dc)	WLAN	8.23	± 9.6 %
10418	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc, Long)	WLAN	8.14	± 9.6 %
10419	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc, Short)	WLAN	8.19	± 9.6 %
10422	AAB	IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)	WLAN	8.32	± 9.6 %
10423	AAB	IEEE 802.11n (HT Greenfield, 43.3 Mbps, 16-QAM)	WLAN	8.47	± 9.6 %
10424	AAB	IEEE 802.11n (HT Greenfield, 72.2 Mbps, 64-QAM)	WLAN	8.40	± 9.6 %
10425	AAB	IEEE 802.11n (HT Greenfield, 15 Mbps, BPSK)	WLAN	8.41	± 9.6 %
10426	AAB	IEEE 802.11n (HT Greenfield, 90 Mbps, 16-QAM)	WLAN	8.45	± 9.6 %
10427	AAB	IEEE 802.11n (HT Greenfield, 150 Mbps, 64-QAM)	WLAN	8.41	± 9.6 %
10430	AAD	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1)	LTE-FDD	8.28	± 9.6 %
10431	AAD	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1)	LTE-FDD	8.38	± 9.6 %
10432	AAC	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1)	LTE-FDD	8.34	± 9.6 %
10433	AAC	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1)	LTE-FDD	8.34	± 9.6 %
10434	AAA	W-CDMA (BS Test Model 1, 64 DPCH)	WCDMA	8.60	± 9.6 %
10435	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10447	AAD	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.56	± 9.6 %
10448	AAD	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1, Clippin 44%)	LTE-FDD	7.53	± 9.6 %
10449	AAC	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1, Cliping 44%)	LTE-FDD	7.51	± 9.6 %
10450	AAC	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.48	± 9.6 %
10451	AAA	W-CDMA (BS Test Model 1, 64 DPCH, Clipping 44%)	WCDMA	7.59	± 9.6 %
10453	AAD	Validation (Square, 10ms, 1ms)	Test	10.00	± 9.6 %
10456	AAB	IEEE 802.11ac WiFi (160MHz, 64-QAM, 99pc dc)	WLAN	8.63	± 9.6 %
10457	AAA	UMTS-FDD (DC-HSDPA)	WCDMA	6.62	± 9.6 %
10458	AAA	CDMA2000 (1xEV-DO, Rev. B, 2 carriers)	CDMA2000	6.55	± 9.6 %
10459	AAA	CDMA2000 (1xEV-DO, Rev. B, 3 carriers)	CDMA2000	8.25	± 9.6 %
10460	AAA	UMTS-FDD (WCDMA, AMR)	WCDMA	2.39	± 9.6 %
10461	AAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10462	AAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM, UL Sub)	LTE-TDD	8.30	± 9.6 %

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10463	AAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM, UL Sub)	LTE-TDD	8.56	± 9.6 %
10464	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10465	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10466	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	± 9.6 %
10467	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10468	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10469	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM, UL Sub)	LTE-TDD	8.56	± 9.6 %
10470	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10471	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10472	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	± 9.6 %
10473	AAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10474	AAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10475	AAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	± 9.6 %
10477	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10478	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	± 9.6 %
10479	AAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10480	AAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL Sub)	LTE-TDD	8.18	± 9.6 %
10481	AAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM, UL Sub)	LTE-TDD	8.45	± 9.6 %
10482	AAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL Sub)	LTE-TDD	7.71	± 9.6 %
10483	AAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, Sub)	LTE-TDD	8.39	± 9.6 %
10484	AAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL Sub)	LTE-TDD	8.47	± 9.6 %
10485	AAF	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK, UL Sub)	LTE-TDD	7.59	± 9.6 %
10486	AAF	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM, UL Sub)	LTE-TDD	8.38	± 9.6 %
10487	AAF	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM, UL Sub)	LTE-TDD	8.60	± 9.6 %
10488	AAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK, UL Sub)	LTE-TDD	7.70	± 9.6 %
10489	AAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM, UL Sub)	LTE-TDD	8.31	± 9.6 %
10490	AAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM, UL Sub)	LTE-TDD	8.54	± 9.6 %
10491	AAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10492	AAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM, UL Sub)	LTE-TDD	8.41	± 9.6 %
10493	AAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM, UL Sub)	LTE-TDD	8.55	± 9.6 %
10494	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10495	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM, UL Sub)	LTE-TDD	8.37	± 9.6 %
10496	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM, UL Sub)	LTE-TDD	8.54	± 9.6 %
10497	AAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK, UL Sub)	LTE-TDD	7.67	± 9.6 %
10498	AAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM, UL Sub)	LTE-TDD	8.40	± 9.6 %
10499	AAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM, UL Sub)	LTE-TDD	8.68	± 9.6 %
10500	AAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK, UL Sub)	LTE-TDD	7.67	± 9.6 %
10501	AAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM, UL Sub)	LTE-TDD	8.44	± 9.6 %
10502	AAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM, UL Sub)	LTE-TDD	8.52	± 9.6 %
10503	AAF	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK, UL Sub)	LTE-TDD	7.72	± 9.6 %
10504	AAF	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM, UL Sub)	LTE-TDD	8.31	± 9.6 %
10505	AAF	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM, UL Sub)	LTE-TDD	8.54	± 9.6 %
10506	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10507	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM, UL Sub)	LTE-TDD	8.36	± 9.6 %
10508	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UL Sub)	LTE-TDD	8.55	± 9.6 %
10509	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL Sub)	LTE-TDD	7.99	± 9.6 %
10510	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL Sub)	LTE-TDD	8.49	± 9.6 %
10511	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM, UL Sub)	LTE-TDD	8.51	± 9.6 %
10512	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10513	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL Sub)	LTE-TDD	8.42	± 9.6 %
10514	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL Sub)	LTE-TDD	8.45	± 9.6 %
10515	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 99pc dc)	WLAN	1.58	± 9.6 %
10516	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 99pc dc)	WLAN	1.57	± 9.6 %
10517	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 99pc dc)	WLAN	1.58	± 9.6 %
10518	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 99pc dc)	WLAN	8.23	± 9.6 %
10519	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 99pc dc)	WLAN	8.39	± 9.6 %
10520	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 99pc dc)	WLAN	8.12	± 9.6 %
10521	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 99pc dc)	WLAN	7.97	± 9.6 %
10522	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 99pc dc)	WLAN	8.45	± 9.6 %
10523	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 99pc dc)	WLAN	8.08	± 9.6 %
10524	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 99pc dc)	WLAN	8.27	± 9.6 %
10525	AAB	IEEE 802.11ac WiFi (20MHz, MCS0, 99pc dc)	WLAN	8.36	± 9.6 %
10526	AAB	IEEE 802.11ac WiFi (20MHz, MCS1, 99pc dc)	WLAN	8.42	± 9.6 %
10527	AAB	IEEE 802.11ac WiFi (20MHz, MCS2, 99pc dc)	WLAN	8.21	± 9.6 %

