Zacta

TEST REPORT

Report number : JPD-TR-16226-0
Issue date : January 27, 2017

The device, as described herewith, was tested pursuant to applicable test procedure and complies with the requirements of;

FCC Part15 Subpart E

The test results are traceable to the international or national standards.

Applicant	:	KYOCERA Corporation
Equipment under test (EUT)	:	Mobile Phone
Model number	:	DA03
FCC ID	:	JOYDA03

Date of test	:	October 6, 31 November 1, 4 December 2, 8, 9, 12, 13, 14, 15, 16, 19, 22, 23, 2016 January 20, 26, 2017
Test place	:	TÜV SÜD Zacta Ltd. Yonezawa Testing Center 5-4149-7, Hachimanpara, Yonezawa-shi, Yamagata, 992-1128 Japan Phone: +81-238-28-2881 Fax: +81-238-28-2888
Test results	:	Complied

The results in this report are applicable only to the equipment tested.
This report shall not be re-produced except in full without the written approval of TÜV SÜD Zacta Ltd.
This test report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

Tested by : Kazunori Saito Tadahiro Seino
Kazunori Saito Tadahiro Seino

Tested by : Taiki Watanabe
Taiki Watanabe

Approved by : Hiroaki Suzuki
Hiroaki Suzuki
Lab Manager of RF Lab

NVLAP TESTING
NVLAP LAB CODE 200306-0

ilac-MRA

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1. Summary of Test

1.1 Purpose of test

It is the original test in order to verify conformance to FCC Part 15 Subpart E.

1.2 Standards

CFR47 FCC Part 15 Subpart E

1.2.1 Test Methods

ANSI C63.10-2013, KDB789033 D02 General UNII Test Procedures New Rules v01r03

1.2.2 Deviation from standards

None

1.3 List of applied test to the EUT

Test items Section	Test items	Condition	Result
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

1.3.1 Test set up

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1.4 Modification to the EUT by laboratory

None

2. Equipment Under Test

2.1 General Description of equipment

EUT is the Mobile Phone.

2.2 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	:	Mobile Phone
Trade name	:	Kyocera
Model number	:	DA03
Serial number	:	N/A
EUT condition	:	Pre-Production
Power ratings	:	Battery: DC 3.8V
Size	:	(W) 71.0 x (D) 10.4 mm x (H)142.0 mm
Environment	:	Indoor and Outdoor use
Terminal limitation	:	-20˚C to 60˚C
RF Specification Protocol	:	IEEE802.11a, IEEE802.11n (HT20), IEEE802.11n (HT40) IEEE802.11ac (HT20), IEEE802.11ac (HT40), IEEE802.11ac (HT80)
Frequency range	:	IEEE802.11a/n/ac (HT20): 5180MHz-5320MHz, 5500MHz-5700MHz IEEE802.11n/ac(HT40): 5190MHz-5310MHz, 5510MHz-5670MHz IEEE802.11ac(HT80): 5210MHz, 5290MHz, 5530MHz, 5610MHz
Number of RF Channels	:	IEEE802.11a/n/ac (HT20): 19 Channels IEEE802.11n/ac(HT40): 9 Channels IEEE802.11ac(HT80): 4 Channels
Modulation type	:	IEEE802.11a/n/ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
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, 65Mbps IEEE802.11n (HT20 SGI): 7.2, 14.4, 21.7, 28.9, 43.3, 57.8, 65, 72.2Mbps IEEE802.11ac (HT20 LGI): 6.5, 13, 19.5, 26, 39, 52, 58.5, 65, 78, 86.5Mbps IEEE802.11ac (HT20 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, 135Mbps IEEE802.11n (HT40 SGI): 15, 30, 45, 60, 90, 120, 135, 150Mbps IEEE802.11ac (HT40 LGI): 13.5, 27, 40.5, 54, 81, 108, 121.5, 135, 162, 180Mbps IEEE802.11ac (HT40 SGI): 15, 30, 45, 60, 90, 120, 135, 150, 180, 200Mbps IEEE802.11ac (HT80 LGI): 29.3, 58.5, 87.8, 117, 175.5, 234, 263.3, 292.6, 351, 390Mbps IEEE802.11ac (HT80 SGI): 32.5, 65, 97.5, 130, 195, 260, 292.5, 325, 390, 433.3Mbps

Channel separation	:	IEEE802.11a/n/ac (HT20): 20MHz IEEE802.11n/ac (HT40): 40MHz IEEE802.11ac (HT80): 80MHz
Output power	:	30.799mW (IEEE802.11a) 31.944mW (IEEE802.11n: HT20) 21.271mW (IEEE802.11n: HT40) 18.878mW (IEEE802.11ac: HT80)
Antenna type	:	Internal antenna
Antenna gain	:	5.15-5.25GHz, 5.25-5.35GHz band: -2.2dBi 5.47-5.725GHz band: -2.0dBi

2.3 Variation of the family model(s)

Not applicable

2.4 Operating channels and frequencies

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

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

[IEEE802.11n/ac (HT40)]

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

[IEEE802.11ac (HT80)]

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

2.5 Operating mode

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

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

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
5.2GHz Band	IEEE802.11a: OFDM	6Mbps
	IEEE802.11n (HT20): OFDM	MCS0 (6.5Mbps)
	IEEE802.11n (HT40): OFDM	MCS0 (13.5Mbps)
	IEEE802.11ac (HT80): OFDM	MCS0 (29.3Mbps)
5.3GHz Band	IEEE802.11a: OFDM	6Mbps
	IEEE802.11n (HT20): OFDM	MCS0 (6.5Mbps)
	IEEE802.11n (HT40): OFDM	MCS0 (13.5Mbps)
	IEEE802.11ac (HT80): OFDM	MCS0 (29.3Mbps)
5.6GHz Band	IEEE802.11a: OFDM	6Mbps
	IEEE802.11n (HT20): OFDM	MCS0 (6.5Mbps)
	IEEE802.11n (HT40): OFDM	MCS0 (13.5Mbps)
	IEEE802.11ac (HT80): OFDM	MCS0 (29.3Mbps)

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.

2.6 Operating mode

[Tx mode]
i) Test program setup to the DM tool
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 DM tool
ii) Select a Test mode
Operating frequency: 5.2GHz Band, 5.3GHz Band, 5.6GHz Band
iii) Start test mode

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3. Configuration of equipment

3.1 Equipment(s) used

No.	Equipment	Company	Model No.	Serial No.	FCC ID / DoC	Comment
1	Mobile Phone	KYOCERA	DA03	N/A	JOYDA03	EUT
2	AC Adapter	au	N/A	N/A	N/A	*

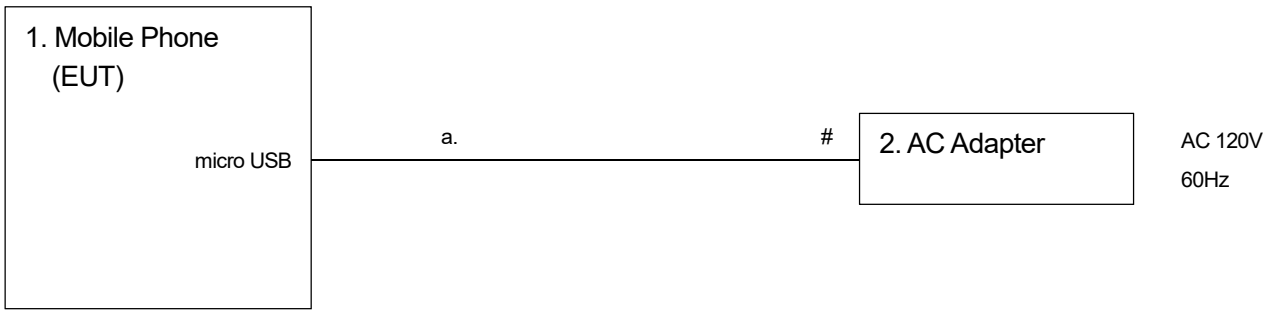
*: AC power line Conducted Emission Test.

3.2 Cable(s) used

No.	Cable	Length[m]	Shield	Connector	Comment
a	Micro USB cable(for AC Adapter)	1.0	Yes	Metal	*

*: AC power line Conducted Emission Test.

3.3 System configuration



: Un-detachable cable

Note1: Numbers assigned to equipment or cables on this diagram correspond to the list in “3.1 Equipment(s) used” and “3.2 Cable(s) used”.

4. 26dB Bandwidth and 99% Occupied Bandwidth

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

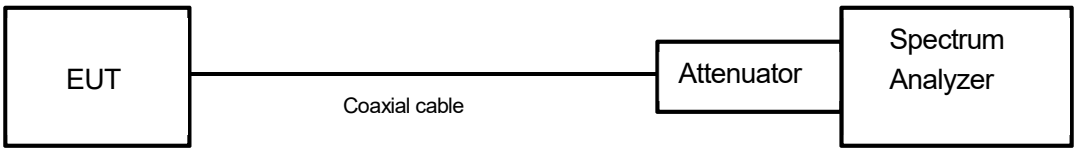
The 26dB bandwidth and 99% occupied bandwidth is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

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

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 Limit

None

4.3 Measurement result

Date	:	October 31, 2016			
Temperature	:	20.6 [˚C]			
Humidity	:	46.5 [%]	Test engineer	:	
Test place	:	Shielded room No.4			Kazunori Saito

Date	:	January 20, 2017			
Temperature	:	23.2 [˚C]			
Humidity	:	25.8 [%]	Test engineer	:	
Test place	:	Shielded room No.4			Kazunori Saito

Mode	Band	Channel	Frequency (MHz)	26dB bandwidth (MHz)	99% Occupied bandwidth (MHz)
802.11a	5.2GHz Band	36	5180	21.951	16.7818
		40	5200	21.799	16.8497
		48	5240	22.045	16.7918
	5.3GHz Band	52	5260	22.282	16.8004
		56	5280	21.776	16.7848
		64	5320	21.494	16.7818
	5.6GHz Band	100	5500	21.630	16.7764
		116	5580	21.809	16.8080
		140	5700	22.059	16.7580

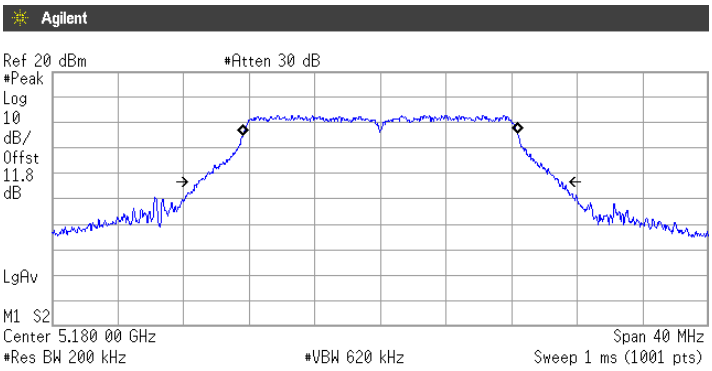
Mode	Band	Channel	Frequency (MHz)	26dB bandwidth (MHz)	99% Occupied bandwidth (MHz)
802.11n (20MHz)	5.2GHz Band	36	5180	21.977	17.8204
		40	5200	22.046	17.8044
		48	5240	22.035	17.8206
	5.3GHz Band	52	5260	22.217	17.8526
		56	5280	22.282	17.8730
		64	5320	22.281	17.9051
	5.6GHz Band	100	5500	22.324	17.8427
		116	5580	21.852	17.8017
		140	5700	22.105	17.8274

Mode	Band	Channel	Frequency (MHz)	26dB bandwidth (MHz)	99% Occupied bandwidth (MHz)
802.11n (40MHz)	5.2GHz Band	38	5190	43.523	36.1555
		46	5230	43.140	36.1736
	5.3GHz Band	54	5270	42.725	36.1280
		62	5310	43.573	36.1612
	5.6GHz Band	102	5510	43.311	36.1539
		110	5550	43.691	36.1624
		134	5670	43.014	36.1800

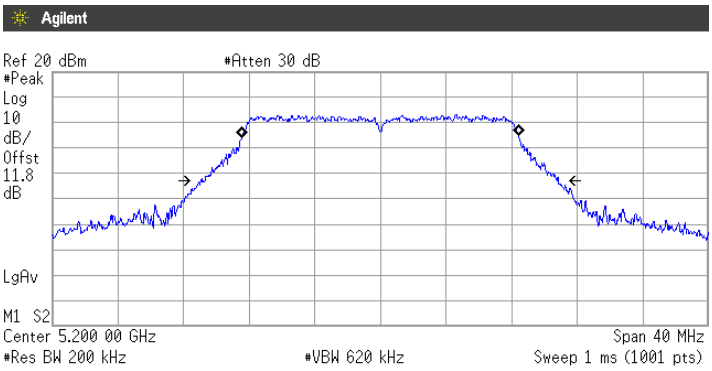
Mode	Band	Channel	Frequency (MHz)	26dB bandwidth (MHz)	99% Occupied bandwidth (MHz)
802.11ac (80MHz)	5.2GHz Band	42	5210	83.965	74.6945
	5.3GHz Band	58	5290	84.043	74.7136
	5.6GHz Band	106	5530	84.095	74.6854
		122	5610	83.634	74.6736

4.4 Trace data
[IEEE802.11a]
(5.2GHz Band)

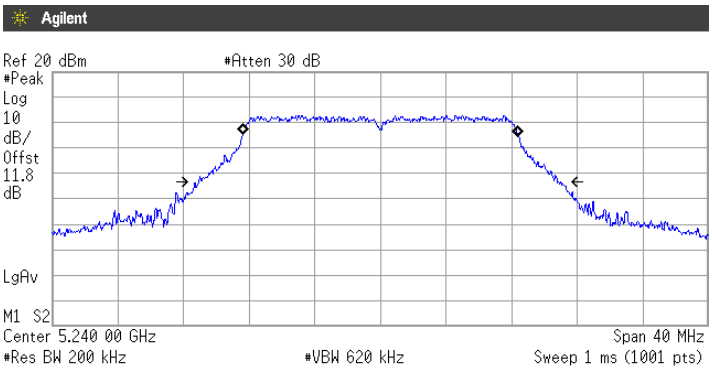
Channel: 36



Channel: 40

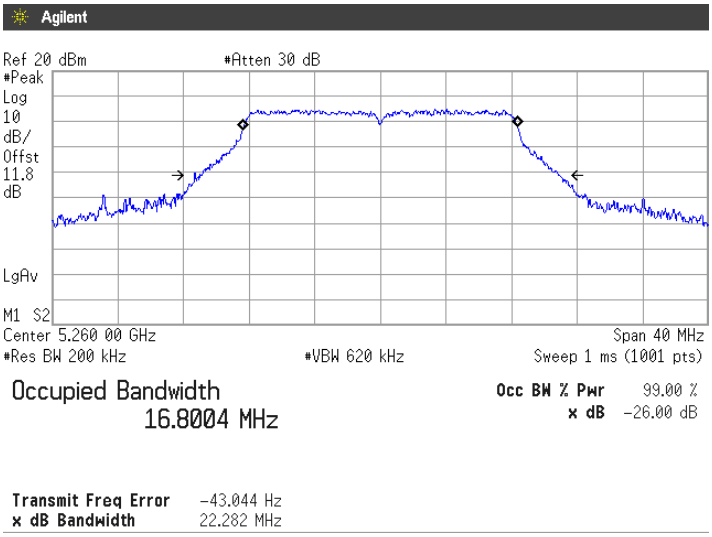


Channel: 48

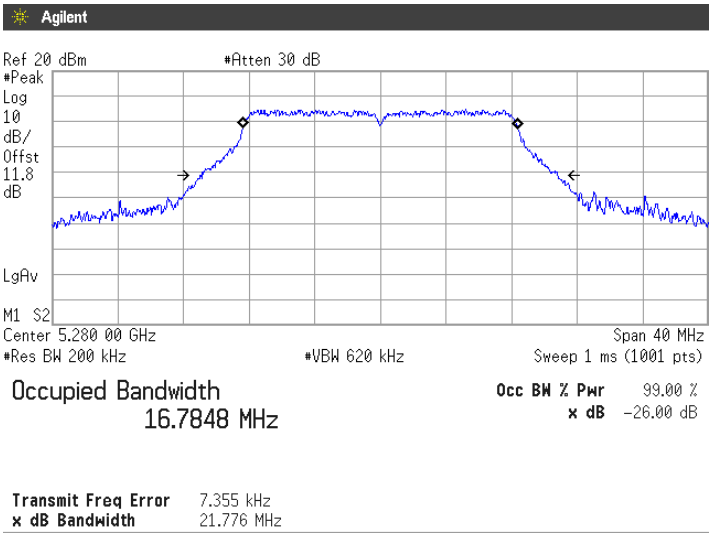


(5.3GHz Band)

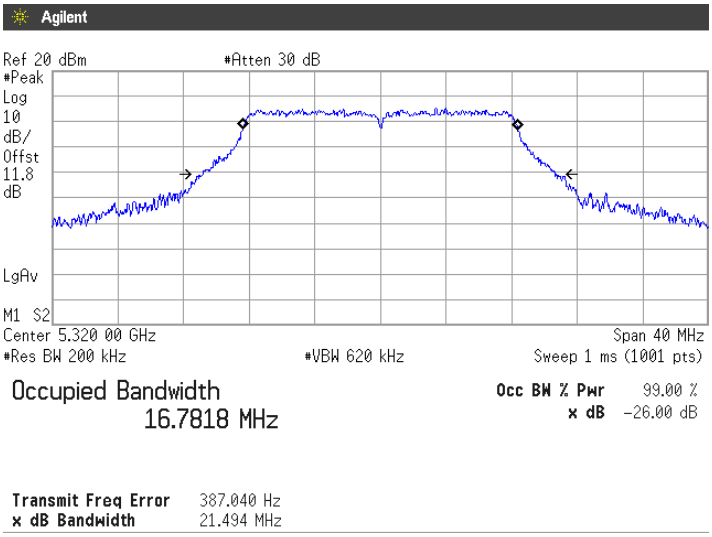
Channel: 52



Channel: 56

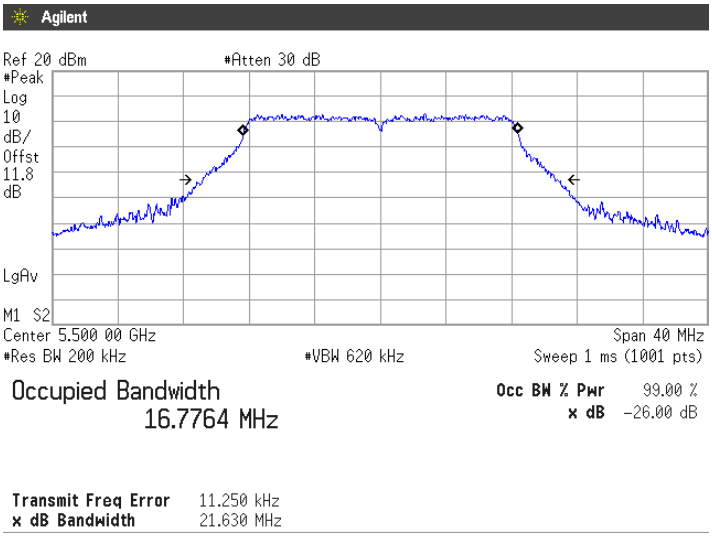


Channel: 64

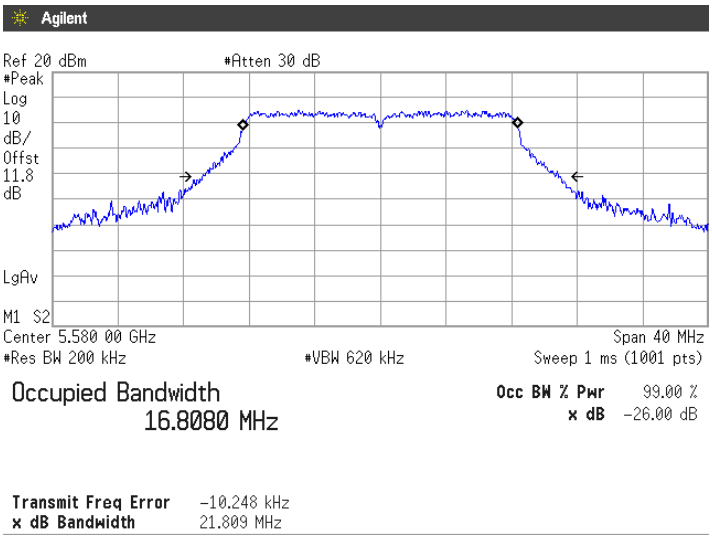


(5.6GHz Band)

