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# Report On

Specific Absorption Rate Testing of the Apple Inc, A2289.

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

FCC ID: BCGAA2289
IC: 579C-A2289

**COMMERCIAL-IN-CONFIDENCE**

**Document 75947591 Report 18 Issue 1** **March 2020**

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**REPORT ON**

Specific Absorption Rate Testing of the
Apple Inc, A2289

Document 75947591 Report 18 Issue 1

March 2020

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**DATED**

10 March 2020

**CONTENTS**

# SECTION 1

# REPORT SUMMARY

Specific Absorption Rate Testing of the
A2289

## 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 | 10 March 2020 |

## 1.2 INTRODUCTION

The information contained in this report is intended to show verification of the Specific Absorption Rate Testing of the A2289 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 | A2289 |
| Serial Numbers | C02G005P0CR (WLAN Radiated Sample)<br>C02G004P09R (Bluetooth Radiated Sample)<br>C02ZG008P0CR (WLAN Conducted Sample)<br>C02ZG008P09R (Bluetooth Conducted Sample) |
| Number of Samples Tested | 4 |
| Hardware Version | Rev 1.0 |
| Software Version | 19C4 |
| Battery Cell Manufacturer | Not Supplied |
| Battery Model Number | Not Supplied |
| Test Specification/Issue/Date | KDB 447498 D01 v06 General RF Exposure Guidance |
| Order Number | 0540187743 |
| Date of Receipt of EUT | 05/12/2019 |
| Start of Test | 07/12/2019 |
| Finish of Test | 23/01/2020 |
| Related Documents | FCC 47CFR 2.1093<br>KDB 865664 – D01 v01r04<br>KDB 865664 – D02 v01r02<br>KDB 648474 – D04 v01r03<br>KDB 248227 – D01 v02r02<br>IEEE 1528-2013 |
| Name of Engineers | Mohamud Mohamud<br>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 | 0.95 (Measured) | 1.06 (Scaled) |
| The maximum 1g volume averaged SAR level measured for all the tests performed did not exceed the limits for General Population/Uncontrolled Exposure (W/kg) 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) |
|---|---|---|---|---|
| Bluetooth | 2450 MHz | Body | 0.07 | 1.13* |
| WLAN | 2450 MHz | Body | 1.06 | |
| WLAN | U-NII-2A | Body | 1.01 | |
| WLAN | U-NII-2C | Body | 0.94 | |
| WLAN | U-NII-3 | Body | 1.00 | |
| 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 (W/kg) Partial Body of 1.6 W/kg.<br>* See Section 1.4.3. | | | | |

## 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 Type | Measured Max 1g SAR (W/kg) * | Max 1g SAR (W/kg) Target | Percentage Drift on Reference |
|---|---|---|---|---|---|
| 07/12/2019 | 2450 | MBBL-B3 | 49.88 | 51.2 | 0.16 |
| 10/12/2019 | 2450 | MBBL-B3 | 50.28 | 51.2 | 0.96 |
| 09/01/2020 | 2450 | MBBL-B3 | 51.28 | 51.2 | 2.88 |
| 08/12/2019 | 5300 | MBBL-B3 | 70.30 | 74.2 | -5.95 |
| 08/12/2019 | 5600 | MBBL-B3 | 71.63 | 76.1 | -2.53 |
| 10/12/2019 | 5800 | MBBL-B3 | 77.43 | 73.8 | 4.92 |
| 10/12/2019 | 5600 | MBBL-B3 | 73.23 | 76.1 | -3.92 |
| 23/01/2019 | 2450 | MBBL-B3 | 51.69 | 51.2 | 0.92 |

*Normalised to a forward power of 1W

### 1.4.2 esults Summary Tables

Bluetooth - 2450 MHz - BDR - DH5 - Antenna WF1:
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 Rear Of Display | 78 | 2480 | 16.30 | 16.50 | 0.01 | 0.01 | Figure 5 |
| 0mm Bottom | 78 | 2480 | 16.30 | 16.50 | 0.07 | 0.07 | Figure 6 |
| Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g)<br>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:<br>≤ 0.8W/kg when the transmission band is ≤ 100MHz<br>≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz<br>≤ 0.4W/kg when the transmission band is ≥ 200MHz | | | | | | | |

WLAN - 2450 MHz - 802.11b - 20 MHz - 1 Mbps - SISO Antenna WF1:
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 | 11 | 2462 | 17.30 | 17.75 | 0.95 | 1.06 | Figure 7 |
| 0mm Rear Of Display | 11 | 2462 | 17.30 | 17.75 | 0.06 | 0.07 | Figure 8 |
| 0mm Bottom | 1 | 2412 | 17.30 | 17.75 | 0.50 | 0.56 | Figure 9 |
| 0mm Bottom | 6 | 2437 | 17.30 | 17.75 | 0.48 | 0.56 | Figure 10 |
| Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g)<br>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:<br>≤ 0.8W/kg when the transmission band is ≤ 100MHz<br>≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz<br>≤ 0.4W/kg when the transmission band is ≥ 200MHz<br>KDB 248227 D01 v02 - Testing was not required for OFDM as per Section 5.2.2 | | | | | | | |

WLAN - 2450 MHz - 802.11b - 20 MHz - 1 Mbps - SISO Antenna WF2:
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 | 1 | 2412 | 17.40 | 17.75 | 0.47 | 0.51 | Figure 11 |
| 0mm Rear Display | 1 | 2412 | 17.40 | 17.75 | 0.04 | 0.04 | Figure 12 |
| Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g)<br>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:<br>≤ 0.8W/kg when the transmission band is ≤ 100MHz<br>≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz<br>≤ 0.4W/kg when the transmission band is ≥ 200MHz<br>KDB248227 D01 v02 - Testing was not required for OFDM as per Section 5.2.2 | | | | | | | |

WLAN - 2450 MHz - 802.11b - 20 MHz - 1 Mbps – 2x2 MIMO - Antenna WF1 and WF2:

Specific Absorption Rate (Maximum SAR) 1g Results

| Test Position | Ant | 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 | WF1 | 1 | 2412 | 17.30 | 17.75 | 0.57 | 0.63 | Figure 13 |
| 0mm Bottom | WF2 | 1 | 2412 | 17.40 | 17.75 | 0.43 | 0.46 | |
| Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g)<br>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:<br>≤ 0.8W/kg when the transmission band is ≤ 100MHz<br>≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz<br>≤ 0.4W/kg when the transmission band is ≥ 200MHz<br>KDB248227 D01 v02 - Testing was not required for OFDM as per Section 5.2.2<br>KDB248227 D01 v02 - Only one position was tested as per Section 5.1.1<br>KDB248227 D01 v02 – A duty factor scaling was applied to the scaled SAR as per section 2.2 | | | | | | | | |

WLAN - U-NII-2A - 802.11ac - 80 MHz - SISO Antenna WF2
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 | 58 | 5300 | 12.10 | 12.75 | 0.86 | 1.00 | Figure 14 |
| 0mm Rear Of Display | 58 | 5300 | 12.10 | 12.75 | 0.18 | 0.21 | Figure 15 |
| Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g)<br>KDB248227 D01 v02 – U-NII-1 Testing was not required as this met the test exclusion criteria of Section 5.3.1 | | | | | | | |

WLAN - U-NII-2A - 802.11ac - 80 MHz - SISO Antenna WF1
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 | 58 | 5300 | 12.20 | 12.75 | 0.86 | 0.98 | Figure 16 |
| 0mm Rear Of Display | 58 | 5300 | 12.20 | 12.75 | 0.19 | 0.22 | Figure 17 |
| Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g)<br>KDB248227 D01 v02 – U-NII-1 Testing was not required as this met the test exclusion criteria of Section 5.3.1 | | | | | | | |

WLAN - U-NII-2A – MIMO - 802.11ac - 80 MHz - 2x2 MIMO - Antenna WF1 and WF2:
Specific Absorption Rate (Maximum SAR) 1g Results

| Test Position | Ant | 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 | WF1 | 58 | 5300 | 12.20 | 12.75 | 0.832 | 0.94 | Figure 18 |
| 0mm Bottom | WF2 | 58 | 5300 | 12.10 | 12.75 | 0.82 | 0.95 | |
| Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g)<br>KDB248227 D01 v02 – U-NII-1 Testing was not required as this met the test exclusion criteria of Section 5.3.1 | | | | | | | | |

WLAN - U-NII-2C - 802.11ac - 80 MHz - SISO Antenna WF1
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 | 138 | 5690 | 10.90 | 11.00 | 0.83 | 0.85 | Figure 19 |
| 0mm Rear Of Display | 138 | 5690 | 10.90 | 11.00 | 0.15 | 0.16 | Figure 20 |
| 0mm Bottom | 122 | 5610 | 10.80 | 11.00 | 0.84 | 0.88 | Figure 21 |
| 0mm Bottom | 106 | 5530 | 10.70 | 11.00 | 0.72 | 0.77 | Figure 22 |
| Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g)<br>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:<br>≤ 0.8W/kg when the transmission band is ≤ 100MHz<br>≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz<br>≤ 0.4W/kg when the transmission band is ≥ 200MHz | | | | | | | |

WLAN - U-NII-2C - 802.11ac - 80 MHz - SISO Antenna WF2
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 | 138 | 5690 | 10.80 | 11.00 | 0.45 | 0.47 | Figure 23 |
| 0mm Rear Of Display | 138 | 5690 | 10.80 | 11.00 | 0.11 | 0.11 | Figure 24 |
| 0mm Bottom | 122 | 5610 | 10.80 | 11.00 | 0.55 | 0.58 | Figure 25 |
| 0mm Bottom | 106 | 5530 | 10.70 | 11.00 | 0.61 | 0.65 | Figure 26 |
| Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g)<br>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:<br>≤ 0.8W/kg when the transmission band is ≤ 100MHz<br>≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz<br>≤ 0.4W/kg when the transmission band is ≥ 200MHz | | | | | | | |

WLAN - U-NII-2C - 802.11ac - 80 MHz - MCS0 - 2x2 MIMO - Antenna WF1 and WF2:
Specific Absorption Rate (Maximum SAR) 1g Results

| Test Position | Ant | 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 | WF1 | 138 | 5690 | 10.70 | 11.00 | 0.57 | 0.62 | Figure 27 |
| 0mm Bottom | WF2 | 138 | 5690 | 10.90 | 11.00 | 0.32 | 0.33 | |
| 0mm Bottom | WF1 | 106 | 5530 | 10.80 | 11.00 | 0.54 | 0.57 | Figure 28 |
| 0mm Bottom | WF2 | 106 | 5530 | 10.80 | 11.00 | 0.49 | 0.51 | |
| 0mm Bottom | WF1 | 122 | 5610 | 10.70 | 11.00 | 0.63 | 0.67 | Figure 29 |
| 0mm Bottom | WF2 | 122 | 5610 | 10.80 | 11.00 | 0.42 | 0.44 | |
| Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g)<br>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:<br>≤ 0.8W/kg when the transmission band is ≤ 100MHz<br>≤ 0.6W/kg when the transmission band is between 100MHz and 200MHz<br>≤ 0.4W/kg when the transmission band is ≥ 200MHz | | | | | | | | |

WLAN - U-NII-3 - 802.11ac - 80 MHz - MCS0 - SISO Antenna WF1
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 | 11.80 | 12.00 | 0.86 | 0.90 | Figure 30 |
| 0mm Rear Of Display | 155 | 5775 | 11.80 | 12.00 | 0.18 | 0.18 | Figure 31 |
| Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) | | | | | | | |

WLAN - U-NII-3 - 802.11ac - 80 MHz - MCS0 - SISO Antenna WF2
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 | 11.90 | 12.00 | 0.52 | 0.53 | Figure 32 |
| 0mm Rear Of Display | 155 | 5775 | 11.90 | 12.00 | 0.12 | 0.12 | Figure 33 |
| Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) | | | | | | | |

WLAN - U-NII-3 - 802.11ac - 80 MHz - MCS0 - 2x2 MIMO - Antenna WF1 and WF2: Specific Absorption Rate (Maximum SAR) 1g Results

| Test Position | Ant | 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 | WF1 | 155 | 5775 | 11.80 | 12.00 | 0.63 | 0.66 | Figure 34 |
| 0mm Bottom | WF2 | 155 | 5775 | 11.80 | 12.00 | 0.38 | 0.40 | |
| Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g) | | | | | | | | |

Measurement Variability :Specific Absorbtion 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 Edge Initial Test | 11 | 2462 | 17.3 | 17.5 | 0.95 | 1.06 | Figure 7 |
| 0mm Bottom Edge Repeated | 11 | 2462 | 17.3 | 17.5 | 0.91 | 1.00 | Figure 35 |
| 0mm Bottom Edge Core1 Initial Test | 58 | 5300 | 12.1 | 12.75 | 0.86 | 1.00 | Figure 12 |
| 0mm Bottom Edge Core1 Repeated | 58 | 5300 | 12.1 | 12.75 | 0.87 | 1.01 | Figure 36 |
| 0mm Bottom Edge WF1 Initial Test | 122 | 5610 | 10.8 | 11.00 | 0.84 | 0.88 | Figure 21 |
| 0mm Bottom Edge WF1 Repeated | 122 | 5610 | 10.8 | 11.00 | 0.82 | 0.86 | Figure 37 |
| 0mm Bottom Edge WF1 Initial Test | 155 | 5775 | 11.8 | 12.00 | 0.86 | 0.90 | Figure 28 |
| 0mm Bottom Edge WF1 Repeated | 155 | 5775 | 11.8 | 12.00 | 0.87 | 0.91 | Figure 38 |
| Limit for General Population (Uncontrolled Exposure) 1.6 W/kg (1g)<br>KDB 865664 – Section 2.8.1- Repeated Scans for measured SAR ≥ 0.8 W/kg | | | | | | | |

### 1.4.3 Simultaneous Transmission

| Position | WLAN-SISO Antenna WF1 1 g SAR (W/kg) | WLAN-SISO Antenna WF2 1 g SAR (W/kg) | Bluetooth Antenna WF1 1 g SAR (W/kg) | Sum of 1 g SAR (W/Kg) | Peak Location Separation Ratio required? | Peak Location Separation Ratio |
|---|---|---|---|---|---|---|
| Bottom | 1.06 | - | 0.07 | 1.13 | No | N/A |
| Bottom | - | 1.01 | 0.07 | 1.08 | No | N/A |
| Rear Of Display | 0.22 | | 0.01 | 0.23 | No | N/A |
| Rear Of Display | - | 0.21 | 0.01 | 0.22 | No | N/A |

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

### 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, U-NII-2A and U-NII-2C frequency bands.

2.4GHz WLAN : SISO WF1

| Test Position | Ant | Channel Number | Frequency (MHz) | Scaled 1g SAR (W/kg) | Test | Ratio |
|---|---|---|---|---|---|---|
| 0mm Bottom | Antenna WF1 | 11 | 2462 | 1.06 | Initial | 1.05 |
| 0mm Bottom | Antenna WF1 | 11 | 2462 | 1.00 | Repeated | |

U-NII-2A : SISO WF2

| Test Position | Ant | Channel Number | Frequency (MHz) | Scaled 1g SAR (W/kg) | Test | Ratio |
|---|---|---|---|---|---|---|
| 0mm Bottom | Antenna WF2 | 58 | 5300 | 1.00 | Initial | 1.00 |
| 0mm Bottom | Antenna WF2 | 58 | 5300 | 1.01 | Repeated | |

U-NII-2A : SISO WF1

| Test Position | Ant | Channel Number | Frequency (MHz) | Scaled 1g SAR (W/kg) | Test | Ratio |
|---|---|---|---|---|---|---|
| 0mm Bottom | Antenna WF1 | 122 | 5610 | 0.88 | Initial | 1.02 |
| 0mm Bottom | Antenna WF1 | 122 | 5610 | 0.86 | Repeated | |

U-NII-2C : SISO WF1

| Test Position | Ant | Channel Number | Frequency (MHz) | Scaled 1g SAR (W/kg) | Test | Ratio |
|---|---|---|---|---|---|---|
| 0mm Bottom | Antenna WF1 | 155 | 5775 | 0.90 | Initial | 0.99 |
| 0mm Bottom | Antenna WF1 | 155 | 5775 | 0.91 | 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 |
|---|---|---|---|---|---|---|---|
| Bluetooth - 2450 MHz | 2480 | 16.50 | 45.00 | Body | 5 | 4.5 | No |
| WLAN – 2450MHz | 2462 | 17.75 | 60.00 | Body | 5 | 6.0 | No |
| WLAN – U-NII-2A | 5300 | 12.75 | 19.00 | Body | 5 | 8.7 | No |
| WLAN – U-NII-2C | 5690 | 11. 00 | 13.00 | Body | 5 | 6.2 | No |
| WLAN – U-NII-3 | 5775 | 12.00 | 16.00 | Body | 5 | 7.7 | No |

### 1.4.6 Technical Description

The equipment under test (EUT) was an Apple Inc, A2289 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/LE), 2.4 GHz WLAN 802.11b/g/n and 5 GHz WLAN 802.11a/n/ac. 2x2 MIMO is supported for WLAN, Bluetooth is transmitted on Antenna WF1 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 > 0.80 W/kg (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)

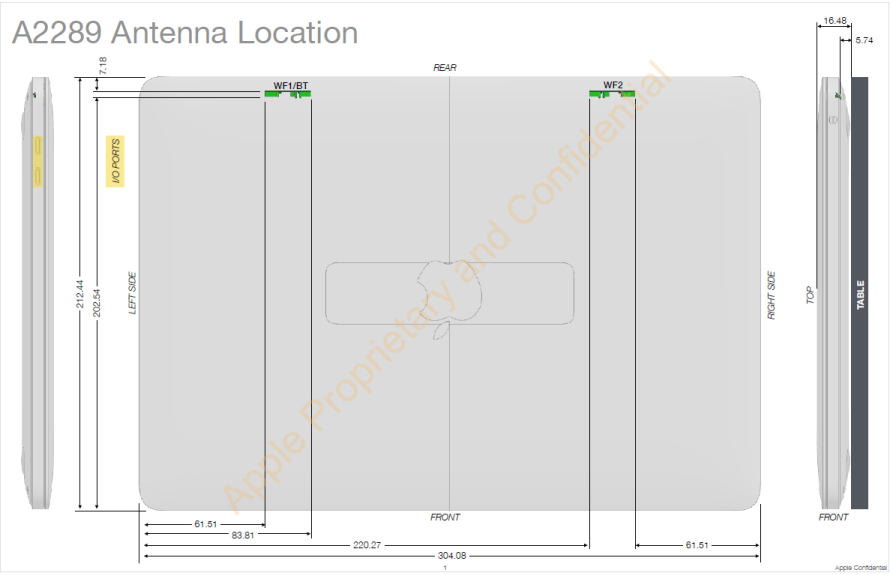



**Figure 1 Antenna Location Diagram**

2450 MHz 802.11g/n 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-1 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 blue apply to ISED only and values highlighted in green apply to FCC only. All other values are universal.

