MEASUREMENT REPORT

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

FCC ID:	2ACS5-YUNMQA
IC:	11554B-YUNMQA
APPLICANT:	Yuneec Technology Co., Limited
Application Type:	Certification
Product:	Mantis Q
Model No.:	YUNMQA
Brand Name:	YUNEEC
FCC Classification:	Unlicensed National Information Infrastructure (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 ~ April 09, 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.

Revision History

Report No.	Version	Description	Issue Date	Note
1804TW0107-U1	Rev. 01	Initial Report	16-07-2018	Valid

CONTENTS

Description Page

§2.1033 General Information

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

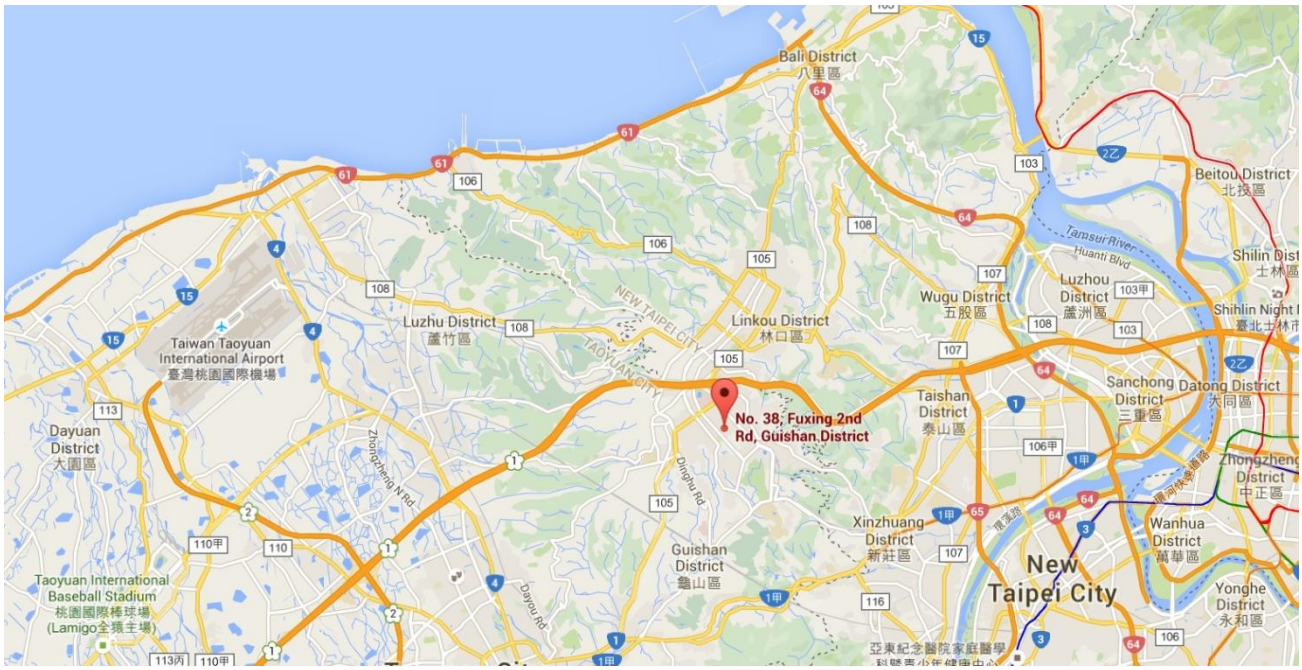
1. INTRODUCTION

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 Canda.

2.4. Description of Available Antennas

Antenna Type	Manufacturer	Frequency Band (MHz)	Max Peak Gain (dBi)
PCB Antenna	Yuneec International (China) 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

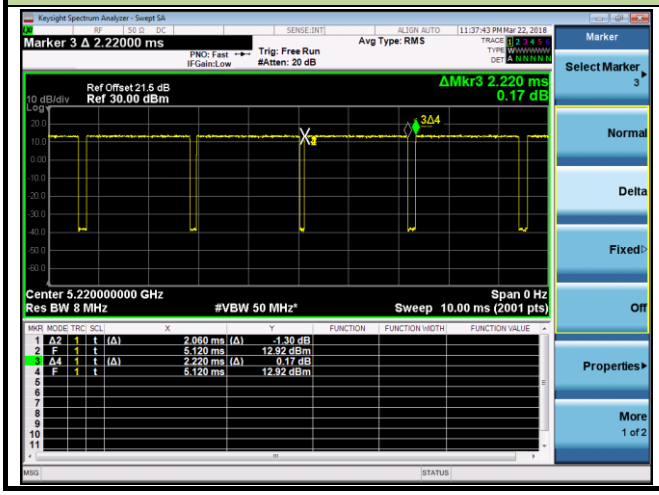
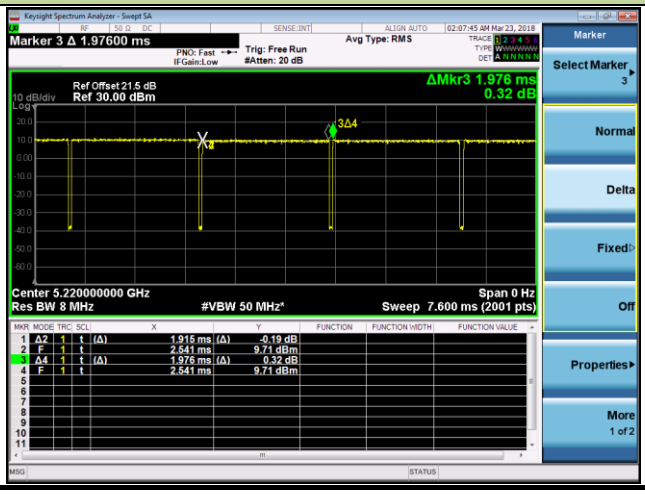
This device contains the following capabilities:

5GHz WLAN (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 %

802.11a - T = 2.060 ms	802.11n-HT20 - T = 1.915 ms
	

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

Conducted Emissions - SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTTWA00045	1 year	2019/03/17
Two-Line V-Network	R&S	ENV216	MRTTWA00019	1 year	2019/03/23
Two-Line V-Network	R&S	ENV216	MRTTWA00020	1 year	2019/03/23
Temperature/Humidity Meter	TFA	35.1078.10.IT	MRTTWA00033	1 year	2019/06/08

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
Acitve 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

Conducted Test Equipment - SR1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EXA Signal Analyzer	KEYSIGHT	N9010A	MRTTWA00012	1 year	2019/07/10
X-Series USB Peak and Average Power Sensor	KEYSIGHT	U2021XA	MRTTWA00014	1 year	2019/03/18
X-Series USB Peak and Average Power Sensor	KEYSIGHT	U2021XA	MRTTWA00015	1 year	2019/03/18
Programmable Temperature & Humidity Chamber	TEN BILLION	TTH-B3UP	MRTTWA00036	1 year	2019/05/11
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.

AC Conducted Emission Measurement - SR1
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 150kHz~30MHz: 3.46dB
Radiated Emission Measurement - AC1
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz ~ 1GHz: 4.18dB 1GHz ~ 40GHz: 4.76dB

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(a)	26dB Bandwidth	N/A	Conducted	Pass	Section 7.2
15.407(e)	6dB Bandwidth	≥ 500kHz		Pass	Section 7.3
15.407(a)(1)(iii), (3)	Maximum Conducted Output Power	Refer to section 7.4		Pass	Section 7.4
15.407(a)(1)(iii), (3), (5)	Peak Power Spectral Density	Refer to section 7.5		Pass	Section 7.5
15.407(g)	Frequency Stability	N/A		Pass	Section 7.6
15.407(b)(1), (4)(i)	Undesirable Emissions	≤ -27dBm/MHz EIRP Detail see section 7.8	Radiated	Pass	Section 7.7 & 7.8
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	
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 7.9

RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
RSS-247 §6.2	99% Bandwidth	N/A	Conducted	Pass	Section 7.2
RSS-247 §6.2.4	6dB Bandwidth	>500kHz		Pass	Section 7.3
RSS-247 §6.2.4	Max Conducted Output Power	Refer to section 7.4		Pass	Section 7.4
RSS-247 §6.2.4	Peak Power Spectral Density	Refer to section 7.5		Pass	Section 7.5
RSS-Gen [8.11]	Frequency Stability	N/A		Pass	Section 7.6
RSS-247 §6.2.4	Out-of-Band Emissions	Refer to section 7.8	Radiated	Pass	Section 7.7 & 7.8
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	
RSS-Gen [8.8]	AC Conducted Emissions 150kHz - 30MHz	≤ RSS-Gen [8.8] Limit	Line Conducted	Pass	Section 7.9

Notes:

1) All channels, modes, and modulations/data rates were investigated among all UNII bands. The test results shown in the following sections represent the worst case emissions.
2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.

7.2. 26dB Bandwidth Measurement

7.2.1.Test Limit

N/A

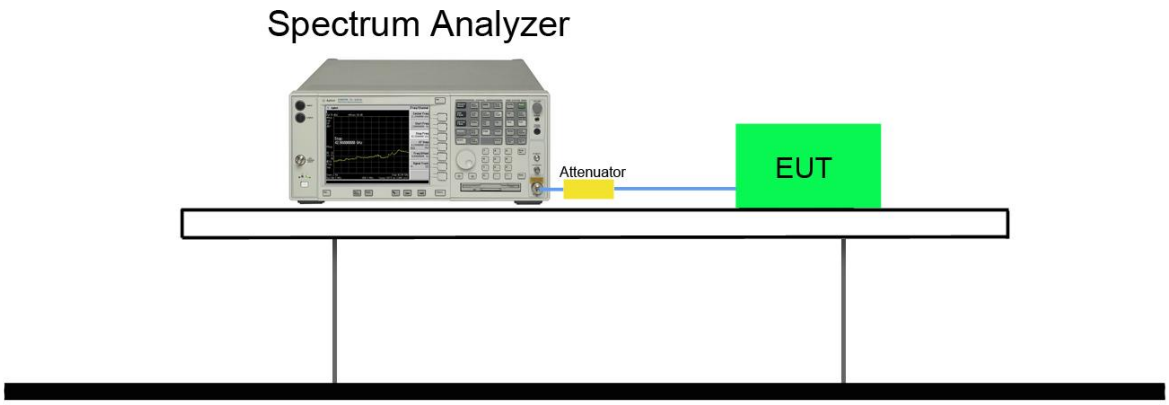
7.2.2.Test Procedure used

KDB 789033 D02v02r01 – Section C.1

7.2.3.Test Setting

1. The analyzers' automatic bandwidth measurement capability was used to perform the 26dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 26. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediated power nulls in the fundamental emission.
2. RBW = approximately 1% of the emission bandwidth.
3. VBW ≥ 3 × RBW.
4. Detector = Peak.
5. Trace mode = max hold.

7.2.4.Test Setup



7.2.5.Test Result

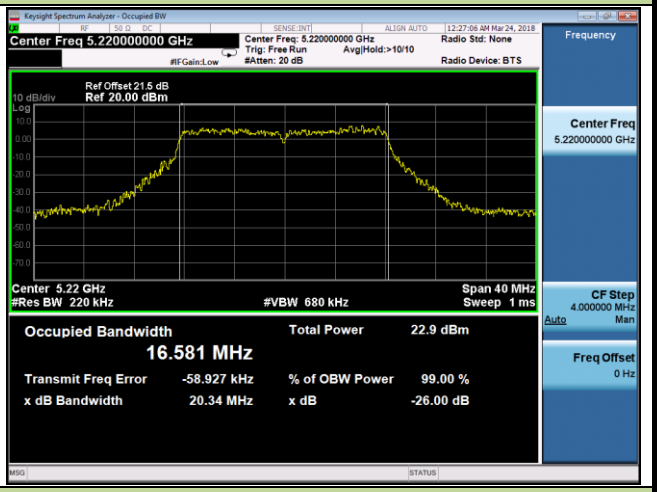
Product	Mantis Q	Temperature	24°C
Test Engineer	Kevin Ker	Relative Humidity	59%
Test Site	SR1	Test Date	2018/03/24

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
802.11a	6	36	5180	20.94	16.65
802.11a	6	44	5220	20.34	16.58
802.11a	6	48	5240	21.57	16.65
802.11a	6	149	5745	21.17	16.72
802.11a	6	157	5785	24.29	17.82
802.11a	6	165	5825	23.51	17.84
802.11n-HT20	MCS0	36	5180	21.42	17.73
802.11n-HT20	MCS0	44	5220	20.54	17.75
802.11n-HT20	MCS0	48	5240	21.07	17.70
802.11n-HT20	MCS0	149	5745	21.59	17.83
802.11n-HT20	MCS0	157	5785	21.00	17.70
802.11n-HT20	MCS0	165	5825	21.34	17.77

802.11a 26dB Bandwidth & 99% Bandwidth

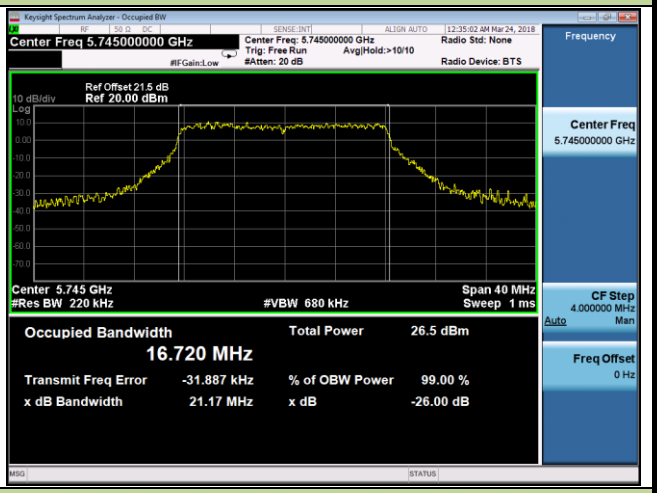
Channel 36 (5180MHz)

Channel 44 (5220MHz)

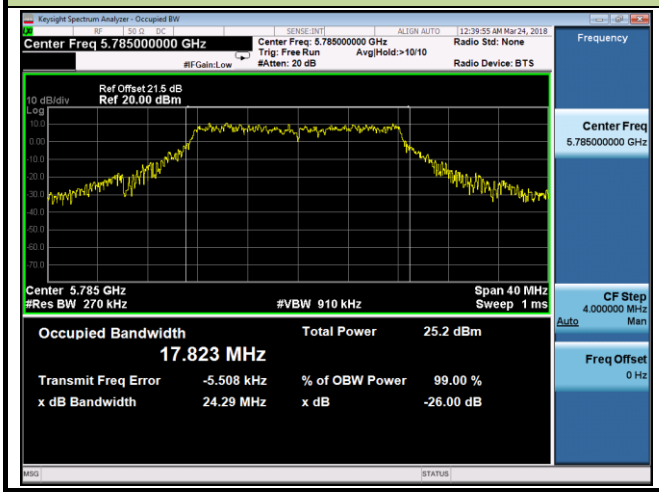


Channel 48 (5240MHz)

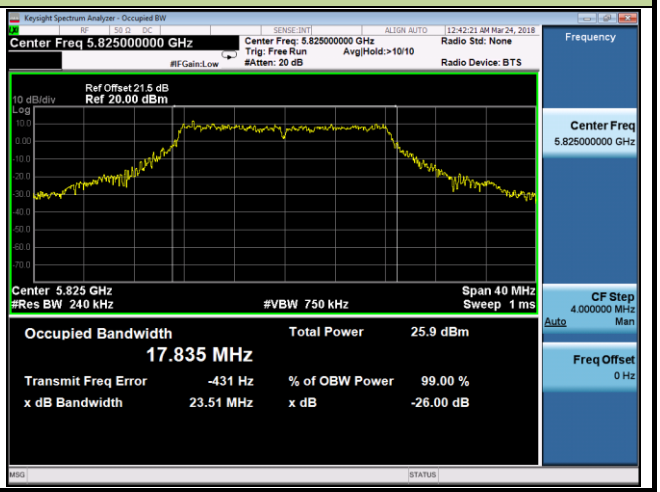
Channel 149 (5745MHz)



