

TEST REPORT

Report number : Z101C-15054

Issue date : May 29, 2015

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	: KA44
FCC ID	: JOYKA44

Date of test : April 21, 22, 25, May 1, 5, 7, 8, 10, 14, 2015
Test place : TÜV SÜD Zacta Ltd. Yonezawa Testing Center
4149-7 Hachimanpara 5-chome
Yonezawa-shi Yamagata 992-1128 Japan
Phone: +81-238-28-2880 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 : 
Taiki Watanabe

Tested by : 
Hikaru Shibata

Authorized by : 
Eiji Akiba
Deputy General Manager of EMC Technical Department

Table of contents

	Page
1. Summary of Test	4
1.1 Purpose of test	4
1.2 Standards	4
1.3 List of applied test to the EUT	4
1.4 Modification to the EUT by laboratory	4
2. Equipment Under Test	5
2.1 General Description of equipment	5
2.2 EUT information	5
2.3 Variation of the family model(s)	6
2.4 Operating channels and frequencies	6
2.5 Operating mode	8
2.6 Operating mode	8
3. Configuration of equipment	9
3.1 Equipment(s) used	9
3.2 Cable(s) used	9
3.3 System configuration	9
4. 26dB Bandwidth and 99% Occupied Bandwidth	10
4.1 Measurement procedure	10
4.2 Limit	10
4.3 Measurement result	10
4.4 Trace data	12
5. Maximum Conducted Output Power	23
5.1 Measurement procedure	23
5.2 Limit	23
5.3 Measurement result	25
5.4 Trace data	27
6. Peak Power Spectral Density	38
6.1 Measurement procedure	38
6.2 Limit	38
6.3 Measurement result	39
6.4 Trace data	41
7. Radiated Emissions (Restricted Bands of Operation)	52
7.1 Measurement procedure	52
7.2 Calculation method	53
7.3 Limit	53
7.4 Test data	54
8. Frequency Stability	59
8.1 Measurement procedure	59
8.2 Limit	59
8.3 Measurement result	60
9. AC Power Line Conducted Emissions	62
9.1 Measurement procedure	62
9.2 Calculation method	62



Zacta

9.3 Limit.....	62
9.4 Test data.....	63
10. Duty Cycle.....	66
10.1 Measurement procedure.....	66
10.2 Limit.....	66
10.3 Measurement result.....	66
10.4 Trace data	69
11. Antenna requirement.....	74
12. Uncertainty of measurement.....	75
13. Laboratory description	76
Appendix A. Test equipment	77

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 C63.10-2009, KDB789033 D02 General UNII Test Procedures New Rules v01

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

Table-Top

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	: KA44
Serial number	: N/A
EUT condition	: Pre-Production
Power ratings	: Battery: DC 3.8V
Size	: (W) 72.0 × (D) 8.2 × (H) 146.0 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	: 20.022mW (IEEE802.11a) 20.077mW (IEEE802.11n: HT20) 18.741mW (IEEE802.11n: HT40) 18.318mW (IEEE802.11ac: HT80)
Antenna type	: Internal antenna
Antenna gain	: 5.15-5.25GHz, 5.25-5.35GHz band: 1.3dBi 5.47-5.725GHz band: 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



Zacta

[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
	120	5600	118	5590	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 Y 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

3. Configuration of equipment

3.1 Equipment(s) used

No.	Equipment	Company	Model No.	Serial No.	FCC ID / DoC	Comment
1	Mobile Phone	KYOCERA	KA44	N/A	JOYKA44	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

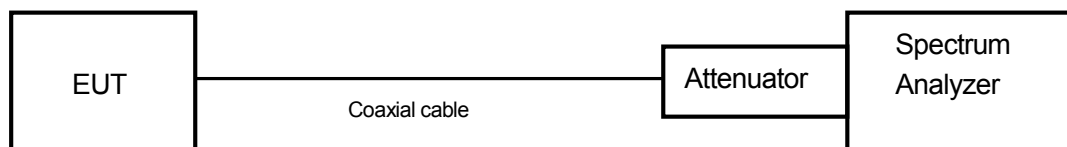
The EUT was set to operate with following conditions.

- 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 : May 5, 2015
 Temperature : 22.4 [°C]
 Humidity : 42.6 [%]
 Test place : Shielded room No.4

Test engineer :
 Hikaru Shibata

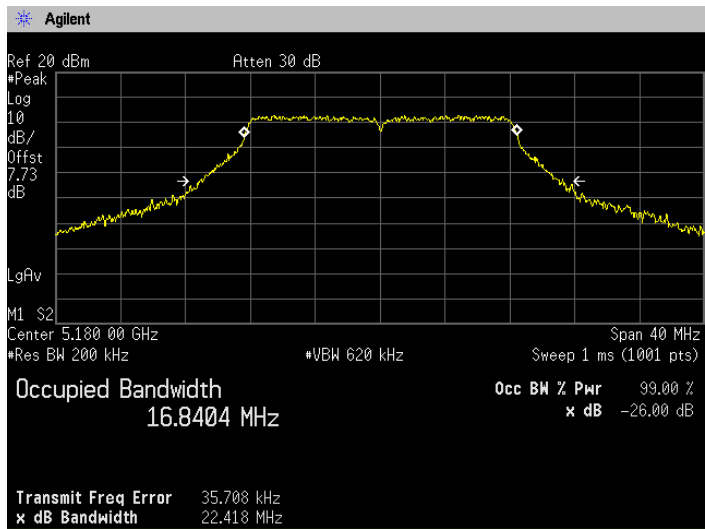
Mode	Band	Channel	Frequency (MHz)	26dB bandwidth (MHz)	99% Occupied bandwidth (MHz)
802.11a	5.2GHz Band	36	5180	22.418	16.8404
		40	5200	21.523	16.7594
		48	5240	21.961	16.7473
	5.3GHz Band	52	5260	21.911	16.7433
		56	5280	21.471	16.7293
		64	5320	21.705	16.7834
	5.6GHz Band	100	5500	22.137	16.8095
		120	5600	21.862	16.7917
		140	5700	21.596	16.7549

Mode	Band	Channel	Frequency (MHz)	26dB bandwidth (MHz)	99% Occupied bandwidth (MHz)
802.11n (20MHz)	5.2GHz Band	36	5180	22.026	17.8343
		40	5200	21.757	17.8192
		48	5240	22.067	17.8209
	5.3GHz Band	52	5260	22.332	17.8717
		56	5280	22.322	17.8252
		64	5320	22.048	17.8263
	5.6GHz Band	100	5500	21.905	17.8289
		120	5600	22.378	17.8644
		140	5700	22.641	17.8317

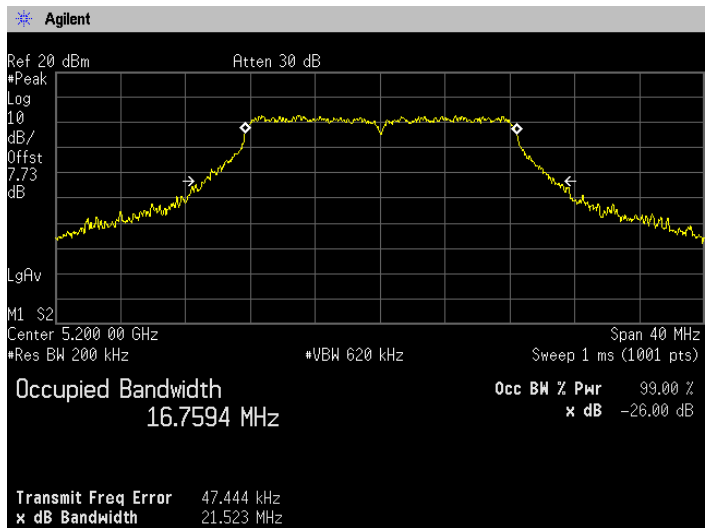
Mode	Band	Channel	Frequency (MHz)	26dB bandwidth (MHz)	99% Occupied bandwidth (MHz)
802.11n (40MHz)	5.2GHz Band	38	5190	43.422	36.1397
		46	5230	44.031	36.1612
	5.3GHz Band	54	5270	43.098	36.1175
		62	5310	42.600	36.1279
	5.6GHz Band	102	5510	44.000	36.1614
		118	5590	43.108	36.2141
		134	5670	43.023	36.1071

Mode	Band	Channel	Frequency (MHz)	26dB bandwidth (MHz)	99% Occupied bandwidth (MHz)
802.11ac (80MHz)	5.2GHz Band	42	5210	83.389	74.4924
	5.3GHz Band	58	5290	83.134	74.4367
	5.6GHz Band	106	5530	82.992	74.4876
		122	5610	82.832	74.5630

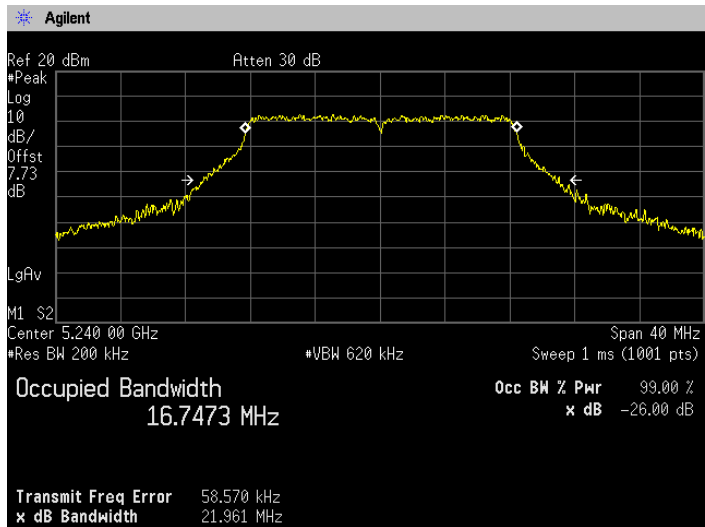
4.4 Trace data
[IEEE802.11a]
(5.2GHz Band)
Channel: 36



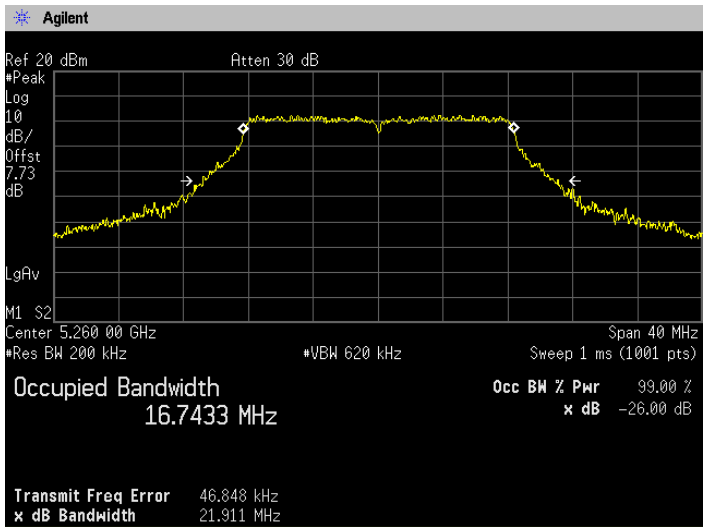
Channel: 40



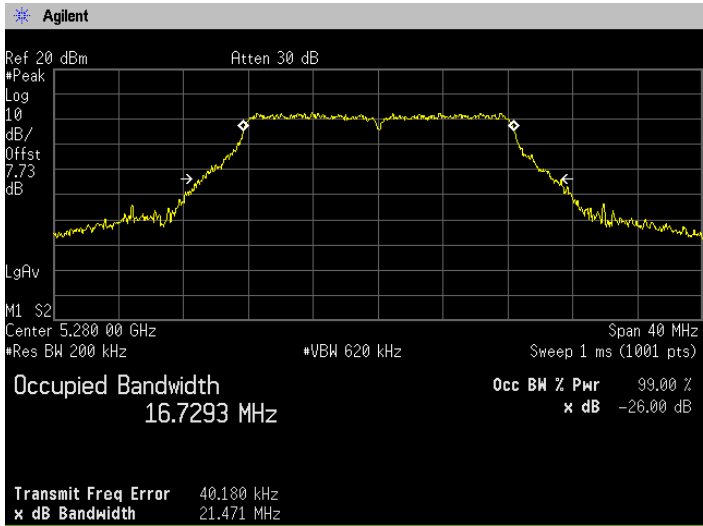
Channel: 48



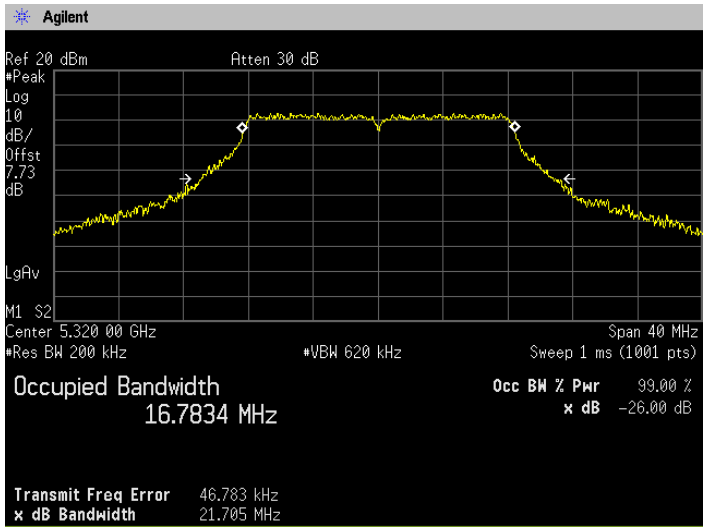
(5.3GHz Band)
Channel: 52



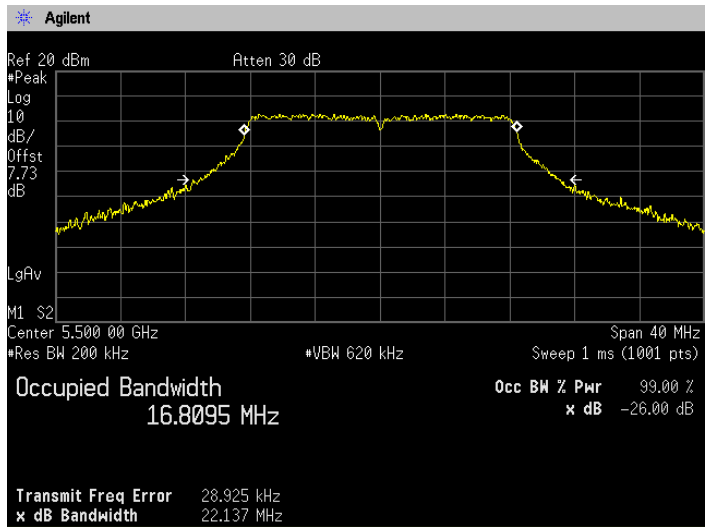
Channel: 56



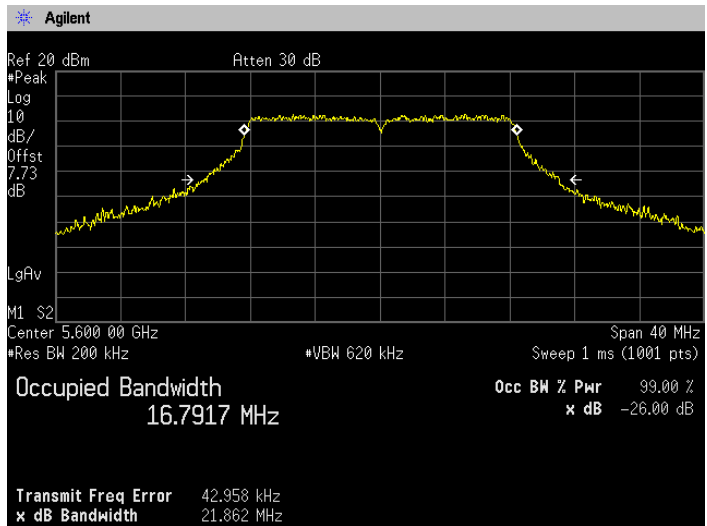
Channel: 64



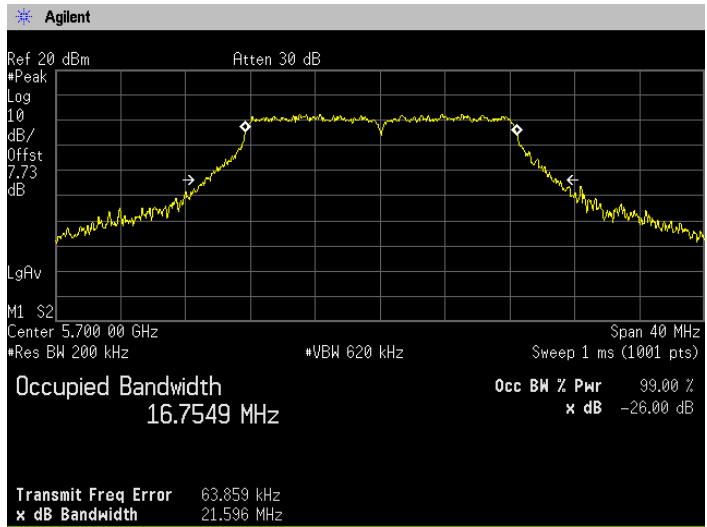
(5.6GHz Band)
Channel: 100



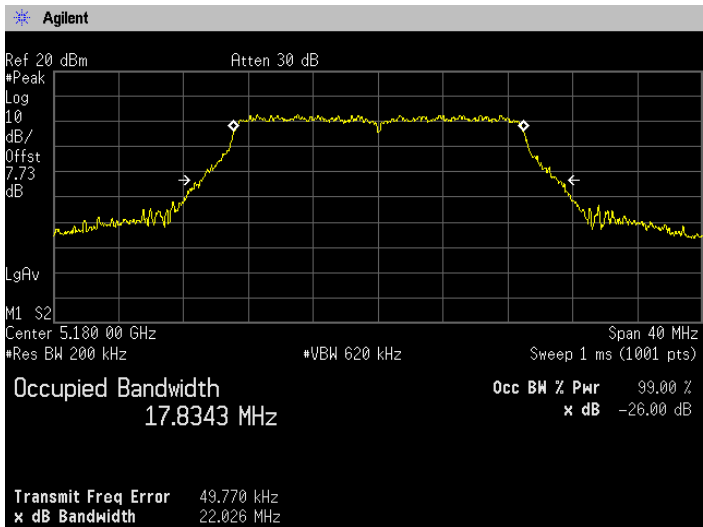
Channel: 120



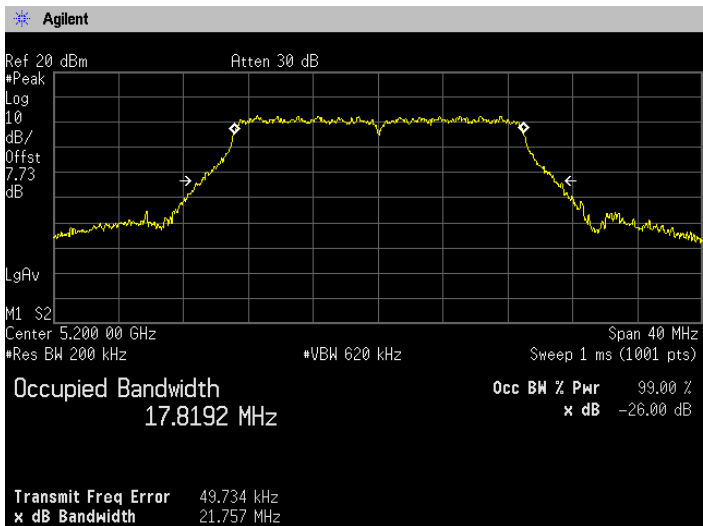
Channel: 140



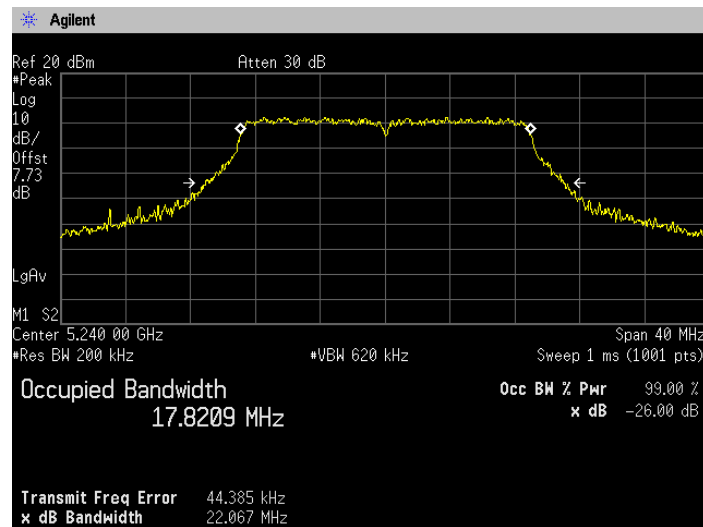
[IEEE802.11n (HT20)]
(5.2GHz Band)
Channel: 36