All levels in dBm

Bluetooth – FCC and ISED

| Band | Configuration | Channel | BDR | EDR | LE/LE2M | HDR4/HDR8 |
|---|---|---|---|---|---|---|
| 2.4GHz | iPA | All | 12.00 | 10.00 | 7.00 | 3.50 |
| | ePa | | 16.50 | 16.50 | N/A | 10.00 |

WLAN – FCC and ISED

| Band | Channel | Center Frequency (MHz) | 802.11b (SISO) | 802.11g (SISO) | 802.11n HT20 (SISO) | 802.11n HT20 (2 Tx, DSSS) | 802.11n HT20 (2 Tx, non-TXBF) | 802.11n HT20 (2 Tx, TXBF) |
|---|---|---|---|---|---|---|---|---|
| 2.4GHz | 1 | 2412 | 17.75 | 13.50 | 13.50 | 17.75 | 13.50 | 11.50 |
| 2.4GHz | 2 | 2417 | 17.75 | 16.00 | 16.00 | 17.75 | 15.50 | 13.50 |
| 2.4GHz | 3 | 2422 | 17.75 | 17.75 | 17.75 | 17.75 | 17.50 | 15.50 |
| 2.4GHz | 4 | 2427 | 17.75 | 17.75 | 17.75 | 17.75 | 17.75 | 16.50 |
| 2.4GHz | 5 | 2432 | 17.75 | 17.75 | 17.75 | 17.75 | 17.75 | 17.75 |
| 2.4GHz | 6 | 2437 | 17.75 | 17.75 | 17.75 | 17.75 | 17.75 | 17.75 |
| 2.4GHz | 7 | 2442 | 17.75 | 17.75 | 17.75 | 17.75 | 17.75 | 17.50 |
| 2.4GHz | 8 | 2447 | 17.75 | 17.75 | 17.75 | 17.75 | 17.00 | 15.00 |
| 2.4GHz | 9 | 2452 | 17.75 | 17.00 | 17.00 | 17.75 | 15.50 | 13.50 |
| 2.4GHz | 10 | 2457 | 17.75 | 16.00 | 16.00 | 17.75 | 14.50 | 12.50 |
| 2.4GHz | 11 | 2462 | 17.75 | 11.50 | 11.50 | 17.00 | 10.50 | 8.50 |
| 2.4GHz | 12 | 2467 | 14.50 | 9.50 | 9.50 | 13.50 | 8.50 | 6.50 |
| 2.4GHz | 13 | 2472 | 12.50 | 0.00 | 0.00 | 10.50 | -3.00 | -5.00 |

| Band | Channel | Center Frequency (MHz) | 802.11a (SISO) | 802.11n HT20 (SISO) | 802.11n HT20 (2 Tx CDD, non-TXBF) | | 802.11n HT20 (2 Tx SDM, non-TXBF) | | 802.11n HT20 (2 Tx, TXBF) | |
|---|---|---|---|---|---|---|---|---|---|---|
| U-NII-1 | 36 | 5180 | 12.50 | 12.50 | 12.50 | 8.50 | 12.50 | 11.00 | 12.00 | 8.50 |
| U-NII-1 | 40 | 5200 | 12.50 | 12.50 | 12.50 | 8.50 | 12.50 | 11.00 | 12.50 | 8.50 |
| U-NII-1 | 44 | 5220 | 12.50 | 12.50 | 12.50 | 8.50 | 12.50 | 11.00 | 12.50 | 8.50 |
| U-NII-1 | 48 | 5240 | 12.50 | 12.50 | 12.50 | 8.50 | 12.50 | 11.00 | 12.50 | 8.50 |
| U-NII-2A | 52 | 5260 | 12.75 | 12.75 | 12.75 | | 12.75 | | 12.75 | |
| U-NII-2A | 56 | 5280 | 12.75 | 12.75 | 12.75 | | 12.75 | | 12.75 | |
| U-NII-2A | 60 | 5300 | 12.75 | 12.75 | 12.75 | | 12.75 | | 12.75 | |
| U-NII-2A | 64 | 5320 | 12.75 | 12.75 | 12.75 | | 12.75 | | 12.75 | |
| U-NII-2C | 100 | 5500 | 11.00 | 11.00 | 11.00 | | 11.00 | | 11.00 | |
| U-NII-2C | 104 | 5520 | 11.00 | 11.00 | 11.00 | | 11.00 | | 11.00 | |
| U-NII-2C | 108 | 5540 | 11.00 | 11.00 | 11.00 | | 11.00 | | 11.00 | |
| U-NII-2C | 112 | 5560 | 11.00 | 11.00 | 11.00 | | 11.00 | | 11.00 | |
| U-NII-2C | 116 | 5580 | 11.00 | 11.00 | 11.00 | | 11.00 | | 11.00 | |
| U-NII-2C | 120 | 5600 | 11.00 | 11.00 | 11.00 | | 11.00 | | 11.00 | |
| U-NII-2C | 124 | 5620 | 11.00 | 11.00 | 11.00 | | 11.00 | | 11.00 | |
| U-NII-2C | 128 | 5640 | 11.00 | 11.00 | 11.00 | | 11.00 | | 11.00 | |
| U-NII-2C | 132 | 5660 | 11.00 | 11.00 | 11.00 | | 11.00 | | 11.00 | |
| U-NII-2C | 136 | 5680 | 11.00 | 11.00 | 11.00 | | 11.00 | | 11.00 | |
| U-NII-2C | 140 | 5700 | 11.00 | 11.00 | 11.00 | | 11.00 | | 11.00 | |
| U-NII-2C | 144 | 5720 | 11.00 | 11.00 | 11.00 | | 11.00 | | 11.00 | |
| U-NII-3 | 149 | 5745 | 12.00 | 12.00 | 12.00 | | 12.00 | | 12.00 | |
| U-NII-3 | 153 | 5765 | 12.00 | 12.00 | 12.00 | | 12.00 | | 12.00 | |
| U-NII-3 | 157 | 5785 | 12.00 | 12.00 | 12.00 | | 12.00 | | 12.00 | |
| U-NII-3 | 161 | 5805 | 12.00 | 12.00 | 12.00 | | 12.00 | | 12.00 | |
| U-NII-3 | 165 | 5825 | 12.00 | 12.00 | 12.00 | | 12.00 | | 12.00 | |

| Band | Channel | Center Frequency (MHz) | 802.11n HT40 (1 Tx) | 802.11n HT40 (2 Tx CDD, non-TXBF) | | 802.11n HT40 (2 Tx SDM, non-TXBF) | 802.11n HT40 (2 Tx, TXBF) | |
|---|---|---|---|---|---|---|---|---|
| U-NII-1 | 38 | 5190 | 12.50 | 12.50 | 11.00 | 12.50 | 12.00 | 11.00 |
| U-NII-1 | 46 | 5230 | 12.50 | 12.50 | 11.00 | 12.50 | 12.50 | 11.00 |
| U-NII-2A | 54 | 5270 | 12.75 | 12.75 | | 12.75 | 12.75 | |
| U-NII-2A | 62 | 5310 | 12.75 | 12.75 | | 12.75 | 12.75 | |
| U-NII-2C | 102 | 5510 | 11.00 | 11.00 | | 11.00 | 11.00 | |
| U-NII-2C | 110 | 5550 | 11.00 | 11.00 | | 11.00 | 11.00 | |
| U-NII-2C | 118 | 5590 | 11.00 | 11.00 | | 11.00 | 11.00 | |
| U-NII-2C | 126 | 5630 | 11.00 | 11.00 | | 11.00 | 11.00 | |
| U-NII-2C | 134 | 5670 | 11.00 | 11.00 | | 11.00 | 11.00 | |
| U-NII-2C | 142 | 5710 | 11.00 | 11.00 | | 11.00 | 11.00 | |
| U-NII-3 | 151 | 5755 | 12.00 | 12.00 | | 12.00 | 12.00 | |
| U-NII-3 | 159 | 5795 | 12.00 | 12.00 | | 12.00 | 12.00 | |

| Band | Channel | Center Frequency (MHz) | 802.11ac VHT80 (1 Tx) | 802.11ac VHT80 (2 Tx CDD, non-TXBF) | 802.11ac VHT80 (2 Tx SDM, non-TXBF) | 802.11ac VHT80 (2 Tx, TXBF) |
|---|---|---|---|---|---|---|
| U-NII-1 | 42 | 5210 | 12.50 | 12.50 | 12.50 | 11.00 |
| U-NII-2A | 58 | 5290 | 12.75 | 12.75 | 12.75 | 12.50 |
| U-NII-2C | 106 | 5530 | 11.00 | 11.00 | 11.00 | 11.00 |
| U-NII-2C | 122 | 5610 | 11.00 | 11.00 | 11.00 | 11.00 |
| U-NII-2C | 138 | 5690 | 11.00 | 11.00 | 11.00 | 11.00 |
| U-NII-3 | 155 | 5775 | 12.00 | 12.00 | 12.00 | 12.00 |

## 1.6 POWER MEASUREMENTS

### 1.6.1 Method

Conducted power measurements were performed with a power meter.

**Bluetooth- BDR – Antenna WF1**

| Technology | Channel | Modulation | Duty Cycle (%) | Packet Type | Frequency (MHz) | Measured Power (dBm) | Tune Up (dBm) |
|---|---|---|---|---|---|---|---|
| BDR | 0 | GFSK | 77.0 | DH5 | 2402 | 16.11 | 16.50 |
| BDR | 39 | GFSK | 77.0 | DH5 | 2441 | 15.78 | 16.50 |
| BDR | 78 | GFSK | 77.0 | DH5 | 2480 | 16.26 | 16.50 |

| Technology | Channel | Modulation | Duty Cycle (%) | Packet Type | Frequency (MHz) | Measured Power (dBm) | Tune Up (dBm) |
|---|---|---|---|---|---|---|---|
| EDR | 0 | PSK | 77.0 | 3-DH5 | 2402 | 15.71 | 16.50 |
| EDR | 39 | PSK | 77.0 | 3-DH5 | 2441 | 15.32 | 16.50 |
| EDR | 78 | PSK | 77.0 | 3-DH5 | 2480 | 15.64 | 16.50 |

**WLAN 2450 MHz SISO Antenna WF1**

| Technology | Channel | Modulation | Duty Cycle (%) | Rate (Mbps) | Frequency (MHz) | Measured Power (dBm) | Tune Up (dBm) |
|---|---|---|---|---|---|---|---|
| 802.11b | 1 | BPSK | 100 | 1 | 2412 | 17.20 | 17.75 |
| 802.11b | 6 | BPSK | 100 | 1 | 2437 | 17.10 | 17.75 |
| 802.11b | 11 | BPSK | 100 | 1 | 2462 | 17.30 | 17.75 |

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

### WLAN 2450 MHz SISO Antenna WF2

| Technology | Channel | Modulation | Duty Cycle (%) | Rate (Mbps) | Frequency (MHz) | Measured Power (dBm) | Tune Up (dBm) |
|---|---|---|---|---|---|---|---|
| 802.11b | 1 | BPSK | 100 | 1 | 2412 | 17.40 | 17.75 |
| 802.11b | 6 | BPSK | 100 | 1 | 2437 | 17.40 | 17.75 |
| 802.11b | 11 | BPSK | 100 | 1 | 2462 | 17.20 | 17.75 |

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

### WLAN 2450 MHz 2x2 MIMO - Antenna WF1 and Antenna WF2

**Core0**

| Technology | Channel | Modulation | Duty Cycle (%) | Rate (Mbps) | Frequency (MHz) | Measured Power (dBm) | Tune Up (dBm) |
|---|---|---|---|---|---|---|---|
| 802.11b | 1 | BPSK | 100 | 1 | 2412 | 17.30 | 17.75 |
| 802.11b | 6 | BPSK | 100 | 1 | 2437 | 17.30 | 17.75 |
| 802.11b | 10 | BPSK | 100 | 1 | 2457 | 17.30 | 17.75 |
| 802.11b | 11 | BPSK | 100 | 1 | 2462 | 16.50 | 17.00 |

- Top Channel , has lower declared power,hence measurement performed on adjacent channel.

**Core1**

| Technology | Channel | Modulation | Duty Cycle (%) | Rate (Mbps) | Frequency (MHz) | Measured Power (dBm) | Tune Up (dBm) |
|---|---|---|---|---|---|---|---|
| 802.11b | 1 | BPSK | 100 | 1 | 2412 | 17.40 | 17.75 |
| 802.11b | 6 | BPSK | 100 | 1 | 2437 | 17.30 | 17.75 |
| 802.11b | 10 | BPSK | 100 | 1 | 2457 | 17.20 | 17.75 |
| 802.11b | 11 | BPSK | 100 | 1 | 2462 | 16.60 | 17.00 |

- Top Channel , has lower declared power,hence measurement performed on adjacent channel.

### WLAN U-NII 2A SISO Antenna WF1

| Technology | Channel | Modulation | Duty Cycle (%) | Rate (Mbps) | Frequency (MHz) | Measured Power (dBm) | Tune Up (dBm) |
|---|---|---|---|---|---|---|---|
| 802.11ac VHT80 | 58 | BPSK | 100 | 29.3 | 5290 | 12.20 | 12.75 |

### WLAN U-NII 2A SISO Antenna WF2

| Technology | Channel | Modulation | Duty Cycle (%) | Rate (Mbps) | Frequency (MHz) | Measured Power (dBm) | Tune Up (dBm) |
|---|---|---|---|---|---|---|---|
| 802.11ac VHT80 | 58 | BPSK | 100 | 29.3 | 5290 | 12.10 | 12.75 |

### WLAN U-NII 2A 2x2 MIMO - Antenna WF1 and Antenna WF2

**Antenna WF1**

| Technology | Channel | Modulation | Duty Cycle (%) | Rate (Mbps) | Frequency (MHz) | Measured Power (dBm) | Tune Up (dBm) |
|---|---|---|---|---|---|---|---|
| 802.11ac VHT80 | 58 | BPSK | 100 | 29.3 | 5290 | 12.20 | 12.75 |

**Antenna WF2**

| Technology | Channel | Modulation | Duty Cycle (%) | Rate (Mbps) | Frequency (MHz) | Measured Power (dBm) | Tune Up (dBm) |
|---|---|---|---|---|---|---|---|
| 802.11ac VHT80 | 58 | BPSK | 100 | 29.3 | 5290 | 12.10 | 12.75 |

### WLAN U-NII 2C SISO Antenna WF1

| Technology | Channel | Modulation | Duty Cycle (%) | Rate (Mbps) | Frequency (MHz) | Measured Power (dBm) | Tune Up (dBm) |
|---|---|---|---|---|---|---|---|
| 802.11ac VHT80 | 106 | BPSK | 100 | 29.3 | 5530 | 10.70 | 11.00 |
| 802.11ac VHT80 | 122 | BPSK | 100 | 29.3 | 5610 | 10.80 | 11.00 |
| 802.11ac VHT80 | 138 | BPSK | 100 | 29.3 | 5690 | 10.90 | 11.00 |

### WLAN U-NII 2C SISO Antenna WF2

| Technology | Channel | Modulation | Duty Cycle (%) | Rate (Mbps) | Frequency (MHz) | Measured Power (dBm) | Tune Up (dBm) |
|---|---|---|---|---|---|---|---|
| 802.11ac VHT80 | 106 | BPSK | 100 | 29.3 | 5530 | 10.70 | 11.00 |
| 802.11ac VHT80 | 122 | BPSK | 100 | 29.3 | 5610 | 10.80 | 11.00 |
| 802.11ac VHT80 | 138 | BPSK | 100 | 29.3 | 5690 | 10.80 | 11.00 |

### WLAN U-NII 2C 2x2 MIMO - Antenna WF1 and Antenna WF2

**Antenna WF1**

| Technology | Channel | Modulation | Duty Cycle (%) | Rate (Mbps) | Frequency (MHz) | Measured Power (dBm) | Tune Up (dBm) |
|---|---|---|---|---|---|---|---|
| 802.11ac VHT80 | 106 | BPSK | 100 | 29.3 | 5530 | 10.80 | 11.00 |
| 802.11ac VHT80 | 122 | BPSK | 100 | 29.3 | 5610 | 10.70 | 11.00 |
| 802.11ac VHT80 | 138 | BPSK | 100 | 29.3 | 5690 | 10.70 | 11.00 |

**Antenna WF2**

| Technology | Channel | Modulation | Duty Cycle (%) | Rate (Mbps) | Frequency (MHz) | Measured Power (dBm) | Tune Up (dBm) |
|---|---|---|---|---|---|---|---|
| 802.11ac VHT80 | 106 | BPSK | 100 | 29.3 | 5530 | 10.80 | 11.00 |
| 802.11ac VHT80 | 122 | BPSK | 100 | 29.3 | 5610 | 10.80 | 11.00 |
| 802.11ac VHT80 | 138 | BPSK | 100 | 29.3 | 5690 | 10.90 | 11.00 |

### WLAN U-NII 3 SISO Antenna WF1

| Technology | Channel | Modulation | Duty Cycle (%) | Rate (Mbps) | Frequency (MHz) | Measured Power (dBm) | Tune Up (dBm) |
|---|---|---|---|---|---|---|---|
| 802.11ac VHT80 | 155 | BPSK | 100 | 29.3 | 5775 | 11.80 | 12.00 |

### WLAN U-NII 3 SISO Antenna WF2

| Technology | Channel | Modulation | Duty Cycle (%) | Rate (Mbps) | Frequency (MHz) | Measured Power (dBm) | Tune Up (dBm) |
|---|---|---|---|---|---|---|---|
| 802.11ac VHT80 | 155 | BPSK | 100 | 29.3 | 5775 | 11.90 | 12.00 |

### WLAN U-NII 3 2x2 MIMO - Antenna WF1 and Antenna WF2

**Antenna WF1**

| Technology | Channel | Modulation | Duty Cycle (%) | Rate (Mbps) | Frequency (MHz) | Measured Power (dBm) | Tune Up (dBm) |
|---|---|---|---|---|---|---|---|
| 802.11ac VHT80 | 155 | BPSK | 100 | 29.3 | 5775 | 11.80 | 12.00 |

