MPE Report

Applicant	:	Draytek Corporation
Product Name	:	Vigor Router 11ax Series
Trade Name	:	DrayTek
Model Number	:	Vigor2765ax, Vigor2765Vax, Vigor2766ax, Vigor2766Vax, Vigor2135ax, Vigor2135Vax, Vigor2135Fax, Vigor2135FVax, VigorAP 906
Applicable Standard	:	47 CFR § 2.1091
Received Date	:	Feb. 08, 2022
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Issued by

Approved By : Kris Pan

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Taiwan Accreditation Foundation accreditation number: 1330
Test Firm MRA designation number: TW0010

Note:
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Revision History

Rev.	Issued Date	Revisions	Revised By
00	Sep. 20, 2022	Initial Issue	Abby Hsu

Contents

1. General Information

1.1 Reference Applicable Standard

Standard	Description	Version
IEEE C95.1	American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 300 KHz to 100 GHz, New York.	1992
47 CFR Part §2.1091	Radiofrequency radiation exposure evaluation: mobile devices.	-
47 CFR Part §1.1310	Radiofrequency radiation exposure limits.	-

2. Description of Equipment under Test (EUT)

Applicant	Draytek Corporation No.26, FuShing Rd., Hukou, Hsinchu Industrial Park, Hsinchu 303, Taiwan
Manufacturer	Draytek Corporation No.26, FuShing Rd., Hukou, Hsinchu Industrial Park, Hsinchu 303, Taiwan
Product Name	Vigor Router 11ax Series
Trade Name	DrayTek
Model Number	Vigor2765ax, Vigor2765Vax, Vigor2766ax, Vigor2766Vax, Vigor2135ax, Vigor2135Vax, Vigor2135Fax, Vigor2135FVax, VigorAP 906
FCC ID	VGY2765AX
Frequency Range	WLAN 2.4 GHz Band：2412 - 2462 MHz WLAN 5.2 GHz Band：5180 - 5240 MHz WLAN 5.8 GHz Band：5745 - 5825 MHz
Supported Modulations	WLAN 2.4 GHz : 802.11b/g/n/ax HT20/HT40/HE20/HE40
	WLAN 5 GHz : 802.11a/n/ac/ax HT20/HT40/VHT20/VHT40/VHT80/HE20/HE40/HE80

Note:

The above information of DUT was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

Antenna Information							
Model	Type	Band	Freq.(Min)	Freq.(Max)	ANT 0	ANT 1	Directional
DPD2430Z01-150W17U7S	Dipole Antenna	2.4 GHz	2412	2462	2.70	2.70	5.71
DPD2430Z01-150W17U7S	Dipole Antenna	5.2 GHz	5180	5240	2.50	2.50	5.51
DPD2430Z01-150W17U7S	Dipole Antenna	5.8 GHz	5745	5825	2.50	2.50	5.51

3. RF Exposure Limit

For devices that operate at larger distances from persons, where there are minimal RF coupling interactions between a device and the user or nearby persons, RF exposure compliance using maximum permissible exposure (MPE) limits is applied. The limits for MPE is listed as below:

Limits for General Population / Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time$\|E\|^2$,$\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824 / f	2.19 / f	($180 / f^2$)*	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	F / 1,500	30
1,500-100,000	-	-	1.0	30
Limits for Occupational / Controlled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time$\|E\|^2$,$\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1,842 / f	4.89 / f	($900 / f^2$)*	6
30-300	61.4	0.163	1.0	6
300-1,500	-	-	F / 300	6
1,500-100,000	-	-	5	6

