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# TEST REPORT

Report number : Z071C-13158

Issue date : May 23, 2013

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	: YAKF-1
FCC ID	: JOYYAKF-1

Date of test : April 30, May 2, 8, 9, 13, 20, 23, 2013  
 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 client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

Tested by : Chiaki Kanno  
 Chiaki Kanno

Tested by : Taiki Watanabe  
 Taiki Watanabe

Authorized by : Hiroaki Suzuki  
 Hiroaki Suzuki  
 Manager of EMC Technical Department



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## 1. Summary of Test

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### 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 C63.4-2003, KDB789033

#### 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(a)	Peak Excursion	Conducted	PASS
15.407(d) 15.205 15.209	Radiated emissions (Restricted Bands of Operation)	Radiated	PASS
15.407(g)	Frequency Stability	Conducted	PASS
15.207	AC Power Line Conducted Emissions	Conducted	PASS

#### 1.3.1 Test set up

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### 1.4 Modification to the EUT by laboratory

None



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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	: YAKF-1
Serial number	: N/A
EUT condition	: Pre-Production
Max. frequency	: 1.5GHz
Power ratings	: Battery: DC 3.8V
Size	: (W) 134 × (D) 66 × (H) 10.9 mm
Environment	: Indoor and Outdoor use
Terminal limitation	: -20°C to 60°C
RF Specification Protocol	: IEEE802.11a, IEEE802.11n (HT20), IEEE802.11n (HT40)
Frequency range	: IEEE802.11a/n (HT20): 5180MHz-5320MHz, 5500MHz-5700MHz IEEE802.11n (HT40): 5190MHz-5310MHz, 5510MHz-5670MHz
Number of RF Channels	: IEEE802.11a/n (HT20): 19 Channels IEEE802.11n (HT40): 9 Channels
Modulation type	: IEEE802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)
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 IEEE802.11n (HT40 LGI): 13.5, 27, 40.5, 54, 81, 108, 121.5, 135Mbps IEEE802.11n (HT40 LGI): 15, 30, 45, 60, 90, 120, 135, 150Mbps
Channel separation	: IEEE802.11a/n (HT20): 20MHz IEEE802.11n (HT40): 40MHz
Output power	: 14.717dBm (IEEE802.11a) 14.644dBm (IEEE802.11n: HT20) 11.667dBm (IEEE802.11n: HT40)
Antenna type	: Internal antenna
Antenna gain	: 0dBi



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### 2.3 Variation of the family model(s)

Not applicable

### 2.4 Operating channels and frequencies

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

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

#### [IEEE802.11n (HT40)]

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

## 2.5 Description of Test mode

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

Band	IEEE802.11a/n (HT20)		IEEE802.11n (HT40)	
	Channel	Frequency [MHz]	Channel	Frequency [MHz]
5.2GHz Band	36	5180	38	5190
	40	5200	-	-
	48	5240	46	5230
5.3GHz Band	52	5260	54	5270
	56	5280	-	-
	64	5320	62	5310
5.6GHz Band	100	5500	102	5510
	116	5580	118	5590
	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
	IEEE802.11n (HT40): OFDM	MCS0
5.3GHz Band	IEEE802.11a: OFDM	6Mbps
	IEEE802.11n (HT20): OFDM	MCS0
	IEEE802.11n (HT40): OFDM	MCS0
5.6GHz Band	IEEE802.11a: OFDM	6Mbps
	IEEE802.11n (HT20): OFDM	MCS0
	IEEE802.11n (HT40): OFDM	MCS0

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	YAKF-1	N/A	JOYYAKF-1	EUT
2	AC Adapter	KYOCERA	KYCAA1	N/A	-	*

\*: AC power line Conducted Emission Test.

#### 3.2 Cable(s) used

No.	Cable	Length[m]	Shield	Connector	Comment
a	DC cable	1.5	No	Plastic	*

\*: 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

### 4.1 Measurement procedure [FCC 15.407(a), KDB789033]

The bandwidth at 26dB down from the highest inband 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=200kHz/430kHz, VBW=620kHz/1.3MHz, Span=40MHz/80MHz, Sweep=auto, Detector=Peak, Trace mode=Max hold

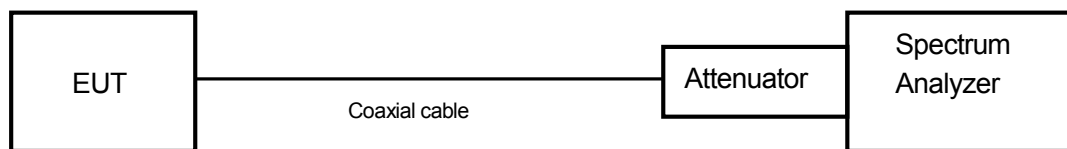
The EUT was set to operate with following conditions.

- 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 13, 2013  
 Temperature : 22.0 [°C]  
 Humidity : 46.0 [%]  
 Test place : Shielded room

Test personnel :

Tested by :

Chiaki Kanno

Mode	Band	Channel	Frequency (MHz)	Test Result (MHz)
802.11a	5.2GHz Band	36	5180	22.103
		40	5200	21.854
		48	5240	21.942
	5.3GHz Band	52	5260	22.332
		56	5280	21.568
		64	5320	21.751
	5.6GHz Band	100	5500	20.831
		116	5580	22.670
		140	5700	22.319



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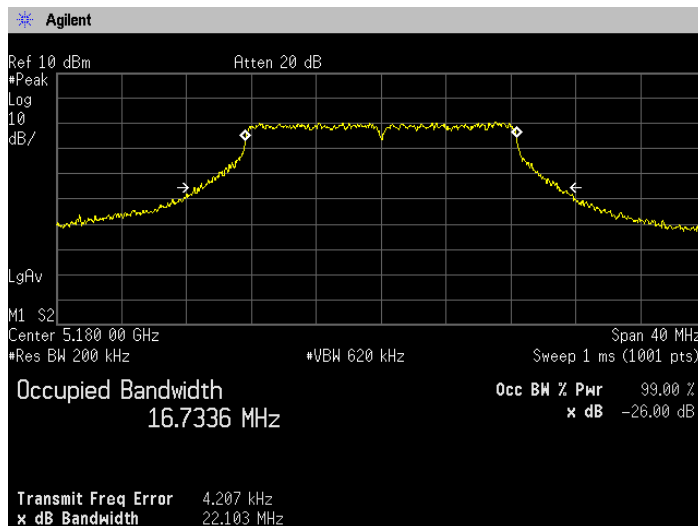
Mode	Band	Channel	Frequency (MHz)	Test Result (MHz)
802.11n (20MHz)	5.2GHz Band	36	5180	22.205
		40	5200	22.118
		48	5240	22.252
	5.3GHz Band	52	5260	22.242
		56	5280	22.156
		64	5320	22.121
	5.6GHz Band	100	5500	22.650
		116	5580	22.614
		140	5700	22.750

Mode	Band	Channel	Frequency (MHz)	Test Result (MHz)
802.11n (40MHz)	5.2GHz Band	38	5190	41.946
		46	5230	42.133
	5.3GHz Band	54	5270	41.872
		62	5310	41.767
	5.6GHz Band	102	5510	42.275
		118	5590	42.219
		134	5670	42.508

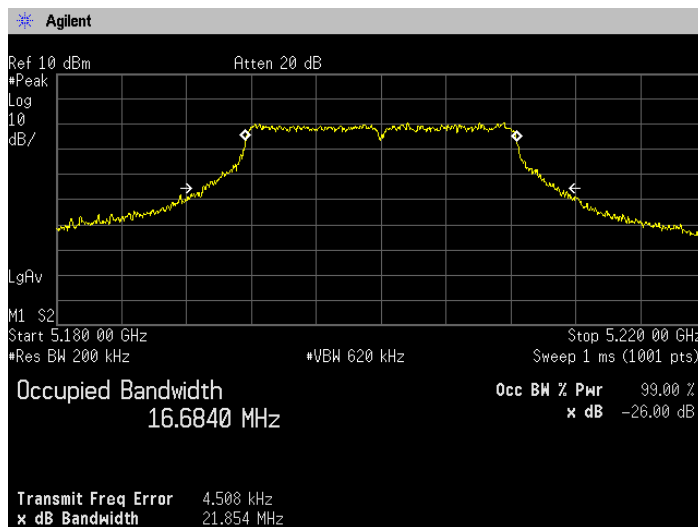


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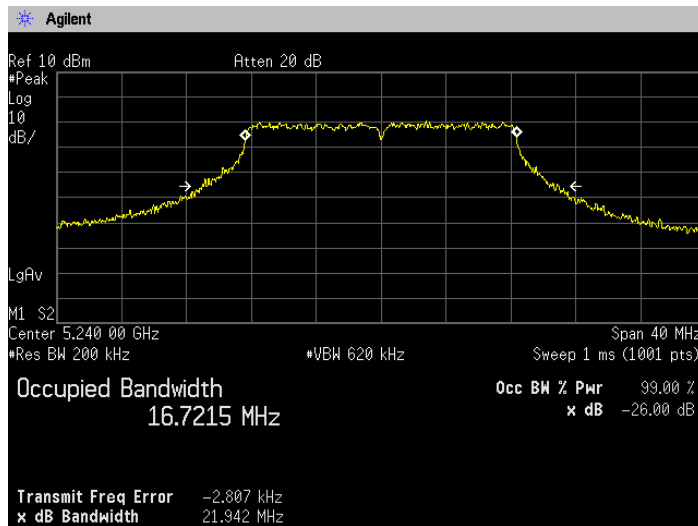
**4.4 Trace data**  
**[IEEE802.11a]**  
**(5.2GHz Band)**  
**Channel: 36**



**Channel: 40**



**Channel: 48**

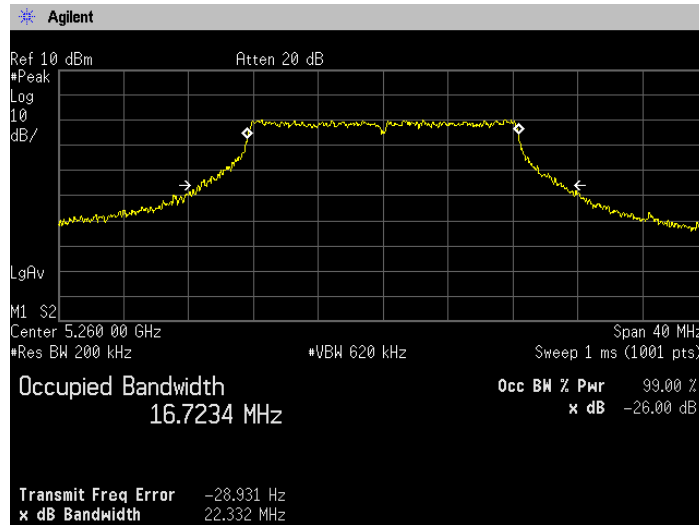




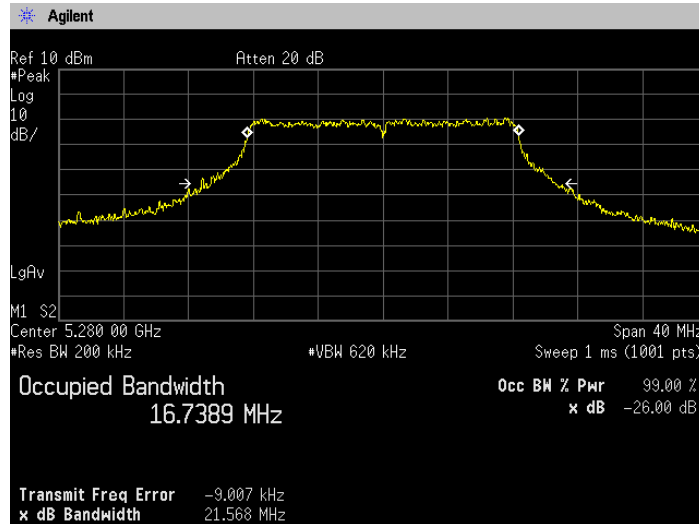
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(5.3GHz Band)

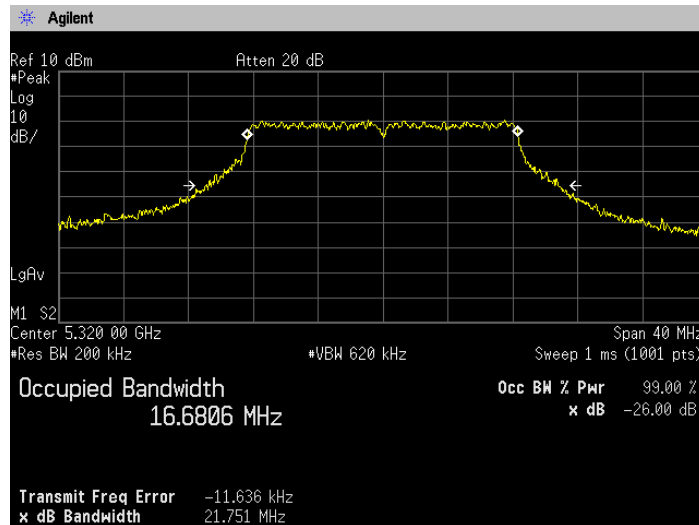
Channel: 52



Channel: 56



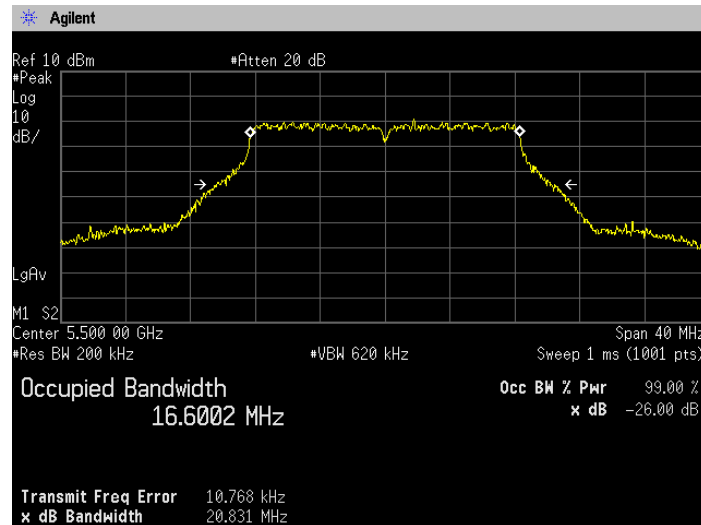
Channel: 64



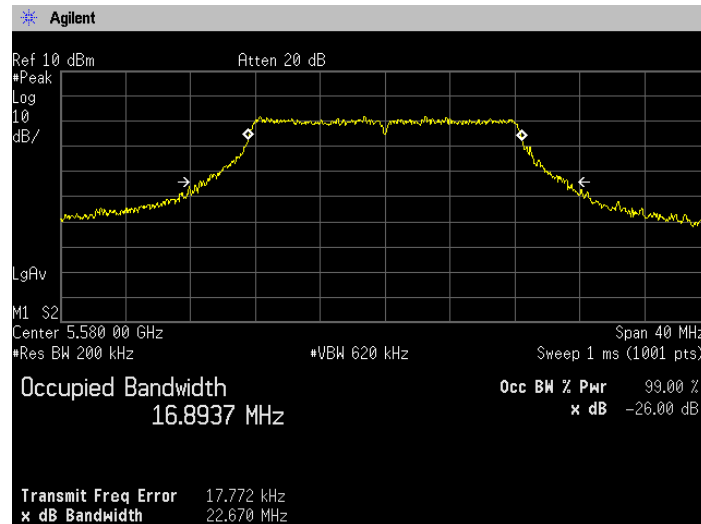


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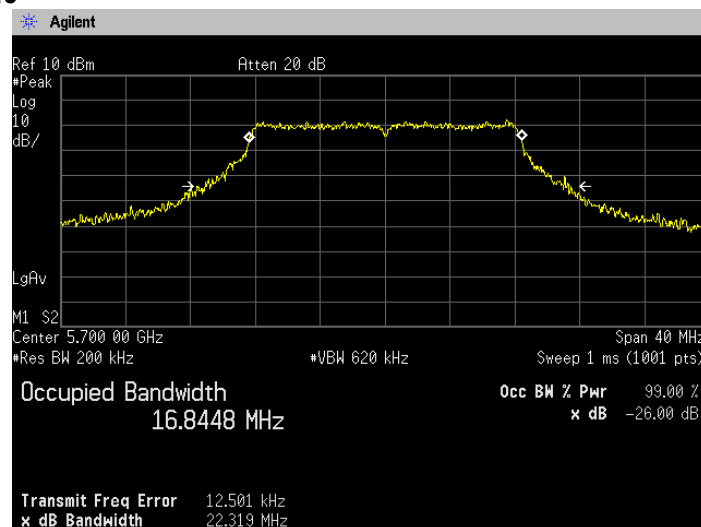
**(5.6GHz Band)  
Channel: 100**



**Channel: 116**



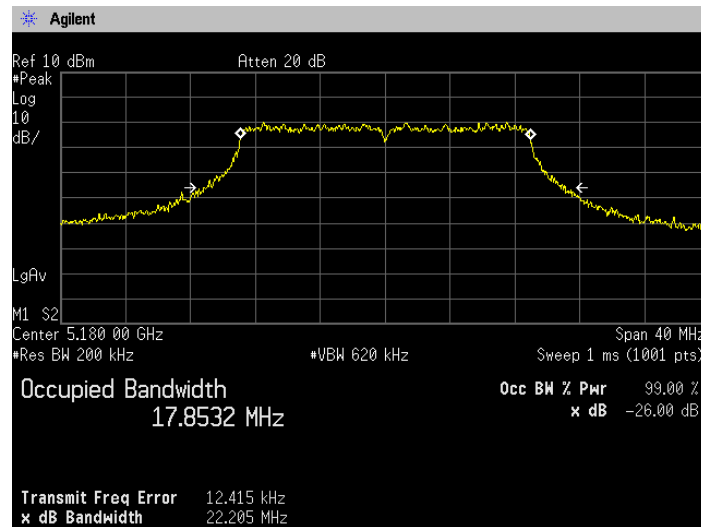
**Channel: 140**



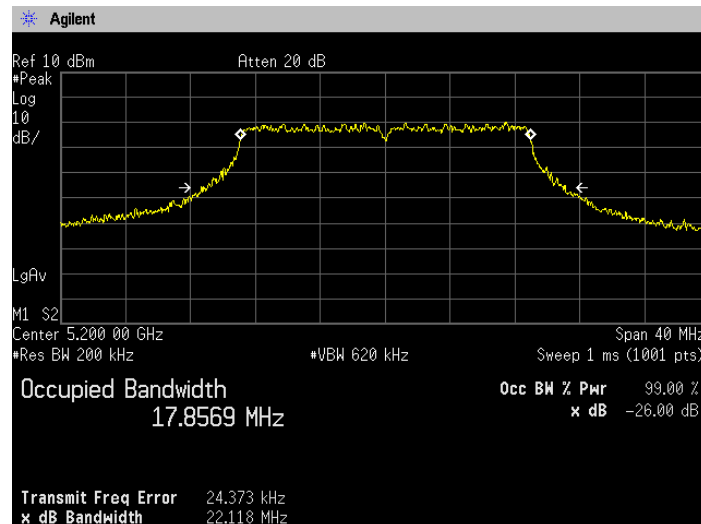


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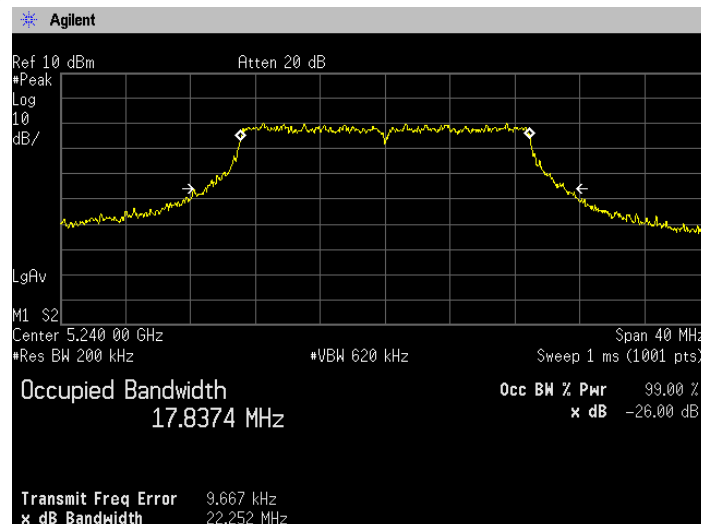
**[IEEE802.11n (HT20)]  
(5.2GHz Band)  
Channel: 36**



**Channel: 40**



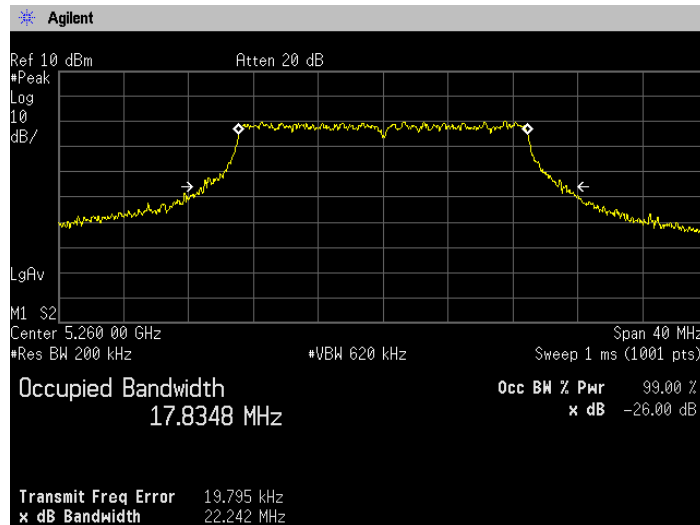
**Channel: 48**



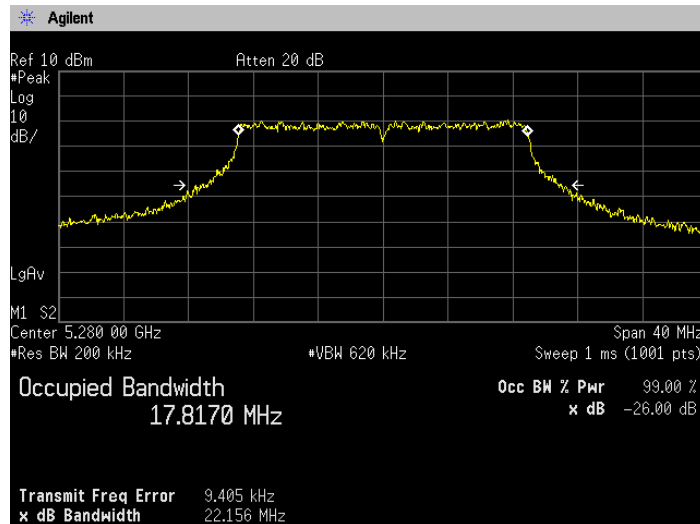


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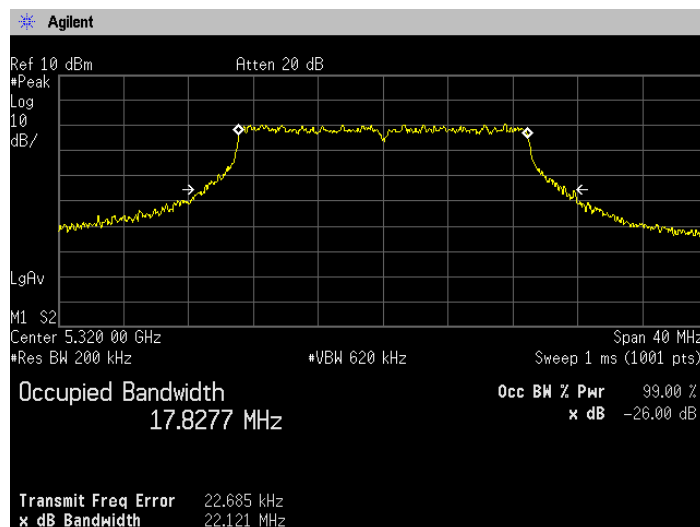
**(5.3GHz Band)  
Channel: 52**



