

SAR TEST REPORT



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

| Product Name | Tablet Computer |
|--------------------------------------|--|
| Marketing Name | SW512-52,SW512-52P |
| Brand Name | acer |
| Model No. | N17P5 |
| Prepared for | Acer Incorporated |
| Company Address | 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, |
| | KDB248227D01v02r02,KDB865664D01v01r04, |
| | KDB865664D02v01r02,KDB447498D01v06, |
| | KDB616217D04v01r02, |
| FCC ID | HLZ7265D2 |
| Date of Receipt | May. 02, 2017 |
| Date of Test(s) | May. 12, 2017 ~ May. 18, 2017 |
| Date of Issue | Jul. 14, 2017 |
| 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.

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Signed on behalf of SGS

Engineer

Bond Tsai

Date: Jul. 14, 201

台灣檢驗科技股份有限公司

Supervisor

John Teh

John Yeh Date: Jul. 14, 2017

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Revision History

| Report Number | Revision | Description | Issue Date |
|---------------|----------|------------------------------|---------------|
| E5/2017/50001 | Rev.00 | Initial creation of document | May. 24, 2017 |
| E5/2017/50001 | Rev.01 | 1 st modification | Jul. 14, 2017 |
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1. General Information

1.1 Testing Laboratory

| SGS Taiwan Ltd. Elec | SGS Taiwan Ltd. Electronics & Communication Laboratory | | | | |
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| 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) |

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1.3 Description of EUT

| Equipment Under Test | Tablet Computer | | | | | |
|---------------------------------------|--|--------|-------|------|--|--|
| Marketing Name | SW512-52,SW512-52P | | | | | |
| Brand Name | acer | | | | | |
| Model No. of Host | N17P5 | | | | | |
| Model No. of BT/WLAN Module | 7265D2W | | | | | |
| FCC ID | HLZ7265D2 | | | | | |
| Antenna Designation (Maximum Gain) | Main_2.45GHz: -2.28, 5GHz: 0.20 Aux_2.45GHz: -2.26, 5GHz: -0.22 | | | | | |
| Mode of Operation | WLAN802.11 a/b/g/n(20M/40M)/ac(| 20M/40 |)M/80 | M) | | |
| Duty Cycle | WLAN802.11 a/b/g/n(20M/40M)/ ac(20M/40M/80M) | 1 | | | | |
| | Bluetooth | 1 | | | | |
| | WLAN802.11 b/g/n(20M) | 2412 | — | 2462 | | |
| | WLAN802.11 n(40M) | 2422 | — | 2452 | | |
| | WLAN802.11 a/n(20M)/ac(20M) 5.2G | 5180 | — | 5240 | | |
| | WLAN802.11 n(40M)/ac(40M) 5.2G | 5190 | — | 5230 | | |
| | WLAN802.11 ac(80M) 5.2G 5210 | | |) | | |
| TX Frequency Range (MHz) | WLAN802.11 a/n(20M)/ac(20M) 5.3G | 5260 | — | 5320 | | |
| | WLAN802.11 n(40M)/ac(40M) 5.3G | 5270 | _ | 5310 | | |
| | WLAN802.11 ac(80M) 5.3G 5290 | | |) | | |
| | WLAN802.11 a/n/ac(20M) 5.6G | 5500 | _ | 5720 | | |
| | WLAN802.11 n/ac(40M) 5.6G | 5510 | _ | 5710 | | |
| | WLAN802.11 ac(80M) 5.6G | 5530 | _ | 5690 | | |

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| | WLAN802.11 a/n(20M)/ac(20M) 5.8G | 5745 | — | 5825 |
|-----------------------------|----------------------------------|------|------|------|
| TX Frequency Range (MHz) | WLAN802.11 n(40M)/ac(40M) 5.8G | 5710 | _ | 5795 |
| | WLAN802.11 ac(80M) 5.8G | | 5775 | |
| | Bluetooth | 2402 | _ | 2480 |
| | WLAN802.11 b/g/n(20M) | 1 | _ | 11 |
| | WLAN802.11 n(40M) | 3 | _ | 9 |
| | WLAN802.11 a/n(20M)/ac(20M) 5.2G | 36 | _ | 48 |
| | WLAN802.11 n(40M)/ac(40M) 5.2G | 38 | _ | 46 |
| | WLAN802.11 ac(80M) 5.2G | | 42 | |
| | WLAN802.11 a/n(20M)/ac(20M) 5.3G | 52 | _ | 64 |
| | WLAN802.11 n(40M)/ac(40M) 5.3G | 54 | — | 62 |
| Channel Number (ARFCN) | WLAN802.11 ac(80M) 5.3G | | 58 | |
| | WLAN802.11 a/n/ac(20M) 5.6G | 100 | — | 144 |
| | WLAN802.11 n/ac(40M) 5.6G | 102 | — | 142 |
| | WLAN802.11 ac(80M) 5.6G | 106 | — | 138 |
| | WLAN802.11 a/n(20M)/ac(20M) 5.8G | 149 | — | 165 |
| | WLAN802.11 n(40M)/ac(40M) 5.8G | 151 | — | 159 |
| | WLAN802.11 ac(80M) 5.8G | | 155 | |
| | Bluetooth | 0 | | 78 |

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| Max. SAR (1g) (Unit: W/Kg) | | | | | | |
|----------------------------|-----------------------------|------------|-----------|---------|----------|--|
| Antenna | Band | Measured | Reported | Channel | Position | |
| | WLAN802.11b | 0.85 | 0.85 | 6 | Top side | |
| | WLAN802.11 ac(80M) 5.2G | 0.25 | 0.26 | 42 | Top side | |
| Main | WLAN802.11 ac(80M) 5.3G | 0.32 | 0.33 | 58 | Top side | |
| | WLAN802.11 ac(80M) 5.6G | 0.49 | 0.49 | 122 | Top side | |
| | WLAN802.11 ac(80M) 5.8G | 0.81 | 0.81 | 155 | Top side | |
| | WLAN802.11b | 0.73 | 0.74 | 6 | Top side | |
| | Bluetooth (GFSK) | 0.03 | 0.03 | 39 | Top side | |
| Aux | WLAN802.11 ac(80M) 5.2G | 0.43 | 0.46 | 42 | Top side | |
| Aux | WLAN802.11 ac(80M) 5.3G | 0.41 | 0.41 | 58 | Top side | |
| | WLAN802.11 ac(80M) 5.6G | 0.22 | 0.23 | 138 | Top side | |
| | WLAN802.11 ac(80M) 5.8G | 0.70 | 0.70 | 155 | Top side | |
| Maxim | num Simultaneous Transmissi | on Reporte | ed 1g SAR | (W/kg) | 1.59 | |

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| Antenna | SI | MIMO | |
|----------------------|---------|---------|----------|
| Band | Chain 0 | Chain 1 | Chain0+1 |
| WLAN802.11b | V | V | - |
| WLAN802.11g | V | V | - |
| WLAN802.11n(20M) | V | V | V |
| WLAN802.11n(40M) | V | V | V |
| WLAN802.11ac | 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 |

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

Main (Chain 0)

| Main Antenna | | | | | | | | |
|--------------|--------------|---------|--------------------|-----------|--|---------------------------|--|--|
| Band | Mode | Channel | Frequency (MHz) | Data Rate | Max. Rated Avg. Power + Max. | Average power (dBm) | | |
| | | 1 | 2412 | | 16.50 | 16.14 | | |
| | 802.11b | 6 | 2437 | 1Mbps | 16.50 | 16.48 | | |
| | | 11 | 2462 | | 16.50 | 16.49 | | |
| | | 1 | 2412 | 6Mbps | 14.00 | 13.92 | | |
| | 802.11g | 6 | 2437 | | 16.50 | 16.11 | | |
| 2450 MHz | | 11 | 2462 | | 12.50 | 12.44 | | |
| 2430 1011 12 | | 1 | 2412 | | 14.00 | 13.85 | | |
| | 802.11n-HT20 | 6 | 2437 | MCS0 | 16.50 | 16.21 | | |
| | | 11 | 2462 | 1 | 12.50 | 12.44 | | |
| | | 3 | 2422 | | 13.50 | 13.41 | | |
| | 802.11n-HT40 | 6 | 2437 | MCS0 | 16.50 | 16.35 | | |
| | | 9 | 2452 | | 12.50 | 12.43 | | |

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| Main Antenna | | | | | | | | |
|---------------|----------------|---------|--------------------|-----------|--|---------------------------|--|--|
| Band | Mode | Channel | Frequency (MHz) | Data Rate | Max. Rated Avg. Power + Max. | Average power (dBm) | | |
| | | 36 | 5180 | | 12.50 | 12.43 | | |
| | 802.11a | 40 | 5200 | 6Mbps | 12.50 | 12.44 | | |
| | 002.118 | 44 | 5220 | olviops | 12.50 | 12.37 | | |
| | | 48 | 5240 | | 12.50 | 12.45 | | |
| | 802.11n-HT20 | 36 | 5180 | MCS0 | 12.50 | 12.42 | | |
| | | 40 | 5200 | | 12.50 | 12.50 | | |
| | | 44 | 5220 | | 12.50 | 12.44 | | |
| | | 48 | 5240 | | 12.50 | 12.46 | | |
| 5.15-5.25 GHz | | 36 | 5180 | | 12.50 | 12.37 | | |
| | 802.11n-VHT20 | 40 | 5200 | MCS0 | 12.50 | 12.46 | | |
| | 002.111-011120 | 44 | 5220 | 10030 | 12.50 | 12.41 | | |
| | | 48 | 5240 | | 12.50 | 12.39 | | |
| | 802.11n-HT40 | 38 | 5190 | MCS0 | 12.00 | 11.92 | | |
| | 002.111-11140 | 46 | 5230 | WC30 | 12.50 | 12.34 | | |
| | 802.11n-VHT40 | 38 | 5190 | MCS0 | 12.00 | 11.56 | | |
| | 002.111-011140 | 46 | 5230 | WC30 | 12.50 | 12.47 | | |
| | 802.11n-VHT80 | 42 | 5210 | MCS0 | 12.50 | 12.34 | | |

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| Main Antenna | | | | | | | | |
|---------------|----------------|---------|--------------------|-----------|--|---------------------------|--|--|
| Band | Mode | Channel | Frequency (MHz) | Data Rate | Max. Rated Avg. Power + Max. | Average power (dBm) | | |
| | | 52 | 5260 | | 12.50 | 12.44 | | |
| | 802.11a | 56 | 5280 | 6Mbps | 12.50 | 12.46 | | |
| | 002.118 | 60 | 5300 | olviops | 12.50 | 12.43 | | |
| | | 64 | 5320 | | 12.50 | 12.50 | | |
| | 802.11n-HT20 | 52 | 5260 | MCS0 | 12.50 | 12.48 | | |
| | | 56 | 5280 | | 12.50 | 12.37 | | |
| | | 60 | 5300 | | 12.50 | 12.35 | | |
| | | 64 | 5320 | | 12.50 | 12.34 | | |
| 5.25-5.35 GHz | | 52 | 5260 | | 12.50 | 12.45 | | |
| | 802.11n-VHT20 | 56 | 5280 | MCS0 | 12.50 | 12.44 | | |
| | 002.111-11120 | 60 | 5300 | WC30 | 12.50 | 12.37 | | |
| | | 64 | 5320 | | 12.50 | 12.46 | | |
| | 802.11n-HT40 | 54 | 5270 | MCS0 | 12.50 | 12.49 | | |
| | 002.111-11140 | 62 | 5310 | 10000 | 12.50 | 12.43 | | |
| | 802.11n-VHT40 | 54 | 5270 | MCS0 | 12.50 | 12.43 | | |
| | 002.111-011140 | 62 | 5310 | 10000 | 12.50 | 12.49 | | |
| | 802.11n-VHT80 | 58 | 5290 | MCS0 | 12.50 | 12.31 | | |

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| | | Mair | n Antenna | | | |
|----------|---------------|---------|--------------------|-----------|--|---------------------------|
| Band | Mode | Channel | Frequency (MHz) | Data Rate | Max. Rated Avg. Power + Max. | Average power (dBm) |
| | | 100 | 5500 | | 11.50 | 11.21 |
| | | 120 | 5600 | | 11.50 | 11.45 |
| | 802.11a | 124 | 5620 | 6Mbps | 11.50 | 11.43 |
| | | 128 | 5640 | | 11.50 | 11.38 |
| | | 140 | 5700 | | 11.50 | 11.23 |
| | | 100 | 5500 | | 11.50 | 11.46 |
| | | 120 | 5600 | | 11.50 | 11.44 |
| | 802.11n-HT20 | 124 | 5620 | MCS0 | 11.50 | 11.45 |
| | | 128 | 5640 | | 11.50 | 11.47 |
| | | 140 | 5700 | | 11.50 | 11.42 |
| | | 100 | 5500 | | 11.50 | 11.44 |
| | | 120 | 5600 | MCS0 | 11.50 | 11.34 |
| | 802.11n-VHT20 | 124 | 5620 | | 11.50 | 11.39 |
| | 002.111-11120 | 128 | 5640 | | 11.50 | 11.31 |
| 5600 MHz | | 140 | 5700 | | 11.50 | 11.42 |
| | | 144 | 5720 | | 11.50 | 11.18 |
| | | 102 | 5510 | | 11.50 | 11.45 |
| | | 110 | 5550 | | 11.50 | 11.44 |
| | 802.11n-HT40 | 118 | 5590 | MCS0 | 11.50 | 11.48 |
| | | 126 | 5630 | | 11.50 | 11.43 |
| | | 134 | 5670 | | 11.50 | 11.34 |
| | | 102 | 5510 | | 11.50 | 11.45 |
| | | 118 | 5590 | | 11.50 | 11.44 |
| | 802.11n-VHT40 | 126 | 5630 | MCS0 | 11.50 | 11.47 |
| | | 134 | 5670 | | 11.50 | 11.35 |
| | | 142 | 5710 | | 11.50 | 11.50 |
| | | 106 | 5530 | | 11.50 | 11.45 |
| | 802.11n-VHT80 | 122 | 5610 | MCS0 | 11.50 | 11.49 |
| | | 138 | 5690 | | 11.50 | 11.47 |

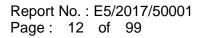
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| | Main Antenna | | | | | | |
|--------------|------------------------|---------|--------------------|-----------|--|---------------------------|--|
| Mode | Mode | Channel | Frequency (MHz) | Data Rate | Max. Rated Avg. Power + Max. | Average power (dBm) | |
| | | 149 | 5745 | | 15.00 | 14.67 | |
| | 802.11a | 157 | 5785 | 6Mbps | 15.00 | 14.73 | |
| | | 165 | 5825 | 1 | 15.00 | 14.89 | |
| | 802.11n-HT20 | 149 | 5745 | MCS0 | 15.00 | 14.78 | |
| | | 157 | 5785 | | 15.00 | 14.91 | |
| | | 165 | 5825 | | 15.00 | 14.93 | |
| 5800 MHz | | 149 | 5745 | | 15.00 | 14.82 | |
| 3800 1011 12 | 802.11n-VHT20 | 157 | 5785 | MCS0 | 15.00 | 14.81 | |
| | | 165 | 5825 | | 15.00 | 14.39 | |
| | 802.11n-HT40 | 151 | 5755 | MCS0 | 15.00 | 14.71 | |
| | ου <u>2.1111-</u> Π140 | 159 | 5795 | IVIC SU | 15.00 | 14.82 | |
| | 802.11n-VHT40 | 151 | 5755 | MCS0 | 15.00 | 14.81 | |
| | 002.111-011140 | 159 | 5795 | 10030 | 15.00 | 14.93 | |
| | 802.11n-VHT80 | 155 | 5775 | MCS0 | 15.00 | 14.99 | |

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Aux (Chain 1)

| | | Aux Antenna | | | | | | |
|---------------|---------------|-------------|--------------------|-----------|--|---------------------------|--|--|
| Band | Mode | Channel | Frequency (MHz) | Data Rate | Max. Rated Avg. Power + Max. | Average power (dBm) | | |
| | | 1 | 2412 | | 17.50 | 17.33 | | |
| | 802.11b | 6 | 2437 | 1Mbps | 17.50 | 17.49 | | |
| | | 11 | 2462 | | 17.50 | 17.15 | | |
| | | 1 | 2412 | | 14.50 | 14.37 | | |
| | 802.11g | 6 | 2437 | 6Mbps | 17.50 | 17.45 | | |
| 2450 MHz | | 11 | 2462 | | 12.50 | 12.45 | | |
| | | 1 | 2412 | | 14.50 | 14.43 | | |
| | 802.11n-HT20 | 6 | 2437 | MCS0 | 17.50 | 17.44 | | |
| | | 11 | 2462 | | 12.50 | 12.37 | | |
| | | 3 | 2422 | | 13.50 | 13.25 | | |
| | 802.11n-HT40 | 6 | 2437 | MCS0 | 16.50 | 16.41 | | |
| | | 9 | 2452 | | 11.50 | 11.44 | | |
| | | Δ | Antonno | | | | | |
| | | Aux | Antenna | | • • | | | |
| Band | Mode | Channel | Frequency (MHz) | Data Rate | Max. Rated Avg. Power + Max. | Average power (dBm) | | |
| | | 36 | 5180 | | 12.50 | 12.15 | | |
| | 000 11- | 40 | 5200 | CM/hma | 12.50 | 12.44 | | |
| | 802.11a | 44 | 5220 | 6Mbps | 12.50 | 12.18 | | |
| | | 48 | 5240 | | 12.50 | 12.34 | | |
| | | 36 | 5180 | | 12.50 | 12.47 | | |
| | 000 44 × UT00 | 40 | 5200 | | 12.50 | 12.46 | | |
| | 802.11n-HT20 | 44 | 5220 | MCS0 | 12.50 | 12.37 | | |
| | | 48 | 5240 | | 12.50 | 12.35 | | |
| 5.15-5.25 GHz | | 36 | 5180 | | 12.50 | 12.34 | | |
| | | 40 | 5200 | MOOO | 12.50 | 12.31 | | |
| | 802.11n-VHT20 | 44 | 5220 | MCS0 | 12.50 | 12.47 | | |
| | | 48 | 5240 | | 12.50 | 12.45 | | |
| | | 38 | 5190 | MCSO | 12.00 | 11.78 | | |
| | 802.11n-HT40 | 46 | 5230 | MCS0 | 12.50 | 12.50 | | |
| | | 38 | 5190 | MCSO | 12.00 | 11.71 | | |
| | 802.11n-VHT40 | 46 | 5230 | MCS0 | 12.50 | 12.49 | | |
| | 802.11n-VHT80 | 42 | 5210 | MCS0 | 12.50 | 12.22 | | |

