FCC Test Report

Product Name	：	Venation E2 IoT Gateway
Trade Name	：	ARDOMUS
Model No.	：	VE2A01
FCC ID.	：	2AUDBVEHA1

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

Date of Receipt	：	Jan. 13, 2020
Issued Date	：	Apr. 23, 2021
Report No.	：	2010134R-RFUSP24V00
Report Version	：	V1.0

Testing Laboratory
3024

Test Report Certification

Issued Date : Apr. 23, 2021
Report No. : 2010134R-RFUSP24V00

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.	:	2AUDBVEHA1
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 15.247: 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 : Lyla Yang

(Lyla Yang / Engineering Adm. Specialist)

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

TABLE OF CONTENTS

1. General Information

1.1. EUT Description

Product Name	Venation E2 IoT Gateway	
Product Type	Zigbee	
Trade Name	ARDOMUS	
Model No.	VE2A01	
Frequency Range/ Channel Number	Zigbee	2405~2480MHz / 16 Channels
	IEEE 802.11b/g IEEE 802.11n (20MHz)	2412~2462MHz / 11 Channels
	IEEE 802.11n (40MHz)	2422~2452MHz / 7 Channels
Type of Modulation	Zigbee	OQPSK
	IEEE 802.11b	Direct Sequence Spread Spectrum
	IEEE 802.11g/n	Orthogonal Frequency Division Multiplexing
Data Speed	Zigbee	250kbps
	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
Zigbee	HongBo	290-10539	PCB Antenna	3.14 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	Channel	Frequency
11	2405MHz	12	2410MHz	13	2415MHz	14	2420MHz
15	2425MHz	16	2430MHz	17	2435MHz	18	2440MHz
19	2445MHz	20	2450MHz	21	2455MHz	22	2460MHz
23	2465MHz	24	2470MHz	25	2475MHz	26	2480MHz

Note:

1. This device is a Venation E2 IoT Gateway including 2.4GHz b/g/n and 2.4GHz Zigbee transmitting and receiving functions. This report only shows Zigbee 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 15.247.
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	OQPSK	19	0	Complies
Maximum peak conducted output power	OQPSK	11/19/25/26	0	Complies
Radiated Emission	OQPSK	11/19/26	0	Complies
RF antenna conducted test	OQPSK	11/19/26	0	Complies
Radiated Emission Band Edge	OQPSK	11/19/25/26	0	Complies
DTS Bandwidth	OQPSK	11/19/26	0	Complies
Occupied Bandwidth	OQPSK	11/19/26	0	Complies
Power Density	OQPSK	11/19/26	0	Complies

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

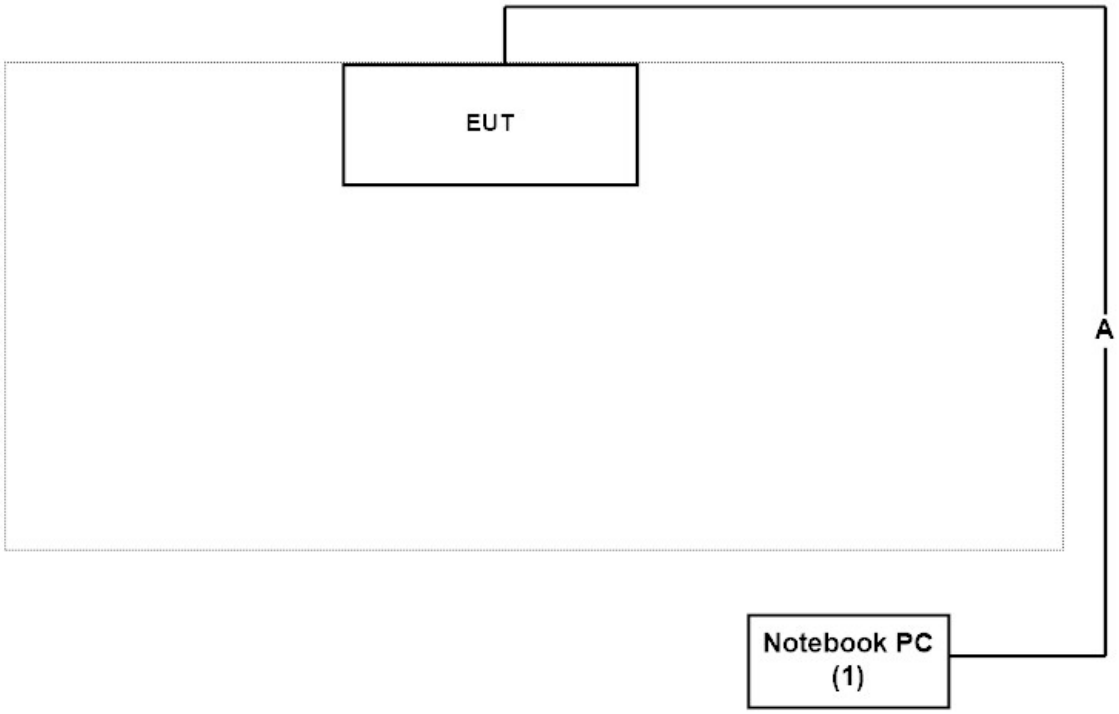
1.3. Tested System Details

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	Lenovo	B590	WB15330077	DoC	Non-Shielded, 1.8m, one ferrite core bonded

1.4. Configuration of tested System

Connection Diagram



Signal Cable Type		Signal cable Description
A	LAN Cable	Non-Shielded, 10m

1.5. EUT Exercise Software

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

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required	Test Site
Temperature (°C)	FCC PART 15 C 15.207	15 - 35	2
Humidity (%RH)	Conducted Emission	25 - 75	
Temperature (°C)	FCC PART 15 C 15.247	15 - 35	1
Humidity (%RH)	Maximum peak conducted output power	25 - 75	
Temperature (°C)	FCC PART 15 C 15.247	15 - 35	1
Humidity (%RH)	Radiated Emission	25 - 75	
Temperature (°C)	FCC PART 15 C 15.247	15 - 35	1
Humidity (%RH)	RF antenna conducted test	25 - 75	
Temperature (°C)	FCC PART 15 C 15.247	15 - 35	1
Humidity (%RH)	Radiated Emission Band Edge	25 - 75	
Temperature (°C)	FCC PART 15 C 15.247	15 - 35	1
Humidity (%RH)	Occupied Bandwidth & DTS Bandwidth	25 - 75	
Temperature (°C)	FCC PART 15 C 15.247	15 - 35	1
Humidity (%RH)	Power Density	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	info.tw@dekra.com
Website	http://www.dekra.com.tw

1.7. 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

Maximum peak conducted 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

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
Band Reject Filter	Micro-Tronics	BRM50702	G192	2020/03/09	2021/03/08
Signal Analyzer	R&S	FSV40	101435	2020/06/24	2021/06/23
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

RF antenna conducted test / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Spectrum Analyzer	Keysight	N9030B	MY57140404	2020/06/03	2021/06/02
Spectrum Analyzer	Keysight	N9010B	MY57110159	2020/04/15	2021/04/14
Spectrum Analyzer	Agilent	N9010A	US47140172	2020/06/18	2021/06/17
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30	2021/03/29

Radiated Emission 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	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
Band Reject Filter	Micro-Tronics	BRM50702	G192	2020/03/09	2021/03/08
Signal Analyzer	R&S	FSV40	101435	2020/06/24	2021/06/23
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

Occupied Bandwidth / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Spectrum Analyzer	Keysight	N9030B	MY57140404	2020/06/03	2021/06/02
Spectrum Analyzer	Keysight	N9010B	MY57110159	2020/04/15	2021/04/14
Spectrum Analyzer	Agilent	N9010A	US47140172	2020/06/18	2021/06/17
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30	2021/03/29

DTS Bandwidth / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Spectrum Analyzer	Keysight	N9030B	MY57140404	2020/06/03	2021/06/02
Spectrum Analyzer	Keysight	N9010B	MY57110159	2020/04/15	2021/04/14
Spectrum Analyzer	Agilent	N9010A	US47140172	2020/06/18	2021/06/17
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30	2021/03/29

Power Density / SR12-H

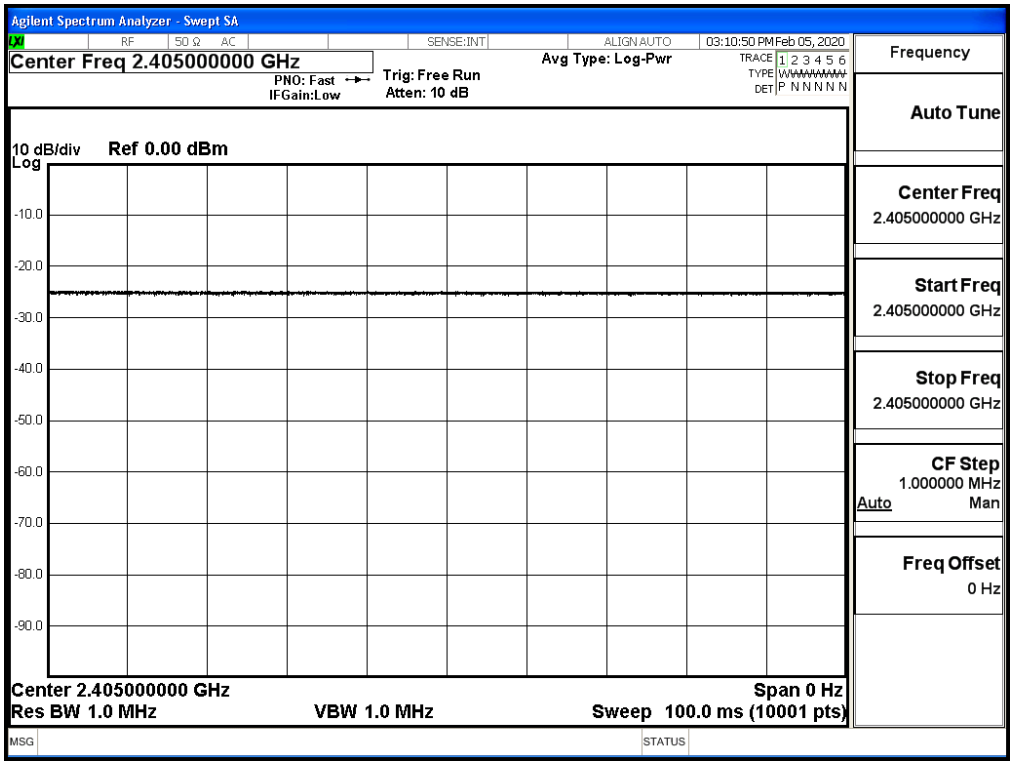
Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Spectrum Analyzer	Keysight	N9030B	MY57140404	2020/06/03	2021/06/02
Spectrum Analyzer	Keysight	N9010B	MY57110159	2020/04/15	2021/04/14
Spectrum Analyzer	Agilent	N9010A	US47140172	2020/06/18	2021/06/17
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30	2021/03/29

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

1.8. Duty Cycle

Zigbee mode						
Mode	On Time (ms)	On+Off Time(ms)	Duty Cycle (%)	Duty Factor(dB) linear voltage	Duty Factor(dB) Power	1/T Minimum VBW (kHz)
IEEE 802.15.1	100.000	100.000	100.00%	0.000000	0.00	0.010

2405 MHz



1.9. Uncertainty

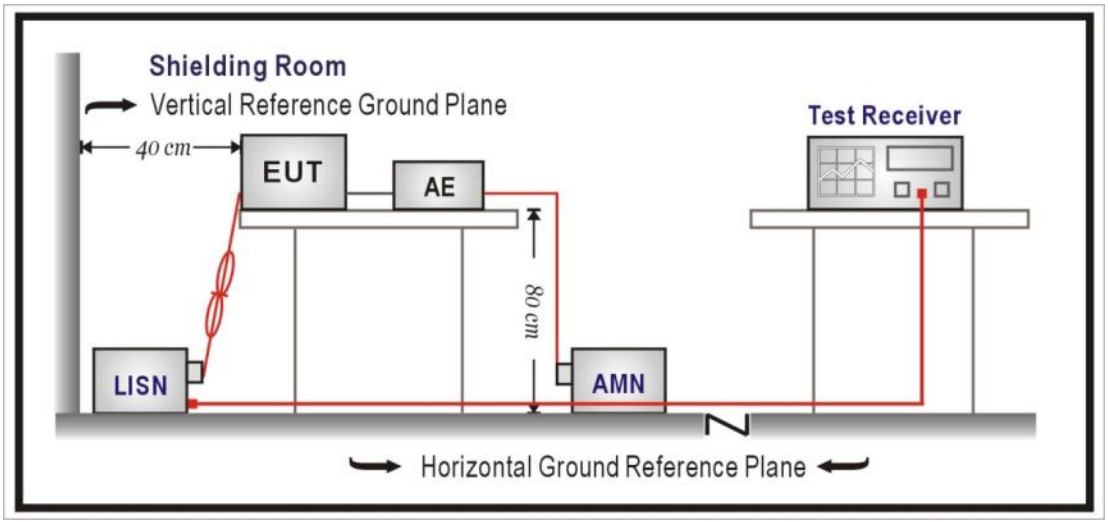
Test item	Uncertainty
Maximum peak conducted output power	± 1.27 dB
Radiated Emission	30MHz～1GHz as ± 3.43 dB 1GHz～26.5GHz as ± 3.65 dB
RF antenna conducted test	± 1.27dB
Radiated Emission Band Edge	± 3.9 dB
DTS Bandwidth	± 50 Hz
Occupied Bandwidth	± 50 Hz
Power Density	± 1.27 dB

2. Aetenna Requirements

According to FCC 47CFR 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

3. Conducted Emission

3.1. Test Setup



3.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 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.

3.3. Test Procedure

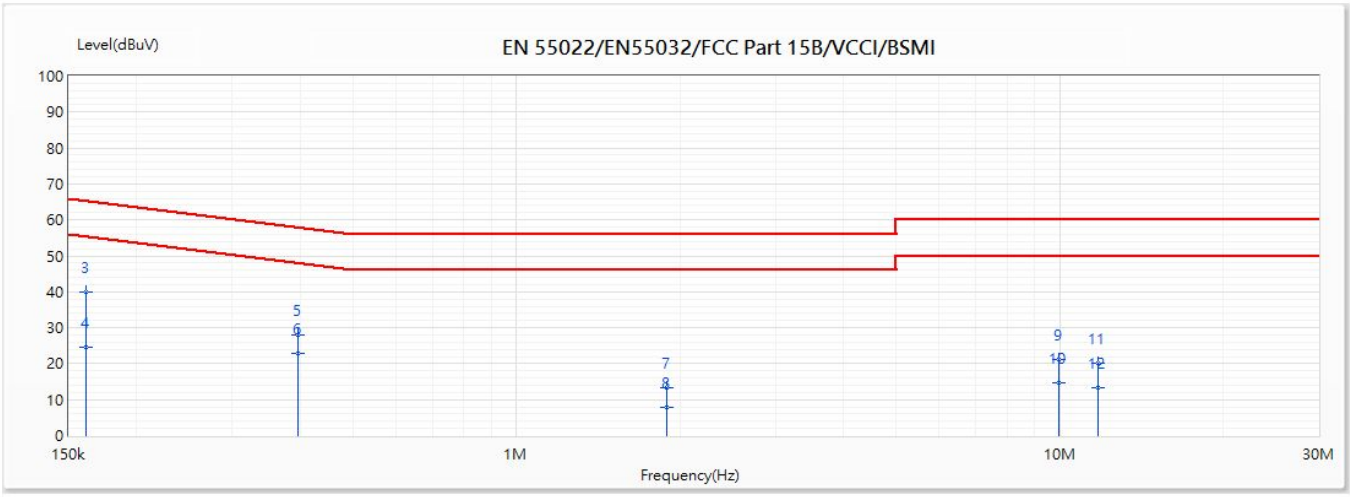
The EUT was setup according to ANSI C63.4: 2014 and tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements.
The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 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.

3.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.207: 2019

3.5. Test Result

Model No	VE2A01	Site	SR2-H
Test Voltage	AC 120V/60Hz	Test Date	2020/5/13
Test Mode	Mode 1: Transmit	Engineer	Scott
Phase	L1	Temperature (℃)	24
Test Condition	Zigbee	Humidity (%RH)	59
Note	2445MHz		



No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.1	15.91	66.00	-50.09	6.25	9.66	QP
2	0.1	7.51	56.00	-48.49	-2.15	9.66	AV
*3	0.161	40.01	65.67	-25.66	30.35	9.66	QP
4	0.161	24.73	55.67	-30.95	15.06	9.66	AV
5	0.397	28.14	58.94	-30.79	18.43	9.71	QP
6	0.397	22.88	48.94	-26.06	13.17	9.71	AV
7	1.895	13.47	56.00	-42.53	3.63	9.84	QP
8	1.895	7.95	46.00	-38.05	-1.89	9.84	AV
9	9.959	21.01	60.00	-38.99	10.91	10.10	QP
10	9.959	14.78	50.00	-35.22	4.68	10.10	AV
11	11.805	20.19	60.00	-39.81	10.06	10.13	QP
12	11.805	13.35	50.00	-36.65	3.22	10.13	AV

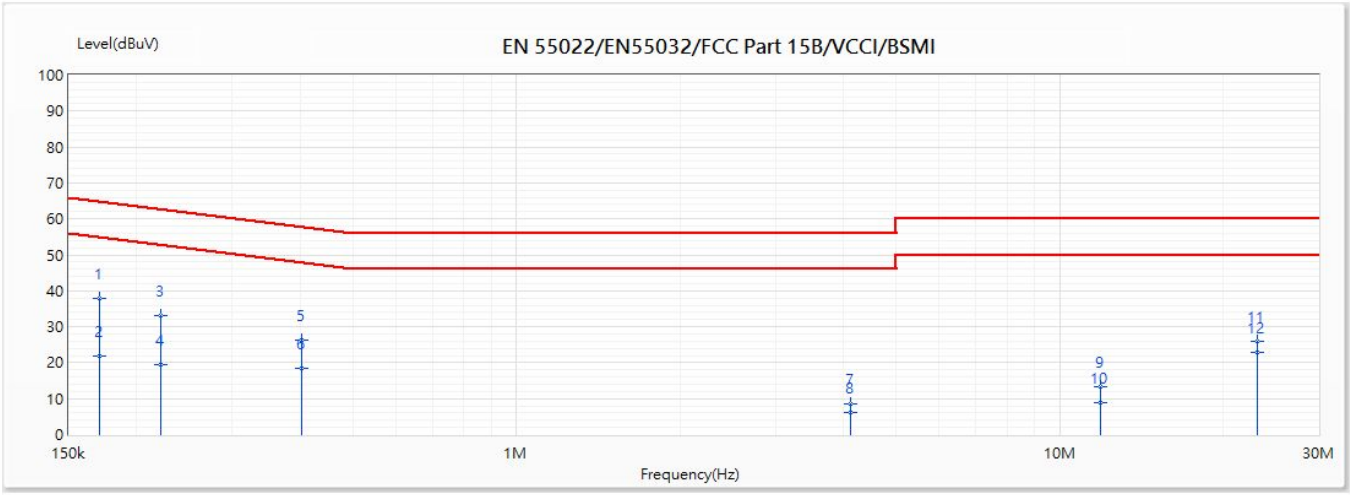
Remark:

