CFR 47 FCC Part 15.407

TEST REPORT

Product： **Industrial IEEE 802.11a/b/g Dual-RF AP/Bridge/Client**

Trade Name： MOXA

Model Number： AWK-5222

FCC ID： SLE-AWK-5222

Prepared for

MOXA Inc.

Fl.4, No.135, Lane 235, Pao-Chiao Rd., Shing Tien City, Taipei, R.O.C.

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Prepared by

Interocean EMC Technology Corp.

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Remark：

The test report consists of ***63*** pages in total. It shall not be reproduced except in full, without the written approval of IETC. This document may be altered or revised by IETC only, and shall be noted in the revision section of the document.

The test results in the report only to the tested sample.

Table of Contents

Statement of Compliance

Applicant: MOXA Inc.

Manufacturer: MOXA Inc.

Product: Industrial IEEE 802.11a/b/g Dual-RF AP/Bridge/Client

Model No.: AWK-5222

Tested Power Supply: DC 12V

Date of Final Test: May 06, 2009

Configuration of Measurements and Standards Used :

FCC Rules and Regulations Part 15 Subpart E

I HEREBY CERTIFY THAT: The data shown in this report were made in accordance with the procedures given in ANSI C63.4, and the energy emitted by the device was founded to be within the limits applicable. I assume full responsibility for accuracy and completeness of these data.

Note: 1. The result of the testing report relate only to the item tested.

2. The testing report shall not be reproduced expect in full, without the written approval of IETC

Report Issued: 2009/06/05

Project Engineer: Anya Lee Approved: Jerry Liu

Anya Lee

Jerry Liu

1 General Information

1.1 Description of Equipment Under Test

Product : Industrial IEEE 802.11a/b/g Dual-RF AP/Bridge/Client

Model Number : AWK-5222

Applicant : **MOXA Inc.**
Fl.4, No.135, Lane 235, Pao-Chiao Rd., Shing Tien City, Taipei, R.O.C.

Manufacturer : **MOXA Inc.**
Fl.4, No.135, Lane 235, Pao-Chiao Rd., Shing Tien City, Taipei, R.O.C.

Operating Frequency : 5180MHz ~ 5240MHz

Channel Number : Refer to section 1.2

Type of Modulation : OFDM

Antenna description : This device uses Dipole antenna.

Antenna Gain	：	2dBi
Connector type	：	SMA-Male-RP

Sample Receive date : Apr. 23, 2009

Date of Test : Apr. 23 ~ May 06, 2009

Additional Description : 1.) The EUT is **Industrial IEEE 802.11a/b/g Dual-RF AP/Bridge/Client**.
2.) The test model is "**AWK-5222**" and included in this report.
3.) It contains two RF modules which are identical.
4.) Both module can transmit individual or simultaneously.
5.) The operating frequencies of this product are 2412-2462MHz and 5180-5240MHz.
6.) For more detail specification about EUT, please refer to the user's manual.

1.2 Table for Carrier Frequencies

802.11a

CH No.	36	40	44	48
CF (MHz)	5180	5200	5220	5240

1.3 Test Facility

Site Description	:	☒RF Test Room ☒OATS 2
Name of Firm	:	Interocean EMC Technology Corp.
Company web	:	http://www.ietc.com.tw
Site 1, 2 Location	:	No.5-2, Lin 1, Tin-Fu Tsun, Lin-Kou Hsiang, Taipei County, Taiwan, R.O.C.
Site 3, 4 Location	:	No. 12, Ruei-Shu Valley, Ruei-Ping Tsun, Lin-Kou Hsiang, Taipei County, Taiwan, R.O.C.
Site Filing	:	● Federal Communication Commissions – USA Registration No.: 96399 (OATS 1 & 2) Registration No.: 518958 (OATS 3 & 4) Designation No.: TW1020 ● Voluntary Control Council for Interference by Information Technology Equipment (VCCI) – Japan Member No.: 1349 Registration No. (Conducted Room): C-1094 Registration No. (Conducted Room): T-1562 Registration No. (OATS 1): R-1040 Registration No. (OATS 2): R-1041 ● Industry Canada (IC) OUR FILE: 46405-4437 Submission: 130946 Registration No. (OATS 1): 4437A-1 Registration No. (OATS 2): 4437A-2 Registration No. (OATS 3): 4437A-3 Registration No. (OATS 4): 4437A-4 ● Japan Electrical Safety & Environment Technology Laboratories (JET) Registration No.: 04S03-01
Site Accreditation	:	● Bureau of Standards and Metrology and Inspection (BSMI) – Taiwan, R.O.C. Accreditation No.: SL2-IN-E-0026 for CNS13438 / CISPR22 SL2-R1-E-0026 for CNS13439 / CISPR13 SL2-R2-E-0026 for CNS13439 / CISPR13 SL2-A1-E-0026 for CNS13783-1 / CISPR14-1 ● Taiwan Accreditation Foundation (TAF) Accreditation No.: 1113 ● TüV NORD Certificate No: TNTW0801R-01

1.4 Test Equipment

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSP30	100002	2009/12/10
Preamplifier	Agilent	8449B	3008A01434	2010/04/01
Preamplifier	Agilent	83050A	3950A00225	2009/08/10
Preamplifier	SCHAFFNER	CA30100	2	2009/10/20
Horn Antenna	COM-POWER	AH-118	10081	2010/05/12
Horn Antenna	Schwarzbeck	BBHA 9120	9120D-583	2011/02/09
Horn Antenna	Schwarzbeck	BBHA 9170	213	2010/06/08
Wide Bandwidth Sensor	Anritsu	MA2491A	728133	2009/10/16
Power Meter	Anritsu	ML2495A	736010	2009/10/16
Temp & Humidity chamber	GIAN FORCE	GTH-150-40-2P-U	MAA0305-012	2009/05/14
Signal Generator	Agilent	E8254A	US41140164	2009/05/21

Note: The above equipments are within the valid calibration period.

1.5 Summary of Measurement

Report Clause	Test Parameter	Reference Document CFR47 Part15	Results
2	26dB Bandwidth	§15.407 (a)	Pass
3	Peak output power test	§15.407 (a)	Pass
4	Power test of Data Rate	§15.407(a)	Pass
5	Power Spectrum Density test	§15.407 (a)	Pass
6	Peak excursion to average ratio test	§15.407(a)(6)	Pass
7	Radiated spurious emission test	§15.407(b), 15.209, 15.205	Pass
8	Band edge test	§15.209, 15.205	Pass
9	RF antenna conducted spurious emission test	§15.407(b)	Pass
10	AC Power Line Conducted Emission test	§15.407(b)(6), 15.207	Pass

1.6 Justification

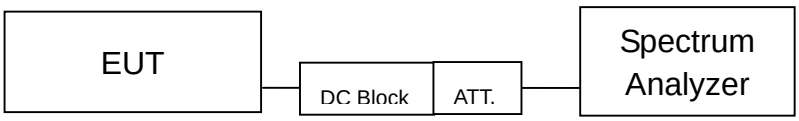
The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of the frequency band were all reach limit requirement, thus we evaluate the EUT pass the specified test.

2 26dB bandwidth

2.1 Limits

No regulation limit, for reference purpose.

2.2 Configuration of Measurement



2.3 Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to UNII test procedure of Oct 2002 DA 02-2138 for compliance to FCC 47CFR 15.407 requirements.

2.4 Test Result

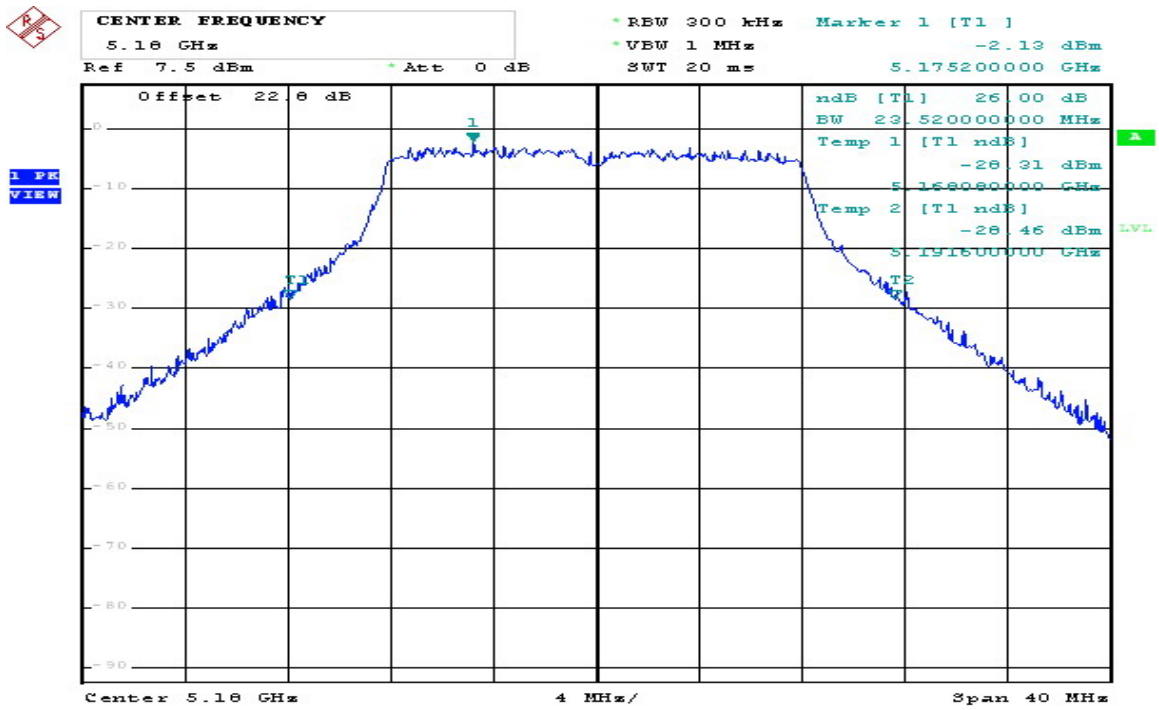
The final test data is shown on as following pages.

26dB Bandwidth

Test Mode：802.11a			
Test CH		26dB Bandwidth (MHz)	
CH No.	Freq. (MHz)	Module A	Module B
36	5180	23.52	24.32
40	5200	23.52	24.64
48	5240	24.16	24.72

26dB Bandwidth

802.11a CH36 5180MHz (Module A)



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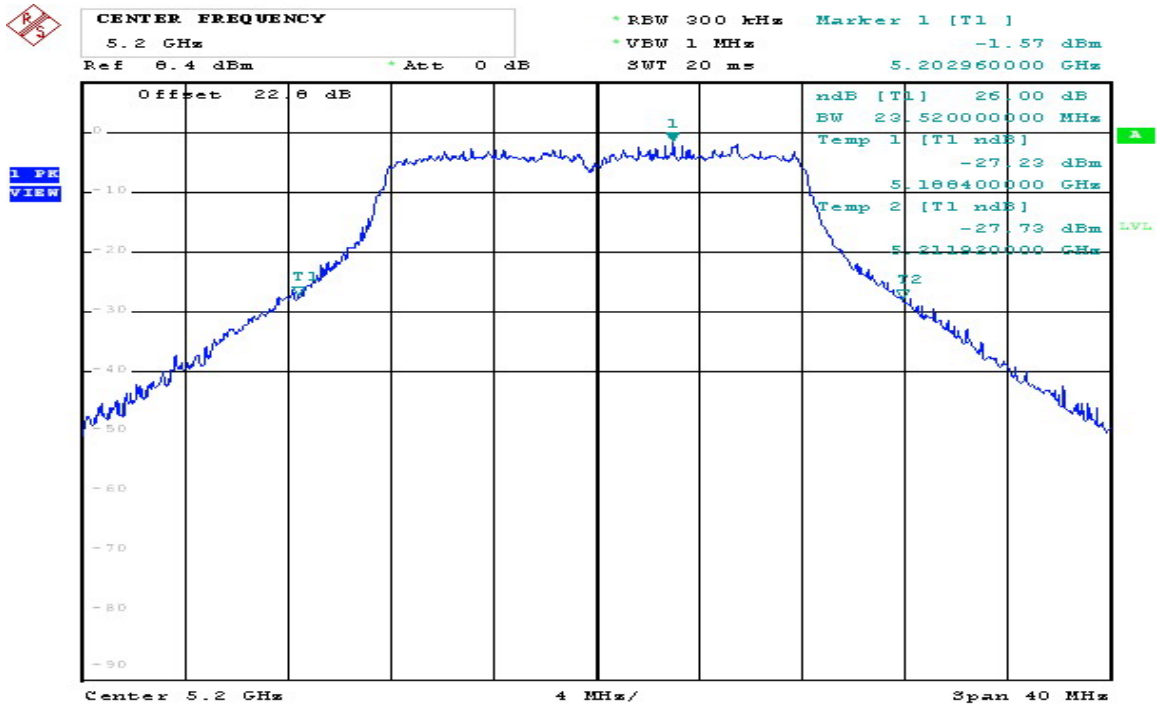
Date: 29.APR.2009 10:00:56

802.11a CH44 5200MHz (Module A)



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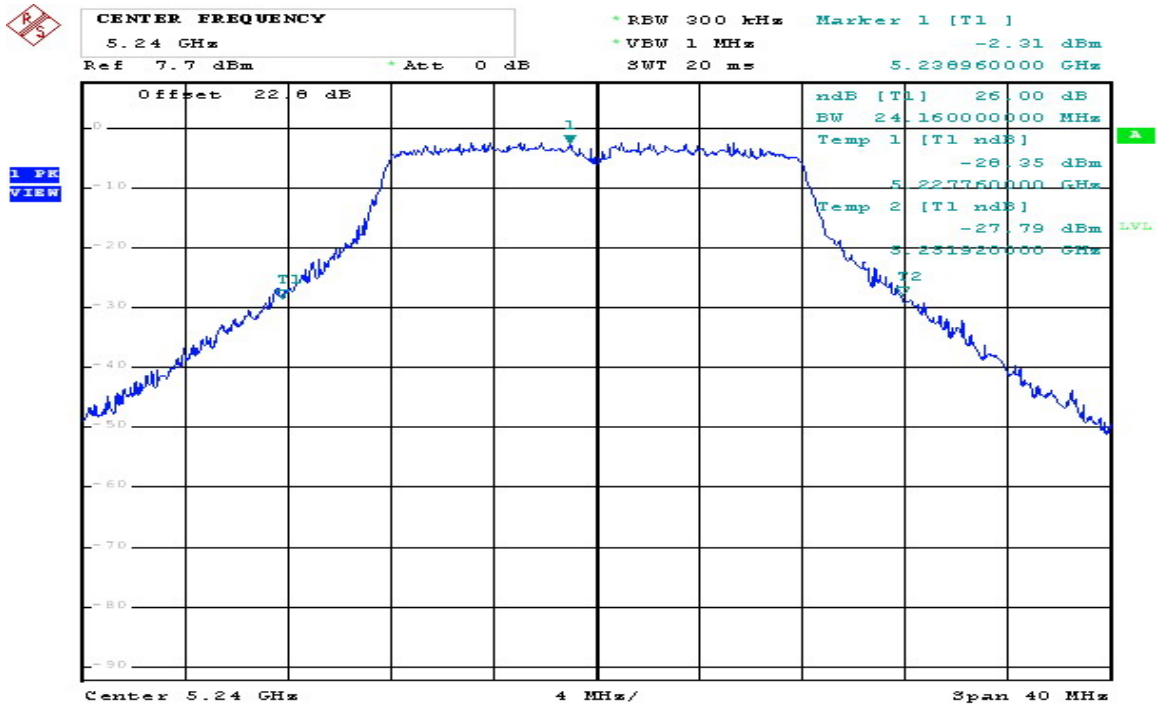
802.11a CH48 5240MHz (Module A)



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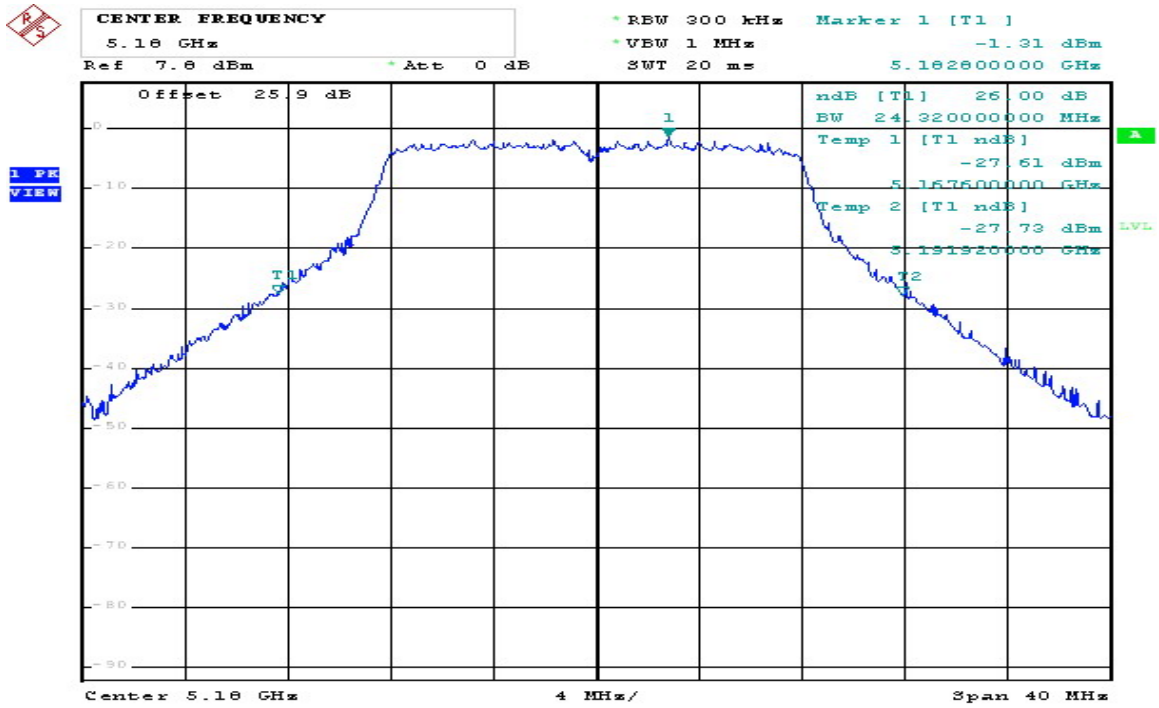
802.11a CH36 5180MHz (Module B)