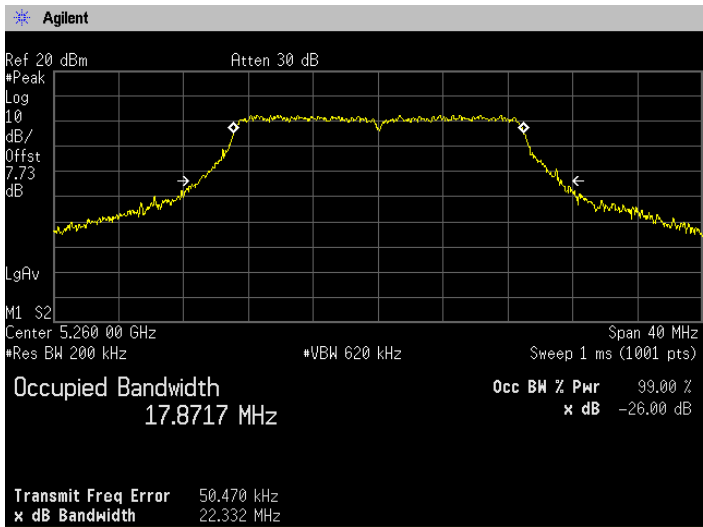
Channel: 40



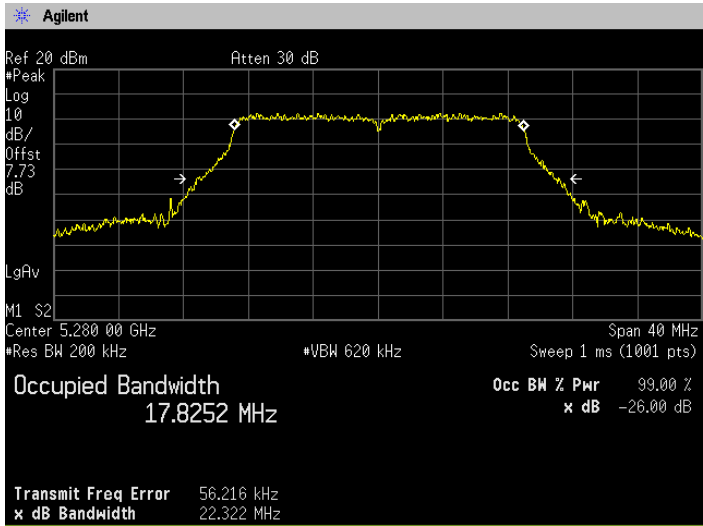
Channel: 48



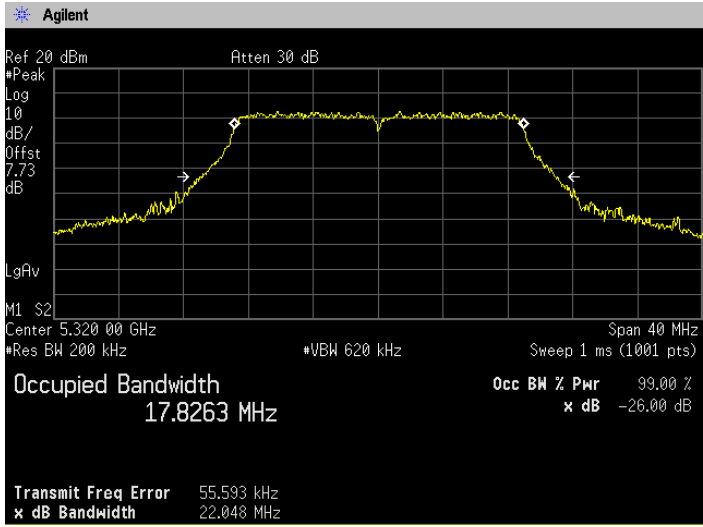
(5.3GHz Band)
Channel: 52



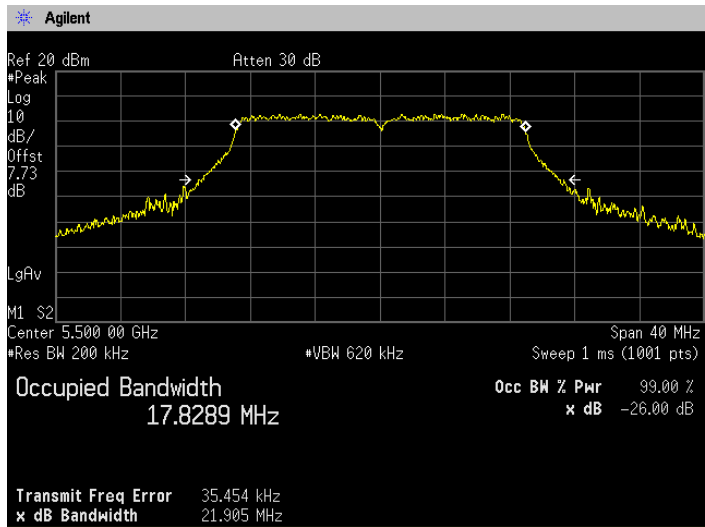
Channel: 56



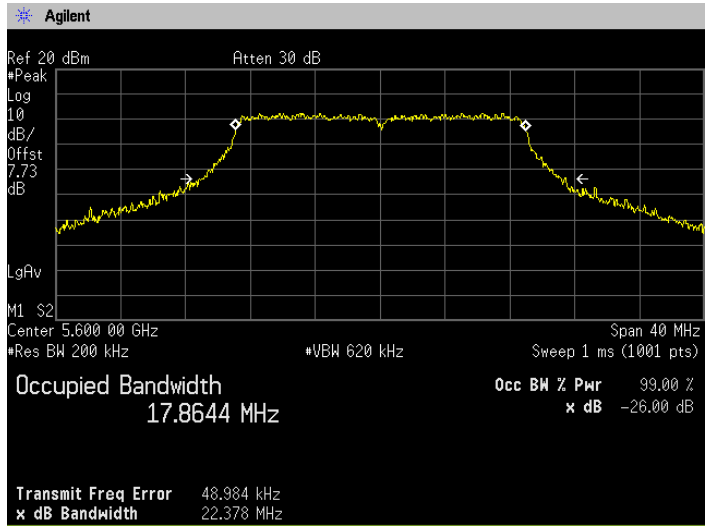
Channel: 64



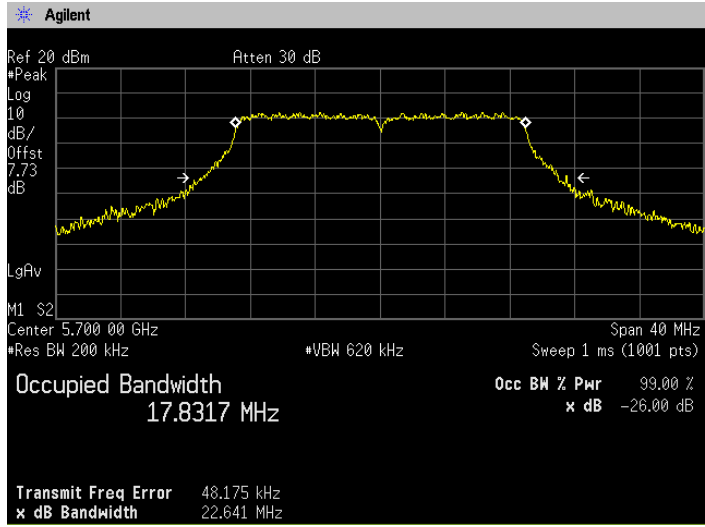
(5.6GHz Band)
Channel: 100



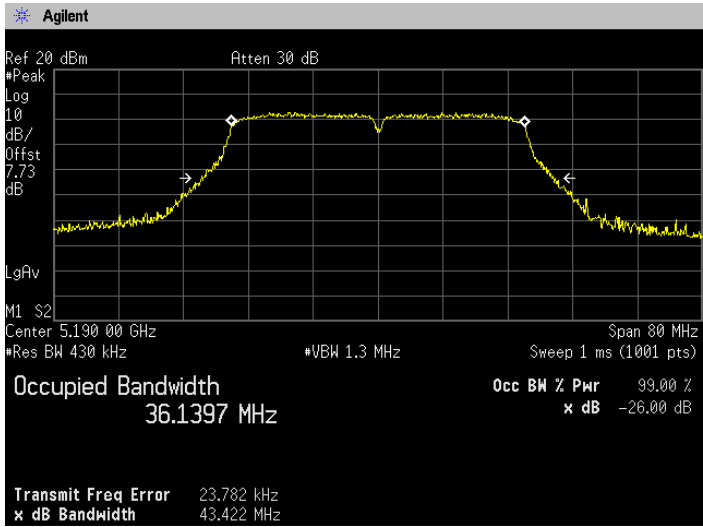
Channel: 120



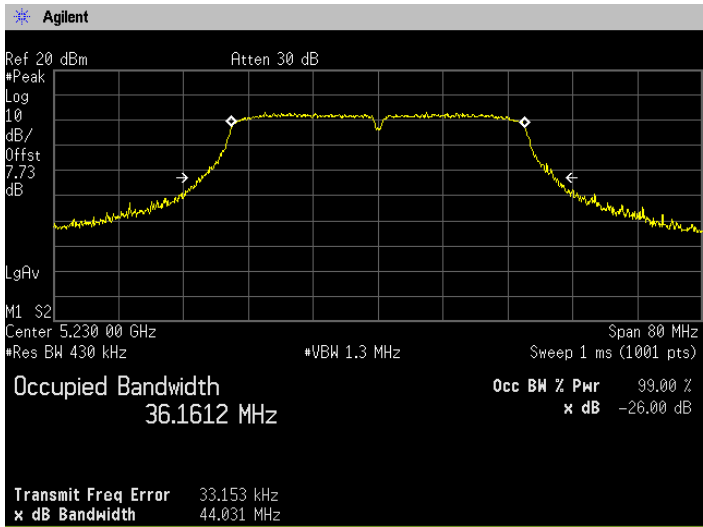
Channel: 140



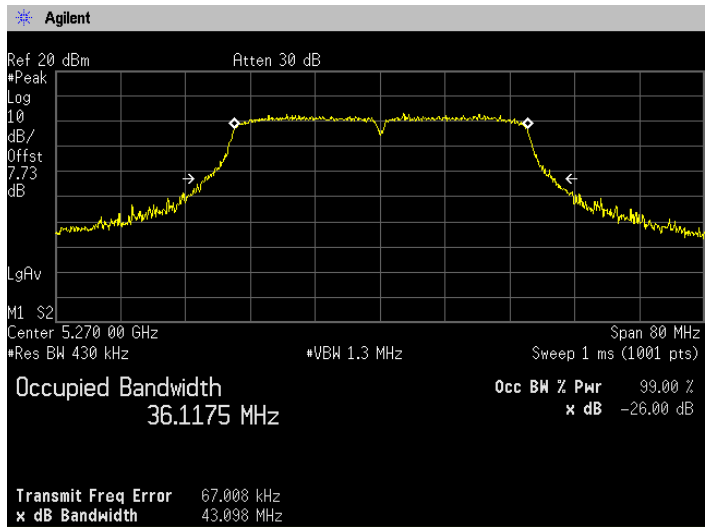
[IEEE802.11n (HT40)]
(5.2GHz Band)
Channel: 38



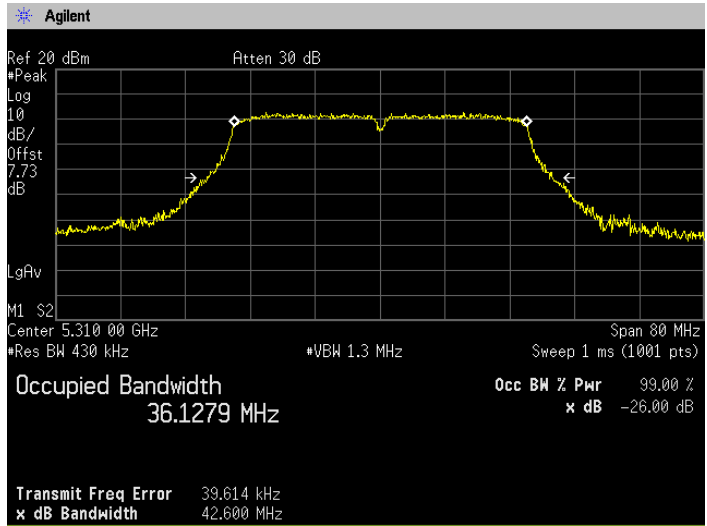
Channel: 46



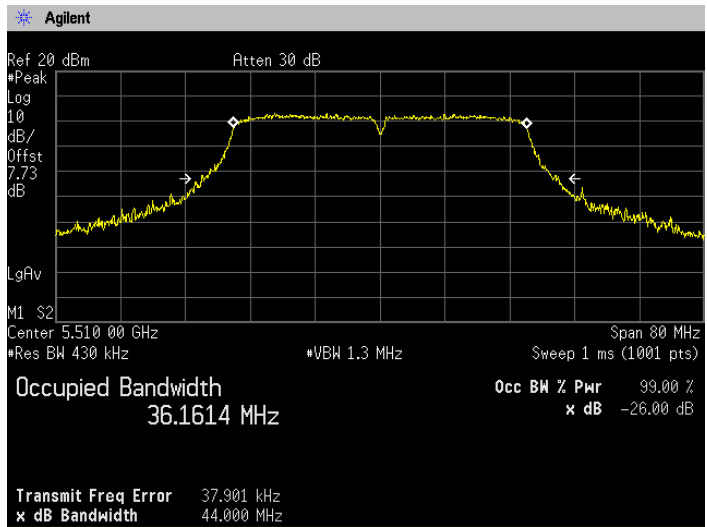
(5.3GHz Band)
Channel: 54



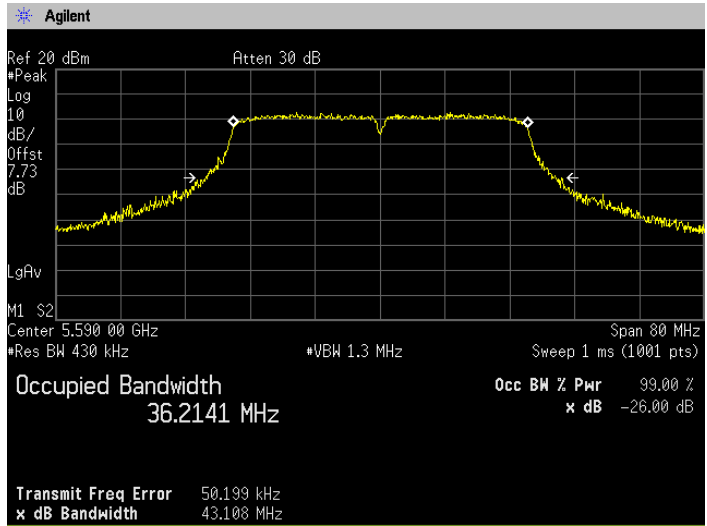
Channel: 62



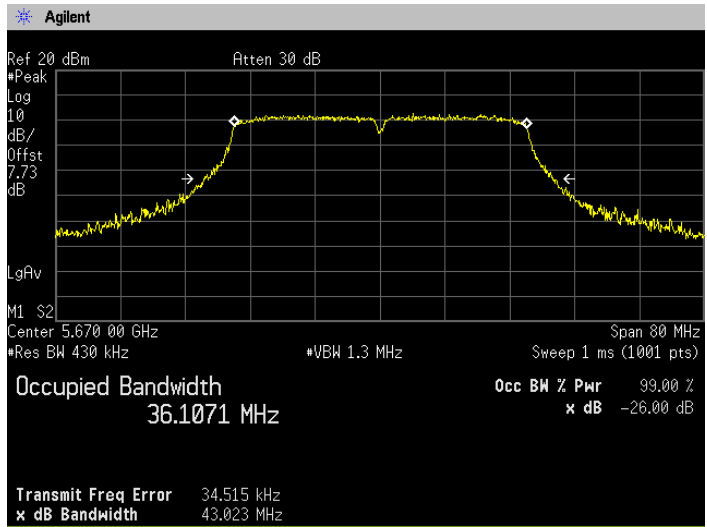
(5.6GHz Band)
Channel: 102



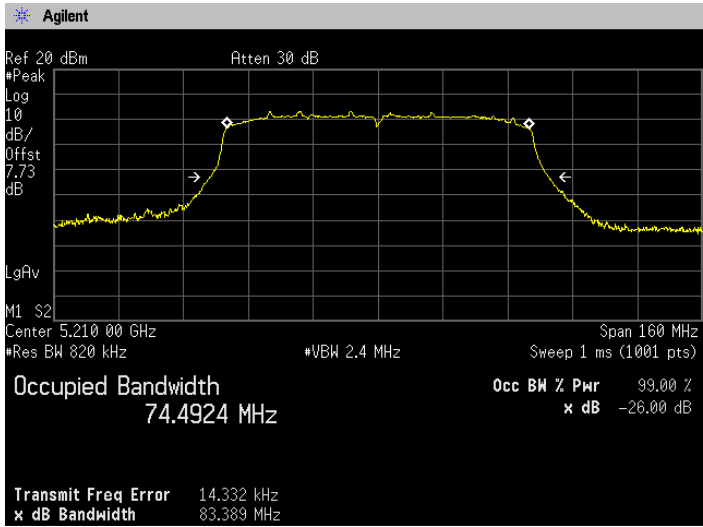
Channel: 118



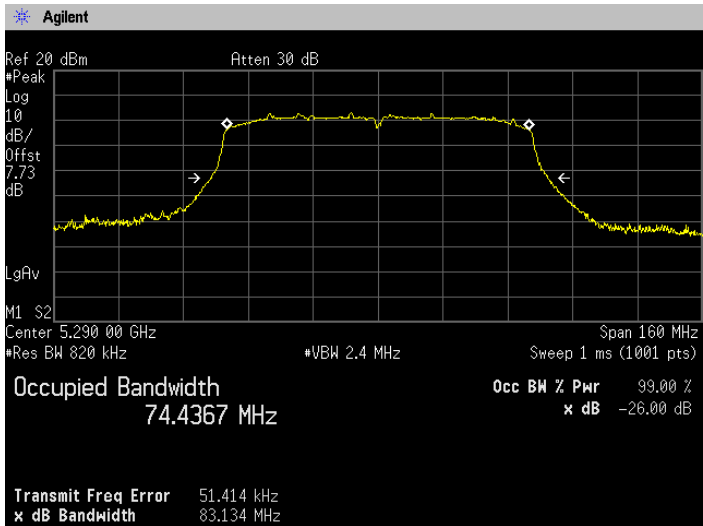
Channel: 134



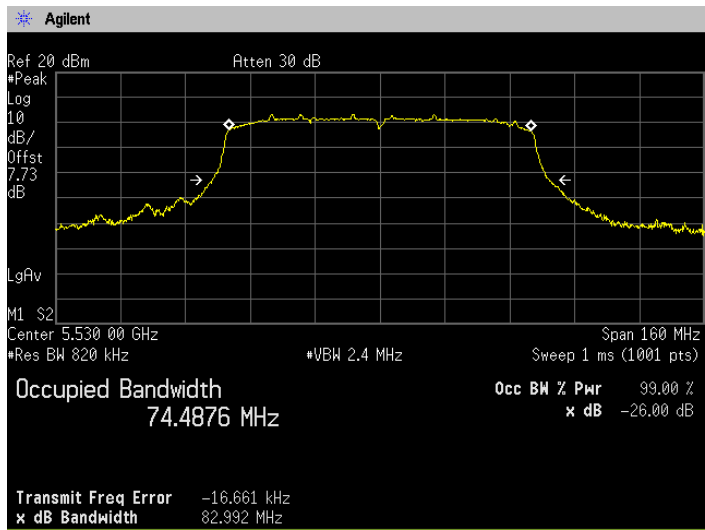
[IEEE802.11ac (HT80)]
(5.2GHz Band)
Channel: 42



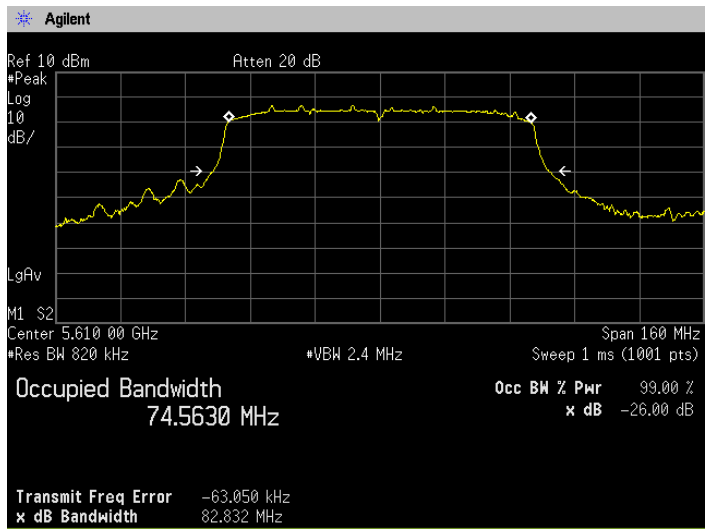
(5.3GHz Band)
Channel: 58



(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=25MHz/50MHz/100MHz, Sweep=auto, Detector=RMS, Trace mode=Averaging

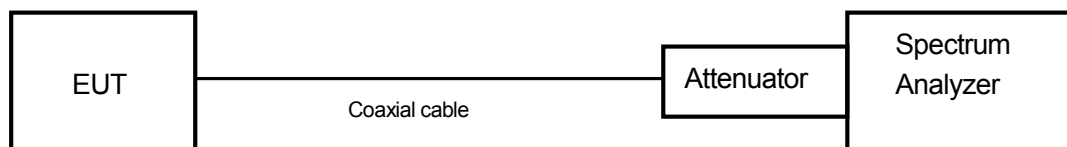
The EUT was set to operate with following conditions.

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

The test mode of EUT is as follows.

