

## FCC IC Test Report (NFC)

**Report No.:** FCC\_IC\_RF\_SL19061301-SFE-035\_NFC Rev\_2.0

**FCC ID:** 2AJWD-ERA2

**IC:** 22010-ERA2

**Test Model:** K400

**Received Date:** 06/15/2019

**Test Date:** 06/17/2019/-07/09/2019

**Issued Date:** 08/12/2019

**Applicant:** PAX Labs, Inc.

**Address:** 660 Alabama St. Second Floor, San Francisco, CA 94110, U.S.A.

**Manufacturer:** Wise Ally Holdings Ltd. (A member of Defond Group)

**Address:** Units 3203-3207, Tower 1, Enterprise Square Five, 38 Wang Chiu Road,  
Kowloon Bay, Hong Kong

**Issued By:** Bureau Veritas Consumer Products Services, Inc.

**Lab Address:** 775 Montague Expressway, Milpitas, CA 95035

**Test Location (1):** 775 Montague Expressway, Milpitas, CA 95035

**FCC Registration /  
Designation Number:** 540430

**ISED# / CAB identifier:** 4842D



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### Release Control Record

Issue No.	Description	Date Issued
FCC_IC_RF_SL19061301-SFE-035_NFC	Original Release	07/12/2019
FCC_IC_RF_SL19061301-SFE-035_NFC Rev_1.0	Update Applicant Name	07/30/2019
FCC_IC_RF_SL19061301-SFE-035_NFC Rev_2.0	Update Per Review	08/12/2019

## 1 Certificate of Conformity

**Product:** Electronic Vapor Device and Oil Pod

**Brand:** PAX

**Test Model:** K400

**Sample Status:** Engineering sample

**Applicant:** PAX Labs, Inc.

**Test Date:** 06/17/2019-07/01/2019

**Standards:** 47 CFR FCC Part 15, Subpart C (Section 15.225)

47 CFR FCC Part 15, Subpart C (Section 15.215)

47 CFR FCC Part 15, Subpart C (Section 15.203)

RSS-210 Issue 9, August 2016

ANSI C63.10: 2013

RSS-Gen Issue 5, March 2019

The above equipment has been tested by **Bureau Veritas Consumer Products Services, Inc., Milpitas Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**Prepared by :**



**Date:**

08/12/2019

Deon Dai / Test Engineer

**Approved by :**



**Date:**

08/12/2019

Chen Ge / Engineer Reviewer

## 2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.225) RSS 210 Issue9, RSS Gen Issue5			
FCC IC Clause	Test Item	Result	Remarks
15.207 RSS Gen 8.8	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -7.69 dB at 21.039 MHz.
15.225 (a)(b)(c) RSS 210 B.6.a/b/c	The field strength of any emissions	Pass	Meet the requirement of limit. Minimum passing margin is -41.53dB at 13.56MHz.
15.225 (d) 15.209 RSS Gen	Radiated Spurious Emission	Pass	Meet the requirement of limit.
15.225 (e) RSS 210 B.6	The frequency tolerance	Pass	Meet the requirement of limit.
15.215 (c) RSS Gen 6.7	20dB Bandwidth & 99% Bandwidth	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	-

### 2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	3.51dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	3.73dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

Product	Electronic Vapor Device and Oil Pod
Brand	PAX
Test Model	K400
Identification No. of EUT	N/A
Status of EUT	Engineering sample
Power Supply Rating	3.8Vdc Battery
Modulation Type	ASK
Operating Frequency	13.56 MHz
Antenna Type	Coil Antenna
Antenna Connector	N/A

### 3.2 Description of Test Modes

3.2.1 1 channel is provided to this EUT

Channel	Freq. (MHz)
1	13.56

3.2.2 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE	PLC	FS	EB	
A	-	-	-	√	Power from battery
B	√	√	√	-	Power from Adapter

Where RE: Radiated Emission

PLC: Power Line Conducted Emission

FS: Frequency Stability

EB: 20dB Bandwidth measurement

**NOTE:** The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane**.

**NOTE:** "-" means no effect.

#### Radiated Emission Test:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
B	1	1	ASK

#### Power Line Conducted Emission Test:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
B	1	1	ASK

#### Frequency Stability:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
B	1	1	ASK

#### Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE	25deg. C, 65%RH	120Vac, 60Hz	Deon Dai
PLC	25deg. C, 65%RH	120Vac, 60Hz	Deon Dai
FS	25deg. C, 68%RH	120Vac, 60Hz	Deon Dai
BW	21deg. C, 60%RH	120Vac, 60Hz	Deon Dai

### 3.3 Description of Support Units

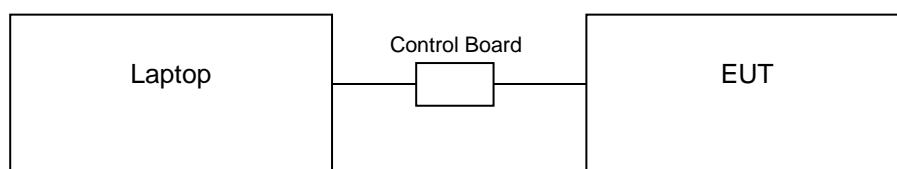
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	Apple	A1466	C1MR31G5G944	QDS-BRCM1072	Provided by Customer
B.	Control Board	-	K4 Dongle	Ver 3.0	-	Provided by Customer

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB console cable	1	0.8	N	0	Provided by Customer

Note: The core(s) is(are) originally attached to the cable(s).

#### 3.3.1 Configuration of System under Test



### 3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**47 CFR FCC Part 15, Subpart C (Section 15.225)**

**47 CFR FCC Part 15, Subpart C (Section 15.215)**

**RSS 210 Issue9, August 2016**

**ANSI C63.10:2013**

**RSS Gen Issue5, March 2019**

All test items have been performed and recorded as per the above standards.



