RF Exposure report

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

EUT Description	WLAN and BT, 2x2 PCIe M.2 1216 SD adapter card
Brand Name	Intel® Wi-Fi 6E AX211
Model Name	AX211D2W
Applicant	ASUSTeK COMPUTER INC.
	1F., No. 15, Lide Rd., Beitou Dist., Taipei City 112, Taiwan
Standards	IEEE/ANSI C95.1-1992, IEEE 1528-2013
FCC ID	MSQAX211D2
Date of EUT Receipt	Aug. 29, 2022
Date of Test(s)	Dec. 26, 2022
Date of Issue	Jan. 09, 2023

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

Remarks:

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

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

Signed on behalf of SGS

Clerk / Kimmy Chiou	PM / Afu Chen	Approved By / John Yeh
Kimmy Chiou	afu Chen	John Teh

Date: Jan. 09, 2023

Revision History

Report Number	Revision	Description	Issue Date	Revised By	Remark
TESA2211000537ES	00	Initial creation of document	Jan. 09, 2023	Kimmy Chiou	

Note:

1. The mark " * " is the revised version of the report due to comments submitted by the certification.
2. This report only WLAN 5.9GHz

Contents

1 GENERAL INFORMATION

1.1 Test Methodology

The SAR testing method and procedure for this device is in accordance with the following standards:
IEEE/ANSI C95.1-1992
IEEE 1528-2013
KDB447498D01v06
KDB865664D01v01r04
KDB865664D02v01r02
KDB616217D04v01r02
KDB248227D01v02r01

1.2 Description of EUT

EUT Description	WLAN and BT, 2x2 PCIe M.2 1216 SD adapter card	
Brand Name	Intel® Wi-Fi 6E AX211	
Model No.	AX211D2W	
FCC ID	MSQAX211D2	
Host Information	Product Type: Notebook PC Trade Name: ASUS Model Name: GZ301V, GZ301VIC, GZ301VVC, GZ301VUC, GZ301VJC, GZ301VFC All models are electrically identical, different model names are for marketing purpose.	
Mode	WLAN: 802.11a/n/ac/ax HT20/HT40/VHT80/VHT160/HE20/HE40/HE80/HE160	
Duty Cycle	WLAN802.11	Refer to page 28
Supported radios (TX Frequency Range, MHz)	802.11a/n/ac/ax	5.9GHz (5850.0 – 5895.0 MHz)

1.3 Maximum value

Summary of Maximum SAR Value	
Mode	Highest SAR 1g Body (W/kg)
5.9G WLAN	0.31

1.4 Antenna Information

Laptop mode_WLAN

Vendor	ASAP																			
Antenna	Main										Aux									
Part Number	LA9RF399-CS-H										LA9RF400-CS-H									
Frequency(MHz)	2400~2500	5150~5250	5250~5350	5470~5725	5725~5850	5850~5895	5925~6425	6425~6525	6525~6875	6875~7125	2400~2500	5150~5250	5250~5350	5470~5725	5725~5850	5850~5895	5925~6425	6425~6525	6525~6875	6875~7125
Gain (dBi)	2.56	3.64	3.64	4.59	3.12	3.12	4.33	3.90	3.90	3.90	-0.33	2.24	1.48	3.55	4.5	4.50	4.35	3.90	3.90	3.90

Tablet mode_WLAN

Vendor	Inpaq																			
Antenna	Main										Aux									
Part Number	MDA-LE-02-013										MDA-LE-01-005									
Frequency(MHz)	2400~2500	5150~5250	5250~5350	5470~5725	5725~5850	5850~5895	5925~6425	6425~6525	6525~6875	6875~7125	2400~2500	5150~5250	5250~5350	5470~5725	5725~5850	5850~5895	5925~6425	6425~6525	6525~6875	6875~7125
Gain (dBi)	2.48	3.51	2.76	4.21	2.52	2.52	4.01	3.80	3.83	2.95	-0.74	1.55	0.64	3.55	3.66	3.66	3.61	3.72	3.38	3.87

Note: Antenna information is provided by the applicant.

2 MEASUREMENT SYSTEM

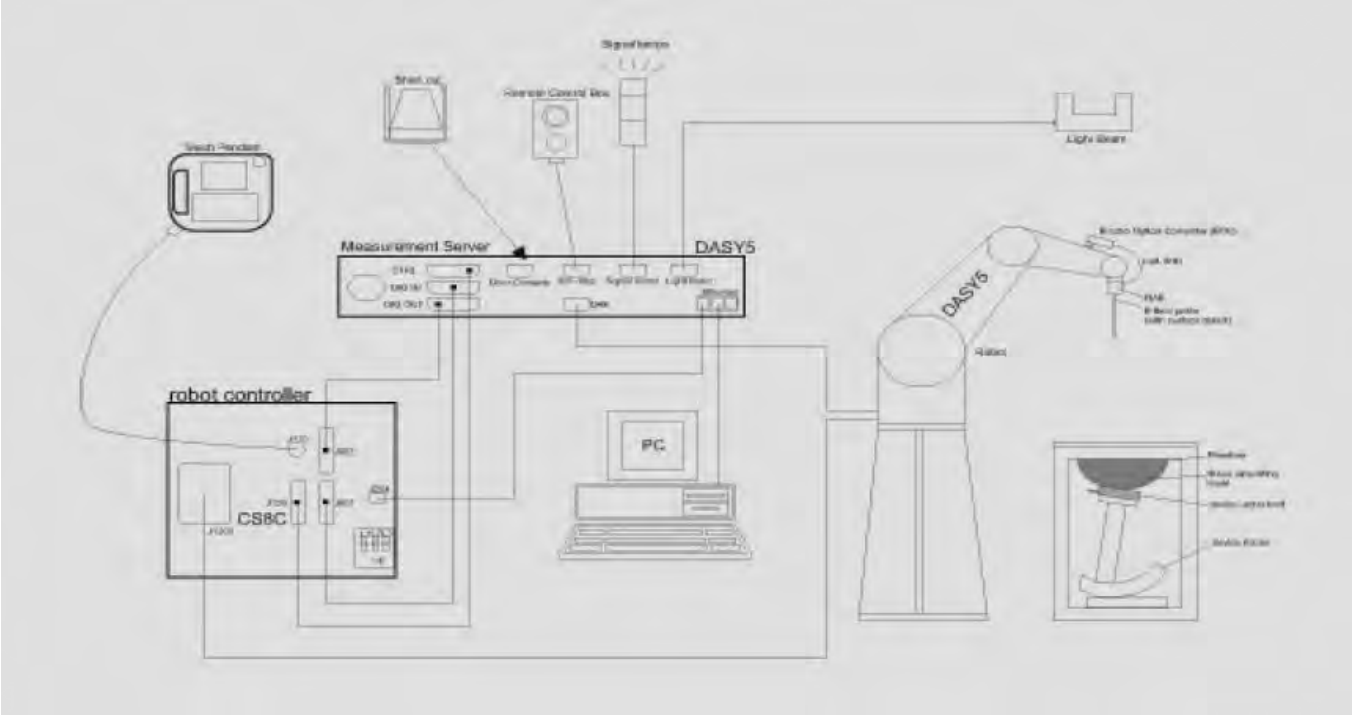
2.1 Test Facility

Laboratory	Test Site Address	Test Site Name	FCC Designation number	IC CAB identifier
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	1F, No. 8, Alley 15, Lane 120, Sec. 1, NeiHu Road, Neihu District, Taipei City, 11493, Taiwan.	SAR 2	TW0029	TW3702
		SAR 6		
	No. 2, Keji 1st Rd., Guishan Township, Taoyuan County, 33383, Taiwan	SAR 1	TW0028	
		SAR 4		
	No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan	SAR 3	**TW0027**	
		SAR 7		
Note: Test site name is remarked on the equipment list in each section of this report as an indication where measurements occurred in specific test site and address.				

