TEST REPORT

KCTL Inc.
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1. Applicant

Name:	DIGIPARTS, Inc
Address:	U-Tower #1901, 120 Heungdeokjungang-ro, Giheung-gu, Yongin-si, Gyeonggido, 446-982, Korea

2. Sample Description:

FCC ID:	2AHWQ-DT800
Type of equipment:	Car Navigation
Basic Model:	DT800

3. Date of Test: June 23 ~ August 24, 2016

4. Test method used: FCC Part 15 Subpart E, 15.407

5. Test Results

Test Item:	Refer to page 7
Result:	Complied (Refer to page 8 ~ page 38)
Measurement Uncertainty:	Refer to page 7

This result shown in this report refers only to the sample(s) tested unless otherwise stated.

Affirmation	Tested by Name: HEE SU, AHN	Technical Manager Name: CHANG MIN, KIM

2016. 08. 24

KCTL Inc.

History of Issued Test Report

Issued date:.	Report Number	History
July 07, 2016	KCTL16-FR0058	Issued the original test teport
August 24, 2016	KCTL16-FR0058(1)	Re-tested Spurious Emission

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1. Client information

Applicant:	DIGIPARTS, Inc
Address:	U-Tower #1901, 120 Heungdeokjungang-ro, Giheung-gu, Yongin-si, Gyeonggido, 446-982, Korea
Telephone number:	+82-31-627-5921
Facsimile number:	+82-31-627-5921
Contact person:	Jae-woo Lee / jwlee@digiparts.co.kr

Manufacturer:	DIGIPARTS, Inc
Address:	U-Tower #1901, 120 Heungdeokjungang-ro, Giheung-gu, Yongin-si, Gyeonggido, 446-982, Korea

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2. Laboratory information

Address

KCTL Ltd.
65 Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea (443-390)
Telephone Number: +82-70-5008-1016 Facsimile Number: +82-505-299-8311

Certificate

KOLAS No.: 231
FCC Site Designation No: KR0040
FCC Site Registration No: 687132
VCCI Site Registration No.: R-3327, G-198, C-3706, T-1849
IC Site Registration No.:8035A-2

SITE MAP

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3. Description of E.U.T.

3.1 Basic description

Applicant:	DIGIPARTS, Inc
Address of Applicant	U-Tower #1901, 120 Heungdeokjungang-ro, Giheung-gu, Yongin-si, Gyeonggido, 446-982, Korea
Manufacturer	DIGIPARTS, Inc
Address of Manufacturer	U-Tower #1901, 120 Heungdeokjungang-ro, Giheung-gu, Yongin-si, Gyeonggido, 446-982, Korea
Type of equipment	Car Navigation
Basic Model	DT800

3.2 General description

Frequency Range	2 402 ㎒ ~ 2 480 ㎒ (Bluetooth) 2 412 ㎒ ~ 2 462 ㎒ (802.11b/g/n_HT20) 5 745 ㎒ ~ 5 825 ㎒ (802.11a/n_HT20)
Type of Modulation	GFSK, π/4DQPSK, 8DPSK (Bluetooth) 802.11b: DSSS, 802.11a/g/n: OFDM
Number of Channels	2.4 ㎓: 79 channels (Bluetooth) 11 ch (802.11b/g/n HT20) 5.8 ㎓: 5 725 ㎒ Band: 5 ch (802.11a/n_HT20)
Type of Antenna	Chip Antenna
Antenna Gain	2.4 ㎓: 2.1 dBi (2 400 ㎒ ~ 2 483.5 ㎒) 5.8 ㎓: 2.4 dBi (5 725 ㎒ ~ 5 875 ㎒)
Transmit Power	8.36 dBm
Power supply	DC 12 V
Product SW/HW version	1.0
Radio SW/HW version	1.0
Test SW Version	Ampak RFTestTool, VER:5.0
RF power setting in TEST SW	Referred the measuring instrument from manufacturer

Note : The above EUT information was declared by the manufacturer.
The EUT operates simultaneously.

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3.3 Test frequency

- 802.11a/n_HT20

Frequency	U-NII-3
Lowest frequency	5 745 ㎒
Middle frequency	5 785 ㎒
Highest frequency	5 825 ㎒

3.4 Test Voltage

Mode	Voltage
Norminal voltage	DC 12 V

3.5 Duty Factor

Mode	Duty cycle [%]	Duty cycle factor [㏈]
802.11a	96.37	0.16
802.11n HT20	96.14	0.17

* Duty cycle factor=10log(1/Duty cycle)

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4. Summary of test results

4.1 Standards & results

FCC Rule	IC Rule (RSS-GEN)	Parameter	Report Section	Test Result
15.203 15.407(a)(1)(2)(3)	-	Antenna Requirement	5.1	C
15.403(i),15.407(e)	RSS-247, 5.1 RSS-GEN, 6.6	Bandwidth Measurement	5.3	C
15.407(a)(1)(2)	RSS-247, 5.4	Maximum Conducted Output Power	5.2	C
15.407(a)(1)(2)(5)	RSS-247, 5.3, (2)	Peak Power Spectral Density	5.4	C
15.205(a), 15.209(a), 15.407(b)(1), 15.407(b)(2), 15.407(b)(3)	RSS-247, 5.5 RSS-GEN, 8.9, 10	Spurious Emission, Band Edge and Restricted bands	5.5	C
15.407(g)	RSS-GEN, 6.11	Frequency Stability	5.6	C
15.207(a)	RSS-GEN, 8.8	Conducted Emissions	5.7	C
15.407(h)	RSS-247, 6.3	Dynamic Frequency Selection	-	N/A1)

Note: C = complies
NC = Not complies
NT = Not tested
NA = Not Applicable
N/A1): This device uses only WIFI 5G U-NII-3.

* The general test methods used to test this device is ANSI C63.10:2013

4.2 Uncertainty

Measurement Item	Expanded Uncertainty U = *k*Uc (*k* = 2)	
Conducted RF power	1.44 dB	
Conducted Spurious Emissions	1.52 dB	
Radiated Spurious Emissions	30 MHz ~ 300 MHz:	+ 4.94 dB, - 5.06 dB
		+ 4.93 dB, - 5.05 dB
	300 MHz ~ 1 000 MHz:	+ 4.97 dB, - 5.08 dB
		+ 4.84 dB, - 4.96 dB
	1 GHz ~ 25 GHz:	+ 6.03 dB, - 6.05 dB
Conducted Emissions	9 kHz ~ 150 kHz:	3.75 dB
	150 kHz ~ 30 MHz:	3.36 dB

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5. Test results

5.1 Antenna Requirement

5.1.1 Regulation

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.
And according to §15.407(a)(1)(2)(3), If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.1.2 Result

-Complied

The transmitter has permanently attached chip Antenna.

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5.2 Maximum Conducted Output Power

5.2.1 Regulation

According to §15.407(a) (1) (iv) For mobile and portable client devices in the 5.15-5.25 ㎓ band, the maximum conducted output power over the frequency band of operation shall not exceed 250 ㎽ provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to §15.407(a) (2) For the 5.25-5.35 ㎓ and 5.47-5.725 ㎓ bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 ㎽ or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dBthat the directional gain of the antenna exceeds 6 dBi.

According to §15.407(a) (3) For the band 5.725-5.85 ㎓, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-㎑ band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information.

The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

5.2.2 Measurement Procedure

These test measurement settings are specified in section C of 789033 D02 General UNII Test Procedures.

5.2.2.1 Method PM (Measurement using an RF average power meter):

(i) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied.

