

## FCC Test Report (Part 1)

### RF Exposure (EMF)

|                         |                     |                                  |                |
|-------------------------|---------------------|----------------------------------|----------------|
| <b>Test Report no.:</b> | EMC_BO_002034(v1.0) | <b>Date of Report:</b>           | 11-Apr-2016    |
| <b>Number of pages:</b> | 9                   | <b>Project support engineer:</b> | Frank Wittmann |
| <b>Test period:</b>     | 06-Apr-2016         |                                  |                |

|                      |                                                                               |               |             |
|----------------------|-------------------------------------------------------------------------------|---------------|-------------|
| <b>Applicant:</b>    | Novero Dabendorf GmbH, Märkische Straße 72, 15806 Zossen, Mr. Christian Pauli |               |             |
| <b>Manufacturer:</b> | Novero Dabendorf GmbH, Märkische Straße 72, 15806 Zossen, Germany             |               |             |
| <b>EUT ident.:</b>   | Novero, WCH-184 (WCH-184a, WCH-184b, WCH-184c)                                |               |             |
| <b>FCC ID:</b>       | RK7184-00                                                                     | <b>IC ID:</b> | 4774A-18400 |

|                            |                                                                                                                                                                                                                                                      |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Referred documents:</b> | CFR 47, FCC rules Part 1, KDB 680106 D01 RF Exposure Wireless Charging Apps v02, IC standards 216 Issue 1, Safety Code 6 (2015). Deviations or clarifications to these standards are noted in the related test result under "test method and limit". |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                            |                                                            |                 |                                       |
|----------------------------|------------------------------------------------------------|-----------------|---------------------------------------|
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|                            | Tel.:                                                      | +49 234/51668-0 | e-mail: product-validation@novero.com |
|                            | FCC listing no.:                                           | 881111          | IC recognition no.: 7847A-1           |
|                            | Laboratory manager:                                        | Jürgen Mitterer |                                       |

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

|                   |                                                                                     |                   |                                                                                       |
|-------------------|-------------------------------------------------------------------------------------|-------------------|---------------------------------------------------------------------------------------|
| <b>Approver:</b>  | Ines Baufeld                                                                        | <b>Author:</b>    | Robert Müller                                                                         |
| <b>Title:</b>     | Laboratory Quality Manager                                                          | <b>Title:</b>     | Product Certification Manager                                                         |
| <b>Signature:</b> |  | <b>Signature:</b> |  |

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## 1. Summary for FCC Part 1 EMF Test Report

|                               |                 |
|-------------------------------|-----------------|
| Date of receipt               | 06-Apr-2016     |
| Testing completed             | 06-Apr-2016     |
| The customer's contact person | Christian Pauli |
| Notes                         | none            |

### 1.1. EUT and Accessory Information

The EUT is an inductive wireless power transfer device (wireless charger) with load management operating at 111kHz. EUT is tested with a self designed and shielded receiver simulator which requests and consumes always maximum rated TX power.

| Product               | Type     | SN   | HW   | MV | SW   | DUT       |
|-----------------------|----------|------|------|----|------|-----------|
| Wireless charger unit | WCH-184b | --   | C1.1 | -- | 0.08 | DAB16035E |
| Artificial load       | WCH Rec. | 0001 | 1.0  | -- | --   | DAB16024E |
| Power cable           | --       | --   | --   | -- | --   | DAB15201E |
| RF cable with BiasT   | --       | --   | --   | -- | --   | DAB14039  |

### 1.2. Summary of Test Results

| Section | Section in CFR 47 | Section in RSS-102 / SC6 | Name of the test | Result |
|---------|-------------------|--------------------------|------------------|--------|
| 3       | 1.307(b), 1.1310  | 4 / 2.2.1                | RF Exposure      | PASS   |

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

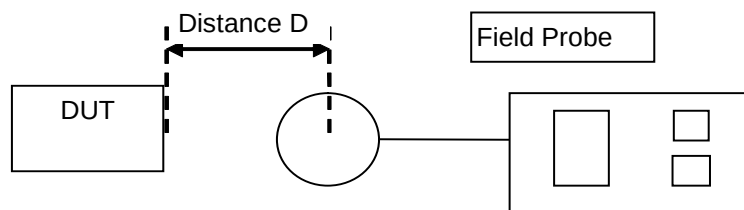
### 1.3. Measurement Uncertainties

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

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## 2. EMF Test setup



### 3. E and H-field strength

(FCC §1.307(b), §1.1310, RSS-102, Safety Code 6)

|                              |                                                                               |
|------------------------------|-------------------------------------------------------------------------------|
| EUT with DUT number          | DAB16035E                                                                     |
| Accessories with DUT numbers | DAB16024E (Novero WCH Receiver), DAB15201E (power cable), DAB14039 (RF cable) |
| Operation Voltage [V] / [Hz] | 12 / DC                                                                       |
| Result                       | PASS                                                                          |
| Remarks                      | OP1 (5Ω/5W load, Primary Coil 1)                                              |
| Temp [°C] / Humidity [%RH]   | 23.2 / 35                                                                     |
| Date of measurements         | 06-Apr-2016                                                                   |
| Measured by                  | Robert Müller                                                                 |