## 4 Test Types and Results

### 4.1 Field Strength of Fundamental Emission and Radiated Spurious Emission

#### 4.1.1 Limits of Radiated Emission Measurement

The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

#### NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$   
Limit Line (dBuV/m) =  $20 \log \text{Emission level (uV/m)} + \text{Distance extrapolation factor}$
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

#### 4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
EMI Test Receiver ROHDE & SCHWARZ	ESIB 40	100179	08/28/2018	08/28/2019
Spectrum Analyzer KEYSIGHT	N9030B	MY57140374	07/22/2018	07/22/2019
Passive Loop Antenna (9k-30MHz)	6512	49120	07/14/2018	07/14/2019
Hybrid Antenna SUNAR	JB6	A111717	03/09/2019	03/09/2020
Preamplifier RF-BAY	LPA-6-30	11170602	05/06/2019	05/06/2020
Preamplifier RF-BAY	LNA-150	12170607	02/16/2019	02/16/2020

#### 4.1.3 Test Procedures

##### **For Radiated emission below 30MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

##### **NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30MHz.

##### **For Radiated emission above 30MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

##### **Note:**

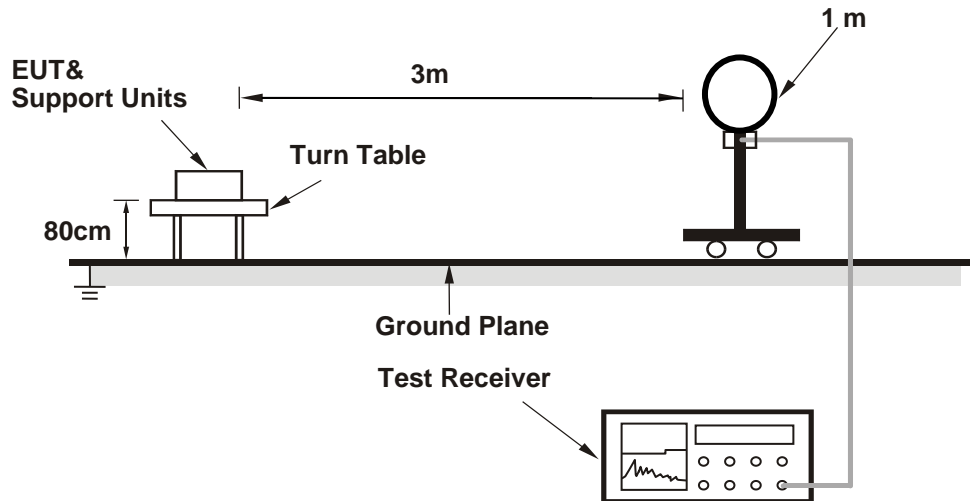
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle  $< 98\%$ ) or 10Hz (Duty cycle  $\geq 98\%$ ) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 Deviation from Test Standard

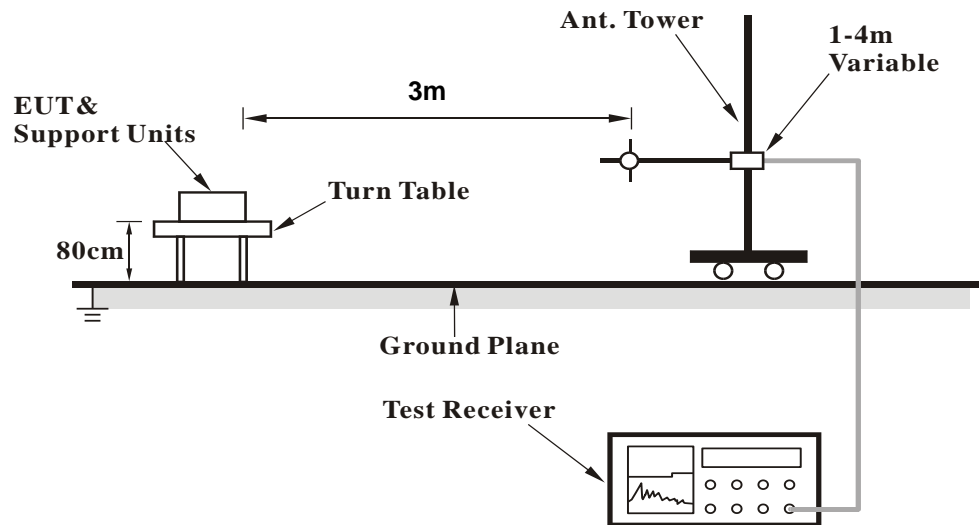
No deviation.

#### 4.1.5 Test Setup

##### For Radiated emission below 30MHz



##### For Radiated emission 30MHz to 1GHz



#### 4.1.6 EUT Operating Conditions

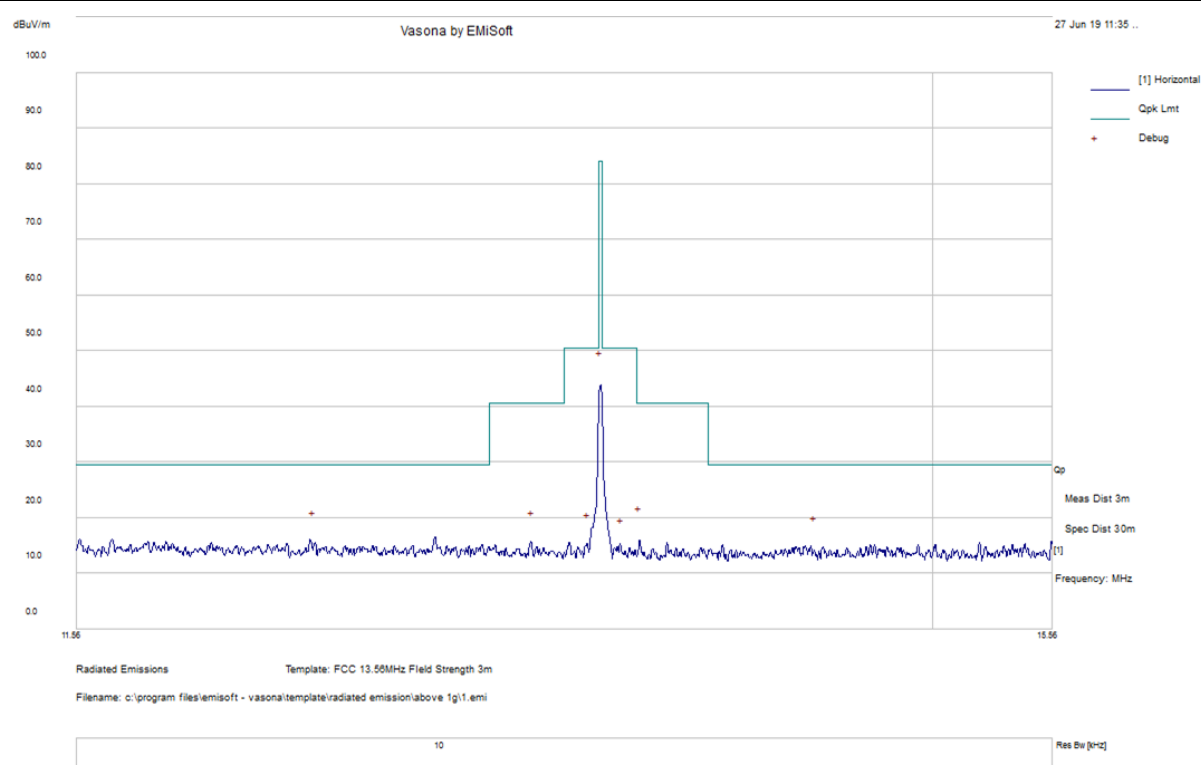
- Connected the EUT with the Notebook Computer which is placed on remote site.
- Controlling software has been activated to set the EUT on specific status.

