FCC/IC TEST REPORT

Test report No.:	EMC- FCC- R0254
FCC ID:	IOMKD004
IC ID:	282C-KD004
Type of equipment:	Miracast Dongle
Model Name:	KCA-WL100
Applicant:	JVC KENWOOD Corporation
Max.RF Output Power:	13.46 dBm
FCC Rule Part(s):	FCC Part 15 Subpart E 15.407
IC Rule Part(s):	RSS-247 Issue 1, May 2015 RSS-GEN Issue 4, November 2014
Frequency Range:	5 745 ㎒ ~ 5 825 ㎒
Test result:	Complied

The above equipment was tested by EMC compliance Testing Laboratory for compliance with the requirements of FCC Rules and Regulations.
The results of testing in this report apply to the product/system which was tested only.
Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Date of receipt: 2015. 05. 18

Date of test: 2015. 07. 01 ~ 07. 02

Issued date: 2015. 07. 03

Tested by: NAM, TAEK YONG

Approved by: SON, MIN GI

[Contents]

1. Client information

Applicant:	JVC KENWOOD Corporation
Address:	2967-3, Ishikawa-machi, Hachioji-shi, Tokyo,192-8525 Japan
Telephone number:	+81-42-646-4889
Contact person:	Manabu Sato / sato.manabu96@jvckenwood.com

Manufacturer:	OVIT Co,.Ltd
Address:	6F,1023-7 YOUNGTONG-DONG, YOUNGTONG-GU, SUWON CITY, KYOUNGGIDO,443-470

2. Laboratory information

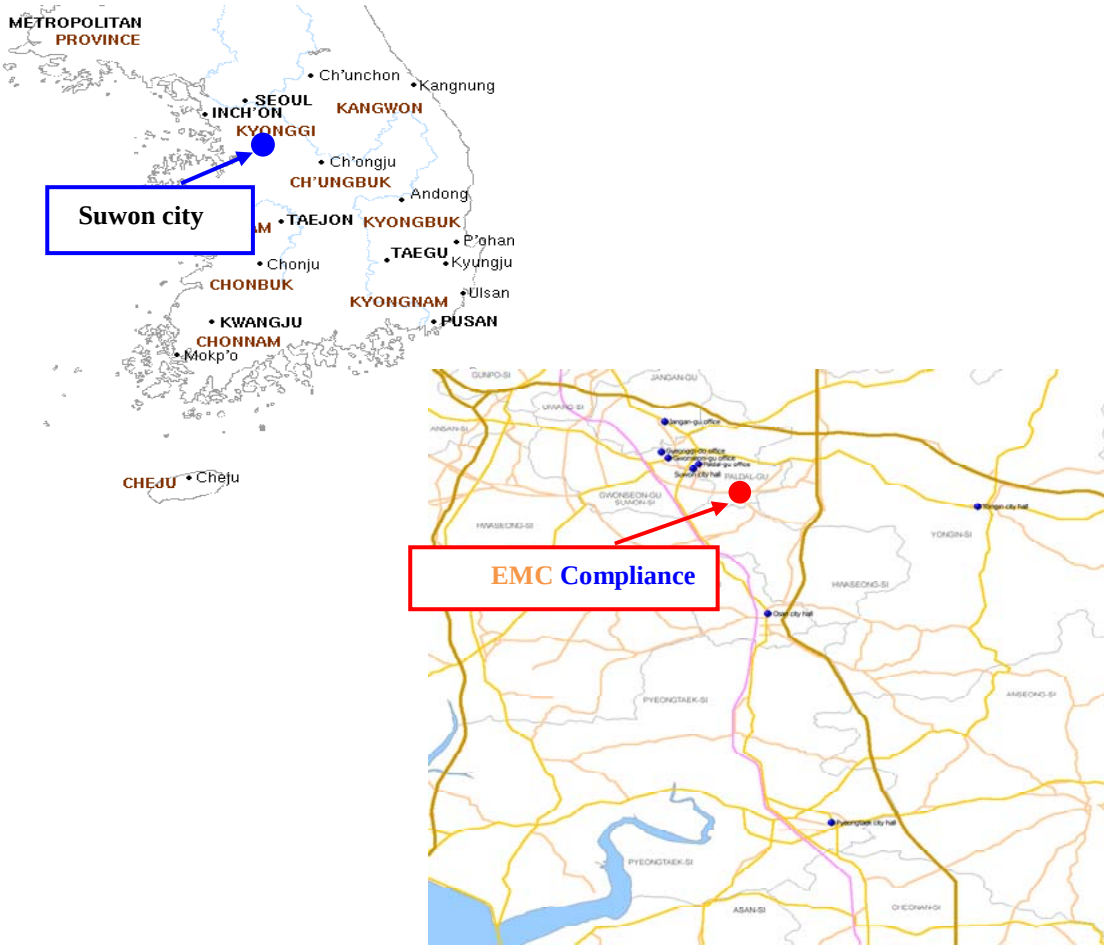
Address

EMC compliance Ltd.
480-5 Shin-dong, Yeongtong-gu, Suwon-city, Gyunggi-do, 443-390, Korea
Telephone Number: 82-31-336-9919 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



3. Description of E.U.T.

3.1 Basic description

Applicant:	JVC KENWOOD Corporation
Address of Applicant	2967-3, Ishikawa-machi, Hachioji-shi, Tokyo,192-8525 Japan
Manufacturer	OVIT Co,.Ltd
Address of Manufacturer	6F,1023-7 YOUNGTONG-DONG, YOUNGTONG-GU, SUWON CITY, KYOUNGGIDO,443-470
Type of equipment	Miracast Dongle
Basic Model	KCA-WL100
Serial number	N/A

3.2 General description

Frequency Range	2 412 ㎒ ~ 2 462 ㎒ (802.11b/g/n_HT20) 5 745 ㎒ ~ 5 825 ㎒ (802.11a/n_HT20)
Type of Modulation	CCK(802.11b), OFDM (802.11b/g/a/n_HT20)
Number of Channels	2.0 ㎓: 11 ch (802.11b/g/n_HT20) 5.0 ㎓: 5 ch (802.11a/n_HT20)
Type of Antenna	PCB Antenna
Antenna Gain	2 ㎓: -1.82 dBi 5 ㎓: 0.01 dBi
Transmit Power	13.46 dBm
Power supply	DC 5 V *
H/W Version	1.0
S/W Version	3.21.08k
Test S/W version	4.86 (Teraterm)
RF Power setting	Default

* Declared by the applicant.

