

## Table of Contents

1.	RADIO FREQUENCY EXPOSURE .....	2
1.1	PRODUCT TECHNICAL INFORMATION.....	2
1.2	PRODUCT CLASSIFICATION .....	2
1.3	RADIO FREQUENCY EXPOSURE LIMIT .....	3
1.4	RADIO FREQUENCY EXPOSURE CALCULATION FORMULA.....	3
1.5	CALCULATION RESULT .....	3
1.5.1	<i>Simultaneous transmission MPE</i> .....	3
1.5.2	<i>Conclusion</i> .....	4

## 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 °C	
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/cm <sup>2</sup> )
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<sup>2</sup>)  
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/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
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:

- \*2.4GHz Band RF Output Power: Refer 50074914 001 Appendix A;
- \*5GHz Bands RF Output Power: Refer 50074914 002 Appendix A;
- 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/cm<sup>2</sup>/1 mW/cm<sup>2</sup>

=0.0977

The MPE ratio for 5GHz WiFi can be calculated as follow:

=The power density at 20cm distance/MPE limit

=0.0617 mW/cm<sup>2</sup>/1 mW/cm<sup>2</sup>

=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  $\leq 1.0$ , 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.