

# FCC Test Report

Product Name : Venation E2 IoT Gateway  
Trade Name : ARDOMUS  
Model No. : VE2A02  
FCC ID : 2AUSBVEHA2

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

Date of Receipt : Jan. 13, 2020  
Issued Date : Jun. 11, 2021  
Report No. : 2010143R-RFUSP66V00  
Report Version : V1.0



The test results relate only to the samples tested.

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# Test Report Certification


Issued Date : Jun. 11, 2021

Report No. : 2010143R-RFUSP66V00



Product Name : Venation E2 IoT Gateway  
Applicant : Ardopus 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, Science-Based Industrial, Hsin-Chu, Taiwan  
Model No. : VE2A02  
FCC ID : 2AUSBVEHA2  
EUT Test Voltage : AC 100-240V, 50/60Hz  
Testing Voltage : AC 120V/60Hz  
Trade Name : ARDOMUS  
Applicable Standard : FCC CFR Title 47 Part 15 Subpart C Section 15.249: 2019  
ANSI C63.10: 2013  
Laboratory Name : 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

Documented By :   
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( Lyla Yang / Engineering Adm. Specialist )

Tested By :   
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( Elwin Lin / Senior Engineer )

Approved By :   
\_\_\_\_\_  
( Louis Hsu / Deputy Manager )

### Revision History

Version	Description	Issued Date
V1.0	Initial issue of report	Jun. 11, 2021

## TABLE OF CONTENTS

Description	Page
1. General Information .....	5
1.1. EUT Description.....	5
1.2. Test Mode .....	6
1.3. Tested System Details .....	7
1.4. Configuration of tested System.....	7
1.5. EUT Exercise Software.....	7
1.6. Comments and Remarks .....	8
1.7. Test Facility .....	9
1.8. List of Test Equipment .....	10
1.9. Duty Cycle .....	12
1.10. Uncertainty.....	14
2. Conducted Emission.....	15
2.1. Test Setup.....	15
2.2. Limits .....	15
2.3. Test Procedure.....	16
2.4. Test Specification .....	16
2.5. Test Result.....	17
3. Fundamental Power.....	19
3.1. Test Setup.....	19
3.2. Test procedures .....	19
3.3. Limits .....	20
3.4. Test Specification .....	20
3.5. Test Result.....	21
4. Radiated Emission.....	27
4.1. Test Setup.....	27
4.2. Limits .....	28
4.3. Test Procedure.....	28
4.4. Test Specification .....	28
4.5. Test Result.....	29
Attachment.....	43
Test Setup Photograph .....	43

## 1. General Information

### 1.1. EUT Description

Product Name	Venation E2 IoT Gateway	
Product Type	Z-Wave 、WiFi 2.4G	
Trade Name	ARDOMUS	
Model No.	VE2A02	
Frequency Range/ Channel Number	Z-Wave	908.40MHz / 908.42MHz / 916.00MHz 3 Channels
	IEEE 802.11b/g	2412~2462MHz / 11 Channels
	IEEE 802.11n (20MHz)	
	IEEE 802.11n (40MHz)	2422~2452MHz / 7 Channels
Type of Modulation	Z-Wave	908.40MHz: FSK (for 40kbps) 908.42MHz: FSK (for 9.6kbps) 916.00MHz: GFSK (for 100kbps)
	IEEE 802.11b	Direct Sequence Spread Spectrum
	IEEE 802.11g/n	Orthogonal Frequency Division Multiplexing
Data Speed	Z-Wave	908.40MHz: 40kbps 908.42MHz: 9.6kbps 916.00MHz: 100kbps
	IEEE 802.11b	1, 2, 5.5, 11Mbps
	IEEE 802.11g	6, 9, 12, 18, 24, 36, 48, 54Mbps
	IEEE 802.11n	Support a subset of the combination of GI, MCS 0~MCS 15 and bandwidth defined in 802.11n

Antenna Information				
No.	Manufacturer	Model No.	Antenna Type	Antenna Gain
Wi-Fi (ANT0)	HongBo	290-10536	PCB Antenna	3.58 dBi
Wi-Fi (ANT1)	HongBo	290-10537	PCB Antenna	3.91 dBi
Z-Wave	HongBo	290-10540	PCB Antenna	-0.43 dBi

Note: WiFi Directional Gain: 6.76 dBi

Accessories Information	
Power Adapter	DVE, DSA-6PFG-05 FUS 050100 I/P: 100-240V~50/60Hz 0.2A O/P: +5V === 1A Cable Out: Non-Shielded, 1.5m

Working Frequency of Each Channel					
Channel	Frequency	Channel	Frequency	Channel	Frequency
01	908.40MHz	02	908.42MHz	03	916.00MHz

Note:

1. This device is a Venation E2 IoT Gateway including 2.4GHz b/g/n and 902-928MHz Z-Wave transmitting and receiving functions. This report only shows Z-Wave test data.
2. These test results on a sample of the device are for the purpose of demonstrating Compliance with Part 15 Subpart C Paragraph 15.249.
3. Regards to the frequency band operation; the lowest, middle and highest frequency of channel were selected to perform the test, and then shown on this report.
4. The EUT description is from the customer declaration.

## 1.2. Test Mode

DEKRA has verified the construction and function in typical operation. The preliminary tests were performed in different data rate, and to find the worst condition, which was shown in this test report. The following table is the final test mode.

Test Mode	Mode 1: Transmit
-----------	------------------

Test Items	Modulation	Channel	Antenna	Result
Conducted Emission	FSK/GFSK	0	Z-Wave	Complies
Fundamental Power	FSK/GFSK	0/1/2	Z-Wave	Complies
Radiated Emission	FSK/GFSK	0/1/2	Z-Wave	Complies

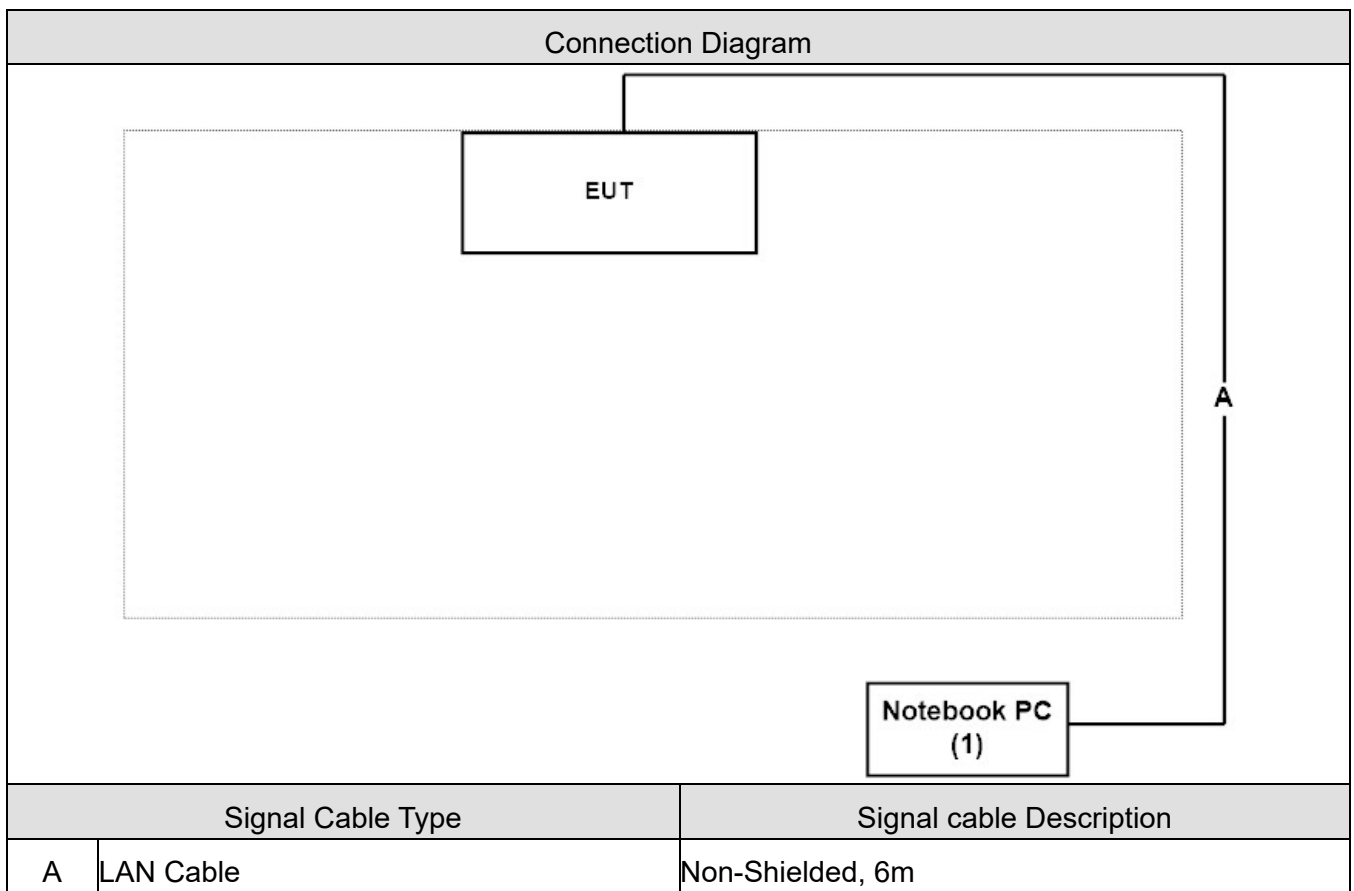
Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

### 1.3. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	FCC ID	Power Cord
1 Notebook PC	Dell	E6320	8611271467	DoC	Non-Shielded, 1.8m, one ferrite core bonded

### 1.4. Configuration of tested System



### 1.5. EUT Exercise Software

1	Set the EUT according to the picture above.
2	EUT power on.
3	Start the software Tera Term and enter command to set relevant parameters.
4	Confirm that the signal sent is correct.

---

## **1.6. Comments and Remarks**

The product specification and testing instructions for the EUT declared in the report are provided by the manufacturer who will take all responsibilities for the accuracy.



## 1.7. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required	Test Site
Temperature (°C)	FCC PART 15 C 15.209 Conducted Emission	15 - 35	2
Humidity (%RH)		25 - 75	
Temperature (°C)	FCC PART 15 C 15.209 Fundamental Power	15 - 35	1
Humidity (%RH)		25 - 75	
Temperature (°C)	FCC PART 15 C 15.209 Radiated Emission	15 - 35	1
Humidity (%RH)		25 - 75	

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	<a href="mailto:info.tw@dekra.com">info.tw@dekra.com</a>
Website	<a href="http://www.dekra.com.tw">http://www.dekra.com.tw</a>

## 1.8. List of Test Equipment

### Conducted Emission / SR2-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Artificial Mains Network	R&S	ENV4200	848411/010	2020/01/08	2021/01/07
Test Receiver	R&S	ESCS 30	836858/022	2020/02/25	2021/02/24
LISN	R&S	ENV216	100092	2020/06/22	2021/06/21

### Fundamental Power / CB4-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal Analyzer	R&S	FSVA40	101455	2020/10/12	2021/10/11
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30	2021/03/29
				2021/03/31	2022/03/30
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2020/02/21	2021/02/20
				2021/01/25	2022/01/24
Bilog Antenna	Teseq	CBL6112D	23191	2020/06/12	2021/06/11
Horn Antenna	Schwarzbeck	BBHA 9120D	639	2020/06/04	2021/06/03
Horn Antenna	Schwarzbeck	BBHA 9170	202	2019/12/27	2020/12/26
Pre-Amplifier	DEKRA	AP-025C	12183122	2020/09/03	2021/09/02
Pre-Amplifier	EMCI	EMC11830I	980366	2019/12/03	2020/12/02
				2020/11/30	2021/11/29
Pre-Amplifier	DEKRA	AP-400C	201801231	2019/12/03	2020/12/02
				2020/11/16	2021/11/15
Horn Antenna	Schwarzbeck	BBHA 9120D	01656	2020/10/14	2021/10/13
Signal Analyzer	R&S	FSV40	101435	2020/06/24	2021/06/23
Band Reject Filter	Micro-Tronics	BRM50702	G192	2020/03/09	2021/03/08
				2021/03/04	2022/03/03
Band Reject Filter	Micro-Tronics	BRM50716	G089	2020/03/18	2021/03/17
				2021/03/11	2022/03/10
Band Reject Filter	Micro-Tronics	BRM50716	G068	2020/03/09	2021/03/08
				2021/03/04	2022/03/03
Coaxial Cable(10m)	Suhner	SF102_SF104	CB4-H	2020/04/25	2021/04/24
				2021/04/25	2022/04/24
DEKRA Testing System	DEKRA	Version 1.2	CB4-H	NA	NA