#### 4.1.7 Test Results

### Field strength of Fundermental Emissions

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	13.553 ~ 13.567MHz
Input Power	120Vac, 60Hz	Detector Function	Quasi-Peak
Environmental Conditions	25 deg. C, 70% RH	Tested By	Deon Dai

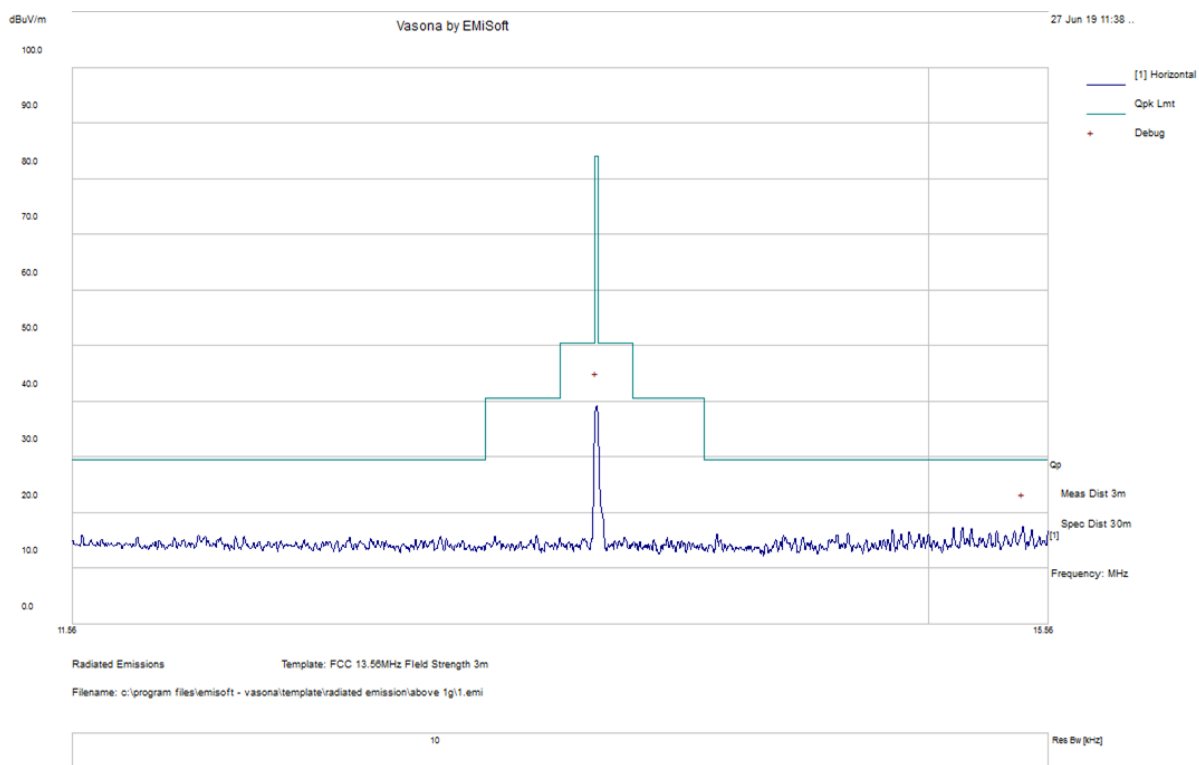
#### Antenna Polarity & Test Distance: Loop Antenna 0 degree At 3m



No	Freq. [MHz]	Raw (dBuV)	Cale Loss (dB)	AF (dB/m)	Level (dBuV/m)	Measurement Type	Pol	Hgt (cm)	Azt Deg	Limit (dBuV/m)	Margin (dB)	Pass /Fail
1	13.7225	9.6	0.85	1.68	12.13	Quasi Max	0	100	25	40.51	-28.38	Pass
2	13.56	39.96	0.84	1.67	42.47	Quasi Max	0	100	227	84	-41.53	Pass
3	12.427	8.87	0.82	1.6	11.29	Quasi Max	0	100	186	29.54	-18.25	Pass
4	13.279	9.77	0.84	1.67	12.28	Quasi Max	0	100	257	40.51	-28.23	Pass
5	14.472	6.82	0.86	1.67	9.35	Quasi Max	0	100	299	29.54	-20.19	Pass
6	13.508	7.82	0.84	1.66	10.32	Quasi Max	0	100	290	50.5	-40.18	Pass
	13.649	6.24	0.84	1.7	8.78	Quasi Max	0	100	126	50.5	-41.72	Pass

**Note: Test done is done at 3m distance, the level is converted to 30m spec accordingly.**

### Antenna Polarity & Test Distance: Loop Antenna 90 degree At 3m



No	Freq.	Raw	Cale Loss	AF	Level	Measurement Type	Pol	Hgt	Azt	Limit	Margin	Pass /Fail
	[MHz]	(dBuV)	(dB)	(dB/m)	(dBuV/m)			(cm)	Deg	(dBuV/m)	(dB)	
1	15.44	10.9	0.88	1.63	13.41	Quasi Max	90	100	0	29.54	-16.13	Pass
2	13.56	34.36	0.84	1.67	36.87	Quasi Max	90	100	0	84	-47.13	Pass

