

Report on the RF Testing of:

KYOCERA Corporation
Tablet, Model: KC-T302DT
FCC ID: JOYKB18

In accordance with FCC Part15 Subpart E

Prepared for: KYOCERA Corporation
Yokohama Office 2-1-1 Kagahara, Tsuzuki-ku
Yokohama-shi, Kanagawa, Japan
Phone: +81-45-943-6253 Fax: +81-45-943-6314



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Document Number: JPD-TR-19090-0

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Hiroaki Suzuki	Deputy Manager of RF Group	Approved Signatory	14 JUN 2019

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EXECUTIVE SUMMARY

A sample(s) of this product was tested and found to be compliant with FCC Part15 Subpart E.



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TÜV SÜD Japan Ltd.
Yonezawa Testing Center
5-4149-7 Hachimanpara,
Yonezawa-shi, Yamagata,
992-1128 Japan

Phone: +81 (0) 238 28 2881
Fax: +81 (0) 238 28 2888
www.tuv-sud.jp

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1 Summary of Test

1.1 Modification history of the test report

Document Number	Modification History	Issue Date
JPD-TR-19090-0	First Issue	Refer to the cover page

1.2 Standards

CFR47 FCC Part 15 Subpart E

1.3 Test methods

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

1.4 Deviation from standards

None

1.5 List of applied test(s) of the EUT

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

1.6 Test information

None

1.7 Test set up

Table-top

1.8 Test period

26-April-2019 - 21-May-2019

2 Equipment Under Test

2.1 EUT information

Applicant	KYOCERA Corporation Yokohama Office 2-1-1 Kagahara, Tsuzuki-ku Yokohama-shi, Kanagawa, Japan Phone: +81-45-943-6253 Fax: +81-45-943-6314
Equipment Under Test (EUT)	Tablet
Model number	KC-T302DT
Serial number	N/A
Trade name	Kyocera
Number of sample(s)	1
EUT condition	Pre-Production
Power rating	Battery: DC 3.8 V
Size	(W) 180.0 × (D) 10.7 × (H) 270.0 mm
Environment	Indoor and Outdoor use
Terminal limitation	-20°C to 60°C
Hardware Version	DMT1
Software Version	V0.040JS
Firmware Version	Not applicable
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, 256QAM)



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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 SGI): 15, 30, 45, 60, 90, 120, 135, 150Mbps
Channel separation	IEEE802.11a/n (HT20): 20MHz IEEE802.11n (HT40): 40MHz
Output power	13.789mW (IEEE802.11a) 14.280mW (IEEE802.11n: HT20) 13.925mW (IEEE802.11n: HT40)
Antenna type	Internal antenna
Antenna gain	5.15-5.25 GHz band: 3.8 dBi 5.25-5.35 GHz band: 3.8 dBi 5.47-5.725 GHz band: 3.5 dBi

2.2 Modification to the EUT

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

Modification State	Description of Modification	Modification fitted by	Date of Modification
Model: KC-T302DT, Serial Number: N/A			
0	As supplied by the applicant	Not Applicable	Not Applicable

2.3 Variation of family model(s)

2.3.1 List of family model(s)

Not applicable

2.3.2 Reason for selection of EUT

Not applicable

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]
5.2 GHz Band	36	5180	38	5190
	40	5200	-	-
	48	5240	46	5230
5.3 GHz Band	52	5260	54	5270
	56	5280	-	-
	64	5320	62	5310
5.6 GHz Band	100	5500	102	5510
	116	5580	110	5550
	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
5.2 GHz Band	IEEE802.11a: OFDM	6Mbps
	IEEE802.11n (HT20): OFDM	MCS0 (7.2Mbps)
	IEEE802.11n (HT40): OFDM	MCS0 (13.5Mbps)
5.3 GHz Band	IEEE802.11a: OFDM	6Mbps
	IEEE802.11n (HT20): OFDM	MCS0 (6.5Mbps)
	IEEE802.11n (HT40): OFDM	MCS0 (13.5Mbps)
5.6 GHz Band	IEEE802.11a: OFDM	6Mbps
	IEEE802.11n (HT20): OFDM	MCS0 (6.5Mbps)
	IEEE802.11n (HT40): OFDM	MCS0 (13.5Mbps)

The field strength of spurious emissions was measured at each position of all three axis X, Y and Z to compare the level, and the maximum noise.

The worst emission was found in Y axis and the worst case recorded.

Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports.

2.6 Operating flow

- Tx mode

- Test program setup to the DM tool
- Select a Test mode
Operating frequency: 5.2GHz Band, 5.3GHz Band, 5.6GHz Band
- Start test mode

- Rx mode

- Test program setup to the DM tool
- Select a Test mode
Operating frequency: 5.2GHz Band, 5.3GHz Band, 5.6GHz Band
- Start test mode

3 Configuration of Equipment

Numbers assigned to equipment on the diagram in “3.3 System configuration” correspond to the lists in “3.1 Equipment used” and “3.2 Cable(s) used”.

Cabling and setup(s) were taken into consideration and test data was taken under worse case condition.

3.1 Equipment used

No.	Equipment	Company	Model No.	Serial No.	FCC ID / DoC	Comment
1	Tablet	KYOCERA	KC-T302DT	N/A	JOYKB18	EUT
2	AC Adapter	SALOM ELECTRIC	ADT301	JS-MHA	N/A	*

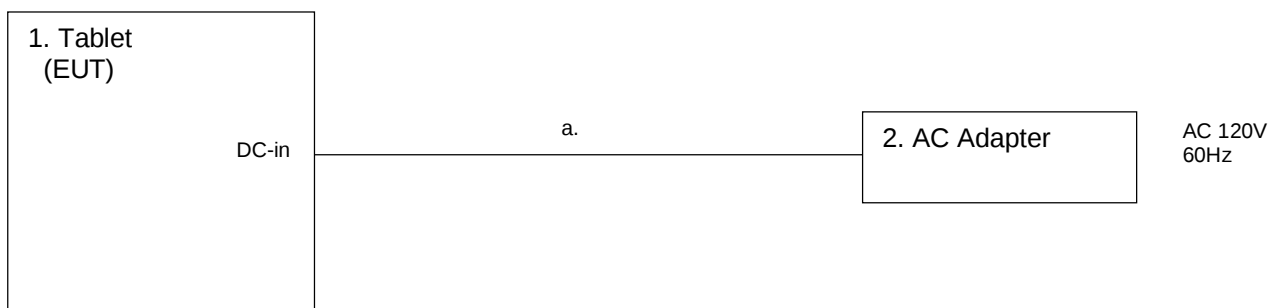
*: AC power line Conducted Emission Test.

3.2 Cable(s) used

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

*: AC power line Conducted Emission Test.

3.3 System configuration



4 Test Result

4.1 26dB Bandwidth and 99% Occupied Bandwidth

4.1.1 Measurement procedure

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

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

The spectrum analyzer is set to;

- RBW=200 kHz, VBW=620 kHz, Span=40 MHz
- Sweep=auto, Detector=Peak, Trace mode=Max hold

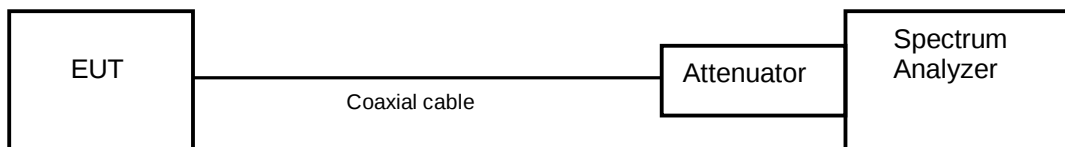
The EUT was set to operate with following conditions.

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

The test mode of EUT is as follows.

- Tx mode

- Test configuration



4.1.2 Limit

None

4.1.3 Measurement result

Date : 26-April-2019

Temperature : 20.5 [°C]

Humidity : 36.9 [%]

Test place : Shielded room No.4

Test engineer :

Chiaki Kanno

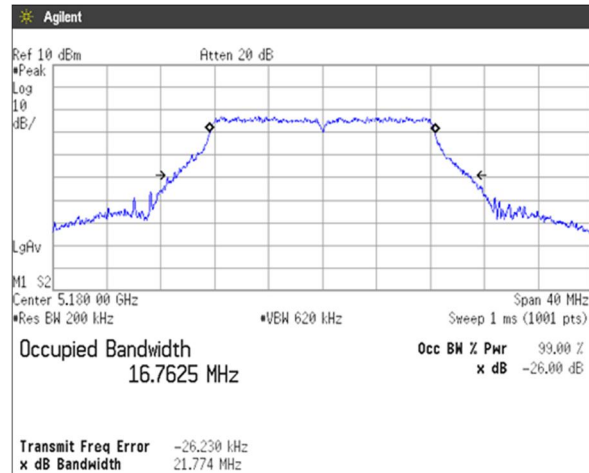
Mode	Band	Channel	Frequency (MHz)	26dB bandwidth (MHz)	99% Occupied bandwidth (MHz)
802.11a	5.2GHz Band	36	5180	21.774	16.7625
		40	5200	21.591	16.7512
		48	5240	21.864	16.7646
	5.3GHz Band	52	5260	21.873	16.7201
		56	5280	21.574	16.7299
		64	5320	21.785	16.7533
	5.6GHz Band	100	5500	21.875	16.7467
		116	5580	21.669	16.7602
		140	5700	21.410	16.7541

Mode	Band	Channel	Frequency (MHz)	26dB bandwidth (MHz)	99% Occupied bandwidth (MHz)
802.11n (20MHz)	5.2GHz Band	36	5180	21.817	17.8326
		40	5200	21.728	17.8246
		48	5240	21.886	17.8535
	5.3GHz Band	52	5260	22.023	17.8397
		56	5280	22.135	17.8162
		64	5320	21.753	17.7908
	5.6GHz Band	100	5500	21.997	17.7947
		116	5580	21.957	17.8220
		140	5700	22.045	17.8073

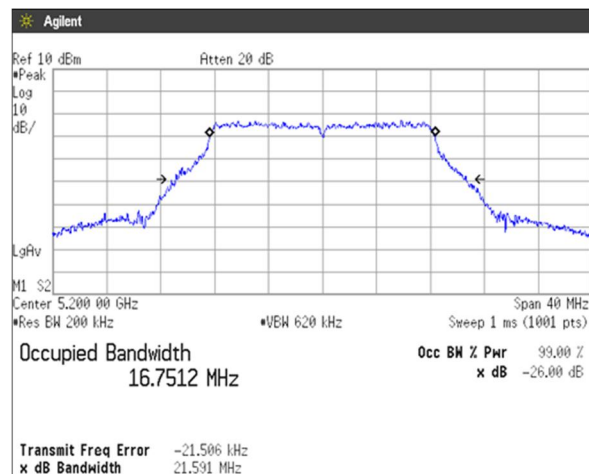
Mode	Band	Channel	Frequency (MHz)	26dB bandwidth (MHz)	99% Occupied bandwidth (MHz)
802.11n (40MHz)	5.2GHz Band	38	5190	43.552	36.1741
		46	5230	43.483	36.1363
	5.3GHz Band	54	5270	42.965	36.1536
		62	5310	42.647	36.1843
	5.6GHz Band	102	5510	43.736	36.1616
		110	5550	43.888	36.1939
		134	5670	43.228	36.1970

4.1.4 Trace data

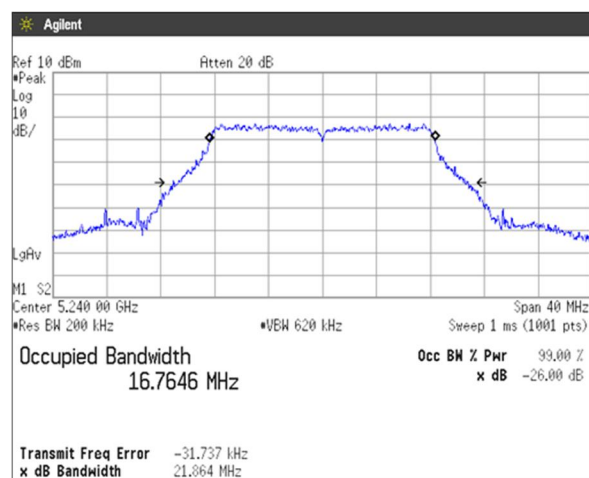
**[IEEE802.11a]
(5.2 GHz Band)
Channel: 36**



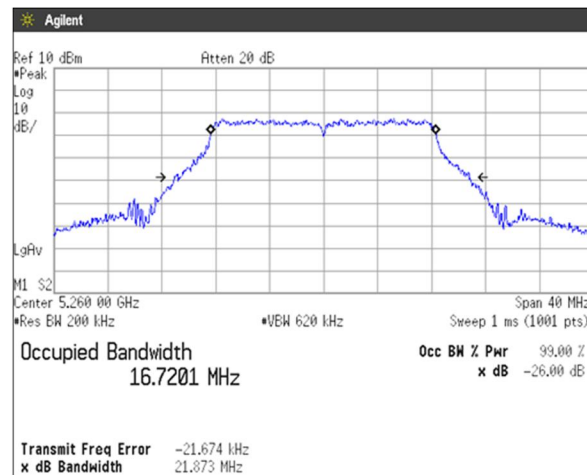
Channel: 40



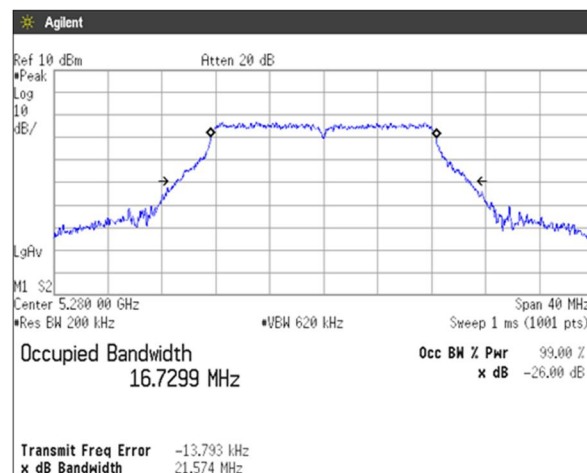
Channel: 48



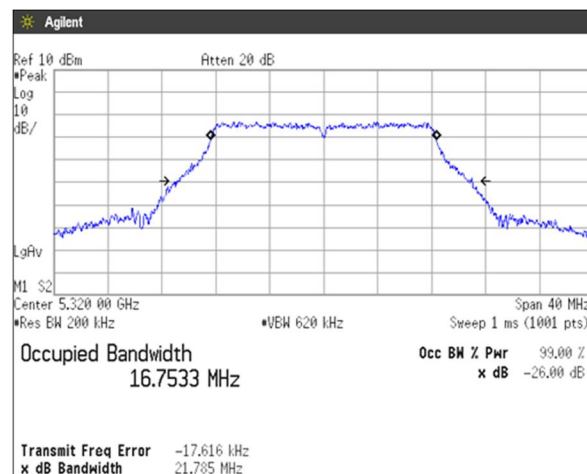
(5.3 GHz Band)
Channel: 52



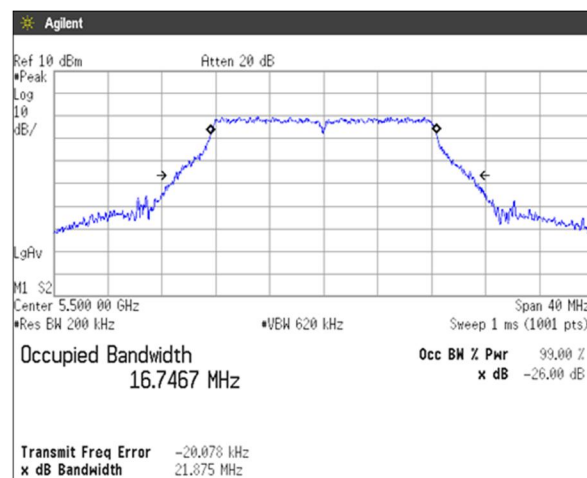
Channel: 56



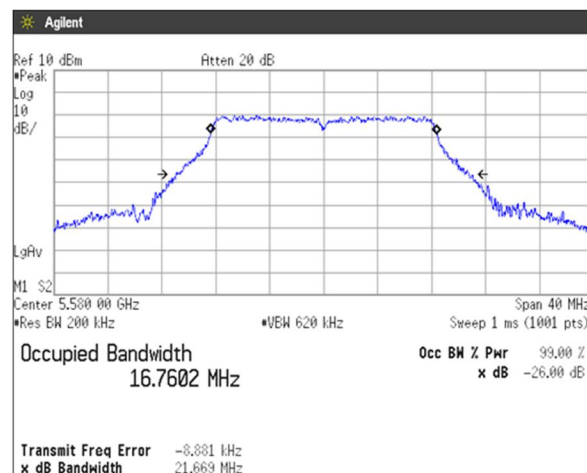
Channel: 64



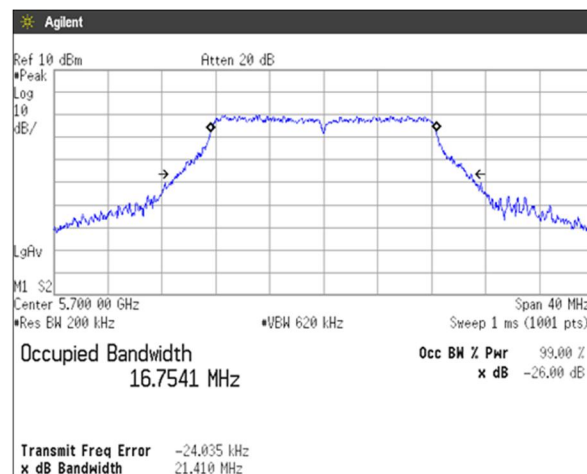
(5.6 GHz Band)
Channel: 100



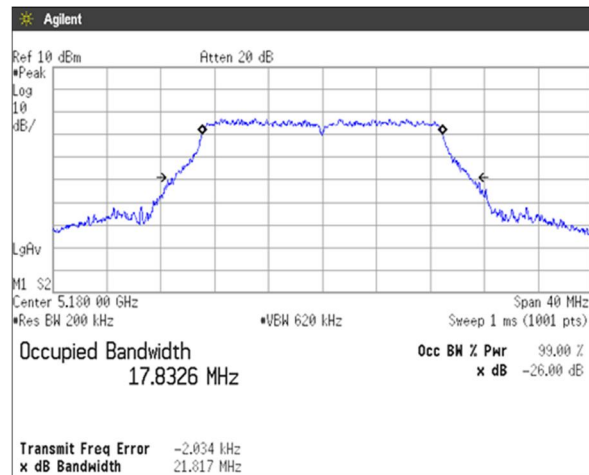
Channel: 116



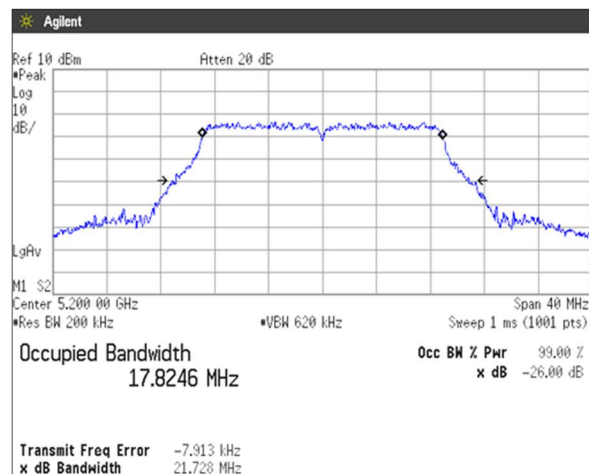
Channel: 140



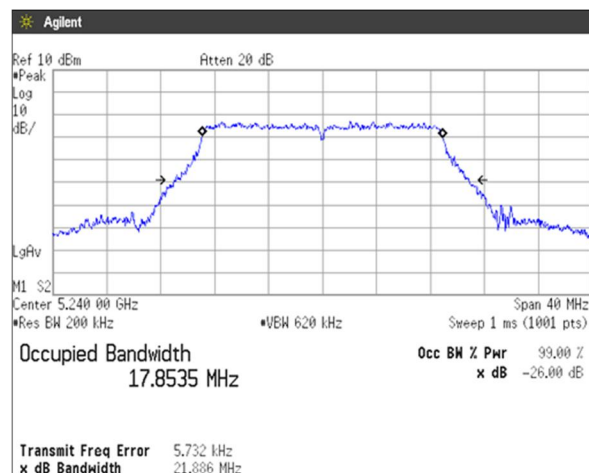
[IEEE802.11n (HT20)]
(5.2 GHz Band)
Channel: 36



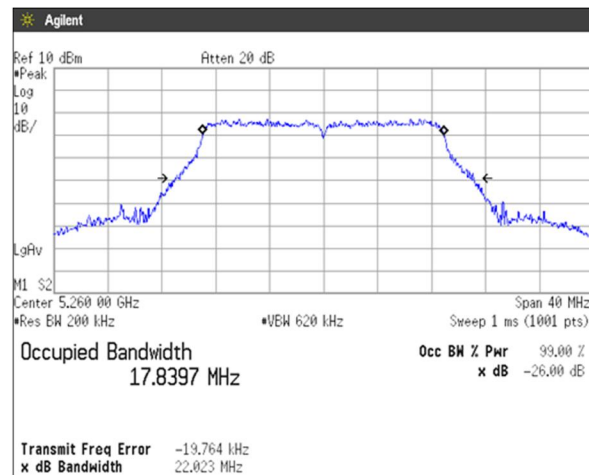
Channel: 40



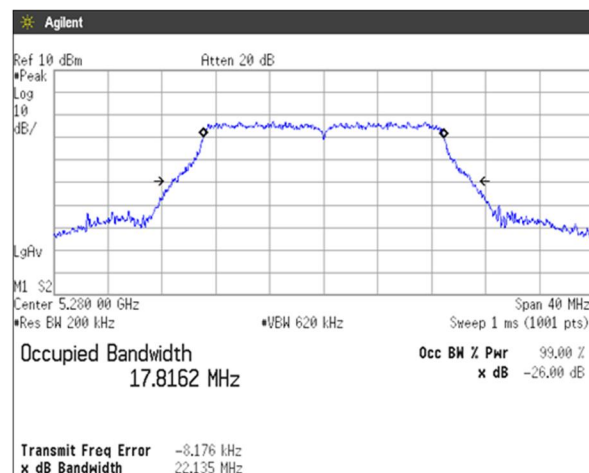
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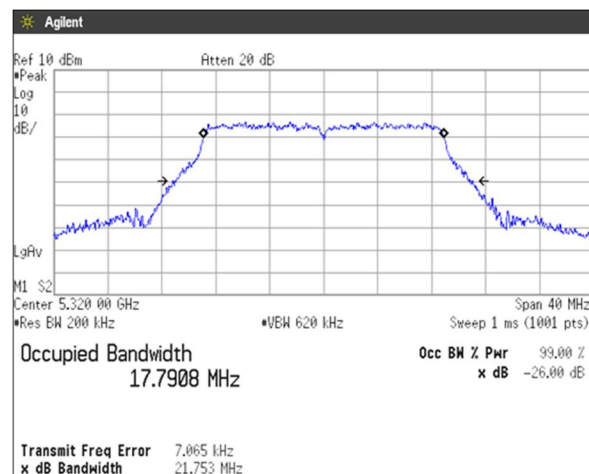
(5.3 GHz Band)
Channel: 52