## Radiated Emission / CB4-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal Analyzer	R&S	FSVA40	101455	2020/10/12	2021/10/11
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30	2021/03/29
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2020/02/21	2021/02/20
Bilog Antenna	Teseq	CBL6112D	23191	2020/06/12	2021/06/11
Horn Antenna	Schwarzbeck	BBHA 9120D	639	2020/06/04	2021/06/03
Horn Antenna	Schwarzbeck	BBHA 9170	202	2019/12/27	2020/12/26
Pre-Amplifier	DEKRA	AP-025C	12183122	2020/09/03	2021/09/02
Pre-Amplifier	EMCI	EMC11830I	980366	2019/12/03	2020/12/02
Pre-Amplifier	DEKRA	AP-400C	201801231	2019/12/03	2020/12/02
Horn Antenna	Schwarzbeck	BBHA 9120D	01656	2020/10/14	2021/10/13
Signal Analyzer	R&S	FSV40	101435	2020/06/24	2021/06/23
Band Reject Filter	Micro-Tronics	BRM50702	G192	2020/03/09	2021/03/08
Band Reject Filter	Micro-Tronics	BRM50716	G089	2020/03/18	2021/03/17
Band Reject Filter	Micro-Tronics	BRM50716	G068	2020/03/09	2021/03/08
Coaxial Cable(10m)	Suhner	SF102_SF104	CB4-H	2020/04/25	2021/04/24
DEKRA Testing System	DEKRA	Version 1.2	CB4-H	NA	NA

## Band Edge / CB4-H

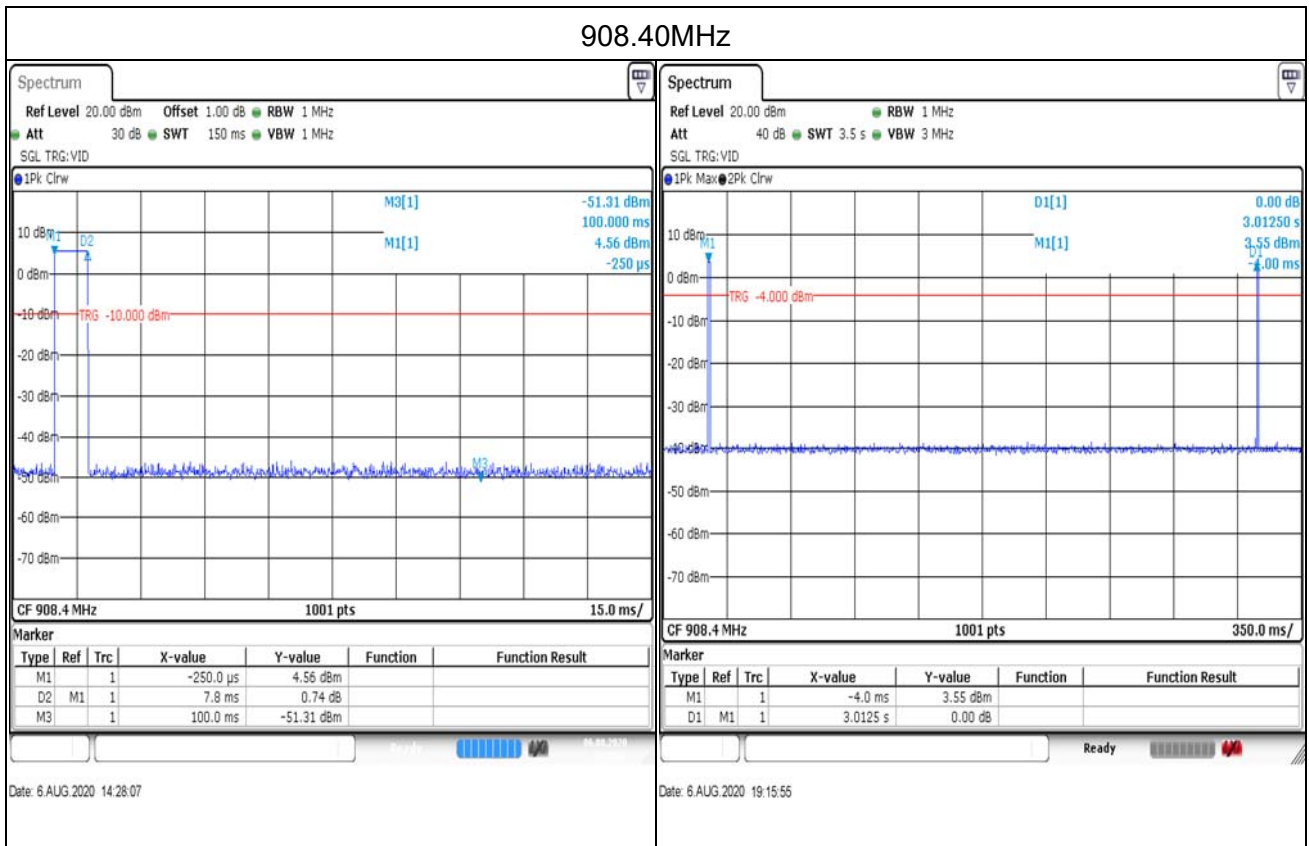
Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal Analyzer	R&S	FSVA40	101455	2020/10/12	2021/10/11
Signal & Spectrum Analyzer	R&S	FSV40	101049	2021/03/31	2022/03/30
Signal Analyzer	R&S	FSVA40	101435	2020/06/24	2021/06/23
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2021/01/25	2022/01/24
Bilog Antenna	Teseq	CBL6112D	23191	2021/02/26	2022/02/25
Horn Antenna	Schwarzbeck	BBHA 9120D	01640	2020/09/17	2021/09/16
Horn Antenna	Schwarzbeck	BBHA 9170	203	2021/03/11	2022/03/10
Pre-Amplifier	EMCI	EMC01820I	980364	2020/09/14	2021/09/13
Pre-Amplifier	EMCI	EMC0031835	980233	2020/12/07	2021/12/06
Pre-Amplifier	DEKRA	AP-400C	201801231	2020/11/16	2021/11/15
Band Reject Filter	Micro-Tronics	BRM50702	G192	2021/03/04	2022/03/03
Wideband Radio Communication Tester	R&S	CMW500	106071	2021/01/27	2022/01/26
Wireless Conn. Tseter	R&S	CMW500	157118	2020/07/23	2021/07/22
Coaxial Cable(10m)	Suhner	SF102_SF104	CB4-H	2021/04/25	2022/04/24
DEKRA Testing System	DEKRA	Version 2.0	CB4-H	NA	NA

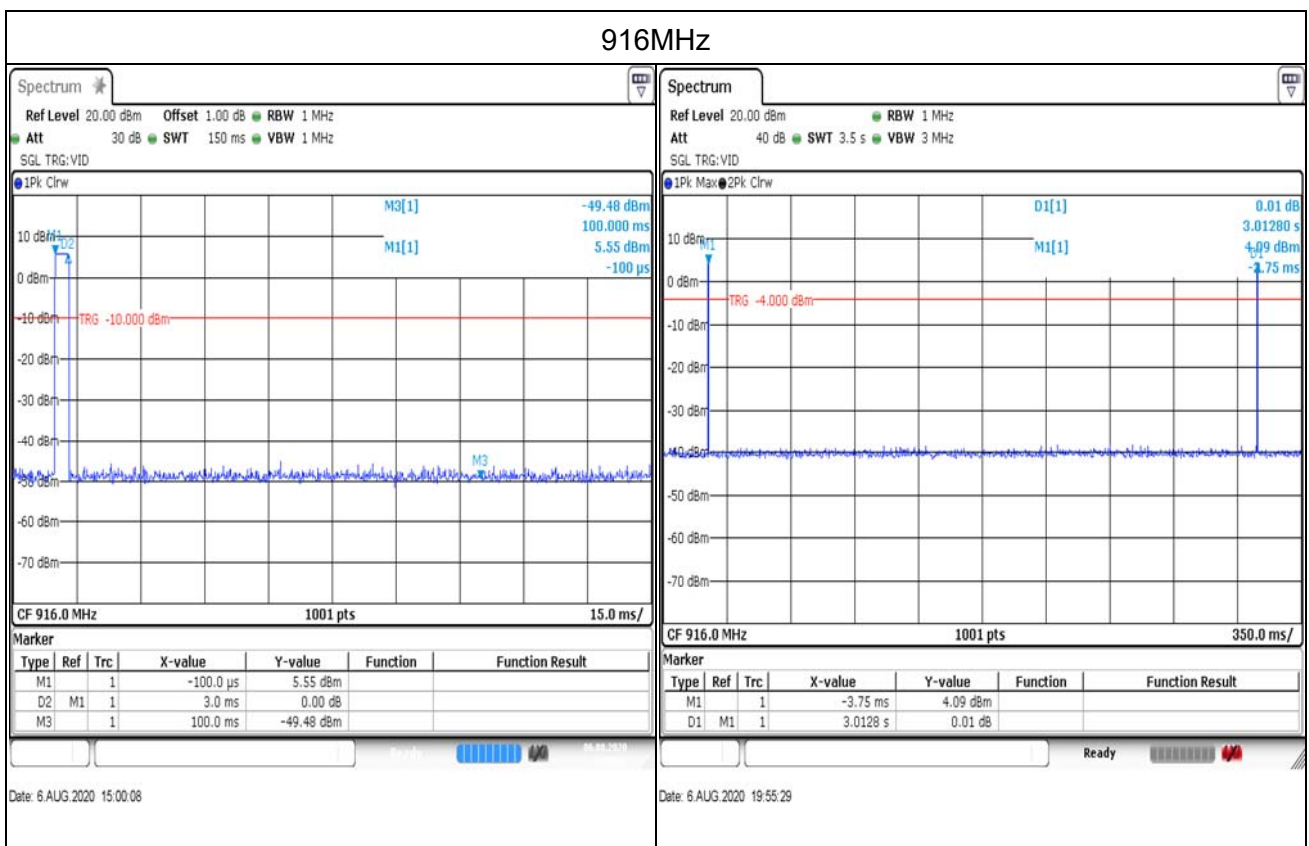
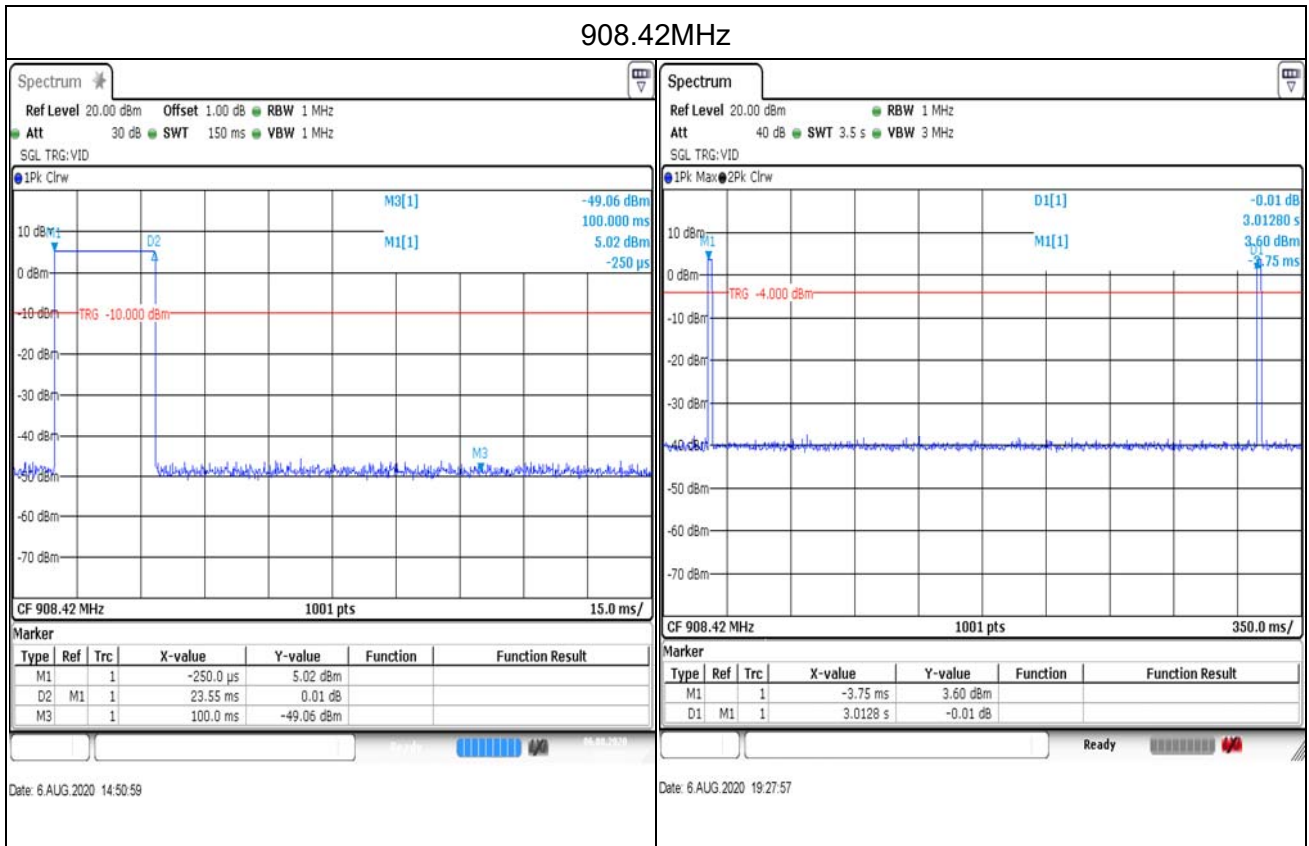
Note: All equipment upon which need to calibrated are with calibration period of 1 year.