3.3 Available channel list and frequency

5.0 ㎓ Band

* 802.11a/n_HT20

	Frequency
Low frequency	5 745 ㎒
Middle frequency	5 785 ㎒
High frequency	5 825 ㎒

3.4 Test Voltage

Mode	Voltage
Norminal voltage	DC 5.0 V

3.5 Duty Factor

	Duty cycle	Duty cycle factor
802.11a	63.37	1.98
802.11n HT20	61.98	2.08

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

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, 5.2	Bandwidth Measurement	5.2	C
15.407(a)(1)(2)	RSS-247, 5.4(4)	Maximum Conducted Output Power	5.3	C
15.407(a)(1)(2)(5)	RSS-247, 5.2	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, 6.2.1 RSS-GEN, 8.9 RSS-GEN, 8.10	Spurious Emission, Band Edge and Restricted bands	5.6	C
15.407(g)	RSS-GEN, 6.11	Frequency Stability	5.7	C
15.207(a)	RSS-GEN, 8.8	Conducted Emissions	5.8	C
15.407(h)	RSS-247, 6.3	Dynamic Frequency Selection	5.9	N/A

Note: C = complies
NC = Not complies
NT = Not tested
NA = Not Applicable

* The general test methods used to test this device is ANSI C63.4 2009

4.2 Uncertainty

Measurement Item	Expanded Uncertainty U = KUc (K = 2)	
Conducted RF power	± 1.36 dB	
Conducted Spurious Emissions	± 1.52 dB	
Radiated Spurious Emissions	30 ㎒ ~ 300 ㎒:	+ 4.94 dB, - 5.06 dB
		+ 4.93 dB, - 5.05 dB
	300 ㎒ ~ 1 000 ㎒:	+ 4.97 dB, - 5.08 dB
		+ 4.84 dB, - 4.96 dB
	1 ㎓ ~ 40 ㎓:	+ 6.03 dB, - 6.05 dB
Conducted Emissions	9 ㎑ ~ 150 ㎑:	± 3.75 dB
	150 ㎑ ~ 30 ㎒:	± 3.36 dB

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 a PCB Pattern type of antenna. The directional peak gain of the antenna is 0.01 dBi.

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).

5.2.4 Test Result

-Complied

*802.11a

5 725 Band

Frequency [㎒]	Average Power [dBm]	Duty Factor [dB]	Result [dBm]	Limit [dBm]	Margin [dBm]
5 745	10.60	1.98	12.58	30.00	17.42
5 785	10.80	1.98	12.79	30.00	17.21
5 825	10.27	1.98	12.25	30.00	17.75

*802.11n HT20

5 725 Band

Frequency [㎒]	Average Power [dBm]	Duty Factor [dB]	Result [dBm]	Limit [dBm]	Margin [dBm]
5 745	11.38	2.08	13.46	30.00	16.54
5 785	11.28	2.08	13.35	30.00	16.65
5 825	11.17	2.08	13.24	30.00	16.76

-NOTE:

1. Duty Factor : refer to 3.5
2. Result = Total power calculation + Duty Factor

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 dB 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 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

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 dB down from the maximum of theemission. 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 GHz

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 kHz for theband 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

a) Set RBW = 100 kHz.
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 dB 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.

5.3.3 Test Result

-Complied

*802.11a

5 725 Band

Frequency	6 dB Bandwidth	OBW
5 745	16.40	16.48
5 785	16.40	16.48
5 825	16.96	16.56

*802.11n HT20

5 725 Band

Frequency	6 dB Bandwidth	OBW
5 745	17.24	17.60
5 785	16.84	17.60
5 825	15.28	17.60

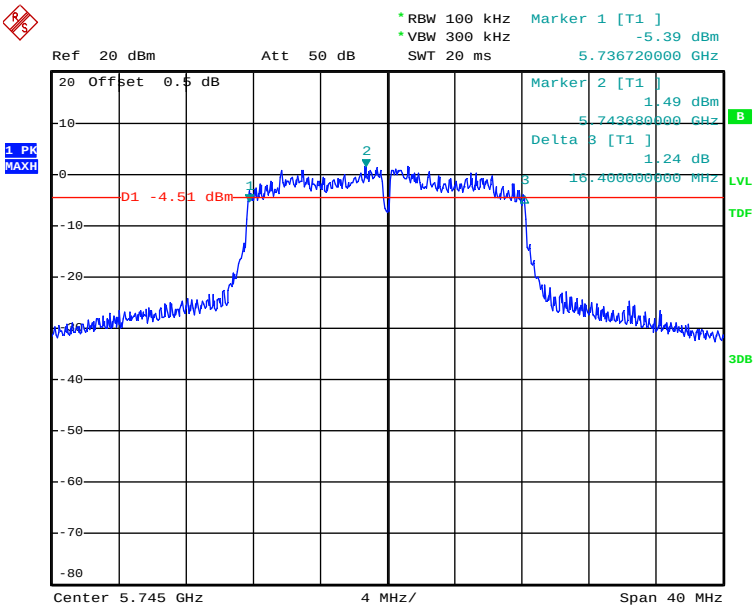
5.3.4 Test Plot

Figure 1. Plot of Bandwidth Measurement

* 802.11a_5 725 Band (26 dB Bandwidth)

