FCC TEST REPORT

for

Meiloon Industrial Co., Ltd.

active loudspeaker

Model Number: Bravado

FCC ID: R48BRAVA
IC: 7190A-BRAVA

Prepared for : Meiloon Industrial Co., Ltd.
Address : No.99, Xingfu Road, Taoyuan Dist, Taoyuan City, Taiwan

Prepared by : Keyway Testing Technology Co., Ltd.
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Report No. : 15KWE093047F
Date of Test : Sep.7~Sep.15,2015
Date of Report : Sep.16, 2015

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Test Report Declaration Page

Keyway Testing Technology Co., Ltd.

Applicant: **Address:**	Meiloon Industrial Co., Ltd. No.99, Xingfu Road, Taoyuan Dist, Taoyuan City, Taiwan		
Manufacturer: **Address:**	Martin logan LTD 2101 Delaware Street, Lawrence, KS 66046 USA		
Factory: **Address:**	Dongguan Meiloon Acoustic Equipments Co., Ltd. 77, Yuanlin Road Fenghuanggang Ind, Estate, Tangxia Town, 523727 Dongguan City, Guangdong Province, PEOPLE'S REPUBLIC OF CHINA.		
E.U.T:	active loudspeaker		
Model Number:	Bravado		
Trade Name:	MARTIN LOGAN	**Serial No.:**	------
Date of Receipt:	Sep. 6 , 2015	**Date of Test:**	Sep.7~Sep.15,2015
Test Specification:	FCC Part 15, Subpart 15.407: Oct. 1, 2014 ANSI C63.10:2013 KDB789033 D02 v01 RSS-247 Issue 1 May 2015 RSS-Gen Issue 4 November 2014		
Test Result:	The equipment under test was found to be compliance with the requirements of the standards applied.		

Issue Date: Sep.16, 2015

Tested by:	Reviewed by:	Approved by:
Keven Wu / Engineer	Andy Gao/ Supervisor	Jade Yang/ Supervisor

Other Aspects:

None.

Abbreviations: OK/P=passed fail/F=failed n.a/N=not applicable E.U.T=equipment under tested

1.TEST SUMMARY

Test Items	Test Requirement	Result
Conducted Emissions	15.207 RSS-GEN, Section 8.8	PASS
Radiated Emissions	15.407(b), 15.209 &RSS-Gen §6.13	PASS
26dB bandwidth and 99%dB Bandwidth	15.407 (a) RSS-247 §5.2(1) &RSS-Gen§6.6	PASS
Power density	15.407 (a) & RSS-247 §6.2.1	PASS
Maximum Peak Output Power	15.407 (a) & RSS-247 §6.2.1	PASS
Emissions from out of band	15.407 (b) & RSS-247 §6.2.1	PASS
Antenna Requirement	15.203&RSS-Gen§8.3	PASS

2.GENERAL PRODUCT INFORMATION

2.1. Product Function

Refer to Technical Construction Form and User Manual.

2.2. Description of Device (EUT)

Product Name:	active loudspeaker
Model No.:	Bravado
Operation Frequency:	2412MHz~2462MHz (802.11b/802.11g/802.11n(H20)) 2422MHz~2452MHz (802.11n(H40)) 5180-5240 MHz; 5745-5825 MHz(5G 802.11a/n(HT20)) 5190-5230 MHz; 5755-5795 MHz(802.11n(HT40))
Channel numbers:	11 for 802.11b/802.11g/802.11n(H20) ,7 for 802.11n(H40) 5channels for 5G 802.11a/n(HT20) 4channels for 802.11n(HT40)
Modulation technology:	Direct Sequence Spread Spectrum (DSSS) for (IEEE 802.11b) Orthogonal Frequency Division Multiplexing(OFDM) for (IEEE 802.11g/802.11n)
Data speed (IEEE 802.11b):	1Mbps, 2Mbps, 5.5Mbps, 11Mbps
Data speed (IEEE 802.11g):	6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps,54Mbps
Data speed (IEEE 802.11n):	Up to 150Mbps
Antenna Type:	PIFA
Antenna gain:	3.3dBi for 2.4G wifi(declare by Applicant) 3.25dBi for 5G
Power supply:	AC 120V/60Hz

2.3. Test Supporting System

None.

2.4. Product Version

Product SW version	V0.1.3464
Product HW version	V01
Radio SW version	V03
Radio HW version	1.9.1.009
Test SW Version	V1.2
RF power setting in TEST SW	2.4G:11b 15 dBm;11g 14 dBm;11n(HT20) 13 dBm; 11n(HT40) 11 dBm 5G:11n 14 dBm; 11a 13 dBm

2.5. Independent Operation Modes

The basic operation modes are:

These is Digital Transmission system (DTS) and have modulation OFDM, DSSS, DBPSK, DQPSK, CCK, 16QAM, 64QAM. According exploratory test, EUT will have maximum output power in those data rate (802.11a/n: MCS0), so those data rate were used for all test. The equipment enables high-speed access without wires to network assets. This adapter uses the IEEE 802.11 protocol to enable wireless communications between the host and Wireless rooter.

For 802.11a/n(HT20):

1.lowest channel : 5180MHz (Channel 36)

2.middle channel : 5200MHz (Channel 40)

3. highest channel : 5240MHz (Channel 48)

For 802.11n(HT40):

4. For lowest channel : 5190MHz (Channel 38)

5. highest channel : 5230MHz (Channel 46)

For 802.11a/n(HT20):

6.lowest channel : 5745MHz (Channel 149)

7. middle channel : 5785MHz (Channel 157)

8. highest channel : 5825MHz (Channel 165)

For 802.11n(HT40):

9. lowest channel : 5755MHz (Channel 151)

10. For highest channel : 5795MHz (Channel 159)

Note: for conducted emission test, we pretest all mode,the worst mode was 802.11a channel 36.
for radiated emissions test, we pretest all mode,the worst mode was 802.11a.
The worst mode's data was recording and show in the test report.

2.6. TEST SITES

2.6.1. Test Facilities

Lab Qualifications : Certificated by Industry Canada
Registration No.: 9868A
Date of registration: December 8, 2011

Certificated by FCC, USA
Registration No.: 370994
Date of registration: February 21, 2012

Certificated by CNAS China
Registration No.: CNAS L5783
Date of registration: August 8, 2012

2.7. List of Test and Measurement Instruments

2.7.1. For conducted emission at the mains terminals test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr. 27,15	Apr. 27,16
Artificial Mains Network	Rohde&Schwarz	ENV216	101315	Apr. 27,15	Apr. 27,16
Artificial Mains Network (AUX)	Rohde&Schwarz	ENV216	101314	Apr. 27,15	Apr. 27,16
RF Cable	FUJIKURA	3D-2W	944 Cable	Apr. 27,15	Apr. 27,16

2.7.2. For radiated emission test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr. 27,15	Apr. 27,16
System Simulator	Agilent	E5515C	GB43130245	Apr. 27,15	Apr. 27,16
Power Splitter	Weinschel	1506A	NW425	Apr. 27,15	Apr. 27,16
Bilog Antenna	ETS-LINDGREEN	3142D	135452	Apr. 27,15	Apr. 27,16
Spectrum Analyzer	Agilent	E4411B	MY4511304	Apr. 27,15	Apr. 27,16
Spectrum Analyzer	R&S	FSV40	132.1.3008K39 -100967	Apr. 27,15	Apr. 27,16
3m Semi-anechoic Chamber	ETS-LINDGREEN	966	KW01	Apr. 27,15	Apr. 27,16
Signal Amplifier	SONOMA	310	187016	Apr. 27,15	Apr. 27,16
Signal Amplifier	Agilent	8449B	3008A00251	Apr. 27,15	Apr. 27,16
RF Cable	IMRO	IMRO-400	966 Cable 1#	N/A	N/A
MULTI-DEVICE Controller	ETS-LINDGREEN	2090	126913	N/A	N/A
Horn Antenna	DAZE	ZN30701	11003	Apr. 27,15	Apr. 27,16
Horn Antenna	SCHWARZBECK	BBHA9170	9170-068	Apr. 27,15	Apr. 27,16
Spectrum Analyzer	Agilent	8593E	3911A04271	Apr. 27,15	Apr. 27,16
Spectrum Analyzer	Agilent	E4408B	MY44211125	Apr. 27,15	Apr. 27,16
Signal Amplifier	DAZE	ZN3380C	11001	Apr. 27,15	Apr. 27,16
High Pass filter	Micro	HPM50111	324216	Apr. 27,15	Apr. 27,16
Filter	COM-MW	ZBSF-C836.5-25-X	KW032	Apr. 27,15	Apr. 27,16
Filter	COM-MW	ZBSF-C1747.5-75-X2	KW035	Apr. 27,15	Apr. 27,16
Filter	COM-MW	ZBSF-C1880-60-X2	KW037	Apr. 27,15	Apr. 27,16
DC Power Supply	LongWei	PS-305D	010964729	Apr. 27,15	Apr. 27,16
Constant temperature and humidity box	GF	GTH-800-40-1P	MAA9906-005	Apr. 27,15	Apr. 27,16
Universal radio communication tester	Rohde&Schwarz	CMU200	3215420	Apr. 27,15	Apr. 27,16
Splitter	Agilent	11636B	0025164	Apr. 27,15	Apr. 27,16

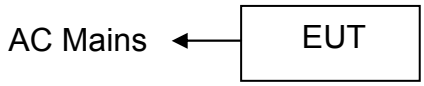
3. TEST SET-UP AND OPERATION MODES

3.1. Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

3.2. Block Diagram of Test Set-up

System Diagram of Connections between EUT and Simulators



(EUT: active loudspeaker)

3.3. Test Operation Mode and Test Software

None.

3.4. Special Accessories and Auxiliary Equipment

None.

3.5. Countermeasures to Achieve EMC Compliance

None.

4. EMISSION TEST RESULTS

4.1. Conducted Emission at the Mains Terminals Test

4.1.1. Limit 15.207 limits

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15-0.5 0.5-5 5-30	66 to 56 56 60	56 to 46 46 50

4.1.2. Test Setup

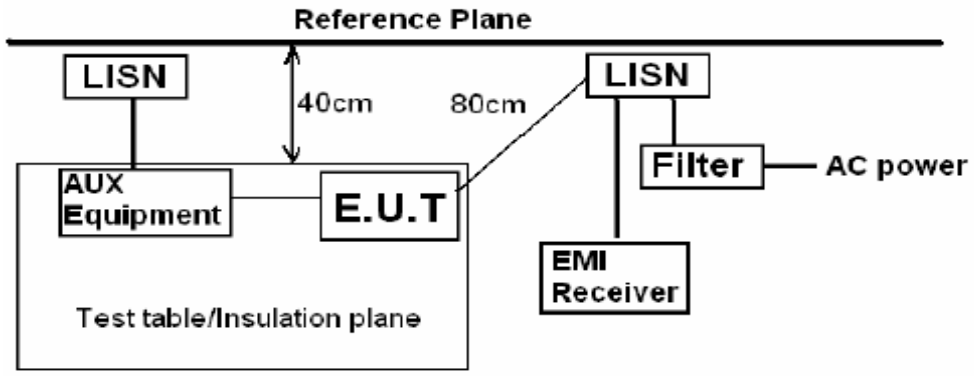
The EUT was put on a wooden table which was 0.8 m high above the ground and connected to the AC mains through the Artificial Mains Network (AMN). Where the mains cable supplied by the manufacture was longer than 0.8 m, the excess was folded back and forth parallel to the cable at the centre so as to form a bundle no longer than 0.4 m.

The EUT was kept 0.4 m from any other earthed conducting surface. Both sides of AC line were checked to find out the maximum conducted emission levels according to the test procedure during the conducted emission test.

The frequency range from 150 kHz to 30 MHz was investigated.

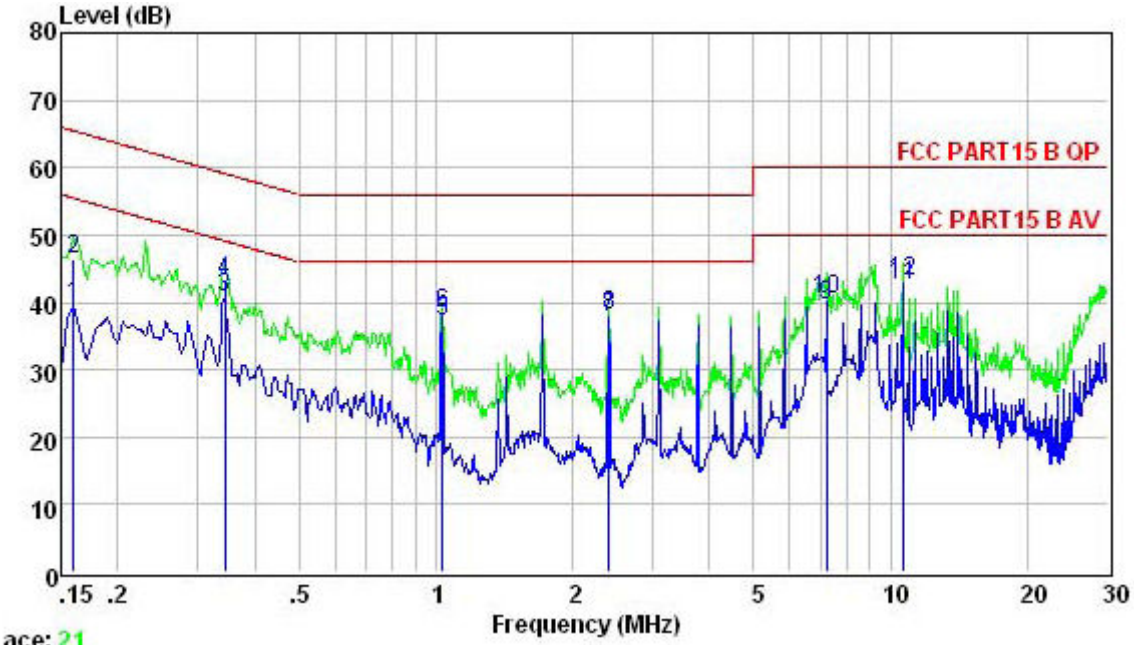
The bandwidth of the test receiver was set at 9 kHz.

Pretest for all mode, The test data of the worst case condition(s) was reported on the following page.



Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m

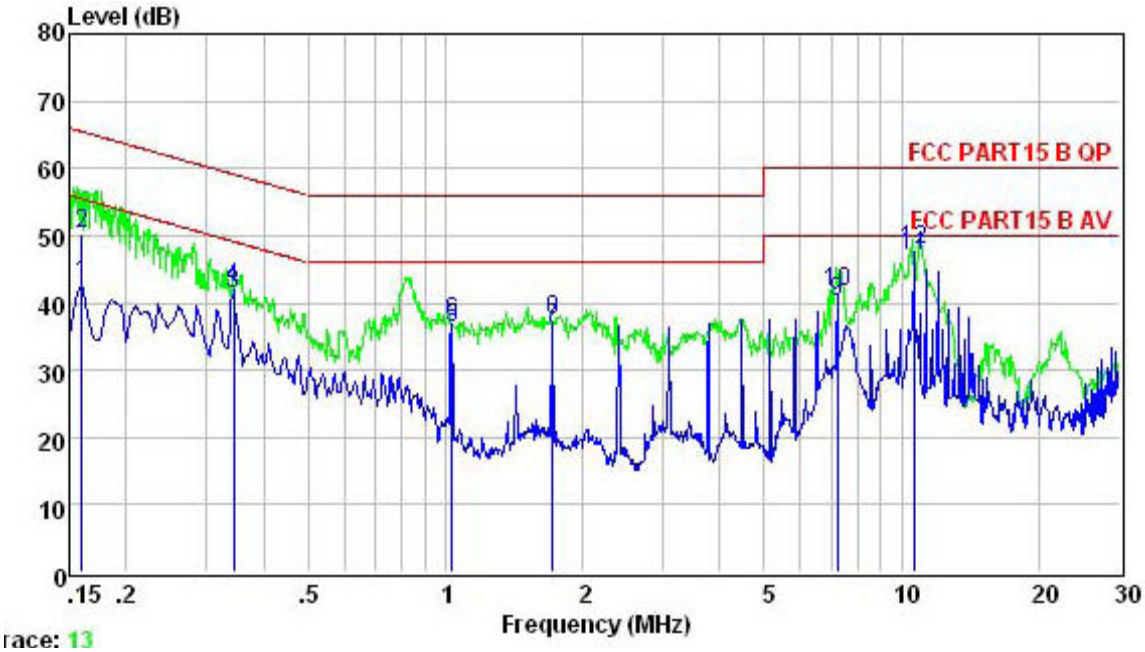
Line



ace: 21

	Freq	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dB	
1	0.160	39.44	55.47	-16.03	Average
2	0.160	46.26	65.47	-19.21	QP
3	0.345	40.80	49.09	-8.29	Average
4	0.345	43.26	59.09	-15.83	QP
5	1.032	37.18	46.00	-8.82	Average
6	1.032	38.26	56.00	-17.74	QP
7	2.396	37.66	46.00	-8.34	Average
8	2.396	38.21	56.00	-17.79	QP
9	7.213	39.53	50.00	-10.47	Average
10	7.213	40.35	60.00	-19.65	QP
11	10.620	42.66	50.00	-7.34	Average
12	10.620	43.17	60.00	-16.83	QP

Neutral



race: 13

	Freq	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dB	
1	0.160	42.74	55.47	-12.73	Average
2	0.160	50.21	65.47	-15.26	QP
3	0.345	41.47	49.09	-7.62	Average
4	0.345	42.22	59.09	-16.87	QP
5	1.032	36.19	46.00	-9.81	Average
6	1.032	37.23	56.00	-18.77	QP
7	1.716	36.33	46.00	-9.67	Average
8	1.716	37.45	56.00	-18.55	QP
9	7.213	40.06	50.00	-9.94	Average
10	7.213	41.56	60.00	-18.44	QP
11	10.620	46.96	50.00	-3.04	Average
12	10.620	47.98	60.00	-12.02	QP

4.2. Radiated Emission Test

4.2.1. Limit 15.209 limits

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

4.2.2. Restricted bands of operation

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

4.2.3. Test setup

The EUT was placed on a turn table which was 0.8 m(above 1GHz, the high was 1.5m) above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was set 3 m away from the receiving antenna which was mounted on an antenna tower. The measuring antenna moved up and down to find out the maximum emission level. It moved from 1 m to 4 m for both horizontal and vertical polarizations.

The EUT was tested in the Chamber Site. It was pre-scanned with a Peak detector from the spectrum, and all the final readings from the test receiver were measured with the Quasi-Peak detector.

The bandwidth of the EMI test receiver is set at 120kHz for frequency range from 30MHz to 1000 MHz.

The bandwidth of the Spectrum's VBW is set at 3MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure above 1GHz, Both PK and AV measure, PK detector is used.

The frequency range from 30MHz to 10^{th} harmonic (25GHz) are checked. and no any emissions were found from 18GHz to 25 GHz, So the radiated emissions from 18GHz to 25GHz were not record.

Notes: 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading-Preamp Factor.