### 1.9. Duty Cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Factor(dB) linear voltage
908.40MHz	7.8	100	-22.16
908.42MHz	23.55	100	-12.56
916.00MHz	3	100	-30.46

Note: The customer declares the duty cycle between the low/mid/high channels is different, and the 3 channel specifications are independent.



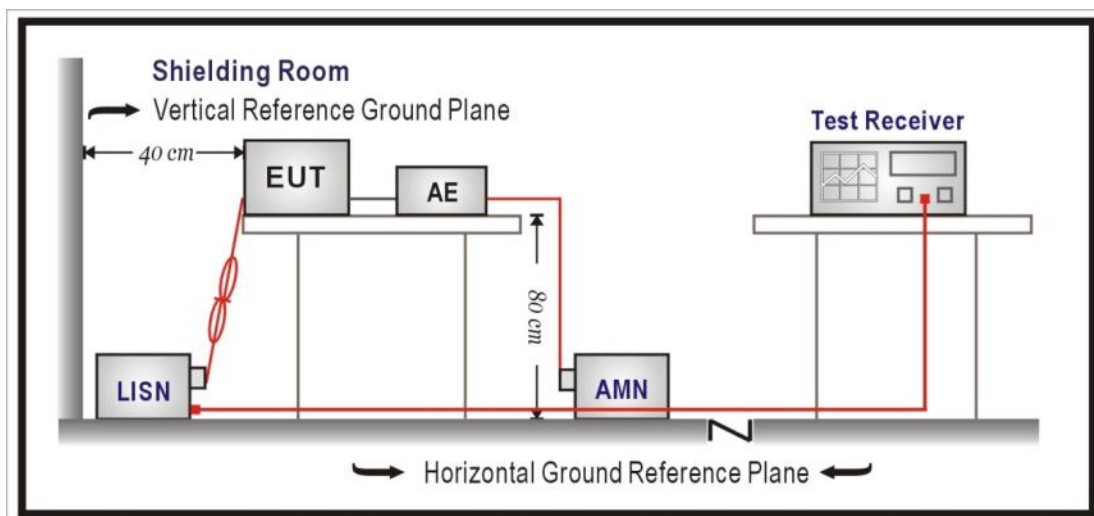


**1.10. Uncertainty**

Test item	Uncertainty
Conducted Emission	$\pm 2.26$ dB
Fundamental Power	1GHz~26.5GHz as $\pm 3.65$ dB
Radiated Emission	30MHz~1GHz as $\pm 3.43$ dB 1GHz~26.5GHz as $\pm 3.65$ dB

## 2. Conducted Emission

### 2.1. Test Setup



### 2.2. Limits

FCC Part 15 Subpart C Paragraph 15.249 Limits (dBuV)		
Frequency (MHz)	QP	AV
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

### **2.3. Test Procedure**

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.249 requirements.

The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs.)

Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

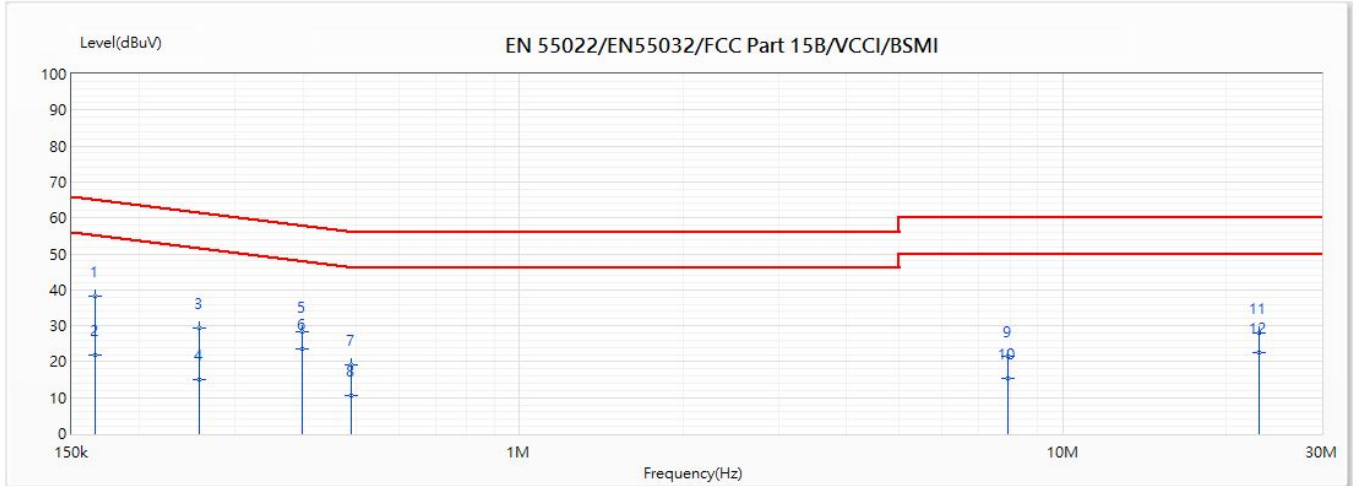
### **2.4. Test Specification**

According to FCC Part 15 Subpart C Paragraph 15.207: 2019



## 2.5. Test Result

Model No	VE2A02	Site	SR2-H
Test Voltage	AC 120V/60Hz	Test Date	2020/5/13
Test Mode	Mode 1: Transmit	Engineer	Scott
Phase	L1	Temperature (°C)	24
Test Condition	908.42MHz	Humidity (%RH)	59

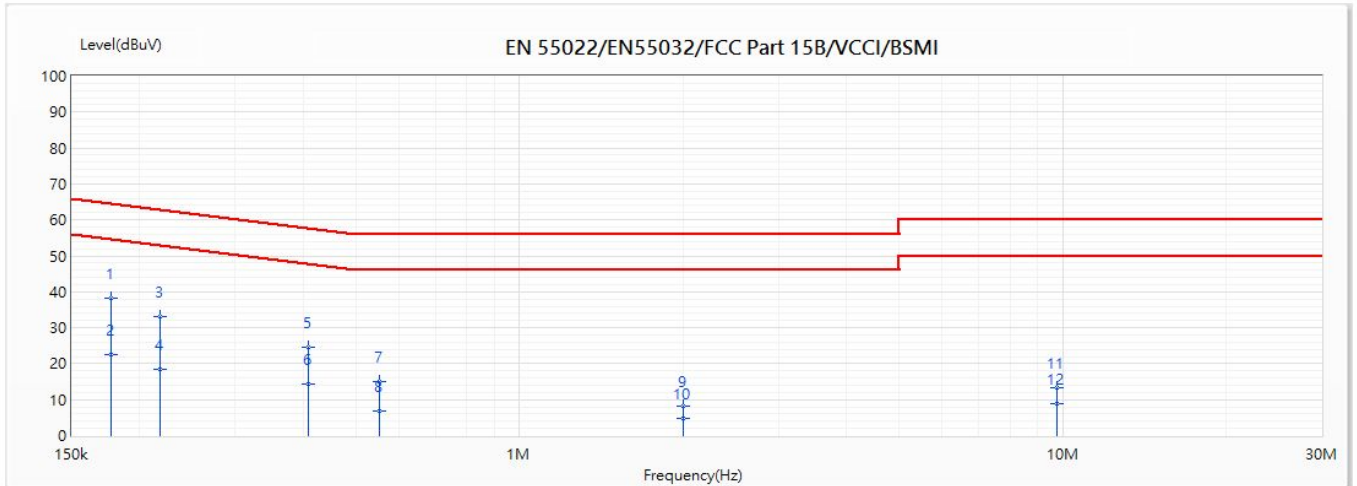


No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.166	38.10	65.55	-27.45	28.44	9.66	QP
2	0.166	21.69	55.55	-33.86	12.03	9.66	AV
3	0.258	29.43	62.93	-33.50	19.75	9.68	QP
4	0.258	15.00	52.93	-37.92	5.32	9.68	AV
5	0.399	28.34	58.90	-30.56	18.63	9.71	QP
*6	0.399	23.47	48.90	-25.43	13.76	9.71	AV
7	0.49	19.03	56.28	-37.25	9.30	9.73	QP
8	0.49	10.57	46.28	-35.71	0.84	9.73	AV
9	7.923	21.48	60.00	-38.52	11.45	10.03	QP
10	7.923	15.20	50.00	-34.80	5.18	10.03	AV
11	23.067	27.86	60.00	-32.14	17.56	10.29	QP
12	23.067	22.37	50.00	-27.63	12.08	10.29	AV

Remark:

1. "\*" means this data is the worst emission level.
2. Emission Level = Reading Level + Correct Factor (Correct Factor = LISN Insertion Loss + Cable Loss).
3. Margin = Emission Level - Limit.

Model No	VE2A02	Site	SR2-H
Test Voltage	AC 120V/60Hz	Test Date	2020/5/13
Test Mode	Mode 1: Transmit	Engineer	Scott
Phase	L2	Temperature (°C)	24
Test Condition	908.42MHz	Humidity (%RH)	59



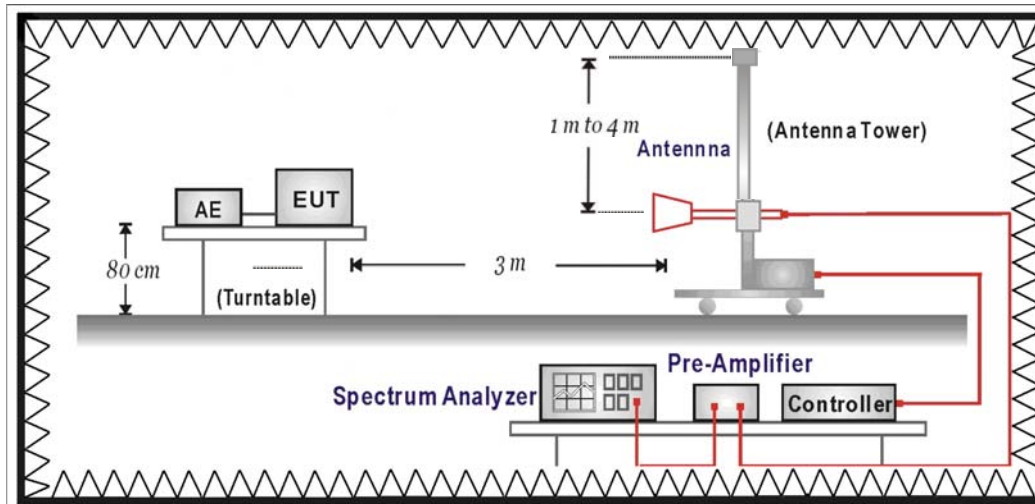
No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
*1	0.177	38.35	65.22	-26.87	28.67	9.68	QP
2	0.177	22.47	55.22	-32.75	12.79	9.68	AV
3	0.219	33.03	64.04	-31.01	23.35	9.68	QP
4	0.219	18.28	54.04	-35.76	8.59	9.68	AV
5	0.409	24.53	58.59	-34.06	14.80	9.72	QP
6	0.409	14.35	48.59	-34.24	4.63	9.72	AV
7	0.552	15.06	56.00	-40.94	5.31	9.75	QP
8	0.552	6.70	46.00	-39.30	-3.05	9.75	AV
9	2.007	8.10	56.00	-47.90	-1.75	9.85	QP
10	2.007	4.85	46.00	-41.15	-5.00	9.85	AV
11	9.764	13.35	60.00	-46.65	3.21	10.14	QP
12	9.764	8.74	50.00	-41.26	-1.40	10.14	AV

Remark:

1. "\*" means this data is the worst emission level.
2. Emission Level = Reading Level + Correct Factor (Correct Factor = LISN Insertion Loss + Cable Loss).
3. Margin = Emission Level - Limit.