- The EUT is configured to transmit continuously or to transmit with a constant duty cycle.
- At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.
- The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

(ii) If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in section II.B.

(iii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.

(iv) Adjust the measurement in dBm by adding 10 log(1/x) where x is the duty cycle (e.g., 10 log(1/0.25) if the duty cycle is 25 percent).

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5.2.4 Test Result

-Complied

-802.11a _U-NII-3

Frequency [㎒]	Result [dBm]	Duty Factor [dB]	Total result [dBm]	Limit [dBm]	Margin [dB]
5 745	8.20	0.16	8.36	30.00	21.64
5 785	7.88	0.16	8.04	30.00	21.96
5 825	7.51	0.16	7.67	30.00	22.33

-802.11n HT20 _U-NII-3

Frequency [㎒]	Result [dBm]	Duty Factor [dB]	Total result [dBm]	Limit [dBm]	Margin [dB]
5 745	7.20	0.17	7.37	30.00	22.63
5 785	6.92	0.17	7.09	30.00	22.91
5 825	6.54	0.17	6.71	30.00	23.29

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5.3 Bandwidth Measurement

5.3.1 Regulation

According to §15.403,(i) Emission bandwidth. For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 ㏈ down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

According to §15.407,(e) Within the 5.725-5.85 ㎓ band, the minimum 6 ㏈ bandwidth of U-NII devices shall be at least 500 ㎑.

5.3.2 Measurement Procedure

1.Emission Bandwidth (EBW)

a)Set RBW = approximately 1% of the emission bandwidth.
b)Set the VBW > RBW.
c)Detector = Peak.
d)Trace mode = max hold.
e)Measure the maximum width of the emission that is 26 ㏈ down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeatmeasurement as needed until the RBW/EBW ratio is approximately 1%.

2.Minimum Emission Bandwidth for the band 5.725 - 5.85 ㎓

Section 15.407(e) specifies the minimum 6 ㏈ emission bandwidth of at least 500 ㎑ for the band 5.725-5.85.
The following procedure shall be used for measuring this bandwidth:
a) Set RBW = 100 ㎑.
b) Set the video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associatedwith the two outermost amplitude points (upper and lower frequencies) that are attenuated by6 ㏈ relative to the maximum level measured in the fundamental emission.

Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

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5.3.3 Test Result

-Complied

- 802.11a_U-NII-3

Frequency [㎒]	6 dB Bandwidth [㎒]	OBW [㎒]
5 745	15.11	16.82
5 785	15.11	16.82
5 825	15.11	16.65

- 802.11n HT20_U-NII-3

Frequency [㎒]	6 dB Bandwidth [㎒]	OBW [㎒]
5 745	15.11	17.59
5 785	15.93	17.53
5 825	15.93	17.55

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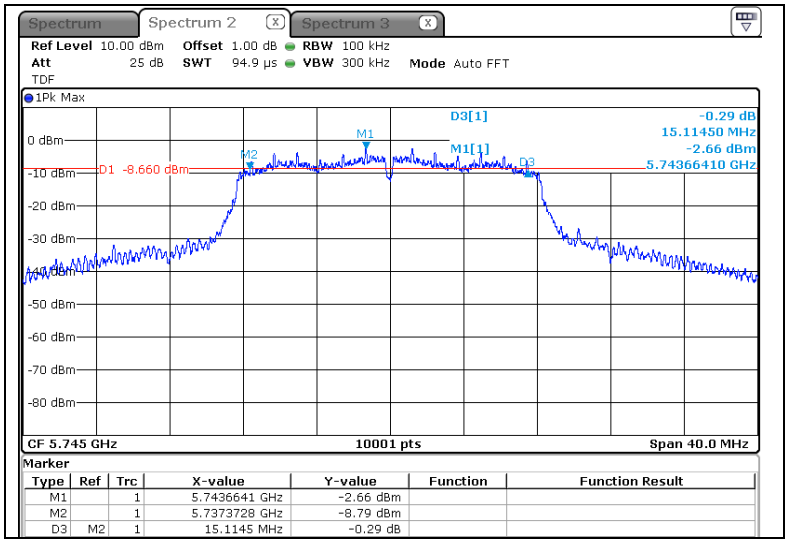
5.3.4 Test Plot

Figure 1. Plot of Bandwidth Measurement

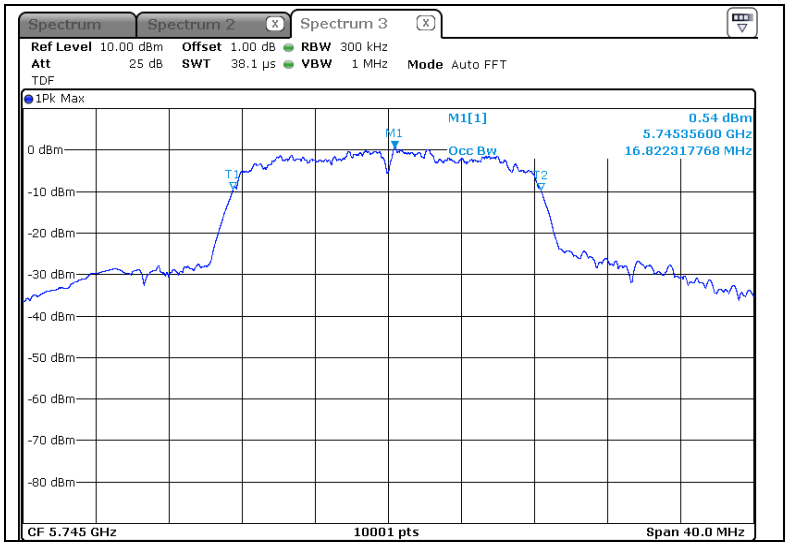
- 802.11a_U-NII-3

-5 745 ㎒

EBW



OBW



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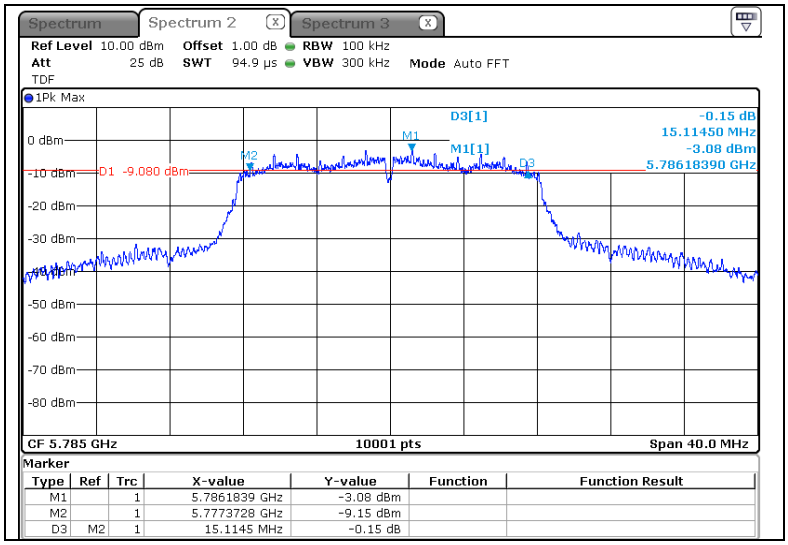
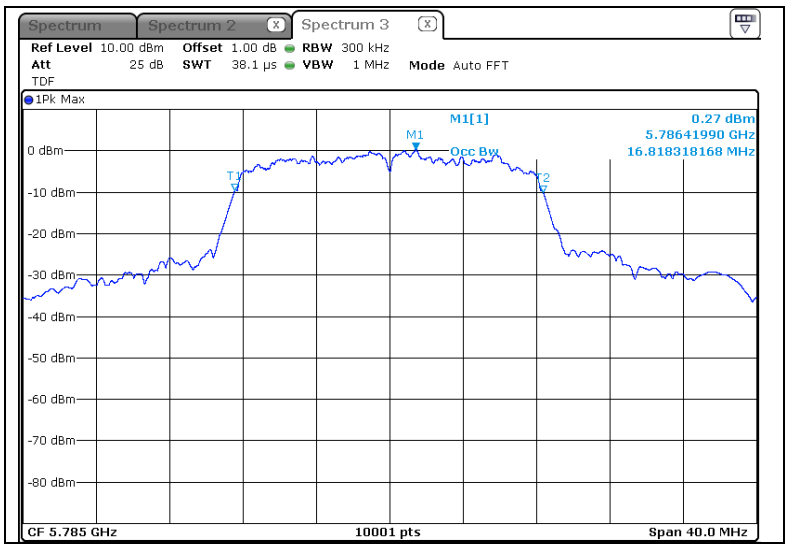
-5 785 ㎒

