# SAR TEST REPORT

Testing Laboratory 3702

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

| | |
|---|---|
| **Product Name** | Notebook Computer |
| **Brand Name** | acer |
| **Model No.** | N20Q13 |
| **Prepared for** | Acer Incorporated<br>8F., No. 88, Sec. 1, Xintai 5th Rd., Xizhi, New Taipei City 22181, Taiwan (R.O.C) |
| **Standards** | IEEE/ANSI C95.1-1992, IEEE 1528-2013 |
| **FCC ID** | HLZAX201D2 |
| **Date of Receipt** | May 05, 2021 |
| **Date of Test(s)** | Jun. 09, 2021 ~ Jun. 11, 2021 |
| **Date of Issue** | Jun. 15, 2021 |

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

**Remarks:**

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

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

**Signed on behalf of SGS**

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

**Date: Jun. 15, 2021**



SGS Taiwan Ltd. | No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 | t (886-2) 2299-3279 f (886-2) 2298-0488 www.sgs.com.tw
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# Revision History

| Report Number | Revision | Description | Issue Date |
|---|---|---|---|
| E5/2021/50001 | Rev.00 | Initial creation of document | Jun. 15, 2021 |
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# 0. Guidance applied

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

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

## Contents

# 1. General Information

## 1.1 Testing Laboratory

| | |
|---|---|
| SGS Taiwan Ltd. Central RF Lab | |
| No. 2, Keji 1st Rd., Guishan Township, Taoyuan County, 33383, Taiwan | |
| FCC Designation Number | TW0028 |
| Tel | +886-2-2299-3279 |
| Fax | +886-2-2298-0488 |
| Internet | http://www.tw.sgs.com/ |

## 1.2 Details of Applicant

| | |
|---|---|
| Company Name | Acer Incorporated |
| Company Address | 8F., No. 88, Sec. 1, Xintai 5th Rd., Xizhi, New Taipei City 22181, Taiwan (R.O.C) |

## 1.3 Description of EUT

General Information of Host:

| | | |
|---|---|---|
| Equipment Under Test | Notebook Computer | |
| Brand Name | acer | |
| Model No. | N20Q13 | |
| FCC ID | HLZAX201D2 | |
| Mode of Operation | ☒WLAN802.11 a/b/g/n/ac/ax(20M/40M/80M/160M)<br>☒Bluetooth | |
| Duty Cycle | WLAN802.11 a/b/g/n/ac/ax(20M/40M/80/160M) | Refer to page 21-24 |
| | Bluetooth | 76.8% |
| TX Frequency Range (MHz) | WLAN802.11 b/g/n/ax(20M) | 2412 — 2462 |
| | WLAN802.11 n/ax(40M) | 2422 — 2452 |
| | WLAN802.11 a/n/ac/ax(20M) 5.2G | 5180 — 5240 |
| | WLAN802.11 n/ac/ax(40M) 5.2G | 5190 — 5230 |
| | WLAN802.11 ac/ax(80M) 5.2G | 5210 |
| | WLAN802.11 ac/ax(160M) 5.2G | 5250 |
| | WLAN802.11 a/n/ac/ax(20M) 5.3G | 5260 — 5320 |
| | WLAN802.11 n/ac/ax(40M) 5.3G | 5270 — 5310 |
| | WLAN802.11 ac/ax(80M) 5.3G | 5290 |
| | WLAN802.11 a/n/ac/ax(20M) 5.6G | 5500 — 5720 |
| | WLAN802.11 n/ac/ax(40M) 5.6G | 5510 — 5710 |
| | WLAN802.11 ac/ax(80M) 5.6G | 5530 — 5690 |
| | WLAN802.11 ac/ax(160M) 5.6G | 5570 |


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| | | |
|---|---|---|
| TX Frequency Range (MHz) | WLAN802.11 a/n/ac/ax(20M) 5.8G | 5745 — 5825 |
| | WLAN802.11 n/ac/ax(40M) 5.8G | 5755 — 5795 |
| | WLAN802.11 ac/ax(80M) 5.8G | 5775 |
| | Bluetooth | 2402 — 2480 |
| Channel Number (ARFCN) | WLAN802.11 b/g/n/ax(20M) | 1 — 11 |
| | WLAN802.11 n/ax(40M) | 3 — 9 |
| | WLAN802.11 a/n/ac/ax(20M) 5.2G | 36 — 48 |
| | WLAN802.11 n/ac/ax(40M) 5.2G | 38 — 46 |
| | WLAN802.11 ac/ax(80M) 5.2G | 42 |
| | WLAN802.11 ac/ax(160M) 5.2G | 50 |
| | WLAN802.11 a/n/ac/ax(20M) 5.3G | 52 — 64 |
| | WLAN802.11 n/ac/ax(40M) 5.3G | 54 — 62 |
| | WLAN802.11 ac/ax(80M) 5.3G | 58 |
| | WLAN802.11 a/n/ac/ax(20M) 5.6G | 100 — 144 |
| | WLAN802.11 n/ac/ax(40M) 5.6G | 102 — 142 |
| | WLAN802.11 ac/ax(80M) 5.6G | 106 — 138 |
| | WLAN802.11 ac/ax(160M) 5.6G | 114 |
| | WLAN802.11 a/n/ac/ax(20M) 5.8G | 149 — 165 |
| | WLAN802.11 n/ac/ax(40M) 5.8G | 151 — 159 |
| | WLAN802.11 ac/ax(80M) 5.8G | 155 |
| | Bluetooth | 0 — 78 |

| Max. SAR (1g) (Unit: W/Kg) | | | | | |
|---|---|---|---|---|---|
| Antenna | Band | Measured | Reported | Channel | Position |
| Main | WLAN 802.11b | 1.03 | 1.04 | 6 | Bottom surface |
| | WLAN 802.11ac(80M) 5.2G | 0.69 | 0.70 | 42 | Bottom surface |
| | WLAN 802.11ac(80M) 5.3G | 0.56 | 0.57 | 58 | Bottom surface |
| | WLAN 802.11ac(80M) 5.6G | 0.53 | 0.54 | 138 | Bottom surface |
| | WLAN 802.11ac(80M) 5.8G | 0.63 | 0.64 | 155 | Bottom surface |
| Aux | WLAN 802.11b | 1.02 | 1.03 | 11 | Bottom surface |
| | Bluetooth(GFSK) | 0.14 | 0.23 | 78 | Bottom surface |
| | WLAN 802.11n(40M) 5.2G | 0.87 | 0.88 | 46 | Bottom surface |
| | WLAN 802.11ac(80M) 5.2G | 0.81 | 0.82 | 42 | Bottom surface |
| | WLAN 802.11a 5.3G | 0.78 | 0.80 | 56 | Bottom surface |
| | WLAN 802.11n(40M) 5.3G | 0.81 | 0.82 | 54 | Bottom surface |
| | WLAN 802.11ac(80M) 5.6G | 0.49 | 0.50 | 106 | Bottom surface |
| | WLAN 802.11ac(80M) 5.8G | 0.45 | 0.45 | 155 | Bottom surface |

**WLAN802.11 a/b/g/n/ax(20M/40M)/ac/ax(20M/40M/80M/160M) conducted power table:**

| Antenna / Band | SISO | | MIMO |
|---|---|---|---|
| | Main | Aux | Main + Aux |
| WLAN802.11b | V | V | - |
| WLAN802.11g | V | V | - |
| WLAN802.11n(20M) | V | V | V |
| WLAN802.11n(40M) | V | V | V |
| WLAN802.11ax(20M) | V | V | V |
| WLAN802.11ax(40M) | V | V | V |
| WLAN802.11a | V | V | - |
| WLAN802.11n(20M) 5G | V | V | V |
| WLAN802.11n(40M) 5G | V | V | V |
| WLAN802.11ac(20M) 5G | V | V | V |
| WLAN802.11ac(40M) 5G | V | V | V |
| WLAN802.11ac(80M) 5G | V | V | V |
| WLAN802.11ac(160M) 5G | V | V | V |
| WLAN802.11ax(20M) 5G | V | V | V |
| WLAN802.11ax(40M) 5G | V | V | V |
| WLAN802.11ax(80M) 5G | V | V | V |
| WLAN802.11ax(160M) 5G | V | V | V |

## Aux

| Aux Antenna | | | | | | |
|---|---|---|---|---|---|---|
| Band | Mode | Channel | Frequency (MHz) | Data Rate | Max. Rated Avg. Power + Max. Tolerance (dBm) | Average power (dBm) |
| 2450 MHz | 802.11b | 1 | 2412 | 1Mbps | 17.50 | 17.47 |
| | | 2 | 2417 | | 17.50 | 17.40 |
| | | 6 | 2437 | | 17.50 | 17.49 |
| | | 10 | 2457 | | 17.50 | 17.27 |
| | | 11 | 2462 | | 17.50 | 17.48 |
| | 802.11g | 1 | 2412 | 6Mbps | 17.00 | 16.90 |
| | | 2 | 2417 | | 17.50 | 17.33 |
| | | 6 | 2437 | | 17.50 | 17.42 |
| | | 10 | 2457 | | 17.50 | 17.37 |
| | | 11 | 2462 | | 17.00 | 16.77 |
| | 802.11n20-HT0 | 1 | 2412 | MCS0 | 17.00 | 16.87 |
| | | 6 | 2437 | | 17.50 | 17.33 |
| | | 11 | 2462 | | 15.50 | 15.37 |
| | 802.11ax20-HE0 | 1 | 2412 | MCS0 | 17.00 | 16.79 |
| | | 6 | 2437 | | 17.50 | 17.41 |
| | | 11 | 2462 | | 15.50 | 15.40 |
| | 802.11n40-HT0 | 3 | 2422 | MCS0 | 16.50 | 16.29 |
| | | 6 | 2437 | | 15.50 | 15.28 |
| | | 9 | 2452 | | 14.50 | 14.30 |
| | 802.11ax40-HE0 | 3 | 2422 | MCS0 | 16.50 | 16.43 |
| | | 6 | 2437 | | 15.50 | 15.29 |
| | | 9 | 2452 | | 15.00 | 14.89 |


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| Aux Antenna | | | | | | |
|---|---|---|---|---|---|---|
| Band | Mode | Channel | Frequency (MHz) | Data Rate | Max. Rated Avg. Power + Max. Tolerance (dBm) | Average power (dBm) |
| 5.15-5.25 GHz | 802.11a | 36 | 5180 | 6Mbps | 18.50 | 18.37 |
| | | 40 | 5200 | | 18.50 | 18.32 |
| | | 44 | 5220 | | 18.50 | 18.43 |
| | | 48 | 5240 | | 18.50 | 18.36 |
| | 802.11n20-HT0 | 36 | 5180 | MCS0 | 18.50 | 18.38 |
| | | 40 | 5200 | | 18.50 | 18.33 |
| | | 44 | 5220 | | 18.50 | 18.28 |
| | | 48 | 5240 | | 18.50 | 18.36 |
| | 802.11ac20-VHT0 | 36 | 5180 | MCS0 | 18.50 | 18.36 |
| | | 40 | 5200 | | 18.50 | 18.31 |
| | | 44 | 5220 | | 18.50 | 18.40 |
| | | 48 | 5240 | | 18.50 | 18.31 |
| | 802.11ax20-HE0 | 36 | 5180 | MCS0 | 18.50 | 18.26 |
| | | 40 | 5200 | | 18.50 | 18.31 |
| | | 44 | 5220 | | 18.50 | 18.29 |
| | | 48 | 5240 | | 18.50 | 18.39 |
| | 802.11n40-HT0 | 38 | 5190 | MCS0 | 18.50 | 18.49 |
| | | 46 | 5230 | | 18.50 | 18.48 |
| | 802.11ac40-VHT0 | 38 | 5190 | MCS0 | 18.50 | 18.31 |
| | | 46 | 5230 | | 18.50 | 18.26 |
| | 802.11ax40-HE0 | 38 | 5190 | MCS0 | 18.50 | 18.28 |
| | | 46 | 5230 | | 18.50 | 18.42 |
| | 802.11ac80-VHT0 | 42 | 5210 | MCS0 | 18.50 | 18.49 |
| | 802.11ax80-HE0 | 42 | 5210 | MCS0 | 15.00 | 14.86 |
| | 802.11ac160-VHT0 | 50 | 5250 | MCS0 | 15.00 | 14.77 |
| | 802.11ax160-HE0 | 50 | 5250 | MCS0 | 15.00 | 14.86 |



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| Aux Antenna | | | | | | |
|---|---|---|---|---|---|---|
| Band | Mode | Channel | Frequency (MHz) | Data Rate | Max. Rated Avg. Power + Max. Tolerance (dBm) | Average power (dBm) |
| 5.25-5.35 GHz | 802.11a | 52 | 5260 | 6Mbps | 18.50 | 18.47 |
| | | 56 | 5280 | | 18.50 | 18.49 |
| | | 60 | 5300 | | 18.50 | 18.48 |
| | | 64 | 5320 | | 18.50 | 18.46 |
| | 802.11n20-HT0 | 52 | 5260 | MCS0 | 18.50 | 18.41 |
| | | 56 | 5280 | | 18.50 | 18.31 |
| | | 60 | 5300 | | 18.50 | 18.46 |
| | | 64 | 5320 | | 18.50 | 18.38 |
| | 802.11ac20-VHT0 | 52 | 5260 | MCS0 | 18.50 | 18.39 |
| | | 56 | 5280 | | 18.50 | 18.46 |
| | | 60 | 5300 | | 18.50 | 18.29 |
| | | 64 | 5320 | | 18.50 | 18.33 |
| | 802.11ax20-HE0 | 52 | 5260 | MCS0 | 18.50 | 18.36 |
| | | 56 | 5280 | | 18.50 | 18.40 |
| | | 60 | 5300 | | 18.50 | 18.44 |
| | | 64 | 5320 | | 18.00 | 17.84 |
| | 802.11n40-HT0 | 54 | 5270 | MCS0 | 18.50 | 18.48 |
| | | 62 | 5310 | | 17.50 | 17.28 |
| | 802.11ac40-VHT0 | 54 | 5270 | MCS0 | 18.50 | 18.40 |
| | | 62 | 5310 | | 17.50 | 17.30 |
| | 802.11ax40-HE0 | 54 | 5270 | MCS0 | 18.50 | 18.33 |
| | | 62 | 5310 | | 17.50 | 17.45 |
| | 802.11ac80-VHT0 | 58 | 5290 | MCS0 | 18.00 | 17.95 |
| | 802.11ax80-HE0 | 58 | 5290 | MCS0 | 18.00 | 17.96 |