**Note:** Test is done at 3m distance, the level is converted to 30m spec accordingly.

## Radiated Sourious Emissions (9 kHz~30 MHz)

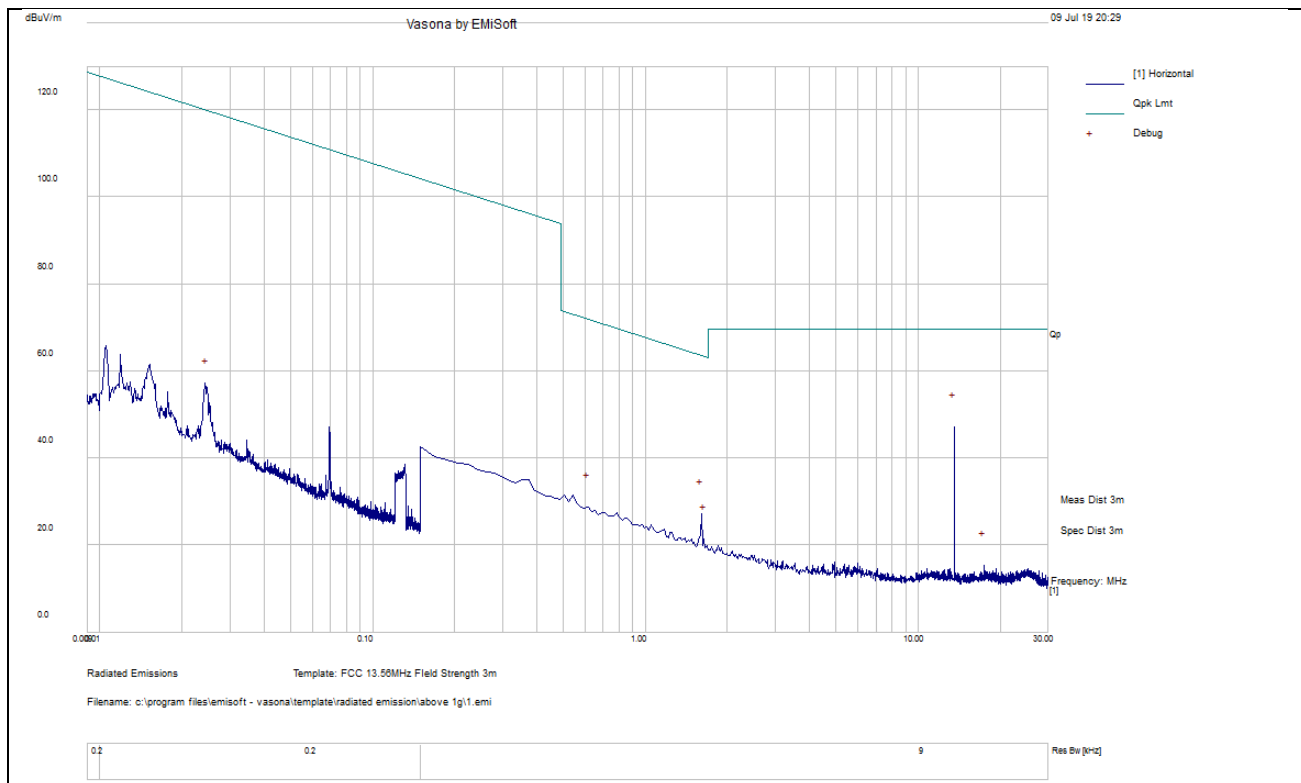
EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	13.553 ~ 13.567MHz
Input Power	120Vac, 60Hz	Detector Function	Quasi-Peak
Environmental Conditions	25 deg. C, 70% RH	Tested By	Deon Dai

### ANTENNA POLARITY & test distance: HORIZONTAL& VERTICAL at 3 m

No	Freq.	Raw	Cale Loss	AF	Level	Measurement Type	Pol	Hgt	Azt	Limit	Margin	Pass /Fail
	[MHz]	(dBuV)	(dB)	(dB/m)	(dBuV/m)			(cm)	Deg	(dBuV/m)	(dB)	
1	13.5638	44.57	0.84	1.67	47.08	Peak	0	100	0	69.54	-22.46	Pass
2	1.60518	17.42	0.56	9.17	27.16	Peak	0	100	0	63.49	-36.33	Pass
3	1.64252	11.71	0.56	8.99	21.27	Peak	0	100	0	63.29	-42.03	Pass
4	0.61640	11.53	0.46	16.67	28.67	Peak	0	100	0	71.81	-43.14	Pass
5	17.4256	13.04	0.91	1.3	15.25	Peak	0	100	0	69.54	-54.29	Pass
6	0.02451	9.47	0.11	45.36	54.94	Peak	0	100	4	119.82	-64.88	Pass

### REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Cable Loss (dB) + AF (dB)
2. AF (dB/m) = Antenna Factor (dB/m) – Preamplifier Gain (dB).
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.



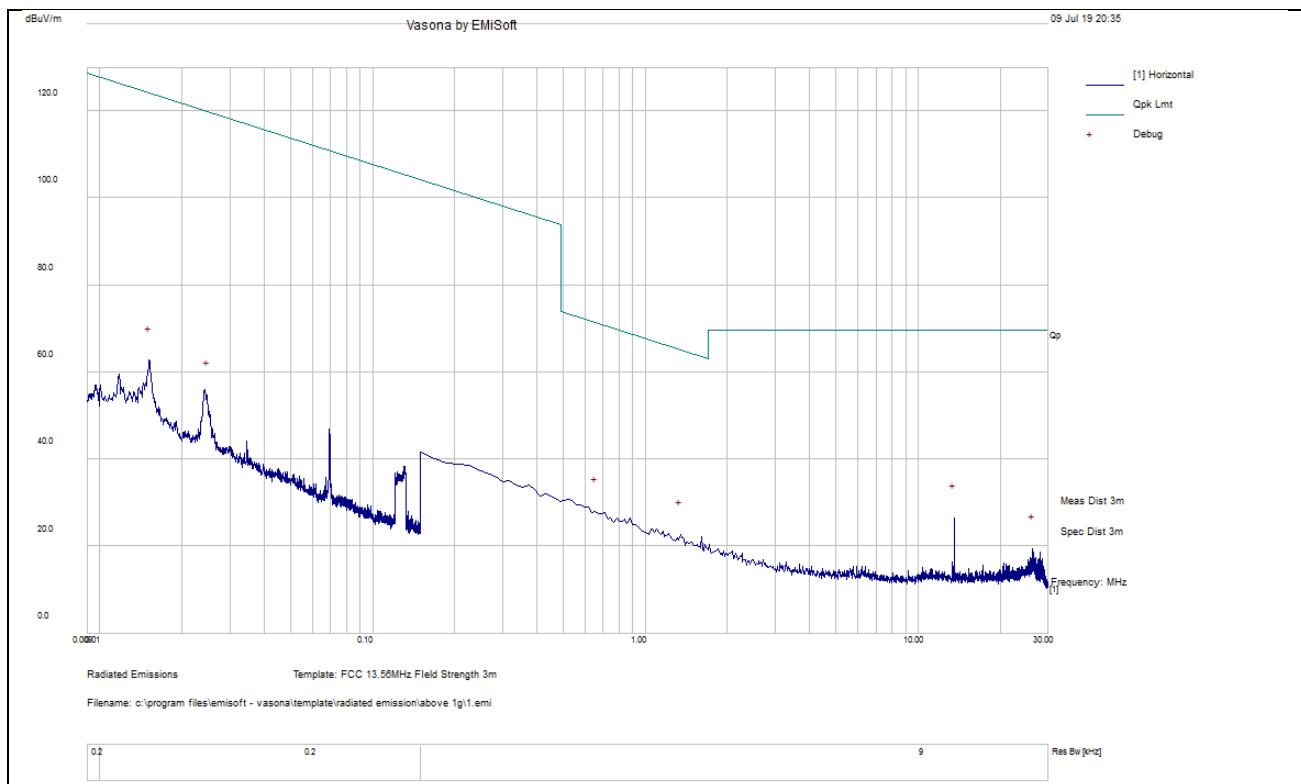
EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	Below 30MHz
Input Power	120Vac, 60Hz	Detector Function	Quasi-Peak
Environmental Conditions	25 deg. C, 70% RH	Tested By	Deon Dai

