FCC TEST REPORT

for

ComTrade USA East, Inc.

Tablet Computer

Model Number: Hero 8_W – Tesla tablet H785

FCC ID: 2AERW-H785

Prepared for	:	ComTrade USA East, Inc.
Address	:	275 Grove Street Suite 2-400, Newton, Massachusetts, United States
Prepared by	:	Keyway Testing Technology Co., Ltd.
Address	:	Building 1, Baishun Industrial Zone, Zhangmutou Town, Dongguan, Guangdong, China
		Tel: 86-769-8718 2258
		Fax: 86-769-8718 1058

Report No.	:	15KWE052601F
Date of Test	:	May 20~25, 2015
Date of Report	:	May 26, 2015

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Keyway Testing Technology Co., Ltd.

Applicant: **Address:**	ComTrade USA East, Inc. 275 Grove Street Suite 2-400, Newton, Massachusetts, United States		
Manufacturer: **Address:**	Borqs BeiJing Ltd. Tower A, Building B23, Universal Business Park, No. 10 Jiuxianqiao Road, Chaoyang District Beijing, 100015 China		
E.U.T:	Tablet Computer		
Model Number:	Hero 8_W – Tesla tablet H785		
Trade Name:	------	**Serial No.:**	------
Date of Receipt:	May 18, 2015	**Date of Test:**	May 20~25, 2015
Test Specification:	FCC Part 15, Subpart 15.407: Oct. 1, 2014 ANSI C63.10:2013		
Test Result:	The equipment under test was found to be compliance with the requirements of the standards applied. **Issue Date: May 26, 2015**		

Tested by:	Reviewed by:	Approved by:
Daisy Chen / 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	PASS
Radiated Emissions	15.407(b), 15.209	PASS
26dB bandwidth and 99%dB Bandwidth	15.407 (a)	PASS
Power density	15.407 (a)	PASS
Maximum Peak Output Power	15.407 (a)	PASS
Emissions from out of band	15.407 (b)	PASS
Frequency Stability	15.407 (g)	PASS
Antenna Requirement	15.203	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:	Tablet Computer
Model No.:	Hero 8_W – Tesla tablet H785
Operation Frequency:	WIFI:2412MHz~2462MHz (802.11b/802.11g/802.11n(H20)) 2422MHz~2452MHz (802.11n(H40)) WIFI:5180-5240 MHz; (5G 802.11a/n(HT20)) 5190-5230 MHz; (802.11n(HT40)) BT: 2402MHz~2480MHz
Channel numbers:	WIFI:11 for 802.11b/802.11g/802.11n(H20) ,7 for 802.11n(H40) BT: 40 Channels 7channels for 5G 802.11a/n(HT20) 8channels 5G for 802.11n(HT40)
Modulation technology:	WIFI: Direct Sequence Spread Spectrum (DSSS) for (IEEE 802.11b) Orthogonal Frequency Division Multiplexing(OFDM) for (IEEE 802.11g/802.11n) BT: GFSK
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:	Internal
Antenna gain:	1.5dBi for WIFI 1.5dBi for BT
Power supply:	DC 3.7V form battery DC 5V from adapter
Adapter	Manufacturer: Borqs BeiJing Ltd. M/N: ASSA43e-050200 I/P:AC 100~240V 50/60Hz 0.45A O/P:DC 5V 2A

2.3. Product Version

Product SW version	3.10.20
Product HW version	Anzhen4_mrd8_w_64-userdebug
Radio SW version	4.4
Radio HW version	VT2.1
Test SW Version	T1.2
RF power setting in TEST SW	2.4G:11b 15 dBm;11g 14 dBm;11n(HT20) 13 dBm; 11n(HT40) 11 dBm 5G:11n 12 dBm; 11a 14 dBm BT:0dBm

Note: SW means software, HW means hardware.

2.4. 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)

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.

2.5. TEST SITES

2.5.1. 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

2.6. List of Test and Measurement Instruments

2.6.1. 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

2.6.2. 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

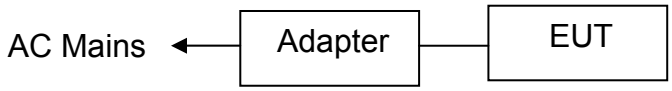
3. TEST SET-UP AND OPERATION MODES

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: Tablet Computer)

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	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

4.1.2. Test Setup

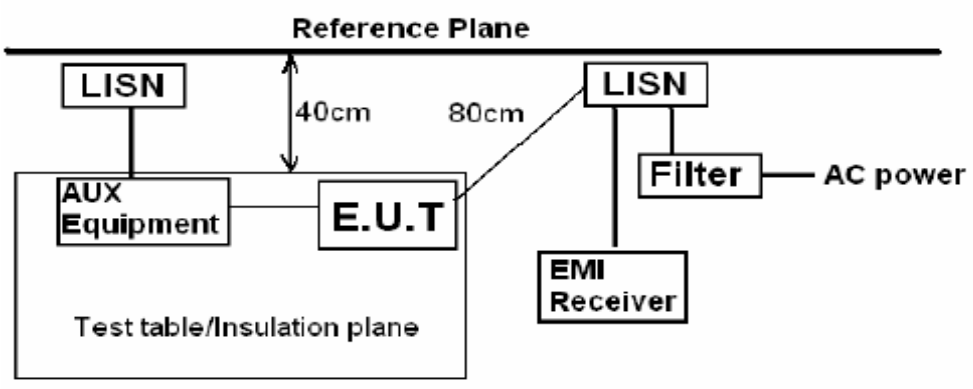
The EUT was put on a wooden table which was 0.8 m high above the ground and connected to the AC mains through the Artificial Mains Network (AMN). Where the mains cable supplied by the manufacture was longer than 0.8 m, the excess was folded back and forth parallel to the cable at the centre so as to 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.

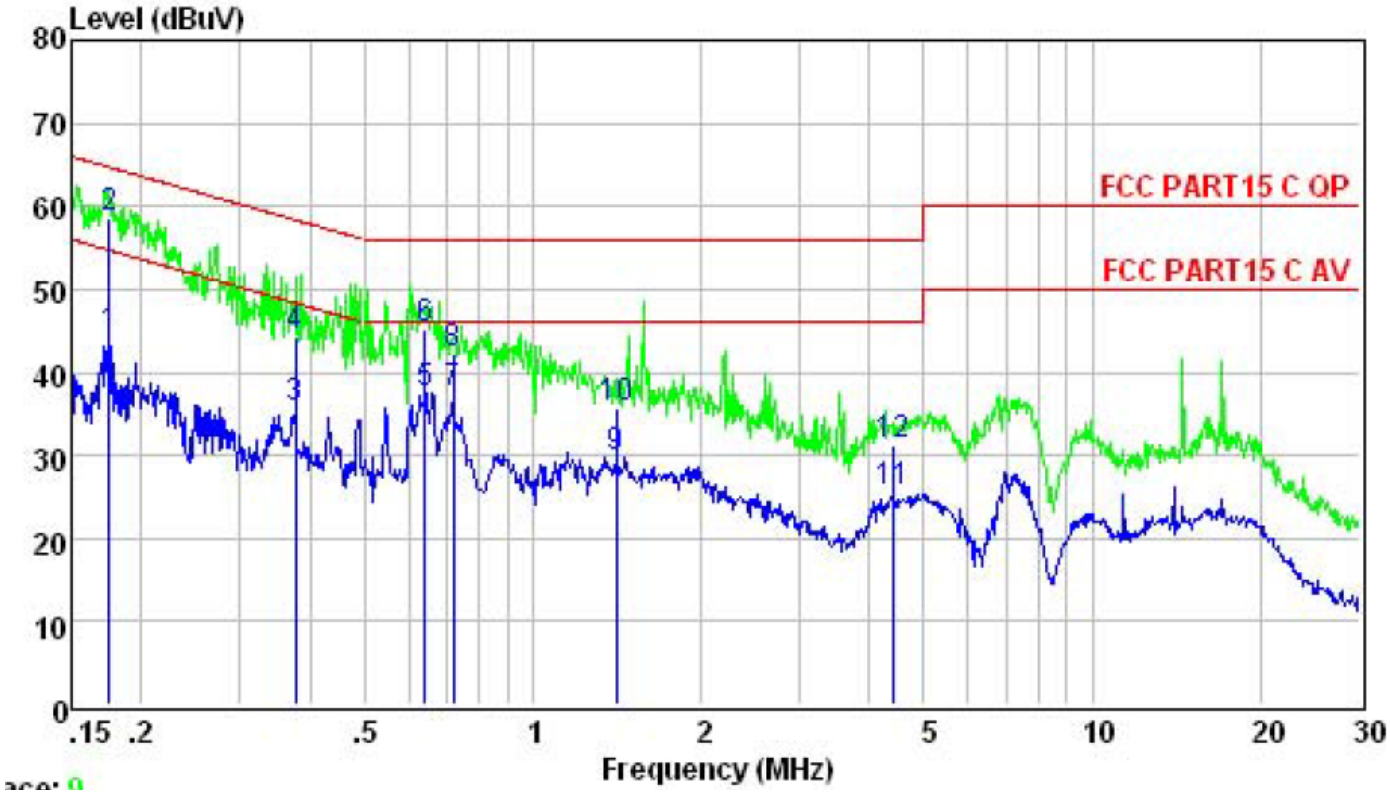
The bandwidth of the test receiver was set at 9 kHz.

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



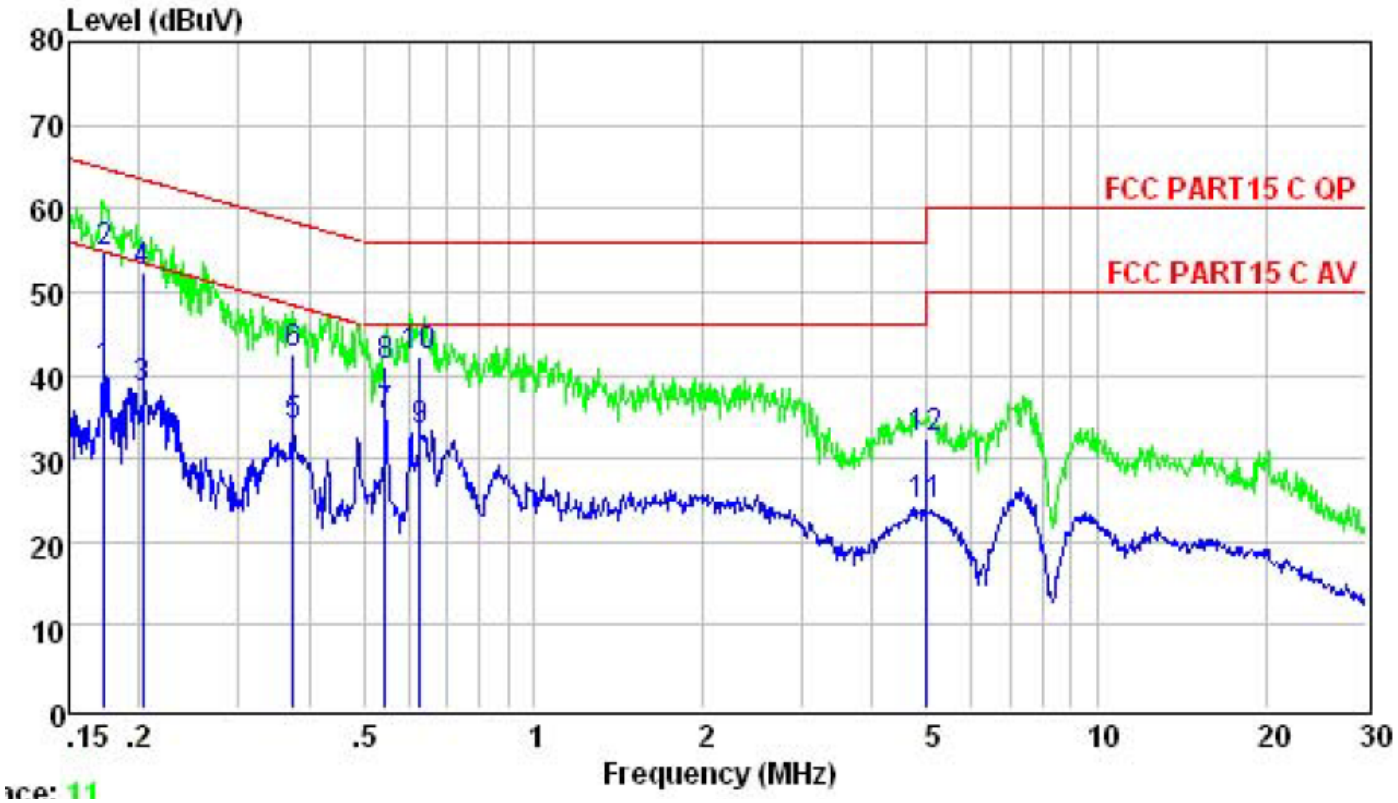
Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m