Channel 157 (5785MHz)

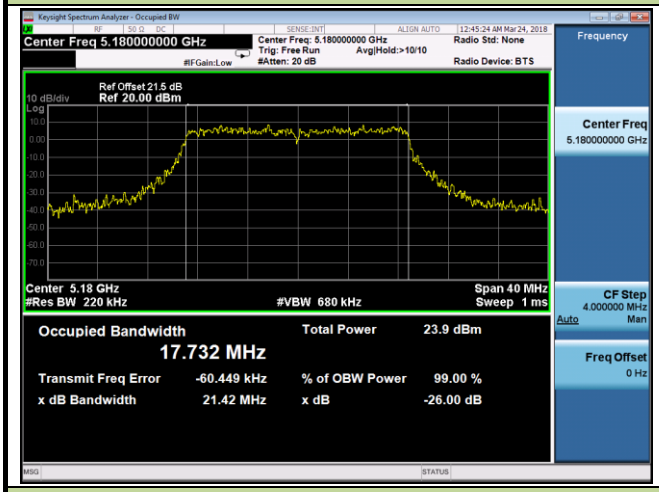


Channel 165 (5825MHz)

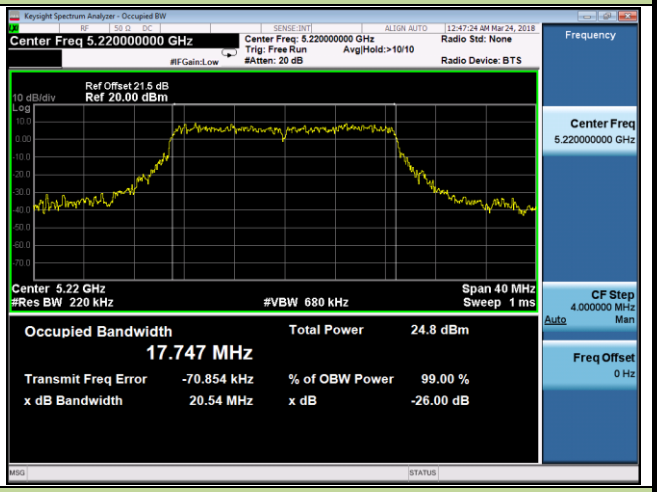


802.11n-HT20 26dB Bandwidth & 99% Bandwidth

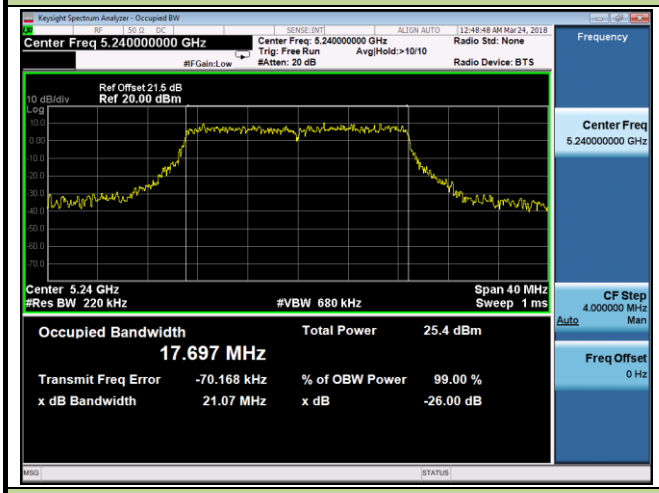
Channel 36 (5180MHz)



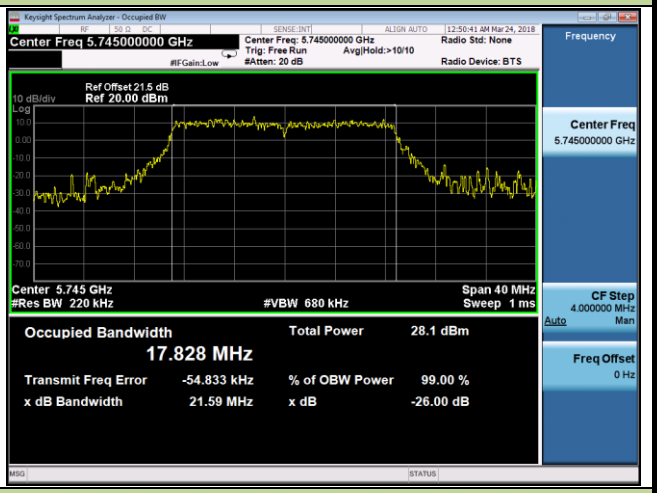
Channel 44 (5220MHz)



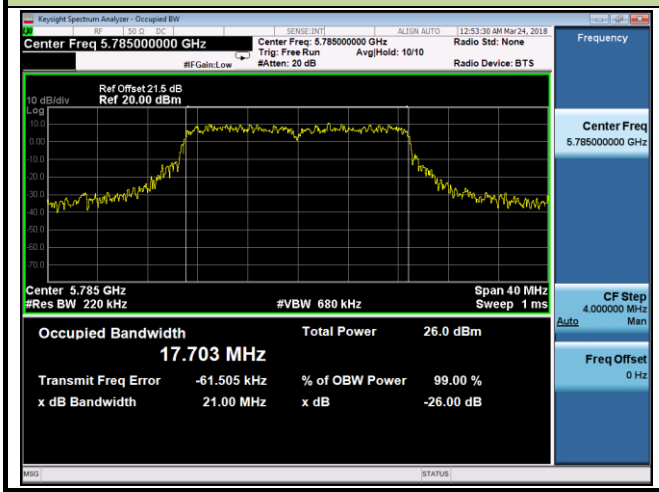
Channel 48 (5240MHz)



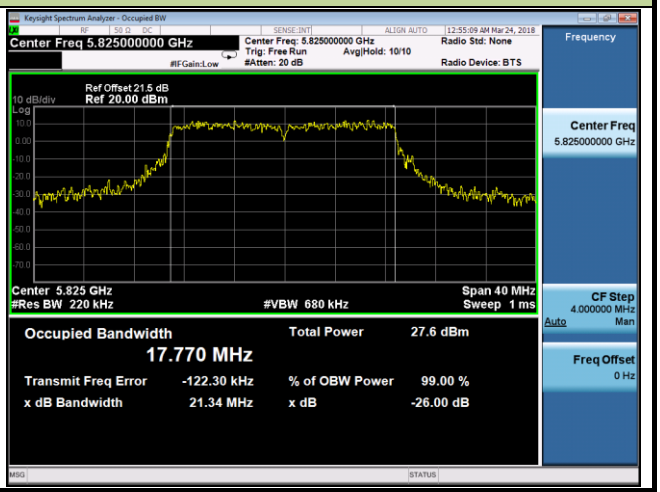
Channel 149 (5745MHz)



Channel 157 (5785MHz)



Channel 165 (5825MHz)



7.3. 6dB Bandwidth Measurement

7.3.1.Test Limit

The minimum 6dB bandwidth shall be at least 500 kHz.

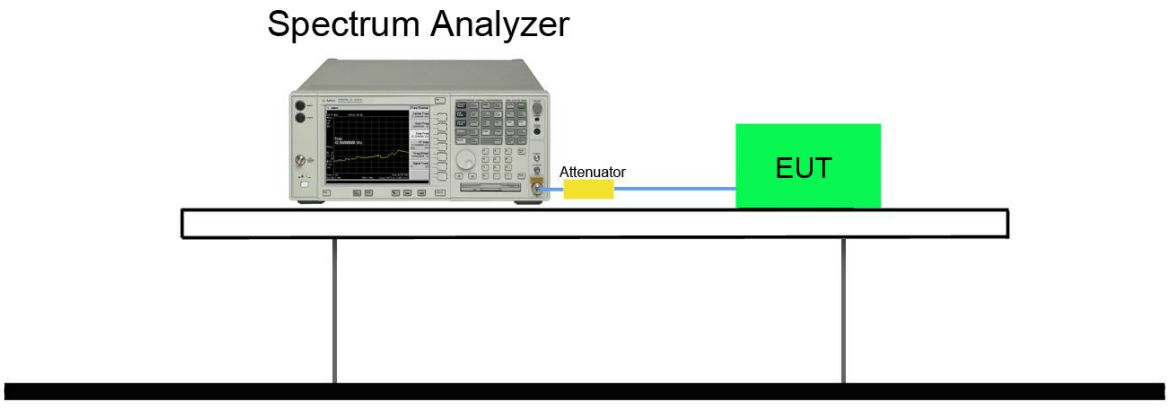
7.3.2.Test Procedure used

KDB 789033 D02v02r01 – Section C.2

7.3.3.Test Setting

1. Set center frequency to the nominal EUT channel center frequency.
2. RBW = 100 kHz.
3. VBW ≥ 3 × RBW.
4. Detector = Peak.
5. Trace mode = max hold.
6. Sweep = auto couple.
7. Allow the trace to stabilize.
8. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

7.3.4.Test Setup



7.3.5.Test Result

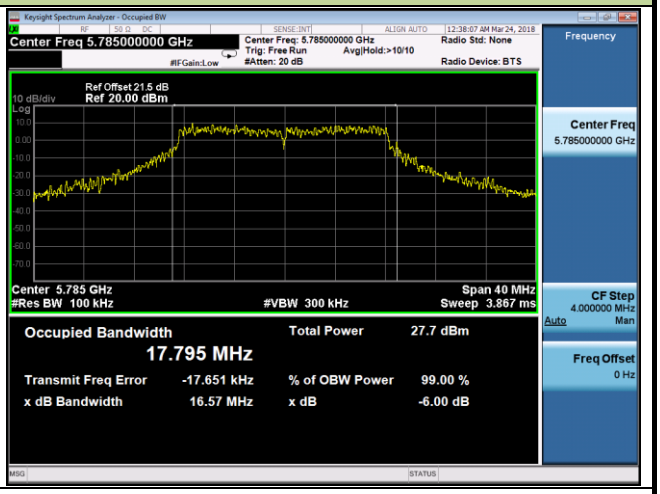
Product	Mantis Q	Temperature	24°C
Test Engineer	Kevin Ker	Relative Humidity	59%
Test Site	SR1	Test Date	2018/03/24

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
802.11a	6	149	5745	16.48	≥ 0.5	Pass
802.11a	6	157	5785	16.57	≥ 0.5	Pass
802.11a	6	165	5825	16.52	≥ 0.5	Pass
802.11n-HT20	MCS0	149	5745	17.79	≥ 0.5	Pass
802.11n-HT20	MCS0	157	5785	17.59	≥ 0.5	Pass
802.11n-HT20	MCS0	165	5825	17.77	≥ 0.5	Pass

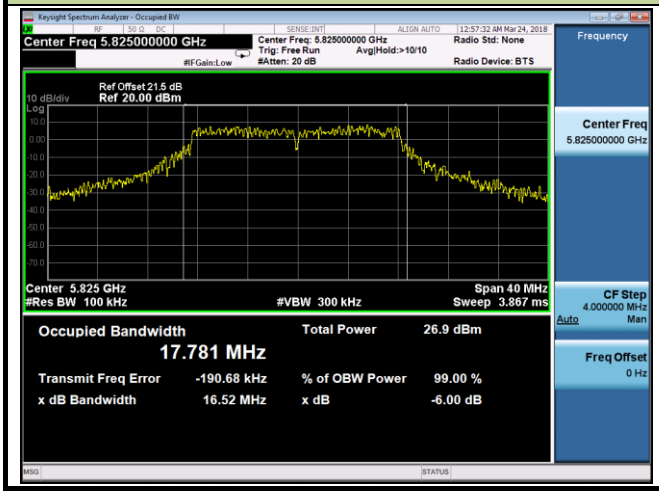
802.11a 6dB Bandwidth

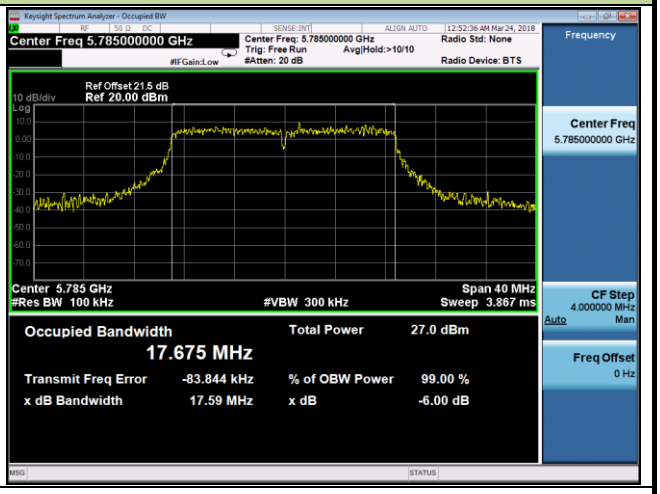
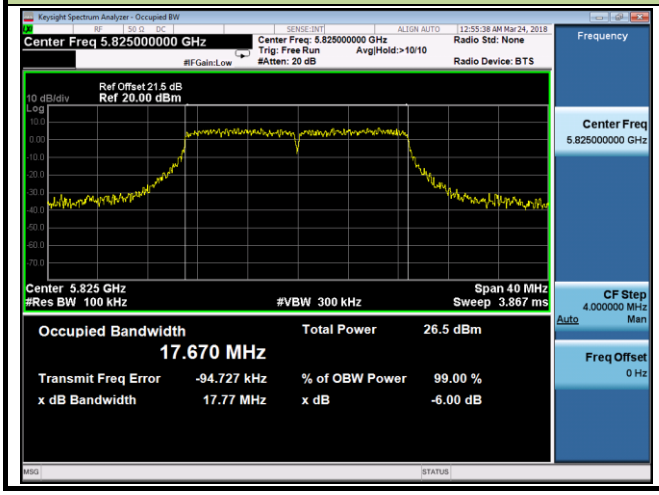
Channel 149 (5745MHz)

Channel 157 (5785MHz)



Channel 165 (5825MHz)



802.11n-HT20 6dB Bandwidth	
Channel 149 (5745MHz)	Channel 157 (5785MHz)
	
Channel 165 (5825MHz)	
	

7.4. Output Power Measurement

7.4.1.Test Limit

For FCC

For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm). If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For IC

For the 5.725-5.85 GHz band, the maximum conducted output power shall not exceed 1 W.

If transmitting antennas of directional gain greater than 6dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

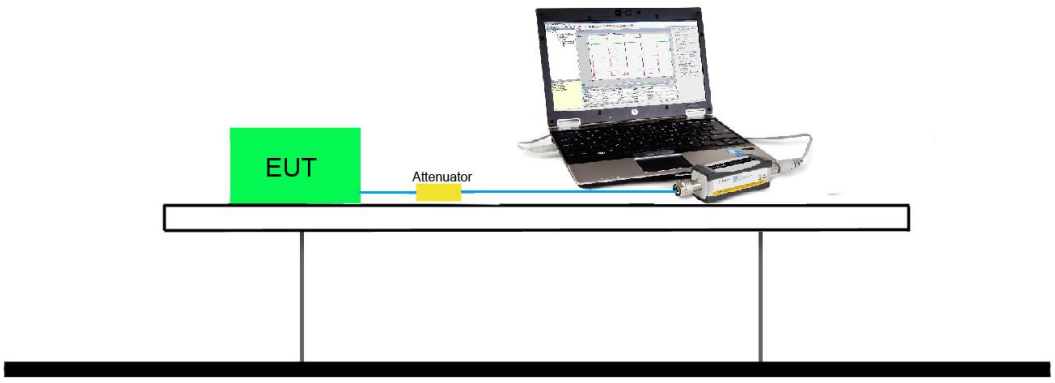
7.4.2.Test Procedure Used

KDB 789033 D02v02r01 - Section E) 3) b) Method PM-G

7.4.3.Test Setting

Average power measurements were perform only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.

