

## 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 ~ 5.320GHz <input checked="" 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>	15.131 dBm (32.59mW) for 5G WIFI 23.056 dBm (202.12mW) for 2.4G WIFI 2.872 dBm (1.94mW) for BT
<b>Antenna gain</b>	See Antenna Information
<b>Evaluation applied</b>	<input checked="" type="checkbox"/> MPE Evaluation <input type="checkbox"/> SAR Evaluation

### Antenna Information

Ant. (Chain)	Brand	Model name	Antenna Type	Connector	Gain (dBi)	Application range
1,2	FN-LI NK	K212-100 37-A	Diople	RP-SMA(M)	2.98	2.4G Band
					3.59	U-NII-1 Band
					3.79	U-NII-2A Band
					4.56	U-NII-2C Band
					3.85	U-NII-3 Band

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

Where

$P_d$  = Power density in mW/cm<sup>2</sup>

$P_{out}$  = 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<sup>2</sup>. 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

Only the worst case was recorded in the report.

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: BT (8DPSK)					
Low	2412	2.872	1.94	0.00074	1
Test mode: 2.4G WIFI (IEEE 802.11g)					
Low	2412	23.056	202.12	0.07660	1
Test mode: 2.4G WIFI (IEEE 802.11n(HT20) MIMO)					
Low(ant1)	2412	19.914	98.04	0.03874	1
Low(ant2)	2412	18.760	75.16	0.02970	1
Test mode: 2.4G WIFI (IEEE 802.11a)					
Low	5700	15.131	32.59	0.01235	1
Test mode: 5G WIFI (IEEE 802.11 n(HT20) MIMO)					
Low(ant1)	5745	12.260	16.83	0.00812	1
Low(ant2)	5745	11.604	14.47	0.00698	1

When bluetooth and WiFi(2.4G) work together:

Ratio BT	2.4G WIFI (SISO) Ratio	2.4G WIFI (MIMO) Ratio	BT+2.4G WIFI (SISO) Ratio Total	BT+2.4G WIFI (MIMO) Ratio Total	Ratio Limits
0.00074	0.07660	0.06844	0.07734	0.06918	1

When bluetooth and WiFi(5G) work together:

Ratio BT	5G WIFI (SISO) Ratio	5G WIFI (MIMO) Ratio	BT+5G WIFI (SISO) Ratio Total	BT+5G WIFI (MIMO) Ratio Total	Ratio Limits
0.00074	0.01235	0.01511	0.01309	0.01585	1

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

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