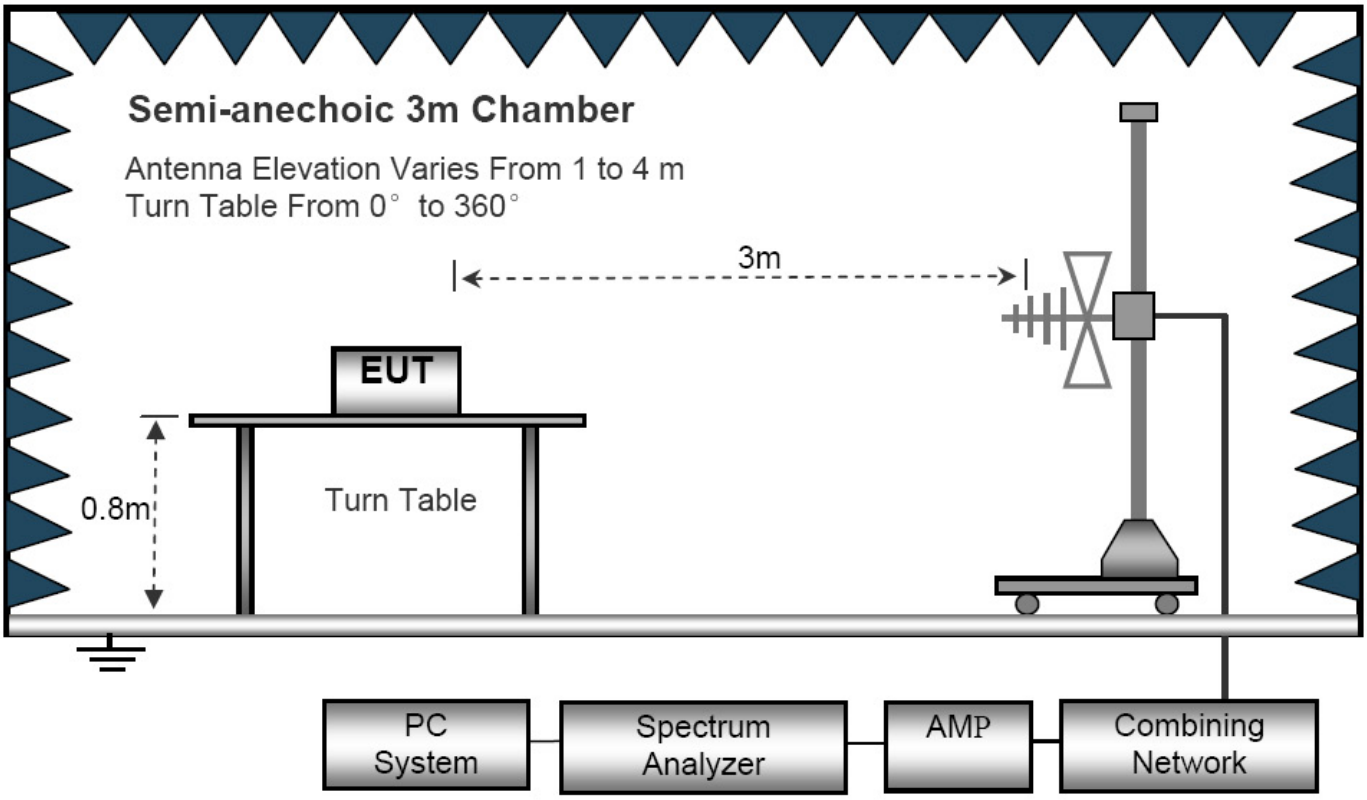
2. Measurement Uncertainty: ±3.2 dB at a level of confidence of 95%.

3. For emissions above 1GHz, if peak level comply with average limit, then the average level is deemed to comply with average limit.

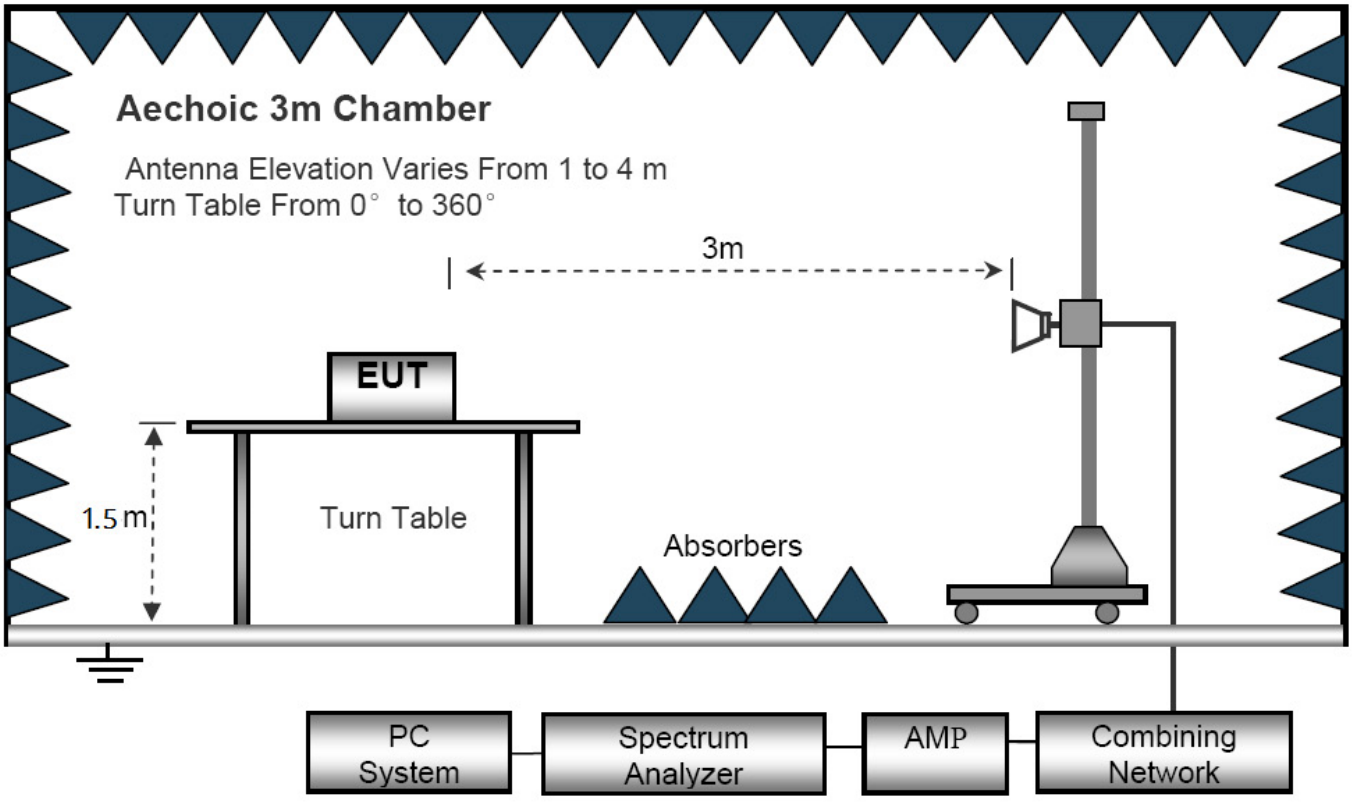
4. For emissions below 1GHz, pretest for all mode, The test data of the worst case condition(s) was reported on the following pages.

5. For Both PK and AV value above 1GHz, PK detector is used.

Below 1GHz

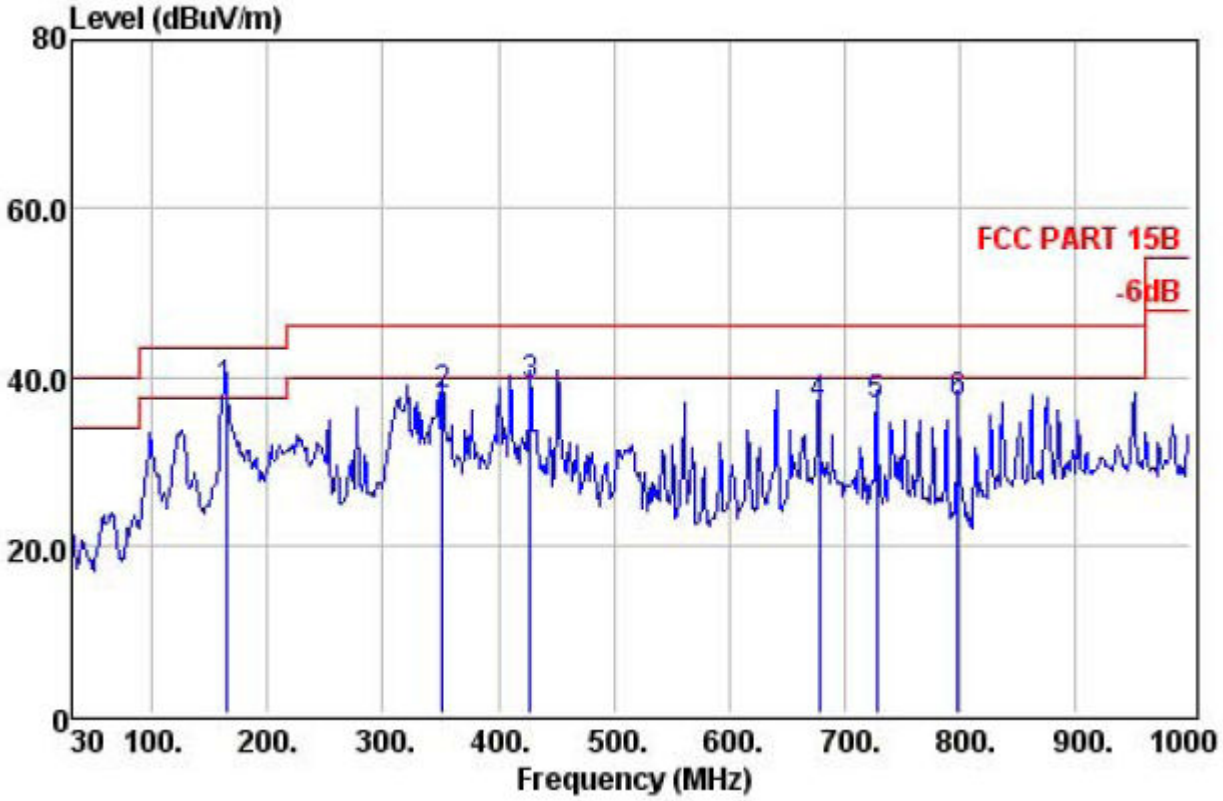


Above 1GHz



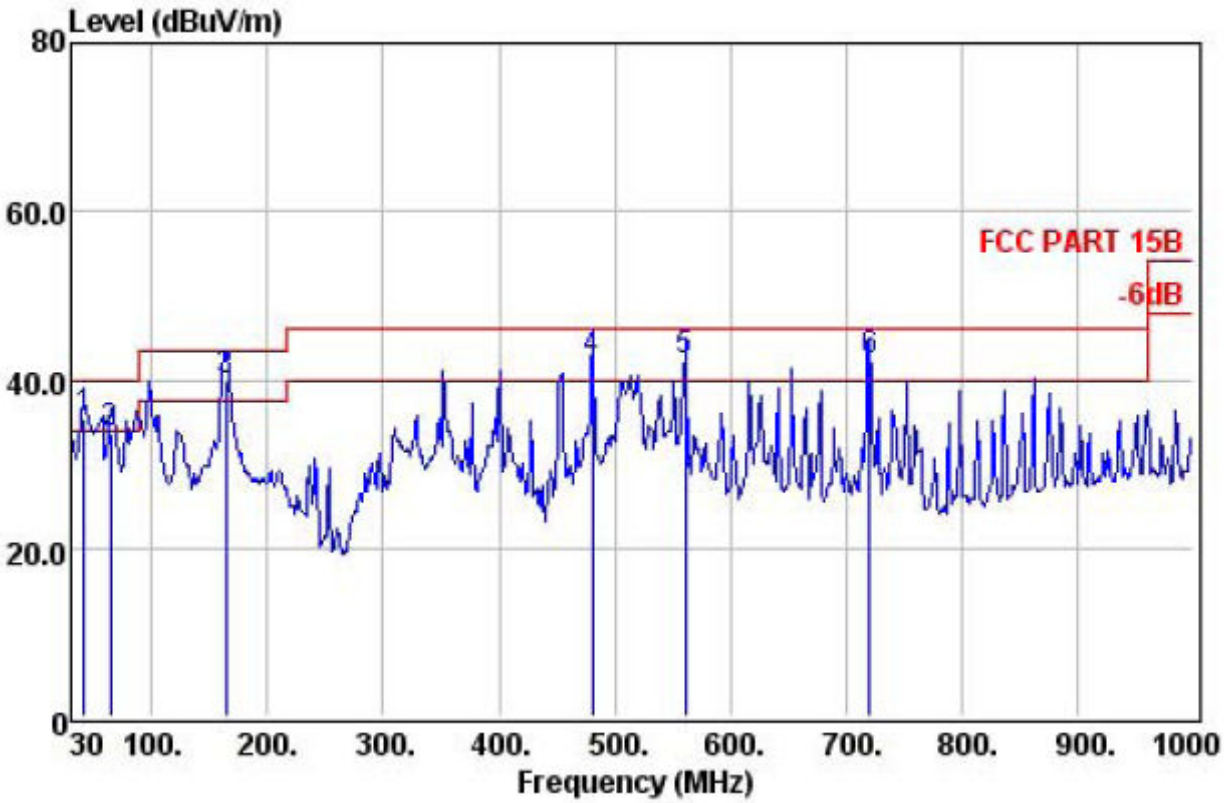
Below 1GHz

Horizontal



		Freq	Preamp Factor	Read Level	Cable Loss	Level	Limit Line	Over Limit	Remark
		MHz	dB	dBuV	dB	dBuV/m	dBuV/m	dB	
1	!	163.86	31.21	58.64	1.30	38.28	43.50	-5.22	QP
2		352.04	30.66	50.53	2.10	37.64	46.00	-8.36	QP
3		427.70	30.63	49.95	2.55	39.02	46.00	-6.98	QP
4		677.96	30.75	41.68	3.80	36.72	46.00	-9.28	QP
5		728.40	30.66	40.63	3.96	36.56	46.00	-9.44	QP
6		798.24	30.57	40.11	4.29	36.81	46.00	-9.19	QP

Vertical



	Freq	Preamp Factor	Read Level	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dBuV/m	dBuV/m	dB	
1 !	30.00	31.41	48.00	0.56	35.95	40.00	-4.05	QP
2 !	54.25	31.37	57.95	0.75	35.49	40.00	-4.51	QP
3 !	551.86	30.88	50.71	3.12	42.47	46.00	-3.53	QP
4 !	652.74	30.82	47.58	3.58	41.81	46.00	-4.19	QP
5 !	720.64	30.65	46.00	3.96	41.79	46.00	-4.21	QP
6 !	752.65	30.67	46.56	4.12	42.80	46.00	-3.20	QP

Above 1GHz

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel (5180 MHz)							
10360.000	37.46	13.09	50.55	74	-23.45	Pk	Vertical
15540.000	34.14	15.16	49.30	74	-24.70	Pk	Vertical
10360.000	36.35	13.09	49.44	74	-24.56	Pk	Horizontal
15540.000	34.88	15.16	50.04	74	-23.96	Pk	Horizontal
middle Channel (5200 MHz)							
10400.000	38.65	13.11	51.76	74	-22.24	Pk	Vertical
15600.000	35.37	15.19	50.56	74	-23.44	Pk	Vertical
10400.000	34.14	13.11	47.25	74	-26.75	Pk	Horizontal
15600.000	35.09	15.19	50.28	74	-23.72	Pk	Horizontal
High Channel (5240 MHz)							
10480.000	39.25	13.19	52.44	74	-21.56	Pk	Vertical
15720.00	36.98	15.25	52.23	74	-21.77	Pk	Vertical
10480.000	33.25	13.19	46.44	74	-27.56	Pk	Horizontal
15720.00	36.14	15.34	51.48	74	-22.52	Pk	Horizontal

Note:”802.11a(5G)” mode is the worst mode. When PK value is lower than the Average value limit,average didn't record.

5. BAND EDGE COMPLIANCE TEST

5.1. Limits

Band 5.15-5.25GHz:

FCC: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.

IC: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

FCC: 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.

IC: For the band 5725-5825 MHz, emissions within the frequency range from the band edges to 10 MHz above or below the band edges shall not exceed -17 dBm/MHz e.i.r.p. For frequencies more than 10 MHz above or below the band edges, emissions shall not exceed -27 dBm/MHz.

5.2. Test setup

Test method: FCC KDB 789033 G)& Parts 15.407(b)(4) & 15.209(a)

Same as Clause 4.2.

5.3. Test Data

Please see data as below:

Note: we pretest horizontal and vertical, the worst was horizontal and show in the report.

Modulation	Test Frequency (MHz)	Max Level (dBμV/m)	EIRP[dBm]	Limit[dBm]	Result
802.11a	5180	51.45	-43.75	-27.00	Pass
	5240	52.56	-42.64	-27.00	Pass
	5745	52.74	-42.46	-27.00	Pass
	5825	52.15	-43.05	-27.00	Pass
802.11n(HT20)	5180	52.35	-42.85	-27.00	Pass
	5240	53.26	-41.94	-27.00	Pass
	5745	49.64	-45.56	-27.00	Pass
	5825	50.04	-45.16	-27.00	Pass
802.11n(HT40)	5190	50.22	-44.98	-27.00	Pass
	5230	51.46	-43.74	-27.00	Pass
	5745	51.52	-43.68	-27.00	Pass
	5825	51.08	-44.12	-27.00	Pass

Remark: 1. According to KDB 789033 D02 section H) d) (iii), for measurement above 1000MHz@3m distance, the limit of EIRP is calculated as follows: EIRP[dBm] = E[dBμV/m] - 95.2

6. 26DB AND 99% BANDWIDTH TEST

6.1. Measurement Procedure

The bandwidth at 26 dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum power control level, as defined in KDB 789033, at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26 dB bandwidth.

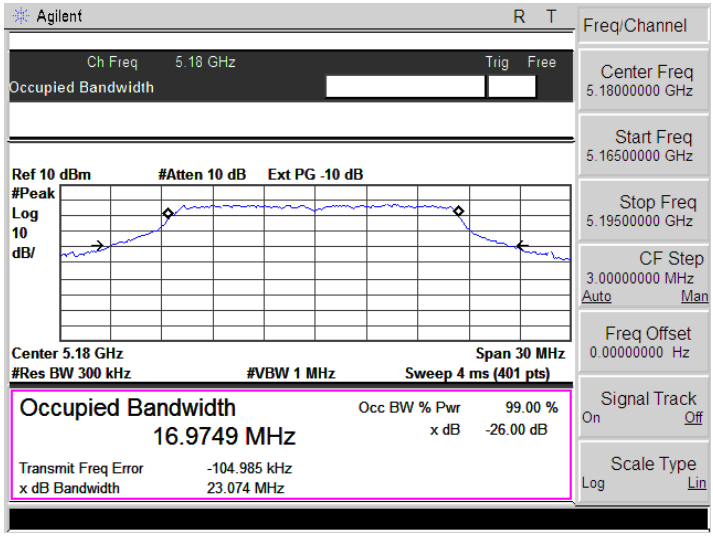
The 26 dB bandwidth is used to determine the conducted power limits.