7.4.4.Test Setup



7.4.5.Test Result

Power output test was verified over all data rates of each mode shown as below table, and then choose the maximum power output (Gray Marker) for final test of each channel.

Output power at various data rates:

Test Mode	Frequency (MHz)	Data Rate (Mbps)	Average Power (dBm)
802.11a	5785	6	21.89
		24	21.46
		54	21.03
802.11n-HT20	5785	MCS0	21.85
		MCS3	21.39
		MCS7	21.01

Product	Mantis Q	Temperature	22°C
Test Engineer	Kevin Ker	Relative Humidity	54%
Test Site	SR1	Test Date	2018/03/20
Test Item	FCC Output Power		

Test Mode	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Average Power (dBm)	Average Power Limit (dBm)	Result
802.11a	6	36	5180	21.65	≤ 30.00	Pass
802.11a	6	44	5220	21.73	≤ 30.00	Pass
802.11a	6	48	5240	21.38	≤ 30.00	Pass
802.11a	6	149	5745	21.97	≤ 30.00	Pass
802.11a	6	157	5785	21.89	≤ 30.00	Pass
802.11a	6	165	5825	21.69	≤ 30.00	Pass
802.11n-HT20	MCS0	149	5180	21.73	≤ 30.00	Pass
802.11n-HT20	MCS0	157	5220	21.42	≤ 30.00	Pass
802.11n-HT20	MCS0	165	5240	21.56	≤ 30.00	Pass
802.11n-HT20	MCS0	149	5745	21.92	≤ 30.00	Pass
802.11n-HT20	MCS0	157	5785	21.85	≤ 30.00	Pass
802.11n-HT20	MCS0	165	5825	21.95	≤ 30.00	Pass

Product	Mantis Q	Temperature	22°C
Test Engineer	Kevin Ker	Relative Humidity	54%
Test Site	SR1	Test Date	2018/03/20
Test Item	IC Output Power		

Test Mode	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Average Power (dBm)	Average Power Limit (dBm)	Result
802.11a	6	149	5745	21.97	≤ 30.00	Pass
802.11a	6	157	5785	21.89	≤ 30.00	Pass
802.11a	6	165	5825	21.69	≤ 30.00	Pass
802.11n-HT20	MCS0	149	5745	21.92	≤ 30.00	Pass
802.11n-HT20	MCS0	157	5785	21.85	≤ 30.00	Pass
802.11n-HT20	MCS0	165	5825	21.95	≤ 30.00	Pass

7.5. Power Spectral Density Measurement

7.5.1.Test Limit

For FCC

For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.

For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

If transmitting antennas of directional gain greater than 6dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

For IC

For the 5.725-5.85 GHz band, the power spectral density shall not exceed 30 dBm in any 500 kHz band.

If transmitting antennas of directional gain greater than 6dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

7.5.2.Test Procedure Used

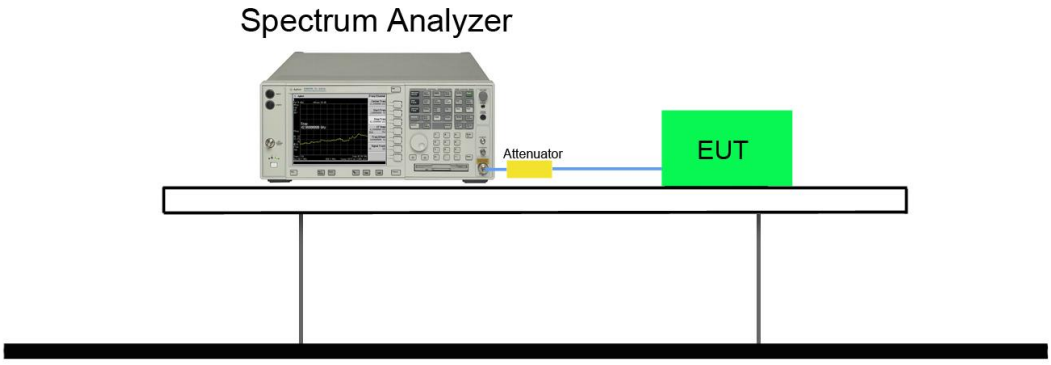
KDB 789033 D02v02r01 - Section F

7.5.3.Test Setting

1. Analyzer was set to the center frequency of the UNII channel under investigation
2. Span was set to encompass the entire 26dB OBW of the signal.
3. RBW = 1MHz, if measurement bandwidth of Maximum PSD is specified in 500 kHz, RBW = 100 kHz
4. VBW = 3MHz
5. Number of sweep points ≥ 2 × (span / RBW)
6. Detector = power averaging (RMS)
7. Sweep time = auto
8. Trigger = free run

9. Use the peak search function on the instrument to find the peak of the spectrum and record its value.
10. Add 10*log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add 10*log(1/0.25) = 6 dB if the duty cycle is 25 percent.
11. When the measurement bandwidth of Maximum PSD is specified in 500 kHz, add a constant factor 10*log(500kHz/100kHz) = 6.99 dB to the measured result.

7.5.4.Test Setup



7.5.5.Test Result

Product	Mantis Q	Temperature	24°C
Test Engineer	Kevin Ker	Relative Humidity	59%
Test Site	SR1	Test Date	2018/03/23 ~ 2018/04/09
Test Item	Power Spectral Density (FCC NII-Band1)		

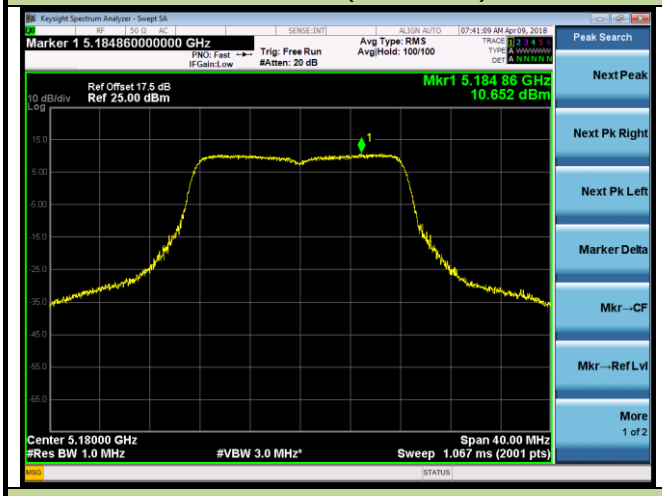
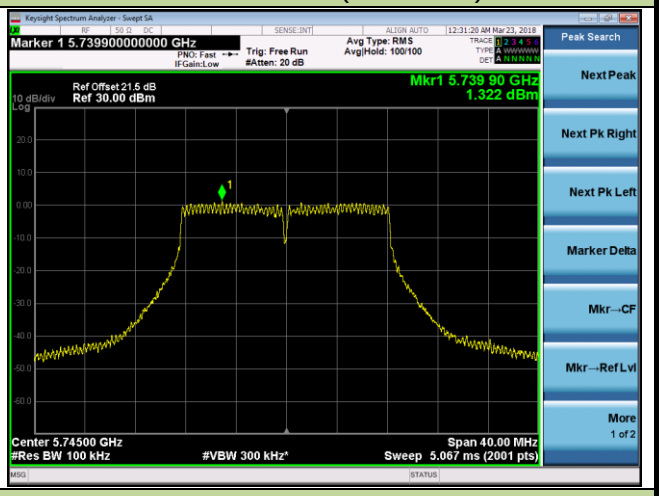
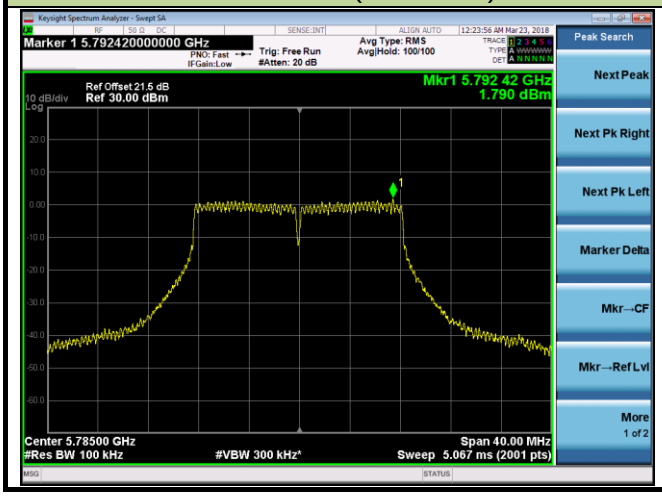
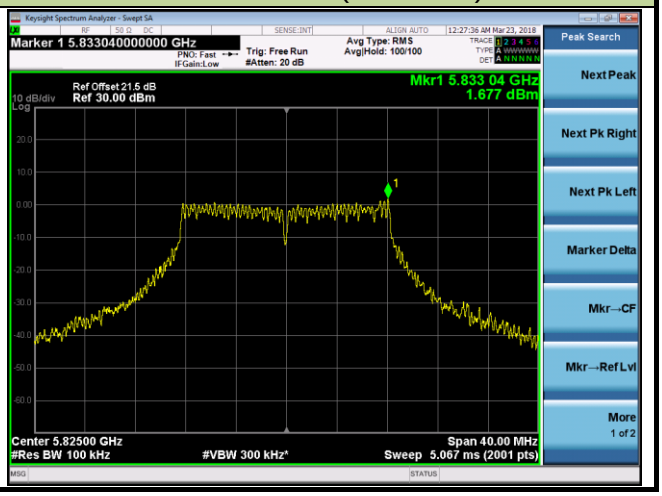
Test Mode	Data Rate (Mbps)	Channel No.	Freq. (MHz)	PSD (dBm/ MHz)	Duty Cycle (%)	Final PSD (dBm/ MHz)	PSD Limit (dBm/ MHz)	Result
802.11a	6	36	5180	10.65	92.79	10.97	≤ 17	Pass
802.11a	6	44	5220	11.63	92.79	11.95	≤ 17	Pass
802.11a	6	48	5240	12.59	92.79	12.91	≤ 17	Pass
802.11n-HT20	MCS0	36	5180	11.81	96.91	11.95	≤ 17	Pass
802.11n-HT20	MCS0	44	5220	11.74	96.91	11.88	≤ 17	Pass
802.11n-HT20	MCS0	48	5240	10.96	96.91	11.10	≤ 17	Pass

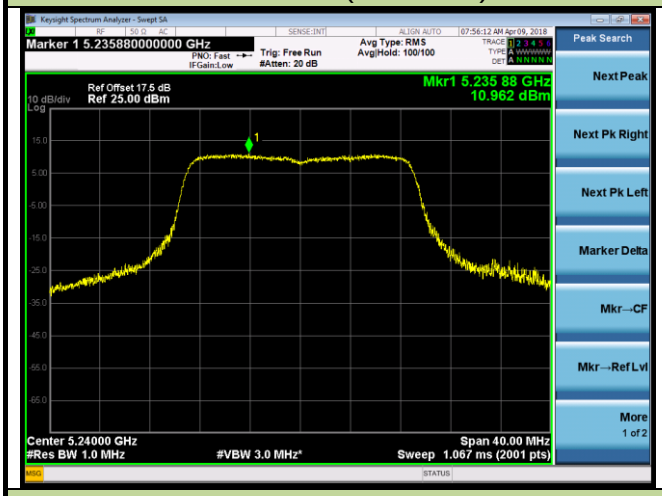
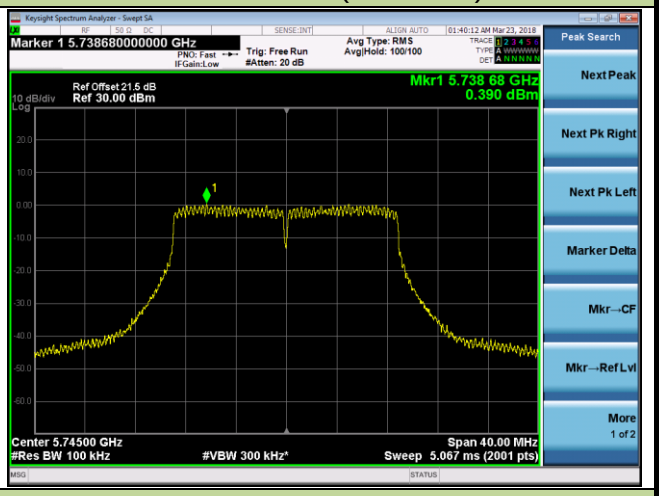
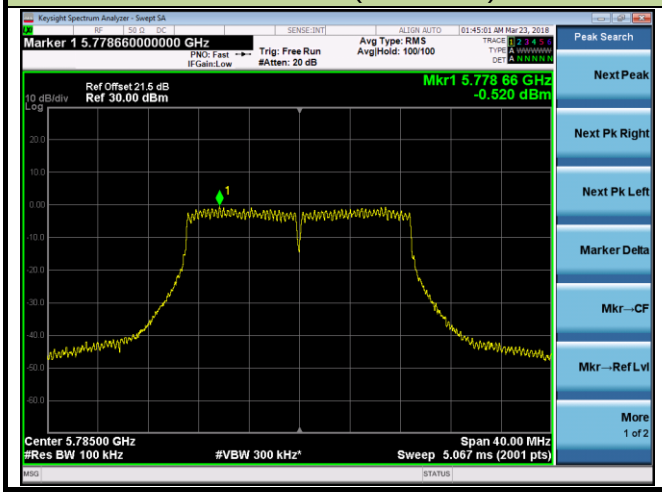
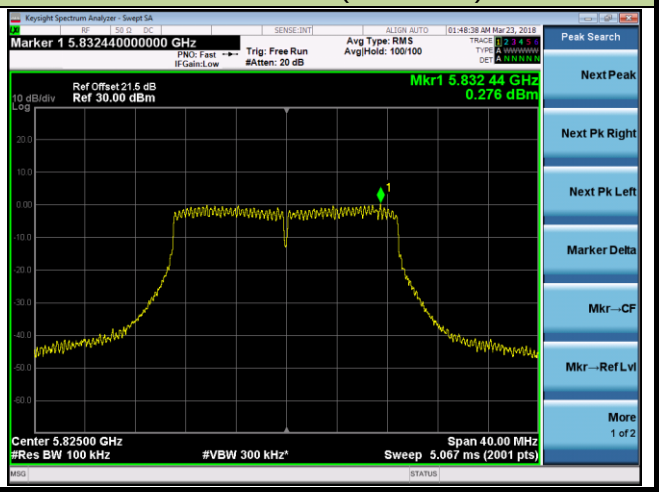
Note: When EUT duty cycle < 98%, the Final PSD (dBm/MHz) = PSD (dBm/MHz) + 10*log (1/Duty Cycle).

Product	Mantis Q	Temperature	24°C
Test Engineer	Kevin Ker	Relative Humidity	59%
Test Site	SR1	Test Date	2018/03/23 ~ 2018/04/09
Test Item	Power Spectral Density (FCC & IC NII-Band 3)		

Test Mode	Data Rate (Mbps)	Channel No.	Freq. (MHz)	PSD (dBm/ 100KHz)	Duty Cycle (%)	Constant Factor	Final PSD (dBm/ 500kHz)	Limit (dBm/ 500kHz)	Result
802.11a	6	149	5745	1.32	92.79	6.99	8.63	≤ 30.00	Pass
802.11a	6	157	5785	1.79	92.79	6.99	9.10	≤ 30.00	Pass
802.11a	6	165	5825	1.68	92.79	6.99	8.99	≤ 30.00	Pass
802.11n-HT20	MCS0	149	5745	0.39	96.91	6.99	7.52	≤ 30.00	Pass
802.11n-HT20	MCS0	157	5785	-0.52	96.91	6.99	6.61	≤ 30.00	Pass
802.11n-HT20	MCS0	165	5825	0.28	96.91	6.99	7.41	≤ 30.00	Pass

Note: When EUT duty cycle < 98%, the Final PSD (dBm/500kHz) = PSD (dBm/100kHz) + Constant Factor + 10*log (1/Duty Cycle).

