



Zacta

TEST REPORT

Report number : Z101C-15044

Issue date : May 20, 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	: KA43
FCC ID	: JOYKA43

Date of test : April 6, 7, 21, 22, 25, 29, 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
 Taiki Watanabe

Tested by : Hikaru Shibata
 Hikaru Shibata

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

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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 C63.10-2009, 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 (99% Occupied Band width)	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



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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	: KA43
Serial number	: N/A
EUT condition	: Pre-Production
Power ratings	: Battery: DC 3.8V
Size	: (W) 72.2 × (D) 15.5 × (H) 147.2 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



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Channel separation	:	IEEE802.11a/n/ac (HT20): 20MHz IEEE802.11n/ac (HT40): 40MHz IEEE802.11ac (HT80): 80MHz
Output power	:	42.121mW (IEEE802.11a) 42.993mW (IEEE802.11n: HT20) 24.877mW (IEEE802.11n: HT40) 24.577mW (IEEE802.11ac: HT80)
Antenna type	:	Internal antenna
Antenna gain	:	5.15-5.25GHZ, 5.25-5.35GHz band: 0.5dBi 5.47-5.725GHz band: 1.7dBi

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



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[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	KA43	N/A	JOYKA43	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

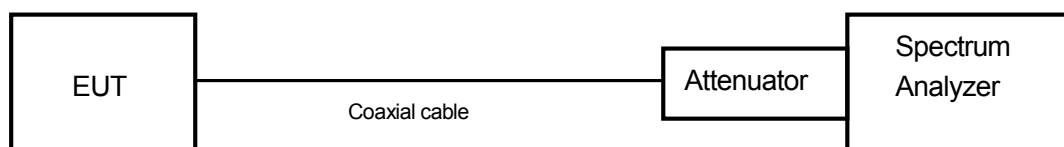
The EUT was set to operate with following conditions.

- 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 : April 6, 2015
 Temperature : 20.8 [°C]
 Humidity : 50.0 [%]
 Test place : Shielded room No.4

Test engineer : Hikaru Shibata

Date : April 29, 2015
 Temperature : 24.9 [°C]
 Humidity : 38.6 [%]
 Test place : Shielded room No.4

Test engineer : Hikaru Shibata



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Mode	Band	Channel	Frequency (MHz)	26dB bandwidth (MHz)	99% occupied bandwidth (MHz)
802.11a	5.2GHz Band	36	5180	21.937	16.739
		40	5200	22.298	16.754
		48	5240	21.636	16.716
	5.3GHz Band	52	5260	22.472	16.747
		56	5280	21.390	16.716
		64	5320	21.749	16.771
	5.6GHz Band	100	5500	22.163	16.881
		120	5600	22.961	16.886
		140	5700	22.274	16.854

Mode	Band	Channel	Frequency (MHz)	Test Result (MHz)	99% occupied bandwidth (MHz)
802.11n (20MHz)	5.2GHz Band	36	5180	22.189	17.878
		40	5200	22.087	17.826
		48	5240	21.951	17.796
	5.3GHz Band	52	5260	22.328	17.825
		56	5280	22.071	17.783
		64	5320	21.552	17.813
	5.6GHz Band	100	5500	22.450	17.868
		120	5600	22.341	17.874
		140	5700	22.192	17.916

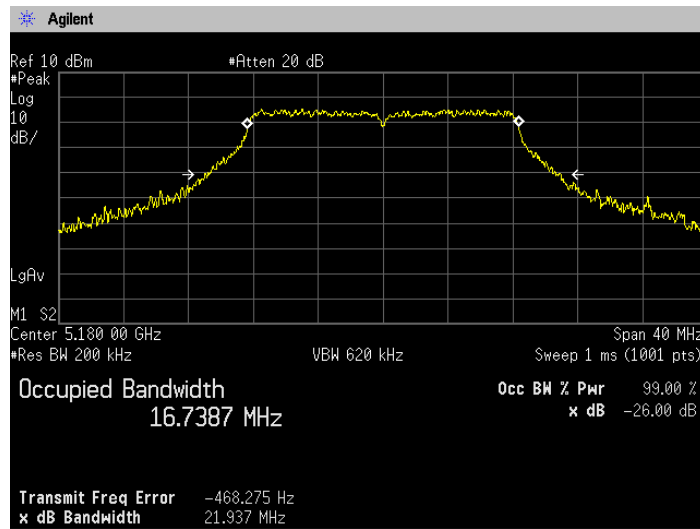


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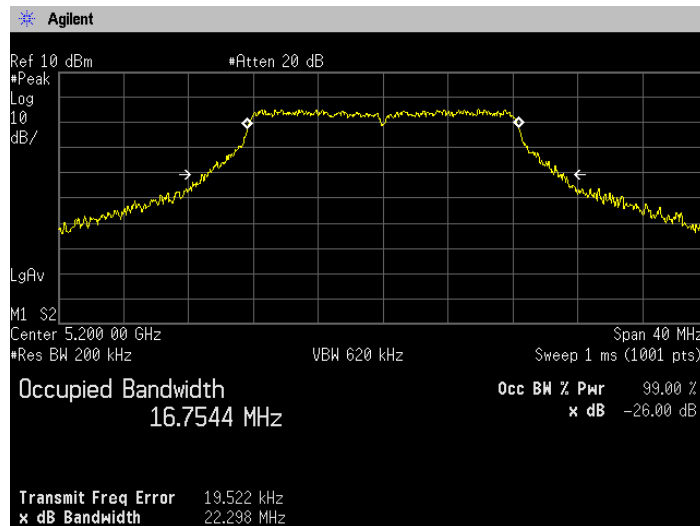
Mode	Band	Channel	Frequency (MHz)	Test Result (MHz)	99% occupied bandwidth (MHz)
802.11n (40MHz)	5.2GHz Band	38	5190	43.779	36.139
		46	5230	43.413	36.124
	5.3GHz Band	54	5270	42.862	36.131
		62	5310	43.240	36.172
	5.6GHz Band	102	5510	43.537	36.168
		118	5590	43.987	36.213
134		5670	43.052	36.117	

Mode	Band	Channel	Frequency (MHz)	Test Result (MHz)	99% occupied bandwidth (MHz)
802.11ac (80MHz)	5.2GHz Band	42	5210	82.537	74.589
	5.3GHz Band	58	5290	82.963	74.545
	5.6GHz Band	106	5530	82.604	74.553
		122	5610	82.832	74.563

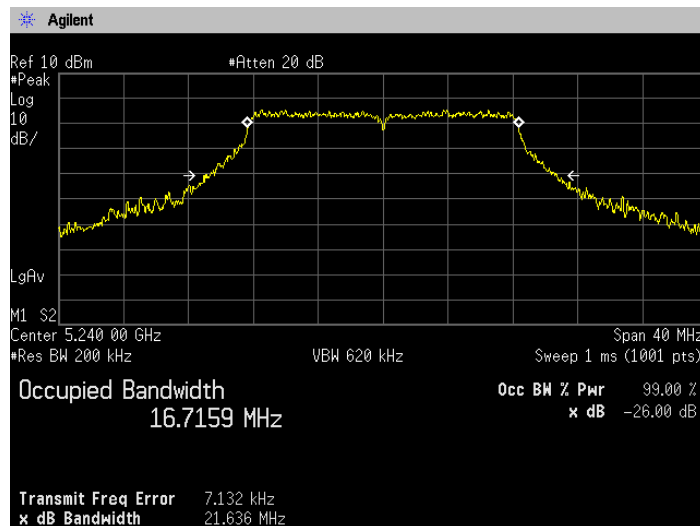
4.4 Trace data
[IEEE802.11a]
(5.2GHz Band)
Channel: 36



Channel: 40



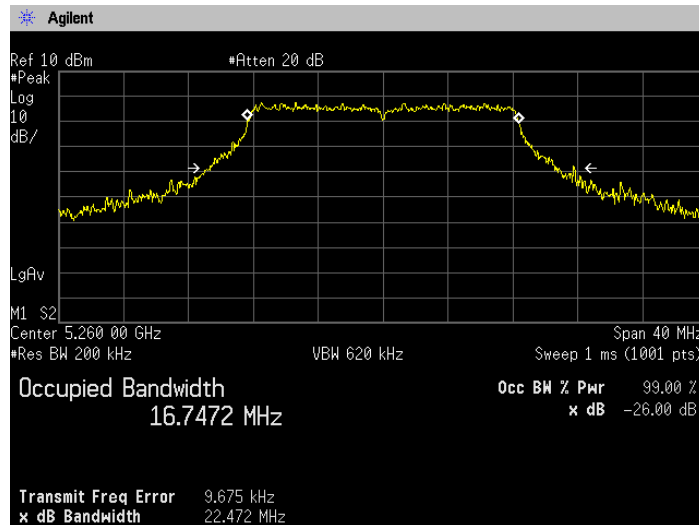
Channel: 48



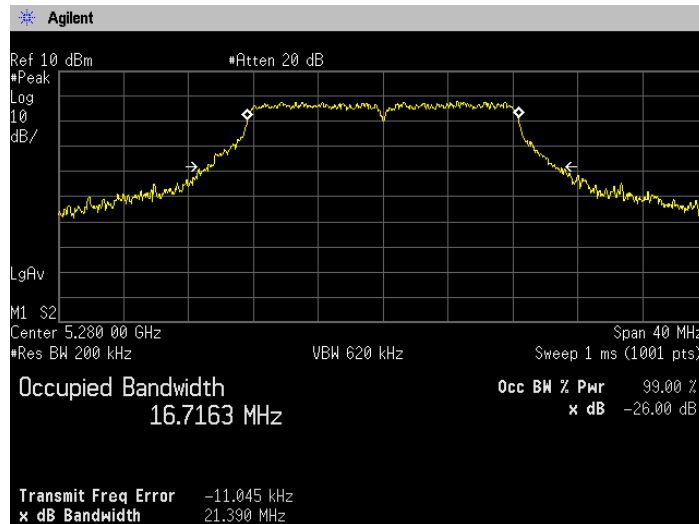


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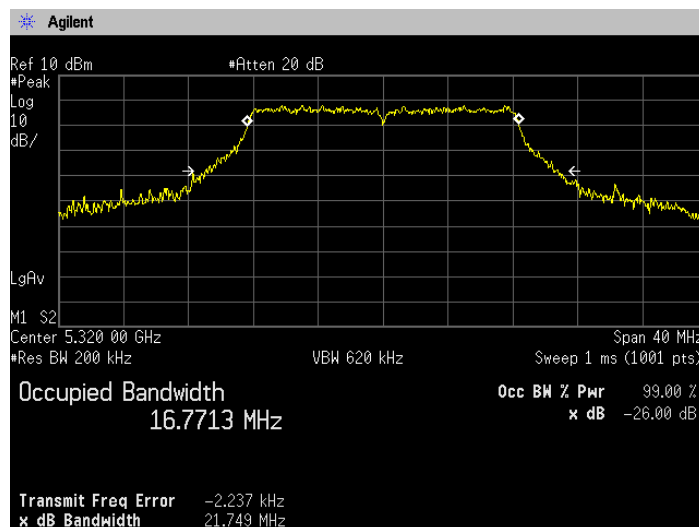
**(5.3GHz Band)
Channel: 52**



Channel: 56



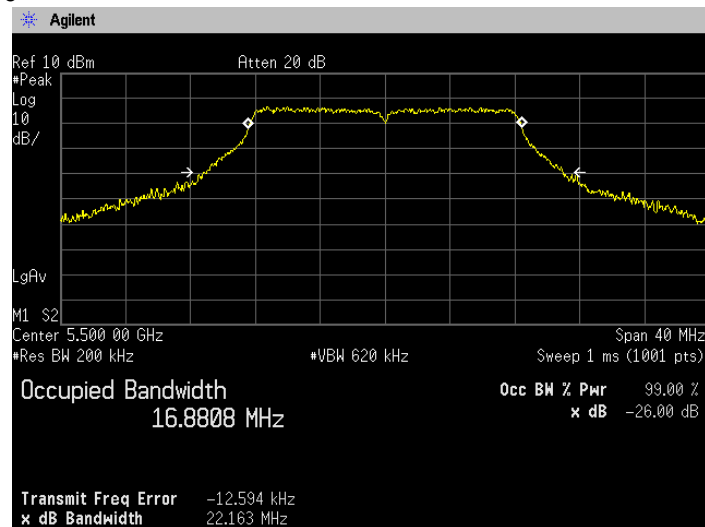
Channel: 64



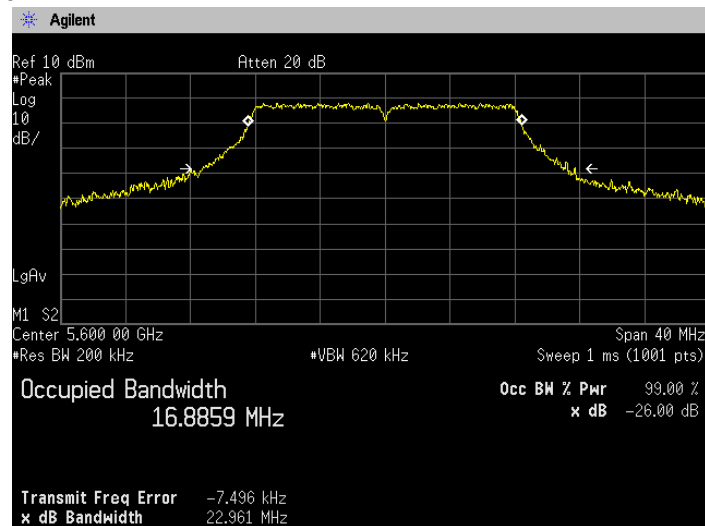


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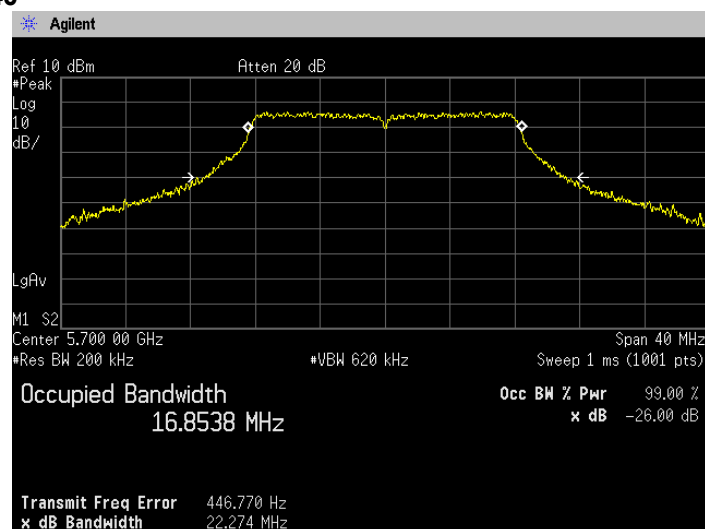
**(5.6GHz Band)
Channel: 100**



Channel: 120



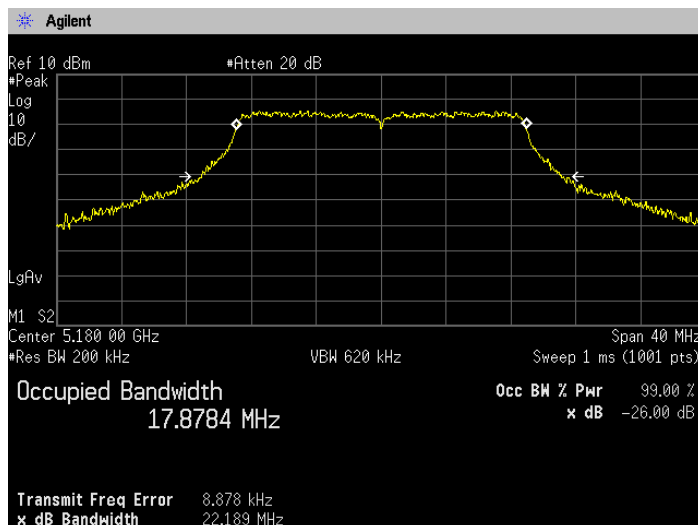
Channel: 140



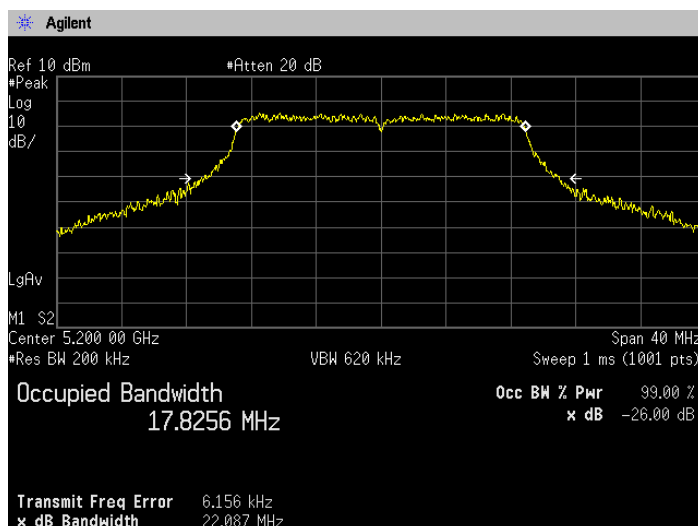


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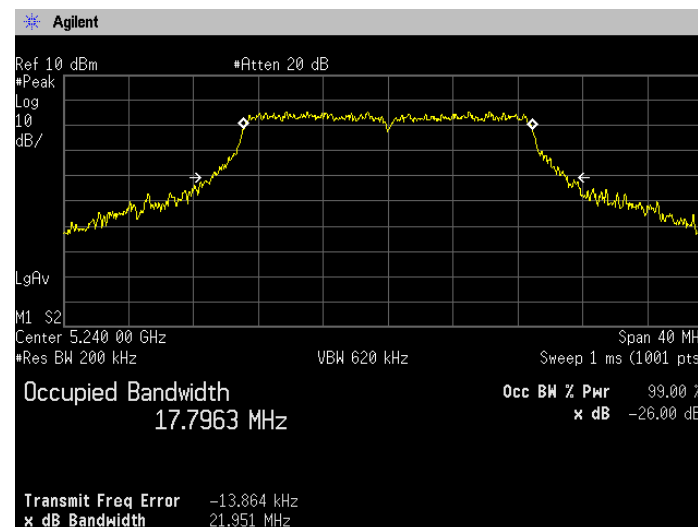
[IEEE802.11n (HT20)]
(5.2GHz Band)
Channel: 36



Channel: 40



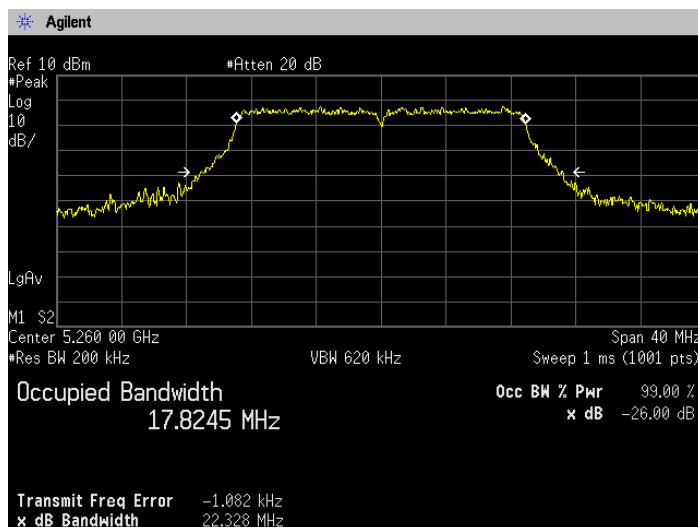
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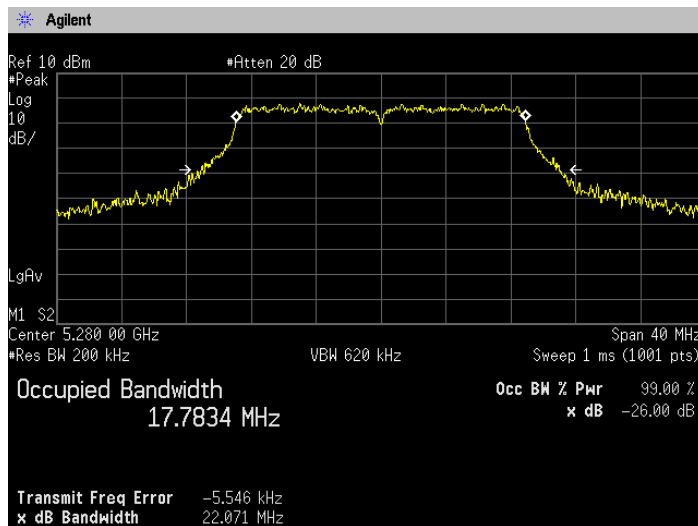


