

RF Exposure Evaluation Declaration

Product Name : Venation E2 IoT Gateway
Trade Name : ARDOMUS
Model No. : VE2A01
FCC ID. : 2AUSBVEHA1

Applicant : Ardomus Networks Corporation
Address : 1F., No. 295-2, Shixing Rd., Zhubei City,
Hsinchu County 30286, Taiwan

Date of Receipt : Jan. 13, 2020
Date of Declaration : Apr. 23, 2021
Report No. : 2010134R-SAUSP03V00
Report Version : V1.0



The declaration results relate only to the samples calculated.

The declaration shall not be reproduced except in full without the written approval of DEKRA Testing and Certification Co., Ltd..

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Issued Date : Apr. 23, 2021

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Product Name : Venation E2 IoT Gateway

Applicant : Ardomus Networks Corporation

Address : 1F., No. 295-2, Shixing Rd., Zhubei City, Hsinchu County
30286, Taiwan

Manufacturer : MitraStar Technology Corporation

Address : No. 6, Innovation Rd II, Hsinchu Science Park, Hsinchu 30076,
Taiwan

Model No. : VE2A01

FCC ID. : 2AUSBVEHA1

Trade Name : ARDOMUS

Applicable Standard : FCC 47 CFR Part 2.1091 Radiofrequency radiation exposure
evaluation: mobile devices.

Test Lab : Hsin Chu Laboratory

Address : No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu
County 310, Taiwan, R.O.C.
TEL: +886-3-582-8001 / FAX: +886-3-582-8958

Test Result : Complied

Tested By :

Clemens Fang

(Clemens Fang / Senior Engineer)

Approved By :

Louis Hsu

(Louis Hsu / Deputy Manager)

Revision History

Version	Description	Issued Date
V1.0	Initial issue of report	Apr. 23, 2021

1.1. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required	Actual	Test Site
Temperature (°C)	Peak Output Power	15 - 35	20	1
Humidity (%RH)		25 - 75	50	

Note: Test site information refers to Laboratory Information.

Laboratory Information

USA : FCC Registration Number: TW3024
Canada : IC Registration Number: 22397-1 / 22397-2 / 22397-3

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site : <http://www.dekra.com.tw>

If you have any comments, Please don't hesitate to contact us. Our test sites as below:

Test Laboratory	DEKRA Testing and Certification Co., Ltd.
Address	1. No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C. 2. No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.
Phone number	1. +886-3-582-8001 2. +886-3-582-8001
Fax number	1. +886-3-582-8958 2. +886-3-582-8958
E mail address	info.tw@dekra.com
Website	http://www.dekra.com.tw

1.2. List of Test Equipment

Peak Output Power / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
High Speed Peak Power Meter Dual Input	Anritsu	ML2496A	1602004	2019/12/02	2020/12/01
Pulse Power Sensor	Anritsu	MA2411B	1531043	2019/12/02	2020/12/01
Pulse Power Sensor	Anritsu	MA2411B	1531044	2019/12/02	2020/12/01
Power Meter	Keysight	8990B	MY51000248	2020/05/20	2021/05/19
Power Sensor	Keysight	N1923A	MY57240005	2020/05/20	2021/05/19

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

1.3. Uncertainty

Test item	Uncertainty
Peak Output Power	± 2.26 dB

Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2. RF Exposure Evaluation

2.1. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	F/1500	6
1500-100,000	--	--	1	30

F= Frequency in MHz

RF Field Strength Limits for Controlled Use Devices (Controlled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-1023	170	180	-	Instantaneous*
0.1-10	-	1.6/ <i>f</i>	-	6**
1.29-10	193/ <i>f</i> 0.5	-	-	6**
10-20	61.4	0.163	10	6
20-48	129.8/ <i>f</i> 0.25	0.3444/ <i>f</i> 0.25	44.72/ <i>f</i> 0.5	6
48-100	49.33	0.1309	6.455	6
100-6000	15.60 <i>f</i> 0.25	0.04138 <i>f</i> 0.25	0.6455 <i>f</i> 0.5	6
6000-15000	137	0.364	50	6
15000-150000	137	0.364	50	616000/ <i>f</i> 1.2
150000-300000	0.354 <i>f</i> 0.5	9.40 x 10 ⁻⁴ <i>f</i> 0.5	3.33 x 10 ⁻⁴ <i>f</i>	616000/ <i>f</i> 1.2

Note: *f* is frequency in MHz. *Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR).

Friis Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * r^2)$

Where

P_d = power density in mW/cm^2

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, $1 mW/cm^2$. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

2.2. Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

2.3. Test Result of RF Exposure Evaluation

Product	Venation E2 IoT Gateway
Test Mode	Transmit Mode
Test Condition	RF Exposure Evaluation

Antenna Gain: WLAN 2.4GHz: The maximum antenna gain is 3.91 dBi.
 Zigbee: The maximum antenna gain is 3.14 dBi.

Output Power into Antenna & RF Exposure Evaluation Distance:

WLAN Function					
2.4GHz Band					
Mode	Frequency (MHz)	Maximum Conducted Output Power		Maximum Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)
		dBm	mW		
802.11b	2412	10.385	10.927	0.005	1
	2437	10.357	10.857	0.005	1
	2462	9.595	9.110	0.004	1
802.11g	2412	18.015	63.314	0.031	1
	2437	17.607	57.637	0.028	1
	2462	16.571	45.405	0.022	1
802.11n (20MHz)	2412	17.142	51.785	0.025	1
	2437	16.986	49.957	0.024	1
	2462	17.176	52.192	0.026	1
802.11n (40MHz)	2422	16.088	40.626	0.020	1
	2437	17.973	62.705	0.031	1
	2452	18.197	66.024	0.032	1

Zigbee					
Mode	Frequency (MHz)	Maximum Conducted Output Power		Maximum Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)
		dBm	mW		
IEEE 802.15.1	2405	18.570	71.945	0.02949	1
	2445	18.330	68.077	0.02791	1
	2480	-0.870	0.818	0.00034	1

Note:

1. The antenna information is from the customer declaration.
2. The results are evaluated using the maximum power.

Collocation Power Density

Product	Venation E2 IoT Gateway
Test Mode	Transmit Mode
Test Condition	RF Exposure Evaluation

Power Density for WiFi 2.4GHz (mW/cm ²)	Power Density for Zigbee (mW/cm ²)	Collocation Power Density (mW/cm ²)	Limit (mW/cm ²)
0.032	0.02949	0.06149	1

Note.

WLAN 2.4GHz: Power Density / Limit = $0.032 / 1 = 0.032$ (mW/cm²)

Zigbee: Power Density / Limit = $0.02949 / 1 = 0.02949$ (mW/cm²)

Total Power Density = $0.032 + 0.02949 = 0.06149$ (mW/cm²)