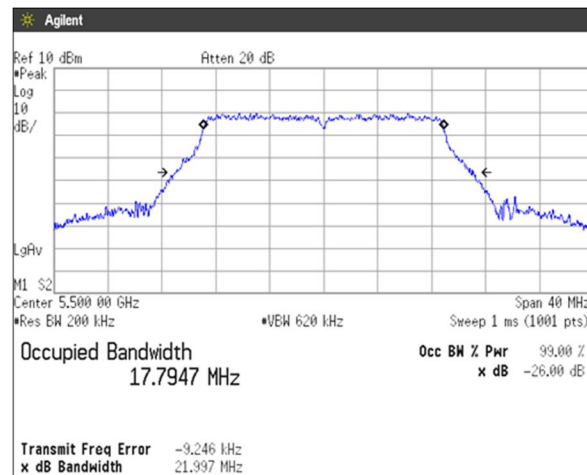
Channel: 56



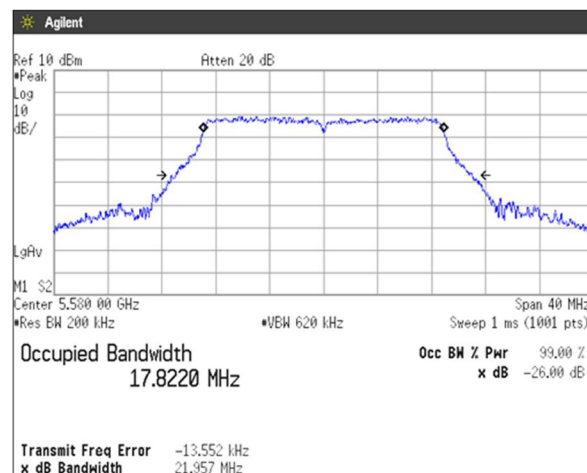
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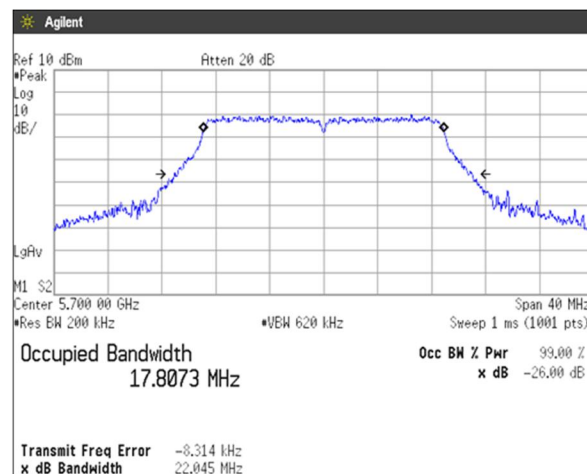
(5.6 GHz Band)
Channel: 100



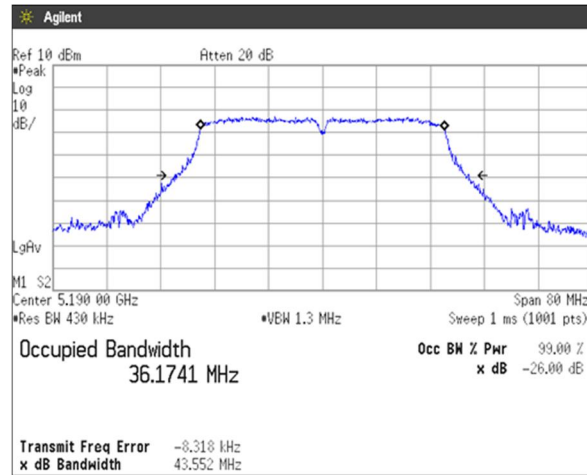
Channel: 116



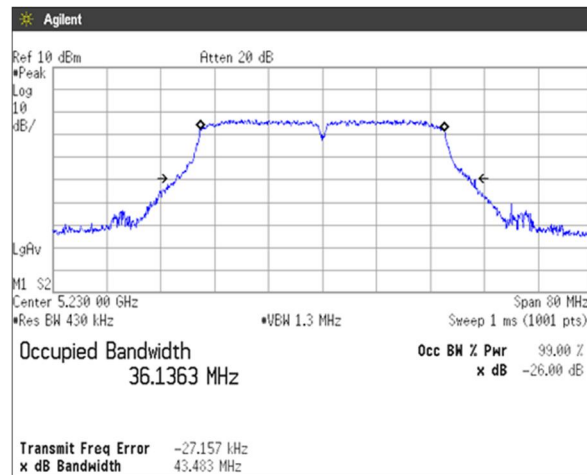
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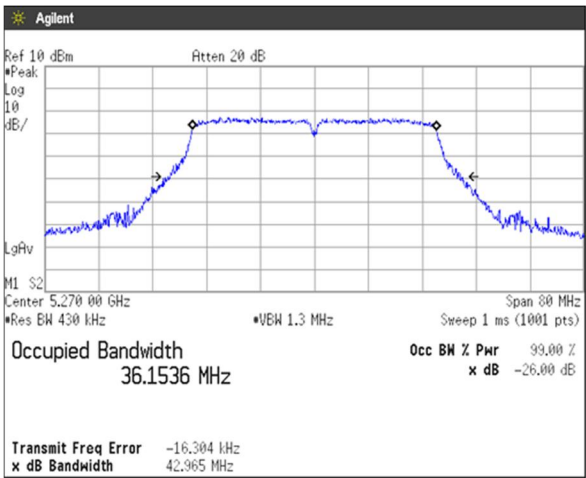
[IEEE802.11n (HT40)]
(5.2 GHz Band)
Channel: 38



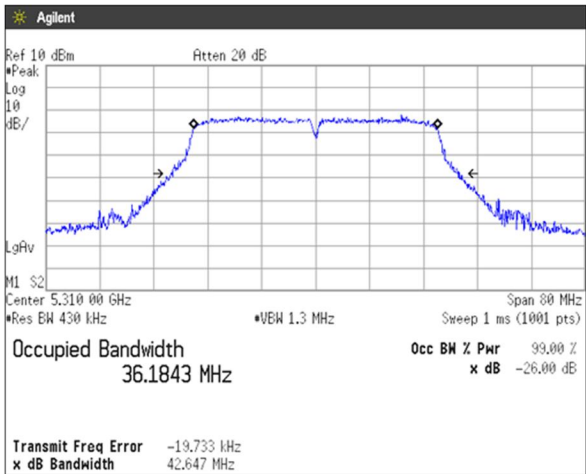
Channel: 46



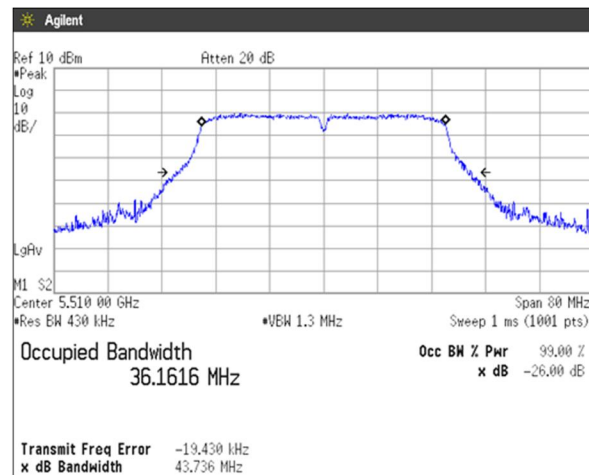
(5.3 GHz Band)
Channel: 54



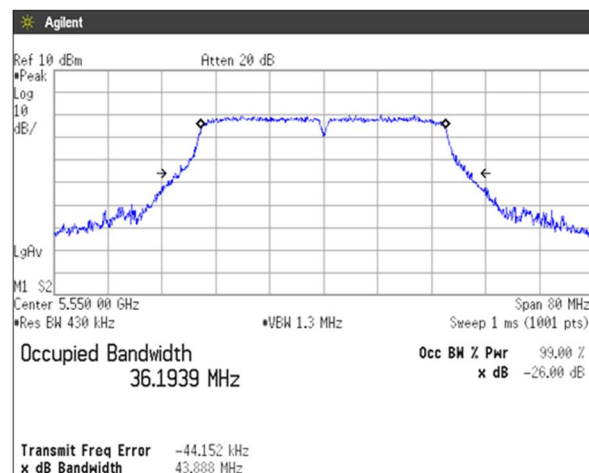
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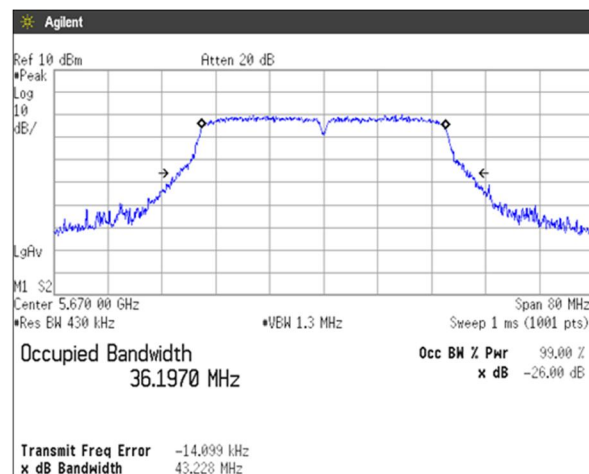
(5.6 GHz Band)
Channel: 102



Channel: 110



Channel: 134



4.2 Maximum Conducted Output Power

4.2.1 Measurement procedure

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

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

The spectrum analyzer is set to;

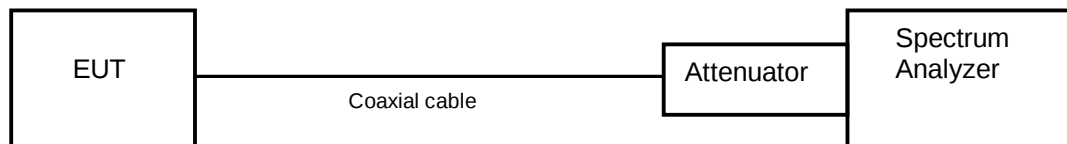
- RBW=1MHz, VBW=3MHz, Span=35MHz/70MHz/140MHz, Sweep=auto, Detector=RMS, Trace mode=Averaging

The EUT was set to operate with following conditions.

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

The test mode of EUT is as follows.

- Tx mode
- Test configuration



4.2.2 Limit

- (1) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250mW provided the maximum antenna gain does not exceed 6 dBi.
- (2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250mW or $11\text{dBm} + 10\log B$, where B is the 2 dB emission bandwidth in megahertz.
- (3) For the 5.725-5.85 GHz bands, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

<Output Power Limit Calculation>

Band	Mode	Power Limit (mW)	Calculated Limit (dBm)	Antenna Gain (dBi)	Determined Limit (dBm)
5.2GHz Band	802.11a	250	23.97	3.8	23.97
	802.11n HT20				
	802.11n HT40				

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	3.8	23.97
		21.574	24.34		
	802.11n HT20	250	23.97		23.97
		21.753	24.38		
	802.11n HT40	250	23.97		23.97
		42.647	27.30		

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	3.5	23.97
		21.410	24.31		
	802.11n HT20	250	23.97		23.97
		21.957	24.42		
	802.11n HT40	250	23.97		23.97
		43.228	27.36		

4.2.3 Measurement result

Date : 09-May-2019

Temperature : 20.5 [°C]

Humidity : 36.9 [%]

Test place : Shielded room No.4

Test engineer :

Taiki Watanabe

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	8.42	1.364	1.372	0.994	0.025	8.445	6.991
	40	5200	8.61					8.635	7.304
	48	5240	8.78					8.805	7.595
	52	5260	9.04	1.364	1.372	0.994	0.025	9.065	8.064
	56	5280	8.61					8.635	7.304
	64	5320	8.29					8.315	6.785
	100	5500	11.37	1.364	1.372	0.994	0.025	11.395	13.789
	116	5580	11.27					11.295	13.475
	140	5700	11.28					11.305	13.506

Note: Output Power Value = Reading value on average power meter + cable and attenuator factor

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	8.50	1.274	1.284	0.992	0.034	8.534	7.135
	40	5200	8.48					8.514	7.102
	48	5240	8.87					8.904	7.770
	52	5260	8.90	1.276	1.284	0.994	0.027	8.927	7.811
	56	5280	8.53					8.557	7.173
	64	5320	8.71					8.737	7.477
	100	5500	11.52	1.276	1.284	0.994	0.027	11.547	14.280
	116	5580	11.26					11.287	13.450
	140	5700	11.28					11.307	13.512

Note: Output Power Value = Reading value on average power meter + cable and attenuator factor

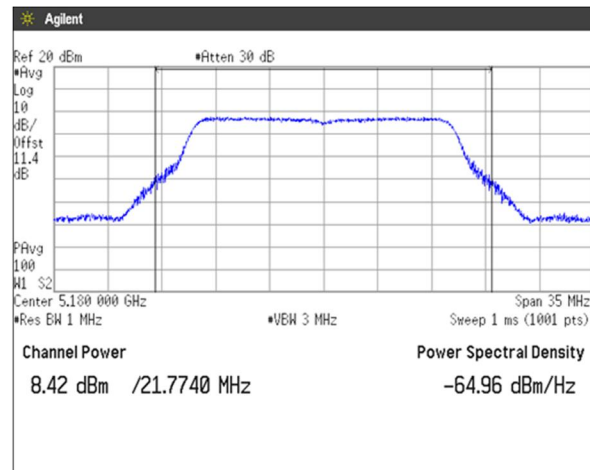
Mode	Channel	Frequency (MHz)	Reading (dBm)	Duty Cycle			DCF (dB)	Test Result (dBm)	Test Result (mW)
				On Time(ms)	On+Off Time(ms)	X			
802.11n (40MHz)	38	5190	8.67	0.635	0.645	0.984	0.068	8.738	7.478
	46	5230	8.43					8.498	7.076
	54	5270	8.75	0.635	0.645	0.984	0.068	8.818	7.617
	62	5310	8.56					8.628	7.291
	102	5510	11.37	0.635	0.645	0.984	0.068	11.438	13.925
	110	5550	11.11					11.178	13.116
	134	5670	11.31					11.378	13.734

Note: Output Power Value = Reading value on average power meter + cable and attenuator factor

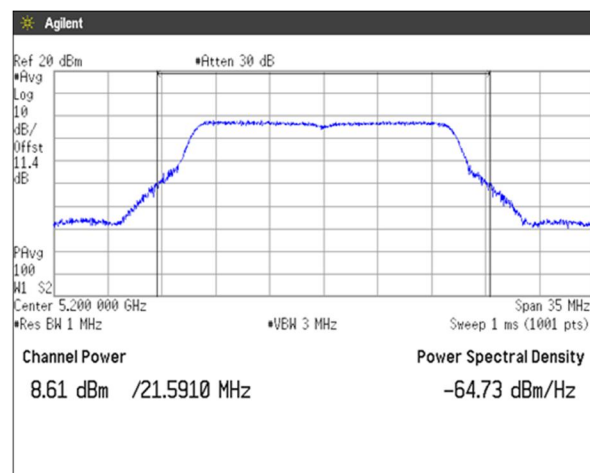
4.2.4 Trace data

[IEEE802.11a]
(5.2GHz Band)

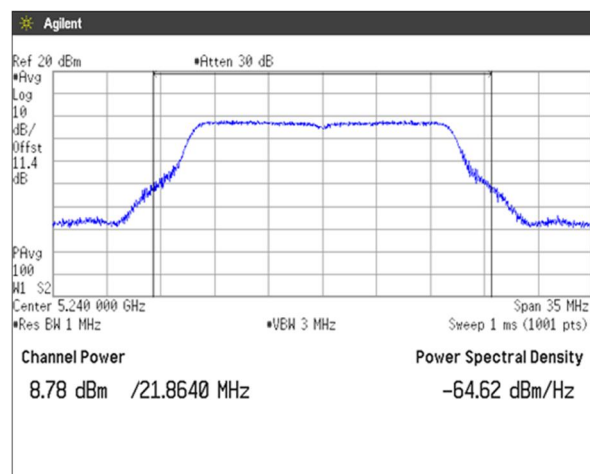
Channel: 36



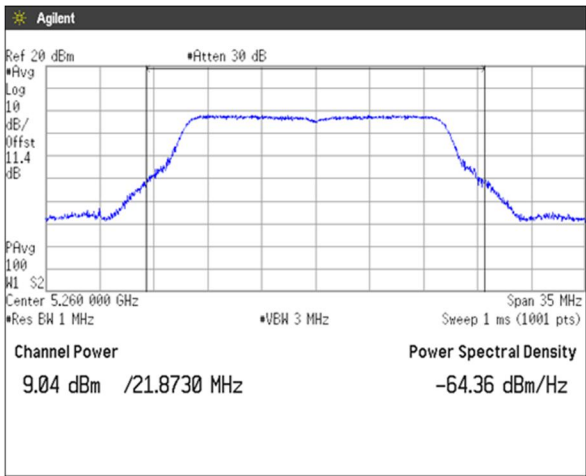
Channel: 40



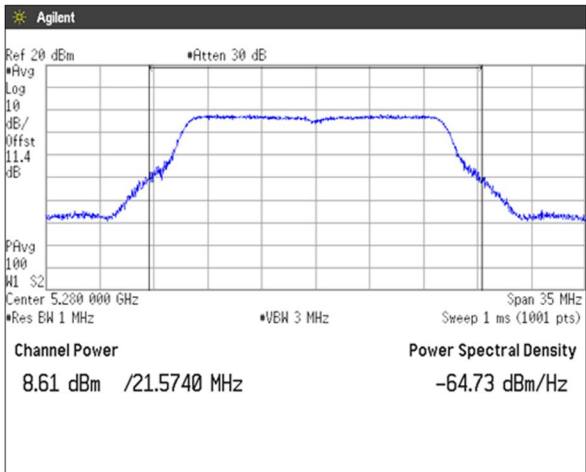
Channel: 48



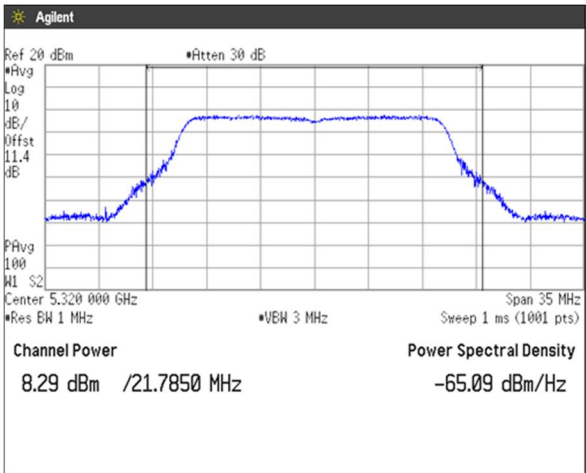
(5.3GHz Band)
Channel: 52



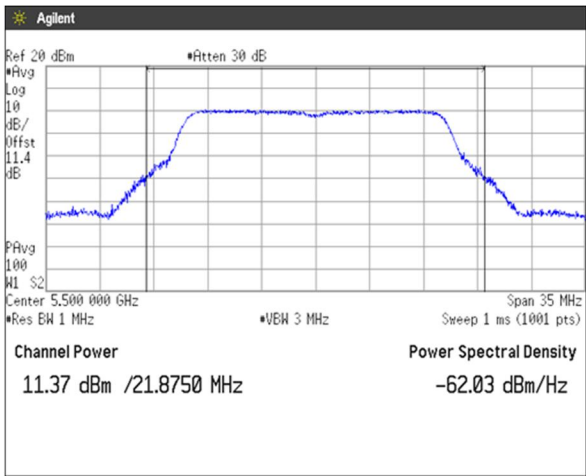
Channel: 56



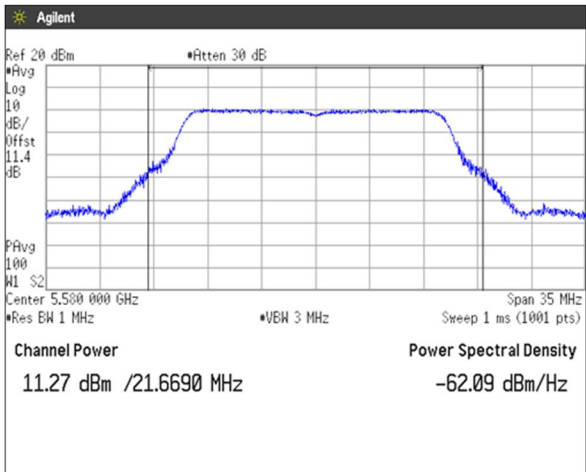
Channel: 64



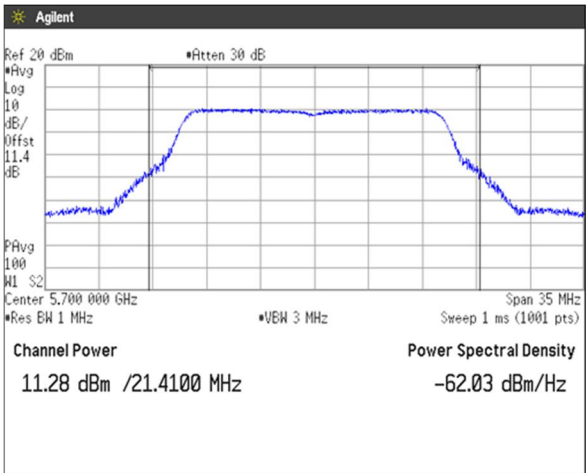
(5.6GHz Band)
Channel: 100



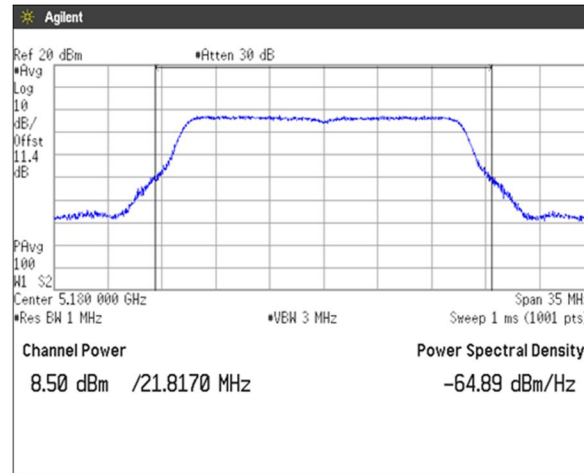
Channel: 116



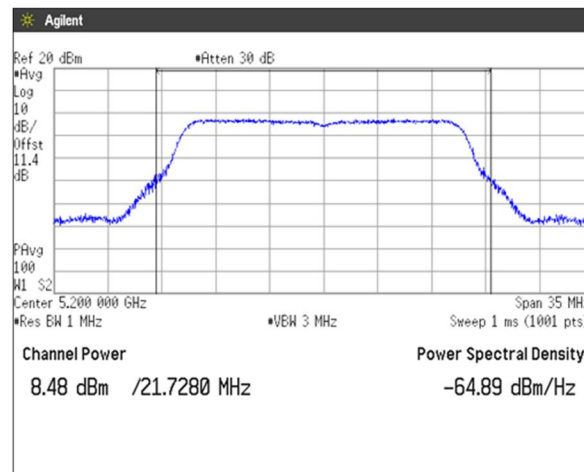
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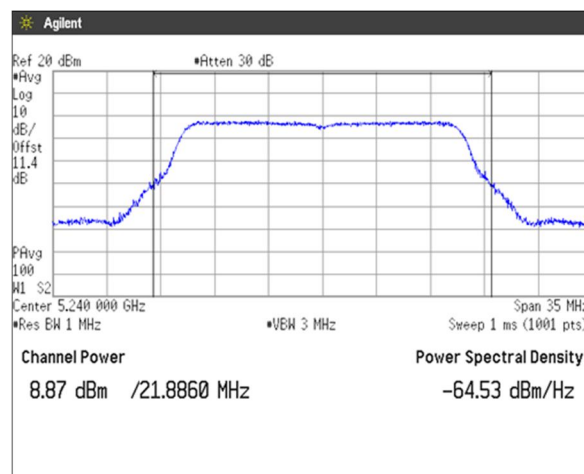
[IEEE802.11n (HT20)]
(5.2GHz Band)
Channel: 36