#### 3.1. Test method and limit

Measurement was made from all sides of the DUT in 10, 9, 8, 7, 6 and 5cm distance (DUT edge to the center of probe)

Different probes were used to measure E and H-field separately

The highest emission level was recorded

EUT was cooled during measurements to avoid overheating and therefore power shut down

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] |
|-------------------------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|------------------------|
| (A) Limits for Occupational/Control Exposures         |                                     |                                     |                                     |                        |
| 0.3 – 3.0                                             | 614                                 | 1.63                                | *(100)                              | 6                      |
| 3.0 – 30                                              | 1842/f(MHz)                         | 4.89/f(MHz)                         | *(900/f(MHz) <sup>2</sup> )         | 6                      |
| 30 – 300                                              | 61.4                                | 0.163                               | 1.0                                 | 6                      |
| 300 – 1500                                            |                                     |                                     | f(MHz)/300                          | 6                      |
| 1500 - 100000                                         |                                     |                                     | 5                                   | 6                      |
| (B) Limits for General Population/Uncontrol 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(MHz)                          | 2.19/f(MHz)                         | *(180/f(MHz) <sup>2</sup> )         | 30                     |
| 30 – 300                                              | 27.5                                | 0.073                               | 0.2                                 | 30                     |
| 300 – 1500                                            |                                     |                                     | F(MHz)/1500                         | 30                     |
| 1500 - 100000                                         |                                     |                                     | 1.0                                 | 30                     |

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

IC limits for maximum permissible exposure for general public and uncontrolled environment

| Frequency range<br>[MHz] | Electric Field<br>Strength Limit<br>[V/m] | Magnetic Field<br>Strength Limit<br>[A/m] | Power Density<br>[mW/cm <sup>2</sup> ] | Average Time<br>[minutes] |
|--------------------------|-------------------------------------------|-------------------------------------------|----------------------------------------|---------------------------|
| <b>0.003 – 10</b>        | <b>83</b>                                 | <b>90</b>                                 | -                                      | <b>Instantaneous</b>      |
| <b>0.1 – 10</b>          | -                                         | <b>0.73 / f</b>                           | -                                      | <b>6</b>                  |
| 1.1 – 10                 | 87 / f <sup>0.5</sup>                     | -                                         | -                                      | 6                         |
| 10 – 20                  | 27.46                                     | 0.0728                                    | -2                                     | 6                         |
| 20 – 48                  | 58.07 / f <sup>0.25</sup>                 | 0.1540 / f <sup>0.25</sup>                | 8.944 / f <sup>0.5</sup>               | 6                         |
| 48 -300                  | 22.06                                     | 0.05852                                   | 1.291                                  | 6                         |
| 300 – 6000               | 3.142 f <sup>0.3417</sup>                 | 0.008335 f <sup>0.3417</sup>              | 0.02619 f <sup>0.6834</sup>            | 6                         |
| 6000 – 15000             | 61.4                                      | 0.163                                     | 10                                     | 6                         |
| 15000 – 150000           | 61.4                                      | 0.163                                     | 10                                     | 616000/f                  |
| 150000 - 300000          | 0.158 f <sup>0.5</sup>                    | 4.21 x 10 <sup>-4</sup> f <sup>0.5</sup>  |                                        | 616000/f                  |

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

## 3.2. EMF Test Results

### 3.2.1 E-field Strength

Detector: RMS, Trace: Average

| Operation Mode | 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] | IC Limit [V/m] | Result |
|----------------|-----------------|---------------|-------------------|-------------------|-------------------|-------------------|-----------------|-----------------|----------------|--------|
| 1              | 111             | 10            | 2)                | 2)                | 2)                | 2)                | 0.37            | 614             | 83             | PASS   |
| 1              | 111             | 9             | 2)                | 2)                | 0.33              | 2)                | 0.32            | 614             | 83             | PASS   |
| 1              | 111             | 8             | 2)                | 2)                | 0.32              | 2)                | 0.40            | 614             | 83             | PASS   |
| 1              | 111             | 7             | 2)                | 2)                | 0.43              | 0.39              | 0.47            | 614             | 83             | PASS   |
| 1              | 111             | 6             | 2)                | 2)                | 0.50              | 0.68              | 0.60            | 614             | 83             | PASS   |
| 1              | 111             | 5             | 0.31              | 2)                | 0.68              | <b>1.07</b>       | 1)              | 614             | 83             | PASS   |