EBW



OBW



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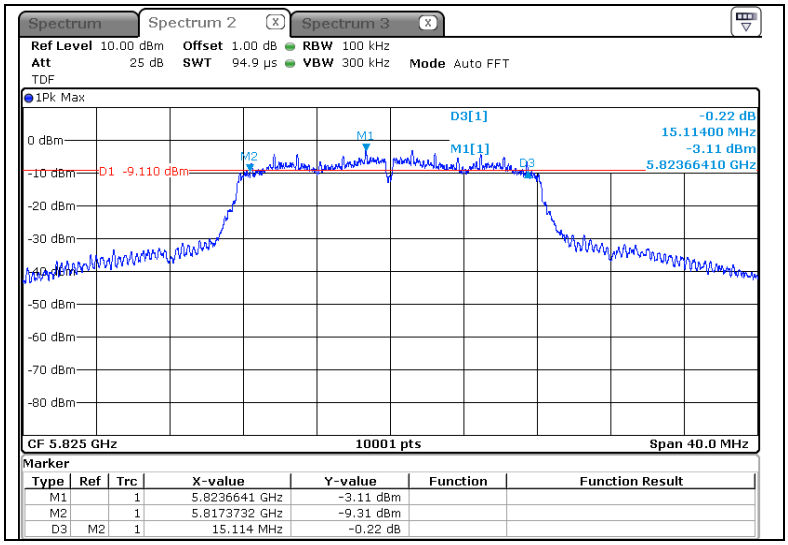
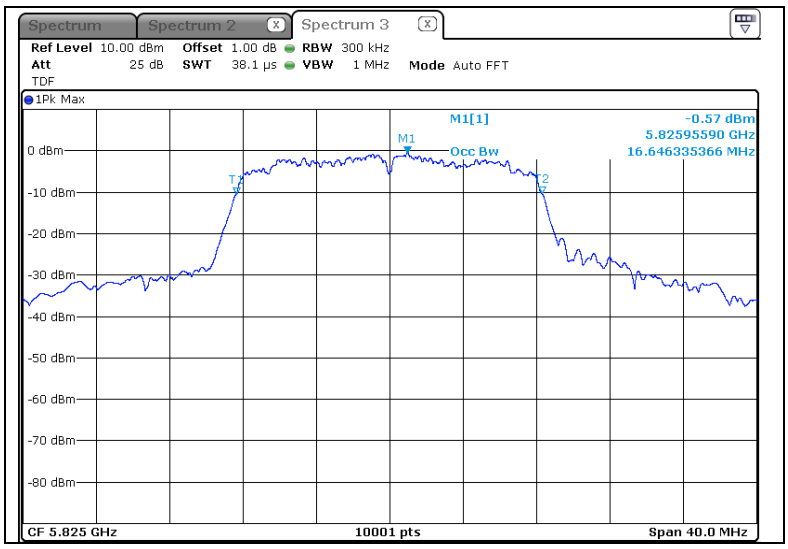
-5 825 ㎒

EBW



OBW



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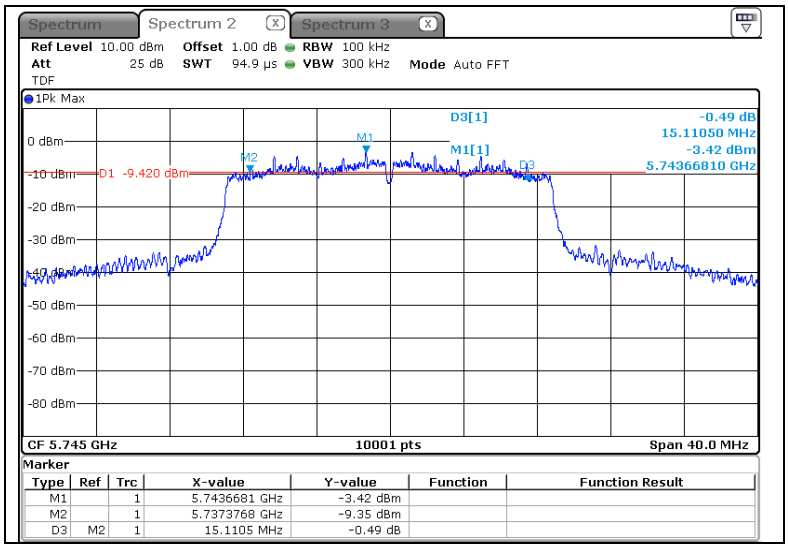
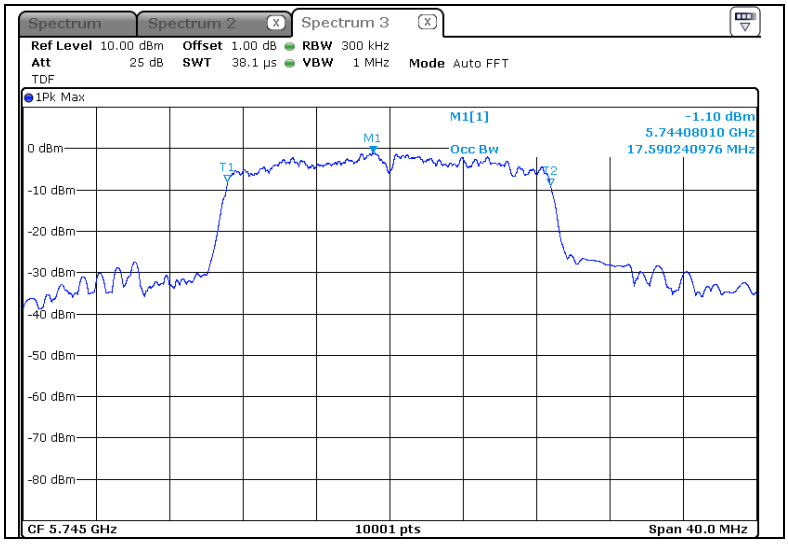
- 802.11n HT20_U-NII-3