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	VE2A01	Site	SR2-H
Test Voltage	AC 120V/60Hz	Test Date	2020/5/13
Test Mode	Mode 1: Transmit	Engineer	Scott
Phase	L2	Temperature (℃)	24
Test Condition	Zigbee	Humidity (%RH)	59
Note	2445MHz		



No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.171	38.00	65.41	-27.41	28.32	9.68	QP
2	0.171	21.75	55.41	-33.65	12.07	9.68	AV
3	0.222	33.10	63.95	-30.85	23.42	9.68	QP
4	0.222	19.59	53.95	-34.35	9.91	9.68	AV
5	0.402	26.12	58.79	-32.66	16.40	9.72	QP
6	0.402	18.40	48.79	-30.39	8.68	9.72	AV
7	4.132	8.66	56.00	-47.34	-1.25	9.91	QP
8	4.132	6.13	46.00	-39.87	-3.78	9.91	AV
9	11.892	13.27	60.00	-46.73	3.06	10.21	QP
10	11.892	8.78	50.00	-41.22	-1.43	10.21	AV
11	23.129	26.08	60.00	-33.92	15.57	10.52	QP
*12	23.129	22.86	50.00	-27.14	12.35	10.52	AV

Remark:

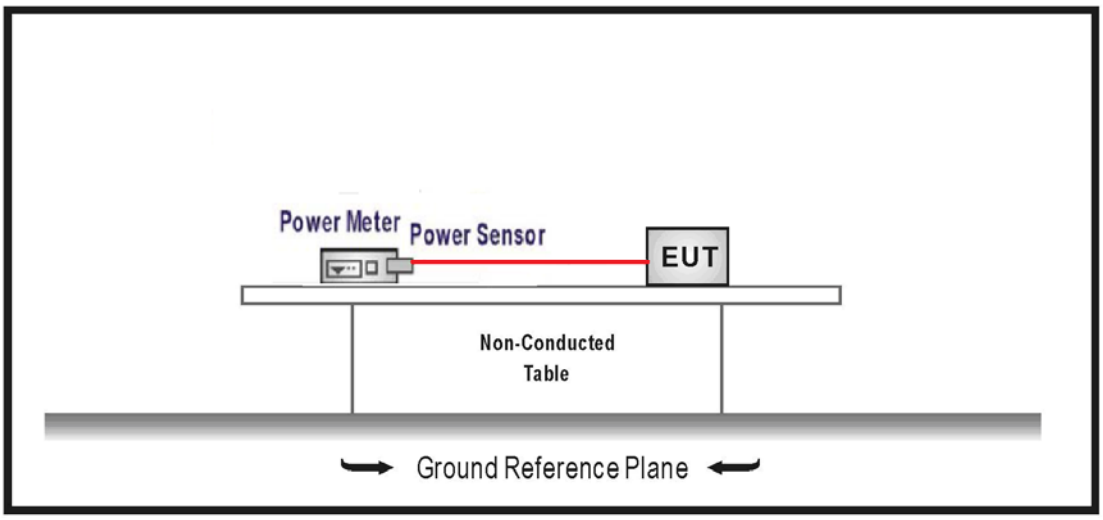
1. "*" means this data is the worst emission level.

2. Emission Level = Reading Level + Correct Factor (Correct Factor = LISN Insertion Loss + Cable Loss).

3. Margin = Emission Level - Limit.

4. Maximum peak conducted output power

4.1. Test Setup



4.2. Test procedures

The EUT was tested according to DTS test procedure of KDB 558074 D01 V05r02 Measurement to FCC 47CFR 15.247 requirements.

4.3. Limits

The maximum peak power shall be less 1 Watt.

4.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247: 2019

4.5. Test Result

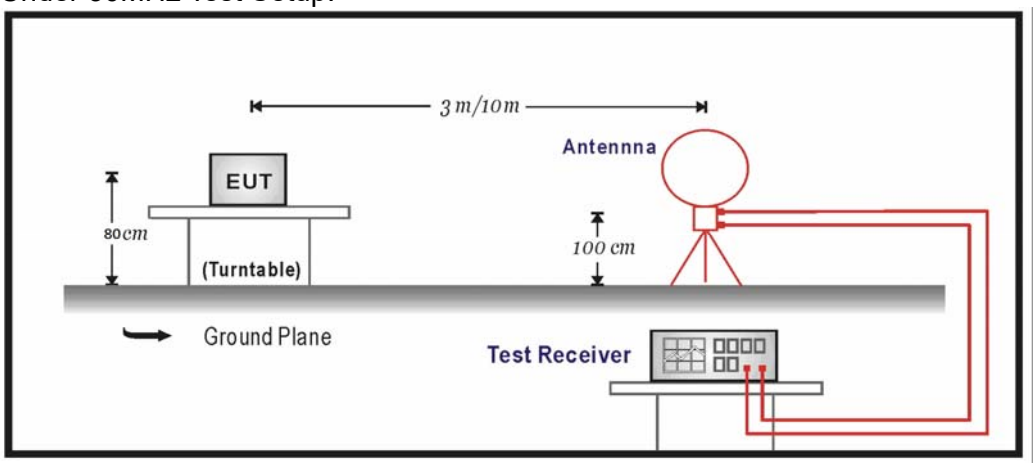
Product	Venation E2 IoT Gateway		
Test Item	Maximum peak conducted output power		
Test Mode	Mode 1: Transmit		
Date of Test	2020/11/12	Test Site	SR12-H
Temperature(°C)	21.0	Humidity (%RH)	62.0

IEEE 802.15.1 _Zigbee				
Channel No.	Frequency (MHz)	Meter Power (Average)	Meter Power (Peak)	Limit (dBm)
11	2405	18.570	18.590	≦30
19	2445	18.330	18.350	≦30
25	2475	18.370	18.400	≦30
26	2480	-0.870	-0.820	≦30

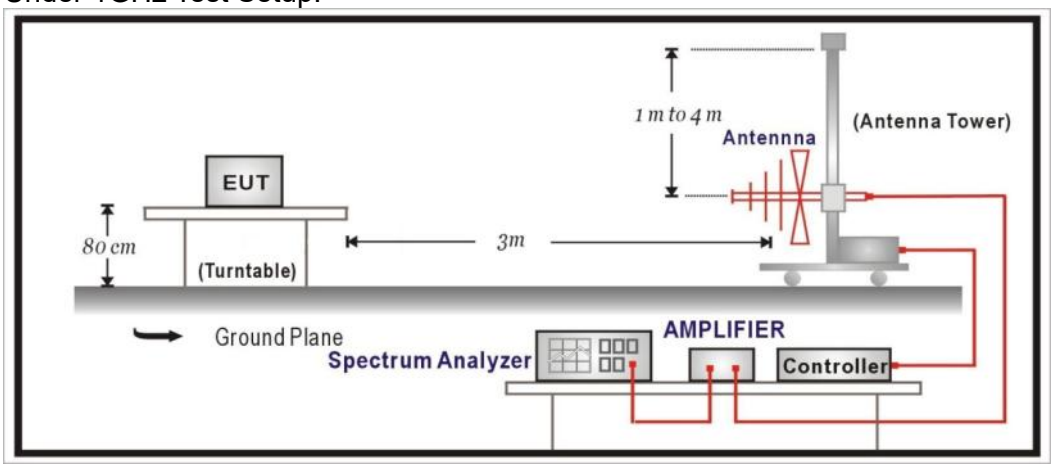
5. Radiated Emission

5.1. Test Setup

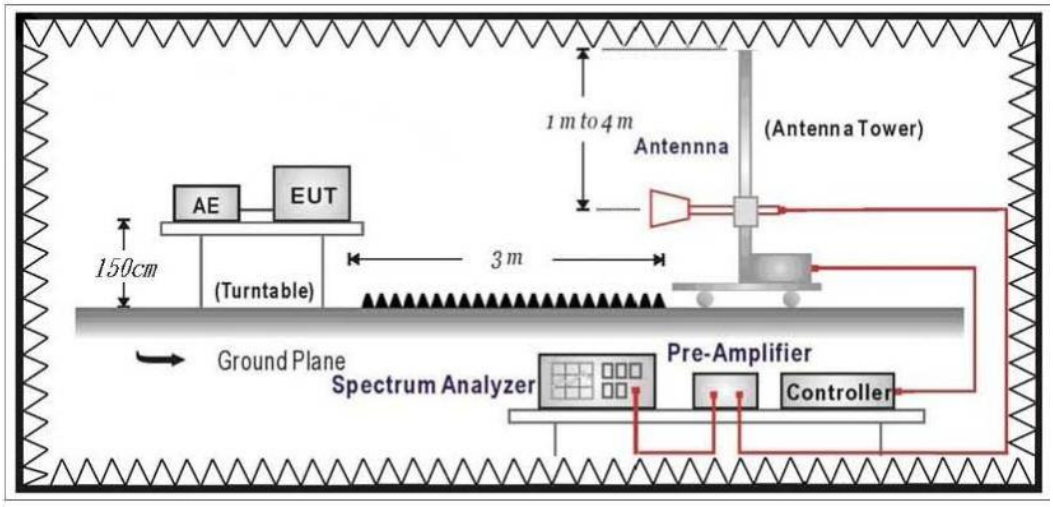
Under 30MHz Test Setup:



Under 1GHz Test Setup:



Above 1GHz Test Setup:



5.2. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency (MHz)	uV/m	dBuV/m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks: E field strength (dBuV/m) = 20 log E field strength (uV/m)

5.3. Test Procedure

The EUT was setup according to ANSI C63.10:2013 and tested according to DTS test procedure of KDB 558074 D01 V05r02 for compliance to FCC 47CFR 15.247 requirements.
The EUT and its simulators are placed on a turn table which is 1.5 meter above ground(under 1GHz) or 1.5 meter above ground (above 1GHz). 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.

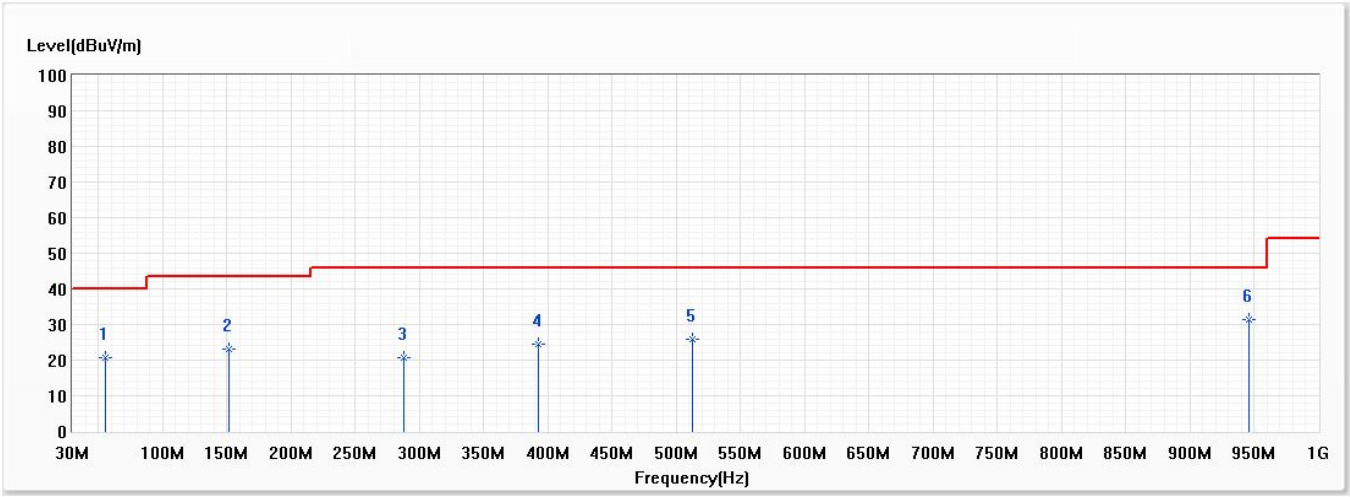
5.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247: 2019

5.5. Test Result

30MHz-1GHz Spurious

Model No	VE2A01	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/11/11
Test Mode	Mode 1: Transmit	Engineer	Lion
Polarity	Horizontal	Temperature (℃)	24.0
Test Condition	Zigbee,Ch19,2.445G,	Humidity (%RH)	56.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	55.826	20.62	40.00	-19.38	28.27	-7.65	QP
2	151.614	23.14	43.50	-20.36	26.97	-3.83	QP
3	287.535	20.82	46.00	-25.18	22.52	-1.70	QP
4	393.023	24.50	46.00	-21.50	23.05	1.45	QP
5	512.454	25.95	46.00	-20.05	22.38	3.57	QP
* 6	945.801	31.50	46.00	-14.50	22.73	8.77	QP

Note:

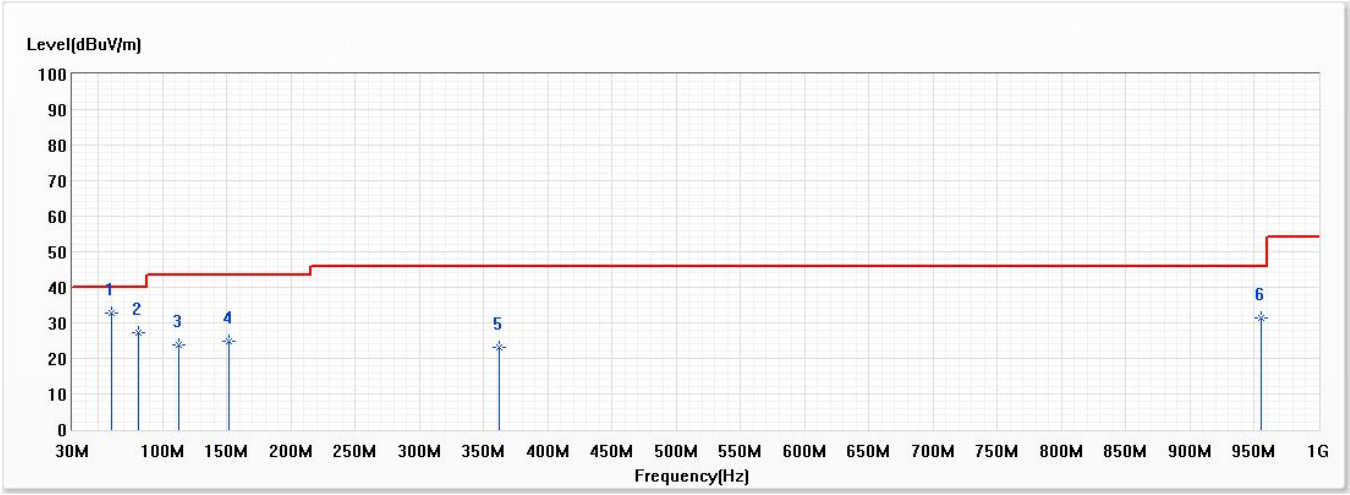
1. All reading levels is Quasi-Peak value.

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	VE2A01	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/11/11
Test Mode	Mode 1: Transmit	Engineer	Lion
Polarity	Vertical	Temperature (℃)	24.0
Test Condition	Zigbee,Ch19,2.445G,	Humidity (%RH)	56.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	60.191	32.72	40.00	-7.28	41.61	-8.89	QP
2	81.168	27.22	40.00	-12.78	35.14	-7.92	QP
3	112.814	23.85	43.50	-19.65	28.16	-4.31	QP
4	151.614	24.93	43.50	-18.57	28.76	-3.83	QP
5	362.468	23.14	46.00	-22.86	22.65	0.49	QP
6	955.259	31.27	46.00	-14.73	22.35	8.92	QP

Note:

1. All reading levels is Quasi-Peak value.

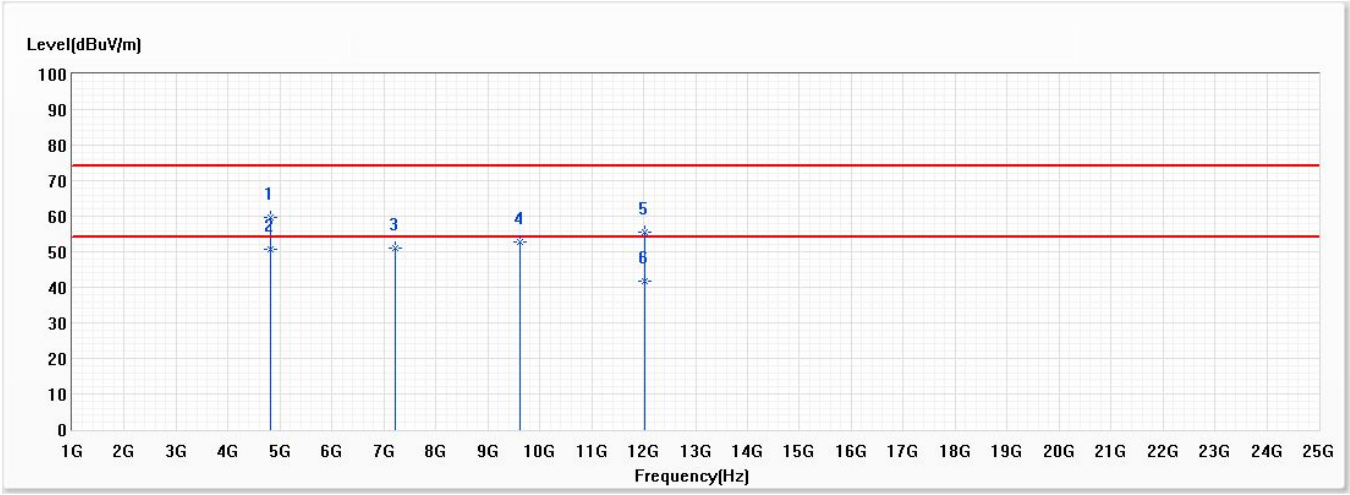
2. “ * ”, means this data is the worst value.

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	VE2A01	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/11/11
Test Mode	Mode 1: Transmit	Engineer	Lion Wang
Polarity	Horizontal	Temperature (℃)	24.0
Test Condition	Zigbee_Ch11,2.405G,	Humidity (%RH)	56.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	4810.000	59.78	74.00	-14.22	61.36	-1.58	PK
* 2	4810.000	50.55	54.00	-3.45	52.13	-1.58	AV
3	7215.000	51.05	74.00	-22.95	44.94	6.11	PK
4	9620.000	52.64	74.00	-21.36	41.30	11.34	PK
5	12025.000	55.67	74.00	-18.33	42.12	13.55	PK
6	12025.000	41.77	54.00	-12.23	28.22	13.55	AV

Note:

1.All reading above 1GHz is performed with peak and/or average measurements as necessary.

