

TEST REPORT

of

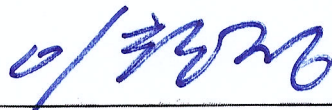
FCC Part 15 Subpart E §15.407 / RSS-210 Issue 8, RSS-Gen Issue 3

FCC ID/IC Certification: A3LEADT10 / 649E-EADT10

Equipment Under Test : Allshare Cast Hub
Model Name : EAD-T10
Serial No. : N/A
Applicant : SAMSUNG ELECTRONICS CO., LTD.
Manufacturer : SAMSUNG ELECTRONICS CO., LTD.
Date of Test(s) : 2012.04.03 ~ 2012.04.11
Date of Issue : 2012.04.17

In the configuration tested, the EUT complied with the standards specified above.

Tested By:



Logan Lee

Date

2012.04.17

Approved By:



Feel Jeong

Date

2012.04.17

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1. General Information

1.1. Testing laboratory

SGS Korea Co., Ltd.(Gunpo Laboratory)

- 705, Dongchun-Dong Sooji-Gu, Yongin-Shi, Kyungki-Do, South Korea.

- Wireless Div. 2FL, 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea 435-040

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1.2. Details of applicant

Applicant : SAMSUNG ELECTRONICS CO., LTD.

Address : 416, Maetan-dong, Yeongtong-gu, Suwon-city, Gyeonggi-do, Korea

Contact Person : Kim, Jin-Kyung

Phone No. : +82 31 301 4187

1.3. Description of EUT

Kind of Product	Allshare Cast Hub
Model Name	EAD-T10
Serial Number	N/A
Power Supply	DC 5 V
Frequency Range	1) 2 412 MHz ~ 2 462 MHz (11b/g/n_HT20), 2) 5 745 MHz ~ 5 825 MHz (11a/n_HT20), 3) 5 755 MHz ~ 5 795 MHz (11a/n_HT40), 4) 5 180 MHz ~ 5 240 MHz (11a/n_HT20_Non DFS), 5) 5 190 MHz ~ 5 230 MHz (11a/n_HT40_Non DFS)
Modulation Technique	DSSS, OFDM
Number of Channels	1) 11 channel (11b/g/n_HT20) 2) 5 channel (11a/n_HT20) 3) 2 channel (11n_HT40), 4) 4 channel (11a/n_HT20_Non DFS) 5) 2 channel (11n_HT40_Non DFS)
Antenna Type	Internal type (SISO)
Antenna Gain	1) 0.33 dB i(11b/g/n_HT20) 2), 3) -6.40 dB i(11a/n_HT20, HT40) 4), 5) 0.38 dB i(11a/n_HT20, HT40_Non DFS)

1.4. Declaration by the manufacturer

- EUT does not support DFS band from 5 260 MHz to 5 700 MHz

- We found out the test mode with the highest power level after we analyze all the data rates. So we choose 6 Mbps data rate for 11a and MCS0 for 11n_HT20 and HT40 (worst case) as a representative.

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1.5. Test equipment list

Equipment	Manufacturer	Model	S/N	Cal Due.
Signal Generator	R&S	SMR40	100272	Jul. 15, 2012
Spectrum Analyzer	Agilent	N9030A	US51350132	Oct. 28, 2012
Attenuator	Agilent	8490D	50748	May 01, 2013
Attenuator	AEROFLEX/INMET	18N-20dB	3	Apr. 02, 2013
Power Sensor	R&S	NRP-Z81	100669	Apr. 03, 2013
Low Pass Filter	Mini-Circuits	NLP-1200+	V8979400903-1	Jul. 11, 2012
High Pass Filter	Wainwright	WHK3.0/18G-10SS	344	Jul. 07, 2012
High Pass Filter	Wainwright	WHK6.0/18G-10SS	11	Jul. 07, 2012
DC Power Supply	Agilent	U8002A	MY50020026	Mar. 29, 2013
Preamplifier	H.P.	8447F	2944A03909	Jul. 04, 2012
Preamplifier	R&S	SCU18	10117	Jan. 12, 2013
Preamplifier	MITEQ Inc.	JS44-18004000-35-8P	1546891	Jul. 04, 2012
Test Receiver	R&S	ESU26	100109	Feb. 21, 2013
Bilog Antenna	SCHWARZBECK MESSELEKTRONIK	VULB9163	396	May 12, 2013
Horn Antenna	R&S	HF906	100326	Nov. 23, 2012
Horn Antenna	SCHWARZBECK MESSELEKTRONIK	BBHA9170	BBHA9170223	Jun. 30, 2012
Antenna Master	INNCO	MM4000	N.C.R	N.C.R.
Turn Table	INNCO	DS 1200S	N.C.R	N.C.R.
Anechoic Chamber	SY Corporation	L × W × H (6.5 m × 3.5 m × 3.5 m)	N.C.R	N.C.R.
EMI Test Receiver	R&S	ESHSI0	863365/018	Jul. 07, 2012
Two-Line V-Network	R&S	ENV216	100190	Jan. 09, 2013
Anechoic Chamber	SY Corporation	L × W × H (9.6 m × 6.4 m × 6.4 m)	N.C.R	N.C.R

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1.6. Summary of test result

The EUT has been tested according to the following specifications:

APPLIED STANDARD:FCC Part15 subpart E			
Section in FCC 15	Section in RSS-210 RSS-Gen	Test Item	Result
15.205(a) 15.209(a) 15.407(b)(1) 15.407(b)(2) 15.407(b)(3)	RSS-Gen 7 A9.2(1) A9.2(2) A9.2(3)	Transmitter radiated spurious emissions and Conducted spurious emission	Complied
15.109(a)	RSS-Gen 6	Receiver Radiated Spurious Emission	Complied
15.407(a)(1) 15.407(a)(2)	A9.2(1) A9.2(2) A9.2(3)	Output power	Complied
15.407(a)(1) 15.407(a)(2)	A9.2(1) A9.2(2) A9.2(3)	Peak power spectral density	Complied
15.407(a)(6)	-	Peak excursion	Complied
15.207	RSS-Gen 5.5/ RSS-102	Transmitter AC power line Conducted emission	Complied
15.407(h)	A9.3	DFS -Channel closing transmission time -Channel move time -Non occupied period	N/A

1.7. Test report revision

Revision	Report number	Description
0	F690501/RF-RTL005449	Initial
1	F690501/RF-RTL005449-1	Revised Description of EUT

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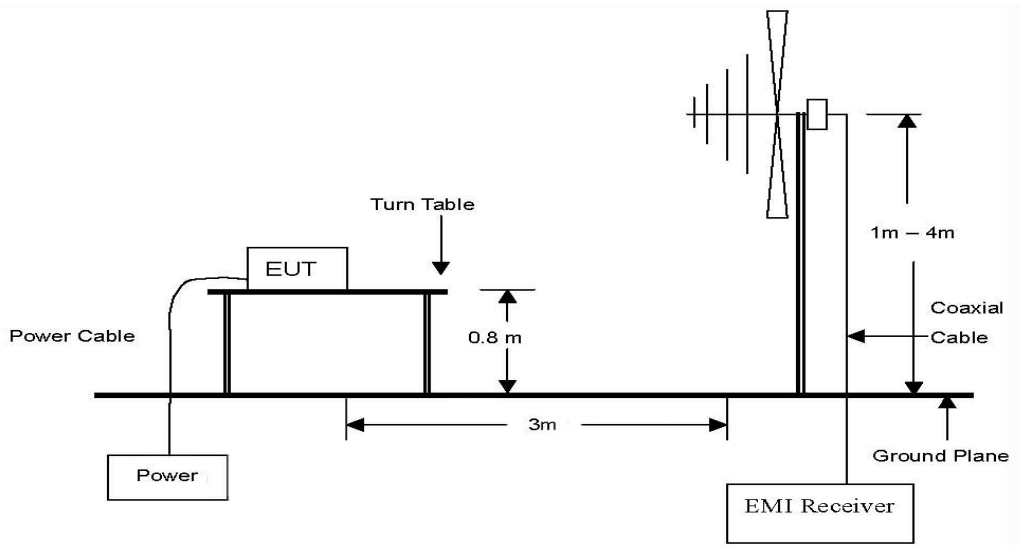
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2. Transmitter radiated spurious emissions and conducted spurious emission

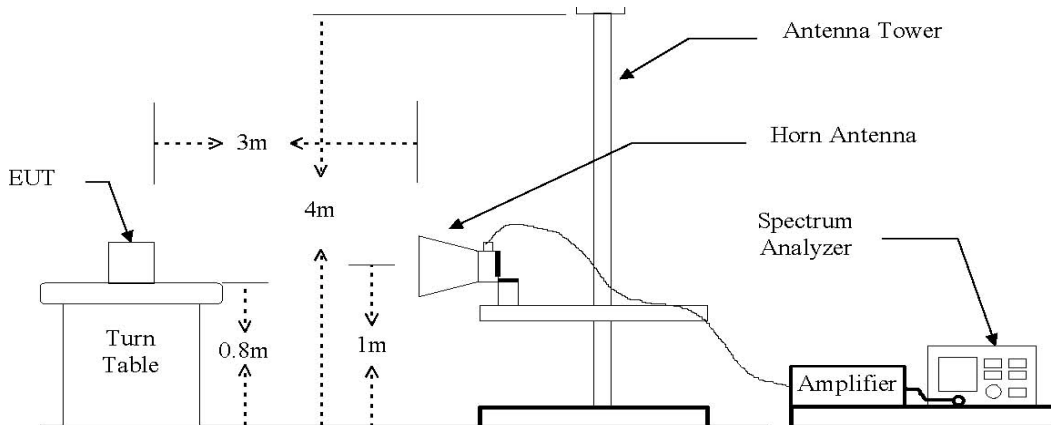
2.1. Test setup

2.1.1. Transmitter radiated spurious emissions

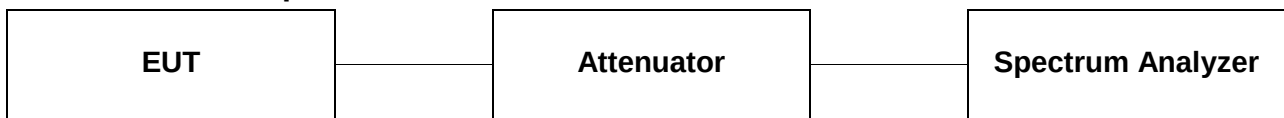
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 40 GHz Emissions.



2.1.2. Conducted spurious emissions



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2.2. Limit

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 m/MHz.

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

For transmitters operating in the 5.47 ~ 5.725 GHz band: all emissions outside of the 5.47 ~ 5.725 GHz band shall not exceed an EIRP of -27 dB m/MHz.

2.3. Test procedures

Radiated emissions from the EUT were measured according to the dictates of KDB558074.

2.3.1. Test procedures for radiated spurious emissions

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
2. During performing radiated emission below 1 GHz, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 GHz, the EUT was set 3 meter away from the interference-receiving antenna.
3. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. Compliance shall be demonstrated using CISPR quasi-peak detection; however, peak detection is permitted as an alternative to quasi-peak detection.
7. At frequencies above 1000 MHz, measurements performed using the peak and average measurement, respectively, must satisfy the respective peak and average limits. If all peak measurements satisfy the average limit, then average measurements are not required.
8. Peak emission levels are measured by setting the analyzer as follows: RBW = 1 MHz, VBW $\geq$ 3 MHz, Detector = Peak, Sweep time = auto, Trace hold = max hold.
9. Average emission levels are measured by setting the analyzer as follows: RBW = 1 MHz, VBW $\leq$ RBW/100 (but not less than 10 Hz), Detector = Peak, Sweep time = auto, Trace hold = max hold.

2.3.2. Test procedures for conducted spurious emissions

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Peak emission levels are measured by setting the analyzer as follows : RBW = 1 MHz, VBW $\geq$ 3 MHz, Detector = Peak, Sweep time = auto, Trace hold = max hold.

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2.4. Test result

Ambient temperature : $(24 \pm 2) ^\circ\text{C}$
Relative humidity : 49 % R.H.

2.4.1. Spurious radiated emission (Worst case configuration_11a mode)

The frequency spectrum from 30 MHz to 1000 MHz was investigated. All emissions are not reported much lower than the prescribed limits.

Radiated emissions			Ant	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	Amp gain+CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
63.23	40.23	Peak	V	11.40	-26.40	25.23	40.00	14.77
103.01	34.11	Peak	V	11.50	-26.40	19.21	43.50	24.29
124.27	36.75	Peak	V	9.00	-26.10	19.75	43.50	23.85
Above 200.00	Not detected	-	-	-	-	-	-	-

■ Remark:

1. All spurious emission at channels are almost the same below 1 GHz, so that the low channel was chosen at representative in final test.
2. Actual = Reading + AF + AMP + CL
3. To get a maximum emission level from the EUT, the EUT was moved throughout the X, Y and Z planes. The worst case is Z-axis.

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2.4.2. Spurious radiated emission for above 1 GHz

802.11a (Non-DFS)

A. Low Channel (5 180 MHz)

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dB uV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Actual (dB uV/m)	Limit (dB uV/m)	Margin (dB)
*5 150.00	18.67	Peak	V	33.43	7.69	59.79	74.00	14.21
*5 150.00	7.13	Average	V	33.43	7.69	48.25	54.00	5.75
Frequency (MHz)	Reading (dB uV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dB uV/m)	Limit (dB uV/m)	Margin (dB)
10 359.57	38.47	Peak	V	37.58	-31.53	44.52	74.00	29.48
Above 10 400.00	Not detected	-	-	-	-	-	-	-

B. Middle Channel (5 220 MHz)

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dB uV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dB uV/m)	Limit (dB uV/m)	Margin (dB)
10 439.62	37.92	Peak	V	37.67	-31.61	43.98	74.00	30.02
Above 10 500.00	Not detected	-	-	-	-	-	-	-

C. High Channel (5 240 MHz)

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dB uV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dB uV/m)	Limit (dB uV/m)	Margin (dB)
10 478.00	38.05	Peak	V	37.61	-31.58	44.08	74.00	29.92
Above 10 500.00	Not detected	-	-	-	-	-	-	-

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802.11n-HT20 (Non-DFS)

A. Low Channel (5 180 MHz)

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dB uV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Actual (dB uV/m)	Limit (dB uV/m)	Margin (dB)
*5 150.00	19.46	Peak	V	33.43	7.69	60.58	74.00	13.42
*5 150.00	7.15	Average	V	33.43	7.69	48.27	54.00	5.73
Frequency (MHz)	Reading (dB uV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dB uV/m)	Limit (dB uV/m)	Margin (dB)
10 359.31	38.60	Peak	V	37.58	-31.53	44.65	74.00	29.35
Above 10 400.00	Not detected	-	-	-	-	-	-	-

B. Middle Channel (5 220 MHz)

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dB uV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dB uV/m)	Limit (dB uV/m)	Margin (dB)
10 441.01	37.79	Peak	V	37.67	-31.61	43.85	74.00	30.15
Above 10 500.00	Not detected	-	-	-	-	-	-	-

C. High Channel (5 240 MHz)

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dB uV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dB uV/m)	Limit (dB uV/m)	Margin (dB)
10 481.74	38.83	Peak	V	37.61	-31.58	44.86	74.00	29.14
Above 10 500.00	Not detected	-	-	-	-	-	-	-

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802.11n-HT40 (Non-DFS)

A. Low Channel (5 190 MHz)

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dB uV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Actual (dB uV/m)	Limit (dB uV/m)	Margin (dB)
*5 150.00	18.49	Peak	V	33.43	7.69	59.61	74.00	14.39
*5 150.00	7.15	Average	V	33.43	7.69	48.27	54.00	5.73
Frequency (MHz)	Reading (dB uV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dB uV/m)	Limit (dB uV/m)	Margin (dB)
10 376.01	38.59	Peak	V	37.55	-31.52	44.62	74.00	29.38
Above 10 400.00	Not detected	-	-	-	-	-	-	-

B. High Channel (5 230 MHz)

Frequency (MHz)	Reading (dB uV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dB uV/m)	Limit (dB uV/m)	Margin (dB)
10 462.29	38.28	Peak	V	37.62	-31.60	44.30	74.00	29.70
Above 10 500.00	Not detected	-	-	-	-	-	-	-

■ Remarks

1. "*" means the restricted band.
2. Measuring frequencies from 1 GHz to the 40 GHz of highest fundamental Frequency.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using peak/average detector mode.
4. Average test would be performed if the peak result were greater than the average limit.
5. To get a maximum emission level from the EUT, the EUT was moved throughout the x-axis, y-axis and z-axis. The worst case is x-axis.