#### ANTENNA POLARITY & test distance: HORIZONTAL & VERTICAL at 3 m

No	Freq.	Raw	Cable Loss	AF	Level	Measurement Type	Pol	Hgt	Azt	Limit	Margin	Pass /Fail
	[MHz]	(dBuV)	(dB)	(dB/m)	(dBuV/m)			(cm)	Deg	(dBuV/m)	(dB)	
1	1.344	11.5	0.54	10.52	22.57	Peak	90	100	0	65.04	-42.47	Pass
2	13.5638	23.92	0.84	1.67	26.42	Peak	90	100	0	69.54	-43.12	Pass
3	0.65371	11.24	0.46	16.23	27.94	Peak	90	100	0	71.3	-43.36	Pass
4	26.3620	17.05	1.06	1.31	19.42	Peak	90	100	0	69.54	-50.12	Pass
5	0.01524	13.64	0.06	48.76	62.46	Peak	90	100	357	123.94	-61.48	Pass
6	0.02470	9.33	0.11	45.29	54.73	Peak	90	100	357	119.75	-65.02	Pass

#### REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Cable Loss (dB) + AF (dB)
2. AF (dB/m) = Antenna Factor (dB/m) – Preamplifier Gain (dB).
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.





## Radiated Spurious Emissions (30 MHz~1000 MHz)

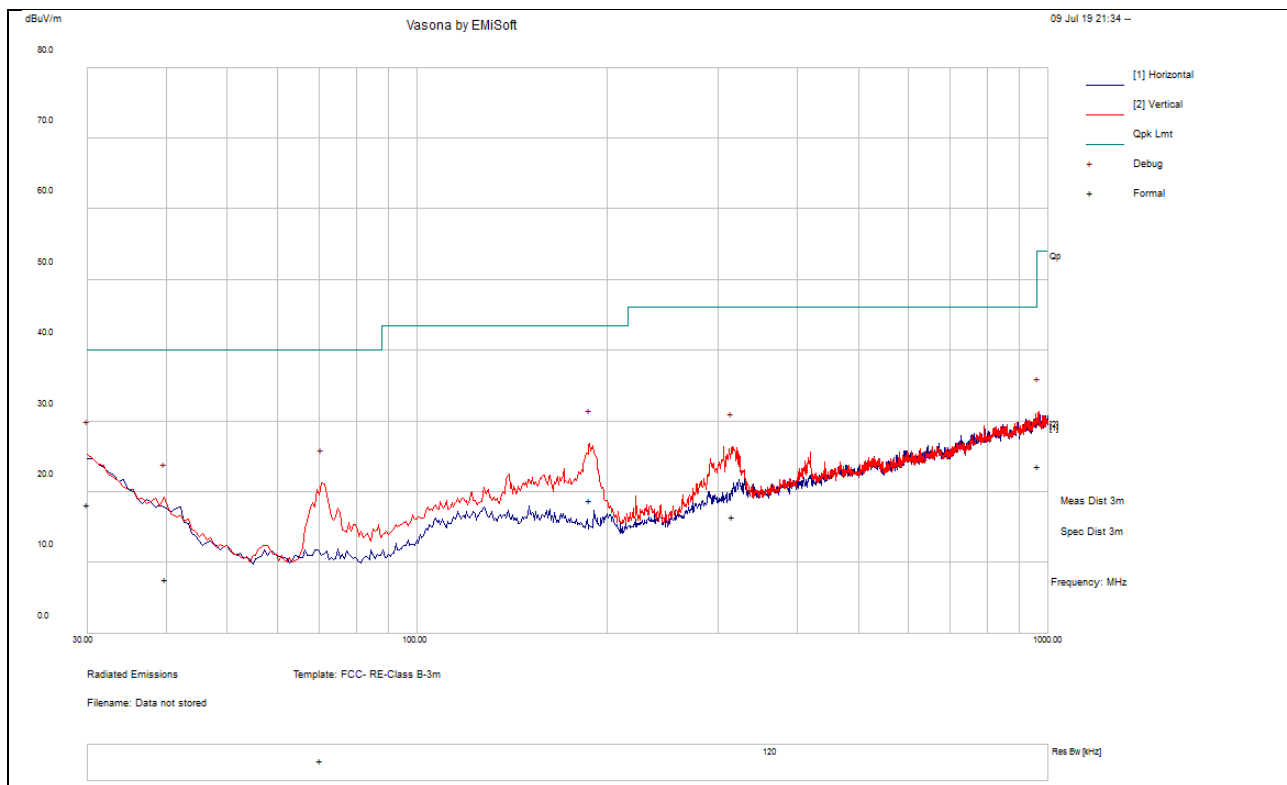
EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	13.553 ~ 13.567MHz
Input Power	120Vac, 60Hz	Detector Function	Quasi-Peak
Environmental Conditions	25 deg. C, 70% RH	Tested By	Deon Dai

### ANTENNA POLARITY & test distance: HORIZONTAL& VERTICAL at 3 m

No	Freq.	Raw	Cable Loss	AF	Level	Measurement Type	Pol	Hgt	Azt	Limit	Margin	Pass /Fail
	[MHz]	(dBuV)	(dB)	(dB/m)	(dBuV/m)			(cm)	Deg	(dBuV/m)	(dB)	
1	30	18.62	11.12	-11.48	18.26	Quasi Max	V	319	59	40	-21.74	Pass
2	187.816	31.66	12.5	-25.25	18.92	Quasi Max	V	112	24	43.5	-24.58	Pass
3	70.3984	-1.99	11.58	-27.53	-17.94	Quasi Max	V	302	276	40	-57.94	Pass
4	315.773	24.95	13.32	-21.74	16.53	Quasi Max	V	208	345	46	-29.47	Pass
5	39.8684	16.19	11.3	-19.72	7.77	Quasi Max	V	182	242	40	-32.23	Pass
6	965.516	19.81	16.05	-12.17	23.69	Quasi Max	V	258	239	54	-30.31	Pass

### REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Cable Loss (dB) + AF (dB)
2. AF (dB/m) = Antenna Factor (dB/m) – Preamplifier Gain (dB).
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.