Line



	Freq	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	
1	0.175	44.21	54.72	-10.51	Average
2	0.175	58.45	64.72	-6.27	QP
3	0.377	35.61	48.34	-12.73	Average
4	0.377	44.44	58.34	-13.90	QP
5	0.641	37.60	46.00	-8.40	Average
6	0.641	45.23	56.00	-10.77	QP
7	0.720	37.59	46.00	-8.41	Average
8	0.720	42.21	56.00	-13.79	QP
9	1.411	29.79	46.00	-16.21	Average
10	1.411	35.55	56.00	-20.45	QP
11	4.384	25.55	46.00	-20.45	Average
12	4.384	31.32	56.00	-24.68	QP

Neutral



	Freq	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	
1	0.173	40.57	54.81	-14.24	Average
2	0.173	54.68	64.81	-10.13	QP
3	0.203	38.49	53.49	-15.00	Average
4	0.203	52.21	63.49	-11.28	QP
5	0.375	33.81	48.39	-14.58	Average
6	0.375	42.57	58.39	-15.82	QP
7	0.546	35.07	46.00	-10.93	Average
8	0.546	41.02	56.00	-14.98	QP
9	0.630	33.40	46.00	-12.60	Average
10	0.630	42.35	56.00	-13.65	QP
11	4.952	24.28	46.00	-21.72	Average
12	4.952	32.45	56.00	-23.55	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 table 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.

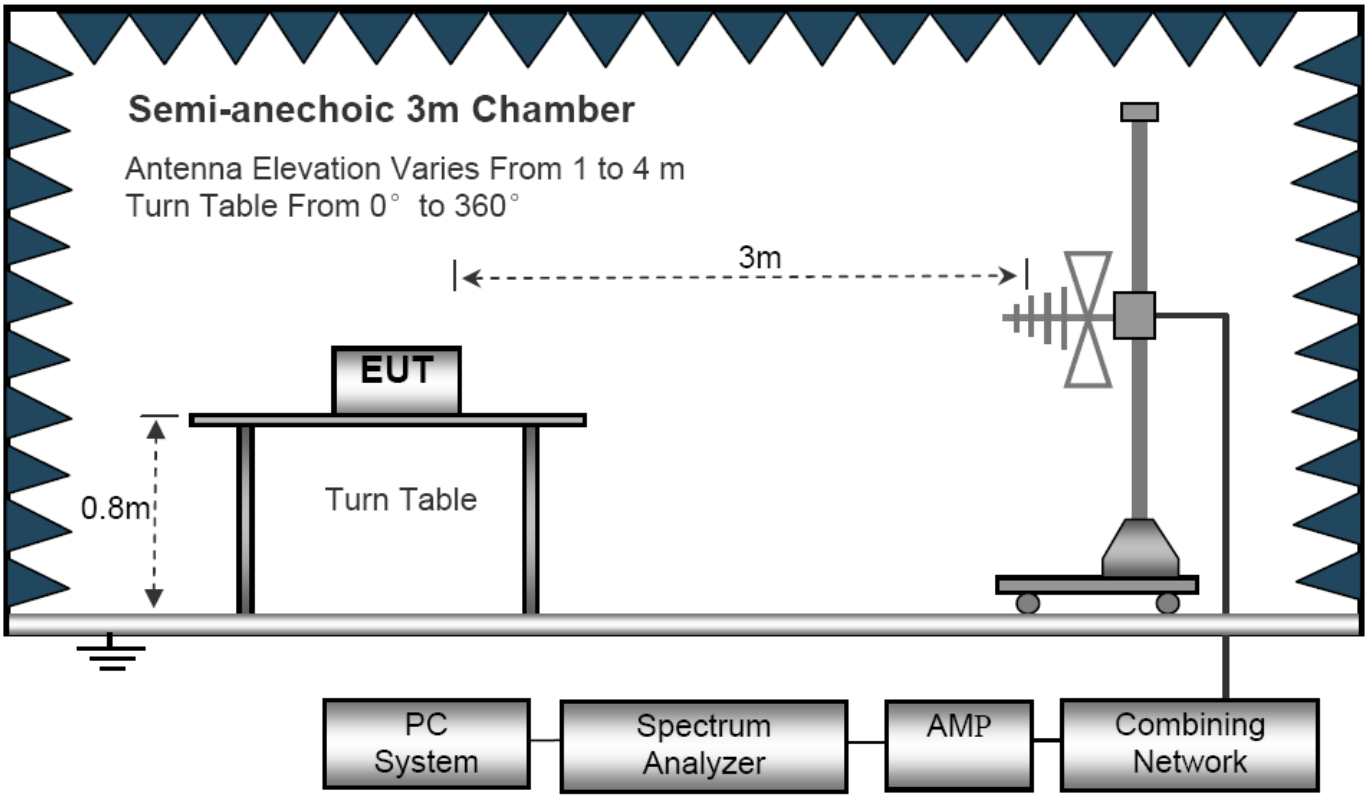
2. Measurement Uncertainty: ±3.2 dB at a level of confidence of 95%.

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

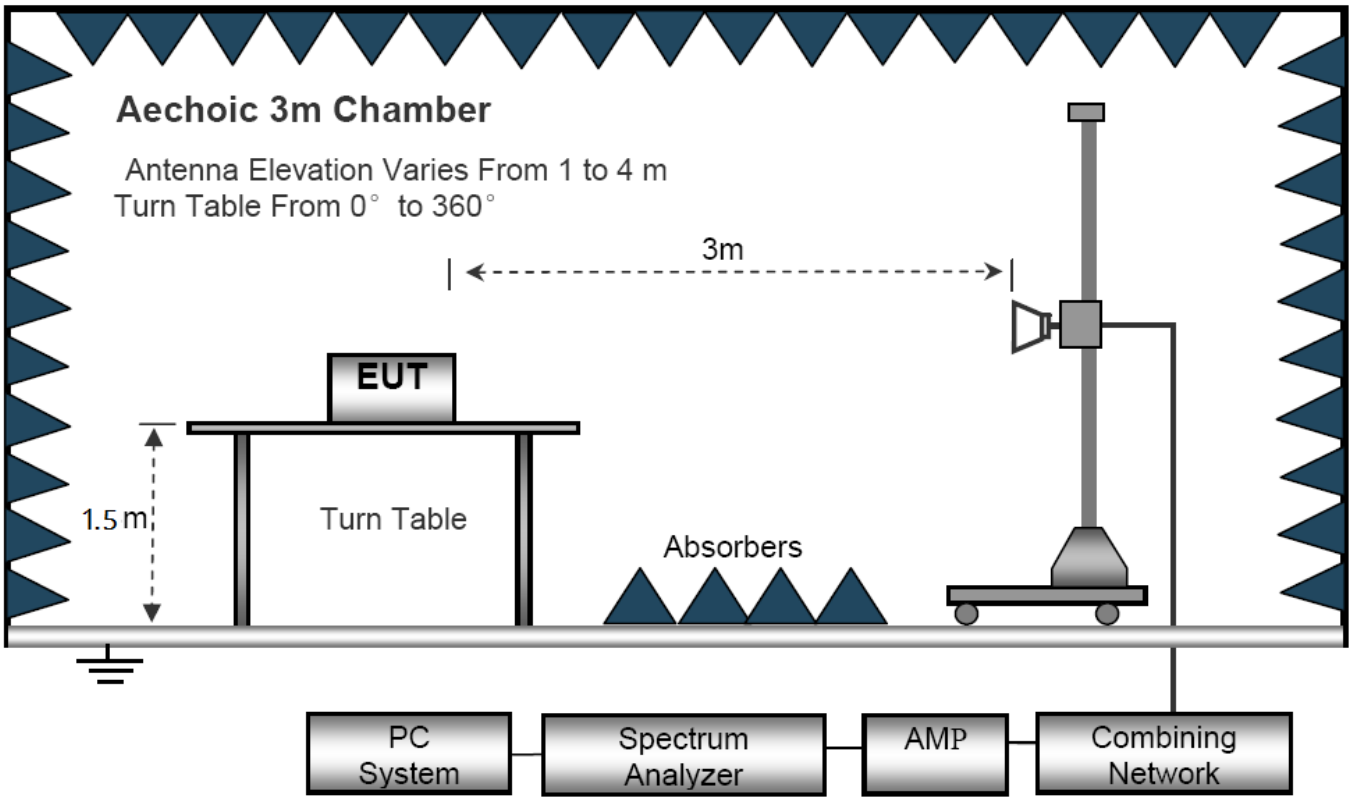
4. For emissions below 1GHz, pretest for all mode, The test data of the worst case condition(s) was reported on the following pages.