### 3. Fundamental Power

#### 3.1. Test Setup



#### 3.2. Test procedures

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a quasi-peak detector function and on any frequency or frequencies above 1000 MHz the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. When average radiated emission measurement are included emission measurement below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit. The bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

### 3.3. Limits

Fundamental and Harmonics Emission Limits

<b>FCC Part 15 Subpart C Paragraph 15.249 Limits</b>				
Fundamental Frequency (MHz)	Field Strength of Fundamental		Field Strength of Harmonics	
	mV/m	dBuV/m	uV/m	dBuV/m
902-928	50	94	500	54
2400-2483.5	50	94	500	54
5725-5875	50	94	500	54

Remarks:

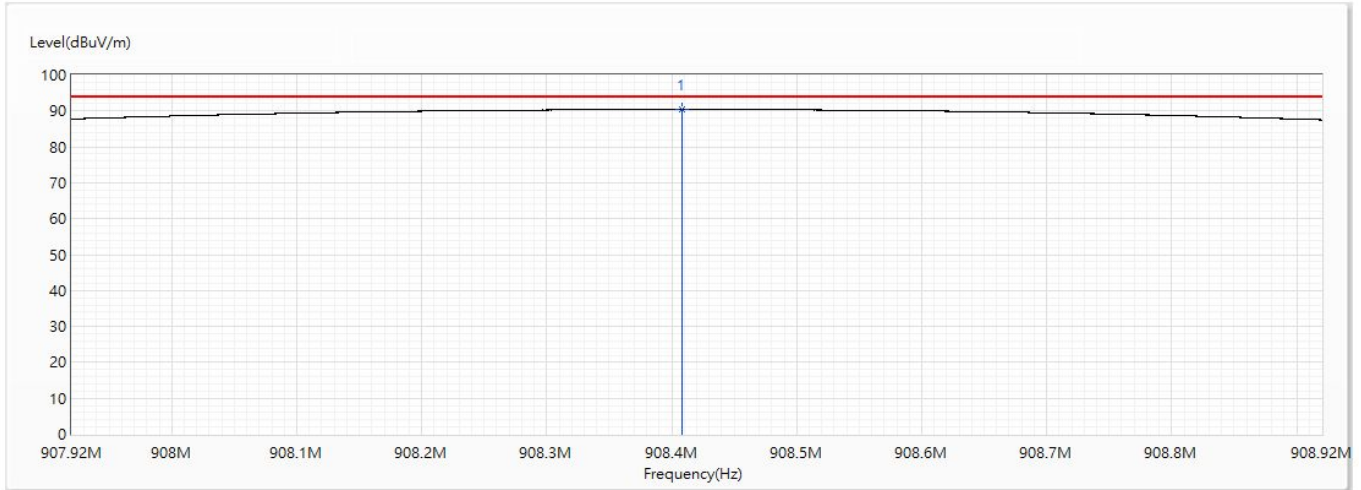
1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
3. The emission limit in this paragraph is based on measurement instrumentation employing an average detector.

### 3.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.249: 2019

### 3.5. Test Result

Model No	VE2A02	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/8/13
Test Mode	Mode 1: Transmit	Engineer	Lion
Polarity	Horizontal	Temperature (°C)	23.0
Test Condition	908.42MHz	Humidity (%RH)	54.0

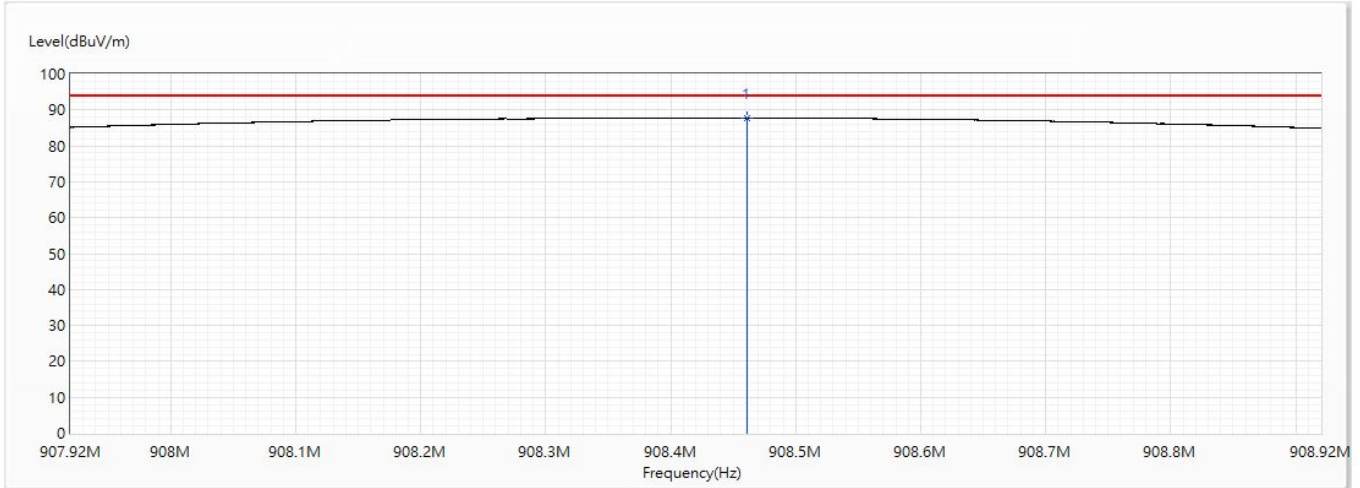


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	908.408	90.38	94.00	-3.62	82.04	8.34	PK

Note:

1. All reading levels is Peak value.
2. “ \* ”, means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor
4. The emission under 30MHz were not included is because their levels are lower than 20dB from limit.

Model No	VE2A02	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/8/13
Test Mode	Mode 1: Transmit	Engineer	Lion
Polarity	Vertical	Temperature (°C)	23.0
Test Condition	908.42MHz	Humidity (%RH)	54.0

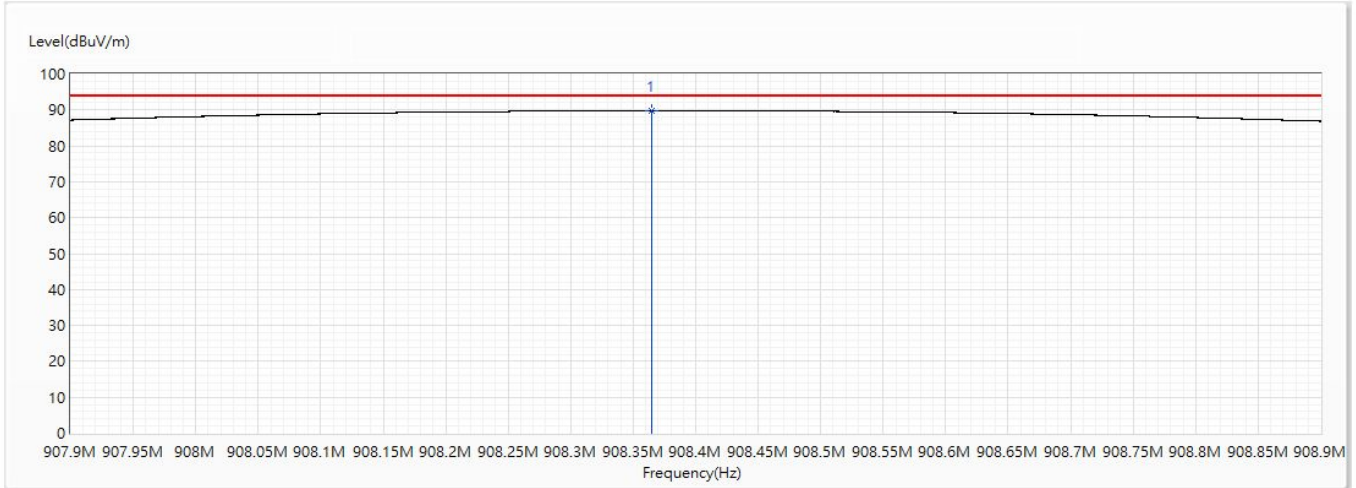


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	908.461	87.76	94.00	-6.24	79.42	8.34	PK

Note:

1. All reading levels is Peak value.
2. “ \* ”, means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor
4. The emission under 30MHz were not included is because their levels are lower than 20dB from limit.

Model No	VE2A02	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/8/8
Test Mode	Mode 1: Transmit	Engineer	Lion
Polarity	Horizontal	Temperature (°C)	23.0
Test Condition	908.4MHz	Humidity (%RH)	54.0

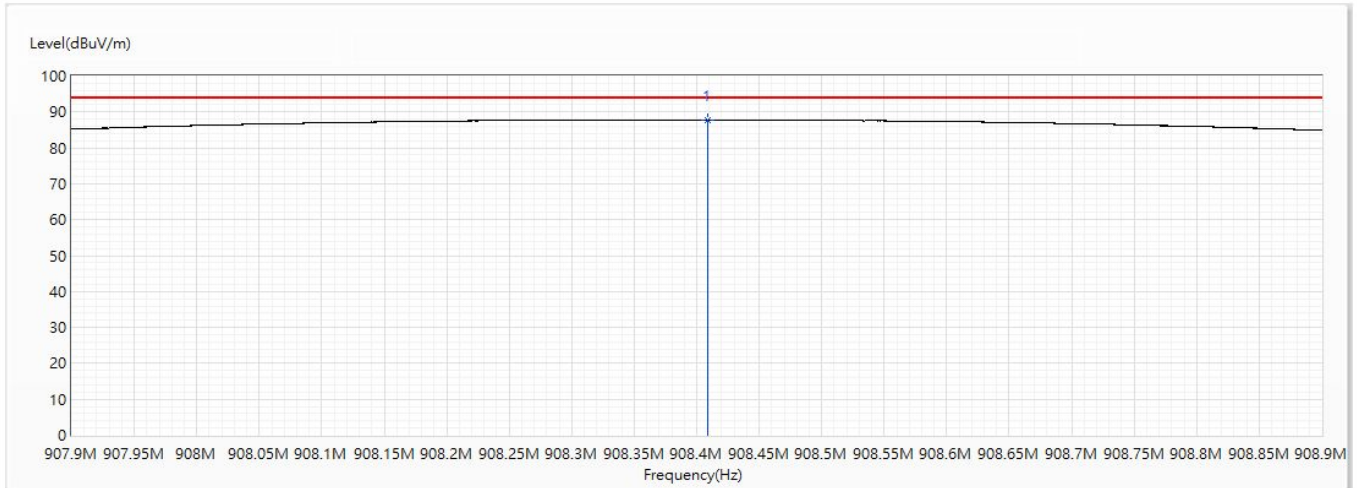


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	908.365	89.77	94.00	-4.23	81.42	8.35	PK

Note:

1. All reading levels is Peak value.
2. “ \* ”, means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor
4. The emission under 30MHz were not included is because their levels are lower than 20dB from limit.

Model No	VE2A02	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/8/8
Test Mode	Mode 1: Transmit	Engineer	Lion
Polarity	Vertical	Temperature (°C)	23.0
Test Condition	908.4MHz	Humidity (%RH)	54.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	908.409	87.81	94.00	-6.19	79.47	8.34	PK

Note:

1. All reading levels is Peak value.
2. “ \* ”, means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor
4. The emission under 30MHz were not included is because their levels are lower than 20dB from limit.



Model No	VE2A02	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/8/8
Test Mode	Mode 1: Transmit	Engineer	Lion
Polarity	Horizontal	Temperature (°C)	23.0
Test Condition	916MHz	Humidity (%RH)	54.0

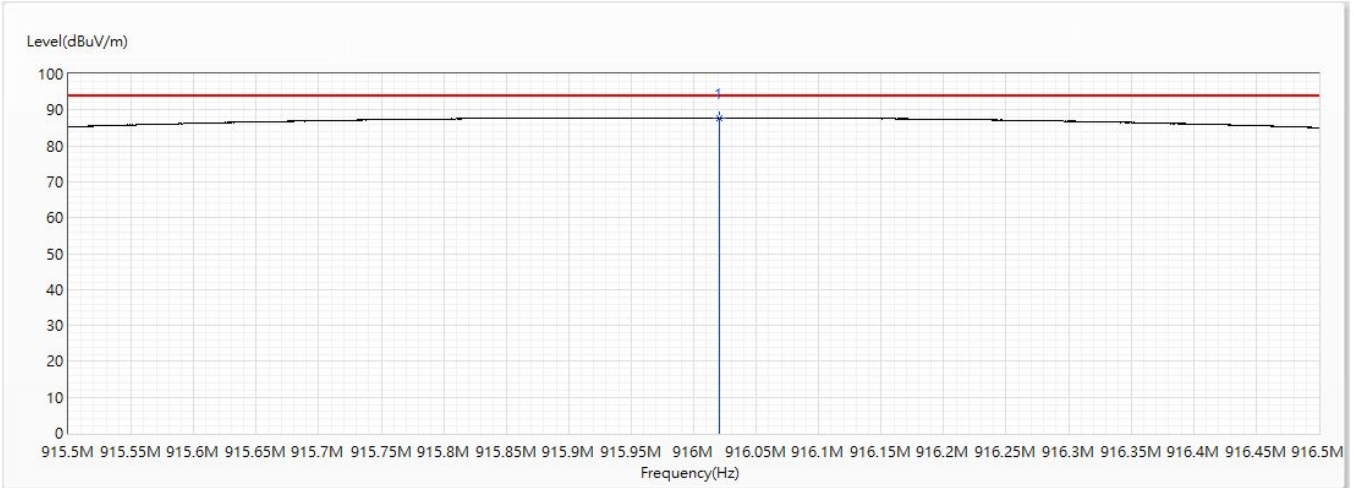


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	916.002	86.83	94.00	-7.17	78.50	8.33	PK

Note:

1. All reading levels is Peak value.
2. “ \* ”, means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor
4. The emission under 30MHz were not included is because their levels are lower than 20dB from limit.