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10528	AAB	IEEE 802.11ac WiFi (20MHz, MCS3, 99pc dc)	WLAN	8.36	± 9.6 %
10529	AAB	IEEE 802.11ac WiFi (20MHz, MCS4, 99pc dc)	WLAN	8.36	± 9.6 %
10531	AAB	IEEE 802.11ac WiFi (20MHz, MCS6, 99pc dc)	WLAN	8.43	± 9.6 %
10532	AAB	IEEE 802.11ac WiFi (20MHz, MCS7, 99pc dc)	WLAN	8.29	± 9.6 %
10533	AAB	IEEE 802.11ac WiFi (20MHz, MCS8, 99pc dc)	WLAN	8.38	± 9.6 %
10534	AAB	IEEE 802.11ac WiFi (40MHz, MCS0, 99pc dc)	WLAN	8.45	± 9.6 %
10535	AAB	IEEE 802.11ac WiFi (40MHz, MCS1, 99pc dc)	WLAN	8.45	± 9.6 %
10536	AAB	IEEE 802.11ac WiFi (40MHz, MCS2, 99pc dc)	WLAN	8.32	± 9.6 %
10537	AAB	IEEE 802.11ac WiFi (40MHz, MCS3, 99pc dc)	WLAN	8.44	± 9.6 %
10538	AAB	IEEE 802.11ac WiFi (40MHz, MCS4, 99pc dc)	WLAN	8.54	± 9.6 %
10540	AAB	IEEE 802.11ac WiFi (40MHz, MCS6, 99pc dc)	WLAN	8.39	± 9.6 %
10541	AAB	IEEE 802.11ac WiFi (40MHz, MCS7, 99pc dc)	WLAN	8.46	± 9.6 %
10542	AAB	IEEE 802.11ac WiFi (40MHz, MCS8, 99pc dc)	WLAN	8.65	± 9.6 %
10543	AAB	IEEE 802.11ac WiFi (40MHz, MCS9, 99pc dc)	WLAN	8.65	± 9.6 %
10544	AAB	IEEE 802.11ac WiFi (80MHz, MCS0, 99pc dc)	WLAN	8.47	± 9.6 %
10545	AAB	IEEE 802.11ac WiFi (80MHz, MCS1, 99pc dc)	WLAN	8.55	± 9.6 %
10546	AAB	IEEE 802.11ac WiFi (80MHz, MCS2, 99pc dc)	WLAN	8.35	± 9.6 %
10547	AAB	IEEE 802.11ac WiFi (80MHz, MCS3, 99pc dc)	WLAN	8.49	± 9.6 %
10548	AAB	IEEE 802.11ac WiFi (80MHz, MCS4, 99pc dc)	WLAN	8.37	± 9.6 %
10550	AAB	IEEE 802.11ac WiFi (80MHz, MCS6, 99pc dc)	WLAN	8.38	± 9.6 %
10551	AAB	IEEE 802.11ac WiFi (80MHz, MCS7, 99pc dc)	WLAN	8.50	± 9.6 %
10552	AAB	IEEE 802.11ac WiFi (80MHz, MCS8, 99pc dc)	WLAN	8.42	± 9.6 %
10553	AAB	IEEE 802.11ac WiFi (80MHz, MCS9, 99pc dc)	WLAN	8.45	± 9.6 %
10554	AAC	IEEE 802.11ac WiFi (160MHz, MCS0, 99pc dc)	WLAN	8.48	± 9.6 %
10555	AAC	IEEE 802.11ac WiFi (160MHz, MCS1, 99pc dc)	WLAN	8.47	± 9.6 %
10556	AAC	IEEE 802.11ac WiFi (160MHz, MCS2, 99pc dc)	WLAN	8.50	± 9.6 %
10557	AAC	IEEE 802.11ac WiFi (160MHz, MCS3, 99pc dc)	WLAN	8.52	± 9.6 %
10558	AAC	IEEE 802.11ac WiFi (160MHz, MCS4, 99pc dc)	WLAN	8.61	± 9.6 %
10560	AAC	IEEE 802.11ac WiFi (160MHz, MCS6, 99pc dc)	WLAN	8.73	± 9.6 %
10561	AAC	IEEE 802.11ac WiFi (160MHz, MCS7, 99pc dc)	WLAN	8.56	± 9.6 %
10562	AAC	IEEE 802.11ac WiFi (160MHz, MCS8, 99pc dc)	WLAN	8.69	± 9.6 %
10563	AAC	IEEE 802.11ac WiFi (160MHz, MCS9, 99pc dc)	WLAN	8.77	± 9.6 %
10564	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 99pc dc)	WLAN	8.25	± 9.6 %
10565	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 99pc dc)	WLAN	8.45	± 9.6 %
10566	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 99pc dc)	WLAN	8.13	± 9.6 %
10567	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 99pc dc)	WLAN	8.00	± 9.6 %
10568	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 99pc dc)	WLAN	8.37	± 9.6 %
10569	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 99pc dc)	WLAN	8.10	± 9.6 %
10570	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 99pc dc)	WLAN	8.30	± 9.6 %
10571	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 90pc dc)	WLAN	1.99	± 9.6 %
10572	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 90pc dc)	WLAN	1.99	± 9.6 %
10573	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 90pc dc)	WLAN	1.98	± 9.6 %
10574	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 90pc dc)	WLAN	1.98	± 9.6 %
10575	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 90pc dc)	WLAN	8.59	± 9.6 %
10576	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 90pc dc)	WLAN	8.60	± 9.6 %
10577	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 90pc dc)	WLAN	8.70	± 9.6 %
10578	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 90pc dc)	WLAN	8.49	± 9.6 %
10579	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 90pc dc)	WLAN	8.36	± 9.6 %
10580	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 90pc dc)	WLAN	8.76	± 9.6 %
10581	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 90pc dc)	WLAN	8.35	± 9.6 %
10582	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 90pc dc)	WLAN	8.67	± 9.6 %
10583	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 90pc dc)	WLAN	8.59	± 9.6 %
10584	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 90pc dc)	WLAN	8.60	± 9.6 %
10585	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 90pc dc)	WLAN	8.70	± 9.6 %
10586	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 90pc dc)	WLAN	8.49	± 9.6 %
10587	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 90pc dc)	WLAN	8.36	± 9.6 %
10588	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 90pc dc)	WLAN	8.76	± 9.6 %
10589	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 90pc dc)	WLAN	8.35	± 9.6 %
10590	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 90pc dc)	WLAN	8.67	± 9.6 %
10591	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS0, 90pc dc)	WLAN	8.63	± 9.6 %
10592	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS1, 90pc dc)	WLAN	8.79	± 9.6 %
10593	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS2, 90pc dc)	WLAN	8.64	± 9.6 %
10594	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS3, 90pc dc)	WLAN	8.74	± 9.6 %
10595	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS4, 90pc dc)	WLAN	8.74	± 9.6 %