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| | Aux Antenna | | | | | | | |
|---------------|----------------|---------|--------------------|-----------|--|---------------------------|--|--|
| Band | Mode | Channel | Frequency (MHz) | Data Rate | Max. Rated Avg. Power + Max. | Average power (dBm) | | |
| | | 52 | 5260 | | 12.50 | 12.41 | | |
| | 802.11a | 56 | 5280 | 6Mbps | 12.50 | 12.47 | | |
| | 002.118 | 60 | 5300 | olvibps | 12.50 | 12.49 | | |
| | | 64 | 5320 | | 12.50 | 12.36 | | |
| | 802.11n-HT20 | 52 | 5260 | MCS0 | 12.50 | 12.45 | | |
| | | 56 | 5280 | | 12.50 | 12.31 | | |
| | | 60 | 5300 | | 12.50 | 12.34 | | |
| | | 64 | 5320 | | 12.50 | 12.43 | | |
| 5.25-5.35 GHz | | 52 | 5260 | | 12.50 | 12.50 | | |
| | 802.11n-VHT20 | 56 | 5280 | MCS0 | 12.50 | 12.47 | | |
| | 002.111-011120 | 60 | 5300 | 10000 | 12.50 | 12.41 | | |
| | | 64 | 5320 | | 12.50 | 12.35 | | |
| | 802.11n-HT40 | 54 | 5270 | MCS0 | 12.50 | 12.34 | | |
| | 002.111-11140 | 62 | 5310 | WC30 | 12.50 | 12.28 | | |
| | 802.11n-VHT40 | 54 | 5270 | MCS0 | 12.50 | 12.41 | | |
| | 002.111-011140 | 62 | 5310 | 10030 | 12.50 | 12.38 | | |
| | 802.11n-VHT80 | 58 | 5290 | MCS0 | 12.50 | 12.50 | | |

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| | | Aux | Antenna | | | |
|----------|---------------|---------|--------------------|-----------|--|---------------------------|
| Band | Mode | Channel | Frequency (MHz) | Data Rate | Max. Rated Avg. Power + Max. | Average power (dBm) |
| | | 100 | 5500 | | 11.50 | 11.42 |
| | | 120 | 5600 | | 11.50 | 11.45 |
| | 802.11a | 124 | 5620 | 6Mbps | 11.50 | 11.49 |
| | | 128 | 5640 | | 11.50 | 11.45 |
| | | 140 | 5700 | | 11.50 | 11.41 |
| | | 100 | 5500 | | 11.50 | 11.34 |
| | | 120 | 5600 | | 11.50 | 11.45 |
| | 802.11n-HT20 | 124 | 5620 | MCS0 | 11.50 | 11.36 |
| | | 128 | 5640 | | 11.50 | 11.37 |
| | | 140 | 5700 | | 11.50 | 11.31 |
| | | 100 | 5500 | | 11.50 | 11.14 |
| | | 120 | 5600 | MCS0 | 11.50 | 11.42 |
| | | 124 | 5620 | | 11.50 | 11.18 |
| | 802.11n-VHT20 | 128 | 5640 | | 11.50 | 11.24 |
| 5600 MHz | | 140 | 5700 | | 11.50 | 11.28 |
| | | 144 | 5720 | | 11.50 | 11.43 |
| | | 102 | 5510 | | 11.50 | 11.48 |
| | | 110 | 5550 | | 11.50 | 11.43 |
| | 802.11n-HT40 | 118 | 5590 | MCS0 | 11.50 | 11.42 |
| | | 126 | 5630 | | 11.50 | 11.49 |
| | | 134 | 5670 | | 11.50 | 11.43 |
| | | 102 | 5510 | | 11.50 | 11.42 |
| | | 118 | 5590 | | 11.50 | 11.44 |
| | 802.11n-VHT40 | 126 | 5630 | MCS0 | 11.50 | 11.50 |
| | | 134 | 5670 | | 11.50 | 11.46 |
| | | 142 | 5710 | | 11.50 | 11.38 |
| | | 106 | 5530 | | 11.50 | 11.24 |
| | 802.11n-VHT80 | 122 | 5610 | MCS0 | 11.50 | 11.28 |
| | | 138 | 5690 | | 11.50 | 11.29 |

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| Aux Antenna | | | | | | |
|--------------|----------------|---------|--------------------|-----------|--|---------------------------|
| Mode | Mode | Channel | Frequency (MHz) | Data Rate | Max. Rated Avg. Power + Max. | Average power (dBm) |
| | | 149 | 5745 | | 16.50 | 16.25 |
| | 802.11a | 157 | 5785 | 6Mbps | 16.50 | 16.25 |
| | | 165 | 5825 | | 16.50 | 16.50 |
| | 802.11n-HT20 | 149 | 5745 | MCS0 | 16.50 | 16.46 |
| | | 157 | 5785 | | 16.50 | 16.41 |
| | | 165 | 5825 | | 16.50 | 16.43 |
| 5800 MHz | | 149 | 5745 | | 16.50 | 16.47 |
| 3000 1011 12 | 802.11n-VHT20 | 157 | 5785 | MCS0 | 16.50 | 16.42 |
| | | 165 | 5825 | | 16.50 | 16.45 |
| | 802.11n-HT40 | 151 | 5755 | MCS0 | 16.50 | 16.38 |
| | 002.110-H140 | 159 | 5795 | 10030 | 16.50 | 16.42 |
| | 802.11n-VHT40 | 151 | 5755 | MCS0 | 16.50 | 16.48 |
| | 002.111-011140 | 159 | 5795 | WC30 | 16.50 | 16.41 |
| | 802.11n-VHT80 | 155 | 5775 | MCS0 | 16.50 | 16.50 |

Bluetooth conducted power table:

| Mada | Channal | Frequency | Average | Output Pow | ver (dBm) | Max. Rated Avg. |
|--------------|---------|-----------|---------|------------|-----------|---------------------------|
| Mode Channel | | (MHz) | 1Mbps | 2Mbps | 3Mbps | Power + Max. Tolerance |
| | CH 00 | 2402 | 3.03 | -2.62 | -2.63 | |
| BR/EDR | CH 39 | 2441 | 3.81 | -1.97 | -1.96 | 5 |
| | CH 78 | 2480 | 3.59 | -2.18 | -1.99 | |

| Mada | Channal | Frequency | Average Output Power (dBm) | Max. Rated Avg. |
|--------------|---------|-----------|----------------------------|---------------------------|
| Mode Channel | | (MHz) | GFSK | Power + Max. Tolerance |
| | CH 00 | 2402 | 0.86 | |
| LE | CH 19 | 2440 | 1.53 | 5 |
| | CH 39 | 2480 | 1.32 | |

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1.4 Test Environment

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

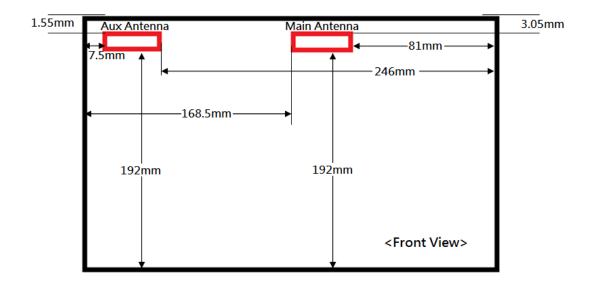
1.5 Operation Description

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.

EUT was tested in the following configurations:

WLAN Main: back/top sides with test distance 0mm.

WLAN Aux: back/top/left sides with test distance 0mm.



Front view of tablet

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Note:

802.11b DSSS SAR Test Requirements:

- 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. For WLAN Main/Aux antennas, 5.2/5.3/5.6/5.8ac(80) is chosen to be the initial test configurations.
- 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.
- 8. BT and WLAN Aux use the same antenna path, but they can't transmit at the same time.

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- 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.
- 10. 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)
- 11.Based on KDB447498D01,
 - (1) SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances≤ 50 mm are determined by:

 $\frac{\text{Max.tune up power(mW)}}{\text{Min.test separation distance(mm)}} \times \sqrt{f(\text{GHz})} \le 3$

When the minimum test separation distance is < 5mm, 5mm is applied to determine SAR test exclusion.

(2) For test separation distances > 50 mm, and the frequency at 100 MHz to 1500MHz, the SAR test exclusion threshold is determined according to the following, and as illustrated in Appendix B of KDB447498 D01.

[(Threshold at 50mm in step1) + (test separation distance-50mm)x($\frac{f(MHz)}{150}$)](mW),

(3) For test separation distances > 50 mm, and the frequency at >1500MHz to 6GHz, the SAR test exclusion threshold is determined according to the following, and as illustrated in Appendix B of KDB447498 D01.

[(Threshold at 50mm in step1) + (test separation distance-50mm)x10](mW),

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| | Mode | WLAN Main 2.45GHz | WLAN Main 5GHz |
|------------|-------------------------------------|----------------------|-------------------|
| Max. tune | -up power(dBm) | 16.5 | 15 |
| Max. tune | -up power(mW) | 44.668 | 31.623 |
| | Test separation distance (mm) | less than 5 | less than 5 |
| Top side | Calculation value | 14.018 | 15.264 |
| | Require SAR testing? | YES | YES |
| | Test separation distance (mm) | 81 | 81 |
| Right side | Calculation value | 311.402 | 311.526 |
| | Require SAR testing? | NO | NO |
| | Test separation distance (mm) | 168.5 | 168.5 |
| Left side | Calculation value | 1186.402 | 1186.526 |
| | Require SAR testing? | NO | NO |
| Bottom | Test separation distance (mm) | 192 | 192 |
| side | Calculation value | 1421.402 | 1421.526 |
| | Require SAR testing? | NO | NO |
| | Test separation distance (mm) | less than 5 | less than 5 |
| Back side | Calculation value | 14.018 | 15.264 |
| | Require SAR testing? | YES | YES |

| Mode | | WLAN Aux 2.45GHz | WLAN Aux 5GHz | BT |
|------------|-------------------------------------|---------------------|------------------|-------------|
| Max. tune- | -up power(dBm) | 17.5 | 16.5 | 5 |
| Max. tune | -up power(mW) | 56.234 | 44.668 | 3.162 |
| | Test separation distance (mm) | less than 5 | less than 5 | less than 5 |
| Top side | Calculation value | 17.647 | 21.561 | 0.996 |
| | Require SAR testing? | YES | YES | NO |
| | Test separation distance (mm) | 246 | 246 | 246 |
| Right side | >20cm | YES | YES | YES |
| | Require SAR testing? | NO | NO | NO |
| | Test separation distance (mm) | 7.5 | 7.5 | 7.5 |
| Left side | Calculation value | 11.765 | 14.374 | 0.664 |
| | Require SAR testing? | YES | YES | NO |
| Bottom | Test separation distance (mm) | 192 | 192 | 192 |
| side | Calculation value | 1421.765 | 1422.156 | 1420.100 |
| | Require SAR testing? | NO | NO | NO |
| | Test separation distance (mm) | less than 5 | less than 5 | less than 5 |
| Back side | Calculation value | 17.647 | 21.561 | 0.996 |
| | Require SAR testing? | YES | YES | NO |

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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= σ (|Ei|²)/ ρ where σ and ρ 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.

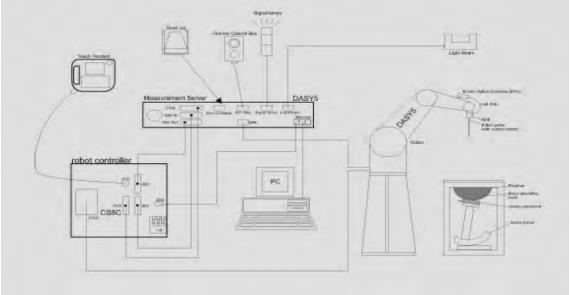


Fig. a The block diagram of SAR system

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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. The SAM twin phantom enabling testing left-hand and right-hand usage.
- 11. The device holder for handheld mobile phones.
- 12. Tissue simulating liquid mixed according to the given recipes.
- 13. Validation dipole kits allowing to validate the proper functioning of the system.

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1.7 System Components

EX3DV4 E-Field Probe

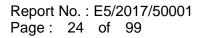
| Construction | Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE) | | | |
|--------------|--|--|--|--|
| Calibration | Basic Broad Band Calibration in air Conversion Factors (CF) for HSL 2450/5200/5300/5600/5800 MHz Additional CF for other liquids and frequencies upon request | | | |
| Frequency | 10 MHz to > 6 GHz | | | |
| Directivity | ± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis) | | | |
| Dynamic | $10 \mu\text{W/g}$ to > 100 mW/g | | | |
| Range | Linearity: $\pm 0.2 \text{ dB}$ (noise: typically < 1 μ W/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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DUIANTON

| 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 | 2 ± 0.2 mm |
| Thickness | |
| Filling Volume | Approx. 30 liters |
| Dimensions | Major axis: 600 mm |
| | 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. | |
|--------------|--|---------------|
| | | 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 \geq 15 cm \pm 5 mm (frequency \leq 3 GHz) or \geq 10 cm \pm 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.

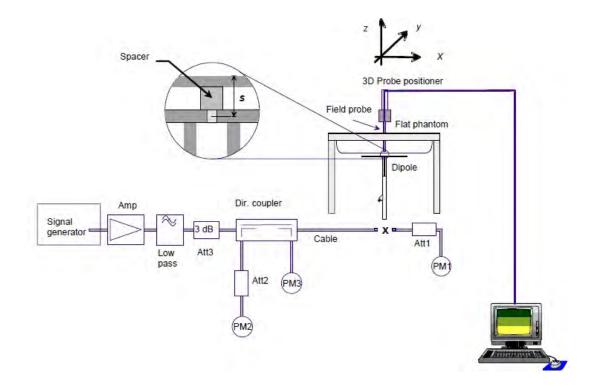


Fig. b The block diagram of system verification

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| Validation Kit | S/N | Frequ (Mł | - | 1W Target SAR-1g (mW/g) | Measured SAR-1g (mW/g) | Measured SAR-1g normalized to 1W (mW/g) | Deviation (%) | Measured Date | | | | | | | | | | | | |
|-------------------|------|--------------|------|-------------------------------|------------------------------|--|------------------|------------------|------|------|------|------|------|------|------|------|------|------|-------|---------------|
| D2450V2 | 727 | 2450 | Body | 50.6 | 12.6 | 50.4 | -0.40% | May. 12, 2017 | | | | | | | | | | | | |
| | 1023 | 5200 | Body | 72.8 | 7.6 | 76 | 4.40% | May. 13, 2017 | | | | | | | | | | | | |
| D5GHzV2 | | 1022 | 1022 | 1022 | 1022 | 1022 | 1022 | 1022 | 1023 | 1023 | 1022 | 1022 | 1023 | 5300 | Body | 76.1 | 7.77 | 77.7 | 2.10% | May. 15, 2017 |
| DOGHZVZ | | 5600 | Body | 79.6 | 8.26 | 82.6 | 3.77% | May. 17, 2017 | | | | | | | | | | | | |
| | | 5800 | Body | 75.9 | 7.63 | 76.3 | 0.53% | May. 18, 2017 | | | | | | | | | | | | |

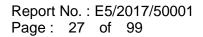
Table 1. Results of system validation

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1.9 Tissue Simulant Fluid for the Frequency Band

The dielectric properties for this body-simulant fluid were measured by using the Schmid & Partner Engineering AG Model DAKS Dielectric Probe Kit in conjunction with Network Analyzer. All dielectric parameters of tissue simulates were measured within 24 hours of SAR measurements. The measured conductivity and permittivity are all within \pm 5% of the target values.

The depth of the tissue simulant in the flat section of the phantom was \geq 15 cm ± 5 mm (Frequency \leq 3G) or \geq 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 |
|----------------|---------------------|--------------------------------|---|------------------------------------|---|--------------------------------------|----------|---------|
| | | 2402 | 52.764 | 1.904 | 53.902 | 1.931 | -2.16% | -1.41% |
| | | 2412 | 52.751 | 1.914 | 53.859 | 1.940 | -2.10% | -1.37% |
| | | 2437 | 52.717 | 1.938 | 53.842 | 1.966 | -2.13% | -1.47% |
| | May. 12, 2017 | 2441 | 52.712 | 1.941 | 53.819 | 1.969 | -2.10% | -1.42% |
| | | 2450 | 52.700 | 1.950 | 53.781 | 1.981 | -2.05% | -1.59% |
| | | 2462 | 52.685 | 1.967 | 53.742 | 1.994 | -2.01% | -1.37% |
| | | 2480 | 52.662 | 1.993 | 53.704 | 2.018 | -1.98% | -1.28% |
| | May. 13, 2017 | 5200 | 49.014 | 5.299 | 49.038 | 5.170 | -0.05% | 2.44% |
| Body | | 5210 | 49.001 | 5.311 | 48.936 | 5.191 | 0.13% | 2.26% |
| | May. 15, 2017 | 5290 | 48.892 | 5.404 | 48.706 | 5.323 | 0.38% | 1.50% |
| | | 5300 | 48.879 | 5.416 | 48.656 | 5.333 | 0.46% | 1.53% |
| | | 5530 | 48.566 | 5.685 | 47.911 | 5.751 | 1.35% | -1.17% |
| | May 17 2017 | 5600 | 48.471 | 5.766 | 47.760 | 5.828 | 1.47% | -1.07% |
| | May. 17, 2017 | 5610 | 48.458 | 5.778 | 47.706 | 5.838 | 1.55% | -1.04% |
| | | 5690 | 48.349 | 5.872 | 47.485 | 5.962 | 1.79% | -1.54% |
| | May 19 2017 | 5755 | 48.261 | 5.947 | 47.206 | 6.080 | 2.19% | -2.23% |
| | May. 18, 2017 | 5800 | 48.200 | 6.000 | 47.121 | 6.139 | 2.24% | -2.32% |

Table 2. Dielectric Parameters of Tissue Simulant Fluid

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| Frequency (MHz) | | | Total | | | | | |
|--------------------|------|---------|---------|------|------------------|-----------|-------|-----------------|
| | Mode | DGMBE | Water | Salt | Preventol D-7 | Cellulose | Sugar | Total amount |
| 2450M | Body | 301.7ml | 698.3ml | | _ | | | 1.0L(Kg) |

The composition of the tissue simulating liquid:

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

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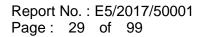
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1.10 Evaluation Procedures

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.

$$SAR = \frac{\sigma}{\rho} \left| E \right|^2 = C \frac{\delta T}{\delta t}$$

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 $\pm 10\%$ (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 $\pm 5\%$ (RSS) when the same liquid is used for the calibration and for actual measurements and $\pm 7-9\%$ (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.

