Report on the RF Testing of:

KYOCERA Corporation
Mobile Phone, Model: KC-T303DT
FCC ID: JOYEB1080

In accordance with FCC Part15 Subpart E

Japan

Add value.
Inspire trust.

Prepared for: KYOCERA Corporation
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COMMERCIAL-IN-CONFIDENCE

Document Number: JPD-TR-21237-0

SIGNATURE			
Hiroaki Suzuki			
NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
Hiroaki Suzuki	Deputy Manager of RF Group	Approved Signatory	2021.11.19

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Japan Ltd. document control rules.

EXECUTIVE SUMMARY – Result: Complied
A sample of this product was tested and the result above was confirmed in accordance with FCC Part15 Subpart E.

ACCREDITED
Certificate #3686.03

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Japan

Contents

Japan

1 Summary of Test

1.1 Modification history of the test report

Document Number	Modification History	Issue Date
JPD-TR-21237-0	First Issue	Refer to the cover page

1.2 Standards

CFR47 FCC Part 15 Subpart E

1.3 Test methods

ANSI C63.10-2013
KDB789033 D02 General U-NII Test Procedures New Rules v02r01

1.4 Deviation from standards

None

1.5 List of applied test(s) of the EUT

Test item section	Test item	Condition	Result	Remark
15.407(a)	26dB Bandwidth	Conducted	PASS	-
15.407(a)	Maximum Conducted Output Power	Conducted	PASS	-
15.407(a)	Peak Power Spectral Density	Conducted	PASS	-
15.407(b) 15.205 15.209	Radiated emissions (Restricted Bands of Operation)	Radiated	PASS	-
15.407(g)	Frequency Stability	Conducted	PASS	-
15.207	AC Power Line Conducted Emissions	Conducted	PASS	-

1.6 Test information

None

1.7 Test set up

Table-top

1.8 Test period

27-September-2021 - 16-November-2021

Japan

2 Equipment Under Test

All information in this chapter was provided by the applicant.

2.1 EUT information

Applicant	KYOCERA Corporation Yokohama Office 2-1-1 Kagahara, Tsuzuki-ku Yokohama-shi, Kanagawa, Japan Phone: +81-45-943-6253 Fax: +81-45-943-6314
Equipment Under Test (EUT)	Tablet
Model number	KC-T303DT
Serial number	1080FCCRF01, 1080FCCRF02
Trade name	Kyocera
Number of sample(s)	2
EUT condition	Prototype
Power rating	Battery: DC 3.8 V
Size	(W) 260 mm × (D) 169 mm × (H) 10.2 mm
Environment	Indoor and Outdoor use
Terminal limitation	-20˚C to 60˚C
Hardware version	DMT
Software version	0.130.JS
Firmware version	Not applicable
RF Specification	
Protocol	IEEE802.11a, IEEE802.11n (HT20), IEEE802.11n (HT40) IEEE802.11ac (VHT20), IEEE802.11ac (VHT40), EEE802.11ac (VHT80)
Frequency range	IEEE802.11a/n (HT20) / IEEE802.11ac (VHT20): 5180 MHz-5320 MHz, 5500 MHz-5720 MHz IEEE802.11n (HT40) / IEEE802.11ac (VHT40): 5190 MHz-5310 MHz, 5510 MHz-5710 MHz IEEE802.11ac (VHT80): 5210 MHz, 5290 MHz, 5530 MHz, 5610 MHz, 5690MHz
Number of RF Channels	IEEE802.11a/n (HT20) / IEEE802.11ac (VHT20): 25 Channels IEEE802.11n (HT40) / IEEE802.11ac (VHT40): 12 Channels IEEE802.11ac (VHT80): 6 Channels
Modulation type	IEEE802.11a/n/ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)

Japan

Data rate	IEEE802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps IEEE802.11n (HT20 LGI): 6.5, 13, 19.5, 26, 39, 52, 58.5, 65, 78, 86.5Mbps IEEE802.11n (HT20 SGI): 7.2, 14.4, 21.7, 28.9, 43.3, 57.8, 65, 72.2, 86.7, 96.1Mbps IEEE802.11ac (VHT20 LGI): 6.5, 13, 19.5, 26, 39, 52, 58.5, 65, 78, 86.5Mbps IEEE802.11ac (VHT20 SGI): 7.2, 14.4, 21.7, 28.9, 43.3, 57.8, 65, 72.2, 86.6, 96.1Mbps IEEE802.11n (HT40 LGI): 13.5, 27, 40.5, 54, 81, 108, 121.5, 135, 162, 180Mbps IEEE802.11n (HT40 SGI): 15, 30, 45, 60, 90, 120, 135, 150, 180, 200Mbps IEEE802.11ac (VHT40 LGI): 13.5, 27, 40.5, 54, 81, 108, 121.5, 135, 162, 180Mbps IEEE802.11ac (VHT40 SGI): 15, 30, 45, 60, 90, 120, 135, 150, 180, 200Mbps IEEE802.11ac (VHT80 LGI): 29.5, 58.5, 87.8, 117, 175.5, 234, 263.3, 292.5, 351, 390Mbps IEEE802.11ac (VHT80 SGI): 32.5, 65, 97.5, 130, 195, 260, 292.5, 325, 390, 433.3Mbps
Channel separation	IEEE802.11a/n(HT20) / IEEE802.11ac (VHT20): 20 MHz IEEE802.11n (HT40) / IEEE802.11ac (VHT40): 40 MHz IEEE802.11ac (VHT80): 80 MHz
Conducted power	11.469 mW (IEEE802.11a) 10.215 mW (IEEE802.11n: HT20) 10.966 mW (IEEE802.11n: HT40) 10.320 mW (IEEE802.11ac: VHT80)
Antenna type	Internal antenna
Antenna gain	5.15-5.25 GHz band: 1.4 dBi 5.25-5.35 GHz band: 1.4 dBi 5.47-5.725 GHz band: 1.8 dBi

2.2 Modification to the EUT

The table below details modifications made to the EUT during the test project.

Modification State	Description of Modification	Modification fitted by	Date of Modification
Model: KC-T303DT, Serial Number: 1080FCCRF01, 1080FCCRF02			
0	As supplied by the applicant	Not Applicable	Not Applicable

2.3 Variation of family model(s)

2.3.1 List of family model(s)

Not applicable

2.3.2 Reason for selection of EUT

Not applicable

Japan

2.4 Operating channels and frequencies

[IEEE802.11a/n (HT20) / IEEE802.11ac (VHT20)]

Channel	Frequency [MHz]
36	5180
40	5200
44	5220
48	5240
52	5260
56	5280
60	5300
64	5320
100	5500
104	5520
108	5540
112	5560
116	5580
120	5600
124	5620
128	5640
132	5660
136	5680
140	5700
144	5720

[IEEE802.11n (HT40) / IEEE802.11ac (VHT40)]

Channel	Frequency [MHz]
38	5190
46	5230
54	5270
62	5310
102	5510
110	5550
118	5590
126	5630
134	5670
142	5710

[IEEE802.11ac (VHT80)]

Channel	Frequency [MHz]
42	5210
58	5290
106	5530
122	5610
138	5690

2.5 Description of test mode

The EUT had been tested under operating condition.
There are three channels have been tested as following:

Band	IEEE802.11a/n (HT20) IEEE802.11ac (VHT20)		IEEE802.11n (HT40) IEEE802.11ac (VHT40)		IEEE802.11ac (HT80)	
	Channel	Frequency [MHz]	Channel	Frequency [MHz]	Channel	Frequency [MHz]
5.2 GHz Band	36	5180	38	5190	42	5210
	40	5200	-	-	-	-
	48	5240	46	5230	-	-
5.3 GHz Band	52	5260	54	5270	58	5290
	56	5280	-	-	-	-
	64	5320	62	5310	-	-
5.6 GHz Band	100	5500	102	5510	106	5530
	116	5580	110	5550	122	5610
	140	5700	134	5670	138	5690
	144	5720	142	5690	-	-

The pre-test has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates.

Band	Modulation Type	Data Rate
5.2 GHz Band	IEEE802.11a: OFDM	6Mbps
	IEEE802.11n (HT20): OFDM	MCS0 (6.5Mbps)
	IEEE802.11n (HT40): OFDM	MCS0 (13.5Mbps)
	IEEE802.11ac (VHT80): OFDM	MCS0 (29.5Mbps)
5.3 GHz Band	IEEE802.11a: OFDM	6Mbps
	IEEE802.11n (HT20): OFDM	MCS0 (6.5Mbps)
	IEEE802.11n (HT40): OFDM	MCS0 (13.5Mbps)
	IEEE802.11ac (VHT80): OFDM	MCS0 (29.5Mbps)
5.6 GHz Band	IEEE802.11a: OFDM	6Mbps
	IEEE802.11n (HT20): OFDM	MCS0 (6.5Mbps)
	IEEE802.11n (HT40): OFDM	MCS0 (13.5Mbps)
	IEEE802.11ac (VHT80): OFDM	MCS0 (29.5Mbps)

The field strength of spurious emissions was measured at each position of all three axis X, Y and Z to compare the level, and the maximum noise.
The worst emission was found in X axis and the worst case recorded.
Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports.

2.6 Operating flow

- Tx mode

i) Test program setup to the Software
ii) Select a Test mode
Operating frequency: 5.2GHz Band, 5.3GHz Band, 5.6GHz Band
iii) Start test mode

- Rx mode

i) Test program setup to the Software
ii) Select a Test mode
Operating frequency: 5.2GHz Band, 5.3GHz Band, 5.6GHz Band
iii) Start test mode

Japan

3 Configuration of Equipment

Numbers assigned to equipment on the diagram in “3.3 System configuration” correspond to the lists in “3.1 Equipment used” and “3.2 Cable(s) used”.
This test configuration is based on the manufacture’s instruction.
Cabling and setup(s) were taken into consideration and test data was taken under worse case condition.

3.1 Equipment used

No.	Equipment	Company	Model No.	Serial No.	FCC ID/DoC	Comment
1	Tablet	KYOCERA	KC-T303DT	1080FCCRF01, 1080FCCRF02	JOYEB1080	EUT
2	AC Adapter	JUSTSYSTEMS.	ADT306	JHA	N/A	*

*:AC power line Conducted Emission Test.

3.2 Cable(s) used

No.	Equipment	Length[m]	Shield	Connector	Comment
a	DC cable for AC Adapter	1.2	No	Plastic	*

*:AC power line Conducted Emission Test.

3.3 System configuration

Japan

4 Test Result

4.1 26dB Bandwidth and 99% Occupied Bandwidth

4.1.1 Measurement procedure

[FCC 15.407(a), KDB 789033 D02, Section C, D]

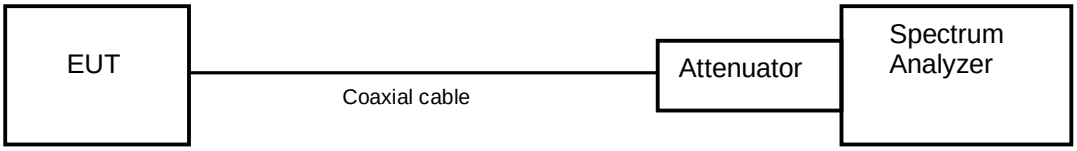
The 26dB bandwidth and 99% occupied bandwidth is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

The spectrum analyzer is set to;
- RBW=200 kHz/430 kHz/820 kHz, VBW=620 kHz/1.3 MHz/2.4 MHz, Span=40 MHz/80 MHz/160 MHz
  Sweep=auto, Detector=Peak, Trace mode=Max hold

The EUT was set to operate with following conditions.
- 5.2 GHz Band, 5.3 GHz Band, 5.6 GHz Band

The test mode of EUT is as follows.
- Tx mode

- Test configuration



4.1.2 Limit

None

Japan

4.1.3 Measurement result

Date : 27-September-2021
Temperature : 18.1 [˚C]
Humidity : 62.8 [%] Test engineer :
Test place : Shielded room No.4 Kazunori Saito

Mode	Band	Channel	Frequency (MHz)	26 dB bandwidth (MHz)	99% Occupied bandwidth (MHz)
802.11a	5.2 GHz Band	36	5180	19.989	16.4123
		40	5200	19.927	16.3982
		48	5240	19.820	16.4223
	5.3 GHz Band	52	5260	19.864	16.3968
		56	5280	19.967	16.4358
		64	5320	19.806	16.4249
	5.6 GHz Band	100	5500	19.844	16.4289
		116	5580	20.020	16.4361
		140	5700	19.779	16.4260
		144	5720	19.990	16.4669

Mode	Band	Channel	Frequency (MHz)	26 dB bandwidth (MHz)	99% Occupied bandwidth (MHz)
802.11n (20 MHz)	5.2 GHz Band	36	5180	20.373	17.5522
		40	5200	20.326	17.5289
		48	5240	20.288	17.5326
	5.3 GHz Band	52	5260	20.167	17.5246
		56	5280	20.177	17.5506
		64	5320	20.110	17.5293
	5.6 GHz Band	100	5500	20.258	17.5635
		116	5580	20.160	17.5263
		140	5700	20.138	17.5657
		144	5720	20.188	17.5462

Mode	Band	Channel	Frequency (MHz)	26 dB bandwidth (MHz)	99% Occupied bandwidth (MHz)
802.11n (40 MHz)	5.2 GHz Band	38	5190	40.676	35.9685
		46	5230	40.622	36.0169
	5.3 GHz Band	54	5270	40.788	35.9860
		62	5310	40.290	35.9389
	5.6 GHz Band	102	5510	40.833	35.9964
		110	5550	40.693	36.0351
		134	5670	40.386	35.9571
		142	5710	40.368	35.9421

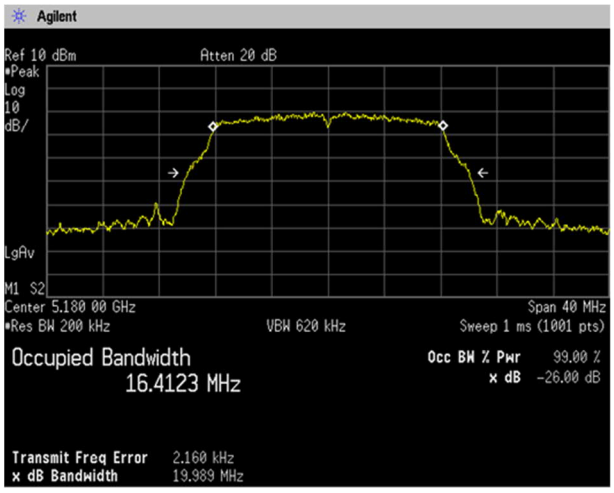
Mode	Band	Channel	Frequency (MHz)	26dB bandwidth (MHz)	99% Occupied bandwidth (MHz)
802.11ac (80 MHz)	5.2 GHz Band	42	5210	81.017	75.2058
	5.3 GHz Band	58	5290	80.991	75.1619
	5.6 GHz Band	106	5530	80.790	75.1631
		122	5610	81.016	75.1853
		138	5690	81.158	75.0869

Japan

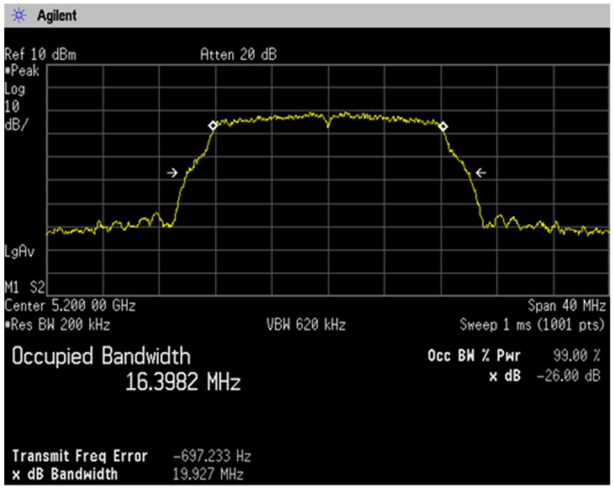
4.1.4 Trace data

[IEEE802.11a]
(5.2 GHz Band)

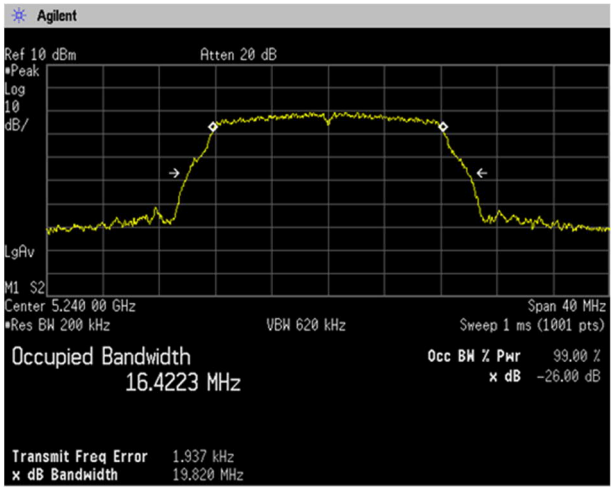
Channel: 36



Channel: 40



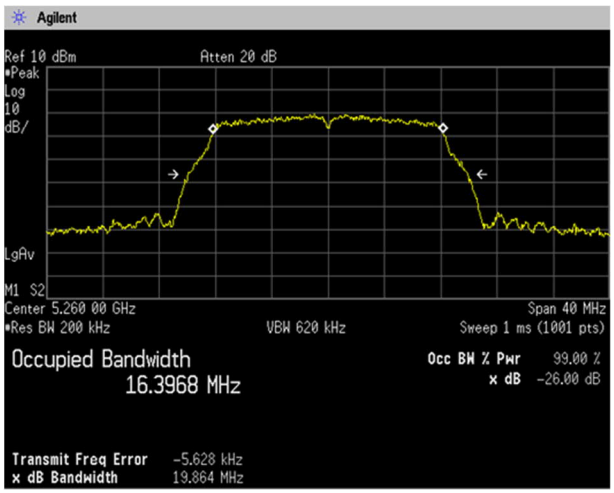
Channel: 48



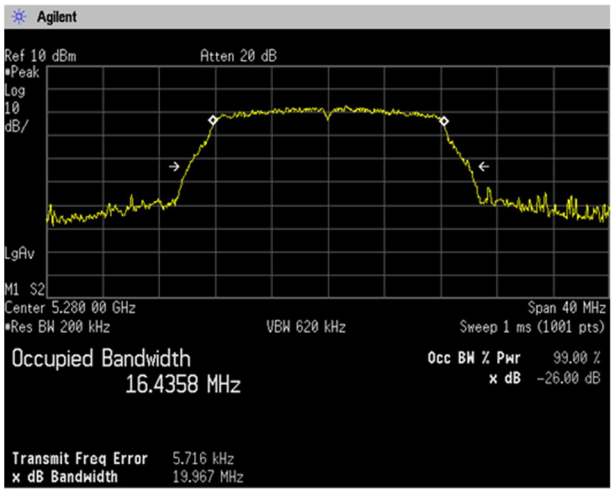
Japan

(5.3 GHz Band)

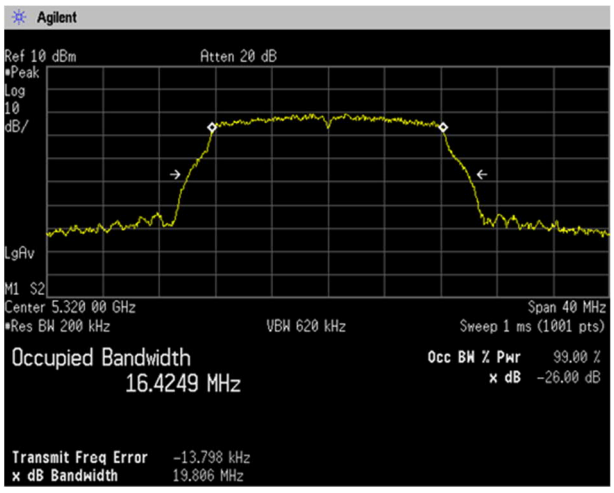
Channel: 52



Channel: 56



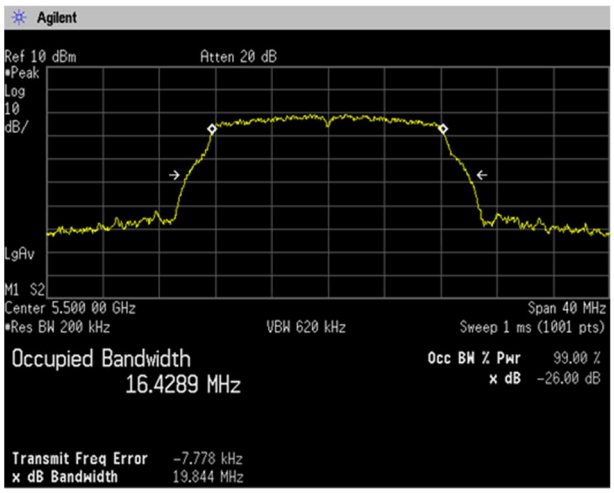
Channel: 64



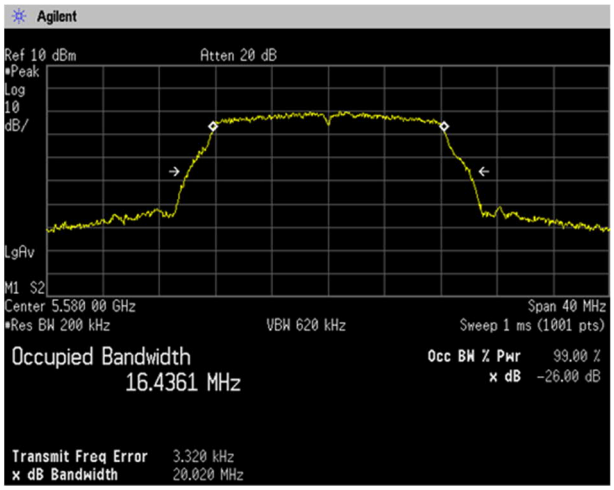
Japan

(5.6 GHz Band)