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

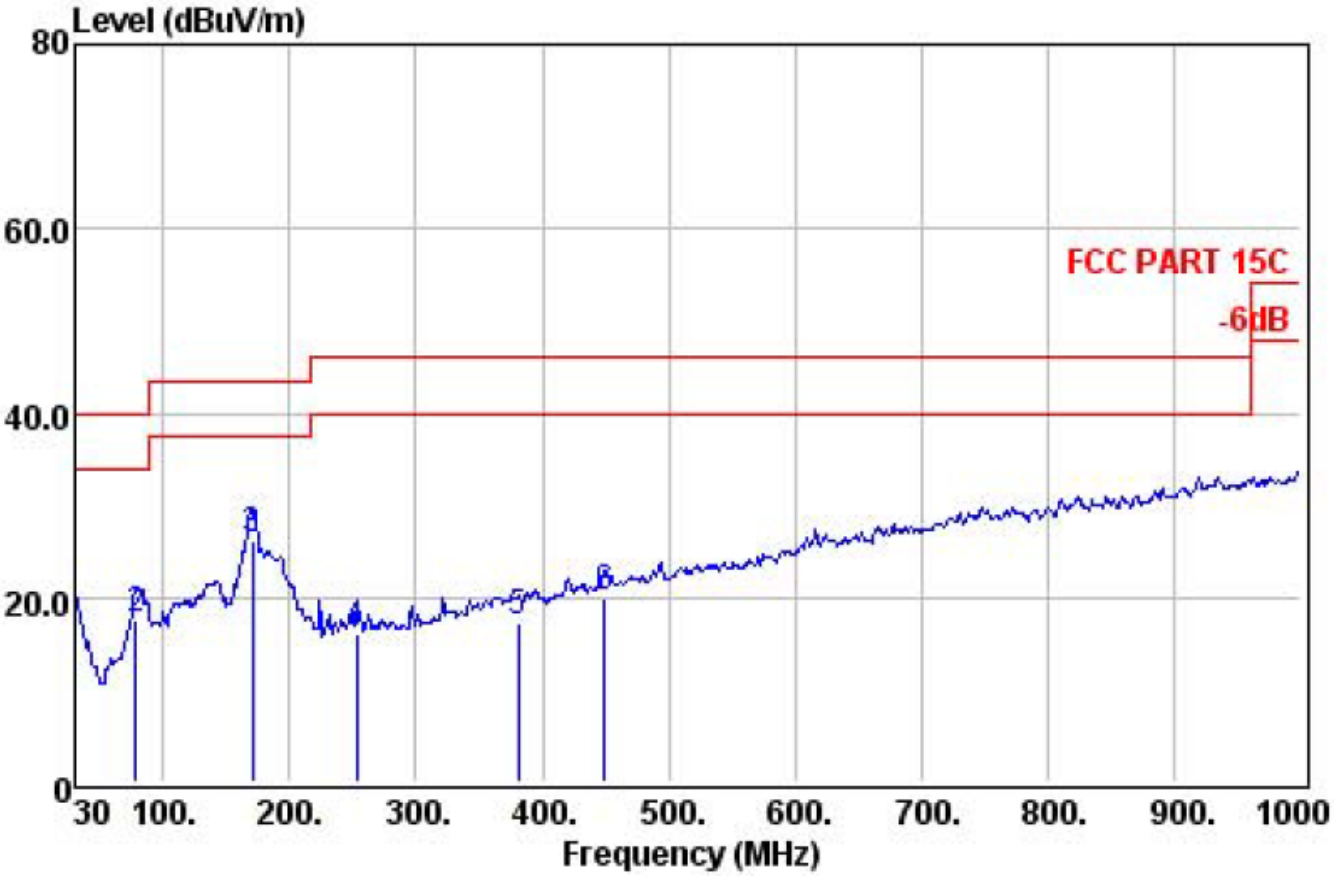
Below 1GHz



Above 1GHz

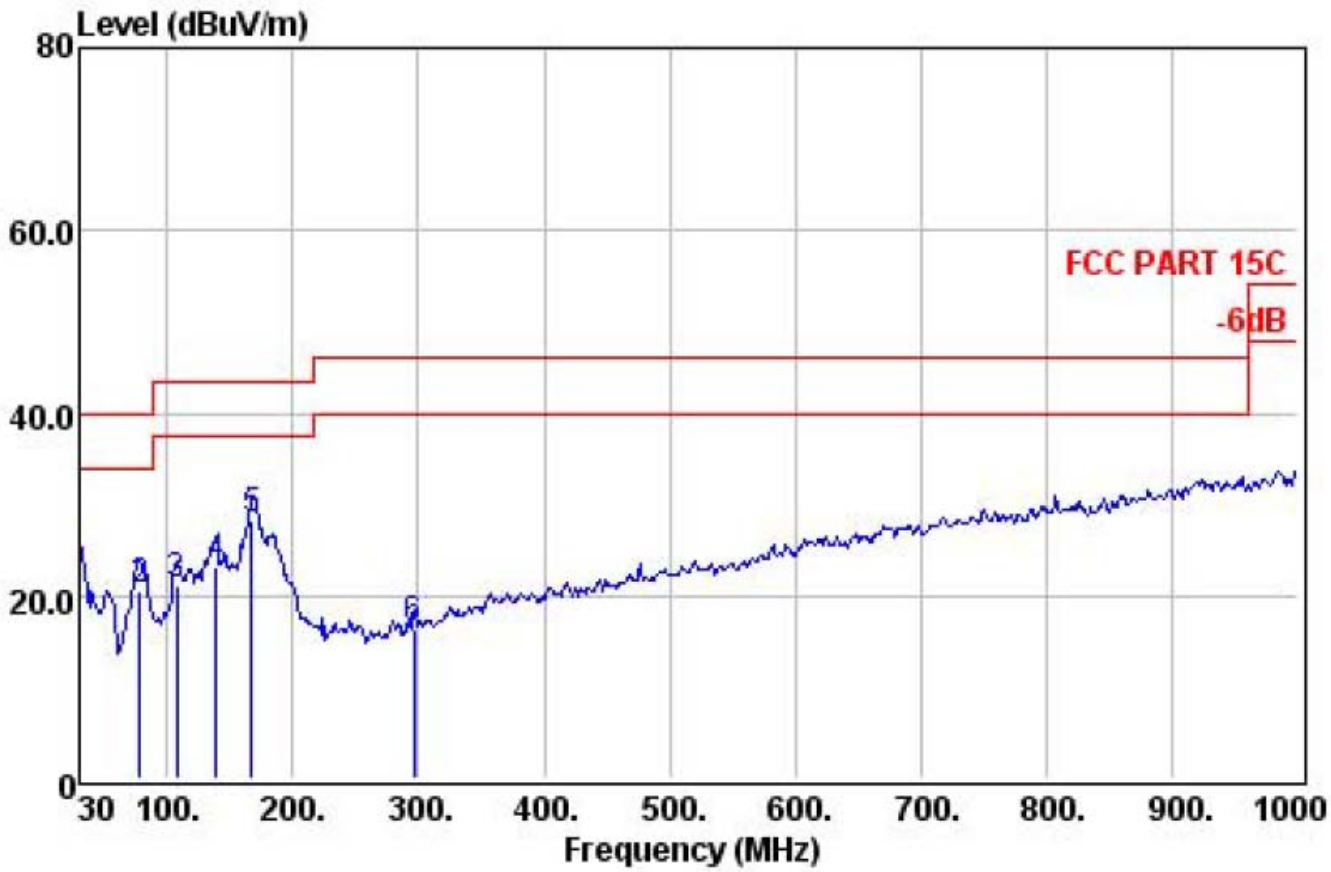


Below 1GHz
Horizontal



	Freq	Preamp Factor	Read Level	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dBuV/m	dBuV/m	dB	
1	30.00	31.41	31.57	0.56	19.52	40.00	-20.48	QP
2	78.50	31.34	40.20	0.85	17.64	40.00	-22.36	QP
3	170.65	31.19	45.96	1.30	26.19	43.50	-17.31	QP
4	253.10	30.97	32.28	1.70	15.92	46.00	-30.08	QP
5	381.14	30.62	29.35	2.27	17.21	46.00	-28.79	QP
6	449.04	30.61	30.44	2.62	20.03	46.00	-25.97	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	36.59	0.56	24.54	40.00	-15.46	QP
2	78.50	31.34	42.95	0.85	20.39	40.00	-19.61	QP
3	107.60	31.32	42.10	1.03	21.18	43.50	-22.32	QP
4	138.64	31.21	44.82	1.22	23.22	43.50	-20.28	QP
5	167.74	31.20	48.32	1.30	28.32	43.50	-15.18	QP
6	296.75	30.93	31.80	1.87	16.44	46.00	-29.56	QP

Above 1GHz
802.11a TX Channel 36
Horizontal

	Freq	Preamp Factor	Read Level	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dBuV/m	dBuV/m	dB	
1	5879.00	27.69	18.23	15.93	41.40	74.00	-32.60	Peak
2	7902.00	28.08	16.87	16.65	42.04	74.00	-31.96	Peak
3	9483.00	28.59	15.98	16.92	42.29	74.00	-31.71	Peak
4	10979.00	28.90	11.60	17.16	39.35	74.00	-34.65	Peak
5	12220.00	29.04	14.08	17.56	42.04	74.00	-31.96	Peak
6	13597.00	29.32	8.55	18.89	41.22	74.00	-32.78	Peak

Vertical

	Freq	Preamp Factor	Read Level	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dBuV/m	dBuV/m	dB	
1	5692.00	27.67	20.16	14.84	41.85	74.00	-32.15	Peak
2	7086.00	27.92	14.88	16.60	40.79	74.00	-33.21	Peak
3	8718.00	28.31	16.43	16.82	42.00	74.00	-32.00	Peak
4	10061.00	28.81	12.44	16.98	39.12	74.00	-34.88	Peak
5	11115.00	28.91	13.21	17.19	41.08	74.00	-32.92	Peak
6	12271.00	29.05	14.26	17.59	42.26	74.00	-31.74	Peak

802.11a TX Channel 40
Horizontal

	Freq	Preamp Factor	Read Level	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dBuV/m	dBuV/m	dB	
1	5607.00	27.66	19.66	14.45	40.78	74.00	-33.22	Peak
2	6933.00	27.89	16.01	16.60	41.74	74.00	-32.26	Peak
3	8463.00	28.24	17.13	16.76	42.42	74.00	-31.58	Peak
4	9874.00	28.75	17.29	16.95	43.79	74.00	-30.21	Peak
5	11183.00	28.92	15.24	17.20	43.17	74.00	-30.83	Peak
6	12730.00	29.15	14.01	17.99	42.91	74.00	-31.09	Peak

Vertical

	Freq	Preamp Factor	Read Level	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dBuV/m	dBuV/m	dB	
1	6151.00	27.73	18.88	16.60	43.16	74.00	-30.84	Peak
2	7307.00	27.96	18.23	16.61	44.20	74.00	-29.80	Peak
3	8701.00	28.31	14.70	16.81	40.24	74.00	-33.76	Peak
4	10231.00	28.82	17.10	17.01	44.06	74.00	-29.94	Peak
5	11506.00	28.95	13.44	17.27	41.66	74.00	-32.34	Peak
6	13138.00	29.23	10.73	18.38	41.21	74.00	-32.79	Peak

802.11a TX Channel 48
Horizontal

	Freq	Preamp Factor	Read Level	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dBuV/m	dBuV/m	dB	
1	6134.00	27.73	17.58	16.60	41.84	74.00	-32.16	Peak
2	7477.00	27.99	16.52	16.63	42.55	74.00	-31.45	Peak
3	8667.00	28.30	15.10	16.81	40.61	74.00	-33.39	Peak
4	10078.00	28.81	12.68	16.98	39.38	74.00	-34.62	Peak
5	11659.00	28.97	11.94	17.30	40.01	74.00	-33.99	Peak
6	13767.00	29.35	9.05	19.10	42.07	74.00	-31.93	Peak

Vertical

	Freq	Preamp Factor	Read Level	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dBuV/m	dBuV/m	dB	
1	6525.00	27.81	18.79	16.60	43.52	74.00	-30.48	Peak
2	8531.00	28.26	16.84	16.77	42.19	74.00	-31.81	Peak
3	10996.00	28.90	14.80	17.16	42.56	74.00	-31.44	Peak
4	13580.00	29.32	10.50	18.87	43.13	74.00	-30.87	Peak
5	14617.00	29.49	12.64	19.76	43.02	74.00	-30.98	Peak
6	15756.00	29.66	12.53	20.48	42.73	74.00	-31.27	Peak

5. BAND EDGE COMPLIANCE TEST

5.1. Limits

Band 5.15-5.25GHz:

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

5.2. Test setup

Test method: FCC KDB 789033 D02 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	49.87	-45.33	-27.00	Pass
	5240	49.69	-45.51	-27.00	Pass
802.11n(HT20)	5180	49.89	-45.31	-27.00	Pass
	5240	50.32	-44.88	-27.00	Pass
802.11n(HT40)	5190	49.97	-45.23	-27.00	Pass
	5230	50.32	-44.88	-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