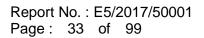
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1.12 Test Standards and Limits

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.

- Limits for Occupational/Controlled exposure: 0.4 W/kg as averaged over the (1) 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).
- Occupational/Controlled limits apply when persons are exposed as a (2) 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.
- Limits for General Population/Uncontrolled exposure: 0.08 W/kg as (3) 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

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exercise control over their exposure. Warning labels placed on consumer 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.

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2. Summary of Results

WLAN Main Antenna

| Antenna | Mode | Position | Distance (mm) | СН | Freq. (MHz) | Max. Rated Avg. Power + Max. | Measured Avg. Power | Scaling | Averaged SAR over 1g (W/kg) | | Plot |
|---------|----------------------------|-----------|------------------|-----|----------------|---------------------------------|------------------------|---------|--------------------------------|----------|------|
| | | | (11111) | | (1011 12) | Tolerance (dBm) | (dBm) | | Measured | Reported | page |
| | | Back sdie | 0 | 11 | 2462 | 16.5 | 16.49 | 100.23% | 0.240 | 0.241 | - |
| | | Top side | 0 | 1 | 2412 | 16.5 | 16.14 | 108.64% | 0.733 | 0.796 | - |
| | WLAN802.11 b | Top side | 0 | 6 | 2437 | 16.5 | 16.48 | 100.46% | 0.845 | 0.849 | 42 |
| | | Top side* | 0 | 6 | 2437 | 16.5 | 16.48 | 100.46% | 0.841 | 0.845 | - |
| | | Top side | 0 | 11 | 2462 | 16.5 | 16.49 | 100.23% | 0.839 | 0.841 | - |
| | WLAN802.11 ac(80M) 5.2G | Back sdie | 0 | 42 | 5210 | 12.5 | 12.34 | 103.75% | 0.022 | 0.023 | - |
| Main | | Top side | 0 | 42 | 5210 | 12.5 | 12.34 | 103.75% | 0.252 | 0.261 | 43 |
| | WLAN802.11 ac(80M) | Back sdie | 0 | 58 | 5290 | 12.5 | 12.31 | 104.47% | 0.031 | 0.032 | - |
| | 5.3G | Top side | 0 | 58 | 5290 | 12.5 | 12.31 | 104.47% | 0.316 | 0.330 | 44 |
| | WLAN802.11 ac(80M) | Back sdie | 0 | 122 | 5610 | 11.5 | 11.49 | 100.23% | 0.035 | 0.035 | - |
| | 5.6G | Top side | 0 | 122 | 5610 | 11.5 | 11.49 | 100.23% | 0.485 | 0.486 | 45 |
| | WLAN802.11 ac(80M) | Back sdie | 0 | 155 | 5775 | 15 | 14.99 | 100.23% | 0.044 | 0.044 | - |
| | 5.8G | Top side | 0 | 155 | 5775 | 15 | 14.99 | 100.23% | 0.808 | 0.810 | 46 |

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

Note:

Scaling = $\frac{\text{reported SAR}}{\text{measured SAR}} = \frac{P2(mW)}{P1(mW)} = 10^{\left(\frac{P2-P1}{10}\right)(dBm)}$ Reported SAR = measured SAR * (scaling) Where P2 is maximum specified power, P1 is measured conducted power

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WLAN Aux Antenna

| Antenna | Mode | Position | Distance (mm) | СН | Freq. (MHz) | Max. Rated Avg. Power + Max. | Measured Avg. Power | Scaling | Averaged SAR over 1g (W/kg) | |
|---------|----------------------------|-----------|------------------|-----|----------------|---------------------------------|------------------------|---------|--------------------------------|----------|
| _ | | | (mm) | | (1011 12) | Tolerance (dBm) | (dBm) | | Measured | Reported |
| | | Back sdie | 0 | 6 | 2437 | 17.5 | 17.49 | 100.23% | 0.259 | 0.260 |
| | WLAN802.11 b | Top side | 0 | 6 | 2437 | 17.5 | 17.49 | 100.23% | 0.734 | 0.736 |
| | | Left side | 0 | 6 | 2437 | 17.5 | 17.49 | 100.23% | 0.143 | 0.143 |
| | | Back sdie | 0 | 39 | 2441 | 5 | 3.81 | 131.52% | 0.008 | 0.011 |
| | Bluetooth (GFSK) | Top side | 0 | 39 | 2441 | 5 | 3.81 | 131.52% | 0.025 | 0.033 |
| | | Left side | 0 | 39 | 2441 | 5 | 3.81 | 131.52% | 0.002 | 0.003 |
| | | Back sdie | 0 | 42 | 5210 | 12.5 | 12.22 | 106.66% | 0.061 | 0.065 |
| | WLAN802.11 ac(80M) 5.2G | Top side | 0 | 42 | 5210 | 12.5 | 12.22 | 106.66% | 0.431 | 0.460 |
| Aux | 0.20 | Left side | 0 | 42 | 5210 | 12.5 | 12.22 | 106.66% | 0.206 | 0.220 |
| Aux | | Back sdie | 0 | 58 | 5290 | 12.5 | 12.50 | 100.00% | 0.053 | 0.053 |
| | WLAN802.11 ac(80M) 5.3G | Top side | 0 | 58 | 5290 | 12.5 | 12.50 | 100.00% | 0.406 | 0.406 |
| | 0.00 | Left side | 0 | 58 | 5290 | 12.5 | 12.50 | 100.00% | 0.193 | 0.193 |
| | | Back sdie | 0 | 138 | 5690 | 11.5 | 11.29 | 104.95% | 0.022 | 0.023 |
| | WLAN802.11 ac(80M) 5.6G | Top side | 0 | 138 | 5690 | 11.5 | 11.29 | 104.95% | 0.221 | 0.232 |
| | 0.00 | Left side | 0 | 138 | 5690 | 11.5 | 11.29 | 104.95% | 0.125 | 0.131 |
| | | Back sdie | 0 | 155 | 5775 | 16.5 | 16.50 | 100.00% | 0.064 | 0.064 |
| | WLAN802.11 ac(80M) 5.8G | Top side | 0 | 155 | 5775 | 16.5 | 16.50 | 100.00% | 0.699 | 0.699 |
| | 0.00 | Left side | 0 | 155 | 5775 | 16.5 | 16.50 | 100.00% | 0.291 | 0.291 |

Note:

Scaling = $\frac{\text{reported SAR}}{\text{measured SAR}} = \frac{P_2(mW)}{P_1(mW)} = 10^{\left(\frac{P_2-P_1}{10}\right)(dBm)}$

Reported SAR = measured SAR * (scaling)

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

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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 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:

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

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.

| Mode / Band | Test position | antenna to user separation distance | Estimated SAR(W/kg) |
|--------------------|---------------|-------------------------------------|---------------------|
| WLAN Main 2.4 / 5G | Left | 168.5mm | 0.4 |

3.1 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 \leq 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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2.4 GHz WLAN MIMO

| No. | Conditions | Position | Max. WLAN Main | Max. WLAN Aux | SAR Sum | SPLSR |
|-----|---------------------------------|-----------|-------------------|------------------|---------|---------------------------|
| | | Back side | 0.241 | 0.260 | 0.501 | ΣSAR<1.6, Not required |
| 1 | 2.4 GHz WLAN Main + WLAN Aux | Top side | 0.849 | 0.736 | 1.585 | ΣSAR<1.6, Not required |
| | | Left side | 0.400 | 0.143 | 0.543 | ΣSAR<1.6, Not required |

5 GHz WLAN MIMO

| No. | Conditions | Position | Max. WLAN Main | Max. WLAN Aux | SAR Sum | SPLSR |
|-----|-------------------------------|-----------|-------------------|------------------|---------|---------------------------|
| | | Back side | 0.044 | 0.065 | 0.109 | ΣSAR<1.6, Not required |
| 2 | 5 GHz WLAN Main + WLAN Aux | Top side | 0.810 | 0.699 | 1.509 | ΣSAR<1.6, Not required |
| | | Left side | 0.400 | 0.291 | 0.691 | ΣSAR<1.6, Not required |

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BT+ 2.4GHz WLAN Main

| No. | Conditions | Position | Max. WLAN Main | BT | SAR Sum | SPLSR |
|-----|---------------------------|-----------|-------------------|-------|---------|---------------------------|
| | | Back side | 0.241 | 0.011 | 0.252 | ΣSAR<1.6, Not required |
| 3 | 2.4 GHz WLAN Main + BT | Top side | 0.849 | 0.033 | 0.882 | ΣSAR<1.6, Not required |
| | | Left side | 0.400 | 0.003 | 0.403 | ΣSAR<1.6, Not required |

BT+ 5GHz WLAN Main

| No. | Conditions | Position | Max. WLAN Main | BT | SAR Sum | SPLSR |
|-----|-------------------------|-----------|-------------------|-------|---------|---------------------------|
| | | Back side | 0.044 | 0.011 | 0.055 | ΣSAR<1.6, Not required |
| 4 | 5 GHz WLAN Main + BT | Top side | 0.810 | 0.033 | 0.843 | ΣSAR<1.6, Not required |
| | | Left side | 0.400 | 0.003 | 0.403 | ΣSAR<1.6, Not required |

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4. Instruments List

| Manufacturer | Device | Туре | Serial number | Date of last calibration | Date of next calibration |
|--------------|---|--------------------|------------------|--------------------------|-----------------------------|
| SPEAG | Dosimetric E-Field Probe | EX3DV4 | 3831 | Jan.23,2017 | Jan.22,2018 |
| SPEAG | System Validation | D2450V2 | 727 | Apr.21,2017 | Apr.20,2018 |
| JF LAG | Dipole | D5GHzV2 | 1023 | Jan.20,2017 | Jan.19,2018 |
| SPEAG | Data acquisition Electronics | DAE4 | 547 | Mar.22,2017 | Mar.21,2018 |
| SPEAG | Software | DASY 52 V52.8.8 | N/A | Calibration not required | Calibration not required |
| SPEAG | Phantom | ELI | N/A | Calibration not required | Calibration not required |
| SPEAG | Vector Network Analyzer and Vector Reflect meter | DAKS VNA R140 | 0040513 | Jan.24,2017 | Jan.23,2018 |
| SPEAG | Dielectric Probe Kit | DAKS-3.5 | 1053 | Jan.24,2017 | Jan.23,2018 |
| Agilent | Dual-directional | 772D | MY46151242 | Jul.11,2016 | Jul.10,2017 |
| Aglient | coupler | 778D | MY48220468 | Jul.06,2016 | Jul.05,2017 |
| Agilent | RF Signal Generator | N5181A | MY50144143 | Mar.01,2017 | Feb.28,2018 |
| Agilent | Power Meter | E4417A | MY52240003 | Oct.17,2016 | Oct.16,2017 |
| Agilent | Power Sensor | E9301H | MY52200003 | Oct.17,2016 | Oct.16,2017 |
| | | | MY52200004 | Oct.17,2016 | Oct.16,2017 |
| TECPEL | Digital thermometer | DTM-303A | TP130074 | Mar.09,2017 | Mar.08,2018 |

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5. Measurements

Date: 2017/5/12

WLAN802.11b_Body_Top side_CH 6_Main_0mm

Communication System: WLAN 2.45G; Frequency: 2437 MHz Medium parameters used: f = 2437 MHz; σ = 1.966 S/m; ϵ_r = 53.842; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.5°C; Liquid temperature: 22.2°C

DASY5 Configuration:

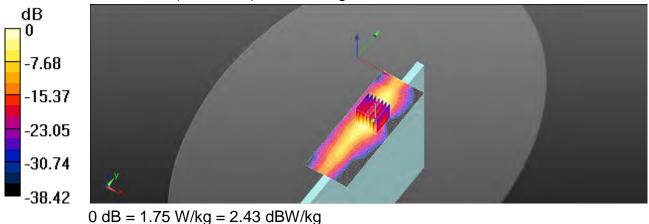
- Probe: EX3DV4 SN3831; ConvF(7.3, 7.3, 7.3); Calibrated: 2017/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2017/3/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (51x141x1): Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 1.31 W/kg

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm,

dy=5mm, dz=5mm Reference Value = 5.002 V/m; Power Drift = 0.19 dB Peak SAR (extrapolated) = 2.67 W/kg SAR(1 g) = 0.845 W/kg; SAR(10 g) = 0.307 W/kg Maximum value of SAR (measured) = 1.75 W/kg



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Date: 2017/5/13

WLAN802.11ac(80M) 5.2G_Body_Top side_CH 42_Main_0mm

Communication System: WLAN 5G; Frequency: 5210 MHz Medium parameters used: f = 5210 MHz; σ = 5.191 S/m; ϵ_r = 48.936; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.6°C; Liquid temperature: 22.1°C

DASY5 Configuration:

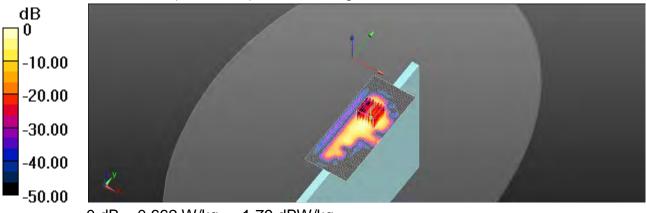
- Probe: EX3DV4 SN3831; ConvF(4.46, 4.46, 4.46); Calibrated: 2017/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2017/3/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (61x151x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 0.515 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 2.374 V/m; Power Drift = -0.11 dB Peak SAR (extrapolated) = 1.26 W/kg SAR(1 g) = 0.252 W/kg; SAR(10 g) = 0.061 W/kg Maximum value of SAR (measured) = 0.662 W/kg



0 dB = 0.662 W/kg = -1.79 dBW/kg

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Date: 2017/5/15

WLAN802.11ac(80M) 5.3G_Body_Top side_CH 58_Main_0mm

Communication System: WLAN 5G; Frequency: 5290 MHz Medium parameters used: f = 5290 MHz; σ = 5.323 S/m; ϵ_r = 48.706; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.7°C; Liquid temperature: 22.1°C

DASY5 Configuration:

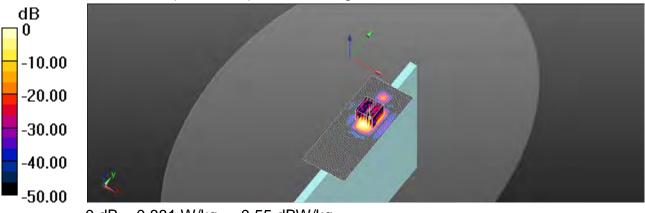
- Probe: EX3DV4 SN3831; ConvF(4.21, 4.21, 4.21); Calibrated: 2017/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2017/3/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (61x151x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 1.09 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 1.210 V/m; Power Drift = 0.13 dB Peak SAR (extrapolated) = 1.69 W/kg SAR(1 g) = 0.316 W/kg; SAR(10 g) = 0.072 W/kg Maximum value of SAR (measured) = 0.881 W/kg



0 dB = 0.881 W/kg = -0.55 dBW/kg

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Date: 2017/5/17

WLAN802.11ac(80M) 5.6G_Body_Top side_CH 122_Main_0mm

Communication System: WLAN 5G; Frequency: 5610 MHz Medium parameters used: f = 5610 MHz; σ = 5.838 S/m; ϵ_r = 47.706; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.5°C; Liquid temperature: 22.0°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(3.67, 3.67, 3.67); Calibrated: 2017/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2017/3/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (61x151x1): Interpolated grid: dx=10 mm, dy=10 mm

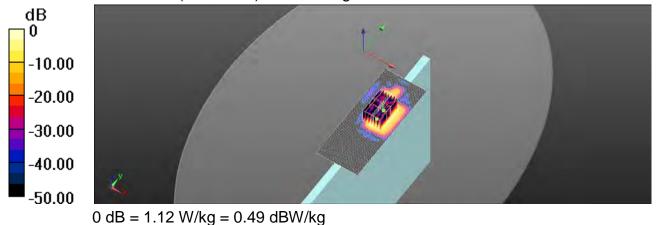
Maximum value of SAR (interpolated) = 1.23 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 0.3030 V/m; Power Drift = 0.14 dB Peak SAR (extrapolated) = 2.52 W/kg SAR(1 g) = 0.485 W/kg; SAR(10 g) = 0.117 W/kg Maximum value of SAR (measured) = 1.34 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 1: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 0.3030 V/m; Power Drift = 0.14 dB Peak SAR (extrapolated) = 2.11 W/kg SAR(1 g) = 0.337 W/kg; SAR(10 g) = 0.095 W/kg Maximum value of SAR (measured) = 1.12 W/kg



