



## MEASUREMENT REPORT

### FCC PART 15.407 / RSS-247 WLAN 802.11a/n

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**FCC ID:** 2ACS5-YUNMQA  
**IC:** 11554B-YUNMQA  
**APPLICANT:** Yuneec Technology Co., Limited

**Application Type:** Class II Permissive Change  
**Product:** Mantis Q  
**Model No.:** YUNMQA  
**Brand Name:** YUNEEC  
**FCC Classification:** Unlicensed National Information Infrastructure (U-NII)  
**FCC Rule Part(s):** Part 15.407  
**IC Rule(s):** RSS-247 Issue 2, RSS-GEN Issue 5  
**Test Procedure(s):** ANSI C63.10-2013, KDB 789033 D02v02r01  
**Test Date:** March 20 ~ November 15, 2018

Reviewed By:

*Paddy Chen*

( Paddy Chen )

Approved By:

*Chenz Ker*

( Chenz Ker )



Testing Laboratory  
3261

The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB 789033 D02v02r01. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Taiwan) Co., Ltd.

## Revision History

Report No.	Version	Description	Issue Date	Note
1811TW0103-U1	Rev. 01	Initial Report	11-16-2018	Valid

Note: This report is prepared for FCC Class II permissive change and supplement to MRT Original "1804TW0107-U1" report changing antenna position, others are same as original. We reassessed the radiated spurious emission and band edge again.

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## §2.1033 General Information

<b>Applicant:</b>	Yunee Technology Co., Limited
<b>Applicant Address:</b>	Unit 2301, 23/F, 9 Chong Yip Street, Kwun Tong, Kowloon, Hong Kong.
<b>Manufacturer:</b>	Yunee International (China) Co., Ltd.
<b>Manufacturer Address:</b>	No.388 East Zhengwei Road, Jinxi Town, Kunshan, Jiangsu 215324, China
<b>Test Site:</b>	MRT Technology (Taiwan) Co., Ltd
<b>Test Site Address:</b>	No. 38, Fuxing Second Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C)
<b>FCC Registration No.:</b>	153292
<b>IC Registration No.:</b>	21723-1
<b>Test Device Serial No.:</b>	N/A <input type="checkbox"/> Production <input checked="" type="checkbox"/> Pre-Production <input type="checkbox"/> Engineering

### Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Fuxing Rd., Taoyuan, Taiwan ( R.O.C )

- MRT facility is a FCC registered (Reg. No. 153292) test facility with the site description report on file and is designated by the FCC as an Accredited Test Film.
- MRT facility is an IC registered (MRT Reg. No. 21723-1) test laboratory with the site description on file at Industry Canada.
- MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (TAF) under the American Association for Laboratory Accreditation Program (TAF Cert. No. 3261) in EMC, Telecommunications and Radio testing for FCC, Industry Taiwan, EU and TELEC Rules.

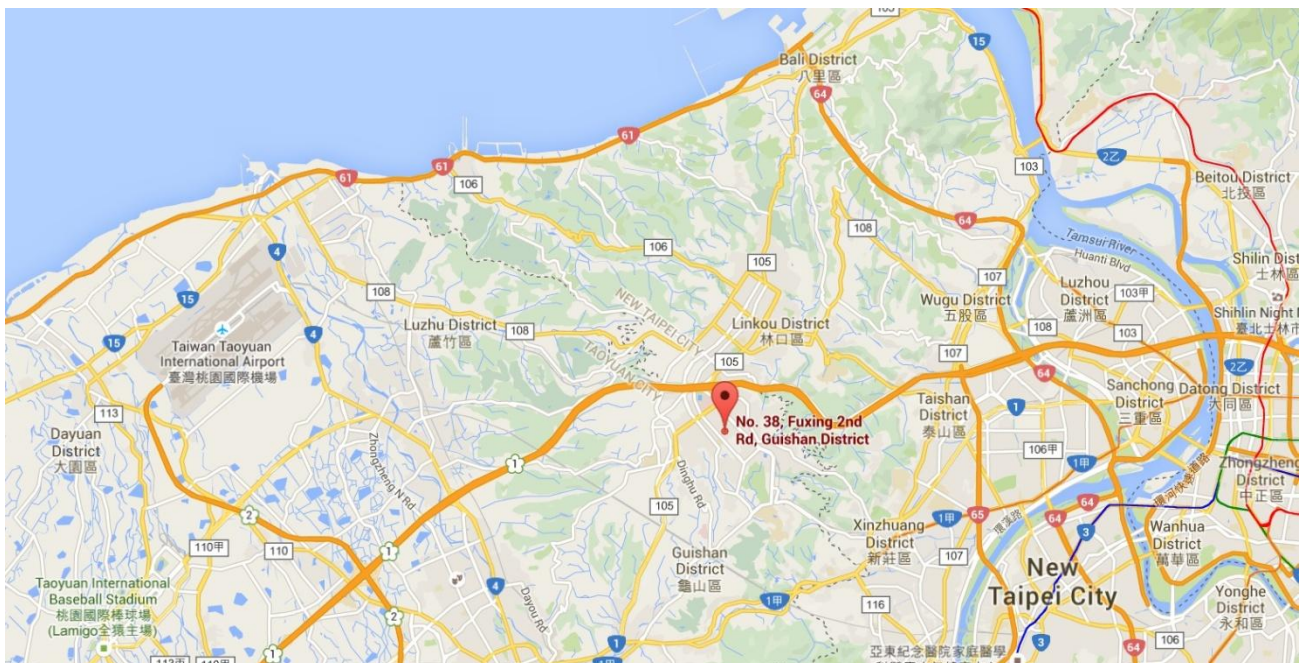
## 1. INTRODUCTION

### 1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

### 1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taoyuan City. These measurement tests were conducted at the MRT Technology (Taiwan) Co., Ltd. Facility located at No.38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 33377, Taiwan (R.O.C).



## 2. PRODUCT INFORMATION

### 2.1. Equipment Description

Product Name:	Mantis Q
Model No.:	YUNMQA
Wi-Fi Specification:	802.11a/n-HT20
Battery Specification:	11.4V, 2800mAh

### 2.2. Product Specification Subjective to this Report

Frequency Range:	802.11a/n-HT20: 5180~5240MHz, 5745~5825MHz
Type of Modulation:	802.11a/n-HT20: OFDM
Data Rate:	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n-HT20: up to 72.2Mbps

### 2.3. Working Frequencies for this report

802.11a/n-HT20

Channel	Frequency	Channel	Frequency	Channel	Frequency
36	5180 MHz	40	5200 MHz	44	5220 MHz
48	5240 MHz	149	5745 MHz	153	5765 MHz
157	5785 MHz	161	5805 MHz	165	5825 MHz

**Note: For the 5150 ~ 5250MHz band, the device can't use it when market on Canada.**

### 2.4. Description of Available Antennas

Antenna Type	Manufacturer	Frequency Band (MHz)	Max Peak Gain (dBi)
PCB Antenna	INPAQ TECHNOLOGY CO., LTD.	5180 ~ 5240	1.60
		5745 ~ 5825	2.32

### 2.5. Test Mode

Test Mode	Mode 1: Transmit by 802.11a (6Mbps)
	Mode 2: Transmit by 802.11n-HT20 (MCS0)

## 2.6. Description of Test Software

The test utility software used during testing was engineering directive ordered by applicant.

Mode	Channel No.	Frequency (MHz)	Power Parameter Value
802.11a	36	5180	40
	44	5220	40
	48	5240	41
	149	5745	40
	157	5785	39
	165	5825	39
802.11n-HT20	36	5180	44
	44	5220	44
	48	5240	44
	149	5745	44
	157	5785	43
	165	5825	45



### 2.7. Device Capabilities

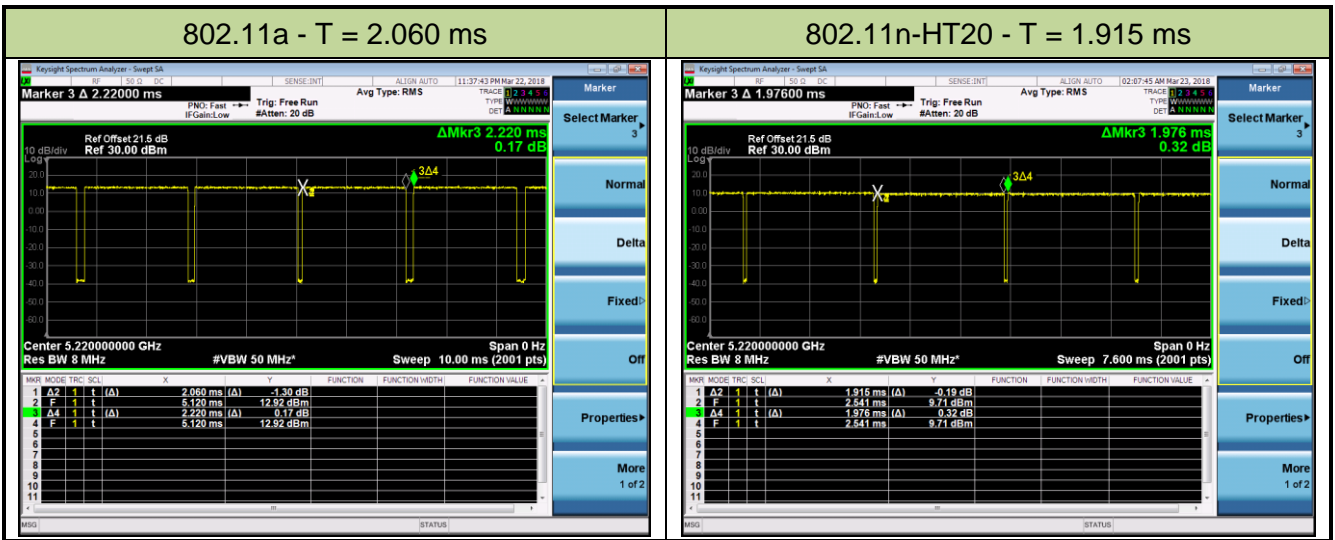
This device contains the following capabilities:

5GHz WLAN (U-NII)

**Note:** 5GHz (UNII) operation is possible in 20MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz.

The duty cycles are as follows:

Test Mode	Duty Cycle
802.11a	92.79 %
802.11n-HT20	96.91 %



### 2.8. Test Configuration

The device was tested per the guidance of KDB 789033 D02v02r01. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

### 2.9. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

## **2.10. Labeling Requirements**

### Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase.

However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

### RSP-100 Issue 11 Section 3

The manufacturer, importer or distributor shall meet the labelling requirements set out in this section for every unit:

- (i) prior to marketing in Canada, for products manufactured in Canada
- (ii) prior to importation into Canada, for imported products

For information regarding the e-labelling option, see Notice 2014–DRS1003. The label for the certified product represents the manufacturer's or importer's compliance with Innovation, Science and Economic Development Canada's (ISED) regulatory requirements.

Please see attachment for IC label and label location.

### 3. DESCRIPTION OF TEST

#### 3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013), and the guidance provided in KDB 789033 D02v02r01 were used in the measurement.

**Deviation from measurement procedure.....None**

#### 3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions are used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.

### 3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-40GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB Beam-Width of horn antenna, the horn antenna should be always directed to the EUT when rising height.

## 4. ANTENNA REQUIREMENTS

### Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 antenna of the **Mantis Q** is **permanently attached**.
- There are no provisions for connection to an external antenna.

### Conclusion:

The unit complies with the requirement of §15.203.