## 4.2 Conducted Emission Measurement

### 4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

### 4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
EMI Test Receiver ROHDE & SCHWARZ	ESIB 40	100179	08/28/2018	08/28/2019
Transient Limiter ELECTRO-METRICS	EM-7600-5	106	12/31/2018	12/31/2019
LISN EMCO	3816/2NM	214372	01/10/2019	01/10/2020

### 4.2.3 Test Procedures

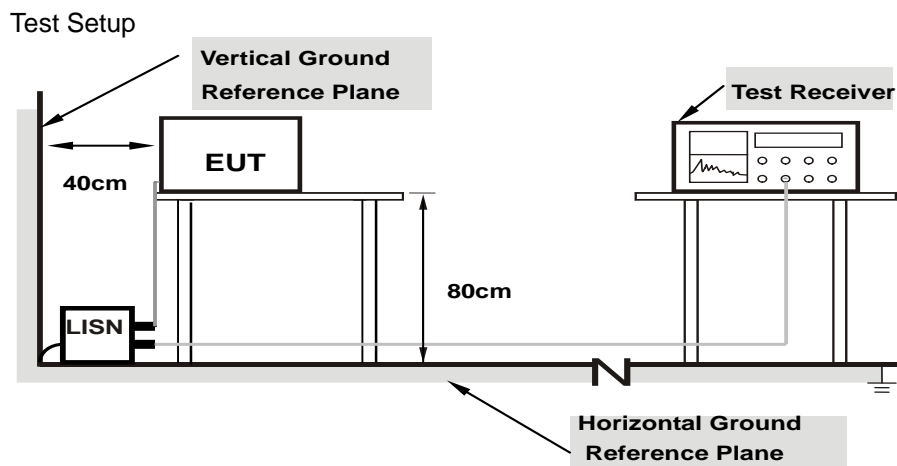
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

**NOTE:** The resolution bandwidth and video bandwidth of test receiver is 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

### 4.2.4 Deviation from Test Standard

No deviation.

#### 4.2.5



**Note: 1.Support units were connected to second LISN.**

For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.2.6 EUT Operating Conditions

Same as 4.1.6.

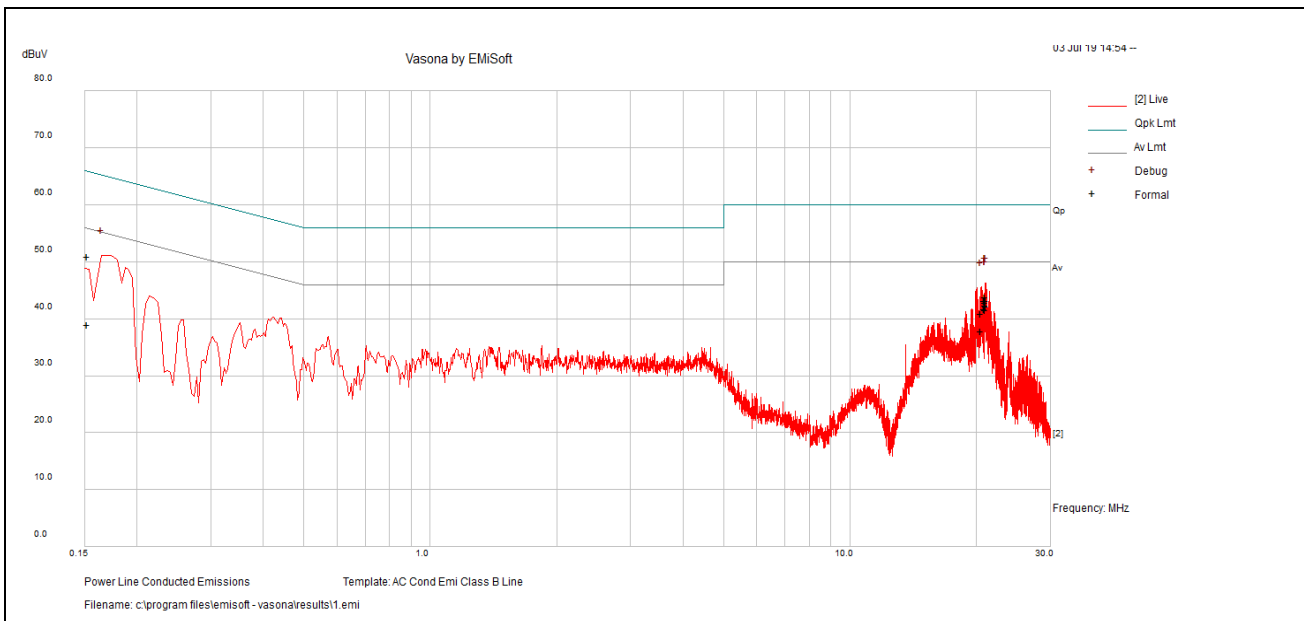
#### 4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak / Average
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No	Freq. [MHz]	Raw (dBuV)	Cale Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line	Limit (dBuV)	Margin (dB)	Pass /Fail
1	21.039	34.47	8.9	0.48	43.85	Quasi Peak	Live	60	-16.15	Pass
2	21.120	33.74	8.91	0.48	43.13	Quasi Peak	Live	60	-16.87	Pass
3	0.153	43.73	7.12	0.05	50.89	Quasi Peak	Live	65.86	-14.97	Pass
4	21.081	33.46	8.91	0.48	42.85	Quasi Peak	Live	60	-17.15	Pass
5	20.999	33.75	8.9	0.48	43.13	Quasi Peak	Live	60	-16.87	Pass
6	20.560	28.5	8.91	0.47	37.88	Quasi Peak	Live	60	-22.12	Pass
7	21.039	32.93	8.9	0.48	42.31	Average	Live	50	-7.69	Pass
8	21.120	32.77	8.91	0.48	42.16	Average	Live	50	-7.84	Pass
9	0.153	31.76	7.12	0.05	38.92	Average	Live	55.86	-16.94	Pass
10	21.081	32.15	8.91	0.48	41.54	Average	Live	50	-8.46	Pass
11	20.999	32.38	8.9	0.48	41.75	Average	Live	50	-8.25	Pass
12	20.560	31.54	8.91	0.47	40.92	Average	Live	50	-9.08	Pass

#### REMARKS:

1. The emission levels of other frequencies were very low against the limit.
2. Margin value = Emission level - Limit value
3. Emission Level = Correction Factor + Raw Value + Factors Value.