2.2 SAR System

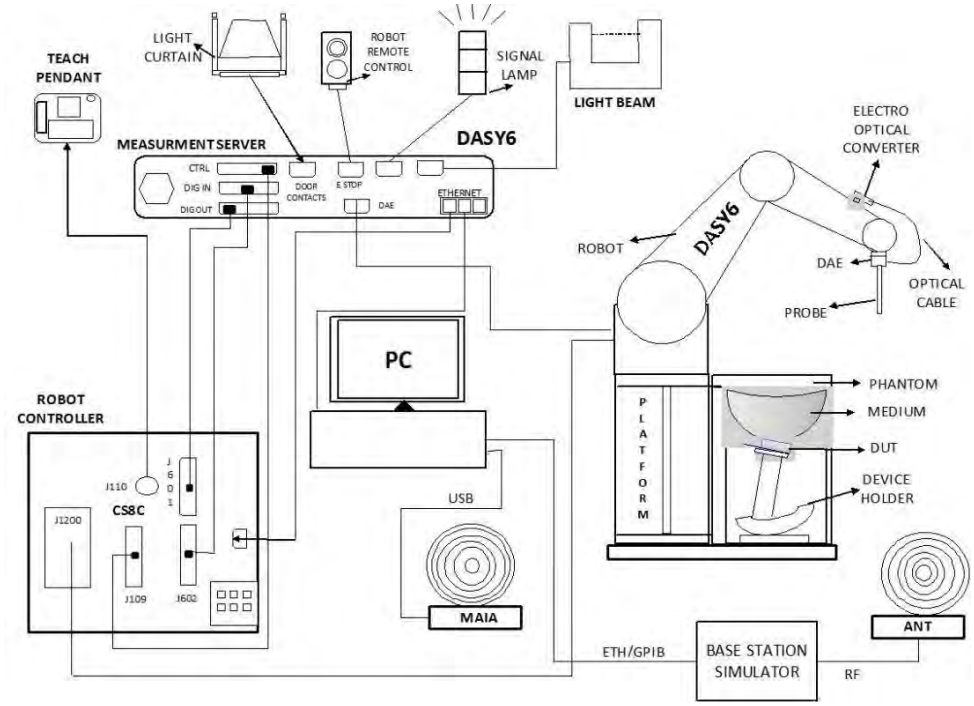
Block Diagram (DASY5)

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



Block Diagram (DASY6)

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



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Windows 10 and the DASY6 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

EX3DV4 E-Field Probe

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Calibration	Basic Broad Band Calibration in air Conversion Factors (CF) for HSL 5750 MHz Additional CF for other liquids and frequencies upon request	
Frequency	10 MHz to > 6 GHz	
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)	
Dynamic Range	10 µW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)	
Dimensions	Tip diameter: 2.5 mm	
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.	

PHANTOM (SAM)

Model	Twin SAM
Construction	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points with the robot.
Shell Thickness	2 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Height: 850 mm; Length: 1000 mm; Width: 500 mm

DEVICE HOLDER (SAM)

Construction	In combination with the Twin SAM Phantom V4.0/V4.0C or Twin SAM, the Mounting Device (made from POM) enables the rotation of the mounted transmitter in spherical coordinates, whereby the rotation point is the ear opening. The devices can be easily and accurately positioned according to IEC, IEEE, CENELEC, FCC or other specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

Device Holder

3 SAR SYSTEM VERIFICATION

3.1 Tissue Simulating Liquid

For the measurement of the field distribution inside the SAM phantom with DASY, the phantom must be filled with homogeneous tissue simulating liquid. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15cm. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15cm.

3.2 Tissue Simulant Liquid measurement

The dielectric properties for this Head-simulant fluid were measured by using the SPEAG Dielectric Assessment Kit (DAKS-3.5)
All dielectric parameters of tissue simulates were measured within 24 hours of SAR measurements. The measured conductivity and permittivity are all within ± 5% of the target values.

3.3 Measurement results of Tissue Simulant Liquid

Tissue Type	Measurement Date	Measured Frequency (MHz)	Target Dielectric Constant, εr	Target Conductivity, σ (S/m)	Measured Dielectric Constant, εr	Measured Conductivity, σ (S/m)	% dev εr	% dev σ
Head	Dec. 26, 2022	5750	35.350	5.220	35.094	5.301	-0.72%	1.55%
		5815	35.285	5.286	34.881	5.428	-1.14%	2.69%

3.4 The composition of the tissue simulating liquid:

Simulating Liquids for 600 MHz -10 GHz, Manufactured by SPEAG:

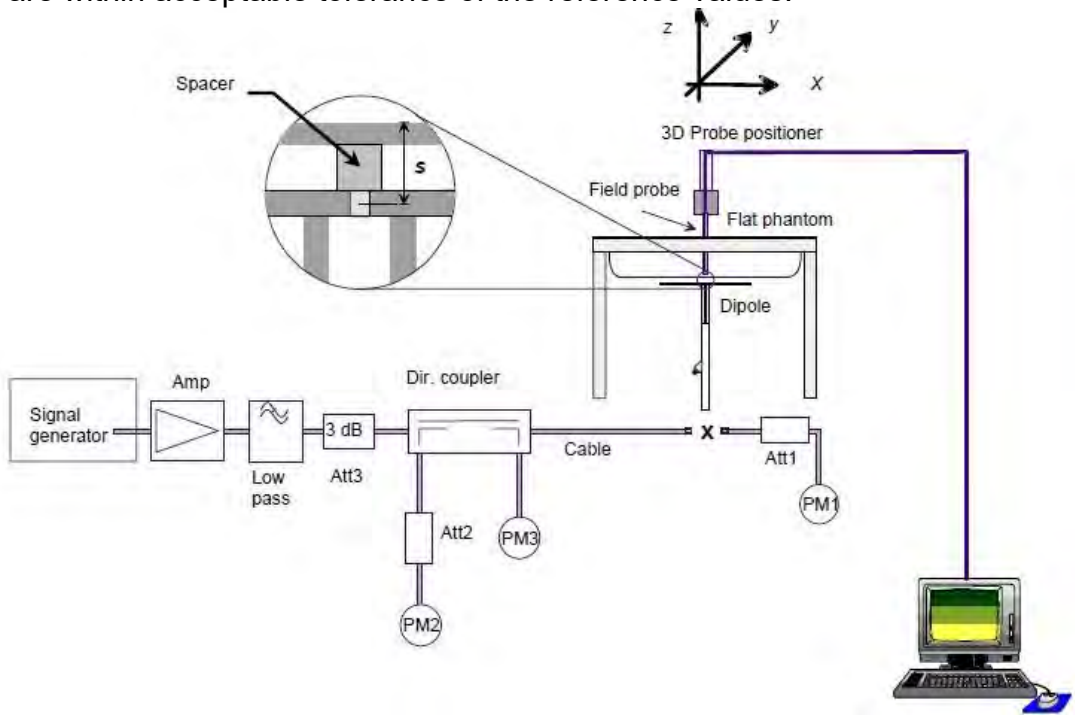
Broad-band head tissue simulating liquids	SPEAG Product	Frequency range (MHz)	Main Ingredients
	HBBL600-10000V6	600 - 10000	Water, Oil

3.5 System check

The microwave circuit arrangement for system check is sketched in below. The daily system accuracy verification occurs within the flat section of the SAM phantom and ELI phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR values.

The tests were conducted on the same days as the measurement of the DUT. The obtained results from the system accuracy verification are displayed with SAR values normalized to 1W forward power delivered to the dipole.

During the tests, the liquid depth from the center of the flat phantom to the liquid top surface was 15 cm above in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.



The block diagram of system check

3.6 System check results

Validation Kit	S/N	Frequency (MHz)	1W Target 1g-SAR (W/kg)	pin=100mW Measured 1g-SAR (W/kg)	Normalized to 1W 1g-SAR (W/kg)	Deviation (%)	Limit	Measurement Date
D5GHzV2	1023	5750	81	7.76	77.6	-4.20	± 10%	Dec.26,2022

4 TEST CONFIGURATIONS

4.1 Test Environment

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

4.2 Test Note

- **General:** Measurements are performed respectively on the lowest, middle and highest channels of the operating band(s).
- **General:** The EUT is set to maximum power level during all tests, and at the beginning of each test the battery is fully charged.
- **General:** During the SAR testing, the DASY system checks power drift by comparing the e-field strength of one specific location measured at the beginning with that measured at the end of the SAR testing.
- **General:** According to KDB447498D01v06, testing of other required channels is not required when the reported 1-g SAR for the highest output channel is ≤ 0.8 W/kg, when the transmission band is ≤ 100 MHz.
- **General:** According to KDB865664D01v01r04, SAR measurement variability must be assessed for each frequency band. When the original highest measured SAR is ≥ 0.8 W/kg, repeated that measurement once. 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 (~ 10% from the 1-g SAR limit).
- **WLAN 5GHz:** Initial Test Configuration: An initial test configuration is determined for OFDM transmission modes according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified for production units in each standalone and aggregated frequency band. SAR is measured using the highest measured maximum output power channel. When the reported SAR of the initial test configuration is > 0.8 W/kg, SAR measurement is required for the subsequent next highest measured output power channel(s) in the initial test configuration until the reported SAR is ≤ 1.2 W/kg or all required channels are tested. Since the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for subsequent test configuration.
- **WLAN 5GHz:** Based on FCC guidance, general principles of KDB248227D01 can be applied to 802.11ax to determine initial test configuration with 802.11ax being considered as the highest 802.11 mode for the appropriate frequency band.
- **General:** The device was tested based on FCC guidance.

4.3 Test position

Laptop mode SAR test position (0mm)

For laptop PC, according to KDB 616217 D04, SAR evaluation is required for the bottom surface of the keyboard. This EUT was tested in the base of EUT directly against the flat phantom. The required minimum test separation distance for incorporating transmitters and antennas into laptop computer display is determined with the display screen opened at an angle of 90° to the keyboard compartment. SAR measurement for laptop mode is not required because the antenna to user distance is larger than 20cm.

