

## FCC Test Report (Part 1)

### RF Exposure (EMF)

|                         |                       |                                  |                |
|-------------------------|-----------------------|----------------------------------|----------------|
| <b>Test Report no.:</b> | EMC_BO_002150 (v1.0)  | <b>Date of Report:</b>           | 02-FEB-2018    |
| <b>Number of pages:</b> | 14                    | <b>Project support engineer:</b> | Frank Wittmann |
| <b>Test period:</b>     | 16.01.2018-18.01.2018 |                                  |                |

|                            |                                                                                      |               |             |
|----------------------------|--------------------------------------------------------------------------------------|---------------|-------------|
| <b>Applicant:</b>          | Laird Dabendorf GmbH, Märkische Straße 72, 15806 Zossen, Germany, Mr. Heiko Dörschel |               |             |
| <b>Manufacturer:</b>       | Laird Dabendorf GmbH, Märkische Straße 72, 15806 Zossen, Germany                     |               |             |
| <b>EUT identification:</b> | Laird, WCH-186 (WCH-186a, WCH-186b)                                                  |               |             |
| <b>FCC ID:</b>             | RK7186-00                                                                            | <b>IC ID:</b> | 4774A-18600 |

|                            |                                                           |                                         |                                    |
|----------------------------|-----------------------------------------------------------|-----------------------------------------|------------------------------------|
| <b>Testing laboratory:</b> | Laird Bochum GmbH, Meesmannstr.103, 44807 Bochum, Germany |                                         |                                    |
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|                            | <b>FCC designation no.:</b>                               | DE0017                                  | <b>IC recognition no.:</b> 7847A-1 |
|                            | <b>Laboratory manager:</b>                                | Jürgen Mitterer                         |                                    |

|                    |                                                                             |
|--------------------|-----------------------------------------------------------------------------|
| <b>Test result</b> | The EUT complies with the requirements made in the referred test documents. |
|--------------------|-----------------------------------------------------------------------------|

|                  |                    |                |                          |
|------------------|--------------------|----------------|--------------------------|
| <b>Approver:</b> | Jürgen Mitterer    | <b>Author:</b> | Frank Wittmann           |
| <b>Title:</b>    | Laboratory Manager | <b>Title:</b>  | Senior EMC Test Engineer |

**Signature:**  **Signature:** 

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## 1. Summary for FCC Part 1 EMF test report

|                               |                |
|-------------------------------|----------------|
| Date of receipt               | 16-JAN-2018    |
| Testing completed             | 18-JAN-2018    |
| The customer's contact person | Heiko Dörschel |
| Notes                         | none           |

### 1.1. EUT and accessory information

The EUT is an inductive wireless power transfer device (wireless charger) with load modulation operating at 111 kHz. In case of AM radio frequency interference in the car, the main WPT operating frequency at 111 kHz can be switched to 112 or 113 kHz. The highest output power is available at 111 kHz. The EUT is tested with a commercial available mobile phone with highest duty cycle of 100%.

| Product               | Type      | SN                    | HW  | MV | SW   | DUT       |
|-----------------------|-----------|-----------------------|-----|----|------|-----------|
| Wireless charger unit | WCH-186b  | 000002B02F6B          | H10 | -- | 0050 | DAB17146E |
| Power cable           | --        | --                    | --  | -- | --   | DAB15193E |
| RF cable cellular     | --        | --                    | --  | -- | --   | DAB16169E |
| RF cable NFC          | --        | --                    | --  | -- | --   | DAB17003E |
| Mobile Phone          | Galaxy S7 | IMEI: 357810085825140 | --  | -- | --   | MPS7      |

### 1.2. Applied standards

| Standard / Rule Part | Version |
|----------------------|---------|
| CFR 47, FCC Part 2   | -       |
| CFR 47, FCC Part 1   | -       |
| KDB 680106 D01       | v02     |
| ISED RSS-216         | Issue 2 |
| ISED RSS-102         | Issue 5 |
| SPR-002              | Issue 1 |
| Safety Code 6        | 2015    |

Deviations or clarifications to these standards are noted in the related test result under "test method and limit".