**Antenna WF2**

| Technology | Channel | Modulation | Duty Cycle (%) | Rate (Mbps) | Frequency (MHz) | Measured Power (dBm) | Tune Up (dBm) |
|---|---|---|---|---|---|---|---|
| 802.11ac VHT80 | 155 | BPSK | 100 | 29.3 | 5775 | 11.80 | 12.00 |

## SECTION 2

## TEST DETAILS

Specific Absorption Rate Testing of the
A2289

## 2.1 DASY5 MEASUREMENT SYSTEM

### 2.1.1 System Description

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

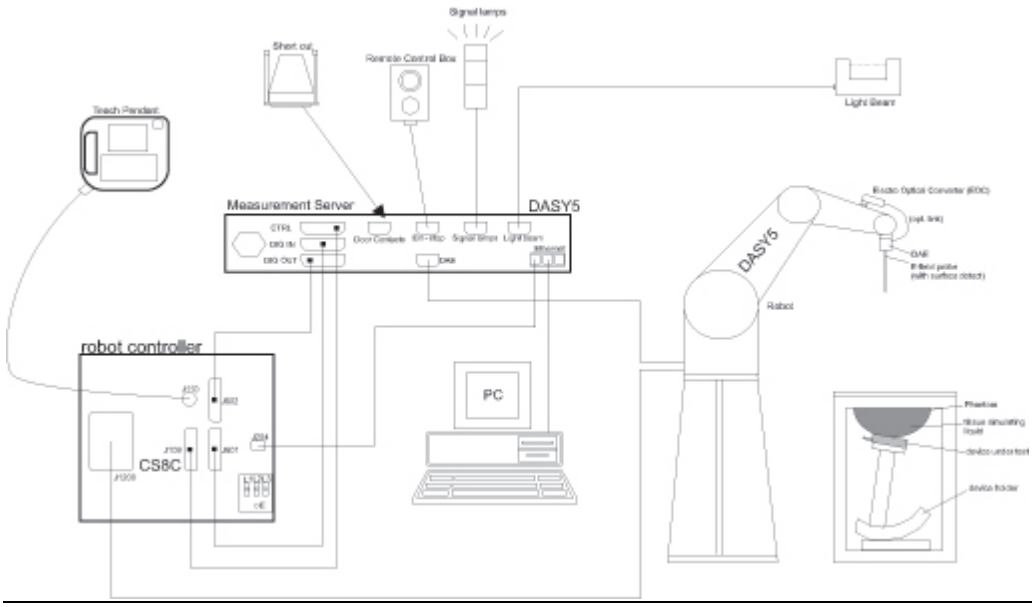



**Figure 2 System Description Diagram**

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:** | 23.2 °C |
| **DATE:** | 09/01/2020 | **RELATIVE HUMIDITY:** | 37.0 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 2.125 S/m |
| **DUT CONFIGURATION:** | Bluetooth – Antenna WF1 | **RELATIVE PERMITTIVITY:** | 52.985 |
| **DUT POSITION:** | 0mm - Rear of Display | **LIQUID TEMPERATURE:** | 22 °C |
| **RAT:** | Bluetooth | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 2480 MHz | **DRIFT:** | -0.06 dB |
| **MODULATION:** | GFSK | **PEAK SAR:** | 0.014 W/kg |
| **DUTY CYCLE:** | 77 % | **SAR (1g):** | 0.01 W/kg |

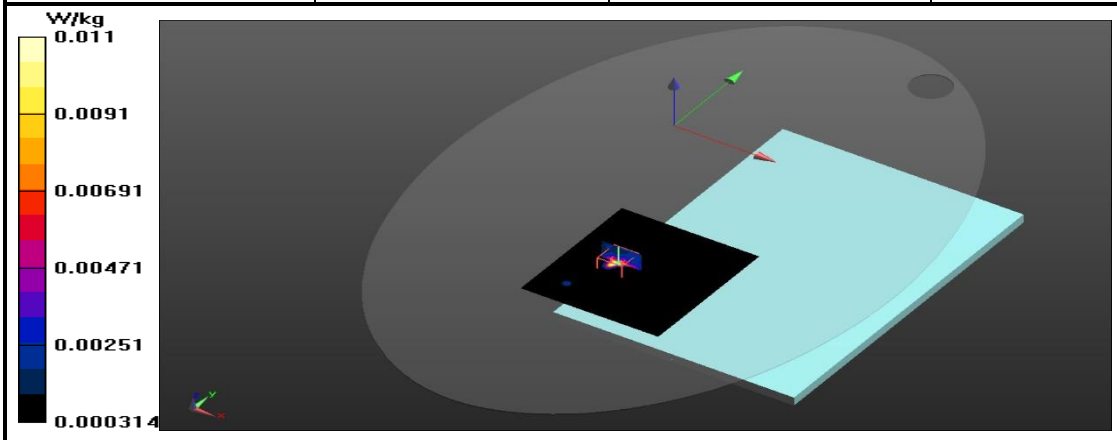



Figure 5: SAR Body Testing Results for the A2289 at 2480 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 23.2 °C |
| **DATE:** | 09/01/2020 | **RELATIVE HUMIDITY:** | 37.0 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 2.125 S/m |
| **DUT CONFIGURATION:** | Bluetooth – Antenna WF1 | **RELATIVE PERMITTIVITY:** | 52.985 |
| **DUT POSITION:** | 0mm - Bottom | **LIQUID TEMPERATURE:** | 22 °C |
| **RAT:** | Bluetooth | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 2480 MHz | **DRIFT:** | 0.16 dB |
| **MODULATION:** | GFSK | **PEAK SAR:** | 0.195 W/kg |
| **DUTY CYCLE:** | 77 % | **SAR (1g):** | 0.07 W/kg |

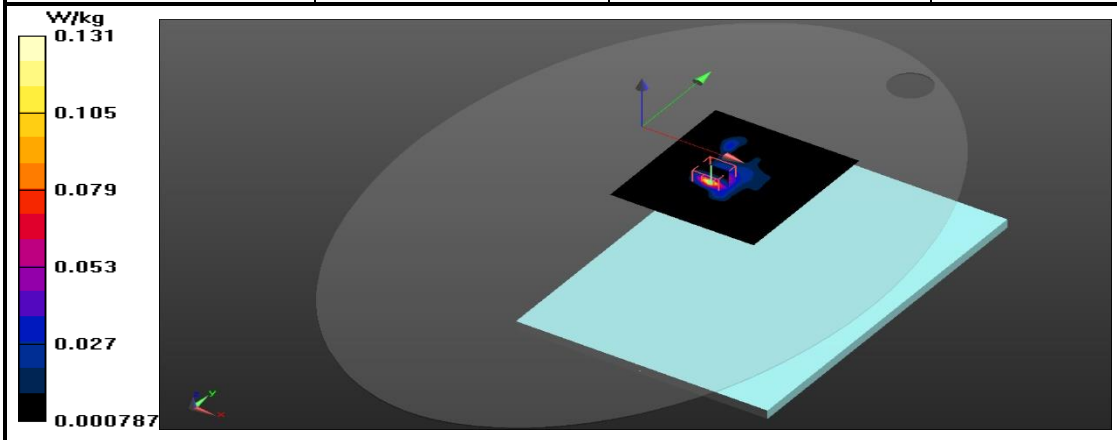



Figure 6: SAR Body Testing Results for the A2289 at 2480 MHz.

## 2.3 WLAN 2450 MHz BODY SAR TEST RESULTS

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 23.0 °C |
| **DATE:** | 07/12/2019 | **RELATIVE HUMIDITY:** | 46.2 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 1.975 S/m |
| **DUT CONFIGURATION:** | 802.11b 20 MHz 1Mbps - SISO Antenna WF1 | **RELATIVE PERMITTIVITY:** | 52.249 |
| **DUT POSITION:** | 0mm - Bottom | **LIQUID TEMPERATURE:** | 21.6 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 2462 MHz | **DRIFT:** | 0.03 dB |
| **MODULATION:** | BPSK | **PEAK SAR:** | 2.71 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 1.06 W/kg |

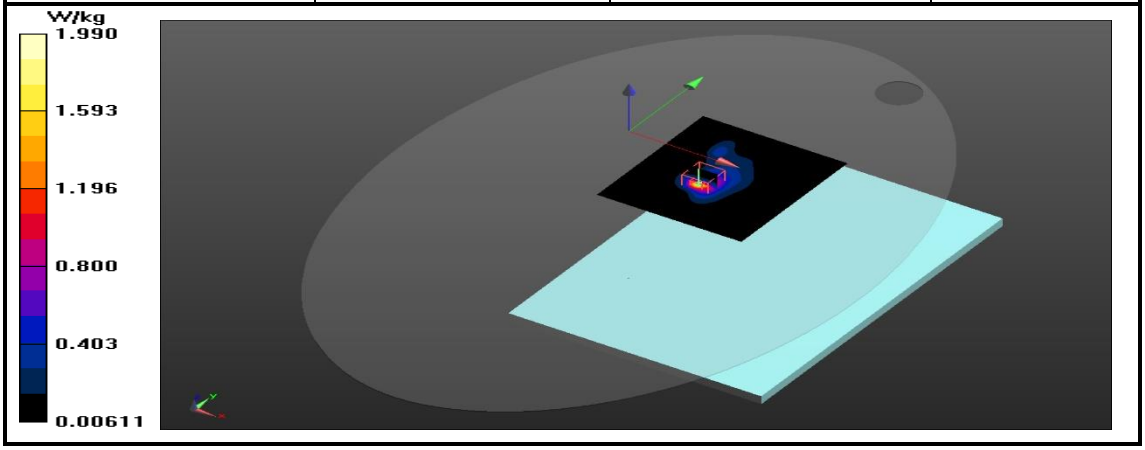



Figure 7: SAR Body Testing Results for the A2289 at 2462 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 23 0°C |
| **DATE:** | 07/12/2019 | **RELATIVE HUMIDITY:** | 46.2 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 1.975 S/m |
| **DUT CONFIGURATION:** | 802.11b 20 MHz 1Mbps - SISO Antenna WF1 | **RELATIVE PERMITTIVITY:** | 52.249 |
| **DUT POSITION:** | 0mm - Rear of Display | **LIQUID TEMPERATURE:** | 21.6 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 2462 MHz | **DRIFT:** | 0.02 dB |
| **MODULATION:** | BPSK | **PEAK SAR:** | 0.13 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.07 W/kg |

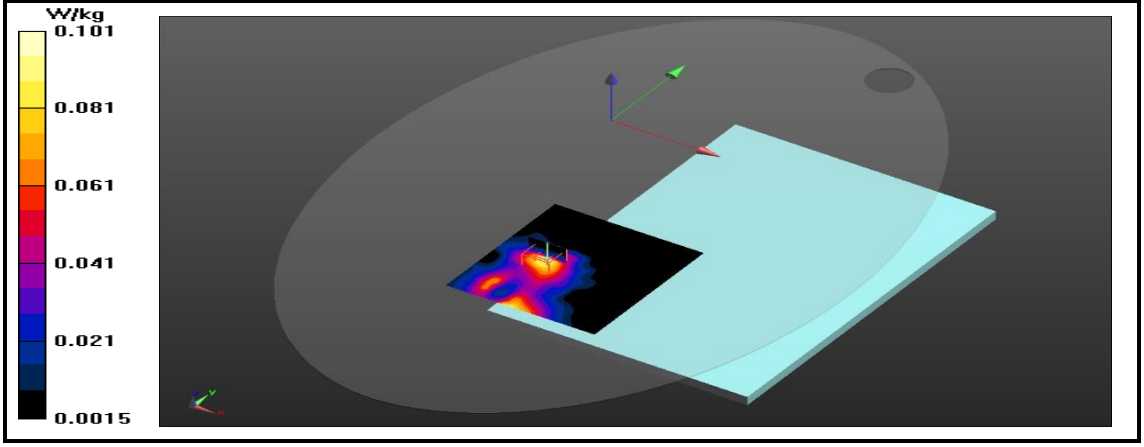



Figure 8: SAR Body Testing Results for the A2289 at 2462 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 21.8 °C |
| **DATE:** | 23/01/2020 | **RELATIVE HUMIDITY:** | 35.8 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 2.001 S/m |
| **DUT CONFIGURATION:** | 802.11b 20 MHz 1Mbps - SISO Antenna WF1 | **RELATIVE PERMITTIVITY:** | 53.14 |
| **DUT POSITION:** | 0mm - Rear of Display | **LIQUID TEMPERATURE:** | 21.1 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 2412 MHz | **DRIFT:** | 0.07 dB |
| **MODULATION:** | BPSK | **PEAK SAR:** | 0.132 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.56 W/kg |

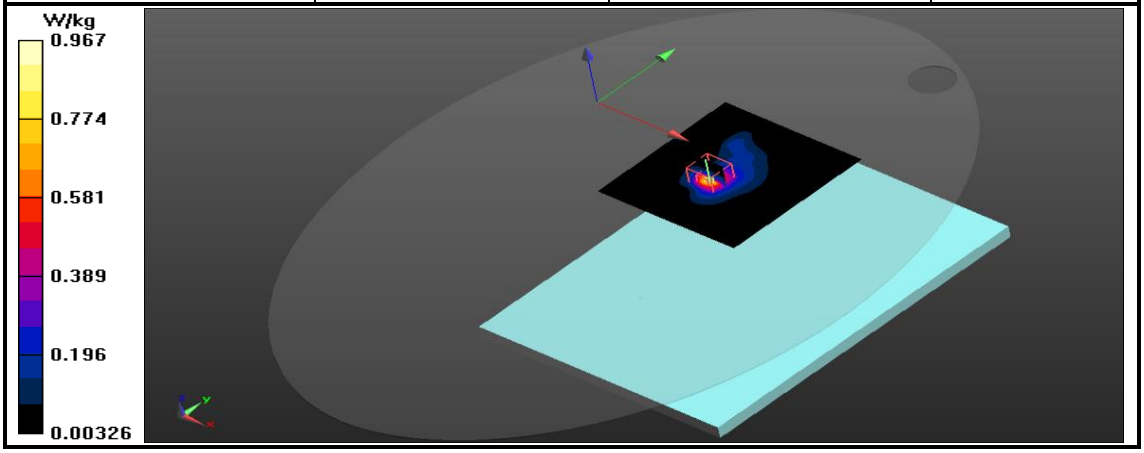



Figure 9: SAR Body Testing Results for the A2289 at 2462 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 21.8 °C |
| **DATE:** | 23/01/2020 | **RELATIVE HUMIDITY:** | 35.8 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 2.03 S/m |
| **DUT CONFIGURATION:** | 802.11b 20 MHz 1Mbps - SISO Antenna WF1 | **RELATIVE PERMITTIVITY:** | 53.097 |
| **DUT POSITION:** | 0mm - Bottom | **LIQUID TEMPERATURE:** | 21.1 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 2437 MHz | **DRIFT:** | 0.03 dB |
| **MODULATION:** | BPSK | **PEAK SAR:** | 1.36 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.56 W/kg |

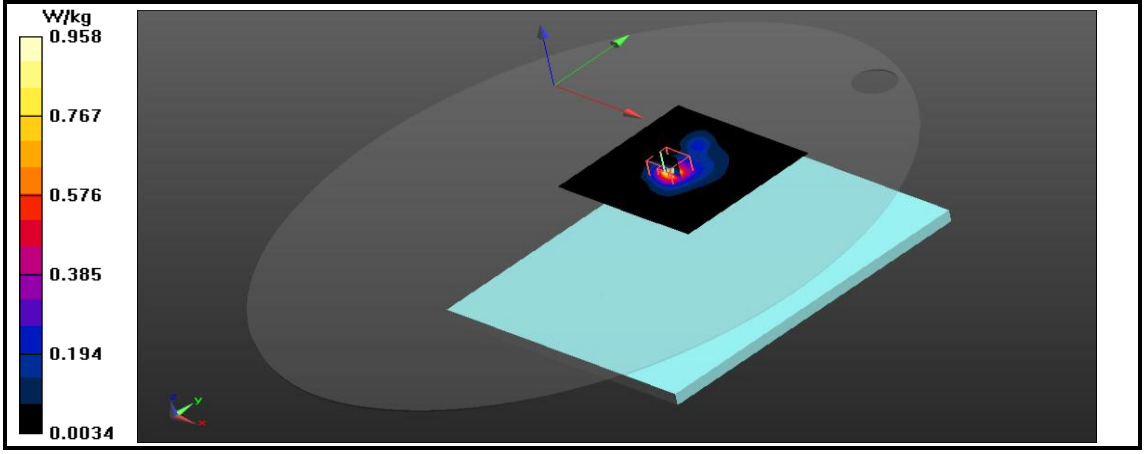



Figure 10: SAR Body Testing Results for the A2289 at 2462 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 23.0 °C |
| **DATE:** | 07/12/2019 | **RELATIVE HUMIDITY:** | 46.2 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 1.93 S/m |
| **DUT CONFIGURATION:** | 802.11b 20 MHz 1Mbps - SISO Antenna WF2 | **RELATIVE PERMITTIVITY:** | 52.32 |
| **DUT POSITION:** | 0mm - Bottom | **LIQUID TEMPERATURE:** | 21.6 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 2412 MHz | **DRIFT:** | 0.10 dB |
| **MODULATION:** | BPSK | **PEAK SAR:** | 1.3 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.51 W/kg |

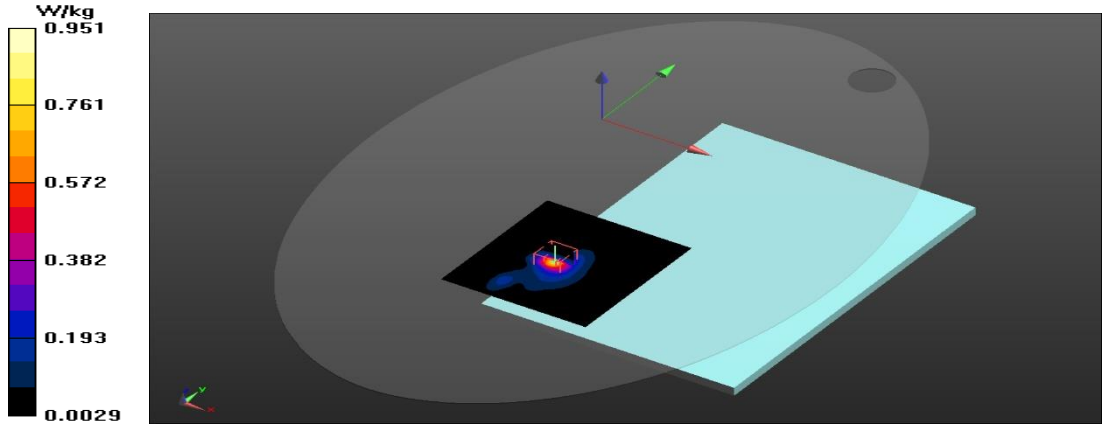



Figure 11: SAR Body Testing Results for the A2289 at 2412 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 23.0 °C |
| **DATE:** | 07/12/2019 | **RELATIVE HUMIDITY:** | 46.2 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 1.93 S/m |
| **DUT CONFIGURATION:** | 802.11b 20 MHz 1Mbps - SISO Antenna WF2 | **RELATIVE PERMITTIVITY:** | 52.32 |
| **DUT POSITION:** | 0mm - Rear of Display | **LIQUID TEMPERATURE:** | 21.6 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 2412 MHz | **DRIFT:** | -0.04 dB |
| **MODULATION:** | BPSK | **PEAK SAR:** | 0.076 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.04 W/kg |