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Date: 2017/5/18

WLAN802.11ac(80M) 5.8G_Body_Top side_CH 155_Main_0mm

Communication System: WLAN 5G; Frequency: 5775 MHz Medium parameters used: f = 5775 MHz; σ = 6.08 S/m; ϵ_r = 47.206; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.7°C; Liquid temperature: 22.1°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(3.87, 3.87, 3.87); Calibrated: 2017/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2017/3/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (61x151x1): Interpolated grid: dx=10 mm, dy=10 mm

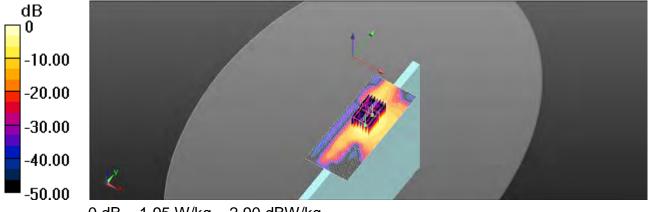
Maximum value of SAR (interpolated) = 2.13 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 2.723 V/m; Power Drift = 0.19 dB Peak SAR (extrapolated) = 4.42 W/kg SAR(1 g) = 0.808 W/kg; SAR(10 g) = 0.226 W/kg Maximum value of SAR (measured) = 1.92 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 1: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 2.723 V/m; Power Drift = 0.19 dB Peak SAR (extrapolated) = 4.40 W/kg SAR(1 g) = 0.783 W/kg; SAR(10 g) = 0.213 W/kg Maximum value of SAR (measured) = 1.95 W/kg



0 dB = 1.95 W/kg = 2.90 dBW/kg

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Date: 2017/5/12

WLAN802.11b_Body_Top side_CH 6_Aux_0mm

Communication System: WLAN 2.45G; Frequency: 2437 MHz Medium parameters used: f = 2437 MHz; σ = 1.966 S/m; ϵ_r = 53.842; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.5°C; Liquid temperature: 22.2°C

DASY5 Configuration:

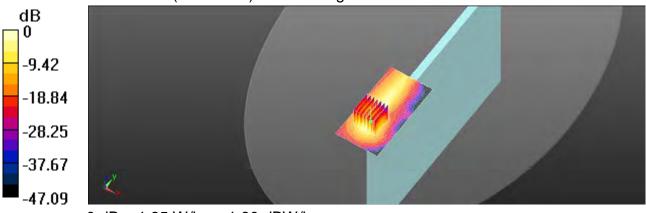
- Probe: EX3DV4 SN3831; ConvF(7.3, 7.3, 7.3); Calibrated: 2017/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2017/3/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (51x101x1): Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 1.41 W/kg

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm,

dy=5mm, dz=5mm Reference Value = 2.723 V/m; Power Drift = 0.15 dB Peak SAR (extrapolated) = 2.00 W/kg SAR(1 g) = 0.734 W/kg; SAR(10 g) = 0.282 W/kg Maximum value of SAR (measured) = 1.35 W/kg



0 dB = 1.35 W/kg = 1.30 dBW/kg

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Date: 2017/5/12

Bluetooth (GFSK)_Body_Top side_CH 39_Aux_0mm

Communication System: Bluetooth; Frequency: 2441 MHz Medium parameters used: f = 2441 MHz; σ = 1.969 S/m; ϵ_r = 53.819; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.5°C; Liquid temperature: 22.2°C

DASY5 Configuration:

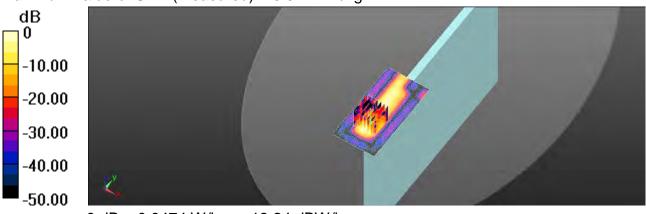
- Probe: EX3DV4 SN3831; ConvF(7.3, 7.3, 7.3); Calibrated: 2017/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2017/3/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (51x101x1): Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 0.0799 W/kg

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm,

dy=5mm, dz=5mm Reference Value = 2.633 V/m; Power Drift = -0.12 dB Peak SAR (extrapolated) = 0.106 W/kg SAR(1 g) = 0.025 W/kg; SAR(10 g) = 0.00785 W/kg Maximum value of SAR (measured) = 0.0474 W/kg



0 dB = 0.0474 W/kg = -13.24 dBW/kg

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Date: 2017/5/13

WLAN802.11ac(80M) 5.2G_Body_Top side_CH 42_Aux_0mm

Communication System: WLAN 5G; Frequency: 5210 MHz Medium parameters used: f = 5210 MHz; σ = 5.191 S/m; ϵ_r = 48.936; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.6°C; Liquid temperature: 22.1°C

DASY5 Configuration:

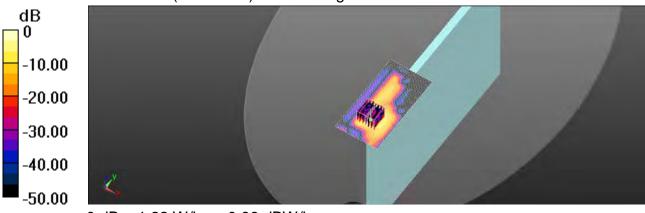
- Probe: EX3DV4 SN3831; ConvF(4.46, 4.46, 4.46); Calibrated: 2017/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2017/3/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (61x121x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 1.28 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 3.332 V/m; Power Drift = 0.06 dB Peak SAR (extrapolated) = 2.26 W/kg SAR(1 g) = 0.431 W/kg; SAR(10 g) = 0.096 W/kg Maximum value of SAR (measured) = 1.22 W/kg



0 dB = 1.22 W/kg = 0.86 dBW/kg

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Report No. : E5/2017/50001 Page : 50 of 99

Date: 2017/5/15

WLAN802.11ac(80M) 5.3G_Body_Top side_CH 58_Aux_0mm

Communication System: WLAN 5G; Frequency: 5290 MHz Medium parameters used: f = 5290 MHz; σ = 5.323 S/m; ϵ_r = 48.706; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.7°C; Liquid temperature: 22.1°C

DASY5 Configuration:

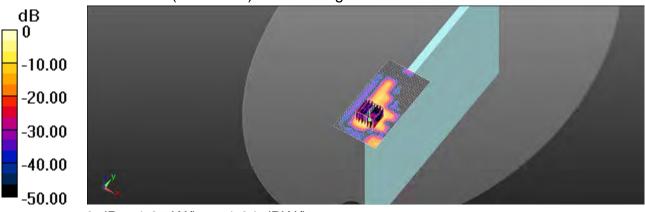
- Probe: EX3DV4 SN3831; ConvF(4.21, 4.21, 4.21); Calibrated: 2017/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2017/3/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (61x121x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 1.34 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 2.541 V/m; Power Drift = 0.14 dB Peak SAR (extrapolated) = 2.45 W/kg SAR(1 g) = 0.406 W/kg; SAR(10 g) = 0.089 W/kg Maximum value of SAR (measured) = 1.27 W/kg



0 dB = 1.27 W/kg = 1.04 dBW/kg

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Date: 2017/5/17

WLAN802.11ac(80M) 5.6G_Body_Top side_CH 138_Aux_0mm

Communication System: WLAN 5G; Frequency: 5690 MHz Medium parameters used: f = 5690 MHz; σ = 5.962 S/m; ϵ_r = 47.485; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.5°C; Liquid temperature: 22.0°C

DASY5 Configuration:

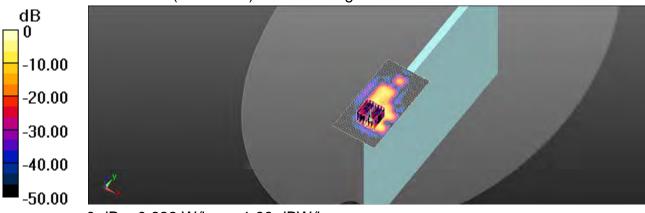
- Probe: EX3DV4 SN3831; ConvF(3.67, 3.67, 3.67); Calibrated: 2017/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2017/3/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (61x121x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 1.48 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 4.218 V/m; Power Drift = 0.11 dB Peak SAR (extrapolated) = 1.14 W/kg SAR(1 g) = 0.221 W/kg; SAR(10 g) = 0.065 W/kg Maximum value of SAR (measured) = 0.633 W/kg



0 dB = 0.633 W/kg = -1.99 dBW/kg

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Date: 2017/5/18

WLAN802.11ac(80M) 5.8G_Body_Top side_CH 155_Aux_0mm

Communication System: WLAN 5G; Frequency: 5775 MHz Medium parameters used: f = 5775 MHz; σ = 6.08 S/m; ϵ_r = 47.206; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.7°C; Liquid temperature: 22.1°C

DASY5 Configuration:

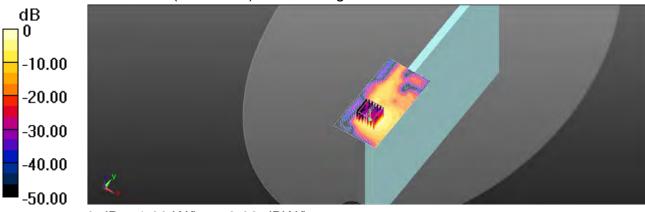
- Probe: EX3DV4 SN3831; ConvF(3.87, 3.87, 3.87); Calibrated: 2017/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2017/3/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (61x121x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 2.02 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 3.441 V/m; Power Drift = 0.08 dB Peak SAR (extrapolated) = 4.42 W/kg SAR(1 g) = 0.699 W/kg; SAR(10 g) = 0.193 W/kg Maximum value of SAR (measured) = 1.83 W/kg



0 dB = 1.83 W/kg = 2.62 dBW/kg

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6. SAR System Performance Verification

Date: 2017/5/12

Dipole 2450 MHz SN:727

Communication System: CW; Frequency: 2450 MHz

Medium parameters used: f = 2450 MHz; σ = 1.981 S/m; ϵ_r = 53.781; ρ = 1000 kg/m³ Phantom section: Flat Section

Ambient temperature: 22.5°C; Liquid temperature: 22.2°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(7.3, 7.3, 7.3); Calibrated: 2017/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2017/3/22 •
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

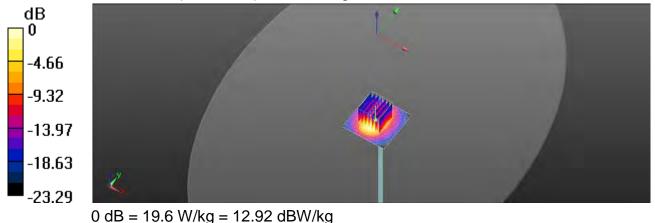
Configuration/Pin=250mW/Area Scan (51x51x1): Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 20.6 W/kg

Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

dx=5mm, dy=5mm, dz=5mm Reference Value = 97.94 V/m; Power Drift = 0.10 dB Peak SAR (extrapolated) = 26.8 W/kg SAR(1 g) = 12.6 W/kg; SAR(10 g) = 5.66 W/kg

Maximum value of SAR (measured) = 19.6 W/kg



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Date: 2017/5/13

Dipole 5200 MHz SN:1023

Communication System: CW; Frequency: 5200 MHz Medium parameters used: f = 5200 MHz; σ = 5.17 S/m; ϵ_r = 49.038; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.6°C; Liquid temperature: 22.1°C

DASY5 Configuration:

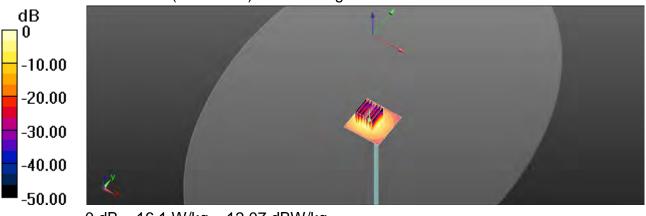
- Probe: EX3DV4 SN3831; ConvF(4.46, 4.46, 4.46); Calibrated: 2017/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2017/3/22
- Phantom: Body •
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Pin=100mW/Area Scan (51x51x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 15.7 W/kg

Configuration/Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid:

dx=4mm, dy=4mm, dz=2mm Reference Value = 50.46 V/m; Power Drift = 0.14 dB Peak SAR (extrapolated) = 33.1 W/kg SAR(1 g) = 7.6 W/kg; SAR(10 g) = 2.09 W/kg Maximum value of SAR (measured) = 16.1 W/kg



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

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Date: 2016/5/15

Dipole 5300 MHz_SN:1023

Communication System: CW; Frequency: 5300 MHz Medium parameters used: f = 5300 MHz; σ = 5.333 S/m; ϵ_r = 48.656; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.7°C; Liquid temperature: 22.1°C

DASY5 Configuration:

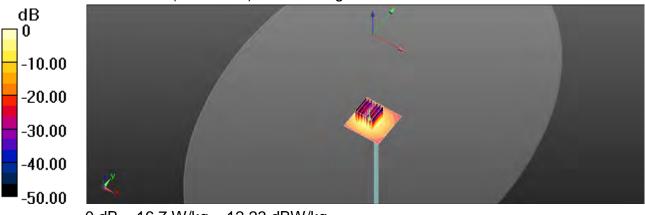
- Probe: EX3DV4 SN3831; ConvF(4.21, 4.21, 4.21); Calibrated: 2017/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2017/3/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Pin=100mW/Area Scan (51x51x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 16.1 W/kg

Configuration/Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid:

dx=4mm, dy=4mm, dz=2mm Reference Value = 51.09 V/m; Power Drift = 0.13 dB Peak SAR (extrapolated) = 34.2 W/kg SAR(1 g) = 7.77 W/kg; SAR(10 g) = 2.14 W/kg Maximum value of SAR (measured) = 16.7 W/kg



0 dB = 16.7 W/kg = 12.23 dBW/kg

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Date: 2017/5/17

Dipole 5600 MHz SN:1023

Communication System: CW; Frequency: 5600 MHz Medium parameters used: f = 5600 MHz; σ = 5.828 S/m; ϵ_r = 47.76; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.5°C; Liquid temperature: 22.0°C

DASY5 Configuration:

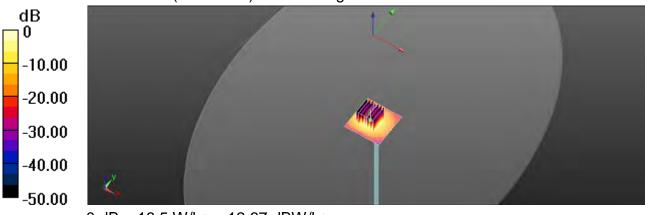
- Probe: EX3DV4 SN3831; ConvF(3.67, 3.67, 3.67); Calibrated: 2017/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2017/3/22
- Phantom: Body •
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Pin=100mW/Area Scan (51x51x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 17.9 W/kg

Configuration/Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid:

dx=4mm, dy=4mm, dz=2mm Reference Value = 56.43 V/m; Power Drift = 0.10 dB Peak SAR (extrapolated) = 38.6 W/kg SAR(1 g) = 8.26 W/kg; SAR(10 g) = 2.28 W/kg Maximum value of SAR (measured) = 18.5 W/kg



0 dB = 18.5 W/kg = 12.67 dBW/kg

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Date: 2017/5/18

Dipole 5800 MHz SN:1023

Communication System: CW; Frequency: 5800 MHz Medium parameters used: f = 5800 MHz; σ = 6.139 S/m; ϵ_r = 47.121; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.7°C; Liquid temperature: 22.1°C

DASY5 Configuration:

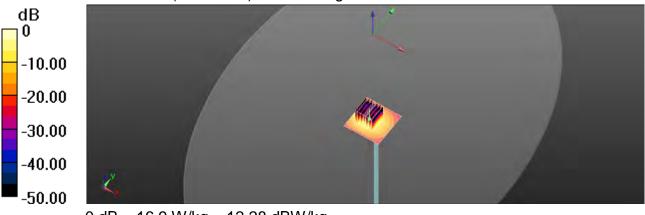
- Probe: EX3DV4 SN3831; ConvF(3.87, 3.87, 3.87); Calibrated: 2017/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2017/3/22
- Phantom: Body •
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Pin=100mW/Area Scan (51x51x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 16.5 W/kg

Configuration/Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid:

dx=4mm, dy=4mm, dz=2mm Reference Value = 48.39 V/m; Power Drift = 0.11 dB Peak SAR (extrapolated) = 37.0 W/kg SAR(1 g) = 7.63 W/kg; SAR(10 g) = 2.08 W/kg Maximum value of SAR (measured) = 16.9 W/kg



0 dB = 16.9 W/kg = 12.28 dBW/kg

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7. DAE & Probe Calibration Certificate

| credited by the Swas Accredit e Swise Accreditation Servic | | | a.: SCS 0108 |
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| e swise Accreditation Servic altitateral Agreement for the r | | | |
| SGS - TW (Aut | den) | Certilicane No: | DAE4-547_Mar17 |
| CALIBRATION O | CERTIFICATE | | |
| Object | DAE4 - SD 000 D | 04 BM - SN: 547 | |
| Calibration procedure(s) | QA CAL-06,v29 Calibration proces | lure for the data acquisition electr | onics (DAE) |
| Calibratical male | March 22, 2017 | | |
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Report No. : E5/2017/50001 Page : 59 of 99

Calibration Laboratory of Schmid & Partner Engineering AG Zeighaustrasse 53, 8004 Zurich, Switzerland



Schweizerlocher Kalbmendienst Service suisse d'Abtennage Servizie svizzens di tetaune Baits Calibration Service

Accreditation No.: SCS 0108

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Accentied by the Swiss Accendition Service (SAS) The Swiss Accorditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibiration certificates

Glossary

DAE Connector angle

data acquisition electronics angle information used in DASY system to align probe sensor X to the robot coordinate system

Methods Applied and Interpretation of Parameters

- DC Voltage Measurement: Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- Connector angle: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
 - DC Voltage Measurement Linearity: Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
 - Common mode sensitivity; Influence of a positive or negative common mode voltage on the differential measurement.
 - Channel separation: Influence of a voltage on the neighbor channels not subject to an input voltage.
 - AD Converter Values with inputs shorled. Values on the internal AD converter corresponding to zero input voltage
 - Input Offset Measurement: Output voltage and statistical results over a large number of zero voltage measurements.
 - Input Offset Current: Typical value for information; Maximum channel input offset current, not considering the input resistance.
 - Input resistance: Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
 - Low Battery Alarm Voltage: Typical value for information. Below this voltage, a bettery alarm signal is generated.
 - Power consumption: Typical value for information. Supply currents in various operating modes.