802.11a Power Spectral Density	
Channel 36 (5180MHz)	Channel 44 (5220MHz)
	
Channel 48 (5240MHz)	Channel 149 (5745MHz)
	
Channel 157 (5785MHz)	Channel 165 (5825MHz)
	

802.11n-HT20 Power Spectral Density	
Channel 36 (5180MHz)	Channel 44 (5220MHz)
	
Channel 48 (5240MHz)	Channel 149 (5745MHz)
	
Channel 157 (5785MHz)	Channel 165 (5825MHz)
	

7.6. Frequency Stability Measurement

7.6.1.Test Limit

Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

The transmitter center frequency tolerance shall be ±20 ppm maximum for the 5GHz band (IEEE 802.11 specification).

7.6.2.Test Procedure Used

Frequency Stability Under Temperature Variations:

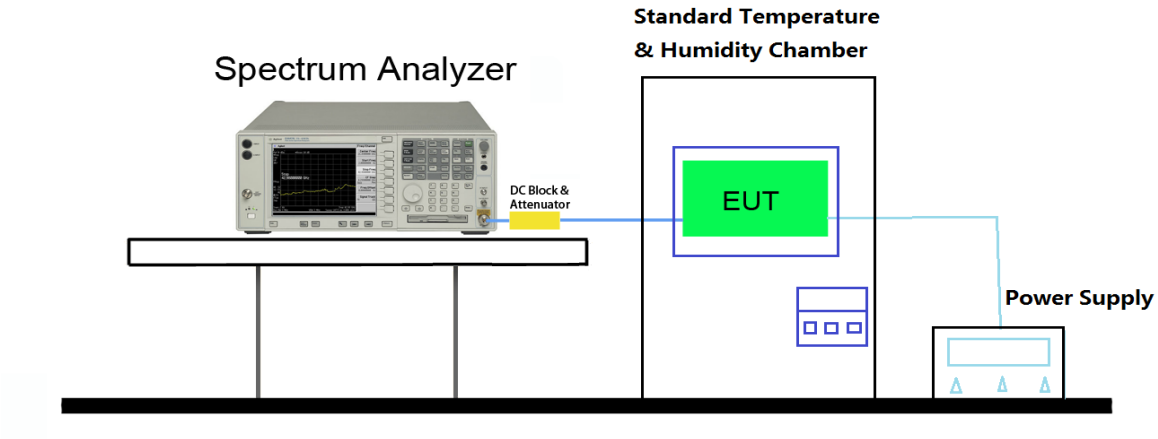
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to highest. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C decreased per stage until the lowest temperature reached.

Frequency Stability Under Voltage Variations:

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, record the maximum frequency change.

7.6.3.Test Setup



7.6.4.Test Result

Test Engineer	Kevin Ker	Temperature	-30 ~ 50°C
Test Time	2018/04/07	Relative Humidity	52%RH
Test Mode	5180MHz (Carrier Mode)	Test Site	SR1

Voltage (%)	Power (VDC)	Temp (°C)	Frequency Tolerance (ppm)			
			0 minutes	2 minutes	5 minutes	10 minutes
100%	11.4	- 30	10.63	8.33	6.63	4.83
		- 20	9.99	9.12	8.51	6.77
		- 10	9.55	8.65	7.41	4.88
		0	9.47	8.26	7.52	5.22
		+ 10	10.25	9.13	8.02	5.87
		+ 20 (Ref)	10.37	9.41	8.24	6.13
		+ 30	10.48	9.98	8.55	6.79
		+ 40	11.44	9.25	8.11	5.53
		+ 50	12.11	8.24	7.65	4.14
115%	13.11	+ 20	10.55	9.37	8.16	6.35
85%	9.69	+ 20	10.46	8.89	7.41	5.77

Note: Frequency Tolerance (ppm) = {[Measured Frequency (Hz) – Declared Frequency (Hz)] / Declared Frequency (Hz)} *10^6.

7.7. Radiated Spurious Emission Measurement

7.7.1.Test Limit

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 4 must not exceed the limits shown in Table per Section 8.9.

FCC Part 15 Subpart C Paragraph 15.209 & RSS-Gen Issue4 Section 8.9		
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

7.7.2.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)

7.7.3.Test Setting

Quasi-Peak& Average Measurements below30MHz

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

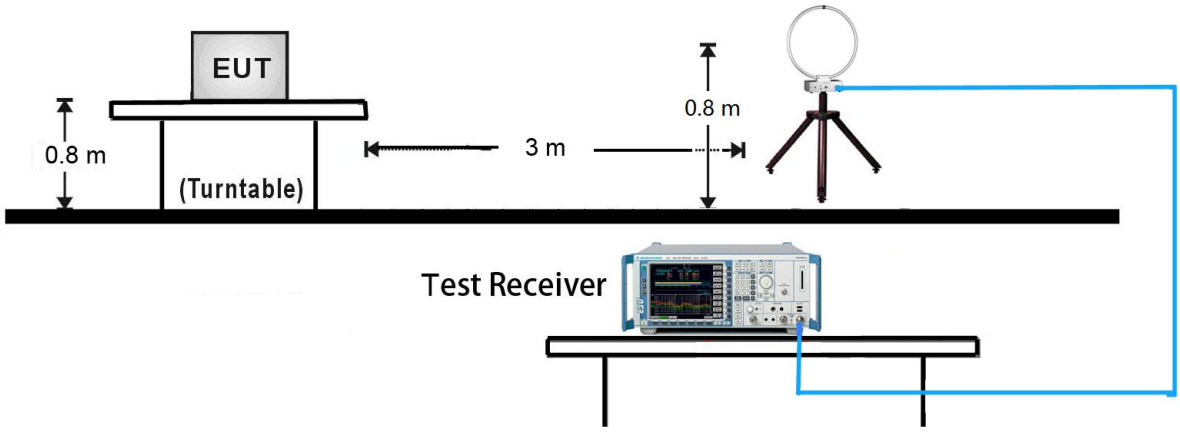
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Measurements above 1GHz (Method AD)

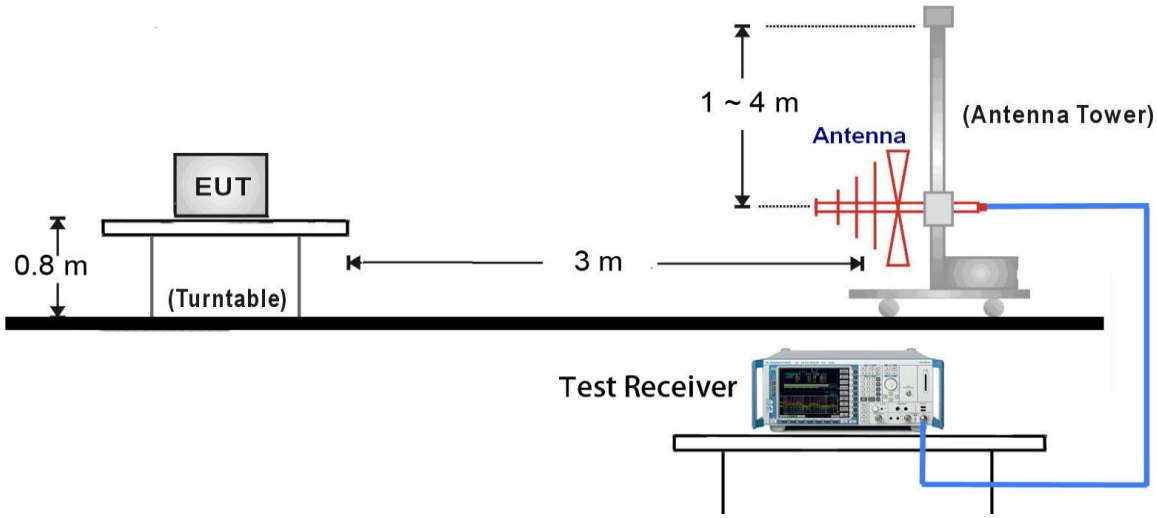
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = power average (Average)
5. Number of measurement points = 1001 (Number of points must be > 2 x span/RBW)
6. Sweep time = auto
7. Trace was averaged over at 100 sweeps

7.7.4.Test Setup

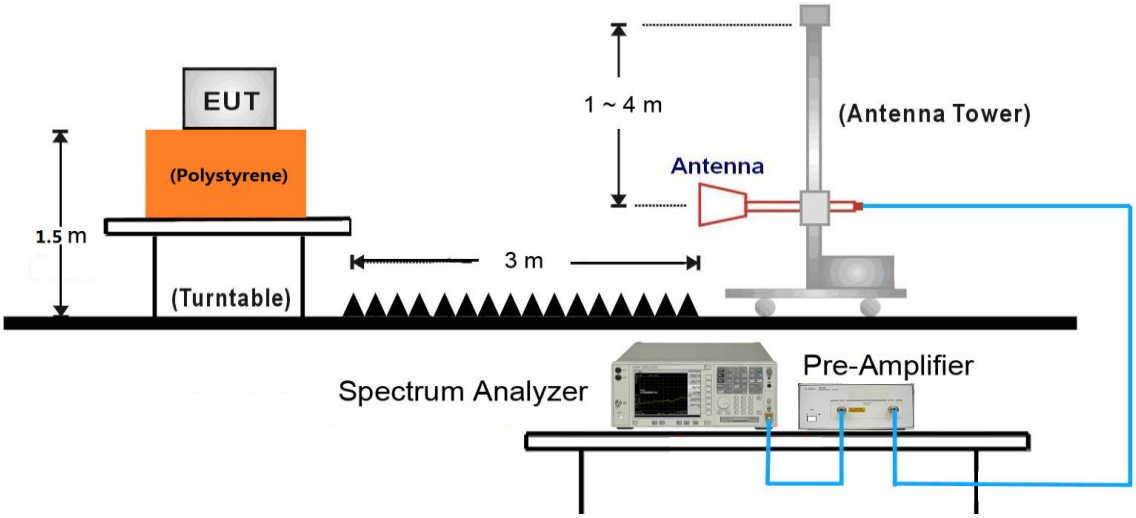
9kHz ~ 30MHz Test Setup:



30MHz ~ 1GHz Test Setup:



1GHz ~ 40GHz Test Setup:



7.7.5.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
*	7919.0	36.7	12.4	49.1	68.2	-19.1	Peak	Horizontal
*	9687.0	36.8	14.6	51.4	68.2	-16.8	Peak	Horizontal
	10834.5	35.1	18.1	53.2	74.0	-20.8	Peak	Horizontal
	11650.5	33.5	19.3	52.8	74.0	-21.2	Peak	Horizontal
*	7944.5	36.9	12.5	49.4	68.2	-18.8	Peak	Vertical
*	10010.0	36.0	15.4	51.4	68.2	-16.8	Peak	Vertical
	11412.5	34.5	19.1	53.6	74.0	-20.4	Peak	Vertical
	12143.5	33.4	18.9	52.3	74.0	-21.7	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
*	7995.5	37.6	12.5	50.1	68.2	-18.1	Peak	Horizontal
*	9874.0	35.2	15.8	51.0	68.2	-17.2	Peak	Horizontal
	10919.5	35.0	18.4	53.4	74.0	-20.6	Peak	Horizontal
	11718.5	33.7	19.0	52.7	74.0	-21.3	Peak	Horizontal
*	8845.5	34.7	14.0	48.7	68.2	-19.5	Peak	Vertical
*	9950.5	36.5	15.3	51.8	68.2	-16.4	Peak	Vertical
	10732.5	35.6	17.6	53.2	74.0	-20.8	Peak	Vertical
	11667.5	34.3	19.3	53.6	74.0	-20.4	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
*	8820.0	35.0	14.0	49.0	68.2	-19.2	Peak	Horizontal
*	10154.5	35.7	16.0	51.7	68.2	-16.5	Peak	Horizontal
	10945.0	34.9	18.4	53.3	74.0	-20.7	Peak	Horizontal
	12169.0	33.8	18.8	52.6	74.0	-21.4	Peak	Horizontal
*	8701.0	35.2	13.8	49.0	68.2	-19.2	Peak	Vertical
*	9874.0	35.6	15.8	51.4	68.2	-16.8	Peak	Vertical
	11013.0	35.2	18.5	53.7	74.0	-20.3	Peak	Vertical
	12288.0	34.0	18.6	52.6	74.0	-21.4	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 (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	8888.0	35.1	14.0	49.1	68.2	-19.1	Peak	Horizontal
*	9882.5	36.1	15.6	51.7	68.2	-16.5	Peak	Horizontal
	11310.5	34.7	18.9	53.6	74.0	-20.4	Peak	Horizontal
	11956.5	34.4	18.6	53.0	74.0	-21.0	Peak	Horizontal
*	7944.5	37.8	12.5	50.3	68.2	-17.9	Peak	Vertical
*	9984.5	36.4	15.4	51.8	68.2	-16.4	Peak	Vertical
	11490.0	38.9	19.3	58.2	74.0	-15.8	Peak	Vertical
	11490.0	23.3	19.3	42.6	54.0	-11.4	Average	Vertical
	12203.0	33.7	18.8	52.5	74.0	-21.5	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:	802.11a	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
*	7876.5	37.7	12.4	50.1	68.2	-18.1	Peak	Horizontal
*	10010.0	37.1	15.4	52.5	68.2	-15.7	Peak	Horizontal
	10962.0	34.9	18.4	53.3	74.0	-20.7	Peak	Horizontal
	11786.5	33.1	18.8	51.9	74.0	-22.1	Peak	Horizontal
*	8752.0	34.2	13.9	48.1	68.2	-20.1	Peak	Vertical
*	10265.0	35.4	16.5	51.9	68.2	-16.3	Peak	Vertical
	11570.0	36.0	19.5	55.5	74.0	-18.5	Peak	Vertical
	11570.0	21.9	19.5	41.4	54.0	-12.6	Average	Vertical
	12211.5	33.6	18.8	52.4	74.0	-21.6	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:	802.11a	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
*	8871.0	35.3	14.0	49.3	68.2	-18.9	Peak	Horizontal
*	10239.5	35.7	16.4	52.1	68.2	-16.1	Peak	Horizontal
	11132.0	34.0	18.6	52.6	74.0	-21.4	Peak	Horizontal
	12364.5	34.1	18.4	52.5	74.0	-21.5	Peak	Horizontal
*	8828.5	35.8	14.0	49.8	68.2	-18.4	Peak	Vertical
*	10401.0	36.0	16.9	52.9	68.2	-15.3	Peak	Vertical
	11404.0	35.2	19.1	54.3	74.0	-19.7	Peak	Vertical
	12220.0	34.1	18.7	52.8	74.0	-21.2	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
*	8624.5	35.2	13.5	48.7	68.2	-19.5	Peak	Horizontal
*	10486.0	35.8	17.1	52.9	68.2	-15.3	Peak	Horizontal
	10996.0	34.8	18.5	53.3	74.0	-20.7	Peak	Horizontal
	11905.5	34.6	18.6	53.2	74.0	-20.8	Peak	Horizontal
*	8010.0	37.9	12.5	50.4	68.2	-17.8	Peak	Vertical
*	10163.0	36.3	16.0	52.3	68.2	-15.9	Peak	Vertical
	10911.0	35.0	18.4	53.4	74.0	-20.6	Peak	Vertical
	12220.0	33.9	18.7	52.6	74.0	-21.4	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	35.2	14.0	49.2	68.2	-19.0	Peak	Horizontal
*	10180.0	36.0	16.1	52.1	68.2	-16.1	Peak	Horizontal
	11030.0	34.7	18.5	53.2	74.0	-20.8	Peak	Horizontal
	12220.0	33.9	18.7	52.6	74.0	-21.4	Peak	Horizontal
*	8743.5	35.1	13.9	49.0	68.2	-19.2	Peak	Vertical
*	9874.0	35.7	15.8	51.5	68.2	-16.7	Peak	Vertical
	10936.5	34.7	18.4	53.1	74.0	-20.9	Peak	Vertical
	12067.0	34.2	18.8	53.0	74.0	-21.0	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:	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
*	8803.0	35.9	14.0	49.9	68.2	-18.3	Peak	Horizontal
*	10375.5	35.5	16.9	52.4	68.2	-15.8	Peak	Horizontal
	11038.5	35.5	18.5	54.0	74.0	-20.0	Peak	Horizontal
	12228.5	33.9	18.7	52.6	74.0	-21.4	Peak	Horizontal
*	8820.0	34.8	14.0	48.8	68.2	-19.4	Peak	Vertical
*	10316.0	35.9	16.7	52.6	68.2	-15.6	Peak	Vertical
	10936.5	34.5	18.4	52.9	74.0	-21.1	Peak	Vertical
	12126.5	34.1	18.9	53.0	74.0	-21.0	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:	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
*	8820.0	35.5	14.0	49.5	68.2	-18.7	Peak	Horizontal
*	9967.5	36.4	15.3	51.7	68.2	-16.5	Peak	Horizontal
	10953.5	34.6	18.4	53.0	74.0	-21.0	Peak	Horizontal
	11880.0	34.2	18.6	52.8	74.0	-21.2	Peak	Horizontal
*	8684.0	36.6	13.7	50.3	68.2	-17.9	Peak	Vertical
*	9993.0	36.5	15.4	51.9	68.2	-16.3	Peak	Vertical
	11490.0	38.3	19.3	57.6	74.0	-16.4	Peak	Vertical
	11490.0	24.1	19.3	43.4	54.0	-10.6	Average	Vertical
	12254.0	33.6	18.6	52.2	74.0	-21.8	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 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
*	8828.5	35.1	14.0	49.1	68.2	-19.1	Peak	Horizontal
*	10316.0	34.6	16.7	51.3	68.2	-16.9	Peak	Horizontal
	11570.0	39.7	17.7	57.4	74.0	-16.6	Peak	Horizontal
	11570.0	22.7	19.5	42.2	54.0	-11.8	Average	Horizontal
	12322.0	33.7	18.5	52.2	74.0	-21.8	Peak	Horizontal
*	8760.5	34.5	13.9	48.4	68.2	-19.8	Peak	Vertical
*	9933.5	36.0	15.3	51.3	68.2	-16.9	Peak	Vertical
	11570.0	40.8	19.5	60.3	74.0	-13.7	Peak	Vertical
	11570.0	26.4	19.5	45.9	54.0	-8.1	Average	Vertical
	12483.5	34.1	18.5	52.6	74.0	-21.4	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
*	8752.0	35.7	13.9	49.6	68.2	-18.6	Peak	Horizontal
*	9899.5	36.4	15.4	51.8	68.2	-16.4	Peak	Horizontal
	10902.5	35.1	18.3	53.4	74.0	-20.6	Peak	Horizontal
	11684.5	33.7	19.2	52.9	74.0	-21.1	Peak	Horizontal
*	8811.5	35.1	14.0	49.1	68.2	-19.1	Peak	Vertical
*	9950.5	36.3	15.3	51.6	68.2	-16.6	Peak	Vertical
	11650.0	35.0	19.3	54.3	74.0	-19.7	Peak	Vertical
	11650.0	23.9	19.3	43.2	54.0	-10.8	Average	Vertical
	12475.0	33.8	18.5	52.3	74.0	-21.7	Peak	Vertical