- Tx mode

- Test configuration



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 $11\text{dBm} + 10\log B$, 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	1.3	23.97
	802.11n HT20				
	802.11n HT40				
	802.11ac HT80				

Band	Mode	Power Limit (mW)	Calculated Limit (dBm)	Antenna Gain (dBi)	Determined Limit (dBm)
		Least 26dBc BW (MHz)			
5.3GHz Band	802.11a	250	23.97	1.3	23.97
		21.390	24.30		
	802.11n HT20	250	23.97		23.97
		21.552	24.33		
	802.11n HT40	250	23.97		23.97
		42.862	27.32		
	802.11ac HT80	250	23.97		23.97
		82.963	30.19		

Band	Mode	Power Limit (mW)	Calculated Limit (dBm)	Antenna Gain (dBi)	Determined Limit (dBm)
		Least 26dBc BW (MHz)			
5.6GHz Band	802.11a	250	23.97	0	23.97
		21.852	24.39		
	802.11n HT20	250	23.97		23.97
		21.515	24.33		
	802.11n HT40	250	23.97		23.97
		42.519	27.29		
	802.11ac HT80	250	23.97		23.97
		82.604	30.17		

5.3 Measurement result

Date : May 8, 2015

Temperature : 22.4 [°C]

Humidity : 42.6 [%]

Test place : Shielded room No.4

Test engineer :

Hikaru Shibata

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	12.830	1.364	1.372	0.994	0.025	12.855	19.297
	40	5200	12.810					12.835	19.209
	48	5240	12.880					12.905	19.521
	52	5260	12.690	1.364	1.372	0.994	0.025	12.715	18.685
	56	5280	12.680					12.705	18.642
	64	5320	12.990					13.015	20.022
	100	5500	12.960	1.364	1.372	0.994	0.025	12.985	19.884
	120	5600	12.710					12.735	18.772
	140	5700	12.530					12.555	18.009

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	12.870	1.276	1.284	0.994	0.027	12.897	19.485
	40	5200	12.880					12.907	19.530
	48	5240	12.900					12.927	19.620
	52	5260	12.760	1.276	1.284	0.994	0.027	12.787	18.998
	56	5280	12.950					12.977	19.847
	64	5320	12.980					13.007	19.985
	100	5500	13.000	1.274	1.282	0.994	0.027	13.027	20.077
	120	5600	12.780					12.807	19.085
	140	5700	12.590					12.617	18.268

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

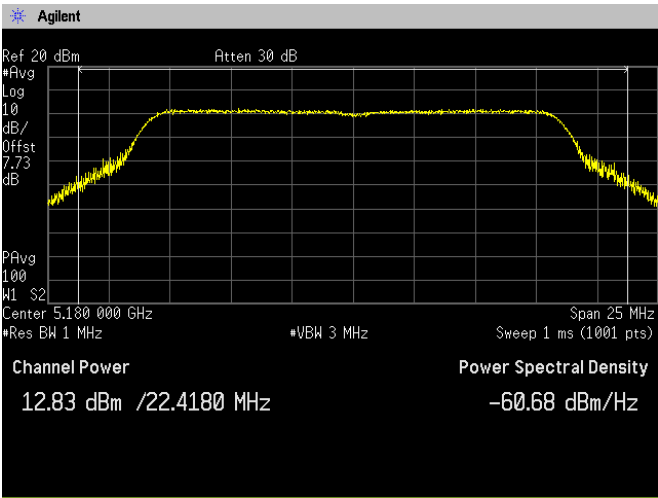
Mode	Channel	Frequency (MHz)	Reading (dBm)	Duty Cycle			DCF (dB)	Test Result (dBm)	Test Result (mW)
				On Time(ms)	On+Off Time(ms)	X			
802.11n (40MHz)	38	5190	12.610	0.636	0.646	0.985	0.068	12.678	18.527
	46	5230	12.660					12.728	18.741
	54	5270	12.480	0.635	0.646	0.983	0.075	12.555	18.009
	62	5310	12.640					12.715	18.685
	102	5510	12.660	0.635	0.645	0.984	0.068	12.728	18.741
	118	5590	12.470					12.538	17.939
	134	5670	12.370					12.438	17.531

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

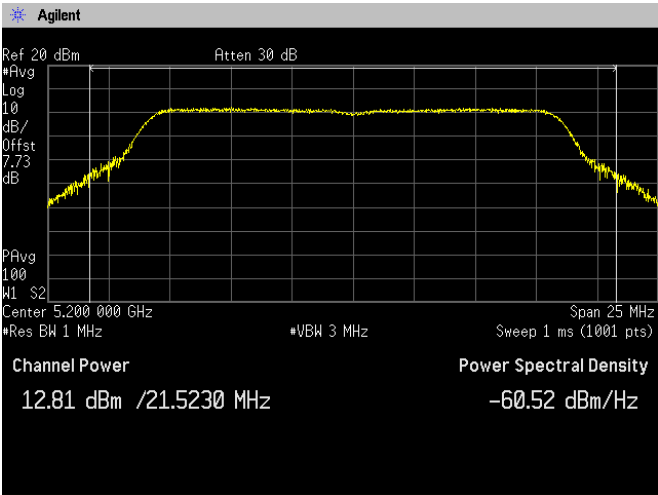
Mode	Channel	Frequency (MHz)	Reading (dBm)	Duty Cycle			DCF (dB)	Test Result (dBm)	Test Result (mW)
				On Time(ms)	On+Off Time(ms)	X			
802.11ac (80MHz)	42	5210	12.250	0.247	0.258	0.956	0.196	12.446	17.564
	58	5290	12.320	0.247	0.258	0.958	0.188	12.508	17.814
	106	5530	12.450	0.248	0.258	0.960	0.179	12.629	18.318
	122	5610	12.250	0.248	0.257	0.962	0.170	12.420	17.460

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

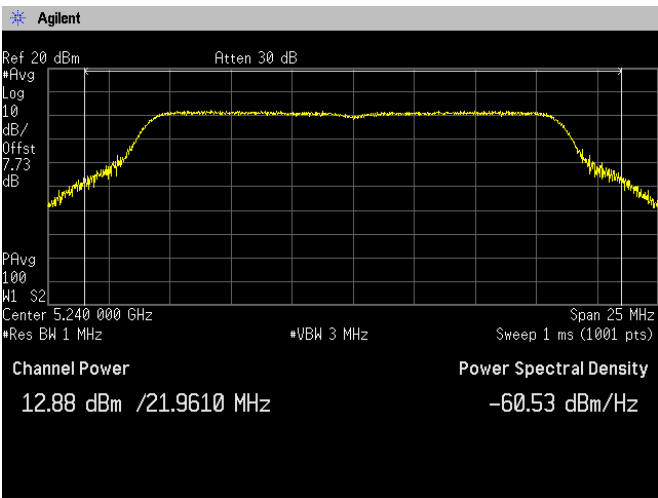
5.4 Trace data
[IEEE802.11a]
(5.2GHz Band)
Channel: 36



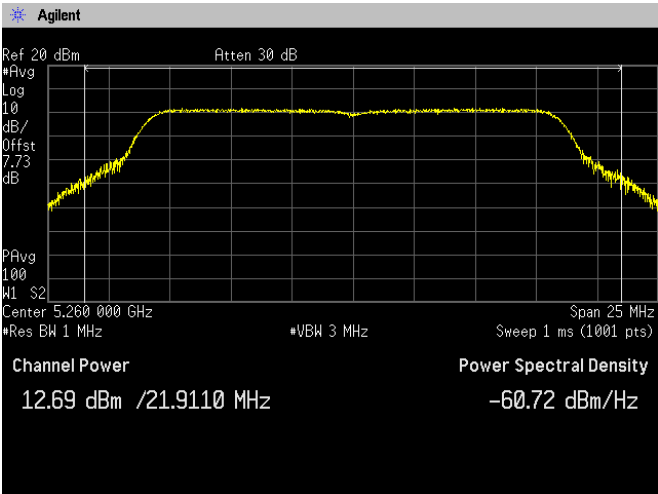
Channel: 40



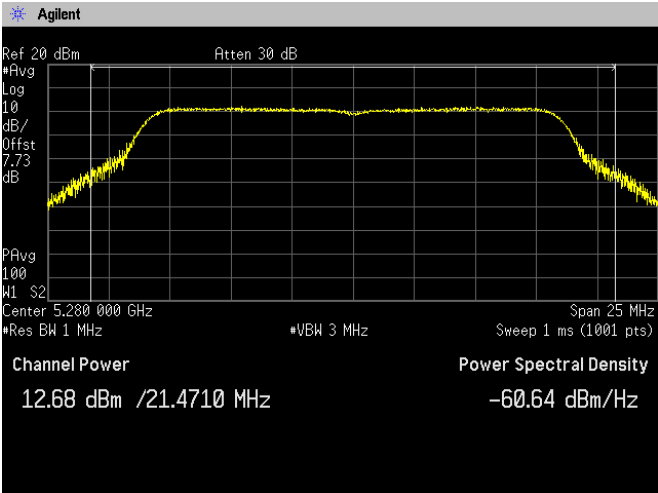
Channel: 48



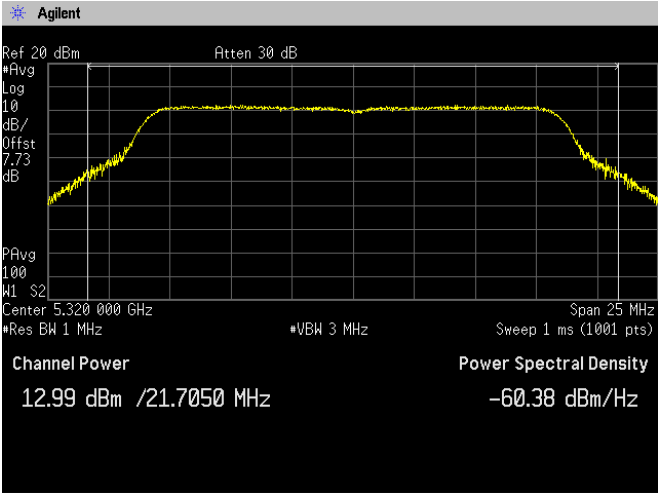
(5.3GHz Band)
Channel: 52



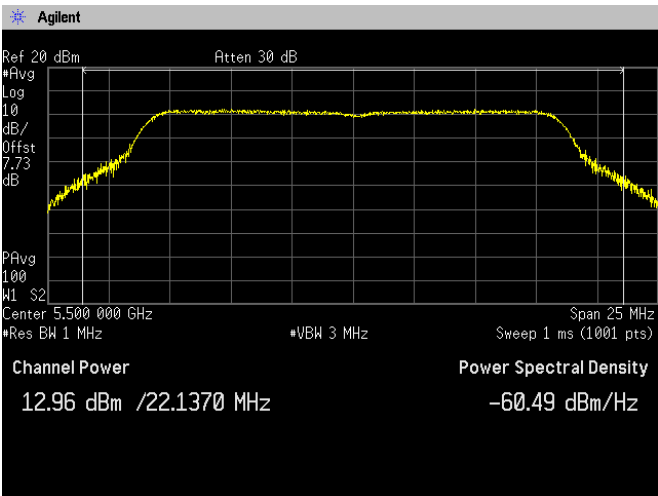
Channel: 56



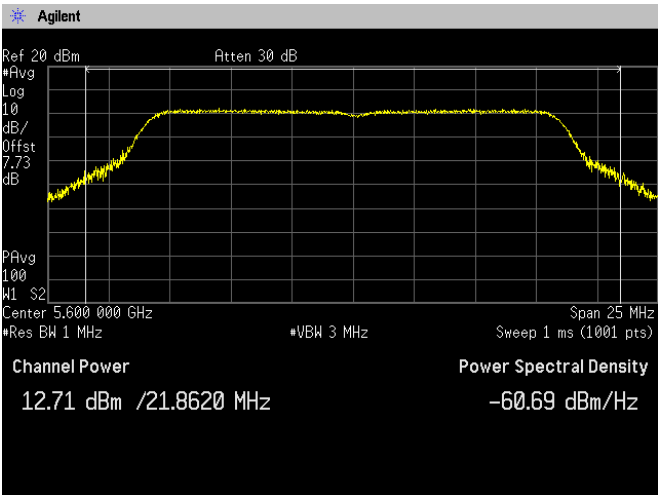
Channel: 64



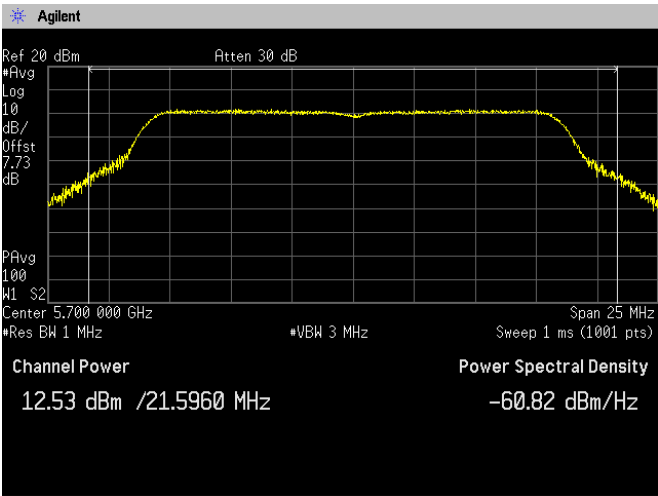
(5.6GHz Band)
Channel: 100



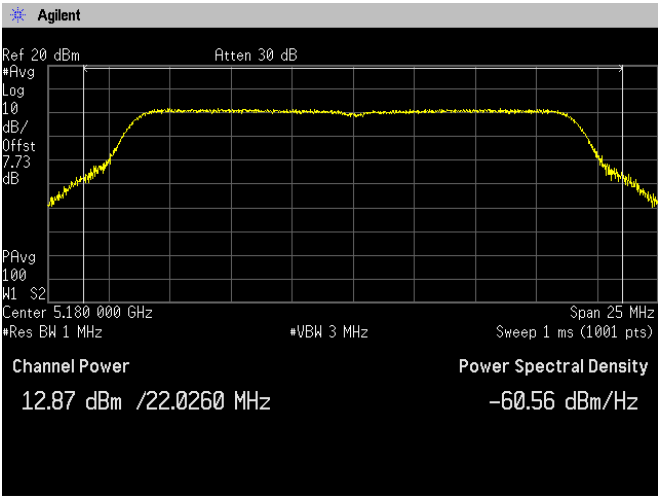
Channel: 120



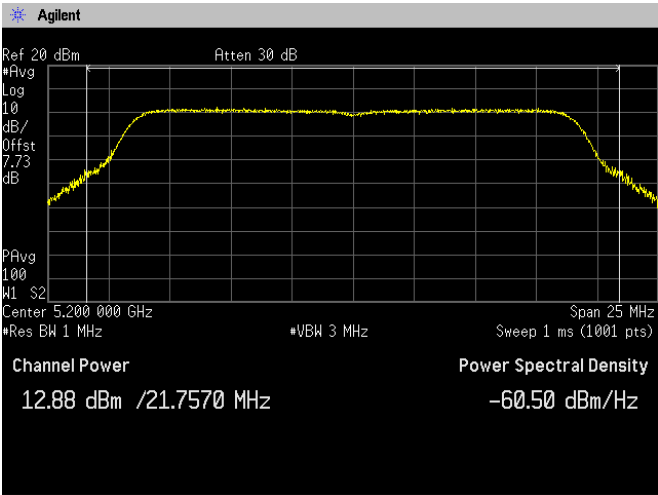
Channel: 140



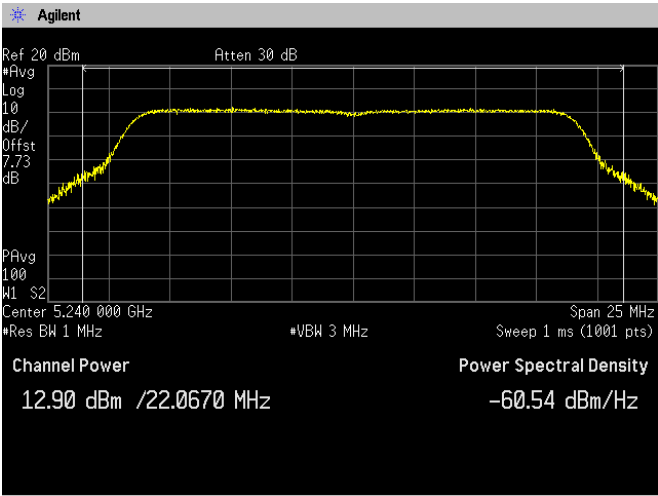
[IEEE802.11n (HT20)]
(5.2GHz Band)
Channel: 36