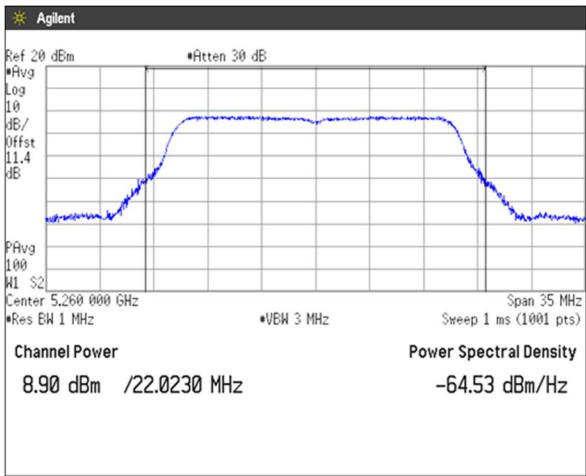
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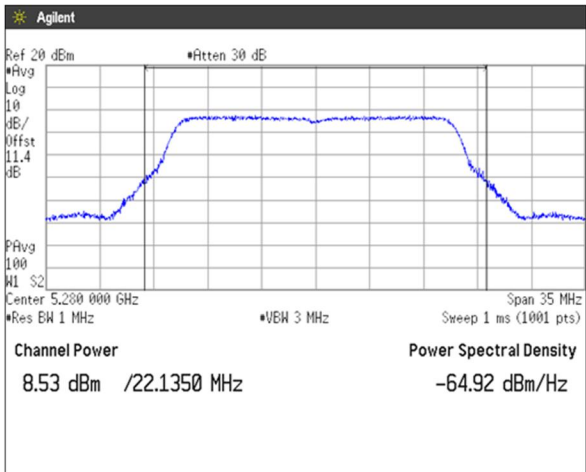
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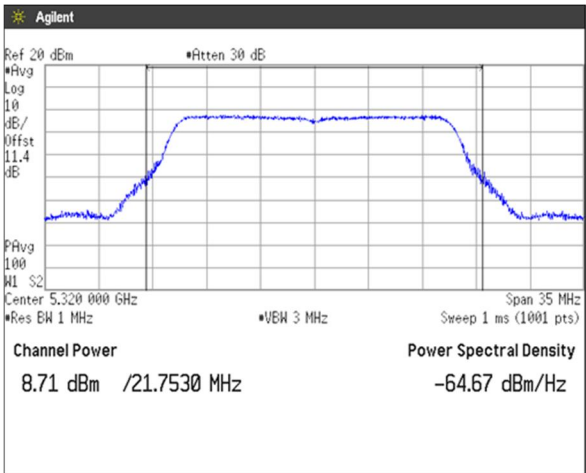
(5.3GHz Band)
Channel: 52



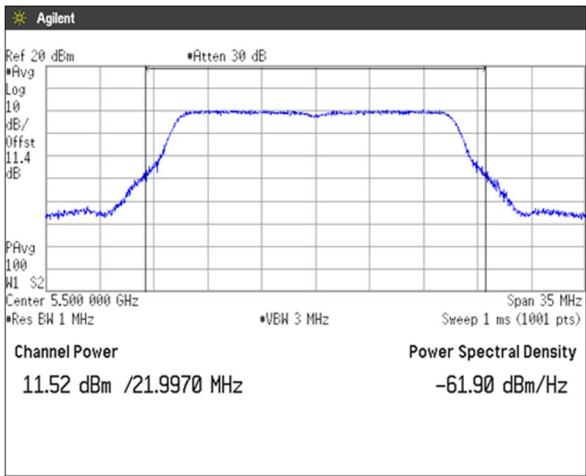
Channel: 56



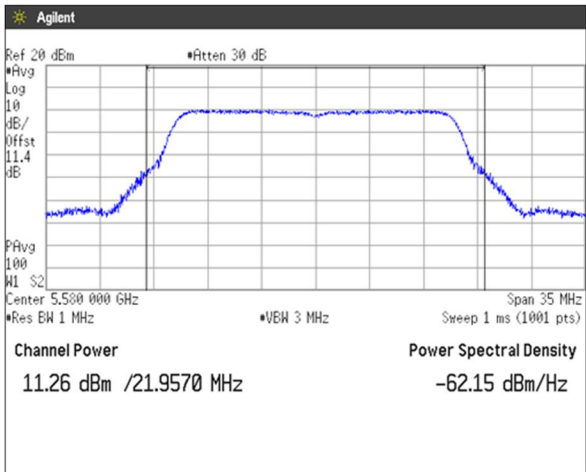
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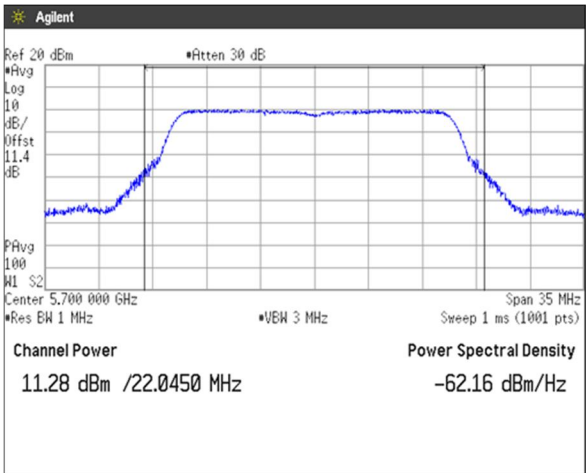
(5.6GHz Band)
Channel: 100



Channel: 116

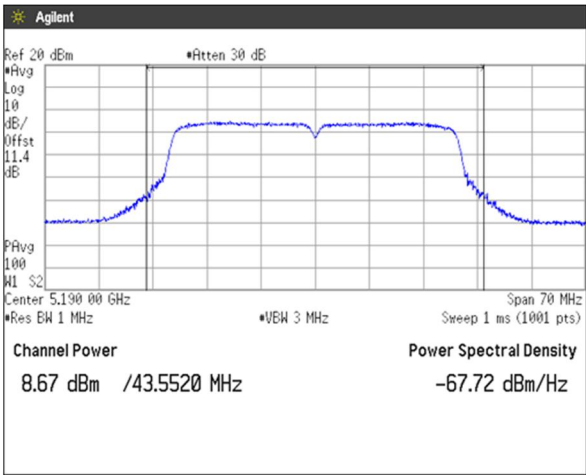


Channel: 140

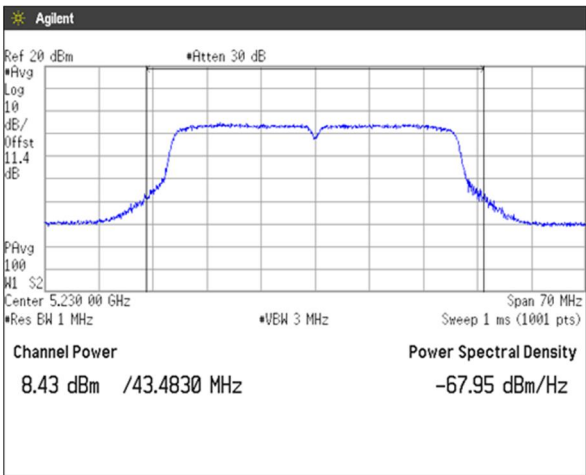


[IEEE802.11n (HT40)]
(5.2GHz Band)

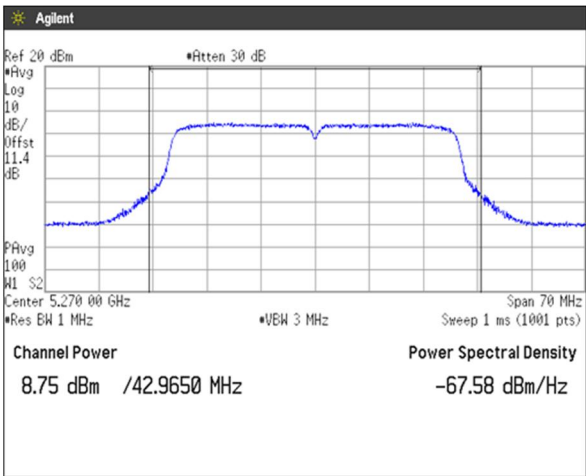
Channel: 38



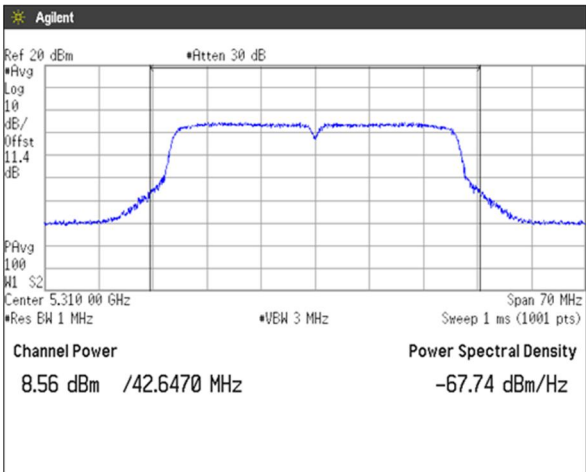
Channel: 46



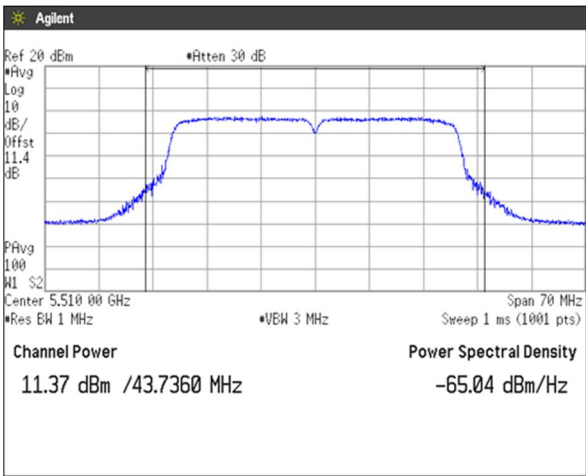
(5.3GHz Band)
Channel: 54



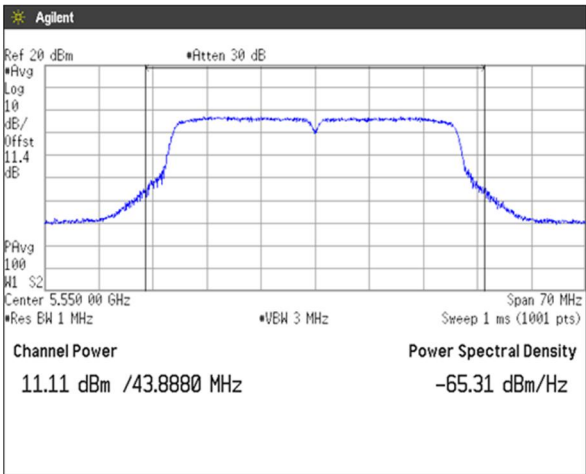
Channel: 62



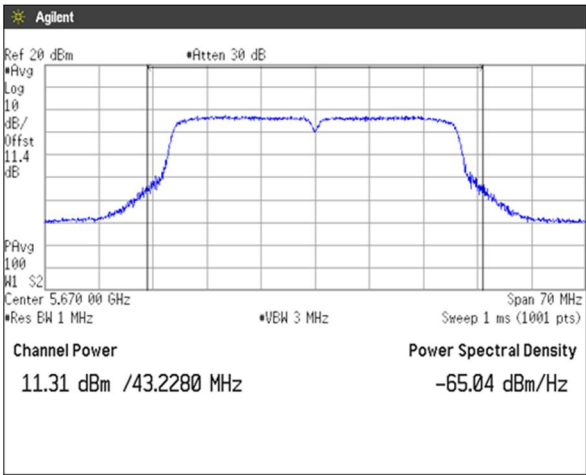
(5.6GHz Band)
Channel: 102



Channel: 110



Channel: 134



4.3 Peak Power Spectral Density

4.3.1 Measurement procedure

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

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

The spectrum analyzer is set to;

- RBW=1 MHz, VBW=3 MHz, Span=25 MHz, Sweep=Auto,
- Detector=RMS, Trace mode=Averaging

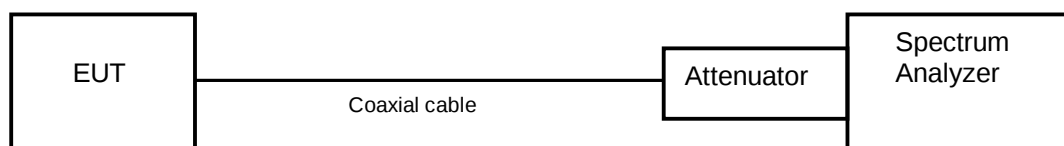
The EUT was set to operate with following conditions.

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

The test mode of EUT is as follows.

- Tx mode

- Test configuration



4.3.2 Limit

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

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

(3) For the 5.725-5.85 GHz bands, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.

However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirection applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

<Peak Power Spectral Density Limit Calculation>

Band	Antenna Gain (dBi)	Limit
5.2 GHz Band	3.8	14.8 dBm/MHz
5.3 GHz Band	3.8	14.8 dBm/MHz
5.6 GHz Band	3.5	14.5 dBm/MHz

4.3.3 Measurement result

Date : 8-May-2019

Temperature : 23.6 [°C]

Humidity : 46.1 [%]

Test place : Shielded room No.4

Test engineer :

Taiki Watanabe

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	-1.907	1.364	1.372	0.994	0.025	-1.882
	40	5200	-2.270					-2.245
	48	5240	-1.628					-1.603
	52	5260	-1.472	1.364	1.372	0.994	0.025	-1.447
	56	5280	-2.160					-2.135
	64	5320	-2.249					-2.224
	100	5500	0.959	1.364	1.372	0.994	0.025	0.984
	116	5580	0.469					0.494
	140	5700	0.568					0.593

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

Note 2: Test Result = Reading + DCF

Mode	Channel	Frequency (MHz)	Reading (dBm)	Duty Cycle			DCF (dB)	Test Result (dBm)
				On Time(ms)	On+Off Time(ms)	X		
802.11n (20MHz)	36	5180	-2.415	1.274	1.284	0.992	0.034	-2.381
	40	5200	-2.486					-2.452
	48	5240	-2.325					-2.291
	52	5260	-1.926	1.276	1.284	0.994	0.027	-1.899
	56	5280	-2.316					-2.289
	64	5320	-2.221					-2.194
	100	5500	0.314	1.276	1.284	0.994	0.027	0.341
	116	5580	0.331					0.358
	140	5700	0.238					0.265

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

Note 2: Test Result = Reading + DCF

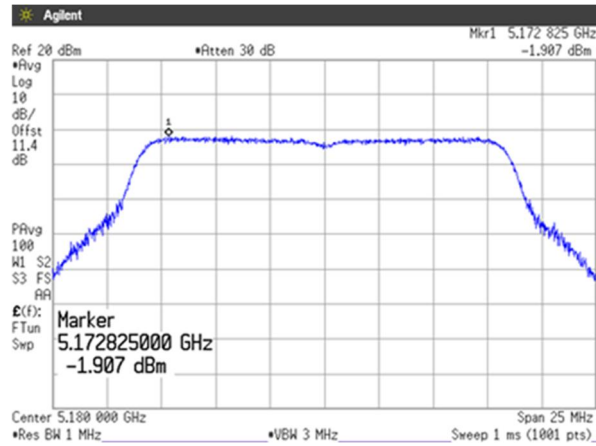
Mode	Channel	Frequency (MHz)	Reading (dBm)	Duty Cycle			DCF (dB)	Test Result (dBm)
				On Time(ms)	On+Off Time(ms)	X		
802.11n (40MHz)	38	5190	-5.221	0.635	0.645	0.984	0.068	-5.153
	46	5230	-5.627					-5.559
	54	5270	-4.557	0.635	0.645	0.984	0.068	-4.489
	62	5310	-5.513					-5.445
	102	5510	-2.356	0.635	0.645	0.984	0.068	-2.288
	110	5550	-2.318					-2.250
	134	5670	-2.532					-2.464

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

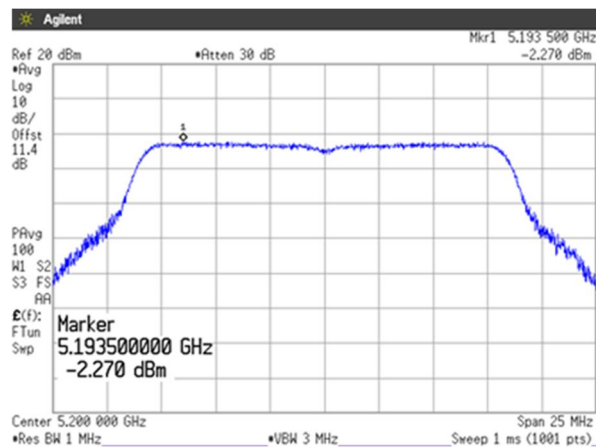
Note 2: Test Result = Reading + DCF

4.3.4 Trace data

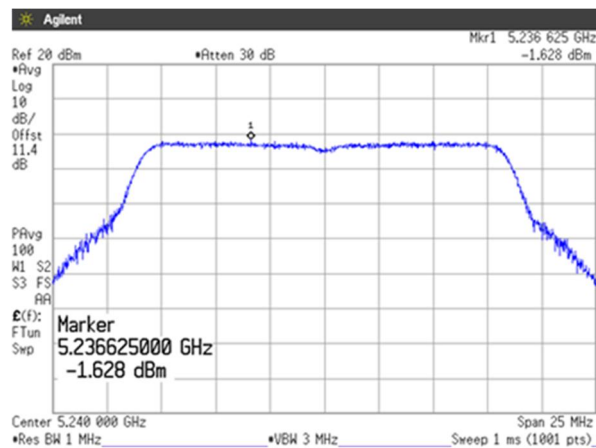
[IEEE802.11a]
(5.2 GHz Band)
Channel: 36