## 5. TEST EQUIPMENT CALIBRATION DATE

### Radiated Emissions - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Signal Analyzer	R&S	FSV40	MRTTWA00007	1 year	2019/03/02
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2019/03/16
Broadband Preamplifier	SCHWARZBECK	BBV 9718	MRTTWA00005	1 year	2019/04/06
Broadband Amplifier	SCHWARZBECK	BBV 9721	MRTTWA00006	1 year	2019/04/06
Active Loop Antenna	SCHWARZBECK	FMZB 1519B	MRTTWA00002	1 year	2019/04/06
Broadband TRILOG Antenna	SCHWARZBECK	VULB 9162	MRTTWA00001	1 year	2019/04/06
Broadband Hornantenna	SCHWARZBECK	BBHA 9120D	MRTTWA00003	1 year	2019/04/06
Breitband Hornantenna	SCHWARZBECK	BBHA 9170	MRTTWA00004	1 year	2019/04/06
Temperature/Humidity Meter	TFA	35.1078.10.IT	MRTTWA00033	1 year	2019/06/08

Software	Version	Function
e3	V 8.3.5	EMI Test Software

## 6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .

Radiated Emission Measurement - AC1
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Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ): $\pm 4.22\text{dB}$
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## 7. TEST RESULT

### 7.1. Summary

**Company Name:** Yuneec Technology Co., Limited  
**FCC ID:** 2ACS5-YUNMQA  
**IC:** 11554B-YUNMQA

FCC Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.407(b)(1), (4)(i)	Undesirable Emissions	Detail see section 7.2	Radiated	Pass	Section 7.2
15.205, 15.209 15.407(b)(5), (6), (7)	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		Pass	Section 7.3

RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
RSS-247 §6.2.4	Out-of-Band Emissions	Refer to section 7.2	Radiated	Pass	Section 7.2
RSS-247 §6.2.4	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in RSS-Gen [8.9]		Pass	Section 7.3

**Note:** All channels, modes, and modulations/data rates were investigated among all U-NII bands. The test results shown in the following sections represent the worst case emissions.



## 7.2. Radiated Spurious Emission Measurement

### 7.2.1. Test Limit

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.25 GHz band shall not exceed an e.i.r.p. of  $-27$  dBm/MHz.

For transmitters operating in the 5.725-5.85 GHz band:

All emissions shall be limited to a level of  $-27$  dBm/MHz at 75 MHz or more above or below the band edge.

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

All out of band emissions appearing in a restricted band as specified in Section 8.10 of the RSS-Gen Issue 5 must not exceed the limits shown in Table per Section 8.9.

FCC Part 15 Subpart C Paragraph 15.209 & RSS-Gen Issue5 Section 8.9		
Frequency [MHz]	Field Strength [ $\mu$ V/m]	Measured Distance [Meters]
0.009 – 0.490	2400/F (kHz)	300
0.490 – 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

### 7.2.2. Test Procedure Used

ANSI C63.10 Section 6.3 (General Requirements)

ANSI C63.10 Section 6.4 (Standard test method below 30MHz)

ANSI C63.10 Section 6.5 (Standard test method above 30MHz to 1GHz)

ANSI C63.10 Section 6.6 (Standard test method above 1GHz)

### **7.2.3. Test Setting**

#### **Quasi-Peak & Average Measurements below 30MHz**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = 200Hz for 9kHz to 150kHz frequency; RBW = 9kHz for 0.15MHz to 30MHz frequency
4. Detector = CISPR quasi-peak or power average (Average)
5. Sweep time = auto couple
6. Trace was allowed to stabilize

#### **Quasi-Peak Measurements below 1GHz**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = 120 kHz
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

#### **Peak Measurements above 1GHz**

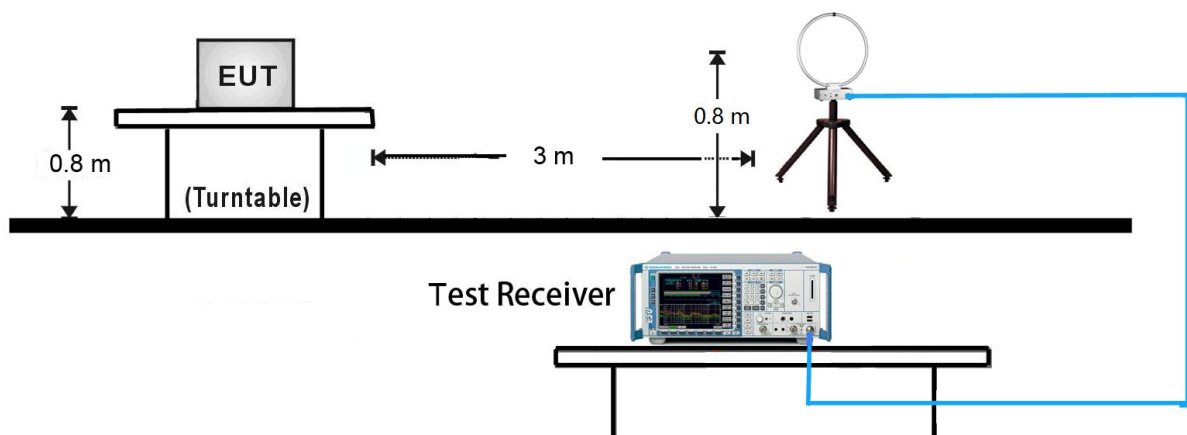
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

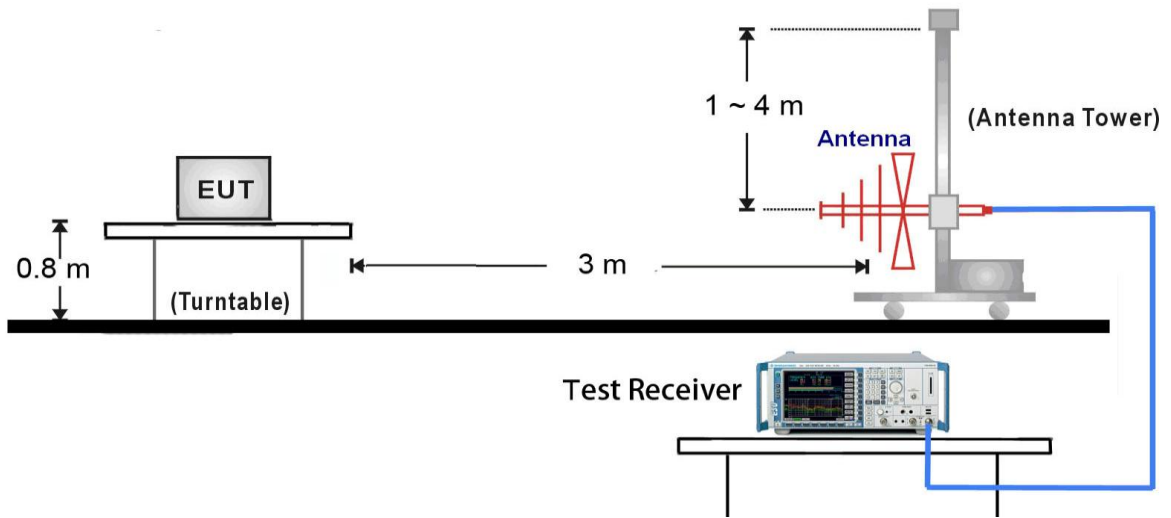
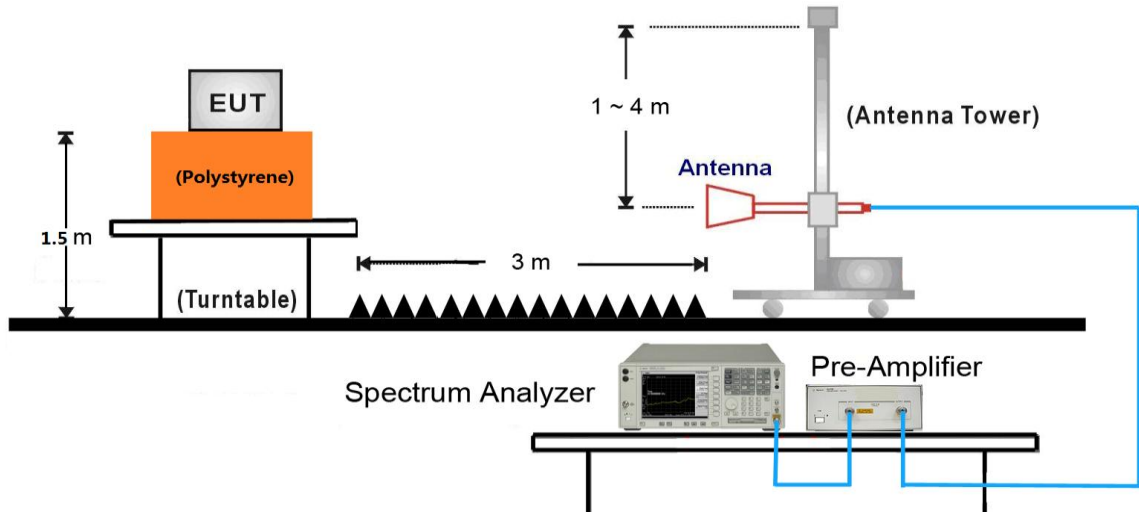
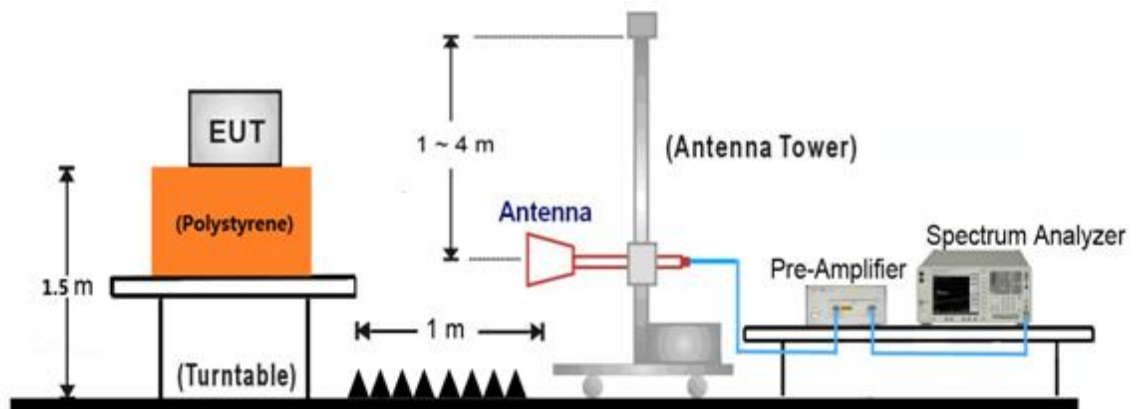
### **Average Measurements above 1GHz (Method VB)**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW; If the EUT is configured to transmit with duty cycle  $\geq 98\%$ , set VBW = 10 Hz.  
If the EUT duty cycle is  $< 98\%$ , set VBW  $\geq 1/T$ . T is the minimum transmission duration.
4. Detector = Peak
5. Sweep time = auto
6. Trace mode = max hold
7. Trace was allowed to stabilize

#### **7.2.4. Test Setup**

##### **9kHz ~ 30MHz Test Setup:**



30MHz ~ 1GHz Test Setup:1GHz ~ 18GHz Test Setup:18MHz ~ 40GHz Test Setup:

### 7.2.5. Test Result

Test Mode:	802.11a	Test Site:	AC1
Test Channel:	36	Test Engineer:	Kevin Ker
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	8735.0	30.7	13.9	44.6	68.2	-23.6	Peak	Horizontal
*	9865.5	33.4	16.0	49.4	68.2	-18.8	Peak	Horizontal
	10885.5	32.1	18.3	50.4	74.0	-23.6	Peak	Horizontal
	12092.5	31.5	18.9	50.4	74.0	-23.6	Peak	Horizontal
*	8718.0	33.2	13.8	47.0	68.2	-21.2	Peak	Vertical
*	9899.5	32.2	15.4	47.6	68.2	-20.6	Peak	Vertical
	11030.0	32.0	18.5	50.5	74.0	-23.5	Peak	Vertical
	11795.0	31.1	18.8	49.9	74.0	-24.1	Peak	Vertical