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10596	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS5, 90pc dc)	WLAN	8.71	± 9.6 %
10597	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS6, 90pc dc)	WLAN	8.72	± 9.6 %
10598	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS7, 90pc dc)	WLAN	8.50	± 9.6 %
10599	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS0, 90pc dc)	WLAN	8.79	± 9.6 %
10600	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS1, 90pc dc)	WLAN	8.88	± 9.6 %
10601	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS2, 90pc dc)	WLAN	8.82	± 9.6 %
10602	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS3, 90pc dc)	WLAN	8.94	± 9.6 %
10603	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS4, 90pc dc)	WLAN	9.03	± 9.6 %
10604	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS5, 90pc dc)	WLAN	8.76	± 9.6 %
10605	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS6, 90pc dc)	WLAN	8.97	± 9.6 %
10606	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS7, 90pc dc)	WLAN	8.82	± 9.6 %
10607	AAB	IEEE 802.11ac WiFi (20MHz, MCS0, 90pc dc)	WLAN	8.64	± 9.6 %
10608	AAB	IEEE 802.11ac WiFi (20MHz, MCS1, 90pc dc)	WLAN	8.77	± 9.6 %
10609	AAB	IEEE 802.11ac WiFi (20MHz, MCS2, 90pc dc)	WLAN	8.57	± 9.6 %
10610	AAB	IEEE 802.11ac WiFi (20MHz, MCS3, 90pc dc)	WLAN	8.78	± 9.6 %
10611	AAB	IEEE 802.11ac WiFi (20MHz, MCS4, 90pc dc)	WLAN	8.70	± 9.6 %
10612	AAB	IEEE 802.11ac WiFi (20MHz, MCS5, 90pc dc)	WLAN	8.77	± 9.6 %
10613	AAB	IEEE 802.11ac WiFi (20MHz, MCS6, 90pc dc)	WLAN	8.94	± 9.6 %
10614	AAB	IEEE 802.11ac WiFi (20MHz, MCS7, 90pc dc)	WLAN	8.59	± 9.6 %
10615	AAB	IEEE 802.11ac WiFi (20MHz, MCS8, 90pc dc)	WLAN	8.62	± 9.6 %
10616	AAB	IEEE 802.11ac WiFi (40MHz, MCS0, 90pc dc)	WLAN	8.82	± 9.6 %
10617	AAB	IEEE 802.11ac WiFi (40MHz, MCS1, 90pc dc)	WLAN	8.81	± 9.6 %
10618	AAB	IEEE 802.11ac WiFi (40MHz, MCS2, 90pc dc)	WLAN	8.58	± 9.6 %
10619	AAB	IEEE 802.11ac WiFi (40MHz, MCS3, 90pc dc)	WLAN	8.86	± 9.6 %
10620	AAB	IEEE 802.11ac WiFi (40MHz, MCS4, 90pc dc)	WLAN	8.87	± 9.6 %
10621	AAB	IEEE 802.11ac WiFi (40MHz, MCS5, 90pc dc)	WLAN	8.77	± 9.6 %
10622	AAB	IEEE 802.11ac WiFi (40MHz, MCS6, 90pc dc)	WLAN	8.68	± 9.6 %
10623	AAB	IEEE 802.11ac WiFi (40MHz, MCS7, 90pc dc)	WLAN	8.82	± 9.6 %
10624	AAB	IEEE 802.11ac WiFi (40MHz, MCS8, 90pc dc)	WLAN	8.96	± 9.6 %
10625	AAB	IEEE 802.11ac WiFi (40MHz, MCS9, 90pc dc)	WLAN	8.96	± 9.6 %
10626	AAB	IEEE 802.11ac WiFi (80MHz, MCS0, 90pc dc)	WLAN	8.83	± 9.6 %
10627	AAB	IEEE 802.11ac WiFi (80MHz, MCS1, 90pc dc)	WLAN	8.88	± 9.6 %
10628	AAB	IEEE 802.11ac WiFi (80MHz, MCS2, 90pc dc)	WLAN	8.71	± 9.6 %
10629	AAB	IEEE 802.11ac WiFi (80MHz, MCS3, 90pc dc)	WLAN	8.85	± 9.6 %
10630	AAB	IEEE 802.11ac WiFi (80MHz, MCS4, 90pc dc)	WLAN	8.72	± 9.6 %
10631	AAB	IEEE 802.11ac WiFi (80MHz, MCS5, 90pc dc)	WLAN	8.81	± 9.6 %
10632	AAB	IEEE 802.11ac WiFi (80MHz, MCS6, 90pc dc)	WLAN	8.74	± 9.6 %
10633	AAB	IEEE 802.11ac WiFi (80MHz, MCS7, 90pc dc)	WLAN	8.83	± 9.6 %
10634	AAB	IEEE 802.11ac WiFi (80MHz, MCS8, 90pc dc)	WLAN	8.80	± 9.6 %
10635	AAB	IEEE 802.11ac WiFi (80MHz, MCS9, 90pc dc)	WLAN	8.81	± 9.6 %
10636	AAC	IEEE 802.11ac WiFi (160MHz, MCS0, 90pc dc)	WLAN	8.83	± 9.6 %
10637	AAC	IEEE 802.11ac WiFi (160MHz, MCS1, 90pc dc)	WLAN	8.79	± 9.6 %
10638	AAC	IEEE 802.11ac WiFi (160MHz, MCS2, 90pc dc)	WLAN	8.86	± 9.6 %
10639	AAC	IEEE 802.11ac WiFi (160MHz, MCS3, 90pc dc)	WLAN	8.85	± 9.6 %
10640	AAC	IEEE 802.11ac WiFi (160MHz, MCS4, 90pc dc)	WLAN	8.98	± 9.6 %
10641	AAC	IEEE 802.11ac WiFi (160MHz, MCS5, 90pc dc)	WLAN	9.06	± 9.6 %
10642	AAC	IEEE 802.11ac WiFi (160MHz, MCS6, 90pc dc)	WLAN	9.06	± 9.6 %
10643	AAC	IEEE 802.11ac WiFi (160MHz, MCS7, 90pc dc)	WLAN	8.89	± 9.6 %
10644	AAC	IEEE 802.11ac WiFi (160MHz, MCS8, 90pc dc)	WLAN	9.05	± 9.6 %
10645	AAC	IEEE 802.11ac WiFi (160MHz, MCS9, 90pc dc)	WLAN	9.11	± 9.6 %
10646	AAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Sub=2,7)	LTE-TDD	11.96	± 9.6 %
10647	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Sub=2,7)	LTE-TDD	11.96	± 9.6 %
10648	AAA	CDMA2000 (1x Advanced)	CDMA2000	3.45	± 9.6 %
10652	AAE	LTE-TDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	6.91	± 9.6 %
10653	AAE	LTE-TDD (OFDMA, 10 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	7.42	± 9.6 %
10654	AAD	LTE-TDD (OFDMA, 15 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	6.96	± 9.6 %
10655	AAE	LTE-TDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	7.21	± 9.6 %
10658	AAA	Pulse Waveform (200Hz, 10%)	Test	10.00	± 9.6 %
10659	AAA	Pulse Waveform (200Hz, 20%)	Test	6.99	± 9.6 %
10660	AAA	Pulse Waveform (200Hz, 40%)	Test	3.98	± 9.6 %
10661	AAA	Pulse Waveform (200Hz, 60%)	Test	2.22	± 9.6 %
10662	AAA	Pulse Waveform (200Hz, 80%)	Test	0.97	± 9.6 %
10670	AAA	Bluetooth Low Energy	Bluetooth	2.19	± 9.6 %
10671	AAA	IEEE 802.11ax (20MHz, MCS0, 90pc dc)	WLAN	9.09	± 9.6 %