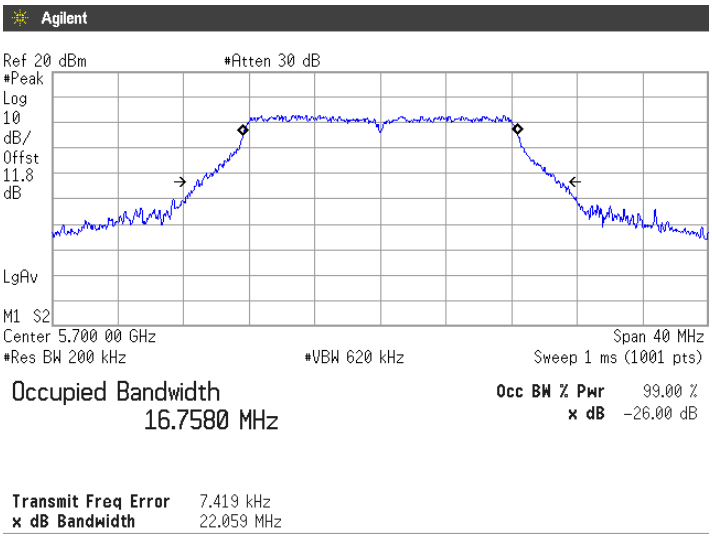
Channel: 100



Channel: 116

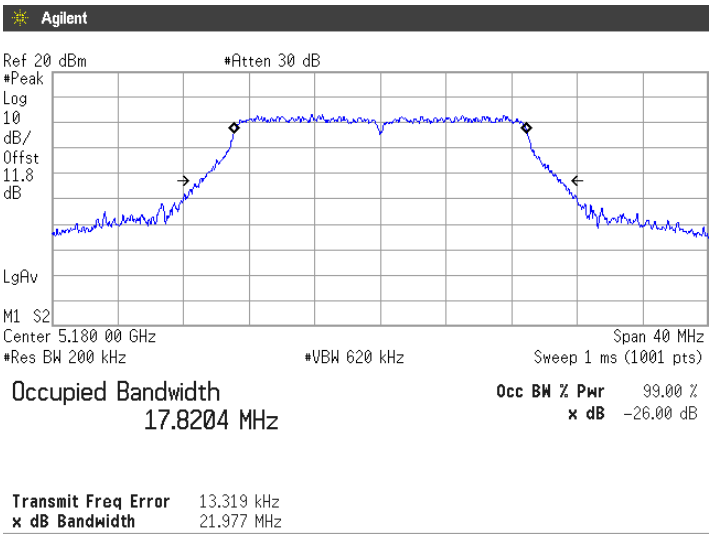


Channel: 140

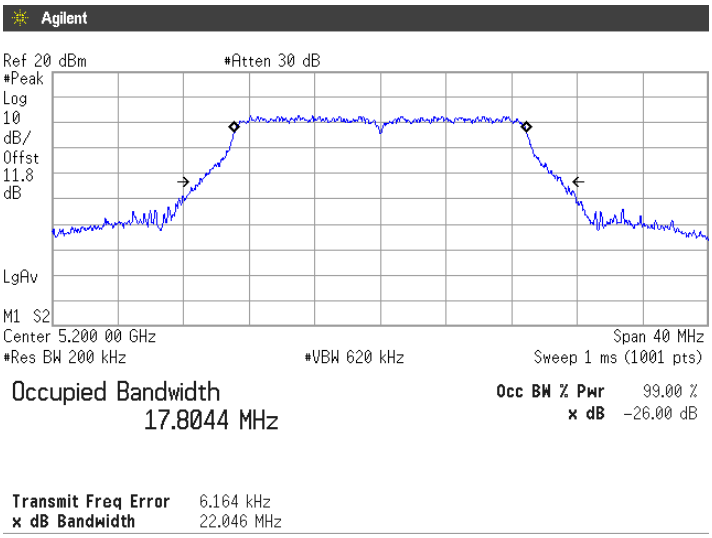


[IEEE802.11n (HT20)]
(5.2GHz Band)

Channel: 36



Channel: 40



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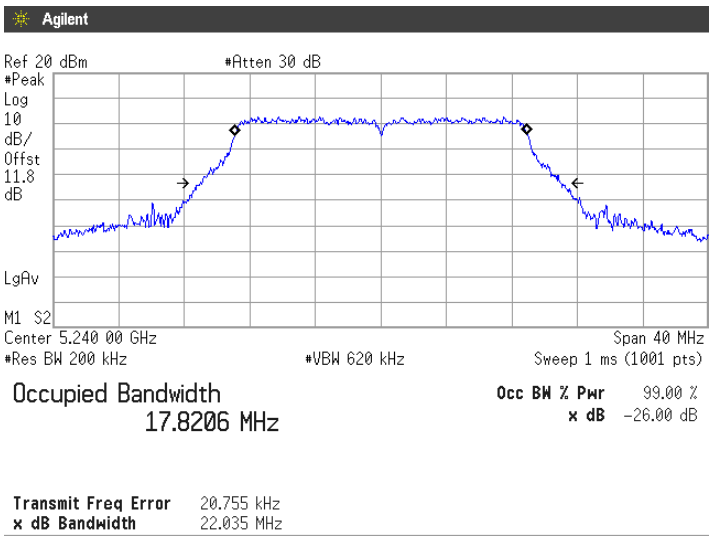
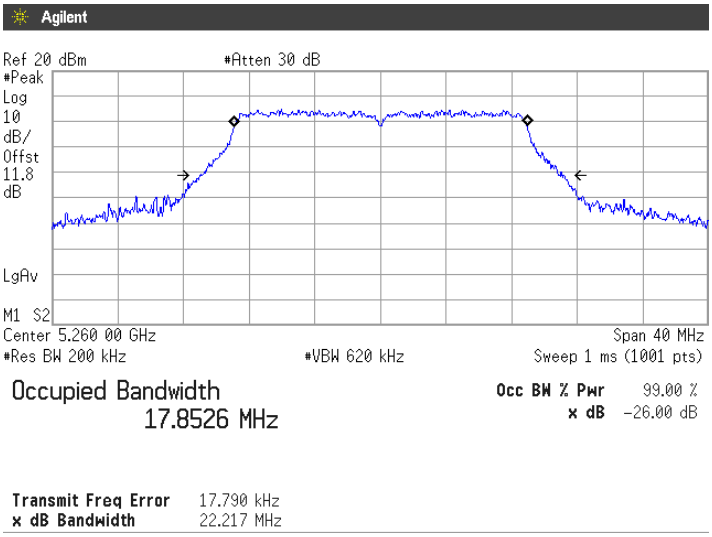
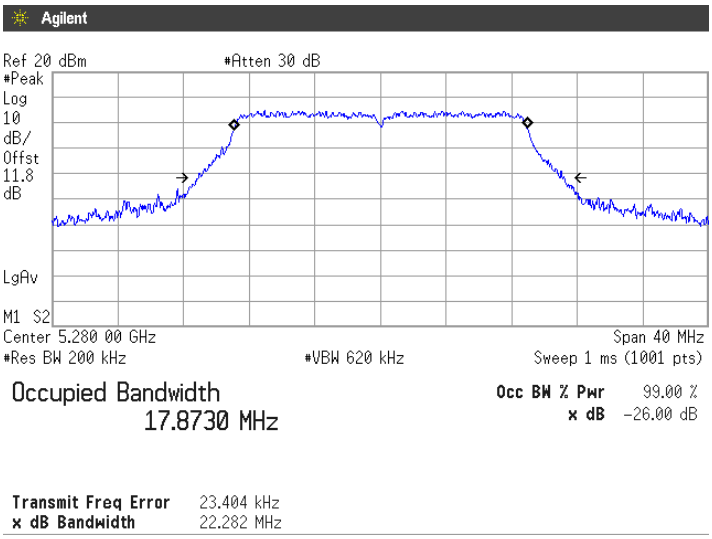


(5.3GHz Band)

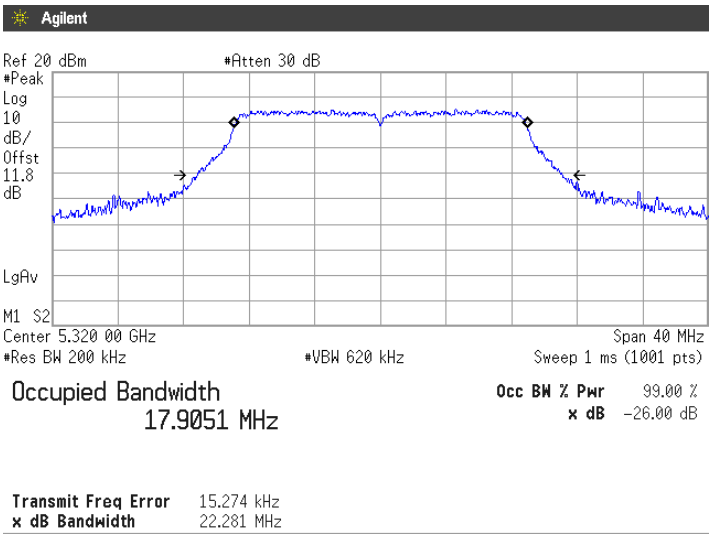
Channel: 52



Channel: 56

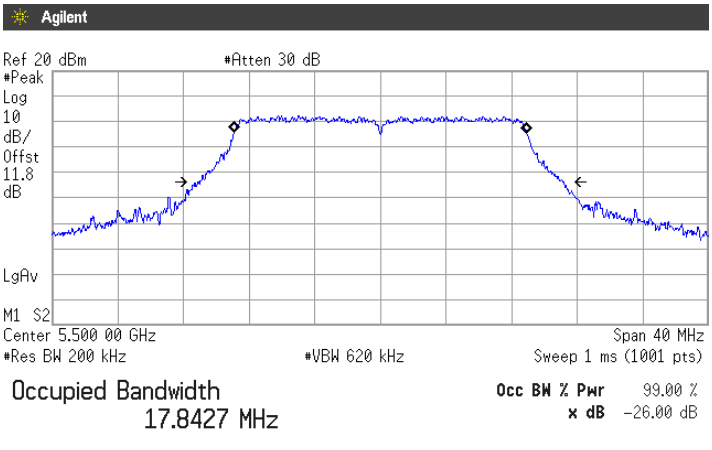


Channel: 64



(5.6GHz Band)

Channel: 100



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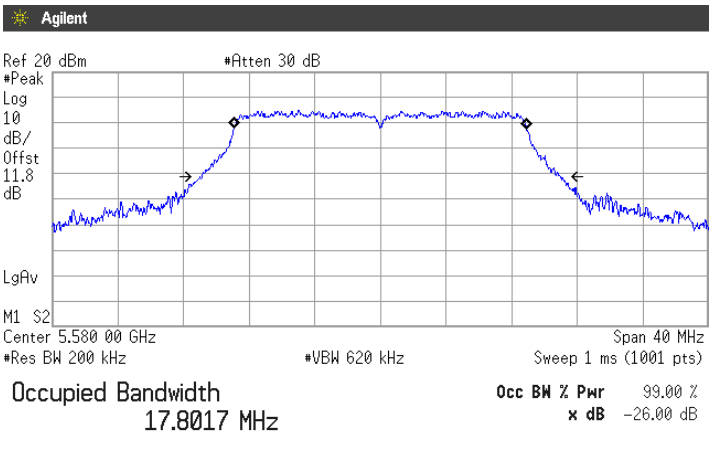

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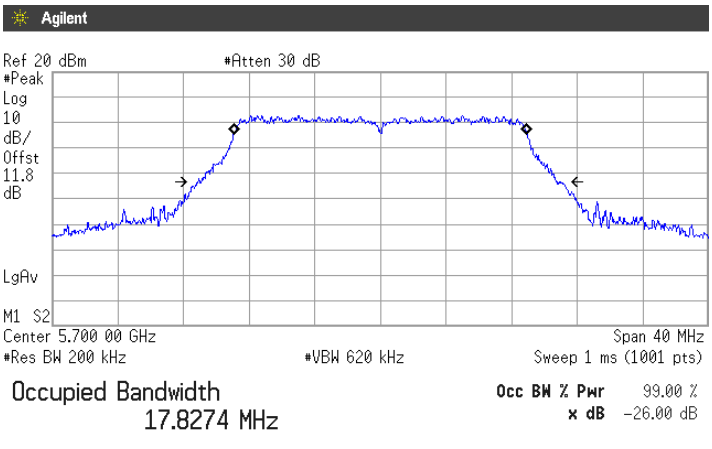
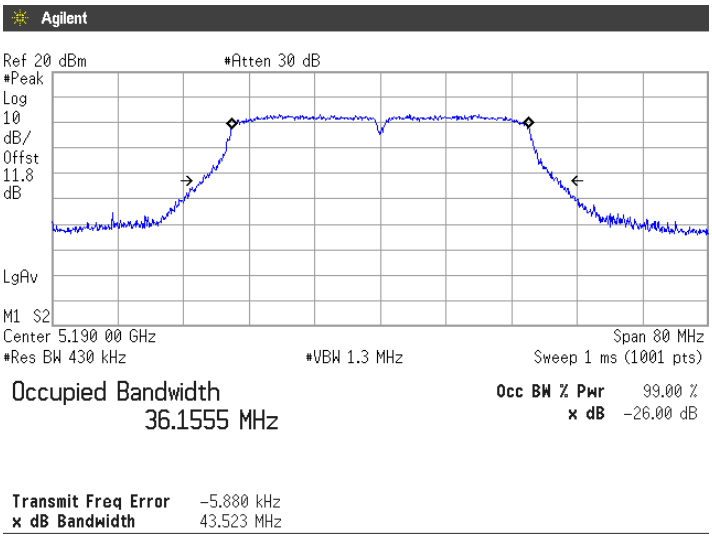
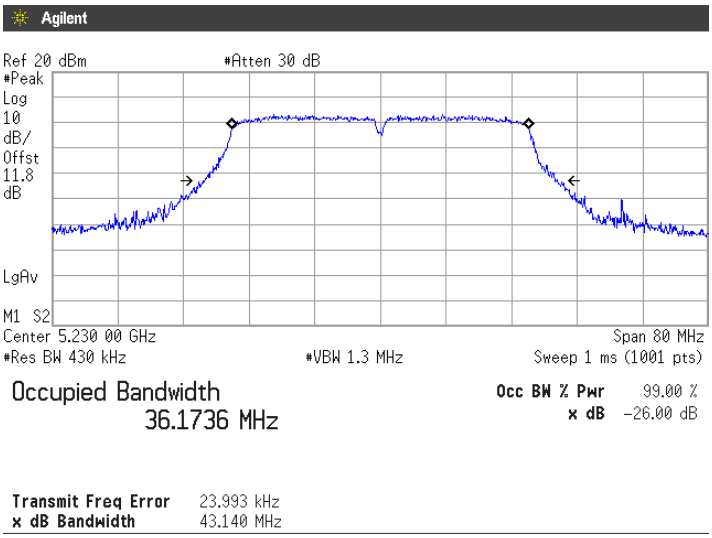


[IEEE802.11n (HT40)]
(5.2GHz Band)

Channel: 38

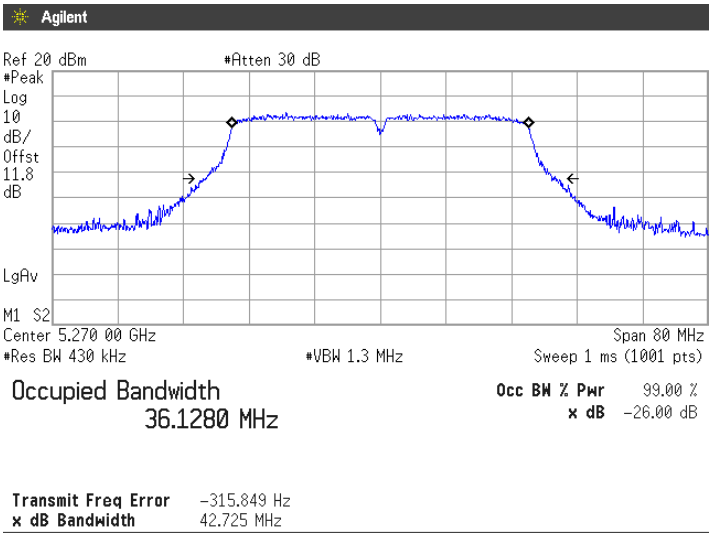


Channel: 46

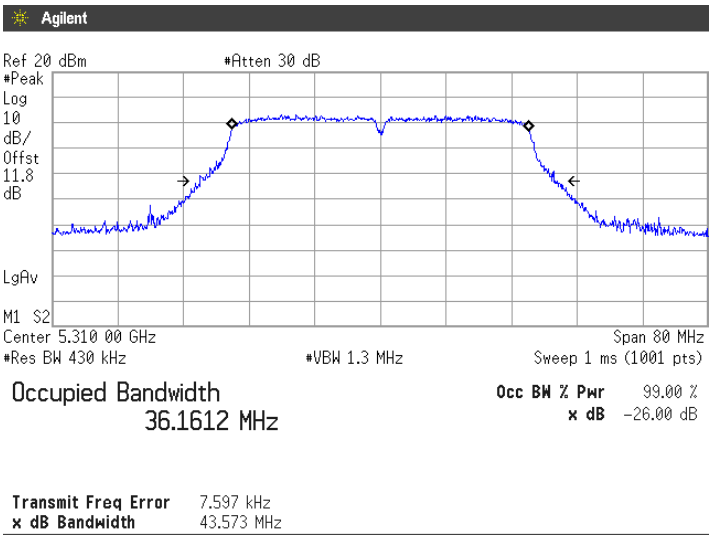


(5.3GHz Band)

Channel: 54

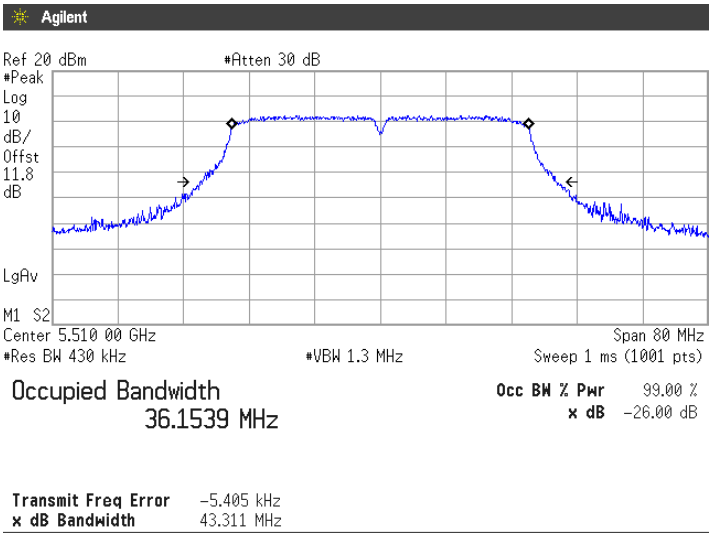


Channel: 62

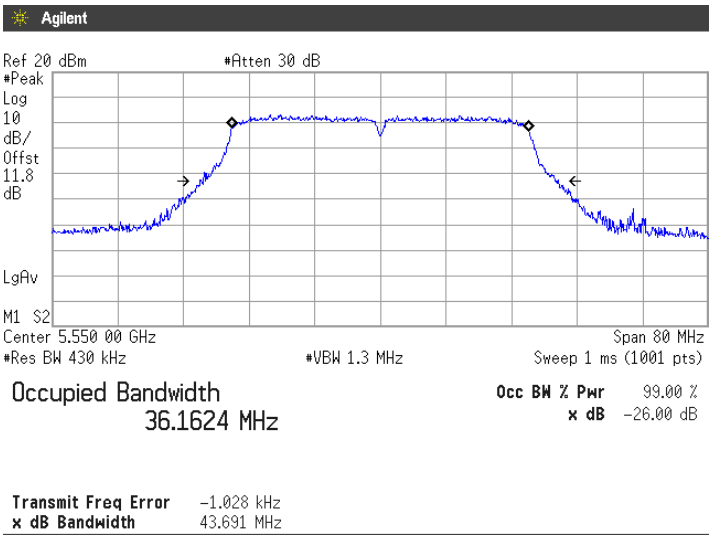


(5.6GHz Band)