**Channel: 56**



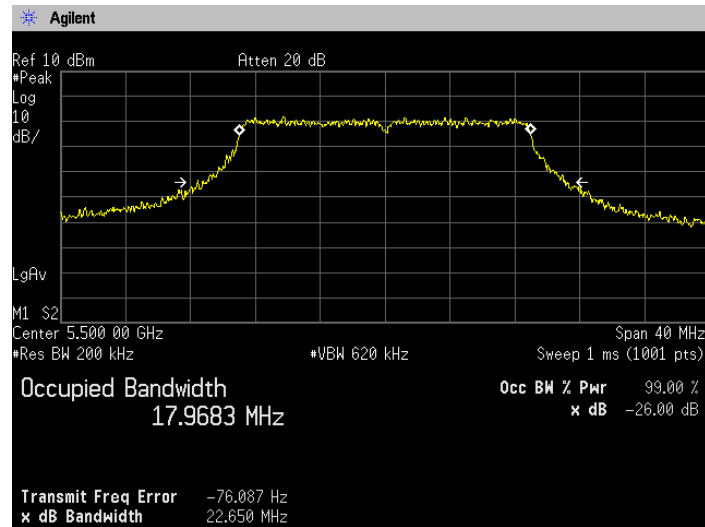
**Channel: 64**



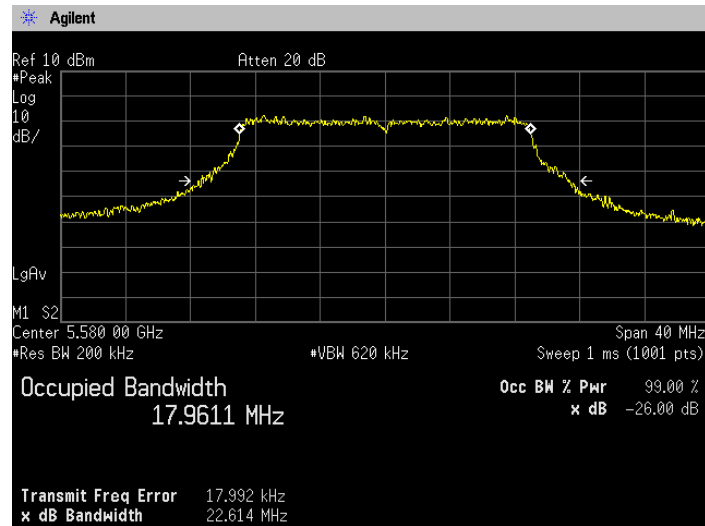


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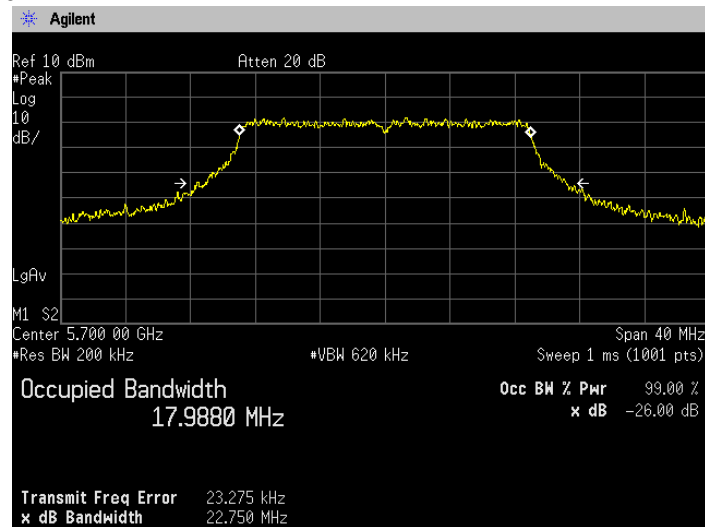
**(5.6GHz Band)**  
**Channel: 100**



**Channel: 116**



**Channel: 140**



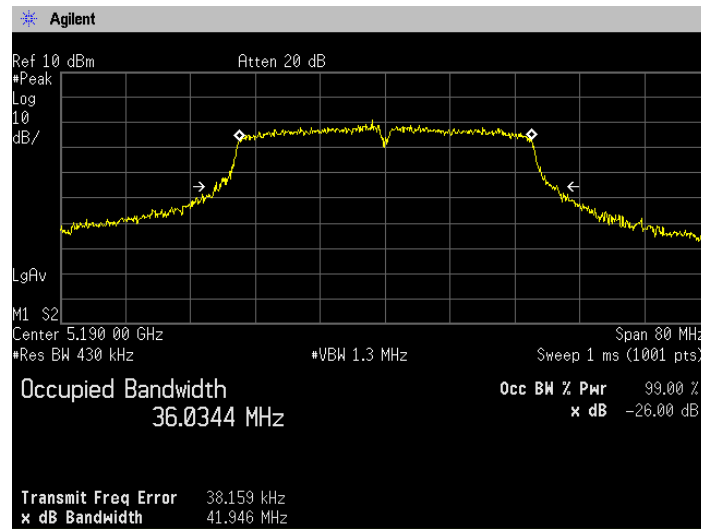




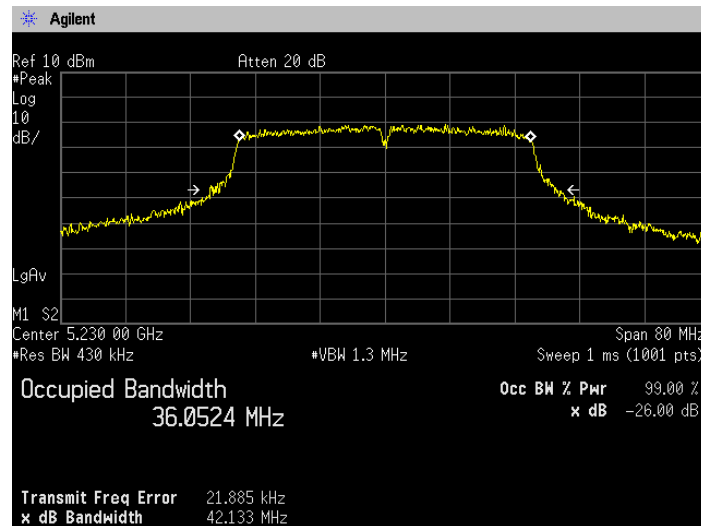
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[IEEE802.11n (HT40)]  
(5.2GHz Band)

Channel: 38



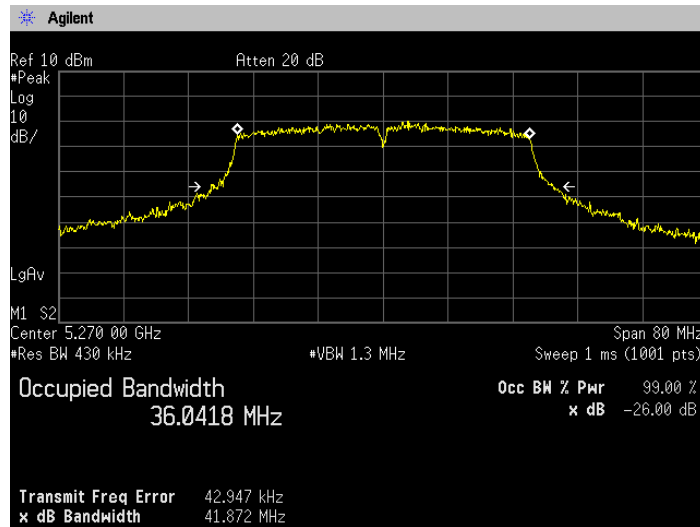
Channel: 46



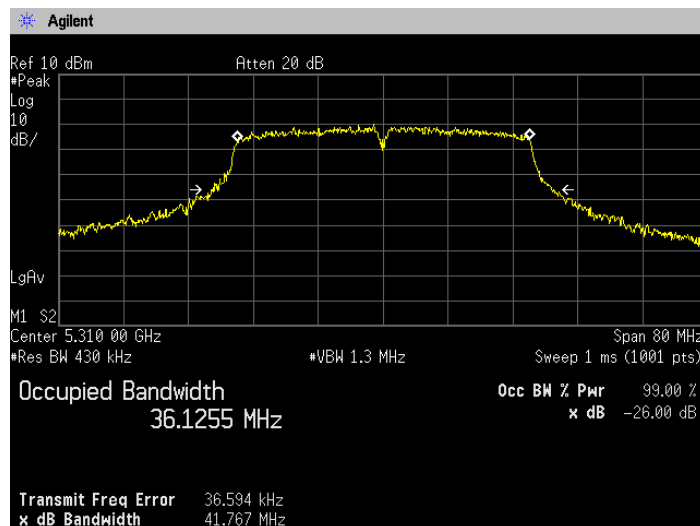


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**(5.3GHz Band)  
Channel: 54**



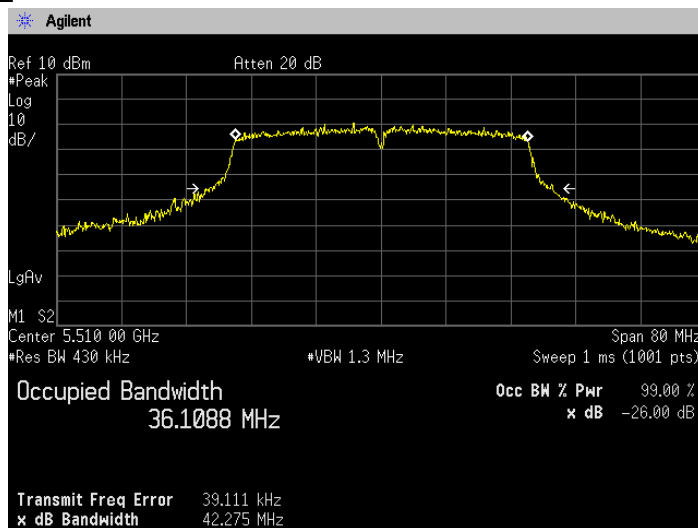
**Channel: 62**



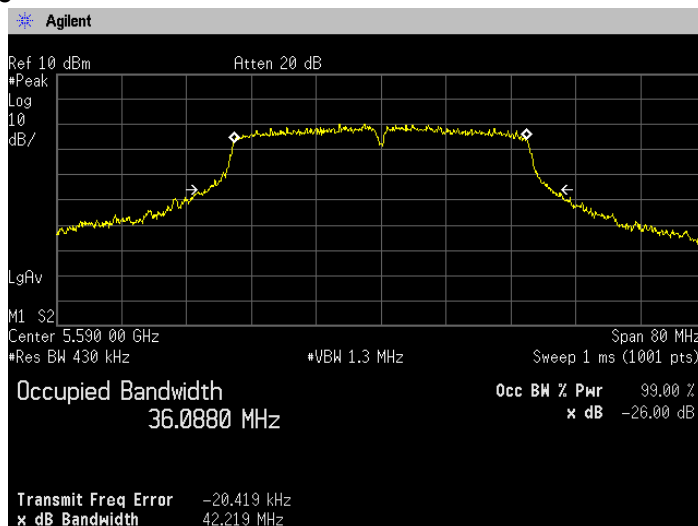


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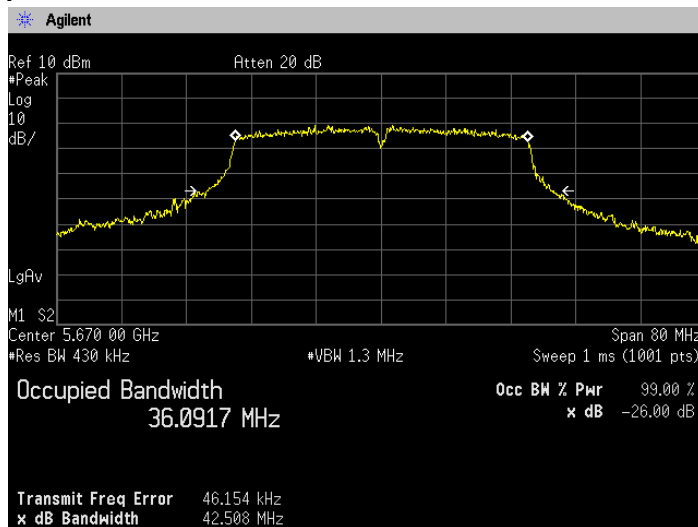
(5.6GHz Band)  
Channel: 102



Channel: 118



Channel: 134



## 5. Maximum Conducted Output Power

### 5.1 Measurement procedure [FCC 15.407(a), KDB789033]

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=8MHz, Span=25MHz/50MHz, Sweep=auto,  
Detector=RMS, Trace mode=Averaging

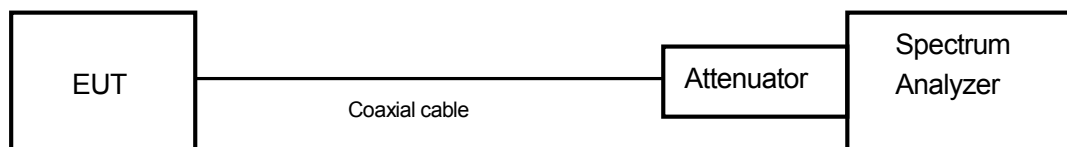
The EUT was set to operate with following conditions.

- 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 the band 5.15-5.25GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50mW or  $4\text{dBm} + 10\log B$ , where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.
- (2) For the band 5.25-5.35GHz, 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 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.
- (3) For the band 5.5-5.7GHz, 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 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

## &lt;Output Power Limit Calculation&gt;

Band	Mode	Power Limit (mW)	Calculated Limit (dBm)	Antenna Gain (dBi)	Determined Limit (dBm)
		Least 26dBc BW (MHz)			
5.2GHz Band	802.11a	50	16.98	0	16.98
		21.449	17.31		
	802.11n HT20	50	16.98		16.98
		21.449	17.31		
	802.11n HT40	50	16.98		16.98
		21.449	17.31		

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	23.97
		21.449	24.31		
	802.11n HT20	250	23.97		23.97
		21.449	24.31		
	802.11n HT40	250	23.97		23.97
		21.449	24.31		

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
		21.449	24.31		
	802.11n HT20	250	23.97		23.97
		21.651	24.35		
	802.11n HT40	250	23.97		23.97
		41.385	27.17		

### 5.3 Measurement result

Date : May 13, 2013  
 Temperature : 22.0 [°C]  
 Humidity : 46.0 [%]  
 Test place : Shielded room

Test personnel :

Tested by :

Chiaki Kanno

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	12.260	1.396	1.430	0.98	0.10	12.260
	40	5200	12.410					12.410
	48	5240	12.440					12.440
	52	5260	12.470	1.396	1.428	0.98	0.10	12.470
	56	5280	12.620					12.620
	64	5320	12.780					12.780
	100	5500	14.600	1.396	1.430	0.98	0.10	14.600
	116	5580	14.490					14.490
	140	5700	14.260					14.260

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	12.220	1.308	1.340	0.98	0.10	12.220
	40	5200	12.190					12.190
	48	5240	12.260					12.260
	52	5260	12.350	1.308	1.340	0.98	0.10	12.350
	56	5280	12.540					12.540
	64	5320	12.660					12.660
	100	5500	14.520	1.308	1.340	0.98	0.10	14.520
	116	5580	14.480					14.480
	140	5700	14.230					14.230

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

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



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Mode	Channel	Frequency (MHz)	Reading (dBm)	Duty Cycle			DCF (dB)	Test Result (dBm)
				On Time(ms)	On+Off Time(ms)	x		
802.11n (40MHz)	36	5180	11.100	0.647	0.683	0.95	0.24	11.340
	40	5200	11.150					11.390
	52	5260	11.170	0.647	0.683	0.95	0.24	11.410
	56	5280	11.420					11.660
	100	5500	11.300	0.648	0.684	0.95	0.23	11.530
	116	5580	11.230					11.460
	140	5700	10.960					11.190

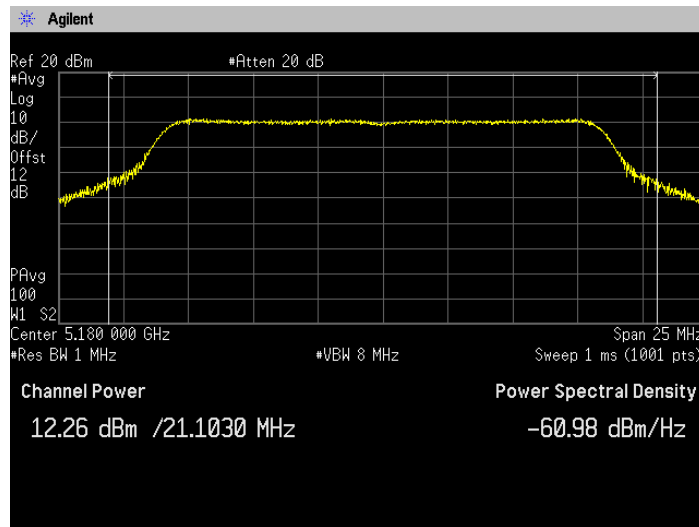
Note1:  $X = \text{On time} / (\text{On} + \text{Off time})$ ,  $\text{DCF} = 10 \log(1/x)$

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

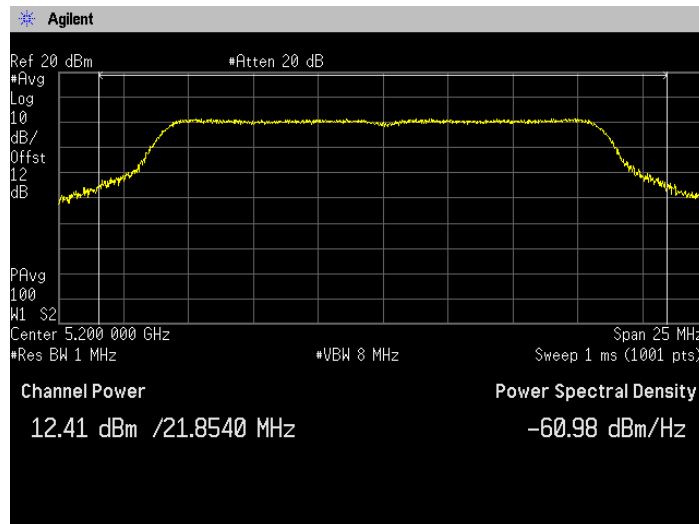


Zacta

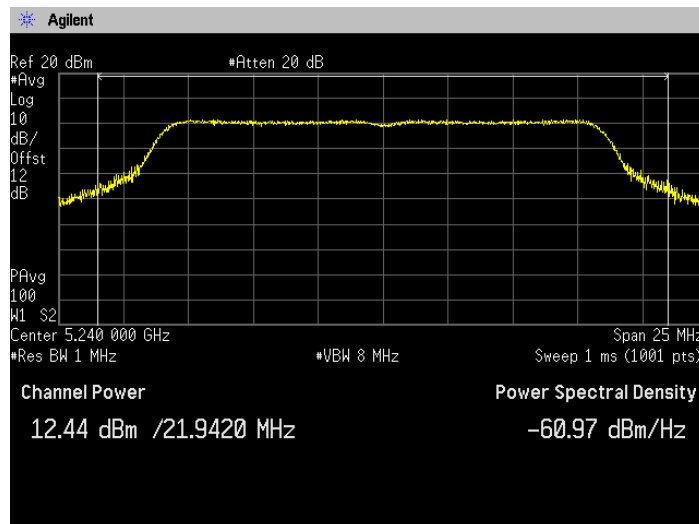
**5.4 Trace data**  
**[IEEE802.11a]**  
**(5.2GHz Band)**  
**Channel: 36**