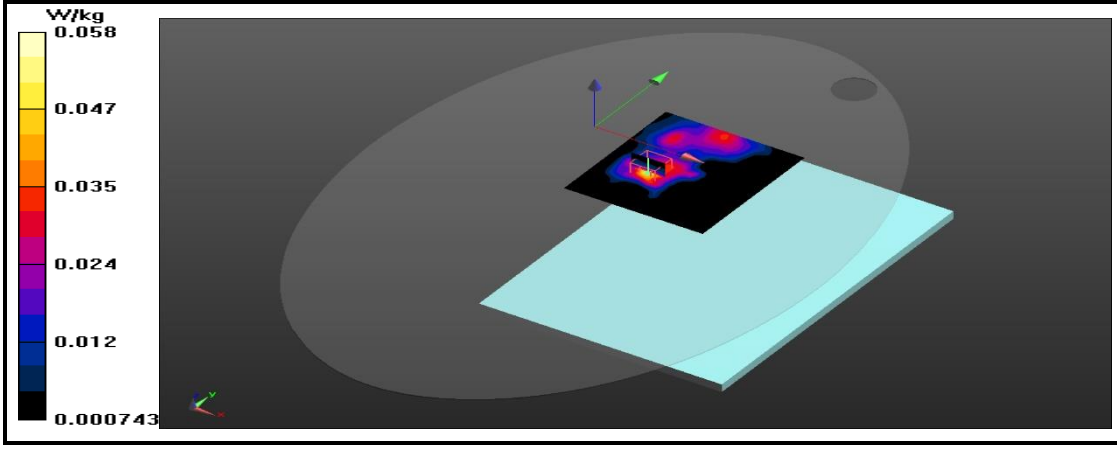



Figure 12: SAR Body Testing Results for the A2289 at 2412 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 21.0 °C |
| **DATE:** | 10/12/2019 | **RELATIVE HUMIDITY:** | 37.2 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 1.93 S/m |
| **DUT CONFIGURATION:** | 802.11b 20 MHz 1Mbps - MIMO Antenna WF1 & WF1 | **RELATIVE PERMITTIVITY:** | 52.32 |
| **DUT POSITION:** | 0mm - Bottom | **LIQUID TEMPERATURE:** | 20.3 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 2412 MHz | **DRIFT:** | -0.16 dB |
| **MODULATION:** | BPSK | **PEAK SAR:** | 1.55 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.63 W/kg |

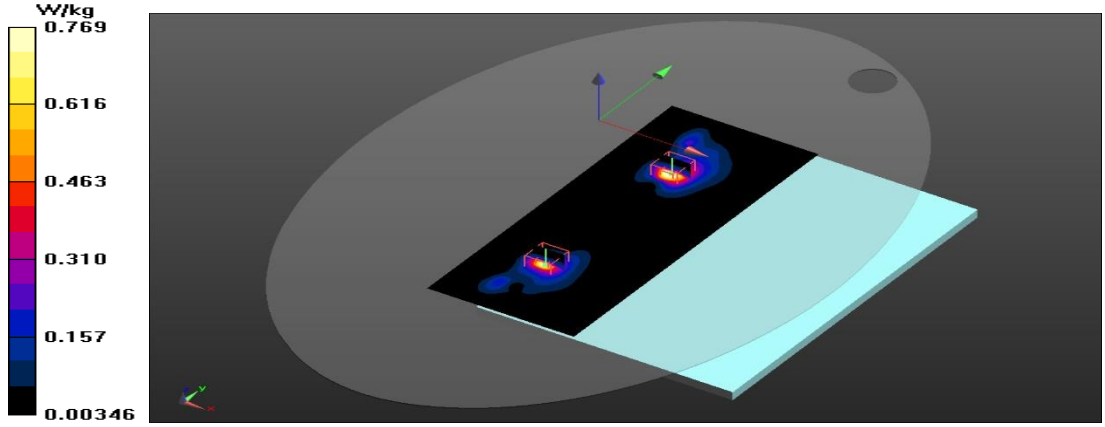



Figure 13: SAR Body Testing Results for the A2289 at 2412 MHz.

## 2.4 WLAN U-NII 2A BODY SAR TEST RESULTS

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 23.0 °C |
| **DATE:** | 07/12/2019 | **RELATIVE HUMIDITY:** | 46.2 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 5.475 S/m |
| **DUT CONFIGURATION:** | 802.11ac 80 MHz 29.3 Mbps - SISO Antenna WF2 | **RELATIVE PERMITTIVITY:** | 47.082 |
| **DUT POSITION:** | 0mm - Bottom | **LIQUID TEMPERATURE:** | 23.3 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 5300 MHz | **DRIFT:** | -0.18 dB |
| **MODULATION:** | MCS0 | **PEAK SAR:** | 3.10 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 1.00 W/kg |

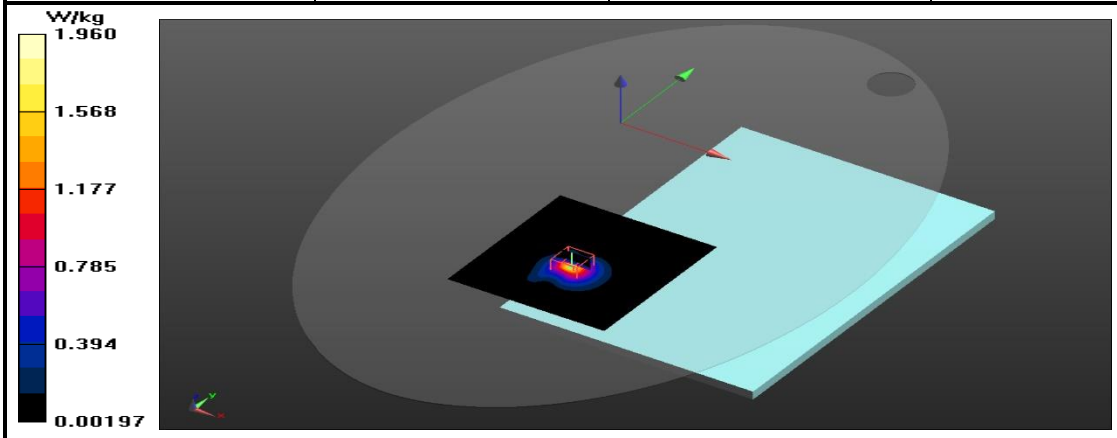



Figure 14: SAR Body Testing Results for the A2289 at 5300 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 23.0 °C |
| **DATE:** | 07/12/2019 | **RELATIVE HUMIDITY:** | 46.2 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 5.475 S/m |
| **DUT CONFIGURATION:** | 802.11ac 80 MHz 29.3 Mbps - SISO Antenna WF2 | **RELATIVE PERMITTIVITY:** | 47.082 |
| **DUT POSITION:** | 0mm - Rear of Display | **LIQUID TEMPERATURE:** | 22.3 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 5300 MHz | **DRIFT:** | -0.01 dB |
| **MODULATION:** | MCS0 | **PEAK SAR:** | 0.561 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.21 W/kg |

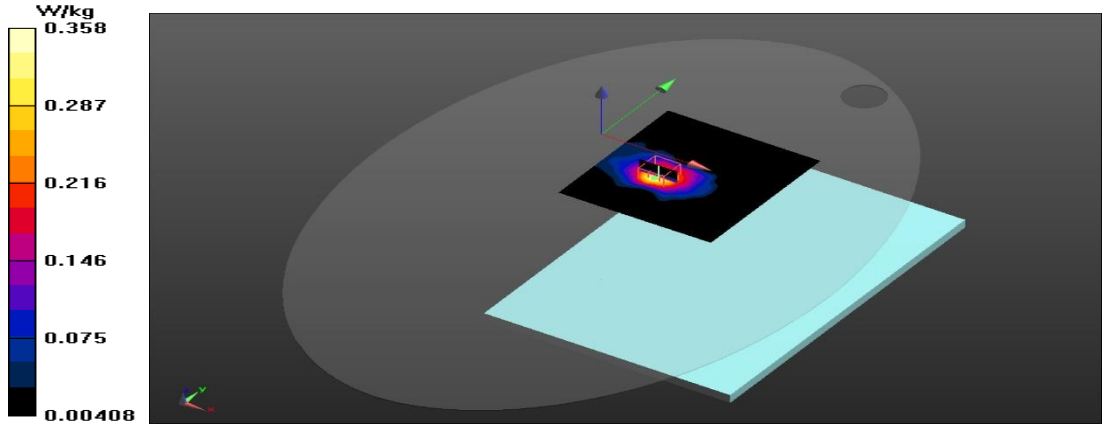



Figure 15: SAR Body Testing Results for the A2289 at 5300 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 23.0 °C |
| **DATE:** | 07/12/2019 | **RELATIVE HUMIDITY:** | 46.2 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 5.475 S/m |
| **DUT CONFIGURATION:** | 802.11ac 80 MHz 29.3 Mbps - SISO Antenna WF1 | **RELATIVE PERMITTIVITY:** | 47.082 |
| **DUT POSITION:** | 0mm - Bottom | **LIQUID TEMPERATURE:** | 22.3 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 5300 MHz | **DRIFT:** | 0.01 dB |
| **MODULATION:** | MCS0 | **PEAK SAR:** | 3.10 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.98 W/kg |

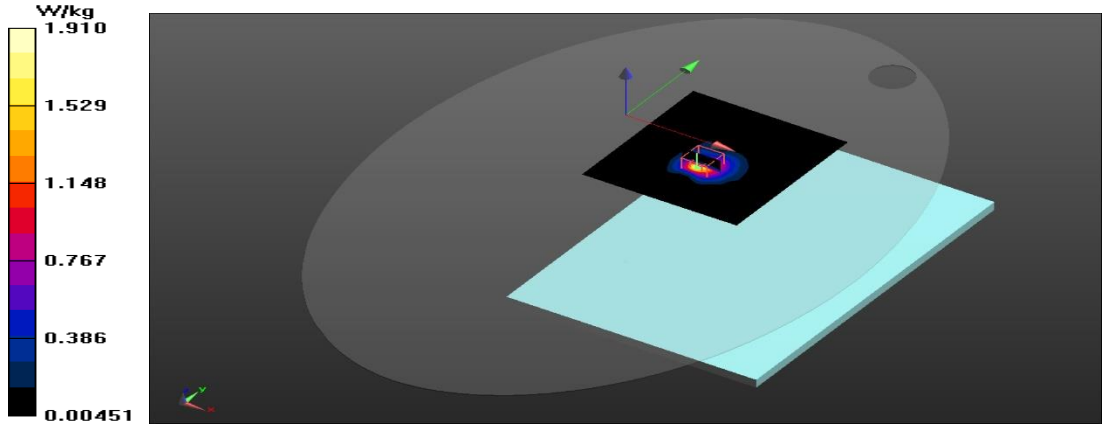



Figure 16: SAR Body Testing Results for the A2289 at 5300 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 23.0 °C |
| **DATE:** | 07/12/2019 | **RELATIVE HUMIDITY:** | 46.2 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 5.475 S/m |
| **DUT CONFIGURATION:** | 802.11ac 80 MHz 29.3 Mbps - SISO Antenna WF1 | **RELATIVE PERMITTIVITY:** | 47.082 |
| **DUT POSITION:** | 0mm - Rear of Display | **LIQUID TEMPERATURE:** | 22.3 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 5300 MHz | **DRIFT:** | -0.07 dB |
| **MODULATION:** | MCS0 | **PEAK SAR:** | 0.605 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.22 W/kg |

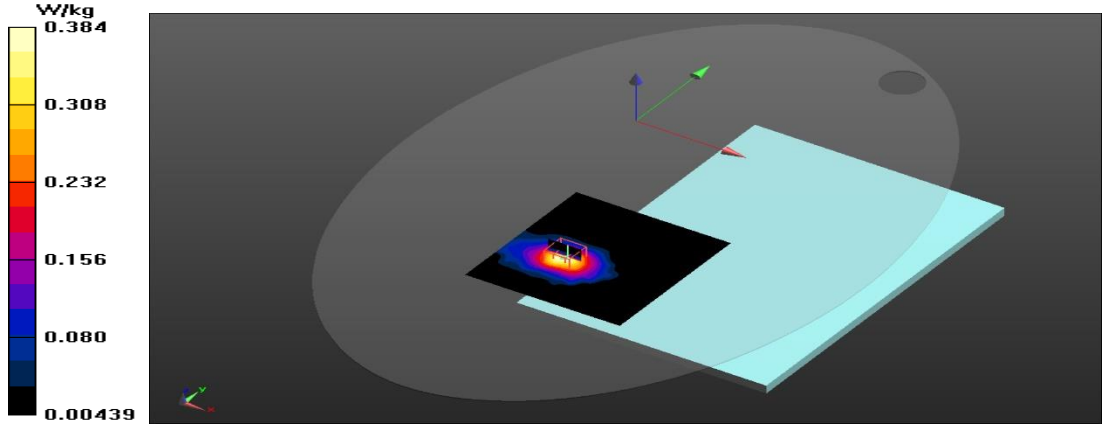



Figure 17: SAR Body Testing Results for the A2289 at 5300 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 23.0 °C |
| **DATE:** | 08/12/2019 | **RELATIVE HUMIDITY:** | 46.2 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 5.475 S/m |
| **DUT CONFIGURATION:** | 802.11ac 80 MHz 29.3 Mbps - MIMO Antenna WF1 & WF1 | **RELATIVE PERMITTIVITY:** | 47.082 |
| **DUT POSITION:** | 0mm - Bottom | **LIQUID TEMPERATURE:** | 22.3 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 5300 MHz | **DRIFT:** | 0.07 dB |
| **MODULATION:** | MCS0 | **PEAK SAR:** | 3.27 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.95 W/kg |

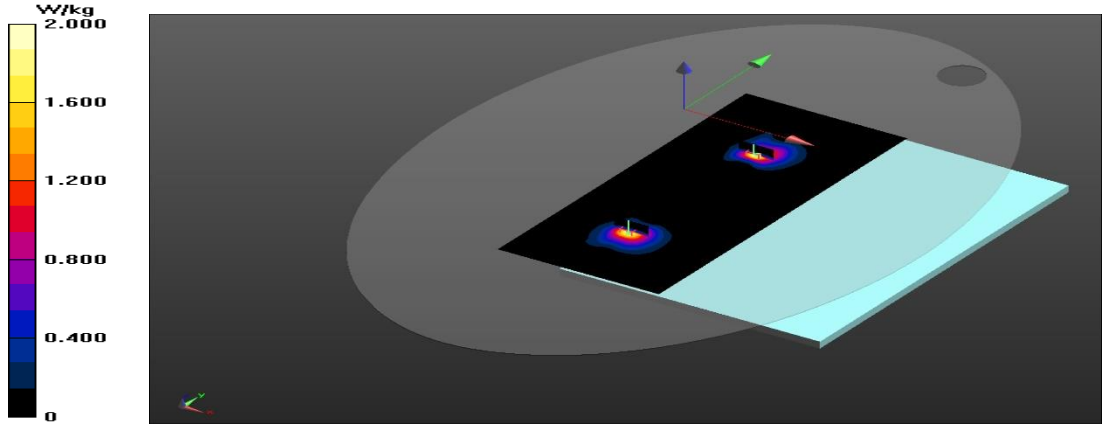



Figure 18: SAR Body Testing Results for the A2289 at 5300 MHz.