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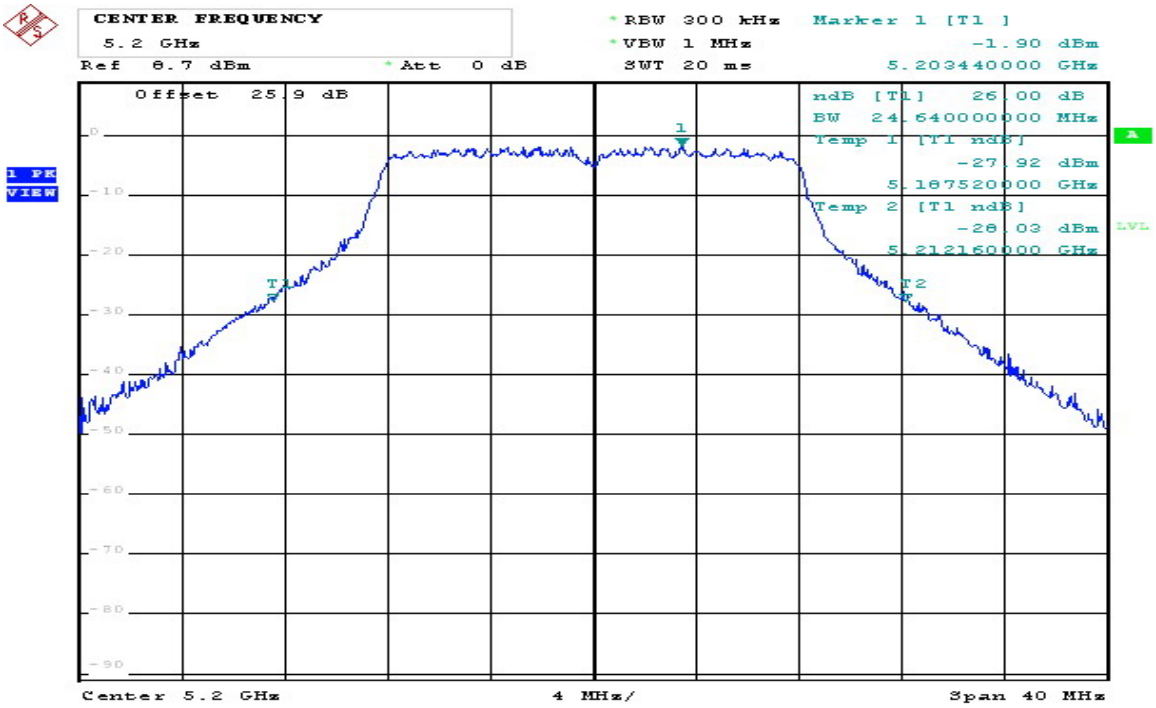
802.11a CH44 5200MHz (Module B)



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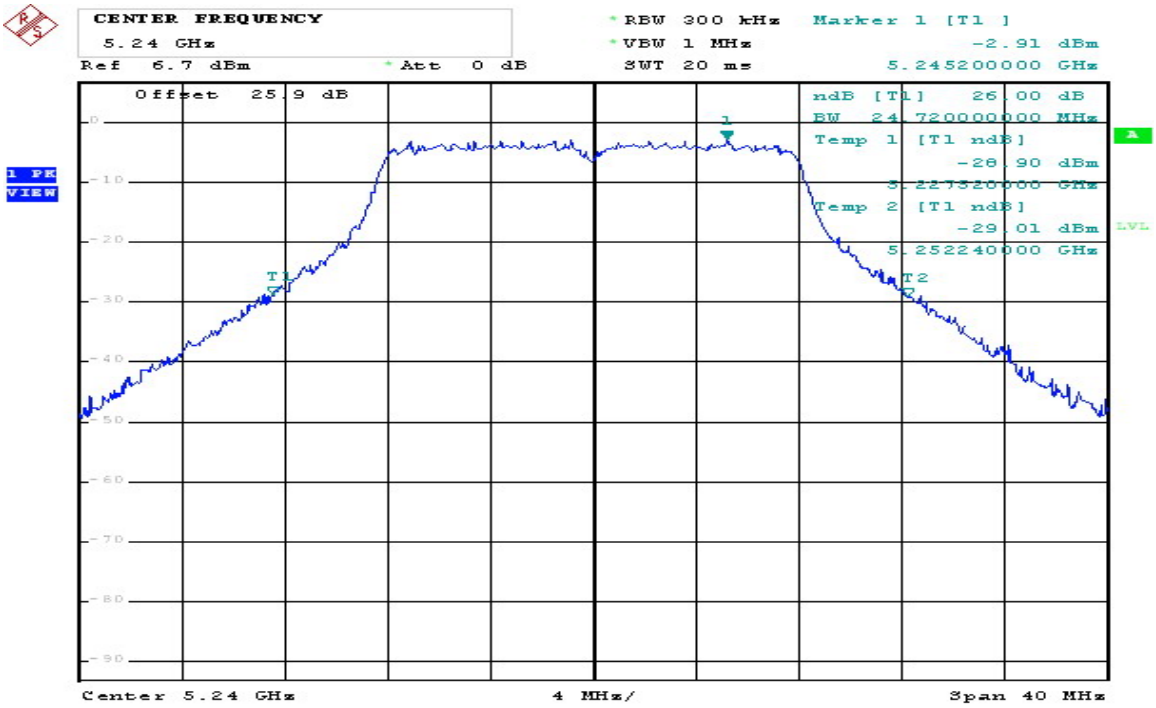
802.11a CH48 5240MHz (Module B)



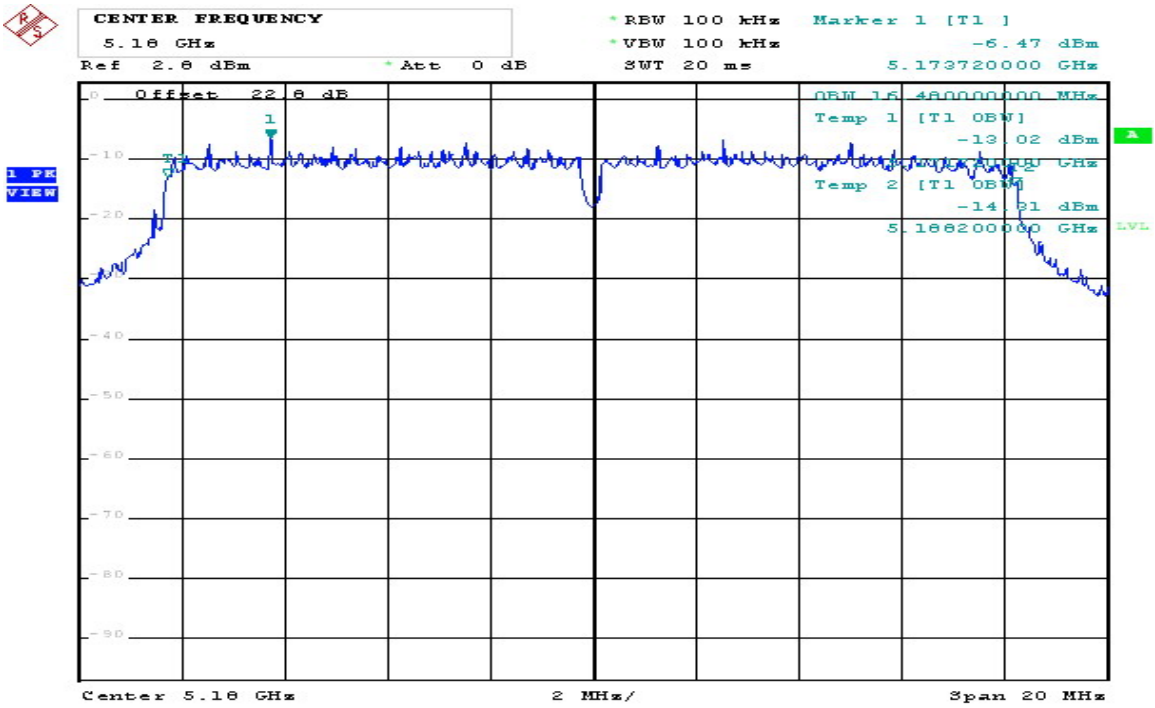
Comment: 802.11a 5240MHz
Date: 29.APR.2009 10:15:36

99% Occupied bandwidth

Test Mode：802.11a			
Test CH		Occupied Bandwidth (MHz)	
CH No.	Freq. (MHz)	Module A	Module B
36	5180	16.48	16.52
40	5200	16.52	16.52
48	5240	16.52	16.52

99% Occupied bandwidth

802.11a CH36 5180MHz (Module A)



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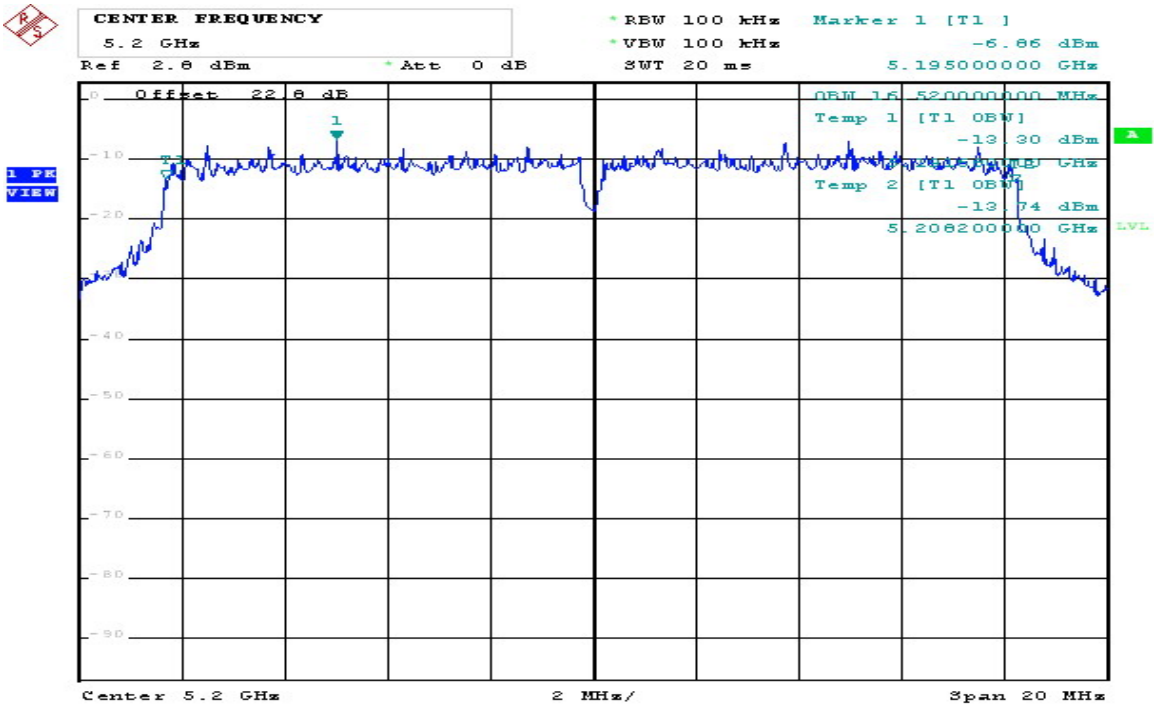
Date: 29.APR.2009 10:03:11

802.11a CH44 5200MHz (Module A)



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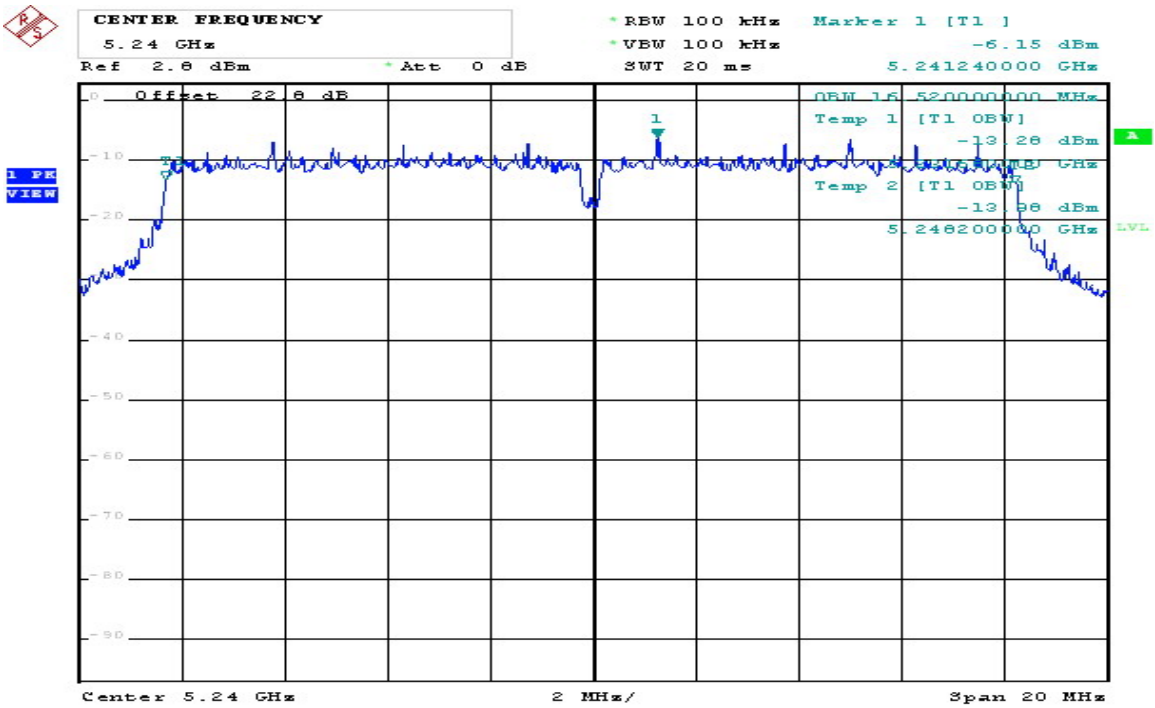
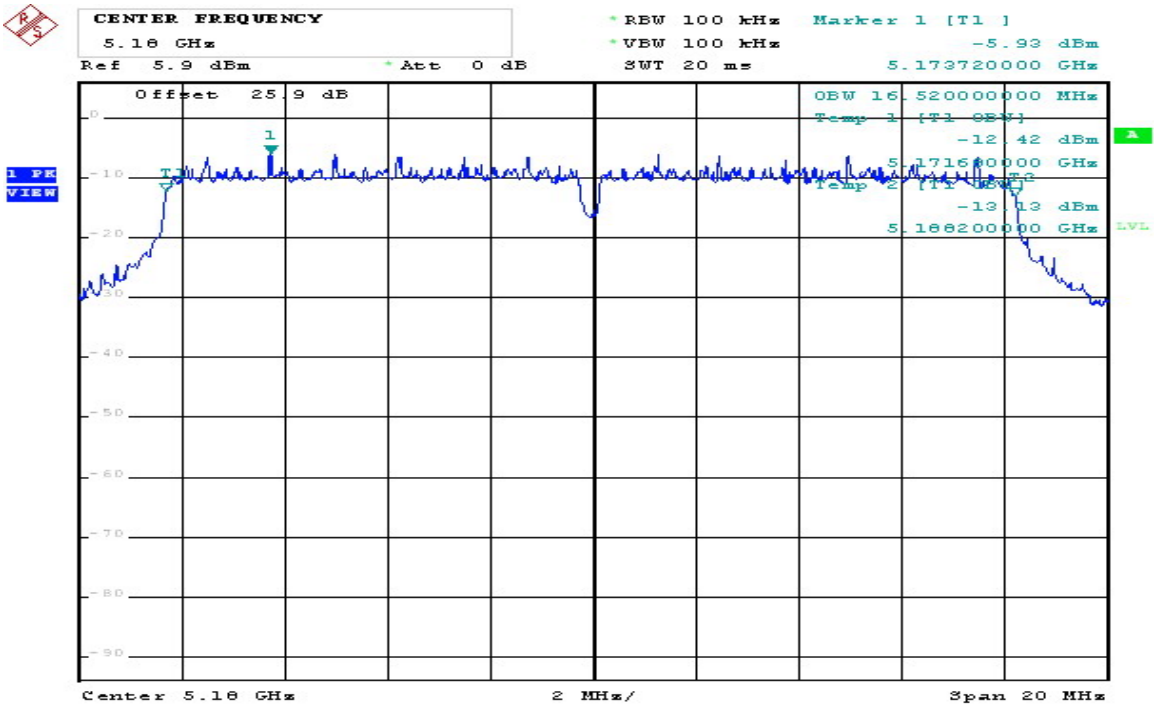
Date: 29.APR.2009 10:09:22

