



CTK Co., Ltd.  
The Prime Leader of Global Regulatory Certification

## CTK Co., Ltd.

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# RF EXPOSURE EVALUATION

|                            |                                                                        |
|----------------------------|------------------------------------------------------------------------|
| <b>Applicant</b>           | NEOLAB CONVERGENCE                                                     |
| <b>Applicant Address</b>   | #1501, Mario Tower, 28, Digital-ro 30-gil, Guro-gu, Seoul, Korea 08389 |
| <b>FCC ID</b>              | 2AALG-NWP-F130                                                         |
| <b>IC</b>                  | 21452-NWPF130                                                          |
| <b>Product Description</b> | Smart Pen                                                              |
| <b>Basic model</b>         | NWP-F130                                                               |
| <b>Variant Model name</b>  | -                                                                      |
| <b>Operating Frequency</b> | 2 402 MHz - 2 480 MHz                                                  |
| <b>Antenna type</b>        | PCB Antenna                                                            |
| <b>Antenna gain</b>        | -1.62 dBi                                                              |
| <b>Power Source</b>        | DC 3.7 V (Battery)                                                     |
| <b>Number of channels</b>  | Bluetooth LE : 40                                                      |



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### \* \* RF Exposure Evaluation \* \*

#### Exemption Limits for Routine Evaluation

##### SAR Test Exclusion Thresholds for 100 MHz - 6 GHz and $\leq 50$ mm

Approximate SAR Test Exclusion Power Thresholds at Selected Frequencies and Test Separation Distances are illustrated in the following Table, The equation and threshold in Note 1 must be applied to determine SAR test exclusion.

| MHz  | 5   | 10  | 15  | 20  | 25  | mm                                      |
|------|-----|-----|-----|-----|-----|-----------------------------------------|
| 150  | 39  | 77  | 116 | 155 | 194 | SAR Test<br>Exclusion<br>Threshold (mW) |
| 300  | 27  | 55  | 82  | 110 | 137 |                                         |
| 450  | 22  | 45  | 67  | 89  | 112 |                                         |
| 835  | 16  | 33  | 49  | 66  | 82  |                                         |
| 900  | 16  | 32  | 47  | 63  | 79  |                                         |
| 1500 | 12  | 24  | 37  | 49  | 61  |                                         |
| 1900 | 11  | 22  | 33  | 44  | 54  |                                         |
| 2450 | 10  | 19  | 29  | 38  | 48  |                                         |
| 3600 | 8   | 16  | 24  | 32  | 40  |                                         |
| 5200 | 7   | 13  | 20  | 26  | 33  |                                         |
| 5400 | 6   | 13  | 19  | 26  | 32  |                                         |
| 5800 | 6   | 12  | 19  | 25  | 31  |                                         |
|      |     |     |     |     |     |                                         |
| MHz  | 30  | 35  | 40  | 45  | 50  | mm                                      |
| 150  | 232 | 271 | 310 | 349 | 387 | SAR Test<br>Exclusion<br>Threshold (mW) |
| 300  | 164 | 192 | 219 | 246 | 274 |                                         |
| 450  | 134 | 157 | 179 | 201 | 224 |                                         |
| 835  | 98  | 115 | 131 | 148 | 164 |                                         |
| 900  | 95  | 111 | 126 | 142 | 158 |                                         |
| 1500 | 73  | 86  | 98  | 110 | 122 |                                         |
| 1900 | 65  | 76  | 87  | 98  | 109 |                                         |
| 2450 | 57  | 67  | 77  | 86  | 96  |                                         |
| 3600 | 47  | 55  | 63  | 71  | 79  |                                         |
| 5200 | 39  | 46  | 53  | 59  | 66  |                                         |
| 5400 | 39  | 45  | 52  | 58  | 65  |                                         |
| 5800 | 37  | 44  | 50  | 56  | 62  |                                         |

Note 1 :

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances  $\leq 50$  mm are determined by :



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$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})]^*$

$[\sqrt{f(\text{GHz})}] \leq 3.0$  for 1-g SAR and  $\leq 7.5$  for 10-g extremity SAR, where

- $f(\text{GHz})$  is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is  $\leq 50$  mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is  $< 5$  mm, a distance of 5 mm according to 4.1f) is applied to determine SAR test exclusion.