**Channel: 40**



**Channel: 48**

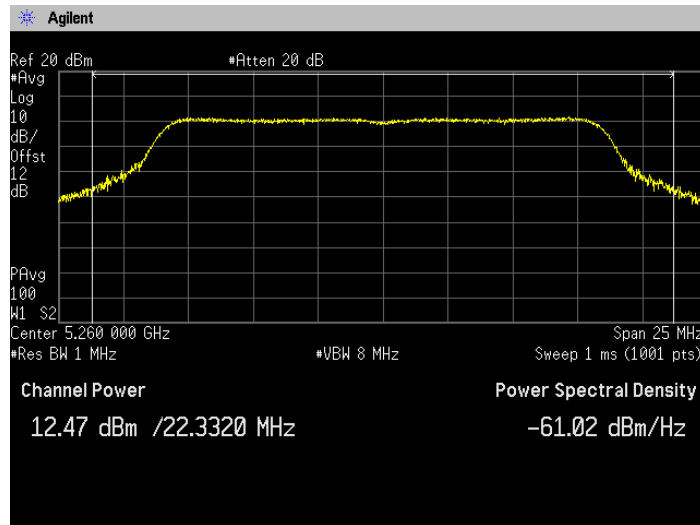




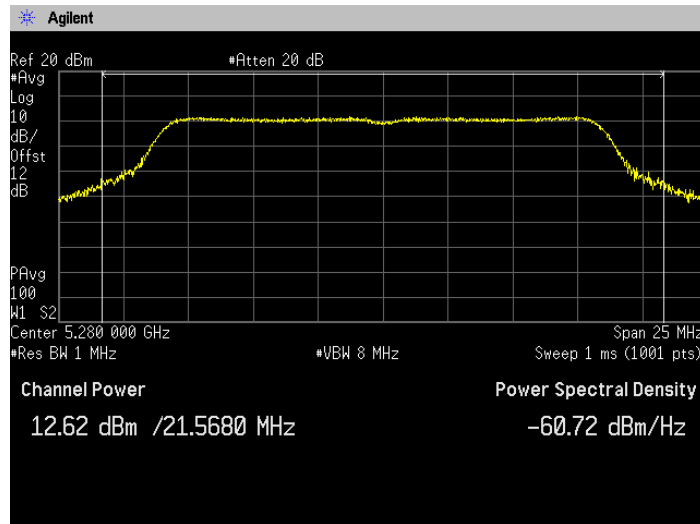


Zacta

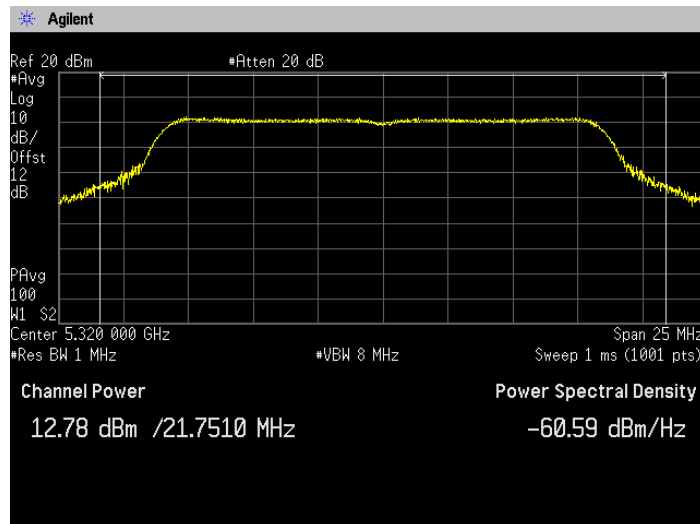
**(5.3GHz Band)  
Channel: 52**



**Channel: 56**



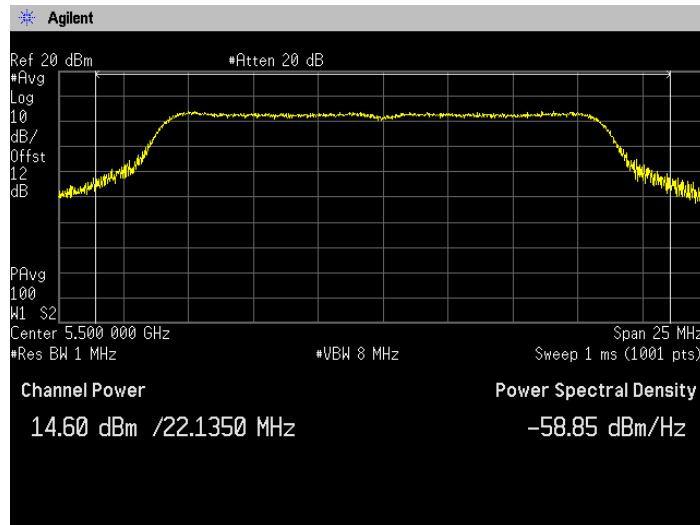
**Channel: 64**



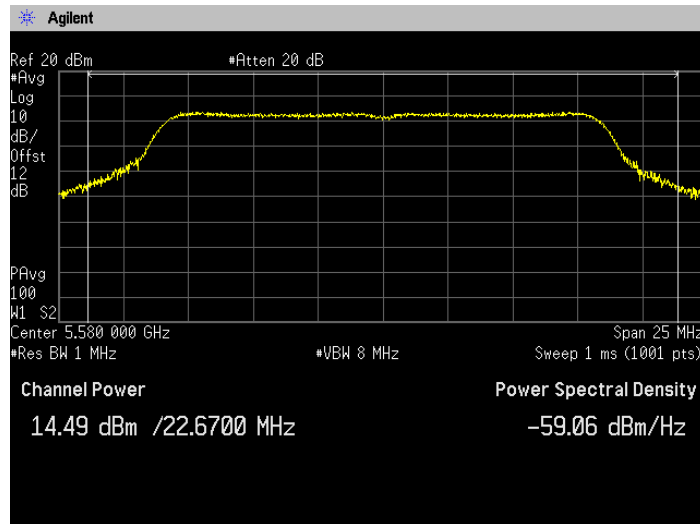


Zacta

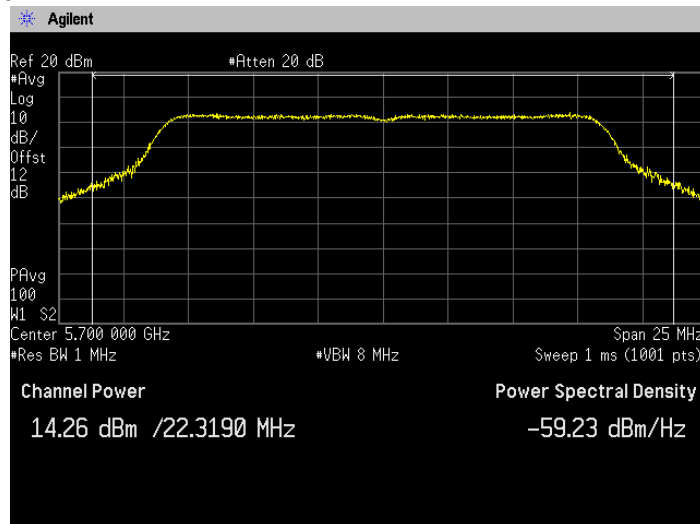
**(5.6GHz Band)**  
**Channel: 100**



**Channel: 116**



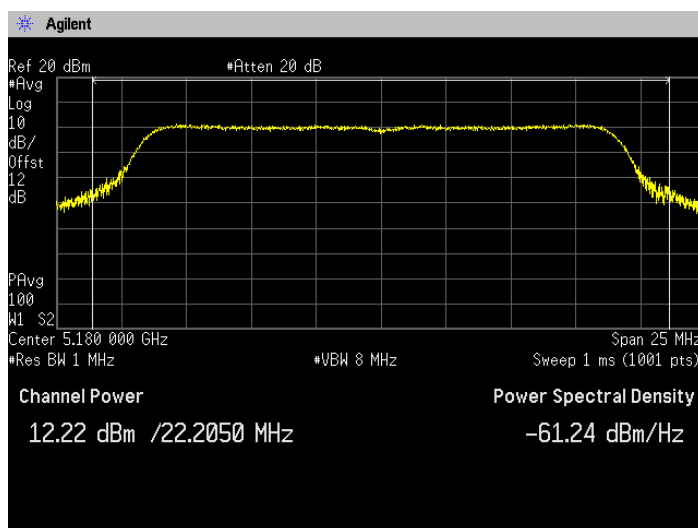
**Channel: 140**



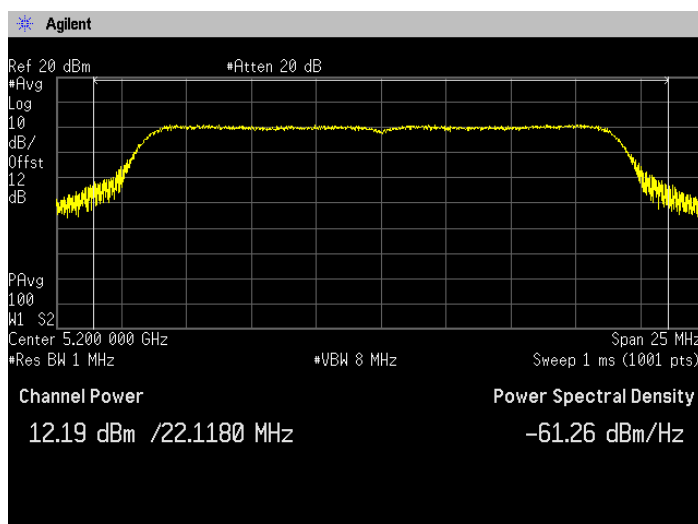


Zacta

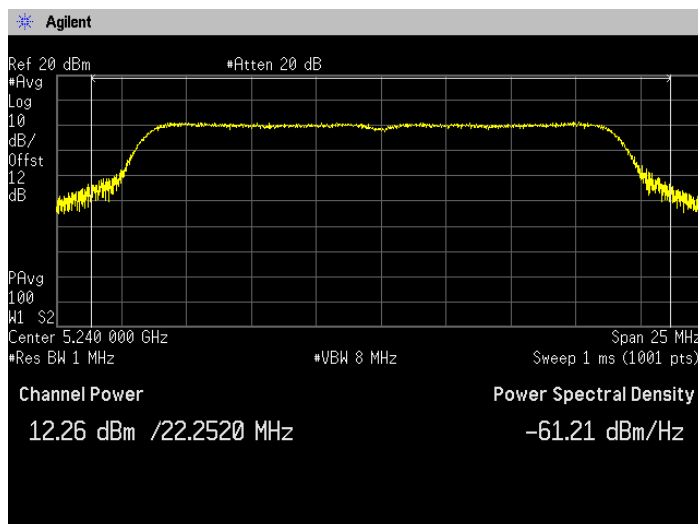
**[IEEE802.11 (HT20)]**  
**(5.2GHz Band)**  
**Channel: 36**



**Channel: 40**



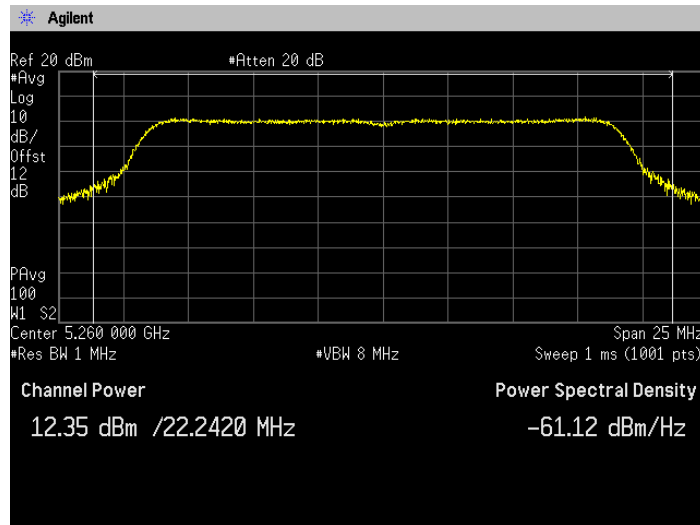
**Channel: 48**



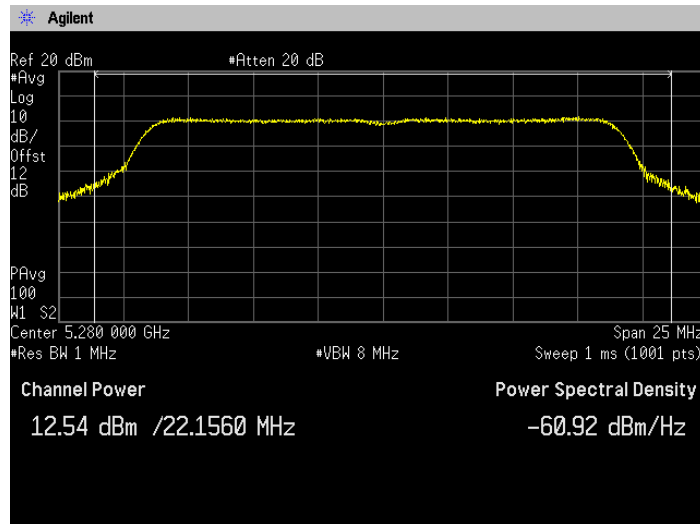


Zacta

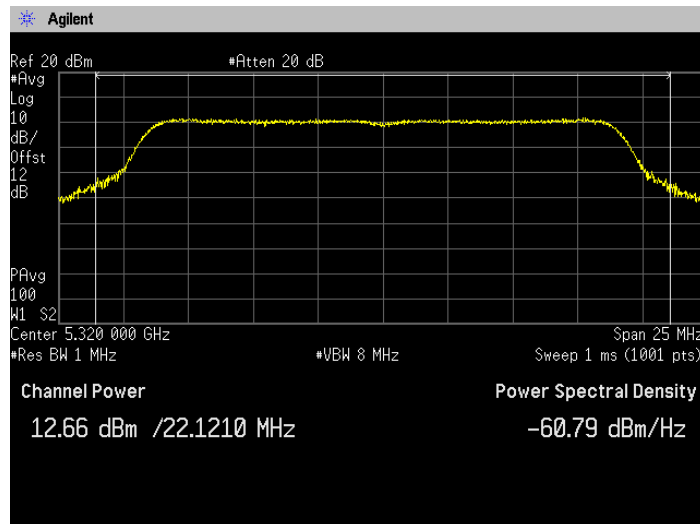
**(5.3GHz Band)**  
**Channel: 52**



**Channel: 56**



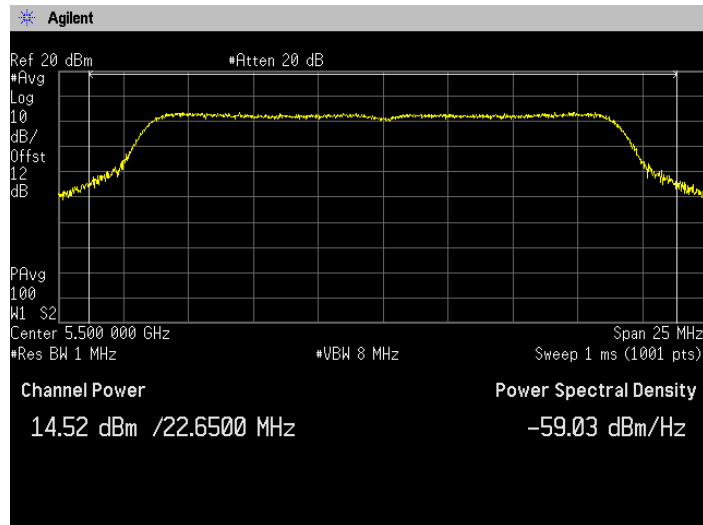
**Channel: 64**



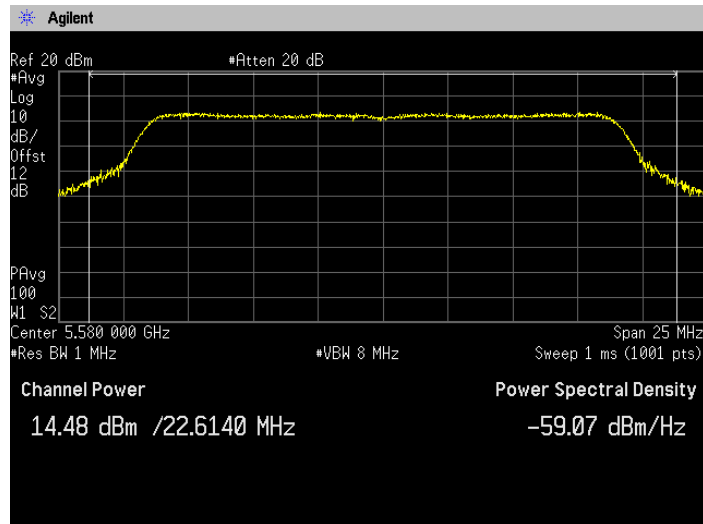


Zacta

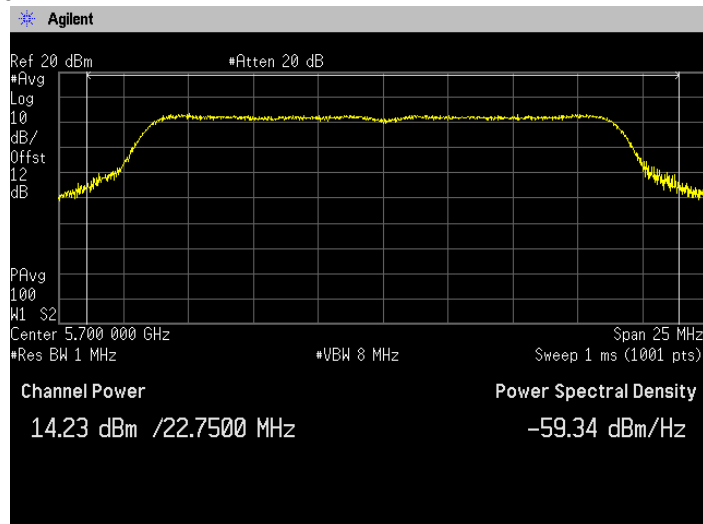
**(5.6GHz Band)**  
**Channel: 100**



**Channel: 116**



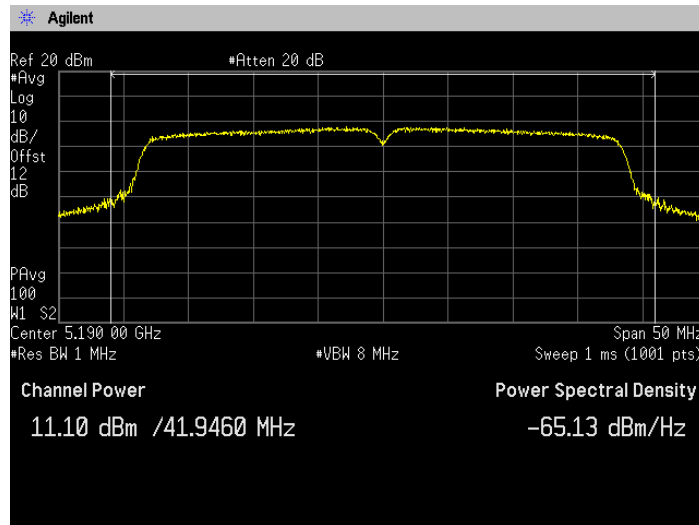
**Channel: 140**



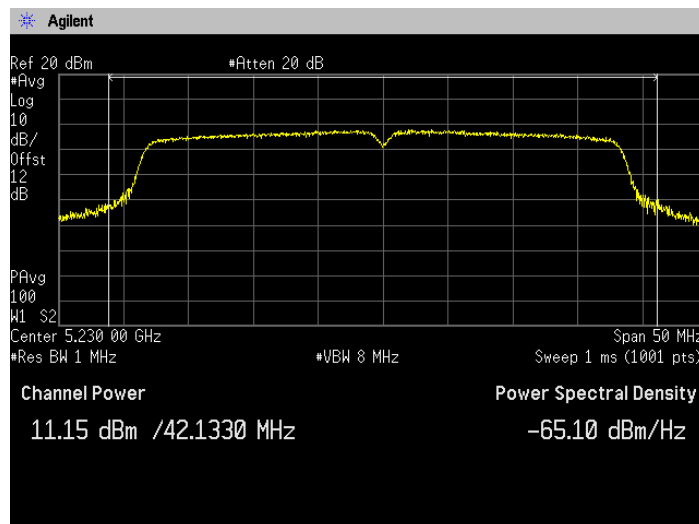


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**[IEEE802.11n (HT40)]**  
**(5.2GHz Band)**  
**Channel: 36**



**Channel: 40**

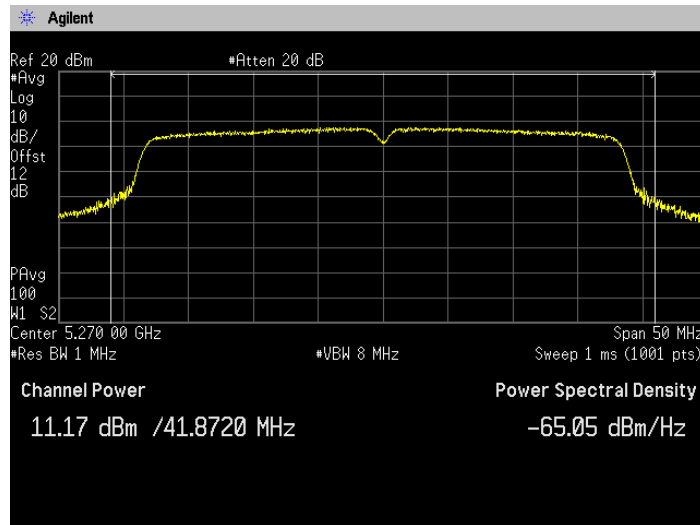




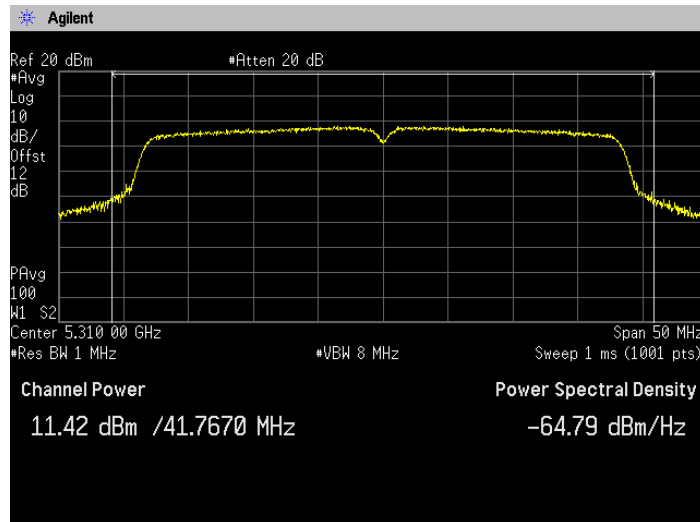
Zacta

(5.3GHz Band)

Channel: 54



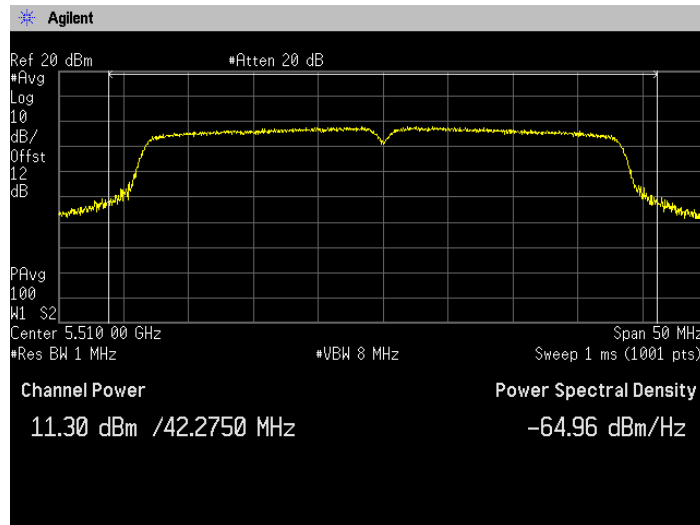
Channel: 62



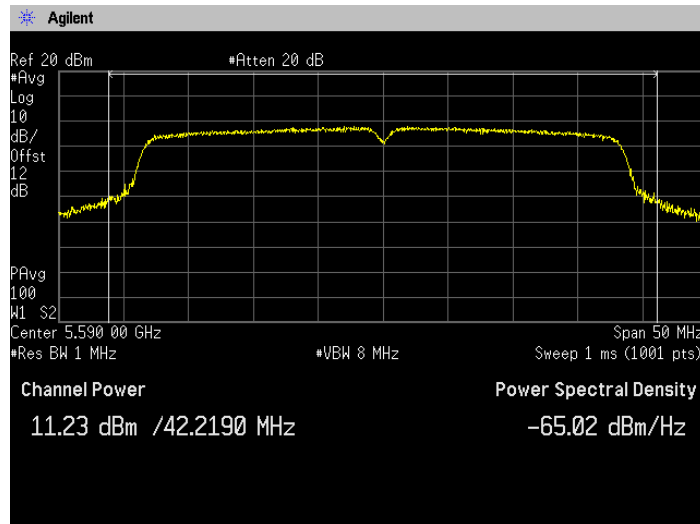


Zacta

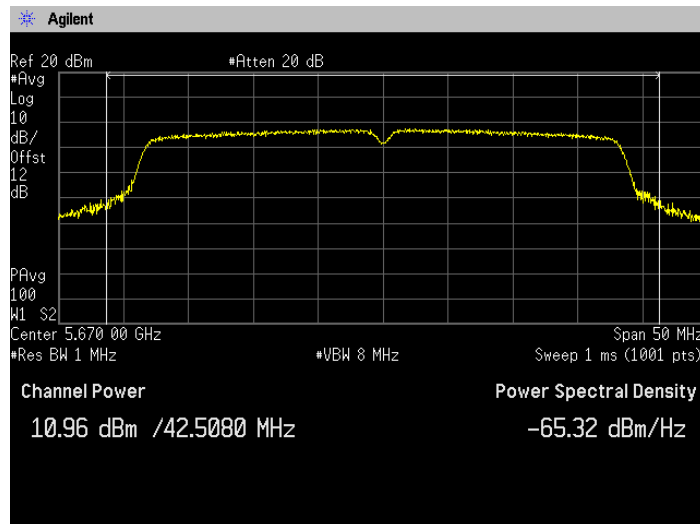
**(5.6GHz Band)**  
**Channel: 102**



**Channel: 118**



**Channel: 134**





## 6. Peak Power Spectral Density

### 6.1 Measurement procedure

[FCC 15.407(a), KDB789033]

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=8MHz, Span=25MHz/50MHz, Sweep=Auto, Detector=RMS, Trace mode=Averaging

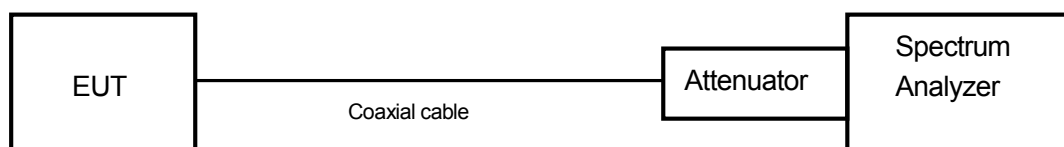
The EUT was set to operate with following conditions.