802.11a CH48 5240MHz (Module A)



Comment: 802.11a 5240MHz
Date: 29.APR.2009 10:15:12

802.11a CH36 5180MHz (Module B)



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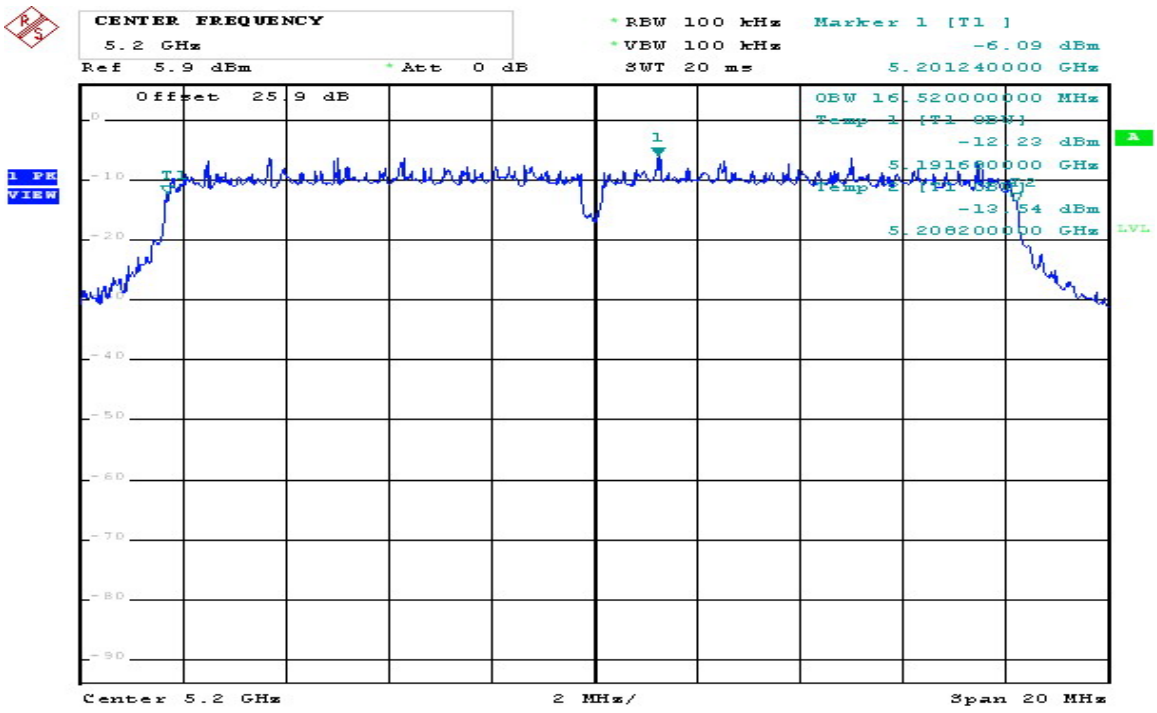
802.11a CH44 5200MHz (Module B)



Comment: 802.11a 5200MHz
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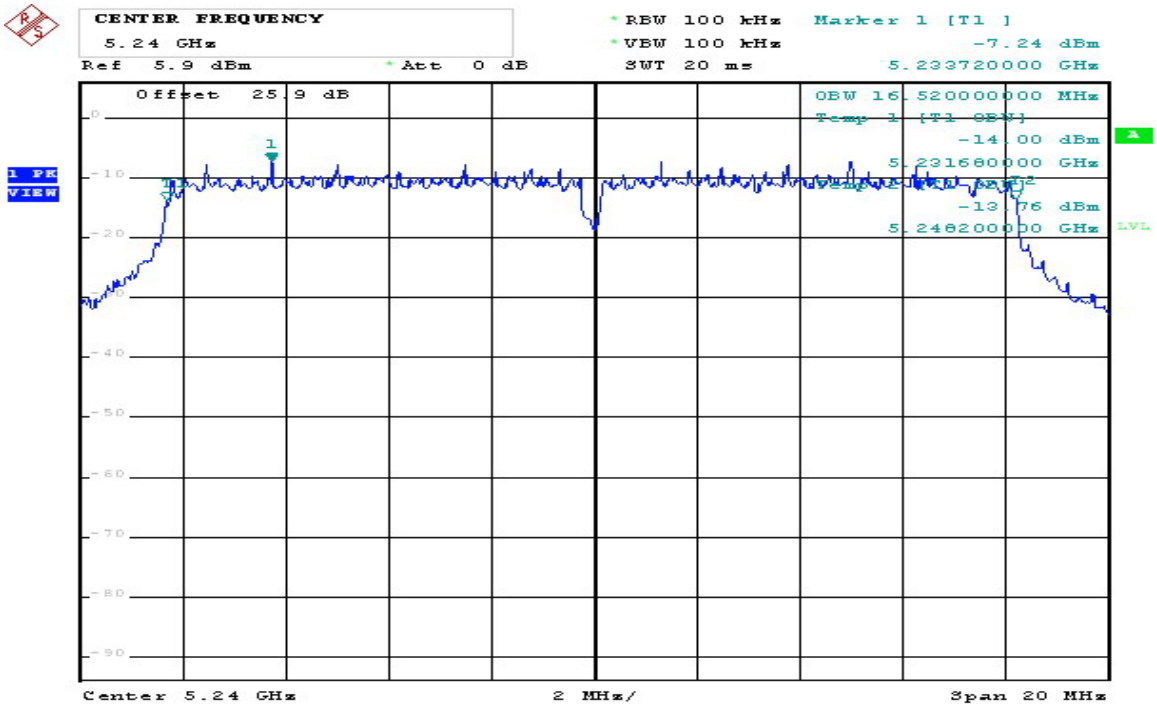
802.11a CH48 5240MHz (Module B)



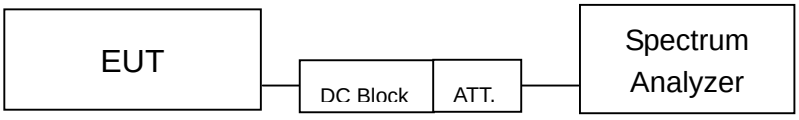
Comment: 802.11a 5240MHz
Date: 29.APR.2009 10:17:54

3 Peak output power test

3.1 Limits

Operating Frequency (MHz)	Output power limit
5150~5250	< 50mW (17dBm) or 4dBm+10logB
5250~5350, 5470~5725	< 250mW (24dBm) or 11dBm+10logB
5725~5825	< 1W (30dBm) or 17dBm+10logB

3.2 Configuration of Measurement



3.3 Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to UNII test procedure of Oct 2002 DA 02-2138 for compliance to FCC 47CFR 15.407 requirements.

3.4 Test Result

PASS.

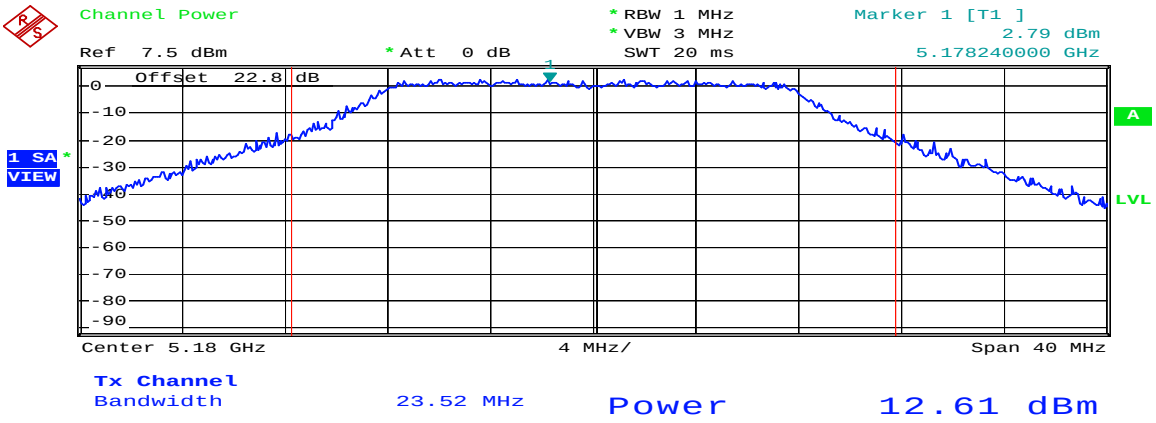
The final test data is shown on as following pages.

Maximum output power

Mode：802.11 a								
CH	Freq. (MHz)	Maximum transmit power				Total Power (dBm)	Limit (dBm)	Margin (dB)
		(dBm)		(watts)				
		Module A	Module B	Module A	Module B			
36	5180	12.61	13.61	0.0182	0.0230	16.15	17	-0.85
40	5200	12.72	13.41	0.0187	0.0219	16.09	17	-0.91
48	5240	12.85	12.76	0.0193	0.0189	15.82	17	-1.18

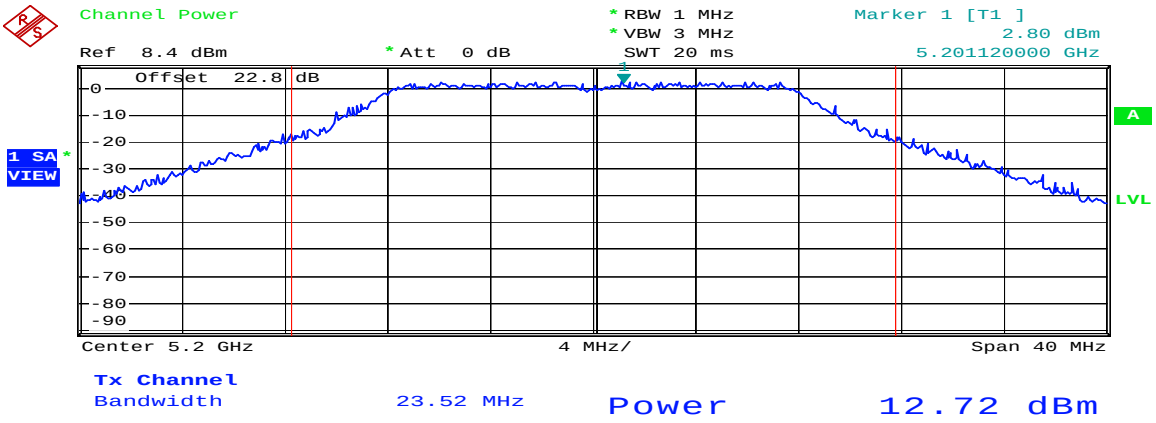
Peak output power test

802.11a CH36 5180MHz (Module A)



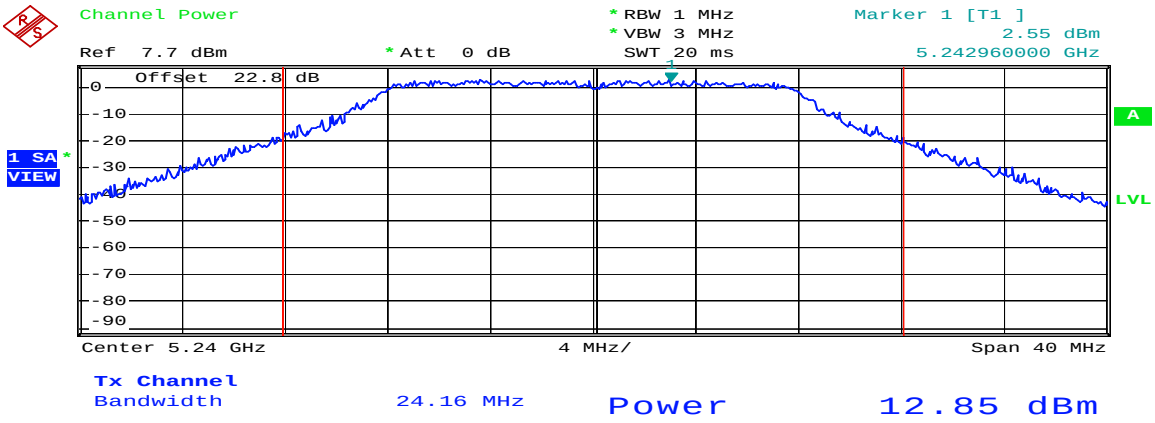
Comment: 802.11a 5180MHz Limit:16.989700
Date: 29.APR.2009 10:02:04

802.11 a CH44 5200MHz (Module A)



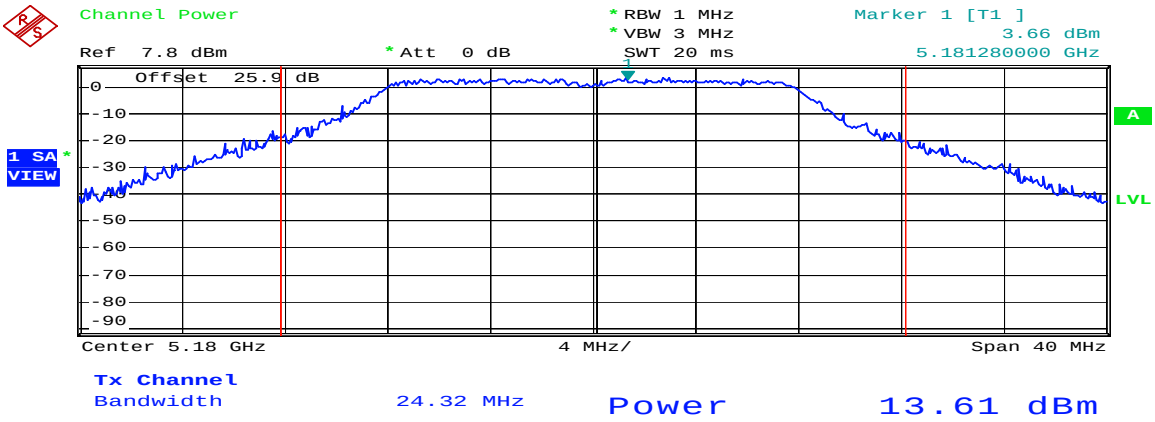
Comment: 802.11a 5200MHz Limit:16.989700
Date: 29.APR.2009 10:08:13

802.11 a CH48 5240MHz (Module A)



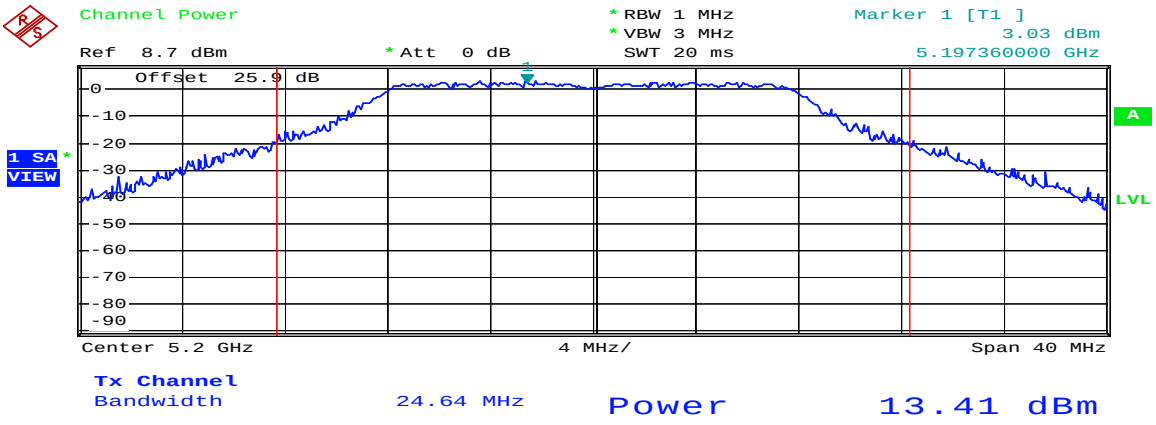
Comment: 802.11a 5240MHz Limit:16.989700
Date: 29.APR.2009 10:14:05

802.11a CH36 5180MHz (Module B)