-5 745 ㎒

6 dB Bandwidth



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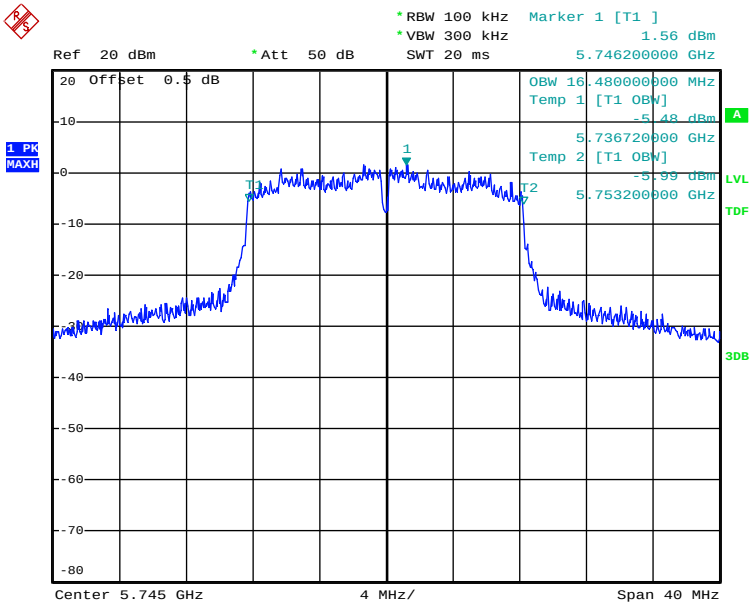
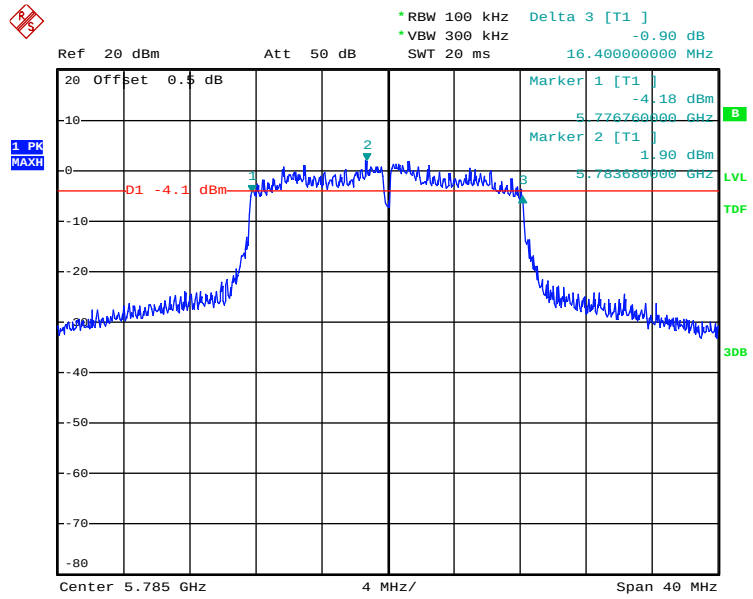
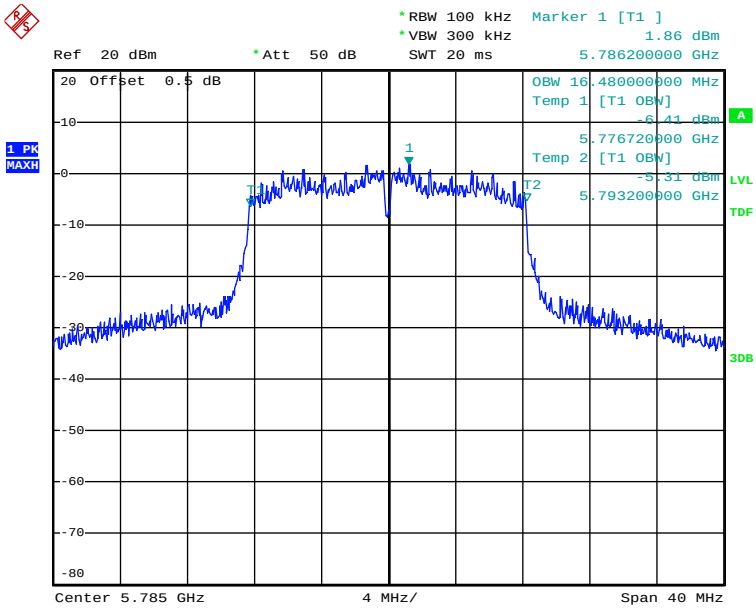


