

## RF EXPOSURE EVALUATION

### EUT Specification

<b>EUT</b>	WIFI+BT Module
<b>Frequency band (Operating)</b>	<input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input checked="" type="checkbox"/> WLAN: 5.18GHz ~ 5.24GHz <input type="checkbox"/> WLAN: 5.50GHz ~ 5.70GHz <input checked="" type="checkbox"/> WLAN: 5.745GHz ~ 5825GHz <input checked="" type="checkbox"/> Others(Bluetooth: 2.402GHz ~ 2.480GHz) <input type="checkbox"/> Others(Zigbee: 2.405GHz ~ 2.480GHz)
<b>Device category</b>	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others ____
<b>Antenna diversity</b>	<input type="checkbox"/> Single antenna <input checked="" type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity
<b>Max. output power</b>	10.29 dBm (10.69mW) for 5G WIFI Band1 9.78 dBm (9.51mW) for 5G WIFI Band4 17.95 dBm (62.37mW) for 2.4G WIFI 5.73 dBm (3.74mW) for BT 6.23 dBm (4.20mW) for Zigbee
<b>Antenna gain</b>	2.8dBi for BLE antenna 2.8dBi for BT antenna 2.8dBi for 2.4G wifi antenna 3.6dBi for 5G wifi antenna
<b>Evaluation applied</b>	<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 <sup>2</sup> )
300-1500	--	--	F/1500
1500-100000	--	--	1

## 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

$\pi = 3.1416$

$R$  = 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

Channel	Channel Frequency (MHz)	Max Output power (dBm)	Max Output power (mW)	Power density at 20cm ( $mW/cm^2$ )	Power density Limits ( $mW/cm^2$ )
Test mode: GFSK					
Low	2402	4.72	2.96	0.00112	1
Middle	2441	5.64	3.66	0.00139	1
High	2480	5.73	3.74	0.00142	1
Test mode: $\pi/4$ -DQPSK					
Low	2402	3.64	2.31	0.00088	1
Middle	2441	4.53	2.84	0.00108	1
High	2480	4.64	2.91	0.00110	1
Test mode: 8DPSK					
Low	2402	4.01	2.52	0.00096	1
Middle	2441	5.00	3.16	0.00120	1
High	2480	5.07	3.21	0.00122	1
Test mode: GFSK (BLE)					
Low	2402	5.82	3.82	0.00145	1
Middle	2441	6.18	4.15	0.00157	1
High	2480	6.23	4.20	0.00159	1

Dongguan Nore Testing Center Co., Ltd.  
 Report No.: NTC2108110F-01  
 FCC ID: 2AATL-8274B-PR

Channel	Channel Frequency (MHz)	Max Output power (dBm)	Max Output power (mW)	Power density at 20cm (mW/cm <sup>2</sup> )	Power density Limits (mW/cm <sup>2</sup> )				
Test mode: IEEE 802.11b									
Low	2412	17.12	51.52	0.01953	1				
Middle	2437	17.18	52.24	0.01980	1				
High	2462	17.25	53.09	0.02012	1				
Test mode: IEEE 802.11g									
Low	2412	14.93	31.12	0.01179	1				
Middle	2437	15.23	33.34	0.01264	1				
High	2462	15.34	34.20	0.01296	1				
Test mode: IEEE 802.11n(HT20)									
Low	2412	ANT_1	ANT_2	ANT_1	ANT_2	ANT_1	ANT_2	Total	1
		14.75	14.51	29.85	28.25	0.01131	0.01071	0.02202	
Middle	2437	15.11	13.81	32.43	24.04	0.01229	0.00911	0.02140	1
High	2462	15.27	13.98	33.65	25.00	0.01275	0.00947	0.02222	1
Test mode: IEEE 802.11n(HT40)									
Low	2422	15.11	14.52	32.43	28.31	0.01229	0.01073	0.02302	1
Middle	2437	15.26	14.60	33.57	28.84	0.01272	0.01093	0.02365	1
High	2452	15.12	14.65	32.51	29.17	0.01232	0.01106	0.02338	1

Dongguan Nore Testing Center Co., Ltd.  
 Report No.: NTC2108110F-01  
 FCC ID: 2AATL-8274B-PR