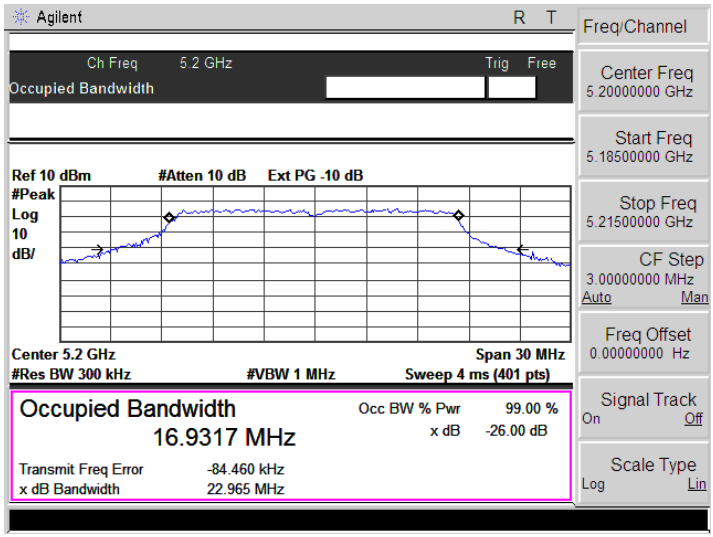
The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3

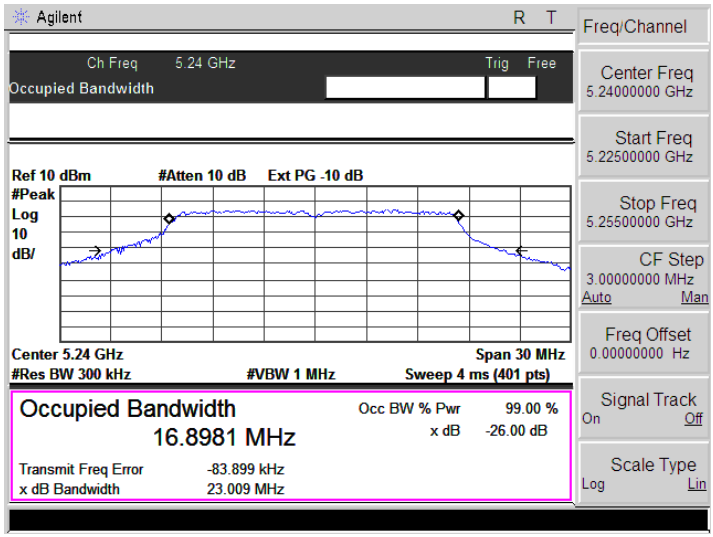
	Channel number	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
802.11a	36	5180	23.074	16.9749
	40	5200	22.965	16.9317
	48	5240	23.009	16.8981
802.11n (HT20)	36	5180	23.577	17.9893
	40	5200	23.466	17.9953
	48	5240	23.407	17.9738
802.11n (HT40)	38	5190	44.534	36.6640
	46	5230	42.113	36.4497

	Channel number	Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (MHz)
802.11a	149	5745	16.527	16.4717	0.5
	157	5785	16.519	16.4418	0.5
	165	5825	16.551	16.4640	0.5
802.11n (HT20)	149	5745	17.741	17.6502	0.5
	157	5785	17.710	17.6591	0.5
	165	5825	17.726	17.6420	0.5
802.11n (HT40)	151	5755	36.534	36.9562	0.5
	159	5795	36.495	36.9663	0.5

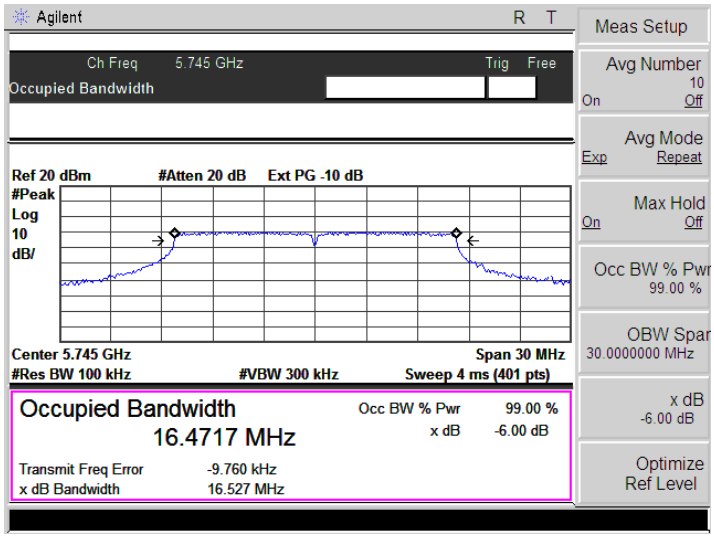
802.11a
-26dB

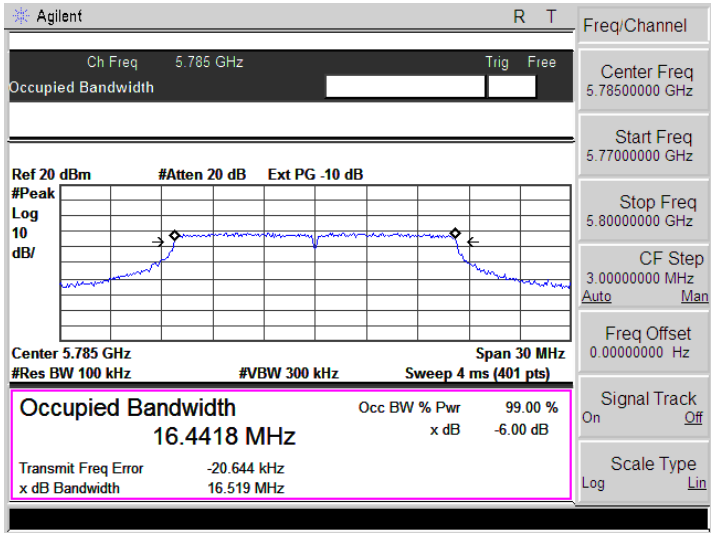

Agilent
R T
Ch Freq 5.18 GHz
Trig Free
Occupied Bandwidth
Ref 10 dBm
#Atten 10 dB
Ext PG -10 dB
#Peak
Log
10
dB/
Center 5.18 GHz
Span 30 MHz
#Res BW 300 kHz
#VBW 1 MHz
Sweep 4 ms (401 pts)
Occupied Bandwidth
16.9749 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -104.985 kHz
x dB Bandwidth 23.074 MHz
Freq/Channel
Center Freq
5.18000000 GHz
Start Freq
5.16500000 GHz
Stop Freq
5.19500000 GHz
CF Step
3.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

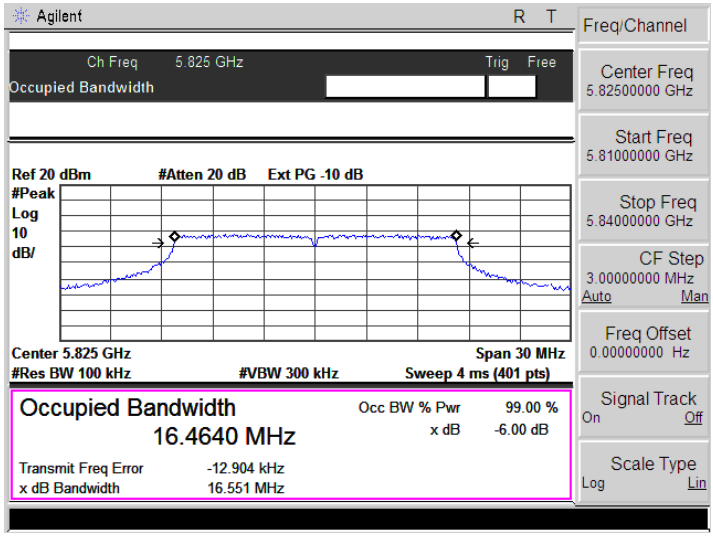

Agilent
R T
Ch Freq 5.2 GHz
Trig Free
Occupied Bandwidth
Ref 10 dBm
#Atten 10 dB
Ext PG -10 dB
#Peak
Log
10
dB/
Center 5.2 GHz
Span 30 MHz
#Res BW 300 kHz
#VBW 1 MHz
Sweep 4 ms (401 pts)
Occupied Bandwidth
16.9317 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -84.460 kHz
x dB Bandwidth 22.965 MHz
Freq/Channel
Center Freq
5.20000000 GHz
Start Freq
5.18500000 GHz
Stop Freq
5.21500000 GHz
CF Step
3.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin


Agilent
R T
Ch Freq 5.24 GHz
Trig Free
Occupied Bandwidth
Ref 10 dBm
#Atten 10 dB
Ext PG -10 dB
#Peak
Log
10
dB/
Center 5.24 GHz
Span 30 MHz
#Res BW 300 kHz
#VBW 1 MHz
Sweep 4 ms (401 pts)
Occupied Bandwidth
16.8981 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -83.899 kHz
x dB Bandwidth 23.009 MHz
Freq/Channel
Center Freq
5.24000000 GHz
Start Freq
5.22500000 GHz
Stop Freq
5.25500000 GHz
CF Step
3.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

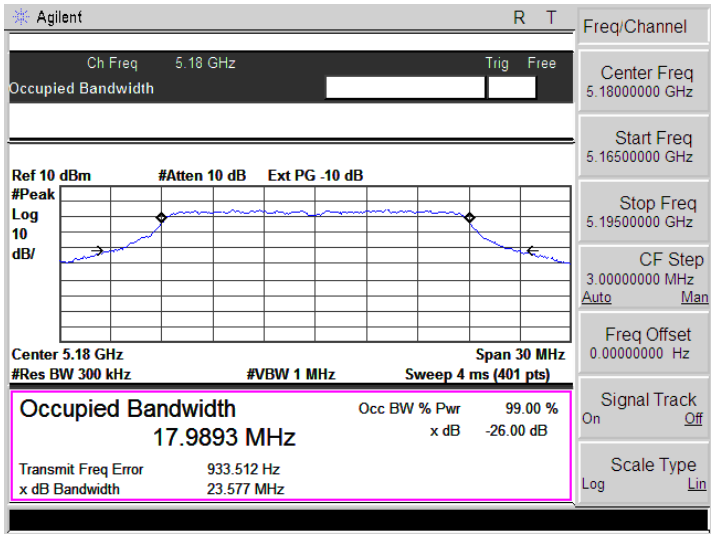
-6dB

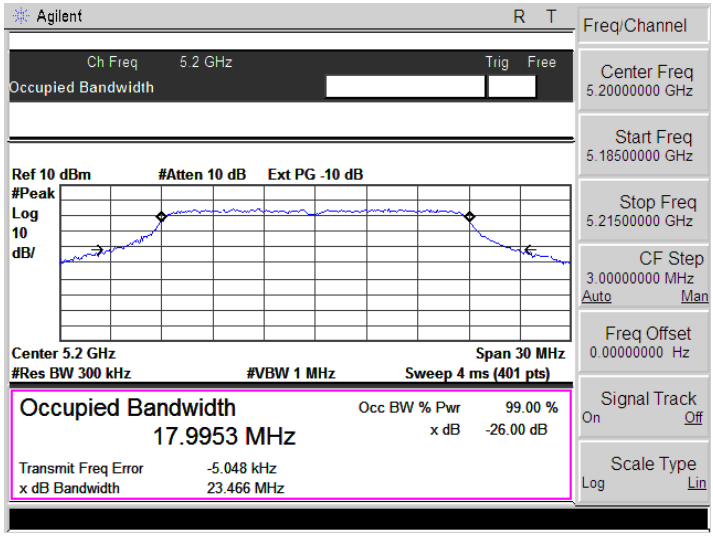

Agilent
R T
Ch Freq 5.745 GHz
Trig Free
Occupied Bandwidth
Ref 20 dBm
#Atten 20 dB
Ext PG -10 dB
#Peak
Log
10
dB/
Center 5.745 GHz
Span 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 4 ms (401 pts)
Occupied Bandwidth
16.4717 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -9.760 kHz
x dB Bandwidth 16.527 MHz
Meas Setup
Avg Number 10
On Off
Avg Mode
Exp Repeat
Max Hold
On Off
Occ BW % Pwr 99.00 %
OBW Span 30.0000000 MHz
x dB -6.00 dB
Optimize Ref Level

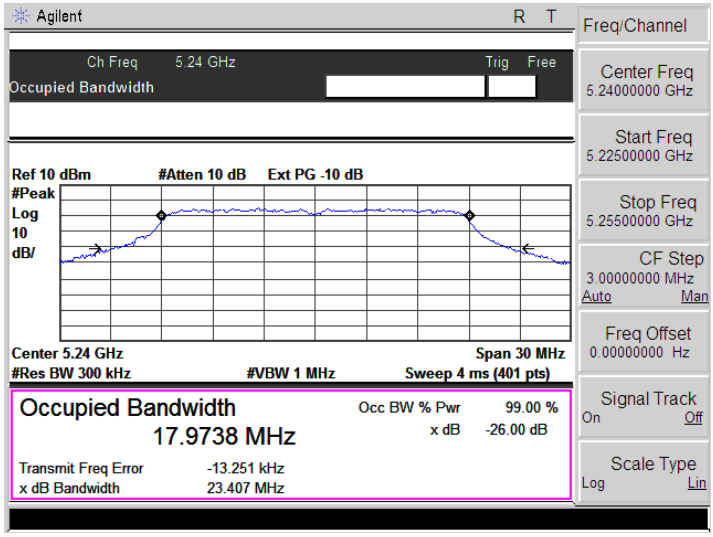

Agilent
R T
Ch Freq 5.785 GHz
Trig Free
Occupied Bandwidth
Ref 20 dBm
#Atten 20 dB
Ext PG -10 dB
#Peak
Log
10
dB/
Center 5.785 GHz
Span 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 4 ms (401 pts)
Occupied Bandwidth
16.4418 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -20.644 kHz
x dB Bandwidth 16.519 MHz
Freq/Channel
Center Freq 5.78500000 GHz
Start Freq 5.77000000 GHz
Stop Freq 5.80000000 GHz
CF Step 3.00000000 MHz
Auto Man
Freq Offset 0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin


Agilent
R T
Ch Freq 5.825 GHz
Trig Free
Occupied Bandwidth
Ref 20 dBm
#Atten 20 dB
Ext PG -10 dB
#Peak
Log
10
dB/
Center 5.825 GHz
Span 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 4 ms (401 pts)
Occupied Bandwidth
16.4640 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -12.904 kHz
x dB Bandwidth 16.551 MHz
Freq/Channel
Center Freq 5.82500000 GHz
Start Freq 5.81000000 GHz
Stop Freq 5.84000000 GHz
CF Step 3.00000000 MHz
Auto Man
Freq Offset 0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

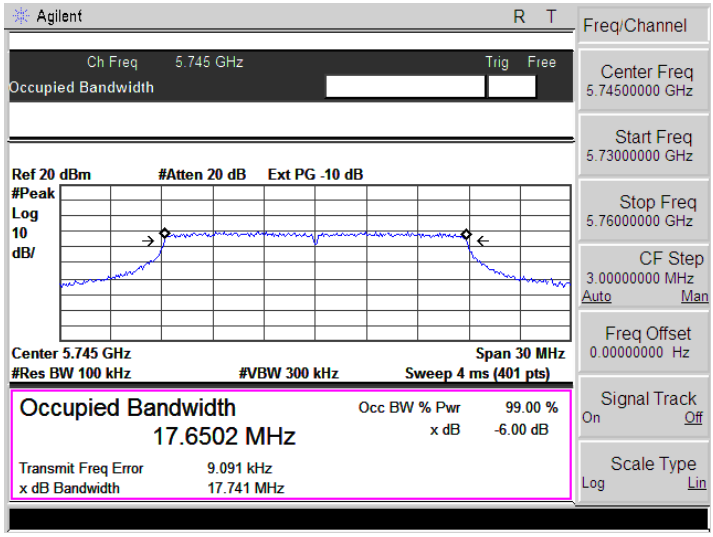
802.11n (HT20)
-26dB

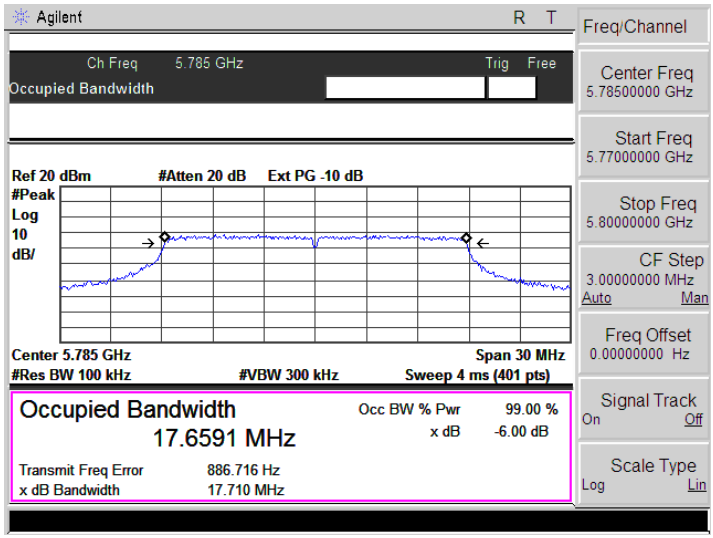


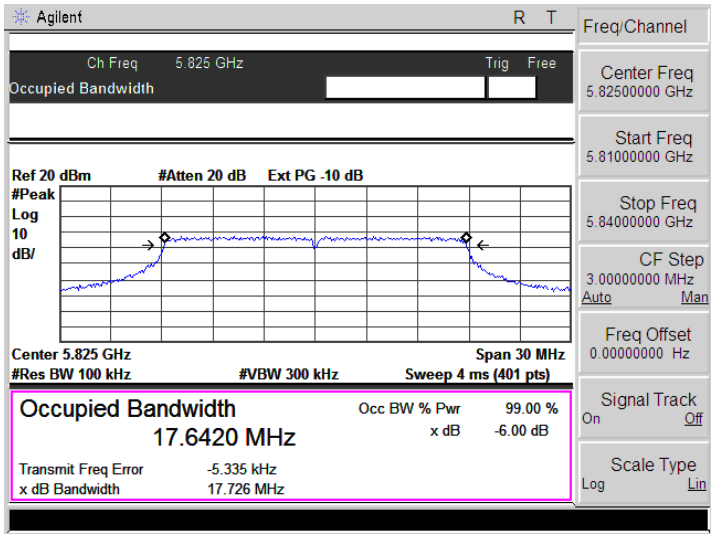




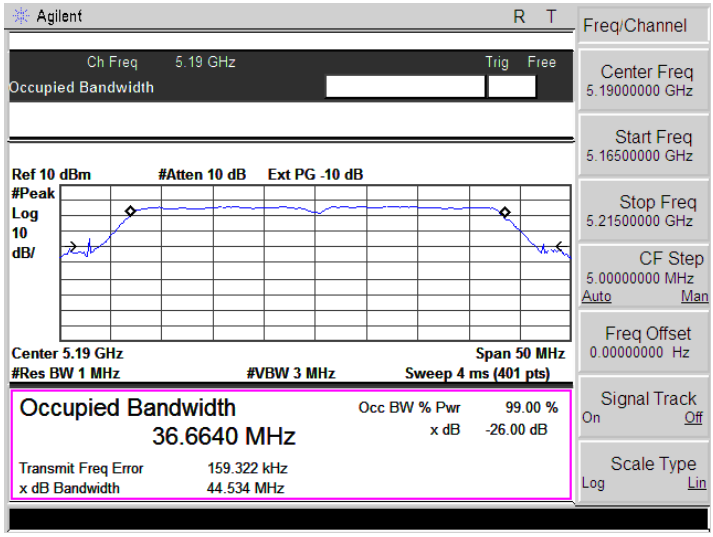
-6dB

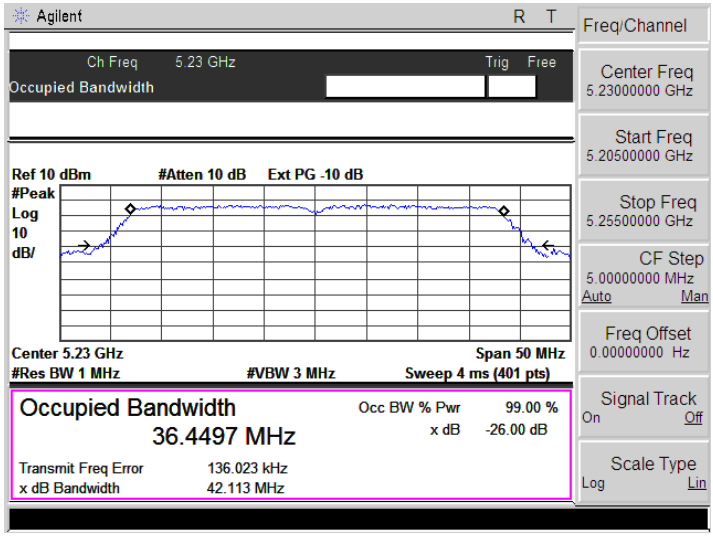

Agilent
R T
Freq/Channel
Ch Freq 5.745 GHz
Trig Free
Occupied Bandwidth
Center Freq
5.74500000 GHz
Start Freq
5.73000000 GHz
Stop Freq
5.76000000 GHz
CF Step
3.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin
Ref 20 dBm
#Atten 20 dB
Ext PG -10 dB
#Peak
Log
10
dB/
Center 5.745 GHz
Span 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 4 ms (401 pts)
Occupied Bandwidth
17.6502 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error 9.091 kHz
x dB Bandwidth 17.741 MHz