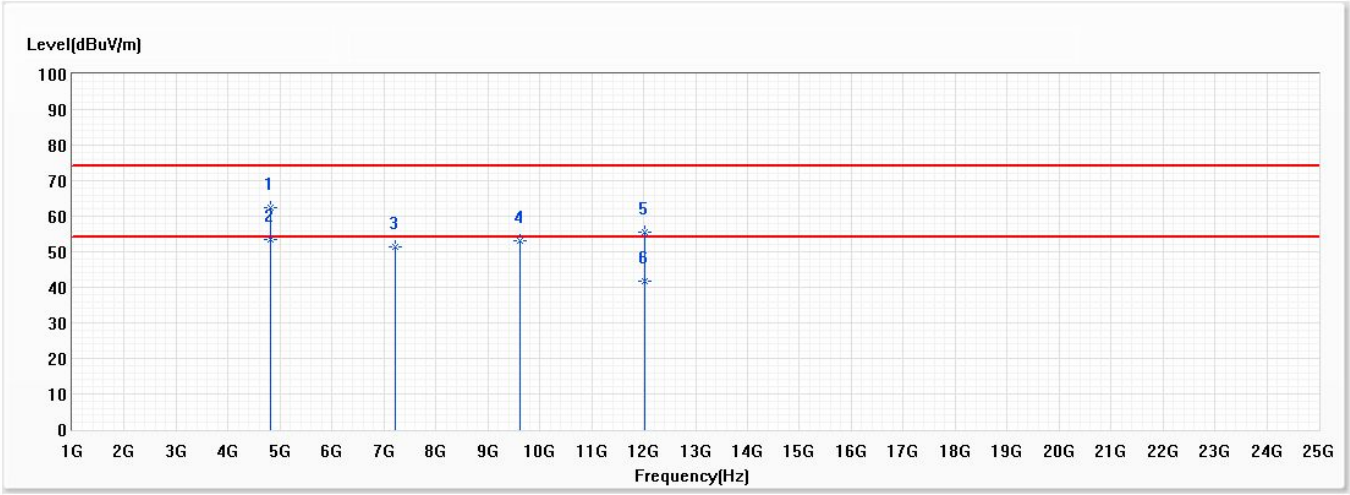
2. “ * ”, means this data is the worst value.

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.

Model No	VE2A01	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/11/11
Test Mode	Mode 1: Transmit	Engineer	Lion Wang
Polarity	Vertical	Temperature (℃)	24.0
Test Condition	Zigbee_Ch11,2.405G,	Humidity (%RH)	56.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	4810.000	62.47	74.00	-11.53	64.05	-1.58	PK
* 2	4810.000	53.39	54.00	-0.61	54.97	-1.58	AV
3	7215.000	51.55	74.00	-22.45	45.44	6.11	PK
4	9620.000	53.03	74.00	-20.97	41.69	11.34	PK
5	12025.000	55.36	74.00	-18.64	41.81	13.55	PK
6	12025.000	41.88	54.00	-12.12	28.33	13.55	AV

Note:

1.All reading above 1GHz is performed with peak and/or average measurements as necessary.

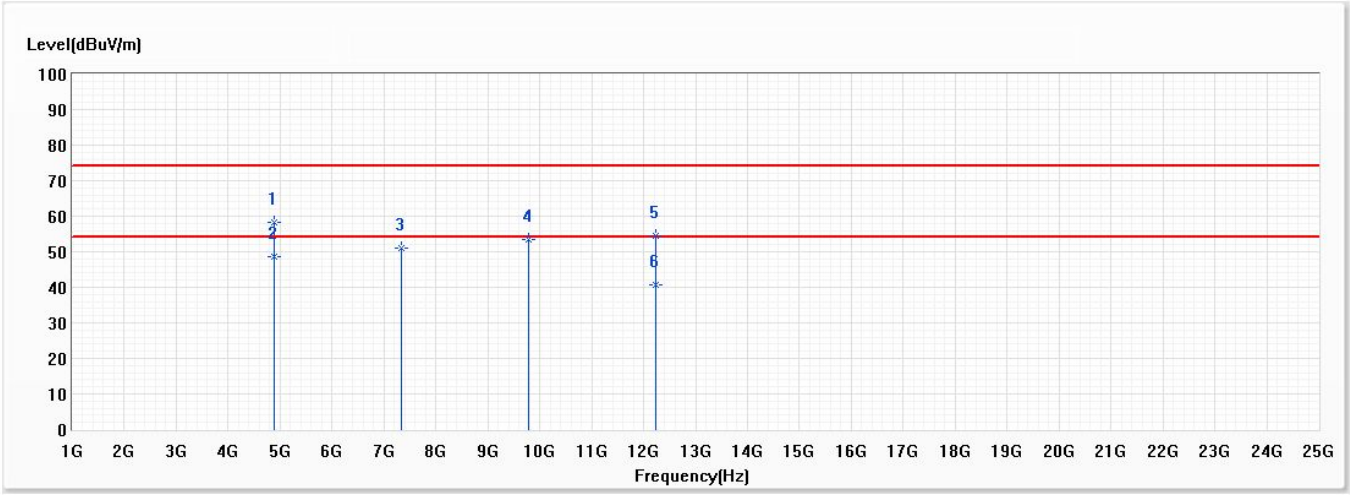
2. “ * ”, means this data is the worst value.

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.

Model No	VE2A01	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/11/11
Test Mode	Mode 1: Transmit	Engineer	Lion Wang
Polarity	Horizontal	Temperature (℃)	24.0
Test Condition	Zigbee_Ch19,2.445G,	Humidity (%RH)	56.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	4890.000	58.29	74.00	-15.71	59.55	-1.26	PK
* 2	4890.000	48.66	54.00	-5.34	49.92	-1.26	AV
3	7335.000	51.01	74.00	-22.99	44.52	6.49	PK
4	9780.000	53.44	74.00	-20.56	41.93	11.51	PK
5	12225.000	54.56	74.00	-19.44	41.35	13.21	PK
6	12225.000	40.71	54.00	-13.29	27.50	13.21	AV

Note:

1.All reading above 1GHz is performed with peak and/or average measurements as necessary.

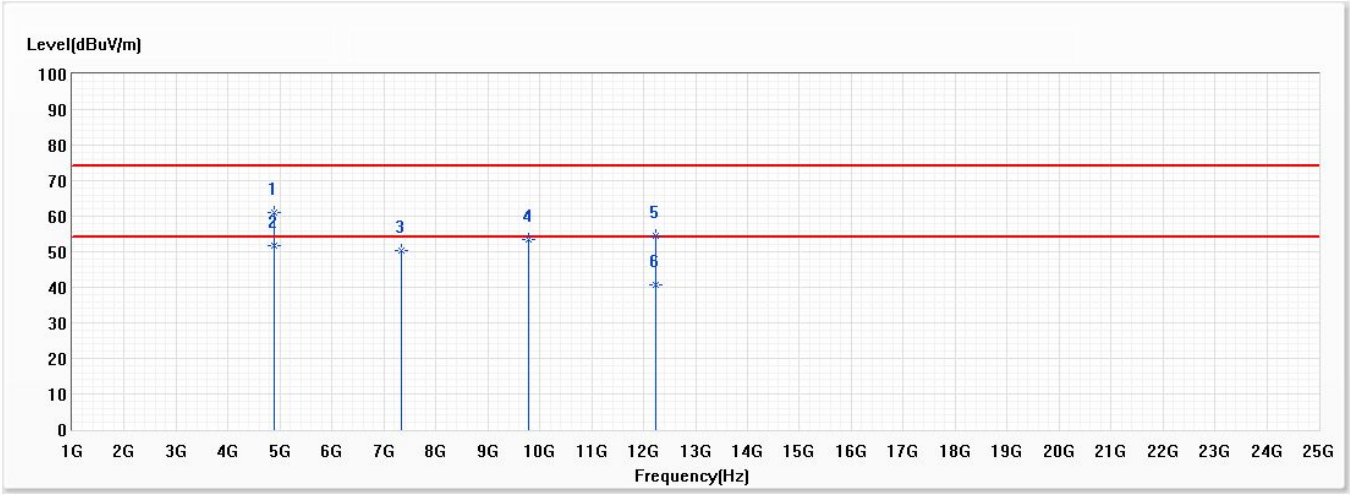
2. “ * ”, means this data is the worst value.

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.

Model No	VE2A01	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/11/11
Test Mode	Mode 1: Transmit	Engineer	Lion Wang
Polarity	Vertical	Temperature (℃)	24.0
Test Condition	Zigbee_Ch19,2.445G,	Humidity (%RH)	56.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	4890.000	60.89	74.00	-13.11	62.15	-1.26	PK
* 2	4890.000	51.74	54.00	-2.26	53.00	-1.26	AV
3	7335.000	50.27	74.00	-23.73	43.78	6.49	PK
4	9780.000	53.53	74.00	-20.47	42.02	11.51	PK
5	12225.000	54.32	74.00	-19.68	41.11	13.21	PK
6	12225.000	40.57	54.00	-13.43	27.36	13.21	AV

Note:

1.All reading above 1GHz is performed with peak and/or average measurements as necessary.

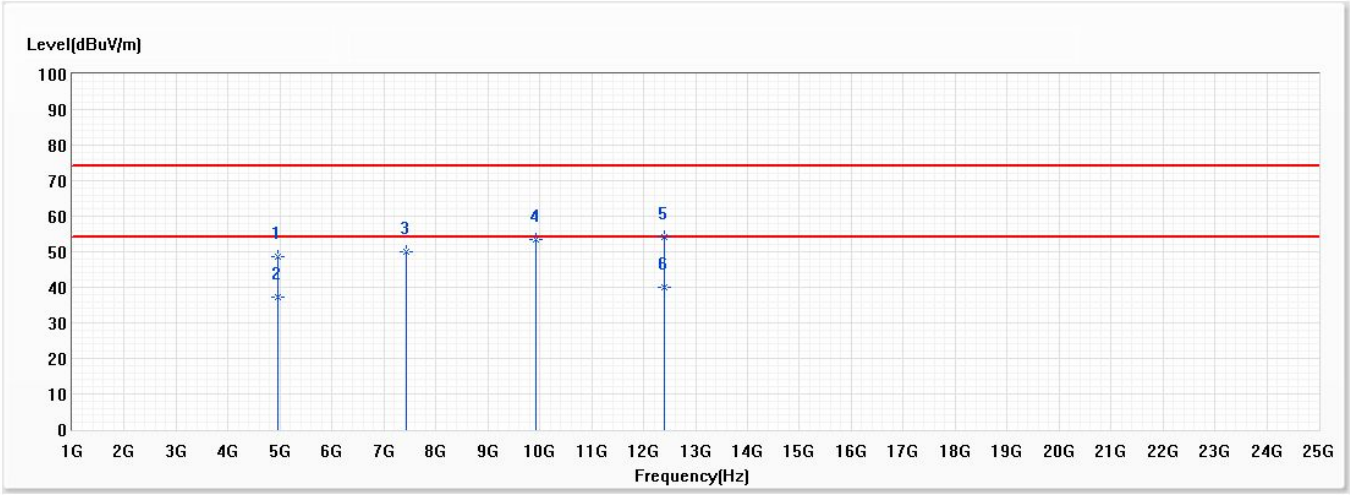
2. “ * ”, means this data is the worst value.

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.

Model No	VE2A01	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/11/11
Test Mode	Mode 1: Transmit	Engineer	Lion Wang
Polarity	Horizontal	Temperature (℃)	24.0
Test Condition	Zigbee_Ch26,2.48G,	Humidity (%RH)	56.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	4960.000	48.58	74.00	-25.42	49.56	-0.98	PK
2	4960.000	37.13	54.00	-16.87	38.11	-0.98	AV
3	7440.000	50.12	74.00	-23.88	43.28	6.84	PK
4	9920.000	53.46	74.00	-20.54	41.86	11.60	PK
5	12400.000	54.01	74.00	-19.99	41.16	12.85	PK
* 6	12400.000	40.17	54.00	-13.83	27.32	12.85	AV

Note:

1.All reading above 1GHz is performed with peak and/or average measurements as necessary.

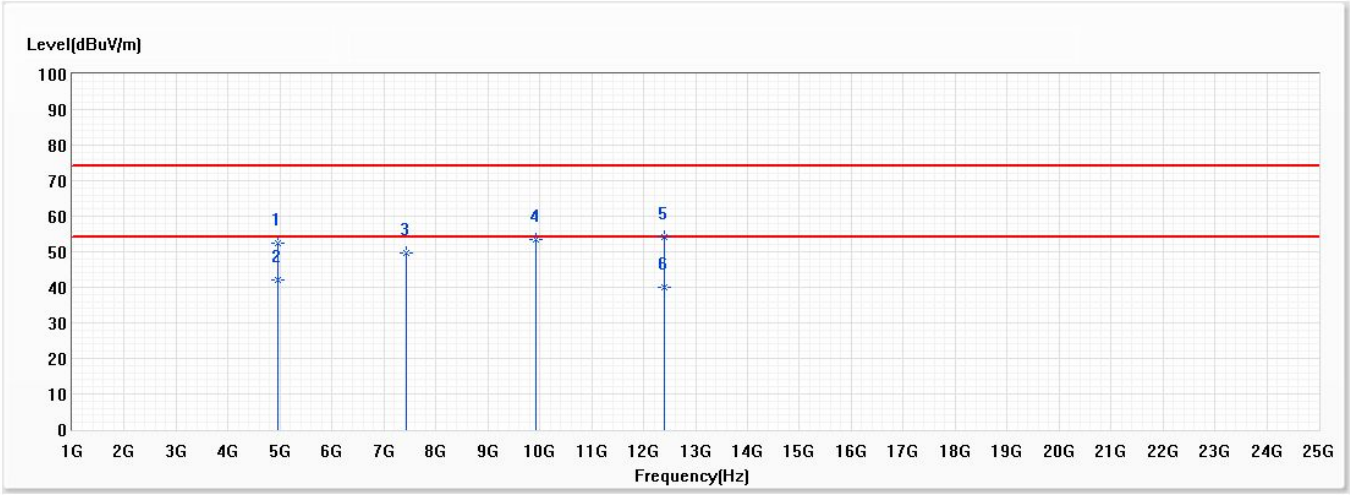
2. “ * ”, means this data is the worst value.

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.

Model No	VE2A01	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/11/11
Test Mode	Mode 1: Transmit	Engineer	Lion Wang
Polarity	Vertical	Temperature (℃)	24.0
Test Condition	Zigbee_Ch26,2.48G,	Humidity (%RH)	56.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	4960.000	52.39	74.00	-21.61	53.37	-0.98	PK
* 2	4960.000	42.02	54.00	-11.98	43.00	-0.98	AV
3	7440.000	49.77	74.00	-24.23	42.93	6.84	PK
4	9920.000	53.35	74.00	-20.65	41.75	11.60	PK
5	12400.000	54.03	74.00	-19.97	41.18	12.85	PK
6	12400.000	40.11	54.00	-13.89	27.26	12.85	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.

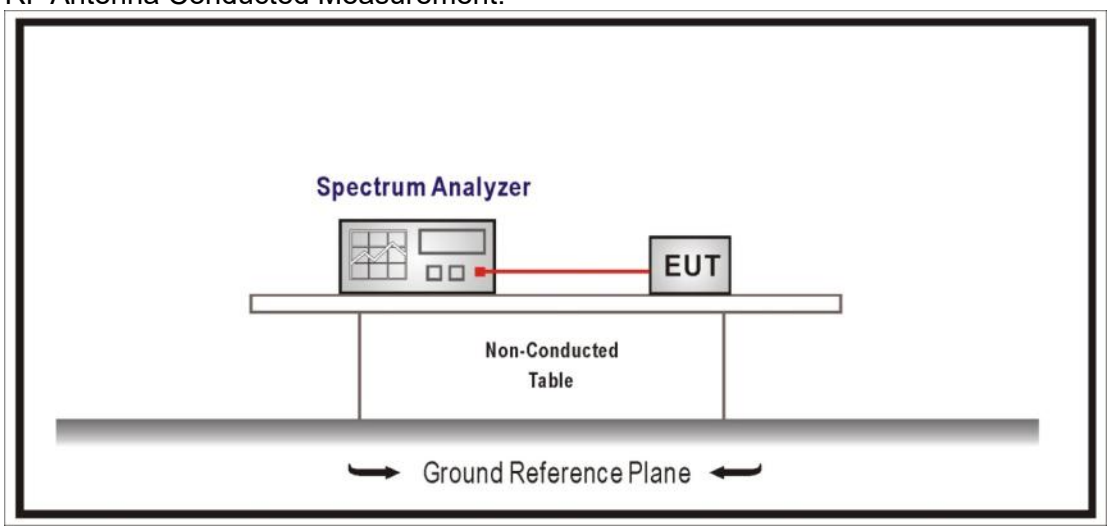
4.The average measurement was not performed when the peak measured data under the limit of average detection.

5.The emission above 13GHz were not included is because their levels are lower than 20dB form limit.

6. RF antenna conducted test

6.1. Test Setup

RF Antenna Conducted Measurement:



6.2. Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on an RF conducted or radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

6.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB 558074 D01 V05r02 for compliance to FCC 47CFR 15.247 requirements. Set RBW = 100 kHz, Set VBW> RBW, scan up through 10th harmonic.