Channel: 100



Channel: 116



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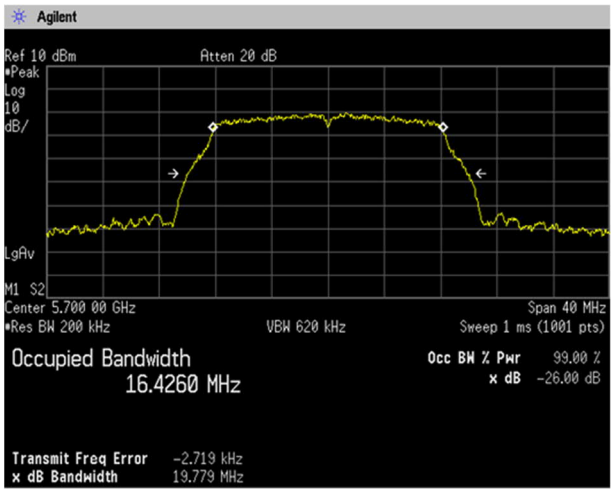
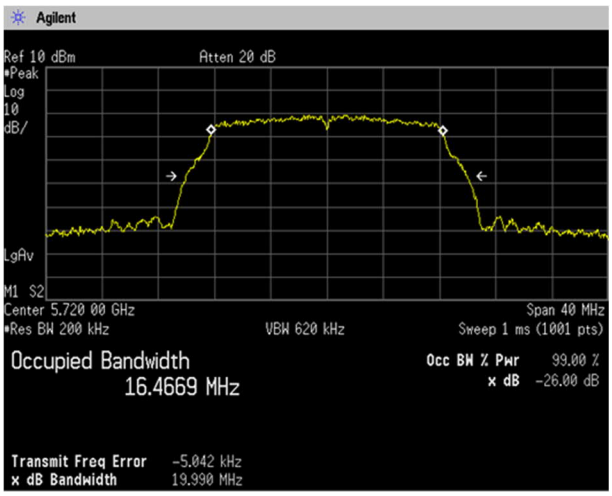


Japan

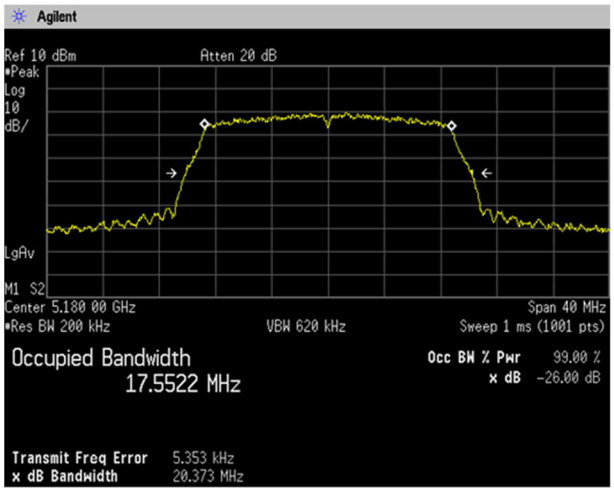
Channel: 144



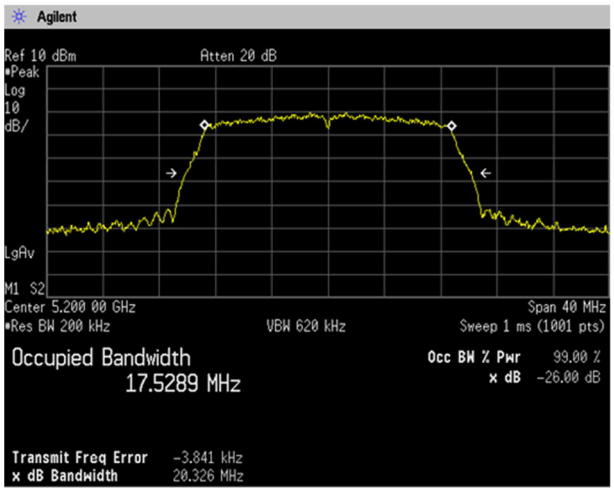
Japan

[IEEE802.11n (HT20)]
(5.2 GHz Band)

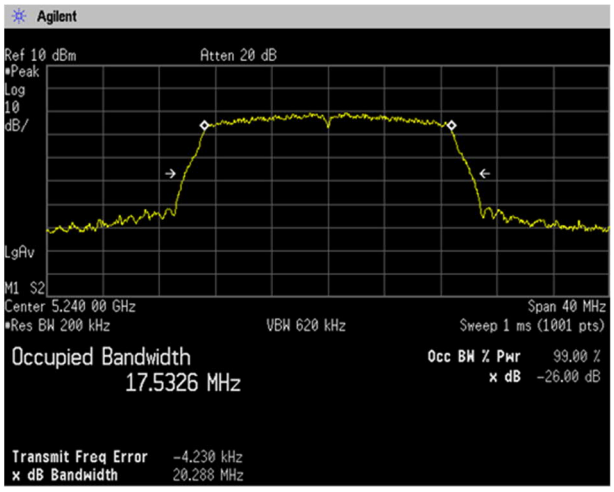
Channel: 36



Channel: 40



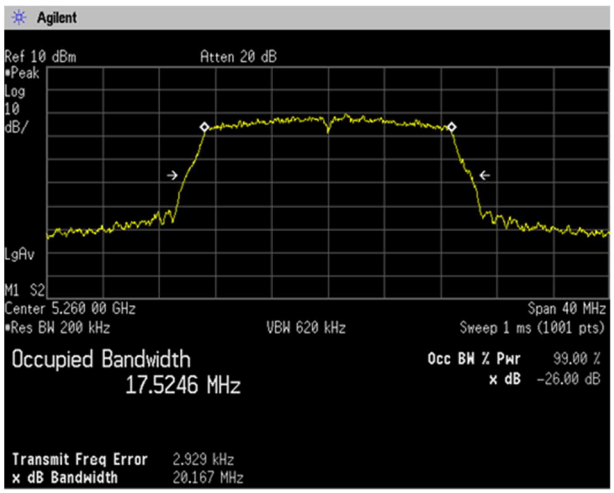
Channel: 48



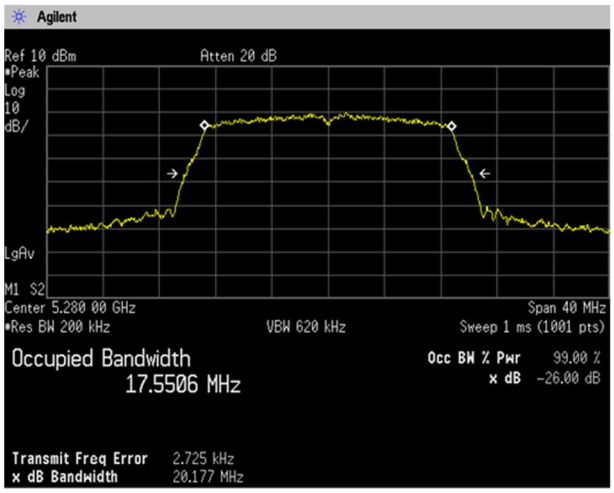
Japan

(5.3 GHz Band)

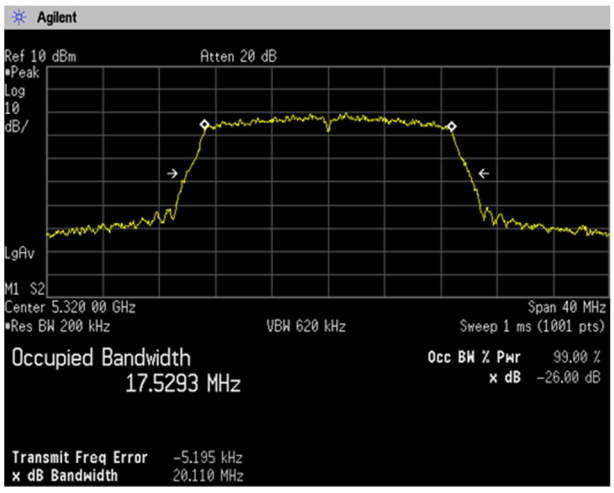
Channel: 52



Channel: 56



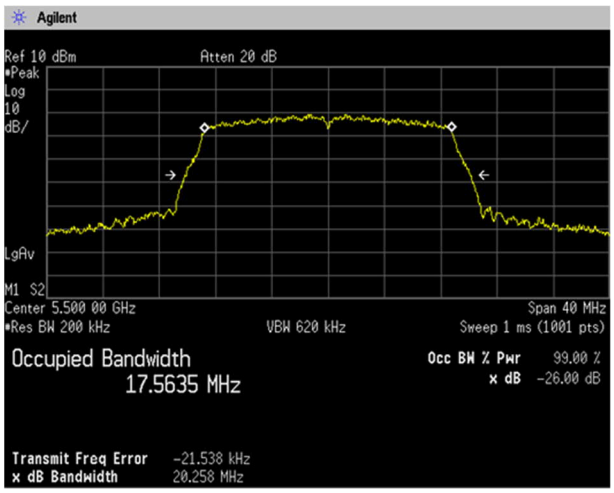
Channel: 64



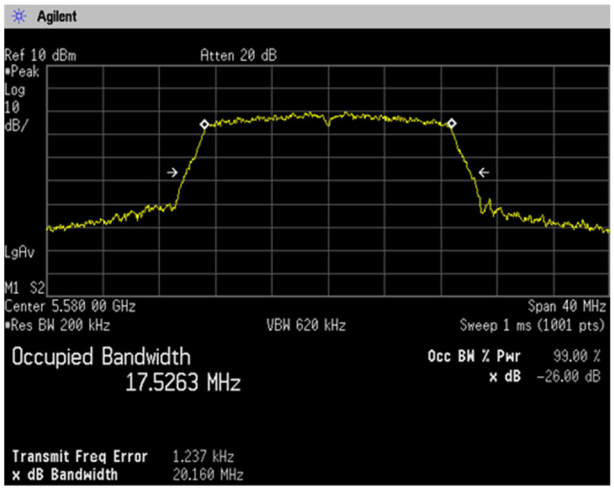
Japan

(5.6 GHz Band)

Channel: 100



Channel: 116



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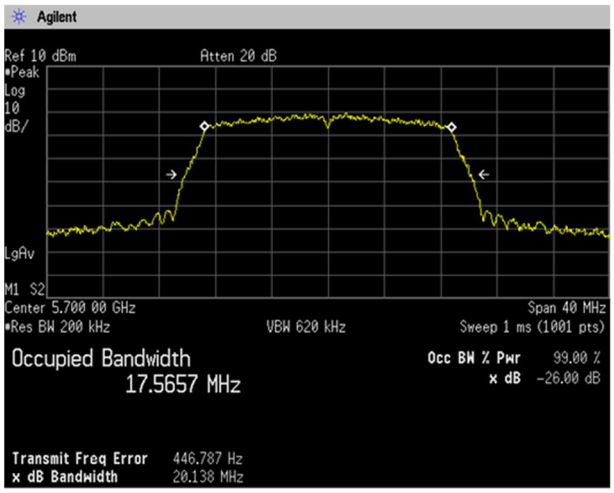
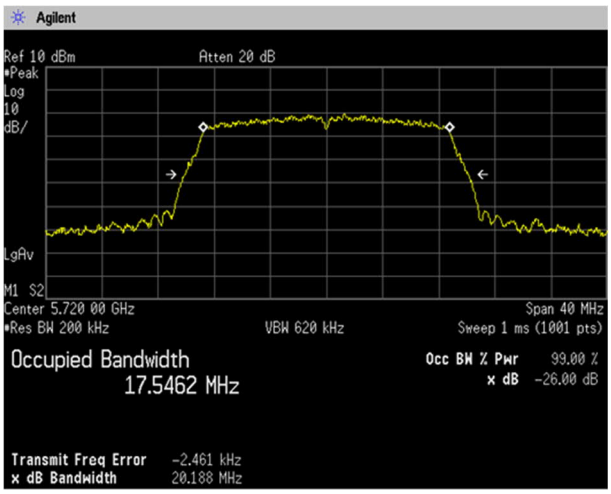


Japan

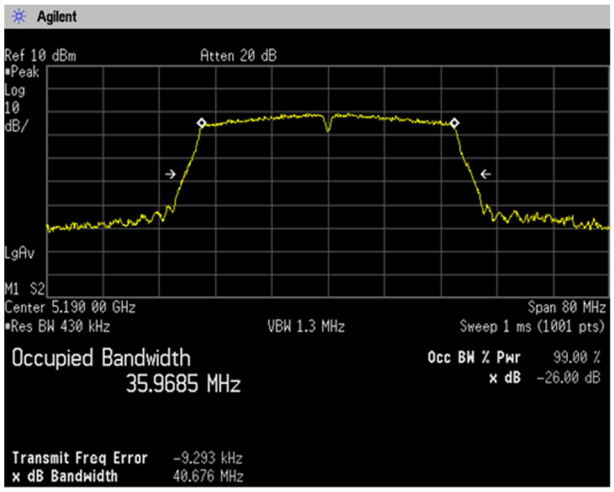
Channel: 144



Japan

[IEEE802.11n (HT40)]
(5.2 GHz Band)

Channel: 38



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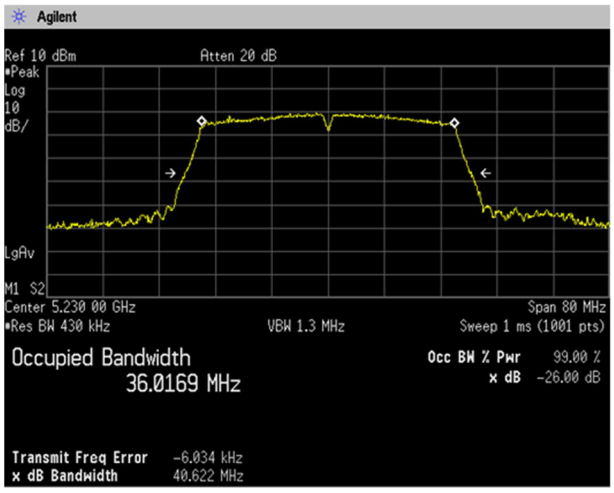
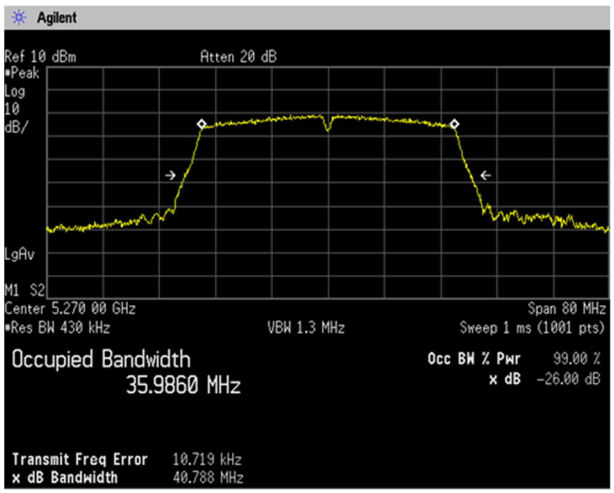


Japan

(5.3 GHz Band)

Channel: 54



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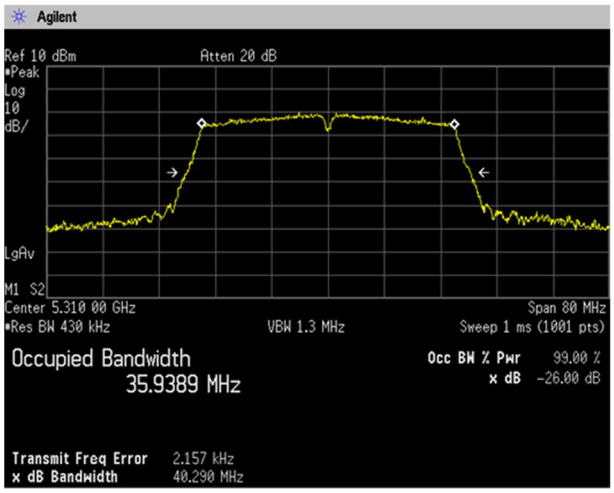
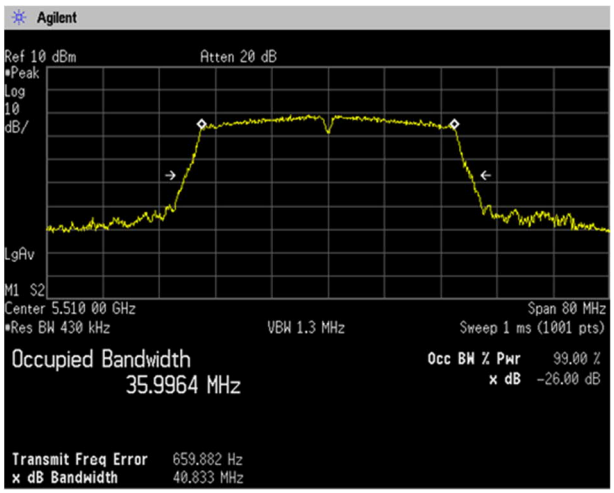


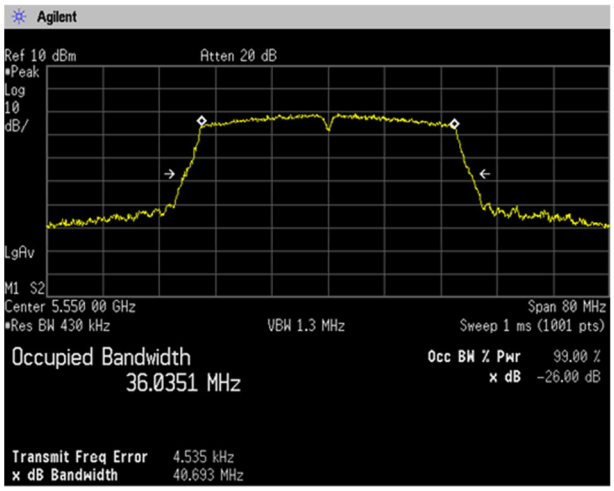
Japan

(5.6 GHz Band)

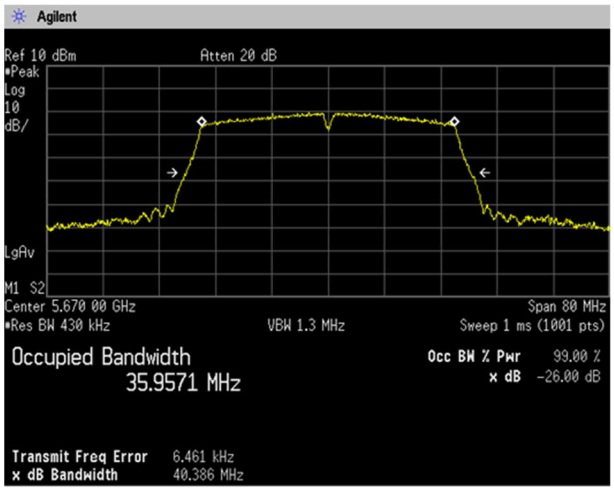
Channel: 102



Channel: 110

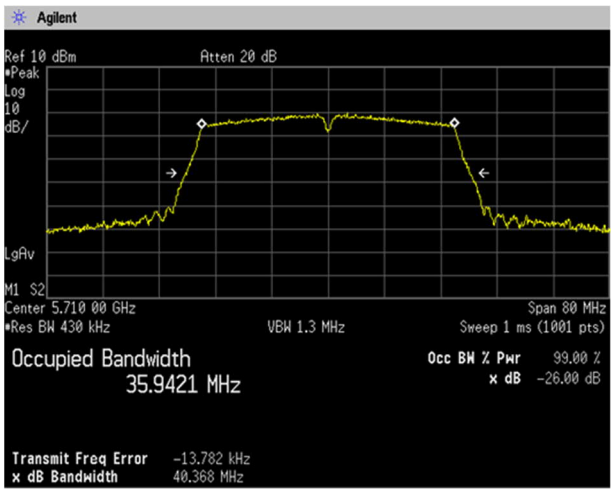


Channel: 134



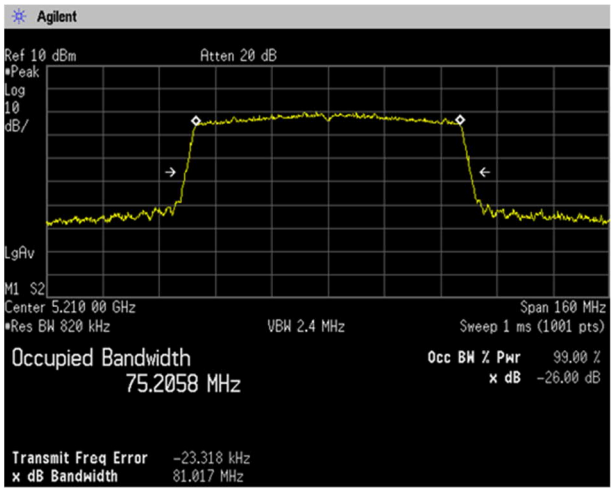
Japan

Channel: 142

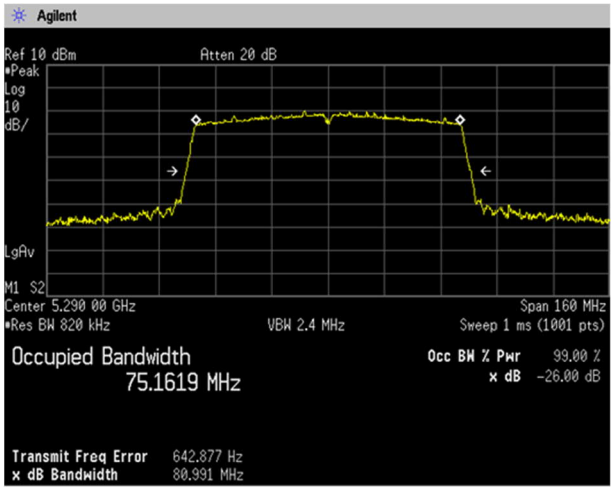


Japan

[IEEE802.11ac (HT80)]
(5.2 GHz Band)
Channel: 42



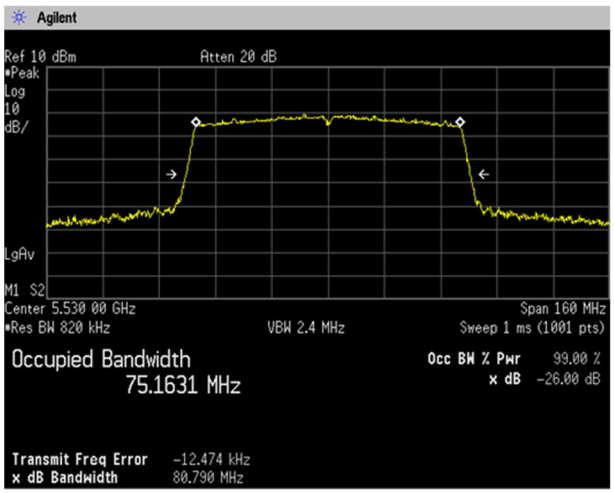
(5.3GHz Band)
Channel: 58



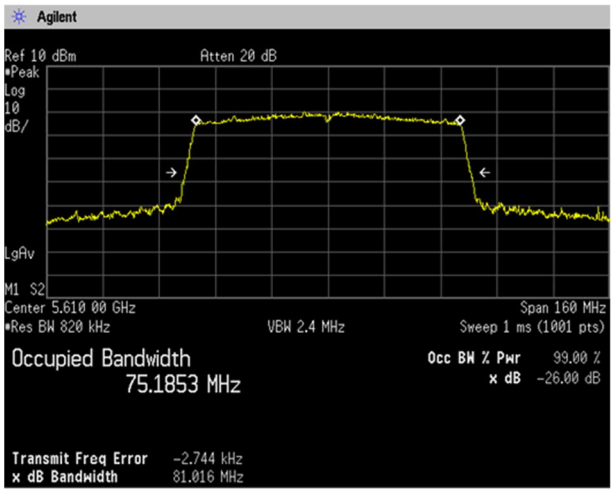
Japan

(5.6 GHz Band)