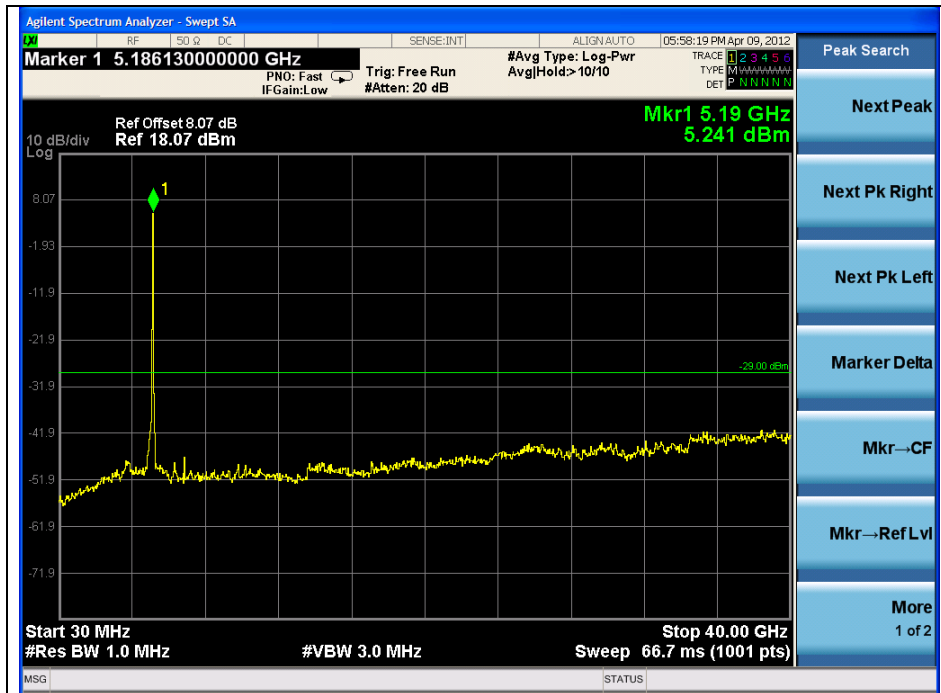
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2.4.3. Spurious RF Conducted Emissions: Plot of Spurious RF Conducted Emission

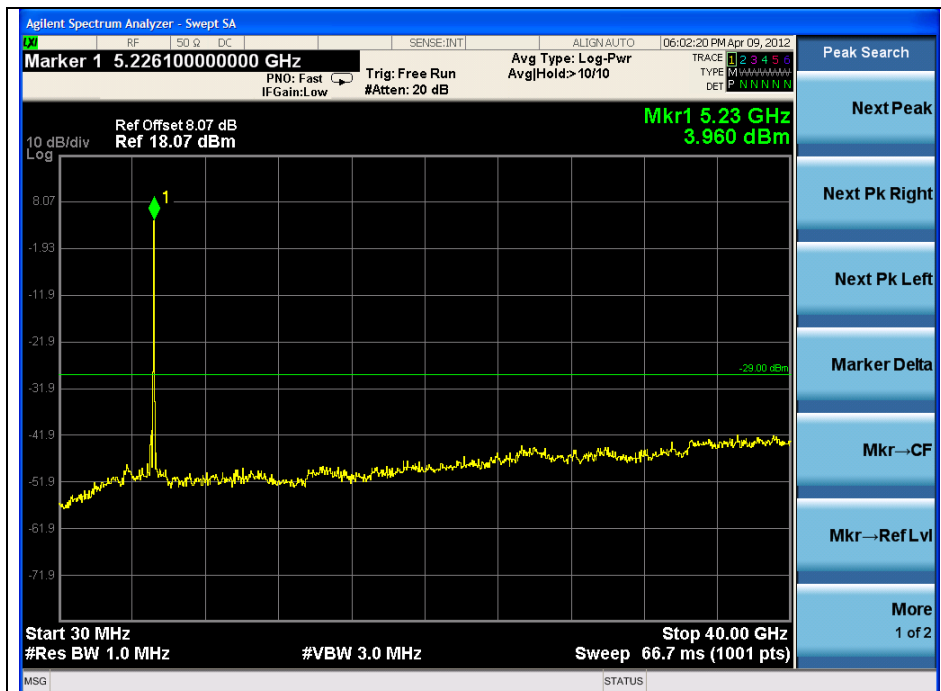
For 5.15 – 5.25 GHz, the antenna gain is 0.38 dB i, So the EIRP limit is -29 dB m/MHz

802.11a (Non-DFS)

5 180 MHz



5 220 MHz



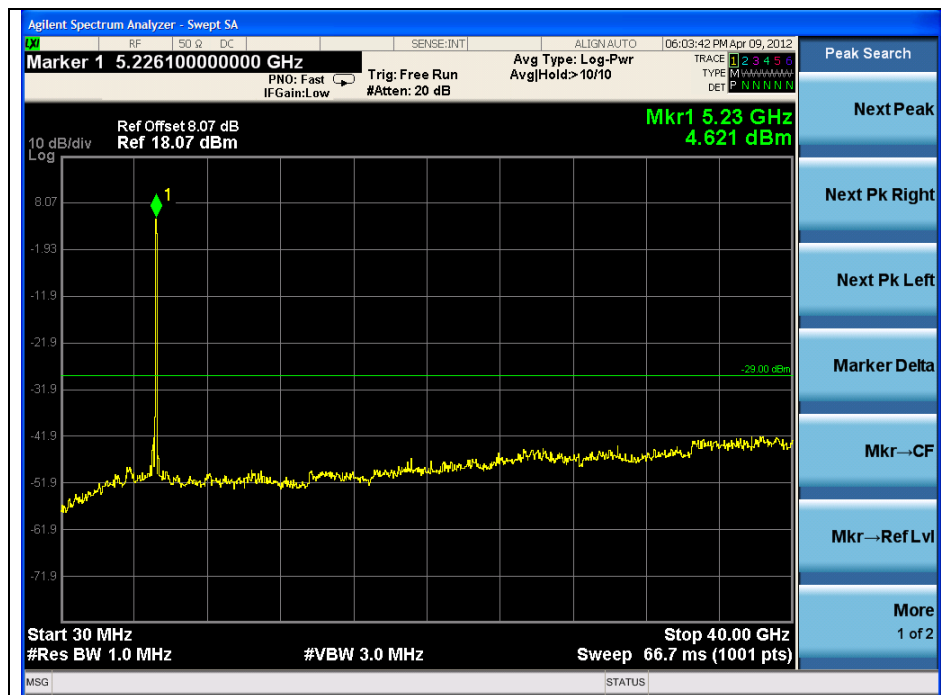
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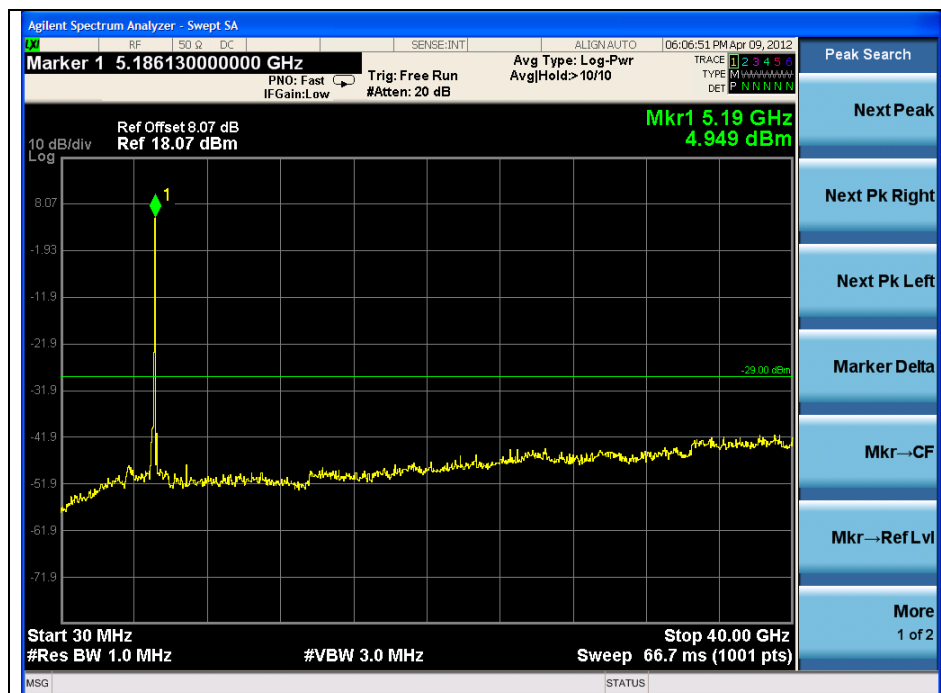
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5 240 MHz



802.11n-HT20 (Non-DFS)

5 180 MHz



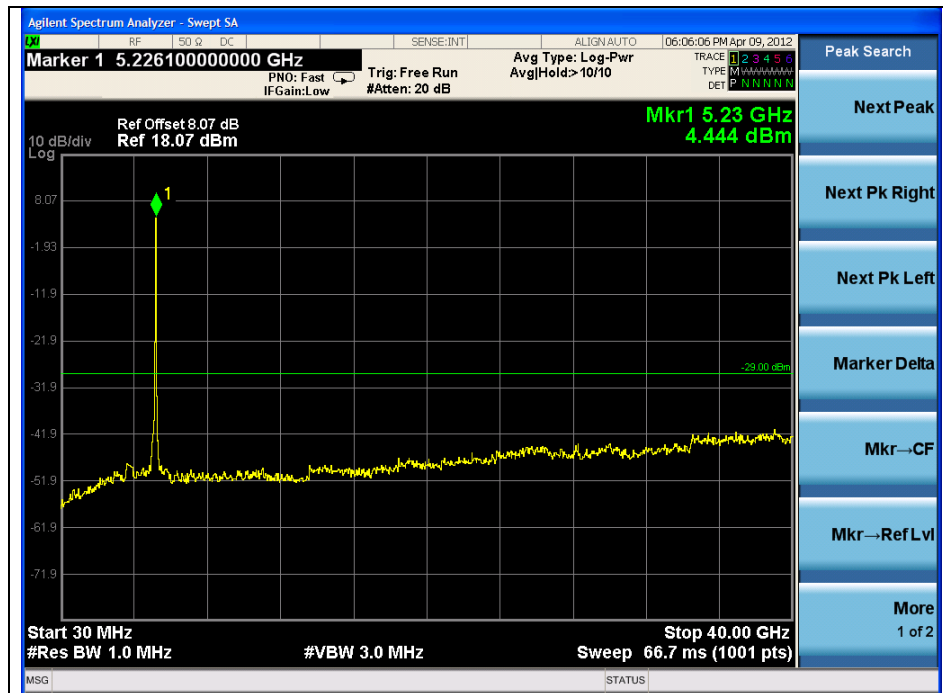
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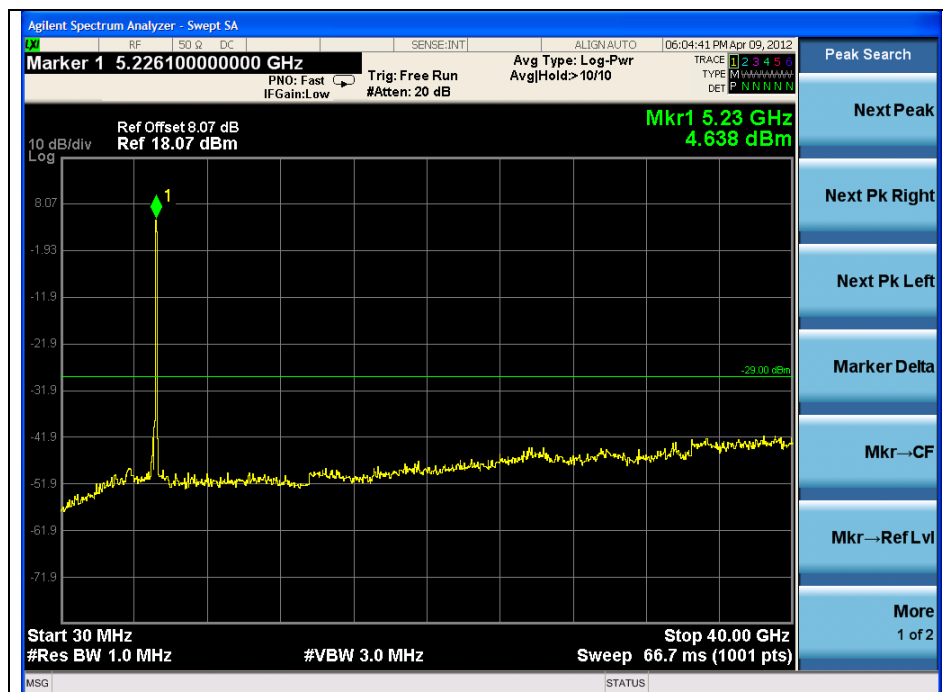
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5 220 MHz