6.4. Test Specification

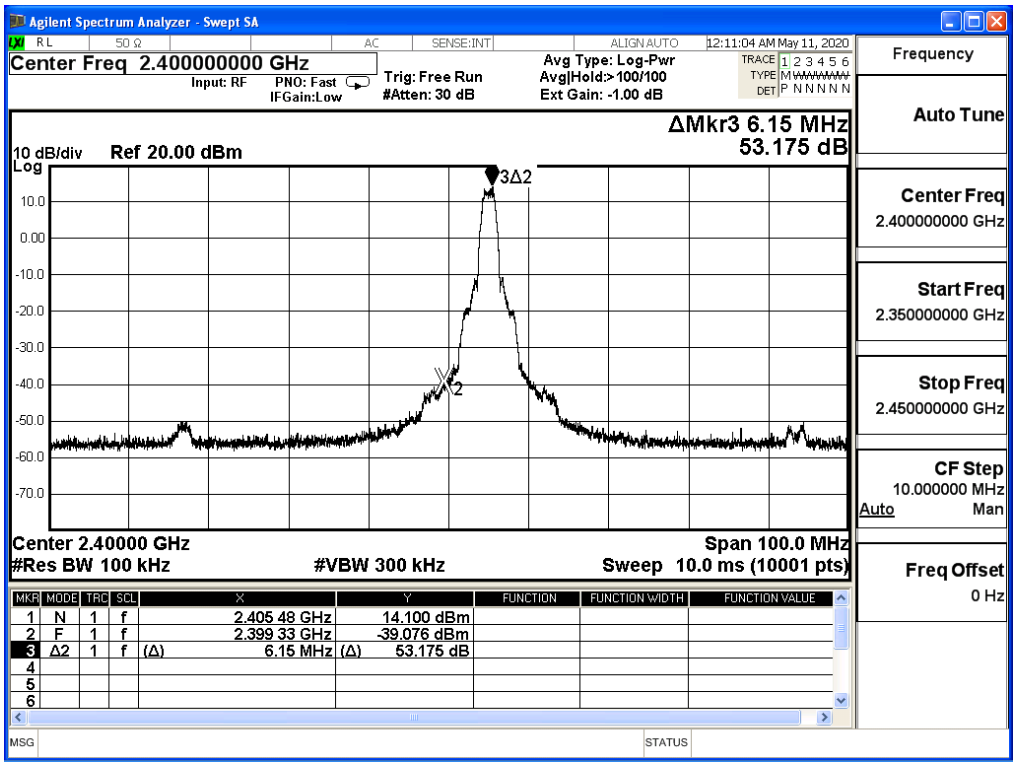
According to FCC Part 15 Subpart C Paragraph 15.247: 2019

6.5. Test Result

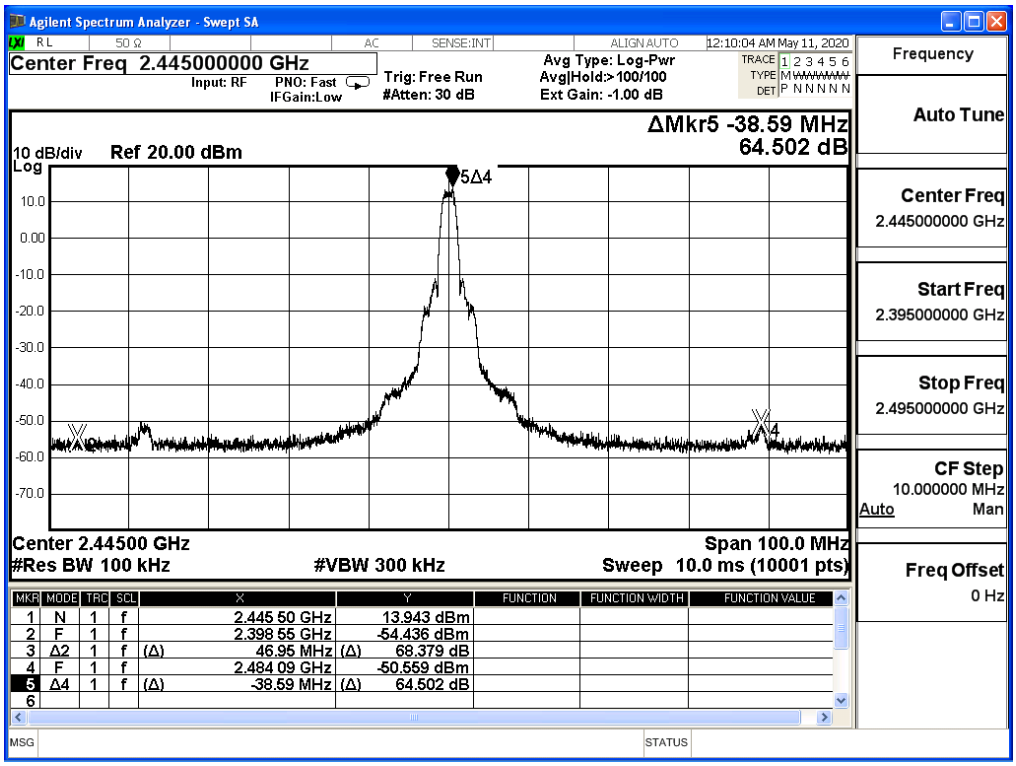
Product	Venation E2 IoT Gateway		
Test Item	RF antenna conducted test		
Test Mode	Mode 1: Transmit		
Date of Test	2020/05/11	Test Site	SR12-H
Temperature(°C)	24.0	Humidity (%RH)	62.0

IEEE 802.15.1 _Zigbee				
Channel	Frequency (MHz)	Measure Level (dBc)	Limit (dBc)	Result
11	2405	53.175	≧20	Pass
19	2445	54.038	≧20	Pass
26	2480	35.746	≧20	Pass

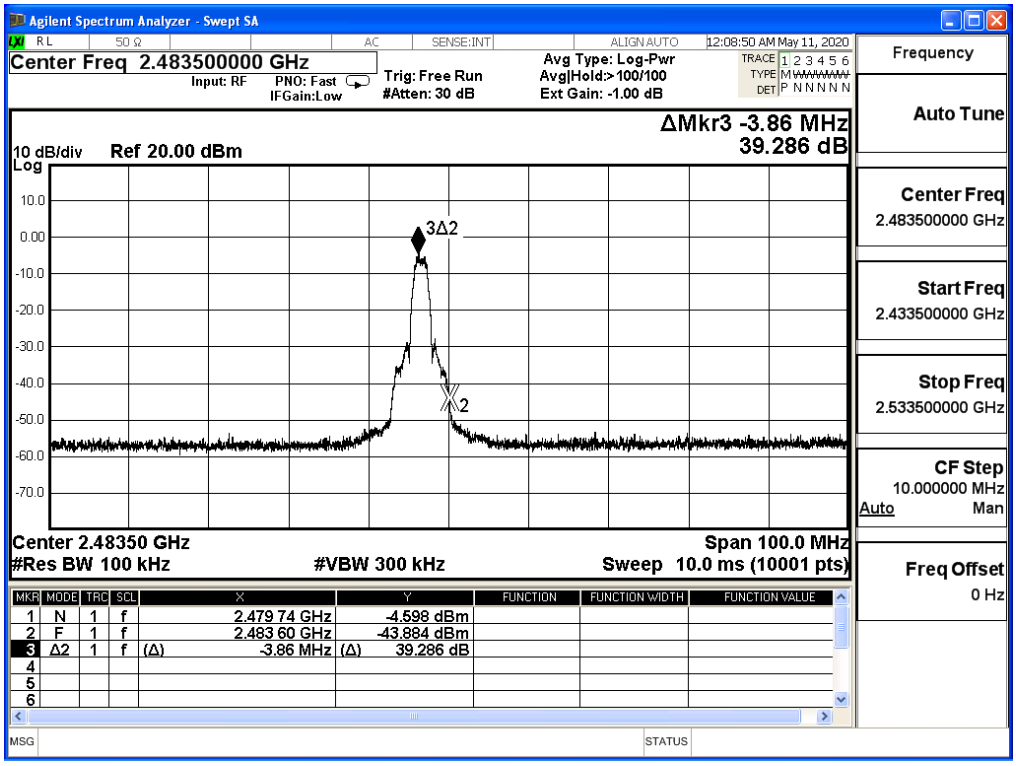
Channel 11 (2405MHz)



Channel 19 (2445MHz)

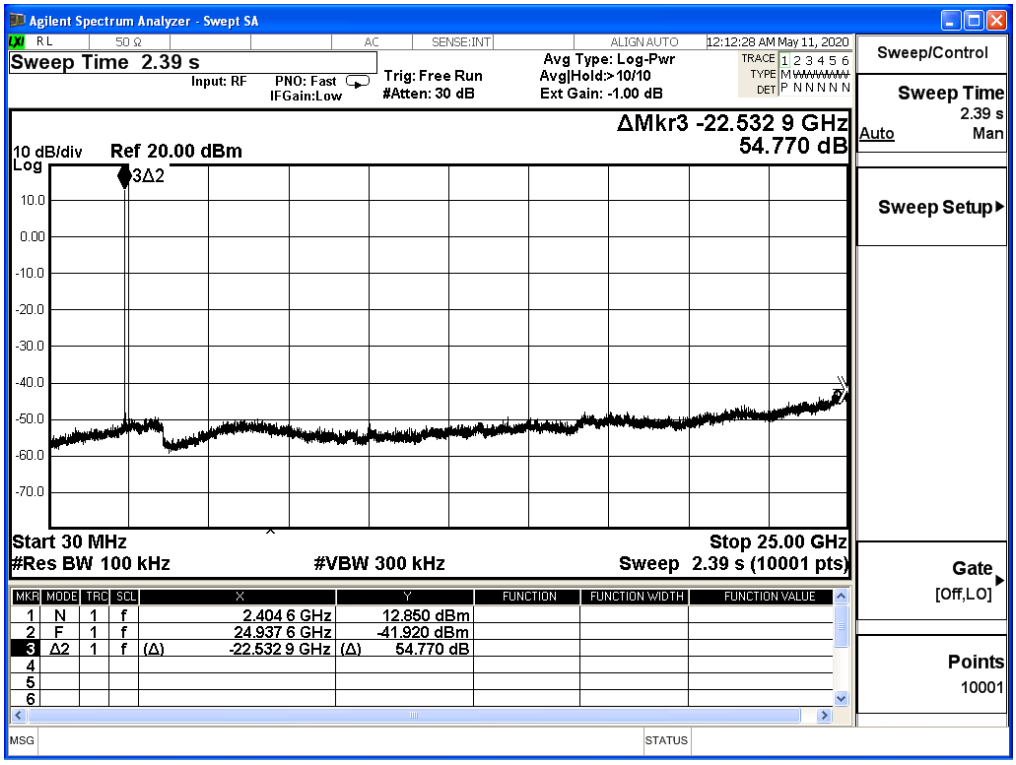


Channel 26 (2480MHz)

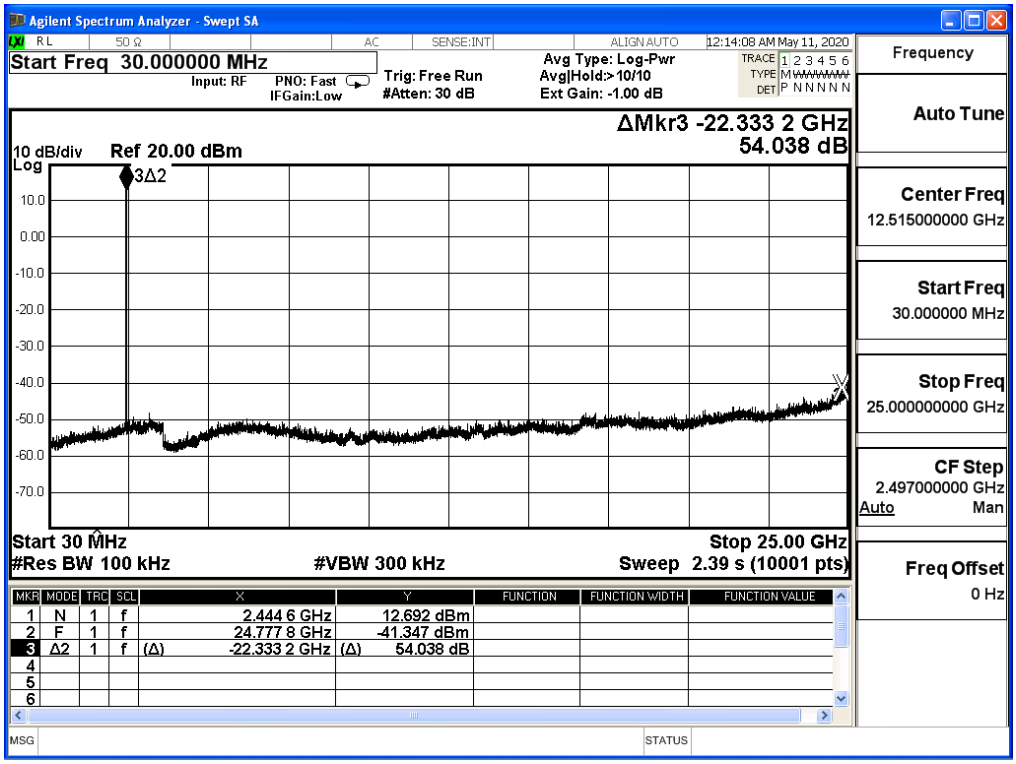


Product	Venation E2 IoT Gateway		
Test Item	RF antenna conducted test		
Test Mode	Mode 1: Transmit		
Date of Test	2020/05/11	Test Site	SR12-H
Temperature(°C)	24.0	Humidity (%RH)	62.0

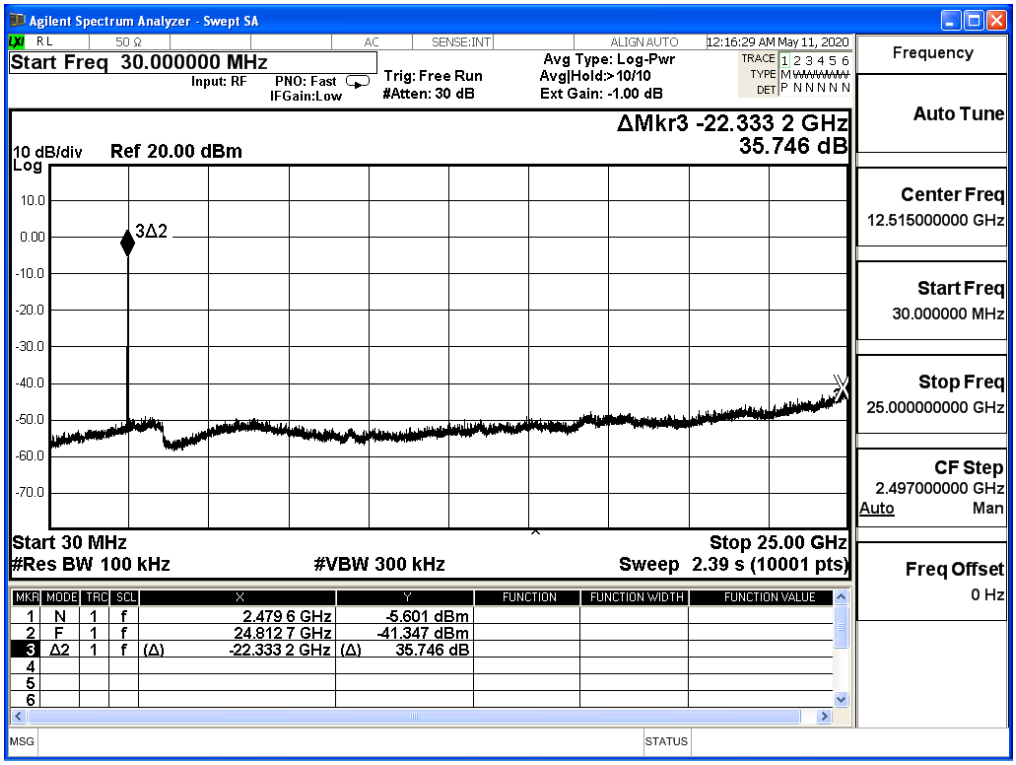
2405MHz (30MHz-25GHz)- IEEE 802.15.1 _Zigbee



2445MHz (30MHz-25GHz)- IEEE 802.15.1 _Zigbee

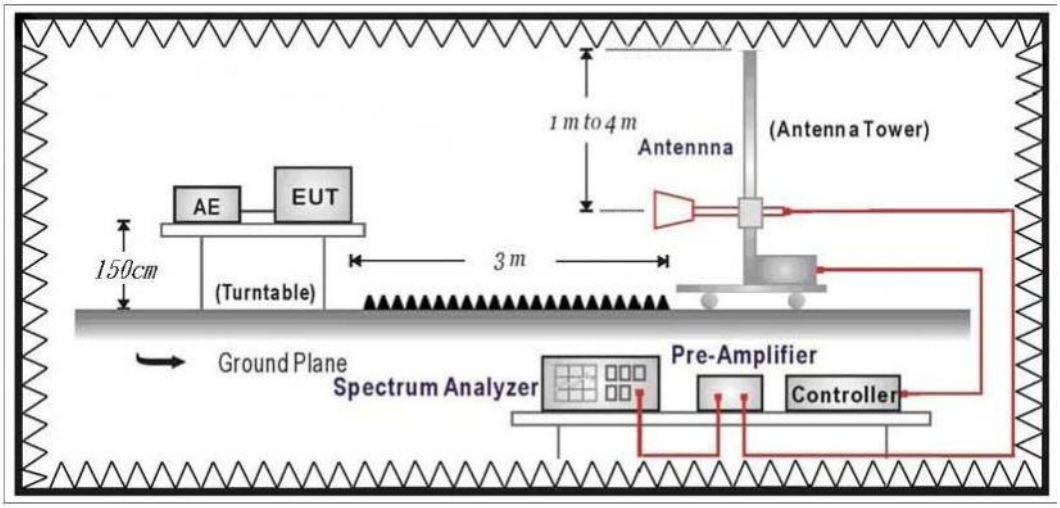


2480MHz (30MHz-25GHz)- IEEE 802.15.1 _Zigbee



7. Radiated Emission Band Edge

7.1. Test Setup



7.2. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

7.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB 558074 D01 V05r02 for compliance to FCC 47CFR 15.247 requirements. The EUT and its simulators are placed on a turn table which is 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

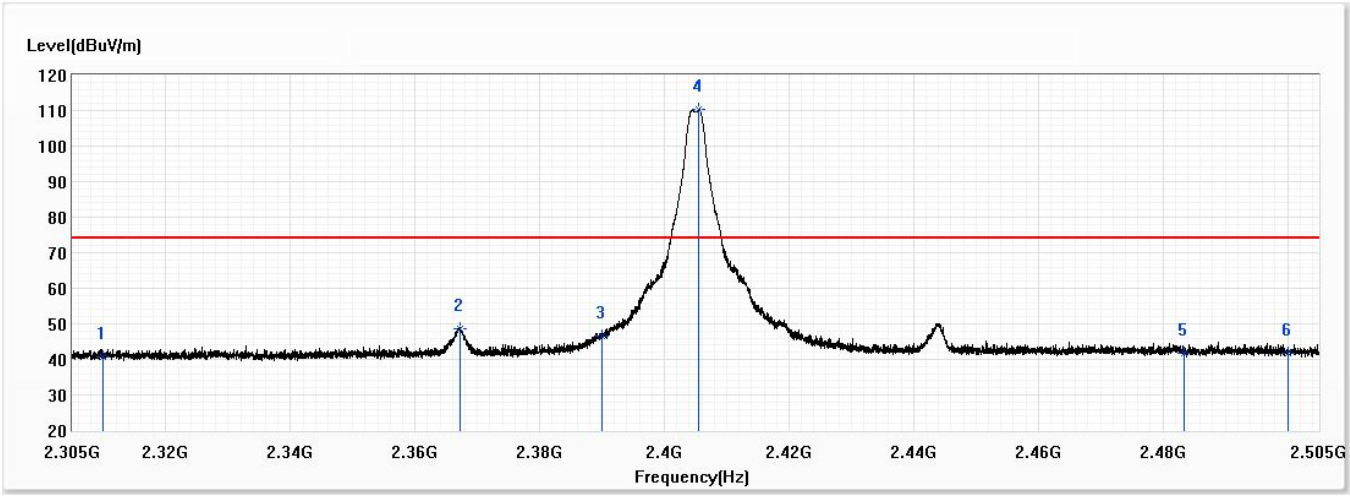
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

7.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247: 2019

7.5. Test Result

Model No	VE2A01	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/11/11
Test Mode	Mode 1: Transmit	Engineer	Lion Wang
Polarity	Horizontal	Temperature (℃)	24.0
Test Condition	Zigbee_Ch11,2.405G,	Humidity (%RH)	56.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310.000	40.66	74.00	-33.34	29.04	11.62	PK
2	2367.150	48.77	74.00	-25.23	36.85	11.92	PK
3	2390.000	46.48	74.00	-27.52	34.45	12.03	PK
! 4	2405.550	110.21	74.00	36.21	98.10	12.11	PK
5	2483.500	41.69	74.00	-32.31	29.18	12.51	PK
6	2500.000	41.87	74.00	-32.13	29.27	12.60	PK

Note:

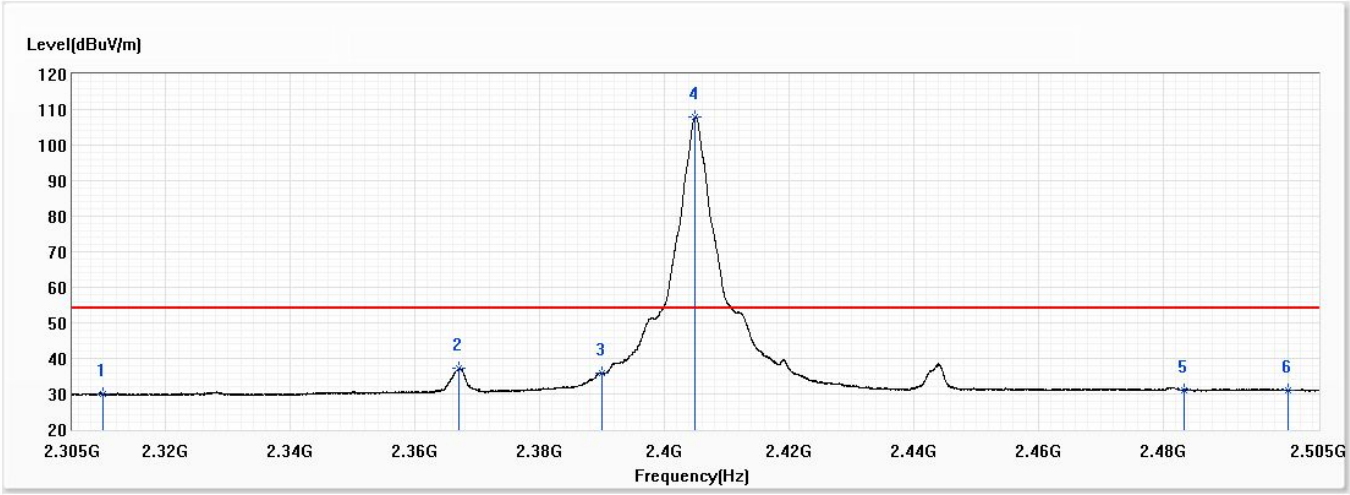
1. All reading above 1GHz is performed with peak and/or average measurements as necessary.