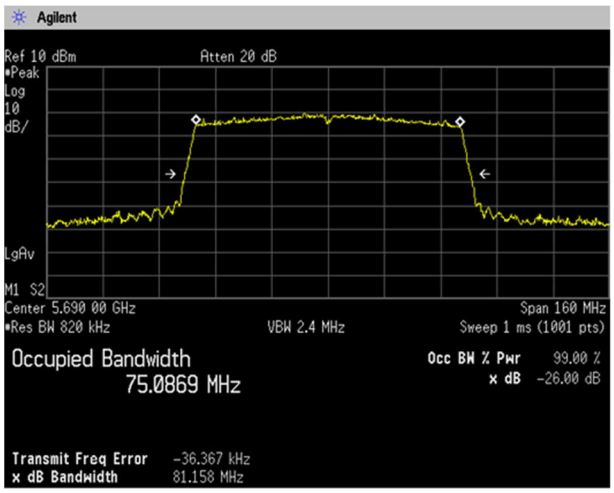
Channel: 106



Channel: 122



Channel: 138



Japan

4.2 Maximum Conducted Output Power

4.2.1 Measurement procedure

[FCC 15.407(a), KDB 789033 D02, Section E.2.b) Method SA-1, d)Method SA-2]

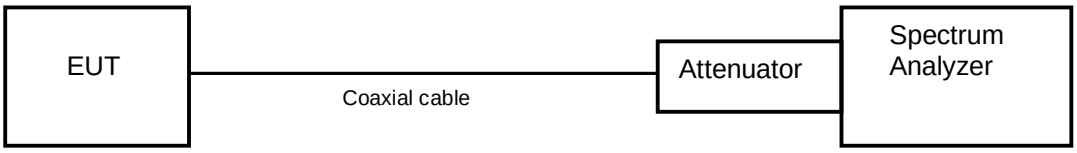
The peak power is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

The spectrum analyzer is set to;
- RBW=1MHz, VBW=3MHz, Span=35MHz/70MHz/140MHz, Sweep=auto, Detector=RMS, Trace mode=Averaging

The EUT was set to operate with following conditions.
- 5.2GHz Band, 5.3GHz Band, 5.6GHz Band

The test mode of EUT is as follows.
- Tx mode

- Test configuration



4.2.2 Limit

(1) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250mW provided the maximum antenna gain does not exceed 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250mW or 11dBm + 10logB, where B is the 2 6dB emission bandwidth in megahertz.

(3) For the 5.725-5.85 GHz bands, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

<Output Power Limit Calculation>

Band	Mode	Power Limit (mW)	Calculated Limit (dBm)	Antenna Gain (dBi)	Determined Limit (dBm)
5.2GHz Band	802.11a	250	23.97	1.4	23.97
	802.11n HT20				
	802.11n HT20				
	802.11ac HT80				

Band	Mode	Power Limit (mW) / Least 26dBc BW (MHz)	Calculated Limit (dBm)	Antenna Gain (dBi)	Determined Limit (dBm)
5.3GHz Band	802.11a	250	23.97	1.4	23.97
		19.806	23.97		
	802.11n HT20	250	23.97		23.97
		20.110	24.03		
	802.11n HT20	250	23.97		23.97
		40.290	27.05		
	802.11ac HT80	250	23.97		23.97
		80.991	30.08		

Band	Mode	Power Limit (mW) / Least 26dBc BW (MHz)	Calculated Limit (dBm)	Antenna Gain (dBi)	Determined Limit (dBm)
5.6GHz Band	802.11a	250	23.97	1.8	23.96
		19.779	23.96		
	802.11n HT20	250	23.97		23.97
		20.138	24.04		
	802.11n HT20	250	23.97		23.97
		40.386	27.06		
	802.11ac HT80	250	23.97		23.97
		80.790	30.07		

Japan

4.2.3 Measurement result

Date : 28-September-2020
Temperature : 20.8 [˚C]
Humidity : 55.4 [%] Test engineer :
Test place : Shielded room No.4 Kazunori Saito

Mode	Channel	Frequency (MHz)	Reading (dBm)	Duty Cycle			DCF (dB)	Test Result (dBm)	Test Result (mW)
				On Time(ms)	On+Off Time(ms)	X			
802.11a	36	5180	9.82	1.392	1.436	0.969	0.135	9.955	9.897
	40	5200	10.20					10.335	10.802
	58	5240	9.64					9.775	9.495
	52	5260	9.95	1.390	1.436	0.968	0.141	10.091	10.213
	56	5280	9.98					10.121	10.283
	64	5320	9.86					10.001	10.003
	100	5500	9.85	1.392	1.436	0.969	0.135	9.985	9.966
	116	5580	10.46					10.595	11.469
	140	5700	10.07					10.205	10.484
	144	5720	10.20					10.335	10.802

Note1: X = On time / (On + Off time), DCF=10log (1/x)
Note2: Test Result=Reading + DCF

Mode	Channel	Frequency (MHz)	Reading (dBm)	Duty Cycle			DCF (dB)	Test Result (dBm)	Test Result (mW)
				On Time(ms)	On+Off Time(ms)	X			
802.11n (20MHz)	36	5180	9.73	1.286	1.332	0.965	0.153	9.883	9.733
	40	5200	9.68					9.833	9.622
	58	5240	9.70					9.853	9.666
	52	5260	9.88	1.288	1.332	0.967	0.146	10.026	10.060
	56	5280	9.61					9.756	9.453
	64	5320	9.93					10.076	10.176
	100	5500	9.53	1.288	1.334	0.966	0.152	9.682	9.295
	116	5580	9.70					9.852	9.666
	140	5700	9.94					10.092	10.215
	144	5720	9.70					9.852	9.666

Note: X = On time / (On + Off time), DCF=10log (1/x)
Note2: Test Result=Reading + DCF

Japan

Mode	Channel	Frequency (MHz)	Reading (dBm)	Duty Cycle			DCF (dB)	Test Result (dBm)	Test Result (mW)
				On Time(ms)	On+Off Time(ms)	X			
802.11n (40MHz)	38	5190	10.11	0.636	0.680	0.935	0.291	10.401	10.966
	46	5230	9.71					10.001	10.001
	54	5270	9.40	0.636	0.680	0.935	0.291	9.691	9.312
	62	5310	9.44					9.731	9.398
	102	5510	9.40	0.635	0.681	0.932	0.304	9.704	9.341
	110	5550	9.67					9.974	9.940
	134	5670	9.62					9.924	9.826
	142	5710	9.27					9.574	9.065

Note: X = On time / (On + Off time), DCF=10log (1/x)
Note2: Test Result=Reading + DCF

Mode	Channel	Frequency (MHz)	Reading (dBm)	Duty Cycle			DCF (dB)	Test Result (dBm)	Test Result (mW)
				On Time(ms)	On+Off Time(ms)	X			
802.11ac (80MHz)	42	5210	9.57	0.323	0.368	0.878	0.567	10.137	10.320
	58	5290	9.25	0.324	0.368	0.879	0.558	9.808	9.567
	106	5530	9.51	0.323	0.367	0.879	0.558	10.068	10.158
	122	5610	9.54	0.324	0.369	0.880	0.556	10.096	10.224
	138	5690	9.50	0.323	0.368	0.878	0.564	10.064	10.148

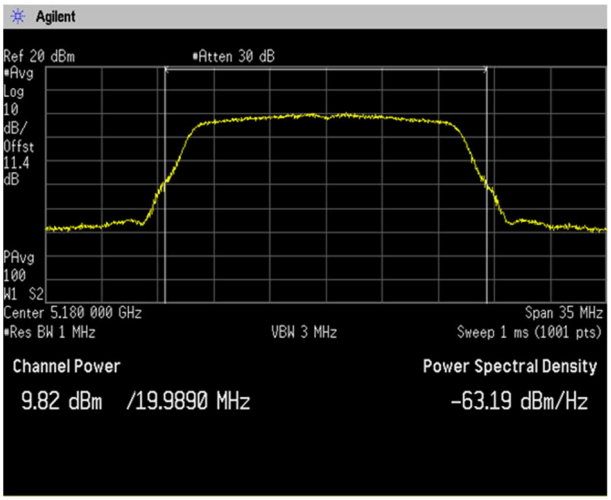
Note: X = On time / (On + Off time), DCF=10log (1/x)
Note2: Test Result=Reading + DCF

Japan

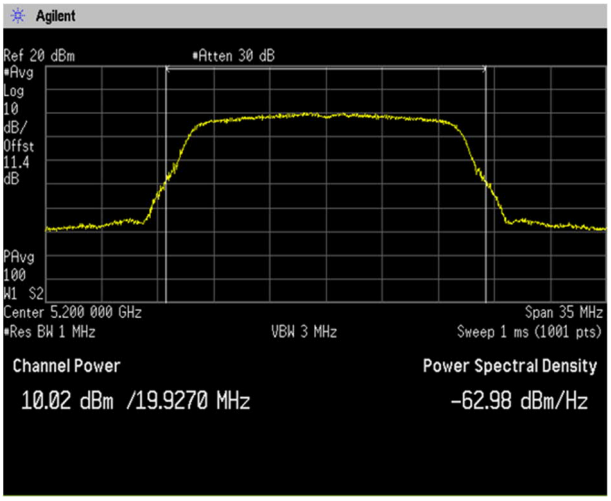
4.2.4 Trace data

[IEEE802.11a]
(5.2GHz Band)

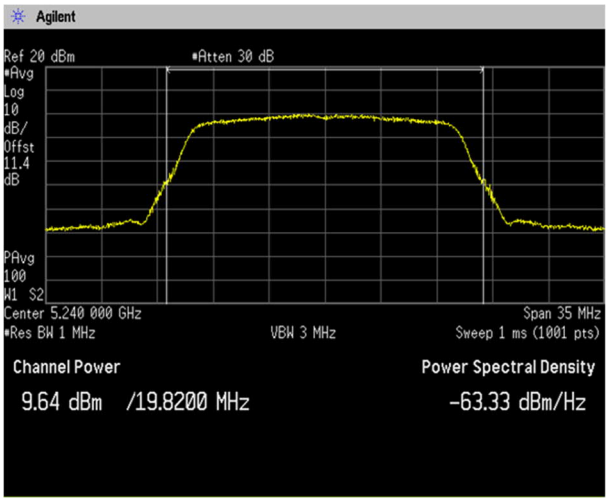
Channel: 36



Channel: 40



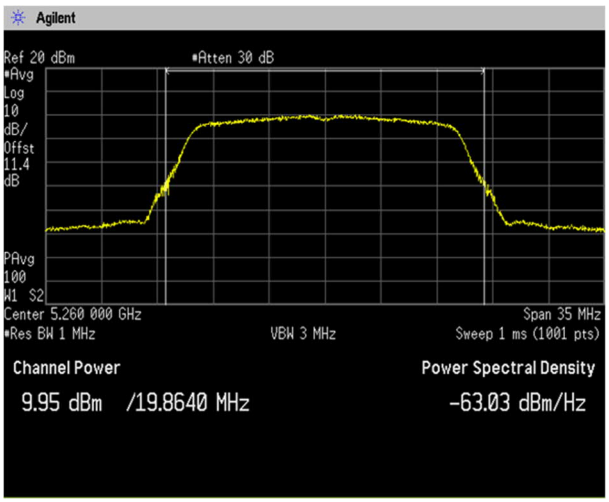
Channel: 48



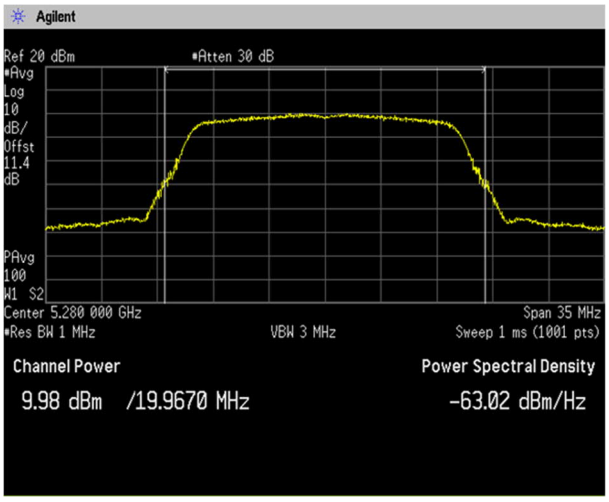
Japan

(5.3GHz Band)

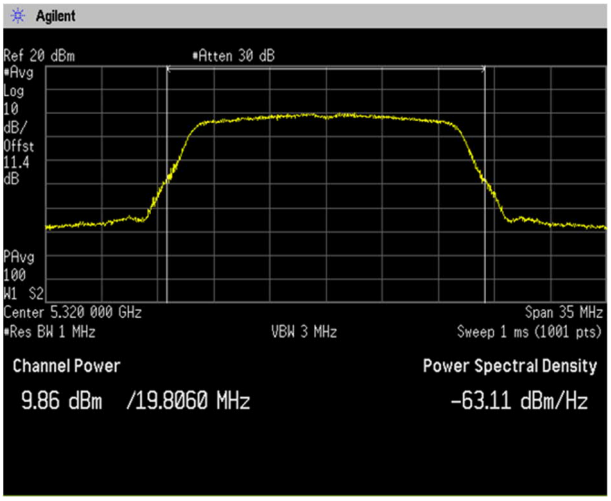
Channel: 52



Channel: 56



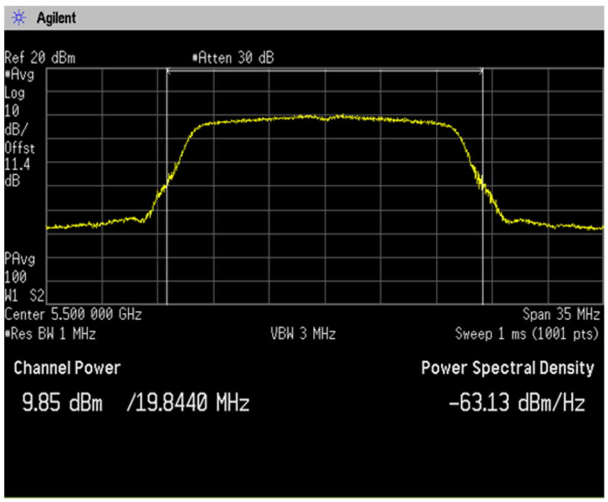
Channel: 64



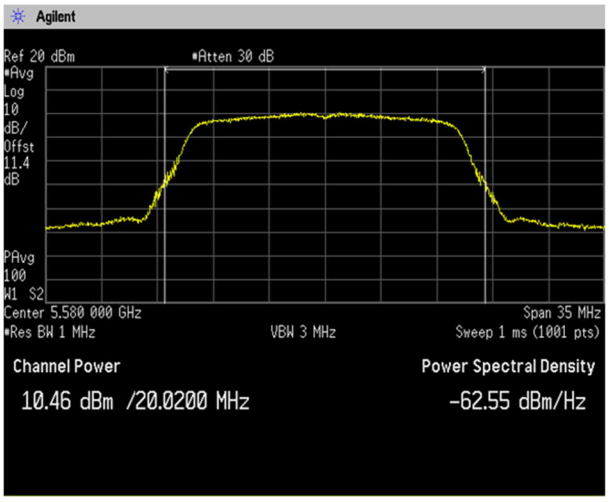
Japan

(5.6GHz Band)

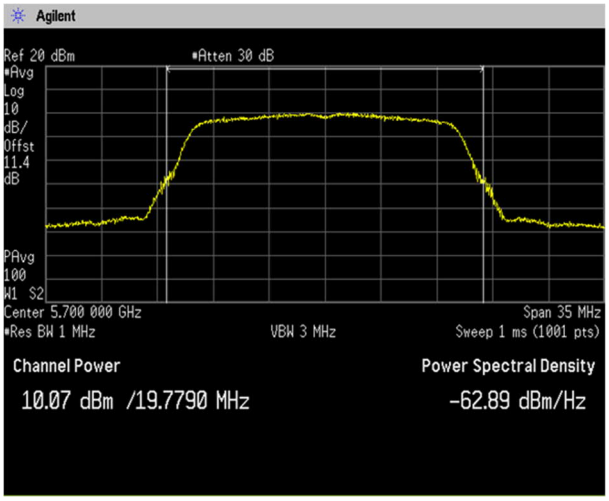
Channel: 100



Channel: 116

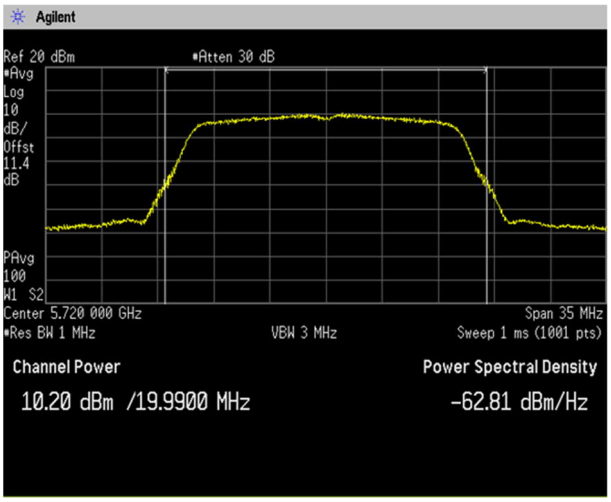


Channel: 140



Japan

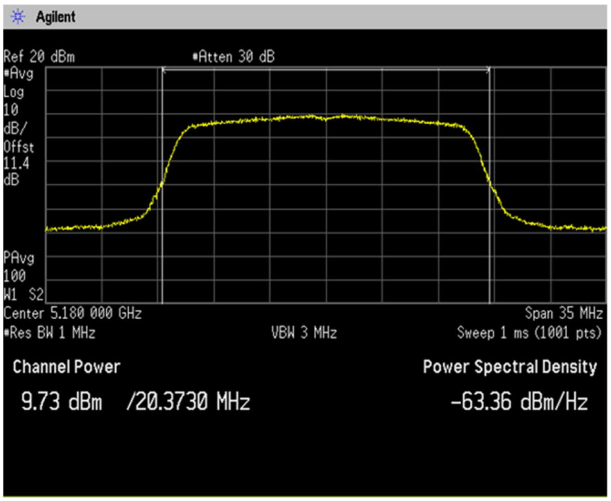
Channel: 144



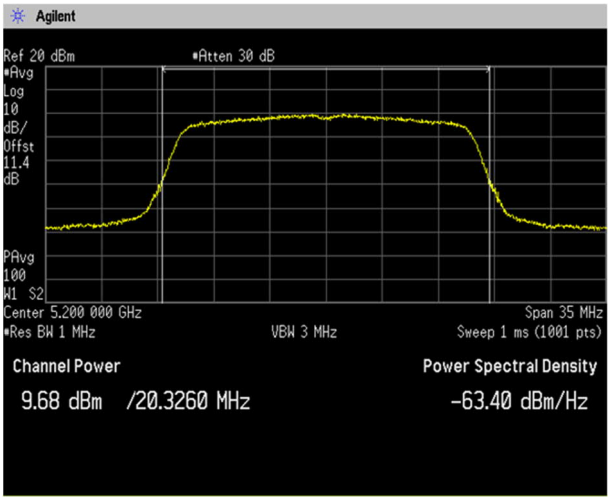
Japan

[IEEE802.11n (HT20)]
(5.2GHz Band)