Certificate No: DAE4-547_Mar17

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DC Voltage Measurement

| High Range: | 1LSB = | 0.1UV. | full minge = | -100+300 mV |
|------------------|---------------|-----------------|---------------|---------------|
| Low Range: | 1LSB = | EInV. | full range = | -1+3mV |
| DASY measurement | navameters Au | to Zero Time: S | sec Measuring | Time 2 corrit |

| Calibration Factors | x | Y | z |
|---------------------|-----------------------|-----------------------|-----------------------|
| High Bange | 403.189 / 0.02% (k=2) | 403.093±0.02% (k=2) | 402.739 ± 0.02% (k=2) |
| Low Range | 3,95348 ± 1.50% (k=2) | 3.90456 ± 1.50% (R=2) | 3.96243 ± 1.50% (k=2) |

Connector Angle

| Connector Angle to be used in DASY system | 91.0°±1 |
|---|-------------|

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Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

| High Range | Reading (µV) | Difference (µV) | Error (%) |
|-------------------|--------------|-----------------|-----------|
| Channel X + Input | 200031.23 | 0,59 | 0.00 |
| Channel X + Input | 20005,44 | 2.04 | 0.01 |
| Channel X - Input | -20000.97 | 4,91 | -0.02 |
| Channel Y + Input | 200029.80 | -1.03 | -0.00 |
| Channel Y + Input | 20000.30 | -3.03 | -0.02 |
| Channel Y - Input | -20007.73 | -1.72 | 0.01 |
| Channel Z + Input | 200030.21 | -0.96 | -0.00 |
| Channel Z + Input | 20003.13 | -0.21 | -0.00 |
| Channel Z - Input | -20005.14 | 0.81 | -0.00 |

| Low Range | Reading (µV) | Difference (µV) | Error (%) |
|-------------------|--------------|-----------------|-----------|
| Channel X + Input | 2000.02 | -0.08 | -0.00 |
| Channel X + Input | 200 18 | 0.36 | 0.18 |
| Channel X - Input | -200.16 | 0.00 | -0.00 |
| Channel Y + Input | 2000,10 | 0.06 | 0.00 |
| Channel Y + Input | 199.43 | -0.40 | -0.20 |
| Channel Y - Input | -200.77 | -0.70 | 0:35 |
| Channel Z + Input | 2000,19 | 0.28 | 0.01 |
| Channel Z + Input | 198.82 | -1,00 | -0.50 |
| Channel Z - Input | -201,46 | -1.37 | 0.68 |

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| | Common mode Input Voltage (mV) | High Range Average Reading (µV) | Low Range Average Reading (µV) |
|-----------|-----------------------------------|------------------------------------|-----------------------------------|
| Channel X | 200 | -2.09 | -5.00 |
| | - 200 | 6.80 | 4,50 |
| Channel V | 200 | -0.67 | 4.21 |
| | - 200 | 0,37 | -0.41 |
| Channel Z | 200 | 5.07 | 4.93 |
| | ÷ 200 | -7,67 | -8.12 |

3. Channel separation

| | Input Voltage (mV) | Channel X (µV) | Channel Y (µV) | Channel Z (µV) |
|-----------|--------------------|----------------|----------------|----------------|
| Channel X | 200 | | 2.65 | -2.08 |
| Channel Y | 200 | 10,56 | | 3.60 |
| Channel Z | 200 | 4.55 | 7.85 | |

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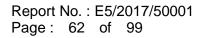
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4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| | High Range (LSB) | Low Range (LSB) |
|-----------|------------------|-----------------|
| Channel X | 16364 | 15364 |
| Channel Y | 16476 | 16801 |
| Channel Z | 16077 | 16468 |
| | | |

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 soc; Measuring time: 3 sec Input 10MD

| | Average (µV) | min. Offset (µV) | max. Offset (µV) | Std. Deviation (µV) |
|-----------|--------------|------------------|------------------|------------------------|
| Channel X | -0.53 | -1.14 | 0.26 | 0.31 |
| Channel Y | -1.03 | -2.43 | -0.21 | 0.32 |
| Channel Z | -1.56 | -2.31 | -0.62 | 0.35 |

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <251A

7. Input Resistance (Typical values for information)

| | Zeroing (kOhm) | Measuring (MOhm) |
|-----------|----------------|------------------|
| Channel X | 200 | 200 |
| Channel Y | 200 | 200 |
| Channel Z | 200 | 200 |

8. Low Battery Alarm Voltage (Typical values for information)

| Typical values | Alarm Level (VDC) |
|----------------|-------------------|
| Supply (+ Vcc) | +7.9 |
| Supply (- Vcc) | -7,6 |

9. Power Consumption (Typical values for information)

| Typical values | Switched off (mA) | Stand by (mA) | Transmitting (mA) |
|----------------|-------------------|---------------|-------------------|
| Supply (+ Voc) | +0.01 | +6 | #14 |
| Supply (- Voc) | -0.01 | B | -9 |

Certificate No: DAE4-547_Mar1

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| Calibration Equipment used (MA Pream malar NRP Power service: NRP-291 Power service: NRP-291 Reference 20 dB Attenuator Reterence 20 dB Attenuator Retainence Proce ESSUV2 DAE4 Secondary Stancards Power meter E4419B Power service E4412A Power service E4412A RF generator HF 38448C | ITE omisal for cH454460) ID SN 104778 SN 103245 SN 103245 SN 35277 (20x) SN 3013 SN 35277 (20x) SN 3013 SN 550 ID SN 6841293874 SN MY41686087 SN 1083642(01700) | Cai Date (Certificate No.) 16-Apr-16 (No. 217-02/389/32299) 06-Apr-16 (No. 217-02/389/32299) 06-Apr-16 (No. 217-02/289) 05-Apr-16 (No. 217-02/289) 21-Dec-16 (No. 217 | Scheduled Calmation Apr-17 Apr-17 Apr-17 Dec-17 Dec-17 Dec-17 Scheduled Check In house check: Jun-18 In house check: Jun-18 In house check: Jun-18 In house check. Jun-18 |
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| Calibration Equipment used (Ma Premary Standards Prome service NRP-291 Power service NRP-291 Reference 20 dB Attenuator Ratioancu Pribe ESSOV2 DAE4 Secondary Standards Power service E44198 Power service E44198 Power service E44198 Rower service E4412A RF generator HP 8668C Network Analysis HP 8753E | ITE omisal for cH459400) ID SN 104778 SN 103245 SN 103245 SN 30245 SN 3025 SN 302 | Cai Dale (Detrificate No.) 16: Apr-16 (No. 217-02289/12289) 96: Apr-16 (No. 217-02289) 95: Apr-16 (No. 217-02289) 95: Apr-16 (No. 217-02289) 91: Dec-16 (No. 253-2013, Dec16) 7: Dec-16 (No. 253-2013, Dec16) Check Data (In Data-860, Dec16) 0: Apr-16 (In Datas Check Jun-10) 0: Apr-16 (In Datas Check Jun-16) 18: Oct.01 (In Datas Check Jun-16) | Scheidulin) Calmation April7 April7 April7 Disc-17 Disc-17 Disc-17 Scheidulen Dhisck In house check: Jun-18 In house check: Jun-18 In house check: Jun-18 In house check. Jun-18 In house check. Jun-18 In house check. Jun-18 |
| Calibration Equipment used (M8 Pream malar NRP Power service NRP-201 Power service NRP-201 Reference 20 dB Attenuator Rationnu Prote ESSUV2 DAE4 Secondary Stancards Power meter E4410B Power service E4412A Power service E4412A RF generalor HP-8648C | ITE omisal for cH454400) IE SN 104778 SN 103244 SN 103245 SN 55277 (20x) SN 0013 SN 550 ID SN 6641283874 SN 550 ID SN 6641283874 SN 00110210 SN US35422(01700) SN US35422(01700) | Cal Date (Detriftonie No.) 16-Apr-16 (No. 217-02289/02289) 16-Apr-16 (No. 217-02289) 16-Apr-16 (No. 217-02289) 11-Det-16 (No. 217-02289) 11-Det-17 (No. 217-02289) 11-Det-17 (No. 217-02289) 11-Det-17 (No. 217-02289) 11-Det-17 (No. 217-02289) 11-Det-18 (No. 217-0289) 11-Det-18 (No. | Scheidulin) Calmation April7 April7 April7 Disc-17 Disc-17 Disc-17 Scheidulen Dhisck In house check: Jun-18 In house check: Jun-18 In house check: Jun-18 In house check. Jun-18 In house check. Jun-18 In house check. Jun-18 |
| Calibration Equipment used (Ma Premary Bransantes Prome emoter NRP Power service NRP-291 Power service NRP-291 Reference 20 dB Attenuator Ratioencu Printe ESSOV2 DAE4 Secondary Staticaeds Power service E44198 Power service E44198 Power service E44198 Power service E44198 RF generator HP 86680 Network Analysis HP 875315 | ITE omisal for cH459400) ID SN 104778 SN 103245 SN 103245 SN 30245 SN 3025 SN 302 | Cai Dale (Defificate No.) 16:Apr-16 (No. 217-02289) 06:Apr-16 (No. 217-02289) 05:Apr-16 (No. 217-02289) 05:Apr-16 (No. 217-02289) 05:Apr-16 (No. 217-02289) 17:Dec-16 (No. 217-02289) 17:Dec-16 (No. 217-02289) 00:Apr-16 (No. 217-02289) 00:Apr-10 (No. 217-0289) 00:Apr-10 (No. | Scheidulin) Calmation April7 April7 April7 Disc-17 Disc-17 Disc-17 Scheidulen Dhisck In house check: Jun-18 In house check: Jun-18 In house check: Jun-18 In house check. Jun-18 In house check. Jun-18 In house check. Jun-18 |
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Calibration Laboratory of Schmid & Partner Engineering AG nightisstrasse 43, 5004 Zurich, Switzerland



Schweizerischer Kallprierti S Service suisse d'étaionnaph C Servizio svizzens di laimilia s Swiss Calibration Service

Accreditation No. SCS 0108

Accredited by the Bwas Accreditation Service (SA3)

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| Glossary: | |
|-----------------|--|
| 151. | Itsue simulating liquid |
| NGRMx,y.z | sanstivity in free space |
| ConvF | sensitivity in TSL / NORMx.y.z |
| DCP | diade compression point |
| CF | creat factor (1/duty_cycle) of the RF signal |
| A. B. C. D | modulation dependent linearization parameters |
| Polarization in | a rotation around probe axis |
| Polarization 8 | 9 rotation around an axis that is in the plane normal to probe exis (at measurement center), |
| | i.e., 9 = 0 is normal to probe axis |
| Connector Angle | information used in DASY system to align probe sensor X in the robot cooldinate system |
| | |

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, 'IEEE Recommanded Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Massummant
- Absorption Rate (SAR) in the Human Head from Wireless Communications Levices: Neasonannin Techniques", June 2013
 IEC 62209-1. "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used inclose proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
 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
 KDB 365664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- NORM/, y,z: Assessed for E-Beld polarization 8 = 0 (f ± 900 MHz in TEM-oolt, F > 1800 MHz; R22 waveguide) NORM/, y,z are only intermediate values, L = , the uncertainties of NORM/, y,z does not affect the E²-field uncertainty inside TSL (see bislow *ConvE*).
- uncertainty inside TSL (see below ConvF). NORM(I)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 not media. We take maximum calibration range expressed in RMS votinge across the diade.
- media. VR is the maximum calibration range expressed in RMS votinge across the diade. ConvE and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Stansord for 1 ≤ 000 MHz) and incide waveguide using analytical field distributions based of 00/VP measurements for 1 > 800 MHz. The same setups are used for assessment of the parameters applied for toundary compensation (atchs, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe ecource classe to the boundary. The sensitivity in TSL corresponds to NORMusyz * 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 (solvcpy (3D deviation from isotropy): In a field of low gradients realized using a flat pheritom sxposed by a patch antenna.
- Sensor Offset: The sension offset corresponds to the offset of virtual measurement center from the probe lip (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NORMs (no uncertainty required).

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EX3DV4 - SN 3831

4anitary 23, 2017

Probe EX3DV4

SN:3831

Manufactured: Calibrated: September 6, 2011 January 23, 2017

(Nate: non-compatible with DASY2 systems)

Certificate No: EX3-3831_Jan17

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EX30V4- SN:3531

January 23 20177

142.6

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3831

Basic Calibration Parameters

| | Bensor X | Sensor Y | Sensor Z | Une (k=2) |
|--|----------|----------|----------|-----------|
| Norm (µV/(V/m) ²) ^A | 0.43 | 0.41 | 0.42 | ± 10.1 % |
| DCP (mV) ⁿ | 101.7 | 102.0 | 100.6 | |

| Modula | ation Calibration Parameters | | | | _ | _ | | |
|--------|------------------------------|-----|---------|-----------|-----|---------|----------|---------------|
| UND | Communication System Name | | A dB | B dBõV | C | D uB | VR mV | Unc" (k=2) |
| D | DW . | x | 0.0 | 0.0 | 1.0 | 0.00 | 149.3 | \$22% |
| | | - W | 0.0 | 0.0 | 2.0 | | 138.4 | |

Z 0.0

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%.

0.0

1.0

The uncertainties of Norm X.Y.Z on mit offect time E¹-Roal uncertainty instant (SL (new Pargen 5 and 8). Numerical improvements uncertainty not required. Uncertainty is determined using the max, several new mean response applying rectangual distribution and is expressed for the rouses of the field values.

Gentificatio No; EX3-3831_Jan17

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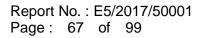
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EX30VH- SN 3631

January 23, 3017

| f (MHz) ⁼ | Relative Permittivity [®] | Conductivity (S/m) | Convil X | ConvF Y | ConvF Z | Alpisa ¹⁰ | Depth ^c (mm) | Unic (k=2) |
|----------------------|---------------------------------------|-----------------------|----------|---------|---------|----------------------|----------------------------|---------------|
| 750 | 41.9 | 0.89 | 9.63 | 9.63 | 9.63 | 0.57 | 0.80 | ± 42.0 % |
| 835 | 41.5 | 0.90 | 9.15 | 9.15 | 9.15 | 0.53 | 0.81 | ± 12.0 % |
| 900 | 41.5 | 0.07 | 9.08 | 9.08 | 9,08 | 0.42 | 0,96 | ± 12.0 % |
| 1450 | 40.5 | 1,20 | 8,41 | B:41 | 8.41 | 0.35 | 0.80 | ± 12.0 % |
| 1750 | 40.1 | 1.37 | 8.17 | 8.17 | 8,17 | 0.32 | 0.90 | E 12.0 % |
| 1900 | 40,0 | 1.40 | 7.85 | 7.85 | 7.86 | 0.39 | 0.80 | = 12.0 % |
| 2000 | 40.0 | 4.40 | 7.80 | 7,80 | 7.80 | 0.35 | 0.80 | ± 12.0 ₩ |
| 2300 | 39.5 | 1.87 | 7.59 | 7.69 | 7.69 | 0.26 | 1.02 | ± 12.0 % |
| 2450 | 39.2 | 1.80 | 7.21 | 7,21 | 7.21 | 0.40 | 0.90 | 112.0 % |
| 2600 | 39.0 | 1,96 | 6.99 | 8.99 | 6.99 | D.38 | 0,60 | £12.0 % |
| 3500 | 37.0 | 2.91 | 6.55 | 6.55 | 6.55 | 0.30 | 1.20 | ± 13,7 % |
| 5200 | 36.0 | 4.66 | 5.02 | 5.02 | 5.02 | 0.30 | 1.80 | ±131% |
| 5300 | 35.9 | 4.76 | 4.70 | 4,70 | -4.70 | 0.35 | 1.80 | ±131.1 % |
| 5600 | 35.5 | 6.07 | 4.51 | 4.53 | 4.51 | 0.40 | 1.80 | ±18.1% |
| 5900 | 35.3 | 6.27 | 4,45 | 4.46 | 4.48 | 0.40 | т.80 | 1 13.1 % |

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3831

⁶ Frequency validity above 300 MH is of a 118 MHs only applies for DRSY V6.4 and hadre (sum Flage 2) essel in revencies to 1.50 MHz. The interpretation of the Cover Encentrative in automatic temperative and the uncertainty in the inducated temperative band. The uncertainty and the uncertainty and the uncertainty and the inducated temperative band. The uncertainty and the temperature tails at 3.0 kHz, the uncertainty is the uncertainty and the USAN unaversal. A final uncertainty as the RES of the uncertainty are adapted by the uncertainty and the USAN and the USAN