## 2.5 WLAN U-NII 2C BODY SAR TEST RESULTS

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 20.4 °C |
| **DATE:** | 08/12/2019 | **RELATIVE HUMIDITY:** | 40.6 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 6.045 S/m |
| **DUT CONFIGURATION:** | 802.11ac 80 MHz 29.3 Mbps - SISO Antenna WF1 | **RELATIVE PERMITTIVITY:** | 46.314 |
| **DUT POSITION:** | 0mm - Bottom | **LIQUID TEMPERATURE:** | 20.29 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 5690 MHz | **DRIFT:** | 0.07 dB |
| **MODULATION:** | MCS0 | **PEAK SAR:** | 3.55 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.85 W/kg |

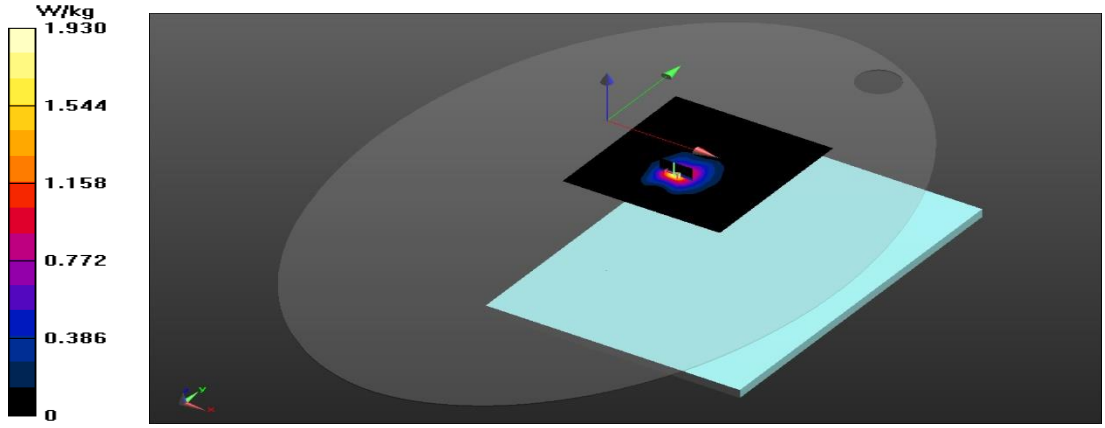



Figure 19: SAR Body Testing Results for the A2289 at 5690 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 21.8 °C |
| **DATE:** | 08/12/2019 | **RELATIVE HUMIDITY:** | 35.8 % |
| **PHANTOM:** | QD OVA 004 Ax | **RELATIVE PERMITTIVITY:** | 6.045 S/m |
| **DUT CONFIGURATION:** | 802.11ac 80 MHz 29.3 Mbps - SISO Antenna WF1 | **CONDUCTIVITY:** | 46.314 |
| **DUT POSITION:** | 0mm - Rear of Display | **LIQUID TEMPERATURE:** | 20.29 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 5690 MHz | **DRIFT:** | 0.01 dB |
| **MODULATION:** | MCS0 | **PEAK SAR:** | 0.600 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.16 W/kg |

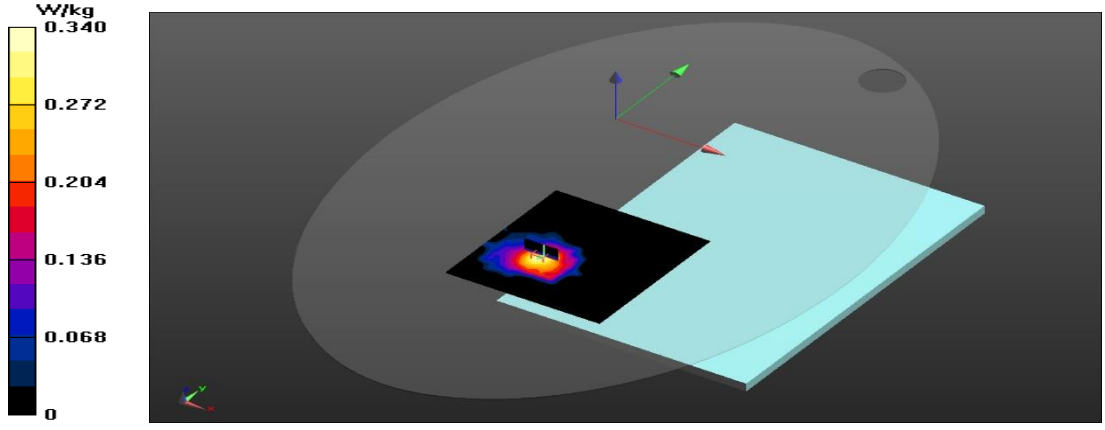



Figure 20: SAR Body Testing Results for the A2289 at 5690 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 21.8 °C |
| **DATE:** | 08/12/2019 | **RELATIVE HUMIDITY:** | 35.8 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 5.926 S/m |
| **DUT CONFIGURATION:** | 802.11ac 80 MHz 29.3 Mbps - SISO Antenna WF1 | **RELATIVE PERMITTIVITY:** | 46.462 |
| **DUT POSITION:** | 0mm - Bottom | **LIQUID TEMPERATURE:** | 20.29 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 5610 MHz | **DRIFT:** | 0.04 dB |
| **MODULATION:** | MCS0 | **PEAK SAR:** | 3.49 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.88 W/kg |

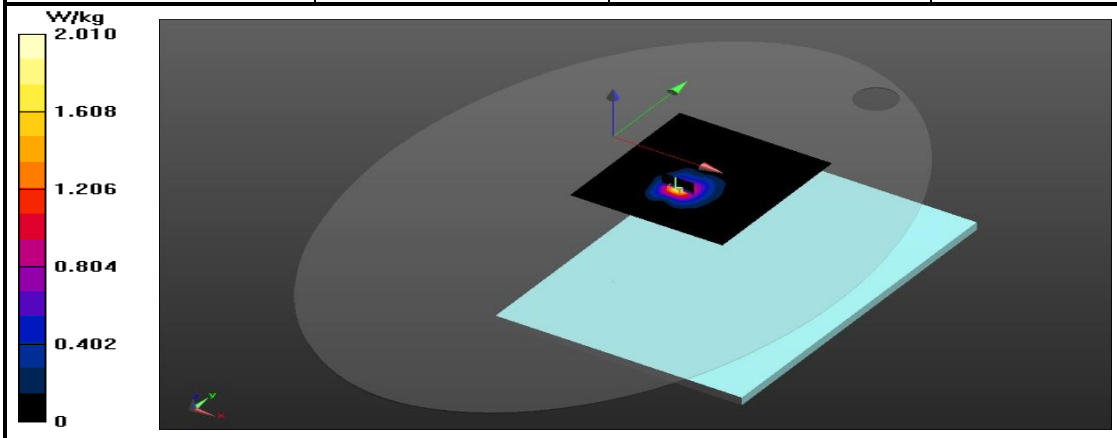



Figure 21: SAR Body Testing Results for the A2289 at 5610 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 21.8 °C |
| **DATE:** | 08/12/2019 | **RELATIVE HUMIDITY:** | 35.8 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 5.808 S/m |
| **DUT CONFIGURATION:** | 802.11ac 80 MHz 29.3 Mbps - SISO Antenna WF1 | **RELATIVE PERMITTIVITY:** | 46.614 |
| **DUT POSITION:** | 0mm - Bottom | **LIQUID TEMPERATURE:** | 20.29 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 5530 MHz | **DRIFT:** | 0.00 dB |
| **MODULATION:** | MCS0 | **PEAK SAR:** | 2.92 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.77 W/kg |

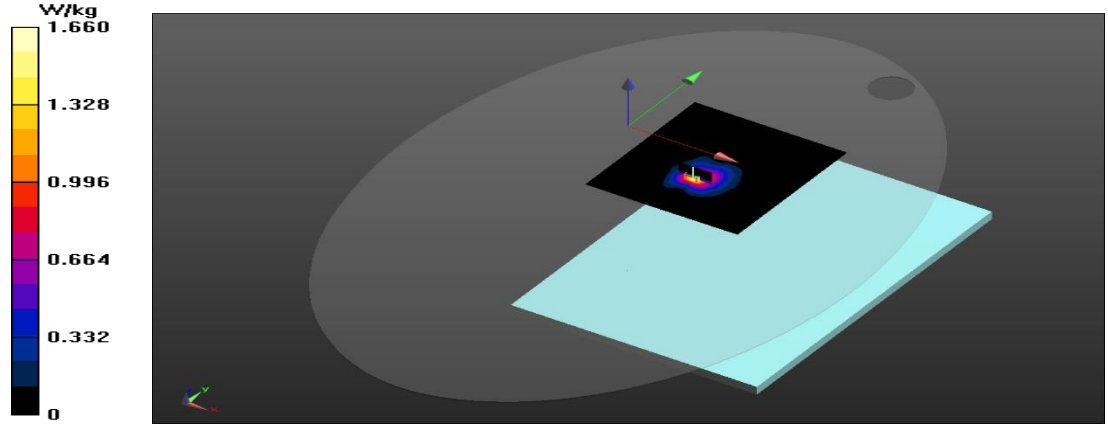



Figure 22: SAR Body Testing Results for the A2289 at 5530 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 21.8 °C |
| **DATE:** | 08/12/2019 | **RELATIVE HUMIDITY:** | 35.8 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 6.045 S/m |
| **DUT CONFIGURATION:** | 802.11ac 80 MHz 29.3 Mbps - SISO Antenna WF2 | **RELATIVE PERMITTIVITY:** | 46.314 |
| **DUT POSITION:** | 0mm - Bottom | **LIQUID TEMPERATURE:** | 20.29 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 5690 MHz | **DRIFT:** | -0.07 dB |
| **MODULATION:** | MCS0 | **PEAK SAR:** | 1.95 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.47 W/kg |

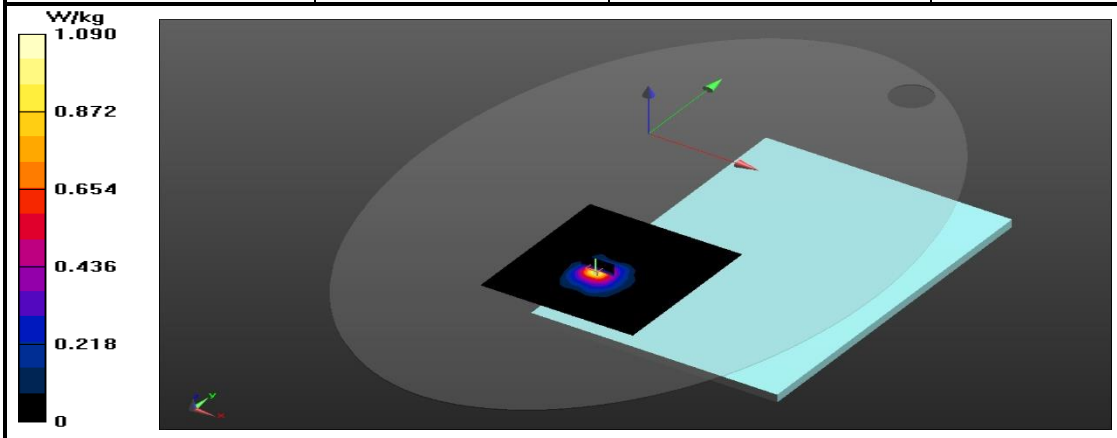



Figure 23: SAR Body Testing Results for the A2289 at 5690 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 21.8 °C |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 6.045 S/m |
| **DUT CONFIGURATION:** | 802.11ac 80 MHz 29.3 Mbps - SISO Antenna WF2 | **RELATIVE PERMITTIVITY:** | 46.314 |
| **DUT POSITION:** | 0mm - Rear of Display | **LIQUID TEMPERATURE:** | 20.29 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 5690 MHz | **DRIFT:** | -0.11 dB |
| **MODULATION:** | MCS0 | **PEAK SAR:** | 0.434 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.11 W/kg |

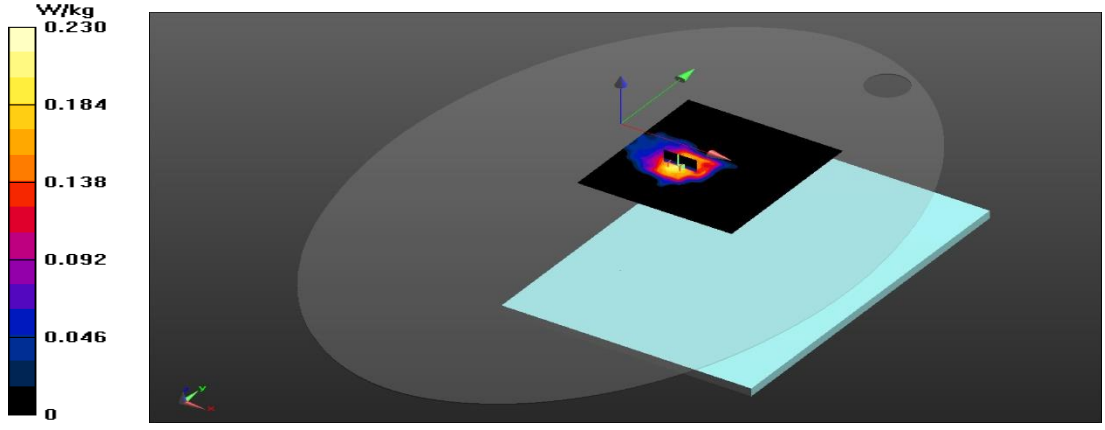



Figure 24: SAR Body Testing Results for the A2289 at 5690 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 21.8 °C |
| **DATE:** | 08/12/2019 | **RELATIVE HUMIDITY:** | 35.8 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 5.926 S/m |
| **DUT CONFIGURATION:** | 802.11ac 80 MHz 29.3 Mbps - SISO Antenna WF2 | **RELATIVE PERMITTIVITY:** | 46.462 |
| **DUT POSITION:** | 0mm - Bottom | **LIQUID TEMPERATURE:** | 20.29 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 5610 MHz | **DRIFT:** | 0.02 dB |
| **MODULATION:** | MCS0 | **PEAK SAR:** | 2.26 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.58 W/kg |

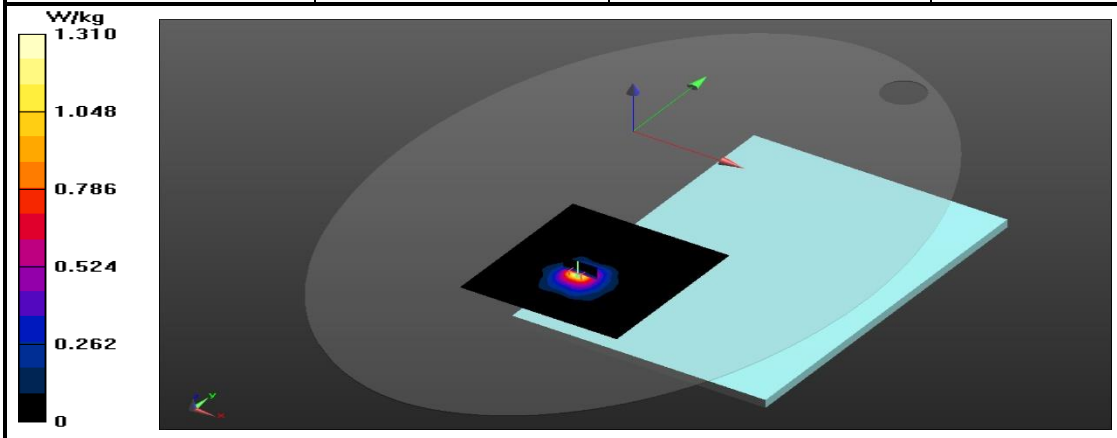



Figure 25: SAR Body Testing Results for the A2289 at 5610 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 21.8 °C |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 5.808 S/m |
| **DUT CONFIGURATION:** | 802.11ac 80 MHz 29.3 Mbps - SISO Antenna WF2 | **RELATIVE PERMITTIVITY:** | 46.614 |
| **DUT POSITION:** | 0mm - Bottom | **LIQUID TEMPERATURE:** | 20.29 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 5530 MHz | **DRIFT:** | -0.01 dB |
| **MODULATION:** | MCS0 | **PEAK SAR:** | 2.43 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.65 W/kg |

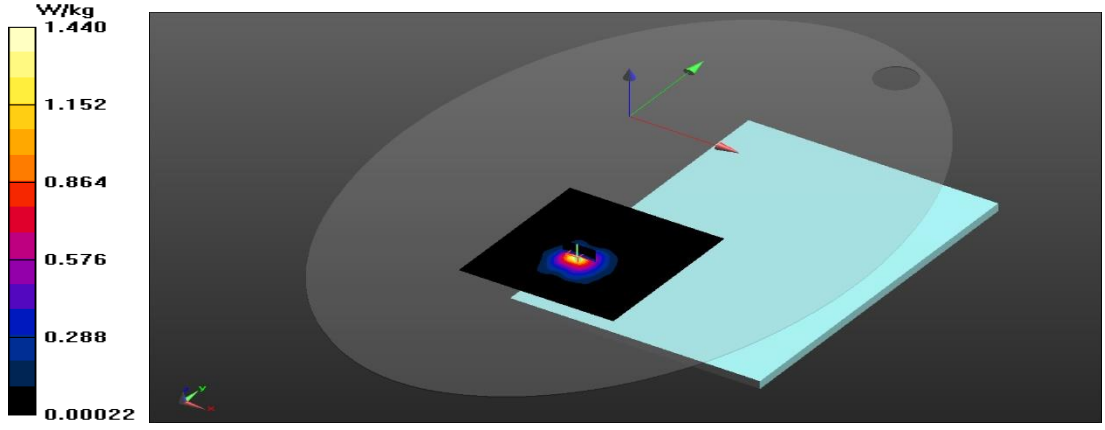



Figure 26: SAR Body Testing Results for the A2289 at 5530 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 20.4 °C |
| **DATE:** | 10/12/2019 | **RELATIVE HUMIDITY:** | 37.2 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 6.045 S/m |
| **DUT CONFIGURATION:** | 802.11ac 80 MHz 29.3 Mbps - MIMO Antenna WF1 & WF1 | **RELATIVE PERMITTIVITY:** | 46.314 |
| **DUT POSITION:** | 0mm - Bottom | **LIQUID TEMPERATURE:** | 21.2 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 5690 MHz | **DRIFT:** | -0.14 dB |
| **MODULATION:** | MCS0 | **PEAK SAR:** | 2.63 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.62 W/kg |

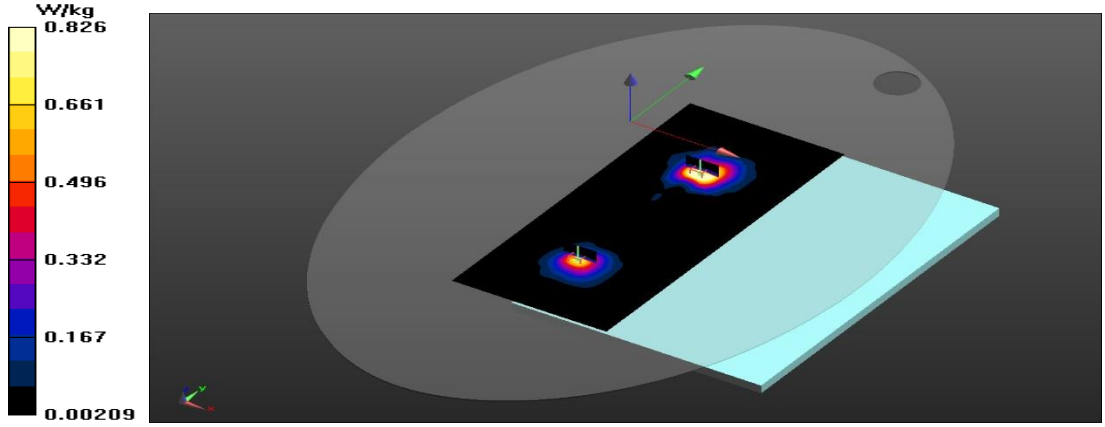



Figure 27: SAR Body Testing Results for the A2289 at 5690 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 20.4 °C |
| **DATE:** | 10/12/2019 | **RELATIVE HUMIDITY:** | 37.2 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 5.808 S/m |
| **DUT CONFIGURATION:** | 802.11ac 80 MHz 29.3 Mbps - MIMO Antenna WF1 & WF1 | **RELATIVE PERMITTIVITY:** | 46.614 |
| **DUT POSITION:** | 0mm - Bottom | **LIQUID TEMPERATURE:** | 21.2 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 5530 MHz | **DRIFT:** | -0.07 dB |
| **MODULATION:** | MCS0 | **PEAK SAR:** | 2.36 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.57 W/kg |