2. Emission Level = Reading Level + Correct Factor.

3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

4. The fundamental for reference only, it’s not restricted by unwanted emission limit.

Model No	VE2A01	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/11/11
Test Mode	Mode 1: Transmit	Engineer	Lion Wang
Polarity	Horizontal	Temperature (℃)	24.0
Test Condition	Zigbee_Ch11,2.405G,	Humidity (%RH)	56.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310.000	29.92	54.00	-24.08	18.30	11.62	AV
2	2367.100	37.38	54.00	-16.62	25.46	11.92	AV
3	2390.000	35.75	54.00	-18.25	23.72	12.03	AV
! 4	2404.975	107.90	54.00	53.90	95.79	12.11	AV
5	2483.500	31.09	54.00	-22.91	18.58	12.51	AV
6	2500.000	31.01	54.00	-22.99	18.41	12.60	AV

Note:

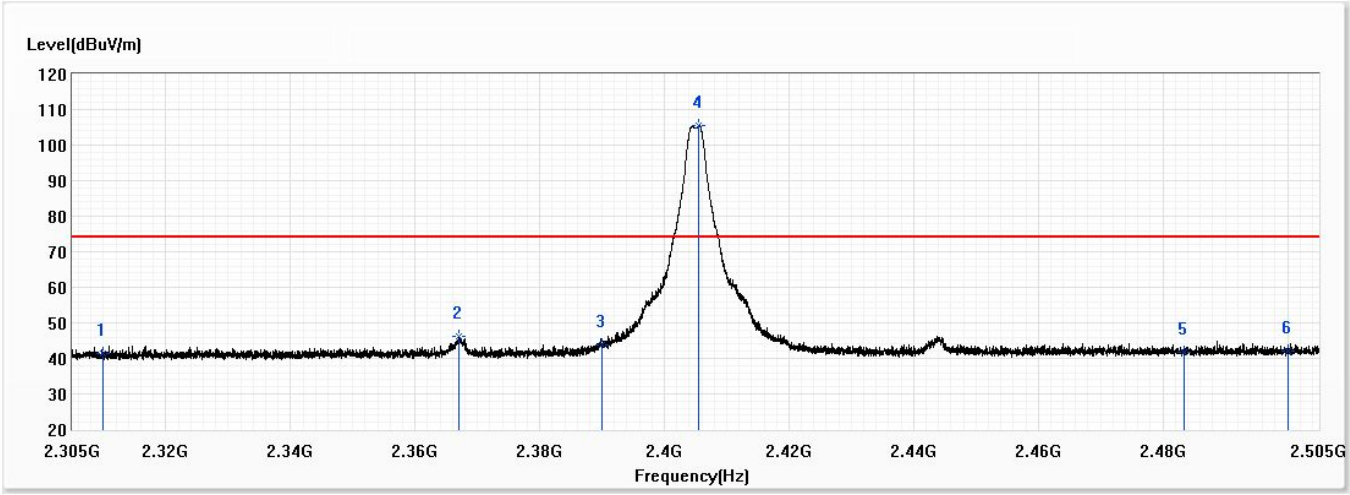
1. All reading above 1GHz is performed with peak and/or average measurements as necessary.

2. Emission Level = Reading Level + Correct Factor.

3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

4. The fundamental for reference only, it’s not restricted by unwanted emission limit.

Model No	VE2A01	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/11/11
Test Mode	Mode 1: Transmit	Engineer	Lion Wang
Polarity	Vertical	Temperature (℃)	24.0
Test Condition	Zigbee_Ch11,2.405G,	Humidity (%RH)	56.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310.000	41.26	74.00	-32.74	29.64	11.62	PK
2	2367.050	46.07	74.00	-27.93	34.15	11.92	PK
3	2390.000	43.95	74.00	-30.05	31.92	12.03	PK
! 4	2405.550	105.47	74.00	31.47	93.36	12.11	PK
5	2483.500	41.57	74.00	-32.43	29.06	12.51	PK
6	2500.000	41.97	74.00	-32.03	29.37	12.60	PK

Note:

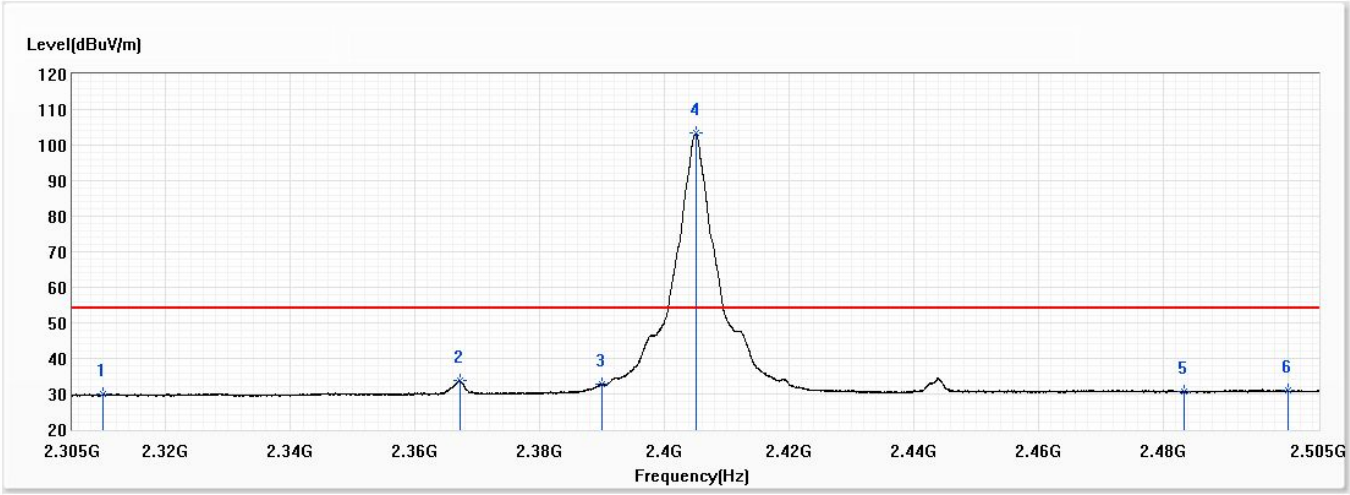
1. All reading above 1GHz is performed with peak and/or average measurements as necessary.

2. Emission Level = Reading Level + Correct Factor.

3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

4. The fundamental for reference only, it’s not restricted by unwanted emission limit.

Model No	VE2A01	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/11/11
Test Mode	Mode 1: Transmit	Engineer	Lion Wang
Polarity	Vertical	Temperature (℃)	24.0
Test Condition	Zigbee_Ch11,2.405G,	Humidity (%RH)	56.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310.000	29.83	54.00	-24.17	18.21	11.62	AV
2	2367.250	33.78	54.00	-20.22	21.86	11.92	AV
3	2390.000	32.65	54.00	-21.35	20.62	12.03	AV
! 4	2405.025	103.28	54.00	49.28	91.17	12.11	AV
5	2483.500	30.56	54.00	-23.44	18.05	12.51	AV
6	2500.000	31.05	54.00	-22.95	18.45	12.60	AV

Note:

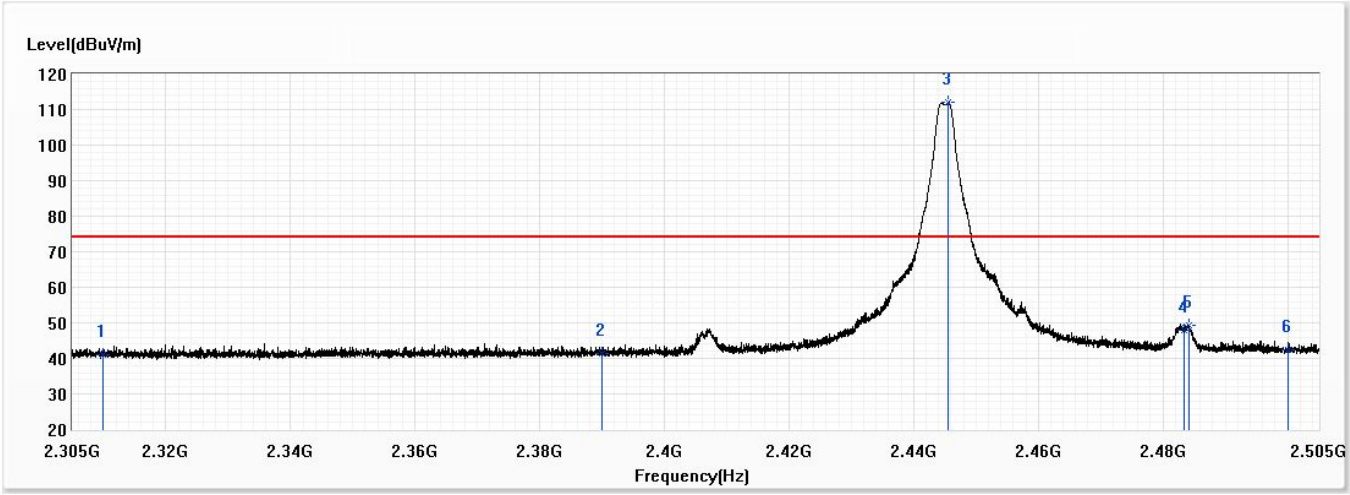
1. All reading above 1GHz is performed with peak and/or average measurements as necessary.

2. Emission Level = Reading Level + Correct Factor.

3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

4. The fundamental for reference only, it’s not restricted by unwanted emission limit.

Model No	VE2A01	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/11/11
Test Mode	Mode 1: Transmit	Engineer	Lion Wang
Polarity	Horizontal	Temperature (℃)	24.0
Test Condition	Zigbee_Ch19,2.445G,	Humidity (%RH)	56.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310.000	41.01	74.00	-32.99	29.39	11.62	PK
2	2390.000	41.49	74.00	-32.51	29.46	12.03	PK
! 3	2445.550	111.96	74.00	37.96	99.64	12.32	PK
4	2483.500	47.89	74.00	-26.11	35.38	12.51	PK
5	2484.125	49.39	74.00	-24.61	36.88	12.51	PK
6	2500.000	42.52	74.00	-31.48	29.92	12.60	PK

Note:

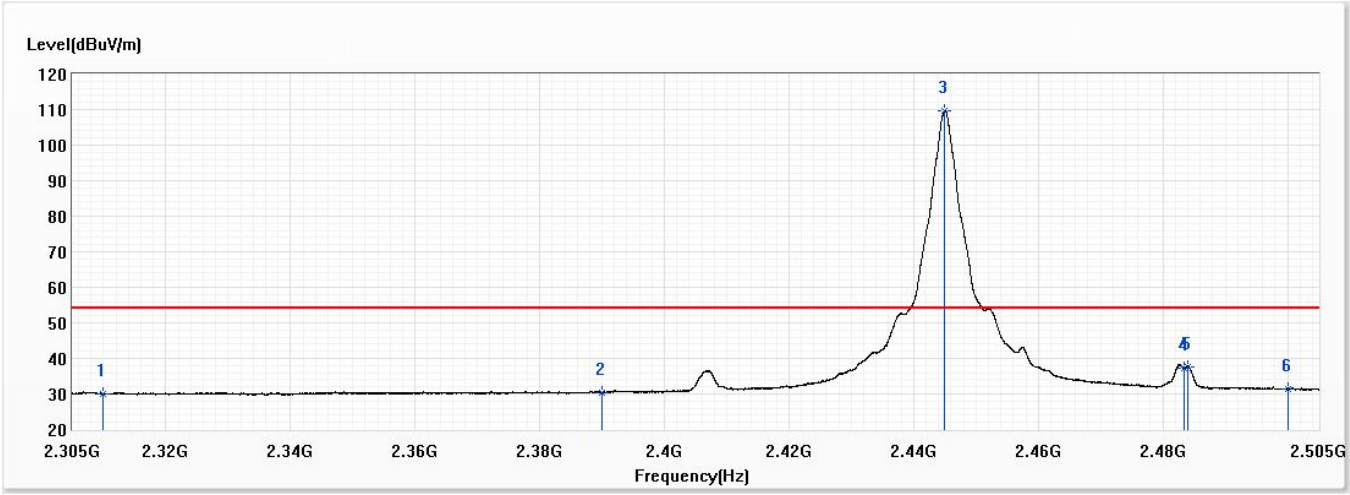
1. All reading above 1GHz is performed with peak and/or average measurements as necessary.

2. Emission Level = Reading Level + Correct Factor.

3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

4. The fundamental for reference only, it’s not restricted by unwanted emission limit.

Model No	VE2A01	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/11/11
Test Mode	Mode 1: Transmit	Engineer	Lion Wang
Polarity	Horizontal	Temperature (℃)	24.0
Test Condition	Zigbee_Ch19,2.445G,	Humidity (%RH)	56.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310.000	29.98	54.00	-24.02	18.36	11.62	AV
2	2390.000	30.43	54.00	-23.57	18.40	12.03	AV
! 3	2445.025	109.69	54.00	55.69	97.37	12.32	AV
4	2483.500	37.27	54.00	-16.73	24.76	12.51	AV
5	2483.950	37.72	54.00	-16.28	25.21	12.51	AV
6	2500.000	31.49	54.00	-22.51	18.89	12.60	AV

Note:

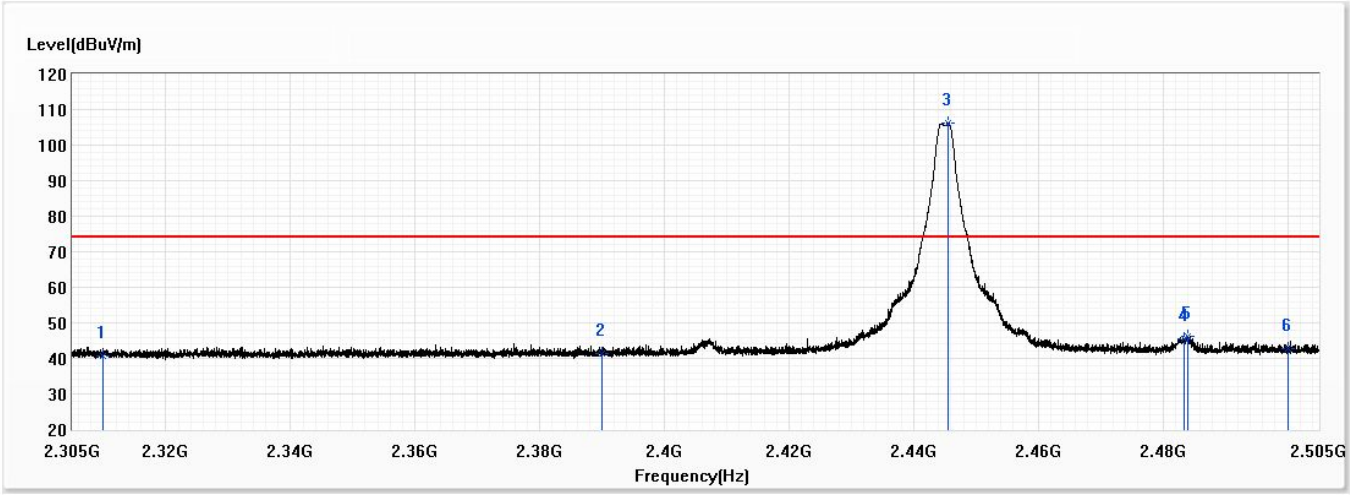
1. All reading above 1GHz is performed with peak and/or average measurements as necessary.