### 1.3. Summary of test results

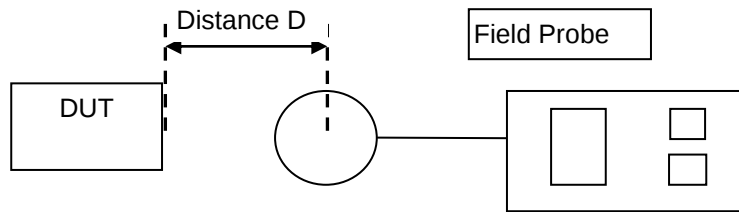
| Section | Section in CFR 47 | Section in RSS-102 / SC6 | Name of the test      | Result |
|---------|-------------------|--------------------------|-----------------------|--------|
| 3.2     | 1.1307(b), 1.1310 | 4 / 2.2.1                | RF Exposure (H-field) | PASSED |
| 3.3     | 1.1307(b), 1.1310 | 4 / 2.2.1                | RF Exposure (E-field) | PASSED |

PASSED: The EUT complies with the essential requirements in the standard.  
 FAILED: The EUT does not comply with the essential requirements in the standard.  
 NP: The test was not performed.  
 NA: The test was not applicable.

#### 1.4. Measurement uncertainties

| Parameter                         | Worst Case Uncertainty | Max. Uncertainty |
|-----------------------------------|------------------------|------------------|
| H-field probe 100 cm <sup>2</sup> | 3.33 %                 | < 30 %           |
| H-field probe 3 cm <sup>2</sup>   | 4.17 %                 |                  |
| H-field level tester              | 12.60 %                |                  |
| E-field probe + level tester      | 20 %                   |                  |

## 2. EMF Test setup



### 3. RF Exposure (EMF)

|                              |                                       |
|------------------------------|---------------------------------------|
| EUT with DUT number          | DAB17146E                             |
| Accessories with DUT numbers | MPS7, DAB15193E, DAB16069E, DAB17003E |
| Operation Voltage [V] / [Hz] | 12 / DC                               |
| Result                       | PASSED                                |
| Remarks                      | None                                  |
| Temp [°C] / Humidity [%RH]   | 21.2 / 31.0                           |
| Date of measurements         | 16-JAN-2018 to 18-Jan-2018            |
| Measured by                  | Ralf Lange, Bhushan Pawar             |

#### 3.1. Test method and limit

The DUT is working on the operating frequency (111 kHz) with the highest output power (worst case). Measurement was made from all sides of the DUT in 10, 9, 8, 7, 6, 5, 4, 3 cm and lower distance (DUT edge to the center of probe), if possible.

The mobile phone was placed in the center of the charging area of each coil (left, middle, right), one after another.

Minimum distance between the primary coil in the DUT and the secondary coil in the mobile phone (best coupling).

Different probes were used for E- and H-field measurement.

The highest emission level was recorded.

Side definition for positioning of E- and H-field probe



FCC limits for maximum permissible exposure

| Frequency range [MHz]                                      | Electric Field Strength Limit [V/m] | Magnetic Field Strength Limit [A/m] | Power Density [mW/cm <sup>2</sup> ] | Average Time [minutes] |
|------------------------------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|------------------------|
| (B) Limits for General Population / Uncontrolled Exposures |                                     |                                     |                                     |                        |
| <b>0.3 – 1.34</b>                                          | <b>614</b>                          | <b>1.63</b>                         | <b>100</b>                          | <b>30</b>              |
| 1.34 – 30                                                  | 824 / $f_{\text{[MHz]}}$            | 2.19 / $f_{\text{[MHz]}}$           | 180 / $f_{\text{[MHz]}}^2$          | 30                     |
| 30 – 300                                                   | 27.5                                | 0.073                               | 0.2                                 | 30                     |
| 300 – 1500                                                 |                                     |                                     | $f_{\text{[MHz]}} / 1500$           | 30                     |
| 1500 – 100000                                              |                                     |                                     | 1.0                                 | 30                     |

Note1: According to DUT operating frequency and installation definition, the limit in bold letters (300 kHz) was applied.