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EX0044-SN 3831

Junnary 22. 2017

| (MHz) ^C | Relative Permittivity | Conductivity (S/m) | ConvP X | Conv# ¥ | Conv∓ Z | Alpha | Depth C (mm) | Unc (k=2) |
|--------------------|--------------------------|-----------------------|---------|---------|---------|-------|-----------------|--------------|
| 750 | 59.5 | 0.96 | 9.59 | 9.69 | 9.59 | 0.46 | 0.80 | ± 12.0 % |
| 835 | 55.2 | 0.97 | 9.25 | 9.25 | 9.25 | 0.48 | 0.80 | ±12.0 % |
| 900 | 55.0 | 1,05 | 9,15 | 9.15 | 9.15 | 0.35 | 0.80 | ±12.0 % |
| 1750 | 53.4 | 1,49 | 7.78 | 7.78 | 7.78 | 0.36 | 0.80 | 1 12.0 % |
| 1900 | 59.2 | 1.52 | 7.53 | 7.53 | 7.53 | 0.38 | 0,80 | 1 12.0 % |
| 2000 | 63.3 | 1.52 | 7.66 | 7.66 | 7.66 | 0.32 | 0.80 | ± 12,0 % |
| 2300 | 62.9 | 1.81 | 7.32 | 7.32 | 7.32 | 0.29 | 1.00 | ± 12.0 % |
| 2450 | 52.7 | 1.95 | 7.30 | 7.30 | 7.30 | 0.33 | 0.80 | ± 12.0 % |
| 2800 | 52.5 | 2.16 | 7.D5 | 7.96 | 7.05 | D.30 | 0.80 | ± 12.5 % |
| 5200 | 49.0 | 5.30 | 4.47 | 4.47 | 4.47 | 0.40 | 1,90 | ± 13.1 5 |
| 5300 | 48.9 | 5.42 | 4.21 | 4.21 | 4.21 | 0.45 | 1,90 | = 13.1 9 |
| 5600 | 48.5 | 5,77 | 3.67 | 3,67 | 3.67 | 0.60 | 1.90 | ±13.1 % |
| 5800 | 48.2 | 6.00 | 3.67 | 3.87 | 3,87 | 0.50 | 1.90 | ± 13.1 9 |

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3831

Frequency votably active 300 MHz of ± 100 MHz only enclose for DAST v4.8 and higher (see Page 2), also it is restricted to ± 50 MHz. The anisotratively is the FSS of the Crow uncertainty at calibration intervents and higher (see Page 2), also it is restricted to ± 50 MHz. The anisotratively is the FSS of the Crow uncertainty at calibration intervents and the uncertainty for the inducted imparts basis. Preparing which backs 300 MHz is + 10, 35, 40, 50 and 70 MHz the Crow seasonwers is 30, 64, 120, 150 and 220 MHz calibratively. Above 6 Cele Imparts patient calibration of + 110 MHz. Also and 70 MHz the uncertaintee is 10, 64, 120, 150 and 220 MHz calibratively. Above 6 Cele Imparts which calls the uncertainty is the variety of facuse parameters (client in one is related to ± 10% if the dispectively. Above 6 Cele Imparts the Cover Uncertainty is intervalent answer 10Hz, the uncertaintee premises (a lead to ± 10% if the anisotration of the RSS of the Cover Uncertainty is intervalent scale of the 20 Miz and allow 20 Miz the uncertaintee to the 10 Miz the anisotration of the RSS of "A regulation and determined within an application. SPEAC warrange wait the transaction parameters is the other to the Secure of the RSS of the Cover time is the individual scale. SPEAC warrange wait the transaction parameters and way warrange within any distance larger than hell the number to demine the scaled and the scale parameters and the secure of the scale of the scale larger than hell the number to demine the scale of the scale larger than hell the number to demine the scale of the scale larger than hell the number to demine the scale of the scale larger than hell the number to demine the scale of the scale larger than hell the number to demine the scale of the scale larger than hell the number to demine the scale of the scale larger than hell the number to demine the scale of the scale larger than hell the number to demine the scale of the scale of

Cartificate No: FX3-3831_Lan11

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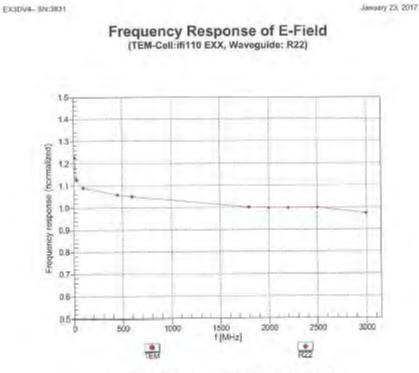
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Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Certificate No: EX3-3831_Jan17

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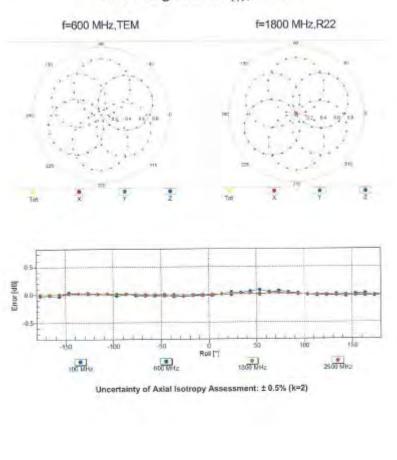
Member of SGS Group



Report No. : E5/2017/50001 Page : 70 of 99

EX3DV4- SN:3831

January 23, 2017



Receiving Pattern (\$), 9 = 0°

Cartificate No: EX3-3831_Jan17

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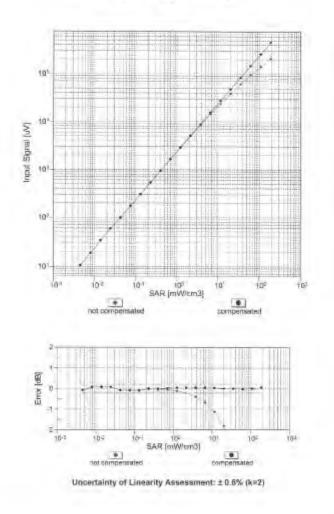


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EX30V4- SN:3831

ABRIDARY 23, 2017

Dynamic Range f(SARhead) (TEM cell , fava = 1900 MHz)



Centificate No. EX3-3831_Jan17

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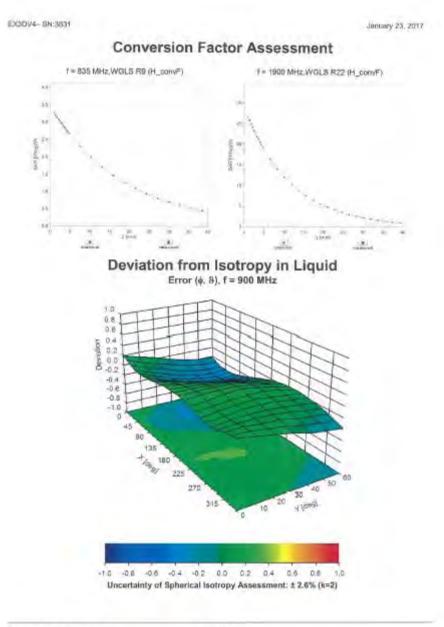
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Certificate No: EX3-3831_Jan17

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EXODV4-SN(383)

January 23, 2017

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3831

Other Probe Parameters

| Sensor Arrangement | Triongular |
|--|------------|
| Connector Angle (*) | -16.3 |
| Mechanical Surface Datection Mode | ertabiled |
| Optical Surface Detection Mode | disabled |
| Probe Overall Length | 337 mm |
| Probe Body Diemeter | 10 mm |
| Tip Length | 9 mm |
| Tip Diameter | 2.5-min |
| Probe Tip to Sensor X Celibration Point | 1 mm |
| Probe Tip to Sensor Y Calibration Point | 7 mm |
| Probe Tip to Sensor Z Calibration Point | 1 0100 |
| Rectimmended Measurement Distance from Surface | 1.4 mm |

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8. Uncertainty Budget

| A | с | D | е | | f | g | h=c * f / e | i=c * g / e | k |
|--|---------------------------|----------------------------|-----|-----------|---------|----------|-------------------------|-------------------------|-------------|
| Source of Uncertainty | Tolerance/ Uncertainty | Probability Distributio | Div | Div Value | ci (1g) | ci (10g) | Standard uncertainty | Standard uncertainty | vi, or Veff |
| Measurement system | | | | | | | | | |
| Probe calibration | 6.55% | N | 1 | 1 | 1 | 1 | 6.55% | 6.55% | 80 |
| lsotropy , Axial | 3.50% | R | √3 | 1.732 | 1 | 1 | 2.02% | 2.02% | 80 |
| lsotropy, Hemispherical | 9.60% | R | √3 | 1.732 | 1 | 1 | 5.54% | 5.54% | œ |
| 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% | ø |
| Linearity | 4.70% | R | √3 | 1.732 | 1 | 1 | 2.71% | 2.71% | 80 |
| Detection Limits | 1.00% | R | √3 | 1.732 | 1 | 1 | 0.58% | 0.58% | 80 |
| Readout Electronics | 0.30% | Ν | 1 | 1 | 1 | 1 | 0.30% | 0.30% | 80 |
| Response time | 0.80% | R | √3 | 1.732 | 1 | 1 | 0.46% | 0.46% | 80 |
| Integration Time | 2.60% | R | √3 | 1.732 | 1 | 1 | 1.50% | 1.50% | 80 |
| Measurement drift (class A evaluation) | 1.75% | R | √3 | 1.732 | 1 | 1 | 1.01% | 1.01% | 80 |
| RF ambient condition - noise | 3.00% | R | √3 | 1.732 | 1 | 1 | 1.73% | 1.73% | 80 |
| RF ambient conditions - reflections | 3.00% | R | √3 | 1.732 | 1 | 1 | 1.73% | 1.73% | 8 |
| Probe positioner Mechanical restrictions | 0.40% | R | √3 | 1.732 | 1 | 1 | 0.23% | 0.23% | œ |
| Probe Positioning with respect to phantom shell | 2.90% | R | √3 | 1.732 | 1 | 1 | 1.67% | 1.67% | 80 |
| Post-processing | 1.00% | R | √3 | 1.732 | 1 | 1 | 0.58% | 0.58% | œ |
| Max SAR Eval | 1.00% | R | √3 | 1.732 | 1 | 1 | 0.58% | 0.58% | 8 |
| Test Sample related | | | | | | | | | |
| Test sample positioning | 2.90% | Ν | 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% | œ |
| Phantom and Setup | | | | | | | | | |
| Phantom Uncertainty | 4.00% | R | √3 | 1.732 | 1 | 1 | 2.31% | 2.31% | 80 |
| Liquid permittivity (mea.) | 2.24% | N | 1 | 1 | 0.64 | 0.43 | 1.43% | 0.96% | М |
| Liquid Conductivity (mea.) | 2.44% | N | 1 | 1 | 0.6 | 0.49 | 1.46% | 1.20% | М |
| Combined standard uncertainty | | RSS | | | | | 11.89% | 11.81% | |
| Expant uncertainty (95% confidence interval), K=2 | | | | | | | 23.79% | 23.61% | |

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

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| А | с | D | е | | f | g | h=c * f / e | i=c * g / e | k |
|--|---------------------------|----------------------------|-----|-----------|---------|----------|-------------------------|-------------------------|---|
| Source of Uncertainty | Tolerance/ Uncertainty | Probability Distributio | Div | Div Value | ci (1g) | ci (10g) | Standard uncertainty | Standard uncertainty | vi, or Veff |
| Measurement system | | | | | | | | | |
| Probe calibration | 6.00% | N | 1 | 1 | 1 | 1 | 6.00% | 6.00% | ∞ |
| lsotropy , Axial | 3.50% | R | √3 | 1.732 | 1 | 1 | 2.02% | 2.02% | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ |
| lsotropy, Hemispherical | 9.60% | R | √3 | 1.732 | 1 | 1 | 5.54% | 5.54% | ~ |
| Modulation Response | 2.40% | R | √3 | 1.732 | 1 | 1 | 1.40% | 1.40% | ∞ |
| Boundary Effect | 1.00% | R | √3 | 1.732 | 1 | 1 | 0.58% | 0.58% | ~ |
| Linearity | 4.70% | R | √3 | 1.732 | 1 | 1 | 2.71% | 2.71% | ∞ |
| Detection Limits | 1.00% | R | √3 | 1.732 | 1 | 1 | 0.58% | 0.58% | ∞ |
| Readout Electronics | 0.30% | N | 1 | 1 | 1 | 1 | 0.30% | 0.30% | ~ |
| Response time | 0.80% | R | √3 | 1.732 | 1 | 1 | 0.46% | 0.46% | ~ |
| Integration Time | 2.60% | R | √3 | 1.732 | 1 | 1 | 1.50% | 1.50% | ~ |
| Measurement drift (class A evaluation) | 1.75% | R | √3 | 1.732 | 1 | 1 | 1.01% | 1.01% | ~ |
| RF ambient condition - noise | 3.00% | R | √3 | 1.732 | 1 | 1 | 1.73% | 1.73% | ~ |
| RF ambient conditions - reflections | 3.00% | R | √3 | 1.732 | 1 | 1 | 1.73% | 1.73% | ~ |
| Probe positioner Mechanical restrictions | 0.40% | R | √3 | 1.732 | 1 | 1 | 0.23% | 0.23% | ~ |
| Probe Positioning with respect to phantom shell | 2.90% | R | √3 | 1.732 | 1 | 1 | 1.67% | 1.67% | ∞ |
| Post-processing | 1.00% | R | √3 | 1.732 | 1 | 1 | 0.58% | 0.58% | ~ |
| Max SAR Eval | 1.00% | R | √3 | 1.732 | 1 | 1 | 0.58% | 0.58% | ~ |
| Test Sample related | | | | | | | | | |
| Test sample positioning | 2.90% | N | 1 | 1 | 1 | 1 | 2.90% | 2.90% | M-1 |
| Device Holder Uncertainty | 3.60% | N | 1 | 1 | 1 | 1 | 3.60% | 3.60% | M-1 |
| Drift of output power | 5.00% | R | √3 | 1.732 | 1 | 1 | 2.89% | 2.89% | ~ |
| Phantom and Setup | | | | | | | | | |
| Phantom Uncertainty | 4.00% | R | √3 | 1.732 | 1 | 1 | 2.31% | 2.31% | œ |
| Liquid permittivity (mea.) | 2.16% | N | 1 | 1 | 0.64 | 0.43 | 1.38% | 0.93% | М |
| Liquid Conductivity (mea.) | 1.59% | N | 1 | 1 | 0.6 | 0.49 | 0.95% | 0.78% | М |
| Combined standard uncertainty | | RSS | | | | | 11.54% | 11.47% | |
| Expant uncertainty (95% confidence interval), K=2 | | | | | | | 23.08% | 22.94% | |

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

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9. Phantom Description

Schmid & Partner Engineering AG

s a е

Zeughausstrasse 43, 8004 Zurich, Switzerland Phone +41 44 245 9700, Fax +41 44 245 9779 info@speag.com, http://www.speag.com

Certificate of Conformity / First Article Inspection

| Item | Oval Flat Phantom ELI 5.0 |
|--------------|---|
| Type No | QD OVA 002 A |
| Series No | 1108 and higher |
| Manufacturer | Untersee Composites Knebelstrasse 8, CH-8268 Mannenbach, Switzerland |

Tests

Complete tests were made on the prototype units QD OVA 001 A, pre-series units QD OVA 001 B as well as on some series units QD OVA 001 B. Some tests are made on all series units QD OVA 002 A.

| Test | Requirement | Details | Units tested | |
|-------------------------|---|---|---------------------------------|--|
| Shape | Internal dimensions, depth and sagging are compatible with standards | Bottom elliptical 600 x 400 mm, Depth 190 mm, dimension compliant with [1] for f > 375 MHz | Prototypes | |
| Material thickness | Bottom: 2.0mm +/- 0.2mm | dimension compliant with [3] for f > 800 MHz | all | |
| Material parameters | rel. permittivity 2 – 5, loss tangent ≤ 0.05, at f ≤ 6 GHz | rel. permittivity 3.5 +/- 0.5 loss tangent ≤ 0.05 | Material samples | |
| Material resistivity | Compatibility with tissue simulating liquids . | Compatible with SPEAG liquids. ** | Phantoms, Material sample | |
| Sagging | Sagging of the flat section in tolerance when filled with tissue simulating liquid. | within tolerance for filling height up to 155 mm | Prototypes, samples | |

Note: Compatibility restrictions apply certain liquid components mentioned in the standard. containing e.g. DGBE, DGMHE or Triton X-100. Observe technical note on material compatibility.