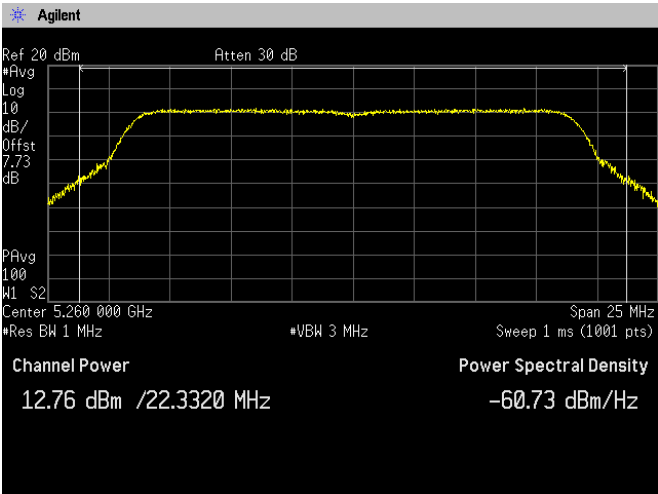
Channel: 40



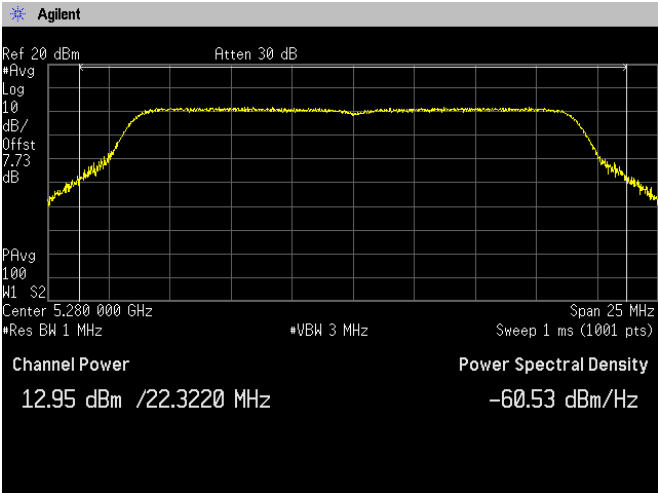
Channel: 48



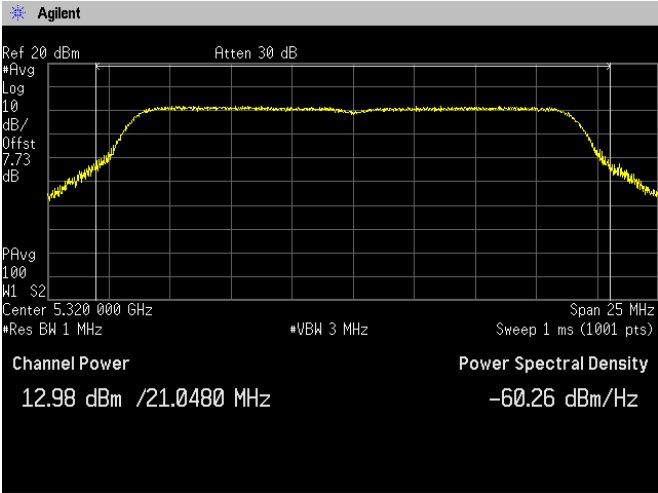
(5.3GHz Band)
Channel: 52



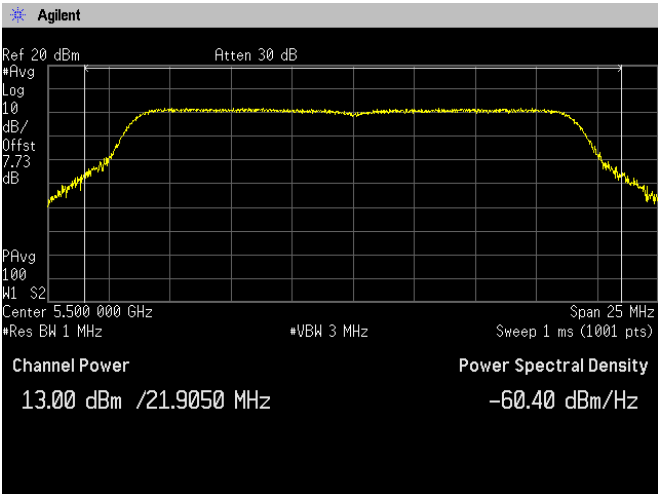
Channel: 56



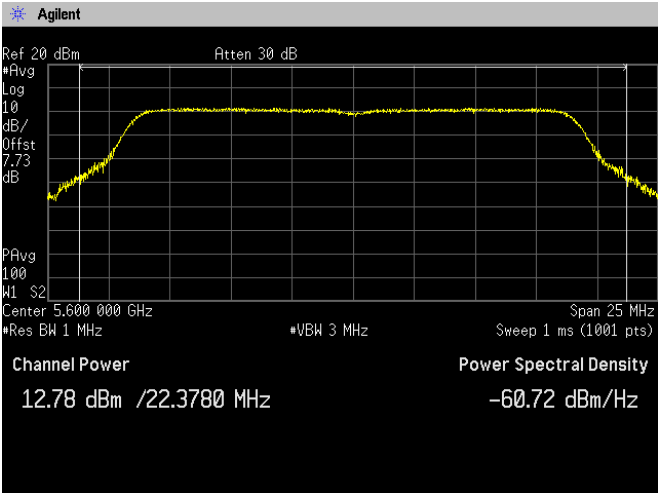
Channel: 64



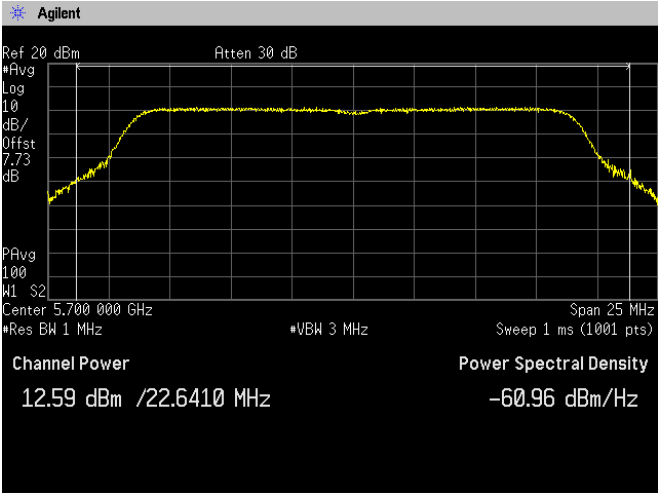
(5.6GHz Band)
Channel: 100



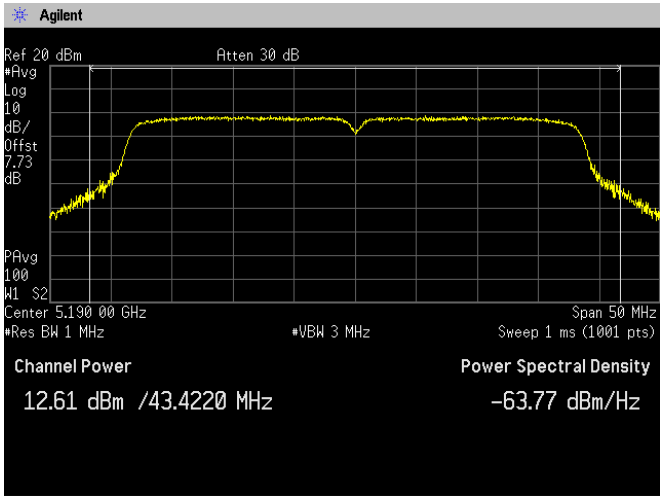
Channel: 120



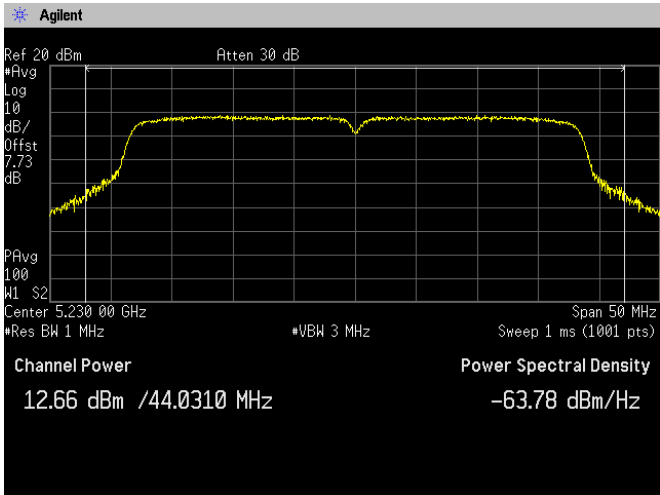
Channel: 140



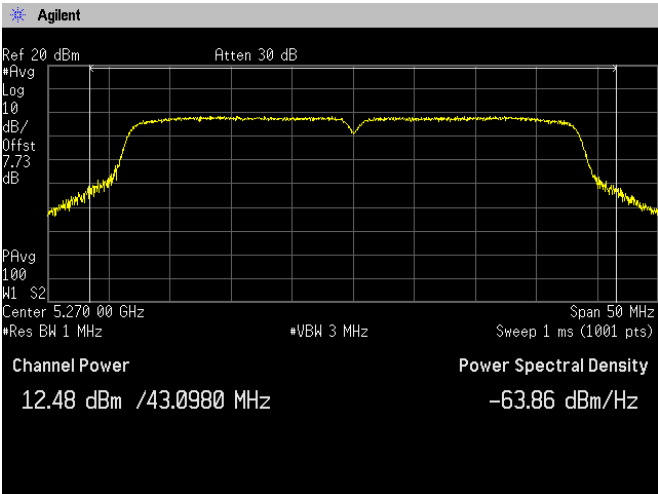
[IEEE802.11n (HT40)]
(5.2GHz Band)
Channel: 38



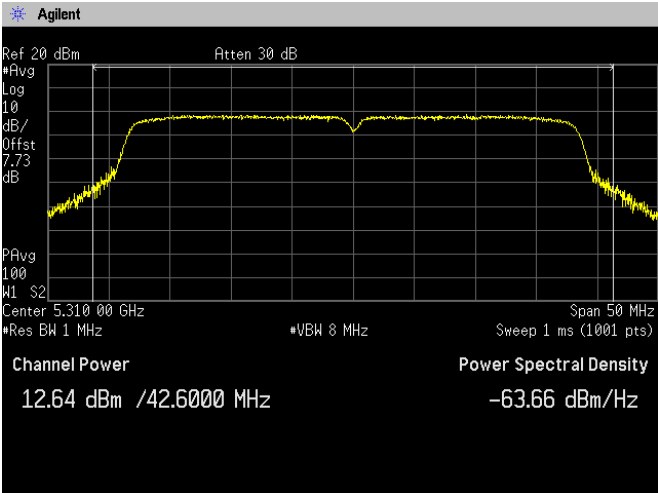
Channel: 46



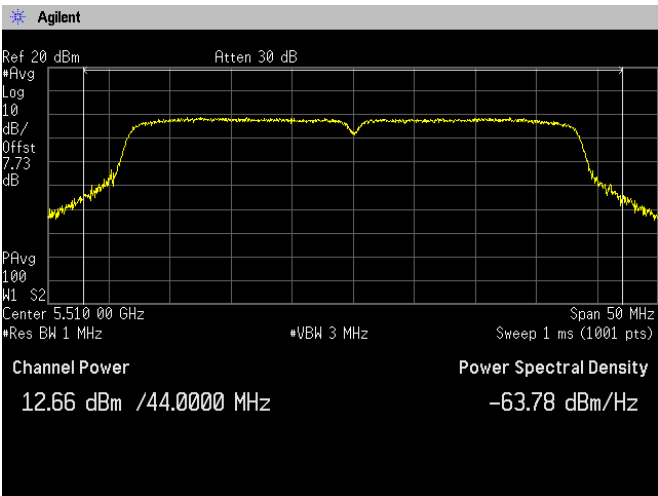
(5.3GHz Band)
Channel: 54



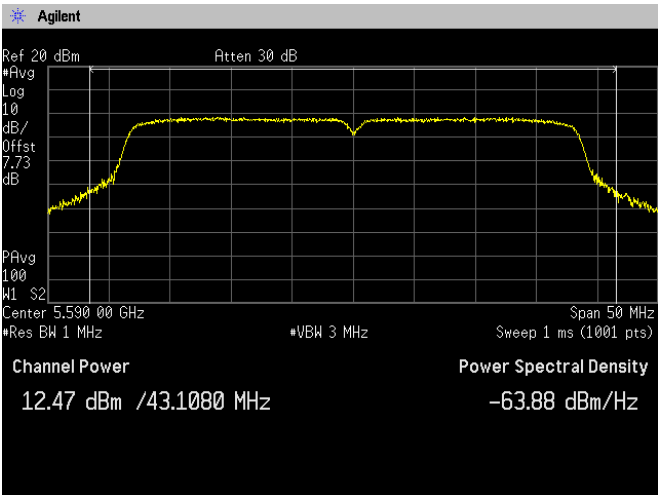
Channel: 62



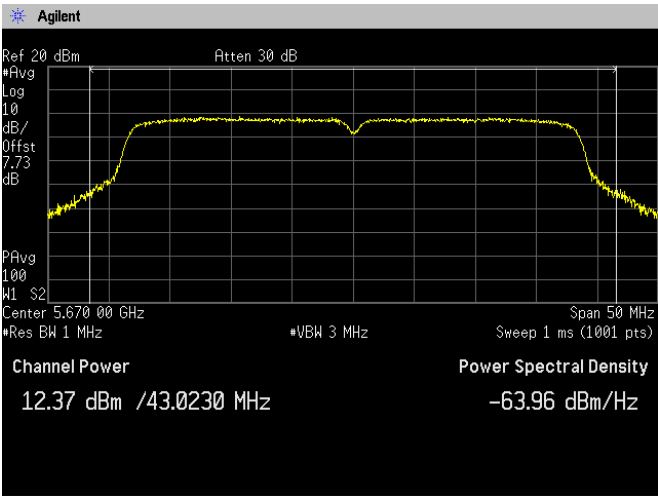
(5.6GHz Band)
Channel: 102



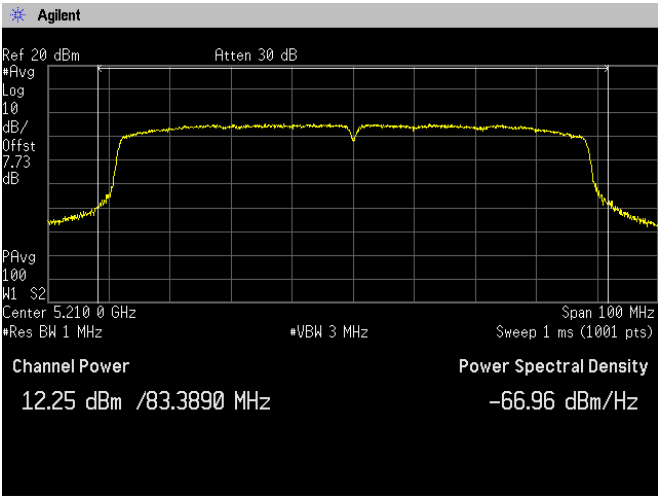
Channel: 118



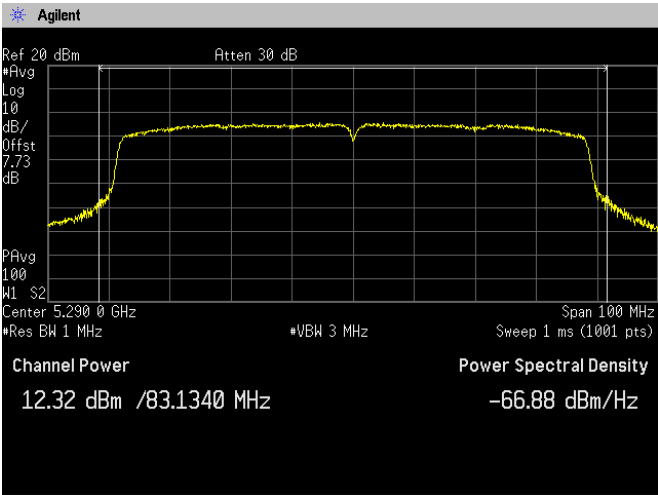
Channel: 134



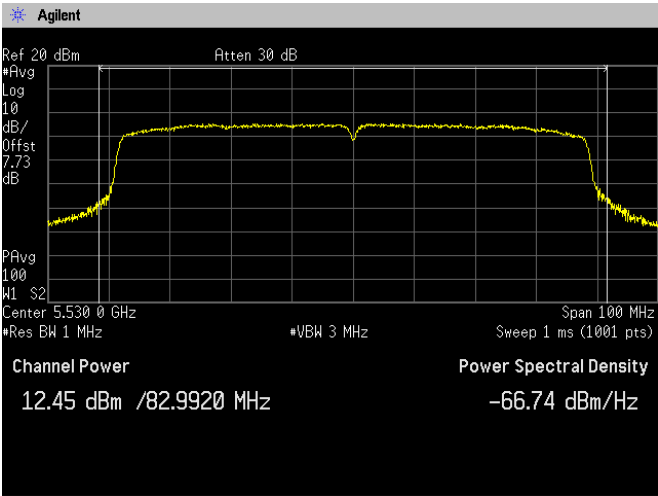
[IEEE802.11ac (HT80)]
(5.2GHz Band)
Channel: 42



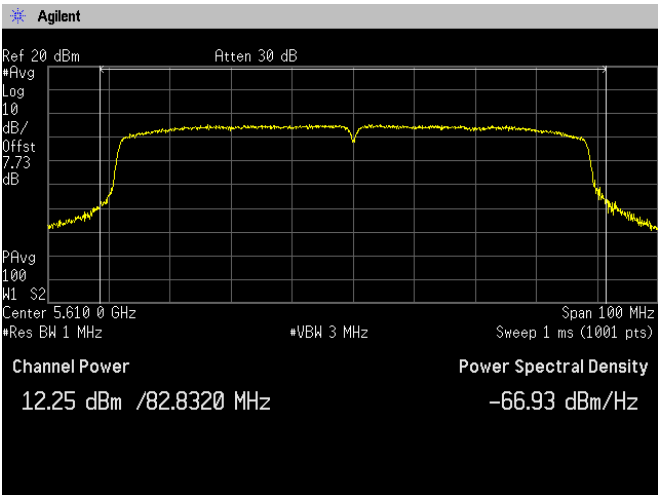
(5.3GHz Band)
Channel: 58



(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

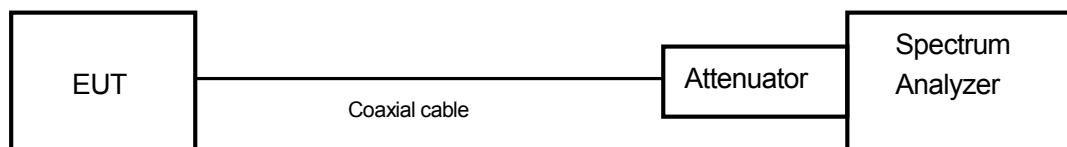
The EUT was set to operate with following conditions.

- 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 (dBm)
5.2GHz Band	1.3	11
5.3GHz Band	1.3	11
5.6GHz Band	0	11

6.3 Measurement result

Date : May 8, 2015
 Temperature : 22.4 [°C]
 Humidity : 42.6 [%]
 Test place : Shielded room No.4

Test engineer : Hikaru Shibata

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	2.025	1.364	1.372	0.994	0.025	2.050
	40	5200	2.023					2.048
	48	5240	2.005					2.030
	52	5260	1.821	1.364	1.372	0.994	0.025	1.846
	56	5280	1.855					1.880
	64	5320	2.210					2.235
	100	5500	2.233	1.364	1.372	0.994	0.025	2.258
	120	5600	1.879					1.904
	140	5700	1.818					1.843

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	1.873	1.276	1.284	0.994	0.027	1.900
	40	5200	1.825					1.852
	48	5240	1.857					1.884
	52	5260	1.501	1.276	1.284	0.994	0.027	1.528
	56	5280	1.762					1.789
	64	5320	1.906					1.933
	100	5500	1.937	1.274	1.282	0.994	0.027	1.964
	120	5600	1.729					1.756
	140	5700	1.883					1.910

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

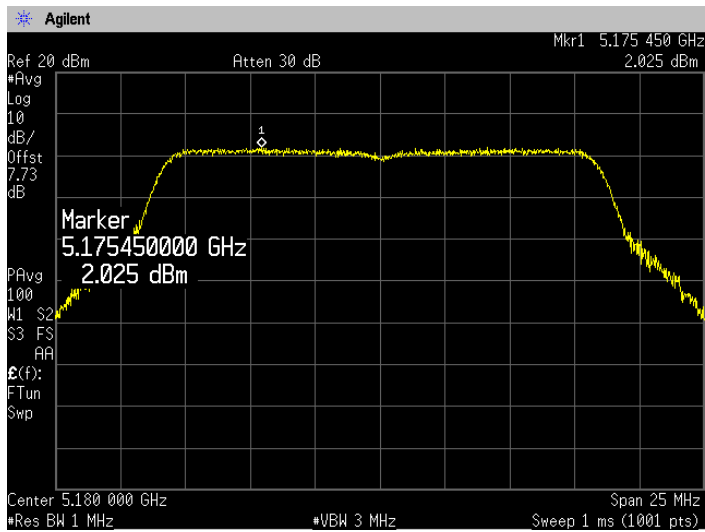
Mode	Channel	Frequency (MHz)	Reading (dBm)	Duty Cycle			DCF (dB)	Test Result (dBm)
				On Time(ms)	On+Off Time(ms)	X		
802.11n (40MHz)	38	5190	-1.217	0.636	0.646	0.985	0.068	-1.149
	46	5230	-1.429					-1.361
	54	5270	-1.493	0.635	0.646	0.983	0.075	-1.418
	62	5310	-1.282					-1.207
	102	5510	-1.076	0.635	0.645	0.984	0.068	-1.008
	118	5590	-1.596					-1.528
	134	5670	-1.514					-1.446

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

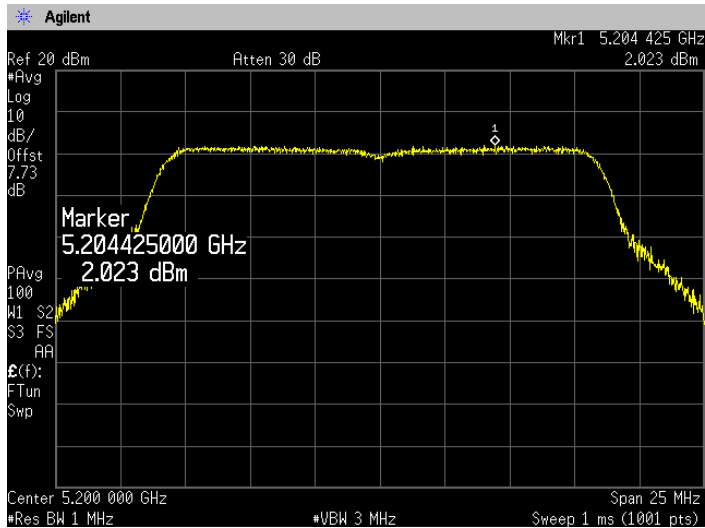
Mode	Channel	Frequency (MHz)	Reading (dBm)	Duty Cycle			DCF (dB)	Test Result (dBm)
				On Time(ms)	On+Off Time(ms)	X		
802.11ac (80MHz)	42	5210	-4.391	0.247	0.258	0.956	0.196	-4.195
	58	5290	-4.145	0.247	0.258	0.958	0.188	-3.957
	106	5530	-4.117	0.248	0.258	0.960	0.179	-3.938
	122	5610	-4.414	0.248	0.257	0.962	0.170	-4.244

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

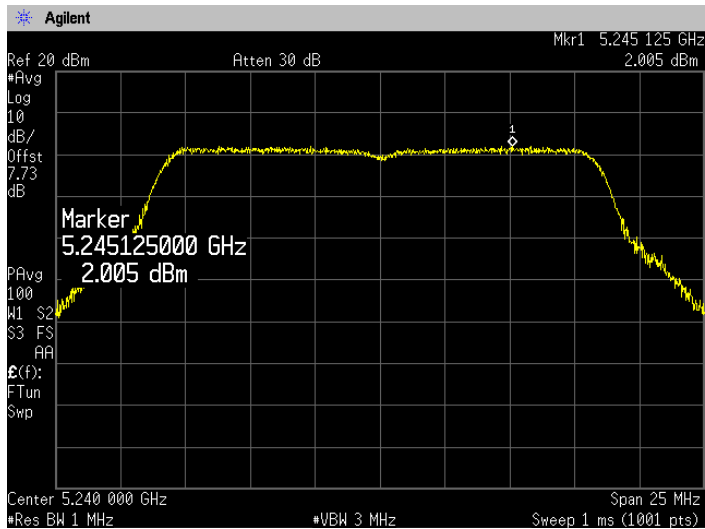
6.4 Trace data
[IEEE802.11a]
(5.2GHz Band)
Channel: 36



Channel: 40

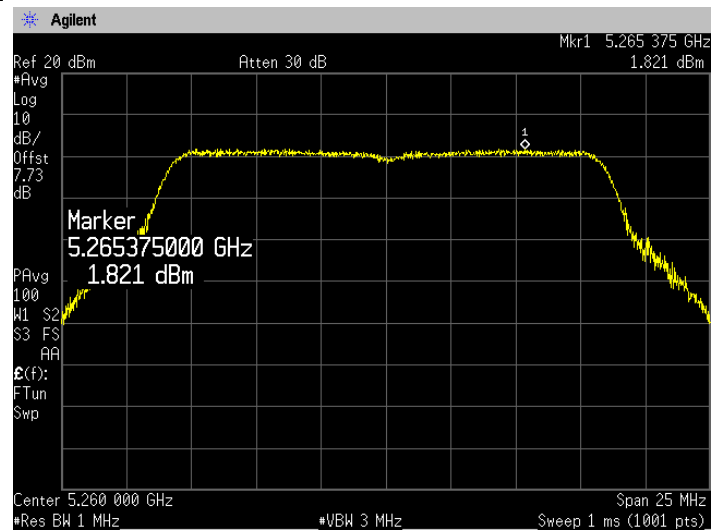


Channel: 48

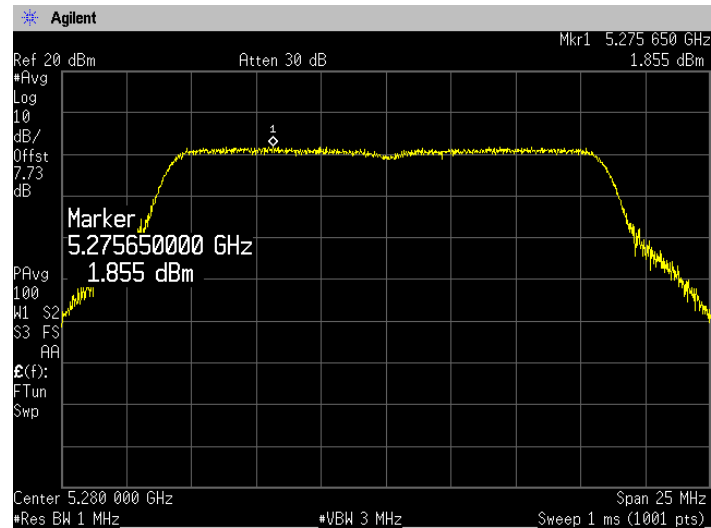


(5.3GHz Band)