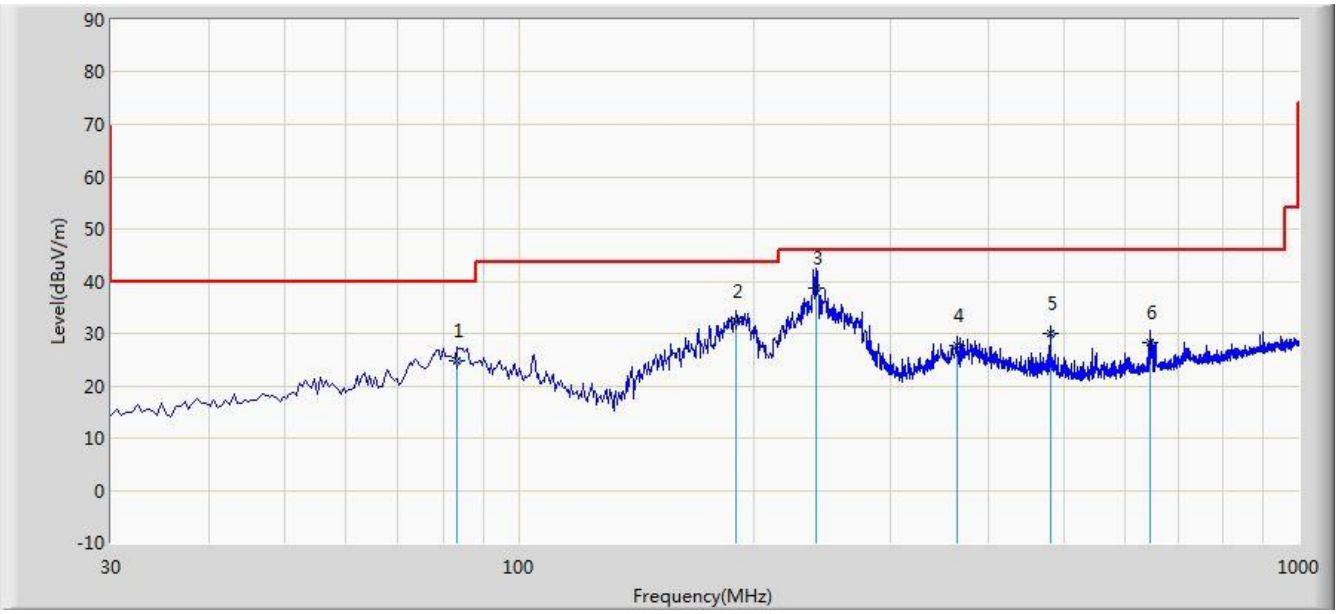
Note 1: “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

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: 2018/04/18 - 15:11
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: VULB9162_0.03-8GHz	Polarity: Horizontal
EUT: Mantis Q	Power: By Battery
Worse Case Mode: Transmit by 802.11a at Channel 5785MHz	



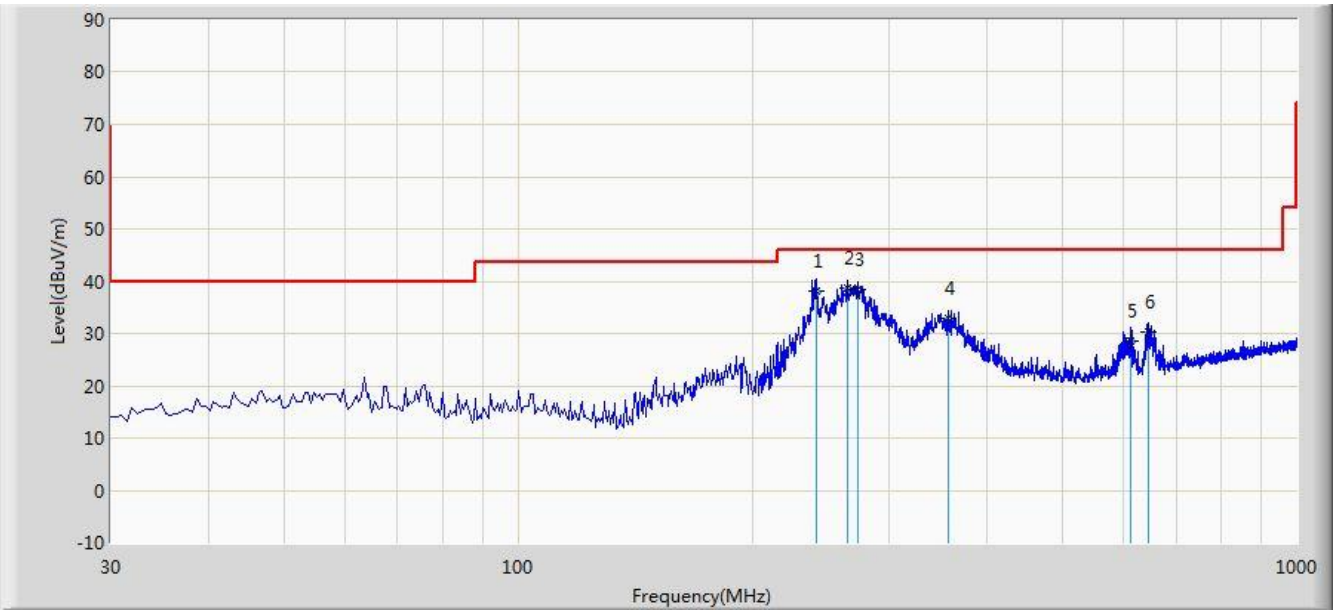
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			83.350	24.860	14.947	-15.140	40.000	9.914	QP
2			190.050	32.236	20.315	-11.264	43.500	11.921	QP
3		*	240.975	38.739	25.142	-7.261	46.000	13.597	QP
4			364.650	27.825	11.551	-18.175	46.000	16.274	QP
5			480.080	29.887	11.654	-16.113	46.000	18.233	QP
6			645.465	28.133	7.258	-17.867	46.000	20.875	QP

Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + 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 ~ 25GHz), therefore no data appear in the report.

Site: AC1	Time: 2018/04/18 - 15:18
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: VULB9162_0.03-8GHz	Polarity: Vertical
EUT: Mantis Q	Power: By Battery
Worse Case Mode: 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			241.460	38.069	24.457	-7.931	46.000	13.612	QP
2		*	264.740	38.795	24.652	-7.205	46.000	14.143	QP
3			273.470	38.403	24.121	-7.597	46.000	14.282	QP
4			356.405	32.968	16.820	-13.032	46.000	16.148	QP
5			612.000	28.600	8.124	-17.400	46.000	20.476	QP
6			645.950	30.163	9.279	-15.837	46.000	20.883	QP

Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + 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 ~ 25GHz), therefore no data appear in the report.

7.8. Radiated Restricted Band Edge Measurement

7.8.1.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
[1] 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	([2])
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 [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

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

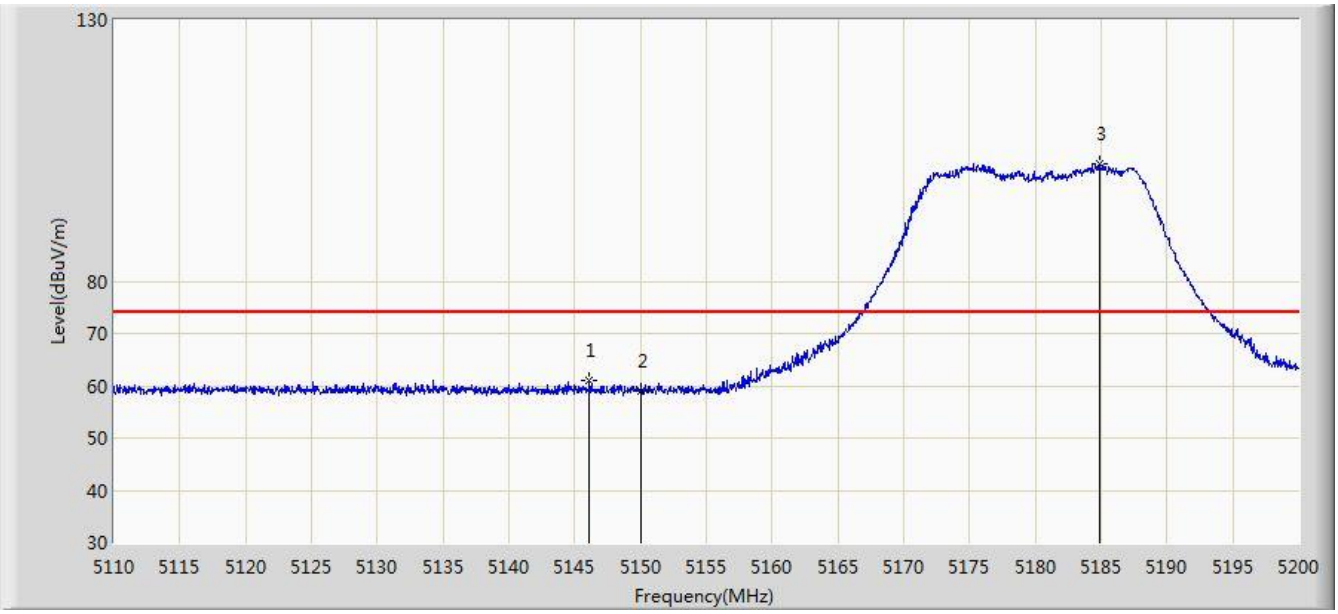
d) -27 dBm/MHz at frequencies more than 75 MHz above or below the band edges.

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]	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

7.8.2.Test Result

Site: AC1	Time: 2018/03/27 - 20:29
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Horizontal
EUT: Mantis Q	Power: By Battery
Transmit by 802.11a at Channel 5180MHz	

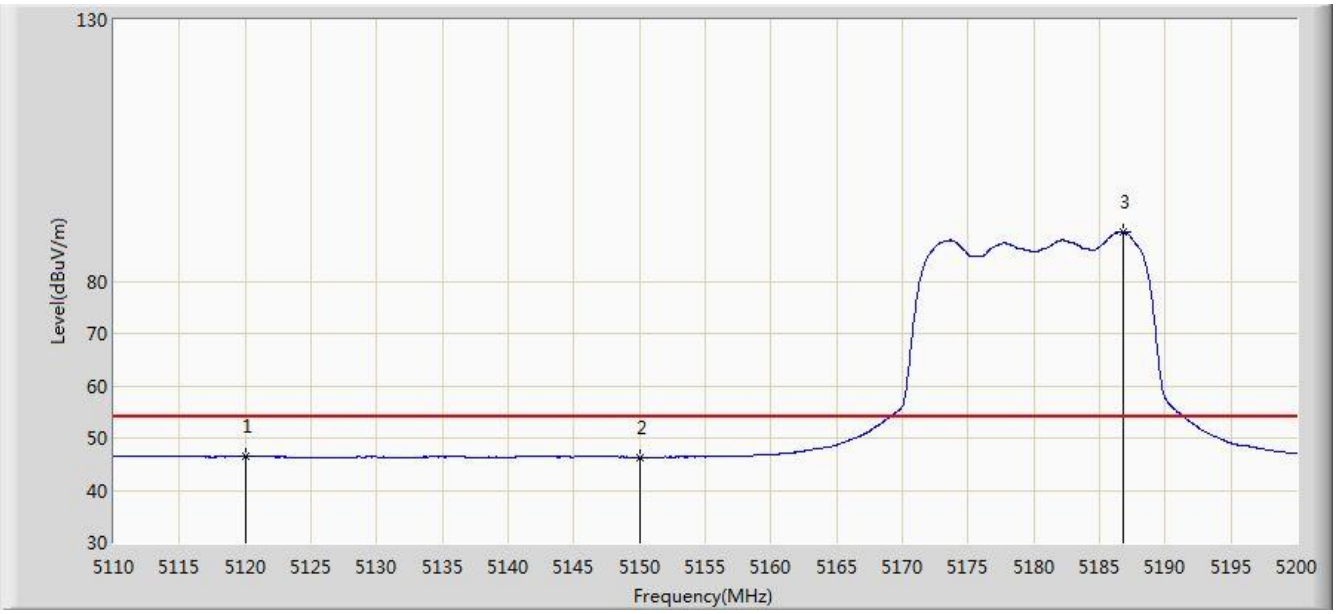


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5146.090	60.959	56.783	-13.041	74.000	4.175	PK
2			5150.000	58.938	54.769	-15.062	74.000	4.170	PK
3		*	5184.880	102.510	98.458	N/A	N/A	4.052	PK