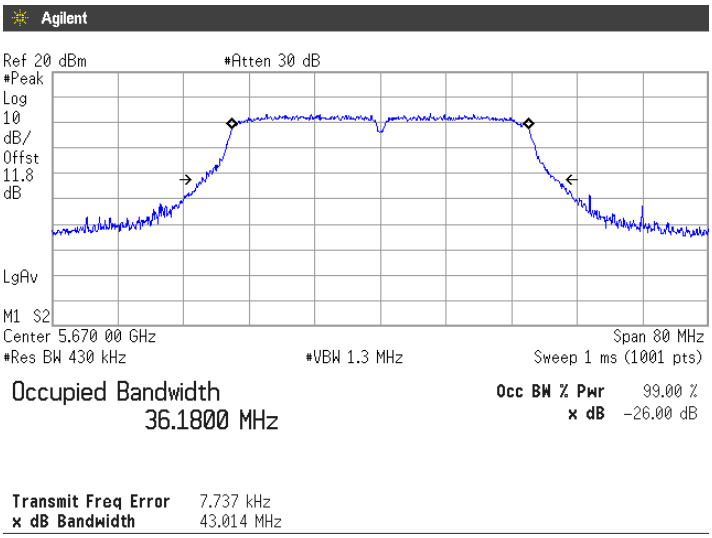
Channel: 102



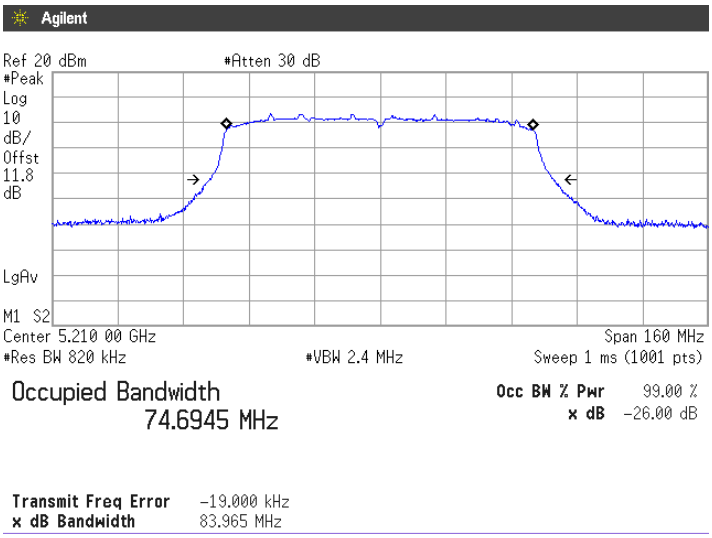
Channel: 110



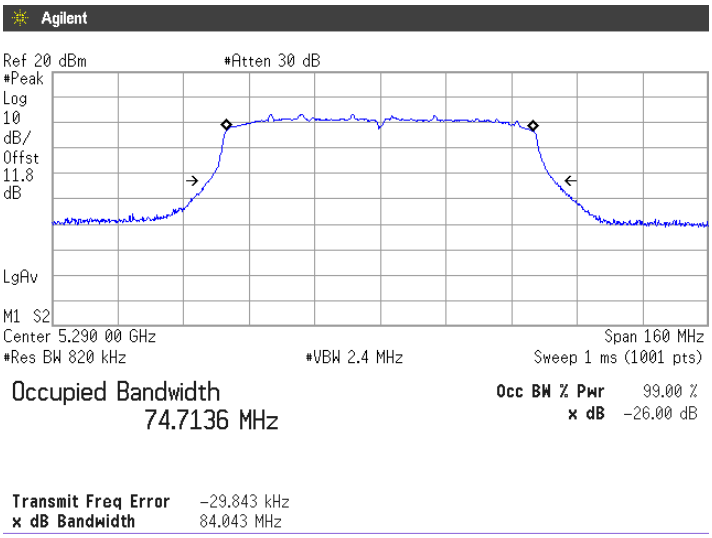
Channel: 134



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

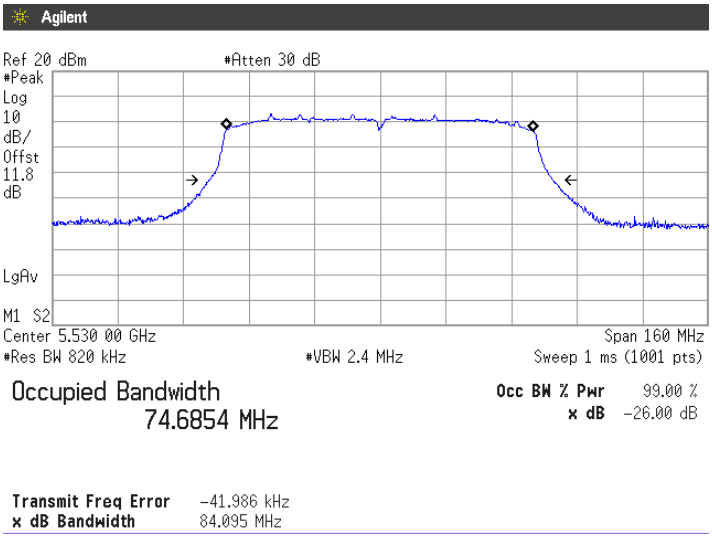


(5.3GHz Band)
Channel: 58

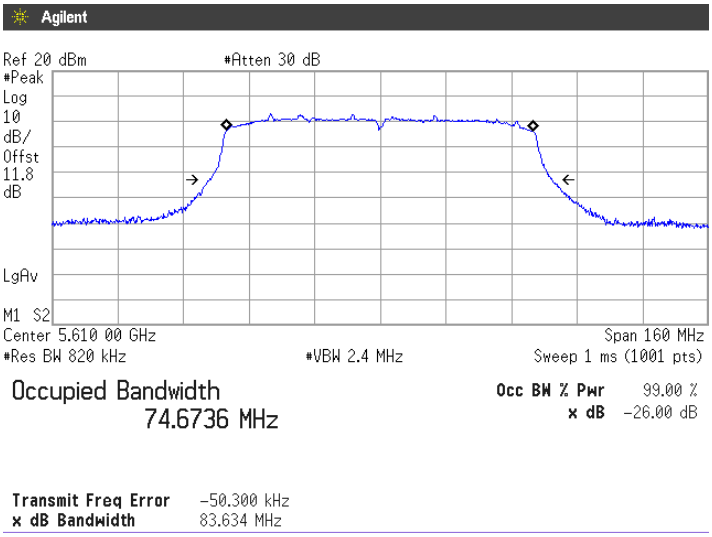


(5.6GHz Band)

Channel: 106



Channel: 122



5. Maximum Conducted Output Power

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

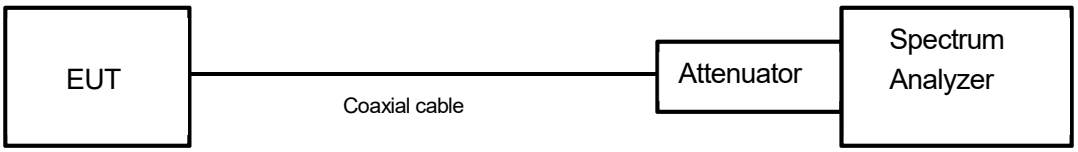
The peak power is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

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



5.2 Limit

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

(2) For the 5.25-5.35GHz and 5.47-5.725GHz 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 26dB emission bandwidth in megahertz.

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

<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	-2.2	23.97
	802.11n HT20				
	802.11n HT40				
	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	-2.2	23.97
		21.494	24.32		
	802.11n HT20	250	23.97		23.97
		22.217	24.47		
	802.11n HT40	250	23.97		23.97
		42.725	27.31		
	802.11ac HT80	250	23.97		23.97
		84.043	30.25		

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	-2.0	23.97
		21.63	24.35		
	802.11n HT20	250	23.97		23.97
		21.852	24.39		
	802.11n HT40	250	23.97		23.97
		43.014	27.34		
	802.11ac HT80	250	23.97		23.97
		83.634	30.22		

5.3 Measurement result

Date : October 31, 2016
Temperature : 20.6 [˚C]
Humidity : 46.5 [%] Test engineer :
Test place : Shielded room No.4 Kazunori Saito

Date : January 20, 2017
Temperature : 20.6 [˚C]
Humidity : 46.5 [%] 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	13.080	1.362	1.370	0.994	0.025	13.105	20.443
	40	5200	12.890					12.915	19.568
	48	5240	12.880					12.905	19.523
	52	5260	14.710	1.364	1.372	0.994	0.025	14.735	29.754
	56	5280	14.800					14.825	30.377
	64	5320	14.850					14.875	30.728
	100	5500	12.600	1.364	1.372	0.994	0.025	12.625	18.304
	116	5580	14.860					14.885	30.799
	140	5700	12.930					12.955	19.749

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

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	13.050	1.276	1.284	0.994	0.027	13.077	20.310
	40	5200	13.150					13.177	20.783
	48	5240	13.080					13.107	20.451
	52	5260	14.730	1.274	1.284	0.992	0.034	14.764	29.950
	56	5280	15.010					15.044	31.944
	64	5320	14.860					14.894	30.860
	100	5500	12.630	1.274	1.284	0.992	0.034	12.664	18.467
	116	5580	14.960					14.994	31.579
	140	5700	12.860					12.894	19.471

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

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	13.210	0.635	0.645	0.984	0.068	13.278	21.271
	46	5230	13.060					13.128	20.549
	54	5270	12.980	0.636	0.645	0.986	0.061	13.041	20.142
	62	5310	12.850					12.911	19.548
	102	5510	12.730	0.634	0.646	0.981	0.081	12.811	19.105
	110	5550	12.880					12.961	19.776
	134	5670	13.020					13.101	20.424

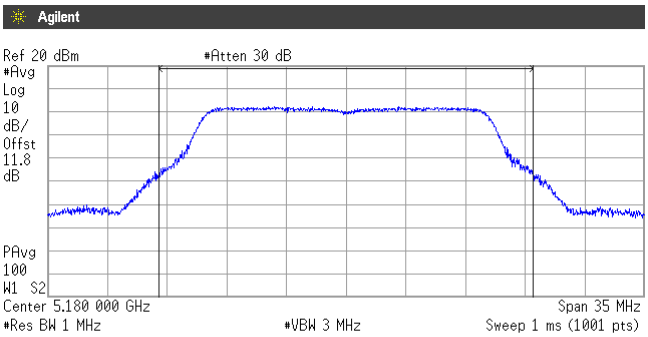
Note: X = On time / (On + Off time), DCF=10log (1/x)

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	12.730	0.247	0.258	0.957	0.190	12.920	19.587
	58	5290	12.370	0.247	0.258	0.957	0.190	12.560	18.029
	106	5530	12.350	0.247	0.258	0.957	0.189	12.539	17.944
	122	5610	12.300	0.247	0.258	0.957	0.190	12.490	17.740

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

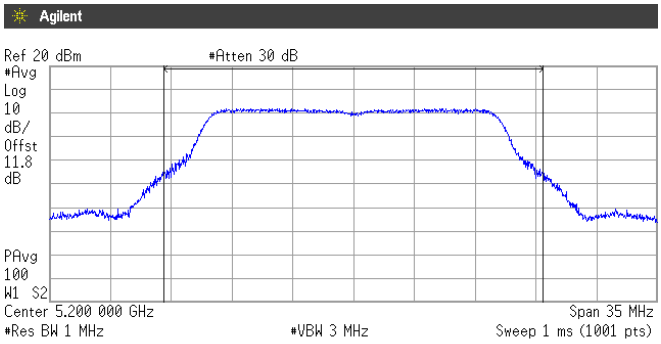
5.4 Trace data
[IEEE802.11a]
(5.2GHz Band)

Channel: 36



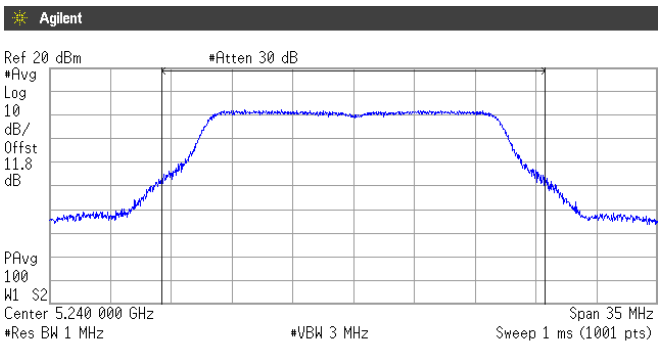
Channel Power	Power Spectral Density
13.08 dBm /21.9510 MHz	-60.33 dBm/Hz

Channel: 40



Channel Power	Power Spectral Density
12.89 dBm /21.7990 MHz	-60.50 dBm/Hz

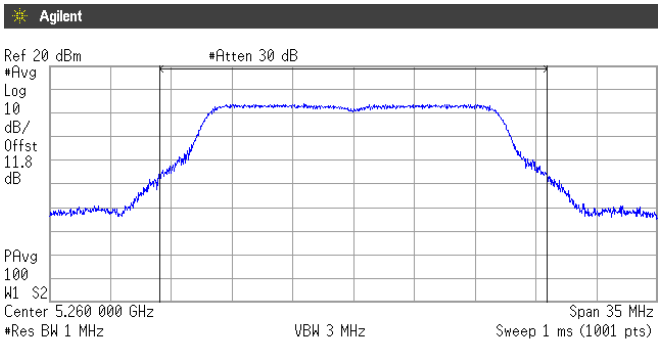
Channel: 48



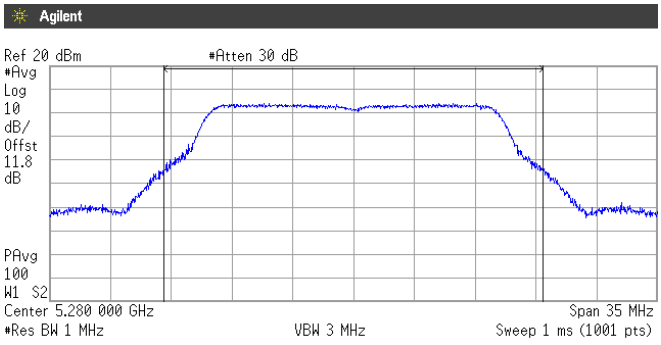
Channel Power	Power Spectral Density
12.88 dBm /22.0450 MHz	-60.55 dBm/Hz

(5.3GHz Band)

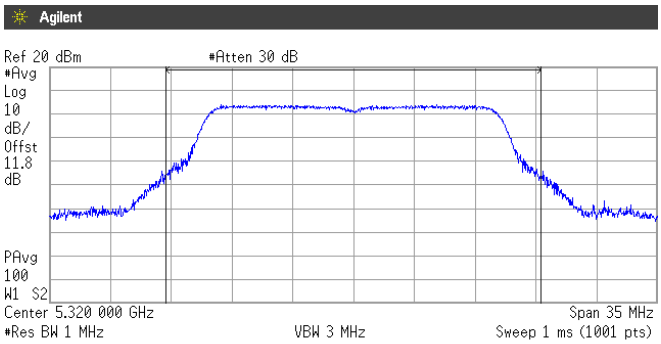
Channel: 52



Channel: 56

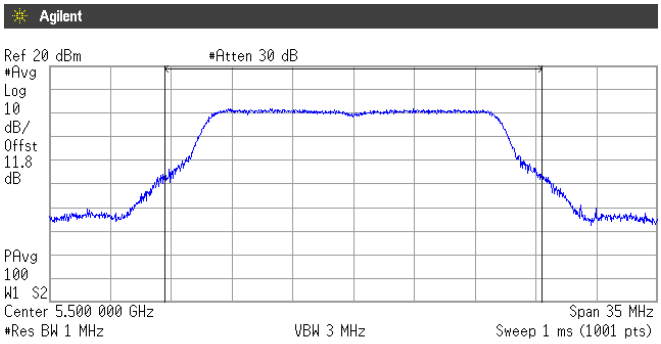


Channel: 64

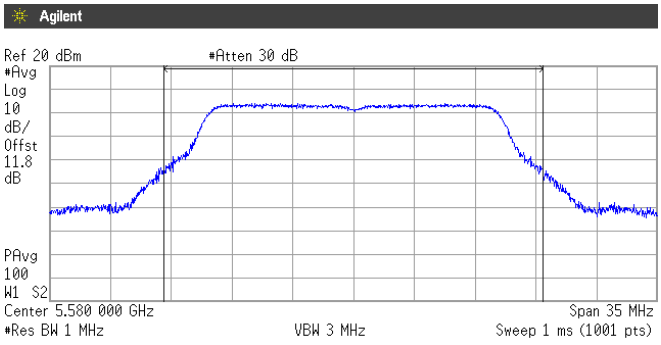


(5.6GHz Band)

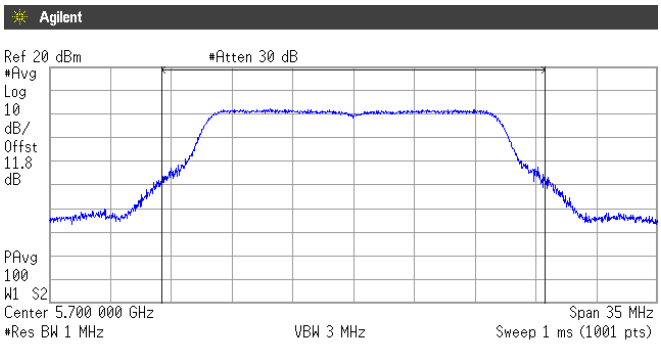
Channel: 100



Channel: 116

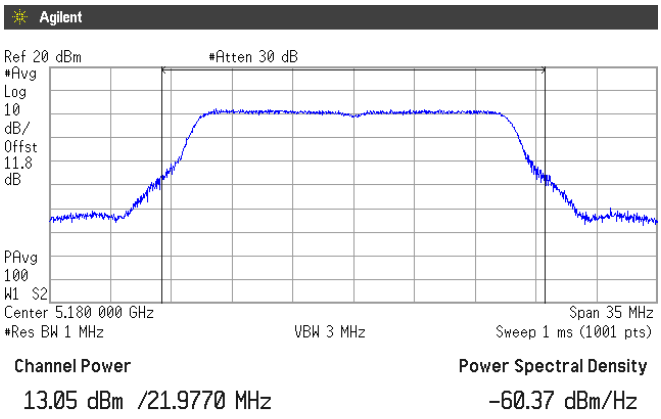


Channel: 140

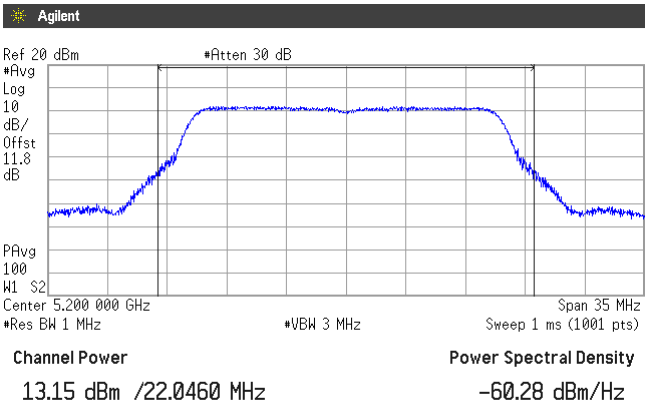


[IEEE802.11n (HT20)]
(5.2GHz Band)

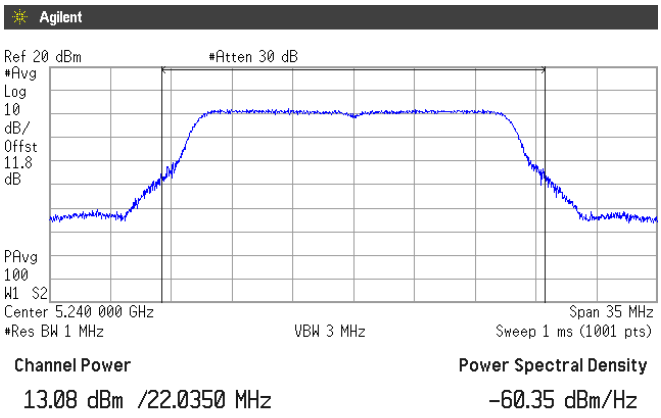
Channel: 36



Channel: 40



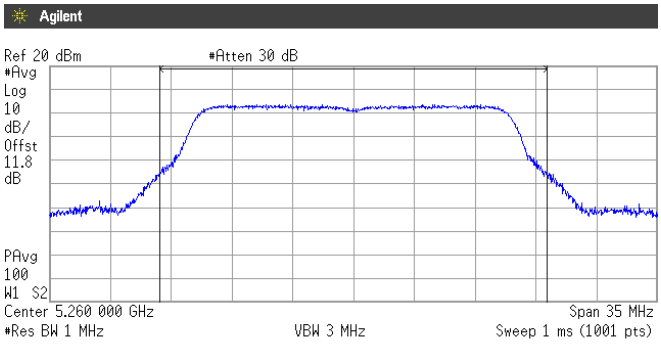
Channel: 48



Zacta

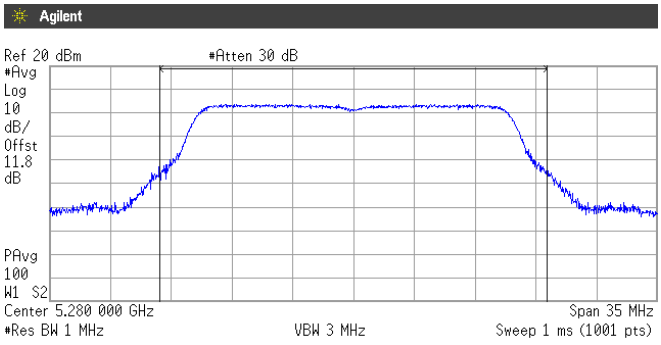
(5.3GHz Band)

Channel: 52



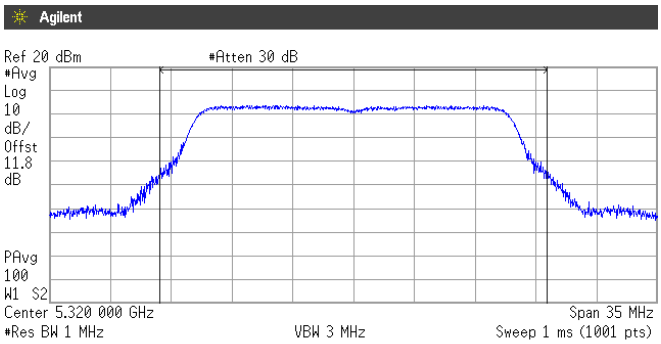
Channel Power	Power Spectral Density
14.73 dBm /22.2170 MHz	-58.73 dBm/Hz

Channel: 56



Channel Power	Power Spectral Density
15.01 dBm /22.2882 MHz	-58.47 dBm/Hz

Channel: 64

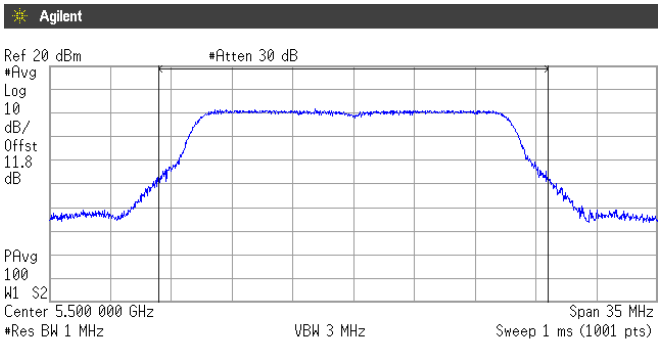


Channel Power	Power Spectral Density
14.86 dBm /22.2810 MHz	-58.62 dBm/Hz

Zacta

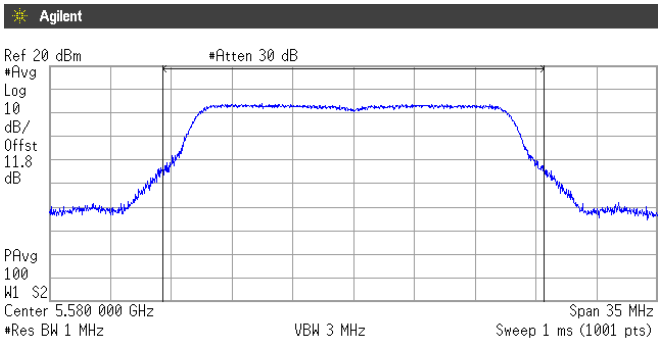
(5.6GHz Band)