10672	AAA	IEEE 802.11ax (20MHz, MCS1, 90pc dc)	WLAN	8.57	± 9.6 %
10673	AAA	IEEE 802.11ax (20MHz, MCS2, 90pc dc)	WLAN	8.78	± 9.6 %
10674	AAA	IEEE 802.11ax (20MHz, MCS3, 90pc dc)	WLAN	8.74	± 9.6 %
10675	AAA	IEEE 802.11ax (20MHz, MCS4, 90pc dc)	WLAN	8.90	± 9.6 %
10676	AAA	IEEE 802.11ax (20MHz, MCS5, 90pc dc)	WLAN	8.77	± 9.6 %
10677	AAA	IEEE 802.11ax (20MHz, MCS6, 90pc dc)	WLAN	8.73	± 9.6 %
10678	AAA	IEEE 802.11ax (20MHz, MCS7, 90pc dc)	WLAN	8.78	± 9.6 %
10679	AAA	IEEE 802.11ax (20MHz, MCS8, 90pc dc)	WLAN	8.89	± 9.6 %
10680	AAA	IEEE 802.11ax (20MHz, MCS9, 90pc dc)	WLAN	8.80	± 9.6 %
10681	AAA	IEEE 802.11ax (20MHz, MCS10, 90pc dc)	WLAN	8.62	± 9.6 %
10682	AAA	IEEE 802.11ax (20MHz, MCS11, 90pc dc)	WLAN	8.83	± 9.6 %
10683	AAA	IEEE 802.11ax (20MHz, MCS0, 99pc dc)	WLAN	8.42	± 9.6 %
10684	AAA	IEEE 802.11ax (20MHz, MCS1, 99pc dc)	WLAN	8.26	± 9.6 %
10685	AAA	IEEE 802.11ax (20MHz, MCS2, 99pc dc)	WLAN	8.33	± 9.6 %
10686	AAA	IEEE 802.11ax (20MHz, MCS3, 99pc dc)	WLAN	8.28	± 9.6 %
10687	AAA	IEEE 802.11ax (20MHz, MCS4, 99pc dc)	WLAN	8.45	± 9.6 %
10688	AAA	IEEE 802.11ax (20MHz, MCS5, 99pc dc)	WLAN	8.29	± 9.6 %
10689	AAA	IEEE 802.11ax (20MHz, MCS6, 99pc dc)	WLAN	8.55	± 9.6 %
10690	AAA	IEEE 802.11ax (20MHz, MCS7, 99pc dc)	WLAN	8.29	± 9.6 %
10691	AAA	IEEE 802.11ax (20MHz, MCS8, 99pc dc)	WLAN	8.25	± 9.6 %
10692	AAA	IEEE 802.11ax (20MHz, MCS9, 99pc dc)	WLAN	8.29	± 9.6 %
10693	AAA	IEEE 802.11ax (20MHz, MCS10, 99pc dc)	WLAN	8.25	± 9.6 %
10694	AAA	IEEE 802.11ax (20MHz, MCS11, 99pc dc)	WLAN	8.57	± 9.6 %
10695	AAA	IEEE 802.11ax (40MHz, MCS0, 90pc dc)	WLAN	8.78	± 9.6 %
10696	AAA	IEEE 802.11ax (40MHz, MCS1, 90pc dc)	WLAN	8.91	± 9.6 %
10697	AAA	IEEE 802.11ax (40MHz, MCS2, 90pc dc)	WLAN	8.61	± 9.6 %
10698	AAA	IEEE 802.11ax (40MHz, MCS3, 90pc dc)	WLAN	8.89	± 9.6 %
10699	AAA	IEEE 802.11ax (40MHz, MCS4, 90pc dc)	WLAN	8.82	± 9.6 %
10700	AAA	IEEE 802.11ax (40MHz, MCS5, 90pc dc)	WLAN	8.73	± 9.6 %
10701	AAA	IEEE 802.11ax (40MHz, MCS6, 90pc dc)	WLAN	8.86	± 9.6 %
10702	AAA	IEEE 802.11ax (40MHz, MCS7, 90pc dc)	WLAN	8.70	± 9.6 %
10703	AAA	IEEE 802.11ax (40MHz, MCS8, 90pc dc)	WLAN	8.82	± 9.6 %
10704	AAA	IEEE 802.11ax (40MHz, MCS9, 90pc dc)	WLAN	8.56	± 9.6 %
10705	AAA	IEEE 802.11ax (40MHz, MCS10, 90pc dc)	WLAN	8.69	± 9.6 %
10706	AAA	IEEE 802.11ax (40MHz, MCS11, 90pc dc)	WLAN	8.66	± 9.6 %
10707	AAA	IEEE 802.11ax (40MHz, MCS0, 99pc dc)	WLAN	8.32	± 9.6 %
10708	AAA	IEEE 802.11ax (40MHz, MCS1, 99pc dc)	WLAN	8.55	± 9.6 %
10709	AAA	IEEE 802.11ax (40MHz, MCS2, 99pc dc)	WLAN	8.33	± 9.6 %
10710	AAA	IEEE 802.11ax (40MHz, MCS3, 99pc dc)	WLAN	8.29	± 9.6 %
10711	AAA	IEEE 802.11ax (40MHz, MCS4, 99pc dc)	WLAN	8.39	± 9.6 %
10712	AAA	IEEE 802.11ax (40MHz, MCS5, 99pc dc)	WLAN	8.67	± 9.6 %
10713	AAA	IEEE 802.11ax (40MHz, MCS6, 99pc dc)	WLAN	8.33	± 9.6 %
10714	AAA	IEEE 802.11ax (40MHz, MCS7, 99pc dc)	WLAN	8.26	± 9.6 %
10715	AAA	IEEE 802.11ax (40MHz, MCS8, 99pc dc)	WLAN	8.45	± 9.6 %
10716	AAA	IEEE 802.11ax (40MHz, MCS9, 99pc dc)	WLAN	8.30	± 9.6 %
10717	AAA	IEEE 802.11ax (40MHz, MCS10, 99pc dc)	WLAN	8.48	± 9.6 %
10718	AAA	IEEE 802.11ax (40MHz, MCS11, 99pc dc)	WLAN	8.24	± 9.6 %
10719	AAA	IEEE 802.11ax (80MHz, MCS0, 90pc dc)	WLAN	8.81	± 9.6 %
10720	AAA	IEEE 802.11ax (80MHz, MCS1, 90pc dc)	WLAN	8.87	± 9.6 %
10721	AAA	IEEE 802.11ax (80MHz, MCS2, 90pc dc)	WLAN	8.76	± 9.6 %
10722	AAA	IEEE 802.11ax (80MHz, MCS3, 90pc dc)	WLAN	8.55	± 9.6 %
10723	AAA	IEEE 802.11ax (80MHz, MCS4, 90pc dc)	WLAN	8.70	± 9.6 %
10724	AAA	IEEE 802.11ax (80MHz, MCS5, 90pc dc)	WLAN	8.90	± 9.6 %
10725	AAA	IEEE 802.11ax (80MHz, MCS6, 90pc dc)	WLAN	8.74	± 9.6 %
10726	AAA	IEEE 802.11ax (80MHz, MCS7, 90pc dc)	WLAN	8.72	± 9.6 %
10727	AAA	IEEE 802.11ax (80MHz, MCS8, 90pc dc)	WLAN	8.66	± 9.6 %
10728	AAA	IEEE 802.11ax (80MHz, MCS9, 90pc dc)	WLAN	8.65	± 9.6 %
10729	AAA	IEEE 802.11ax (80MHz, MCS10, 90pc dc)	WLAN	8.64	± 9.6 %
10730	AAA	IEEE 802.11ax (80MHz, MCS11, 90pc dc)	WLAN	8.67	± 9.6 %
10731	AAA	IEEE 802.11ax (80MHz, MCS0, 99pc dc)	WLAN	8.42	± 9.6 %
10732	AAA	IEEE 802.11ax (80MHz, MCS1, 99pc dc)	WLAN	8.46	± 9.6 %
10733	AAA	IEEE 802.11ax (80MHz, MCS2, 99pc dc)	WLAN	8.40	± 9.6 %
10734	AAA	IEEE 802.11ax (80MHz, MCS3, 99pc dc)	WLAN	8.25	± 9.6 %
10735	AAA	IEEE 802.11ax (80MHz, MCS4, 99pc dc)	WLAN	8.33	± 9.6 %