5 240 MHz



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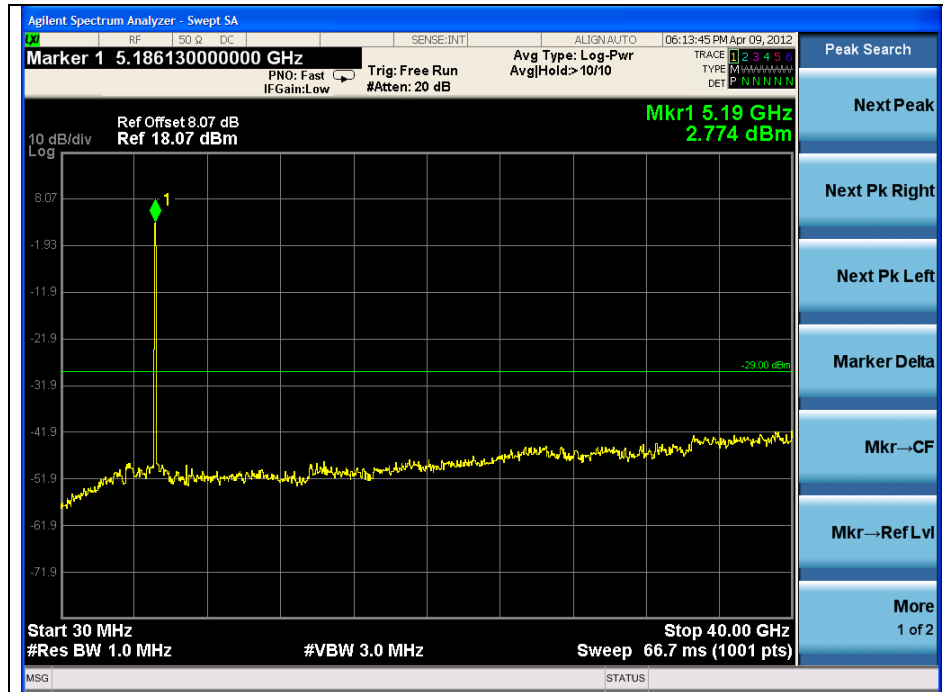
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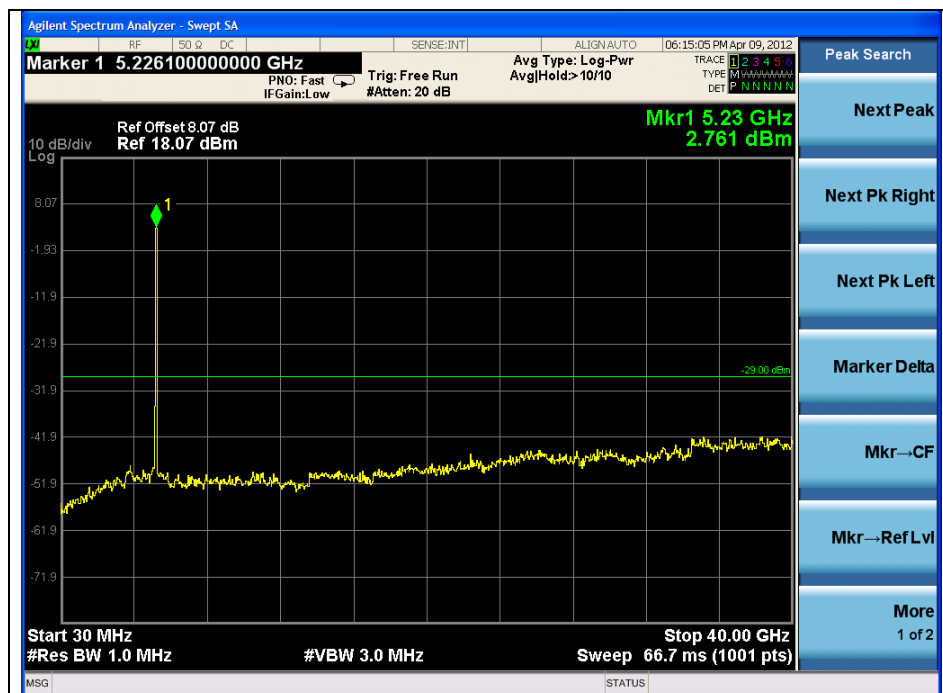
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802.11n-HT40 (Non-DFS)

5 190 MHz



5 230 MHz



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3. Receiver Radiated spurious emissions

3.1. Test setup - Same as clause 2.1.

3.1.1. Receiver Radiated Spurious Emissions - Same as clause 2.1.1.

3.2. Limit

According to §15.109(a), Except for Class A digital devices, the field strength of radiated emission from unintentional radiator at a distance of 3 m shall not exceed the following values:

Frequency (MHz)	Distance (Meters)	Radiated (dB μ V/m)	Radiated (μ V/m)
30 - 88	3	40.0	100
88 – 216	3	43.5	150
216 – 960	3	46.0	200
Above 960	3	54.0	500

3.3. Test Procedures - Same as clause 2.3.

Radiated emissions from the EUT were measured according to the dictates of KDB558074.

3.3.1. Test Procedures for Radiated Spurious Emissions- Same as clause 2.3.1.

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3.4. Test Results

Ambient temperature : (24 ± 2) °C
Relative humidity : 47 % R.H.

3.4.1. Spurious Radiated Emission (Worst case configuration_11a mode)

The frequency spectrum from 30 MHz to 40 GHz was investigated. Emission levels are not reported much lower than the limits by over 30 dB. All reading values are peak values.

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP + CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
54.20	37.52	Peak	V	13.40	-26.30	24.62	40.00	15.38
92.74	35.44	Peak	V	10.70	-26.40	19.74	43.50	23.76
133.42	44.12	Peak	V	8.80	-26.00	26.92	43.50	16.58
272.80	40.02	Peak	V	12.60	-24.90	27.72	46.00	18.28
Above 300.00	Not detected	-	-	-	-	-	-	-

Remark:

1. All spurious emission at channels are almost the same from 30 MHz to 40 GHz, so that the low channel was chosen at representative in final test.
2. Actual = Reading + AF + AMP + CL

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4. 26 dB bandwidth and 99% occupied bandwidth

4.1. Test setup



4.2. Limit

None; for reporting purpose only

4.3. Test procedure

4.3.1. 26 dB bandwidth

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = approximately 1 % of the emission bandwidth, VBW > RBW, Detector = peak, Trace mode = max hold.
4. Measure the maximum width of the emission that is 26 dB down from the peak of the emission.
5. Repeat until all the test channels are investigated.

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4.4. Test result

Ambient temperature : (24 ± 2) °C
Relative humidity : 49 % R.H.

Mode : 11a

Operating mode	Frequency (MHz)	26 dB bandwidth (MHz)	99% bandwidth (MHz)
Non - DFS	5 180	20.33	16.89
	5 220	20.64	16.88
	5 240	20.26	17.02

Mode : 11n_HT20

Operating mode	Frequency (MHz)	26 dB bandwidth (MHz)	99% bandwidth (MHz)
Non - DFS	5 180	21.41	17.99
	5 220	21.03	18.06
	5 240	21.24	18.02

Mode : 11n_HT40

Operating mode	Frequency (MHz)	26 dB bandwidth (MHz)	99% bandwidth (MHz)
Non - DFS	5 190	43.10	36.65
	5 230	42.10	36.65

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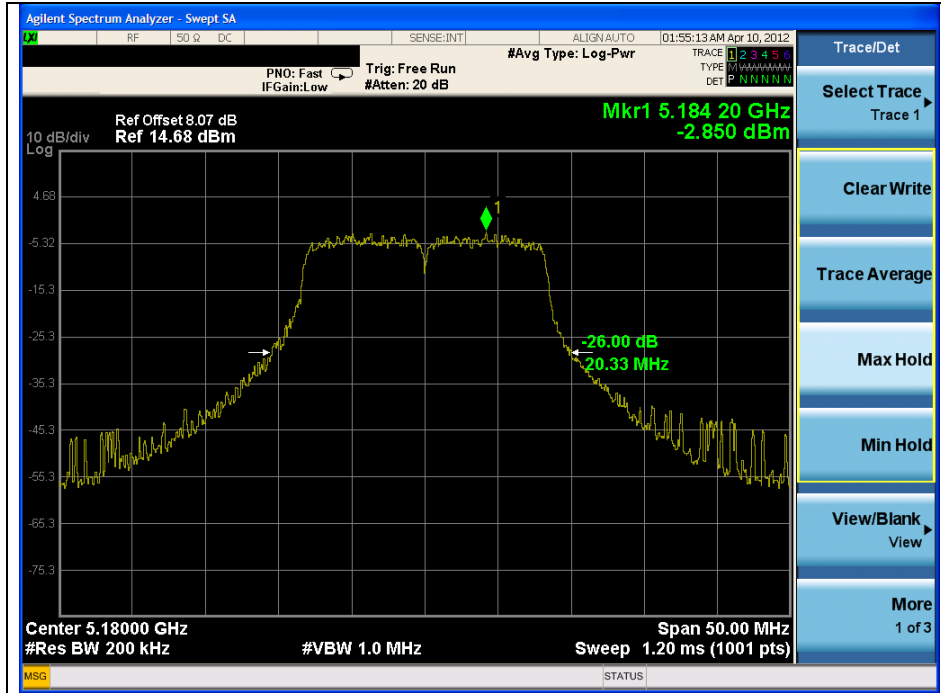
Tel. +82 31 428 5700 / Fax. +82 31 427 2371

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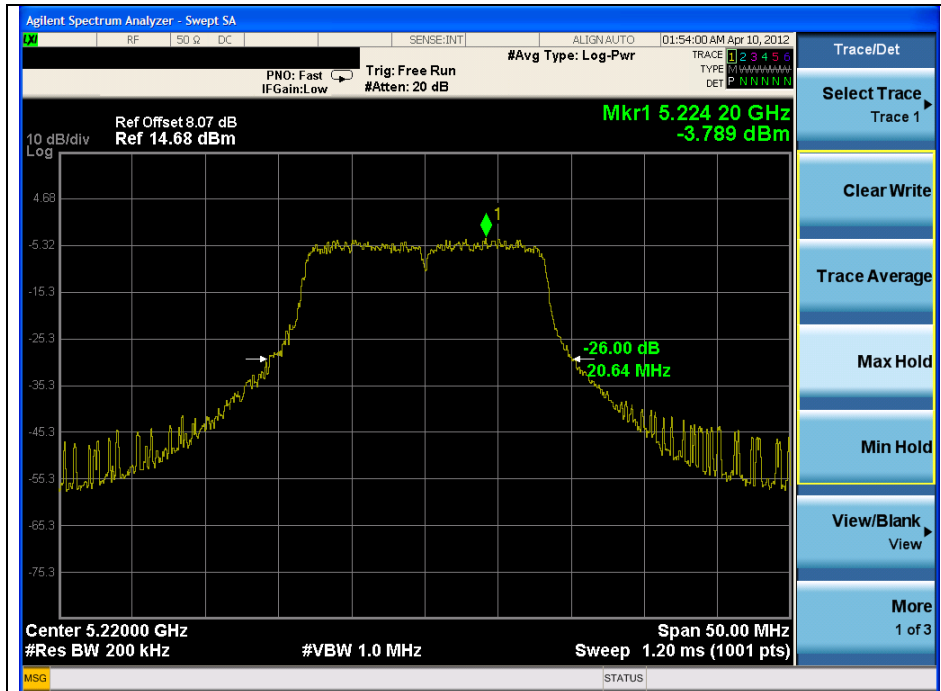
26 dB Bandwidth

802.11a (Non-DFS)

Low Channel (5 180 MHz)



Middle Channel (5 220 MHz)



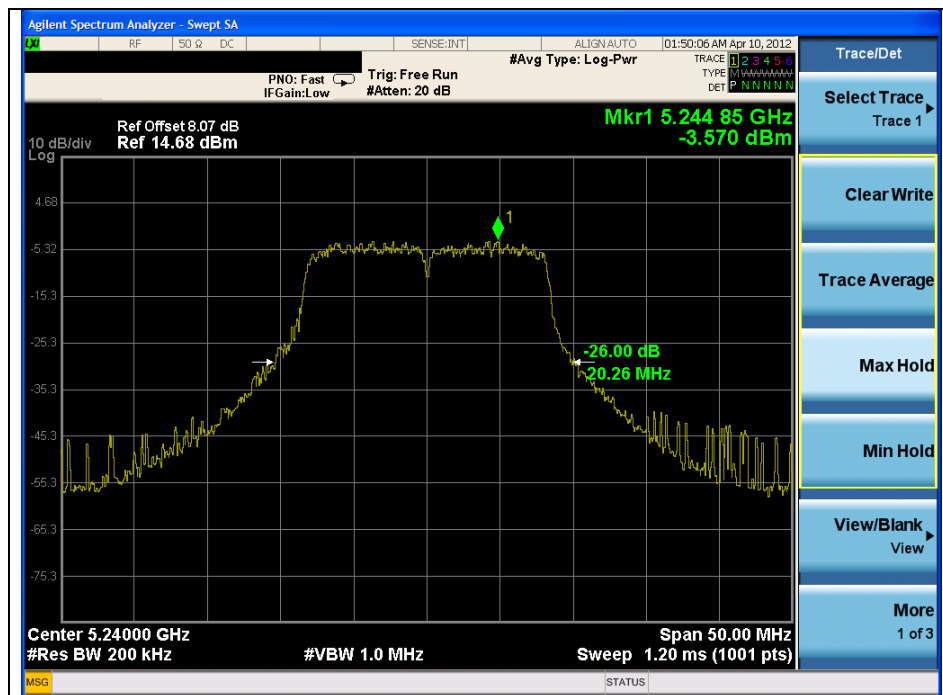
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High Channel (5 240 MHz)



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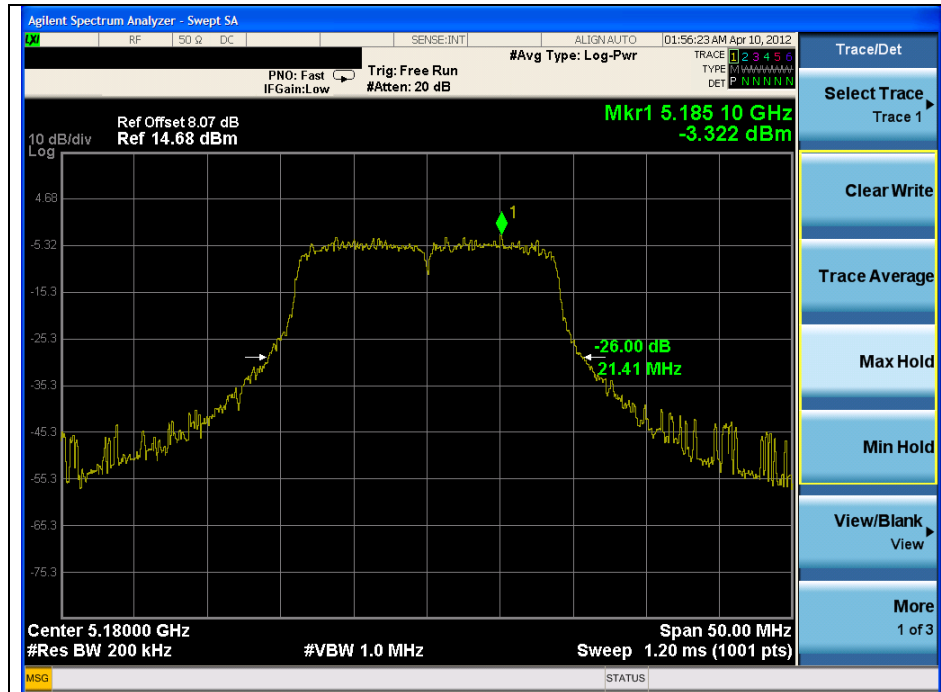
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Tel. +82 31 428 5700 / Fax. +82 31 427 2371

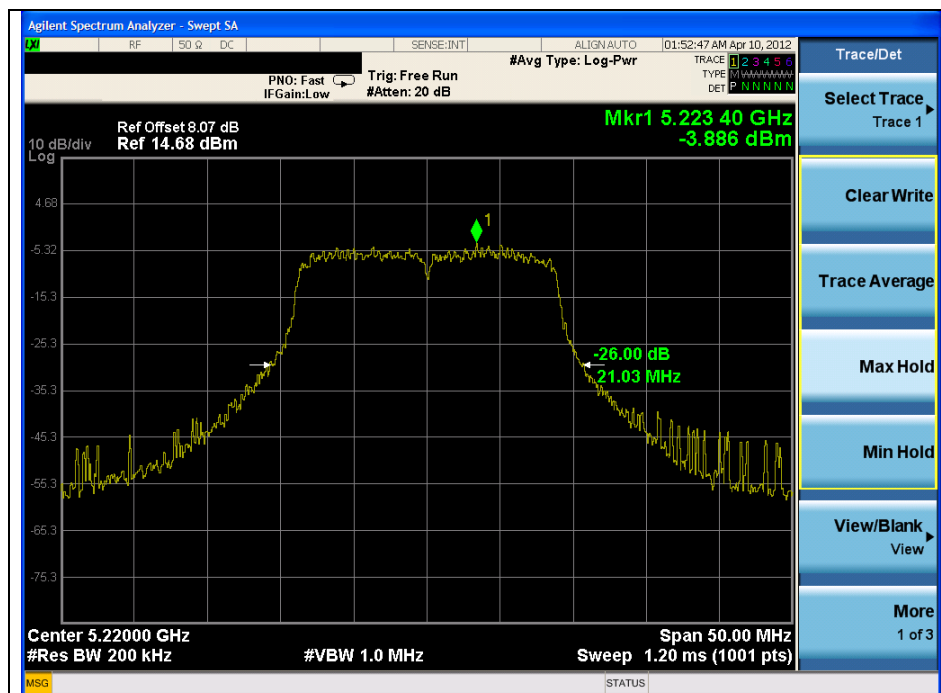
www.ee.sgs.com/korea

802.11n-HT20 (Non-DFS)