| Aux Antenna | | | | | | |
|---|---|---|---|---|---|---|
| Band | Mode | Channel | Frequency (MHz) | Data Rate | Max. Rated Avg. Power + Max. Tolerance (dBm) | Average power (dBm) |
| 5600 MHz | 802.11a | 100 | 5500 | 6Mbps | 16.50 | 16.44 |
| | | 120 | 5600 | | 16.50 | 16.30 |
| | | 140 | 5700 | | 16.50 | 16.31 |
| | | 144 | 5720 | | 16.50 | 16.29 |
| | 802.11n20-HT0 | 100 | 5500 | MCS0 | 16.50 | 16.27 |
| | | 120 | 5600 | | 16.50 | 16.36 |
| | | 140 | 5700 | | 16.50 | 16.41 |
| | | 144 | 5720 | | 16.50 | 16.32 |
| | 802.11ac20-VHT0 | 100 | 5500 | MCS0 | 16.50 | 16.36 |
| | | 120 | 5600 | | 16.50 | 16.28 |
| | | 140 | 5700 | | 16.50 | 16.28 |
| | | 144 | 5720 | | 16.50 | 16.29 |
| | 802.11ax20-HE0 | 100 | 5500 | MCS0 | 16.50 | 16.31 |
| | | 120 | 5600 | | 16.50 | 16.36 |
| | | 140 | 5700 | | 16.50 | 16.28 |
| | | 144 | 5720 | | 16.50 | 16.30 |
| | 802.11n40-HT0 | 102 | 5510 | MCS0 | 16.50 | 16.48 |
| | | 118 | 5590 | | 16.50 | 16.43 |
| | | 134 | 5670 | | 16.50 | 16.49 |
| | | 142 | 5710 | | 16.50 | 16.44 |
| | 802.11ac40-VHT0 | 102 | 5510 | MCS0 | 16.50 | 16.28 |
| | | 118 | 5590 | | 16.50 | 16.40 |
| | | 134 | 5670 | | 16.50 | 16.29 |
| | | 142 | 5710 | | 16.50 | 16.34 |
| | 802.11ax40-HE0 | 102 | 5510 | MCS0 | 16.50 | 16.39 |
| | | 118 | 5590 | | 16.50 | 16.37 |
| | | 134 | 5670 | | 16.50 | 16.42 |
| | | 142 | 5710 | | 16.50 | 16.43 |
| | 802.11ac80-VHT0 | 106 | 5530 | MCS0 | 16.50 | 16.49 |
| | | 122 | 5610 | | 16.50 | 16.44 |
| | | 138 | 5690 | | 16.50 | 16.45 |
| | 802.11ax80-HE0 | 106 | 5530 | MCS0 | 16.50 | 16.35 |
| | | 122 | 5610 | | 16.50 | 16.35 |
| | | 138 | 5690 | | 16.50 | 16.31 |
| | 802.11ac160-VHT0 | 114 | 5570 | MCS0 | 14.50 | 14.31 |
| | 802.11ax160-HE0 | 114 | 5570 | MCS0 | 14.50 | 14.40 |

| Aux Antenna | | | | | | |
|---|---|---|---|---|---|---|
| Band | Mode | Channel | Frequency (MHz) | Data Rate | Max. Rated Avg. Power + Max. Tolerance (dBm) | Average power (dBm) |
| 5800 MHz | 802.11a | 149 | 5745 | 6Mbps | 15.50 | 15.44 |
| | | 157 | 5785 | | 15.50 | 15.39 |
| | | 165 | 5825 | | 15.50 | 15.28 |
| | 802.11n20-HT0 | 149 | 5745 | MCS0 | 15.50 | 15.36 |
| | | 157 | 5785 | | 15.50 | 15.44 |
| | | 165 | 5825 | | 15.50 | 15.46 |
| | 802.11ac20-VHT0 | 149 | 5745 | MCS0 | 15.50 | 15.46 |
| | | 157 | 5785 | | 15.50 | 15.37 |
| | | 165 | 5825 | | 15.50 | 15.30 |
| | 802.11ax20-HE0 | 149 | 5745 | MCS0 | 15.50 | 15.35 |
| | | 157 | 5785 | | 15.50 | 15.35 |
| | | 165 | 5825 | | 15.50 | 15.42 |
| | 802.11n40-HT0 | 151 | 5755 | MCS0 | 15.50 | 15.47 |
| | | 159 | 5795 | | 15.50 | 15.49 |
| | 802.11ac40-VHT0 | 151 | 5755 | MCS0 | 15.50 | 15.33 |
| | | 159 | 5795 | | 15.50 | 15.32 |
| | 802.11ax40-HE0 | 151 | 5755 | MCS0 | 15.50 | 15.39 |
| | | 159 | 5795 | | 15.50 | 15.31 |
| | 802.11ac80-VHT0 | 155 | 5775 | MCS0 | 15.50 | 15.49 |
| | 802.11ax80-HE0 | 155 | 5775 | MCS0 | 15.50 | 15.27 |

## Main

| Main Antenna | | | | | | |
|---|---|---|---|---|---|---|
| Band | Mode | Channel | Frequency (MHz) | Data Rate | Max. Rated Avg. Power + Max. Tolerance (dBm) | Average power (dBm) |
| 2450 MHz | 802.11b | 1 | 2412 | 1Mbps | 18.50 | 18.47 |
| | | 2 | 2417 | | 18.50 | 18.37 |
| | | 6 | 2437 | | 18.50 | 18.48 |
| | | 10 | 2457 | | 18.50 | 18.41 |
| | | 11 | 2462 | | 18.50 | 18.49 |
| | 802.11g | 1 | 2412 | 6Mbps | 17.00 | 16.82 |
| | | 2 | 2417 | | 18.50 | 18.35 |
| | | 6 | 2437 | | 18.50 | 18.34 |
| | | 10 | 2457 | | 18.50 | 18.36 |
| | | 11 | 2462 | | 17.00 | 16.79 |
| | 802.11n20-HT0 | 1 | 2412 | MCS0 | 17.00 | 16.92 |
| | | 6 | 2437 | | 18.50 | 18.28 |
| | | 11 | 2462 | | 15.50 | 15.25 |
| | 802.11ax20-HE0 | 1 | 2412 | MCS0 | 17.00 | 16.89 |
| | | 6 | 2437 | | 18.50 | 18.29 |
| | | 11 | 2462 | | 15.50 | 15.27 |
| | 802.11n40-HT0 | 3 | 2422 | MCS0 | 16.50 | 16.31 |
| | | 6 | 2437 | | 15.50 | 15.35 |
| | | 9 | 2452 | | 16.00 | 15.85 |
| | 802.11ax40-HE0 | 3 | 2422 | MCS0 | 16.50 | 16.35 |
| | | 6 | 2437 | | 15.50 | 15.25 |
| | | 9 | 2452 | | 16.50 | 16.38 |

| Main Antenna | | | | | | |
|---|---|---|---|---|---|---|
| Band | Mode | Channel | Frequency (MHz) | Data Rate | Max. Rated Avg. Power + Max. Tolerance (dBm) | Average power (dBm) |
| 5.15-5.25 GHz | 802.11a | 36 | 5180 | 6Mbps | 16.50 | 16.30 |
| | | 40 | 5200 | | 16.50 | 16.28 |
| | | 44 | 5220 | | 16.50 | 16.41 |
| | | 48 | 5240 | | 16.50 | 16.36 |
| | 802.11n20-HT0 | 36 | 5180 | MCS0 | 16.50 | 16.33 |
| | | 40 | 5200 | | 16.50 | 16.37 |
| | | 44 | 5220 | | 16.50 | 16.31 |
| | | 48 | 5240 | | 16.50 | 16.42 |
| | 802.11ac20-VHT0 | 36 | 5180 | MCS0 | 16.50 | 16.37 |
| | | 40 | 5200 | | 16.50 | 16.33 |
| | | 44 | 5220 | | 16.50 | 16.32 |
| | | 48 | 5240 | | 16.50 | 16.33 |
| | 802.11ax20-HE0 | 36 | 5180 | MCS0 | 16.50 | 16.45 |
| | | 40 | 5200 | | 16.50 | 16.45 |
| | | 44 | 5220 | | 16.50 | 16.32 |
| | | 48 | 5240 | | 16.50 | 16.34 |
| | 802.11n40-HT0 | 38 | 5190 | MCS0 | 16.50 | 16.49 |
| | | 46 | 5230 | | 16.50 | 16.48 |
| | 802.11ac40-VHT0 | 38 | 5190 | MCS0 | 16.50 | 16.36 |
| | | 46 | 5230 | | 16.50 | 16.28 |
| | 802.11ax40-HE0 | 38 | 5190 | MCS0 | 16.50 | 16.47 |
| | | 46 | 5230 | | 16.50 | 16.29 |
| | 802.11ac80-VHT0 | 42 | 5210 | MCS0 | 16.50 | 16.47 |
| | 802.11ax80-HE0 | 42 | 5210 | MCS0 | 15.00 | 14.93 |
| | 802.11ac160-VHT0 | 50 | 5250 | MCS0 | 15.00 | 14.97 |
| | 802.11ax160-HE0 | 50 | 5250 | MCS0 | 15.00 | 14.87 |

| Main Antenna | | | | | | |
|---|---|---|---|---|---|---|
| Band | Mode | Channel | Frequency (MHz) | Data Rate | Max. Rated Avg. Power + Max. Tolerance (dBm) | Average power (dBm) |
| 5.25-5.35 GHz | 802.11a | 52 | 5260 | 6Mbps | 15.50 | 15.37 |
| | | 56 | 5280 | | 15.50 | 15.34 |
| | | 60 | 5300 | | 15.50 | 15.45 |
| | | 64 | 5320 | | 15.50 | 15.33 |
| | 802.11n20-HT0 | 52 | 5260 | MCS0 | 15.50 | 15.35 |
| | | 56 | 5280 | | 15.50 | 15.29 |
| | | 60 | 5300 | | 15.50 | 15.28 |
| | | 64 | 5320 | | 15.50 | 15.36 |
| | 802.11ac20-VHT0 | 52 | 5260 | MCS0 | 15.50 | 15.35 |
| | | 56 | 5280 | | 15.50 | 15.28 |
| | | 60 | 5300 | | 15.50 | 15.34 |
| | | 64 | 5320 | | 15.50 | 15.27 |
| | 802.11ax20-HE0 | 52 | 5260 | MCS0 | 15.50 | 15.35 |
| | | 56 | 5280 | | 15.50 | 15.33 |
| | | 60 | 5300 | | 15.50 | 15.44 |
| | | 64 | 5320 | | 15.50 | 15.35 |
| | 802.11n40-HT0 | 54 | 5270 | MCS0 | 15.50 | 15.47 |
| | | 62 | 5310 | | 15.50 | 15.48 |
| | 802.11ac40-VHT0 | 54 | 5270 | MCS0 | 15.50 | 15.29 |
| | | 62 | 5310 | | 15.50 | 15.35 |
| | 802.11ax40-HE0 | 54 | 5270 | MCS0 | 15.50 | 15.29 |
| | | 62 | 5310 | | 15.50 | 15.39 |
| | 802.11ac80-VHT0 | 58 | 5290 | MCS0 | 15.50 | 15.49 |
| | 802.11ax80-HE0 | 58 | 5290 | MCS0 | 15.50 | 15.36 |

| Main Antenna | | | | | | |
|---|---|---|---|---|---|---|
| Band | Mode | Channel | Frequency (MHz) | Data Rate | Max. Rated Avg. Power + Max. Tolerance (dBm) | Average power (dBm) |
| 5600 MHz | 802.11a | 100 | 5500 | 6Mbps | 15.50 | 15.41 |
| | | 120 | 5600 | | 15.50 | 15.42 |
| | | 140 | 5700 | | 15.50 | 15.42 |
| | | 144 | 5720 | | 15.50 | 15.37 |
| | 802.11n20-HT0 | 100 | 5500 | MCS0 | 15.50 | 15.34 |
| | | 120 | 5600 | | 15.50 | 15.31 |
| | | 140 | 5700 | | 15.50 | 15.41 |
| | | 144 | 5720 | | 15.50 | 15.31 |
| | 802.11ac20-VHT0 | 100 | 5500 | MCS0 | 15.50 | 15.39 |
| | | 120 | 5600 | | 15.50 | 15.39 |
| | | 140 | 5700 | | 15.50 | 15.28 |
| | | 144 | 5720 | | 15.50 | 15.42 |
| | 802.11ax20-HE0 | 100 | 5500 | MCS0 | 15.50 | 15.39 |
| | | 120 | 5600 | | 15.50 | 15.34 |
| | | 140 | 5700 | | 15.50 | 15.36 |
| | | 144 | 5720 | | 15.50 | 15.45 |
| | 802.11n40-HT0 | 102 | 5510 | MCS0 | 15.50 | 15.49 |
| | | 118 | 5590 | | 15.50 | 15.44 |
| | | 134 | 5670 | | 15.50 | 15.46 |
| | | 142 | 5710 | | 15.50 | 15.45 |
| | 802.11ac40-VHT0 | 102 | 5510 | MCS0 | 15.50 | 15.42 |
| | | 118 | 5590 | | 15.50 | 15.40 |
| | | 134 | 5670 | | 15.50 | 15.35 |
| | | 142 | 5710 | | 15.50 | 15.34 |
| | 802.11ax40-HE0 | 102 | 5510 | MCS0 | 15.50 | 15.35 |
| | | 118 | 5590 | | 15.50 | 15.35 |
| | | 134 | 5670 | | 15.50 | 15.43 |
| | | 142 | 5710 | | 15.50 | 15.29 |
| | 802.11ac80-VHT0 | 106 | 5530 | MCS0 | 15.50 | 15.48 |
| | | 122 | 5610 | | 15.50 | 15.43 |
| | | 138 | 5690 | | 15.50 | 15.49 |
| | 802.11ax80-HE0 | 106 | 5530 | MCS0 | 15.50 | 15.26 |
| | | 122 | 5610 | | 15.50 | 15.33 |
| | | 138 | 5690 | | 15.50 | 15.42 |
| | 802.11ac160-VHT0 | 114 | 5570 | MCS0 | 14.50 | 14.40 |
| | 802.11ax160-HE0 | 114 | 5570 | MCS0 | 14.50 | 14.34 |

| Main Antenna | | | | | | |
|---|---|---|---|---|---|---|
| Band | Mode | Channel | Frequency (MHz) | Data Rate | Max. Rated Avg. Power + Max. Tolerance (dBm) | Average power (dBm) |
| 5800 MHz | 802.11a | 149 | 5745 | 6Mbps | 16.50 | 16.32 |
| | | 157 | 5785 | | 16.50 | 16.38 |
| | | 165 | 5825 | | 16.50 | 16.27 |
| | 802.11n20-HT0 | 149 | 5745 | MCS0 | 16.50 | 16.28 |
| | | 157 | 5785 | | 16.50 | 16.45 |
| | | 165 | 5825 | | 16.50 | 16.33 |
| | 802.11ac20-VHT0 | 149 | 5745 | MCS0 | 16.50 | 16.34 |
| | | 157 | 5785 | | 16.50 | 16.40 |
| | | 165 | 5825 | | 16.50 | 16.28 |
| | 802.11ax20-HE0 | 149 | 5745 | MCS0 | 16.50 | 16.29 |
| | | 157 | 5785 | | 16.50 | 16.38 |
| | | 165 | 5825 | | 16.50 | 16.29 |
| | 802.11n40-HT0 | 151 | 5755 | MCS0 | 16.50 | 16.48 |
| | | 159 | 5795 | | 16.50 | 16.47 |
| | 802.11ac40-VHT0 | 151 | 5755 | MCS0 | 16.50 | 16.38 |
| | | 159 | 5795 | | 16.50 | 16.34 |
| | 802.11ax40-HE0 | 151 | 5755 | MCS0 | 16.50 | 16.36 |
| | | 159 | 5795 | | 16.50 | 16.41 |
| | 802.11ac80-VHT0 | 155 | 5775 | MCS0 | 16.50 | 16.49 |
| | 802.11ax80-HE0 | 155 | 5775 | MCS0 | 16.50 | 16.38 |

## Bluetooth conducted power table:

| Mode | Channel | Frequency (MHz) | 1Mbps | | 2Mbps | | 3Mbps | |
|---|---|---|---|---|---|---|---|---|
| | | | Max. Rated Avg. Power + Max. Tolerance (dBm) | Average power (dBm) | Max. Rated Avg. Power + Max. Tolerance (dBm) | Average power (dBm) | Max. Rated Avg. Power + Max. Tolerance (dBm) | Average power (dBm) |
| BR/EDR | CH 00 | 2402 | 10.50 | 8.54 | 10.00 | 7.29 | 10.00 | 7.31 |
| | CH 39 | 2441 | | 8.99 | | 7.71 | | 7.69 |
| | CH 78 | 2480 | | 9.44 | | 7.99 | | 7.98 |

| Mode | Channel | Frequency (MHz) | GFSK | |
|---|---|---|---|---|
| | | | Max. Rated Avg. Power + Max. Tolerance (dBm) | Average Output Power (dBm) |
| LE | CH 0 | 2412 | 9 | 7.93 |
| | CH 20 | 2442 | | 8.41 |
| | CH 39 | 2480 | | 8.53 |


