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Report On

Specific Absorption Rate Testing of the Apple Inc, A2338.

Covering FCC 47CFR 2.1093, RSS 102 Issue 5
and related documents.

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REPORT ON

Specific Absorption Rate Testing of the Apple Inc, A2338

Document 75948987 Report 17 Issue 1

October 2020

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22 October 2020

CONTENTS

Section		Page No
1	**REPORT SUMMARY**	**3**
1.1	Report Modification History	4
1.2	Introduction	4
1.3	Brief Summary of Results	5
1.4	Test Results Summary	6
1.5	Power Tables (Tune up values)	18
1.6	Power Measurements	25
2	**TEST DETAILS**	**33**
2.1	DASY5 Measurement System	34
2.2	Bluetooth 2450 MHz Body SAR Test Results	38
2.3	WLAN 2450 MHz Body SAR Test Results	40
2.4	WLAN U-NII 1 Body SAR Test Results	45
2.5	WLAN U-NII 2C Body SAR Test Results	48
2.6	WLAN U-NII 3 Body SAR Test Results	54
3	**TEST EQUIPMENT USED**	**57**
3.1	Test Equipment Used	58
3.2	Test Software	59
3.3	Dielectric Properties of Simulant Liquids	60
3.4	Test Conditions	61
3.5	Measurement Uncertainty	62
4	**ACCREDITATION, DISCLAIMERS AND COPYRIGHT**	**64**
4.1	Accreditation, Disclaimers and Copyright	65

ANNEX A Probe Calibration Reports A.2
ANNEX B Dipole Calibration Reports B.2
ANNEX C Photographs C.2

SECTION 1

REPORT SUMMARY

Specific Absorption Rate Testing of the
A2338

1.1 REPORT MODIFICATION HISTORY

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
01	First Issue	<DATE>

1.2 INTRODUCTION

The information contained in this report is intended to show verification of the Specific Absorption Rate Testing of the A2338 to the requirements of KDB 447498 D01 v06 General RF Exposure Guidance.

Objective	To perform Specific Absorption Rate Testing to determine the Equipment Under Test's (EUT's) compliance with the requirements specified of KDB 447498 D01 v06 General RF Exposure Guidance, for the series of tests carried out.
Applicant	Apple Inc
Manufacturer	Apple Inc
Manufacturing Description	Laptop Computer
Model Number	A2338
Serial Numbers	C02CX02FQC36 (Radiated Sample 1 (5GHz testing)) C02CX015QC36 (Radiated Sample 2 (2.4GHz testing)) C02CX02YQC36 (Conducted Sample 1 (5GHz testing)) C02CX01HQC36 (Conducted Sample 2 (2.4GHz testing))
Number of Samples Tested	4
Hardware Version	Rev 1.0
Software Version	20W112771j
Battery Cell Manufacturer	Not Supplied
Battery Model Number	Not Supplied
Test Specification/Issue/Date	KDB 447498 D01 v06 General RF Exposure Guidance
Order Number	0540201117
Date of Receipt of EUT	16-Jul-2020
Start of Test	09-Sep-2020
Finish of Test	21-Sep-2020
Related Documents	FCC 47CFR 2.1093: 2019 KDB 865664 – D01 v01r04 KDB 865664 – D02 v01r02 KDB 248227 – D01 v02r02 IEEE 1528-2013
Name of Engineers	Aasim Butt Mohamud Mohamud Stephen Dodd

1.3 BRIEF SUMMARY OF RESULTS

The measurements shown in this report were made in accordance with the procedures specified KDB 447498 D01 v06 General RF Exposure Guidance.

The maximum 1g volume averaged stand-alone SAR found during this Assessment:

Max 1g SAR (W/kg) Body	0.92 W/kg (Measured)	0.99 W/kg (Scaled)
The maximum 1g volume averaged SAR level measured for all the tests performed did not exceed the limits for General Population/Uncontrolled Exposure Partial Body of 1.6 W/kg.		

The maximum 1g volume averaged stand-alone Reported SAR found during this Assessment for each supported mode:

RAT	Band	Test Configuration	Max Reported SAR (W/kg)	Highest Simultaneous Transmission SAR (W/kg)
802.11b	2.4GHz	Bottom - 0mm	0.99	1.41*
Bluetooth **B**DR	2.4GHz	Bottom - 0mm	0.48	
802.11ac 80	5GHz	Bottom - 0mm	0.93	
The maximum 1g volume averaged SAR level measured for all the tests performed (including simultaneous transmission analysis results) did not exceed the limits for General Population/Uncontrolled Exposure Partial Body of 1.6 W/kg. *Simultaneous transmiision is summation of Bluetooth and 5GHz WLAN				

1.4 TEST RESULTS SUMMARY

1.4.1 System Performance / Validation Check Results

Prior to formal testing being performed a System Check was performed in accordance with KDB 865664 and the results were compared against published data in Standard IEEE 1528-2013. The following results were obtained: -

System performance / Validation results

Date	Frequency (MHz)	Fluid Tye	Measured Max 1g SAR (W/kg) *	Max 1g SAR (W/kg) Target	Percentage Drift on Reference
09/09/2020	2450	MBBL	52.95	51.20	3.42
10/09/2020	2450	MBBL	52.95	51.20	3.42
14/09/2020	2450	MBBL	49.68	51.20	-2.96
21/09/2020	5200	MBBL	73.03	71.80	1.71
09/09/2020	5300	MBBL	78.03	74.20	5.16
15/09/2020	5300	MBBL	80.61	74.20	8.64
10/09/2020	5600	MBBL	74.05	76.10	-2.69
16/09/2020	5600	MBBL	80.81	76.10	9.86
11//09/2020	5800	MBBL	76.22	74.10	2.86
16/09/2020	5800	MBBL	73.63	74.10	-0.64

*Normalised to a forward power of 1W

1.4.2 Results Summary Tables

Bluetooth - 2450 MHz - EDR - Antenna (BT Core 0):
Specific Absorption Rate (Maximum SAR) 1g Results

Test Position	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
0mm - Bottom	39	2480.00	15.71	16.00	0.45	0.45	3
0mm - Rear of Display	39	2480.00	15.71	16.00	0.03	0.03	4
Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is: ≤ 0.8W/kg when the transmission band is ≤ 100MHz ≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz ≤ 0.4W/kg when the transmission band is ≥ 200MHz							

Bluetooth - 2450 MHz - EDR - Antenna (BT Core 1):
Specific Absorption Rate (Maximum SAR) 1g Results

Test Position	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
0mm - Bottom	39	2441	15.65	16.00	0.35	0.38	5
0mm - Rear of Display	39	2441	15.65	16.00	0.03	0.03	6
Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is: ≤ 0.8W/kg when the transmission band is ≤ 100MHz ≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz ≤ 0.4W/kg when the transmission band is ≥ 200MHz							

WLAN - 2450 MHz - 802.11b - 20 MHz - 1 Mbps - SISO Antenna (2.4GHz Core 0):
Specific Absorption Rate (Maximum SAR) 1g Results

Test Position	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
0mm - Bottom	6	2437	17.69	18.00	0.77	0.83	7
0mm - Rear of Display	6	2437	17.69	18.00	0.07	0.07	8
0mm - Bottom	11	2462	17.58	18.00	0.80	0.80	9
0mm - Bottom	1	2412	17.51	18.00	0.64	0.72	10

Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g)
KDB 248227 D01 v02 - Testing was not required for OFDM as per Section 5.2.2
KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is:
≤ 0.8W/kg when the transmission band is ≤ 100MHz
≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz
≤ 0.4W/kg when the transmission band is ≥ 200MHz

WLAN - 2450 MHz - 802.11b - 20 MHz - 1 Mbps - SISO Antenna (2.4GHz Core 1)
Specific Absorption Rate (Maximum SAR) 1g Results

Test Position	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
0mm - Bottom	6	2437	17.69	18.00	0.92	**0.99**	11
0mm Rear	6	2437	17.69	18.00	0.08	0.08	12
0mm - Bottom	11	2462	17.54	18.00	0.89	0.89	13
0mm - Bottom	1	2412	17.50	18.00	0.69	0.78	14

Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g)
KDB 248227 D01 v02 - Testing was not required for OFDM as per Section 5.2.2
KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is:
≤ 0.8W/kg when the transmission band is ≤ 100MHz
≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz
≤ 0.4W/kg when the transmission band is ≥ 200MHz

WLAN - 2450 MHz - 802.11n - HT20– 2x2 MIMO - Antenna (2.4GHz Core 0 and Core 1):
Specific Absorption Rate (Maximum SAR) 1g Results

Test Position	Antenna	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
0mm - Bottom	(2.4GHz Core 0)	6	2437	17.58	18.00	0.62	0.68	15
0mm - Bottom	(2.4GHz Core 1)	6	2437	17.62	18.00	0.79	0.86	
0mm - Bottom	(2.4GHz Core 0)	7	2442	17.65	18.00	0.61	0.66	16
0mm - Bottom	(2.4GHz Core 1)	7	2442	17.66	18.00	0.79	0.85	
Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is: ≤ 0.8W/kg when the transmission band is ≤ 100MHz ≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz ≤ 0.4W/kg when the transmission band is ≥ 200MHz Worst case position which was found in 2.4GHz SISO testing was used. Channels 6 and 7 were tested only. Top and bottom channels are much lower power.								

WLAN - U-NII-1 - 802.11ac – VHT80- MCS0 - SISO Antenna (5GHz Core 0)
Specific Absorption Rate (Maximum SAR) 1g Results

Test Position	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
0mm - Bottom	42	5210	12.31	12.75	0.77	0.85	17
0mm - Rear of Display	42	5210	12.31	12.75	0.19	0.21	18
Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is: ≤ 0.8W/kg when the transmission band is ≤ 100MHz ≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz ≤ 0.4W/kg when the transmission band is ≥ 200MHz							

WLAN - U-NII-1 - 802.11ac – VHT80 - MCS0 - SISO Antenna (5GHz Core 1)
Specific Absorption Rate (Maximum SAR) 1g Results

Test Position	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
0mm - Bottom	42	5210	12.36	12.75	0.64	0.70	19
0mm - Rear of Display	42	5210	12.36	12.75	0.15	0.17	20
Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is: ≤ 0.8W/kg when the transmission band is ≤ 100MHz ≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz ≤ 0.4W/kg when the transmission band is ≥ 200MHz							

WLAN - U-NII-1 - 802.11n – HT40 - MCS0 - 2x2 MIMO - Antenna (5GHz Core 0 and Core 1): Specific Absorption Rate (Maximum SAR) 1g Results

Test Position	Antenna	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
0mm - Bottom	(5GHz Core 0)	46	5230	12.45	12.75	0.73	0.78	21
0mm - Bottom	(5GHz Core 1)	46	5230	12.48	12.75	0.72	0.76	
Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is: ≤ 0.8W/kg when the transmission band is ≤ 100MHz ≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz ≤ 0.4W/kg when the transmission band is ≥ 200MHz Worst case position which was found in U-NII-1 SISO testing was used.								

WLAN - U-NII-2C - 802.11ac - 80 MHz - MCS0 - SISO Antenna (5GHz Core 0): Specific Absorption Rate (Maximum SAR) 1g Results

Test Position	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
0mm - Bottom	106	5530	11.37	11.75	0.75	0.82	22
0mm - Rear of Display	106	5530	11.37	11.75	0.17	0.18	23
0mm - Bottom	122	5610	11.25	11.75	0.83	0.93	24
0mm - Bottom	138	5690	11.15	11.75	0.77	0.88	25
Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is: ≤ 0.8W/kg when the transmission band is ≤ 100MHz ≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz ≤ 0.4W/kg when the transmission band is ≥ 200MHz							

WLAN - U-NII-2C - 802.11ac - 80 MHz - MCS0 - SISO Antenna (5GHz Core 1):
Specific Absorption Rate (Maximum SAR) 1g Results

Test Position	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
0mm - Bottom	106	5530	11.40	11.75	0.76	0.82	26
0mm - Rear of Display	106	5530	11.40	11.75	0.14	0.15	27
0mm - Bottom	122	5610	11.32	11.75	0.62	0.68	28
0mm - Bottom	138	5690	11.13	11.75	0.55	0.63	29

Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g)
KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is:
≤ 0.8W/kg when the transmission band is ≤ 100MHz
≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz
≤ 0.4W/kg when the transmission band is ≥ 200MHz

WLAN - U-NII-2C - 802.11ac - 80 MHz - MCS0 - 2x2 MIMO - (5GHz Core 0 and Core 1):
Specific Absorption Rate (Maximum SAR) 1g Results

Test Position	Antenna	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
0mm - Bottom	(5GHz Core 0)	138	5690	11.38	11.75	0.78	0.85	30
0mm - Bottom	(5GHz Core 1)	138	5690	11.35	11.75	0.54	0.59	
0mm - Bottom	(5GHz Core 0)	122	5610	11.34	11.75	0.88	0.96	31
0mm - Bottom	(5GHz Core 1)	122	5610	11.25	11.75	0.68	0.76	
0mm - Bottom	(5GHz Core 0)	106	5530	11.02	11.50	0.83	0.92	32
0mm - Bottom	(5GHz Core 1)	106	5530	11.01	11.50	0.76	0.86	

Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g)
KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is:
≤ 0.8W/kg when the transmission band is ≤ 100MHz
≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz
≤ 0.4W/kg when the transmission band is ≥ 200MHz
Worst case position which was found in U-NII-2C SISO testing was used.

WLAN - U-NII-3 - 802.11ac - 80 MHz - MCS0 - SISO Antenna (5GHz Core 0):
Specific Absorption Rate (Maximum SAR) 1g Results

Test Position	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
0mm - Bottom	155	5775	10.67	11.00	0.64	0.69	33
0mm - Rear of Display	155	5775	10.67	11.00	0.16	0.17	34
Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is: ≤ 0.8W/kg when the transmission band is ≤ 100MHz ≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz ≤ 0.4W/kg when the transmission band is ≥ 200MHz							

WLAN - U-NII-3 - 802.11ac - 80 MHz - MCS0 - SISO Antenna (5GHz Core 1):
Specific Absorption Rate (Maximum SAR) 1g Results

Test Position	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
0mm - Bottom	155	5775	10.71	11.00	0.44	0.47	35
0mm - Rear of Display	155	5775	10.71	11.00	0.08	0.08	36
Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is: ≤ 0.8W/kg when the transmission band is ≤ 100MHz ≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz ≤ 0.4W/kg when the transmission band is ≥ 200MHz							

WLAN - U-NII-3 - 802.11ac - 80 MHz - MCS0 - 2x2 MIMO - Antenna (5GHz Core 0 and Core 1):
Specific Absorption Rate (Maximum SAR) 1g Results

Test Position	Antenna	Channel Number	Frequency (MHz)	Measured Average Power (dBm)	Tune Up (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Scan Figure Number
0mm - Bottom	(5GHz Core 0)	155	5775	10.73	11.00	0.73	0.78	37
0mm - Bottom	(5GHz Core 1)	155	5775	10.65	11.00	0.53	0.57	
Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) KDB 447498 D01 - Testing of other required channels within the operation mode of a frequency band is not required when the reported 1g SAR for mid-band or highest output power channel is: ≤ 0.8W/kg when the transmission band is ≤ 100MHz ≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz ≤ 0.4W/kg when the transmission band is ≥ 200MHz Worst case position which was found in U-NII-3 SISO testing was used.								

1.4.3 Simultaneous Transmission

Position	5GHz WLAN-1 g SAR (W/kg)	Bluetooth 1 g SAR (W/kg)	Sum of 1 g SAR (W/Kg)	Peak Location Separation Ratio required?	Peak Location Separation Ratio
Bottom	0.93	0.48	1.41	No	N/A

KDB 447498 D01 - Section 4.3.2: Simultaneous test exclusion is applicable as the sum of 1g SAR of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit.

The highest overall 5GHz WLAN and Bluetooth results were used for a conservative estimate.

1.4.4 Measurement Variability (KDB 865664 D01)

Repeated measurements are required only when the measured SAR is ≥ 0.80 W/kg. If the measured SAR value of the initial repeated measurement is < 1.45 W/kg with ≤ 20% variation, only one repeated measurement is required to reaffirm that the results are not expected to have substantial variations, which may introduce significant compliance concerns. A second repeated measurement is required only if the measured result for the initial repeated measurement is within 10% of the SAR limit and vary by more than 20%, which are often related to device and measurement setup difficulties. The following procedures are applied to determine if repeated measurements are required. The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds. The repeated measurement results must be clearly identified in the SAR report. All measured SAR, including the repeated results, must be considered to determine compliance.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2 to 4 do not apply.
2) When the original highest measured SAR is ≥ 0.80 W/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 (~ 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 and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

Repeated measurements were required for the 2.4GHz WLAN, U-NII-1 and U-NII-2C frequency bands.
All results for, U-NII-2A and U-NII-3 Bands were all lower than 0.8W/kg.

2.4GHz : SISO Measurement variabilty results.

Test Position	Ant	Channel Number	Frequency (MHz)	Scaled 1g SAR (W/kg)	Test	Ratio
0mm Bottom	(2.4GHz Core0)	6	2437	0.99	Initial	1.10
0mm Bottom	(2.4GHz Core0)	6	2437	0.90	Repeated	

U-NII-1 : SISO Measurement variabilty results.

Test Position	Ant	Channel Number	Frequency (MHz)	Scaled 1g SAR (W/kg)	Test	Ratio
0mm Bottom	(5GHz Core 0)	42	5210	0.84	Initial	1.10
0mm Bottom	(5GHz Core 0)	42	5210	0.94	Repeated	

U-NII-2C : MIMO (5GHz Core 0 and 1) Measurement variabilty results.

Test Position	Ant	Channel Number	Frequency (MHz)	Scaled 1g SAR (W/kg)	Test	Ratio
0mm Bottom	(5GHz Core 0)	122	5610	0.96	Initial	1.03
0mm Bottom	(5GHz Core 0)	122	5610	1.00	Repeated	

Test Position	Ant	Channel Number	Frequency (MHz)	Scaled 1g SAR (W/kg)	Test	Ratio
0mm Bottom	(5GHz Core 1)	122	5610	0.76	Initial	1.00
0mm Bottom	(5GHz Core 1)	122	5610	0.77	Repeated	

1.4.5 Standalone SAR Test Exclusion Considerations. (KDB 447498 D01)

The 1g SAR Test exclusion thresholds for 100 MHz to 6 GHz *test separation distances* ≤ 50 mm are determined by:

[(*max power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] [√f (GHz)]* ≤ 3.0, where

- f (GHz) is the RF channel transmit frequency in GHz.
- Power and distance are rounded to the nearest mW and mm before calculation.
- The result is rounded to one decimal place for comparison.
- When the maximum test separation distance is < 5 mm, a distance of 5 mm is applied.

RAT & Band	Frequency (MHz)	Power (dBm)	Power (mW)	Test Position	Distance (mm)	Threshold	Test Exclusion
WLAN – 2450MHz	2437	18.00	63	Body	5	19.7	No
WLAN – 2450MHz	2462	18.00	63	Body	5	19.8	No
WLAN – 2450MHz	2412	18.00	63	Body	5	19.6	No
Bluetooth - 2450 MHz	2480	16.00	40	Body	5	12.6	No
WLAN U-NII 1	5210	12.75	19	Body	5	8.7	No
WLAN U-NII 1	5230	12.75	19	Body	5	8.7	No
WLAN U-NII 2C	5530	11.75	15	Body	5	7.1	No
WLAN U-NII 2C	5610	11.75	15	Body	5	7.1	No
WLAN U-NII 2C	5690	11.75	15	Body	5	7.2	No
WLAN U-NII 3	5775	11.00	13	Body	5	6.2	No

1.4.6 Technical Description

The equipment under test (EUT) was an Apple Inc, A2338 Laptop Computer. A full technical description can be found in the manufacturer's documentation.

1.4.7 Test Configuration and Modes of Operation

The testing was performed with an integral battery supplied by Apple Inc. The batteries were fully charged before each measurement and there were no external connections.

Supported technologies are Bluetooth (BDR/EDR//HDR/LE-1M/LE-M2), 2.4 GHz WLAN (802.11b/g/n/ax) and 5 GHz WLAN (802.11a/n/ac/ax). 2x2 MIMO is supported for WLAN.

Transmit Beamforming is supported for Bluetooth, however this is at 2dBm lower power than the highest declared power SISO transmission mode, the antennas are spatially separated and were assessed in SISO modes only.

WLAN and Bluetooth testing were achieved using the devices internal software, scripts and settings supplied by the customer. For each scan, the device was configured into a continuous transmission test mode at maximum power. Testing was performed in each position at the frequency that gave the highest output power for each band. Some SAR levels were found to be higher than the thresholds set in KDB 447498 D01 therefore additional testing was required at the relevant frequencies / channels of the bands.

Conducted power measurements were performed on a modified device (accessible conducted ports) and the measured SAR results were power scaled to the maximum declared tune-up level.

For each antenna, the bottom surface and the rear of the EUT display were assessed for SAR. MIMO testing was carried out on the bottom surface of the EUT only. (Worst case position of SISO results)

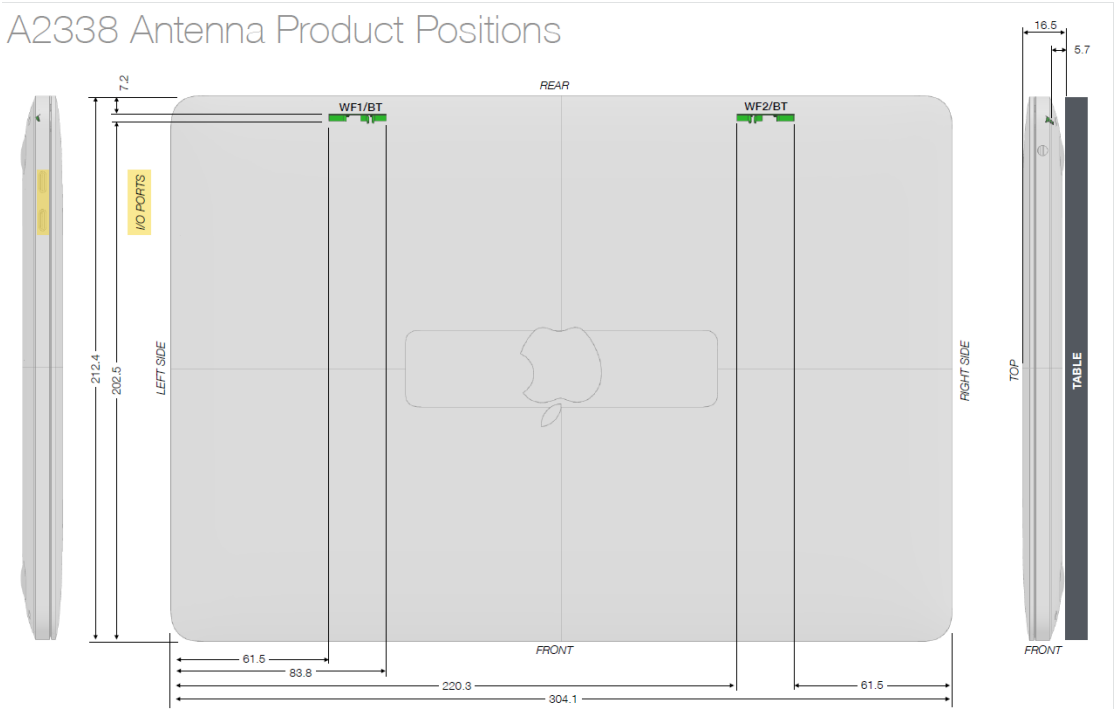

Figure 1 Antenna Location Diagram

2450 MHz 802.11g/n/ax OFDM configurations met the test exclusion requirements of KDB 248227 D01 section 5.2.2 as the highest reported SAR for DSSS was adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR was ≤ 1.2 W/kg.