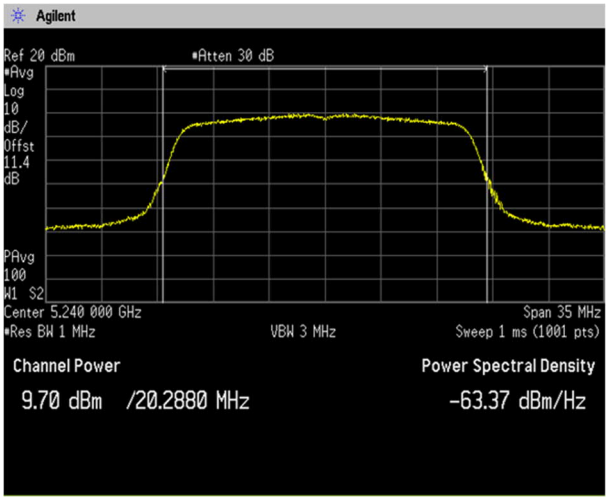
Channel: 36



Channel: 40



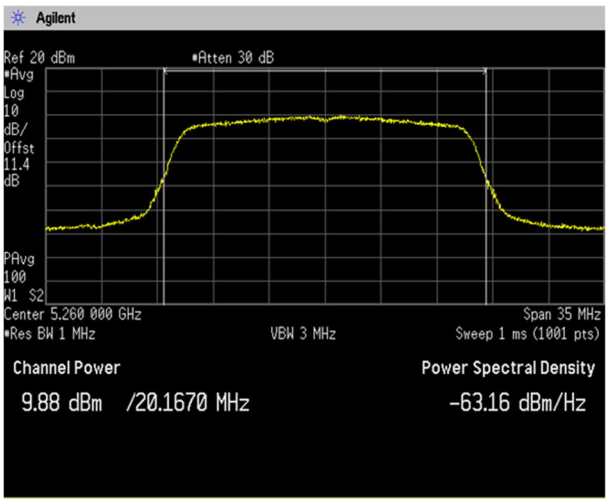
Channel: 48



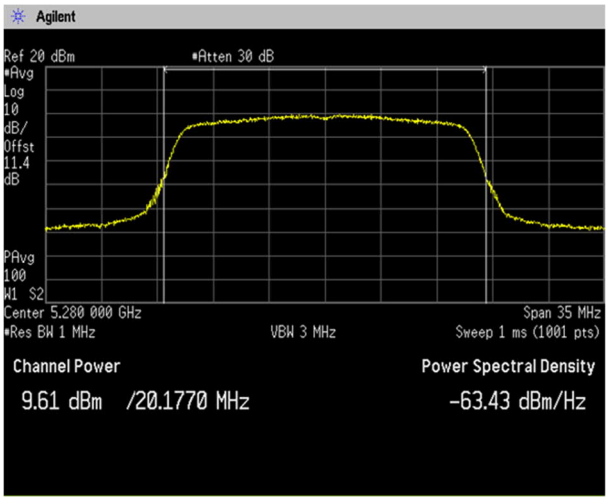
Japan

(5.3GHz Band)

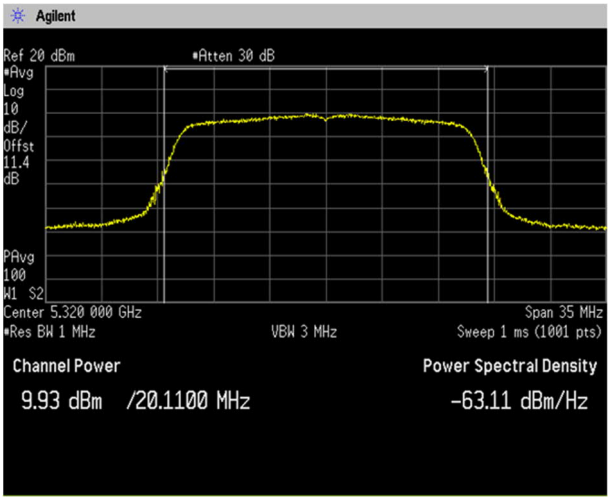
Channel: 52



Channel: 56

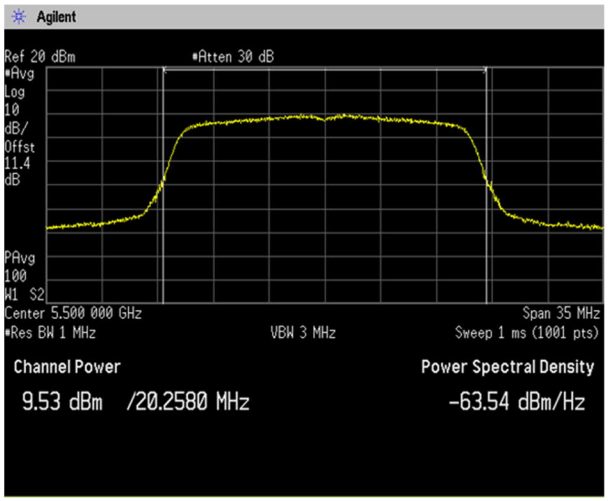


Channel: 64

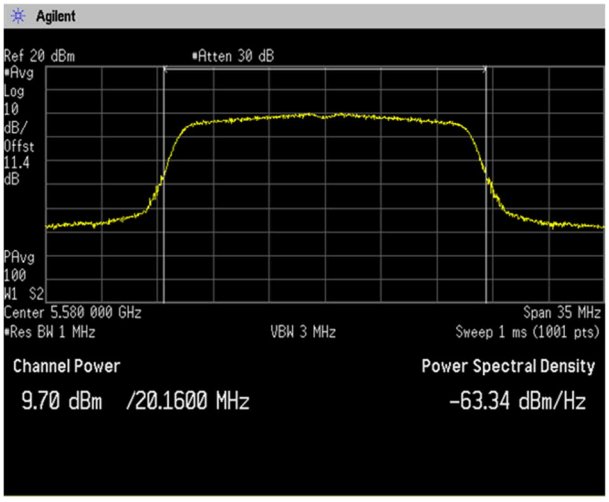


(5.6GHz Band)

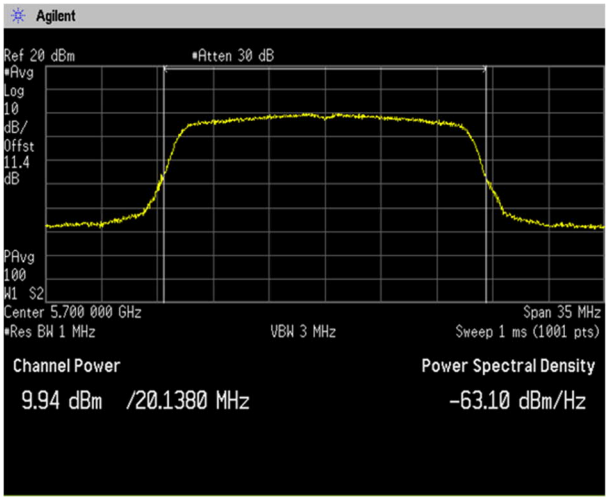
Channel: 100



Channel: 116

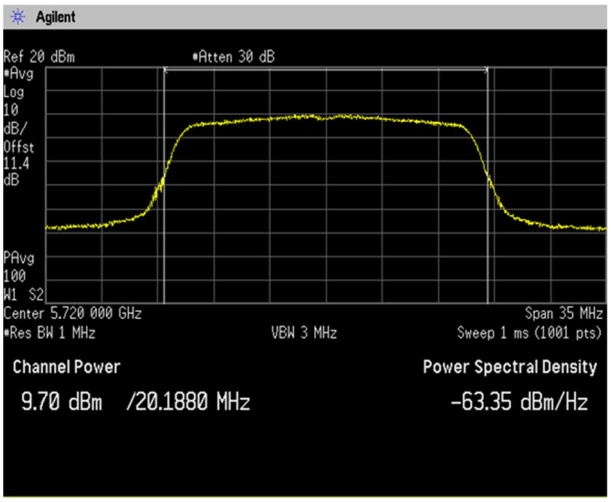


Channel: 140



Japan

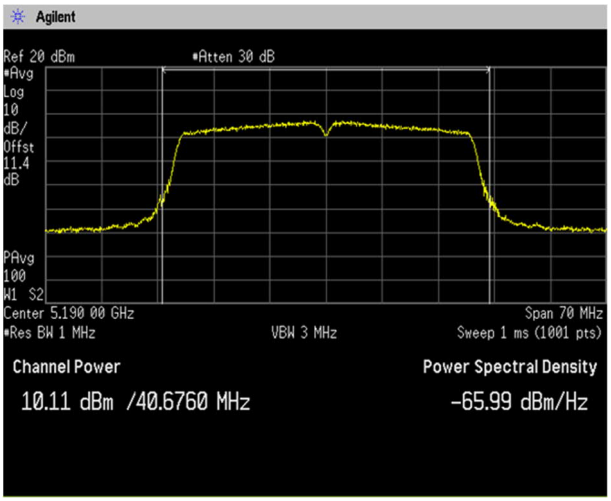
Channel: 144



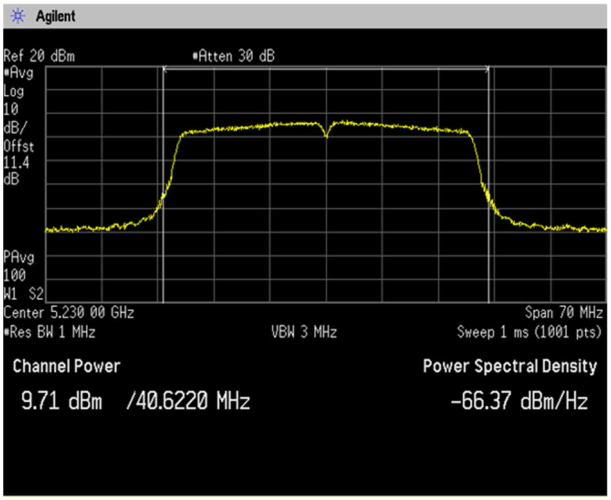
Japan

[IEEE802.11n (HT40)]
(5.2GHz Band)

Channel: 38



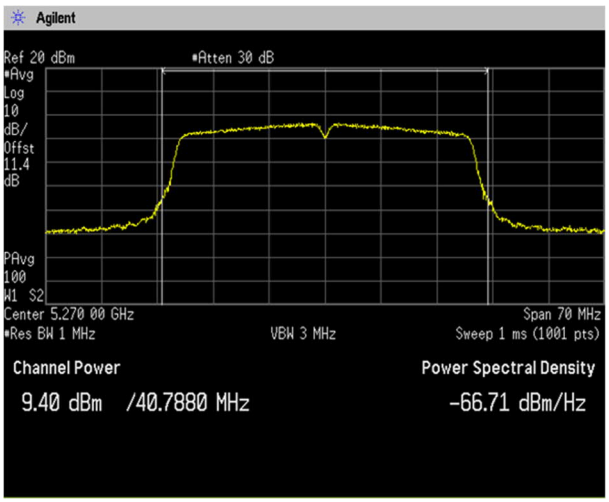
Channel: 46



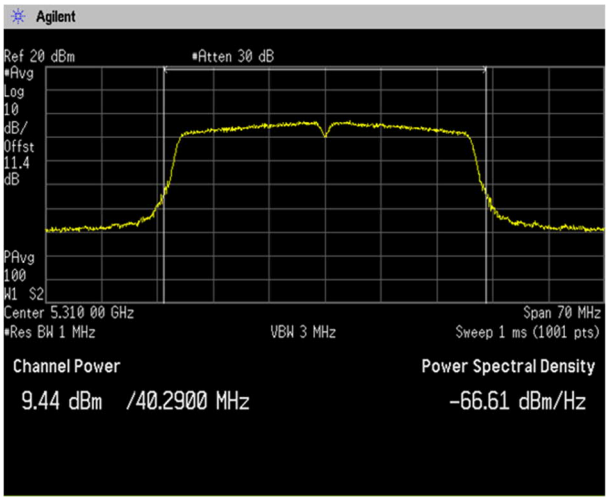
Japan

(5.3GHz Band)

Channel: 54



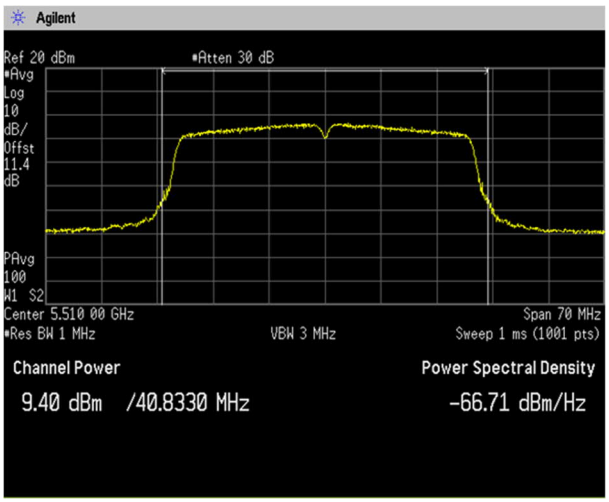
Channel: 62



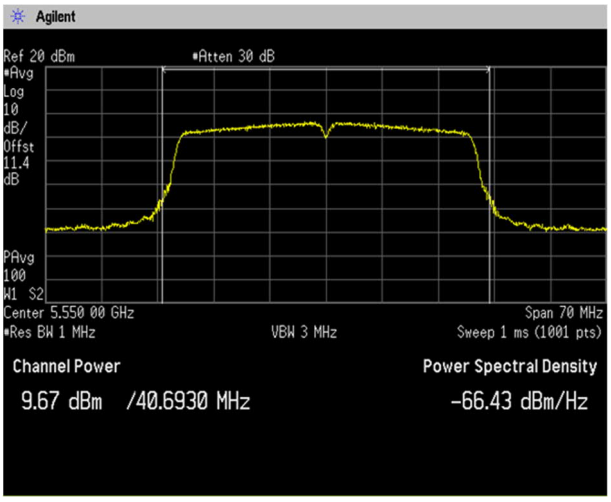
Japan

(5.6GHz Band)

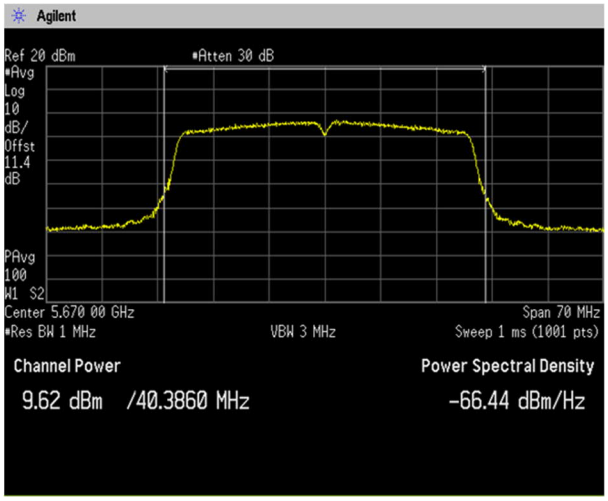
Channel: 102



Channel: 110

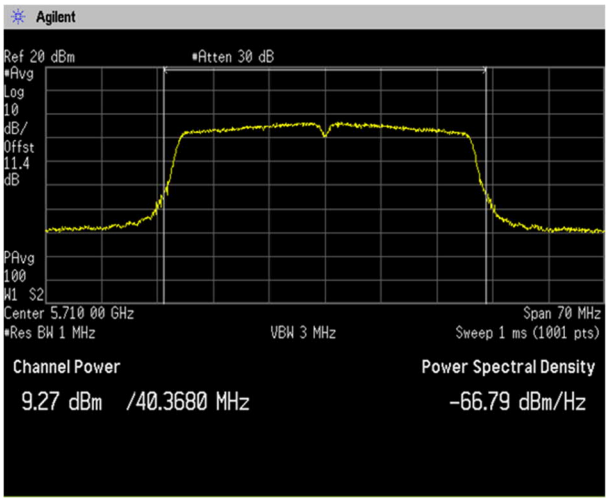


Channel: 134



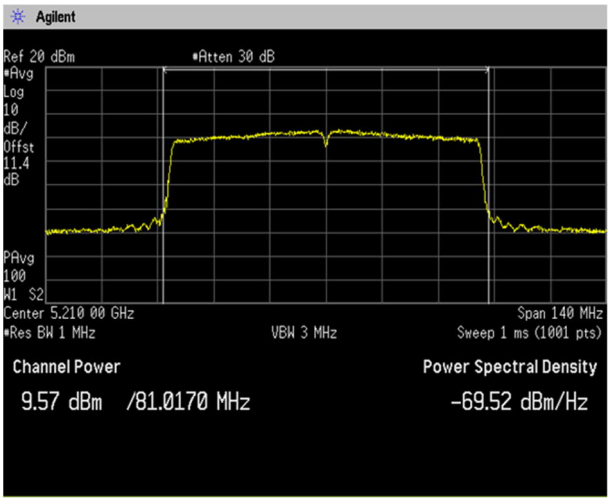
Japan

Channel: 142

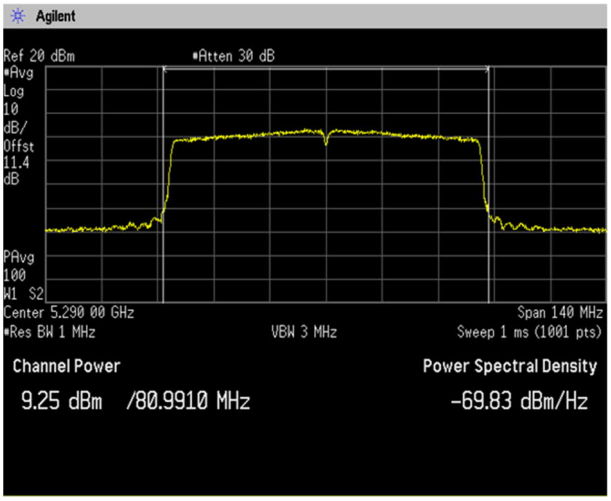


Japan

[IEEE802.11ac (HT80)]
(5.2 GHz Band)
Channel: 42



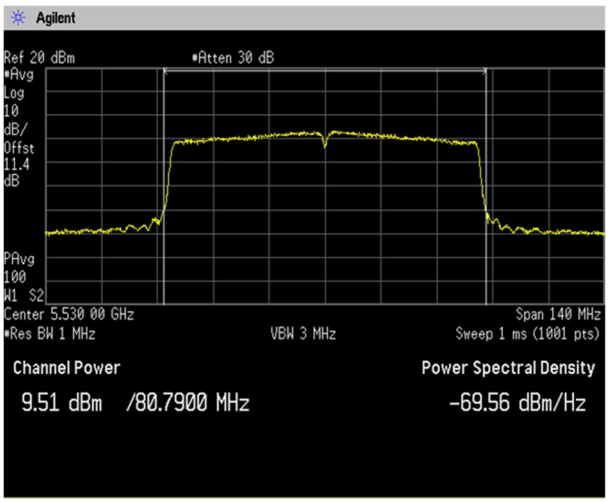
(5.3GHz Band)
Channel: 58



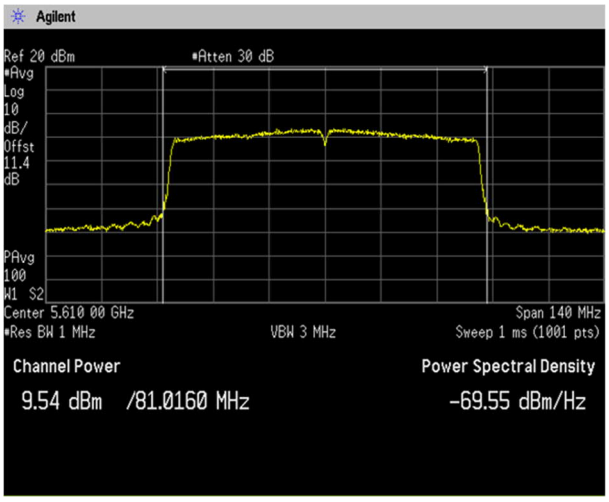
Japan

(5.6 GHz Band)

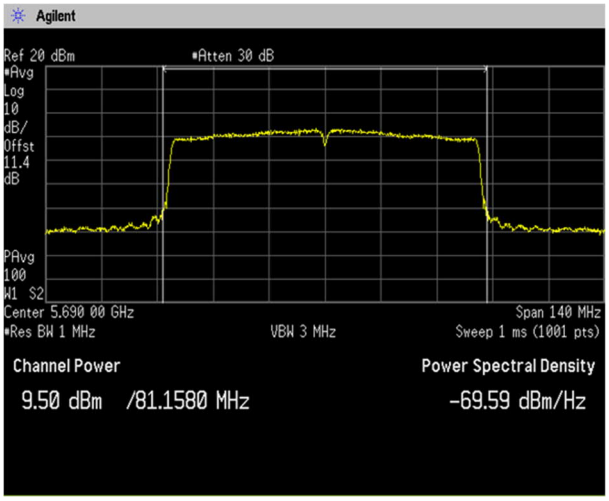
Channel: 106



Channel: 122



Channel: 138



4.3 Peak Power Spectral Density

4.3.1 Measurement procedure

[FCC 15.407(a), KDB 789033 D02, Section F]

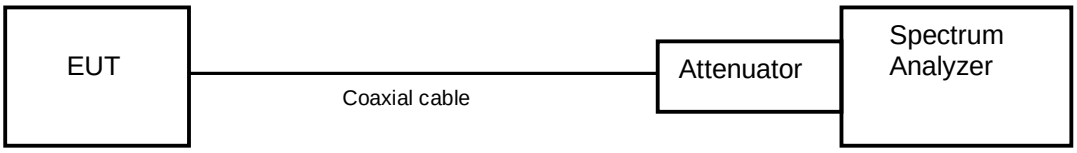
The peak power spectral density is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

The spectrum analyzer is set to;
- RBW=1 MHz, VBW=3 MHz, Span=25 MHz/50 MHz/100 MHz, Sweep=Auto, Detector=RMS, Trace mode=Averaging

The EUT was set to operate with following conditions.
- 5.2 GHz Band, 5.3 GHz Band, 5.6 GHz Band

The test mode of EUT is as follows.
- Tx mode

- Test configuration



4.3.2 Limit

(1) For mobile and portable client devices in the 5.15-5.25 GHz band, 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, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, 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, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.