2. Emission Level = Reading Level + Correct Factor.

3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

4. The fundamental for reference only, it’s not restricted by unwanted emission limit.

Model No	VE2A01	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/11/11
Test Mode	Mode 1: Transmit	Engineer	Lion Wang
Polarity	Vertical	Temperature (℃)	24.0
Test Condition	Zigbee_Ch19,2.445G,	Humidity (%RH)	56.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310.000	40.86	74.00	-33.14	29.24	11.62	PK
2	2390.000	41.34	74.00	-32.66	29.31	12.03	PK
! 3	2445.550	106.12	74.00	32.12	93.80	12.32	PK
4	2483.500	45.52	74.00	-28.48	33.01	12.51	PK
5	2484.000	46.37	74.00	-27.63	33.86	12.51	PK
6	2500.000	42.62	74.00	-31.38	30.02	12.60	PK

Note:

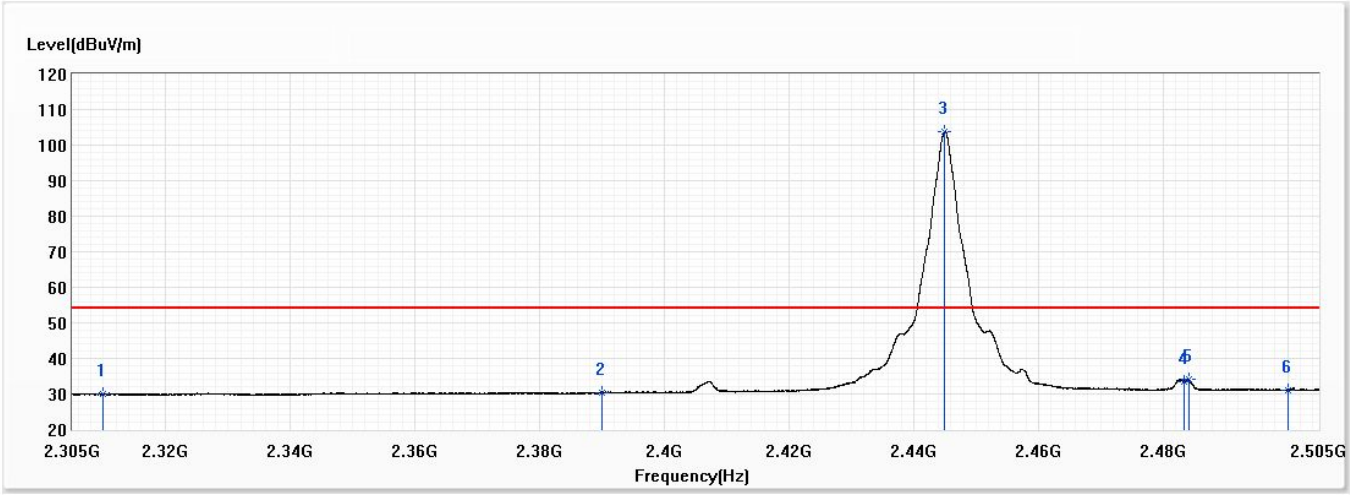
1. All reading above 1GHz is performed with peak and/or average measurements as necessary.

2. Emission Level = Reading Level + Correct Factor.

3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

4. The fundamental for reference only, it’s not restricted by unwanted emission limit.

Model No	VE2A01	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/11/11
Test Mode	Mode 1: Transmit	Engineer	Lion Wang
Polarity	Vertical	Temperature (℃)	24.0
Test Condition	Zigbee_Ch19,2.445G,	Humidity (%RH)	56.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310.000	30.09	54.00	-23.91	18.47	11.62	AV
2	2390.000	30.48	54.00	-23.52	18.45	12.03	AV
! 3	2445.025	103.91	54.00	49.91	91.59	12.32	AV
4	2483.500	33.56	54.00	-20.44	21.05	12.51	AV
5	2484.150	34.02	54.00	-19.98	21.51	12.51	AV
6	2500.000	31.05	54.00	-22.95	18.45	12.60	AV

Note:

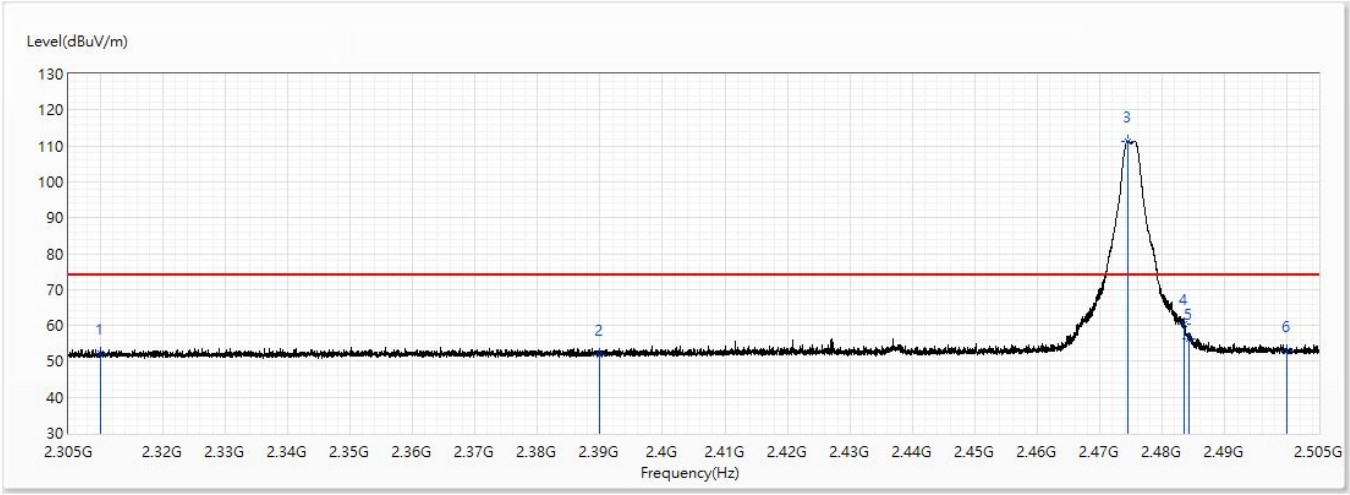
1. All reading above 1GHz is performed with peak and/or average measurements as necessary.

2. Emission Level = Reading Level + Correct Factor.

3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

4. The fundamental for reference only, it’s not restricted by unwanted emission limit.

Model No	VE2A01	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/11/11
Test Mode	Mode 1: Transmit	Engineer	Lion Wang
Polarity	Horizontal	Temperature (℃)	24.0
Test Condition	Zigbee_Ch25,2.475G,	Humidity (%RH)	56.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310	52.15	74.00	-21.85	40.53	11.62	PK
2	2390	51.89	74.00	-22.11	39.86	12.03	PK
! 3	2474.475	111.38	74.00	37.38	98.93	12.45	PK
4	2483.5	60.40	74.00	-13.60	47.89	12.51	PK
5	2484.3	56.45	74.00	-17.55	43.95	12.50	PK
6	2500	52.76	74.00	-21.24	40.16	12.60	PK

Note:

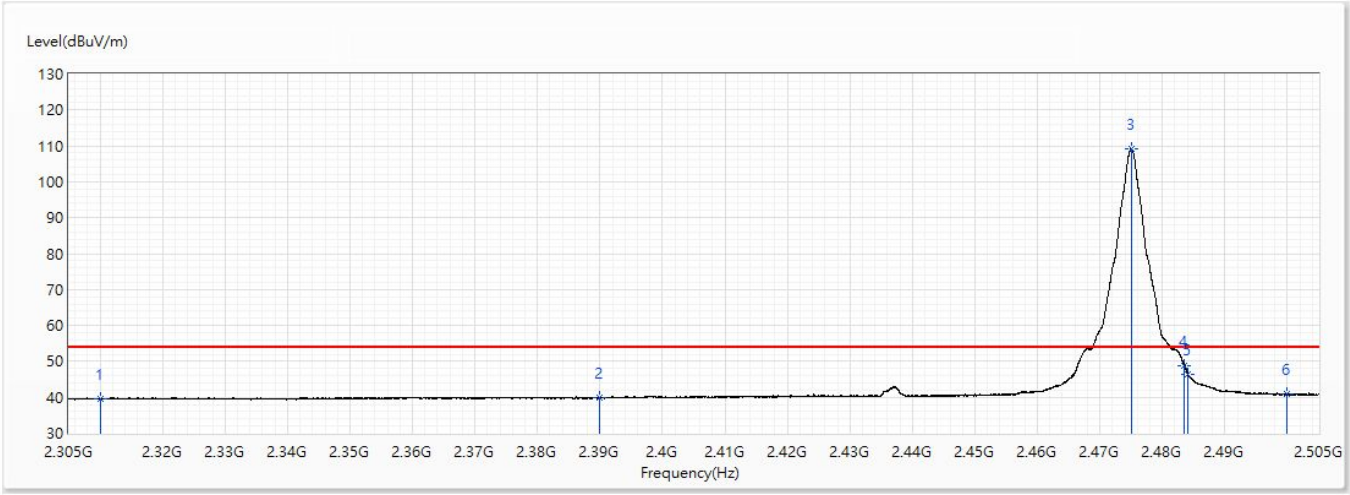
1. All reading above 1GHz is performed with peak and/or average measurements as necessary.

2. Emission Level = Reading Level + Correct Factor.

3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

4. The fundamental for reference only, it’s not restricted by unwanted emission limit.

Model No	VE2A01	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/11/11
Test Mode	Mode 1: Transmit	Engineer	Lion Wang
Polarity	Horizontal	Temperature (℃)	24.0
Test Condition	Zigbee_Ch25,2.475G,	Humidity (%RH)	56.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310	39.70	54.00	-14.30	28.08	11.62	AV
2	2390	39.81	54.00	-14.19	27.78	12.03	AV
! 3	2475.025	109.16	54.00	55.16	96.71	12.45	AV
4	2483.5	48.94	54.00	-5.06	36.43	12.51	AV
5	2484.075	46.47	54.00	-7.53	33.97	12.50	AV
6	2500	40.84	54.00	-13.16	28.24	12.60	AV

Note:

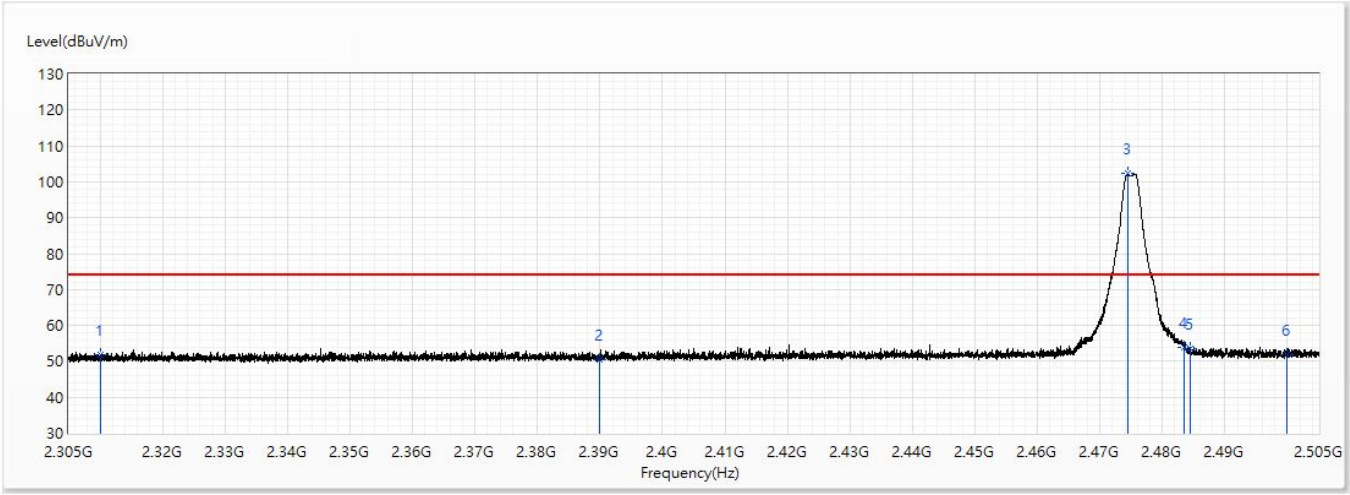
1. All reading above 1GHz is performed with peak and/or average measurements as necessary.

2. Emission Level = Reading Level + Correct Factor.

3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

4. The fundamental for reference only, it’s not restricted by unwanted emission limit.

Model No	VE2A01	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/11/11
Test Mode	Mode 1: Transmit	Engineer	Lion Wang
Polarity	Vertical	Temperature (℃)	24.0
Test Condition	Zigbee_Ch25,2.475G,	Humidity (%RH)	56.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310	51.89	74.00	-22.11	40.27	11.62	PK
2	2390	50.38	74.00	-23.62	38.35	12.03	PK
! 3	2474.5	102.20	74.00	28.20	89.75	12.45	PK
4	2483.5	54.02	74.00	-19.98	41.51	12.51	PK
5	2484.425	53.55	74.00	-20.45	41.05	12.50	PK
6	2500	51.75	74.00	-22.25	39.15	12.60	PK

Note:

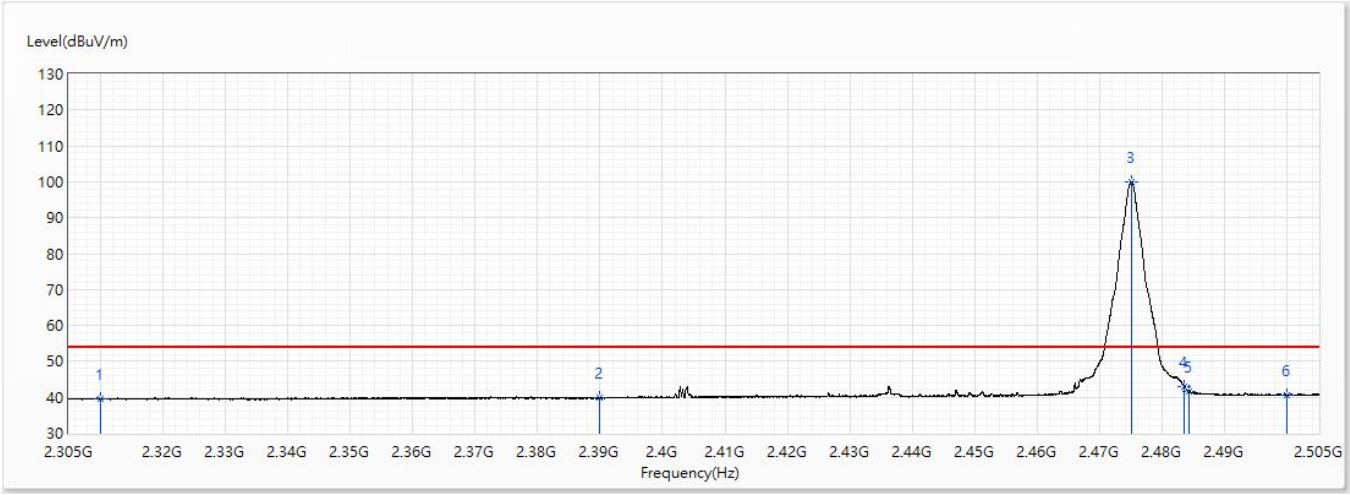
1. All reading above 1GHz is performed with peak and/or average measurements as necessary.

2. Emission Level = Reading Level + Correct Factor.

3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

4. The fundamental for reference only, it’s not restricted by unwanted emission limit.

Model No	VE2A01	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/11/11
Test Mode	Mode 1: Transmit	Engineer	Lion Wang
Polarity	Vertical	Temperature (℃)	24.0
Test Condition	Zigbee_Ch25,2.475G,	Humidity (%RH)	56.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310	39.58	54.00	-14.42	27.96	11.62	AV
2	2390	39.77	54.00	-14.23	27.74	12.03	AV
! 3	2475.05	100.04	54.00	46.04	87.59	12.45	AV
4	2483.5	43.08	54.00	-10.92	30.57	12.51	AV
5	2484.25	41.54	54.00	-12.46	29.04	12.50	AV
6	2500	40.66	54.00	-13.34	28.06	12.60	AV

Note:

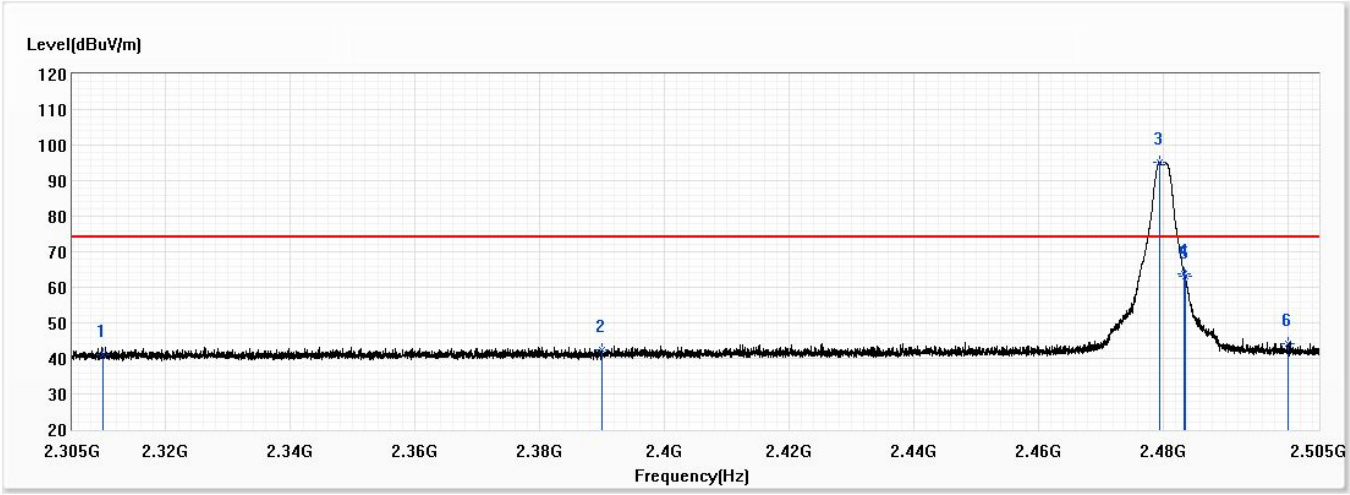
1. All reading above 1GHz is performed with peak and/or average measurements as necessary.