For the 5GHz frequency bands the transmission mode used for testing was determined by the 802.11 configuration with the highest declared output power in each frequency band. Where multiple 802.11 configurations have the same specified output power, testing was performed using the mode with the largest channel bandwidth with the lowest order modulation and lowest data rate.

The U-NII-2A Band was not tested as this met the test exclusion requirements of KDB 248227 D01 section 5.3.1.

For SAR assessment, the relevant surfaces of the device were placed against an Elliptical phantom with a 0mm separation distance.

The Elliptical Flat Phantom dimensions are 600mm major axis and 400mm minor axis with a shell thickness of 2mm. The phantom was filled to a minimum depth of 150mm with the appropriate body simulant liquid. The dielectric properties were measured and found to be in accordance with the requirements specified in KDB 865665.

Included in this report are descriptions of the test method; the equipment used and an analysis of the test uncertainties applicable and diagrams indicating the locations of maximum SAR for each test position along with photographs indicating the positioning of the EUT against the elliptical phantom as appropriate.

1.4.8 Deviations from Standard

Initially, area scans were completed covering the whole of the bottom surface of the EUT to determine that there were no other RF radiators (unintentional) other than the antennas. The actual SAR measurements were completed using smaller area scans covering the antenna locations only.

1.5 POWER TABLES (TUNE UP VALUES)

Note: Power levels highlighted in green apply to ISED only and values highlighted in blue apply to FCC only. All other values are the same between FCC and ISED.

All levels in dBm

Bluetooth

BT Core	PA	Channel	BDR (dBm)	EDR (dBm)	LE Data (dBm)	LE ADV (dBm)	HDR4 (dBm)	HDR8 (dBm)
0	iPA	All	12.5	10	12.5	12.5	6.5	6.5
0	ePA		16	16	16	12.5	13	13
1	iPA		12.5	10	12.5	12.5	6.5	6.5
1	ePA		16	16	16	12.5	13	13

Bluetooth - TXBF

BT Core	PA	Channel	BDR (dBm)	EDR (dBm)	LE Data (dBm)	LE ADV (dBm)	HDR4 (dBm)	HDR8 (dBm)
0	iPA	All	12.5	10	12.5	9	6.5	6.5
0	ePA		14	14	14	9	10	10
1	iPA		12.5	10	12.5	9	6.5	6.5
1	ePA		14	14	14	9	10	10

WLAN

2.4GHz - SISO

Channel	Center Frequency (MHz)	b (SISO)	g (SISO)	11n/11ac HT20 (SISO)	11ax HE20 (SISO)	11ax HE20 RU106 (SISO)	11ax HE20 RU52 (SISO)	11ax HE20 RU26 (SISO)
1	2412	18	13.5	13.5	12	17.5	17	14
2	2417	18	16	16	14	18	17	14
3	2422	18	18	18	18	18	17	14
4	2427	18	18	18	18	18	17	14
5	2432	18	18	18	18	18	17	14
6	2437	18	18	18	18	18	17	14
7	2442	18	18	18	18	18	17	14
8	2447	18	18	18	18	18	17	14
9	2452	18	17	17	17	18	17	14
10	2457	18	16	16	16	18	17	14
11	2462	18	11.5	11.5	11	17.25	17	14
12	2467	14.5	9.5	9.5	8	13.75	16	14
13	2472	12.5	0	0	0	0	-3	0

2.4GHz - MIMO

Channel	Center Frequency (MHz)	11n/11ac HT20 (2Tx, nonTXBF)	11ax HE20 (2Tx, nonTXBF)	11ax HE20 RU106 (2Tx, nonTXBF)	11ax HE20 RU52 (2Tx, nonTXBF)	11ax HE20 RU26 (2Tx, nonTXBF)
1	2412	13.5	12	14.5	16	14
2	2417	15.5	14	17.5	17	14
3	2422	17.5	16	18	17	14
4	2427	18	17	18	17	14
5	2432	18	18	18	17	14
6	2437	18	18	18	17	14
7	2442	18	18	18	17	14
8	2447	17	17	18	17	14
9	2452	16.5	16	18	17	14
10	2457	15.5	15	18	17	14
11	2462	10.5	10.5	17.25	17	14
12	2467	8.5	7	13.75	15.75	14
13	2472	0	0	0	-3	0

5GHz - 20MHz BW - SISO

Channel	Center Frequency (MHz)	a (SISO)	11n/11ac HT20 (SISO)	11ax HE20 (SISO)	11ax HE20 RU106 (SISO)	11ax HE20 RU52 (SISO)	11ax HE20 RU26 (SISO)
36	5180	12.75	12.75	12.75	12.5	9.5	6.5
40	5200	12.75	12.75	12.75	12.5	9.5	6.5
44	5220	12.75	12.75	12.75	12.5	9.5	6.5
48	5240	12.75	12.75	12.75	12.5	9.5	6.5
36	5180	12.75	12.75	12.75	12.75	12.75	12
40	5200	12.75	12.75	12.75	12.75	12.75	12
44	5220	12.75	12.75	12.75	12.75	12.75	12
48	5240	12.75	12.75	12.75	12.75	12.75	12
52	5260	12.5	12.5	12.5	12.5	12.5	NS
56	5280	12.5	12.5	12.5	12.5	12.5	NS
60	5300	12.5	12.5	12.5	12.5	12.5	NS
64	5320	12.5	12.5	12.5	12.5	12.5	NS
100	5500	11.75	11.75	11.75	11.75	11.75	NS
104	5520	11.75	11.75	11.75	11.75	11.75	NS
108	5540	11.75	11.75	11.75	11.75	11.75	NS
112	5560	11.75	11.75	11.75	11.75	11.75	NS
116	5580	11.75	11.75	11.75	11.75	11.75	NS
120	5600	11.75	11.75	11.75	11.75	11.75	NS
124	5620	11.75	11.75	11.75	11.75	11.75	NS
128	5640	11.75	11.75	11.75	11.75	11.75	NS
132	5660	11.75	11.75	11.75	11.75	11.75	NS
136	5680	11.75	11.75	11.75	11.75	11.75	NS
140	5700	11.75	11.75	11.75	11.75	11.75	NS
144	5720	11.75	11.75	11.75	11.75	11.75	NS
149	5745	11	11	11	11	11	11
153	5765	11	11	11	11	11	11
157	5785	11	11	11	11	11	11
161	5805	11	11	11	11	11	11
165	5825	11	11	11	11	11	11

5GHz - 20MHz BW - MIMO

Channel	Center Frequency (MHz)	11n/11ac HT20 (2Tx, CDD, nonTX BF)	11ax HE20 (2Tx, CDD, nonTX BF)	11ax HE20 RU106 (2Tx, CDD, nonTX BF)	11ax HE20 RU52 (2Tx, CDD, nonTX BF)	11ax HE20 RU26 (2Tx, CDD, nonTX BF)	11n/11ac HT20 (2Tx, SDM, nonTX BF)	11ax HE20 (2Tx, SDM, nonTX BF)	11ax HE20 RU106 (2Tx, SDM, nonTX BF)	11ax HE20 RU52 (2Tx, SDM, nonTX BF)	11ax HE20 RU26 (2Tx, SDM, nonTX BF)	11n/11ac HT20 (2Tx, TxBF)
36	5180	8.75	8.75	6.75	3.75	0.75	12	12	10	7	4	8.75
40	5200	8.75	8.75	6.75	3.75	0.75	12	12	10	7	4	8.75
44	5220	8.75	8.75	6.75	3.75	0.75	12	12	10	7	4	8.75
48	5240	8.75	8.75	6.75	3.75	0.75	12	12	10	7	4	8.75
36	5180	12.75	12.5	11	10	7.75	12.75	12.5	11	10	8	12
40	5200	12.75	12.75	12.75	10.75	7.75	12.75	12.75	12.75	12	9	12.75
44	5220	12.75	12.75	12.75	10.75	7.75	12.75	12.75	12.75	12	9	12.75
48	5240	12.75	12.75	12.75	10.75	7.75	12.75	12.75	12.75	12	9	12.75
52	5260	12.5	12.5	12.5	11.5	NS	12.5	12.5	12.5	12	NS	12.5
56	5280	12.5	12.5	12.5	11.5	NS	12.5	12.5	12.5	12	NS	12.5
60	5300	12.5	12.5	12.5	11.5	NS	12.5	12.5	12.5	12	NS	12.5
64	5320	12.5	12.5	10	9	NS	12.5	12.5	10	9	NS	12.5
100	5500	11.75	11.75	11.75	11	NS	11.75	11.75	11.75	11.75	NS	11.75
104	5520	11.75	11.75	11.75	11	NS	11.75	11.75	11.75	11.75	NS	11.75
108	5540	11.75	11.75	11.75	11	NS	11.75	11.75	11.75	11.75	NS	11.75
112	5560	11.75	11.75	11.75	11	NS	11.75	11.75	11.75	11.75	NS	11.75
116	5580	11.75	11.75	11.75	11	NS	11.75	11.75	11.75	11.75	NS	11.75
120	5600	11.75	11.75	11.75	11	NS	11.75	11.75	11.75	11.75	NS	11.75
124	5620	11.75	11.75	11.75	11	NS	11.75	11.75	11.75	11.75	NS	11.75
128	5640	11.75	11.75	11.75	11	NS	11.75	11.75	11.75	11.75	NS	11.75
132	5660	11.75	11.75	11.75	11	NS	11.75	11.75	11.75	11.75	NS	11.75
136	5680	11.75	11.75	11.75	11	NS	11.75	11.75	11.75	11.75	NS	11.75
140	5700	11.75	11.75	11.75	11	NS	11.75	11.75	11.75	11.75	NS	11.75
144	5720	11.75	11.75	11.75	11	NS	11.75	11.75	11.75	11.75	NS	11.75
149	5745	11	11	11	11	11	11	11	11	11	11	11
153	5765	11	11	11	11	11	11	11	11	11	11	11
157	5785	11	11	11	11	11	11	11	11	11	11	11
161	5805	11	11	11	11	11	11	11	11	11	11	11
165	5825	11	11	11	11	11	11	11	11	11	11	11

5GHz - 40MHz BW - SISO

Channel	Center Frequency (MHz)	11n/11ac HT40 (SISO)	11ax HE40 (SISO)	11ax HE40 RU106 (SISO)	11ax HE40 RU52 (SISO)	11ax HE40 RU26 (SISO)
38	5190	12.75	12.75	12.5	9.5	6.5
46	5230	12.75	12.75	12.5	9.5	6.5
38	5190	12.75	12.75	12.75	12.75	12
46	5230	12.75	12.75	12.75	12.75	12
54	5270	12.5	12.5	12.5	12.5	NS
62	5310	12.5	12.5	12.5	12.5	NS
102	5510	11.75	11.75	11.75	11.75	NS
110	5550	11.75	11.75	11.75	11.75	NS
118	5590	11.75	11.75	11.75	11.75	NS
126	5630	11.75	11.75	11.75	11.75	NS
134	5670	11.75	11.75	11.75	11.75	NS
142	5710	11.75	11.75	11.75	11.75	NS
151	5755	11	11	11	11	11
159	5795	11	11	11	11	11

5GHz - 40MHz BW - MIMO

Channel	Center Frequency (MHz)	11n/11ac HT40 (2Tx, CDD, nonTXBF)	11ax HE40 (2Tx, CDD, nonTXBF)	11ax HE40 RU106 (2Tx, CDD, nonTXBF)	11ax HE40 RU52 (2Tx, CDD, nonTXBF)	11ax HE40 RU26 (2Tx, CDD, nonTXBF)	11n/11ac HT40 (2Tx, SDM, nonTXBF)	11ax HE40 (2Tx, SDM, nonTXBF)	11ax HE40 RU106 (2Tx, SDM, nonTXBF)	11ax HE40 RU52 (2Tx, SDM, nonTXBF)	11ax HE40 RU26 (2Tx, SDM, nonTXBF)	11n/11ac HT40 (2Tx, TxBF)
38	5190	11.25	11	6.75	3.75	0.75	12.75	11.75	10	7	4	11.25
46	5230	11.25	11.25	6.75	3.75	0.75	12.75	12.75	10	7	4	11.25
38	5190	11.5	11	12.75	10.75	7.75	12.75	11.75	12.75	12	9	12
46	5230	12.75	12.75	12.75	10.75	7.75	12.75	12.75	12.75	12	9	12.75
54	5270	12.5	12.5	12.5	11.5	NS	12.5	12.5	12.5	12	NS	12.5
62	5310	12.25	11.75	11	11	NS	12.25	11.75	11	11	NS	11
102	5510	11.75	11	11.75	11	NS	11.75	11	11.75	11.75	NS	10.5
110	5550	11.75	11.75	11.75	11	NS	11.75	11.75	11.75	11.75	NS	11.75
118	5590	11.75	11.75	11.75	11	NS	11.75	11.75	11.75	11.75	NS	11.75
126	5630	11.75	11.75	11.75	11	NS	11.75	11.75	11.75	11.75	NS	11.75
134	5670	11.75	11.75	11.75	11	NS	11.75	11.75	11.75	11.75	NS	11.75
142	5710	11.75	11.75	11.75	11	NS	11.75	11.75	11.75	11.75	NS	11.75
151	5755	11	11	11	11	11	11	11	11	11	11	11
159	5795	11	11	11	11	11	11	11	11	11	11	11

5GHz - 80MHz BW - SISO

Channel	Center Frequency (MHz)	11ac VHT80 (SISO)	11ax HE80 (SISO)	11ax HE80 RU106 (SISO)	11ax HE80 RU52 (SISO)	11ax HE80 RU26 (SISO)
42	5210	12.75	12.75	12.5	9.5	6.5
42	5210	12.75	12.75	12.75	12.75	12
58	5290	12.5	12.5	12.5	12	NS
106	5530	11.75	11.75	11.75	11.75	NS
122	5610	11.75	11.75	11.75	11.75	NS
138	5690	11.75	11.75	11.75	11.75	NS
155	5775	11	11	11	11	11

5GHz - 80MHz BW - MIMO

Channel	Center Frequency (MHz)	11ac VHT80 (2Tx, CDD, nonTX BF)	11ax HE80 (2Tx, CDD, nonTX BF)	11ax HE80 RU106 (2Tx, CDD, nonTX BF)	11ax HE80 RU52 (2Tx, CDD, nonTX BF)	11ax HE80 RU26 (2Tx, CDD, nonTX BF)	11ac VHT80 (2Tx, SDM, nonTX BF)	11ax HE80 (2Tx, SDM, nonTX BF)	11ax HE80 RU106 (2Tx, SDM, nonTX BF)	11ax HE80 RU52 (2Tx, SDM, nonTX BF)	11ax HE80 RU26 (2Tx, SDM, nonTX BF)	11ac VHT80 (2Tx, TxBF)
42	5210	10.75	9.75	6.75	3.75	0.75	10.5	9.75	10	7	4	9.25
42	5210	10.75	9.75	12	10.75	7.75	10.5	9.75	12	12	9	9.25
58	5290	11	10	9	8	NS	11	10	9	8	NS	9.5
106	5530	11.5	10	11.75	11	NS	11.5	10	11.75	11.5	NS	9.5
122	5610	11.75	11.75	11.75	11	NS	11.75	11.75	11.75	11.75	NS	11.75
138	5690	11.75	11.75	11.75	11	NS	11.75	11.75	11.75	11.75	NS	11.75
155	5775	11	11	11	11	11	11	11	11	11	11	11

NS = Not Supported.

1.6 POWER MEASUREMENTS

1.6.1 Method

Conducted power measurements were performed with a power meter.

Bluetooth - EDR

(BT Core 0)

Technology	Channel	Modulation	Packet Type	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
EDR	0	PSK	3-DH5	2402	15.48	16.00
EDR	39	PSK	3-DH5	2441	15.33	16.00
EDR	78	PSK	3-DH5	2480	15.62	16.00

(BT Core 1)

Technology	Channel	Modulation	Packet Type	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
EDR	0	PSK	3-DH5	2402	15.33	16.00
EDR	39	PSK	3-DH5	2441	15.41	16.00
EDR	78	PSK	3-DH5	2480	15.25	16.00

Bluetooth - BDR

(BT Core 0)

Technology	Channel	Modulation	Packet Type	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
BDR	0	GFSK	DH5	2402	15.67	16.00
BDR	39	GFSK	DH5	2441	15.71	16.00
BDR	78	GFSK	DH5	2480	15.68	16.00

(BT Core 1)

Technology	Channel	Modulation	Packet Type	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
BDR	0	GFSK	DH5	2402	15.58	16.00
BDR	39	GFSK	DH5	2441	15.65	16.00
BDR	78	GFSK	DH5	2480	15.55	16.00

Bluetooth - LE

(BT Core 0)

Technology	Channel	Modulation	Packet Type	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
BTLE	0	GFSK	1M	2402	15.38	16.00
BTLE	39	GFSK	1M	2441	15.37	16.00
BTLE	78	GFSK	1M	2480	15.63	16.00

(BT Core 1)

Technology	Channel	Modulation	Packet Type	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
BTLE	0	GFSK	1M	2402	15.27	16.00
BTLE	39	GFSK	1M	2441	15.35	16.00
BTLE	78	GFSK	1M	2480	15.15	16.00

WLAN 2450 MHz - SISO

(2.4GHz Core 0)

Technology	Channel	Modulation	Duty Cycle (%)	Rate (Mbps)	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
802.11b	1	BPSK	100	1	2412	17.51	18.00
802.11b	6	BPSK	100	1	2437	17.69	18.00
802.11b	11	BPSK	100	1	2462	17.58	18.00

- Power measurements were not performed for OFDM modes, OFDM configurations met the test exclusion requirements of KDB 248227 D01 section 5.2.2.

(2.4GHz Core 1)

Technology	Channel	Modulation	Duty Cycle (%)	Rate (Mbps)	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
802.11b	1	BPSK	100	1	2412	17.50	18.00
802.11b	6	BPSK	100	1	2437	17.69	18.00
802.11b	11	BPSK	100	1	2462	17.54	18.00

- Power measurements were not performed for OFDM modes OFDM configurations met the test exclusion requirements of KDB 248227 D01 section 5.2.2.