(3) For the 5.725-5.85 GHz bands, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz 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 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 6dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirection applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

<Peak Power Spectral Density Limit Calculation>

Band	Antenna Gain (dBi)	Limit
5.2 GHz Band	1.4	12.4 dBm/MHz
5.3 GHz Band	1.4	12.4 dBm/MHz
5.6 GHz Band	1.8	12.8 dBm/MHz

Japan

4.3.3 Measurement result

Date : 29-September-2021
Temperature : 20.0 [˚C]
Humidity : 62.3 [%]
Test place : Shielded room No.4

Test engineer : Kazunori Saito

Mode	Channel	Frequency (MHz)	Reading (dBm)	Duty Cycle			DCF (dB)	Test Result (dBm)
				On Time(ms)	On+Off Time(ms)	X		
802.11a	36	5180	-0.210	1.392	1.436	0.969	0.135	-0.075
	40	5200	-0.315					-0.180
	48	5240	-0.332					-0.197
	52	5260	-0.348	1.390	1.436	0.968	0.141	-0.207
	56	5280	-0.306					-0.165
	64	5320	-0.159					-0.018
	100	5500	-0.158	1.392	1.436	0.969	0.135	-0.023
	116	5580	0.073					0.208
	140	5700	-0.156					-0.021
	144	5720	0.100					0.235

Note: X = On time / (On + Off time), DCF=10log (1/x)
Note 2: Test Result = Reading + DCF

Mode	Channel	Frequency (MHz)	Reading (dBm)	Duty Cycle			DCF (dB)	Test Result (dBm)
				On Time(ms)	On+Off Time(ms)	X		
802.11n (20MHz)	36	5180	-0.375	1.286	1.332	0.965	0.153	-0.222
	40	5200	-0.485					-0.332
	48	5240	-0.520					-0.367
	52	5260	-0.451	1.288	1.332	0.967	0.146	-0.305
	56	5280	-0.248					-0.102
	64	5320	-0.206					-0.060
	100	5500	-0.548	1.288	1.334	0.966	0.152	-0.396
	116	5580	0.214					0.366
	140	5700	-0.684					-0.532
	144	5720	-0.262					-0.110

Note: X = On time / (On + Off time), DCF=10log (1/x)
Note 2: Test Result = Reading + DCF

Mode	Channel	Frequency (MHz)	Reading (dBm)	Duty Cycle			DCF (dB)	Test Result (dBm)
				On Time(ms)	On+Off Time(ms)	X		
802.11n (40MHz)	38	5190	-3.485	0.636	0.680	0.935	0.291	-3.194
	46	5230	-3.367					-3.076
	54	5270	-3.126	0.636	0.680	0.935	0.291	-2.835
	62	5310	-3.152					-2.861
	102	5510	-3.402	0.635	0.681	0.932	0.304	-3.098
	110	5550	-3.358					-3.054
	134	5670	-3.197					-2.893
	142	5710	-3.372					-3.068

Note: X = On time / (On + Off time), DCF=10log (1/x)
Note 2: Test Result = Reading + DCF

Mode	Channel	Frequency (MHz)	Reading (dBm)	Duty Cycle			DCF (dB)	Test Result (dBm)
				On Time(ms)	On+Off Time(ms)	X		
802.11ac (80MHz)	42	5210	-6.940	0.323	0.368	0.878	0.567	-6.373
	58	5290	-6.777	0.324	0.368	0.879	0.558	-6.219
	106	5530	-6.919	0.323	0.367	0.879	0.558	-6.361
	122	5610	-6.608	0.323	0.367	0.879	0.558	-6.050
	138	5690	-6.291	0.324	0.369	0.880	0.556	-5.735

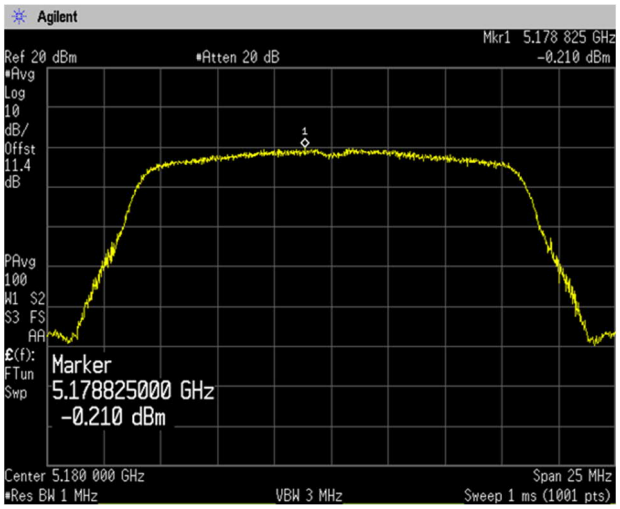
Note: X = On time / (On + Off time), DCF=10log (1/x)
Note 2: Test Result = Reading + DCF

Japan

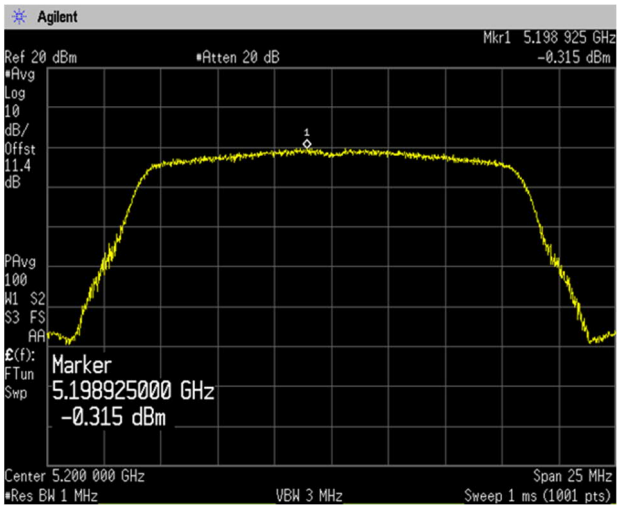
4.3.4 Trace data

[IEEE802.11a]
(5.2 GHz Band)

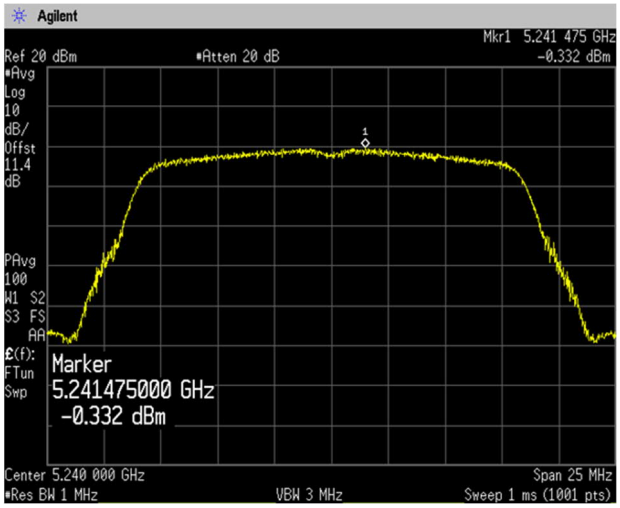
Channel: 36



Channel: 40



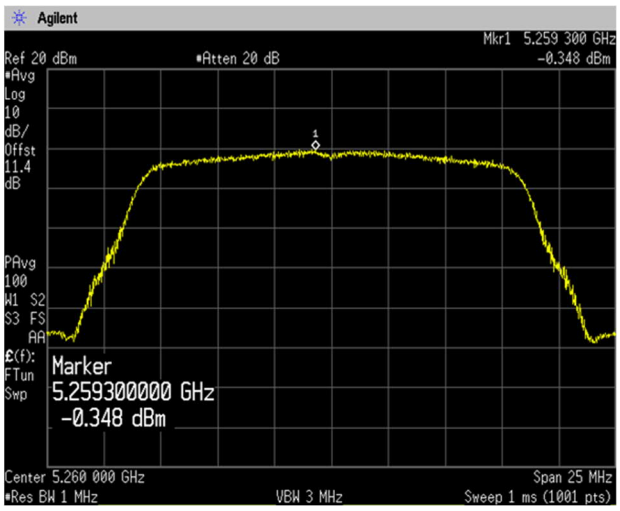
Channel: 48



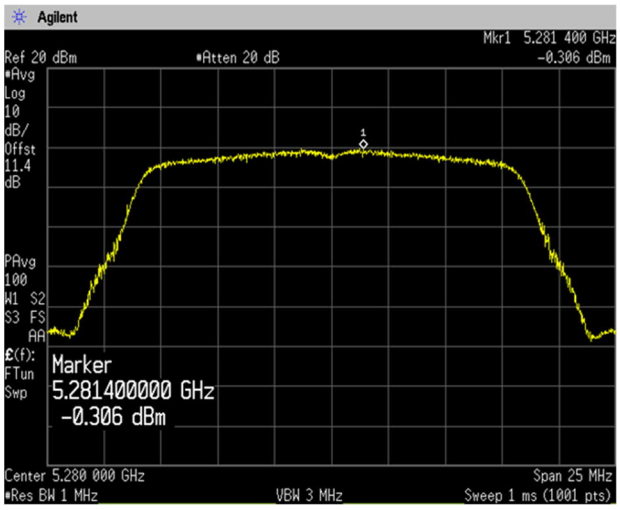
Japan

(5.3 GHz Band)

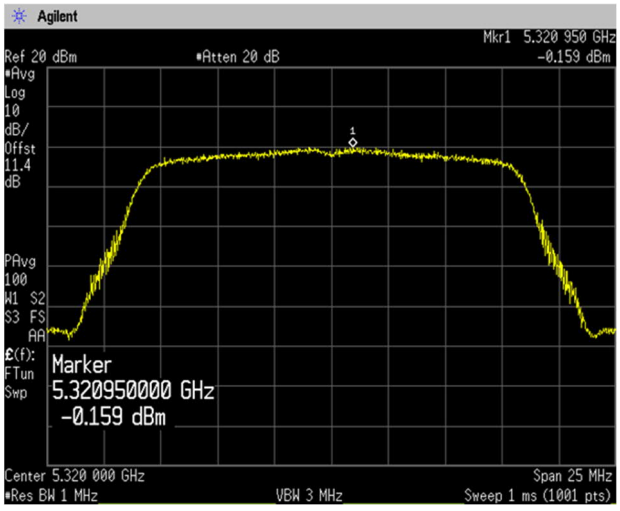
Channel: 52



Channel: 56



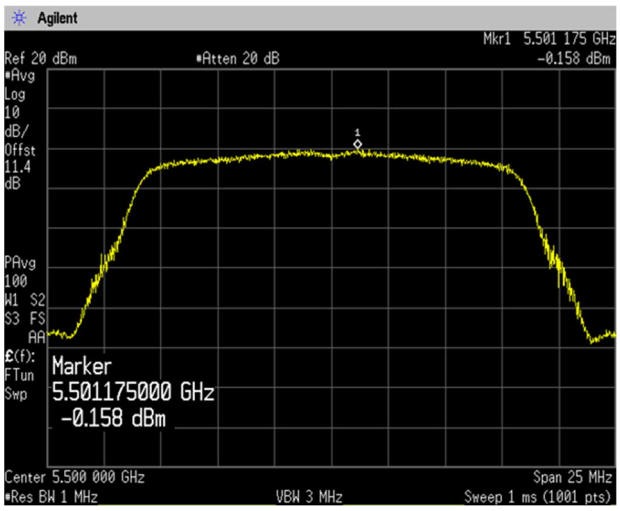
Channel: 64



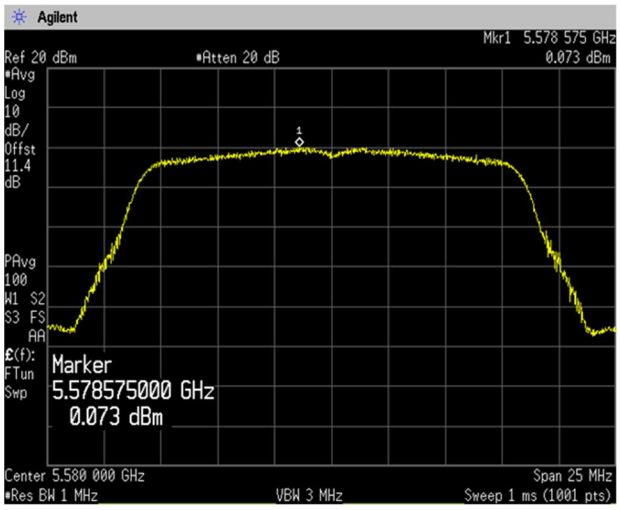
Japan

(5.6 GHz Band)

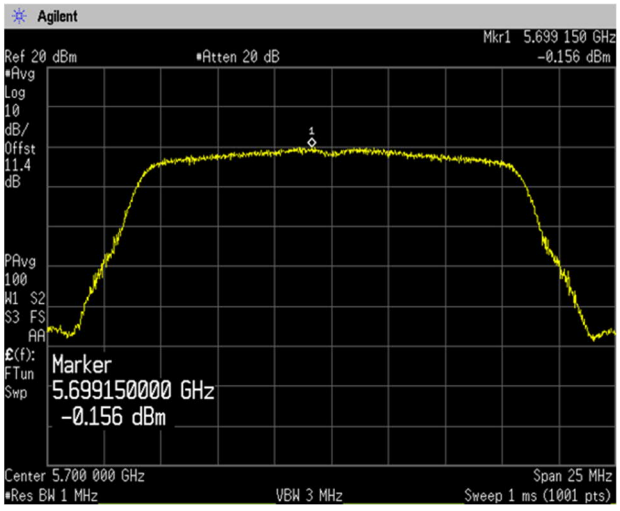
Channel: 100



Channel: 116

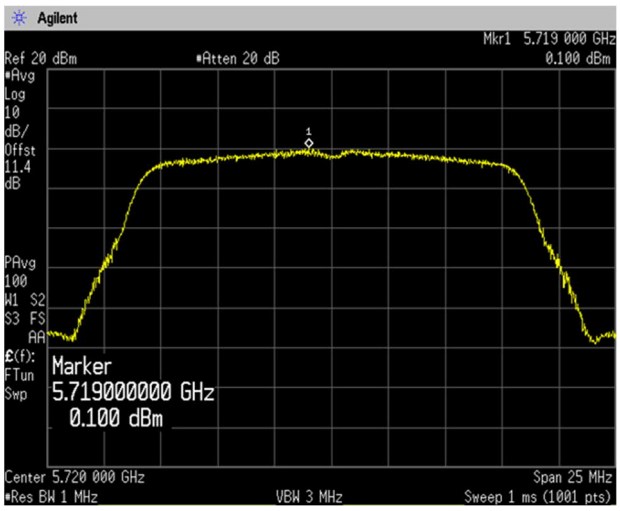


Channel: 140



Japan

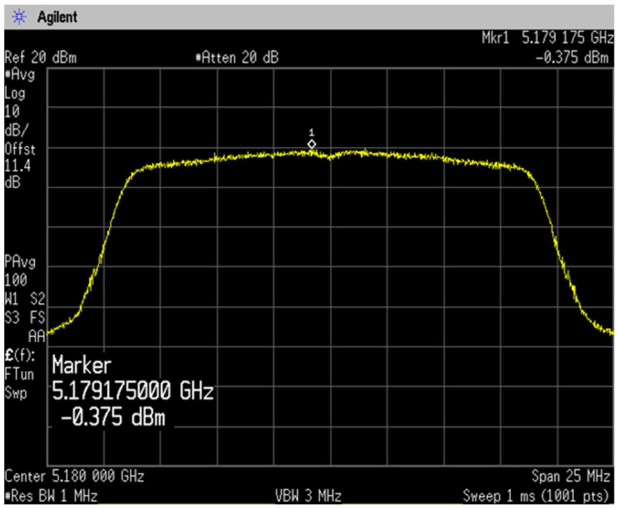
Channel: 144



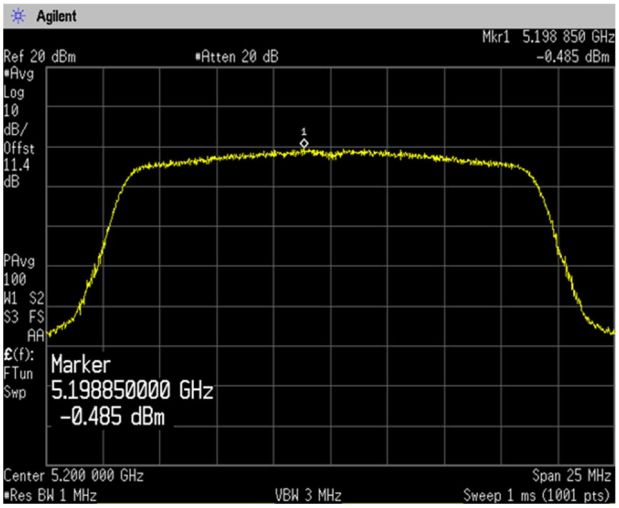
Japan

[IEEE802.11n (HT20)]
(5.2 GHz Band)

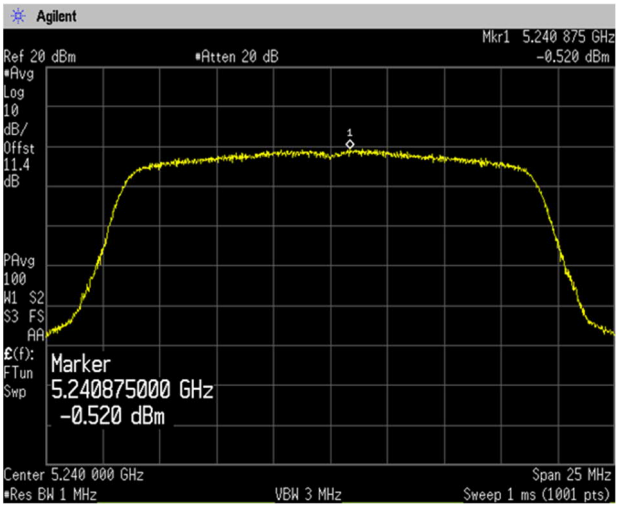
Channel: 36



Channel: 40

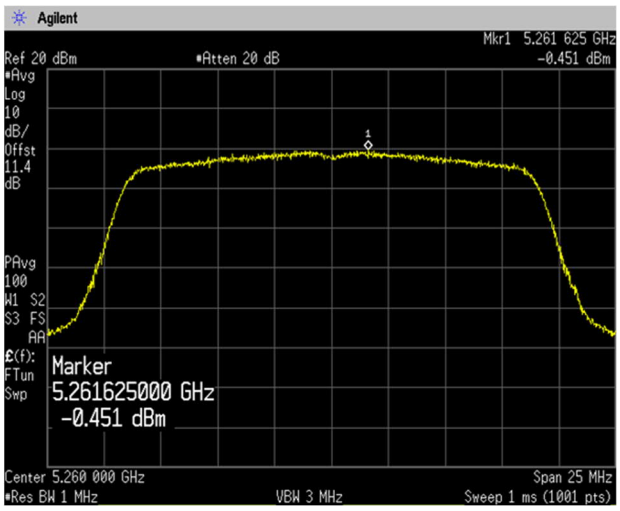


Channel: 48

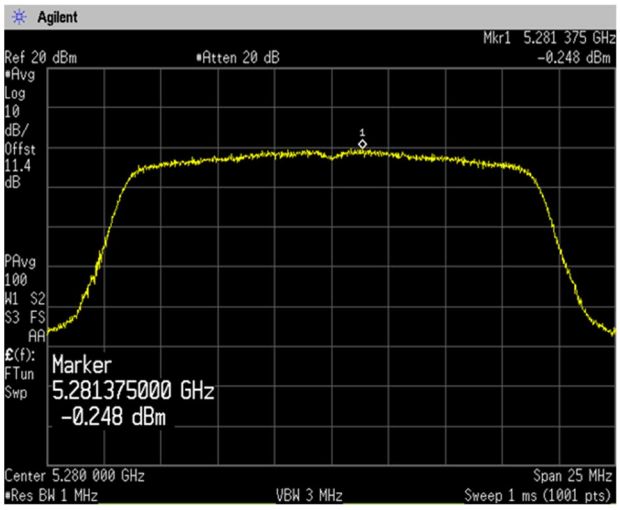


(5.3 GHz Band)