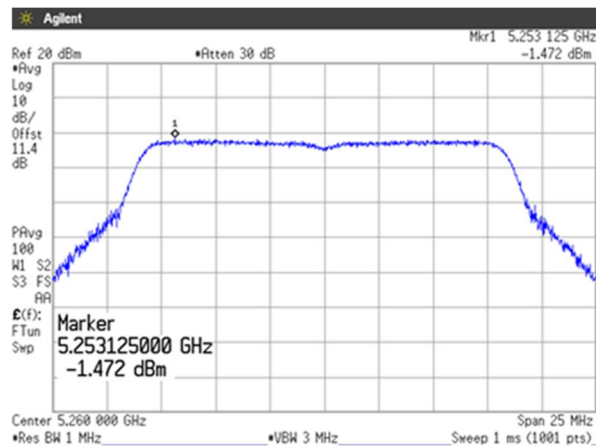
Channel: 40



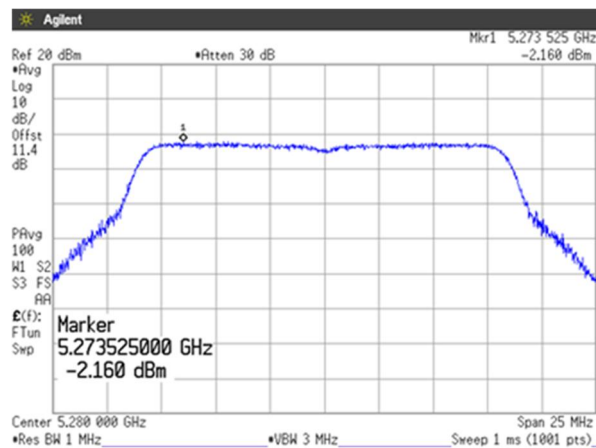
Channel: 48



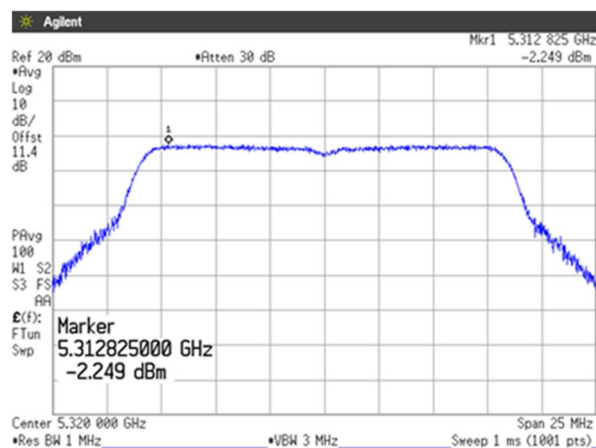
(5.3 GHz Band)
Channel: 52



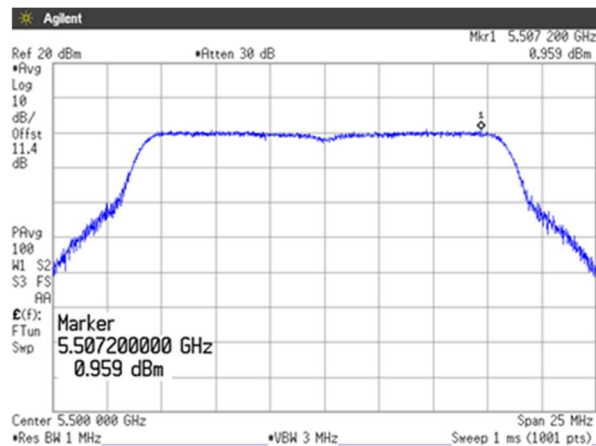
Channel: 56



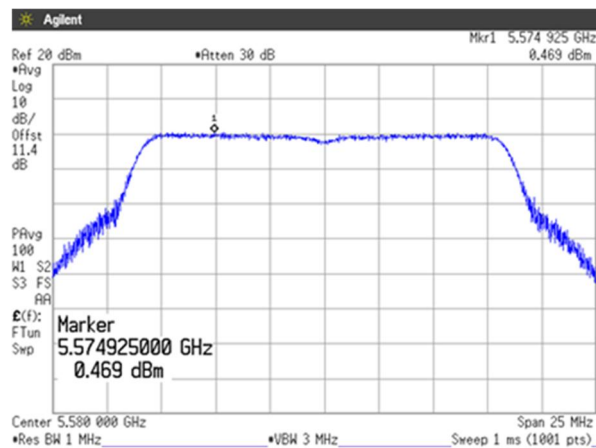
Channel: 64



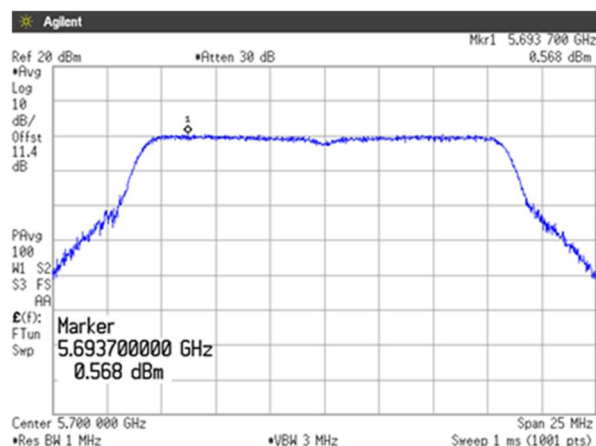
(5.6 GHz Band)
Channel: 100



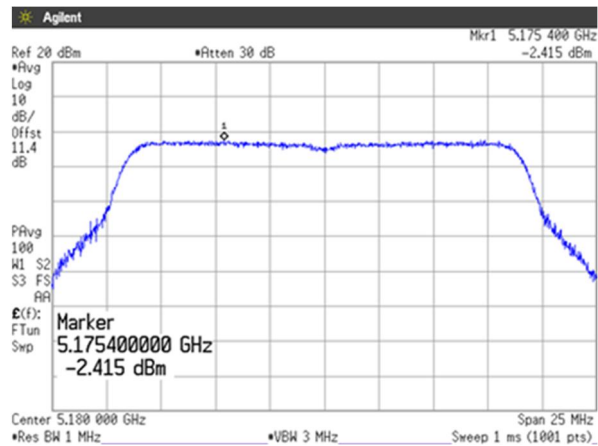
Channel: 116



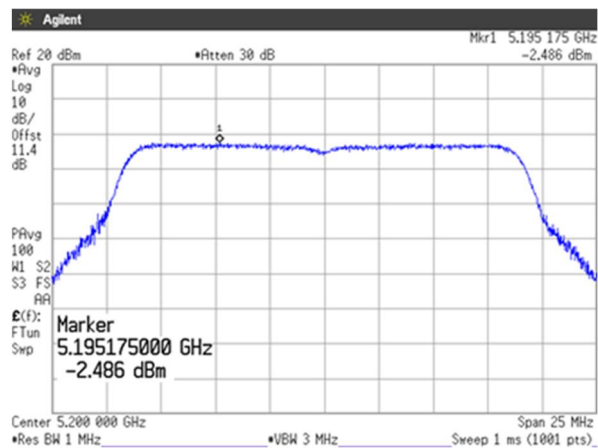
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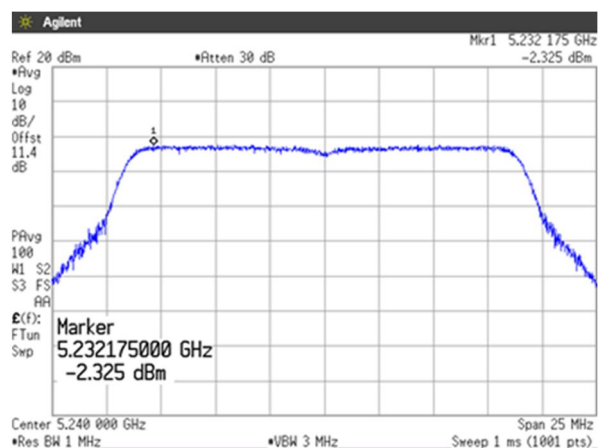
[IEEE802.11n (HT20)]
(5.2 GHz Band)
Channel: 36



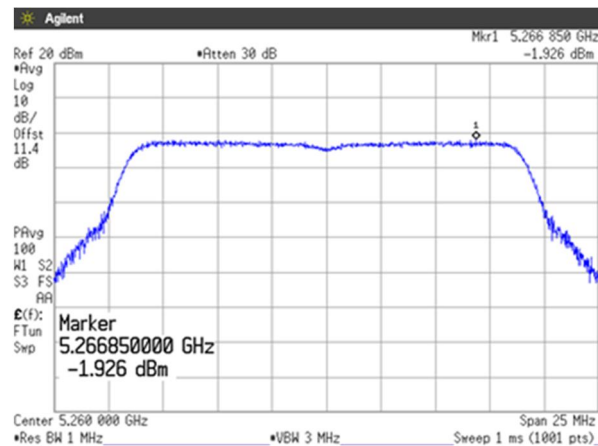
Channel: 40



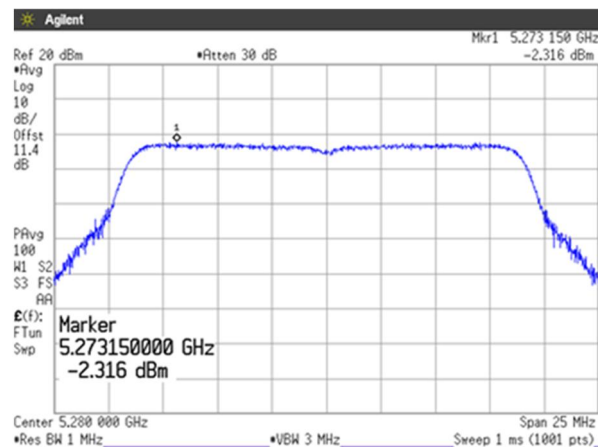
Channel: 48



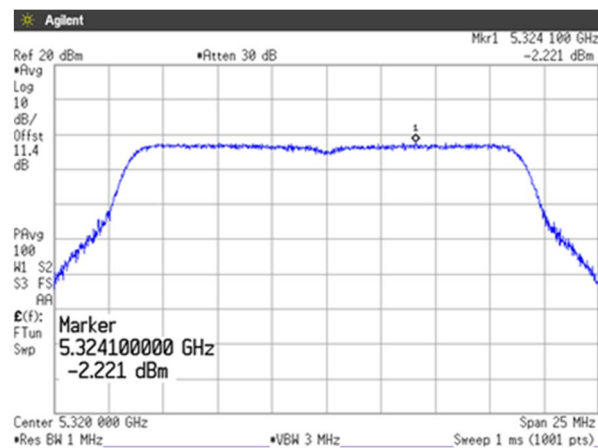
(5.3 GHz Band)
Channel: 52



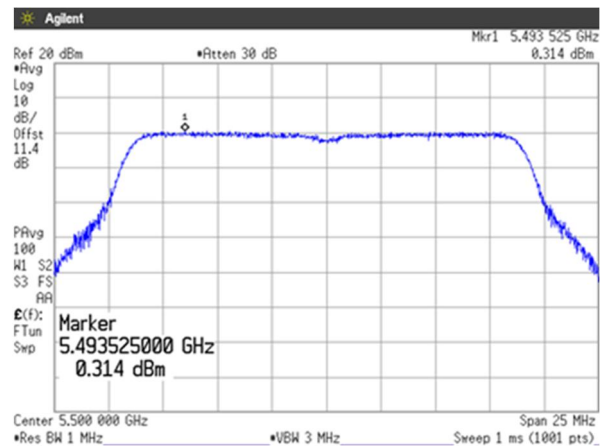
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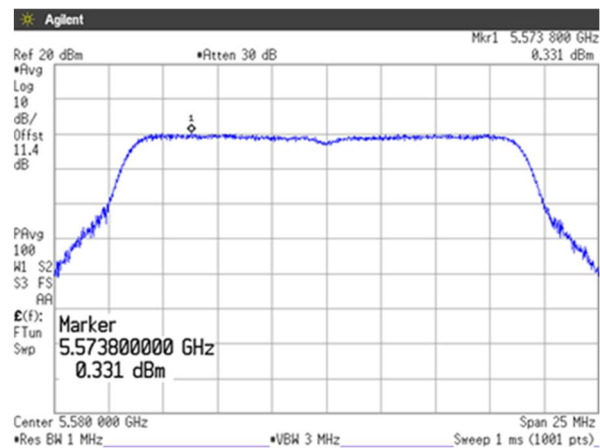
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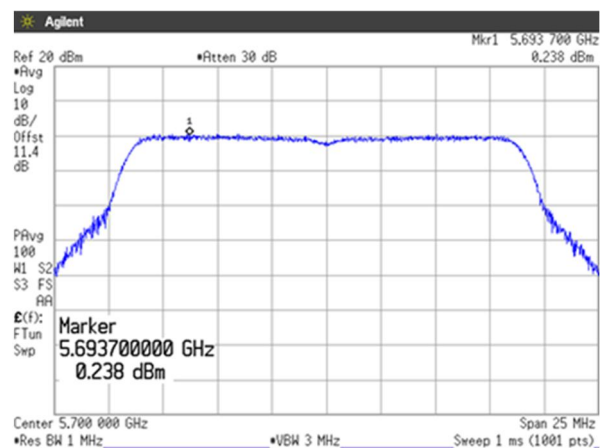
(5.6 GHz Band)
Channel: 100



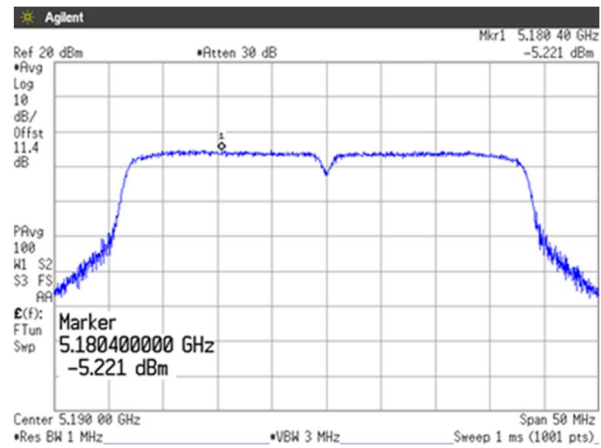
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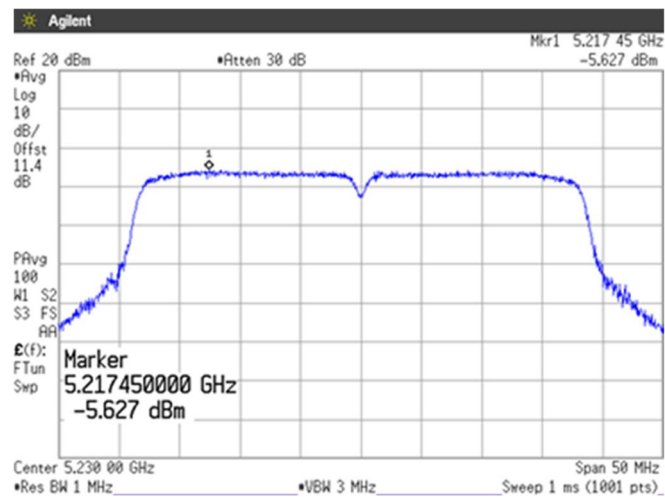
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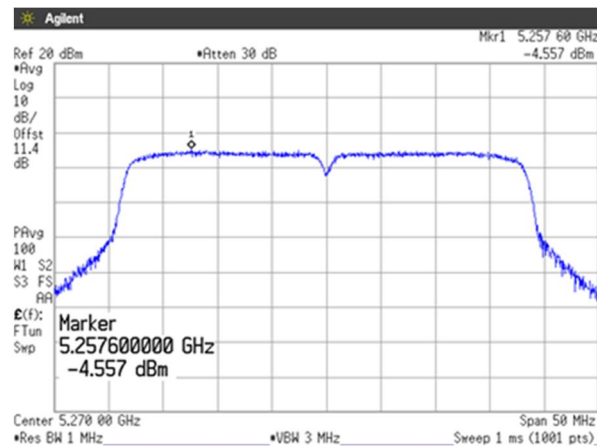
[IEEE802.11n (HT40)]
(5.2 GHz Band)
Channel: 38



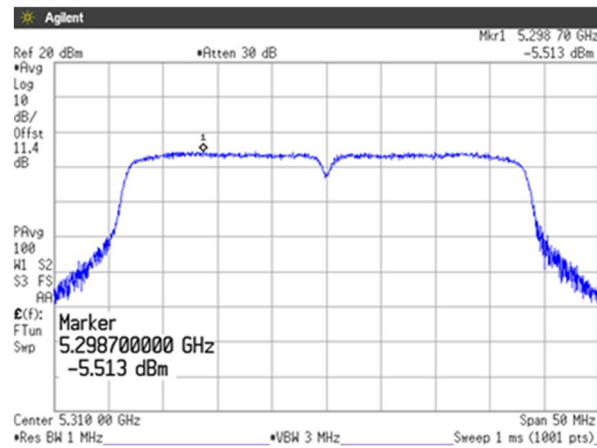
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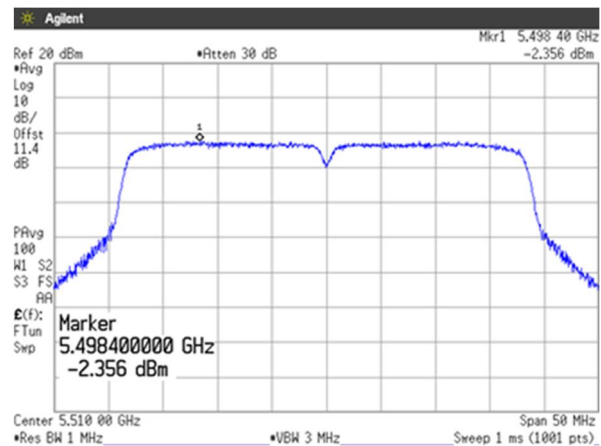
(5.3 GHz Band)
Channel: 54



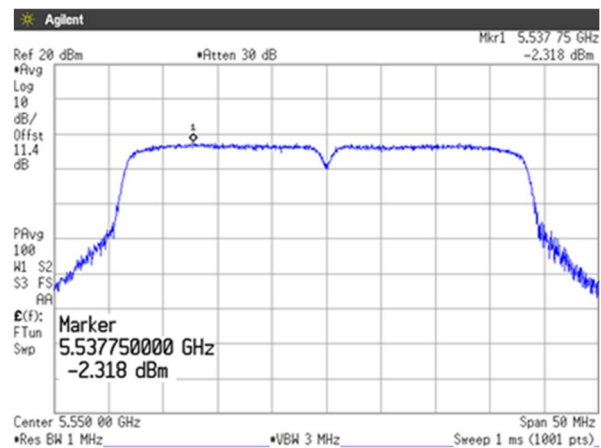
Channel: 62



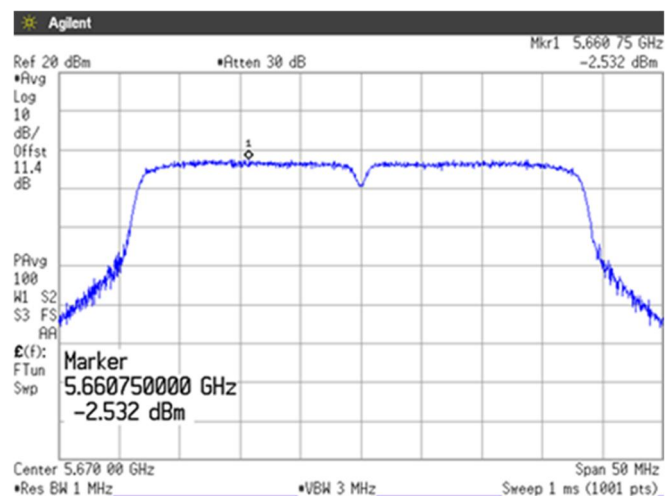
(5.6 GHz Band)
Channel: 102



Channel: 110



Channel: 134



4.4 Radiated Emissions (Restricted Bands of Operation)

4.4.1 Measurement procedure

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

Test was applied by following conditions.

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

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

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

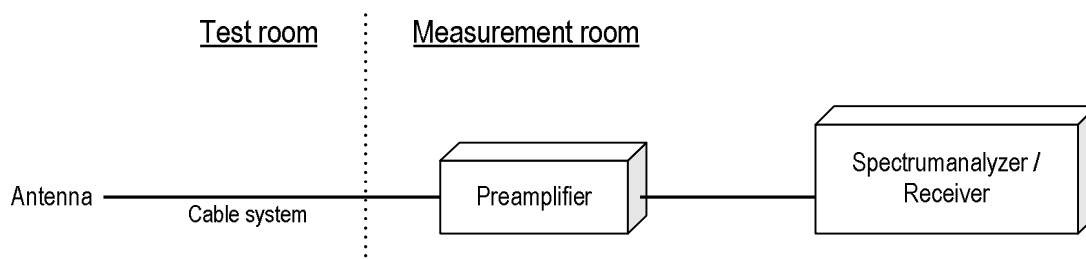
The EUT was set to operate with following conditions.

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

The test mode of EUT is as follows.

- Tx mode, Rx mode

- Test configuration



Duty cycle result

Mode	Band	On Time(ms)	On+Off Time(ms)	Duty Cycle (%)	DCF (dB)
802.11a	W52	1.364	1.372	99.4	0.051
	W53	1.364	1.372	99.4	0.051
	W56	1.364	1.372	99.4	0.051
802.11n (20MHz)	W52	1.274	1.284	99.2	0.068
	W53	1.276	1.284	99.4	0.054
	W56	1.276	1.284	99.4	0.054
802.11n (40MHz)	W52	0.635	0.645	98.4	0.136
	W53	0.635	0.645	98.4	0.136
	W56	0.635	0.645	98.4	0.136

4.4.2 Calculation method

[150 kHz to 25 GHz]

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

Margin = Limit - Emission level

Example:

Detector: Peak

Limit @ 5147.0 MHz: 74.0 dBuV/m (Peak Limit)

S.A Reading = 40.9 dBuV Cable system loss = 16.4 dB

Result = 40.9 + 16.4 = 57.3 dBuV/m

Margin = 74.0 - 57.3 = 16.7 dB

4.4.3 Limit

- (1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.
- (3) For transmitters operating in the 5.47-5.725GHz band: all emissions outside of the 5.47 5-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.