- 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 the band 5.15-5.25GHz, the peak power spectral density shall not exceed 4dBm in any 1-MHz band. If transmitting antenna 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 band 5.25-5.35GHz, the peak power spectral density shall not exceed 11dBm in any 1-MHz band. If transmitting antenna 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 band 5.5-5.7GHz, the peak power spectral density shall not exceed 11dBm in any 1-MHz band. If transmitting antenna 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.

#### <Peak Power Spectral Density Limit Calculation>

Band	Limit (dBm)	Antenna Gain (dBi)	Determined Limit (dBm)
5.2GHz Band	4	0	4
5.3GHz Band	11	0	11
5.6GHz Band	11	0	11

### 6.3 Measurement result

Date : May 13, 2013  
 Temperature : 22.0 [°C]  
 Humidity : 46.0 [%]  
 Test place : Shielded room

Test personnel :

Tested by :

Chiaki Kanno

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	1.636	1.396	1.430	0.98	0.10	1.636
	40	5200	2.032					2.032
	48	5240	1.940					1.940
	52	5260	1.771	1.396	1.428	0.98	0.10	1.771
	56	5280	2.247					2.247
	64	5320	2.135					2.135
	100	5500	3.800	1.396	1.430	0.98	0.10	3.800
	116	5580	4.008					4.008
	140	5700	3.547					3.547

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	1.559	1.308	1.340	0.98	0.10	1.559
	40	5200	1.647					1.647
	48	5240	1.519					1.519
	52	5260	1.591	1.308	1.340	0.98	0.10	1.591
	56	5280	2.028					2.028
	64	5320	1.989					1.989
	100	5500	3.694	1.308	1.340	0.98	0.10	3.694
	116	5580	3.748					3.748
	140	5700	3.368					3.368

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

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



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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	-2.313	0.647	0.683	0.95	0.24	-2.073
	46	5230	-2.261					-2.021
	54	5270	-1.633	0.647	0.683	0.95	0.24	-1.393
	62	5310	-1.940					-1.700
	102	5510	-1.772	0.648	0.684	0.95	0.23	-1.542
	110	5550	-2.032					-1.802
	134	5670	-2.325					-2.095

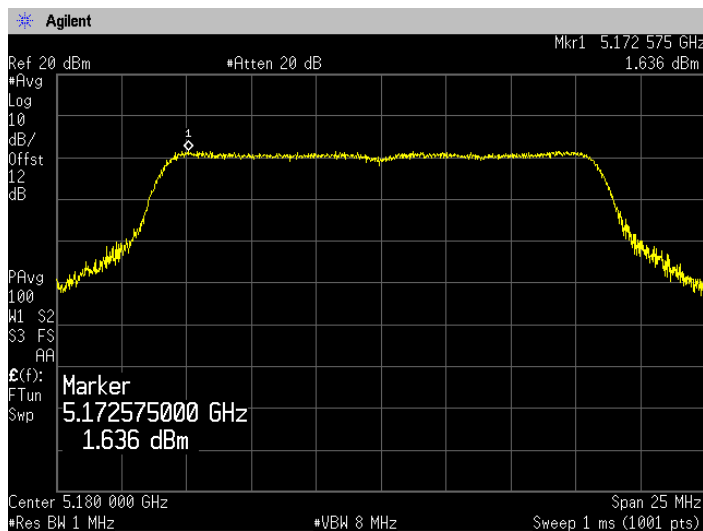
Note1: X = On time / (On + Off time), DCF=10log (1/x)

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

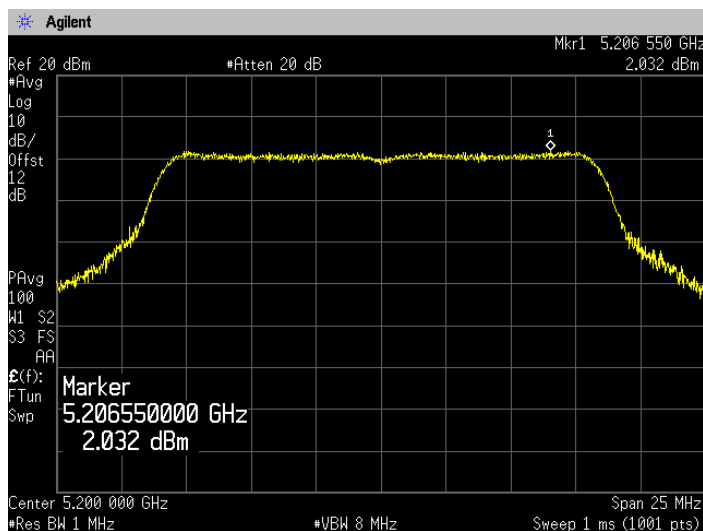


Zacta

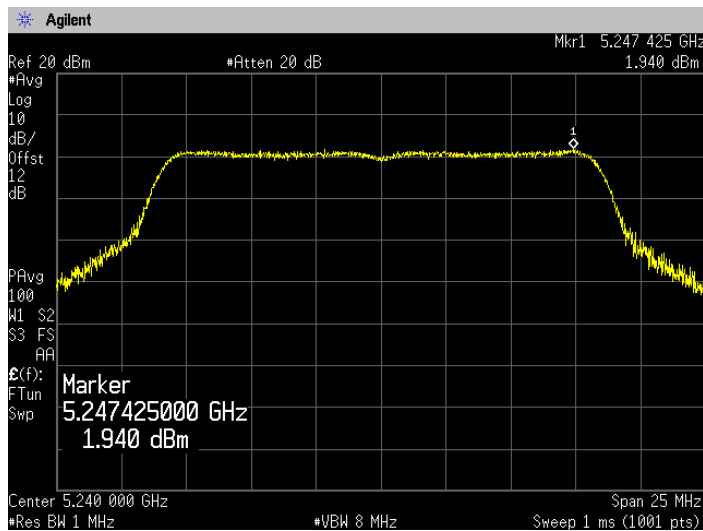
**6.4 Trace data**  
**[IEEE802.11a]**  
**(5.2GHz Band)**  
**Channel: 36**



**Channel: 40**



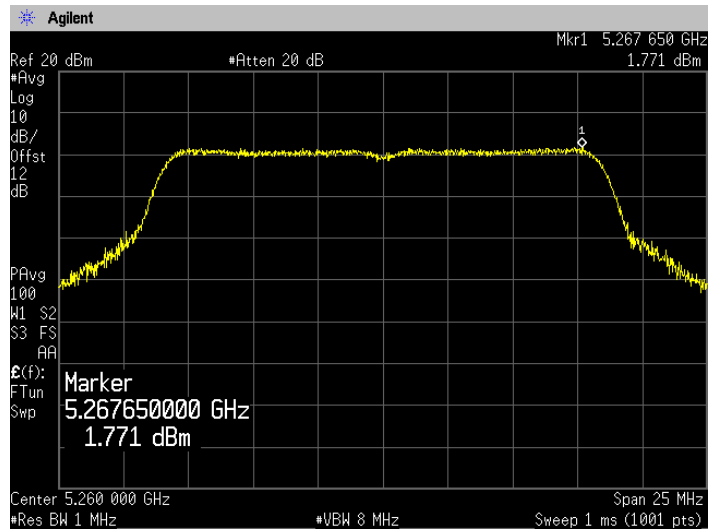
**Channel: 48**



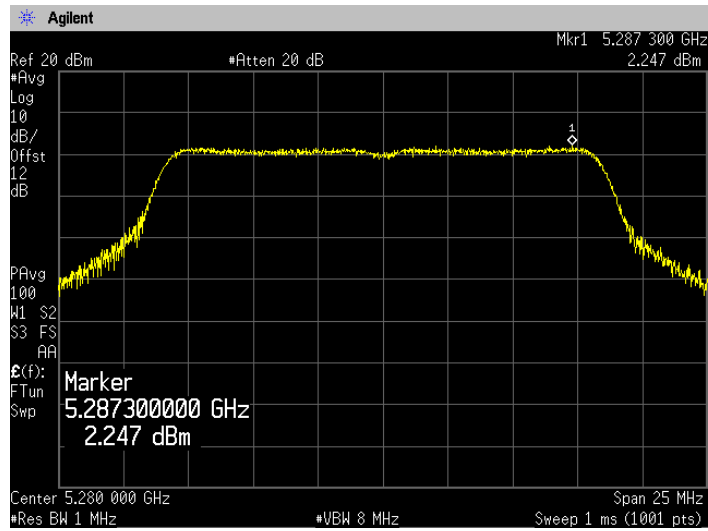


Zacta

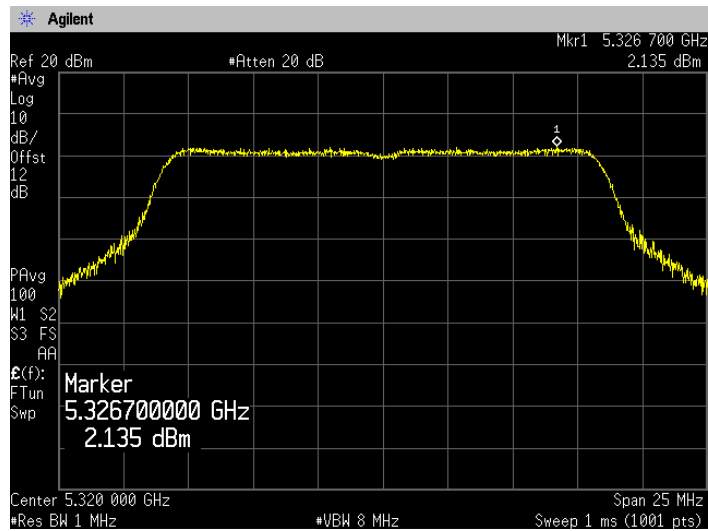
(5.3GHz Band)  
Channel: 52



Channel: 56



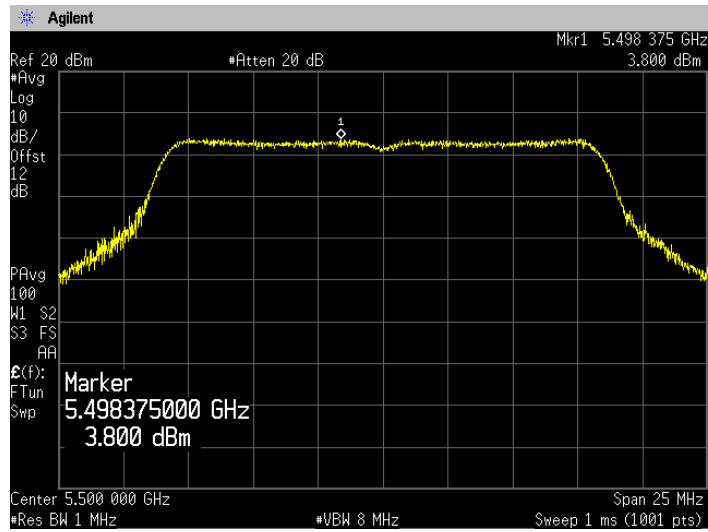
Channel: 64



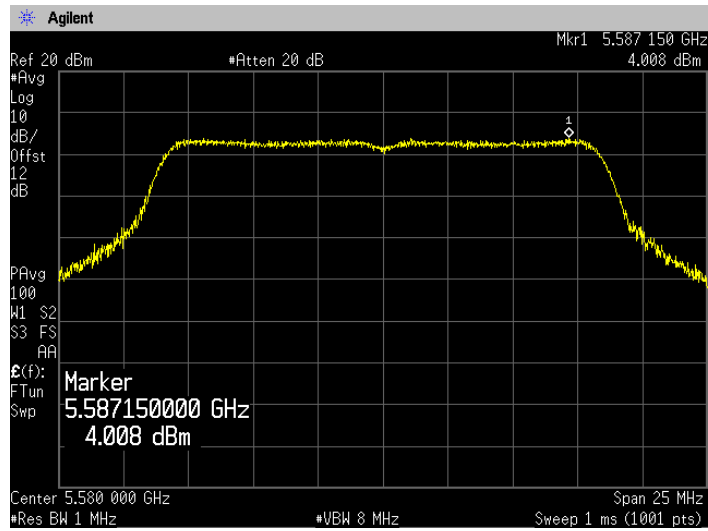


Zacta

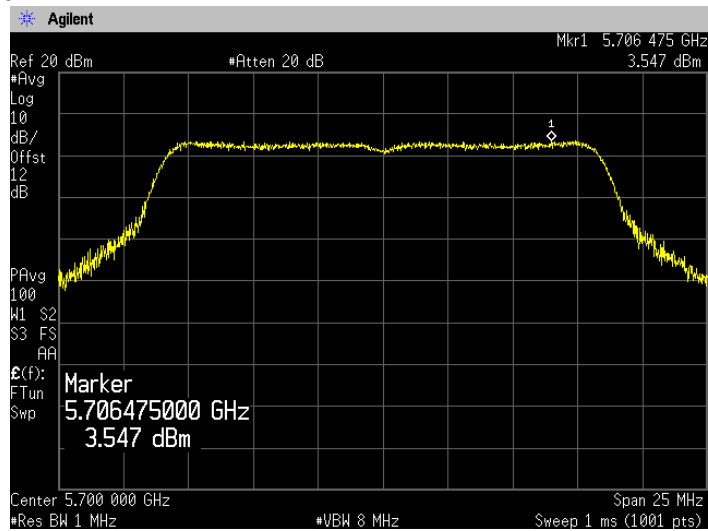
**(5.6GHz Band)**  
**Channel: 100**



**Channel: 116**



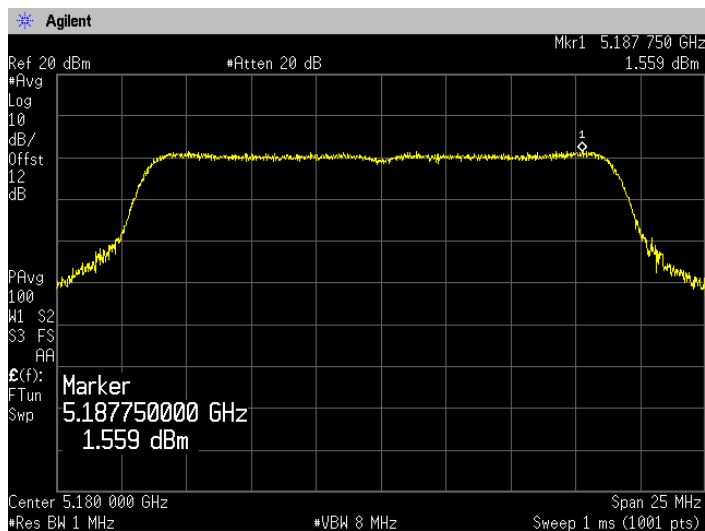
**Channel: 140**



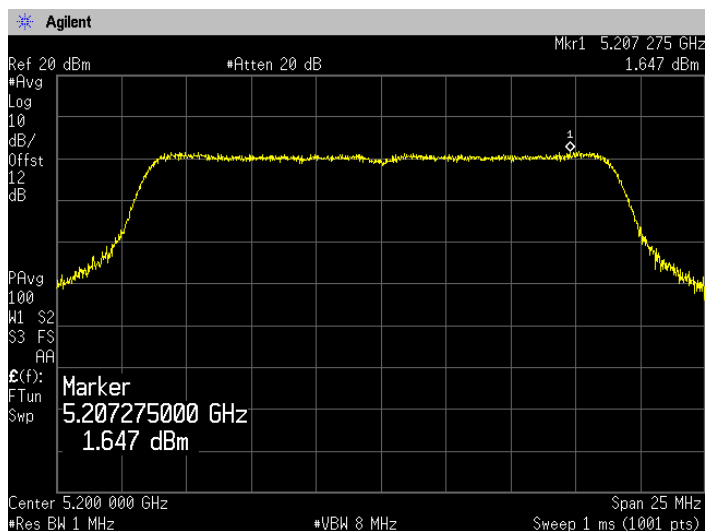


Zacta

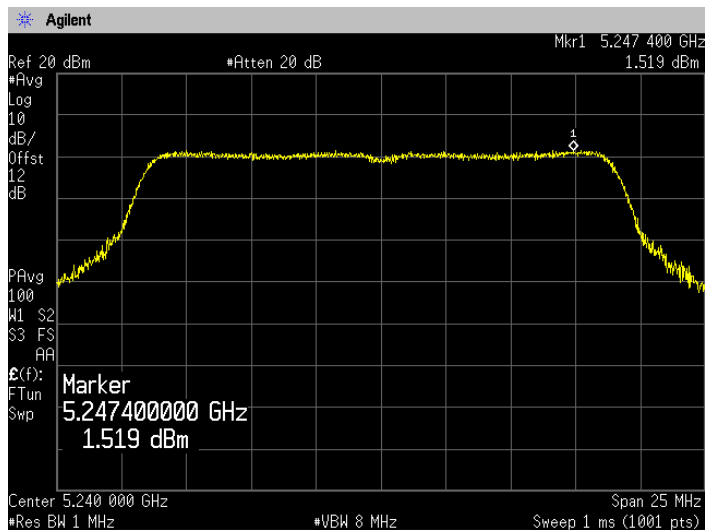
**[IEEE802.11 (HT20)]  
(5.2GHz Band)  
Channel: 36**



