

RF exposure evaluation

Human exposure to RF emissions from mobile devices (47 CFR §2.1091) may be evaluated based on the MPE limits adopted by the FCC for electric and magnetic field strength and/or power density, as appropriate, since exposures are assumed to occur at distances of 20 cm or more from persons.

According to KDB 680106 D01 RF Exposure Wireless Charging Apps, RF exposure evaluation should be conducted assuming a user separation distance of 15 cm for devices designed for typical desktop applications. E and H field strength measurements or numerical modelling may be used to demonstrate compliance. Measurements should be made from all sides and the top of the primary/client pair, with the 15 cm measured from the center of the probe(s) to the edge of the device

IC Exemption Limits

According to RSS-102-issue5, Industry Canada has adopted the RF field strength limits established in Health Canada’s RF exposure guideline, and test procedure of SRP-002 Section 6.6. Defined in RSS-102 Table 4 for Limits:

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

| Frequency Range (MHz) | Electric Field (V/m rms) | Magnetic Field (A/m rms) | Power Density (W/m ²) | Reference Period (minutes) |
|------------------------|----------------------------------|---|------------------------------------|---------------------------------|
| 0.003-10 ²¹ | 83 | 90 | - | Instantaneous* |
| 0.1-10 | - | 0.73/ <i>f</i> | - | 6** |
| 1.1-10 | 87/ <i>f</i> ^{0.5} | - | - | 6** |
| 10-20 | 27.46 | 0.0728 | 2 | 6 |
| 20-48 | 58.07/ <i>f</i> ^{0.25} | 0.1540/ <i>f</i> ^{0.25} | 8.944/ <i>f</i> ^{0.5} | 6 |
| 48-300 | 22.06 | 0.05852 | 1.291 | 6 |
| 300-6000 | 3.142 <i>f</i> ^{0.3417} | 0.008335 <i>f</i> ^{0.3417} | 0.02619 <i>f</i> ^{0.6834} | 6 |
| 6000-15000 | 61.4 | 0.163 | 10 | 6 |
| 15000-150000 | 61.4 | 0.163 | 10 | 616000/ <i>f</i> ^{1.2} |
| 150000-300000 | 0.158 <i>f</i> ^{0.5} | 4.21 x 10 ⁻⁴ <i>f</i> ^{0.5} | 6.67 x 10 ⁻⁵ <i>f</i> | 616000/ <i>f</i> ^{1.2} |

Note: *f* is frequency in MHz.
 *Based on nerve stimulation (NS).
 ** Based on specific absorption rate (SAR).

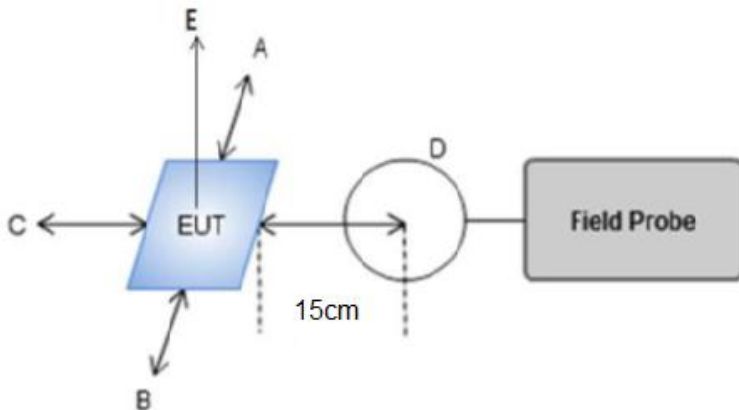
1. Limits For General Population/Uncontrolled Exposure

| Frequency Range (MHz) | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW /cm ²) | Averaging Time (minutes) |
|-----------------------|-------------------------------|-------------------------------|--------------------------------------|--------------------------|
| 0.3 ~ 3.0 | 614 | 1.63 | (100)* | 30 |
| 3.0 ~ 30 | 824/ <i>f</i> | 2.19/ <i>f</i> | (180/ <i>f</i> ₂)* | 30 |
| 30 ~ 300 | 27.5 | 0.073 | 0.2 | 30 |
| 300~1500 | - | - | <i>f</i> /1500 | 30 |
| 1500~100000 | - | - | 1.0 | 30 |

2. The Equipment List

| Instrument | Manufacturer | Model No. | Serial No. | Calibration Until |
|-----------------------|--------------|-----------------------------------|------------|-------------------|
| B-Field Probe | Narda | B-Field Probe 100 cm ² | B-0137 | Jun. 19, 2020 |
| Magnetic field meter | Narda | ELT-400 | B-0137 | Jun. 19, 2020 |
| Broadband field meter | Narda | NBM-550 | B-0959 | Nov. 18, 2019 |
| B-Field Probe | Narda | EF0391 | A-1034 | Nov. 18, 2019 |