-5 785 ㎒

6 ㏈ Bandwidth

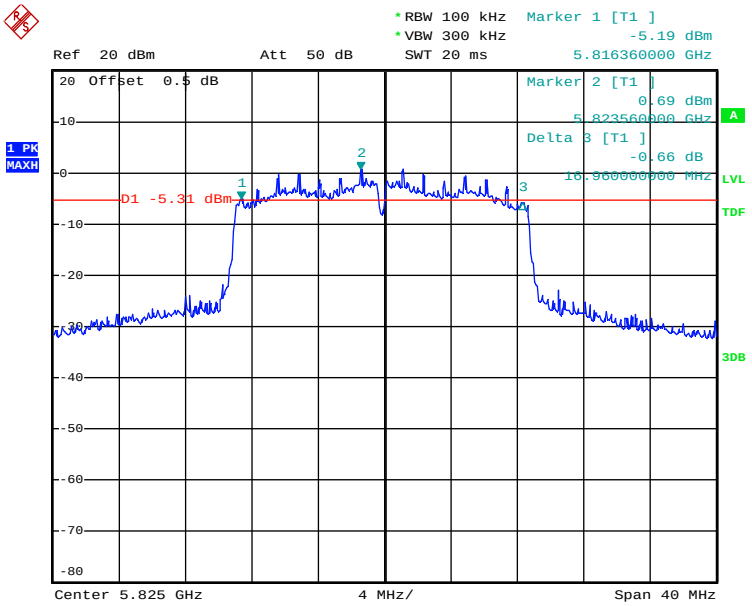


OBW



-5 825 ㎒

6 ㏈ Bandwidth



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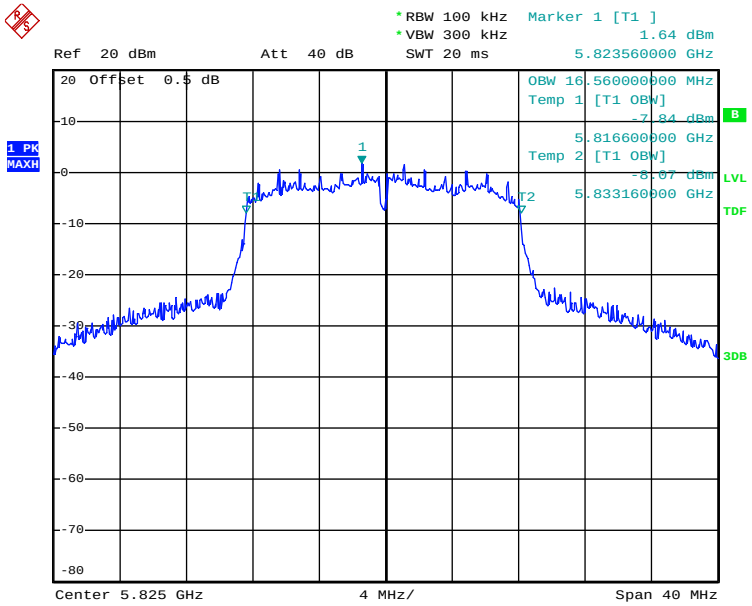
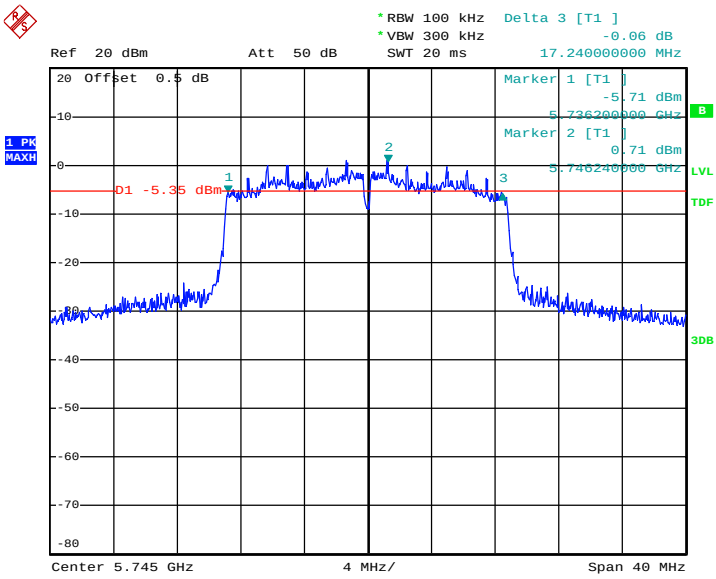


* 802.11n HT20_5 725 Band (6 dB Bandwidth)

-5 745 ㎒

6 dB Bandwidth



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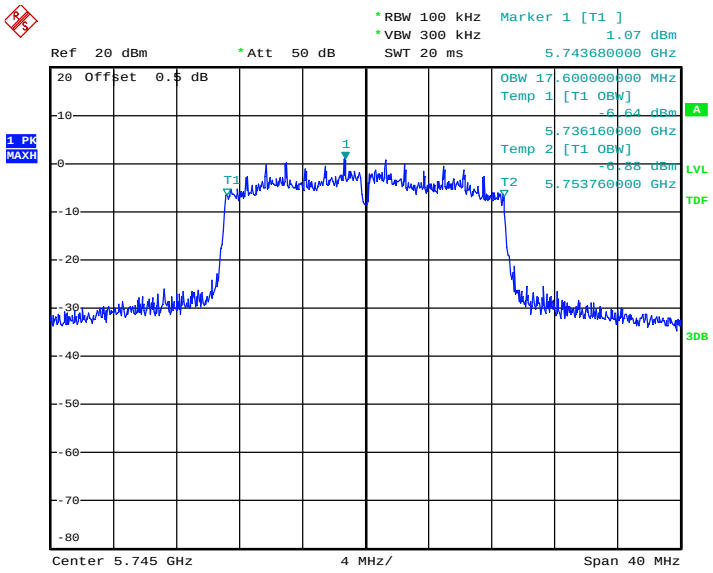
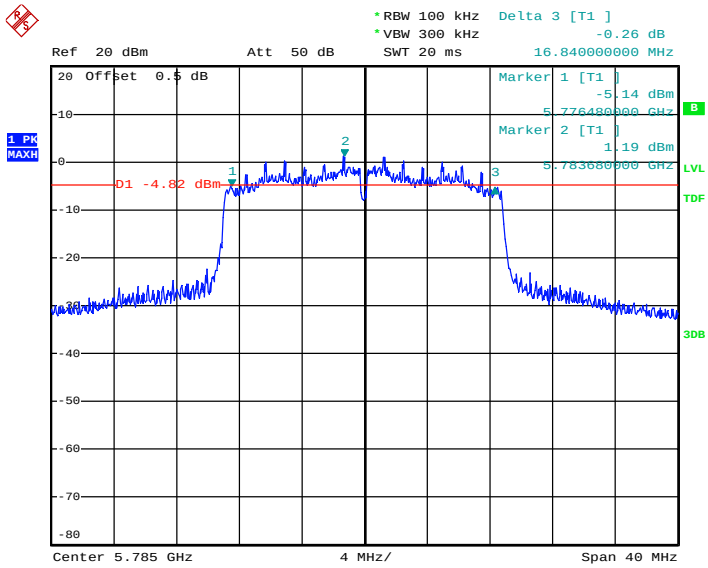


