



CTK Co., Ltd.
The Power of CTK Engineering Corporation

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RF EXPOSURE EVALUATION

| | |
|----------------------------|--|
| Applicant | NEOLAB CONVERGENCE |
| Applicant Address | #1501, Mario Tower, 28, Digital-ro 30-gil, Guro-gu, Seoul, Korea 08389 |
| Product Description | SMARTPEN |
| FCC ID | 2AALG-NWP-F45 |
| RF power | 8.37 dBm (6.87 mW) |
| Antenna type | PCB Antenna |
| Antenna Gain | -0.08 dBi |
| Frequency Range | 2402 MHz - 2480 MHz |
| Number of channels | 40 |



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** RF Exposure Evaluation **

Exemption Limits for Routine Evaluation

SAR Test Exclusion Thresholds for 100 MHz - 6 GHz and ≤ 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 Exclusion 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 Exclusion 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 ≤ 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 ≤ 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 ≤ 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) | Maximum output power to antenna (mW) | SAR Test Exclusion Threshold (mW) |
|--------------|-----------------|--------------------------------------|-----------------------------------|
| Bluetooth LE | 2 480 | 6.87 | 10 |

Per FCC KDB 447498 D01v06, the SAR exclusion threshold for distances ≤ 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 : $[(6.87 / 5) * \sqrt{2.480}] = 2.16 (\leq 3.0)$

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