Standards

- [1] OET Bulletin 65, Supplement C, "Evaluating Compliance with FCC Guidelines for Human Exposure
- to Radiofrequency Electromagnetic Fields", Edition 01-01 IEEE 1528-2003, "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement [2] Techniques, December 2003 [3] IEC 62209–1 ed1.0, "Human exposure to radio frequency fields from hand-held and body-mounted
- wireless communication devices Human models, instrumentation, and procedures Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)*, 2005-02-18
- [4] IEC 62209-2 ed1.0, "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 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)", 2010-03-30

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of body-worn SAR measurements and system performance checks as specified in [1 - 4] and further standards

25.7.2011 Date

Signature / Stamp

peag

nic 8, Partrier-Enginaering AG boyestrassy 43, 8004 Visich, Shi fria 14/41: 44/2659708, Fext+46 6445 977

Page 1(1)

Doc No 881 - QD OVA 002 A - A

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10. System Validation from Original Equipment Supplier

| Engineering AG Ighausstrasse 43, 6004 Zurich | n, Switzerland | Rac MRA | Schweizerischer Kalibrierdienst Service suisse d'étalonnage Servizio svizzero di taratura Swiss Calibration Service |
|---|--|---|--|
| ccredited by the Swiss Accreditat he Swiss Accreditation Service luttilateral Agreement for the re | is one of the signatories | s to the EA | ccreditation No.: SCS 0108 |
| illent SGS -TW (Aude | | Contraction of the | o: D2450V2-727_Apr17 |
| CALIBRATION C | ERTIFICATE | | - |
| Dbject | D2450V2 - SN: 7 | 27 | |
| Calibration procedure(s) | QA CAL-05.v9 Calibration proce | dure for dipole validation kits ab | ove 700 MHz |
| Calibration date: | April 21, 2017 | | |
| The measurements and the unce All calibrations have been conduc | cted in the closed laborato | ry facility; environment temperature (22 \pm 3) | °C and humidity < 70%, |
| All calibrations have been conduct | TE critical for calibration) | | |
| Alt calibrations have been conduc Calibration Equipment used (M&1 Primary Standards | TE critical for calibration) | Cal Date (Certificate No.) | Scheduled Calibration |
| All calibrations have been conduc Calibration Equipment used (M&1 Primary Standards Power meter NRP | TE critical for calibration) | Cal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) | Scheduled Calibration |
| All calibrations have been conduc Calibration Equipment used (M&1 Primary Standards Power meter NRP Power sensor NRP-Z91 | TE critical for calibration) | Cal Date (Certificate No.) | Scheduled Calibration |
| All calibrations have been conduc Calibration Equipment used (M&1 Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 | TE critical for calibration) ID # SN: 104778 SN: 103244 | Gal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) | Scheduled Calibration Apr-18 Apr-18 |
| Alt calibrations have been conduc Calibration Equipment used (M&1 Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismalch combination | TE critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 103245 SN: 5059 (20k) SN: 5047.2 / 06327 | Cal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02522) 07-Apr-17 (No. 217-02528) 07-Apr-17 (No. 217-02529) | Scheduled Calibration Apr-18 Apr-18 Apr-18 Apr-18 Apr-18 |
| All calibrations have been conduc Calibration Equipment used (M&1 Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismalch combination Reference Probe EX3DV4 | TE critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5059 (20k) SN: 5047.2 / 06327 SN: 7349 | Gal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02522) 07-Apr-17 (No. 217-02528) 07-Apr-17 (No. 217-02529) 31-Dec-16 (No. EX3-7349_Dec16) | Scheduled Calibration Apr-18 Apr-18 Apr-18 Apr-18 Apr-18 Dec-17 |
| All calibrations have been conduc Calibration Equipment used (M&1 Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 | TE critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 103245 SN: 5059 (20k) SN: 5047.2 / 06327 | Cal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02522) 07-Apr-17 (No. 217-02528) 07-Apr-17 (No. 217-02529) | Scheduled Calibration Apr-18 Apr-18 Apr-18 Apr-18 Apr-18 |
| Alt calibrations have been conduc Calibration Equipment used (M&1 Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards | TE critical for calibration) ID # SN: 104778 SN: 103244 SN: 103244 SN: 103245 SN: 5056 (20k) SN: 5047.2 / 06327 SN: 5047.2 / 06327 SN: 7349 SN: 601 ID # | Cal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02522) 07-Apr-17 (No. 217-02528) 07-Apr-17 (No. 217-02528) 31-Dec-16 (No. EX3-7349_Dec16) 28-Mar-17 (No. DAE4-601_Mar17) Check Date (in house) | Scheduled Calibration Apr-18 Apr-18 Apr-18 Apr-18 Apr-18 Dec-17 Mar-18 Scheduled Check |
| Alt calibrations have been conduct Calibration Equipment used (M&T Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter EPM-442A | TE critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5056 (20k) SN: 5047.2 / 06327 SN: 7349 SN: 601 ID # SN: GB37480704 | Gal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02522) 07-Apr-17 (No. 217-02528) 07-Apr-17 (No. 217-02529) 31-Dec-16 (No. EX3-7349_Dec16) 28-Mar-17 (No. DAE4-601_Mar17) Check Date (in house) 07-Oct-15 (in house check Oct-16) | Scheduled Calibration Apr-18 Apr-18 Apr-18 Apr-18 Apr-18 Dec-17 Mar-18 Scheduled Check In house check: Oct-18 |
| Alt calibrations have been conduct Calibration Equipment used (M&1 Primary Standards Power meter NRP- Power sensor NRP-Z91 Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter EPM-442A Power sensor NP 8481A | TE critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5057.2 / 06327 SN: 7349 SN: 601 ID # SN: GB37480704 SN: US37292783 | Gal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02522) 07-Apr-17 (No. 217-02528) 07-Apr-17 (No. 217-02529) 31-Dec-16 (No. 217-02529) 31-Dec-16 (No. 217-02529) 04-Apr-17 (No. 217-02529) 07-Apr-17 (No. 217-02529) 07-Opt-15 (In house) 07-Opt-15 (In house check Oct-16) 07-Opt-15 (In house check Oct-16) | Scheduled Calibration Apr-18 Apr-18 Apr-18 Apr-18 Apr-18 Dec-17 Mar-18 Scheduled Check In house check: Oct-18 In house check: Oct-18 |
| All calibrations have been conduc Calibration Equipment used (M&T Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A | TE critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5056 (20k) SN: 50472 (20k) SN: 50472 (206327 SN: 601 ID # SN: GB37480704 SN: US37292783 SN. MY41092317 | Cal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02522) 07-Apr-17 (No. 217-02528) 07-Apr-17 (No. 217-02529) 31-Dec-16 (No. EX3-7349_Dec16) 28-Mar-17 (No. DAE4-601_Mar17) Check Date (in house) 07-Oct-15 (in house check Oct-16) 07-Oct-15 (in house check Oct-16) 07-Oct-15 (in house check Oct-16) | Scheduled Calibration Apr-18 Apr-18 Apr-18 Apr-18 Apr-18 Dec-17 Mar-18 Scheduled Check In house check: Oct-18 In house check: Oct-18 In house check: Oct-18 |
| Alt calibrations have been conduct Calibration Equipment used (M&T Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter EPM-442A | TE critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5057.2 / 06327 SN: 7349 SN: 601 ID # SN: GB37480704 SN: US37292783 | Gal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02522) 07-Apr-17 (No. 217-02528) 07-Apr-17 (No. 217-02529) 31-Dec-16 (No. 217-02529) 31-Dec-16 (No. 217-02529) 04-Apr-17 (No. 217-02529) 07-Apr-17 (No. 217-02529) 07-Opt-15 (In house) 07-Opt-15 (In house check Oct-16) 07-Opt-15 (In house check Oct-16) | Scheduled Calibration Apr-18 Apr-18 Apr-18 Apr-18 Apr-18 Dec-17 Mar-18 Scheduled Check In house check: Oct-18 In house check: Oct-18 |
| Alt calibrations have been conduc Calibration Equipment used (M&T Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06 | TE critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 7349 SN: 601 ID # SN: GB37480704 SN: US37292783 SN. MY41092317 SN: 100972 SN: US37390585 | Cal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02522) 07-Apr-17 (No. 217-02528) 07-Apr-17 (No. 217-02529) 31-Dec-16 (No. EX3-7349_Dec16) 28-Mat-17 (No. DAE4-601_Mar17) Check Date (in house check Oct-16) 07-Oct-15 (in house check Oct-16) 07-Oct-15 (in house check Oct-16) 07-Oct-15 (in house check Oct-16) 15-Jun-15 (in house check Oct-16) 18-Oct-01 (in house check Oct-16) | Scheduled Calibration Apr-18 Apr-18 Apr-18 Apr-18 Apr-18 Dec-17 Mar-18 Scheduled Check In house check: Oct-18 In house check: Oct-17 |
| Alt calibrations have been conduc Calibration Equipment used (M&T Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer HP 8753E | TE critical for calibration) ID # SN: 104778 SN: 103244 SN: 103244 SN: 103245 SN: 5050 (20k) SN: 5050 (20k) SN: 5050 (20k) SN: 601 ID # SN: GB37480704 SN: US37292783 SN: MY41092317 SN: 100072 SN: US37390585 Name | Cal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02523) 07-Apr-17 (No. 217-02528) 07-Apr-17 (No. 217-02528) 07-Apr-17 (No. 217-02529) 31-Dec-16 (In house check Oct-16) 07-Oct-15 (In house check Oct-16) 15-Jun-15 (In house check Oct-16) 18-Oct-01 (In house check Oct-16) 18-Oct-01 (In house check Oct-16) Function | Scheduled Calibration Apr-18 Apr-18 Apr-18 Apr-18 Apr-18 Dec-17 Mar-18 Scheduled Check In house check: Oct-18 In house check: Oct-18 In house check: Oct-18 In house check: Oct-18 |
| Alt calibrations have been conduc Calibration Equipment used (M&T Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06 | TE critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 7349 SN: 601 ID # SN: GB37480704 SN: US37292783 SN. MY41092317 SN: 100972 SN: US37390585 | Cal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02522) 07-Apr-17 (No. 217-02528) 07-Apr-17 (No. 217-02529) 31-Dec-16 (No. EX3-7349_Dec16) 28-Mat-17 (No. DAE4-601_Mar17) Check Date (in house check Oct-16) 07-Oct-15 (in house check Oct-16) 07-Oct-15 (in house check Oct-16) 07-Oct-15 (in house check Oct-16) 15-Jun-15 (in house check Oct-16) 18-Oct-01 (in house check Oct-16) | Scheduled Calibration Apr-18 Apr-18 Apr-18 Apr-18 Dec-17 Mar-18 Scheduled Check In house check: Oct-18 In house check: Oct-17 |
| Alt calibrations have been conduc Calibration Equipment used (M&T Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer HP 8753E | TE critical for calibration) ID # SN: 104778 SN: 103244 SN: 103244 SN: 103245 SN: 5050 (20k) SN: 5050 (20k) SN: 5050 (20k) SN: 601 ID # SN: GB37480704 SN: US37292783 SN: MY41092317 SN: 100072 SN: US37390585 Name | Cal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02523) 07-Apr-17 (No. 217-02528) 07-Apr-17 (No. 217-02528) 07-Apr-17 (No. 217-02529) 31-Dec-16 (In house check Oct-16) 07-Oct-15 (In house check Oct-16) 15-Jun-15 (In house check Oct-16) 18-Oct-01 (In house check Oct-16) 18-Oct-01 (In house check Oct-16) Function | Scheduled Calibration Apr-18 Apr-18 Apr-18 Apr-18 Dec-17 Mar-18 Scheduled Check In house check: Oct-18 In house check: Oct-17 |
| Alt calibrations have been conduct Calibration Equipment used (M&1 Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer HP 8753E Calibrated by: | TE critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5059 (20k) SN: 5059 (20k) SN: 601 ID # SN: GB37480704 SN: U37292783 SN: WY4109217 SN: U337390585 Name Michael Weber | Cal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02522) 07-Apr-17 (No. 217-02528) 07-Apr-17 (No. 217-02529) 31-Dec-16 (No. EX3-7349_Dec16) 28-Mar-17 (No. DAE4-601_Mar17) Check Date (in house check Oct-16) 07-Oct-15 (in house check Oct-16) 07-Oct-15 (in house check Oct-16) 15-Jun-15 (in house check Oct-16) 18-Oct-01 (in house check Oct-16) 18-Oct-01 (in house check Oct-16) Laboratory Technician | Scheduled Calibration Apr-18 Apr-18 Apr-18 Apr-18 Apr-18 Dec-17 Mar-18 Scheduled Check In house check: Oct-18 In house check: Oct-17 |

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



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

Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS)

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Glossary:

| TSL | tissue simulating liquid |
|----------|-------------------------------------|
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A | not applicable or not measured |
| 1 40.0.0 | ther all business of the the second |

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, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

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Measurement Conditions

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

| DASY5 | V52.10.0 |
|------------------------|--|
| Advanced Extrapolation | |
| Modular Flat Phantom | |
| 10 mm | with Spacer |
| dx, dy, dz = 5 mm | |
| 2450 MHz ± 1 MHz | |
| | Advanced Extrapolation Modular Flat Phantom 10 mm dx, dy, dz = 5 mm |

Head TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Head TSL parameters | 22.0 °C | 39.2 | 1.80 mho/m |
| Measured Head TSL parameters | (22.0 ± 0.2) °C | 37.7 ± 6 % | 1.87 mho/m ± 6 % |
| Head TSL temperature change during test | < 0.5 °C | | |

SAR result with Head TSL

| SAR averaged over 1 cm ³ (1 g) of Head TSL | Condition | |
|---|--------------------|--------------------------|
| SAR measured | 250 mW input power | 13.4 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 52.2 W/kg ± 17.0 % (k=2) |

| SAR averaged over 10 cm ³ (10 g) of Head TSL | condition | |
|---|--------------------|--------------------------|
| SAR measured | 250 mW input power | 6.18 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 24.3 W/kg ± 16.5 % (k=2) |

Body TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Body TSL parameters | 22.0 °C | 52.7 | 1.95 mho/m |
| Measured Body TSL parameters | (22.0 ± 0.2) °C | 52.5 ± 6 % | 2.03 mho/m ± 6 % |
| Body TSL temperature change during test | < 0.5 °C | | |

SAR result with Body TSL

| SAR averaged over 1 cm ³ (1 g) of Body TSL | Condition | |
|---|--------------------|--------------------------|
| SAR measured | 250 mW input power | 12.9 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | 50.6 W/kg ± 17.0 % (k=2) |

| SAR averaged over 10 cm ³ (10 g) of Body TSL | condition | |
|---|--------------------|--------------------------|
| SAR measured | 250 mW input power | 6.01 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | 23.8 W/kg ± 16.5 % (k=2) |

Certificate No: D2450V2-727_Apr17

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

| Impedance, transformed to feed point | 56.3 Ω + 2.1 jΩ |
|--------------------------------------|-----------------|
| Return Loss | - 24.0 dB |

Antenna Parameters with Body TSL

| Impedance, transformed to feed point | 51.1 Ω + 4.1 jΩ |
|--------------------------------------|-----------------|
| Return Loss | - 27.5 dB |

General Antenna Parameters and Design

| Electrical Delay (one direction) 1.148 ns |
|---|
|---|

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

| Manufactured by | SPEAG |
|-----------------|------------------|
| Manufactured on | January 09, 2003 |

Certificate No: D2450V2-727_Apr17

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f (886-2) 2298-0488



DASY5 Validation Report for Head TSL

Date: 21.04.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 727

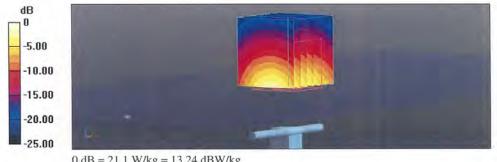
Communication System: UID 0 - CW; Frequency: 2450 MHz Medium parameters used: f = 2450 MHz; $\sigma = 1.87$ S/m; $\epsilon_r = 37.7$; $\rho = 1000$ kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(7.72, 7.72, 7.72); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001 .
- DASY52 52.10.0(1442); SEMCAD X 14.6.10(7413)

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 109.8 V/m; Power Drift = -0.06 dB Peak SAR (extrapolated) = 27.3 W/kg SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.18 W/kg Maximum value of SAR (measured) = 21.1 W/kg



0 dB = 21.1 W/kg = 13.24 dBW/kg

Certificate No: D2450V2-727_Apr17

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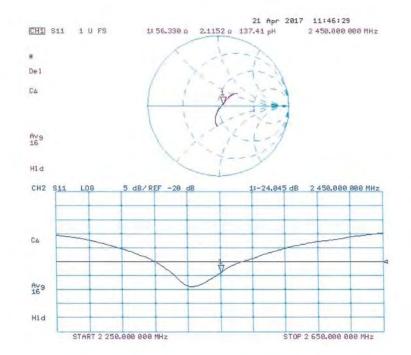
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Impedance Measurement Plot for Head TSL



Certificate No: D2450V2-727_Apr17

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DASY5 Validation Report for Body TSL

Date: 21.04.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 727

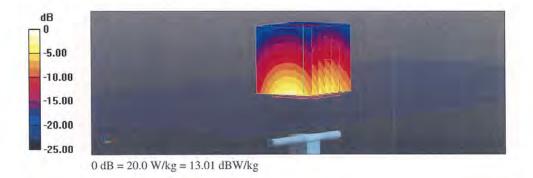
Communication System: UID 0 - CW; Frequency: 2450 MHz Medium parameters used: f = 2450 MHz; $\sigma = 2.03$ S/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(7.79, 7.79, 7.79); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1442); SEMCAD X 14.6.10(7413)

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

Measurement grid: dx=5mm, dy=5mm, dz=5mmReference Value = 105.0 V/m; Power Drift = -0.01 dB Peak SAR (extrapolated) = 25.4 W/kg SAR(1 g) = 12.9 W/kg; SAR(10 g) = 6.01 W/kg Maximum value of SAR (measured) = 20.0 W/kg



Certificate No: D2450V2-727_Apr17

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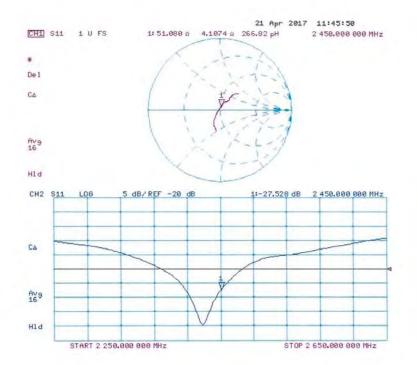
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Impedance Measurement Plot for Body TSL



Certificate No: D2450V2-727_Apr17

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| Al calibrations have been conduct Calibration Equipment used (MAV Primary EtianSards Power mether MPP Power sensor MPP-251 Power sensor MPP-251 Reference 20 dB Attenuator Type-N mismetick combinetion Falerance Probe EX3DV4 DAE4 Sacondary Standards Power sensor HIP 0411A Power sensor HIP 0411A Power sensor HIP 0411A Power sensor HIP 0411A Power sensor HIP 0411A RF generator R&S SMT-00 Natwork Analyzer HIP 07535 | Charlot in the closed introverprint TE critical for calibration ID 4 SNE 104778 SNE 103245 SNE 1033 SNE 10037 SNE 10037460704 BN 105372902781 SNE 1003721 SNE 1003720 SNE 1003720 SNE 1003730 SNE 1003730 SNE 1003730 | ry lacility: anw communic temporature (92 ± 37 October (Continents No.) October (No. 217-02289)(02289) October 16 (No. 217-02289) October 16 (No. 217-02295) October 16 (No. 217-02295) October 16 (No. 217-02295) October 16 (No. 217-02295) October 16 (No. 2217-02295) October 17 (No. DAE&GOL, Jan 17) October 17 (No. DAE&GOL, Jan 17) October 17 (No. DAE&GOL, Jan 17) October 16 (In house Check Oct 16) O7-Oct-16 (In house check Oct-16) O7-Oct-15 (In house check Oct-16) O7-Oct-15 (In house check Oct-16) O7-Oct-15 (In house check Oct-16) Of Oct-15 (In house check Oct-16) D5-Unr 15 (In house check Oct-16) | C and humidity < 70% Schessleid Crainimicm Apr-17 Apr-17 Apr-17 Apr-17 Apr-17 Dai-17 Dai-17 Dai-17 Jan-18 <u>Schessules Direck</u> In frouse check Dc1-18 In frouse check: Dc1-18 In frouse check: Dc1-18 In frouse check: Dc1-18 In frouse check: Dc1-18 |