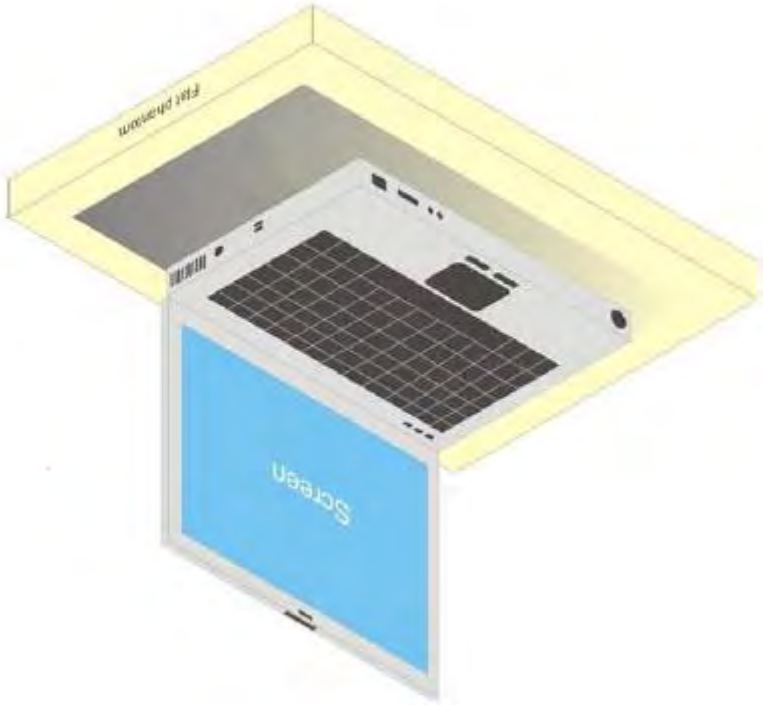


Illustration for Laptop Setup

Tablet mode SAR test position (0mm)

For full-size tablet, according to KDB 616217 D04, SAR evaluation is required for back surface and edges of the devices. The back surface and edges of the tablet are tested with the tablet touching the phantom. Exposures from antennas through the front surface of the display section of a tablet are generally limited to the user's hands. Exposures to hands for typical consumer transmitters used in tablets are not expected to exceed the extremity SAR limit; therefore, SAR evaluation for the front surface of tablet display screens are generally not necessary. When voice mode is supported on a tablet and it is limited to speaker mode or headset operations only, additional SAR testing for this type of voice use is not required.

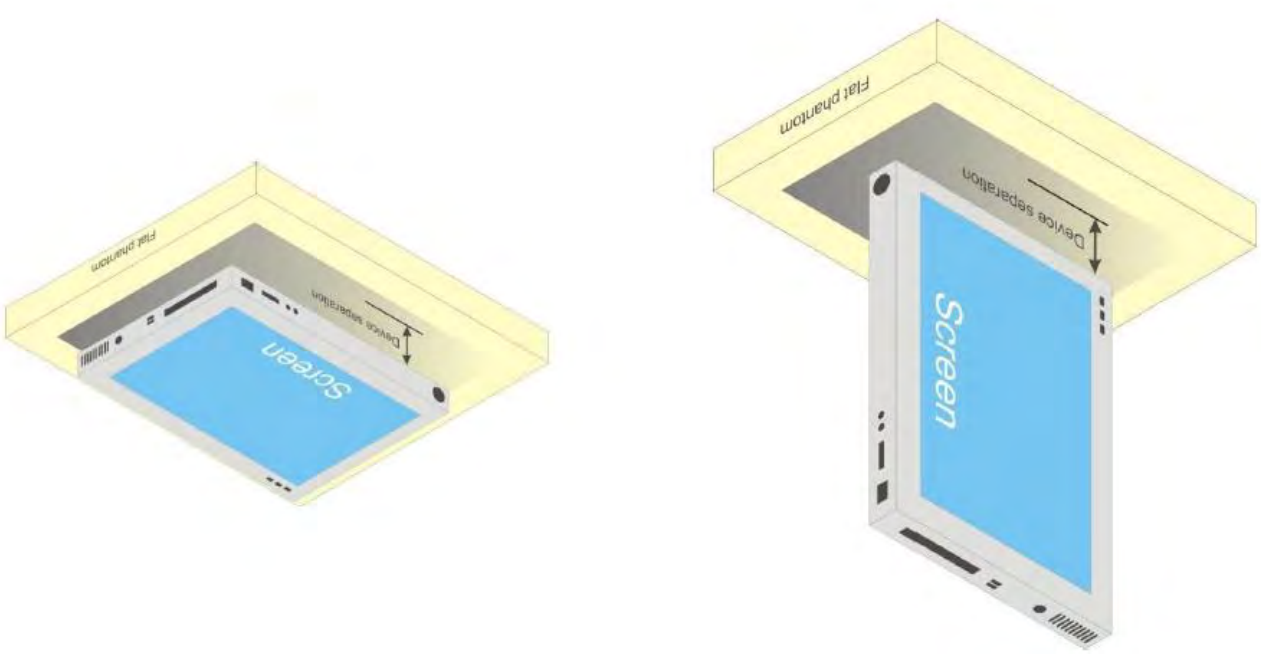


Illustration for Tablet Setup

4.4 Power verification of device mode

For the device modes verification, the measured conducted output power is monitored qualitatively to identify the triggering characteristics and recorded quantitatively.

Results and conclusion

The measured output power versus lid angle is tabulated in the following table based on the guidance from 2019-11 TCB workshop, and the triggering verification complies with the device mode / power level declared by the manufacturer.

Device mode verification by power measurement

Antenna	Operation mode	Lid angle	802.11ac(160M) 5.9G
Main	Lid close	0°	n/a
		10°	n/a
	Laptop	20°	17.15
		15°	17.23
	Lid close	10°	n/a
		11°	n/a
		12°	n/a
	Laptop	13°	17.16
		14°	17.16
		15°	17.20
		16°	17.24
		17°	17.19
		18°	17.19
		19°	17.20
		20°	17.25
		30°	17.15
		40°	17.15
		50°	17.21
		60°	17.21
		70°	17.23
		80°	17.15
		90°	17.17
		100°	17.23
		110°	17.16
		120°	17.20
		130°	17.24
		140°	17.25
		150°	17.15
		160°	17.24
		170°	17.20
		180°	17.17
		190°	17.24
	Flip	200°	7.88
	Laptop	195°	17.21
		196°	17.18
		197°	17.19
		198°	17.19
		199°	17.22
	Flip	200°	7.92
		201°	7.91
		202°	7.93
		203°	7.87
		204°	7.91
		205°	7.94
		206°	7.89
		207°	7.87
		208°	7.92
		209°	7.91
		210°	7.94
		220°	7.87
		230°	7.93
		240°	7.89
		250°	7.89
		260°	7.90
		270°	7.93
		280°	7.88
		290°	7.91
		300°	7.85
		310°	7.85
		320°	7.94
		330°	7.86
		340°	7.95
		350°	7.94
		360°	7.85
	Flip	350°	7.94
		340°	7.85
		330°	7.85
		320°	7.87
		310°	7.91
		300°	7.89
		290°	7.94
		280°	7.94
		270°	7.94
		260°	7.94
		250°	7.92
		240°	7.85
		230°	7.91
		220°	7.95
		210°	7.93
		200°	7.88
		190°	7.85
		180°	7.93
		170°	7.89
		160°	7.93
	Laptop	150°	17.23
		155°	17.19
	Flip	160°	7.93

Antenna	Operation mode	Lid angle	802.11ac(160M) 5.9G
Main	Laptop	159°	17.16
		158°	17.23
		157°	17.20
		156°	17.16
		155°	17.25
		154°	17.20
		153°	17.15
		152°	17.24
		151°	17.21
		150°	17.18
		140°	17.16
		130°	17.15
		120°	17.19
		110°	17.25
		100°	17.25
		90°	17.24
		80°	17.16
		70°	17.21
		60°	17.19
		50°	17.21
		40°	17.23
		30°	17.20
		20°	17.15
	Lid close	10°	n/a
	Laptop	15°	17.25
		14°	17.16
		13°	17.21
	Lid close	12°	n/a
		11°	n/a
		10°	n/a
		0°	n/a
	Book	20°	7.95
		15°	7.95
	Book	13°	7.89
		14°	7.97
		15°	7.95
		16°	7.98
		17°	7.98
		18°	7.90
		19°	7.94
		20°	7.89
		30°	7.91
		40°	7.95
		50°	7.95
		60°	7.89
		70°	7.95
		80°	7.96
		90°	7.97
		100°	7.91
		110°	7.88
		120°	7.95
		130°	7.92
		140°	7.90
		150°	7.93
		160°	7.97
		170°	7.94
		180°	7.88
		190°	7.89
	Book	195°	7.97
		196°	7.98
		197°	7.95
		198°	7.93
		199°	7.96
	Book	150°	7.89
		155°	7.94
	Book	159°	7.88
		158°	7.91
		157°	7.97
		156°	7.95
		155°	7.96
		154°	7.96
		153°	7.95
		152°	7.96
		151°	7.90
		150°	7.93
		140°	7.92
		130°	7.94
		120°	7.94
		110°	7.93
		100°	7.91
		90°	7.97
		80°	7.88
		70°	7.94
		60°	7.96
		50°	7.93
		40°	7.91
		30°	7.97
		20°	7.93
	Book	15°	7.90
		14°	7.89
		13°	7.90

*The screen orientation is 90° or 270° in book mode, other is laptop mode.