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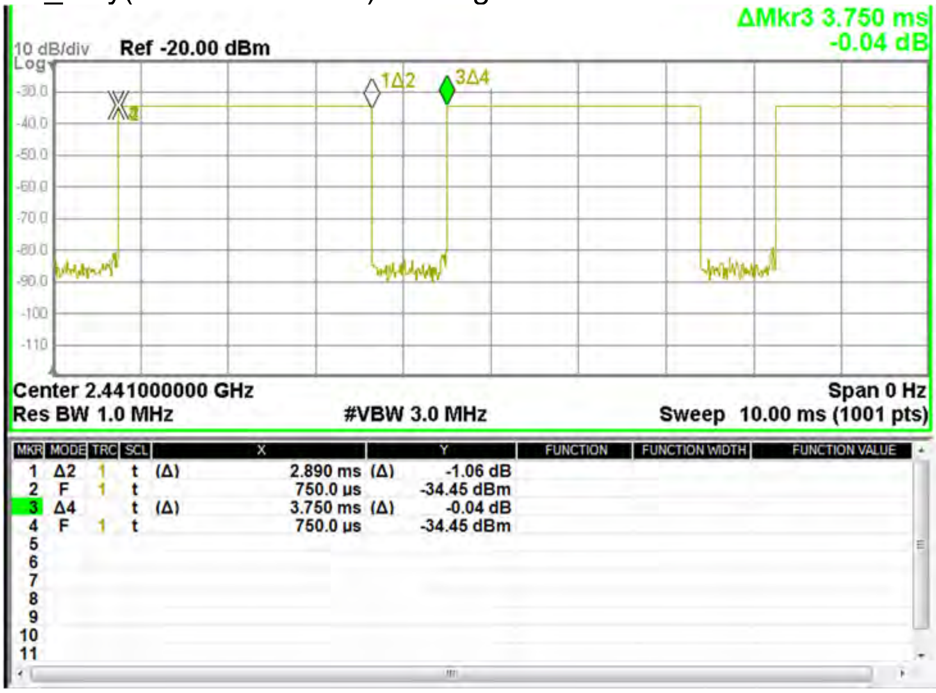
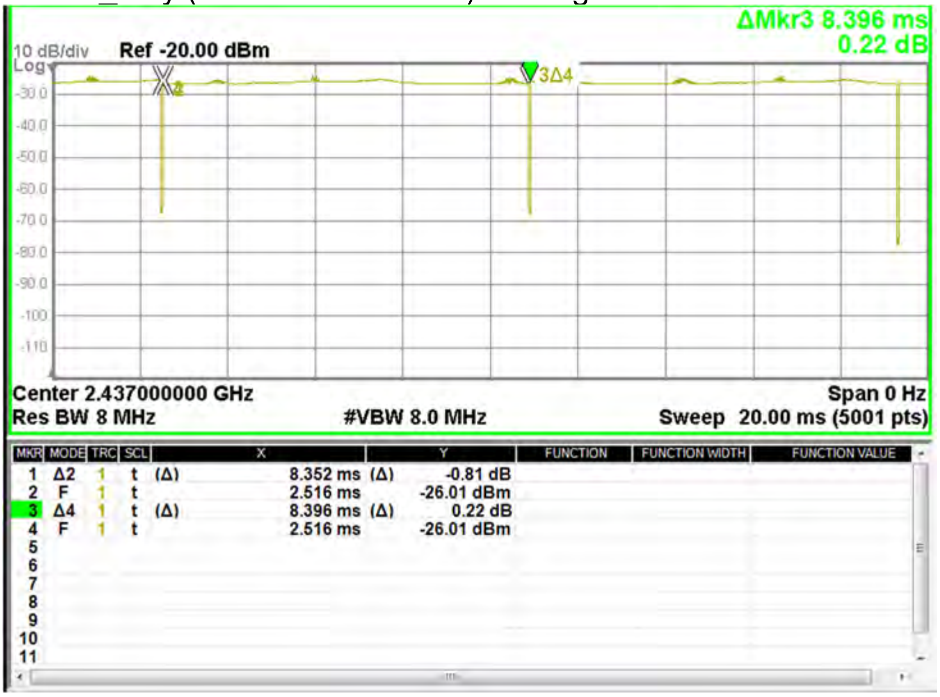
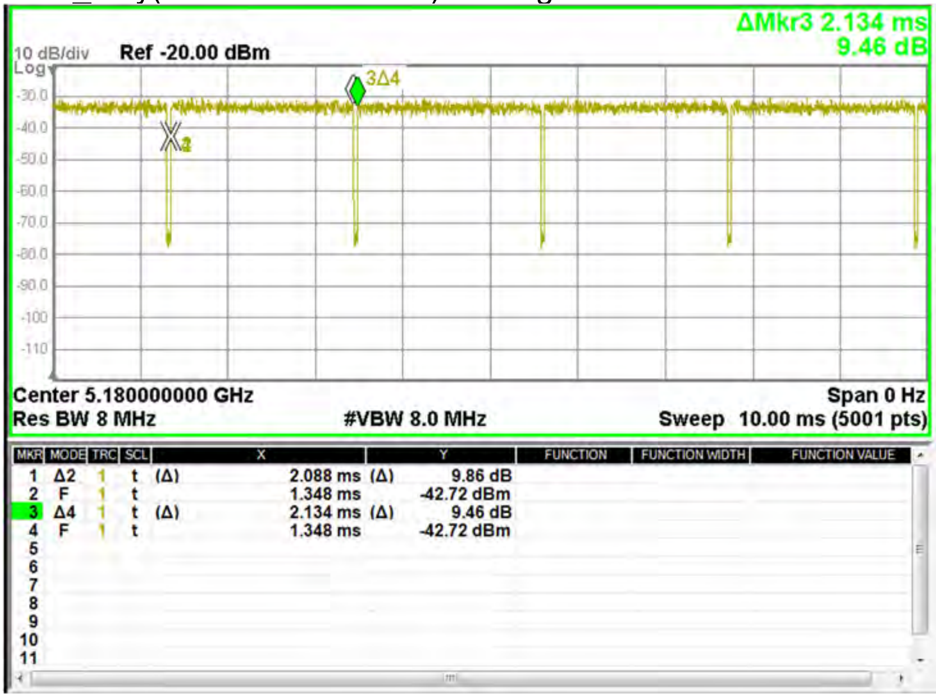
BT_duty(2.89/3.75=0.771) Scaling Factor=1.297



2.4G b_duty (8.352/8.396=0.995) Scaling Factor=1.005



5G a_duty(2.088/2.134=0.978) Scaling Factor=1.022



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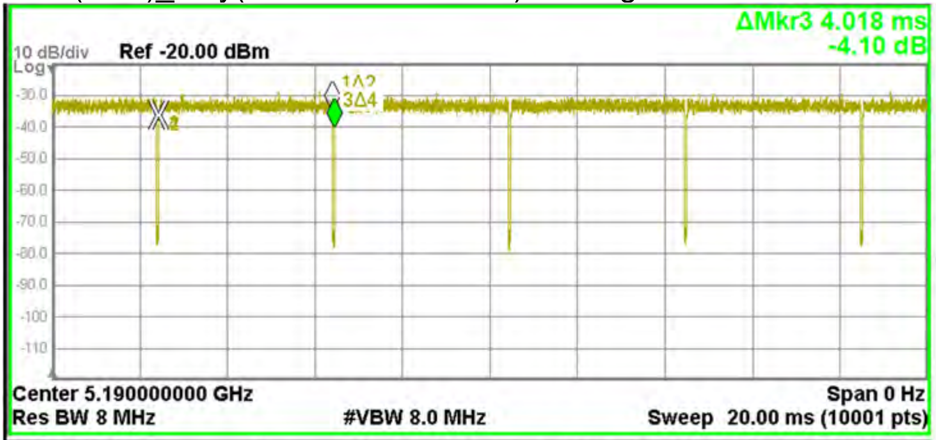
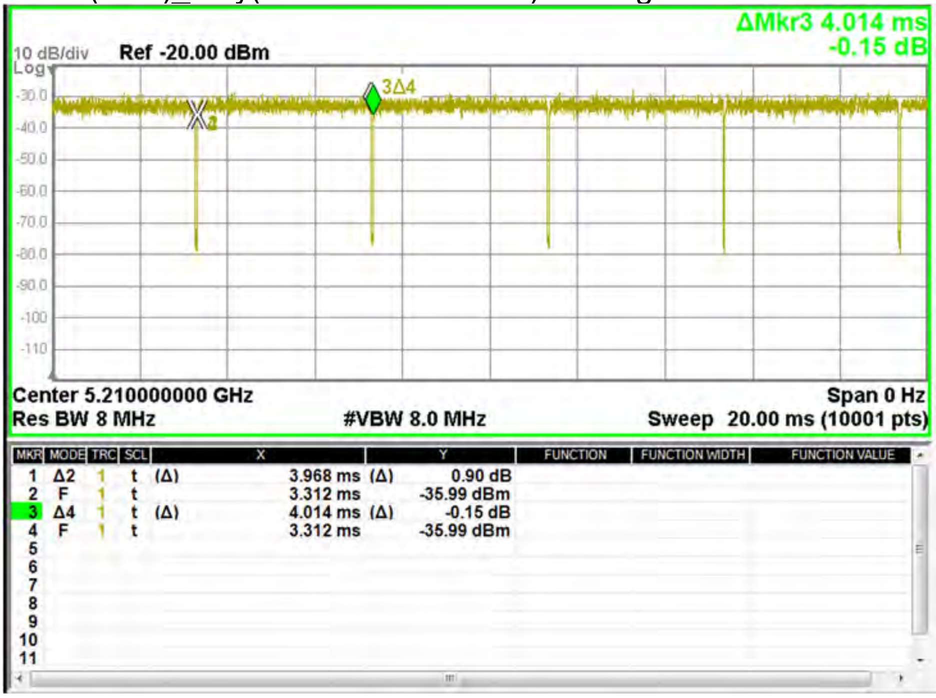
5G n(40M)_duty(3.972/4.018=0.989) Scaling Factor=1.011




| MKR | MODE | TRC | SCL | X | Y | FUNCTION | FUNCTION WIDTH | FUNCTION VALUE |
|---|---|---|---|---|---|---|---|---|
| 1 | Δ2 | 1 | t (Δ) | 3.972 ms (Δ) | 1.29 dB | | | |
| 2 | F | 1 | t | 2.426 ms | -36.45 dBm | | | |
| 3 | Δ4 | 1 | t (Δ) | 4.018 ms (Δ) | -4.10 dB | | | |
| 4 | F | 1 | t | 2.426 ms | -36.45 dBm | | | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
| 10 | | | | | | | | |
| 11 | | | | | | | | |

5G ac(80M)_duty(3.968/4.014=0.989) Scaling Factor=1.011



### 1.4 Test Environment

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

### 1.5 Operation Description

Use chipset specific software to control the EUT, and makes it transmit in maximum power. Measurements are performed respectively on the lowest, middle and highest channels of the operating band(s). The EUT is set to maximum power level during all tests, and at the beginning of each test the battery is fully charged.

**Laptop mode**

SAR is measured with keyboard bottom surface touch against the flat phantom.

Note:

802.11b DSSS SAR Test Requirements:

1. SAR is measured for 2.4 GHz 802.11b DSSS mode using the highest measured maximum output power channel, when the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.

2. When the reported SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

802.11g/n OFDM SAR Test Exclusion Requirements:

3. SAR is not required for 802.11g/n since the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

Initial Test Configuration:

4. An initial test configuration is determined for OFDM transmission modes according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified for production units in each standalone and aggregated frequency band.

5. SAR is measured using the highest measured maximum output power channel. When the reported SAR of the initial test configuration is > 0.8 W/kg, SAR measurement is required for the subsequent next highest measured output power channel(s) in the initial test configuration until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.

6. Since the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for subsequent test configuration.

7. BT and WLAN Aux use the same antenna path, but they can't transmit at the same time.
8. According to KDB447498 D01, testing of other required channels is not required when the reported 1-g SAR for the highest output channel is ≤ 0.8 W/kg, when the transmission band is ≤ 100 MHz.
9. According to KDB865664 D01, SAR measurement variability must be assessed for each frequency band. When the original highest measured SAR is ≥ 0.8 W/kg, repeated that measurement once. Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~10% from the 1-g SAR limit)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## 1.6 The SAR Measurement System

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

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

1. A standard high precision 6-axis robot (Staubli RX family) with controller, teach pendant and software. An arm extension is for accommodating the data acquisition electronics (DAE).
2. A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage intissue simulating liquid. The probe is equipped with an optical surface detector system.
3. A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

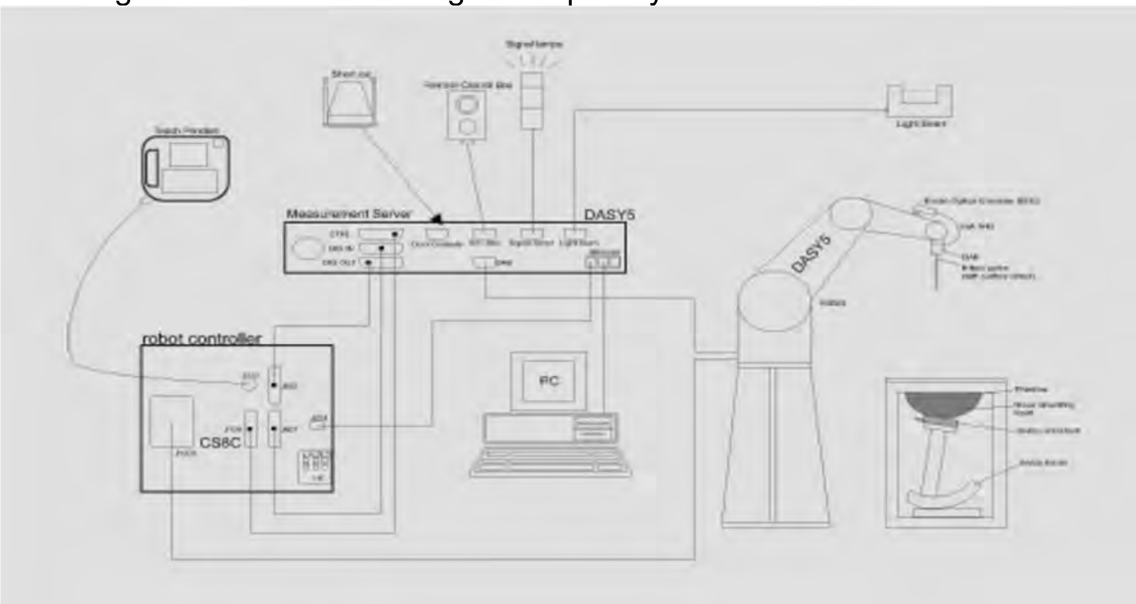


Fig. a The block diagram of SAR system


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

## 1.7 System Components

### EX3DV4 E-Field Probe

| | | |
|---|---|---|
| Construction | Symmetrical design with triangular core<br>Built-in shielding against static charges<br>PEEK enclosure material (resistant to organic solvents, e.g., DGBE) |  |
| Calibration | Basic Broad Band Calibration in air<br>Conversion Factors (CF) for HSL 2450/5200/5300/5600/5800 MHz<br>Additional CF for other liquids and frequencies upon request | |
| Frequency | 10 MHz to > 6 GHz | |
| Directivity | ± 0.3 dB in HSL (rotation around probe axis)<br>± 0.5 dB in tissue material (rotation normal to probe axis) | |
| Dynamic Range | 10 μW/g to > 100 mW/g<br>Linearity: ± 0.2 dB (noise: typically < 1 μW/g) | |
| Dimensions | Tip diameter: 2.5 mm | |
| Application | High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%. | |


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**PHANTOM**

| | | |
|---|---|---|
| Model | ELI | |
| Construction | The ELI phantom is used for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles. | |
| Shell Thickness | 2 ± 0.2 mm |  |
| Filling Volume | Approx. 30 liters | |
| Dimensions | Major axis: 600 mm<br>Minor axis: 400 mm | |

**DEVICE HOLDER**

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


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## 1.8 SAR System Verification

The microwave circuit arrangement for system verification is sketched in Fig. b. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR values. These tests were done at 2450/5200/5300/5600 /5800 MHz. The tests were conducted on the same days as the measurement of the DUT. The obtained results from the system accuracy verification are displayed in the table 1 (SAR values are normalized to 1W forward power delivered to the dipole). During the tests, the liquid depth above the ear reference points was ≥ 15 cm ± 5 mm (frequency ≤ 3 GHz) or ≥ 10 cm ± 5 mm (frequency > 3 G Hz) in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.