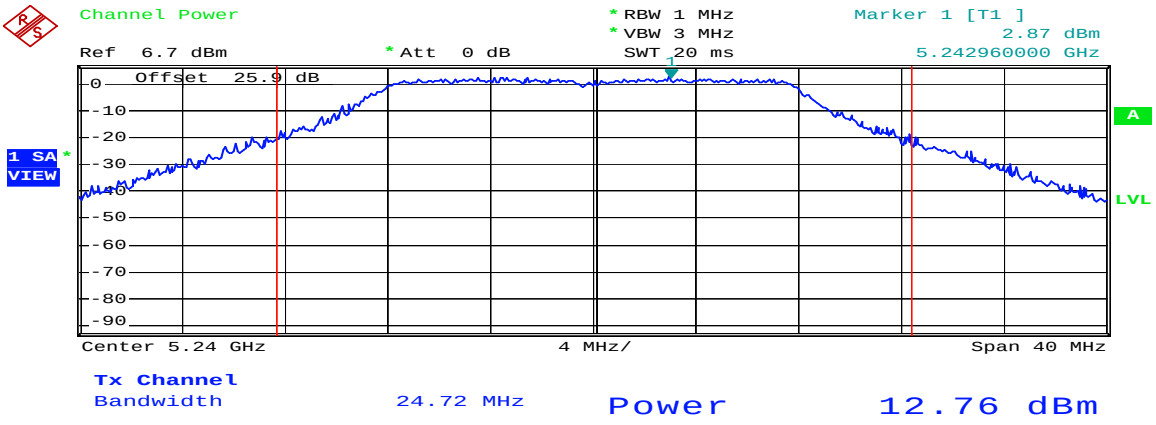
Comment: 802.11a 5180MHz Limit:16.989700
Date: 29.APR.2009 10:04:42

802.11 a CH44 5200MHz (Module B)



Comment: 802.11a 5200MHz Limit:16.989700
Date: 29.APR.2009 10:10:55

802.11 a CH48 5240MHz (Module B)



Comment: 802.11a 5240MHz Limit:16.989700
Date: 29.APR.2009 10:16:44

4 Power test of Data Rate

Module A

Mode	Bandwidth (MHz)	Channel	Data Rate	Output Power	
				(dBm)	(watts)
802.11b	20	6	1	19.05	0.0804
			5.5	18.71	0.0743
			11	19.25	0.0841
802.11g	20	6	6	20.92	0.1236
			36	20.69	0.1172
			54	20.54	0.1132
802.11a	20	40	6	12.72	0.0187
			36	12.69	0.0186
			54	12.65	0.0184

Module B

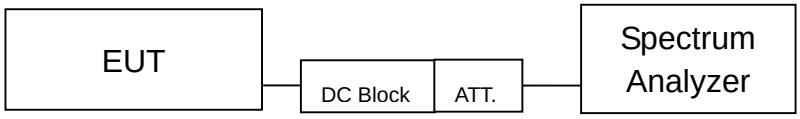
Mode	Bandwidth (MHz)	Channel	Data Rate	Output Power	
				(dBm)	(watts)
802.11b	20	6	1	19.36	0.0863
			5.5	19.03	0.0800
			11	19.39	0.0869
802.11g	20	6	6	21.10	0.1288
			36	21.03	0.1268
			54	20.95	0.1245
802.11a	20	40	6	13.41	0.0219
			36	13.27	0.0212
			54	13.24	0.0211

5 Power Spectrum Density test

5.1 Limits

Operating Frequency (MHz)	Power density limit
5150~5250	< 4dBm/MHz
5250~5350, 5470~5725	< 11dBm/MHz
5725~5825	< 17dBm/MHz

5.2 Configuration of Measurement



5.3 Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to UNII test procedure of Oct 2002 DA 02-2138 for compliance to FCC 47CFR 15.407 requirements.

5.4 Test Result

PASS.

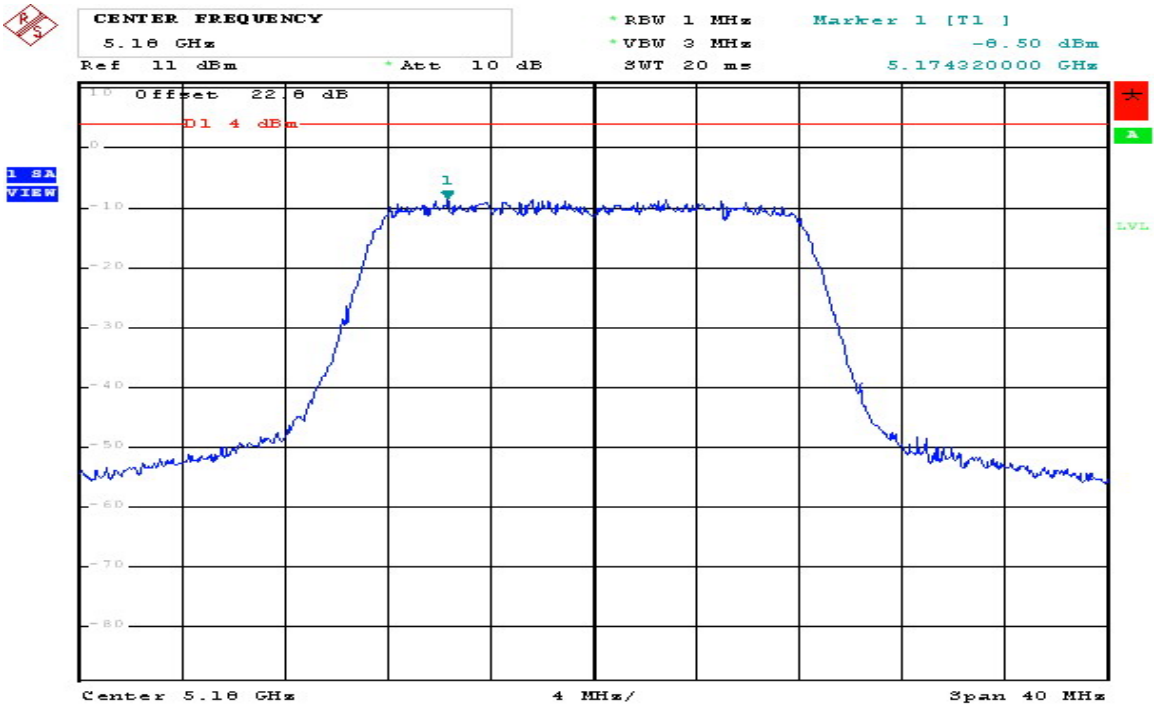
The final test data is shown on as following pages.

Power spectral density

802.11a						
CH	Freq. (MHz)	Power Spectral Density (dBm)		Total Spectral Density (dBm)	Limit (dBm)	Margin (dB)
		Module A	Module B			
36	5180	-8.50	-6.79	-4.58	4	-8.58
40	5200	-8.49	-6.62	-4.44	4	-8.44
48	5240	-8.20	-7.53	-4.84	4	-8.84

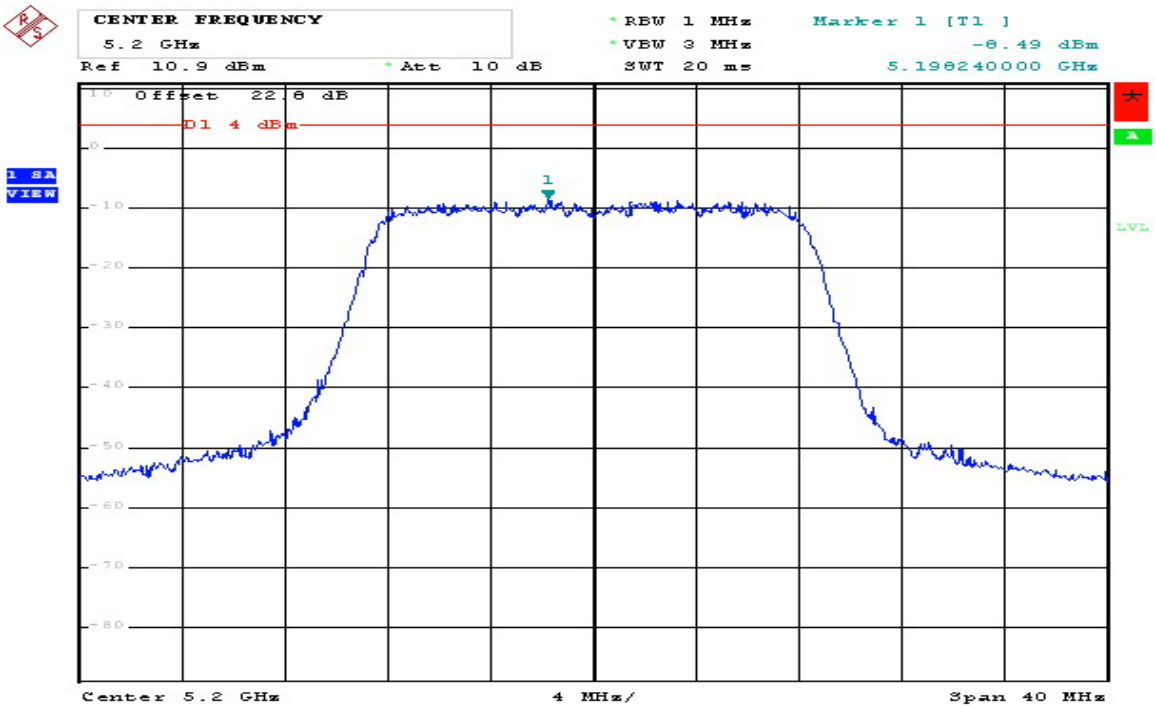
Power spectral density

802.11a CH36 5180MHz (Module A)



Comment: 802.11a 5180MHz
Date: 29.APR.2009 10:02:54

802.11a CH44 5200MHz (Module A)



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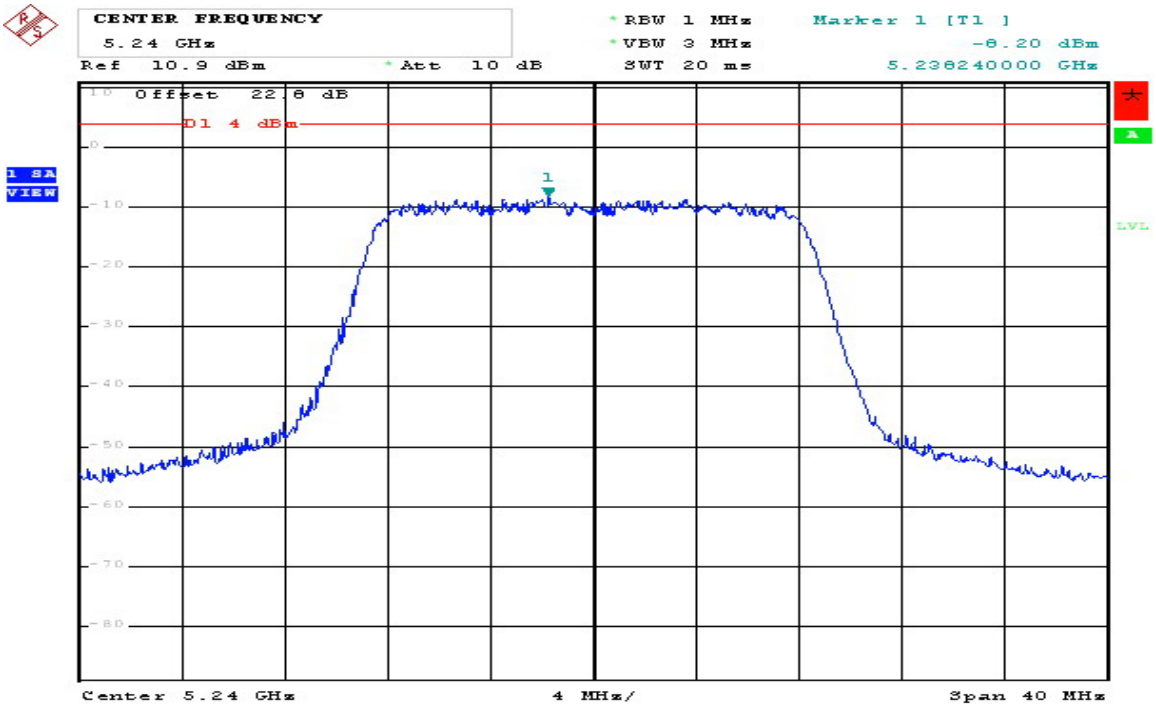
802.11a CH48 5240MHz (Module A)



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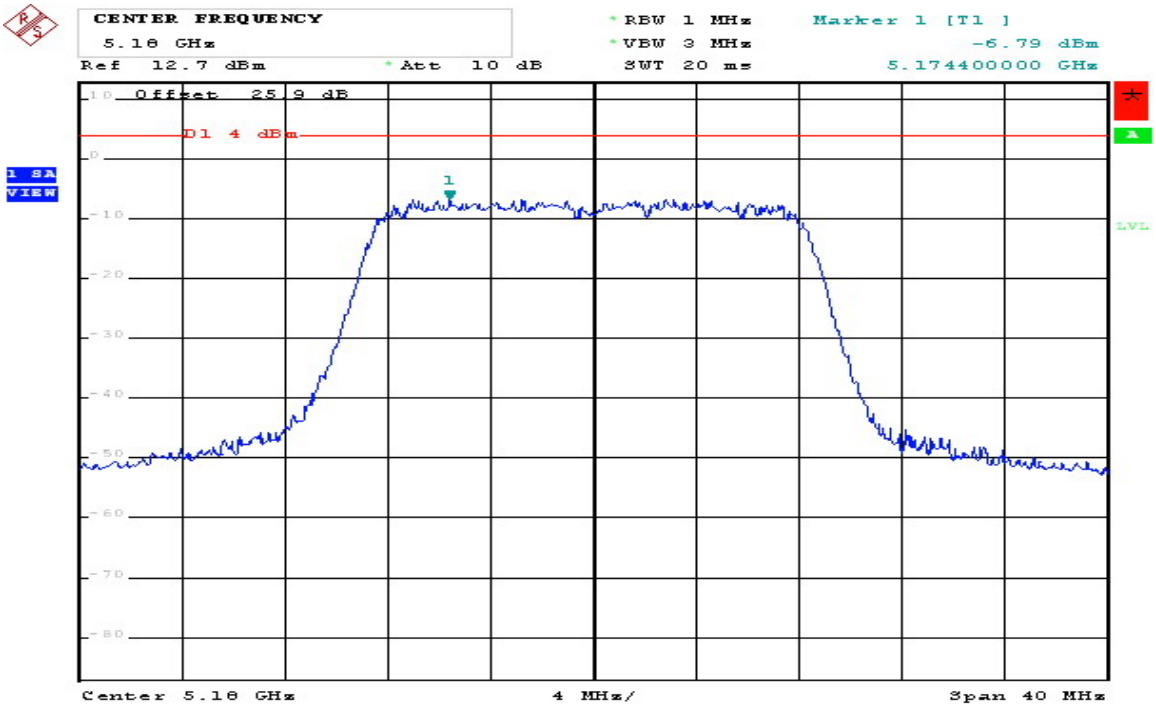
802.11a CH36 5180MHz (Module B)



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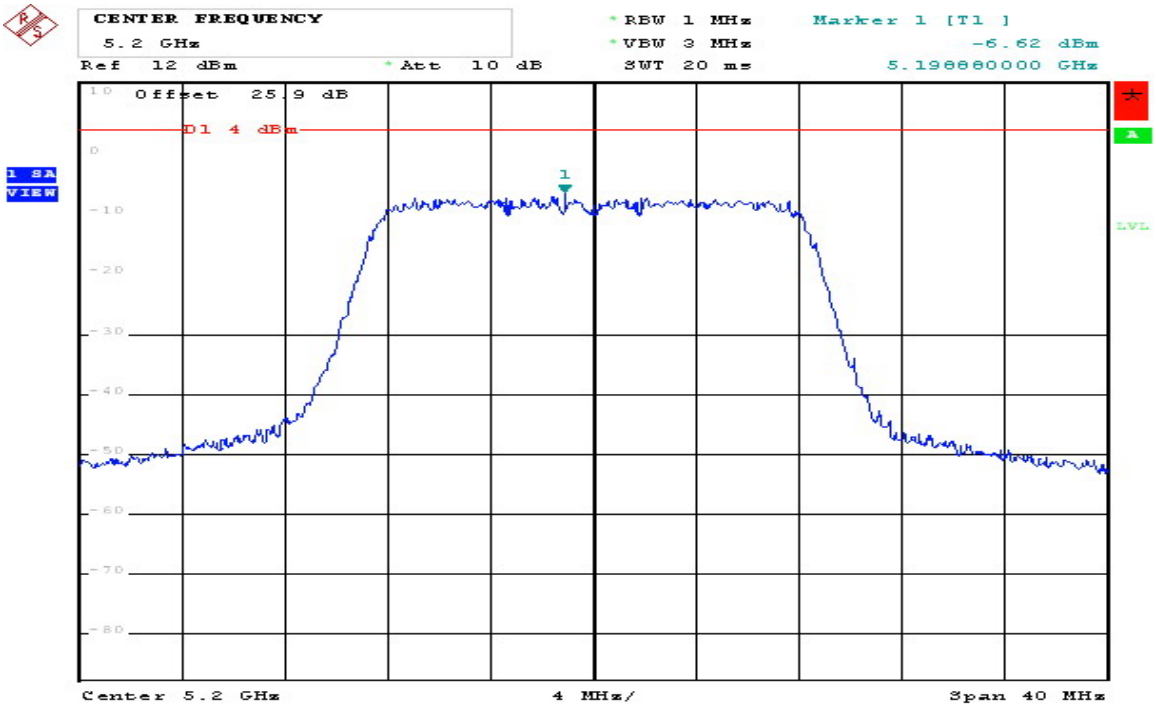
802.11a CH44 5200MHz (Module B)