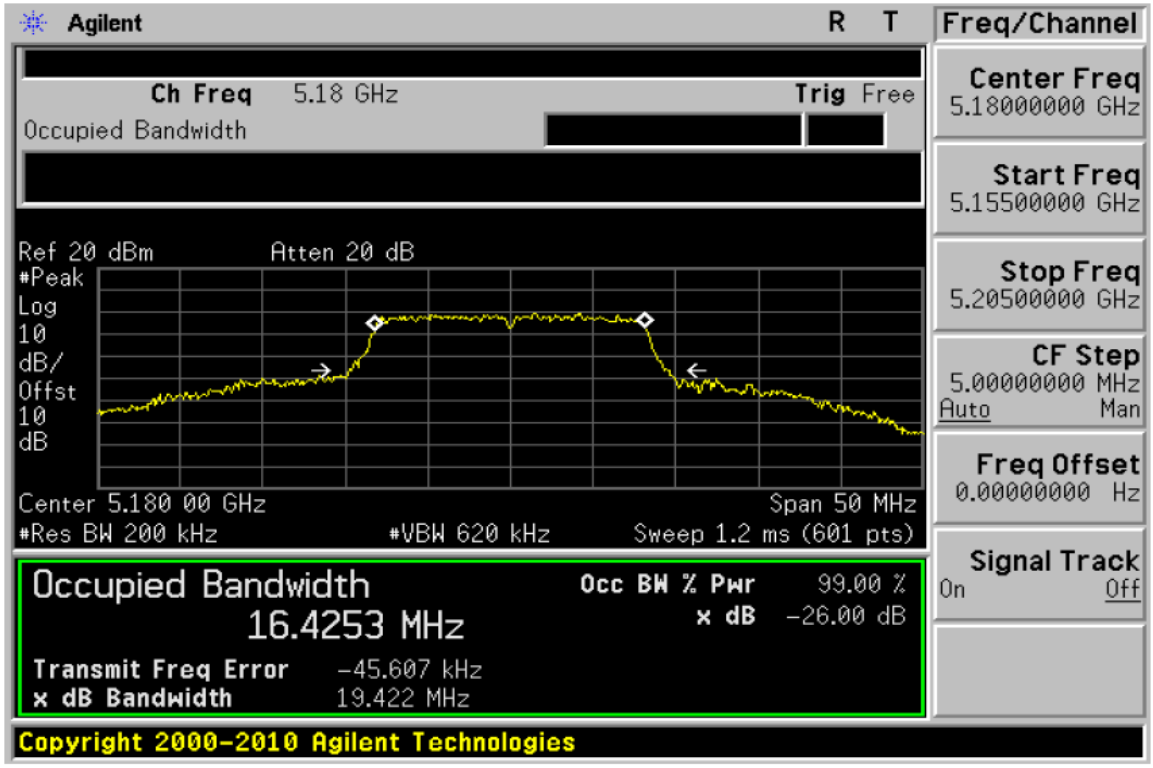
6.1. Measurement Procedure

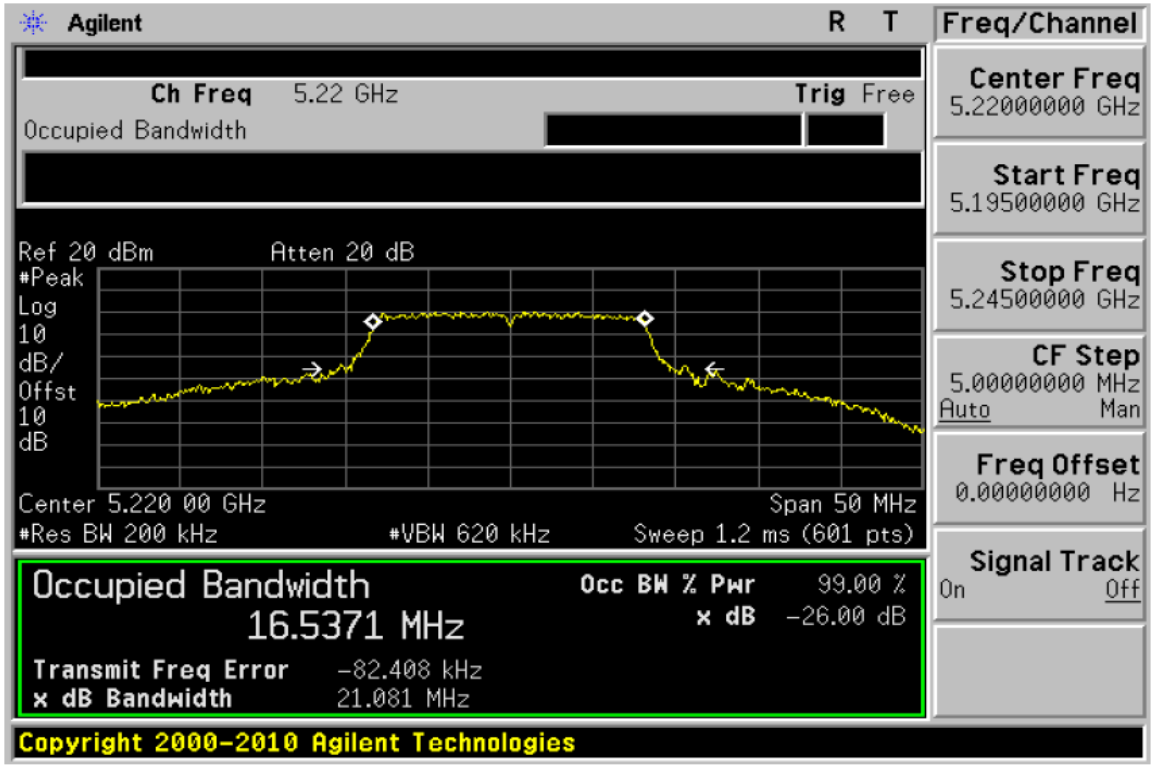
The bandwidth at 26 dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum power control level, as defined in KDB 789033 D02, at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26 dB bandwidth.

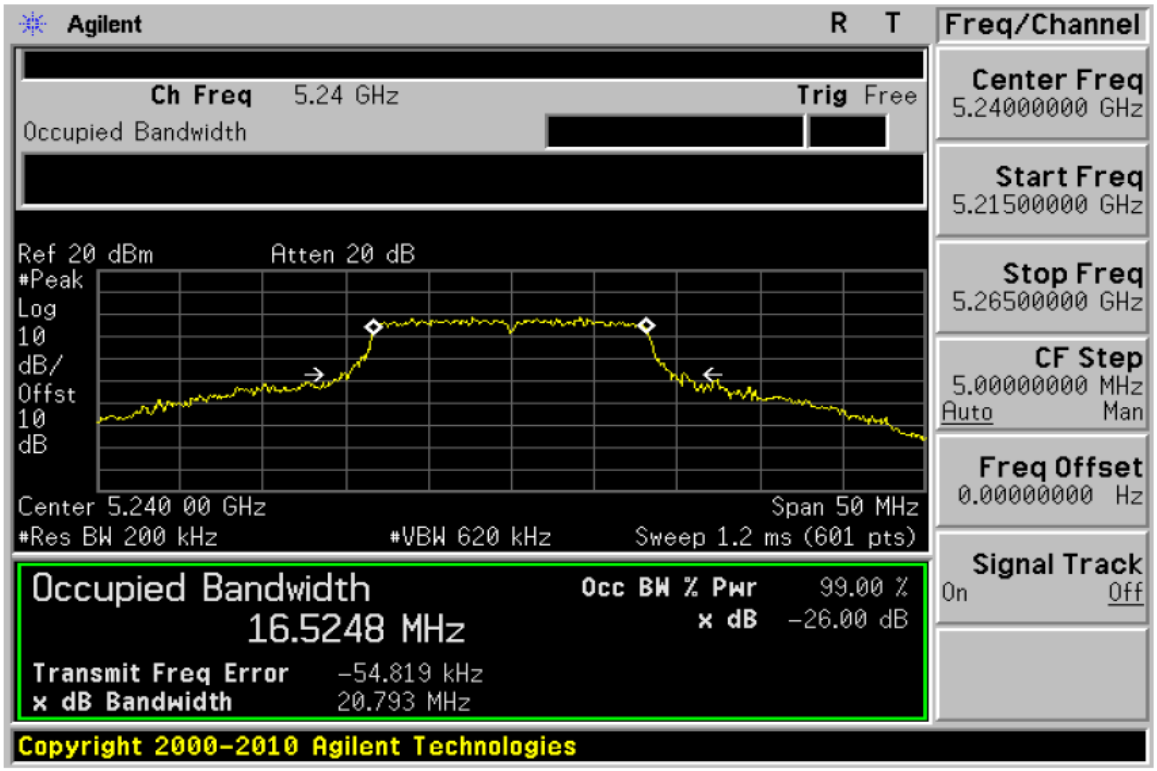
The 26 dB bandwidth is used to determine the conducted power limits.

	Channel number	**Frequency (MHz)**	**26dB Bandwidth (MHz)**	**99% Bandwidth (MHz)**
802.11a	36	5180	19.422	16.425
	40	5200	21.081	16.537
	48	5240	20.793	16.525
802.11n (HT20)	36	5180	19.675	17.418
	40	5200	19.742	17.465
	48	5240	20.645	16.494
802.11n (HT40)	38	5190	44.076	35.954
	46	5230	40.102	35.880