WLAN 2450 MHz - 2x2 MIMO

(2.4GHz Core 0)

Technology	Channel	Modulation	Duty Cycle (%)	Rate (Mbps)	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
802.11n	1	BPSK	100	13.5	2412	13.00	13.50
802.11n	2	BPSK	100	13.5	2417	14.98	15.50
802.11n	3	BPSK	100	13.5	2422	17.08	17.50
802.11n	4	BPSK	100	13.5	2427	17.60	18.00
802.11n	5	BPSK	100	13.5	2432	17.61	18.00
802.11n	6	BPSK	100	13.5	2437	17.58	18.00
802.11n	7	BPSK	100	13.5	2442	17.65	18.00
802.11n	8	BPSK	100	13.5	2447	16.56	17.00
802.11n	9	BPSK	100	13.5	2452	16.05	16.50
802.11n	10	BPSK	100	13.5	2457	15.05	15.50
802.11n	11	BPSK	100	13.5	2462	10.12	10.50
802.11n	12	BPSK	100	13.5	2467	8.10	8.50
802.11n	13	BPSK	100	13.5	2472	-0.50	0.00

(2.4GHz Core 1)

Technology	Channel	Modulation	Duty Cycle (%)	Rate (Mbps)	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
802.11n	1	BPSK	100	13.5	2412	13.10	13.50
802.11n	2	BPSK	100	13.5	2417	15.20	15.50
802.11n	3	BPSK	100	13.5	2422	17.05	17.50
802.11n	4	BPSK	100	13.5	2427	17.59	18.00
802.11n	5	BPSK	100	13.5	2432	17.62	18.00
802.11n	6	BPSK	100	13.5	2437	17.62	18.00
802.11n	7	BPSK	100	13.5	2442	17.66	18.00
802.11n	8	BPSK	100	13.5	2447	16.66	17.00
802.11n	9	BPSK	100	13.5	2452	16.10	16.50
802.11n	10	BPSK	100	13.5	2457	15.09	15.50
802.11n	11	BPSK	100	13.5	2462	10.00	10.50
802.11n	12	BPSK	100	13.5	2467	8.05	8.50
802.11n	13	BPSK	100	13.5	2472	-0.50	0.00

WLAN U-NII 1 - SISO

(5GHz Core 0)

Technology	Channel	Modulation	Duty Cycle (%)	Rate (Mbps)	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
802.11ac VHT80	42	BPSK	100	13.5	5210	12.31	12.75

(5GHz Core 1)

Technology	Channel	Modulation	Duty Cycle (%)	Rate (Mbps)	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
802.11ac VHT80	42	BPSK	100	13.5	5310	12.36	12.75

WLAN U-NII 1 - 2x2 MIMO

(5GHz Core 0)

Technology	Channel	Modulation	Duty Cycle (%)	Rate (Mbps)	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
802.11n HT40 SDM	38	BPSK	100	13.5	5190	12.25	12.75
802.11n HT40 SDM	46	BPSK	100	13.5	5230	12.31	12.75
802.11n HT40 CDD	46	BPSK	100	13.5	5230	12.45	12.75

(5GHz Core 1)

Technology	Channel	Modulation	Duty Cycle (%)	Rate (Mbps)	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
802.11n HT40 SDM	38	BPSK	100	13.5	5190	12.36	12.75
802.11n HT40 SDM	46	BPSK	100	13.5	5230	12.39	12.75
802.11n HT40 CDD	46	BPSK	100	13.5	5230	12.48	12.75

WLAN U-NII 2C - SISO

(5GHz Core 0)

Technology	Channel	Modulation	Duty Cycle (%)	Rate (Mbps)	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
802.11ac VHT80	106	BPSK	100	29.3	5530	11.37	11.75
802.11ac VHT80	122	BPSK	100	29.3	5610	11.25	11.75
802.11ac VHT80	138	BPSK	100	29.3	5690	11.15	11.75

(5GHz Core 1

Technology	Channel	Modulation	Duty Cycle (%)	Rate (Mbps)	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
802.11ac VHT80	106	BPSK	100	29.3	5530	11.40	11.75
802.11ac VHT80	122	BPSK	100	29.3	5610	11.32	11.75
802.11ac VHT80	138	BPSK	100	29.3	5690	11.23	11.75

WLAN U-NII 2C - 2x2 MIMO

(5GHz Core 0)

Technology	Channel	Modulation	Duty Cycle (%)	Rate (Mbps)	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
802.11ac VHT80 -CDD	106	BPSK	100	29.3	5530	11.02	11.50
802.11ac VHT80 -CDD	122	BPSK	100	29.3	5610	11.34	11.75
802.11ac VHT80 -CDD	138	BPSK	100	29.3	5690	11.38	11.75

(5GHz Core 1)

Technology	Channel	Modulation	Duty Cycle (%)	Rate (Mbps)	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
802.11ac VHT80 -CDD	106	BPSK	100	29.3	5530	11.01	11.50
802.11ac VHT80 -CDD	122	BPSK	100	29.3	5610	11.25	11.75
802.11ac VHT80 -CDD	138	BPSK	100	29.3	5690	11.35	11.75

(5GHz Core 0)

Technology	Channel	Modulation	Duty Cycle (%)	Rate (Mbps)	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
802.11ac VHT80 -SDM	106	BPSK	100	29.3	5530	10.95	11.50
802.11ac VHT80-SDM	122	BPSK	100	29.3	5610	11.25	11.75
802.11ac VHT80-SDM	138	BPSK	100	29.3	5690	11.12	11.75

(5GHz Core 1)

Technology	Channel	Modulation	Duty Cycle (%)	Rate (Mbps)	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
802.11ac VHT80 -SDM	106	BPSK	100	29.3	5530	10.93	11.50
802.11ac VHT80-SDM	122	BPSK	100	29.3	5610	11.1	11.75
802.11ac VHT80-SDM	138	BPSK	100	29.3	5690	11.2	11.75

WLAN U-NII 3 - SISO

(5GHz Core 0)

Technology	Channel	Modulation	Duty Cycle (%)	Rate (Mbps)	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
802.11ac VHT80	155	BPSK	100	29.3	5775	10.67	11.00

WLAN U-NII 3 - SISO

(5GHz Core 1)

Technology	Channel	Modulation	Duty Cycle (%)	Rate (Mbps)	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
802.11ac VHT80	155	BPSK	100	29.3	5775	10.71	11.00

WLAN U-NII 3 - 2x2 MIMO

(5GHz Core 0)

Technology	Channel	Modulation	Duty Cycle (%)	Rate (Mbps)	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
802.11ac VHT80 - CDD	155	BPSK	100	29.3	5775	10.73	11.00

(5GHz Core 1)

Technology	Channel	Modulation	Duty Cycle (%)	Rate (Mbps)	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
802.11ac VHT80 –CDD	155	BPSK	100	29.3	5775	10.65	11.00

(5GHz Core 0)

Technology	Channel	Modulation	Duty Cycle (%)	Rate (Mbps)	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
802.11ac VHT80 -SDM	155	BPSK	100	29.3	5775	10.62	11.00

(5GHz Core 1)

Technology	Channel	Modulation	Duty Cycle (%)	Rate (Mbps)	Frequency (MHz)	Measured Power (dBm)	Tune Up (dBm)
802.11ac VHT80 –SDM	155	BPSK	100	29.3	5775	10.52	11.00

SECTION 2

TEST DETAILS

Specific Absorption Rate Testing of the
A2338

2.1 DASY5 MEASUREMENT SYSTEM

2.1.1 System Description

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

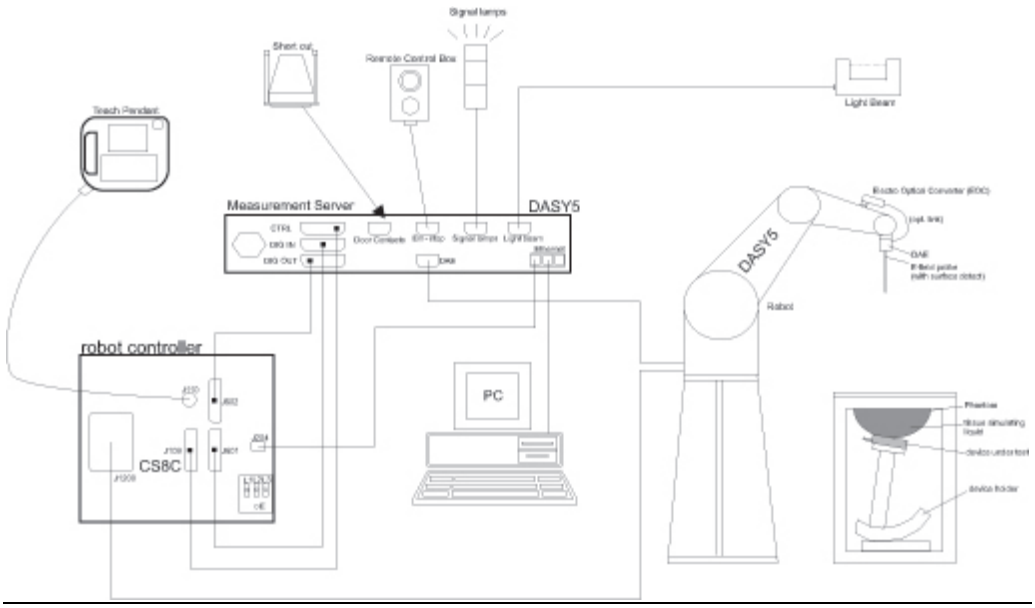

Figure 2 System Description Diagram

A standard high precision 6-axis robot (Stäubli TX=RX family) 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 the DASY5 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.

2.1.2 Probe Specification

The probes used by the DASY system are isotropic E-field probes, constructed with a symmetric design and a triangular core. The probes have built-in shielding against static charges and are contained within a PEEK enclosure material. These probes are specially designed and calibrated for use in liquids with high permittivities. The frequency range of the probes are from 6 MHz to 6 GHz.

2.1.3 Data Acquisition Electronics

The data acquisition electronics (DAE4 or DAE3) consist 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 with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock.

The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection. The input impedance of both the DAE4 as well as of the DAE3 box is 200MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

2.1.4 SAR Evaluation Description

The DASY5 software includes all numerical procedures necessary to evaluate the spatial peak SAR values.

Based on the IEEE 1528 standard, a new algorithm has been implemented. The spatial-peak SAR can be computed over any required mass.

The base for the evaluation is a "cube" measurement in a volume of 30mm3 (7x7x7 points). The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the centre of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan. If the 10g cube or both cubes are not entirely inside the measured volumes, the system issues a warning regarding the evaluated spatial peak values within the Post processing engine (SEMCAD X). This means that if the measured volume is shifted, higher values might be possible. To get the correct values you can use a finer measurement grid for the area scan. In complicated field distributions, a large grid spacing for the area scan might miss some details and give an incorrectly interpolated peak location.

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

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

2.1.5 Interpolation, Extrapolation and Detection of Maxima

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

In DASY5, the choice of the coordinate system defining the location of the measurement points has no influence on the uncertainty of the interpolation, Maxima Search and extrapolation routines. The interpolation, extrapolation and maximum search routines are all based on the modified Quadratic Shepard's method. Thereby, the interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation. The DASY5 routines construct a once-continuously differentiable function that interpolates the measurement values as follows:

For each measurement point a trivariate (3-D) / bivariate (2-D) quadratic is computed.
It interpolates the measurement values at the data point and forms a least-square fit to neighbouring measurement values. The spatial location of the quadratic with respect to the measurement values is attenuated by an inverse distance weighting. This is performed since the calculated quadratic will fit measurement values at nearby points more accurate than at points located further away.

After the quadratics are calculated for at all measurement points, the interpolating function is calculated as a weighted average of the quadratics.

There are two control parameters that govern the behaviour of the interpolation method. One specifies the number of measurement points to be used in computing the least-square fits for the local quadratics. These measurement points are the ones nearest the input point for which the quadratic is being computed. The second parameter specifies the number of measurement points that will be used in calculating the weights for the quadratics to produce the final function. The input data points used there are the ones nearest the point at which the interpolation is desired. Appropriate defaults are chosen for each of the control parameters

The trivariate quadratics that have been previously computed for the 3-D interpolation and whose input data are at the closest distance from the phantom surface, are used in order to extrapolate the fields to the surface of the phantom.

In order to determine all the field maxima in 2-D (Area Scan) and 3-D (Zoom Scan), the measurement grid is refined by a default factor of 10 and the interpolation function is used to evaluate all field values between corresponding measurement points. Subsequently, a linear search is applied to find all the candidate maxima. In a last step, non-physical maxima are removed and only those maxima which are within 2 dB of the global maximum value are retained.

In the Area Scan, the gradient of the interpolation function is evaluated to find all the extrema of the SAR distribution. The uncertainty on the locations of the extrema is less than 1/20 of the grid size. Only local maxima within 2 dB of the global maximum are searched and passed for the Zoom Scan measurement.

In the Zoom Scan, the interpolation function is used to extrapolate the Peak SAR from the lowest measurement points to the inner phantom surface (the extrapolation distance). The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1g and 10g cubes, the extrapolation distance should not be larger than 5mm.

2.1.6 Averaging and Determination of Spatial Peak SAR

The interpolated data is used to average the SAR over the 1g and 10g cubes by spatially discretising the entire measured volume. The resolution of this spatial grid used to calculate the averaged SAR is 1mm or about 42875 interpolated points. The resulting volumes are defined as cubical volumes containing the appropriate tissue parameters that are cantered at the location. The location is defined as the centre of the incremental volume (voxel).

The spatial-peak SAR must be evaluated in cubical volumes containing a mass that is within 5%of the required mass. The cubical volume centred at each location, as defined above, should be expanded in all directions until the desired value for the mass is reached, with no surface boundaries of the averaging volume extending beyond the outermost surface of the considered region. In addition, the cubical volume should not consist of more than 10% of air. If these conditions are not satisfied, then the centre of the averaging volume is moved to the next location. Otherwise, the exact size of the final sampling cube is found using an inverse polynomial approximation algorithm, leading to results with improved accuracy. If one boundary of the averaging volume reaches the boundary of the measured volume during its expansion, it will not be evaluated at all. Reference is kept of all locations used and those not used for averaging the SAR. All average SAR values are finally assigned to the centred location in each valid averaging volume.

All locations included in an averaging volume are marked to indicate that they have been used at least once. If a location has been marked as used but has never been assigned to the centre of a cube, the highest averaged SAR value of all other cubical volumes which have used this location for averaging is assigned to this location. Only those locations that are not part of any valid averaging volume should be marked as unused. For the case of an unused location, a new averaging volume must be constructed which will have the unused location centred at one surface of the cube. The remaining five surfaces are expanded evenly in all directions until the required mass is enclosed, regardless of the amount of included air. Of the six possible cubes with one surface centred on the unused location, the smallest cube is used, which still contains the required mass.

If the final cube containing the highest averaged SAR touches the surface of the measured volume, an appropriate warning is issued within the Post-processing engine.

2.2 BLUETOOTH 2450 MHz BODY SAR TEST RESULTS

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	20.1 °C
DATE:	10/09/2020	**RELATIVE HUMIDITY:**	47.0 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	1.991 S/m
DUT CONFIGURATION:	SISO (BT Core 0)	**RELATIVE PERMITTIVITY:**	54.475
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	22.1 °C
RAT:	Bluetooth BDR	**SCAN TYPE:**	Full
FREQUENCY:	2441 MHz	**DRIFT:**	0.03 dB
MODULATION:	GFSK	**PEAK SAR:**	0.92 W/kg
DUTY CYCLE:	77 %	**SAR (1g):**	0.48 W/kg

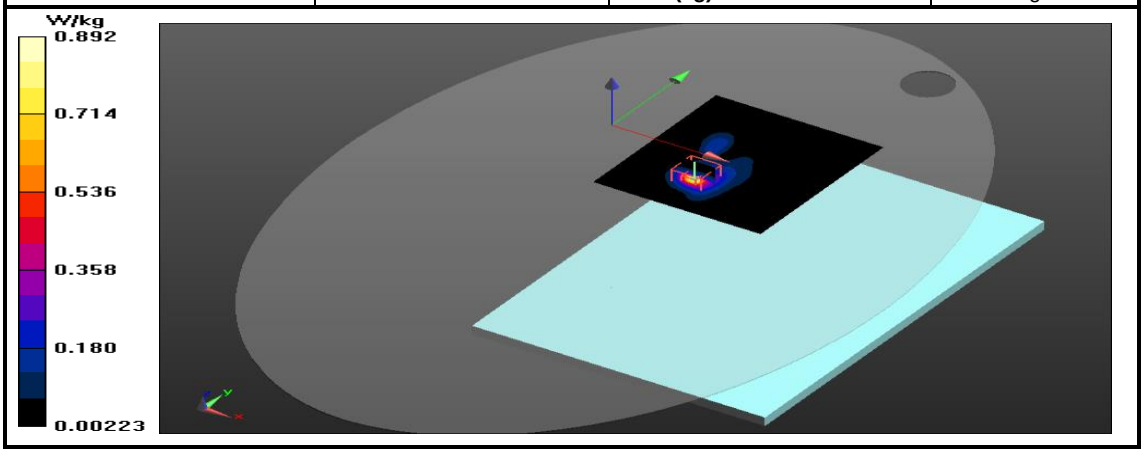

Figure 3: SAR Body Testing Results for the A2338 at 2441 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	20.1 °C
DATE:	10/09/2020	**RELATIVE HUMIDITY:**	47.0 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	1.991 S/m
DUT CONFIGURATION:	SISO (BT Core 0)	**RELATIVE PERMITTIVITY:**	54.475
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	22.1 °C
RAT:	Bluetooth BDR	**SCAN TYPE:**	Full
FREQUENCY:	2441 MHz	**DRIFT:**	-0.12 dB
MODULATION:	GFSK	**PEAK SAR:**	0.05 W/kg
DUTY CYCLE:	77 %	**SAR (1g):**	0.03 W/kg

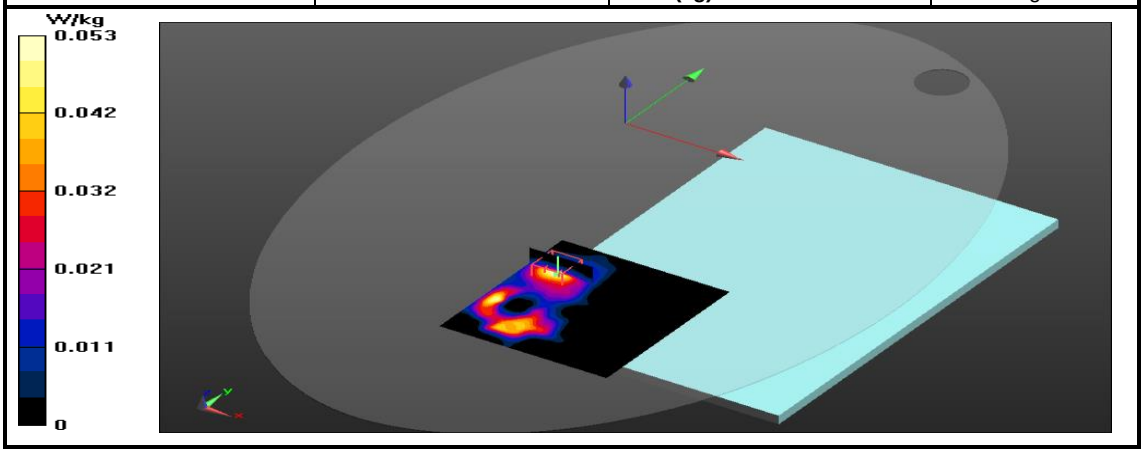

Figure 4: SAR Body Testing Results for the A2338 at 2441 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	20.1 °C
DATE:	10/09/2020	**RELATIVE HUMIDITY:**	47.0 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	1.991 S/m
DUT CONFIGURATION:	SISO (BT Core 1)	**RELATIVE PERMITTIVITY:**	54.475
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	22.1 °C
RAT:	Bluetooth BDR	**SCAN TYPE:**	Full
FREQUENCY:	2441 MHz	**DRIFT:**	-0.07 dB
MODULATION:	GFSK	**PEAK SAR:**	0.68 W/kg
DUTY CYCLE:	77 %	**SAR (1g):**	0.38 W/kg

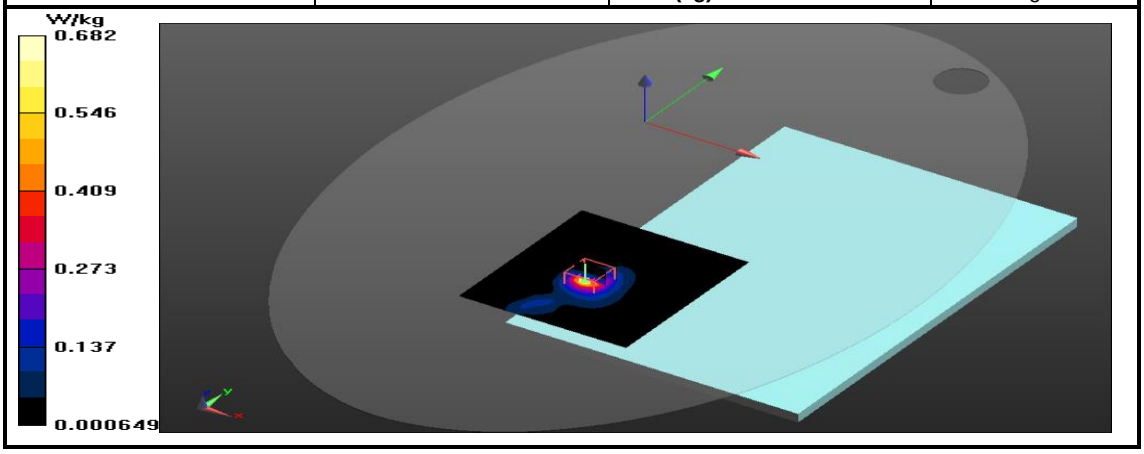

Figure 5: SAR Body Testing Results for the A2338 at 2441 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	20.1 °C
DATE:	10/09/2020	**RELATIVE HUMIDITY:**	47.0 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	1.991 S/m
DUT CONFIGURATION:	SISO (BT Core 1)	**RELATIVE PERMITTIVITY:**	54.475
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	22.1 °C
RAT:	Bluetooth BDR	**SCAN TYPE:**	Full
FREQUENCY:	2441 MHz	**DRIFT:**	0.00 dB
MODULATION:	GFSK	**PEAK SAR:**	0.05 W/kg
DUTY CYCLE:	77 %	**SAR (1g):**	0.03 W/kg

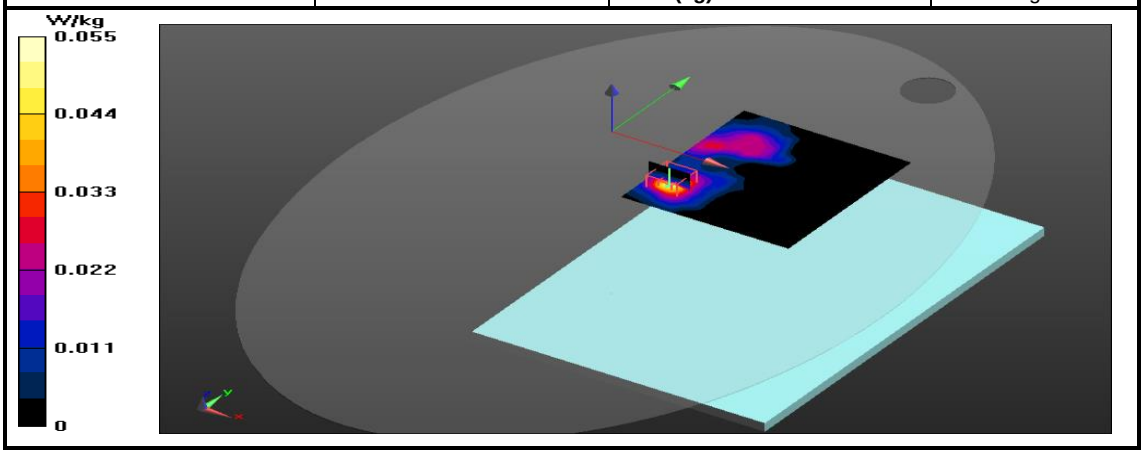

Figure 6: SAR Body Testing Results for the A2338 at 2441 MHz.