**Channel: 40**



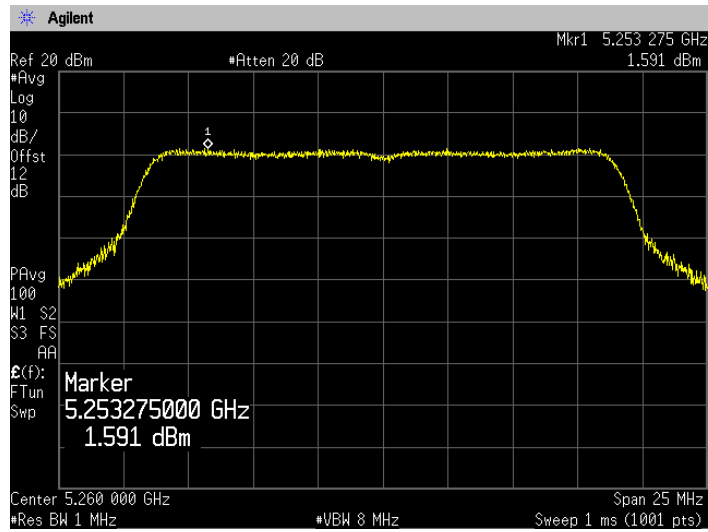
**Channel: 48**



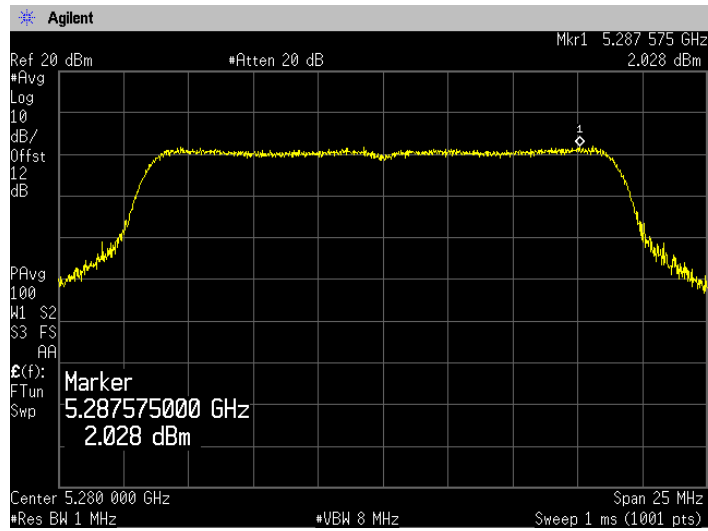


Zacta

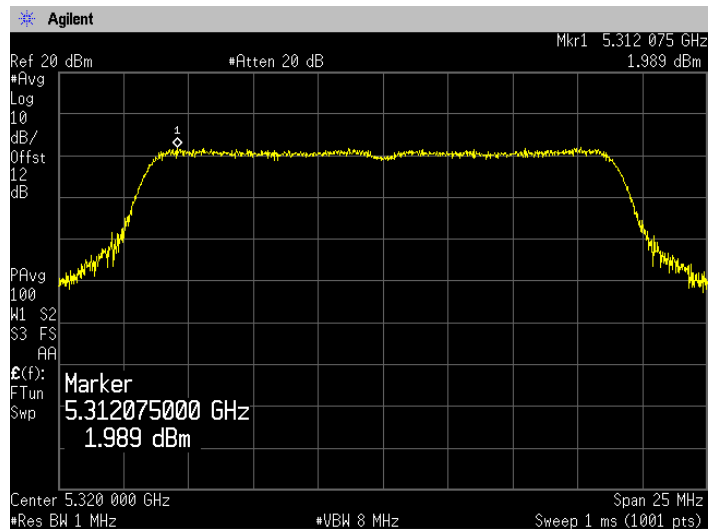
(5.3GHz Band)  
Channel: 52



Channel: 56



Channel: 64

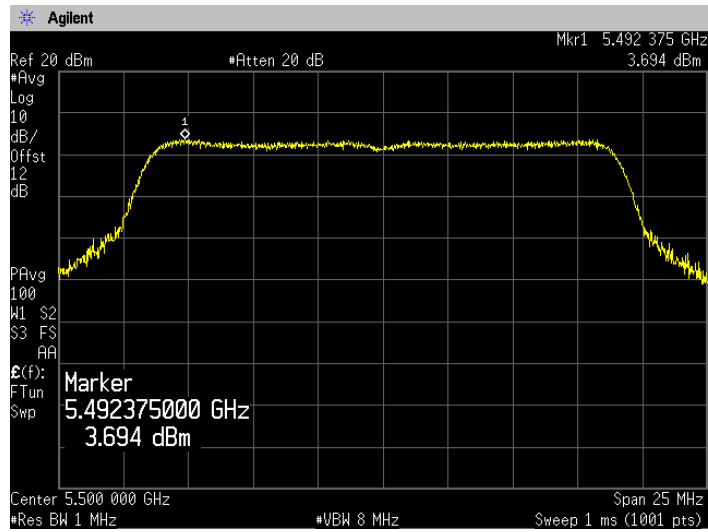




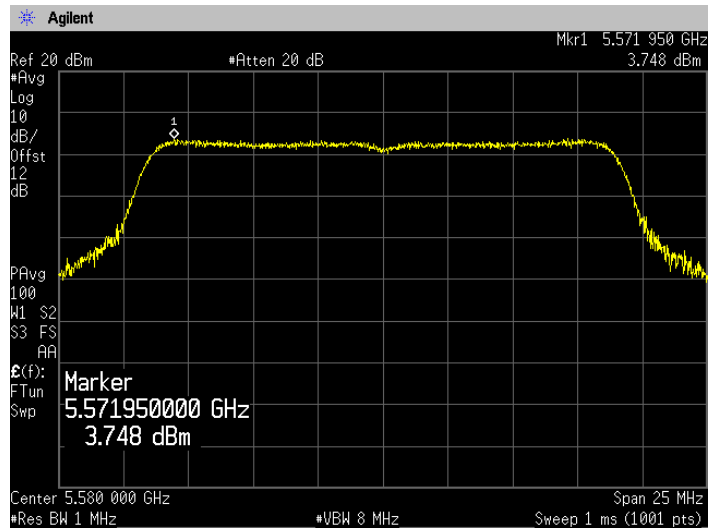


Zacta

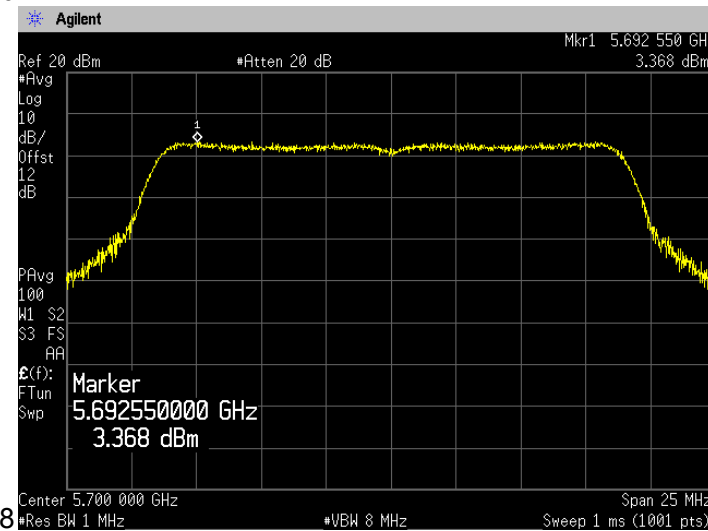
(5.6GHz Band)  
Channel: 100



Channel: 116



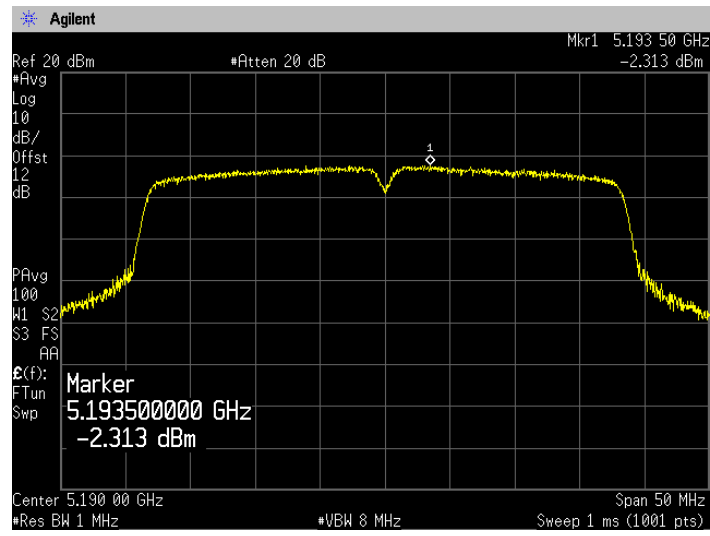
Channel: 140



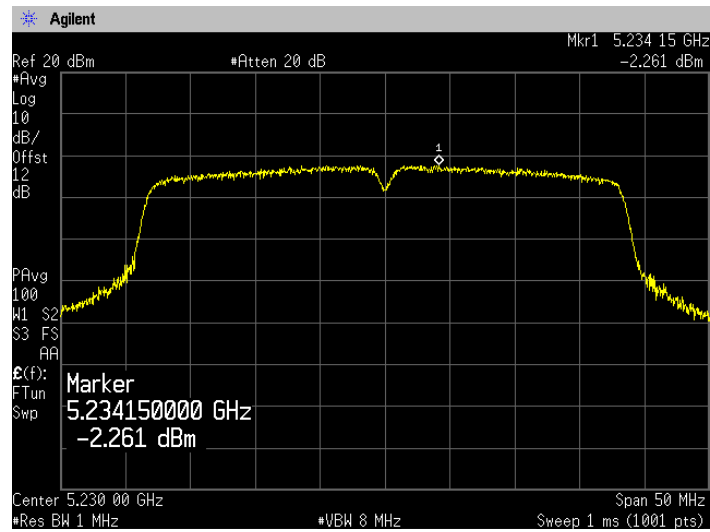


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**[IEEE802.11 (HT40)]**  
**(5.2GHz Band)**  
**Channel: 38**



**Channel: 46**

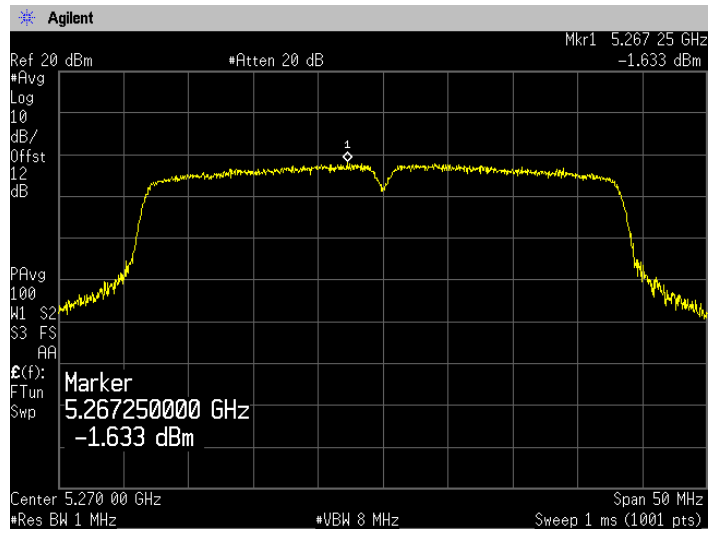




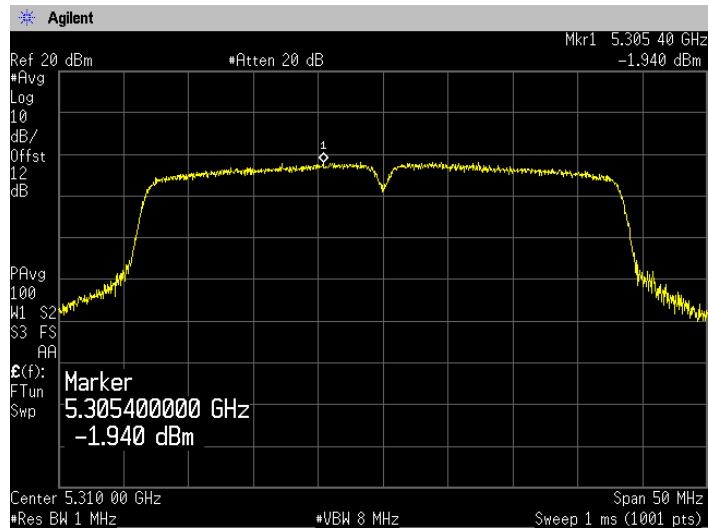
Zacta

(5.3GHz Band)

Channel: 54



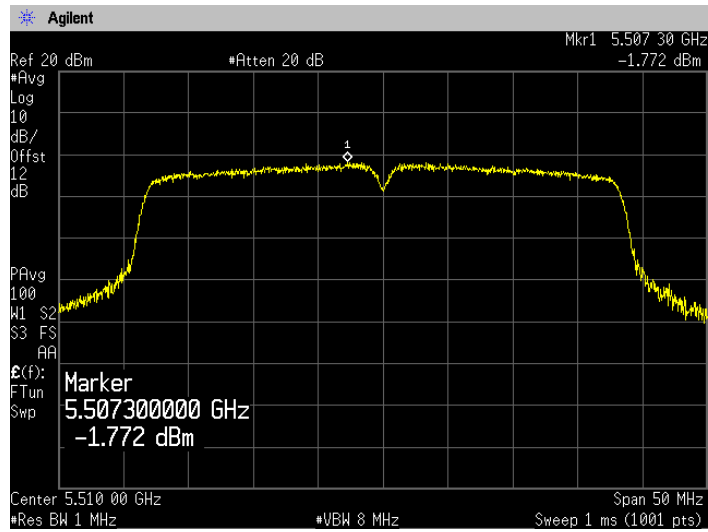
Channel: 62



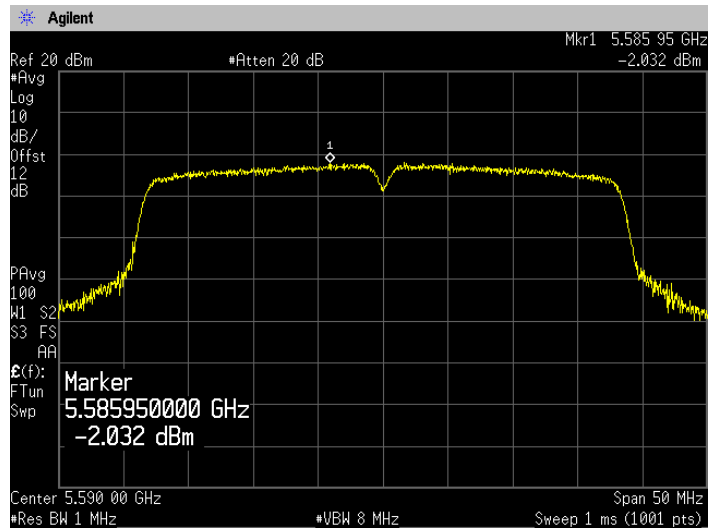


Zacta

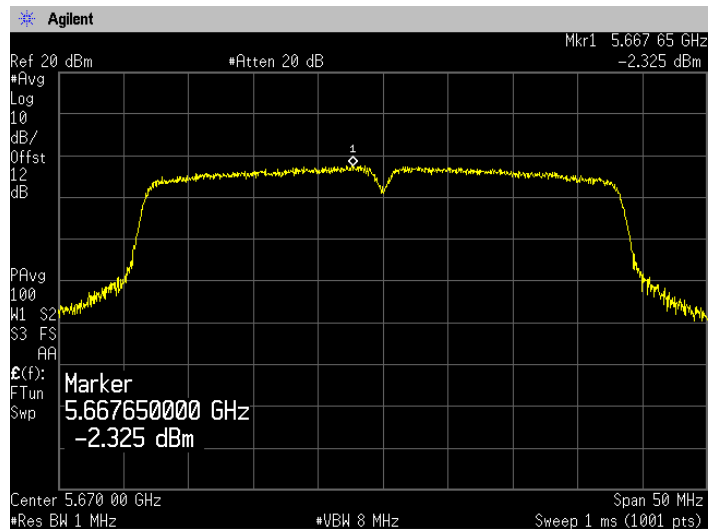
(5.6GHz Band)  
Channel: 102



Channel: 118



Channel: 134



## 7. Peak Excursion

### 7.1 Measurement procedure [FCC 15.407(a), KDB789033]

The peak excursion are 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=8MHz, Span=25MHz/50MHz, Sweep=auto, Detector=Peak/RMS, Trace mode=Max hold

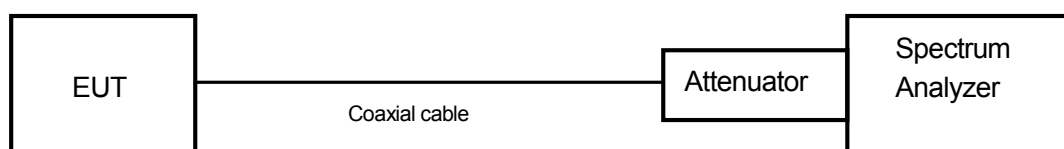
The EUT was set to operate with following conditions.

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

The test mode of EUT is as follows.

- Tx mode

- Test configuration



### 7.2 Limit

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13dB across any 1MHz bandwidth or the emission bandwidth whichever is less

### 7.3 Measurement result

Date : May 13, 2013  
 Temperature : 22.0 [°C]  
 Humidity : 46.0 [%]  
 Test place : Shielded room

Test personnel :

Tested by :

Chiaki Kanno

Mode	Bnad	Channel	Frequency (MHz)	Test Result (dB/MHz)	Limit (dB/MHz)
802.11a	5.2GHz Band	36	5180	10.558	13
		40	5200	8.106	
		48	5240	8.754	
	5.3GHz Band	52	5260	8.252	
		56	5280	8.121	
		64	5300	9.270	
	5.6GHz Band	100	5500	7.264	
		116	5580	7.604	
		140	5700	7.334	



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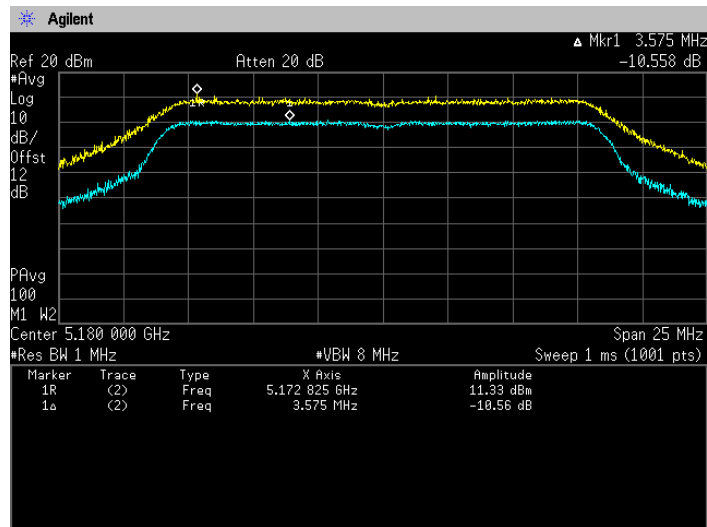
Mode	Bnad	Channel	Frequency (MHz)	Test Result (dB/MHz)	Limit (dB/MHz)
802.11n (20MHz)	5.2GHz Band	36	5180	8.559	13
		40	5200	7.971	
		48	5240	7.278	
	5.3GHz Band	52	5260	7.938	
		56	5280	8.619	
		64	5320	9.045	
	5.6GHz Band	100	5500	8.486	
		116	5580	7.828	
		140	5700	7.856	

Mode	Bnad	Channel	Frequency (MHz)	Test Result (dB/MHz)	Limit (dB/MHz)
802.11n (40MHz)	5.2GHz band	38	5190	8.852	13
		46	5230	8.483	
	5.3GHz Band	54	5270	8.734	
		62	5310	9.919	
	5.6GHz Band	102	5510	8.224	
		118	5590	9.094	
		134	5670	8.902	

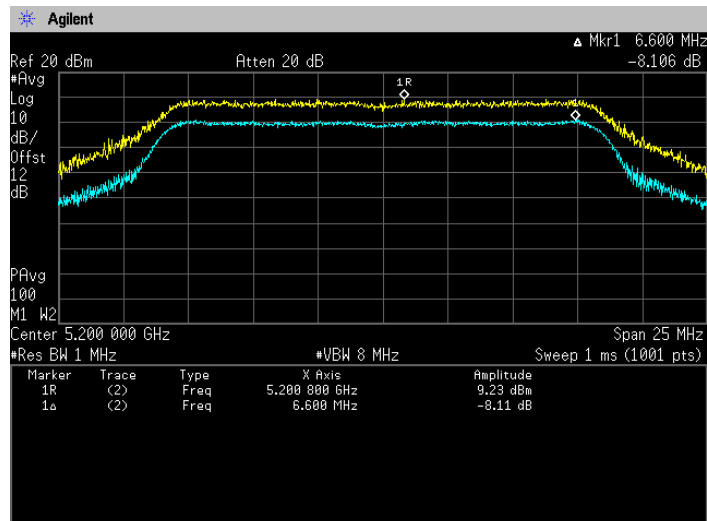


Zacta

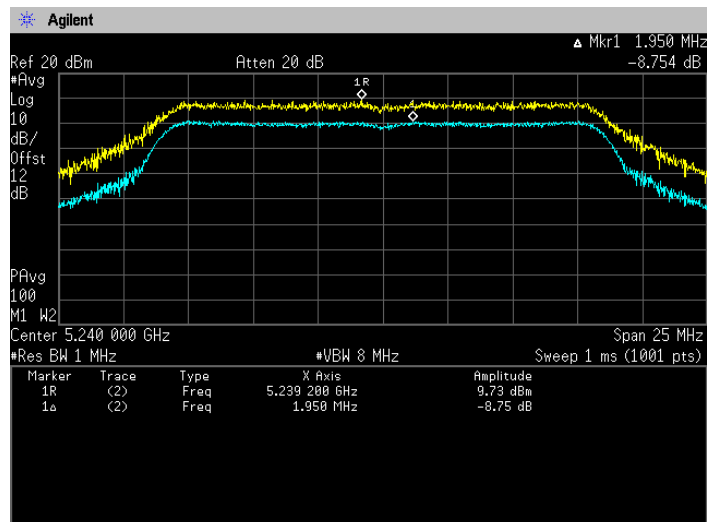
**7.4 Trace data**  
**[IEEE802.11a]**  
**(5.2GHz Band)**  
**Channel: 36**



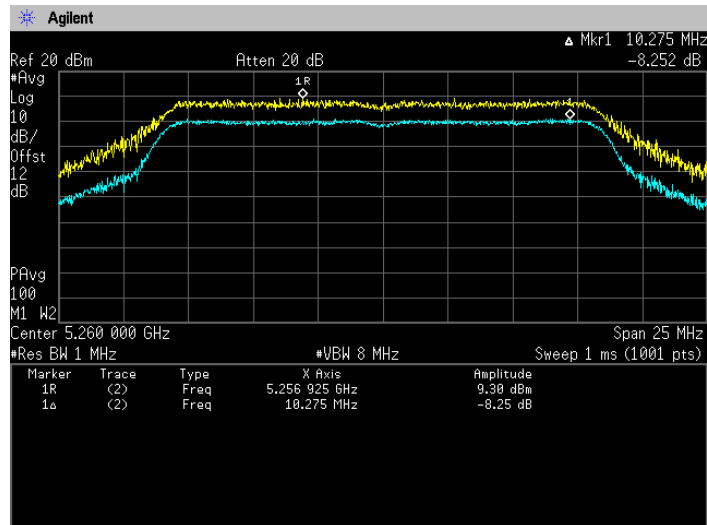
**Channel: 40**



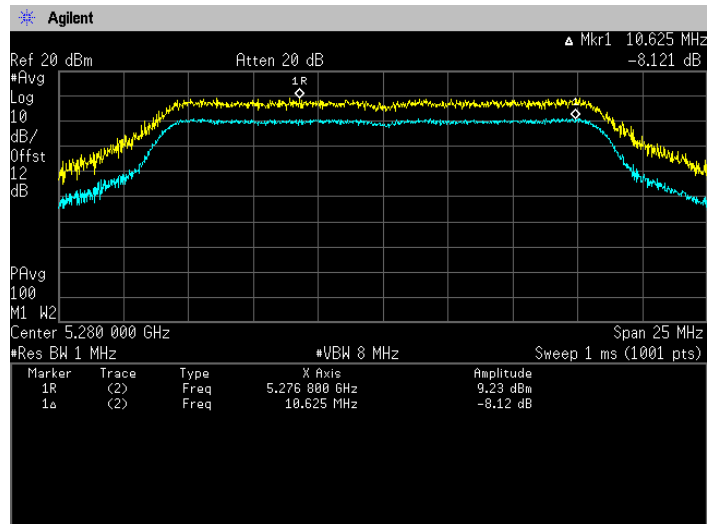
**Channel: 48**



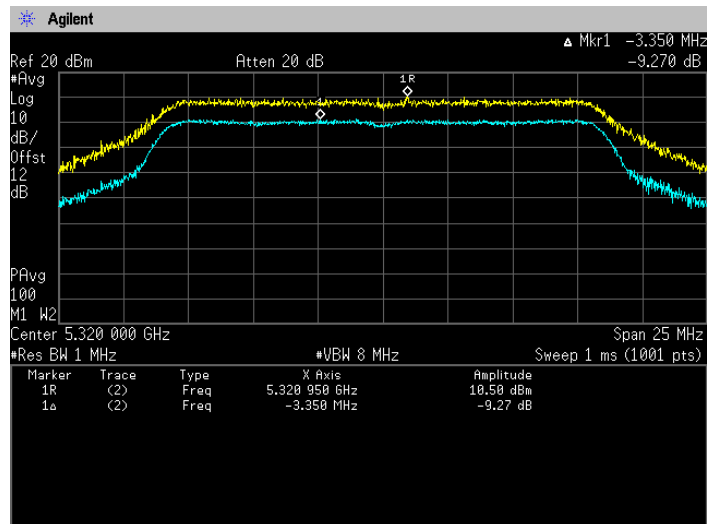
(5.3GHz Band)  
Channel: 52



Channel: 56



Channel: 64

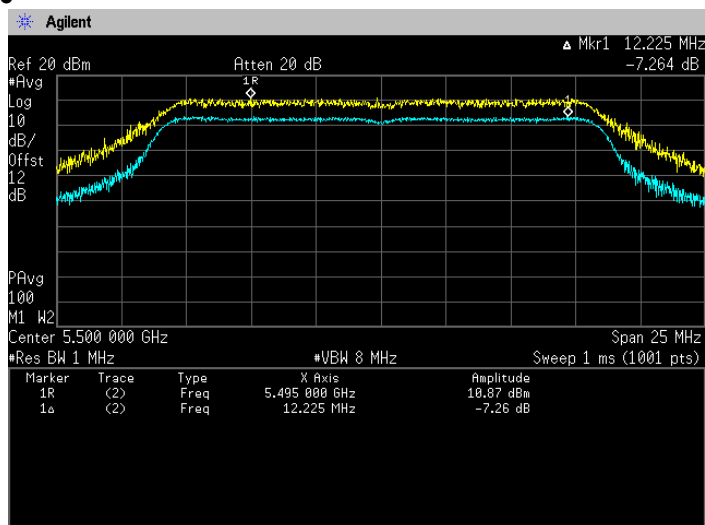




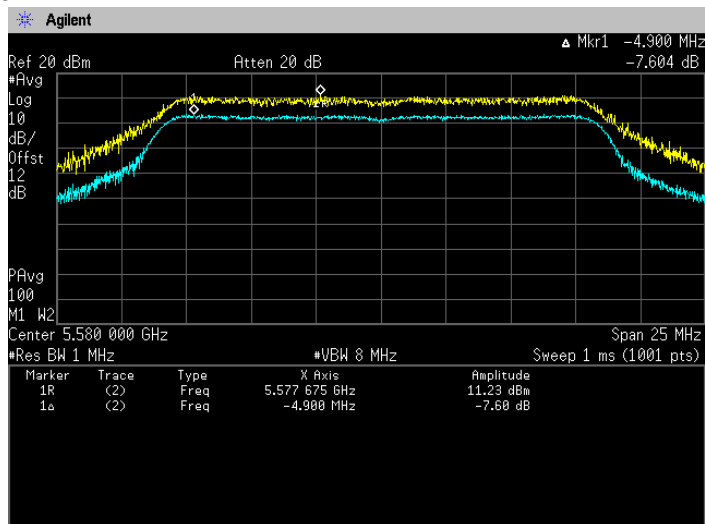


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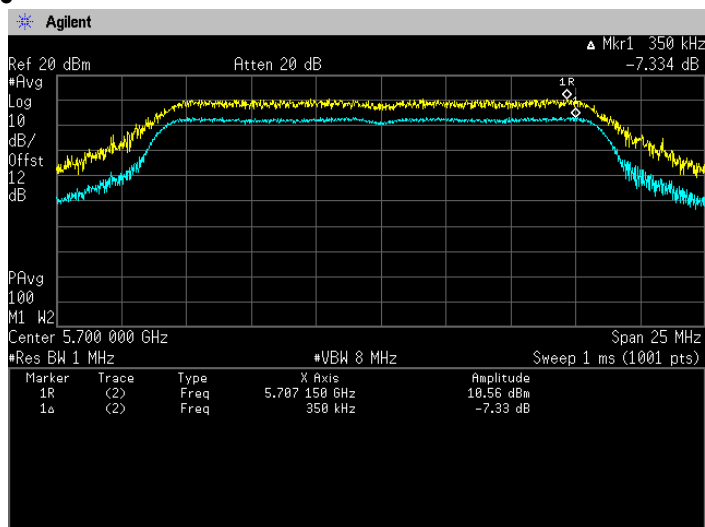
(5.6GHz Band)  
Channel: 100