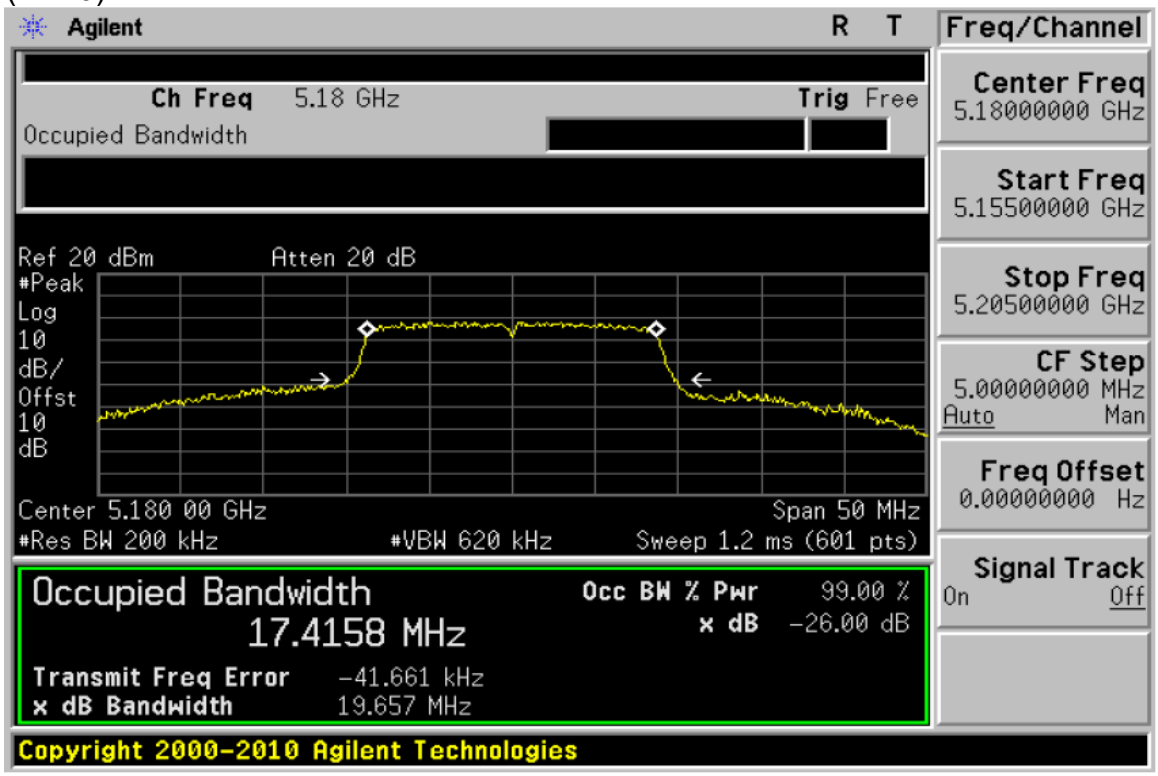
802.11a

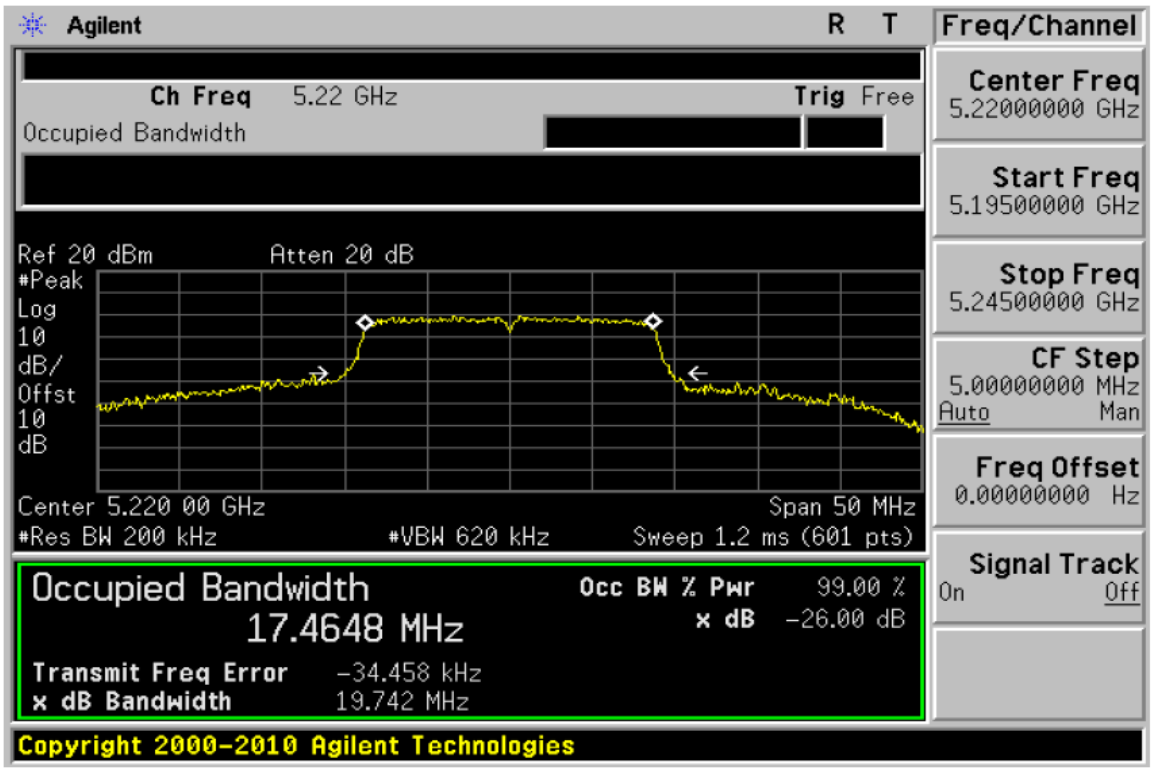

Agilent
R T
Freq/Channel
Ch Freq 5.18 GHz
Trig Free
Occupied Bandwidth
Ref 20 dBm
Atten 20 dB
#Peak
Log
10
dB/
Offst
10
dB
Center 5.180 00 GHz
Span 50 MHz
#Res BW 200 kHz
#VBW 620 kHz
Sweep 1.2 ms (601 pts)
Occupied Bandwidth
16.4253 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -45.607 kHz
x dB Bandwidth 19.422 MHz
Center Freq
5.18000000 GHz
Start Freq
5.15500000 GHz
Stop Freq
5.20500000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2010 Agilent Technologies

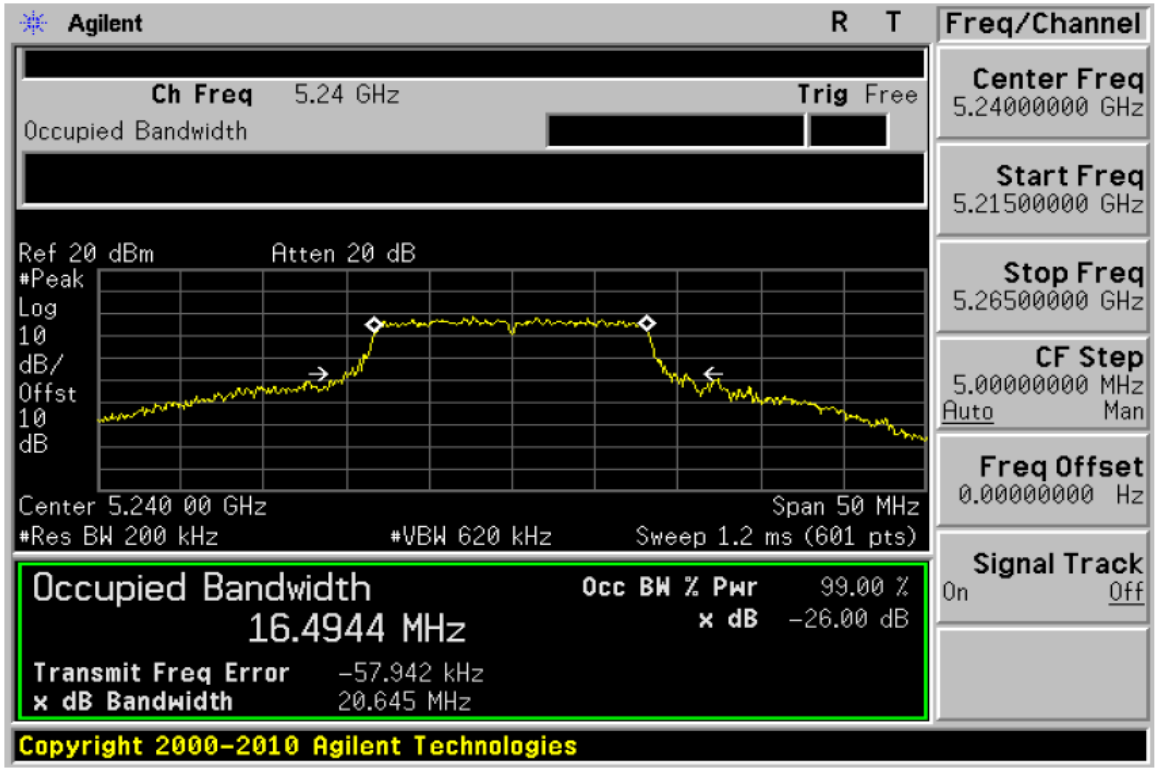

Agilent
R T
Freq/Channel
Ch Freq 5.22 GHz
Trig Free
Occupied Bandwidth
Ref 20 dBm
Atten 20 dB
#Peak
Log
10
dB/
Offst
10
dB
Center 5.220 00 GHz
Span 50 MHz
#Res BW 200 kHz
#VBW 620 kHz
Sweep 1.2 ms (601 pts)
Occupied Bandwidth
16.5371 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -82.408 kHz
x dB Bandwidth 21.081 MHz
Center Freq
5.22000000 GHz
Start Freq
5.19500000 GHz
Stop Freq
5.24500000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2010 Agilent Technologies


Agilent
R T
Freq/Channel
Ch Freq 5.24 GHz
Trig Free
Occupied Bandwidth
Ref 20 dBm
Atten 20 dB
#Peak
Log
10
dB/
Offst
10
dB
Center 5.240 00 GHz
Span 50 MHz
#Res BW 200 kHz
#VBW 620 kHz
Sweep 1.2 ms (601 pts)
Occupied Bandwidth
16.5248 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -54.819 kHz
x dB Bandwidth 20.793 MHz
Center Freq
5.24000000 GHz
Start Freq
5.21500000 GHz
Stop Freq
5.26500000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2010 Agilent Technologies

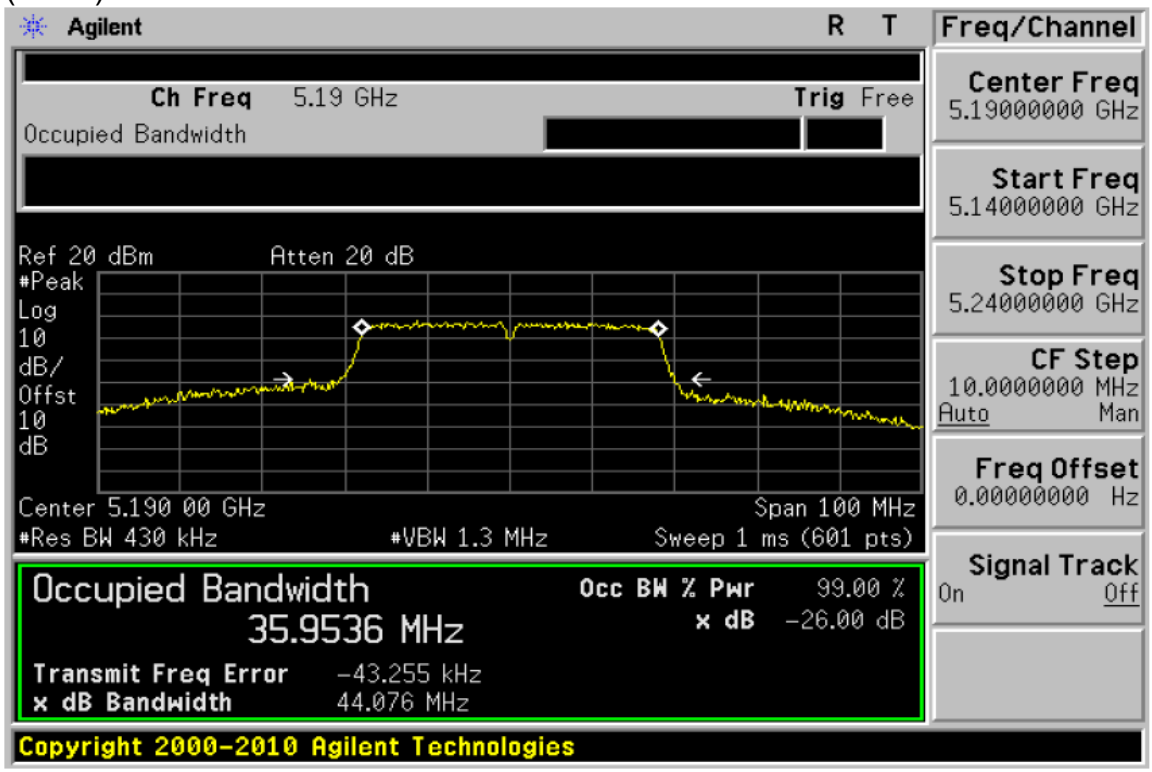
802.11n (HT20)