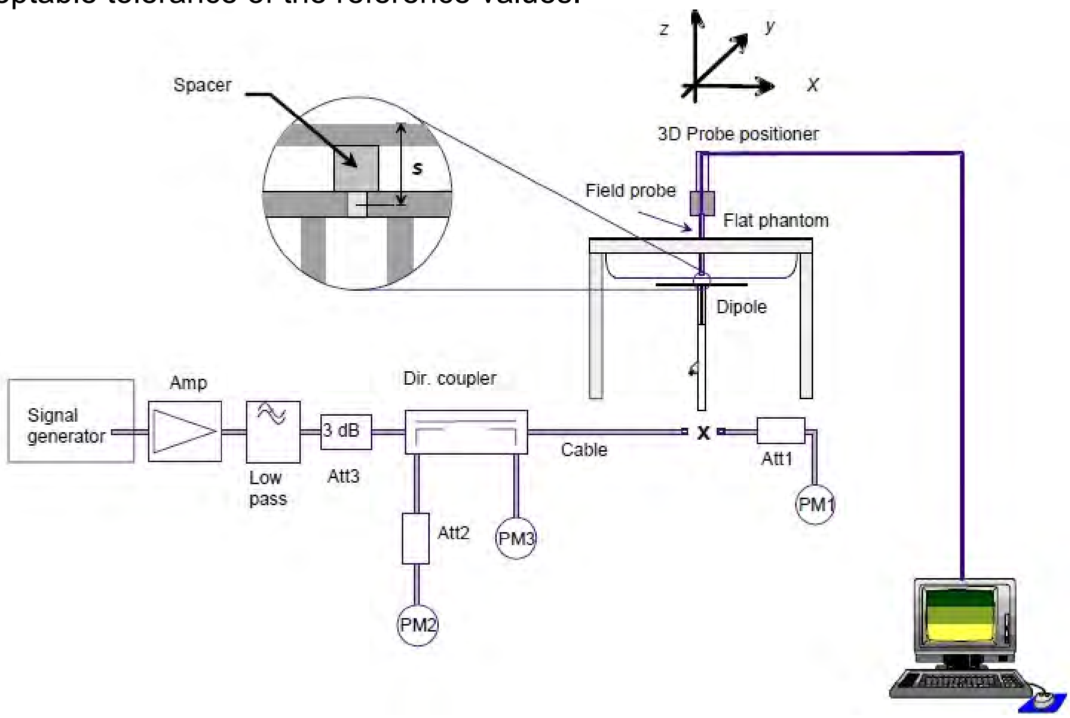


Fig. b The block diagram of system verification

| Validation Kit | S/N | Frequency (MHz) | | 1W Target SAR-1g (mW/g) | pin=250mW Measured SAR-1g (mW/g) | Measured SAR-1g normalized to 1W (mW/g) | Deviation (%) | Measured Date |
|---|---|---|---|---|---|---|---|---|
| D2450V2 | 727 | 2450 | Head | 53.9 | 12.90 | 51.6 | -4.27% | Jun. 09, 2021 |
| Validation Kit | S/N | Frequency (MHz) | | 1W Target SAR-1g (mW/g) | Pin=100mW Measured SAR-1g (mW/g) | Measured SAR-1g normalized to 1W (mW/g) | Deviation (%) | Measured Date |
| D5GHzV2 | 1023 | 5200 | Head | 77.9 | 7.94 | 79.4 | 1.93% | Jun. 10, 2021 |
| | | 5300 | Head | 80.4 | 8.17 | 81.7 | 1.62% | Jun. 10, 2021 |
| | | 5600 | Head | 83.9 | 8.61 | 86.1 | 2.62% | Jun. 11, 2021 |
| | | 5800 | Head | 80.9 | 7.84 | 78.4 | -3.09% | Jun. 11, 2021 |

Table 1. Results of system validation



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## 1.9 Tissue Simulant Fluid for the Frequency Band

The dielectric properties for this Head-simulant fluid were measured by using the SPEAG Dielectric Assessment Kit (DAKS-3.5)
All dielectric parameters of tissue simulates were measured within 24 hours of SAR measurements. The measured conductivity and permittivity are all within ± 5% of the target values.
The depth of the tissue simulant in the flat section of the phantom was ≥ 15 cm ± 5 mm (Frequency ≤3G) or ≥ 10 cm ± 5 mm (Frequency >3G) during all tests. (Fig. 2)

| Tissue Type | Measurement Date | Measured Frequency (MHz) | Target Dielectric Constant, εr | Target Conductivity, σ (S/m) | Measured Dielectric Constant, εr | Measured Conductivity, σ (S/m) | % dev εr | % dev σ |
|---|---|---|---|---|---|---|---|---|
| Head | Jun, 09. 2021 | 2402 | 39.285 | 1.757 | 38.585 | 1.738 | -1.78% | -1.11% |
| | | 2437 | 39.223 | 1.788 | 38.523 | 1.767 | -1.78% | -1.18% |
| | | 2441 | 39.216 | 1.792 | 38.516 | 1.771 | -1.78% | -1.19% |
| | | 2450 | 39.200 | 1.800 | 38.500 | 1.778 | -1.79% | -1.21% |
| | | 2462 | 39.185 | 1.813 | 38.485 | 1.789 | -1.79% | -1.34% |
| | | 2480 | 39.162 | 1.827 | 38.462 | 1.805 | -1.79% | -1.21% |
| | Jun, 10. 2021 | 5190 | 35.997 | 4.645 | 35.297 | 4.555 | -1.94% | -1.93% |
| | | 5200 | 35.986 | 4.655 | 35.286 | 4.565 | -1.95% | -1.93% |
| | | 5210 | 35.974 | 4.665 | 35.274 | 4.575 | -1.95% | -1.93% |
| | | 5230 | 35.951 | 4.686 | 35.251 | 4.595 | -1.95% | -1.93% |
| | | 5260 | 35.917 | 4.717 | 35.217 | 4.626 | -1.95% | -1.93% |
| | | 5270 | 35.906 | 4.727 | 35.206 | 4.636 | -1.95% | -1.92% |
| | | 5280 | 35.894 | 4.737 | 35.194 | 4.646 | -1.95% | -1.92% |
| | | 5290 | 35.883 | 4.747 | 35.183 | 4.656 | -1.95% | -1.92% |
| | | 5300 | 35.871 | 4.758 | 35.171 | 4.666 | -1.95% | -1.92% |
| | | 5310 | 35.860 | 4.768 | 35.160 | 4.676 | -1.95% | -1.92% |
| | | 5320 | 35.849 | 4.778 | 35.149 | 4.686 | -1.95% | -1.92% |
| | Jun, 11. 2021 | 5510 | 35.631 | 4.973 | 34.931 | 4.879 | -1.96% | -1.88% |
| | | 5530 | 35.609 | 4.993 | 34.909 | 4.899 | -1.97% | -1.88% |
| | | 5590 | 35.540 | 5.055 | 34.840 | 4.959 | -1.97% | -1.89% |
| | | 5600 | 35.529 | 5.065 | 34.829 | 4.969 | -1.97% | -1.89% |
| | | 5610 | 35.517 | 5.075 | 34.817 | 4.979 | -1.97% | -1.89% |
| | | 5670 | 35.449 | 5.137 | 34.749 | 5.039 | -1.97% | -1.89% |
| | | 5690 | 35.426 | 5.157 | 34.726 | 5.060 | -1.98% | -1.89% |
| | | 5710 | 35.403 | 5.178 | 34.703 | 5.080 | -1.98% | -1.89% |
| | | 5755 | 35.351 | 5.224 | 34.651 | 5.125 | -1.98% | -1.89% |
| | | 5775 | 35.329 | 5.244 | 34.629 | 5.145 | -1.98% | -1.89% |
| | | 5795 | 35.306 | 5.265 | 34.606 | 5.165 | -1.98% | -1.89% |
| | | 5800 | 35.300 | 5.270 | 34.600 | 5.170 | -1.98% | -1.89% |

Table 2. Dielectric Parameters of Tissue Simulant Fluid



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The composition of the tissue simulating liquid:

| Frequency (MHz) | Mode | Ingredient | | | | | | Total amount |
|---|---|---|---|---|---|---|---|---|
| | | DGMBE | Water | Salt | Preventol D-7 | Cellulose | Sugar | |
| 2450M | Head | 550ml | 450ml | — | — | — | — | 1.0L(Kg) |

Body Simulating Liquids for 5 GHz, Manufactured by SPEAG:

| Ingredients | Water | Esters, Emulsifiers, Inhibitors | Sodium and Salt |
|---|---|---|---|
| (% by weight) | 60-80 | 20-40 | 0-1.5 |

Table 3. Recipes for Tissue Simulating Liquid

## 1.10 Evaluation Procedures

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

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

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

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

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

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

The first procedure is an extrapolation (incl. Boundary correction) to get the points between the lowest measured plane and the surface. The next step uses 3D



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

## 1.11 Probe Calibration Procedures

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

### 1.11.1 Transfer Calibration with Temperature Probes

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

$$SAR = C \frac{\delta T}{\delta t},$$

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

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


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

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

### 1.11.2 Calibration with Analytical Fields

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

- The setup must enable accurate determination of the incident power.
- The accuracy of the calculated field strength will depend on the assessment of the dielectric parameters of the liquid.
- Due to the small wavelength in liquids with high permittivity, even small


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setups might be above the resonant cutoff frequencies. The field distribution in the setup must be carefully checked for conformity with the theoretical field distribution.

## References


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

## 1.12 Test Standards and Limits

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

(1) Limits for Occupational/Controlled exposure: 0.4 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 8 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 20 W/kg, as averaged over an 10 grams of tissue (defined as a tissue volume in the shape of a cube).

(2) Occupational/Controlled limits apply when persons are exposed as a consequence of their employment provided these persons are fully aware of and exercise control over their exposure. Awareness of exposure can be accomplished by use of warning labels or by specific training or education through appropriate means, such as an RF safety program in a work environment.

(3) Limits for General Population/Uncontrolled exposure: 0.08 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 4 W/kg, as averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). General Population/Uncontrolled limits apply when the general public may be exposed, or when persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or do not exercise control over their exposure. Warning labels placed on consumer



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devices such as cellular telephones will not be sufficient reason to allow these devices to be evaluated subject to limits for occupational/controlled exposure in paragraph (d)(1) of this section. (Table 4.)

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

Table 4. RF exposure limits

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

# 2. Summary of Results

## 2.1 Decision rules

Reported measurement data comply with IEEE 1528-2013:
Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

## 2.2 Summary of Results

| Antenna | Mode | Position | Distance (mm) | CH | Freq. (MHz) | Max. Rated Avg. Power + Max. Tolerance (dBm) | Measured Avg. Power (dBm) | Duty cycle scaling | Power scaling | Averaged SAR over 1g (W/kg) | | Plot page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Measured | Reported | |
| Main | WLAN 802.11b | Bottom surface | 0 | 1 | 2412 | 18.50 | 18.47 | 1.005 | 100.69% | 1.010 | 1.022 | - |
| | | Bottom surface | 0 | 6 | 2437 | 18.50 | 18.48 | 1.005 | 100.46% | 1.030 | 1.040 | 46 |
| | | Bottom surface | 0 | 11 | 2462 | 18.50 | 18.49 | 1.005 | 100.23% | 1.030 | 1.038 | - |
| | | Bottom surface* | 0 | 11 | 2462 | 18.50 | 18.49 | 1.005 | 100.23% | 0.998 | 1.005 | - |
| | WLAN 802.11ac(80M) 5.2G | Bottom surface | 0 | 42 | 5210 | 16.50 | 16.47 | 1.011 | 100.69% | 0.690 | 0.702 | 47 |
| | WLAN 802.11ac(80M) 5.3G | Bottom surface | 0 | 58 | 5290 | 15.50 | 15.49 | 1.011 | 100.23% | 0.564 | 0.572 | 48 |
| | WLAN 802.11ac(80M) 5.6G | Bottom surface | 0 | 138 | 5690 | 15.50 | 15.49 | 1.011 | 100.23% | 0.529 | 0.536 | 48 |
| | WLAN 802.11ac(80M) 5.8G | Bottom surface | 0 | 155 | 5775 | 16.50 | 16.49 | 1.011 | 100.23% | 0.628 | 0.636 | 50 |
| Aux | WLAN 802.11b | Bottom surface | 0 | 6 | 2437 | 17.50 | 17.49 | 1.005 | 100.23% | 0.953 | 0.960 | - |
| | | Bottom surface | 0 | 11 | 2462 | 17.50 | 17.48 | 1.005 | 100.46% | 1.020 | 1.030 | 51 |
| | | Bottom surface* | 0 | 11 | 2462 | 17.50 | 17.48 | 1.005 | 100.46% | 0.992 | 1.002 | - |
| | Bluetooth(GFSK) | Bottom surface | 0 | 78 | 2480 | 10.50 | 9.44 | 1.297 | 127.64% | 0.137 | 0.227 | 52 |
| | WLAN 802.11n(40M) 5.2G | Bottom surface | 0 | 38 | 5190 | 18.50 | 18.49 | 1.011 | 100.23% | 0.760 | 0.770 | - |
| | | Bottom surface* | 0 | 46 | 5230 | 18.50 | 18.48 | 1.011 | 100.46% | 0.869 | 0.883 | 53 |
| | | Bottom surface | 0 | 46 | 5230 | 18.50 | 18.48 | 1.011 | 100.46% | 0.853 | 0.866 | - |
| | WLAN 802.11ac(80M) 5.2G | Bottom surface | 0 | 42 | 5210 | 18.50 | 18.49 | 1.011 | 100.23% | 0.808 | 0.819 | 54 |
| | | Bottom surface* | 0 | 42 | 5210 | 18.50 | 18.49 | 1.011 | 100.23% | 0.792 | 0.803 | - |
| | WLAN 802.11a 5.3G | Bottom surface | 0 | 56 | 5280 | 18.50 | 18.49 | 1.022 | 100.23% | 0.782 | 0.801 | 55 |
| | | Bottom surface* | 0 | 56 | 5280 | 18.50 | 18.49 | 1.022 | 100.23% | 0.774 | 0.793 | - |
| | | Bottom surface | 0 | 60 | 5300 | 18.50 | 18.48 | 1.011 | 100.46% | 0.751 | 0.763 | - |
| | WLAN 802.11n(40M) 5.3G | Bottom surface | 0 | 54 | 5270 | 18.50 | 18.48 | 1.011 | 100.46% | 0.808 | 0.821 | 56 |
| | | Bottom surface* | 0 | 54 | 5270 | 18.50 | 18.48 | 1.011 | 100.46% | 0.806 | 0.819 | - |
| | WLAN 802.11ac(80M) 5.6G | Bottom surface | 0 | 106 | 5530 | 16.50 | 16.49 | 1.011 | 100.23% | 0.490 | 0.497 | 57 |
| | WLAN 802.11ac(80M) 5.8G | Bottom surface | 0 | 155 | 5775 | 15.50 | 15.49 | 1.011 | 100.23% | 0.448 | 0.454 | 58 |