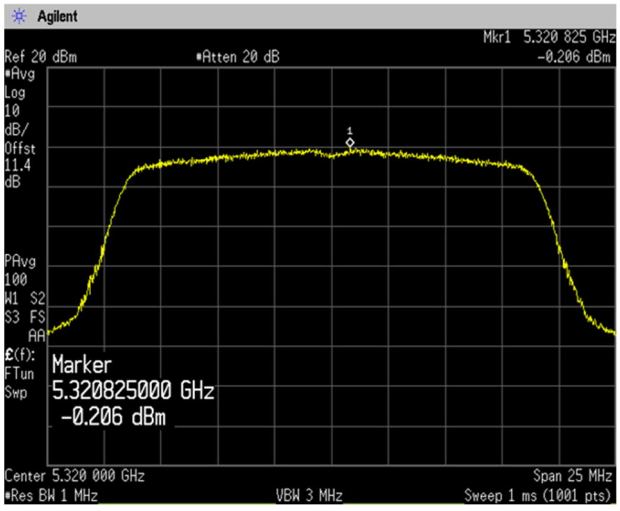
Channel: 52



Channel: 56



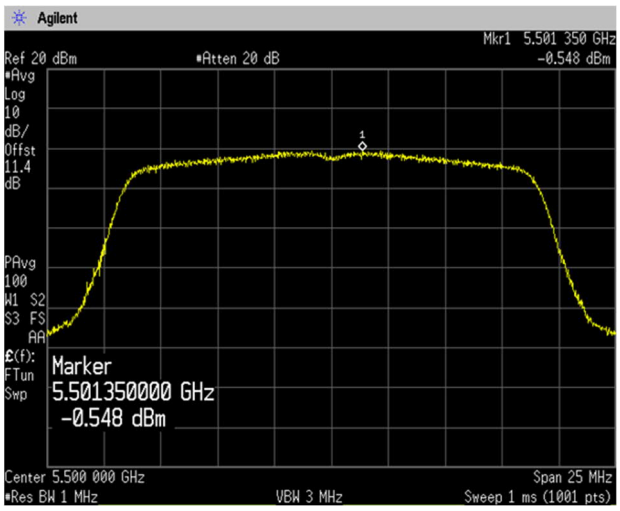
Channel: 64



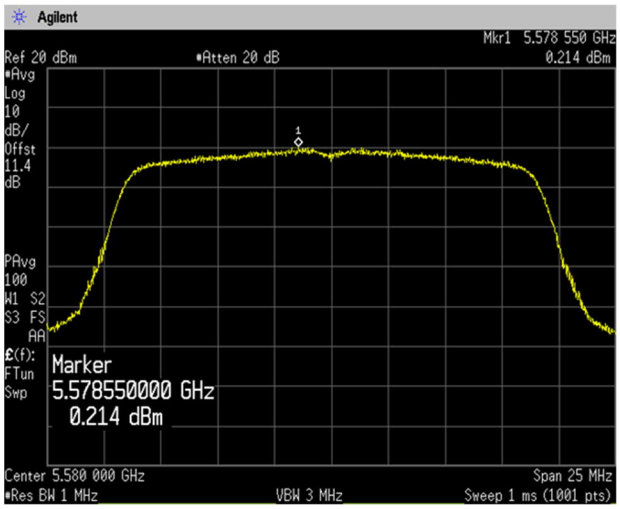
Japan

(5.6 GHz Band)

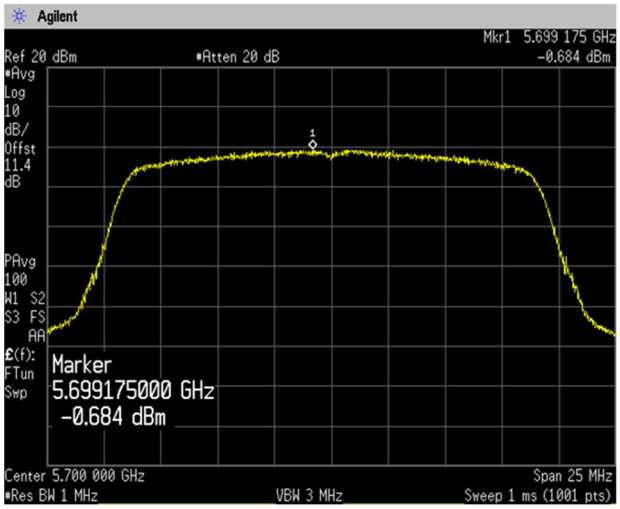
Channel: 100



Channel: 116

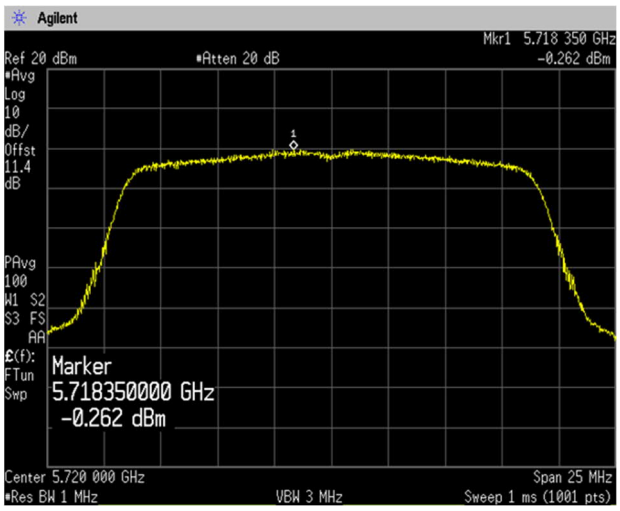


Channel: 140



Japan

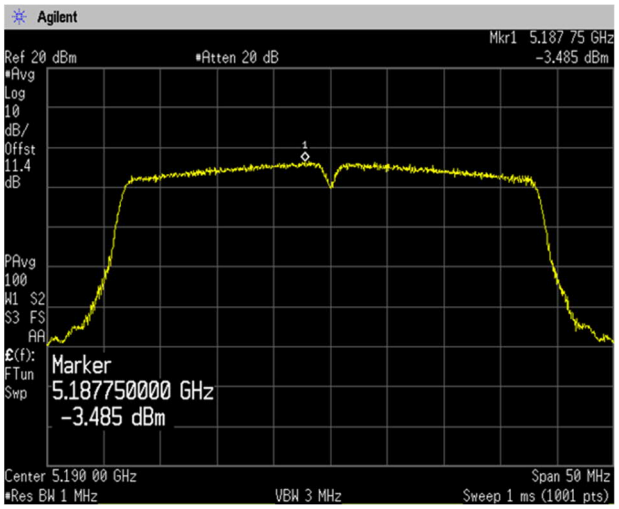
Channel: 144



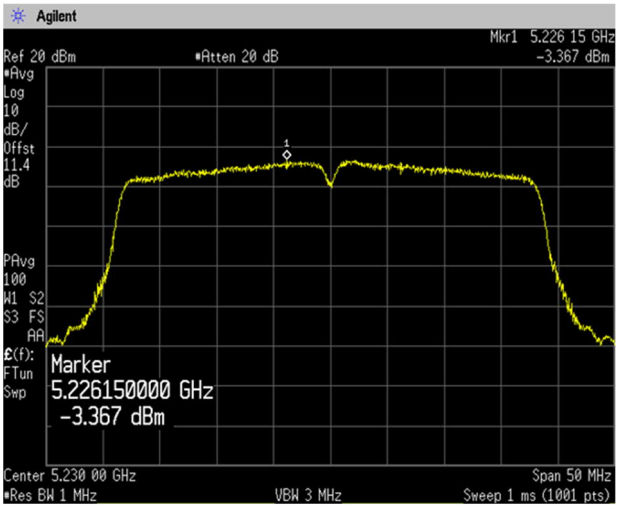
Japan

[IEEE802.11n (HT40)]
(5.2 GHz Band)

Channel: 38



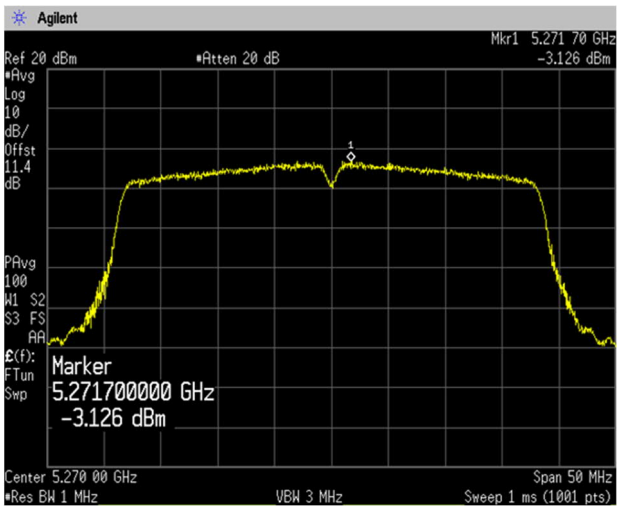
Channel: 46



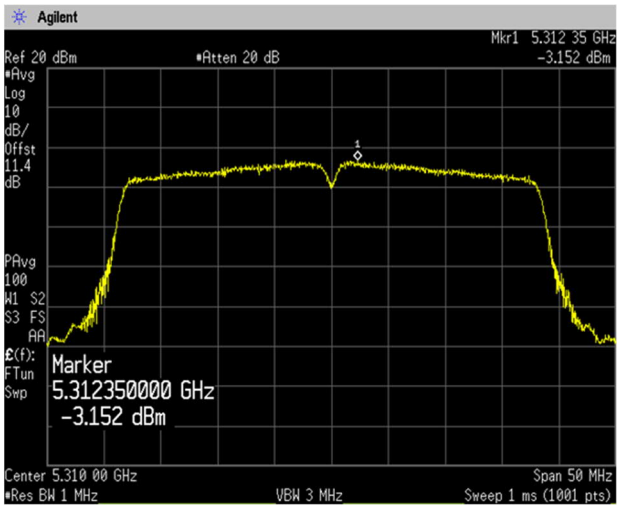
Japan

(5.3 GHz Band)

Channel: 54



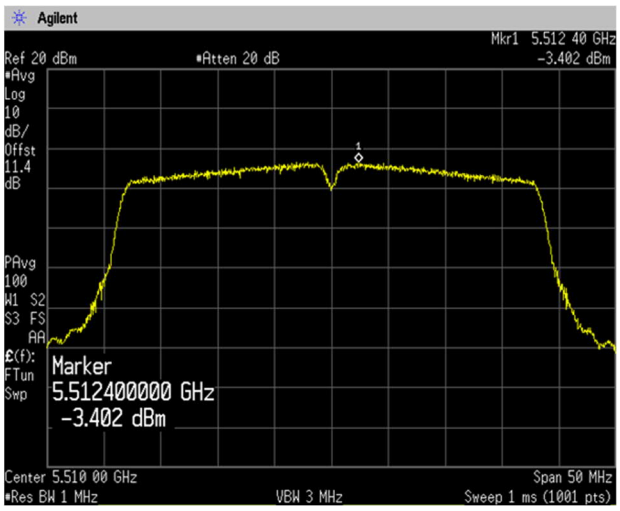
Channel: 62



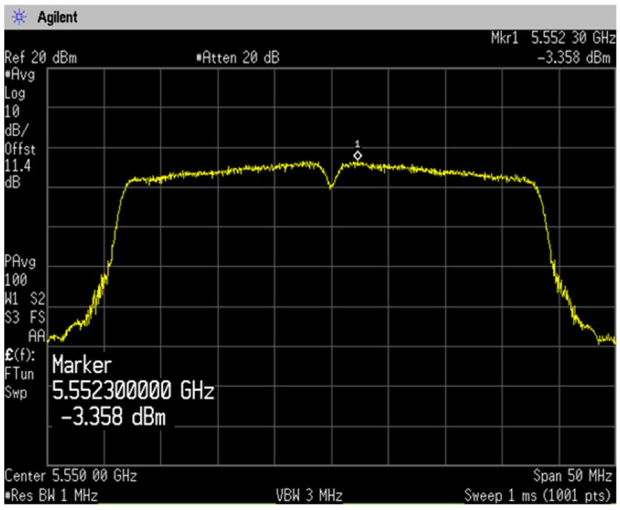
Japan

(5.6 GHz Band)

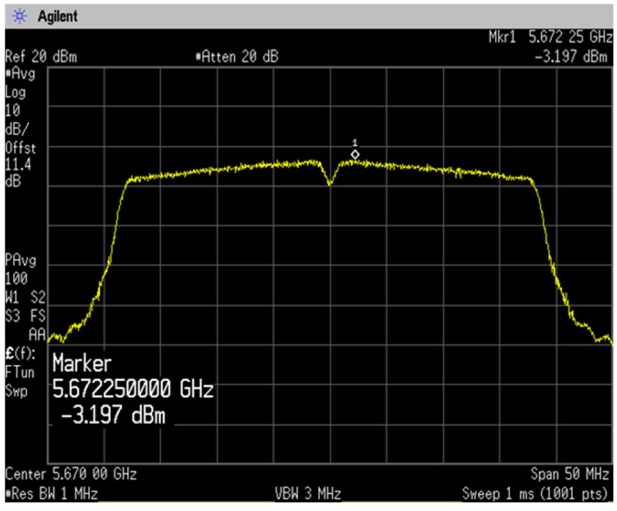
Channel: 102



Channel: 110

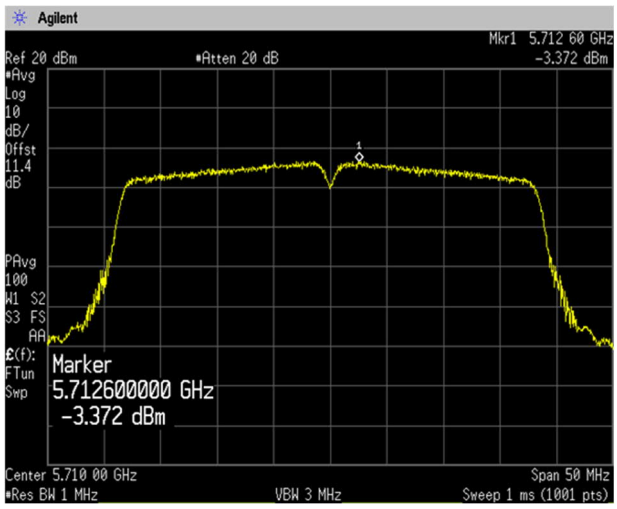


Channel: 134



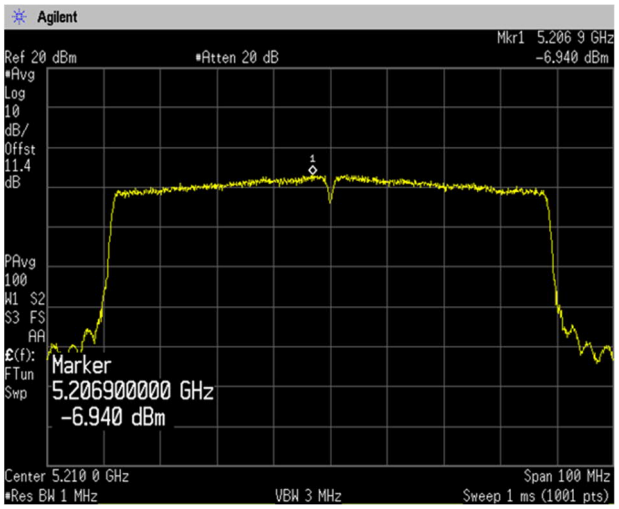
Japan

Channel: 142

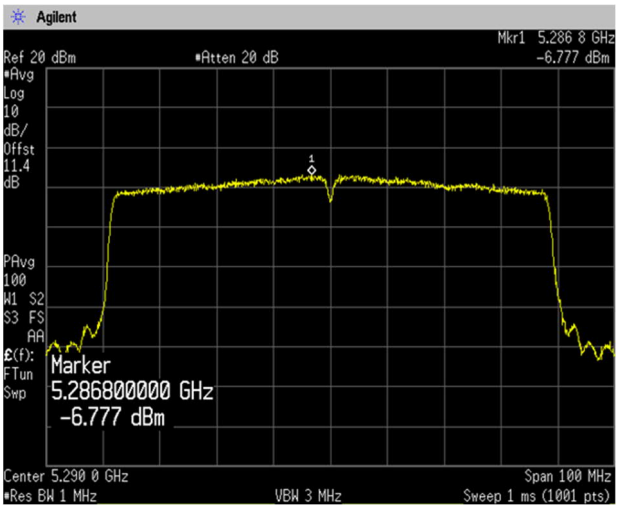


Japan

[IEEE802.11ac (HT80)]
(5.2 GHz Band)
Channel: 42



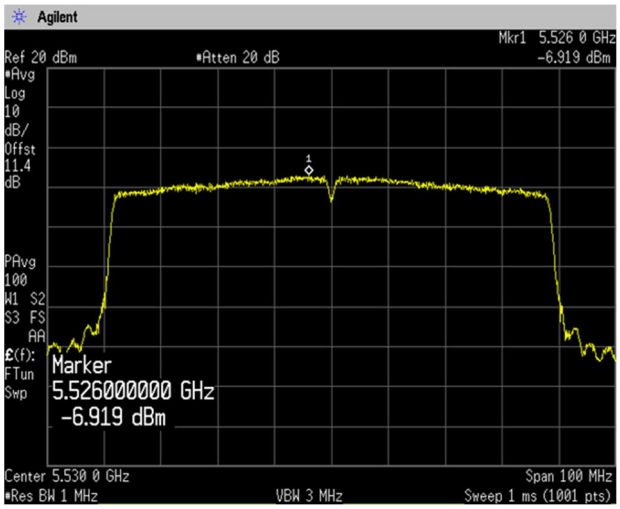
(5.3 GHz Band)
Channel: 58



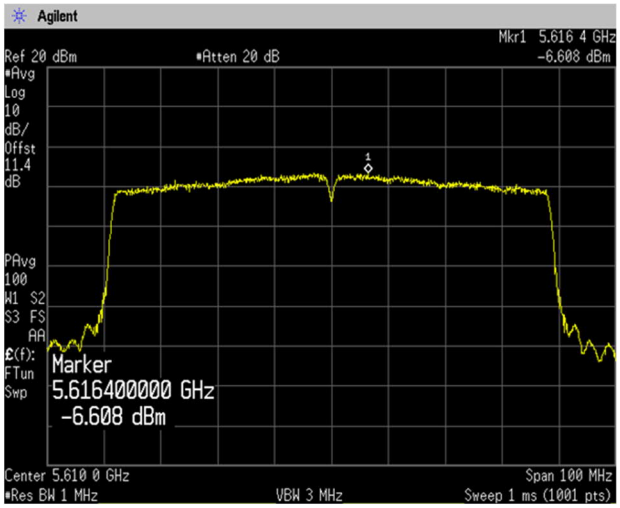
Japan

(5.6 GHz Band)

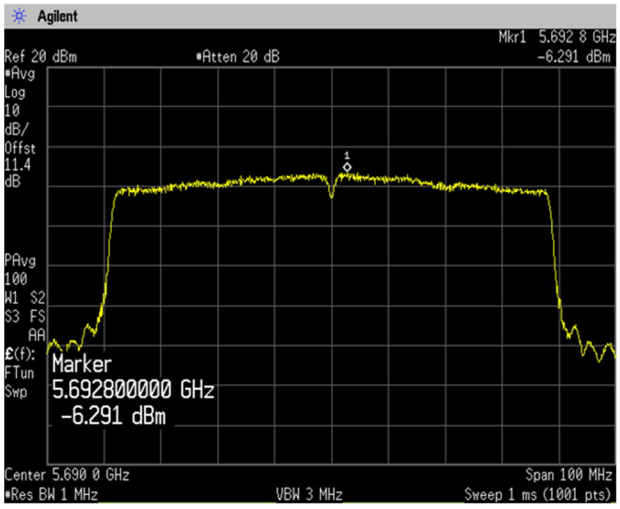
Channel: 106



Channel: 122



Channel: 138



4.4 Radiated Emissions (Restricted Bands of Operation)

4.4.1 Measurement procedure

[FCC 15.407(b), 15.205, 15.209, KDB 789033 D02, Section G.4, 5, 6.c)Method AD]

Test was applied by following conditions.

Test method	:	ANSI C63.10
Frequency range	:	9 kHz to 40 GHz
Test place	:	3m Semi-anechoic chamber
EUT was placed on	:	Styrofoam table / (W) 1.0 × (D) 1.0 ×(H) 0.8 m (below 1 GHz) Styrofoam table / (W) 0.6 × (D) 0.6 ×(H) 1.5 m (above 1 GHz)
Antenna distance	:	3m
Test receiver setting		Below 1 GHz
- Detector	:	Quasi-peak
- Bandwidth	:	120 kHz
Spectrum analyzer setting		Above 1 GHz
- Peak	:	RBW=1 MHz, VBW=3 MHz, Span=0 Hz, Sweep=auto, Detector=Peak Trace mode=Max hold
- Average	:	RBW=1 MHz, VBW=3 MHz, Span=0 Hz, Sweep=auto, Detector=RMS Trace mode=Averaging(300 counts)

Radiated emission measurements are performed at 3m distance with the broadband antenna (Loop antenna, Biconical antenna, Log periodic antenna, Double ridged guide antenna and Bload-band horn Antenna). The antenna is positioned both the horizontal and vertical planes of polarization and height is varied 1m to 4m and stopped at height producing the maximum emission. As for the Loop antenna, it is positioned with its plane vertical, and the center of the Loop antenna is 1m above the ground plane.

The EUT is Placed on a turntable, which is 0.8m (below 1 GHz) and 1.5m (above 1 GHz) above ground plane. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. The test results represent the worst case emission for each emission with manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation. Sufficient time for the EUT, support equipment, and test equipment are allowed in order for them to warm up to their normal operating condition.

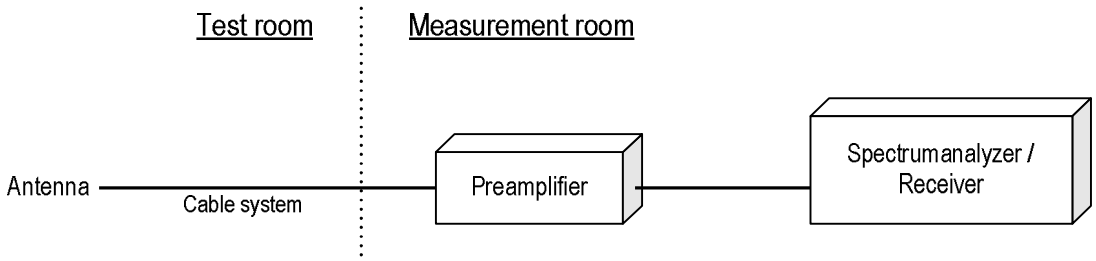
The EUT was set to operate with following conditions.

