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Report On

RF Exposure Estimation of the Vertex Telecom, Inc. DW33D Damai WiFi AC1750M Dual Band Gigabit Router

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RF Exposure Estimation of the
The Vertex Telecom, Inc.
DW33D Damai WiFi AC1750M Dual Band Gigabit Router

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PREPARED FOR

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DATED

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ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47: Part 1 and 2. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

G Zhao

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RF Exposure Measurement

1 Introduction

This document was prepared to analyze the expected level of Radiofrequency Radiation Exposure caused by the radio transmission equipment DW33D Damai WiFi AC1750M Dual Band Gigabit Router belonging to The Vertex Telecom, Inc.

2 Limits and Guidelines on Maximum Permissible Exposure (MPE)

Based on Section FCC Part 1.1307(b) requirements for environmental impact of human exposure to radio-frequency (RF) radiation, according to the KBD447498 Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies, a device may be used in mobile exposure condition with no restrictions when output power is ≤ $60/f_{(GHz)}$ mWas specified in the following table:

Limits for Maximum Permissible Exposure

Exposure Category	Limit
General Population	1.0mW/cm^{2}or 10W/m^2

NOTE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.
NOTE 2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

3 Calculation of Output Power threshold for DW33D Damai WiFi AC1750M Dual Band Gigabit Router

Below method describes a theoretical approach to compare the output power of the DW33D Damai WiFi AC1750M Dual Band Gigabit Router based on a typical configuration mobile device.

In accordance with 47CFR FCC Part 2.1091, the product was defined as a mobile device.

3.1 Typical Configuration of the DW33D Damai WiFi AC1750M Dual Band Gigabit Router

The DW33D Damai WiFi AC1750M Dual Band Gigabit Router supports frequency band of 2400MHz to 2483.5MHz and 5725MHz to 5850MHz. It supports DSSS and OFDM modulation.

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3.2 Antennas and Technical Description of DW33D Damai WiFi AC1750M Dual Band Gigabit Router

Frequency Band: 2400MHz to 2483.5MHz

20MHz Bandwidth

Max. output power at antenna connector(dBm)	**Modulation Type**	**Channel 1 (2412MHz)**	**Channel 6 (2437MHz)**	**Channel 11 (2462MHz)**
	DSSS	23.71	23.61	24.14
	OFDM	24.06	24.18	24.16
Transmitter frequency band	2400MHz to 2483.5MHz			
Number of antenna ports	1			
Antenna gain	7.8dBi			

Note: The Directional Gain= 3dBi+10log (3) =7.8dBi was used as antenna gain.

40MHz Bandwidth

Max. output power at antenna connector(dBm)	**Modulation Type**	**Channel 1 (2412MHz)**	**Channel 6 (2437MHz)**	**Channel 11 (2462MHz)**
	OFDM	22.98	22.66	22.82
Transmitter frequency band	2400MHz to 2483.5MHz			
Number of antenna ports	1			
Antenna gain	7.8dBi			

Note: The Directional Gain= 3dBi+10log (3) =7.8dBi was used as antenna gain.

Frequency Band: 5725MHz to 5850MHz

20MHz Bandwidth

Max. output power at antenna connector(dBm)	**Modulation Type**	**Channel 149 (5745MHz)**	**Channel 157 (5785MHz)**	**Channel 165 (5825MHz)**
	OFDM	17.23	18.60	18.39
Transmitter frequency band	5725MHz to 5850MHz			
Number of antenna ports	1			
Antenna gain	9.8dBi			

Note: The Directional Gain= 5dBi+10log (3) =9.8dBi was used as antenna gain.

40MHz Bandwidth

Max. output power at antenna connector(dBm)	**Modulation Type**	**Channel 151 (5755MHz)**	**Channel 159 (5795MHz)**
	OFDM	16.35	17.28
Transmitter frequency band	5725MHz to 5850MHz		
Number of antenna ports	1		
Antenna gain	9.8dBi		

Note: The Directional Gain= 5dBi+10log (3) =9.8dBi was used as antenna gain.

80MHz Bandwidth

Max. output power at antenna connector(dBm)	**Modulation Type**	**Channel 155 (5775MHz)**
	OFDM	13.05
Transmitter frequency band	5725MHz to 5850MHz	
Number of antenna ports	1	
Antenna gain	9.8dBi	

Note: The Directional Gain= 5dBi+10log (3) =9.8dBi was used as antenna gain.

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3.3 Calculation result

Frequency Band: 2400MHz to 2483.5MHz

This WLAN device operate with distance d ≥ 20cm,
The maximum measured antenna conducted power, P_{max}=24.18dBm
The antenna gain, G=7.8dBi,

So, the maximum EIRP power= P+G=31.98dBm, or 1577.61mW
The limit for Maximum Permissible Exposure (MPE) for transmitter at 2.4GHz is1.0mW/cm^2

The power density is related to EIRP with the equation:
S = EIRP/4πD^2, which equal to 1=1577.61mW /4πD^2, π = 3.1416, thus D=11.2cm

The minimum safe separation distance D= 11.2cm, which is below 20cm.

Frequency Band: 5725MHz to 5850MHz

This WLAN device operate with distance d ≥ 20cm,
The maximum measured antenna conducted power, P_{max}=18.60dBm
The antenna gain, G=9.8dBi,

So, the maximum EIRP power= P+G=28.40dBm, or 691.83mW
The limit for Maximum Permissible Exposure (MPE) for transmitter at 2.4GHz is1.0mW/cm^2

The power density is related to EIRP with the equation:
S = EIRP/4πD^2, which equal to 1=691.83mW /4πD^2, π = 3.1416, thus D=7.42cm

The minimum safe separation distance D= 7.42cm, which is below 20cm.