Model No	VE2A02	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/8/8
Test Mode	Mode 1: Transmit	Engineer	Lion
Polarity	Vertical	Temperature (°C)	23.0
Test Condition	916MHz	Humidity (%RH)	54.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	916.021	87.83	94.00	-6.17	79.50	8.33	PK

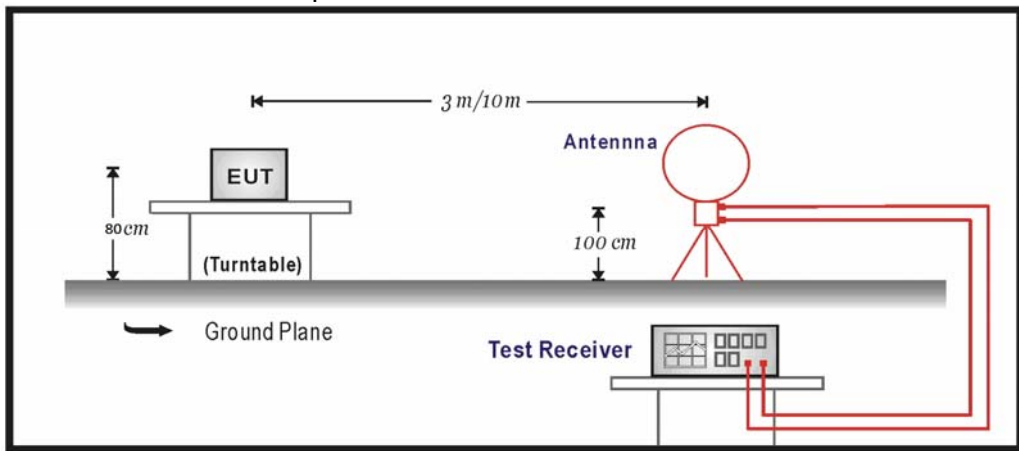
Note:

1. All reading levels is Peak value.
2. “ \* ”, means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor
4. The emission under 30MHz were not included is because their levels are lower than 20dB from limit.

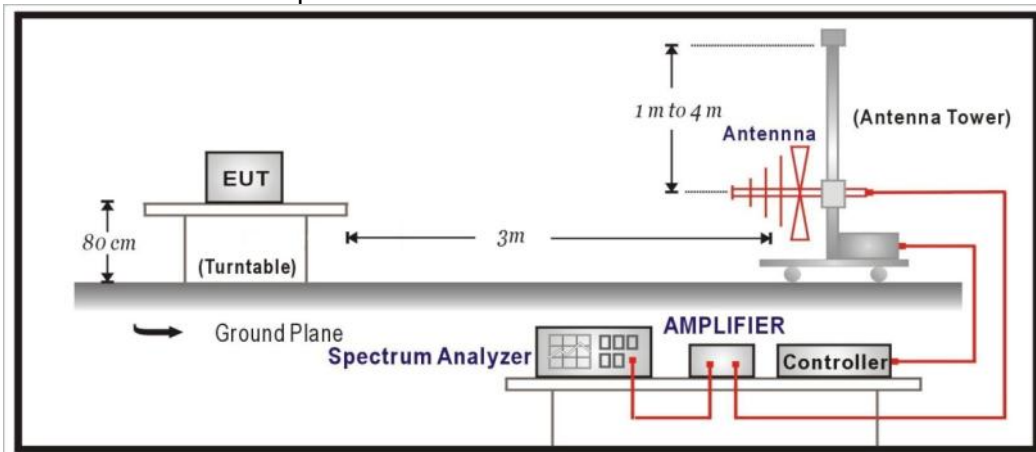
## 4. Radiated Emission

### 4.1. Test Setup

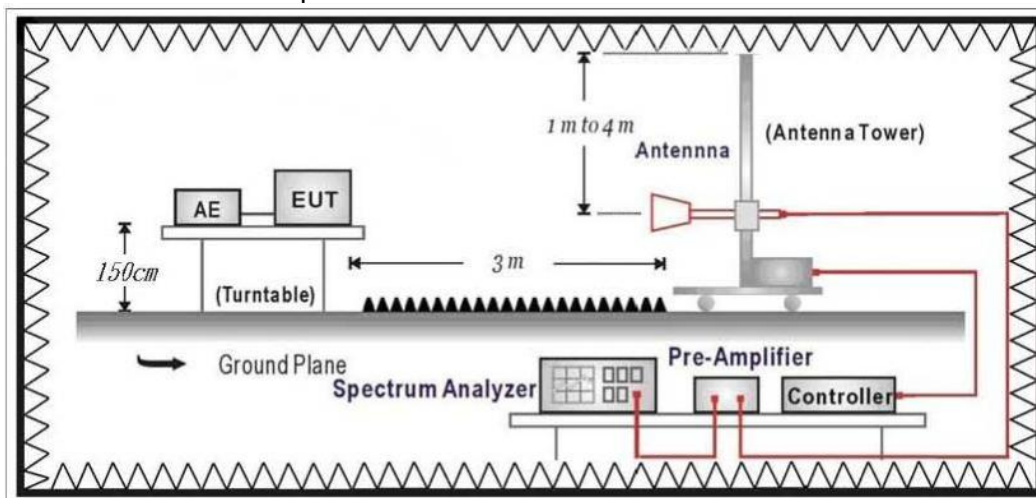
Under 30MHz Test Setup:



Under 1GHz Test Setup:



Above 1GHz Test Setup:



## 4.2. Limits

FCC Part 15 Subpart C Paragraph 15.249 Limits				
Fundamental Frequency (MHz)	Field Strength of Fundamental		Field Strength of Harmonics	
	mV/m	dBuV/m	uV/m	dBuV/m
902-928	50	94	500	54
2400-2483.5	50	94	500	54
5725-5875	50	94	500	54

Remarks:

1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
3. The emission limit in this paragraph is based on measurement instrumentation employing an average detector.

## 4.3. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a quasi-peak detector function and on any frequency or frequencies above 1000 MHz the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. When average radiated emission measurement are included emission measurement below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit. The bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

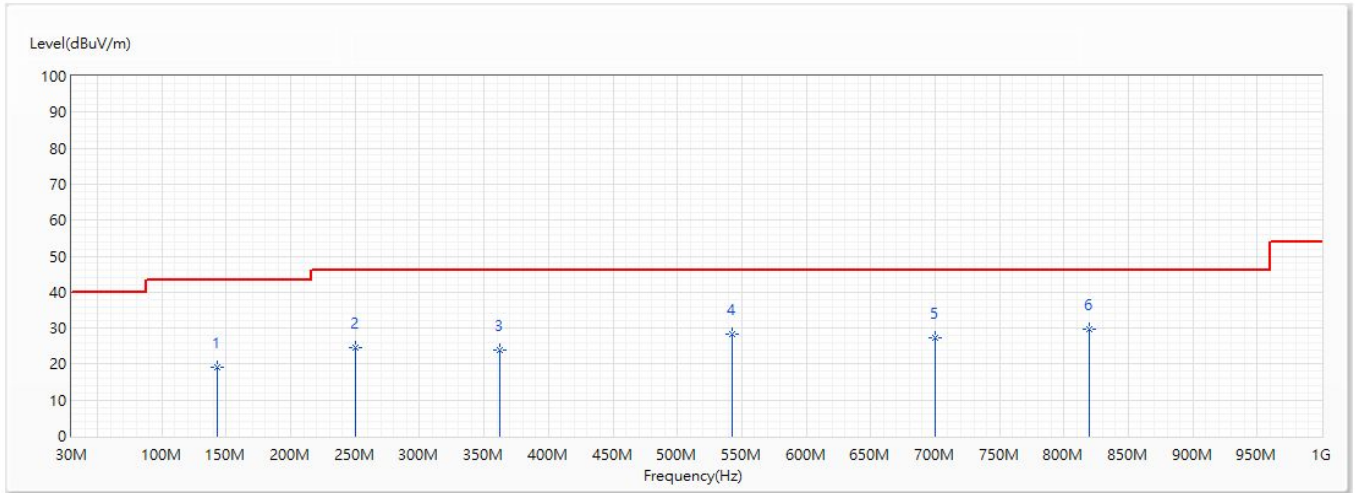
## 4.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.249: 2019

### 4.5. Test Result

#### 30MHz-1GHz Spurious

Model No	VE2A02	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/8/8
Test Mode	Mode 1: Transmit	Engineer	Lion
Polarity	Horizontal	Temperature (°C)	23.0
Test Condition	908.4MHz	Humidity (%RH)	54.0

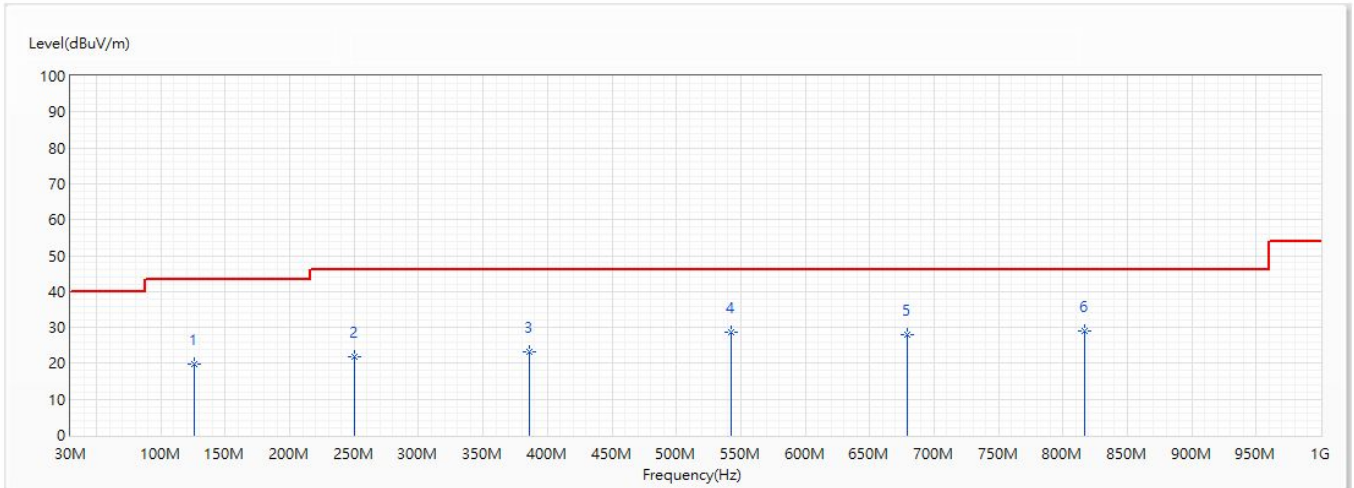


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	143.126	19.08	43.50	-24.42	22.83	-3.75	QP
2	249.948	24.74	46.00	-21.26	27.08	-2.34	QP
3	361.983	24.01	46.00	-21.99	23.47	0.54	QP
4	542.524	28.23	46.00	-17.77	23.91	4.32	QP
5	700.27	27.42	46.00	-18.58	21.26	6.16	QP
* 6	819.459	29.78	46.00	-16.22	22.57	7.21	QP

Note:

1. All reading levels is Quasi-Peak value.
2. “ \* ”, means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor
4. The emission under 30MHz were not included is because their levels are lower than 20dB from limit.