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

Note:

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

4.4.4 Test data

Date : 18-May-2019
 Temperature : 20.2 [°C]
 Humidity : 50.6 [%]
 Test place : 3m Semi-anechoic chamber

Test engineer : Chiaki Kanno

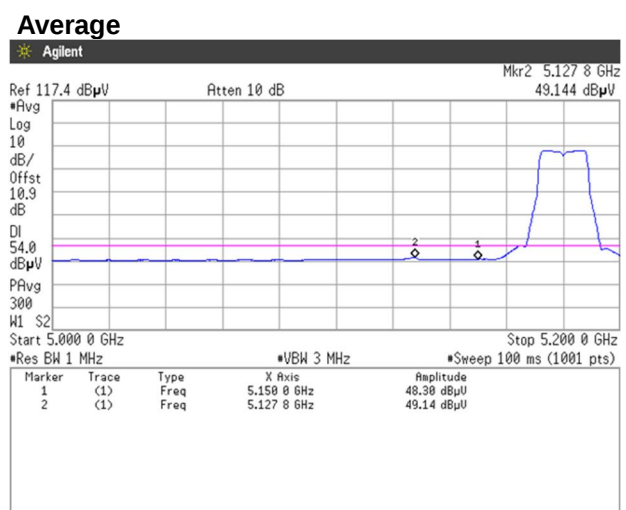
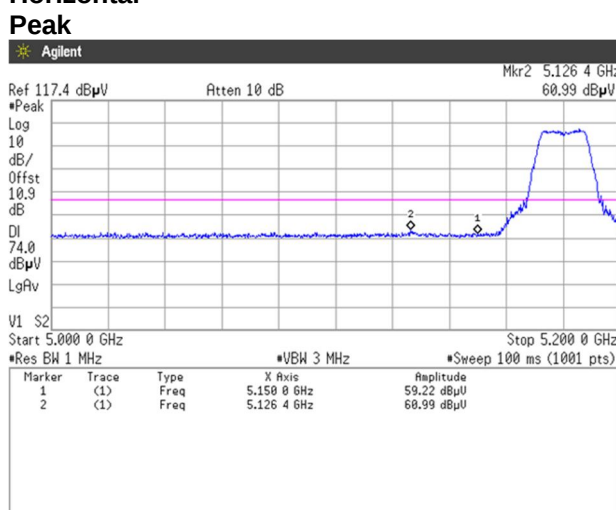
Date : 120-May-2019
 Temperature : 21.1 [°C]
 Humidity : 47.4 [%]
 Test place : 3m Semi-anechoic chamber

Test engineer : Chiaki Kanno

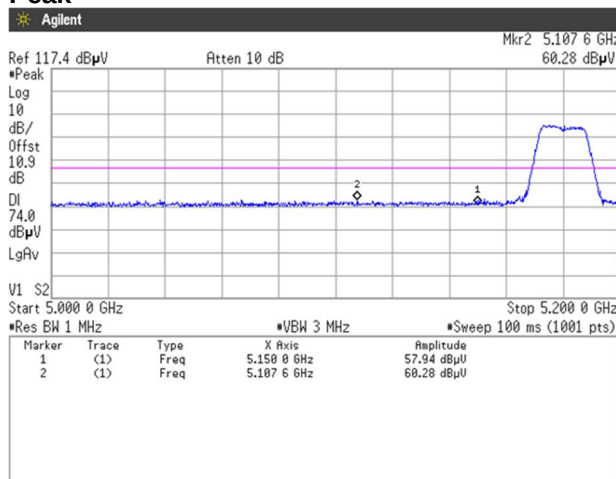
4.4.4.1 Restricted Bandedge

[IEEE802.11a]

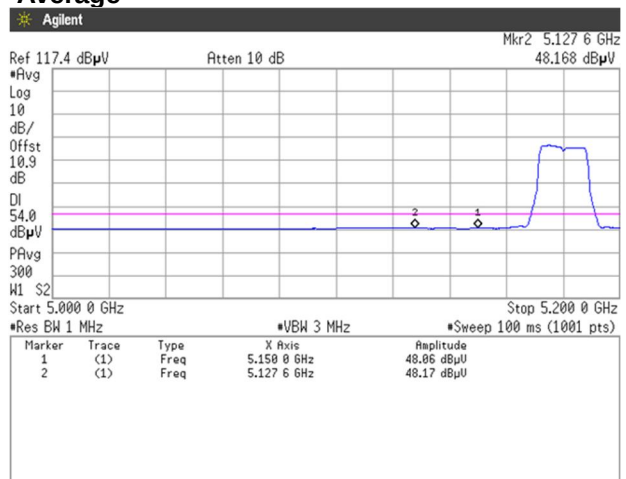
5.2 GHz Band, Channel Low Horizontal



Vertical

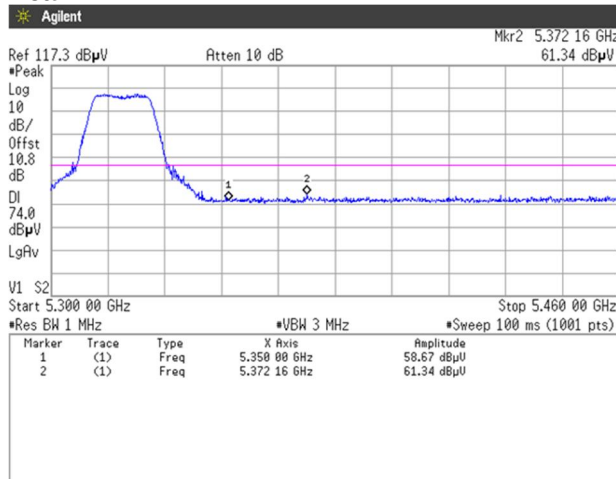


Average

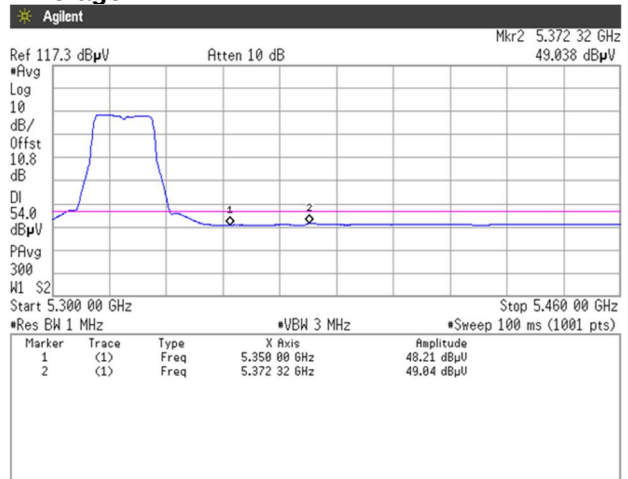


[IEEE802.11a]

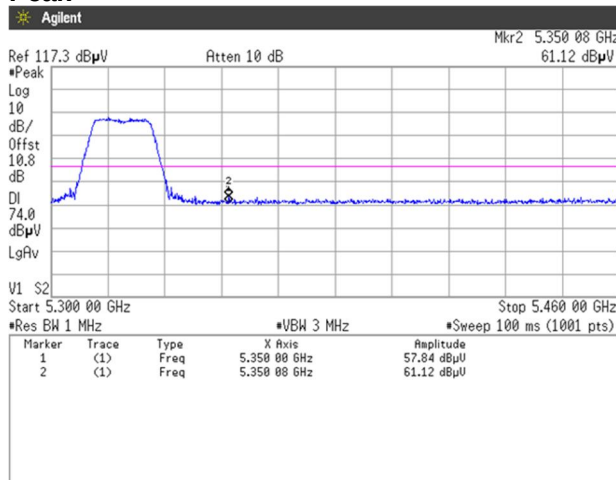
5.3 GHz Band, Channel High Horizontal Peak



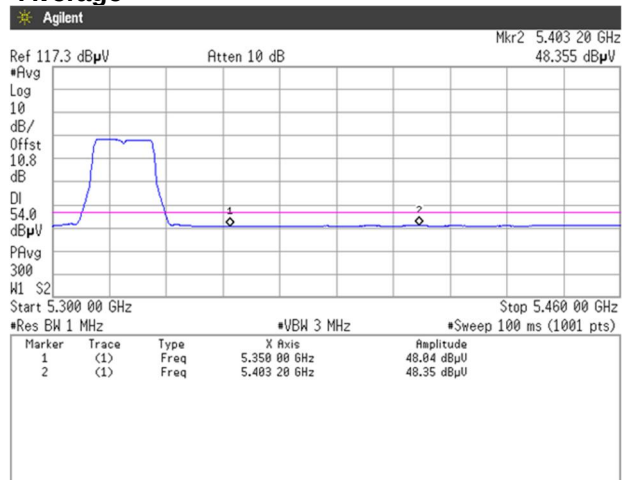
Average



Vertical Peak



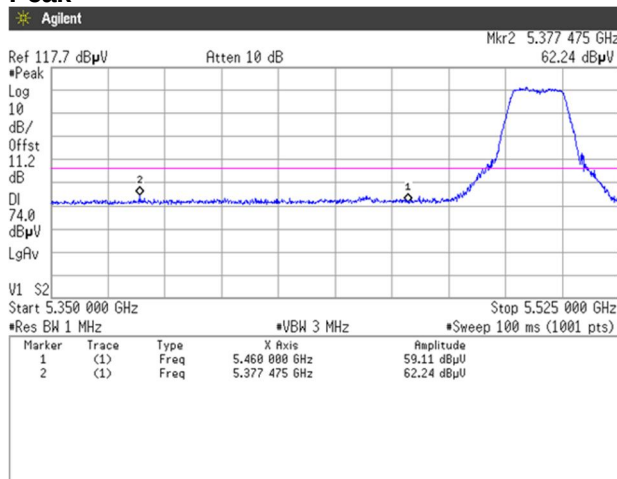
Average



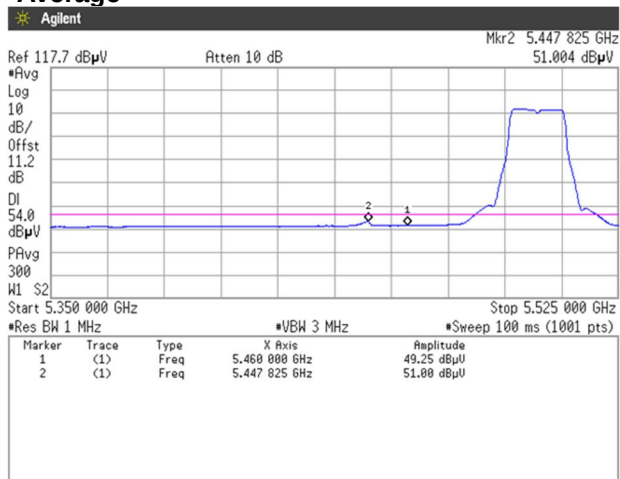
[IEEE802.11a]

5.6 GHz Band, Channel Low

Peak

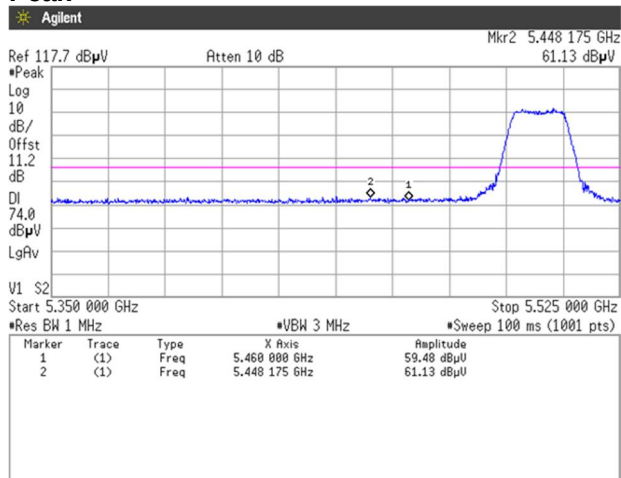


Average

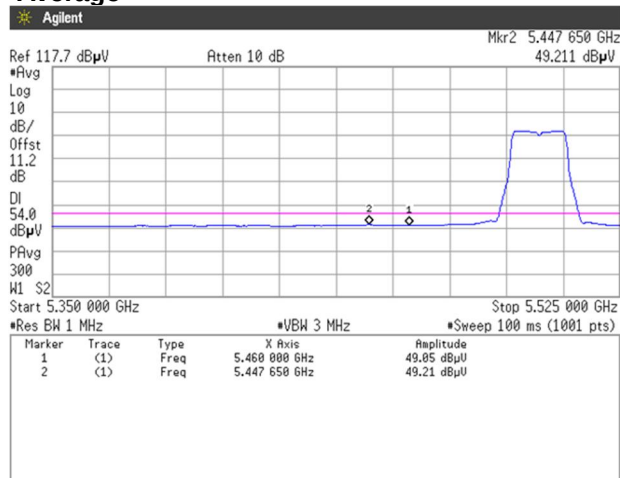


Vertical

Peak



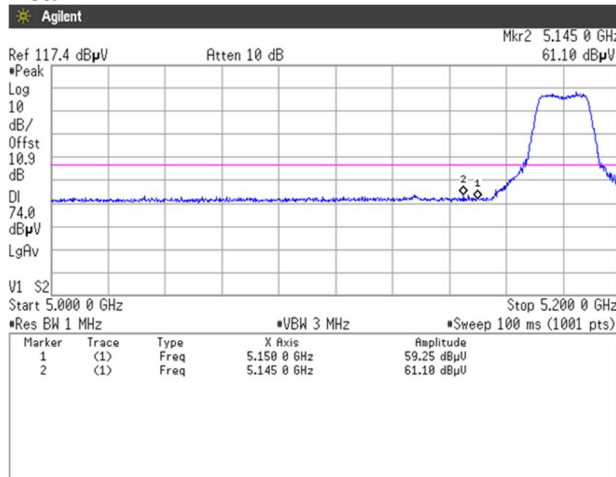
Average



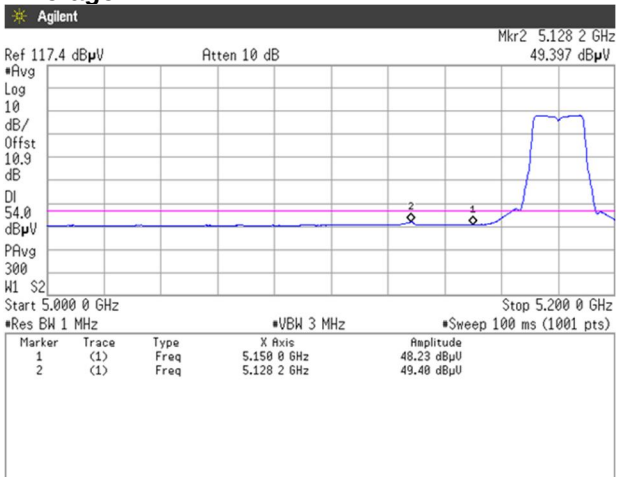
[IEEE802.11n (HT20)]

5.2 GHz Band, Channel Low
Horizontal

Peak

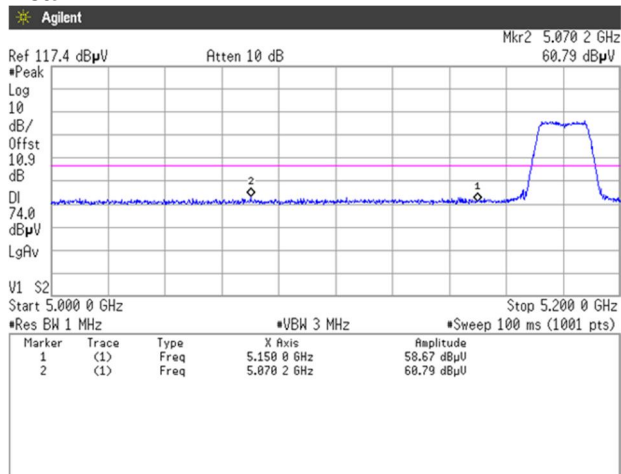


Average

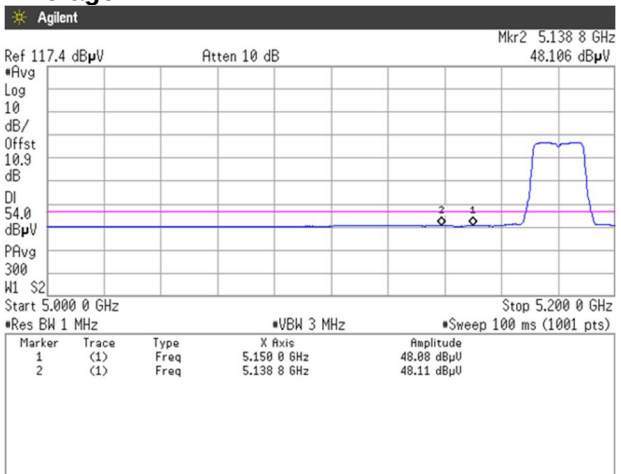


Vertical

Peak

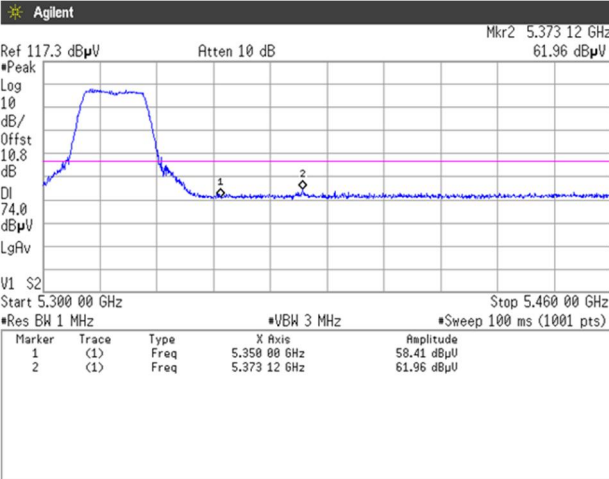


Average

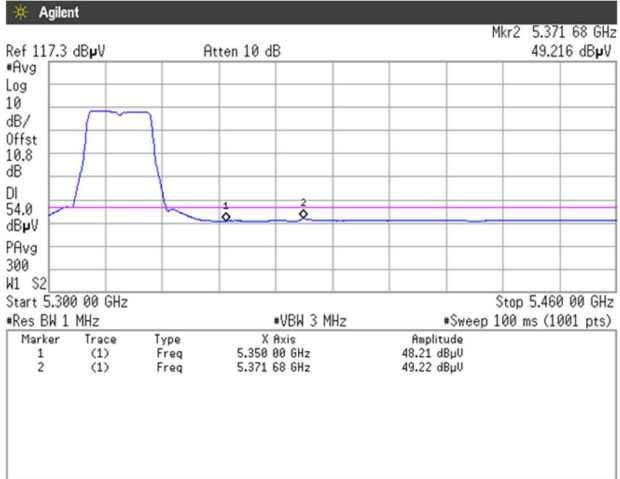


[IEEE802.11n (HT20)]

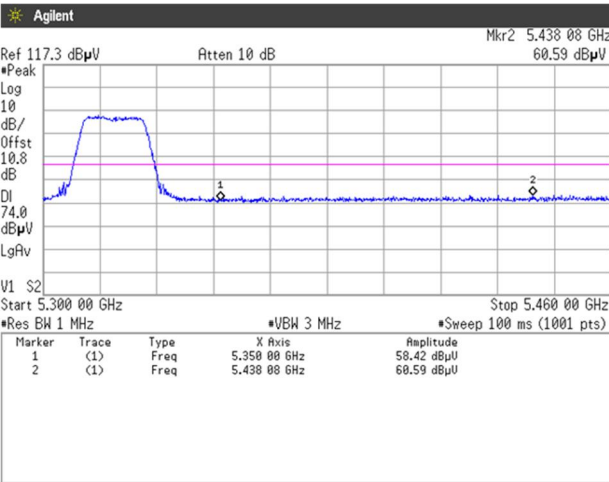
**5.3 GHz Band, Channel High
Horizontal
Peak**



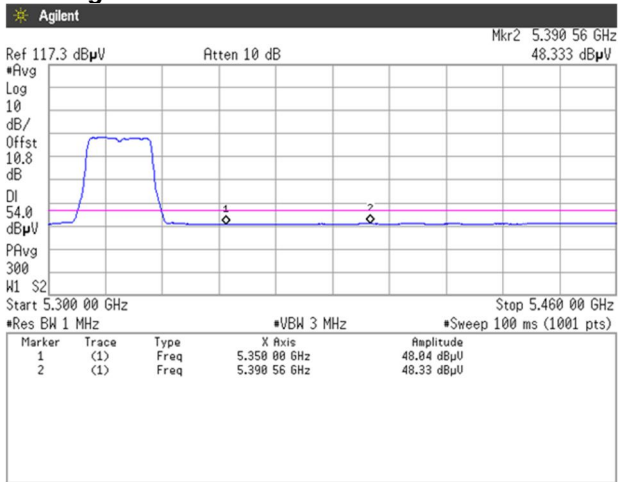
Average



**Vertical
Peak**



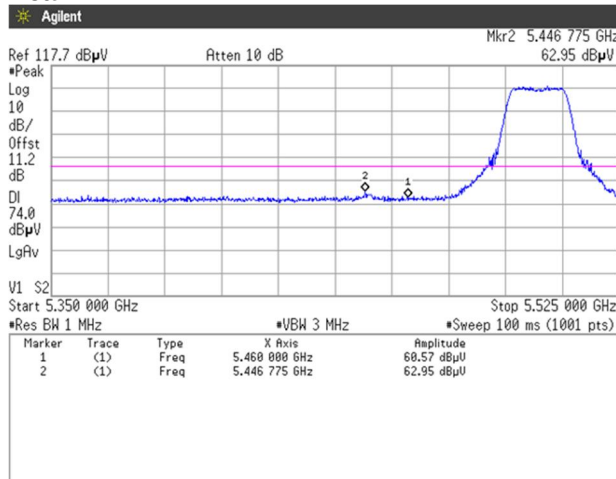
Average



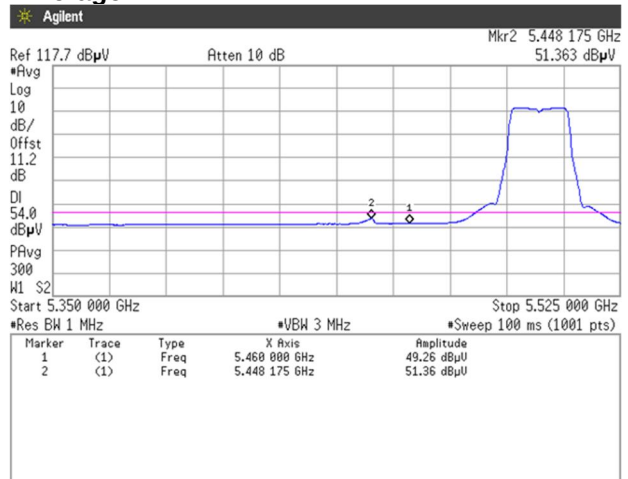
[IEEE802.11n (HT20)]

5.6 GHz Band, Channel Low
Horizontal

Peak

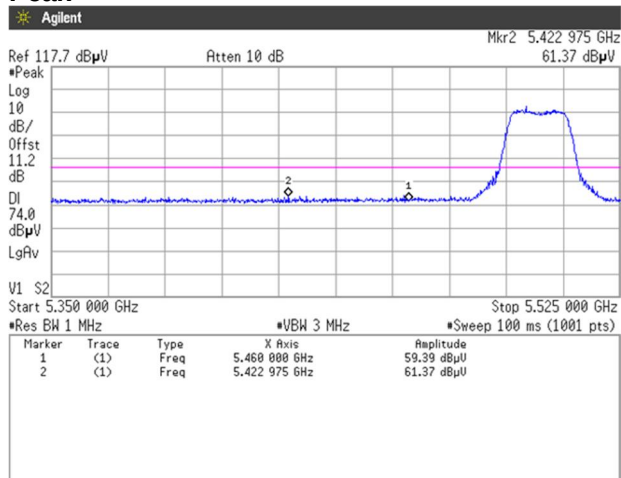


Average

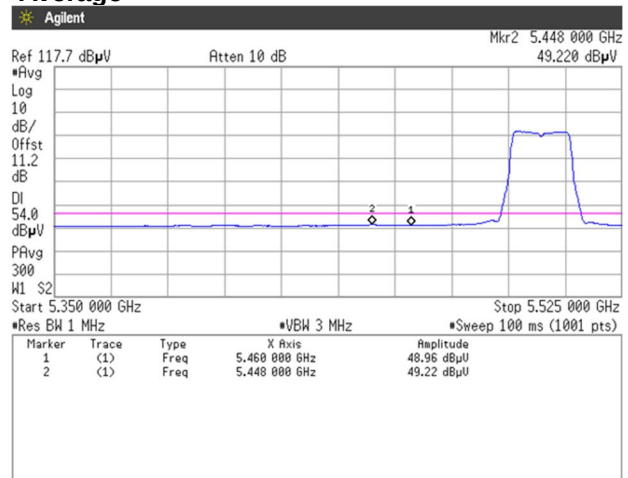


Vertical

Peak



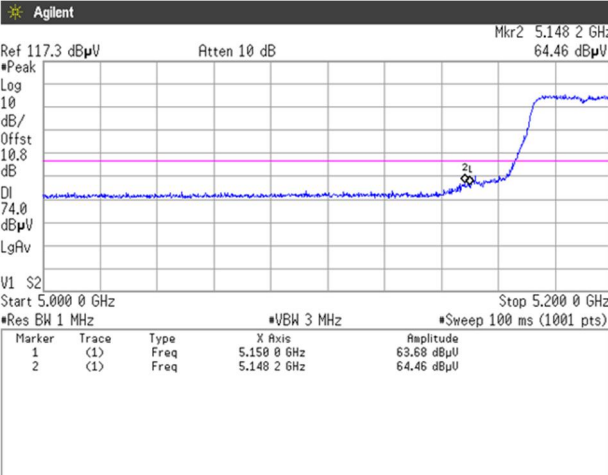
Average



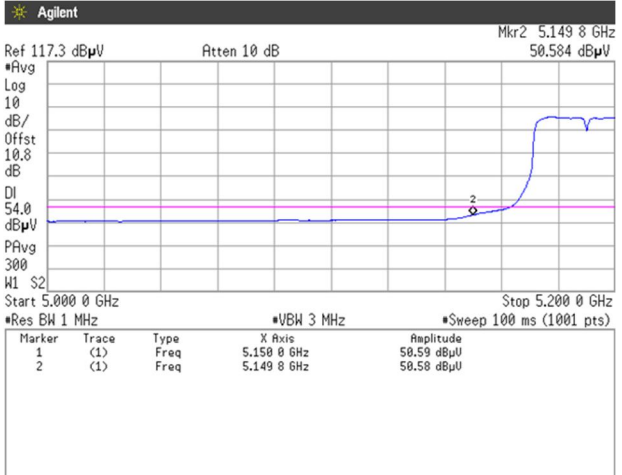
[IEEE802.11n (HT40)]