Low Channel (5 180 MHz)



Middle Channel (5 220 MHz)



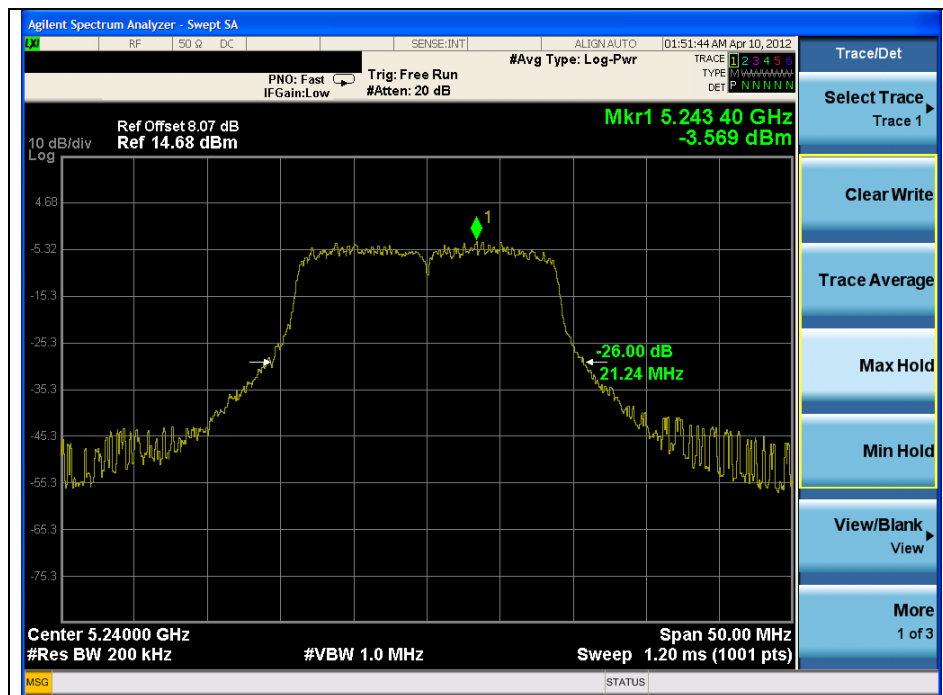
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High Channel (5 240 MHz)



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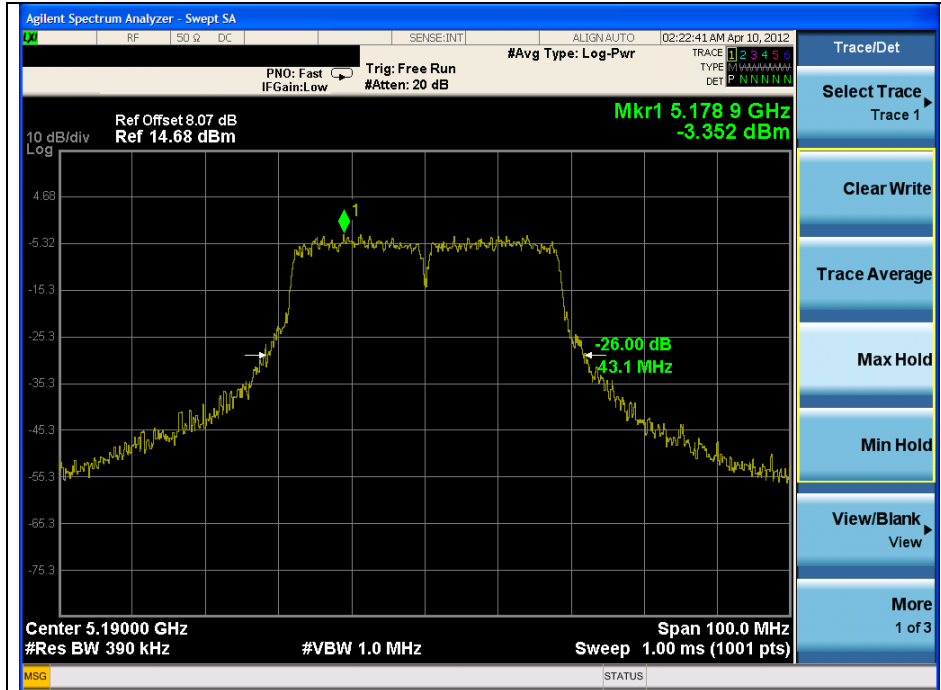
SGS Korea Co., Ltd. (Gunpo Laboratory) 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea, 435-040

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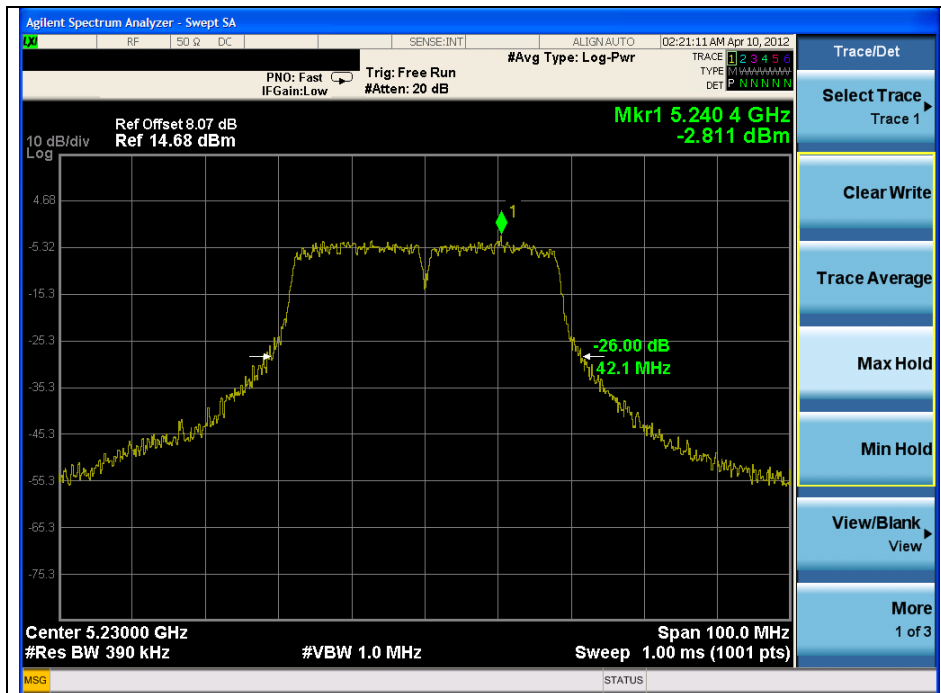
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802.11n-HT40 (Non-DFS)

Low Channel (5 190 MHz)



High Channel (5 230 MHz)



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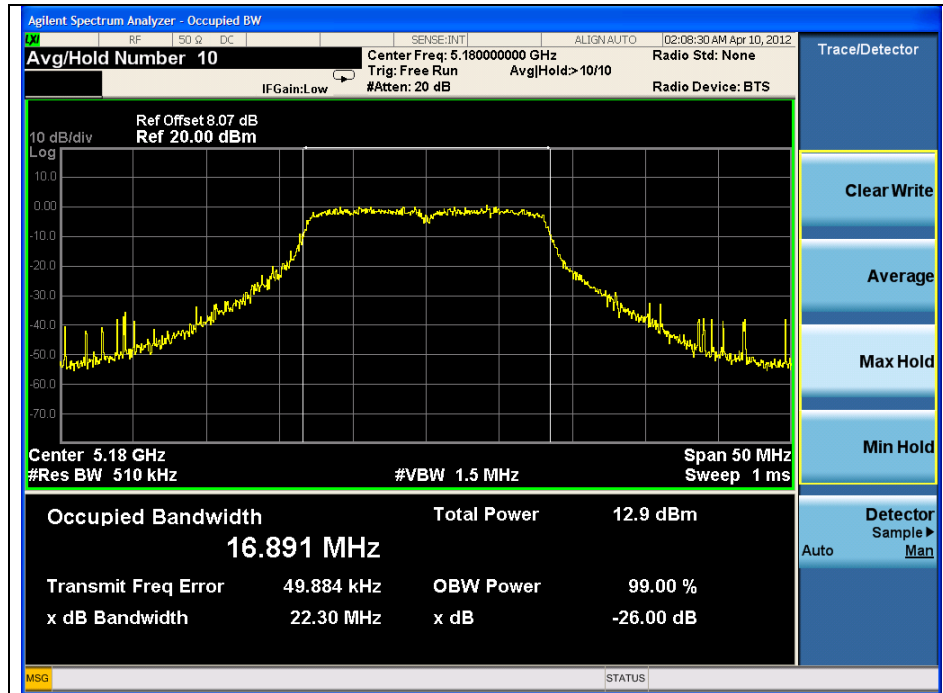
Tel. +82 31 428 5700 / Fax. +82 31 427 2371

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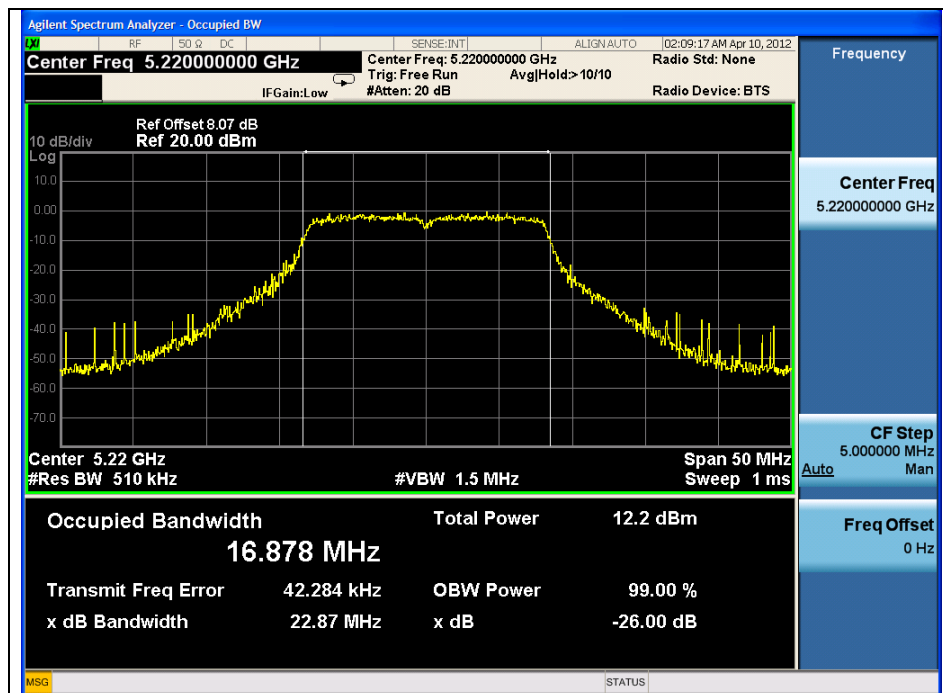
99% Bandwidth

802.11a (Non-DFS)

Low Channel (5 180 MHz)



Middle Channel (5 220 MHz)



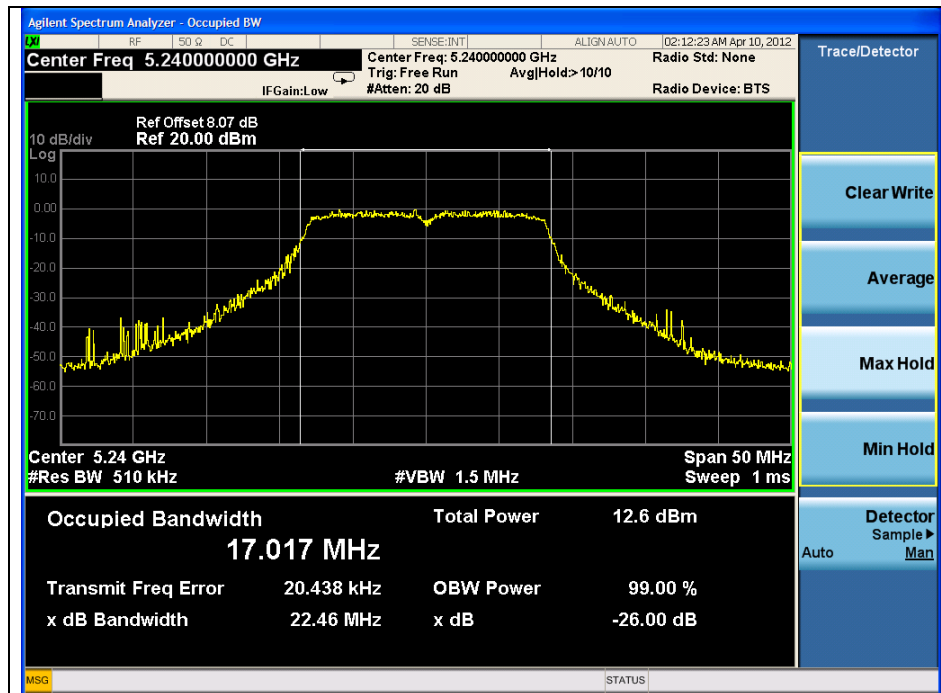
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High Channel (5 240 MHz)



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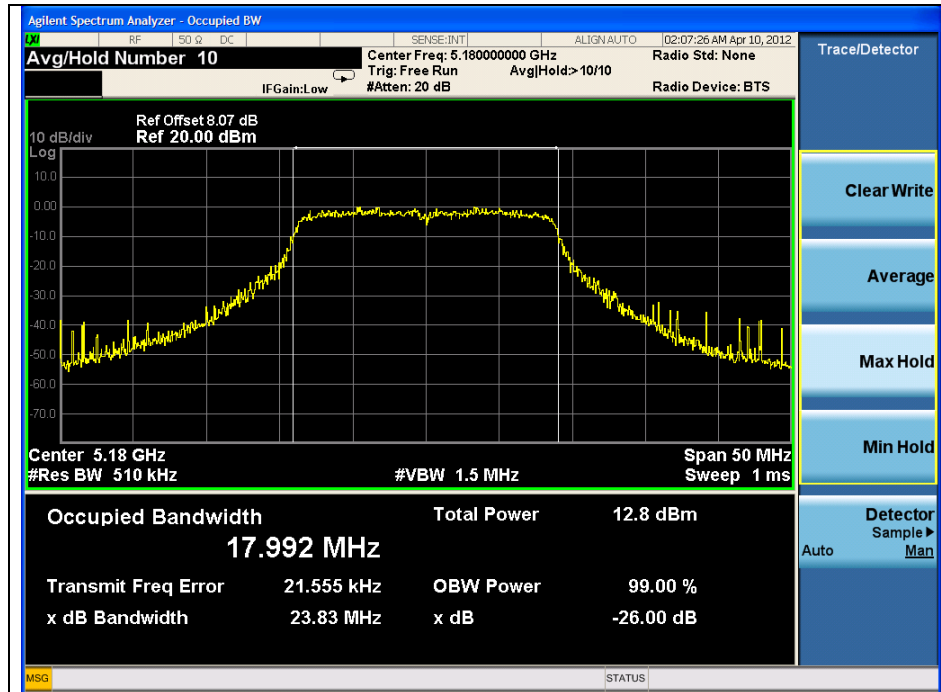
SGS Korea Co., Ltd. (Gunpo Laboratory) 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea, 435-040