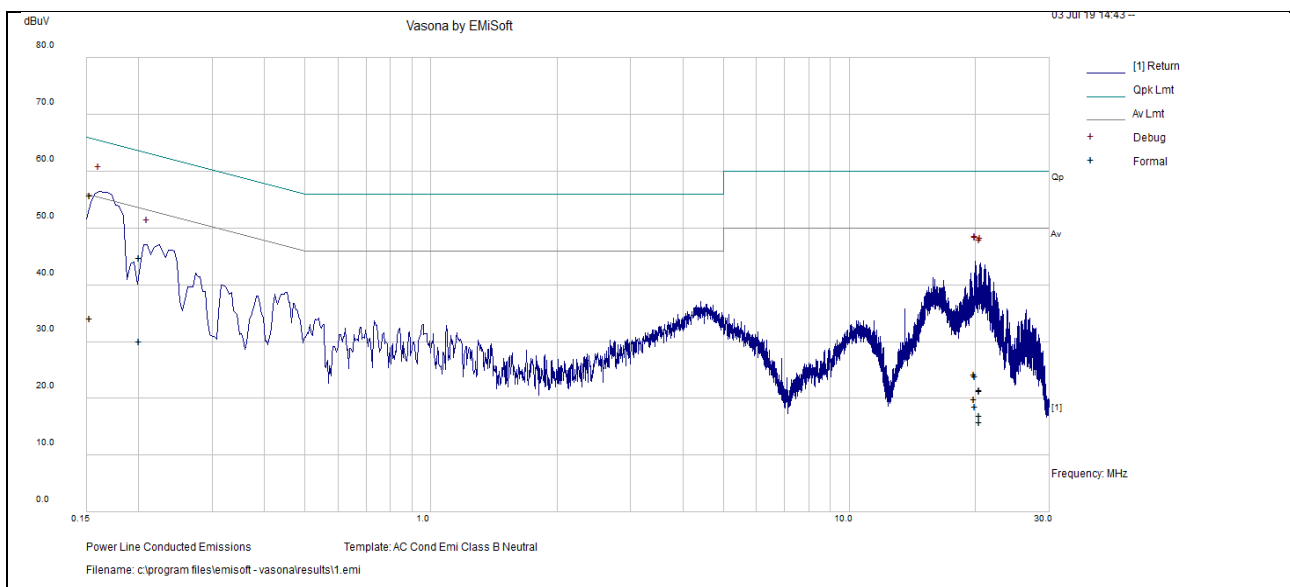


Phase	Neutral (N)	Detector Function	Quasi-Peak / Average
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No	Freq.	Raw	Cale Loss	Factors	Level	Measurement Type	Line	Limit	Margin	Pass /Fail
	[MHz]	(dBuV)	(dB)	(dB)	(dBuV)			(dBuV)	(dB)	
1	0.153	48.58	7.12	0.04	55.74	Quasi Peak	Return	65.82	-10.08	Pass
2	20.000	14.9	8.93	0.43	24.26	Quasi Peak	Return	60	-35.74	Pass
3	20.054	14.56	8.93	0.43	23.92	Quasi Peak	Return	60	-36.08	Pass
4	0.201	37.54	7.17	0.04	44.75	Quasi Peak	Return	63.58	-18.83	Pass
5	20.595	11.96	8.91	0.46	21.34	Quasi Peak	Return	60	-38.66	Pass
6	20.557	12.19	8.91	0.46	21.56	Quasi Peak	Return	60	-38.44	Pass
7	0.153	27.03	7.12	0.04	34.18	Average	Return	55.82	-21.64	Pass
8	20.000	10.46	8.93	0.43	19.82	Average	Return	50	-30.18	Pass
9	20.054	9.28	8.93	0.43	18.64	Average	Return	50	-31.36	Pass
10	0.201	22.92	7.17	0.04	30.13	Average	Return	53.58	-23.45	Pass
11	20.595	7.53	8.91	0.46	16.9	Average	Return	50	-33.1	Pass
12	20.557	6.5	8.91	0.46	15.88	Average	Return	50	-34.12	Pass

#### REMARKS:

1. The emission levels of other frequencies were very low against the limit.
2. Margin value = Emission level - Limit value
3. Emission Level = Correction Factor + Raw Value + Factors Value.

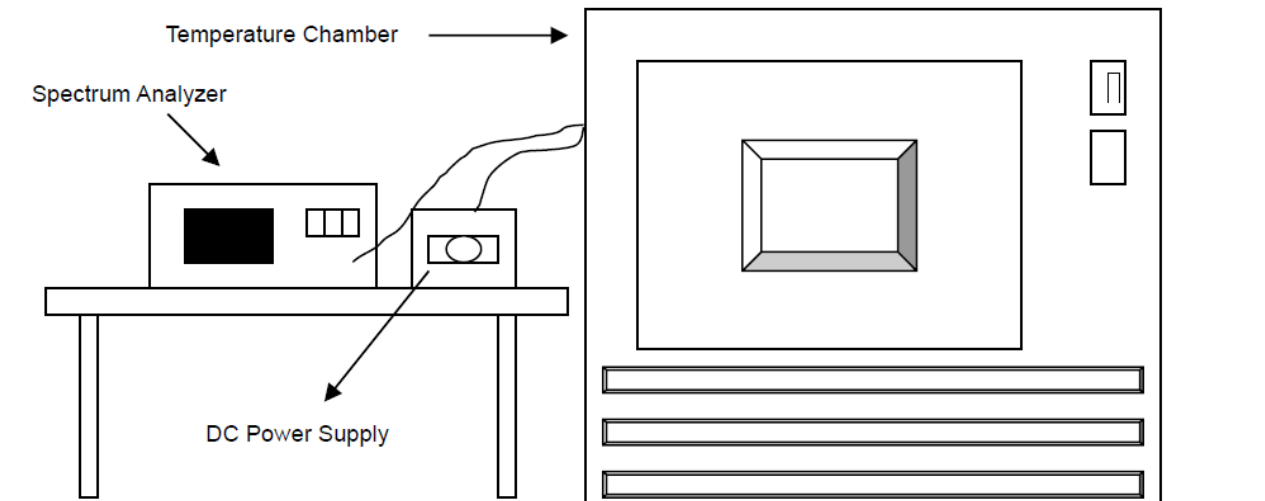


### 4.3 Frequency Stability

#### 4.3.1 Limits of Frequency Stability Measurement

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency over a temperature variation of  $-20$  degrees to  $50$  degrees C at normal supply voltage, and for a variation in the primary supply voltage from  $85\%$  to  $115\%$  of the rated supply voltage at a temperature of  $20$  degrees C.