2.3 WLAN 2450 MHz BODY SAR TEST RESULTS

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	23.0 °C
DATE:	09/09/2020	**RELATIVE HUMIDITY:**	56.9 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	1.987 S/m
DUT CONFIGURATION:	SISO (2.4GHz Core 0)	**RELATIVE PERMITTIVITY:**	54.481
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	21.9 °C
RAT:	802.11b	**SCAN TYPE:**	Full
FREQUENCY:	2437 MHz	**DRIFT:**	-0.01 dB
MODULATION:	BPSK	**PEAK SAR:**	1.47 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.83 W/kg

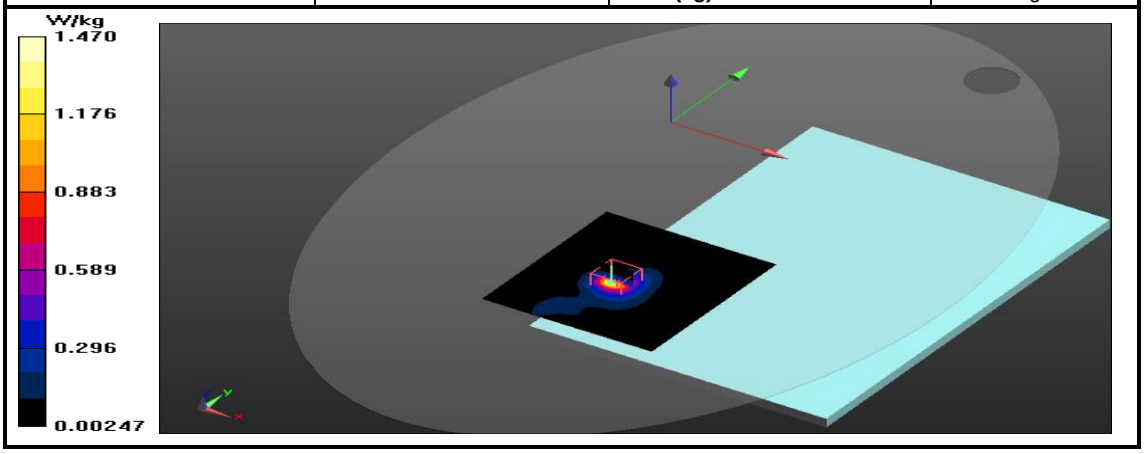

Figure 7: SAR Body Testing Results for the A2338 at 2437 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	23.0 °C
DATE:	09/09/2020	**RELATIVE HUMIDITY:**	56.9 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	1.987 S/m
DUT CONFIGURATION:	SISO (2.4GHz Core 0)	**RELATIVE PERMITTIVITY:**	54.481
DUT POSITION:	0mm - Rear of Display	**LIQUID TEMPERATURE:**	21.9 °C
RAT:	802.11b	**SCAN TYPE:**	Full
FREQUENCY:	2437 MHz	**DRIFT:**	-0.08 dB
MODULATION:	BPSK	**PEAK SAR:**	0.10 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.07 W/kg

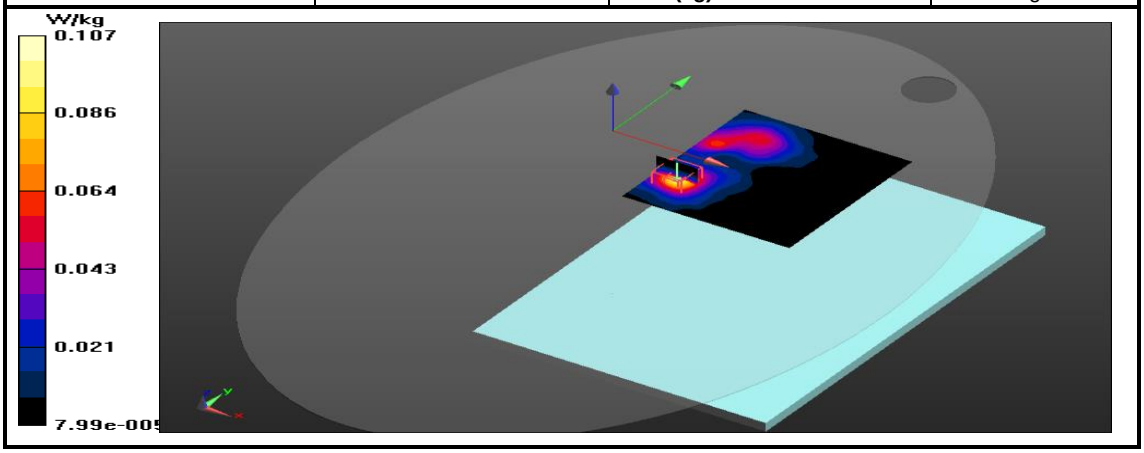

Figure 8: SAR Body Testing Results for the A2338 at 2437 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	23.0 °C
DATE:	09/09/2020	**RELATIVE HUMIDITY:**	56.9 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	2.01 S/m
DUT CONFIGURATION:	SISO (2.4GHz Core 0)	**RELATIVE PERMITTIVITY:**	54.444
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	21.9 °C
RAT:	802.11b	**SCAN TYPE:**	Full
FREQUENCY:	2462 MHz	**DRIFT:**	0.04 dB
MODULATION:	BPSK	**PEAK SAR:**	1.63 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.80 W/kg

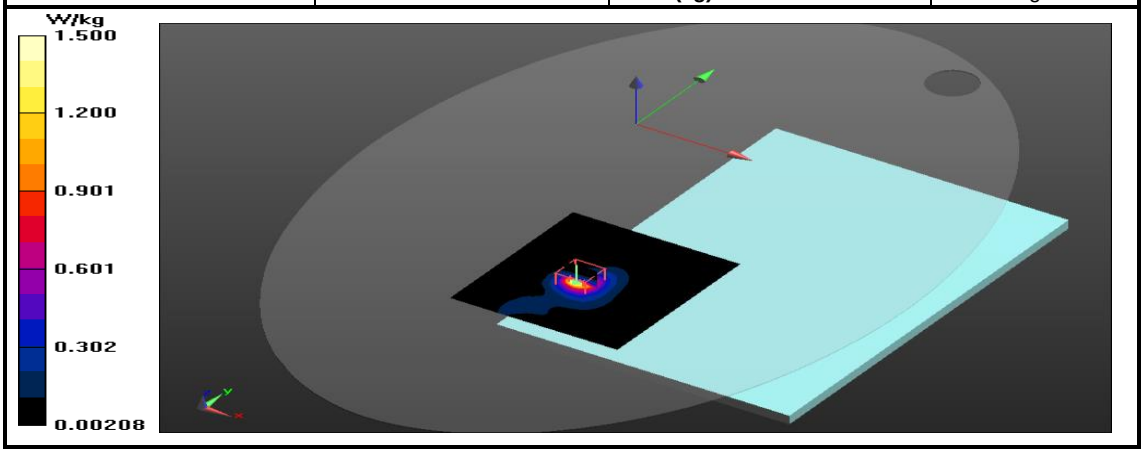

Figure 9: SAR Body Testing Results for the A2338 at 2462 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	23.0 °C
DATE:	09/09/2020	**RELATIVE HUMIDITY:**	56.9 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	1.965 S/m
DUT CONFIGURATION:	SISO (2.4GHz Core 0)	**RELATIVE PERMITTIVITY:**	54.515
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	21.9 °C
RAT:	802.11b	**SCAN TYPE:**	Full
FREQUENCY:	2412 MHz	**DRIFT:**	0.02 dB
MODULATION:	BPSK	**PEAK SAR:**	1.16 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.72 W/kg

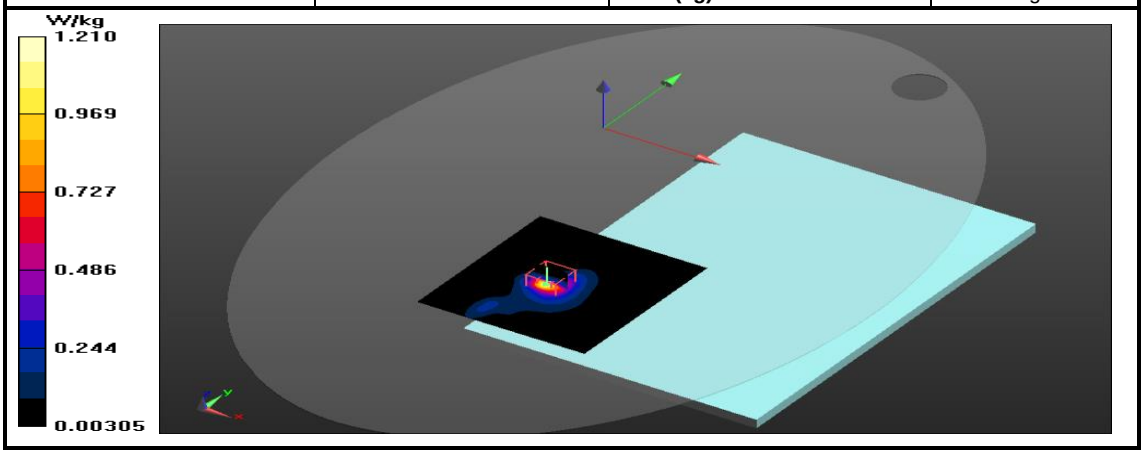

Figure 10: SAR Body Testing Results for the A2338 at 2412 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	23.0 °C
DATE:	09/09/2020	**RELATIVE HUMIDITY:**	56.9 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	1.987 S/m
DUT CONFIGURATION:	SISO (2.4GHz Core 1)	**RELATIVE PERMITTIVITY:**	54.481
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	21.9 °C
RAT:	802.11b	**SCAN TYPE:**	Full
FREQUENCY:	2437 MHz	**DRIFT:**	0.01 dB
MODULATION:	BPSK	**PEAK SAR:**	1.41 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.99 W/kg

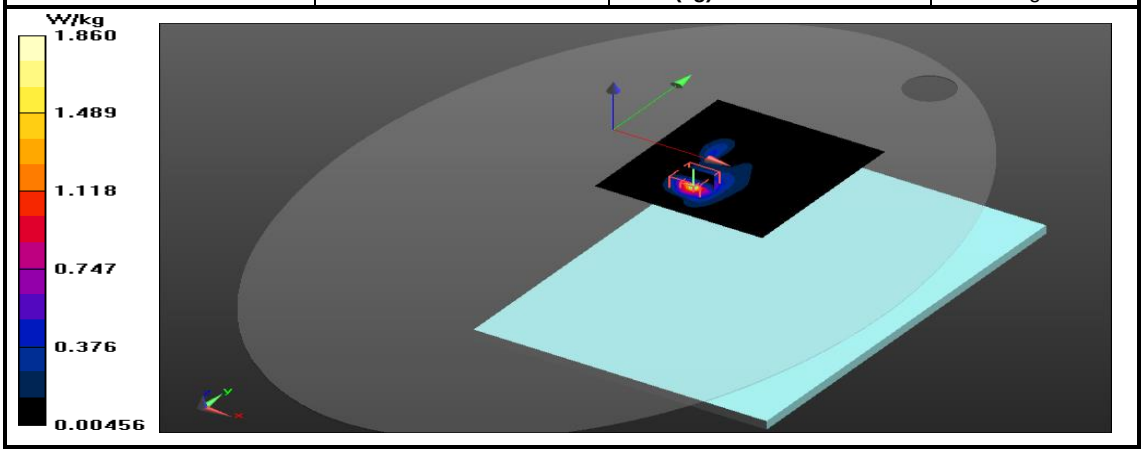

Figure 11: SAR Body Testing Results for the A2338 at 2437 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	23.0 °C
DATE:	09/09/2020	**RELATIVE HUMIDITY:**	56.9 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	1.987 S/m
DUT CONFIGURATION:	SISO (2.4GHz Core 1)	**RELATIVE PERMITTIVITY:**	54.481
DUT POSITION:	0mm - Rear of Display	**LIQUID TEMPERATURE:**	21.9 °C
RAT:	802.11b	**SCAN TYPE:**	Full
FREQUENCY:	2437 MHz	**DRIFT:**	-0.15 dB
MODULATION:	BPSK	**PEAK SAR:**	0.13 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.08 W/kg

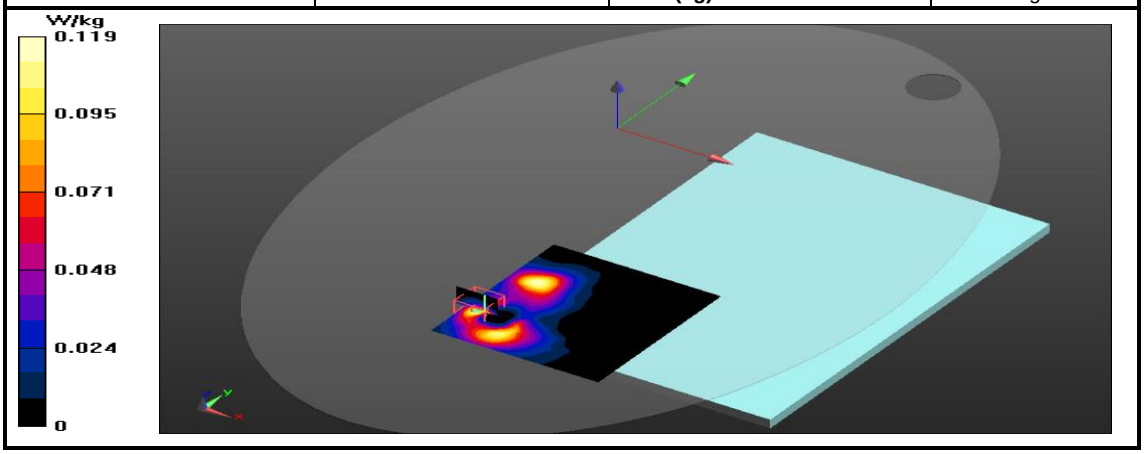

Figure 12: SAR Body Testing Results for the A2338 at 2437 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	23.0 °C
DATE:	15/09/2020	**RELATIVE HUMIDITY:**	56.9 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	2.004 S/m
DUT CONFIGURATION:	SISO (2.4GHz Core 1)	**RELATIVE PERMITTIVITY:**	53.489
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	21.9 °C
RAT:	802.11b	**SCAN TYPE:**	Full
FREQUENCY:	2462 MHz	**DRIFT:**	0.03 dB
MODULATION:	BPSK	**PEAK SAR:**	1.64 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.89 W/kg

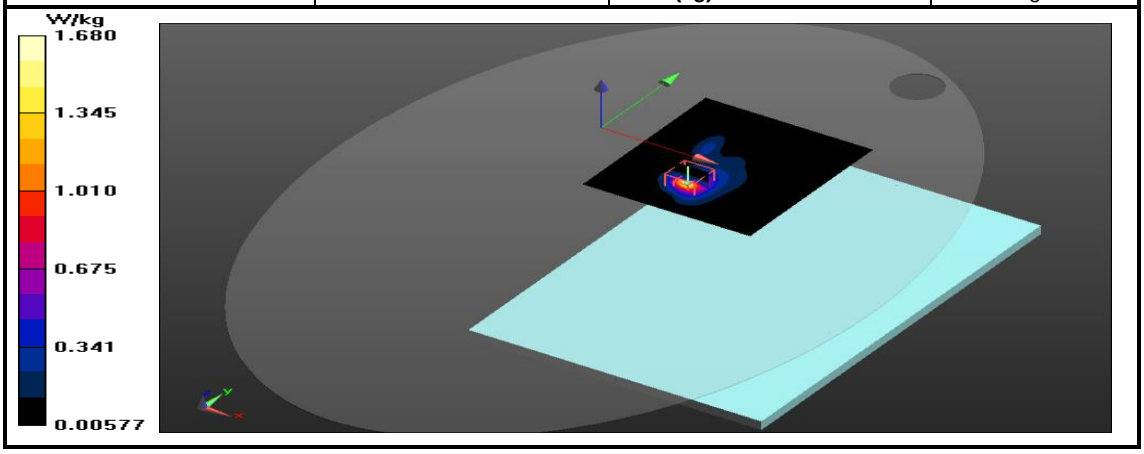

Figure 13: SAR Body Testing Results for the A2338 at 2462 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	23.0 °C
DATE:	09/09/2020	**RELATIVE HUMIDITY:**	56.9 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	1.965 S/m
DUT CONFIGURATION:	SISO (2.4GHz Core 1)	**RELATIVE PERMITTIVITY:**	54.515
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	21.9 °C
RAT:	802.11b	**SCAN TYPE:**	Full
FREQUENCY:	2412 MHz	**DRIFT:**	-0.09 dB
MODULATION:	BPSK	**PEAK SAR:**	0.96 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.78 W/kg

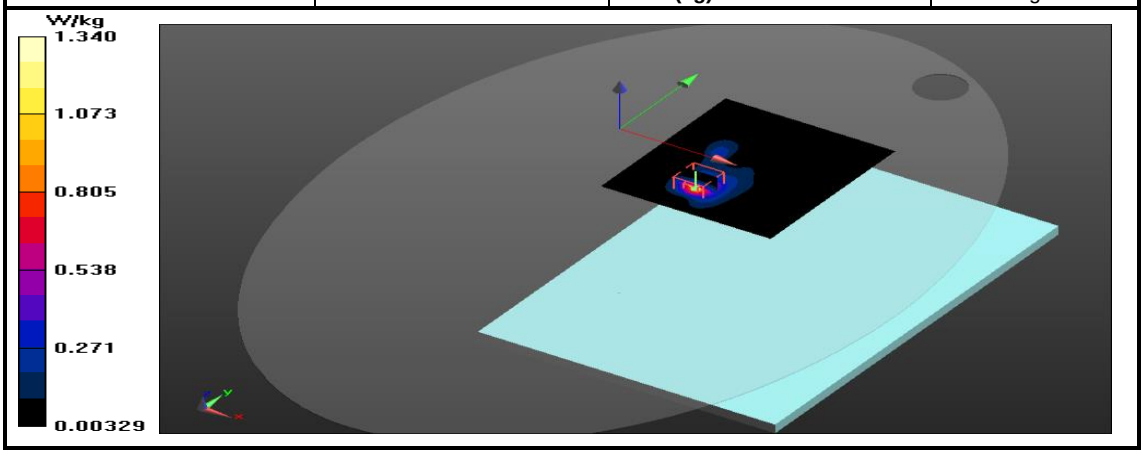

Figure 14: SAR Body Testing Results for the A2338 at 2412 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	22.6 °C
DATE:	14/09/2020	**RELATIVE HUMIDITY:**	59.6 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	1.987 S/m
DUT CONFIGURATION:	MIMO (2.4GHz Core 0 and Core 1)	**RELATIVE PERMITTIVITY:**	54.481
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	23.0 °C
RAT:	802.11n HT20	**SCAN TYPE:**	Full
FREQUENCY:	2437 MHz	**DRIFT:**	0.12 dB
MODULATION:	MCS0	**PEAK SAR:**	1.55 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.86 W/kg

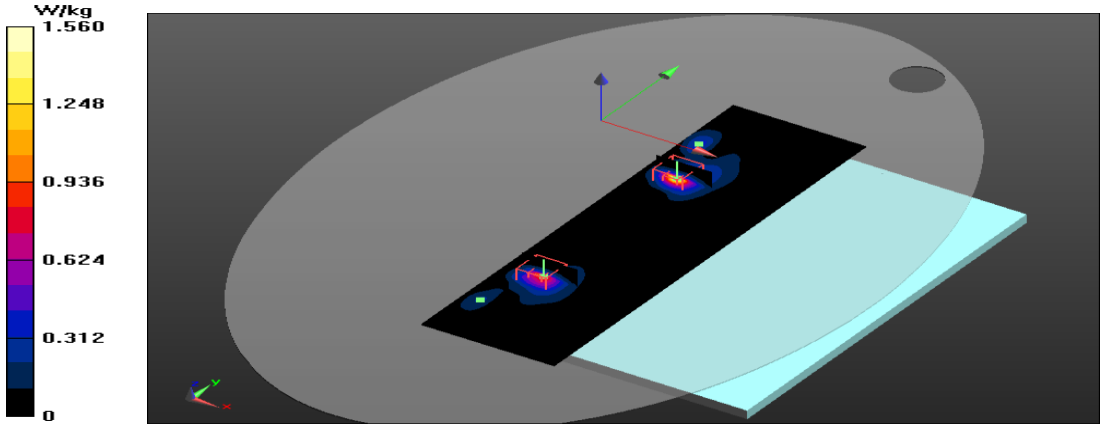

Figure 15: SAR Body Testing Results for the A2338 at 2437 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	22.6 °C
DATE:	14/09/2020	**RELATIVE HUMIDITY:**	59.6 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	1.992 S/m
DUT CONFIGURATION:	MIMO (2.4GHz Core 0 and Core 1)	**RELATIVE PERMITTIVITY:**	54.474
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	23.0 °C
RAT:	802.11n HT20	**SCAN TYPE:**	Full
FREQUENCY:	2442 MHz	**DRIFT:**	-0.21 dB
MODULATION:	MCS0	**PEAK SAR:**	1.57 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.85 W/kg

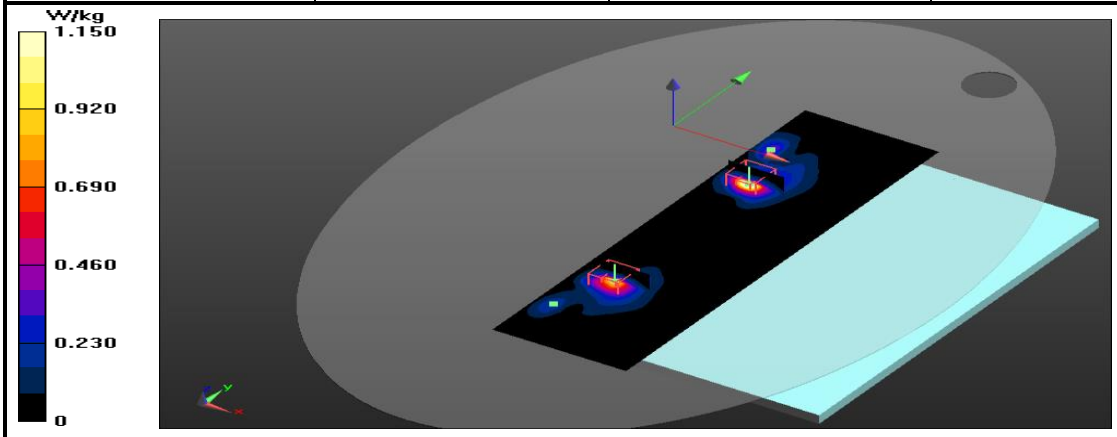

Figure 16: SAR Body Testing Results for the A2338 at 2442 MHz.