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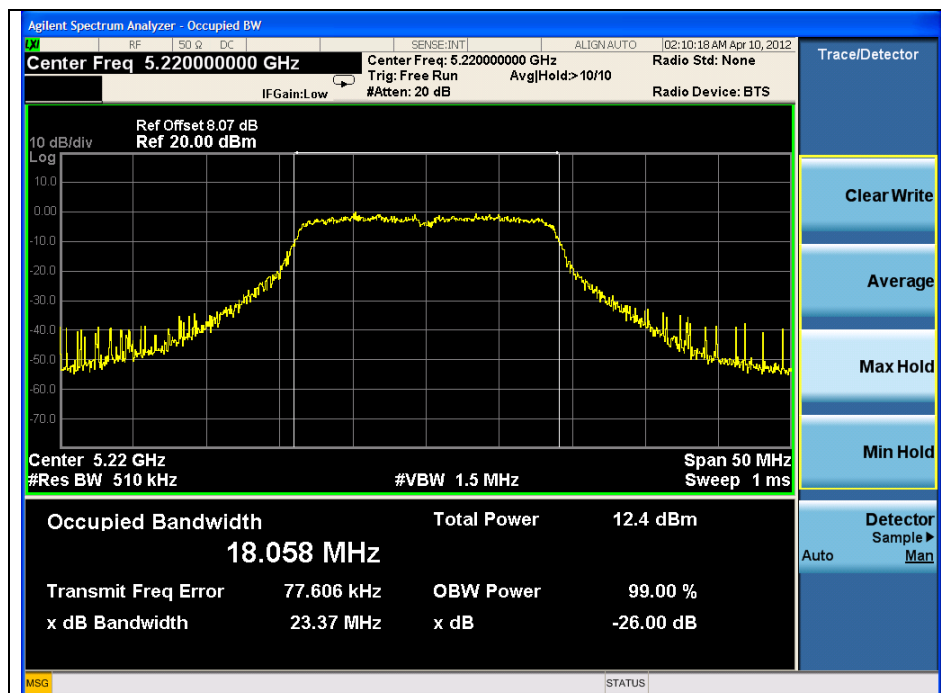
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802.11n-HT20 (Non-DFS)

Low Channel (5 180 MHz)



Middle Channel (5 220 MHz)



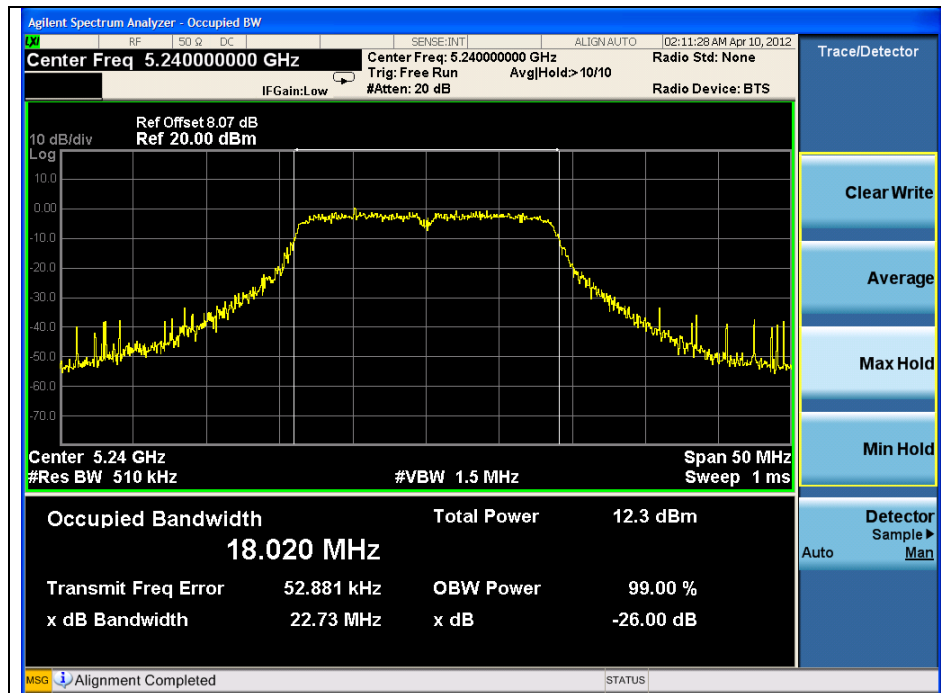
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High Channel (5 240 MHz)



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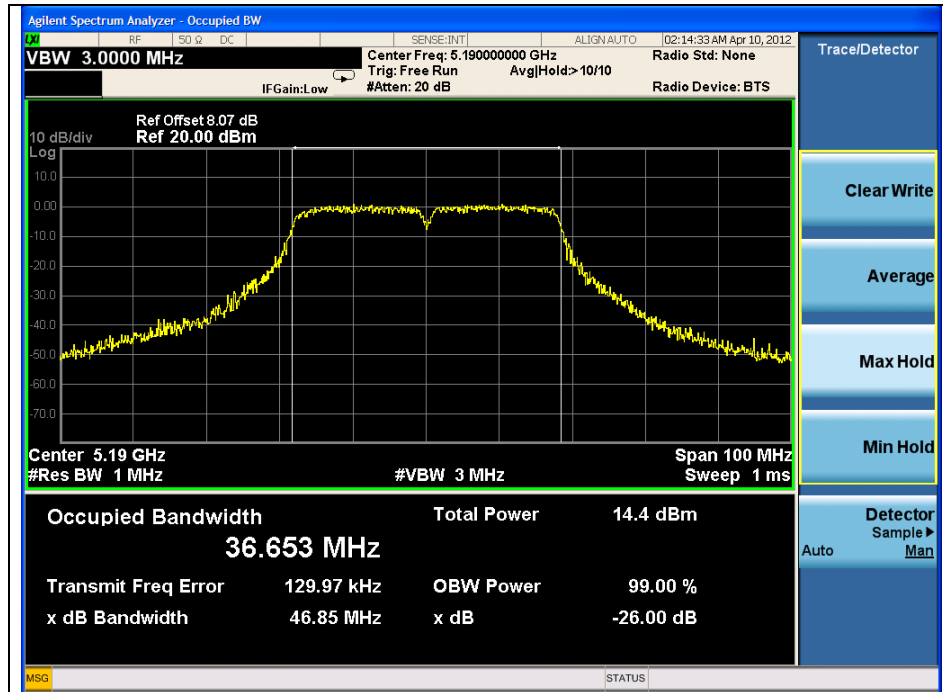
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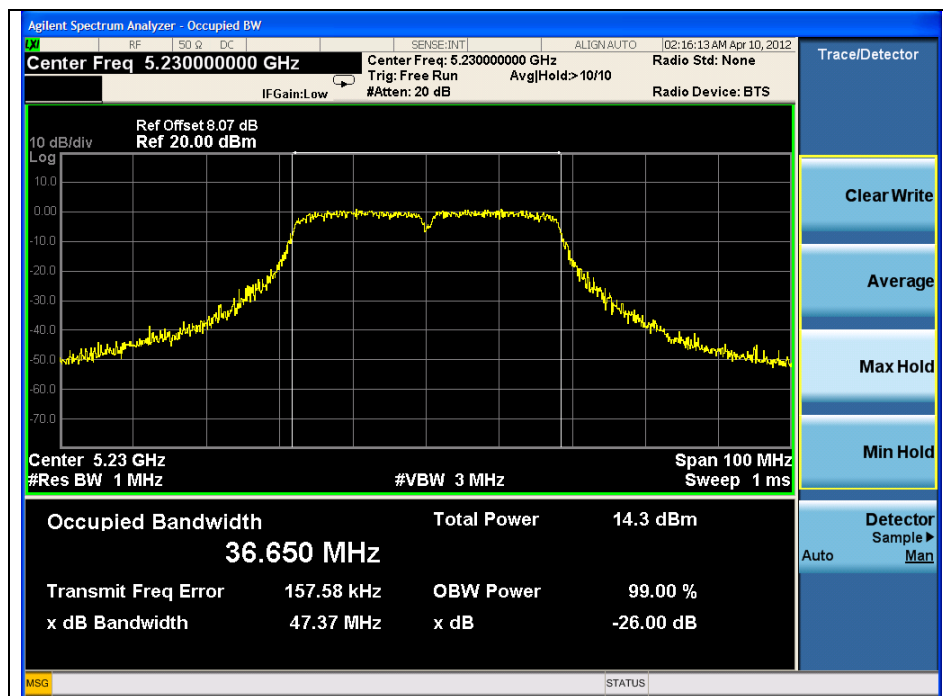
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802.11n-HT40 (Non-DFS)

Low Channel (5 190 MHz)



High Channel (5 230 MHz)



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5. Output power

5.1. Test setup



5.2. Limit

5.2.1. FCC 15.407

(a)(1)

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

5.3. Test procedure

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set span to encompass the entire emission bandwidth of the signal.
4. Set RBW=1 MHz, VBW $\geq$ 3 MHz, Number of points in sweep $\geq$ 2 span / RBW, Sweep time = auto, Detector = RMS.
5. If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle $\geq$ 98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run".
6. Trace average at least 100 traces in power averaging (i.e., RMS) mode.
7. Compute power by integrating the spectrum across the 26 dB EBW of the signal using the spectrum analyzer's band power measurement function with band limits set equal to the EBW band edges. If the spectrum analyzer does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the 26 dB EBW of the spectrum.

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5.4. Test result

Ambient temperature : (24 ± 2) °C
Relative humidity : 49 % R.H.

FCC Limit

Mode : 11a

Frequency (MHz)	Fixed Limit (dB m)	26 dB BW (MHz)	4+10LogB (dB m)	Antenna gain (dB i)	Limit (dB m)
5 180	17	20.33	17.08	0.38	17
5 220	17	20.64	17.15	0.38	17
5 240	17	20.26	17.07	0.38	17

Mode : 11n_HT20

Frequency (MHz)	Fixed Limit (dB m)	26 dB BW (MHz)	4+10LogB (dB m)	Antenna gain (dB i)	Limit (dB m)
5 180	17	21.41	17.31	0.38	17
5 220	17	21.03	17.23	0.38	17
5 240	17	21.24	17.27	0.38	17

Mode : 11n_HT40

Frequency (MHz)	Fixed Limit (dB m)	26 dB BW (MHz)	4+10LogB (dB m)	Antenna gain (dB i)	Limit (dB m)
5 190	17	43.10	20.34	0.38	17
5 230	17	42.10	20.24	0.38	17

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IC Limit

Mode : 11a

Frequency (MHz)	Fixed Limit (dB m e.i.r.p.)	99% BW (MHz)	10+10LogB (dB m e.i.r.p.)	Antenna gain (dB i)	Limit (dB m e.i.r.p.)
5 180	23	16.89	22.28	0.38	22.28
5 220	23	16.88	22.27	0.38	22.27
5 240	23	17.02	22.31	0.38	22.31

Mode : 11n_HT20

Frequency (MHz)	Fixed Limit (dB m e.i.r.p.)	99% BW (MHz)	10+10LogB (dB m e.i.r.p.)	Antenna gain (dB i)	Limit (dB m e.i.r.p.)
5 180	23	17.99	22.55	0.38	22.55
5 220	23	18.06	22.57	0.38	22.57
5 240	23	18.02	22.56	0.38	22.56

Mode : 11n_HT40

Frequency (MHz)	Fixed Limit (dB m e.i.r.p.)	99% BW (MHz)	10+10LogB (dB m e.i.r.p.)	Antenna gain (dB i)	Limit (dB m e.i.r.p.)
5 190	23	36.65	25.64	0.38	23
5 230	23	36.65	25.64	0.38	23

Result

-NON DFS

Operation Mode	Channel	Channel Frequency (MHz)	Result		Limit	
			FCC (dB m)	IC (dB m e.i.r.p.)	FCC (dB m)	IC (dB m e.i.r.p.)
Non DFS 11a	Low	5 180	7.25	7.63	17	22.28
	Middle	5 220	6.44	6.82	17	22.27
	High	5 240	6.73	7.11	17	22.31
Non DFS 11n_HT20	Low	5 180	7.06	7.44	17	22.55
	Middle	5 220	6.33	6.71	17	22.57
	High	5 240	6.63	7.01	17	22.56
Non DFS 11n_HT40	Low	5 190	7.39	7.77	17	23
	High	5 230	7.37	7.75	17	23

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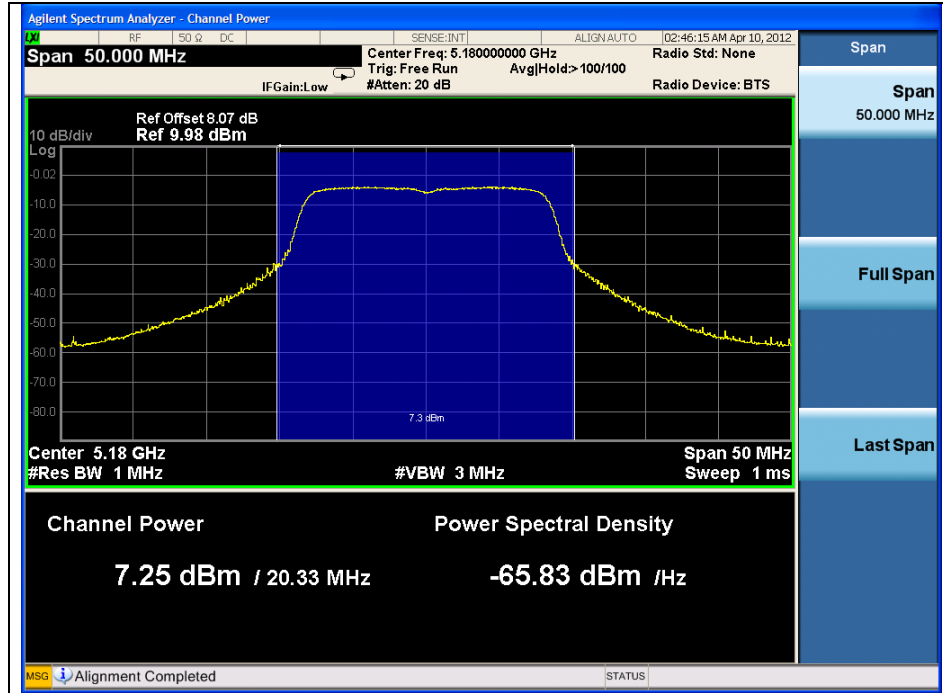
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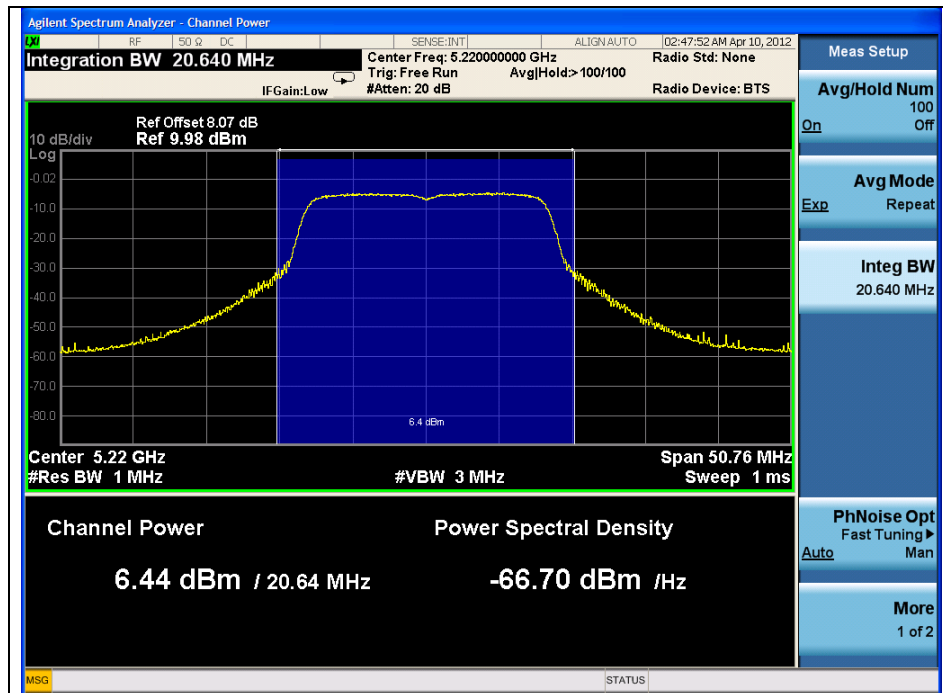
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802.11a (Non-DFS)