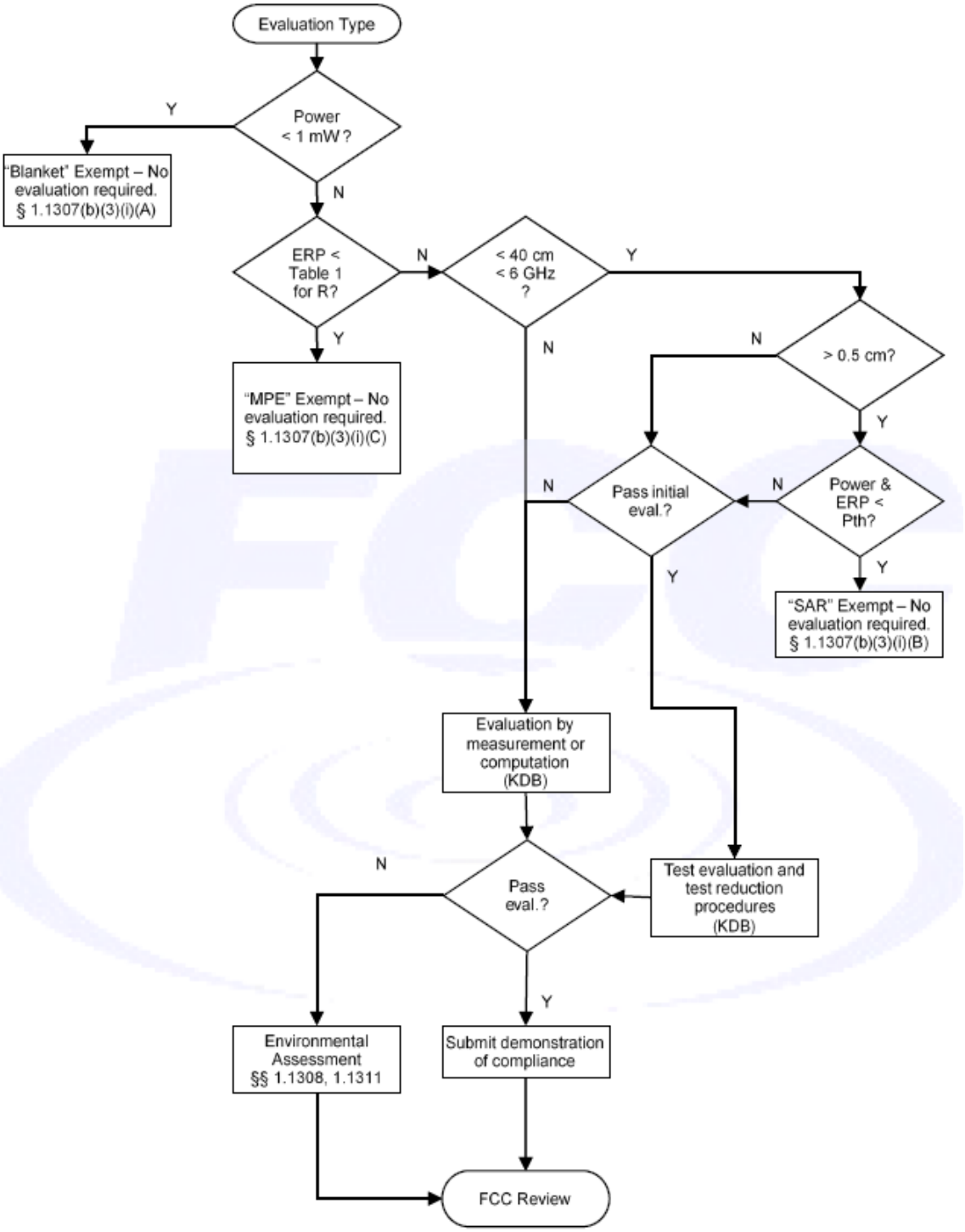
f = frequency in MHz. * = Plane-wave equivalent power density.

4. RF Exposure Assessment

4.1 Exemption Evaluation

Exemption evaluation was performed according to the appendix A and B in KDB447498 D04.

The General Sequence for Determination of Procedure demonstrated in Figure A.1 of KDB447498 D04 was applied.



4.2 Human Exposure Assessment

Due to the design and installation of this product, it is not possible to conduct SAR evaluation. This is because client either manufactures or supplies the antenna(s) that will be used in the installation of this product. Therefore, this product will be evaluated as a mobile device per 47 CFR § 1.1310 titled “Radiofrequency radiation exposure limits”, generally referred to as MPE limits.

In 47 CFR § 2.1091, paragraph (b) defines a mobile device 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 least 20 cm is normally maintained between the transmitter’s radiating structure(s) and the body of the user or nearby persons.”

Exposure evaluation
$$S_{eirp} = \frac{EIRP}{4\pi d^2} = \frac{PG}{4\pi d^2}\left(W/m^2\right)$$ Where S: is the input power (W); G: is the antenna gain; d : is the distance between antennas and evaluation point (m).

5. Maximum Tune-up Power

Beamforming OFF :

Operate Band	Frequency (MHz)	MIMO
2.4 GHz	2412 - 2462	29.50
5.2 GHz	5180 - 5240	29.50
5.8 GHz	5745 - 5850	28.50

Beamforming ON :

Operate Band	Frequency (MHz)	MIMO Beamforming
2.4 GHz	2412 - 2462	26.00
5.2 GHz	5180 - 5240	26.50
5.8 GHz	5745 - 5850	25.00

6. Test Result

Band	Frequency (MHz)	Distance (cm) [R]	Tune-up Power (dBm) [P]	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	Power with Duty cycle (mW) [P]x[G]	Power Density (mW/cm^2) [S]	Antenna	Evaluated / Exposure Limit
2.4 GHz	2412 - 2462	20.0	29.50	2.70	1.86	1	1657.73	0.33	MIMO	0.33
5.2 GHz	5180 - 5240	20.0	29.50	2.50	1.78	1	1586.43	0.32	MIMO	0.32
5.8 GHz	5745 - 5825	20.0	28.50	2.50	1.78	1	1260.14	0.25	MIMO	0.25
2.4 GHz	2412 - 2462	20.0	26.00	5.71	3.72	1	1480.96	0.29	MIMO Beamforming	0.29
5.2 GHz	5180 - 5240	20.0	26.50	5.51	3.56	1	1590.19	0.32	MIMO Beamforming	0.32
5.8 GHz	5745 - 5825	20.0	25.00	5.51	3.56	1	1125.77	0.22	MIMO Beamforming	0.22

Note:

1. Mobile or fixed location transmitters, minimum separation distance is 0.2 m, even if calculations indicate MPE distance is less.
2. The Numeric Gain calculated by 10^(ant. Gain(dBi) /10).
3. The MPE results are evaluated by lowest data rate for WLAN.
4. The device operating IEEE 802.11 b mode is 1TX Diversity.
5. The device operating IEEE 802.11 a/g/n/ac/ax mode is 2TX MIMO.

Simultaneous Transmitting：

2.4GHz WLAN + 5GHz WLAN

Total MPE : 0.65 mW/cm^2

TER: 0.65 < 1

7. Conclusion

The result shows that this device is compliance with the exposure limits in 47 CFR §1.1310.

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