Note 1: "\*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Test Mode:	802.11a	Test Site:	AC1
Test Channel:	44	Test Engineer:	Kevin Ker
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	8743.5	31.3	13.9	45.2	68.2	-23.0	Peak	Horizontal
*	9865.5	32.5	16.0	48.5	68.2	-19.7	Peak	Horizontal
	11089.5	31.9	18.6	50.5	74.0	-23.5	Peak	Horizontal
	12135.0	32.2	18.9	51.1	74.0	-22.9	Peak	Horizontal
*	8743.5	31.8	13.9	45.7	68.2	-22.5	Peak	Vertical
*	10120.5	33.5	15.8	49.3	68.2	-18.9	Peak	Vertical
	11072.5	32.4	18.6	51.0	74.0	-23.0	Peak	Vertical
	12075.5	32.0	18.9	50.9	74.0	-23.1	Peak	Vertical

Note 1: "\*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Test Mode:	802.11a	Test Site:	AC1
Test Channel:	48	Test Engineer:	Kevin Ker
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	8786.0	32.5	13.9	46.4	68.2	-21.8	Peak	Horizontal
*	9636.0	35.2	14.4	49.6	68.2	-18.6	Peak	Horizontal
	11455.0	31.6	19.2	50.8	74.0	-23.2	Peak	Horizontal
	11965.0	30.8	18.6	49.4	74.0	-24.6	Peak	Horizontal
*	8752.0	32.3	13.9	46.2	68.2	-22.0	Peak	Vertical
*	9908.0	34.0	15.3	49.3	68.2	-18.9	Peak	Vertical
	10860.0	31.9	18.2	50.1	74.0	-23.9	Peak	Vertical
	11727.0	31.7	19.0	50.7	74.0	-23.3	Peak	Vertical

Note 1: "\*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Test Mode:	802.11a	Test Site:	AC1
Test Channel:	149	Test Engineer:	Kevin Ker
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dB $\mu$ V)	Factor (dB)	Measure Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Detector	Polarization
*	8692.5	31.2	13.7	44.9	68.2	-23.3	Peak	Horizontal
*	9925.0	33.8	15.3	49.1	68.2	-19.1	Peak	Horizontal
	10851.5	32.2	18.1	50.3	74.0	-23.7	Peak	Horizontal
	11982.0	32.0	18.7	50.7	74.0	-23.3	Peak	Horizontal
*	8922.0	32.4	14.0	46.4	68.2	-21.8	Peak	Vertical
*	9857.0	31.1	16.2	47.3	68.2	-20.9	Peak	Vertical
	10885.5	31.9	18.3	50.2	74.0	-23.8	Peak	Vertical
	12007.5	30.5	18.7	49.2	74.0	-24.8	Peak	Vertical

Note 1: "\*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dB $\mu$ V/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)



Test Mode:	802.11a	Test Site:	AC1
Test Channel:	157	Test Engineer:	Kevin Ker
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	8837.0	30.6	14.0	44.6	68.2	-23.6	Peak	Horizontal
*	10120.5	33.3	15.8	49.1	68.2	-19.1	Peak	Horizontal
	11072.5	32.6	18.6	51.2	74.0	-22.8	Peak	Horizontal
	12109.5	31.3	18.9	50.2	74.0	-23.8	Peak	Horizontal
*	8735.0	31.5	13.9	45.4	68.2	-22.8	Peak	Vertical
*	10095.0	33.8	15.7	49.5	68.2	-18.7	Peak	Vertical
	11557.0	32.5	19.5	52.0	74.0	-22.0	Peak	Vertical
	12067.0	32.3	18.8	51.1	74.0	-22.9	Peak	Vertical

Note 1: "\*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Test Mode:	802.11a	Test Site:	AC1
Test Channel:	165	Test Engineer:	Kevin Ker
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	8726.5	32.2	13.8	46.0	68.2	-22.2	Peak	Horizontal
*	9857.0	31.7	16.2	47.9	68.2	-20.3	Peak	Horizontal
	11650.5	34.7	19.3	54.0	74.0	-20.0	Peak	Horizontal
	11651.3	29.4	19.3	48.7	54.0	-5.3	Average	Horizontal
	12118.0	31.5	18.9	50.4	74.0	-23.6	Peak	Horizontal
*	8735.0	31.3	13.9	45.2	68.2	-23.0	Peak	Vertical
*	10086.5	34.4	15.7	50.1	68.2	-18.1	Peak	Vertical
	11268.0	31.6	18.8	50.4	74.0	-23.6	Peak	Vertical
	12143.5	32.0	18.9	50.9	74.0	-23.1	Peak	Vertical

Note 1: "\*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Test Mode:	802.11n-HT20	Test Site:	AC1
Test Channel:	36	Test Engineer:	Kevin Ker
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	8701.0	31.5	13.8	45.3	68.2	-22.9	Peak	Horizontal
*	9823.0	33.3	15.6	48.9	68.2	-19.3	Peak	Horizontal
	11004.5	32.3	18.5	50.8	74.0	-23.2	Peak	Horizontal
	12126.5	31.5	18.9	50.4	74.0	-23.6	Peak	Horizontal
*	8675.5	32.7	13.7	46.4	68.2	-21.8	Peak	Vertical
*	9865.5	32.0	16.0	48.0	68.2	-20.2	Peak	Vertical
	10928.0	31.4	18.4	49.8	74.0	-24.2	Peak	Vertical
	12109.5	31.1	18.9	50.0	74.0	-24.0	Peak	Vertical

Note 1: "\*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Test Mode:	802.11n-HT20	Test Site:	AC1
Test Channel:	44	Test Engineer:	Kevin Ker
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	8871.0	31.3	14.0	45.3	68.2	-22.9	Peak	Horizontal
*	10103.5	33.7	15.7	49.4	68.2	-18.8	Peak	Horizontal
	11149.0	32.0	18.7	50.7	74.0	-23.3	Peak	Horizontal
	11914.0	31.7	18.6	50.3	74.0	-23.7	Peak	Horizontal
*	8871.0	31.3	14.0	45.3	68.2	-22.9	Peak	Vertical
*	9899.5	32.6	15.4	48.0	68.2	-20.2	Peak	Vertical
	10928.0	31.4	18.4	49.8	74.0	-24.2	Peak	Vertical
	12007.5	31.0	18.7	49.7	74.0	-24.3	Peak	Vertical

Note 1: "\*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Test Mode:	802.11n-HT20	Test Site:	AC1
Test Channel:	48	Test Engineer:	Kevin Ker
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	8837.0	32.3	14.0	46.3	68.2	-21.9	Peak	Horizontal
*	10486.0	35.3	17.1	52.4	68.2	-15.8	Peak	Horizontal
	11259.5	31.6	18.8	50.4	74.0	-23.6	Peak	Horizontal
	12067.0	31.0	18.8	49.8	74.0	-24.2	Peak	Horizontal
*	8684.0	32.6	13.7	46.3	68.2	-21.9	Peak	Vertical
*	10069.5	33.7	15.6	49.3	68.2	-18.9	Peak	Vertical
	11004.5	32.4	18.5	50.9	74.0	-23.1	Peak	Vertical
	12058.5	30.3	18.8	49.1	74.0	-24.9	Peak	Vertical

Note 1: "\*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Test Mode:	802.11n-HT20	Test Site:	AC1
Test Channel:	149	Test Engineer:	Kevin Ker
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	8879.5	31.9	14.0	45.9	68.2	-22.3	Peak	Horizontal
*	10010.0	33.4	15.4	48.8	68.2	-19.4	Peak	Horizontal
	10834.5	32.8	18.1	50.9	74.0	-23.1	Peak	Horizontal
	11633.5	31.7	19.4	51.1	74.0	-22.9	Peak	Horizontal
*	8854.0	30.1	14.0	44.1	68.2	-24.1	Peak	Vertical
*	9857.0	31.6	16.2	47.8	68.2	-20.4	Peak	Vertical
	10877.0	31.8	18.2	50.0	74.0	-24.0	Peak	Vertical
	12058.5	31.6	18.8	50.4	74.0	-23.6	Peak	Vertical

Note 1: "\*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Test Mode:	802.11n-HT20	Test Site:	AC1
Test Channel:	157	Test Engineer:	Kevin Ker
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	8718.0	32.2	13.8	46.0	68.2	-22.2	Peak	Horizontal
*	10086.5	34.1	15.7	49.8	68.2	-18.4	Peak	Horizontal
	11582.5	32.8	19.5	52.3	74.0	-21.7	Peak	Horizontal
	11999.0	32.3	18.7	51.0	74.0	-23.0	Peak	Horizontal
*	8709.5	32.5	13.8	46.3	68.2	-21.9	Peak	Vertical
*	9857.0	32.3	16.2	48.5	68.2	-19.7	Peak	Vertical
	11047.0	32.1	18.5	50.6	74.0	-23.4	Peak	Vertical
	11939.5	31.9	18.6	50.5	74.0	-23.5	Peak	Vertical

Note 1: "\*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Test Mode:	802.11n-HT20	Test Site:	AC1
Test Channel:	165	Test Engineer:	Kevin Ker
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	8667.0	33.5	13.6	47.1	68.2	-21.1	Peak	Horizontal
*	9899.5	33.8	15.4	49.2	68.2	-19.0	Peak	Horizontal
	11098.0	32.1	18.6	50.7	74.0	-23.3	Peak	Horizontal
	11659.0	33.9	19.3	53.2	74.0	-20.8	Peak	Horizontal
*	11659.3	28.7	19.3	48.0	54.0	-6.0	Average	Horizontal
*	8794.5	29.8	13.9	43.7	68.2	-24.5	Peak	Vertical
	9984.5	34.1	15.4	49.5	68.2	-18.7	Peak	Vertical
	10868.5	33.2	18.2	51.4	74.0	-22.6	Peak	Vertical
	11642.0	32.5	19.4	51.9	74.0	-22.1	Peak	Vertical

Note 1: "\*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

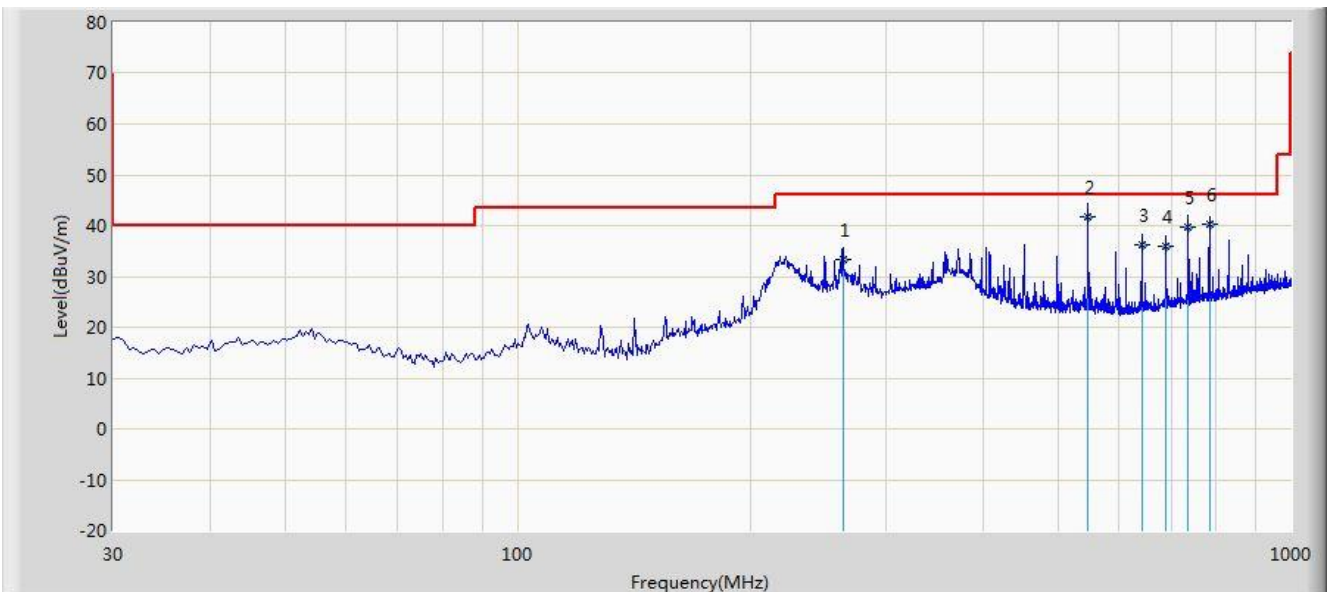
Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)