Model No	VE2A02	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/8/8
Test Mode	Mode 1: Transmit	Engineer	Lion
Polarity	Vertical	Temperature (°C)	23.0
Test Condition	908.4MHz	Humidity (%RH)	54.0



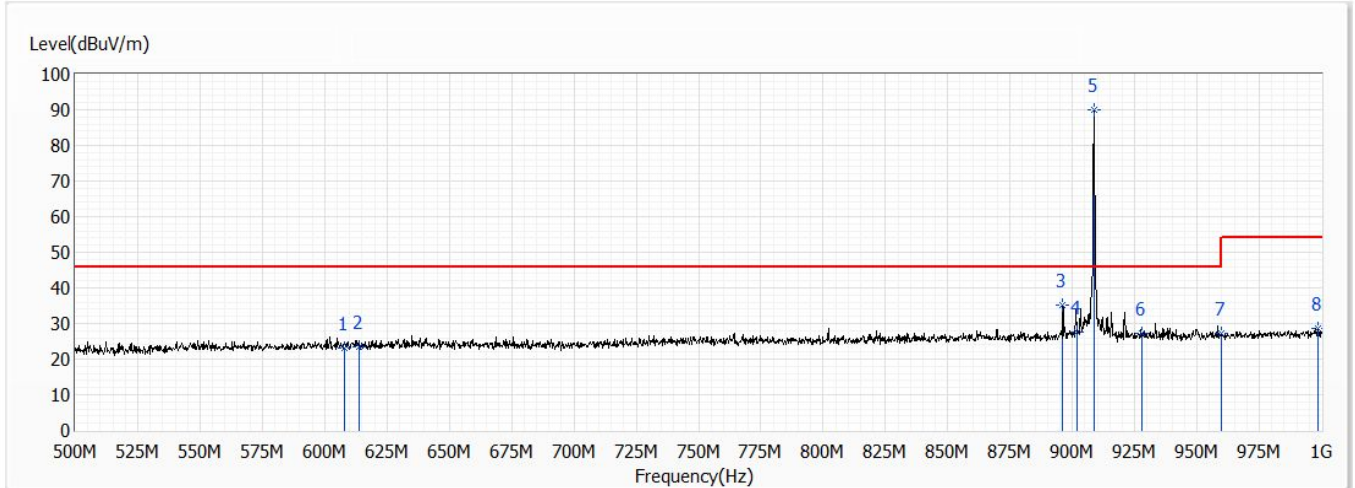
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	125.545	19.65	43.50	-23.85	22.03	-2.38	QP
2	249.948	21.91	46.00	-24.09	24.25	-2.34	QP
3	385.748	23.11	46.00	-22.89	22.14	0.97	QP
4	542.524	28.82	46.00	-17.18	24.50	4.32	QP
5	679.536	28.05	46.00	-17.95	22.34	5.71	QP
* 6	816.67	28.84	46.00	-17.16	21.75	7.09	QP

Note:

1. All reading levels is Quasi-Peak value.
2. “ \* ”, means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor
4. The emission under 30MHz were not included is because their levels are lower than 20dB from limit.

**Band Edge**

Model No	VE2A02	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2021/6/10
Test Mode	Mode 1: Transmit	Engineer	Scott Chang
Polarity	Horizontal	Temperature (°C)	23.0
Test Condition	908.42MHz	Humidity (%RH)	54.0

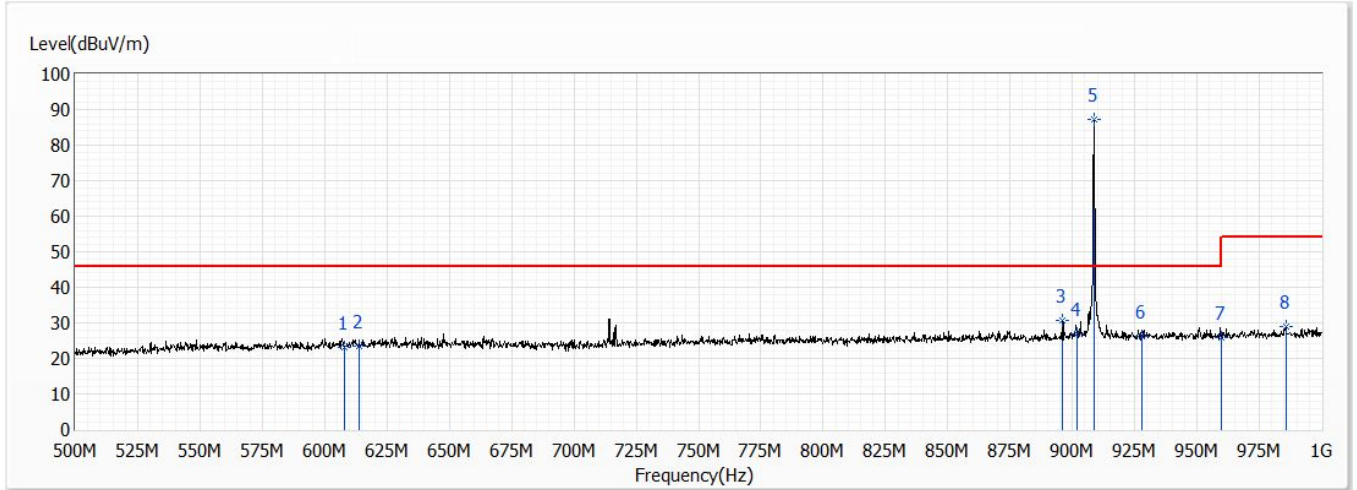


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	608.000	23.24	46.00	-22.76	19.29	3.95	QP
2	614.000	23.37	46.00	-22.63	19.33	4.04	QP
* 3	896.000	35.16	46.00	-10.84	28.70	6.46	QP
4	902.000	27.56	46.00	-18.44	21.02	6.54	QP
! 5	908.500	90.16	46.00	44.16	83.54	6.62	QP
6	928.000	27.30	46.00	-18.70	20.49	6.81	QP
7	960.000	27.16	46.00	-18.84	20.01	7.15	QP
8	998.500	28.64	54.00	-25.36	20.97	7.67	QP

Note:

1. All reading levels is Quasi-Peak value.
2. “ \* ”, means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor
4. The emission under 30MHz were not included is because their levels are lower than 20dB from limit.

Model No	VE2A02	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2021/6/10
Test Mode	Mode 1: Transmit	Engineer	Scott Chang
Polarity	Vertical	Temperature (°C)	23.0
Test Condition	908.42MHz	Humidity (%RH)	54.0



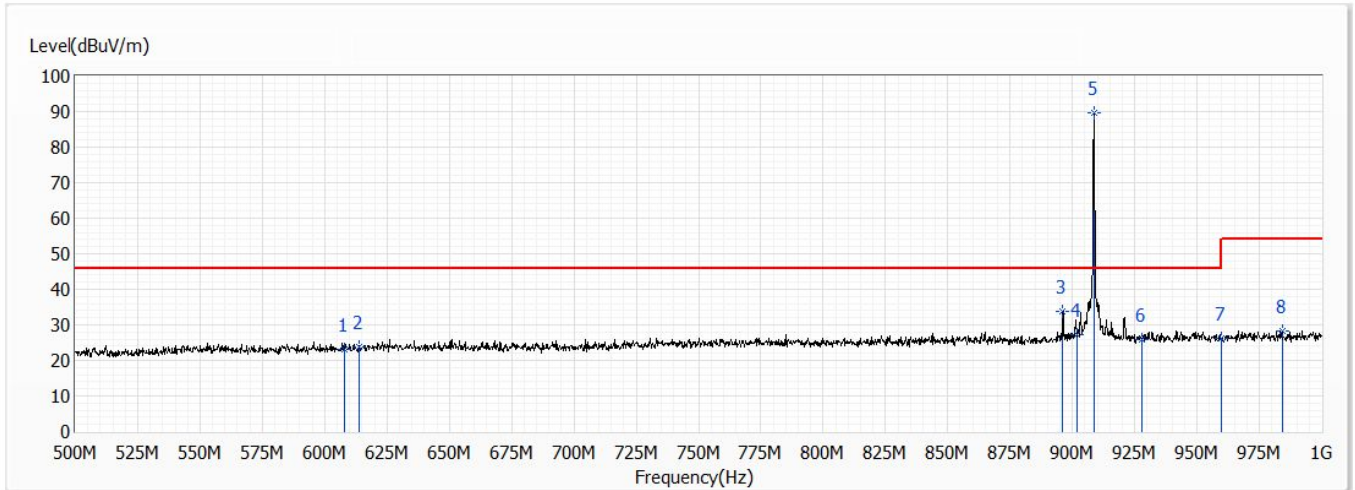
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	608.000	22.98	46.00	-23.02	19.03	3.95	QP
2	614.000	23.43	46.00	-22.57	19.39	4.04	QP
* 3	896.000	30.62	46.00	-15.38	24.16	6.46	QP
4	902.000	26.81	46.00	-19.19	20.27	6.54	QP
! 5	908.500	87.25	46.00	41.25	80.63	6.62	QP
6	928.000	26.13	46.00	-19.87	19.32	6.81	QP
7	960.000	25.97	46.00	-20.03	18.82	7.15	QP
8	985.750	28.89	54.00	-25.11	21.49	7.40	QP

Note:

1. All reading levels is Quasi-Peak value.
2. “ \* ”, means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor
4. The emission under 30MHz were not included is because their levels are lower than 20dB from limit.



Model No	VE2A02	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2021/6/10
Test Mode	Mode 1: Transmit	Engineer	Scott Chang
Polarity	Horizontal	Temperature (°C)	23.0
Test Condition	908.4MHz	Humidity (%RH)	54.0

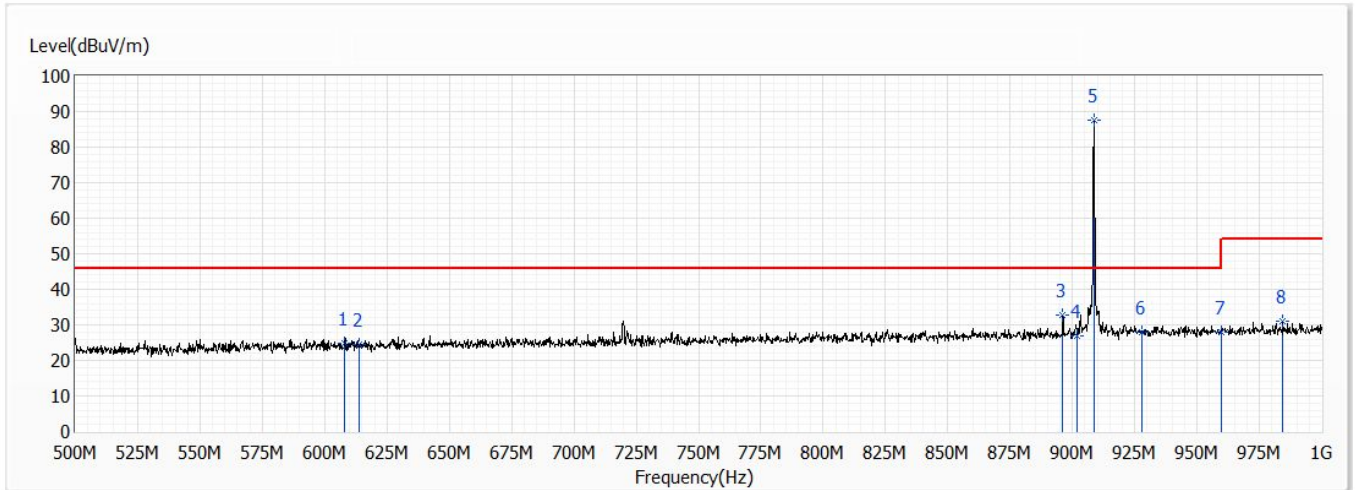


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	608.000	22.97	46.00	-23.03	19.02	3.95	QP
2	614.000	23.71	46.00	-22.29	19.67	4.04	QP
* 3	896.000	33.92	46.00	-12.08	27.46	6.46	QP
4	902.000	27.12	46.00	-18.88	20.58	6.54	QP
! 5	908.500	89.55	46.00	43.55	82.93	6.62	QP
6	928.000	25.95	46.00	-20.05	19.14	6.81	QP
7	960.000	26.27	46.00	-19.73	19.12	7.15	QP
8	984.250	28.32	54.00	-25.68	20.93	7.39	QP

Note:

1. All reading levels is Quasi-Peak value.
2. “ \* ”, means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor
4. The emission under 30MHz were not included is because their levels are lower than 20dB from limit.

Model No	VE2A02	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2021/6/10
Test Mode	Mode 1: Transmit	Engineer	Scott Chang
Polarity	Vertical	Temperature (°C)	23.0
Test Condition	908.4MHz	Humidity (%RH)	54.0

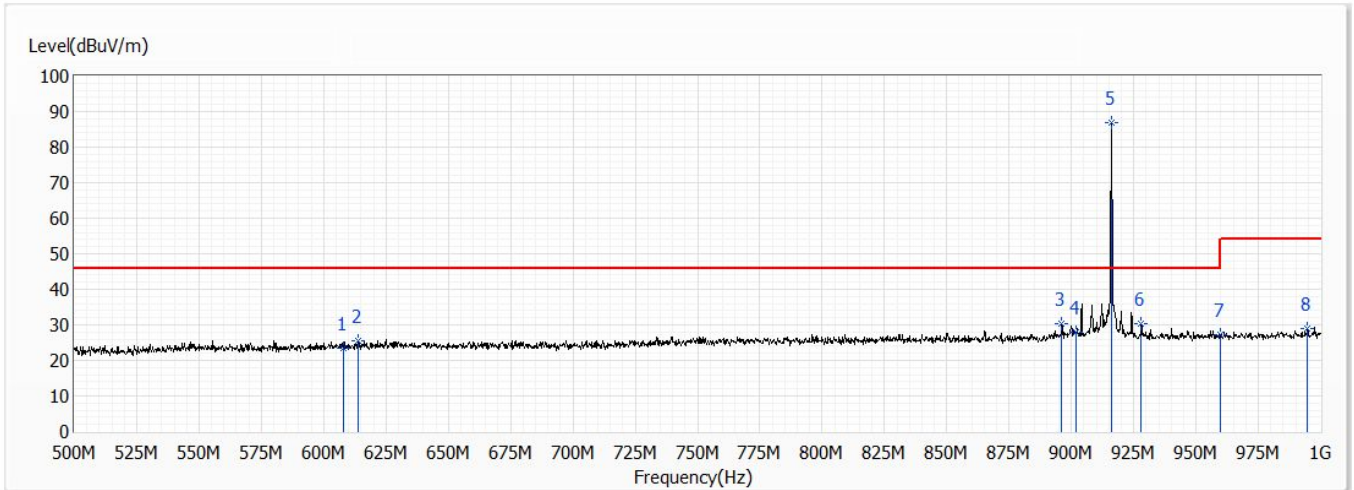


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	608.000	24.72	46.00	-21.28	19.56	5.16	QP
2	614.000	24.57	46.00	-21.43	19.35	5.22	QP
* 3	896.000	32.87	46.00	-13.13	26.41	6.46	QP
4	902.000	26.98	46.00	-19.02	20.44	6.54	QP
! 5	908.500	87.72	46.00	41.72	81.10	6.62	QP
6	928.000	27.80	46.00	-18.20	20.99	6.81	QP
7	960.000	27.83	46.00	-18.17	18.26	9.57	QP
8	984.500	30.94	54.00	-23.06	20.99	9.95	QP

Note:

1. All reading levels is Quasi-Peak value.
2. “ \* ”, means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor
4. The emission under 30MHz were not included is because their levels are lower than 20dB from limit.