2.4 WLAN U-NII 1 BODY SAR TEST RESULTS

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	23.2 °C
DATE:	09/09/2020	**RELATIVE HUMIDITY:**	47.3 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	5.421 S/m
DUT CONFIGURATION:	SISO (5GHz Core 0)	**RELATIVE PERMITTIVITY:**	49.627
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	21.9 °C
RAT:	802.11ac VHT80	**SCAN TYPE:**	Full
FREQUENCY:	5210 MHz	**DRIFT:**	-0.01 dB
MODULATION:	MCS0	**PEAK SAR:**	1.46 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.85 W/kg

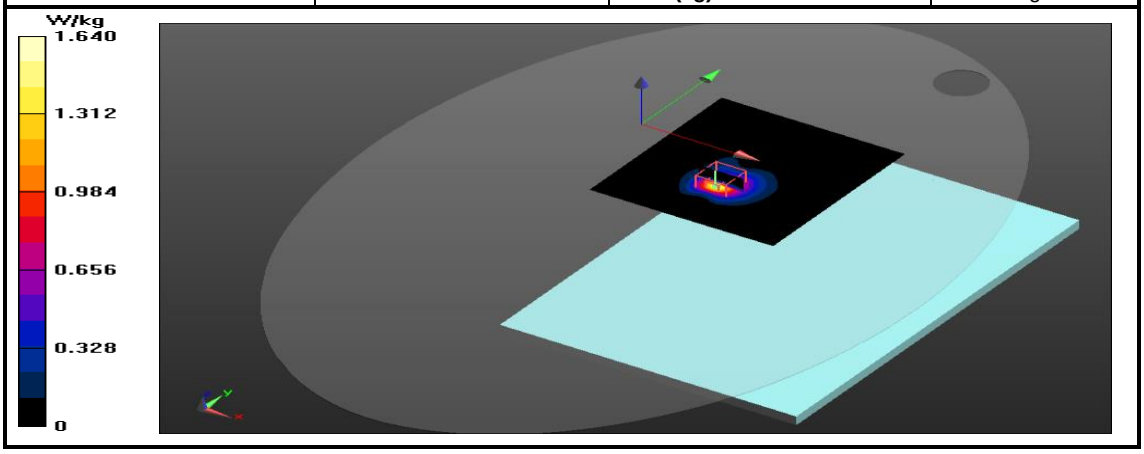

Figure 17: SAR Body Testing Results for the A2338 at 5210 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	23.2 °C
DATE:	09/09/2020	**RELATIVE HUMIDITY:**	47.3 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	5.421 S/m
DUT CONFIGURATION:	SISO (5GHz Core 0)	**RELATIVE PERMITTIVITY:**	49.627
DUT POSITION:	0mm - Rear of Display	**LIQUID TEMPERATURE:**	21.9 °C
RAT:	802.11ac VHT80	**SCAN TYPE:**	Full
FREQUENCY:	5210 MHz	**DRIFT:**	0.00 dB
MODULATION:	MCS0	**PEAK SAR:**	0.39 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.21 W/kg

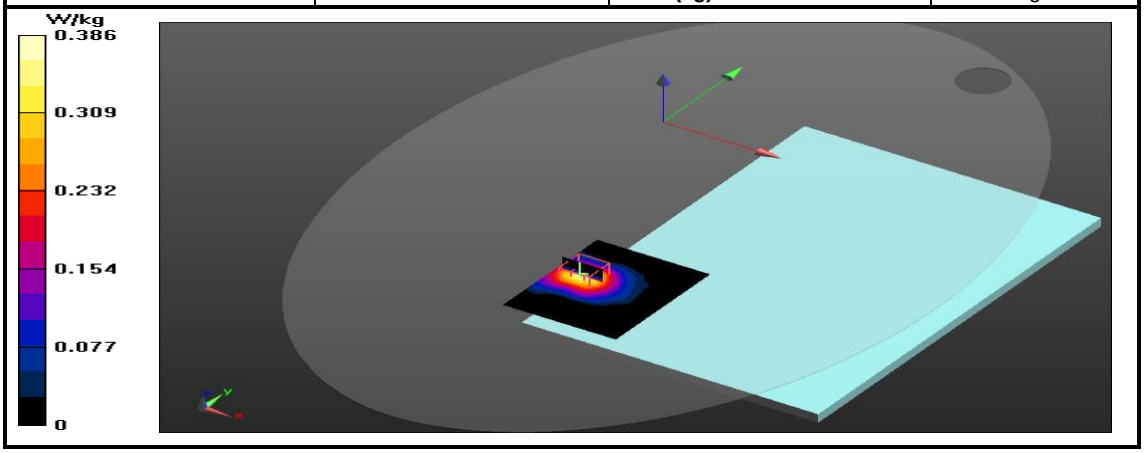

Figure 18: SAR Body Testing Results for the A2338 at 5210 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	23.2 °C
DATE:	10/09/2020	**RELATIVE HUMIDITY:**	47.3 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	5.421 S/m
DUT CONFIGURATION:	SISO (5GHz Core 1)	**RELATIVE PERMITTIVITY:**	49.627
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	21.9 °C
RAT:	802.11ac VHT80	**SCAN TYPE:**	Full
FREQUENCY:	5210 MHz	**DRIFT:**	-0.11 dB
MODULATION:	MCS0	**PEAK SAR:**	1.46 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.70 W/kg

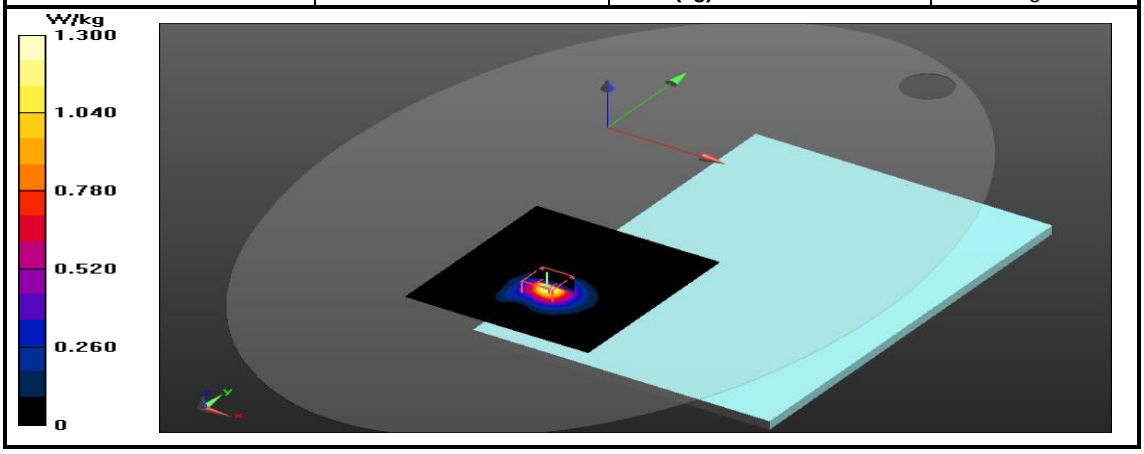

Figure 19: SAR Body Testing Results for the A2338 at 5210 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	23.2 °C
DATE:	10/09/2020	**RELATIVE HUMIDITY:**	47.3 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	5.421 S/m
DUT CONFIGURATION:	SISO (5GHz Core 1)	**RELATIVE PERMITTIVITY:**	49.627
DUT POSITION:	0mm - Rear of Display	**LIQUID TEMPERATURE:**	21.9 °C
RAT:	802.11ac VHT80	**SCAN TYPE:**	Full
FREQUENCY:	5210 MHz	**DRIFT:**	0.16 dB
MODULATION:	MCS0	**PEAK SAR:**	0.30 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.17 W/kg

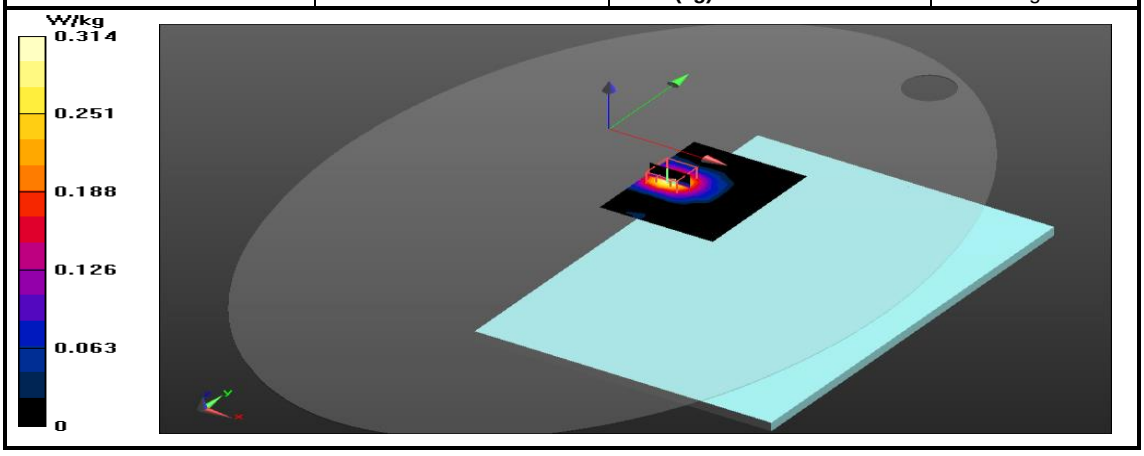

Figure 20: SAR Body Testing Results for the A2338 at 5210 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	22.1 °C
DATE:	21/09/2020	**RELATIVE HUMIDITY:**	54.8 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	5.405 S/m
DUT CONFIGURATION:	MIMO (5GHz Core 0 and Core 1)	**RELATIVE PERMITTIVITY:**	48.654
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	21.4 °C
RAT:	802.11n HT40	**SCAN TYPE:**	Full
FREQUENCY:	5230 MHz	**DRIFT:**	0.03 dB
MODULATION:	MCS0	**PEAK SAR:**	1.65 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.78 W/kg

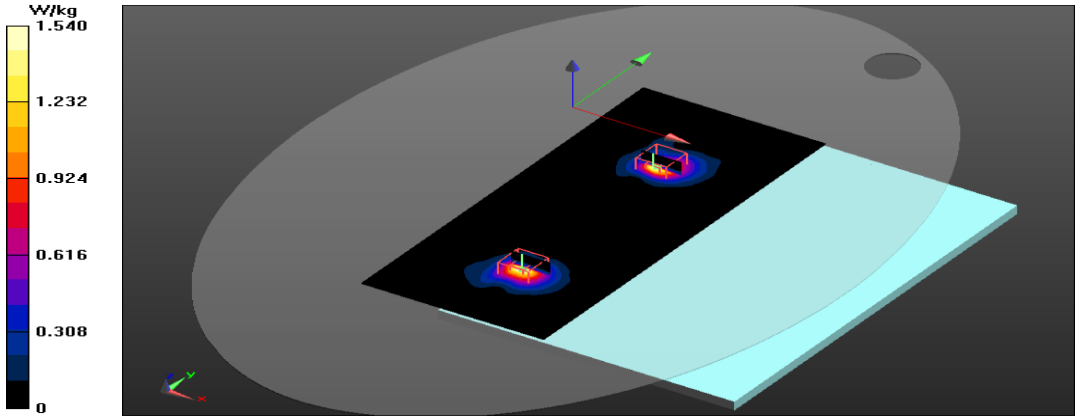

Figure 21: SAR Body Testing Results for the A2338 at 5230 MHz.

2.5 WLAN U-NII 2C BODY SAR TEST RESULTS

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	23.7 °C
DATE:	10/09/2020	**RELATIVE HUMIDITY:**	47.3 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	5.888 S/m
DUT CONFIGURATION:	SISO (5GHz Core 0)	**RELATIVE PERMITTIVITY:**	48.922
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	21.8 °C
RAT:	802.11ac VHT80	**SCAN TYPE:**	Full
FREQUENCY:	5530 MHz	**DRIFT:**	0.00 dB
MODULATION:	MCS0	**PEAK SAR:**	1.66 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.82 W/kg

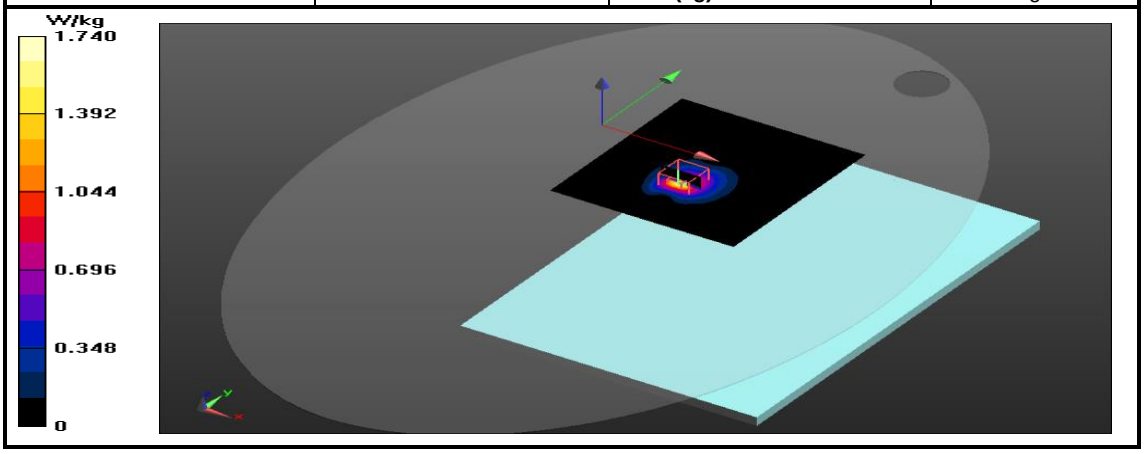

Figure 22: SAR Body Testing Results for the A2338 at 5530 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	23.7 °C
DATE:	10/09/2020	**RELATIVE HUMIDITY:**	47.3 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	5.888 S/m
DUT CONFIGURATION:	SISO (5GHz Core 0)	**RELATIVE PERMITTIVITY:**	48.922
DUT POSITION:	0mm - Rear of Display	**LIQUID TEMPERATURE:**	21.8 °C
RAT:	802.11ac VHT80	**SCAN TYPE:**	Full
FREQUENCY:	5530 MHz	**DRIFT:**	0.00 dB
MODULATION:	MCS0	**PEAK SAR:**	0.36 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.18 W/kg

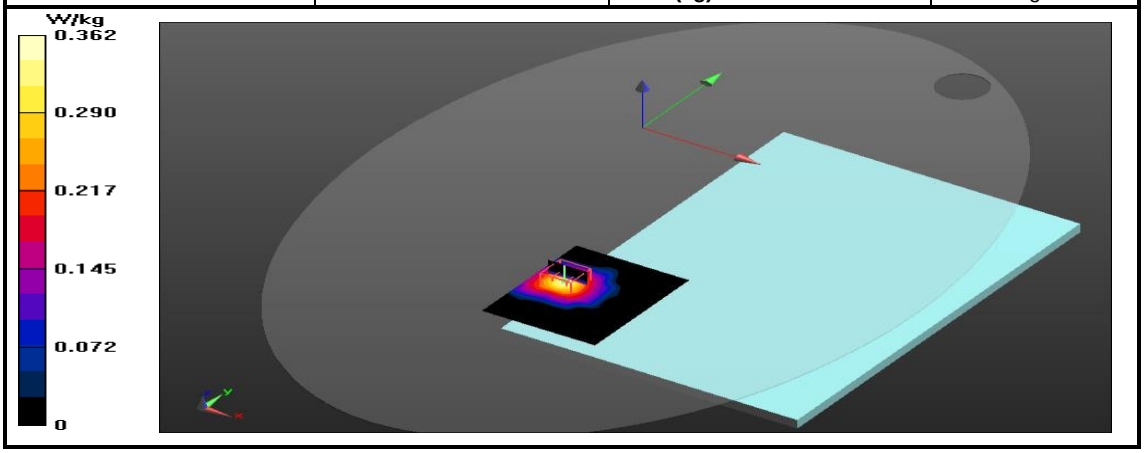

Figure 23: SAR Body Testing Results for the A2338 at 5530 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	20.1 °C
DATE:	11/09/2020	**RELATIVE HUMIDITY:**	47.0 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	6.006 S/m
DUT CONFIGURATION:	SISO (5GHz Core 0)	**RELATIVE PERMITTIVITY:**	48.769
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	22.1 °C
RAT:	802.11ac VHT80	**SCAN TYPE:**	Full
FREQUENCY:	5610 MHz	**DRIFT:**	0.00 dB
MODULATION:	MCS0	**PEAK SAR:**	1.74 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.93 W/kg

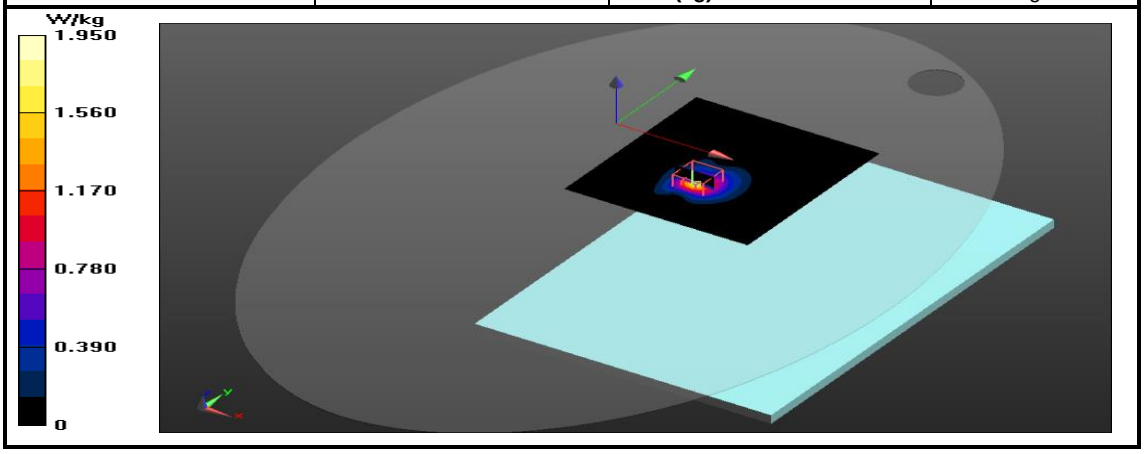

Figure 24: SAR Body Testing Results for the A2338 at 5610 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	20.1 °C
DATE:	11/09/2020	**RELATIVE HUMIDITY:**	47.0 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	6.054 S/m
DUT CONFIGURATION:	SISO (5GHz Core 0)	**RELATIVE PERMITTIVITY:**	48.456
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	22.1 °C
RAT:	802.11ac VHT80	**SCAN TYPE:**	Full
FREQUENCY:	5690 MHz	**DRIFT:**	-0.03 dB
MODULATION:	MCS0	**PEAK SAR:**	1.81 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.88 W/kg

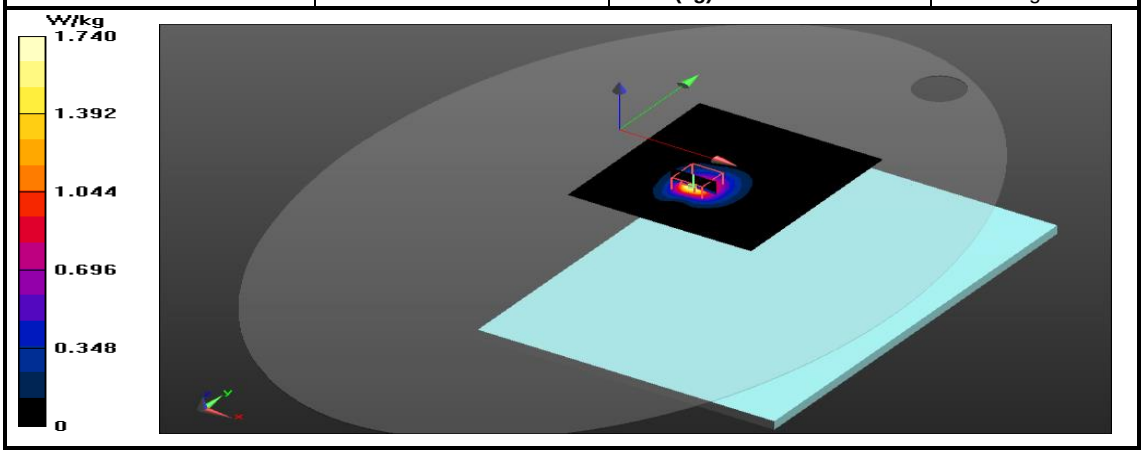

Figure 25: SAR Body Testing Results for the A2338 at 5690 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	23.7 °C
DATE:	11/09/2020	**RELATIVE HUMIDITY:**	40.7 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	5.888 S/m
DUT CONFIGURATION:	SISO (5GHz Core 1)	**RELATIVE PERMITTIVITY:**	48.922
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	21.8 °C
RAT:	802.11ac VHT80	**SCAN TYPE:**	Full
FREQUENCY:	5530 MHz	**DRIFT:**	0.08 dB
MODULATION:	MCS0	**PEAK SAR:**	1.62 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.82 W/kg

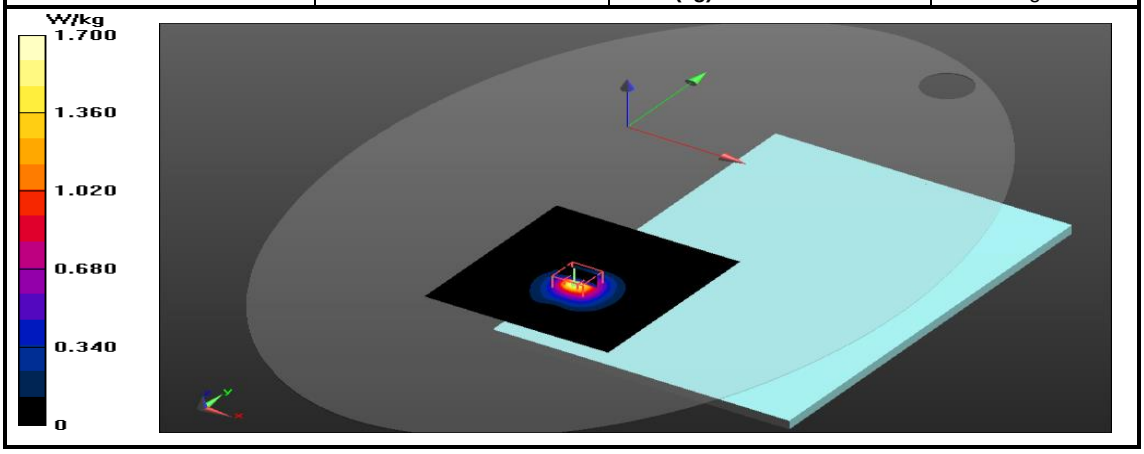

Figure 26: SAR Body Testing Results for the A2338 at 5530 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	23.7 °C
DATE:	11/09/2020	**RELATIVE HUMIDITY:**	40.7 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	5.888 S/m
DUT CONFIGURATION:	SISO (5GHz Core 1)	**RELATIVE PERMITTIVITY:**	48.922
DUT POSITION:	0mm - Rear of Display	**LIQUID TEMPERATURE:**	21.8 °C
RAT:	802.11ac VHT80	**SCAN TYPE:**	Full
FREQUENCY:	5530 MHz	**DRIFT:**	-0.06 dB
MODULATION:	MCS0	**PEAK SAR:**	0.30 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.15 W/kg