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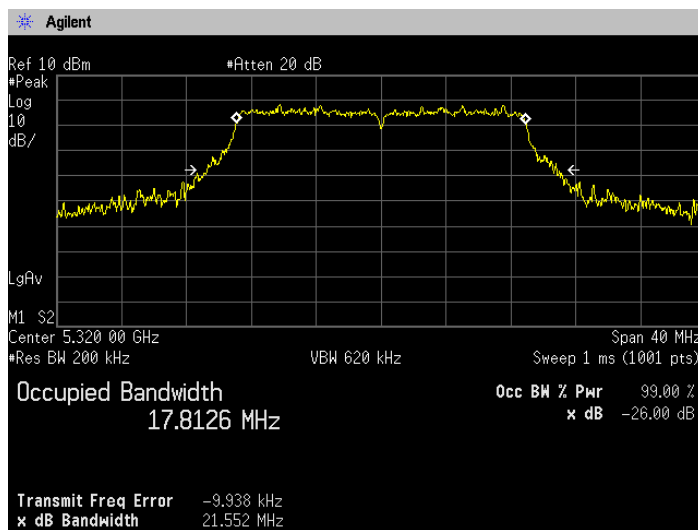
(5.3GHz Band)
Channel: 52



Channel: 56



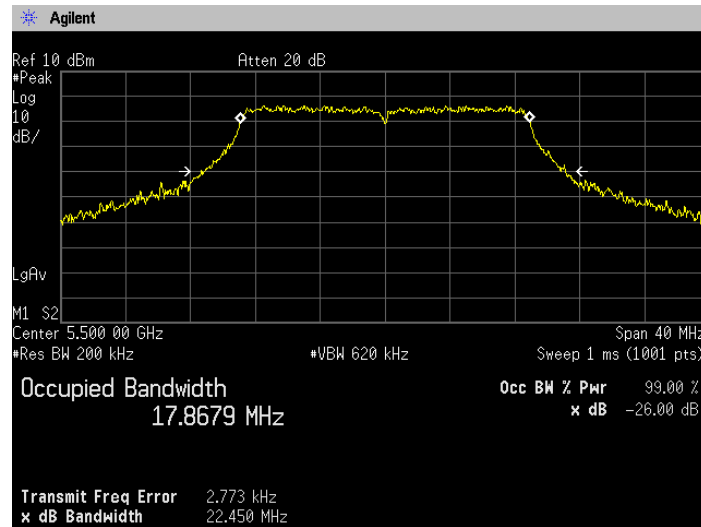
Channel: 64



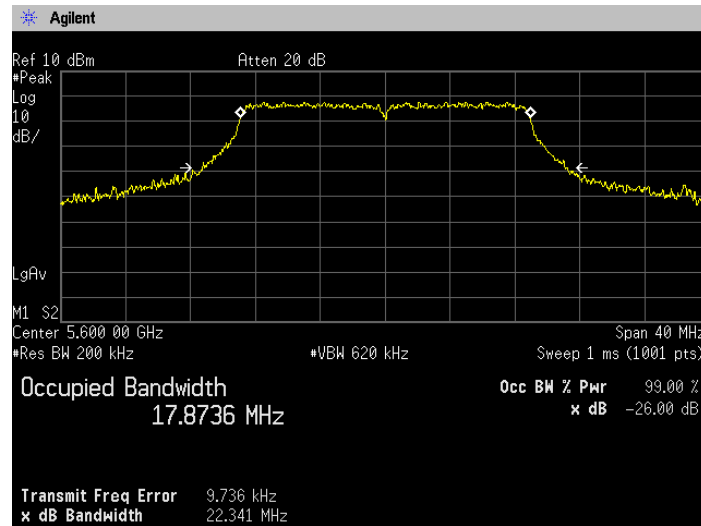


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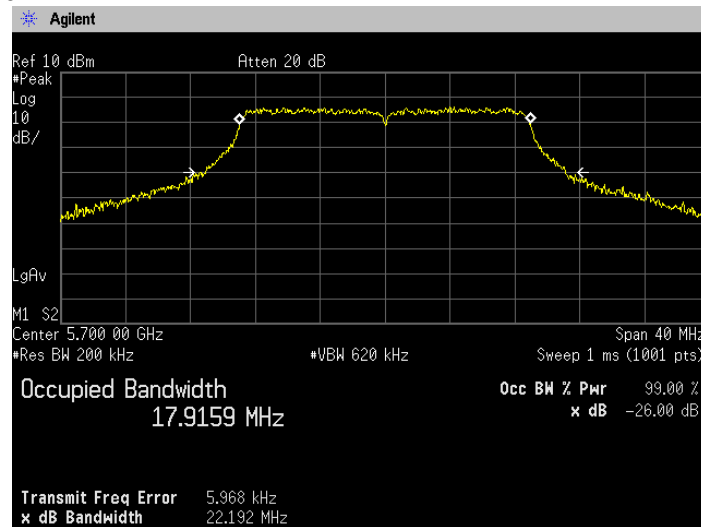
**(5.6GHz Band)
Channel: 100**



Channel: 120



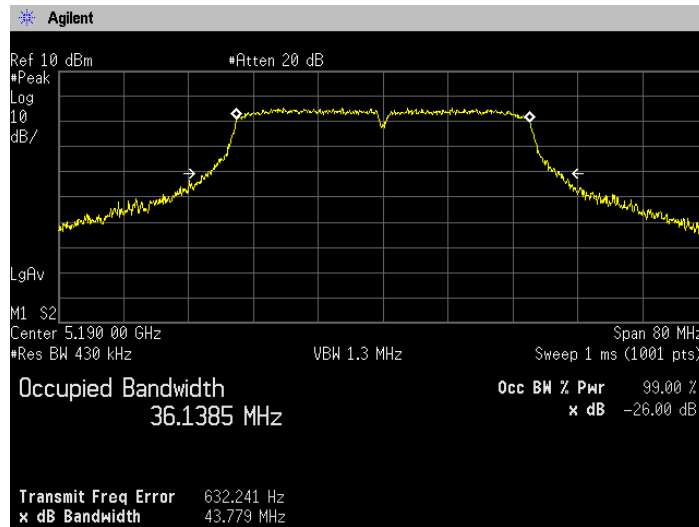
Channel: 140



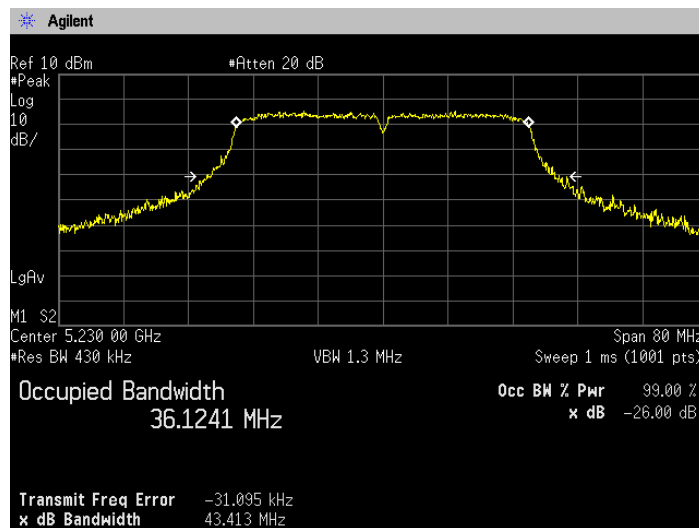


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[IEEE802.11n (HT40)]
(5.2GHz Band)
Channel: 38



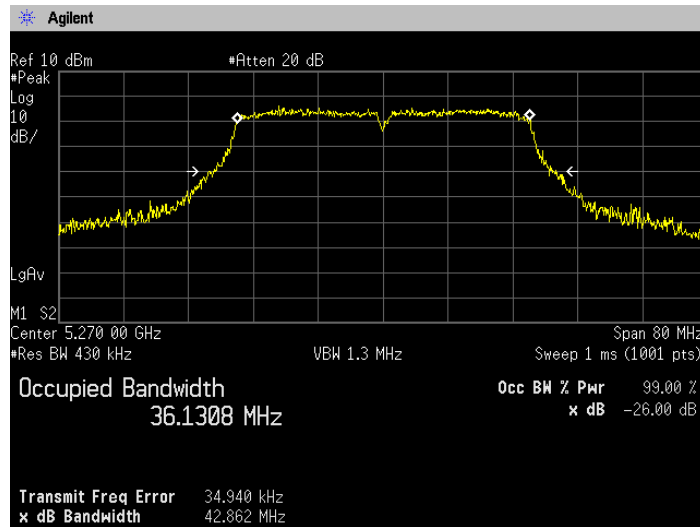
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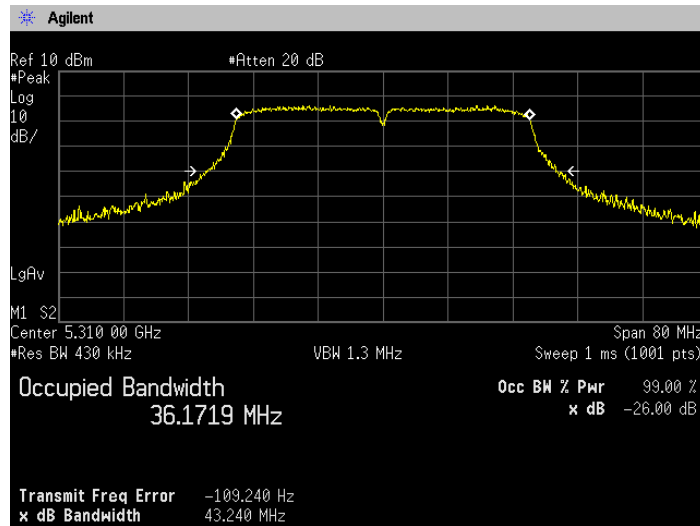


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(5.3GHz Band)
Channel: 54



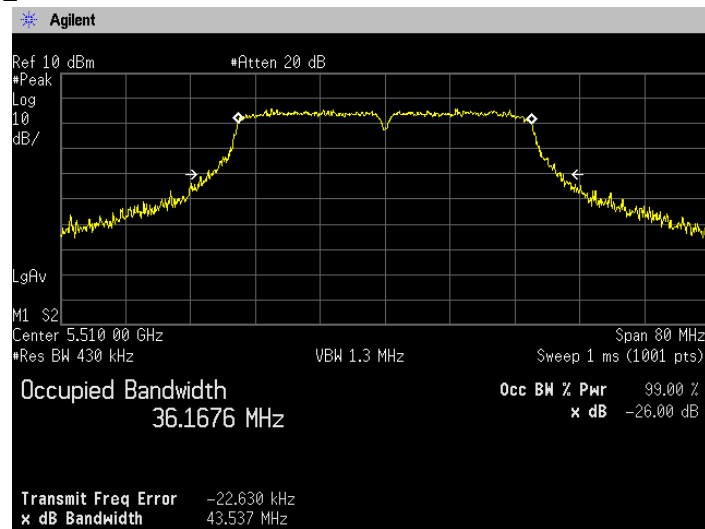
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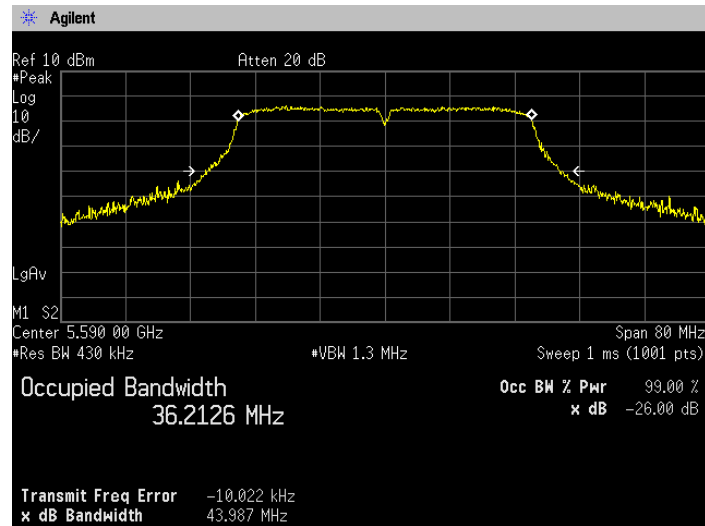


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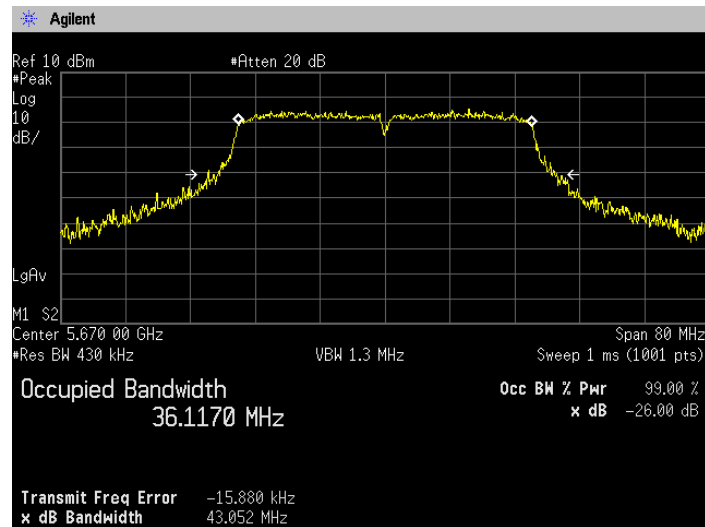
**(5.6GHz Band)
Channel: 102**



Channel: 118



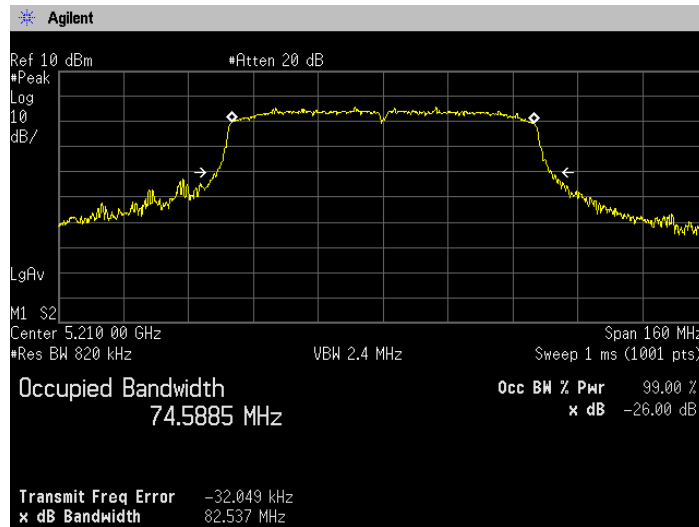
Channel: 134



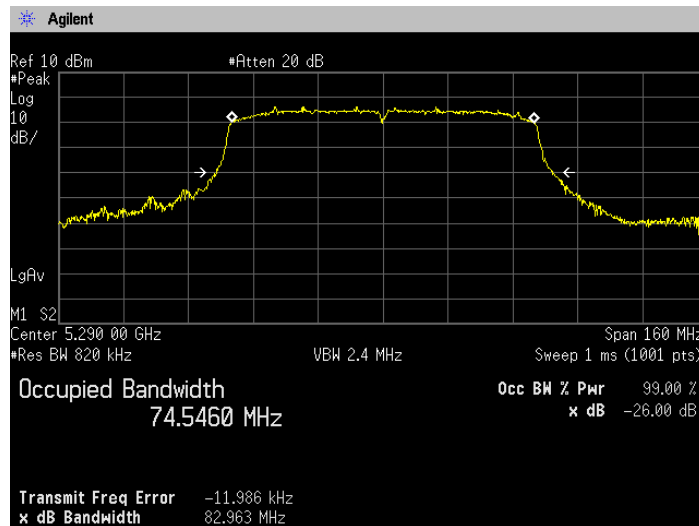


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[IEEE802.11ac (HT80)]
(5.2GHz Band)
Channel: 42



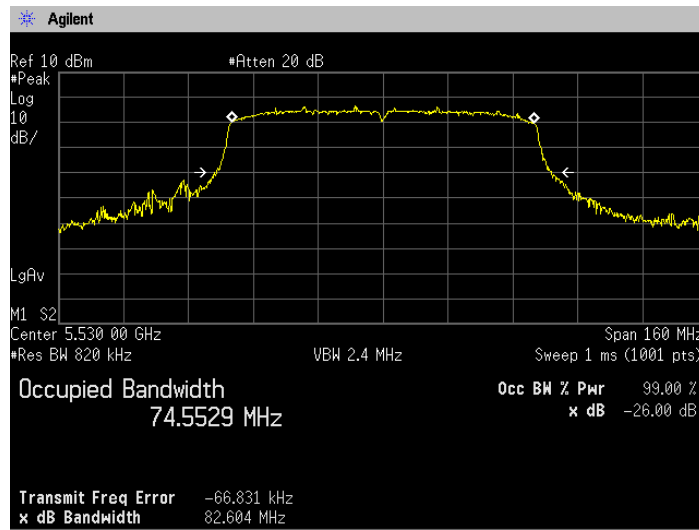
(5.3GHz Band)
Channel: 58



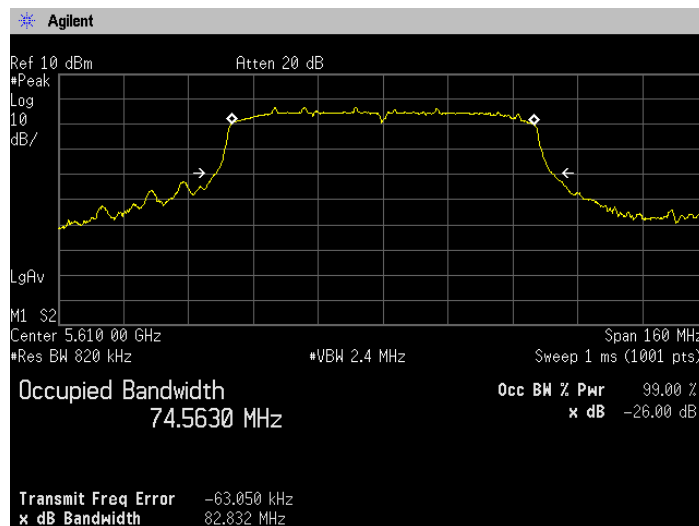


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**(5.6GHz Band)
Channel: 106**



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

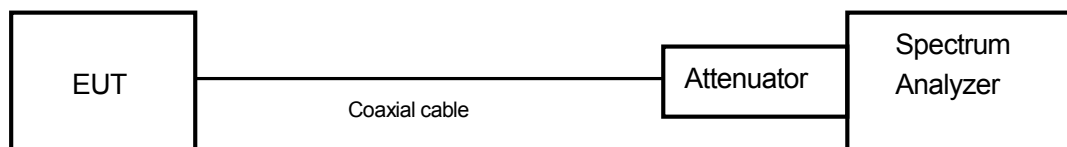
The EUT was set to operate with following conditions.