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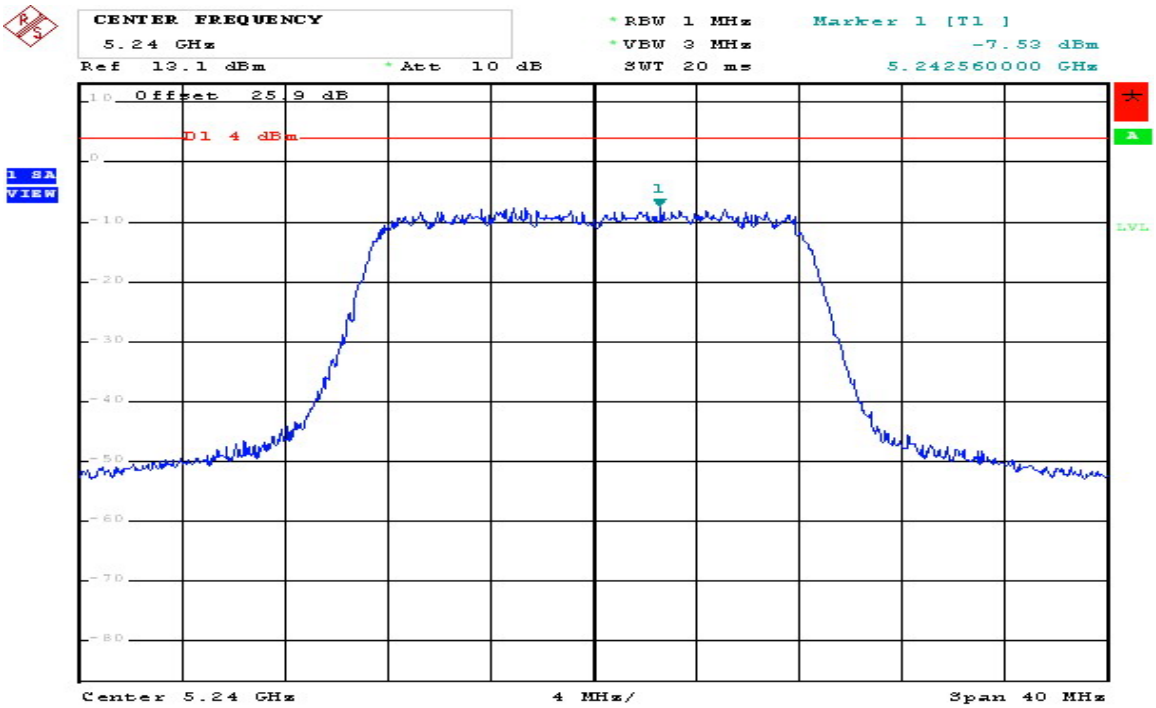
802.11a CH48 5240MHz (Module B)



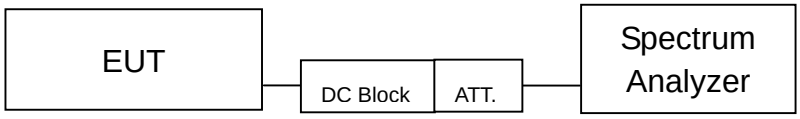
Comment: 802.11a 5240MHz
Date: 29.APR.2009 10:17:37

6 Peak excursion to average ratio test

6.1 Limits

Operating Frequency (MHz)	Peak excursion to average ratio limit
5150~5250	<13dB
5250~5350	<13dB
5725~5825	<13dB

6.2 Configuration of Measurement



6.3 Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to UNII test procedure of Oct 2002 DA 02-2138 for compliance to FCC 47CFR 15.407 requirements.
The transmitter output operates continuously therefore 2nd trace of method#3 is used.
Peak excursion to average ratio was measured from the antenna port of the EUT.
Using a 50ohm spectrum analyzer with the RBW=VBW=1MHz for peak measurement and RBW=1MHz, VBW=10kHz for average measurement. Peak excursion to average ratio was read directly.

6.4 Test Result

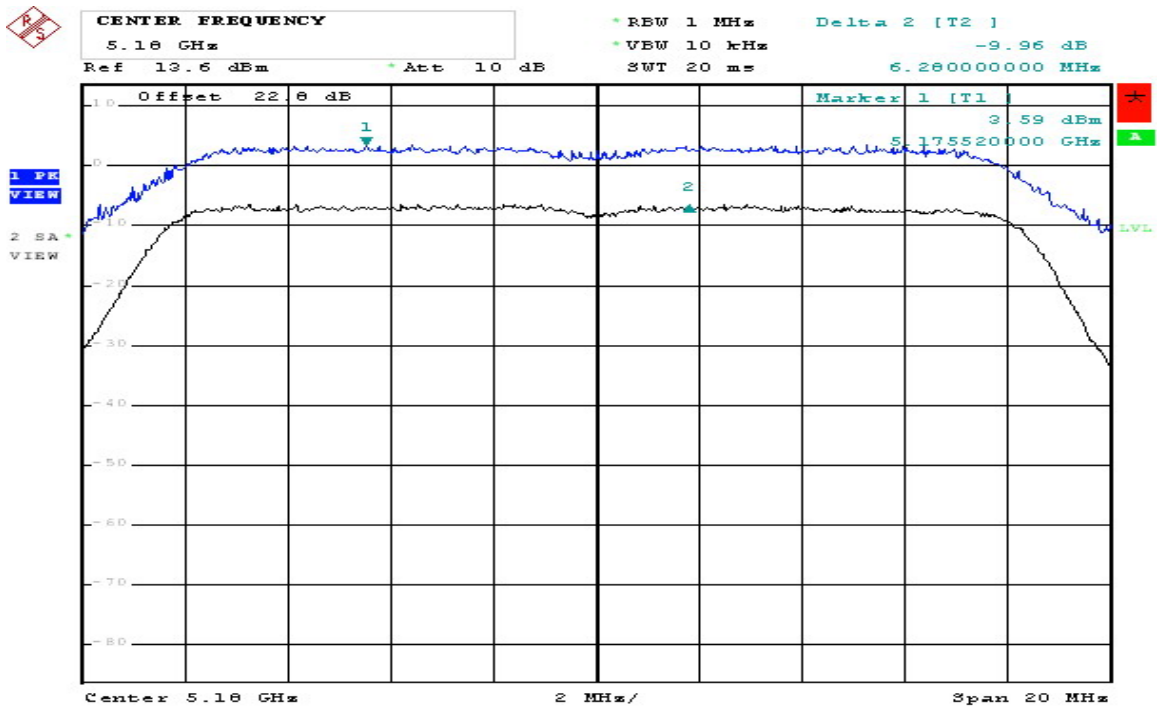
PASS.
The final test data is shown on as following pages.

Peak excursion to Average ratio

Test Mode：802.11a				
Test CH		PK excursion to Avg. ratio (dB)		Limit (dB)
CH No.	Freq. (MHz)	Module A	Module B	
36	5180	9.96	9.66	13
40	5200	10.77	9.85	13
48	5240	9.33	10.20	13

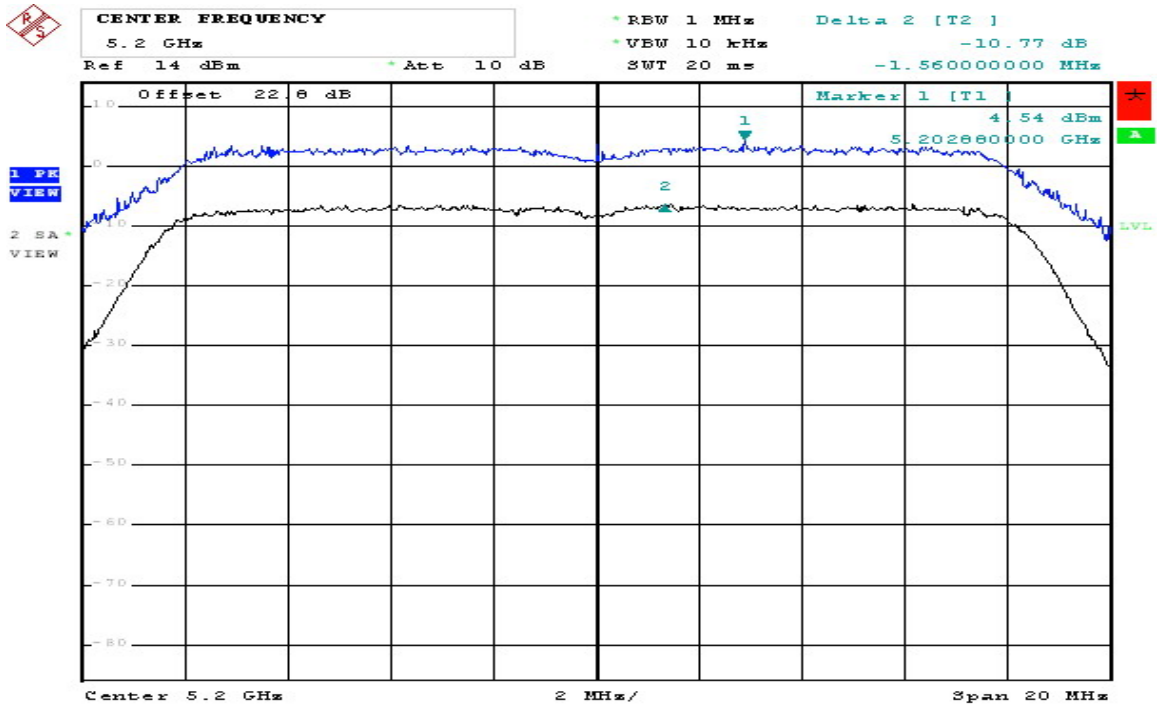
Peak excursion to Average ratio

802.11a CH36 5180MHz PK to AV Ratio (Module A)



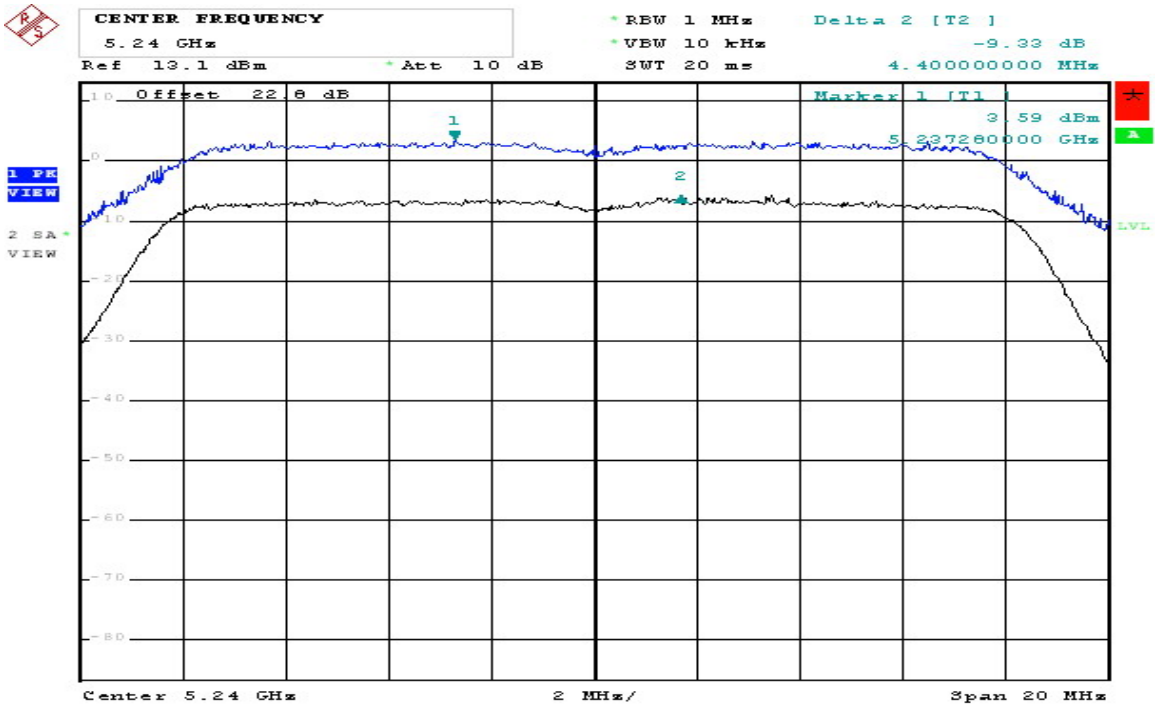
Comment: 802.11a 5180MHz
Date: 29.APR.2009 10:02:31

802.11a CH44 5200MHz PK to AV Ratio (Module A)



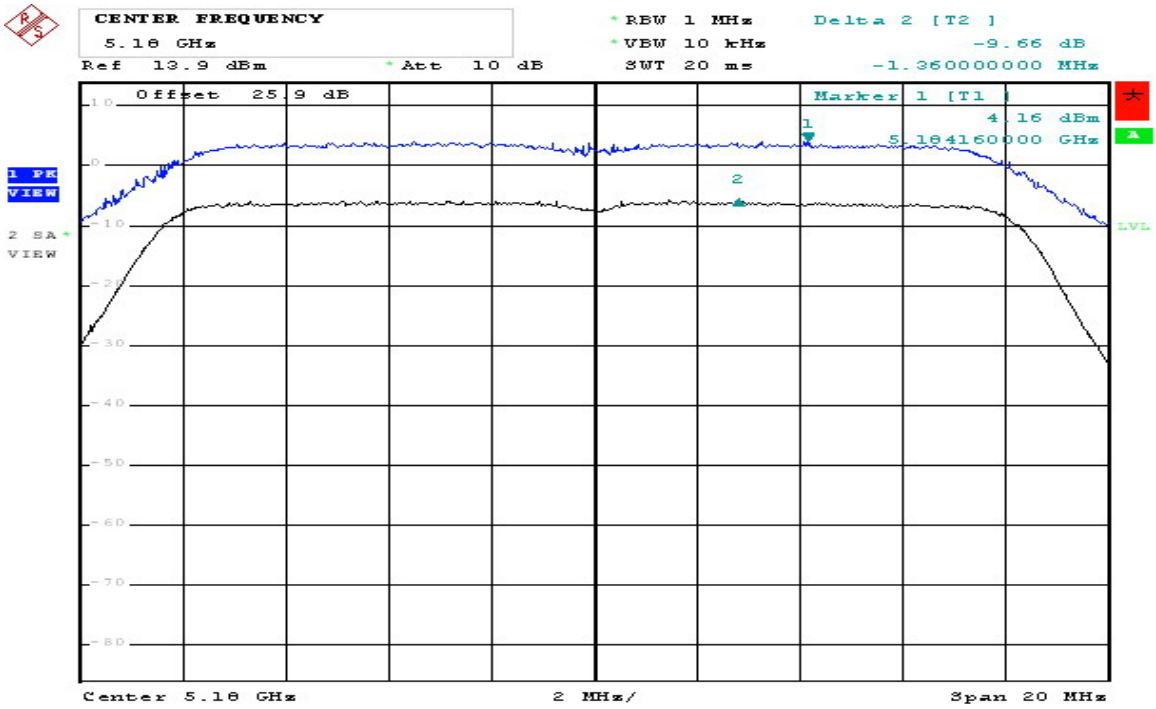
Comment: 802.11a 5200MHz
Date: 29.APR.2009 10:08:43

802.11a CH48 5240MHz PK to AV Ratio (Module A)



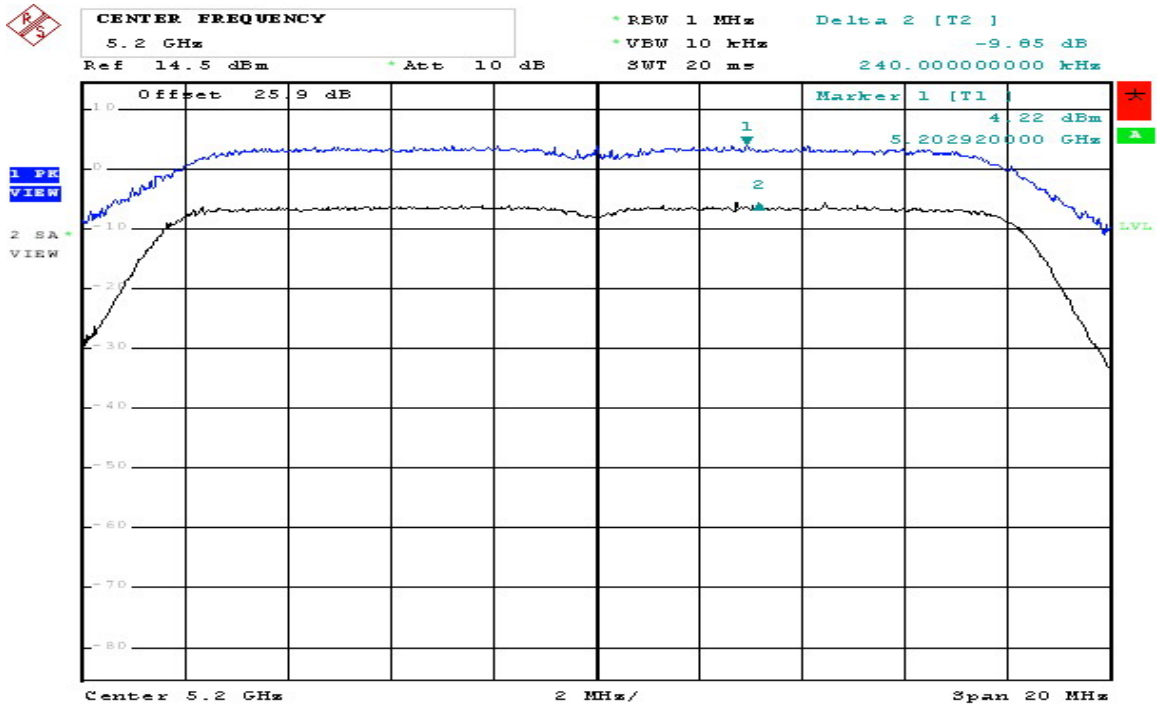
Comment: 802.11a 5240MHz
Date: 29.APR.2009 10:14:32