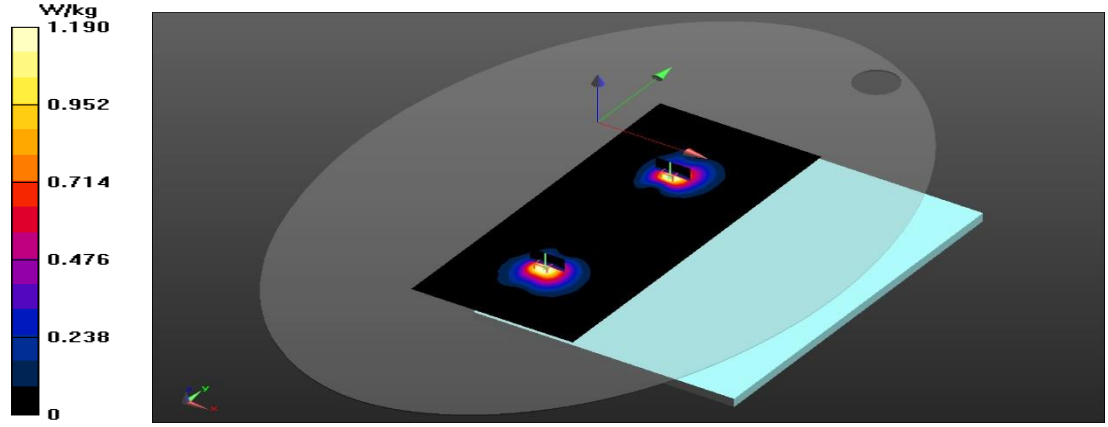



Figure 28: SAR Body Testing Results for the A2289 at 5530 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 20.4 °C |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 5.926 S/m |
| **DUT CONFIGURATION:** | 802.11ac 80 MHz 29.3 Mbps - MIMO Antenna WF1 & WF1 | **RELATIVE PERMITTIVITY:** | 46.462 |
| **DUT POSITION:** | 0mm - Bottom | **LIQUID TEMPERATURE:** | 21.2 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 5610 MHz | **DRIFT:** | -0.14 dB |
| **MODULATION:** | MCS0 | **PEAK SAR:** | 2.79 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.67 W/kg |

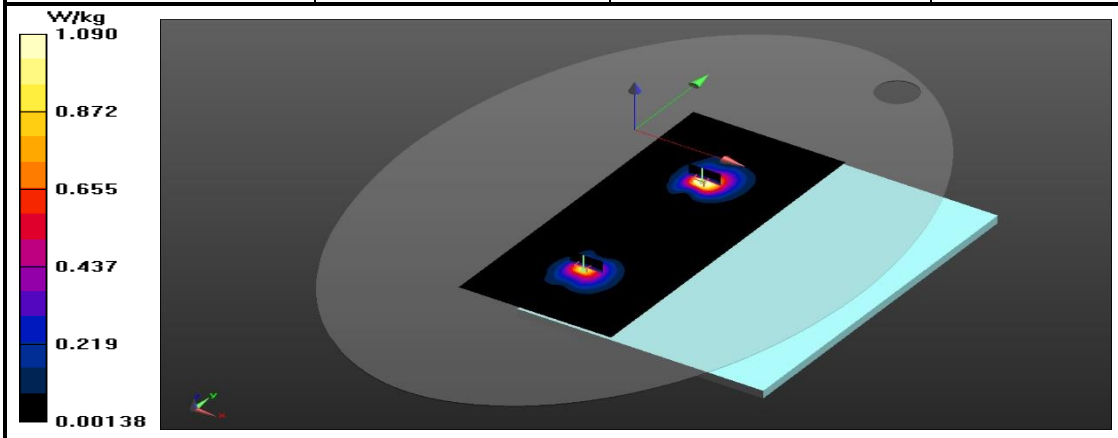



Figure 29: SAR Body Testing Results for the A2289 at 5530 MHz.

## 2.6 WLAN U-NII 3 BODY SAR TEST RESULTS

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 21.2 °C |
| **DATE:** | 10/12/2019 | **RELATIVE HUMIDITY:** | 37.2 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 6.175 S/m |
| **DUT CONFIGURATION:** | 802.11ac 80 MHz 29.3 Mbps - SISO Antenna WF1 | **RELATIVE PERMITTIVITY:** | 46.153 |
| **DUT POSITION:** | 0mm - Bottom | **LIQUID TEMPERATURE:** | 20.3 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 5775 MHz | **DRIFT:** | 0.13 dB |
| **MODULATION:** | MCS0 | **PEAK SAR:** | 4.02 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.90 W/kg |

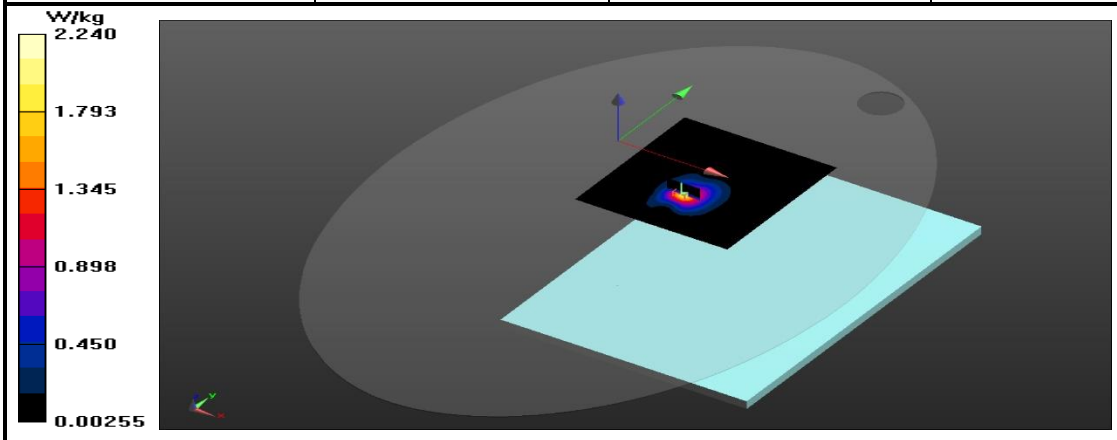



Figure 30: SAR Body Testing Results for the A2289 at 5775 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 21.2 °C |
| **DATE:** | 10/12/2019 | **RELATIVE HUMIDITY:** | 37.2 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 6.175 S/m |
| **DUT CONFIGURATION:** | 802.11ac 80 MHz 29.3 Mbps - SISO Antenna WF1 | **RELATIVE PERMITTIVITY:** | 46.153 |
| **DUT POSITION:** | 0mm - Rear of Display | **LIQUID TEMPERATURE:** | 20.3 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 5775 MHz | **DRIFT:** | -0.03 dB |
| **MODULATION:** | MCS0 | **PEAK SAR:** | 0.712 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.18 W/kg |

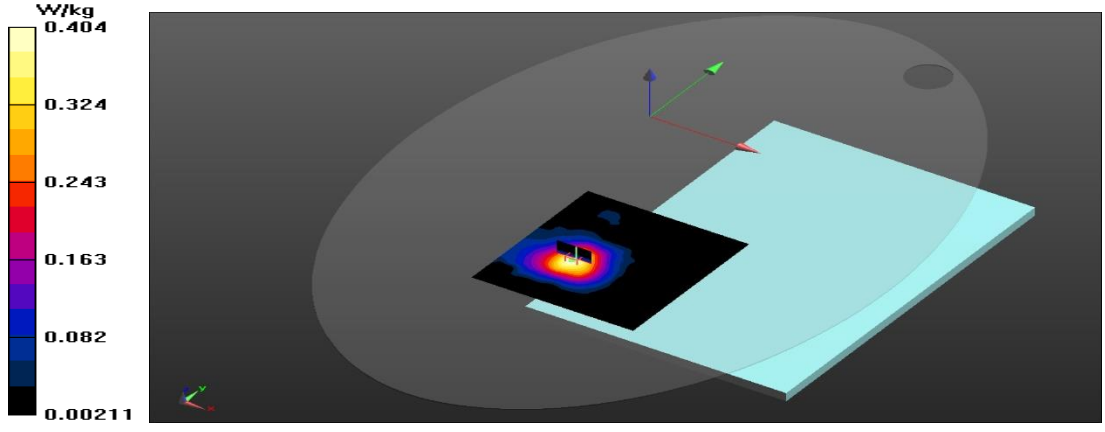



Figure 31: SAR Body Testing Results for the A2289 at 5775 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 21.2 °C |
| **DATE:** | 10/12/2019 | **RELATIVE HUMIDITY:** | 37.2 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 6.175 S/m |
| **DUT CONFIGURATION:** | 802.11ac 80 MHz 29.3 Mbps - SISO Antenna WF2 | **RELATIVE PERMITTIVITY:** | 46.153 |
| **DUT POSITION:** | 0mm - Bottom | **LIQUID TEMPERATURE:** | 20.3 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 5775 MHz | **DRIFT:** | -0.10 dB |
| **MODULATION:** | MCS0 | **PEAK SAR:** | 2.42 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.53 W/kg |

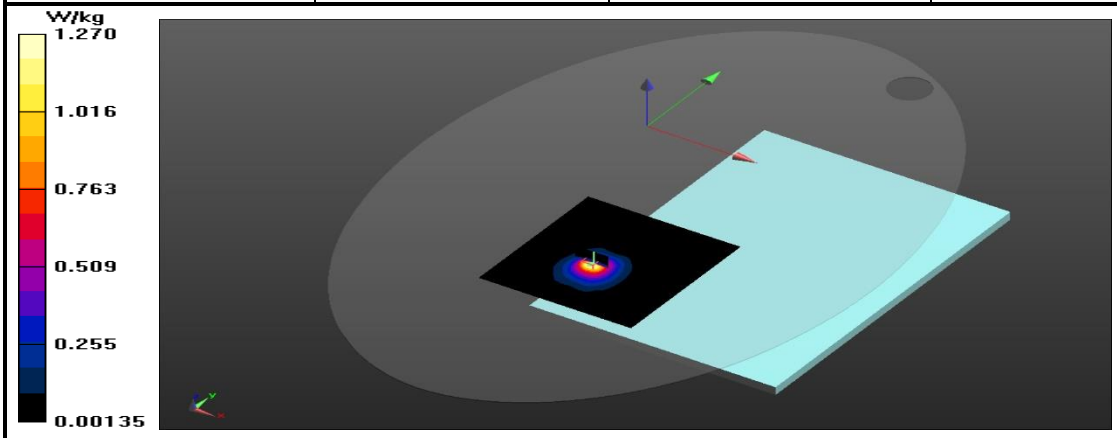



Figure 32: SAR Body Testing Results for the A2289 at 5775 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 21.2 °C |
| **DATE:** | 10/12/2019 | **RELATIVE HUMIDITY:** | 37.2 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 6.175 S/m |
| **DUT CONFIGURATION:** | 802.11ac 80 MHz 29.3 Mbps - SISO Antenna WF2 | **RELATIVE PERMITTIVITY:** | 46.153 |
| **DUT POSITION:** | 0mm - Rear of Display | **LIQUID TEMPERATURE:** | 20.3 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 5775 MHz | **DRIFT:** | -0.13 dB |
| **MODULATION:** | MCS0 | **PEAK SAR:** | 0.483 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.12 W/kg |

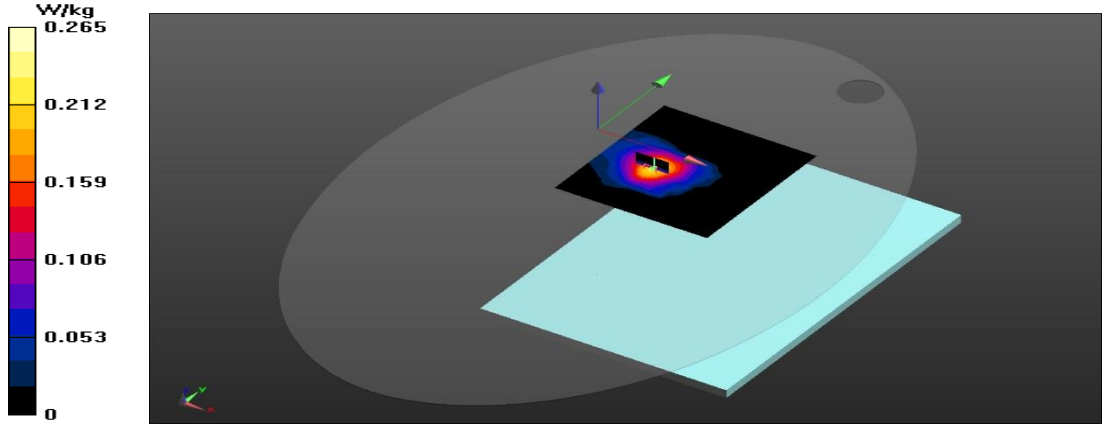



Figure 33: SAR Body Testing Results for the A2289 at 5775 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 20.4 °C |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 6.175 S/m |
| **DUT CONFIGURATION:** | 802.11ac 80 MHz 29.3 Mbps - MIMO Antenna WF1 & WF1 | **RELATIVE PERMITTIVITY:** | 46.153 |
| **DUT POSITION:** | 0mm - Bottom | **LIQUID TEMPERATURE:** | 21.2 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 5775 MHz | **DRIFT:** | -0.05 dB |
| **MODULATION:** | MCS0 | **PEAK SAR:** | 1.83 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.66 W/kg |

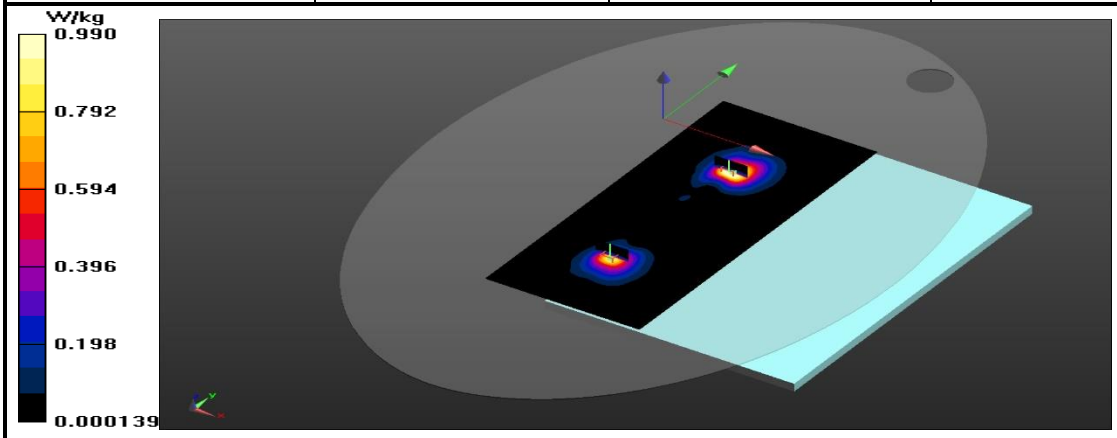



Figure 34: SAR Body Testing Results for the A2289 at 5775 MHz.

## 2.7 MEASUREMENT VARIABILITY TESTS

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 22.3 °C |
| **DATE:** | 10/12/2019 | **RELATIVE HUMIDITY:** | 38.3 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 1.975 S/m |
| **DUT CONFIGURATION:** | 802.1b 20 MHz 1 Mbps - SISO Antenna WF1 | **RELATIVE PERMITTIVITY:** | 52.249 |
| **DUT POSITION:** | 0mm - Bottom Edge | **LIQUID TEMPERATURE:** | 22.5 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 2462 MHz | **DRIFT:** | -0.15 dB |
| **MODULATION:** | 1 Mbps | **PEAK SAR:** | 2.53 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 1.00 W/kg |

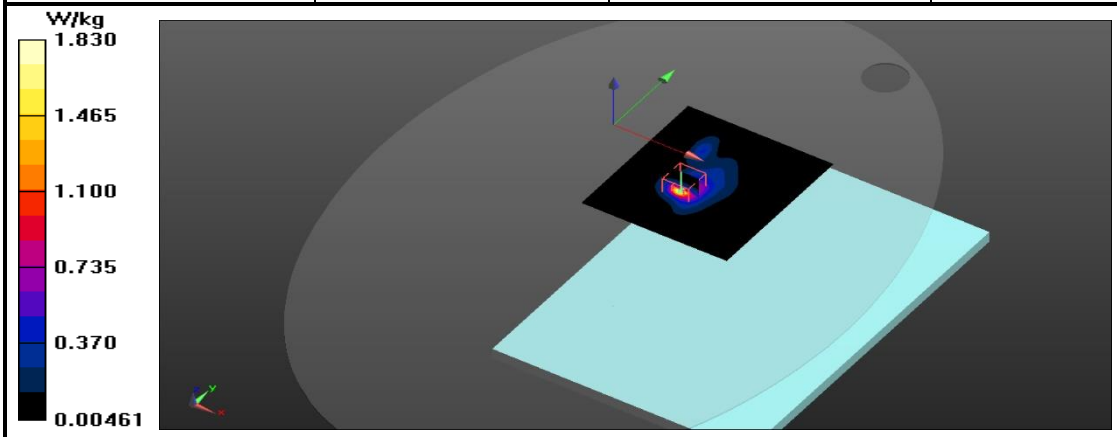



Figure 35: SAR Body Testing Results for the A2289 at 2462 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 22.0 °C |
| **DATE:** | 15/12/2019 | **RELATIVE HUMIDITY:** | 38.6 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 5.388 S/m |
| **DUT CONFIGURATION:** | 802.11ac 80 MHz 29.3 Mbps - SISO Antenna WF2 | **RELATIVE PERMITTIVITY:** | 46.911 |
| **DUT POSITION:** | 0mm - Bottom | **LIQUID TEMPERATURE:** | 21.6 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 5300 MHz | **DRIFT:** | -0.00 dB |
| **MODULATION:** | MCS0 | **PEAK SAR:** | 3.19 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 1.01 W/kg |