- 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	0.5	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	0.5	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	1.7	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				



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5.3 Measurement result

Date : April 6, 2015
 Temperature : 20.8 [°C]
 Humidity : 50.0 [%]
 Test place : Shielded room No.4

Test engineer : Hikaru Shibata

Date : April 29, 2015
 Temperature : 24.9 [°C]
 Humidity : 38.6 [%]
 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	13.390	1.364	1.372	0.994	0.025	13.415	21.953
	40	5200	13.390					13.415	21.953
	48	5240	13.610					13.635	23.094
	52	5260	15.830	1.364	1.372	0.994	0.025	15.855	38.503
	56	5280	15.950					15.975	39.582
	64	5320	16.220					16.245	42.121
	100	5500	13.960	1.364	1.370	0.996	0.025	13.985	25.032
	120	5600	15.720					15.745	37.540
	140	5700	13.770					13.795	23.961

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	13.460	1.274	1.284	0.992	0.034	13.494	22.356
	40	5200	13.380					13.414	21.948
	48	5240	13.650					13.684	23.356
	52	5260	15.870	1.276	1.286	0.992	0.034	15.904	38.940
	56	5280	16.070					16.104	40.776
	64	5320	16.300					16.334	42.993
	100	5500	14.070	1.276	1.284	0.994	0.027	14.097	25.686
	120	5600	15.720					15.747	37.558
	140	5700	13.800					13.827	24.138

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	13.180	0.636	0.646	0.985	0.068	13.248	21.125
	46	5230	13.350					13.418	21.968
	54	5270	13.610	0.634	0.644	0.984	0.068	13.678	23.324
	62	5310	13.890					13.958	24.877
	102	5510	13.750	0.636	0.646	0.985	0.068	13.818	24.088
	110	5550	13.670					13.738	23.648
	118	5590	13.470					13.538	22.584
	134	5670	13.350					13.418	21.968

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

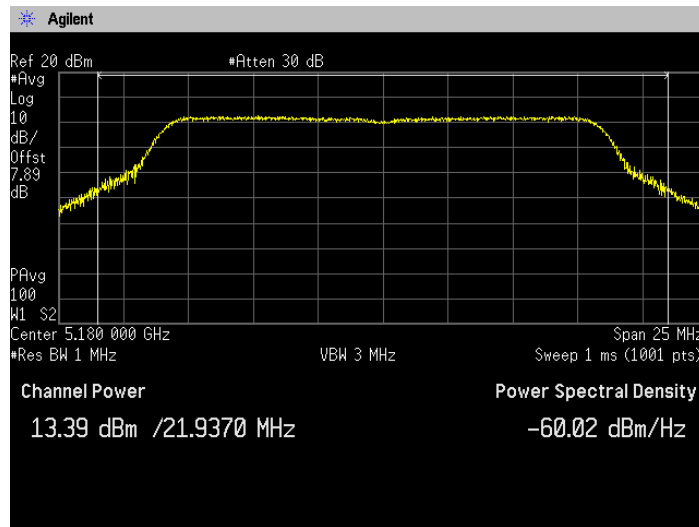
Mode	Channel	Frequency (MHz)	Reading (dBm)	Duty Cycle			DCF (dB)	Test Result (dBm)	Test Result (mW)
				On Time(ms)	On+Off Time(ms)	X			
802.11ac (80MHz)	42	5210	13.090	0.248	0.258	0.961	0.172	13.262	21.192
	58	5290	13.700	0.248	0.260	0.954	0.205	13.905	24.577
	106	5530	13.550	0.246	0.256	0.961	0.173	13.723	23.567
	122	5610	13.520	0.248	0.258	0.961	0.172	13.692	23.397

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

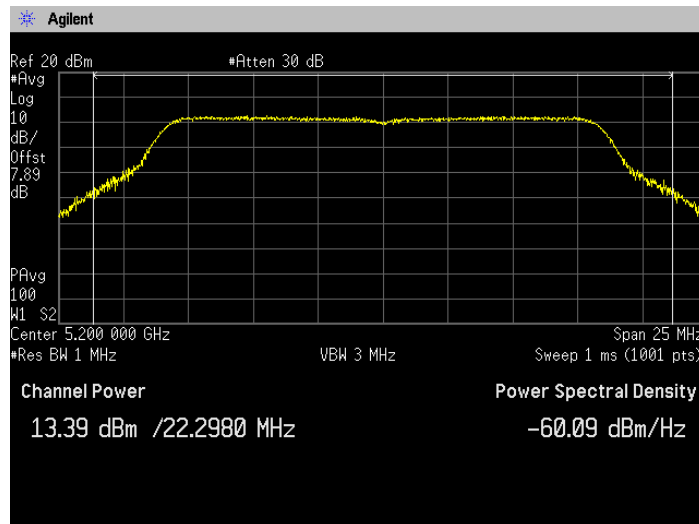


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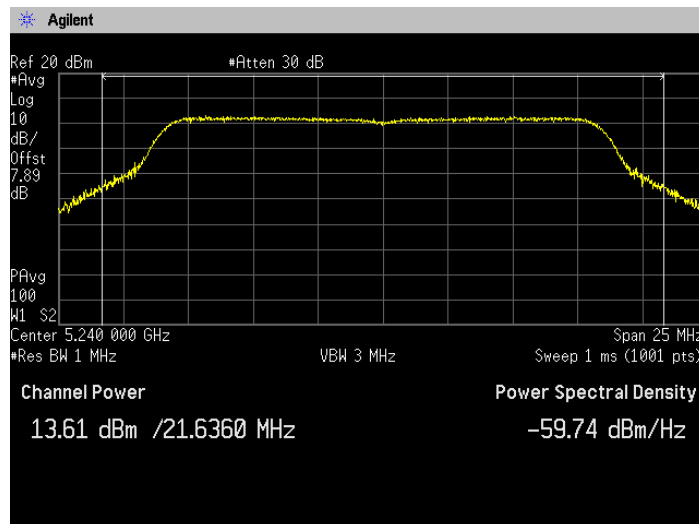
5.4 Trace data
[IEEE802.11a]
(5.2GHz Band)
Channel: 36



Channel: 40



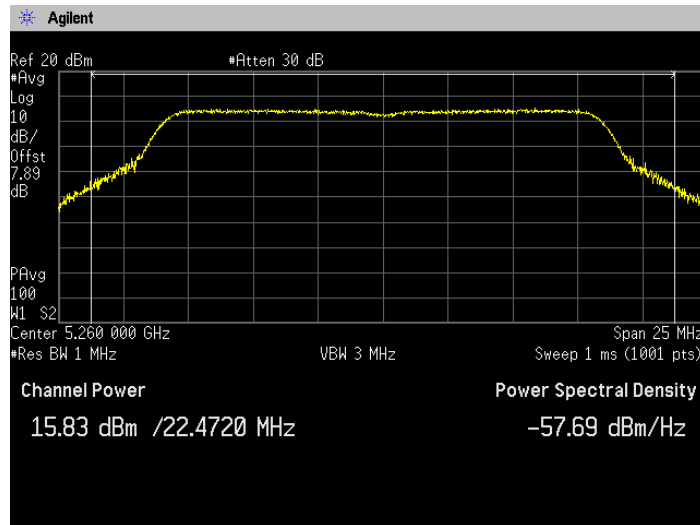
Channel: 48



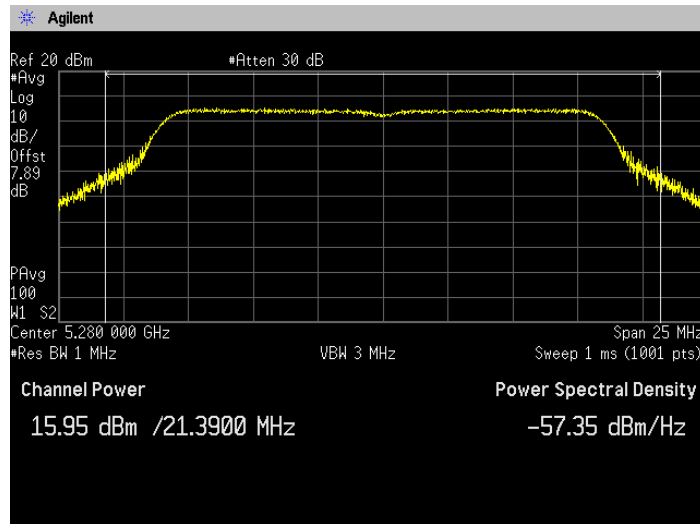


Zacta

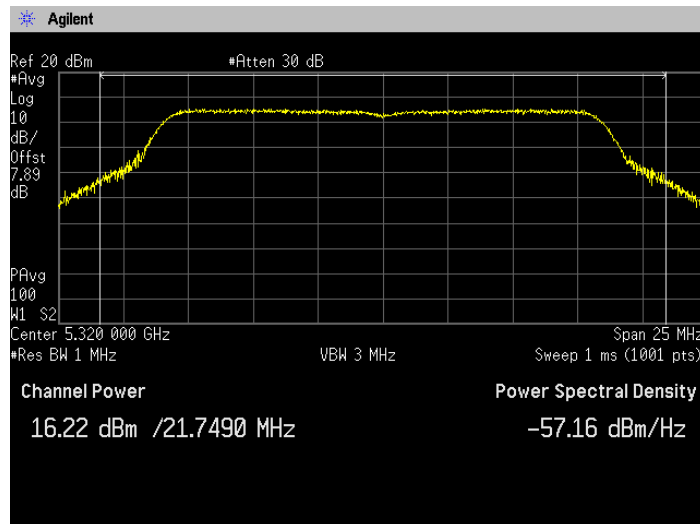
(5.3GHz Band)
Channel: 52



Channel: 56



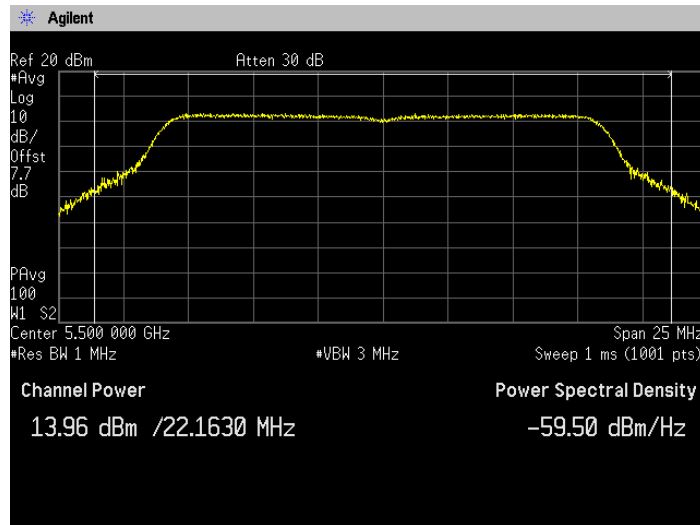
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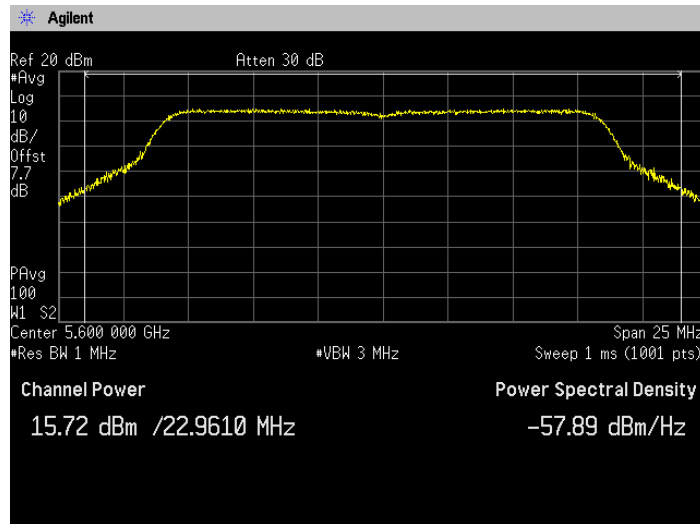


Zacta

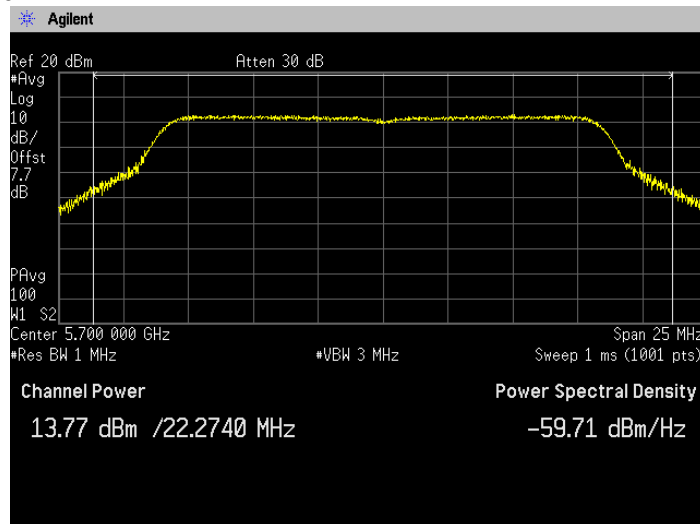
(5.6GHz Band)
Channel: 100



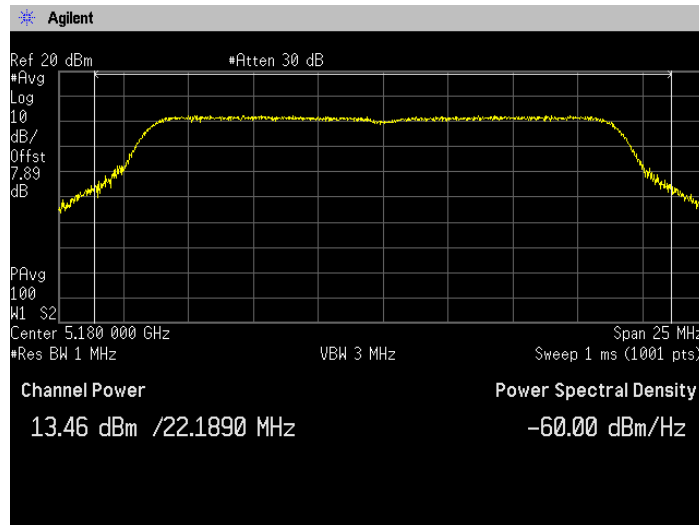
Channel: 120



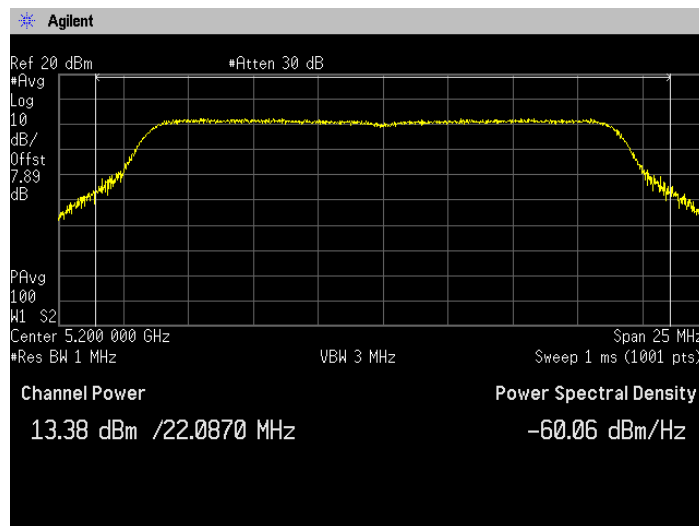
Channel: 140



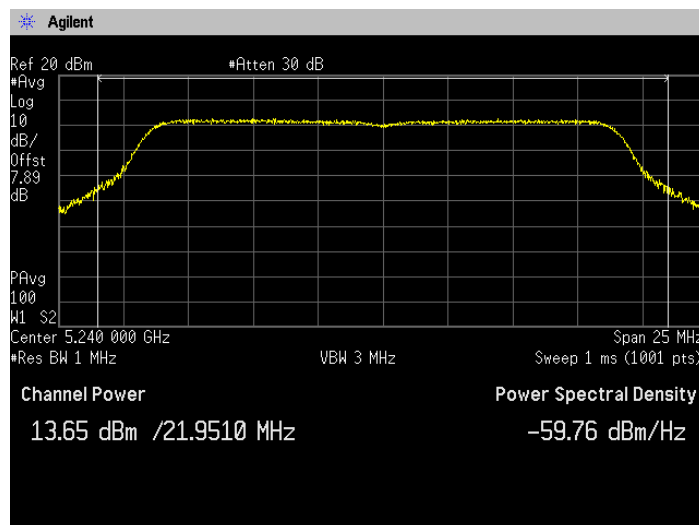
**[IEEE802.11n (HT20)]
(5.2GHz Band)
Channel: 36**



Channel: 40



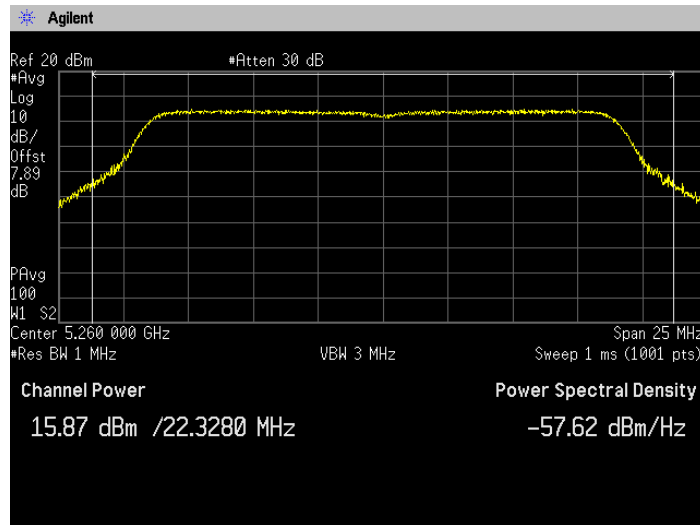
Channel: 48



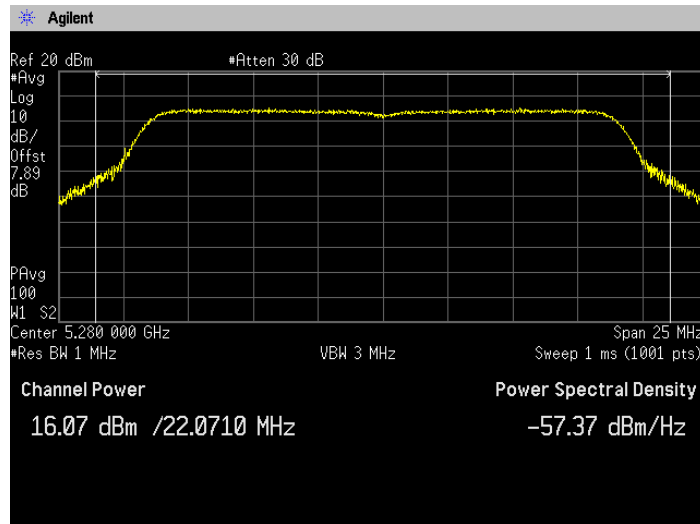


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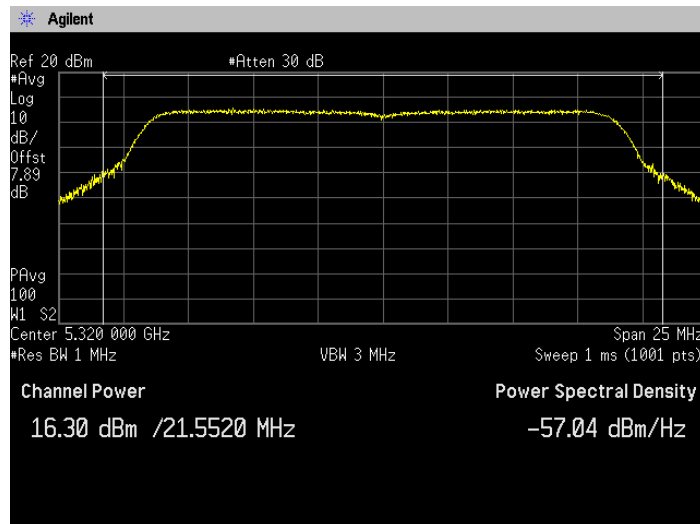
(5.3GHz Band)
Channel: 52



Channel: 56



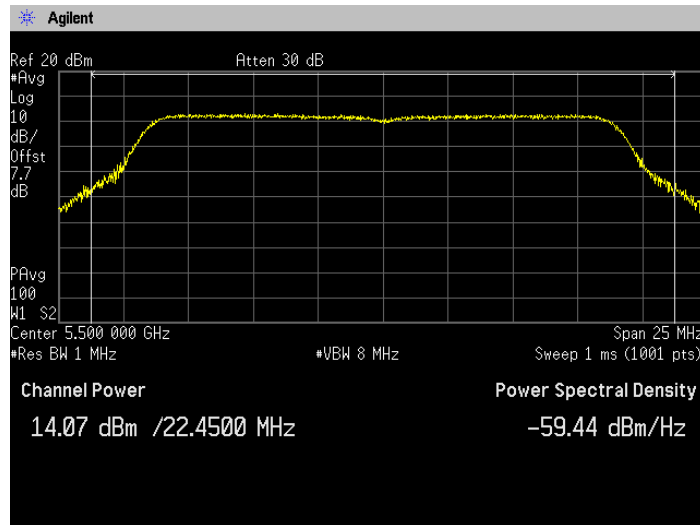
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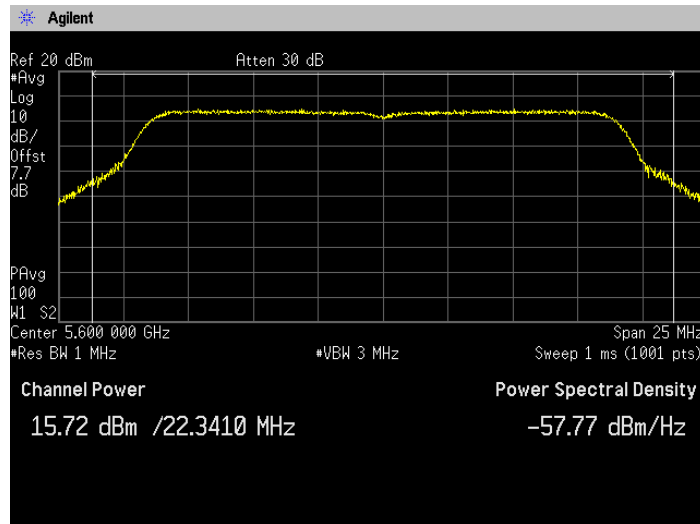