Low Channel (5 180 MHz)



Middle Channel (5 220 MHz)



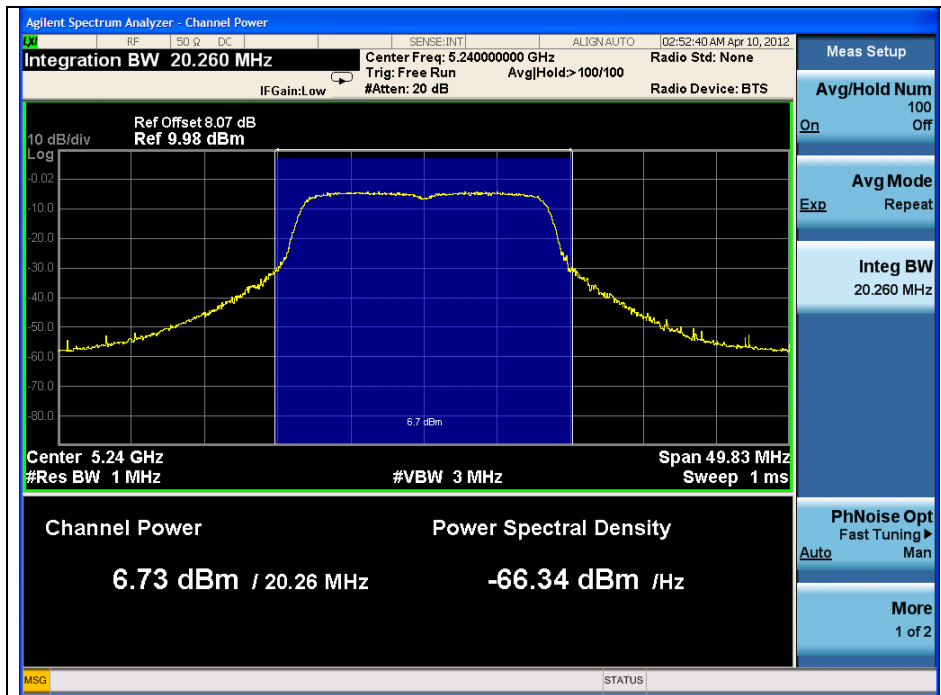
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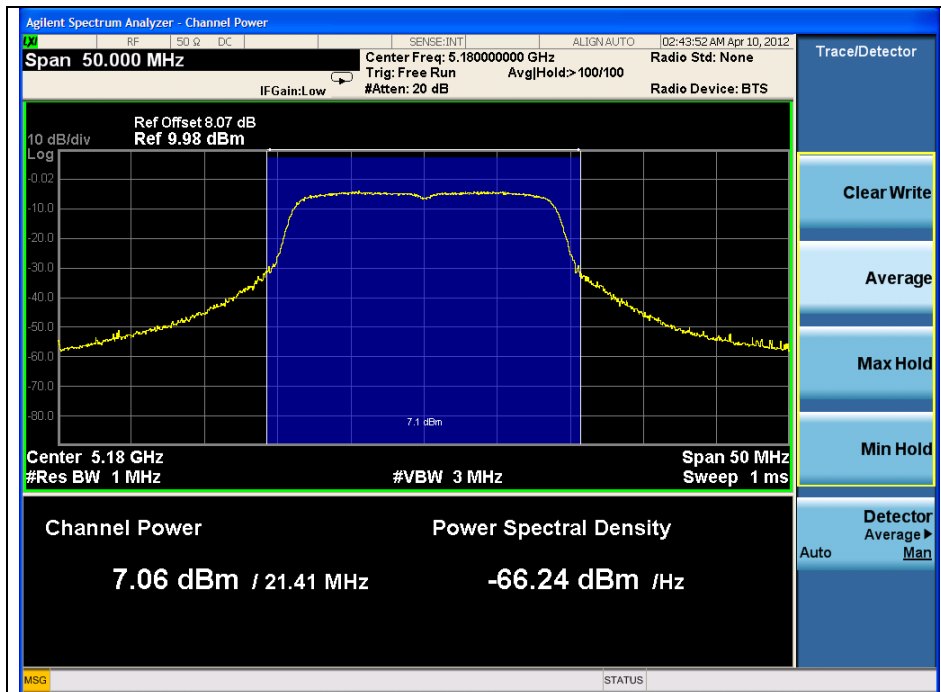
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High Channel (5 240 MHz)



802.11n-HT20 (Non-DFS)

Low Channel (5 180 MHz)



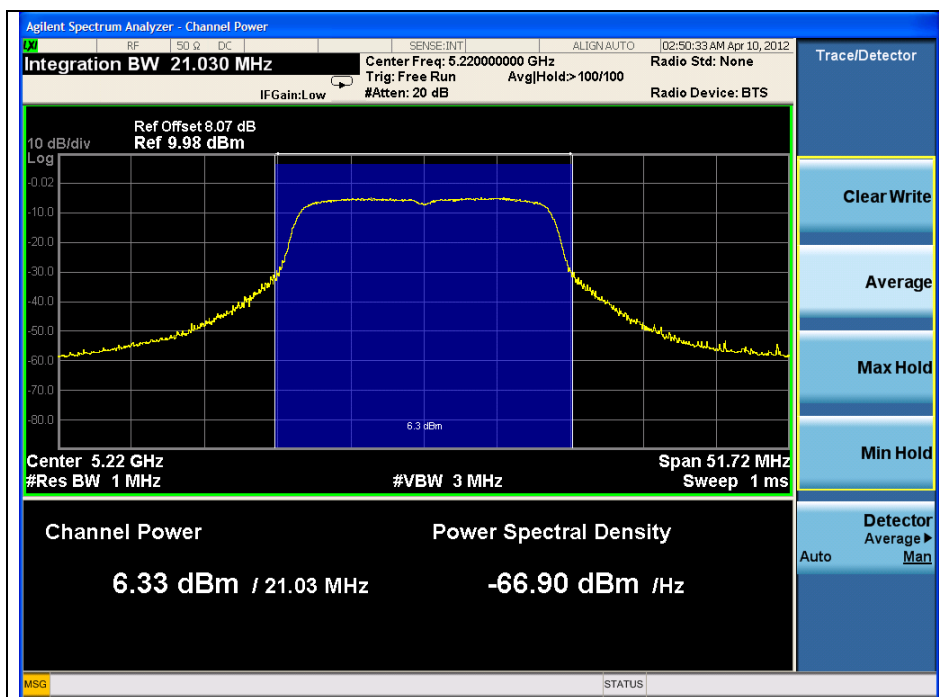
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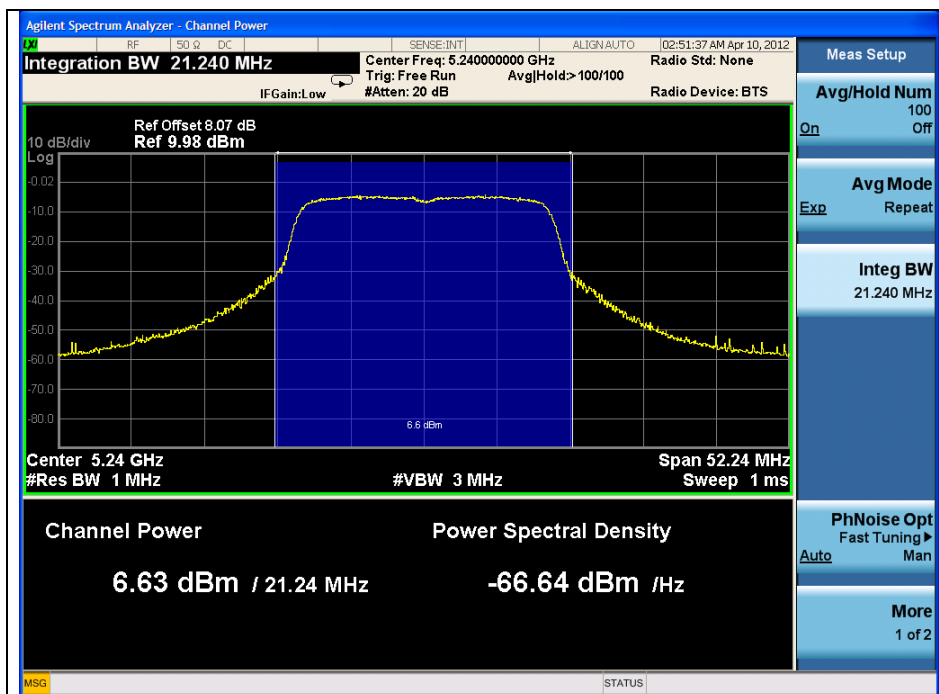
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Middle Channel (5 220 MHz)



High Channel (5 240 MHz)



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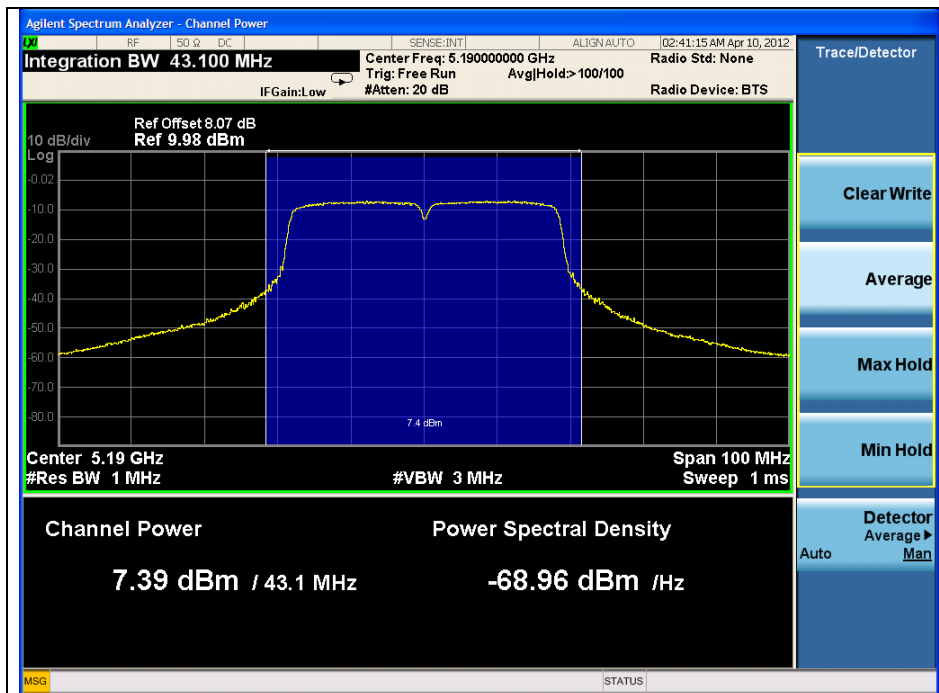
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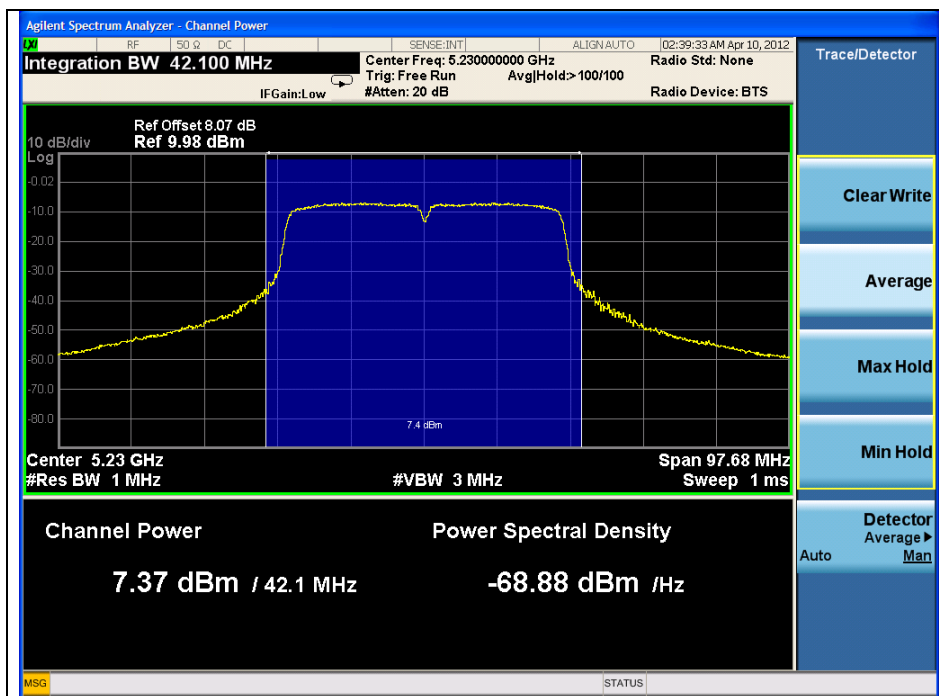
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802.11n-HT40 (Non-DFS)

Low Channel (5 190 MHz)



High Channel (5 230 MHz)



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6. Peak power spectral density

6.1. Test setup



6.2. Limit

6.2.1. FCC 15.407

(a)(1)

For the band 5.15-5.25 GHz band, the peak power spectral density shall not exceed 4 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

6.3. Test procedure

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set span to encompass the entire emission bandwidth of the signal.
4. Set RBW=1 MHz, VBW $\geq$ 3 MHz, Number of points in sweep $\geq$ 2 span / RBW, Sweep time = auto, Detector = RMS.
5. If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle $\geq$ 98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run".
6. Trace average at least 100 traces in power averaging (i.e., RMS) mode.
7. Use the peak search function on the spectrum analyzer to find the peak of the spectrum.

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6.4. Test result

Ambient temperature : (24 ± 2) °C
Relative humidity : 49 % R.H.