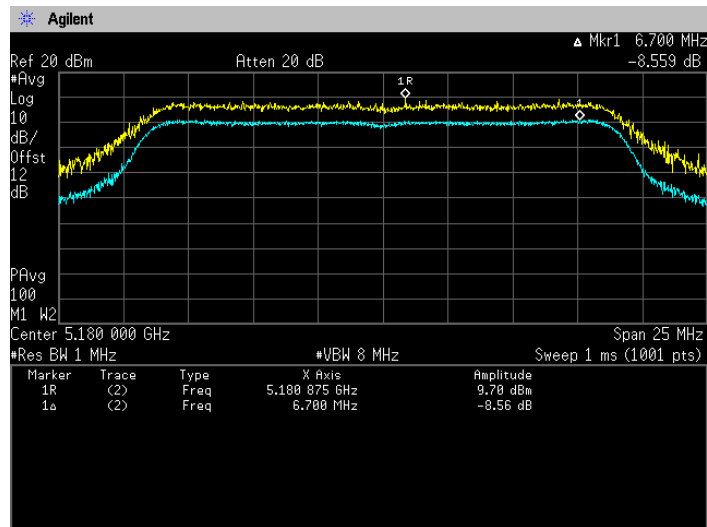
Channel: 116



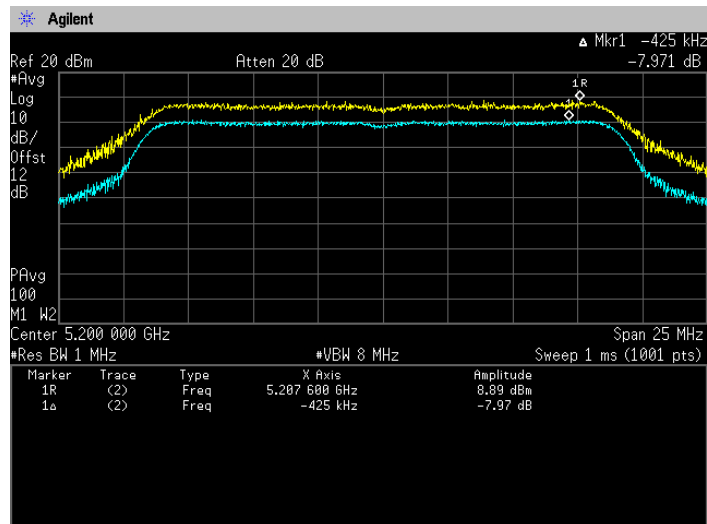
Channel: 140



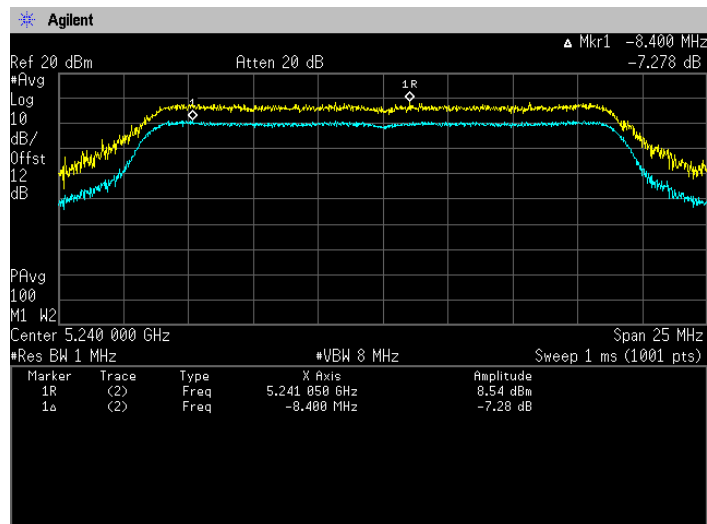
**[IEEE802.11 (HT20)]  
(5.2GHz Band)  
Channel: 36**



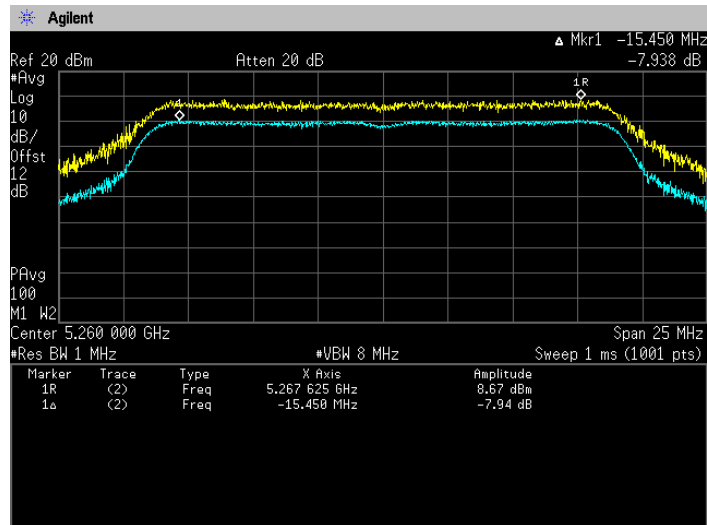
**Channel: 40**



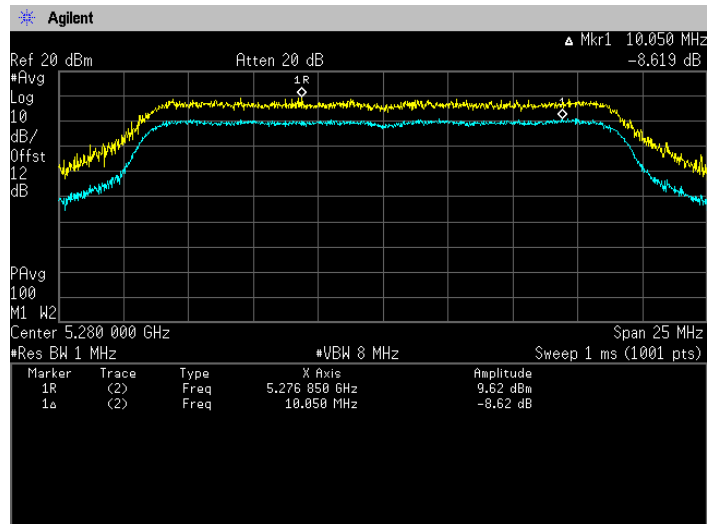
**Channel: 48**



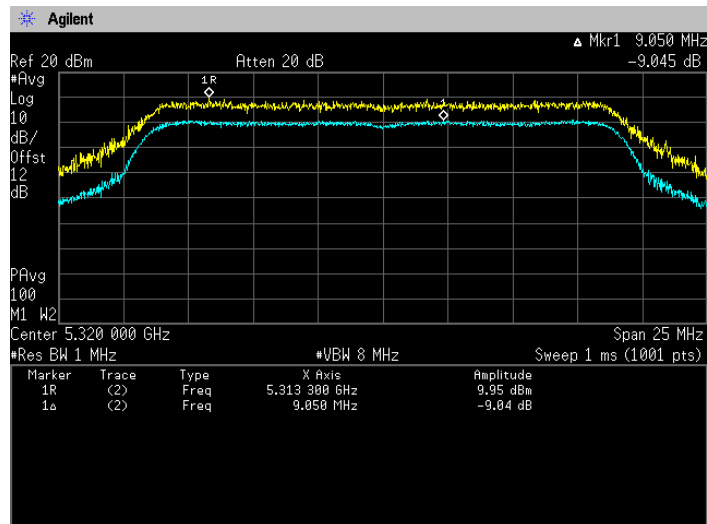
(5.3GHz Band)  
Channel: 52



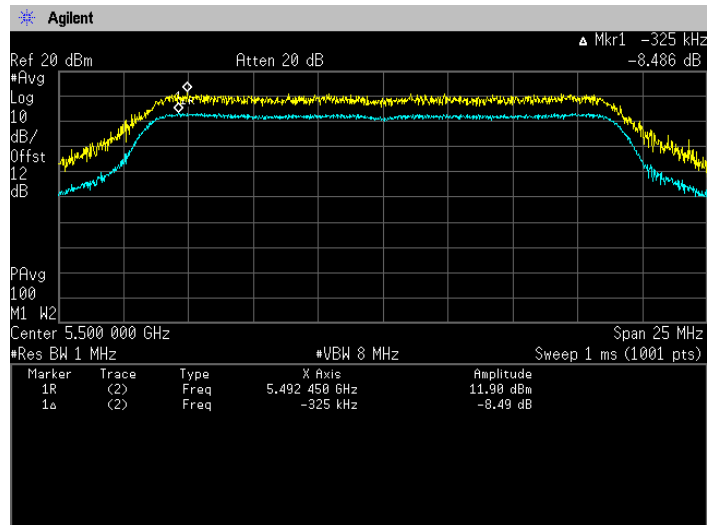
Channel: 56



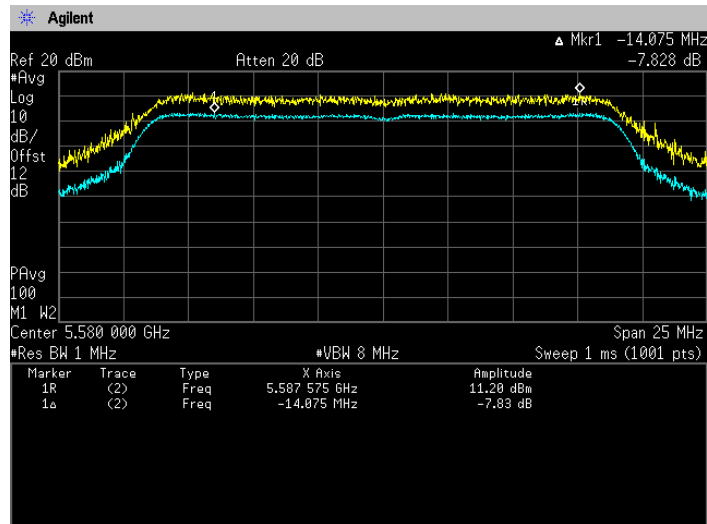
Channel: 64



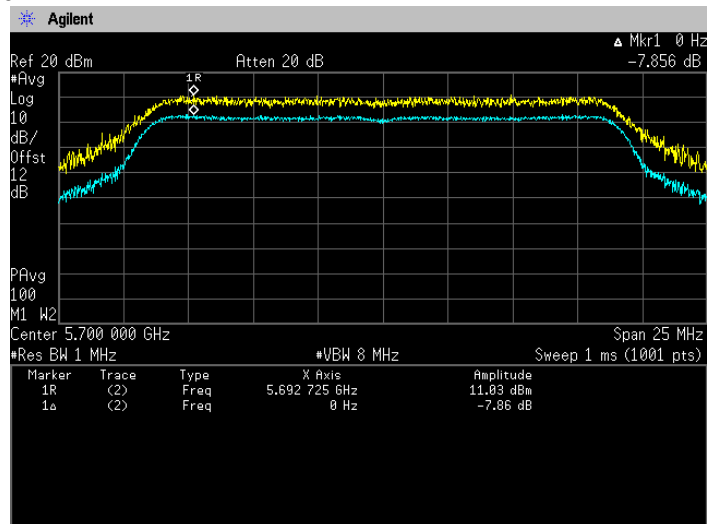
**(5.6GHz Band)**  
**Channel: 100**



**Channel: 116**



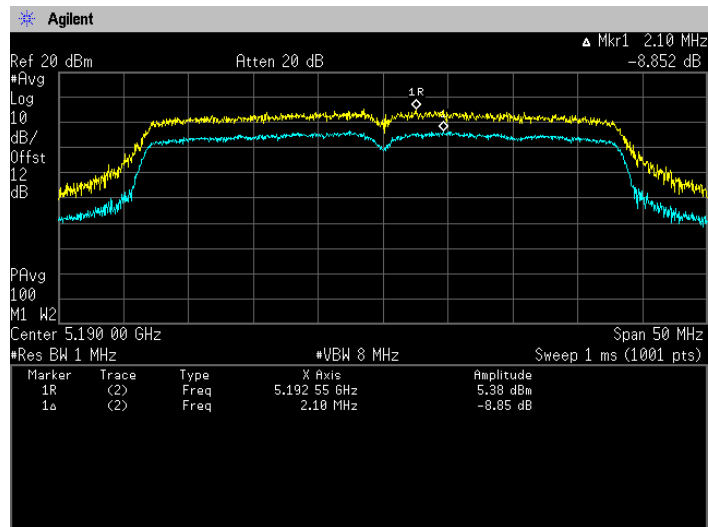
**Channel: 140**



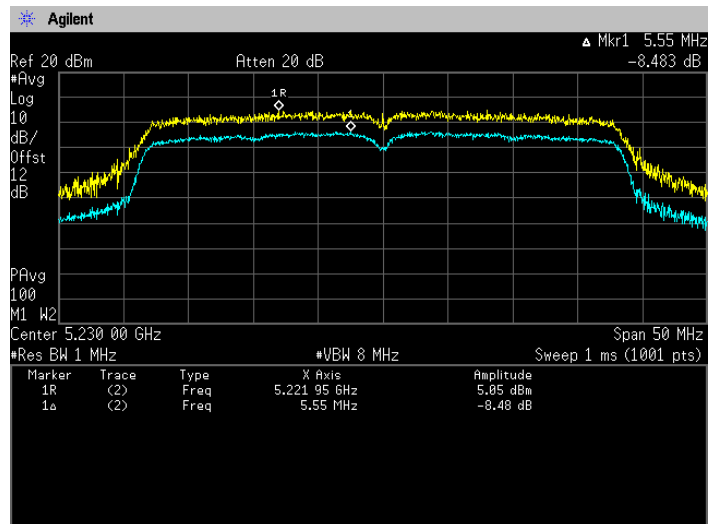


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**[IEEE802.11 (HT40)]  
(5.2GHz Band)  
Channel: 38**



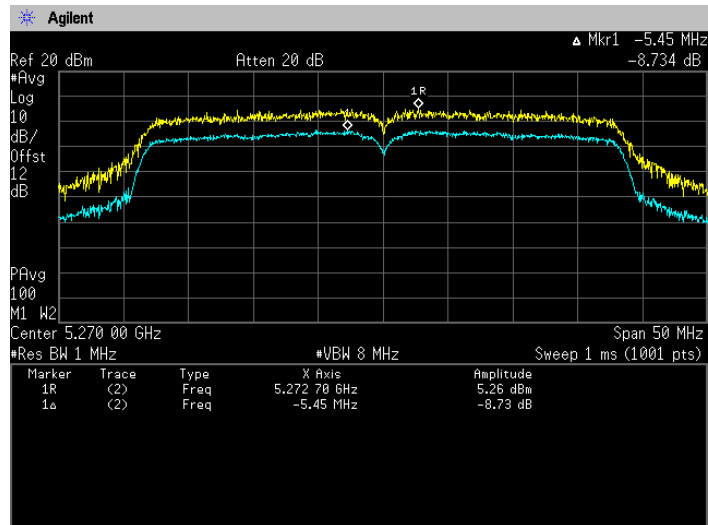
**Channel: 46**



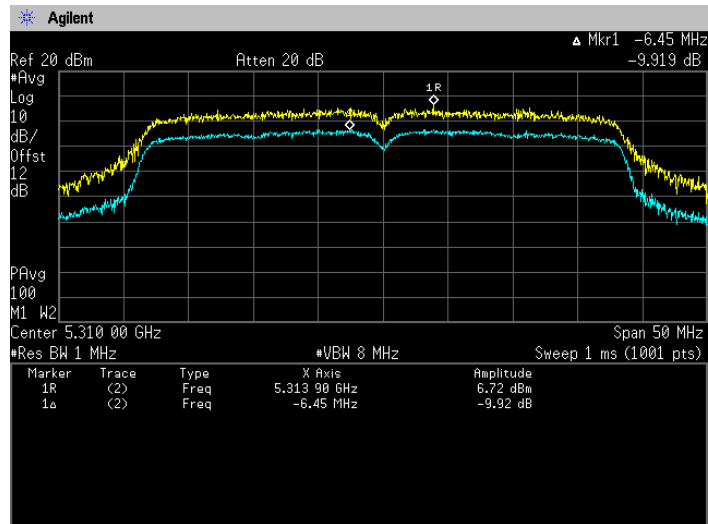


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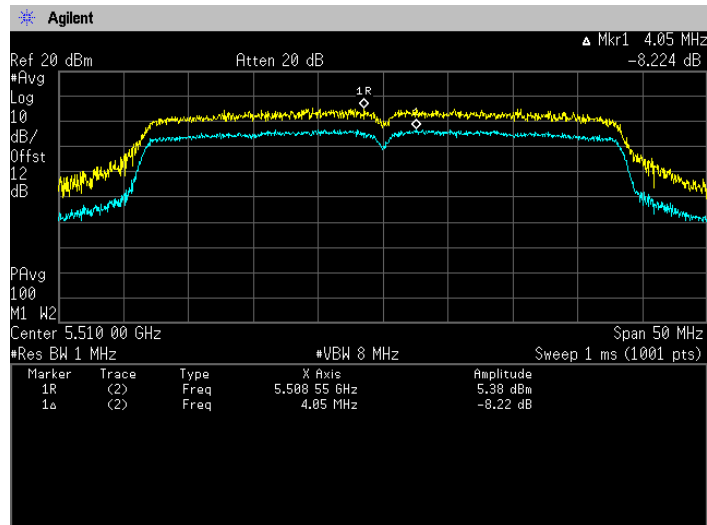
(5.3GHz Band)  
Channel: 54



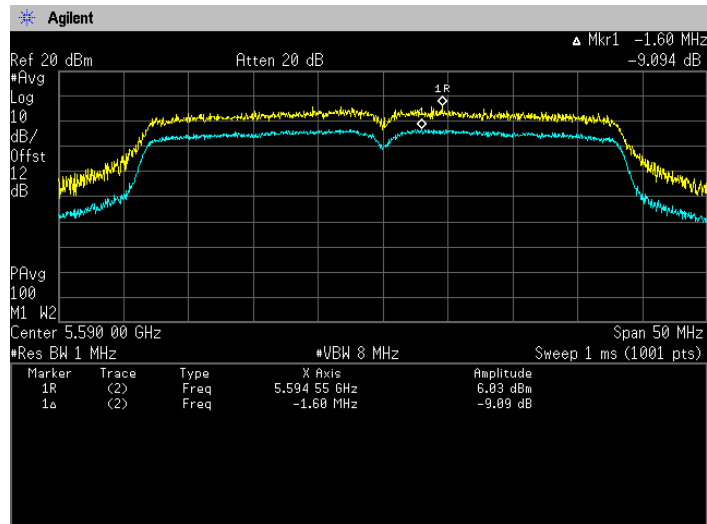
Channel: 62



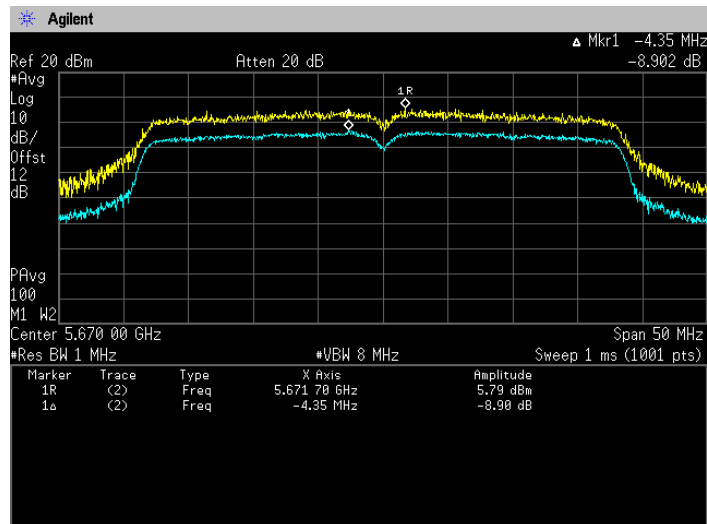
**(5.6GHz Band)**  
**Channel: 102**



**Channel: 118**



**Channel: 134**



## 8. Radiated Emissions (Restricted Bands of Operation)

### 8.1 Measurement procedure

[FCC 407(d), 15.205, 15.209, KDB789033]

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=1MHz, Span=0Hz, Sweep=auto
- Average	:	RBW=1MHz, VBW=10Hz, Span=0Hz, Sweep=auto
	:	Display mode=Linear

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.