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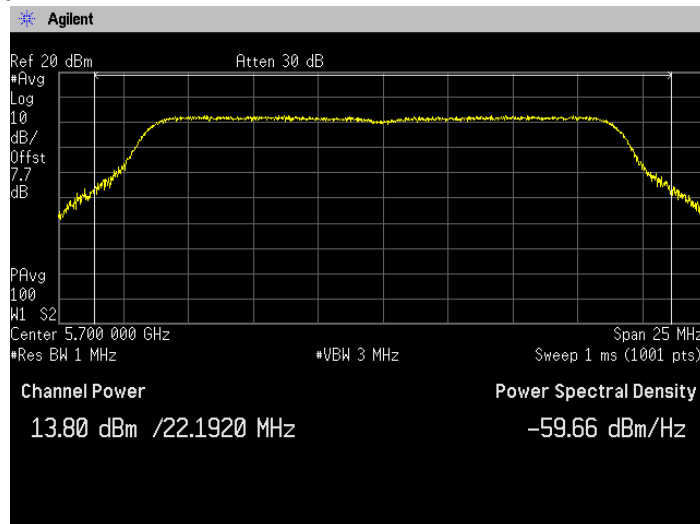
(5.6GHz Band)
Channel: 100



Channel: 120



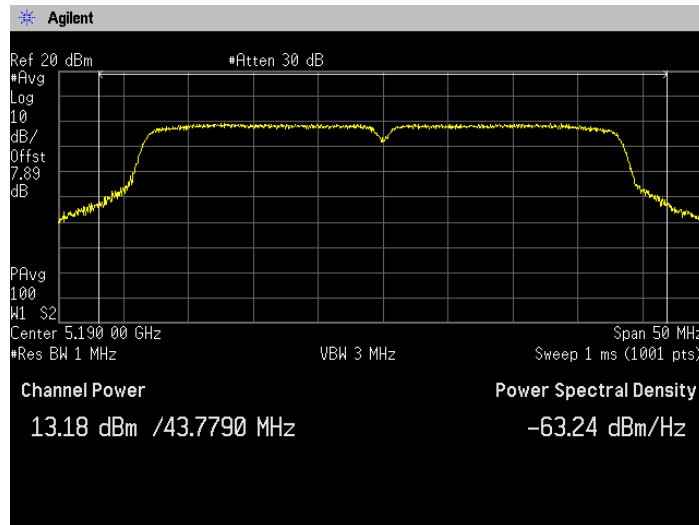
Channel: 140



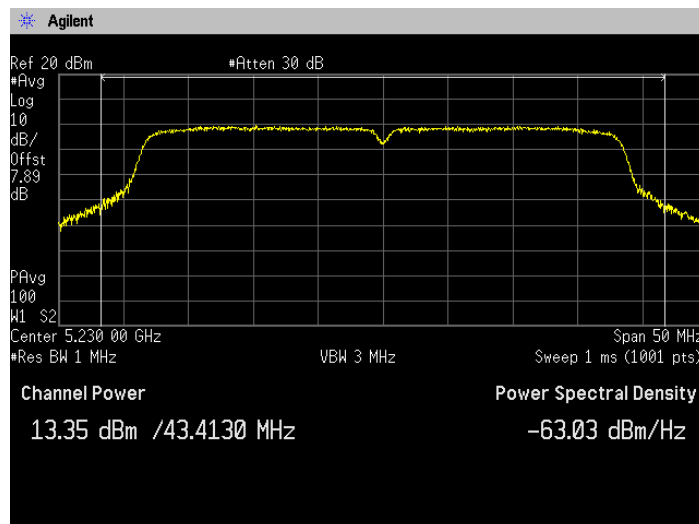


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[IEEE802.11n (HT40)]
(5.2GHz Band)
Channel: 38

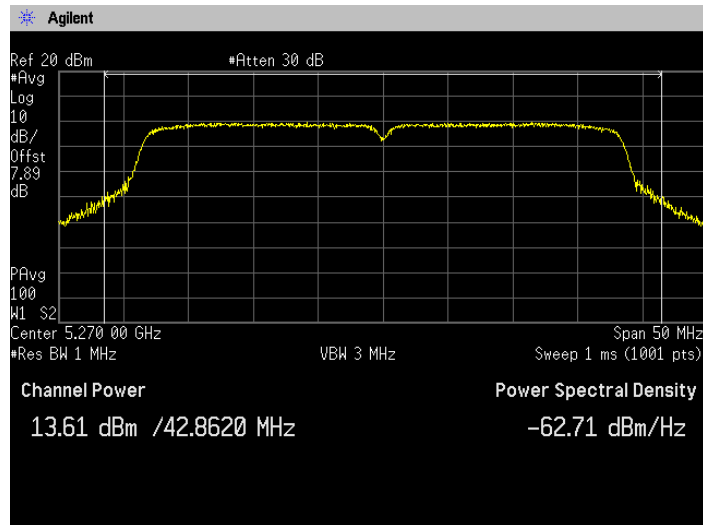


Channel: 46

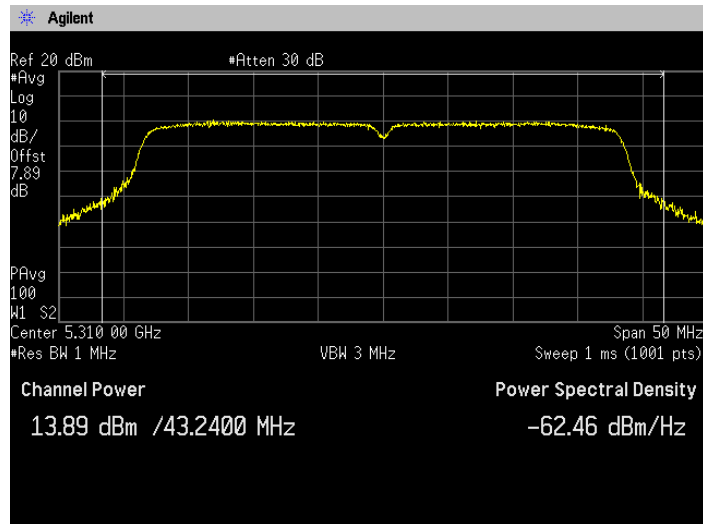


(5.3GHz Band)

Channel: 54

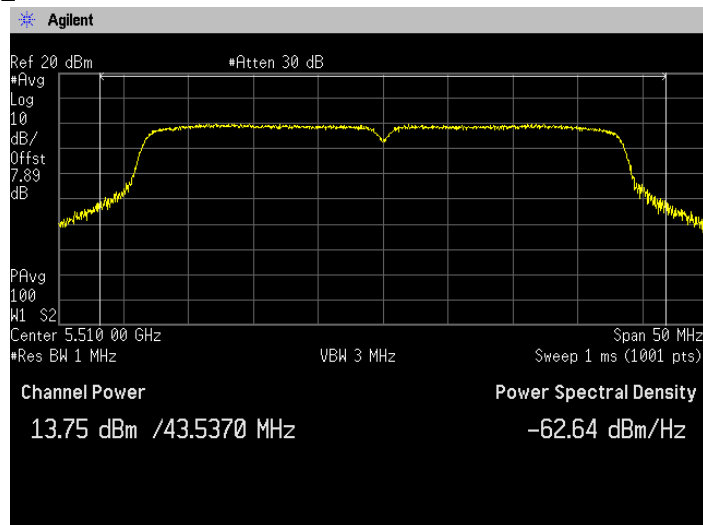


Channel: 62

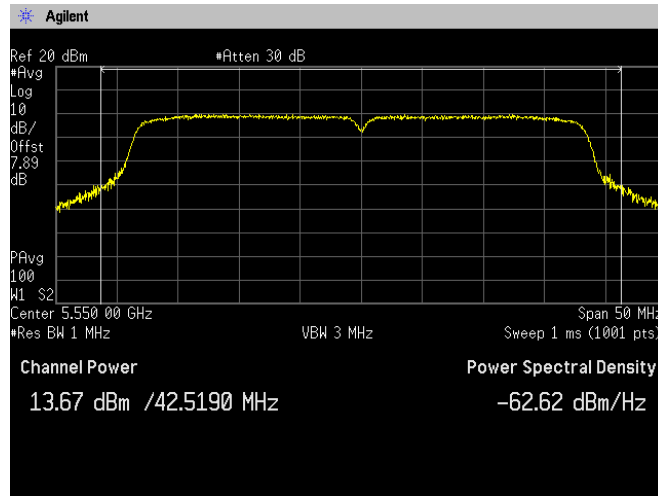


(5.6GHz Band)

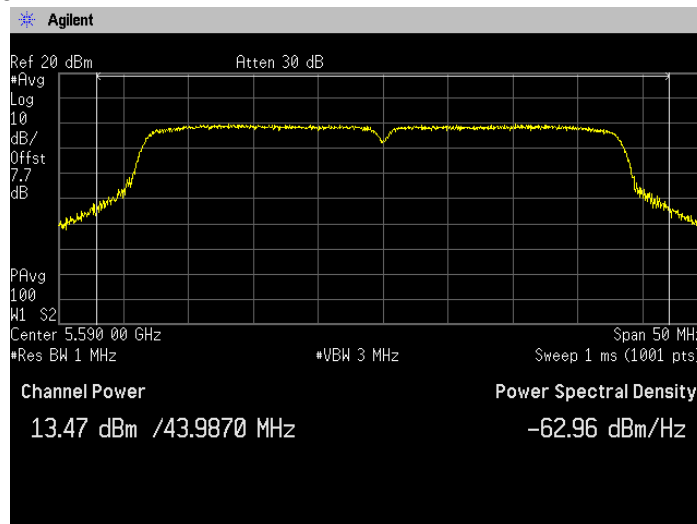
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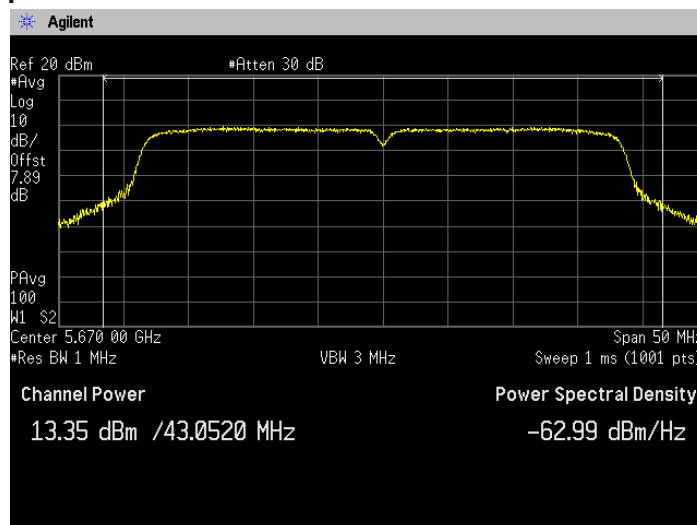
Channel: 110



Channel: 118



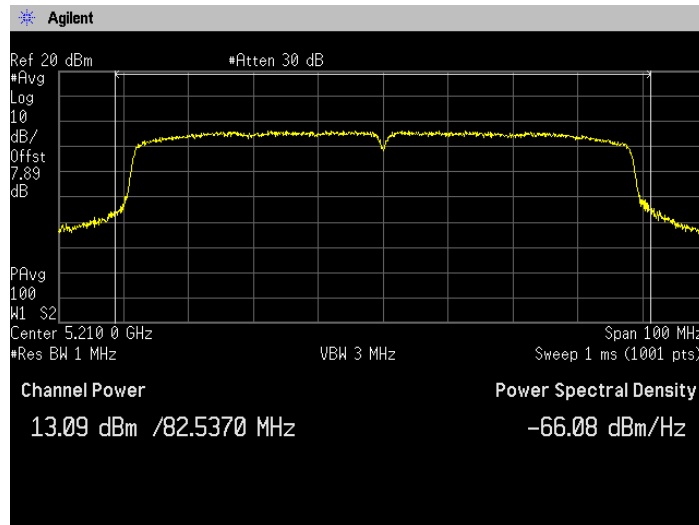
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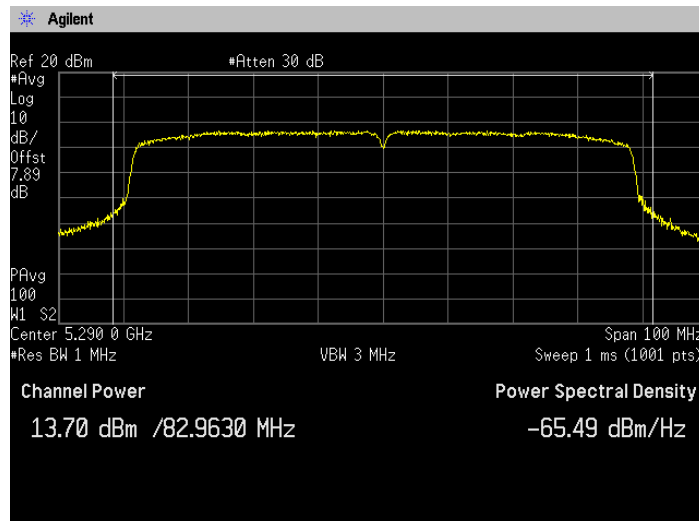


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[IEEE802.11ac (HT80)]
(5.2GHz Band)
Channel: 42



(5.3GHz Band)
Channel: 58

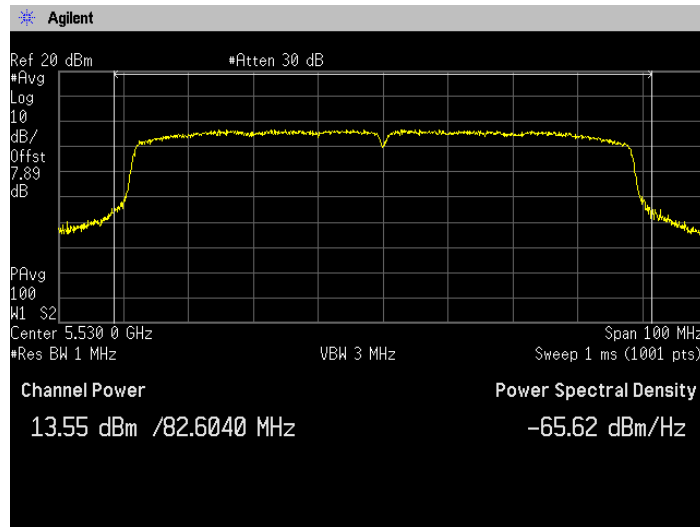




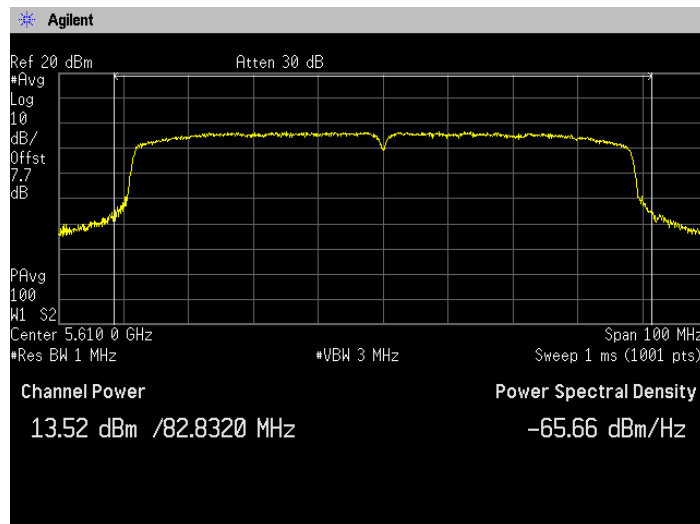
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(5.6GHz Band)

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

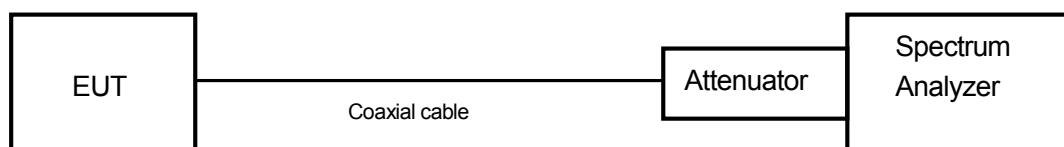
The EUT was set to operate with following conditions.

- 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, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, 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	0.4	11
5.3GHz Band	0.4	11
5.6GHz Band	1.7	11



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6.3 Measurement result

Date : April 7, 2015
 Temperature : 25.6 [°C]
 Humidity : 34.1 [%]
 Test place : Shielded room No.4

Test engineer :

Hikaru Shibata

Date : April 29, 2015
 Temperature : 24.9 [°C]
 Humidity : 38.6 [%]
 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	2.669	1.362	1.372	0.993	0.025	2.694
	40	5200	2.635					2.660
	48	5240	2.872					2.897
	52	5260	4.660	1.364	1.372	0.994	0.025	4.685
	56	5280	5.038					5.063
	64	5320	5.376					5.401
	100	5500	3.387	1.364	1.372	0.994	0.025	3.412
	120	5600	4.860					4.885
140	5700	3.066	3.091					

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

Note2: Test Result = Reading + DCF (If transmit duty cycle < 98 percent)

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	2.722	1.276	1.286	0.992	0.034	2.756
	40	5200	2.345					2.379
	48	5240	2.345					2.379
	52	5260	4.587	1.274	1.284	0.992	0.034	4.621
	56	5280	5.165					5.199
	64	5320	5.254					5.288
	100	5500	3.118	1.276	1.284	0.994	0.027	3.145
	120	5600	4.791					4.818
140	5700	2.982	3.009					

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

Note2: Test Result = Reading + DCF (If transmit duty cycle < 98 percent)

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	-0.737	0.636	0.646	0.985	0.068	-0.669
	46	5230	-0.503					-0.435
	54	5270	-0.530	0.634	0.644	0.984	0.068	-0.462
	62	5310	0.110					0.178
	102	5510	-0.441	0.636	0.646	0.985	0.068	-0.373
	110	5550	-0.493					-0.425
	118	5590	-0.351					-0.351
	134	5670	-0.836					-0.768

Note1: $X = \text{On time} / (\text{On} + \text{Off time})$, $\text{DCF} = 10 \log(1/x)$

Note2: $\text{Test Result} = \text{Reading} + \text{DCF}$ (If transmit duty cycle < 98 percent)

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	-3.753	0.248	0.258	0.961	0.172	-3.581
	58	5290	-3.239	0.248	0.260	0.954	0.205	-3.034
	106	5530	-3.265	0.248	0.258	0.961	0.172	-3.093
	122	5610	-3.239	0.248	0.258	0.961	0.172	-3.067

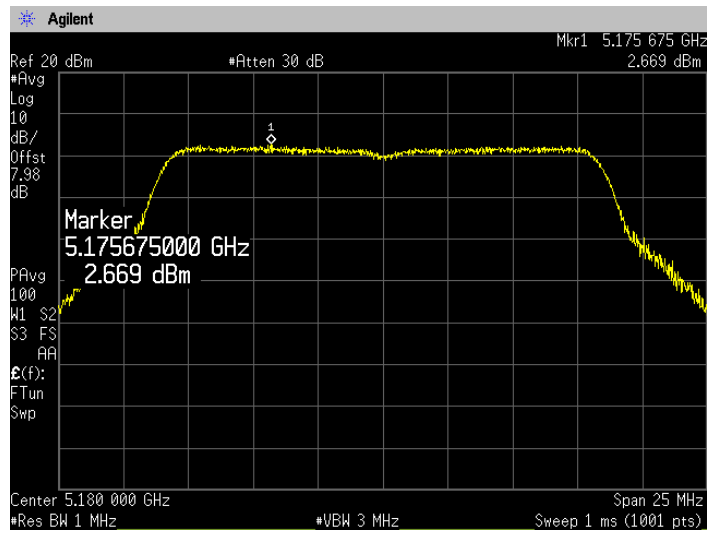
Note1: $X = \text{On time} / (\text{On} + \text{Off time})$, $\text{DCF} = 10 \log(1/x)$