* - repeated at the highest SAR measurement according to the KDB 865664 D01

Note:

$$\text{Scaling} = \frac{\text{reported SAR}}{\text{measured SAR}} = \frac{\text{P2(mW)}}{\text{P1(mW)}} = 10^{\left(\frac{\text{P2}-\text{P1}}{10}\right)(\text{dBm})}$$

Reported SAR = measured SAR * (scaling)

Where P2 is maximum specified power, P1 is measured conducted power

## 2.3 Reporting statements of conformity

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



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# 3. Simultaneous Transmission Analysis

## Simultaneous Transmission Scenarios:

| Simultaneous Transmit Configurations | Body |
|---|---|
| 2.4GHz WLAN MIMO | Yes |
| 5GHz WLAN MIMO | Yes |
| BT + 2.4GHz WLAN Main | Yes |
| BT + 5GHz WLAN Main | Yes |

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


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### 3.1 Estimated SAR calculation

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

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

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

### 3.2 SPLSR evaluation and analysis

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

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

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

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

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


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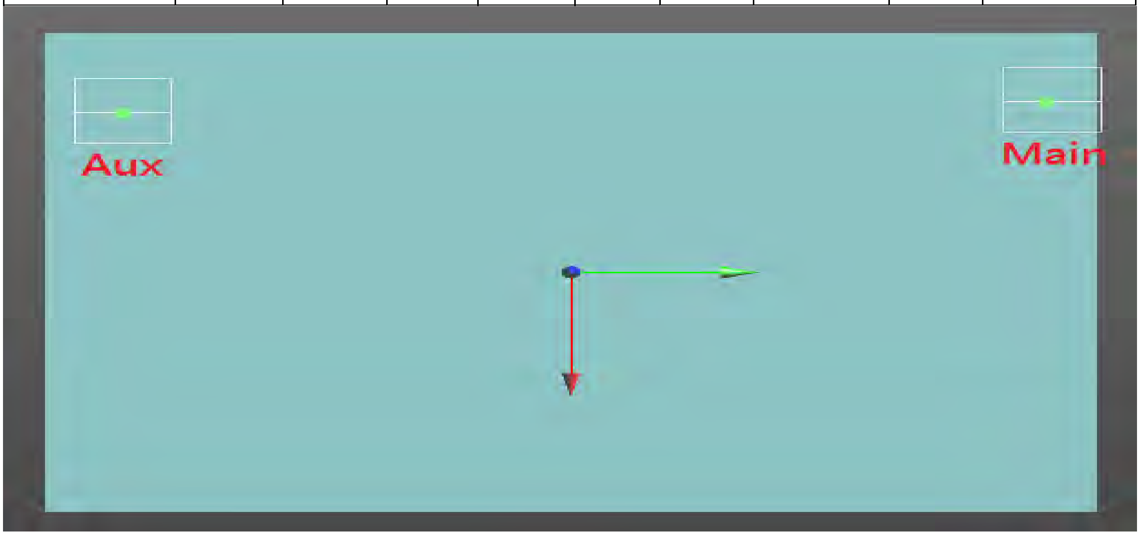
The simultaneous Transmission conditions (Notebook mode)

| Exposure position 1g(W/kg) | 1 | 2 | 3 | 4 | 5 | Scenario 1 | Scenario 2 | Scenario 3 | Scenario 4 | SPLSR |
|---|---|---|---|---|---|---|---|---|---|---|
| | WLAN 2.4GHz Main | WLAN 2.4GHz Aux | WLAN 5GHz Main | WLAN 5GHz Aux | BT (Aux) | 1+2 Sum | 3+4 Sum | 1+5 Sum | 3+5 Sum | |
| Bottom side | 1.040 | 1.030 | 0.702 | 0.883 | 0.227 | 2.070 | 1.585 | 1.267 | 0.929 | Analyzed as below |

## WLAN 2.4GGz MIMO

| Conditions | Position | SAR Value (W/kg) | Coordinates (cm) | | | ΣSAR (W/kg) | Peak Location Separation Distance (mm) | SPLSR | Simultaneous Transmission SAR Test |
|---|---|---|---|---|---|---|---|---|---|
| | | | x | y | z | | | | |
| WLAN Main | Botttom Surface | 1.040 | -7.82 | 14.62 | -0.23 | 2.070 | 284.24 | 0.010 | SPLSR<0.04, Not required |
| WLAN Aux | | 1.030 | -7.34 | -13.80 | -0.25 | | | | |



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# 4. Instruments List

| Manufacturer | Device | Type | Serial number | Date of last calibration | Date of next calibration |
|---|---|---|---|---|---|
| SPEAG | Dosimetric E-Field Probe | EX3DV4 | 7509 | Apr.26.2021 | Apr.25.2022 |
| SPEAG | System Validation Dipole | D2450V2 | 727 | Apr.14,2021 | Apr.13,2022 |
| | | D5GHzV2 | 1023 | Jan.26.2021 | Jan.25.2022 |
| SPEAG | Data acquisition Electronics | DAE4 | 1336 | Aug.13,2020 | Aug.12,2021 |
| SPEAG | Software | DASY 52 52.10.4 | N/A | Calibration not required | Calibration not required |
| SPEAG | Phantom | ELI | N/A | Calibration not required | Calibration not required |
| SPEAG | Dielectric Assessment Kit | DAKS-3.5 | 1053 | Feb.17,2021 | Feb.16,2022 |
| Agilent | Dual-directional coupler | 772D | MY52180142 | Oct.06,2020 | Oct.05,2021 |
| | | 778D | MY52180302 | Oct.06,2020 | Oct.05,2021 |
| Agilent | Signal Generator | N5181A | MY50145142 | Dec.27,2020 | Dec.26,2021 |
| Agilent | Power Meter | E4417A | MY52200004 | Oct.18,2020 | Oct.17,2021 |
| Agilent | Power Sensor | E9301H | MY52240003 | Oct.18,2020 | Oct.17,2021 |
| | | | MY52200003 | Oct.18,2020 | Oct.17,2021 |
| TECPEL | Digital thermometer | DTM-303A | TP190085 | Dec.22,2020 | Dec.14,2021 |

# 5. Measurements

Date: 2021/6/9

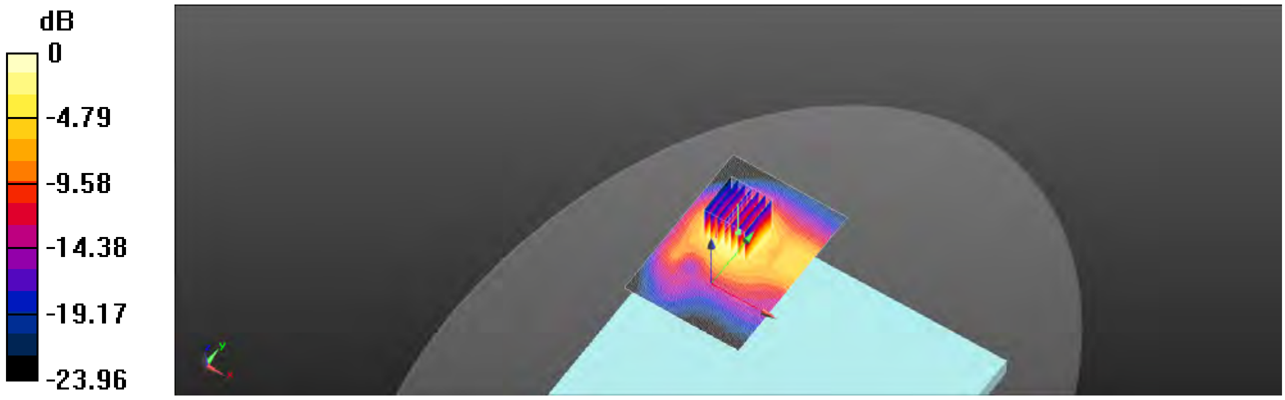
**Report No: E5/2021/50001**
**WLAN 802.11b_Body_Bottom side_CH 6_0mm_Main**
Communication System: WLAN ; Frequency: 2437 MHz; Duty Cycle: 1:1.005
Medium parameters used: f = 2437 MHz; σ = 1.767 S/m; $\varepsilon_r$ = 38.523; ρ = 1000 kg/m$^3$
Phantom section: Flat Section
Ambient temperature: 22.4°C; Liquid temperature: 21.9°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7509; ConvF(8.18, 8.18, 8.18); Calibrated: 2021/4/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2020/8/13
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

**Area Scan (71x101x1):** Interpolated grid: dx=12 mm, dy=12 mm
Maximum value of SAR (interpolated) = 1.56 W/kg

**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.5421 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 2.04 W/kg
**SAR(1 g) = 1.03 W/kg; SAR(10 g) = 0.493 W/kg**
Smallest distance from peaks to all points 3 dB below = 11.2 mm
Ratio of SAR at M2 to SAR at M1 = 51.5%
Maximum value of SAR (measured) = 1.50 W/kg




0 dB = 1.50 W/kg = 1.76 dBW/kg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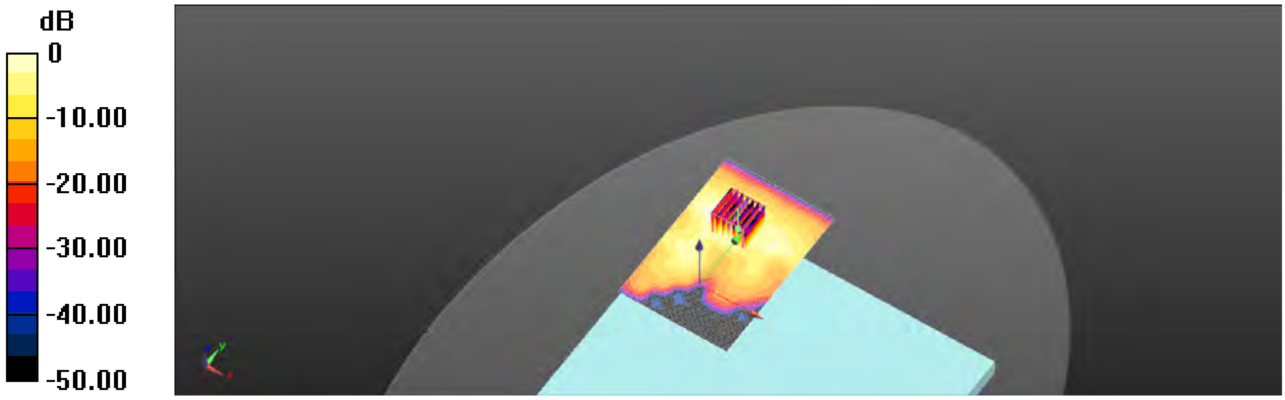
Date: 2021/6/10

**Report No: E5/2021/50001**
**WLAN 802.11ac(80M) 5.2G_Body_Bottom side_CH 42_0mm_Main**
Communication System: WLAN; Frequency: 5210 MHz; Duty Cycle: 1:1.011
Medium parameters used: f = 5210 MHz; σ = 4.575 S/m; $\varepsilon_r$ = 35.274; ρ = 1000 kg/m$^3$
Phantom section: Flat Section
Ambient temperature: 22.2°C; Liquid temperature: 21.8°C

DASY5 Configuration:
- Probe: EX3DV4 - SN7509; ConvF(5.7, 5.7, 5.7); Calibrated: 2021/4/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2020/8/13
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

**Area Scan (81x121x1):** Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.33 W/kg

**Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.6213 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 2.42 W/kg
**SAR(1 g) = 0.690 W/kg; SAR(10 g) = 0.256 W/kg**
Smallest distance from peaks to all points 3 dB below = 10.4 mm
Ratio of SAR at M2 to SAR at M1 = 55.4%
Maximum value of SAR (measured) = 1.27 W/kg




0 dB = 1.27 W/kg = 1.05 dBW/kg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Date: 2021/6/10

**Report No: E5/2021/50001**

**WLAN 802.11ac(80M) 5.3G_Body_Bottom side_CH 58_0mm_Main**

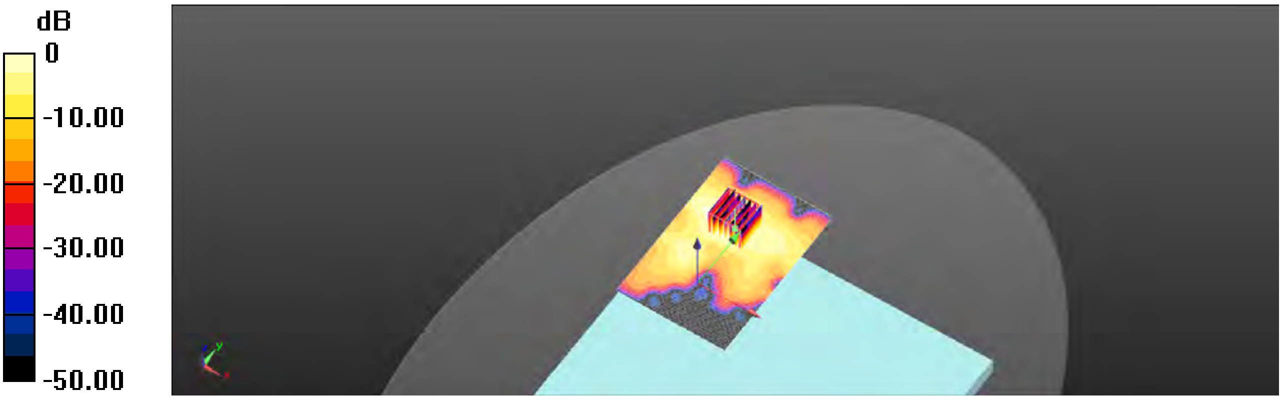
Communication System: WLAN; Frequency: 5290 MHz; Duty Cycle: 1:1.011
Medium parameters used: f = 5290 MHz; σ = 4.656 S/m; $\varepsilon_r$ = 35.183; ρ = 1000 kg/m$^3$
Phantom section: Flat Section
Ambient temperature: 22.2°C; Liquid temperature: 21.8°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7509; ConvF(5.45, 5.45, 5.45); Calibrated: 2021/4/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2020/8/13
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

**Area Scan (81x121x1):** Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.11 W/kg

**Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.0132 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.97 W/kg
**SAR(1 g) = 0.564 W/kg; SAR(10 g) = 0.210 W/kg**
Smallest distance from peaks to all points 3 dB below = 10.2 mm
Ratio of SAR at M2 to SAR at M1 = 54.8%
Maximum value of SAR (measured) = 1.05 W/kg




0 dB = 1.05 W/kg = 0.21 dBW/kg

Date: 2021/6/11

**Report No: E5/2021/50001**

**WLAN 802.11ac(80M) 5.6G_Body_Bottom side_CH 138_0mm_Main**

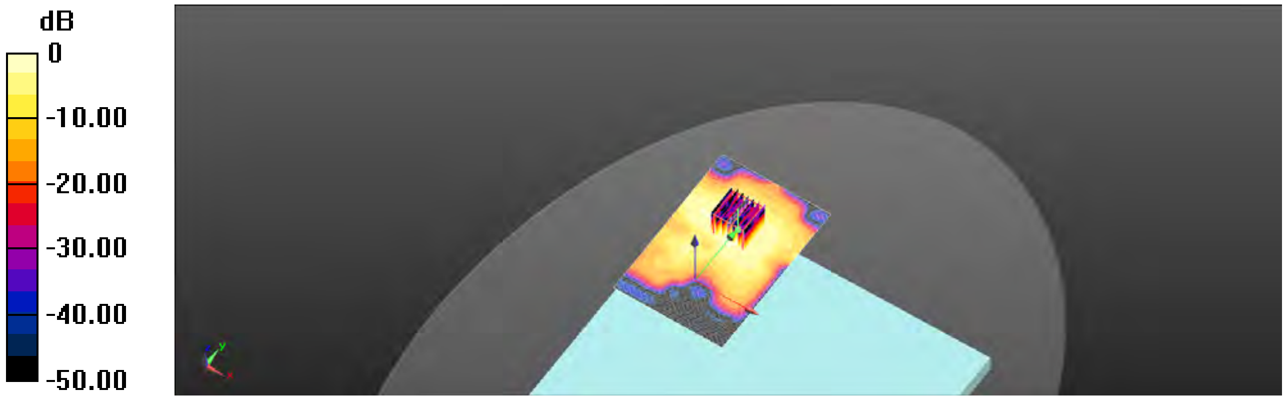
Communication System: WLAN ; Frequency: 5690 MHz; Duty Cycle: 1:1.011
Medium parameters used: f = 5690 MHz; $\sigma$ = 5.06 S/m; $\varepsilon_r$ = 34.726; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section
Ambient temperature: 22.3°C; Liquid temperature: 21.7°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7509; ConvF(5.1, 5.1, 5.1) ; Calibrated: 2021/4/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2020/8/13
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