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: 2018/03/27 - 20:42
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Horizontal
EUT: Mantis Q	Power: By Battery
Transmit by 802.11a at Channel 5180MHz	

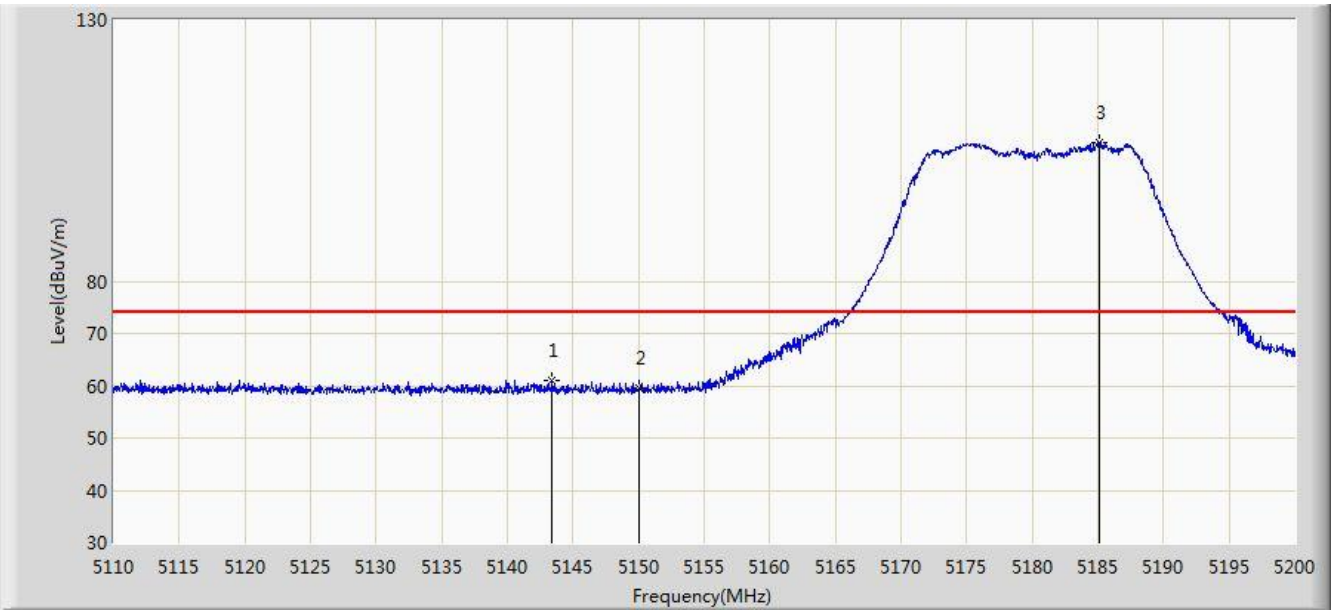


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5119.990	46.656	42.481	-7.344	54.000	4.175	AV
2			5150.000	46.337	42.168	-7.663	54.000	4.170	AV
3		*	5186.860	89.420	85.375	N/A	N/A	4.044	AV

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: 2018/03/27 - 20:43
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Vertical
EUT: Mantis Q	Power: By Battery
Transmit by 802.11a at Channel 5180MHz	

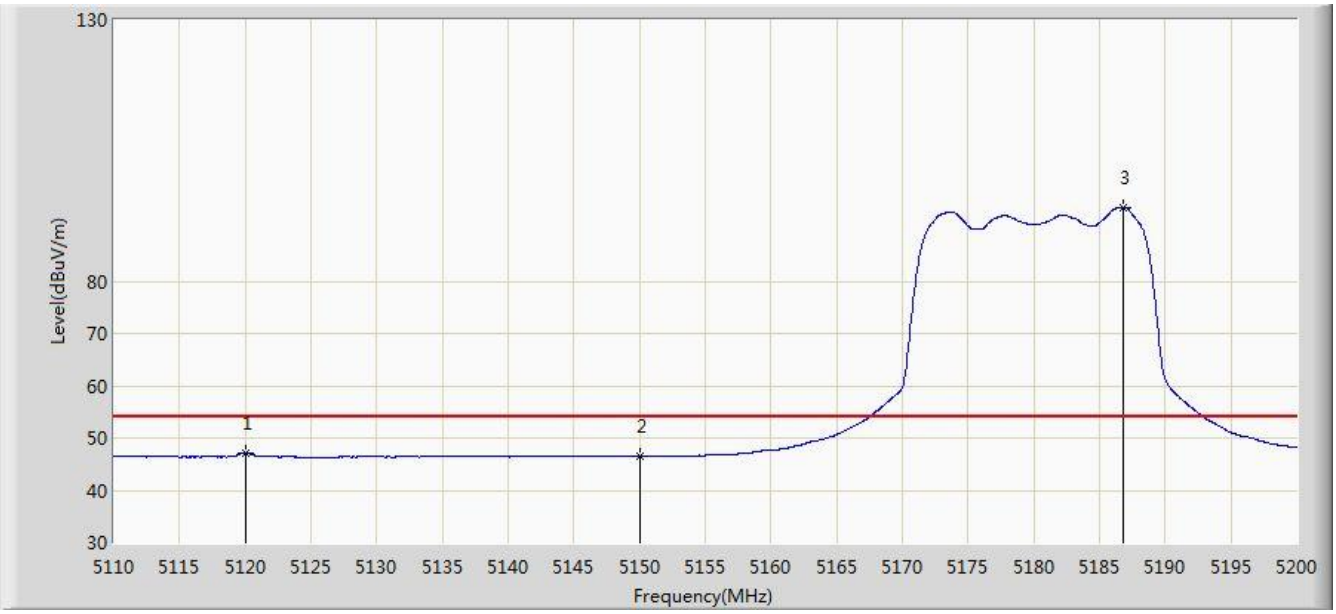


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5143.435	61.138	56.962	-12.862	74.000	4.175	PK
2			5150.000	59.481	55.312	-14.519	74.000	4.170	PK
3		*	5185.150	106.649	102.598	N/A	N/A	4.050	PK

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: 2018/03/27 - 20:46
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Vertical
EUT: Mantis Q	Power: By Battery
Transmit by 802.11a at Channel 5180MHz	

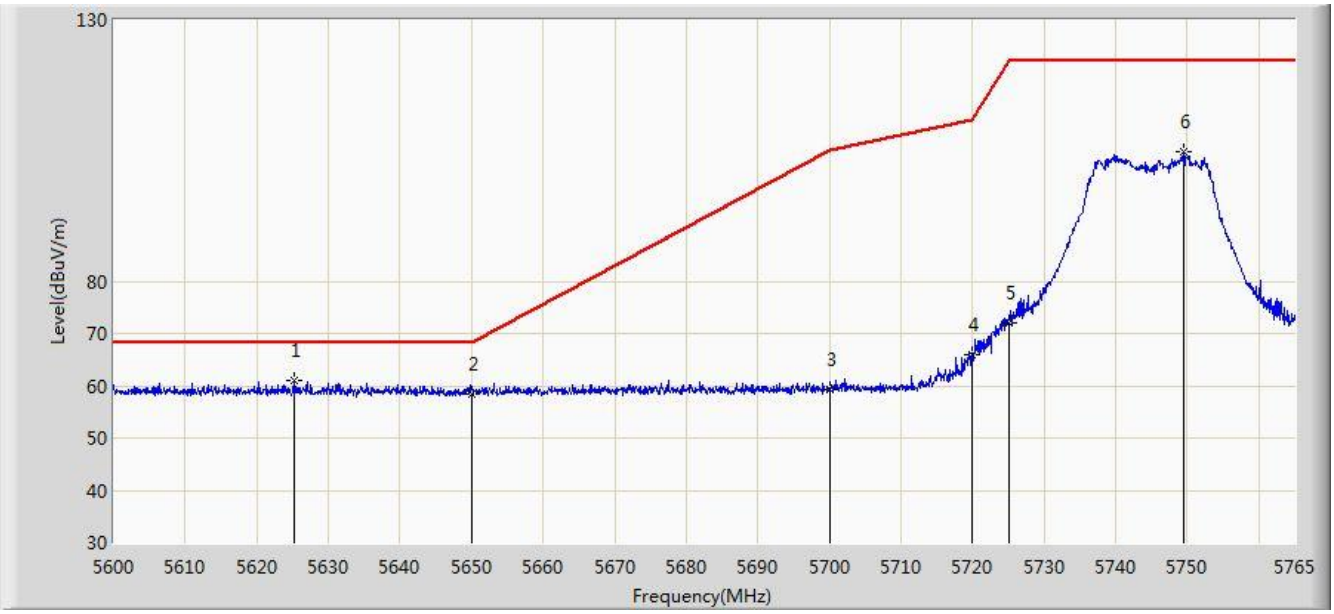


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5119.990	47.194	43.019	-6.806	54.000	4.175	AV
2			5150.000	46.479	42.310	-7.521	54.000	4.170	AV
3		*	5186.815	94.096	90.051	N/A	N/A	4.045	AV

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: 2018/03/27 - 20:54
Limit: FCC_Part15.407_RE(3m)_Bandedge	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Horizontal
EUT: Mantis Q	Power: By Battery
Transmit by 802.11a at Channel 5745MHz	

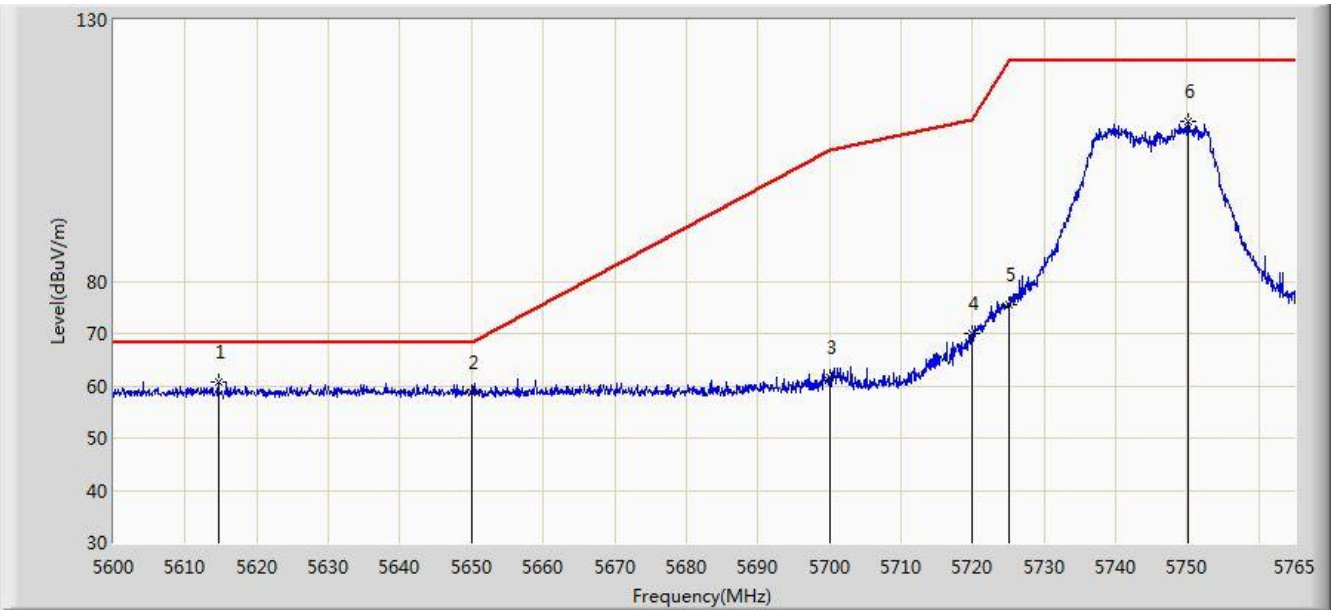


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	5625.328	60.937	56.341	-7.263	68.200	4.595	PK
2			5650.000	58.502	53.831	-9.698	68.200	4.671	PK
3			5700.000	59.145	54.267	-46.055	105.200	4.878	PK
4			5720.000	65.855	60.858	-44.945	110.800	4.997	PK
5			5725.000	71.959	66.930	-50.241	122.200	5.029	PK
6			5749.408	104.655	99.475	N/A	N/A	5.180	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: 2018/03/27 - 20:58
Limit: FCC_Part15.407_RE(3m)_Bandedge	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Vertical
EUT: Mantis Q	Power: By Battery
Transmit by 802.11a at Channel 5745MHz	

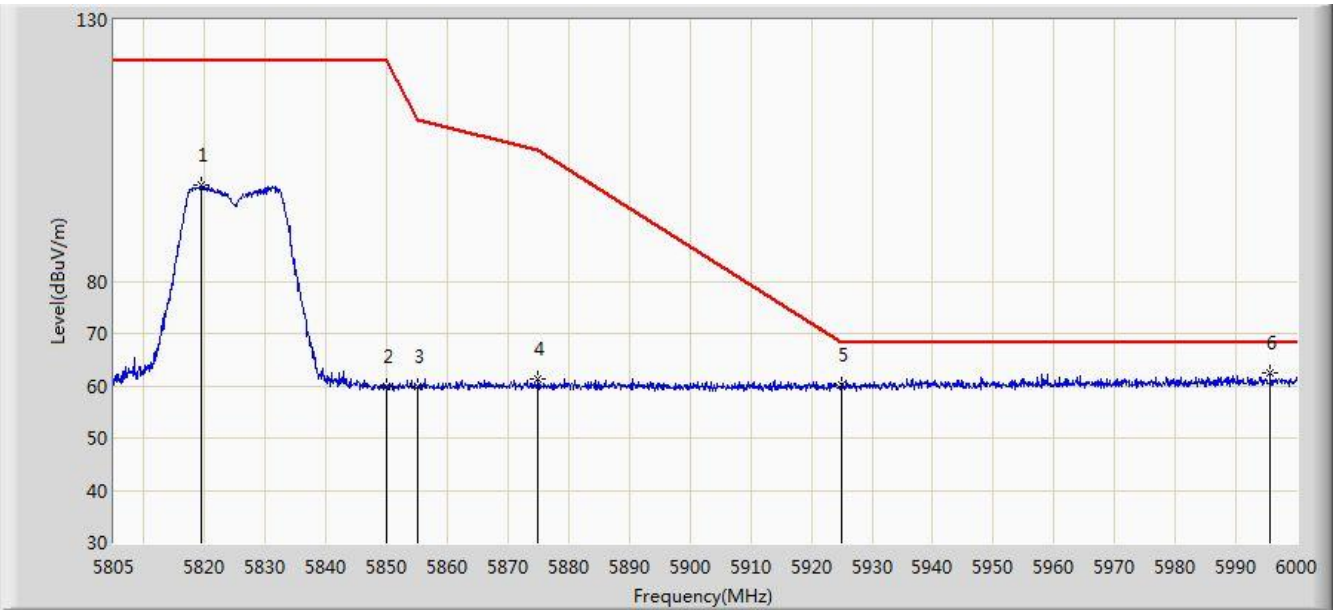


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	5614.603	60.752	56.187	-7.448	68.200	4.565	PK
2			5650.000	58.564	53.893	-9.636	68.200	4.671	PK
3			5700.000	61.723	56.845	-43.477	105.200	4.878	PK
4			5720.000	69.869	64.872	-40.931	110.800	4.997	PK
5			5725.000	75.559	70.530	-46.641	122.200	5.029	PK
6			5750.067	110.462	105.278	N/A	N/A	5.184	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: 2018/03/27 - 21:03
Limit: FCC_Part15.407_RE(3m)_Bandedge	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Horizontal
EUT: Mantis Q	Power: By Battery
Transmit by 802.11a at Channel 5825MHz	