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10736	AAA	IEEE 802.11ax (80MHz, MCS5, 99pc dc)	WLAN	8.27	± 9.6 %
10737	AAA	IEEE 802.11ax (80MHz, MCS6, 99pc dc)	WLAN	8.36	± 9.6 %
10738	AAA	IEEE 802.11ax (80MHz, MCS7, 99pc dc)	WLAN	8.42	± 9.6 %
10739	AAA	IEEE 802.11ax (80MHz, MCS8, 99pc dc)	WLAN	8.29	± 9.6 %
10740	AAA	IEEE 802.11ax (80MHz, MCS9, 99pc dc)	WLAN	8.48	± 9.6 %
10741	AAA	IEEE 802.11ax (80MHz, MCS10, 99pc dc)	WLAN	8.40	± 9.6 %
10742	AAA	IEEE 802.11ax (80MHz, MCS11, 99pc dc)	WLAN	8.43	± 9.6 %
10743	AAA	IEEE 802.11ax (160MHz, MCS0, 90pc dc)	WLAN	8.94	± 9.6 %
10744	AAA	IEEE 802.11ax (160MHz, MCS1, 90pc dc)	WLAN	9.16	± 9.6 %
10745	AAA	IEEE 802.11ax (160MHz, MCS2, 90pc dc)	WLAN	8.93	± 9.6 %
10746	AAA	IEEE 802.11ax (160MHz, MCS3, 90pc dc)	WLAN	9.11	± 9.6 %
10747	AAA	IEEE 802.11ax (160MHz, MCS4, 90pc dc)	WLAN	9.04	± 9.6 %
10748	AAA	IEEE 802.11ax (160MHz, MCS5, 90pc dc)	WLAN	8.93	± 9.6 %
10749	AAA	IEEE 802.11ax (160MHz, MCS6, 90pc dc)	WLAN	8.90	± 9.6 %
10750	AAA	IEEE 802.11ax (160MHz, MCS7, 90pc dc)	WLAN	8.79	± 9.6 %
10751	AAA	IEEE 802.11ax (160MHz, MCS8, 90pc dc)	WLAN	8.82	± 9.6 %
10752	AAA	IEEE 802.11ax (160MHz, MCS9, 90pc dc)	WLAN	8.81	± 9.6 %
10753	AAA	IEEE 802.11ax (160MHz, MCS10, 90pc dc)	WLAN	9.00	± 9.6 %
10754	AAA	IEEE 802.11ax (160MHz, MCS11, 90pc dc)	WLAN	8.94	± 9.6 %
10755	AAA	IEEE 802.11ax (160MHz, MCS0, 99pc dc)	WLAN	8.64	± 9.6 %
10756	AAA	IEEE 802.11ax (160MHz, MCS1, 99pc dc)	WLAN	8.77	± 9.6 %
10757	AAA	IEEE 802.11ax (160MHz, MCS2, 99pc dc)	WLAN	8.77	± 9.6 %
10758	AAA	IEEE 802.11ax (160MHz, MCS3, 99pc dc)	WLAN	8.69	± 9.6 %
10759	AAA	IEEE 802.11ax (160MHz, MCS4, 99pc dc)	WLAN	8.58	± 9.6 %
10760	AAA	IEEE 802.11ax (160MHz, MCS5, 99pc dc)	WLAN	8.49	± 9.6 %
10761	AAA	IEEE 802.11ax (160MHz, MCS6, 99pc dc)	WLAN	8.58	± 9.6 %
10762	AAA	IEEE 802.11ax (160MHz, MCS7, 99pc dc)	WLAN	8.49	± 9.6 %
10763	AAA	IEEE 802.11ax (160MHz, MCS8, 99pc dc)	WLAN	8.53	± 9.6 %
10764	AAA	IEEE 802.11ax (160MHz, MCS9, 99pc dc)	WLAN	8.54	± 9.6 %
10765	AAA	IEEE 802.11ax (160MHz, MCS10, 99pc dc)	WLAN	8.54	± 9.6 %
10766	AAA	IEEE 802.11ax (160MHz, MCS11, 99pc dc)	WLAN	8.51	± 9.6 %
10767	AAC	5G NR (CP-OFDM, 1 RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	7.99	± 9.6 %
10768	AAC	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.01	± 9.6 %
10769	AAC	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.01	± 9.6 %
10770	AAC	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.02	± 9.6 %
10771	AAC	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.02	± 9.6 %
10772	AAC	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.23	± 9.6 %
10773	AAC	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.03	± 9.6 %
10774	AAC	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.02	± 9.6 %
10775	AAB	5G NR (CP-OFDM, 50% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.31	± 9.6 %
10776	AAC	5G NR (CP-OFDM, 50% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.30	± 9.6 %
10777	AAB	5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.30	± 9.6 %
10778	AAC	5G NR (CP-OFDM, 50% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10779	AAB	5G NR (CP-OFDM, 50% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.42	± 9.6 %
10780	AAC	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.38	± 9.6 %
10781	AAC	5G NR (CP-OFDM, 50% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.38	± 9.6 %
10782	AAC	5G NR (CP-OFDM, 50% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.43	± 9.6 %
10783	AAC	5G NR (CP-OFDM, 100% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.31	± 9.6 %
10784	AAC	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.29	± 9.6 %
10785	AAC	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.40	± 9.6 %
10786	AAC	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.35	± 9.6 %
10787	AAC	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.44	± 9.6 %
10788	AAC	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.39	± 9.6 %
10789	AAC	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.37	± 9.6 %
10790	AAC	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.39	± 9.6 %
10791	AAC	5G NR (CP-OFDM, 1 RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.83	± 9.6 %
10792	AAC	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.92	± 9.6 %
10793	AAC	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.95	± 9.6 %
10794	AAC	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.82	± 9.6 %
10795	AAC	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.84	± 9.6 %
10796	AAC	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.82	± 9.6 %
10797	AAC	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.01	± 9.6 %
10798	AAC	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.89	± 9.6 %
10799	AAC	5G NR (CP-OFDM, 1 RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.93	± 9.6 %