-5 745 ㎒

EBW



OBW



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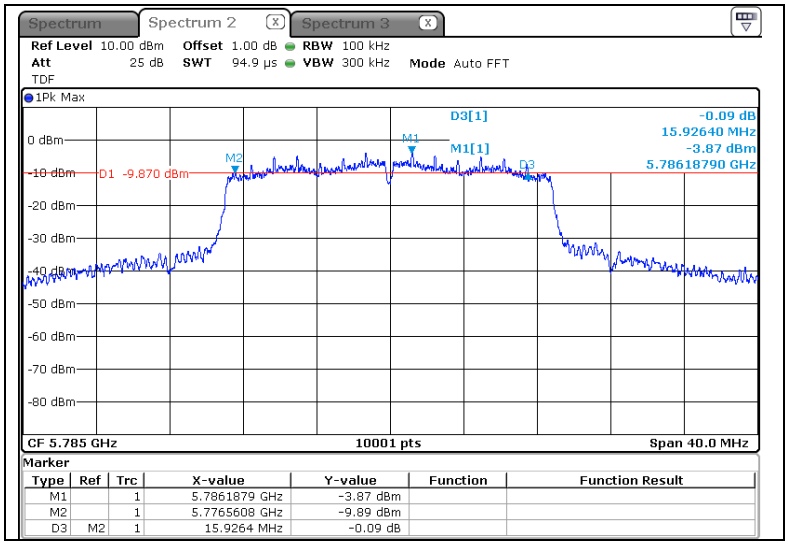
-5 785 ㎒

EBW



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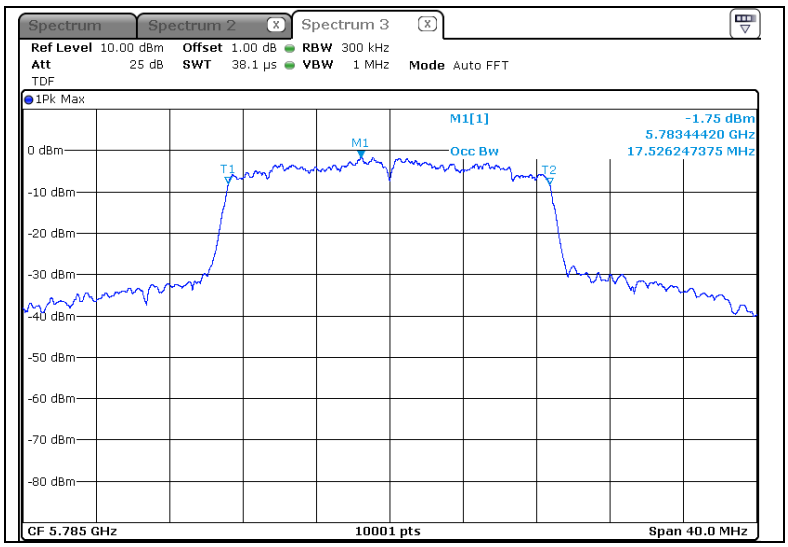

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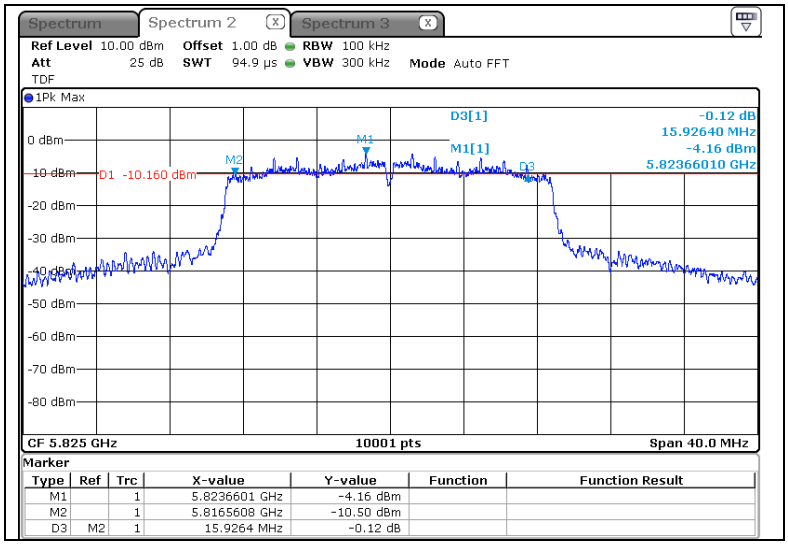
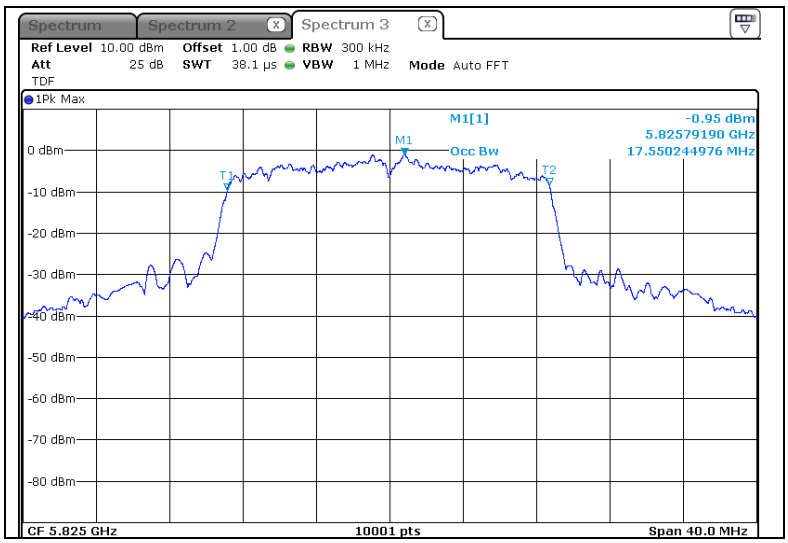
-5 825 ㎒

EBW



OBW



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5.4 Peak Power Spectral Density

5.4.1 Regulation

According to §15.407(a) (1) (iv) For mobile and portable client devices in the 5.15-5.25 ㎓ band, the maximum conducted output power over the frequency band of operation shall not exceed 250 ㎽ provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to §15.407(a) (2) For the 5.25-5.35 ㎓ and 5.47-5.725 ㎓ bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 ㎽ or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dBthat the directional gain of the antenna exceeds 6 dBi.

According to §15.407(a) (3) For the band 5.725-5.85 ㎓, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-㎑ band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information.

The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

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5.4.2 Measurement Procedure

These test measurement settings are specified in section F of 789033 D02 General UNII Test Procedures New Rules v01.

5.4.2.1 Maximum power spectral density (PSD)

1. Create an average power spectrum for the EUT operating mode being tested by following the instructions in section II.E.2. for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, "Compute power…". (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)

2. Use the peak search function on the instrument to find the peak of the spectrum and record its value.

3. Make the following adjustments to the peak value of the spectrum, if applicable:
a) If Method SA-2 or SA-2 Alternative was used, add 10 log(1/x), where x is the duty cycle, to the peak of the spectrum.
b) If Method SA-3 Alternative was used and the linear mode was used in step II.E.2.g)(viii), add 1 ㎧ to the final result to compensate for the difference between linear averaging and power averaging.
4. The result is the Maximum PSD over 1 ㎒ reference bandwidth.