Model No	VE2A02	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2021/6/10
Test Mode	Mode 1: Transmit	Engineer	Scott Chang
Polarity	Horizontal	Temperature (°C)	23.0
Test Condition	916MHz	Humidity (%RH)	54.0

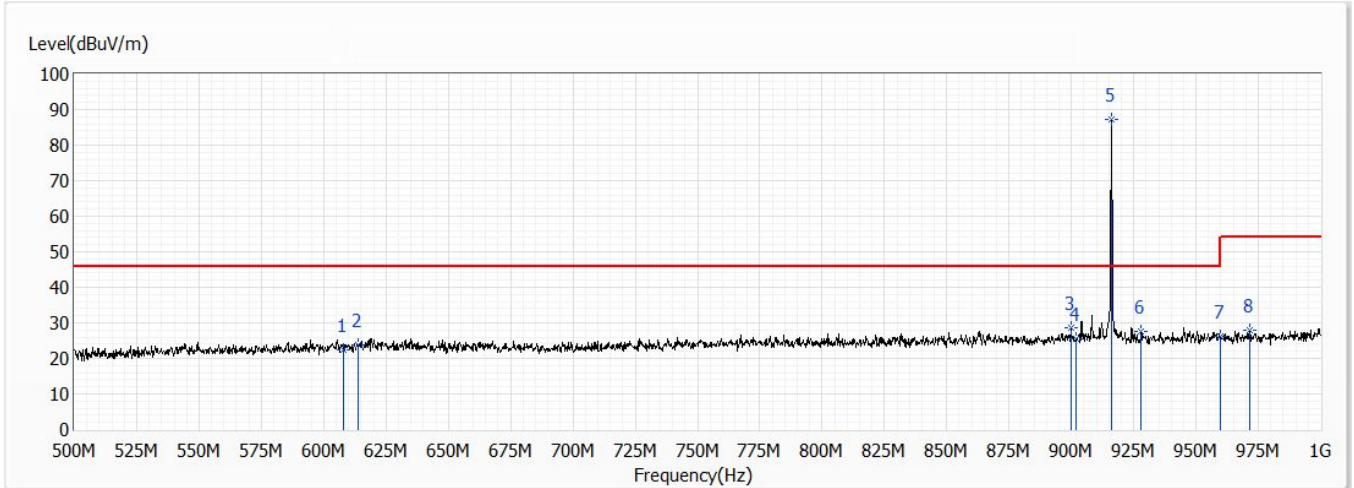


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	608.000	23.33	46.00	-22.67	19.38	3.95	QP
2	614.000	25.50	46.00	-20.50	21.46	4.04	QP
3	896.000	30.28	46.00	-15.72	23.82	6.46	QP
4	902.000	27.95	46.00	-18.05	21.41	6.54	QP
! 5	916.000	86.88	46.00	40.88	80.22	6.66	QP
* 6	928.000	30.32	46.00	-15.68	23.51	6.81	QP
7	960.000	27.31	46.00	-18.69	20.16	7.15	QP
8	994.750	29.11	54.00	-24.89	21.60	7.51	QP

Note:

1. All reading levels is Quasi-Peak value.
2. “ \* ”, means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor
4. The emission under 30MHz were not included is because their levels are lower than 20dB from limit.

Model No	VE2A02	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2021/6/10
Test Mode	Mode 1: Transmit	Engineer	Scott Chang
Polarity	Vertical	Temperature (°C)	23.0
Test Condition	916MHz	Humidity (%RH)	54.0



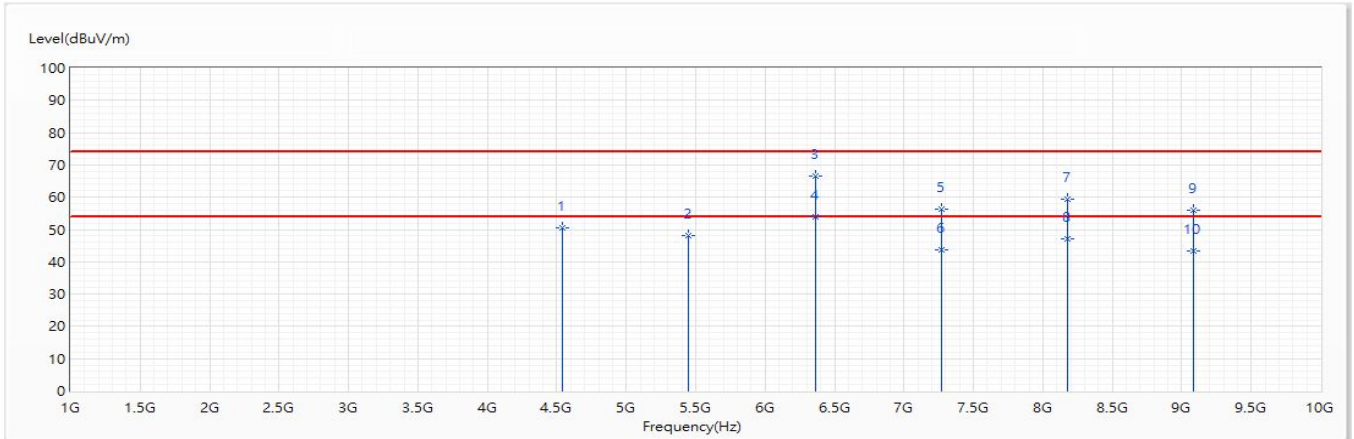
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	608.000	22.42	46.00	-23.58	18.47	3.95	QP
2	614.000	23.90	46.00	-22.10	19.86	4.04	QP
* 3	899.750	28.56	46.00	-17.44	22.08	6.48	QP
4	902.000	25.67	46.00	-20.33	19.13	6.54	QP
! 5	916.000	87.41	46.00	41.41	80.75	6.66	QP
6	928.000	27.74	46.00	-18.26	20.93	6.81	QP
7	960.000	26.35	46.00	-19.65	19.20	7.15	QP
8	971.750	28.09	54.00	-25.91	20.79	7.30	QP

Note:

1. All reading levels is Quasi-Peak value.
2. “ \* ”, means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor
4. The emission under 30MHz were not included is because their levels are lower than 20dB from limit.

**Above 1GHz Spurious**

Model No	VE2A02	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/8/12
Test Mode	Mode 1: Transmit	Engineer	Lion
Polarity	Horizontal	Temperature (°C)	23.0
Test Condition	908.42MHz	Humidity (%RH)	54.0

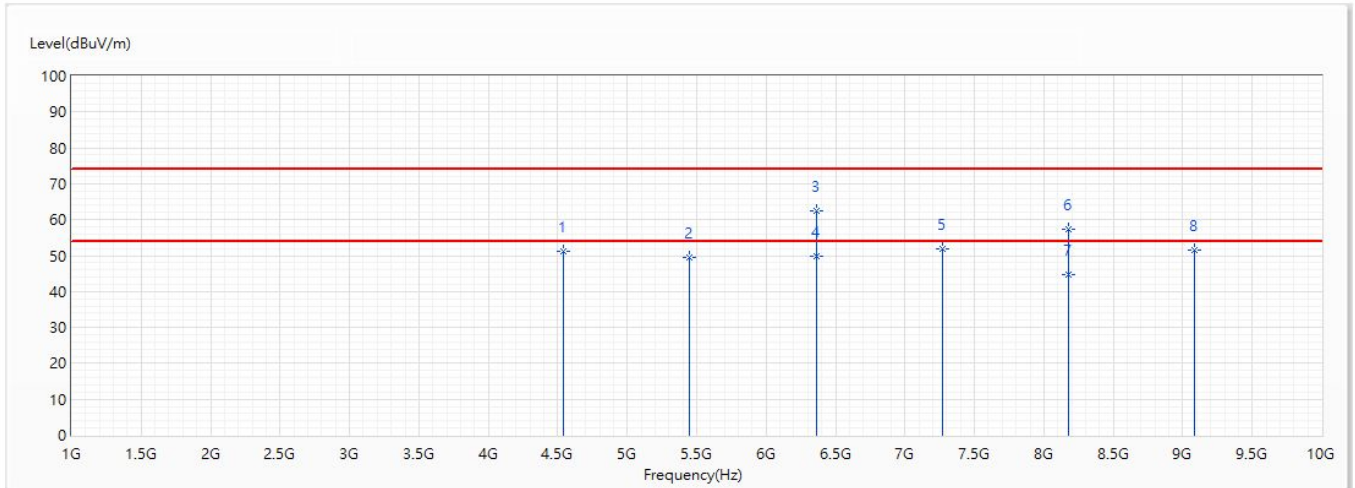


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Duty Cycle Corr'n (dB)	Detector Type
1	4542.1	50.52	74	-23.48	53.12	-2.6	-	PK
2	5450.52	48.08	74	-25.92	48.39	-0.31	-	PK
3	6358.94	66.4	74	-7.6	63.98	2.42	-	PK
* 4	6358.94	53.84	54	-0.16	-	-	-12.56	AV
5	7267.36	56.4	74	-17.6	50.12	6.28	-	PK
6	7267.36	43.84	54	-10.16	-	-	-12.56	AV
7	8175.78	59.5	74	-14.5	51.12	8.38	-	PK
8	8175.78	46.94	54	-7.06	-	-	-12.56	AV
9	9084.2	55.81	74	-18.19	45.87	9.94	-	PK
10	9084.2	43.25	54	-10.75	-	-	-12.56	AV

Note:

1. All reading above 1GHz is performed with peak and/or average measurements as necessary.
2. " \* ", means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission above 13GHz were not included is because their levels are lower than 20dB form limit.
6. The calculation of average value :  
Average value = Peak value + Duty cycle correction factor (The duty cycle correction factor refer to section "Duty Cycle")

Model No	VE2A02	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/8/12
Test Mode	Mode 1: Transmit	Engineer	Lion
Polarity	Vertical	Temperature (°C)	23.0
Test Condition	908.42MHz	Humidity (%RH)	54.0

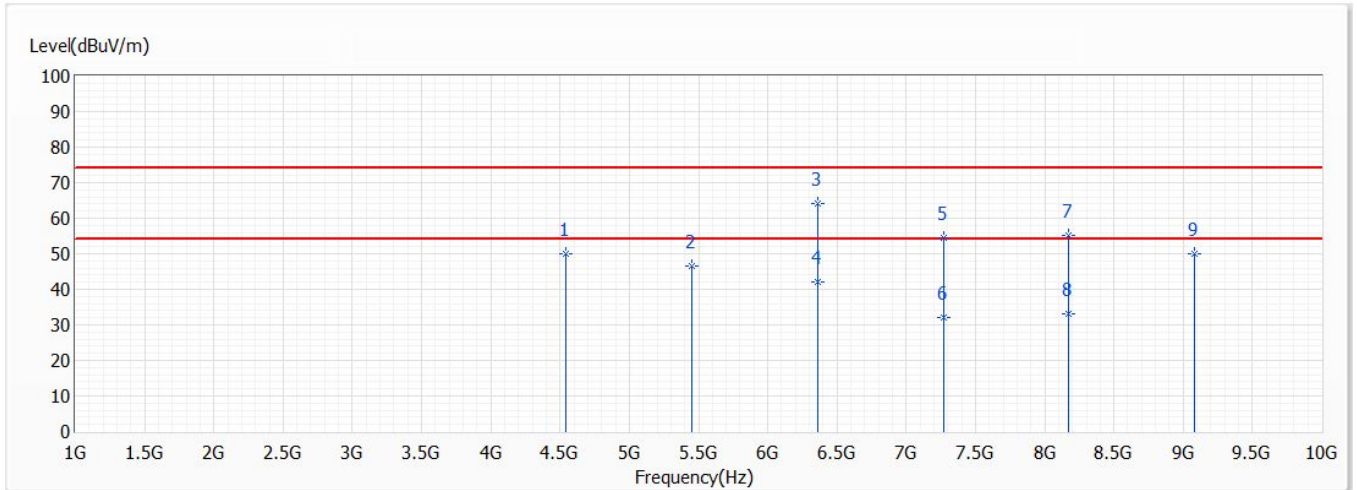


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Duty Cycle Corr'n (dB)	Detector Type
1	4542.1	51.25	74	-22.75	53.85	-2.6	-	PK
2	5450.52	49.64	74	-24.36	49.95	-0.31	-	PK
3	6358.94	62.43	74	-11.57	60.01	2.42	-	PK
* 4	6358.94	49.87	54	-4.13	-	-	-12.56	AV
5	7267.36	51.84	74	-22.16	45.56	6.28	-	PK
6	8175.78	57.37	74	-16.63	48.99	8.38	-	PK
7	8175.78	44.81	54	-9.19	-	-	-12.56	AV
8	9084.2	51.6	74	-22.4	41.66	9.94	-	PK