Note2: $\text{Test Result} = \text{Reading} + \text{DCF}$ (If transmit duty cycle < 98 percent)

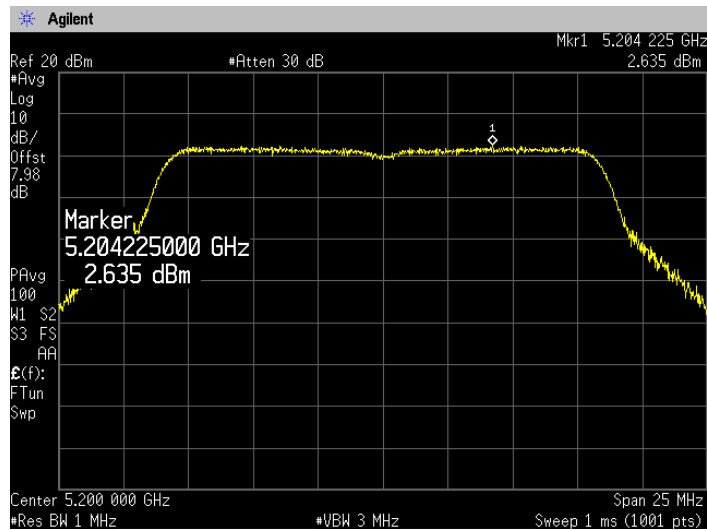


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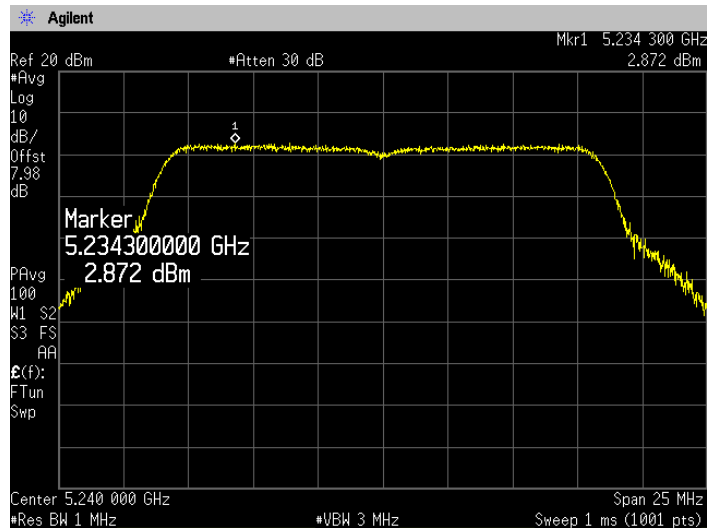
6.4 Trace data
[IEEE802.11a]
(5.2GHz Band)
Channel: 36



Channel: 40



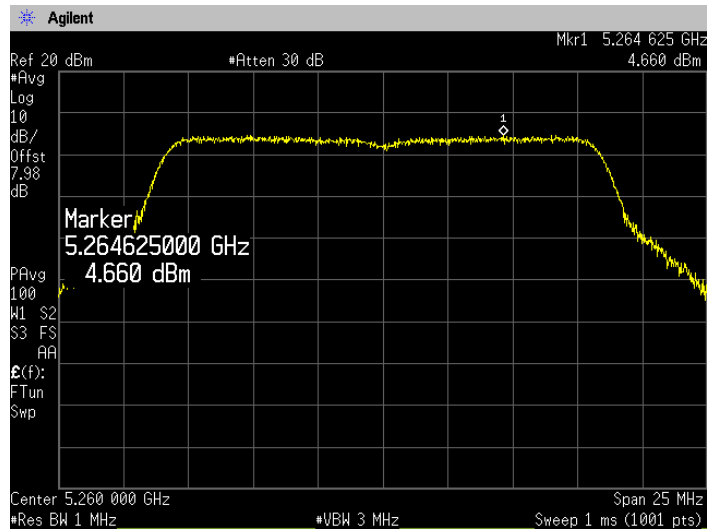
Channel: 48



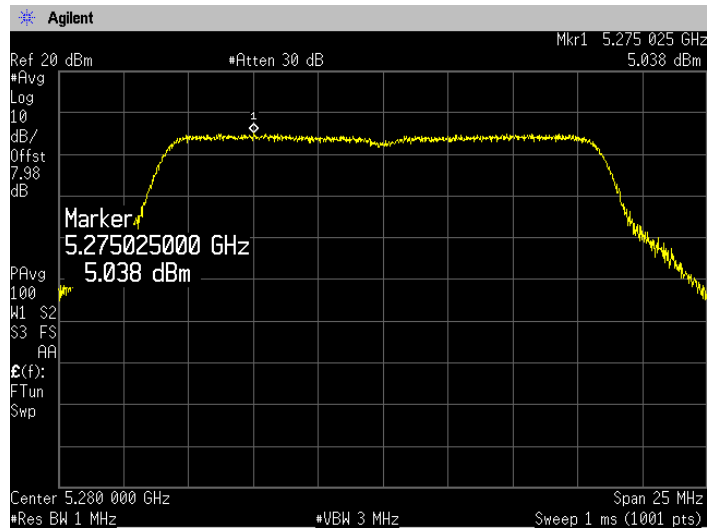


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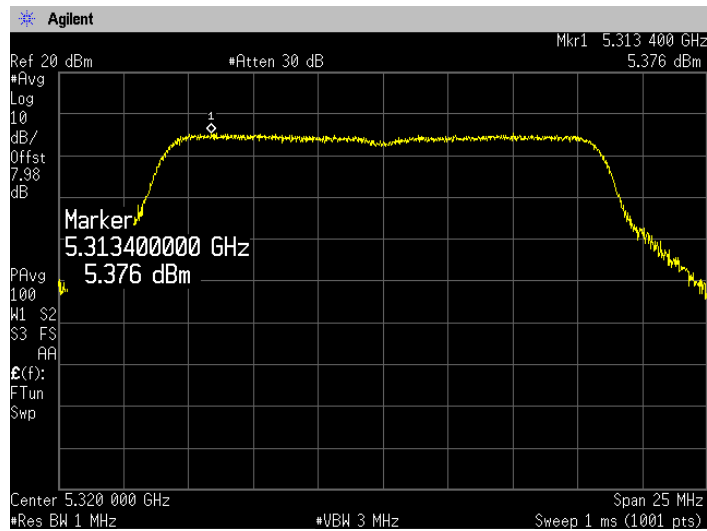
(5.3GHz Band)
Channel: 52



Channel: 56



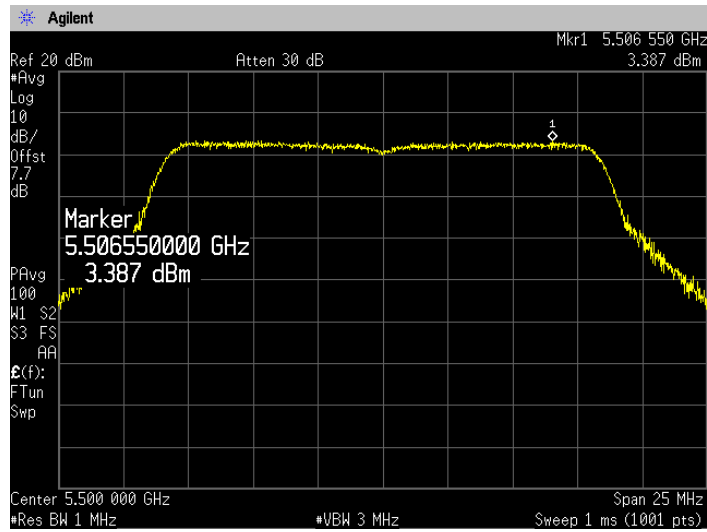
Channel: 64



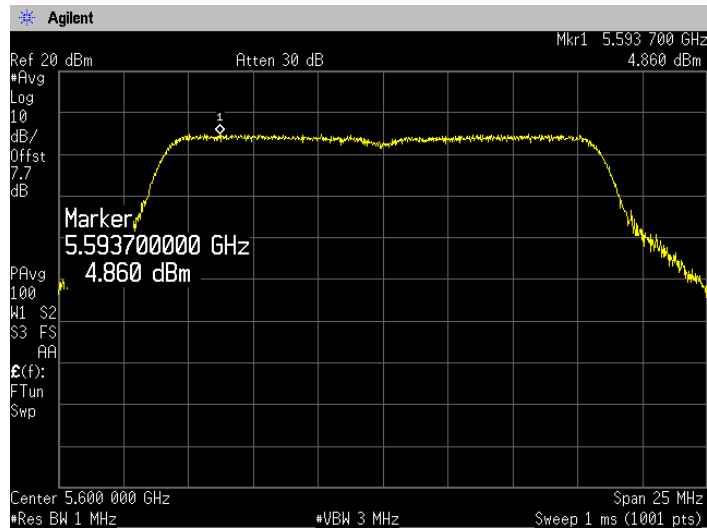


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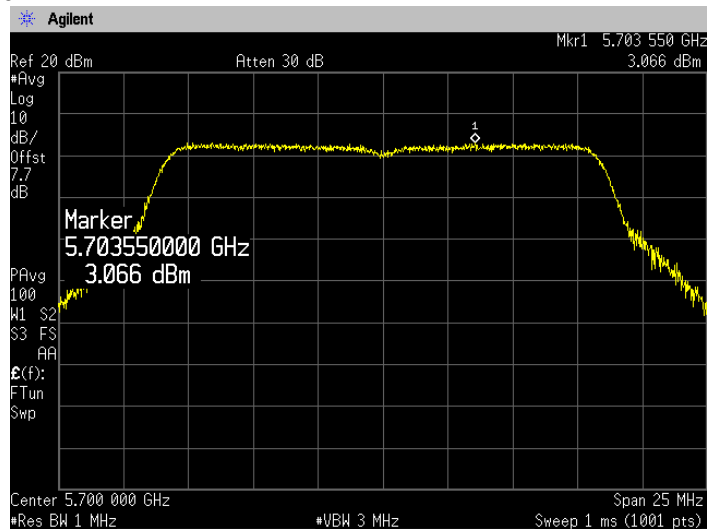
(5.6GHz Band)
Channel: 100



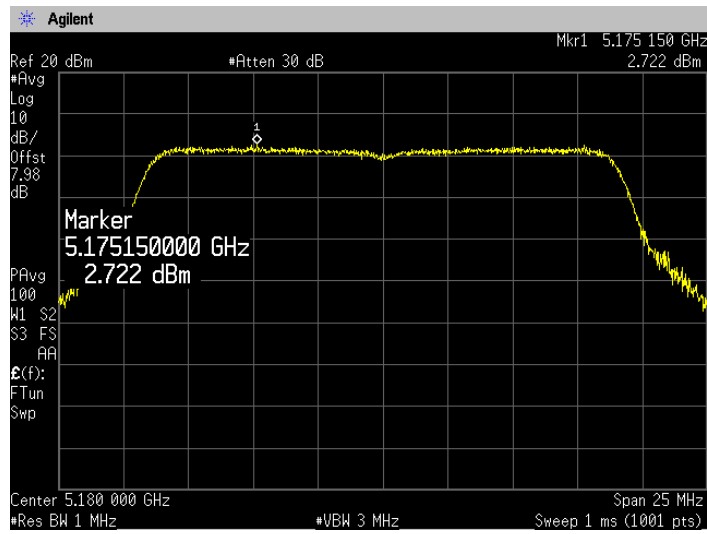
Channel: 120



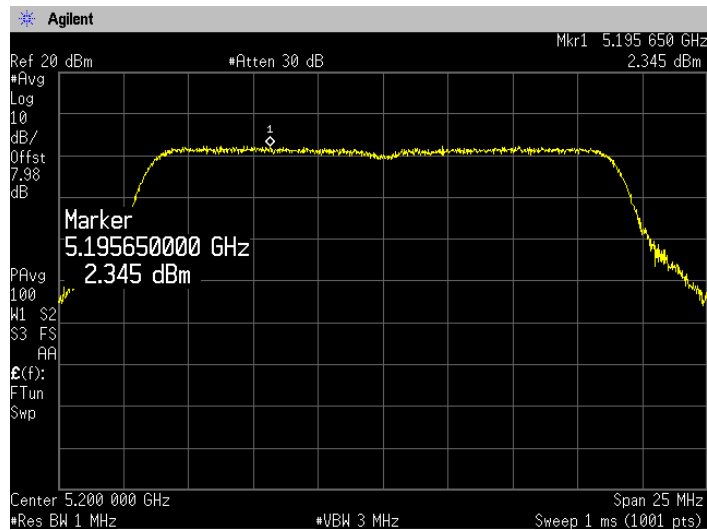
Channel: 140



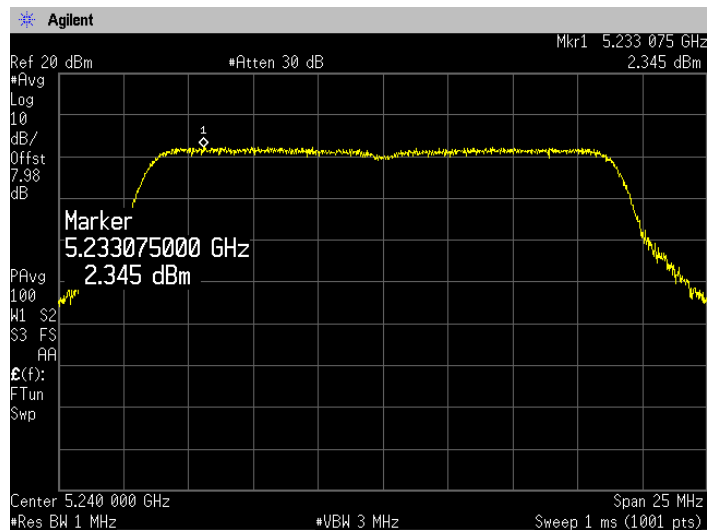
[IEEE802.11n (HT20)]
(5.2GHz Band)
Channel: 36



Channel: 40



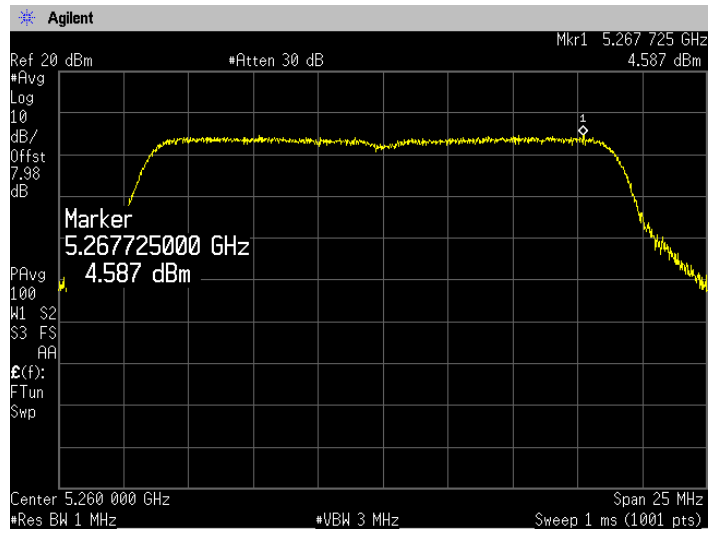
Channel: 48



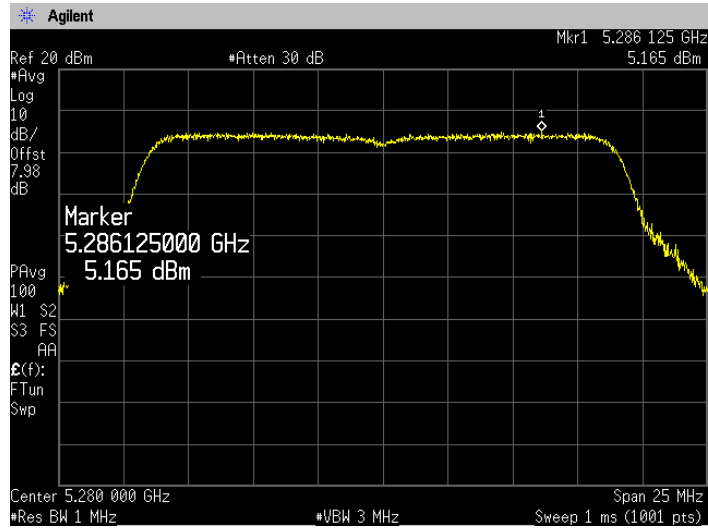


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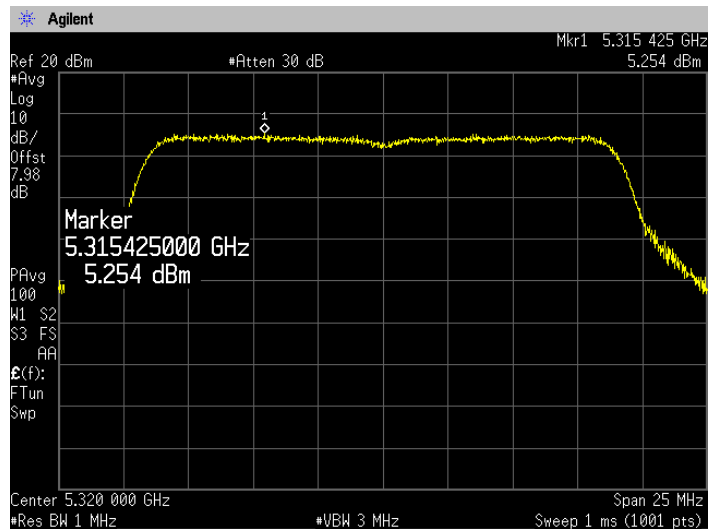
(5.3GHz Band)
Channel: 52



Channel: 56



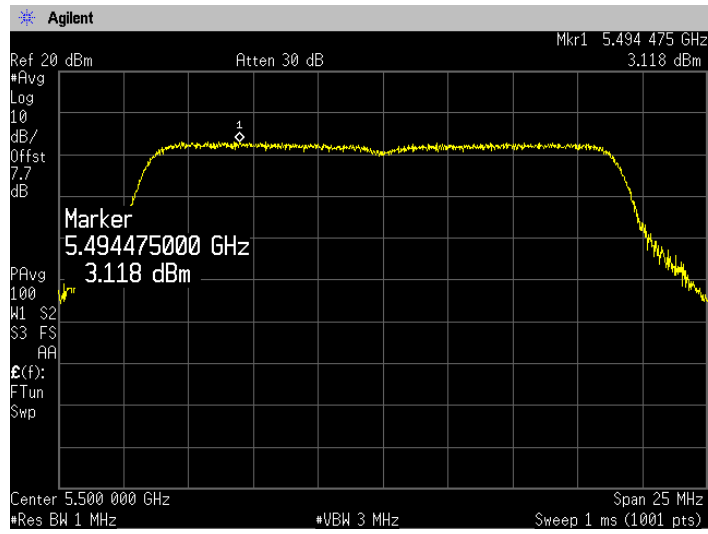
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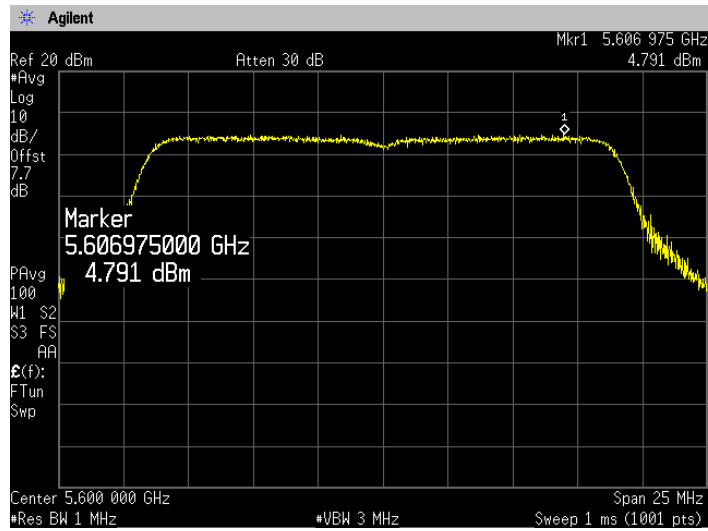