10801	AAC	5G NR (CP-OFDM, 1 RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.89	± 9.6 %
10802	AAC	5G NR (CP-OFDM, 1 RB, 90 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.87	± 9.6 %
10803	AAC	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.93	± 9.6 %
10805	AAC	5G NR (CP-OFDM, 50% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10806	AAC	5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.37	± 9.6 %
10809	AAC	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10810	AAC	5G NR (CP-OFDM, 50% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10812	AAC	5G NR (CP-OFDM, 50% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.35	± 9.6 %
10817	AAC	5G NR (CP-OFDM, 100% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.35	± 9.6 %
10818	AAC	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10819	AAC	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.33	± 9.6 %
10820	AAC	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.30	± 9.6 %
10821	AAC	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10822	AAC	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10823	AAC	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.36	± 9.6 %
10824	AAC	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.39	± 9.6 %
10825	AAC	5G NR (CP-OFDM, 100% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10827	AAC	5G NR (CP-OFDM, 100% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.42	± 9.6 %
10828	AAC	5G NR (CP-OFDM, 100% RB, 90 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.43	± 9.6 %
10829	AAC	5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.40	± 9.6 %
10830	AAC	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.63	± 9.6 %
10831	AAC	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.73	± 9.6 %
10832	AAC	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.74	± 9.6 %
10833	AAC	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.70	± 9.6 %
10834	AAC	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.75	± 9.6 %
10835	AAC	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.70	± 9.6 %
10836	AAC	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.66	± 9.6 %
10837	AAC	5G NR (CP-OFDM, 1 RB, 60 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.68	± 9.6 %
10839	AAC	5G NR (CP-OFDM, 1 RB, 80 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.70	± 9.6 %
10840	AAC	5G NR (CP-OFDM, 1 RB, 90 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.67	± 9.6 %
10841	AAC	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.71	± 9.6 %
10843	AAC	5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.49	± 9.6 %
10844	AAC	5G NR (CP-OFDM, 50% RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10846	AAC	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10854	AAC	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10855	AAC	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.36	± 9.6 %
10856	AAC	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.37	± 9.6 %
10857	AAC	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.35	± 9.6 %
10858	AAC	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.36	± 9.6 %
10859	AAC	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10860	AAC	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10861	AAC	5G NR (CP-OFDM, 100% RB, 60 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.40	± 9.6 %
10863	AAC	5G NR (CP-OFDM, 100% RB, 80 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10864	AAC	5G NR (CP-OFDM, 100% RB, 90 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.37	± 9.6 %
10865	AAC	5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10866	AAC	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10868	AAC	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.89	± 9.6 %
10869	AAD	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.75	± 9.6 %
10870	AAD	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.86	± 9.6 %
10871	AAD	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	5.75	± 9.6 %
10872	AAD	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.52	± 9.6 %
10873	AAD	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.61	± 9.6 %
10874	AAD	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.65	± 9.6 %
10875	AAD	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	7.78	± 9.6 %
10876	AAD	5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	8.39	± 9.6 %
10877	AAD	5G NR (CP-OFDM, 1 RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	7.95	± 9.6 %
10878	AAD	5G NR (CP-OFDM, 100% RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.41	± 9.6 %
10879	AAD	5G NR (CP-OFDM, 1 RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.12	± 9.6 %
10880	AAD	5G NR (CP-OFDM, 100% RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.38	± 9.6 %
10881	AAD	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.75	± 9.6 %
10882	AAD	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.96	± 9.6 %
10883	AAD	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.57	± 9.6 %
10884	AAD	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.53	± 9.6 %
10885	AAD	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.61	± 9.6 %