3. Test Setup Block



| | |
|------------------------|--|
| <p>Test procedure:</p> | <p>(1) Power transfer frequency is less than 1 MHz.</p> <p>(2) Output power from each primary coil is less than or equal to 15 watts.</p> <p>(3) The transfer system includes only single primary and secondary coils. This includes charging systems that may have multiple primary coils and clients that are able to detect and allow coupling only between individual pairs of coils.</p> <p>(4) Client device is placed directly in contact with the transmitter.</p> <p>(5) Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion).</p> <p>(6) The aggregate H-field strengths at 15 cm surrounding the device and 20 cm above the top surface from all simultaneous transmitting coils are demonstrated to be less than 50% of the MPE limit.</p> |
| <p>Test Result:</p> | <p>Pass</p> |

4. Version

| Version No. | Date | Description |
|-------------|---------------|-------------|
| 00 | 08 Aug., 2019 | Original |
| | | |
| | | |
| | | |

Tested By: YT Yang **Date:** 08 Aug., 2019
Test Engineer

Reviewed By: Wimer Zhang **Date:** 08 Aug., 2019
Project Engineer

5. MPE EVALUATION RESULTS

Remark: Pre-scan input: 5V and input: 9V of the Power supply, found input: 5V was worse case mode. So the report only reflects the worst mode.

a) 0% charging load mode (for input: 9V, output: empty load)

6. Electric Field Strength Measurement

| Measured Side | Distance (cm) | Measured Value (V/m) | 50 % of Limit (V/m) | Limit (V/m) |
|---------------|---------------|----------------------|---------------------|-------------|
| A | 15 | 0.85 | 307.00 | 614 |
| B | 15 | 0.65 | 307.00 | 614 |
| C | 15 | 0.77 | 307.00 | 614 |
| D | 15 | 0.89 | 307.00 | 614 |
| E | 20 | 0.86 | 307.00 | 614 |

Magnetic Field Strength Measurement

| Measured Side | Distance (cm) | Measured Value (A/m) | 50 % of Limit (A/m) | Limit (A/m) |
|---------------|---------------|----------------------|---------------------|-------------|
| A | 15 | 0.192 | 0.815 | 1.63 |
| B | 15 | 0.184 | 0.815 | 1.63 |
| C | 15 | 0.149 | 0.815 | 1.63 |
| D | 15 | 0.166 | 0.815 | 1.63 |
| E | 20 | 0.173 | 0.815 | 1.63 |

b) 50% charging load mode (for input: 9V, output: 1.5A)

Electric Field Strength Measurement

| Measured Side | Distance (cm) | Measured Value (V/m) | 50 % of Limit (V/m) | Limit (V/m) |
|---------------|---------------|----------------------|---------------------|-------------|
| A | 15 | 1.88 | 307.00 | 614 |
| B | 15 | 1.96 | 307.00 | 614 |
| C | 15 | 1.89 | 307.00 | 614 |
| D | 15 | 1.66 | 307.00 | 614 |
| E | 20 | 1.61 | 307.00 | 614 |

Magnetic Field Strength Measurement

| Measured Side | Distance (cm) | Measured Value (A/m) | 50 % of Limit (A/m) | Limit (A/m) |
|---------------|---------------|----------------------|---------------------|-------------|
| A | 15 | 0.282 | 0.815 | 1.63 |
| B | 15 | 0.279 | 0.815 | 1.63 |
| C | 15 | 0.283 | 0.815 | 1.63 |
| D | 15 | 0.266 | 0.815 | 1.63 |
| E | 20 | 0.284 | 0.815 | 1.63 |

c) 100% charging load mode (for input: 9V, output: 3A)

Electric Field Strength Measurement

| Measured Side | Distance (cm) | Measured Value (V/m) | 50 % of Limit (V/m) | Limit (V/m) |
|---------------|---------------|----------------------|---------------------|-------------|
| A | 15 | 2.75 | 307.00 | 614 |
| B | 15 | 2.42 | 307.00 | 614 |
| C | 15 | 2.39 | 307.00 | 614 |
| D | 15 | 2.35 | 307.00 | 614 |
| E | 20 | 2.49 | 307.00 | 614 |

Magnetic Field Strength Measurement

| Measured Side | Distance (cm) | Measured Value (A/m) | 50 % of Limit (A/m) | Limit (A/m) |
|---------------|---------------|----------------------|---------------------|-------------|
| A | 15 | 0.544 | 0.815 | 1.63 |
| B | 15 | 0.543 | 0.815 | 1.63 |
| C | 15 | 0.559 | 0.815 | 1.63 |
| D | 15 | 0.532 | 0.815 | 1.63 |
| E | 20 | 0.522 | 0.815 | 1.63 |

-----End of report-----