5.2 GHz Band, Channel Low
Horizontal

Peak

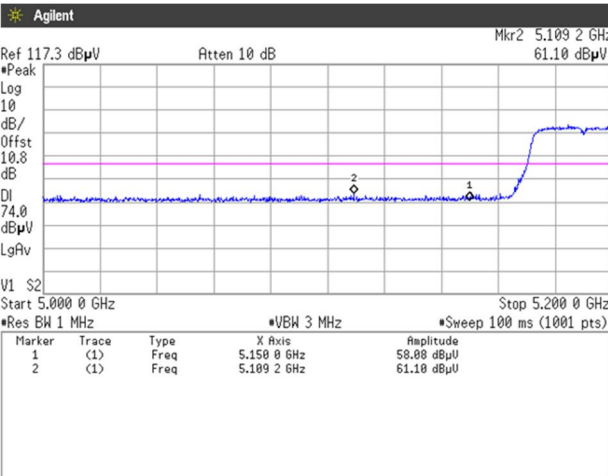


Average

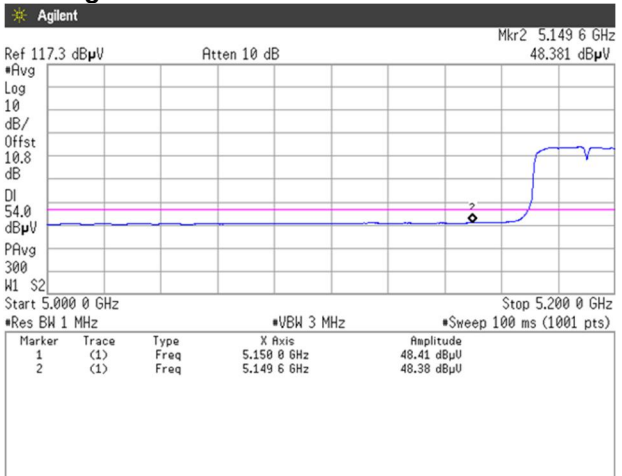


Vertical

Peak

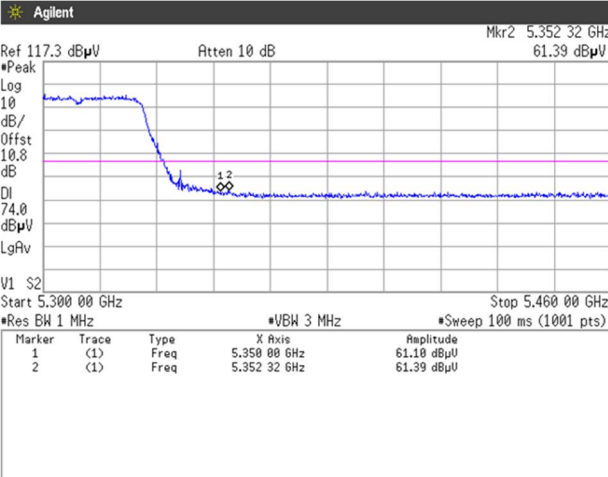


Average

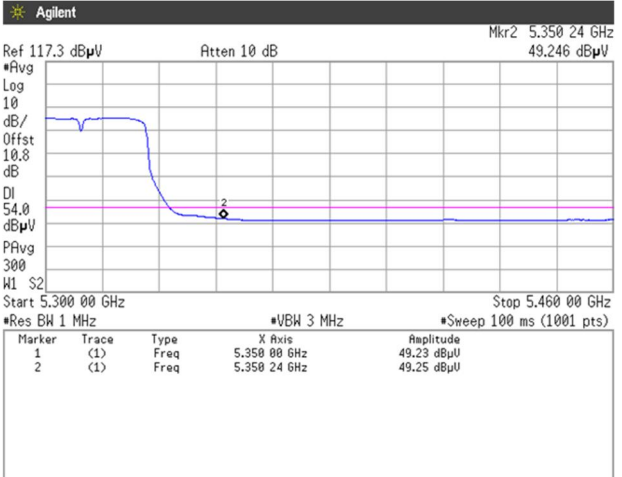


[IEEE802.11n (HT40)]

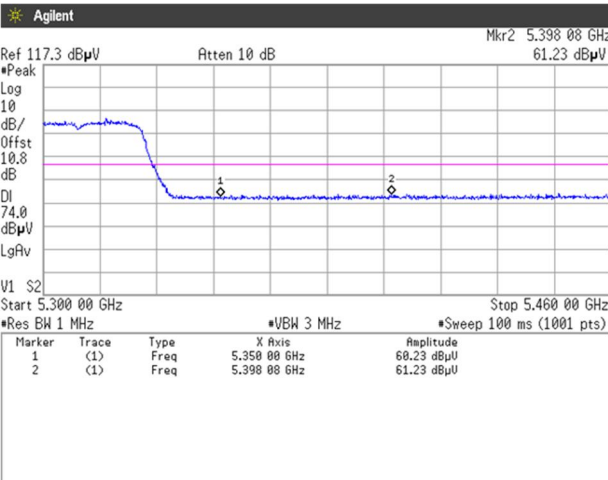
5.3 GHz Band, Channel High
Horizontal
Peak



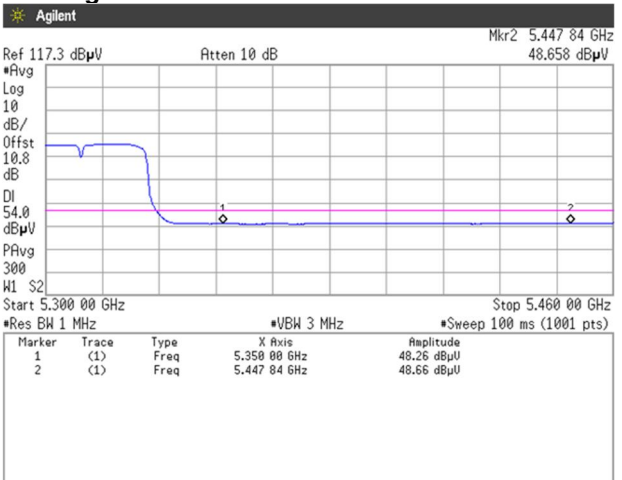
Average



Vertical
Peak



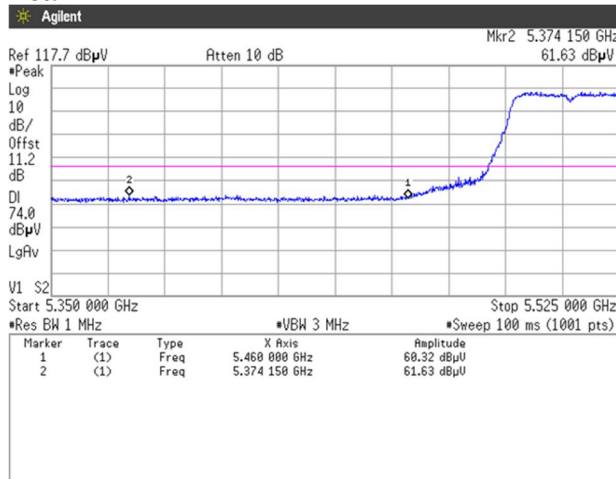
Average



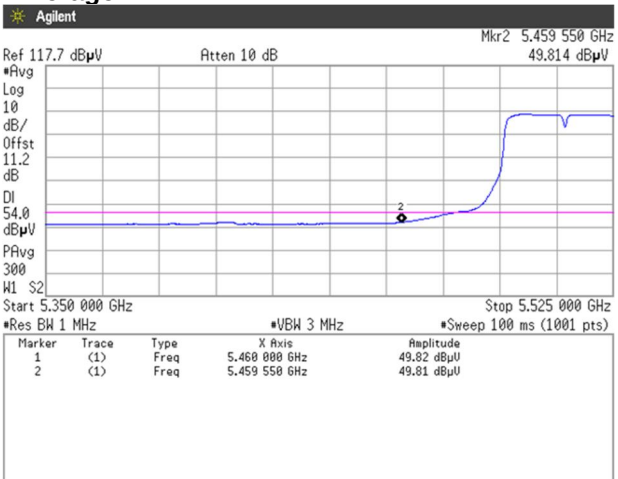
[IEEE802.11n (HT40)]

5.6 GHz Band, Channel Low
Horizontal

Peak

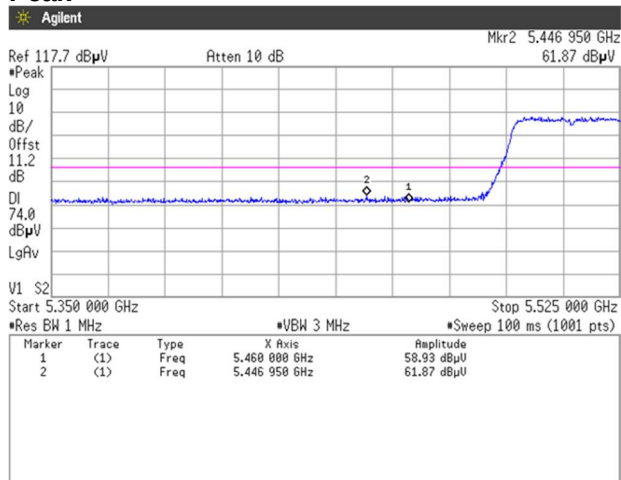


Average

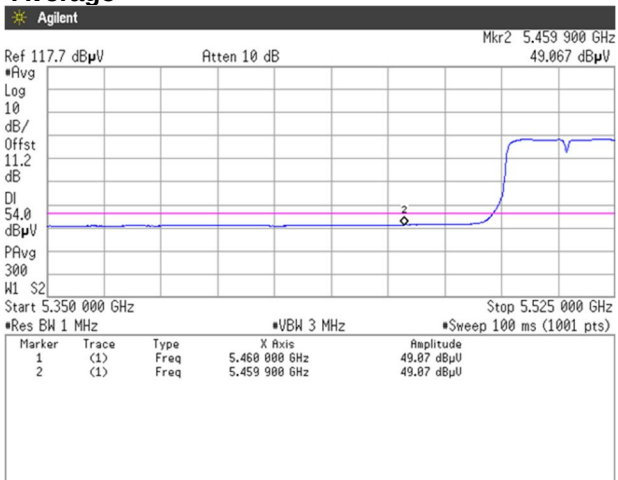


Vertical

Peak



Average



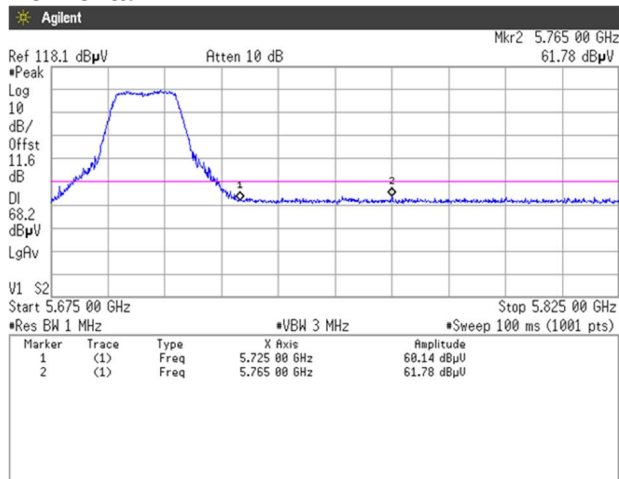
4.4.4.2 Non-Restricted Bandedge

[IEEE802.11a]

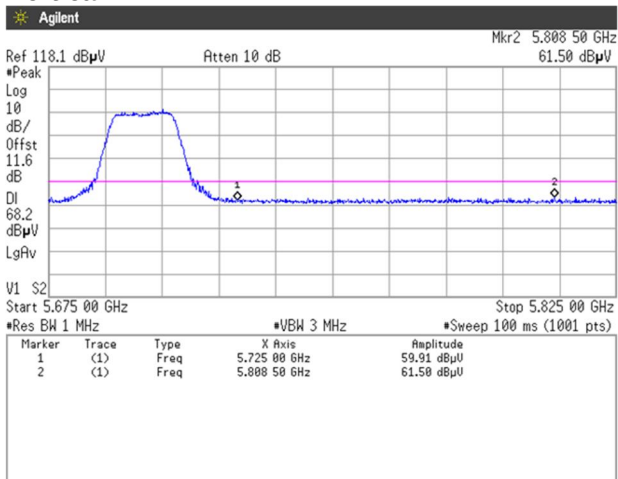
5.6 GHz Band, Channel High

Peak

Horizontal



Vertical

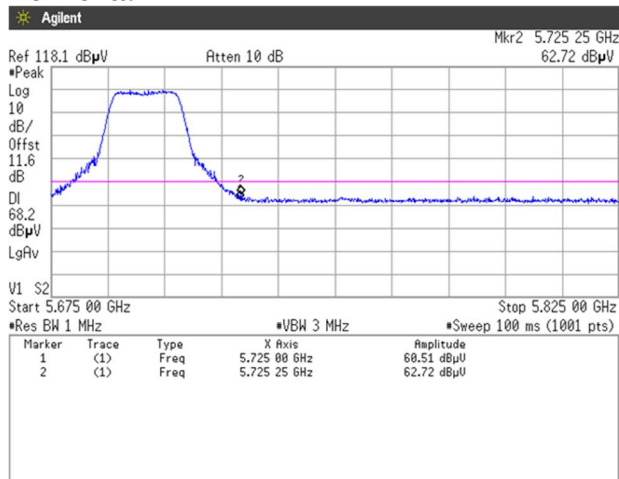


[IEEE802.11n (HT20)]

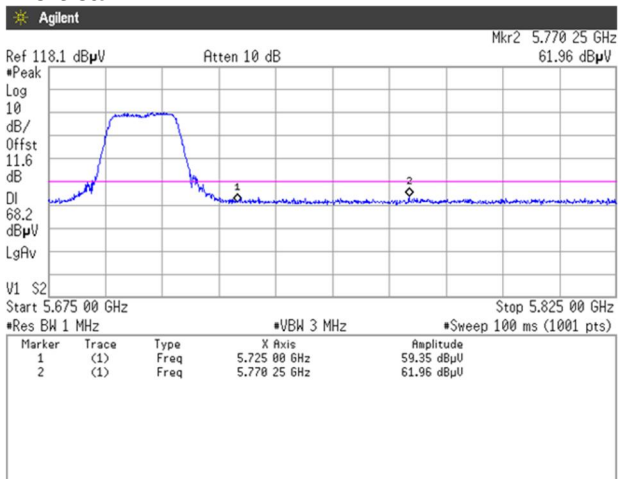
5.6GHz Band, Channel High

Peak

Horizontal



Vertical





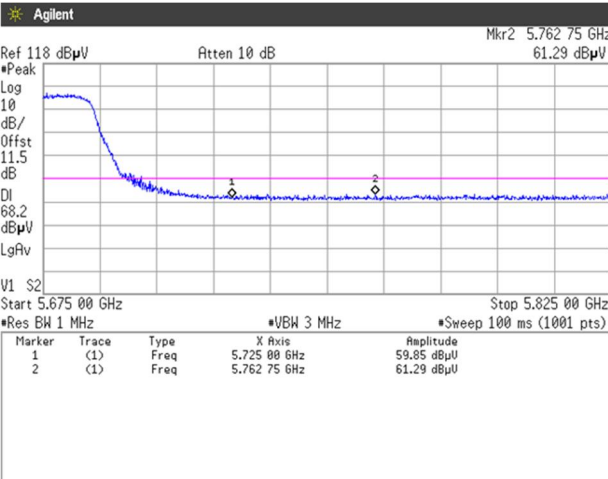
Japan

[IEEE802.11n (HT40)]

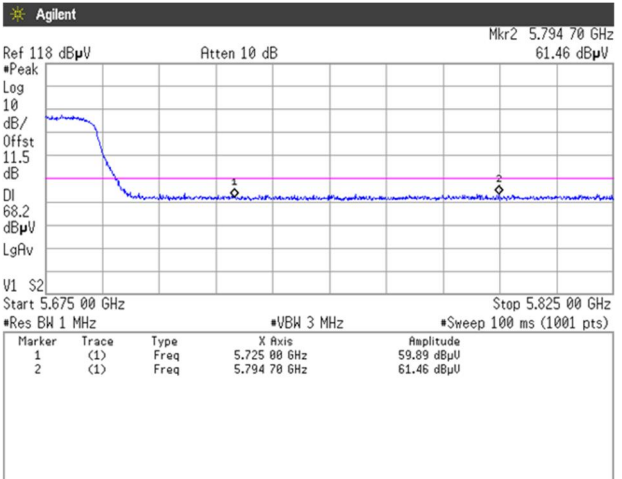
5.6GHz Band, Channel High

Peak

Horizontal



Vertical



4.4.4.3 Radiated Emissions

Date	: 26-April-2019		
Temperature	: 21.2 [°C]		
Humidity	: 44.1 [%]	Test engineer	:
Test place	: 3m Semi-anechoic chamber		<u>Chiaki Kanno</u>
Date	: 7-May-2019		
Temperature	: 19.5 [°C]		
Humidity	: 46.2 [%]	Test engineer	:
Test place	: 3m Semi-anechoic chamber		<u>Chiaki Kanno</u>
Date	: 8-May-2019		
Temperature	: 19.3 [°C]		
Humidity	: 41.5 [%]	Test engineer	:
Test place	: 3m Semi-anechoic chamber		<u>Chiaki Kanno</u>
Date	: 9-May-2019		
Temperature	: 18.6 [°C]		
Humidity	: 39.6 [%]	Test engineer	:
Test place	: 3m Semi-anechoic chamber		<u>Chiaki Kanno</u>
Date	: 17-18-May-2019		
Temperature	: 20.2 [°C]		
Humidity	: 50.6 [%]	Test engineer	:
Test place	: 3m Semi-anechoic chamber		<u>Chiaki Kanno</u>
Date	: 21-May-2019		
Temperature	: 21.1 [°C]		
Humidity	: 47.4 [%]	Test engineer	:
Test place	: 3m Semi-anechoic chamber		<u>Chiaki Kanno</u>

**[IEEE802.11a]
(5.2 GHz 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	10360.00	H	PK	46.3	10.7		57.0	68.2	11.2
	40	5200	10400.00	H	PK	46.6	10.7		57.3	68.2	10.9
	48	5240	10480.00	H	PK	45.8	10.8		56.6	68.2	11.6

(5.3 GHz 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	46.4	10.9		57.3	68.2	10.9
	56	5280	10560.00	H	PK	46.3	10.9		57.2	68.2	11.0
	64	5320	10640.00	H	PK	46.7	11.1		57.8	74.0	16.2
				H	AV	34.1	11.1	0.051	45.3	54.0	8.7

(5.6 GHz 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	5465.70	H	PK	49.6	11.1		60.7	68.2	7.5
			5465.90	V	PK	49.8	11.1		60.9	68.2	7.3
			11000.00	H	PK	45.3	11.6		56.9	74.0	17.1
			11000.00	H	AV	33.7	10.6	0.051	44.4	54.0	9.6
	116	5580	11160.00	H	PK	46.0	11.8		57.8	74.0	16.2
			11160.00	H	AV	33.6	11.8	0.051	45.5	54.0	8.5
	140	5700	11400.00	H	PK	45.8	12.1		57.9	74.0	16.1
			11400.00	H	AV	33.8	12.1	0.051	46.0	54.0	8.0

Note:

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

**[IEEE802.11n (HT20)]
(5.2 GHz 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	10360.00	H	PK	45.6	10.7		56.3	68.2	11.9
	40	5200	10400.00	H	PK	45.5	10.7		56.2	68.2	12.0
	48	5240	10480.00	H	PK	45.8	10.8		56.6	68.2	11.6

(5.3 GHz 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	45.5	10.9		56.4	68.2	11.8
	56	5280	10560.00	H	PK	45.6	10.9		56.5	68.2	11.7
	64	5320	10640.00	H	PK	45.5	11.1		56.6	74.0	17.4
				H	AV	33.9	11.1	0.054	45.1	54.0	8.9

(5.6 GHz 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	5467.00	H	PK	49.8	11.1		60.9	68.2	7.3
			5463.00	V	PK	49.5	11.1		60.6	68.2	7.6
			11000.00	H	PK	45.5	11.6		57.1	74.0	16.9
			11000.00	H	AV	33.3	11.6	0.054	45.0	54.0	9.0
	116	5580	11160.00	H	PK	45.9	11.8		57.7	74.0	16.3
			11160.00	H	AV	33.6	11.8	0.054	45.5	54.0	8.5
	140	5700	11400.00	H	PK	45.6	12.1		57.7	74.0	16.3
			11400.00	H	AV	33.8	12.1	0.054	46.0	54.0	8.0

Note:

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

[IEEE802.11n (HT40)] (5.2 GHz 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	10380.00	H	PK	45.4	10.7		56.1	68.2	12.1
	46	5230	10460.00	H	PK	45.4	10.8		56.2	68.2	12.0