802.11a CH36 5180MHz PK to AV Ratio (Module B)



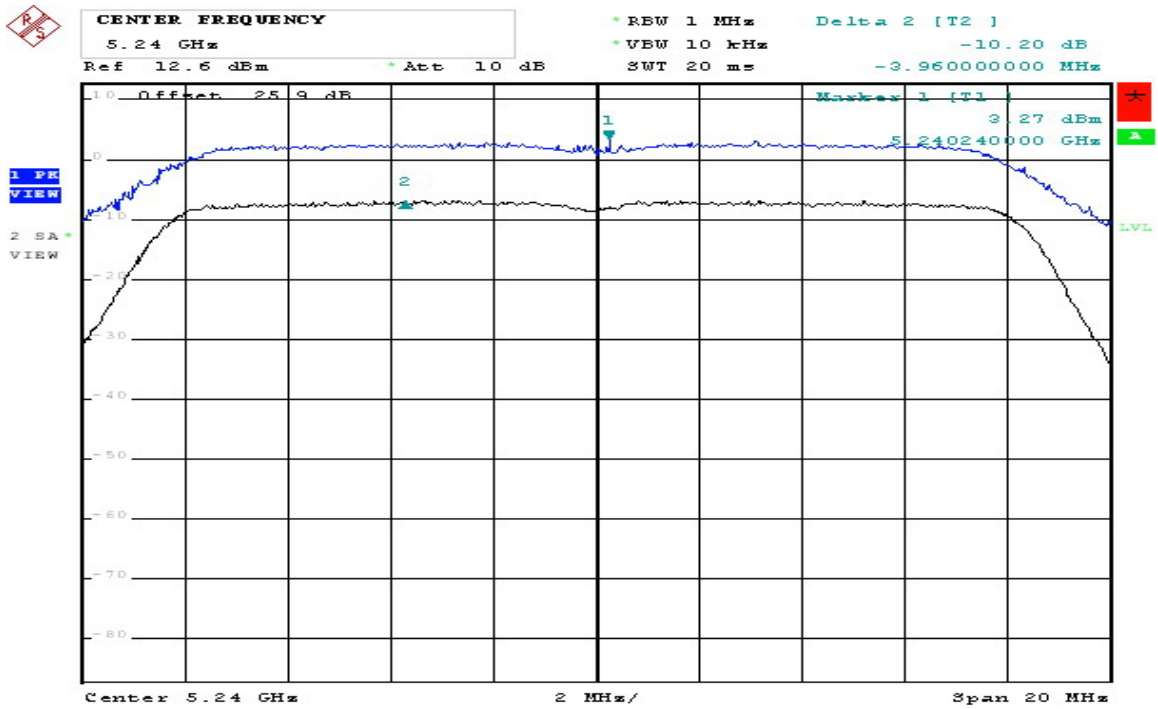
Comment: 802.11a 5180MHz
Date: 29.APR.2009 10:05:09

802.11a CH44 5200MHz PK to AV Ratio (Module B)



Comment: 802.11a 5200MHz
Date: 29.APR.2009 10:11:24

802.11a CH48 5240MHz PK to AV Ratio (Module B)



Comment: 802.11a 5240MHz
Date: 29.APR.2009 10:17:12

7 Radiated spurious emission test

7.1 Limits

According to FCC 15.407(b)(1) requirement, the radiated emission shall comply with the following limits.

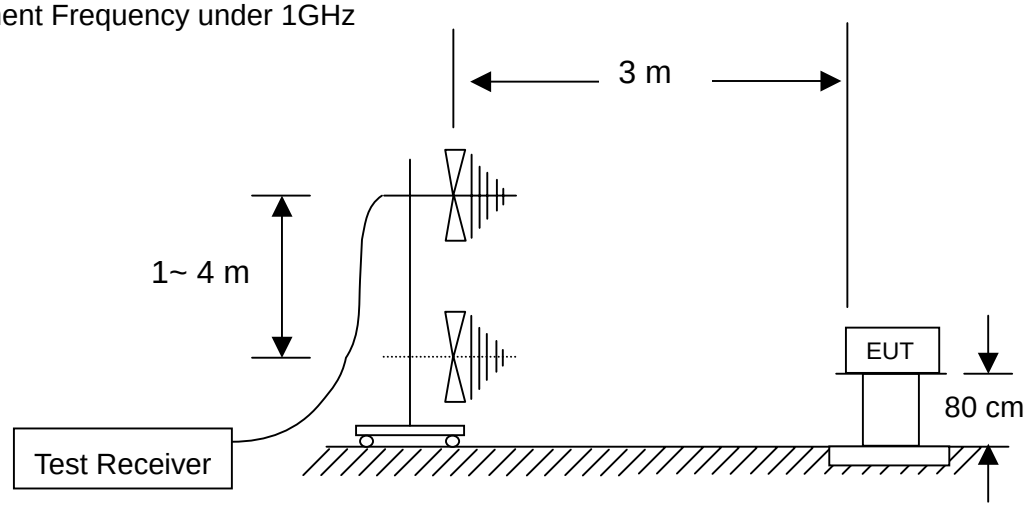
Operating Frequency (MHz)	Limit of Spurious Emissions	
	dBm / MHz EIRP	dB(μV/m) @3m
5150~5250	-27	68.3
5250~5350	-27	68.3
5725~5825	-27	68.3
	-17 (on ±10MHz range of Subscriber transmit channel block)	78.3

The radiated emission shall comply with §15.209(a).

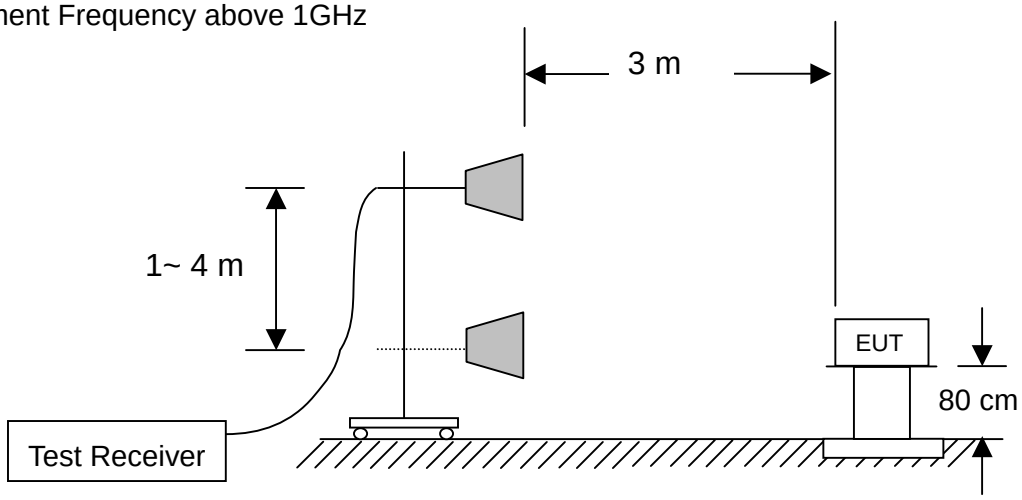
Frequency (MHz)	Field strength dB(μV/m)	Measurement distance (meters)
1.705~30.0	29.5	30
30 ~ 88	40	3
88~216	43.5	3
216~960	46	3
Above 960	54	3

7.2 Configuration of Measurement

Measurement Frequency under 1GHz



Measurement Frequency above 1GHz



7.3 Test Procedure

Radiated emission measurements were performed from 30MHz to 40GHz. Spectrum Analyzer Resolution Bandwidth is 100kHz or greater for frequencies 30MHz to 1GHz, 1MHz for frequencies above 1GHz.

The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meter and down to 1 meter.

7.4 Test Result

PASS.

The final test data is shown on as following pages.

Radiated spurious emission

Test Environment

Ambient temperature ： 25.0℃

Relative humidity ： 40%

Radiated Emission below 1GHz

After verifying RF modular A, B and Dual Transmit mode, the worst case is Dual Transmit mode.

Worst case: Dual Tx CH36								
Frequency (MHz)	Antenna Polarization	Reading (dB μ V)	Preamp (dB)	Correction Factor (dB/m)	Corrected Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Det. Mode
333.312	H	62.58	32.93	15.59	45.24	46.00	-0.76	QP
366.654	H	62.44	33.37	16.53	45.60	46.00	-0.40	QP
399.996	H	58.56	33.80	17.58	42.34	46.00	-3.66	QP
433.312	H	58.54	34.20	18.17	42.51	46.00	-3.49	QP
500.032	H	57.18	34.40	19.26	42.04	46.00	-3.96	QP
766.620	H	53.17	32.27	22.77	43.67	46.00	-2.33	QP
333.344	V	55.09	32.93	15.59	37.75	43.50	-5.75	QP
366.664	V	57.95	33.37	16.53	41.11	46.00	-4.89	QP
400.004	V	52.26	33.80	17.58	36.04	43.50	-7.46	QP
433.328	V	51.82	34.20	18.17	35.79	46.00	-10.21	QP
499.984	V	58.28	34.40	19.26	43.14	46.00	-2.86	QP
766.608	V	50.95	32.27	22.77	41.45	46.00	-4.55	QP

Remark ： Corrected Level = Reading + Correction Factor – Preamp
Correction Factor = Antenna Factor + Cable Loss
The present spurious only show those points are above noise level and the frequency range test from 30MHz to 1GHz.

Radiated spurious emission

Radiated Emission above 1GHz

After verifying RF modular A, B and Dual Transmit mode, the worst case is Dual Transmit mode.

Worst case: Dual Tx CH36								
Frequency (MHz)	Antenna Polarization	Reading (dBμV)	Preamp (dB)	Corrected Factor (dB/m)	Corrected Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Det Mode
*10360	H	45.79	36.57	47.30	56.52	74.0	-17.48	PK
*10360	H	31.82	36.57	47.30	42.55	54.0	-11.45	AV
*15540	H	52.41	62.20	46.87	37.08	54.0	-16.92	PK
*20720	H	55.74	59.23	43.83	40.34	54.0	-13.66	PK
*25900	H	56.30	51.79	46.44	50.95	54.0	-3.05	PK
*31080	H	27.33	25.64	47.88	49.57	54.0	-4.43	PK
*36260	H	33.04	24.74	49.46	57.76	74.0	-16.24	PK
*36260	H	19.67	24.74	49.46	44.39	54.0	-9.61	AV
*10360	V	46.81	36.57	47.30	57.54	74.0	-16.46	PK
*10360	V	32.65	36.57	47.30	43.38	54.0	-10.62	AV
*15540	V	53.01	62.20	46.87	37.68	54.0	-16.32	PK
*20720	V	59.34	59.23	43.83	43.94	54.0	-10.06	PK
*25900	V	56.36	51.79	46.44	51.01	54.0	-2.99	PK
*31080	V	27.68	25.64	47.88	49.92	54.0	-4.08	PK
*36260	V	34.51	24.74	49.46	59.23	74.0	-14.77	PK
*36260	V	21.68	24.74	49.46	46.40	54.0	-7.60	AV

Remark ： Corrected Level = Reading + Correction Factor – Preamp
Correction Factor = Antenna Factor + Cable Loss
* Mark indicated background noise level.

Worst case: Dual Tx CH40								
Frequency (MHz)	Antenna Polarization	Reading (dBμV)	Preamp (dB)	Corrected Factor (dB/m)	Corrected Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Det Mode
*10440	H	45.83	36.52	47.41	56.72	74.0	-17.28	PK
*10440	H	31.84	36.52	47.41	42.73	54.0	-11.27	AV
*15600	H	53.66	62.19	46.96	38.43	54.0	-15.57	PK
*20800	H	53.28	59.00	44.07	38.35	54.0	-15.65	PK
*26000	H	54.36	51.25	46.38	49.49	54.0	-4.51	PK
*31200	H	31.54	25.54	47.86	53.86	74.0	-20.14	PK
*31200	H	19.64	25.54	47.86	41.96	54.0	-12.04	AV
*36400	H	33.28	24.54	49.66	58.40	74.0	-15.60	PK
*36400	H	20.94	24.54	49.66	46.06	54.0	-7.94	AV
*10440	V	46.43	36.52	47.41	57.32	74.0	-16.68	PK
*10440	V	32.17	36.52	47.41	43.06	54.0	-10.94	AV
*15600	V	54.68	62.19	46.96	39.45	54.0	-14.55	PK
*20800	V	54.32	59.00	44.07	39.39	54.0	-14.61	PK
*26000	V	54.21	51.25	46.38	49.34	54.0	-4.66	PK
*31200	V	31.49	25.54	47.86	53.81	74.0	-20.19	PK
*31200	V	19.68	25.54	47.86	42.00	54.0	-12.00	AV
*36400	V	34.17	24.54	49.66	59.29	74.0	-14.71	PK
*36400	V	22.71	24.54	49.66	47.83	54.0	-6.17	AV

Remark ： Corrected Level = Reading + Correction Factor – Preamp
Correction Factor = Antenna Factor + Cable Loss
* Mark indicated background noise level.

Worst case: Dual Tx CH48								
Frequency (MHz)	Antenna Polarization	Reading (dBμV)	Preamp (dB)	Corrected Factor (dB/m)	Corrected Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Det Mode
*10480	H	46.14	36.42	47.60	57.32	74.0	-16.68	PK
*10480	H	32.13	36.42	47.60	43.31	54.0	-10.69	AV
*15720	H	53.67	62.15	47.15	38.67	54.0	-15.33	PK
*20960	H	55.69	51.79	46.44	50.34	54.0	-3.66	PK
*26200	H	54.07	51.25	46.36	49.18	54.0	-4.82	PK
*31440	H	30.98	25.35	47.81	53.44	74.0	-20.56	PK
*31440	H	17.44	25.35	47.81	39.90	54.0	-14.10	AV
*36680	H	34.59	24.15	49.62	60.06	74.0	-13.94	PK
*36680	H	21.65	24.15	49.62	47.12	54.0	-6.88	AV
*10480	V	47.05	36.42	47.60	58.23	74.0	-15.77	PK
*10480	V	32.06	36.42	47.60	43.24	54.0	-10.76	AV
*15720	V	54.61	62.15	47.15	39.61	54.0	-14.39	PK
*20960	V	57.43	51.79	46.44	52.08	54.0	-1.92	PK
*26200	V	55.32	51.25	47.81	51.88	54.0	-2.12	PK
*31440	V	31.12	25.35	47.81	53.58	74.0	-20.42	PK
*31440	V	18.07	25.35	47.81	40.53	54.0	-13.47	AV
*36680	V	35.54	24.15	49.62	61.01	74.0	-12.99	PK
*36680	V	21.47	24.15	49.62	46.94	54.0	-7.06	AV

Remark ： Corrected Level = Reading + Correction Factor – Preamp
Correction Factor = Antenna Factor + Cable Loss
* Mark indicated background noise level.

8 Band edge test

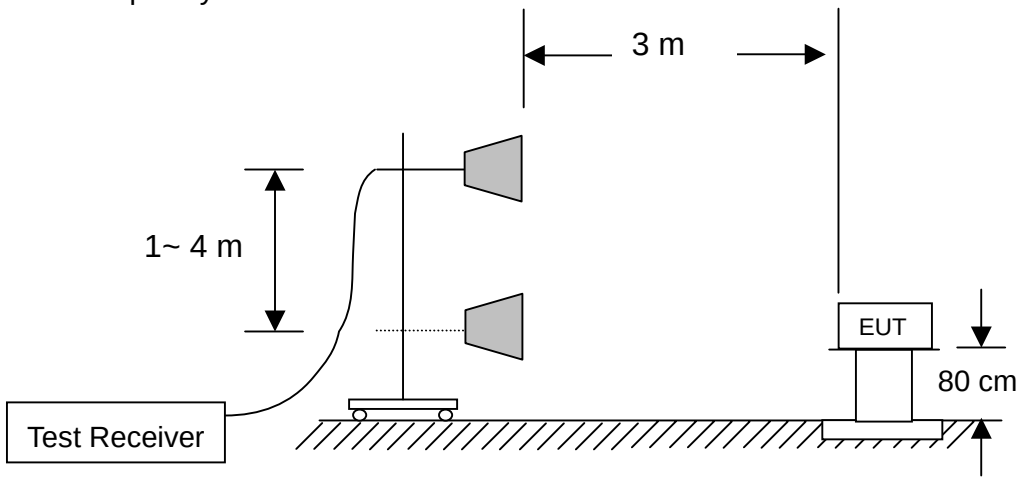
8.1 Limit

According to FCC Part 15.205 requirement：

Any radiated emission in the restricted bands shall be complied with the limits in 15.209.