- 5.2 GHz Band, 5.3 GHz Band, 5.6 GHz Band

The test mode of EUT is as follows.

- Tx mode, Rx mode

- Test configuration



Duty cycle result

Mode	Band	On Time(ms)	On+Off Time(ms)	Duty Cycle (%)	DCF (dB)
802.11a	W52	1.392	1.436	96.94	0.135
	W53	1.390	1.436	96.80	0.141
	W56	1.392	1.436	96.94	0.135
802.11n (20MHz)	W52	1.286	1.332	96.55	0.153
	W53	1.288	1.332	96.70	0.146
	W56	1.288	1.334	96.55	0.152
802.11n (40MHz)	W52	0.636	0.680	93.53	0.291
	W53	0.636	0.680	93.53	0.291
	W56	0.635	0.681	93.25	0.304
802.11ac (80MHz)	W52	0.323	0.368	87.77	0.567
	W53	0.324	0.368	87.95	0.558
	W56	0.323	0.367	87.94	0.558

Note: DCF = 10log(1/x)

4.4.2 Calculation method

[150 kHz to 25 GHz]
Emission level = Reading + (Ant. factor + Cable system loss - Amp. Gain)
Margin = Limit - Emission level

Example:
Detector: Peak
Limit @ 5147.0 MHz: 74.0 dBuV/m (Peak Limit)
S.A Reading = 40.9 dBuV Cable system loss = 16.4 dB
Result = 40.9 + 16.4 = 57.3 dBuV/m
Margin = 74.0 - 57.3 = 16.7 dB

4.4.3 Limit

(1) 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 EIRP of -27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.

(3) For transmitters operating in the 5.47-5.725GHz band: all emissions outside of the 5.47 5-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.

Frequency [MHz]	Field strength		Distance [m]
	[uV/m]	[dBuV/m]	
0.009-0.490	2400 / F [kHz]	20logE [uV/m]	300
0.490-1.705	24000 / F [kHz]	20logE [uV/m]	30
1.705-30	30	29.5	30
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Note:
1. The lower limit shall apply at the transition frequencies.
2. Emission level [dBuV/m] = 20log Emission [uV/m]
3. As shown in 15.35(b), for frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition modulation.

Japan

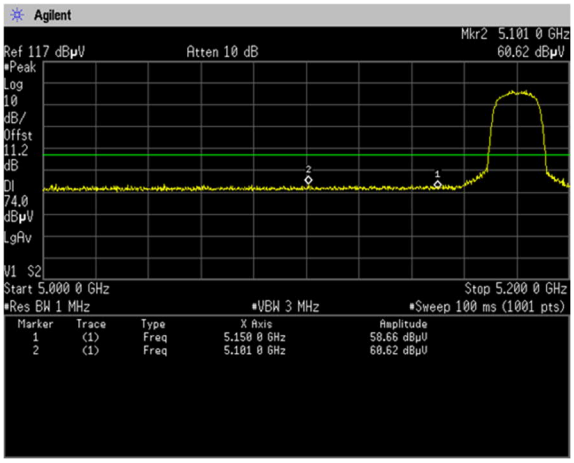
4.4.4 Test data

Date	:	10-November-2021			
Temperature	:	23.1 [˚C]			
Humidity	:	39.9 [%]	Test engineer	:	
Test place	:	3m Semi-anechoic chamber			Tadahiro Seino

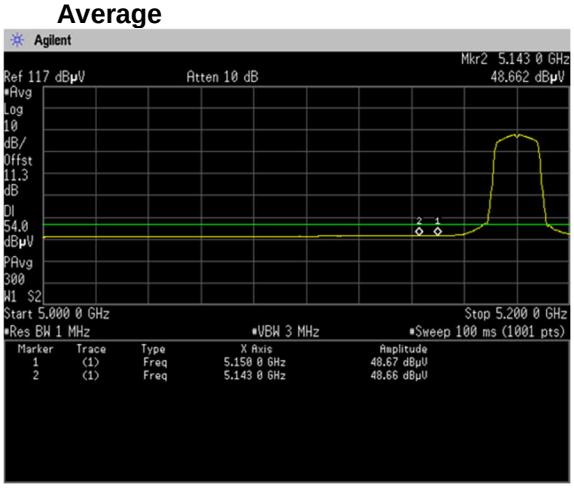
4.4.4.1 Restricted Bandedge

[IEEE802.11a]

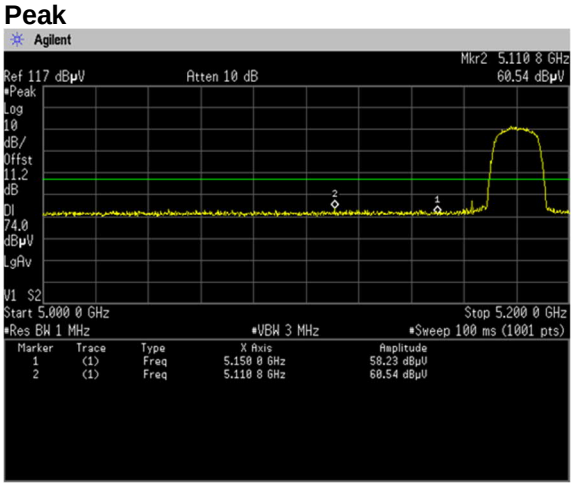
5.2 GHz Band, Channel Low
Horizontal
Peak



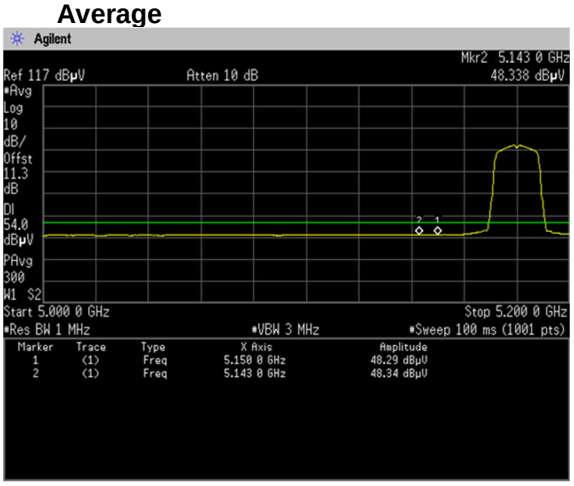
Average



Vertical
Peak

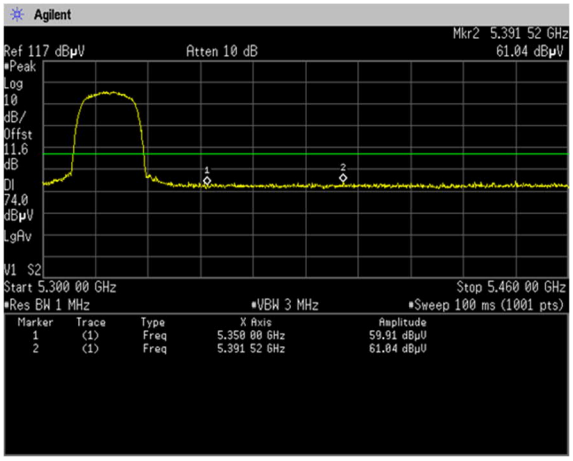


Average

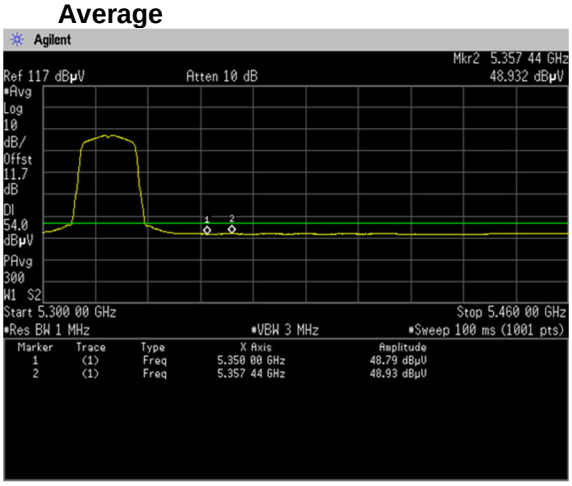


[IEEE802.11a]

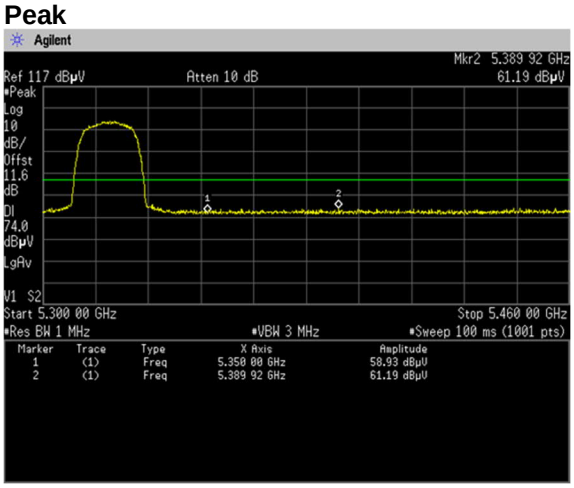
5.3 GHz Band, Channel High
Horizontal
Peak



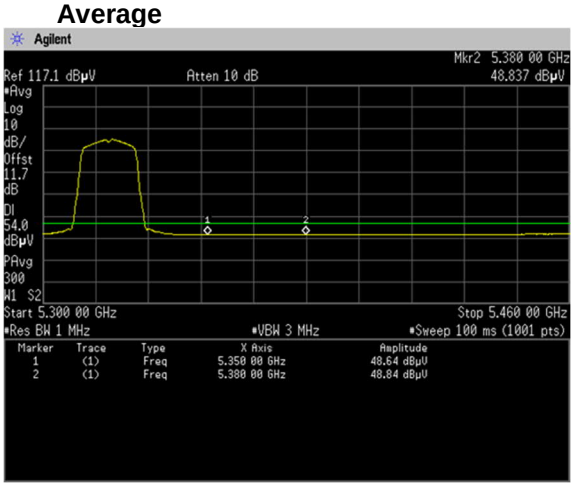
Average



Vertical
Peak



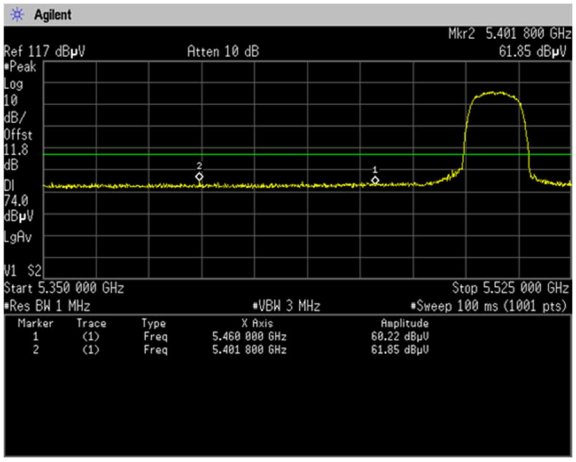
Average



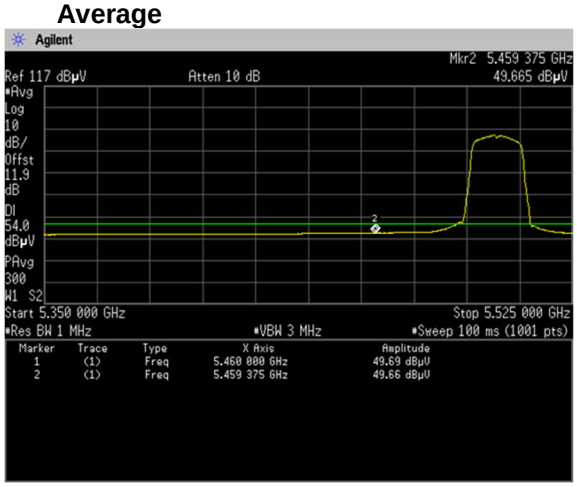
Japan

[IEEE802.11a]

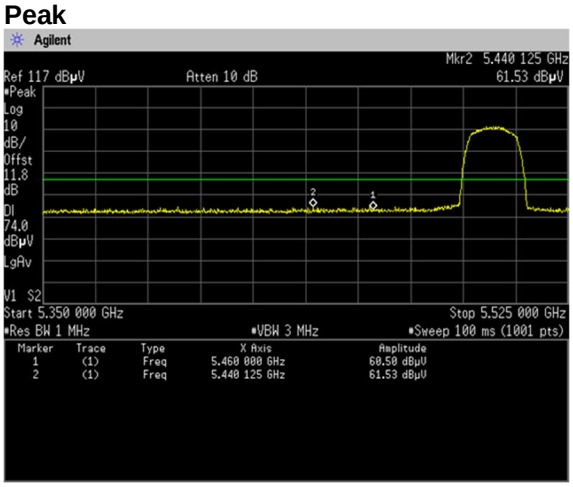
5.6 GHz Band, Channel Low
Horizontal
Peak



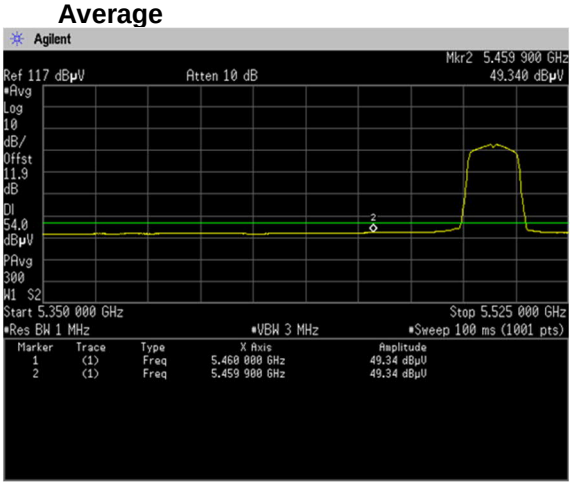
Average



Vertical
Peak



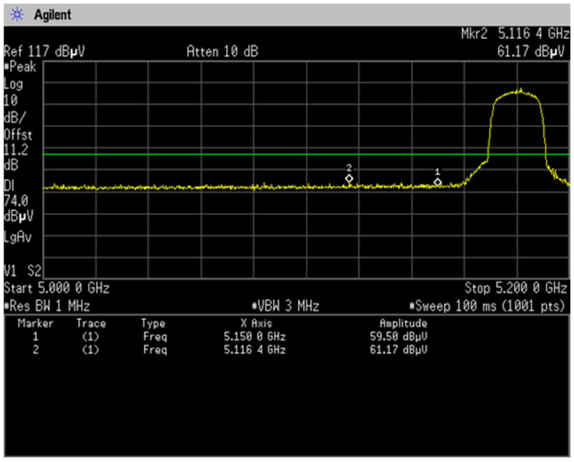
Average



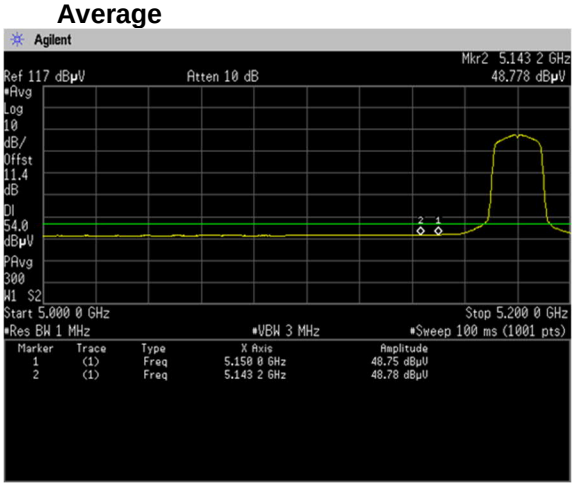
Japan

[IEEE802.11n (HT20)]

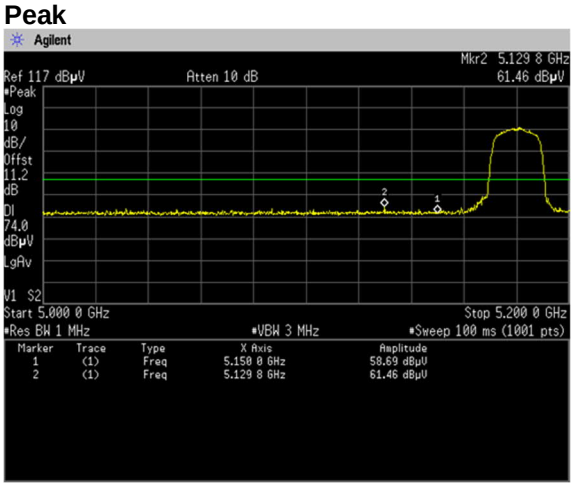
5.2 GHz Band, Channel Low
Horizontal
Peak



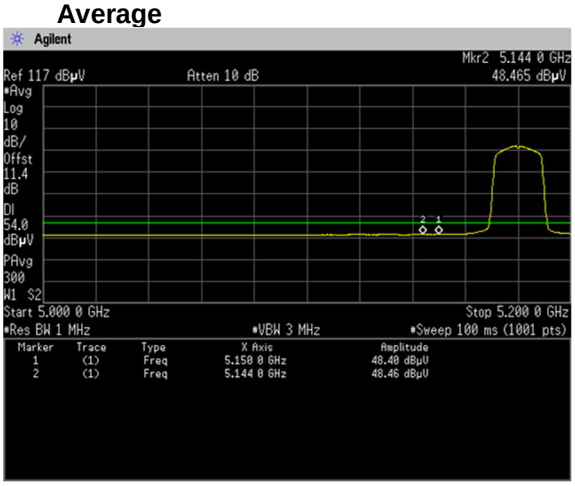
Average



Vertical
Peak



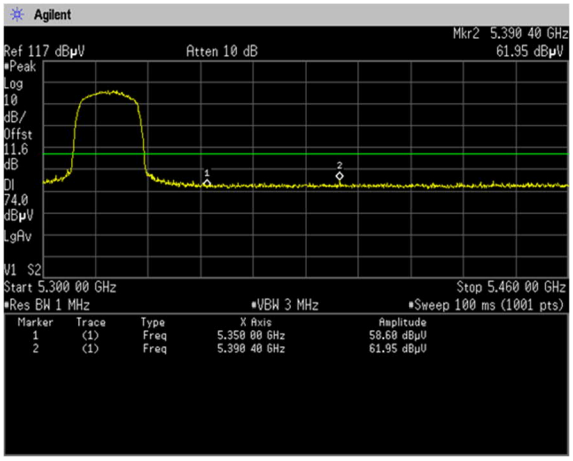
Average



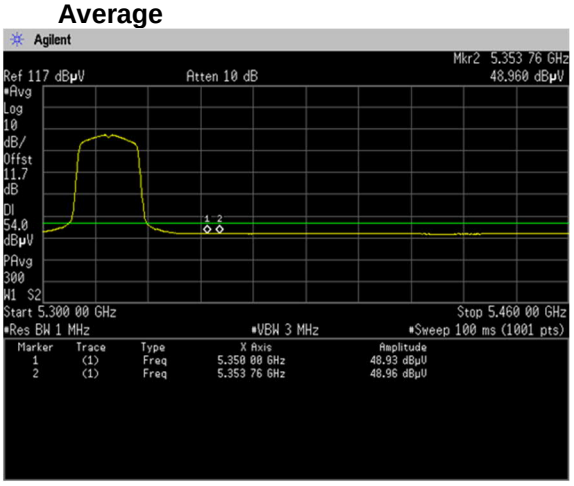
Japan

[IEEE802.11n (HT20)]

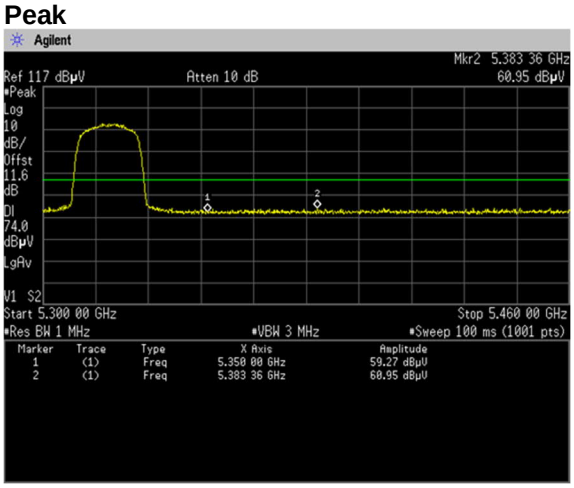
5.3 GHz Band, Channel High
Horizontal
Peak