Channel: 100



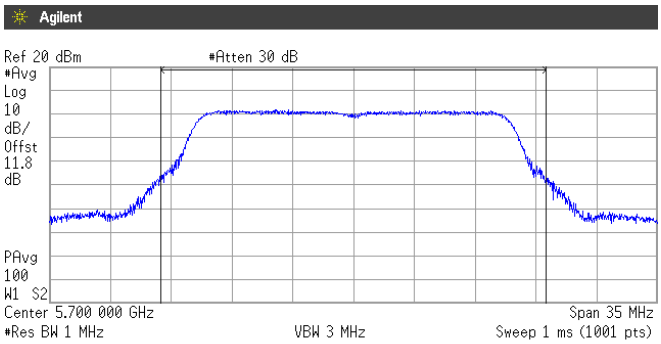
Channel Power	Power Spectral Density
12.63 dBm /22.3240 MHz	-60.85 dBm/Hz

Channel: 116



Channel Power	Power Spectral Density
14.96 dBm /21.8520 MHz	-58.43 dBm/Hz

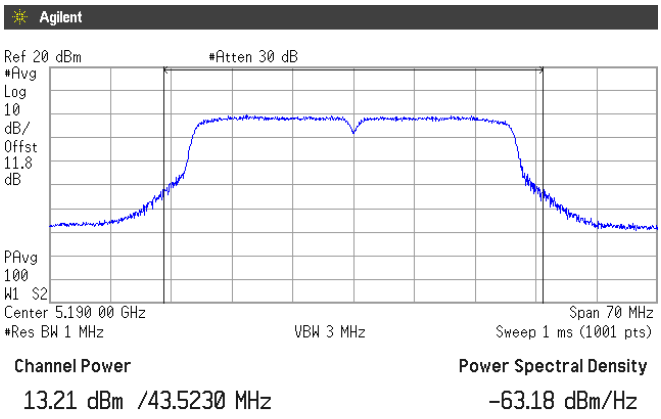
Channel: 140



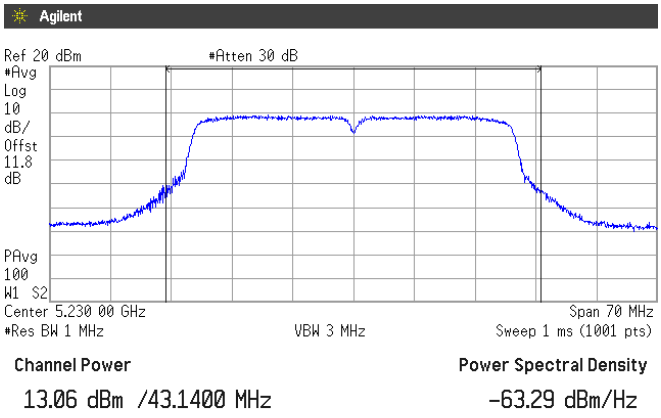
Channel Power	Power Spectral Density
12.86 dBm /22.1050 MHz	-60.59 dBm/Hz

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

Channel: 38



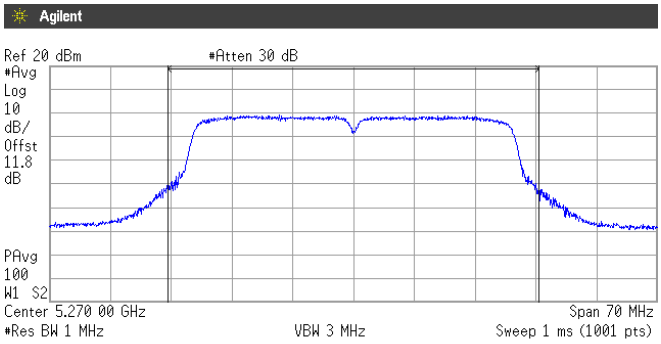
Channel: 46



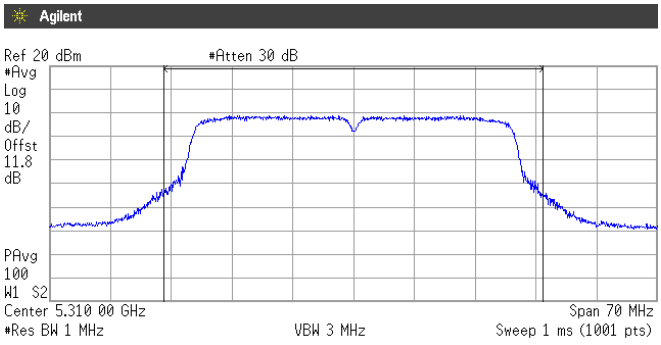
Zacta

(5.3GHz Band)

Channel: 54

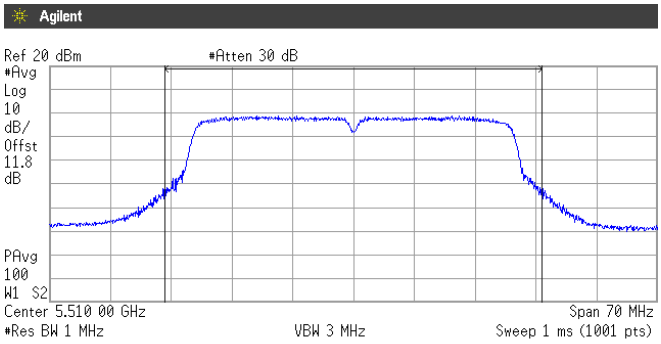


Channel: 62

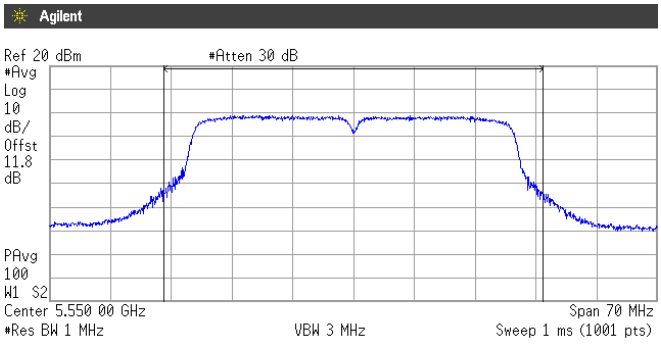


(5.6GHz Band)

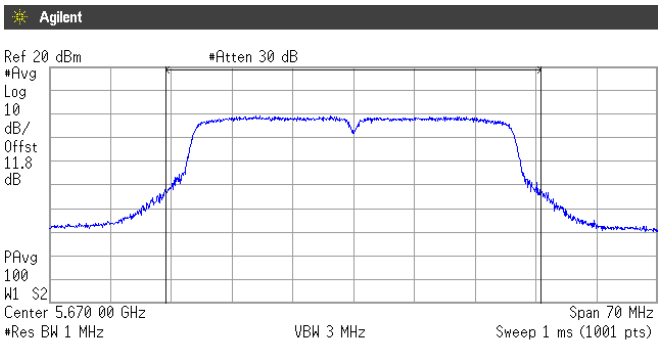
Channel: 102



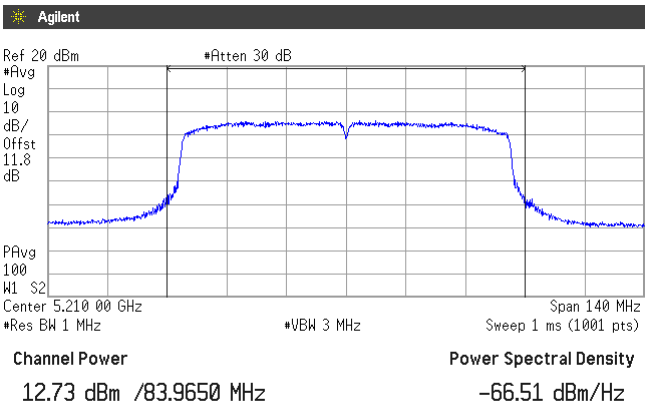
Channel: 110



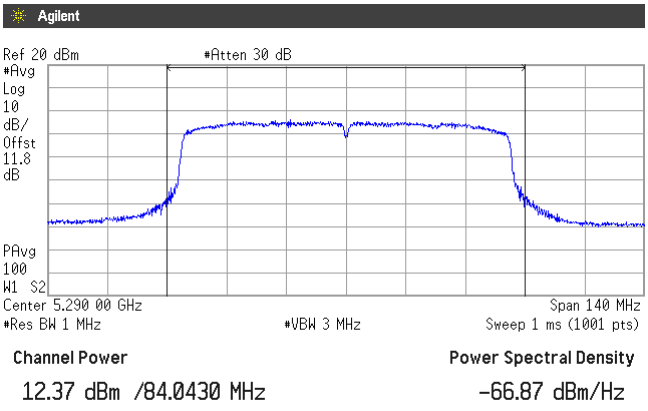
Channel: 134



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

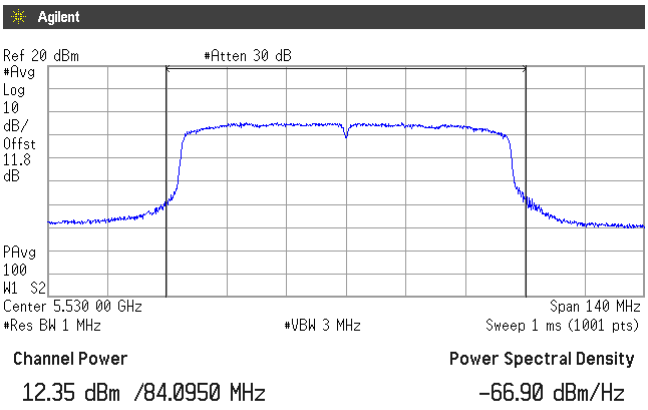


(5.3GHz Band)
Channel: 58

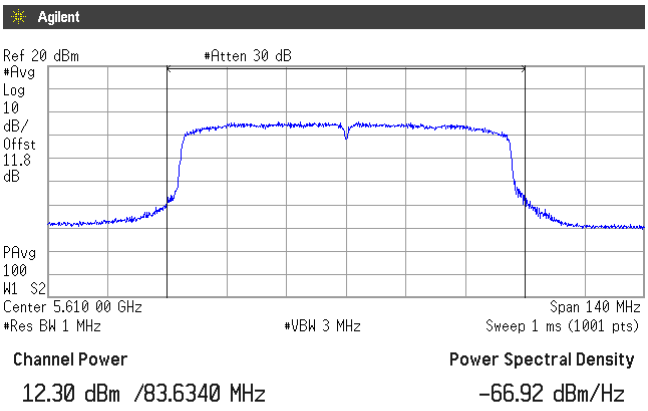


(5.6GHz Band)

Channel: 106



Channel: 122



6. Peak Power Spectral Density

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

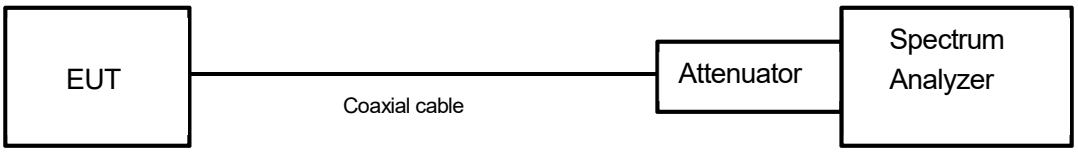
The peak power spectral density is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

The spectrum analyzer is set to;
- RBW=1MHz, VBW=3MHz, Span=25MHz/50MHz/100MHz, 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



6.2 Limit

(1) For mobile and portable client devices in the 5.15-5.25GHz band, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi are used, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6dBi.

(2) For the 5.25-5.35GHz and 5.47-5.725GHz bands, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi are used, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6dBi.

(3) For the 5.725-5.85GHz bands, the maximum power spectral density shall not exceed 30dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6dBi 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 6dBi. 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
5.2GHz Band	-2.2	11dBm/MHz
5.3GHz Band	-2.2	11dBm/MHz
5.6GHz Band	-2.0	11dBm/MHz

6.3 Measurement result

Date : November 1, 2016
Temperature : 21.6 [˚C]
Humidity : 47.9 [%] Test engineer :
Test place : Shielded room No.4 Kazunori Saito

Date : November 4, 2016
Temperature : 23.5 [˚C]
Humidity : 47.5 [%] Test engineer :
Test place : Shielded room No.4 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	2.215	1.362	1.370	0.994	0.025	2.240
	40	5200	2.375					2.400
	48	5240	1.830					1.855
	52	5260	3.926	1.364	1.372	0.994	0.025	3.951
	56	5280	3.909					3.934
	64	5320	3.905					3.930
	100	5500	1.908	1.364	1.372	0.994	0.025	1.933
	116	5580	4.161					4.186
	140	5700	2.432					2.457

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

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	1.936	1.276	1.284	0.994	0.027	1.963
	40	5200	1.818					1.845
	48	5240	1.942					1.969
	52	5260	4.042	1.274	1.284	0.992	0.034	4.076
	56	5280	3.982					4.016
	64	5320	4.097					4.131
	100	5500	1.419	1.274	1.284	0.992	0.034	1.453
	116	5580	4.297					4.331
	140	5700	2.208					2.242

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

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	-0.632	0.635	0.645	0.984	0.068	-0.564
	46	5230	-0.732					-0.664
	54	5270	-0.835	0.636	0.645	0.986	0.061	-0.774
	62	5310	-1.011					-0.950
	102	5510	-1.120	0.634	0.646	0.981	0.081	-1.039
	110	5550	-1.009					-0.928
	134	5670	-1.007					-0.926

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

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	-4.390	0.247	0.258	0.957	0.190	-4.200
	58	5290	-4.375	0.247	0.258	0.957	0.190	-4.185
	106	5530	-4.422	0.247	0.258	0.957	0.189	-4.233
	122	5610	-4.165	0.247	0.258	0.957	0.190	-3.975

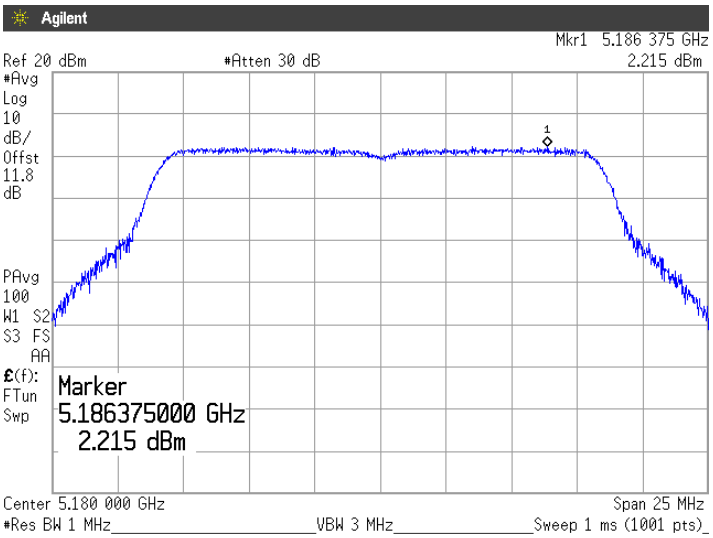
Note: X = On time / (On + Off time), DCF=10log (1/x)

6.4 Trace data

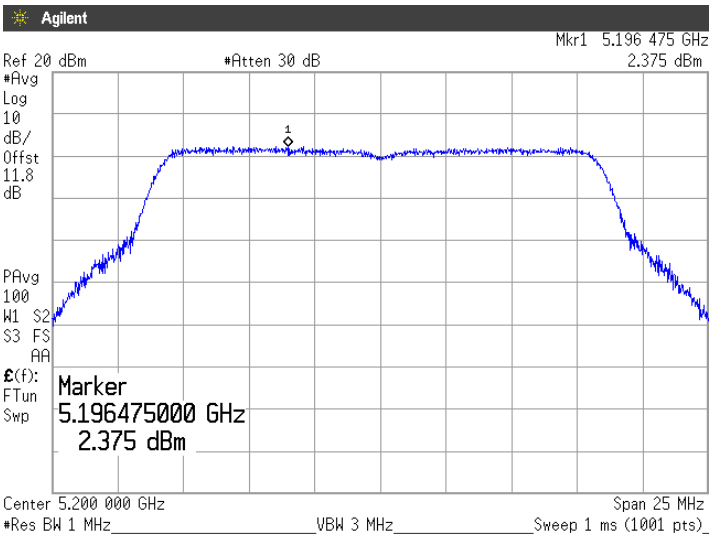
[IEEE802.11a]

(5.2GHz Band)

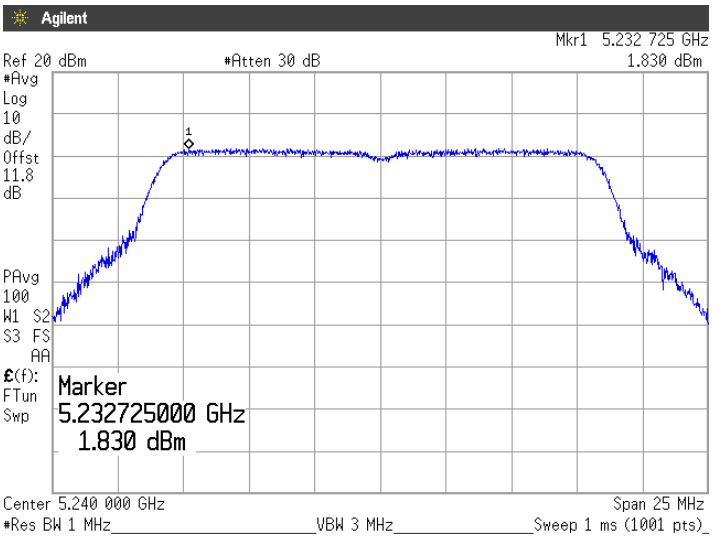
Channel: 36



Channel: 40

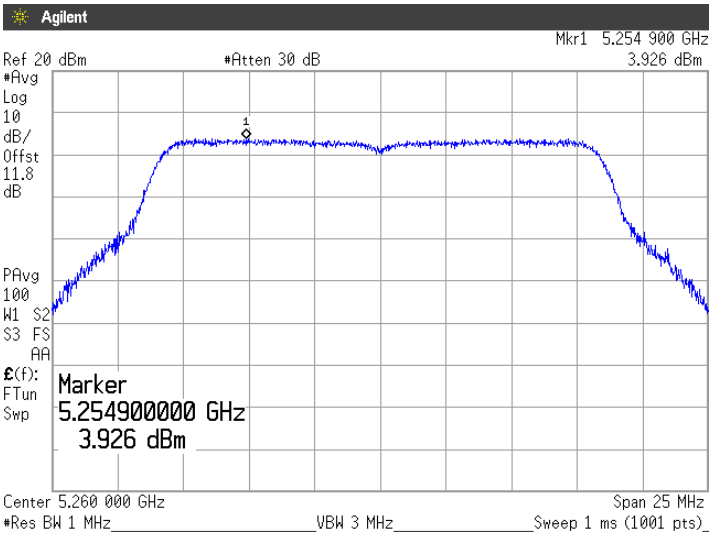


Channel: 48

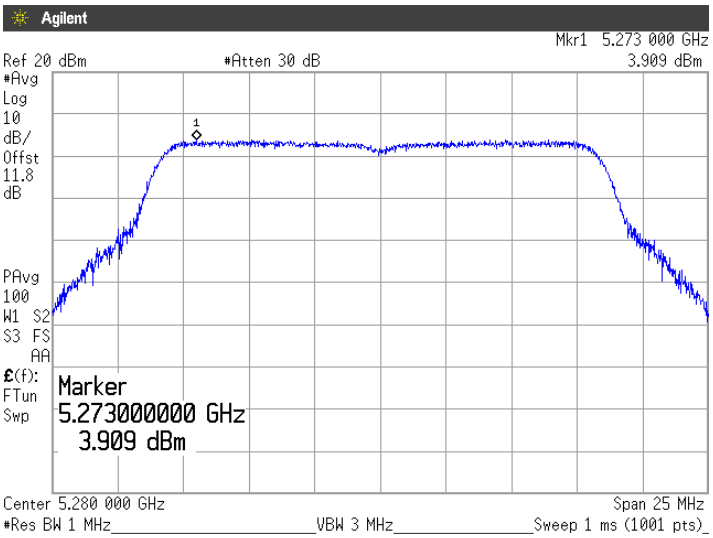


(5.3GHz Band)