8.2 Configuration of Measurement

Measurement Frequency above 1GHz



8.3 Test Procedure

Set RBW =1M, VBW= RBW for peak, and VBW=10Hz for average.

The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to present worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

8.4 Test Result

PASS.

The final test data is shown on as following pages.

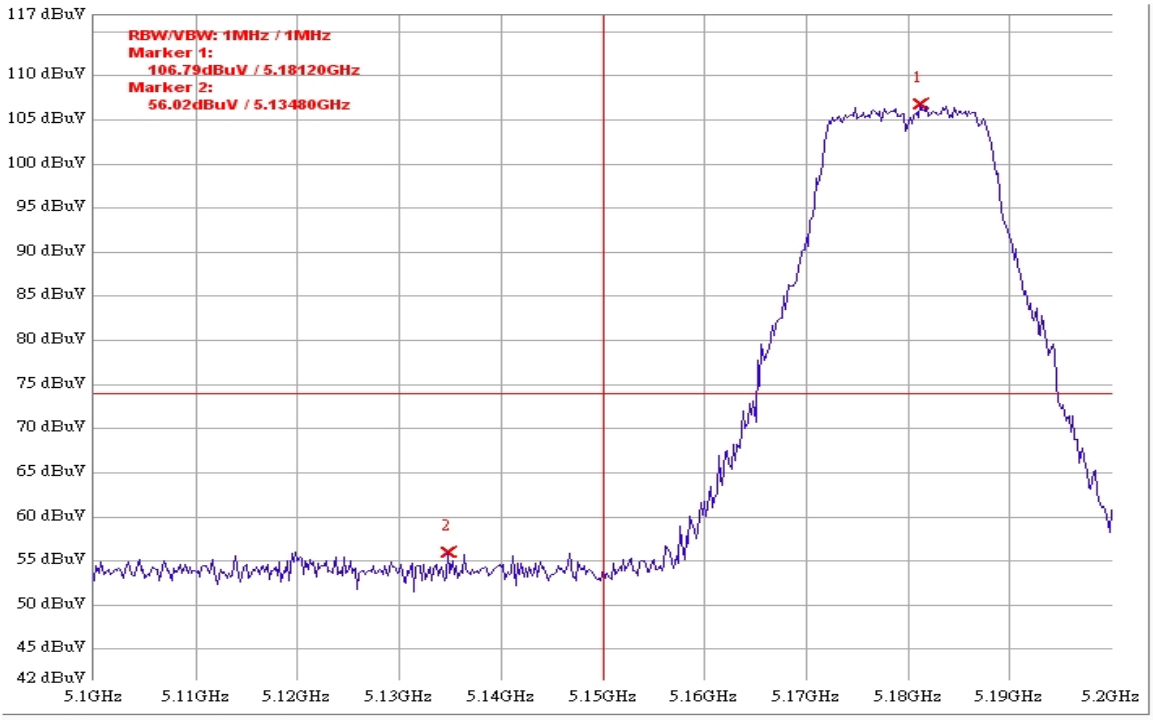
Band edge test

After verifying RF modular A, B and Dual Transmit mode, the worst case is Dual Transmit mode.

802.11a					
CH	**Restricted Band (MHz)**	**Maximum Level (dBμV/m)**	**Limit (dBm)**	**Margin (dB)**	**Detector Mode**
36	4500~5150	56.02	74	-17.98	PK
		45.49	54	-8.51	AV

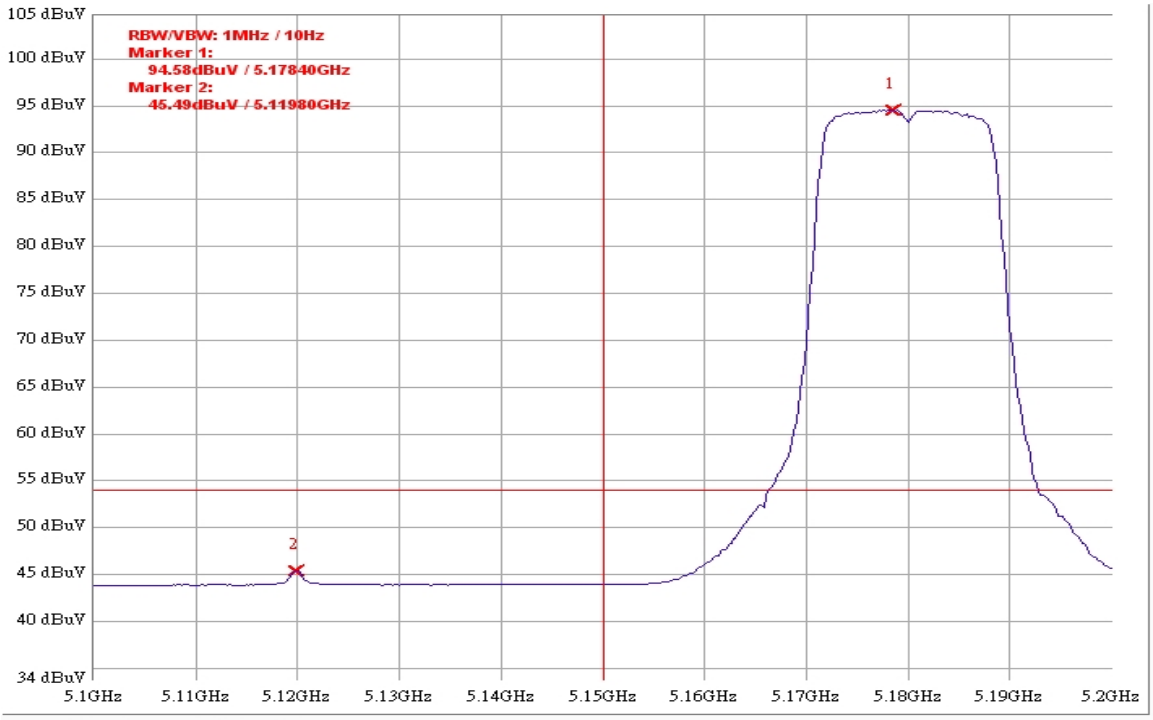
Band edge test

802.11a CH36 5180MHz PK



Band Edge_802.11a_5180MHz_PK

802.11a CH36 5180MHz AV



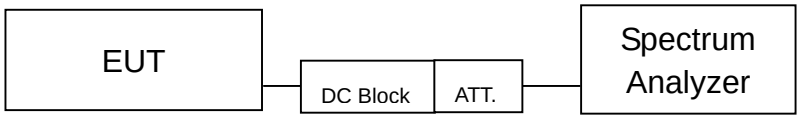
Band Edge_802.11a_5180MHz_AV

9 RF antenna conducted spurious emission test

9.1 Limits

Operating Frequency (MHz)	Limit (dBm / MHz EIRP)
5150~5250	-27
5250~5350	-27
5725~5825	-27 (Subscriber transmit channel block -17dBm/MHz on ±10MHz range)

9.2 Configuration of Measurement



9.3 Test Procedure

The measurements were performed from 30MHz to 10th harmonic or 40GHz. RF antenna conducted per 15.407(b) was measured from the EUT antenna port.

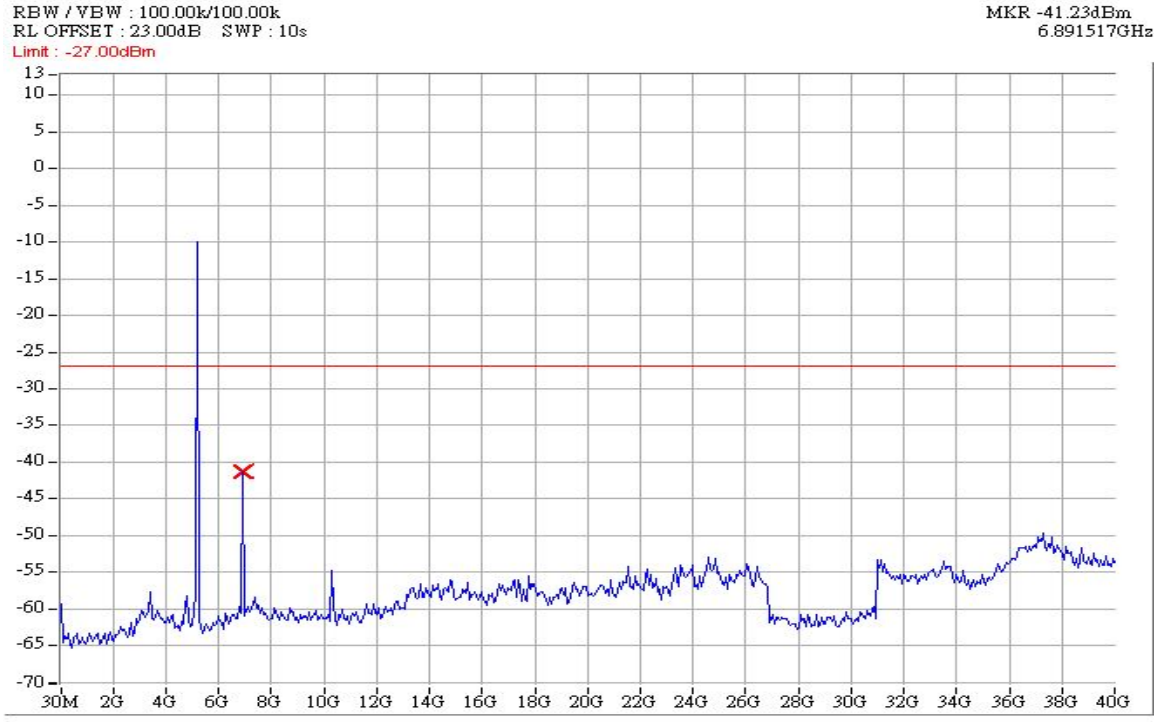
9.4 Test Result

PASS.

The final test data is shown on as following pages.

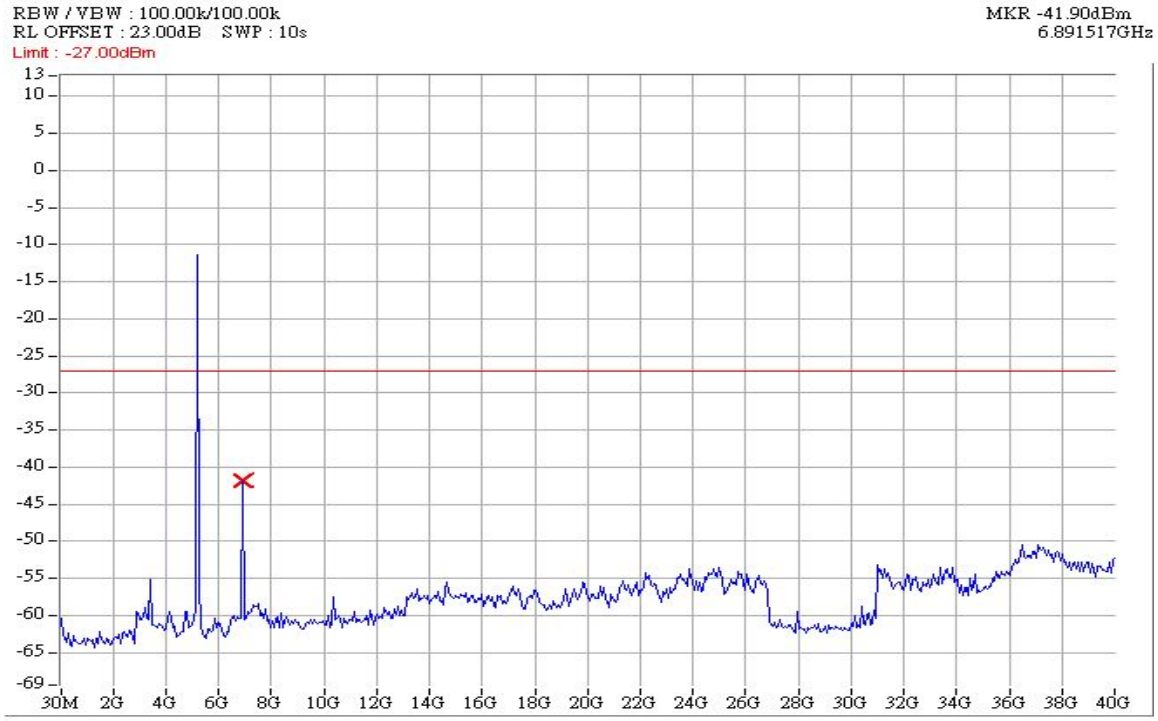
Conducted spurious emission

802.11a CH36 5180MHz (Module A)



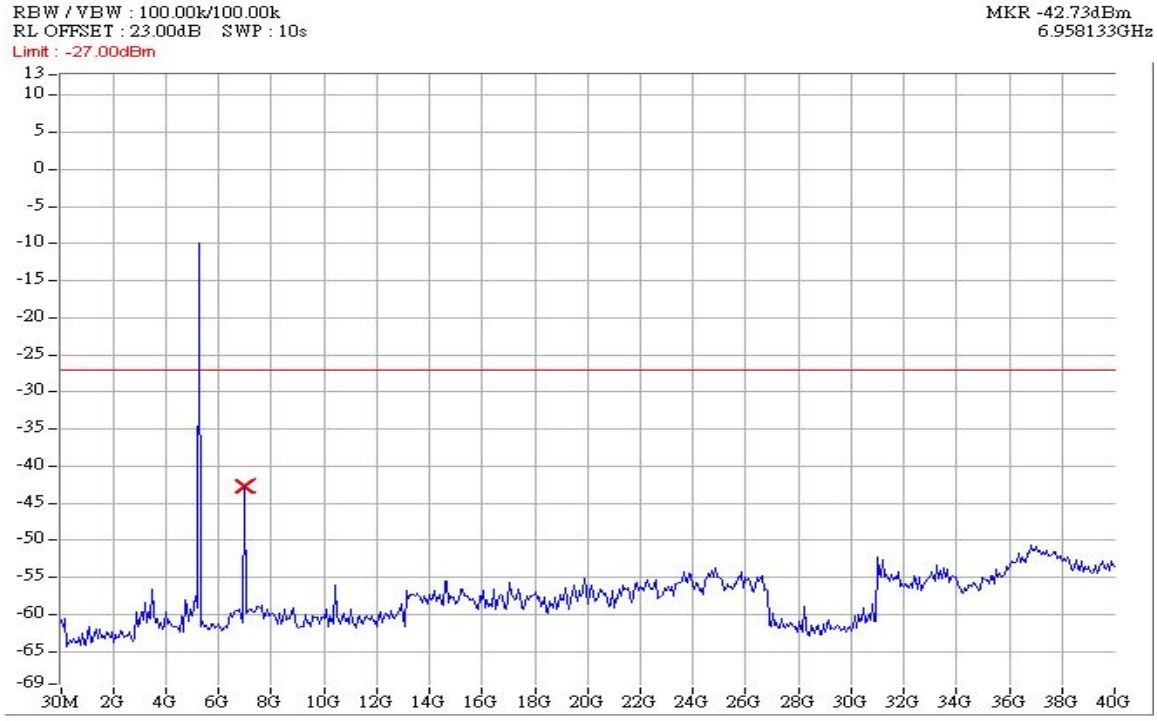
802.11a Conducted Spurious 5180MHz

802.11a CH44 5200MHz (Module A)



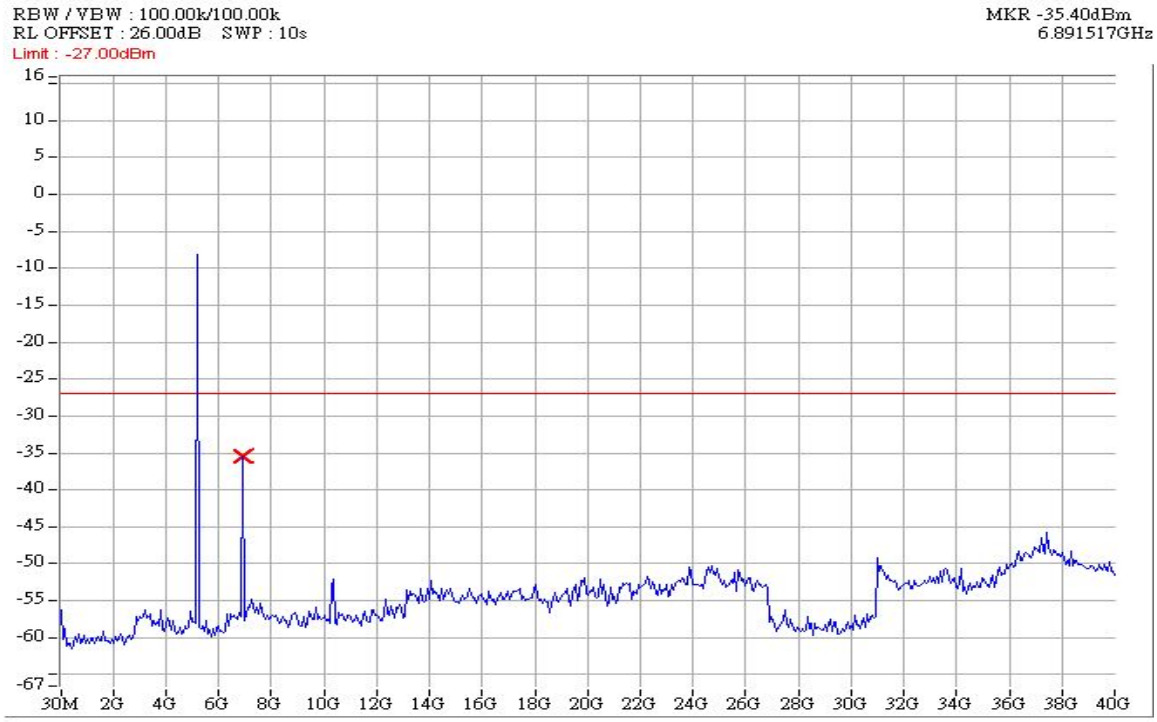
802.11a Conducted Spurious 5200MHz

802.11 a CH48 5240MHz (Module A)