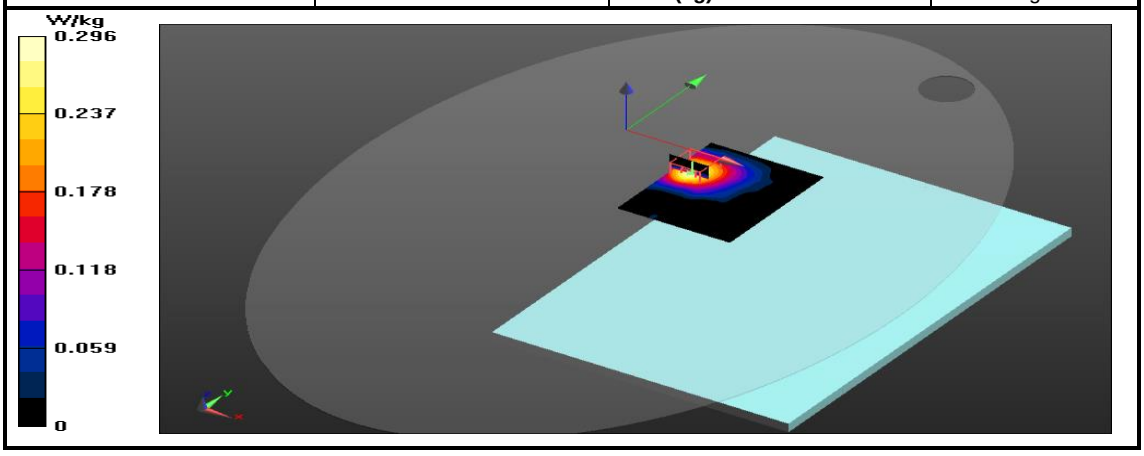

Figure 27: SAR Body Testing Results for the A2338 at 5530 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	23.7 °C
DATE:	11/09/2020	**RELATIVE HUMIDITY:**	40.7 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	6.006 S/m
DUT CONFIGURATION:	SISO (5GHz Core 1)	**RELATIVE PERMITTIVITY:**	48.769
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	21.8 °C
RAT:	802.11ac VHT80	**SCAN TYPE:**	Full
FREQUENCY:	5610 MHz	**DRIFT:**	0.03 dB
MODULATION:	MCS0	**PEAK SAR:**	1.48 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.68 W/kg

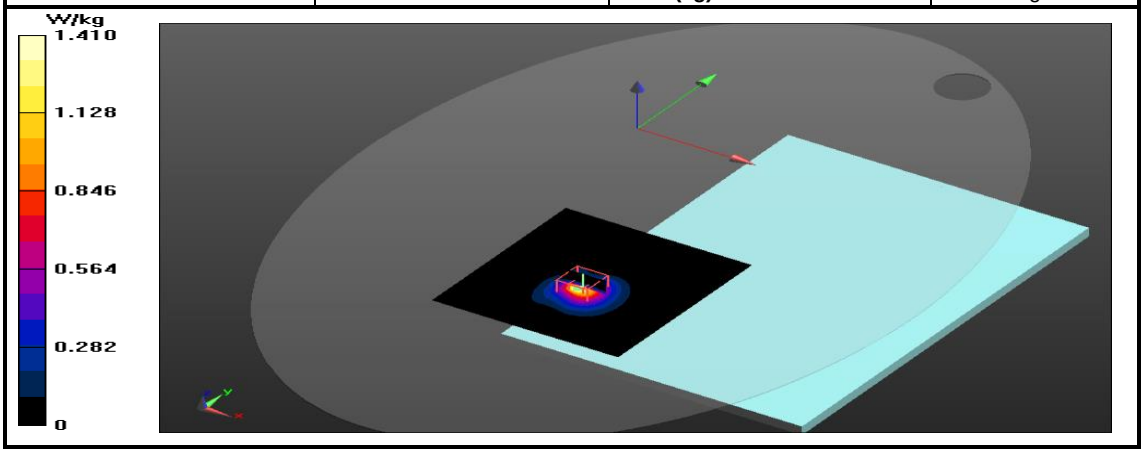

Figure 28: SAR Body Testing Results for the A2338 at 5610 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	23.7 °C
DATE:	11/09/2020	**RELATIVE HUMIDITY:**	40.7 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	6.054 S/m
DUT CONFIGURATION:	SISO (5GHz Core 1)	**RELATIVE PERMITTIVITY:**	48.456
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	21.8 °C
RAT:	802.11ac VHT80	**SCAN TYPE:**	Full
FREQUENCY:	5690 MHz	**DRIFT:**	-0.00 dB
MODULATION:	MCS0	**PEAK SAR:**	1.26 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.63 W/kg

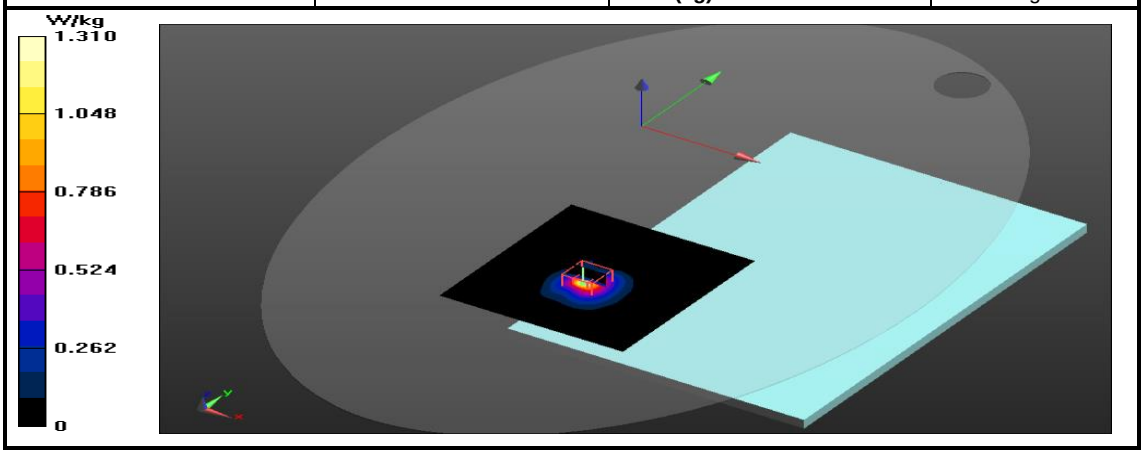

Figure 29: SAR Body Testing Results for the A2338 at 5690 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	20.1 °C
DATE:	11/09/2020	**RELATIVE HUMIDITY:**	47.0 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	6.054 S/m
DUT CONFIGURATION:	MIMO (5GHz Core 0 and Core 1)	**RELATIVE PERMITTIVITY:**	48.456
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	22.1 °C
RAT:	802.11ac VHT80	**SCAN TYPE:**	Full
FREQUENCY:	5690 MHz	**DRIFT:**	-0.12 dB
MODULATION:	MCS0	**PEAK SAR:**	1.70 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.85 W/kg

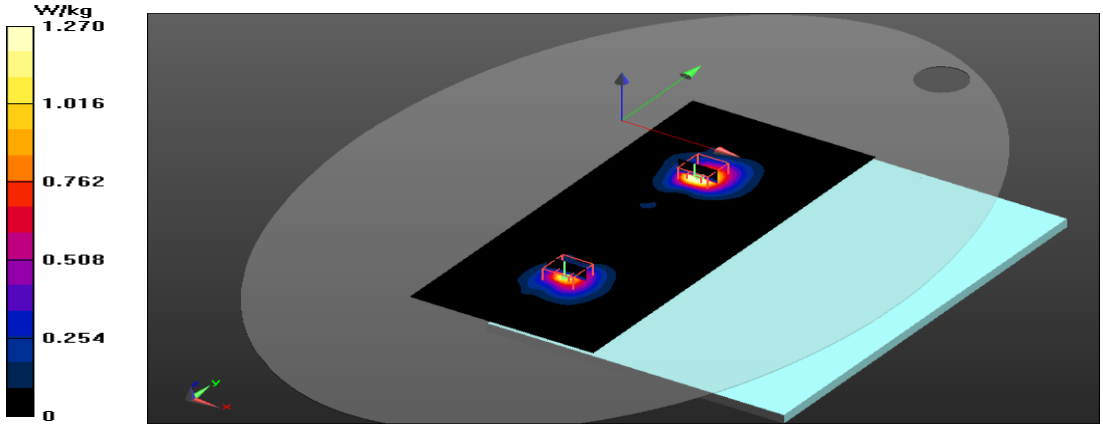

Figure 30: SAR Body Testing Results for the A2338 at 5690 MHz

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	23.7 °C
DATE:	16/09/2020	**RELATIVE HUMIDITY:**	40.7 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	5.955 S/m
DUT CONFIGURATION:	MIMO (5GHz Core 0 and Core 1)	**RELATIVE PERMITTIVITY:**	47.891
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	21.8 °C
RAT:	802.11ac VHT80	**SCAN TYPE:**	Full
FREQUENCY:	5610 MHz	**DRIFT:**	-0.15 dB
MODULATION:	MCS0	**PEAK SAR:**	2.05 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.96 W/kg

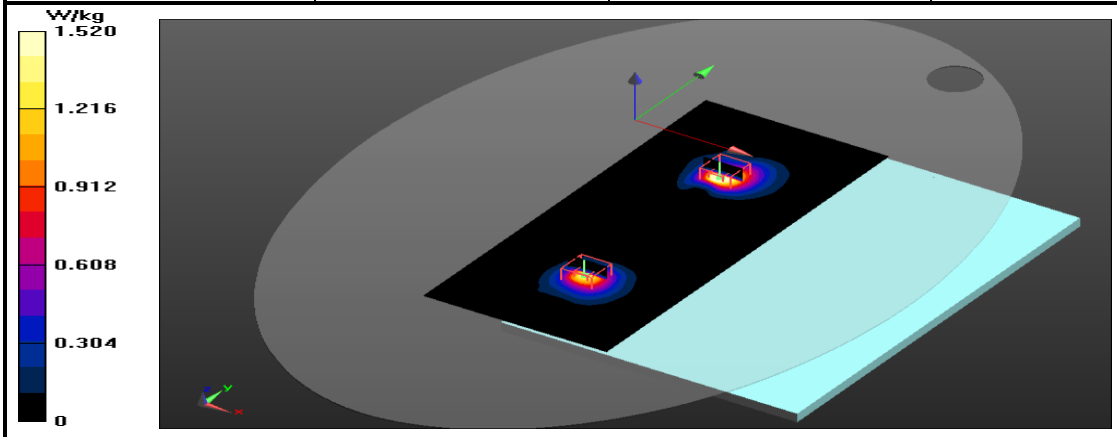

Figure 31: SAR Body Testing Results for the A2338 at 5610 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	22.4 °C
DATE:	16/09/2020	**RELATIVE HUMIDITY:**	52.1 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	5.838 S/m
DUT CONFIGURATION:	MIMO (5GHz Core 0 and Core 1)	**RELATIVE PERMITTIVITY:**	48.04
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	21.8 °C
RAT:	802.11ac VHT80	**SCAN TYPE:**	Full
FREQUENCY:	5530 MHz	**DRIFT:**	-0.10 dB
MODULATION:	MCS0	**PEAK SAR:**	1.99 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.92 W/kg

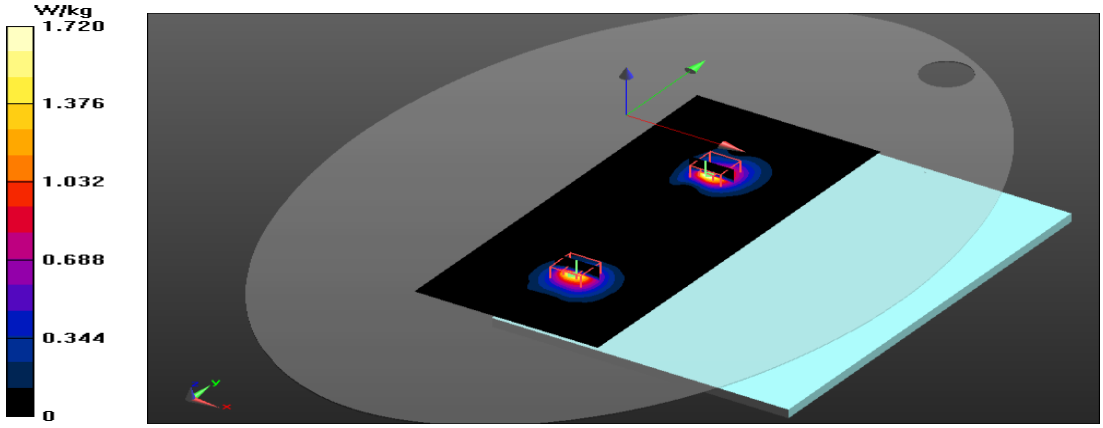

Figure 32: SAR Body Testing Results for the A2338 at 5530 MHz.

2.6 WLAN U-NII 3 BODY SAR TEST RESULTS

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	22.4 °C
DATE:	11/09/2020	**RELATIVE HUMIDITY:**	52.1 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	6.184 S/m
DUT CONFIGURATION:	SISO (5GHz Core 0)	**RELATIVE PERMITTIVITY:**	48.303
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	21.8 °C
RAT:	802.11ac VHT80	**SCAN TYPE:**	Full
FREQUENCY:	5775 MHz	**DRIFT:**	0.09 dB
MODULATION:	MCS0	**PEAK SAR:**	1.33 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.69 W/kg

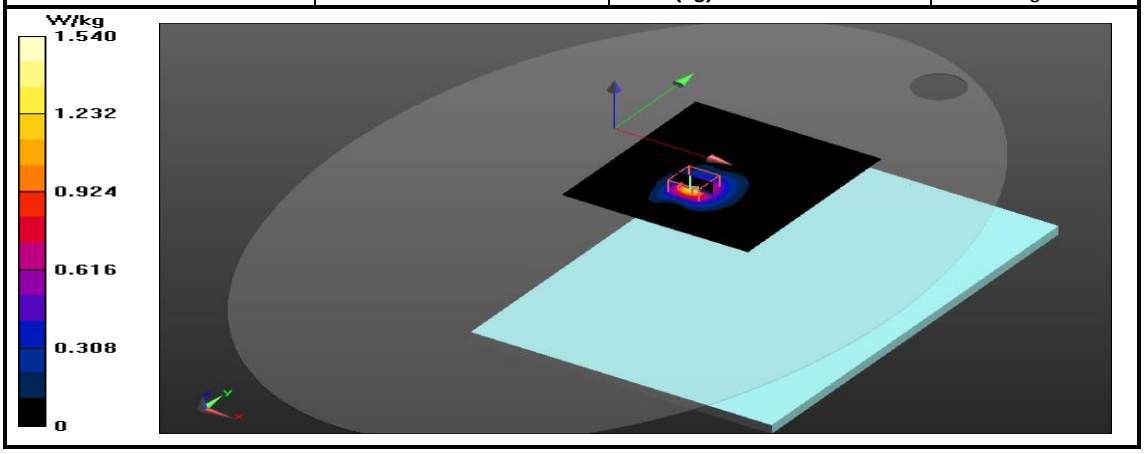

Figure 33: SAR Body Testing Results for the A2338 at 5775 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	22.4 °C
DATE:	12/09/2020	**RELATIVE HUMIDITY:**	52.1 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	6.184 S/m
DUT CONFIGURATION:	SISO (5GHz Core 0)	**RELATIVE PERMITTIVITY:**	48.303
DUT POSITION:	0mm - Rear of Display	**LIQUID TEMPERATURE:**	21.8 °C
RAT:	802.11ac VHT80	**SCAN TYPE:**	Full
FREQUENCY:	5775 MHz	**DRIFT:**	-0.02 dB
MODULATION:	MCS0	**PEAK SAR:**	0.34 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.17 W/kg

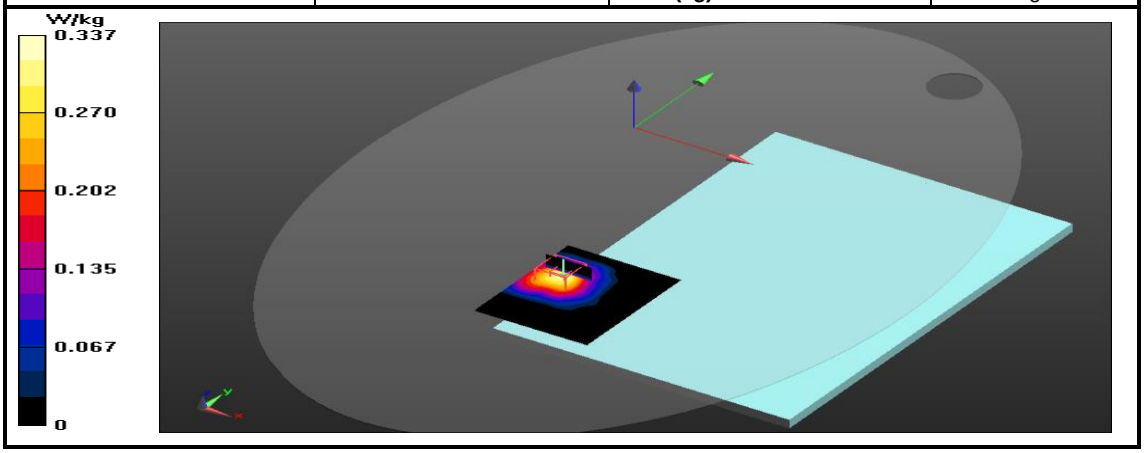

Figure 34: SAR Body Testing Results for the A2338 at 5775 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	22.4 °C
DATE:	12/09/2020	**RELATIVE HUMIDITY:**	52.1 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	6.184 S/m
DUT CONFIGURATION:	SISO (5GHz Core 1)	**RELATIVE PERMITTIVITY:**	48.303
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	21.8 °C
RAT:	802.11ac VHT80	**SCAN TYPE:**	Full
FREQUENCY:	5775 MHz	**DRIFT:**	0.07 dB
MODULATION:	MCS0	**PEAK SAR:**	1.00 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.47 W/kg

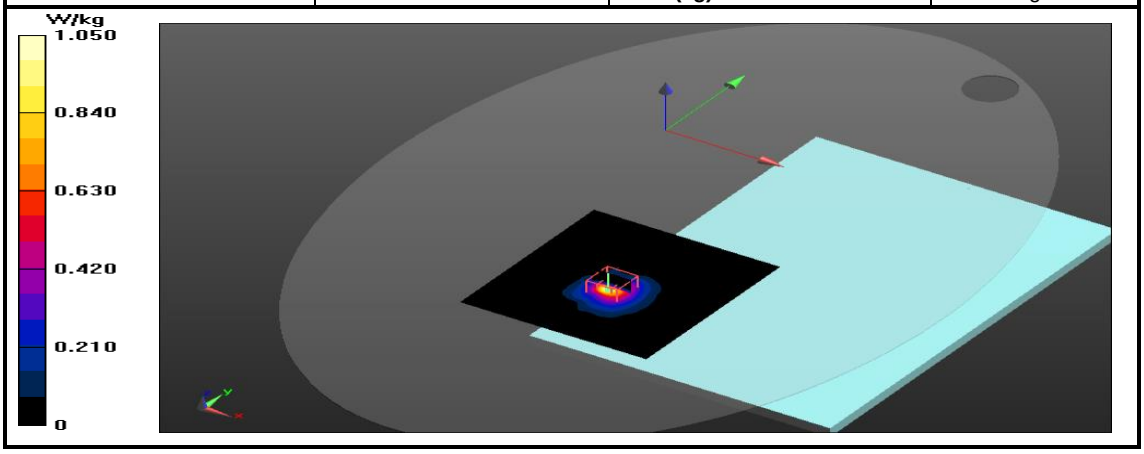

Figure 35: SAR Body Testing Results for the A2338 at 5775 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	22.4 °C
DATE:	12/09/2020	**RELATIVE HUMIDITY:**	52.1 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	6.184 S/m
DUT CONFIGURATION:	SISO (5GHz Core 1)	**RELATIVE PERMITTIVITY:**	48.303
DUT POSITION:	0mm – Rear of Display	**LIQUID TEMPERATURE:**	21.8 °C
RAT:	802.11ac VHT80	**SCAN TYPE:**	Full
FREQUENCY:	5775 MHz	**DRIFT:**	0.00 dB
MODULATION:	MCS0	**PEAK SAR:**	0.17 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.08 W/kg

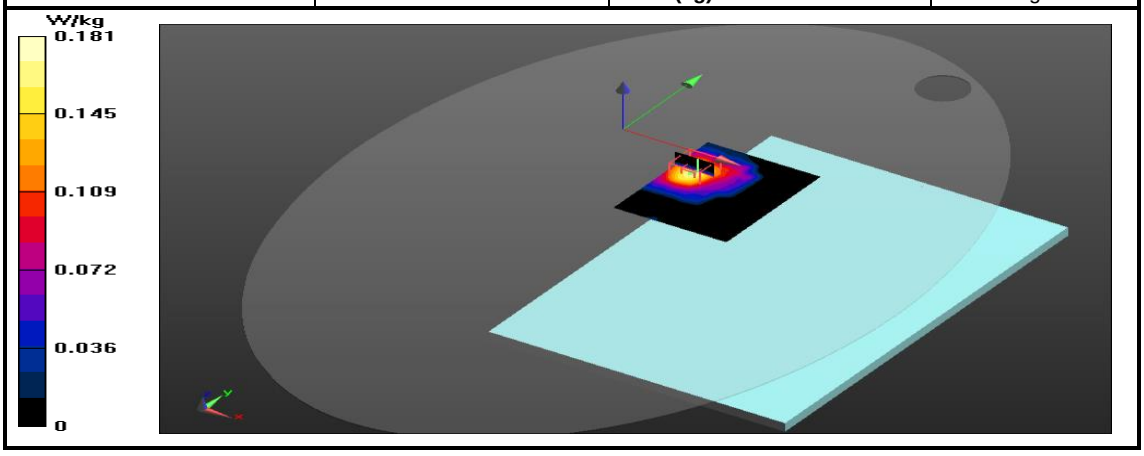

Figure 36: SAR Body Testing Results for the A2338 at 5775 MHz.

