

Radio Frequency Exposure

1.1 Radio Frequency Exposure Compliance

1.1.1 Electromagnetic Fields

RESULT:

Pass

Test Specification

Test item	: WIFI+BT Module IEEE 802.11 a/b/g/n/ac/ax 2T/2R
Identification / Type No.	: WXT2IM2511
FCC ID	: 2BAD6-7METZIFPD
IC	: 30102-7METZIFPD
HVIN	: WXT2IM2511
Test standard	: CFR47 FCC Part 2: Section 2.1093 CFR47 FCC Part 1: Section 1.1310 FCC KDB Publication 447498 v06 RSS-102 Issue 5 February 2021

Product Classification

This device defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at 20 cm is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons.

1.1.2 Radio Frequency Exposure Limit

For FCC:

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)
300-1,500	--	--	f/1500
1,500-100,000	--	--	1.0

For IC:

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10 ²¹	83	90	-	Instantaneous*
0.1-10	-	0.73/ f	-	6**
1.1-10	87/ f ^{0.5}	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ f ^{0.25}	0.1540/ f ^{0.25}	8.944/ f ^{0.5}	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 f ^{0.3417}	0.008335 f ^{0.3417}	0.02619 f ^{0.6834}	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ f ^{1.2}
150000-300000	0.158 f ^{0.5}	4.21 x 10 ⁻⁴ f ^{0.5}	6.67 x 10 ⁻⁵ f	616000/ f ^{1.2}
Note: f is frequency in MHz. *Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR).				

1.1.3 Radio Frequency Exposure Calculation Formula

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (in appropriate units, e.g. mW/cm²)
P = power input to the antenna (in appropriate units, e.g., 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 (appropriate units, e.g., cm)

or:

$$S = \frac{EIRP}{4\pi R^2}$$

where: EIRP = equivalent (or effective) isotropically radiated power

1.1.4 Calculation Result

1)

Stand-alone transmission MPE

Mode	*Measured RF Output Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	FCC Limit (mW/cm ²)	Power Density (W/m ²)	IC Limit (W/m ²)
Bluetooth	9.099	1.85	20	0.002	1.0	0.024	5.3
2.4GHz Wi-Fi	22.731	3.33	20	0.080	1.0	0.801	5.3
5GHz Wi-Fi	18.476	4.77	20	0.042	1.0	0.418	9.0

Note:

1. Bluetooth Output Power: Refer to test report CN23Q5RT 001, CN23Q5RT 002
2. 2.4GHz Wi-Fi RF Output Power: Refer to test report CN23Q5RT 003
3. 5GHz Wi-Fi RF Output Power: Refer to test report CN23Q5RT 004

2) Simultaneous transmission MPE

The product has multiple transmitters, the Simultaneous Transmission possibilities are listing below:

Simultaneous Tx Combination	Configuration
1	Bluetooth + 2.4GHz Wi-Fi
2	Bluetooth + 5GHz Wi-Fi

Per KDB 447498 D01 v06, simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on calculated or measured field strengths or power density, is ≤ 1.0 .

For FCC

No.	Test Mode	Calculation (mW/cm ²)	Limit (mW/cm ²)	Calculation	Limit	Result
1	Bluetooth + 2.4GHz Wi-Fi	0.002	1	0.082	1	Pass
		0.080	1			
2	Bluetooth + 5GHz Wi-Fi	0.002	1	0.042	1	Pass
		0.042	1			

For IC

No.	Test Mode	Calculation (W/m ²)	Limit (W/m ²)	Calculation	Limit	Result
1	Bluetooth + 2.4GHz Wi-Fi	0.024	5.3	0.156	1	Pass
		0.801	5.3			
2	Bluetooth + 5GHz Wi-Fi	0.024	5.3	0.051	1	Pass
		0.418	9.0			

1.1.5 Conclusion

Therefore the maximum calculations result of above are meet the requirement of Radio Frequency Exposure (MPE) limit.