-5 785 ㎒

6 ㏈ Bandwidth



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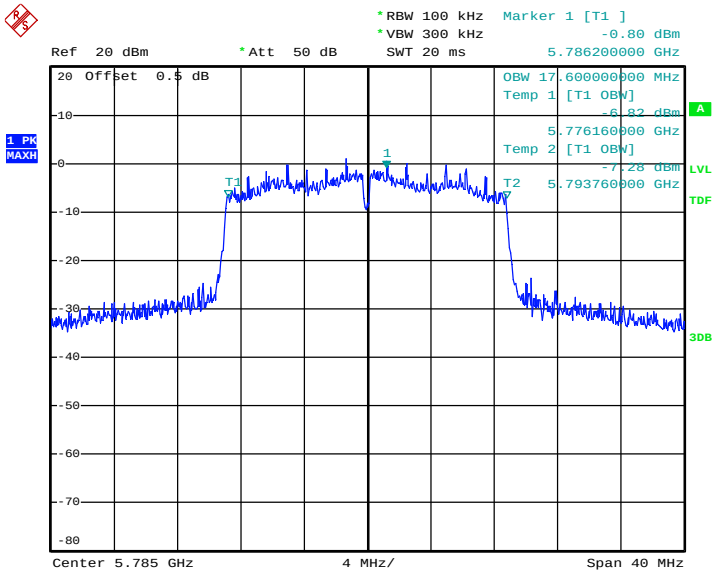
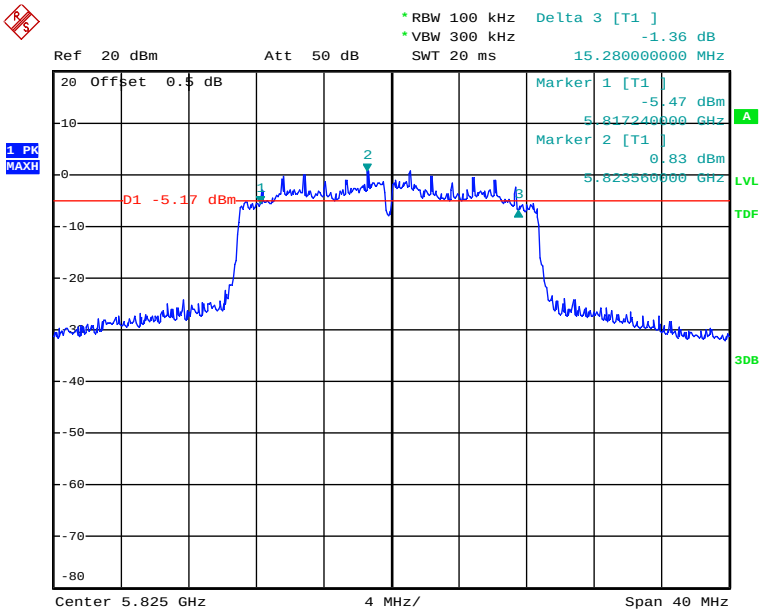


-5 825 ㎒

6 ㏈ Bandwidth



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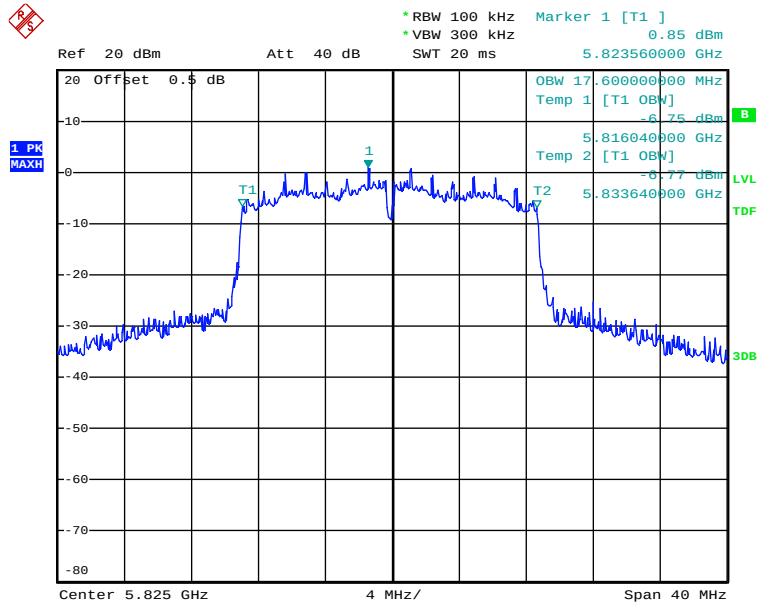


5.4 Peak Power Spectral Density

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.

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.

5.4.3 Test Result

-Complied

* 802.11a

5 725 Band

Frequency [㎒]	Reading [dBm]	Duty Cycle [dB]	Total result [dBm]	Limit [dBm]	Margin [dB]
5 745	-0.85	1.98	1.13	30.00	28.87
5 785	-0.97	1.98	1.01	30.00	28.99
5 825	-0.51	1.98	1.47	30.00	28.53

*802.11n HT20

5 725 Band

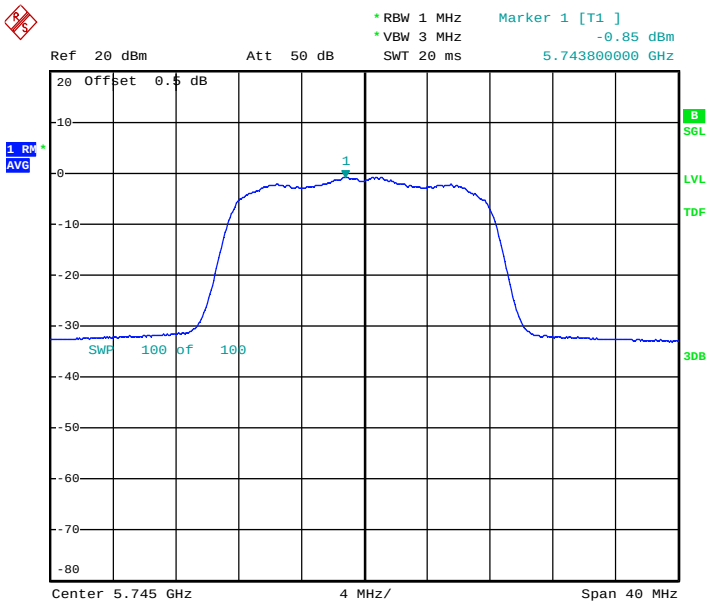
Frequency [㎒]	Reading [dBm]	Duty Cycle [dB]	Total result [dBm]	Limit [dBm]	Margin [dB]
5 745	0.40	2.08	2.51	30.00	27.49
5 785	0.04	2.08	2.12	30.00	27.88
5 825	0.43	2.08	2.51	30.00	27.49