**The worst case of Radiated Emission below 1GHz:**

Site: AC1	Time: 2018/10/16 - 07:22
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: VULB9162_0.03-8GHz	Polarity: Horizontal
EUT: Mantis Q	Power: By Battery
<b>Worse Case Mode:</b> Transmit by 802.11a at channel 5785MHz	



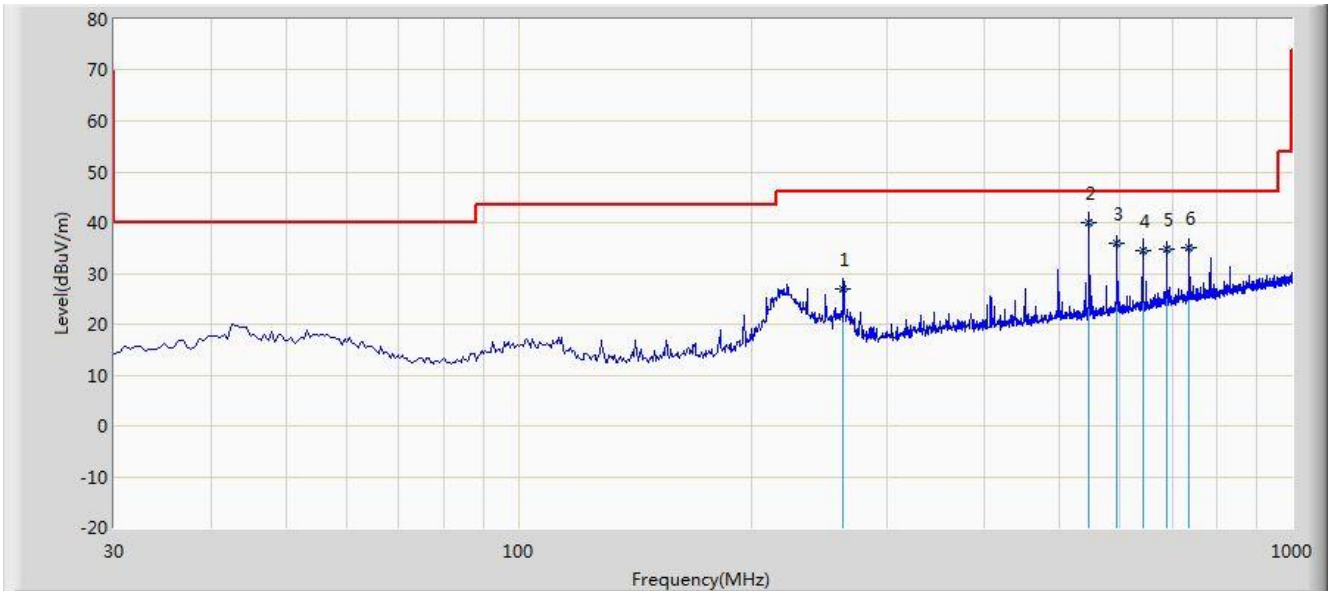
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			263.250	33.405	19.287	-12.595	46.000	14.118	QP
2		*	546.870	41.800	22.478	-4.200	46.000	19.321	QP
3			641.385	36.181	15.369	-9.819	46.000	20.812	QP
4			689.256	36.035	14.365	-9.965	46.000	21.669	QP
5			736.258	39.682	17.325	-6.318	46.000	22.358	QP
6			784.250	40.309	17.365	-5.691	46.000	22.945	QP

Note 1: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 40GHz), therefore no data appear in the report.

Site: AC1	Time: 2018/10/16 - 07:28
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: VULB9162_0.03-8GHz	Polarity: Vertical
EUT: Mantis Q	Power: By Battery
<b>Worse Case Mode:</b> Transmit by 802.11a at channel 5785MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			262.380	27.083	12.980	-18.917	46.000	14.102	QP
2		*	546.580	39.973	20.658	-6.027	46.000	19.316	QP
3			594.680	35.930	15.687	-10.070	46.000	20.243	QP
4			641.286	34.469	13.658	-11.531	46.000	20.811	QP
5			689.674	34.654	12.977	-11.346	46.000	21.677	QP
6			736.580	35.045	12.684	-10.955	46.000	22.361	QP

Note 1: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 40GHz), therefore no data appear in the report.

### 7.3. Radiated Restricted Band Edge Measurement

#### 7.3.1. Test Limit

##### **For 15.205 requirement:**

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a).

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41	--	--	--

**For 15.407(b) requirement:**

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.725-5.85 GHz band:

All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 – 0.490	2400/F (kHz)	300
0.490 – 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

**For RSS-Gen Section 8.10 Requirement:**

Radiated emissions which fall in the restricted bands, as defined in Section 8.10 of RSS-Gen, must also comply with the radiated emission limits specified in Section 8.9.

Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.009 - 0.110	149.9 - 150.5	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.525225	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 - 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	--
8.37625 - 8.38675	1718.8 - 1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 - 2390	
12.51975 - 12.52025	2483.5 - 2500	
12.57675 - 12.57725	2655 - 2900	
13.36 - 13.41	3260 - 3267	
16.42 - 16.423	3332 - 3339	
16.69475 - 16.69525	334.5 - 3358	
16.80425 - 16.80475	3500 - 4400	
25.5 - 25.67	4500 - 5150	
37.5 - 38.25	5350 - 5460	
73 - 74.6	7250 - 7750	
74.8 - 75.2	8025 - 8500	
108 - 138	--	

Note: \*Certain frequency bands listed in Table 6 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to the devices are set out in the 200- and 300-series of RSSs, such as RSS-210 and RSS-310, which contain the requirements that apply to licence-exempt radio apparatus.

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the band 5725-5850 MHz shall have e.i.r.p. of unwanted emissions comply with the following:

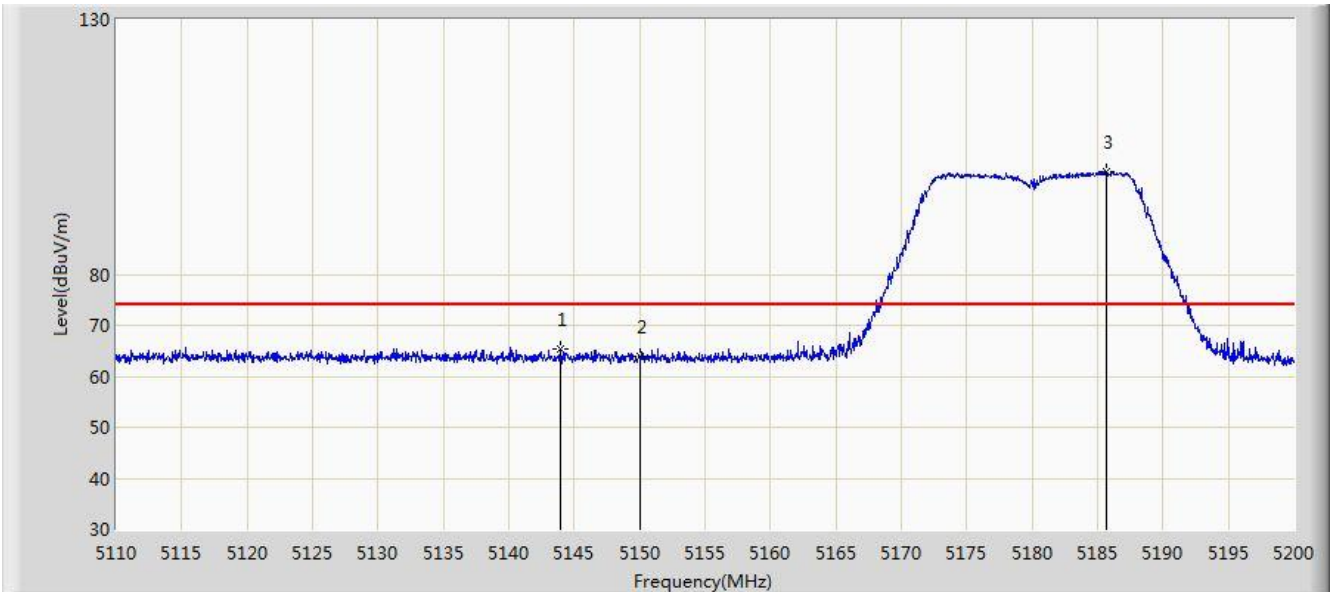
- a) 27 dBm/MHz at frequencies from the band edges decreasing linearly to 15.6 dBm/MHz at 5MHz above or below the band edges;
- b) 15.6 dBm/MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm/MHz at 25 MHz above or below the band edges;
- c) 10 dBm/MHz at 25 MHz above or below the band edges decreasing linearly to -27 dBm/MHz at 75 MHz above or below the band edges; and
- d) -27 dBm/MHz at frequencies more than 75 MHz above or below the band edges.

All out of band emissions appearing in a restricted band as specified in Section 8.10 of the RSS-Gen must not exceed the limits shown in Table per Section 8.9.

RSS-Gen Section 8.9			
Frequency [MHz]	Magnetic Field Strength (H-Field) [uA/m]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	6.37/F (F in kHz)	--	300
0.490 - 1.705	63.7/F (F in kHz)	--	30
1.705 - 30	0.08	--	30
30 - 88	--	100	3
88 - 216	--	150	3
216 - 960	--	200	3
Above 960	--	500	3

### 7.3.2. Test Result

Site: AC1	Time: 2018/11/15 - 20:24
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Horizontal
EUT: Mantis Q	Power: By Battery
Test Mode: Transmit by 802.11a at channel 5180MHz	

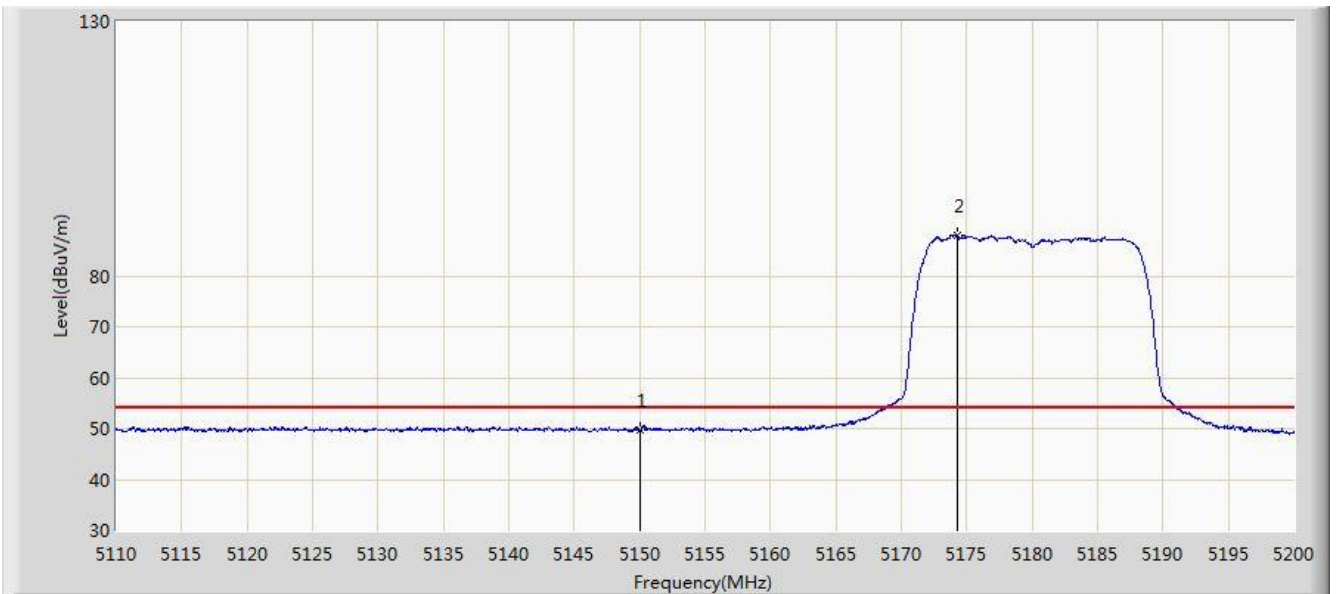


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5143.975	65.340	61.164	-8.660	74.000	4.176	PK
2			5150.000	63.791	59.622	-10.209	74.000	4.170	PK
3		*	5185.645	100.149	96.100	N/A	N/A	4.049	PK