**Area Scan (81x121x1):** Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.02 W/kg

**Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.3197 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 2.09 W/kg
**SAR(1 g) = 0.529 W/kg; SAR(10 g) = 0.186 W/kg**
Smallest distance from peaks to all points 3 dB below = 9.1 mm
Ratio of SAR at M2 to SAR at M1 = 51.8%
Maximum value of SAR (measured) = 1.02 W/kg




0 dB = 1.02 W/kg = 0.08 dBW/kg



SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區新北產業園區五工路 134 號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.sgs.com.tw
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Date: 2021/6/11

**Report No: E5/2021/50001**

**WLAN 802.11ac(80M) 5.8G_Body_Bottom side_CH 155_0mm_Main**

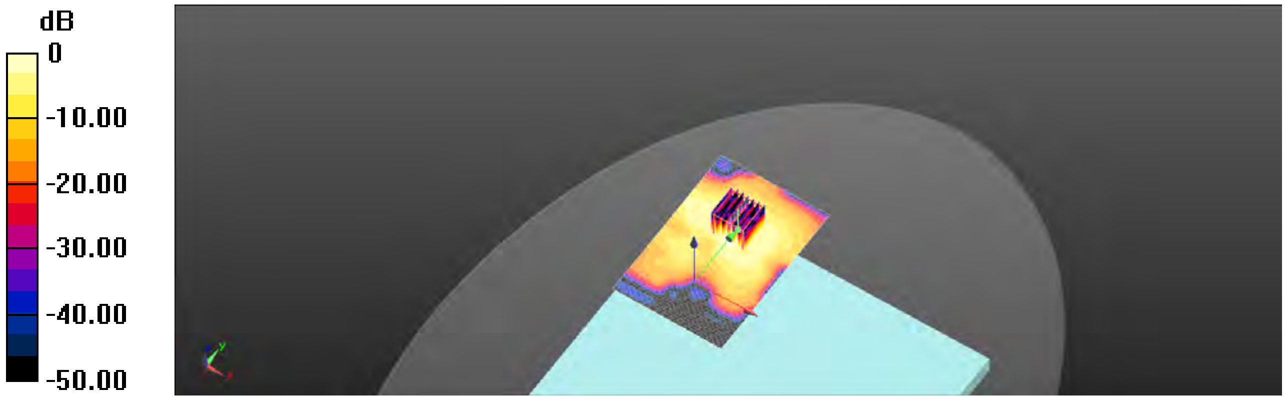
Communication System: WLAN; Frequency: 5775 MHz; Duty Cycle: 1:1.011
Medium parameters used: f = 5775 MHz; σ = 5.145 S/m; $\varepsilon_r$ = 34.629; ρ = 1000 kg/m$^3$
Phantom section: Flat Section
Ambient temperature: 22.3°C; Liquid temperature: 21.7°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7509; ConvF(5.2, 5.2, 5.2); Calibrated: 2021/4/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2020/8/13
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

**Area Scan (81x121x1):** Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.22 W/kg

**Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.1573 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 2.53 W/kg
**SAR(1 g) = 0.628 W/kg; SAR(10 g) = 0.216 W/kg**
Smallest distance from peaks to all points 3 dB below = 8.5 mm
Ratio of SAR at M2 to SAR at M1 = 51.4%
Maximum value of SAR (measured) = 1.23 W/kg




0 dB = 1.23 W/kg = 0.90 dBW/kg



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台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.sgs.com.tw
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Date: 2021/6/9

**Report No: E5/2021/50001**

**WLAN 802.11b_Body_Bottom side_CH 11_0mm_Aux**

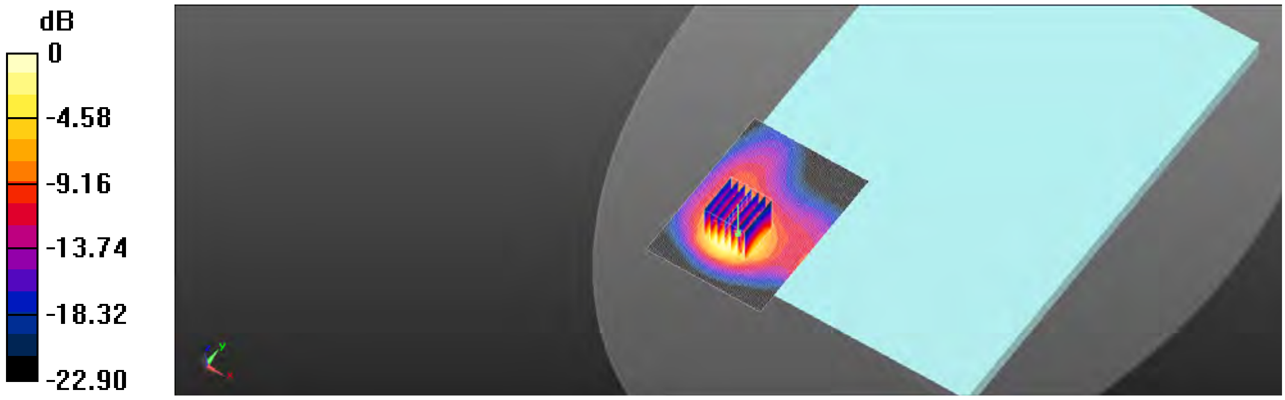
Communication System: WLAN; Frequency: 2462 MHz; Duty Cycle: 1:1.005
Medium parameters used: f = 2462 MHz; $\sigma$ = 1.789 S/m; $\varepsilon_r$ = 38.485; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Ambient temperature: 22.4°C; Liquid temperature: 21.9°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7509; ConvF(8.18, 8.18, 8.18); Calibrated: 2021/4/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2020/8/13
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

**Area Scan (71x101x1):** Interpolated grid: dx=12 mm, dy=12 mm
Maximum value of SAR (interpolated) = 1.62 W/kg

**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.9452 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 2.06 W/kg
**SAR(1 g) = 1.02 W/kg; SAR(10 g) = 0.493 W/kg**
Smallest distance from peaks to all points 3 dB below = 12 mm
Ratio of SAR at M2 to SAR at M1 = 59%
Maximum value of SAR (measured) = 1.53 W/kg




0 dB = 1.53 W/kg = 1.84 dBW/kg

Date: 2021/6/9

**Report No: E5/2021/50001**

**Bluetooth(GFSK)_Body_Bottom side_CH 78_0mm_Aux**

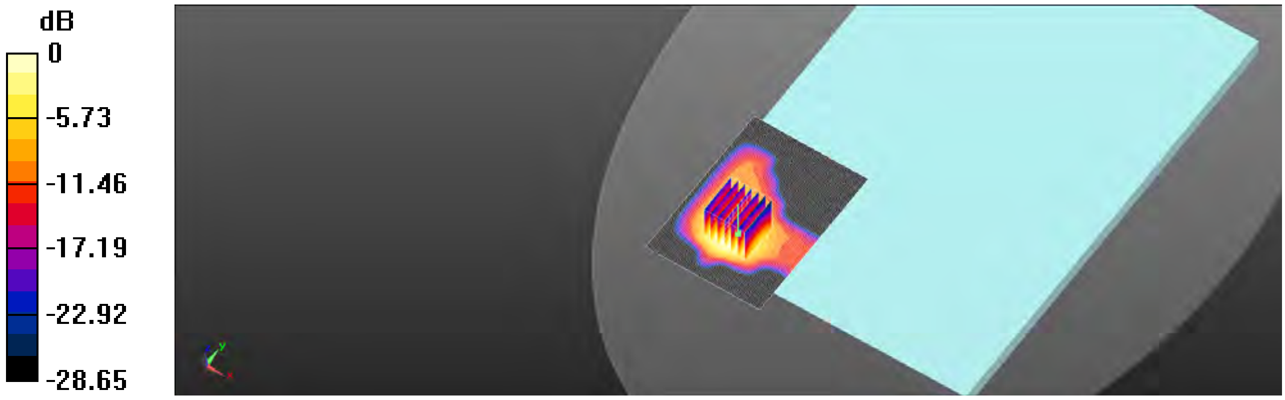
Communication System: Bluetooth; Frequency: 2480 MHz; Duty Cycle: 1:1.297
Medium parameters used: f = 2480 MHz; $\sigma$ = 1.805 S/m; $\varepsilon_r$ = 38.462; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section
Ambient temperature: 22.4°C; Liquid temperature: 21.9°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7509; ConvF(8.18, 8.18, 8.18); Calibrated: 2021/4/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2020/8/13
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

**Area Scan (71x101x1):** Interpolated grid: dx=12 mm, dy=12 mm
Maximum value of SAR (interpolated) = 0.215 W/kg

**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.461 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.278 W/kg
**SAR(1 g) = 0.137 W/kg; SAR(10 g) = 0.065 W/kg**
Smallest distance from peaks to all points 3 dB below = 11.3 mm
Ratio of SAR at M2 to SAR at M1 = 58.1%
Maximum value of SAR (measured) = 0.205 W/kg




0 dB = 0.205 W/kg = -6.89 dBW/kg

Date: 2021/6/10

**Report No: E5/2021/50001**

**WLAN 802.11n(40M) 5.2G_Body_Bottom side_CH 46_0mm_Aux**

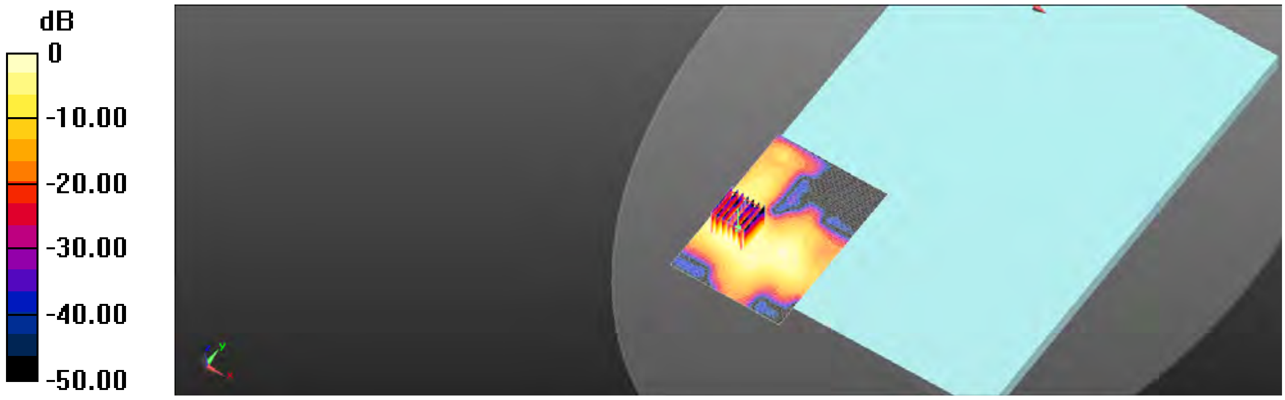
Communication System: WLAN ; Frequency: 5230 MHz; Duty Cycle: 1:1.011
Medium parameters used: f = 5230 MHz; $\sigma$ = 4.595 S/m; $\varepsilon_r$ = 35.251; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section
Ambient temperature: 22.2°C; Liquid temperature: 21.8°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7509; ConvF(5.7, 5.7, 5.7); Calibrated: 2021/4/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2020/8/13
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

**Area Scan (81x121x1):** Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.65 W/kg

**Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.5241 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 3.22 W/kg
**SAR(1 g) = 0.869 W/kg; SAR(10 g) = 0.287 W/kg**
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 56.7%
Maximum value of SAR (measured) = 1.66 W/kg




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

Date: 2021/6/10

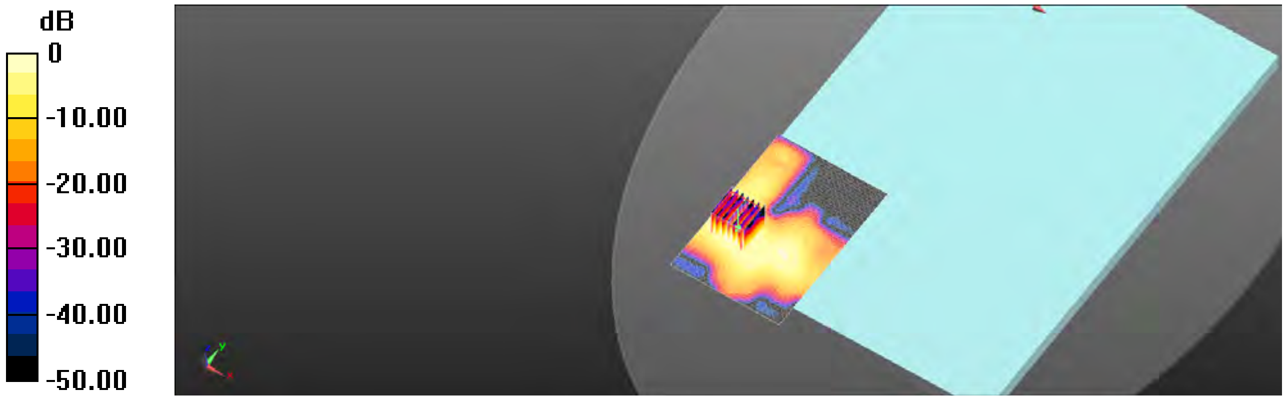
**Report No: E5/2021/50001**
**WLAN 802.11ac(80M) 5.2G_Body_Bottom side_CH 42_0mm_Aux**
Communication System: WLAN; Frequency: 5210 MHz; Duty Cycle: 1:1.011
Medium parameters used: f = 5210 MHz; σ = 4.575 S/m; $\varepsilon_r$ = 35.274; ρ = 1000 kg/m$^3$
Phantom section: Flat Section
Ambient temperature: 22.2°C; Liquid temperature: 21.8°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7509; ConvF(5.7, 5.7, 5.7); Calibrated: 2021/4/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2020/8/13
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

**Wifi/Area Scan (81x121x1):** Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.52 W/kg

**Wifi/Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.5649 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 2.98 W/kg
**SAR(1 g) = 0.808 W/kg; SAR(10 g) = 0.265 W/kg**
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 56.9%
Maximum value of SAR (measured) = 1.53 W/kg