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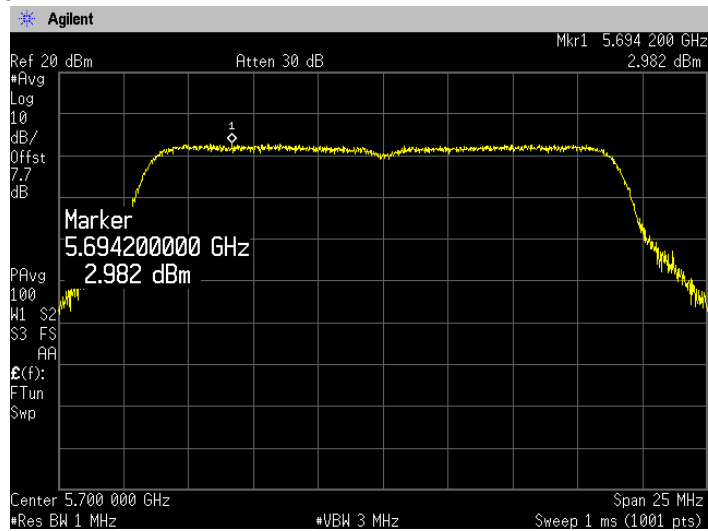
(5.6GHz Band)
Channel: 100



Channel: 120



Channel: 140

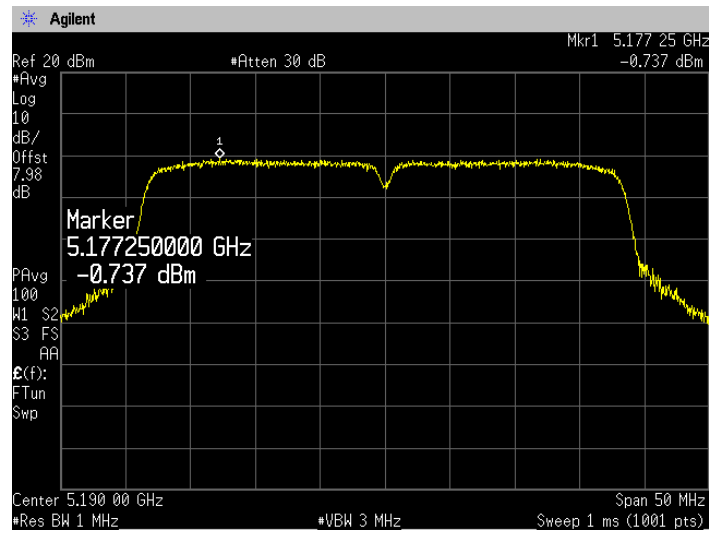




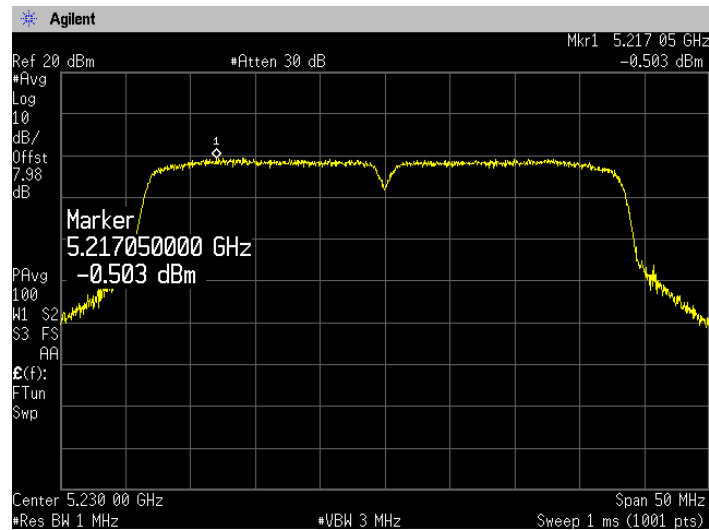
Zacta

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

Channel: 38



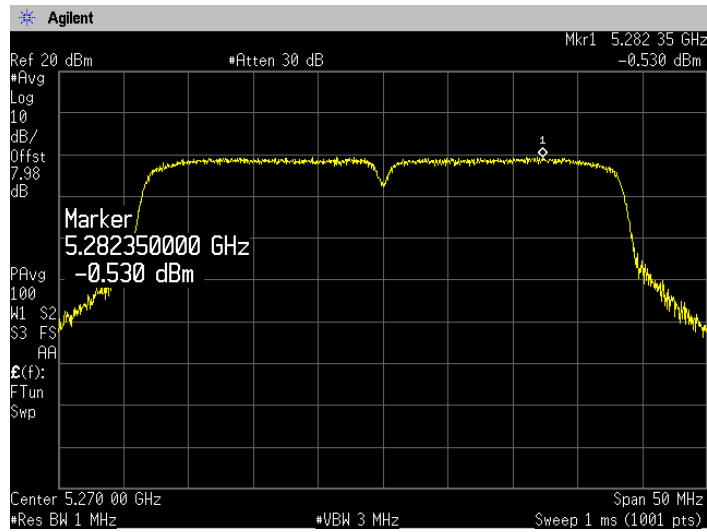
Channel: 46



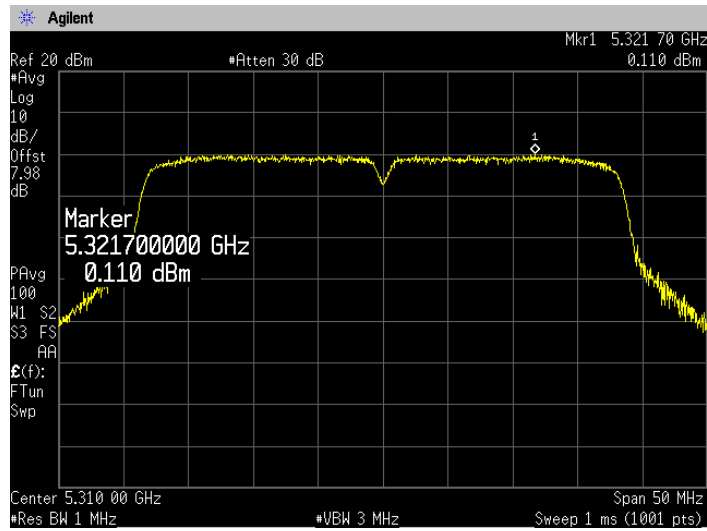


Zacta

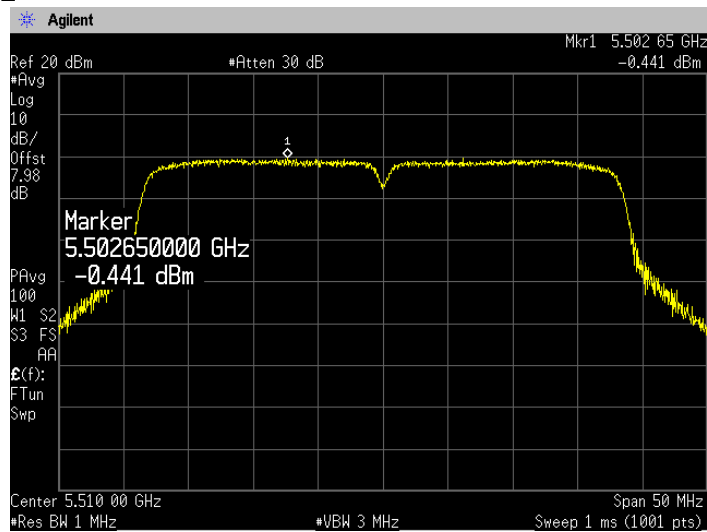
(5.3GHz Band)
Channel: 54



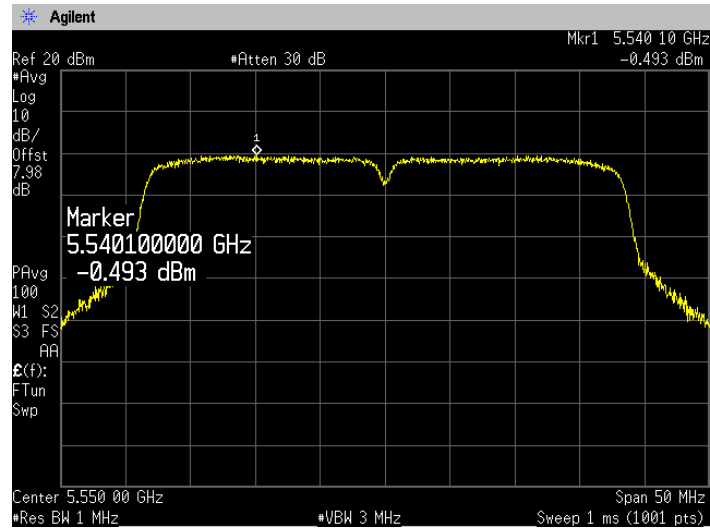
Channel: 62



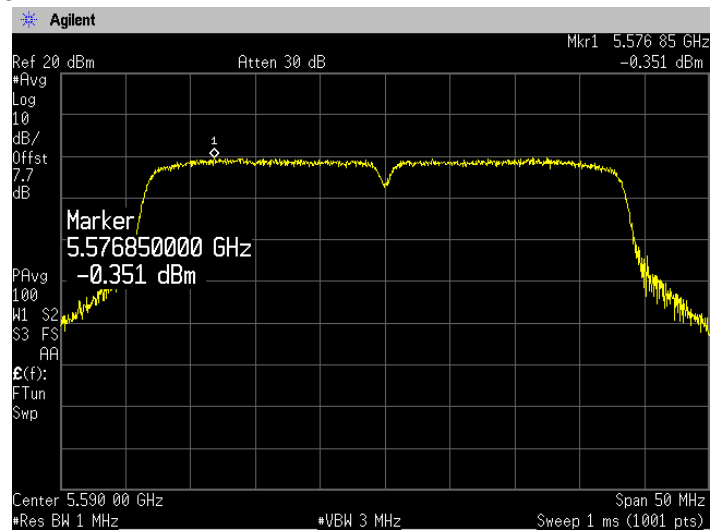
(5.6GHz Band)
Channel: 102



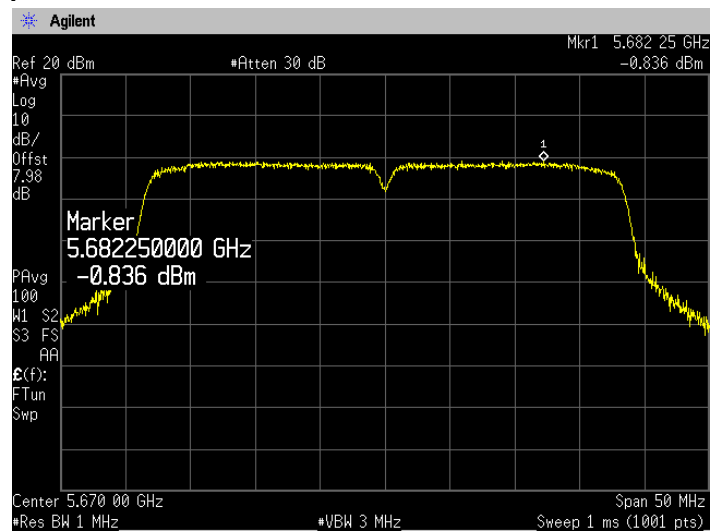
Channel: 110



Channel: 118



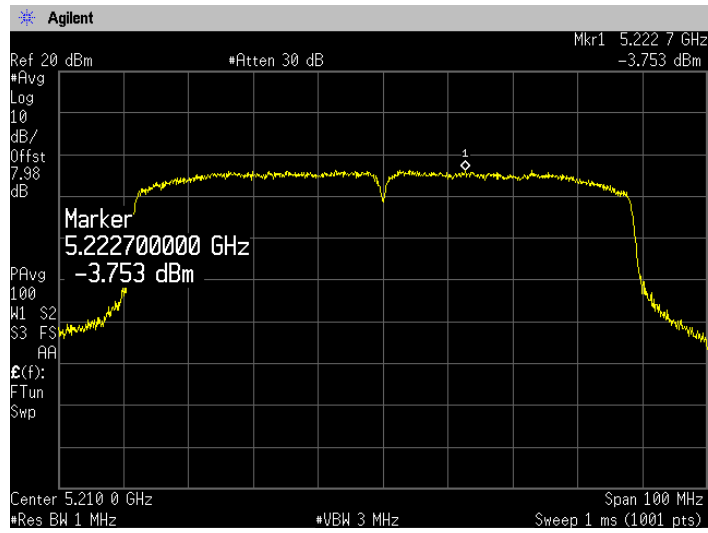
Channel: 134



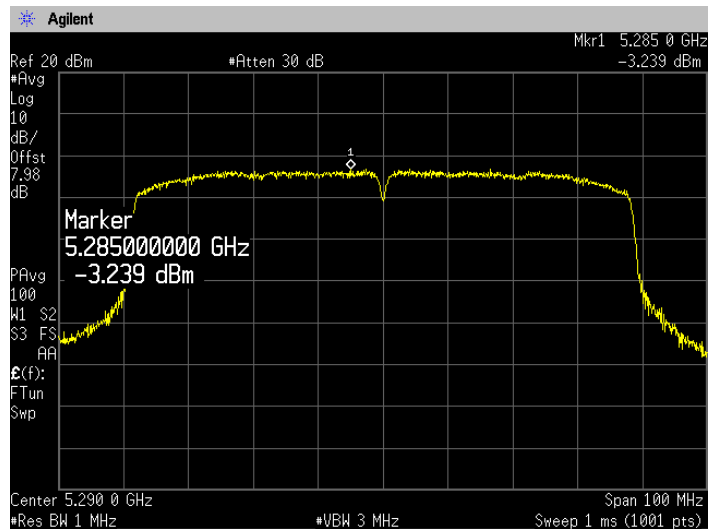


Zacta

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



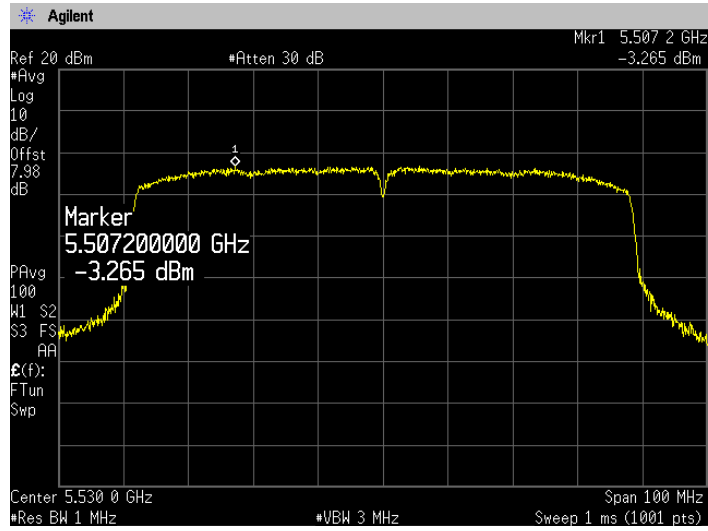
(5.3GHz Band)
Channel: 58



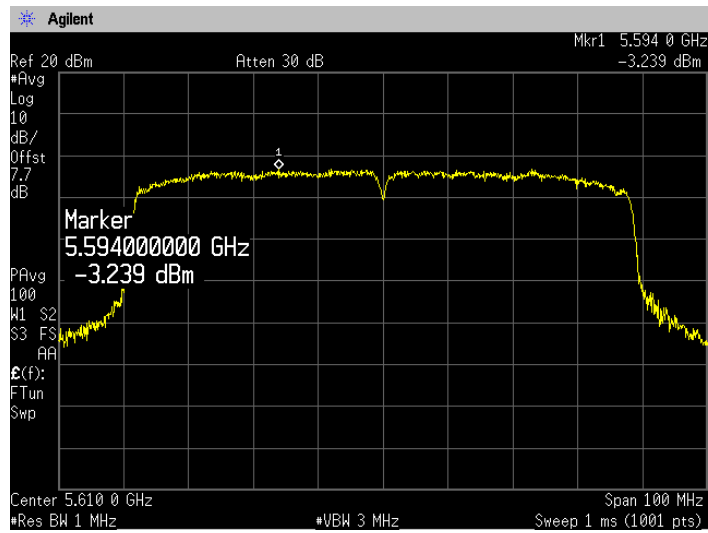


Zacta

(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.

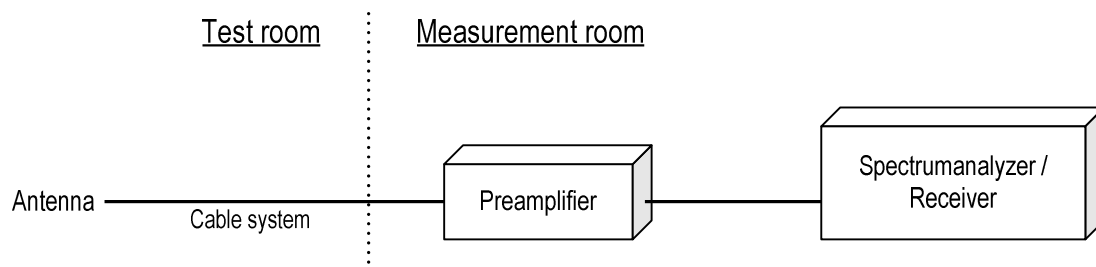
The EUT was set to operate with following conditions.

- 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.



Zacta

7.4 Test data

Date	: April 21, 2015	Test engineer	:	<u>Taiki Watanabe</u>
Temperature	: 22.3 [°C]			
Humidity	: 33.8 [%]			
Test place	: 3m Semi-anechoic chamber			
Date	: April 22, 2015	Test engineer	:	<u>Taiki Watanabe</u>
Temperature	: 21.7 [°C]			
Humidity	: 32.4 [%]			
Test place	: 3m Semi-anechoic chamber			
Date	: April 25, 2015	Test engineer	:	<u>Taiki Watanabe</u>
Temperature	: 22.8 [°C]			
Humidity	: 32.9 [%]			
Test place	: 3m Semi-anechoic chamber			

**[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	5127.20	V	PK	43.8	14.1	-	57.9	74.0	16.1
			5127.20	V	AV	33.8	14.1	-	47.9	54.0	6.1
			10360.00	V	PK	39.2	23.7	-	62.9	68.2	5.3
	40	5200	10400.00	V	PK	38.8	23.7	-	62.5	68.2	5.7
	48	5240	10480.00	V	PK	39.5	23.9	-	63.4	68.2	4.8

(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	39.4	24.1	-	63.5	68.2	4.7
	64	5320	5351.00	V	PK	54.3	14.8	-	69.1	74.0	4.9
			5351.00	V	AV	33.0	14.8	-	47.8	54.0	6.2
			10640.00	V	PK	39.9	24.8	-	64.7	74.0	9.3
			10640.00	V	AV	27.4	24.8	-	52.2	54.0	1.8

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.