5. For devices operating in the bands 5.15-5.25 ㎓, 5.25-5.35 ㎓, and 5.47-5.725 ㎓, the above procedures make use of 1 ㎒ RBW to satisfy directly the 1 ㎒ reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 ㎓, the rules specify a measurement bandwidth of 500 ㎑. Many spectrum analyzers do not have 500 ㎑ RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 ㎒, or 500 ㎑, "provided that the measured power is integrated over the full reference bandwidth" to show the total power over the specified measurement bandwidth (i.e., 1 ㎒, or 500 ㎑). If measurements are performed using a reduced resolution bandwidth (< 1 ㎒, or < 500 ㎑) and integrated over 1 ㎒, or 500 ㎑ bandwidth, the following adjustments to the procedures apply: a) Set RBW ≥ 1/T, where T is defined in section II.B.l.a).
c) Set VBW ≥ 3 RBW.
d) If measurement bandwidth of Maximum PSD is specified in 500 ㎑, add 10log(500 ㎑/RBW) to the measured result, whereas RBW (< 500 ㎑) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
e) If measurement bandwidth of Maximum PSD is specified in 1 ㎒, add 10log(1 ㎒/RBW) to the measured result, whereas RBW (< 1 ㎒) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
f) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 ㎑ for the sections 5.c) and 5.d) above, since RBW=100 ㎑ is available on nearly all spectrum analyzers.

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5.4.3 Test Result

-Complied

-802.11a_U-NII-3

Frequency [㎒]	Reading [dBm]	Duty Cycle [dB]	Total result [dBm]	Limit [dBm]	Margin [dB]
5 745	-4.11	0.16	-3.95	30.00	33.95
5 785	-4.67	0.16	-4.51	30.00	34.51
5 825	-4.87	0.16	-4.71	30.00	34.71

-802.11n HT20_U-NII-3

Frequency [㎒]	Reading [dBm]	Duty Cycle [dB]	Total result [dBm]	Limit [dBm]	Margin [dB]
5 745	-5.37	0.17	-5.20	30.00	35.20
5 785	-5.63	0.17	-5.46	30.00	35.46
5 825	-5.89	0.17	-5.72	30.00	35.72

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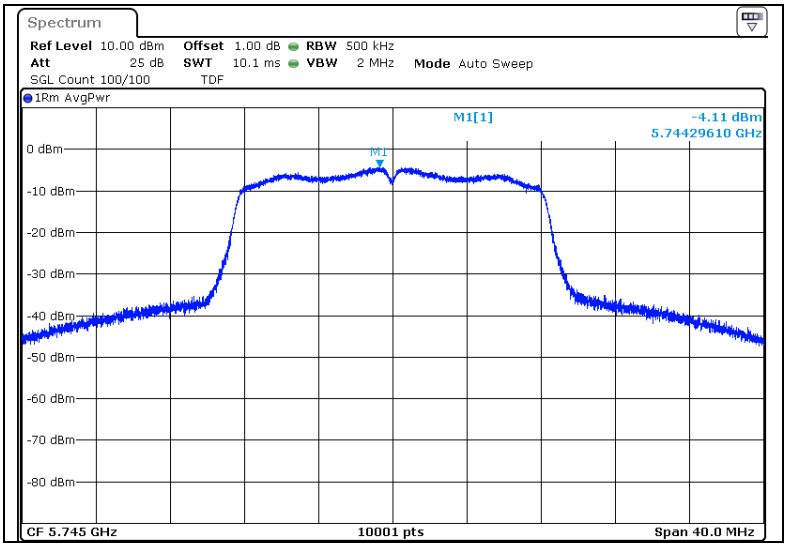
5.4.4 Test Plot

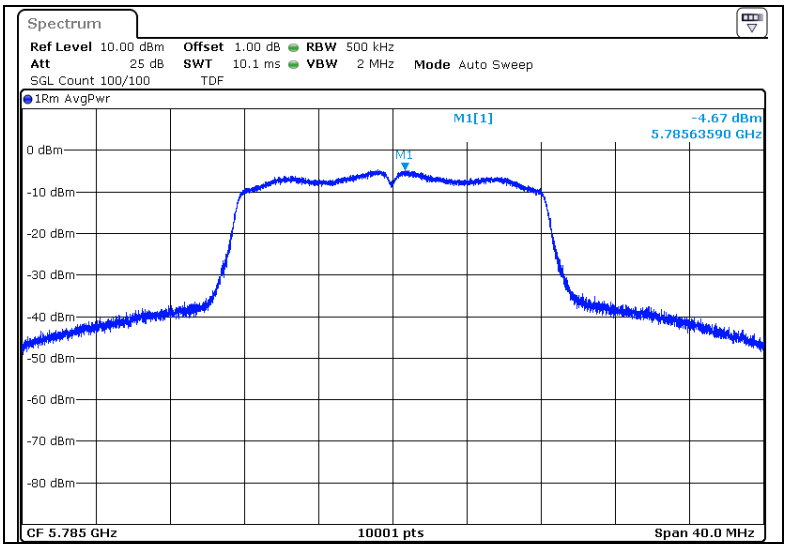
Figure 2. Plot of the Power Spectral Density

- 802.11a_U-NII-3

-5 745 ㎒



-5 785 ㎒



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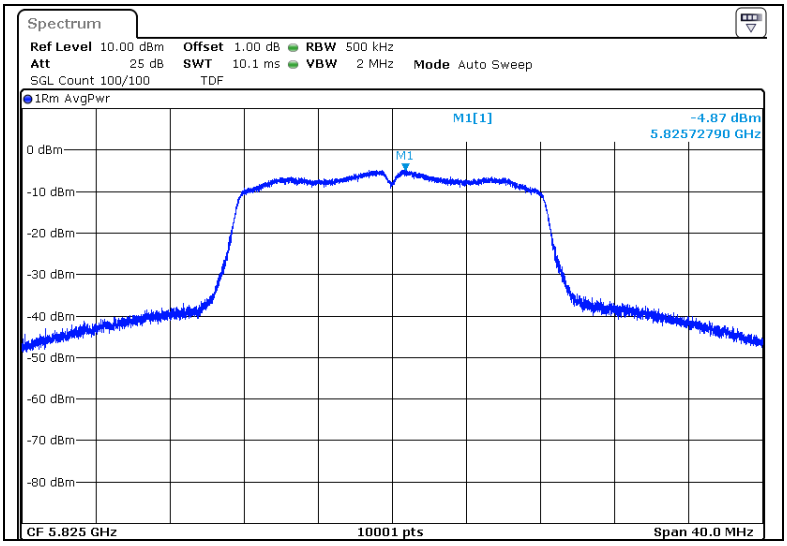
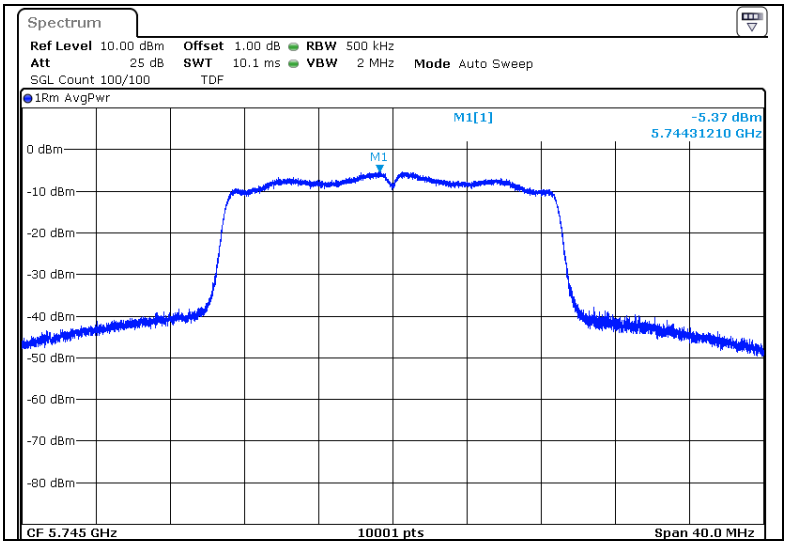
-5 825 ㎒