Antenna	Operation mode	Lid angle	802.11ac(160M) 5.9G
Aux	Lid close	0°	n/a
		10°	n/a
	Laptop	20°	16.34
		15°	16.36
	Lid close	10°	n/a
		11°	n/a
		12°	n/a
	Laptop	13°	16.38
		14°	16.30
		15°	16.33
		16°	16.30
		17°	16.33
		18°	16.39
		19°	16.30
		20°	16.35
		30°	16.31
		40°	16.30
		50°	16.34
		60°	16.30
		70°	16.37
		80°	16.31
		90°	16.37
		100°	16.31
		110°	16.33
		120°	16.34
		130°	16.37
		140°	16.36
		150°	16.39
		160°	16.34
		170°	16.39
		180°	16.31
		190°	16.37
	Flip	200°	8.92
	Laptop	195°	16.34
		196°	16.31
		197°	16.32
		198°	16.38
		199°	16.33
	Flip	200°	8.85
		201°	8.90
		202°	8.91
		203°	8.88
		204°	8.85
		205°	8.91
		206°	8.91
		207°	8.93
		208°	8.86
		209°	8.87
		210°	8.93
		220°	8.92
		230°	8.92
		240°	8.91
		250°	8.89
		260°	8.94
		270°	8.89
		280°	8.89
		290°	8.95
		300°	8.89
		310°	8.86
		320°	8.91
		330°	8.93
		340°	8.93
		350°	8.88
		360°	8.87
	Flip	350°	8.95
		340°	8.90
		330°	8.88
		320°	8.93
		310°	8.91
		300°	8.88
		290°	8.91
		280°	8.92
		270°	8.88
		260°	8.91
		250°	8.92
		240°	8.91
		230°	8.93
		220°	8.87
		210°	8.87
		200°	8.91
		190°	8.94
		180°	8.86
		170°	8.89
		160°	8.86
	Laptop	150°	16.32
		155°	16.36
	Flip	160°	8.94

Antenna	Operation mode	Lid angle	802.11ac(160M) 5.9G
Aux	Laptop	159°	16.34
		158°	16.33
		157°	16.34
		156°	16.38
		155°	16.40
		154°	16.39
		153°	16.33
		152°	16.34
		151°	16.39
		150°	16.35
		140°	16.32
		130°	16.33
		120°	16.33
		110°	16.32
		100°	16.32
		90°	16.36
		80°	16.34
		70°	16.35
		60°	16.33
		50°	16.36
		40°	16.39
		30°	16.34
		20°	16.38
	Lid close	10°	n/a
	Laptop	15°	16.38
		14°	16.34
		13°	16.37
	Lid close	12°	n/a
		11°	n/a
		10°	n/a
		0°	n/a
	Book	20°	8.90
		15°	8.84
	Book	13°	8.88
		14°	8.84
		15°	8.94
		16°	8.93
		17°	8.88
		18°	8.86
		19°	8.86
		20°	8.88
		30°	8.94
		40°	8.90
		50°	8.88
		60°	8.92
		70°	8.85
		80°	8.85
		90°	8.92
		100°	8.84
		110°	8.86
		120°	8.91
		130°	8.91
		140°	8.91
		150°	8.87
		160°	8.90
		170°	8.93
		180°	8.85
		190°	8.90
	Book	195°	8.86
		196°	8.91
		197°	8.85
		198°	8.93
		199°	8.88
	Book	150°	8.92
		155°	8.93
	Book	159°	8.84
		158°	8.84
		157°	8.93
		156°	8.92
		155°	8.94
		154°	8.90
		153°	8.90
		152°	8.91
		151°	8.86
		150°	8.90
		140°	8.85
		130°	8.94
		120°	8.89
		110°	8.94
		100°	8.86
		90°	8.85
		80°	8.90
		70°	8.85
		60°	8.86
		50°	8.94
		40°	8.92
		30°	8.90
		20°	8.84
	Book	15°	8.94
		14°	8.85
		13°	8.85

*The screen orientation is 90° or 270° in book mode, other is laptop mode.

4.5 Test limit

§ 2.1093(d)(1)
Applications for equipment authorization of portable RF sources subject to routine environmental evaluation must contain a statement confirming compliance with the limits specified in § 1.1310 as part of their application. Technical information showing the basis for this statement must be submitted to the Commission upon request. The SAR limits specified in § 1.1310(a) through (c) of this chapter shall be used for evaluation of portable devices transmitting in the frequency range from 100 kHz to 6 GHz. Portable devices that transmit at frequencies above 6 GHz shall be evaluated in terms of the MPE limits specified in Table 1 to § 1.1310(e)(1). A minimum separation distance applicable to the operating configurations and exposure conditions of the device shall be used for the evaluation. In general, maximum time-averaged power levels must be used for evaluation. All unlicensed personal communications service (PCS) devices and unlicensed NII devices shall be subject to the limits for general population/uncontrolled exposure.
Radiofrequency radiation exposure limits.
§ 1.1310(a)
Specific absorption rate (SAR) shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in § 1.1307(b) within the frequency range of 100 kHz to 6 GHz (inclusive).
§ 1.1310(b)
The SAR limits for occupational/controlled exposure are 0.4 W/kg, as averaged over the whole body, and a peak spatial-average SAR of 8 W/kg, averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the parts of the human body treated as extremities, such as hands, wrists, feet, ankles, and pinnae, where the peak spatial-average SAR limit for occupational/controlled exposure is 20 W/kg, averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). Exposure may be averaged over a time period not to exceed 6 minutes to determine compliance with occupational/controlled SAR limits.
§ 1.1310(c)
The SAR limits for general population/uncontrolled exposure are 0.08 W/kg, as averaged over the whole body, and a peak spatial-average SAR of 1.6 W/kg, averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the parts of the human body treated as extremities, such as hands, wrists, feet, ankles, and pinnae, where the peak spatial-average SAR limit is 4 W/kg, averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). Exposure may be averaged over a time period not to exceed 30 minutes to determine compliance with general population/uncontrolled SAR limits.

Note to paragraphs (a) through (c):
SAR is a measure of the rate of energy absorption due to exposure to RF electromagnetic energy. These SAR limits to be used for evaluation are based generally on criteria published by the American National Standards Institute (ANSI) for localized SAR in Section 4.2 of "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz," ANSI/IEEE Std C95.1-1992, copyright 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017. These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in "Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields," NCRP Report No. 86, Section 17.4.5, copyright 1986 by NCRP, Bethesda, Maryland 20814. Limits for whole body SAR and peak spatial-average SAR are based

on recommendations made in both of these documents. The MPE limits in Table 1 are based generally on criteria published by the NCRP in “Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields,” NCRP Report No. 86, Sections 17.4.1, 17.4.1.1, 17.4.2 and 17.4.3, copyright 1986 by NCRP, Bethesda, Maryland 20814. In the frequency range from 100 MHz to 1500 MHz, these MPE exposure limits for field strength and power density are also generally based on criteria recommended by the ANSI in Section 4.1 of “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz,” ANSI/IEEE Std C95.1-1992, copyright 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017.

Portable devices that transmit at frequencies above 6 GHz shall be evaluated in terms of the MPE limits specified in Table 1 to § 1.1310(e)(1).
According to ANSI/IEEE C95.1-1992, the criteria listed in the following Table shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.
Peak Spatially Averaged Power Density was evaluated over a circular area of 4cm2 per interim FCC Guidance for near-field power density evaluations per October 2018 TCB Workshop notes

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(i) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*(100)	≤6
3.0-30	1842/f	4.89/f	*($900/f^2$)	<6
30-300	61.4	0.163	1.0	<6
300-1,500			f/300	<6
1,500-100,000			5	<6
(ii) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*($180/f^2$)	<30
30-300	27.5	0.073	0.2	<30
300-1,500			f/1500	<30
1,500-100,000			1.0	<30

f = frequency in MHz. * = Plane-wave equivalent power density.
Table 1 to § 1.1310(e)(1) - Limits for Maximum Permissible Exposure (MPE)

5 MAXIMUM OUTPUT POWER

5.1 WLAN

Notebook mode

WLAN Main						
Mode	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5.9GHz	802.11a	169	5845	6Mbps	19.00	18.90
		173	5865		19.00	18.90
		177	5885		17.50	17.42
	802.11n20-HT0	169	5845	MCS0	19.25	19.18
		173	5865		19.25	19.16
		177	5885		17.75	17.73
	802.11ax20-HE0	169	5845	MCS0	19.25	19.21
		173	5865		19.25	19.15
		177	5885		17.75	17.69
	802.11n40-HT0	167	5835	MCS0	20.50	20.42
		175	5875		20.50	20.42
	802.11ax40-HE0	167	5835	MCS0	20.50	20.48
		175	5875		20.50	20.44
	802.11ac80-VHT0	171	5855	MCS0	20.50	20.49
	802.11ax80-HE0	171	5855	MCS0	20.50	20.39
	802.11ac160-VHT0	163	5815	MCS0	17.50	17.36
	802.11ax160-HE0	163	5815	MCS0	17.50	17.33