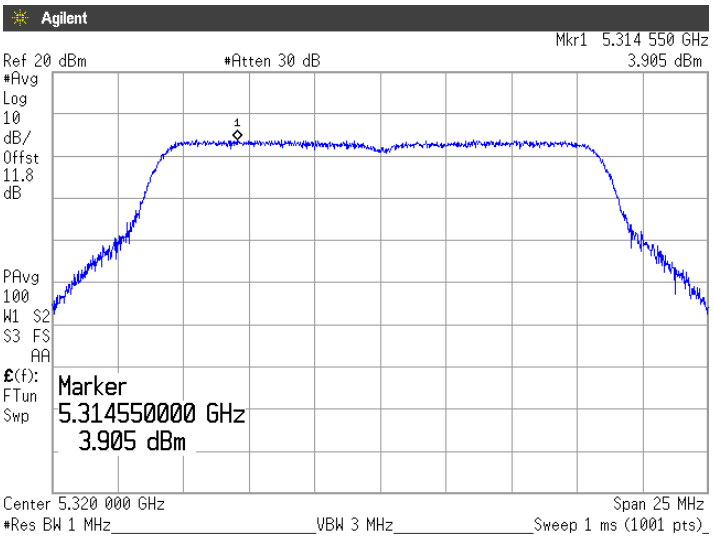
Channel: 52



Channel: 56

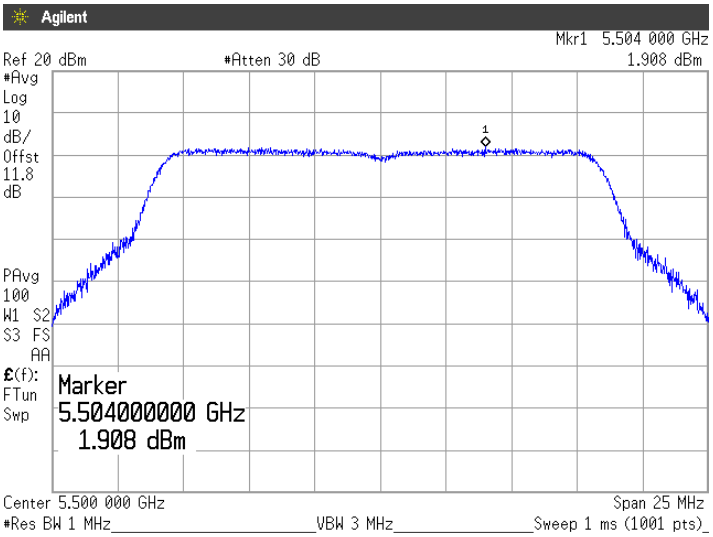


Channel: 64

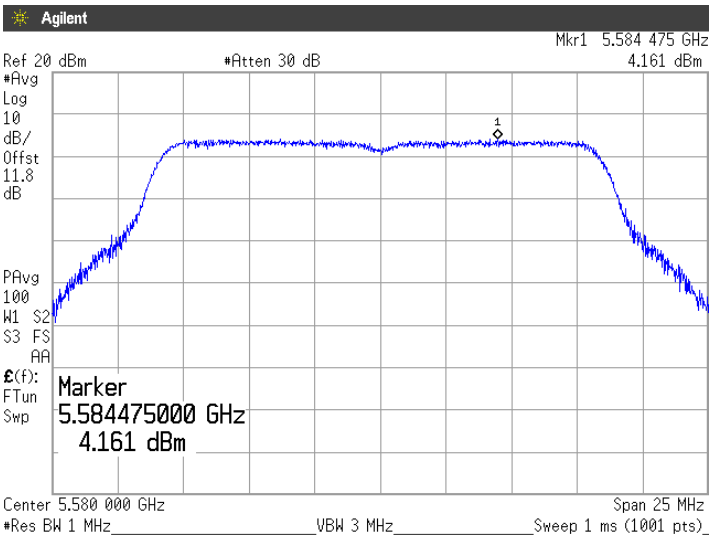


(5.6GHz Band)

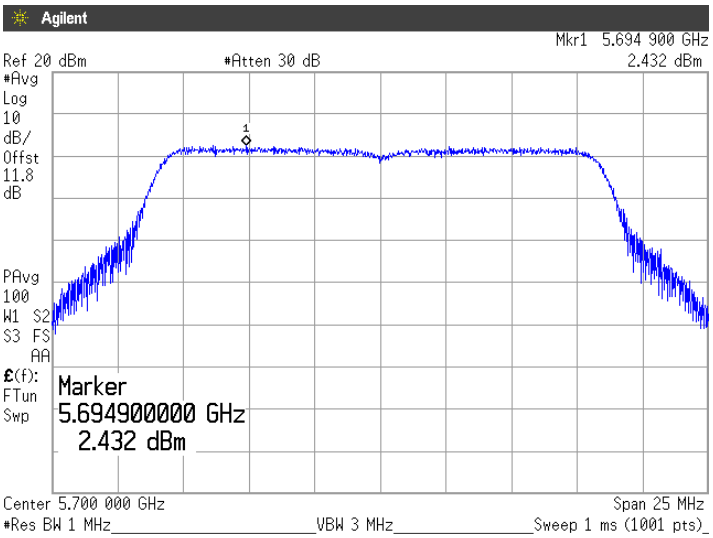
Channel: 100



Channel: 116

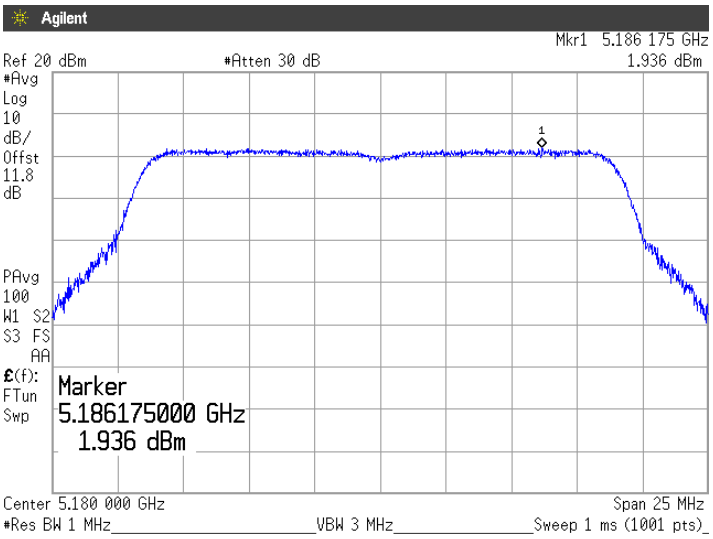


Channel: 140

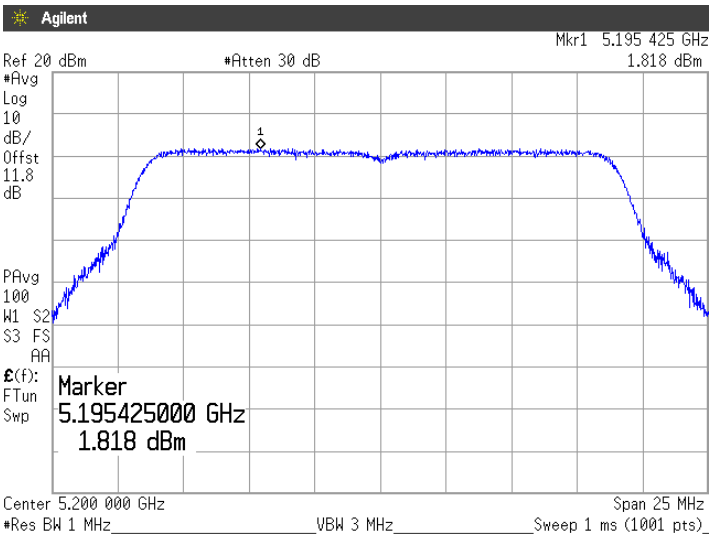


[IEEE802.11n (HT20)]
(5.2GHz Band)

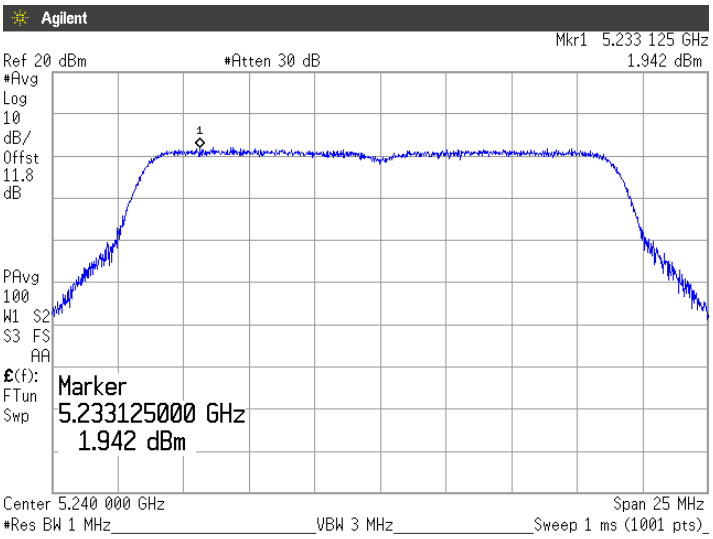
Channel: 36



Channel: 40

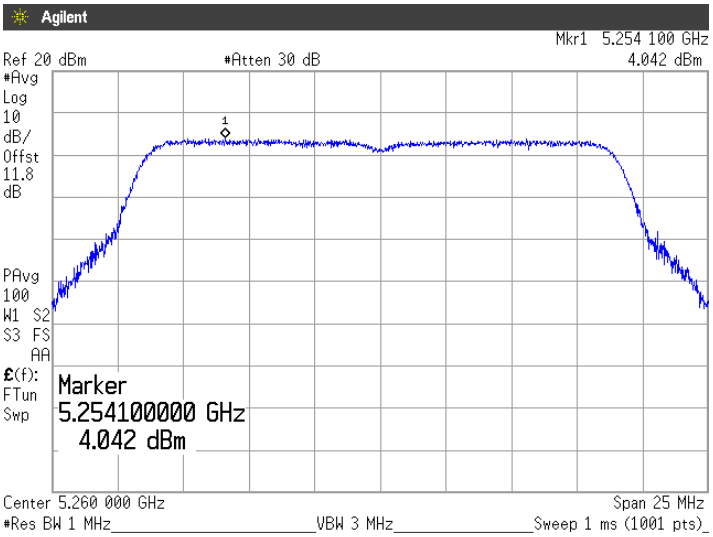


Channel: 48

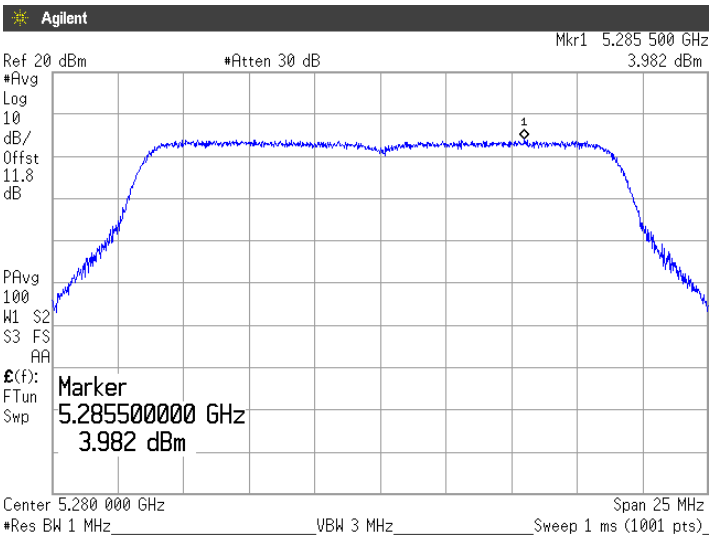


(5.3GHz Band)

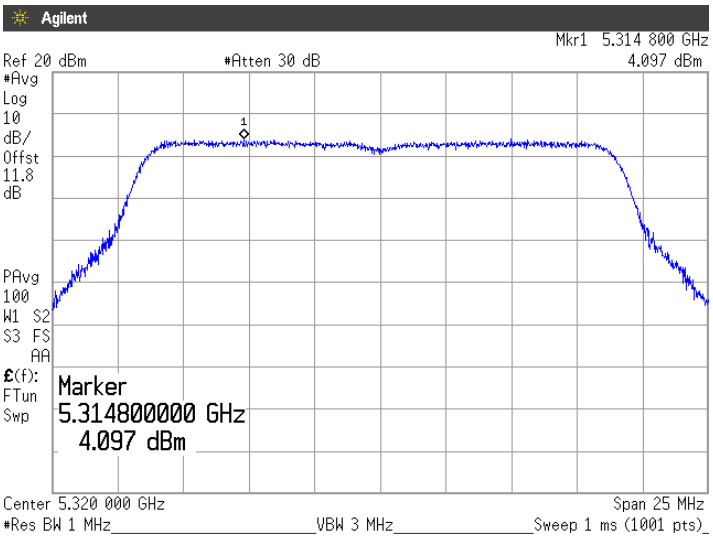
Channel: 52



Channel: 56

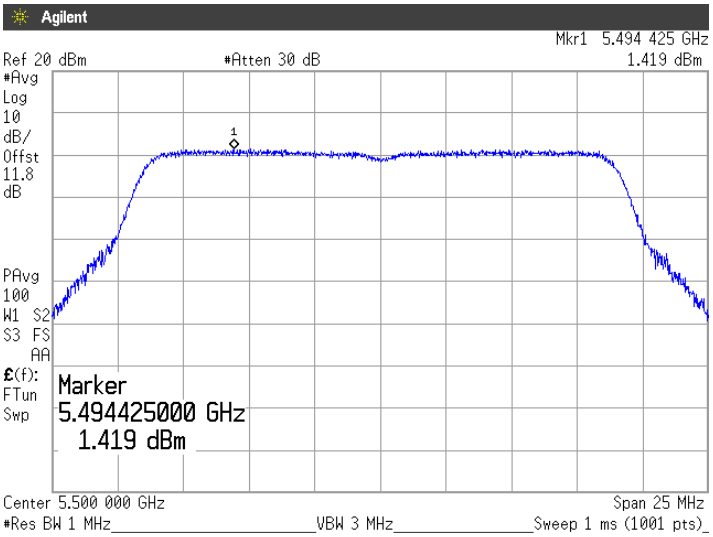


Channel: 64

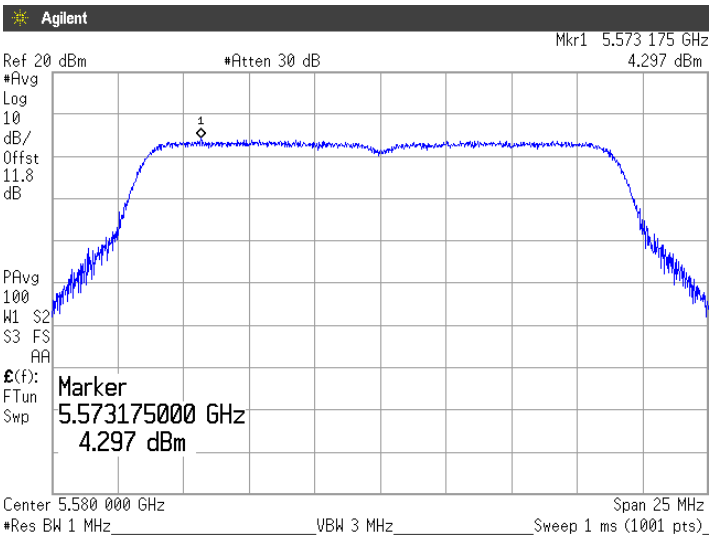


(5.6GHz Band)

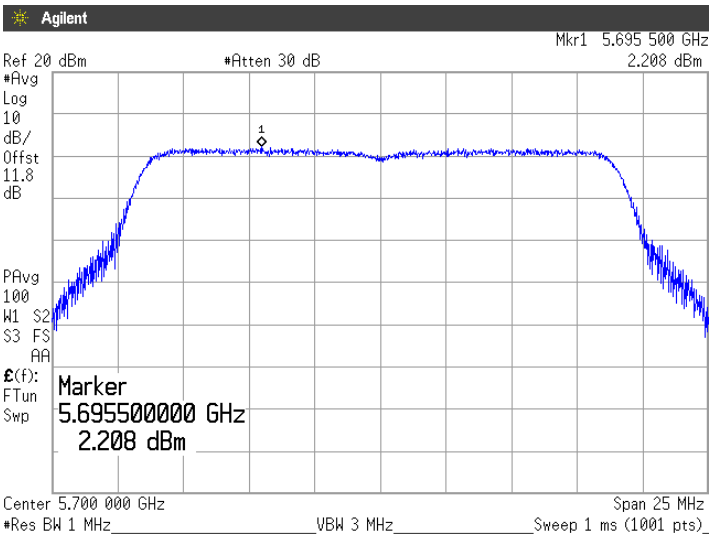
Channel: 100



Channel: 116

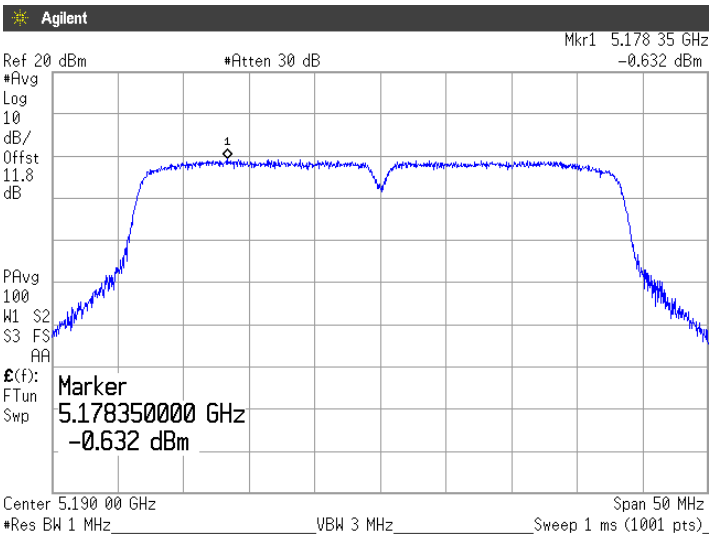


Channel: 140

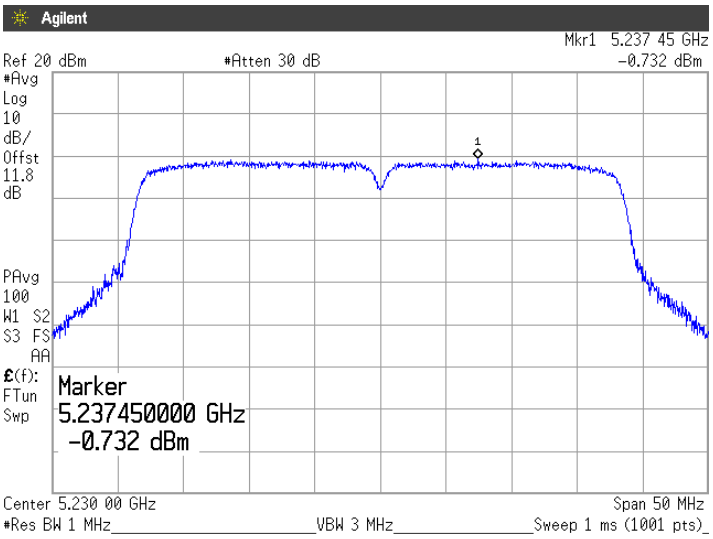


[IEEE802.11n (HT40)]
(5.2GHz Band)

Channel: 38

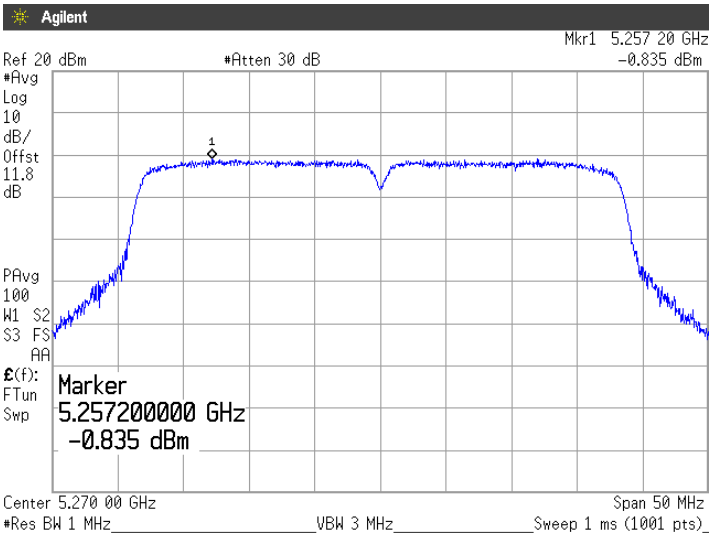


Channel: 46

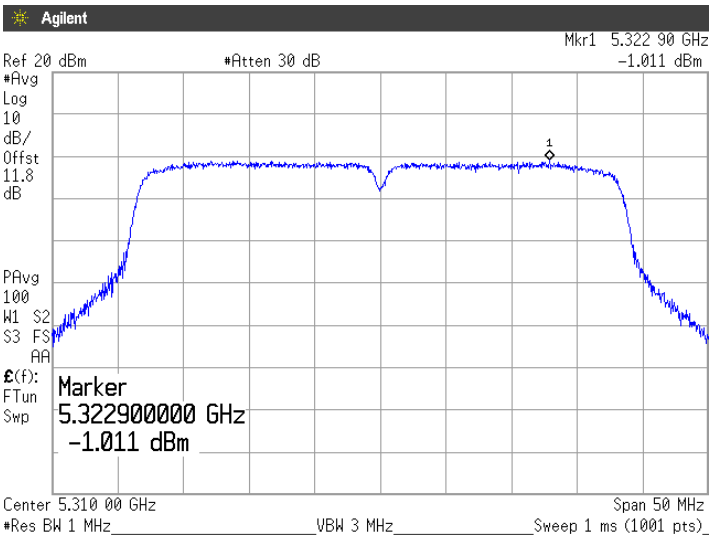


(5.3GHz Band)