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Site: AC1	Time: 2018/11/15 - 20:49
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Horizontal
EUT: Mantis Q	Power: By Battery
Test Mode: Transmit by 802.11a at channel 5180MHz	



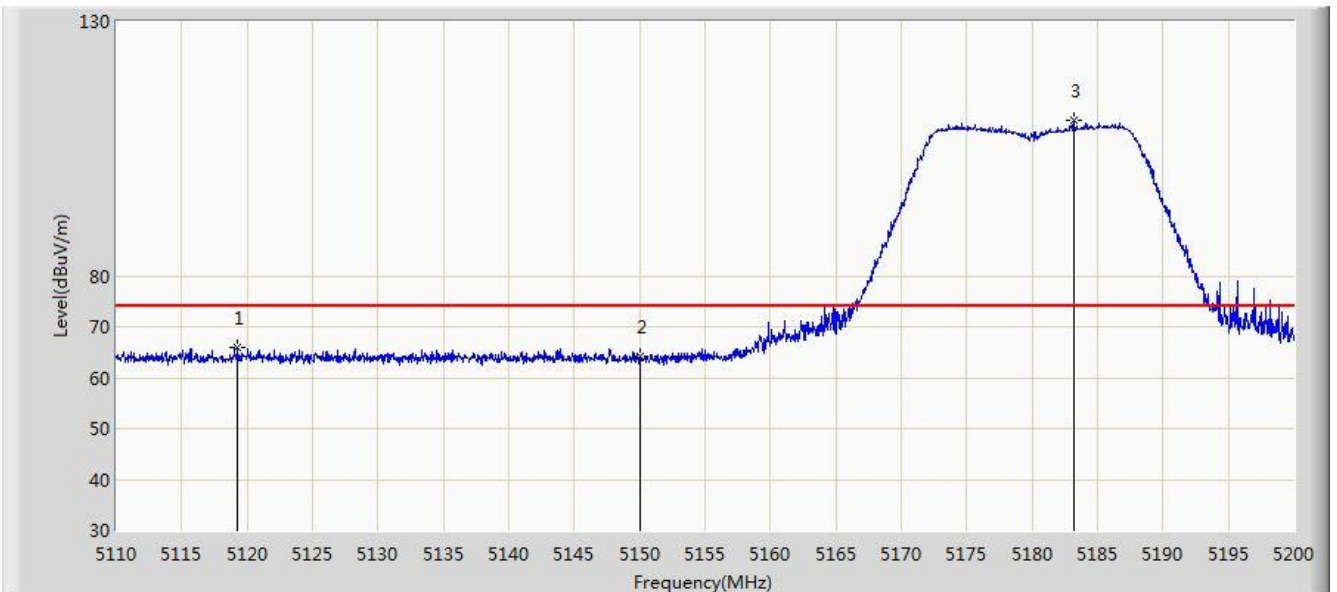
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5150.000	49.679	45.510	-4.321	54.000	4.170	AV
2		*	5174.305	88.038	83.949	N/A	N/A	4.088	AV

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)



Site: AC1	Time: 2018/11/15 - 20:29
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Vertical
EUT: Mantis Q	Power: By Battery
Test Mode: Transmit by 802.11a at channel 5180MHz	

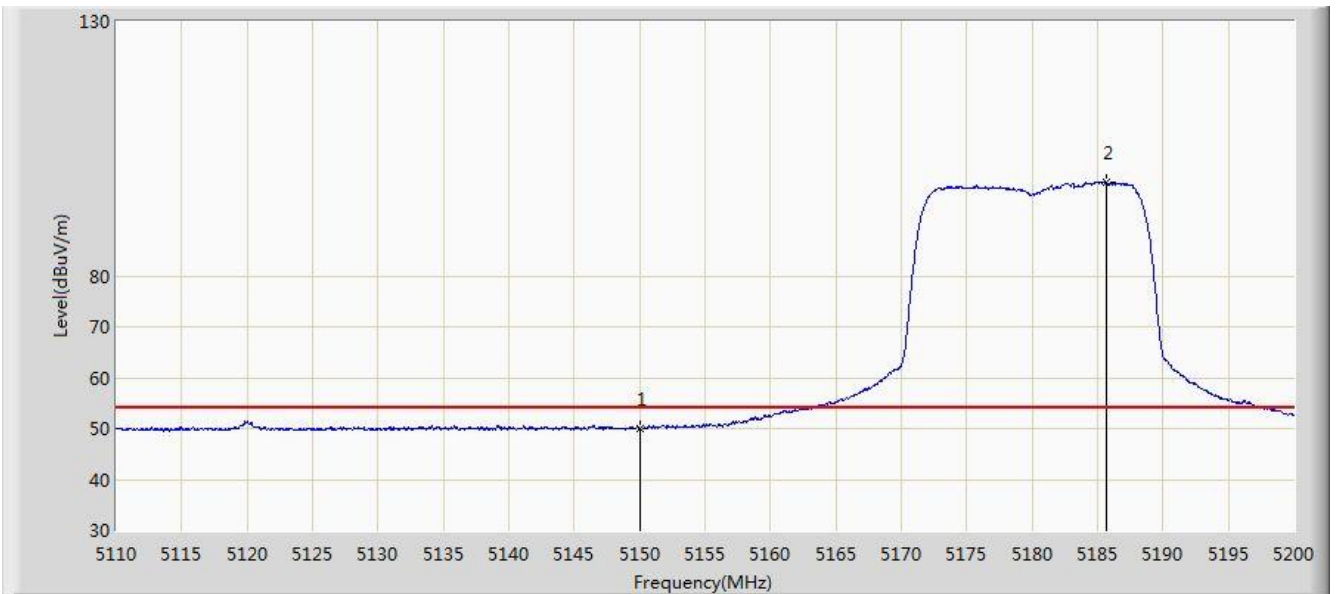


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5119.270	65.871	61.696	-8.129	74.000	4.175	PK
2			5150.000	64.215	60.046	-9.785	74.000	4.170	PK
3		*	5183.170	110.522	106.464	N/A	N/A	4.057	PK

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Site: AC1	Time: 2018/11/15 - 20:51
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Vertical
EUT: Mantis Q	Power: By Battery
Test Mode: Transmit by 802.11a at channel 5180MHz	

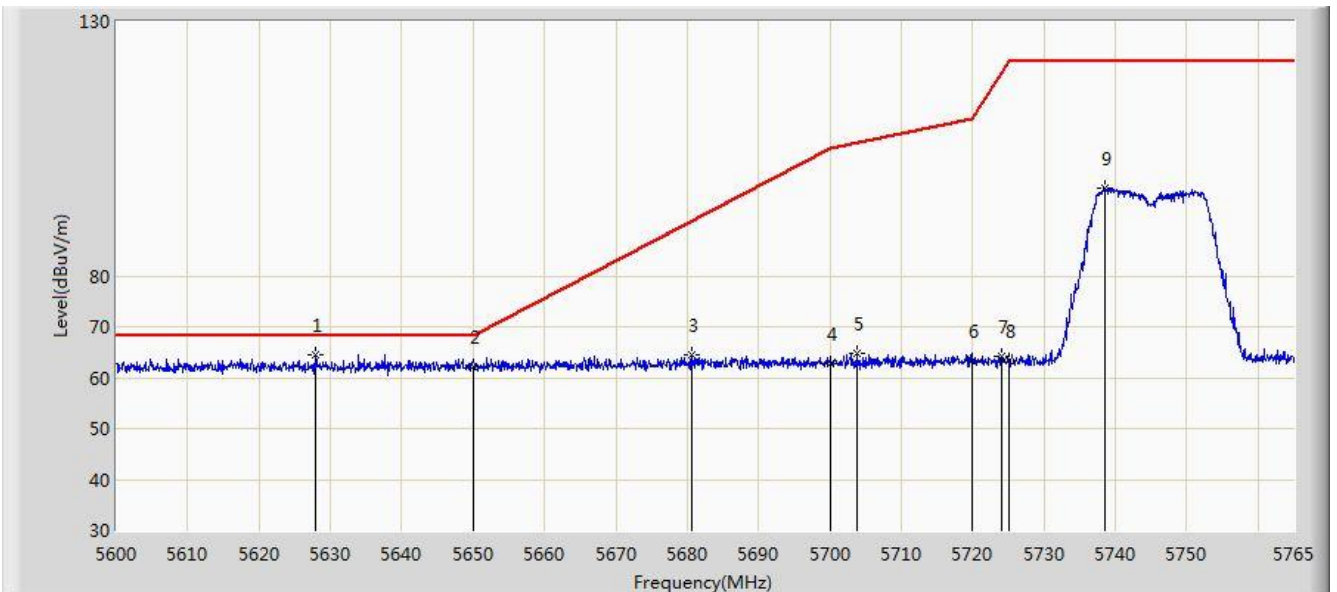


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5150.000	50.063	45.894	-3.937	54.000	4.170	AV
2		*	5185.645	98.475	94.426	N/A	N/A	4.049	AV

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Site: AC1	Time: 2018/11/15 - 20:55
Limit: FCC_Part15.407(b)(4)(i)_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Horizontal
EUT: Mantis Q	Power: By Battery
Test Mode: Transmit by 802.11a at channel 5745MHz	

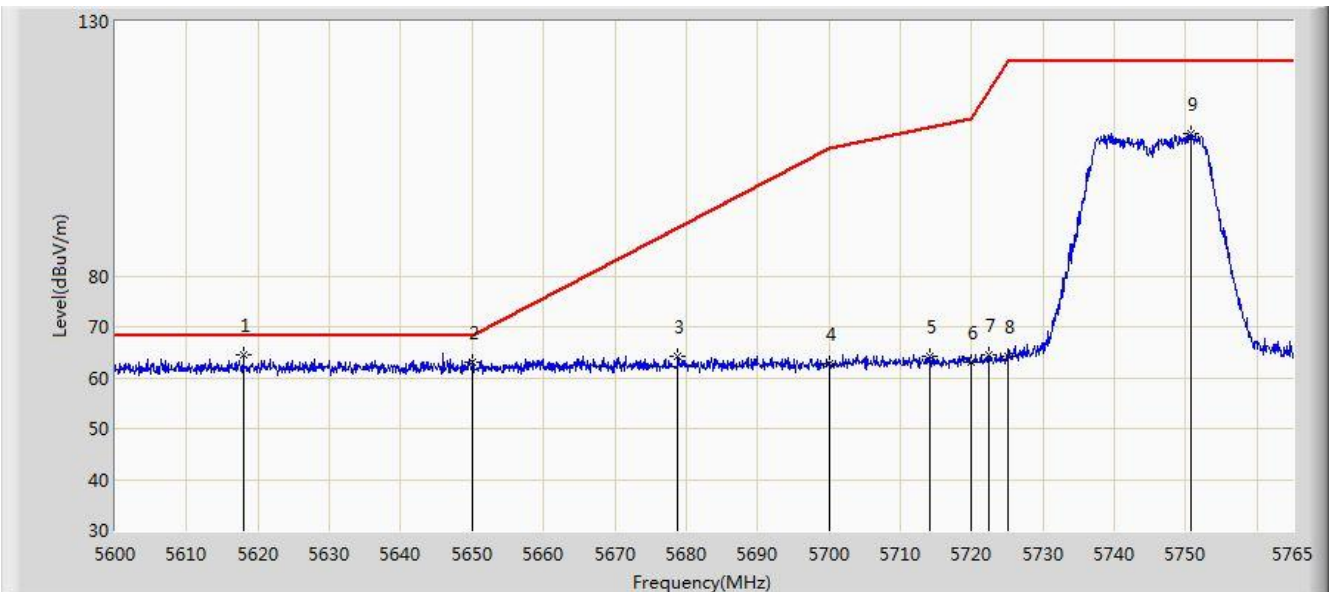


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	5627.967	64.603	60.000	-3.597	68.200	4.604	PK
2			5650.000	62.112	57.441	-6.088	68.200	4.671	PK
3			5680.603	64.512	59.722	-26.373	90.885	4.790	PK
4			5700.000	62.884	58.006	-42.316	105.200	4.878	PK
5			5703.703	64.704	59.806	-41.534	106.238	4.897	PK
6			5720.000	63.194	58.197	-47.606	110.800	4.997	PK
7			5724.163	64.345	59.321	-55.948	120.292	5.024	PK
8			5725.000	63.311	58.282	-58.889	122.200	5.029	PK
9			5738.600	97.334	92.218	N/A	N/A	5.115	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Site: AC1	Time: 2018/11/15 - 20:59
Limit: FCC_Part15.407(b)(4)(i)_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Vertical
EUT: Mantis Q	Power: By Battery
Test Mode: Transmit by 802.11a at channel 5745MHz	