0 dB = 1.53 W/kg = 1.84 dBW/kg

Date: 2021/6/10

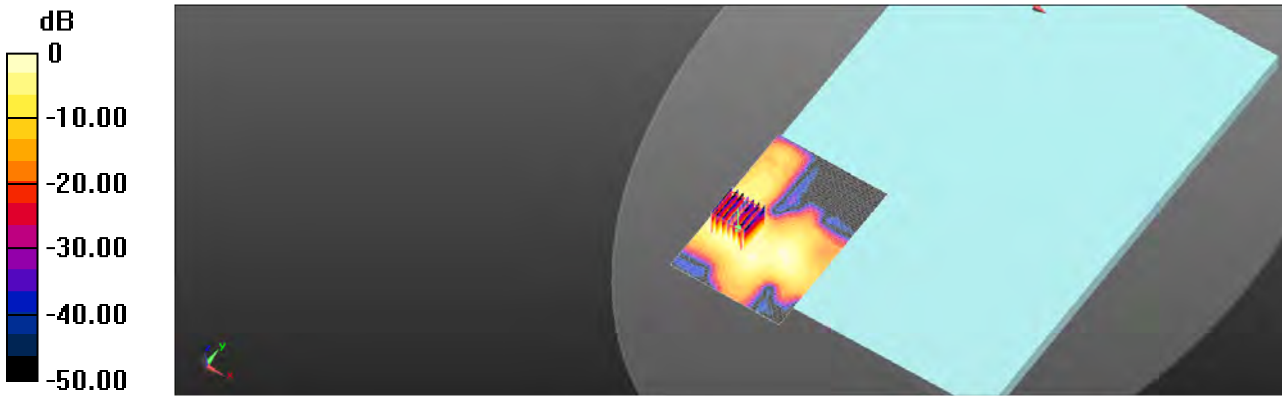
**Report No: E5/2021/50001**
**WLAN 802.11a 5.3G_Body_Bottom side_CH 56_0mm_Aux**
Communication System: WLAN ; Frequency: 5280 MHz; Duty Cycle: 1:1.022
Medium parameters used: f = 5280 MHz; $\sigma$ = 4.646 S/m; $\varepsilon_r$ = 35.194; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Ambient temperature: 22.2°C; Liquid temperature: 21.8°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7509; ConvF(5.45, 5.45, 5.45); Calibrated: 2021/4/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2020/8/13
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

**Area Scan (81x121x1):** Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.50 W/kg

**Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.9564 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 2.95 W/kg
**SAR(1 g) = 0.782 W/kg; SAR(10 g) = 0.260 W/kg**
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 56%
Maximum value of SAR (measured) = 1.50 W/kg




0 dB = 1.50 W/kg = 1.77 dBW/kg

Date: 2021/6/10

**Report No: E5/2021/50001**

**WLAN 802.11n(40M) 5.3G_Body_Bottom side_CH 54_0mm_Aux**

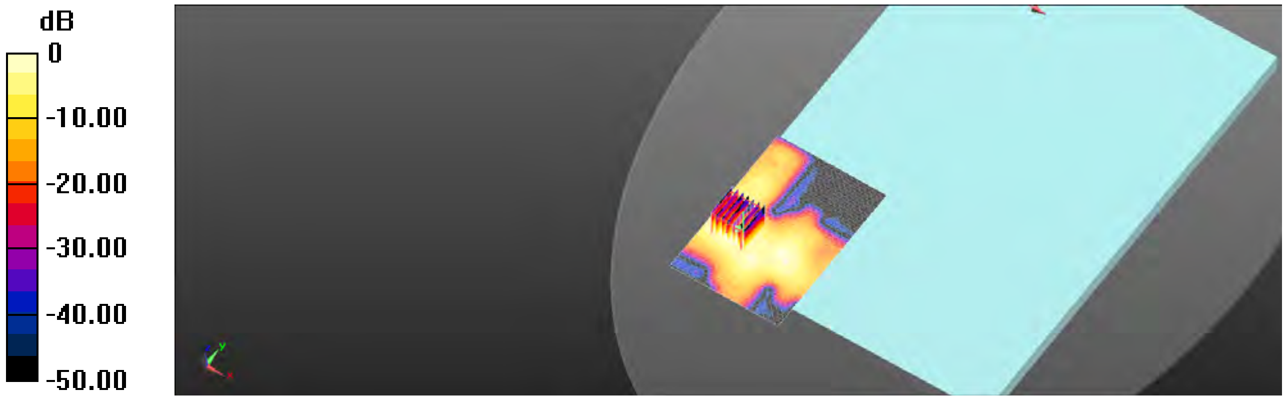
Communication System: WLAN ; Frequency: 5270 MHz; Duty Cycle: 1:1.011
Medium parameters used: f = 5270 MHz; $\sigma$ = 4.636 S/m; $\varepsilon_r$ = 35.206; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Ambient temperature: 22.2°C; Liquid temperature: 21.8°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7509; ConvF(5.45, 5.45, 5.45); Calibrated: 2021/4/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2020/8/13
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

**Area Scan (81x121x1):** Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.55 W/kg

**Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.3352 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 3.04 W/kg
**SAR(1 g) = 0.808 W/kg; SAR(10 g) = 0.266 W/kg**
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 56.1%
Maximum value of SAR (measured) = 1.51 W/kg




0 dB = 1.51 W/kg = 1.79 dBW/kg

Date: 2021/6/11

**Report No: E5/2021/50001**

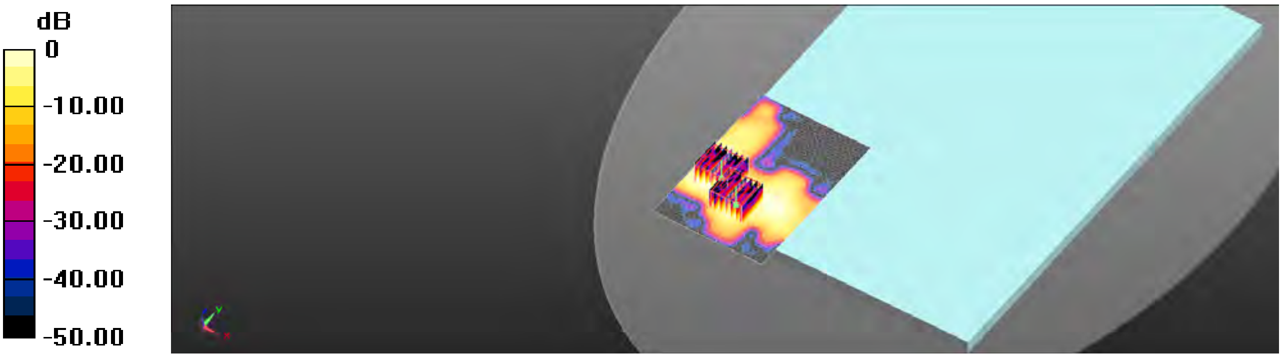
**WLAN 802.11ac(80M) 5.6G_Body_Bottom side_CH 106_0mm_Aux**

Communication System: WLAN ; Frequency: 5530 MHz; Duty Cycle: 1:1.011
Medium parameters used: f = 5530 MHz; σ = 4.899 S/m; $\varepsilon_r$ = 34.909; ρ = 1000 kg/m$^3$
Phantom section: Flat Section
Ambient temperature: 22.1°C; Liquid temperature: 21.8°C
DASY5 Configuration:

- Probe: EX3DV4 - SN7509; ConvF(5.1, 5.1, 5.1); Calibrated: 2021/4/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2020/8/13
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

**Area Scan (81x121x1):** Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 0.985 W/kg
**Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.5137 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.98 W/kg
**SAR(1 g) = 0.490 W/kg; SAR(10 g) = 0.155 W/kg**
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 53.4%
Maximum value of SAR (measured) = 0.958 W/kg

**Zoom Scan (7x7x12)/Cube 1:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.8421 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.60 W/kg
**SAR(1 g) = 0.383 W/kg; SAR(10 g) = 0.116 W/kg**
Smallest distance from peaks to all points 3 dB below = 6.6 mm
Ratio of SAR at M2 to SAR at M1 = 53.8%
Maximum value of SAR (measured) = 0.764 W/kg




0 dB = 0.764 W/kg = -1.17 dBW/kg



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台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.sgs.com.tw
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Date: 2021/6/11

**Report No: E5/2021/50001**

**WLAN 802.11ac(80M) 5.8G_Body_Bottom side_CH 155_0mm_Aux**

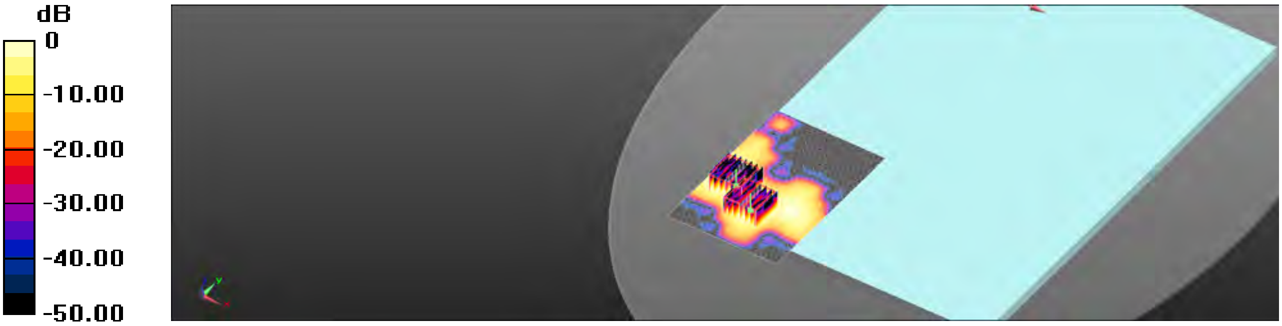
Communication System: WLAN; Frequency: 5775 MHz; Duty Cycle: 1:1.011
Medium parameters used: f = 5775 MHz; $\sigma$ = 5.145 S/m; $\varepsilon_r$ = 34.629; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Ambient temperature: 22.3°C; Liquid temperature: 21.7°C
DASY5 Configuration:

- Probe: EX3DV4 - SN7509; ConvF(5.2, 5.2, 5.2); Calibrated: 2021/4/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2020/8/13
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

**Area Scan (81x121x1):** Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 0.871 W/kg

**Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.7184 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.93 W/kg
**SAR(1 g) = 0.448 W/kg; SAR(10 g) = 0.129 W/kg**
Smallest distance from peaks to all points 3 dB below = 6.8 mm
Ratio of SAR at M2 to SAR at M1 = 52.3%
Maximum value of SAR (measured) = 0.909 W/kg

**Zoom Scan (7x7x12)/Cube 1:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.4982 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.76 W/kg
**SAR(1 g) = 0.403 W/kg; SAR(10 g) = 0.123 W/kg**
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 51.4%
Maximum value of SAR (measured) = 0.824 W/kg




0 dB = 0.824 W/kg = -0.84 dBW/kg

# 6. SAR System Performance Verification

Date: 2021/6/9

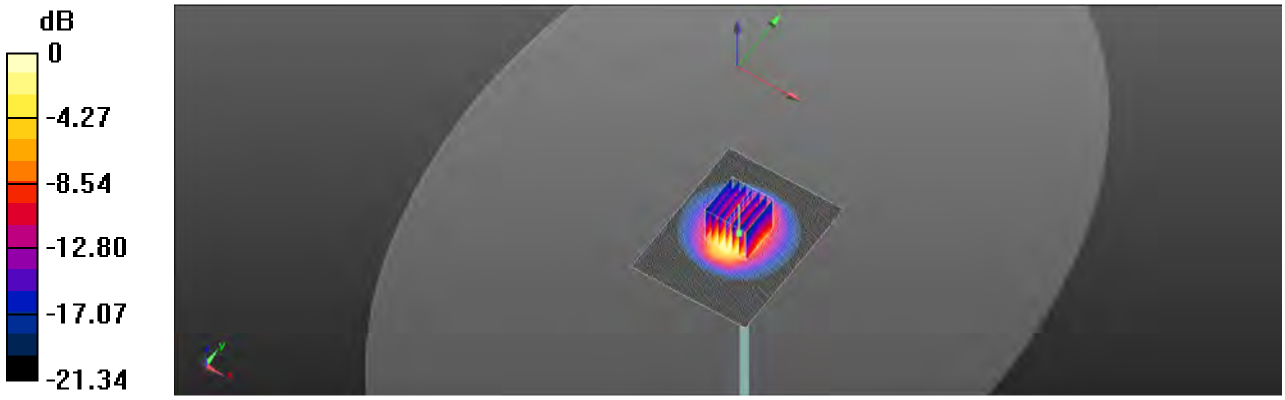
**Report No: E5/2021/50001**
**Dipole 2450 MHz_SN:727**
Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.778 S/m; $\varepsilon_r$ = 38.5; ρ = 1000 kg/$m^3$
Phantom section: Flat Section
Ambient temperature: 22.4°C; Liquid temperature: 21.9°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7509; ConvF(8.18, 8.18, 8.18); Calibrated: 2021/4/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2020/8/13
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

**Area Scan (71x91x1):** Interpolated grid: dx=12 mm, dy=12 mm
Maximum value of SAR (interpolated) = 18.9 W/kg

**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.53 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 25.6 W/kg
**SAR(1 g) = 12.9 W/kg; SAR(10 g) = 5.97 W/kg**
Smallest distance from peaks to all points 3 dB below = 9 mm
Ratio of SAR at M2 to SAR at M1 = 58.7%
Maximum value of SAR (measured) = 18.4 W/kg




0 dB = 18.4 W/kg = 12.65 dBW/kg

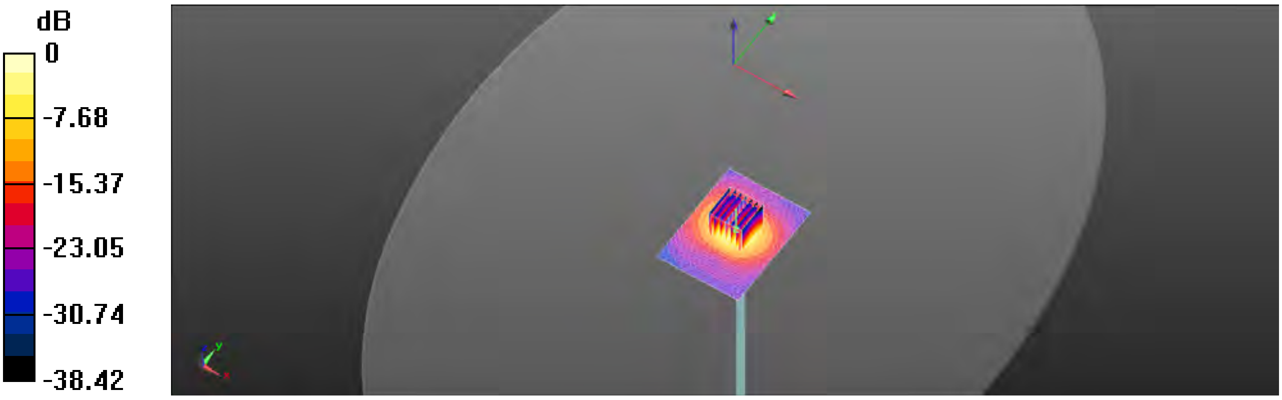
Date: 2021/6/10

**Report No: E5/2021/50001**
**Dipole 5200 MHz_SN:1023**
Communication System: CW; Frequency: 5200 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 4.565 S/m; $\varepsilon_r$ = 35.286; ρ = 1000 kg/$m^3$
Phantom section: Flat Section
Ambient temperature: 22.2°C; Liquid temperature: 21.8°C

DASY5 Configuration:
- Probe: EX3DV4 - SN7509; ConvF(5.7, 5.7, 5.7); Calibrated: 2021/4/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2020/8/13
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

**Area Scan (61x81x1):** Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 16.6 W/kg

**Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 57.59 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 30.4 W/kg
**SAR(1 g) = 7.94 W/kg; SAR(10 g) = 2.27 W/kg**
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 57.1%
Maximum value of SAR (measured) = 16.1 W/kg