ISED limits for maximum permissible exposure

| Frequency range [MHz]                                                                      | Electric Field Strength Limit [V/m] | Magnetic Field Strength Limit [A/m]              | Power Density [W/m <sup>2</sup> ]          | Average Time [minutes]            |
|--------------------------------------------------------------------------------------------|-------------------------------------|--------------------------------------------------|--------------------------------------------|-----------------------------------|
| RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment) |                                     |                                                  |                                            |                                   |
| <b>0.003 – 10</b>                                                                          | <b>83</b>                           | <b>90</b>                                        | -                                          | <b>Instantaneous</b>              |
| <b>0.1 – 10</b>                                                                            | -                                   | <b>0.73 / <math>f_{\text{[MHz]}}</math></b>      | -                                          | <b>6</b>                          |
| 1.1 – 10                                                                                   | 87 / $f_{\text{[MHz]}}^{0.5}$       | -                                                | -                                          | 6                                 |
| 10 – 20                                                                                    | 27.46                               | 0.0728                                           | -2                                         | 6                                 |
| 20 – 48                                                                                    | 58.07 / $f_{\text{[MHz]}}^{0.25}$   | 0.1540 / $f_{\text{[MHz]}}^{0.25}$               | 8.944 / $f_{\text{[MHz]}}^{0.5}$           | 6                                 |
| 48 – 300                                                                                   | 22.06                               | 0.05852                                          | 1.291                                      | 6                                 |
| 300 – 6000                                                                                 | 3.142 $f_{\text{[MHz]}}^{0.3417}$   | 0.008335 $f_{\text{[MHz]}}^{0.3417}$             | 0.02619 $f_{\text{[MHz]}}^{0.6834}$        | 6                                 |
| 6000 – 15000                                                                               | 61.4                                | 0.163                                            | 10                                         | 6                                 |
| 15000 – 150000                                                                             | 61.4                                | 0.163                                            | 10                                         | 616000 / $f_{\text{[MHz]}}^{1.2}$ |
| 150000 – 300000                                                                            | 0.158 $f_{\text{[MHz]}}^{0.5}$      | 4.21 x 10 <sup>-4</sup> $f_{\text{[MHz]}}^{0.5}$ | 6.67 x 10 <sup>-5</sup> $f_{\text{[MHz]}}$ | 616000 / $f_{\text{[MHz]}}^{1.2}$ |

Note: According to DUT operating frequency and installation definition, the limit in bold letters was applied.

## 3.2. Test results H-field (FCC, ISED)

### 3.2.1 H-field (left coil)

Detector: RMS, Mode: 320  $\mu$ T, Range: normal, Low Cut: 10 Hz

| Frequency [kHz] | Distance [cm] | Level Pos A [A/m] | Level Pos B [A/m] | Level Pos C [A/m] | Level Pos D [A/m] | Level Top [A/m] | FCC Limit [A/m] | ISED Limit [A/m] | Result |
|-----------------|---------------|-------------------|-------------------|-------------------|-------------------|-----------------|-----------------|------------------|--------|
| 111             | 10            | 0.15              | 0.15              | 0.32              | 0.21              | 0.35            | 1.63            | 90 / 6.58        | PASSED |
| 111             | 9             | 0.18              | 0.18              | 0.40              | 0.24              | 0.43            | 1.63            | 90 / 6.58        | PASSED |
| 111             | 8             | 0.22              | 0.20              | 0.54              | 0.29              | 0.55            | 1.63            | 90 / 6.58        | PASSED |
| 111             | 7             | 0.28              | 0.36              | 0.75              | 0.37              | 0.72            | 1.63            | 90 / 6.58        | PASSED |
| 111             | 6             | 0.36              | 0.40              | 1.05              | 0.45              | 0.99            | 1.63            | 90 / 6.58        | PASSED |
| 111             | 5             | 0.70              | 0.45              | 1.27              | 0.59              | 1.29            | 1.63            | 90 / 6.58        | PASSED |
| 111             | 4.2           | 0.96              | 0.51              | <b>1.63</b>       | 0.69              | <b>1.63</b>     | 1.63            | 90 / 6.58        | PASSED |
| 111             | 4             | 1.01              | 0.53              | NP                | 0.72              | NP              | 1.63            | 90 / 6.58        | PASSED |
| 111             | 3.1           | <b>1.63</b>       | 0.65              | NP                | 0.90              | NP              | 1.63            | 90 / 6.58        | PASSED |
| 111             | 3             | NP                | 0.67              | NP                | 0.93              | NP              | 1.63            | 90 / 6.58        | PASSED |
| 111             | 2             | NP                | 0.91              | NP                | 1.25              | NP              | 1.63            | 90 / 6.58        | PASSED |
| 111             | 1.6           | NP                | 1.05              | NP                | 1.49              | NP              | 1.63            | 90 / 6.58        | PASSED |