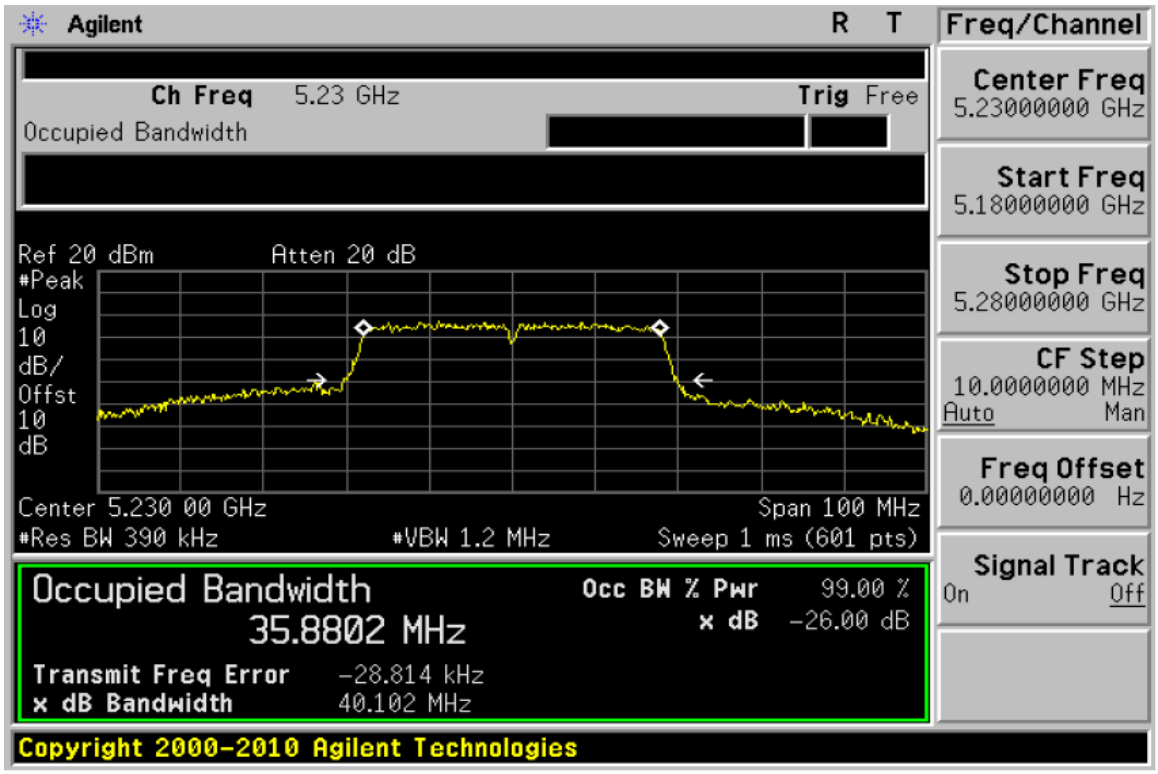

Agilent
R T
Freq/Channel
Ch Freq 5.18 GHz
Trig Free
Occupied Bandwidth
Ref 20 dBm
Atten 20 dB
#Peak
Log
10
dB/
Offst
10
dB
Center 5.180 00 GHz
Span 50 MHz
#Res BW 200 kHz
#VBW 620 kHz
Sweep 1.2 ms (601 pts)
Occupied Bandwidth
17.4158 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -41.661 kHz
x dB Bandwidth 19.657 MHz
Center Freq
5.18000000 GHz
Start Freq
5.15500000 GHz
Stop Freq
5.20500000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2010 Agilent Technologies


Agilent
R T
Freq/Channel
Ch Freq 5.22 GHz
Trig Free
Occupied Bandwidth
Ref 20 dBm
Atten 20 dB
#Peak
Log
10
dB/
Offst
10
dB
Center 5.220 00 GHz
Span 50 MHz
#Res BW 200 kHz
#VBW 620 kHz
Sweep 1.2 ms (601 pts)
Occupied Bandwidth
17.4648 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -34.458 kHz
x dB Bandwidth 19.742 MHz
Center Freq
5.22000000 GHz
Start Freq
5.19500000 GHz
Stop Freq
5.24500000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2010 Agilent Technologies


Agilent
R T
Freq/Channel
Ch Freq 5.24 GHz
Trig Free
Occupied Bandwidth
Ref 20 dBm
Atten 20 dB
#Peak
Log
10
dB/
Offst
10
dB
Center 5.240 00 GHz
Span 50 MHz
#Res BW 200 kHz
#VBW 620 kHz
Sweep 1.2 ms (601 pts)
Occupied Bandwidth
16.4944 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -57.942 kHz
x dB Bandwidth 20.645 MHz
Center Freq
5.24000000 GHz
Start Freq
5.21500000 GHz
Stop Freq
5.26500000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2010 Agilent Technologies

802.11n (HT40)


Agilent
R T
Freq/Channel
Ch Freq 5.19 GHz
Trig Free
Occupied Bandwidth
Ref 20 dBm
Atten 20 dB
#Peak
Log
10
dB/
Offst
10
dB
Center 5.190 00 GHz
Span 100 MHz
#Res BW 430 kHz
#VBW 1.3 MHz
Sweep 1 ms (601 pts)
Occupied Bandwidth
35.9536 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -43.255 kHz
x dB Bandwidth 44.076 MHz
Center Freq
5.19000000 GHz
Start Freq
5.14000000 GHz
Stop Freq
5.24000000 GHz
CF Step
10.0000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2010 Agilent Technologies


Agilent
R T
Freq/Channel
Ch Freq 5.23 GHz
Trig Free
Occupied Bandwidth
Ref 20 dBm
Atten 20 dB
#Peak
Log
10
dB/
Offst
10
dB
Center 5.230 00 GHz
Span 100 MHz
#Res BW 390 kHz
#VBW 1.2 MHz
Sweep 1 ms (601 pts)
Occupied Bandwidth
35.8802 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -28.814 kHz
x dB Bandwidth 40.102 MHz
Center Freq
5.23000000 GHz
Start Freq
5.18000000 GHz
Stop Freq
5.28000000 GHz
CF Step
10.0000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2010 Agilent Technologies

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.

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

For FCC

	Frequency (MHz)	Output Power (dBm)	26dB Bandwidth (MHz)	FCC Limit (dBm)	Result
802.11a	5180	14.68	19.422	24.0	Pass
	5200	14.52	21.081	24.0	Pass
	5240	13.35	20.793	24.0	Pass
802.11n (HT20)	5180	13.26	19.675	24.0	Pass
	5200	12.36	19.742	24.0	Pass
	5240	12.39	20.645	24.0	Pass
802.11n (HT40)	5190	14.68	44.076	24.0	Pass
	5230	14.52	40.102	24.0	Pass

EIRP=output power+antenna gain

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.