(5.3 GHz 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	45.4	10.9		56.3	68.2	11.9
	62	5310	10620.00	H	PK	45.1	11.1		56.2	74.0	17.8
			10620.00	H	AV	33.9	11.1	0.136	45.1	54.0	8.9

(5.6 GHz 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	5465.20	H	PK	53.7	11.1		64.8	68.2	3.4
			5462.30	V	PK	49.8	11.1		60.9	68.2	7.3
			11020.00	H	PK	45.1	11.6		56.7	74.0	17.3
			11020.00	H	AV	33.7	11.6	0.136	45.4	54.0	8.6
	110	5550	11100.00	H	PK	45.7	11.6		57.3	74.0	16.7
			11100.00	H	AV	33.6	11.6	0.136	45.3	54.0	8.7
			11340.00	H	PK	45.5	12.0		57.5	74.0	16.5
	134	5670	11340.00	H	AV	33.3	12.0	0.136	45.4	54.0	8.6

Note:

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

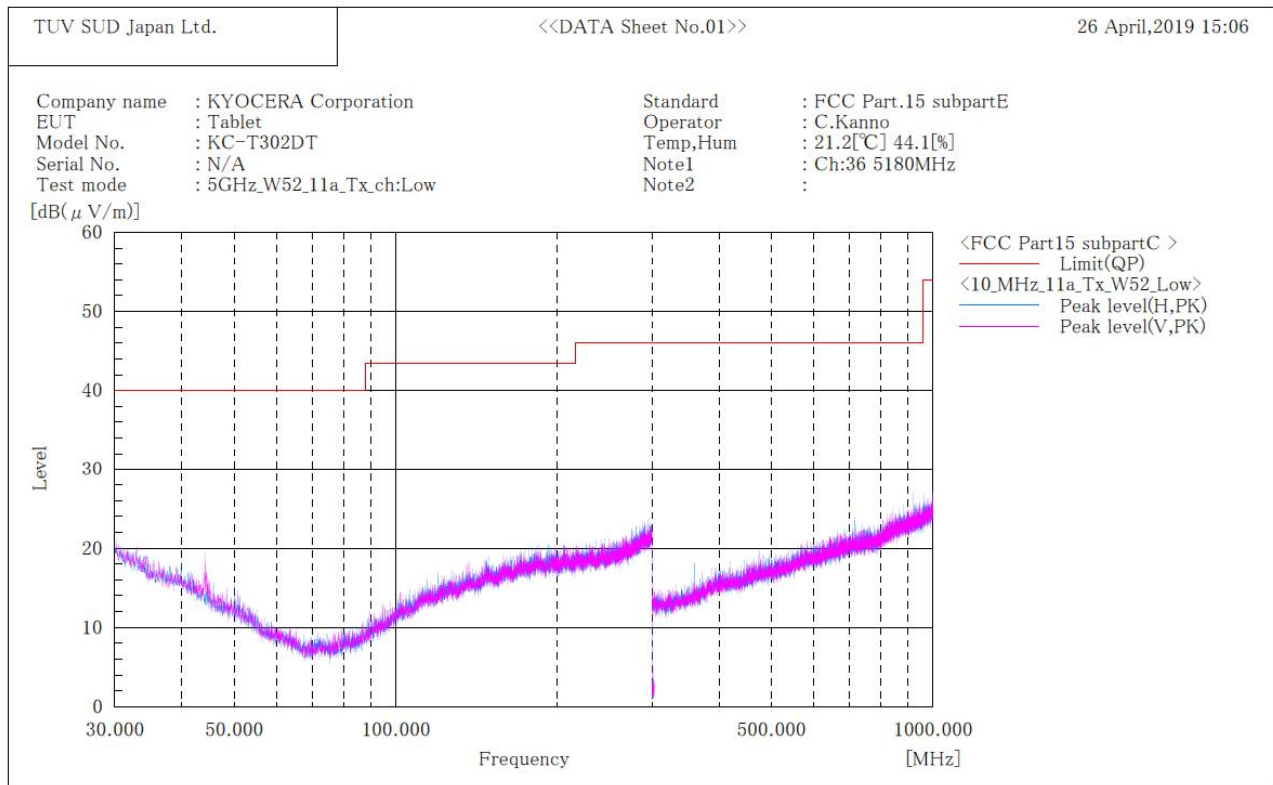
4.4.4.4 Measurement chart

Transmission mode

[11a]

W52 / Channel Low
BELOW 1GHz

***** RADIATED EMISSION *****
[3m Semi-anechoic chamber]



Final Result

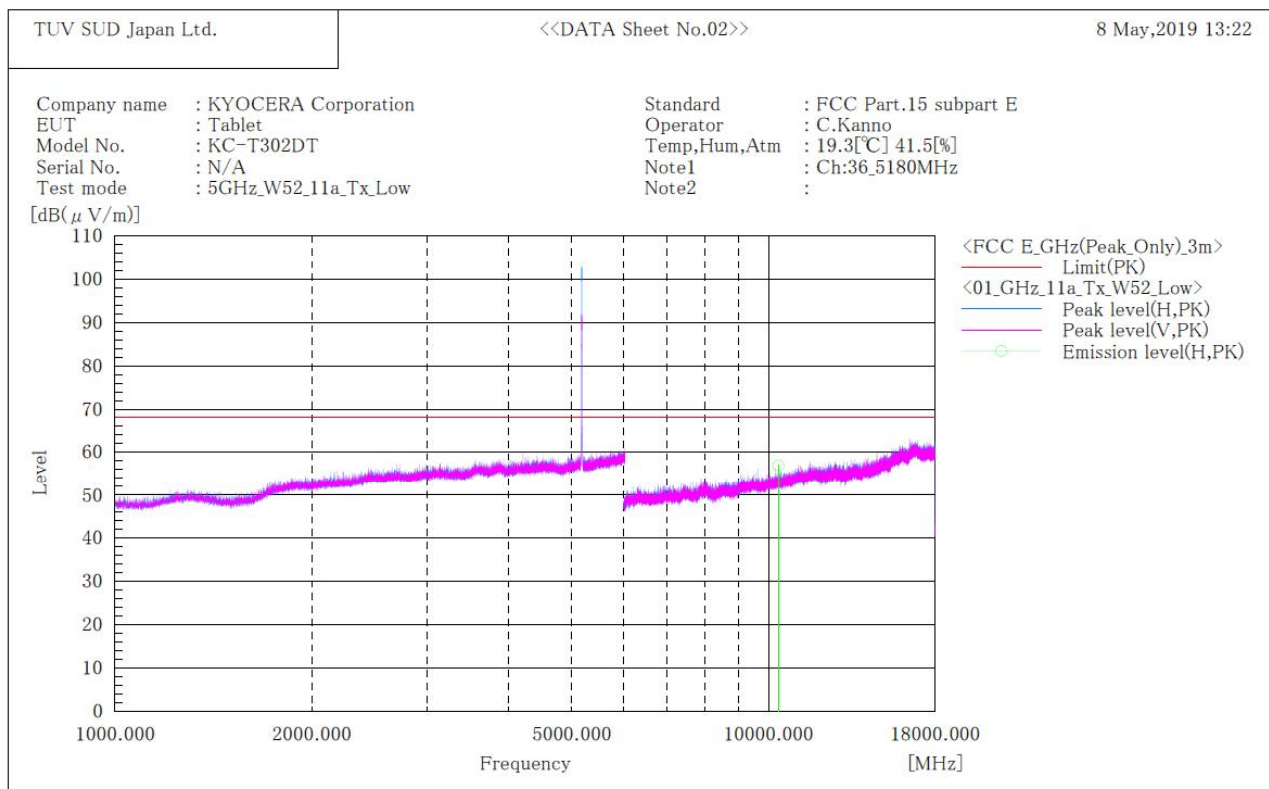
No.	Frequency (P)	c. f	Height	Angle
	[MHz]	[dB(1/m)]	[cm]	[°]

Note:

1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 1000MHz at the 3 meters distance.

[11a]
W52 / Channel Low
ABOVE 1GHz

***** RADIATED EMISSION *****
 [3m Semi-anechoic chamber]



Final Result

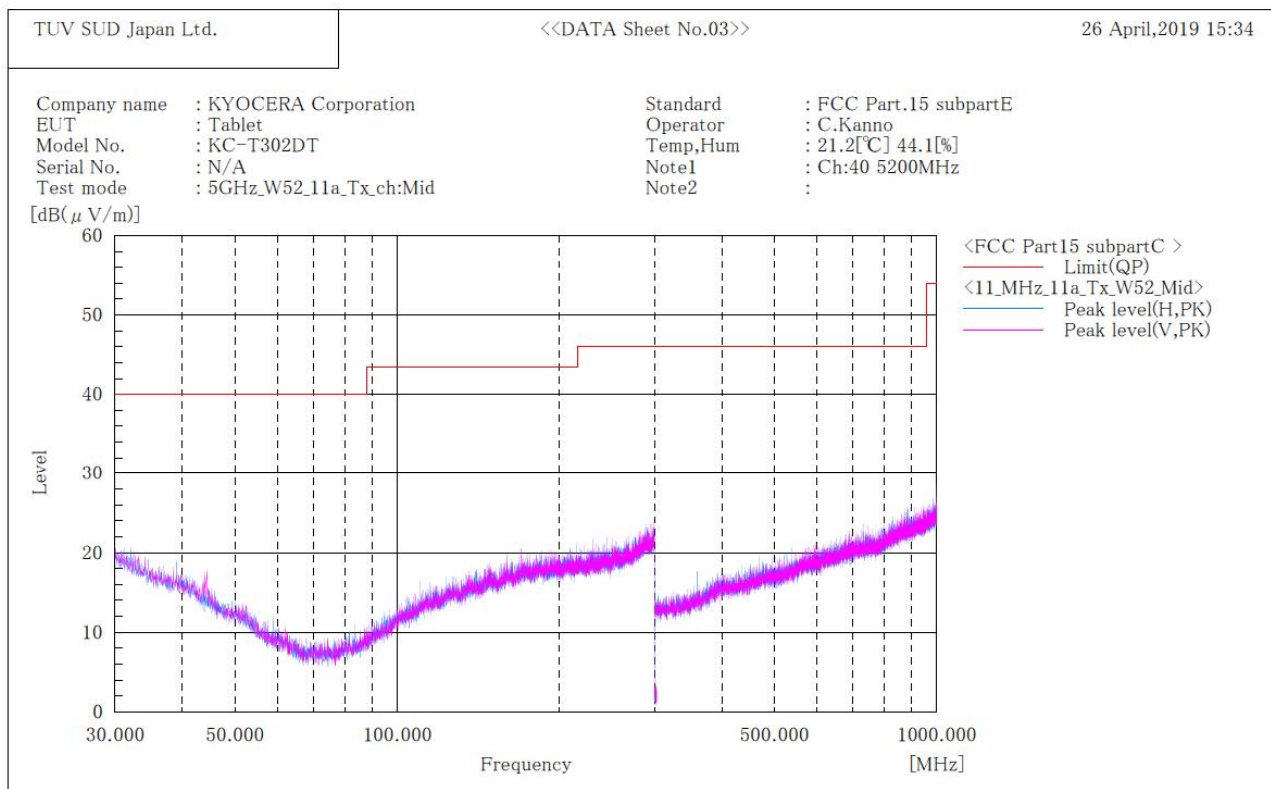
No.	Frequency [MHz]	(P)	Reading PK [dB(μV)]	c.f [dB(1/m)]	Result PK [dB(μV/m)]	Limit PK [dB(μV/m)]	Margin PK [dB]	Height [cm]	Angle [°]
1	10360.000	H	46.3	10.7	57.0	68.2	11.2	160.0	274.0

Note:

1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 18GHz to 40GHz at the 3 meters distance.

[11a]
W52 / Channel Middle
BELOW 1GHz

***** RADIATED EMISSION *****
 [3m Semi-anechoic chamber]



Final Result

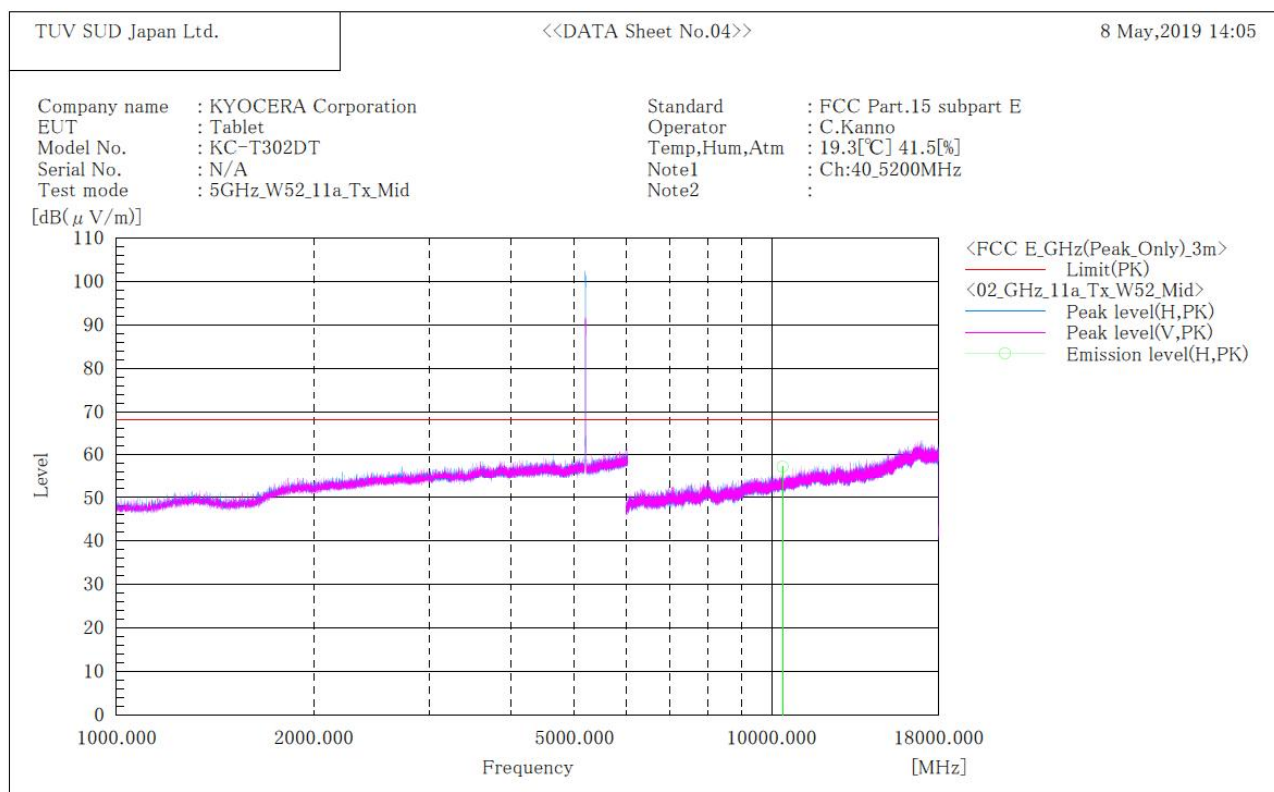
No.	Frequency (P)	c.f	Height	Angle
	[MHz]	[dB(1/m)]	[cm]	[°]

Note:

1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 1000MHz at the 3 meters distance.

[11a]
W52 / Channel Middle
ABOVE 1GHz

***** RADIATED EMISSION *****
 [3m Semi-anechoic chamber]



Final Result

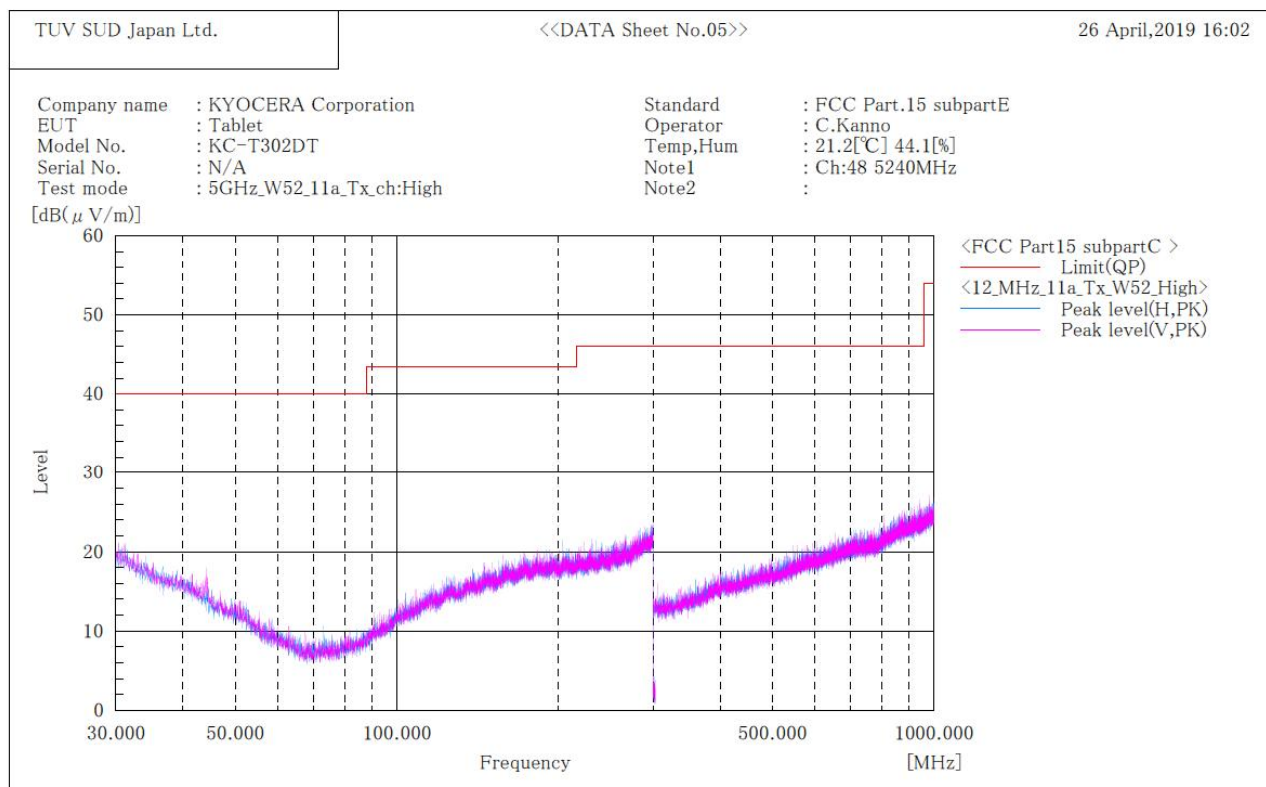
No.	Frequency	(P)	Reading	c. f	Result	Limit	Margin	Height	Angle
	[MHz]		PK [dB(μV)]	[dB(1/m)]	PK [dB(μV/m)]	PK [dB(μV/m)]	PK [dB]	[cm]	[°]
1	10400.000	H	46.6	10.7	57.3	68.2	10.9	152.0	167.0

Note:

1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 18GHz to 40GHz at the 3 meters distance.

[11a]
W52 / Channel High
BELOW 1GHz

***** RADIATED EMISSION *****
 [3m Semi-anechoic chamber]



Final Result

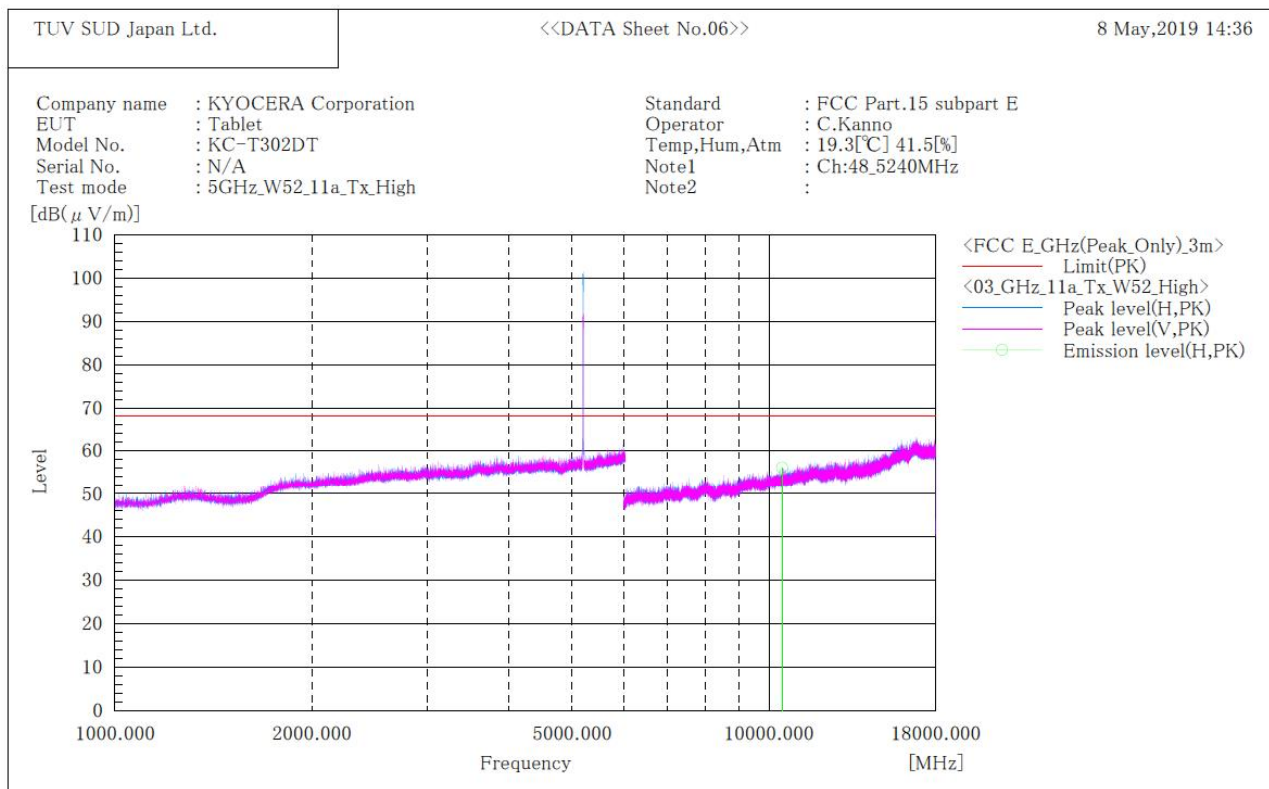
No.	Frequency (P)	c. f	Height	Angle
	[MHz]	[dB(1/m)]	[cm]	[°]

Note:

1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 1000MHz at the 3 meters distance.