1) not possible due to artificial load dimension

2) noise floor level

### 3.2.2 Worst case position setup photo



### 3.2.3 H-field Strength

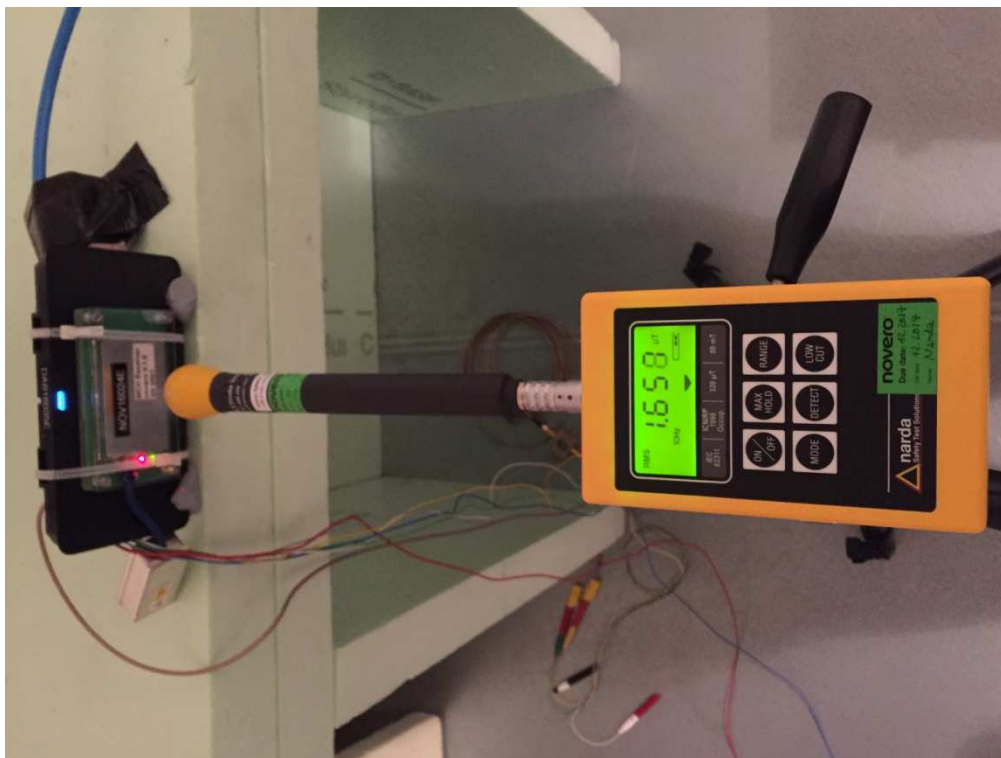
Detector: RMS, Mode: 320 $\mu$ T; Range: normal; Low Cut: 10Hz

| Operation Mode | 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] | IC Limit [A/m] | Result |
|----------------|-----------------|---------------|-------------------|-------------------|-------------------|-------------------|-----------------|-----------------|----------------|--------|
| 1              | 111             | 10            | 0.10              | 0.08              | 0.08              | 0.07              | 0.34            | 1.63            | 90/6.57        | PASS   |
| 1              | 111             | 9             | 0.12              | 0.08              | 0.09              | 0.08              | 0.46            | 1.63            | 90/6.57        | PASS   |
| 1              | 111             | 8             | 0.14              | 0.10              | 0.10              | 0.11              | 0.58            | 1.63            | 90/6.57        | PASS   |
| 1              | 111             | 7             | 0.17              | 0.12              | 0.10              | 0.13              | 0.65            | 1.63            | 90/6.57        | PASS   |
| 1              | 111             | 6             | 0.39              | 0.32              | 0.37              | 0.32              | 0.98            | 1.63            | 90/6.57        | PASS   |
| 1              | 111             | 5             | 0.48              | 0.34              | 0.43              | 0.36              | <b>1.32</b>     | 1.63            | 90/6.57        | PASS   |

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, 7cm were done with 100cm<sup>2</sup> probe

### 3.2.4 Worst case position setup photo



#### 4. Test Equipment

| Equipment                        | Manufacturer        | Type       | Serial No. | Calibration | Interval |
|----------------------------------|---------------------|------------|------------|-------------|----------|
| H-field Level Meter              | Narda               | ELT-400    | N-0385     | 01-Dec-14   | 3 years  |
| H-field probe 3cm <sup>2</sup>   | Narda               | 2300/90.20 | C-0111     | 02-Mar-14   | 3 years  |
| H-field probe 100cm <sup>2</sup> | Narda               | 2300/90.10 | M-0823     | 02-Dec-14   | 3 years  |
| E-field Level Meter              | Wandel & Goltermann | EMR 20     | P-0030     | 03-Dec-14   | 3 years  |
| E-field probe                    | Wandel & Goltermann | Type8      | M-0082     | 03-Dec-14   | 3 years  |