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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	NEO SMARTPEN dimo		
FCC ID	2AALG-NWP-F30		
IC	21452-NWPF30		
RF power	Bluetooth: 8.25 dBm Peak Conducted Bluetooth LE: 1.64 dBm Peak Conducted		
Antenna type	PCB Pattern antenna		
Antenna Gain	1.62 dBi(Peak)		
Frequency Range	2402 MHz - 2480 MHz		
Number of channels	Bluetooth: 79 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 ≤ 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	
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	SAR Test Exclusion
1900	11	22	33	44	54	Threshold (mW)
2450	10	19	29	38	48	1 m 4 sho to (m 11)
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	
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	SAR Test Exclusion
1900	65	76	87	98	109	Threshold (mW)
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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[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]* [$\sqrt{f(GHz)}$] ≤ 3.0 for 1-g SAR and ≤ 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 \leq 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	6.683	10
Bluetooth LE	2 440	1.459	10

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

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

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

Bluetooth : $[(6.683 / 5) * \sqrt{2.402}] = 2.07 (\le 3.0)$ Bluetooth LE : $[(1.459 / 5) * \sqrt{2.440}] = 0.46 (\le 3.0)$

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