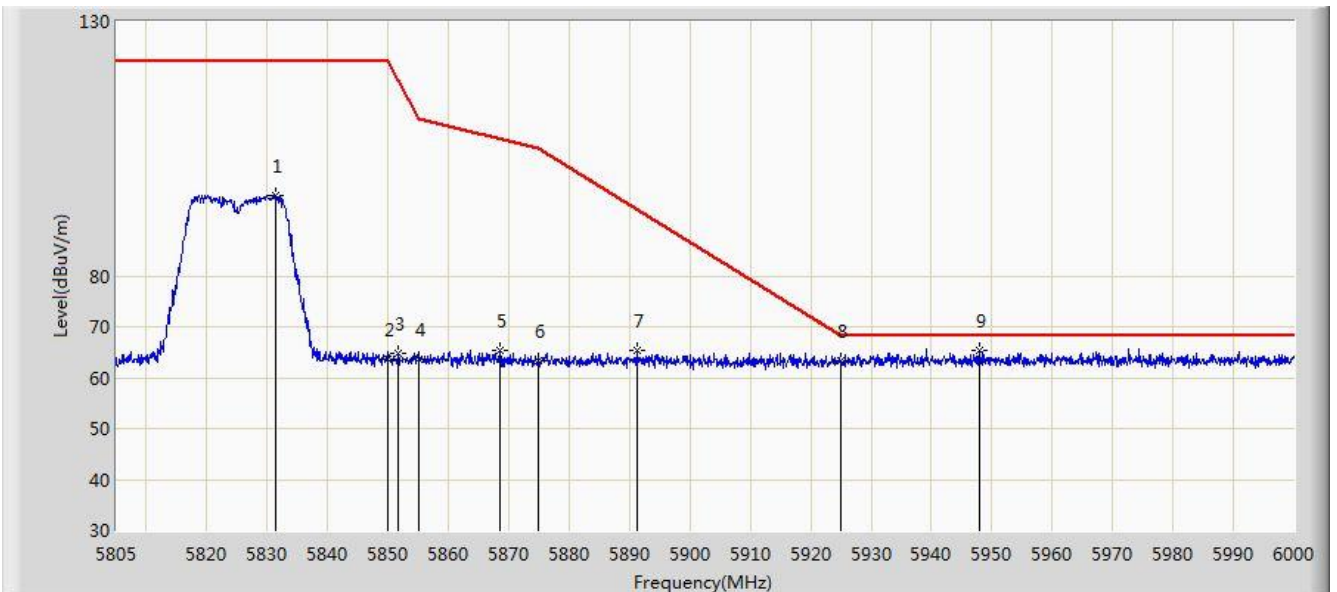


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	5617.985	64.388	59.813	-3.812	68.200	4.575	PK
2			5650.000	63.130	58.459	-5.070	68.200	4.671	PK
3			5678.788	64.241	59.459	-25.302	89.543	4.782	PK
4			5700.000	62.769	57.891	-42.431	105.200	4.878	PK
5			5714.098	64.141	59.182	-45.009	109.149	4.959	PK
6			5720.000	63.178	58.181	-47.622	110.800	4.997	PK
7			5722.430	64.525	59.513	-51.816	116.342	5.012	PK
8			5725.000	64.181	59.152	-58.019	122.200	5.029	PK
9			5750.810	107.832	102.644	N/A	N/A	5.187	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Site: AC1	Time: 2018/11/15 - 21:00
Limit: FCC_Part15.407(b)(4)(i)_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Horizontal
EUT: Mantis Q	Power: By Battery
Test Mode: Transmit by 802.11a at channel 5825MHz	

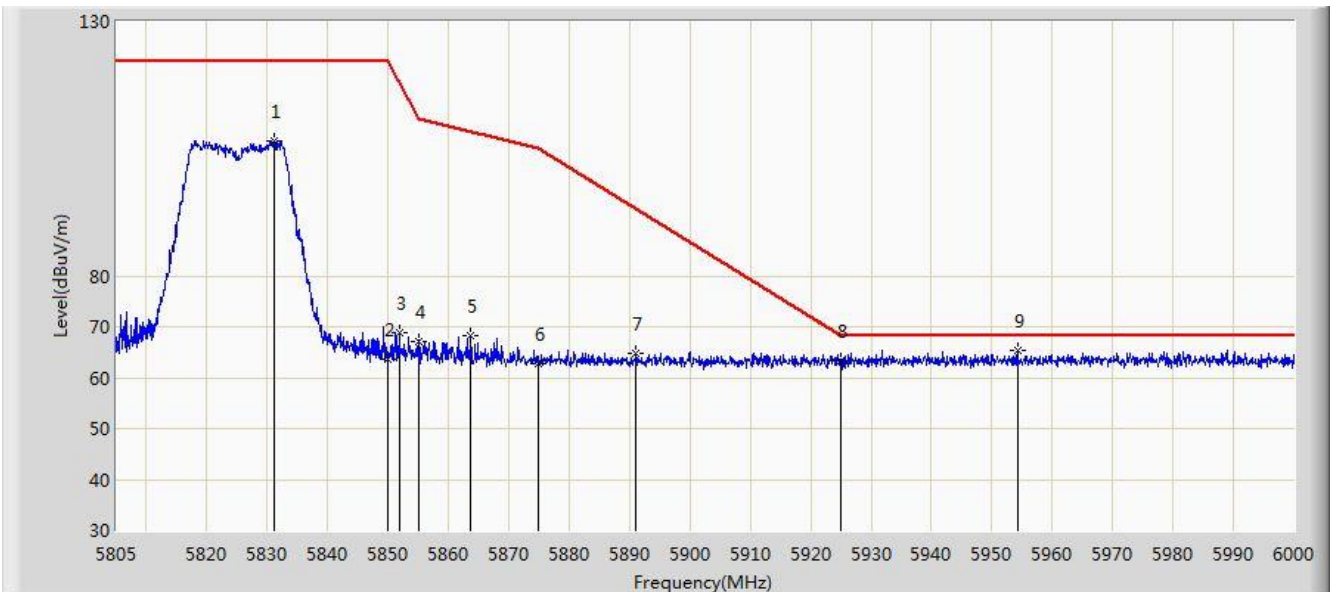


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5831.422	95.891	90.266	N/A	N/A	5.626	PK
2			5850.000	63.554	57.828	-58.646	122.200	5.726	PK
3			5851.703	64.668	58.935	-53.648	118.316	5.732	PK
4			5855.000	63.542	57.796	-47.258	110.800	5.746	PK
5			5868.570	65.358	59.560	-41.641	106.998	5.798	PK
6			5875.000	63.394	57.574	-41.806	105.200	5.820	PK
7			5891.190	65.236	59.361	-27.949	93.185	5.875	PK
8			5925.000	63.197	57.231	-5.003	68.200	5.967	PK
9		*	5947.837	65.261	59.239	-2.939	68.200	6.023	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Site: AC1	Time: 2018/11/15 - 21:02
Limit: FCC_Part15.407(b)(4)(i)_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Vertical
EUT: Mantis Q	Power: By Battery
Test Mode: Transmit by 802.11a at channel 5825MHz	

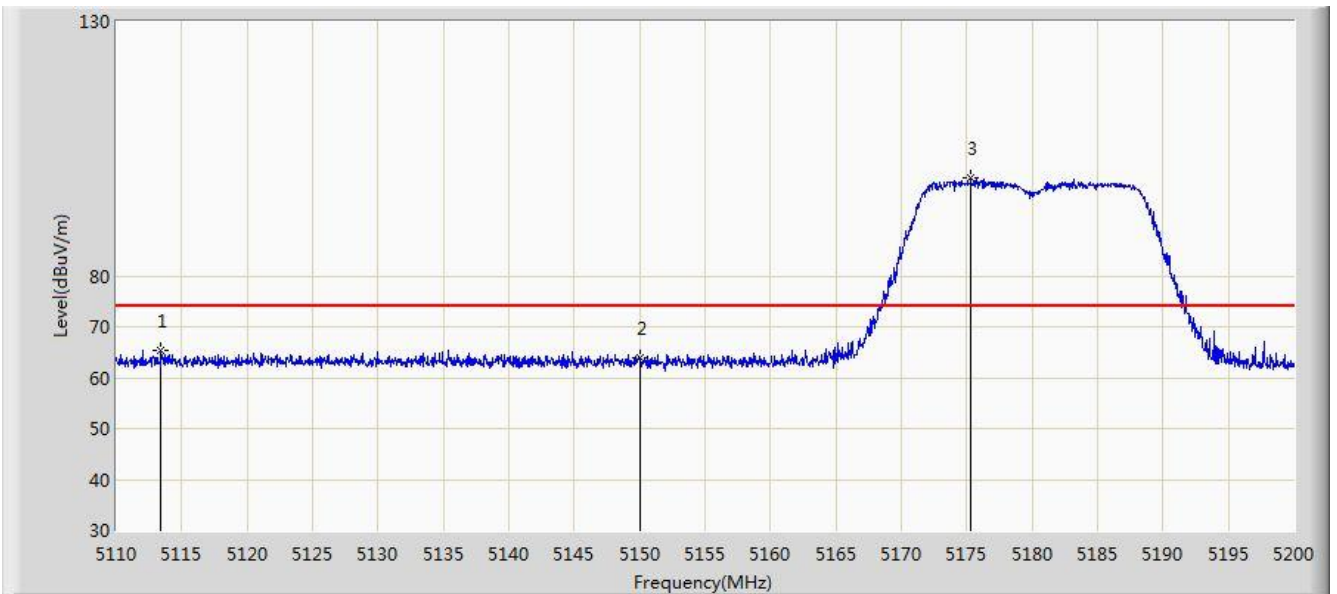


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5831.033	106.597	100.974	N/A	N/A	5.623	PK
2			5850.000	63.643	57.917	-58.557	122.200	5.726	PK
3			5851.800	68.771	63.038	-49.324	118.095	5.733	PK
4			5855.000	67.084	61.338	-43.716	110.800	5.746	PK
5			5863.695	68.401	62.620	-39.962	108.363	5.781	PK
6			5875.000	62.818	56.998	-42.382	105.200	5.820	PK
7			5891.092	64.783	58.908	-28.475	93.258	5.875	PK
8			5925.000	63.415	57.449	-4.785	68.200	5.967	PK
9		*	5954.272	65.231	59.197	-2.969	68.200	6.034	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Site: AC1	Time: 2018/11/15 - 21:04
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Horizontal
EUT: Mantis Q	Power: By Battery
Test Mode: Transmit by 802.11n-HT20 at channel 5180MHz	