SOFTWARE VERSION:	52.10.2(1495)	**AMBIENT TEMPERATURE:**	22.4 °C
DATE:	16/09/2020	**RELATIVE HUMIDITY:**	52.1 %
PHANTOM:	QDOVA003-FB	**CONDUCTIVITY:**	6.202 S/m
DUT CONFIGURATION:	MIMO (5GHz Core 0 and Core 1)	**RELATIVE PERMITTIVITY:**	47.592
DUT POSITION:	0mm - Bottom	**LIQUID TEMPERATURE:**	21.8 °C
RAT:	802.11ac VHT80	**SCAN TYPE:**	Full
FREQUENCY:	5775 MHz	**DRIFT:**	-0.04 dB
MODULATION:	MCS0	**PEAK SAR:**	1.71 W/kg
DUTY CYCLE:	100 %	**SAR (1g):**	0.78 W/kg

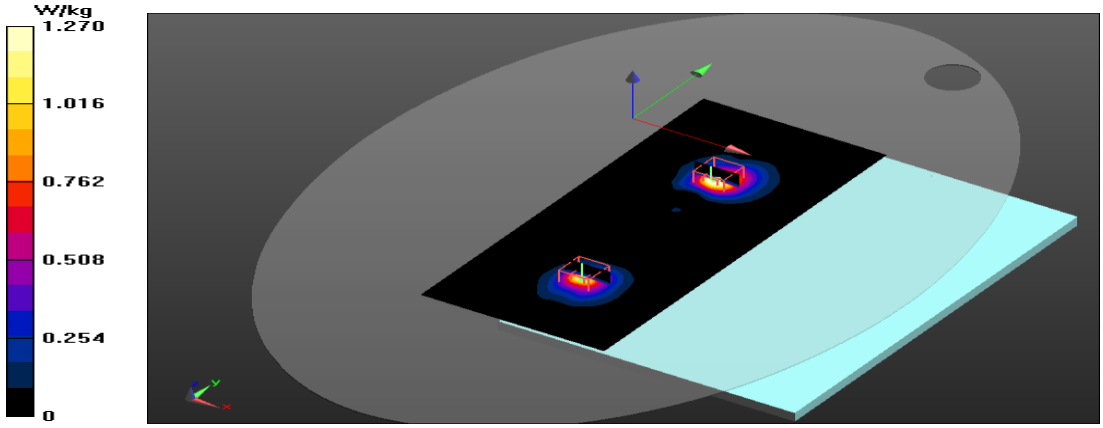

Figure 37: SAR Body Testing Results for the A2338 at 5775 MHz.

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT USED

The following test equipment was used at TÜV SÜD:

Instrument Description	Manufacturer	Model Type	TE Number	Cal Period (months)	Calibration Due Date
Attenuator (30dB, 25W)	Weinschel	46-30-34	2776	12	10-Aug-2021
Thermocouple Thermometer	Fluke	51	3172	12	02-Jan-2021
Power Meter	Rohde & Schwarz	NRP	3491	12	11-Oct-2020
Wideband Power Sensor, 50MHz - 18GHz	Rohde & Schwarz	NRP-Z81	3492	12	11-Oct-2020
Validation Dipole (2.4GHz)	Speag	D2450V2	3875	12	10-Dec-2020
Validation Dipole (5GHz)	Speag	D5GHzV2	4309	12	06-Dec-2020
Data Acquisition Electronics	Speag	DAE 4 - SD 000 D04 BM	4689	12	10-Dec-2020
Measurement Server	Speag	DASY 5 Measurement Server	4692	-	TU
Body Phantom	Speag	ELI Phantom	4699	-	TU
Dosimetric SAR Probe	Speag	EX3DV4	4700	12	16-Dec-2020
Robot	Stäubli	TX90 XL Robot	4704	-	TU
Hygropalm Hygrometer	Rotronic	HP21	5264	12	15-Jul-2021
Power Source for SAR system validation	Speag	POWERSOURCE1-SE UMS 160 BA	5371	12	09-Dec-2020
Dielectric Assessment Kit	Speag	DAK 200MHz to 20GHz	4690	-	TU
Dielectric Probe Stand	Speag	Stand	4691	-	TU
Network Analyser	Keysight Technologies	E5063A	5018	12	18-Jul-2021
Device Holder	Speag	MD4HHTV5	5335	-	TU
MBBL Fluid	Speag	Batch 2	N/A	Weekly	22-Sept-2020

TU - Traceability Unscheduled

3.2 TEST SOFTWARE

The following software was used to control the TÜV SÜD DASY Systems.

Instrument	Version Number
DASY system	52.10.2(1495)

3.3 DIELECTRIC PROPERTIES OF SIMULANT LIQUIDS

The fluid properties of the simulant fluids used during routine SAR evaluation meet the dielectric properties required KDB 865665.

The dielectric properties of the tissue simulant liquids used for the SAR testing at TÜV SÜD are as follows:

Fluid Type and Frequency	Relative Permittivity Target (εr)	Relative Permittivity Measured (εr)	Conductivity Target (S/m)	Conductivity Measured (S/m)	Date	Fluid Temperature °C
MBBL @ 2450 MHz	52.70	54.83	1.95	1.95	03-09-20	22.1
MBBL @ 5200 MHz	49.01	49.92	5.30	5.38	03-09-20	22.1
MBBL @ 5300 MHz	48.88	49.71	5.42	5.53	03-09-20	22.1
MBBL @ 5500 MHz	48.61	49.31	5.65	5.83	03-09-20	22.1
MBBL @ 5600 MHz	48.47	49.12	5.77	5.98	03-09-20	22.1
MBBL @ 5800 MHz	48.20	48.75	6.00	6.29	03-09-20	22.1
MBBL @ 2450 MHz	52.70	54.46	1.95	2.00	09-09-20	21.9
MBBL @ 5200 MHz	49.01	49.65	5.30	5.41	09-09-20	21.9
MBBL @ 5300 MHz	48.88	49.42	5.42	5.55	09-09-20	21.9
MBBL @ 5500 MHz	48.61	48.98	5.65	5.84	09-09-20	21.9
MBBL @ 5600 MHz	48.47	48.79	5.77	5.99	09-09-20	21.9
MBBL @ 5800 MHz	48.20	48.42	6.00	6.30	09-09-20	21.9
MBBL @ 2450 MHz	52.70	54.11	1.95	1.97	11-09-20	22.3
MBBL @ 5200 MHz	49.01	49.40	5.30	5.34	11-09-20	22.3
MBBL @ 5300 MHz	48.88	49.20	5.42	5.48	11-09-20	22.3
MBBL @ 5500 MHz	48.61	48.80	5.65	5.77	11-09-20	22.3
MBBL @ 5600 MHz	48.47	48.62	5.77	5.92	11-09-20	22.3
MBBL @ 5800 MHz	48.20	48.25	6.00	6.22	11-09-20	22.3
MBBL @ 2450 MHz	52.70	53.51	1.95	1.99	15-09-20	22.6
MBBL @ 5200 MHz	49.01	48.72	5.30	5.36	15-09-20	22.6
MBBL @ 5300 MHz	48.88	48.51	5.42	5.51	15-09-20	22.6
MBBL @ 5500 MHz	48.61	48.10	5.65	5.79	15-09-20	22.6
MBBL @ 5600 MHz	48.47	47.91	5.77	5.94	15-09-20	22.6
MBBL @ 5800 MHz	48.20	47.54	6.00	6.24	15-09-20	22.6

3.4 TEST CONDITIONS

3.4.1 Test Laboratory Conditions

Ambient temperature: Within +15°C to +35°C.
The actual temperature during the testing ranged from 20.1°C to 23.7°C.
The actual humidity during the testing ranged from 40.7% to 59.6% RH.

3.4.2 Test Fluid Temperature Range

Frequency	Fluid Type	Min Temperature °C	Max Temperature °C
2402 - 2480 MHz	MBBL	21.9	23.0
5180 - 5320 MHz	MBBL	21.4	21.9
5500 - 5720 MHz	MBBL	21.8	22.1
5745 - 5825 MHz	MBBL	21.8	21.8

3.4.3 SAR Drift

The SAR Drift was within acceptable limits during scans. The maximum SAR Drift was recorded as 0.21 dB

3.5 MEASUREMENT UNCERTAINTY

Full SAR Measurements, 300 MHz to 3 GHz

Source of Uncertainty	Uncertainty ± %	Probability distribution	Div	c_i (1g)	Standard Uncertainty ± % (1g)	v_i (v_{eff})
Measurement System						
Probe calibration	6.0	N	1.00	1.00	6.0	Infinity
Axial Isotropy	4.7	R	1.73	0.70	1.9	Infinity
Hemispherical Isotropy	9.6	R	1.73	0.70	3.9	Infinity
Boundary effect	1.0	R	1.73	1.00	0.6	Infinity
Linearity	4.7	R	1.73	1.00	2.7	Infinity
System Detection limits	1.0	R	1.73	1.00	0.6	Infinity
Modulation response	2.4	R	1.73	1.00	1.4	Infinity
Readout electronics	0.3	N	1.00	1.00	0.3	Infinity
Response time	0.8	R	1.73	1.00	0.5	Infinity
Integration time	2.6	R	1.73	1.00	1.5	Infinity
RF ambient noise	3.0	R	1.73	1.00	1.7	Infinity
RF ambient reflections	3.0	R	1.73	1.00	1.7	Infinity
Probe positioner	0.4	R	1.73	1.00	0.2	Infinity
Probe positioning	2.9	R	1.73	1.00	1.7	Infinity
Max SAR Evaluation	2.0	R	1.73	1.00	1.2	Infinity
Test sample related						
Device Positioning	2.9	N	1.00	1.00	2.9	145
Device Holder	3.6	N	1.00	1.00	3.6	5
Input Power and SAR Drift	5.0	R	1.73	1.00	2.9	Infinity
Phantom and Setup						
Phantom uncertainty	6.1	R	1.73	1.00	3.5	Infinity
SAR Correction	1.9	R	1.73	1.00	1.1	Infinity
Liquid conductivity Meas.	2.5	R	1.73	0.78	1.1	Infinity
Liquid Permittivity Meas.	2.5	R	1.73	0.23	0.3	Infinity
Temp. Unc. Conductivity	3.4	R	1.73	0.78	1.5	Infinity
Temp. Unc. Permittivity	0.4	R	1.73	0.23	0.1	Infinity
Combined Standard Uncertainty		**RSS**			11.1	361
Expanded Standard Uncertainty		**K=2**			22.2	

Full SAR Measurements, 3 GHz to 6 GHz

Source of Uncertainty	Uncertainty ± %	Probability distribution	Div	c_i (1g)	Standard Uncertainty ± % (1g)	v_i (v_{eff})
Measurement System						
Probe calibration	6.0	N	1.00	0.00	0.0	Infinity
Axial Isotropy	4.7	R	1.73	0.70	1.9	Infinity
Hemispherical Isotropy	9.6	R	1.73	0.70	3.9	Infinity
Boundary effect	1.0	R	1.73	1.00	0.6	Infinity
Linearity	4.7	R	1.73	1.00	2.7	Infinity
System Detection limits	1.0	R	1.73	1.00	0.6	Infinity
Modulation response	2.4	R	1.73	1.00	1.4	Infinity
Readout electronics	0.3	N	1.00	0.00	0.0	Infinity
Response time	0.8	R	1.73	0.00	0.0	Infinity
Integration time	2.6	R	1.73	1.00	1.5	Infinity
RF ambient noise	3.0	R	1.73	1.00	1.7	Infinity
RF ambient reflections	3.0	R	1.73	0.00	0.0	Infinity
Probe positioner	0.4	R	1.73	1.00	0.2	Infinity
Probe positioning	2.9	R	1.73	1.00	1.7	Infinity
Spatial x-y-Resolution	10.0	R	1.73	1.00	5.8	Infinity
Fast SAR z-Approximation	7.0	R	1.73	1.00	4.0	Infinity
Test sample related						
Device Positioning	2.9	N	1.00	1.00	2.9	145
Device Holder	3.6	N	1.00	1.00	3.6	5
Input Power and SAR Drift	5.0	R	1.73	1.00	2.9	Infinity
Phantom and Setup						
Phantom uncertainty	6.1	R	1.73	1.00	3.5	Infinity
SAR Correction	1.9	R	1.73	0.00	0.0	Infinity
Liquid conductivity Meas.	2.5	R	1.73	0.00	0.0	Infinity
Liquid Permittivity Meas.	2.5	R	1.73	0.00	0.0	Infinity
Temp. Unc. Conductivity	3.4	R	1.73	0.00	0.0	Infinity
Temp. Unc. Permittivity	0.4	R	1.73	0.00	0.0	Infinity
Combined Standard Uncertainty		**RSS**			12.2	748
Expanded Standard Uncertainty		**K=2**			24.5	

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).

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ANNEX A

PROBE CALIBRATION REPORT

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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 TüV SüD UK

Certificate No: EX3-3759_Dec19

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3759
Calibration procedure(s)	QA CAL-01.v9, QA CAL-12.v9, QA CAL-14.v5, QA CAL-23.v5, QA CAL-25.v7 Calibration procedure for dosimetric E-field probes
Calibration date:	December 16, 2019

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	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-19 (No. 217-02894)	Apr-20
DAE4	SN: 660	07-Oct-19 (No. DAE4-660_Oct19)	Oct-20
Reference Probe ES3DV2	SN: 3013	31-Dec-18 (No. ES3-3013_Dec18)	Dec-19
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-18)	In house check: Jun-20
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-19)	In house check: Oct-20

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: December 16, 2019

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

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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).

EX3DV4 – SN:3759 December 16, 2019

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3759

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.47	0.43	0.44	± 10.1 %
DCP (mV)[B]	97.8	101.5	102.9	

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	129.9	± 2.5 %	± 4.7 %
		Y	0.00	0.00	1.00		128.8		
		Z	0.00	0.00	1.00		144.0		
10352-AAA	Pulse Waveform (200Hz, 10%)	X	15.00	86.82	19.57	10.00	60.0	± 2.6 %	± 9.6 %
		Y	15.00	89.64	21.31		60.0		
		Z	15.00	86.57	19.72		60.0		
10353-AAA	Pulse Waveform (200Hz, 20%)	X	15.00	87.59	18.52	6.99	80.0	± 1.4 %	± 9.6 %
		Y	15.00	91.96	21.33		80.0		
		Z	15.00	87.33	18.65		80.0		
10354-AAA	Pulse Waveform (200Hz, 40%)	X	15.00	87.63	16.82	3.98	95.0	± 1.0 %	± 9.6 %
		Y	15.00	96.10	21.87		95.0		
		Z	15.00	87.51	17.03		95.0		
10355-AAA	Pulse Waveform (200Hz, 60%)	X	15.00	83.76	13.47	2.22	120.0	± 1.2 %	± 9.6 %
		Y	15.00	101.92	23.17		120.0		
		Z	15.00	85.21	14.45		120.0		
10387-AAA	QPSK Waveform, 1 MHz	X	0.53	60.00	6.77	0.00	150.0	± 3.2 %	± 9.6 %
		Y	0.77	62.79	9.91		150.0		
		Z	0.52	60.00	6.86		150.0		
10388-AAA	QPSK Waveform, 10 MHz	X	2.01	66.94	14.94	0.00	150.0	± 1.4 %	± 9.6 %
		Y	2.33	69.00	16.23		150.0		
		Z	1.94	66.37	14.69		150.0		
10396-AAA	64-QAM Waveform, 100 kHz	X	2.78	68.88	17.92	3.01	150.0	± 0.6 %	± 9.6 %
		Y	3.35	72.42	19.56		150.0		
		Z	2.87	69.19	17.99		150.0		
10399-AAA	64-QAM Waveform, 40 MHz	X	3.38	66.70	15.47	0.00	150.0	± 2.4 %	± 9.6 %
		Y	3.58	67.61	16.04		150.0		
		Z	3.32	66.39	15.30		150.0		
10414-AAA	WLAN CCDF, 64-QAM, 40MHz	X	4.77	65.52	15.47	0.00	150.0	± 4.4 %	± 9.6 %
		Y	4.75	65.34	15.40		150.0		
		Z	4.69	65.27	15.31		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 Pages 5 and 6).
[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.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3759

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	41.3	317.13	37.28	11.79	0.64	5.08	0.00	0.56	1.01
Y	46.3	343.55	35.20	15.77	0.46	5.09	1.25	0.33	1.01
Z	40.6	308.81	36.67	13.00	0.84	5.06	0.40	0.52	1.01

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-3.6
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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3759

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)
450	43.5	0.87	10.74	10.74	10.74	0.13	1.20	± 13.3 %
750	41.9	0.89	10.17	10.17	10.17	0.38	0.99	± 12.0 %
835	41.5	0.90	9.98	9.98	9.98	0.42	0.80	± 12.0 %
900	41.5	0.97	9.52	9.52	9.52	0.43	0.84	± 12.0 %
1640	40.2	1.31	8.57	8.57	8.57	0.22	1.03	± 12.0 %
1750	40.1	1.37	8.46	8.46	8.46	0.25	0.88	± 12.0 %
1900	40.0	1.40	8.11	8.11	8.11	0.28	0.88	± 12.0 %
2100	39.8	1.49	8.00	8.00	8.00	0.26	0.86	± 12.0 %
2300	39.5	1.67	7.69	7.69	7.69	0.26	0.90	± 12.0 %
2450	39.2	1.80	7.44	7.44	7.44	0.20	0.90	± 12.0 %
2600	39.0	1.96	7.18	7.18	7.18	0.18	0.99	± 12.0 %
5200	36.0	4.66	4.51	4.51	4.51	0.40	1.80	± 13.1 %
5300	35.9	4.76	4.37	4.37	4.37	0.40	1.80	± 13.1 %
5500	35.6	4.96	3.91	3.91	3.91	0.40	1.80	± 13.1 %
5600	35.5	5.07	3.83	3.83	3.83	0.40	1.80	± 13.1 %
5800	35.3	5.27	3.81	3.81	3.81	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.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3759

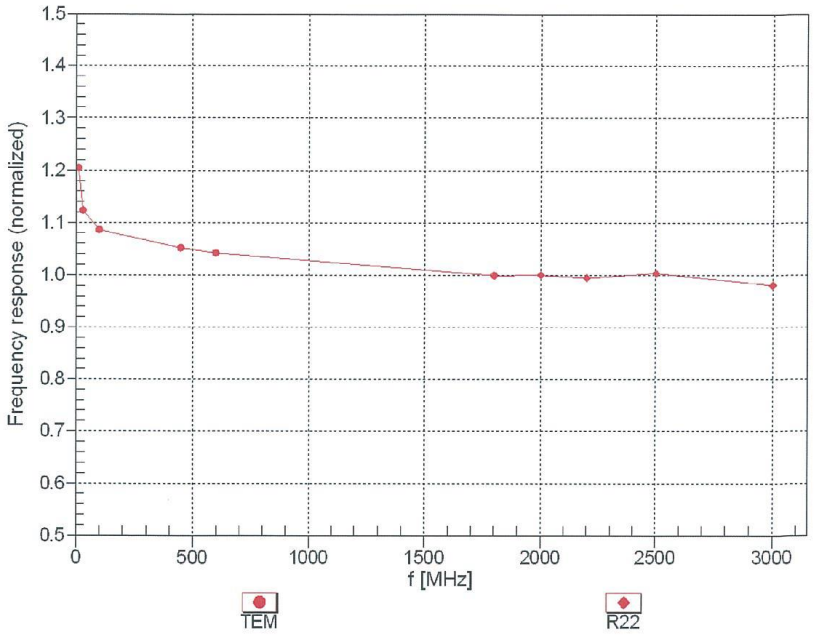
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
450	56.7	0.94	10.94	10.94	10.94	0.05	1.20	± 13.3 %
750	55.5	0.96	10.07	10.07	10.07	0.38	0.81	± 12.0 %
835	55.2	0.97	9.66	9.66	9.66	0.41	0.80	± 12.0 %
900	55.0	1.05	9.54	9.54	9.54	0.32	0.88	± 12.0 %
1640	53.7	1.42	8.30	8.30	8.30	0.33	0.86	± 12.0 %
1750	53.4	1.49	8.16	8.16	8.16	0.27	0.88	± 12.0 %
1900	53.3	1.52	7.82	7.82	7.82	0.24	0.88	± 12.0 %
2100	53.2	1.62	7.69	7.69	7.69	0.30	0.86	± 12.0 %
2300	52.9	1.81	7.31	7.31	7.31	0.29	0.90	± 12.0 %
2450	52.7	1.95	7.25	7.25	7.25	0.18	0.95	± 12.0 %
2600	52.5	2.16	7.00	7.00	7.00	0.17	0.99	± 12.0 %
5200	49.0	5.30	3.87	3.87	3.87	0.50	1.90	± 13.1 %
5300	48.9	5.42	3.79	3.79	3.79	0.50	1.90	± 13.1 %
5500	48.6	5.65	3.35	3.35	3.35	0.50	1.90	± 13.1 %
5600	48.5	5.77	3.23	3.23	3.23	0.50	1.90	± 13.1 %
5800	48.2	6.00	3.22	3.22	3.22	0.50	1.90	± 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.

Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)

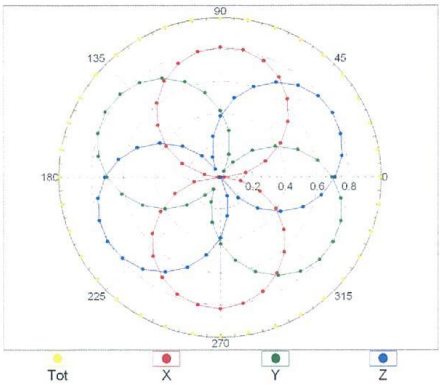


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

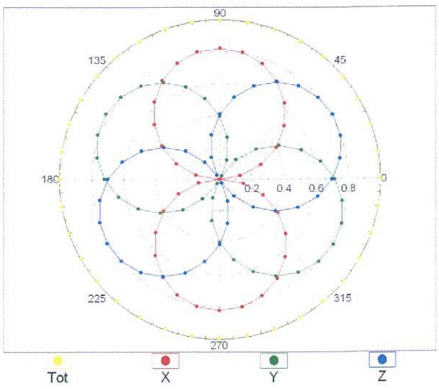
EX3DV4– SN:3759 December 16, 2019

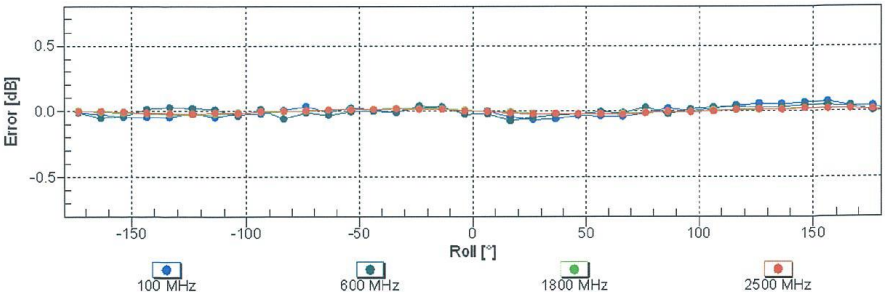
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



f=1800 MHz,R22

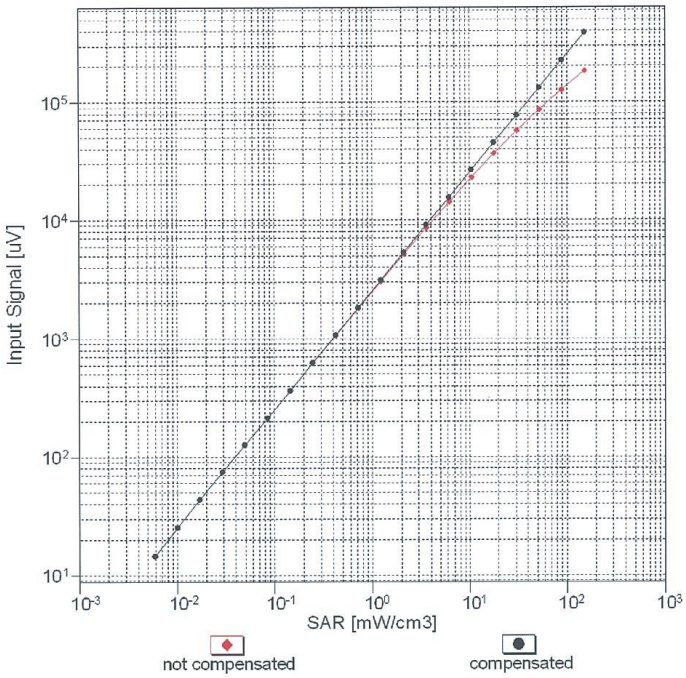


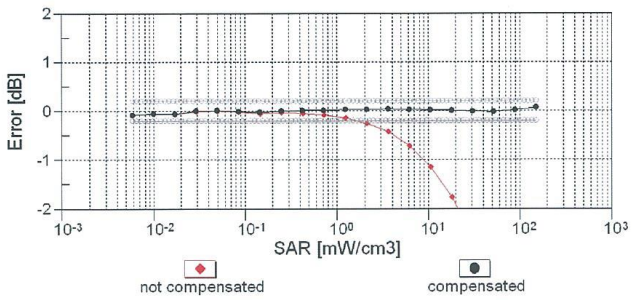


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

EX3DV4– SN:3759 December 16, 2019

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





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

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 %

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 %

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, 3 CTRL symbols)	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, 15 symbols)	WiMAX	15.24	± 9.6 %
10306	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 64QAM, PUSC, 18 symbols)	WiMAX	14.67	± 9.6 %
10307	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, PUSC, 18 symbols)	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, 18 symbols)	WiMAX	14.58	± 9.6 %
10310	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, AMC 2x3, 18 symbols)	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 duty cycle)	WLAN	1.71	± 9.6 %
10316	AAB	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	WLAN	8.36	± 9.6 %
10317	AAC	IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle)	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 duty cycle)	WLAN	8.37	± 9.6 %
10401	AAD	IEEE 802.11ac WiFi (40MHz, 64-QAM, 99pc duty cycle)	WLAN	8.60	± 9.6 %
10402	AAD	IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc duty cycle)	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 Subframe=2,3,4,7,8,9, Subframe Conf=4)	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 duty cycle)	WLAN	1.54	± 9.6 %
10416	AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle)	WLAN	8.23	± 9.6 %
10417	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 99pc duty cycle)	WLAN	8.23	± 9.6 %
10418	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Long preambule)	WLAN	8.14	± 9.6 %
10419	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Short preambule)	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 Subframe=2,3,4,7,8,9)	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 %
10456	AAB	IEEE 802.11ac WiFi (160MHz, 64-QAM, 99pc duty cycle)	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 Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	± 9.6 %
10462	AAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.30	± 9.6 %
10463	AAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.56	± 9.6 %
10464	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	± 9.6 %
10465	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	± 9.6 %
10466	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.57	± 9.6 %
10467	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	± 9.6 %
10468	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	± 9.6 %
10469	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.56	± 9.6 %
10470	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	± 9.6 %
10471	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	± 9.6 %
10472	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.57	± 9.6 %
10473	AAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	± 9.6 %
10474	AAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	± 9.6 %
10475	AAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.57	± 9.6 %
10477	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	± 9.6 %
10478	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.57	± 9.6 %
10479	AAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	± 9.6 %
10480	AAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.18	± 9.6 %
10481	AAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.45	± 9.6 %
10482	AAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.71	± 9.6 %
10483	AAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.39	± 9.6 %
10484	AAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.47	± 9.6 %
10485	AAF	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.59	± 9.6 %
10486	AAF	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.38	± 9.6 %
10487	AAF	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.60	± 9.6 %
10488	AAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.70	± 9.6 %
10489	AAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.31	± 9.6 %
10490	AAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.54	± 9.6 %
10491	AAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	± 9.6 %

10492	AAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.41	± 9.6 %
10493	AAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.55	± 9.6 %
10494	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	± 9.6 %
10495	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.37	± 9.6 %
10496	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.54	± 9.6 %
10497	AAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.67	± 9.6 %
10498	AAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.40	± 9.6 %
10499	AAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.68	± 9.6 %
10500	AAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.67	± 9.6 %
10501	AAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.44	± 9.6 %
10502	AAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.52	± 9.6 %
10503	AAF	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.72	± 9.6 %
10504	AAF	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.31	± 9.6 %
10505	AAF	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.54	± 9.6 %
10506	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	± 9.6 %
10507	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.36	± 9.6 %
10508	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.55	± 9.6 %
10509	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.99	± 9.6 %
10510	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.49	± 9.6 %
10511	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.51	± 9.6 %
10512	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	± 9.6 %
10513	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.42	± 9.6 %
10514	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.45	± 9.6 %
10515	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 99pc duty cycle)	WLAN	1.58	± 9.6 %
10516	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 99pc duty cycle)	WLAN	1.57	± 9.6 %
10517	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 99pc duty cycle)	WLAN	1.58	± 9.6 %
10518	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 99pc duty cycle)	WLAN	8.23	± 9.6 %
10519	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 99pc duty cycle)	WLAN	8.39	± 9.6 %
10520	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 99pc duty cycle)	WLAN	8.12	± 9.6 %
10521	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 99pc duty cycle)	WLAN	7.97	± 9.6 %
10522	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 99pc duty cycle)	WLAN	8.45	± 9.6 %
10523	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 99pc duty cycle)	WLAN	8.08	± 9.6 %
10524	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 99pc duty cycle)	WLAN	8.27	± 9.6 %
10525	AAB	IEEE 802.11ac WiFi (20MHz, MCS0, 99pc duty cycle)	WLAN	8.36	± 9.6 %
10526	AAB	IEEE 802.11ac WiFi (20MHz, MCS1, 99pc duty cycle)	WLAN	8.42	± 9.6 %
10527	AAB	IEEE 802.11ac WiFi (20MHz, MCS2, 99pc duty cycle)	WLAN	8.21	± 9.6 %
10528	AAB	IEEE 802.11ac WiFi (20MHz, MCS3, 99pc duty cycle)	WLAN	8.36	± 9.6 %
10529	AAB	IEEE 802.11ac WiFi (20MHz, MCS4, 99pc duty cycle)	WLAN	8.36	± 9.6 %
10531	AAB	IEEE 802.11ac WiFi (20MHz, MCS6, 99pc duty cycle)	WLAN	8.43	± 9.6 %
10532	AAB	IEEE 802.11ac WiFi (20MHz, MCS7, 99pc duty cycle)	WLAN	8.29	± 9.6 %
10533	AAB	IEEE 802.11ac WiFi (20MHz, MCS8, 99pc duty cycle)	WLAN	8.38	± 9.6 %
10534	AAB	IEEE 802.11ac WiFi (40MHz, MCS0, 99pc duty cycle)	WLAN	8.45	± 9.6 %

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

10588	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 90pc duty cycle)	WLAN	8.76	± 9.6 %
10589	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 90pc duty cycle)	WLAN	8.35	± 9.6 %
10590	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 90pc duty cycle)	WLAN	8.67	± 9.6 %
10591	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS0, 90pc duty cycle)	WLAN	8.63	± 9.6 %
10592	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS1, 90pc duty cycle)	WLAN	8.79	± 9.6 %
10593	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS2, 90pc duty cycle)	WLAN	8.64	± 9.6 %
10594	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS3, 90pc duty cycle)	WLAN	8.74	± 9.6 %
10595	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS4, 90pc duty cycle)	WLAN	8.74	± 9.6 %
10596	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS5, 90pc duty cycle)	WLAN	8.71	± 9.6 %
10597	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS6, 90pc duty cycle)	WLAN	8.72	± 9.6 %
10598	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS7, 90pc duty cycle)	WLAN	8.50	± 9.6 %
10599	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS0, 90pc duty cycle)	WLAN	8.79	± 9.6 %
10600	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS1, 90pc duty cycle)	WLAN	8.88	± 9.6 %
10601	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS2, 90pc duty cycle)	WLAN	8.82	± 9.6 %
10602	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS3, 90pc duty cycle)	WLAN	8.94	± 9.6 %
10603	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS4, 90pc duty cycle)	WLAN	9.03	± 9.6 %
10604	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS5, 90pc duty cycle)	WLAN	8.76	± 9.6 %
10605	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS6, 90pc duty cycle)	WLAN	8.97	± 9.6 %
10606	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS7, 90pc duty cycle)	WLAN	8.82	± 9.6 %
10607	AAB	IEEE 802.11ac WiFi (20MHz, MCS0, 90pc duty cycle)	WLAN	8.64	± 9.6 %
10608	AAB	IEEE 802.11ac WiFi (20MHz, MCS1, 90pc duty cycle)	WLAN	8.77	± 9.6 %
10609	AAB	IEEE 802.11ac WiFi (20MHz, MCS2, 90pc duty cycle)	WLAN	8.57	± 9.6 %
10610	AAB	IEEE 802.11ac WiFi (20MHz, MCS3, 90pc duty cycle)	WLAN	8.78	± 9.6 %
10611	AAB	IEEE 802.11ac WiFi (20MHz, MCS4, 90pc duty cycle)	WLAN	8.70	± 9.6 %
10612	AAB	IEEE 802.11ac WiFi (20MHz, MCS5, 90pc duty cycle)	WLAN	8.77	± 9.6 %
10613	AAB	IEEE 802.11ac WiFi (20MHz, MCS6, 90pc duty cycle)	WLAN	8.94	± 9.6 %
10614	AAB	IEEE 802.11ac WiFi (20MHz, MCS7, 90pc duty cycle)	WLAN	8.59	± 9.6 %
10615	AAB	IEEE 802.11ac WiFi (20MHz, MCS8, 90pc duty cycle)	WLAN	8.82	± 9.6 %
10616	AAB	IEEE 802.11ac WiFi (40MHz, MCS0, 90pc duty cycle)	WLAN	8.82	± 9.6 %
10617	AAB	IEEE 802.11ac WiFi (40MHz, MCS1, 90pc duty cycle)	WLAN	8.81	± 9.6 %
10618	AAB	IEEE 802.11ac WiFi (40MHz, MCS2, 90pc duty cycle)	WLAN	8.58	± 9.6 %
10619	AAB	IEEE 802.11ac WiFi (40MHz, MCS3, 90pc duty cycle)	WLAN	8.86	± 9.6 %
10620	AAB	IEEE 802.11ac WiFi (40MHz, MCS4, 90pc duty cycle)	WLAN	8.87	± 9.6 %
10621	AAB	IEEE 802.11ac WiFi (40MHz, MCS5, 90pc duty cycle)	WLAN	8.77	± 9.6 %
10622	AAB	IEEE 802.11ac WiFi (40MHz, MCS6, 90pc duty cycle)	WLAN	8.68	± 9.6 %
10623	AAB	IEEE 802.11ac WiFi (40MHz, MCS7, 90pc duty cycle)	WLAN	8.82	± 9.6 %
10624	AAB	IEEE 802.11ac WiFi (40MHz, MCS8, 90pc duty cycle)	WLAN	8.96	± 9.6 %
10625	AAB	IEEE 802.11ac WiFi (40MHz, MCS9, 90pc duty cycle)	WLAN	8.96	± 9.6 %
10626	AAB	IEEE 802.11ac WiFi (80MHz, MCS0, 90pc duty cycle)	WLAN	8.83	± 9.6 %
10627	AAB	IEEE 802.11ac WiFi (80MHz, MCS1, 90pc duty cycle)	WLAN	8.88	± 9.6 %
10628	AAB	IEEE 802.11ac WiFi (80MHz, MCS2, 90pc duty cycle)	WLAN	8.71	± 9.6 %
10629	AAB	IEEE 802.11ac WiFi (80MHz, MCS3, 90pc duty cycle)	WLAN	8.85	± 9.6 %
10630	AAB	IEEE 802.11ac WiFi (80MHz, MCS4, 90pc duty cycle)	WLAN	8.72	± 9.6 %
10631	AAB	IEEE 802.11ac WiFi (80MHz, MCS5, 90pc duty cycle)	WLAN	8.81	± 9.6 %
10632	AAB	IEEE 802.11ac WiFi (80MHz, MCS6, 90pc duty cycle)	WLAN	8.74	± 9.6 %
10633	AAB	IEEE 802.11ac WiFi (80MHz, MCS7, 90pc duty cycle)	WLAN	8.83	± 9.6 %
10634	AAB	IEEE 802.11ac WiFi (80MHz, MCS8, 90pc duty cycle)	WLAN	8.80	± 9.6 %
10635	AAB	IEEE 802.11ac WiFi (80MHz, MCS9, 90pc duty cycle)	WLAN	8.81	± 9.6 %
10636	AAC	IEEE 802.11ac WiFi (160MHz, MCS0, 90pc duty cycle)	WLAN	8.83	± 9.6 %
10637	AAC	IEEE 802.11ac WiFi (160MHz, MCS1, 90pc duty cycle)	WLAN	8.79	± 9.6 %
10638	AAC	IEEE 802.11ac WiFi (160MHz, MCS2, 90pc duty cycle)	WLAN	8.86	± 9.6 %
10639	AAC	IEEE 802.11ac WiFi (160MHz, MCS3, 90pc duty cycle)	WLAN	8.85	± 9.6 %
10640	AAC	IEEE 802.11ac WiFi (160MHz, MCS4, 90pc duty cycle)	WLAN	8.98	± 9.6 %
10641	AAC	IEEE 802.11ac WiFi (160MHz, MCS5, 90pc duty cycle)	WLAN	9.06	± 9.6 %
10642	AAC	IEEE 802.11ac WiFi (160MHz, MCS6, 90pc duty cycle)	WLAN	9.06	± 9.6 %
10643	AAC	IEEE 802.11ac WiFi (160MHz, MCS7, 90pc duty cycle)	WLAN	8.89	± 9.6 %
10644	AAC	IEEE 802.11ac WiFi (160MHz, MCS8, 90pc duty cycle)	WLAN	9.05	± 9.6 %
10645	AAC	IEEE 802.11ac WiFi (160MHz, MCS9, 90pc duty cycle)	WLAN	9.11	± 9.6 %
10646	AAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,7)	LTE-TDD	11.96	± 9.6 %
10647	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=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 duty cycle)	WLAN	9.09	± 9.6 %
10672	AAA	IEEE 802.11ax (20MHz, MCS1, 90pc duty cycle)	WLAN	8.57	± 9.6 %
10673	AAA	IEEE 802.11ax (20MHz, MCS2, 90pc duty cycle)	WLAN	8.78	± 9.6 %
10674	AAA	IEEE 802.11ax (20MHz, MCS3, 90pc duty cycle)	WLAN	8.74	± 9.6 %
10675	AAA	IEEE 802.11ax (20MHz, MCS4, 90pc duty cycle)	WLAN	8.90	± 9.6 %
10676	AAA	IEEE 802.11ax (20MHz, MCS5, 90pc duty cycle)	WLAN	8.77	± 9.6 %
10677	AAA	IEEE 802.11ax (20MHz, MCS6, 90pc duty cycle)	WLAN	8.73	± 9.6 %
10678	AAA	IEEE 802.11ax (20MHz, MCS7, 90pc duty cycle)	WLAN	8.78	± 9.6 %
10679	AAA	IEEE 802.11ax (20MHz, MCS8, 90pc duty cycle)	WLAN	8.89	± 9.6 %
10680	AAA	IEEE 802.11ax (20MHz, MCS9, 90pc duty cycle)	WLAN	8.80	± 9.6 %
10681	AAA	IEEE 802.11ax (20MHz, MCS10, 90pc duty cycle)	WLAN	8.62	± 9.6 %
10682	AAA	IEEE 802.11ax (20MHz, MCS11, 90pc duty cycle)	WLAN	8.83	± 9.6 %
10683	AAA	IEEE 802.11ax (20MHz, MCS0, 99pc duty cycle)	WLAN	8.42	± 9.6 %
10684	AAA	IEEE 802.11ax (20MHz, MCS1, 99pc duty cycle)	WLAN	8.26	± 9.6 %
10685	AAA	IEEE 802.11ax (20MHz, MCS2, 99pc duty cycle)	WLAN	8.33	± 9.6 %
10686	AAA	IEEE 802.11ax (20MHz, MCS3, 99pc duty cycle)	WLAN	8.28	± 9.6 %
10687	AAA	IEEE 802.11ax (20MHz, MCS4, 99pc duty cycle)	WLAN	8.45	± 9.6 %
10688	AAA	IEEE 802.11ax (20MHz, MCS5, 99pc duty cycle)	WLAN	8.29	± 9.6 %
10689	AAA	IEEE 802.11ax (20MHz, MCS6, 99pc duty cycle)	WLAN	8.55	± 9.6 %
10690	AAA	IEEE 802.11ax (20MHz, MCS7, 99pc duty cycle)	WLAN	8.29	± 9.6 %
10691	AAA	IEEE 802.11ax (20MHz, MCS8, 99pc duty cycle)	WLAN	8.25	± 9.6 %
10692	AAA	IEEE 802.11ax (20MHz, MCS9, 99pc duty cycle)	WLAN	8.29	± 9.6 %
10693	AAA	IEEE 802.11ax (20MHz, MCS10, 99pc duty cycle)	WLAN	8.25	± 9.6 %
10694	AAA	IEEE 802.11ax (20MHz, MCS11, 99pc duty cycle)	WLAN	8.57	± 9.6 %
10695	AAA	IEEE 802.11ax (40MHz, MCS0, 90pc duty cycle)	WLAN	8.78	± 9.6 %
10696	AAA	IEEE 802.11ax (40MHz, MCS1, 90pc duty cycle)	WLAN	8.91	± 9.6 %
10697	AAA	IEEE 802.11ax (40MHz, MCS2, 90pc duty cycle)	WLAN	8.61	± 9.6 %
10698	AAA	IEEE 802.11ax (40MHz, MCS3, 90pc duty cycle)	WLAN	8.89	± 9.6 %
10699	AAA	IEEE 802.11ax (40MHz, MCS4, 90pc duty cycle)	WLAN	8.82	± 9.6 %
10700	AAA	IEEE 802.11ax (40MHz, MCS5, 90pc duty cycle)	WLAN	8.73	± 9.6 %
10701	AAA	IEEE 802.11ax (40MHz, MCS6, 90pc duty cycle)	WLAN	8.86	± 9.6 %
10702	AAA	IEEE 802.11ax (40MHz, MCS7, 90pc duty cycle)	WLAN	8.70	± 9.6 %
10703	AAA	IEEE 802.11ax (40MHz, MCS8, 90pc duty cycle)	WLAN	8.82	± 9.6 %
10704	AAA	IEEE 802.11ax (40MHz, MCS9, 90pc duty cycle)	WLAN	8.56	± 9.6 %
10705	AAA	IEEE 802.11ax (40MHz, MCS10, 90pc duty cycle)	WLAN	8.69	± 9.6 %
10706	AAA	IEEE 802.11ax (40MHz, MCS11, 90pc duty cycle)	WLAN	8.66	± 9.6 %
10707	AAA	IEEE 802.11ax (40MHz, MCS0, 99pc duty cycle)	WLAN	8.32	± 9.6 %
10708	AAA	IEEE 802.11ax (40MHz, MCS1, 99pc duty cycle)	WLAN	8.55	± 9.6 %
10709	AAA	IEEE 802.11ax (40MHz, MCS2, 99pc duty cycle)	WLAN	8.33	± 9.6 %
10710	AAA	IEEE 802.11ax (40MHz, MCS3, 99pc duty cycle)	WLAN	8.29	± 9.6 %
10711	AAA	IEEE 802.11ax (40MHz, MCS4, 99pc duty cycle)	WLAN	8.39	± 9.6 %
10712	AAA	IEEE 802.11ax (40MHz, MCS5, 99pc duty cycle)	WLAN	8.67	± 9.6 %
10713	AAA	IEEE 802.11ax (40MHz, MCS6, 99pc duty cycle)	WLAN	8.33	± 9.6 %
10714	AAA	IEEE 802.11ax (40MHz, MCS7, 99pc duty cycle)	WLAN	8.26	± 9.6 %
10715	AAA	IEEE 802.11ax (40MHz, MCS8, 99pc duty cycle)	WLAN	8.45	± 9.6 %
10716	AAA	IEEE 802.11ax (40MHz, MCS9, 99pc duty cycle)	WLAN	8.30	± 9.6 %
10717	AAA	IEEE 802.11ax (40MHz, MCS10, 99pc duty cycle)	WLAN	8.48	± 9.6 %
10718	AAA	IEEE 802.11ax (40MHz, MCS11, 99pc duty cycle)	WLAN	8.24	± 9.6 %
10719	AAA	IEEE 802.11ax (80MHz, MCS0, 90pc duty cycle)	WLAN	8.81	± 9.6 %
10720	AAA	IEEE 802.11ax (80MHz, MCS1, 90pc duty cycle)	WLAN	8.87	± 9.6 %
10721	AAA	IEEE 802.11ax (80MHz, MCS2, 90pc duty cycle)	WLAN	8.76	± 9.6 %
10722	AAA	IEEE 802.11ax (80MHz, MCS3, 90pc duty cycle)	WLAN	8.55	± 9.6 %
10723	AAA	IEEE 802.11ax (80MHz, MCS4, 90pc duty cycle)	WLAN	8.70	± 9.6 %
10724	AAA	IEEE 802.11ax (80MHz, MCS5, 90pc duty cycle)	WLAN	8.90	± 9.6 %
10725	AAA	IEEE 802.11ax (80MHz, MCS6, 90pc duty cycle)	WLAN	8.74	± 9.6 %
10726	AAA	IEEE 802.11ax (80MHz, MCS7, 90pc duty cycle)	WLAN	8.72	± 9.6 %
10727	AAA	IEEE 802.11ax (80MHz, MCS8, 90pc duty cycle)	WLAN	8.66	± 9.6 %