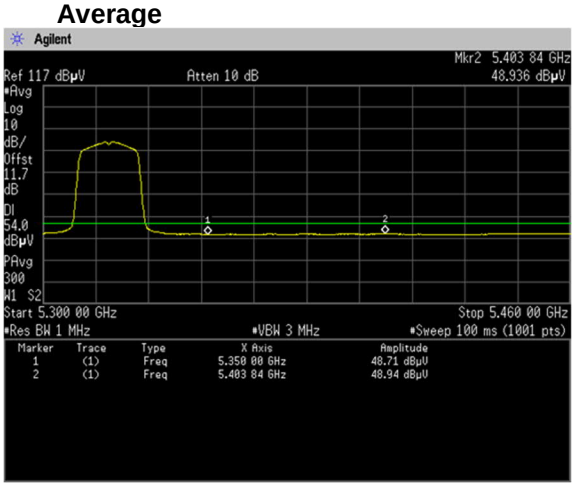
Average



Vertical
Peak

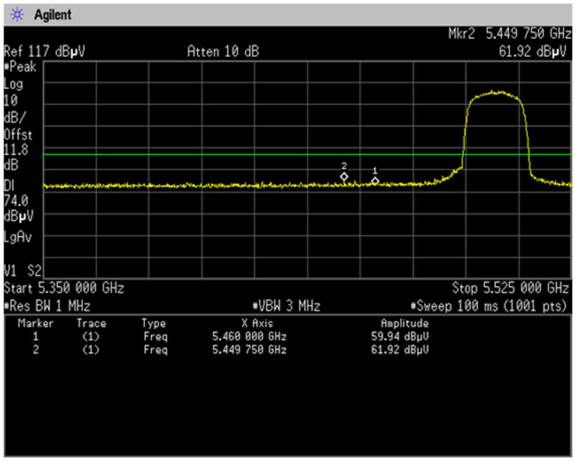


Average

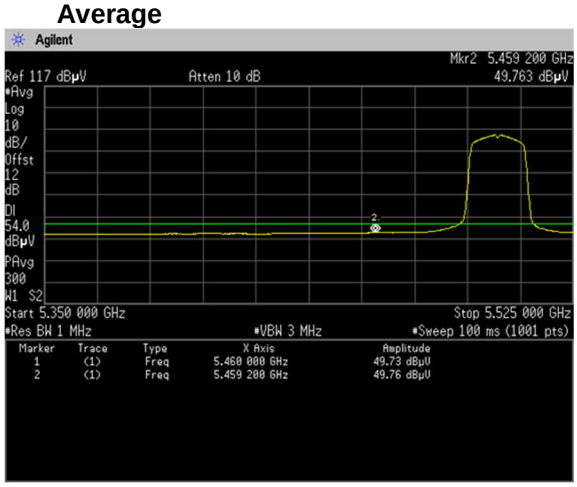


[IEEE802.11n (HT20)]

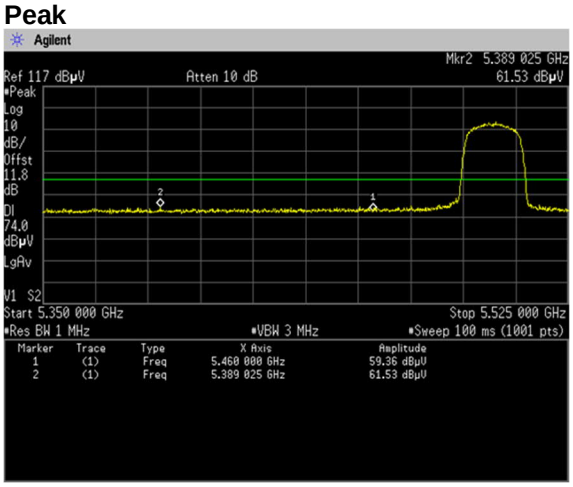
5.6 GHz Band, Channel Low
Horizontal
Peak



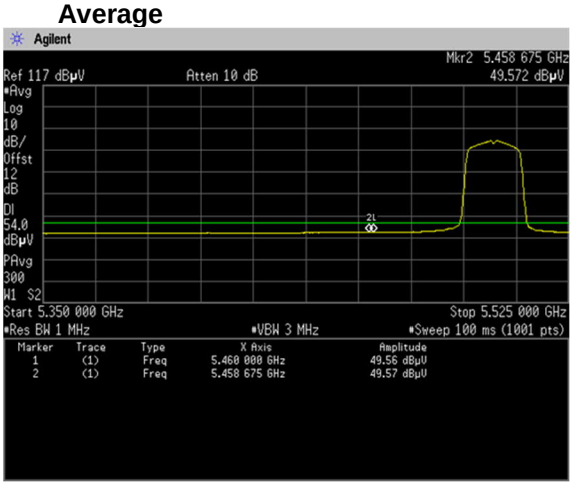
Average



Vertical
Peak



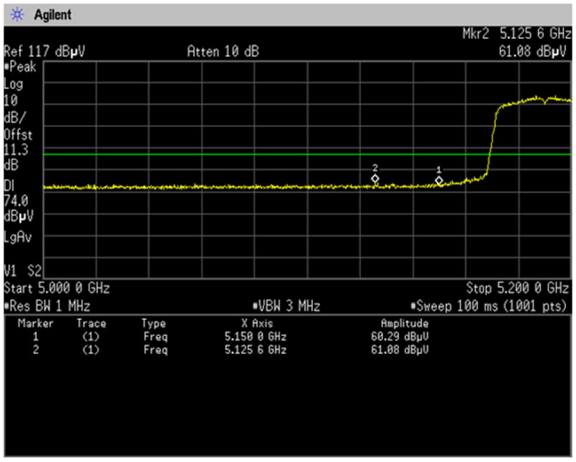
Average



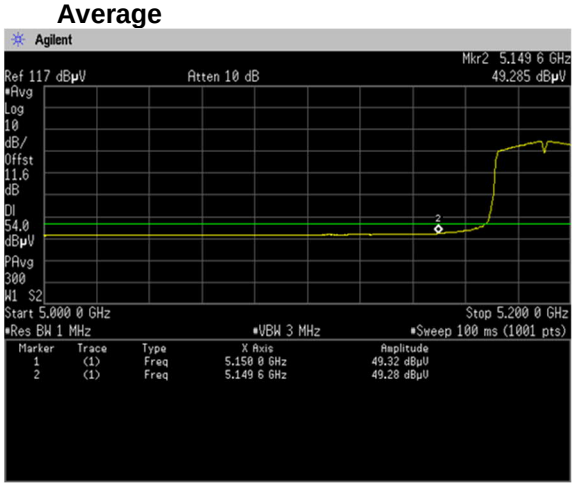
Japan

[IEEE802.11n (HT40)]

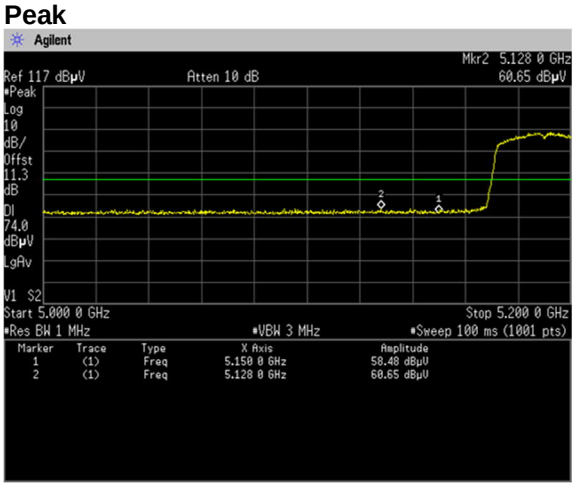
5.2 GHz Band, Channel Low
Horizontal
Peak



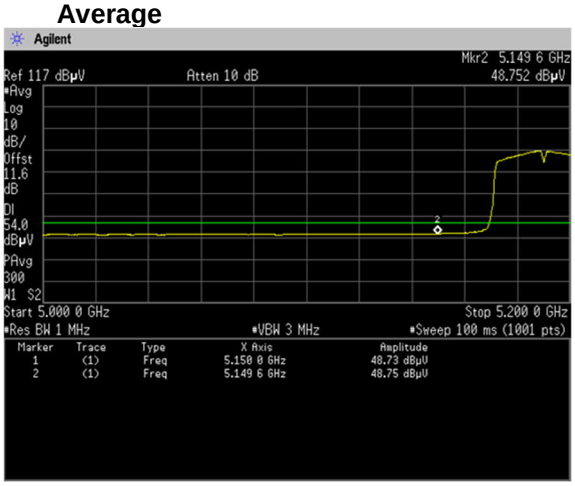
Average



Vertical
Peak



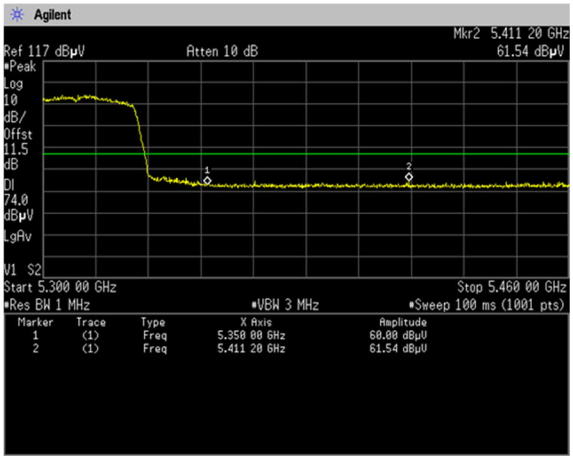
Average



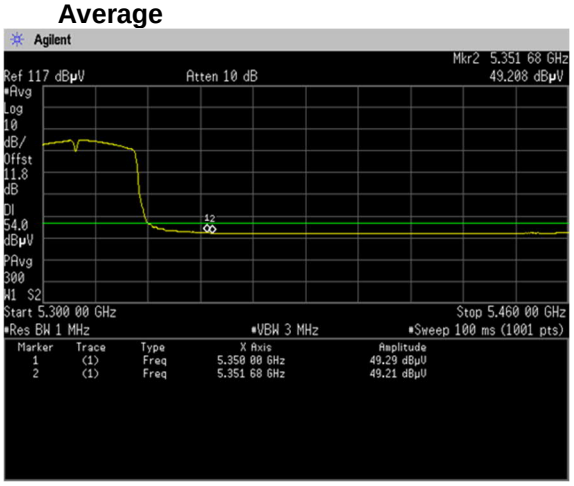
Japan

[IEEE802.11n (HT40)]

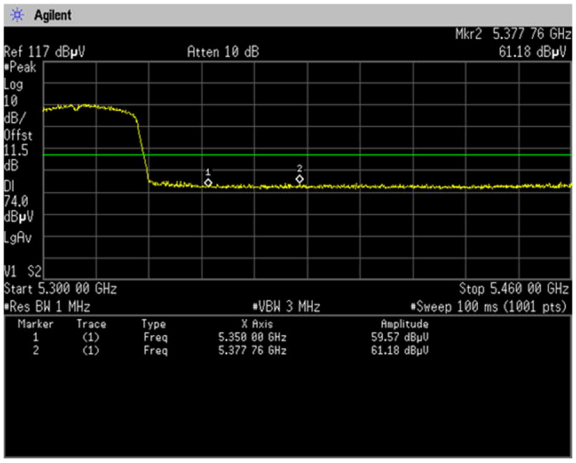
5.3 GHz Band, Channel High
Horizontal
Peak



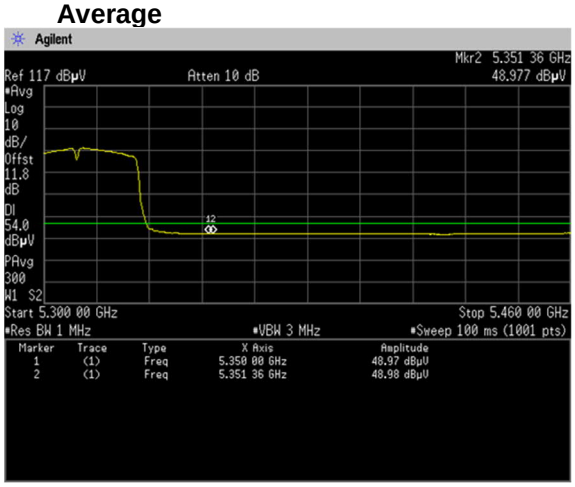
Average



Vertical
Peak



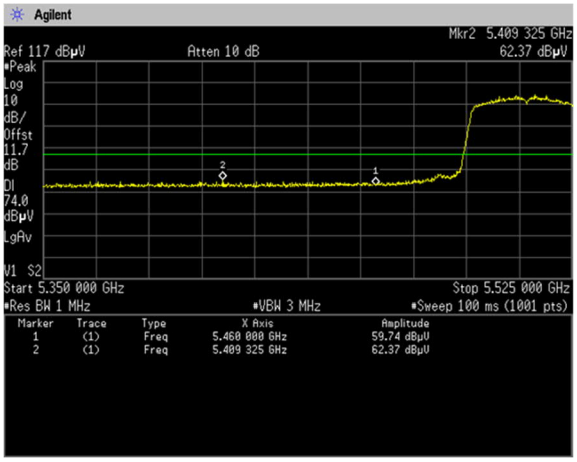
Average



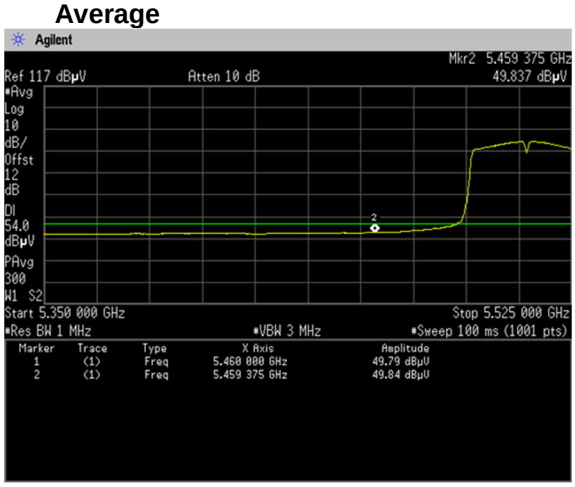
Japan

[IEEE802.11n (HT40)]

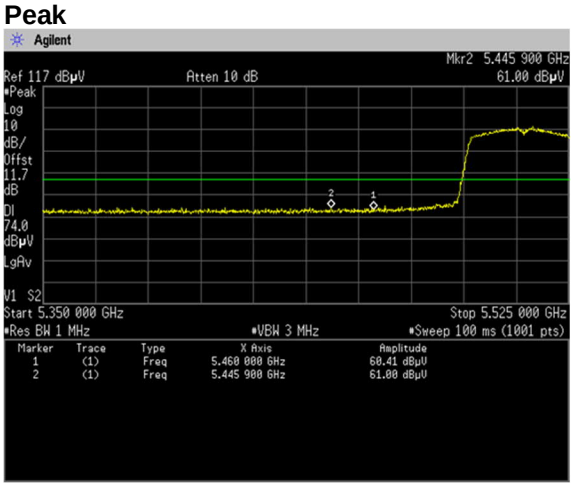
5.6 GHz Band, Channel Low
Horizontal
Peak



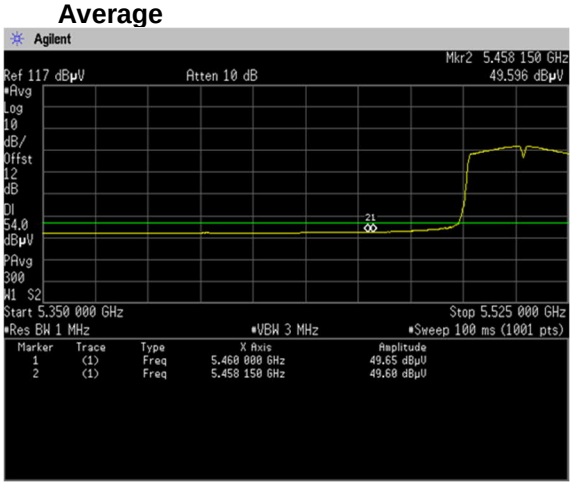
Average



Vertical
Peak



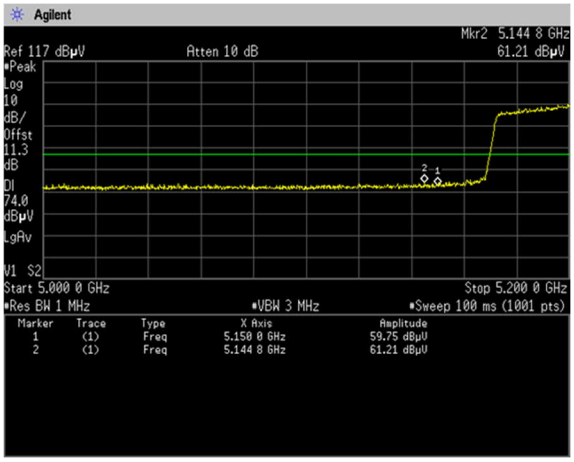
Average



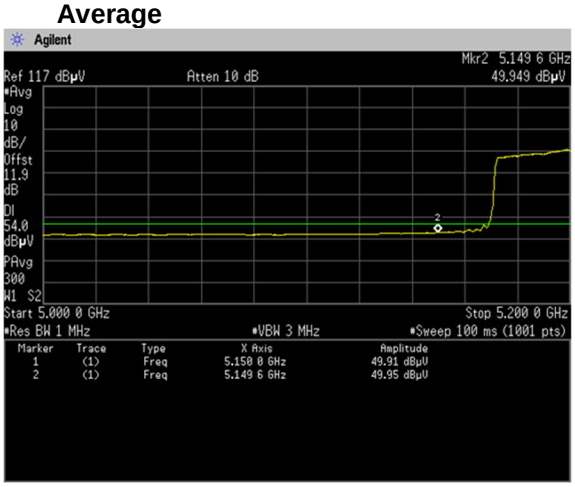
Japan

[IEEE802.11ac (VHT80)]

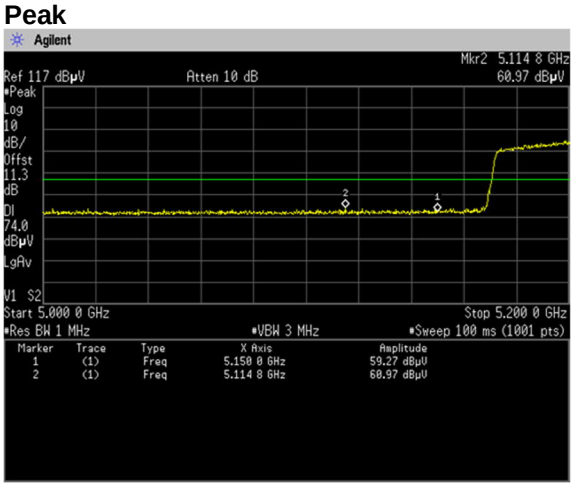
5.2 GHz Band, Channel Low
Horizontal
Peak



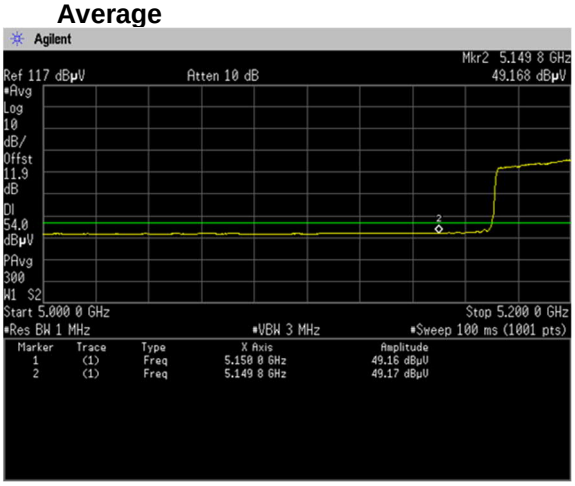
Average



Vertical
Peak



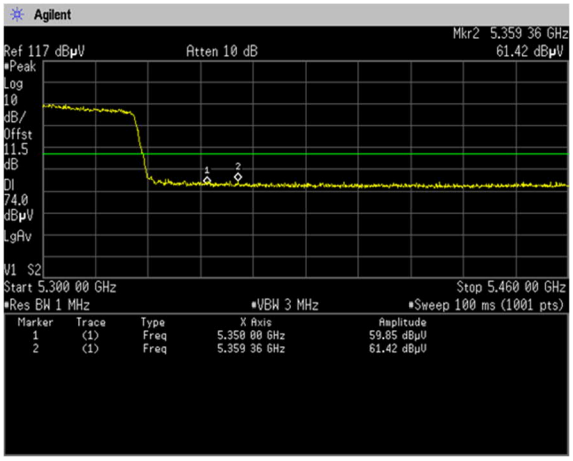
Average



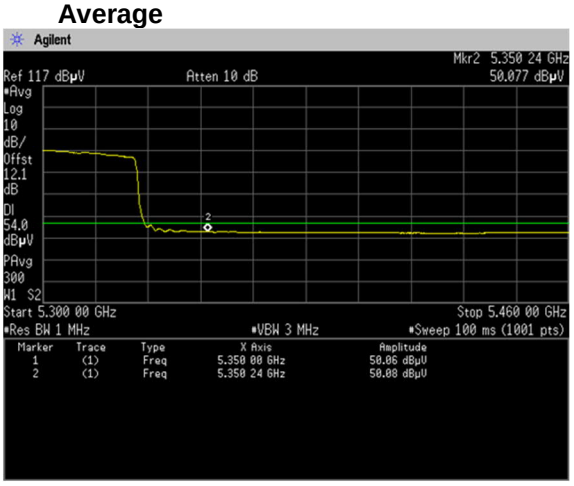
Japan

[IEEE802.11ac (VHT80)]

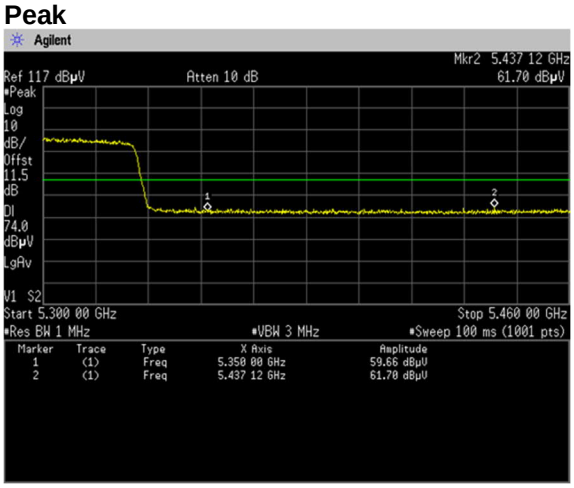
5.3 GHz Band, Channel High
Horizontal
Peak



Average



Vertical
Peak



Average