2. Emission Level = Reading Level + Correct Factor.

3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

4. The fundamental for reference only, it’s not restricted by unwanted emission limit.

Model No	VE2A01	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/11/11
Test Mode	Mode 1: Transmit	Engineer	Lion Wang
Polarity	Horizontal	Temperature (℃)	24.0
Test Condition	Zigbee_Ch26, 2.48G,	Humidity (%RH)	56.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310.000	41.16	74.00	-32.84	29.54	11.62	PK
2	2390.000	42.27	74.00	-31.73	30.24	12.03	PK
! 3	2479.475	95.10	74.00	21.10	82.60	12.50	PK
4	2483.500	63.74	74.00	-10.26	51.23	12.51	PK
5	2483.600	63.01	74.00	-10.99	50.50	12.51	PK
6	2500.000	44.23	74.00	-29.77	31.63	12.60	PK

Note:

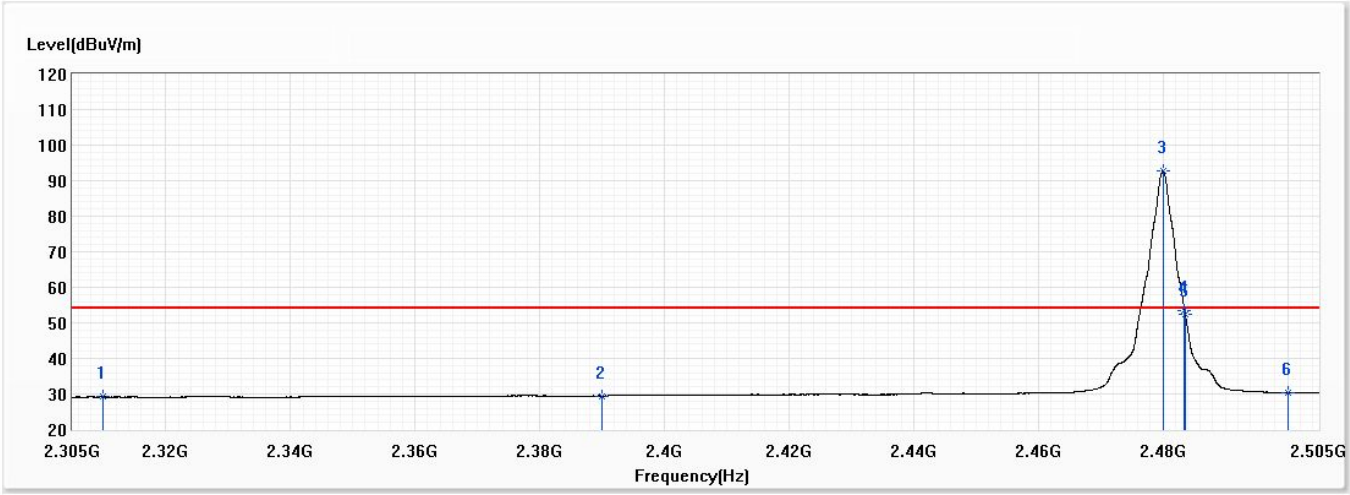
1. All reading above 1GHz is performed with peak and/or average measurements as necessary.

2. Emission Level = Reading Level + Correct Factor.

3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

4. The fundamental for reference only, it’s not restricted by unwanted emission limit.

Model No	VE2A01	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/11/11
Test Mode	Mode 1: Transmit	Engineer	Lion Wang
Polarity	Horizontal	Temperature (℃)	24.0
Test Condition	Zigbee_Ch26, 2.48G,	Humidity (%RH)	56.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310.000	29.15	54.00	-24.85	17.53	11.62	AV
2	2390.000	29.48	54.00	-24.52	17.45	12.03	AV
! 3	2480.000	92.67	54.00	38.67	80.17	12.50	AV
4	2483.500	53.44	54.00	-0.56	40.93	12.51	AV
5	2483.600	52.42	54.00	-1.58	39.91	12.51	AV
6	2500.000	30.31	54.00	-23.69	17.71	12.60	AV

Note:

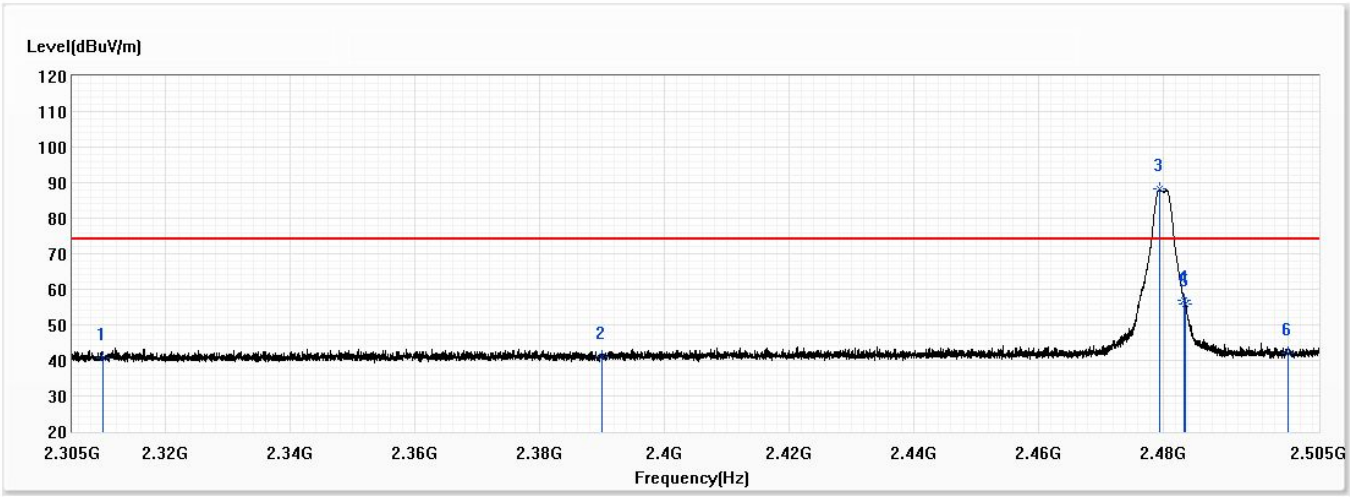
1. All reading above 1GHz is performed with peak and/or average measurements as necessary.

2. Emission Level = Reading Level + Correct Factor.

3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

4. The fundamental for reference only, it’s not restricted by unwanted emission limit.

Model No	VE2A01	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/11/11
Test Mode	Mode 1: Transmit	Engineer	Lion Wang
Polarity	Vertical	Temperature (℃)	24.0
Test Condition	Zigbee_Ch26, 2.48G,	Humidity (%RH)	56.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310.000	40.75	74.00	-33.25	29.13	11.62	PK
2	2390.000	41.03	74.00	-32.97	29.00	12.03	PK
! 3	2479.525	88.14	74.00	14.14	75.64	12.50	PK
4	2483.500	57.05	74.00	-16.95	44.54	12.51	PK
5	2483.600	55.99	74.00	-18.01	43.48	12.51	PK
6	2500.000	42.01	74.00	-31.99	29.41	12.60	PK

Note:

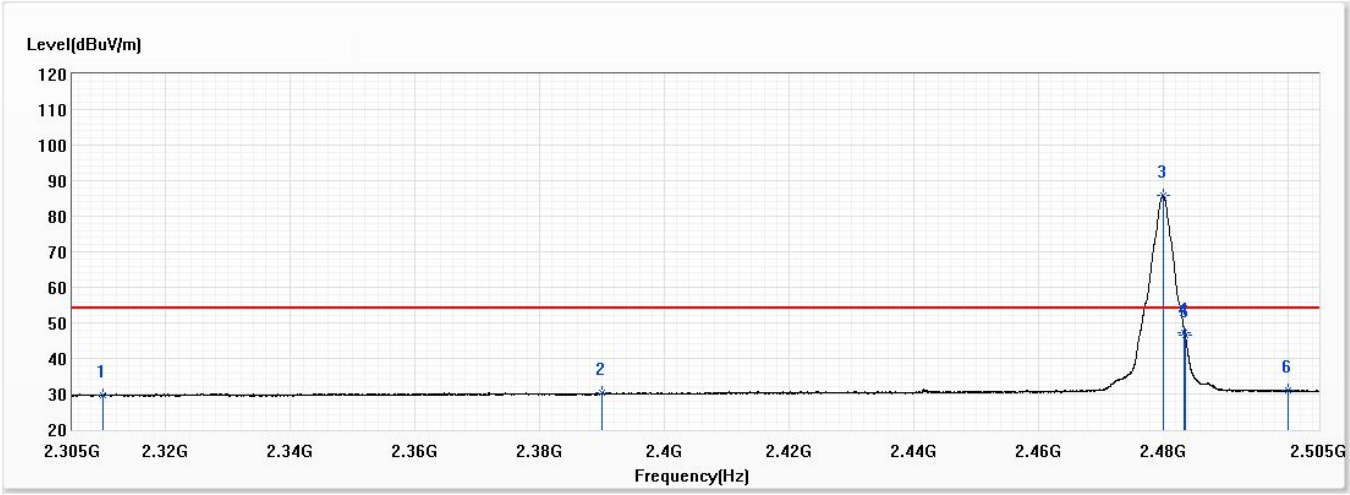
1. All reading above 1GHz is performed with peak and/or average measurements as necessary.

2. Emission Level = Reading Level + Correct Factor.

3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

4. The fundamental for reference only, it’s not restricted by unwanted emission limit.

Model No	VE2A01	Site	CB4-H
Test Voltage	AC 120V/60Hz	Test Date	2020/11/11
Test Mode	Mode 1: Transmit	Engineer	Lion Wang
Polarity	Vertical	Temperature (℃)	24.0
Test Condition	Zigbee_Ch26,_2.48G	Humidity (%RH)	56.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310.000	29.75	54.00	-24.25	18.13	11.62	AV
2	2390.000	30.24	54.00	-23.76	18.21	12.03	AV
! 3	2480.100	85.84	54.00	31.84	73.34	12.50	AV
4	2483.500	47.37	54.00	-6.63	34.86	12.51	AV
5	2483.600	46.48	54.00	-7.52	33.97	12.51	AV
6	2500.000	30.96	54.00	-23.04	18.36	12.60	AV

Note:

1. All reading above 1GHz is performed with peak and/or average measurements as necessary.

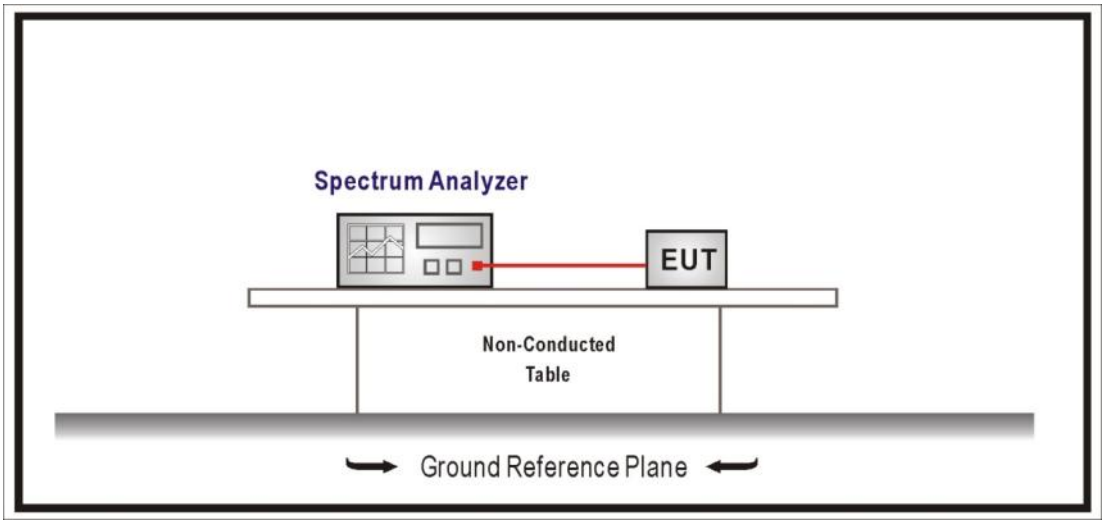
2. Emission Level = Reading Level + Correct Factor.

3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

4. The fundamental for reference only, it’s not restricted by unwanted emission limit.

8. DTS Bandwidth

8.1. Test Setup



8.2. Test Procedures

The EUT was setup according to ANSI C63.10: 2013; tested procedure of KDB 558074 D01 V05r02 for compliance to FCC 47CFR 15.247 requirements. Set RBW = 100KHz, Set the VBW≧3xRBW, Sweep Time=Auto, Set Peak Detector.

8.3. Limits

The 6 dB bandwidth must be greater than 500 kHz.

8.4. Test Specification

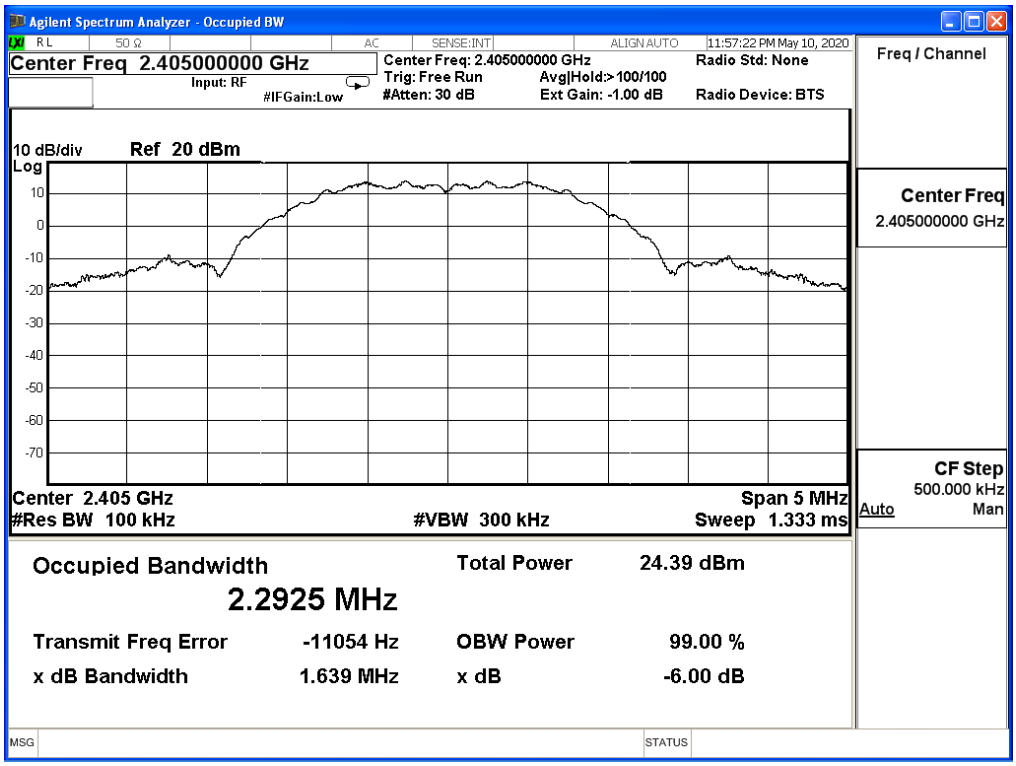
According to FCC Part 15 Subpart C Paragraph 15.247: 2019

8.5. Test Result

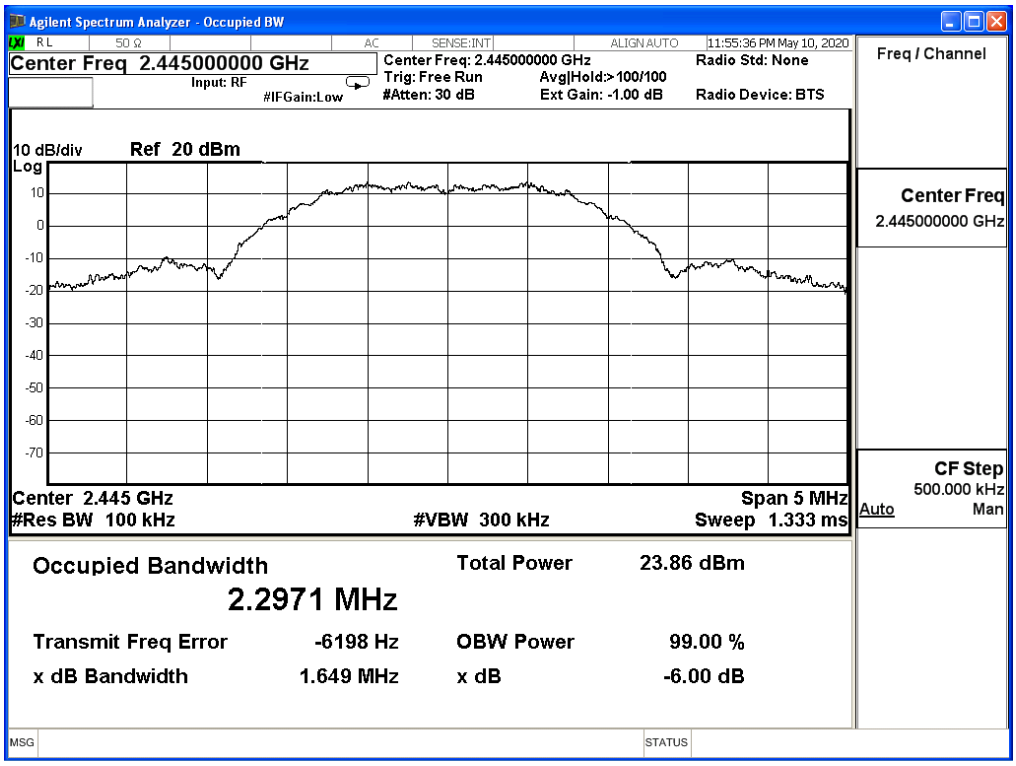
Product	Venation E2 IoT Gateway		
Test Item	DTS Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2020/05/11	Test Site	SR12-H
Temperature(°C)	24.0	Humidity (%RH)	62.0

IEEE 802.15.1 _Zigbee				
Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)	Result
11	2405	1.639	≧0.5	Pass
19	2445	1.649	≧0.5	Pass
26	2480	1.639	≧0.5	Pass

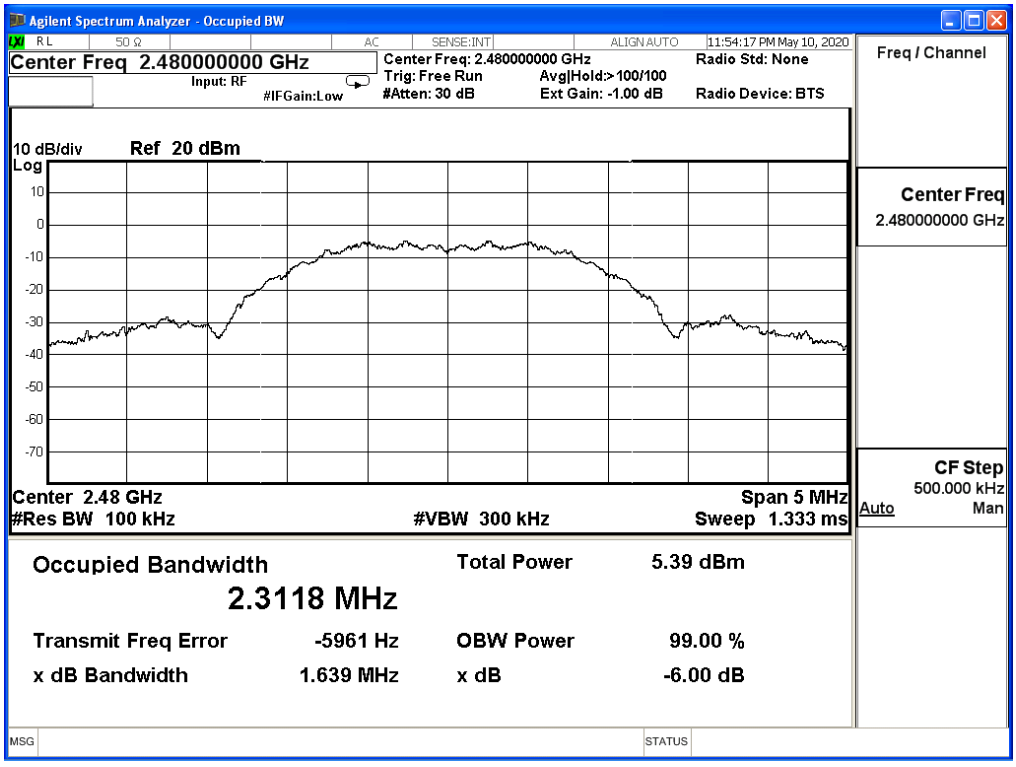
Channel 11 (2405MHz)



Channel 19 (2445MHz)

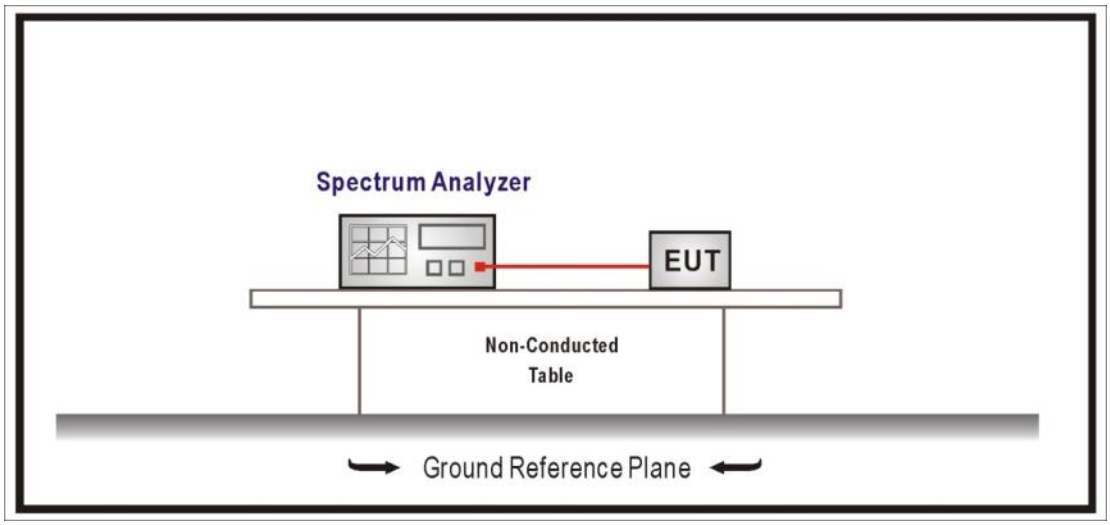


Channel 26 (2480MHz)



9. Occupied Bandwidth

9.1. Test Setup



9.2. Test Procedures

The EUT was setup according to ANSI C63.10: 2013; tested according to DTS test procedure of KDB 558074 D01 V05r02 for compliance to FCC 47CFR 15.247 requirements.
Set RBW = 1-5% of the OBW, Set the VBW≧3xRBW, Sweep Time=Auto.