WLAN Aux						
Mode	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5.9GHz	802.11a	169	5845	6Mbps	19.25	19.14
		173	5865		19.25	19.23
		177	5885		17.75	17.71
	802.11n20-HT0	169	5845	MCS0	19.00	18.89
		173	5865		19.00	18.93
		177	5885		17.50	17.48
	802.11ax20-HE0	169	5845	MCS0	19.00	18.98
		173	5865		19.00	18.92
		177	5885		17.50	17.44
	802.11n40-HT0	167	5835	MCS0	20.50	20.43
		175	5875		20.50	20.40
	802.11ax40-HE0	167	5835	MCS0	20.50	20.46
		175	5875		20.50	20.41
	802.11ac80-VHT0	171	5855	MCS0	20.50	20.47
	802.11ax80-HE0	171	5855	MCS0	20.50	20.40
	802.11ac160-VHT0	163	5815	MCS0	16.50	16.46
	802.11ax160-HE0	163	5815	MCS0	16.50	16.41

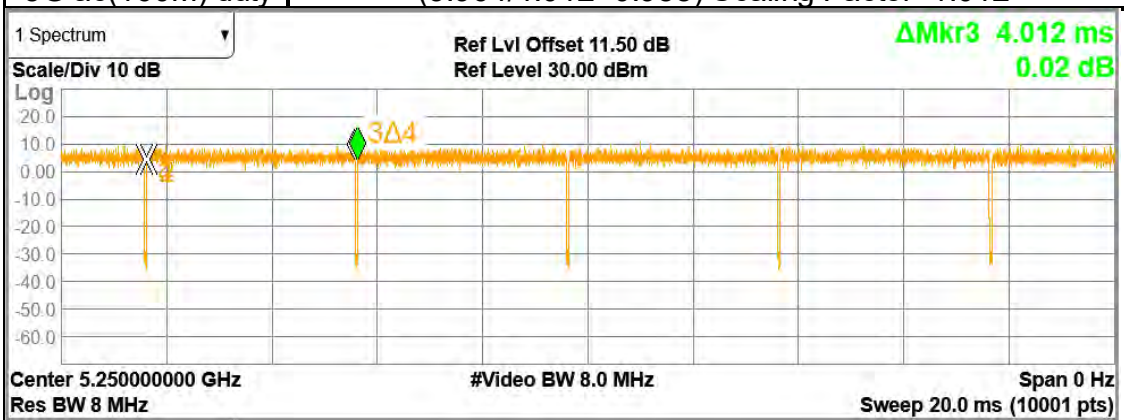
Tablet mode

WLAN Main						
Mode	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5.9GHz	802.11a	169	5845	6Mbps	8.00	7.87
		173	5865		8.00	7.85
		177	5885		8.00	7.82
	802.11n20-HT0	169	5845	MCS0	8.00	7.84
		173	5865		8.00	7.87
		177	5885		8.00	7.83
	802.11ax20-HE0	169	5845	MCS0	8.00	7.96
		173	5865		8.00	7.93
		177	5885		8.00	7.92
	802.11n40-HT0	167	5835	MCS0	8.00	7.88
		175	5875		8.00	7.92
	802.11ax40-HE0	167	5835	MCS0	8.00	7.93
		175	5875		8.00	7.86
	802.11ac80-VHT0	171	5855	MCS0	8.00	7.91
	802.11ax80-HE0	171	5855	MCS0	8.00	7.76
	802.11ac160-VHT0	163	5815	MCS0	8.00	7.98
	802.11ax160-HE0	163	5815	MCS0	8.00	7.83

WLAN Aux						
Mode	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5.9GHz	802.11a	169	5845	6Mbps	9.00	8.91
		173	5865		9.00	8.95
		177	5885		9.00	8.94
	802.11n20-HT0	169	5845	MCS0	9.00	8.96
		173	5865		9.00	8.96
		177	5885		9.00	8.83
	802.11ax20-HE0	169	5845	MCS0	9.00	8.92
		173	5865		9.00	8.89
		177	5885		9.00	8.79
	802.11n40-HT0	167	5835	MCS0	9.00	8.88
		175	5875		9.00	8.91
	802.11ax40-HE0	167	5835	MCS0	9.00	8.94
		175	5875		9.00	8.95
	802.11ac80-VHT0	171	5855	MCS0	9.00	8.93
	802.11ax80-HE0	171	5855	MCS0	9.00	8.72
	802.11ac160-VHT0	163	5815	MCS0	9.00	8.99
	802.11ax160-HE0	163	5815	MCS0	9.00	8.88

6 DUTY CYCLE

5G ac(160M) duty	(3.964/4.012=0.988) Scaling Factor=1.012



5 Marker Table

	Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	Δ2	1	t	(Δ) 3.964 ms	(Δ) -0.3146 dB			
2	F	1	t	1.620 ms	4.521 dBm			
3	Δ4	1	t	(Δ) 4.012 ms	(Δ) 0.01837 dB			
4	F	1	t	1.620 ms	4.521 dBm			
5								
6								

7 SUMMARY OF RESULTS

7.1 Decision rules

Reported measurement data comply with Test Methodology in section 1.1.
Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

7.2 Summary of SAR Results

ASAP

WLAN Main

Mode	Position	Distance (mm)	Channel	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Duty cycle scaling	Power scaling	Averaged SAR over 1g (W/kg)		Plot page
									Measured	Reported	
WLAN 802.11ac(160M) 5.9G	Back Surface	0	163	5815	8.00	7.98	1.00	100.46%	0.107	0.107	-
WLAN 802.11ac(160M) 5.9G	Top Edge	0	163	5815	8.00	7.98	1.00	100.46%	0.258	0.259	001
WLAN 802.11ac(160M) 5.9G	Bottom Edge	0	163	5815	8.00	7.98	1.00	100.46%	0.001	0.001	-
WLAN 802.11ac(160M) 5.9G	Left Edge	0	163	5815	8.00	7.98	1.00	100.46%	0.001	0.001	-
WLAN 802.11ac(160M) 5.9G	Right Edge	0	163	5815	8.00	7.98	1.00	100.46%	0.003	0.003	-
WLAN Aux											
Mode	Position	Distance (mm)	Channel	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Duty cycle scaling	Power scaling	Averaged SAR over 1g (W/kg)		Plot page
									Measured	Reported	
WLAN 802.11ac(160M) 5.9G	Back Surface	0	163	5815	9.00	8.99	1.00	100.23%	0.094	0.094	-
WLAN 802.11ac(160M) 5.9G	Top Edge	0	163	5815	9.00	8.99	1.00	100.23%	0.280	0.281	002
WLAN 802.11ac(160M) 5.9G	Bottom Edge	0	163	5815	9.00	8.99	1.00	100.23%	0.001	0.001	-
WLAN 802.11ac(160M) 5.9G	Left Edge	0	163	5815	9.00	8.99	1.00	100.23%	0.002	0.002	-
WLAN 802.11ac(160M) 5.9G	Right Edge	0	163	5815	9.00	8.99	1.00	100.23%	0.002	0.002	-

INPAQ

WLAN Main

Mode	Position	Distance (mm)	Channel	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Duty cycle scaling	Power scaling	Averaged SAR over 1g (W/kg)		Plot page
									Measured	Reported	
WLAN 802.11ac(160M) 5.9G	Back Surface	0	163	5815	8.00	7.98	1.00	100.46%	0.078	0.078	-
WLAN 802.11ac(160M) 5.9G	Top Edge	0	163	5815	8.00	7.98	1.00	100.46%	0.242	0.243	003
WLAN 802.11ac(160M) 5.9G	Bottom Edge	0	163	5815	8.00	7.98	1.00	100.46%	0.002	0.002	-
WLAN 802.11ac(160M) 5.9G	Left Edge	0	163	5815	8.00	7.98	1.00	100.46%	0.026	0.026	-
WLAN 802.11ac(160M) 5.9G	Right Edge	0	163	5815	8.00	7.98	1.00	100.46%	0.002	0.002	-
WLAN Aux											
Mode	Position	Distance (mm)	Channel	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Duty cycle scaling	Power scaling	Averaged SAR over 1g (W/kg)		Plot page
									Measured	Reported	
WLAN 802.11ac(160M) 5.9G	Back Surface	0	163	5815	9.00	8.99	1.00	100.23%	0.184	0.184	-
WLAN 802.11ac(160M) 5.9G	Top Edge	0	163	5815	9.00	8.99	1.00	100.23%	0.306	0.307	004
WLAN 802.11ac(160M) 5.9G	Bottom Edge	0	163	5815	9.00	8.99	1.00	100.23%	0.001	0.001	-
WLAN 802.11ac(160M) 5.9G	Left Edge	0	163	5815	9.00	8.99	1.00	100.23%	0.002	0.002	-
WLAN 802.11ac(160M) 5.9G	Right Edge	0	163	5815	9.00	8.99	1.00	100.23%	0.049	0.049	-

Note:
Reported SAR = measured SAR * Power scaling * Duty cycle scaling
Reported APD = measured APD * Power scaling * Duty cycle scaling

7.3 Reporting statements of conformity

The conformity statement in this report is based solely on the test results, measurement uncertainty is excluded.