- 802.11n HT20_U-NII-3

-5 745 ㎒



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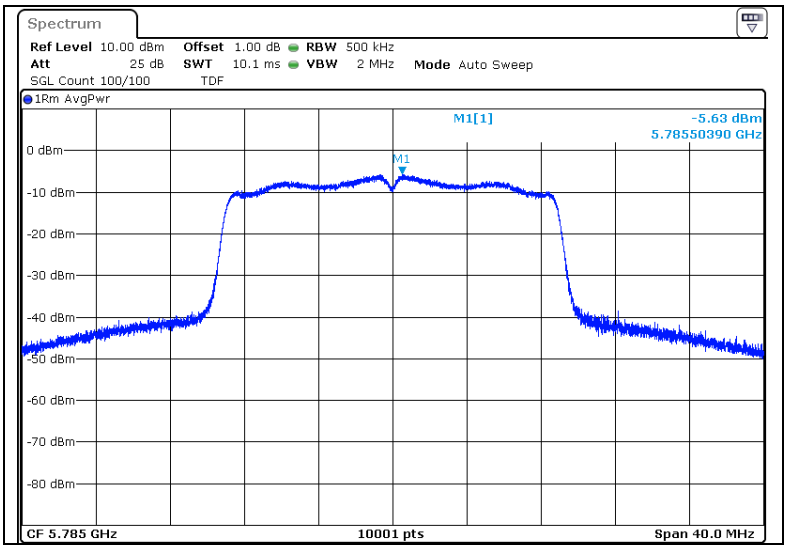
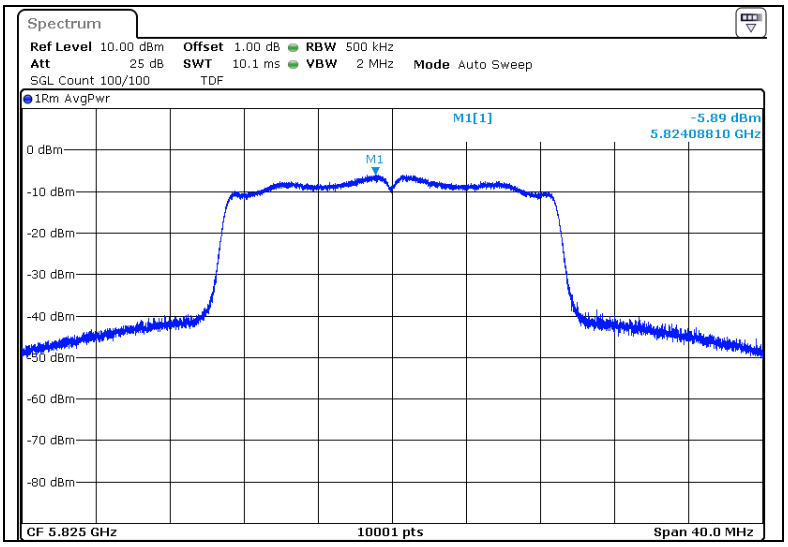
-5 785 ㎒



-5 825 ㎒



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5.5 Spurious Emission, Band Edge And Restricted Bands

5.5.1 Regulation

According to §15.407(b)(1) For transmitters operating in the 5.15–5.25 ㎓ band: all emissions outside of the 5.15–5.35 ㎓ band shall not exceed an EIRP of -27 dBm/㎒.

According to §15.407(b) (2) For transmitters operating in the 5.25-5.35 ㎓ band: All emissions outside of the 5.15-5.35 ㎓ band shall not exceed an e.i.r.p. of −27 dBm/㎒.

According to §15.407(b) For transmitters operating in the 5.47-5.725 ㎓ band: All emissions outside of the 5.47-5.725 ㎓ band shall not exceed an e.i.r.p. of −27 dBm/㎒.

According to §15.407(b) (4) For transmitters operating in the 5.725-5.85 ㎓ band: All emissions within the frequency range from the band edge to 10 ㎒ above or below the band edge shall not exceed an e.i.r.p. of −17 dBm/㎒; for frequencies 10 ㎒ or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of −27 dBm/㎒.

According to §15.407(b)(6) Unwanted emissions below 1 ㎓ must comply with the general field strength limits set forth in §15.209.

According to §15.209(a), Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall notexceed the field strength levels specified in the following table:

Frequency (㎒)	Field strength (μV/m)	Measurement distance (m)
0.009 - 0.490	2 400/F(㎑)	300
0.490 -1.705	24 000/F(㎑)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

** The emission limits shown in the above table are based on measurement instrumentation employing a CISPR quasi-peak detector and above 1000 ㎒ are based on the average value of measured emissions.

According to §15.407(b)(7) The provisions of §15.205 apply to intentional radiators operating under this section.
(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency block edges as the design of the equipment permits.

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According to § 15.205(a) and (b), only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.009 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505	16.694 75 - 16.695 25	608 - 614	5.35 - 5.46
2.173 5 - 2.190 5	16.804 25 - 16.804 75	960 – 1 240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1 300 – 1 427	8.025 - 8.5
4.177 25 - 4.177 75	37.5 - 38.25	1 435 – 1 626.5	9.0 - 9.2
4.207 25 - 4.207 75	73 - 74.6	1 645.5 – 1 646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1 660 – 1 710	10.6 - 12.7
6.267 75 - 6.268 25	108 - 121.94	1 718.8 – 1 722.2	13.25 - 13.4
6.311 75 - 6.312 25	123 - 138	2 200 – 2 300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2 310 – 2 390	15.35 - 16.2
8.362 - 8.366	156.524 75 - 156.525 25	2 483.5 – 2 500	17.7 - 21.4
8.376 25 - 8.386 75	156.7 - 156.9	2 690 – 2 900	22.01 - 23.12
8.414 25 - 8.414 75	162.012 5 - 167.17	3 260 – 3 267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3 332 – 3 339	31.2 - 31.8
12.519 75 - 12.520 25	240 - 285	3 345.8 – 3 358	36.43 - 36.5
12.576 75 - 12.577 25	322 - 335.4	3 600 – 4 400	Above 38.6
13.36 - 13.41			

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1 000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1 000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

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5.5.2 Measurement Procedure

These test measurement settings are specified in section G of 789033 D02 General UNII Test Procedures New Rules v01.
For all radiated emissions tests, measurements must correspond to the direction of maximum emission level for each measured emission (see ANSI C63.10 for guidance).

5.5.2.1 Unwanted Emissions in the Restricted Bands & Outside of the Restricted Bands

(1) For all measurements, follow the requirements in section II.G.3., "General Requirements for Unwanted Emissions Measurements".
(2) At frequencies below 1000 ㎒, use the procedure described in section II.G.4., "Procedure for Unwanted Emissions Measurements Below 1000 ㎒".
(3) At frequencies above 1000 ㎒, measurements performed using the peak and average measurement procedures described in sections II.G.5. and II.G.6, respectively, must satisfy the respective peak and average limits. If all peak measurements satisfy the average limit, then average measurements are not required.