Agilent
R T
Freq/Channel
Ch Freq 5.785 GHz
Trig Free
Occupied Bandwidth
Center Freq
5.78500000 GHz
Start Freq
5.77000000 GHz
Stop Freq
5.80000000 GHz
CF Step
3.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin
Ref 20 dBm
#Atten 20 dB
Ext PG -10 dB
#Peak
Log
10
dB/
Center 5.785 GHz
Span 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 4 ms (401 pts)
Occupied Bandwidth
17.6591 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error 886.716 Hz
x dB Bandwidth 17.710 MHz

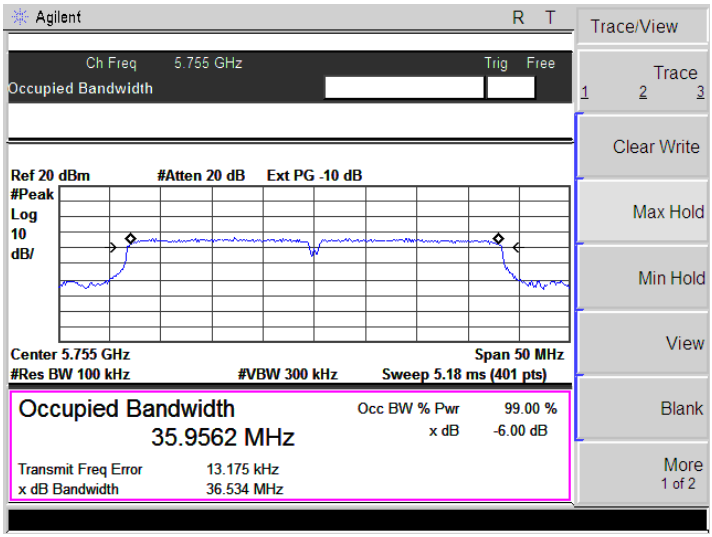

Agilent
R T
Freq/Channel
Ch Freq 5.825 GHz
Trig Free
Occupied Bandwidth
Center Freq
5.82500000 GHz
Start Freq
5.81000000 GHz
Stop Freq
5.84000000 GHz
CF Step
3.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin
Ref 20 dBm
#Atten 20 dB
Ext PG -10 dB
#Peak
Log
10
dB/
Center 5.825 GHz
Span 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 4 ms (401 pts)
Occupied Bandwidth
17.6420 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -5.335 kHz
x dB Bandwidth 17.726 MHz

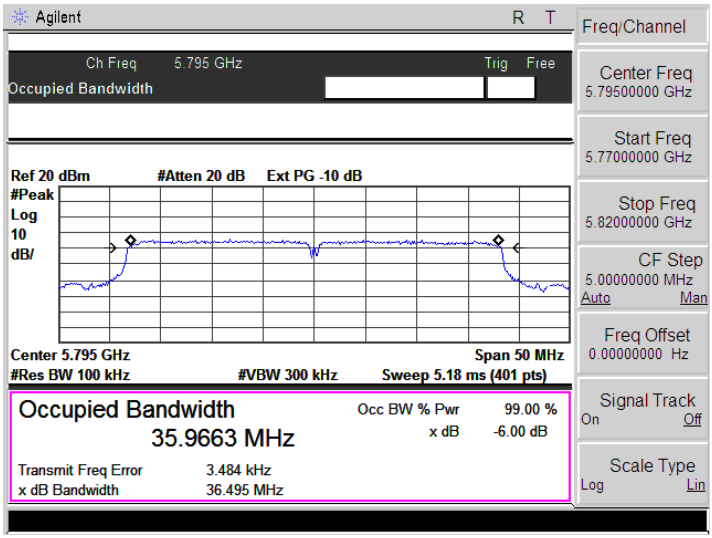
802.11n (HT40)
-26dB





-6dB


Agilent
R T
Ch Freq 5.755 GHz
Trig Free
Occupied Bandwidth
Trace/View
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
More
1 of 2
Ref 20 dBm
#Atten 20 dB
Ext PG -10 dB
#Peak
Log
10
dB/
Center 5.755 GHz
Span 50 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5.18 ms (401 pts)
Occupied Bandwidth
35.9562 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error 13.175 kHz
x dB Bandwidth 36.534 MHz


Agilent
R T
Ch Freq 5.795 GHz
Trig Free
Occupied Bandwidth
Freq/Channel
Center Freq
5.79500000 GHz
Start Freq
5.77000000 GHz
Stop Freq
5.82000000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin
Ref 20 dBm
#Atten 20 dB
Ext PG -10 dB
#Peak
Log
10
dB/
Center 5.795 GHz
Span 50 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5.18 ms (401 pts)
Occupied Bandwidth
35.9663 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error 3.484 kHz
x dB Bandwidth 36.495 MHz

7. OUTPUT POWER TEST

7.1. Limits

Band 5.15-5.25GHz:

FCC: 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 250 mW provided the maximum antenna gain does not exceed 6 dBi.

IC: The maximum e.i.r.p. shall not exceed 200 mW or 10 +10logB dBm, whichever power is less. B is the 99% emission bandwidth in MHz.

Band 5.725-5.825GHz:

FCC: For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

IC: The maximum conducted output power shall not exceed 1 W.

7.2. Test setup

1. The maximum average conducted output power can be measured using Method PM-G (Measurement using a gated RF average power meter):
2. Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

a. The Transmitter output (antenna port) was connected to the power meter.
b. Turn on the EUT and power meter and then record the power value.
c. Repeat above procedures on all channels needed to be tested.

7.3. Test result

	Frequency (MHz)	Average Output Power (dBm)	IC Limit (dBm)	FCC Limit (dBm)	Result
802.11a	5180	13.09	--	24.0	Pass
	5200	13.24	--	24.0	Pass
	5240	13.15	--	24.0	Pass
	5745	12.46	30.0	30.0	Pass
	5785	12.31	30.0	30.0	Pass
	5825	12.15	30.0	30.0	Pass
802.11n (HT20)	5180	12.62	--	24.0	Pass
	5200	12.11	--	24.0	Pass
	5240	12.13	--	24.0	Pass
	5745	12.18	30.0	30.0	Pass
	5785	12.25	30.0	30.0	Pass
	5825	12.31	30.0	30.0	Pass
802.11n (HT40)	5190	11.43	--	24.0	Pass
	5230	11.52	--	24.0	Pass
	5755	11.13	30.0	30.0	Pass
	5795	11.53	30.0	30.0	Pass

For IC For 5.15~5.25GHz, the limit=200 mW or 10 +10logB dBm, whichever power is less

For 5.725-5.825GHz, the limit=1 W
EIRP=output power+antenna gain

	Frequency (MHz)	Peak Output Power (dBm)	Antenna Gain (dBi)	EIRP(dBm)	IC Limit (dBm)
802.11a	5180	13.09	3.25	16.34	22.3
	5200	13.24	3.25	16.49	22.3
	5240	13.15	3.25	16.40	22.3
802.11n (HT20)	5180	12.62	3.25	15.87	22.6
	5200	12.11	3.25	15.36	22.6
	5240	12.13	3.25	15.38	22.5
802.11n (HT40)	5190	11.43	3.25	14.68	23.0
	5230	11.52	3.25	14.77	23.0

8. PEAK POWER SPECTRAL DENSITY TEST

8.1. Limits

Band 5.15-5.25GHz:

FCC: In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

IC: The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band..

Band 5.725-5.825GHz:

FCC: In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

IC: The 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.

8.2. Test setup

Methods refer to FCC KDB 789033

1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, “Compute power…”.

2) Use the peak search function on the instrument to find the peak of the spectrum.

3) The result is the PPSD.

4) The above procedures make use of 1 MHz resolution bandwidth to satisfy the 1 MHz measurement bandwidth specified in the 15.407(a)(5). That rule section also permits use of resolution bandwidths less than 1 MHz “provided that the measured power is integrated to show the total power over the measurement bandwidth” (i.e., 1 MHz). If measurements are performed using a reduced resolution bandwidth and integrated over 1 MHz bandwidth

8.3. Test data

Test data as below

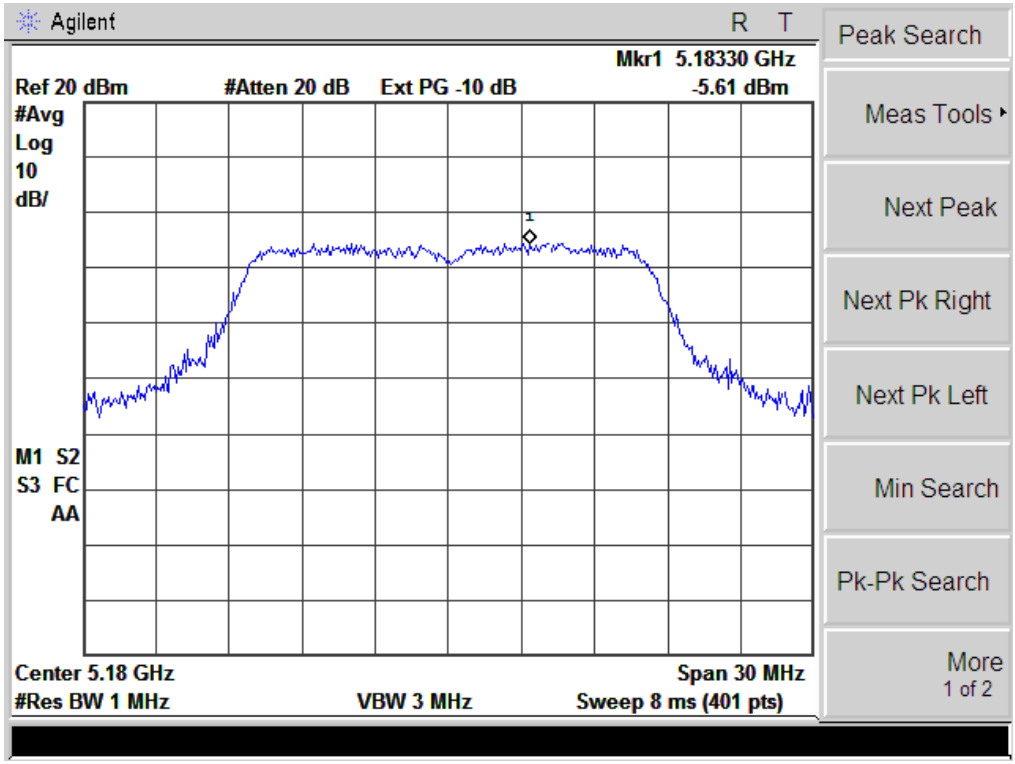
For FCC

	Frequency (MHz)	Power Density. Antenna port (dBm)	FCC Limit (dBm)	Result
802.11a	5180	-5.61	11.0	Pass
	5200	-5.456	11.0	Pass
	5240	-5.642	11.0	Pass
	5745	4.77	30.0	Pass
	5785	4.96	30.0	Pass
	5825	8.37	30.0	Pass
802.11n (HT20)	5180	-6.38	11.0	Pass
	5200	-6.083	11.0	Pass
	5240	-5.745	11.0	Pass
	5745	6.83	30.0	Pass
	5785	6.87	30.0	Pass
	5825	9.52	30.0	Pass
802.11n (HT40)	5190	-7.525	11.0	Pass
	5230	-7.329	11.0	Pass
	5755	-0.41	30.0	Pass
	5795	5.95	30.0	Pass

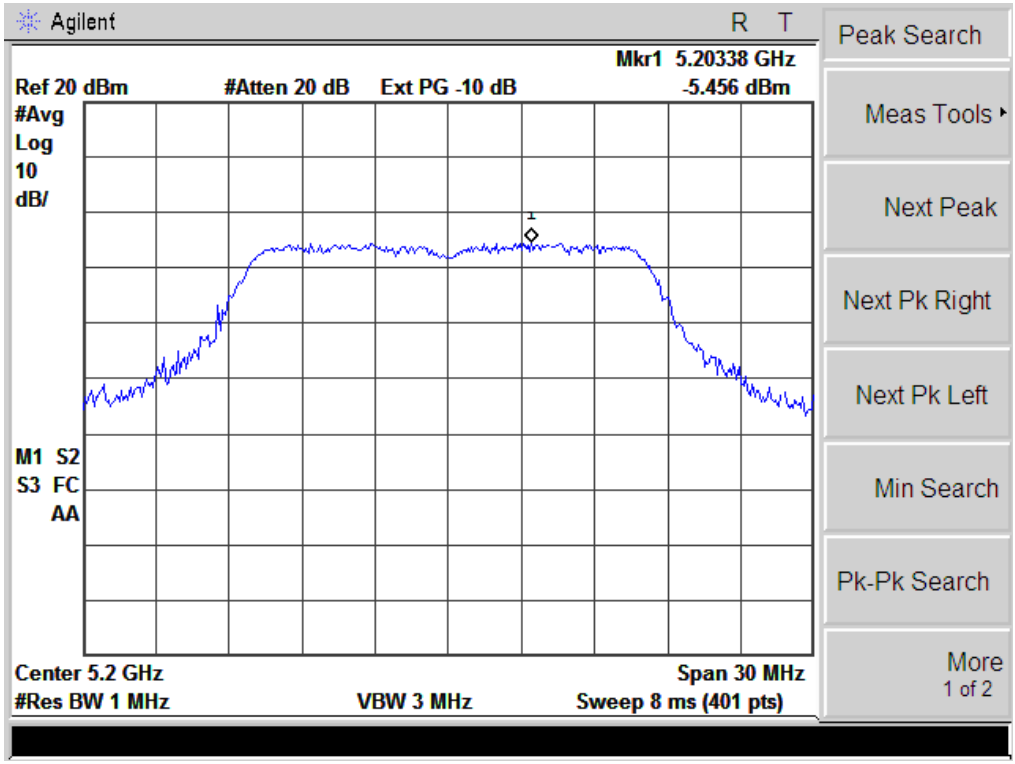
For IC

	Frequency (MHz)	Power Density. Antenna port (dBm))	Antenna Gain (dBi)	EIRP(dBm)	IC Limit (dBm)	Result
802.11a	5180	-5.61	3.25	-2.36	10.0	Pass
	5200	-5.456	3.25	-2.206	10.0	Pass
	5240	-5.642	3.25	-2.392	10.0	Pass
	5745	4.77	--	--	30.0	Pass
	5785	4.96	--	--	30.0	Pass
	5825	8.37	--	--	30.0	Pass
802.11n (HT20)	5180	-6.38	3.25	-3.13	10.0	Pass
	5200	-6.083	3.25	-2.833	10.0	Pass
	5240	-5.745	3.25	-2.495	10.0	Pass
	5745	6.83	--	--	30.0	Pass
	5785	6.87	--	--	30.0	Pass
	5825	9.52	--	--	30.0	Pass
802.11n (HT40)	5190	-7.525	3.25	-4.275	10.0	Pass
	5230	-7.329	3.25	-4.079	10.0	Pass
	5755	-0.41	--	--	30.0	Pass
	5795	5.95	--	--	30.0	Pass