[11a]
W52 / Channel High
ABOVE 1GHz

***** RADIATED EMISSION *****
 [3m Semi-anechoic chamber]



Final Result

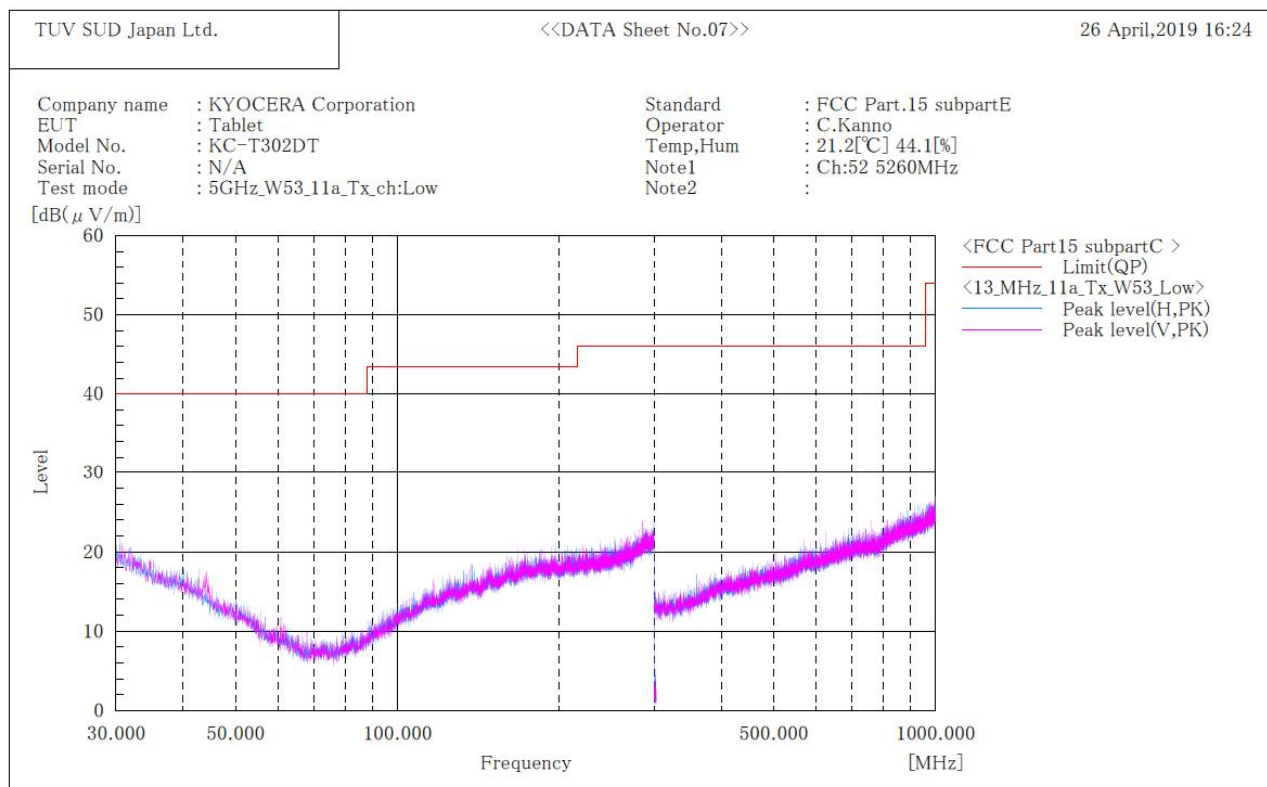
No.	Frequency [MHz]	(P)	Reading PK [dB(μV)]	c.f [dB(1/m)]	Result PK [dB(μV/m)]	Limit PK [dB(μV/m)]	Margin PK [dB]	Height [cm]	Angle [°]
1	10480.000	H	45.4	10.8	56.2	68.2	12.0	105.0	110.0

Note:

1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 18GHz to 40GHz at the 3 meters distance.

[11a]
W53 / Channel Low
BELOW 1GHz

***** RADIATED EMISSION *****
 [3m Semi-anechoic chamber]



Final Result

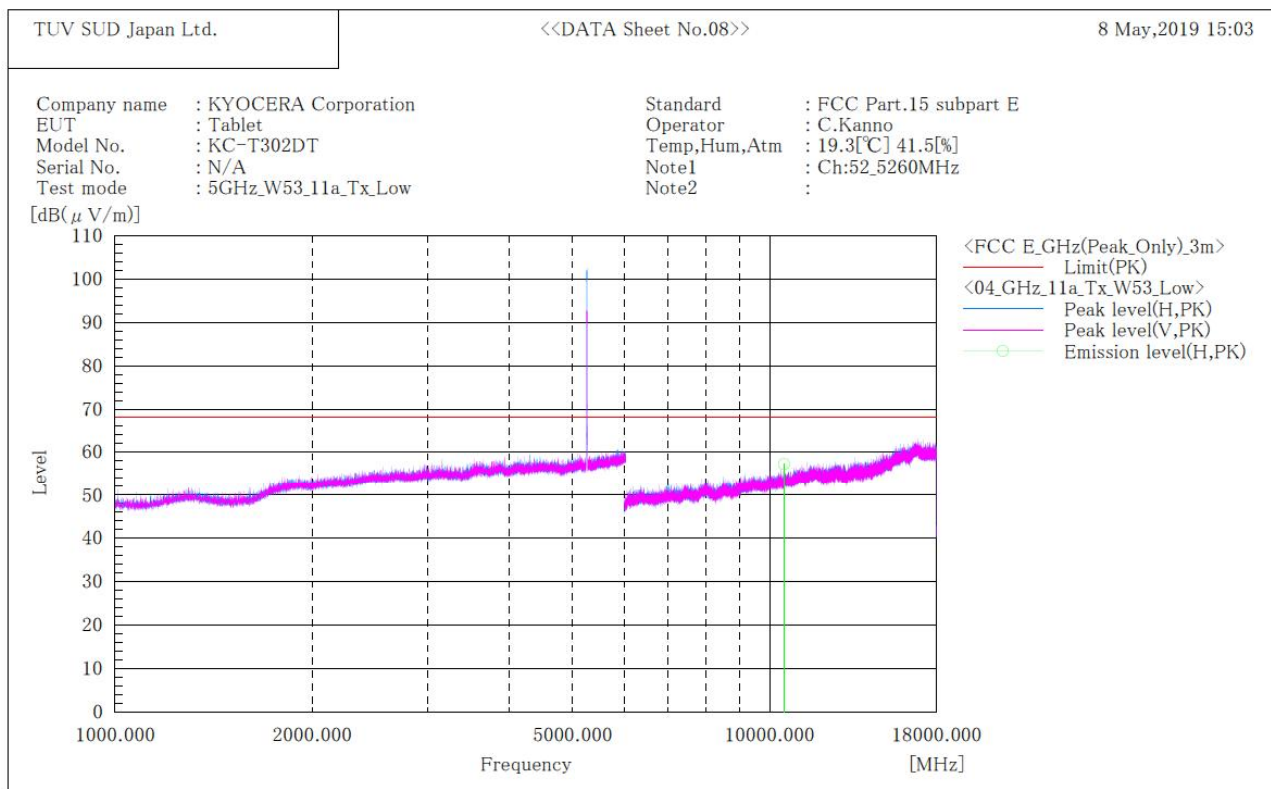
No.	Frequency (P)	c. f	Height	Angle
	[MHz]	[dB(1/m)]	[cm]	[°]

Note:

1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 1000MHz at the 3 meters distance.

[11a]
W53 / Channel Low
ABOVE 1GHz

***** RADIATED EMISSION *****
 [3m Semi-anechoic chamber]



Final Result

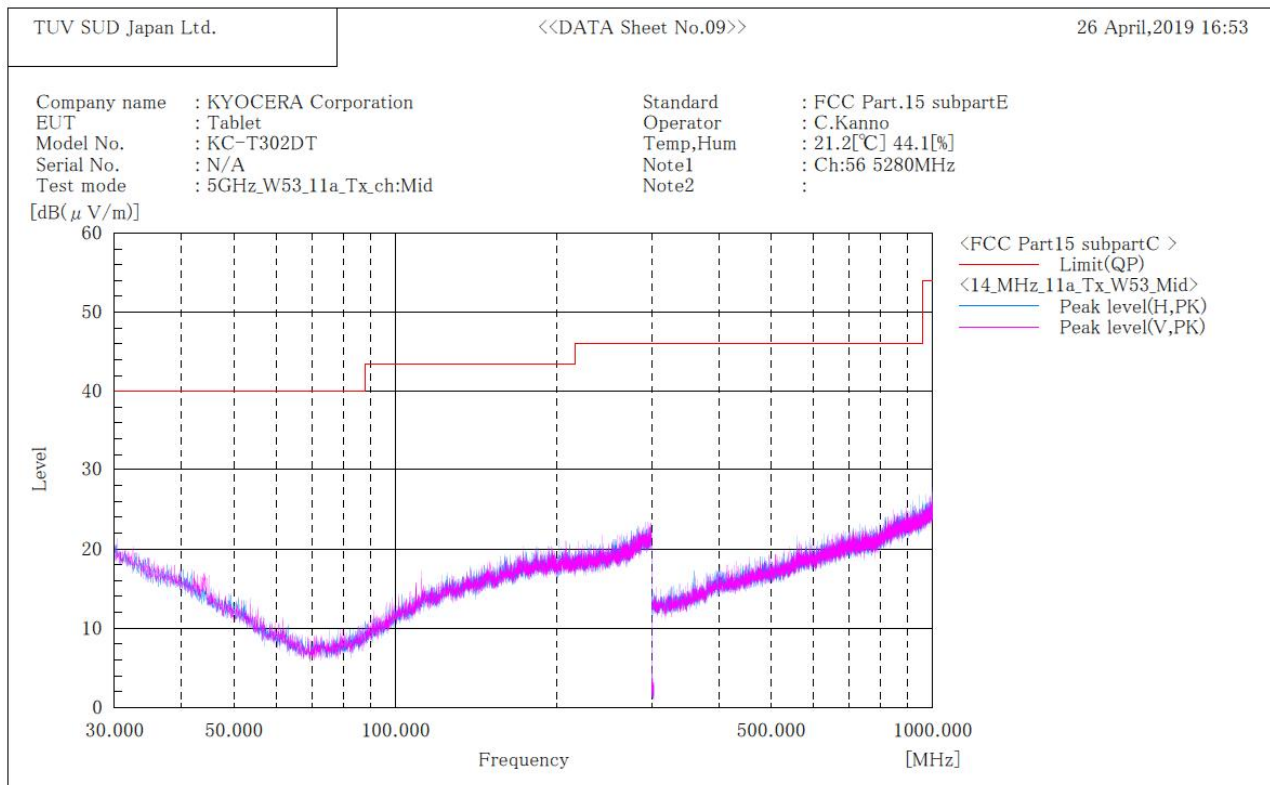
No.	Frequency [MHz]	(P)	Reading PK [dB(μV)]	c.f [dB(1/m)]	Result PK [dB(μV/m)]	Limit PK [dB(μV/m)]	Margin PK [dB]	Height [cm]	Angle [°]
1	10520.000	H	46.4	10.9	57.3	68.2	10.9	175.0	124.0

Note:

1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 18GHz to 40GHz at the 3 meters distance.

[11a]
W53 / Channel Middle
BELOW 1GHz

***** RADIATED EMISSION *****
 [3m Semi-anechoic chamber]



Final Result

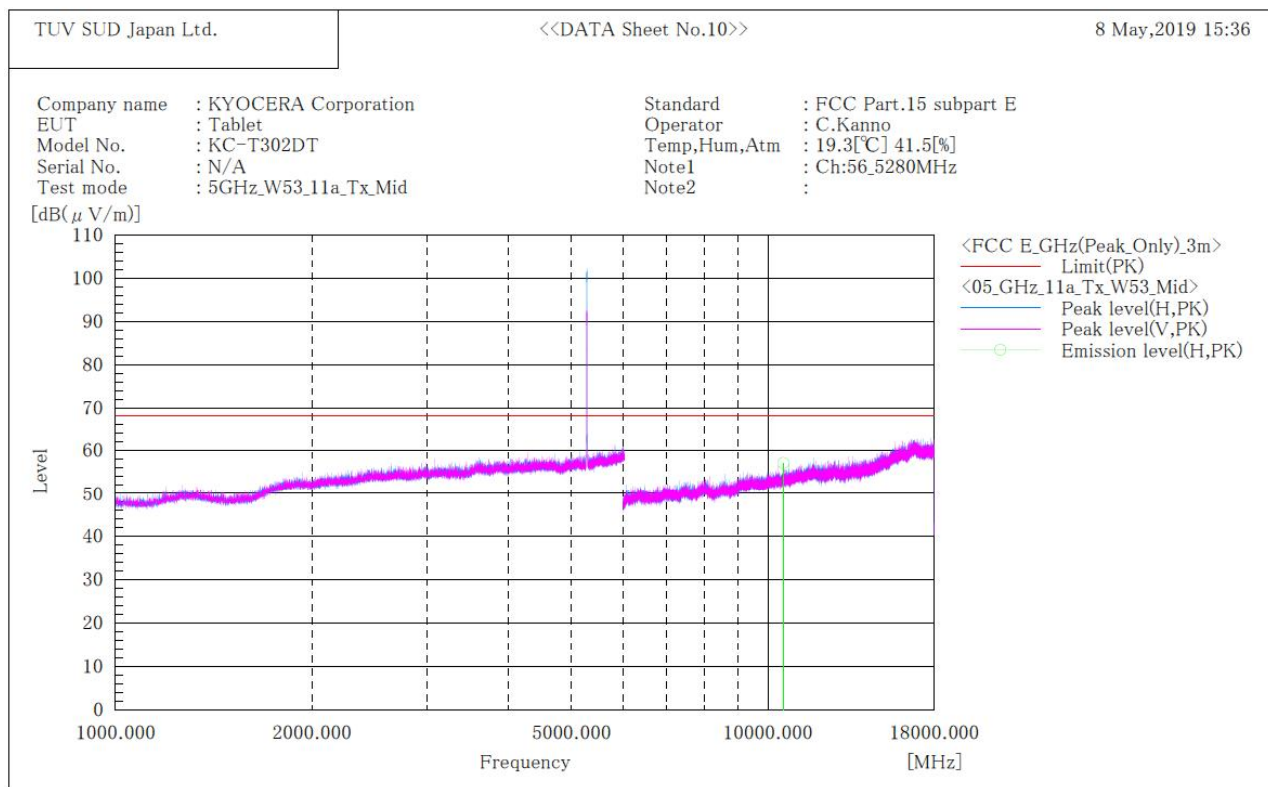
No.	Frequency (P)	c.f	Height	Angle
	[MHz]	[dB(1/m)]	[cm]	[°]

Note:

1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 1000MHz at the 3 meters distance.

[11a]
W53 / Channel Middle
ABOVE 1GHz

***** RADIATED EMISSION *****
 [3m Semi-anechoic chamber]



Final Result

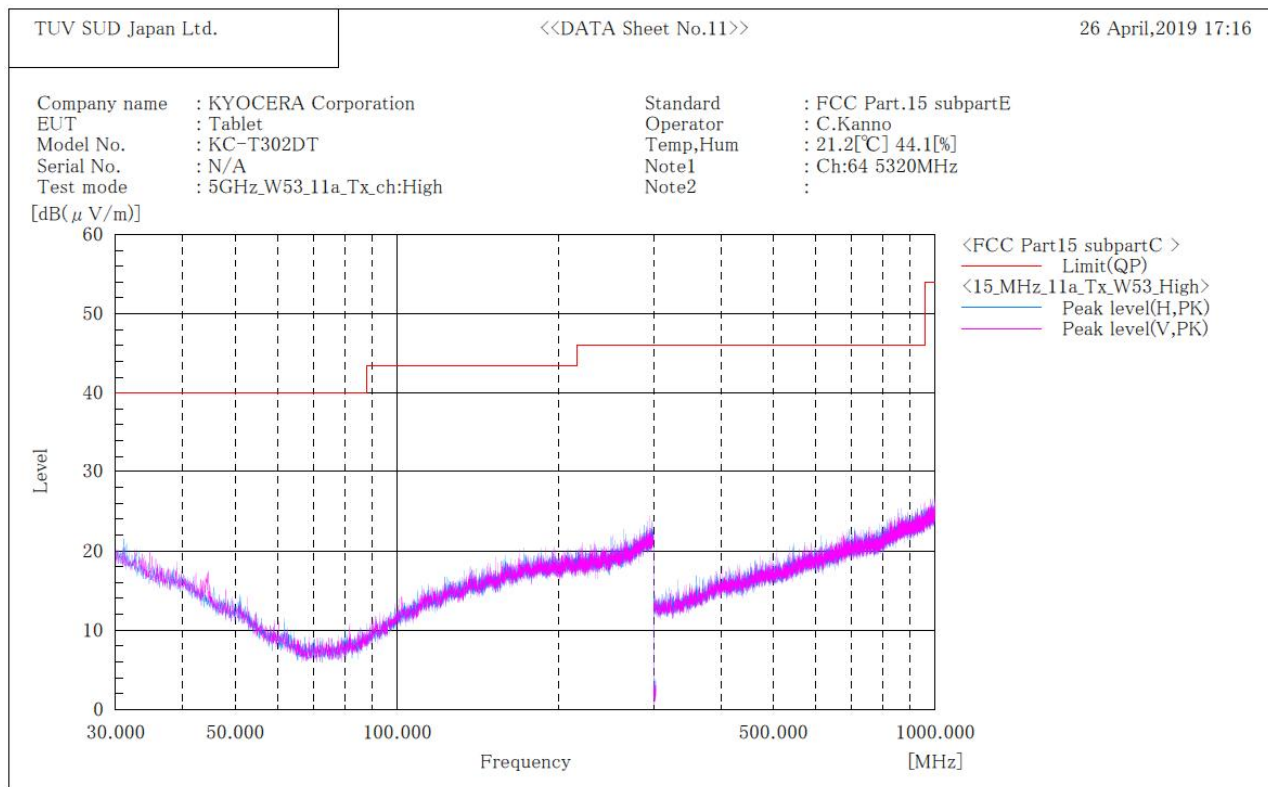
No.	Frequency [MHz]	(P)	Reading PK [dB(μV)]	c.f [dB(1/m)]	Result PK [dB(μV/m)]	Limit PK [dB(μV/m)]	Margin PK [dB]	Height [cm]	Angle [°]
1	10560.000	H	46.3	10.9	57.2	68.2	11.0	151.0	138.0

Note:

1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 18GHz to 40GHz at the 3 meters distance.

[11a]
W53 / Channel High
BELOW 1GHz

***** RADIATED EMISSION *****
 [3m Semi-anechoic chamber]



Final Result

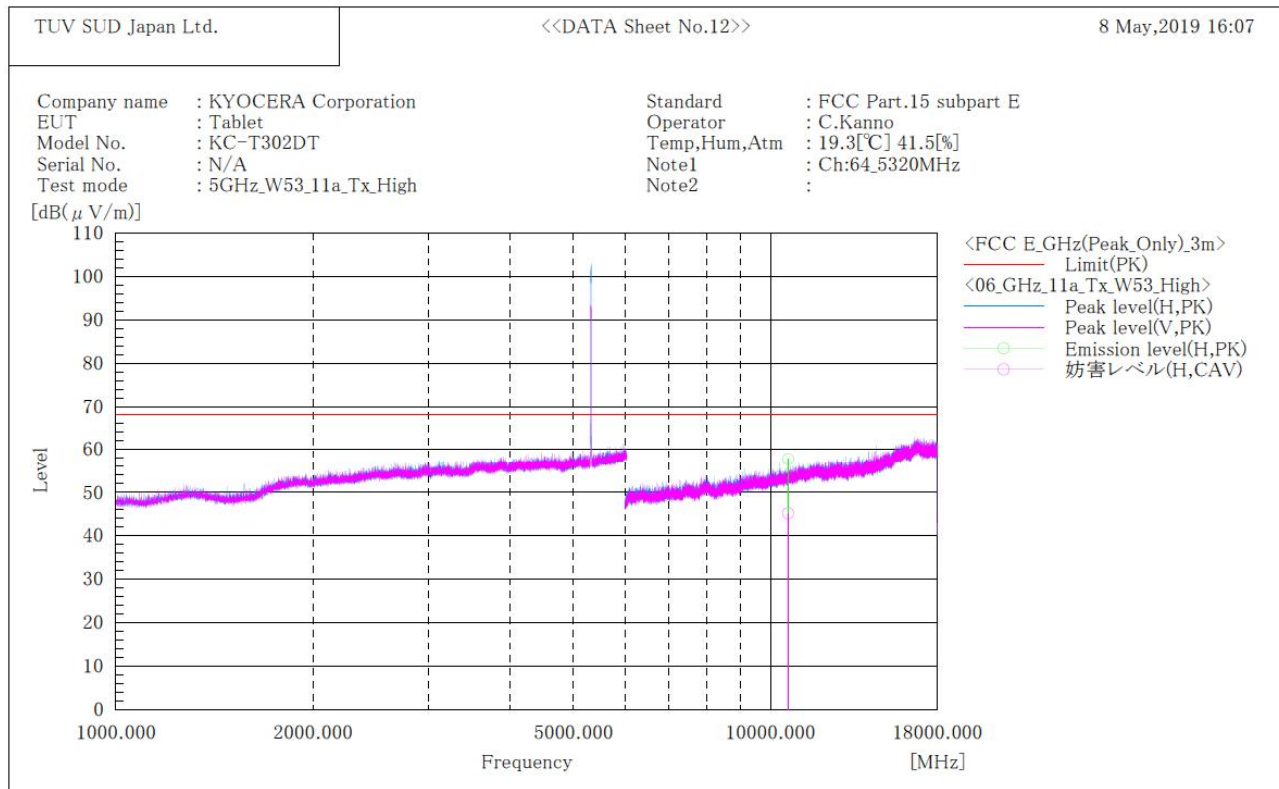
No.	Frequency (P)	c.f	Height	Angle
	[MHz]	[dB(1/m)]	[cm]	[°]

Note:

1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 1000MHz at the 3 meters distance.

[11a]
W53 / Channel High
ABOVE 1GHz

***** RADIATED EMISSION *****
 [3m Semi-anechoic chamber]



Final Result

No.	Frequency	(P)	Reading PK	Reading CAV	c.f	Result PK	Result CAV	Limit PK	Margin PK	Margin CAV	Height	Angle
	[MHz]		[dB(μV)]	[dB(μV)]	[dB(1/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB]	[dB]	[cm]	[°]
1	10640.000	H	46.7	34.1	11.1	57.8	45.2	74.0	16.2	8.8	154.0	124.0

Note:

1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 18GHz to 40GHz at the 3 meters distance.