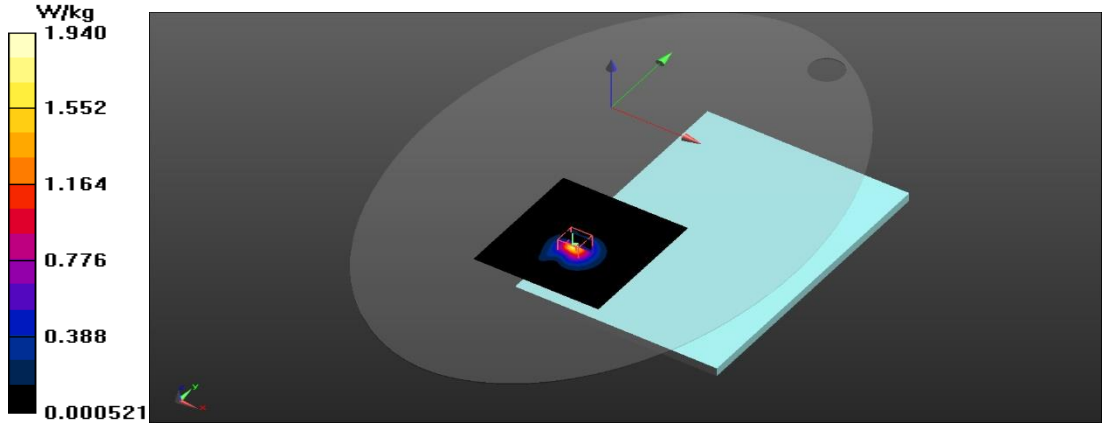



Figure 36: SAR Body Testing Results for the A2289 at 5300 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 22.0 °C |
| **DATE:** | 15/12/2019 | **RELATIVE HUMIDITY:** | 38.6 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 5.813 S/m |
| **DUT CONFIGURATION:** | 802.11ac 80 MHz 29.3 Mbps - SISO Antenna WF1 | **RELATIVE PERMITTIVITY:** | 46.326 |
| **DUT POSITION:** | 0mm - Bottom | **LIQUID TEMPERATURE:** | 21.6 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 5610 MHz | **DRIFT:** | -0.09 dB |
| **MODULATION:** | MCS0 | **PEAK SAR:** | 3.42 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.86 W/kg |

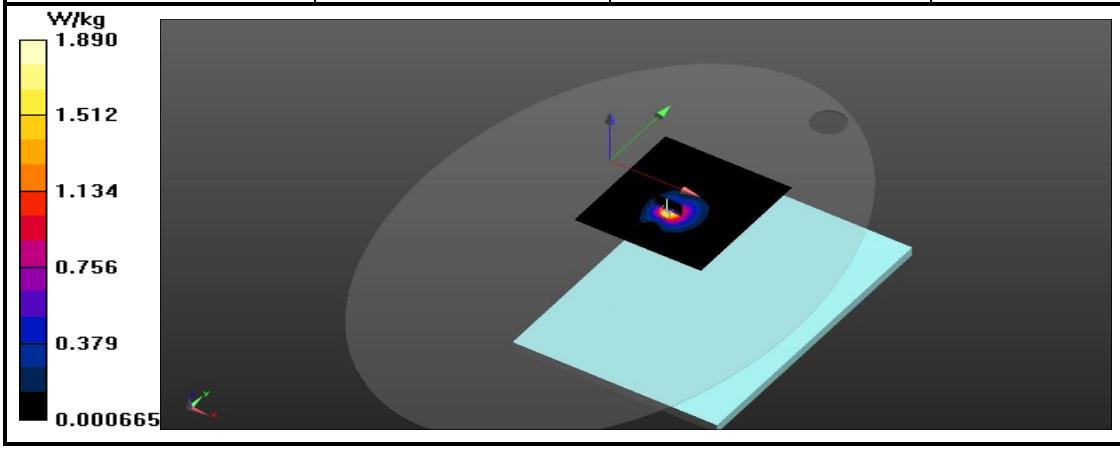



Figure 37: SAR Body Testing Results for the A2289 at 5610 MHz.

| | | | |
|---|---|---|---|
| **SOFTWARE VERSION:** | 52.10.2(1495) | **AMBIENT TEMPERATURE:** | 22.0 °C |
| **DATE:** | 15/12/2019 | **RELATIVE HUMIDITY:** | 38.6 % |
| **PHANTOM:** | QD OVA 004 Ax | **CONDUCTIVITY:** | 6.048 S/m |
| **DUT CONFIGURATION:** | 802.11ac 80 MHz 29.3 Mbps - SISO Antenna WF1 | **RELATIVE PERMITTIVITY:** | 46.041 |
| **DUT POSITION:** | 0mm - Bottom Edge | **LIQUID TEMPERATURE:** | 21.6 °C |
| **RAT:** | WLAN | **SCAN TYPE:** | Full |
| **FREQUENCY:** | 5775 MHz | **DRIFT:** | -0.08 dB |
| **MODULATION:** | MCS0 | **PEAK SAR:** | 3.93 W/kg |
| **DUTY CYCLE:** | 100 % | **SAR (1g):** | 0.91 W/kg |

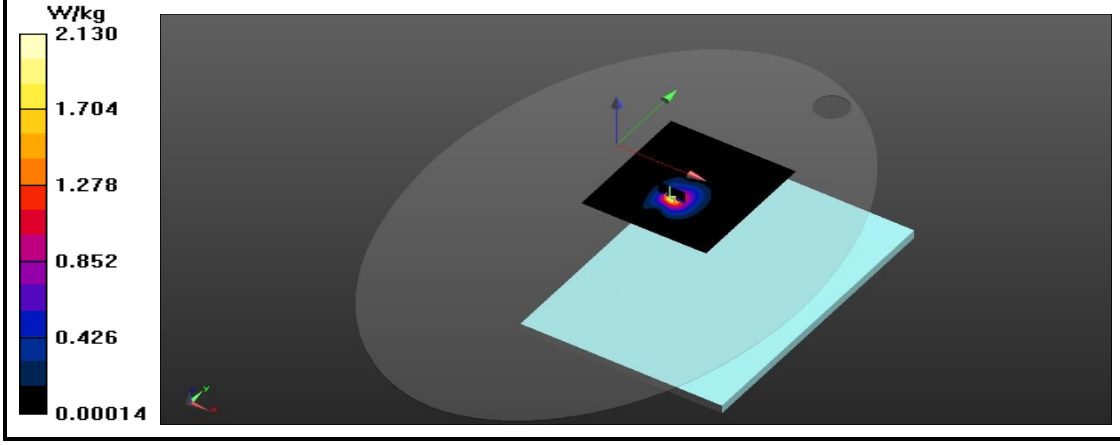



Figure 38: SAR Body Testing Results for the A2289 at 5775 MHz.

# 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 |
|---|---|---|---|---|---|
| Thermometer | Digitron | T208 | 64 | 12 | 12-Jun-2020 |
| Hygrometer | Rotronic | I-1000 | 3068 | 12 | 27-Jun-2020 |
| Power Meter | Rohde & Schwarz | NRP | 3491 | 12 | 11-Oct-2020 |
| Wideband Power Sensor, 50MHz - 18GHz | Rohde & Schwarz | NRP-Z81 | 3492 | 12 | 11-Oct-2020 |
| Attenuator (30dB, 25W) | Weinschel | 46-30-34 | 2776 | 12 | 23-Jul-2020 |
| Data Acquisition Electronics | Speag | DAE 4 - SD 000 D04 BN | 5327 | 12 | 07-Jun-2020 |
| Validation Dipole (5GHz) | Speag | D5GzV2 | 5328 | 12 | 07-Jun-2020 |
| Validation Dipole (2450MHz) | Speag | D2450V2 | 5329 | 12 | 07-Jun-2020 |
| Dosimetric SAR Probe | Speag | EX3DV4 | 5330 | 12 | 07-Jun-2020 |
| Body Phantom | Speag | Oval Flat Phantom ELI v8.0 | 5333 | - | TU |
| Device Holder | Speag | MD4HHTV5 | 5335 | - | TU |
| Measurement server | Speag | DASY 6 Measurement Server | 5337 | - | TU |
| Robot | Staubli | TX90 XLRobot | 5340 | - | TU |
| RF power source | Speag | POWERSOURCE1-SE UMS 160 BA | 5371 | 12 | 12-Sept-2020 |
| MBBL Fluid | Speag | Batch 3 | N/A | Weekly | 27-Jan-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 | 52.27 | 1.95 | 1.96 | 05-12-19 | 22.0 |
| MBBL @ 5200 MHz | 49.01 | 47.29 | 5.30 | 5.33 | 05-12-19 | 22.0 |
| MBBL @ 5300 MHz | 48.88 | 47.02 | 5.41 | 5.52 | 05-12-19 | 22.0 |
| MBBL @ 5500 MHz | 48.61 | 47.67 | 5.65 | 5.76 | 05-12-19 | 22.0 |
| MBBL @ 5600 MHz | 48.47 | 46.48 | 5.77 | 5.91 | 05-12-19 | 22.0 |
| MBBL @ 5800 MHz | 48.20 | 46.10 | 6.00 | 6.21 | 05-12-19 | 22.0 |
| MBBL @ 2450 MHz | 52.70 | 52.08 | 1.95 | 2.03 | 12-12-19 | 20.1 |
| MBBL @ 5200 MHz | 49.01 | 47.11 | 5.30 | 5.25 | 12-12-19 | 20.1 |
| MBBL @ 5300 MHz | 48.88 | 46.91 | 5.41 | 5.39 | 12-12-19 | 20.1 |
| MBBL @ 5500 MHz | 48.61 | 46.52 | 5.65 | 5.66 | 12-12-19 | 20.1 |
| MBBL @ 5600 MHz | 48.47 | 46.34 | 5.77 | 5.80 | 12-12-19 | 20.1 |
| MBBL @ 5800 MHz | 48.20 | 45.99 | 6.00 | 6.08 | 12-12-19 | 20.1 |
| MBBL @ 2450 MHz | 52.70 | 53.06 | 1.95 | 2.10 | 09-01-20 | 22.4 |
| MBBL @ 5200 MHz | 49.01 | 48.05 | 5.30 | 5.19 | 09-01-20 | 22.4 |
| MBBL @ 5300 MHz | 48.88 | 47.85 | 5.41 | 5.33 | 09-01-20 | 22.4 |
| MBBL @ 5500 MHz | 48.61 | 47.46 | 5.65 | 5.60 | 09-01-20 | 22.4 |
| MBBL @ 5600 MHz | 48.47 | 47.27 | 5.77 | 5.74 | 09-01-20 | 22.4 |
| MBBL @ 5800 MHz | 48.20 | 46.91 | 6.00 | 6.00 | 09-01-20 | 22.4 |
| MBBL @ 2450 MHz | 52.70 | 53.08 | 1.95 | 2.04 | 23-01-20 | 21.0 |
| MBBL @ 5200 MHz | 49.01 | 48.07 | 5.30 | 5.43 | 23-01-20 | 21.0 |
| MBBL @ 5300 MHz | 48.88 | 47.86 | 5.41 | 5.57 | 23-01-20 | 21.0 |
| MBBL @ 5500 MHz | 48.61 | 47.45 | 5.65 | 5.86 | 23-01-20 | 21.0 |
| MBBL @ 5600 MHz | 48.47 | 47.26 | 5.77 | 6.01 | 23-01-20 | 21.0 |
| MBBL @ 5800 MHz | 48.20 | 46.88 | 6.00 | 6.31 | 23-01-20 | 21.0 |

## 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 20.4°C to 23.2°C.
The actual humidity during the testing ranged from 35.8% to 46.2% RH.

### 3.4.2 Test Fluid Temperature Range

| Frequency | Fluid Type | Min Temperature °C | Max Temperature °C |
|---|---|---|---|
| 2402 - 2480 MHz | MBBL | 20.3 | 21.6 |
| 5180 - 5320 MHz | MBBL | 22.3 | 22.3 |
| 5500 - 5720 MHz | MBBL | 20.3 | 21.6 |
| 5745 - 5825 MHz | MBBL | 20.3 | 21.6 |

### 3.4.3 SAR Drift

The SAR Drift was within acceptable limits during scans. The maximum SAR Drift was recorded as 0.18 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 | |
| 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 | |
| Response time | 0.8 | R | 1.73 | 0.00 | 0.0 | |
| 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 | |
| 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 | |
| Liquid conductivity Meas. | 2.5 | R | 1.73 | 0.00 | 0.0 | |
| Liquid Permittivity Meas. | 2.5 | R | 1.73 | 0.00 | 0.0 | |
| Temp. Unc. Conductivity | 3.4 | R | 1.73 | 0.00 | 0.0 | |
| Temp. Unc. Permittivity | 0.4 | R | 1.73 | 0.00 | 0.0 | |
| **Combined Standard Uncertainty** | | **RSS** | | | 12.2 | |
| **Expanded Standard Uncertainty** | | **K=2** | | | 24.5 | |

## SECTION 5

## 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).

# 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
S Servizio svizzero di taratura
Swiss Calibration Service

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

**Accreditation No.: SCS 0108**

**Client** TüV SüD UK

**Certificate No: EX3-7536_Jun19**

# CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:7536

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

Calibration date: June 7, 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 | 19-Dec-18 (No. DAE4-660_Dec18) | Dec-19 |
| 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-18) | In house check: Oct-19 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Jeton Kastrati | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: June 12, 2019

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

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

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

**Accreditation No.: SCS 0108**

## 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).

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:7536

## Basic Calibration Parameters

| | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|---|---|---|---|---|
| Norm ($\mu V/(V/m)^2$)[A] | 0.55 | 0.61 | 0.65 | ± 10.1 % |
| DCP (mV)[B] | 95.4 | 98.2 | 102.0 | |

## 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 | 172.6 | ±3.5 % | ± 4.7 % |
| | | Y | 0.00 | 0.00 | 1.00 | | 188.0 | | |
| | | Z | 0.00 | 0.00 | 1.00 | | 193.1 | | |
| 10352-AAA | Pulse Waveform (200Hz, 10%) | X | 15.00 | 89.69 | 20.89 | 10.00 | 60.0 | ± 3.9 % | ± 9.6 % |
| | | Y | 15.00 | 88.32 | 19.87 | | 60.0 | | |
| | | Z | 15.00 | 89.29 | 20.40 | | 60.0 | | |
| 10353-AAA | Pulse Waveform (200Hz, 20%) | X | 15.00 | 92.02 | 21.04 | 6.99 | 80.0 | ± 2.2 % | ± 9.6 % |
| | | Y | 15.00 | 90.27 | 19.63 | | 80.0 | | |
| | | Z | 15.00 | 91.91 | 20.79 | | 80.0 | | |
| 10354-AAA | Pulse Waveform (200Hz, 40%) | X | 15.00 | 97.33 | 22.29 | 3.98 | 95.0 | ± 1.1 % | ± 9.6 % |
| | | Y | 15.00 | 94.70 | 20.25 | | 95.0 | | |
| | | Z | 15.00 | 96.95 | 21.96 | | 95.0 | | |
| 10355-AAA | Pulse Waveform (200Hz, 60%) | X | 15.00 | 105.37 | 24.66 | 2.22 | 120.0 | ± 1.1 % | ± 9.6 % |
| | | Y | 15.00 | 94.51 | 18.63 | | 120.0 | | |
| | | Z | 15.00 | 103.12 | 23.50 | | 120.0 | | |
| 10387-AAA | QPSK Waveform, 1 MHz | X | 1.00 | 65.46 | 12.05 | 0.00 | 150.0 | ± 2.5 % | ± 9.6 % |
| | | Y | 0.59 | 60.00 | 7.77 | | 150.0 | | |
| | | Z | 0.79 | 62.56 | 10.15 | | 150.0 | | |
| 10388-AAA | QPSK Waveform, 10 MHz | X | 2.56 | 70.23 | 16.97 | 0.00 | 150.0 | ± 1.2 % | ± 9.6 % |
| | | Y | 2.01 | 66.26 | 14.66 | | 150.0 | | |
| | | Z | 2.31 | 68.43 | 15.94 | | 150.0 | | |
| 10396-AAA | 64-QAM Waveform, 100 kHz | X | 3.26 | 71.76 | 19.45 | 3.01 | 150.0 | ± 1.3 % | ± 9.6 % |
| | | Y | 2.54 | 67.60 | 17.57 | | 150.0 | | |
| | | Z | 3.42 | 72.97 | 19.95 | | 150.0 | | |
| 10399-AAA | 64-QAM Waveform, 40 MHz | X | 3.70 | 68.00 | 16.39 | 0.00 | 150.0 | ± 2.0 % | ± 9.6 % |
| | | Y | 3.37 | 66.26 | 15.26 | | 150.0 | | |
| | | Z | 3.57 | 67.31 | 15.90 | | 150.0 | | |
| 10414-AAA | WLAN CCDF, 64-QAM, 40MHz | X | 5.06 | 66.10 | 15.93 | 0.00 | 150.0 | ± 4.0 % | ± 9.6 % |
| | | Y | 4.77 | 65.17 | 15.29 | | 150.0 | | |
| | | Z | 4.94 | 65.75 | 15.63 | | 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:7536

## 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 | 53.2 | 403.81 | 36.76 | 16.78 | 0.22 | 5.10 | 0.79 | 0.43 | 1.01 |
| Y | 45.6 | 350.95 | 37.32 | 11.58 | 0.16 | 5.10 | 0.00 | 0.45 | 1.01 |
| Z | 49.8 | 374.34 | 35.95 | 16.56 | 0.05 | 5.10 | 1.65 | 0.25 | 1.01 |

## Other Probe Parameters

| | |
|---|---|
| Sensor Arrangement | Triangular |
| Connector Angle (°) | 74.1 |
| 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:7536

## 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) |
|---|---|---|---|---|---|---|---|---|
| 2450 | 39.2 | 1.80 | 7.98 | 7.98 | 7.98 | 0.34 | 0.86 | ± 12.0 % |
| 5200 | 36.0 | 4.66 | 5.56 | 5.56 | 5.56 | 0.40 | 1.80 | ± 13.1 % |
| 5300 | 35.9 | 4.76 | 5.41 | 5.41 | 5.41 | 0.40 | 1.80 | ± 13.1 % |
| 5500 | 35.6 | 4.96 | 4.95 | 4.95 | 4.95 | 0.40 | 1.80 | ± 13.1 % |
| 5600 | 35.5 | 5.07 | 4.80 | 4.80 | 4.80 | 0.40 | 1.80 | ± 13.1 % |
| 5800 | 35.3 | 5.27 | 4.90 | 4.90 | 4.90 | 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.