9.3. Limits

N/A

9.4. Test Specification

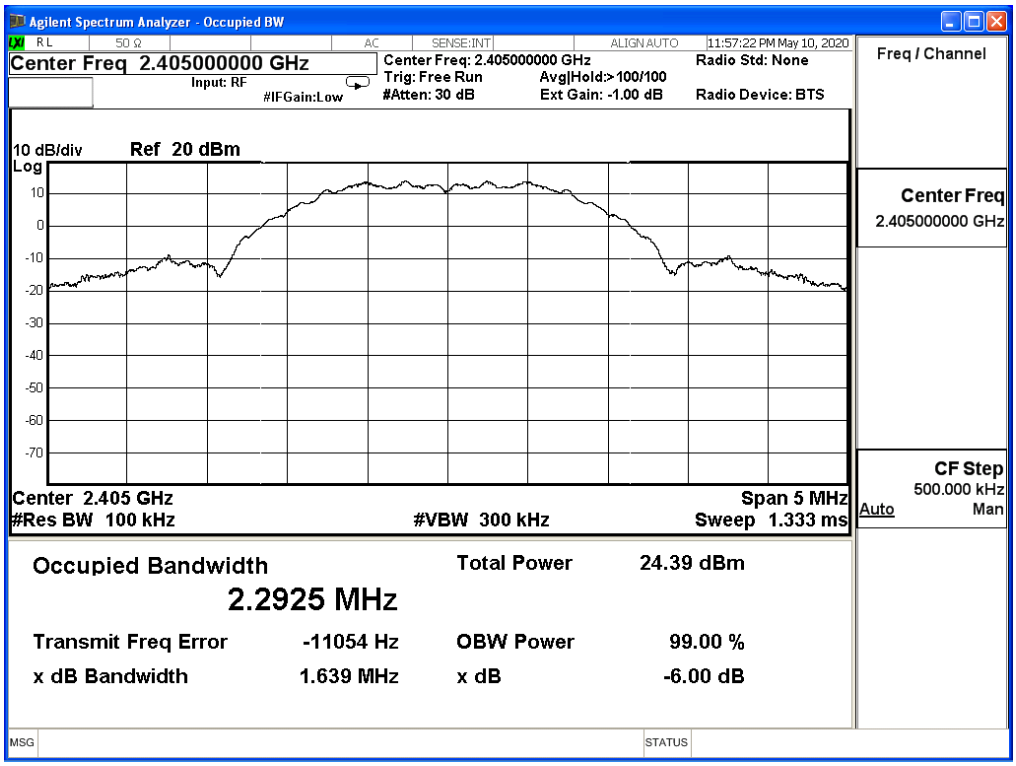
According to FCC Part 15 Subpart C Paragraph 15.247: 2019

9.5. Test Result

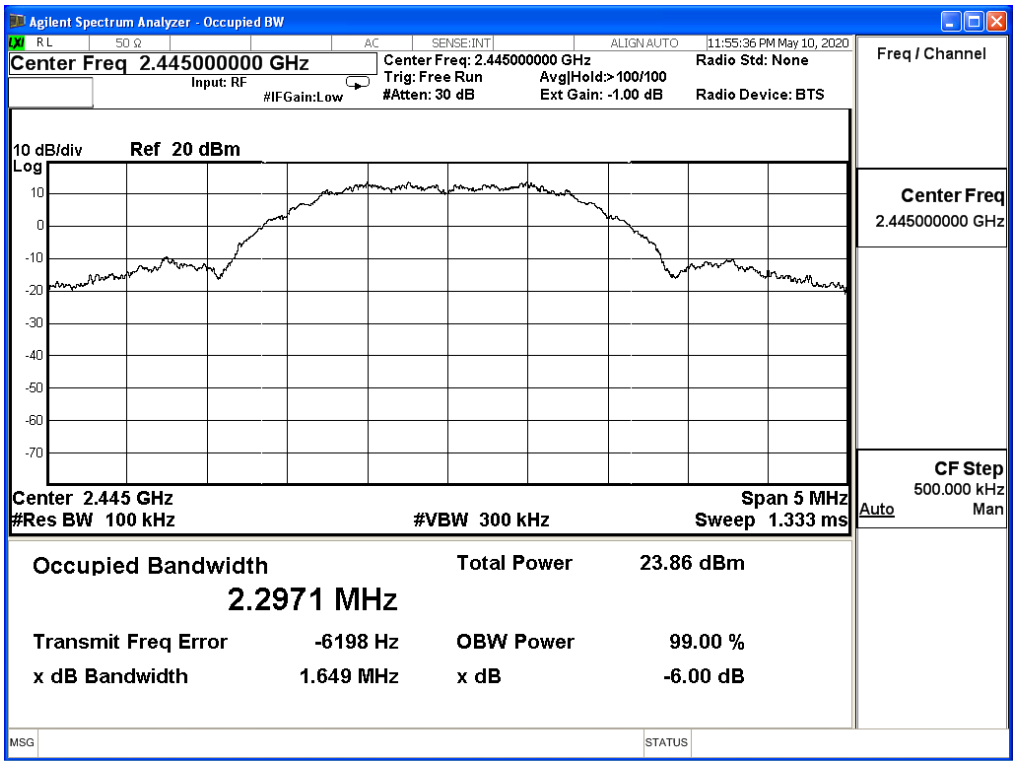
Product	Venation E2 IoT Gateway		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2020/05/11	Test Site	SR12-H
Temperature(°C)	24.0	Humidity (%RH)	62.0

IEEE 802.15.1 _Zigbee			
Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)
11	2405	2.292	---
19	2445	2.297	---
26	2480	2.311	---

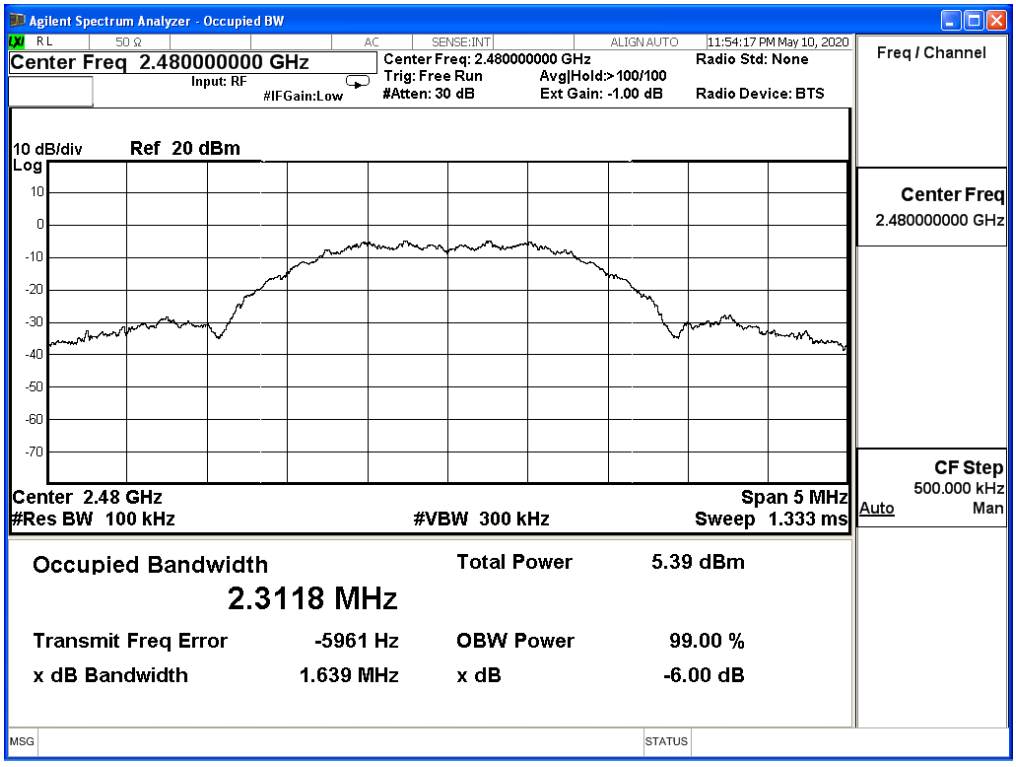
Channel 11 (2405MHz)



Channel 19 (2445MHz)

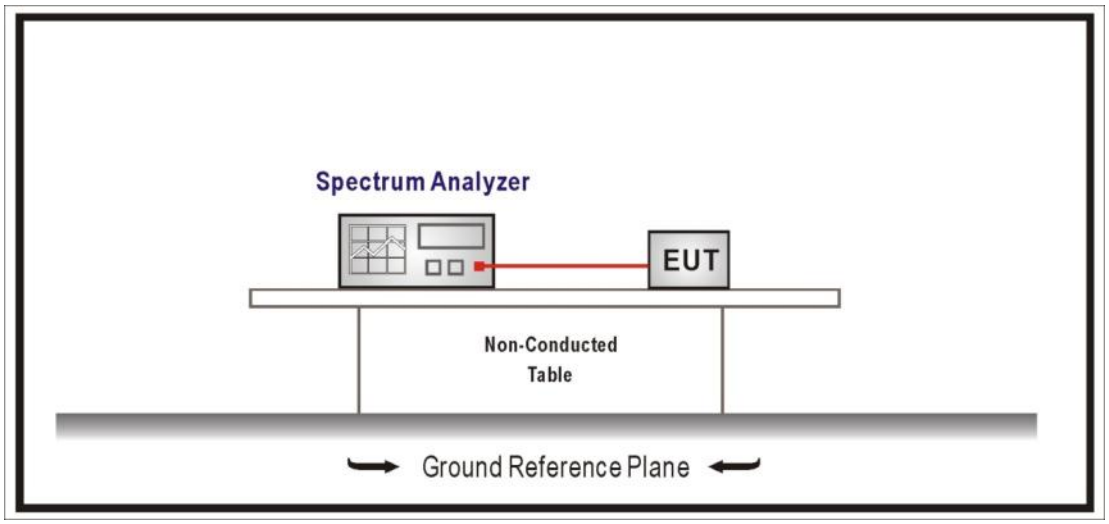


Channel 26 (2480MHz)



10. Power Density

10.1. Test Setup



10.2. Limits

The peak power spectral density conducted from the intentional radiated to the antenna shall not be greater than +8dBm in any 3kHz band during any time interval of continuous transmission.

10.3. Test Procedures

The EUT was setup according to ANSI C63.10: 2013; tested according to DTS test procedure of KDB 558074 D01 V05r02 for compliance to FCC 47CFR 15.247 requirements.
Set 3KHz ≦RBW≦100 kHz, Set VBW≧3xRBW, Sweep time=Auto, Set Peak detector.

10.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247: 2019

10.5. Uncertainty

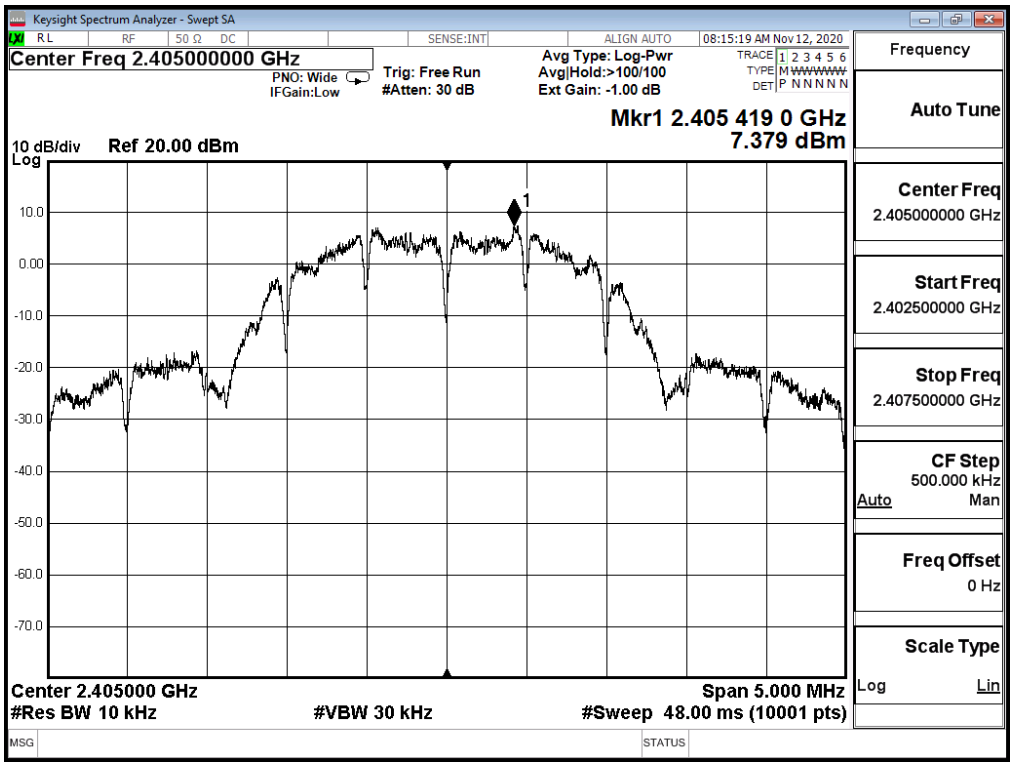
The measurement uncertainty is defined as ±1.27dB.

10.6. Test Result

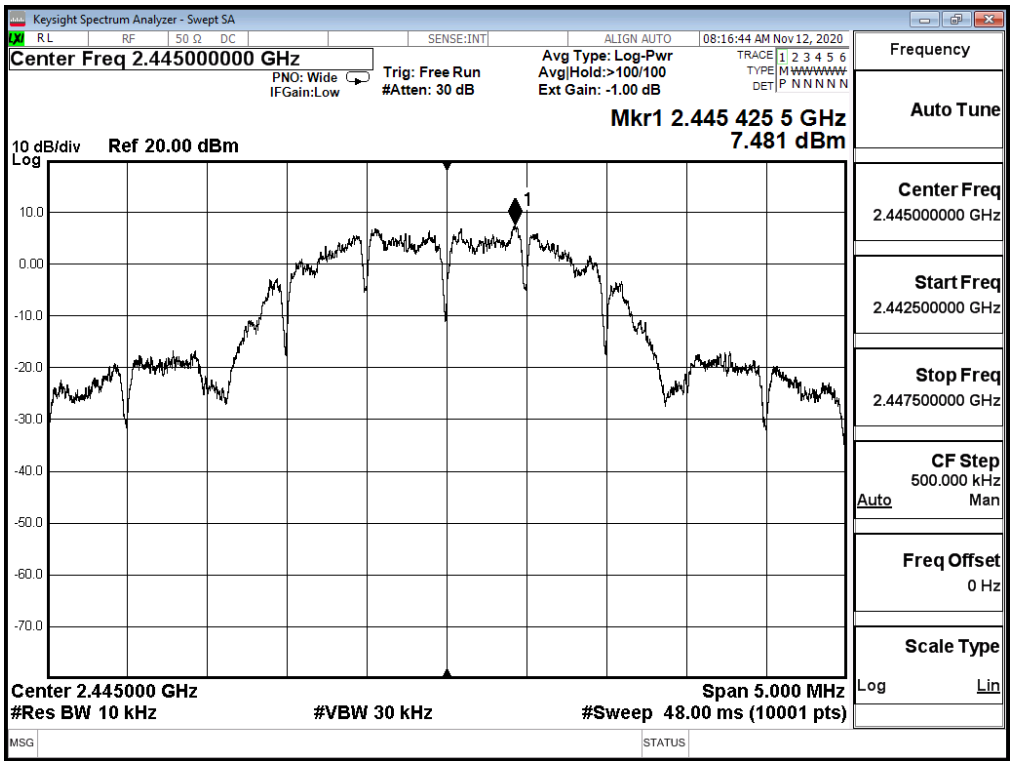
Product	Venation E2 IoT Gateway		
Test Item	Power Density		
Test Mode	Mode 1: Transmit		
Date of Test	2020/11/12	Test Site	SR12-H
Temperature(°C)	21.0	Humidity (%RH)	62.0

IEEE 802.15.1 _Zigbee				
Channel No.	Frequency (MHz)	Measure Level (dBm/RBW)	Limit (dBm/3kHz)	Result
11	2405	7.379	≦8	Pass
19	2445	7.481	≦8	Pass
26	2480	-11.824	≦8	Pass

Channel 11 (2405MHz)



Channel 19 (2445MHz)



Channel 26 (2480MHz)