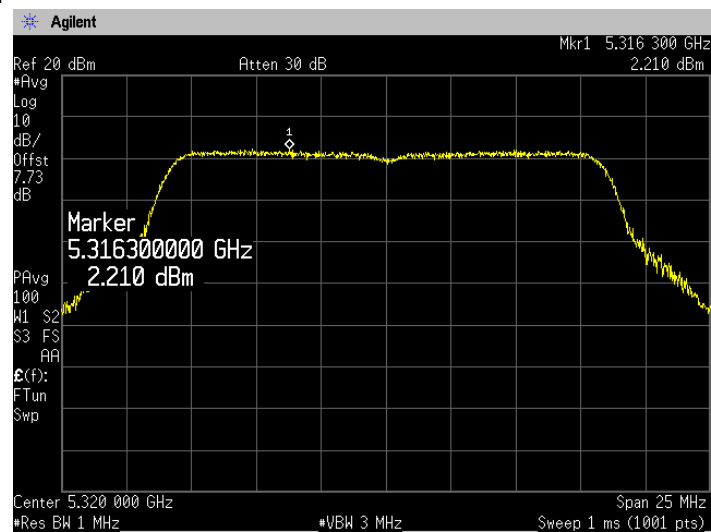
Channel: 52



Channel: 56

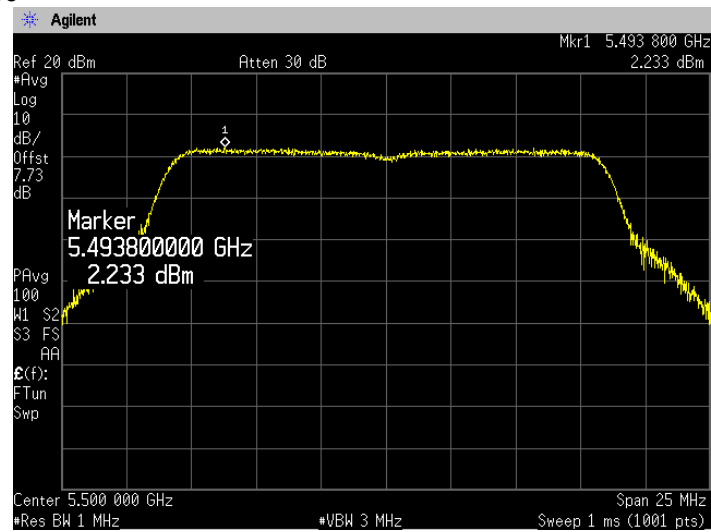


Channel: 64

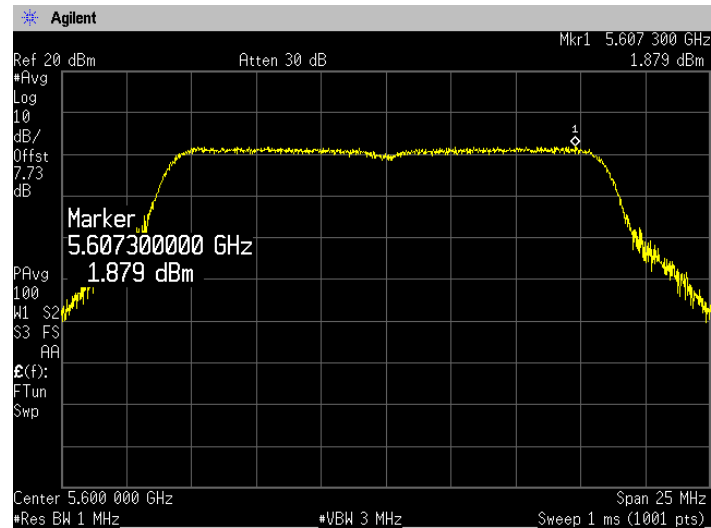


(5.6GHz Band)

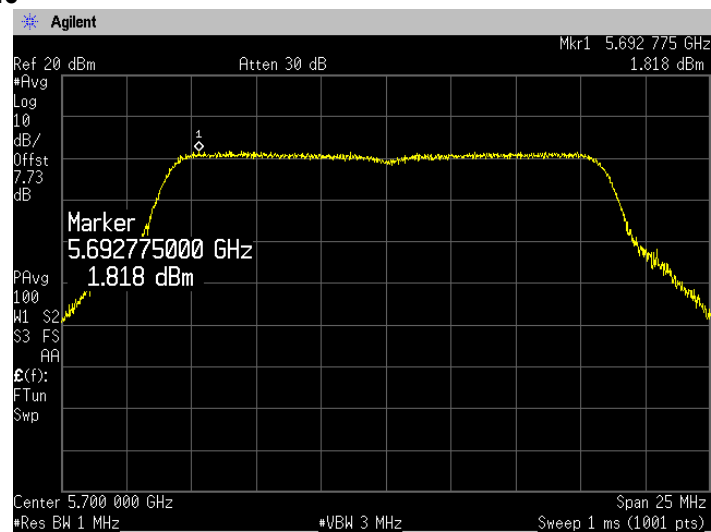
Channel: 100



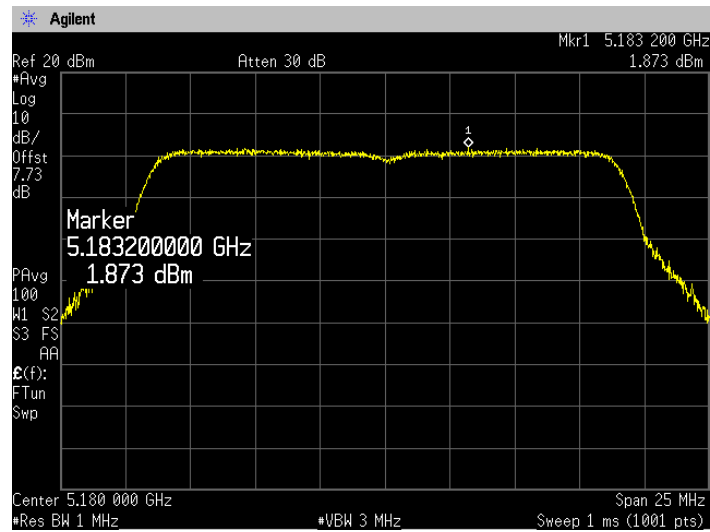
Channel: 120



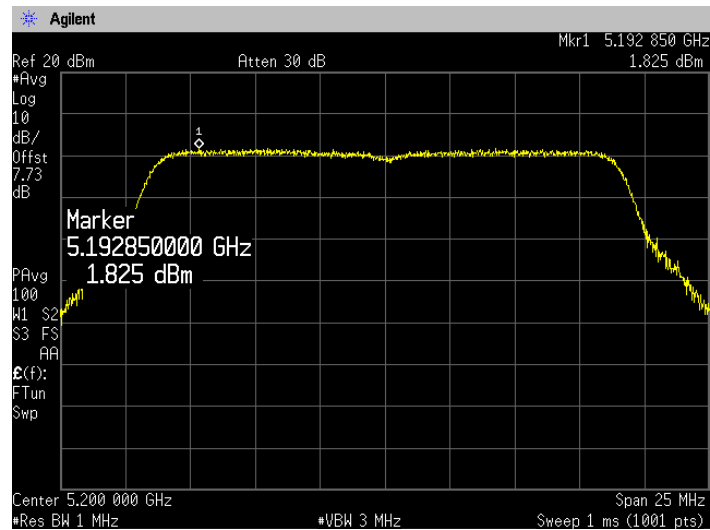
Channel: 140



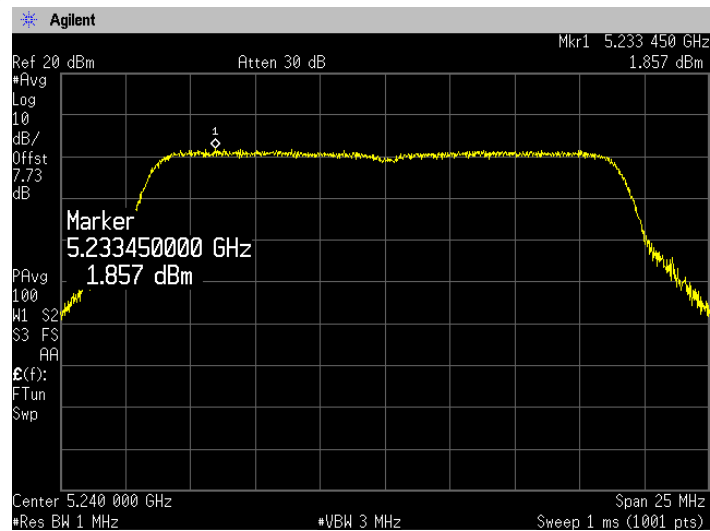
[IEEE802.11n (HT20)]
(5.2GHz Band)
Channel: 36



Channel: 40

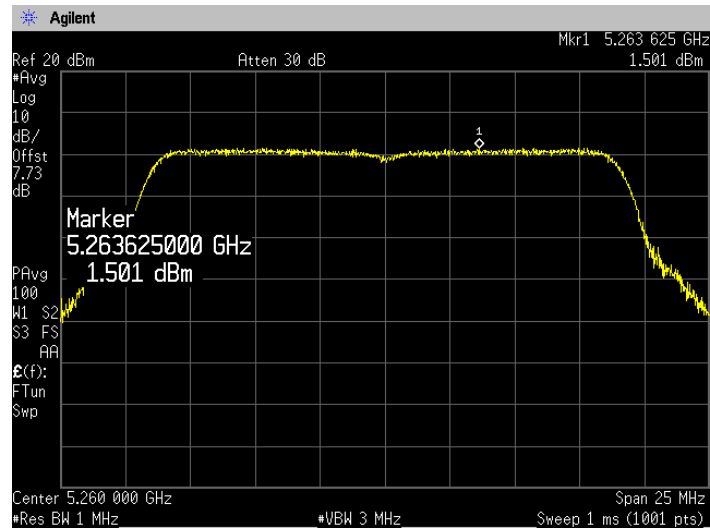


Channel: 48

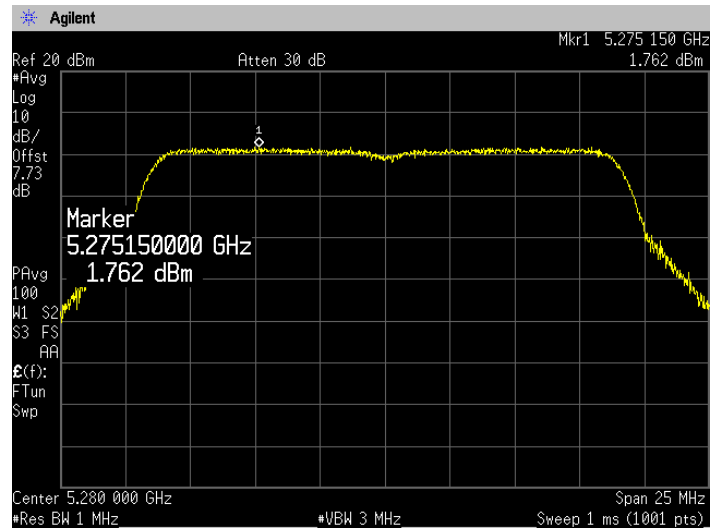


(5.3GHz Band)

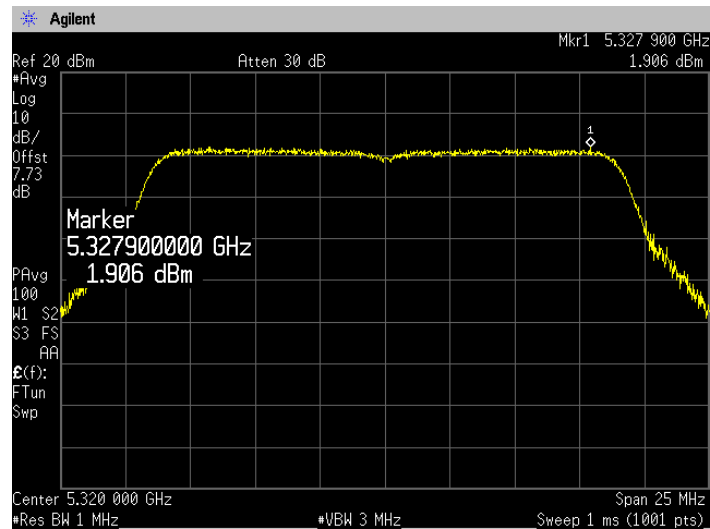
Channel: 52



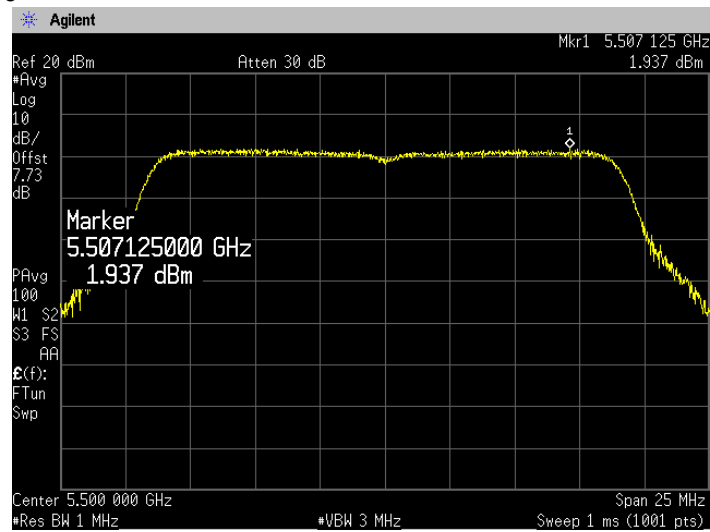
Channel: 56



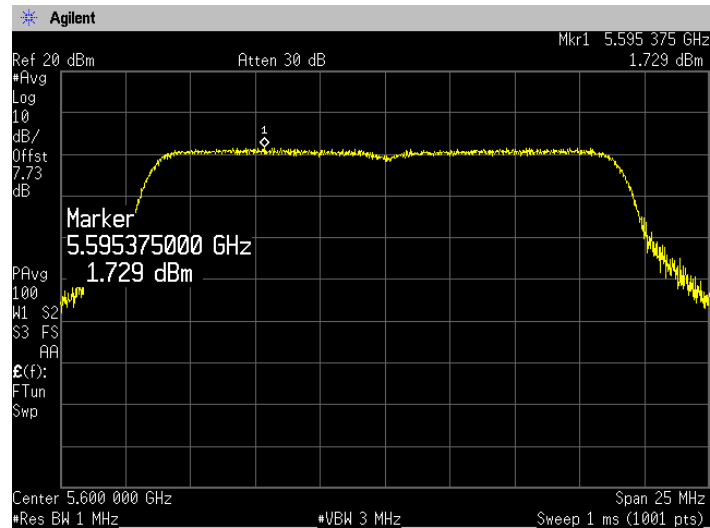
Channel: 64



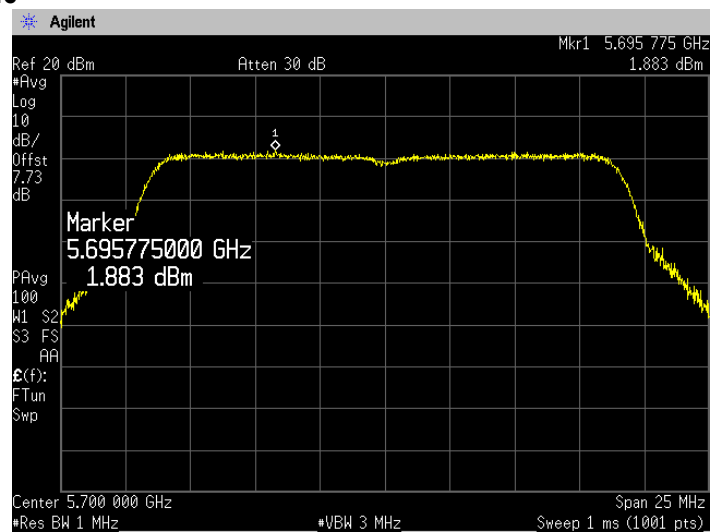
(5.6GHz Band)
Channel: 100



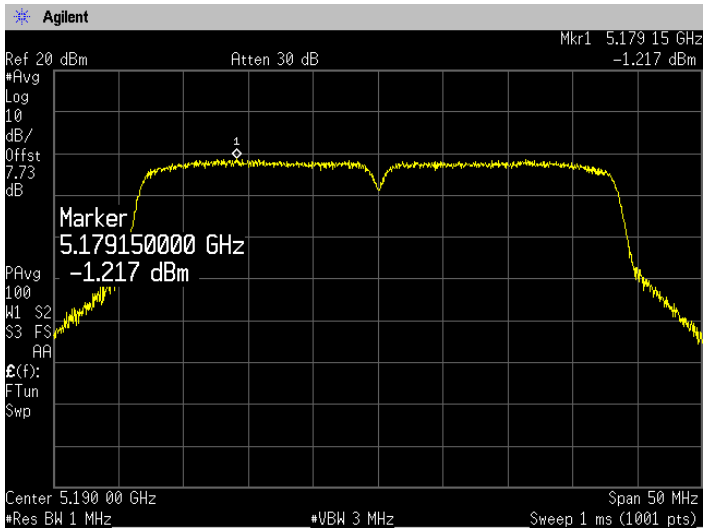
Channel: 120



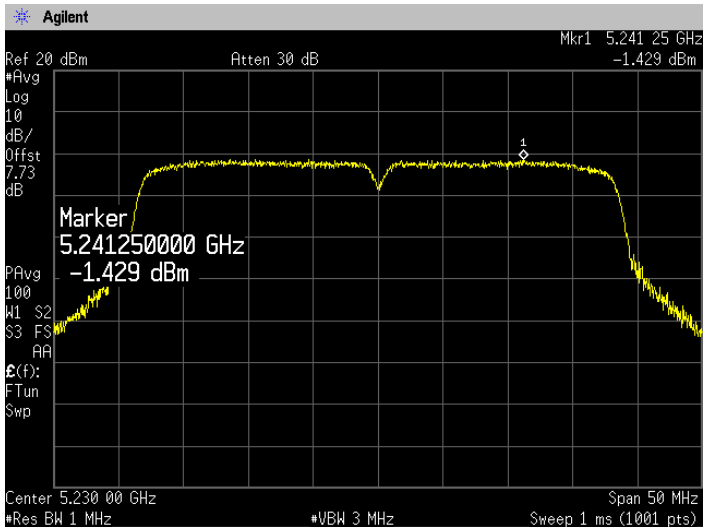
Channel: 140



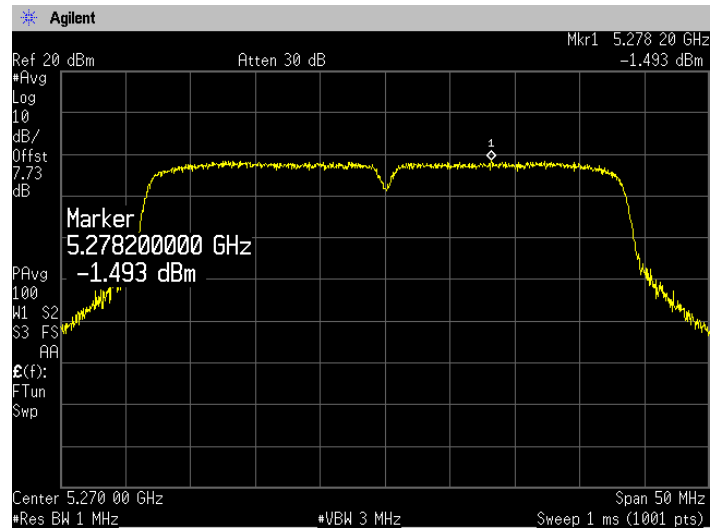
[IEEE802.11n (HT40)]
(5.2GHz Band)
Channel: 38



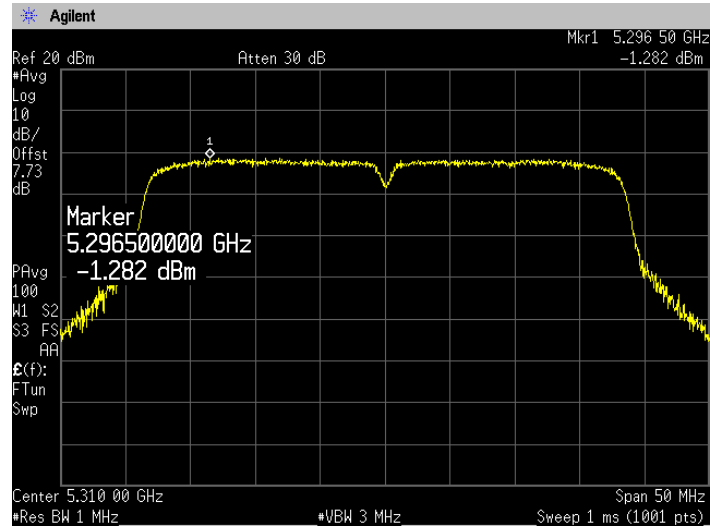
Channel: 46



(5.3GHz Band)
Channel: 54

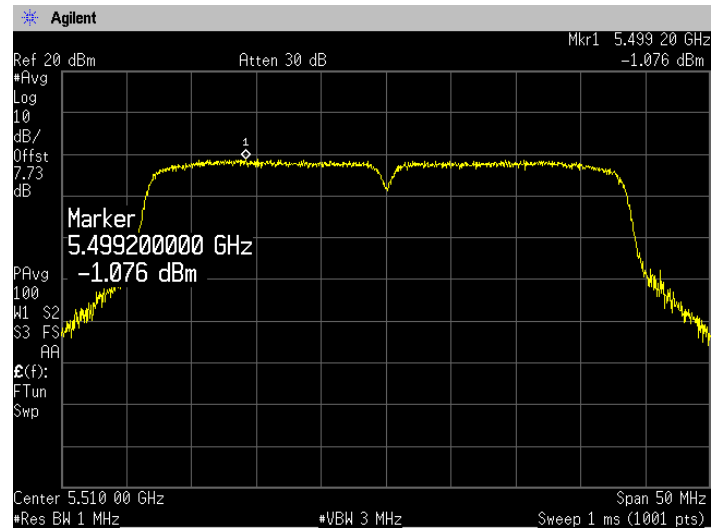


Channel: 62

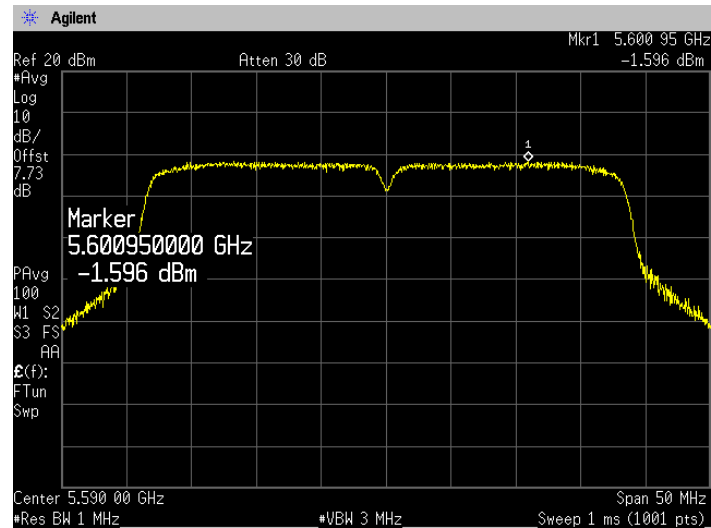


(5.6GHz Band)

