RF Exposure

Product: ID CARD PRINTER
Applicant: T.I.T ENG CO., Ltd.
Model: NUVIA N20
Address: 7th FL., SHINDO BLDG. 10 GARAK-DONG, SONGPA-GU SEOUL, KOREA
FCC ID: XTNNUVIA-N

The following excerpts from KDB447498 indicate the procedure to follow to calculate power exclusion thresholds for transmitters operating below 100MHz and within 50mm separation distance. The exclusion threshold calculation was carried out using 13.56MHz as the transmit frequency and the measured field strength at 3m from the Part 15.225 was used to calculate the radiated output power.

Per KDB 447498 D01 General RF Exposure Guidance v06 (10/23/2015) section 4.3.1 (c)

Stand alone SAR test exclusion threshold is applied;

b) For 100 MHz to 6 GHz and *test separation distances* > 50 mm, the 1-g and 10-g *SAR test exclusion thresholds* are determined by the following (also illustrated in Appendix B):

1) {[Power allowed at *numeric threshold* for 50 mm in step a)] + [(test separation distance – 50 mm)·($f_{(MHz)}$/150)]} mW, for 100 MHz to 1500 MHz

2) {[Power allowed at *numeric threshold* for 50 mm in step a)] + [(test separation distance – 50 mm)·10]} mW, for > 1500 MHz and ≤ 6 GHz

c) For frequencies below 100 MHz, the following may be considered for SAR test exclusion (also illustrated in Appendix C):

1) For *test separation distances* > 50 mm and < 200 mm, the power threshold at the corresponding test separation distance at 100 MHz in step b) is multiplied by [1 + log(100/$f_{(MHz)}$)]

2) For *test separation distances* ≤ 50 mm, the power threshold determined by the equation in c) 1) for 50 mm and 100 MHz is multiplied by ½

3) SAR measurement procedures are not established below 100 MHz.

Appendix C

SAR Test Exclusion Thresholds for < 100 MHz and < 200 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 4.3.1 must be applied to determine SAR test exclusion.

MHz	< 50	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	mm
100	237	474	481	487	494	501	507	514	521	527	534	541	547	554	561	567	
50	308	617	625	634	643	651	660	669	677	686	695	703	712	721	729	738	
10	474	948	961	975	988	1001	1015	1028	1041	1055	1068	1081	1095	1108	1121	1135	
1	711	1422	1442	1462	1482	1502	1522	1542	1562	1582	1602	1622	1642	1662	1682	1702	mW
0.1	948	1896	1923	1949	1976	2003	2029	2056	2083	2109	2136	2163	2189	2216	2243	2269	
0.05	1019	2039	2067	2096	2125	2153	2182	2211	2239	2268	2297	2325	2354	2383	2411	2440	
0.01	1185	2370	2403	2437	2470	2503	2537	2570	2603	2637	2670	2703	2737	2770	2803	2837	

Exclusion threshold calculation:

- Per 4.3(b)(1) the SAR exclusion threshold for <50mm at 100MHz = 237mW
- Per 4.3(c)(1) for test separation distances between 50mm and 200mm the power threshold is multiplied by a factor of [1 + log(100/$f_{(MHz)}$)] Using 13.56MHz as the transmit frequency this factor is 1.86. Multiplying this factor and the exclusion threshold from 4.3(b)(1) above we end up with a value of:

$$1.86 \times 237mW = 440.82mW$$

- Per 4.3(c)(2) for test separation distances below 50mm the power threshold determined by 4.3(c)(1) are multiplied by 0.5. Doing this we have an exclusion threshold for 13.56MHz and a separation distance of under 50mm of:

$$440.82mW \times 0.5 = 220.41mW$$

The maximum measured RF field strength from the part 15.225 testing was **50.43** dBuV/m at 30m or **90.43** dBuV/m at 3m using 40dB per decade factor. This translates to an EIRP of **0.000664** mW which is much less than the exclusion threshold of 220.41mW calculated above.

Conclusion: The Threshold level is much smaller than the limit, no SAR measurement is necessary.