RF EXPOSURE EVALUATION

EUT Specification

FCC ID:	2BO62-NOVA
EUT	RASKARS
Model Name	NOVA, DASH, GUS
Frequency band (Operating)	☒ BLE: 2.402GHz ~ 2.480GHz ☐ WLAN: 2.412GHz ~ 2.462GHz ☐ WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz ☐ WLAN: 5.745GHz ~ 5825GHz ☒ Others (13.56MHz)
Device category	☒ Portable (<20cm separation) ☐ Mobile (>20cm separation) ☐ Others ___
Antenna diversity	☐ Single antenna ☒ Multiple antennas ☐ Tx diversity ☐ Rx diversity ☐ Tx/Rx diversity
Antenna gain	BLE: 0.76dBi
Evaluation applied	☐ MPE Evaluation ☒ SAR Evaluation

Standard Requirement

Portable Device

According to KDB 447498 D01 Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies v06.

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency(RF) Radiation as specified in §1.1307(b):

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:

[(*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,[16] where

- $f_{(GHz)}$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation[17]
- The result is rounded to one decimal place for comparison

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 is applied to determine SAR test exclusion.

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	

Routine SAR evaluation refers to that specifically required by §2.1093, using measurements or computer simulation. When routine SAR evaluation is not required, portable transmitters with output power greater than the applicable low threshold require SAR evaluation to qualify for TCB approval.

Measurement Result

Frequency (MHz)	Maximum output power (dBm)	Tune up tolerance (dBm)	Max Tune Up Power (dBm)	Max Tune Up Power (mW)	Distance (mm)	Calculation results	Limit	Operating Mode
2440	-1.16	-1.16 ±1	-0.160	0.9638	5	0.301	3	GFSK

Note 1: Calculation Value =[(max. power of channel, mW)/(min.test separation distance, mm)] ·[√f(GHz)].

Fox example: 1.656/5*√2.48= 0.522

Frequency (MHz)	Max Output power (dBm)	Max tune-up tolerance Output power (dBm)	Max Output power (dBm)	Distance (mm)	Max Output power (mW)	Limit (mW)
13.56	-49.8576	-49.8576±1	-48.8576	5	0.000013	443

E = EIRP – 20log D + 104.8

where:

E = electric field strength in dBμV/m,

EIRP = equivalent isotropic radiated power in dBm

D = specified measurement distance in meters.

EIRP=E-104.8+20logD=45.4-104.8+20log3= -49.8576dbm

$P_{limit}=P_{100MHz,\leq 50mm}\times[1 + \log(100/f(MHz))]$:

$P_{100MHz,\leq 50mm}$=237mW, f=13.56MHz, log10(100/13.56)≈0.8677

P_{limit}=237×(1+0.8677)=237×1.8677≈443mW

According to KDB447498 D01 V6, threshold at which no SAR required is ≤3.0 for 1-g SAR, separation distance is 5mm.

The simultaneous transmission for BLE+NFC:

$$\sum_i \frac{S_i}{S_{Limit,i}}$$

$=S_{BLE}/S_{limit} + S_{NFC}/S_{limit}$

=0.301/3+0.000013/443

=0.100333

< 1

The SAR measurement is not necessary.