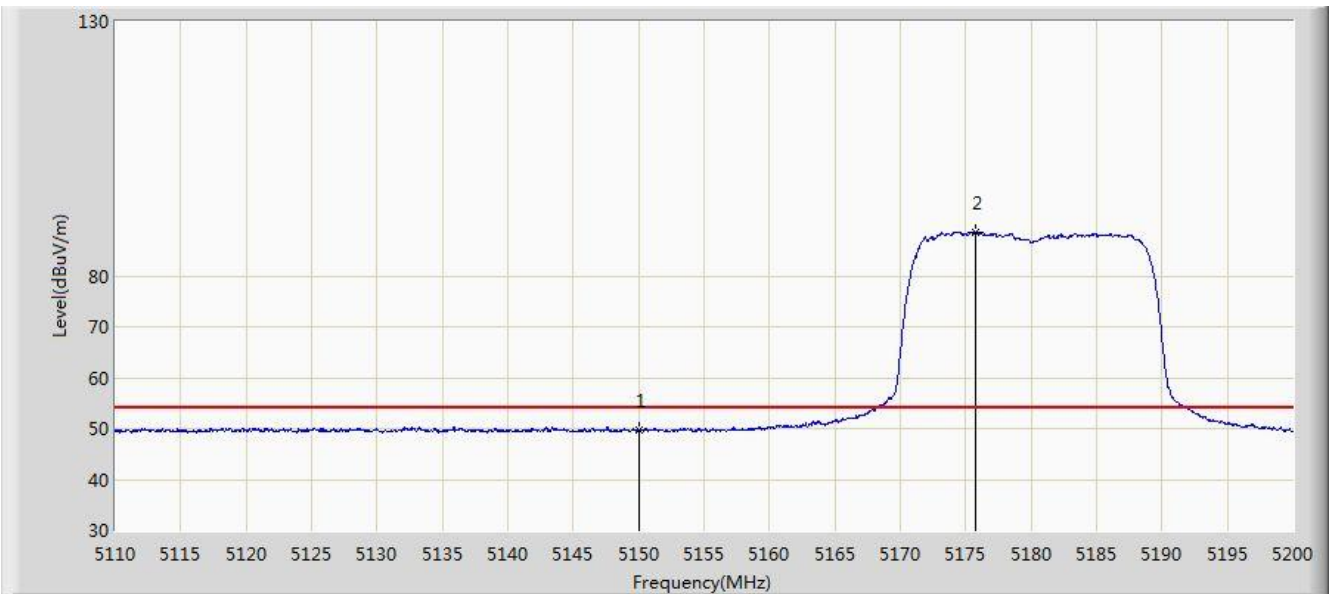


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5113.420	65.391	61.217	-8.609	74.000	4.174	PK
2			5150.000	63.851	59.682	-10.149	74.000	4.170	PK
3		*	5175.295	99.266	95.180	N/A	N/A	4.085	PK

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Site: AC1	Time: 2018/11/15 - 21:07
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Horizontal
EUT: Mantis Q	Power: By Battery
Test Mode: Transmit by 802.11n-HT20 at channel 5180MHz	



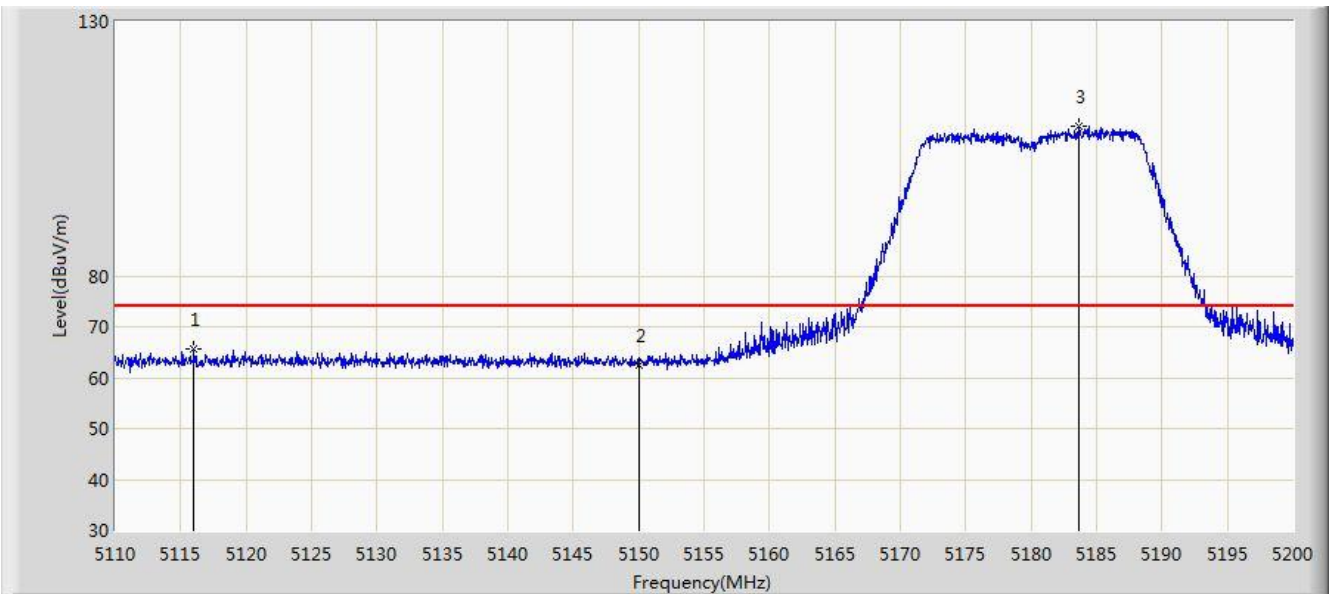
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5150.000	49.682	45.513	-4.318	54.000	4.170	AV
2		*	5175.790	88.687	84.603	N/A	N/A	4.084	AV

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)



Site: AC1	Time: 2018/11/15 - 21:09
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Vertical
EUT: Mantis Q	Power: By Battery
Test Mode: Transmit by 802.11n-HT20 at channel 5180MHz	

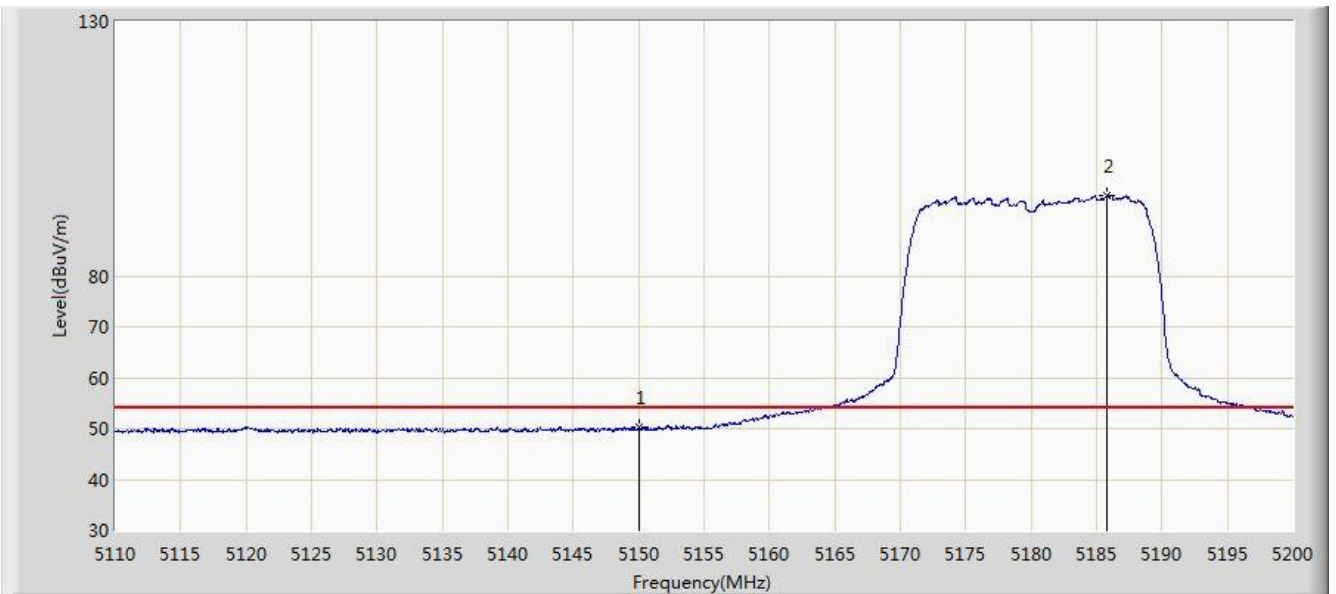


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5116.030	65.585	61.410	-8.415	74.000	4.174	PK
2			5150.000	62.606	58.437	-11.394	74.000	4.170	PK
3		*	5183.665	109.396	105.340	N/A	N/A	4.056	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Site: AC1	Time: 2018/11/15 - 21:11
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Vertical
EUT: Mantis Q	Power: By Battery
Test Mode: Transmit by 802.11n-HT20 at channel 5180MHz	

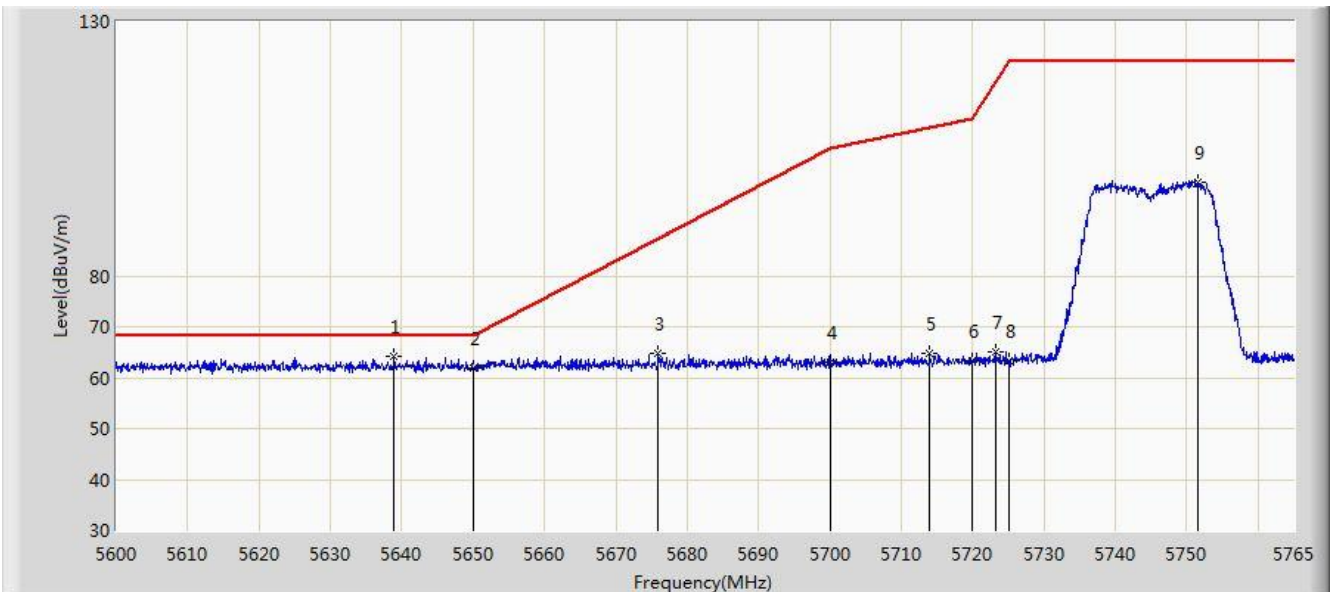


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5150.000	50.188	46.019	-3.812	54.000	4.170	AV
2		*	5185.780	95.927	91.879	N/A	N/A	4.048	AV