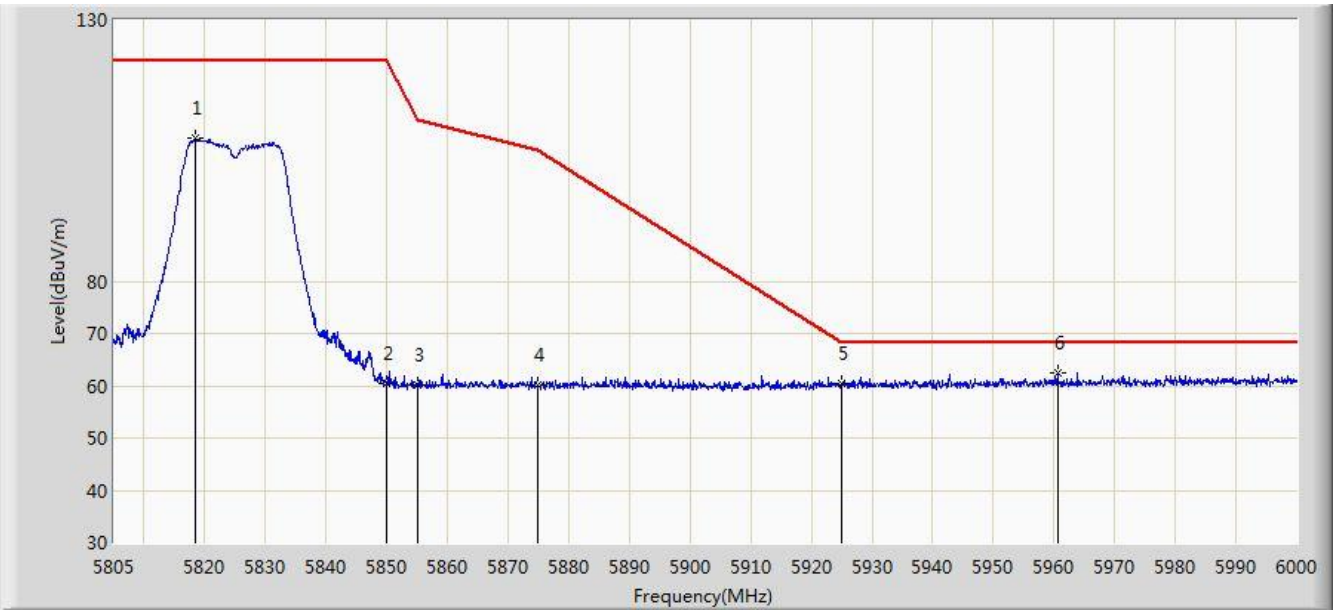


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5819.430	98.380	92.825	N/A	N/A	5.556	PK
2			5850.000	59.777	54.051	-62.423	122.200	5.726	PK
3			5855.000	59.951	54.205	-50.849	110.800	5.746	PK
4			5875.000	61.356	55.536	-43.844	105.200	5.820	PK
5			5925.000	60.221	54.255	-7.979	68.200	5.967	PK
6		*	5995.710	62.564	56.461	-5.636	68.200	6.103	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: 2018/03/27 - 21:11
Limit: FCC_Part15.407_RE(3m)_Bandedge	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Vertical
EUT: Mantis Q	Power: By Battery
Transmit by 802.11a at Channel 5825MHz	

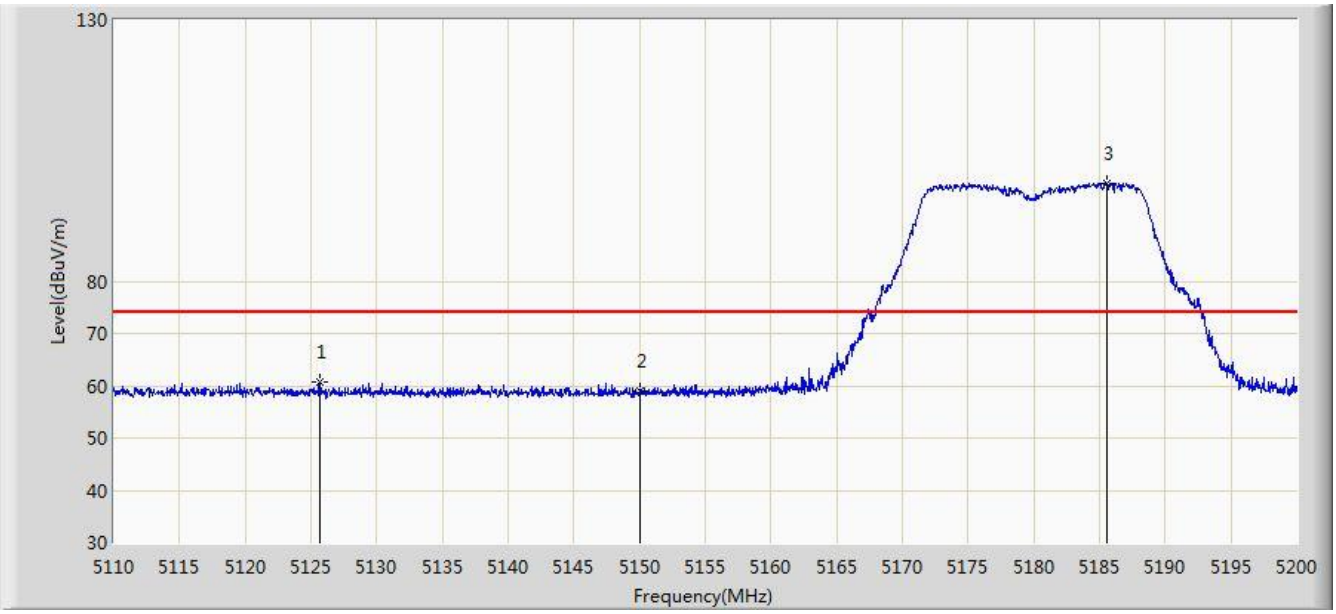


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5818.553	107.319	101.769	N/A	N/A	5.551	PK
2			5850.000	60.396	54.670	-61.804	122.200	5.726	PK
3			5855.000	60.215	54.469	-50.585	110.800	5.746	PK
4			5875.000	60.163	54.343	-45.037	105.200	5.820	PK
5			5925.000	60.322	54.356	-7.878	68.200	5.967	PK
6		*	5960.610	62.458	56.413	-5.742	68.200	6.045	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: 2018/03/27 - 21:31
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Horizontal
EUT: Mantis Q	Power: By Battery
Transmit by 802.11n-HT20 at Channel 5180MHz	

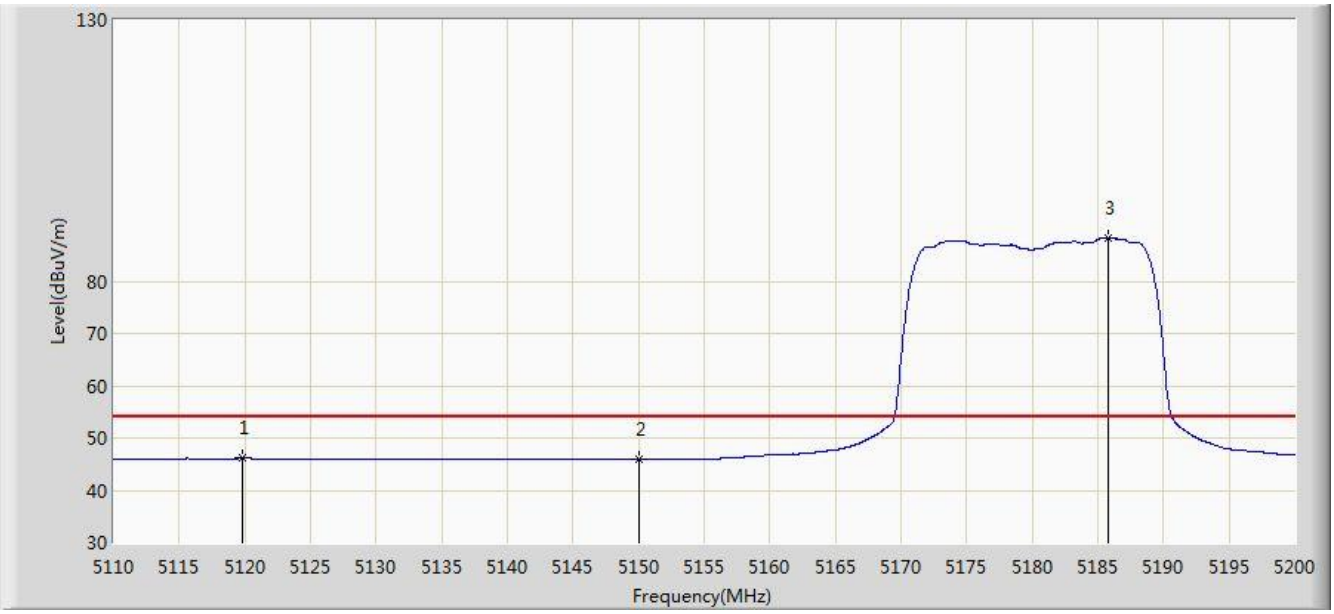


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5125.705	60.779	56.604	-13.221	74.000	4.174	PK
2			5150.000	58.889	54.720	-15.111	74.000	4.170	PK
3		*	5185.510	98.790	94.741	N/A	N/A	4.049	PK

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: 2018/03/27 - 21:36
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Horizontal
EUT: Mantis Q	Power: By Battery
Transmit by 802.11n-HT20 at Channel 5180MHz	

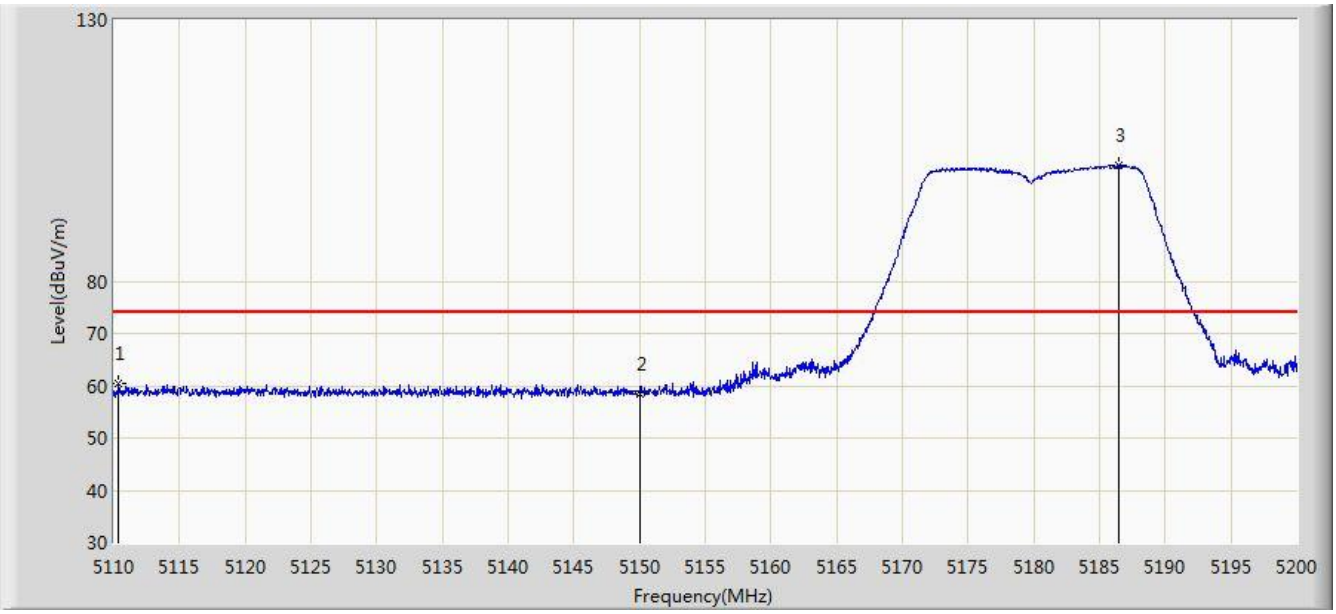


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5119.810	46.189	42.014	-7.811	54.000	4.175	AV
2			5150.000	45.930	41.761	-8.070	54.000	4.170	AV
3		*	5185.735	88.212	84.163	N/A	N/A	4.048	AV

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: 2018/03/27 - 21:38
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Vertical
EUT: Mantis Q	Power: By Battery
Transmit by 802.11n-HT20 at Channel 5180MHz	

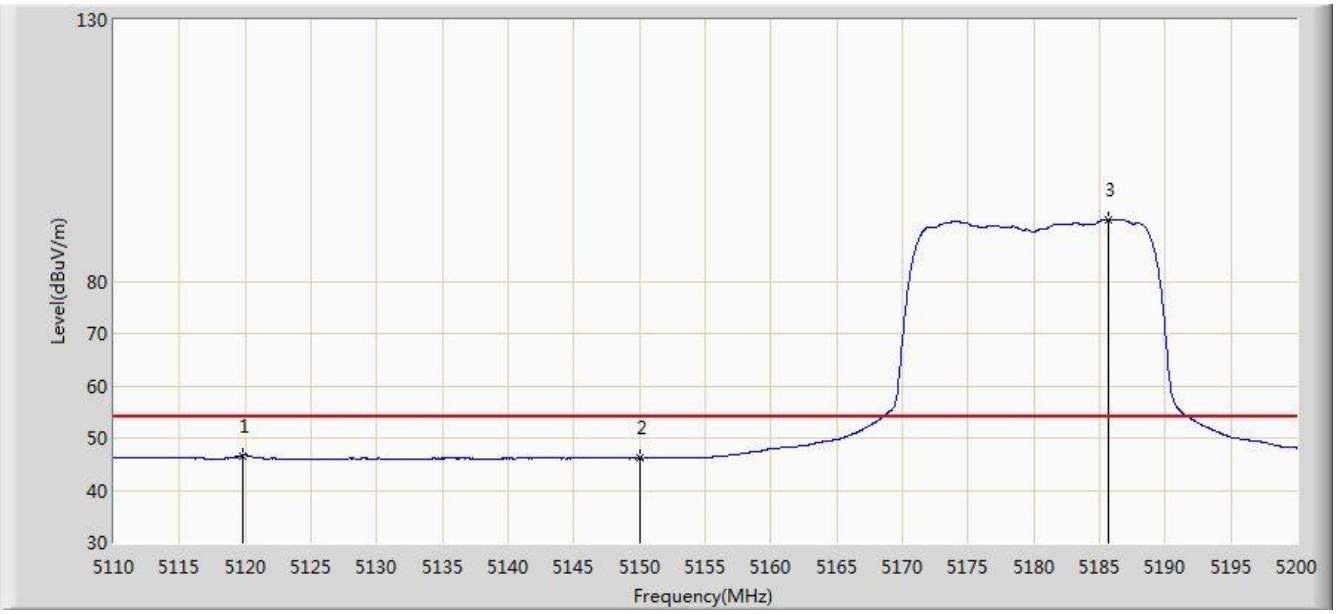


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5110.360	60.357	56.185	-13.643	74.000	4.172	PK
2			5150.000	58.538	54.369	-15.462	74.000	4.170	PK
3		*	5186.500	102.154	98.108	N/A	N/A	4.046	PK

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: 2018/03/27 - 21:40
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Vertical
EUT: Mantis Q	Power: By Battery
Transmit by 802.11n-HT20 at Channel 5180MHz	

