



Test report No. : 4788947466-US-R2`-V0
Page : 1 of 10
Issued date : Oct. 28, 2019
FCC ID : VGYAP912C

Maximum Permissible Exposure Report

Product : 802.11ac Ceiling-mount Access Point
Model Name : VigorAP 912C
FCC ID : VGYAP912C
Test Regulation : 47 CFR FCC Part 2.1091
Received Date : Apr. 9, 2019
Issued Date : Oct. 28, 2019
Applicant : Draytek Corporation
No.26, Fu Shing Rd., HuKou County, Hsinchu Industrial
Park,HsinChu,303,Taiwan
Issued By : Underwriters Laboratories Taiwan Co., Ltd.
Building B and Building E, No. 372-7, Sec. 4, Zhongxing
Rd., Zhudong Township, Hsinchu County, Taiwan



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1. Attestation of Test Results

APPLICANT: Draytek Corporation
 No.26, Fu Shing Rd., HuKou County, Hsinchu Industrial
 Park,HsinChu,303,Taiwan

MANUFACTURER Draytek Corporation
 No.26, Fu Shing Rd., HuKou County, Hsinchu Industrial
 Park,HsinChu,303,Taiwan

EUT DESCRIPTION: 802.11ac Ceiling-mount Access Point

BRAND: DrayTek

MODEL: VigorAP 912C

SAMPLE STAGE: Identical Prototype

APPLICABLE STANDARDS	
STANDARD	Results
47 CFR FCC PART 2.1091	PASS

Underwriters Laboratories Taiwan Co., Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by Underwriters Laboratories Taiwan Co., Ltd. based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Taiwan Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Prepared By:

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Date : Oct. 28, 2019

Approved and Authorized By:

Stanley Wu
 Senior Project Engineer

Date : Oct. 28, 2019

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2. Test Methodology

The tests documented in this report were performed in accordance with KDB 447498 D01 General RF Exposure Guidance v06.

3. Facilities and Accreditation

Test Location	Underwriters Laboratories Taiwan Co., Ltd.
Address	Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
Accreditation Certificate	Underwriters Laboratories Taiwan Co., Ltd. is accredited by TAF, Laboratory Code 3398. The full scope of accreditation can be viewed at http://accreditation.taftw.org.tw/taf/public/basic/viewApplyItems.action?unitNo=3398

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4. Equipment Under Test

4.1. Description of EUT

Product Name	802.11ac Ceiling-mount Access Point
Brand Name	DrayTek
Model Name	VigorAP 912C
Operating Frequency	2.4GHz: 2412MHz ~ 2462MHz 5GHz: 5180MHz ~ 5240MHz 5745MHz ~ 5825MHz
Modulation	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM, 64QAM, 16QAM, QPSK, BPSK
Number of Channel	2.4GHz: 802.11b, 802.11g, 802.11n (HT20): 11 802.11n (HT40): 7 5.18 ~ 5.24GHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 4 802.11n (HT40), 802.11ac (VHT40): 2 802.11ac (VHT80): 1 5.745 ~ 5.85GHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 5 802.11n (HT40), 802.11ac (VHT40): 2 802.11ac (VHT80): 1
Normal Voltage	12Vdc from adapter

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Note:

1. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

Modulation Mode	Tx,Rx Function
802.11a	2TX,2RX
802.11b	2TX,2RX
802.11g	2TX,2RX
802.11n (HT20)	2TX,2RX
802.11n (HT40)	2TX,2RX
802.11ac (VHT20)	2TX,2RX
802.11ac (VHT40)	2TX,2RX
802.11ac (VHT80)	2TX,2RX

* The modulation and bandwidth are similar for 802.11n mode for HT20 / HT40 and 802.11ac mode for VHT20 / VHT40, therefore investigated worst case to representative mode in test report.