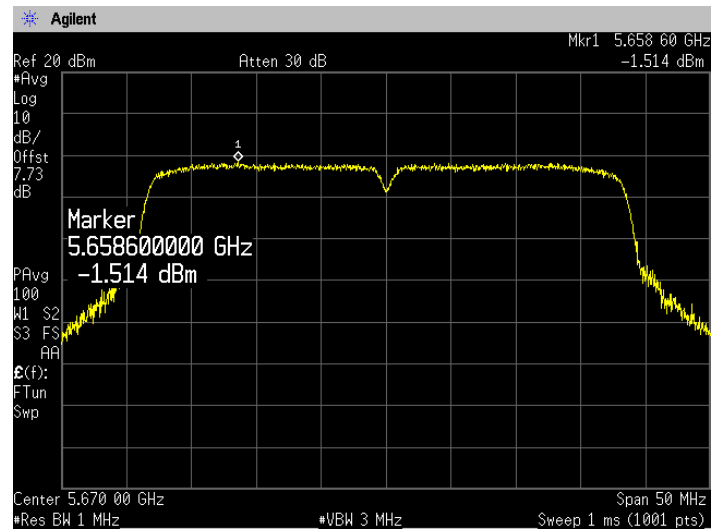
Channel: 102



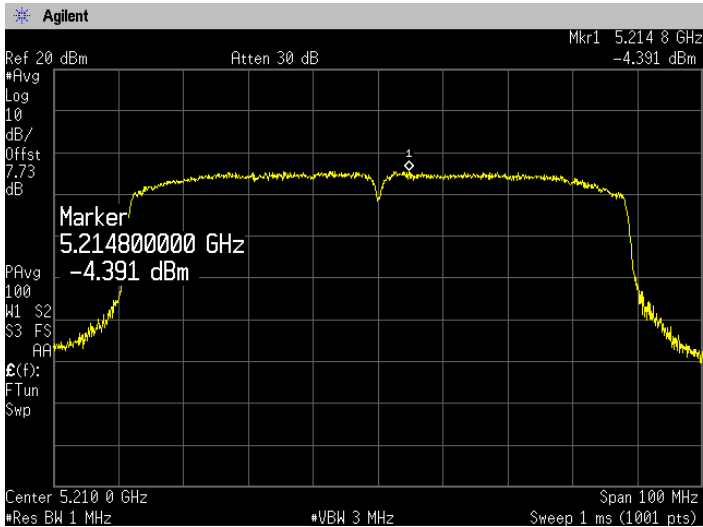
Channel: 118



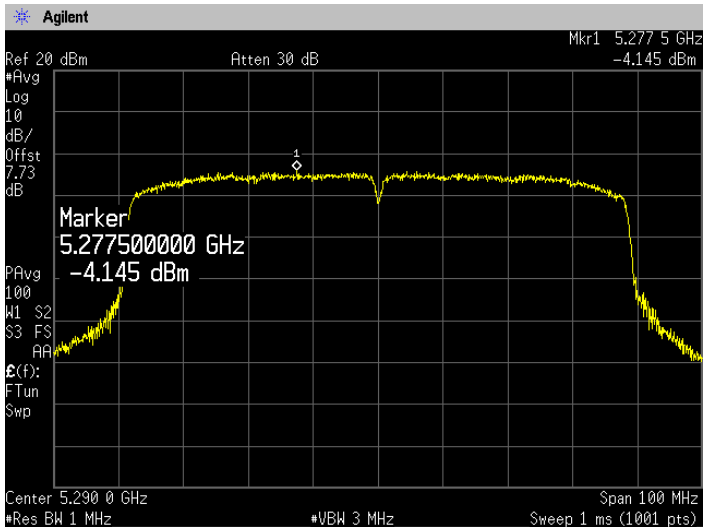
Channel: 134



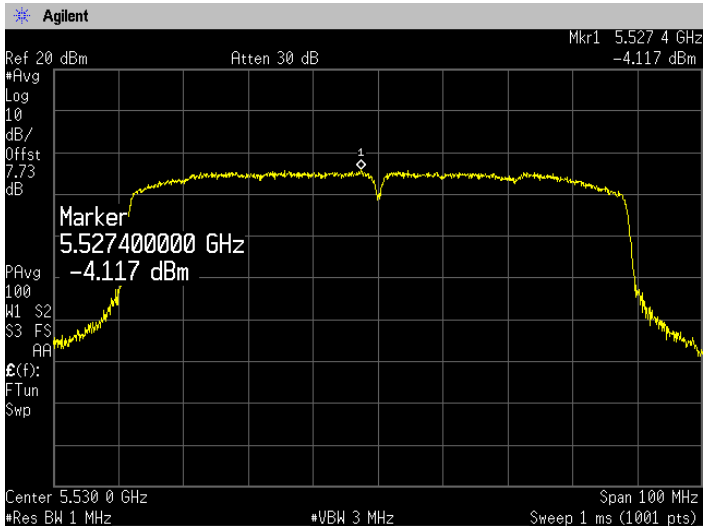
[IEEE802.11ac (HT80)]
(5.2GHz Band)
Channel: 42



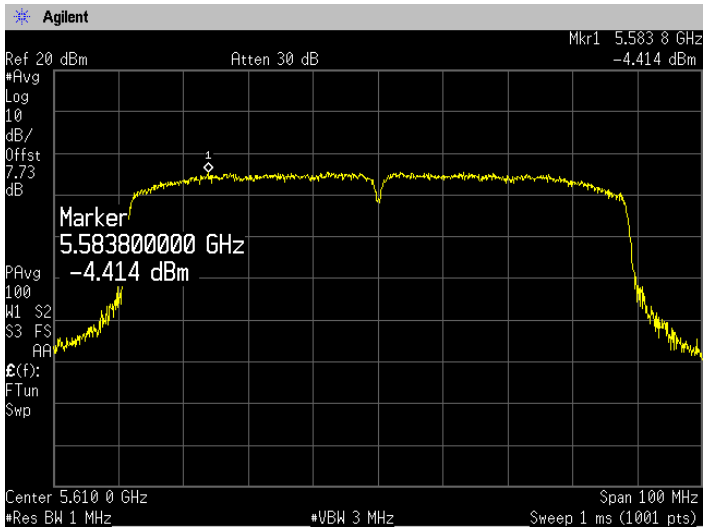
(5.3GHz Band)
Channel: 58



(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.

Frequency range	: 30MHz to 40GHz
Test place	: 3m Semi-anechoic chamber
EUT was placed on	: FRP table / (W)2.0m × (D)1.0m × (H)0.8m
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 (TRILOG antenna and Double ridged guide 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.

The EUT is Placed on a turntable, which is 0.8m 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.

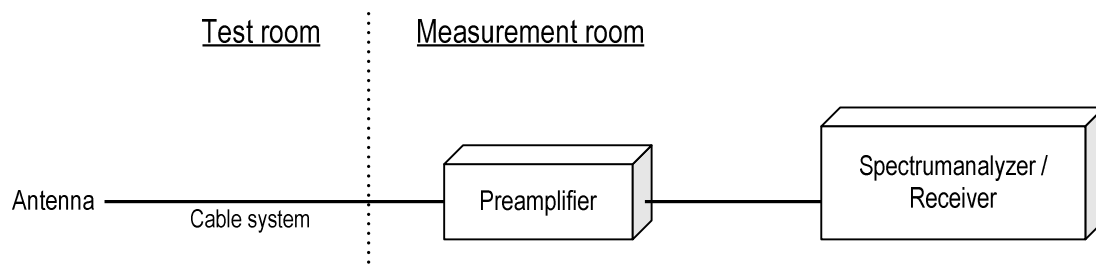
The EUT was set to operate with following conditions.

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

The test mode of EUT is as follows.

- Tx mode, Rx mode

- Test configuration



7.2 Calculation method

Emission level = Reading + (Ant. factor + Cable system loss – Amp. Gain)

Margin = Limit – Emission level

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	: April 21, 2015		
Temperature	: 22.3 [°C]		
Humidity	: 33.8 [%]	Test engineer	:
Test place	: 3m Semi-anechoic chamber		<u>Taiki Watanabe</u>
Date	: April 22, 2015		
Temperature	: 23.5 [°C]		
Humidity	: 28.5 [%]	Test engineer	:
Test place	: 3m Semi-anechoic chamber		<u>Taiki Watanabe</u>
Date	: April 25, 2015		
Temperature	: 24.1 [°C]		
Humidity	: 30.6 [%]	Test engineer	:
Test place	: 3m Semi-anechoic chamber		<u>Taiki Watanabe</u>
Date	: May 1, 2015		
Temperature	: 24.6 [°C]		
Humidity	: 32.6 [%]	Test engineer	:
Test place	: 3m Semi-anechoic chamber		<u>Taiki Watanabe</u>

**[IEEE802.11a]
(5.2GHz Band)**

Mode	Channel	Frequency (MHz)	Frequency (MHz)	ANT H/V	Detector PK/AV	Reading (dBμV)	C.F (dB)	DCF (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
802.11a	36	5180	5127.50	V	PK	40.8	14.1		54.9	74.0	19.1
			5127.50	V	AV	29.1	14.1		43.2	54.0	10.8
			10360.00	H	PK	39.0	23.7		62.7	68.2	5.5
			10360.00	V	PK	39.4	23.7		63.1	68.2	5.1
	40	5200	10400.00	V	PK	38.8	23.7		62.5	68.2	5.7
	48	5240	10480.00	V	PK	39.4	23.9		63.3	68.2	4.9

(5.3GHz Band)

Mode	Channel	Frequency (MHz)	Frequency (MHz)	ANT H/V	Detector PK/AV	Reading (dBμV)	C.F (dB)	DCF (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
802.11a	52	5260	10520.00	V	PK	39.6	24.0		63.6	68.2	4.6
	56	5280	10560.00	V	PK	39.1	24.1		63.2	68.2	5.0
	64	5320	5374.20	V	PK	40.5	14.9		55.4	74.0	18.6
			5374.20	V	AV	29.2	14.9		44.1	54.0	9.9
			10640.00	V	PK	38.9	24.3		63.2	74.0	10.8
			10640.00	V	AV	27.5	24.3		51.8	54.0	2.2

(5.6GHz Band)

Mode	Channel	Frequency (MHz)	Frequency (MHz)	ANT H/V	Detector PK/AV	Reading (dBμV)	C.F (dB)	DCF (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
802.11a	100	5500	5447.60	H	PK	41.8	15.0		56.8	74.0	17.2
			5447.60	H	AV	30.0	15.0		45.0	54.0	9.0
			5447.30	V	PK	42.8	15.0		57.8	74.0	16.2
			5447.30	V	AV	32.1	15.0		47.1	54.0	6.9
			5469.70	H	PK	40.7	15.0		55.7	68.2	12.5
			5468.60	V	PK	40.4	15.0		55.4	68.2	12.8
			11000.00	V	PK	38.5	25.5		64.0	74.0	10.0
			11000.00	V	AV	27.0	25.5		52.5	54.0	1.5
	120	5600	11200.00	H	PK	38.9	25.9		64.8	74.0	9.2
			11200.00	H	AV	27.0	25.9		52.9	54.0	1.1
			11200.00	V	PK	38.9	25.9		64.8	74.0	9.2
			11200.00	V	AV	26.9	25.9		52.8	54.0	1.2
	140	5700	5752.63	H	PK	39.5	15.6		55.1	74.0	18.9
			5752.63	H	AV	28.2	15.6		43.8	54.0	10.2
			5752.51	V	PK	40.8	15.6		56.4	74.0	17.6
			5752.51	V	AV	29.2	15.6		44.8	54.0	9.2
			11400.00	V	PK	39.2	26.1		65.3	74.0	8.7
			11400.00	V	AV	26.8	26.1		52.9	54.0	1.1

Note:

1. Emission Level (Margin) = Limit - [Reading + C.F (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 30MHz to 1000MHz at the 3 meters distance.
3. No emission was detected in the receive mode.

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

Mode	Channel	Frequency (MHz)	Frequency (MHz)	ANT H/V	Detector PK/AV	Reading (dBμV)	C.F (dB)	DCF (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
802.11n (20MHz)	36	5180	5128.30	V	PK	43.3	14.1		57.4	74.0	16.6
			5128.30	V	AV	31.8	14.1		45.9	54.0	8.1
			10360.00	V	PK	39.3	23.7		63.0	68.2	5.2
	40	5200	10400.00	V	PK	39.7	23.7		63.4	68.2	4.8
	48	5240	10480.00	V	PK	39.2	23.9		63.1	68.2	5.1

(5.3GHz Band)

Mode	Channel	Frequency (MHz)	Frequency (MHz)	ANT H/V	Detector PK/AV	Reading (dBμV)	C.F (dB)	DCF (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
802.11n (20MHz)	52	5260	10520.00	V	PK	39.4	24.0		63.4	68.2	4.8
	56	5280	10560.00	V	PK	39.4	24.1		63.5	68.2	4.7
	64	5320	5372.20	V	PK	42.0	14.9		56.9	74.0	17.1
			5372.20	V	AV	30.9	14.9		45.8	54.0	8.2
			10640.00	V	PK	39.3	24.3		63.6	74.0	10.4
			10640.00	V	AV	27.6	24.3		51.9	54.0	2.1

(5.6GHz Band)

Mode	Channel	Frequency (MHz)	Frequency (MHz)	ANT H/V	Detector PK/AV	Reading (dBμV)	C.F (dB)	DCF (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
802.11n (20MHz)	100	5500	5448.00	H	PK	42.0	15.0		57.0	74.0	17.0
			5448.00	H	AV	30.4	15.0		45.4	54.0	8.6
			5448.40	V	PK	43.1	15.0		58.1	74.0	15.9
			5448.40	V	AV	31.8	15.0		46.8	54.0	7.2
			5460.50	H	PK	40.1	15.0		55.1	68.2	13.1
			5460.50	V	PK	40.1	15.0		55.1	68.2	13.1
			11000.00	V	PK	38.2	25.5		63.7	74.0	10.3
			11000.00	V	AV	26.9	25.5		52.4	54.0	1.6
	120	5600	11200.00	V	PK	38.5	25.9		64.4	74.0	9.6
			11200.00	V	AV	26.9	25.9		52.8	54.0	1.2
	140	5700	5752.70	V	PK	40.9	15.6		56.5	68.2	11.7
			11400.00	V	PK	37.9	26.1		64.0	74.0	10.0
			11400.00	V	AV	26.8	26.1		52.9	54.0	1.1

Note:

1. Emission Level (Margin) = Limit - [Reading + C.F (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 30MHz to 1000MHz at the 3 meters distance.
3. No emission was detected in the receive mode.

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

Mode	Channel	Frequency (MHz)	Frequency (MHz)	ANT H/V	Detector PK/AV	Reading (dBμV)	C.F (dB)	DCF (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
802.11n (40MHz)	38	5190	5144.40	V	PK	40.6	14.1		54.7	74.0	19.3
			5144.40	V	AV	28.8	14.1		42.9	54.0	11.1
			10380.00	V	PK	40.1	23.7		63.8	68.2	4.4
	46	5230	10460.00	V	PK	39.6	23.9		63.5	68.2	4.7

(5.3GHz Band)

Mode	Channel	Frequency (MHz)	Frequency (MHz)	ANT H/V	Detector PK/AV	Reading (dBμV)	C.F (dB)	DCF (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
802.11n (40MHz)	54	5270	10540.00	V	PK	39.1	24.0		63.1	68.2	5.1
	62	5310	10620.00	V	PK	39.2	24.2		63.4	74.0	10.6
			10620.00	V	AV	27.4	24.2		51.6	54.0	2.4

(5.6GHz Band)

Mode	Channel	Frequency (MHz)	Frequency (MHz)	ANT H/V	Detector PK/AV	Reading (dBμV)	C.F (dB)	DCF (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
802.11n (40MHz)	102	5510	5459.00	V	PK	40.1	15.0		55.1	74.0	18.9
			5459.00	V	AV	28.4	15.0		43.4	54.0	10.6
			5469.10	V	PK	43.0	15.0		58.0	68.2	10.2
			11020.00	V	PK	39.1	25.5		64.6	74.0	9.4
			11020.00	V	AV	27.0	25.5		52.5	54.0	1.5
	118	5590	11180.00	V	PK	38.8	25.6		64.4	74.0	9.6
			11180.00	V	AV	27.3	25.6		52.9	54.0	1.1
	134	5670	11340.00	V	PK	38.6	26.0		64.6	74.0	9.4
			11340.00	V	AV	27.0	26.0		53.0	54.0	1.0

Note:

1. Emission Level (Margin) = Limit - [Reading + C.F (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 30MHz to 1000MHz at the 3 meters distance.
3. No emission was detected in the receive mode.

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

Mode	Channel	Frequency (MHz)	Frequency (MHz)	ANT H/V	Detector PK/AV	Reading (dBμV)	C.F (dB)	DCF (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
802.11ac (80MHz)	42	5210	5144.90	V	PK	40.2	14.1		54.3	74.0	19.7
			5144.90	V	AV	28.7	14.1	0.196	43.0	54.0	11.0
			10420.00	V	PK	39.3	23.8		63.1	68.2	5.1

(5.3GHz Band)

Mode	Channel	Frequency (MHz)	Frequency (MHz)	ANT H/V	Detector PK/AV	Reading (dBμV)	C.F (dB)	DCF (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
802.11ac (80MHz)	58	5290	5356.20	V	PK	42.9	15.0		57.9	74.0	16.1
			5356.20	V	AV	29.3	15.0	0.188	44.5	54.0	9.5
			10580.00	V	PK	39.5	24.6		64.1	68.2	4.1

(5.6GHz Band)

Mode	Channel	Frequency (MHz)	Frequency (MHz)	ANT H/V	Detector PK/AV	Reading (dBμV)	C.F (dB)	DCF (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
802.11ac (80MHz)	106	5530	11060.00	V	PK	38.4	26.0		64.4	74.0	9.6
			11060.00	V	AV	27.0	26.0	0.179	53.2	54.0	0.8
	122	5610	11220.00	V	PK	38.3	26.4		64.7	74.0	9.3
			11220.00	V	AV	26.8	26.4	0.17	53.4	54.0	0.6

Note:

1. Emission Level (Margin) = Limit - [Reading + C.F (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 30MHz to 1000MHz at the 3 meters distance.
3. No emission was detected in the receive mode.

8. Frequency Stability

8.1 Measurement procedure [FCC 15.407(g)]

The EUT was placed inside of a constant temperature chamber as the temperature in the chamber was varied between -30°C and $+60^{\circ}\text{C}$. The temperature was incremented by 10°C intervals and the unit was allowed to stabilize at each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.

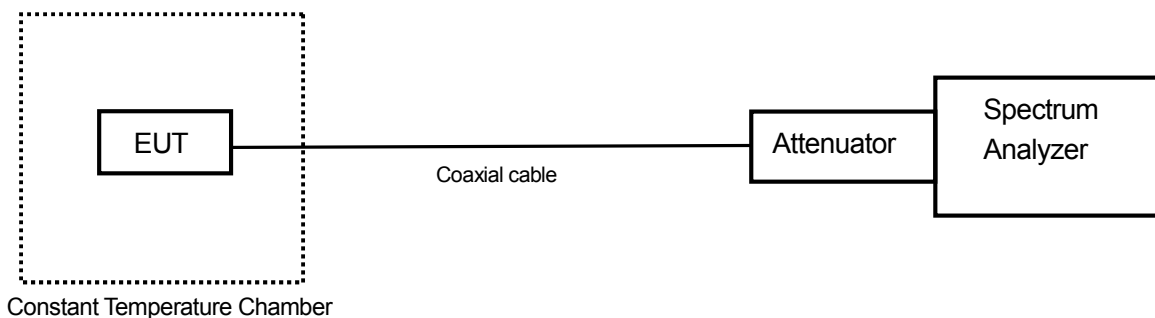
The EUT was set to operate with the following conditions.

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

The test mode of EUT is as follows.

- Tx mode

- Test configuration



8.2 Limit

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

8.3 Measurement result

Date : May 14, 2015

Temperature : 26.3 [°C]

Humidity : 37.1 [%]

Test place : Shielded room No.4

Test engineer :

Hikaru Shibata

[Channel: 36 (5180MHz)]

Power Supply [V]	Temperature [°C]	Measurements Frequency [Hz]	Frequency Tolerance [ppm]
3.80	25(Ref.)	5180048440	0.00000000
	60	5180067958	3.76791843
	50	5180051115	0.51640444
	40	5180043341	-0.98435373
	30	5180045464	-0.57451200
	20	5180045105	-0.64381637
	10	5180044273	-0.80443263
	0	5180046319	-0.40945563
	-10	5180048147	-0.05656318
	-20	5180055595	1.38126121
	-30	5180049980	0.29729452
3.23	25	5180044678	-0.72624803
4.37	25	5180047874	-0.10926539

[Channel: 64 (5320MHz)]

Power Supply [V]	Temperature [°C]	Measurements Frequency [Hz]	Frequency Tolerance [%]
3.80	25(Ref.)	5320043144	0.00000000
	60	5320076044	6.18416037
	50	5320048695	1.04341259
	40	5320044694	0.29135102
	30	5320044944	0.33834312
	20	5320045480	0.43909418
	10	5320048425	0.99266112
	0	5320053983	2.03738949
	-10	5320063517	3.82948022
	-20	5320062362	3.61237672
	-30	5320044087	0.17725420
3.23	25	5320047448	0.80901600
4.37	25	5320041748	-0.26240389



Zacta

[Channel: 140 (5700MHz)]

Power Supply [V]	Temperature [°C]	Measurements Frequency [Hz]	Frequency Tolerance [ppm]
3.80	25(Ref.)	5700047167	0.00000000
	60	5700084830	6.60748918
	50	5700050117	0.51753958
	40	5700047210	0.00754380
	30	5700048515	0.23648927
	20	5700048010	0.14789351
	10	5700066283	3.35365646
	0	5700073807	4.67364554
	-10	5700073208	4.56855869
	-20	5700068011	3.65681185
	-30	5700057038	1.73174006
3.23	25	5700045446	-0.30192733
4.37	25	5700046623	-0.09543781

9. AC Power Line Conducted Emissions

9.1 Measurement procedure [FCC 15.207]

Test was applied by following conditions.