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Calibration Laboratory of Schmid & Partner Engineering AG Zeugnaustress 4, 0004 Zurich, Switzerland



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Accreditation No.: SCS 0108

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Accredited by (ne Swiss Accordiation Sarvice (SAS)

The Swias Accreditation Service is one of the signatoriae to the EA Multilateral Agreement for the recognition of calibration cartificates Glossary:

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

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "IEEE Recommanded 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 62209-2, "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
- c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

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Measurement Conditions

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

| DASY Version | DASYS | V52.8.8 |
|------------------------------|--|----------------------------------|
| Extrapolation | Advanced Extrapolation | |
| Phantom | Modular Flat Phantom V5.0 | 1 |
| Distance Dipole Center - TSL | 10 mm | with Specer |
| Zoom Scan Resolution | dx, dy = 4,0 mm, dz = 1.4 mm | Graded Ratio = 1.4 (Z direction) |
| Frequency | 5200 MHz ± 1 MHz 5300 MHz ± 1 MHz 5600 MHz ± 1 MHz 5800 MHz ± 1 MHz 5800 MHz ± 1 MHz | |

Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Head TSL parameters | 22.0 °C | 38.0 | 4.66 mha/m |
| Measured Head TSL parameters | (22.0 ± 0.2) °C | 35.4 ± 6 % | 4.45 mho/m ± 6.% |
| Head TSL temperature change during test | <0.5 °C | | |

SAR result with Head TSL at 5200 MHz

| SAR averaged over 1 cm ³ (1 g) of Head TSL | Condition | |
|---|--------------------------------|--------------------------|
| SAR measured | 100 mW input power | 7.56 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 75.2 W/kg ± 19.9 % (k=2) |
| | | |
| SAR averaged over 10 cm ³ (10 g) of Head TSL | condition | |
| SAR averaged over 10 cm ³ (10 g) of Head TSL SAR measured | notibres view of turn with 001 | .2.16 W/kg |

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Head TSL parameters at 5300 MHz

The following parameters and calculations were applied.

| | Temperature | Parmittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Head TSL parameters | 22.0 °C | 35.9 | 4.76 mho/m |
| Measured Head TSL parameters | (22.0 ± 0.2) °C | 35,2 ± 6 % | 4.55 mho/m ± 6 % |
| Head TSL temperature change during test | < 0.5 °C | | |

SAR result with Head TSL at 5300 MHz

| SAR averaged over 1 cm ² (1 g) of Head TSL | Condition | |
|---|---------------------------------|----------------------------|
| SAR measured | 100 mW input power | 8.22 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 81.0 W / kg ± 19.9 % (k=2) |
| | | |
| SAR averaged over 10 cm ³ (10 g) of Head TSL | condition | |
| SAR averaged over 10 cm ⁵ (10 g) of Head TSL SAR measured | condition 100 mW input power | 2.35 W/kg |

Head TSL parameters at 5600 MHz

| | Temperature | Permittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Head TSL parameters | 22.0 °C | 35.5 | 5.07 mho/m |
| Measured Head TSL parameters | (22.0 ± 0.2) °C | 347 = 6 % | 4.85 mho/m ± β % |
| Head TSL temperature change during test | < 0.5 °C | | 1000 |

SAR result with Head TSL at 5600 MHz

| SAR averaged over 1 cm ³ (1 g) of Head TSL | Condition | |
|---|---------------------------------|--------------------------|
| SAFI measured | 100 mW input power | 8.22 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 81.7 W/kg ± 19.9 % (k=2) |
| | | |
| SAR averaged over 10 cm ² (10 g) of Head TSL | condition | |
| SAR averaged over 10 cm ² (10 g) of Head TSL SAR massured | condition 100 mW input power | 2.33 W/kg |

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Head TSL parameters at 5800 MHz

The following paramaters and calculations were applied

| Temperature | Permittivity | Conductivity |
|-----------------|----------------------------|--|
| 22.0 °C | 35.3 | 5.27 mho/m |
| (22.0 ± 0.2) °C | 34.4 ± 6 % | 5.05 mho/m ± 6 % |
| < 0.5 °C | - | - |
| | 22.0 °C (22.0 ± 0.2) °C | 22.0 °C 35.3 (22.0 ± 0.2) °C 34.4 ± 6 % |

SAR result with Head TSL at 5800 MHz

| SAR averaged over 1 cm ² (1 g) of Head TSL | Condition | |
|--|---------------------------------|--------------------------|
| SAR measured | 100 mW input power | 7.82 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 77.6 W/kg ± 19.9 % (k=2) |
| | | |
| SAR averaged over 10 cm ³ (10 g) of Head TSL | condition | |
| SAR averaged over 10 cm ³ (10 g) of Head TSL. SAR measured | condition 100 mW input power | 2.22 W/kg |

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Body TSL parameters at 5200 MHz

The following paramaters and calculations were applied.

| | Tempensture | Permittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Body TSL parameters | 22.0 % | 49.0 | 5.30 mhaim |
| Measured Body TSL parameters | (22.0 ± 0.2) "C | 47.5±6% | 5.36 mho/m ± 8 % |
| Body TSL temperature change during test | <0.5 °C | 1 | |

SAR result with Body TSL at 5200 MHz

| SAR averaged over 1 cm ² (1 g) of Body TSL | Condition | |
|---|---------------------------------|--------------------------|
| SAR measured | 100 mW input power | 7,32 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | 72.8 W/kg ± 19.9 % (k=2) |
| | | |
| SAR averaged over 10 cm ² (10 g) of Body TSL | condition | |
| SAR averaged over 10 cm ² (10 g) of Body TSL SAR measured | condition 100 mW input power | 2:05 W/kg |

Body TSL parameters at 5300 MHz

 The following parameters and calculations were applied.
 Temperature
 Permittivity
 Conductivity

 Nominal Body TSL parameters
 22.0 °C
 48.9
 5.42 mho/m

 Measured Body TSL parameters
 (22.0 ± 0.2) °C
 47.3 ± 6 %
 5.50 mho/m ± 6 %

 Body TSL temperature change during test
 < 0.5 °C</td>
 -- --

SAR result with Body TSL at 5300 MHz

| SAR averaged over 1 cm2 (1 g) of Body TSL | Condition | |
|---|---------------------------------|--------------------------|
| SAR measured | 100 mW input power | 7.66 W/kg |
| SAR for nominal Bedy TSL parameters | normalized to 1W | 76.1 W/kg ± 19.9 % (k=2) |
| sources restrict and the base to see | - water and a start of the | |
| SAR averaged over 10 cm ² (10 g) of Body TSL | condition | |
| | condition 100 mW input power | 2.15 W/kg |

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Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Body TSL parameters | 22.0 °C | 48.5 | 5.77 mha/m |
| Measured Body TSL parameters | (22.0 ± 0.2) °C | 46.6 ± 6 % | 5.90 mho/m ± 6 % |
| Body TSL temperature change during test | < 0.5 🖤 | _ | |

SAR result with Body TSL at 5600 MHz

| SAR averaged over 1 cm ³ (1 g) of Body TSL | Condition | |
|---|---------------------------------|--------------------------|
| SAR measured | 100 mW input power | 8.02 W/kg |
| SAB for nominal Body TGL parameters | normalized to 1W | 79.6 W/kg ± 19.9 % (k=2) |
| | | |
| SAR averaged over 10 cm ⁵ (10 g) of Body TSL | condition | |
| | condition 100 mW input power | 2.26 W/kg |

Body TSL parameters at 5800 MHz

| | Temperature | Permittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Body TSL parameters | 22.0 °C | 48.2 | 6.00 mho/m |
| Measured Body TSL parameters | (22.0 ± 0.2) "C | 48,3±6% | 6 17 mho/m ± 6 % |
| Body TSL temperature change during test | < 0.5 °C | | |

SAR result with Body TSL at 5800 MHz

| SAR averaged over 1 cm2 (1 g) of Body TSL | Condition | |
|---|---------------------------------|--------------------------|
| SAR measured | 100 mW Input power | 7.64 W/Kg |
| SAR for nominal Body TSL parameters | normalized to 1W | 75.9 W/kg ± 19.9 % (k=2) |
| | | |
| SAB averaged over 10 cm ² (10 g) of Body TSL | condition | |
| SAR averaged over 10 cm ³ (10 g) of Bady TSL SAR measured | condition 100 mW input power | 2.15 W/kg |

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5200 MHz

| Impedance, transformed to feed point | 49.6 Ω - 6.7 jΩ | |
|--------------------------------------|-----------------|--|
| Return Loss | - 23.4 dB | |

Antenna Parameters with Head TSL at 5300 MHz

| Impedance, transformed to feed point | 49.0 Ω - 1.8 jΩ |
|--------------------------------------|-----------------|
| Return Loss | +33.5 dB |

Antenna Parameters with Head TSL at 5600 MHz

| Impediance, transformed to feed point | 54.1 Ω - 0.2 jΩ |
|---------------------------------------|-----------------|
| Fleturn Loss | - 28.2 dB |

Antenna Parameters with Head TSL at 5800 MHz

| Impedance, transformed to feed point | 55.4 Q + 2.8 jQ | |
|--------------------------------------|-----------------|--|
| Return Loss | -24.8 dB | |

Antenna Parameters with Body TSL at 5200 MHz

| Impedance, transformed to feed point | 48.9 Ω - 7.0 jΩ |
|--------------------------------------|-----------------|
| Return Loss | - 22.9 dB |

Antenna Parameters with Body TSL at 5300 MHz

| Impedance, transformed to feed point | 51.0 Ω - 1.0 jΩ |
|--------------------------------------|-----------------|
| Return Loss | - 37.0 dB |

Antenna Parameters with Body TSL at 5600 MHz

| Impedance, transformed to feed point | 55.6 £2 + 1,5 §2 | |
|--------------------------------------|------------------|---|
| Return Loss | - 25.2 dB | _ |

Antenna Parameters with Body TSL at 5800 MHz

| Impediance, transformed to feed point | 56.6 Ω + 2.7 jΩ |
|---------------------------------------|-----------------|
| Return Loss | - 23.6 dB |

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General Antenna Parameters and Design

Electrical Delay (one direction) 1,198 (is

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

The dipole is made of standard semingid coastal cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldared connections near the leedpoint may be damaged.

Additional EUT Data

| Manulactured by | SPEAG |
|-----------------|-------------------|
| Manufactured on | February 05, 2004 |

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DASY5 Validation Report for Head TSL

Date 20.01.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1023

```
Communication System: UID 0 - CW;

Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz,

Medium parameters used: f = 5200 MHz; \sigma = 4.45 S/m; \epsilon_r = 35.4; \rho = 1000 kg/m<sup>3</sup>.

Medium parameters used: f = 5300 MHz; \sigma = 4.55 S/m; \epsilon_r = 35.2; \rho = 1000 kg/m<sup>3</sup>.

Medium parameters used: f = 5600 MHz; \sigma = 4.85 S/m; \epsilon_r = 34.7; \rho = 1000 kg/m<sup>3</sup>.

Medium parameters used: f = 5800 MHz; \sigma = 5.05 S/m; \epsilon_r = 34.4; \rho = 1000 kg/m<sup>3</sup>.

Medium parameters used: f = 5800 MHz; \sigma = 5.05 S/m; \epsilon_r = 34.4; \rho = 1000 kg/m<sup>3</sup>.
```

DASY52 Configuration:

- Probe: EX3DV4 SN3503; ConvF(5.76, 5.76, 5.76); Calibrated: 31.12.2016, ConvF(5.35, 5.35, 5.35); Calibrated: 31.12.2016, ConvF(5.09, 5.09, 5.09); Calibrated: 31.12.2016, ConvF(5.0), 5.01); Calibrated: 31.12.2016;
- Sensor-Surface: L4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.01.2017
- Phantom: Flut Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm Reference Value = 70.58 V/m; Power Drift = -0.08 dB Peak SAR (extrapolated) = 27.6 W/kg SAR(1 g) = 7.55 W/kg; SAR(10 g) = 2.16 W/kg Mix/mum value of SAR (measured) = 17.4 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm Reference Value = 73.0) V/m; Power Drift = -0.05 dB Peak SAR (extrapolated) = 31.6 W/kg SAR(1 g) = 8.22 W/kg; SAR(10 g) = 2.35 W/kg Maximum value of SAR (measured) = 19.3 W/kg.

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm Reference Value = 71.94 V/m; Power Drift = -0.04 dB Peak SAR (extrapolated) = 33.2 W/kg SAR(1 g) = 8.22 W/kg; SAR(10 g) = 2.33 W/kg Maximum value of SAR (measured) = 19.8 W/kg

Cemtionte No: D5GHzV2-1023_Jan17

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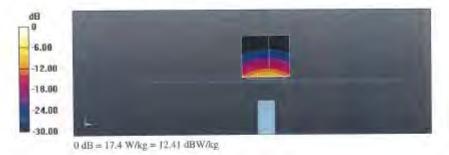
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Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm Reference Value = 69.84 V/m; Power Drift = -0.08 dB Peak SAR (extrapolated) = 32.7 W/kg SAR(1 g) = 7.82 W/kg; SAR(10 g) = 2.22 W/kg Maximum value of SAR (measured) = 19.5 W/kg



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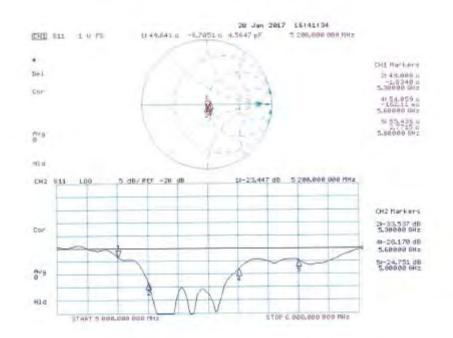
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Impedance Measurement Plot for Head TSL



Certificate No: D5GHzV2-1023_Jan17

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DASY5 Validation Report for Body TSL

Date: 19/01/2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1023

```
Communication System: UID:0 - CW;

Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz,

Medium parameters used: f = 5200 MHz; \sigma = 5.36 S/m; v_r = 47.5; \rho = 1000 kg/m<sup>3</sup>.

Medium parameters used; f = 5300 MHz; \sigma = 5.5 S/m; v_r = 47.5; \rho = 1000 kg/m<sup>3</sup>.

Medium parameters used; f = 5600 MHz; \sigma = 5.9 S/m; v_r = 46.6; \rho = 1000 kg/m<sup>3</sup>.

Medium parameters used; f = 5800 MHz; \sigma = 6.17 S/m; v_r = 46.3; \rho = 1000 kg/m<sup>3</sup>.

Medium parameters used; f = 5800 MHz; \sigma = 6.17 S/m; v_r = 46.3; \rho = 1000 kg/m<sup>3</sup>.

Phantom section: Flat Section

Measurement Standard; DASY5 (IEEE/IEC/ANSI C63.19-2011)
```

DASY52 Configuration:

- Probe: EX3DV4 SN3503; CoavF(5,29, 5,29, 5,29); Calibrated: 31-12.2016, ConvF(5,04, 5,04, 5,04); Calibrated: 31.12.2016, ConvF(4,87, 4,57; 4,57); Calibrated: 31.12.2016, ConvF(4,48, 4,48, 4,48); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601, Calibrated: 04.01.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1,4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm Reference Value = 65.54 V/m; Power Drift = -0.06 dB Peak SAR (extrapolated) = 28.1 W/kg SAR(1 g) = 7.32 W/kg; SAR(10 g) = 2.05 W/kg Maximum value of SAR (measured) = 16.6 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1,4mm Reference Value = 66.93 V/m; Power Drift = -0.07 dB Peak SAR (extrapolated) = 30.1 W/kg SAR(1 g) = 7.66 W/kg; SAR(10 g) = 2.15 W/kg Maximum value of SAR (measured) = 17.6 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm Reference Value = 67.09 V/m; Power Drift = 0.07 dB Peak SAR (extrapolated) = 33.7 W/kg SAR(1 g) = 8.02 W/kg; SAR(10 g) = 2.26 W/kg Maximum value of SAR (measured) = 18.9 W/kg

Centricate No: D5GHzV2-1029_Jan17

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Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm Reference Value = 65.14 V/m; Power Drift = -0.06 dB Peak SAR (extrapolated) = 34.0 W/kg SAR(1 g) = 7.64 W/kg; SAR(10 g) = 2.13 W/kg Maximum value of SAR (measured) = 18.3 W/kg



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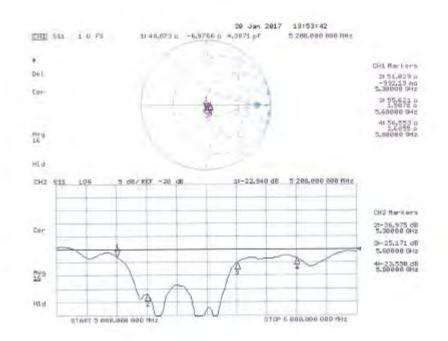
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Impedance Measurement Plot for Body TSL





- End of 1st part of report -

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