

RF EXPOSURE EVALUATION

EUT Specification

EUT	WIFI+BT Module
Frequency band (Operating)	<input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz <input type="checkbox"/> WLAN: 5.745GHz ~ 5825GHz <input checked="" type="checkbox"/> Others(Bluetooth: 2.402GHz ~ 2.480GHz)
Device category	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others ____
Antenna diversity	<input checked="" type="checkbox"/> Single antenna <input type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity
Max. output power	For BT2.1+EDR: 2.24dBm (1.71mW) For BLE: 8.22dBm (6.79mW) For WIFI: 19.45dBm (90.16mW)
Antenna gain	1dBi
Evaluation applied	<input checked="" type="checkbox"/> MPE Evaluation <input type="checkbox"/> 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: $P_d = \frac{P_{out} * G}{4 * \pi * R^2}$

Where

P_d = Power density in mW/cm^2

P_{out} = output power to antenna in Mw

G = gain of antenna in linear scale

π = 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

Channel	Channel Frequency (MHz)	Max Output power (dBm)	Tolerance	Max Tune-UP power (mW)	Antenna Gain (dBi)	Power density at 20cm (mW/cm ²)	Power density Limits (mW/cm ²)
Test Mode: 802.11b							
Low	2412	18.84	±0.1	78.34	1	0.019637	1
Middle	2437	19.38	±0.1	88.72	1	0.022239	1
High	2462	19.45	±0.1	90.16	1	0.022600	1
Test Mode: 802.11g							
Low	2412	13.80	±0.1	24.55	1	0.006154	1
Middle	2437	14.32	±0.1	27.67	1	0.006936	1
High	2462	14.56	±0.1	29.24	1	0.007330	1
Test Mode: 802.11n(HT20)							
Low	2412	13.78	±0.1	24.43	1	0.006124	1
Middle	2437	14.18	±0.1	26.79	1	0.006715	1
High	2462	14.45	±0.1	28.51	1	0.007147	1
Test Mode: 802.11n40(HT40)							
Low	2422	18.82	±0.1	77.98	1	0.019547	1
Middle	2437	18.97	±0.1	80.72	1	0.020234	1
High	2452	19.26	±0.1	86.30	1	0.021633	1

Note: Antenna linear value=1.26dB

Channel	Channel Frequency (MHz)	Max Output power (dBm)	Tolerance	Max Tune-UP power (mW)	Antenna Gain (dBi)	Power density at 20cm (mW/cm ²)	Power density Limits (mW/cm ²)
GFSK							
Low	2402	0.04	±0.1	1.03	1	0.000258	1
Middle	2441	0.73	±0.1	1.21	1	0.000303	1
High	2480	1.02	±0.1	1.29	1	0.000323	1
π/4-DQPSK							
Low	2402	0.99	±0.1	1.29	1	0.000323	1
Middle	2441	1.65	±0.1	1.50	1	0.000376	1
High	2480	2.12	±0.1	1.67	1	0.000419	1
8DPSK							
Low	2402	1.30	±0.1	1.38	1	0.000346	1
Middle	2441	1.85	±0.1	1.57	1	0.000394	1
High	2480	2.24	±0.1	1.71	1	0.000429	1
BLE Mode							
Low	2402	7.44	±0.1	5.68	1	0.001424	1
Middle	2441	7.29	±0.1	5.48	1	0.001374	1
High	2480	8.22	±0.1	6.79	1	0.001702	1

Note: Antenna linear value=1.26dB