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

Date: 2021/6/10

**Report No: E5/2021/50001**

**Dipole 5300 MHz_SN:1023**

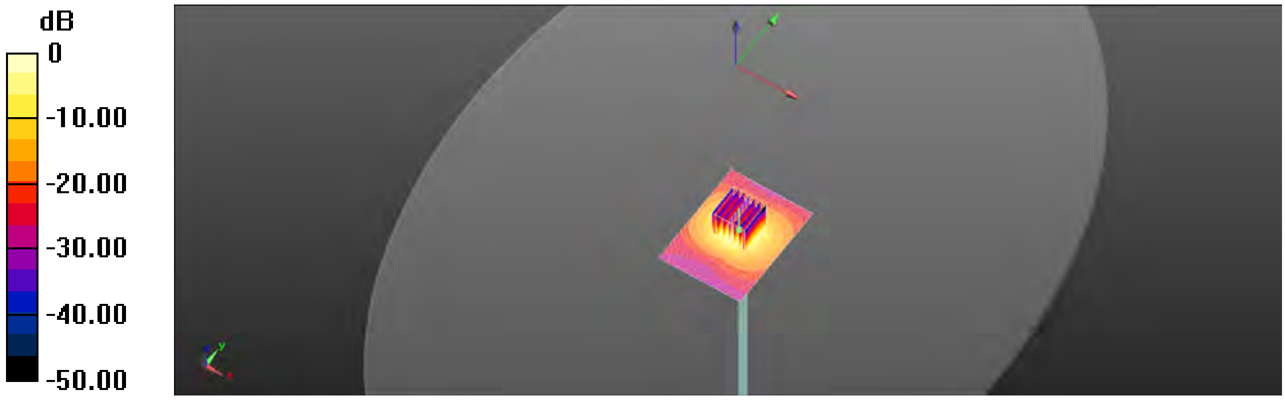
Communication System: CW; Frequency: 5300 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5300 MHz; $\sigma$ = 4.666 S/m; $\varepsilon_r$ = 35.171; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Ambient temperature: 22.2°C; Liquid temperature: 21.8°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7509; ConvF(5.45, 5.45, 5.45); Calibrated: 2021/4/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2020/8/13
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

**Area Scan (61x81x1):** Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 18.7 W/kg

**Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 57.78 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 37.2 W/kg
**SAR(1 g) = 8.17 W/kg; SAR(10 g) = 2.31 W/kg**
Smallest distance from peaks to all points 3 dB below = 7.4 mm
Ratio of SAR at M2 to SAR at M1 = 50.3%
Maximum value of SAR (measured) = 17.3 W/kg




0 dB = 17.3 W/kg = 12.39 dBW/kg



SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區新北產業園區五工路 134 號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.sgs.com.tw
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Date: 2021/6/11

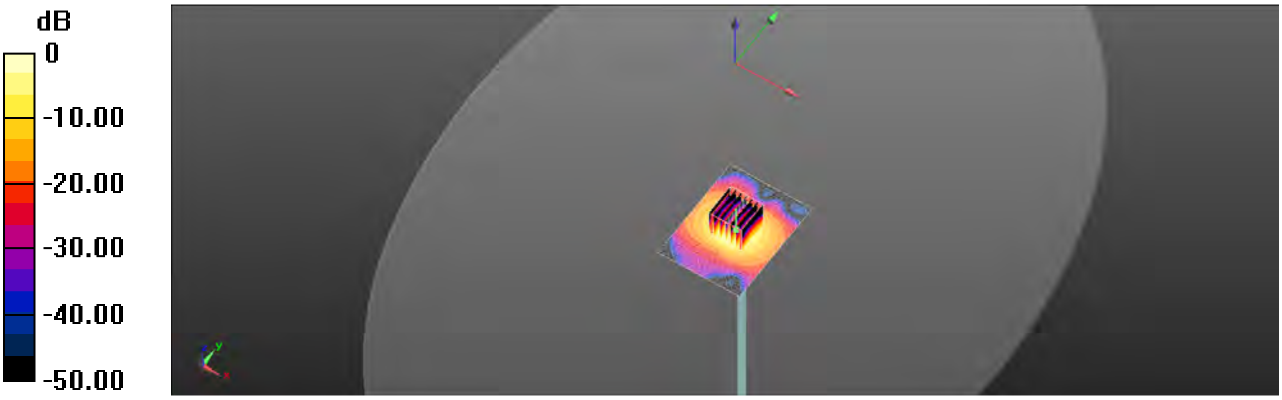
**Report No: E5/2021/50001**
**Dipole 5600 MHz_SN:1023**
Communication System: CW5GHz; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; σ = 4.969 S/m; $\varepsilon_r$ = 34.829; ρ = 1000 kg/m$^3$
Phantom section: Flat Section
Ambient temperature: 22.3°C; Liquid temperature: 21.7°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7509; ConvF(5.1, 5.1, 5.1) ; Calibrated: 2021/4/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2020/8/13
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

**Area Scan (61x81x1):** Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 18.3 W/kg

**Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 64.25 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 41.5 W/kg
**SAR(1 g) = 8.61 W/kg; SAR(10 g) = 2.39 W/kg**
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 59.4%
Maximum value of SAR (measured) = 19.0 W/kg




0 dB = 19.0 W/kg = 12.78 dBW/kg

Date: 2021/6/11

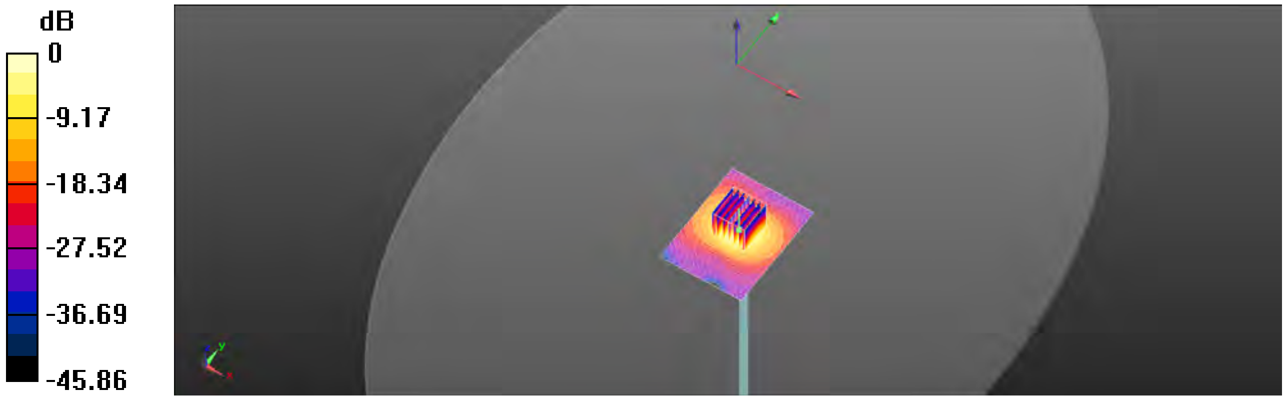
**Report No: E5/2021/50001**
**Dipole 5800 MHz_SN:1023**
Communication System: CW; Frequency: 5800 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; $\sigma$ = 5.170 S/m; $\varepsilon_r$ = 34.600; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Ambient temperature: 22.3°C; Liquid temperature: 21.7°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7509; ConvF(5.2, 5.2, 5.2); Calibrated: 2021/4/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2020/8/13
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

**Area Scan (61x81x1):** Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 16.8 W/kg

**Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 52.52 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 33.1 W/kg
**SAR(1 g) = 7.84 W/kg; SAR(10 g) = 2.18 W/kg**
Smallest distance from peaks to all points 3 dB below = 7.4 mm
Ratio of SAR at M2 to SAR at M1 = 51.9%
Maximum value of SAR (measured) = 16.0 W/kg




0 dB = 16.0 W/kg = 12.05 dBW/kg



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No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區新北產業園區五工路134號
t (886-2) 2299-3279 f (886-2) 2298-0488 www.sgs.com.tw
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# 7. Uncertainty Budget

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

| A | c | D | e | | f | g | h=c * f / e | i=c * g / e | k |
|---|---|---|---|---|---|---|---|---|---|
| Source of Uncertainty | Tolerance/ Uncertaint | Probability | Div | Div Value | ci (1g) | ci (10g) | Standard uncertainty | Standard uncertainty | vi, or Veff |
| | | | | | | | | | |
| **Measurement system** | | | | | | | | | |
| Probe calibration | 6.55% | N | 1 | 1 | 1 | 1 | 6.55% | 6.55% | ∞ |
| ***Isotropy , Axial*** | 3.50% | R | √3 | 1.732 | 1 | 1 | 2.02% | 2.02% | ∞ |
| ***Isotropy, Hemispherical*** | 9.60% | R | √3 | 1.732 | 1 | 1 | 5.54% | 5.54% | ∞ |
| Modulation Response | 2.40% | R | √3 | 1.732 | 1 | 1 | 1.40% | 1.40% | ∞ |
| Boundary Effect | 1.00% | R | √3 | 1.732 | 1 | 1 | 0.58% | 0.58% | ∞ |
| Linearity | 4.70% | R | √3 | 1.732 | 1 | 1 | 2.71% | 2.71% | ∞ |
| Detection Limits | 1.00% | R | √3 | 1.732 | 1 | 1 | 0.58% | 0.58% | ∞ |
| Readout Electronics | 0.30% | N | 1 | 1 | 1 | 1 | 0.30% | 0.30% | ∞ |
| Response time | 0.80% | R | √3 | 1.732 | 1 | 1 | 0.46% | 0.46% | ∞ |
| Integration Time | 2.60% | R | √3 | 1.732 | 1 | 1 | 1.50% | 1.50% | ∞ |
| ***Measurement drift (class A evaluation)*** | 1.75% | R | √3 | 1.732 | 1 | 1 | 1.01% | 1.01% | ∞ |
| RF ambient condition - noise | 3.00% | R | √3 | 1.732 | 1 | 1 | 1.73% | 1.73% | ∞ |
| RF ambient conditions - reflections | 3.00% | R | √3 | 1.732 | 1 | 1 | 1.73% | 1.73% | ∞ |
| Probe positioner Mechanical restrictions | 0.40% | R | √3 | 1.732 | 1 | 1 | 0.23% | 0.23% | ∞ |
| Probe Positioning with respect to phantom | 2.90% | R | √3 | 1.732 | 1 | 1 | 1.67% | 1.67% | ∞ |
| Post-processing | 1.00% | R | √3 | 1.732 | 1 | 1 | 0.58% | 0.58% | ∞ |
| Max SAR Eval | 1.00% | R | √3 | 1.732 | 1 | 1 | 0.58% | 0.58% | ∞ |
| | | | | | | | | | |
| **Test Sample related** | | | | | | | | | |
| Test sample positioning | 2.90% | N | 1 | 1 | 1 | 1 | 2.90% | 2.90% | M-1 |
| Device Holder Uncertainty | 3.60% | N | 1 | 1 | 1 | 1 | 3.60% | 3.60% | M-1 |
| Drift of output power | 5.00% | R | √3 | 1.732 | 1 | 1 | 2.89% | 2.89% | ∞ |
| | | | | | | | | | |
| **Phantom and Setup** | | | | | | | | | |
| Phantom Uncertainty | 4.00% | R | √3 | 1.732 | 1 | 1 | 2.31% | 2.31% | ∞ |
| Liquid permittivity (mea.) | 1.98% | N | 1 | 1 | 0.64 | 0.43 | 1.27% | 0.85% | M |
| Liquid Conductivity (mea.) | 1.93% | N | 1 | 1 | 0.6 | 0.49 | 1.16% | 0.95% | M |
| Combined standard uncertainty | | RSS | | | | | 11.84% | 11.78% | |
| Expant uncertainty (95% confidence | | | | | | | 23.68% | 23.55% | |

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

| A | c | D | e | | f | g | h=c * f / e | i=c * g / e | k |
|---|---|---|---|---|---|---|---|---|---|
| Source of Uncertainty | Tolerance/ Uncertaint | Probability | Div | Div Value | ci (1g) | ci (10g) | Standard uncertainty | Standard uncertainty | vi, or Veff |
| | | | | | | | | | |
| **Measurement system** | | | | | | | | | |
| Probe calibration | 6.00% | N | 1 | 1 | 1 | 1 | 6.00% | 6.00% | ∞ |
| ***Isotropy , Axial*** | 3.50% | R | √3 | 1.732 | 1 | 1 | 2.02% | 2.02% | ∞ |
| ***Isotropy, Hemispherical*** | 9.60% | R | √3 | 1.732 | 1 | 1 | 5.54% | 5.54% | ∞ |
| Modulation Response | 2.40% | R | √3 | 1.732 | 1 | 1 | 1.40% | 1.40% | ∞ |
| Boundary Effect | 1.00% | R | √3 | 1.732 | 1 | 1 | 0.58% | 0.58% | ∞ |
| Linearity | 4.70% | R | √3 | 1.732 | 1 | 1 | 2.71% | 2.71% | ∞ |
| Detection Limits | 1.00% | R | √3 | 1.732 | 1 | 1 | 0.58% | 0.58% | ∞ |
| Readout Electronics | 0.30% | N | 1 | 1 | 1 | 1 | 0.30% | 0.30% | ∞ |
| Response time | 0.80% | R | √3 | 1.732 | 1 | 1 | 0.46% | 0.46% | ∞ |
| Integration Time | 2.60% | R | √3 | 1.732 | 1 | 1 | 1.50% | 1.50% | ∞ |
| ***Measurement drift (class A evaluation)*** | 1.75% | R | √3 | 1.732 | 1 | 1 | 1.01% | 1.01% | ∞ |
| RF ambient condition - noise | 3.00% | R | √3 | 1.732 | 1 | 1 | 1.73% | 1.73% | ∞ |
| RF ambient conditions - reflections | 3.00% | R | √3 | 1.732 | 1 | 1 | 1.73% | 1.73% | ∞ |
| Probe positioner Mechanical restrictions | 0.40% | R | √3 | 1.732 | 1 | 1 | 0.23% | 0.23% | ∞ |
| Probe Positioning with respect to phantom | 2.90% | R | √3 | 1.732 | 1 | 1 | 1.67% | 1.67% | ∞ |
| Post-processing | 1.00% | R | √3 | 1.732 | 1 | 1 | 0.58% | 0.58% | ∞ |
| Max SAR Eval | 1.00% | R | √3 | 1.732 | 1 | 1 | 0.58% | 0.58% | ∞ |
| | | | | | | | | | |
| **Test Sample related** | | | | | | | | | |
| Test sample positioning | 2.90% | N | 1 | 1 | 1 | 1 | 2.90% | 2.90% | M-1 |
| Device Holder Uncertainty | 3.60% | N | 1 | 1 | 1 | 1 | 3.60% | 3.60% | M-1 |
| Drift of output power | 5.00% | R | √3 | 1.732 | 1 | 1 | 2.89% | 2.89% | ∞ |
| | | | | | | | | | |
| **Phantom and Setup** | | | | | | | | | |
| Phantom Uncertainty | 4.00% | R | √3 | 1.732 | 1 | 1 | 2.31% | 2.31% | ∞ |
| Liquid permittivity (mea.) | 1.79% | N | 1 | 1 | 0.64 | 0.43 | 1.15% | 0.77% | M |
| Liquid Conductivity (mea.) | 1.34% | N | 1 | 1 | 0.6 | 0.49 | 0.80% | 0.66% | M |
| Combined standard uncertainty | | RSS | | | | | 11.50% | 11.45% | |
| Expant uncertainty (95% confidence | | | | | | | 23.01% | 22.91% | |



SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區新北產業園區五工路 134 號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.sgs.com.tw
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# Appendixes

**Refer to separated files for the following appendixes.**

**E5202150001 SAR_Appendix A Photographs**

**E5202150001 SAR_Appendix B DAE & Probe Cal. Certificate**

**E5202150001 SAR_Appendix C Phantom Description & Dipole Cal. Certificate**

**- End of report -**


SGS Taiwan Ltd. 台灣檢驗科技股份有限公司 | No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區新北產業園區五工路 134 號
t (886-2) 2299-3279 f (886-2) 2298-0488 www.sgs.com.tw
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