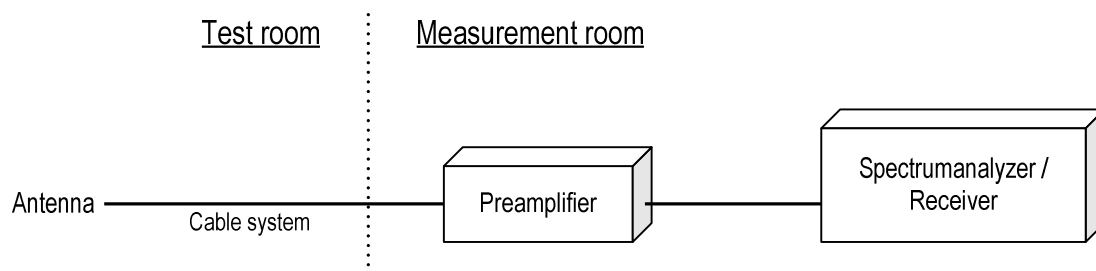
The EUT was set to operate with following conditions.

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

The test mode of EUT is as follows.

- Tx mode, Rx mode

- Test configuration





## 8.2 Calculation method

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

Margin = Limit – Emission level

## 8.3 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.  
Devices operating in the 5.25-5.35GHz band that generate emissions in the 5.15-5.25GHz band must meet all applicable technical requirements for operation in the 5.15-5.25GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27dBm/MHz in the 5.15-5.25GHz band.
- (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 5.725-5.825GHz 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	300	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.



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## 8.4 Test data

Date	: Apr. 30, 2013	Test personnel	:	
Temperature	: 21.7 [°C]	Tested by	:	
Humidity	: 31.4 [%]			
Test place	: 3m Semi-anechoic chamber			<u>Taiki Watanabe</u>
Date	: May 2, 2013	Test personnel	:	
Temperature	: 21.7 [°C]	Tested by	:	
Humidity	: 31.4 [%]			
Test place	: 3m Semi-anechoic chamber			<u>Taiki Watanabe</u>
Date	: May 8, 2013	Test personnel	:	
Temperature	: 21.7 [°C]	Tested by	:	
Humidity	: 23.7 [%]			
Test place	: 3m Semi-anechoic chamber			<u>Taiki Watanabe</u>
Date	: May 9, 2013	Test personnel	:	
Temperature	: 20.4 [°C]	Tested by	:	
Humidity	: 25.8 [%]			
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	5147.01	H	PK	56.9	9.9		66.8	74.0	7.2
			5147.01	H	AV	41.1	9.9		51.0	54.0	3.0
			10360.00	H	PK	41.2	18.8		60.0	68.2	8.2
			10360.00	V	PK	40.9	18.8		59.7	68.2	8.5
	40	5200	10400.00	H	PK	43.2	18.7		61.9	68.2	6.3
			10400.00	V	PK	43.9	18.7		62.6	68.2	5.6
48	5240	10480.00	H	PK	43.1	19.0		62.1	68.2	6.1	
		10480.00	V	PK	42.9	19.0		61.9	68.2	6.3	

### (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	H	PK	40.5	19.5		60.0	68.2	8.2
			10520.00	V	PK	40.2	19.5		59.7	68.2	8.5
	56	5280	10560.00	H	PK	40.6	19.5		60.1	68.2	8.1
			10560.00	V	PK	40.6	19.5		60.1	68.2	8.1
	64	5320	5352.53	H	PK	56.9	10.3		67.2	74.0	6.8
			5352.53	H	AV	41.5	10.3		51.8	54.0	2.2
			10640.00	H	PK	42.0	19.7		61.7	68.2	6.5
			10640.00	V	PK	41.1	19.7		60.8	68.2	7.4



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**(5.6GHz Band)**

Mode	Channel	Frequency (MHz)	Frequency (MHz)	ANT H/V	Detector PK/AV	Reading (dB $\mu$ V)	C.F (dB)	DCF (dB)	Result (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
802.11a	100	5500	5459.67	V	PK	56.0	10.5		66.5	74.0	7.5
			5459.67	V	AV	41.3	10.5		51.8	54.0	2.2
			11000.00	H	PK	41.8	20.8		62.6	68.2	5.6
			11000.00	V	PK	42.2	20.8		63.0	68.2	5.2
	116	5580	11160.00	H	PK	41.0	20.6		61.6	68.2	6.6
			11160.00	V	PK	41.4	20.6		62.0	68.2	6.2
	140	5700	5725.28	V	PK	56.1	10.4		66.5	68.2	1.7
			11400.00	H	PK	39.7	21.0		60.7	68.2	7.5
			11400.00	V	PK	40.0	21.0		61.0	68.2	7.2

**Note:**

1. Emission Level (Margin) = Limit - [Reading + C.F ( Antenna + Cable – Amp)] + DCF (If transmit duty cycle < 98 percent)
2. DCF = 20log (1/x) , x = On time / (On + Off time)
3. No emission were detected in frequency range 30MHz to 1000MHz at the 3 meters distance.
4. 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	5146.75	H	PK	53.5	9.9		63.4	74.0	10.6
			5146.75	H	AV	39.6	9.9		49.5	54.0	4.5
			10360.00	H	PK	40.1	18.8		58.9	68.2	9.3
			10360.00	V	PK	40.5	18.8		59.3	68.2	8.9
	40	5200	10400.00	H	PK	40.5	18.7		59.2	68.2	9.0
			10400.00	V	PK	40.2	18.7		58.9	68.2	9.3
	48	5240	10480.00	H	PK	40.8	19.0		59.8	68.2	8.4
			10480.00	V	PK	41.8	19.0		60.8	68.2	7.4

**(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	H	PK	40.7	19.5		60.2	68.2	8.0
			10520.00	V	PK	41.1	19.5		60.6	68.2	7.6
	56	5280	10560.00	H	PK	40.7	19.5		60.2	68.2	8.0
			10560.00	V	PK	41.0	19.5		60.5	68.2	7.7
	64	5320	5352.64	H	PK	57.4	10.3		67.7	74.0	6.3
			5352.64	H	AV	41.8	10.3		52.1	54.0	1.9
			10640.00	H	PK	41.7	19.7		61.4	68.2	6.8
			10640.00	V	PK	41.5	19.7		61.2	68.2	7.0

**(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	5457.83	H	PK	54.9	10.5		65.4	74.0	8.6
			5457.83	H	AV	40.0	10.5		50.5	54.0	3.5
			11000.00	H	PK	41.1	20.8		61.9	68.2	6.3
			11000.00	V	PK	41.8	20.8		62.6	68.2	5.6
	116	5580	11160.00	H	PK	41.4	20.6		62.0	68.2	6.2
			11160.00	V	PK	41.4	20.6		62.0	68.2	6.2
	140	5700	5725.30	V	PK	53.5	10.4		63.9	68.2	4.3
			11400.00	H	PK	39.9	21.0		60.9	68.2	7.3
			11400.00	V	PK	40.6	21.0		61.6	68.2	6.6

**Note:**

1. Emission Level (Margin) = Limit - [Reading + C.F ( Antenna + Cable – Amp)] + DCF (If transmit duty cycle < 98 percent)
2. DCF = 20log (1/x) , x = On time / (On + Off time)
3. No emission were detected in frequency range 30MHz to 1000MHz at the 3 meters distance.
4. 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	5147.00	H	PK	56.3	9.9		66.2	74.0	7.8
			5147.00	H	AV	41.3	9.9	0.47	51.7	54.0	2.3
			10380.00	H	PK	40.4	18.7		59.1	68.2	9.1
	46	5230	10380.00	V	PK	40.4	18.7		59.1	68.2	9.1
			10460.00	H	PK	41.1	19.2		60.3	68.2	7.9
			10460.00	V	PK	41.3	19.2		60.5	68.2	7.7

**(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	H	PK	39.9	19.5		59.4	68.2	8.8
			10540.00	V	PK	39.7	19.5		59.2	68.2	9.0
	62	5310	5350.88	H	PK	55.1	10.3		65.4	74.0	8.6
			5350.88	H	AV	40.8	10.3	0.47	51.6	54.0	2.4
			10620.00	H	PK	40.9	19.7		60.6	68.2	7.6
			10620.00	V	PK	40.4	19.7		60.1	68.2	8.1

**(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 (40MHz)	102	5510	5459.12	H	PK	53.2	10.5		63.7	74.0	10.3
			5459.12	H	AV	38.5	10.5	0.47	49.5	54.0	4.5
			11020.00	H	PK	40.7	20.7		61.4	68.2	6.8
			11020.00	V	PK	40.9	20.7		61.6	68.2	6.6
	118	5590	11180.00	H	PK	41.1	20.6		61.7	68.2	6.5
			11180.00	V	PK	41.0	20.6		61.6	68.2	6.6
	134	5670	5725.30	H	PK	51.3	10.4		61.7	68.2	6.5
			11340.00	H	PK	40.9	21.3		62.2	68.2	6.0
			11340.00	V	PK	40.6	21.3		61.9	68.2	6.3

**Note:**

1. Emission Level (Margin) = Limit - [Reading + C.F ( Antenna + Cable – Amp)] + DCF (If transmit duty cycle < 98 percent)
2. DCF = 20log (1/x) , x = On time / (On + Off time)
3. No emission were detected in frequency range 30MHz to 1000MHz at the 3 meters distance.
4. No emission was detected in the receive mode.

## 9. Frequency Stability

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### 9.1 Measurement procedure [FCC 15.407(g)]

The EUT was placed on the inside of a constant temperature chamber as the temperature in the chamber was varied between  $-30^{\circ}\text{C}$  and  $+60^{\circ}\text{C}$ . The temperature was incremented by  $10^{\circ}\text{C}$  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.

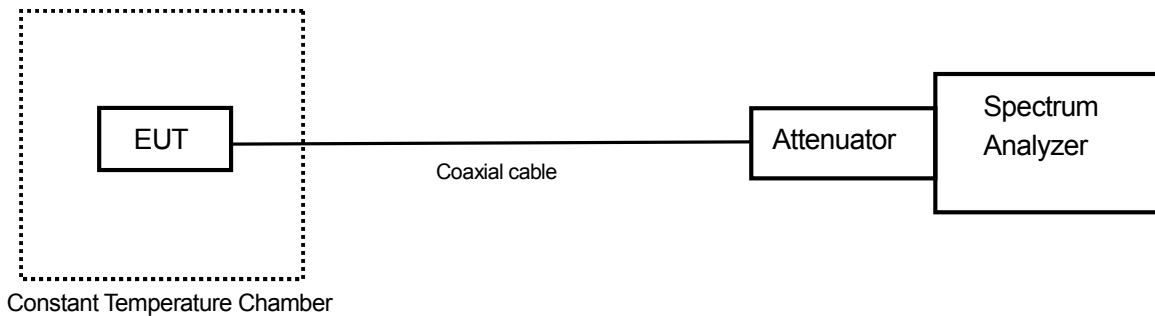
The EUT was set to operate with the following conditions.

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

The test mode of EUT is as follows.

- Tx mode

- Test configuration



### 9.2 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.

### 9.3 Measurement result

Date : May 20, 2013  
 Temperature : 21.5 [°C]  
 Humidity : 50.6 [%]  
 Test place : Shielded room

Test personnel :

Tested by :

Chiaki Kanno

#### [Channel: 36 (5180MHz)]

Power Supply [V]	Temperature [°C]	Measurements Frequency [Hz]	Frequency Tolerance [%]
3.80	25(Ref.)	5,180,013,114	0.00000000
	60	5,179,996,026	-0.00032988
	50	5,180,012,262	-0.00001645
	40	5,180,028,328	0.00029371
	30	5,180,007,435	-0.00010963
	20	5,180,025,882	0.00024649
	10	5,180,032,533	0.00037488
	0	5,180,016,626	0.00006780
	-10	5,180,030,854	0.00034247
	-20	5,180,031,980	0.00036421
-30	5,180,015,986	0.00005544	
3.23	25	5,180,024,717	0.00022400
4.37	25	5,180,007,757	-0.00010342

#### [Channel: 52 (5260MHz)]

Power Supply [V]	Temperature [°C]	Measurements Frequency [Hz]	Frequency Tolerance [%]
3.80	25(Ref.)	5,260,011,817	0.00000000
	60	5,259,986,822	-0.00047519
	50	5,260,009,574	-0.00004264
	40	5,260,017,584	0.00010964
	30	5,260,029,073	0.00032806
	20	5,260,015,855	0.00007677
	10	5,260,026,988	0.00028842
	0	5,260,017,243	0.00010316
	-10	5,260,024,431	0.00023981
	-20	5,260,021,680	0.00018751
-30	5,260,039,585	0.00052791	
3.23	25	5,260,017,212	0.00010257
4.37	25	5,260,017,506	0.00010816



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**[Channel: 100 (5500MHz)]**

Power Supply [V]	Temperature [°C]	Measurements Frequency [Hz]	Frequency Tolerance [%]
3.80	25(Ref.)	5,500,025,150	0.00000000
	60	5,500,027,223	0.00003769
	50	5,500,012,385	-0.00023209
	40	5,500,002,123	-0.00041867
	30	5,500,001,722	-0.00042596
	20	5,500,023,862	-0.00002342
	10	5,500,034,858	0.00017651
	0	5,500,023,992	-0.00002105
	-10	5,500,015,037	-0.00018387
	-20	5,500,028,970	0.00006945
	-30	5,500,037,352	0.00022185
3.23	25	5,500,015,153	-0.00018176
4.37	25	5,500,011,908	-0.00024076



## 10. AC Power Line Conducted Emissions

### 10.1 Measurement procedure [FCC 15.207]

Test was applied by following conditions.

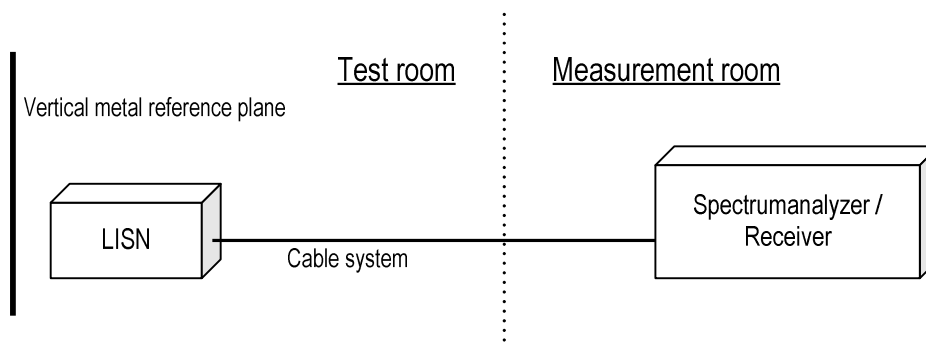
Test method	: ANSI C63.4
Frequency range	: 0.15MHz to 30MHz
Test place	: 10m Semi-anechoic chamber
EUT was placed on	: FRP table / (W)2.0m × (D)1.0m × (H)0.8m
Vertical Metal Reference Plane	: (W)2.0m × (H)2.0m 0.4m away from EUT
Test receiver setting	
- Detector	: Quasi-peak, Average
- Bandwidth	: 9kHz

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



### 10.2 Calculation method

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

Margin = Limit – Emission level

### 10.3 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

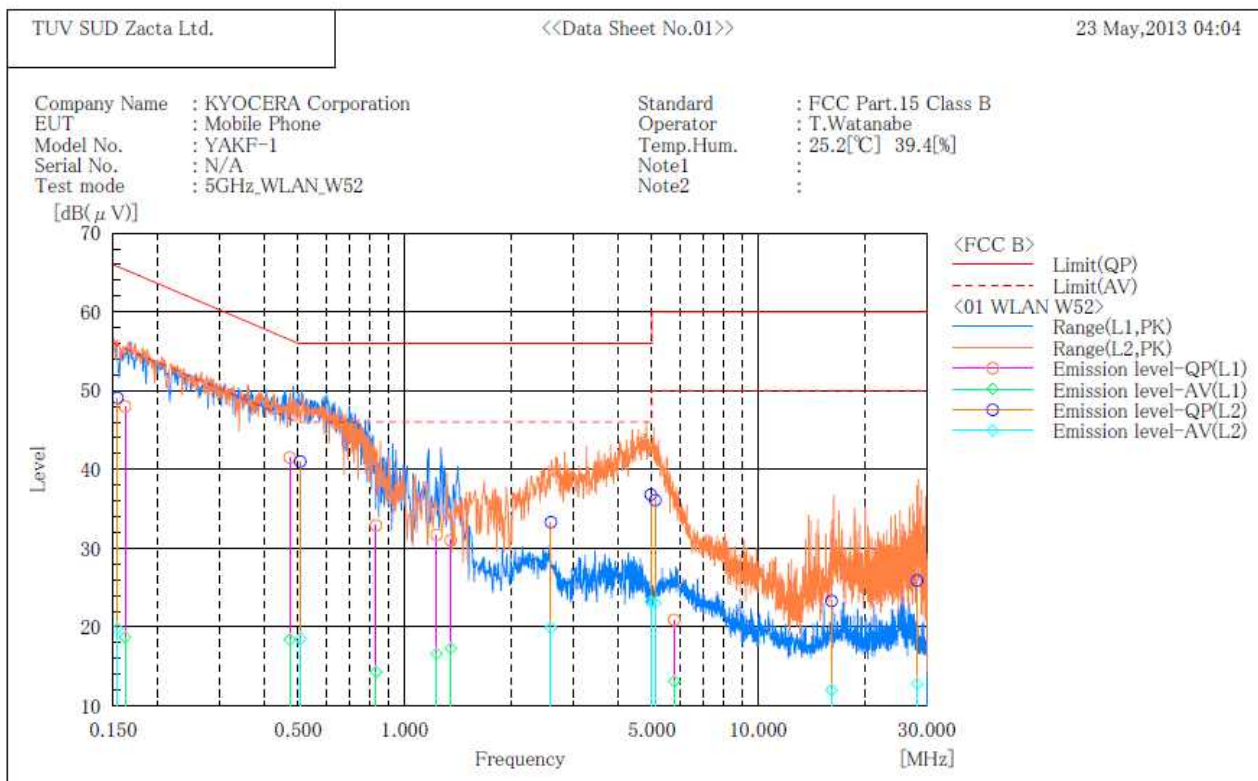
\*: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.



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### 10.4 Test data

\*\*\*\*\* 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	0.162	37.5	8.2	10.5	48.0	18.7	65.4	55.4	17.4	36.7
2	0.473	31.2	8.1	10.3	41.5	18.4	56.5	46.5	15.0	28.1
3	0.830	22.6	4.0	10.3	32.9	14.3	56.0	46.0	23.1	31.7
4	1.232	21.3	6.2	10.4	31.7	16.6	56.0	46.0	24.3	29.4
5	1.349	20.6	6.9	10.4	31.0	17.3	56.0	46.0	25.0	28.7
6	5.786	10.3	2.5	10.6	20.9	13.1	60.0	50.0	39.1	36.9

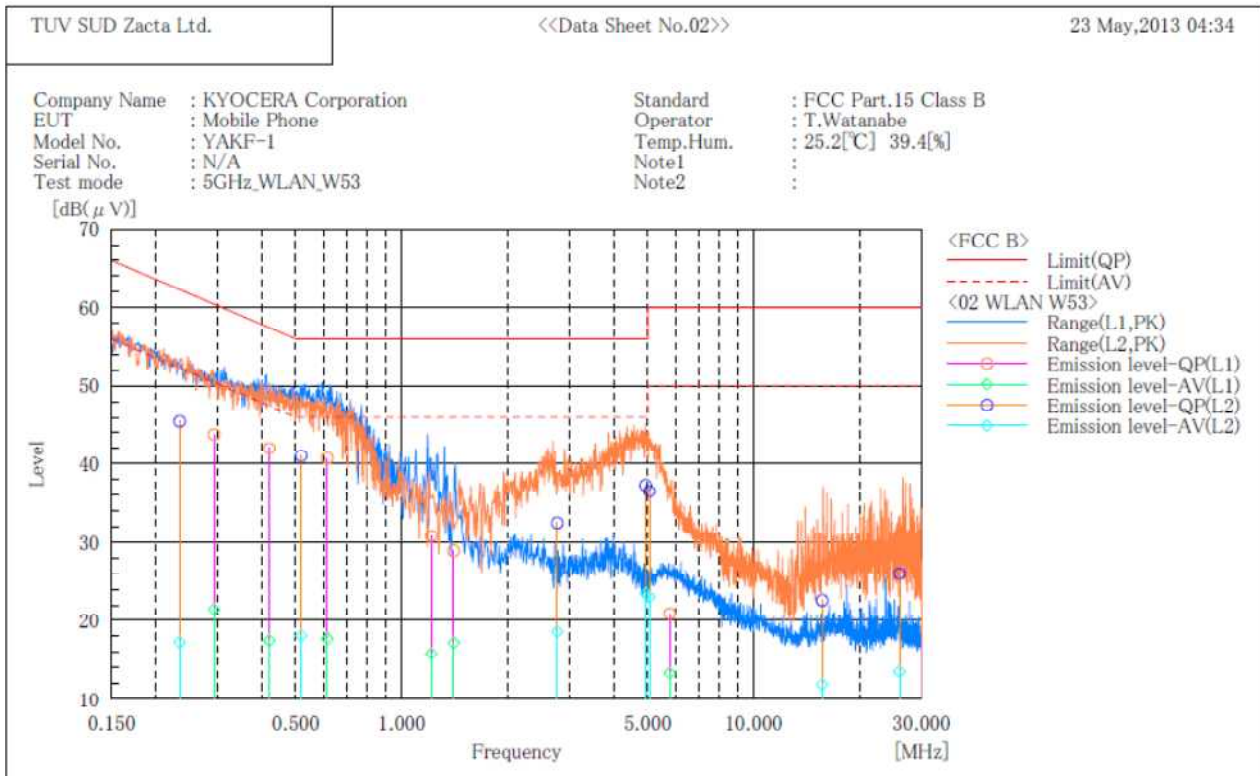
##### — L2 Phase —

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	0.154	38.6	9.3	10.5	49.1	19.8	65.8	55.8	16.7	36.0
2	0.507	30.7	8.2	10.3	41.0	18.5	56.0	46.0	15.0	27.5
3	2.590	22.9	9.5	10.4	33.3	19.9	56.0	46.0	22.7	26.1
4	4.968	26.3	12.7	10.5	36.8	23.2	56.0	46.0	19.2	22.8
5	5.112	25.6	12.5	10.5	36.1	23.0	60.0	50.0	23.9	27.0
6	16.120	12.4	1.1	10.9	23.3	12.0	60.0	50.0	36.7	38.0
7	28.114	14.6	1.5	11.3	25.9	12.8	60.0	50.0	34.1	37.2



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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	0.293	33.5	11.2	10.3	43.8	21.5	60.4	50.4	16.6	28.9
2	0.421	31.7	7.2	10.3	42.0	17.5	57.4	47.4	15.4	29.9
3	0.615	30.4	7.4	10.3	40.7	17.7	56.0	46.0	15.3	28.3
4	1.215	20.4	5.4	10.4	30.8	15.8	56.0	46.0	25.2	30.2
5	1.405	18.5	6.8	10.4	28.9	17.2	56.0	46.0	27.1	28.8
6	5.775	10.3	2.7	10.6	20.9	13.3	60.0	50.0	39.1	36.7