10886	AAD	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.65	± 9.6 %
10887	AAD	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	7.78	± 9.6 %
10888	AAD	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	8.35	± 9.6 %
10889	AAD	5G NR (CP-OFDM, 1 RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.02	± 9.6 %
10890	AAD	5G NR (CP-OFDM, 100% RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.40	± 9.6 %
10891	AAD	5G NR (CP-OFDM, 1 RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.13	± 9.6 %
10892	AAD	5G NR (CP-OFDM, 100% RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.41	± 9.6 %
10897	AAA	5G NR (DFT-s-OFDM, 1 RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.66	± 9.6 %
10898	AAA	5G NR (DFT-s-OFDM, 1 RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.67	± 9.6 %
10899	AAA	5G NR (DFT-s-OFDM, 1 RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.67	± 9.6 %
10900	AAA	5G NR (DFT-s-OFDM, 1 RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10901	AAA	5G NR (DFT-s-OFDM, 1 RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10902	AAA	5G NR (DFT-s-OFDM, 1 RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10903	AAA	5G NR (DFT-s-OFDM, 1 RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10904	AAA	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10905	AAA	5G NR (DFT-s-OFDM, 1 RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10906	AAA	5G NR (DFT-s-OFDM, 1 RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10907	AAA	5G NR (DFT-s-OFDM, 50% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.78	± 9.6 %
10908	AAA	5G NR (DFT-s-OFDM, 50% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.93	± 9.6 %
10909	AAA	5G NR (DFT-s-OFDM, 50% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.96	± 9.6 %
10910	AAA	5G NR (DFT-s-OFDM, 50% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.83	± 9.6 %
10911	AAA	5G NR (DFT-s-OFDM, 50% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.93	± 9.6 %
10912	AAA	5G NR (DFT-s-OFDM, 50% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10913	AAA	5G NR (DFT-s-OFDM, 50% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10914	AAA	5G NR (DFT-s-OFDM, 50% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.85	± 9.6 %
10915	AAA	5G NR (DFT-s-OFDM, 50% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.83	± 9.6 %
10916	AAA	5G NR (DFT-s-OFDM, 50% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.87	± 9.6 %
10917	AAA	5G NR (DFT-s-OFDM, 50% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.94	± 9.6 %
10918	AAA	5G NR (DFT-s-OFDM, 100% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.86	± 9.6 %
10919	AAA	5G NR (DFT-s-OFDM, 100% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.86	± 9.6 %
10920	AAA	5G NR (DFT-s-OFDM, 100% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.87	± 9.6 %
10921	AAA	5G NR (DFT-s-OFDM, 100% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10922	AAA	5G NR (DFT-s-OFDM, 100% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.82	± 9.6 %
10923	AAA	5G NR (DFT-s-OFDM, 100% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10924	AAA	5G NR (DFT-s-OFDM, 100% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10925	AAA	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.95	± 9.6 %
10926	AAA	5G NR (DFT-s-OFDM, 100% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10927	AAA	5G NR (DFT-s-OFDM, 100% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.94	± 9.6 %
10928	AAA	5G NR (DFT-s-OFDM, 1 RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	± 9.6 %
10929	AAA	5G NR (DFT-s-OFDM, 1 RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	± 9.6 %
10930	AAA	5G NR (DFT-s-OFDM, 1 RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	± 9.6 %
10931	AAA	5G NR (DFT-s-OFDM, 1 RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10932	AAA	5G NR (DFT-s-OFDM, 1 RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10933	AAA	5G NR (DFT-s-OFDM, 1 RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10934	AAA	5G NR (DFT-s-OFDM, 1 RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10935	AAA	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10936	AAA	5G NR (DFT-s-OFDM, 50% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.90	± 9.6 %
10937	AAA	5G NR (DFT-s-OFDM, 50% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.77	± 9.6 %
10938	AAA	5G NR (DFT-s-OFDM, 50% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.90	± 9.6 %
10939	AAA	5G NR (DFT-s-OFDM, 50% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.82	± 9.6 %
10940	AAA	5G NR (DFT-s-OFDM, 50% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.89	± 9.6 %
10941	AAA	5G NR (DFT-s-OFDM, 50% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.83	± 9.6 %
10942	AAA	5G NR (DFT-s-OFDM, 50% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.85	± 9.6 %
10943	AAA	5G NR (DFT-s-OFDM, 50% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.95	± 9.6 %
10944	AAA	5G NR (DFT-s-OFDM, 100% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.81	± 9.6 %
10945	AAA	5G NR (DFT-s-OFDM, 100% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.85	± 9.6 %
10946	AAA	5G NR (DFT-s-OFDM, 100% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.83	± 9.6 %
10947	AAA	5G NR (DFT-s-OFDM, 100% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.87	± 9.6 %
10948	AAA	5G NR (DFT-s-OFDM, 100% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.94	± 9.6 %
10949	AAA	5G NR (DFT-s-OFDM, 100% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.87	± 9.6 %
10950	AAA	5G NR (DFT-s-OFDM, 100% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.94	± 9.6 %
10951	AAA	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.92	± 9.6 %
10952	AAA	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.25	± 9.6 %
10953	AAA	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.15	± 9.6 %

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10954	AAA	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.23	± 9.6 %
10955	AAA	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.42	± 9.6 %
10956	AAA	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.14	± 9.6 %
10957	AAA	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.31	± 9.6 %
10958	AAA	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.61	± 9.6 %
10959	AAA	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.33	± 9.6 %
10960	AAA	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.32	± 9.6 %
10961	AAA	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.36	± 9.6 %
10962	AAA	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.40	± 9.6 %
10963	AAA	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.55	± 9.6 %
10964	AAA	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.29	± 9.6 %
10965	AAA	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.37	± 9.6 %
10966	AAA	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.55	± 9.6 %
10967	AAA	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.42	± 9.6 %
10968	AAA	5G NR DL (CP-OFDM, TM 3.1, 100 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.49	± 9.6 %

[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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Attachment 6. − Dipole Calibration Data

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client HCT (Dymstec) Certificate No: D2450V2-1049_Aug20

CALIBRATION CERTIFICATE

결	검 사 자	확 인 자
재		
서명/날	5.W / 08.25	5.O / 08.25
일 자	2020 / 10. 6	2020 / 10. 6

Object D2450V2 - SN:1049

Calibration procedure(s) QA CAL-05.v11
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz

Calibration date: August 26, 2020

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	01-Apr-20 (No. 217-03100/03101)	Apr-21
Power sensor NRP-Z91	SN: 103244	01-Apr-20 (No. 217-03100)	Apr-21
Power sensor NRP-Z91	SN: 103245	01-Apr-20 (No. 217-03101)	Apr-21
Reference 20 dB Attenuator	SN: BH9394 (20k)	31-Mar-20 (No. 217-03106)	Apr-21
Type-N mismatch combination	SN: 310982 / 06327	31-Mar-20 (No. 217-03104)	Apr-21
Reference Probe EX3DV4	SN: 7349	29-Jun-20 (No. EX3-7349_Jun20)	Jun-21
DAE4	SN: 601	27-Dec-19 (No. DAE4-601_Dec19)	Dec-20

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Feb-19)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-19)	In house check: Oct-20

	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 31, 2020

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.9 ± 6 %	1.84 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.0 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**51.4 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.06 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.1 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.5 Ω + 8.5 jΩ
Return Loss	- 21.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.161 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG

DASY5 Validation Report for Head TSL

Date: 26.08.2020

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:1049

Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.84 S/m; ε_r = 38.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

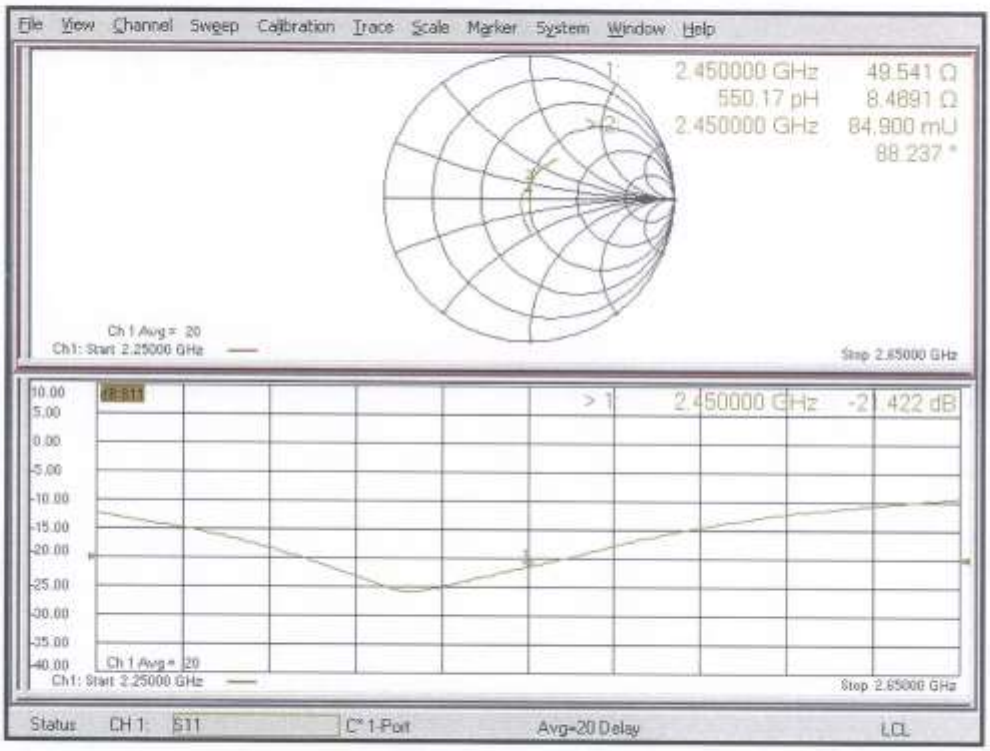
- Probe: EX3DV4 - SN7349; ConvF(7.74, 7.74, 7.74) @ 2450 MHz; Calibrated: 29.06.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.12.2019
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 115.7 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 25.5 W/kg
SAR(1 g) = 13 W/kg; SAR(10 g) = 6.06 W/kg
Smallest distance from peaks to all points 3 dB below = 9 mm
Ratio of SAR at M2 to SAR at M1 = 51.3%
Maximum value of SAR (measured) = 21.4 W/kg