5.4.4 Test Plot

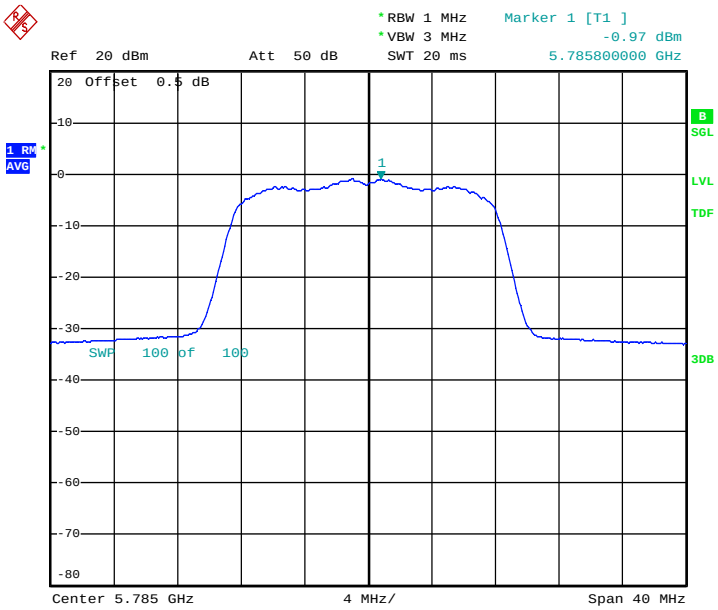
Figure 2. Plot of the Power Spectral Density