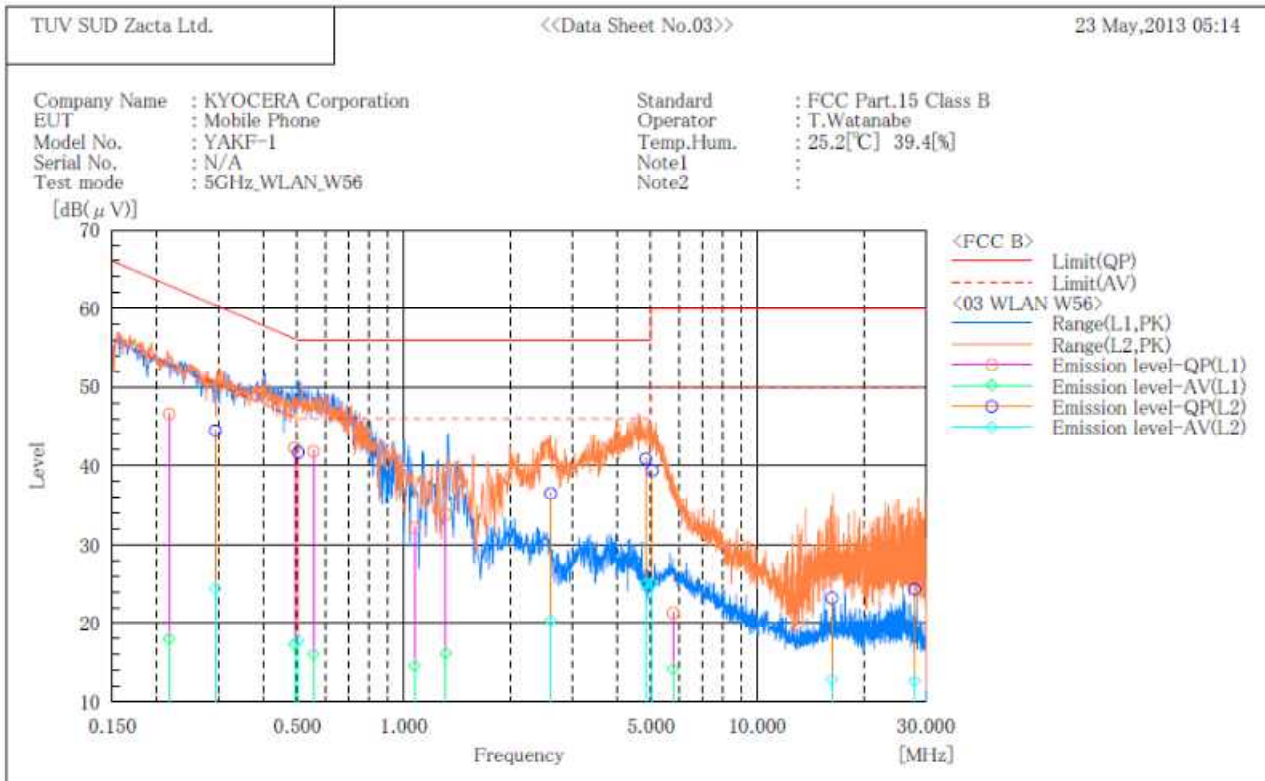
--- L2 Phase ---

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	0.234	35.1	6.9	10.4	45.5	17.3	62.3	52.3	16.8	35.0
2	0.518	30.7	7.8	10.3	41.0	18.1	56.0	46.0	15.0	27.9
3	2.767	22.1	8.2	10.4	32.5	18.6	56.0	46.0	23.5	27.4
4	4.933	26.8	13.0	10.5	37.3	23.5	56.0	46.0	18.7	22.5
5	5.056	26.0	12.5	10.5	36.5	23.0	60.0	50.0	23.5	27.0
6	15.650	11.7	1.0	10.9	22.6	11.9	60.0	50.0	37.4	38.1
7	25.932	14.7	2.2	11.3	26.0	13.5	60.0	50.0	34.0	36.5



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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	0.217	36.2	7.6	10.4	46.6	18.0	62.9	52.9	16.3	34.9
2	0.491	32.0	7.0	10.3	42.3	17.3	56.2	46.2	13.9	28.9
3	0.555	31.5	5.8	10.3	41.8	16.1	56.0	46.0	14.2	29.9
4	1.073	21.7	4.2	10.4	32.1	14.6	56.0	46.0	23.9	31.4
5	1.314	23.4	5.8	10.4	33.8	16.2	56.0	46.0	22.2	29.8
6	5.781	10.7	3.6	10.6	21.3	14.2	60.0	50.0	38.7	35.8

--- 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	0.293	34.2	14.1	10.3	44.5	24.4	60.4	50.4	15.9	26.0
2	0.503	31.4	7.5	10.3	41.7	17.8	56.0	46.0	14.3	28.2
3	2.601	26.1	10.0	10.4	36.5	20.4	56.0	46.0	19.5	25.6
4	4.830	30.4	14.5	10.5	40.9	25.0	56.0	46.0	15.1	21.0
5	5.042	28.9	14.5	10.5	39.4	25.0	60.0	50.0	20.6	25.0
6	16.240	12.3	2.0	10.9	23.2	12.9	60.0	50.0	36.8	37.1
7	27.840	13.0	1.4	11.3	24.3	12.7	60.0	50.0	35.7	37.3

## 11. Duty Cycle

### 11.1 Measurement procedure [KDB789033]

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

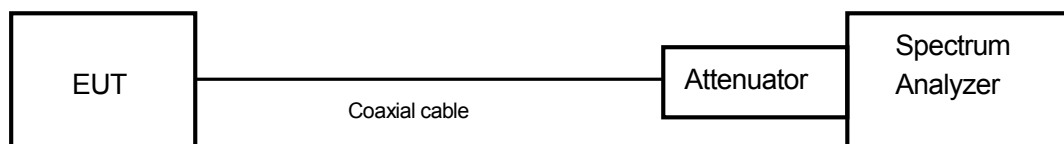
The EUT was set to operate with following conditions.

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

The test mode of EUT is as follows.

- Tx mode

- Test configuration



### 11.2 Limit

None

### 11.3 Measurement result

Date : May 13, 2013  
 Temperature : 20.0 [°C]  
 Humidity : 46.0 [%]  
 Test place : Shielded room

Test personnel :

Tested by :

Chiaki Kanno

Mode	Channel	Frequency (MHz)	Duty Cycle			DCF (dB) 10log(1/x)	DCF (dB) 20log(1/x)
			On Time(ms)	On+Off Time(ms)	x		
802.11a	36	5180	1.396	1.430	0.98	0.10	0.21
	40	5200					
	48	5240					
	52	5260	1.396	1.428	0.98	0.10	0.20
	56	5280					
	64	5320					
	100	5500	1.396	1.430	0.98	0.10	0.21
	116	5580					
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		
802.11n (20MHz)	36	5180	1.308	1.340	0.98	0.10	0.21
	40	5200					
	48	5240					
	52	5260	1.308	1.340	0.98	0.10	0.21
	56	5280					
	64	5320					
	100	5500	1.308	1.340	0.98	0.10	0.21
	116	5580					
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		
802.11n (40MHz)	38	5190	0.647	0.683	0.95	0.24	0.47
	46	5230					
	54	5270	0.647	0.683	0.95	0.24	0.47
	62	5310					
	102	5510	0.648	0.684	0.95	0.23	0.47
	118	5590					
	134	5670					

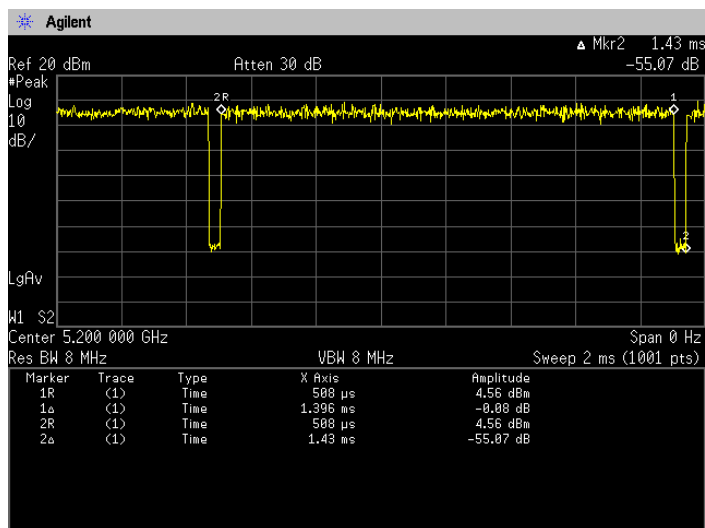
Note: X = On time / (On + Off time)



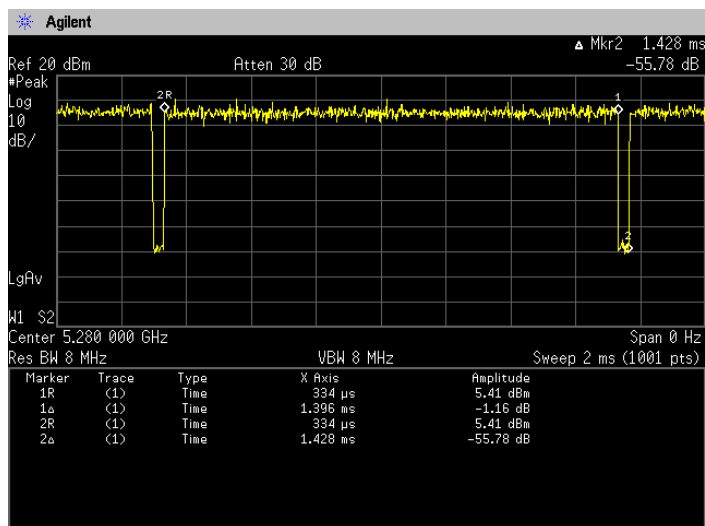
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### 11.4 Trace data [IEEE802.11a]

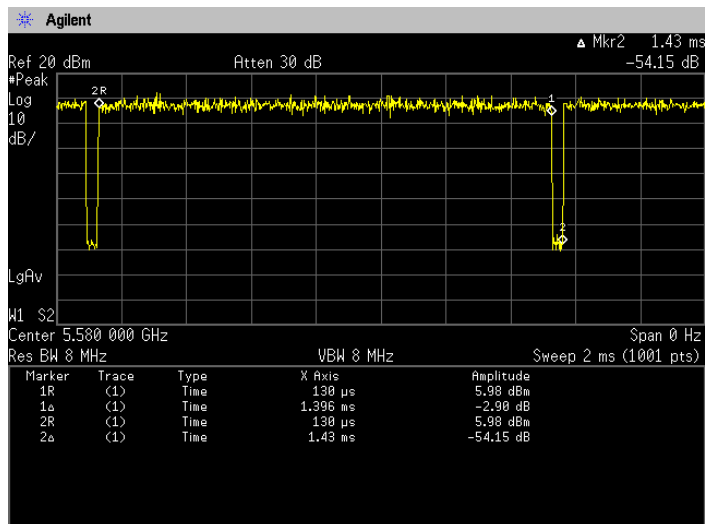
#### Channel: 40



#### Channel: 56

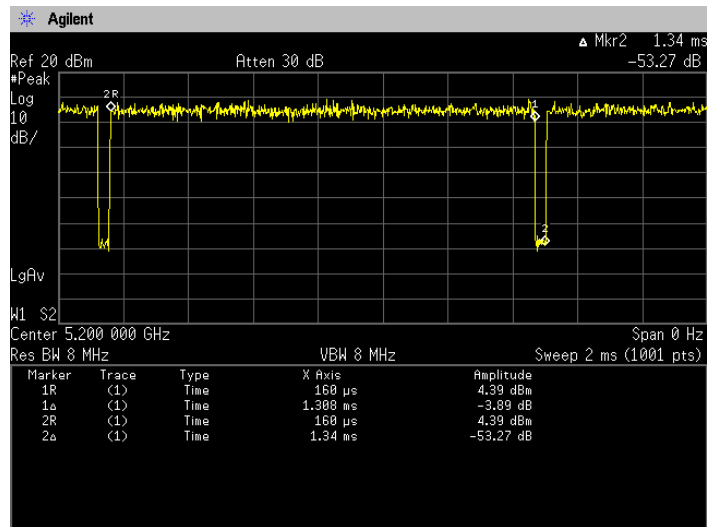


#### Channel: 116

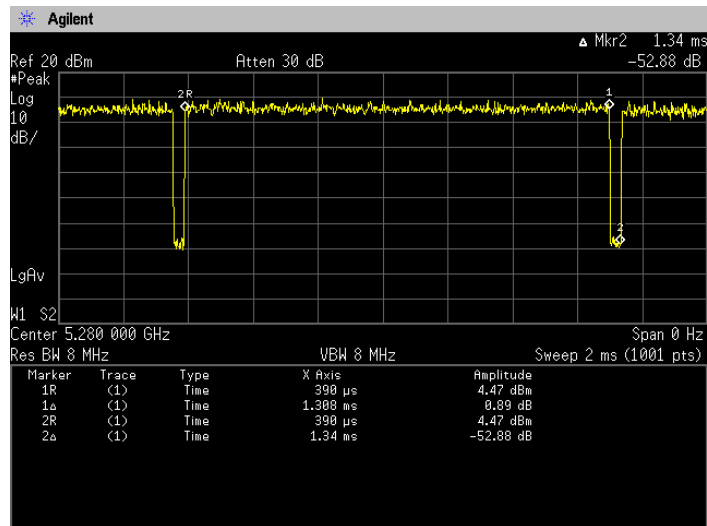


[IEEE802.11n (HT20)]

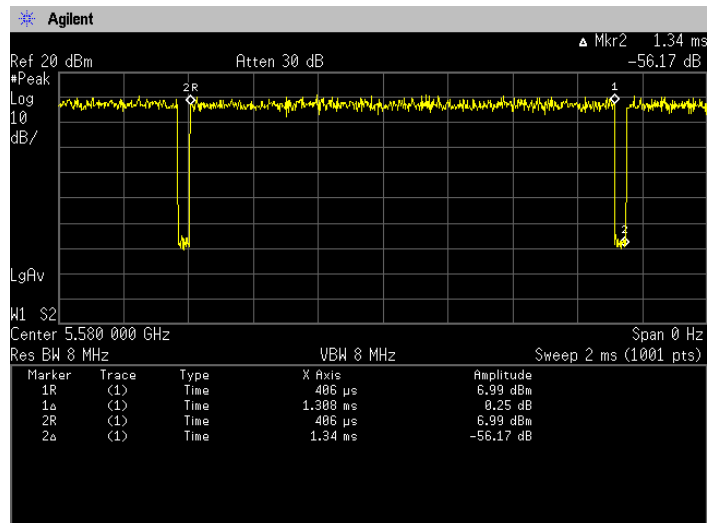
Channel: 40



Channel: 56



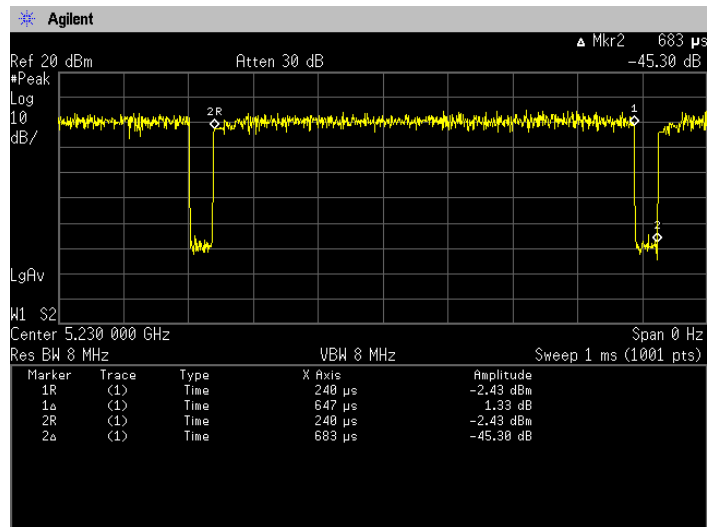
Channel: 116



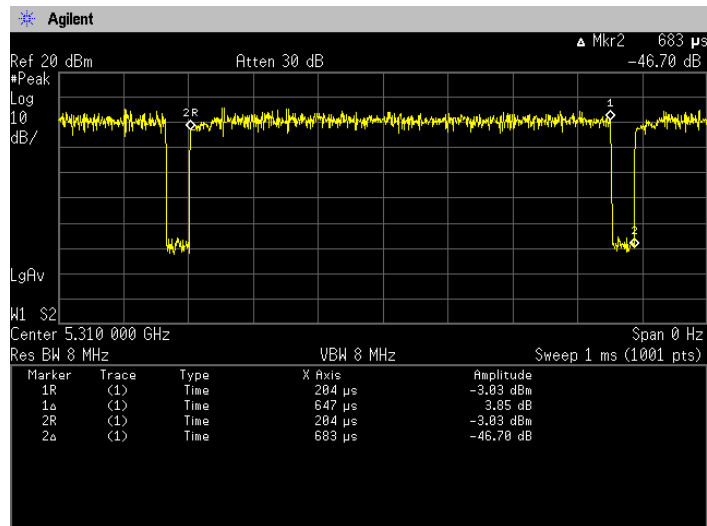


[IEEE802.11n (HT40)]

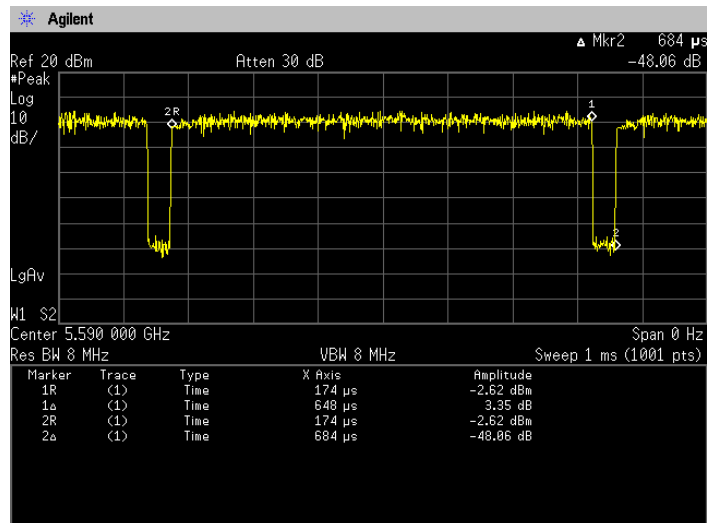
Channel: 46



Channel: 62



Channel: 118





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## ***12. Antenna requirement***

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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.

### 13. Uncertainty of measurement

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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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## 14. 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
10m Semi-anechoic chamber	-	VLAC-013		VLAC-013	Jul. 3, 2013
3m Semi-anechoic chamber				-	
Shielded room No.1		VLAC-013		-	

3) FCC filing:

Site name	Registration Number	Expiry Date
Site 2	91065	Oct.31, 2014
Site 3		
10m Semi-anechoic chamber	540072	Jan. 9, 2016
3m Semi-anechoic chamber		
Shielded room No.1		

4) Industry Canada Oats site filing:

Site name	Sites on file: Oats 3m/10m	Expiry Date
Site 2	4224A-2	Jan. 23, 2015
Site 3	4224A-3	
3m Semi-anechoic chamber	4224A-4	
10m Semi-anechoic chamber	4224A-5	

5) VCCI site filing:

Site name	Radiated emission	Conducted emission for mains port	Expiry Date	Conducted emission for telecom port	Expiry Date
Site 2	R-137	C-133	Nov. 16, 2014	T-1221	Nov. 28, 2014
Site 3	R-138	C-134		T-1222	
10m Semi-anechoic chamber	R-2480	C-2722	Jul. 3, 2013	T-1474	Jul. 3, 2013
	G-81	-		-	-
3m Semi-anechoic chamber	R-2481	C-2723		T-1475	Jul. 3, 2013
	G-82	-		-	-
Shielded room No.1	-	C-2724		T-1476	Jul. 3, 2013

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	US40420937	Oct. 2013	Oct. 19, 2012
Microwave cable	RS	YH20_S1	N/A (S389)	Aug. 2013	Aug. 30, 2012
Microwave cable	SUHNER	SUCOFLEX104/1.5m	199121/4	Oct. 2013	Oct. 7, 2012
Attenuator	Weinschel	56-10	J4180	Nov. 2013	Nov. 12, 2012
Operation type temperature controlled bath	Espec	PL3KP	14016727	Dec. 2013	Dec. 27, 2012

### Radiated emission

Equipment	Company	Model No.	Serial No.	Cal. Due	Cal. Date
EMI Receiver	ROHDE&SCHWARZ	ECSI	100764	Jul. 2013	Jul. 6, 2012
Preamplifier	ANRITSU	MH648A	M96057	Jun. 2013	Jun. 12, 2012
Loop antenna	ROHDE&SCHWARZ	HFH2-Z2	892246/010	Sep. 2013	Sep. 14, 2012
TRILOG Antenna	Schwarzbeck	VULB9160	9160-3218	May 2014	May 2, 2012
Attenuator	TME	CFA-01NPJ-6	N/A (S274)	Jun. 2013	Jun. 12, 2012
Spectrum analyzer	Agilent Technologies	E4447A	MY46180188	Mar. 2014	Mar. 8, 2013
Preamplifier	Agilent Technologies	8449B	3008A1008	Dec. 2013	Dec. 9, 2012
Double ridged guide antenna	EMCO	3115	4328	Jan. 2014	Jan. 21, 2013
Attenuator	AEROFLEX	40A-03	081217-20	Feb. 2014	Feb. 23, 2013
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	BBHA9170189	May 2015	May 2, 2013
Preamplifier	TSJ	MLA-1840-B03-35	1240332	May 2015	May 2, 2013
Microwave cable	SUHNER	SUCOFLEX104/9m	346316/4	Oct. 2013	Oct. 6, 2012
		SUCOFLEX104/1m	322084/4	Oct. 2013	Oct. 6, 2012
		SUCOFLEX104/1.5m	317226/4	Oct. 2013	Oct. 6, 2012
		SUCOFLEX104/7m	41625/6	Oct. 2013	Oct. 6, 2012
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 2013	May 19, 2012

### Conducted emission at mains port

Equipment	Company	Model No.	Serial No.	Cal. due	Cal. date
EMI Receiver	ROHDE&SCHWARZ	ECSI	100764	Jul. 2013	Jul. 6, 2012
Attenuator	HUBER+SUHNER	6810.01.A	N/A (S411)	Jun. 2013	Jun. 25, 2012
Line impedance stabilization network for EUT	Kyoritsu Electrical Works, Ltd.	KNW-407F	8-2003-1	Mar. 2014	Mar. 12, 2013
Coaxial cable	FUJIKURA	5D-2W/4m	N/A (S350)	Feb. 2014	Feb. 4, 2013
Coaxial cable	FUJIKURA	5D-2W/1m	N/A (S193)	Feb. 2014	Feb. 4, 2013
Coaxial cable	SUHNER	RG214/U/10m	N/A (S194)	Feb. 2014	Feb. 4, 2013
PC	DELL	DIMENSION	75465BX	N/A	N/A