Channel	Channel Frequency (MHz)	Max Output power (dBm)	Max Output power (mW)	Power density at 20cm (mW/cm <sup>2</sup> )					Power density Limits (mW/cm <sup>2</sup> )
Test mode: IEEE 802.11a									
Low	5180	8.80	7.59	0.00346					1
Middle	5200	8.71	7.43	0.00339					1
High	5240	9.52	8.95	0.00408					1
Test mode: IEEE 802.11n(HT20)									
Low	5180	ANT_1	ANT_2	ANT_1	ANT_2	ANT_1	ANT_2	Total	1
		6.92	5.79	4.92	3.79	0.00224	0.00173	0.00397	
Middle	5200	6.58	6.32	4.55	4.29	0.00207	0.00196	0.00403	1
High	5240	7.45	7.11	5.56	5.14	0.00253	0.00234	0.00487	1
Test mode: IEEE 802.11n(HT40)									
Low	5190	6.59	5.87	4.56	3.86	0.00208	0.00176	0.00384	1
High	5230	7.15	6.88	5.19	4.88	0.00237	0.00222	0.00459	1
Test mode: IEEE 802.11 ac(VHT20)									
Low	5180	6.81	5.70	4.80	3.72	0.00219	0.00170	0.00389	1
Middle	5200	6.57	6.29	4.54	4.26	0.00207	0.00194	0.00401	1
High	5240	7.42	7.12	5.52	5.15	0.00252	0.00235	0.00487	1
Test mode: IEEE 802.11 ac(VHT40)									
Low	5190	6.46	5.87	4.43	3.86	0.00202	0.00176	0.00378	1
High	5230	7.11	6.88	5.14	4.88	0.00234	0.00222	0.00456	1
Test mode: IEEE 802.11 ac(VHT80)									
Low	5210	6.86	6.54	4.85	4.51	0.00221	0.00206	0.00427	1

Channel	Channel Frequency (MHz)	Max Output power (dBm)	Max Output power (mW)	Power density at 20cm (mW/cm <sup>2</sup> )				Power density Limits (mW/cm <sup>2</sup> )	
Test mode: IEEE 802.11a									
Low	5745	8.11	6.47	0.00295				1	
Middle	5785	8.29	6.75	0.00308				1	
High	5825	7.20	5.25	0.00239				1	
Test mode: IEEE 802.11n(HT20)									
Low	5745	ANT_1	ANT_2	ANT_1	ANT_2	ANT_1	ANT_2	Total	1
		6.43	7.03	4.40	5.05	0.00201	0.00230	0.00431	
Middle	5785	6.44	6.85	4.41	4.84	0.00201	0.00221	0.00422	1
High	5825	5.29	6.03	3.38	4.01	0.00154	0.00183	0.00337	1
Test mode: IEEE 802.11n(HT40)									
Low	5755	6.36	6.86	4.33	4.85	0.00197	0.00221	0.00418	1
High	5795	6.03	6.41	4.01	4.38	0.00183	0.00200	0.00383	1
Test mode: IEEE 802.11 ac(VHT20)									
Low	5745	6.43	6.82	4.40	4.81	0.00201	0.00219	0.00420	1
Middle	5785	6.46	6.62	4.43	4.59	0.00202	0.00209	0.00411	1
High	5825	5.27	5.94	3.37	3.93	0.00154	0.00179	0.00333	1
Test mode: IEEE 802.11 ac(VHT40)									
Low	5755	6.38	6.84	4.35	4.83	0.00198	0.00220	0.00418	1
High	5795	6.11	6.41	4.08	4.38	0.00186	0.00200	0.00386	1
Test mode: IEEE 802.11 ac(VHT80)									
Low	5775	6.48	7.03	4.45	5.05	0.00203	0.00230	0.00433	1

When bluetooth and WiFi(2.4G) work together:

Ratio BT	Ratio 2.4G WIFI	Ratio Total	Ratio Limits
0.00159	0.02365	0.02524	1

When bluetooth and WiFi(5G) work together:

Ratio BT	Ratio 5G WIFI	Ratio Total	Ratio Limits
0.00159	0.00487	0.00646	1

Note: No simultaneously transmit for 2.4G WIFI and 5G WIFI.

**According to KDB447498 D01 V06, Compliance with RF Exposure requirement.**