Note1: Measurement values were transformed from  $\mu$ T to A/m, where 1 A/m = 1.256  $\mu$ T

Note2: Measurements for distances 10, 9, 8, 7 and 6 cm were done with 100 cm<sup>2</sup> H-field probe

Note3: Measurements for distances 5, 4, 3 cm and lower were done with 3 cm<sup>2</sup> H-field probe

Note4: Result declaration relates only to the columns with measured values within each row

Note5: NP = Not Performed

Worst case position H-field probe (left coil, pos C, 4.2 cm)



### 3.2.2 H-field (mid coil)

Detector: RMS, Mode: 320  $\mu$ T, Range: normal, Low Cut: 10 Hz

| Frequency [kHz] | Distance [cm] | Level Pos A [A/m] | Level Pos B [A/m] | Level Pos C [A/m] | Level Pos D [A/m] | Level Top [A/m] | FCC Limit [A/m] | ISED Limit [A/m] | Result |
|-----------------|---------------|-------------------|-------------------|-------------------|-------------------|-----------------|-----------------|------------------|--------|
| 111             | 10            | 0.08              | 0.16              | 0.18              | 0.10              | 0.22            | 1.63            | 90 / 6.58        | PASSED |
| 111             | 9             | 0.10              | 0.17              | 0.22              | 0.11              | 0.27            | 1.63            | 90 / 6.58        | PASSED |
| 111             | 8             | 0.12              | 0.20              | 0.29              | 0.13              | 0.36            | 1.63            | 90 / 6.58        | PASSED |
| 111             | 7             | 0.15              | 0.29              | 0.41              | 0.16              | 0.46            | 1.63            | 90 / 6.58        | PASSED |
| 111             | 6             | 0.20              | 0.29              | 0.55              | 0.20              | 0.63            | 1.63            | 90 / 6.58        | PASSED |
| 111             | 5             | 0.40              | 0.30              | 0.75              | 0.37              | 0.84            | 1.63            | 90 / 6.58        | PASSED |
| 111             | 4             | 0.56              | 0.31              | 1.11              | 0.42              | 1.18            | 1.63            | 90 / 6.58        | PASSED |
| 111             | 3.2           | 0.80              | 0.33              | <b>1.63</b>       | 0.51              | <b>1.63</b>     | 1.63            | 90 / 6.58        | PASSED |
| 111             | 3             | 0.90              | 0.33              | NP                | 0.52              | NP              | 1.63            | 90 / 6.58        | PASSED |
| 111             | 2             | <b>1.63</b>       | 0.40              | NP                | 0.68              | NP              | 1.63            | 90 / 6.58        | PASSED |
| 111             | 1.6           | NP                | 0.44              | NP                | 0.77              | NP              | 1.63            | 90 / 6.58        | PASSED |

Note1: Measurement values were transformed from  $\mu$ T to A/m, where 1 A/m = 1.256  $\mu$ T

Note2: Measurements for distances 10, 9, 8, 7 and 6 cm were done with 100 cm<sup>2</sup> H-field probe

Note3: Measurements for distances 5, 4, 3 cm and lower were done with 3 cm<sup>2</sup> H-field probe

Note4: Result declaration relates only to the columns with measured values within each row

Note5: NP = Not Performed

Worst case position H-field probe (mid coil, pos C, 3.2 cm)