* 802.11a_5 725 Band

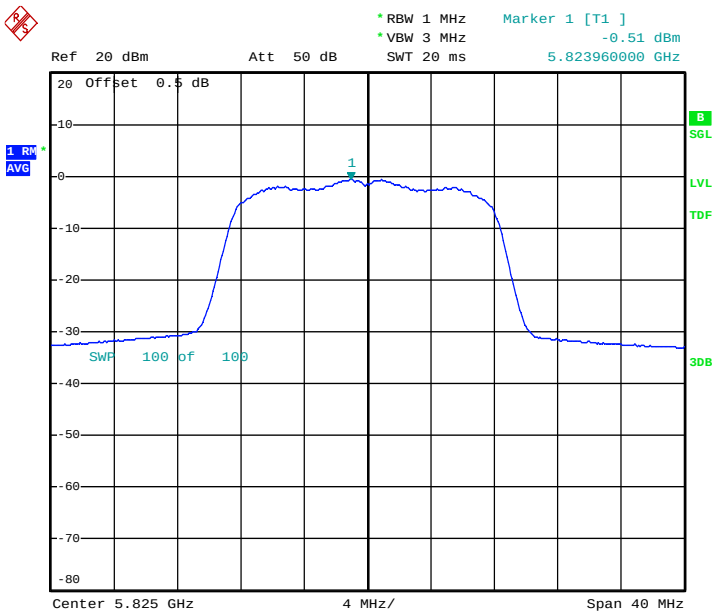
-5 745 ㎒



-5 785 ㎒

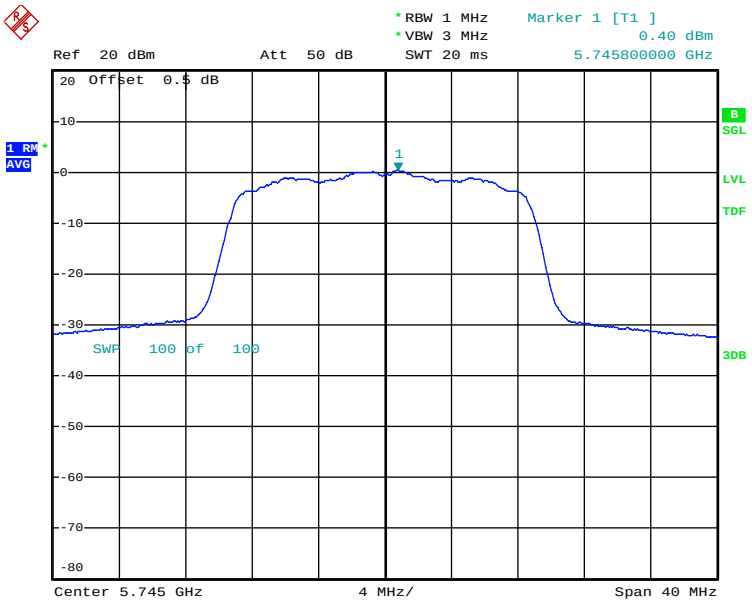


-5 825 ㎒

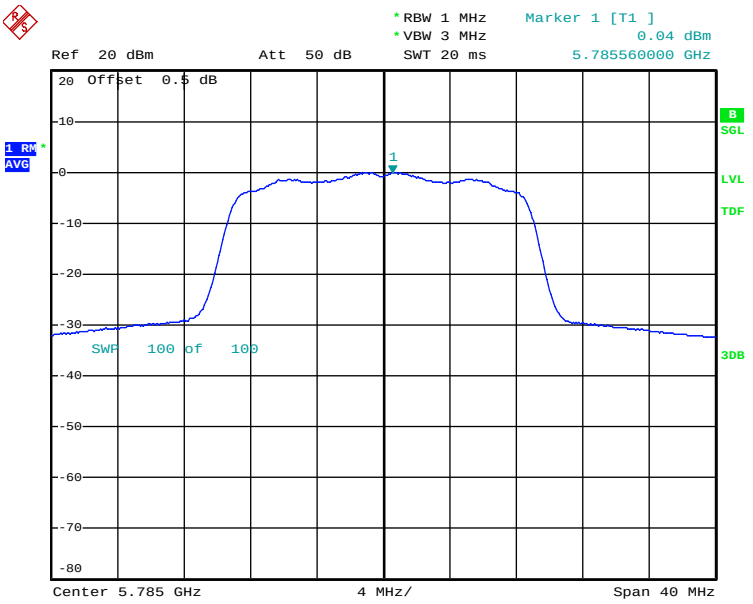


* 802.11n HT20_ 5 725 Band

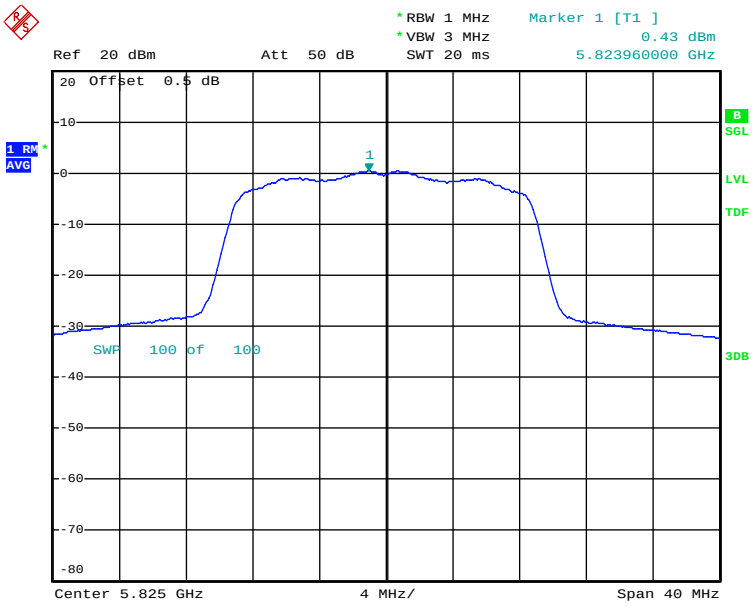
-5 745 ㎒



-5 785 ㎒



-5 825 ㎒



5.6 Spurious Emission, Band Edge And Restricted Bands

5.6.1 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	2400/F(㎑)	300
0.490 -1.705	24000/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.

5.6.2 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).

5.6.2.1 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

5.6.2.2 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)

5.6.3 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.
   ※ Noise was not measured. (Margin was more than 20 dB)
   Worst value of noise floor was recorded.

*** Below 1 ㎓ data (Worst-case: 802.11n_HT20_5 725 Band_Low channel)**

802.11a

Frequency [㎒]	Receiver Bandwidth [�kHz]	Pol. [V/H]	Reading [dB(㎶)]	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 ㎓							
241.46	120	H	53.70	-13.60	40.10	46.00	5.90
717.85	120	H	38.20	-4.80	33.40	46.00	12.60
843.71	120	V	35.80	-1.40	34.40	46.00	11.60
Above 900.00	Not Detected	-	-	-	-	-	-

*** Above 1 ㎓ data_5 725 Band**

802.11a (5 745 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
# 5 725.00	1 000	V	67.40	6.60	74.00	78.20	4.20
Above 6 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-

This hash means Out of Band.

802.11a (5 785 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-

802.11a (5 825 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
# 5 854.44	1 000	V	44.70	7.00	51.70	68.20	16.50
Above 6 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-

This hash means Out of Band.

802.11n HT20 (5 745 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
# 5 723.13	1 000	V	68.40	6.60	75.00	78.20	3.20
Above 6 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-

This hash means Out of Band.

802.11n HT20 (5 785 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-

802.11n HT20 (5 825 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
# 5 859.25	1 000	V	43.3	7	50.3	68.2	17.9
Above 6 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-

This hash means Out of Band.

5.7 Frequency Stability

5.7.1 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.

5.7.2 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.

5.7.3 Test Result

-complied

-5 725 ㎒ BW

Voltage (%)	Power (VDC)	Temp. (°C)	Reading Frequency (㎐)	Frequency Error (㎐)	Frequency Error (%)
100	5	-20	5 744 984 250	-15750	-0.000 3
100		-10	5 744 990 800	-9200	-0.000 2
100		0	5 744 975 540	-24460	-0.000 4
100		10	5 744 976 110	-23890	-0.000 4
100		20	5 744 966 410	-33590	-0.000 6
100		30	5 744 957 110	-42890	-0.000 7
100		40	5 744 951 840	-48160	-0.000 8
100		50	5 744 955 730	-44270	-0.000 8
100		Normal	5 744 954 275	-45725	-0.000 8
85	4.25	Normal	5 744 954 256	-45744	-0.000 8
115	5.75	Normal	5 744 954 086	-45914	-0.000 8

5.8 Conducted Emission

5.8.1 Regulation

According to §15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 ㎑ to 30 ㎒, shall not exceed the limits in the following table, as measured using a 50 µH/50 Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (㎒)	Conducted limit (dB㎶)	
	Qausi-peak	Average
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 – 30	60	50

* Decreases with the logarithm of the frequency.

According to §15.107(a), for unintentional device, except for Class A digital devices, line conducted emission limits are the same as the above table.

5.9.2 Measurement Procedure

1) The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 ㎝ in which is located 40 ㎝ away from the vertical wall and 1.5m away from the side wall of the shielded room.

2) Each current-carrying conductor of the EUT power cord was individually connected through a 50Ω/50µH LISN, which is an input transducer to a Spectrum Analyzer or an EMI/Field Intensity Meter, to the input power source.

3) Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.

4) The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 ㎒ to 30 ㎒.