(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	5447.35	H	PK	44.3	15.0	-	59.3	74.0	14.7
			5447.35	H	AV	33.5	15.0	-	48.5	54.0	5.5
			5447.35	V	PK	45.7	15.0	-	60.7	74.0	13.3
			5447.35	V	AV	35.2	15.0	-	50.2	54.0	3.8
			5468.90	H	PK	44.0	15.0	-	59.0	68.2	9.2
			5468.90	V	PK	45.4	15.0	-	60.4	68.2	7.8
			11000.00	V	PK	39.3	25.5	-	64.8	74.0	9.2
			11000.00	V	AV	27.1	25.5	-	52.6	54.0	1.4
	120	5600	11200.00	H	PK	38.9	25.9	-	64.8	74.0	9.2
			11200.00	H	AV	27.4	25.9	-	53.3	54.0	0.7
			11200.00	V	PK	38.1	25.9	-	64.0	74.0	10.0
			11200.00	V	AV	27.5	25.9	-	53.4	54.0	0.6
	140	5700	5725.70	H	PK	51.2	15.5	-	66.7	68.2	1.5
			5725.70	V	PK	49.9	15.5	-	65.4	68.2	2.8
			11400.00	V	PK	40.5	26.1	-	66.6	74.0	7.4
			11400.00	V	AV	24.6	26.1	-	50.7	54.0	3.3

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	5128.16	V	PK	43.8	14.2	-	58.0	74.0	16.0
			5128.16	V	AV	34.2	14.2	-	48.4	54.0	5.6
			10360.00	V	PK	39.3	23.7	-	63.0	68.2	5.2
	40	5200	10400.00	V	PK	39.1	23.7	-	62.8	68.2	5.4
	48	5240	10480.00	V	PK	39.3	23.9	-	63.2	68.2	5.0

(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	39.9	24.0	-	63.9	68.2	4.3
	56	5280	10560.00	V	PK	39.4	24.1	-	63.5	68.2	4.7
	64	5320	5371.88	H	PK	46.2	14.9	-	61.1	74.0	12.9
			5371.88	H	AV	35.1	14.9	-	50.0	54.0	4.0
			5371.88	V	PK	45.6	14.9	-	60.5	74.0	13.5
			5371.88	V	AV	34.3	14.9	-	49.2	54.0	4.8
			10640.00	V	PK	39.6	24.3	-	63.9	74.0	10.1
			10640.00	V	AV	27.4	24.3	-	51.7	54.0	2.3

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.



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(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	44.8	15.0	-	59.8	74.0	14.2
			5448.00	H	AV	34.4	15.0	-	49.4	54.0	4.6
			5448.00	V	PK	46.8	15.0	-	61.8	74.0	12.2
			5448.00	V	AV	36.1	15.0	-	51.1	54.0	2.9
			5469.00	H	PK	45.8	15.0	-	60.8	68.2	7.4
			5469.00	V	PK	47.4	15.0	-	62.4	68.2	5.8
			11000.00	H	PK	39.8	25.5	-	65.3	74.0	8.7
			11000.00	H	AV	27.0	25.5	-	52.5	54.0	1.5
			11000.00	V	PK	37.6	25.5	-	63.1	74.0	10.9
	11000.00	V	AV	27.0	25.5	-	52.5	54.0	1.5		
	120	5600	11200.00	H	PK	38.6	25.9	-	64.5	74.0	9.5
			11200.00	H	AV	26.9	25.9	-	52.8	54.0	1.2
			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	11400.00	H	PK	39.0	26.1	-	65.1	74.0	8.9
			11400.00	H	AV	27.1	26.1	-	53.2	54.0	0.8
			11400.00	V	PK	39.0	26.1	-	65.1	74.0	8.9
			11400.00	V	AV	26.9	26.1	-	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.

**[IEEE802.11n (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	5149.00	V	PK	49.5	14.2	-	63.7	74.0	10.3
			5149.00	V	AV	32.5	14.2	-	46.7	54.0	7.3
			10380.00	V	PK	39.2	23.7	-	62.9	68.2	5.3
	46	5230	10460.00	V	PK	39.3	23.9	-	63.2	68.2	5.0

(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	39.3	24.0	-	63.3	68.2	4.9
	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	45.5	15.0	-	60.5	74.0	13.5
			5459.00	V	AV	29.5	15.0	-	44.5	54.0	9.5
			5468.90	V	PK	47.9	15.0	-	62.9	68.2	5.3
			11020.00	V	PK	39.6	25.5	-	65.1	74.0	8.9
			11020.00	V	AV	27.0	25.5	-	52.5	54.0	1.5
	118	5590	11180.00	V	PK	39.4	25.6	-	65.0	74.0	9.0
			11180.00	V	AV	27.2	25.6	-	52.8	54.0	1.2
	134	5670	11340.00	V	PK	38.7	26.0	-	64.7	74.0	9.3
			11340.00	V	AV	27.2	26.0	-	53.2	54.0	0.8

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	5148.50	V	PK	49.4	14.2	-	63.6	74.0	10.4
			5148.50	V	AV	33.4	14.2	0.172	47.8	54.0	6.2
			10420.00	V	PK	38.9	23.8	-	62.7	68.2	5.5

(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	5368.55	H	PK	49.1	15.0	-	64.1	74.0	9.9
			5368.55	H	AV	31.1	15.0	0.205	46.3	54.0	7.7
			5368.55	V	PK	49.8	15.0	-	64.8	74.0	9.2
			5368.55	V	AV	31.3	15.0	0.205	46.5	54.0	7.5
			10580.00	V	PK	38.1	24.6	-	62.7	68.2	5.5

(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	5458.30	H	PK	48.1	15.2	-	63.3	74.0	10.7
			5458.30	H	AV	32.1	15.2	0.173	47.5	54.0	6.5
			5458.40	V	PK	49.1	15.2	-	64.3	74.0	9.7
			5458.40	V	AV	36.5	15.2	0.173	51.9	54.0	2.1
			5469.80	H	PK	49.8	15.2	-	65.0	68.2	3.2
			5461.00	V	PK	51.4	15.2	-	66.6	68.2	1.6
			11060.00	H	PK	38.8	26.0	-	64.8	74.0	9.2
			11060.00	H	AV	26.9	26.0	0.173	53.1	54.0	0.9
	122	5610	11060.00	V	PK	38.4	26.0	-	64.4	74.0	9.6
			11060.00	V	AV	27.0	26.0	0.173	53.2	54.0	0.8
			11220.00	V	PK	39.2	26.4	-	65.6	74.0	8.4
			11220.00	V	AV	26.8	26.4	0.172	53.4	54.0	0.6
			11220.00	V	PK	39.1	26.4	-	65.5	74.0	8.5
			11220.00	V	AV	26.8	26.4	0.172	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 of an inside of an 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 channels center frequency was recorded.

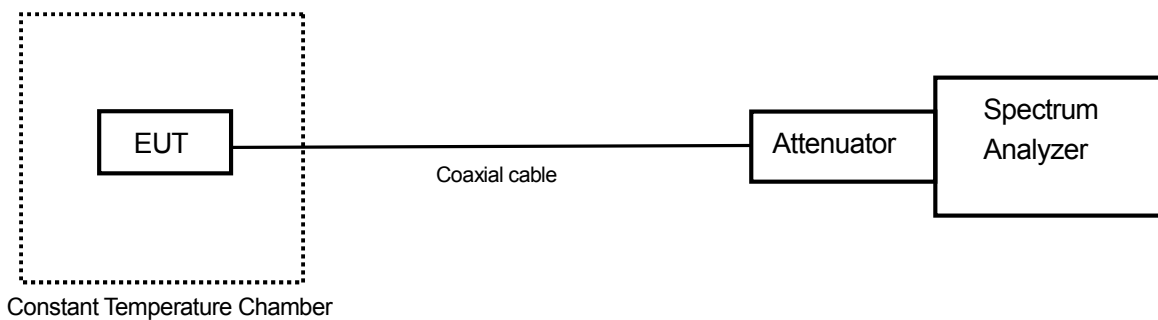
The EUT was set to operate with following conditions.

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

The test mode of EUT is as follows.

- Tx mode

- Test configuration



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 : April 7, 2015
 Temperature : 25.6 [°C]
 Humidity : 34.1 [%]
 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.)	5180004851	0.00000000
	60	5180013286	1.62837685
	50	5179987512	-3.34729416
	40	5179985641	-3.70849074
	30	5180006860	0.38783747
	20	5180005850	0.19285696
	10	5180002604	-0.43378338
	0	5180023055	3.51428242
	-10	5180037547	6.31196320
	-20	5180030994	5.04690647
-30	5180006306	0.28088777	
3.23	25	5179993955	-2.10347293
4.37	25	5180004919	0.01312740

[Channel: 64 (5320MHz)]

Power Supply [V]	Temperature [°C]	Measurements Frequency [Hz]	Frequency Tolerance [%]
3.80	25(Ref.)	5320013766	0.00000000
	60	5320020464	1.25901930
	50	5320001653	-2.27687381
	40	5320013753	-0.00244360
	30	5319993070	-3.89021550
	20	5319991299	-4.22310937
	10	5320010601	-0.59492327
	0	5320034944	3.98081677
	-10	5320030375	3.12198440
	-20	5320030742	3.19096919
-30	5320038813	4.70807052	
3.23	25	5319989602	-4.54209351
4.37	25	5320004427	-1.75544659



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[Channel: 140 (5700MHz)]

Power Supply [V]	Temperature [°C]	Measurements Frequency [Hz]	Frequency Tolerance [ppm]
3.80	25(Ref.)	5699969929	0.00000000
	60	5699984341	2.52843439
	50	5699995572	4.49879566
	40	5699992553	3.96914375
	30	5699964652	-0.92579436
	20	5699984441	2.54597834
	10	5700000544	5.37108097
	0	5700013173	7.58670669
	-10	5700022335	9.19408359
	-20	5700004460	6.05810214
	-30	5700026556	9.93461381
3.23	25	5699962078	-1.37737569
4.37	25	5699961161	-1.53825373

9. AC Power Line Conducted Emissions

9.1 Measurement procedure [FCC 15.207]

Test was applied by following conditions.

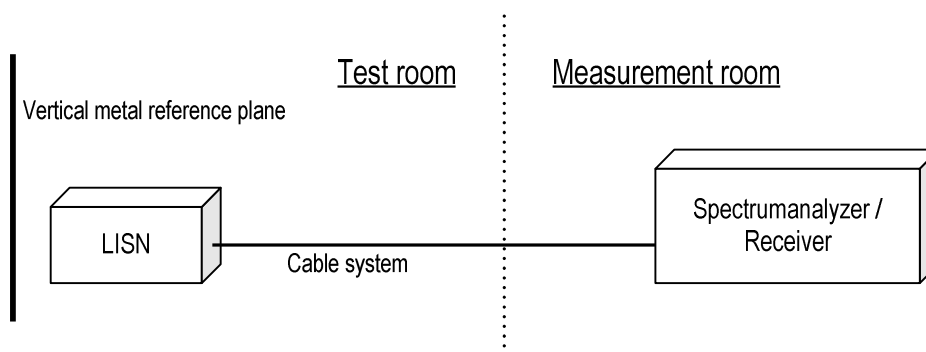
Test method	: ANSI C63.4
Frequency range	: 0.15MHz to 30MHz
Test place	: 10m Semi-anechoic chamber
EUT was placed on	: FRP table / (W)2.0m × (D)1.0m × (H)0.8m
Vertical Metal Reference Plane	: (W)2.0m × (H)2.0m 0.4m away from EUT
Test receiver setting	
- Detector	: Quasi-peak, Average
- Bandwidth	: 9kHz

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

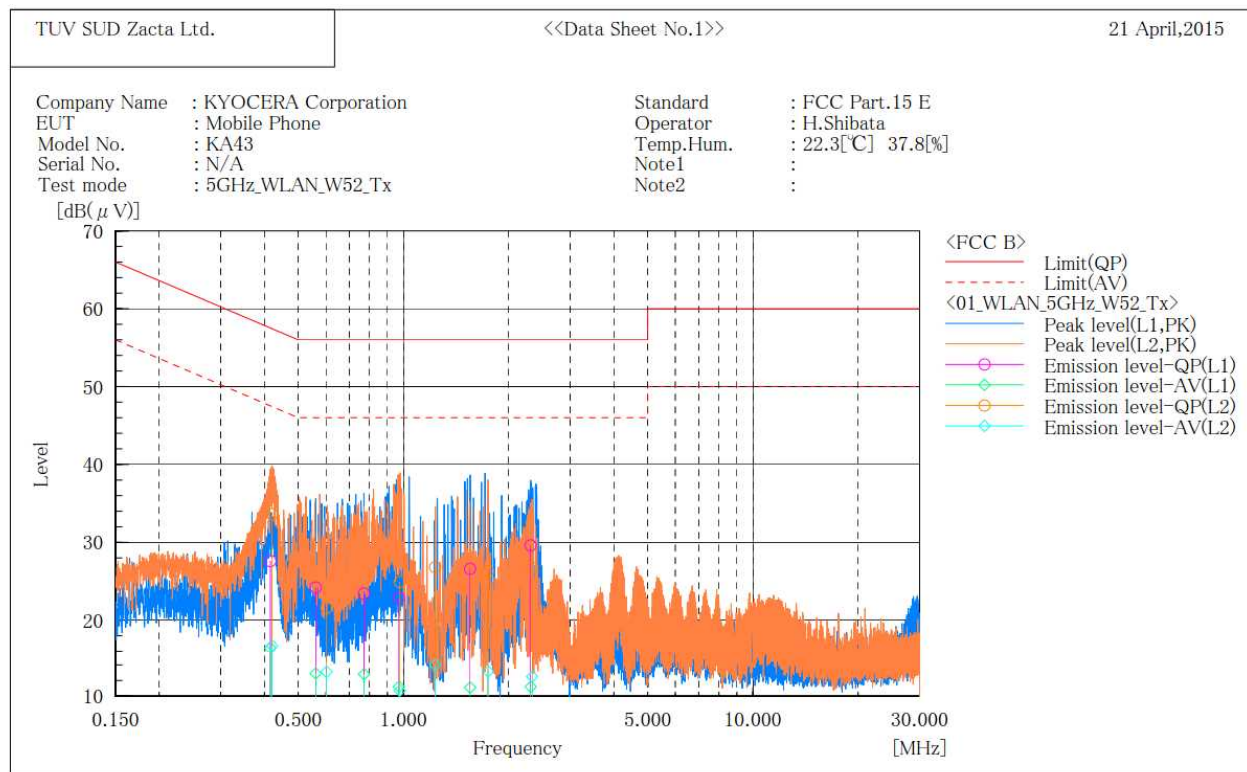
*: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.



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9.4 Test data

***** CONDUCTED EMISSION at MAINS PORT *****
 << 3m Semi-anechoic chamber >>



Final Result

--- L1 Phase ---

No.	Frequency [MHz]	Reading		c. f [dB]	Result		Limit		Margin	
		QP [dB(μV)]	AV [dB(μV)]		QP [dB(μV)]	AV [dB(μV)]	QP [dB(μV)]	AV [dB(μV)]	QP [dB]	AV [dB]
1	0.416	17.3	6.1	10.3	27.6	16.4	57.5	47.5	29.9	31.1
2	0.561	13.9	2.6	10.3	24.2	12.9	56.0	46.0	31.8	33.1
3	0.771	13.1	2.5	10.3	23.4	12.8	56.0	46.0	32.6	33.2
4	0.971	12.6	0.9	10.3	22.9	11.2	56.0	46.0	33.1	34.8
5	1.552	16.3	0.8	10.3	26.6	11.1	56.0	46.0	29.4	34.9
6	2.313	19.2	0.8	10.4	29.6	11.2	56.0	46.0	26.4	34.8

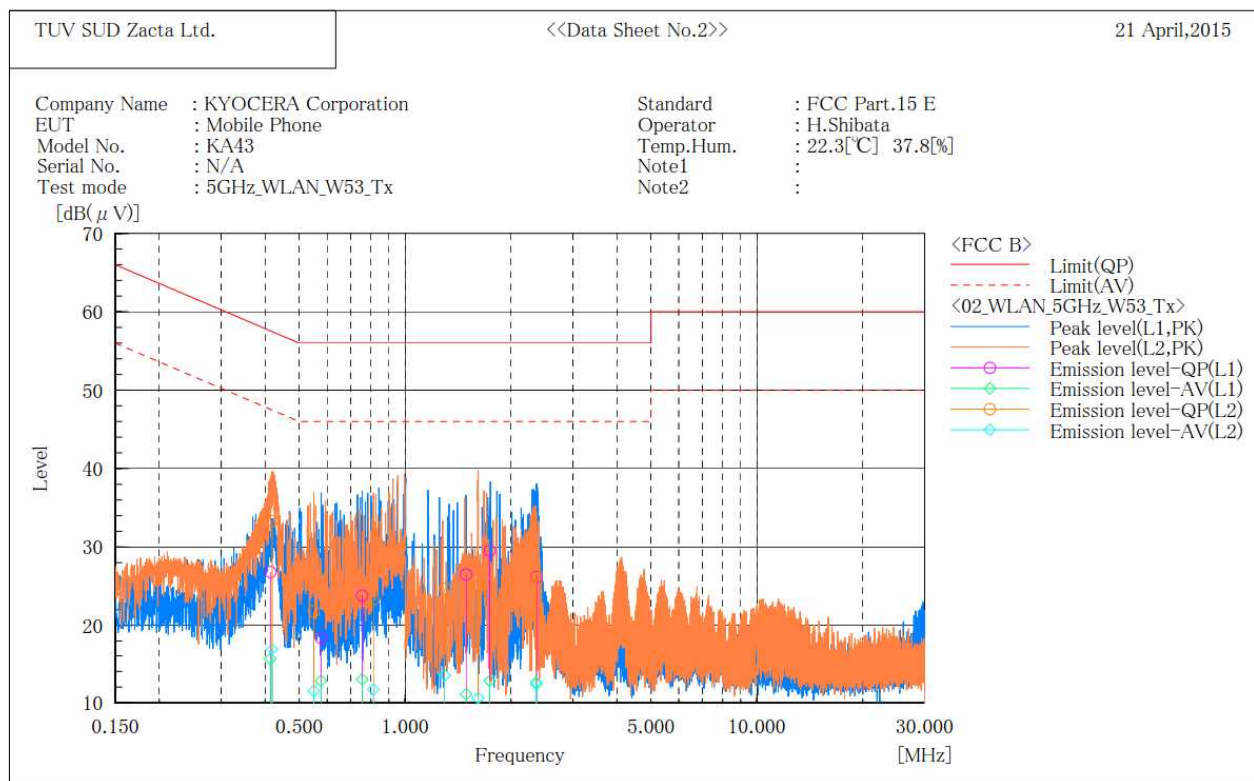
--- L2 Phase ---

No.	Frequency [MHz]	Reading		c. f [dB]	Result		Limit		Margin	
		QP [dB(μV)]	AV [dB(μV)]		QP [dB(μV)]	AV [dB(μV)]	QP [dB(μV)]	AV [dB(μV)]	QP [dB]	AV [dB]
1	0.421	23.3	6.4	10.3	33.6	16.7	57.4	47.4	23.8	30.7
2	0.603	11.3	2.8	10.3	21.6	13.1	56.0	46.0	34.4	32.9
3	0.977	14.6	0.4	10.3	24.9	10.7	56.0	46.0	31.1	35.3
4	1.233	16.4	3.6	10.4	26.8	14.0	56.0	46.0	29.2	32.0
5	1.746	15.9	2.8	10.4	26.3	13.2	56.0	46.0	29.7	32.8
6	2.334	16.3	2.1	10.4	26.7	12.5	56.0	46.0	29.3	33.5



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***** CONDUCTED EMISSION at MAINS PORT *****
 << 3m Semi-anechoic chamber >>



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	0.414	16.5	5.3	10.3	26.8	15.6	57.6	47.6	30.8	32.0
2	0.577	8.1	2.5	10.3	18.4	12.8	56.0	46.0	37.6	33.2
3	0.755	13.5	2.7	10.3	23.8	13.0	56.0	46.0	32.2	33.0
4	1.491	16.2	0.8	10.3	26.5	11.1	56.0	46.0	29.5	34.9
5	1.740	19.2	2.5	10.3	29.5	12.8	56.0	46.0	26.5	33.2
6	2.364	15.8	2.0	10.4	26.2	12.4	56.0	46.0	29.8	33.6