8.2. Test setup

Methods refer to FCC KDB 789033 D02

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

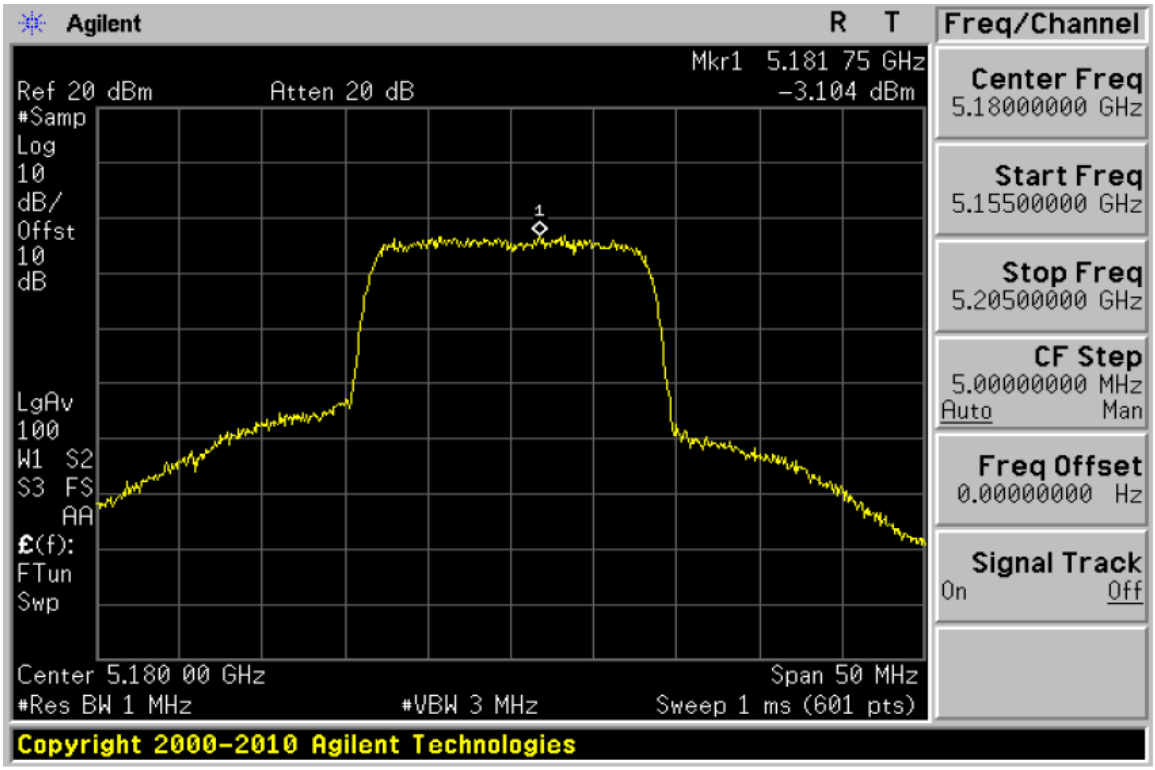
8.3. Test data

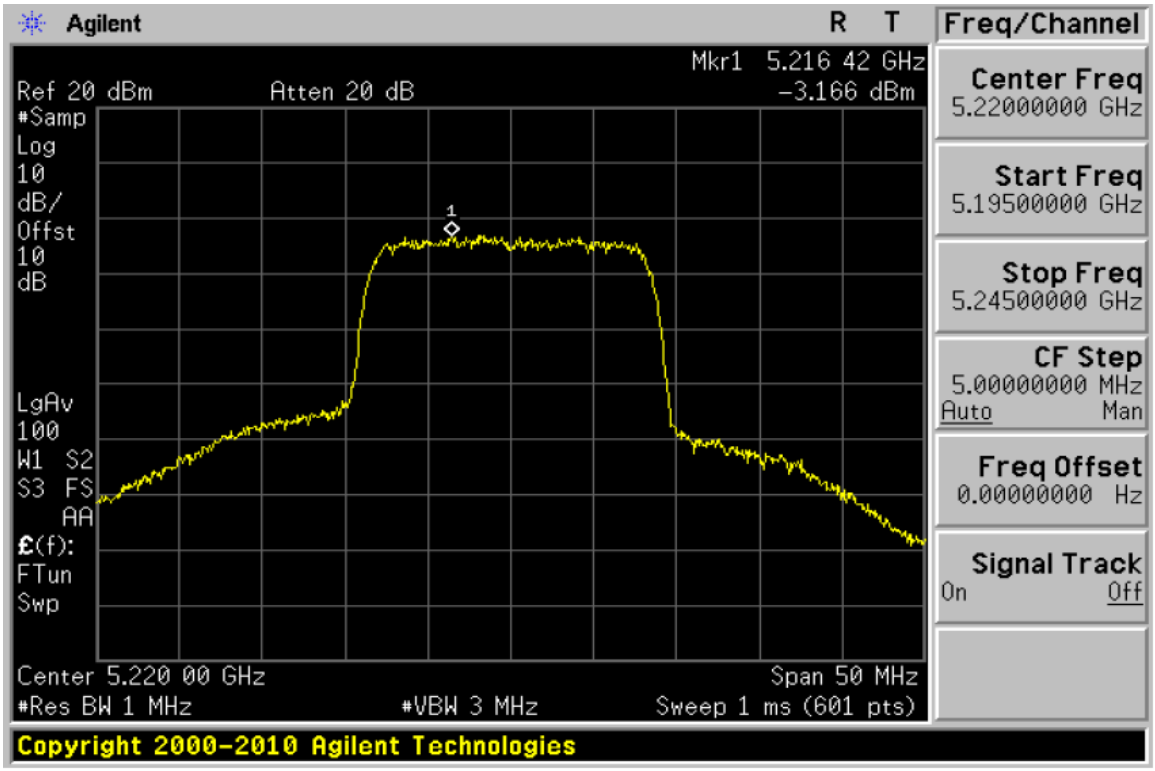
Test data as below

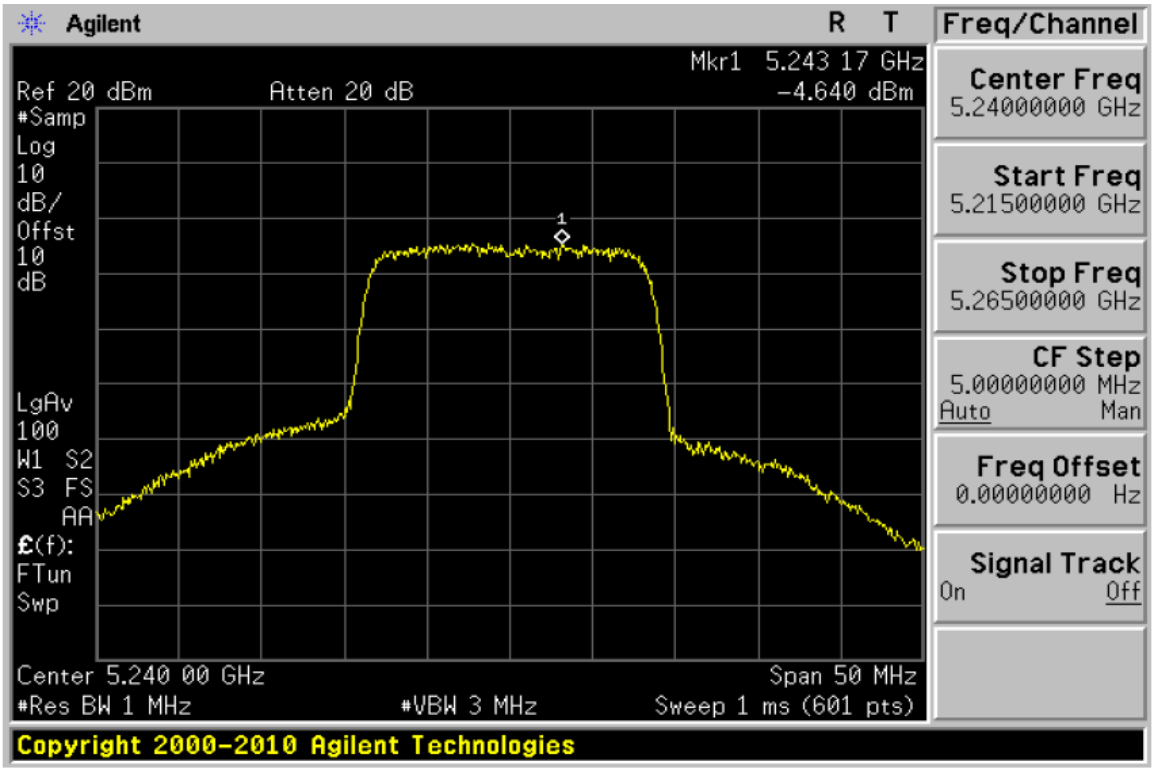
	Frequency (MHz)	Output Power(dBm)	FCC Limit (dBm)	Result
802.11a	5180	-3.10	11.0	Pass
	5200	-3.17	11.0	Pass
	5240	-4.64	11.0	Pass
802.11n (HT20)	5180	-3.32	11.0	Pass
	5200	-3.16	11.0	Pass
	5240	-4.39	11.0	Pass
802.11n (HT40)	5190	-6.52	11.0	Pass
	5230	-8.10	11.0	Pass

EIRP=output power+ antenna gain

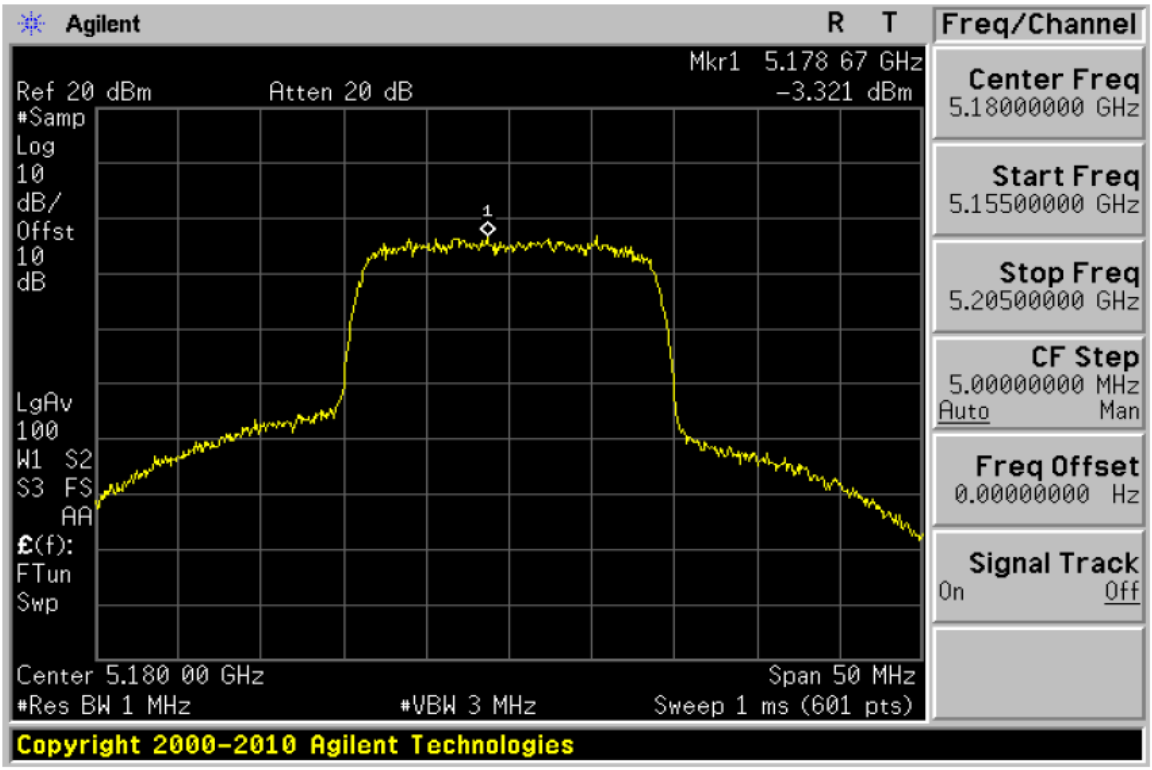
802.11a

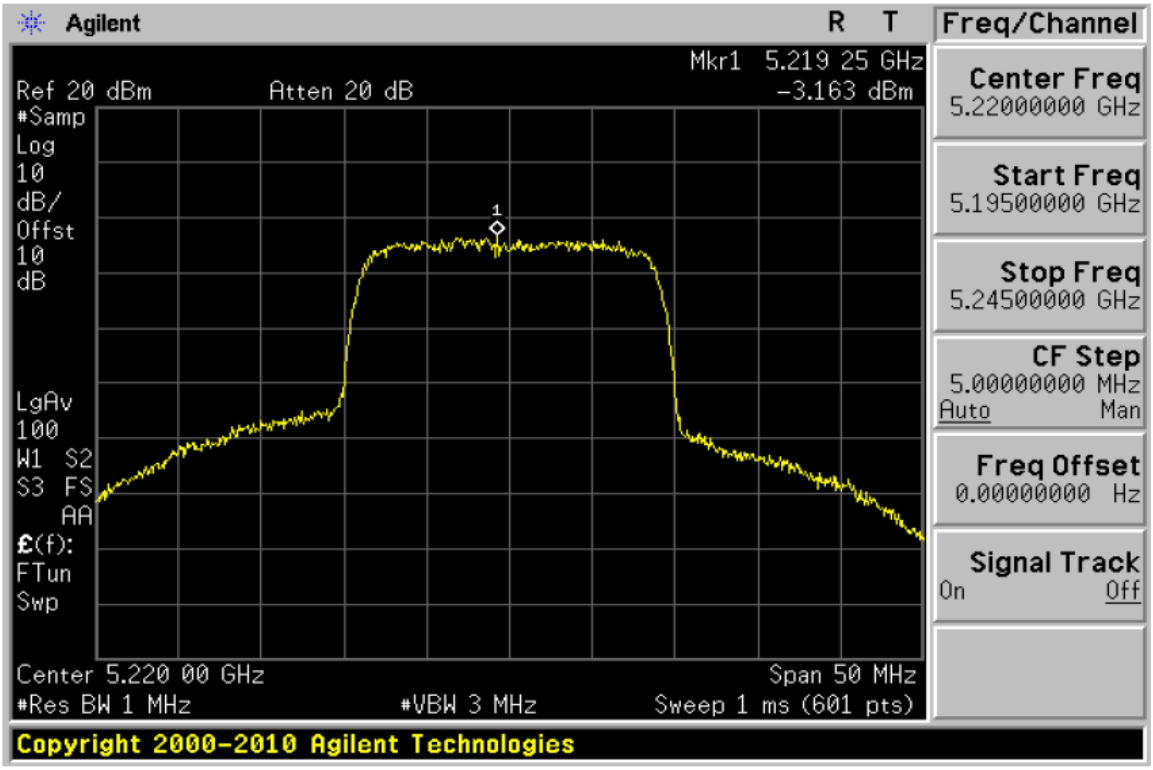

Agilent
R T
Freq/Channel
Mkr1 5.181 75 GHz
Ref 20 dBm
Atten 20 dB
-3.104 dBm
#Samp
Log
10
dB/
Offst
10
dB
LgAv
100
W1 S2
S3 FS
AA
£(f):
FTun
Swp
Center 5.180 00 GHz
Span 50 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 1 ms (601 pts)
Center Freq
5.18000000 GHz
Start Freq
5.15500000 GHz
Stop Freq
5.20500000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2010 Agilent Technologies

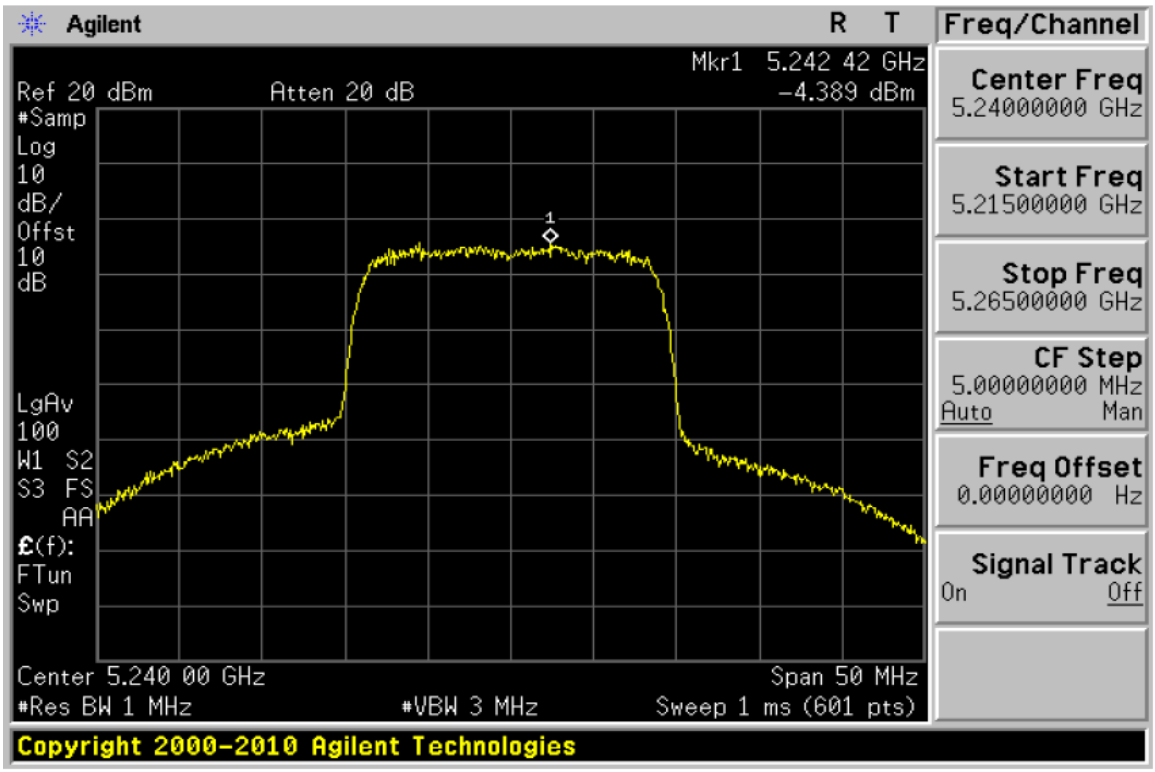

Agilent
R T
Freq/Channel
Mkr1 5.216 42 GHz
Ref 20 dBm
Atten 20 dB
-3.166 dBm
#Samp
Log
10
dB/
Offst
10
dB
LgAv
100
W1 S2
S3 FS
AA
£(f):
FTun
Swp
Center 5.220 00 GHz
Span 50 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 1 ms (601 pts)
Center Freq
5.22000000 GHz
Start Freq
5.19500000 GHz
Stop Freq
5.24500000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2010 Agilent Technologies