0 dB = 21.4 W/kg = 13.30 dBW/kg

Impedance Measurement Plot for Head TSL



Appendix: Transfer Calibration at Four Validation Locations on SAM Head[1]

Evaluation Condition

Phantom	SAM Head Phantom	For usage with cSAR3D**V2**-R/L

SAR result with SAM Head (Top ≅ C0)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	normalized to 1W	**54.8 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR for nominal Head TSL parameters	normalized to 1W	**25.6 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Mouth ≅ F90)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	normalized to 1W	**55.9 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR for nominal Head TSL parameters	normalized to 1W	**26.9 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Neck ≅ H0)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	normalized to 1W	**52.6 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR for nominal Head TSL parameters	normalized to 1W	**24.5 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Ear ≅ D90)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	normalized to 1W	**33.7 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR for nominal Head TSL parameters	normalized to 1W	**17.1 W/kg ± 16.9 % (k=2)**

[1] Additional assessments outside the current scope of SCS 0108

Calibration Laboratory of
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Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accreditation No.: **SCS 0108**

Client **HCT (Dymstec)**

Certificate No: **D5GHzV2-1253_Aug20**

CALIBRATION CERTIFICATE

결재	담 당 자	확 인 자
자격/성명	SW / 박대정	TJ / 서승남
일 자	2020 / 10. 6	2020 / 10. 6

Object	D5GHzV2 - SN:1253
Calibration procedure(s)	QA CAL-22.v5 Calibration Procedure for SAR Validation Sources between 3-10 GHz
Calibration date:	August 31, 2020

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	01-Apr-20 (No. 217-03100/03101)	Apr-21
Power sensor NRP-Z91	SN: 103244	01-Apr-20 (No. 217-03100)	Apr-21
Power sensor NRP-Z91	SN: 103245	01-Apr-20 (No. 217-03101)	Apr-21
Reference 20 dB Attenuator	SN: BH9394 (20k)	31-Mar-20 (No. 217-03106)	Apr-21
Type-N mismatch combination	SN: 310982 / 06327	31-Mar-20 (No. 217-03104)	Apr-21
Reference Probe EX3DV4	SN: 3503	31-Dec-19 (No. EX3-3503_Dec19)	Dec-20
DAE4	SN: 601	27-Dec-19 (No. DAE4-601_Dec19)	Dec-20

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Feb-19)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-19)	In house check: Oct-20

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	[signature]
Approved by:	Katja Pokovic	Technical Manager	[signature]

Issued: August 31, 2020

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: D5GHzV2-1253_Aug20 Page 1 of 8

Calibration Laboratory of
Schmid & Partner
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Accreditation No.: SCS 0108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 10.0 mm, dz = 10.0 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5250 MHz ± 1 MHz 5600 MHz ± 1 MHz 5750 MHz ± 1 MHz	

Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	35.9	4.71 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.6 ± 6 %	4.48 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5250 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.04 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**79.7 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.31 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.8 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.2 ± 6 %	4.83 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.31 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**82.2 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.5 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.4	5.22 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.0 ± 6 %	4.98 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5750 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.04 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**79.6 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.30 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.7 W/kg ± 19.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	50.2 Ω - 4.4 jΩ
Return Loss	- 27.1 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	52.0 Ω + 1.8 jΩ
Return Loss	- 31.6 dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	55.8 Ω + 2.3 jΩ
Return Loss	- 24.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.195 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG

DASY5 Validation Report for Head TSL

Date: 31.08.2020

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1253

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 4.48 S/m; ε_r = 34.6; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5600 MHz; σ = 4.83 S/m; ε_r = 34.2; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5750 MHz; σ = 4.98 S/m; ε_r = 34.0; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

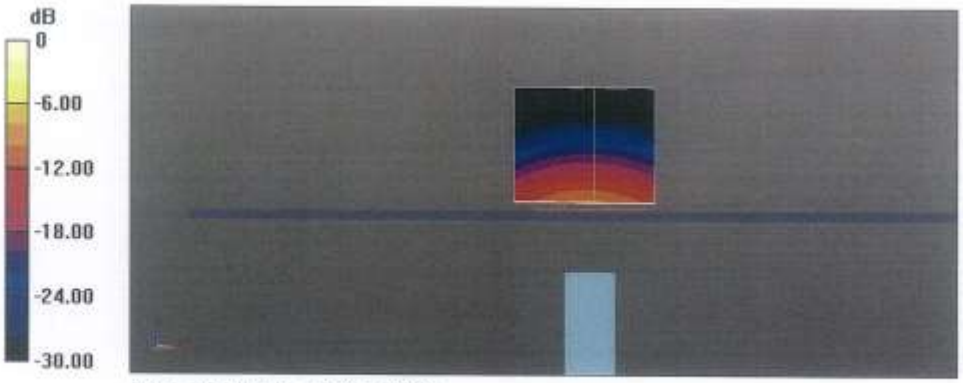
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.5, 5.5, 5.5) @ 5250 MHz,
  ConvF(5.1, 5.1, 5.1) @ 5600 MHz, ConvF(5.08, 5.08, 5.08) @ 5750 MHz; Calibrated: 31.12.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.12.2019
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 77.63 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 27.8 W/kg
SAR(1 g) = 8.04 W/kg; SAR(10 g) = 2.31 W/kg
Smallest distance from peaks to all points 3 dB below = 7.4 mm
Ratio of SAR at M2 to SAR at M1 = 69.8%
Maximum value of SAR (measured) = 18.3 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 77.49 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 31.3 W/kg
SAR(1 g) = 8.31 W/kg; SAR(10 g) = 2.38 W/kg
Smallest distance from peaks to all points 3 dB below = 7.4 mm
Ratio of SAR at M2 to SAR at M1 = 66.9%
Maximum value of SAR (measured) = 19.7 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 75.13 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 31.8 W/kg
SAR(1 g) = 8.04 W/kg; SAR(10 g) = 2.30 W/kg
Smallest distance from peaks to all points 3 dB below = 7.4 mm
Ratio of SAR at M2 to SAR at M1 = 65.3%
Maximum value of SAR (measured) = 19.4 W/kg



0 dB = 19.7 W/kg = 12.94 dBW/kg

Impedance Measurement Plot for Head TSL