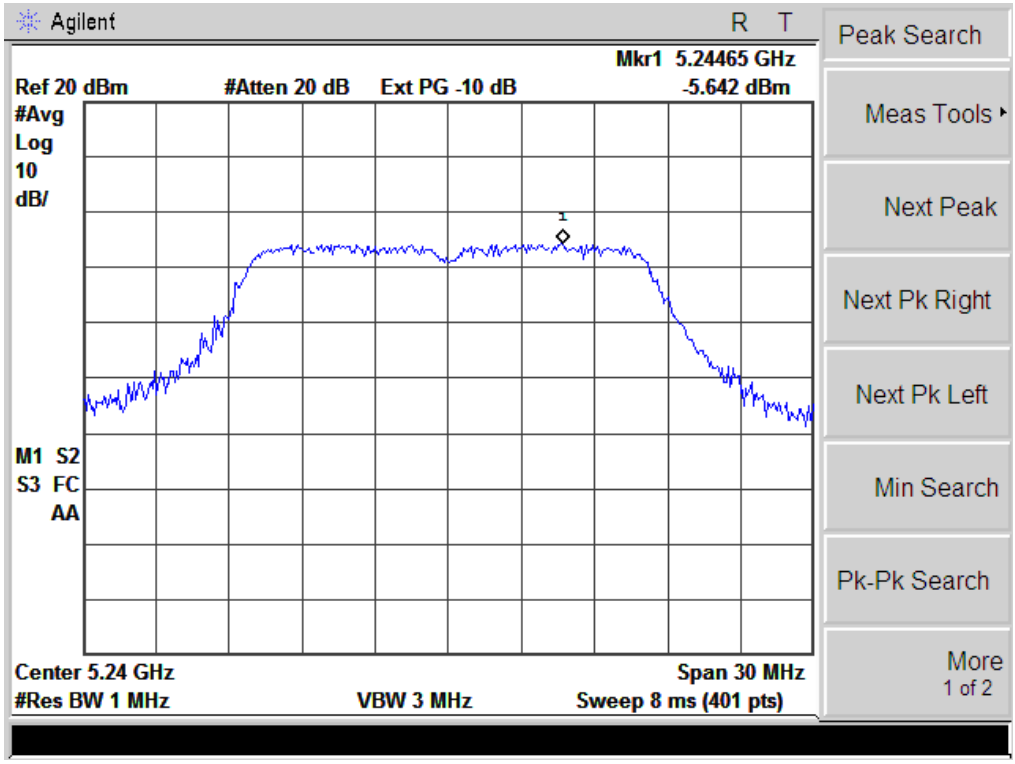
802.11a 5180MHz



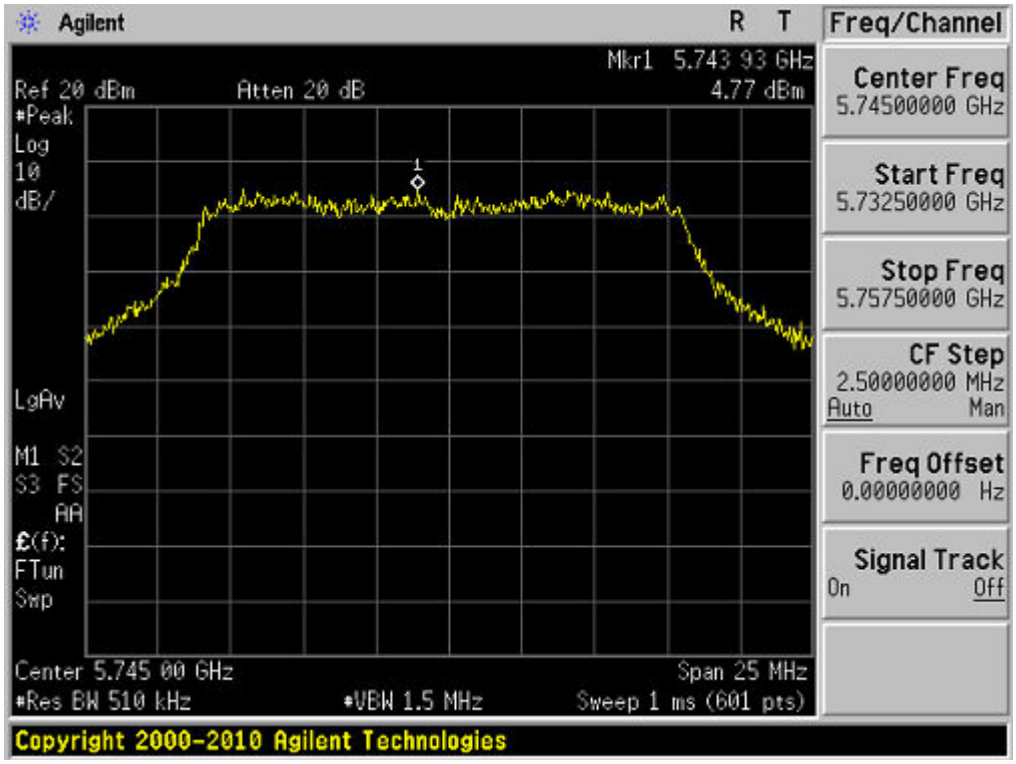
802.11a 5200MHz



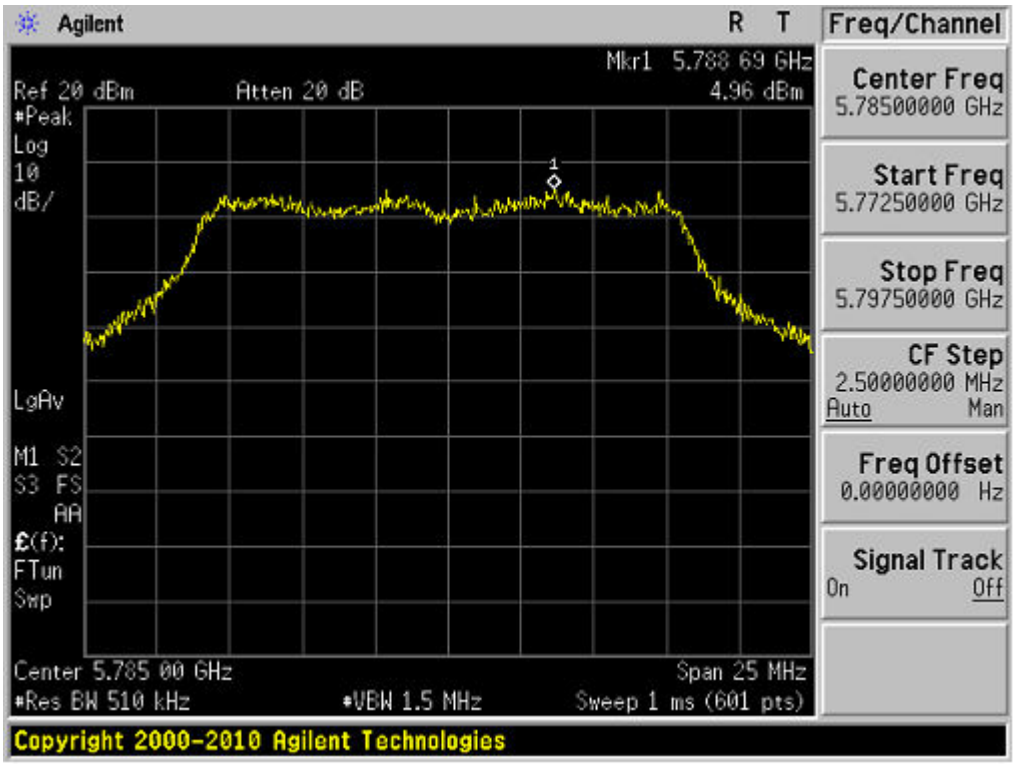
802.11a 5240MHz



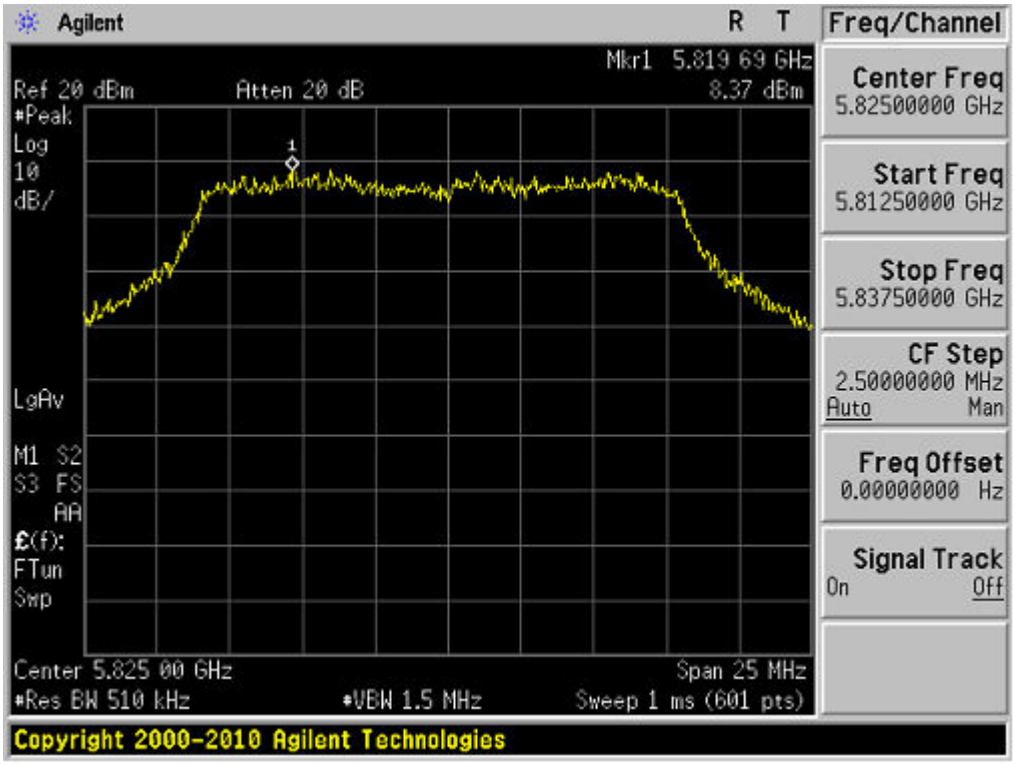
802.11a 5745MHz



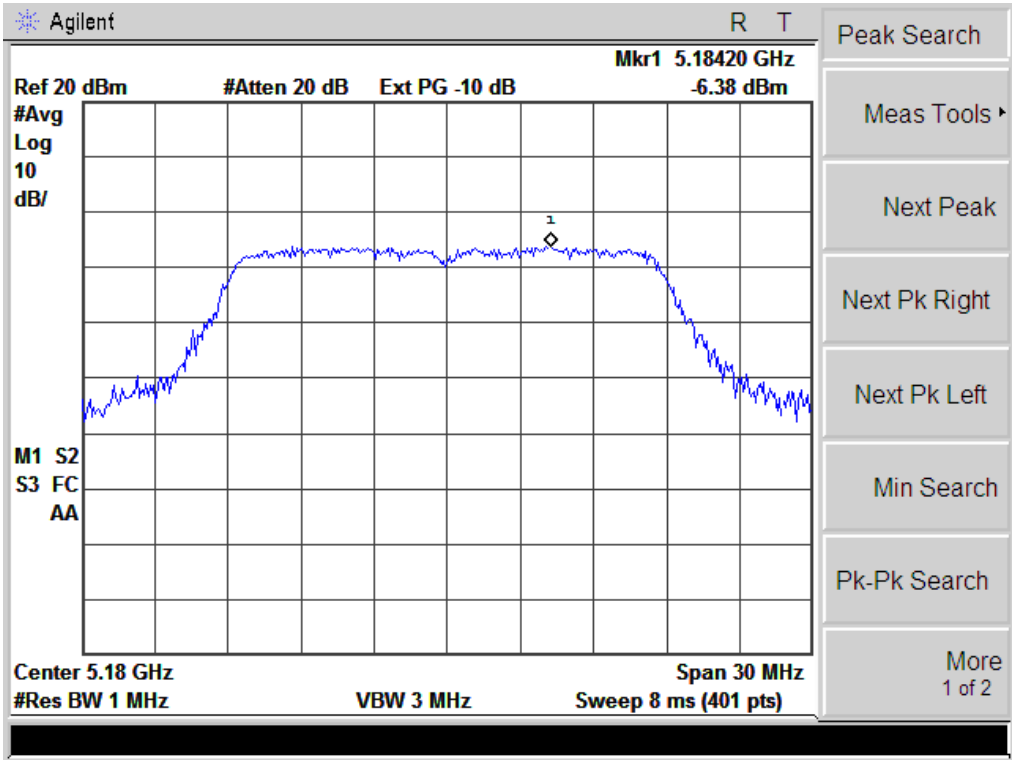
802.11a 5785MHz



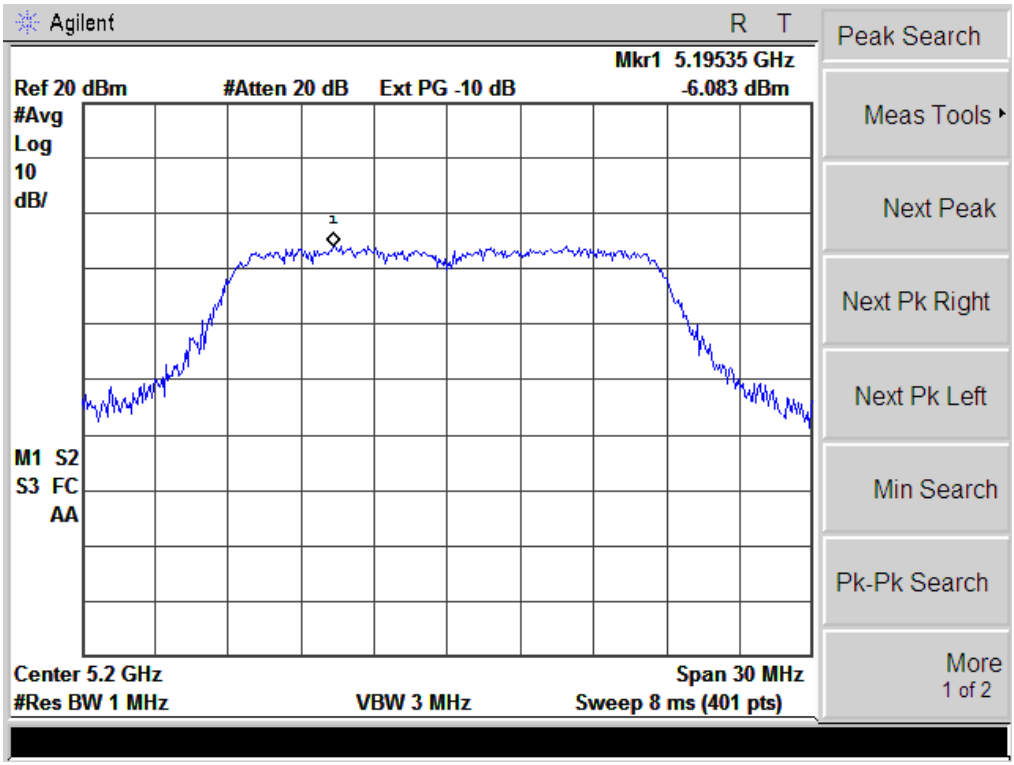
802.11a 5825MHz



802.11n (HT20) 5180MHz



802.11n (HT20) 5200MHz



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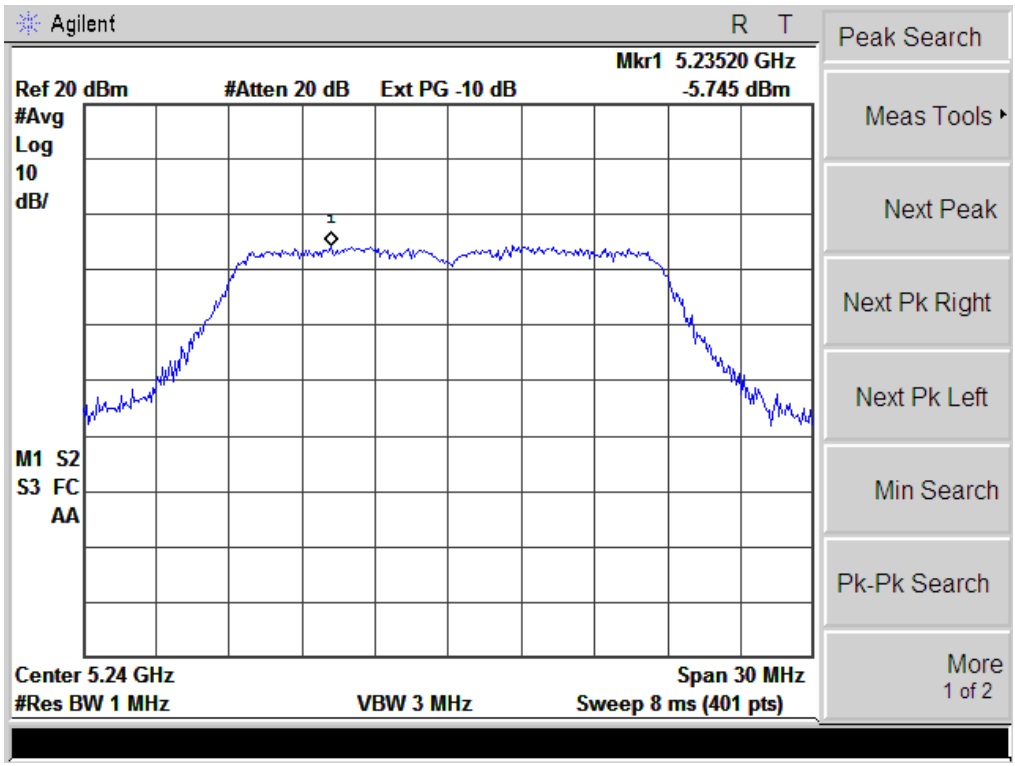

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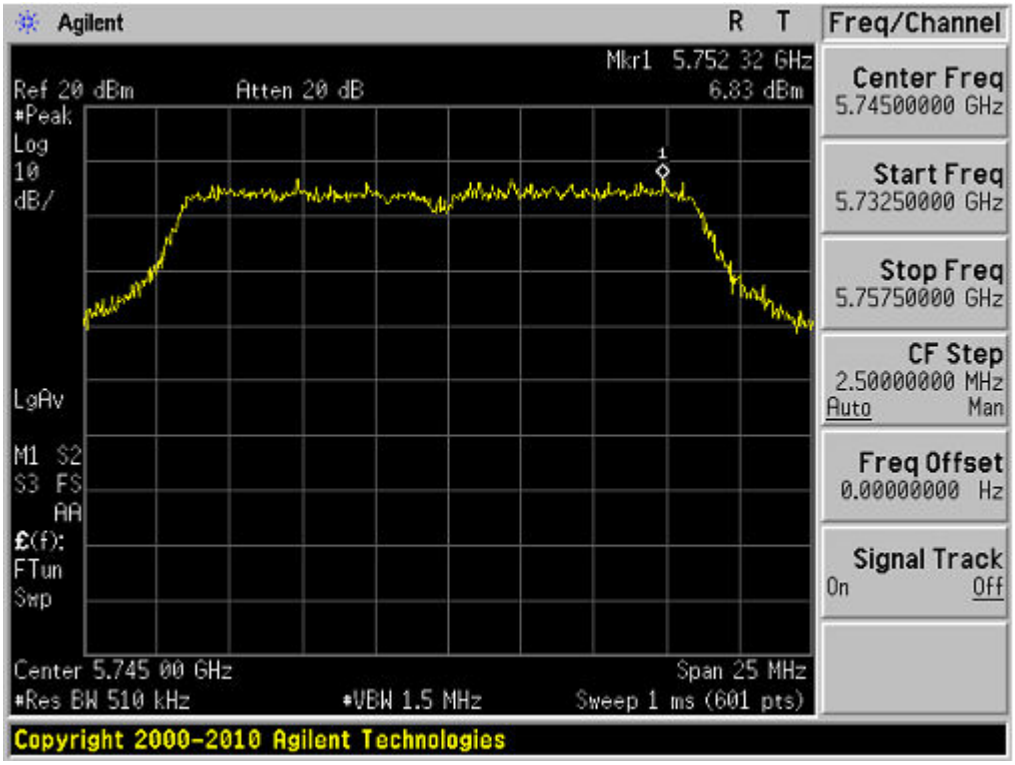

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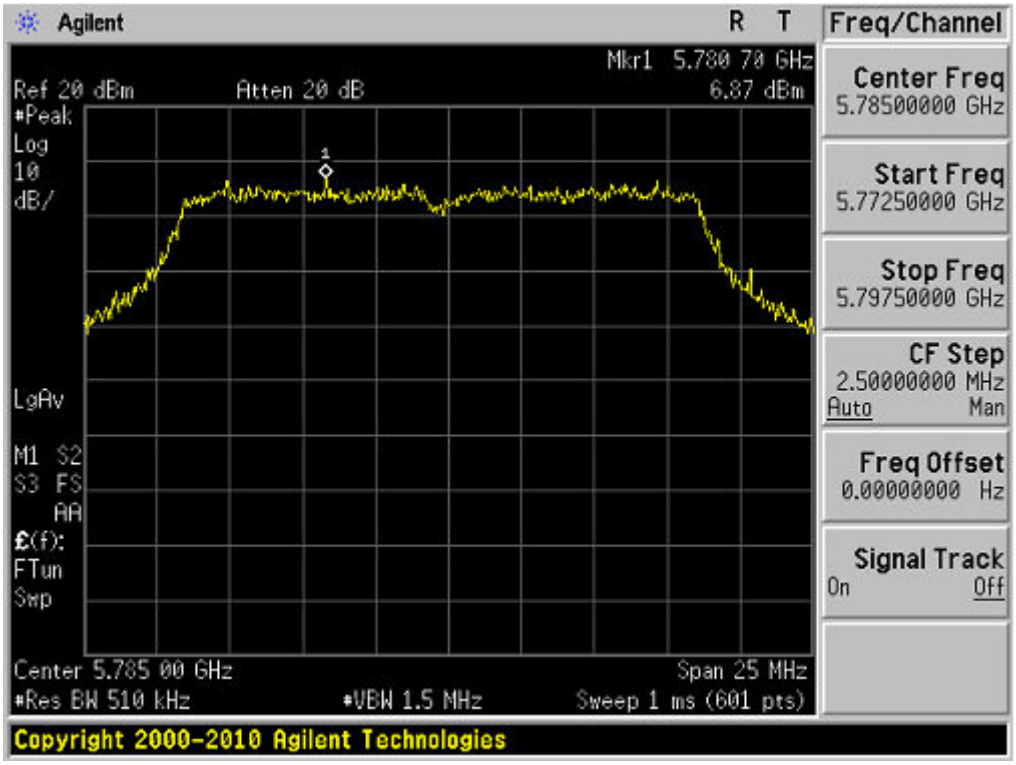