### 3.2.3 H-field (right coil)

Detector: RMS, Mode: 320  $\mu$ T, Range: normal, Low Cut: 10 Hz

| Frequency [kHz] | Distance [cm] | Level Pos A [A/m] | Level Pos B [A/m] | Level Pos C [A/m] | Level Pos D [A/m] | Level Top [A/m] | FCC Limit [A/m] | ISED Limit [A/m] | Result |
|-----------------|---------------|-------------------|-------------------|-------------------|-------------------|-----------------|-----------------|------------------|--------|
| 111             | 10            | 0.20              | 0.23              | 0.25              | 0.20              | 0.38            | 1.63            | 90 / 6.58        | PASSED |
| 111             | 9             | 0.24              | 0.28              | 0.31              | 0.23              | 0.47            | 1.63            | 90 / 6.58        | PASSED |
| 111             | 8             | 0.30              | 0.32              | 0.40              | 0.28              | 0.61            | 1.63            | 90 / 6.58        | PASSED |
| 111             | 7             | 0.40              | 0.38              | 0.54              | 0.34              | 0.80            | 1.63            | 90 / 6.58        | PASSED |
| 111             | 6             | 0.53              | 0.41              | 0.75              | 0.43              | 1.05            | 1.63            | 90 / 6.58        | PASSED |
| 111             | 5             | 0.84              | 0.46              | 1.03              | 0.59              | 1.34            | 1.63            | 90 / 6.58        | PASSED |
| 111             | 4.3           | 1.07              | 0.50              | 1.37              | 0.68              | <b>1.63</b>     | 1.63            | 90 / 6.58        | PASSED |
| 111             | 4             | 1.21              | 0.53              | 1.52              | 0.72              | NP              | 1.63            | 90 / 6.58        | PASSED |
| 111             | 3.8           | 1.31              | 0.56              | <b>1.63</b>       | 0.76              | NP              | 1.63            | 90 / 6.58        | PASSED |
| 111             | 3.3           | <b>1.63</b>       | 0.61              | NP                | 0.88              | NP              | 1.63            | 90 / 6.58        | PASSED |
| 111             | 3             | NP                | 0.63              | NP                | 0.96              | NP              | 1.63            | 90 / 6.58        | PASSED |
| 111             | 2             | NP                | 0.78              | NP                | 1.34              | NP              | 1.63            | 90 / 6.58        | PASSED |
| 111             | 1.6           | NP                | 0.86              | NP                | 1.57              | NP              | 1.63            | 90 / 6.58        | PASSED |

Note1: Measurement values were transformed from  $\mu$ T to A/m, where 1 A/m = 1.256  $\mu$ T

Note2: Measurements for distances 10, 9, 8, 7 and 6 cm were done with 100 cm<sup>2</sup> H-field probe

Note3: Measurements for distances 5, 4, 3 cm and lower were done with 3 cm<sup>2</sup> H-field probe

Note4: Result declaration relates only to the columns with measured values within each row

Note5: NP = Not Performed

Worst case position H-field probe (right coil, top, 4.3 cm)



### 3.3. Test results E-field (FCC, ISED)

#### 3.3.1 E-field (left coil)

Detector: AVRG, Mode: V/m

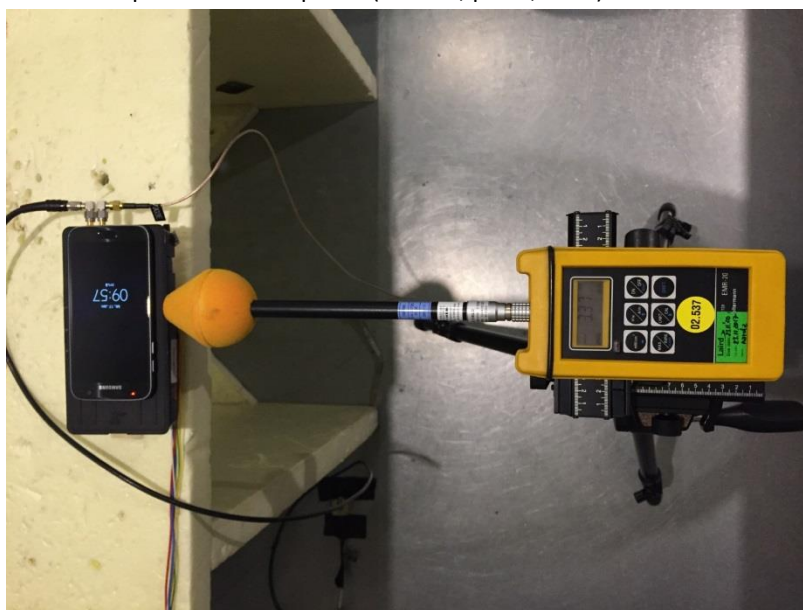
| Frequency [kHz] | Distance [cm] | Level Pos A [V/m] | Level Pos B [V/m] | Level Pos C [V/m] | Level Pos D [V/m] | Level Top [V/m] | FCC Limit [V/m] | ISED Limit [V/m] | Result |
|-----------------|---------------|-------------------|-------------------|-------------------|-------------------|-----------------|-----------------|------------------|--------|
| 111             | 10            | 0.50              | 0.40              | 0.65              | 0.39              | 0.89            | 614             | 83               | PASSED |
| 111             | 9             | 0.56              | 0.48              | 0.81              | 0.43              | 1.06            | 614             | 83               | PASSED |
| 111             | 8             | 0.65              | 0.57              | 1.02              | 0.49              | 1.29            | 614             | 83               | PASSED |
| 111             | 7             | 0.79              | 0.62              | 1.30              | 0.56              | 1.57            | 614             | 83               | PASSED |
| 111             | 6             | 0.97              | 0.79              | 1.68              | 0.70              | 1.93            | 614             | 83               | PASSED |
| 111             | 5             | 1.23              | 1.05              | 2.26              | 0.91              | <b>2.43</b>     | 614             | 83               | PASSED |
| 111             | 4             | 1.54              | 1.56              | <b>3.37</b>       | 1.25              | NP              | 614             | 83               | PASSED |

