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1. Radio Frequency Exposure

RESULT: **Pass**

Test standard : FCC Part2: Section 2.1091
KDB 447498 D01 General RF Exposure Guidance v06

1.1 Product Technical Information

The Equipment Under Test (EUT) is a IEEE 802.11 a/b/g/n/ac 2.4GHz+5GHz 2T2R USB Module, Model: ZDGFMT7612U, operating at 2400-2483.5MHz, 5150-5350MHz, 5470-5725MHz and 5725-5850MHz assign bands. It is powered by 5Vdc (USB Operated).refer below for detail information.

Technical Specification	**Value**	
Frequency Bands	2400-2483.5MHz 5150-5350MHz 5470-5725MHz 5725-5850MHz	
Operating Frequency/Channels/Protocol	20MHz Bandwidth	2412-2462MHz/11CH/802.11b/g/n-HT20 5180-5320MHz/8CH/802.11a/n-HT20/ac20 5500-5700MHz/11CH/802.11a/n-HT20/ac20 5745-5825MHz/5CH/802.11a/n-HT20/ac20
	40MHz Bandwidth	2422-2452MHz/7CH/802.11n-HT40 5190-5310MHz/4CH/802.11n-HT40/ac40 5510-5670MHz/5CH/802.11n-HT40/ac40 5755-5795MHz/2CH/802.11n-HT40/ac40
	80MHz Bandwidth	5210-5290MHz/2CH/802.11ac80 5530-5610MHz/2CH/802.11ac80 5775MHz/1CH/802.11ac80
Channel Spacing	5 MHz	
Extreme Temperature Range	-10~+70 ℃	
Type of Product	Client Device without Radar Detection	
TX Power Control (TPC)	Not Supported	
Modulation	CCK, DSSS, OFDM	
Antenna Number	2	
Antenna Type	Onboard Omni-directional antenna	
RF Output Power (Conducted)	2.4GHz Band	17dBm±3dB for SISO mode (Ant0); 16dBm±2dB for MIMO mode (Ant0 or Ant1);
	5GHz Bands	14dBm±3dB for SISO mode (Ant0); 14dBm±2dB for MIMO mode (Ant0 or Ant1);
Antenna Gain	Ant0: 2.9dBi, Ant1: 2.9dBi	
Operation Voltage	USB Operated	

1.2 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.

1.3 Radio Frequency Exposure Limit

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)
300-1,500			f/1500
1,500-100,000			1.0

1.4 Radio Frequency Exposure Calculation Formula

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

where: S = power density (in appropriate units, e.g. mW/cm^2)
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

1.5 Calculation Result

Mode	Frequency (MHz)	*Measured RF Output Power (mW)	Max RF Output Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm²)	Limit (mW/cm²)
SISO (Ant0)	2412	81.47	100.00	2.9	20	0.0388	1.0
	5180	47.86	50.12	2.9	20	0.0195	1.0
MIMO (Ant0+Ant1)	2452	104.50	126.19	5.9 (note3)	20	0.0977	1.0
	5310	76.48	79.62	5.9 (note3)	20	0.0617	1.0

Note:
1. *2.4GHz Band RF Output Power: Refer 50074914 001 Appendix A;
2. *5GHz Bands RF Output Power: Refer 50074914 002 Appendix A;
3. Ant0+Ant1 total antenna gain is 5.9dBi (KDB 662911 D01).

1.5.1 Simultaneous transmission MPE

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.

Simultaneous transmission Scenarios

No.	Simultaneous transmission Scenarios
1	2.4GHz WiFi+5GHz WiFi

The MPE ratio for 2.4GHz WiFi can be calculated as follow:
=The power density at 20cm distance/MPE limit
=0.0977 mW/cm²/1 mW/cm²
=0.0977

The MPE ratio for 5GHz WiFi can be calculated as follow:
=The power density at 20cm distance/MPE limit
=0.0617 mW/cm²/1 mW/cm²
=0.0617

The sum of the MPE ratios for all simultaneous transmitting antennas:
=0.0977+0.0617
= 0.1594<1.0

As the sum of MPE ratios for all simultaneous transmitting antennas is ≤ 1.0, simultaneous transmission MPE test exclusion will be applied.

1.5.2 Conclusion

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