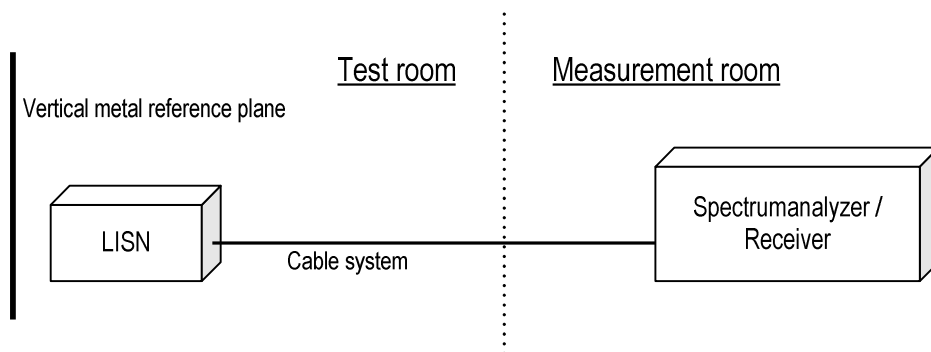
Test method	: ANSI C63.10
Frequency range	: 0.15MHz to 30MHz
Test place	: 10m Semi-anechoic chamber
EUT was placed on	: FRP table / (W)2.0m × (D)1.0m × (H)0.8m
Vertical Metal Reference Plane	: (W)2.0m × (H)2.0m 0.4m away from EUT
Test receiver setting	
- Detector	: Quasi-peak, Average
- Bandwidth	: 9kHz

EUT and peripherals are connected to 50Ω/50μH Line Impedance Stabilization Network (LISN) which are connected to reference ground plane, and are placed 80cm away from EUT. Excess of AC power cable is bundled in center.

LISN for peripheral is terminated in 50Ω.

EUT operating mode is selected to emit the maximum noise. Overall frequency range is investigated with spectrum analyzer using peak detector. Maximum emission configuration is determined by manipulating the EUT, peripherals, interconnecting cables. Then, emission measurements are performed with test receiver in above setting to each current-carrying conductor of the mains port. Sufficient time for EUT, peripherals and test equipment is provided in order for them to warm up to their normal operating condition. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits.

- Test configuration



9.2 Calculation method

Emission level = Reading + (LISN. factor + Cable system loss)

Margin = Limit – Emission level

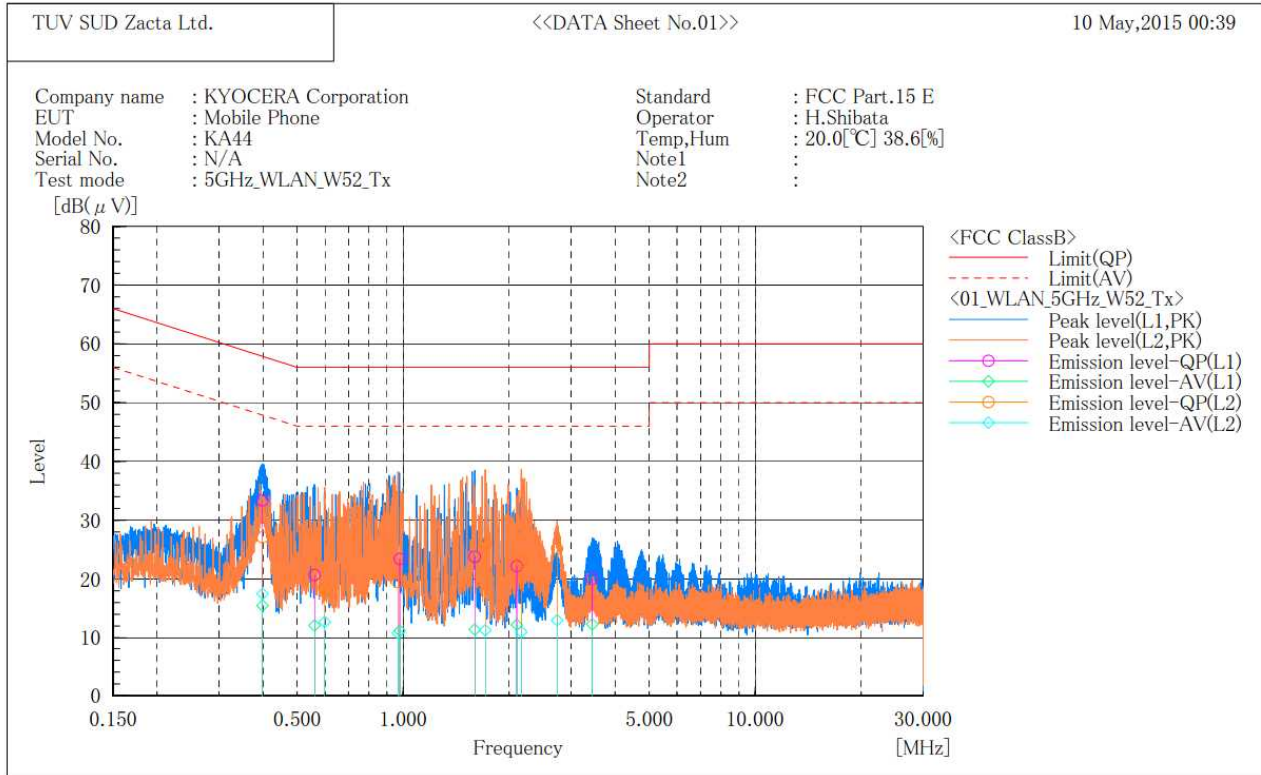
9.3 Limit

Frequency [MHz]	Limit	
	QP [dBuV]	AV [dBuV]
0.15-0.5	66-56*	56-46*
0.5-5	56	46
5-30	60	50

*: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

9.4 Test data

***** CONDUCTED EMISSION at MAINS PORT *****
 << 10m semi-anechoic chamber #1 >>



Final Result

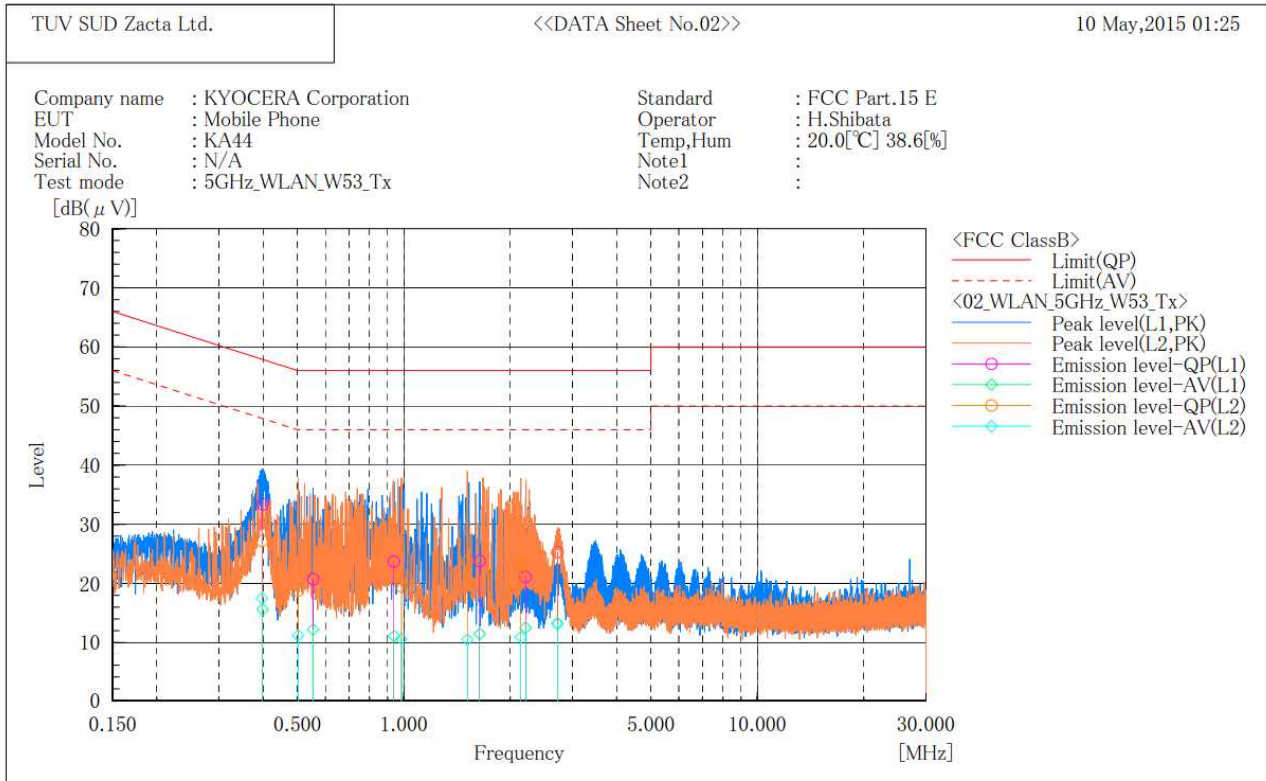
--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading AV [dB(μV)]	c. f [dB]	Result QP [dB(μV)]	Result AV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin AV [dB]
1	0.399	23.2	5.3	10.2	33.4	15.5	57.9	47.9	24.5	32.4
2	0.560	10.4	1.8	10.3	20.7	12.1	56.0	46.0	35.3	33.9
3	0.978	13.1	0.9	10.3	23.4	11.2	56.0	46.0	32.6	34.8
4	1.598	13.4	1.0	10.4	23.8	11.4	56.0	46.0	32.2	34.6
5	2.104	11.8	1.8	10.4	22.2	12.2	56.0	46.0	33.8	33.8
6	3.446	9.5	1.8	10.5	20.0	12.3	56.0	46.0	36.0	33.7

--- L2 Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading AV [dB(μV)]	c. f [dB]	Result QP [dB(μV)]	Result AV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin AV [dB]
1	0.399	16.8	7.2	10.3	27.1	17.5	57.9	47.9	30.8	30.4
2	0.599	8.1	2.4	10.3	18.4	12.7	56.0	46.0	37.6	33.3
3	0.966	9.1	0.4	10.4	19.5	10.8	56.0	46.0	36.5	35.2
4	1.711	15.6	0.9	10.4	26.0	11.3	56.0	46.0	30.0	34.7
5	2.166	12.6	0.5	10.5	23.1	11.0	56.0	46.0	32.9	35.0
6	2.738	14.7	2.5	10.5	25.2	13.0	56.0	46.0	30.8	33.0

***** CONDUCTED EMISSION at MAINS PORT *****
 << 10m semi-anechoic chamber #1 >>



Final Result

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading AV [dB(μV)]	c. f [dB]	Result QP [dB(μV)]	Result AV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin AV [dB]
1	2.723	14.8	2.7	10.5	25.3	13.2	56.0	46.0	30.7	32.8
2	0.399	23.2	5.4	10.2	33.4	15.6	57.9	47.9	24.5	32.3
3	0.554	10.4	1.9	10.3	20.7	12.2	56.0	46.0	35.3	33.8
4	0.938	13.4	0.8	10.3	23.7	11.1	56.0	46.0	32.3	34.9
5	1.640	13.4	1.1	10.4	23.8	11.5	56.0	46.0	32.2	34.5
6	2.210	10.7	2.1	10.4	21.1	12.5	56.0	46.0	34.9	33.5

--- L2 Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading AV [dB(μV)]	c. f [dB]	Result QP [dB(μV)]	Result AV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin AV [dB]
1	0.397	16.9	7.2	10.3	27.2	17.5	57.9	47.9	30.7	30.4
2	0.503	8.5	0.9	10.3	18.8	11.2	56.0	46.0	37.2	34.8
3	0.985	9.1	0.2	10.4	19.5	10.6	56.0	46.0	36.5	35.4
4	1.513	13.3	0.1	10.4	23.7	10.5	56.0	46.0	32.3	35.5
5	2.143	12.6	0.4	10.5	23.1	10.9	56.0	46.0	32.9	35.1
6	2.720	14.7	2.8	10.5	25.2	13.3	56.0	46.0	30.8	32.7

***** CONDUCTED EMISSION at MAINS PORT *****
 << 10m semi-anechoic chamber #1 >>

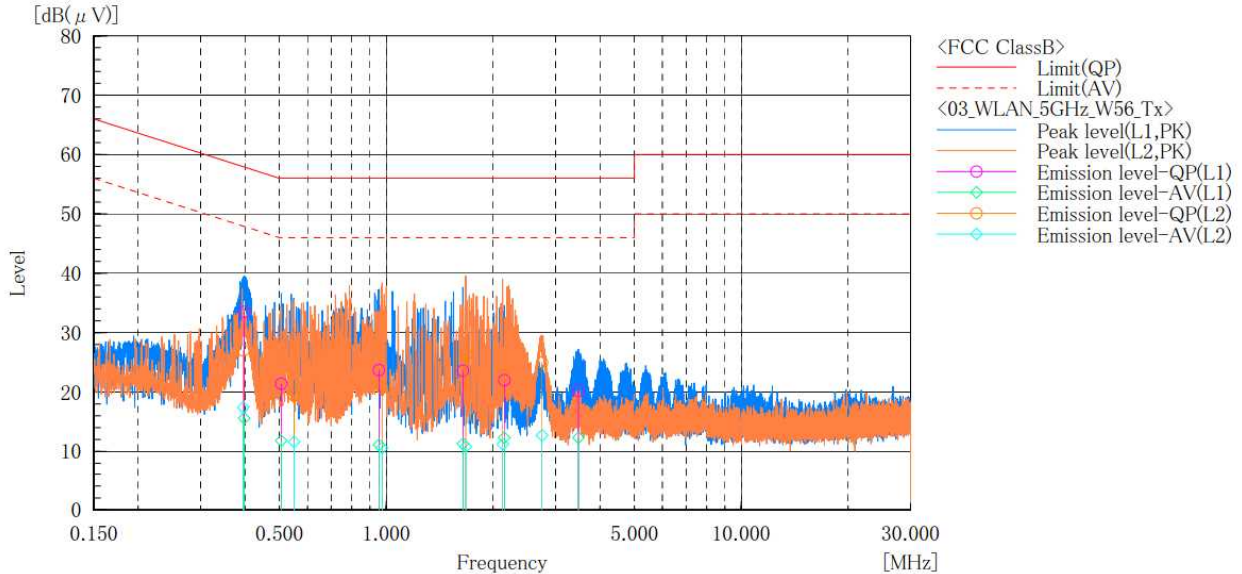
TUV SUD Zacta Ltd.

<<DATA Sheet No.03>>

10 May,2015 03:16

Company name : KYOCERA Corporation
 EUT : Mobile Phone
 Model No. : KA44
 Serial No. : N/A
 Test mode : 5GHz_WLAN_W56_Tx

Standard : FCC Part.15 E
 Operator : H.Shibata
 Temp,Hum : 20.0[°C] 38.6[%]
 Note1 :
 Note2 :



Final Result

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading AV [dB(μV)]	c. f [dB]	Result QP [dB(μV)]	Result AV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin AV [dB]
1	0.398	23.3	5.4	10.2	33.5	15.6	57.9	47.9	24.4	32.3
2	0.506	11.1	1.5	10.3	21.4	11.8	56.0	46.0	34.6	34.2
3	0.954	13.4	0.8	10.3	23.7	11.1	56.0	46.0	32.3	34.9
4	1.645	13.2	0.9	10.4	23.6	11.3	56.0	46.0	32.4	34.7
5	2.150	11.6	1.9	10.4	22.0	12.3	56.0	46.0	34.0	33.7
6	3.478	9.7	1.8	10.5	20.2	12.3	56.0	46.0	35.8	33.7

--- L2 Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading AV [dB(μV)]	c. f [dB]	Result QP [dB(μV)]	Result AV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin AV [dB]
1	0.396	16.7	7.1	10.3	27.0	17.4	57.9	47.9	30.9	30.5
2	0.550	9.2	1.3	10.3	19.5	11.6	56.0	46.0	36.5	34.4
3	0.973	10.3	0.2	10.4	20.7	10.6	56.0	46.0	35.3	35.4
4	1.675	15.9	0.4	10.4	26.3	10.8	56.0	46.0	29.7	35.2
5	2.130	12.3	0.7	10.5	22.8	11.2	56.0	46.0	33.2	34.8
6	2.749	14.5	2.2	10.5	25.0	12.7	56.0	46.0	31.0	33.3

10. Duty Cycle

10.1 Measurement procedure

[KDB 789033 Zero-Span Spectrum Analyzer Method]

The duty cycle 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=8MHz, VBW=8MHz, Span=0Hz, Sweep=Auto, Detector=Peak, Trace mode=Single

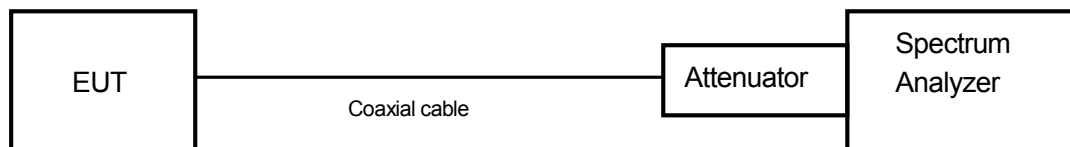
The EUT was set to operate with following conditions.

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

The test mode of EUT is as follows.

- Tx mode

- Test configuration



10.2 Limit

None

10.3 Measurement result

Date : May 7, 2015

Temperature : 19.7 [°C]

Humidity : 43.8 [%]

Test place : Shielded room No.4

Tested by :

Hikaru Shibata

Mode	Channel	Frequency (MHz)	Duty Cycle				DCF (dB) 10log(1/x)	DCF (dB) 20log(1/x)
			On Time(ms)	On+Off Time(ms)	X	1/T		
802.11a	36	5180	1.364	1.372	0.994	733.1	0.025	0.051
	40	5200						
	58	5240						
	52	5260	1.364	1.372	0.994	733.1	0.025	0.051
	56	5280						
	64	5320						
	100	5500	1.364	1.372	0.994	733.1	0.025	0.051
	120	5600						
	140	5700						

Note: X = On time / (On + Off time)

Mode	Channel	Frequency (MHz)	Duty Cycle				DCF (dB) 10log(1/x)	DCF (dB) 20log(1/x)
			On Time(ms)	On+Off Time(ms)	X	1/T		
802.11n (20MHz)	36	5180	1.276	1.284	0.994	783.7	0.027	0.054
	40	5200						
	58	5240						
	52	5260	1.276	1.284	0.994	783.7	0.027	0.054
	56	5280						
	64	5320						
	100	5500	1.274	1.282	0.994	784.9	0.027	0.054
	120	5600						
	140	5700						

Note: X = On time / (On + Off time)

Mode	Channel	Frequency (MHz)	Duty Cycle				DCF (dB) 10log(1/x)	DCF (dB) 20log(1/x)
			On Time(ms)	On+Off Time(ms)	X	1/T		
802.11n (40MHz)	38	5190	0.636	0.646	0.985	1572.3	0.068	0.136
	46	5230						
	54	5270	0.635	0.646	0.983	1574.8	0.075	0.149
	62	5310						
	102	5510	0.635	0.645	0.984	1574.8	0.068	0.136
	118	5590						
	134	5670						

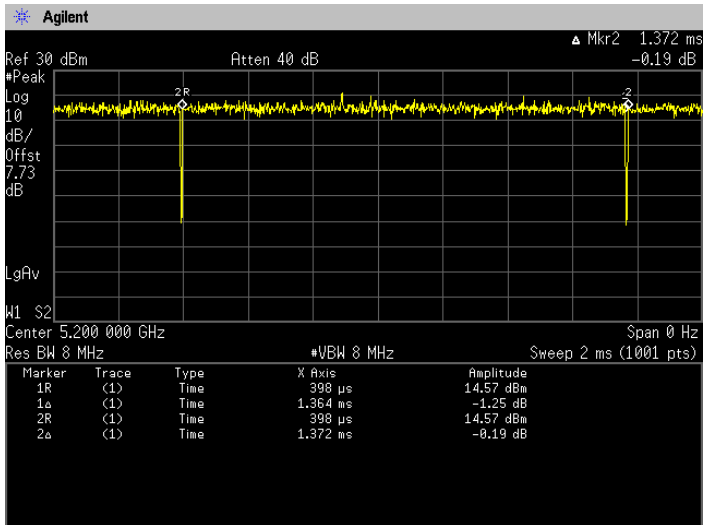
Note: X = On time / (On + Off time)

Mode	Channel	Frequency (MHz)	Duty Cycle				DCF (dB) 10log(1/x)	DCF (dB) 20log(1/x)
			On Time(ms)	On+Off Time(ms)	X	1/T		
802.11ac (80MHz)	42	5210	0.247	0.258	0.956	4056.8	0.196	0.393
	58	5290	0.247	0.258	0.958	4048.6	0.188	0.375
	106	5530	0.248	0.258	0.960	4040.4	0.179	0.358
	122	5610	0.248	0.257	0.962	4040.4	0.170	0.341