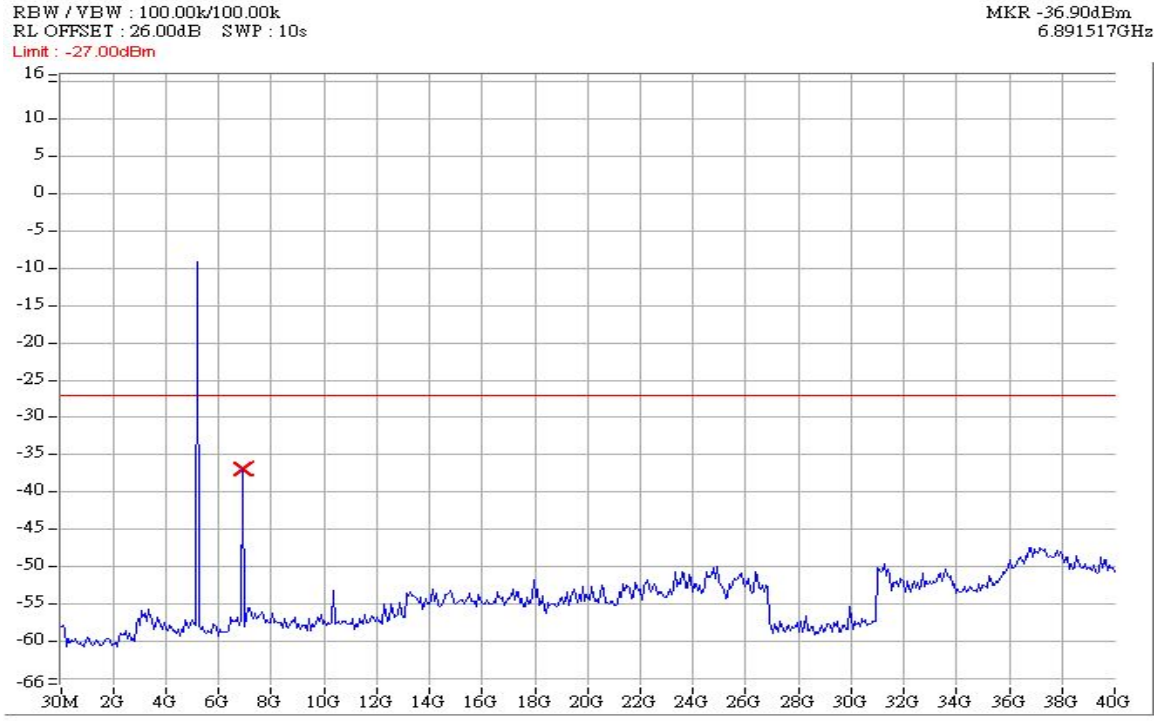
802.11a Conducted Spurious 5240MHz

802.11a CH36 5180MHz (Module B)



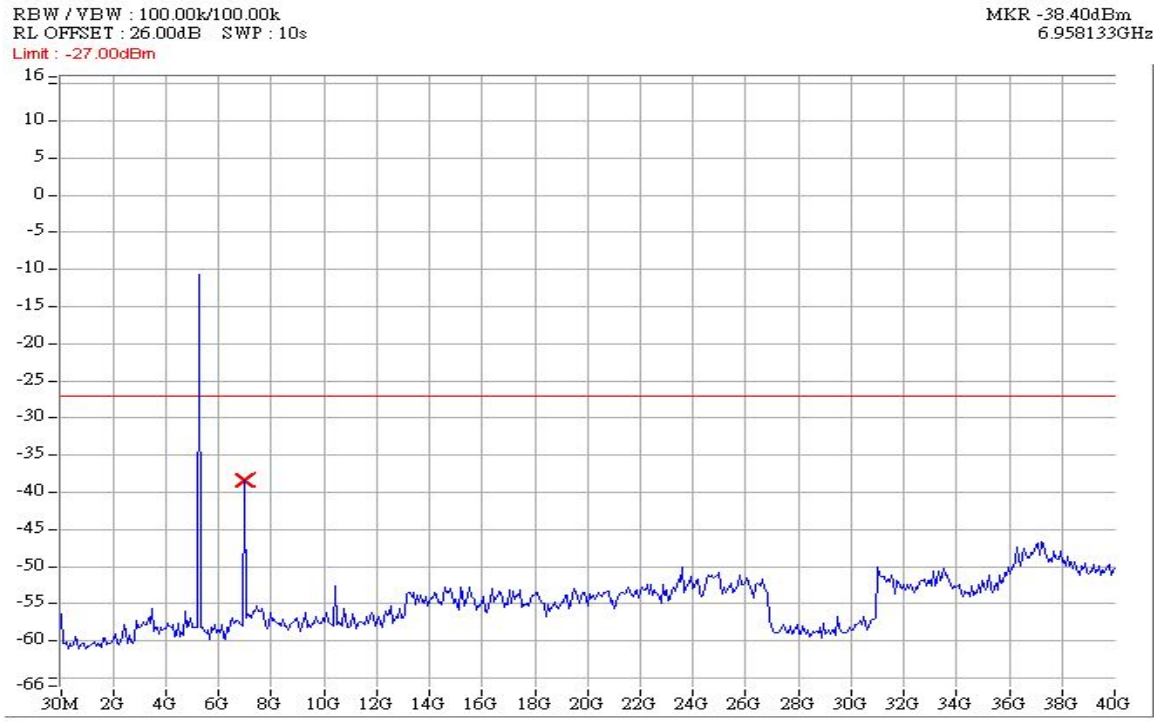
802.11a Conducted Spurious 5180MHz

802.11a CH44 5200MHz (Module B)



802.11a Conducted Spurious 5200MHz

802.11 a CH48 5240MHz (Module B)



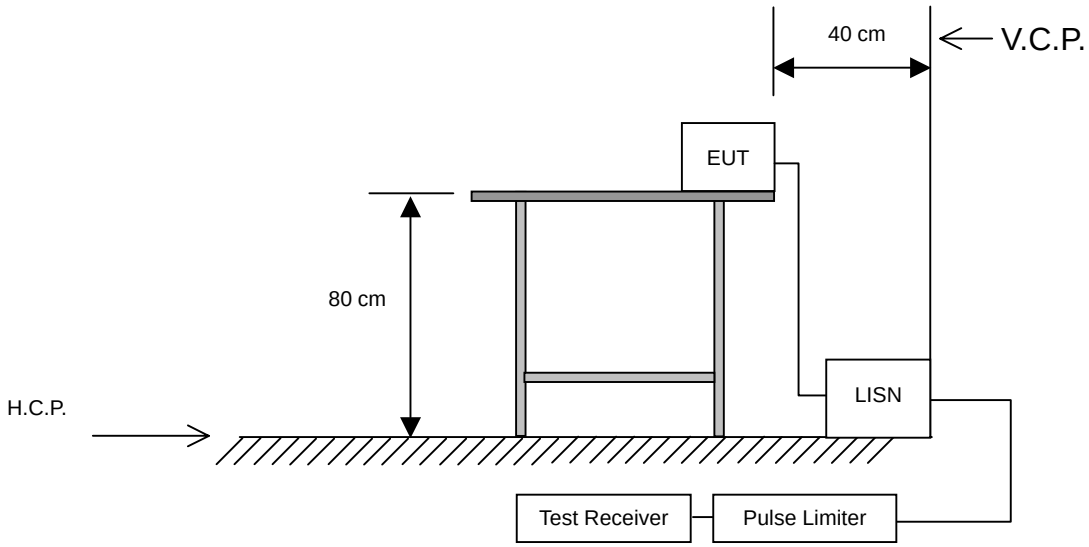
802.11a Conducted Spurious 5240MHz

10 AC Power Line Conducted Emission test

10.1 Limits

Frequency (MHz)	Quasi-Peak (dB μV)	Average (dB μV)
0.15 to 0.5	66 to 56	56 to 46
> 0.5 to 5	56	46
> 5 to 30	60	50
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

10.2 Configuration of Measurement



10.3 Test Procedures

10.3.1 The EUT was placed 80cm height above ground on a non-conductive table and vertical conducting plane located 40cm to the rear of the EUT.

10.3.2 The EUT was connected to the main power through Line Impedance Stabilization Networks (LISN). This setup provided a 50ohm/50mH coupling impedance for the measuring equipment. The auxiliary equipment will place in secondary LISN.

10.3.3 Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/2003 on conducted measurement.

10.4 Test Result

PASS.

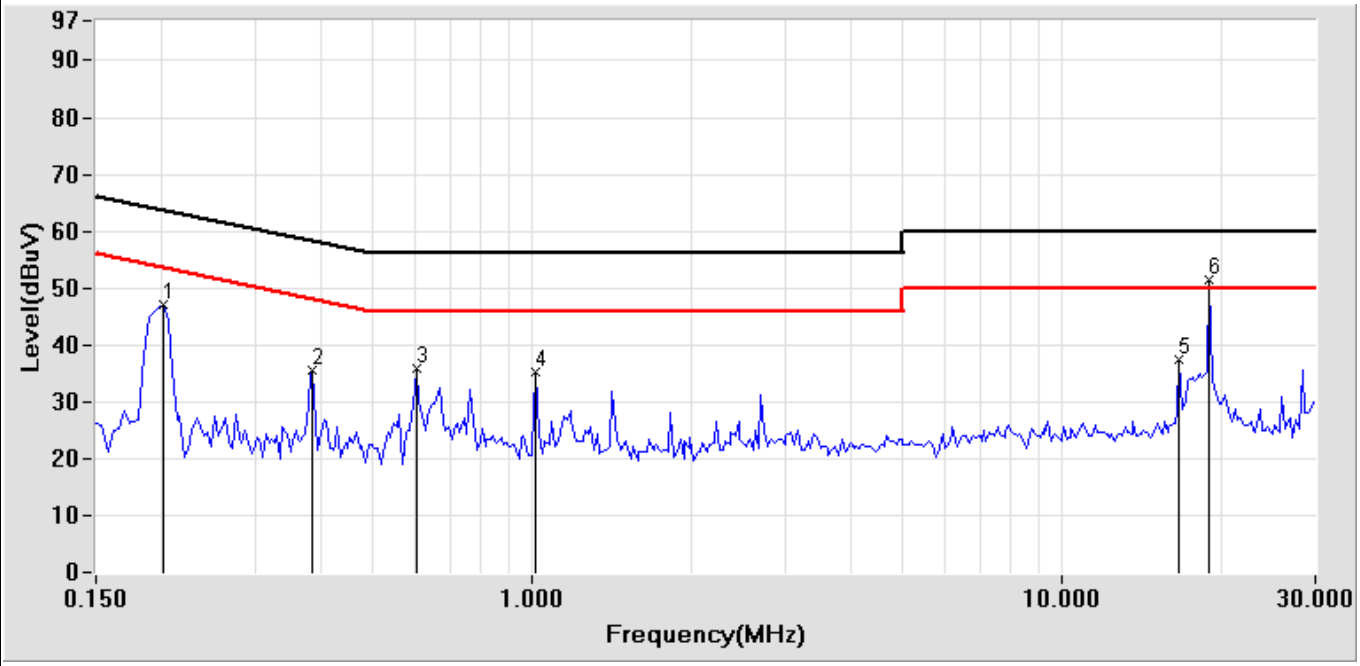
The final test data is shown on as following pages.

Power Line Conducted Test Data

EUT: Industrial IEEE 802.11a/b/g Dual-RF AP/Bridge/Client	POLARITY: Line
CLIENT: MOXA	DISTANCE:
MODEL: AWK-5222	Serial No.:
RATING: DC 12V	FILE/DATA#: MOXA.emi/61
Temperature: 25.0 ℃	OPERATOR: Terry
Humidity: 68 %	TEST SITE: Conduction1

Frequency	Factor	Meter Reading (dBµV)		Emission Level (dBµV)		Limits (dBµV)		Margin (dB)	
(MHz)	(dB)	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
0.201	0.15	45.70	46.22	45.85	46.37	63.57	53.57	-17.72	-7.20
0.384	0.17	34.23	34.15	34.40	34.32	58.19	48.19	-23.79	-13.87
0.603	0.11	34.80	34.27	34.91	34.38	56.00	46.00	-21.09	-11.62
1.009	0.12	34.61	34.68	34.73	34.80	56.00	46.00	-21.27	-11.20
16.541	0.74	36.68	34.20	37.42	34.94	60.00	50.00	-22.58	-15.06
18.912	0.81	49.90	49.00	50.71	49.81	60.00	50.00	-9.29	-0.19

Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



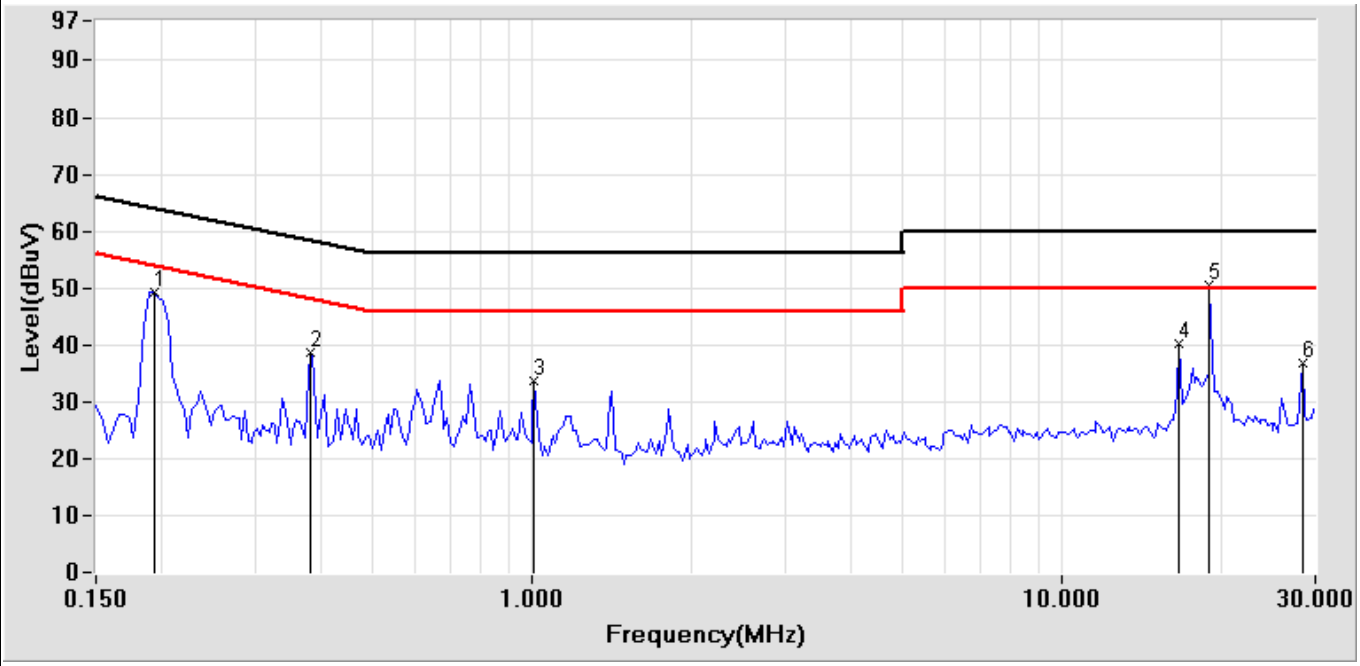
Test Mode: Working Mode

Power Line Conducted Test Data

EUT: Industrial IEEE 802.11a/b/g Dual-RF AP/Bridge/Client	POLARITY: Neutral
CLIENT: MOXA	DISTANCE:
MODEL: AWK-5222	Serial No.:
RATING: DC 12V	FILE/DATA#: MOXA.emi/60
Temperature: 25.0 ℃	OPERATOR: Terry
Humidity: 68 %	TEST SITE: Conduction1

Frequency	Factor	Meter Reading (dBµV)		Emission Level (dBµV)		Limits (dBµV)		Margin (dB)	
(MHz)	(dB)	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
0.193	0.16	48.20	48.10	48.36	48.26	63.91	53.91	-15.55	-5.65
0.380	0.18	37.43	37.40	37.61	37.58	58.28	48.28	-20.67	-10.70
1.005	0.13	32.17	31.99	32.30	32.12	56.00	46.00	-23.70	-13.88
16.552	0.84	38.40	34.94	39.24	35.78	60.00	50.00	-20.76	-14.22
18.892	0.92	49.10	48.30	50.02	49.22	60.00	50.00	-9.98	-0.78
28.373	1.16	34.41	31.09	35.57	32.25	60.00	50.00	-24.43	-17.75

Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



Test Mode: Working Mode