Channel: 54

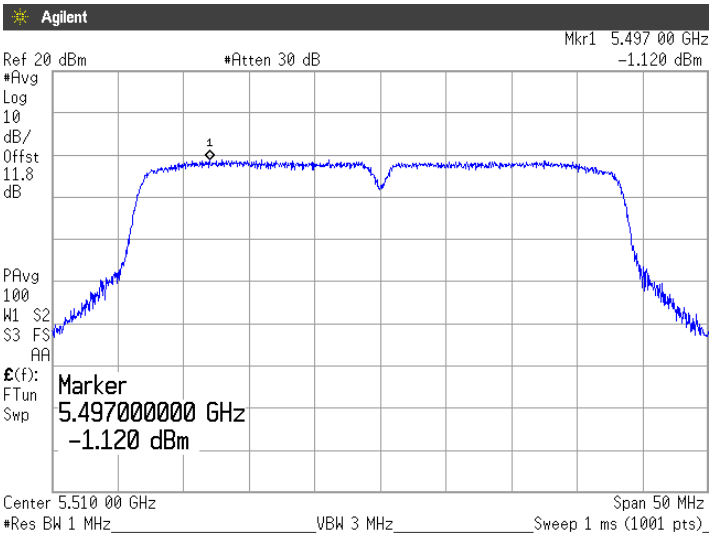


Channel: 62

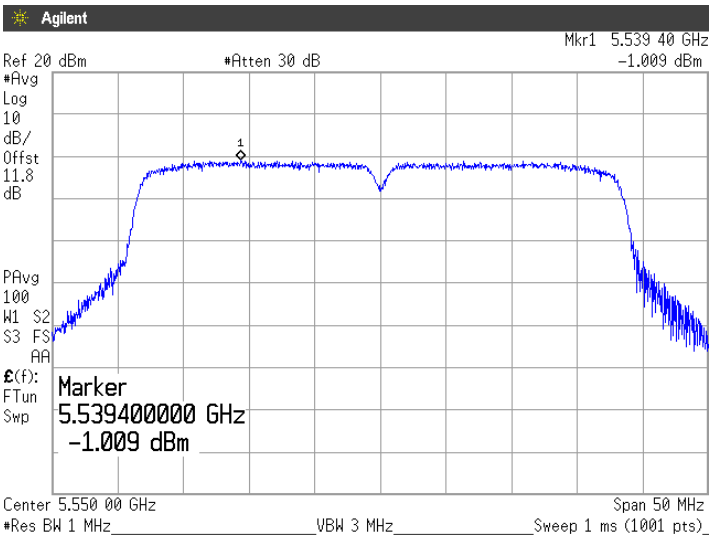


(5.6GHz Band)

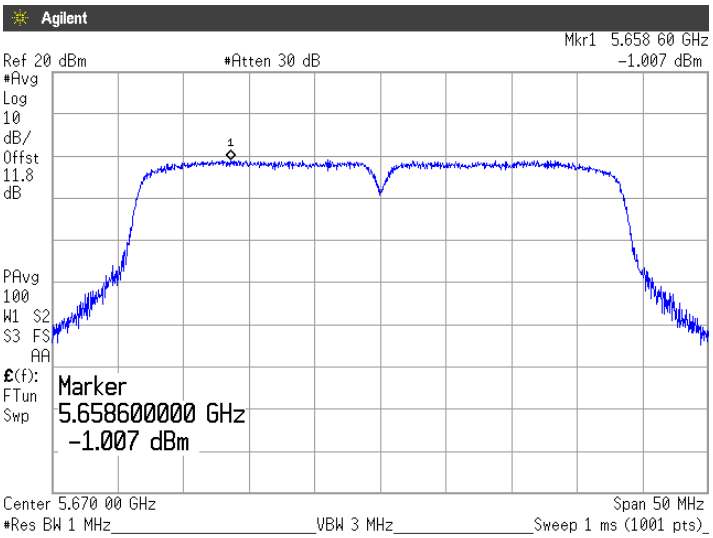
Channel: 102



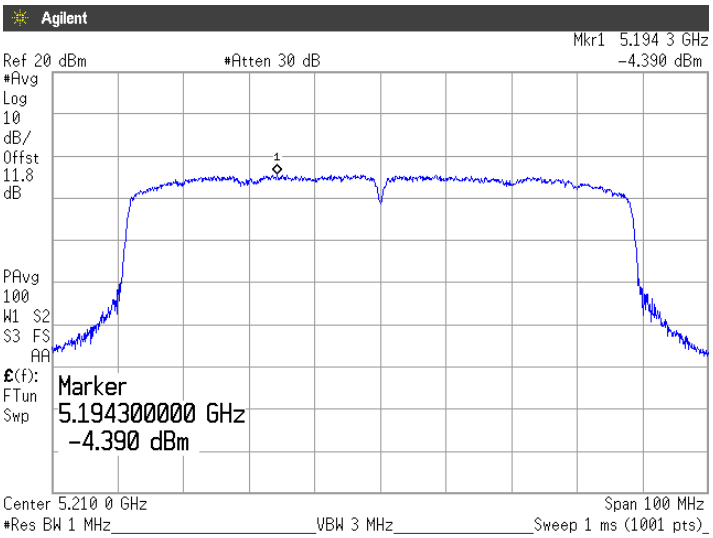
Channel: 110



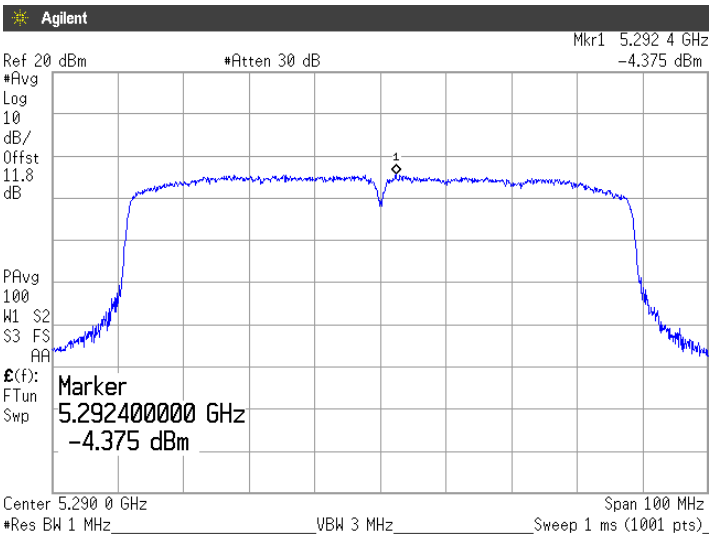
Channel: 134



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

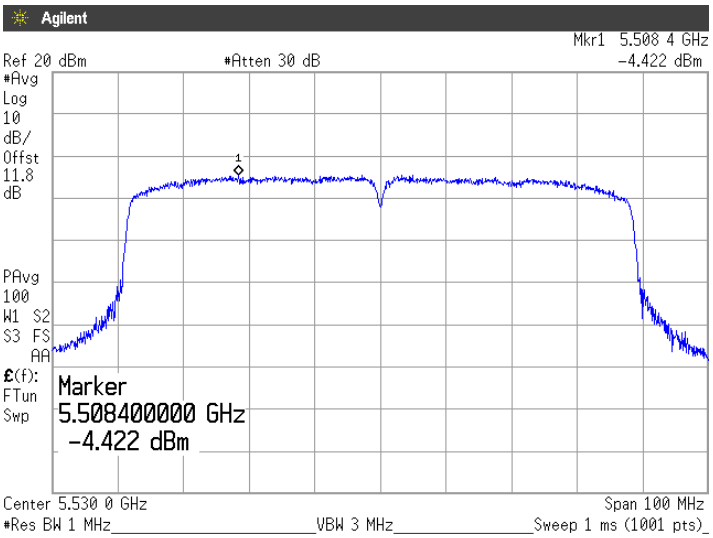


(5.3GHz Band)
Channel: 58

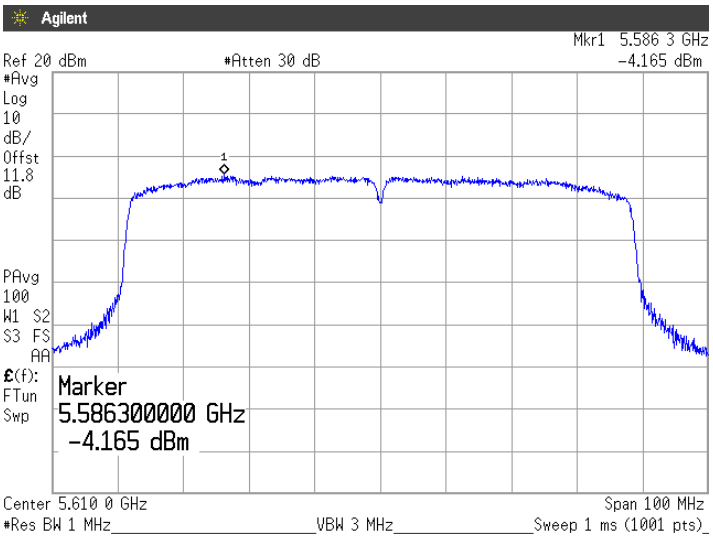


(5.6GHz Band)

Channel: 106



Channel: 122



7. Radiated Emissions (Restricted Bands of Operation)

7.1 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.

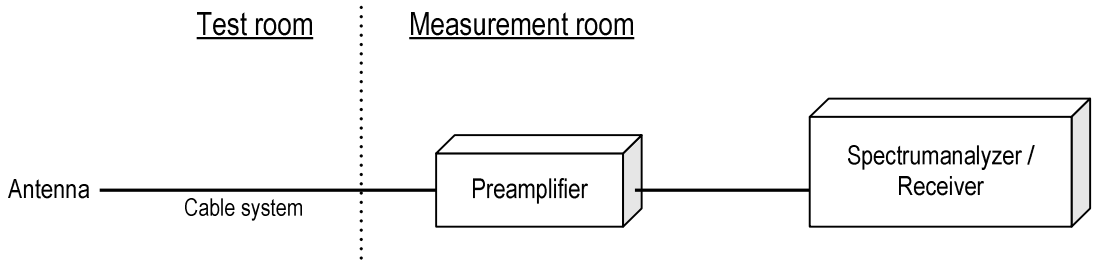
Test method	:	ANSI C63.10
Frequency range	:	30MHz to 40GHz
Test place	:	3m Semi-anechoic chamber No.1
EUT was placed on	:	Styrofoam table / (W)1.0m × (D)1.0m ×(H)0.8m (below 1GHz) Styrofoam table / (W)1.5m × (D)1.0m ×(H)1.5m (above 1GHz)
Antenna distance	:	3m
Test receiver setting		Below 1GHz
- Detector	:	Quasi-peak
- Bandwidth	:	120kHz
Spectrum analyzer setting		Above 1GHz
- Peak	:	RBW=1MHz, VBW=3MHz, Span=0Hz, Sweep=auto, Detector=Peak Trace mode=Max hold
- Average	:	RBW=1MHz, VBW=3MHz, Span=0Hz, 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 1GHz) and 1.5m (above 1GHz) 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.
- 5.2GHz Band, 5.3GHz Band, 5.6GHz 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	1.362	1.370	99.416	-
	W53	1.364	1.372	99.417	-
	W56	1.364	1.372	99.417	-
802.11n (20MHz)	W52	1.276	1.284	99.377	-
	W53	1.274	1.284	99.221	-
	W56	1.274	1.284	99.221	-
802.11n (40MHz)	W52	0.635	0.645	98.450	-
	W53	0.636	0.645	98.605	-
	W56	0.634	0.646	98.142	-
802.11ac (80MHz)	W52	0.247	0.258	95.728	0.190
	W53	0.247	0.258	95.728	0.190
	W56	0.247	0.258	95.728	0.190

7.2 Calculation method

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

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

7.3 Limit

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

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

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

(4) For transmitters operating in the 5.725-5.85GHz band: all emissions within the frequency range from the band edge to 10MHz above or below the band edge shall not exceed an EIRP of -17dBm/MHz; for frequencies 10MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27dBm/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 1000MHz, 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.

7.4 Test data

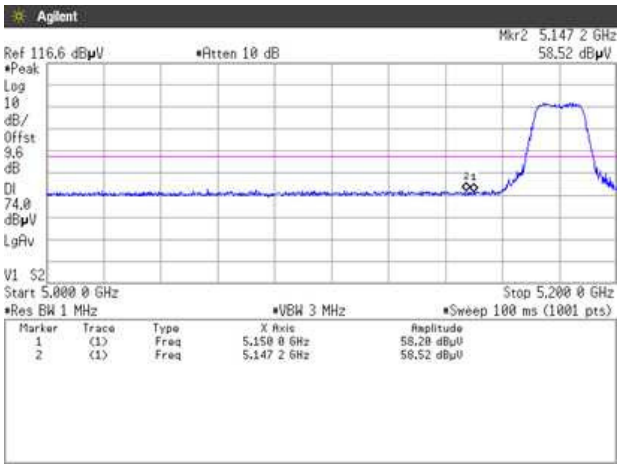
Date	:	December 19, 2016			
Temperature	:	22.3 [˚C]			
Humidity	:	23.9 [%]	Test engineer	:	
Test place	:	3m Semi-anechoic chamber			Taiki Watanabe

Date	:	January 26, 2017			
Temperature	:	23.2 [˚C]			
Humidity	:	24.9 [%]	Test engineer	:	
Test place	:	3m Semi-anechoic chamber			Taiki Watanabe

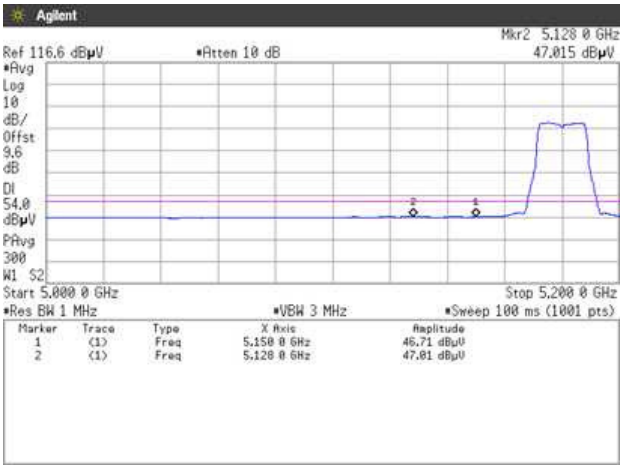
7.4.1 Restricted Bandedge

[IEEE802.11a]

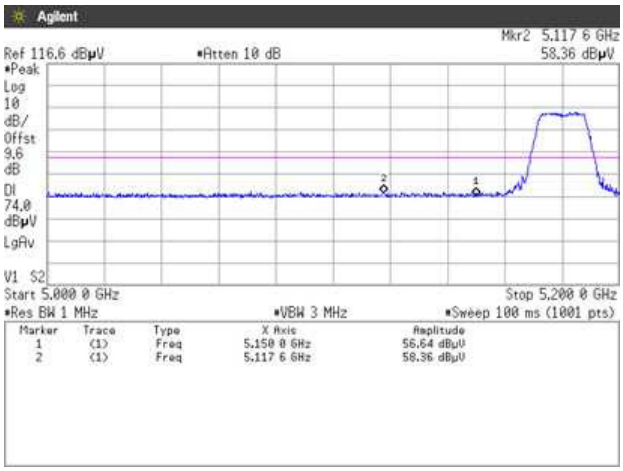
5.2GHz Band, Channel Low
Horizontal
Peak



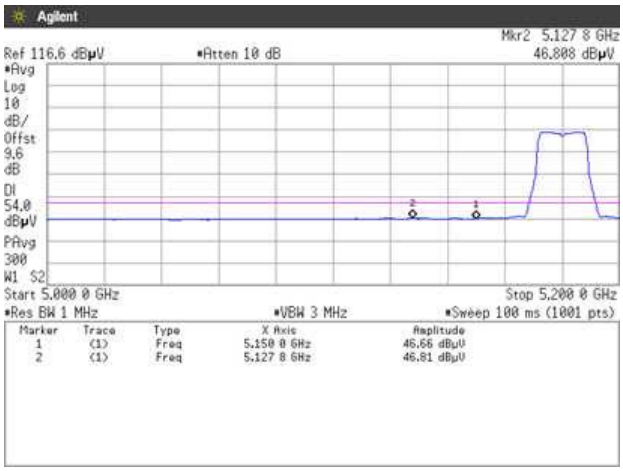
Average



Vertical
Peak



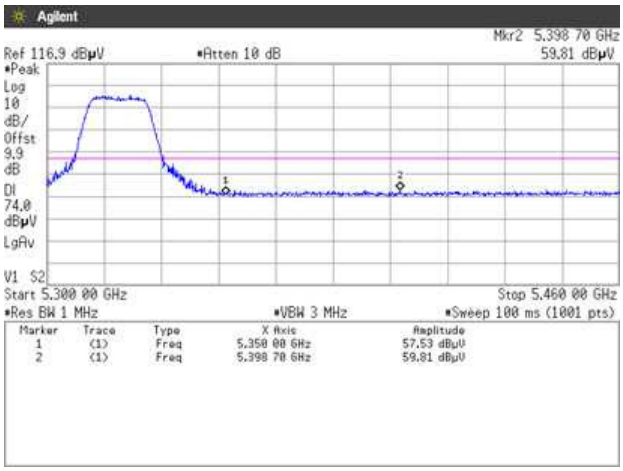
Average



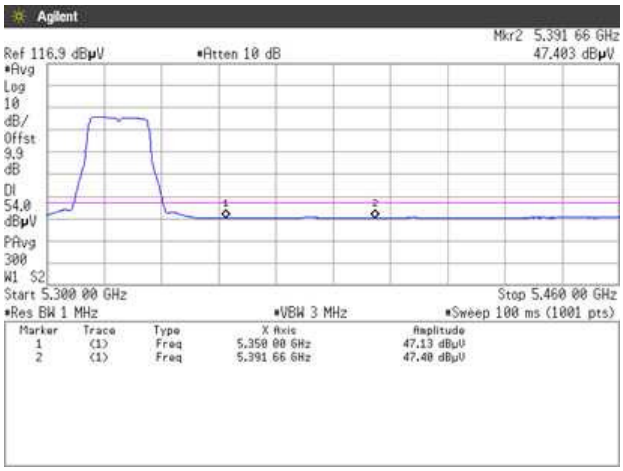
Zacta

[IEEE802.11a]

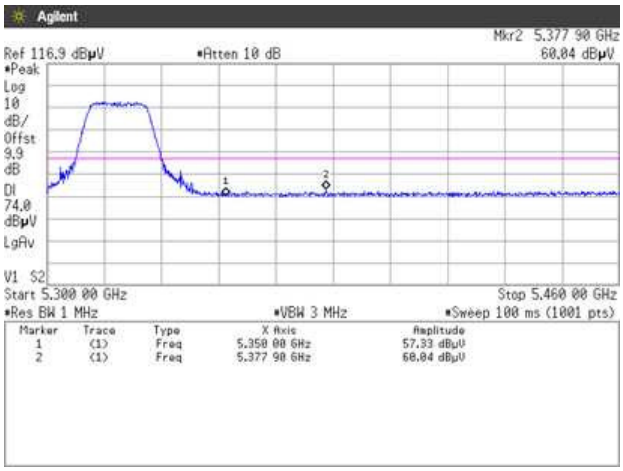
5.3GHz Band, Channel High
Horizontal
Peak



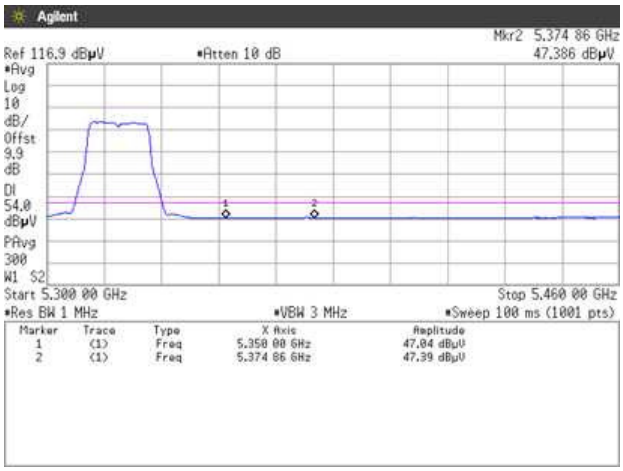
Average



Vertical
Peak



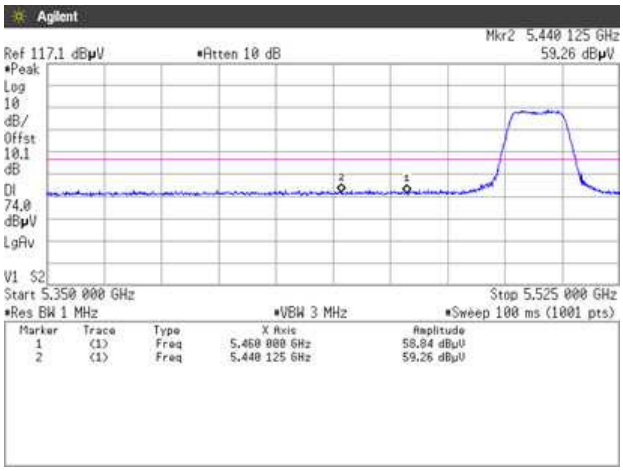
Average



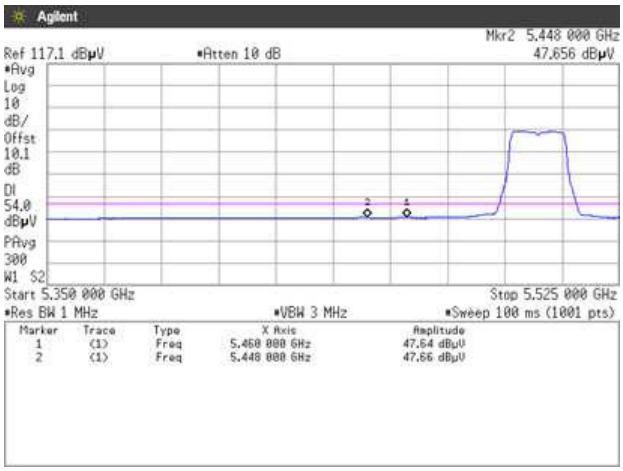
Zacta

[IEEE802.11a]

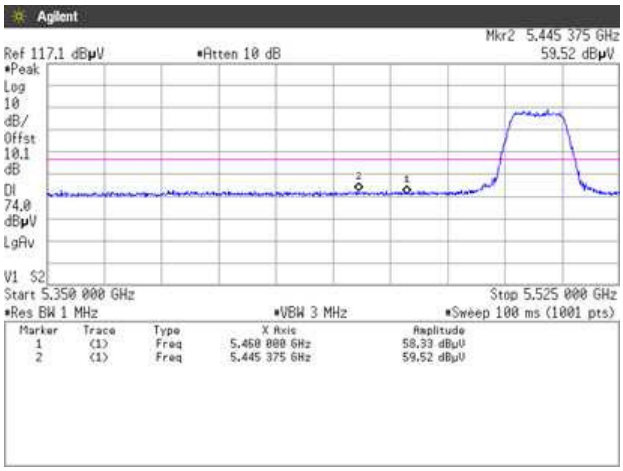
5.6GHz Band, Channel Low
Horizontal
Peak



