RF Exposure

FCC ID: SYA78713

1.0 INTRODUCTION

These calculations are based on the highest EIRP possible from the EUT considering maximum conducted power and antenna gain or EIRP from a radiated emissions test.

Although the duty cycle is less than 100%, for all calculations, 100% will be used as a worst-case.

2.0 FCC RF EXPOSURE COMPLIANCE RESULT:

In accordance with FCC KDB Publication 447498 D01 V06 Clause 4.3.1 c) for transmit frequencies below 100 MHz:

1) For *test separation distances* >50 mm and <200 mm, the power threshold at the corresponding test separation distance at 100 MHz in section 4.3.1 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

This table is for devices with a separation less than 50 mm

MHz	Max Power dBm	Duty Cycle %	EUT EIRP mW	Min Sep mm	SAR Exc Threshold at 50mm 4.3.1 a) in mW	SAR Exclusion threshold per 4.3.1 b)1) in mW	SAR Exclusion threshold per 4.3.1 c) 1) in mW	Result	Notes
13.56	-19.5	100.0	0.0112	50	474.3	474.3	885.9	Exempt	Peak
0.134	8.1	100.0	6.4121	50	474.3	474.3	1837.1	Exempt	Peak

EUT EIRP << SAR exclusion threshold per 4.3.1 c) 2)

It was measured to be 103.3 dBuV/m at 125 kHz at 3 meters or 8.1 dBm or 6.4 mW EIRP.
It was measured to be 75.7 dBuV/m at 13.56 MHz at 3 meters or -19.5 dBm or 0.011mW EIRP.

3.0 FCC SAR TESTING EXCLUSION:

In accordance with FCC KDB Publication 447498 D01 V05R02 Clause 4.3.1(a),

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:
[(*max. power of channel, including tune-up tolerance, mW*) / (*min. test separation distance, mm*)]x[$\sqrt{f_{(GHz)}}$] ≤ 3.0 for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR,[30] where

- $f_{(GHz)}$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation[31]
- The result is rounded to one decimal place for comparison
- The values 3.0 and 7.5 are referred to as *numeric thresholds*

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 4.1 f) is applied to determine SAR test exclusion.

This table is for devices with a separation less than 5 mm

MHz	Max Power dBm	Duty Cycle %	Average Power mW	Min Sep mm	SAR Exc Threshold at 5mm 4.3.1 a)	SAR Exclusion threshold per 4.3.1 a) for 1-g	Result	Notes
2441	2.30	100.0	1.70	5	0.53	3.0	Exempt	

Judgement: The product is exempt from SAR testing

4.0 MPE CALCULATION FROM FCC 1.1310

Freq. (MHz)	Max Power (dBm)	Max Power (mW)	Max Ant Gain (dBi)	Max Ant Gain above Isotropic (numeric)	Duty Cycle %	Max EIRP (mW)	Power Density at ## cm (mW/cm^2)	(S) GP Limit (mW/cm^2)	MPE Ratio
13.56	-19.50	0.01	0	1.00	100.0	0.01	0.0000	0.200	0.0000
0.134	8.10	6.46	0	1.00	100.0	6.46	0.0013	0.200	0.0064
2441	3.90	2.45	1.63	1.46	100.0	3.57	0.2843	1.000	0.2843
								Total	0.2908

= 20 cm for 13.56 MHz and 134 kHz
= 1 cm for 2441 MHz since the BT module is in the handle

The maximum conducted power at 2441 MHz is 1.698 mW with a 1.63 dBi gain for an EIRP of 2.47 mW

Notes on the above table:

In accordance with OET 65, 97-01, Power Density is calculated by
$S = P*G/(4*\pi*R^2)$
Where
S = power density (mW/cm2)
P = power input to the antenna (mW)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna (cm)

Since the calculated power density is less than the limit, this product fully meets the requirements for the general population.