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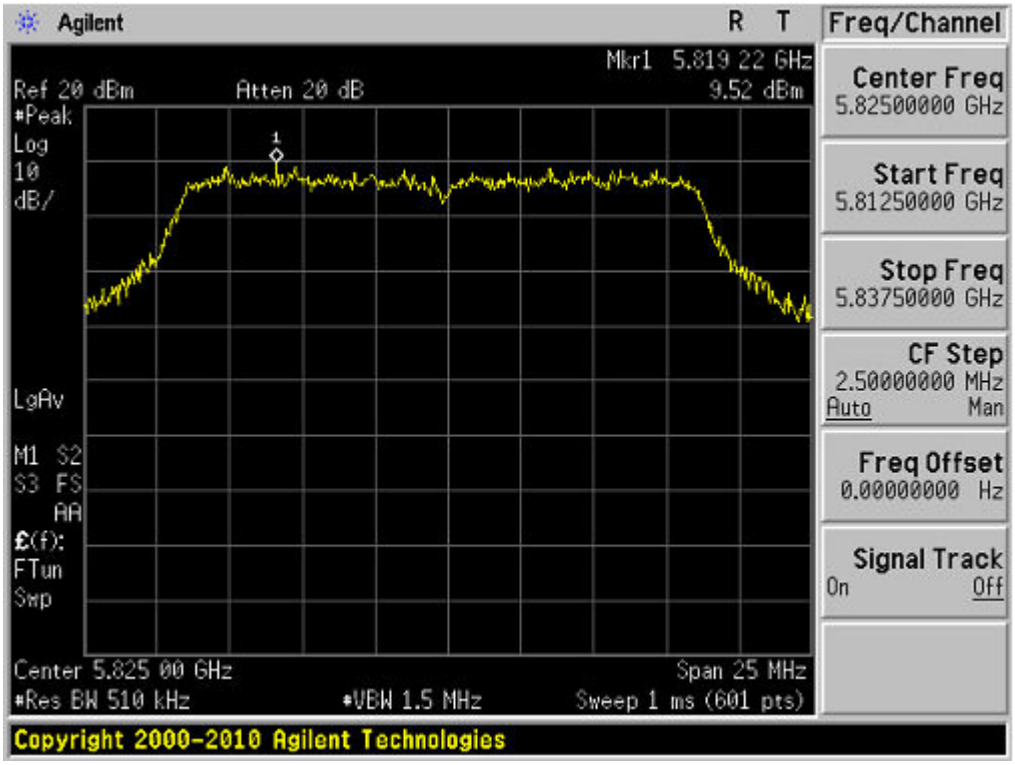
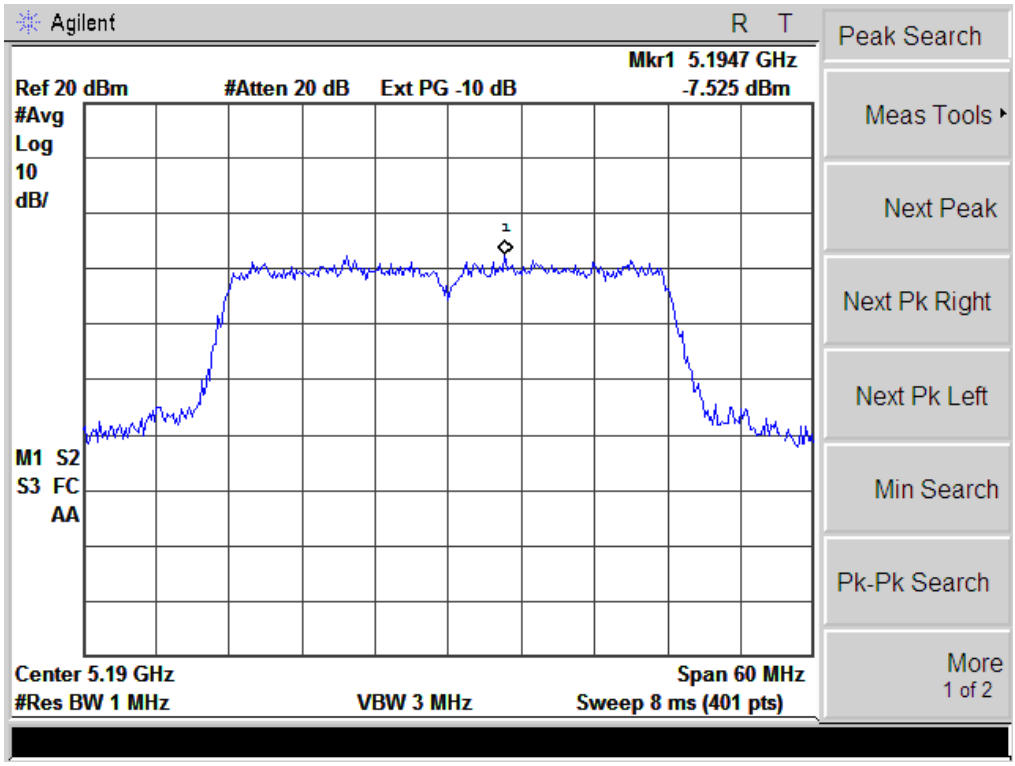
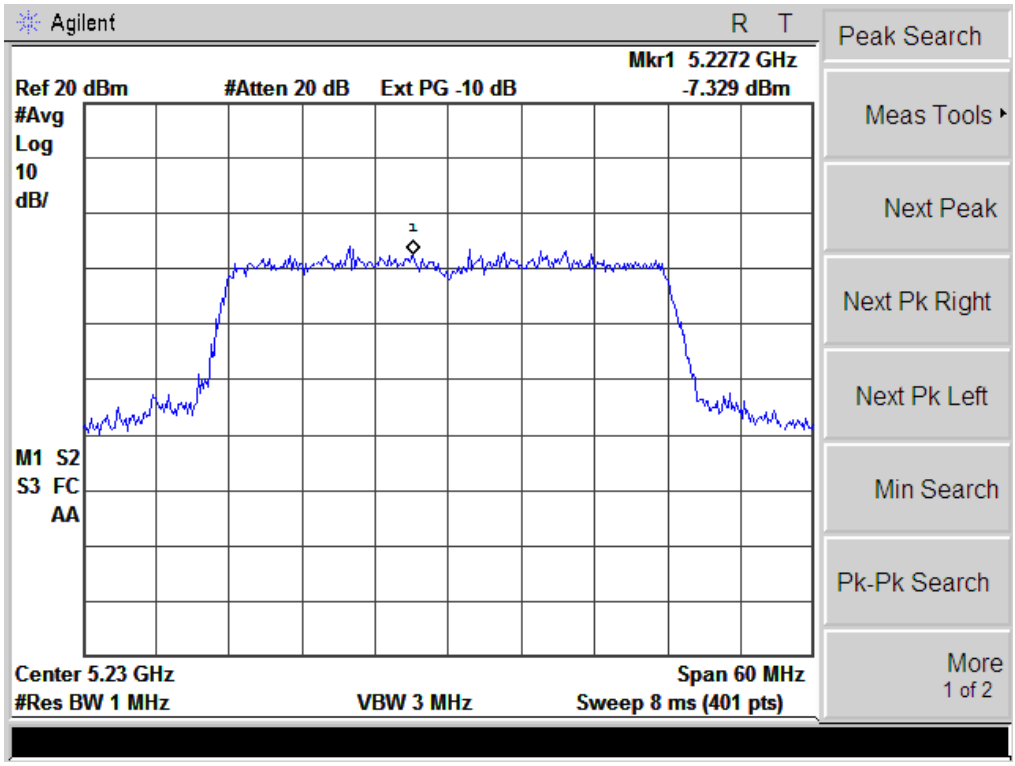


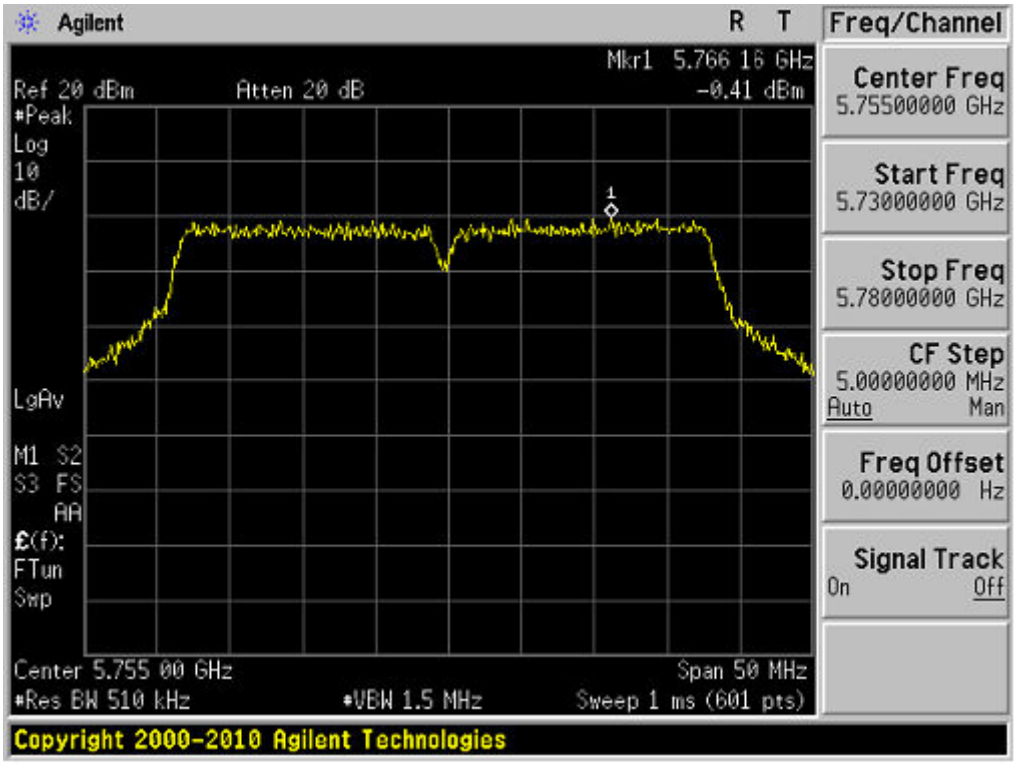
802.11 n (HT40) 5190MHz



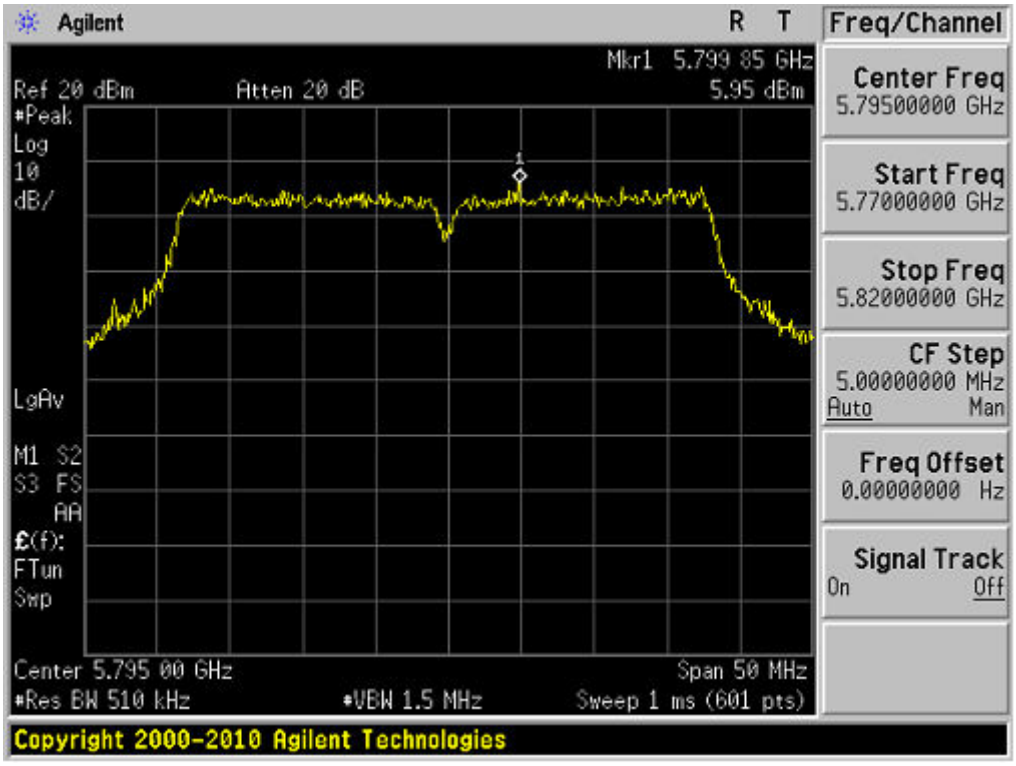
802.11 n (HT40) 5230MHz



802.11 n (HT40) 5755MHz



802.11 n (HT40) 5795MHz



9. ANTENNA REQUIREMENTS

9.1. Limits

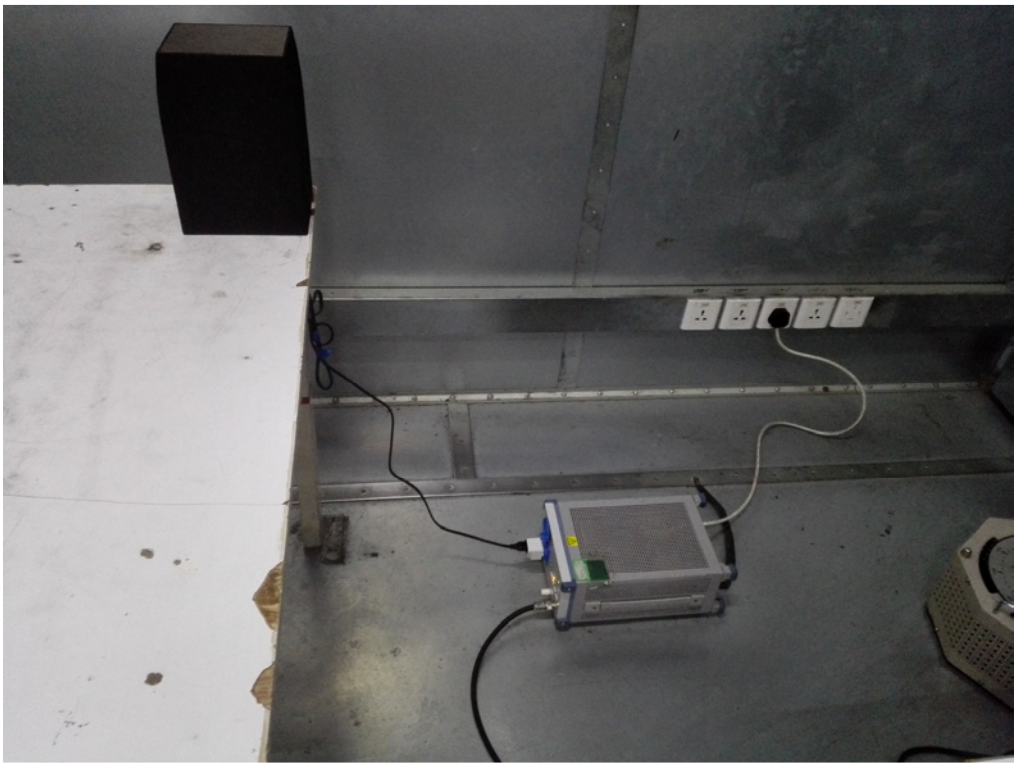
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

9.2. Result

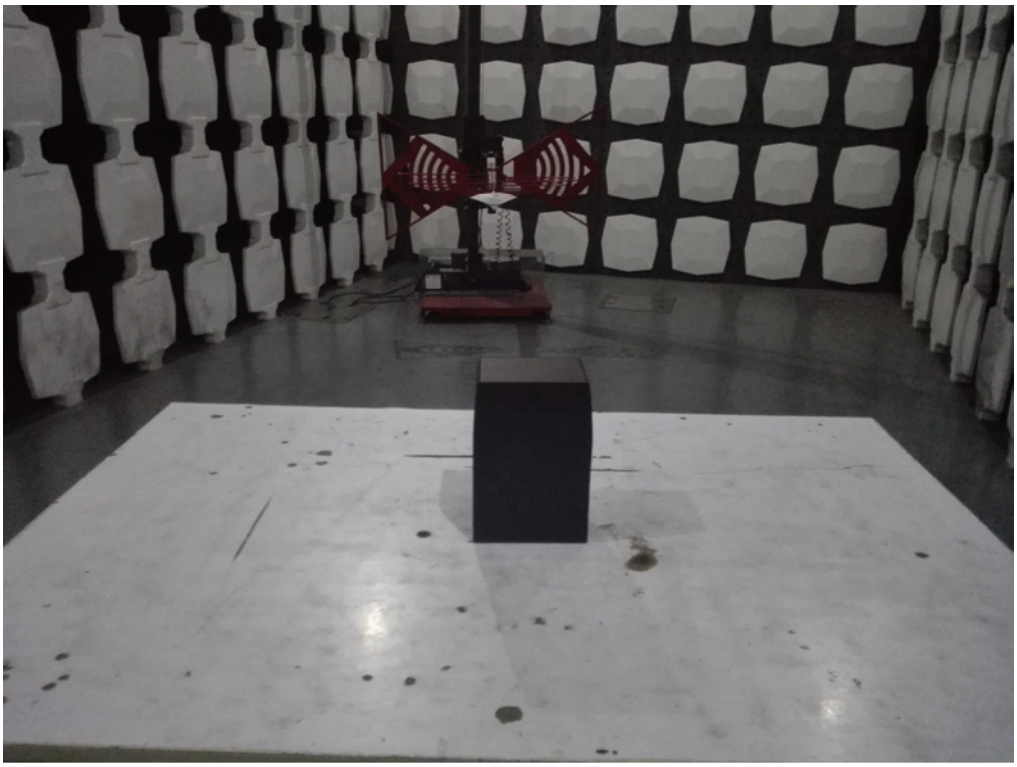
The antennas used for this product are external antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 3.25dBi.