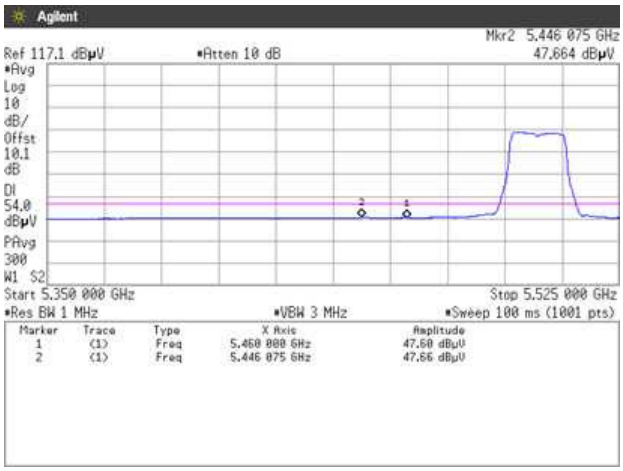
Average



Vertical
Peak



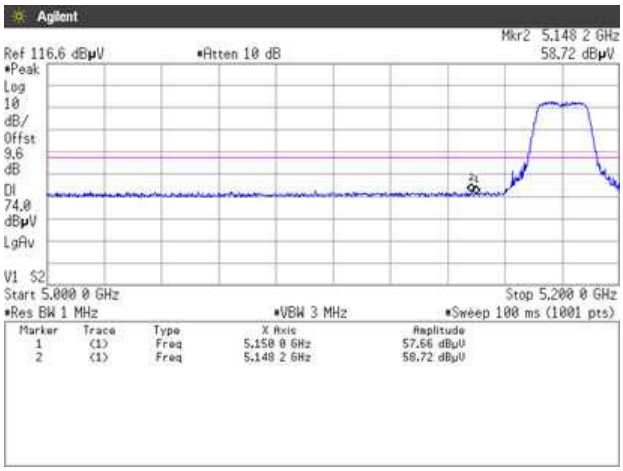
Average



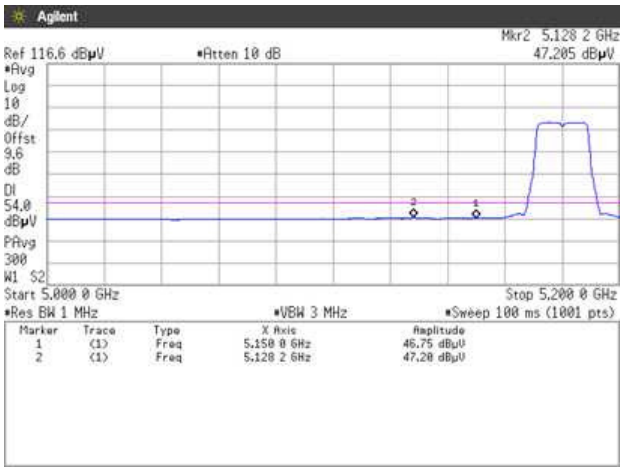
Zacta

[IEEE802.11n (HT20)]

5.2GHz Band, Channel Low
Horizontal
Peak

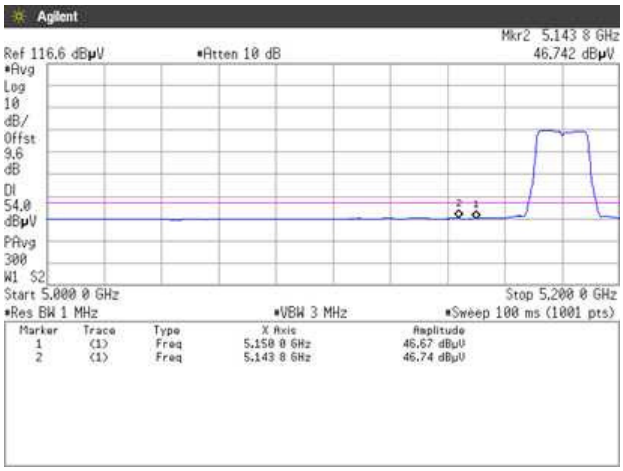


Average



Vertical
Peak

Average



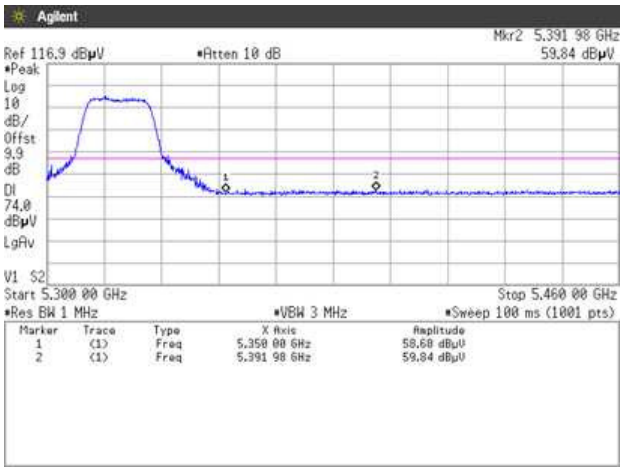
Zacta

[IEEE802.11n (HT20)]

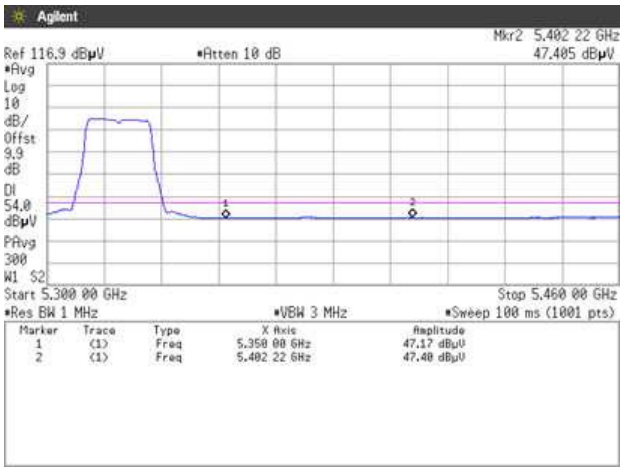
5.3GHz Band, Channel High

Horizontal

Peak

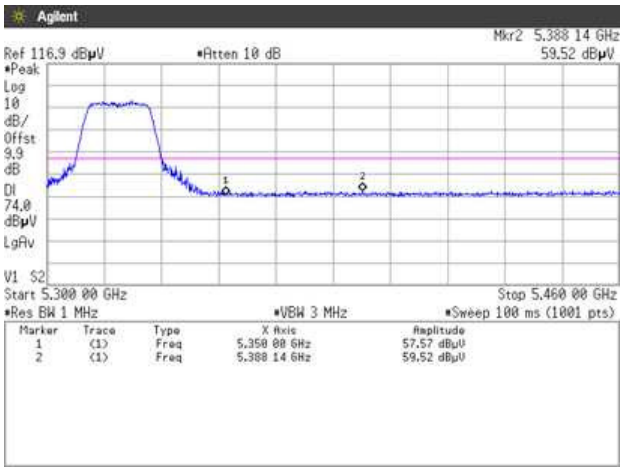


Average

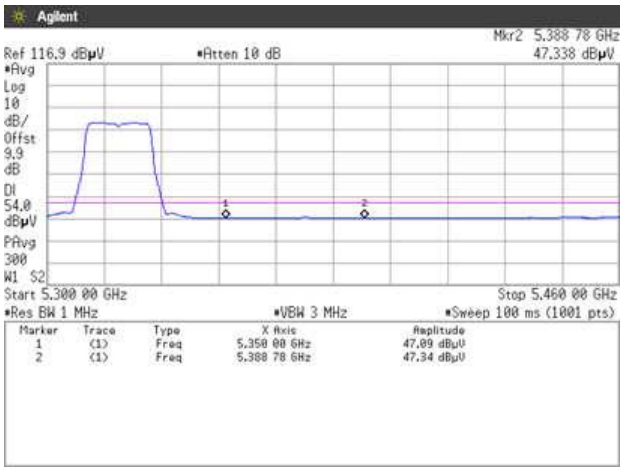


Vertical

Peak



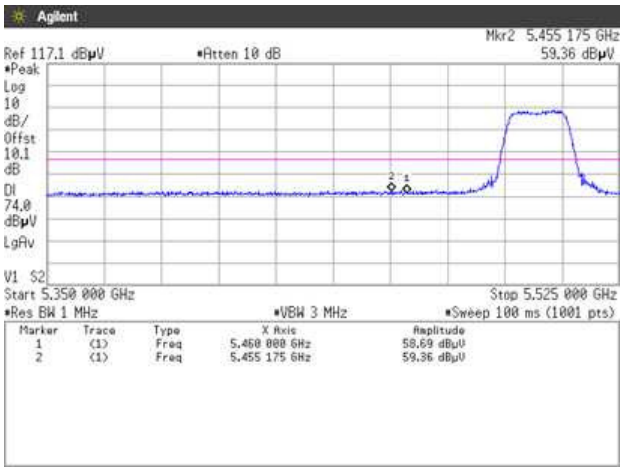
Average



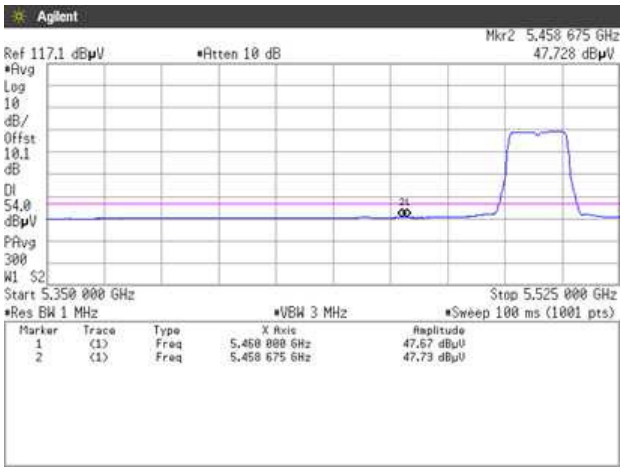
Zacta

[IEEE802.11n (HT20)]

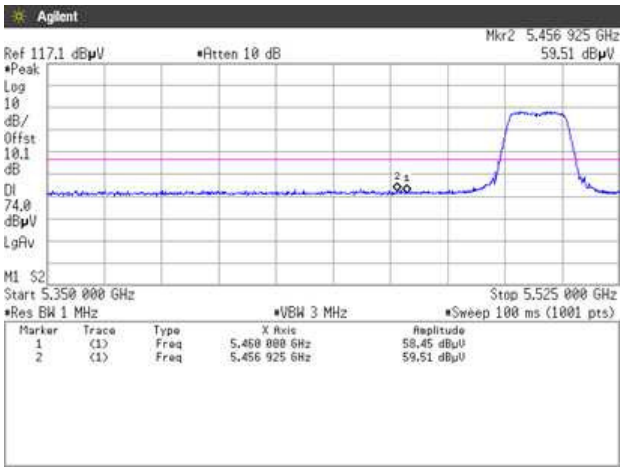
5.6GHz Band, Channel Low
Horizontal
Peak



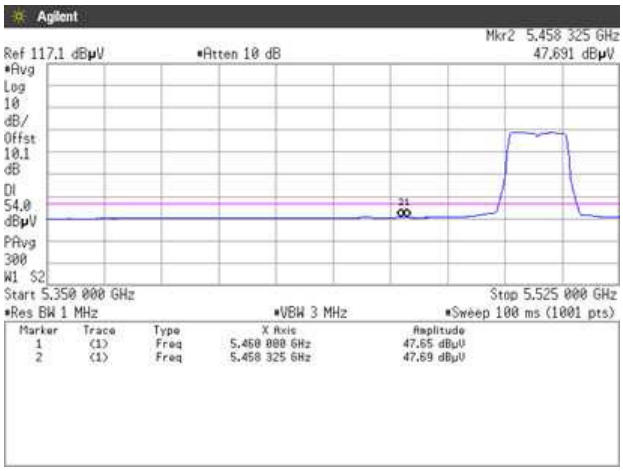
Average



Vertical
Peak



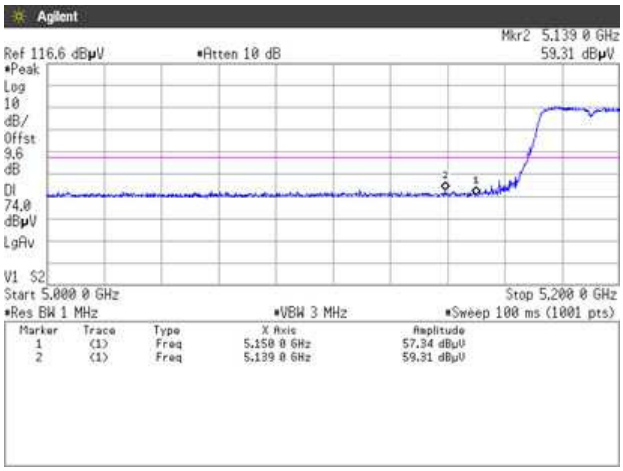
Average



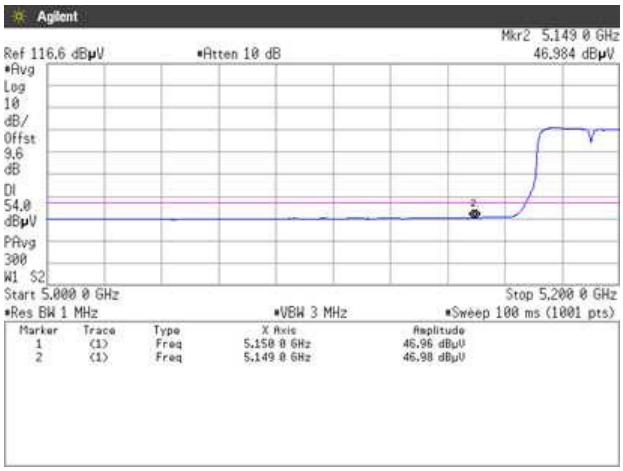
Zacta

[IEEE802.11n (HT40)]

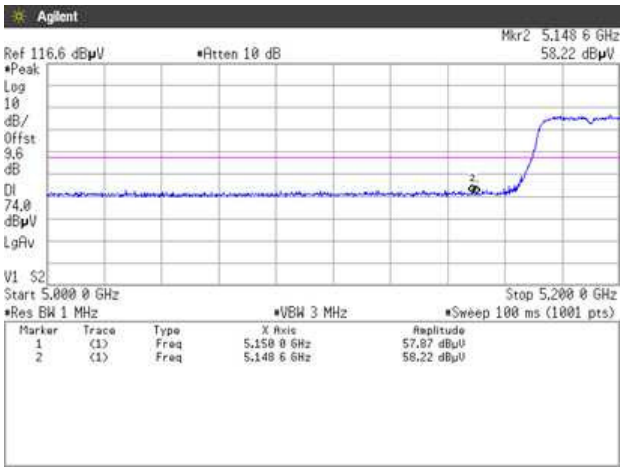
5.2GHz Band, Channel Low
Horizontal
Peak



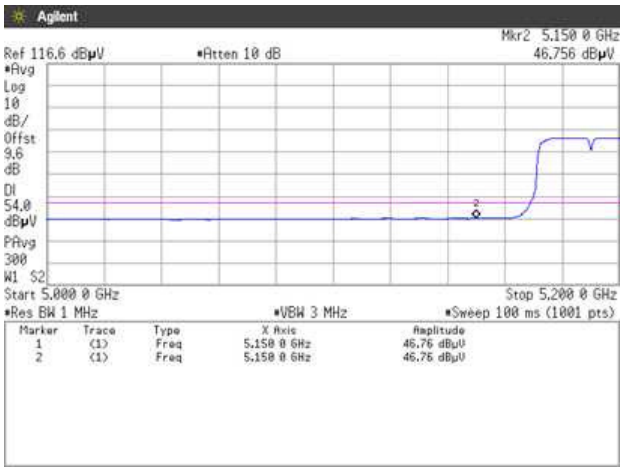
Average



Vertical
Peak



Average



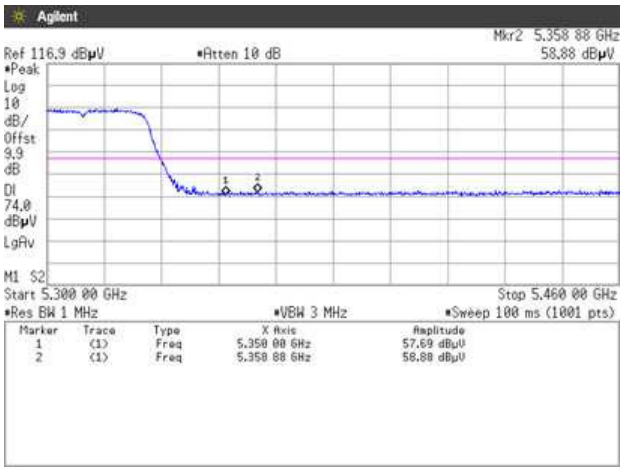
Zacta

[IEEE802.11n (HT40)]

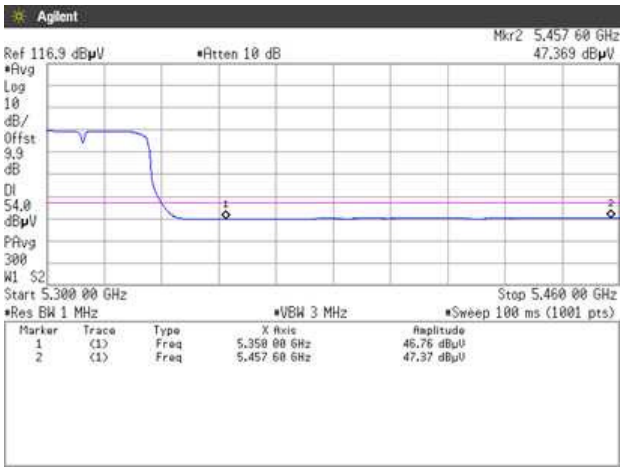
5.3GHz Band, Channel High

Horizontal

Peak

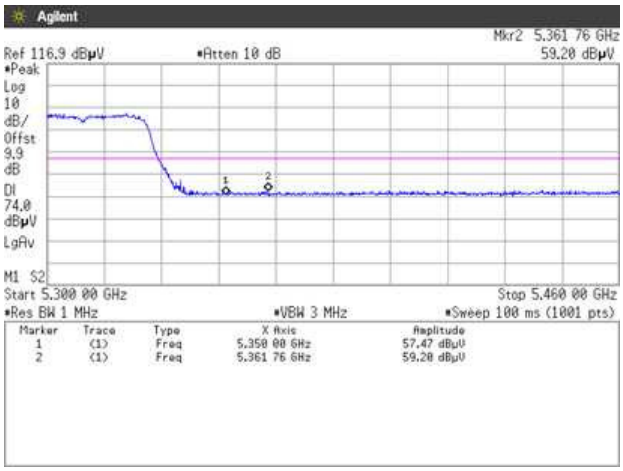


Average

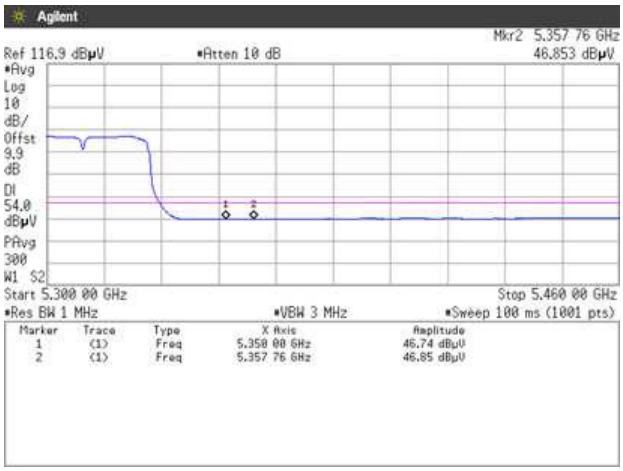


Vertical

Peak



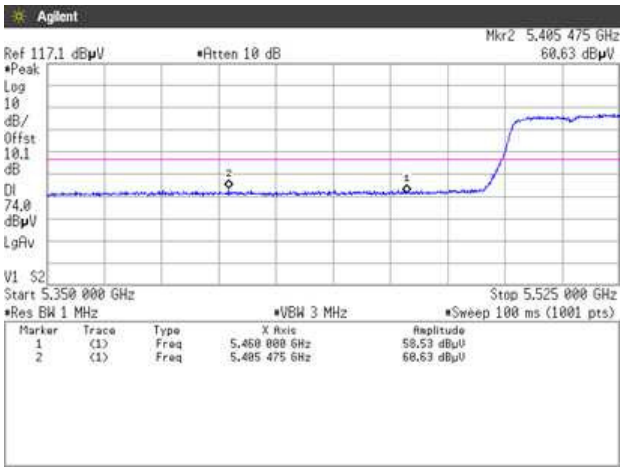
Average



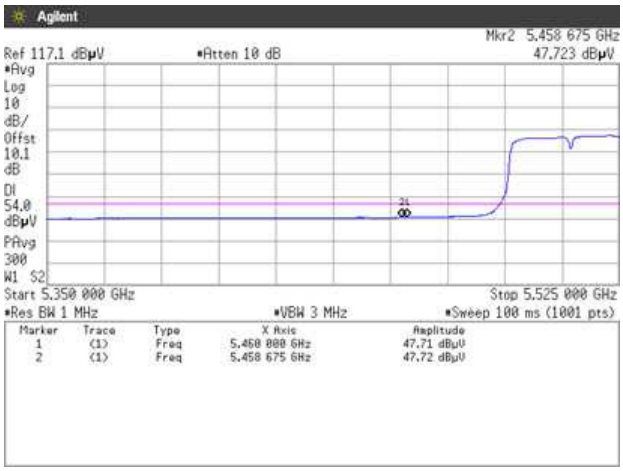
Zacta

[IEEE802.11n (HT40)]