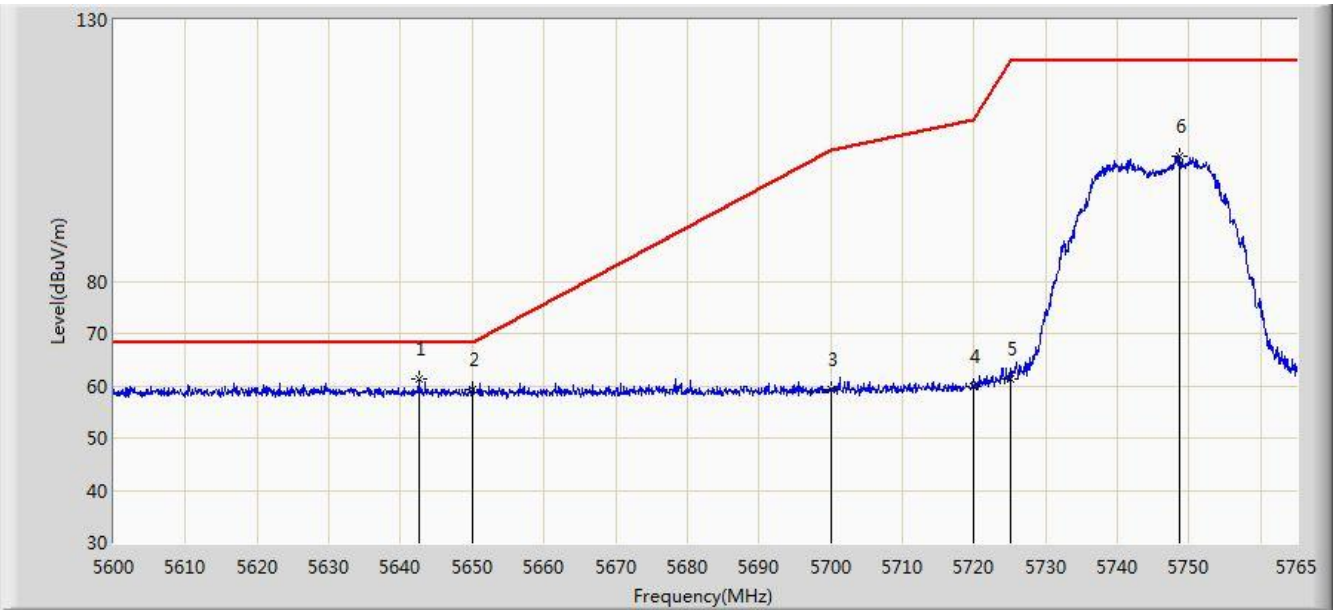


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5119.765	46.627	42.452	-7.373	54.000	4.174	AV
2			5150.000	46.121	41.952	-7.879	54.000	4.170	AV
3		*	5185.645	91.709	87.660	N/A	N/A	4.049	AV

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: 2018/03/27 - 21:41
Limit: FCC_Part15.407_RE(3m)_Bandedge	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Horizontal
EUT: Mantis Q	Power: By Battery
Transmit by 802.11n-HT20 at Channel 5745MHz	

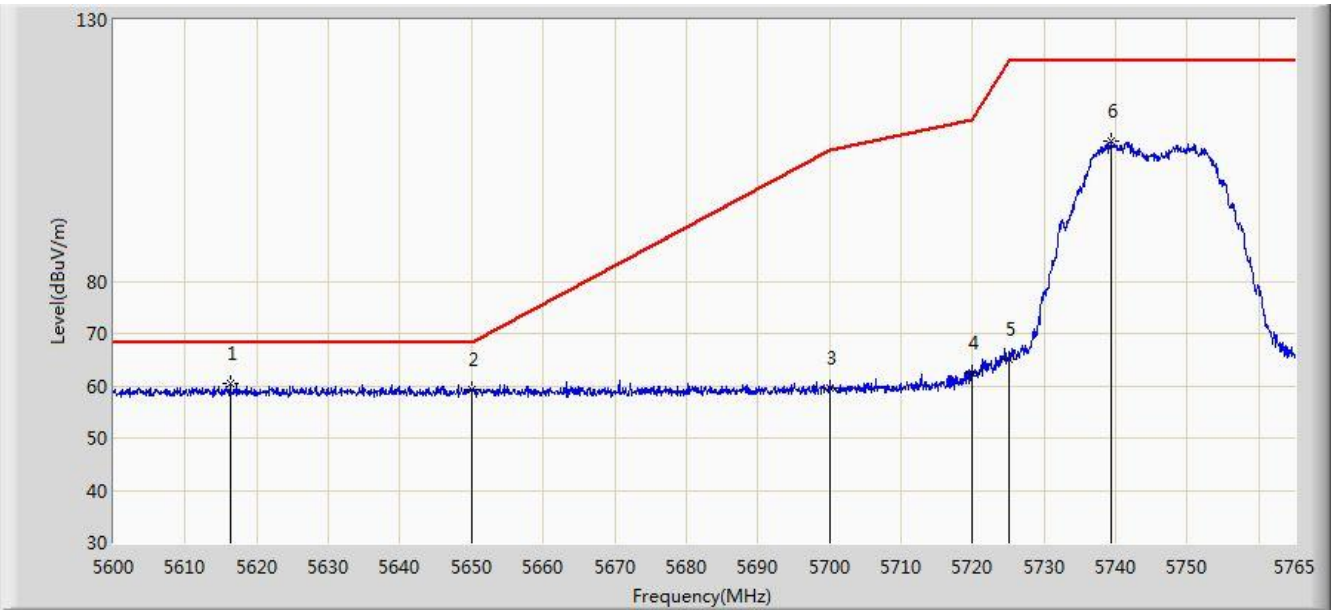


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	5642.570	61.233	56.587	-6.967	68.200	4.646	PK
2			5650.000	59.163	54.492	-9.037	68.200	4.671	PK
3			5700.000	59.260	54.382	-45.940	105.200	4.878	PK
4			5720.000	59.905	54.908	-50.895	110.800	4.997	PK
5			5725.000	61.287	56.258	-60.913	122.200	5.029	PK
6			5748.748	103.875	98.699	N/A	N/A	5.177	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: 2018/03/27 - 21:45
Limit: FCC_Part15.407_RE(3m)_Bandedge	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Vertical
EUT: Mantis Q	Power: By Battery
Transmit by 802.11n-HT20 at Channel 5745MHz	

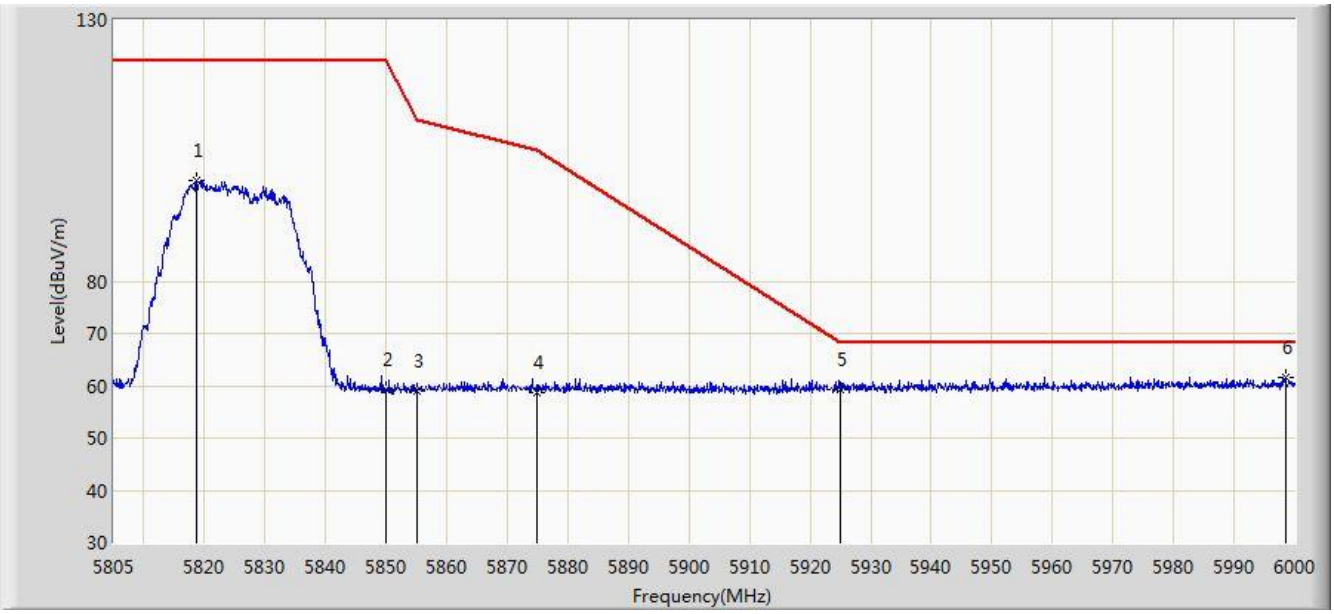


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	5616.252	60.540	55.970	-7.660	68.200	4.569	PK
2			5650.000	59.375	54.704	-8.825	68.200	4.671	PK
3			5700.000	59.530	54.652	-45.670	105.200	4.878	PK
4			5720.000	62.398	57.401	-48.402	110.800	4.997	PK
5			5725.000	64.969	59.940	-57.231	122.200	5.029	PK
6			5739.425	106.708	101.587	N/A	N/A	5.122	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: 2018/03/27 - 21:55
Limit: FCC_Part15.407_RE(3m)_Bandedge	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Horizontal
EUT: Mantis Q	Power: By Battery
Transmit by 802.11n-HT20 at Channel 5825MHz	

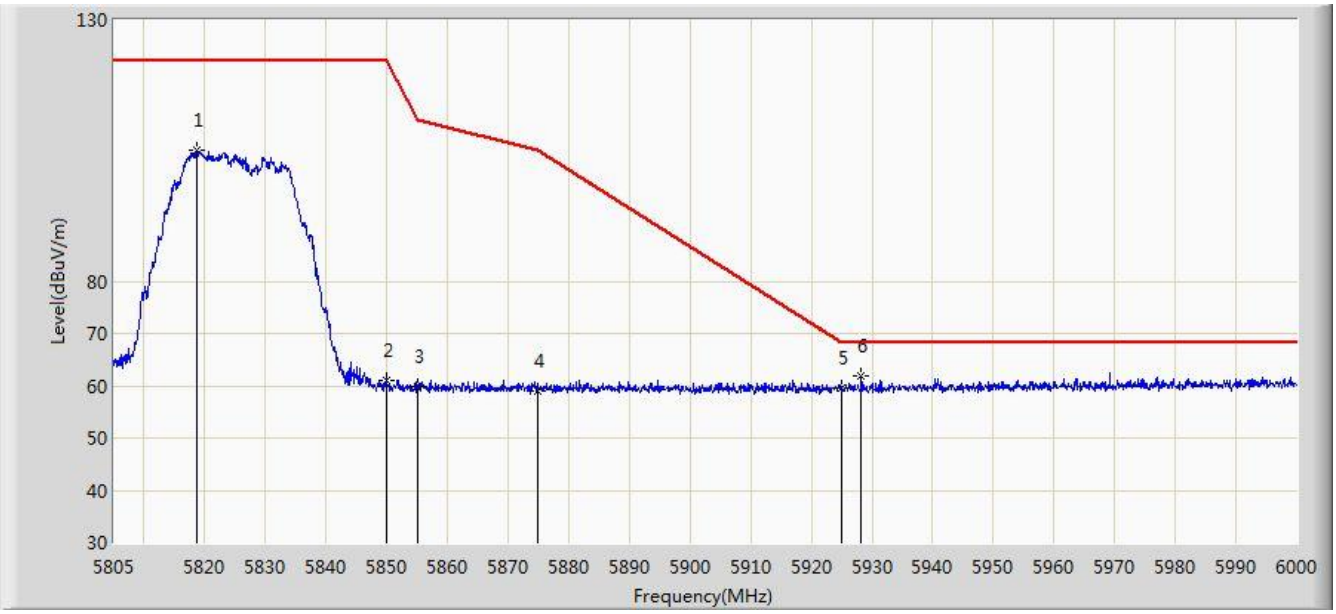


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5818.650	99.182	93.631	N/A	N/A	5.551	PK
2			5850.000	59.220	53.494	-62.980	122.200	5.726	PK
3			5855.000	58.872	53.126	-51.928	110.800	5.746	PK
4			5875.000	58.729	52.909	-46.471	105.200	5.820	PK
5			5925.000	59.264	53.298	-8.936	68.200	5.967	PK
6		*	5998.538	61.655	55.547	-6.545	68.200	6.108	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: 2018/03/27 - 21:59
Limit: FCC_Part15.407_RE(3m)_Bandedge	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz	Polarity: Vertical
EUT: Mantis Q	Power: By Battery
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			5818.650	105.178	99.627	N/A	N/A	5.551	PK
2			5850.000	61.109	55.383	-61.091	122.200	5.726	PK
3			5855.000	59.915	54.169	-50.885	110.800	5.746	PK
4			5875.000	58.955	53.135	-46.245	105.200	5.820	PK
5			5925.000	59.598	53.632	-8.602	68.200	5.967	PK
6		*	5928.240	61.935	55.960	-6.265	68.200	5.975	PK

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

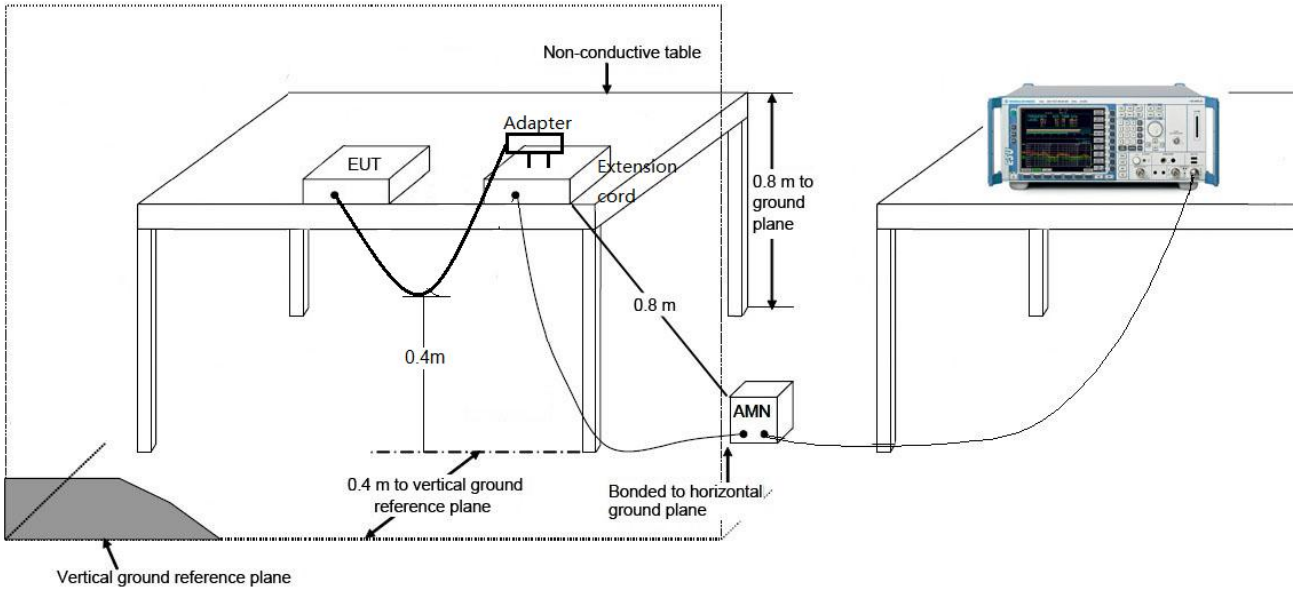
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

7.9. AC Conducted Emissions Measurement

7.9.1.Test Limit

FCC 15.207 & RSS-Gen Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 ~ 0.50	66 ~ 56	56 ~ 46
0.50 ~ 5.0	56	46
5.0 ~ 30	60	50
Note 1: The lower limit shall apply at the transition frequencies. Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.		

7.9.2.Test Setup



7.9.3.Test Result

The EUT is powered by battery, so this requirement does not apply.

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