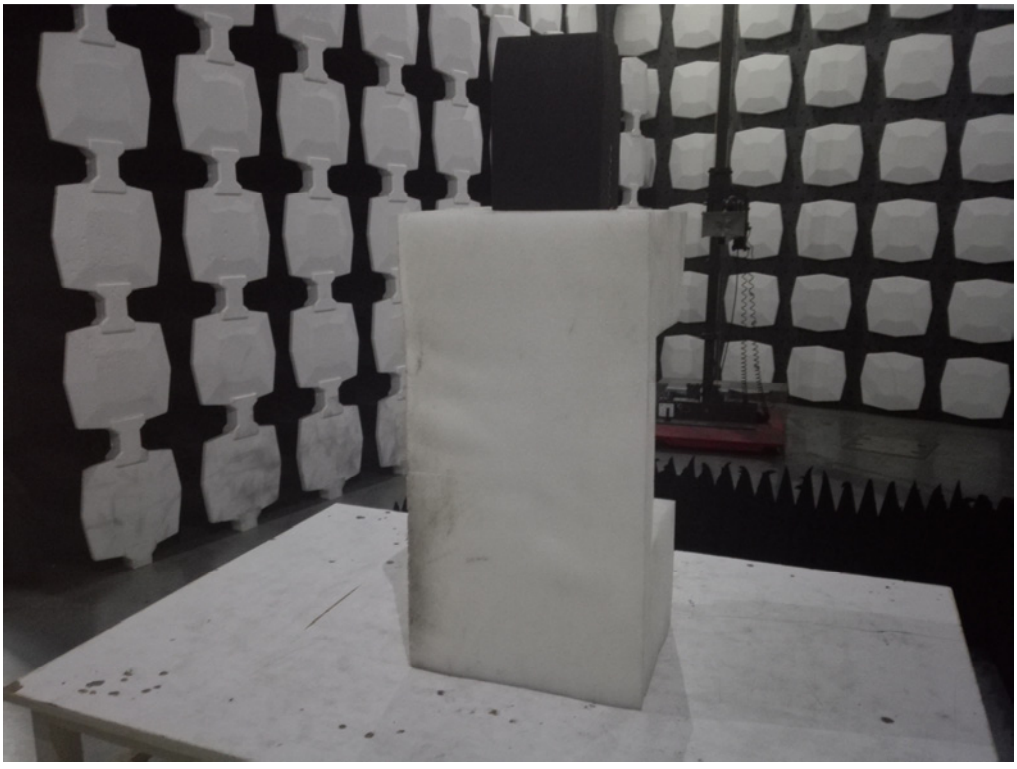
10. PHOTOGRAPHS OF TEST SET-UP

Conducted Emission

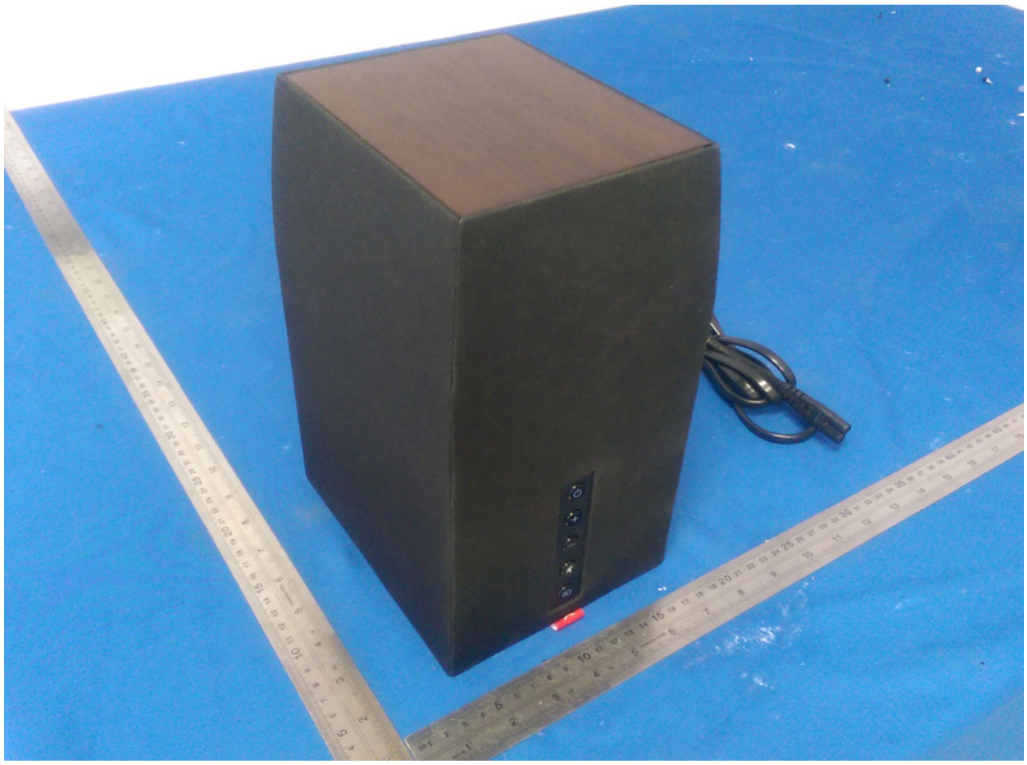


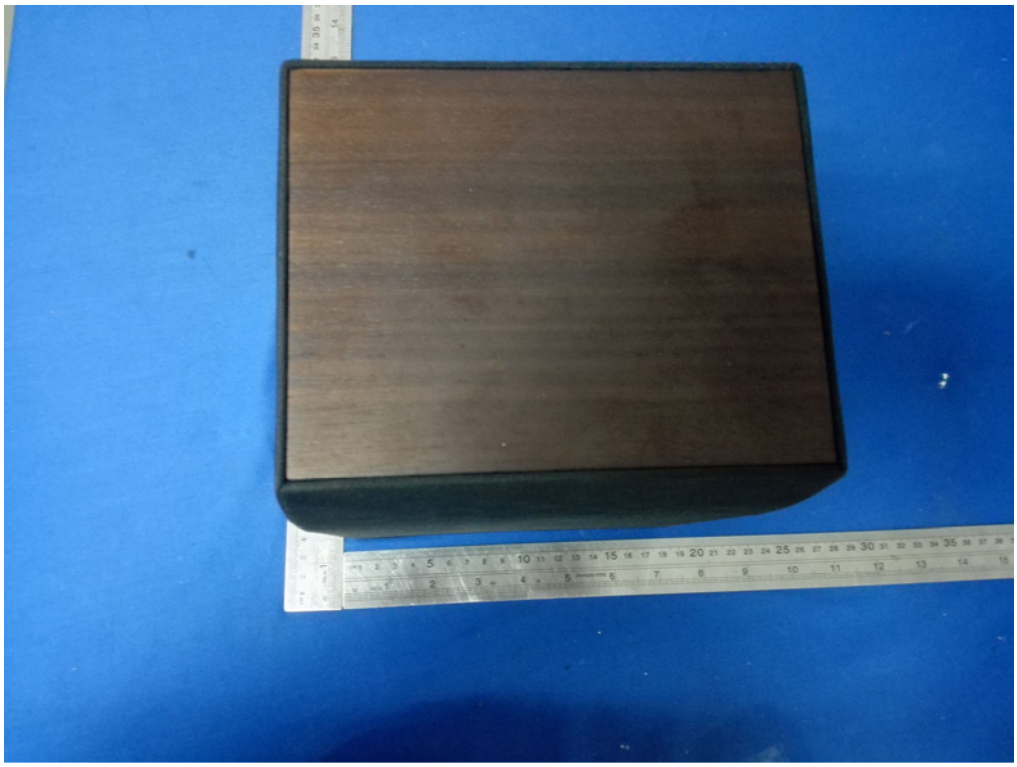
Radiated Emission Test

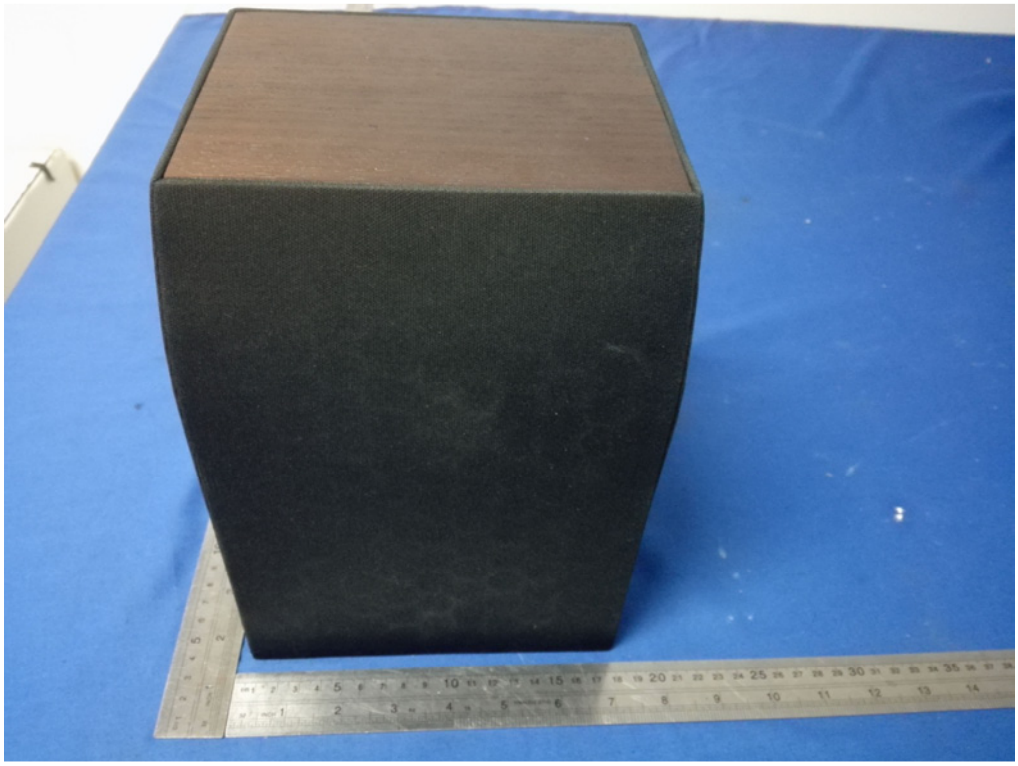


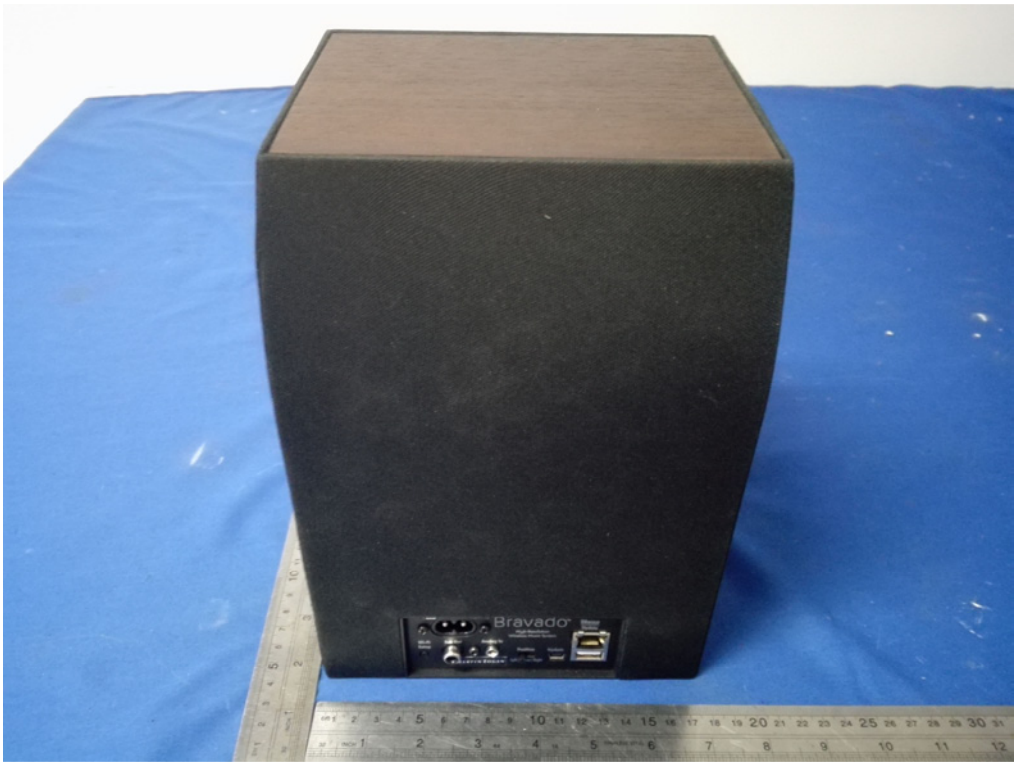


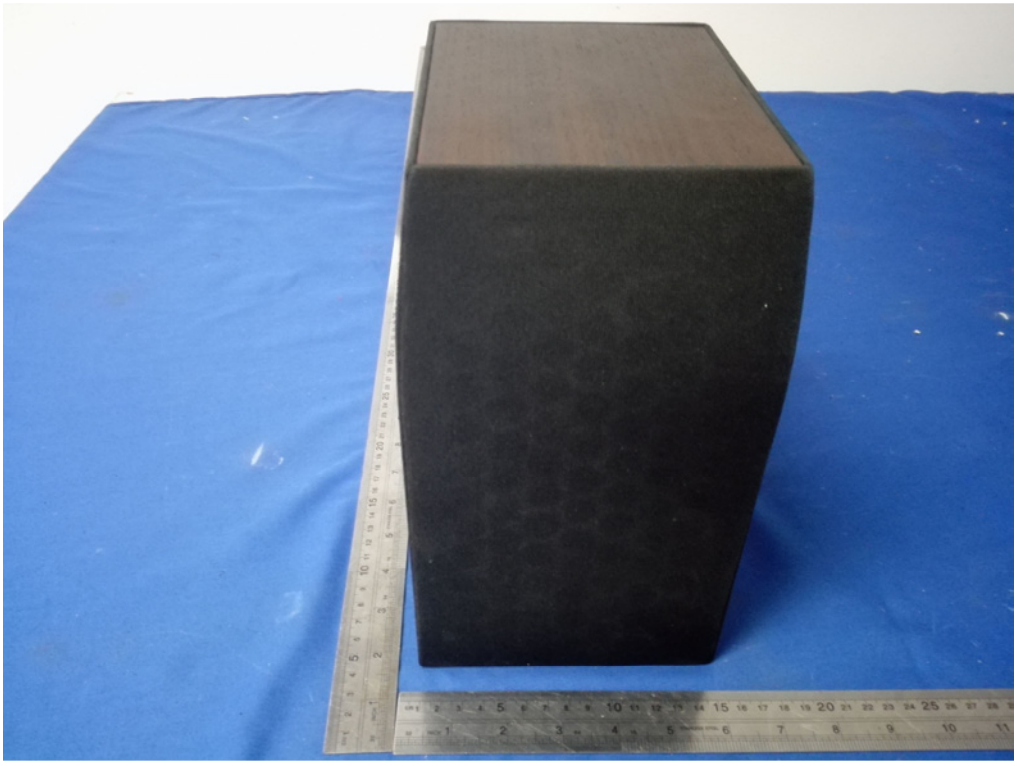
11. PHOTOGRAPHS OF THE EUT



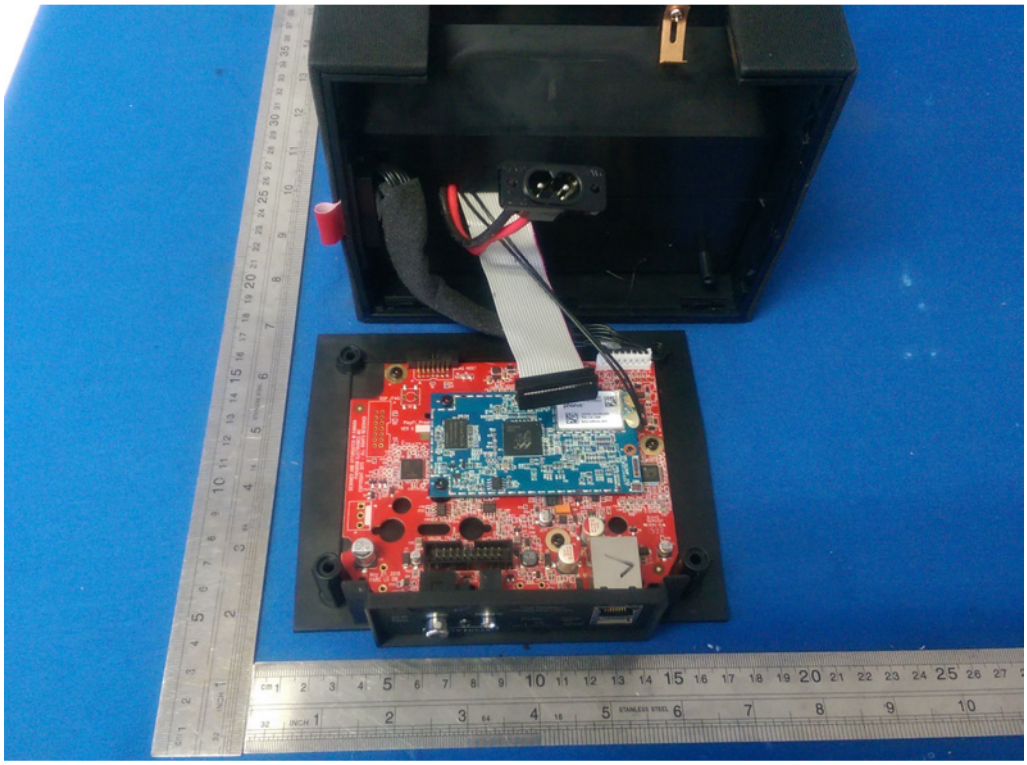


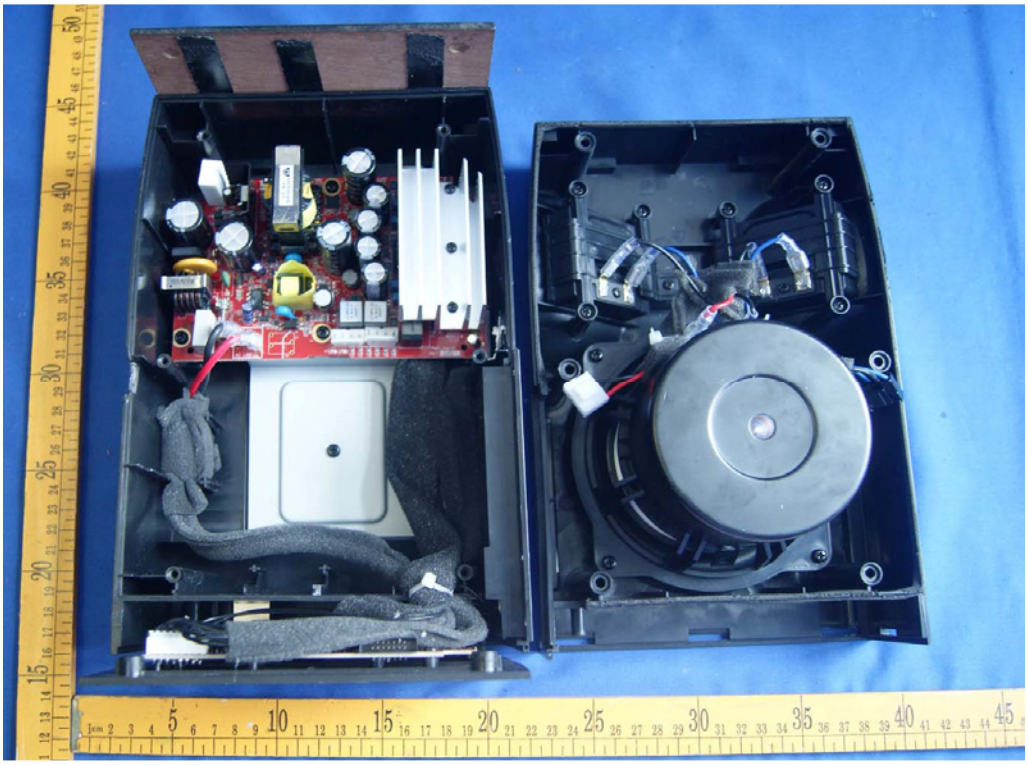


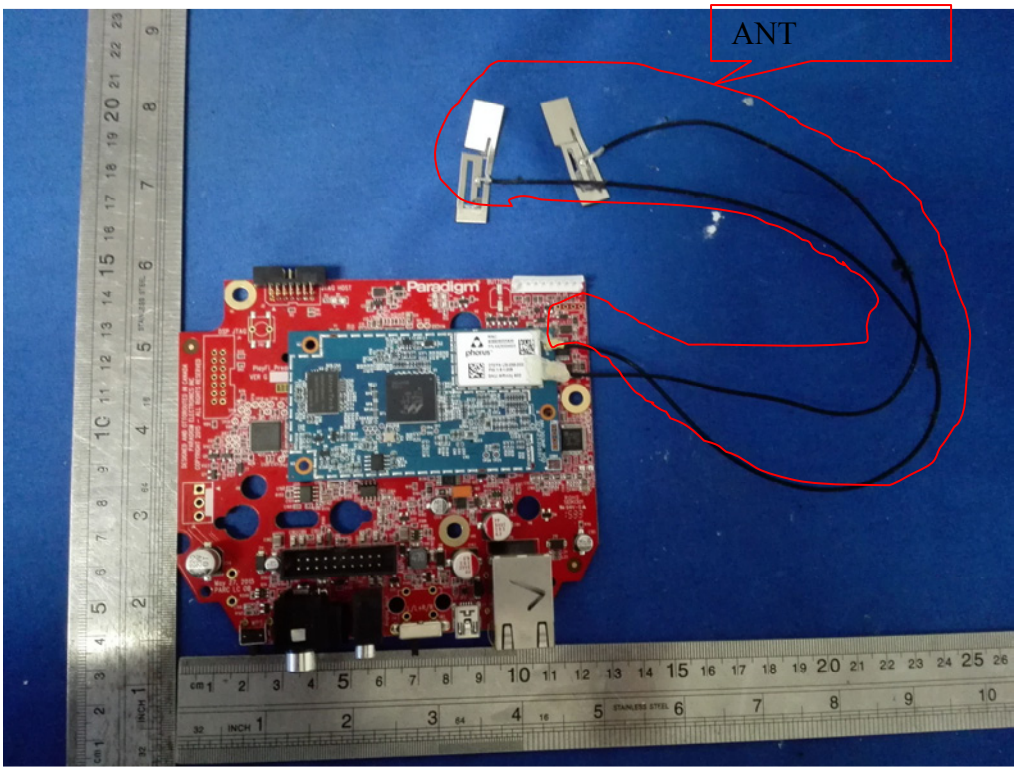