Note1: Measurements for distances 10, 9, 8, 7, 6, 5 and 4 cm were done with the E-field probe

Note2: Result declaration relates only to the columns with measured values within each row

Note3: NP = Not Performed

Worst case position E-field probe (left coil, pos C, 4 cm)



### 3.3.2 E-field (mid coil)

Detector: AVR9, Mode: V/m

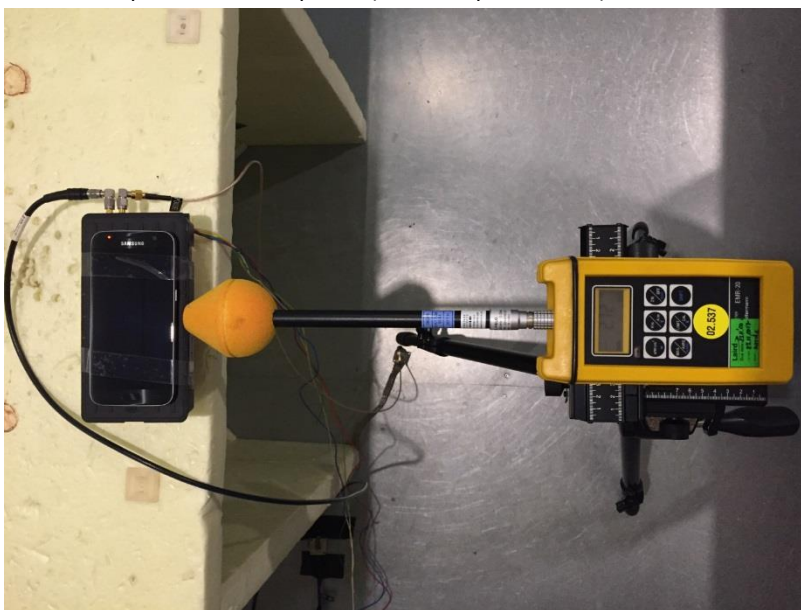
| Frequency [kHz] | Distance [cm] | Level Pos A [V/m] | Level Pos B [V/m] | Level Pos C [V/m] | Level Pos D [V/m] | Level Top [V/m] | FCC Limit [V/m] | ISED Limit [V/m] | Result |
|-----------------|---------------|-------------------|-------------------|-------------------|-------------------|-----------------|-----------------|------------------|--------|
| 111             | 10            | 0.42              | 0.35              | 0.59              | 0.35              | 0.72            | 614             | 83               | PASSED |
| 111             | 9             | 0.53              | 0.39              | 0.68              | 0.37              | 0.87            | 614             | 83               | PASSED |
| 111             | 8             | 0.61              | 0.47              | 0.79              | 0.43              | 1.04            | 614             | 83               | PASSED |
| 111             | 7             | 0.72              | 0.51              | 0.96              | 0.57              | 1.28            | 614             | 83               | PASSED |
| 111             | 6             | 0.86              | 0.56              | 1.28              | 0.72              | 1.59            | 614             | 83               | PASSED |
| 111             | 5             | 1.08              | 0.70              | 1.82              | 0.94              | <b>1.98</b>     | 614             | 83               | PASSED |
| 111             | 4             | 1.43              | 0.96              | <b>2.72</b>       | 1.31              | NP              | 614             | 83               | PASSED |

Note1: Measurements for distances 10, 9, 8, 7, 6, 5 and 4 cm were done with the E-field probe

Note2: Result declaration relates only to the columns with measured values within each row

Note3: NP = Not Performed

Worst case position E-field probe (mid coil, pos C, 4 cm)