7.4 Conclusion

The device is compliant because all the standalone results are less than their corresponding criteria.

8 SIMULTANEOUS TRANSMISSION ANALYSIS

8.1 Simultaneous Transmission Scenarios:

Simultaneous Transmit Configurations	Body
WLAN 2.4GHz Main + BT Aux	Yes
WLAN 2.4GHz Main + WLAN 2.4GHz Aux	Yes
WLAN 5GHz Main + BT Aux	Yes
WLAN 5GHz Main + WLAN 5GHz Aux	Yes
WLAN 5GHz Main + WLAN 5GHz Aux + BT Aux	Yes
WLAN 6GHz Main + BT Aux	Yes
WLAN 6GHz Main + WLAN 6GHz Aux	Yes
WLAN 6GHz Main + WLAN 6GHz Aux + BT Aux	Yes

Note:
1. Bluetooth and WLAN Aux share the same antenna path, and BT can transmit with WLAN Main simultaneously.
2. For 2.4/5GHz WLAN Main and Aux antennas, the maximum output power of each antenna during simultaneous transmission is the same with or less than that used in standalone transmission, and we used the sum of 1-g SAR provision in KDB447498D01 to exclude the simultaneous transmitted SAR measurement.

8.2 Estimated SAR calculation

According to KDB447498 D01v06 – When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

$$\text{Estimated SAR} = \frac{\text{Max. tune up power (mW)}}{\text{Min. test separation distance(mm)}} \times \frac{\sqrt{\text{f(GHz)}}}{7.5}$$

If the minimum test separation distance is < 5mm, a distance of 5mm is used for estimated SAR calculation. When the test separation distance is >50mm, the 0.4W/kg is used for SAR-1g.

8.3 SPLSR evaluation and analysis

Per KDB447498D01, when the sum of SAR is larger than the limit, SAR test exclusion is determined by the SAR sum to peak location separation ratio(SPLSR).

The simultaneous transmitting antennas in each operating mode and exposure condition combination must be considered one pair at a time to determine the SAR to peak location separation ratio to qualify for test exclusion.

The ratio is determined by **(SAR1 + SAR2)^1.5/Ri**, rounded to two decimal digits, and must be **≤ 0.04** for all antenna pairs in the configuration to qualify for 1-g SAR test exclusion.

SAR1 and SAR2 are the highest reported or estimated SAR for each antenna in the pair, and Ri is the separation distance between the peak SAR locations for the antenna pair in mm.

When standalone test exclusion applies, SAR is estimated; the peak location is assumed to be at the feed-point or geometric center of the antenna.

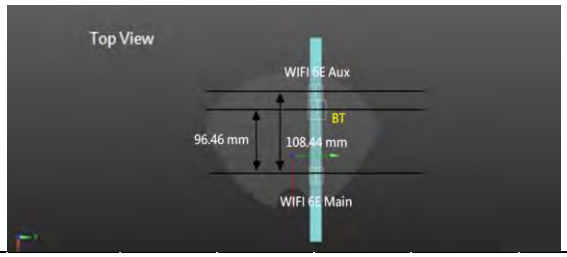
Simultaneous Transmission Combination

ASAP

Exposure Position		Reported SAR							Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
		1	2	3	4	5	6	7	1+2	1+5	3+4	3+5	3+4+5	6+7	5+6	5+6+7
		2.4GHz WLAN Main	2.4GHz WLAN Aux	5GHz WLAN Main	5GHz WLAN Aux	Bluetooth Aux	6GHz WLAN Main	6GHz WLAN Aux	Summed	Summed	Summed	Summed	Summed	Summed	Summed	Summed
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)
Back Surface	0	0.456	0.506	0.136	0.105	0.161	0.193	0.104	**0.962**	**0.617**	**0.241**	**0.297**	**0.402**	**0.297**	**0.354**	**0.458**
Top Edge	0	0.485	1.108	0.468	0.407	0.428	1.008	0.932	**1.593**	**0.913**	**0.875**	**0.896**	**1.303**	1.940	**1.436**	2.368
Bottom Edge	0	0.003	0.002	0.009	0.002	0.002	0.009	0.009	**0.005**	**0.005**	**0.011**	**0.011**	**0.013**	**0.018**	**0.011**	**0.020**
Left Edge	0	0.070	0.008	0.020	0.003	0.006	0.060	0.002	**0.078**	**0.076**	**0.023**	**0.026**	**0.029**	**0.062**	**0.066**	**0.068**
Right Edge	0	0.017	0.022	0.010	0.017	0.014	0.004	0.034	**0.039**	**0.031**	**0.027**	**0.024**	**0.041**	**0.038**	**0.018**	**0.052**

Note. The WLAN data is leverages the measurements from the test report TESA2208000323ES.

ASAP Scenario 1:									
Position	Conditions	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
Top Edge	WLAN 6GHz Main	1.008	5.68	4.18	0.03	-	-	-	-
	WLAN 6GHz + BT Aux	1.360	-3.96	3.84	0.00	2.368	96.46	0.038	SPLSR ≤ 0.04, Not required



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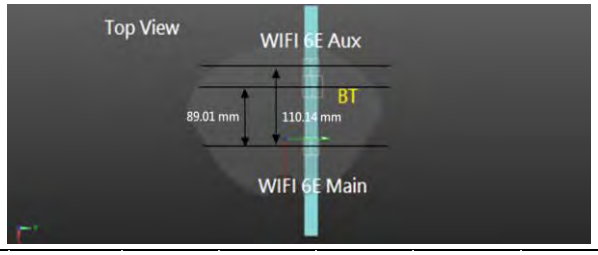
Exposure Position		Reported SAR							Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
		1	2	3	4	5	6	7	1+2	1+5	3+4	3+5	3+4+5	6+7	5+6	5+6+7
		2.4GHz WLAN Main	2.4GHz WLAN Aux	5GHz WLAN Main	5GHz WLAN Aux	Bluetooth Aux	6GHz WLAN Main	6GHz WLAN Aux	Summed	Summed	Summed	Summed	Summed	Summed	Summed	Summed
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)
Back Surface	0	0.469	0.492	0.101	0.184	0.136	0.178	0.119	**0.941**	**0.585**	**0.285**	**0.237**	**0.421**	**0.296**	**0.314**	**0.432**
Top Edge	0	0.484	0.781	0.503	0.307	0.351	0.936	0.572	**1.265**	**0.835**	**0.810**	**0.854**	**1.161**	**1.508**	**1.287**	1.868
Bottom Edge	0	0.002	0.003	0.005	0.001	0.002	0.015	0.014	**0.005**	**0.004**	**0.006**	**0.007**	**0.008**	**0.029**	**0.017**	**0.031**
Left Edge	0	0.024	0.002	0.030	0.002	0.002	0.051	0.006	**0.026**	**0.026**	**0.032**	**0.032**	**0.034**	**0.057**	**0.053**	**0.059**
Right Edge	0	0.004	0.032	0.003	0.049	0.020	0.005	0.032	**0.036**	**0.024**	**0.052**	**0.023**	**0.072**	**0.037**	**0.025**	**0.057**

INPAQ Scenario 1:									
Position	Conditions	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
Top Edge	WLAN 6GHz Main	0.936	4.08	4.00	0.02	-	-	-	-
	WLAN 6GHz + BT Aux	0.868	-4.82	4.16	0.00	1.804	89.01	0.027	SPLSR ≤ 0.04, Not required



8.4 Conclusion

The simultaneous transmission is compliant because both SAR sum and/or SPLSR are less than their corresponding criteria.