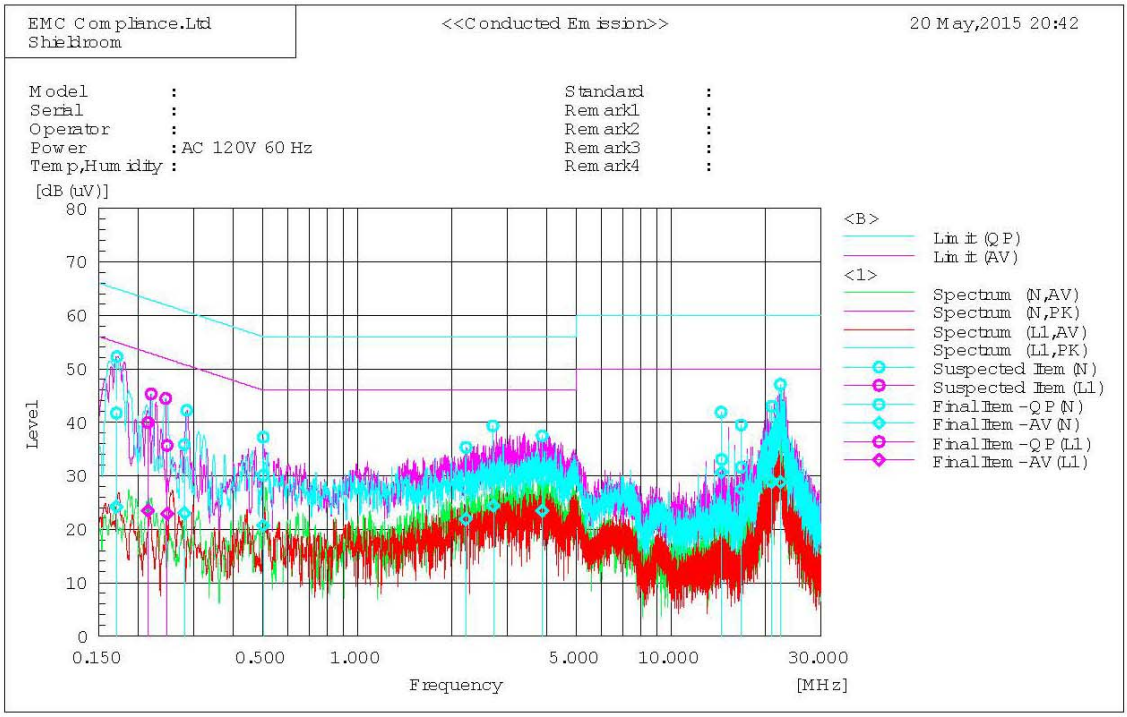
5) The measurements were made with the detector set to PEAK amplitude within a bandwidth of 10 ㎑ or to QUASI-PEAK and AVERAGE within a bandwidth of 9 ㎑. The EUT was in transmitting mode during the measurements.

5.8.3 Test Result

- Complied

Figure 4. plot of Conducted Emission

*Conducted worst-case data : 802.11n_HT20_Low Channel (5 745 ㎒)



Final Result

--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	0.17044	32.2	14.7	9.5	41.7	24.2	64.9	54.9	23.2	30.7
2	0.28107	26.3	13.5	9.5	35.8	23.0	60.8	50.8	25.0	27.8
3	0.50121	20.5	11.1	9.5	30.0	20.6	56.0	46.0	26.0	25.4
4	2.22144	18.3	12.4	9.5	27.8	21.9	56.0	46.0	28.2	24.1
5	2.71047	21.0	14.9	9.5	30.5	24.4	56.0	46.0	25.5	21.6
6	3.88657	20.0	13.9	9.5	29.5	23.4	56.0	46.0	26.5	22.6
7	14.47516	23.2	20.9	9.8	33.0	30.7	60.0	50.0	27.0	19.3
8	16.75321	21.8	17.7	9.8	31.6	27.5	60.0	50.0	28.4	22.5
9	20.94192	26.7	19.1	9.8	36.5	28.9	60.0	50.0	23.5	21.1
10	22.30344	27.7	19.0	9.8	37.5	28.8	60.0	50.0	22.5	21.2

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	0.21496	30.4	14.0	9.5	39.9	23.5	63.0	53.0	23.1	29.5
2	0.24751	26.2	13.4	9.5	35.7	22.9	61.8	51.8	26.1	28.9

6. Test equipment used for test

	Description	Manufacturer	Model No.	Serial No.	Next Cal Date.
■	Wideband Power Sensor	R & S	NRP-Z81	102398	15.11.27
■	Attenuator	HP	8491A	29738	16.01.12
■	Spectrum Analyzer	R & S	FSP40	100209	15.11.07
■	Temp & humidity chamber	ESPEC CORP.	SH-641	92005476	15.12.26
■	DC Power Supply	AGILENT	E3632A	MY400088000	15.12.11
■	Signal generator	R & S	SMR40	100007	16.06.15
■	Spectrum Analyzer	R & S	FSV40	100989	16.01.26
■	Amplifier	SONOMA INSTRUMENT	310	293004	15.09.25
■	Turn Table	Innco Systems	DT2000S-1t	79	-
■	Antenna Mast	Innco Systems	MA4000-EP	303	-
■	Loop Antenna	R & S	HFH2-Z2	100355	16.03.03
■	Bi-Log Antenna	Schwarzbeck	VULB9163	552	16.05.14
■	Horn Antenna	ETS-LINDGREN	3116	86632	15.10.20
■	Horn Antenna	ETS-LINDGREN	3117	155787	16.02.05
■	Attenuator	HP	8491A	MY52460424	15.07.23
■	Broadband Preamplifier	SCHWARZBECK	BBV9718	9718-223	16.04.13
■	Broadband Preamplifier	SCHWARZBECK	BBV9721	2	16.05.19
■	Highpass Filter	Wainwright Instruments GmbH	WHKX3.0/ 18G-12SS	44	16.02.02
■	Highpass Filter	Wainwright Instruments GmbH	WHKX6.5/18G-8SS	2	16.02.24
■	EMI Test Receiver	R & S	ESR7	101078	16.02.24
■	Two-Line-V-network	R & S	ENV216	101358	15.10.04
■	Power Divider	Aeroflex/ Weinschel,Inc	1580-1	RM986	16.04.07
■	Power Divider	Aeroflex/ Weinschel,Inc	1580-1	RM987	16.02.24