(4) Unwanted Emissions that fall Outside of the Restricted Bands
As specified in § 15.407(b), emissions above 1000 ㎒ that are outside of the restricted bands are subject to a maximum emission limit of -27 dBm/㎒ (or -17 dBm/㎒ as specified in § 15.407(b)(4)).
However, an out-of-band emission that complies with both the peak and average limits of § 15.209 is not required to satisfy the -27 dBm/㎒ or -17 dBm/㎒ maximum emission limit.

a) If radiated measurements are performed, field strength is then converted to EIRP as follows:
(i) EIRP = ((E*d)^2) / 30
where: • E is the field strength in V/m; • d is the measurement distance in meters;
• EIRP is the equivalent isotropically radiated power in watts.
(ii) Working in dB units, the above equation is equivalent to:
EIRP[dBm] = E[dBμV/m] + 20 log(d[meters]) - 104.77
(iii) Or, if d is 3 meters:
EIRP[dBm] = E[dBμV/m] - 95.2

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5.5.2.2 Spurious Radiated Emissions:

1. The preliminary and final rdiated measurements were performed to determine the frequency producing the maximum emissions in at a 10m anechoic chamber. The EUT was tested at a distance 3 meters.
2. The EUT was placed on the top of the 0.8-meter height, 1 × 1.5 meter non-metallic table. To find the maximum emission levels, the height of a measuring antenna was changed and the turntable was rotated 360˚.
3. The antenna polarization was also changed from vertical to horizontal. The spectrum was scanned from 9 ㎑ to 30 ㎒ using the loop antenna, and from 30 to 1000 ㎒ using the TRILOG broadband antenna, and from 1 000 ㎒ to 40 000 ㎒ using the horn antenna.
4. Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth.

Note

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 ㎑ for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1 ㎓.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 ㎒ for Peak detection and frequency above 1 ㎓.
   The resolution bandwidth of test receiver/spectrum analyzer is 1 ㎒ and the video bandwidth is 1 ㎑ (≥1/T) for Average detection (AV) at frequency above 1 ㎓. (where T = pulse width)

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5.5.3 Test Result

-complied

1. Band-edge & Conducted Spurious Emissions was shown in figure 3.
   Note: We took the insertion loss of the cable into consideration within the measuring instrument.
2. Measured value of the Field strength of spurious Emissions (Radiated)
3. It tested x,y and z – 3 axis each, mentioned only worst case data at this report.

- Below 1 ㎓ data (Worst-case: 802.11a)

802.11a_Lowest Channel (5 745 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(㎶)]	Factor [dB]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Result [dB(㎶/m)]	Limit [dB(㎶/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 30 ㎒ (3m Distance)										
below 30.00	**Not Detected**	-	-	-	-	-	-	-	-	-
Quasi-Peak DATA. Emissions below 1 ㎓										
396.05	120	H	39.70	-6.10	10.81	-32.62	15.71	33.60	46.00	12.40
693.00	120	H	30.10	0.60	13.88	-32.86	19.58	30.70	46.00	15.30
Above 700.00	**Not Detected**	-	-	-	-	-	-	-	-	-

NOTE 1. Factor = Cable loss + Amp gain + Antenna factor

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- Above 1 ㎓ data_U-NII-3

802.11a (5 745 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(㎶)]	Factor [dB]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Result [dB(㎶/m)]	Limit [dB(㎶/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓										
1 188.38	1 000	V	48.80	-1.70	14.52	-44.91	28.69	47.10	68.20	21.10
5 513.44	1 000	H	44.60	9.20	19.99	-45.37	34.58	53.80	68.20	14.40
5 714.19[1)]	1 000	H	46.10	10.70	21.67	-45.63	34.66	56.80	68.20	11.40
5 724.50[1)]	1 000	H	54.90	10.80	21.77	-45.64	34.67	65.70	78.20	12.50
7 010.31	1 000	V	44.70	-1.40	8.76	-46.08	35.92	43.30	68.20	24.90
11 968.25	1 000	H	44.70	2.60	11.09	-47.05	38.56	47.30	68.20	20.90
15 996.12	1 000	V	41.40	8.20	13.20	-45.66	40.66	49.60	68.20	18.60
19 716.00	1 000	H	45.30	11.10	12.90	-46.60	44.80	56.40	68.20	11.80
28 664.50	1 000	H	43.20	13.80	15.70	-47.80	45.90	57.00	68.20	11.20
39 865.25	1 000	H	40.90	16.10	19.10	-48.80	45.80	57.00	68.20	11.20
Above 40 000.00	**Not Detected**	-	-	-	-	-	-	-	-	-

[1)] Restricted band.

NOTE 1. Factor = Cable loss + Amp gain + Antenna factor

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802.11a (5 785 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 GHz										
1 189.75	1 000	H	48.40	-1.70	14.52	-44.91	28.69	46.70	68.20	21.50
1 580.94	1 000	H	49.00	-1.20	13.92	-45.15	30.03	47.80	68.20	20.40
5 629.63	1 000	H	41.80	10.00	20.89	-45.52	34.63	51.80	68.20	16.40
7 003.13	1 000	V	45.70	-1.40	8.75	-46.07	35.92	44.30	68.20	23.90
12 014.25	1 000	H	45.80	2.60	11.11	-47.08	38.57	48.40	68.20	19.80
15 990.37	1 000	V	40.90	8.10	13.20	-45.75	40.65	49.00	68.20	19.20
19 782.00	1 000	H	45.10	11.20	13.00	-46.70	44.90	56.30	68.20	11.90
29 200.75	1 000	H	43.50	13.80	16.00	-48.10	45.90	57.30	68.20	10.90
39 461.00	1 000	V	41.30	14.50	18.70	-49.30	45.10	55.80	68.20	12.40
Above 40 000.00	**Not Detected**	-	-	-	-	-	-	-	-	-

NOTE 1. Factor = Cable loss + Amp gain + Antenna factor

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802.11a (5 825 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(㎶)]	Factor [dB]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Result [dB(㎶/m)]	Limit [dB(㎶/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓										
1 187.00	1 000	V	49.30	-1.70	14.53	-44.91	28.68	47.60	68.20	20.60
1 620.81	1 000	H	47.30	-1.70	13.30	-45.17	30.17	45.60	68.20	22.60
5 853.06[1)]	1 000	H	44.40	11.00	22.09	-45.81	34.72	55.40	78.20	22.80
5 862.00[1)]	1 000	H	40.60	11.00	22.10	-45.82	34.72	51.60	68.20	16.60
6 924.06	1 000	H	47.20	-1.40	8.75	-46.07	35.92	45.80	68.20	22.40
11 920.81	1 000	V	47.60	2.60	11.08	-47.02	38.54	50.20	68.20	18.00
15 452.75	1 000	H	44.10	6.50	13.00	-46.62	40.12	50.60	68.20	17.60
18 027.50	1 000	V	45.70	10.60	12.40	-45.80	44.00	56.30	68.20	11.90
24 525.75	1 000	V	43.40	12.30	14.70	-47.60	45.20	55.70	68.20	12.50
39 562.75	1 000	H	40.30	14.90	18.80	-49.10	45.20	55.20	68.20	13.00
Above 40 000.00	**Not Detected**	-	-	-	-	-	-	-	-	-

[1)] Restricted band.