Note:

1. All reading above 1GHz is performed with peak and/or average measurements as necessary.
2. " \* ", means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission above 13GHz were not included is because their levels are lower than 20dB form limit.
6. The calculation of average value :  
Average value = Peak value + Duty cycle correction factor (The duty cycle correction factor refer to section "Duty Cycle")

Model No	VE2A02	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/8/8
Test Mode	Mode 1: Transmit	Engineer	Lion
Polarity	Horizontal	Temperature (°C)	23.0
Test Condition	908.4MHz	Humidity (%RH)	54.0

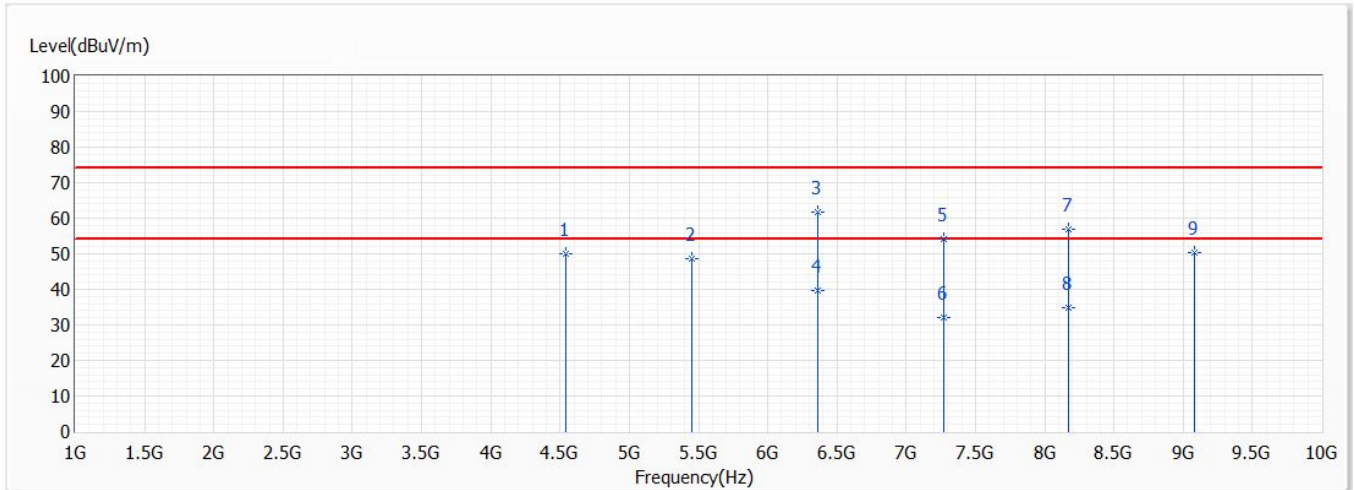


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Duty Cycle Corr'n (dB)	Detector Type
1	4542	50.1	74	-23.9	52.7	-2.6	-	PK
2	5450.4	46.5	74	-27.5	46.81	-0.31	-	PK
* 3	6358.8	64.18	74	-9.82	61.76	2.42	-	PK
4	6358.8	42.02	54	-11.98	-	-	-22.16	AV
5	7267.2	54.35	74	-19.65	48.07	6.28	-	PK
6	7267.2	32.19	54	-21.81	-	-	-22.16	AV
7	8175.6	55.22	74	-18.78	46.84	8.38	-	PK
8	8175.6	33.06	54	-20.94	-	-	-22.16	AV
9	9084	50.12	74	-23.88	40.18	9.94	-	PK

Note:

1. All reading above 1GHz is performed with peak and/or average measurements as necessary.
2. " \* ", means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission above 13GHz were not included is because their levels are lower than 20dB form limit.
6. The calculation of average value :  
Average value = Peak value + Duty cycle correction factor (The duty cycle correction factor refer to section "Duty Cycle")

Model No	VE2A02	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/8/8
Test Mode	Mode 1: Transmit	Engineer	Lion
Polarity	Vertical	Temperature (°C)	23.0
Test Condition	908.4MHz	Humidity (%RH)	54.0



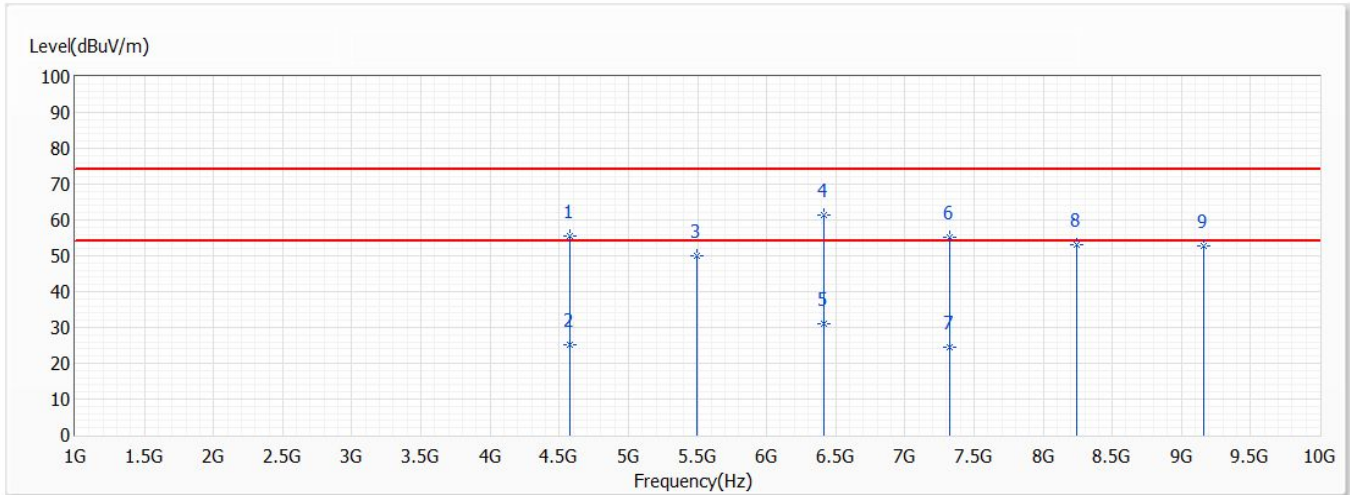
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Duty Cycle Corr'n (dB)	Detector Type
1	4542	50.12	74	-23.88	52.72	-2.6	-	PK
2	5450.4	48.73	74	-25.27	49.04	-0.31	-	PK
* 3	6358.8	61.85	74	-12.15	59.43	2.42	-	PK
4	6358.8	39.69	54	-14.31	-	-	-22.16	AV
5	7267.2	54.16	74	-19.84	47.88	6.28	-	PK
6	7267.2	32	54	-22	-	-	-22.16	AV
7	8175.6	56.9	74	-17.1	48.52	8.38	-	PK
8	8175.6	34.74	54	-19.26	-	-	-22.16	AV
9	9084	50.44	74	-23.56	40.5	9.94	-	PK

Note:

- All reading above 1GHz is performed with peak and/or average measurements as necessary.
- " \* ", means this data is the worst value.
- Emission Level = Reading Level + Correct Factor.
- The average measurement was not performed when the peak measured data under the limit of average detection.
- The emission above 13GHz were not included is because their levels are lower than 20dB form limit.
- The calculation of average value :  
Average value = Peak value + Duty cycle correction factor (The duty cycle correction factor refer to section "Duty Cycle")



Model No	VE2A02	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/8/8
Test Mode	Mode 1: Transmit	Engineer	Lion
Polarity	Horizontal	Temperature (°C)	23.0
Test Condition	916MHz	Humidity (%RH)	54.0

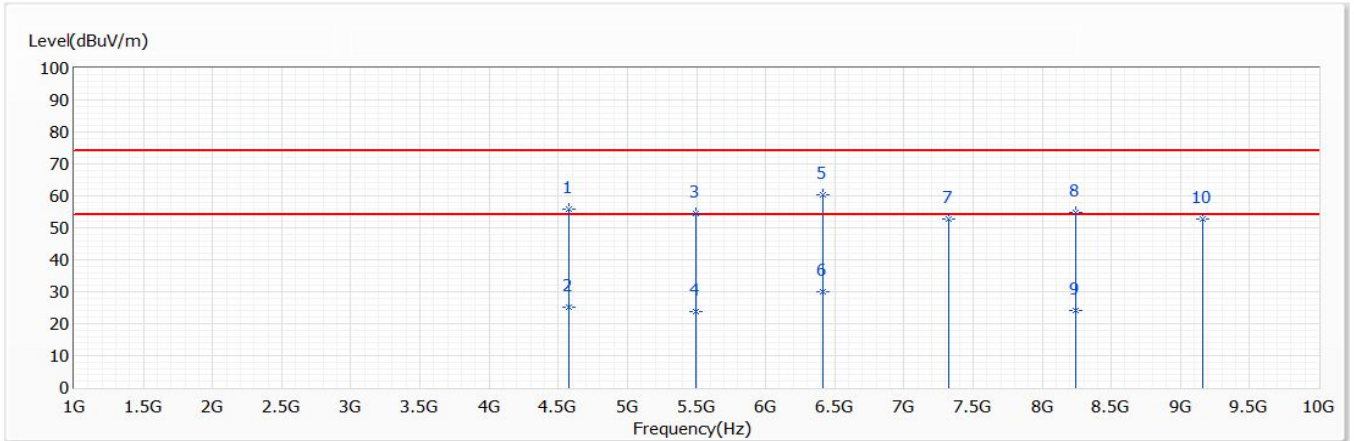


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Duty Cycle Corr'n (dB)	Detector Type
1	4580	55.51	74	-18.49	57.96	-2.45	-	PK
2	4580	25.05	54	-28.95	-	-	-30.46	AV
3	5496	50.15	74	-23.85	50.4	-0.25	-	PK
* 4	6412	61.41	74	-12.59	58.83	2.58	-	PK
5	6412	30.95	54	-23.05	-	-	-30.46	AV
6	7328	55.01	74	-18.99	48.53	6.48	-	PK
7	7328	24.55	54	-29.45	-	-	-30.46	AV
8	8244	53.22	74	-20.78	44.81	8.41	-	PK
9	9160	52.68	74	-21.32	42.52	10.16	-	PK

Note:

- 1.All reading above 1GHz is performed with peak and/or average measurements as necessary.
2. “ \* ”, means this data is the worst value.
- 3.Emission Level = Reading Level + Correct Factor.
- 4.The average measurement was not performed when the peak measured data under the limit of average detection.
- 5.The emission above 13GHz were not included is because their levels are lower than 20dB form limit.
6. The calculation of average value :  
Average value = Peak value + Duty cycle correction factor (The duty cycle correction factor refer to section "Duty Cycle")

Model No	VE2A02	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/8/8
Test Mode	Mode 1: Transmit	Engineer	Lion
Polarity	Vertical	Temperature (°C)	23.0
Test Condition	916MHz	Humidity (%RH)	54.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Duty Cycle Corr'n (dB)	Detector Type
1	4580	55.72	74	-18.28	58.17	-2.45	-	PK
2	4580	25.26	54	-28.74	-	-	-30.46	AV
3	5496	54.4	74	-19.6	54.65	-0.25	-	PK
4	5496	23.94	54	-30.06	-	-	-30.46	AV
* 5	6412	60.29	74	-13.71	57.71	2.58	-	PK
6	6412	29.83	54	-24.17	-	-	-30.46	AV
7	7328	52.75	74	-21.25	46.27	6.48	-	PK
8	8244	54.69	74	-19.31	46.28	8.41	-	PK
9	8244	24.23	54	-29.77	-	-	-30.46	AV
10	9160	52.93	74	-21.07	42.77	10.16	-	PK

Note:

1. All reading above 1GHz is performed with peak and/or average measurements as necessary.
2. " \* ", means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
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