Output Power :

| Mode         | Frequency (MHz) | Measured conducted power (dBm) | Power tolerance [dB] | Maximum conducted power (dBm) | Maximum conducted power (mW) | SAR Test Exclusion Threshold (mW) |
|--------------|-----------------|--------------------------------|----------------------|-------------------------------|------------------------------|-----------------------------------|
| Bluetooth LE | 2 480           | -0.13                          | + 1.5                | 1.37                          | 1.371                        | 10                                |

Per FCC KDB 447498 D01v06, the SAR exclusion threshold for distances  $\leq 50$ mm is defined by the following equation :

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})]^*$   
 $[\sqrt{f(\text{GHz})}] \leq 3.0$

Base on the maximum conducted power of the antenna to use separation distance, SAR was not required;

**Bluetooth LE :  $[(1.371 / 5) * \sqrt{2.480}] = 0.432 (\leq 3.0)$**

Result : As a result of the calculation above, the SAR test is exempt

## Exemption Limits for Routine Evaluation

### (RSS-102 Issue 5, Section 2.5.1)

SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1.

**Table 1: SAR evaluation - Exemption limits for routine evaluation based on frequency and separation distance**

| Frequency (MHz) | Exemption Limits (mW)           |                                 |                                 |                                 |                                 |
|-----------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
|                 | At separation distance of ≤5 mm | At separation distance of 10 mm | At separation distance of 15 mm | At separation distance of 20 mm | At separation distance of 25 mm |
| ≤300            | 71 mW                           | 101 mW                          | 132 mW                          | 162 mW                          | 193 mW                          |
| 450             | 52 mW                           | 70 mW                           | 88 mW                           | 106 mW                          | 123 mW                          |
| 835             | 17 mW                           | 30 mW                           | 42 mW                           | 55 mW                           | 67 mW                           |
| 1900            | 7 mW                            | 10 mW                           | 18 mW                           | 34 mW                           | 60 mW                           |
| 2450            | 4 mW                            | 7 mW                            | 15 mW                           | 30 mW                           | 52 mW                           |
| 3500            | 2 mW                            | 6 mW                            | 16 mW                           | 32 mW                           | 55 mW                           |
| 5800            | 1 mW                            | 6 mW                            | 15 mW                           | 27 mW                           | 41 mW                           |

| Frequency (MHz) | Exemption Limits (mW)           |                                 |                                 |                                 |                                  |
|-----------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|----------------------------------|
|                 | At separation distance of 30 mm | At separation distance of 35 mm | At separation distance of 40 mm | At separation distance of 45 mm | At separation distance of ≥50 mm |
| ≤300            | 223 mW                          | 254 mW                          | 284 mW                          | 315 mW                          | 345 mW                           |
| 450             | 141 mW                          | 159 mW                          | 177 mW                          | 195 mW                          | 213 mW                           |
| 835             | 80 mW                           | 92 mW                           | 105 mW                          | 117 mW                          | 130 mW                           |
| 1900            | 99 mW                           | 153 mW                          | 225 mW                          | 316 mW                          | 431 mW                           |
| 2450            | 83 mW                           | 123 mW                          | 173 mW                          | 235 mW                          | 309 mW                           |
| 3500            | 86 mW                           | 124 mW                          | 170 mW                          | 225 mW                          | 290 mW                           |
| 5800            | 56 mW                           | 71 mW                           | 85 mW                           | 97 mW                           | 106 mW                           |

**Result :** SAR test is exempt as shown in the table below.

| Mode         | Frequency (MHz) | Measured conducted power (dBm) | Power tolerance (dB) | Maximum conducted power (dBm) | Maximum conducted power (mW) | SAR Test Exclusion Threshold (mW) |
|--------------|-----------------|--------------------------------|----------------------|-------------------------------|------------------------------|-----------------------------------|
| Bluetooth LE | 2 480           | -0.13                          | + 1.5                | 1.37                          | 1.371                        | 4                                 |