6.4.1. Non-DFS Band

Operation Mode	Channel	Channel Frequency (MHz)	Peak power spectral density (dB m)		Limit (dB m)	
			FCC (dB m)	IC (dB m e.i.r.p.)	FCC (dB m)	IC (dB m e.i.r.p.)
11a	Low	5 180	-3.62	-3.24	4	10
	Middle	5 220	-4.19	-3.81		
	High	5 240	-4.03	-3.65		
11n_HT20	Low	5 180	-3.70	-3.32		
	Middle	5 220	-4.33	-3.95		
	High	5 240	-4.44	-4.06		
11n_HT40	Low	5 190	-5.60	-5.22		
	High	5 230	-5.85	-5.47		

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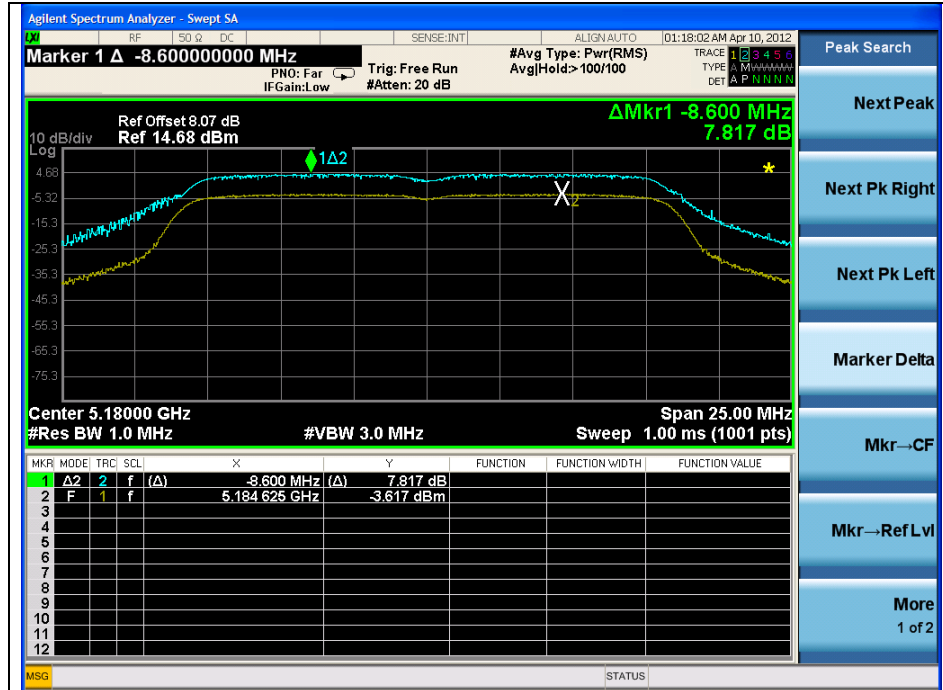
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802.11a (Non-DFS)

Low Channel (5 180 MHz)



Middle Channel (5 220 MHz)



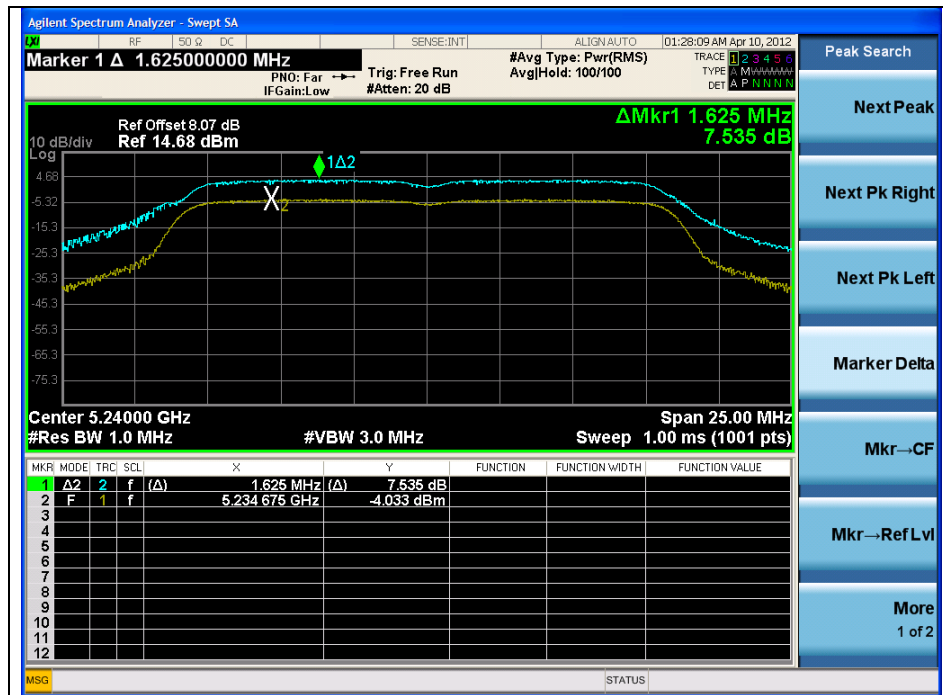
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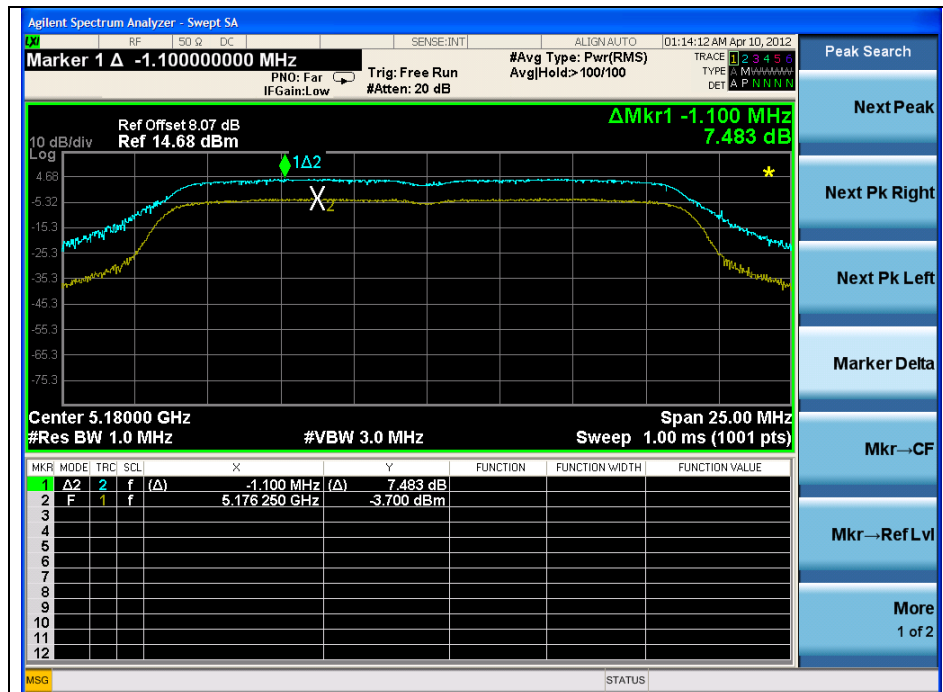
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High Channel (5 240 MHz)



802.11n-HT20 (Non-DFS)

Low Channel (5 180 MHz)



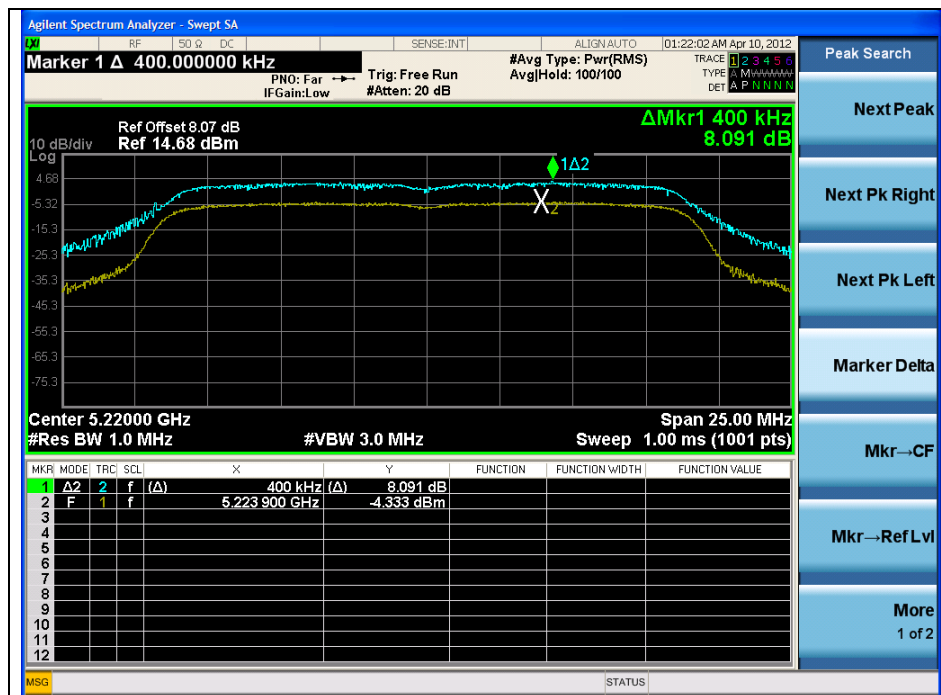
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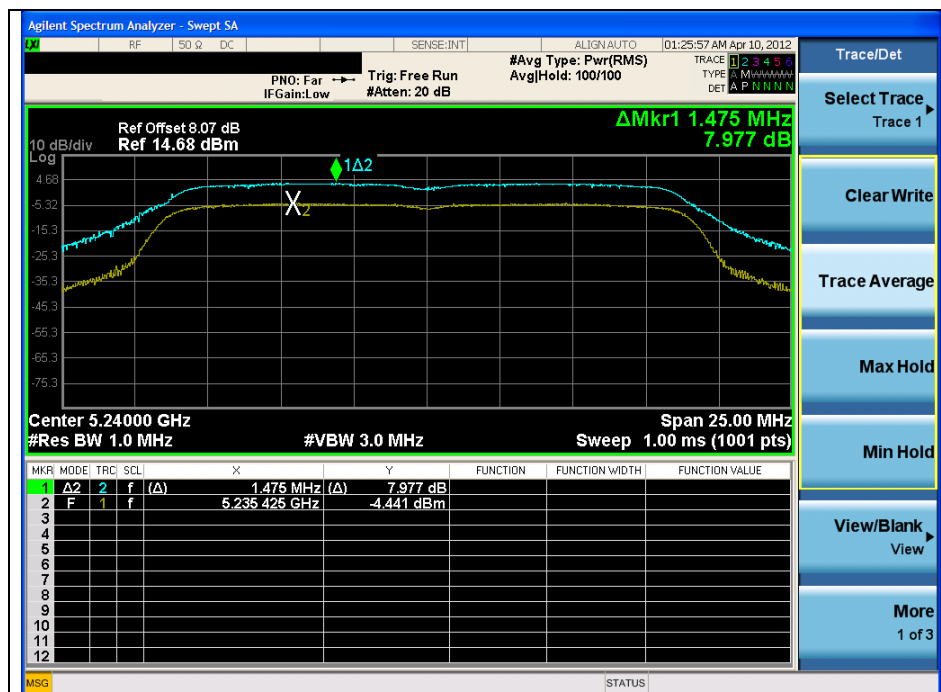
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Middle Channel (5 220 MHz)



High Channel (5 240 MHz)



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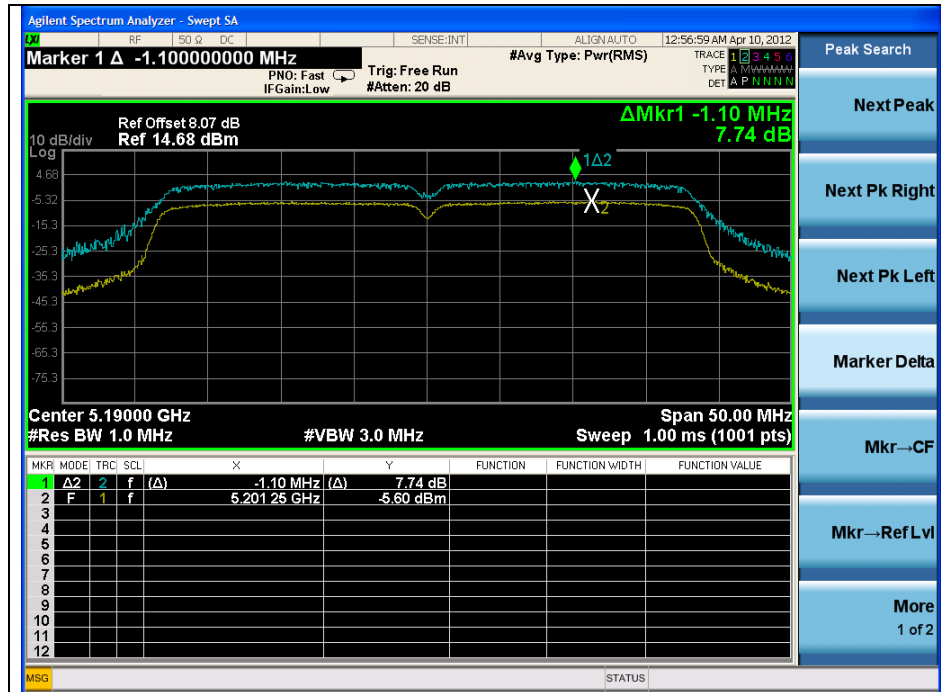
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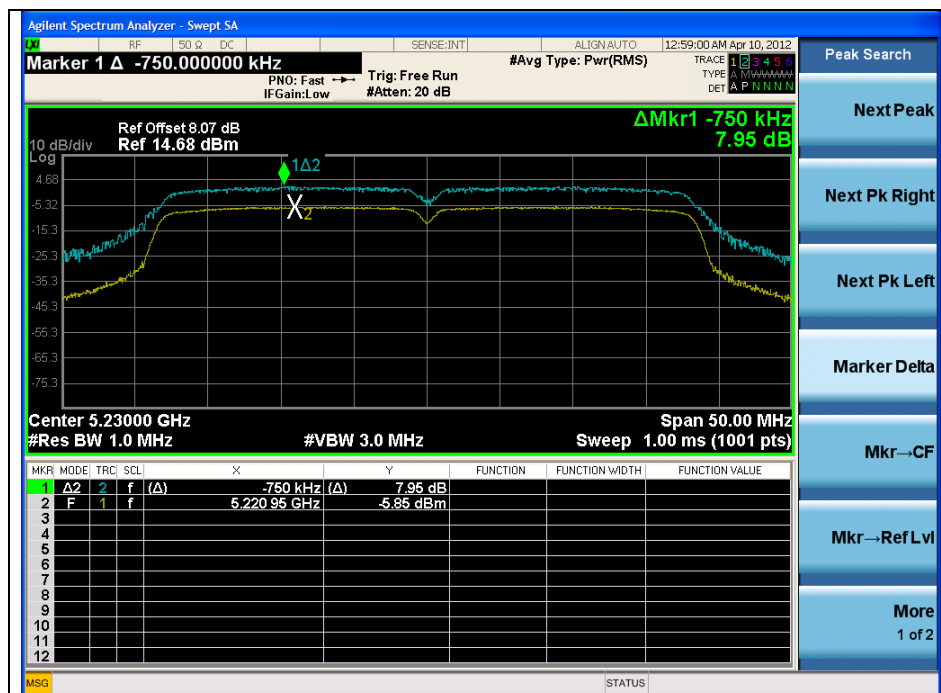
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802.11n-HT40 (Non-DFS)

Low Channel (5 190 MHz)



High Channel (5 230 MHz)



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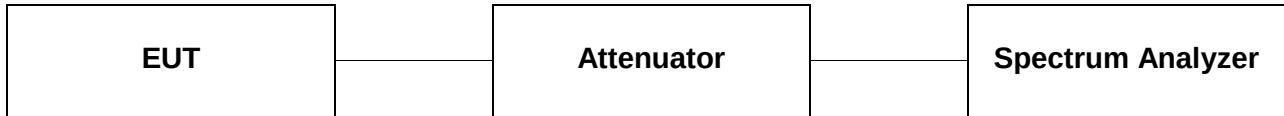
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7. Peak excursion

7.1. Test setup



7.2. Limit

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

7.3. Test procedure

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set span to encompass the entire emission bandwidth of the signal.
4. Set RBW=1 MHz, VBW $\leq$ 3 MHz, Detector = Peak, Trace mode = max-hold.
5. Allow the sweeps to continue until the trace stabilizes and use the peak search function on the spectrum analyzer to find the peak of the spectrum.
6. Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.
7. Repeat the above procedure until the measurements for all frequencies are completed.

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7.4. Test result

Ambient temperature : $(24 \pm 2) ^\circ\text{C}$
Relative humidity : 49 % R.H.

7.4.1. Non-DFS Band

Operation Mode	Channel	Channel Frequency (MHz)	Peak excursion (dB)	Limit (dB)
11a	Low	5 180	7.82	13
	Middle	5 220	7.41	
	High	5 240	7.54	
11n_HT20	Low	5 180	7.48	
	Middle	5 220	8.09	
	High	5 240	7.98	
11n_HT40	Low	5 190	7.74	
	High	5 230	7.95	

Captured images

Please refer to the PPSD captured image as above.

