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## CTK Co., Ltd.

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# RF EXPOSURE EVALUATION

|                            |   |
|----------------------------|---|
| <b>Applicant</b>           | Pen Generations, Inc.   |
| <b>Applicant Address</b>   | 8th Fl., SOLID Space, 673 Sampyeong-dong,<br>Bundang-gu, Seongnam-si, Gyeonggi-do, 463-400, South Korea |
| <b>Product Description</b> | Digital Pen   |
| <b>FCC ID</b>              | ADM-AP-701  |
| <b>RF power</b>            | Bluetooth : -1.33 dBm Peak Conducted<br>Bluetooth LE : -1.07 dBm Peak Conducted                         |
| <b>Antenna type</b>        | Chip Antenna  |
| <b>Antenna Gain</b>        | 1.96 dBi(Peak)  |
| <b>Frequency Range</b>     | 2402 MHz - 2480 MHz   |
| <b>Number of channels</b>  | Bluetooth : 79<br>Bluetooth LE : 40   |



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

### Limits

#### 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  $\leq 7.5$  for 10-g extremity SAR, where

- f(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) | Maximum output power to antenna (mW) | SAR Test Exclusion Threshold (mW) |
|--------------|-----------------|--------------------------------------|-----------------------------------|
| Bluetooth    | 2 402           | 1.156                                | 10                                |
| Bluetooth LE | 2 480           | 1.227                                | 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** :  $[(1.156 / 5) * \sqrt{2.480}] = 0.32 (\leq 3.0)$

**Bluetooth LE** :  $[(1.227 / 5) * \sqrt{2.480}] = 0.34 (\leq 3.0)$

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