2. The EUT contains following accessory devices

Product	Brand	Model	Description
Adapter	DEE VAN ENTERPRISE CO., LTD	DSA-12PF09-12 FUS 120100	I/P:100-240Vac,50/60Hz, 0.5A O/P: 12 Vdc, 1A O/P Cable: 1.5m, Non-shielded, w/o ferrite core
Ceiling mount bracket	Draytek Corporation	N/A	N/A
T-Rail Mounting Kits (Used for suspended ceiling)	Draytek Corporation	N/A	N/A
Fixings and Screws (for ceiling mounting)	Draytek Corporation	N/A	N/A
Screw set (for wall mounting)	Draytek Corporation	N/A	N/A
RJ-45 Cable (Ethernet)	Draytek Corporation	N/A	Length: 1.8m, Non-shielded

3. The above EUT information is declared by manufacturer and for more detailed features description, please refer the manufacturer's or user's manual.

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4.2. Description Of Available Antennas

For 2.4GHz					
Antenna	Brand Name	Model Name	Antenna Type	Connector Type	Antenna Gain(dBi)
Chain(0)	LYNwave	ALX19M-222AA4-00	Embedded	IPEX	3
Chain(1)	LYNwave	ALX19M-222AA4-01	Embedded	IPEX	3.1
For 5GHz					
Antenna	Brand Name	Model Name	Antenna Type	Connector Type	Antenna Gain(dBi)
Chain(0)	LYNwave	ALX19M-222AA4-00	Embedded	IPEX	3.7
Chain(1)	LYNwave	ALX19M-222AA4-01	Embedded	IPEX	4.1

Note: The above antenna information was provided from customer and for more detailed features description, please refer the manufacturer's specification or user's manual.

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5. Requirement

Limits for General Population/Uncontrolled Exposure

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/1500	30
1500-100,000	--	--	1.0	30

Note 1: f = frequency in MHz, * means Plane-wave equivalent power density

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.

Power Density (S) is calculated by the following formula:

$$S = (P \cdot G) / 4\pi R^2$$

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)

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6. Radio Frequency Radiation Exposure Evaluation

CDD Mode

WLAN 2.4GHz

Evaluation Frequency (MHz)	WLAN 2.4GHz					Limit (mW/cm ²)
	Max. Average Power (dBm)	Directional Gain (dBi)	Max. EIRP (dBm)	Max. EIRP (mW)	Power density @ 20 cm (mW/cm ²)	
	2412 ~ 2462	26.27	6.06	32.33	1710.015	

WLAN 5GHz

Evaluation Frequency (MHz)	WLAN 5GHz					Limit (mW/cm ²)
	Max. Average Power (dBm)	Directional Gain (dBi)	Max. EIRP (dBm)	Max. EIRP (mW)	Power density @ 20 cm (mW/cm ²)	
	5180 ~ 5240	24.40	6.91	31.31	1352.073	
5745 ~ 5825	24.19	6.91	31.10	1288.250	0.256	

Beamforming Mode

WLAN 5GHz

Evaluation Frequency (MHz)	WLAN 5GHz					Limit (mW/cm ²)
	Max. Average Power (dBm)	Directional Gain (dBi)	Max. EIRP (dBm)	Max. EIRP (mW)	Power density @ 20 cm (mW/cm ²)	
	5180 ~ 5240	23.52	6.91	30.43	1104.079	
5745 ~ 5825	23.58	6.91	30.49	1119.438	0.223	

Note:

1. Max. EIRP (dBm) = Max. Average Power (dBm) + Directional Gain (dBi)
2. Max. EIRP (mW) = $10^{(\text{Max. EIRP (dBm)} / 10)}$
3. Power density (mW/cm²) = Max. EIRP (mW) / [$4 \times \pi \times (\text{calculated distance})^2$], the calculated distance is 20 cm.

Conclusion:

The formula of calculated the MPE is:

$$\text{CPD1} / \text{LPD1} + \text{CPD2} / \text{LPD2} + \dots \text{etc.} < 1$$

CPD = Calculation power density

LPD = Limit of power density

WLAN 2.4GHz + WLAN 5GHz=0.340+0.269=0.609, therefore the maximum calculations of above situations are less than the “1” limit.

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.

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