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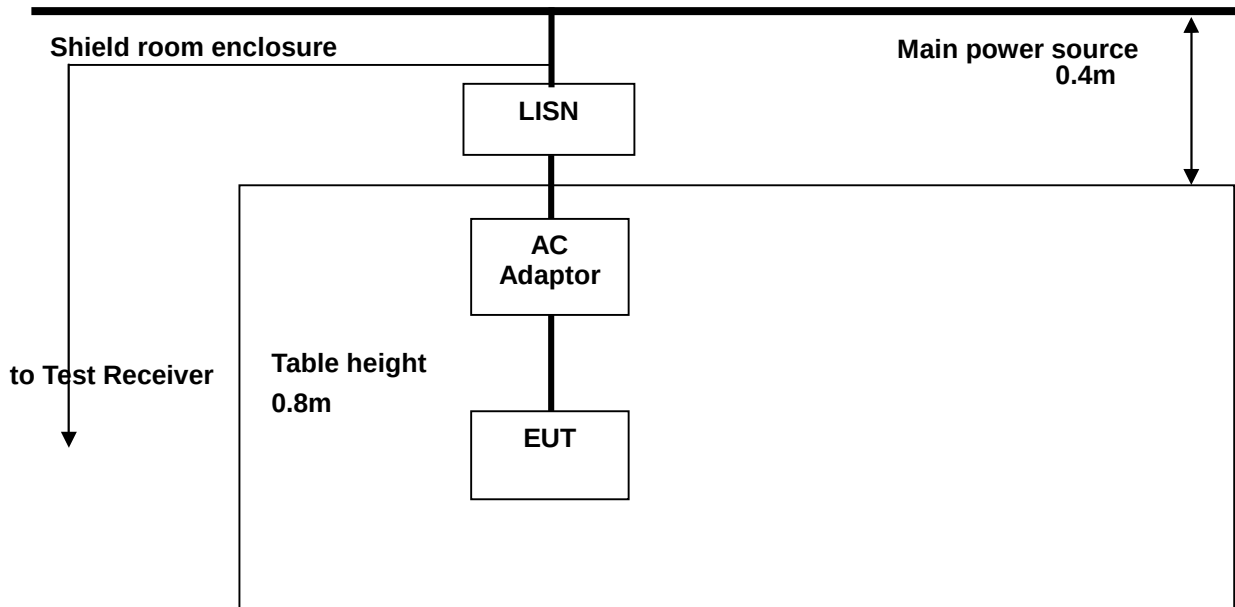
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8. Transmitter AC Power Line Conducted Emission

8.1. Test Setup



8.2. Limit

According to §15.207(a) for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 uH/50 ohm line impedance stabilization network(LISN).

Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

* Decreases with the logarithm of the frequency.

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8.3. Test Procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.4:2003

1. The test procedure is performed in a 6.5m × 3.6m × 3.6m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m(W) × 1.5 m(L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
3. The excess power cable between the EUT and the LISN was bundled. All connecting cables of EUT were moved to find the maximum emission.

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8.4. Test Results

8.4.1. TX mode (Worst case configuration_11a mode)

The following table shows the highest levels of conducted emissions on both phase of Hot and Neutral line.

Ambient temperature : (24 ± 2) °C
Relative humidity : 47 % R.H.

Frequency range : 0.15 MHz – 30 MHz
Measured Bandwidth : 9 kHz

FREQ. (MHz)	LEVEL(dB μ V)		LINE	LIMIT(dB μ V)		MARGIN(dB)	
	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.15	49.17	36.37	H	66.00	56.00	16.83	19.63
0.26	52.13	43.23	H	61.59	51.59	9.46	8.36
0.40	43.57	36.27	H	57.85	47.85	14.28	11.58
0.66	44.97	37.17	H	56.00	46.00	11.03	8.83
1.43	45.10	35.10	H	56.00	46.00	10.90	10.90
2.18	45.98	35.68	H	56.00	46.00	10.02	10.32
0.15	48.56	36.36	N	66.00	56.00	17.44	19.64
0.26	49.21	39.91	N	61.43	51.43	12.22	11.52
0.50	45.15	35.75	N	56.00	46.00	10.85	10.25
1.01	44.16	35.36	N	56.00	46.00	11.84	10.64
1.13	44.93	37.33	N	56.00	46.00	11.07	8.67
2.13	44.06	36.16	N	56.00	46.00	11.94	9.84

Note ;

Line (H) : Hot

Line (N) : Neutral

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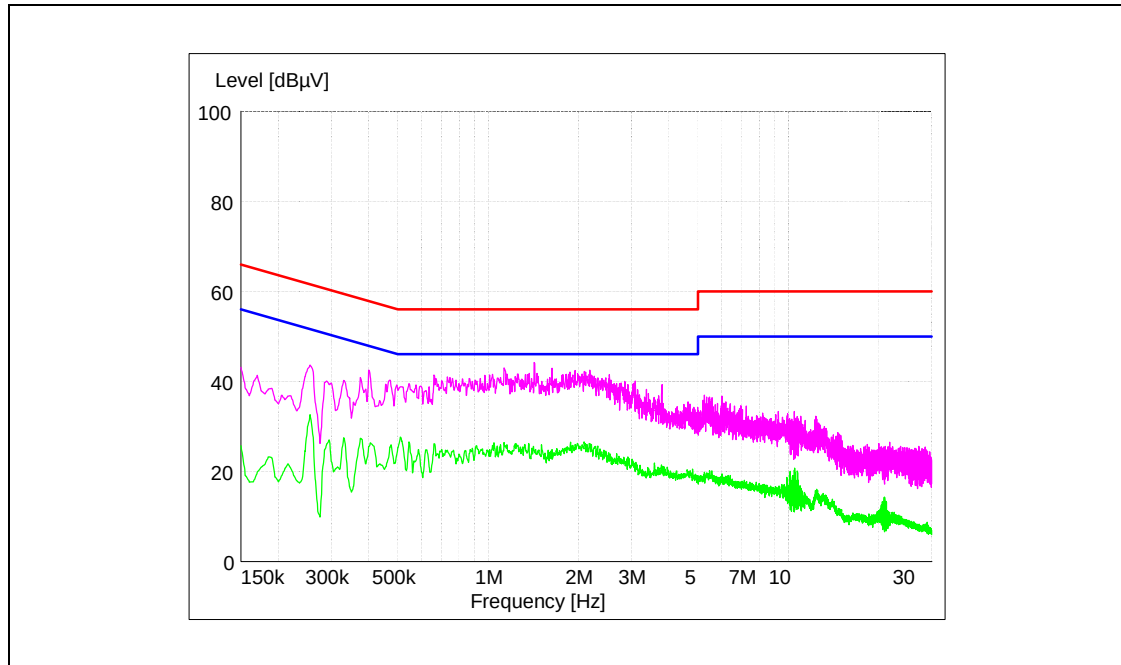
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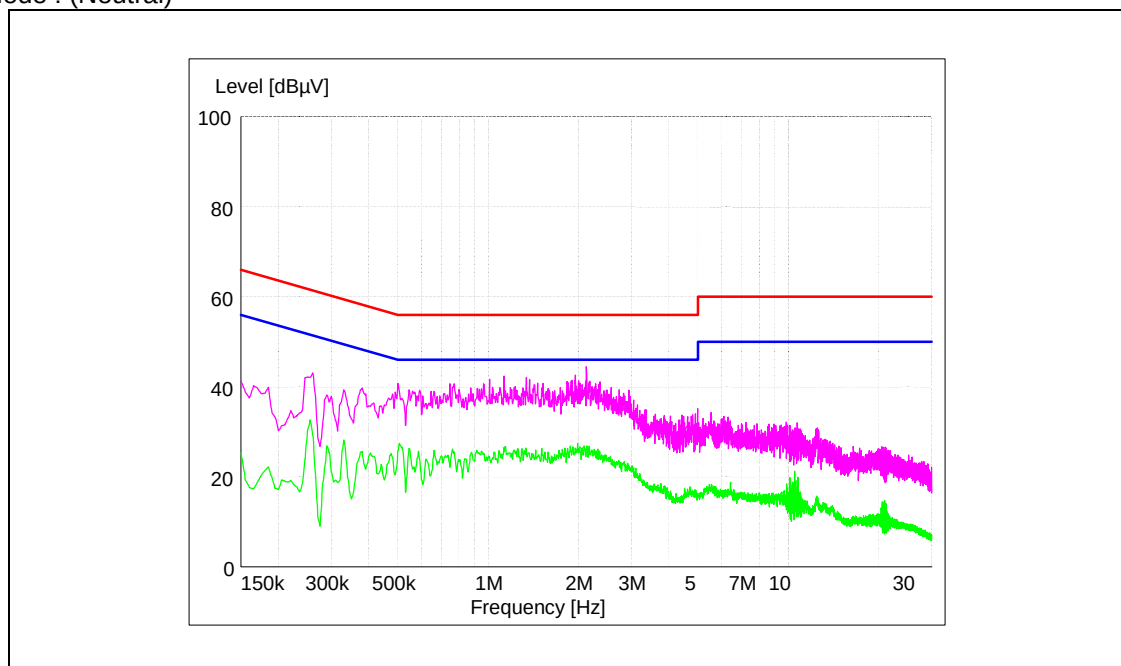
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Plot of Conducted Power line

Test mode : (Hot)



Test mode : (Neutral)



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8.4.2. RX mode

The following table shows the highest levels of conducted emissions on both phase of Hot and Neutral line.

Ambient temperature : (24 ± 2) °C
Relative humidity : 47 % R.H.

Frequency range : 0.15 MHz – 30 MHz
Measured Bandwidth : 9 kHz

FREQ. (MHz)	LEVEL(dB μ V)		LINE	LIMIT(dB μ V)		MARGIN(dB)	
	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.28	47.05	39.05	H	60.97	50.97	13.92	11.92
0.40	41.56	32.66	H	57.96	47.96	16.40	15.30
0.68	41.47	25.77	H	56.00	46.00	14.53	20.23
1.52	41.48	32.88	H	56.00	46.00	14.52	13.12
2.27	38.68	26.48	H	56.00	46.00	17.32	19.52
5.44	34.85	23.55	H	60.00	50.00	25.15	26.45
0.26	40.81	33.41	N	61.43	51.43	20.62	18.02
0.42	41.61	33.41	N	57.55	47.55	15.94	14.14
0.52	32.85	23.85	N	56.00	46.00	23.15	22.15
1.26	39.01	32.01	N	56.00	46.00	16.99	13.99
2.26	35.76	28.76	N	56.00	46.00	20.24	17.24
4.54	29.76	25.16	N	56.00	46.00	26.24	20.84

Note ;

Line (H) : Hot

Line (N) : Neutral

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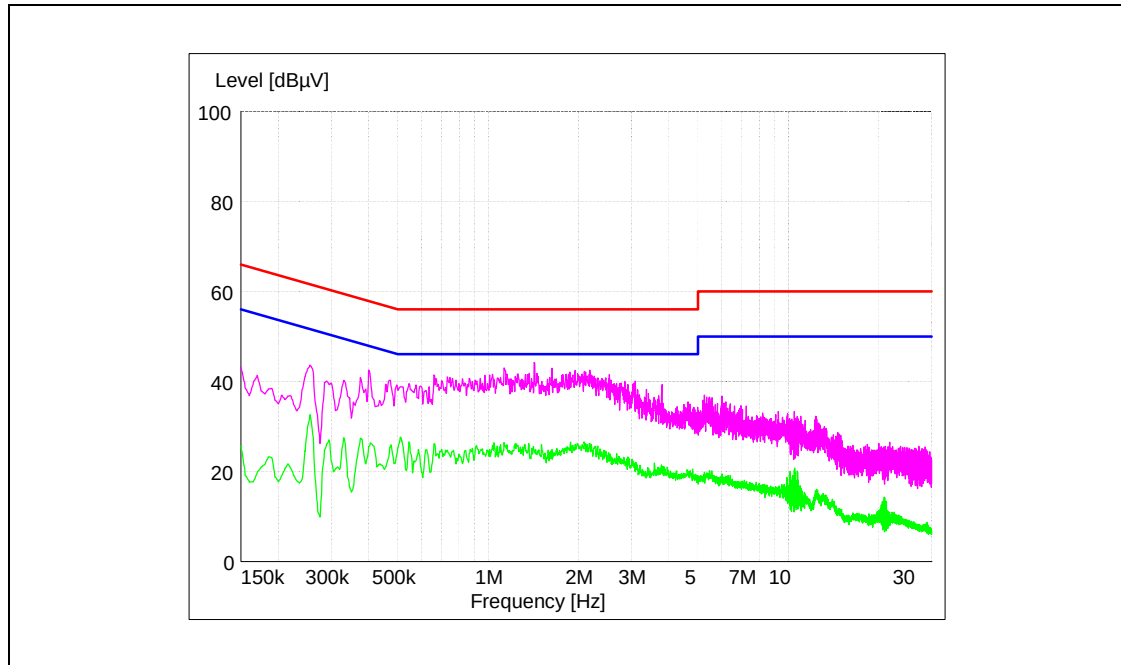
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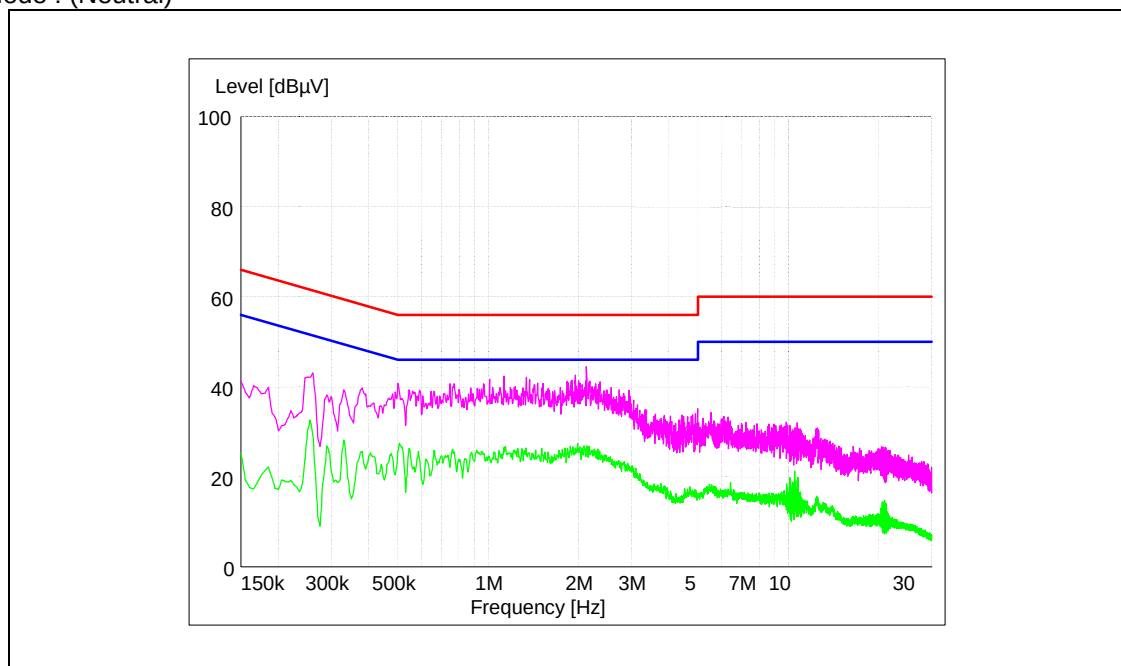
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Plot of Conducted Power line

Test mode : (Hot)



Test mode : (Neutral)



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