#### 4.3.2 Test Setup



#### 4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

#### 4.3.4 Test Procedure

- The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
- Turned the EUT on and coupled its output to a spectrum analyzer.
- Turned the EUT off and set the chamber to the highest temperature specified.
- Allowed sufficient time (approximately 30 min) for the temperature of the chamber to stabilize then turned the EUT on and measured the operating frequency after 2, 5, and 10 minutes.
- Repeated step 2 and 3 with the temperature chamber set to the lowest temperature.
- The test chamber was allowed to stabilize at  $+20$  degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from  $85\%$  to  $115\%$  and the frequency record.

#### 4.3.5 Deviation from Test Standard

No deviation.

#### 4.3.6 EUT Operating Conditions

Same as Item 4.1.6.

#### 4.3.7 Test Result

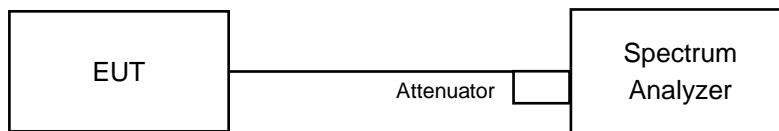
Frequency Stability Versus Temp.				
TEMP. (°C)	Power Supply (Vdc)	Measured Frequency (MHz)	Frequency Dev. (Hz)	Deviation (%)
50	3.8	13.56005	50	0.000369
40		13.55997	-30	-0.000221
30		13.55998	-20	-0.000147
20		13.56004	40	0.000295
10		13.56004	40	0.000295
0		13.56003	30	0.000221
-10		13.55998	-20	-0.000147
-20		13.56004	40	0.000295
20	3.23	13.55997	-30	-0.000221
	4.37	13.56002	20	0.000147

#### 4.4 20dB & 99% Bandwidth

##### 4.4.1 Limits of 20dB Bandwidth Measurement

The 20dB bandwidth shall be specified in operating frequency band.

##### 4.4.2 Test Setup



##### 4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

##### 4.4.4 Test Procedures

The bandwidth of the fundamental frequency was measured by spectrum analyzer with 1kHz RBW and 3kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

##### 4.4.5 Deviation from Test Standard

No deviation.

##### 4.4.6 EUT Operating Conditions

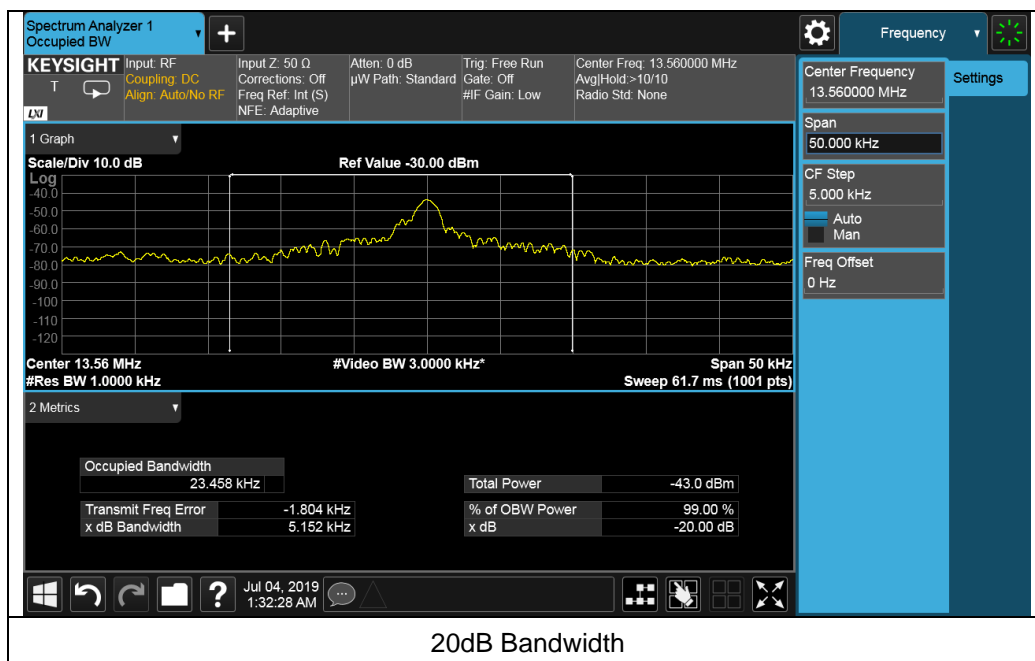
Same as Item 4.1.6.



#### 4.4.7 Test Results

Frequency (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)
13.56	5.152	23.458

Test Plots:



## 4.5 Antenna Requirement

### 4.5.1 Standard Applicable

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.

Antenna requirement must meet at least one of the following:

- a) Antenna must be permanently attached to the device.
- b) The antenna must use a unique type of connector to attach to the device.
- c) Device must be professionally installed. The installer shall be responsible for ensuring that the correct antenna is employed by the device.

Result: The EUT uses an embedded-in antenna which meet the requirement.

## 5 Pictures of Test Arrangements

Please see setup photo file.

## Appendix – Information on the Testing Laboratories

Bureau Veritas is a global leader in testing, inspection and certification (TIC) services. We help businesses improve safety, sustainability and productivity; and our clients include the majority of leading brands in retail, manufacturing and other industries. With a presence in every major country around the world, our quality assurance and compliance solutions are vital in helping our customers enhance product quality and concept-to-consumer journeys. We also assist with increasing speed to market, profitability and brand equity throughout the supply chain. Bureau Veritas is a leading wireless/IoT testing, inspection, audit and certification provider, with a global network of test laboratories to support the IoT industry in areas of connectivity, security, interoperability as well as quality, health & safety, and environmental/chemical requirements.

If you have any comments, please feel free to contact us at the following:

**Milpitas EMC/RF/Safety/Telecom Lab**

775 Montague Expressway, Milpitas, CA 95035

Tel: +1 408 526 1188

**Sunnyvale OTA/Bluetooth Lab**

1293 Anvilwood Avenue, Sunnyvale, CA

94089

Tel: +1 669 600 5293

**Littleton EMC/RF/Safety/Environmental Lab**

1 Distribution Center Cir #1, Littleton, MA 01460

Tel: +1 978 486 8880

**Irvine OTA/PTCRB/Bluetooth/V2X Lab**

15 Musick, Irvine, CA 92618

Tel: +1 949 716 6512

**Email:** [sales.eaw@us.bureauveritas.com](mailto:sales.eaw@us.bureauveritas.com)

**Web Site:** [www.cpsusa-bureauveritas.com](http://www.cpsusa-bureauveritas.com)

The address and road map of all our labs can be found in our web site also.

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