Agilent
R T
Freq/Channel
Mkr1 5.243 17 GHz
Ref 20 dBm
Atten 20 dB
-4.640 dBm
#Samp
Log
10
dB/
Offst
10
dB
LgAv
100
W1 S2
S3 FS
AA
£(f):
FTun
Swp
Center 5.240 00 GHz
Span 50 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 1 ms (601 pts)
Center Freq
5.24000000 GHz
Start Freq
5.21500000 GHz
Stop Freq
5.26500000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2010 Agilent Technologies

802.11n (HT20)


Agilent
R T
Freq/Channel
Mkr1 5.178 67 GHz
Ref 20 dBm
Atten 20 dB
-3.321 dBm
#Samp
Log
10
dB/
Offst
10
dB
LgAv
100
W1 S2
S3 FS
AA
£(f):
FTun
Swp
Center 5.180 00 GHz
Span 50 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 1 ms (601 pts)
Center Freq
5.18000000 GHz
Start Freq
5.15500000 GHz
Stop Freq
5.20500000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2010 Agilent Technologies


Agilent
R T
Freq/Channel
Mkr1 5.219 25 GHz
Ref 20 dBm
Atten 20 dB
-3.163 dBm
#Samp
Log
10
dB/
Offst
10
dB
LgAv
100
W1 S2
S3 FS
AA
£(f):
FTun
Swp
Center 5.220 00 GHz
Span 50 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 1 ms (601 pts)
Center Freq
5.22000000 GHz
Start Freq
5.19500000 GHz
Stop Freq
5.24500000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2010 Agilent Technologies


Agilent
R T
Freq/Channel
Mkr1 5.242 42 GHz
Ref 20 dBm
Atten 20 dB
-4.389 dBm
#Samp
Log
10
dB/
Offst
10
dB
LgAv
100
W1 S2
S3 FS
AA
£(f):
FTun
Swp
Center 5.240 00 GHz
Span 50 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 1 ms (601 pts)
Center Freq
5.24000000 GHz
Start Freq
5.21500000 GHz
Stop Freq
5.26500000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
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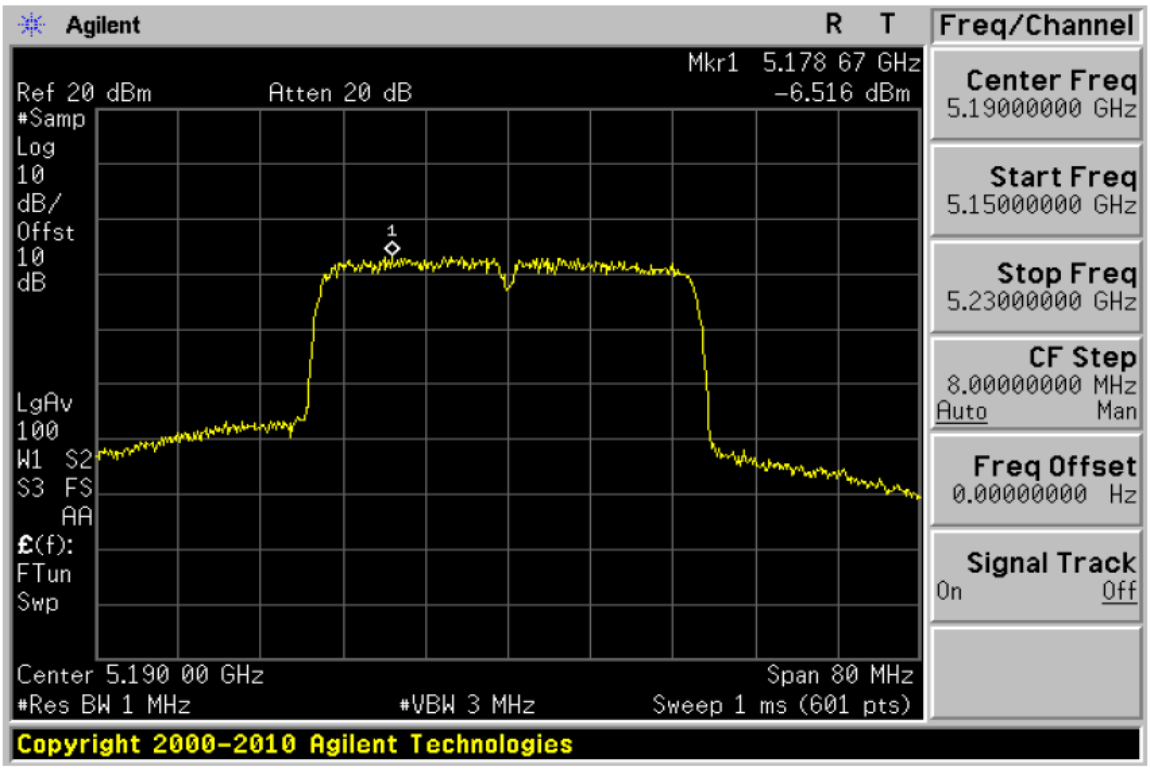
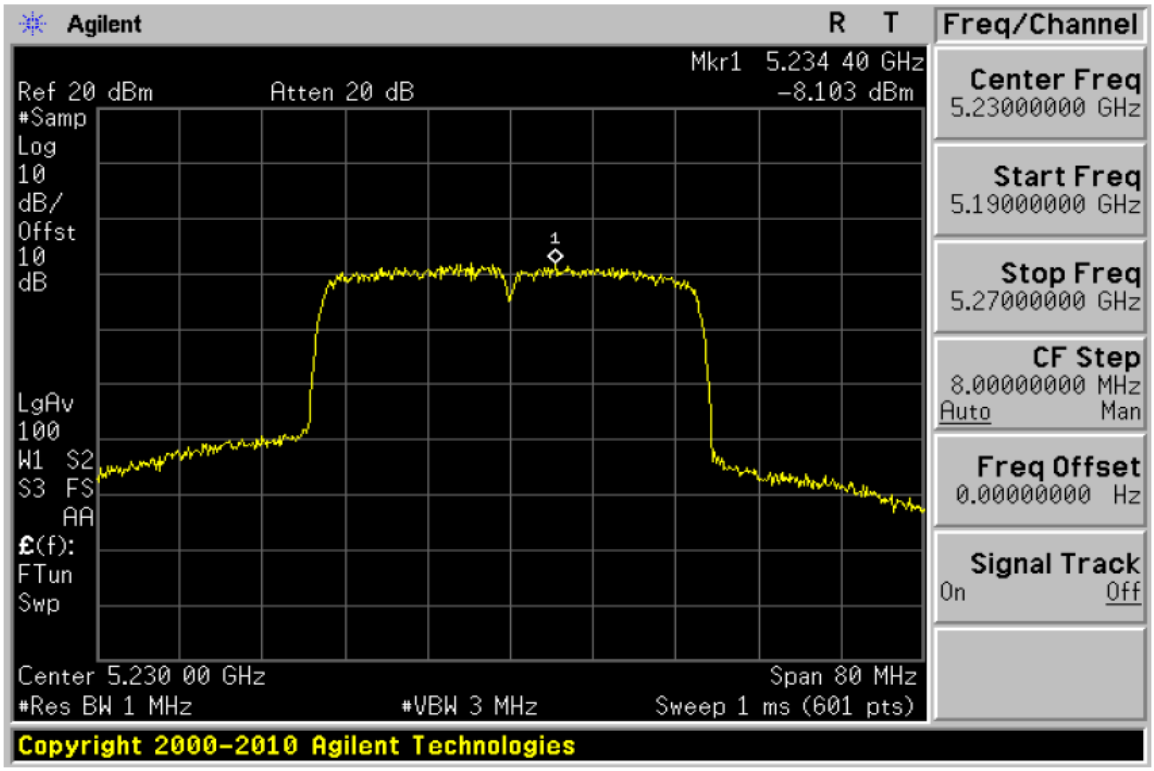
802.11n (HT40)


Agilent
R T
Freq/Channel
Mkr1 5.178 67 GHz
Ref 20 dBm
Atten 20 dB
-6.516 dBm
#Samp
Log
10
dB/
Offst
10
dB
LgAv
100
W1 S2
S3 FS
AA
£(f):
FTun
Swp
Center 5.190 00 GHz
Span 80 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 1 ms (601 pts)
Center Freq
5.19000000 GHz
Start Freq
5.15000000 GHz
Stop Freq
5.23000000 GHz
CF Step
8.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2010 Agilent Technologies


Agilent
R T
Freq/Channel
Mkr1 5.234 40 GHz
Ref 20 dBm
Atten 20 dB
-8.103 dBm
#Samp
Log
10
dB/
Offst
10
dB
LgAv
100
W1 S2
S3 FS
AA
£(f):
FTun
Swp
Center 5.230 00 GHz
Span 80 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 1 ms (601 pts)
Center Freq
5.23000000 GHz
Start Freq
5.19000000 GHz
Stop Freq
5.27000000 GHz
CF Step
8.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2010 Agilent Technologies

9. FREQUENCY STABILITY

9.1. Measurement procedure

[FCC 15.407(g)]

The EUT was placed of an inside of an constant temperature chamber as the temperature in the chamber was varied between -30˚C and +60˚C. The temperature was incremented by 10˚C intervals and the unit was allowed to stabilize at each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channels center frequency was recorded.

9.2. Test setup

Methods refer to FCC KDB 789033 D02

The EUT was set to operate with following conditions.

- 5.2GHz Band

The test mode of EUT is as follows.

- Tx mode

9.3. Limit

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

9.4. Test data

Test Conditions			Frequency Deviation	
Band	Power(Vdc)	Temperature(℃)	Frequency Error(Hz)	ppm
802.11a 5200.00MHz	3.7	-30	43	0.0083
	3.7	-20	35	0.0067
	3.7	-10	42	0.0081
	3.7	0	28	0.0054
	3.7	10	31	0.0060
	3.7	20	39	0.0075
	3.7	30	42	0.0081
	3.7	40	51	0.0098
	3.7	50	33	0.0063
	4.25	25	31	0.0060
	3.70	25	29	0.0056
	3.40	25	11	0.0021
802.11n (HT20) 5200.00MHz	3.7	-30	28	0.0054
	3.7	-20	41	0.0079
	3.7	-10	31	0.0060
	3.7	0	32	0.0062
	3.7	10	28	0.0054
	3.7	20	61	0.0117
	3.7	30	42	0.0081
	3.7	40	27	0.0052
	3.7	50	28	0.0054
	4.25	25	36	0.0069
	3.70	25	12	0.0023
	3.40	25	21	0.0040
802.11n (HT40) 5230.00MHz	3.7	-30	87	0.0166
	3.7	-20	75	0.0143
	3.7	-10	71	0.0136
	3.7	0	68	0.0130
	3.7	10	39	0.0075
	3.7	20	74	0.0141
	3.7	30	37	0.0071
	3.7	40	61	0.0117
	3.7	50	54	0.0103
	4.25	25	35	0.0067
	3.70	25	27	0.0052
	3.40	25	21	0.0040

Note: Measurement Uncertainty: ±20Hz.

10. ANTENNA REQUIREMENTS

10.1. 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.

10.2. Result

The antennas used for this product are permanent attached 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 1.5dBi.

11. PHOTOGRAPHS OF THE EUT

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