### 3.3.3 E-field (right coil)

Detector: AVR9, Mode: V/m

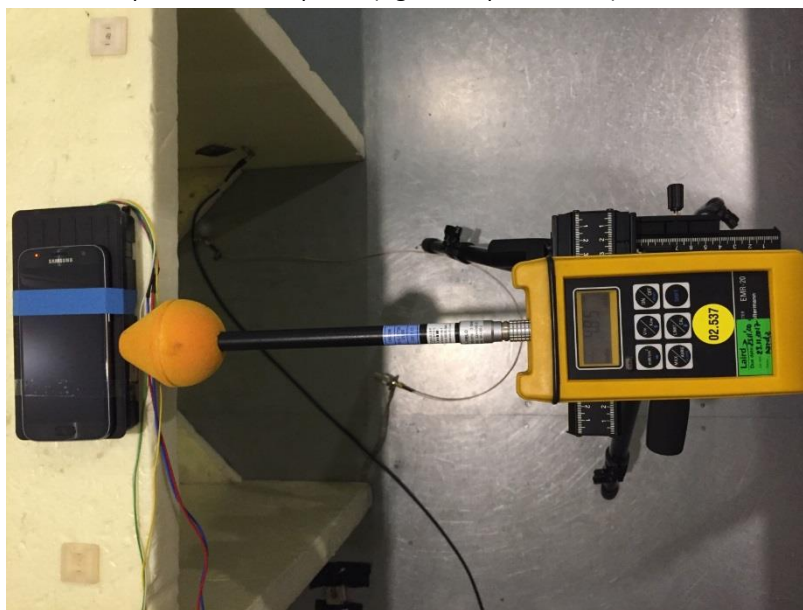
| Frequency [kHz] | Distance [cm] | Level Pos A [V/m] | Level Pos B [V/m] | Level Pos C [V/m] | Level Pos D [V/m] | Level Top [V/m] | FCC Limit [V/m] | ISED Limit [V/m] | Result |
|-----------------|---------------|-------------------|-------------------|-------------------|-------------------|-----------------|-----------------|------------------|--------|
| 111             | 10            | 0.52              | 0.37              | 1.15              | 1.19              | 2.06            | 614             | 83               | PASSED |
| 111             | 9             | 0.59              | 0.44              | 1.35              | 1.37              | 2.34            | 614             | 83               | PASSED |
| 111             | 8             | 0.74              | 0.49              | 1.62              | 1.70              | 2.66            | 614             | 83               | PASSED |
| 111             | 7             | 0.81              | 0.53              | 1.98              | 2.00              | 3.05            | 614             | 83               | PASSED |
| 111             | 6             | 0.95              | 0.64              | 2.48              | 2.41              | 3.47            | 614             | 83               | PASSED |
| 111             | 5             | 1.18              | 0.84              | 3.34              | 2.97              | <b>4.04</b>     | 614             | 83               | PASSED |
| 111             | 4             | 1.45              | 1.16              | <b>4.85</b>       | 3.82              | NP              | 614             | 83               | PASSED |

Note1: Measurements for distances 10, 9, 8, 7, 6, 5 and 4 cm were done with the E-field probe

Note2: Result declaration relates only to the columns with measured values within each row

Note3: NP = Not Performed

Worst case position E-field probe (right coil, pos C, 4 cm)



#### 4. Test Equipment

| Equipment                         | Manufacturer                     | Type       | Serial No. | Actual Calibration | Next Calibration |
|-----------------------------------|----------------------------------|------------|------------|--------------------|------------------|
| Exposure Level Tester             | Narda Safety Test Solutions GmbH | ELT-400    | N-0385     | 07.12.2017         | 07.12.2020       |
| H-field Probe 3 cm <sup>2</sup>   | Narda Safety Test Solutions GmbH | 2300/90.20 | C-0150     | 20.05.2015         | 20.05.2018       |
| H-Field Probe 100 cm <sup>2</sup> | Narda Safety Test Solutions GmbH | Probe      | M-0823     | 07.12.2017         | 07.12.2020       |
| Field Analyzer                    | Wandel & Goltermann              | EMR20      | P-0030     | 23.11.2017         | 23.11.2020       |
| Isotropic Electric Field Probe    | Wandel & Goltermann              | Type 8     | M-0082     | 23.11.2017         | 23.11.2020       |