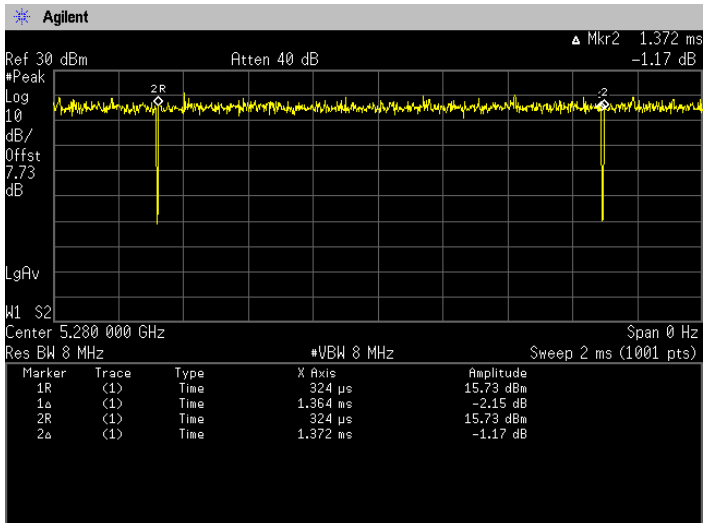
Note: X = On time / (On + Off time)

10.4 Trace data
[IEEE802.11a]

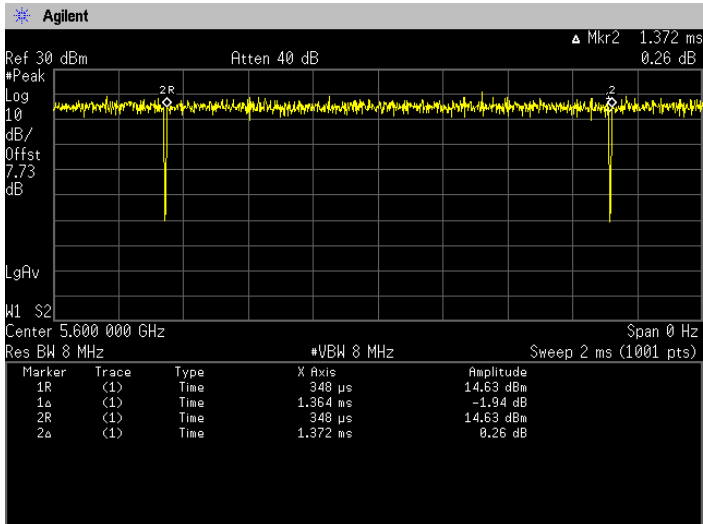
Channel: 40



Channel: 56

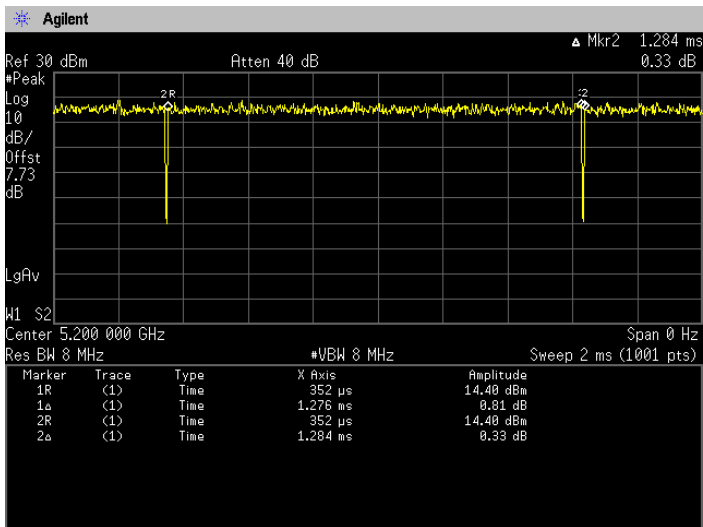


Channel: 120

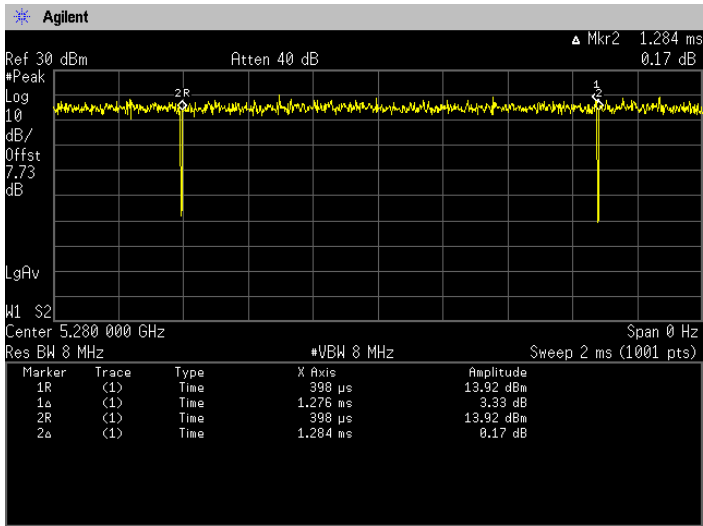


[IEEE802.11n (HT20)]

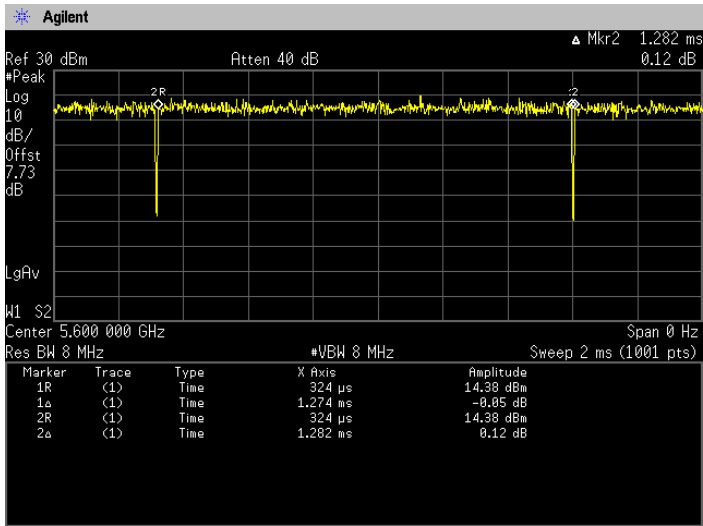
Channel: 40



Channel: 56

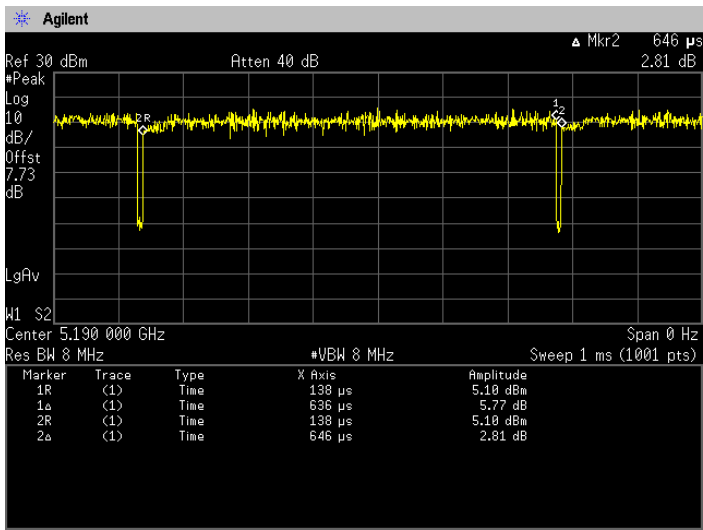


Channel: 120

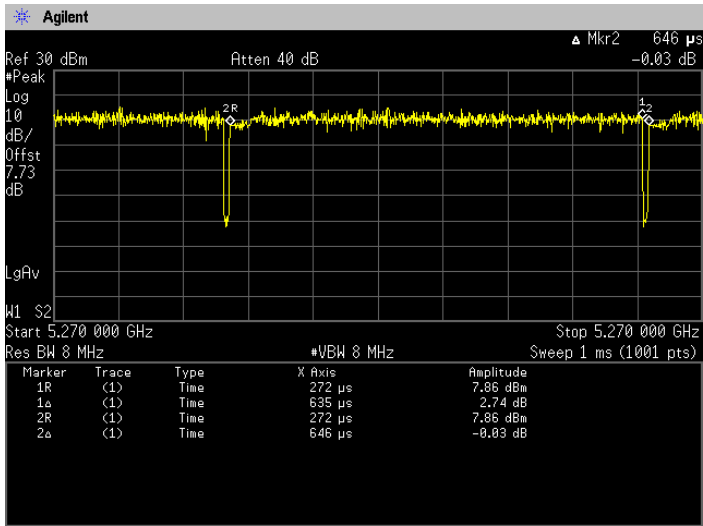


[IEEE802.11n (HT40)]

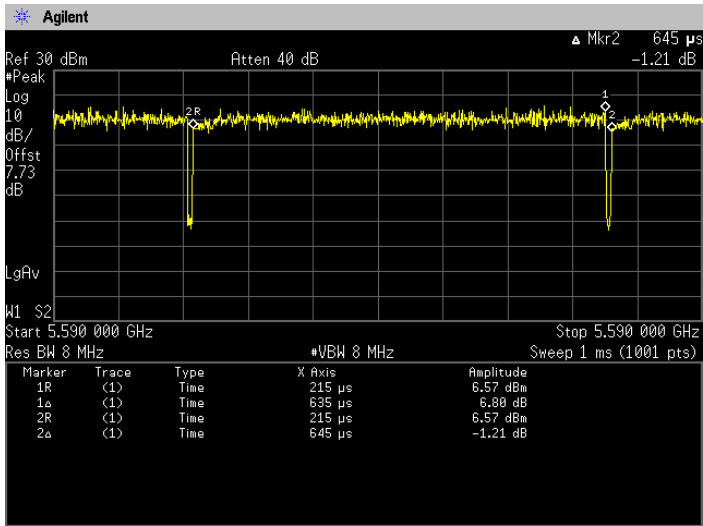
Channel: 38



Channel: 54

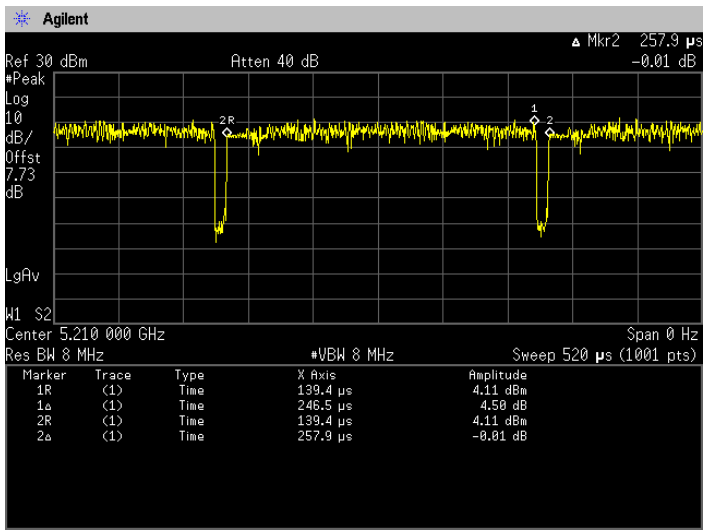


Channel: 118

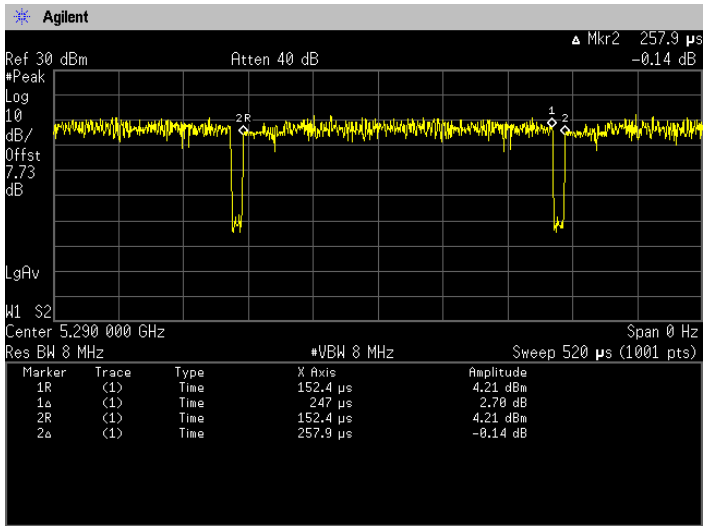


[IEEE802.11ac (HT80)]

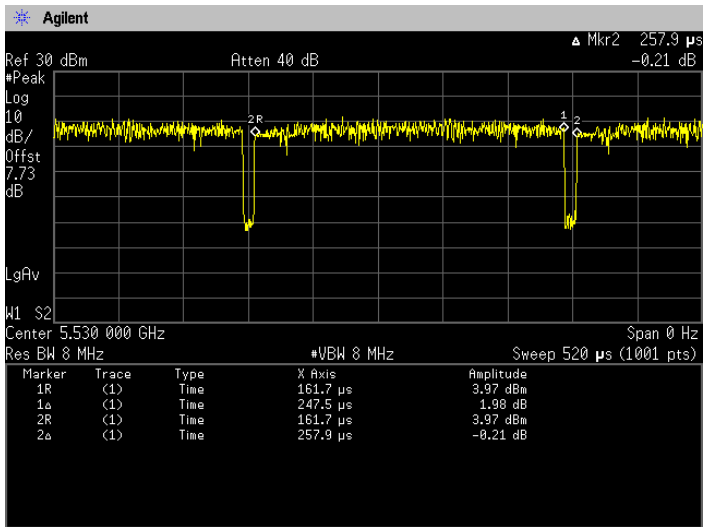
Channel: 42



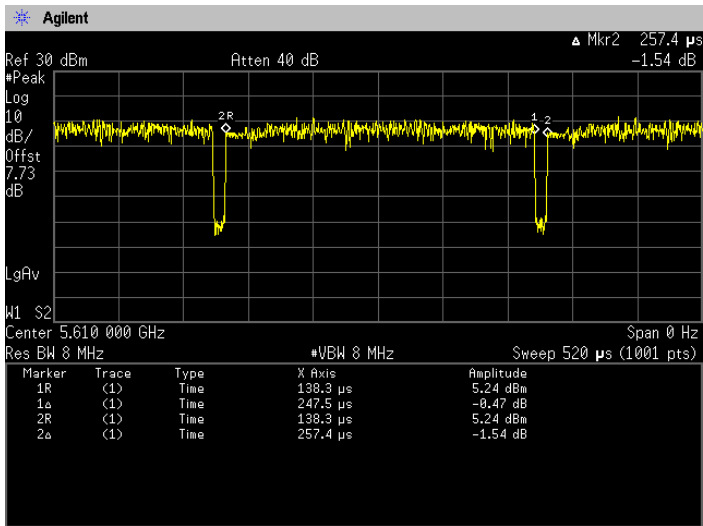
Channel: 58



Channel: 106



Channel: 122



11. Antenna requirement

According to FCC section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

The antenna is a special antenna mounted inside of the EUT. Therefore, the EUT complies with the antenna requirement of FCC section 15.203.

12. Uncertainty of measurement

Expanded uncertainties stated are calculated with a coverage Factor $k=2$.

Please note that these results are not taken into account when determining compliance or non-compliance with test result.

Test item	Measurement uncertainty
Conducted emission at mains port	$\pm 3.0\text{dB}$
Radiated emission (9kHz – 30MHz)	$\pm 4.4\text{dB}$
Radiated emission (30MHz – 1000MHz)	$\pm 4.5\text{dB}$
Radiated emission (1000MHz – 26GHz)	$\pm 3.9\text{dB}$

13. Laboratory description

1. Location:

TÜV SÜD Zacta Ltd. Yonezawa Testing Center
4149-7 Hachimanpara 5-chome Yonezawa-shi Yamagata 992-1128 Japan
Phone: +81-238-28-2880 Fax: +81-238-28-2888

2. Facility filing information:

1) NVLAP accreditation: NVLAP Lab. code: 200306-0

2) VLAC accreditation: Lab. code: VLAC-013

Site name	Radiated emission	Conducted emission for mains port	Conducted emission for telecom port	Radiated emission (CMAD)	Expiry Date
3m Semi-anechoic chamber	VLAC-013	VLAC-013	VLAC-013	-	Jul. 3, 2015
10m Semi-anechoic chamber No.1				VLAC-013	
10m Semi-anechoic chamber No.2				VLAC-013	
Shielded room No.1	-	VLAC-013	-	-	

3) FCC filing:

Site name	Registration Number	Expiry Date
Site 3	91065	Oct. 1, 2017
3m Semi-anechoic chamber	540072	Feb. 20, 2017
10m Semi-anechoic chamber No.1		
10m Semi-anechoic chamber No.2		
Shielded room No.1		

4) Industry Canada Oats site filing:

Site name	Sites on file: Oats 3m/10m	Expiry Date
Site 3	4224A-3	Dec. 3, 2017
3m Semi-anechoic chamber	4224A-4	
10m Semi-anechoic chamber No.1	4224A-5	
10m Semi-anechoic chamber No.2	4224A-6	Jan. 15, 2017

5) VCCI site filing:

Site name	Radiated emission	Conducted emission for mains port	Conducted emission for telecom port	Expiry Date
Site 3	R-138	C-134	T-1222	Nov. 16, 2017
3m Semi-anechoic chamber	A-0166	A-0166	A-0166	Jul. 3, 2015
10m Semi-anechoic chamber No.1				
10m Semi-anechoic chamber No.2				
Shielded room No.1	-	A-0166		

6) TÜV SÜD PS authorization:

Authorized as an EMC test laboratory

7) TÜV Rheinland authorization:

Authorized as an EMC test laboratory

Appendix A. Test equipment

Antenna port conducted test

Equipment	Company	Model No.	Serial No.	Cal. due	Cal. date
Spectrum analyzer	Agilent Technologies	E4440A	US44302655	May 31, 2015	May 30, 2014
Microwave cable	RS	YH_13S5	N/A (S403)	May 31, 2015	May 10, 2014
Attenuator	Weinschel	56-6	J5086	Nov. 30, 2015	Nov. 12, 2014
Operation type temperature controlled bath	Espec	PL1KP	14007261	Jan. 31, 2016	Jan. 9, 2015

Radiated emission

Equipment	Company	Model No.	Serial No.	Cal. Due	Cal. Date
EMI Receiver	ROHDE&SCHWARZ	ESCI	100765	Aug. 31, 2015	Aug. 9, 2014
Preamplifier	ANRITSU	MH648A	M96057	Jun. 30, 2015	Jun. 12, 2014
Loop antenna	ROHDE&SCHWARZ	HFH2-Z2	891847/17	Oct. 31, 2015	Oct. 15, 2014
Biconical antenna	Schwarzbeck	VHA9103/BBA9106	2125	May 31, 2015	May 7, 2014
Log periodic antenna	Schwarzbeck	UHALP9108A	0560	May 31, 2015	May 7, 2014
Attenuator	TME	CFA-01NPJ-6	N/A (S275)	Jun. 30, 2015	Jun. 9, 2014
Attenuator	TME	CFA-01NPJ-3	N/A (S272)	Jun. 30, 2015	Jun. 9, 2014
Spectrum analyzer	Agilent Technologies	E4440A	US44302655	May 31, 2015	May 30, 2014
Preamplifier	Agilent Technologies	8449B	3008A1008	Dec. 31, 2015	Dec. 5, 2014
Double ridged guide antenna	EMCO	3115	5205	Feb. 29, 2016	Feb. 16, 2015
Attenuator	Agilent Technologies	8491B	MY39268633	Feb. 29, 2016	Feb. 1, 2015
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	BBHA9170189	May 31, 2015	May 2, 2013
Preamplifier	TSJ	MLA-1840-B03-35	1240332	May 31, 2015	May 2, 2013
Notch filter	Micro-Tronics	BRM50706	003	Jul. 30, 2015	Jul. 12, 2014
Notch filter	Micro-Tronics	BRM50716	006	Jul. 30, 2015	Jul. 12, 2014
Microwave cable	SUHNER	SUCOFLEX104/9m	346316/4	Oct. 31, 2015	Oct. 31, 2014
		SUCOFLEX104/1m	322084/4	Oct. 31, 2015	Oct. 31, 2014
		SUCOFLEX104/1.5m	317226/4	Oct. 31, 2015	Oct. 31, 2014
		SUCOFLEX104/7m	41625/6	Oct. 31, 2015	Oct. 31, 2014
PC	DELL	DIMENSION E521	75465BX	N/A	N/A
Software	TOYO Corporation	EP5/RE-AJ	0611193/V5.3.61	N/A	N/A
3m Semi-anechoic chamber	TOKIN	N/A	N/A (9002-NSA)	May 31, 2015	May 6, 2014
3m Semi-anechoic chamber	TOKIN	N/A	N/A (9002-SVSWR)	May 31, 2015	May 6, 2014

Conducted emission at mains port

Equipment	Company	Model No.	Serial No.	Cal. due	Cal. date
EMI Receiver	ROHDE&SCHWARZ	ESCI	100765	Aug. 31, 2015	Aug. 9, 2014
Attenuator	HUBER+SUHNER	6810.01.A	N/A (S411)	Feb. 29, 2016	Feb. 5, 2015
Line impedance stabilization network for EUT	Kyoritsu Electrical Works, Ltd.	KNW-407	8-663-4	Mar. 31, 2016	Mar. 5, 2015
Coaxial cable	FUJIKURA	5D-2W/4m	N/A (S350)	Feb. 29, 2016	Feb. 5, 2015
Coaxial cable	FUJIKURA	5D-2W/1m	N/A (S193)	Feb. 29, 2016	Feb. 5, 2015
Coaxial cable	SUHNER	RG214/U/10m	N/A (S194)	Feb. 29, 2016	Feb. 5, 2015
PC	DELL	DIMENSION	75465BX	N/A	N/A

*: The calibrations of the above equipment are traceable to NIST or equivalent standards of the reference organizations.