

RF EXPOSURE EVALUATION

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)

FCC ID: **S8J-R8723RB1**

EUT Specification

EUT	Bluetooth 150Mbps Wireless N USB Module
Frequency band (Operating)	☒ WLAN: 2.412GHz ~ 2.462GHz ☐ WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz ☐ WLAN: 5.745GHz ~ 5825GHz ☒ Others
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation) ☐ Others ____
Exposure classification	☐ Occupational/Controlled exposure (S = 5mW/cm ²) ☒ General Population/Uncontrolled exposure (S=1mW/cm ²)
Antenna diversity	☒ Single antenna ☐ Multiple antennas ☐ Tx diversity ☐ Rx diversity ☐ Tx/Rx diversity
Max. output power	4.43dBm For BT Ver.3.0+EDR 2.02dBm For BT 4.0 14.10dBm For WiFi
Antenna gain (Max)	2dBi
Evaluation applied	☒ MPE Evaluation ☐ SAR Evaluation

Limits for Maximum Permissible Exposure(MPE)

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density(mW/cm ²)	Average Time
(A) Limits for Occupational/Control Exposures				
300-1500	--	--	F/300	6
1500-100000	--	--	5	6
(B) Limits for General Population/Uncontrol Exposures				
300-1500	--	--	F/1500	6
1500-100000	--	--	1	30

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = Power density in mW/cm^2

P_{out} = output power to antenna in Mw

G = gain of antenna in linear scale

$\pi = 3.1416$

R = distance between observation point and center of the radiator in cm

P_d the limit of MPE, $1mW/cm^2$. If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

Measurement Result

For BT Ver.3.0+EDR:

Channel Frequency (MHz)	Measurement Peak Output Power(dBm)		
	GFSK	$\pi/4$ -DQPSK	8DPSK
2402	4.43	3.29	3.53
2441	3.58	2.42	2.58
2480	2.77	1.44	1.60

Channel Frequency (MHz)	Tune up tolerance (dBm)	Max tune up conducted power(dBm)	Output Peak power (mW)	Ant. Gain (dBi)	Ant. Gain (numeric)	Power density at 20cm (mW/cm^2)	Power density Limits (mW/cm^2)
2402	4 ± 1	5	3.16	2	1.585	0.000997	1
2441	4 ± 1	5	3.16	2	1.585	0.000997	1
2480	3 ± 1	4	2.51	2	1.585	0.000792	1
2402	3 ± 1	4	2.51	2	1.585	0.000792	1
2441	3 ± 1	4	2.51	2	1.585	0.000792	1
2480	1 ± 1	2	1.58	2	1.585	0.000500	1
2402	4 ± 1	5	3.16	2	1.585	0.000997	1
2441	3 ± 1	4	2.51	2	1.585	0.000792	1
2480	2 ± 1	3	2.00	2	1.585	0.000629	1

For BT 4.0:

Channel Frequency (MHz)	Measurement Peak Output Power(dBm)
	GFSK
2402	1.23
2440	1.19
2480	2.02

Channel Frequency (MHz)	Tune up tolerance (dBm)	Max tune up conducted power(dBm)	Output Peak power (mW)	Ant. Gain (dBi)	Ant. Gain (numeric)	Power density at 20cm (mW/cm ²)	Power density Limits (mW/cm ²)
2402	1 ± 1	2	1.58	2	1.585	0.000500	1
2440	1 ± 1	2	1.58	2	1.585	0.000500	1
2480	2 ± 1	3	2.00	2	1.585	0.000629	1

For WiFi:

Test Channel	Max Output Power (dBm)				Limit (dBm)	Result
	802.11b	802.11g	802.11n (HT20)	802.11n (HT40)		
Lowest	14.10	11.81	10.73	10.25	30	Pass
Middle	13.90	11.90	10.19	9.92		
Highest	13.25	11.38	9.90	9.59		

Operating Mode	Test Channel	Tune up tolerance (dBm)	Max tune up conducted power(dBm)	Output Peak power (mW)	Ant. Gain (dBi)	Ant. Gain (numeric)	Power density at 20cm (mW/cm ²)	Power density Limits (mW/cm ²)
802.11b	1	14 ± 1	15	31.62	2	1.585	0.009971	1
	6	14 ± 1	15	31.62	2	1.585	0.009971	1
	11	13 ± 1	14	25.12	2	1.585	0.007921	1
802.11g	1	11 ± 1	12	15.85	2	1.585	0.004998	1
	6	12 ± 1	13	19.95	2	1.585	0.006292	1
	11	11 ± 1	12	15.85	2	1.585	0.004998	1
802.11n (H20)	1	11 ± 1	12	15.85	2	1.585	0.004998	1
	6	10 ± 1	11	12.59	2	1.585	0.003970	1
	11	10 ± 1	11	12.59	2	1.585	0.003970	1
802.11n (H40)	3	10 ± 1	11	12.59	2	1.585	0.003970	1
	6	10 ± 1	11	12.59	2	1.585	0.003970	1
	9	10 ± 1	11	12.59	2	1.585	0.003970	1