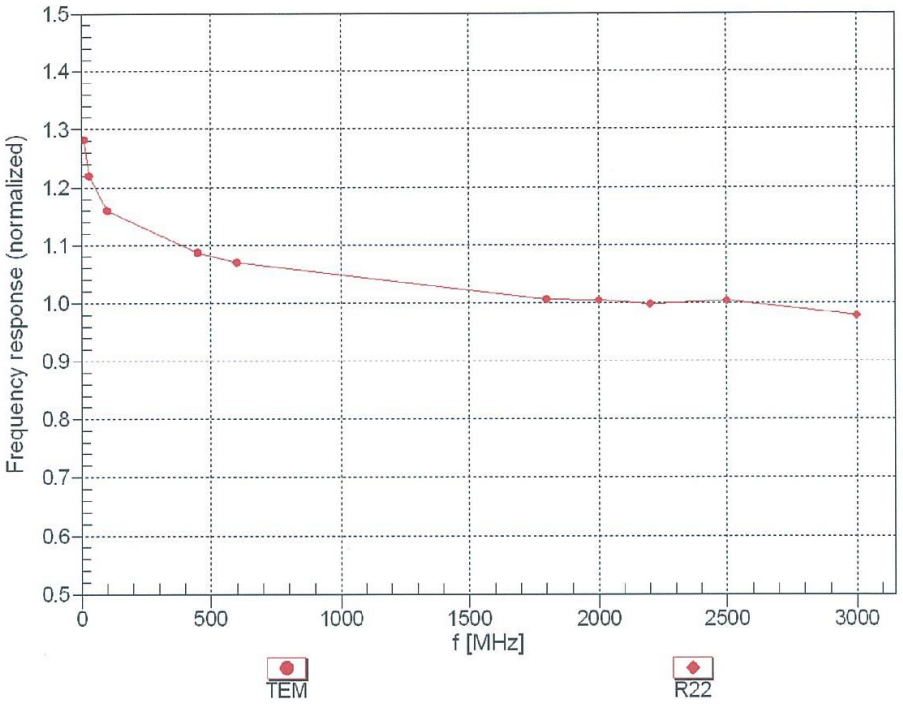
# DASY/EASY - Parameters of Probe: EX3DV4 - SN:7536

## 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) |
|---|---|---|---|---|---|---|---|---|
| 2450 | 52.7 | 1.95 | 7.89 | 7.89 | 7.89 | 0.36 | 0.87 | ± 12.0 % |
| 5200 | 49.0 | 5.30 | 5.02 | 5.02 | 5.02 | 0.50 | 1.90 | ± 13.1 % |
| 5300 | 48.9 | 5.42 | 4.83 | 4.83 | 4.83 | 0.50 | 1.90 | ± 13.1 % |
| 5500 | 48.6 | 5.65 | 4.64 | 4.64 | 4.64 | 0.50 | 1.90 | ± 13.1 % |
| 5600 | 48.5 | 5.77 | 4.47 | 4.47 | 4.47 | 0.50 | 1.90 | ± 13.1 % |
| 5800 | 48.2 | 6.00 | 4.40 | 4.40 | 4.40 | 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.

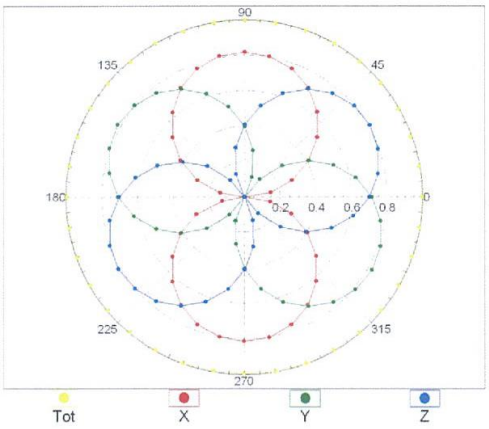
# Frequency Response of E-Field
**(TEM-Cell:ifi110 EXX, Waveguide: R22)**



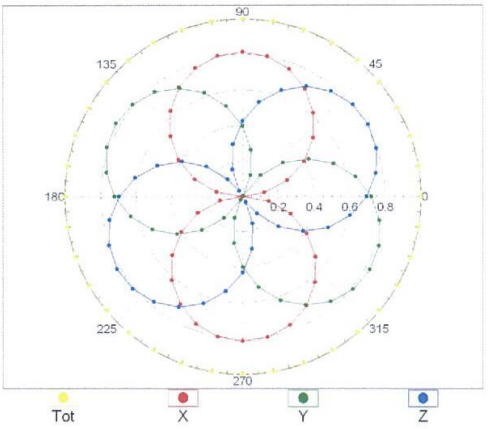

**Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)**

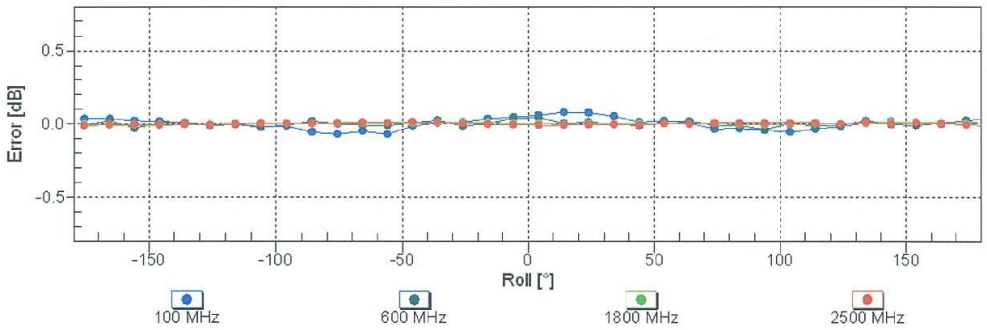
# Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



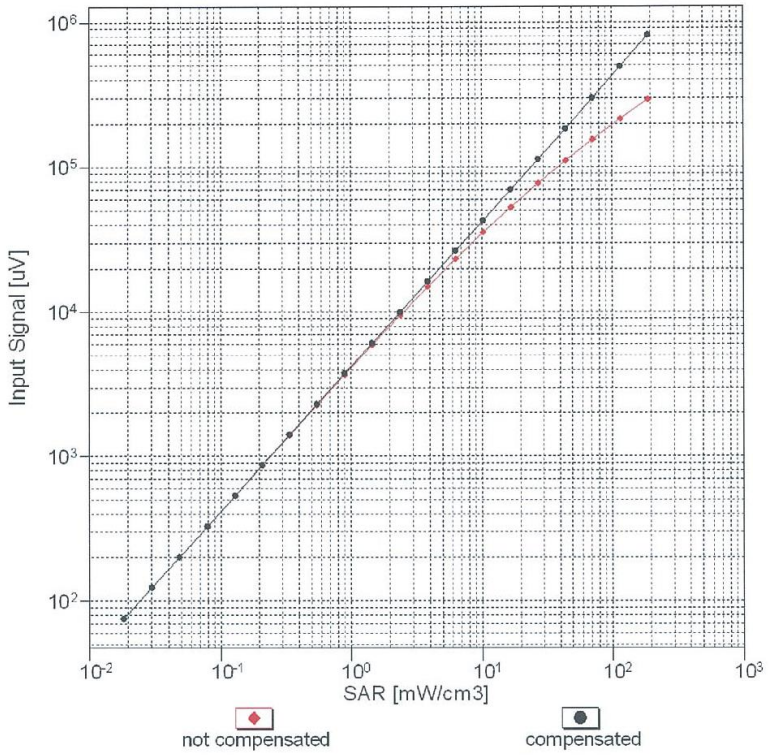

f=1800 MHz,R22

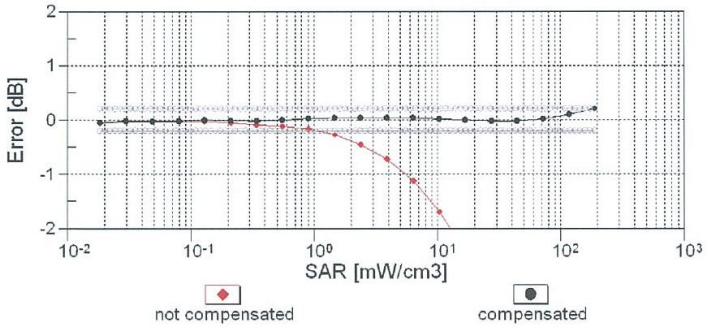



**Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)**

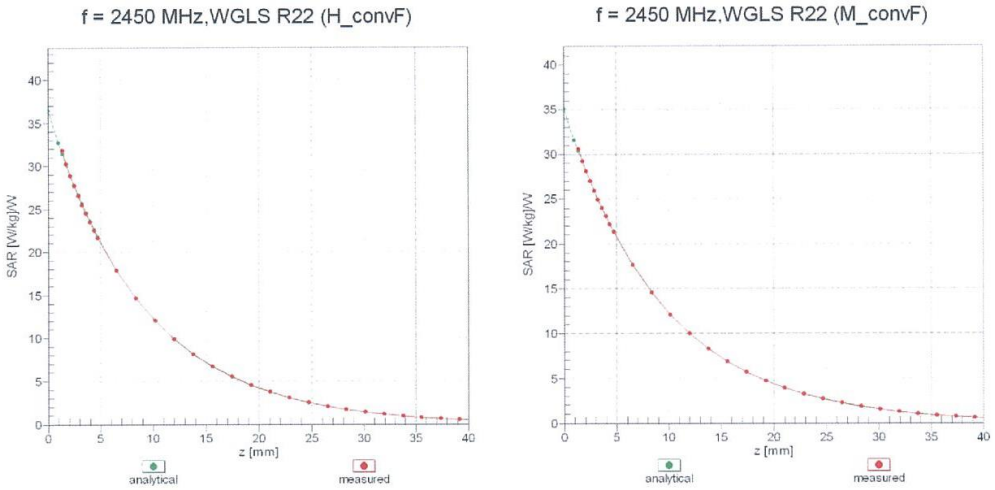
# Dynamic Range f(SAR$_{head}$)
**(TEM cell , $f_{eval}$= 1900 MHz)**



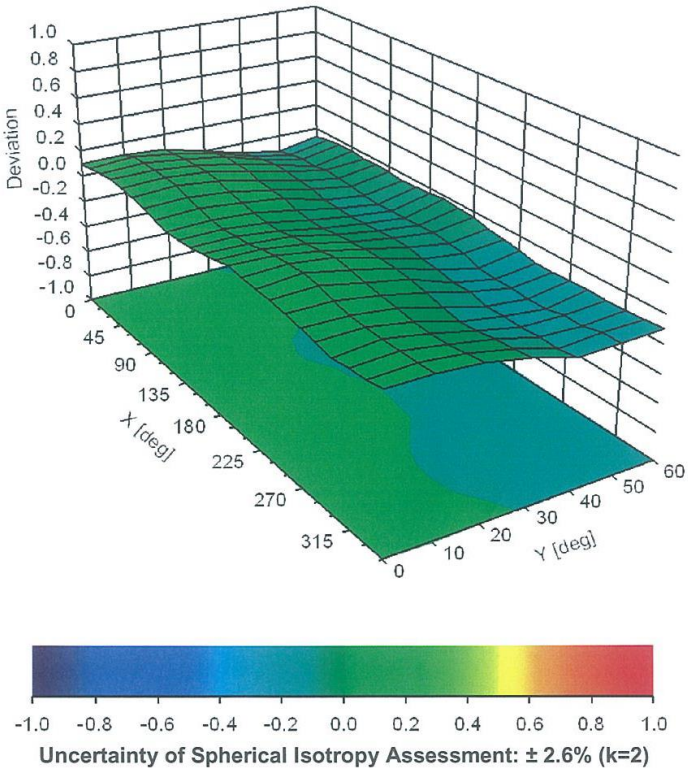

**Uncertainty of Linearity Assessment: ± 0.6% (k=2)**

# Conversion Factor Assessment




# Deviation from Isotropy in Liquid

**Error (ϕ, ϑ), f = 900 MHz**




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

## Appendix: Modulation Calibration Parameters

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

| | | | | | |
|---|---|---|---|---|---|
| 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 | CAA | LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM) | LTE-TDD | 9.49 | ± 9.6 % |
| 10227 | CAA | LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM) | LTE-TDD | 10.26 | ± 9.6 % |
| 10228 | CAA | LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK) | LTE-TDD | 9.22 | ± 9.6 % |
| 10229 | CAC | LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM) | LTE-TDD | 9.48 | ± 9.6 % |
| 10230 | CAC | LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM) | LTE-TDD | 10.25 | ± 9.6 % |
| 10231 | CAC | LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK) | LTE-TDD | 9.19 | ± 9.6 % |
| 10232 | CAF | LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM) | LTE-TDD | 9.48 | ± 9.6 % |
| 10233 | CAF | LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM) | LTE-TDD | 10.25 | ± 9.6 % |
| 10234 | CAF | LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK) | LTE-TDD | 9.21 | ± 9.6 % |
| 10235 | CAF | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM) | LTE-TDD | 9.48 | ± 9.6 % |
| 10236 | CAF | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM) | LTE-TDD | 10.25 | ± 9.6 % |
| 10237 | CAF | 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 | CAA | LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM) | LTE-TDD | 9.82 | ± 9.6 % |
| 10242 | CAA | LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM) | LTE-TDD | 9.86 | ± 9.6 % |
| 10243 | CAA | LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK) | LTE-TDD | 9.46 | ± 9.6 % |
| 10244 | CAC | LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM) | LTE-TDD | 10.06 | ± 9.6 % |
| 10245 | CAC | LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM) | LTE-TDD | 10.06 | ± 9.6 % |
| 10246 | CAC | LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK) | LTE-TDD | 9.30 | ± 9.6 % |
| 10247 | CAF | LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM) | LTE-TDD | 9.91 | ± 9.6 % |
| 10248 | CAF | LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM) | LTE-TDD | 10.09 | ± 9.6 % |
| 10249 | CAF | LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK) | LTE-TDD | 9.29 | ± 9.6 % |
| 10250 | CAF | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM) | LTE-TDD | 9.81 | ± 9.6 % |
| 10251 | CAF | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM) | LTE-TDD | 10.17 | ± 9.6 % |
| 10252 | CAF | 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 | CAA | LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM) | LTE-TDD | 9.96 | ± 9.6 % |
| 10257 | CAA | LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM) | LTE-TDD | 10.08 | ± 9.6 % |
| 10258 | CAA | LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK) | LTE-TDD | 9.34 | ± 9.6 % |
| 10259 | CAC | LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM) | LTE-TDD | 9.98 | ± 9.6 % |
| 10260 | CAC | LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM) | LTE-TDD | 9.97 | ± 9.6 % |
| 10261 | CAC | LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK) | LTE-TDD | 9.24 | ± 9.6 % |
| 10262 | CAF | LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM) | LTE-TDD | 9.83 | ± 9.6 % |
| 10263 | CAF | LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM) | LTE-TDD | 10.16 | ± 9.6 % |
| 10264 | CAF | LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK) | LTE-TDD | 9.23 | ± 9.6 % |
| 10265 | CAF | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM) | LTE-TDD | 9.92 | ± 9.6 % |
| 10266 | CAF | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM) | LTE-TDD | 10.07 | ± 9.6 % |
| 10267 | CAF | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK) | LTE-TDD | 9.30 | ± 9.6 % |
| 10268 | CAF | LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM) | LTE-TDD | 10.06 | ± 9.6 % |
| 10269 | CAF | LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM) | LTE-TDD | 10.13 | ± 9.6 % |
| 10270 | CAF | LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK) | LTE-TDD | 9.58 | ± 9.6 % |
| 10274 | CAB | UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10) | WCDMA | 4.87 | ± 9.6 % |
| 10275 | CAB | UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4) | WCDMA | 3.96 | ± 9.6 % |
| 10277 | CAA | PHS (QPSK) | PHS | 11.81 | ± 9.6 % |
| 10278 | CAA | PHS (QPSK, BW 884MHz, Rolloff 0.5) | PHS | 11.81 | ± 9.6 % |
| 10279 | CAA | PHS (QPSK, BW 884MHz, Rolloff 0.38) | PHS | 12.18 | ± 9.6 % |
| 10290 | AAB | CDMA2000, RC1, SO55, Full Rate | CDMA2000 | 3.91 | ± 9.6 % |
| 10291 | AAB | CDMA2000, RC3, SO55, Full Rate | CDMA2000 | 3.46 | ± 9.6 % |
| 10292 | AAB | CDMA2000, RC3, SO32, Full Rate | CDMA2000 | 3.39 | ± 9.6 % |
| 10293 | AAB | CDMA2000, RC3, SO3, Full Rate | CDMA2000 | 3.50 | ± 9.6 % |
| 10295 | AAB | CDMA2000, RC1, SO3, 1/8th Rate 25 fr. | CDMA2000 | 12.49 | ± 9.6 % |
| 10297 | AAD | LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK) | LTE-FDD | 5.81 | ± 9.6 % |
| 10298 | AAD | LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK) | LTE-FDD | 5.72 | ± 9.6 % |
| 10299 | AAD | LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM) | LTE-FDD | 6.39 | ± 9.6 % |

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|---|---|---|---|---|---|
| 10300 | AAD | LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM) | LTE-FDD | 6.60 | ± 9.6 % |
| 10301 | AAA | IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC) | WiMAX | 12.03 | ± 9.6 % |
| 10302 | AAA | IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC, 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 | AAF | 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 % |

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|---|---|---|---|---|---|
| 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 | AAA | 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 | AAA | 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 | AAA | 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 | AAB | LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.82 | ± 9.6 % |
| 10465 | AAB | 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 | AAB | 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 | AAE | LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.82 | ± 9.6 % |
| 10468 | AAE | 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 | AAE | 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 | AAE | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.82 | ± 9.6 % |
| 10471 | AAE | 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 | AAE | 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 | AAA | 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 | AAA | 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 | AAA | 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 | AAB | LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.71 | ± 9.6 % |
| 10483 | AAB | 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 | AAB | 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 | AAE | LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.59 | ± 9.6 % |
| 10486 | AAE | 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 | AAE | 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 | AAE | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.70 | ± 9.6 % |
| 10489 | AAE | 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 | AAE | 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 % |

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| 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 | AAA | 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 | AAA | 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 | AAA | 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 | AAB | LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.67 | ± 9.6 % |
| 10501 | AAB | 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 | AAB | 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 | AAE | LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.72 | ± 9.6 % |
| 10504 | AAE | 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 | AAE | 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 | AAE | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 7.74 | ± 9.6 % |
| 10507 | AAE | 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 | AAE | 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 % |

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|---|---|---|---|---|---|
| 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 % |

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|---|---|---|---|---|---|
| 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 | AAF | 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 | AAD | LTE-TDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%) | LTE-TDD | 6.91 | ± 9.6 % |
| 10653 | AAD | 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 % |