Bravado




Play-Fi
Bravada
MARTIN LOGAN



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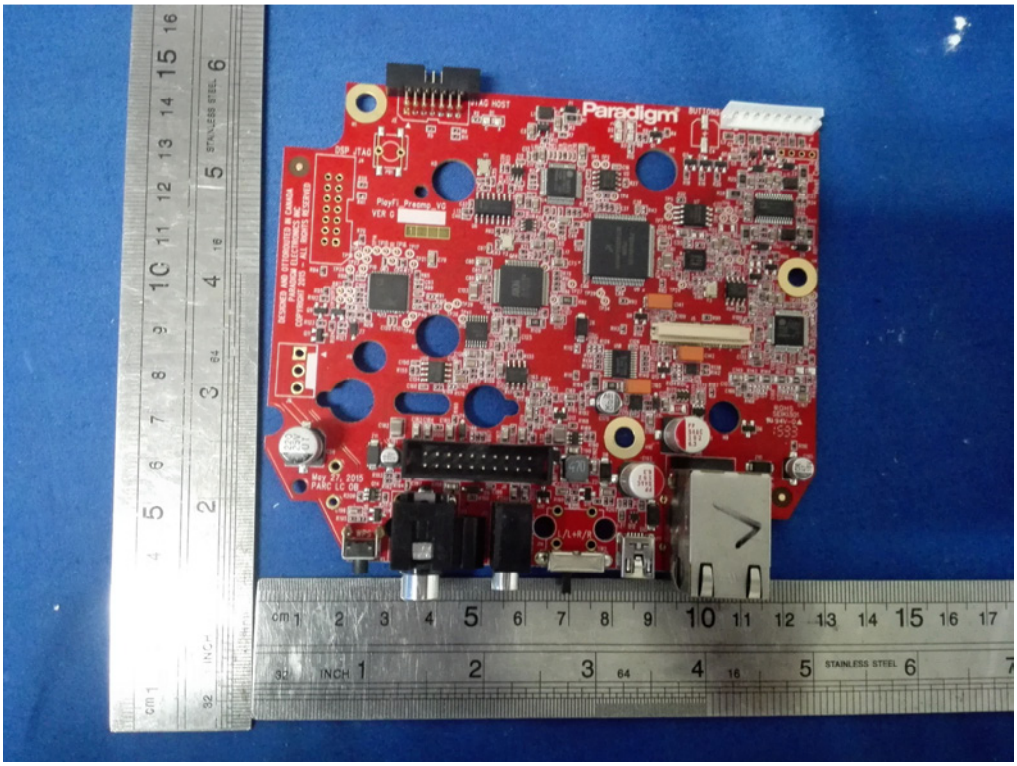
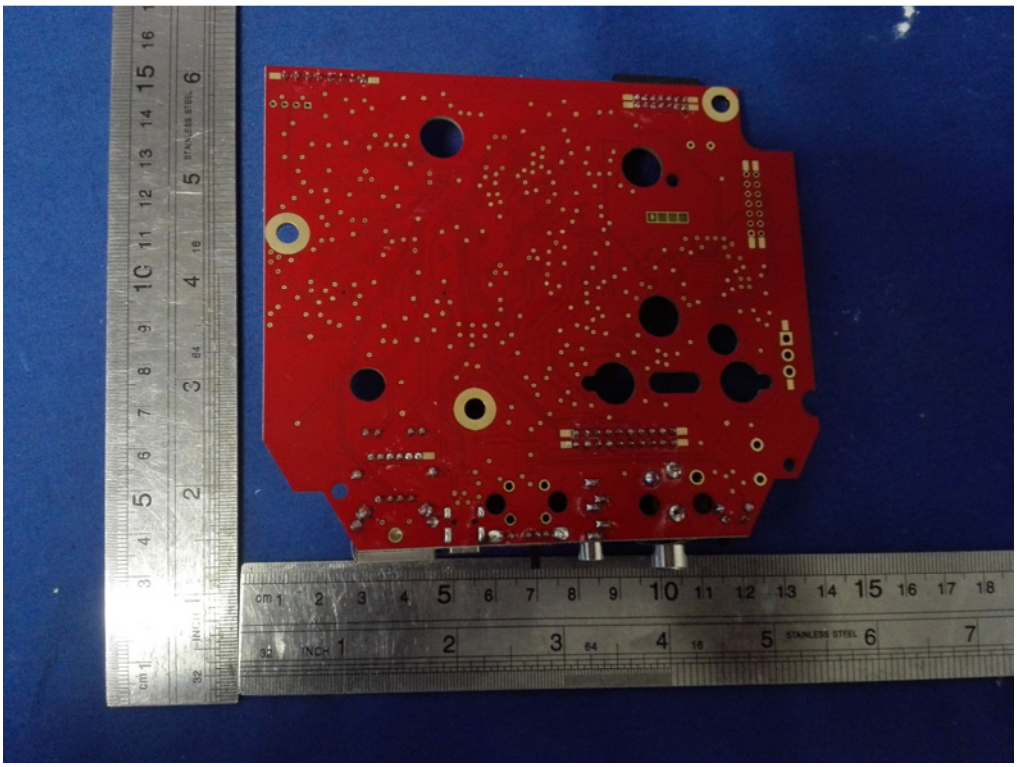
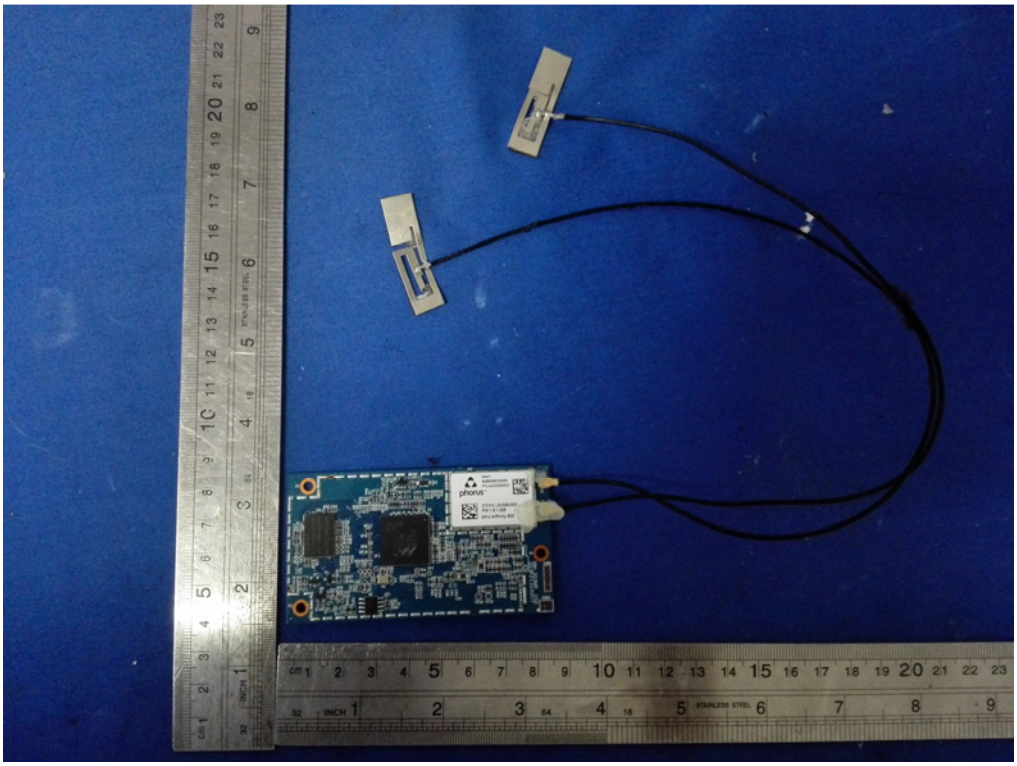
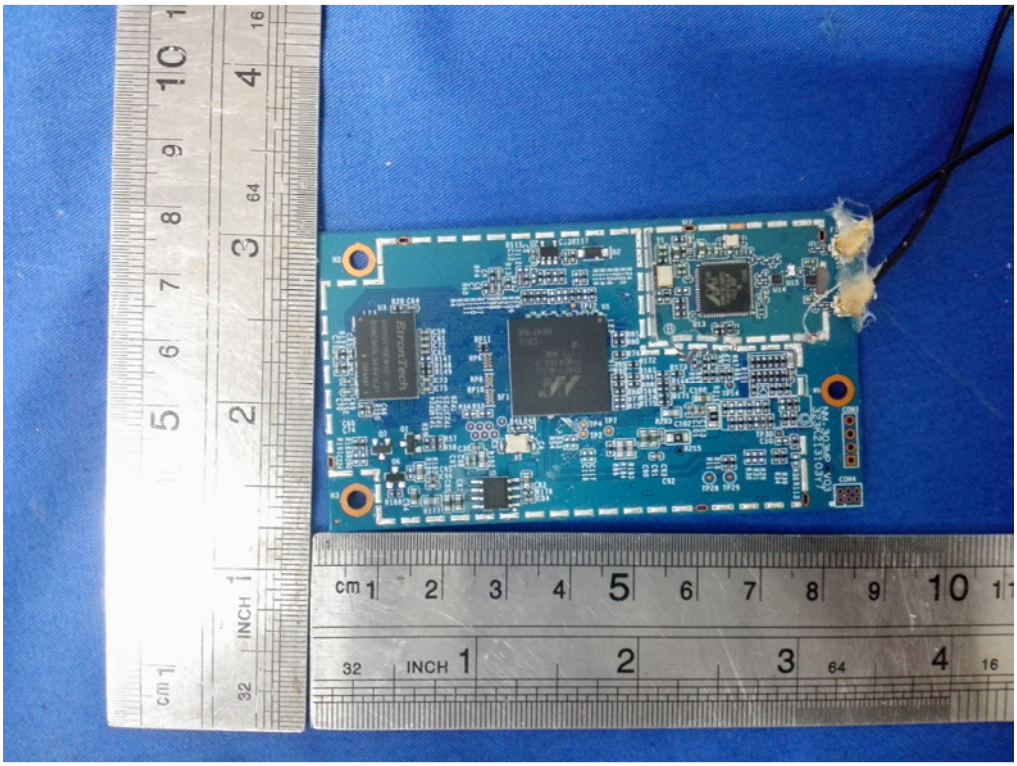
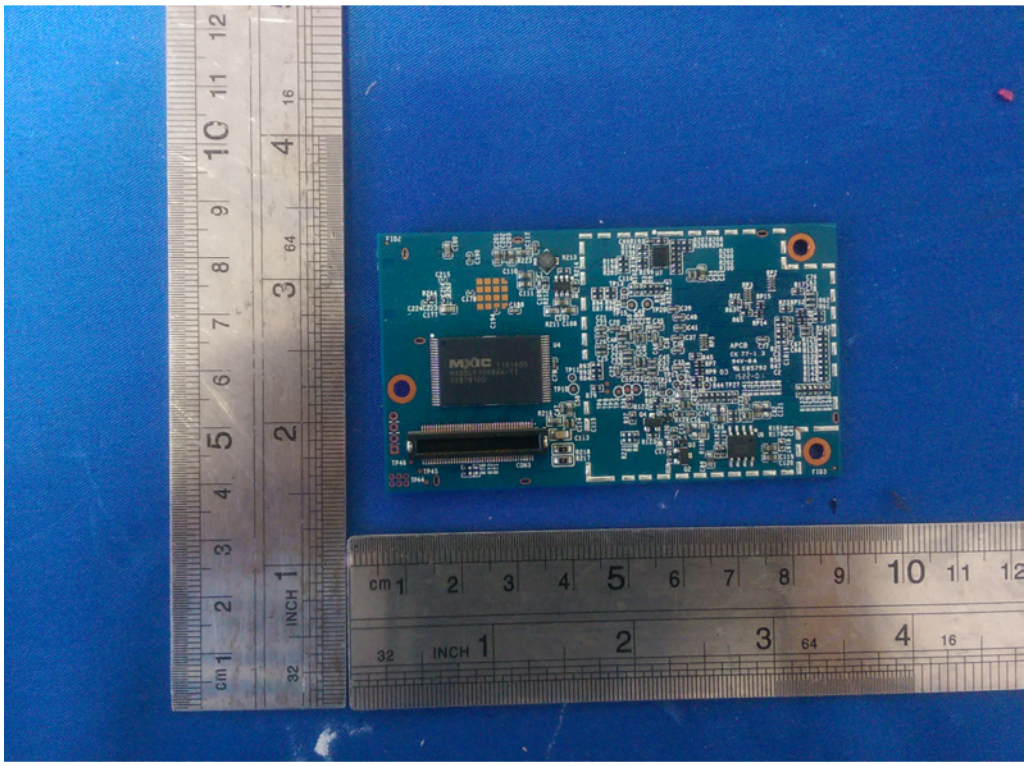
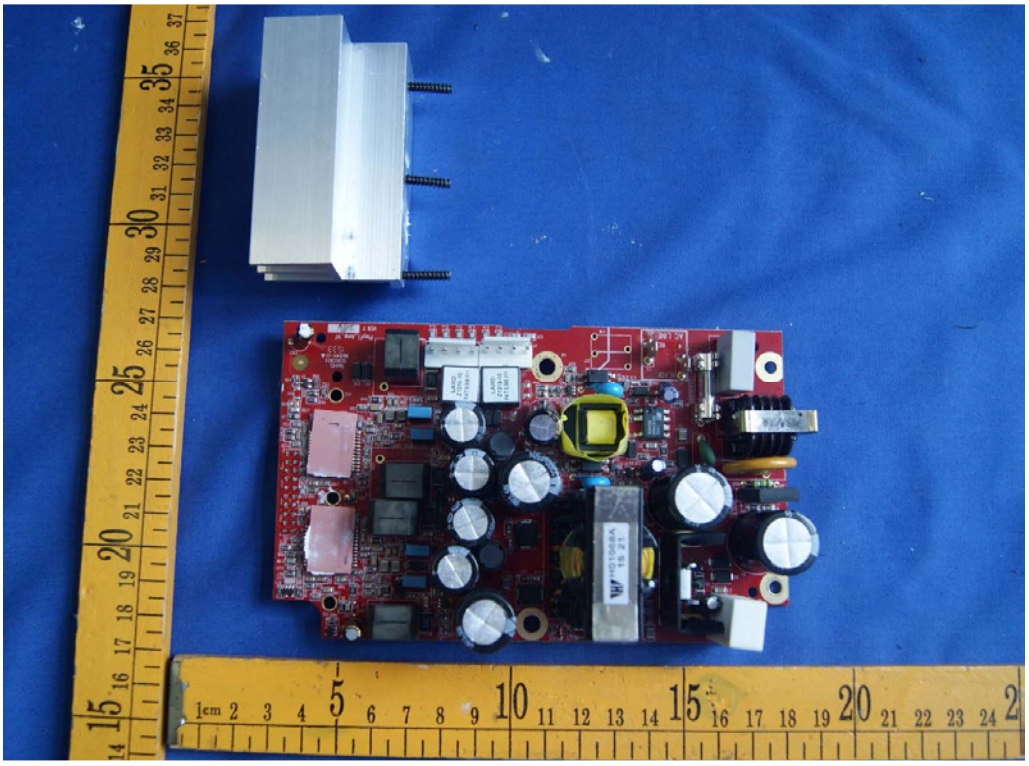

Paradigm

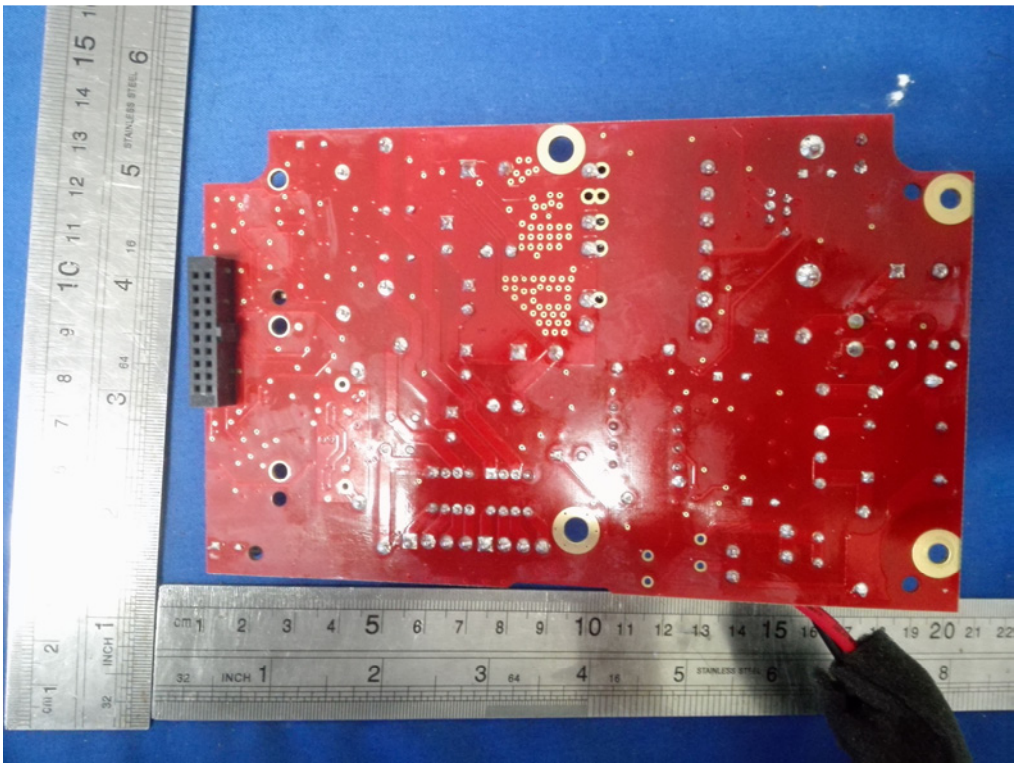












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