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Site: AC1	Time: 2018/11/15 - 21:13
Limit: FCC_Part15.407(b)(4)(i)_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Horizontal
EUT: Mantis Q	Power: By Battery
Test Mode: Transmit by 802.11n-HT20 at channel 5745MHz	

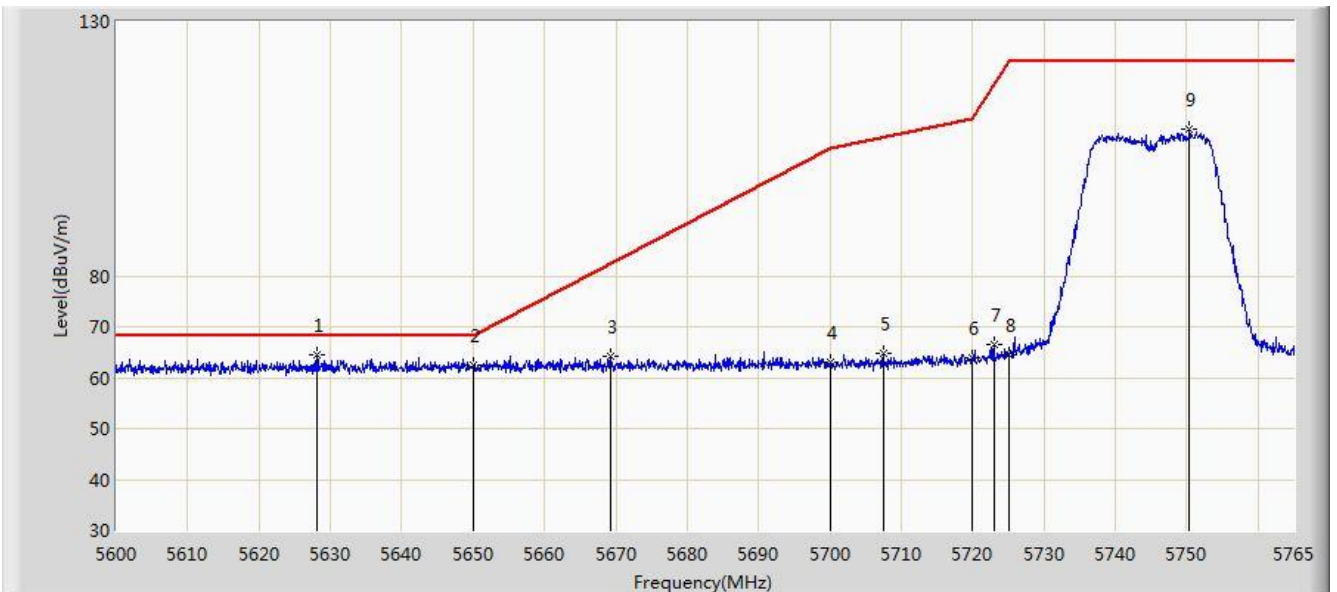


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	5638.940	64.143	59.508	-4.057	68.200	4.635	PK
2			5650.000	61.903	57.232	-6.297	68.200	4.671	PK
3			5675.900	64.731	59.960	-22.676	87.407	4.770	PK
4			5700.000	63.034	58.156	-42.166	105.200	4.878	PK
5			5714.015	64.649	59.691	-44.477	109.126	4.959	PK
6			5720.000	63.280	58.283	-47.520	110.800	4.997	PK
7			5723.172	65.140	60.123	-52.893	118.033	5.017	PK
8			5725.000	63.450	58.421	-58.750	122.200	5.029	PK
9			5751.635	98.520	93.327	N/A	N/A	5.193	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Site: AC1	Time: 2018/11/15 - 21:16
Limit: FCC_Part15.407(b)(4)(i)_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Vertical
EUT: Mantis Q	Power: By Battery
Test Mode: Transmit by 802.11n-HT20 at channel 5745MHz	

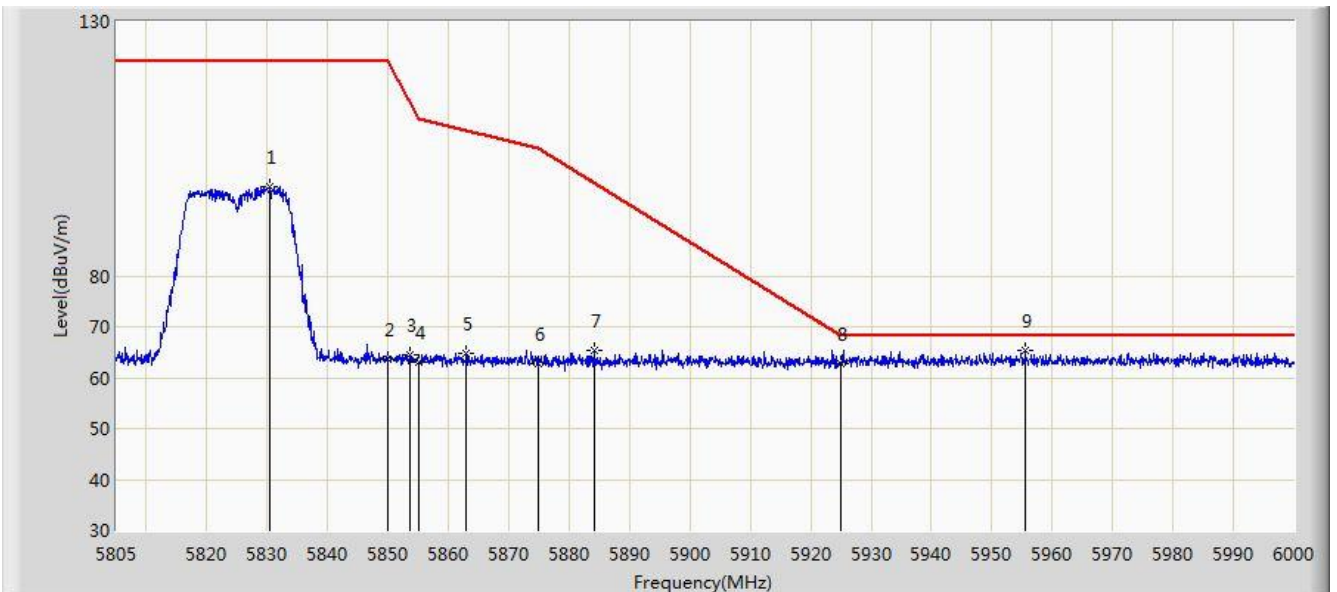


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	5628.050	64.368	59.764	-3.832	68.200	4.604	PK
2			5650.000	62.460	57.789	-5.740	68.200	4.671	PK
3			5669.300	64.119	59.375	-18.401	82.521	4.744	PK
4			5700.000	62.976	58.098	-42.224	105.200	4.878	PK
5			5707.498	64.756	59.838	-42.546	107.302	4.918	PK
6			5720.000	64.012	59.015	-46.788	110.800	4.997	PK
7			5722.925	66.485	61.469	-50.986	117.470	5.015	PK
8			5725.000	64.441	59.412	-57.759	122.200	5.029	PK
9			5750.315	108.723	103.538	N/A	N/A	5.186	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Site: AC1	Time: 2018/11/15 - 21:18
Limit: FCC_Part15.407(b)(4)(i)_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Horizontal
EUT: Mantis Q	Power: By Battery
Test Mode: Transmit by 802.11n-HT20 at channel 5825MHz	

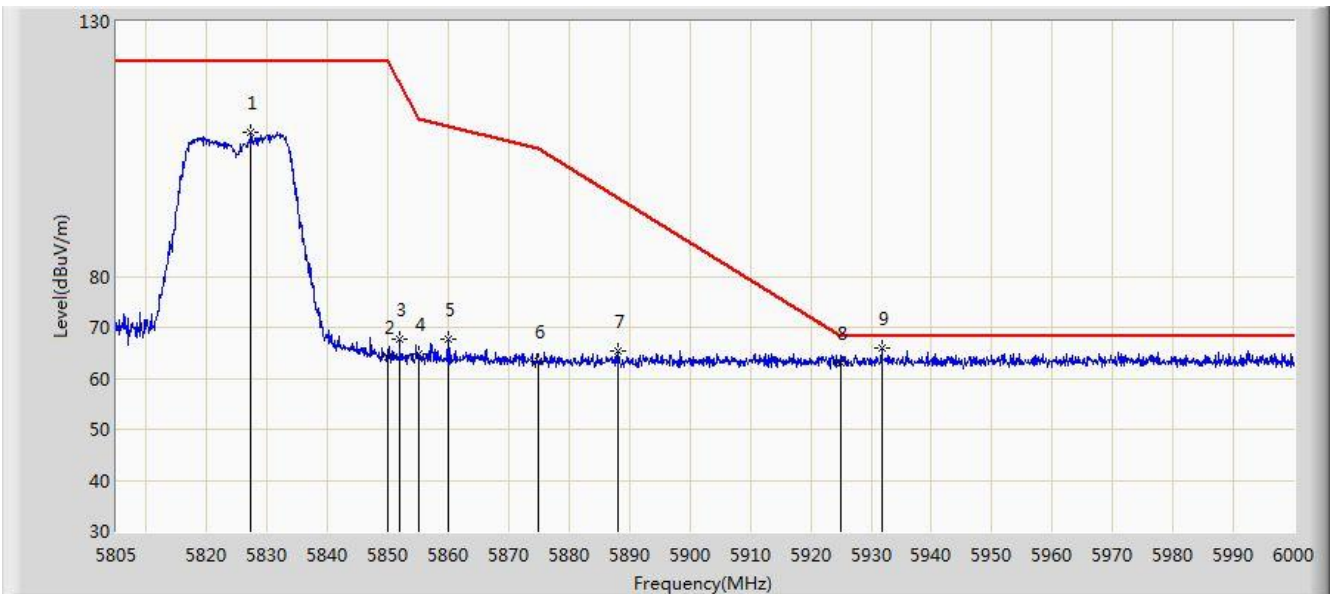


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5830.448	97.502	91.882	N/A	N/A	5.620	PK
2			5850.000	63.710	57.984	-58.490	122.200	5.726	PK
3			5853.555	64.359	58.619	-49.734	114.094	5.741	PK
4			5855.000	63.062	57.316	-47.738	110.800	5.746	PK
5			5863.013	64.903	59.124	-43.651	108.554	5.779	PK
6			5875.000	62.801	56.981	-42.399	105.200	5.820	PK
7			5884.268	65.434	59.582	-32.884	98.318	5.852	PK
8			5925.000	62.850	56.884	-5.350	68.200	5.967	PK
9		*	5955.540	65.412	59.376	-2.788	68.200	6.036	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Site: AC1	Time: 2018/11/15 - 21:20
Limit: FCC_Part15.407(b)(4)(i)_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Vertical
EUT: Mantis Q	Power: By Battery
Test Mode: Transmit by 802.11n-HT20 at channel 5825MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5827.328	108.385	102.783	N/A	N/A	5.602	PK
2			5850.000	64.210	58.484	-57.990	122.200	5.726	PK
3			5851.897	67.625	61.892	-50.248	117.874	5.734	PK
4			5855.000	64.644	58.898	-46.156	110.800	5.746	PK
5			5859.893	67.630	61.864	-41.798	109.428	5.766	PK
6			5875.000	63.190	57.370	-42.010	105.200	5.820	PK
7			5888.167	65.389	59.524	-30.037	95.426	5.865	PK
8			5925.000	63.001	57.035	-5.199	68.200	5.967	PK
9		*	5931.750	65.915	59.932	-2.285	68.200	5.983	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

## 8. CONCLUSION

The data collected relate only the item(s) tested and show that the **Mantis Q** is in compliance with Part 15E of the FCC Rules and ISED Rules.

————— The End —————

## Appendix A - Test Setup Photograph

Refer to "1811TW0103-UT" file.



## Appendix B - EUT Photograph

Refer to “ 1811TW0103-UE” file.