9 INSTRUMENTS LIST

Equipment List					
Manufacturer	**Device**	**Type**	**Serial number**	**Date of last calibration**	**Date of next calibration**
SPEAG	Data acquisition Electronics	DAE4	1260	Sep/22/2022	Sep/21/2023
SPEAG	Dosimetric E-Field Probe	EX3DV4	7466	Jan/26/2022	Jan/25/2023
SPEAG	System Validation Dipole	D5GHzV2	1023	Jan/27/2022	Jan/26/2023
SPEAG	Dielectric Assessment Kit	DAKS-3.5	1053	Feb/28/2022	Feb/27/2023
R&S	MXG Analog Signal Generator	SMB100A03	182012	Jun/13/2022	Jun/12/2023
Agilent	Dual-directional coupler	772D	MY46151258	Oct/03/2022	Oct/02/2023
Agilent	Dual-directional coupler	778D	MY46151242	Aug/30/2022	Aug/29/2023
EMCI	Amplifier	EMC 074225P	980155	Calibration not required	Calibration not required
EMCI	Amplifier	EMC 2830P	980156	Calibration not required	Calibration not required
R&S	Power Meter	NRX	102191	Jan/22/2022	Jan/21/2023
R&S	Power Sensor	NRP18S	101358	Jan/22/2022	Jan/21/2023
R&S	Power Sensor	NRP18S	101974	Oct/18/2022	Oct/17/2023
SPEAG	Software	DASY 52 V52.10.4.1527	N/A	Calibration not required	Calibration not required
SPEAG	Phantom	ELI	N/A	Calibration not required	Calibration not required
TECPEL	Digital thermometer	DTM-303A	TP130074	May/13/2022	May/12/2023

10 UNCERTAINTY BUDGET

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

A	c	D	e		f	g	h=c * f / e	i=c * g / e	k
Source of Uncertainty	Tolerance/ Uncertainty	Probability Distributio	Div	Div Value	ci (1g)	ci (10g)	Standard uncertainty	Standard uncertainty	vi, or Veff
Measurement system									
Probe calibration	6.55%	N	1	1	1	1	6.55%	6.55%	∞
Isotropy , Axial	3.50%	R	√3	1.732	1	1	2.02%	2.02%	∞
Isotropy, Hemispherical	9.60%	R	√3	1.732	1	1	5.54%	5.54%	∞
Modulation Response	2.40%	R	√3	1.732	1	1	1.40%	1.40%	∞
Boundary Effect	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Linearity	4.70%	R	√3	1.732	1	1	2.71%	2.71%	∞
Detection Limits	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Readout Electronics	0.30%	N	1	1	1	1	0.30%	0.30%	∞
Response time	0.80%	R	√3	1.732	1	1	0.46%	0.46%	∞
Integration Time	2.60%	R	√3	1.732	1	1	1.50%	1.50%	∞
Measurement drift (class A evaluation)	1.75%	R	√3	1.732	1	1	1.01%	1.01%	∞
RF ambient condition - noise	3.00%	R	√3	1.732	1	1	1.73%	1.73%	∞
RF ambient conditions - reflections	3.00%	R	√3	1.732	1	1	1.73%	1.73%	∞
Probe positioner Mechanical restrictions	0.40%	R	√3	1.732	1	1	0.23%	0.23%	∞
Probe Positioning with respect to phantom shell	2.90%	R	√3	1.732	1	1	1.67%	1.67%	∞
Post-processing	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Max SAR Eval	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Test Sample related									
Test sample positioning	2.90%	N	1	1	1	1	2.90%	2.90%	M-1
Device Holder Uncertainty	3.60%	N	1	1	1	1	3.60%	3.60%	M-1
Drift of output power	5.00%	R	√3	1.732	1	1	2.89%	2.89%	∞
Phantom and Setup									
Phantom Uncertainty	4.00%	R	√3	1.732	1	1	2.31%	2.31%	∞
Liquid permittivity (mea.)	1.14%	N	1	1	0.64	0.43	0.73%	0.49%	M
Liquid Conductivity (mea.)	2.69%	N	1	1	0.6	0.49	1.61%	1.32%	M
Combined standard uncertainty		RSS					11.85%	11.79%	
Expant uncertainty (95% confidence interval), K=2							23.70%	23.58%	

11 SAR MEASUREMENT RESULTS

Date: 2022/12/26

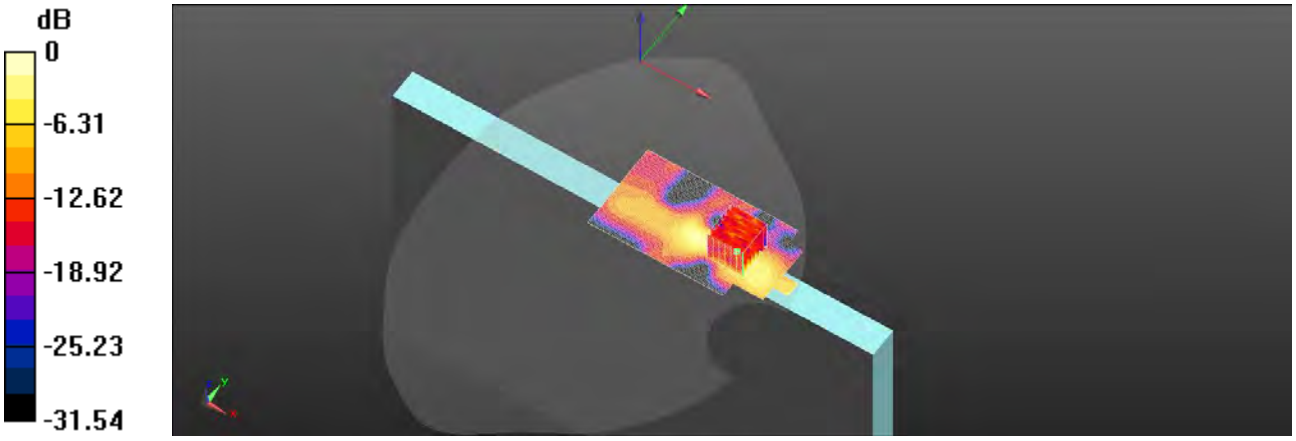
ID: 001
Report No. :TESA2211000537ES
WLAN 802.11ac(160M) 5.9G_Body_Top Edge_CH 163_0mm_Main
Communication System: WLAN 5G; Frequency: 5815 MHz; Duty cycle= 1:1.012
Medium parameters used: f = 5815 MHz; σ = 5.428 S/m; ε_r = 34.881; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.4°C; Liquid temperature: 22.2℃

DASY5 Configuration:

- Probe: EX3DV4 - SN7466; ConvF(4.98, 4.98, 4.98) @ 5815 MHz; Calibrated: 2022/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1260; Calibrated: 2022/9/22
- Phantom: SAM
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (121x61x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 0.557 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 3.484 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.28 W/kg
SAR(1 g) = 0.258 W/kg; SAR(10 g) = 0.070 W/kg
Smallest distance from peaks to all points 3 dB below = 4.9 mm
Ratio of SAR at M2 to SAR at M1 = 55.1%
Maximum value of SAR (measured) = 0.586 W/kg



Date: 2022/12/26

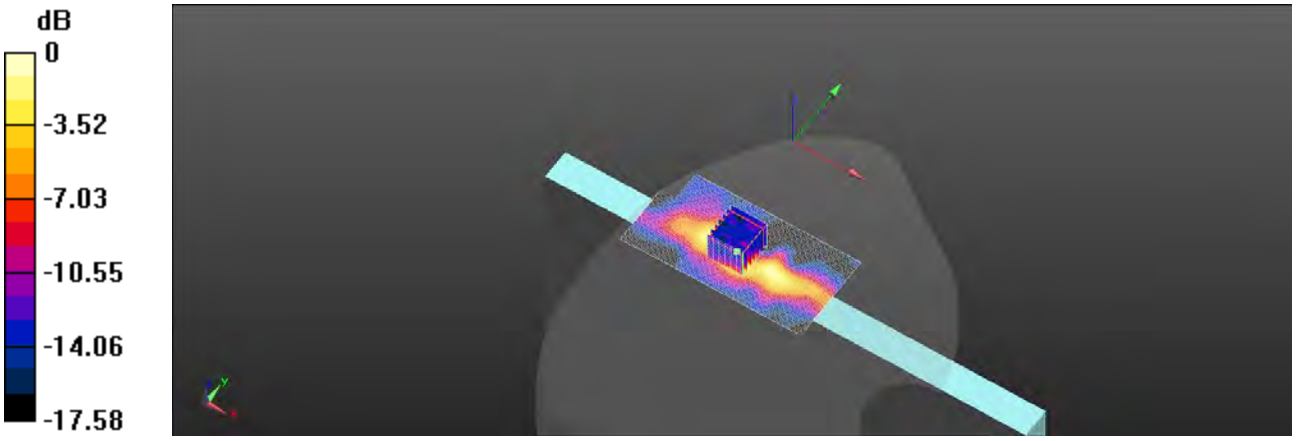
ID: 002
Report No. :TESA2211000537ES
WLAN 802.11ac(160M) 5.9G_Body_Top Edge_CH 163_0mm_Aux
Communication System: WLAN 5G; Frequency: 5815 MHz; Duty cycle= 1:1.012
Medium parameters used: f = 5815 MHz; σ = 5.428 S/m; ε_r = 34.881; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.4°C; Liquid temperature: 22.2℃

DASY5 Configuration:

- Probe: EX3DV4 - SN7466; ConvF(4.98, 4.98, 4.98) @ 5815 MHz; Calibrated: 2022/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1260; Calibrated: 2022/9/22
- Phantom: SAM
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (121x61x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 0.540 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 4.134 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 1.10 W/kg
SAR(1 g) = 0.280 W/kg; SAR(10 g) = 0.094 W/kg
Smallest distance from peaks to all points 3 dB below = 6.8 mm
Ratio of SAR at M2 to SAR at M1 = 55.3%
Maximum value of SAR (measured) = 0.531 W/kg