NOTE 1. Factor = Cable loss + Amp gain + Antenna factor

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802.11n HT20 (5 745 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(㎶)]	Factor [dB]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Result [dB(㎶/m)]	Limit [dB(㎶/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓										
1 189.75	1 000	V	48.20	-1.70	14.52	-44.91	28.69	46.50	68.20	21.70
5 527.88	1 000	H	44.30	9.10	19.90	-45.39	34.59	53.40	68.20	14.80
5 712.81[1)]	1 000	H	45.40	10.70	21.67	-45.63	34.66	56.10	68.20	12.10
5 723.81[1)]	1 000	H	54.10	10.80	21.77	-45.64	34.67	64.90	78.20	13.30
7 123.88	1 000	H	46.90	-1.40	8.81	-46.11	35.90	45.50	68.20	22.70
10 941.87	1 000	V	46.60	3.00	10.76	-45.84	38.08	49.60	68.20	18.60
15 574.94	1 000	V	44.30	6.80	13.05	-46.49	40.24	51.10	68.20	17.10
18.269.50	1 000	H	44.20	10.80	12.50	-45.80	44.10	55.00	68.20	13.20
24 088.50	1 000	V	45.00	11.90	14.40	-47.40	44.90	56.90	68.20	11.30
39 697.50	1 000	V	40.80	15.40	19.00	-49.10	45.50	56.20	68.20	12.00
Above 40 000.00	**Not Detected**	-	-	-	-	-	-	-	-	-

[1)] Restricted band.

NOTE 1. Factor = Cable loss + Amp gain + Antenna factor

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802.11n HT20 (5 785 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(㎶)]	Factor [dB]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Result [dB(㎶/m)]	Limit [dB(㎶/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓										
1 188.38	1 000	V	50.30	-1.70	14.52	-44.91	28.69	48.60	68.20	19.60
1 977.63	1 000	V	44.60	1.90	15.90	-45.39	31.39	46.50	68.20	21.70
5 558.13	1 000	H	43.50	9.30	20.13	-45.43	34.60	52.80	68.20	15.40
7 642.81	1 000	H	48.10	-1.00	9.08	-45.87	35.79	47.10	68.20	21.10
11 846.06	1 000	V	46.50	2.50	11.05	-47.05	38.50	49.00	68.20	19.20
15 865.31	1 000	V	43.30	7.80	13.15	-45.88	40.53	51.10	68.20	17.10
18 101.75	1 000	V	44.90	10.70	12.40	-45.70	44.00	55.60	68.20	12.60
23 585.25	1 000	H	44.00	12.00	14.30	-47.40	45.10	56.00	68.20	12.20
39 562.75	1 000	V	40.90	14.90	18.80	-49.10	45.20	55.80	68.20	12.40
Above 40 000.00	**Not Detected**	-	-	-	-	-	-	-	-	-

NOTE 1. Factor = Cable loss + Amp gain + Antenna factor

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802.11n HT20 (5 825 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(㎶)]	Factor [dB]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Result [dB(㎶/m)]	Limit [dB(㎶/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓										
1 188.38	1 000	V	50.70	-1.70	14.52	-44.91	28.69	49.00	68.20	19.20
2 771.69	1 000	V	42.00	3.80	15.05	-43.63	32.38	45.80	68.20	22.40
5 850.31[1)]	1 000	H	43.10	11.00	22.09	-45.81	34.72	54.10	78.20	24.10
5 862.69[1)]	1 000	H	38.40	11.00	22.10	-45.82	34.72	49.40	68.20	18.80
7 263.31	1 000	V	46.90	-1.30	8.88	-46.05	35.87	45.60	68.20	22.60
11 843.19	1 000	H	47.60	2.50	11.05	-47.05	38.50	50.10	68.20	18.10
15 856.69	1 000	H	43.50	7.70	13.15	-45.97	40.52	51.20	68.20	17.00
18 049.50	1 000	H	45.20	10.60	12.40	-45.80	44.00	55.80	68.20	12.40
24 256.25	1 000	H	44.70	12.00	14.50	-47.50	45.00	56.70	68.20	11.50
39 628.75	1 000	H	40.80	15.10	18.90	-49.20	45.40	55.90	68.20	12.30
Above 40 000.00	**Not Detected**	-	-	-	-	-	-	-	-	-

[1)] Restricted band.

NOTE 1. Factor = Cable loss + Amp gain + Antenna factor

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5.6 Frequency Stability

5.6.1 Regulation

According to §15.407 (g) Manufacturers 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 users manual.

5.6.2 Measurement Procedure

The frequency stability of the carrier frequency of the intentional radiator shall be maintained all conditions of normal operation as specified in the users manual. The frequency stability shall be maintained over a temperature variation of specified in the users manual at normal supply voltage, and over a variation in the primary supply voltage of specified in the users manual of the rated supply voltage at a temperature of 20 °C. For equipment that is capable only of operating from a battery, the frequency stability tests shall be performed using a new battery without any further requirement to vary supply voltage.

1. The EUT was placed inside the environmental test chamber.
2. The temperature was incremented by 10 °C intervals from lowest temperature.
3. Each increase step of temperature measured the frequency.
4. The test temperature was set 20°C and the supply voltage was then adjusted on the EUT from 85 % to 115% and the frequency record.

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5.6.3 Test Result

-Complied

- 802.11a/n_HT20

Voltage [%]	Power [V]	Temp. [°C]	Reading Frequency [㎐]	Frequency Error [㎐]	Frequency Error [%]
100	12	-20	5 744 965 192	-34 808	-0.0 006
		-10	5 744 966 647	-33 353	-0.0 006
		0	5 744 966 876	-33 124	-0.0 006
		10	5 744 966 332	-33 668	-0.0 006
		20	5 744 963 516	-36 484	-0.0 006
		30	5 744 959 043	-40 957	-0.0 007
		40	5 744 951 727	-48 273	-0.0 008
		50	5 744 941 529	-58 471	-0.0 010
		60	5 744 934 915	-65 085	-0.0 011
		Normal	5 744 961 795	-38 205	-0.0 007
85	10.20	Normal	5 744 961 928	-38 072	-0.0 007
115	13.80	Normal	5 744 962 064	-37 936	-0.0 007

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6. Test equipment used for test

	Description	Manufacturer	Model No.	Serial No.	Next Cal Date.
■	Spectrum Analyzer	R & S	FSV40	100989	17.01.07
■	DC Power Supply	Agilent	E3632A	KR75304571	17.07.07
■	Signal Generator	R & S	SMR40	100007	17.06.02
■	Wideband Power Sensor	R & S	NRP-Z81	100677	17.01.08
■	EMI TEST RECEIVER	R & S	ESCI	100710	17.02.26
■	Bi-Log Antenna	SCHWARZBECK	VULB 9163	583	18.06.27
■	Amplifier	SONOMA INSTRUMENT	310N	186280	17.04.07
■	Attenuator	SCHWARZBECK	DGA9552N	BU2404	17.04.08
■	Horn antenna	ETS.lindgren	3116	00086635	17.05.03
■	DOUBLE RIDGED HORN ANTENNA	ETS.lindgren	3117-PA	OO161083	16.11.12
■	AMPLIFIER	L-3 Narda-MITEQ	JS44-18004000 -33-8P	2000997	17.08.23
■	Broadband Preamplifier	SCHWARZBECK	BBV9718	9718-233	17.01.09
■	LOOP Antenna	R & S	HFH2-Z2	100355	18.03.03
■	Antenna Mast	MATURO	AM4.0	079/3440509	-
■	Turn Table	MATURO	CO2000-SOFT	-	-
■	Highpass Filter	Wainwright InstrumentsGmbH	WHKX6.5/18G-8SS	2	17.06.02
■	Vector Signal Generator	R & S	SMBV100A	257566	17.01.07
■	Cable	HUBER+SUHNER	SUCOFLEX 102	MY3565/2	-
■	Cable	MWX221-DMSDMS	JUNFLON	J1012214	-
■	Cable	RadiAll	TESTPRO 3	-	-

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