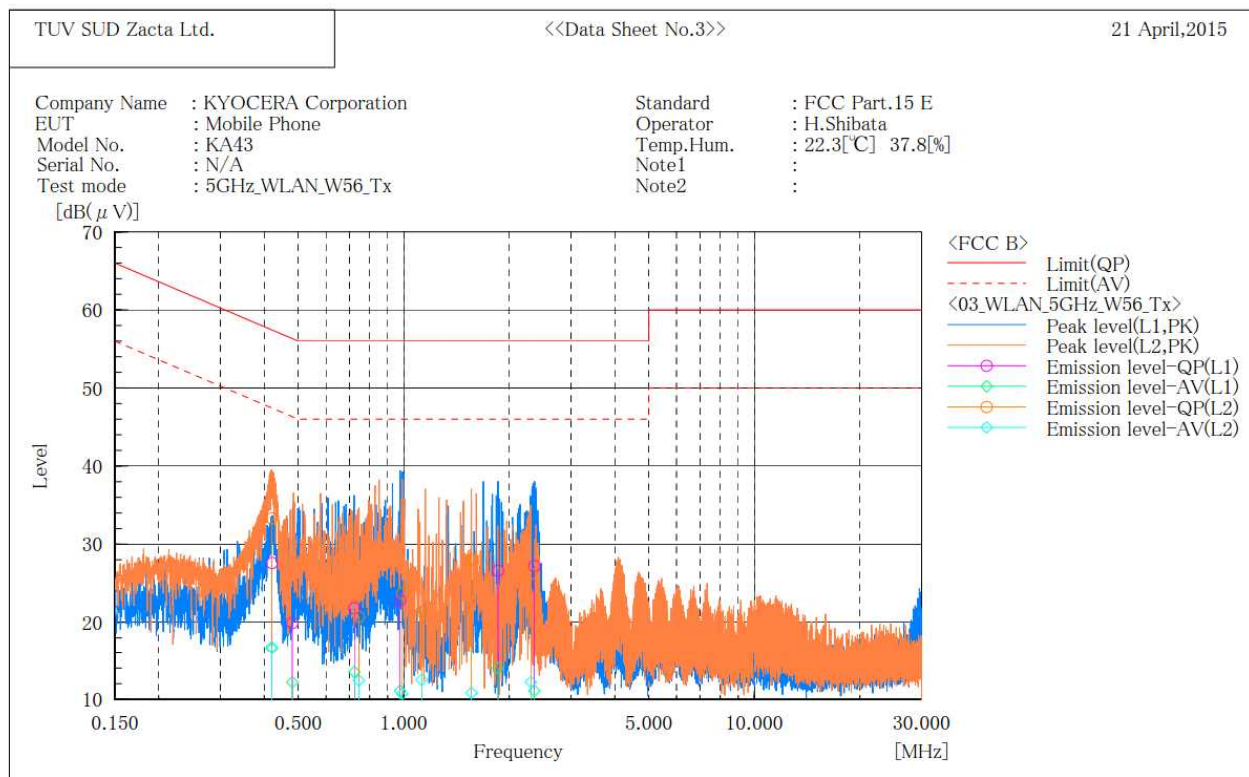
--- L2 Phase ---

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	0.419	23.0	6.6	10.3	33.3	16.9	57.5	47.5	24.2	30.6
2	0.550	11.5	1.2	10.3	21.8	11.5	56.0	46.0	34.2	34.5
3	0.813	13.0	1.4	10.3	23.3	11.7	56.0	46.0	32.7	34.3
4	1.297	14.3	3.1	10.4	24.7	13.5	56.0	46.0	31.3	32.5
5	1.613	14.6	0.2	10.4	25.0	10.6	56.0	46.0	31.0	35.4
6	2.355	15.9	2.2	10.4	26.3	12.6	56.0	46.0	29.7	33.4



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***** CONDUCTED EMISSION at MAINS PORT *****
 << 3m Semi-anechoic chamber >>



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	0.421	17.3	6.3	10.3	27.6	16.6	57.4	47.4	29.8	30.8
2	0.481	9.6	1.9	10.3	19.9	12.2	56.3	46.3	36.4	34.1
3	0.723	11.5	3.2	10.3	21.8	13.5	56.0	46.0	34.2	32.5
4	0.977	12.5	0.8	10.3	22.8	11.1	56.0	46.0	33.2	34.9
5	1.857	16.3	3.7	10.3	26.6	14.0	56.0	46.0	29.4	32.0
6	2.358	16.8	0.7	10.4	27.2	11.1	56.0	46.0	28.8	34.9

--- 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	0.420	23.0	6.5	10.3	33.3	16.8	57.4	47.4	24.1	30.6
2	0.745	10.4	2.1	10.3	20.7	12.4	56.0	46.0	35.3	33.6
3	0.991	13.4	0.4	10.3	23.7	10.7	56.0	46.0	32.3	35.3
4	1.125	11.0	2.1	10.4	21.4	12.5	56.0	46.0	34.6	33.5
5	1.559	17.6	0.4	10.4	28.0	10.8	56.0	46.0	28.0	35.2
6	2.304	15.8	1.8	10.4	26.2	12.2	56.0	46.0	29.8	33.8

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

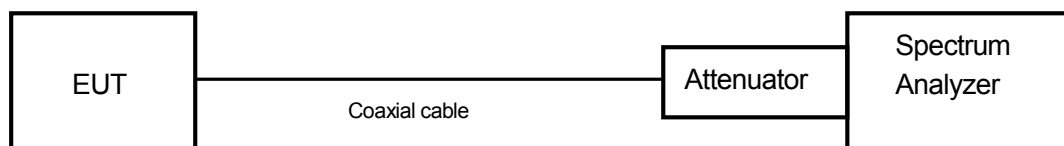
The EUT was set to operate with following conditions.

- 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 : April 6, 2015
 Temperature : 20.8 [°C]
 Humidity : 50.0 [%]
 Test place : Shielded room No.4

Tested by : Hikaru Shibata

Date : April 29, 2015
 Temperature : 24.9 [°C]
 Humidity : 38.6 [%]
 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	1.274	1.284	0.992	784.9	0.034	0.068
	40	5200						
	58	5240						
	52	5260	1.276	1.286	0.992	783.7	0.034	0.068
	56	5280						
	64	5320						
	100	5500	1.276	1.284	0.994	783.7	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	0.634	0.644	0.984	1577.3	0.068	0.136
	62	5310						
	102	5510	0.636	0.646	0.985	1572.3	0.068	0.136
	110	5550						
	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	0.248	0.258	0.961	4032.3	0.172	0.343
	58	5290	0.248	0.260	0.954	4032.3	0.205	0.410
	106	5530	0.248	0.258	0.961	4032.3	0.172	0.343
	122	5610						

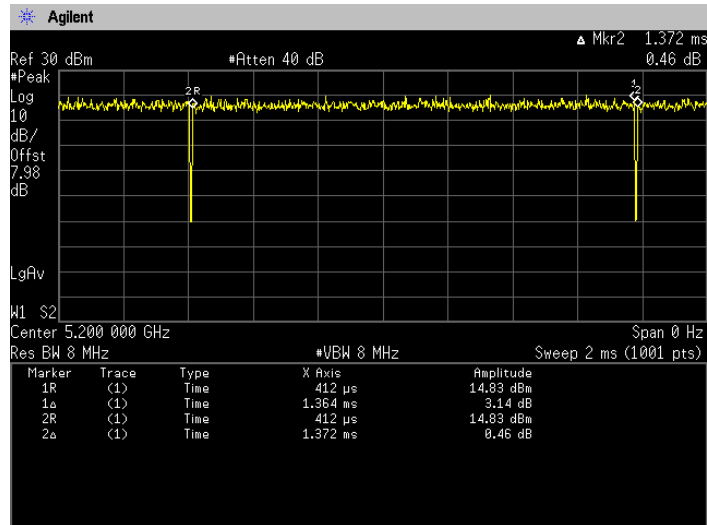
Note: X = On time / (On + Off time)



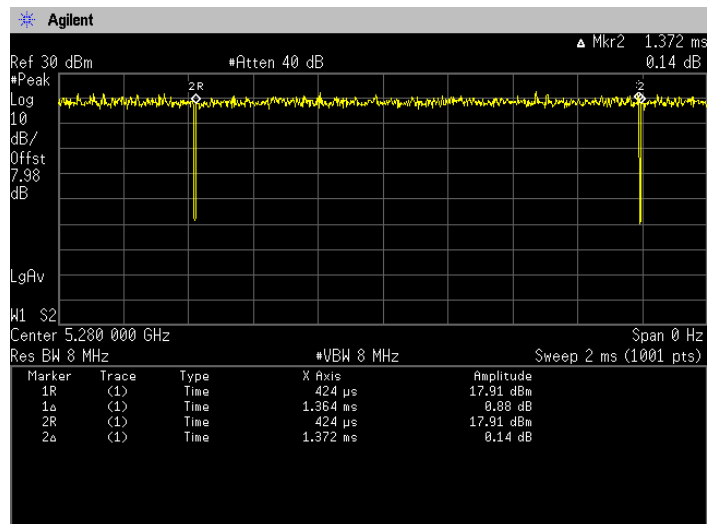
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10.4 Trace data [IEEE802.11a]

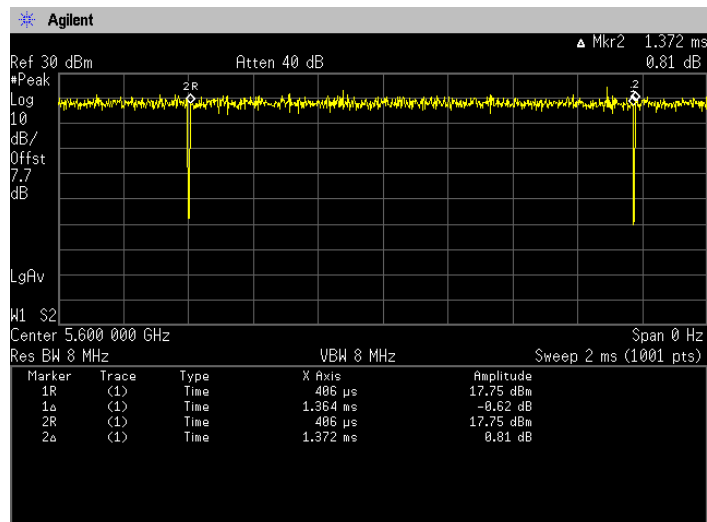
Channel: 40



Channel: 56



Channel: 120

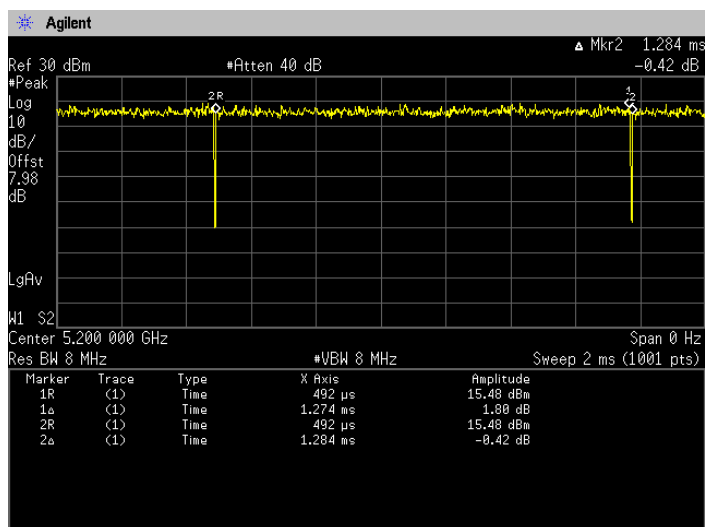




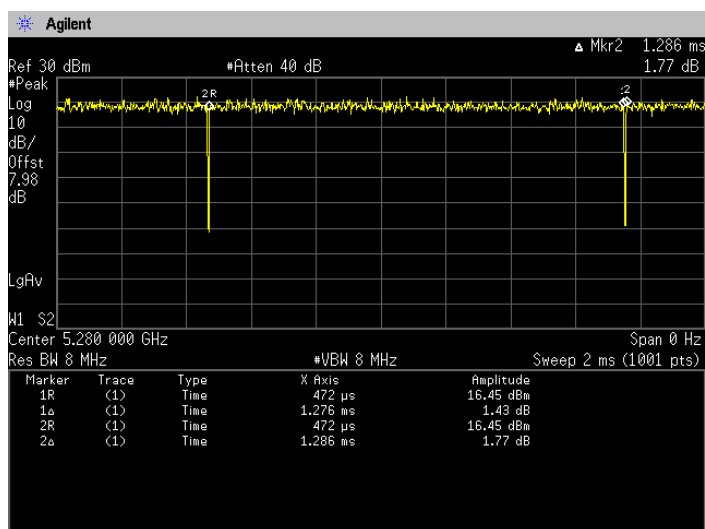
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[IEEE802.11n (HT20)]

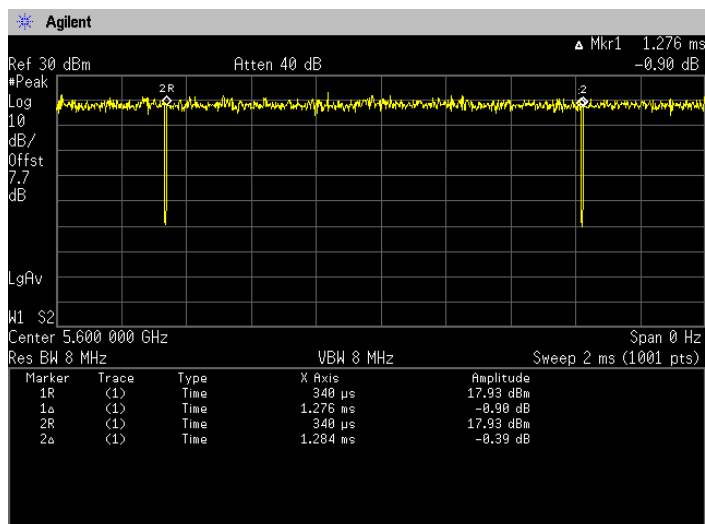
Channel: 40



Channel: 56



Channel: 120

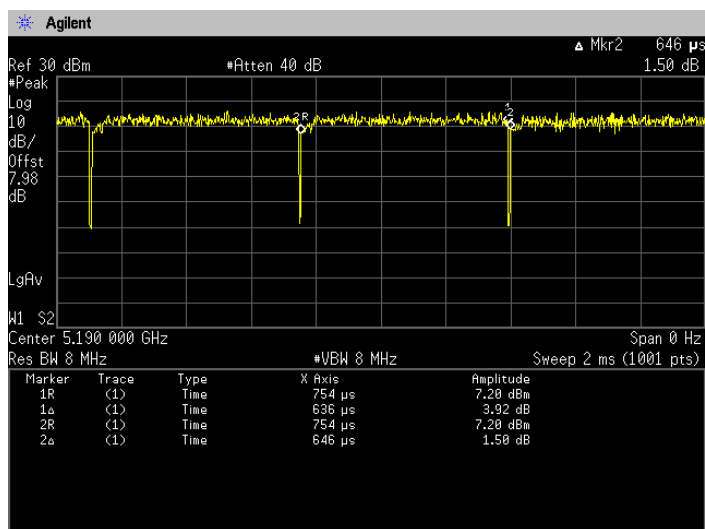




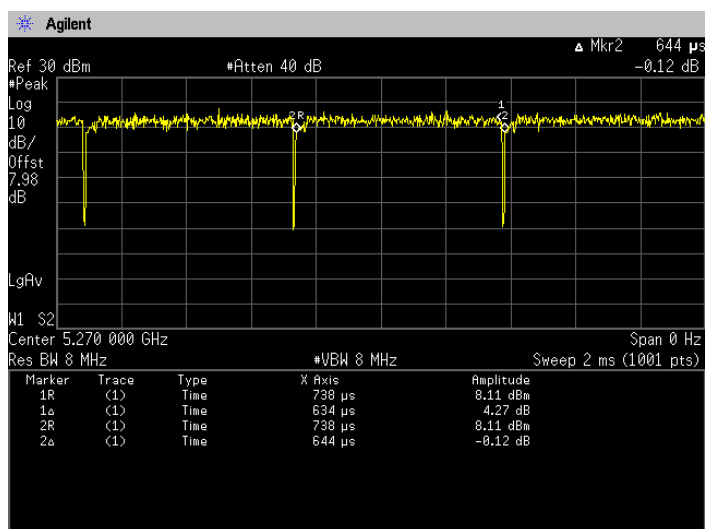
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[IEEE802.11n (HT40)]

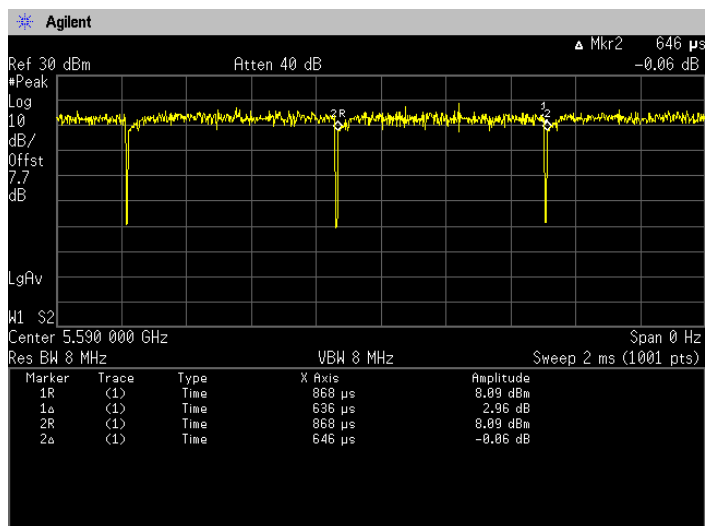
Channel: 38



Channel: 54

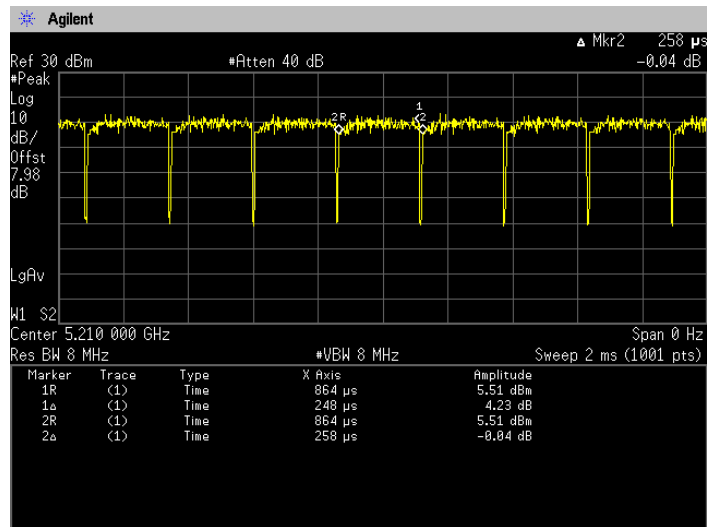


Channel: 118

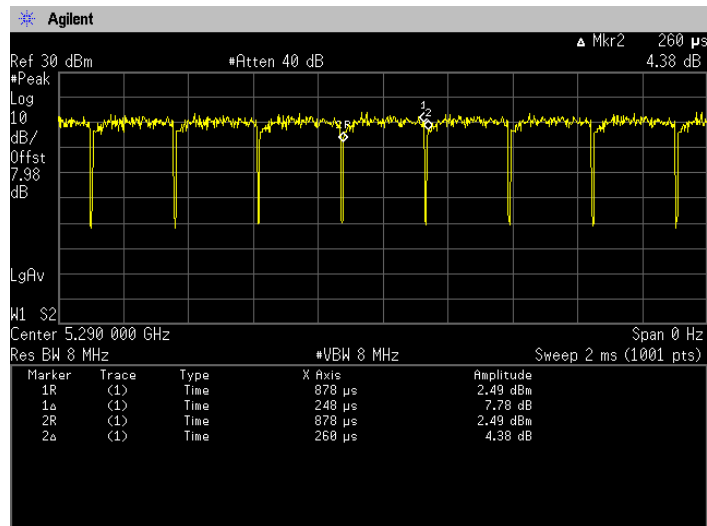


[IEEE802.11ac (HT80)]

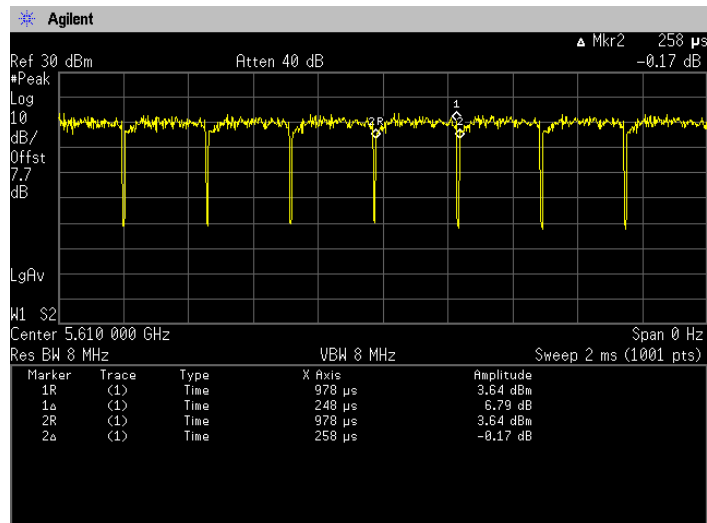
Channel: 42



Channel: 58



Channel: 106





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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.



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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)	$\pm 3.9\text{dB}$



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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	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.