0 dB = 0.531 W/kg = -2.75 dBW/kg

Date: 2022/12/26

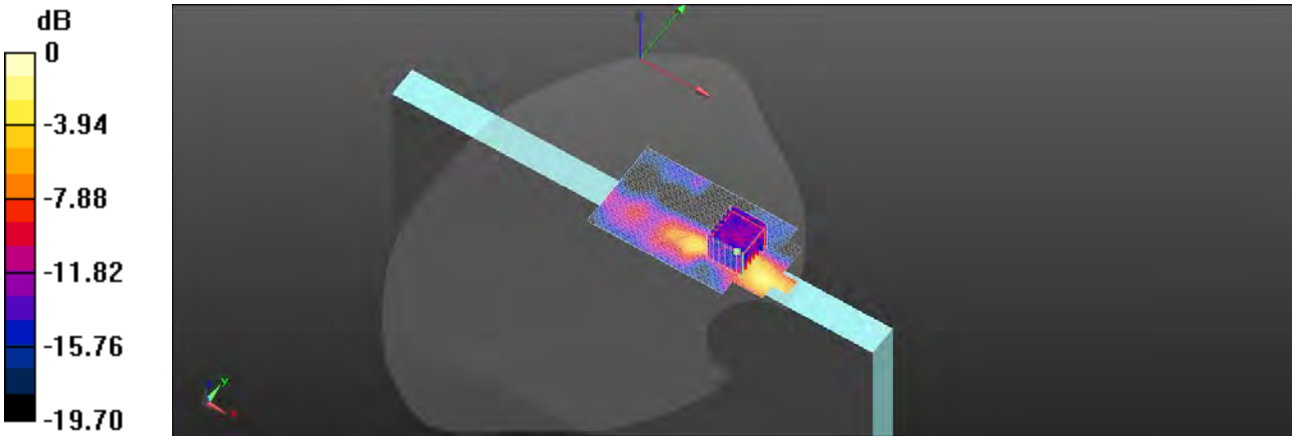
ID: 003
Report No. :TESA2211000537ES
WLAN 802.11ac(160M) 5.9G_Body_Top Edge_CH 163_0mm_Main
Communication System: WLAN 5G; Frequency: 5815 MHz; Duty cycle= 1:1.012
Medium parameters used: f = 5815 MHz; σ = 5.428 S/m; ε_r = 34.881; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.4°C; Liquid temperature: 22.2℃

DASY5 Configuration:

- Probe: EX3DV4 - SN7466; ConvF(4.98, 4.98, 4.98) @ 5815 MHz; Calibrated: 2022/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1260; Calibrated: 2022/9/22
- Phantom: SAM
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (121x61x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 0.436 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 3.906 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 1.26 W/kg
SAR(1 g) = 0.242 W/kg; SAR(10 g) = 0.067 W/kg
Smallest distance from peaks to all points 3 dB below = 4.2 mm
Ratio of SAR at M2 to SAR at M1 = 56.1%
Maximum value of SAR (measured) = 0.548 W/kg



0 dB = 0.548 W/kg = -2.61 dBW/kg

Date: 2022/12/26

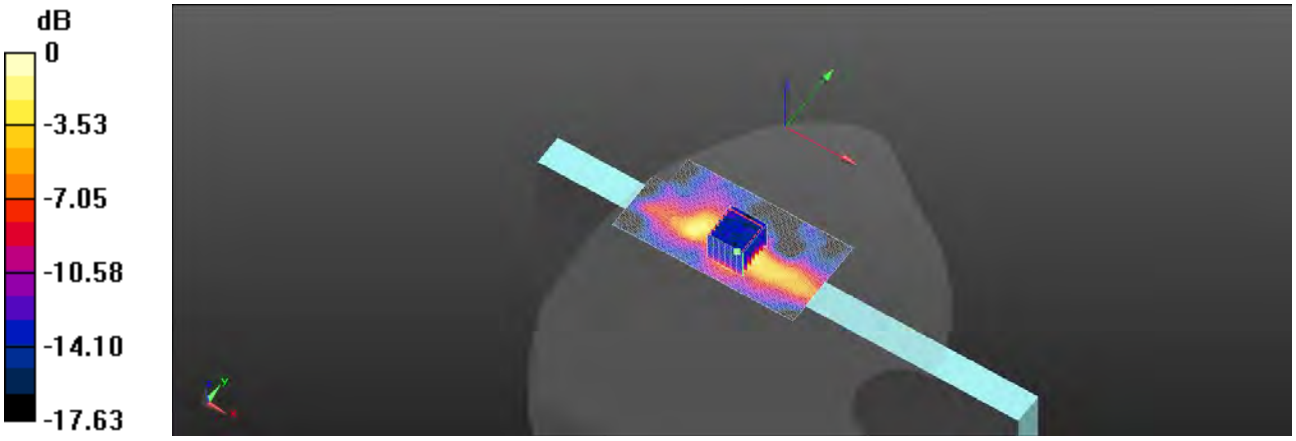
ID: 004
Report No. :TESA2211000537ES
WLAN 802.11ac(160M) 5.9G_Body_Top Edge_CH 163_0mm_Aux
Communication System: WLAN 5G; Frequency: 5815 MHz; Duty cycle= 1:1.012
Medium parameters used: f = 5815 MHz; σ = 5.428 S/m; ε_r = 34.881; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.4°C; Liquid temperature: 22.2℃

DASY5 Configuration:

- Probe: EX3DV4 - SN7466; ConvF(4.98, 4.98, 4.98) @ 5815 MHz; Calibrated: 2022/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1260; Calibrated: 2022/9/22
- Phantom: SAM
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (121x61x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 0.562 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 5.796 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 1.30 W/kg
SAR(1 g) = 0.306 W/kg; SAR(10 g) = 0.097 W/kg
Smallest distance from peaks to all points 3 dB below = 6.8 mm
Ratio of SAR at M2 to SAR at M1 = 56.7%
Maximum value of SAR (measured) = 0.603 W/kg



0 dB = 0.603 W/kg = -2.20 dBW/kg

12 SAR SYSTEM CHECK RESULTS

Date: 2022/12/26

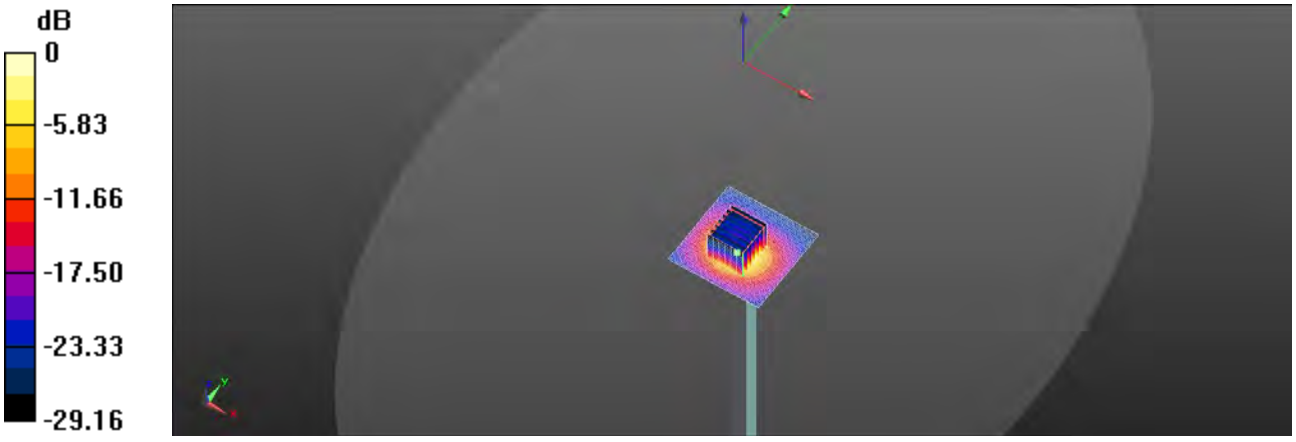
Report No. :TESA2211000537ES
Dipole 5750 MHz_SN:1023
Communication System: CW; Frequency: 5750 MHz; Duty cycle= 1:1
Medium parameters used: f = 5750 MHz; σ = 5.301 S/m; ε_r = 35.094; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.4℃; Liquid temperature: 22.2℃

DASY5 Configuration:

- Probe: EX3DV4 - SN7466; ConvF(4.98, 4.98, 4.98) @ 5750 MHz; Calibrated: 2022/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1260; Calibrated: 2022/9/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (61x61x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 16.5 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 52.95 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 31.0 W/kg
SAR(1 g) = 7.76 W/kg; SAR(10 g) = 2.26 W/kg
Smallest distance from peaks to all points 3 dB below = 7.4 mm
Ratio of SAR at M2 to SAR at M1 = 56%
Maximum value of SAR (measured) = 16.1 W/kg



0 dB = 16.1 W/kg = 12.07 dBW/kg

13 APPENDIXES

Refer to separated files for the following appendixes.

13.1 SAR_Appendix A Photographs

13.2 SAR_Appendix B DAE & Probe Cal. Certificate

13.3 SAR_Appendix C Phantom Description & Dipole Cal. Certificate

- End of report -