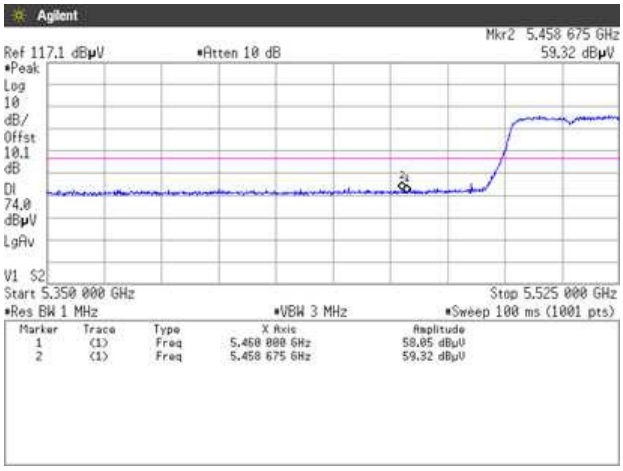
5.6GHz Band, Channel Low
Horizontal
Peak



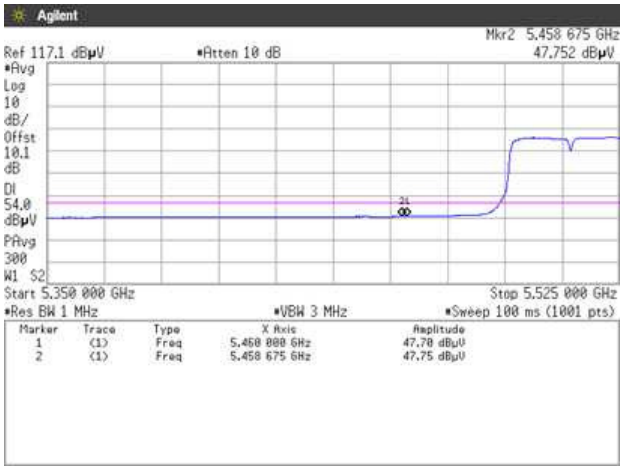
Average



Vertical
Peak



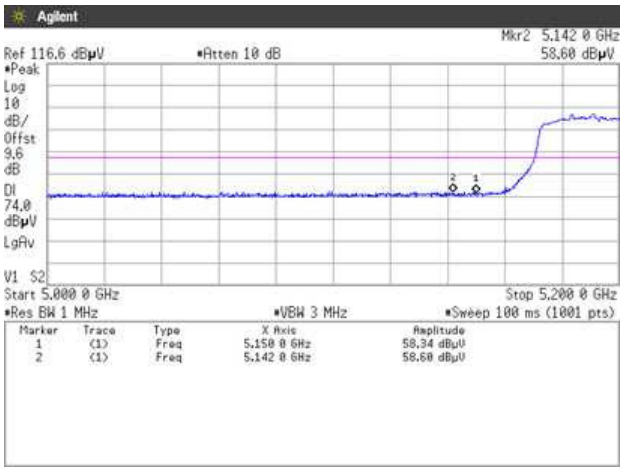
Average



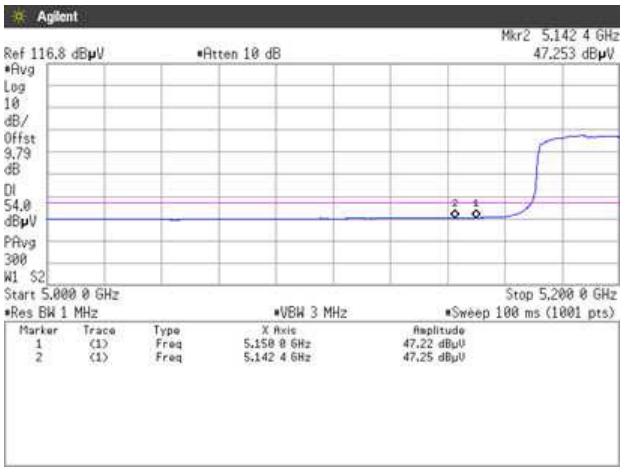
Zacta

[IEEE802.11ac (HT80)]

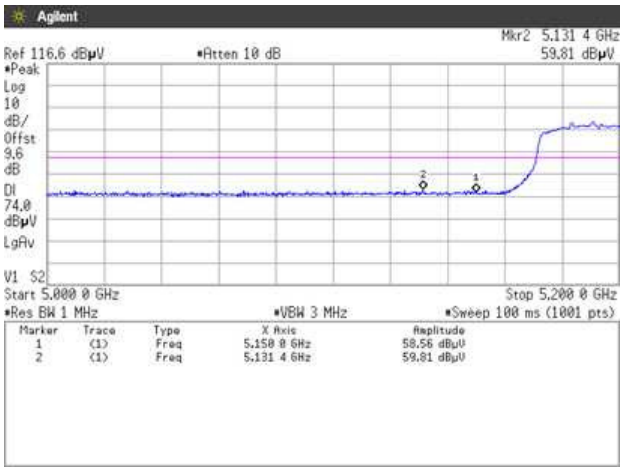
5.2GHz Band, Channel Low
Horizontal
Peak



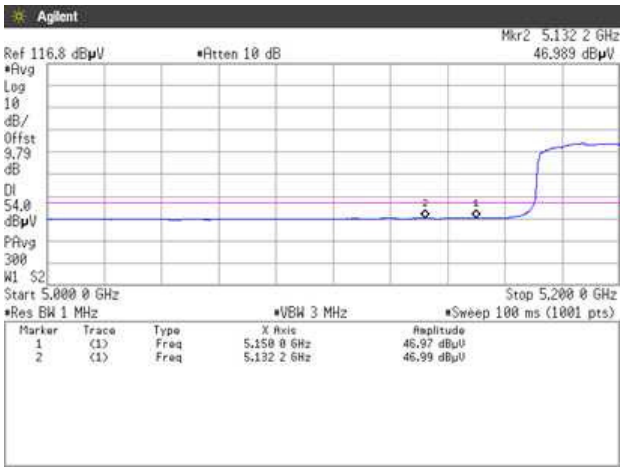
Average



Vertical
Peak



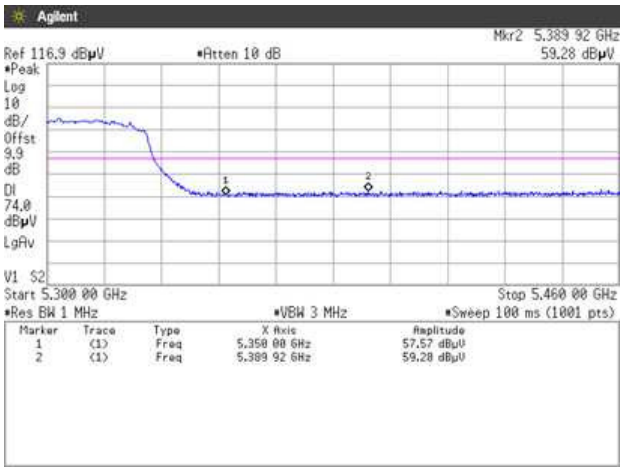
Average



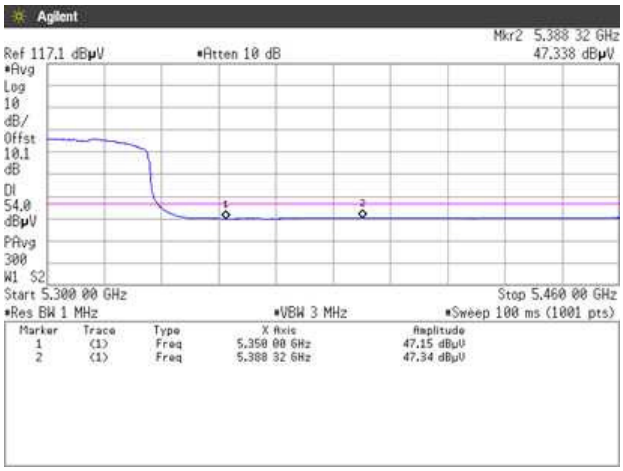
Zacta

[IEEE802.11ac (HT80)]

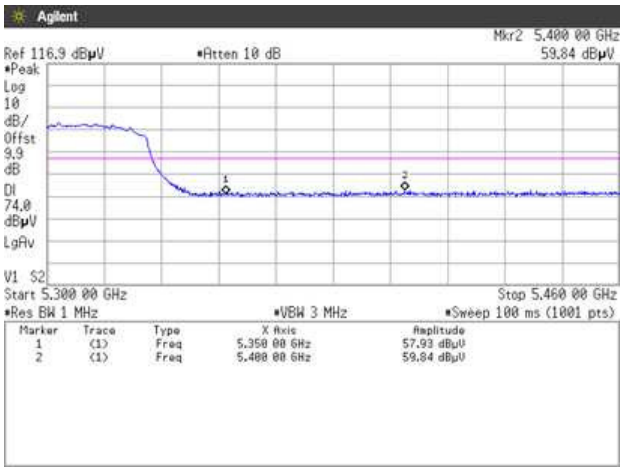
5.3GHz Band, Channel High
Horizontal
Peak



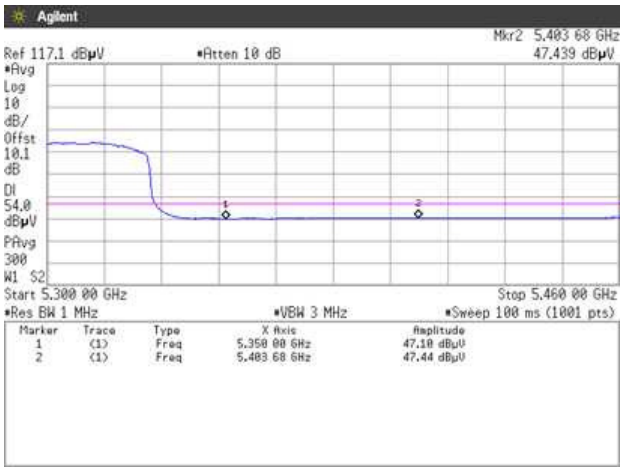
Average



Vertical
Peak



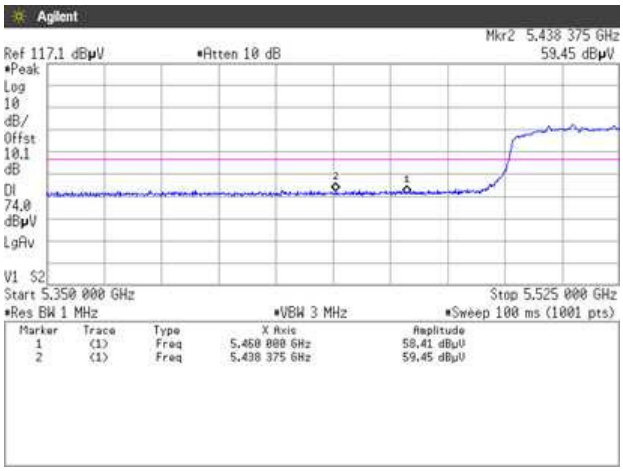
Average



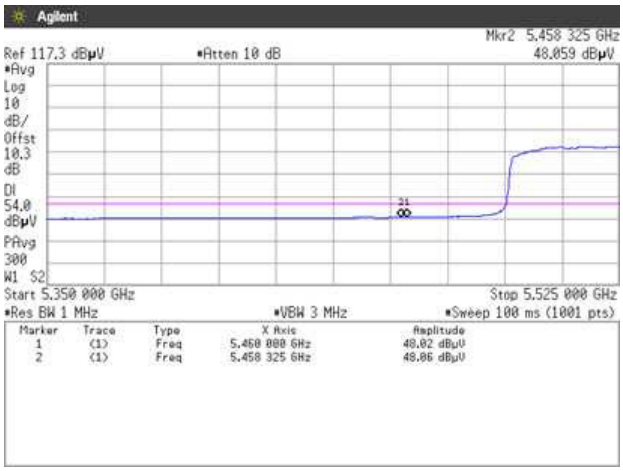
Zacta

[IEEE802.11ac (HT80)]

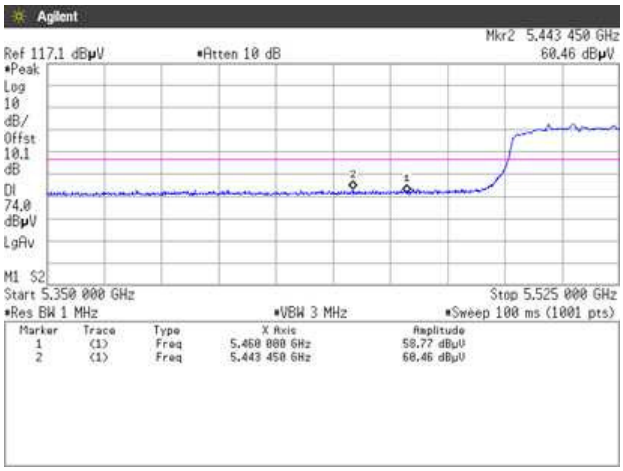
5.6GHz Band, Channel Low
Horizontal
Peak



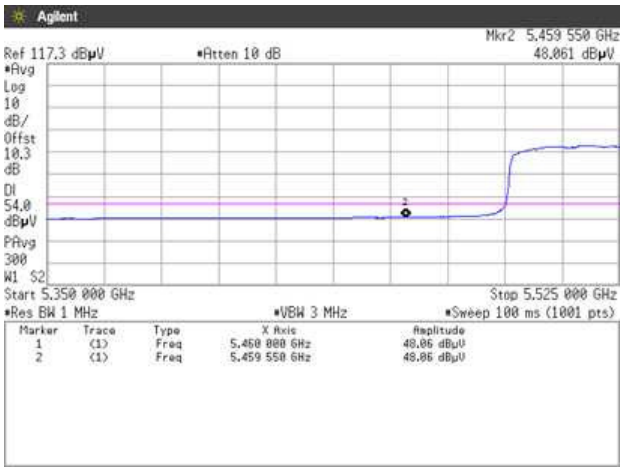
Average



Vertical
Peak



Average

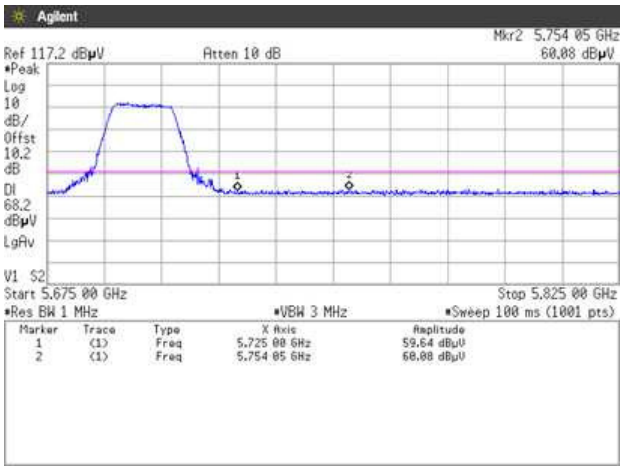


Zacta

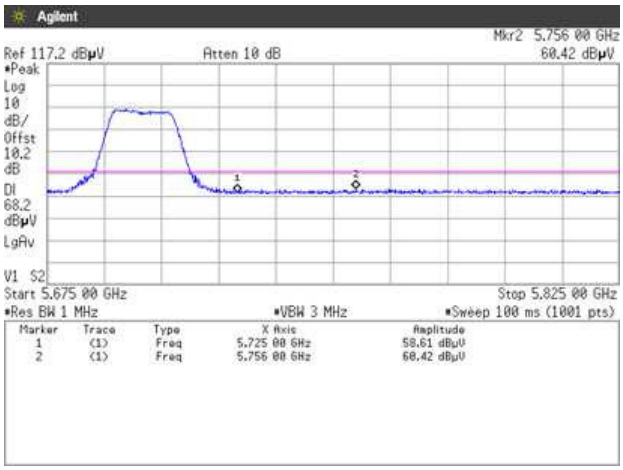
7.4.2 Non-Restricted Bandedge

[IEEE802.11a]

5.6GHz Band, Channel High
Peak
Horizontal

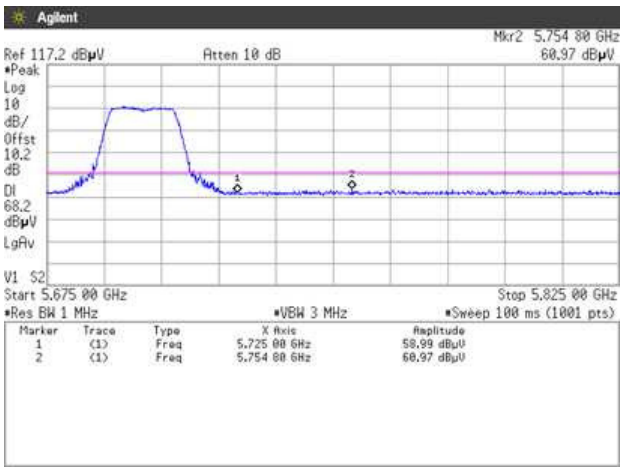


Vertical

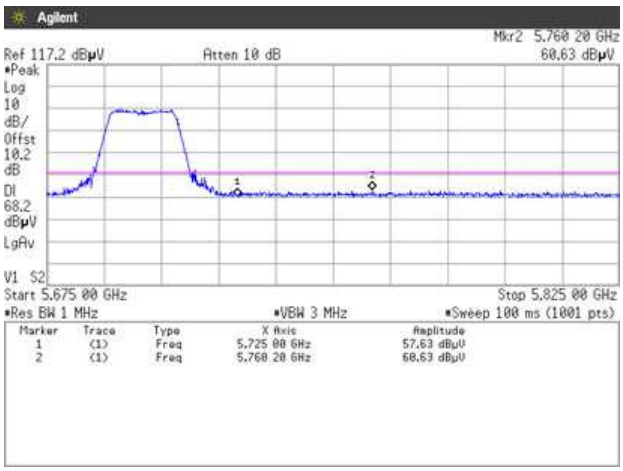


[IEEE802.11n (HT20)]

5.6GHz Band, Channel High
Peak
Horizontal



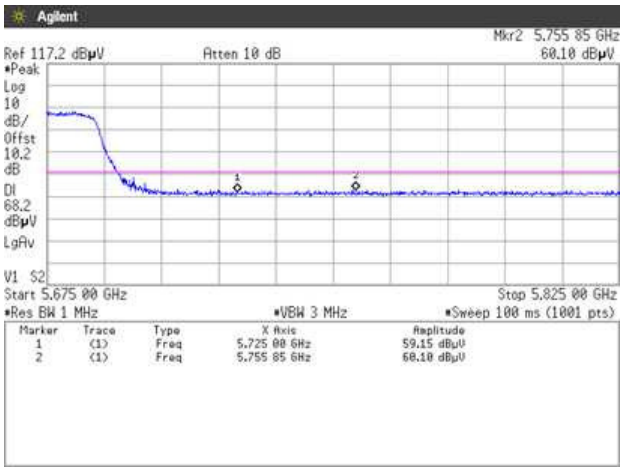
Vertical



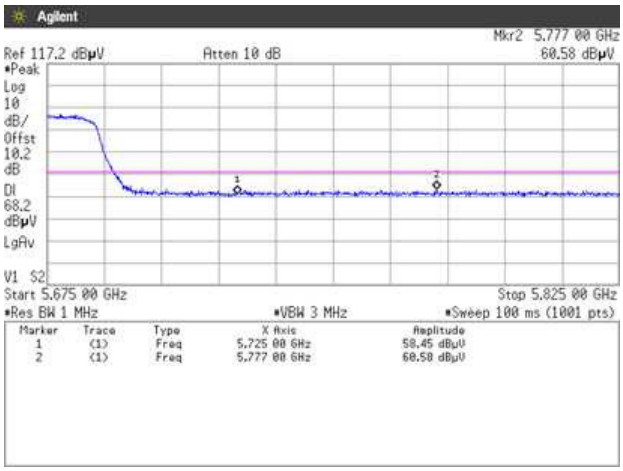
Zacta

[IEEE802. 11n (HT40)]

5.6GHz Band, Channel High
Peak
Horizontal

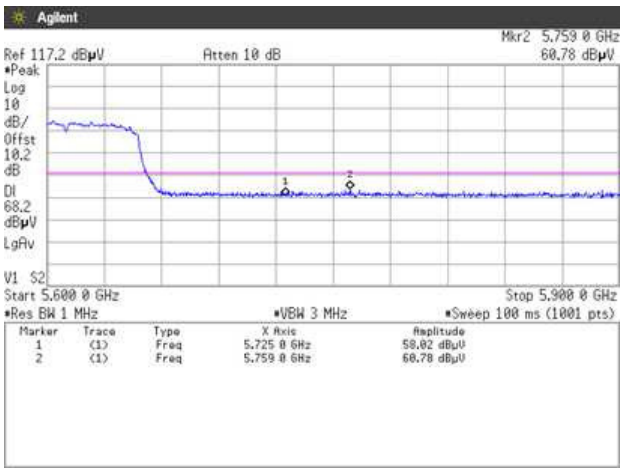


Vertical



[IEEE802.11ac (HT80)]

5.6GHz Band, Channel High
Peak
Horizontal



Vertical